

2010



# SERVICE MANUAL

**VFR1200F**



# How To Use This Manual

This manual describes the service procedures for the VFR1200F.

Follow the Maintenance Schedule (Section 4) recommendations to ensure that the vehicle is in peak operating condition and the emission levels are within the standards set by the U.S. Environmental Protection Agency (EPA) and California Air Resources Board (CARB) and Transport Canada.

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

Sections 1 and 4 apply to the whole vehicle. Section 3 illustrates procedures for removal/installation of components that may be required to perform service described in the following sections.

Section 5 through 22 describe parts of the motorcycle, grouped according to location.

Find the section you want on this page, then turn to the table of contents on 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 are not familiar with this motorcycle, read Technical Feature in section 2.

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

Your safety, and the safety of others, is very important. To help you make informed decisions we have provided safety messages and other information throughout this manual. Of course, it is not practical or possible to warn you about all the hazards associated with servicing this vehicle.

You must use your own good judgement.

You will find important safety information in a variety of forms including:

- Safety Labels – on the vehicle
- Safety Messages – preceded by a safety alert symbol  and one of three signal words, DANGER, WARNING, or CAUTION.

These signal words mean:

**▲ DANGER** You WILL be KILLED or SERIOUSLY HURT if you don't follow instructions.

**▲ WARNING** You CAN be KILLED or SERIOUSLY HURT if you don't follow instructions.

**▲ CAUTION** You CAN be HURT if you don't follow instructions.












- Instructions – how to service this vehicle correctly and safely.

As you read this manual, you will find information that is preceded by a **NOTICE** symbol. The purpose of this message is to help prevent damage to your vehicle, other property, or the environment.

## HOW TO USE THIS MANUAL

### SYMBOLS

The symbols used throughout this manual show specific service procedures. If supplementary information is required pertaining to these symbols, it would be explained specifically in the text without the use of the symbols.

	Replace the part(s) with new one(s) before assembly.
	Use the recommend engine oil, unless otherwise specified.
	Use molybdenum oil solution (mixture of the engine oil and molybdenum grease in a ratio of 1:1).
	Use multi-purpose grease (lithium based multi-purpose grease NLGI #2 or equivalent).
	Use molybdenum disulfide grease (containing more than 3% molybdenum disulfide, NOGI #2 or equivalent). Example: <ul style="list-style-type: none"><li>• Molykote® BR-2 plus manufactured by Dow Corning U.S.A.</li><li>• Multi-purpose M-2 manufactured by Mitsubishi Oil, Japan</li></ul>
	Use molybdenum disulfide paste (containing more than 40% molybdenum disulfide, NOGI #2 or equivalent). Example: <ul style="list-style-type: none"><li>• Molykote® G-n Paste manufactured by Dow Corning U.S.A.</li><li>• Honda Moly 60 (U.S.A. only)</li><li>• Rocol ASP manufactured by Rocol Limited, U.K.</li><li>• Rocol Paste manufactured by Sumico Lubricant, Japan</li></ul>
	Use silicone grease.
	Apply a locking agent. Use a medium strength locking agent unless otherwise specified.
	Apply sealant.
	Use DOT 4 brake fluid. Use the recommended brake fluid unless otherwise specified.
	Use fork or suspension fluid.

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# MEMO

# 1. GENERAL INFORMATION

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## GENERAL INFORMATION

### SERVICE RULES

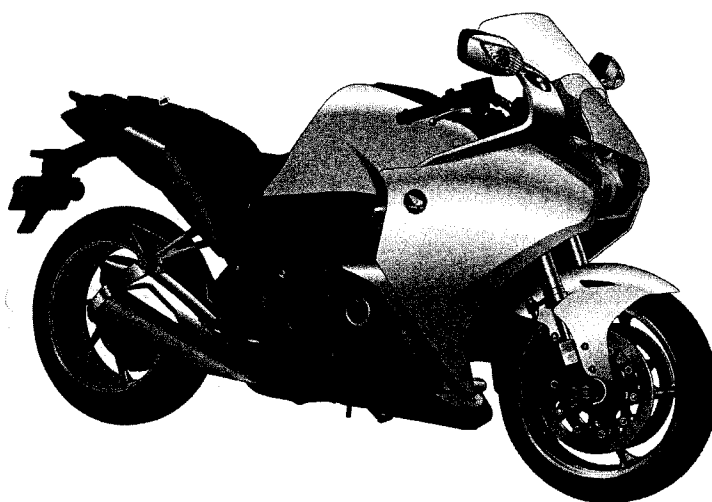
1. Use Honda genuine or Honda-recommended parts and lubricants or their equivalents. Parts that don't meet Honda's design specifications may cause damage to the motorcycle.
2. Use the special tools designed for this product to avoid damage and incorrect assembly.
3. Use only metric tools when servicing the motorcycle. Metric bolts, nuts and screws are not interchangeable with English fasteners.
4. Install new gaskets, O-rings, cotter pins, and lock plates when reassembling.
5. When tightening bolts or nuts, begin with the larger diameter or inner 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 in the Cable and Harness Routing (page 1-22).
9. Do not bend or twist control cables. Damaged control cables will not operates smoothly and may stick or bind.

### ABBREVIATION

Throughout this manual, the following abbreviations are used to identify the respective parts or systems.

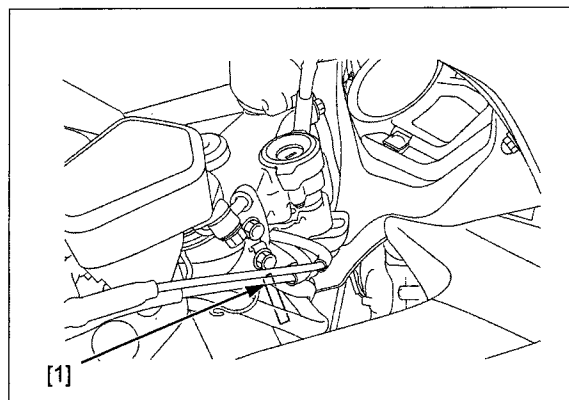
Abbrev. term	Full term
PGM-FI	Programmed Fuel Injection
MAP sensor	Manifold Absolute Pressure sensor
ECT sensor	Engine Coolant Temperature sensor
IAT sensor	Intake Air Temperature sensor
CKP sensor	Crankshaft Position sensor
CMP sensor	Camshaft Position sensor
EOP sensor	Engine Oil Pressure sensor
VS sensor	Vehicle Speed sensor
ECV	Exhaust Control Valve
ECV POT	Exhaust Control Valve Potentiometer
EGCA	Exhaust Gas Control Actuator
ECM	Engine Control Module
EEPROM	Electrically Erasable Programmable Read Only Memory
DLC	Data Link Connector
SCS connector	Service Check Short connector
HDS	Honda Diagnostic System
DTC	Diagnostic Trouble Code
MIL	Malfunction Indicator Lamp
PAIR	Pulse Secondary Air Injection
EVAP	Evaporative Emission
TBW	Throttle by Wire
TCP sensor	Throttle Control Position sensor
TP sensor	Throttle Position sensor

## MODEL IDENTIFICATION

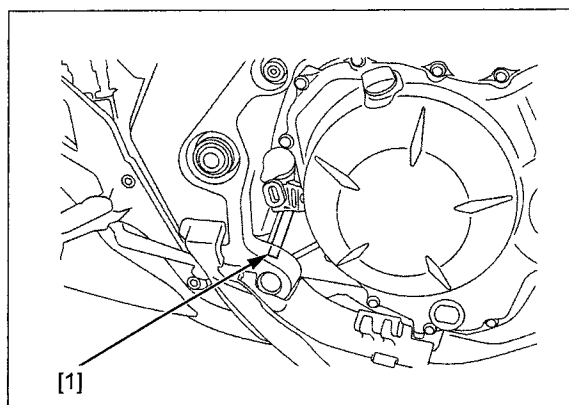


## SERIAL NUMBERS

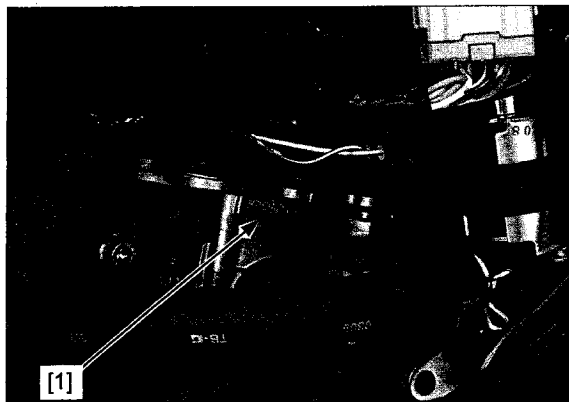
The Vehicle Identification Number (V.I.N) [1] is stamped on the right side of the steering head.



The engine serial number [1] is stamped on the right side of the lower crankcase.



The throttle body identification number [1] is stamped on the right side of the throttle body as shown.

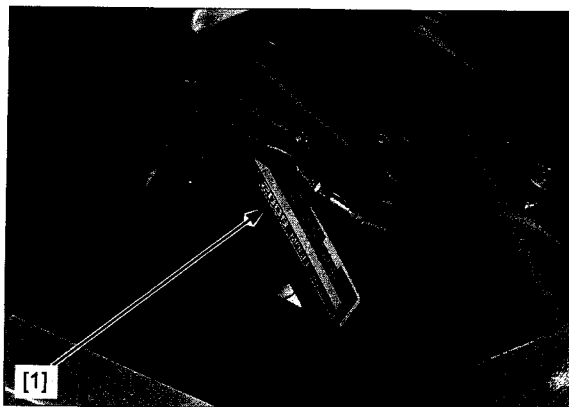




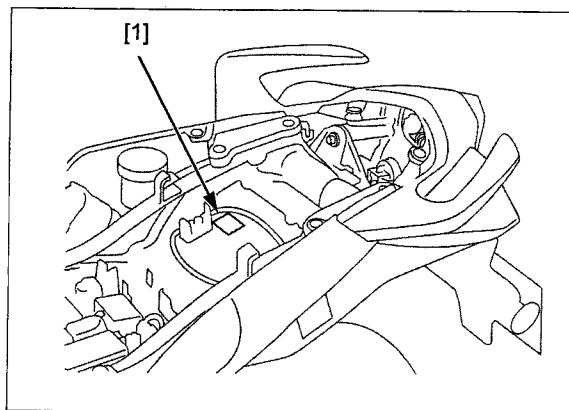
## GENERAL INFORMATION

### LABEL

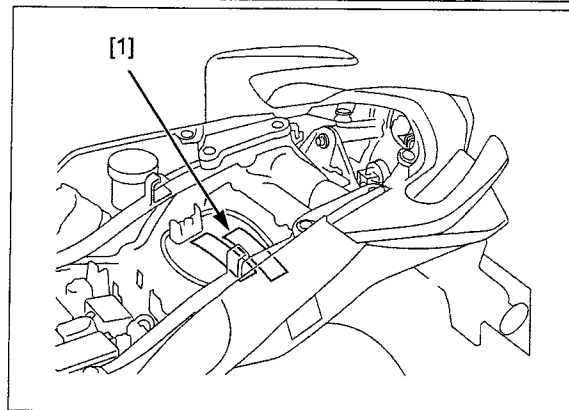
The Safety Certification Label [1] is located on left side of the frame.



The color label [1] is attached on the rear fender. When ordering color-coded parts, always specify the designated color code.



The Emission Control Information Label [1] is attached on the rear fender.



## GENERAL SPECIFICATIONS

ITEM		SPECIFICATIONS
DIMENSIONS	Overall length	2,250 mm (88.6 in)
	Overall width	755 mm (29.7 in)
	Overall height	1,220 mm (48.0 in)
	Wheelbase	1,545 mm (60.8 in)
	Seat height	810 mm (31.9 in)
	Footpeg height	362 mm (14.3 in)
	Ground clearance	125 mm (4.9 in)
	Curb weight	268 kg (591 lbs)
	Maximum weight capacity	196 kg (433 lbs)
FRAME	Frame type	Diamond
	Front suspension	Telescopic fork
	Front axle travel	108 mm (4.25 in)
	Rear suspension	Swingarm
	Rear axle travel	130 mm (5.12 in)
	Front tire size	120/70ZR17M/C(58W)
	Rear tire size	190/55ZR17M/C(75W)
	Front tire brand	BT021F N (Bridgestone)
		ROADSMART CQ K (Dunlop)
	Rear tire brand	BT021R N (Bridgestone)
		ROADSMART K (Dunlop)
	Front brake	Hydraulic double disc
	Rear brake	Hydraulic single disc
	Caster angle	25.5°
ENGINE	Trail length	101 mm (4.0 in)
	Fuel tank capacity	18.5 liter (4.89 US gal, 4.07 Imp gal)
	Cylinder arrangement	76° V
	Bore and stroke	81.0 X 60.0 mm (3.19 X 2.36 in)
	Displacement	1237 cm <sup>3</sup> (75.45 cu-in)
	Compression ratio	12.0 : 1
	Valve train	Chain driven, OHC
	Intake valve	
	opens	at 1 mm (0.04 in) lift
	closes	at 1 mm (0.04 in) lift
	Exhaust valve	
	opens	at 1 mm (0.04 in) lift
	closes	at 1 mm (0.04 in) lift
	Lubrication system	Forced pressure and wet sump
	Oil pump type	Trochoid
	Cooling system	Liquid cooled
	Air filtration	Paper filter
	Engine dry weight	88.8 kg (195.8 lbs)
	Firing order	1 - 2 - 4 - 3
FUEL DELIVERY SYSTEM	Type	PGM-FI (Programmed Fuel Injection)
	Throttle bore	44 mm (1.7 in)
DRIVE TRAIN	Clutch system	Multi-plate, wet
	Clutch operation system	Hydraulic operating
	Transmission	Constant mesh, 6-speeds
	Primary reduction	1.738 (73/42)
	Secondary reduction	
		Final driven side
		Side gear case side
	Final reduction	0.949 (37/39)
	Gear ratio	1.118 (19/17)
	1st	2.545 (28/11)
	2nd	2.600 (39/15)
	3rd	1.736 (33/19)
	4th	1.363 (30/22)
	5th	1.160 (29/25)
	6th	1.032 (32/31)
	Gearshift pattern	0.939 (31/33)
		Left foot operated return system,
		1 - N - 2 - 3 - 4 - 5 - 6



## GENERAL INFORMATION

ITEM		SPECIFICATIONS
ELECTRICAL	Ignition system	Computer-controlled digital transistorized with electric advance
	Starting system	Electric starter motor
	Charging system	Triple phase output alternator
	Regulator/rectifier	FET shorted/triple phase, full wave rectification
	Lighting system	Battery

## LUBRICATION SYSTEM SPECIFICATIONS

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Engine oil capacity	After draining		3.0 liter (3.2 US qt, 2.6 Imp qt)	—
	After draining/filter change		3.2 liter (3.4 US qt, 2.8 Imp qt)	—
	After disassembly		4.0 liter (4.2 US qt, 3.5 Imp qt)	—
Recommended engine oil			Pro Honda GN4 4-stroke oil (U.S.A. and Canada) or equivalent motor oil API service classification: SG or Higher JASO T903 standard: MA Viscosity: SAE 10W-30	—
Oil pressure (at oil filter cartridge)			100 kPa (1.0 kgf/cm <sup>2</sup> , 15 psi) at 1,100 rpm/(80°C/176°F)	—
Oil pump rotor	Feed pump	Tip clearance	0.15 (0.006)	0.20 (0.008)
		Body clearance	0.07 – 0.20 (0.003 – 0.010)	0.34 (0.013)
		Side clearance	0.04 – 0.09 (0.002 – 0.004)	0.12 (0.005)
	Scavenge pump	Tip clearance	0.15 (0.006)	0.20 (0.008)
		Body clearance	0.07 – 0.20 (0.003 – 0.010)	0.34 (0.013)
		Side clearance	0.04 – 0.09 (0.002 – 0.004)	0.12 (0.005)

## FUEL SYSTEM (PGM-FI) SPECIFICATIONS

ITEM	SPECIFICATIONS
Throttle body identification number	GNH0B
Idle speed	1,150 ± 100 min <sup>-1</sup> (rpm)
Throttle grip freeplay	2 – 4 mm (1/16 – 3/16 in)
IAT sensor resistance (at 20°C/68°F)	1 – 4 kΩ
ECT sensor resistance (at 20°C/68°F)	2.3 – 2.6 kΩ
Fuel injector resistance (at 20°C/68°F)	11.6 – 12.4 Ω
PAIR solenoid valve resistance (at 20°C/68°F)	23 – 27 Ω
CKP sensor peak voltage (at 20°C/68°F)	0.7 V minimum
Fuel pressure at idle	343 kPa (3.5 kgf/cm <sup>2</sup> , 50 psi)
Fuel pump flow (at 12V)	320 cm <sup>3</sup> (10.8 US oz, 11.3 Imp oz) minimum/10 seconds

## COOLING SYSTEM SPECIFICATIONS

ITEM		SPECIFICATIONS
Coolant capacity	Radiator and engine	3.6 liter (3.8 US qt, 3.2 Imp qt)
	Reserve tank	1.0 liter (1.1 US qt, 0.9 Imp qt)
Radiator cap relief pressure		108 – 137 kPa (1.1 – 1.4 kgf/cm <sup>2</sup> , 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
Recommended antifreeze		Pro Honda HP Coolant or an equivalent high quality ethylene glycol antifreeze containing silicate free corrosion inhibitors
Standard coolant concentration		50 % mixture with distilled water

## CYLINDER HEAD/VALVES SPECIFICATIONS

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Cylinder compression			1,600 kPa (16.32 kgf/cm <sup>2</sup> , 232 psi) at 300 rpm	—
Valve clearance	IN		0.16 ± 0.03 (0.006 ± 0.001)	—
	EX	Valve side	0.30 ± 0.02 (0.012 ± 0.001)	—
		Roller side	0.21 ± 0.02 (0.008 ± 0.001)	—
Camshaft	Cam lobe height	IN	37.12 – 37.20 (1.461 – 1.465)	37.10 (1.461)
		EX	34.86 – 34.94 (1.372 – 1.376)	34.84 (1.372)
	Runout		—	0.05 (0.002)
	Oil clearance		0.020 – 0.062 (0.0008 – 0.0024)	0.10 (0.004)
Valve lifter	Valve lifter O.D.		28.978 – 28.993 (1.1409 – 1.1415)	28.97 (1.141)
	Valve lifter bore I.D.		29.010 – 29.026 (1.1421 – 1.1428)	29.04 (1.143)
Valve, valve guide	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/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)	0.075 (0.0030)
		EX	0.020 – 0.047 (0.0008 – 0.0019)	0.085 (0.0033)
	Valve guide projection above cylinder head	IN	13.40 – 13.70 (0.528 – 0.539)	—
		EX	22.50 – 22.80 (0.886 – 0.898)	—
	Valve seat width		IN/EX	0.90 – 1.10 (0.035 – 0.043)
Valve spring free length	IN	Outer	37.06 (1.459)	36.30 (1.429)
		Inner	33.24 (1.309)	32.50 (1.280)
	EX		43.01 (1.693)	42.30 (1.665)
Cylinder head warpage			—	0.10 (0.004)

## CLUTCH/GEARSHIFT LINKAGE SPECIFICATIONS

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Specified clutch fluid			DOT 4 brake fluid	—
Clutch master cylinder		Cylinder I.D.	12.700 – 12.743 (0.5000 – 0.5017)	12.755 (0.5022)
		Piston O.D.	12.657 – 12.684 (0.4983 – 0.4994)	12.645 (0.4978)
Clutch	Spring free height		6.70 (0.264)	5.70 (0.224)
	Disc thickness	Disc A, C	3.22 – 3.38 (0.127 – 0.133)	3.1 (0.12)
		Disc B	3.72 – 3.88 (0.146 – 0.153)	3.6 (0.14)
	Plate warpage		—	0.30 (0.012)
Clutch outer guide		I.D.	28.000 – 28.021 (1.1024 – 1.1032)	28.030 (1.1035)
		O.D.	34.975 – 34.991 (1.3770 – 1.3776)	34.965 (1.3766)
Oil pump drive sprocket I.D.			35.025 – 35.145 (1.3789 – 1.3837)	35.155 (1.3841)
Mainshaft O.D. at clutch outer guide			27.980 – 27.990 (1.1016 – 1.1020)	27.96 (1.101)



## GENERAL INFORMATION

### ALTERNATOR/STARTER CLUTCH SPECIFICATIONS

Unit: mm (in)

ITEM	STANDARD	SERVICE LIMIT
Starter driven gear boss O.D.	51.699 – 51.718 (2.0354 – 2.0361)	51.59 (2.031)

### CRANKCASE/TRANSMISSION SPECIFICATIONS

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Transmission	Gear I.D.	M5, M6	31.000 – 31.025 (1.2205 – 1.2215)	31.04 (1.222)
		C1	35.000 – 35.025 (1.3780 – 1.3789)	35.04 (1.380)
		C2	30.000 – 30.021 (1.1811 – 1.1819)	30.04 (1.183)
		C3, C4	33.000 – 33.025 (1.2992 – 1.3002)	33.04 (1.301)
	Gear busing O.D.	M5	30.955 – 30.980 (1.2187 – 1.2197)	30.935 (1.2179)
		M6	30.950 – 30.975 (1.2185 – 1.2195)	30.93 (1.218)
		C3, C4	32.950 – 32.975 (1.2972 – 1.2982)	32.93 (1.296)
	Gear-to-bushing clearance	M5	0.020 – 0.070 (0.0008 – 0.0028)	0.10 (0.004)
		M6	0.025 – 0.075 (0.0010 – 0.0030)	0.11 (0.004)
		C3, C4	0.025 – 0.075 (0.0010 – 0.0030)	0.11 (0.004)
	Gear bushing I.D.	M5	27.985 – 28.006 (1.1018 – 1.026)	28.016 (1.1030)
	Mainshaft O.D.	at M5	27.967 – 27.980 (1.1011 – 1.1016)	27.957 (1.1007)
	Bushing-to-shaft clearance	M5	0.005 – 0.039 (0.0002 – 0.0015)	–
Shift fork, fork shaft	Fork I.D.		12.000 – 12.018 (0.4724 – 0.4731)	12.03 (0.474)
	Claw thickness		5.93 – 6.00 (0.233 – 0.236)	5.9 (0.23)
	Shift fork shaft O.D.		11.957 – 11.968 (0.4707 – 0.4712)	11.95 (0.470)
Output drive train	Final driven gear I.D.		30.000 – 30.013 (1.1811 – 1.1816)	30.03 (1.182)
	Final driven gear bushing	I.D.	25.026 – 25.041 (0.9853 – 0.9859)	25.05 (0.986)
		O.D.	29.959 – 29.980 (1.0220 – 1.0228)	29.95 (1.179)
	Final shaft O.D.		24.980 – 24.993 (0.4707 – 0.4712)	24.962 (0.9828)
	Final driven gear-to-bushing clearance		0.020 – 0.054 (0.0008 – 0.0021)	0.079 (0.0031)
	Final driven gear bushing-to-shaft clearance		0.033 – 0.061 (0.0013 – 0.0024)	0.090 (0.0035)
	Final shaft damper spring free length		114.5 (4.51)	110 (4.3)
	Final shaft/output shaft gear backlash		0.08 – 0.23 (0.003 – 0.009)	0.40 (0.016)
	Backlash difference between measurements		–	0.10 (0.004)

## CRANKSHAFT/PISTON/CYLINDER SPECIFICATIONS

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Crankshaft	Connecting rod side clearance		0.15 – 0.30 (0.006 – 0.012)	0.40 (0.016)
	Runout		–	0.05 (0.002)
	Main journal bearing oil clearance		0.017 – 0.035 (0.0007 – 0.0014)	0.05 (0.002)
Cylinder	I.D.		81.000 – 81.015 (3.1890 – 3.1896)	81.025 (3.1900)
	Out of round		–	0.10 (0.004)
	Taper		–	0.10 (0.004)
	Warpage		–	0.10 (0.004)
Piston, piston rings	Piston O.D. at 8.0 mm (0.31 in) from bottom		80.960 – 80.980 (3.1874 – 3.1882)	80.89 (3.185)
	Piston pin hole I.D.		18.002 – 18.008 (0.7087 – 0.7090)	18.02 (0.709)
	Piston pin O.D.		17.994 – 18.000 (0.7084 – 0.7087)	17.98 (0.708)
	Piston-to-piston pin clearance		0.002 – 0.014 (0.0001 – 0.0006)	0.04 (0.002)
	Piston ring end gap	Top	0.15 – 0.25 (0.006 – 0.010)	0.45 (0.018)
		Second	0.320 – 0.470 (0.0126 – 0.0185)	0.65 (0.026)
		Oil (side rail)	0.20 – 0.70 (0.008 – 0.028)	0.9 (0.04)
	Piston ring-to-ring groove clearance	Top	0.015 – 0.050 (0.0006 – 0.0020)	0.065 (0.0026)
		Second	0.015 – 0.045 (0.0006 – 0.0018)	0.06 (0.002)
Cylinder-to-piston clearance			0.020 – 0.055 (0.0008 – 0.0022)	0.10 (0.004)
Connecting rod small end I.D.			18.010 – 18.042 (0.7091 – 0.7103)	18.05 (0.711)
Connecting rod-to-piston pin clearance			0.010 – 0.048 (0.0004 – 0.0019)	0.06 (0.002)
Crankpin bearing oil clearance			0.034 – 0.052 (0.0013 – 0.0020)	0.06 (0.002)

## FINAL DRIVE SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Recommended final drive oil		Hypoid gear oil, SAE #80	—
Final drive oil capacity	After draining	200 cm <sup>3</sup> (6.8 US oz, 7.0 Imp oz)	—
	After disassembly	240 cm <sup>3</sup> (8.1 US oz, 8.4 Imp oz)	—
Final gear backlash		0.05 – 0.15 (0.002 – 0.006)	0.30 (0.012)
Backlash difference between measurements		—	0.10 (0.004)
Final gear assembly preload		0.1 – 2.9 N·m (1 – 29 kgf·cm, 0.1 – 2.1 lbf·ft)	—

## FRONT WHEEL/SUSPENSION/STEERING SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Minimum tire tread depth		—	1.5 (0.06)
Cold tire pressure	Up to 90 kg (200 lb) load	250 kPa (2.50 kgf/cm <sup>2</sup> , 36 psi)	—
	Up to maximum weight capacity	250 kPa (2.50 kgf/cm <sup>2</sup> , 36 psi)	—
Axle runout		—	0.2 (0.01)
Wheel rim runout	Radial	—	2.0 (0.08)
	Axial	—	2.0 (0.08)
Wheel balance weight		—	60 g (2.1 oz) max.
Fork	Spring free length	232.8 (9.17)	228.1 (8.98)
	Tube runout	—	0.20 (0.008)
	Pre-load adjuster initial setting	9 mm (0.4 in) from top surface of fork bolt	—
	Rebound damping adjuster initial setting	6 clicks from fully hard position	—
	Recommended fork fluid	KHL 15-10 (KYB)	—
	Fluid level	160 (6.3)	—
	Fluid capacity	497 ± 3 cm <sup>3</sup> (16.8 ± 0.1 US oz, 17.5 ± 0.1 Imp oz)	—
Steering head bearing pre-load		16.7 – 20.6 N (1.7 – 2.1 kgf, 3.7 – 4.6 lbf)	—

## GENERAL INFORMATION

### REAR WHEEL/SUSPENSION SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Minimum tire tread depth		—	2.0 (0.08)
Cold tire pressure	Up to 90 kg (200 lb) load	290 kPa (2.90 kgf/cm <sup>2</sup> , 42 psi)	—
	Up to maximum weight capacity	290 kPa (2.90 kgf/cm <sup>2</sup> , 42 psi)	—
Wheel rim runout	Radial	—	2.0 (0.08)
	Axial	—	2.0 (0.08)
Wheel balance weight		—	60 g (2.1 oz) max.
Shock absorber	Spring pre-load adjuster standard position	11 clicks out from lower position	—
	Rebound adjuster initial setting	3/4 turn out from full hard	—

### HYDRAULIC BRAKE SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Front	Specified brake fluid	DOT 4 brake fluid	—
	Brake disc thickness	4.5 ± 0.1 (0.18 ± 0.004)	3.5 (0.14)
	Brake disc warpage	—	0.20 (0.008)
	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)
	Right caliper cylinder I.D.	Upper	25.400 – 25.450 (1.0000 – 1.0020)
		Middle	25.400 – 25.450 (1.0000 – 1.0020)
		Lower	25.400 – 25.450 (1.0000 – 1.0020)
	Right caliper piston O.D.	Upper	25.318 – 25.368 (0.9968 – 0.9987)
		Middle	25.318 – 25.368 (0.9968 – 0.9987)
		Lower	25.318 – 25.368 (0.9968 – 0.9987)
	Left caliper cylinder I.D.	Upper	27.000 – 27.050 (1.0630 – 1.0650)
		Middle	30.230 – 30.280 (1.1902 – 1.1921)
		Lower	27.000 – 27.050 (1.0630 – 1.0650)
	Left caliper piston O.D.	Upper	26.918 – 26.968 (1.0598 – 1.0617)
		Middle	30.148 – 30.198 (1.1869 – 1.1889)
		Lower	26.918 – 26.968 (1.0598 – 1.0617)
Rear	Specified brake fluid	DOT 4 brake fluid	—
	Master cylinder push rod length	67.5 ± 1 (2.66 ± 0.04)	—
	Brake disc thickness	6.0 ± 0.2 (0.24 ± 0.008)	5.0 (0.20)
	Brake disc warpage	—	0.30 (0.012)
	Master cylinder I.D.	17.460 – 17.503 (0.6874 – 0.6891)	17.515 (0.6896)
	Master piston O.D.	17.417 – 17.444 (0.6857 – 0.6868)	17.405 (0.6852)
	Caliper cylinder I.D.	Front	27.000 – 27.050 (1.0630 – 1.0650)
		Rear	27.000 – 27.050 (1.0630 – 1.0650)
	Caliper piston O.D.	Front	26.918 – 26.968 (1.0598 – 1.0617)
		Rear	26.918 – 26.968 (1.0598 – 1.0617)

### BATTERY/CHARGING SYSTEM SPECIFICATIONS

ITEM		SPECIFICATIONS
Battery	Capacity	12 V – 11.2 Ah
	Current leakage	1.2 mA max.
	Voltage (20°C/68°F)	Fully charged
		13.0 – 13.2 V
	Charging current	Needs charging
		Below 12.3 V
Alternator	Charging current	Normal
		1.1 A/5 – 10 h
	Charging coil resistance (20°C/68°F)	Quick
		5.5 A/ h
Alternator	Capacity	0.57 kW/5,000 rpm
	Charging coil resistance (20°C/68°F)	0.1 – 1.0 Ω

## IGNITION SYSTEM SPECIFICATIONS

ITEM	SPECIFICATIONS
Spark plug	IMR9E-9HES (NGK)
	VUH27ES (DENSO)
Spark plug gap	0.80 – 0.90 mm (0.031 – 0.035 in)
CKP sensor peak voltage	0.7 V minimum
Ignition timing ("F"mark)	8.4° BTDC at idle

## ELECTRIC STARTER SPECIFICATIONS

Unit: mm (in)

ITEM	STANDARD	SERVICE LIMIT
Starter motor brush length	12.0 (0.47)	6.5 (0.26)

## LIGHTS/METERS/SWITCHES SPECIFICATIONS

ITEM			SPECIFICATIONS
Bulbs	Headlight	Hi	12 V – 55 W
		Lo	12 V – 55 W
	Brake/taillight		12 V – 21/5 W
	Taillight		12 V – 5 W
	Position light		LED
	Front turn signal light		12 V – 21 W x 2
	Rear turn signal light		12 V – 21 W x 2
	License light		12V – 5 W
	Instrument light		LED
	Turn signal indicator		LED
	High beam indicator		LED
	Neutral indicator		LED
	Low oil pressure indicator		LED
	PGM-FI malfunction indicator		LED
	High coolant temperature indicator		LED
	ABS indicator		LED
Fuse	Main fuse	A	50 A
		B	30 A
	PGM-FI fuse		10 A
	Sub fuse		30 A x 3, 20 A x 2, 15 A x 1, 10 A x 4
Tachometer peak voltage			10.5 V minimum
ECT sensor resistance		80°C (176°F)	2.1 – 2.6 kΩ
		120°C (248°F)	0.65 – 0.73 kΩ
Open air temperature sensor resistance (25°C/77°F)			3 – 7 kΩ

## GENERAL INFORMATION

### STANDARD 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	5.2 (0.5, 3.8)	5 mm screw	4.2 (0.4, 3.1)
6 mm hex bolt and nut	10 (1.0, 7)	6 mm screw	9.0 (0.9, 6.6)
8 mm hex bolt and nut	22 (2.2, 16)	6 mm flange bolt (8 mm head, small flange)	10 (1.0, 7)
10 mm hex bolt and nut	34 (3.5, 25)	6 mm flange bolt (8 mm head, large flange)	12 (1.2, 9)
12 mm hex bolt and nut	54 (5.5, 40)	6 mm flange bolt (10 mm head) and nut	12 (1.2, 9)
		8 mm flange bolt and nut	27 (2.8, 20)
		10 mm flange bolt and nut	39 (4.0, 29)

### ENGINE & FRAME TORQUE VALUES

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

#### ENGINE

##### MAINTENANCE

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Spark plug	4	10	16 (1.6, 12)	
Timing hole cap	1	45	17 (1.7, 13)	Apply grease to the threads
Engine oil filter cartridge	1	20	26 (2.7, 19)	Apply engine oil to the threads.
Valve adjusting screw lock nut	8	5	10 (1.0, 7)	Apply engine oil to the threads.
Engine oil drain bolt	1	14	29 (3.0, 21)	

##### LUBRICATION SYSTEM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Oil filter boss	1	20	See page 4-14	
Oil pump mounting bolt	6	6	12 (1.2, 9)	
Oil pump driven sprocket bolt	1	6	15 (1.5, 11)	Apply a locking agent to the threads.
Oil pump cover bolt	8	6	11 (1.1, 8)	
Oil pump chain guide bolt	1	6	12 (1.2, 9)	Apply a locking agent to the threads.
Oil cooler bolt	1	20	59 (6.0, 44)	Apply engine oil to the threads.

##### FUEL SYSTEM (PGM-FI)

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
ECT sensor	1	12	25 (2.5, 18)	
Throttle body insulator band screw	4	5	See page 6-77	
TCP sensor throttle cable stay screw	2	5	3.4 (0.3, 2.5)	
Knock sensor	1	8	24 (2.4, 18)	
Knock sensor bridge bolt	2	8	24 (2.4, 18)	
O <sub>2</sub> sensor	2	18	24.5 (2.5, 18)	
Fuel rail mounting bolt	8	5	5.1 (0.5, 3.8)	

##### COOLING SYSTEM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Water pump cover flange bolt	2	6	13 (1.3, 10)	CT bolt.



## CYLINDER HEAD/VALVES

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Cylinder head sealing bolt	4	12	32 (3.3, 24)	Apply a locking agent to the threads.
Cylinder head sealing bolt	2	18	27 (2.8, 20)	Apply a locking agent to the threads.
Insulator socket bolt	8	6	12 (1.2, 9)	
Front PAIR check reed valve cover	2	6	13 (1.3, 10)	CT bolt.
Front breather plate flange bolt	2	6	13 (1.3, 10)	Apply a locking agent to the threads.
				CT bolt.
Rear PAIR check reed valve cover	4	5	6.9 (0.7, 5.1)	CT bolt.
Cylinder head bleeding joint	2	8	12 (1.2, 9)	Apply a locking agent to the threads.
Rocker arm shaft socket bolt	14	6	13 (1.3, 10)	Apply engine oil to the threads.
Cam chain tensioner bolt	4	6	12 (1.2, 9)	
Cam chain tensioner base special bolt	2	6	10 (1.0, 7)	Apply a locking agent to the threads.
Front cylinder head cover bolt	4	6	12 (1.2, 9)	
Rear cylinder head cover bolt	3	6	12 (1.2, 9)	
Cam chain tensioner pivot socket bolt	2	6	12 (1.2, 9)	Apply a locking agent to the threads.
Rear cam chain guide set plate bolt	1	6	12 (1.2, 9)	Apply a locking agent to the threads.
Camshaft holder bolt	12	6	12 (1.2, 9)	Apply engine oil to the threads.
Cam sprocket bolt (front)	2	7	20 (2.0, 15)	Apply a locking agent to the threads.
Cam sprocket UBS bolt (rear)	2	7	20 (2.0, 15)	Apply a locking agent to the threads.
				UBS bolt.
Cylinder head mounting bolt	13	10	57 (5.8, 42)	
Cylinder head stud bolt (exhaust pipe stud bolt)	8	6	See page 3-27	

## CLUTCH/GEARSHIFT LINKAGE

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Clutch center lock nut	1	25	186 (19.0, 137)	Apply engine oil to the threads.
Change guide plate bolt	2	6	12 (1.2, 9)	Stake.
Shift drum center pin bolt	1	8	23 (2.3, 17)	Apply a locking agent to the threads.
Gearshift spindle return spring pin	1	8	23 (2.3, 17)	
Right crankcase cover rubber plate bolt	3	6	12 (1.2, 9)	Apply a locking agent to the threads.
Gearshift spindle plate bolt	1	6	12 (1.2, 9)	Apply a locking agent to the threads.
CKP sensor rotor/primary drive gear flange bolt	1	12	98 (10.0, 72)	Apply engine oil to the threads and flange surface.
				Left hand threads.
Clutch slave cylinder mounting bolt	3	6	12 (1.2, 9)	
Clutch slave cylinder bleeder screw	1	8	9.0 (0.9, 6.6)	

## GENERAL INFORMATION

### ALTERNATOR/STARTER CLUTCH

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Flywheel flange bolt	1	12	137 (14.0, 101)	Apply engine oil to the threads and seating surface.
Alternator cover sealing bolt	2	8	23 (2.3, 17)	Apply a locking agent to the threads. Apply a locking agent to the threads. Apply a locking agent to the threads.
Starter clutch torx bolt	6	6	16 (1.6, 12)	
Stator socket bolt	4	6	12 (1.2, 9)	
Stator wire holder socket bolt	1	6	12 (1.2, 9)	

### CRANKCASE/TRANSMISSION

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Main journal 9 mm bolt	6	9	25 (2.5, 18)+270°	Apply engine oil to the threads and seating surface. Apply a locking agent to the threads.
Countershaft socket bolt	1	10	67 (6.8, 49)	
Mainshaft bearing set plate and oil pump chain guide bolt	3	6	12 (1.2, 9)	
Lower crankcase 8 mm bolt	4	8	24 (2.4, 18)	
Lower crankcase 7 mm bolt	6	7	18 (1.8, 13)	Apply a locking agent to the threads.
Lower crankcase 6 mm bolt	8	6	12 (1.2, 9)	
Lower crankcase sealing bolt	1	22	59 (6.0, 44)	
Upper crankcase sealing bolt	1	22	59 (6.0, 44)	
Final shaft socket bolt	1	10	67 (6.8, 49)	Apply engine oil to the threads.
Side gear case mounting bolt	5	8	32 (3.3, 24)	UBS bolt
Side gear case bearing holder bolt	7	8	31 (3.2, 23)	UBS bolt
Side gear case lock nut	2	30	235 (24.0, 173)	Stake.
Side gear case lock nut (final shaft side)	1	64	98 (10.0, 72)	Stake.
Side gear case lock nut (output shaft side)	1	64	175 (17.8, 129)	Stake.

### CRANKSHAFT/PISTON/CYLINDER

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Connecting rod bearing cap bolt	8	8	27 (2.8, 20)+120°	Apply engine oil to the threads and seating surface.
Oil jet mounting bolt	2	6	12 (1.2, 9)	Apply a locking agent to the threads.

### IGNITION SYSTEM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
CKP sensor mounting bolt	2	6	12 (1.2, 9)	Apply a locking agent to the threads.

### ELECTRIC STARTER

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Starter motor terminal nut	1	6	12 (1.2, 9)	
Negative brush mounting screw	1	5	3.7 (0.4, 3.0)	
Starter motor cable nut	1	6	10 (1.0, 7)	
Starter motor case bolt	2	—	4.9 (0.5, 3.6)	

### LIGHTS/METERS/SWITCHES

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
EOP sensor	1	10	22 (2.2, 16)	

**FRAME****MAINTENANCE**

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Air cleaner element screw	2	4	0.8 (0.1, 0.6)	
Air cleaner cover screw	6	4	0.8 (0.1, 0.6)	

**FRAME BODY PANELS/EXHAUST SYSTEM**

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Seat rail upper mounting flange bolt/nut	2	10	34 (3.5, 25)	
Seat rail lower mounting flange bolt	2	10	34 (3.5, 25)	
Seat rail assembly flange bolt	1	8	30 (3.1, 22)	
Rear fender mounting bolt (short)	3	8	32 (3.3, 24)	
Rear fender mounting bolt (long)	1	8	32 (3.3, 24)	
Center cross mounting bolt	4	6	12 (1.2, 9)	
Exhaust pipe joint special nut	8	6	12 (1.2, 9)	
EGCA cable joint nut	1	12	21 (2.1, 15)	
Exhaust pipe muffler band	3	8	17 (1.7, 13)	
Muffler upper guard bolt	3	6	10 (1.0, 7)	
Muffler rear guard bolt	3	5	5.2 (0.5, 3.8)	
Cowl stay bolt	2	8	32 (3.3, 24)	

**FUEL SYSTEM**

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Fuel filler cap bolt	3	4	1.8 (0.2, 1.3)	
Fuel pump mounting nut	6	6	12 (1.2, 9)	
Air cleaner case screw	8	4	0.8 (0.1, 0.6)	
Resonator screw	4	4	0.8 (0.1, 0.6)	
Bank angle sensor mounting bolt	2	4	1.5 (0.2, 1.1)	
IAT sensor	2	5	1.1 (0.1, 0.8)	
MAP sensor	2	4	1.1 (0.1, 0.8)	
Air funnel mounting screw	8	5	4.2 (0.4, 3.1)	

**COOLING SYSTEM**

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Fan motor shroud mounting bolt	3	6	8.4 (0.9, 6.2)	
Cooling fan nut	2	5	2.7 (0.3, 2.0)	
Fan motor mounting bolt	6	5	5.1 (0.5, 3.8)	

**ENGINE MOUNTING**

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Front engine hanger bolt	2	12	54 (5.5, 40)	
Upper engine hanger bolt	2	12	54 (5.5, 40)	
Rear upper engine hanger nut	1	12	54 (5.5, 40)	
Rear lower engine hanger nut	1	12	84 (8.6, 62)	
Engine hanger adjusting bolt	2	18	5.0 (0.5, 3.7)	

## GENERAL INFORMATION

### CLUTCH/GEARSHIFT LINKAGE

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Clutch master cylinder holder bolt	2	6	12 (1.2, 9)	ALOC bolt: replace with a new one.
Clutch master cylinder reservoir cap screw	2	4	1.5 (0.2, 1.1)	
Clutch lever pivot bolt	1	6	1.0 (0.1, 0.7)	
Clutch lever pivot nut	1	6	5.9 (0.6, 4.4)	
Clutch lever switch screw	1	4	1.2 (0.1, 0.9)	
Clutch hose oil bolt	2	10	34 (3.5, 25)	
Gearshift pedal pivot bolt	1	8	22 (2.2, 16)	
Gearshift arm pinch bolt	1	6	10 (1.0, 7)	
Link arm lock nut	2	6	10 (1.0, 7)	

### FINAL DRIVE

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Final gear case cover 10 mm bolt	2	10	62 (6.3, 46)	Apply a locking agent to the threads.
Final gear case cover 8 mm bolt	6	8	25 (2.5, 18)	Apply a locking agent to the threads.
Ring gear shaft bearing retainer	1	75	221 (22.5, 163)	Replace with a new one and stake. Apply grease or gear oil to the threads.
Final gear case bolt	1	75	221 (22.5, 163)	ALOC bolt: replace with a new one. Apply grease or gear oil to the threads.
Pinion gear bearing retainer	1	75	235 (24.0, 173)	Replace with a new one and stake.
Pinion gear lock nut	1	35	206 (21.0, 152)	Replace with a new one and stake.
Final gear assembly stud bolt	4	12	See page 14-23	Apply a locking agent to the threads.
Final gear assembly mounting nut	4	12	88 (9.0, 65)	
Final drive oil drain bolt	1	8	12 (1.2, 9)	
Final drive oil filler cap	1	20	8.0 (0.8, 5.9)	
Rear brake disc flange mounting screw	2	6	9.0 (0.9, 6.6)	

### FRONT WHEEL/SUSPENSION/STEERING

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Handlebar weight mounting screw	2	6	10 (1.0, 7)	ALOC bolt: replace with a new one.
Front axle bolt	1	18	79 (8.1, 58)	Apply a locking agent to the threads.
Front axle holder pinch bolt	2	8	22 (2.2, 16)	
Fork socket bolt	2	8	20 (2.0, 15)	
Fork bolt	2	42	22 (2.2, 16)	
Fork damper rod lock nut	2	—	15.5 (1.6, 11)	
Steering stem nut	1	24	103 (10.5, 76)	
Steering bearing adjusting nut	1	26	45 (4.6, 33)	
Steering bearing adjusting lock nut	1	26	See page 15-38	
Fork top bridge pinch bolt	2	8	22 (2.2, 16)	
Fork bottom bridge pinch bolt	2	8	27 (2.8, 20)	
Left handlebar switch housing screw	2	5	2.5 (0.3, 1.8)	
Right handlebar switch/throttle housing screw	2	5	2.5 (0.3, 1.8)	

## REAR WHEEL/SUSPENSION

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Rear wheel nut	5	12	108 (11.0, 80)	
Rear shock absorber bracket mounting nut	1	10	42 (4.3, 31)	U-nut
Rear shock absorber upper mounting nut	1	10	44 (4.5, 32)	U-nut
Rear shock absorber lower mounting nut	1	10	44 (4.5, 32)	U-nut
Shock arm-to-shock link plate nut	1	12	64 (6.5, 47)	U-nut
Shock arm-to-frame pivot nut	1	12	64 (6.5, 47)	U-nut
Shock link plate-to-swingarm nut	1	12	64 (6.5, 47)	U-nut
Swingarm pivot adjust bolt	1	36	15 (1.5, 11)	
Swingarm pivot nut	1	22	108 (11.0, 80)	U-nut

## HYDRAULIC BRAKE

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Brake caliper bleed valve	4	8	5.4 (0.6, 4.0)	
Front master cylinder reservoir cap screw	2	4	1.5 (0.2, 1.1)	
Front brake caliper mounting bolt	4	10	45 (4.6, 33)	ALOC bolt: replace with a new one.
Pad pin	3	10	18 (1.8, 13)	
Front brake disc bolt	10	6	20 (2.0, 15)	ALOC bolt: replace with a new one.
Rear brake disc bolt	5	8	42 (4.3, 31)	ALOC bolt: replace with a new one.
Front brake light switch screw	1	4	1.2 (0.1, 0.9)	
Front brake lever pivot bolt	1	6	1.0 (0.1, 0.7)	
Front brake lever pivot nut	1	6	5.9 (0.6, 4.4)	
Front master cylinder holder bolt	2	6	12 (1.2, 9)	
Brake hose oil bolt	6	10	34 (3.5, 25)	
Rear master cylinder push rod joint nut	1	8	18 (1.8, 13)	
Rear master cylinder mounting nut	2	6	12 (1.2, 9)	
Rear master cylinder reservoir hose joint screw-washer	1	4	1.5 (0.2, 1.1)	Apply a locking agent to the threads.
Rear brake caliper main slide pin	1	12	23 (2.3, 17)	
Rear brake caliper sub slide pin	1	8	13 (1.3, 9)	
Rear brake caliper mounting bolt	2	10	45 (4.6, 33)	ALOC bolt: replace with a new one.
Rear brake reservoir mounting bolt	1	6	12 (1.2, 9)	
Rear brake pipe clamper bolt	2	6	10 (1.0, 7)	ALOC bolt: replace with a new one.
Rear brake pipe stay nut	1	6	4.0 (0.4, 3.0)	
Brake hose (2/3 way joint)	2	6	10 (1.0, 7)	
PCV mounting bolt	2	6	10 (1.0, 7)	
Brake hose clamper stay bolt	2	6	10 (1.0, 7)	



## GENERAL INFORMATION

### ANTI-LOCK BRAKE SYSTEM (ABS)

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Front wheel pulser ring mounting bolt	5	5	7.0 (0.7, 5.2)	ALOC bolt: replace with a new one. ALOC bolt: replace with a new one. Apply engine oil to the threads and seating surface.
Rear wheel pulser ring mounting bolt	5	5	7.0 (0.7, 5.2)	
Brake pipe joint nut	2	10	14 (1.4, 10)	
Delay valve mounting bolt	1	6	10 (1.0, 7)	

### LIGHTS/METERS/SWITCHES

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Sidestand switch bolt	1	6	10 (1.0, 7)	ALOC bolt: replace with a new one.
Meter screws	3	5	1.0 (0.1, 0.7)	
Taillight SH bolt	1	6	9.8 (1.0, 7.2)	Replace with a new one.
Front turn signal cover screws	2	4	1.5 (0.2, 1.1)	
Ignition switch mounting bolt	2	8	24 (2.4, 18)	

### OTHERS

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Rider footpeg bracket socket bolt	2	8	34 (3.5, 25)	After tighten the pivot bolt to the specified torque, return the bolt 45° to 90°.
Rider footpeg bracket socket bolt	2	10	34 (3.5, 25)	
Rider footpeg cap bolt	2	6	12 (1.2, 9)	
Rider footpeg special bolt	2	5	5.1 (0.5, 3.8)	
Passenger footpeg bracket flange bolt	4	8	32 (3.3, 24)	
Passenger footpeg special bolt	2	6	5.1 (0.5, 3.8)	
Passenger footpeg lock nut	2	6	12 (1.2, 9)	
Inner layer cowl stay bolt	2	8	18 (1.8, 13)	
Sidestand bracket mounting bolt	2	10	39 (4.0, 29)	
Sidestand pivot bolt	1	10	10 (1.0, 7)	
Sidestand nut	1	10	29 (3.0, 21)	

# LUBRICATION & SEAL POINTS

## ENGINE

MATERIAL	LOCATION	REMARKS
Liquid sealant (Three Bond 1207B or equivalent)	Crankcase mating surface Oil pan mating surface Right crankcase cover mating surface Alternator cover mating surface CKP sensor wire grommet Stator wire grommet seating surface	See page 12-23 See page 5-6 See page 10-32 See page 11-6 Three Bond 1211 or 1207B Three Bond 1211 or 1207B
Liquid sealant (Three Bond 5211C, SSKE45T or equivalent)	Cylinder head semi-circular cut-out	See page 9-7
Engine oil	Piston and piston ring sliding surface Clutch disc entire surface Flywheel bolt threads and seating surface Clutch center lock nut threads and seating surface Oil filter cartridge threads and O-ring surface Camshaft holder bolt threads and seating surface Valve stem seal inner surface Valve adjusting screw lock nut threads Valve adjusting screw threads Primary drive gear flange bolt Countershaft socket bolt Final shaft socket bolt Rocker arm shaft bolt Connecting rod bolt threads and seating surface Spark plug hole seal ring inner surface Each gear teeth and rotating surface Each bearing rolling surface Each O-ring whole surface  Other rotating area and sliding surface	Except water pump cover and water joint O-ring
Molybdenum disulfide oil (a mixture of 1/2 engine oil and 1/2 molybdenum disulfide grease)	Main journal bearing surface Piston pin sliding surface Connecting rod bearing surface Connecting rod small end inner surface Rocker arm pivot and valve slipper Camshaft lobes, journals and thrust surface  Camshaft thrust surface Valve stem (valve guide sliding surface) Exhaust valve stem end Valve lifter outer sliding surface Clutch outer/primary driven gear sliding surface Primary drive gear/sub-gear sliding surface M3/M4,C5,C6 shifter gear (shift fork grooves) Starter reduction gear sliding surface	Do not apply mating surface of the camshaft holder
Multi-purpose grease	Timing hole cap threads Gear position sensor small O-ring Each oil seal lip	

## GENERAL INFORMATION

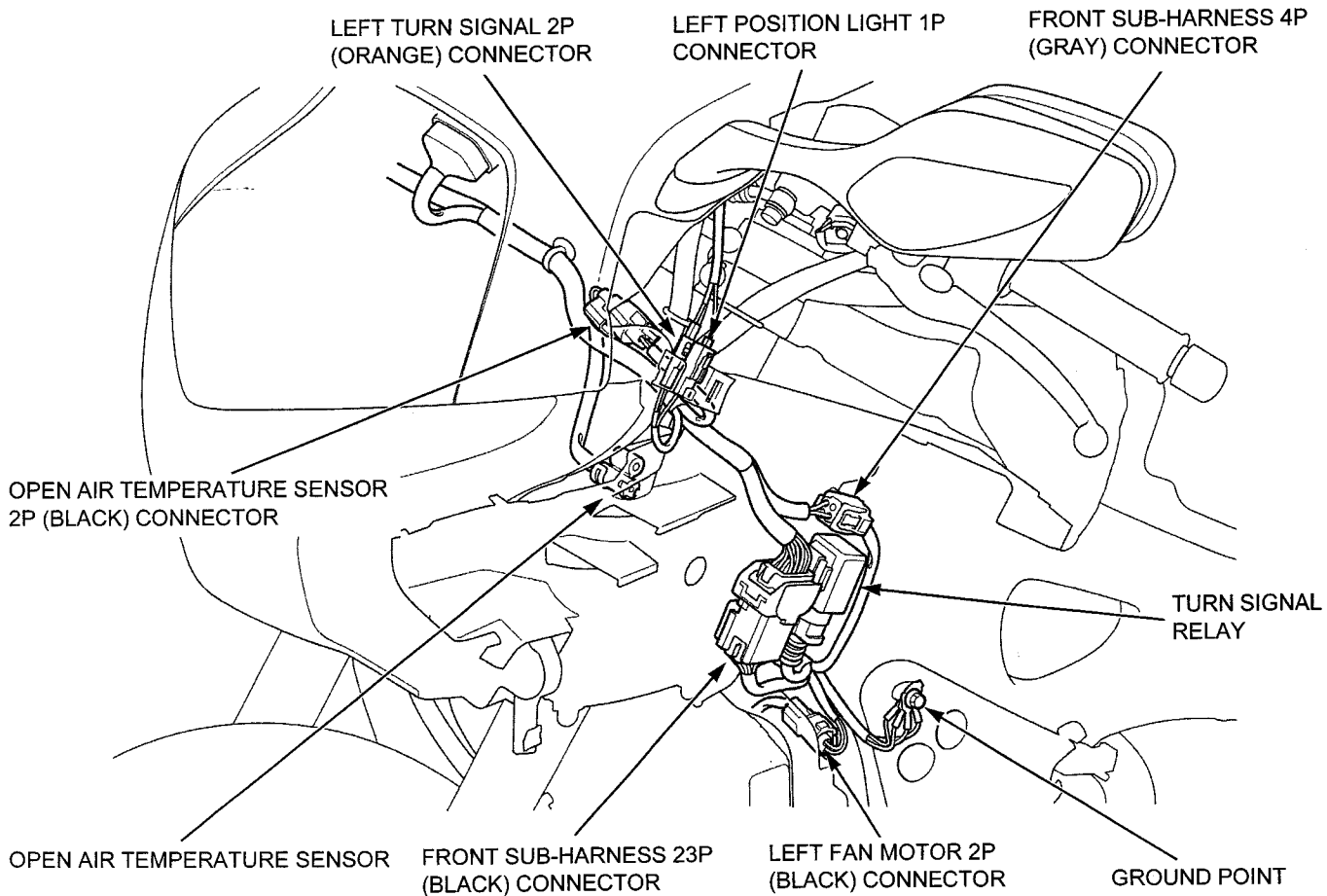
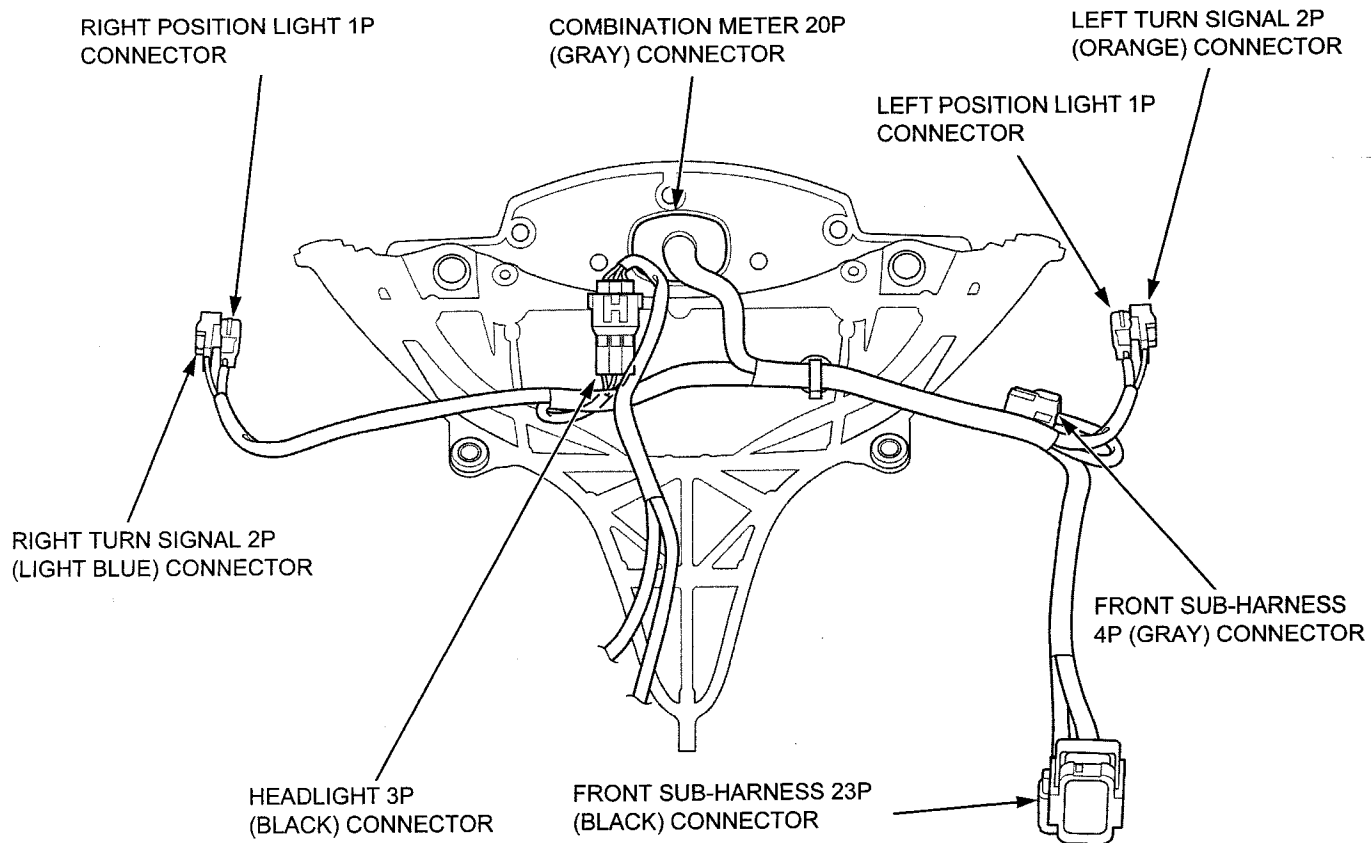
MATERIAL	LOCATION	REMARKS
Locking agent	Cylinder head 12 mm and 18 mm sealing bolt threads	Coating width $6.5 \pm 1.0$ mm except 3.0 – 4.0 mm from tip Coating width $6.5 \pm 1.0$ mm except $2.0 \pm 1.0$ mm from tip Coating width $6.5 \pm 1.0$ mm except $2.0 \pm 1.0$ mm from tip Coating width $6.5 \pm 1.0$ mm except $2.0 \pm 1.0$ mm from tip Coating width $6.5 \pm 1.0$ mm except $2.0 \pm 1.0$ mm from tip Coating width $6.5 \pm 1.0$ mm except $2.0 \pm 1.0$ mm from tip Coating width $6.5 \pm 1.0$ mm except $2.0 \pm 1.0$ mm from tip Coating width $6.5 \pm 1.0$ mm except $2.0 \pm 1.0$ mm from tip Coating width $6.5 \pm 1.0$ mm except $2.0 \pm 1.0$ mm from tip Coating width $6.5 \pm 1.0$ mm except $2.0 \pm 1.0$ mm from tip Coating width $6.5 \pm 1.0$ mm except $2.0 \pm 1.0$ mm from tip Coating width $6.5 \pm 1.0$ mm except $2.0 \pm 1.0$ mm from tip Coating width $6.5 \pm 1.0$ mm except $2.0 \pm 1.0$ mm from tip Coating width $6.5 \pm 1.0$ mm except $2.0 \pm 1.0$ mm from tip Coating width $6.5 \pm 1.0$ mm except $2.0 \pm 1.0$ mm from tip Coating width $4.0 \pm 1.0$ mm except $2.0 \pm 1.0$ mm from tip
	Upper crankcase 22 mm sealing bolt threads	
	Lower crankcase 22 mm sealing bolt threads	
	Cylinder head cover breather plate bolt threads	
	Mainshaft bearing set plate/oil pump chain guide bolt threads	
	Oil pump driven sprocket bolt threads	
	Oil jet mounting bolt threads	
	Gearshift spindle plate bolt threads	
	Starter clutch bolt threads	
	CKP sensor mounting bolt threads	
	Stator wire holder socket bolt threads	
	Stator socket bolt threads	
	Change guide plate bolt threads	
	Cam chain tensioner pivot socket bolt threads	
	Rear cam chain guide set plate bolt threads	
	Cam chain tensioner base special bolt threads	
	Right crankcase cover rubber plate bolt threads	
	Oil filter boss threads (crankcase side)	
	Cam sprocket bolt threads	
	Shift drum center pin bolt thread	

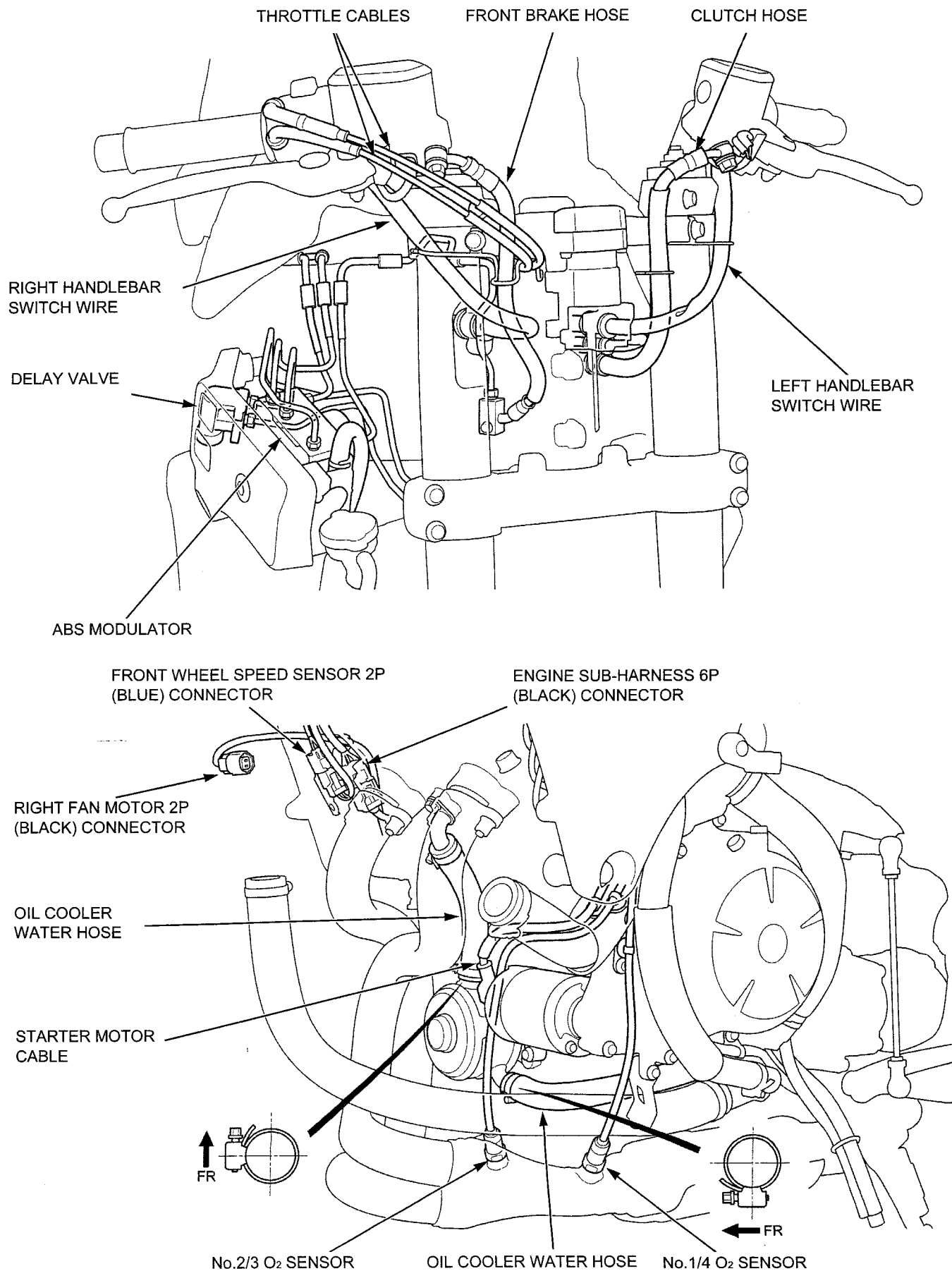
## FRAME

MATERIAL	LOCATION	REMARKS
Multi-purpose grease	Sidestand pivot sliding area Final gear case O-ring (3 places) Final gear case oil seal lips (2 places) Ring gear shaft bearing retainer threads Final gear case threads Rider footpeg sliding area Passenger footpeg sliding area Throttle grip pipe/cable end Rear brake pedal pivot sliding area Clutch lever pivot Change pedal pivot sliding area Front wheel dust seal lips Seat catch hook sliding area	
Molybdenum disulfide grease	Swingarm pivot dust seal lips Swingarm ball bearing Swingarm pivot needle bearings Shock arm needle bearings Shock arm pivot dust seal lips Final drive shaft splines (output shaft and joint shaft) Final drive pinion joint splines Shock absorber pivot dust seal lips Shock absorber needle bearing	1.0 g - 1.5g
Urea based multi-purpose grease with extreme pressure agent (example: EXCELITE EP2 manufactured by KYODO YUSHI, Japan), Shell Stamina EP2 or equivalent)	Upper and lower steering head bearing Steering head dust seal lips Steering head bearing adjusting nut threads	Apply 3 - 5 g each Apply 0.1 - 0.3 g each
Cable lubricant	Throttle cable A, B casing inside	
MORI LG or equivalent	Exhaust valve cable	
SHELL ALVANIA No.2 or equivalent	Change pedal ball joints	
Honda bond A or equivalent	Handlebar grip rubber inside Brake caliper bracket retainer	
Silicone grease	Brake caliper slide pin sliding surfaces Front brake lever pivot/adjuster/push rod sliding area Front brake lever-to-master piston contact area Rear master cylinder push rod-to-master piston contact area Clutch master piston contact area Clutch lever pivot Clutch lever joint piece-to-push rod contact area	Apply 0.1 g Apply 0.1 g Apply 0.1 g
DOT 4 brake fluid	Brake pipe threads Brake and clutch master cylinder inside Brake and clutch master pistons and cups Brake caliper pistons and piston seals	
Fork fluid	Fork cap O-ring Fork dust seal and oil seal lips	
Locking agent	Brake caliper slider pin threads Final gear case cover bolt threads Final gear case stud bolt	8 places 4 places
Hypoid gear oil #80	Final drive gear case inside	200 cm <sup>3</sup> (Full) 240 cm <sup>3</sup> (Exchange)

## GENERAL INFORMATION

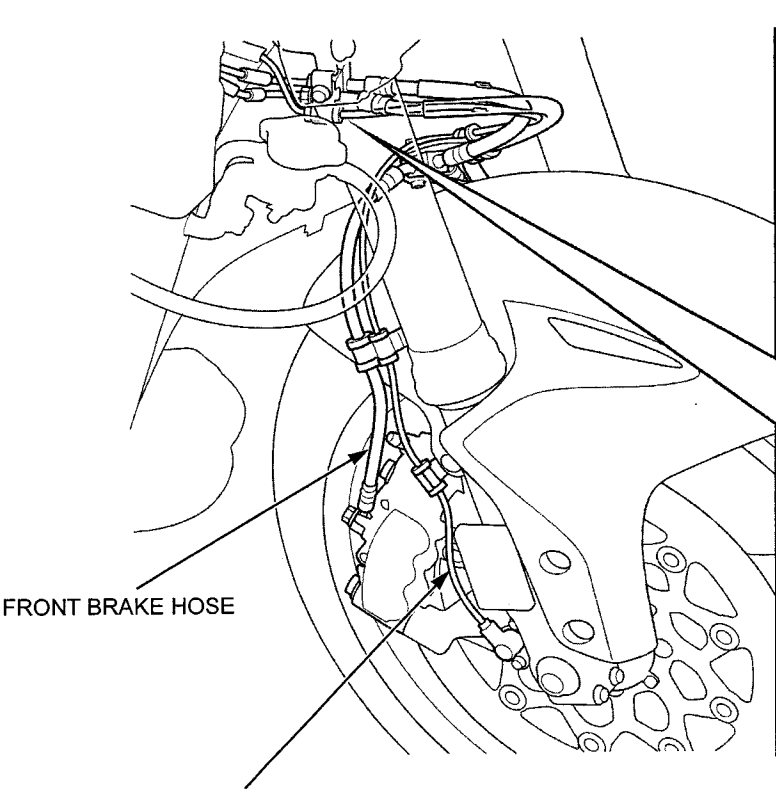
# CABLE & HARNESS ROUTING







GENERAL INFORMATION

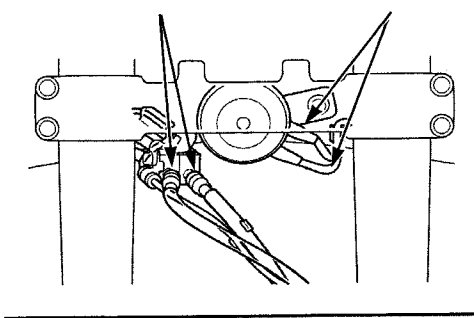


FRONT BRAKE HOSE

FRONT WHEEL SPEED SENSOR WIRE

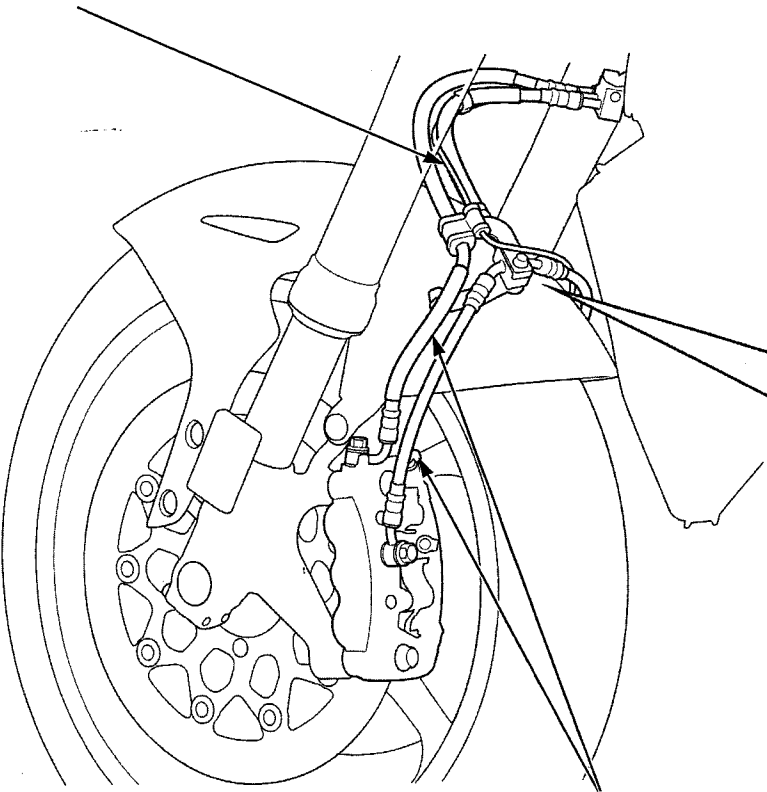
FRONT WHEEL SPEED SENSOR WIRE

FRONT BRAKE HOSES      HORN CONNECTORS

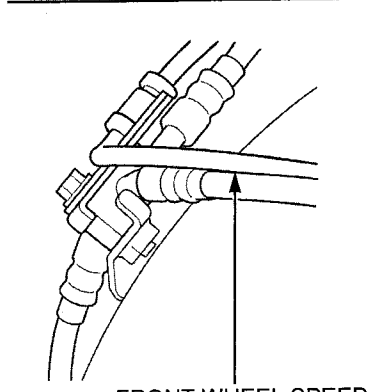
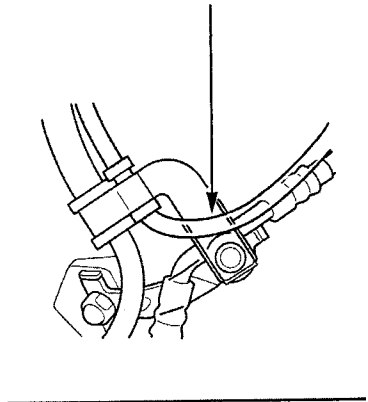


FRONT WHEEL SPEED  
SENSOR WIRE

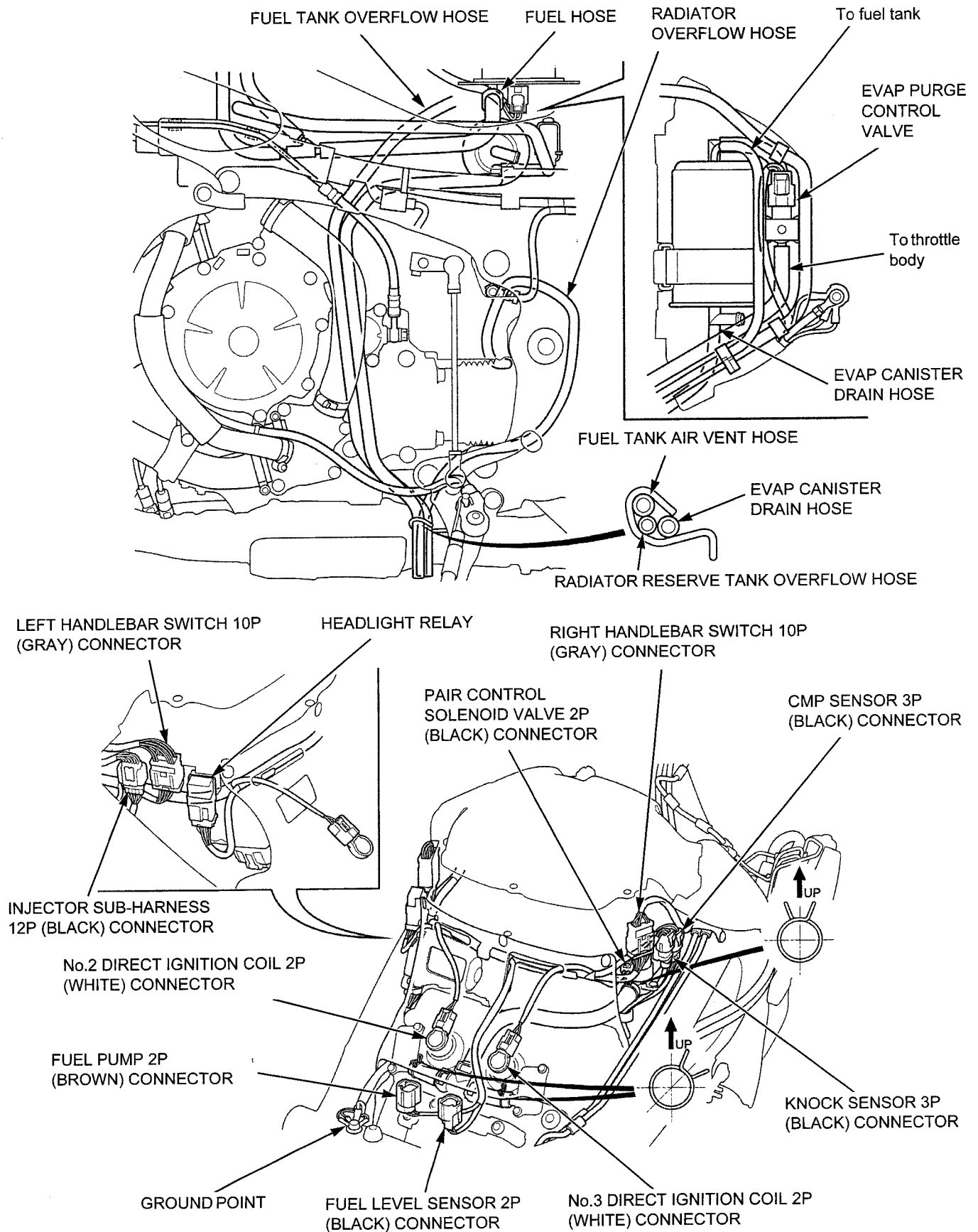
FRONT WHEEL SPEED SENSOR WIRE



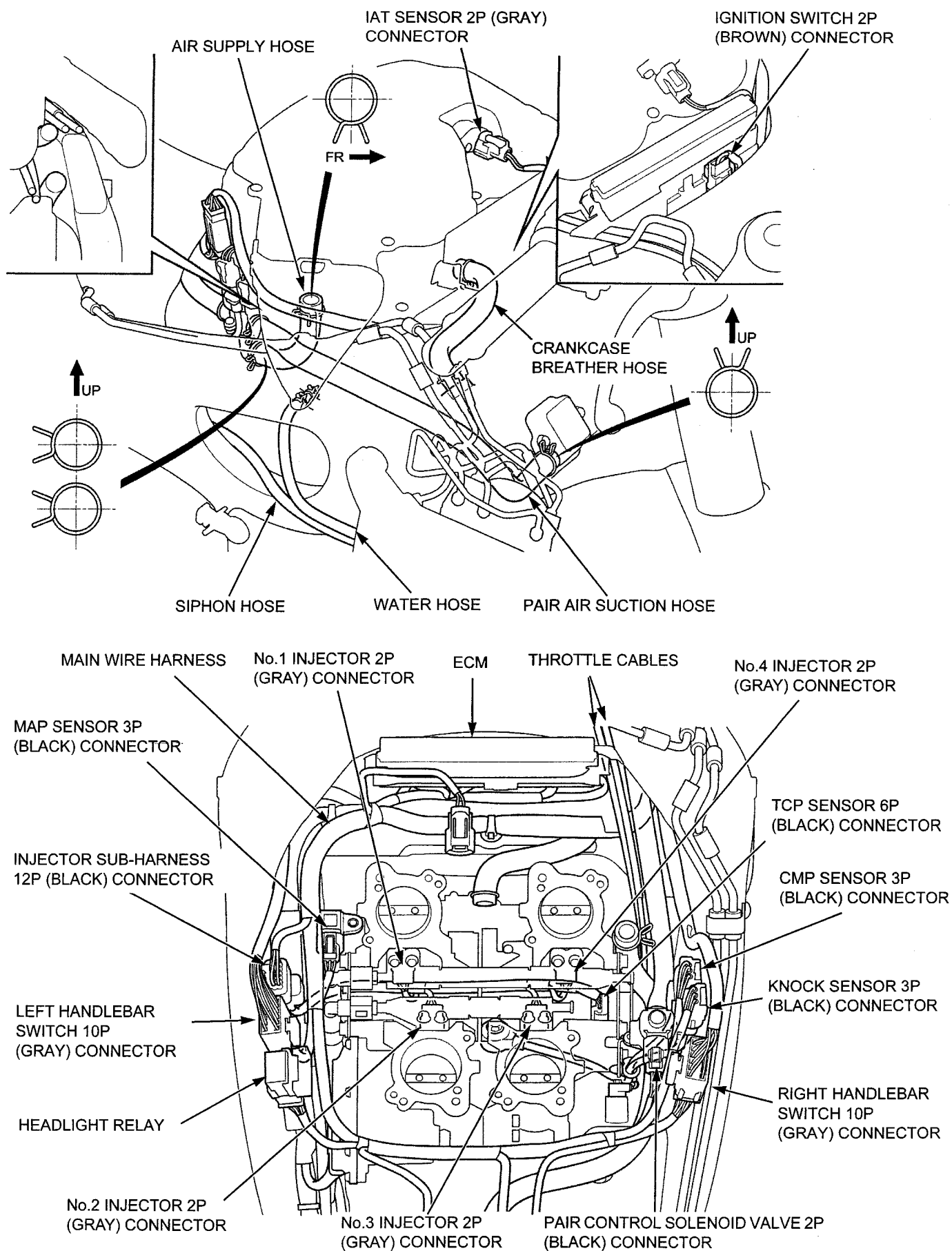
FRONT BRAKE HOSE



FRONT WHEEL SPEED  
SENSOR WIRE



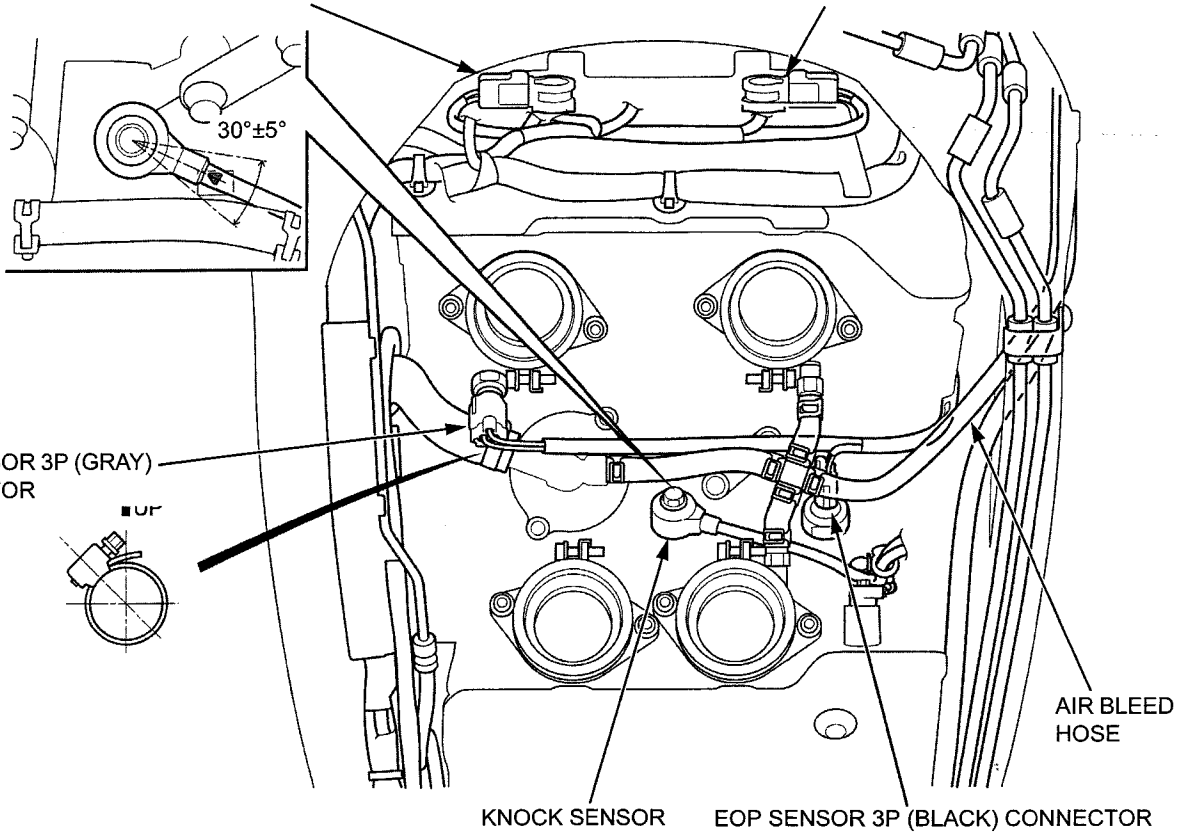
## GENERAL INFORMATION



No.1 DIRECT IGNITION COIL 2P (WHITE) CONNECTOR

No.4 DIRECT IGNITION COIL 2P (WHITE) CONNECTOR

ECT SENSOR 3P (GRAY) CONNECTOR



RADIATOR RESERVE TANK OVERFLOW HOSE

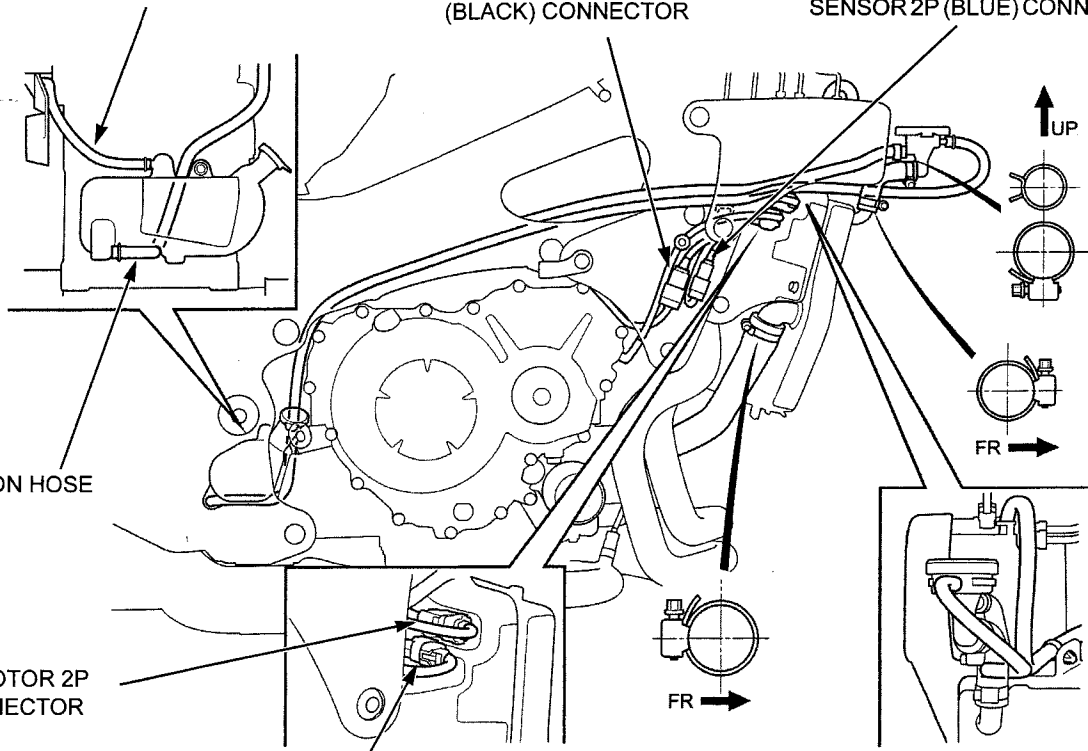
ENGINE SUB-HARNESS 6P (BLACK) CONNECTOR

FRONT WHEEL SPEED SENSOR 2P (BLUE) CONNECTOR

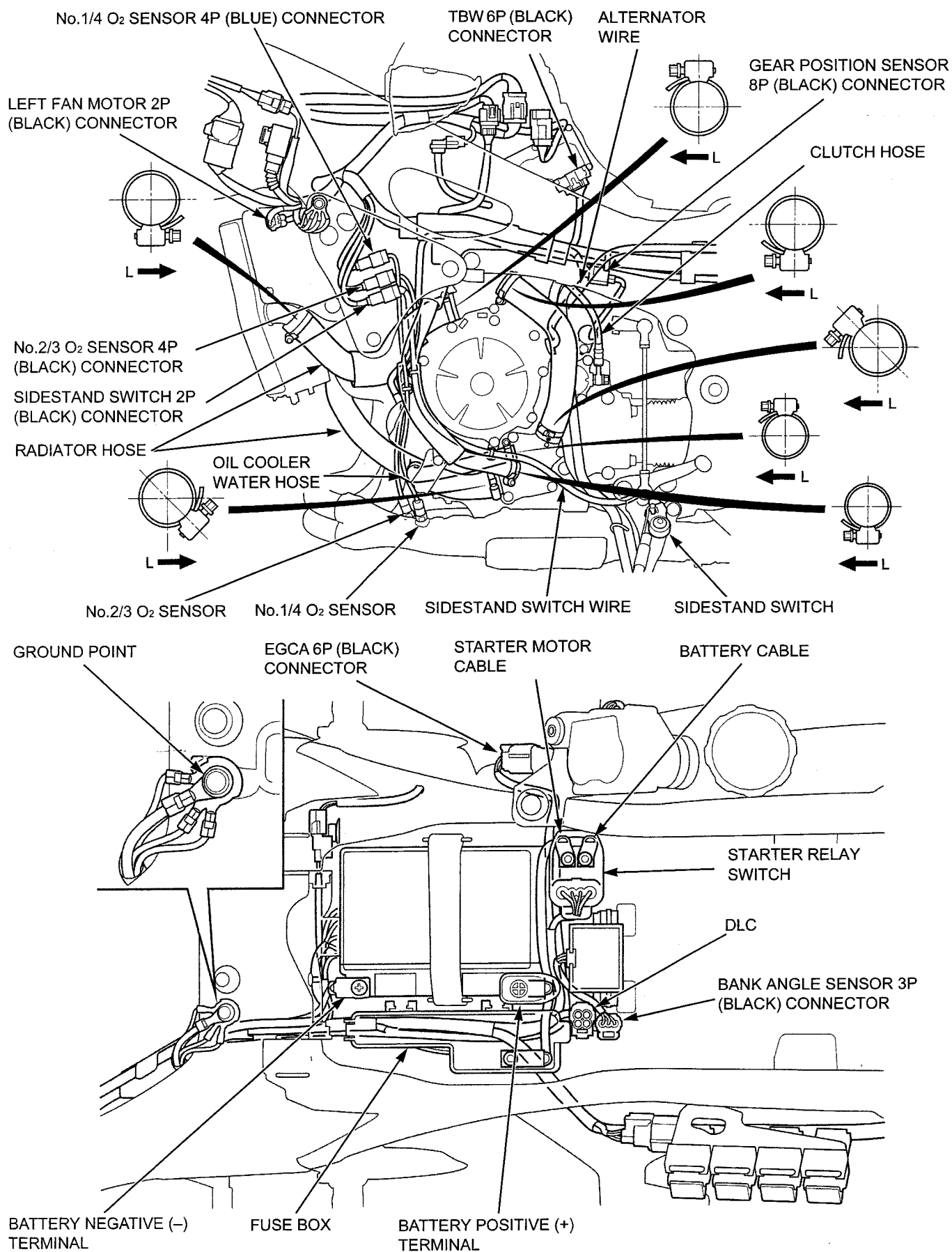
SIPHON HOSE

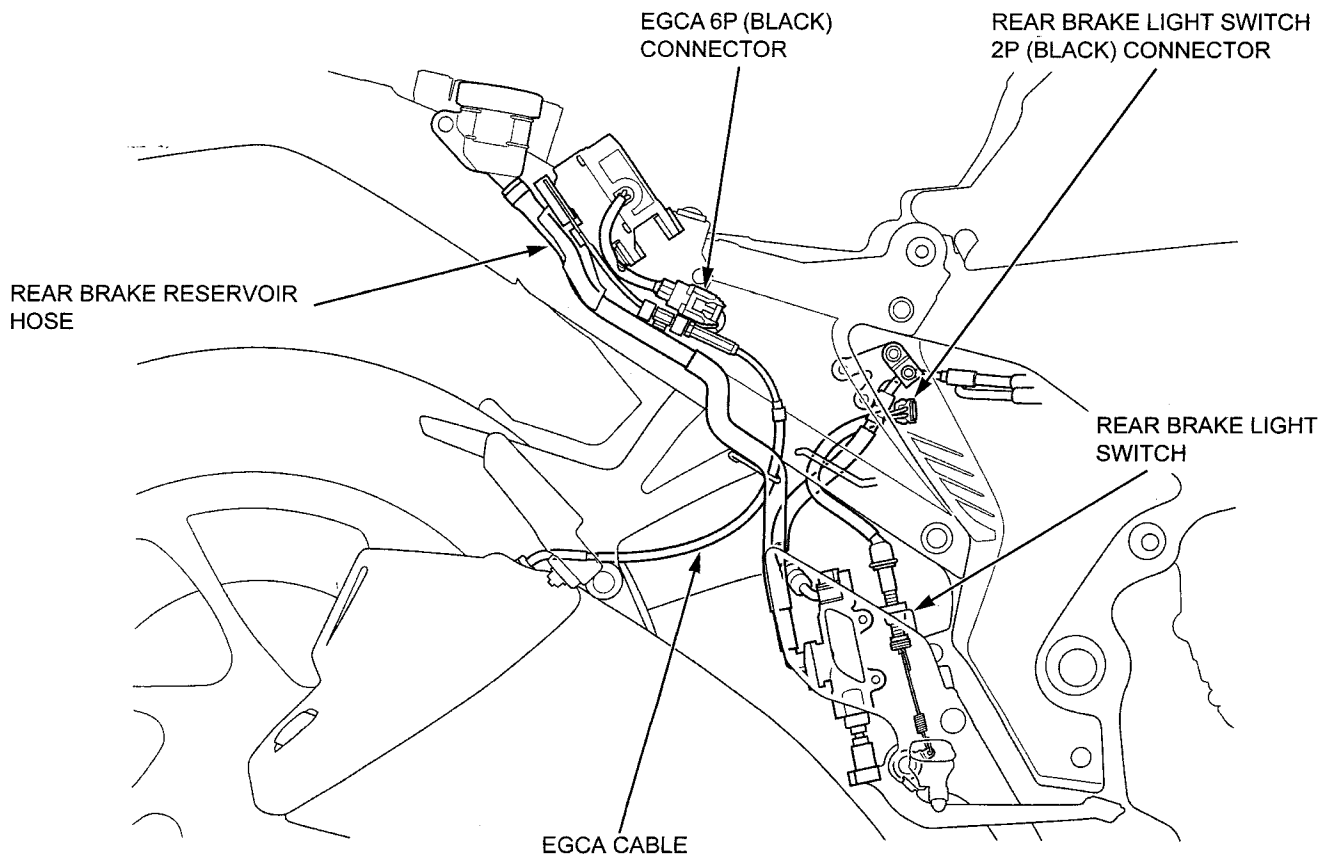
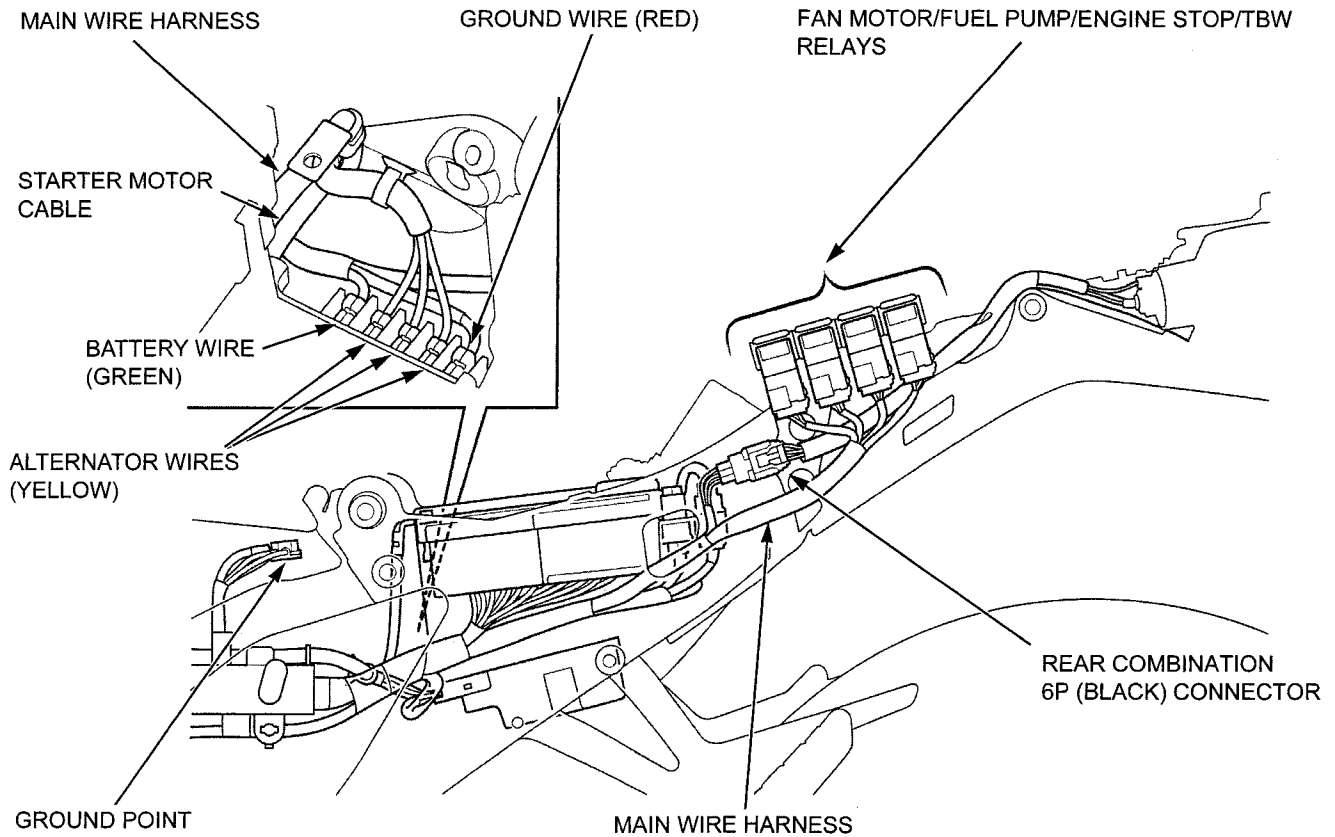
RIGHT FAN MOTOR 2P (BLACK) CONNECTOR

CKP SENSOR 2P (BLACK) CONNECTOR



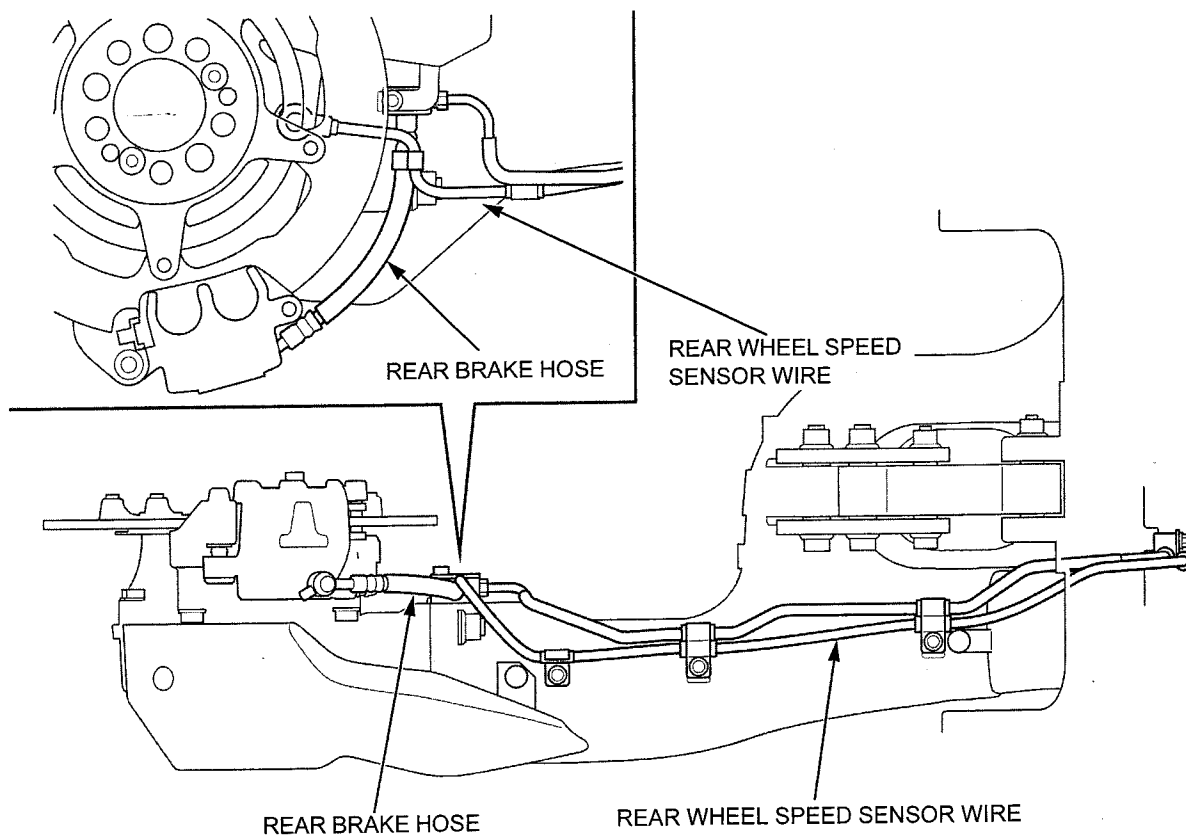
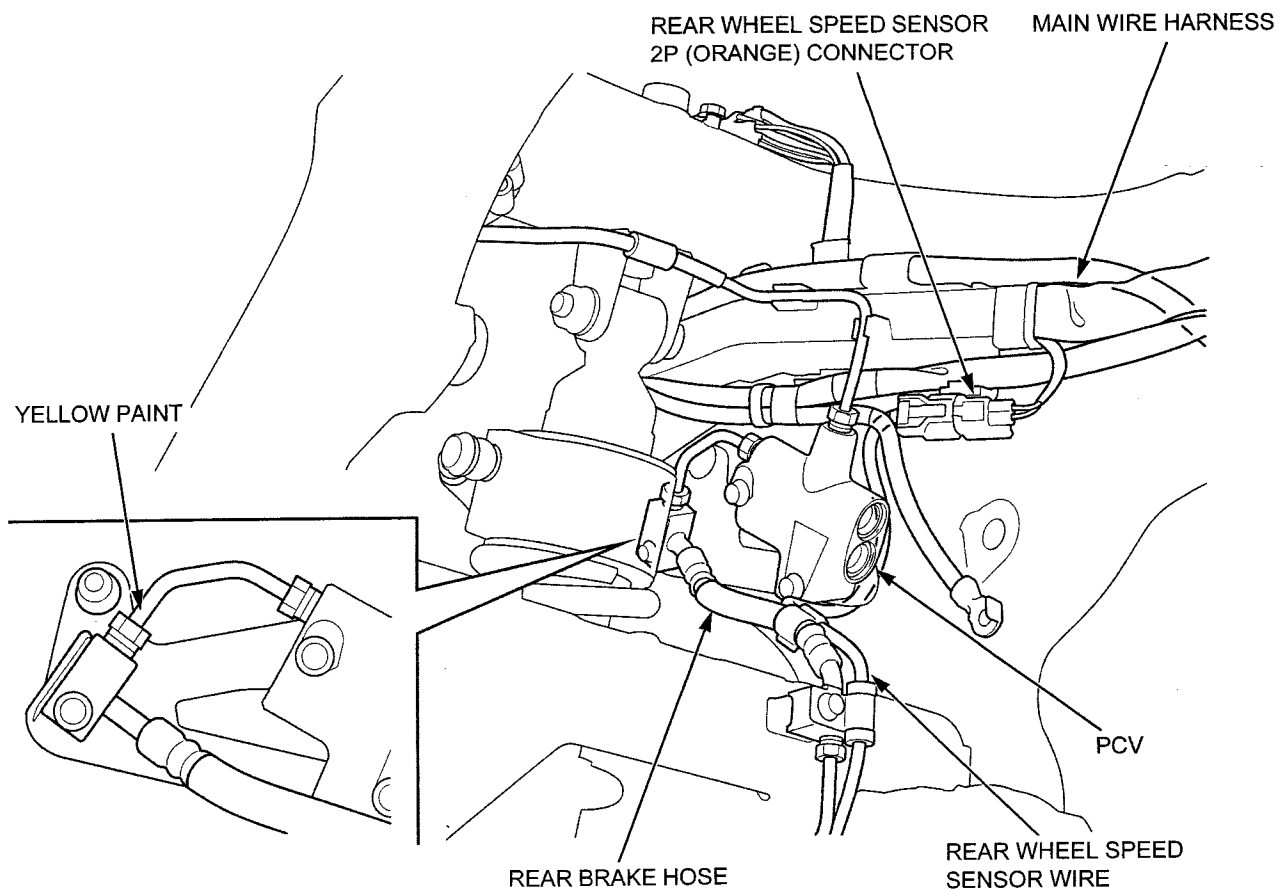
## GENERAL INFORMATION

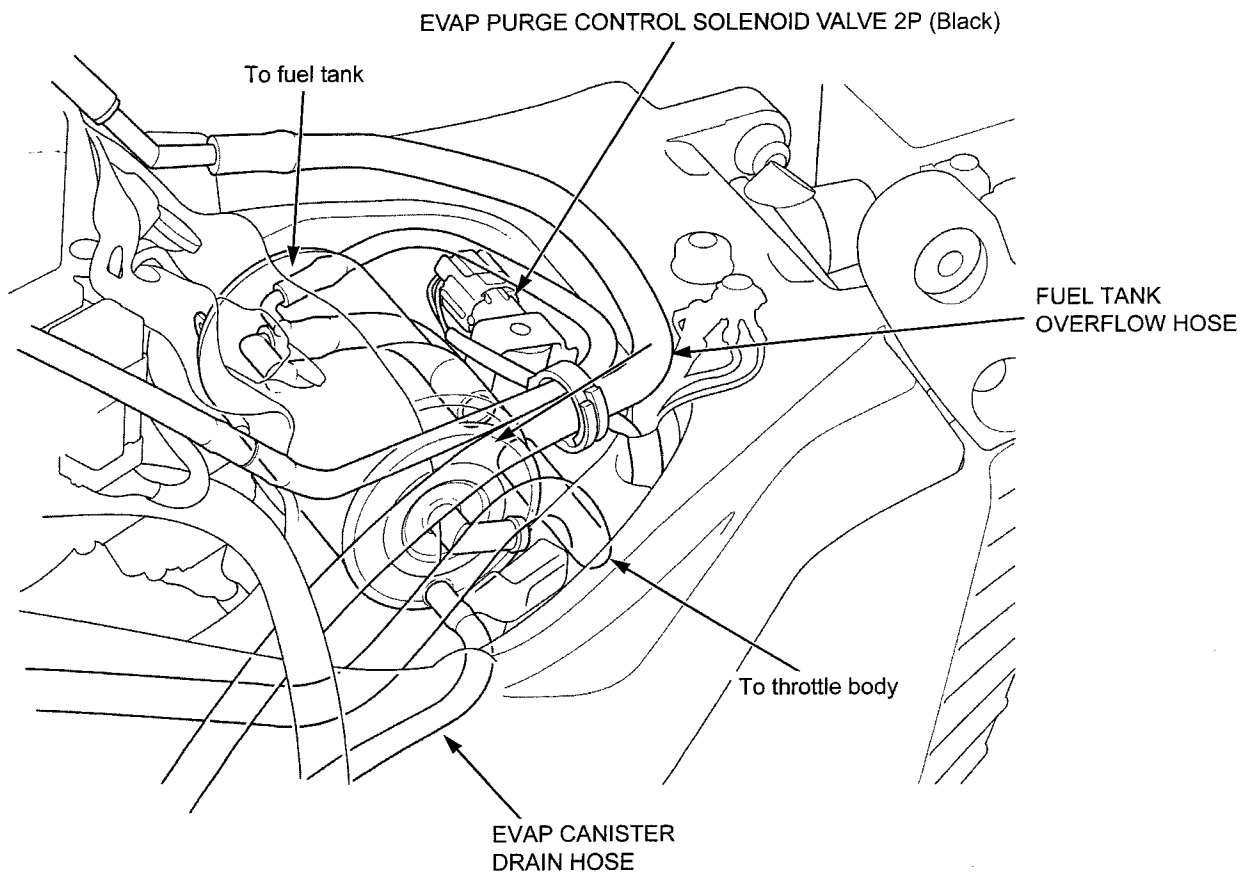
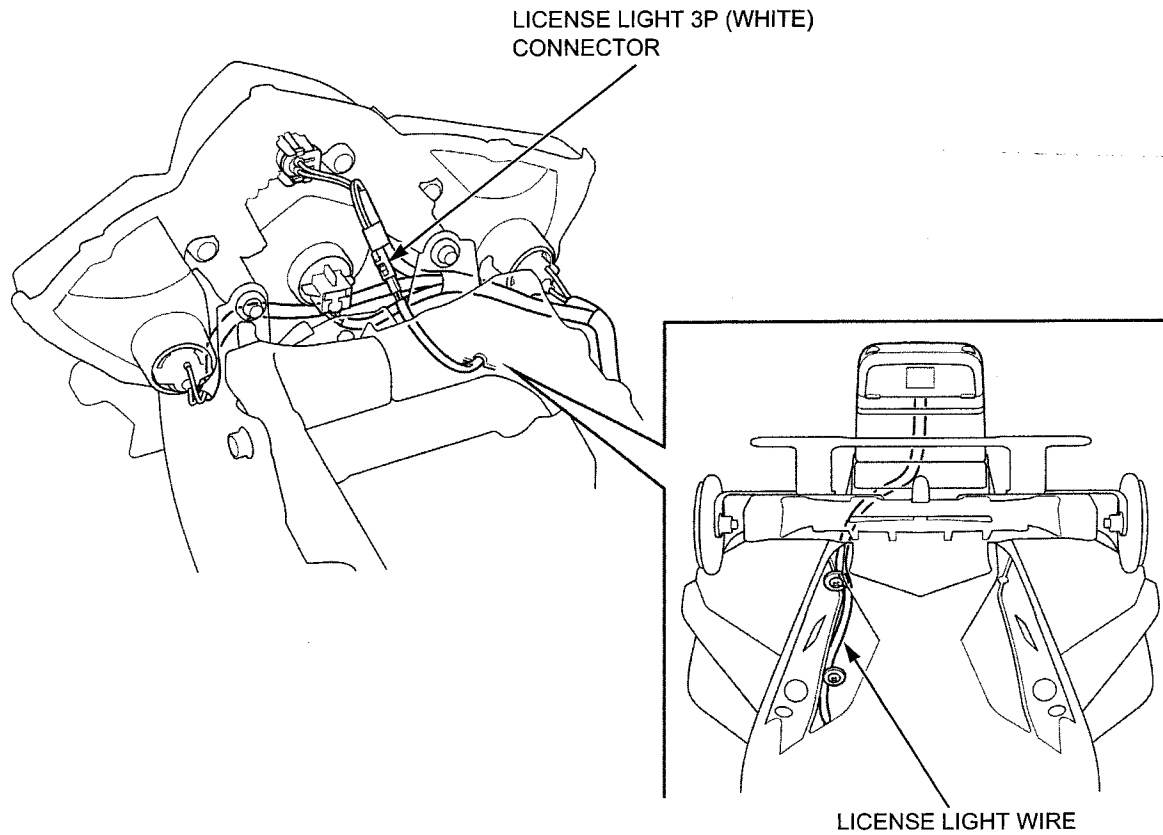






## GENERAL INFORMATION





## GENERAL INFORMATION

# EMISSION CONTROL SYSTEMS

## EXHAUST EMISSION REQUIREMENT

The U.S. Environmental Protection Agency (EPA), California Air Resources Board (CARB) and Transport Canada require manufacturers to certify that their motorcycle comply with applicable exhaust emissions standards during their useful life, when operated and maintained according to the instructions provided.

## NOISE EMISSION REQUIREMENT

The EPA also requires that motorcycles built after January 1, 1983 comply with applicable noise emission standards for one year or 6,000 km (3,730 miles) after the time of sale to the ultimate purchaser, when operated and maintained according to the instructions provided.

## WARRANTY COMPLIANCE

Compliance with the terms of the Distributor's Limited Warranty for Honda Motorcycle Emission Control Systems is necessary in order to keep the emissions system warranty in effect.

## SOURCE OF EMISSIONS

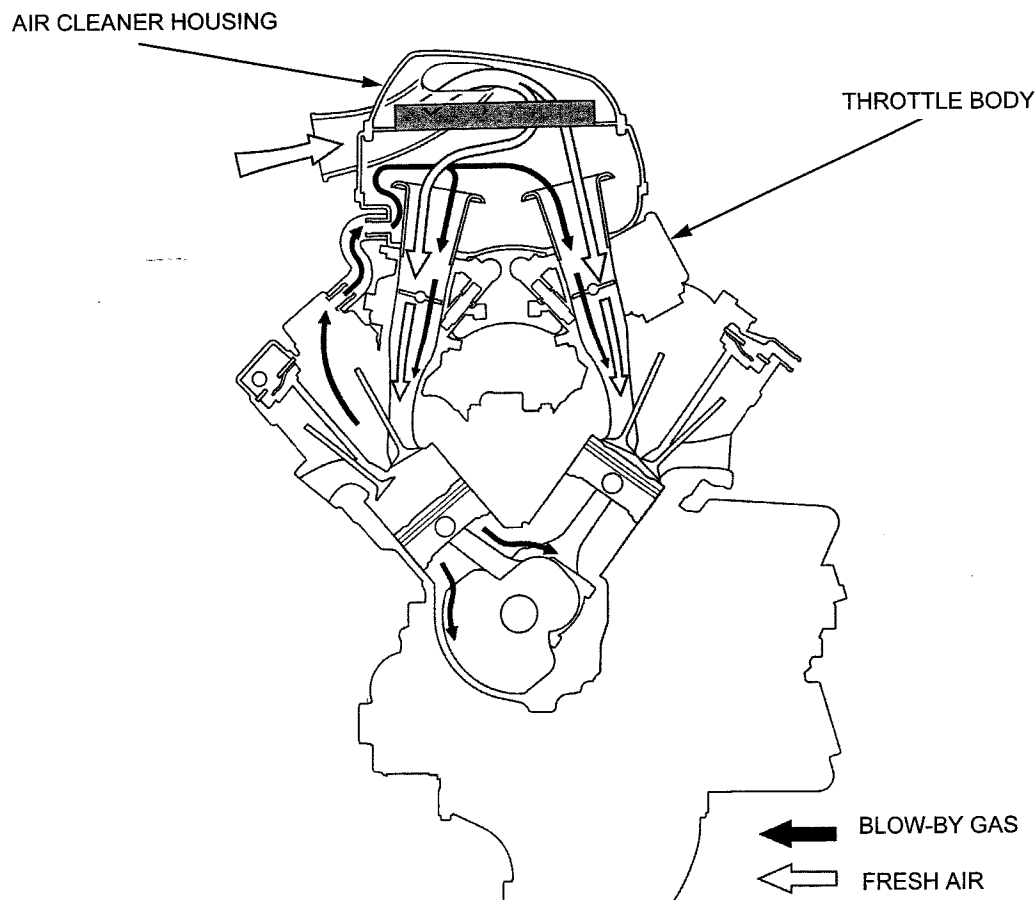
The combustion process produces carbon monoxide (CO), oxides of nitrogen (NOx) and hydrocarbons (HC). Control of carbon monoxide, oxides of nitrogen and hydrocarbons is very important because, under certain conditions, they react to form photochemical smog when subject to sunlight. Carbon monoxide does not react in the same way, but it is toxic. Uncontrolled fuel evaporation also releases hydrocarbons to the atmosphere.

Honda Motor Co., Ltd. utilizes various system to reduce carbon monoxide, hydrocarbons, and oxides of nitrogen.

## CRANKCASE EMISSION CONTROL SYSTEM

The engine is equipped with a closed crankcase system to prevent discharging crankcase emissions into the atmosphere.

Blow-by gas is returned to the combustion chamber through the air cleaner and throttle body.



## EXHAUST EMISSION CONTROL SYSTEM

The exhaust emission control system is composed of a secondary air injection system, a three-way catalytic converter and PGM-FI system.

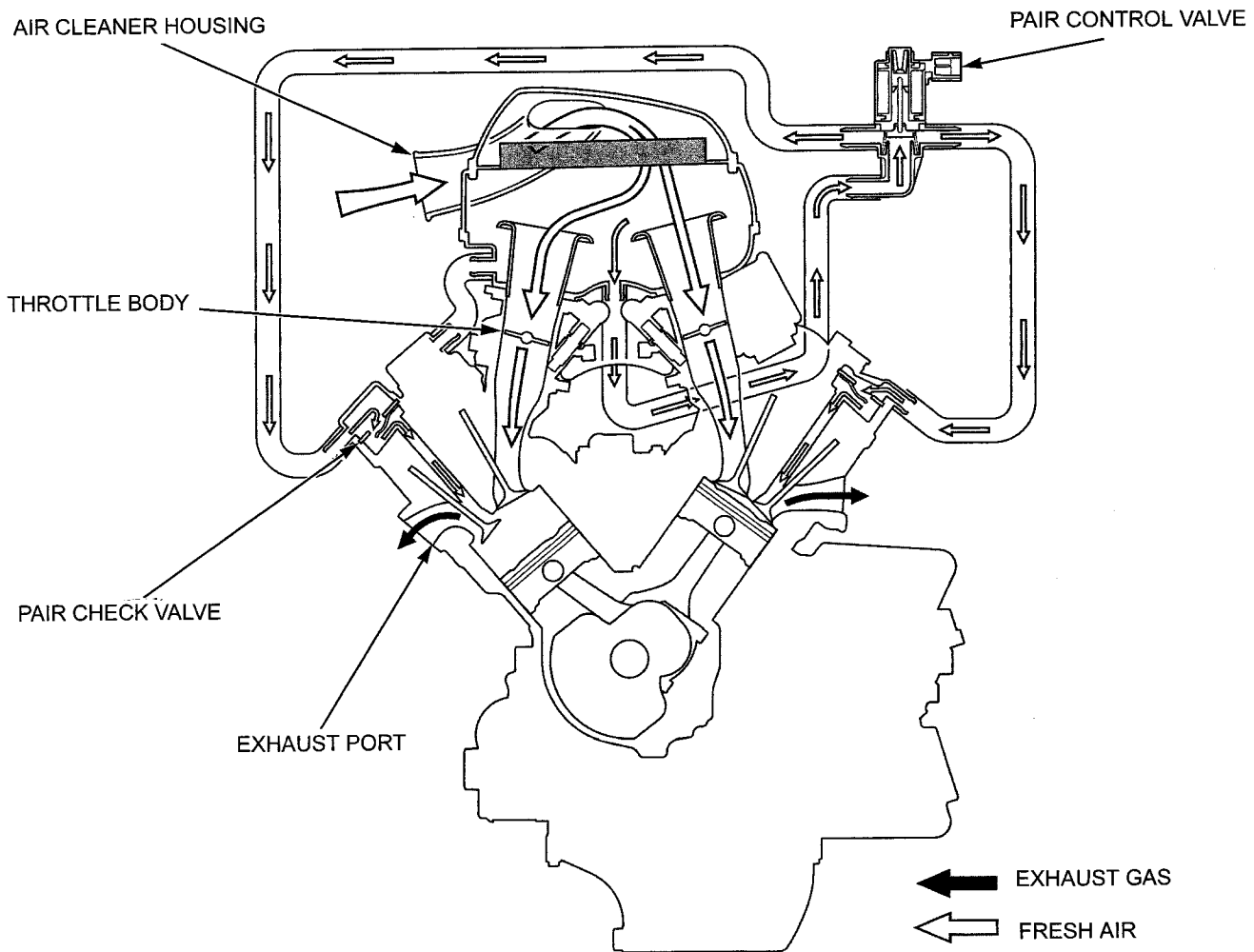
### SECONDARY AIR SUPPLY SYSTEM

The secondary air supply system introduces filtered air into the exhaust gases in the exhaust port. Fresh air is drawn into the exhaust port by the function of the PAIR (Pulse Secondary Air Injection) control valve.

This charge of fresh 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 vapor.

The reed valve prevents reverse air flow through the system. The PAIR control valve is operated by the solenoid valve. The solenoid valve is controlled by the ECM, and the fresh air passage is opened/closed according the running condition (ECT/IAT/TP/MAP sensor and engine revolution).

No adjustments to the secondary air supply system should be made, although periodic inspection of the components is recommended.



### THREE-WAY CATALYTIC CONVERTER

This motorcycle is also equipped with three-way catalytic converter, and two heated oxygen sensors.

The three-way catalytic converter is in the exhaust system. Through chemical reactions, they convert HC, CO, and NO<sub>x</sub> in the engine's exhaust to carbon dioxide (CO<sub>2</sub>), nitrogen (N<sub>2</sub>), and water vapor.

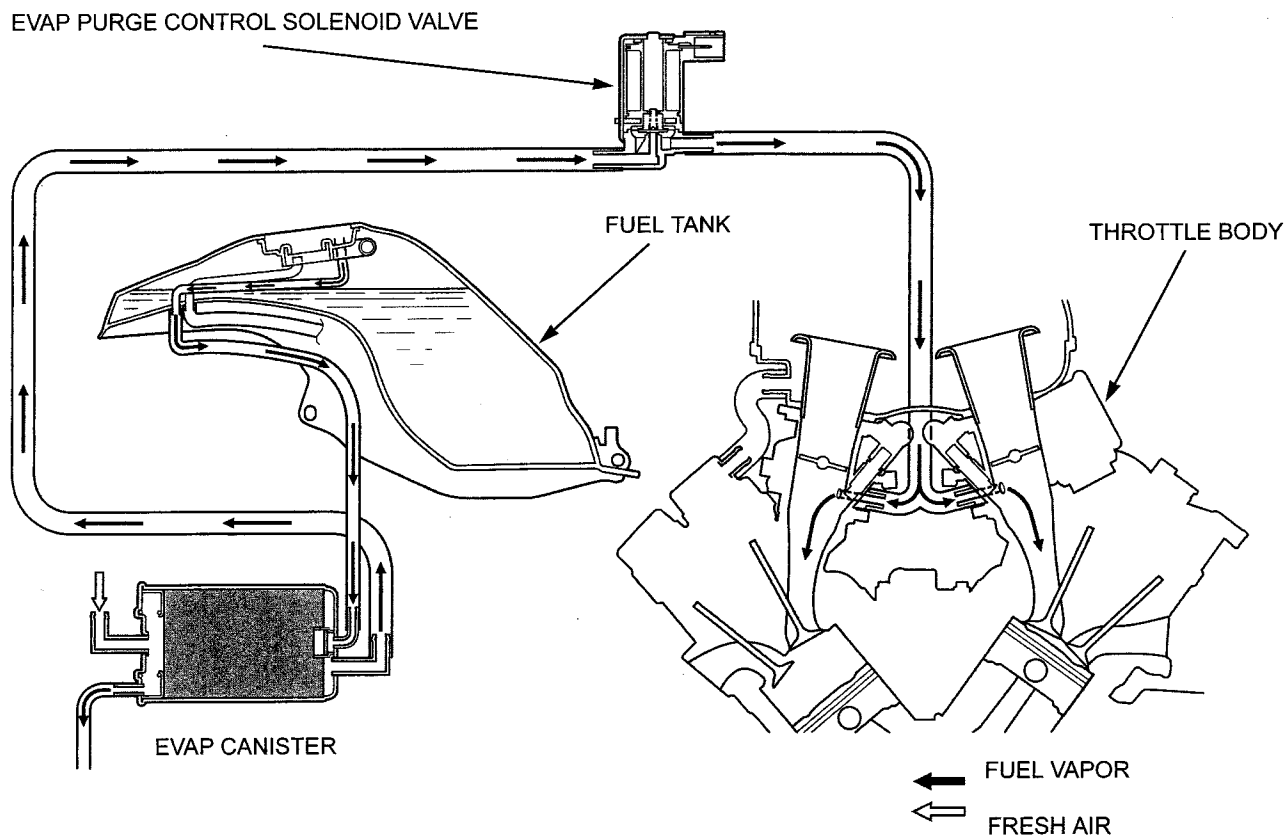
No adjustment to these systems should be made although periodic inspection of the components is recommended.

## GENERAL INFORMATION

### EVAPORATIVE EMISSION CONTROL SYSTEM

This model complies with California Air Resources Board evaporative emission requirements.

Fuel vapor from the fuel tank is routed into the evaporative emission (EVAP) canister where it is absorbed and stored while the engine is stopped. When the engine is running and the evaporative emission (EVAP) purge control solenoid valve is open, fuel vapor in the EVAP canister is drawn into the engine through the throttle body.



### NOISE EMISSION CONTROL SYSTEM

**TAMPERING WITH THE NOISE CONTROL SYSTEM IS PROHIBITED:** U.S. Federal Law and Canadian provincial Law prohibits the following acts or the causing thereof: (1) The removal or rendering inoperative by any person, other than for purposes of maintenance, repair, or replacement, of any device or element of design incorporated into any new vehicle for the purpose of noise control prior to its sale or delivery to the ultimate purchaser or while it is in use; (2) the use of the vehicle after such device or element of design has been removed or rendered inoperative by any person.

**AMONG THOSE ACTS PRESUMED TO CONSTITUTE TAMPERING ARE THE ACTS LISTED BELOW:**

1. Removal or puncturing of the muffler, baffles, header pipes or any other component which conducts exhaust gases.
2. Removal or puncturing of any part of the intake system.
3. Lack of proper maintenance.
4. Replacing any moving parts of the vehicle, or parts of the exhaust or intake system, with parts other than those specified by the manufacturer.

### FUEL PERMEATION EMISSION CONTROL SYSTEM

This motorcycle complies with the Fuel Permeation Emission Control regulations of the U.S. Environmental Protection Agency (EPA), California Air Resources Board (CARB), and Environment Canada (EC). The fuel tank, fuel hoses, and fuel vapor charge hoses used on this motorcycle incorporate fuel permeation control technologies. Tampering with the fuel tank, fuel hoses, or fuel vapor charge hoses to reduce or defeat the effectiveness of the fuel permeation technologies is prohibited by federal regulations.

## 2. TECHNICAL FEATURES

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OFFSET-PIVOT SWINGARM.....2-4

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FRONT MONOBLOCK SIX PISTON  
OPPOSED CALIPER .....2-5

## TECHNICAL FEATURES

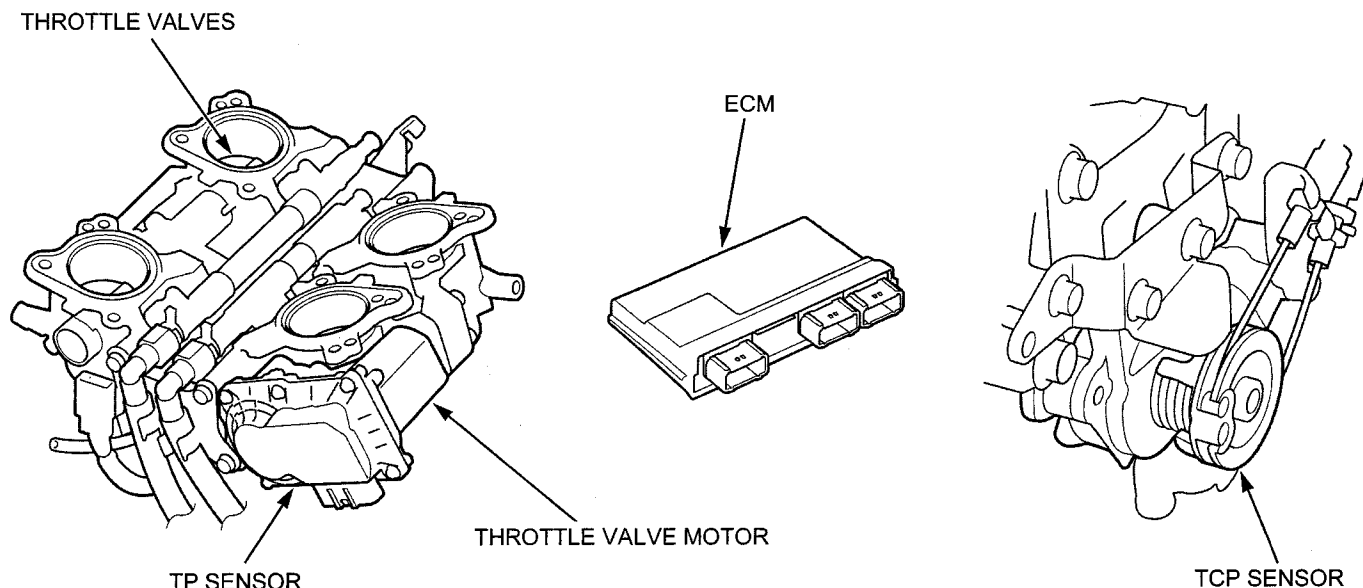
# THROTTLE BY WIRE (TBW) SYSTEM

## OUTLINE

This motorcycle is equipped with an electronically controlled Throttle By Wire (TBW) system.

The system utilizes various sensors and controls to improve engine responsiveness and operation by providing fuel delivery that is smoother and more precise.

The system is comprised of the throttle valves, throttle valve motor, TP (Throttle Position) sensor, TCP (Throttle Control Position) sensor, and ECM. The TBW system also utilizes information from the MAP, ECT, Gear Position, and Rear Wheel Speed sensors.



TBW system includes follow functions:

1. Engine idle control function:

When the engine is idling, the ECM automatically controls the throttle valve to maintain the proper idle speed according to engine loads.

2. Intake air control function:

The ECM controls the amount of intake air according to vehicle speed and driving conditions, which eliminates the need for a variable induction system and also reduces air induction noise.

3. Acceleration control function:

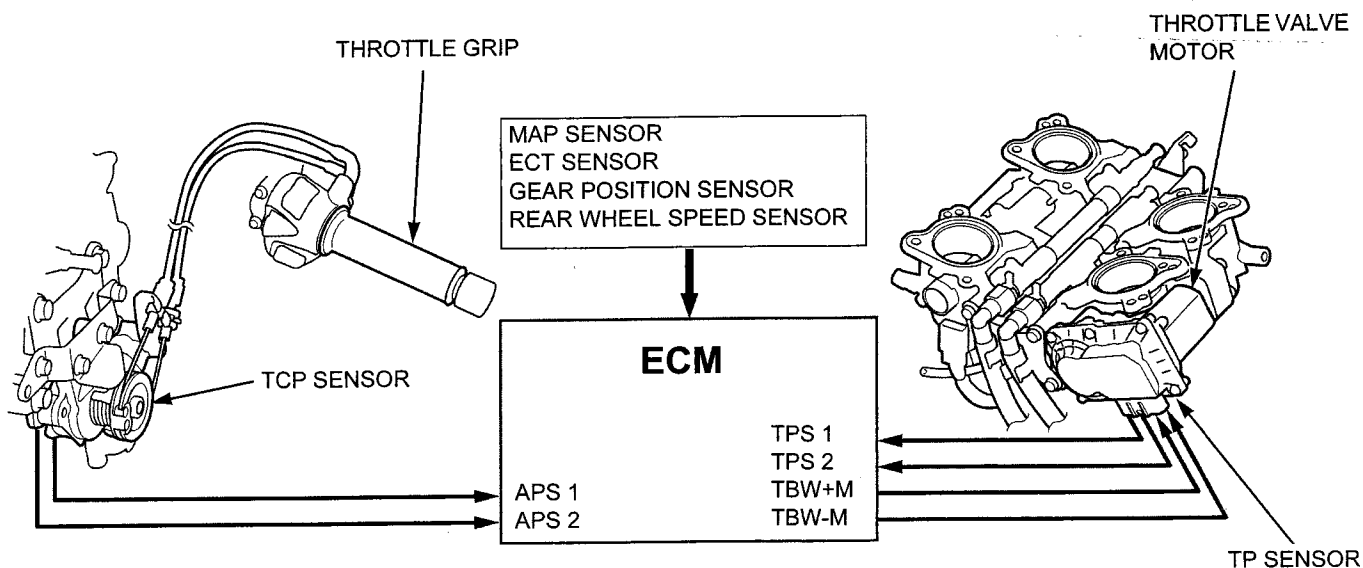
When the rider operates the throttle grip, the ECM controls the throttle valve opening based on signals from the TCP and other sensors.

4. Fail-safe function:

The TBW system includes a fail-safe function that limits the engine or vehicle speed if a component of the system malfunctions.

## OPERATION

When the rider operates the throttle grip, the TCP sensor detects the throttle grip position and sends the information to the ECM. The ECM processes this information and that from the TP and other sensors to activate the throttle valves via the throttle valve motor.

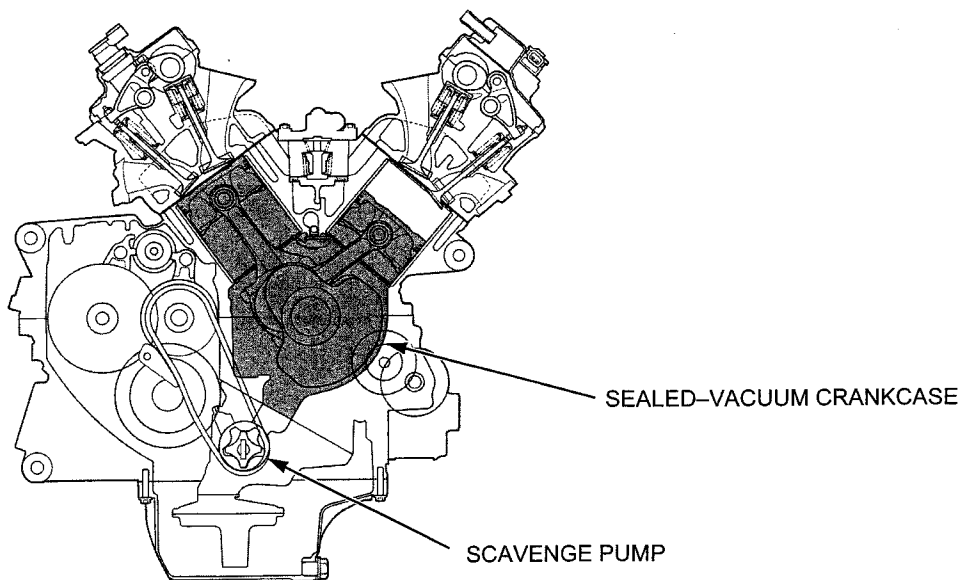


## SEALED-LOW AIR PRESSURE CRANKCASE

### OUTLINE

This motorcycle's engine utilizes a sealed-low air pressure crankcase design. This feature reduces friction and mechanical pumping (windage) losses, and allows for a more compact engine.

Similar in design to racing engines, the engine uses an oil scavenge pump to create low air pressure in the sealed crankcase chamber while also pumping oil from the chamber to lubricate the transmission.





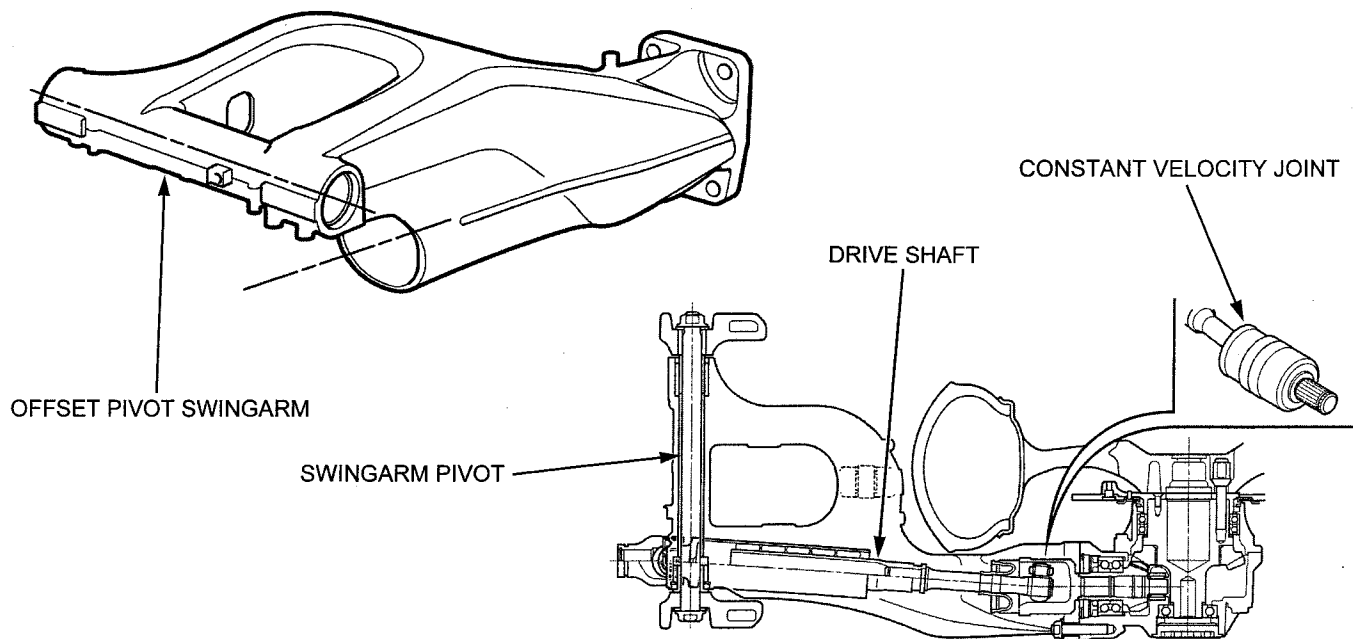
## TECHNICAL FEATURES

### OFFSET-PIVOT SWINGARM

#### OUTLINE

This motorcycle's chassis includes an offset-pivot swingarm. This design allows for optimum swingarm and driveshaft lengths without extending the overall length of the motorcycle. It also helps to eliminate torque-induced shaftdrive jacking common on conventional shaftdrive designs.

The offset design places the driveshaft below the swingarm pivot point, to align with the output shaft, and utilizes a constant velocity joint to manage length variations.

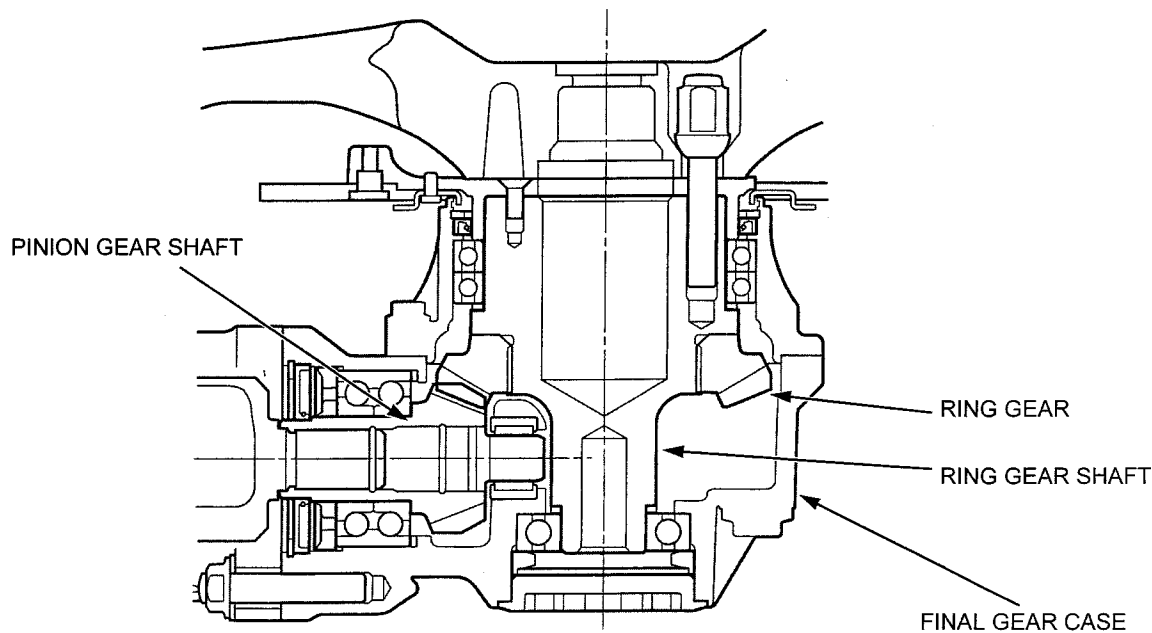


### COMPACT FINAL GEAR CASE

#### OUTLINE

This motorcycle utilizes a compact final gear case design.

The size and weight of the final gear case was reduced by using a smaller ring gear, which was made possible by offsetting the ring and pinion gear shafts.



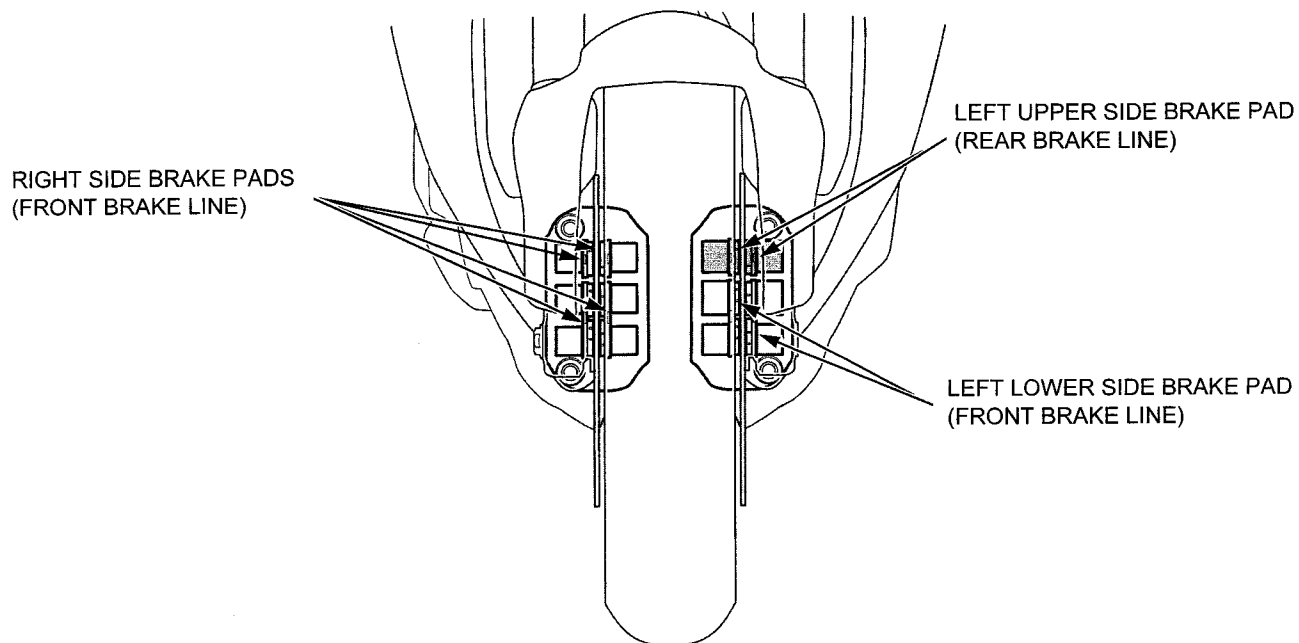
## FRONT MONOBLOCK SIX PISTON OPPOSED CALIPER

### OUTLINE

This motorcycle's braking system includes front wheel, radially mounted, six-piston calipers, which improve braking performance.

The six-piston calipers have four separate brake pads, two on each side of the caliper. The upper pads on both sides of each caliper are operated by one piston each and the lower, larger pads are operated by two pistons each.

The upper two opposed brake pads of the left caliper are combined with the rear brake and are only operated when the rear brake pedal is applied. The rest of the brake pads are operated by the front brake lever.



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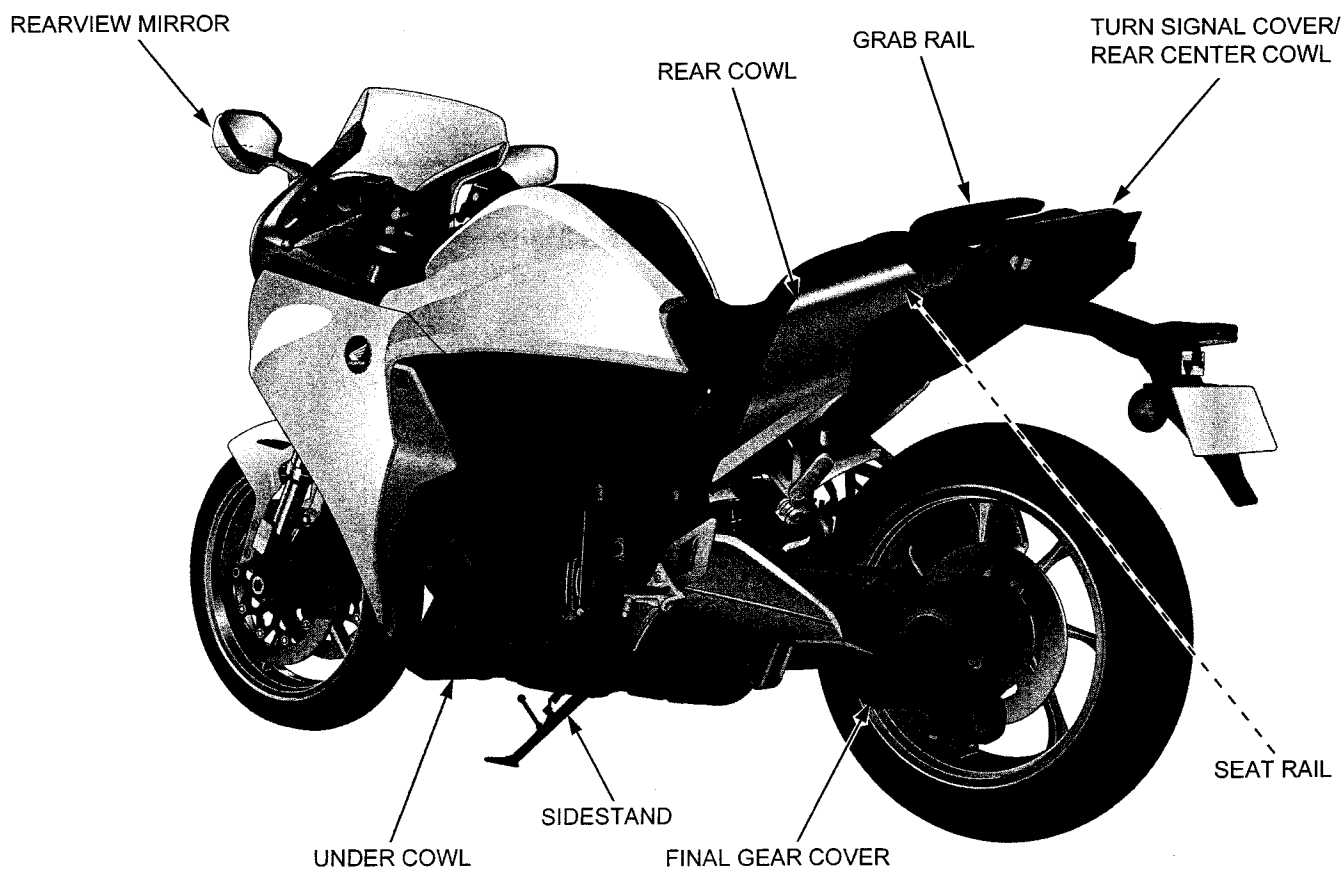
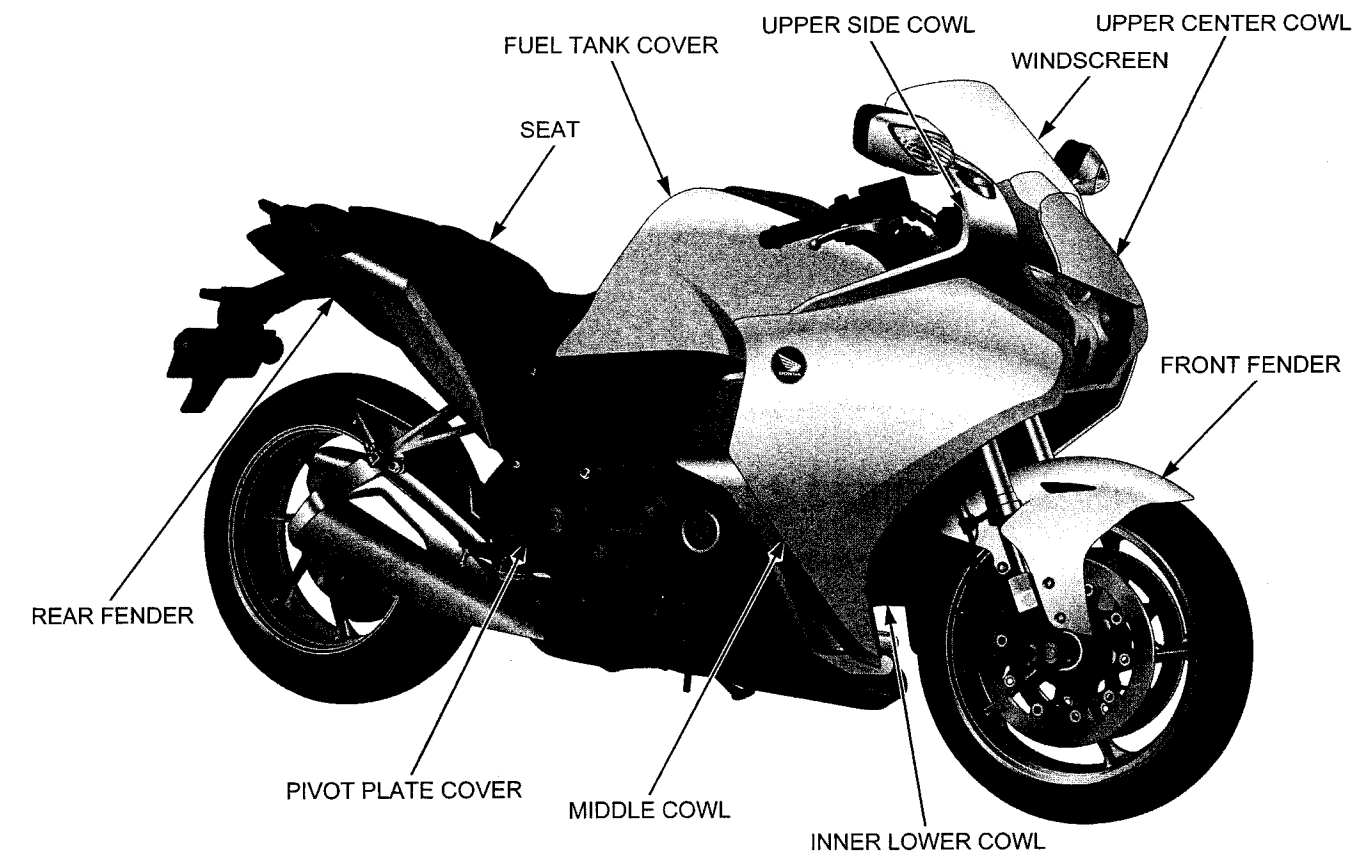
# MEMO

# 3. FRAME/BODY PANELS/EXHAUST SYSTEM

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## BODY PANEL LOCATIONS



## SERVICE INFORMATION

### GENERAL

- 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, exhaust system and sidestand.
- Serious burns may result if the exhaust system is not allowed to cool before components are removed or serviced.
- Always replace the exhaust pipe gaskets after removing the exhaust pipes 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.
- Always inspect the exhaust system for leaks after installation.

### TORQUE VALUES

Rear fender stay mounting bolt (short)	32 N·m (3.3 kgf·m, 24 lbf·ft)	See page 3-30
Rear fender stay mounting bolt (long)	32 N·m (3.3 kgf·m, 24 lbf·ft)	
Seat rail assembly flange bolt	30 N·m (3.1 kgf·m, 22 lbf·ft)	
Center cross plate mounting bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	
Passenger footpeg bracket flange bolt	32 N·m (3.3 kgf·m, 24 lbf·ft)	
Seat rail upper mounting flange bolt/nut	34 N·m (3.5 kgf·m, 25 lbf·ft)	
Seat rail lower mounting flange bolt	34 N·m (3.5 kgf·m, 25 lbf·ft)	
Rear brake reservoir tank mounting bolt	10 N·m (1.0 kgf·m, 7 lbf·ft)	
EGCA cable joint nut	21 N·m (2.1 kgf·m, 15 lbf·ft)	
Muffler rear guard bolt	5.2 N·m (0.5 kgf·m, 3.8 lbf·ft)	
Muffler upper guard bolt	10 N·m (1.0 kgf·m, 7 lbf·ft)	
Exhaust pipe muffler band	17 N·m (1.7 kgf·m, 13 lbf·ft)	
Exhaust pipe joint special nut	12 N·m (1.2 kgf·m, 9 lbf·ft)	
Rider footpeg bracket socket bolt	34 N·m (3.5 kgf·m, 25 lbf·ft)	
Sidestand pivot bolt	—	
Sidestand pivot nut	29 N·m (3.0 kgf·m, 21 lbf·ft)	

## TROUBLESHOOTING

### Excessive exhaust noise

- Broken exhaust system
- Exhaust gas leak

### Poor performance

- Deformed exhaust system
- Exhaust gas leak
- Clogged muffler

### SEAT

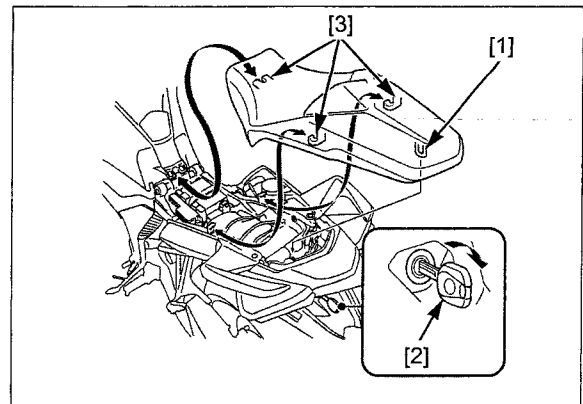
#### REMOVAL/INSTALLATION

Unlock the seat [1] using the ignition key [2].

Pull the seat back and remove it.

Install the seat while aligning its hooks [3] with the retainers on the fuel tank and seat rail.

Push the seat forward, then down to lock it.



### REAR COWL

#### REMOVAL/INSTALLATION

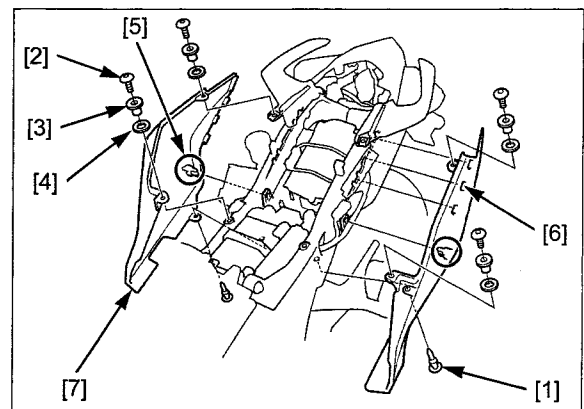
Remove the seat (page 3-4).

Remove the clips [1], special screws [2], collars [3], and rubber washers [4].

*Be careful not to damage the hooks and tabs.*

Release the hooks [5], tabs [6] and remove the rear cowls [7].

Installation is in the reverse order of removal.



### GRAB RAIL

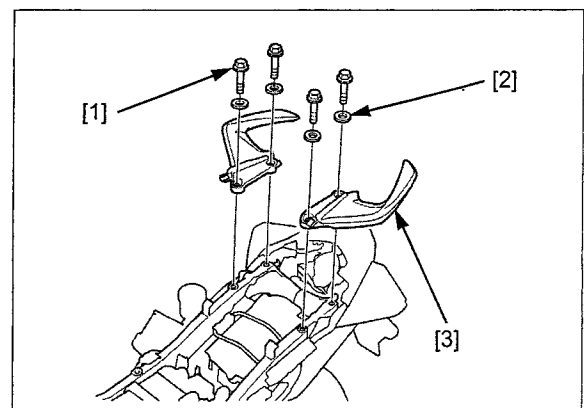
#### REMOVAL/INSTALLATION

Remove the rear cowls (page 3-4).

Remove the bolts [1] and washers [2].

Remove the grab rails [3].

Installation is in the reverse order of removal.



## TURN SIGNAL COVER/REAR CENTER COWL

### REMOVAL/INSTALLATION

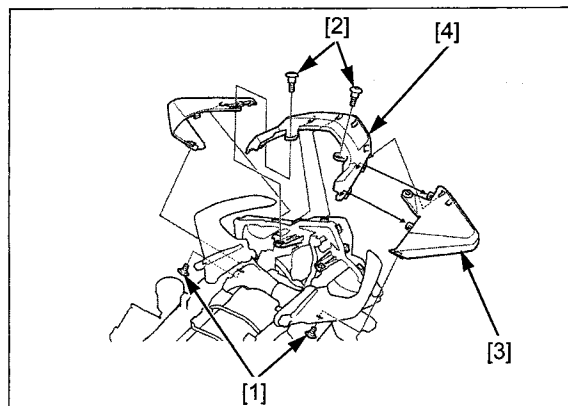
Remove the seat (page 3-4).

Remove the two special screws [1] and two long special screws [2].

*Be careful not to damage the tabs.*

Release the tabs and remove the turn signal covers [3] and rear center cowl [4].

Installation is in the reverse order of removal.

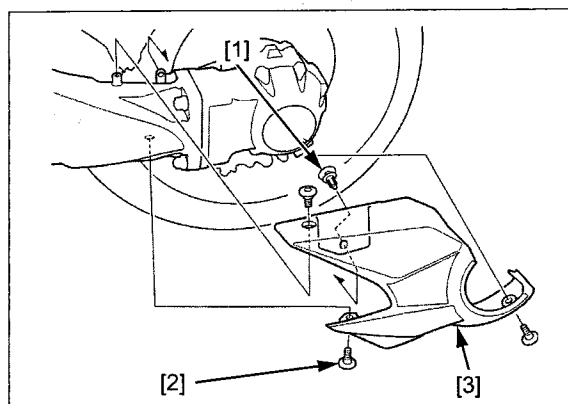


## FINAL GEAR COVER

### REMOVAL/INSTALLATION

Remove the trim clip [1] and special bolts [2], then remove the final gear cover [3].

Installation is in the reverse order of removal.



## PIVOT PLATE COVER

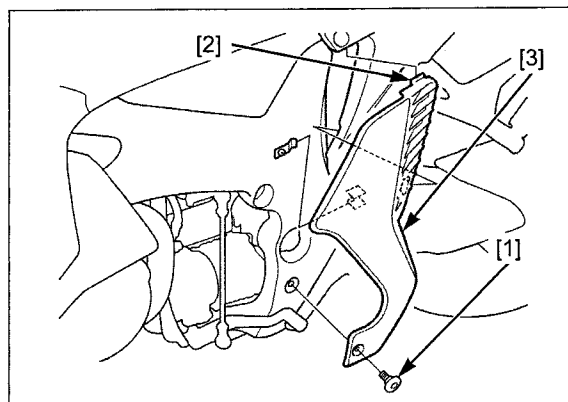
### REMOVAL/INSTALLATION

Remove the special bolt [1].

Release the pivot plate cover tab [2] from the seat rail.

Slide the pivot plate cover [3] rearward and remove the pivot plate cover.

Installation is in the reverse order of removal.





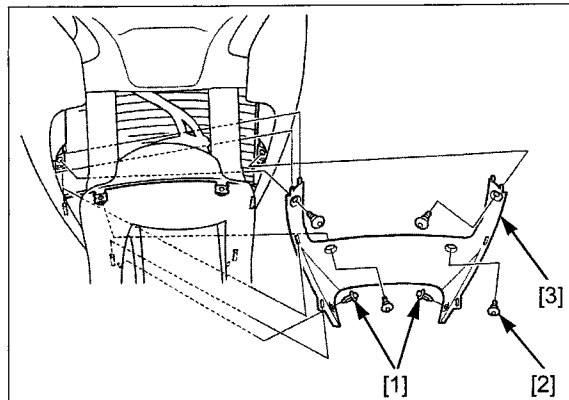
### INNER LOWER COWL

#### REMOVAL/INSTALLATION

*Be careful not to damage the tabs.*

Remove the clips [1], special bolts [2] and inner lower cowl [3].

Installation is in the reverse order of removal.



### UNDER COWL

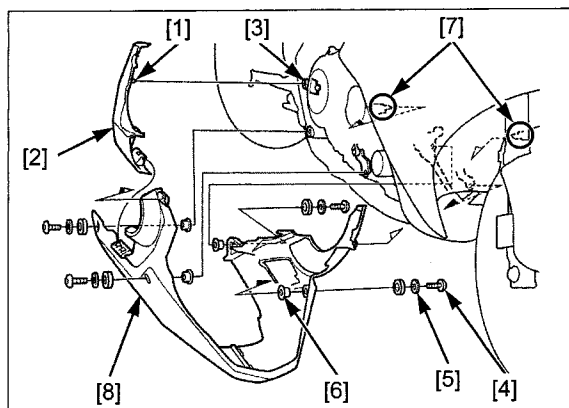
#### REMOVAL/INSTALLATION

Release the boss [1] on the engine heat guard [2] from the engine heat guard stay grommet [3] and remove the engine heat guard.

Remove the special bolts [4], washers [5] and collars [6].

Release the hooks [7] on the middle cowls from the under cowl [8] and remove the under cowl.

Installation is in the reverse order of removal.

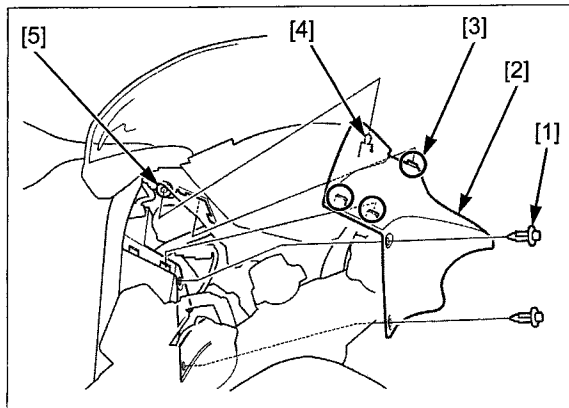


### REARVIEW MIRROR

#### REMOVAL/INSTALLATION

*Be careful not to damage the tabs and bosses.*

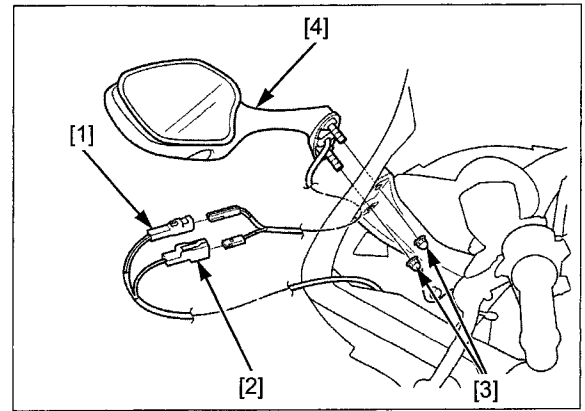
Remove the trim clips [1] and front upper cover A [2] by releasing its tabs [3] and boss [4] from the grommet [5] of upper cover B.



Disconnect the turn signal light 2P connector [1] and position light 1P connector [2].

Remove the nuts [3] and rearview mirror [4].

Installation is in the reverse order of removal.



## MIDDLE COWL

### REMOVAL/INSTALLATION

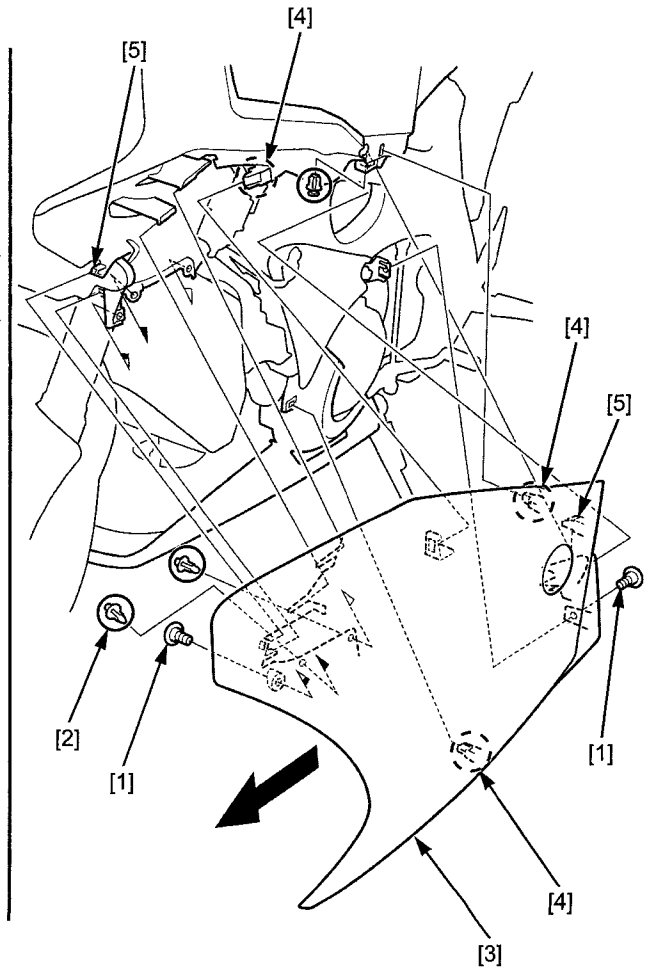
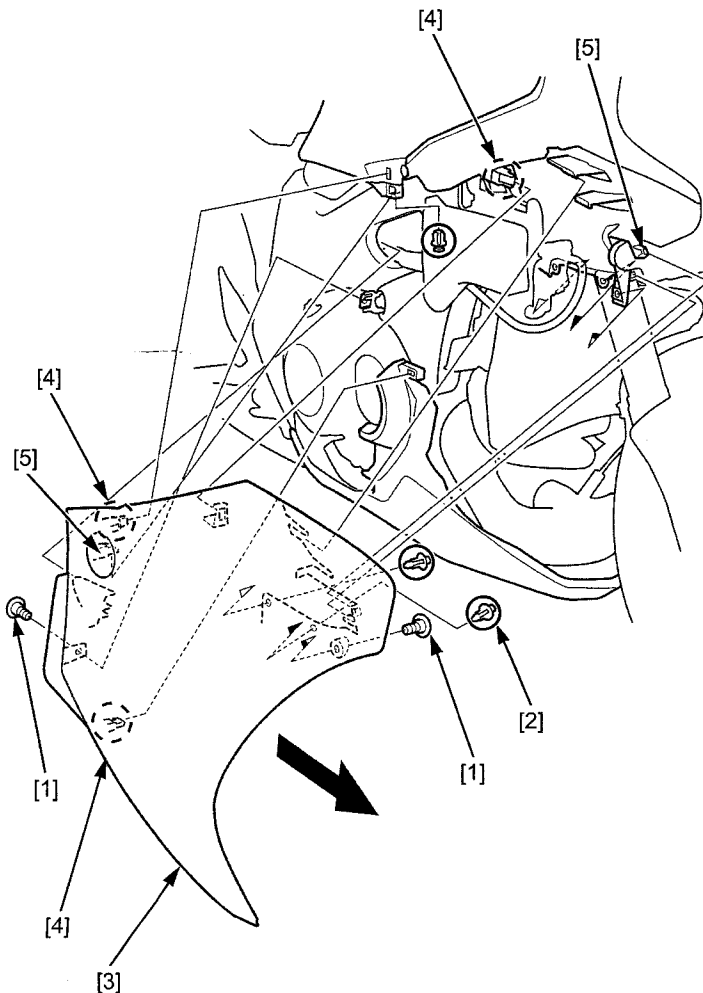
Remove the inner lower cowl (page 3-6).

*Be careful not to damage the tabs and bosses.*

For each side, remove the two special bolts [1] and three clips [2].

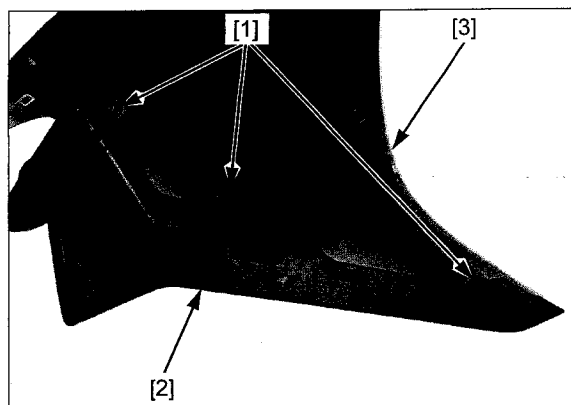
Remove the middle cowl [3] forward by release the three hooks [4] and two bosses [5].

Installation is in the reverse order of removal.

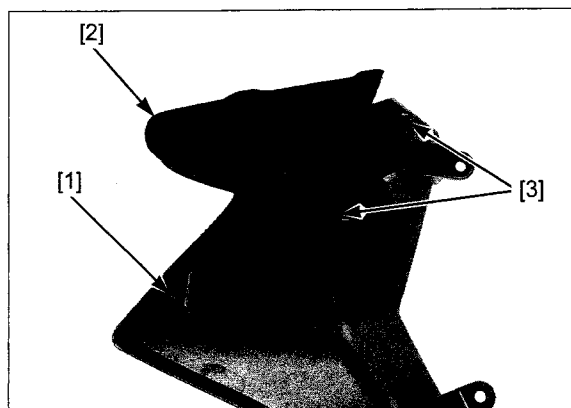


### DISASSEMBLY/ASSEMBLY

Remove the screws [1] and layer cowl [2] from the middle cowl [3].

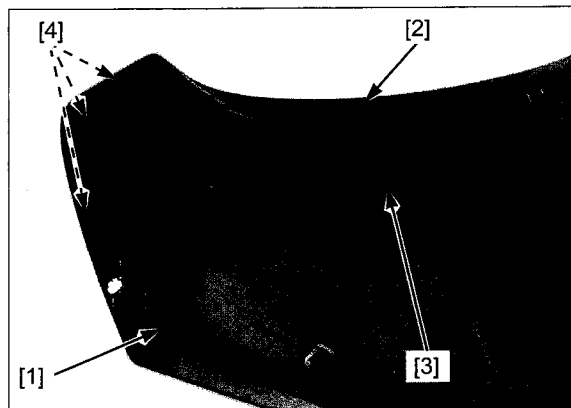


Remove the screw [1] and inner layer cowl [2] by releasing the tabs [3].



Remove the bolt [1], screw [2] and front panel cowl [3] by releasing the tabs [4].

Installation is in the reverse order of removal.



## FUEL TANK COVER

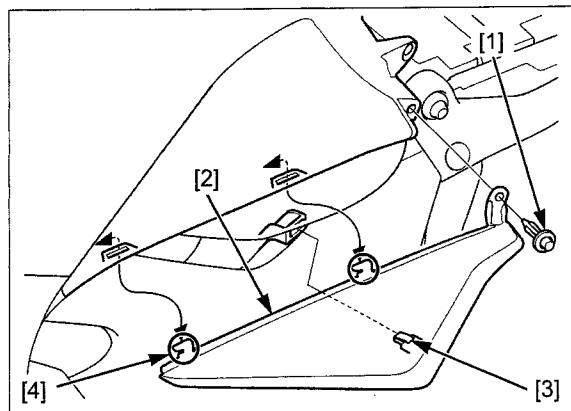
### REMOVAL/INSTALLATION

Remove the following:

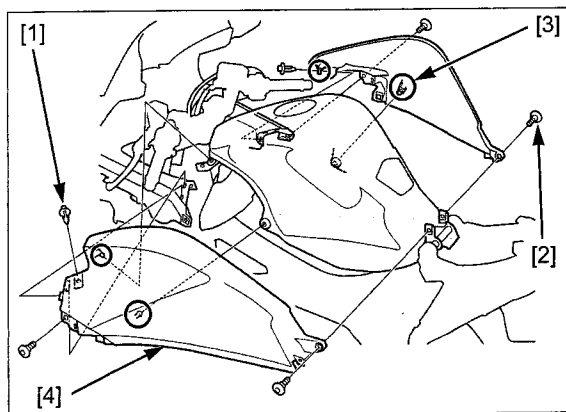
- seat (page 3-4)
- middle cowl (page 3-7)

Remove the trim clip [1] and left knee guard [2] by releasing the hook [3] and tabs [4].

In the same manner, remove the right knee guard.



Remove the two trim clips [1] and four socket bolts [2].  
Release the bosses [3] on the fuel tank covers [4] from the fuel tank and remove the fuel tank covers.  
Installation is in the reverse order of removal.



## UPPER SIDE COWL

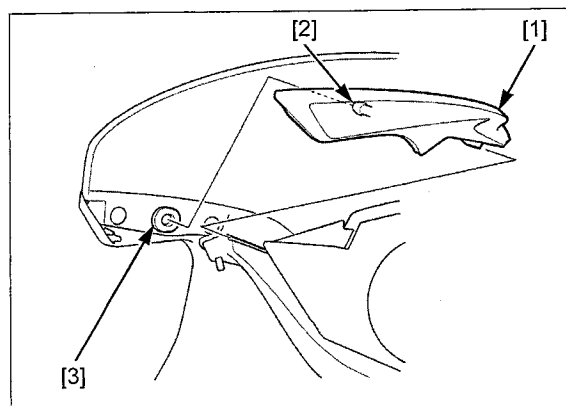
### LEFT UPPER SIDE COWL REMOVAL/INSTALLATION

Remove the following:

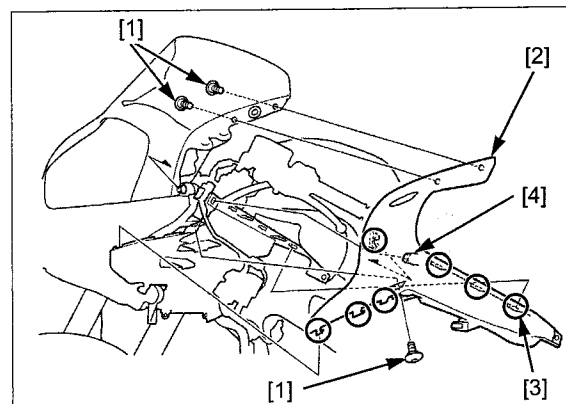
- left rearview mirror (page 3-6)
- left fuel tank cover (page 3-8)

*Be careful not to damage the tabs and bosses.*

Remove the front upper cover C [1] by releasing its boss [2] from the grommet [3] of windscreen.



Remove the three socket bolts [1] and left upper side cowl [2] by releasing the seven hooks [3] and bosses [4].

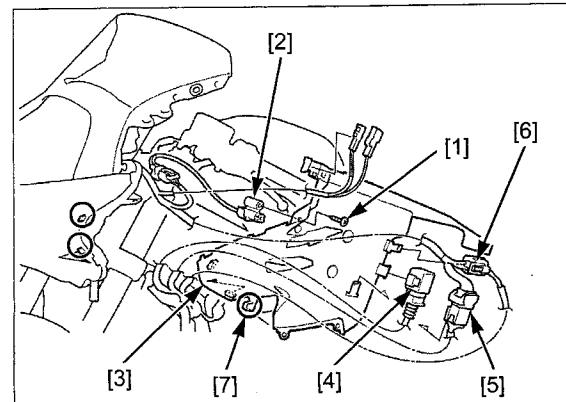


Remove the screw [1] and open air temperature sensor [2] from the inner cowl [3].

Remove the turn signal relay [4], 23P (Black) connector [5] and 4P (Gray) connector [6] from the left inner cowl. Disconnect the 23P connector and 4P connector.

Release the three tabs [7] and remove the inner cowl.

Installation is in the reverse order of removal.



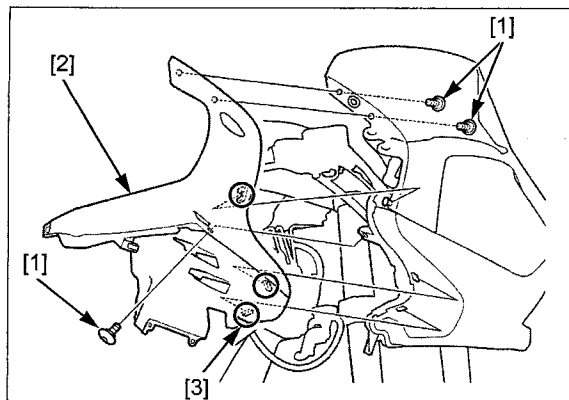
### RIGHT UPPER SIDE COWL REMOVAL/INSTALLATION

Remove the following:

- right rearview mirror (page 3-6)
- right fuel tank cover (page 3-8)
- right front upper cover C (page 3-9)

Remove the three socket bolts [1] and right upper side cowl [2] by releasing the three hooks [3].

Installation is in the reverse order of removal.



### UPPER CENTER COWL/WINDSCREEN REMOVAL/INSTALLATION

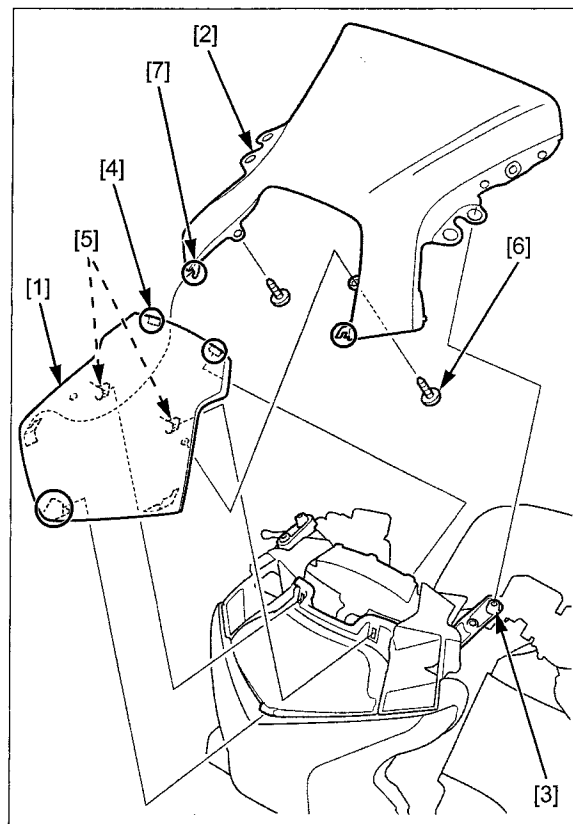
Remove the upper side cowls (page 3-9).

*Be careful not to damage the tabs and bosses.*

Remove the upper center cowl [1]/windscreen [2] assembly forward by releasing the two bosses [3], three tabs [4] and two hooks [5].

Remove the screws [6] and windscreen by releasing the two tabs [7] from the upper center cowl.

Installation is in the reverse order of removal.



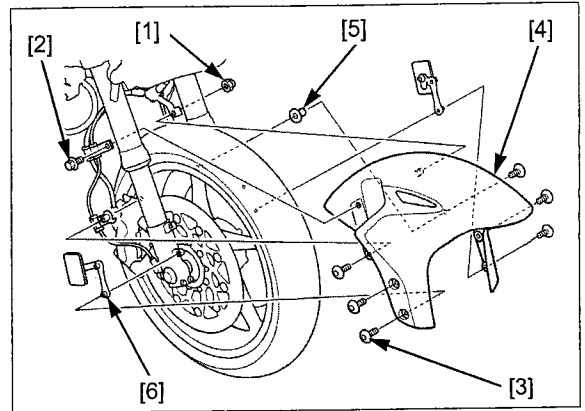
## FRONT FENDER

### REMOVAL/INSTALLATION

Remove the front brake hose clamp nut [1] and clamp bolt [2].

Remove the special screws [3], fender [4], collars [5] and front reflectors [6] from the fork legs.

Installation is in the reverse order of removal.



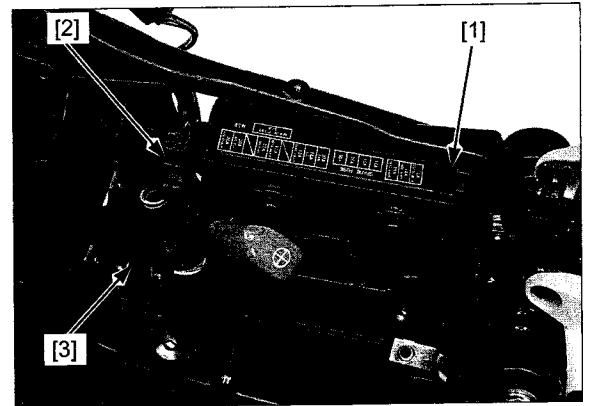
## REAR FENDER

### REMOVAL

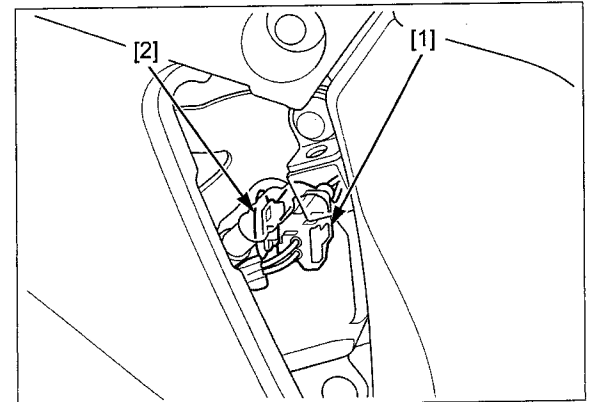
Remove the following:

- battery (page 19-6)
- bank angle sensor (page 6-81)
- grab rails (page 3-4)
- rear combination light (page 22-9)
- pivot plate covers (page 3-5)

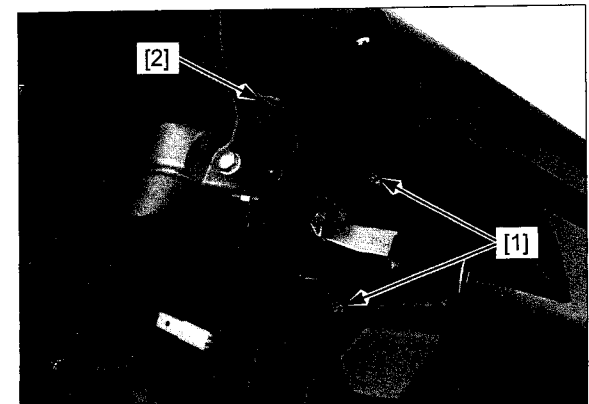
Remove the fuse box [1], DLC [2] and starter relay switch [3] from the rear fender B.



Release the rear brake light switch 2P (Black) connector [1] from the connector stay [2].

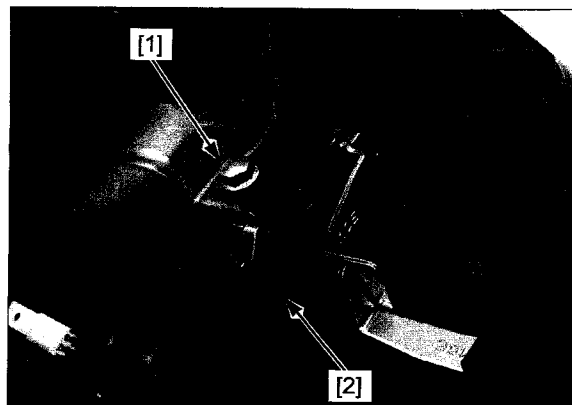


Remove the tapping screws [1] and seat lock cover [2].



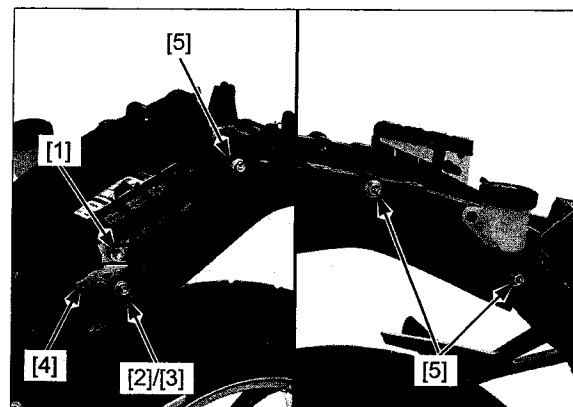
## FRAME/BODY PANELS/EXHAUST SYSTEM

Remove the bolt [1] and seat catch body [2].



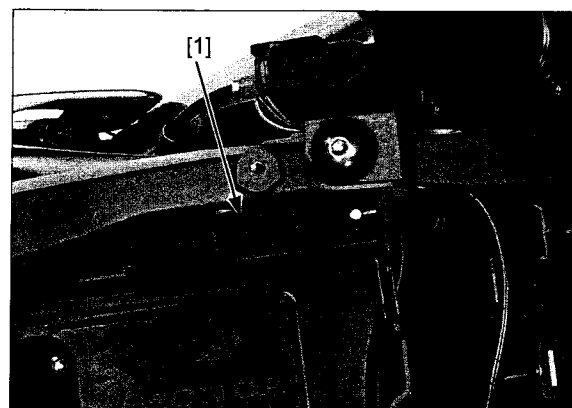
Remove the relay stay mounting bolt/washer [1], rear fender mounting long bolt/washer [2], collar [3] and relay stay [4].

Remove the rear fender mounting short bolts [5].

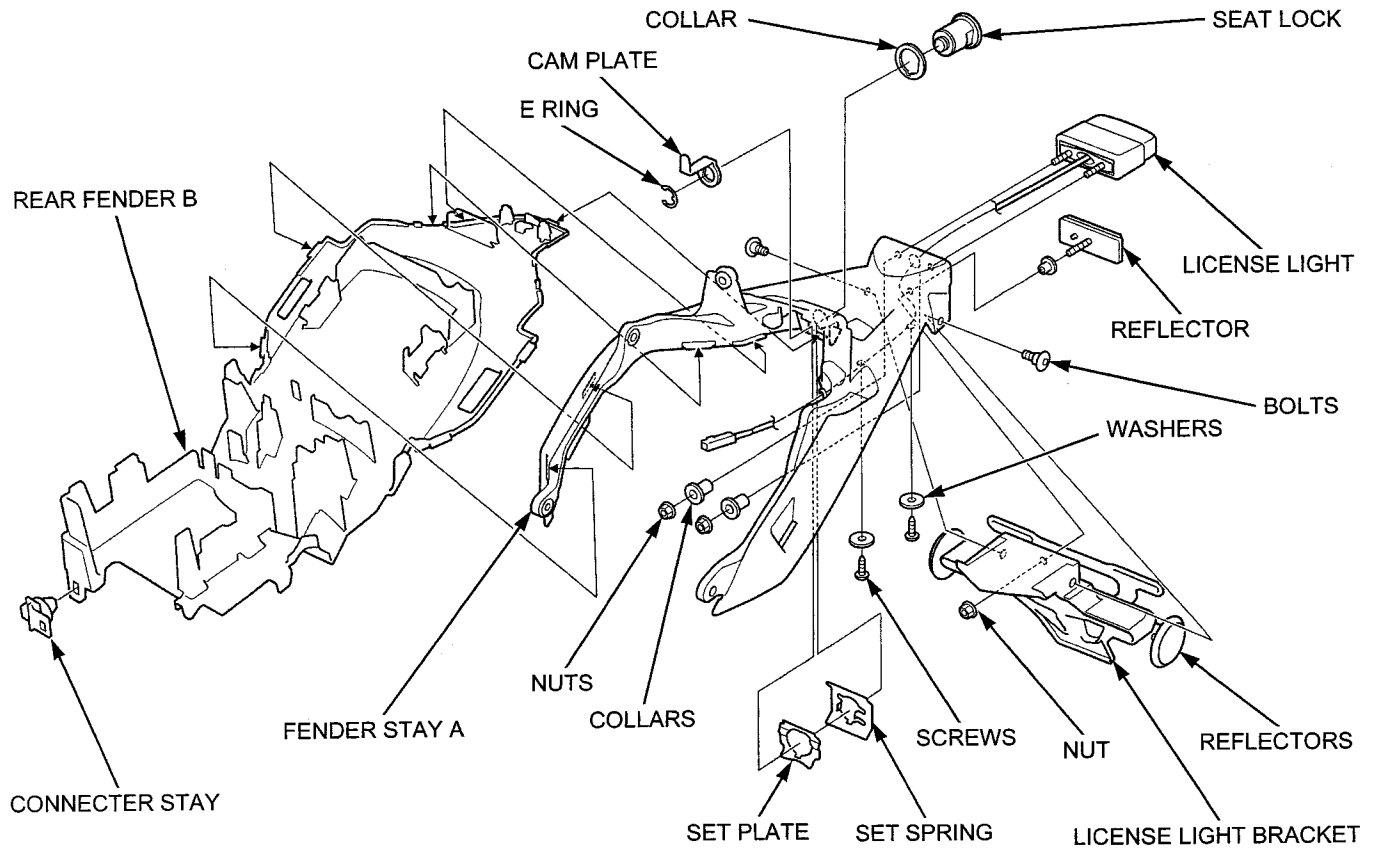


Release the rear fender tabs [1] from the center cross plate.

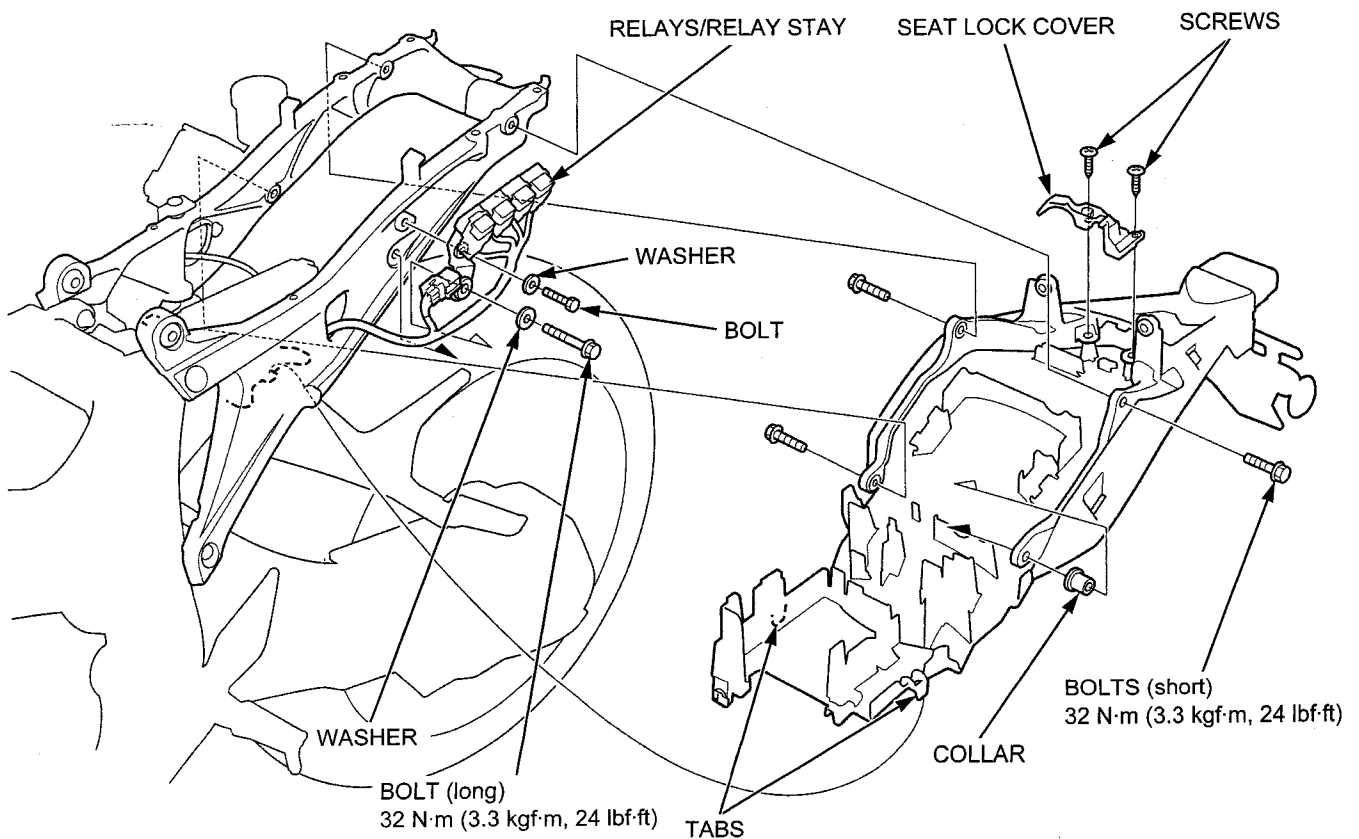
Pull and remove the rear fender backward.



DISASSEMBLY/ASSEMBLY



INSTALLATION

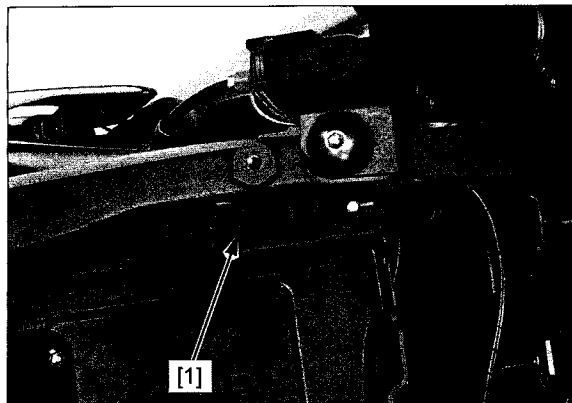




## FRAME/BODY PANELS/EXHAUST SYSTEM

While installing the rear fender, route the main wire harness and battery cables properly (page 1-22).

Install the rear fender by aligning its front tabs [1] with the center cross plate.



Loosely install the rear fender mounting short bolts [1], relay stay [2], collar [3] relay stay mounting bolt/washer [4] and rear fender mounting long bolt/washer [5].

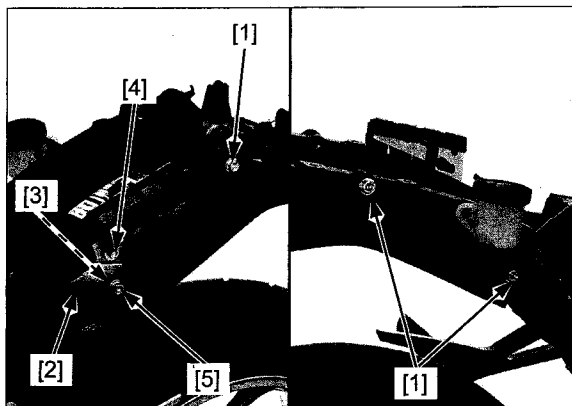
Tighten the rear fender mounting short bolts to the specified torque.

**TORQUE: 32 N·m (3.3 kgf·m, 24 lbf·ft)**

Tighten the rear fender mounting long bolt/washer to the specified torque.

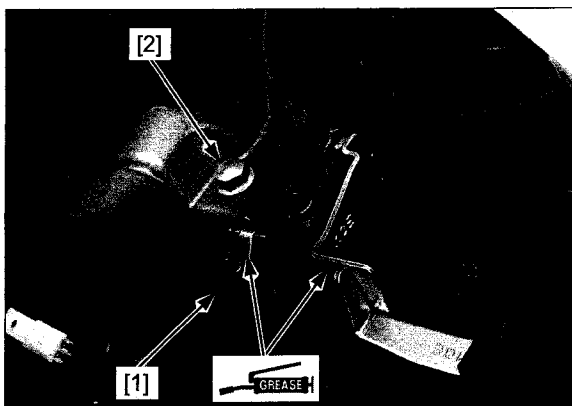
**TORQUE: 32 N·m (3.3 kgf·m, 24 lbf·ft)**

Tighten the relay stay mounting bolt/washer securely.

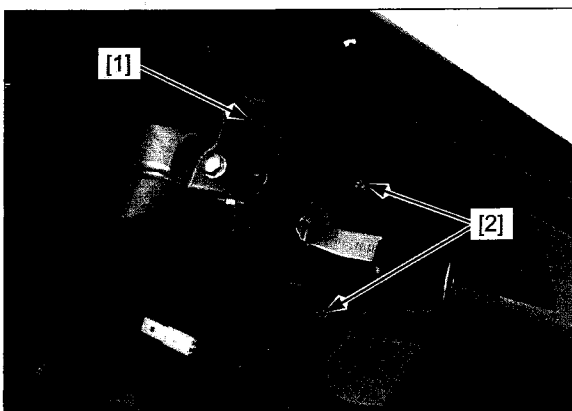


Apply grease to the seat catch hook sliding area.

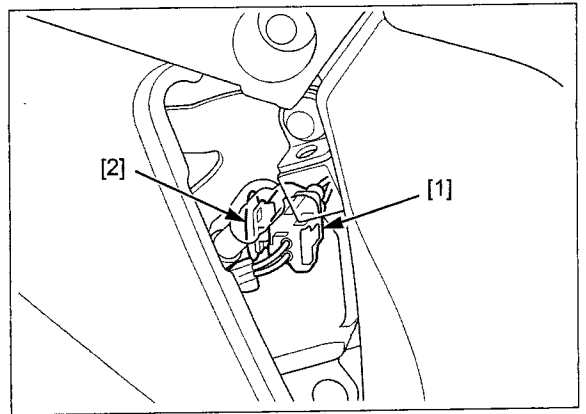
Install the seat catch body [1] and tighten the mounting bolt [2] securely.



Install the seat lock cover [1] and tighten the tapping screws [2] securely.



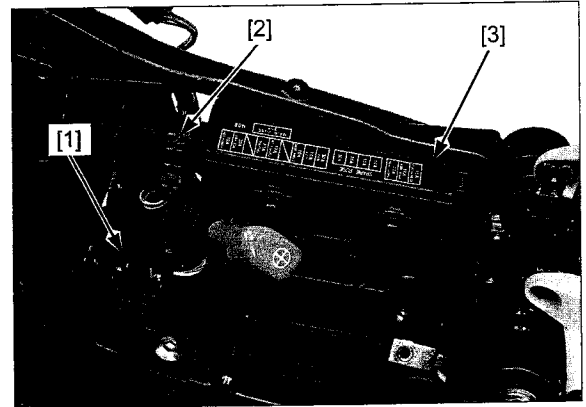
Install the rear brake light switch 2P (Black) connector [1] to the connector stay [2].



Install the starter relay switch [1], DLC [2] and fuse box [3] onto the rear fender.

Install the following:

- rear combination light (page 22-9)
- grab rails (page 3-4)
- pivot plate covers (page 3-5)
- bank angle sensor (page 6-81)
- battery (page 19-6)

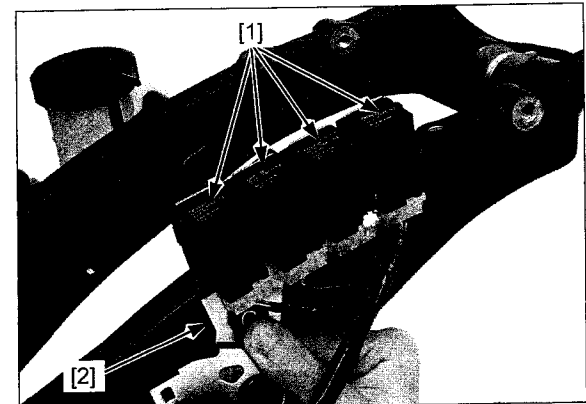


## SEAT RAIL

### REMOVAL

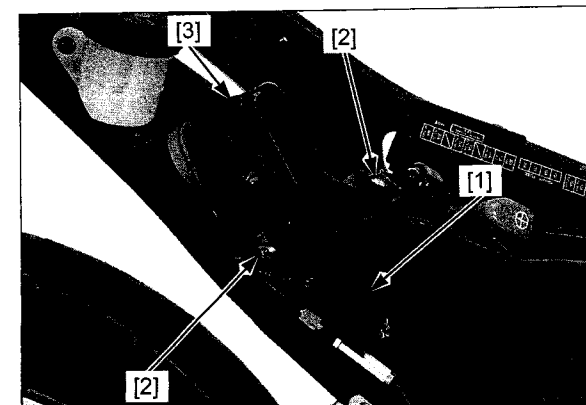
Remove the regulator/rectifier (page 19-8).

Remove the relays [1] from the relay stay [2].



Disconnect the EGCA 6P (Black) connector [1].

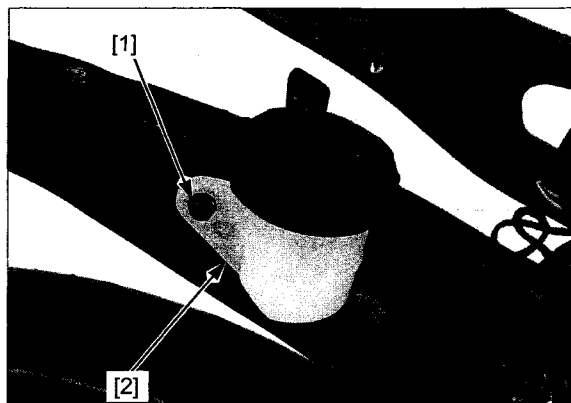
Remove the mounting bolts [2] and EGCA servo motor [3].



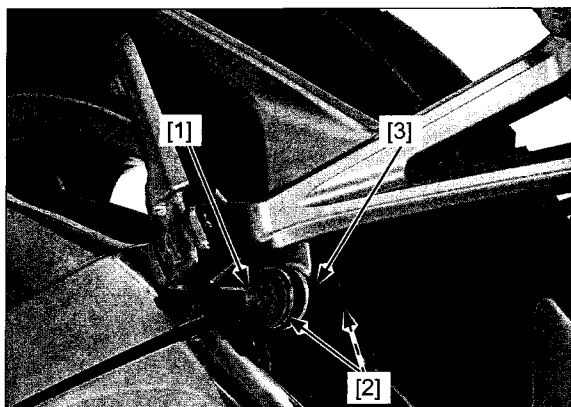
## FRAME/BODY PANELS/EXHAUST SYSTEM

*Keep the rear brake reserve tank upright to prevent air from entering the hydraulic system.*

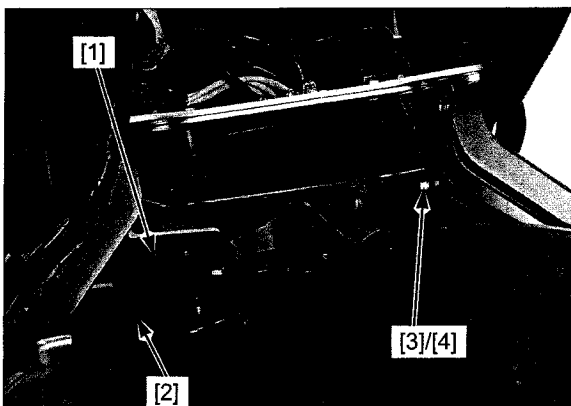
Remove the bolt [1] and rear brake reservoir tank [2] from the seat rail.



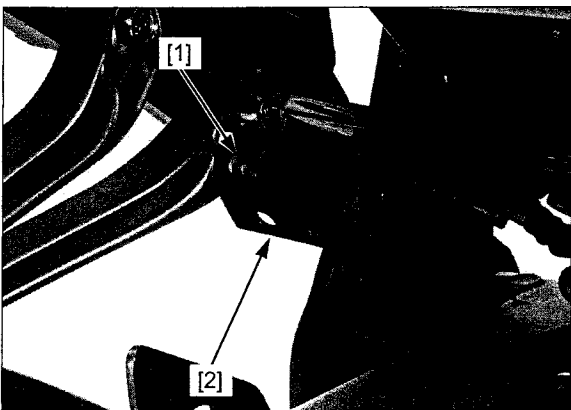
Remove the muffler mounting nut/bolt [1], washers [2] and muffler from the right passenger bracket [3].



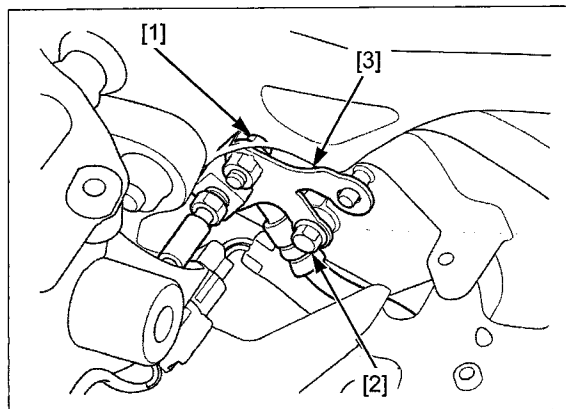
Remove the bolt [1] and the pre-load adjuster [2].  
Remove the bolt [3], EGCA cable guide [4].



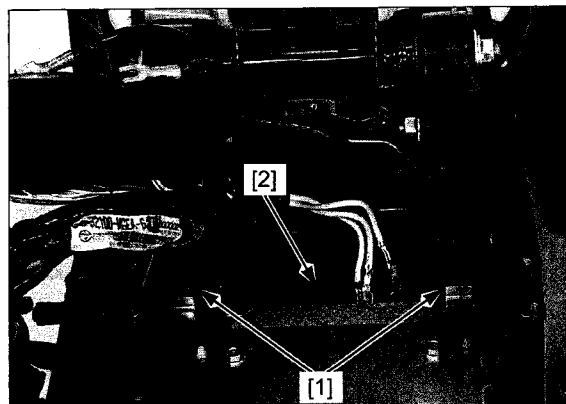
Remove the bolt [1] and pre-load adjuster bracket [2].



Remove the brake pipe joint mounting bolt [1], brake hose stay mounting bolt [2] and brake hose stay [3].



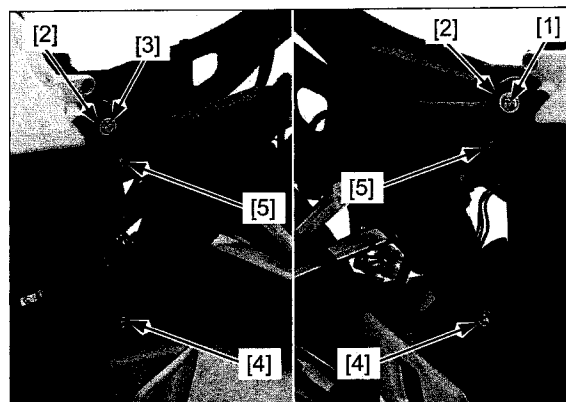
Release the center cross plate tabs [1] and remove the rear heat guard [2].



Remove the fuel tank pivot nut [1], washers [2] and pivot bolt [3].

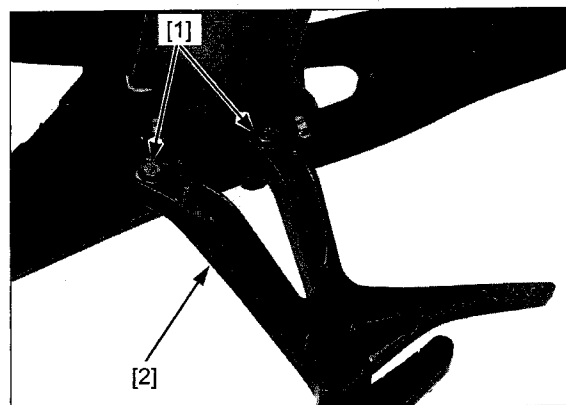
Remove the seat rail lower mounting bolts [4].

Remove the seat rail upper mounting bolt/nut [5], and then remove the seat rail assembly from the frame.



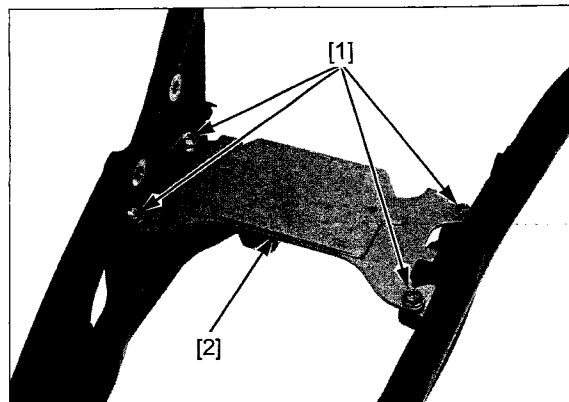
Remove the flange bolts [1] and right passenger footpeg bracket [2].

In the same manner, remove the left passenger footpeg bracket.



## FRAME/BODY PANELS/EXHAUST SYSTEM

Remove the flange bolts [1] and center cross plate [2].



Remove the seat rail assembly flange bolt [1] and separate the seat rails [2].

Assembly is in the reverse order of disassembly.

### TORQUE:

Seat rail assembly flange bolt:

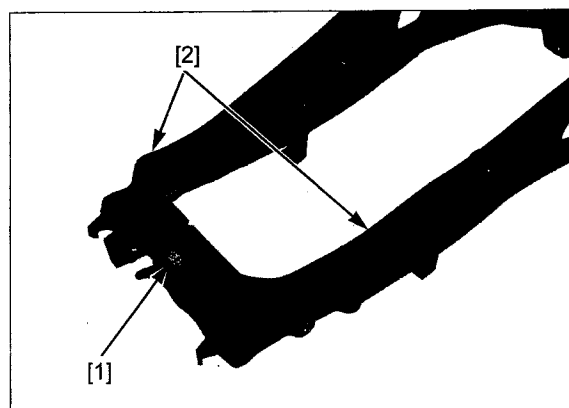
30 N·m (3.1 kgf·m, 22 lbf·ft)

Center cross plate mounting bolt:

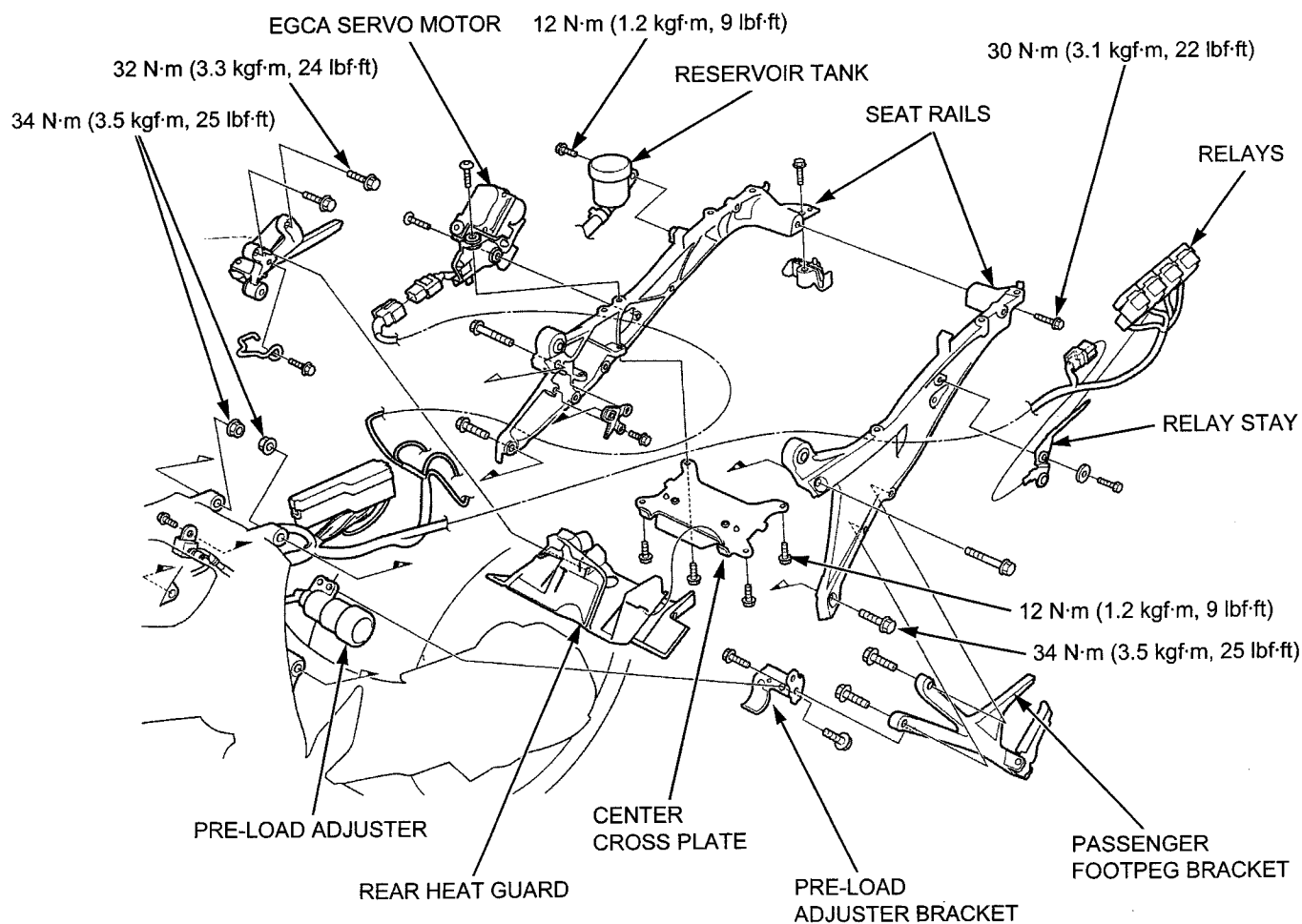
12 N·m (1.2 kgf·m, 9 lbf·ft)

Passenger footpeg bracket flange bolt:

32 N·m (3.3 kgf·m, 24 lbf·ft)



## INSTALLATION



Install the seat rail assembly, upper mounting bolt/nut [1].

Install the lower mounting bolts [2].

Hold the upper mounting bolts and tighten the flange nuts to the specified torque.

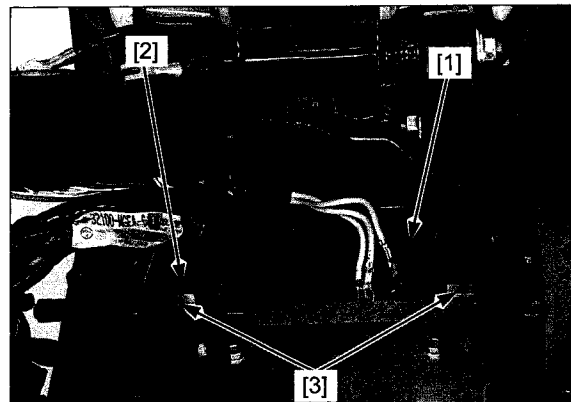
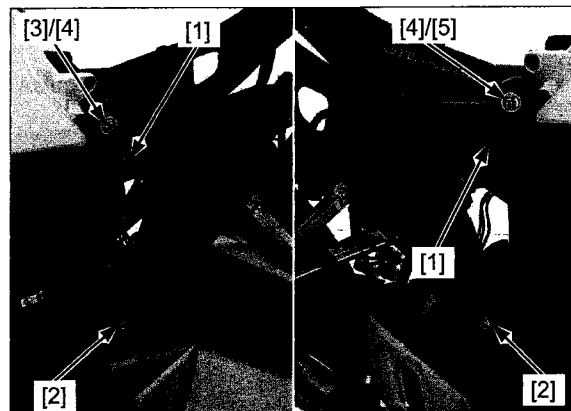
**TORQUE: 35 N·m (3.6 kgf·m, 26 lbf·ft)**

Tighten the lower mounting bolts to the specified torque.

**TORQUE: 35 N·m (3.6 kgf·m, 26 lbf·ft)**

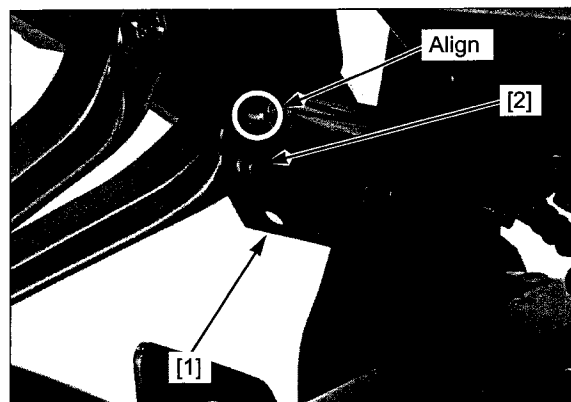
Install the fuel tank pivot bolt [3], washers [4] and pivot nut [5].

Install the rear heat guard [1] by aligning its slits [2] with the tabs [3] of center cross plate.



Install the pre-load adjuster bracket [1] by aligning its hole with the boss of left passenger footpeg bracket.

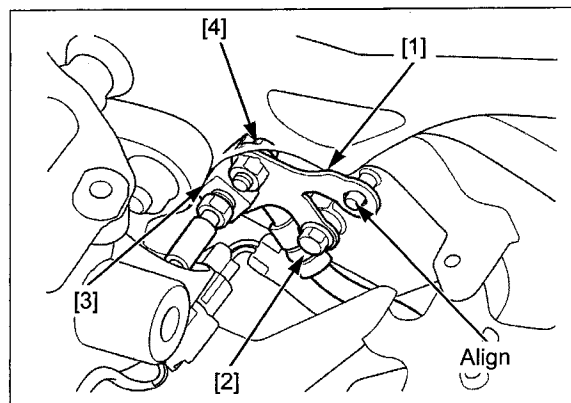
Tighten the mounting bolt [2] securely.



Install the brake hose stay [1] by aligning its hole with the boss of right seat rail.

Tighten the mounting bolt [2] securely.

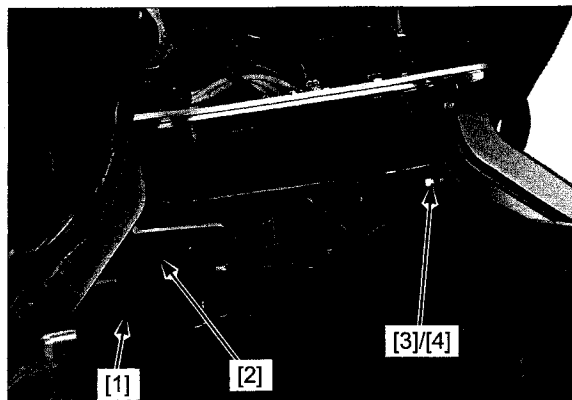
Install the brake pipe joint [3] to the brake hose stay and tighten the mounting bolt [4] securely.



## FRAME/BODY PANELS/EXHAUST SYSTEM

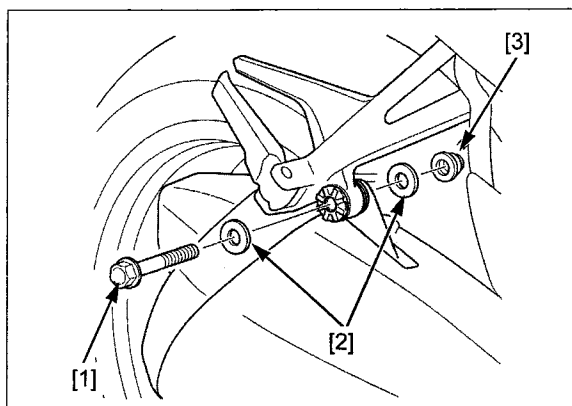
Install the pre-load adjuster [1] and tighten the mounting bolt [2] securely.

Install the EGCA cable guide [3] and tighten the mounting bolt [4] securely.



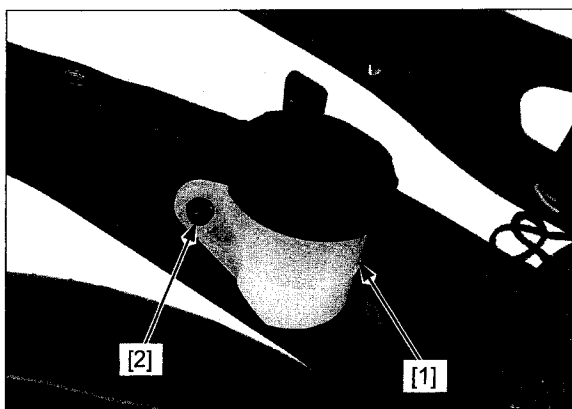
Install the muffler, mounting bolt [1], washers [2] and nut [3].

Hold the muffler mounting bolt and tighten the nut to securely.



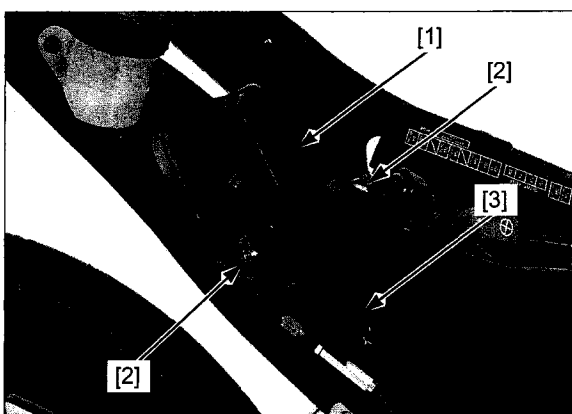
Install the rear brake reservoir tank [1] and tighten the mounting bolt [2] to the specified torque.

**TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)**



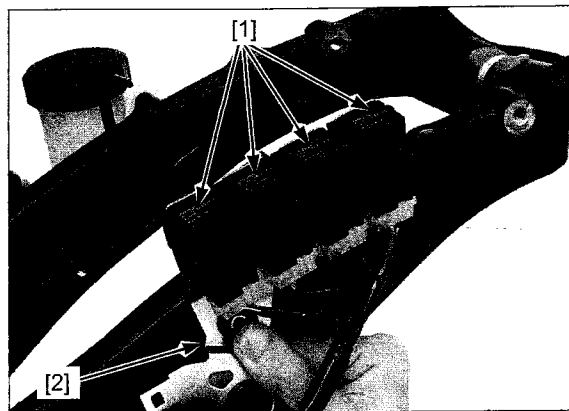
Install the EGCA servo motor [1] and tighten the mounting bolts [2].

Connect the EGCA 6P (Black) connector [3].



Route the wire harness properly (page 1-22).

Install the relays [1] to the relay stay [2].  
Install the regulator/rectifier (page 19-8).

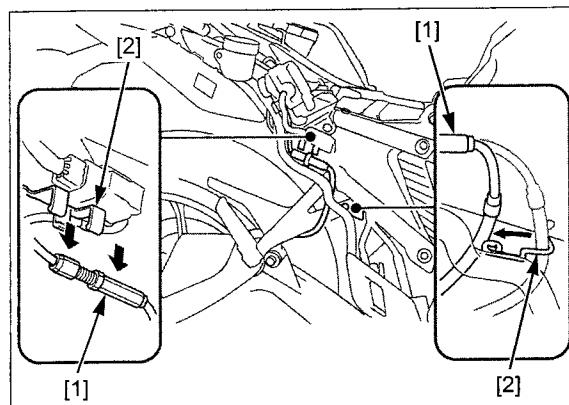


## MUFFLER

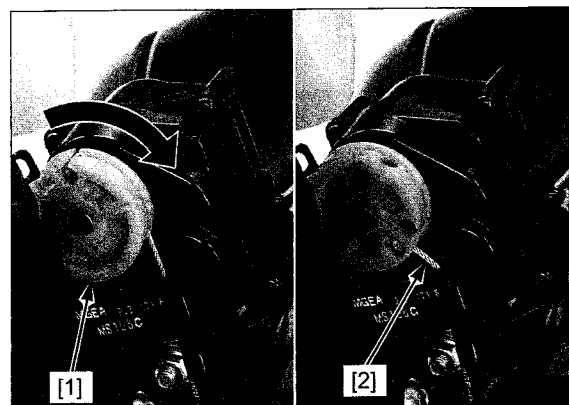
### REMOVAL

Remove the right rear cowl (page 3-4).

Release the EGCA cable [1] from the cable guides [2].

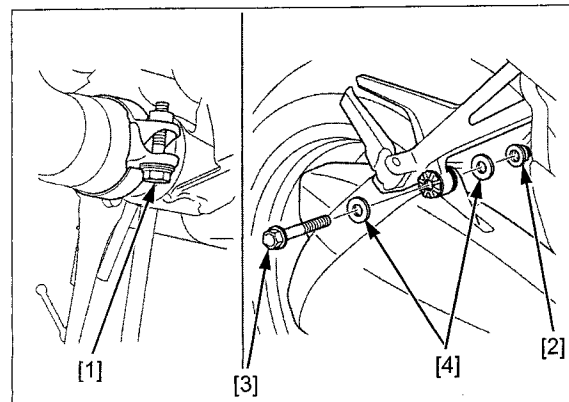


Turn the EGCA pulley [1] clockwise and disconnect the EGCA cable [2] from the EGCA pulley.



Loosen the muffler band bolt [1].

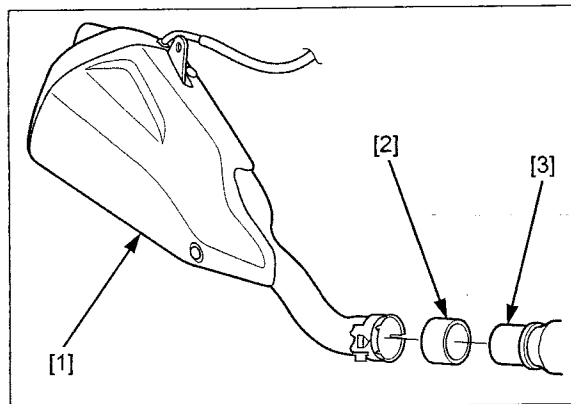
Remove the muffler bracket mounting nut [2], bolt [3] and washers [4].





## FRAME/BODY PANELS/EXHAUST SYSTEM

Remove the muffler [1] and gasket [2] from the exhaust pipe [3].



### DISASSEMBLY/ASSEMBLY

Remove the muffler rear guard, muffler upper guard and valve cover.

Disconnect the EGCA cable [1] from the ECV pulley [2].

Loosen the joint nut and disconnect the EGCA cable from the muffler.

Remove the following:

- three bolts and muffler rear guard
- three bolts, washer and muffler upper guard
- three special bolts and valve cover

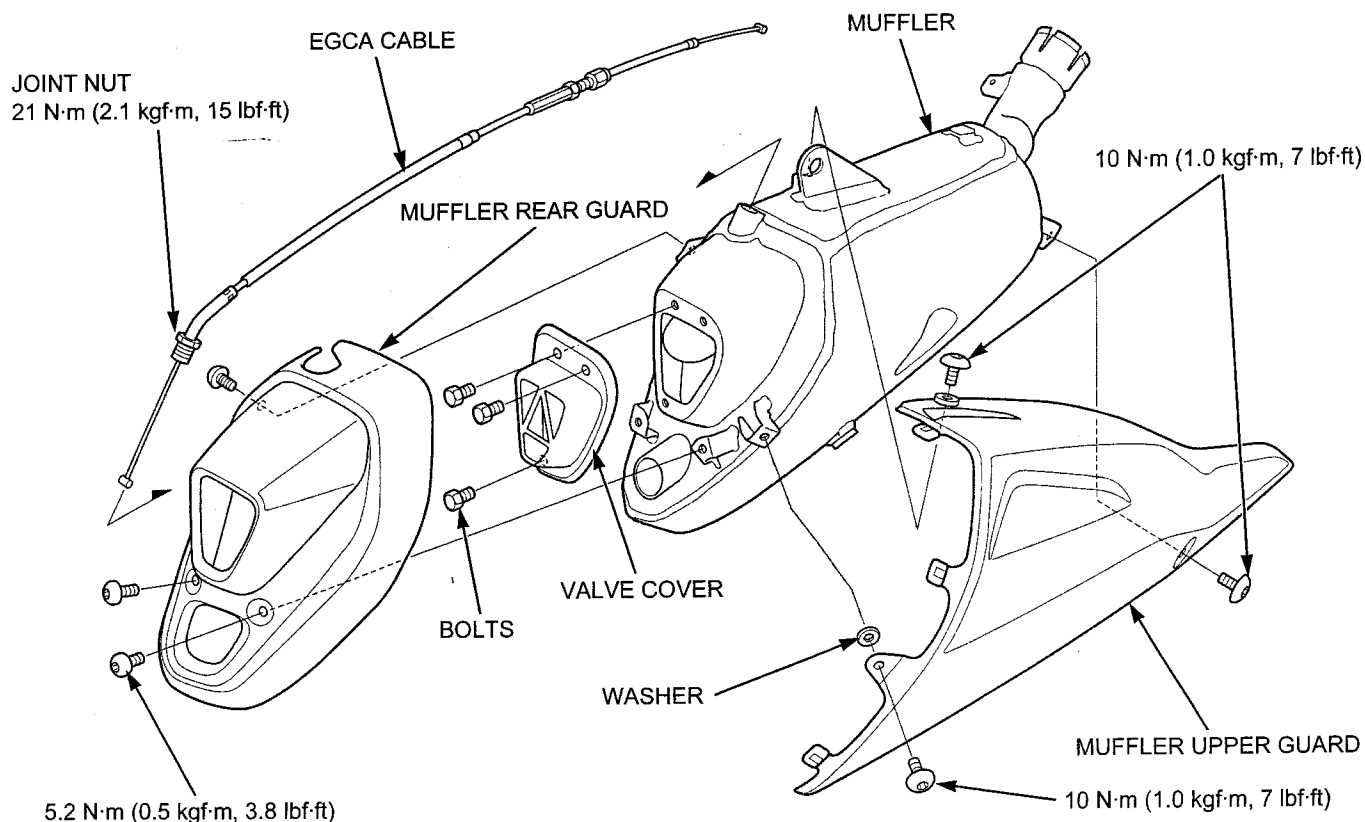
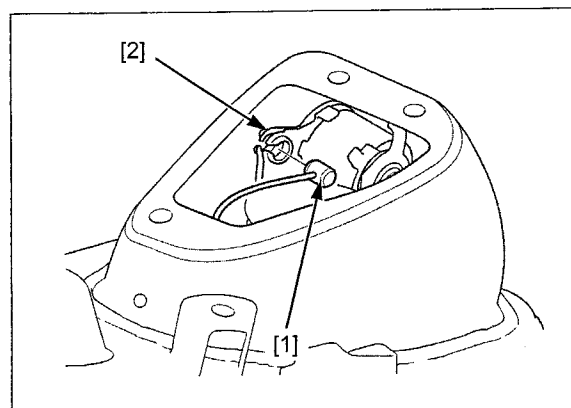
Assembly is in the reverse order of disassembly.

#### TORQUE:

EGCA cable joint nut: 21 N·m (2.1 kgf·m, 15 lbf·ft)

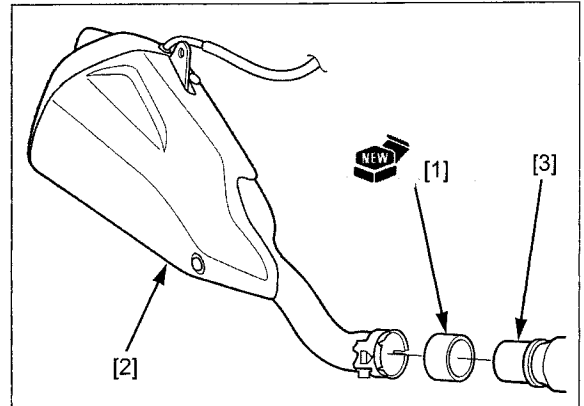
Muffler rear guard bolt: 5.2 N·m (0.5 kgf·m, 3.8 lbf·ft)

Muffler upper guard bolt: 10 N·m (1.0 kgf·m, 7 lbf·ft)



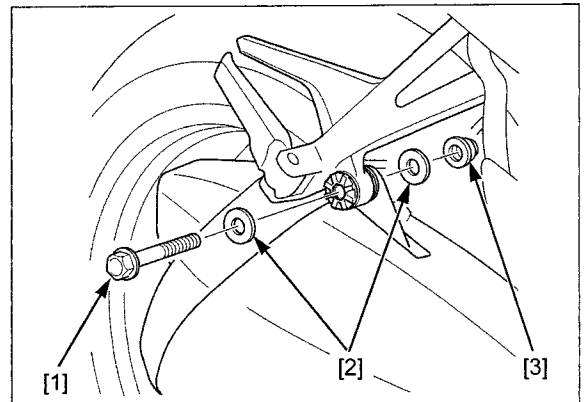
## INSTALLATION

Install a new gasket [1] and muffler [2] to the exhaust pipe [3].



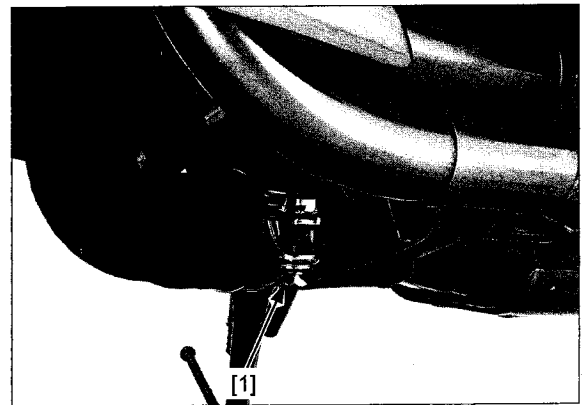
Install the muffler mounting bolt [1], washers [2] and nut [3].

Hold the muffler mounting bolt and tighten the nut securely.



Tighten the muffler band bolt [1] to the specified torque.

**TORQUE: 17 N·m (1.7 kgf·m, 13 lbf·ft)**

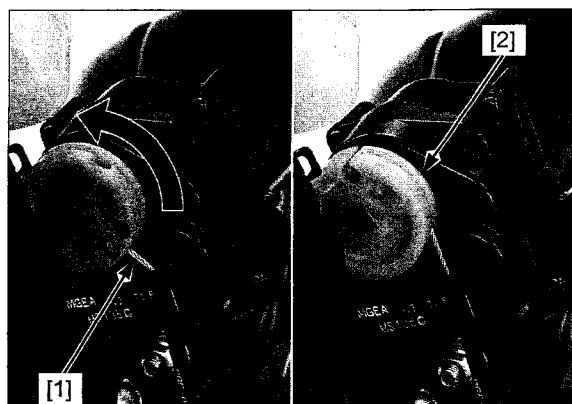


## FRAME/BODY PANELS/EXHAUST SYSTEM

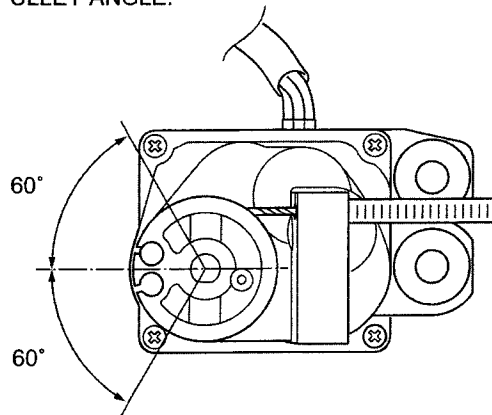
Connect the EGCA cable to the EGCA pulley.

Turn the EGCA pulley counterclockwise to the specified angle as shown.

Check the EGCA and EVC operation (page 4-17).

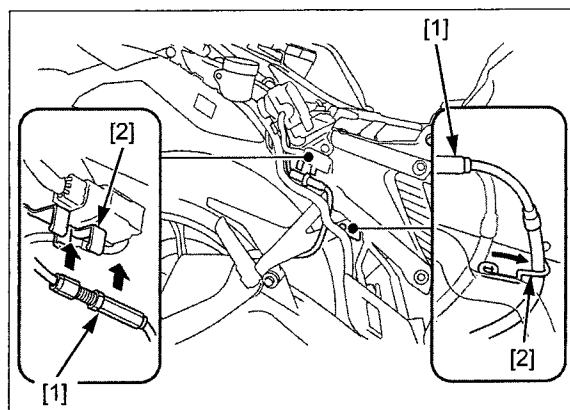


PULLEY ANGLE:



Route the EGCA cable [1] to the cable guides [2].

Install the right rear cowl (page 3-4).



## EXHAUST PIPE

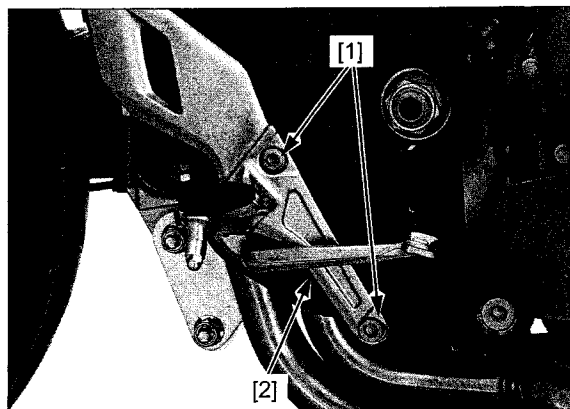
### REMOVAL

Remove the following:

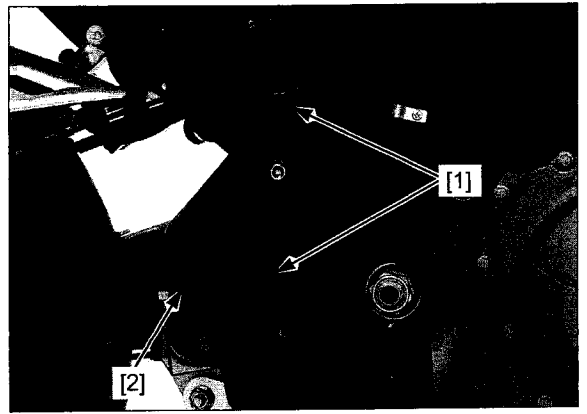
- muffler (page 3-21)
- radiator (page 7-9)
- right pivot plate cover (page 3-5)
- EVAP purge control solenoid valve/canister (page 6-91)
- under cowl (page 3-6)

Remove the right rider footpeg holder mounting bolts [1] and right rider footpeg holder [2].

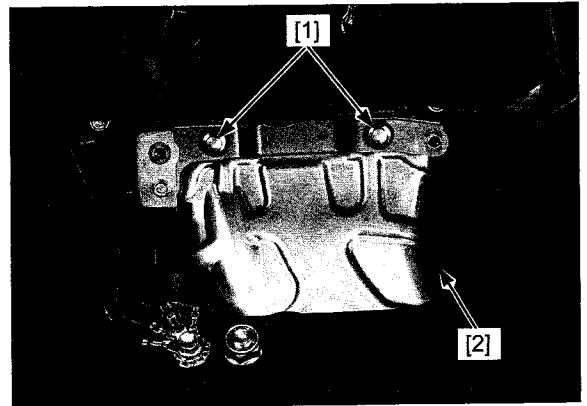
Remove the right rider footpeg holder.



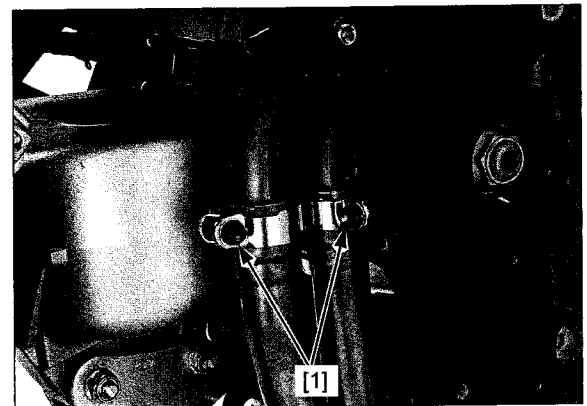
Remove the muffler heat guard plate mounting bolts [1] and muffler heat guard plate [2].



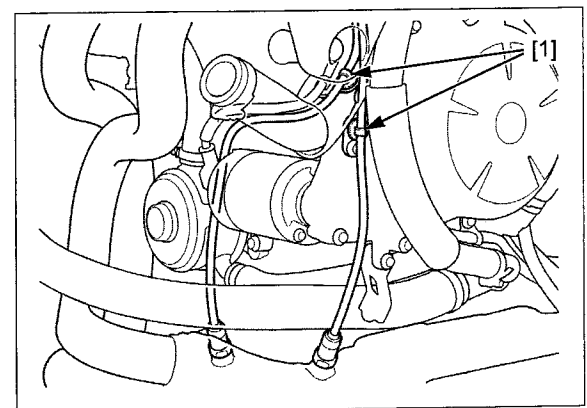
Remove the tank heat protector mounting bolts [1] and exhaust pipe upper protector [2].



Loosen the rear exhaust pipe band bolts [1].



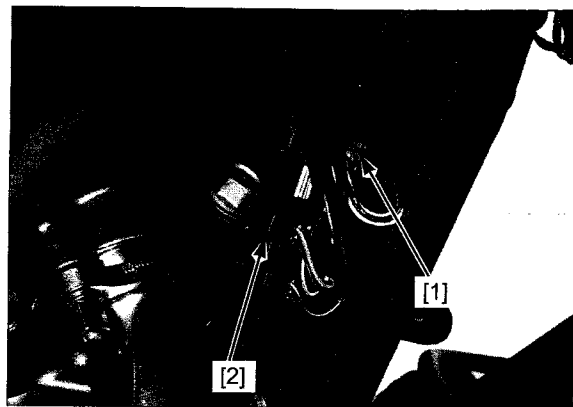
Release the O<sub>2</sub> sensor wire clips [1] from the clip stays.



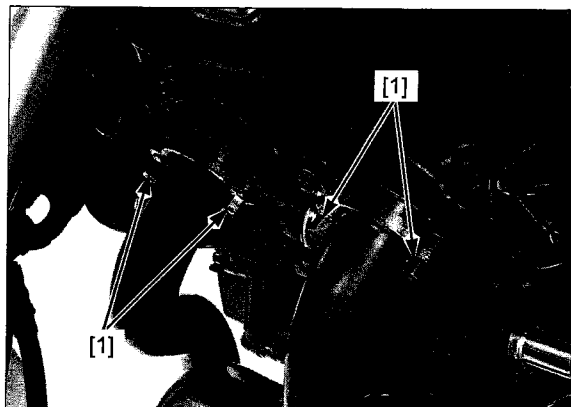
## FRAME/BODY PANELS/EXHAUST SYSTEM

Remove the O<sub>2</sub> sensor 4P (Blue) connector [1] and O<sub>2</sub> sensor 4P (Black) connector [2] from the connector stay.

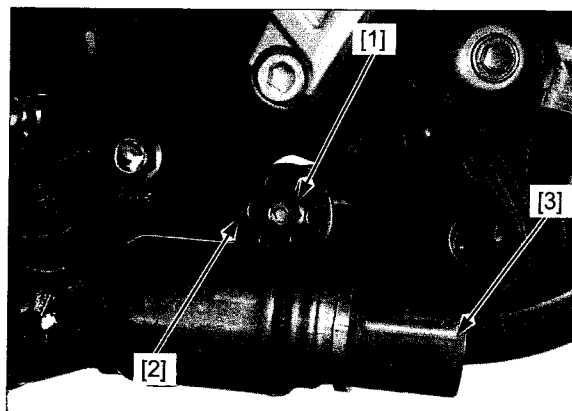
Disconnect the O<sub>2</sub> sensor 4P (Blue) connector and O<sub>2</sub> sensor 4P (Black) connector.



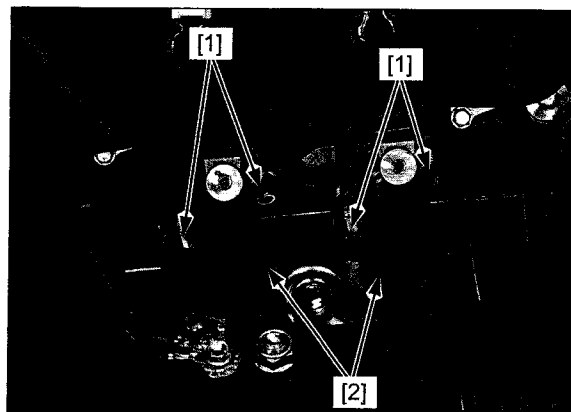
Remove the front exhaust pipe joint special nuts [1].



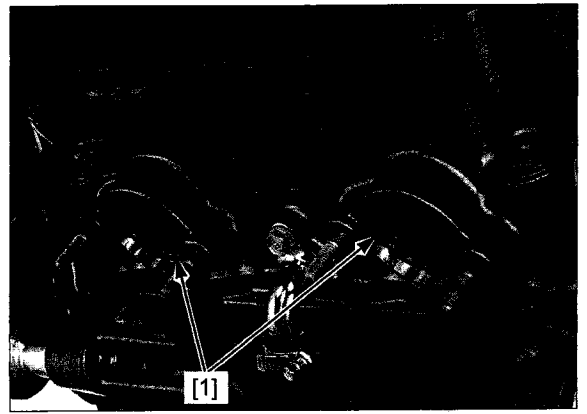
Remove the front exhaust pipe mounting bolt [1], washer [2] and exhaust pipe [3].



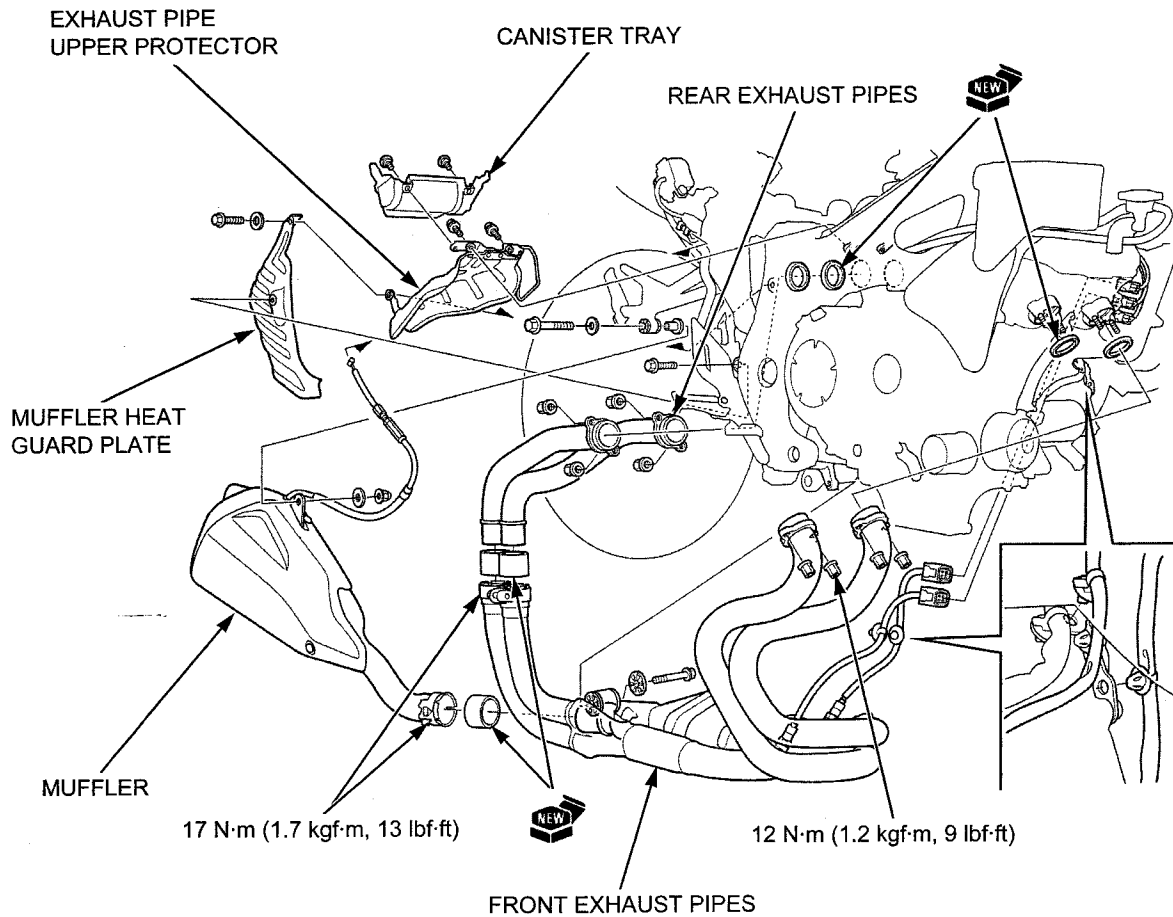
Remove the rear exhaust pipe joint special nuts [1] and rear exhaust pipes [2].



Remove the exhaust pipe gaskets [1] from the front and rear cylinder heads.

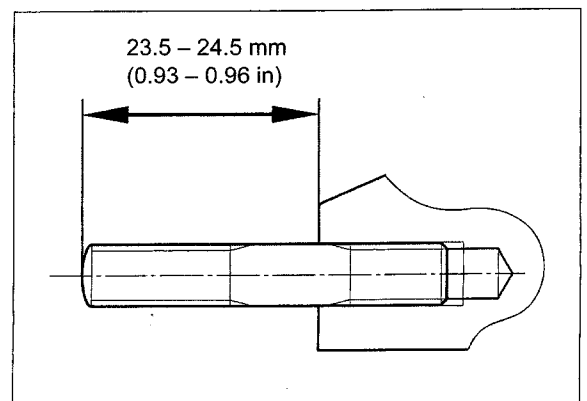


## INSTALLATION



If the exhaust pipe stud bolts are loose, tighten them.  
Be sure to verify the distance from the top of the stud to the cylinder head as shown.

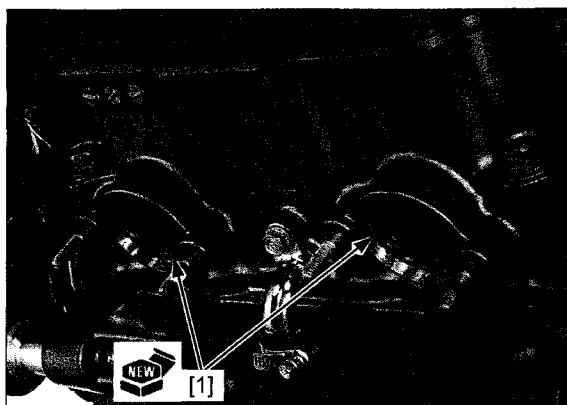
**SPECIFIED LENGTH: 23.5 – 24.5 mm (0.93 – 0.96 in)**



## FRAME/BODY PANELS/EXHAUST SYSTEM

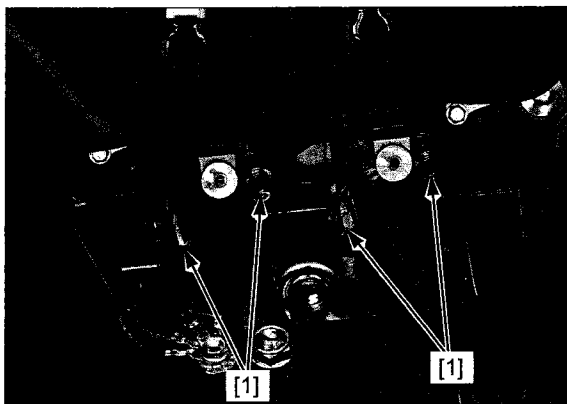
*Always replace the exhaust pipe gaskets with new ones.*

Install new exhaust pipe gaskets [1] onto the front and rear exhaust ports of the front and rear cylinder heads.



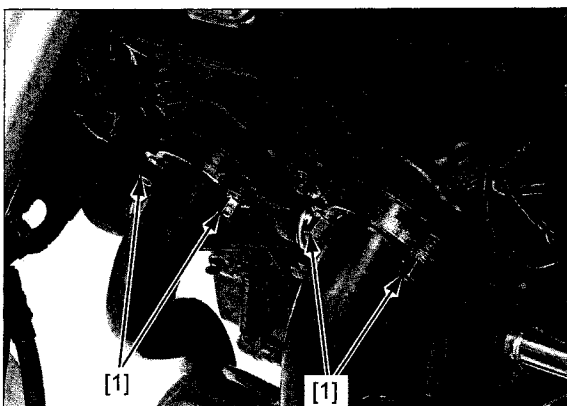
Install the rear exhaust pipes.

Install the exhaust pipe joint nuts [1], but do not tighten them yet.



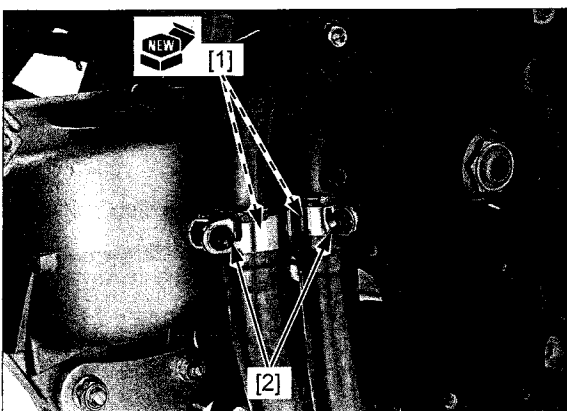
Install the front exhaust pipe.

Install the exhaust pipe joint nuts [1], but do not tighten them yet.



Install new exhaust pipe gaskets [1] to the exhaust pipes.

Joint the exhaust pipes and rear exhaust pipes, but do not tighten the band bolts [2] yet.



Loosely install the exhaust pipe, washer [1] and mounting bolt [2].

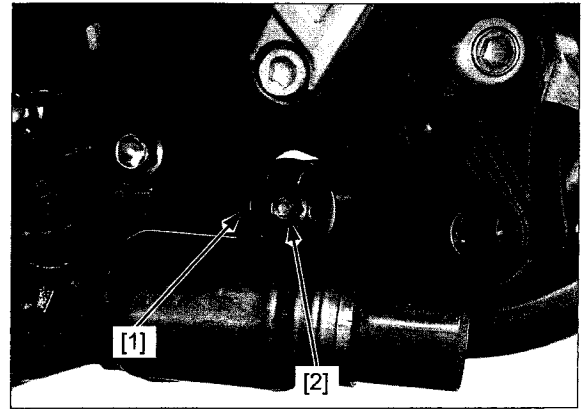
Tighten the front and rear exhaust pipe joint nuts to the specified torque.

**TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)**

Tighten the rear exhaust pipe band bolts to the specified torque.

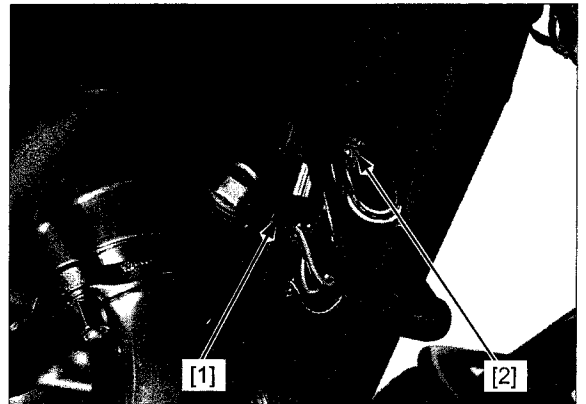
**TORQUE: 17 N·m (1.7 kgf·m, 13 lbf·ft)**

Tighten the exhaust mounting bolt securely.

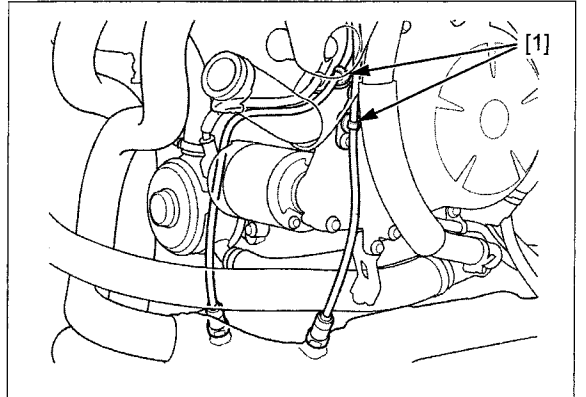


Connect the O<sub>2</sub> sensor 4P (Black) connector [1] and O<sub>2</sub> sensor 4P (Blue) connector [2].

Install the O<sub>2</sub> sensor 4P (Blue) connector and O<sub>2</sub> sensor 4P (Black) connector to the connector stay.

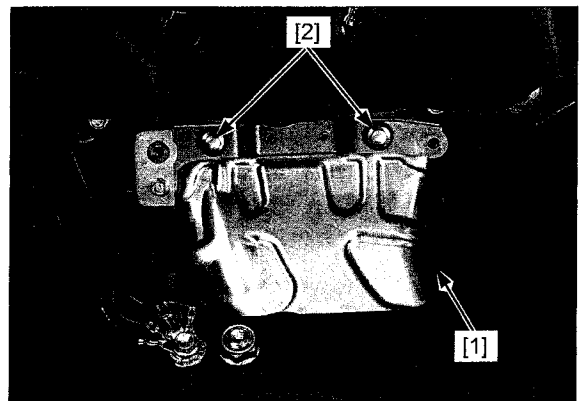


Install the O<sub>2</sub> sensor wire clips [1] to the clip stays.



Install the exhaust pipe upper protector [1].

Tighten the exhaust pipe upper protector mounting bolts [2] securely.

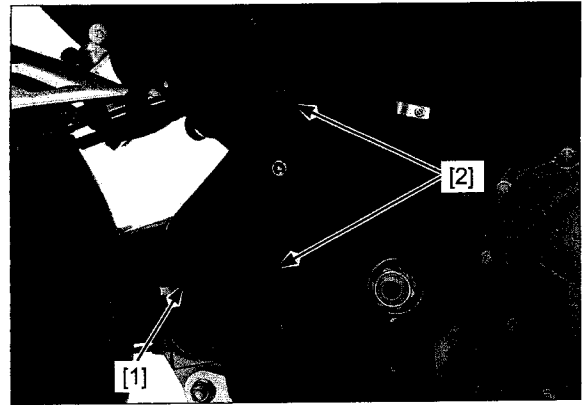




## FRAME/BODY PANELS/EXHAUST SYSTEM

Install the muffler heat guard plate [1].

Tighten the muffler heat guard plate mounting bolts [2] securely.



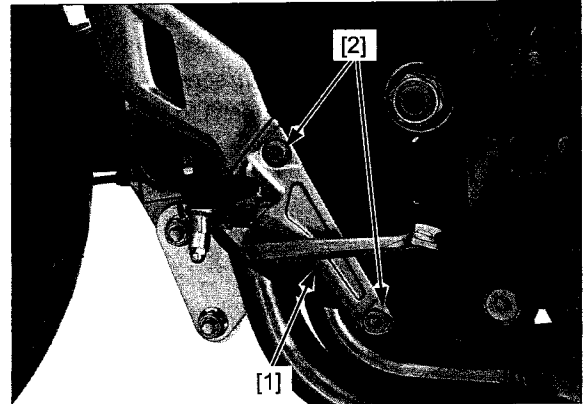
Install the right rider footpeg holder [1].

Tighten the right rider footpeg holder mounting bolts [2] to the specified torque.

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

Install the following:

- muffler (page 3-21)
- radiator (page 7-9)
- right pivot plate cover (page 3-5)
- EVAP purge control solenoid valve/canister (page 6-91)
- under cowl (page 3-6)



## SIDESTAND

### REMOVAL/INSTALLATION

Remove the sidestand switch (page 22-22).

Support the motorcycle securely using a hoist or equivalent.

Remove the sidestand return spring [1].

Remove the sidestand pivot nut [2] and bolt [3], then remove the sidestand [4].

Install the sidestand and return spring in the direction as shown.

Apply grease to the sidestand pivot bolt sliding surface.

Install and tighten the pivot bolt to the specified.

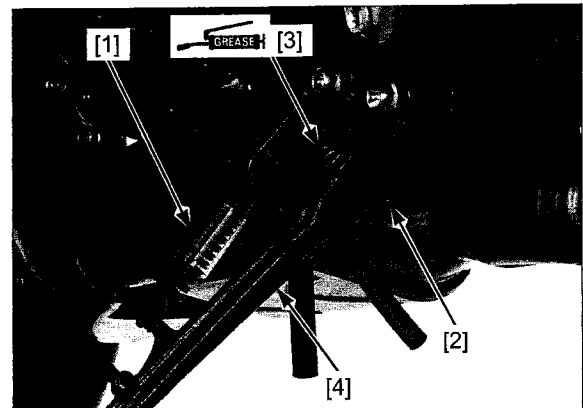
**TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)**

After tightening the pivot bolt, return the pivot bolt 45° to 90°.

Install and tighten the sidestand pivot nut to the specified torque while holding the sidestand pivot bolt.

**TORQUE: 29 N·m (3.0 kgf·m, 21 lbf·ft)**

Install the sidestand switch (page 22-22).



# 4. MAINTENANCE

---

SERVICE INFORMATION .....	4-2	FINAL DRIVE OIL .....	4-20
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EGCA CABLE .....	4-17	STEERING HEAD BEARINGS .....	4-29

## MAINTENANCE

# SERVICE INFORMATION

## GENERAL

- Place the motorcycle on level ground before starting any work.
- 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.
- 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.

## SPECIFICATIONS

ITEM			SPECIFICATIONS
Throttle grip freeplay			2 – 4 mm (1/16 – 3/16 in)
Spark plug	NGK		IMR9E-9HES
	DENSO		VUH27ES
Spark plug gap			0.80 – 0.90 mm (0.031 – 0.035 in)
Valve clearance	IN		0.16 ± 0.03 mm (0.006 ± 0.001 in)
	EX	Valve side	0.30 ± 0.02 mm (0.012 ± 0.001 in)
		Roller side	0.21 ± 0.02 mm (0.008 ± 0.001 in)
Engine oil capacity	After draining		3.0 liter (3.2 US qt, 2.6 Imp qt)
	After draining/oil filter change		3.2 liter (3.4 US qt, 2.8 Imp qt)
Recommended engine oil			Pro Honda GN4 4-stroke oil (U.S.A and Canada) or an equivalent motor oil API service classification: SG or higher JASO T 903 standard: MA Viscosity: SAE 10W-30
Recommended antifreeze			Pro Honda HP Coolant or an equivalent high quality ethylene glycol antifreeze containing silicate free corrosion inhibitors
Recommended final drive oil			Hypoid gear oil, SAE #80
Final drive oil capacity	After draining		200 cm <sup>3</sup> (6.8 US oz, 7.0 Imp oz)
	After disassembly		240 cm <sup>3</sup> (8.1 US oz, 8.4 Imp oz)
Recommended brake fluid			DOT 4 brake fluid
Recommended clutch fluid			DOT 4 brake fluid
Fork	Pre-load adjuster standard position		9 mm (0.4 in) from top surface of fork bolt
	Rebound damping adjuster standard position		6 clicks out from full hard
Rear suspension	Spring pre-load adjuster standard position		11 clicks out from lower position
	Rebound adjuster standard position		3/4 turn out from full hard
Tire size		Front	120/70ZR17M/C(58W)
		Rear	190/55ZR17M/C(73W)
Tire brand	Bridgestone	Front	BT021F N
		Rear	BT021R N
	Dunlop	Front	ROADSMART CQ K
		Rear	ROADSMART K
Tire air pressure	Up to 90 kg (200 lb) load	Front	250 kPa (2.50 kgf/cm <sup>2</sup> , 36 psi)
		Rear	290 kPa (2.90 kgf/cm <sup>2</sup> , 42 psi)
	Up to maximum weight capacity	Front	250 kPa (2.50 kgf/cm <sup>2</sup> , 36 psi)
		Rear	290 kPa (2.90 kgf/cm <sup>2</sup> , 42 psi)
Minimum tire tread depth		Front	1.5 mm (0.06 in)
		Rear	2.0 mm (0.08 in)

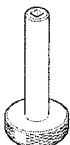
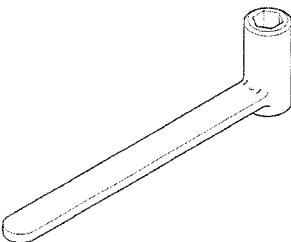
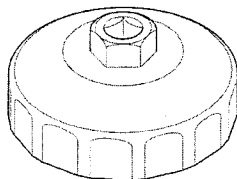
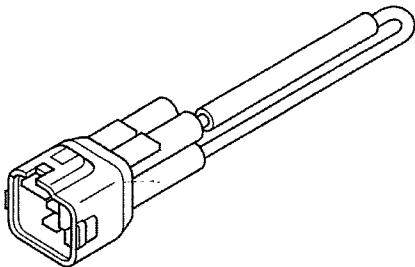
**TORQUE VALUES**

Air cleaner element screw	0.8 N·m (0.1 kgf·m, 0.6 lbf·ft)
Air cleaner cover screw	0.8 N·m (0.1 kgf·m, 0.6 lbf·ft)
Spark plug	16 N·m (1.6 kgf·m, 12 lbf·ft)
Valve adjusting screw lock nut	10 N·m (1.0 kgf·m, 7 lbf·ft)
Timing hole cap	17 N·m (1.7 kgf·m, 13 lbf·ft)
Engine oil drain bolt	29 N·m (3.0 kgf·m, 21 lbf·ft)
Engine oil filter cartridge	26 N·m (2.7 kgf·m, 19 lbf·ft)
Final drive oil filler cap	8.0 N·m (0.8 kgf·m, 5.9 lbf·ft)
Final drive oil drain bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)
Rear master cylinder push rod joint nut	18 N·m (1.8 kgf·m, 13 lbf·ft)

Apply engine oil to the threads.  
Apply grease to the threads.

Apply engine oil to the threads.

**TOOLS**

<p>Tappet adjusting wrench 07908-3290100</p> 	<p>Tappet lock nut wrench 07908-3290200</p> 	<p>Oil filter wrench 07HAA-PJ70101</p>  <p>or 07AAA-PLCA100 (U.S.A only)</p>
<p>SCS connector 070PZ-ZY30100</p> 		

## MAINTENANCE

# MAINTENANCE SCHEDULE

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

I: Inspect and clean, adjust, lubricate or replace if necessary. C: Clean. R: Replace. A: Adjust. L: Lubricate.

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

ITEMS			FREQUENCY NOTE	ODOMETER READING (NOTE 1)								REFER TO PAGE
				x 1,000 mi	0.6	4	8	12	16	20	24	
				x 1,000 km	1.0	6.4	12.8	19.2	25.6	32.0	38.4	
EMISSION RELATED ITEMS	*	FUEL LINE					I		I		I	4-5
	*	THROTTLE OPERATION					I		I		I	4-5
	*	AIR CLEANER	(NOTE 2)					I			I	4-6
	*	SPARK PLUG		EVERY 16,000 mi (25,600 Km) I, EVERY 32,000 mi (51,200 Km) R								4-7
	*	VALVE CLEARANCE							I			4-9
		ENGINE OIL		INITIAL = 600 mi (1,000 km) or 1 month: R REGULAR = EVERY 8,000 mi (12,800 km) or 12 months: R								4-12
		ENGINE OIL FILTER			R		R		R		R	4-12
		RADIATOR COOLANT	(NOTE 3)				I		I		R	4-15
	*	COOLING SYSTEM					I		I		I	4-16
	*	SECONDARY AIR SUPPLY SYSTEM					I		I		I	4-16
	*	EVAPORATIVE EMISSION CONTROL SYSTEM						I			I	4-17
NON-EMISSION RELATED ITEMS	**	EXHAUST GAS CONTROL ACTUATOR CABLE		EVERY 16,000 mi (25,600 Km) I								4-17
		FINAL DRIVE OIL					I		I		R	4-20
		BRAKE FLUID	(NOTE 3)			I	I	R	I	I	R	4-21
		BRAKE PADS WEAR				I	I	I	I	I	I	4-22
		BRAKE SYSTEM			I		I		I		I	4-23
	*	BRAKE LIGHT SWITCH					I		I		I	4-24
	*	HEADLIGHT AIM					I		I		I	4-24
		CLUTCH SYSTEM					I		I		I	4-25
		CLUTCH FLUID	(NOTE 3)			I	I	R	I	I	R	4-25
		SIDESTAND					I		I		I	4-26
	*	SUSPENSION					I		I		I	4-26
	*	NUTS, BOLTS, FASTENERS			I		I		I		I	4-28
	**	WHEELS/TIRES					I		I		I	4-28
	**	STEERING HEAD BEARINGS			I		I		I		I	4-29

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

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

### NOTES:

1. At higher odometer readings, repeat at the frequency interval established here.

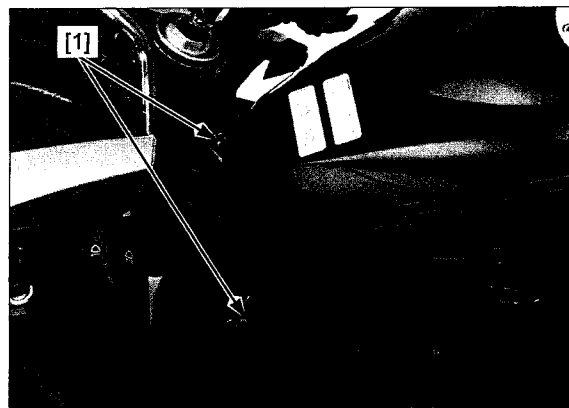
2. Service more frequently when riding in unusually wet or dusty areas.

3. Replace every 2 years, or at the indicated odometer intervals, whichever comes first. Replacement requires mechanical skill.

# FUEL LINE

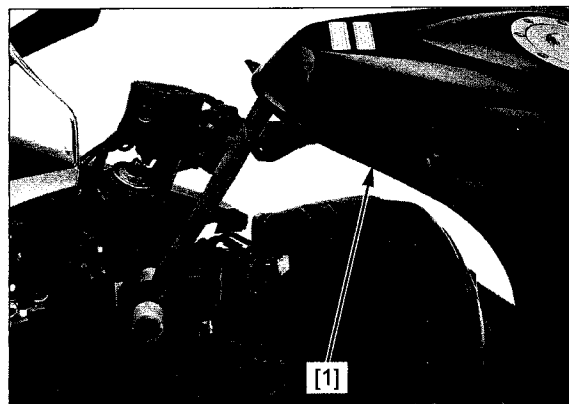
Remove the fuel tank covers (page 3-8).

Remove the two fuel tank mounting bolts [1].



Lift the fuel tank [1].

Support the fuel tank using a suitable support as shown.

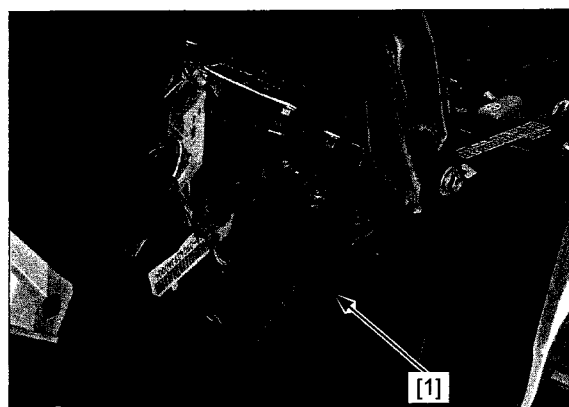


Check the fuel line [1] for deterioration, damage or leakage. Replace the fuel line if necessary. Also check the fuel line fittings for leakage.

*Be careful not to pinch the air vent and overflow hoses.*

Remove the support, then close the fuel tank. Install the fuel tank mounting bolts. Tighten the bolts securely.

Install the fuel tank covers (page 3-8).



# THROTTLE OPERATION

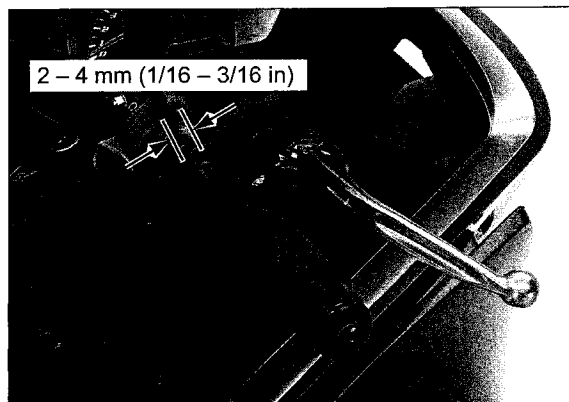
Check for smooth throttle operation and automatic complete closing in all steering positions.

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 freeplay at the throttle grip flange.

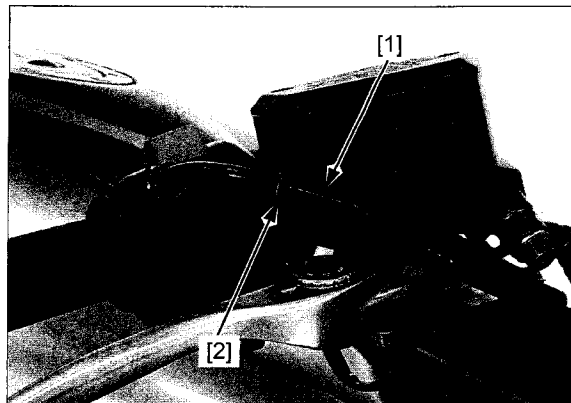
**FREEPLAY: 2 – 4 mm (1/16 – 3/16 in)**



## MAINTENANCE

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

Minor adjustments are made with the upper adjuster [1]. Adjust the freeplay by loosening the lock nut [2] and turning the adjuster.



Major adjustments are made with the lower adjuster on the throttle body.

Remove the right middle cowl (page 3-7).

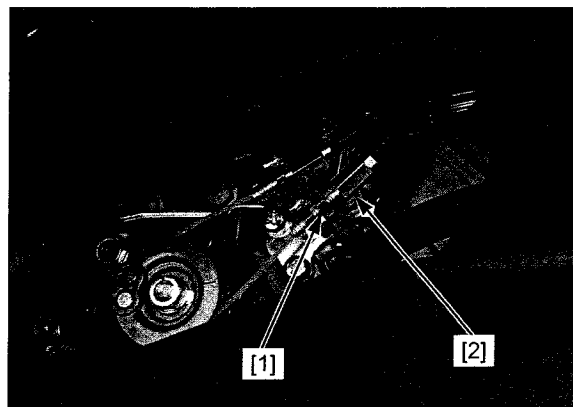
Adjust the freeplay by loosening the lock nut [1] and turning the adjuster [2].

After adjustment, tighten the lock nut securely.

Recheck the throttle operation.

Replace any damaged parts, if necessary.

Install the right middle cowl (page 3-7).

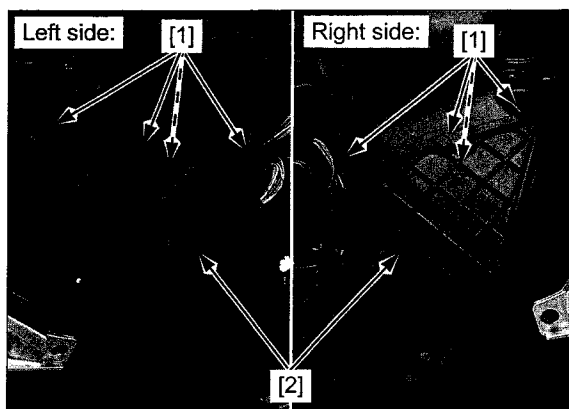


## AIR CLEANER

Lift and support the fuel tank (page 4-5).

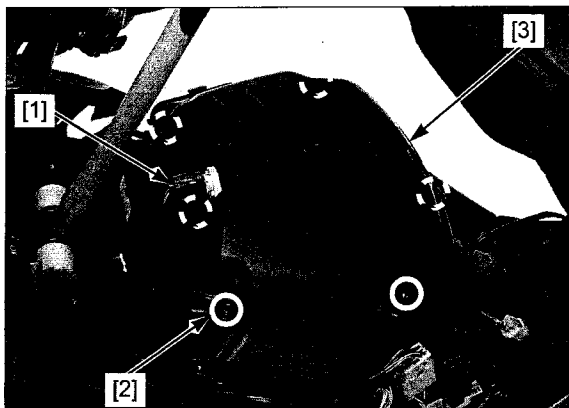
Release the tabs [1] from the air cleaner housing.

Remove the air ducts [2] from the air cleaner housing.

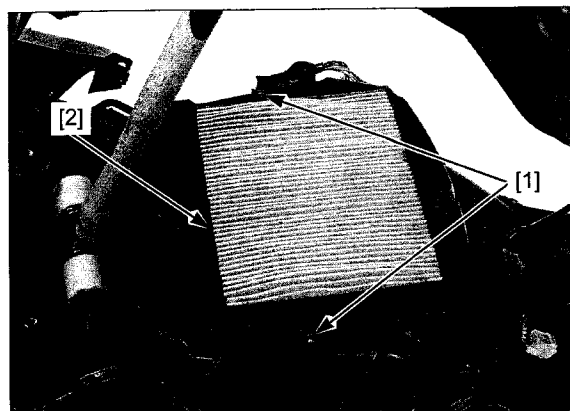


Disconnect the IAT sensor 2P (Gray) connector [1].

Remove the screws [2] and air cleaner cover [3].



Remove the air cleaner element mounting screws [1] and air cleaner element [2].



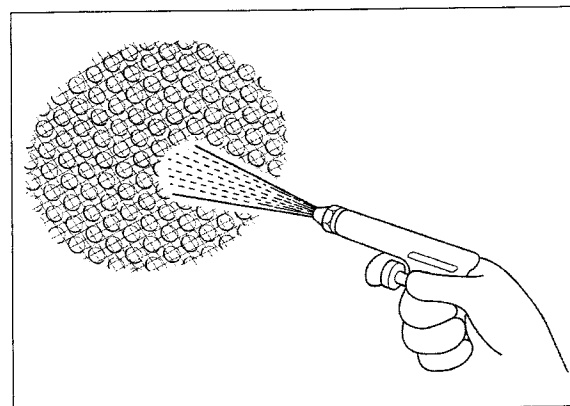
Clean the air cleaner element using compressed air from the throttle body side any time it is excessively dirty.

Installation is in the reverse order of removal.

#### TORQUE:

**Air cleaner element screw:**  
0.8 N·m (0.1 kgf·m, 0.6 lbf·ft)

**Air cleaner cover screw:**  
0.8 N·m (0.1 kgf·m, 0.6 lbf·ft)



## SPARK PLUG

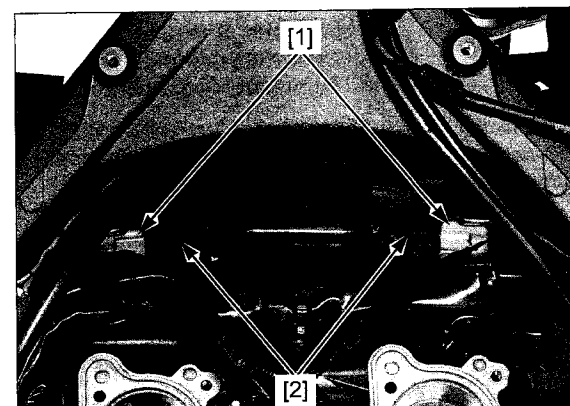
### REMOVAL

#### Front cylinder:

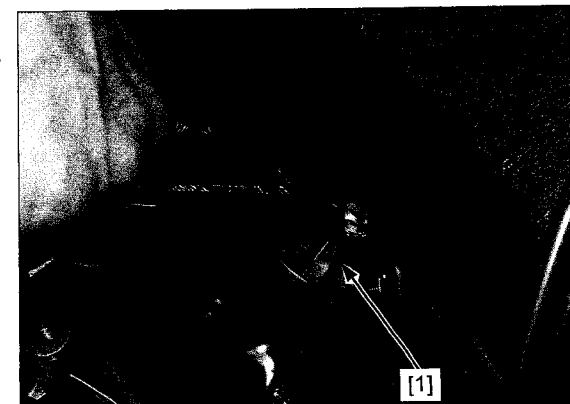
Remove the air cleaner housing (page 6-68).

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

Disconnect the direct ignition coil connectors [1]. Remove the direct ignition coils [2] from the spark plugs.



Remove the spark plug using the spark plug wrench [1]. Inspect or replace as described in the maintenance schedule (page 4-4).





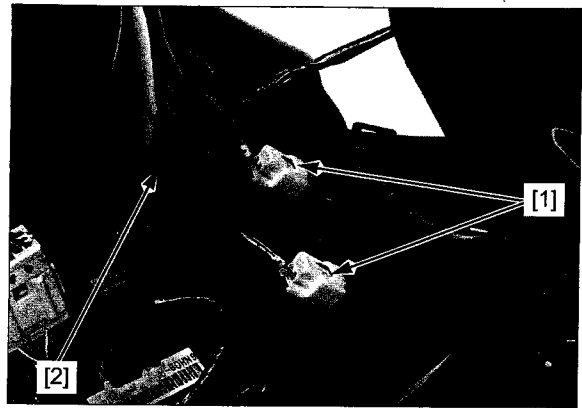
## MAINTENANCE

### Rear cylinder:

Lift and support the fuel tank (page 4-5).

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

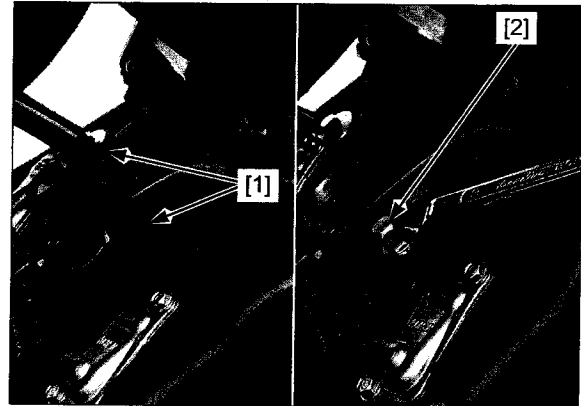
Disconnect the direct ignition coil connectors [1].  
Remove the heat guard rubber [2].



Remove the direct ignition coils [1] from the spark plugs.

Remove the spark plug using the spark plug wrench [2].

Inspect or replace as described in the maintenance schedule (page 4-4).



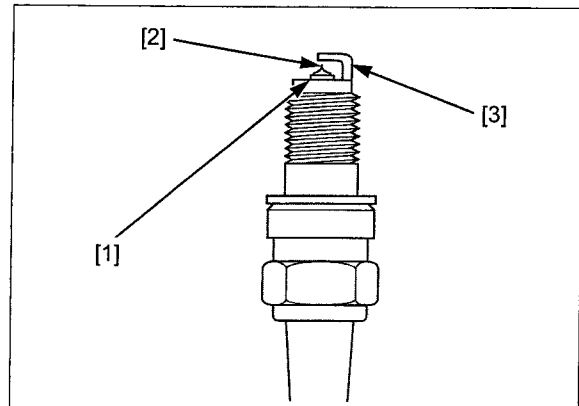
## INSPECTION

Check the following replace if necessary.

- Insulator [1] for damage
- Center electrode [2] and side electrode [3] for wear
- Burnt condition, coloration

*This motorcycle's spark plugs are equipped with an iridium center electrode. Replace the spark plug if the electrode is contaminated.*

If the electrodes are contaminated with accumulated objects or dirt, replace the spark plug.



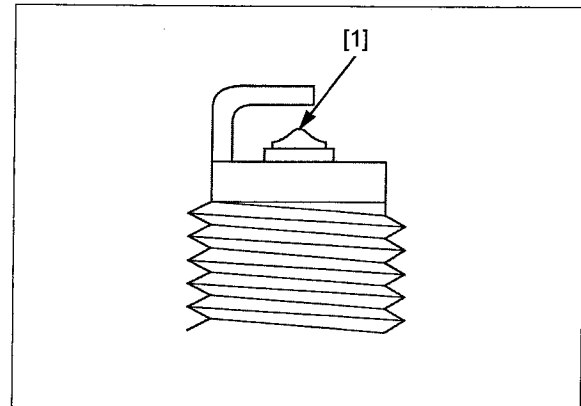
*Always use specified spark plugs on this motorcycle.*

Replace the plug if the center electrode is rounded as shown [1] in the illustration.

### SPECIFIED SPARK PLUG:

NGK: IMR9E-9HES

DENSO: VUH27ES



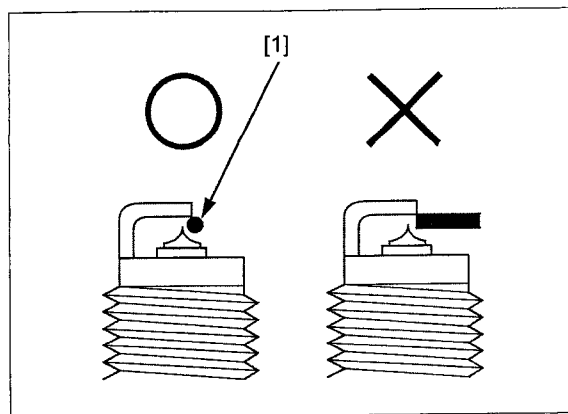
To prevent damaging the iridium center electrode, use a wire type feeler gauge to check the spark plug gap.

Do not adjust the spark plug gap. If the gap is out of specification, replace it with a new one.

Check the gap between the center and side electrodes with a wire type feeler gauge [1].

Make sure that the  $\Phi$  1.0 mm (0.04 in) plug gauge does not insert between the gap.

If the gauge can be inserted into the gap, replace the plug with a new one.



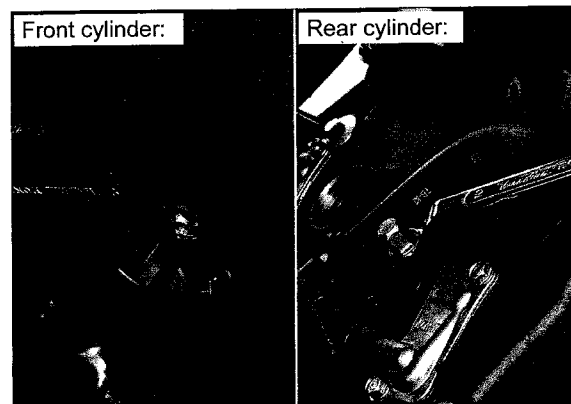
## INSTALLATION

### Front and rear cylinder:

Install and hand tighten the spark plugs to the cylinder head, then tighten the spark plugs to the specified torque.

**TORQUE: 16 N·m (1.6 kgf·m, 12 lbf·ft)**

Install the removed parts in the reverse order of removal.



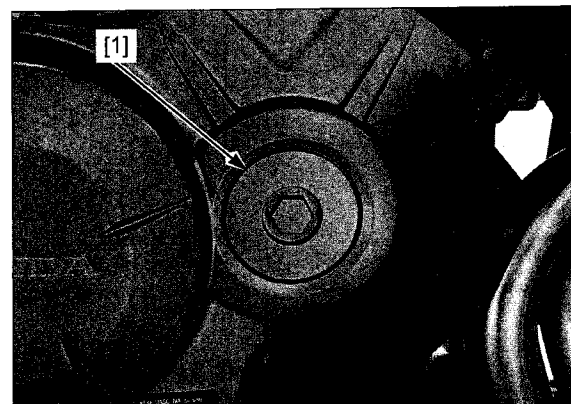
## VALVE CLEARANCE

### INSPECTION

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

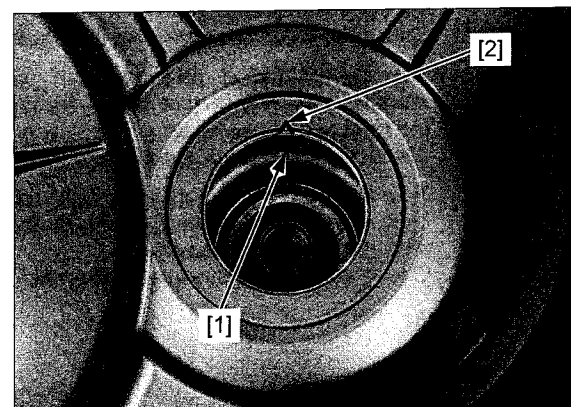
Remove the cylinder head cover (page 9-7).

Remove the timing hole cap [1] and O-ring.



Turn the crankshaft clockwise, align the "MT RT" mark [1] on the CKP sensor rotor with the index mark [2] on the right crankcase cover.

Make sure that the No.2 piston is at TDC (Top Dead Center) on the compression stroke.



## MAINTENANCE

Insert the feeler gauge [1] between the No.2 rocker arm roller and cam lobe.

Check the valve clearance for the exhaust valves using a feeler gauge.

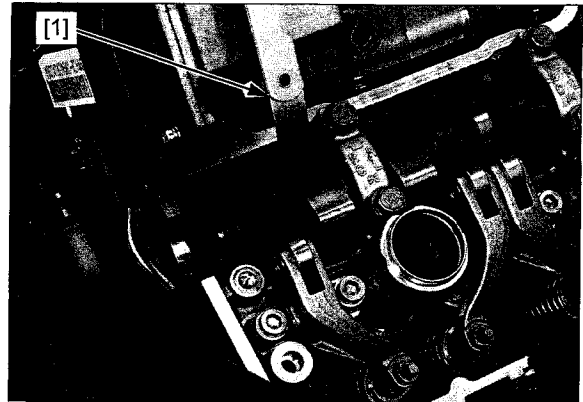
### VALVE CLEARANCE:

**EX: Valve side**

$0.30 \pm 0.02 \text{ mm } (0.012 \pm 0.001 \text{ in})$

**Roller side**

$0.21 \pm 0.02 \text{ mm } (0.008 \pm 0.001 \text{ in})$



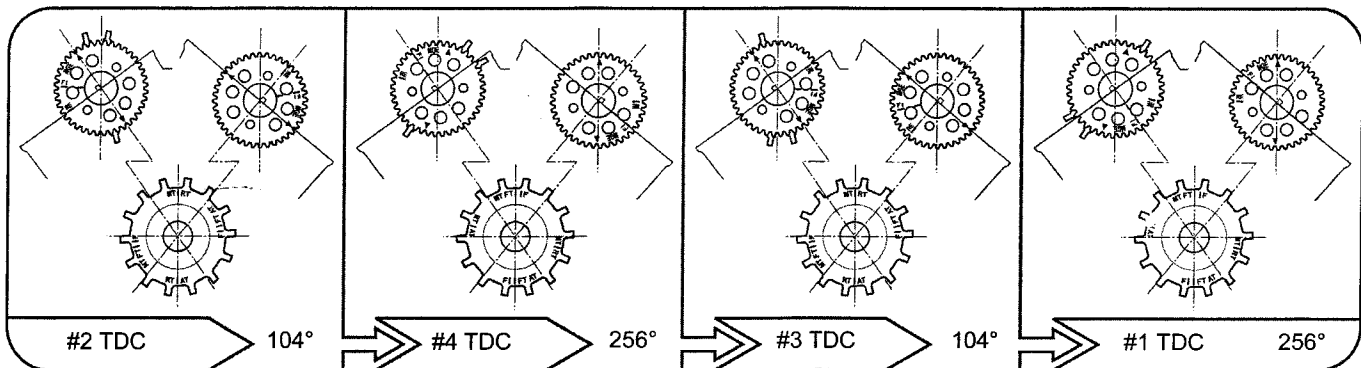
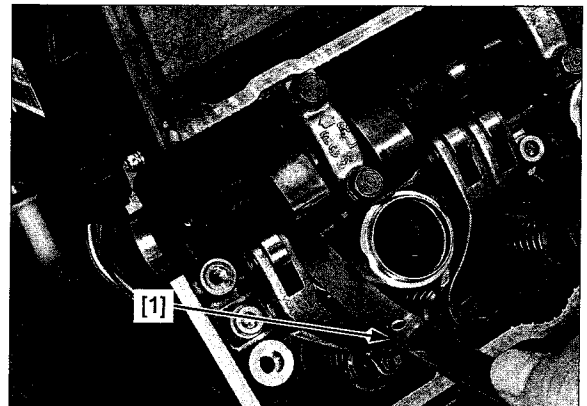
Insert the feeler gauge [1] between the valve lifter and the cam lobe.

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

Check the valve clearance for the intake valves using a feeler gauge.

### VALVE CLEARANCE:

**IN:  $0.16 \pm 0.03 \text{ mm } (0.006 \pm 0.001 \text{ in})$**



Turn the crankshaft clockwise  $104^\circ$ , align the "MT FT" mark on the CKP sensor rotor with the index mark on the right crankcase cover.

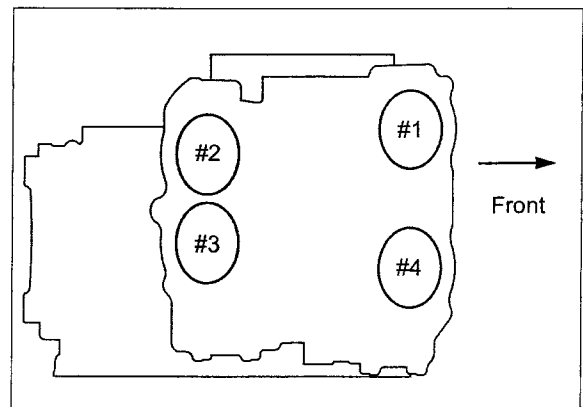
Check the valve clearance for the No.4 cylinder.

Turn the crankshaft clockwise  $256^\circ$ , align the "MT RT" mark on the CKP sensor rotor with the index mark on the right crankcase cover.

Check the valve clearance for the No.3 cylinder.

Turn the crankshaft clockwise  $104^\circ$ , align the "MT FT" mark on the CKP sensor rotor with the index mark on the right crankcase cover.

Check the valve clearance for the No.1 cylinder.

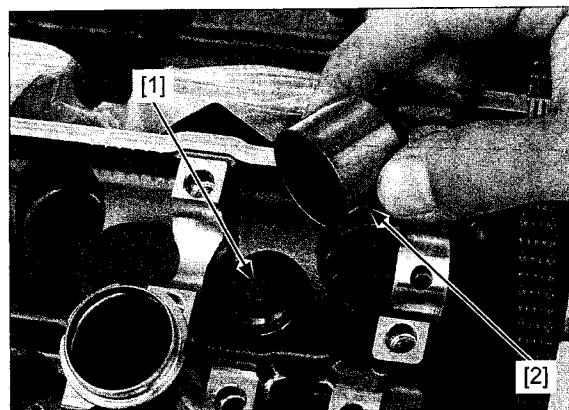


# ADJUSTMENT

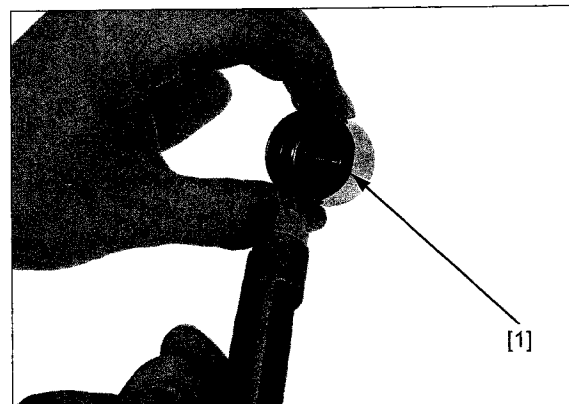
## Intake valve side:

Remove the camshaft (page 9-11).

- The shim [1] may stick to the inside of the valve lifter [2]. Do not allow the shim 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 tweezers or a magnet.



Clean the valve shim contact area in the valve lifter [1] with compressed air.



Sixty-nine different thickness shims are available from the thinnest 1.200 mm thickness shim to the thickest 2.900 mm thickness shim in intervals of 0.025 mm.

Measure the shim [1] thickness and record it.

Calculate the new shim thickness using the equation below.

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

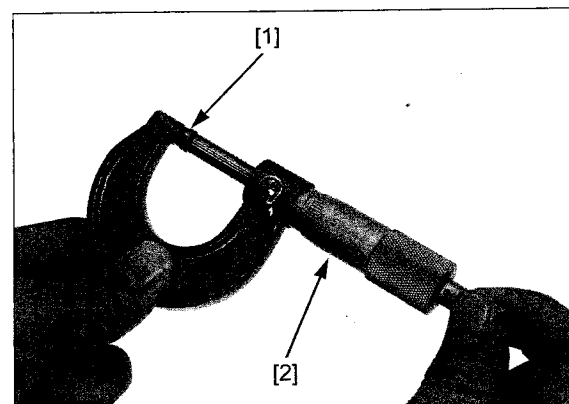
A: New shim thickness

B: Recorded valve clearance

C: Specified valve clearance

D: Old shim thickness

- Make sure of the correct shim thickness by measuring the shim with a micrometer [2].
- Reface the valve seat if carbon deposit result in a calculated dimension of over 2.900 mm.



1.80 mm



1.825 mm



1.85 mm



1.875 mm

## MAINTENANCE

*Install the shims and valve lifters in their original locations.*

Install the newly selected shim [1] on the valve retainer.

Apply molybdenum disulfide oil to the valve lifter [2].  
Install the valve lifter into the valve lifter holes.

Install the camshaft (page 9-11).

Recheck both the intake and exhaust valve clearance (page 4-9).



### Exhaust valve side:

Adjust by loosening the lock nut [1] and turning the adjusting screw [2] until there is a slight drag on the feeler gauge.

#### TOOL:

**Tappet adjusting wrench [3]** 07908-3290100

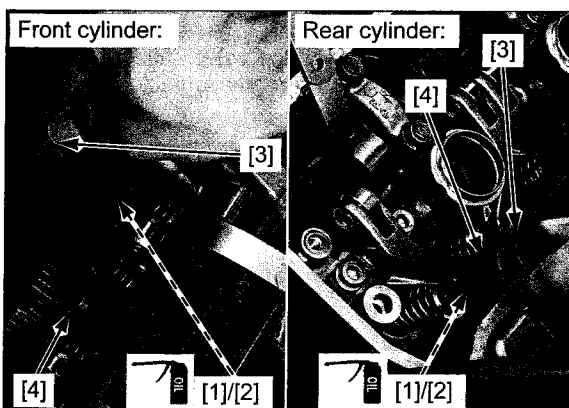
**Tappet lock nut wrench [4]** 07908-3290200

*Apply engine oil to the lock nut threads and seating surface.*

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

**TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)**

After tightening the lock nut, recheck the valve clearance (page 4-9).



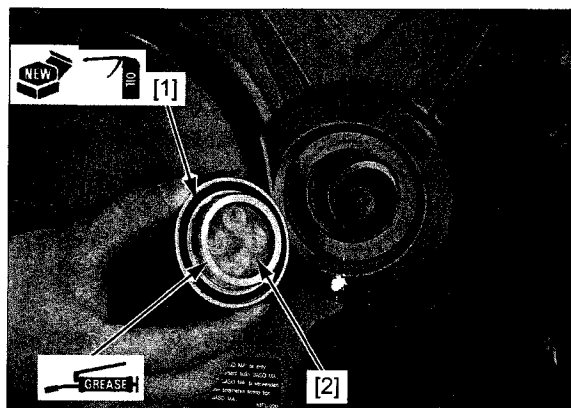
Apply oil to a new O-ring [1] and install it to the crankshaft hole cap [2].

Apply grease to the timing hole cap threads.

Tighten the crankshaft hole cap to the specified torque.

**TORQUE: 17 N·m (1.7 kgf·m, 13 lbf·ft)**

Install the remove parts in the reverse order of removal.



## ENGINE OIL/OIL FILTER

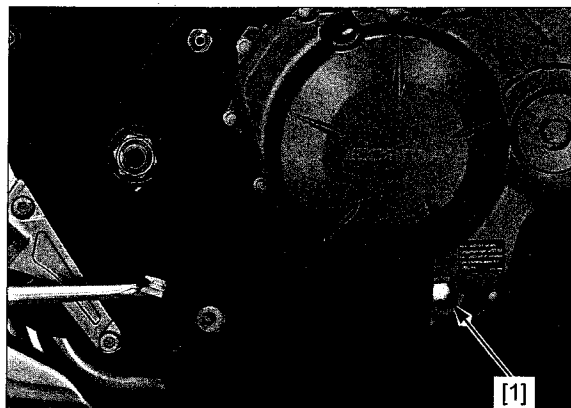
### OIL LEVEL INSPECTION

Start the engine and let it idle for 3 – 5 minutes.

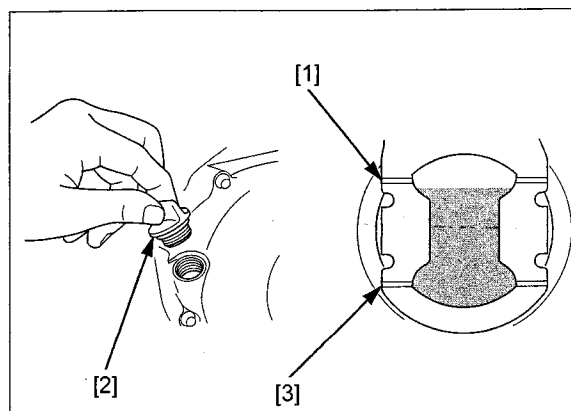
Stop the engine and wait 2 – 3 minutes.

Hold the motorcycle in an upright position.

Check the oil level through the inspection window [1].



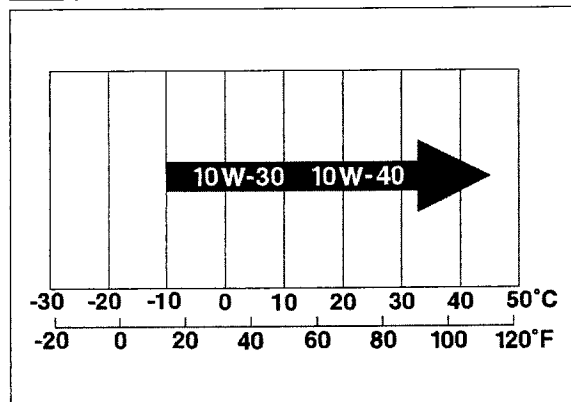
If the level is below the lower level line [1], remove the oil filler cap [2] and fill the crankcase with the recommended oil up to the upper level line [3].



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

**RECOMMENDED ENGINE OIL:**  
**Pro Honda GN4 4-stroke oil (U.S.A. and Canada) or equivalent motor oil**  
**API service classification: SG or higher**  
**JASO T903 standard: MA**  
**Viscosity: SAE 10W-30**

Reinstall the filler cap.



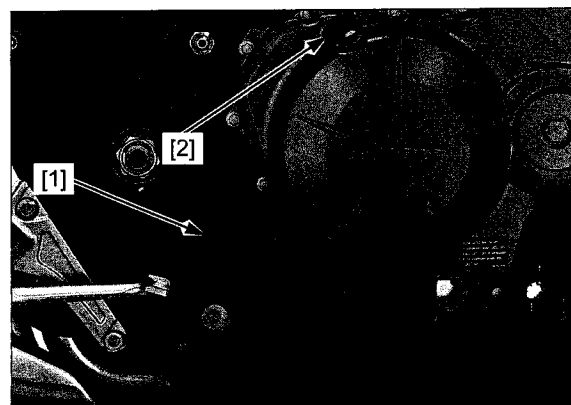
## ENGINE OIL & FILTER CHANGE

Remove the under cowl [1] (page 3-6).

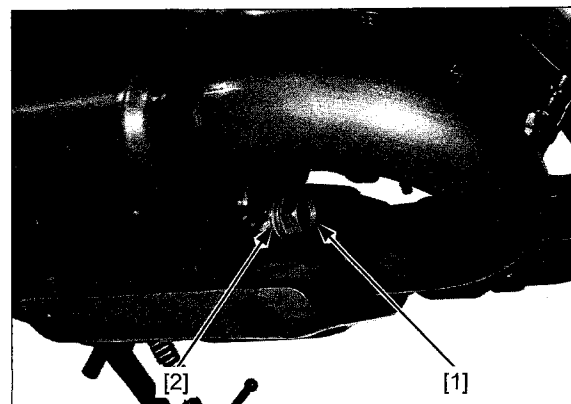
Warm up the engine.

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

Stop the engine and remove the oil filler cap [2].



Remove the drain bolt [1] and sealing washer [2], then drain the oil completely.



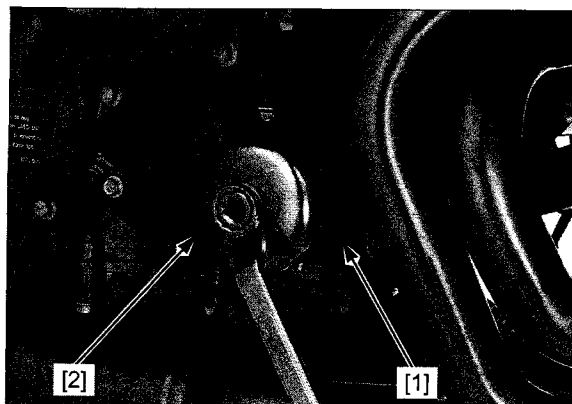
## MAINTENANCE

Remove and discard the oil filter cartridge [1] using the special tool.

### TOOL:

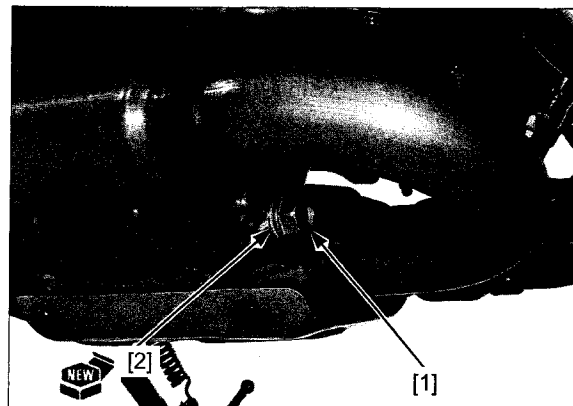
Oil filter wrench [2]

07HAA-PJ70101  
07AAA-PLCA100  
(U.S.A. only)



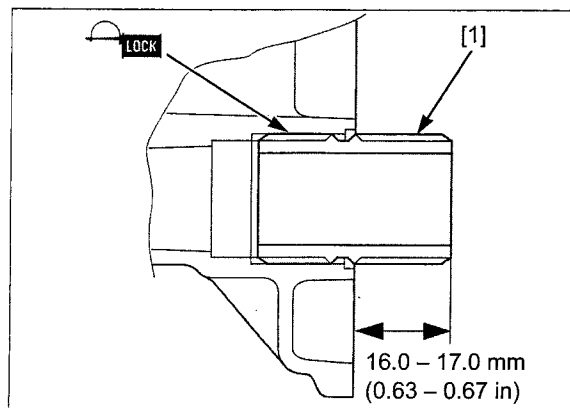
Install the drain bolt [1] with a new sealing washer [2]. Tighten the drain bolt to the specified torque.

**TORQUE: 29 N·m (3.0 kgf·m, 21 lbf·ft)**

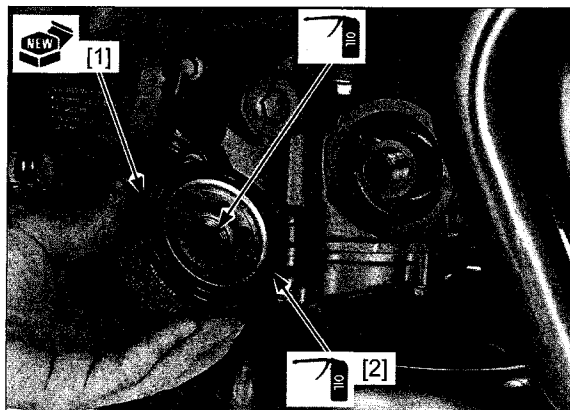


Check that the oil filter boss [1] extends from the crankcase at the specified length as shown.

**SPECIFIED LENGTH: 16.0 – 17.0 mm (0.63 - 0.67 in)**



Apply oil to new oil filter cartridge [1] threads and O-ring [2].



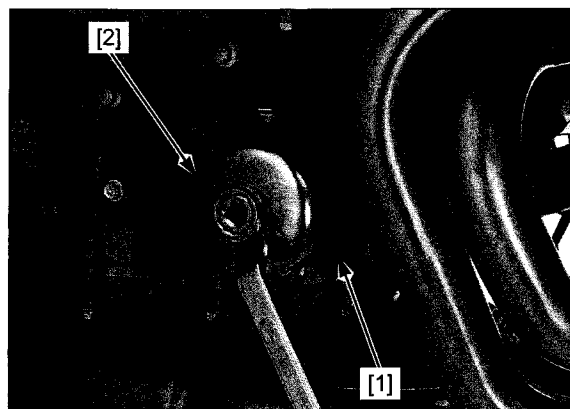
Install the oil filter cartridge [1] and tighten it to the specified torque.

#### TOOL:

Oil filter wrench [2]

07HAA-PJ70101  
07AAA-PLCA100  
(U.S.A. only)

**TORQUE:** 26 N·m (2.7 kgf·m, 19 lbf·ft)



Fill the crankcase with recommended engine oil.

#### OIL CAPACITY:

3.0 liter (3.2 US qt, 2.6 Imp qt) after draining

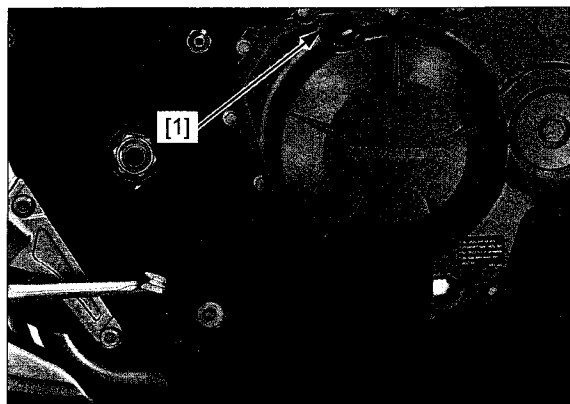
3.2 liter (3.4 US qt, 2.8 Imp qt) after draining/filter change

Check that the O-ring on the oil filler cap [1] is in good condition, and replace it if necessary. Install the oil filler cap.

Check the oil level (page 4-12).

Check that there are no oil leaks.

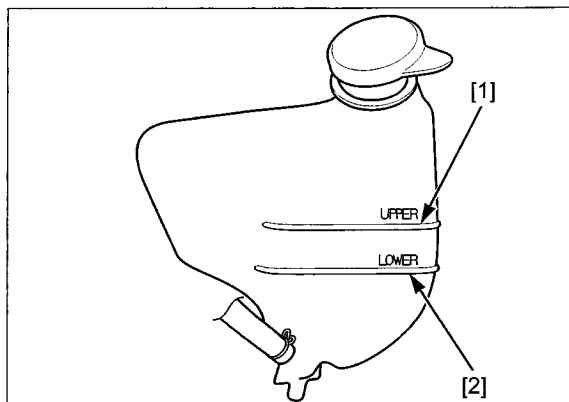
Install the under cowl (page 3-6).



## 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" [1] and "LOWER" [2] level lines.



If necessary, add the recommended coolant.

#### RECOMMENDED ANTIFREEZE:

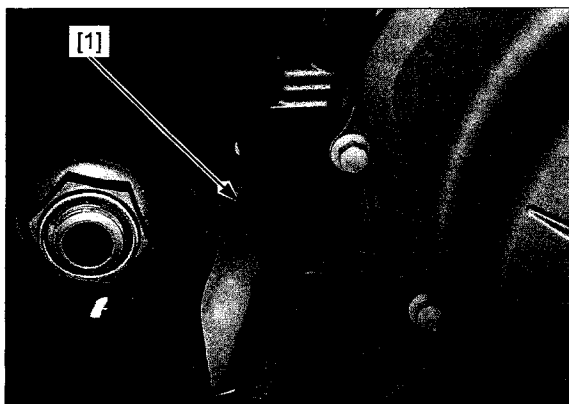
**Pro Honda HP Coolant or an equivalent high quality ethylene glycol antifreeze containing silicate free corrosion inhibitors**

Open the right engine heat guard.

Remove the reserve tank filler cap [1] and fill to the "UPPER" level line with 1:1 mixture of distilled water and antifreeze.

Reinstall the filler cap.

Closes the right engine heat guard.



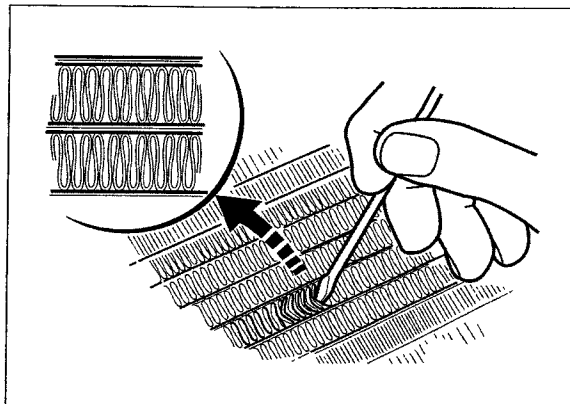


### COOLING SYSTEM

Remove the inner lower cowl (page 3-6).

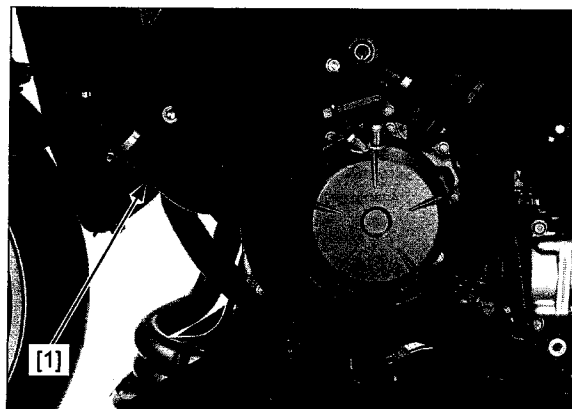
Check the radiator air passages for clogging or damage.

Straighten bent 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 [1] for cracks or deterioration, and replace if necessary.

Check the tightness of all hose clamps and fasteners.



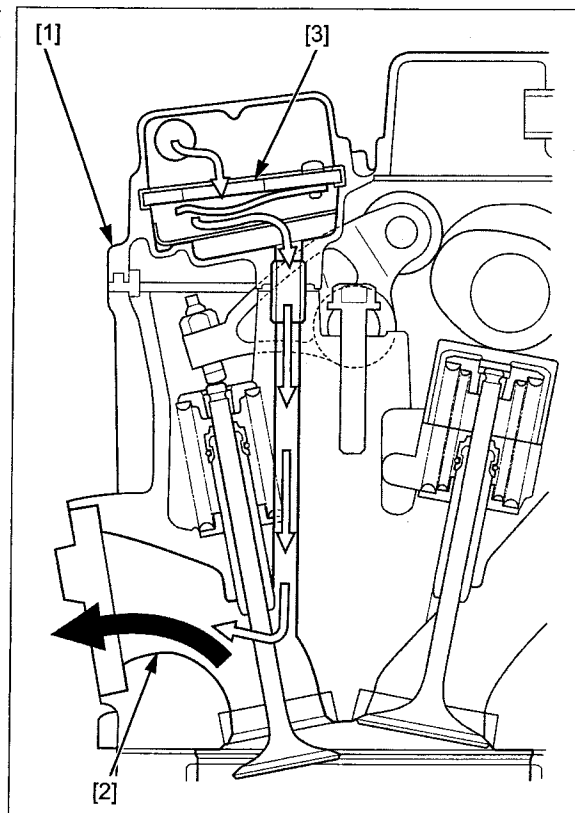
### SECONDARY AIR SUPPLY SYSTEM

- This model is equipped with a built-in secondary air supply system. The pulse secondary air supply system is located on the cylinder head cover [1].
- The secondary air supply system introduces filtered air into the exhaust gases in the exhaust port [2]. 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.

Lift and support the fuel tank (page 4-5).

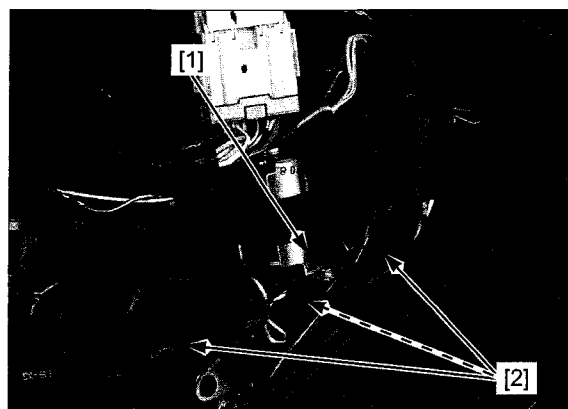
*If the hoses show any signs of heat damage, inspect the PAIR check valve [3] in the PAIR reed valve cover for damage.*

Check the PAIR hoses between the PAIR control solenoid valve and cylinder head cover for deterioration, damage or loose connections. Make sure that the hoses are not cracked.



Check the air suction hose [1] between the air cleaner housing and PAIR control solenoid valve [2] for deterioration, damage or loose connection.

Make sure that the hoses are not kinked, pinched or cracked.

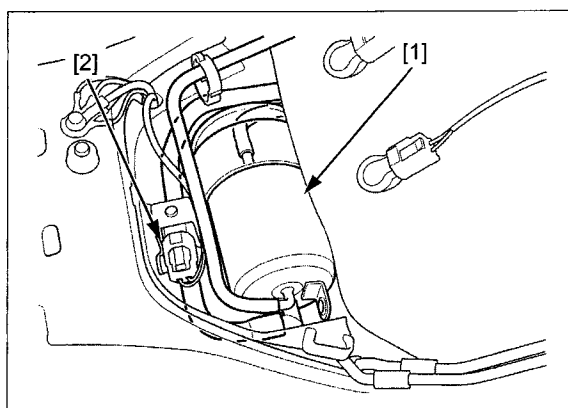


## EVAPORATIVE EMISSION CONTROL SYSTEM

Check the hoses between the fuel tank, EVAP canister [1], EVAP purge control solenoid valve [2] for deterioration, damage or loose connection.

Check the EVAP canister for cracks or other damage.

Refer to the cable and Harness routing for hose connections (page 1-22).



## EGCA CABLE

### OPERATING INSPECTION

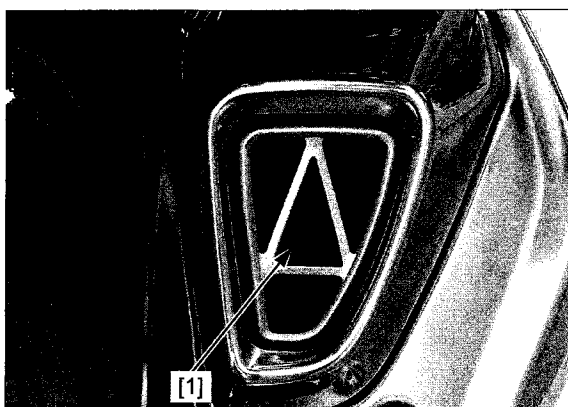
Clear the DTC's (page 6-12).

Start the engine.

Stop the engine and check the ECV [1] is closed fully.

If the ECV is closed fully, it is normal.

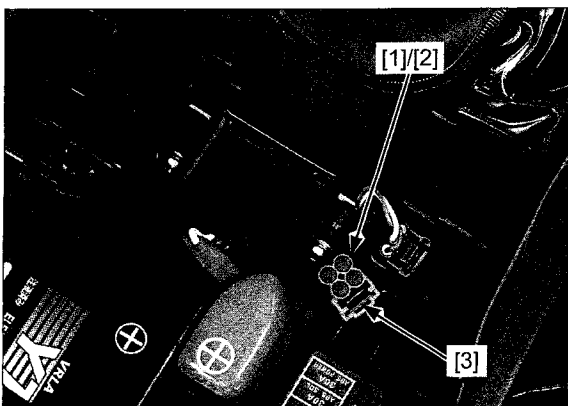
If the ECV is not closed fully, adjust the EGCA cable (page 4-18).



Remove the seat (page 3-4).

Remove the DLC [1] and dummy connector [2] from the rear fender stay [3].

Remove the dummy connector from the DLC.



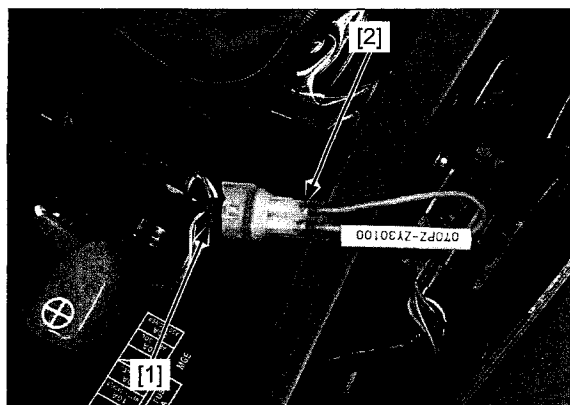
## MAINTENANCE

Connect the special tool to the DLC [1].

**TOOL:**

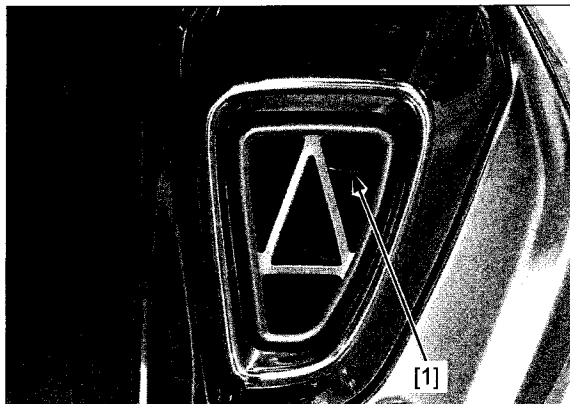
**SCS connector [2]**

**070PZ-ZY30100**



Turn the ignition switch ON and engine stop switch "Q".

If the ECV [1] opens fully, it is normal.



### CABLE INSPECTION

Remove the right rear cowl (page 3-4).

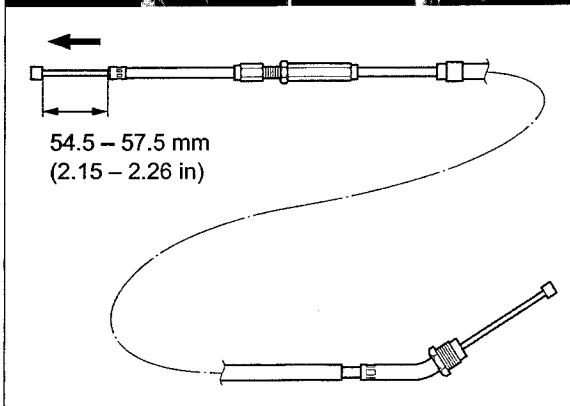
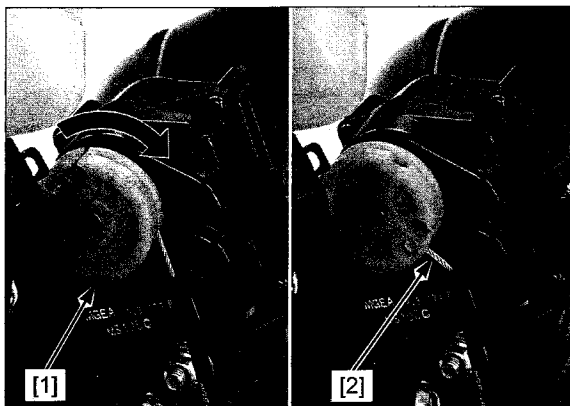
Turn the EGCA pulley [1] clockwise and disconnect the EGCA cable [2] from the EGCA pulley.

Check the EGCA cable length with the ECV closed position.

- Check the length of the EGCA cable with the ECV closed position while pulling the EGCA cable.

**STANDARD LENGTH: 54.5 – 57.5 mm (2.15 – 2.26 in)**

If the cable length is out of the specification, adjust the cable length.



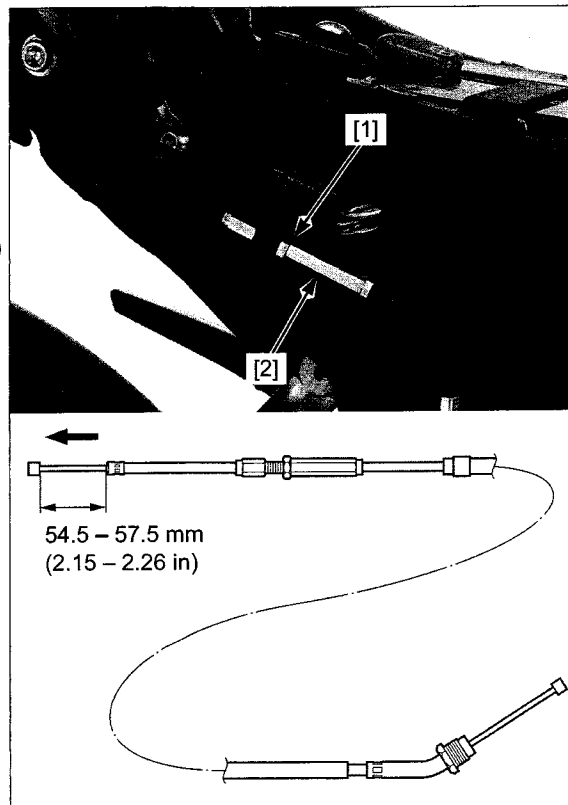
# CABLE ADJUSTMENT

Remove the right rear cowl (page 3-4).

Loosen the lock nut [1] and turn the adjust [2] to the EGCA cable length with the EGCA closed position.

- Keep the EGCA cable straight when adjust the cable length.
- Check the length of the EGCA cable with the ECV closed position while pulling the EGCA cable.

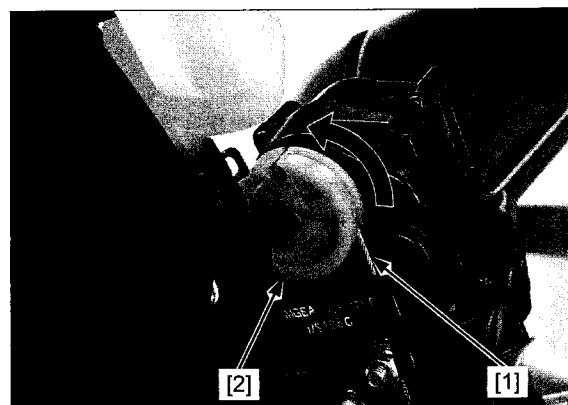
**STANDARD LENGTH: 54.5 – 57.5 mm (2.15 – 2.26 in)**



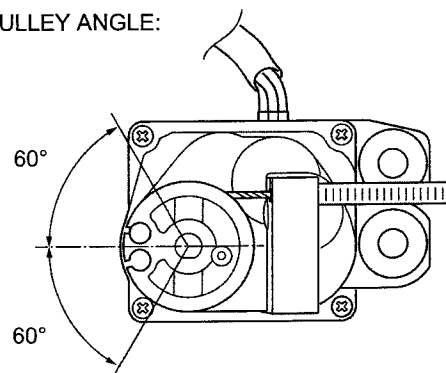
Connect the EGCA cable [1] to the EGCA pulley [2].

Turn the EGCA pulley counterclockwise to the specified angle as shown.

Installation is in the reverse order of removal.



PULLEY ANGLE:

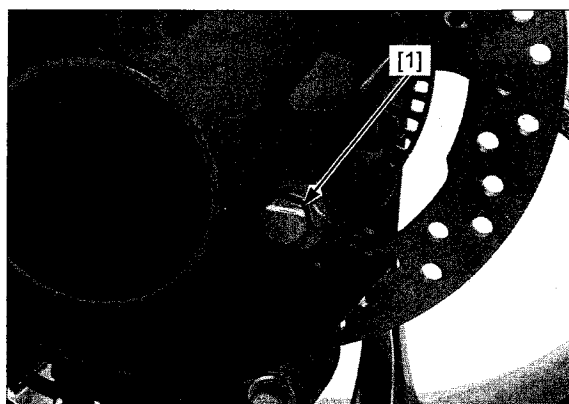


# FINAL DRIVE OIL

## OIL LEVEL CHECK

Place the motorcycle on its sidestand.

Remove the oil filler cap [1] from the final gear case.



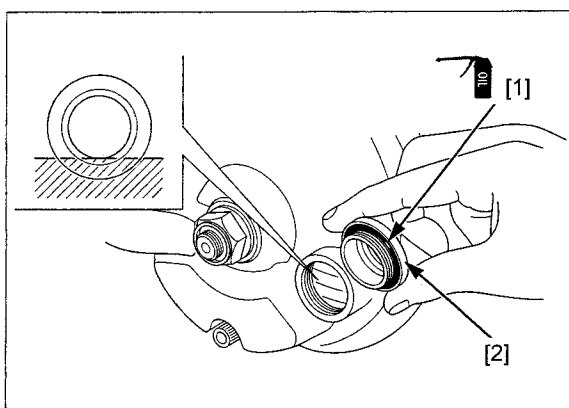
Check that the oil level is to the lower edge of the oil filler hole.

**RECOMMENDED OIL:** Hypoid gear oil, SAE #80

Coat a new O-ring [1] with oil and install it onto the oil filler cap [2].

Install and tighten the final drive oil filler cap to the specified torque.

**TORQUE:** 8.0 N·m (0.8 kgf·m, 5.9 lbf·ft)



## OIL CHANGE

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

Remove the oil filler cap [1] and drain bolt [2] sealing washer [3] from the final gear case, slowly turn the rear wheel and drain the oil.

After the oil is completely drained, install the drain bolt with a new sealing washer and tighten it to the specified torque.

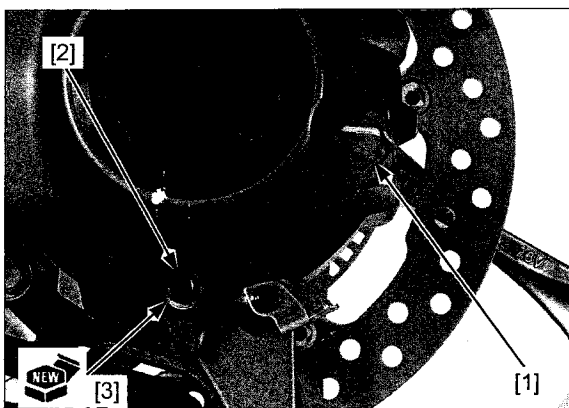
**TORQUE:** 12 N·m (1.2 kgf·m, 9 lbf·ft)

Fill the gear case with recommended oil to the lower edge of the filler hole (page 4-20).

### OIL CAPACITY:

200 cm<sup>3</sup> (6.8 US oz, 7.0 Imp oz) after draining

240 cm<sup>3</sup> (8.1 US oz, 8.4 Imp oz) after disassembly



# BRAKE FLUID

## NOTICE

- 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 shop towel over these parts whenever the system is serviced.

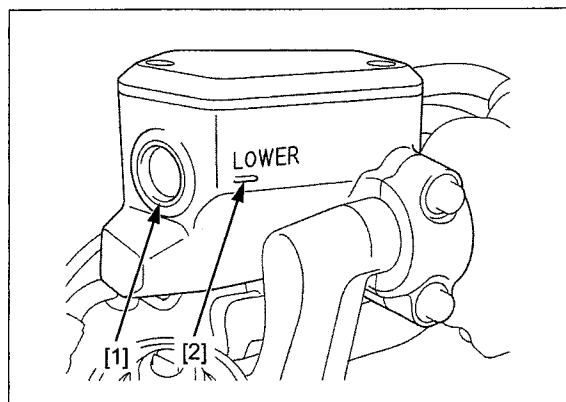
When the fluid level is low, check the brake pads for wear (page 4-22).

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 (page 4-23).

## FRONT BRAKE

Turn the handlebar so that the reservoir is level and check the front brake fluid reservoir level through the sight glass [1].

If the level is near the lower level line [2], check the brake pad wear (page 4-22).



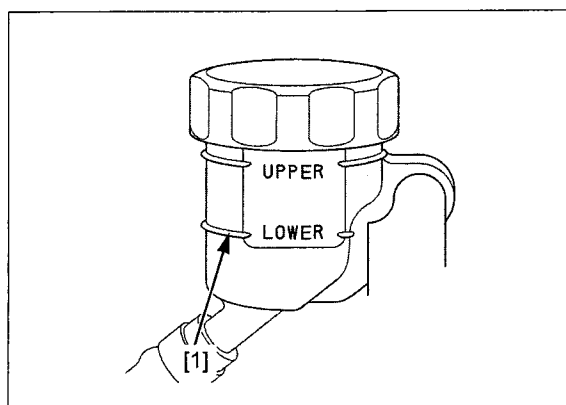
## REAR BRAKE

Remove the right rear cowl (page 3-4).

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

Check the rear brake fluid reservoir level.

If the level is near the lower level line [1], check the brake pad wear (page 4-22).

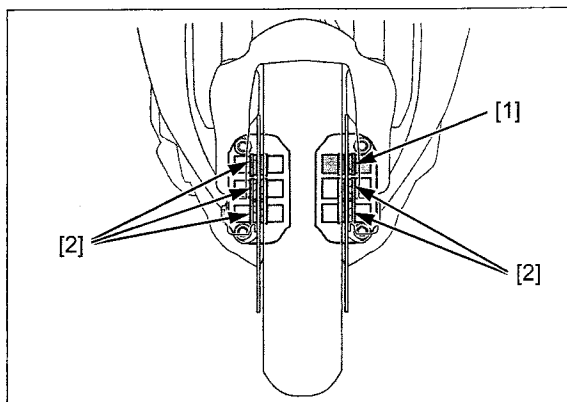


## BRAKE PADS WEAR

### FRONT BRAKE PADS

#### NOTE:

- The front brake caliper of the new brake system has the 4 separate brake pads.  
The small brake pads [1] of left caliper are combined with the rear brake pedal.  
Inspect the conventional brake pads [2] or combined brake pads individually.  
– Conventional brake: Always replace all the right brake pads and left large brake pads with the set to assure even disc pressure.  
– Combined brake: Always replace the left small brake pads in pairs to assure even disc pressure.
- After the brake pad replacement, check the brake operation by applying the brake lever or pedal.

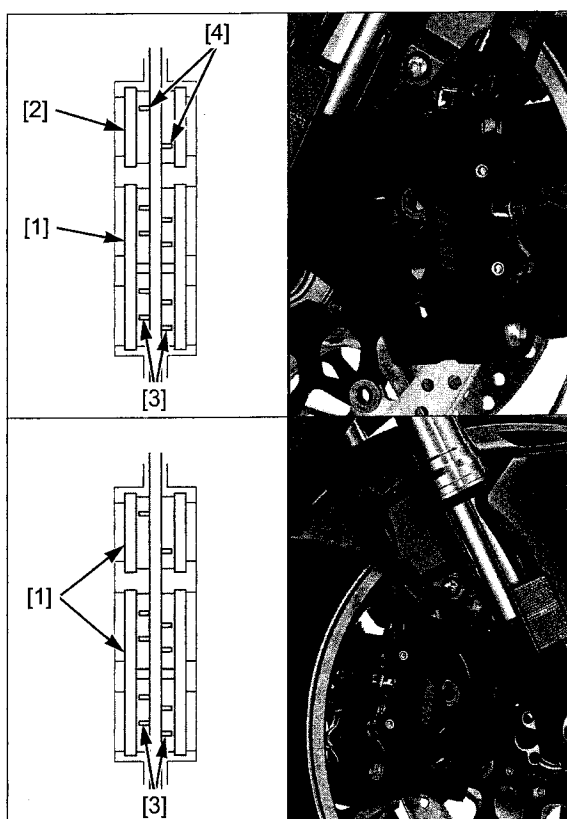


Check the conventional brake pads [1] or combined brake pads [2] individually for wear.

Replace the conventional brake pads as a set if either pad worn to the bottom of the wear limit groove [3].

Replace the combined brake pads if either pad is worn to the bottom of the wear limit groove [4].

Refer to brake pad replacement (page 17-14).

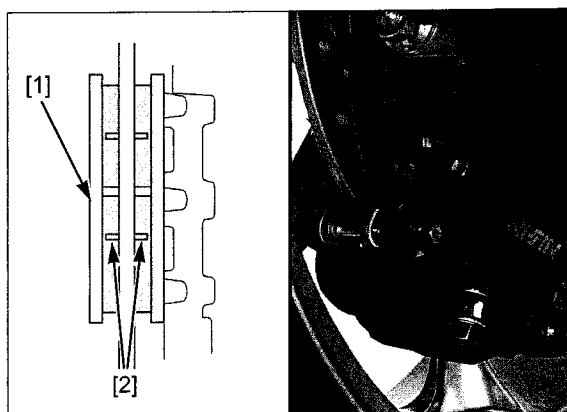


### REAR BRAKE PADS

Check the brake pad [1] for wear.

Replace the brake pads if either pad is worn to the bottom of the wear limit groove [2].

Refer to brake pad replacement (page 17-16).



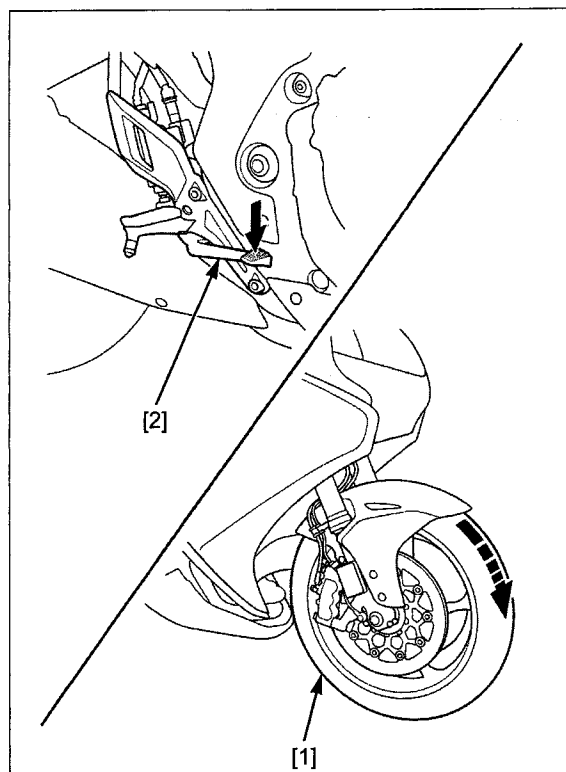
# BRAKE SYSTEM

## INSPECTION

Support the motorcycle securely and raise the front wheel [1] off the ground using a safety stand or a hoist.

Apply the rear brake pedal [2].

Make sure the front wheel does not turn while the rear brake pedal is applied.



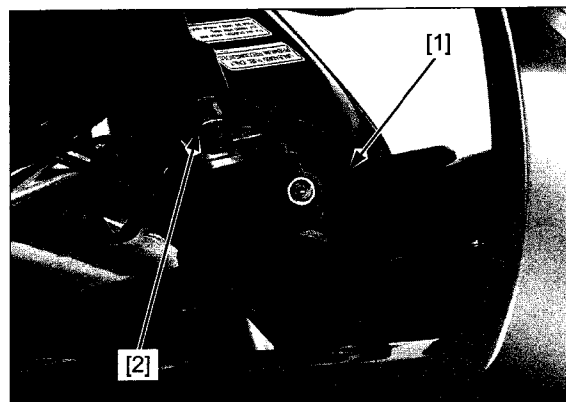
Firmly apply the brake lever or pedal, and check that no air has entered the system. If the lever or pedal feels soft or spongy when operated, bleed the air from the system (page 17-7).

Inspect the brake hose [1] and fittings [2] for deterioration, cracks and signs of leakage.

Tighten any loose fittings.

Replace hoses and fittings as required.

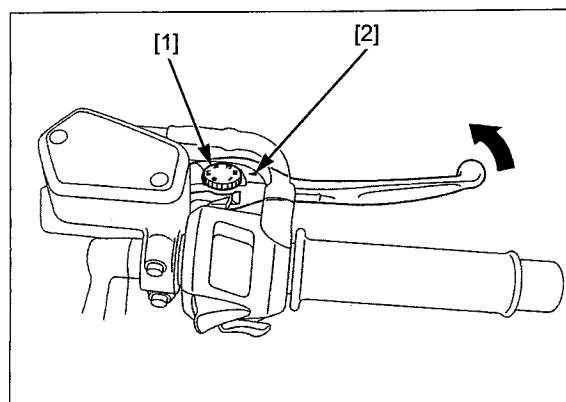
Refer the procedure for brake bleeding (page 17-7).



## BRAKE LEVER ADJUSTMENT

Align the "△" mark [2] on the brake lever with the index number on the adjuster.

The distance between the top of the brake lever and the grip can be adjusted by turning the adjuster [1].





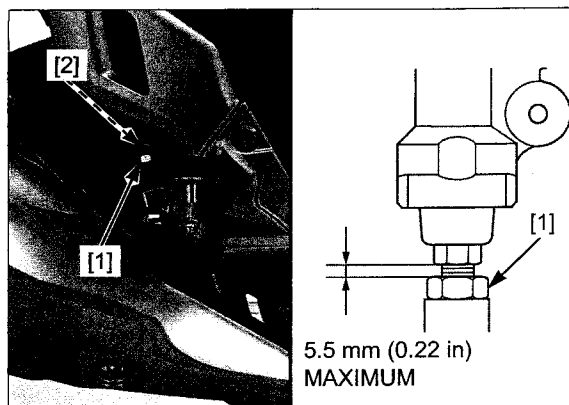
### BRAKE PEDAL HEIGHT ADJUSTMENT

Loosen the lock nut [1] and turn the push rod [2] until the correct pedal height is obtained.

- When adjusting the push rod length, do not extend it more than 5.5 mm (0.22 in).

After adjustment, tighten the lock nut to the specified torque.

**TORQUE: 18 N·m (1.8 kgf·m, 13 lbf·ft)**



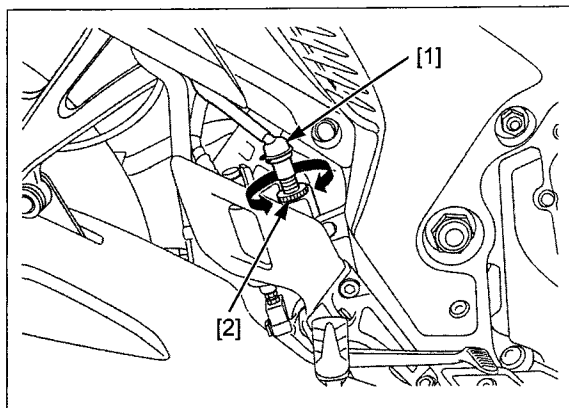
### BRAKE LIGHT SWITCH

*The front brake light switch does not require adjustment.*

Adjust the brake light switch [1] 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 [2]. Do not turn the switch body.



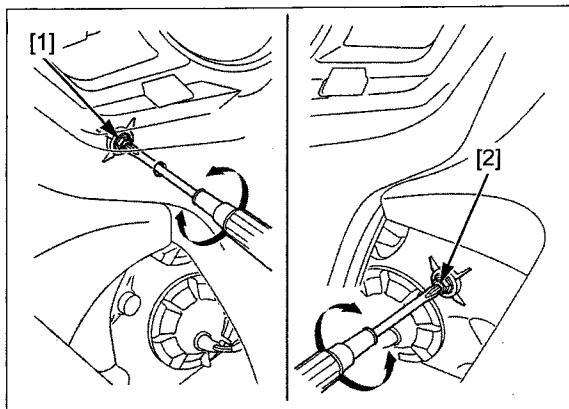
### HEADLIGHT AIM

Place the motorcycle on a level surface.

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

Adjust the headlight beams vertically by turning the vertical beam adjuster [1].

Adjust the headlight beams horizontally by turning the horizontal beam adjusters [2].

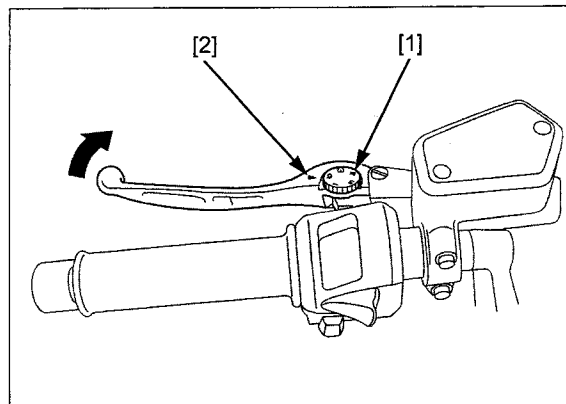


# CLUTCH SYSTEM

## CLUTCH LEVER ADJUSTMENT

Align the "△" mark [2] on the brake lever with the index number on the adjuster.

The distance between the top of the clutch lever and the grip can be adjusted by turning the adjuster [1].



# CLUTCH FLUID

## NOTICE

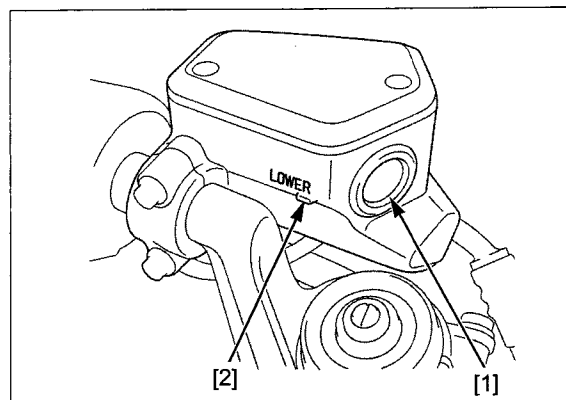
- Do not mix different types of fluid, as they are not compatible with each other.
- Do not allow foreign material to enter the system when filling the reservoir.
- Avoid spilling fluid on painted, plastic or rubber parts. Place a shop towel over these parts whenever the system is serviced.

When the fluid level is low [2], check entire system for leaks.

Turn the handlebar to the right so that the reservoir is level and check the fluid level of the clutch master cylinder reservoir through the sight glass [1].

Firmly apply the clutch lever, and check that no air has entered the system.

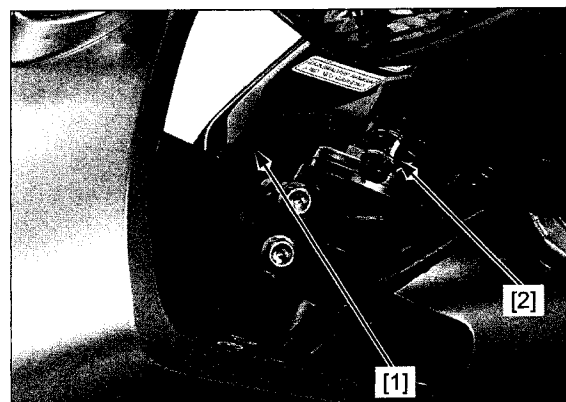
If the lever feels soft or spongy when operated, bleed the air from the system (page 10-6).



Inspect the clutch hose [1] and fittings [2] for deterioration, cracks and signs of leakage. Tighten any loose fittings.

Replace hoses and fittings as required.

Refer the procedures for clutch bleeding (page 10-6).



## SIDESTAND

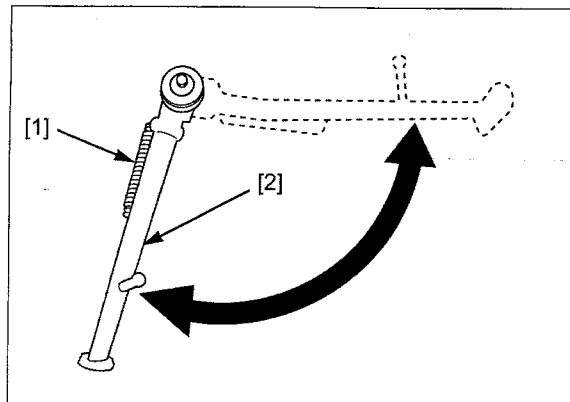
Check the sidestand spring [1] for damage or loss of tension.

Check the sidestand [2] for movement and lubricate the sidestand pivot if necessary.

Check the sidestand ignition cut-off system:

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

If there is a problem with the system, check the sidestand switch (page 22-22).



## SUSPENSION

### FRONT SUSPENSION INSPECTION

Check the action of the forks by operating the front brakes and compressing the front suspension several times.

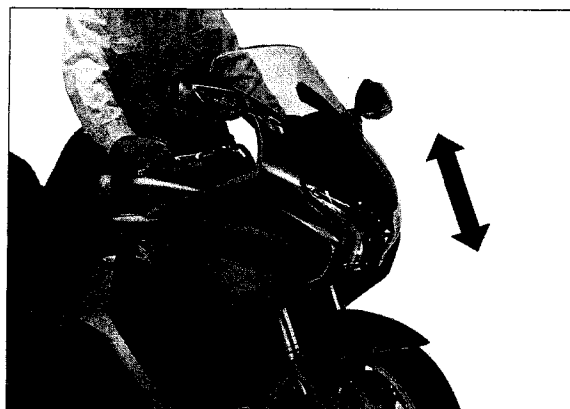
Check the entire assembly for signs of leaks, damage or loose fasteners.

*Loose, worn or damaged suspension parts impair motorcycles stability and control.*

Replace damaged components which cannot be repaired.

Tighten all nuts and bolts.

Refer to the fork service (page 15-19).



### FRONT SUSPENSION ADJUSTMENT

#### SPRING PRE-LOAD ADJUSTER

Spring pre-load can be adjusted by turning the adjuster [1].

**TURN CLOCKWISE:**

Increases the spring pre-load

**TURN COUNTERCLOCKWISE:**

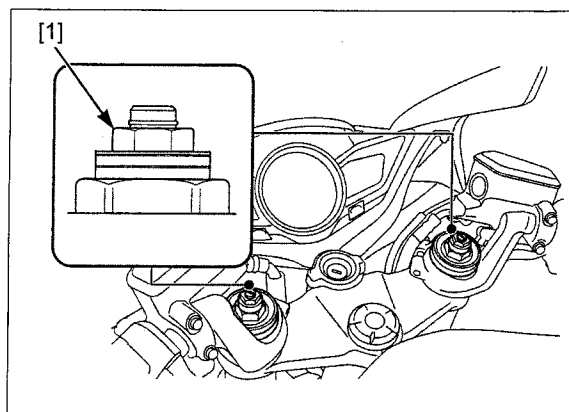
Decreases the spring pre-load

**PRE-LOAD ADJUSTER ADJUSTABLE RANGE:**

4 – 14 mm (0.2 – 0.6 in)

**PRE-LOAD ADJUSTER STANDARD POSITION:**

9 mm (0.4 in) from top surface of fork bolt



### REBOUND DAMPING ADJUSTER

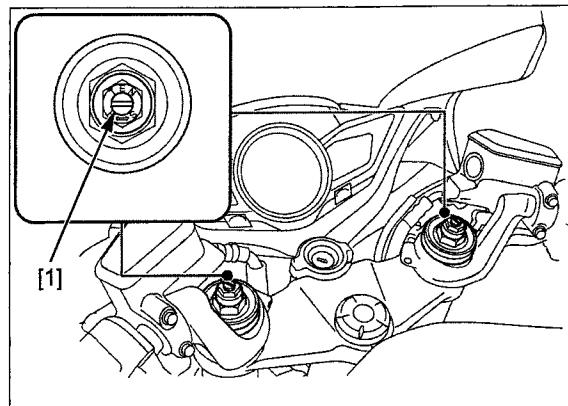
Turn the rebound adjuster [1] clockwise until it stops (fully hard position), then turn the adjuster counterclockwise.

#### REBOUND ADJUSTER ADJUSTABLE RANGE:

11 clicks or more

#### REBOUND ADJUSTER STANDARD POSITION:

6 clicks out from fully hard



### REAR SUSPENSION INSPECTION

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.

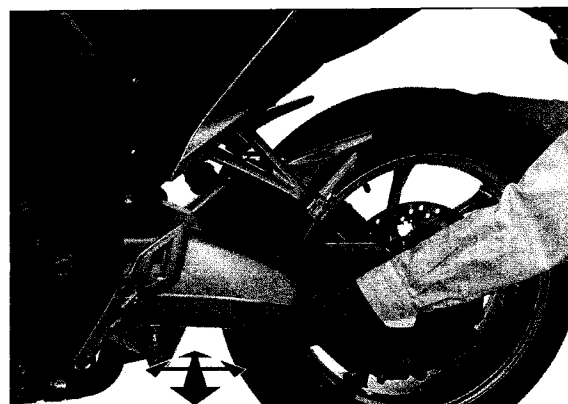
For shock absorber service (page 16-6).



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

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

Replace the bearings if any looseness is felt.



### REAR SUSPENSION ADJUSTMENT

#### SPRING PRE-LOAD ADJUSTER

Spring pre-load can be adjusted by turning the adjuster dial [1].

#### TURN CLOCKWISE:

Increases the spring pre-load

#### TURN COUNTERCLOCKWISE:

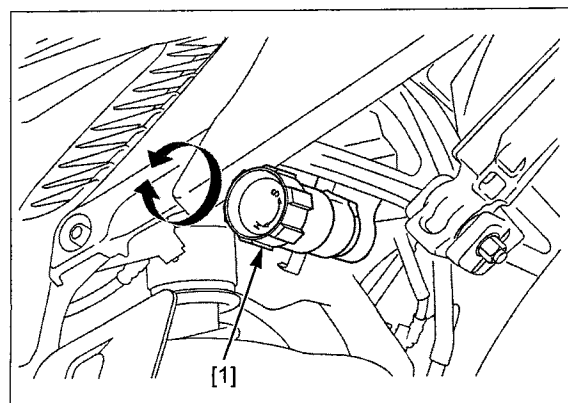
Decreases the spring pre-load

#### PRE-LOAD ADJUSTER ADJUSTABLE RANGE:

25 clicks

#### PRE-LOAD ADJUSTER STANDARD POSITION:

11 clicks out from lower position



### REBOUND DAMPING ADJUSTER

#### NOTICE

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

The rebound damping can be adjusted by turning the adjuster [1].

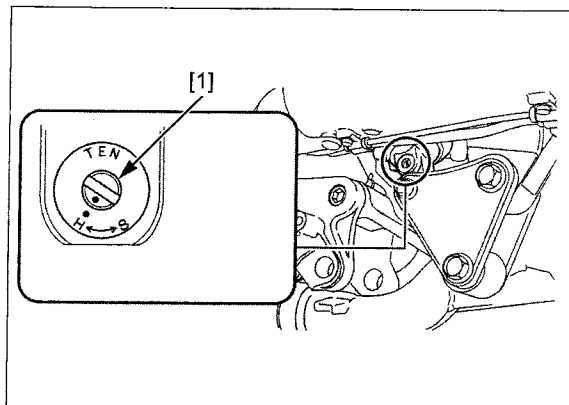
**DIRECTION H:** Increases the damping force

**DIRECTION S:** Decreases the damping force

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

**REBOUND ADJUSTER STANDARD POSITION:**

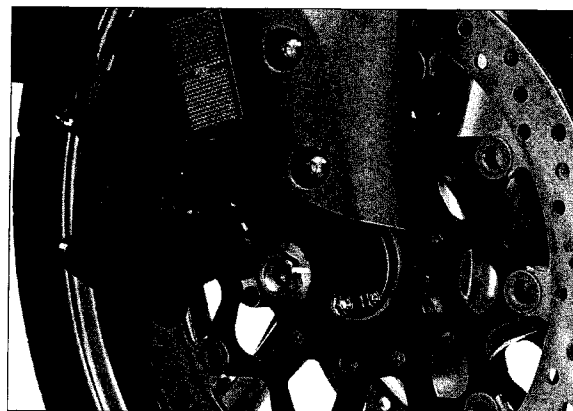
3/4 turn out from fully hard



## NUTS, BOLTS, FASTENERS

Check that all chassis nuts and bolts are tightened to their correct torque values (page 1-12).

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

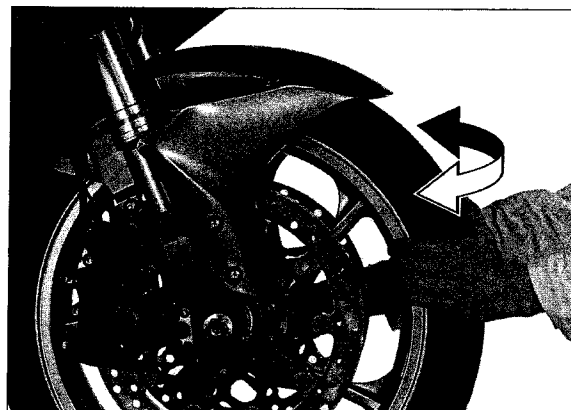


## WHEELS/TIRES

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

Hold the front fork leg and move the front wheel sideways forcefully to see if the wheel bearings are worn.

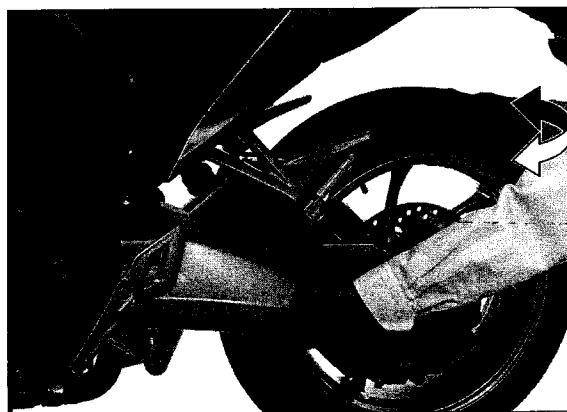
For front wheel service (page 15-13).



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

Hold the swingarm and move the rear wheel sideways with the force to see if the final gear bearings are worn.

For rear wheel service (page 16-5).



Check the tire pressure with a tire pressure gauge when the tires are cold.

## RECOMMENDED TIRE PRESSURE AND TIRE SIZE:

		FRONT	REAR
Tire pressure kPa (kgf/cm <sup>2</sup> , psi)		250 (2.50, 36)	290 (2.90, 42)
Tire size		120/70ZR17 M/C(58W)	190/55ZR17 M/C(75W)
Tire brand	Bridgestone	BT021F N	BT021R N
	Dunlop	ROAD SMART CQ K	ROAD SMART K

Check the tires for cuts, embedded nails, or other damage.

Check the wheel for trueness:

- front wheel (page 15-13)
- rear wheel (page 16-5)

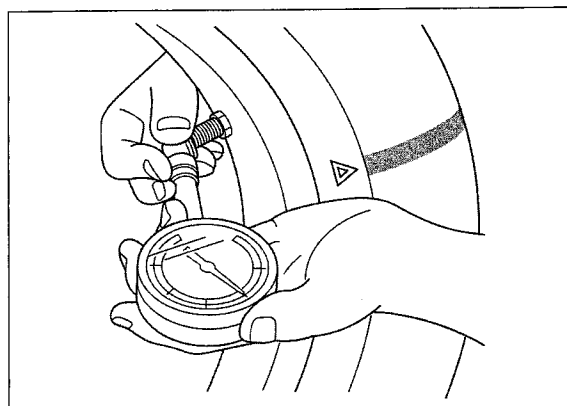
Measure the tread depth at the center of the tires.

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)

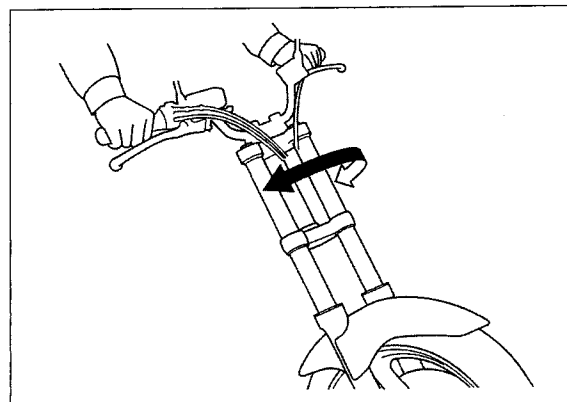


# STEERING HEAD BEARINGS

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

Check that the handlebar moves freely from side to side. Make sure the control cables do not interfere with the handlebar rotation.

If the handlebar moves unevenly, binds, or has vertical movement, inspect the steering head bearings (page 15-30).

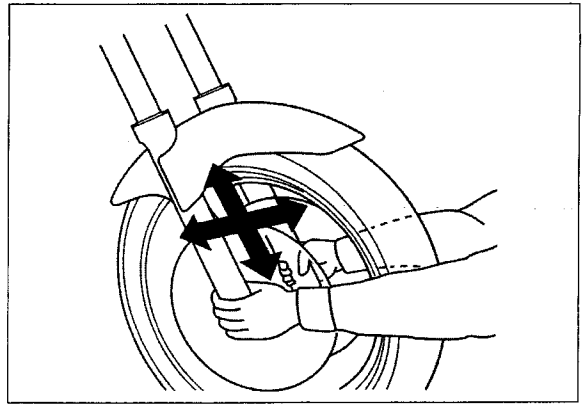


## MAINTENANCE

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Check for steering stem head bearings by grabbing the fork legs and attempting to move the front fork side to side.

Replace the bearings if any looseness is noted (page 15-30).



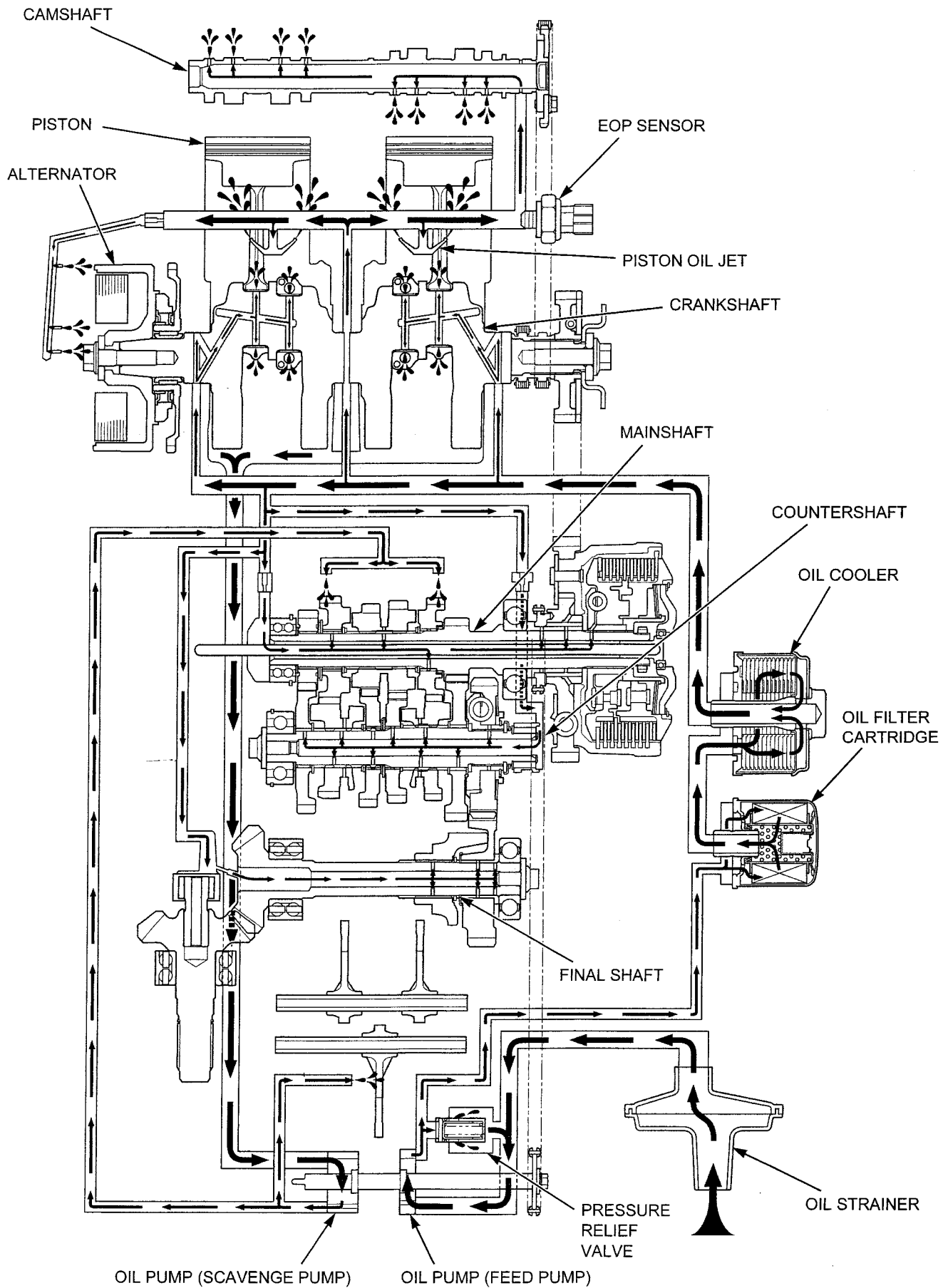
## 5. LUBRICATION SYSTEM

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LUBRICATION SYSTEM DIAGRAM .....	5-2	OIL STRAINER .....	5-6
SERVICE INFORMATION .....	5-3	OIL PUMP .....	5-7
TROUBLESHOOTING .....	5-4	OIL COOLER .....	5-13
OIL PRESSURE INSPECTION .....	5-5		



# LUBRICATION SYSTEM DIAGRAM



## SERVICE INFORMATION

### GENERAL

#### ⚠ 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.

- 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	After draining		3.0 liter (3.2 US qt, 2.6 Imp qt)	—
	After draining/filter change		3.2 liter (3.4 US qt, 2.8 Imp qt)	—
	After disassembly		4.0 liter (4.2 US qt, 3.5 Imp qt)	—
Engine oil			Pro Honda GN4 4-stroke oil (U.S.A. and Canada) or equivalent motor oil API service classification: SG or higher JASO T 903 standard: MA Viscosity: SAE 10W-30	—
Oil pressure (at oil filter cartridge)			100 kPa (1.0 kgf/cm <sup>2</sup> , 15 psi) at 1,100 rpm/80°C (176°F)	—
Oil pump rotor	Feed pump	Tip clearance	0.15 (0.006)	0.20 (0.008)
		Body clearance	0.07 – 0.20 (0.003 – 0.010)	0.34 (0.013)
		Side clearance	0.04 – 0.09 (0.002 – 0.004)	0.12 (0.005)
	Scavenge pump	Tip clearance	0.15 (0.006)	0.20 (0.008)
		Body clearance	0.07 – 0.20 (0.003 – 0.010)	0.34 (0.013)
		Side clearance	0.04 – 0.09 (0.002 – 0.004)	0.12 (0.005)

### TORQUE VALUES

Oil filter cartridge

26 N·m (2.7 kgf·m, 19 lbf·ft)

Apply engine oil to the threads and packing.

Oil filter boss

See page 4-14

Oil pump cover bolt

11 N·m (1.1 kgf·m, 8 lbf·ft)

Oil pump mounting bolt

12 N·m (1.2 kgf·m, 9 lbf·ft)

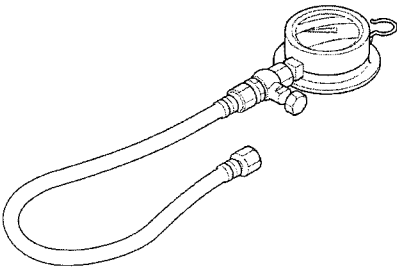
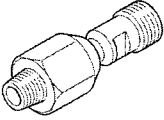
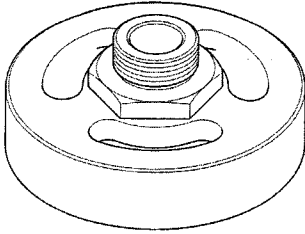
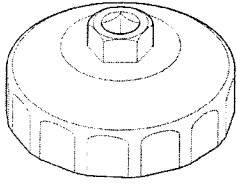
Oil cooler bolt

59 N·m (6.0 kgf·m, 44 lbf·ft)

Apply engine oil to the threads.

## LUBRICATION SYSTEM

### TOOLS

<p>Oil pressure gauge set 07506-3000001</p>  <p>or equivalent commercially available in U.S.A.</p>	<p>Oil pressure gauge attachment 07406-0030000</p>  <p>or equivalent commercially available in U.S.A.</p>	<p>Oil pressure attachment 070MJ-0010100</p>  <p>or 07AMJ-001A100 (U.S.A. only)</p>
<p>Oil filter wrench 07HAA-PJ70101</p>  <p>or 07AAA-PLCA100 (U.S.A. only)</p>		

## TROUBLESHOOTING

### Oil level too low

- Oil consumption
- External oil leak
- Worn piston rings
- Improperly installed piston rings
- Worn cylinders
- Worn stem seals
- Worn valve guide

### Low oil pressure

- Oil level low
- Clogged oil strainer
- Internal oil leak
- Incorrect oil being used

### No oil pressure

- Oil level too low
- Oil pressure relief valve stuck open
- Broken oil pump drive chain
- Broken oil pump drive or driven sprocket
- Damaged oil pump
- Internal oil leak

### High oil pressure

- Oil pressure relief valve stuck closed
- Clogged oil filter, gallery or metering orifice
- Incorrect oil being used

### Oil contamination

- Oil or filter not changed often enough
- Worn piston rings

### Oil emulsification

- Blown cylinder head gasket
- Leaky coolant passage
- Entry of water

## OIL PRESSURE INSPECTION

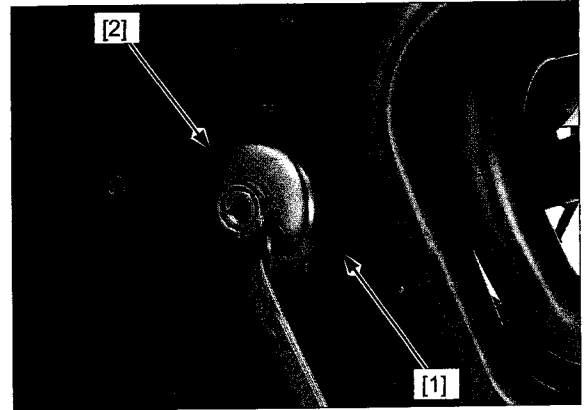
Remove the under cowl (page 3-6).

Remove the oil filter cartridge [1] using the special tool.

**TOOL:**

Oil filter wrench [2]

07HAA-PJ70101 or  
07AAA-PLCA100  
(U.S.A. only)



Apply engine oil to the O-ring and install the oil pressure attachment [1] onto the oil filter boss.

**TOOL:**

Oil pressure attachment

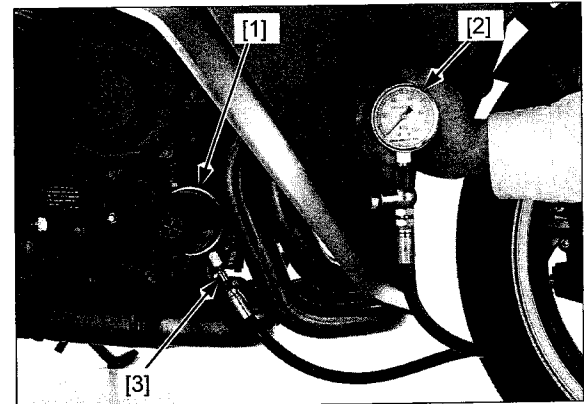
070MJ-0010100  
or 07AMJ-001A100  
(U.S.A. only)

Reinstall the oil filter cartridge and tighten it.

**TOOL:**

Oil filter wrench

07HAA-PJ70101 or  
07AAA-PLCA100  
(U.S.A. only)



**TORQUE:** 26 N·m (2.7 kgf·m, 19 lbf·ft)

Install the oil pressure gauge [2] and attachment [3] to the oil pressure attachment.

**TOOLS:**

Oil pressure gauge 07506-3000001  
Oil pressure gauge attachment 07406-0030000  
or equivalent commercially available in U.S.A.

Check the engine oil level and add the recommended oil if necessary (page 4-12).

Start the engine and warm it up to normal operating temperature (approximately 80°C/176°F).

Check the oil pressure at 1,100 rpm.

**OIL PRESSURE:**

100 kPa (1.0 kgf/cm<sup>2</sup>, 15 psi) at 1,100 rpm/  
80°C (176°F)

Stop the engine, then remove the special tools and oil filter cartridge.

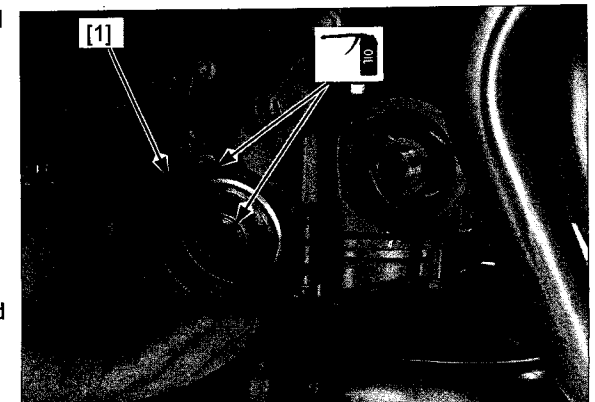
*Apply engine oil to  
the threads and  
O-ring.*

Reinstall the oil filter cartridge [1] and tighten it.

**TOOL:**

Oil filter wrench

07HAA-PJ70101 or  
07AAA-PLCA100  
(U.S.A. only)



**TORQUE:** 26 N·m (2.7 kgf·m, 19 lbf·ft)

Check the engine oil level and add the recommended oil if necessary (page 4-12).

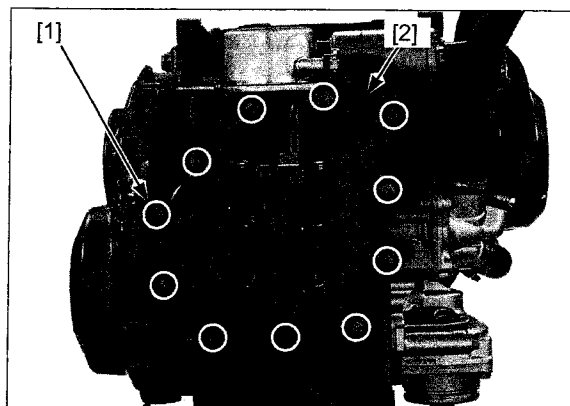
Make sure that there are no oil leaks.

Install the under cowl (page 3-6).

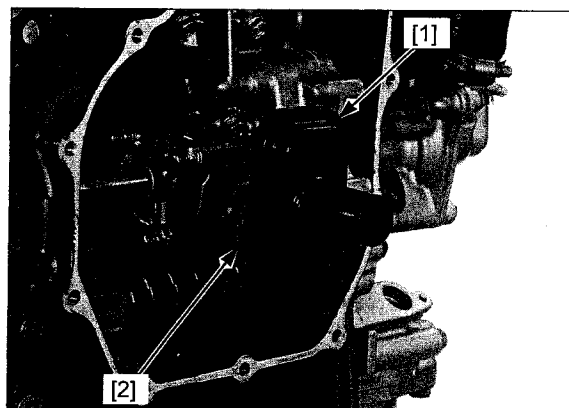
### OIL STRAINER

#### REMOVAL

Drain the engine oil (page 4-13).  
Remove the exhaust pipe (page 3-24).  
Remove the bolts [1] and oil pan [2].



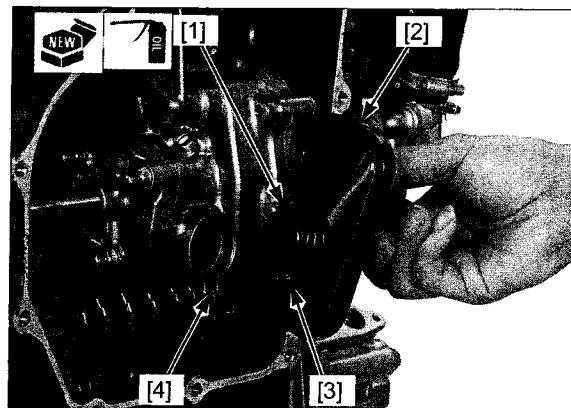
Remove the oil strainer [1] and packing [2].  
Check the oil strainer for damage or contamination.



#### INSTALLATION

Apply engine oil to new oil strainer packing [1] and install it onto the oil strainer [2].

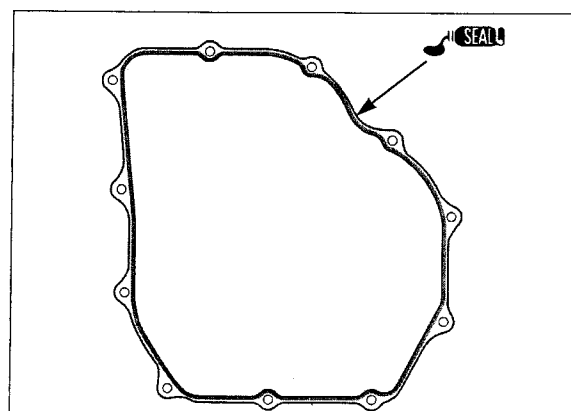
Install the oil strainer aligning its lug [3] with the groove [4] on the oil pump.



Clean the oil pan and lower crankcase mating surface thoroughly, being careful not to damage them.

*Do not apply more sealant than necessary.*

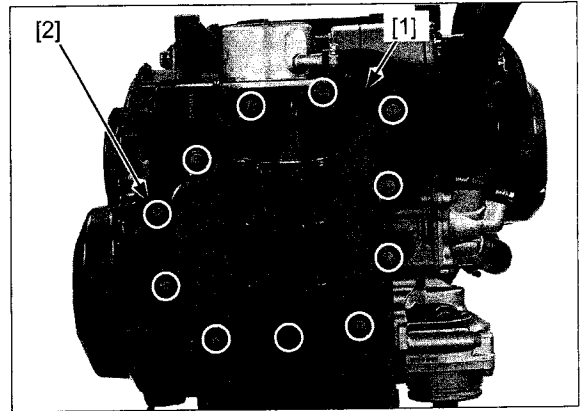
Apply sealant (ThreeBond 1207B or an equivalent) to the mating surface.



Carefully install the oil pan [1] onto the lower crankcase. Install the bolts [2] and tighten them in a crisscross pattern in 2 – 3 steps.

Install the exhaust pipe (page 3-27).  
Fill the crankcase with recommended oil (page 4-12).

After installation, check that there are no oil leaks.



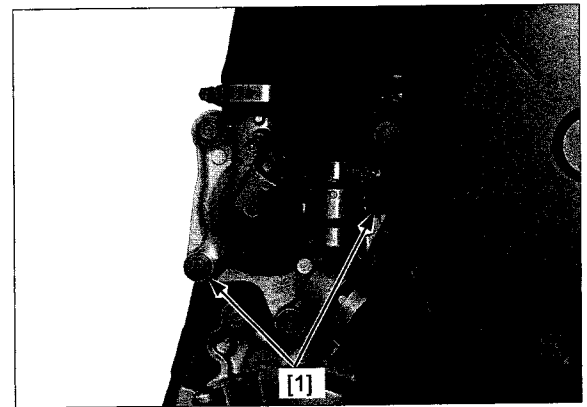
## OIL PUMP

### REMOVAL

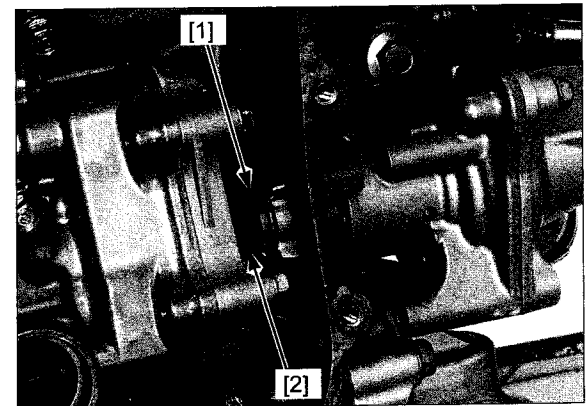
Remove the clutch assembly, oil pump drive and driven sprockets (page 10-14).

Remove the oil pan and oil strainer (page 5-6).

Remove the water pump mounting bolts [1].

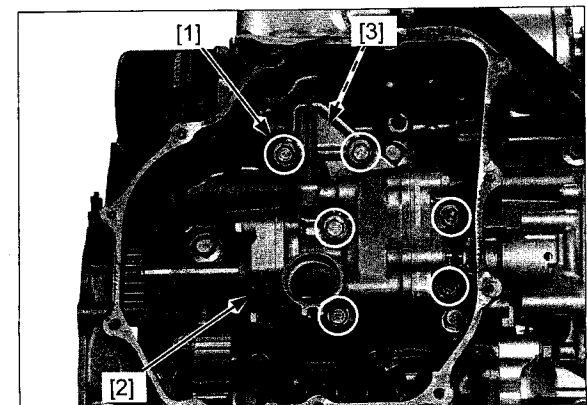


Disengage the water pump shaft [1] from the oil pump shaft [2].



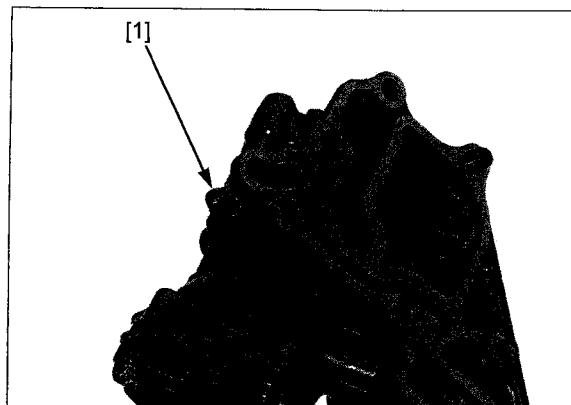
Remove the mounting bolts [1] and oil pump [2].

Remove the gasket [3].



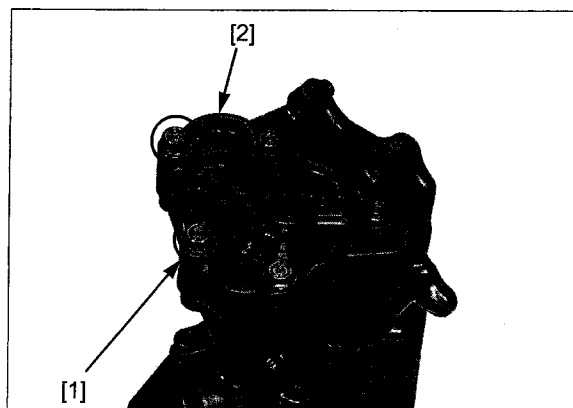
## LUBRICATION SYSTEM

Inspect the oil passage [1] for clogs.



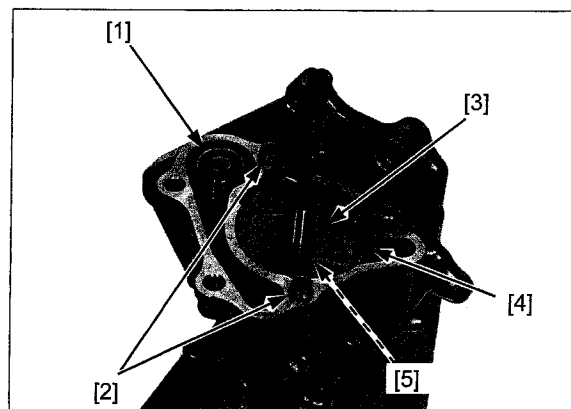
### DISASSEMBLY

Remove the bolts [1] and oil pump cover A (scavenge pump side) [2].

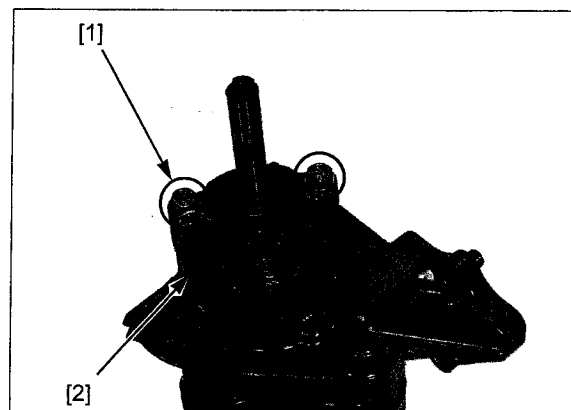


Remove the oil pressure relief valve [1].

Remove the dowel pins [2], inner rotor [3], outer rotor [4] and drive pin [5].

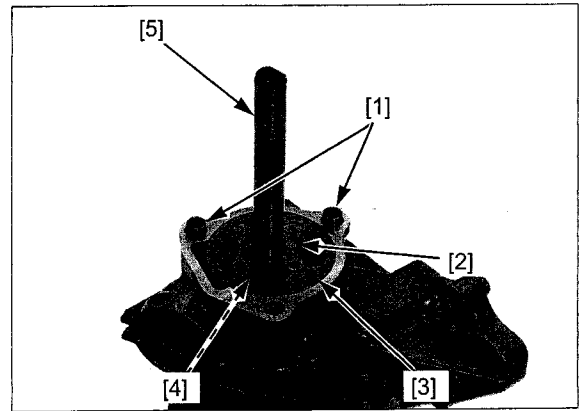


Remove the bolts [1] and oil pump cover B (feed pump side) [2].



Remove the dowel pins [1], inner rotor [2], outer rotor [3], drive pin [4] and oil pump shaft [5].

Clean the all disassembled parts thoroughly.



## INSPECTION

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

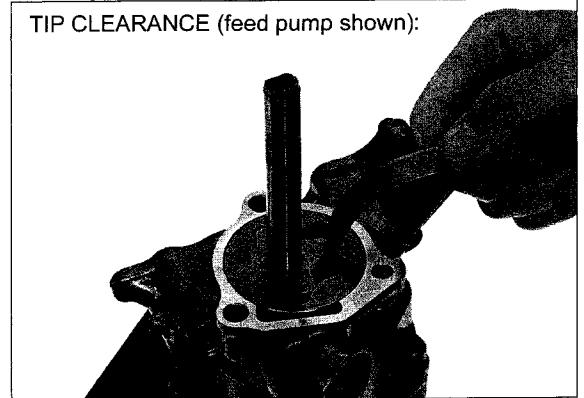
Temporarily install the oil pump shaft. Install the outer and inner rotors into the oil pump body. Measure the rotor tip clearance for the feed and scavenge pump.

### SERVICE LIMITS:

Feed pump: 0.20 mm (0.008 in)

Scavenge pump: 0.20 mm (0.008 in)

TIP CLEARANCE (feed pump shown):



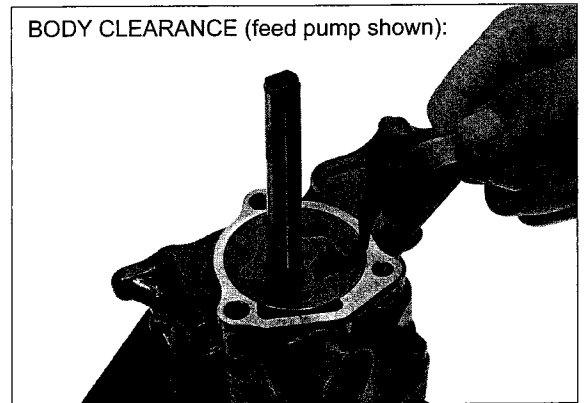
Measure the pump body clearance for the feed and scavenge pump.

### SERVICE LIMITS:

Feed pump: 0.34 mm (0.013 in)

Scavenge pump: 0.34 mm (0.013 in)

BODY CLEARANCE (feed pump shown):



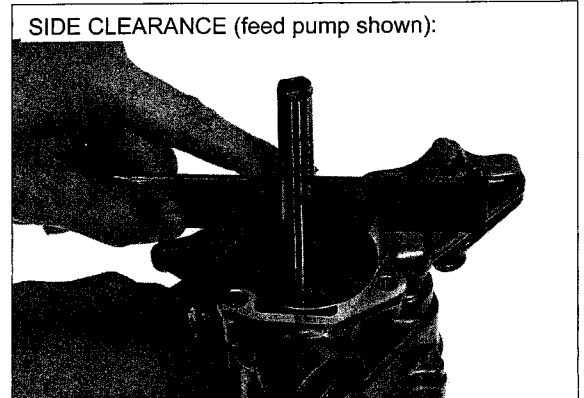
Measure the side clearance for the feed and scavenge pump using a straight edge and feeler gauge.

### SERVICE LIMITS:

Feed pump: 0.12 mm (0.005 in)

Scavenge pump: 0.12 mm (0.005 in)

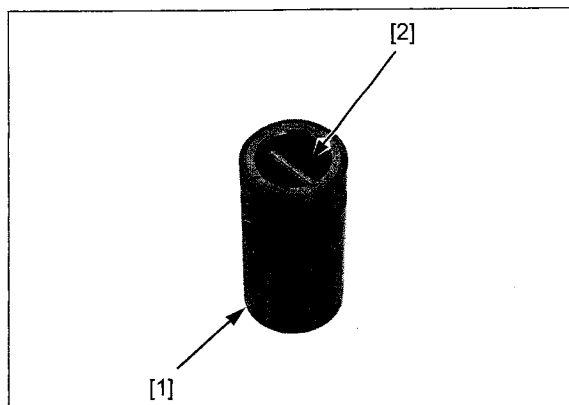
SIDE CLEARANCE (feed pump shown):



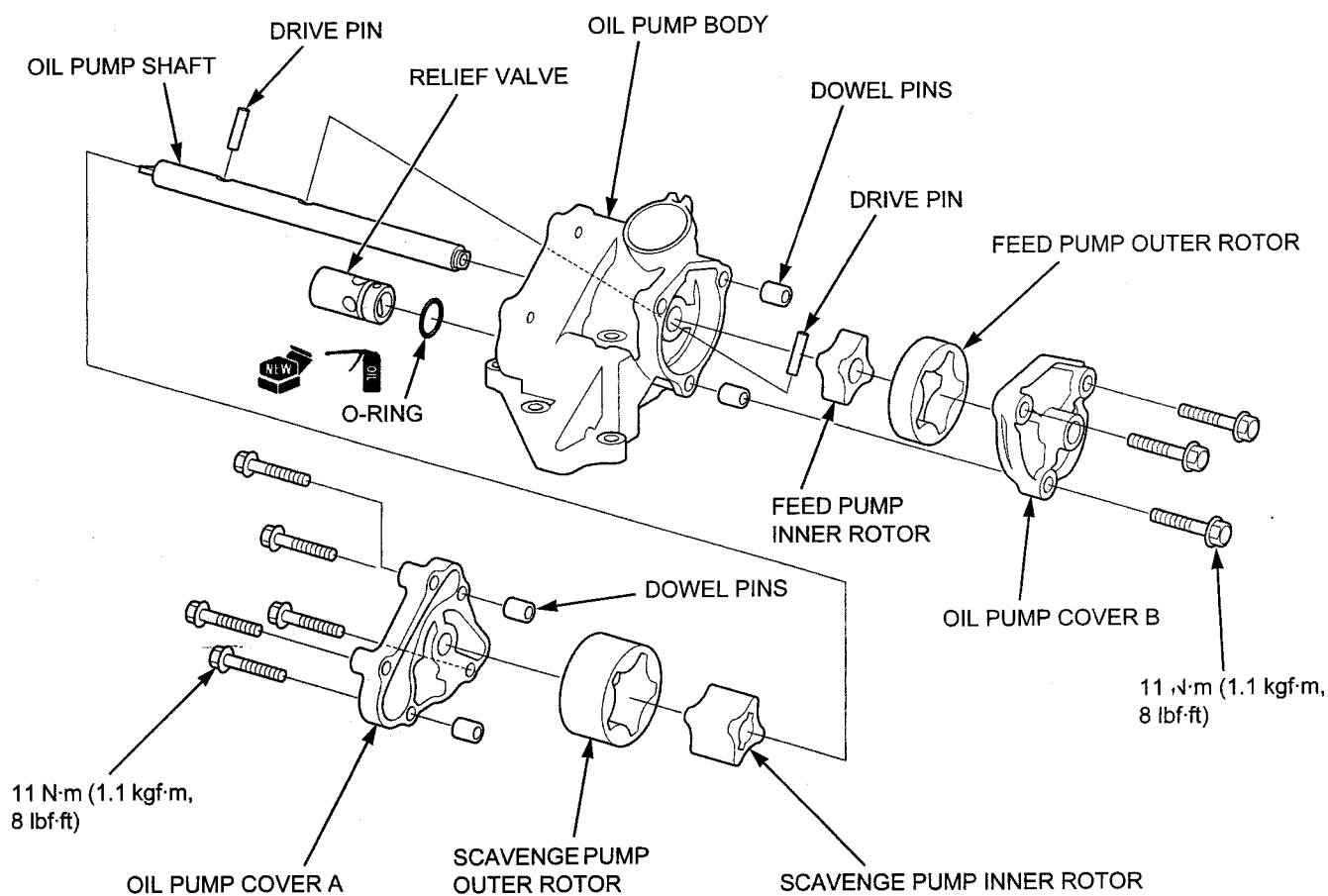


## LUBRICATION SYSTEM

Check the operation of the oil pressure relief valve [1] by pushing on the piston [2].



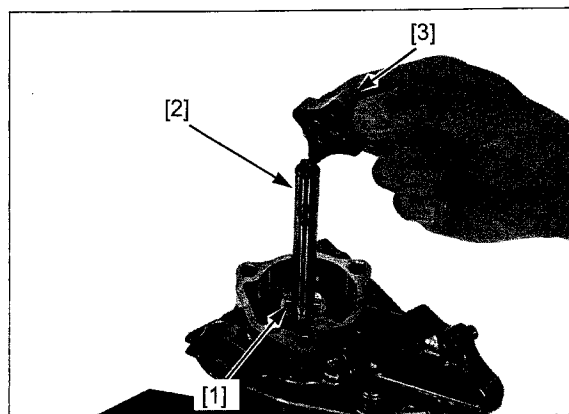
### ASSEMBLY



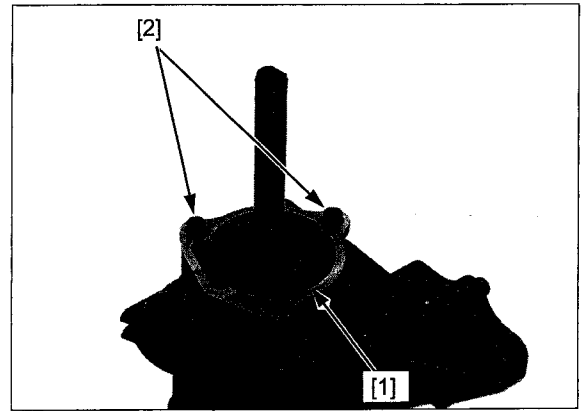
Install the oil pump shaft with its driven sprocket side up.

Install the drive pin [1] into the oil pump shaft [2] and install them to the oil pump body (feed pump side).

Install the feed pump inner rotor [3] while aligning its groove with the drive pin.



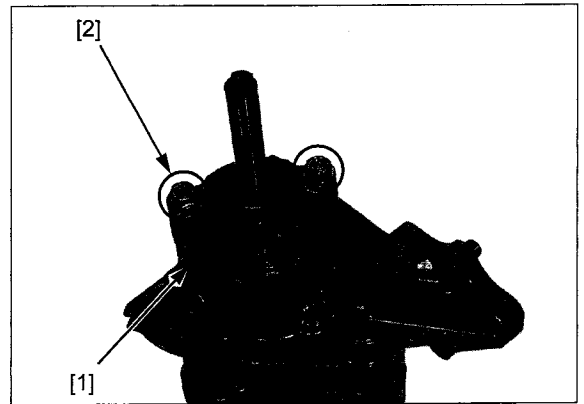
Install the feed pump outer rotor [1] and dowel pins [2].



Install the oil pump cover B [1] and cover bolts [2].

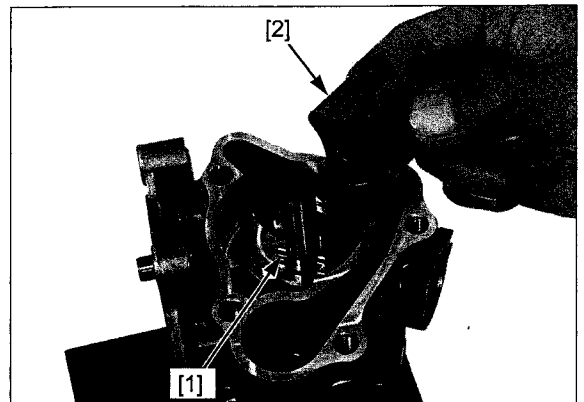
Tighten the bolts to the specified torque.

**TORQUE: 11 N·m (1.1 kgf·m, 8 lbf·ft)**



Install the drive pin [1] into the oil pump shaft.

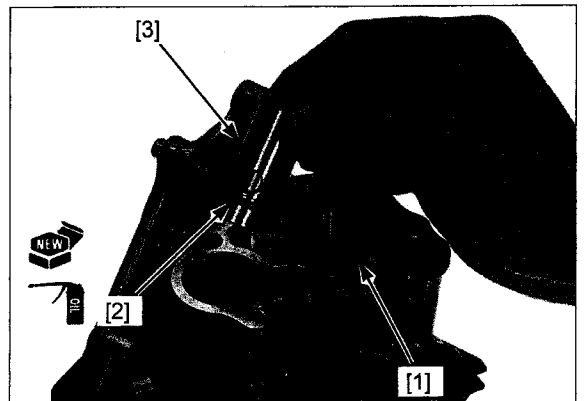
Install the scavenge pump inner rotor [2] while aligning its groove with the drive pin.



Install the outer rotor [1].

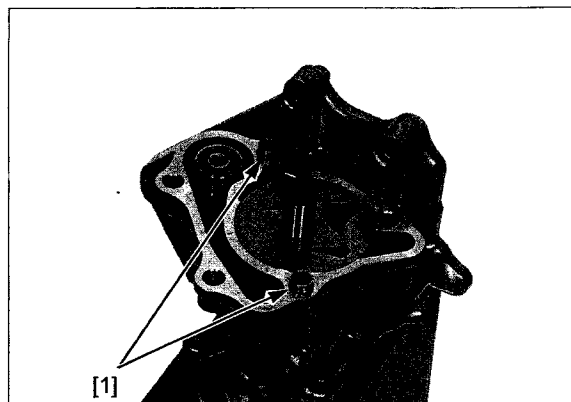
Apply engine oil to new O-ring [2] and install it into the relief valve groove.

Install the pressure relief valve [3] into the oil pump body.



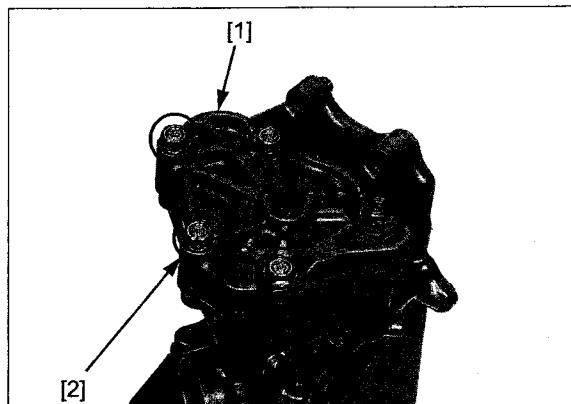
## LUBRICATION SYSTEM

Install the dowel pins [1].



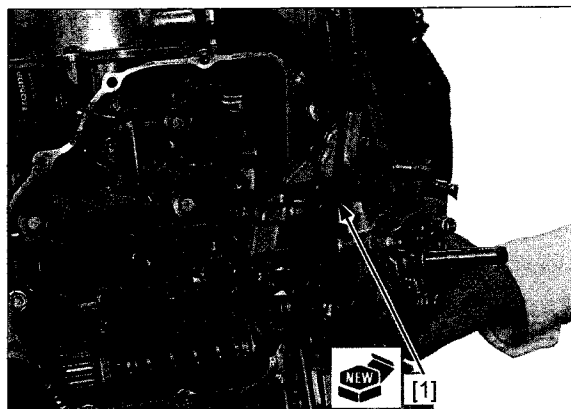
Install the oil pump cover A [1] and bolts [2].  
Tighten the bolts to the specified torque.

**TORQUE: 11 N·m (1.1 kgf·m, 8 lbf·ft)**



## INSTALLATION

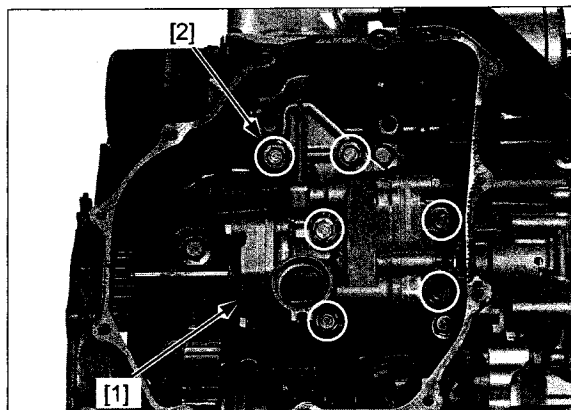
Install a new gasket [1] onto the oil pump.



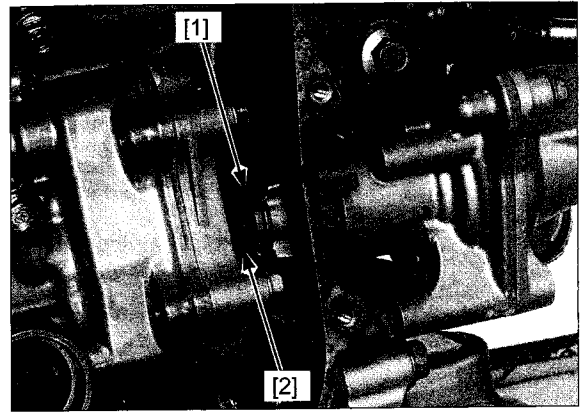
Install the oil pump [1] and mounting bolts [2].

Tighten the bolts to the specified torque.

**TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)**



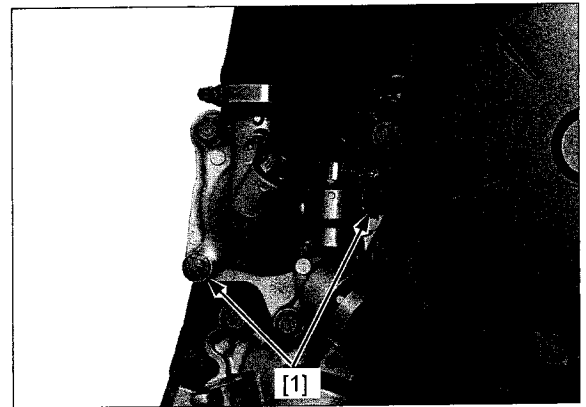
Engage the water pump shaft [1] with the oil pump shaft [2].



Install the water pump mounting bolts [1] and tighten them securely.

Install the oil strainer and oil pan (page 5-6).  
Install the oil pump drive, driven sprocket and clutch assembly (page 10-20).

Fill the crankcase with recommended engine oil (page 4-13).



## OIL COOLER

### REMOVAL/INSTALLATION

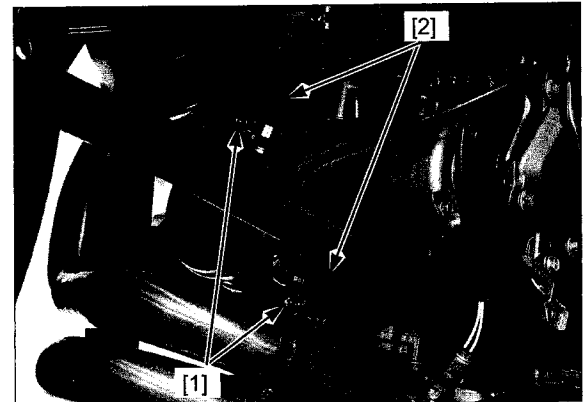
Remove the following:

- under cowl (page 3-6)
- left middle cowl (page 3-7)

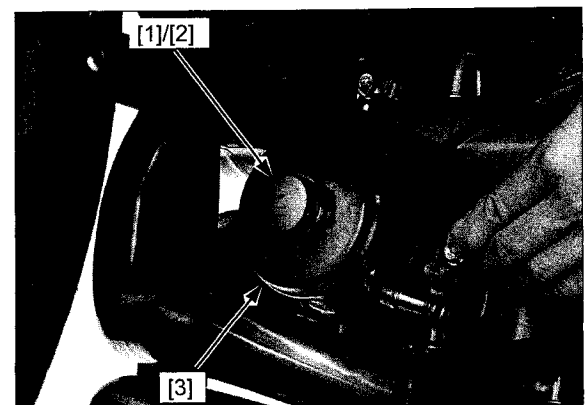
Drain the engine oil (page 4-13).

Drain the coolant from the system (page 7-6).

Loosen the hose band screws [1] and disconnect the water hoses [2] from the oil cooler.



Remove the oil cooler bolts [1], sealing washer [2] and oil cooler [3].



## LUBRICATION SYSTEM

Check the oil cooler [1] for damage.

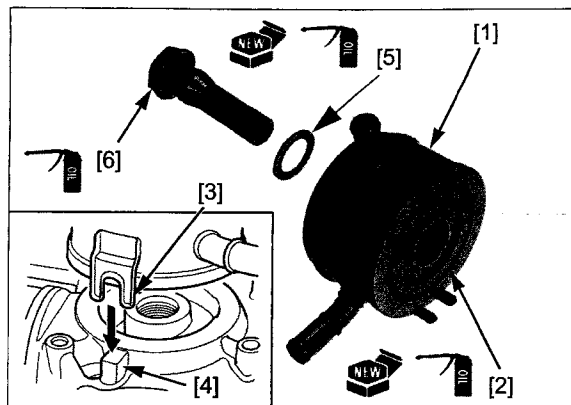
Apply engine oil to new O-ring [2] and install it into the oil cooler groove.

Install the oil cooler aligning its groove [3] with the lug [4] on the lower crankcase.

Apply engine oil to sealing rubber of a new sealing washer [5].

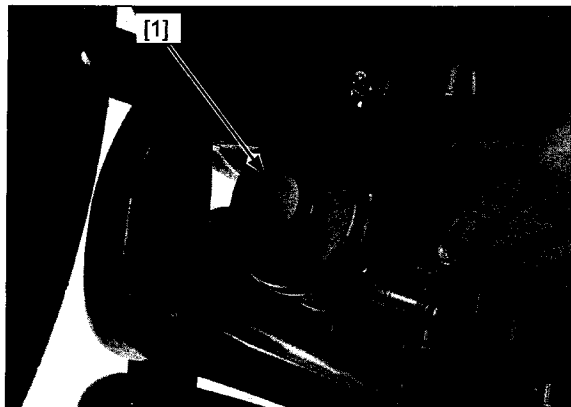
Apply engine oil to the oil cooler bolt threads and seating surface.

Install the sealing washer and oil cooler bolt [6].



Tighten the oil cooler bolt [1] to the specified torque.

**TORQUE: 59 N·m (6.0 kgf·m, 44 lbf·ft)**



Refer to "CABLE & HARNESS ROUTING" for hose band screw direction (page 1-22).

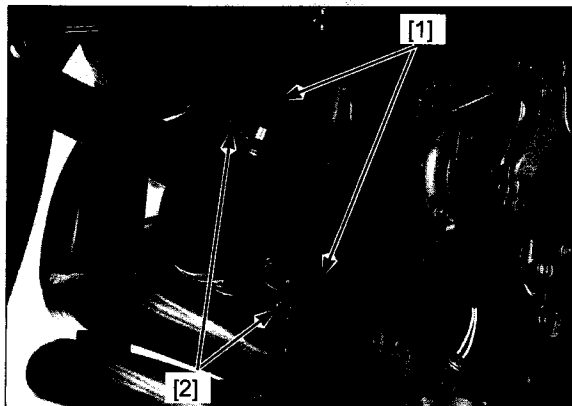
Connect the water hoses [1] to the oil cooler and tighten the hose band screws [2].

Fill the crankcase with the recommended engine oil (page 4-12).

Fill and bleed the cooling system (page 7-5).

Install the following:

- left middle cowl (page 3-7)
- under cowl (page 3-6)



## 6. FUEL SYSTEM (PGM-FI)

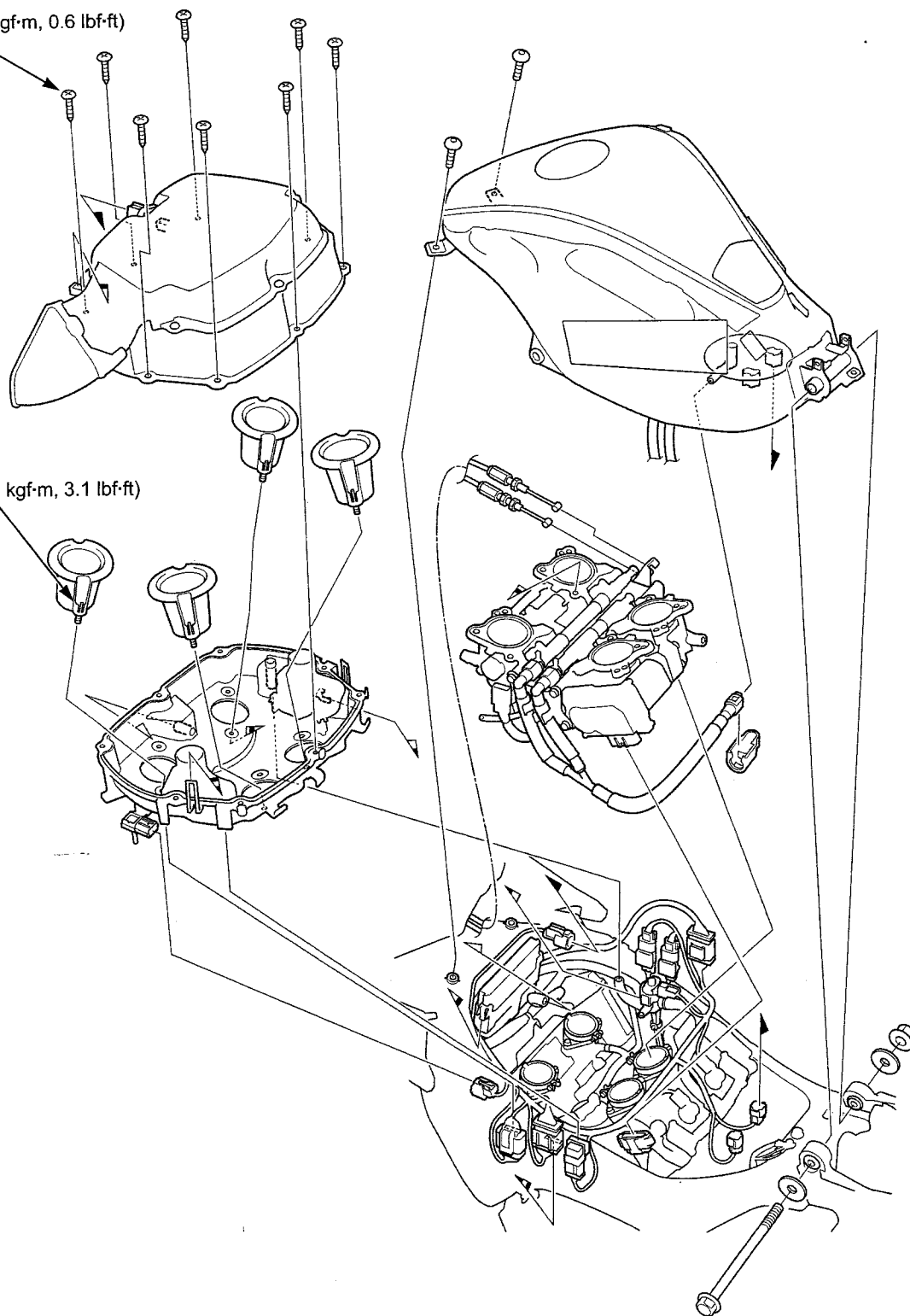
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## COMPONENT LOCATION

0.8 N·m (0.1 kgf·m, 0.6 lbf·ft)

4.2 N·m (0.4 kgf·m, 3.1 lbf·ft)



## SERVICE INFORMATION

### GENERAL

- 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.
- Be sure to relieve the fuel pressure while the engine is OFF.
- 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.
- Do not apply commercially available carburetor cleaners to the inside of the throttle bore.
- The TPS sensor uses a magnetic field. The TPS sensor may cause incorrect TBW operation when a strong magnet is placed close to the sensor. If this occurs, keep the TPS sensor away from the magnet and turn the ignition switch to OFF and ON for restarting the TPS sensor. The TBW system will return to correct operation.
- Do not snap the throttle drum of the TCP sensor from fully open to fully closed after the throttle cable has been removed as this may cause incorrect operation.
- Do not snap the throttle valve from fully open to fully closed by hand as this may cause incorrect operation.
- Seal the cylinder head intake ports with tape or a clean cloth to keep dirt and debris from entering the intake ports after the throttle body has been removed.
- Do not apply excessive force to the fuel rail on the throttle body while removing or installing the throttle body.
- Do not damage the throttle body as this may cause incorrect throttle synchronization.
- Prevent dirt and debris from entering the throttle bore and air passages after the throttle body has been removed. Clean them using compressed air if necessary.
- The throttle body is factory pre-set. Do not disassemble it in a way other than shown in this manual.
- Do not push the fuel pump base under the fuel tank when the fuel tank is stored.
- Always replace the packing when the fuel pump is removed.
- The programmed fuel injection system is equipped with a Self-Diagnostic System (page 6-10). If the MIL blinks, the Self-Diagnostic Procedures to remedy the problem.
- When checking the PGM-FI system, always follow the steps in the troubleshooting flow chart (page 6-5).
- The PGM-FI system has a fail-safe function to secure a minimum running capability even when there a malfunction in the system. When any abnormality is detected by the self-diagnosis function, running capability is secured by making use of the numerical values of a situation preset in advance in the simulated program map. It must be remembered, however, that when any abnormality is detected in four injectors and/or the CKP sensor and CMP sensor, the fail safe function stops the engine to protect it from damage.
- Refer to PGM-FI system location (page 6-6).
- A faulty PGM-FI system is often related to poorly connected or corroded connectors. Check those connections before proceeding.
- Refer to procedures for fuel level sensor inspection (page 22-16).
- The rear wheel speed sensor sends digital pulse signals to the ECM (PGM-FI unit) for computation. Refer to procedures for rear wheel speed sensor inspection (page 18-17).
- When disassembling the PGM-FI parts, note the location of the O-rings. Replace them with new ones upon reassembly.
- Before disconnecting the fuel feed hose, relieve fuel pressure from the system by disconnecting the quick connect fitting of the fuel tank.
- Use a digital tester for PGM-FI system inspection.

### SPECIFICATIONS

ITEM	SPECIFICATIONS
Throttle body identification number	GNH0B
Idle speed	1,150 ± 100 rpm
Throttle grip freeplay	2 – 4 mm (1/16 – 3/16 in)
IAT sensor resistance (at 20°C/68°F)	1 – 4 kΩ
ECT sensor resistance (at 20°C/68°F)	2.3 – 2.6 kΩ
Fuel injector resistance (at 20°C/68°F)	11.6 – 12.4 Ω
PAIR solenoid valve resistance (at 20°C/68°F)	23 – 27 Ω
CKP sensor peak voltage (at 20°C/68°F)	0.7 V minimum
Fuel pressure at idle	343 kPa (3.5 kgf/cm <sup>2</sup> , 50 psi)
Fuel pump flow (at 12V)	320 cm <sup>3</sup> (10.8 US oz, 11.3 Imp oz) minimum/10 seconds

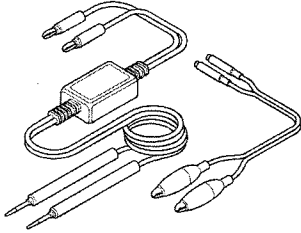
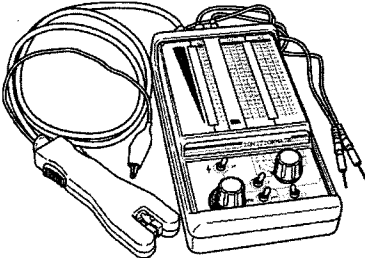

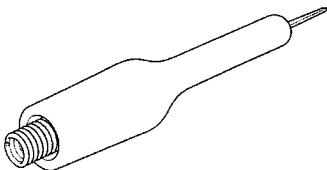
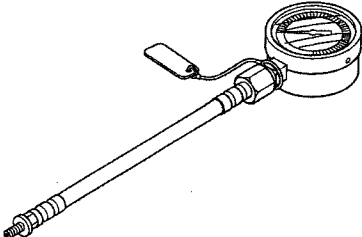
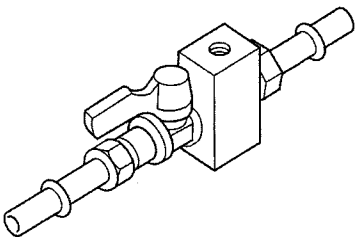
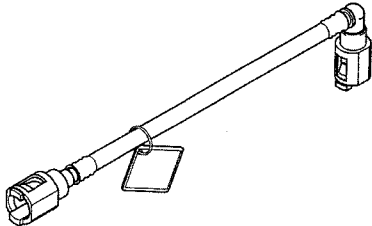
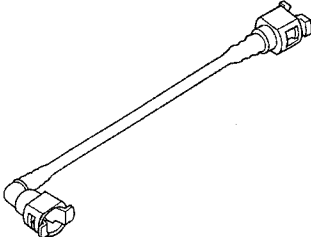
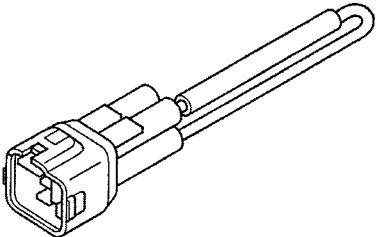


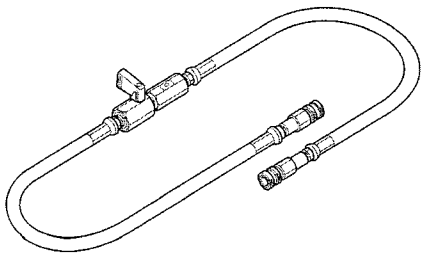
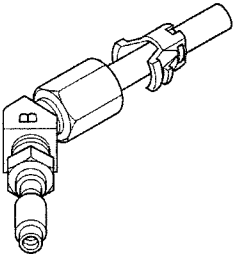
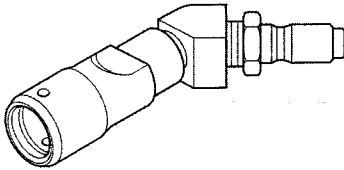
# FUEL SYSTEM (PGM-FI)

## TORQUE VALUES

ECT sensor	25 N·m (2.5 kgf·m, 18 lbf·ft)	
Throttle body insulator band screw	See page 6-76	
Knock sensor	24 N·m (2.4 kgf·m, 18 lbf·ft)	
O <sub>2</sub> sensor	24.5 N·m (2.5 kgf·m, 18 lbf·ft)	
Fuel rail mounting bolt	5.1 N·m (0.5 kgf·m, 3.8 lbf·ft)	
Fuel filler cap bolt	1.8 N·m (0.2 kgf·m, 1.3 lbf·ft)	
Fuel pump mounting nut	12 N·m (1.2 kgf·m, 9 lbf·ft)	
Air cleaner case screw	0.8 N·m (0.1 kgf·m, 0.6 lbf·ft)	
Resonator screws	0.8 N·m (0.1 kgf·m, 0.6 lbf·ft)	
Bank angle sensor mounting bolt	1.5 N·m (0.2 kgf·m, 1.1 lbf·ft)	
IAT sensor	1.1 N·m (0.1 kgf·m, 0.8 lbf·ft)	
MAP sensor	1.1 N·m (0.1 kgf·m, 0.8 lbf·ft)	
Air funnel mounting screw	4.2 N·m (0.4 kgf·m, 3.1 lbf·ft)	
TCP sensor throttle cable stay screw	3.4 N·m (0.3 kgf·m, 2.5 lbf·ft)	
Front PAIR check reed valve cover	13 N·m (1.3 kgf·m, 10 lbf·ft)	CT bolt
Rear PAIR check reed valve cover	6.9 N·m (0.7 kgf·m, 5.1 lbf·ft)	CT bolt

## TOOLS

<p>Peak voltage adaptor 07HGJ-0020100 (Not available in U.S.A.)</p>  <p>with commercially available digital multimeter (impedance 10 MΩ/DCV minimum) or peak voltage tester</p>	<p>IgnitionMate peak voltage tester MTP07-0286 (U.S.A. only)</p> 	<p>Attachment joint, 8 mm/9mm 07ZAJ-S7C0200</p>  <p>(Not available in U.S.A.)</p>
<p>Test probe 07ZAJ-RDJA110</p> 	<p>Fuel pressure gauge 07406-0040004</p>  <p>or 07406-004000B (U.S.A. only)</p>	<p>Pressure gauge manifold 07ZAJ-S5A0111</p>  <p>(Not available in U.S.A.)</p>
<p>Hose attachment, 8 mm/9mm 07ZAJ-S7C0100</p>  <p>(Not available in U.S.A.)</p>	<p>Hose attachment, 9 mm/9mm 07ZAJ-S5A0120</p>  <p>(Not available in U.S.A.)</p>	<p>SCS connector 070PZ-ZY30100</p> 

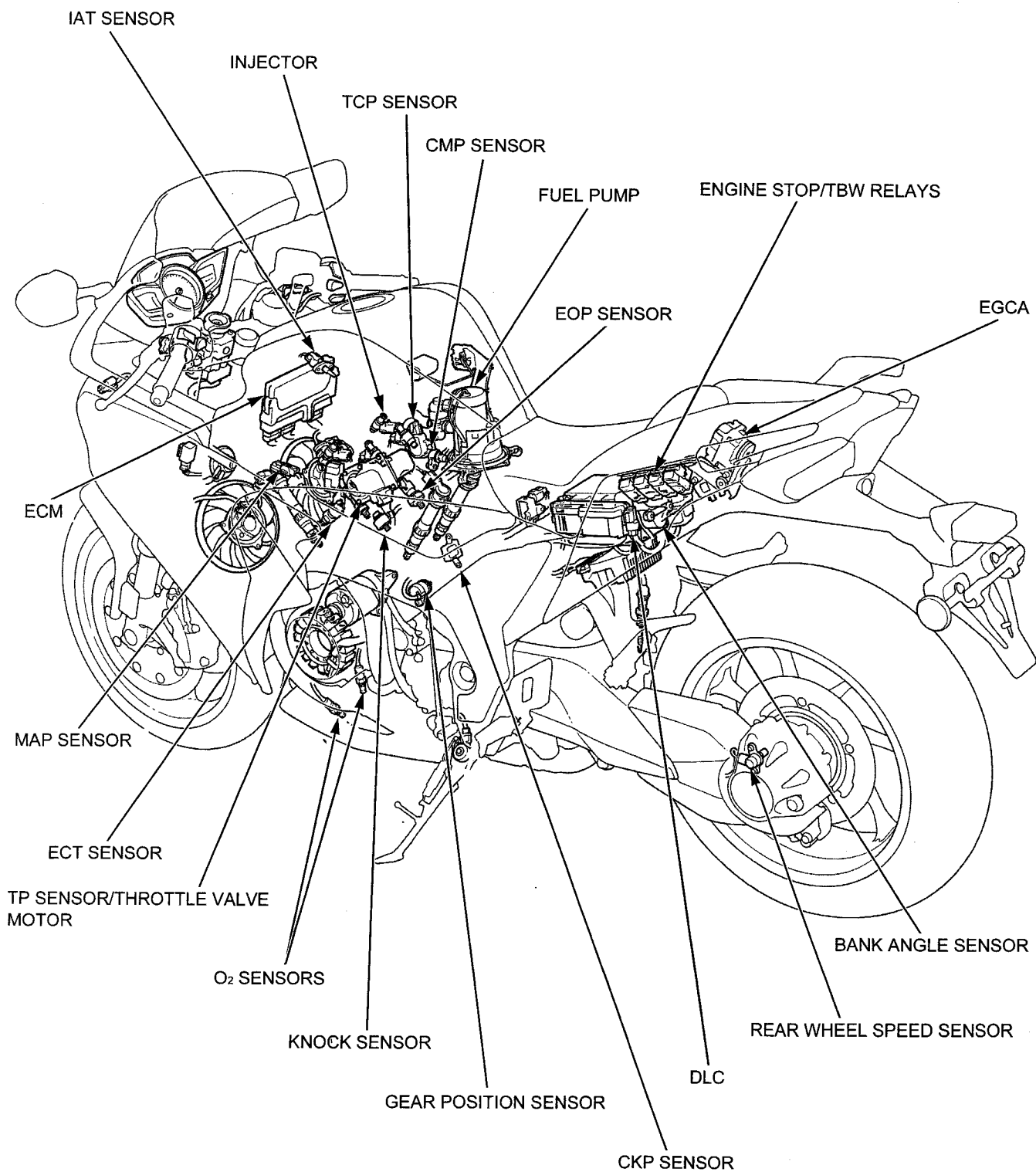
Pressure manifold hose 07AMJ-HW3A100 (U.S.A. only) 	Adaptor, male 07AAJ-S6MA200 (U.S.A. only) 	Adaptor, female 07AAJ-S6MA400 (U.S.A. only) 
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## PGM-FI SYMPTOM TROUBLESHOOTING

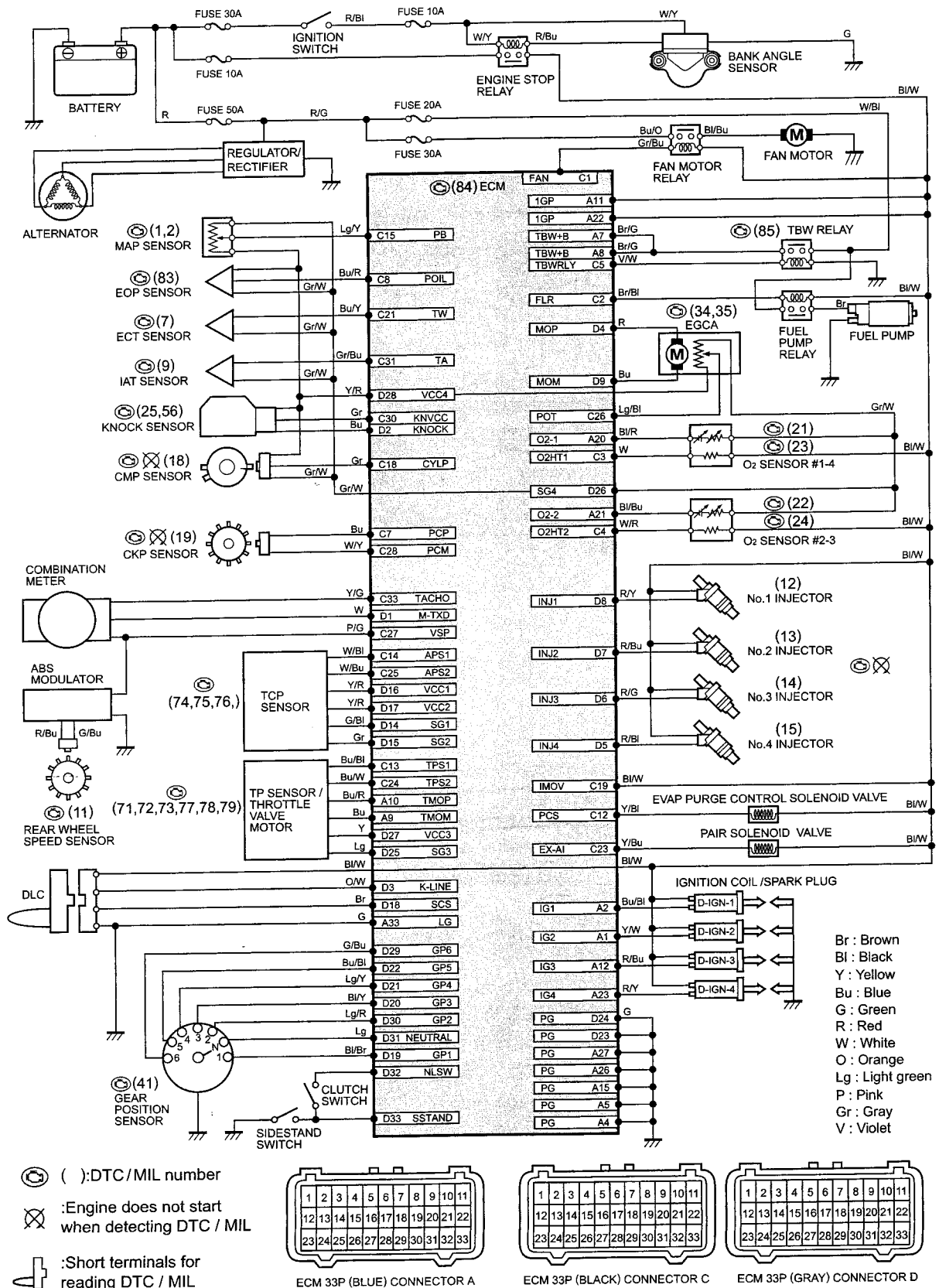
When the motorcycle has one of these symptoms, check the DTC or MIL blinking, refer to the DTC index (page 6-14) and begin the appropriate troubleshooting procedure. If there are no DTC/MIL blinking stored in the ECM memory, do the diagnostic procedure for the symptom, in sequence listed below, until you find the cause.

Symptom	Diagnosis procedure	Also check for
Engine cranks but won't start (No DTC and MIL blinking)	1. Crank the starter for more than ten seconds and check the DTC (page 6-12) and execute the troubleshooting according to the DTC. 2. Inspect the fuel supply system (page 6-60).	<ul style="list-style-type: none"> <li>No fuel to injector               <ul style="list-style-type: none"> <li>Clogged fuel filter</li> <li>Pinched or clogged fuel feed hose</li> <li>Pinched or clogged fuel tank air vent hose</li> </ul> </li> <li>Faulty fuel pump</li> <li>Faulty fuel pump circuits</li> <li>Intake air leak</li> <li>Contaminated/deteriorated fuel</li> <li>Faulty injector</li> <li>Faulty TBW system</li> <li>Faulty ignition system</li> </ul>
Engine cranks but won't start (No fuel pump operation sound when turning the ignition ON)	1. ECM power/ground circuits malfunction (page 6-85). 2. Inspect the fuel supply system (page 6-60).	<ul style="list-style-type: none"> <li>Open circuit in the power input and/or ground wire of the ECM</li> <li>Faulty bank angle sensor or related circuit</li> <li>Faulty engine stop relay or related circuit</li> <li>Faulty engine stop switch or related circuit</li> </ul>
Engine stalls, hard to start, rough idling	1. Check the idle speed. 2. Inspect the fuel supply system (page 6-60). 3. Inspect the battery charging system (page 19-7).	<ul style="list-style-type: none"> <li>Restricted fuel feed hose</li> <li>Contaminated/deteriorated fuel</li> <li>Intake air leak</li> <li>Restricted fuel tank air vent hose</li> <li>Faulty ignition system</li> <li>Faulty TBW system</li> <li>Faulty battery charging system</li> </ul>
Afterburn when engine braking is used	Check the PAIR system (page 4-16).	<ul style="list-style-type: none"> <li>Faulty PAIR system               <ul style="list-style-type: none"> <li>Faulty PAIR control solenoid valve</li> <li>Faulty PAIR check valve</li> <li>Clogged hose of the PAIR system</li> </ul> </li> <li>Faulty ignition system</li> </ul>
Backfiring or misfiring during acceleration	Check the ignition system.	<ul style="list-style-type: none"> <li>Faulty ignition system</li> </ul>
Poor performance (driveability) and poor fuel economy	1. Inspect the fuel supply system (page 6-60). 2. Inspect the air cleaner element (page 4-6).	<ul style="list-style-type: none"> <li>Pinched or clogged fuel feed hose</li> <li>Faulty pressure regulator</li> <li>Faulty injector</li> <li>Faulty ignition system</li> <li>Clogged air cleaner element</li> </ul>
Idle speed is below specifications or fast idle too low (No DTC and MIL blinking)	1. Check the idle speed. 2. Check the TBW system.	<ul style="list-style-type: none"> <li>Faulty TBW system</li> <li>Faulty fuel supply system</li> <li>Faulty ignition system</li> </ul>
Idle speed is above specifications or fast idle too high (No DTC and MIL blinking)	1. Check the idle speed. 2. Check the throttle operation and freeplay 3. Check the TBW system.	<ul style="list-style-type: none"> <li>Faulty TBW system</li> <li>Faulty ignition system</li> <li>Intake air leak</li> <li>Engine top end problem</li> <li>Air cleaner condition</li> </ul>
MIL stays ON but no DTCs set, or MIL never comes ON at all	Troubleshoot the MIL circuit (page 6-59).	<ul style="list-style-type: none"> <li>Faulty MIL circuit</li> </ul>
MIL stays ON at all (No DTC set)	Inspect the DLC circuit.	<ul style="list-style-type: none"> <li>Short circuit in the DLC related wire</li> </ul>

## PGM-FI SYSTEM LOCATION



# PGM-FI SYSTEM DIAGRAM

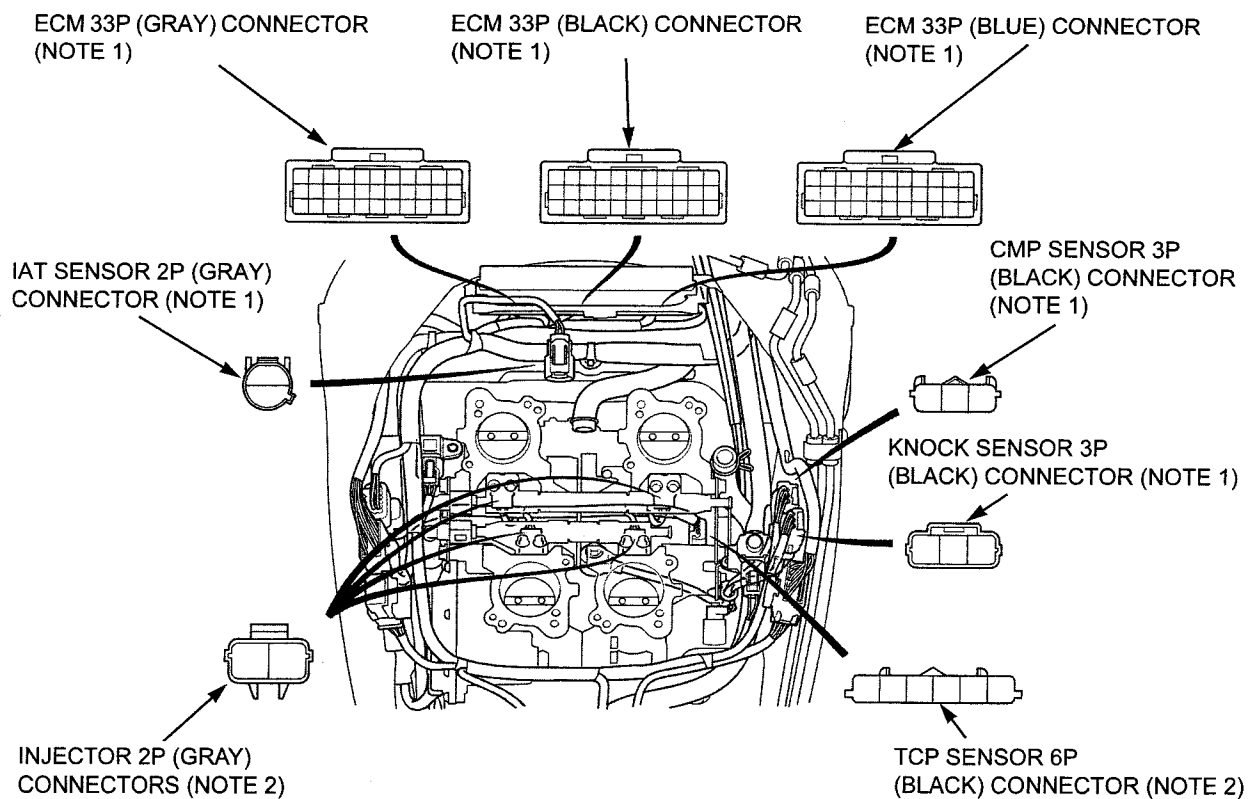


## FUEL SYSTEM (PGM-FI)

### PGM-FI CONNECTOR LOCATION

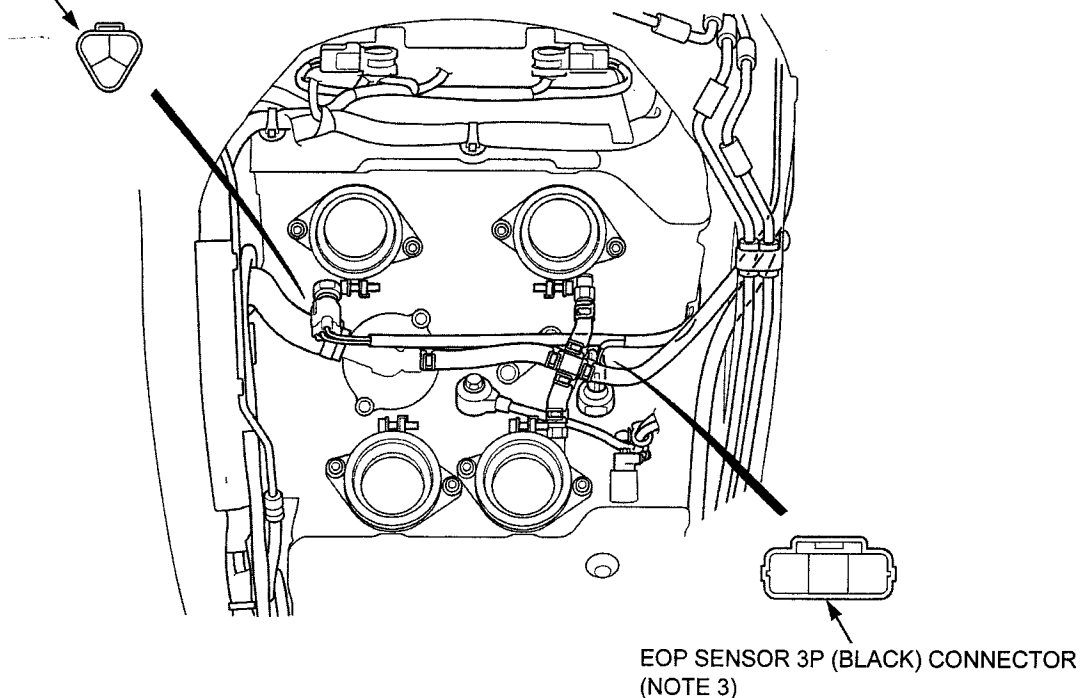
NOTE:1 Lift and support fuel tank (page 4-5).

NOTE:2 Remove the fuel rail (page 6-71).



NOTE:3 Remove the throttle body (page 6-71).

ECT SENSOR 3P (GRAY) CONNECTOR (NOTE 3)



NOTE:4 Remove the engine heat guard (page 11-4).

NOTE:5 Remove the radiator (page 7-9).

NOTE:6 Remove the right middle cowl (page 3-7).

MAP SENSOR 3P  
(BLACK) CONNECTOR  
(NOTE 1)

TBW 6P (BLACK)  
CONNECTOR  
(NOTE 1)

GEAR POSITION SENSOR 8P (BLACK)  
CONNECTOR (NOTE 4)

No2/3 O<sub>2</sub> SENSOR 4P (BLACK) and No1/4 O<sub>2</sub>  
SENSOR 4P (BLUE) CONNECTORS (NOTE 5)

CKP SENSOR 2P  
(BLACK)  
CONNECTOR (NOTE 6)

NOTE:7 Remove the rear cowl (page 3-4).

NOTE:8 Remove the seat (page 3-4).

NOTE:9 Remove the canister tray (page 6-91).

EGCA 6P (BLACK)  
CONNECTOR (NOTE 7)

DLC (NOTE 8)

REAR WHEEL SPEED SENSOR  
2P (ORANGE) CONNECTOR (NOTE 9)

# PGM-FI TROUBLESHOOTING INFORMATION

## GENERAL TROUBLESHOOTING

### Intermittent Failure

The term "intermittent failure" means a system may have had a failure, but it checks OK now. If the MIL does not come on, check for poor contact or loose pins at all connectors related to the circuit that of the troubleshooting. If the MIL was on, but then went out, the original problem may be intermittent.

### Opens and Shorts

"Opens" and "Shorts" are common electrical terms. An open is a break in a wire or at a connection. A short is an accidental connection of a wire to ground or to another wire. In simple electronics, this usually means something will not work at all. With ECMs this can something mean something may work, but not the way it's supposed to.

### If the MIL has come on

Refer to DTC READOUT (page 6-11).

### If the MIL did not stay on

If the MIL did not stay on, but there is a driveability problem, do the PGM-FI SYMPTOM TROUBLESHOOTING (page 6-5).

## SYSTEM DESCRIPTION

### SELF-DIAGNOSIS SYSTEM

The PGM-FI system is equipped with the self-diagnostic system. When any abnormality occurs in the system, the ECM turns on the MIL and stores a DTC in its erasable memory.

### FAIL-SAFE FUNCTION

The PGM-FI system is provided with a fail-safe function to secure a minimum running capability even when there is a malfunction in the system. When any abnormality is detected by the self-diagnosis function, running capability is maintained by pre-programmed values in the simulated program map. When any abnormality is detected in the injector(s), CKP sensor and/or CMP sensor, the fail-safe function stops the engine to protect it from damage.

### DTC (Diagnostic Trouble Code)

- The DTC is composed of a main code and a sub code and it is displayed as a hyphenated number when retrieved from the ECM with the HDS pocket tester.

The digits in front of the hyphen are the main code, they indicate the component of function failure.

The digits behind the hyphen are the sub code, they detail the specific symptom of the component or function failure.

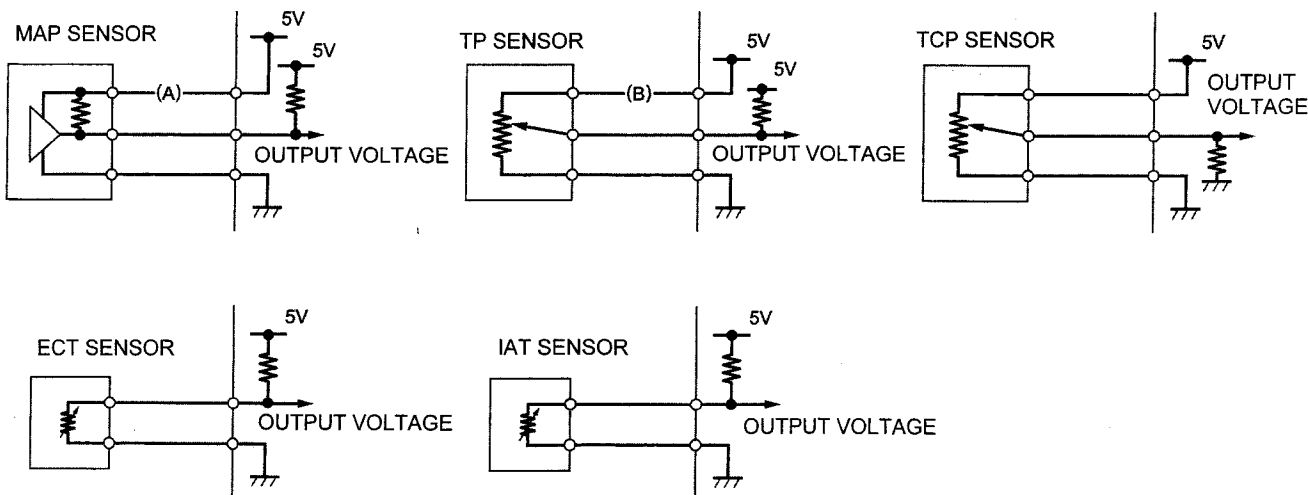
For example, in the case of the MAP sensor:

- DTC 01 - 1 = (MAP sensor voltage) - (lower than the specified value)
- DTC 01 - 2 = (MAP sensor voltage) - (higher than the specified value).
- The MAP, ECT, EOP, TP sensor, TCP sensor and IAT sensor diagnosis will be made according to the voltage output of the affected sensor.

If a failure occurs, the ECM determines the Function Failure, compares the sensor voltage output to the standard value, and then outputs the corresponding DTC to the HDS Pocket Tester.

For example:

- If the input voltage line (A) on the MAP sensor is opened, the ECM detects the output voltage is about 5 V, then the DTC 1-2 (MAP sensor circuit high voltage) will be displayed.
- If the input voltage line (B) on the TP sensor is opened, the ECM detects the output voltage is 5 V, then the DTC 71-1 (TP sensor circuit low voltage) will be displayed.



## MIL Blink Pattern

- If the HDS pocket tester is not available, DTC can be read from the ECM memory by the MIL [1] blink pattern.
- The number of MIL blinks is the equivalent of the main code of the DTC (the sub code cannot be displayed by the MIL).
- The MIL has two types of blinks, a long blink and short blink. The long blinking lasts for 1.3 seconds, the short blinking lasts for 0.5 seconds. One long blink is the equivalent of ten short blinks. For example, when two long blinks are followed by five short blinks, the MIL is 25 (two long blinks = 20 blinks, plus five short blinks).
- When the ECM stores more than one DTC, the MIL will indicate them by blinking in the order from the lowest number to highest number.

## MIL Check

When the ignition switch is turned ON and engine stop switch "Q", the MIL will stay on for a few seconds, then go off. If the MIL does not come on, troubleshoot the MIL circuit (page 6-59).

## CURRENT DTC/FREEZE DTC

The DTC is indicated in two ways according to the failure status.

- In case the ECM detects the problem at present, the MIL will come on and the MIL will start to blink when the sidestand is lowered. It is possible to readout the MIL blink pattern as the current DTC.
- In case the ECM does not detect any problem at present but has a problem stored in its memory, the MIL will not light and blink. If it is necessary to retrieve the past problem, readout the freeze DTC by following the DTC readout procedure.

## HDS POCKET TESTER INFORMATION

- The HDS can readout the DTC, freeze data, current data and other ECM condition.

### How to connect the HDS Pocket Tester

Turn the ignition switch OFF.

Remove the seat (page 3-4).

Remove the dummy connector [1] from the DLC [2].

Connect the HDS pocket tester to the DLC.

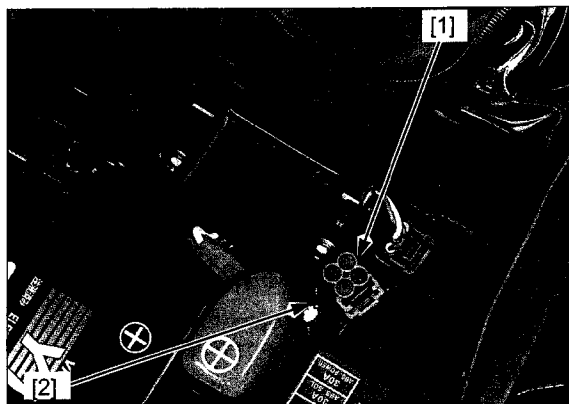
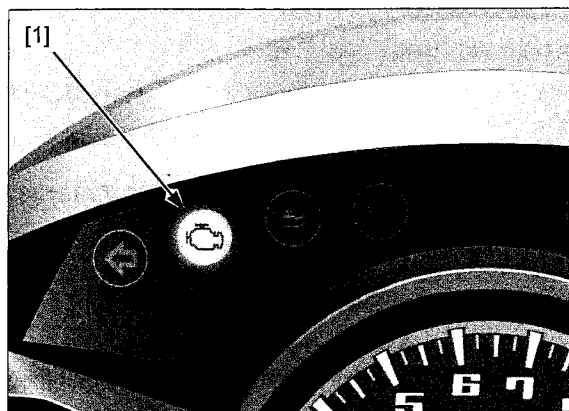
Turn the ignition switch ON, check the DTC and freeze data.

### NOTE:

- Freeze data indicates the engine conditions when the first malfunction was detected.

### ECM reset

The HDS can reset the ECM data including the DTC, freeze data and some learning memory.



## DTC READOUT

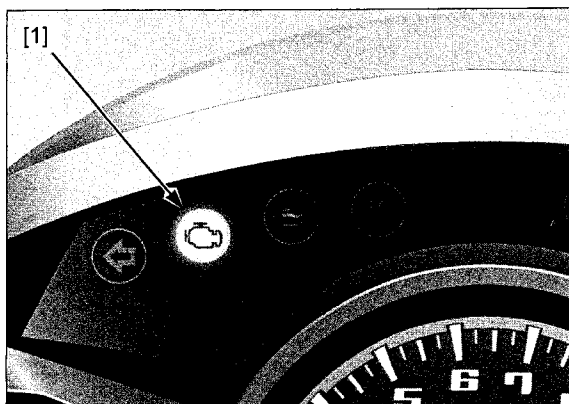
Start the engine and check the MIL [1].

- If the engine will not start, turn the starter motor for more than 10 seconds and check that the MIL blinks.
- When the ignition switch is turned ON, the MIL will stay on for a few seconds, then go off.

If the MIL stays on or blinks, connect the HDS Pocket Tester to the DLC (page 6-11).

Read the DTC, freeze data and follow the troubleshooting index (page 6-14).

To read the DTC with the MIL blinking, refer to the following procedure.





## FUEL SYSTEM (PGM-FI)

### Reading DTC with the MIL

Turn the ignition switch OFF.

Remove the seat (page 3-4).

Remove the dummy connector and short DLC [1] terminals using the special tool [2].

#### TOOL:

SCS connector

070PZ-ZY30100

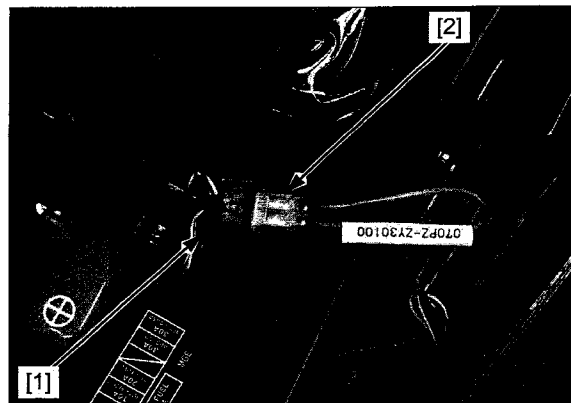
#### CONNECTION: Brown – Green

Make sure the engine stop switch is turned to "  $\odot$ ".

Turn the ignition switch ON and engine stop switch "  $\odot$ ", read, note the MIL blinks and refer to the troubleshooting index (page 6-14).

#### NOTE:

If the ECM has any DTC in its memory, the MIL will start blinking.



## CLEARING DTC

Connect the HDS Pocket Tester to the DLC (page 6-11).

Clear the DTC with the HDS while the engine is stopped.

To clear the DTC without HDS, refer to the following procedure.

#### How to clear the DTC with SCS connector

1. Remove the seat (page 3-4).
2. Turn the ignition switch OFF. Make sure the engine stop switch is turned to "  $\odot$ ".
3. Remove the dummy connector and short the Brown and Green wire terminals of the DLC [1] terminals using the special tool [2].

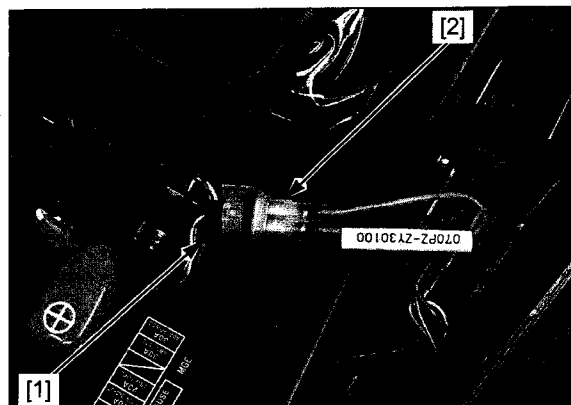
#### TOOL:

SCS connector

070PZ-ZY30100

#### CONNECTION: Brown – Green

4. Turn the ignition switch ON.
5. Remove the special tool from the DLC.
6. The MIL will light for approximately 5 seconds. While the MIL lights, short the DLC terminals again with the special tool. The self-diagnostic memory is erased if the malfunction indicator goes off and starts blinking.



#### NOTE:

- The DLC must be jumped while the MIL lights. If not, the MIL will not start blinking.
- Note that the self-diagnostic memory cannot be erased if the ignition switch is turned "OFF" before the MIL starts blinking.

## CIRCUIT INSPECTION

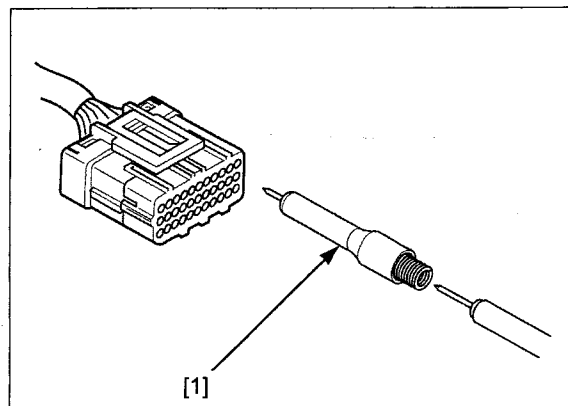
### INSPECTION AT ECM CONNECTOR

- Always clean around and keep any foreign material away from the ECM connector before disconnecting it.
- A faulty PGM-FI system is often related to poorly connected or corroded connections. Check those connections before proceeding.
- In testing at ECM connector (wire harness side) terminal, always use the test probe. Insert the test probe [1] into the connector terminal, then attach the digital multimeter probe to the test probe.

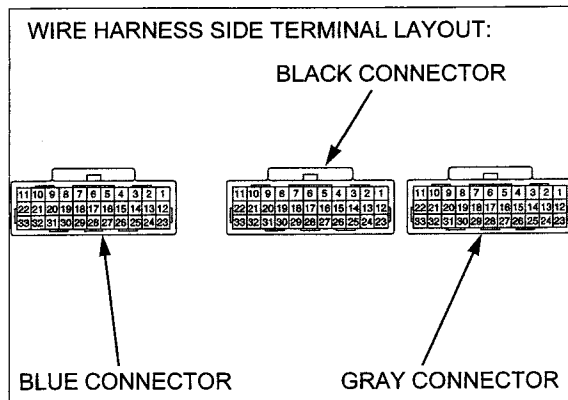
#### TOOL:

Test probe

07ZAJ-RDJA110



The ECM connector terminals (wire harness side) are numbered as shown in the illustration.



# FUEL SYSTEM (PGM-FI)

## DTC INDEX

DTC (MIL blinks)	Function Failure	Symptom/Fail-safe function	Refer to (DTC)
1-1 (1)	MAP sensor circuit low voltage (less than 0.2 V) • MAP sensor or its circuit malfunction	• Engine operates normally • Fail-safe value: 760 mmHg/1,013 hPa	6-16
1-2 (1)	MAP sensor circuit high voltage (more than 3.9 V) • Loose or poor contact of the MAP sensor connector • MAP sensor or its circuit malfunction	• Engine operates normally • Fail-safe value: 760 mmHg/1,013 hPa	6-17
2-1 (2)	MAP sensor performance problem • Loose or poor connection of the MAP sensor vacuum hose • Faulty MAP sensor	• Engine operates normally	6-18
7-1 (7)	ECT sensor circuit low voltage (less than 0.07 V) • ECT sensor or its circuit malfunction	• Hard to start at a low temperature • Fail-safe value: 85°C/185°F • Cooling fan turns on	6-19
7-2 (7)	ECT sensor circuit high voltage (more than 4.93 V) • Loose or poor contact of the ECT sensor connector • ECT sensor or its circuit malfunction	• Hard to start at a low temperature • Fail-safe value: 85°C/185°F • Cooling fan turns on	6-20
9-1 (9)	IAT sensor circuit low voltage (less than 0.07 V) • IAT sensor or its circuit malfunction	• Engine operates normally • Pre-program value: 35°C/95°F	6-21
9-2 (9)	IAT sensor circuit high voltage (more than 4.93 V) • Loose or poor contact of the IAT sensor connector • IAT sensor or its circuit malfunction	• Engine operates normally • Fail-safe value: 35°C/95°F	6-22
11-1 (11)	Rear wheel speed sensor no signal • Loose or poor contact of the rear wheel speed sensor connector • Rear wheel speed sensor or its circuit malfunction	• Engine operates normally	6-23
12-1 (12)	No. 1 injector circuit malfunction • Loose or poor contact of the injector connector • Injector or its circuit malfunction	• Engine does not start • Injectors, fuel pump and ignition shut down	6-24
13-1 (13)	No. 2 injector circuit malfunction • Loose or poor contact of the injector connector • Injector or its circuit malfunction	• Engine does not start • Injectors, fuel pump and ignition shut down	6-26
14-1 (14)	No. 3 injector circuit malfunction • Loose or poor contact of the injector connector • Injector or its circuit malfunction	• Engine does not start • Injectors, fuel pump and ignition shut down	6-26
15-1 (15)	No. 4 injector circuit malfunction • Loose or poor contact of the injector connector • Injector or its circuit malfunction	• Engine does not start • Injectors, fuel pump and ignition shut down	6-26
18-1 (18)	CMP sensor no signal • Loose or poor contact of the CMP sensor connector • CMP sensor or its circuit malfunction	• Engine does not start • Injectors, fuel pump and ignition shut down	6-26
19-1 (19)	CKP sensor no signal • Loose or poor contact of the CKP sensor connector • CKP sensor or its circuit malfunction	• Engine does not start • Injectors, fuel pump and ignition shut down	6-27
21-1 (21)	No.1/4 O <sub>2</sub> sensor malfunction • Loose or poor contact of the O <sub>2</sub> sensor connector • O <sub>2</sub> sensor or its circuit malfunction	• Engine operates normally	6-28
22-1 (22)	No.2/3 O <sub>2</sub> sensor malfunction • Loose or poor contact of the O <sub>2</sub> sensor connector • O <sub>2</sub> sensor or its circuit malfunction	• Engine operates normally	6-30
23-1 (23)	No.1/4 O <sub>2</sub> sensor heater circuit malfunction • Loose or poor contact of the O <sub>2</sub> sensor heater connector • O <sub>2</sub> sensor heater or its circuit malfunction	• Engine operates normally	6-31
24-1 (24)	No.2/3 O <sub>2</sub> sensor heater circuit malfunction • Loose or poor contact of the O <sub>2</sub> sensor heater connector • O <sub>2</sub> sensor heater or its circuit malfunction	• Engine operates normally	6-32
25-1 (25)	Knock sensor circuit malfunction • Loose or poor contact of the knock sensor connector • knock sensor or its circuit malfunction	• Engine operates normally	6-34

<b>DTC (MIL blinks)</b>	<b>Function Failure</b>	<b>Symptom/Fail-safe function</b>	<b>Refer to (DTC)</b>
25-2 (25)	Knock sensor circuit malfunction <ul style="list-style-type: none"> <li>Loose or poor contact of the knock sensor connector</li> <li>knock sensor or its circuit malfunction</li> </ul>	<ul style="list-style-type: none"> <li>Engine operates normally</li> </ul>	6-35
34-1 (34)	ECV POT low voltage malfunction <ul style="list-style-type: none"> <li>Loose or poor contact of the EGCA connector</li> <li>ECV or its circuit malfunction</li> </ul>	<ul style="list-style-type: none"> <li>Engine operates normally</li> </ul>	6-36
34-2 (34)	ECV POT high voltage malfunction <ul style="list-style-type: none"> <li>ECV or its circuit malfunction</li> </ul>	<ul style="list-style-type: none"> <li>Engine operates normally</li> </ul>	6-38
35-1 (35)	EGCA POT malfunction <ul style="list-style-type: none"> <li>Loose or poor contact of the EGCA connector</li> <li>ECV or its circuit malfunction</li> <li>EGCA lock</li> </ul>	<ul style="list-style-type: none"> <li>Engine operates normally</li> </ul>	6-39
41-1 (41)	Gear position sensor malfunction <ul style="list-style-type: none"> <li>Loose or poor contact of the gear position sensor connector</li> <li>Gear position sensor or its circuit malfunction</li> </ul>	<ul style="list-style-type: none"> <li>Engine operates normally</li> </ul>	6-40
56-1 (56)	Knock sensor IC malfunction <ul style="list-style-type: none"> <li>Knock sensor or its circuit malfunction</li> </ul>	<ul style="list-style-type: none"> <li>Engine operates normally</li> </ul>	6-40
71-1 (71)	TP sensor 1 low voltage (less than 0.096 V) <ul style="list-style-type: none"> <li>TP sensor 1 or its circuit malfunction</li> </ul>	<ul style="list-style-type: none"> <li>Vehicle speed limit: approximately 120 km/h (75 mph)</li> </ul>	6-41
71-2 (71)	TP sensor 1 high voltage (more than 4.762 V) <ul style="list-style-type: none"> <li>Loose or poor contact of the TBW connector</li> <li>TP sensor 1 or its circuit malfunction</li> </ul>	<ul style="list-style-type: none"> <li>Vehicle speed limit: approximately 120 km/h (75 mph)</li> </ul>	6-42
72-1 (72)	TP sensor 2 low voltage (less than 0.063 V) <ul style="list-style-type: none"> <li>TP sensor 2 or its circuit malfunction</li> </ul>	<ul style="list-style-type: none"> <li>Vehicle speed limit: approximately 120 km/h (75 mph)</li> </ul>	6-43
72-2 (72)	TP sensor 2 high voltage (more than 4.761 V) <ul style="list-style-type: none"> <li>Loose or poor contact of the TBW connector</li> <li>TP sensor 2 or its circuit malfunction</li> </ul>	<ul style="list-style-type: none"> <li>Vehicle speed limit: approximately 120 km/h (75 mph)</li> </ul>	6-44
73-1 (73)	TP sensor 1-2 voltage correlation failure <ul style="list-style-type: none"> <li>TP sensor or its circuit malfunction</li> </ul>	<ul style="list-style-type: none"> <li>Engine operates at idle speed</li> </ul>	6-45
73-2 (73)	TP sensor 1-2 short circuit <ul style="list-style-type: none"> <li>TP sensor or its circuit malfunction</li> </ul>	<ul style="list-style-type: none"> <li>Engine operates at idle speed</li> </ul>	6-46
74-1 (74)	TCP sensor 1 low voltage (less than 0.137 V) <ul style="list-style-type: none"> <li>Loose or poor contact of the TCP sensor connector</li> <li>TCP sensor 1 or its circuit malfunction</li> </ul>	<ul style="list-style-type: none"> <li>Engine operates at idle speed</li> </ul>	6-47
74-2 (74)	TCP sensor 1 high voltage (more than 4.902 V) <ul style="list-style-type: none"> <li>TCP sensor 1 or its circuit malfunction</li> </ul>	<ul style="list-style-type: none"> <li>Engine operates at idle speed</li> </ul>	6-48
75-1 (75)	TCP sensor 2 low voltage (less than 0.137 V) <ul style="list-style-type: none"> <li>Loose or poor contact of the TCP sensor connector</li> <li>TCP sensor 2 or its circuit malfunction</li> </ul>	<ul style="list-style-type: none"> <li>Engine operates at idle speed</li> </ul>	6-49
75-2 (75)	TCP sensor 2 high voltage (more than 4.902 V) <ul style="list-style-type: none"> <li>TCP sensor 2 or its circuit malfunction</li> </ul>	<ul style="list-style-type: none"> <li>Engine operates at idle speed</li> </ul>	6-51
76-1 (76)	TCP sensor 1-2 voltage correlation failure <ul style="list-style-type: none"> <li>TCP sensor malfunction</li> </ul>	<ul style="list-style-type: none"> <li>Engine operates at idle speed</li> </ul>	6-52
77-1 (77)	TBW return spring failure	<ul style="list-style-type: none"> <li>Vehicle speed limit: approximately 120 km/h (75 mph)</li> </ul>	6-53
78-1 (78)	TBW motor failure <ul style="list-style-type: none"> <li>TBW motor circuit malfunction</li> </ul>	<ul style="list-style-type: none"> <li>Engine operates at idle speed</li> </ul>	6-54
79-1 (79)	TBW system control correlation failure <ul style="list-style-type: none"> <li>TBW system or its circuit malfunction</li> </ul>	<ul style="list-style-type: none"> <li>Engine operates at idle speed</li> </ul>	6-55
83-1 (83)	EOP sensor low voltage (less than 0.059 V) <ul style="list-style-type: none"> <li>EOP sensor or its circuit malfunction</li> </ul>	<ul style="list-style-type: none"> <li>Engine operates normally</li> <li>Oil pressure indicator stays on</li> </ul>	6-55
83-2 (83)	EOP sensor high voltage (more than 4.93 V) <ul style="list-style-type: none"> <li>Loose or poor contact of the EOP sensor connector</li> <li>EOP sensor or its circuit malfunction</li> </ul>	<ul style="list-style-type: none"> <li>Engine operates normally</li> <li>Oil pressure indicator stays on</li> </ul>	6-56
84-1 (84)	ECM processor failure	<ul style="list-style-type: none"> <li>Engine idle speed</li> </ul>	6-58
85-1 (85)	TBW relay failure (ON side) <ul style="list-style-type: none"> <li>TBW relay or its circuit malfunction</li> </ul>	<ul style="list-style-type: none"> <li>Vehicle speed limit: approximately 120 km/h (75 mph)</li> </ul>	6-58
85-2 (85)	TBW relay failure (OFF side) <ul style="list-style-type: none"> <li>TBW relay or its circuit malfunction</li> </ul>	<ul style="list-style-type: none"> <li>Engine operates at idle speed</li> </ul>	6-59

# DTC TROUBLESHOOTING

## DTC 1-1 (MAP SENSOR LOW VOLTAGE)

- Before starting the inspection, check for loose or poor contact on the MAP sensor 3P (Black) connector and ECM 33P connectors, then recheck the DTC.

### 1. MAP Sensor System Inspection

Turn the ignition switch ON and engine stop switch

" $\odot$ ".

Check the MAP sensor with the HDS.

**Is about 0 V or below indicated?**

**YES** – GO TO STEP 2.

**NO** – Intermittent failure

### 2. MAP Sensor Input Voltage Inspection

Turn the ignition switch OFF.

Disconnect the MAP sensor 3P (Black) connector [1].

Turn the ignition switch ON and engine stop switch

" $\odot$ ".

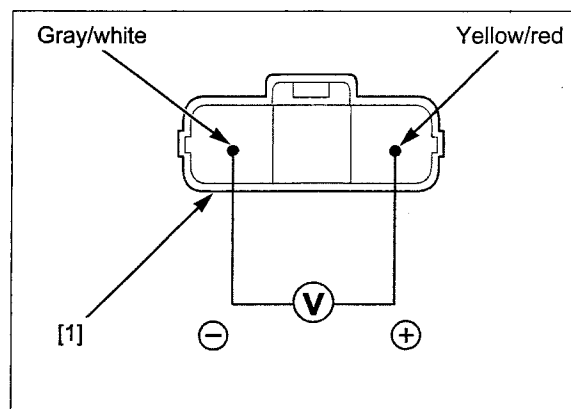
Measure the voltage at the wire side.

**Connection: Yellow/red (+) – Gray/white (-)**

**Is the voltage within 4.75 – 5.25V?**

**YES** – GO TO STEP 4.

**NO** – GO TO STEP 3.



### 3. MAP Sensor Input Line Inspection

Turn the ignition switch OFF.

Disconnect the ECM 33P (Gray) connector [1].

Check for continuity at the Yellow/red wire between the MAP sensor 3P (Black) connector [2] and ECM 33P (Gray) connector.

**Connection: D28 – Yellow/red**

**TOOL:**

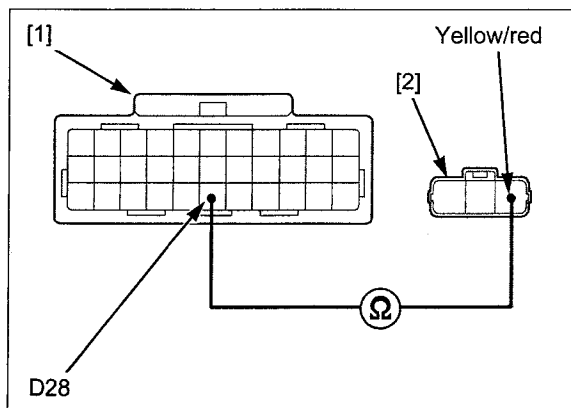
Test probe

07ZAJ-RDJA110

**Is there continuity?**

**YES** – Replace the ECM with a known good one, and recheck.

**NO** – Open circuit in Yellow/red wire



#### 4. MAP Sensor Output Line Short Circuit Inspection

Turn the ignition switch OFF.

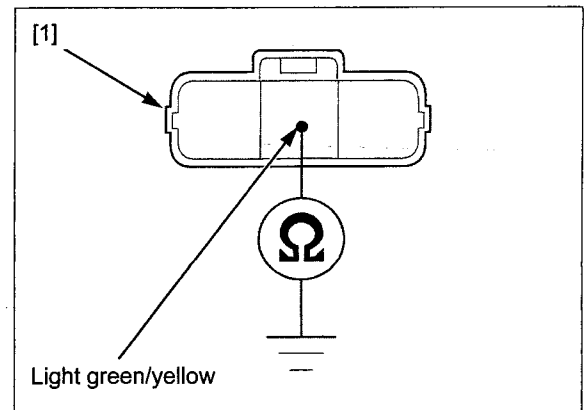
Check for continuity between the MAP sensor 3P (Black) connector [1] at the wire side and ground.

**Connection: Light green/yellow – Ground**

**Is there continuity?**

**YES** – Short circuit in Light green/yellow wire

**NO** – GO TO STEP 5.



#### 5. MAP Sensor Inspection

Replace the MAP sensor with a known good one (page 6-79).

Clear the DTC's (page 6-12).

Turn the ignition switch ON and engine stop switch "Q".

Check the MAP sensor with the HDS.

**Is DTC 1-1 indicated?**

**YES** – Replace the ECM with a known good one, and recheck.

**NO** – Faulty original MAP sensor

### DTC 1-2 (MAP SENSOR HIGH VOLTAGE)

- Before starting the inspection, check for loose or poor contact on the MAP sensor 3P (Black) connector and ECM 33P connectors, then recheck the DTC.

#### 1. MAP Sensor System Inspection 1

Turn the ignition switch ON and engine stop switch "Q".

Check the MAP sensor with the HDS.

**Is about 5 V indicated?**

**YES** – GO TO STEP 2.

**NO** – Intermittent failure

#### 2. MAP Sensor System Inspection 2

Turn the ignition switch OFF.

Disconnect the MAP sensor 3P (Black) connector [1].

Connect the MAP sensor 3P (Black) connector terminals at the wire side with a jumper wire.

**Connection: Light green/yellow – Gray/white**

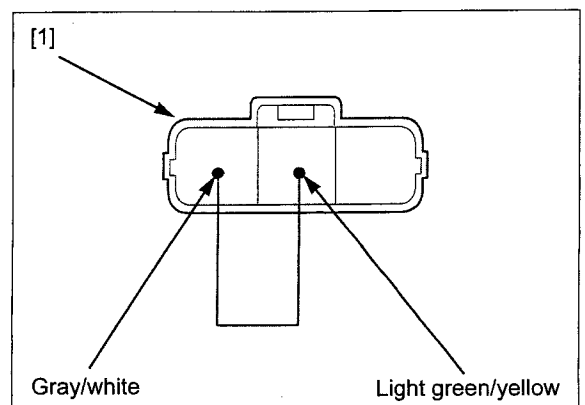
Turn the ignition switch ON and engine stop switch "Q".

Check the MAP sensor with the HDS.

**Is about 0 V indicated?**

**YES** – Faulty MAP sensor

**NO** – GO TO STEP 3.



## FUEL SYSTEM (PGM-FI)

### 3. MAP Sensor Input Voltage Inspection

Turn the ignition switch OFF.  
Remove the jumper wire.

Turn the ignition switch ON and engine stop switch "Q".

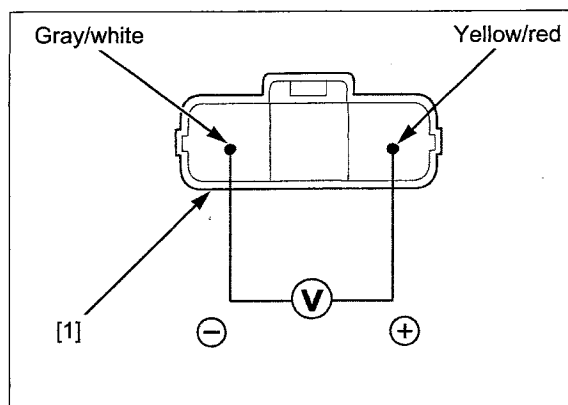
Measure the voltage at the MAP sensor 3P (Black) connector [1] at the wire side.

**Connection: Yellow/red (+) – Gray/white (–)**

**Is the voltage within 4.75 – 5.25V?**

**YES** – GO TO STEP 4.

**NO** – • Open circuit in Gray/white wire  
• Open circuit in Yellow/red wire



### 4. MAP Sensor Output Line Open Circuit Inspection

Turn the ignition switch OFF.

Disconnect the ECM 33P (Black) connector [1].

Check for continuity at the Light green/yellow wire between the MAP sensor 3P (Black) connector [2] and ECM 33P (Black) connector.

**Connection: C15 – Light Green/yellow**

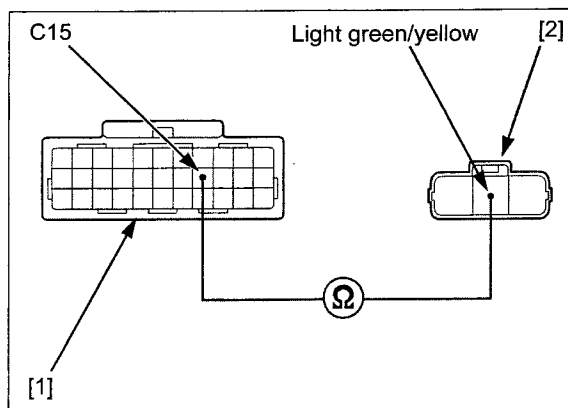
**TOOL:**

**Test probe 07ZAJ-RDJA110**

**Is there continuity?**

**YES** – Replace the ECM with a known good one, and recheck.

**NO** – Open circuit in Light green/yellow wire



## DTC 2-1 (MAP SENSOR)

- Before starting the inspection, check for loose or poor contact on the MAP sensor 3P (Black) connector and ECM 33P connectors, then recheck the DTC.

### 1. MAP Sensor System Inspection

Turn the ignition switch ON and engine stop switch "Q".

Start the engine and check the MAP sensor with the HDS at idle speed.

**Is 1.6 V indicated?**

**YES** – Intermittent failure

**NO** – GO TO STEP 2.

## 2. Manifold Absolute Pressure Test

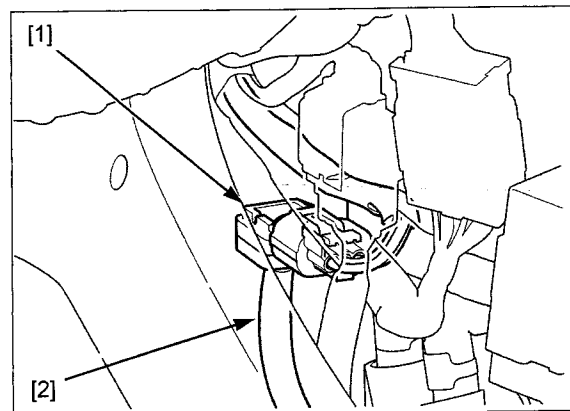
Turn the ignition switch OFF.

Check for connection and installation of the MAP sensor [1] vacuum hose [2].

**Is the MAP sensor vacuum hose connection correct?**

**YES** – GO TO STEP 3.

**NO** – Correct the hose installation



## 3. MAP Sensor System Inspection

Replace the MAP sensor with a known good one (page 6-79).

Turn the ignition switch ON and engine stop switch "O".

Start the engine and check the MAP sensor with the HDS at idle speed.

**Is the reading changed?**

**YES** – Faulty original MAP sensor

**NO** – Replace the ECM with a known good one, and recheck.

## DTC 7-1 (ECT SENSOR LOW VOLTAGE)

- Before starting the inspection, check for loose or poor contact on the ECT sensor 3P (Gray) connector and ECM 33P connectors, then recheck the DTC.

### 1. ECT Sensor System Inspection

Turn the ignition switch ON and engine stop switch "O".

Check the ECT sensor with the HDS.

**Is about 0 V indicated?**

**YES** – GO TO STEP 2.

**NO** – Intermittent failure

### 2. ECT Sensor Inspection

Turn the ignition switch OFF.

Disconnect the ECT sensor 3P (Gray) connector.

Turn the ignition switch ON and engine stop switch "O".

Check the ECT sensor with the HDS.

**Is about 0 V indicated?**

**YES** – GO TO STEP 4.

**NO** – GO TO STEP 3.



## FUEL SYSTEM (PGM-FI)

### 3. ECT Sensor Resistance Inspection

Turn the ignition switch OFF.

Measure the resistance at the ECT sensor [1] terminals.

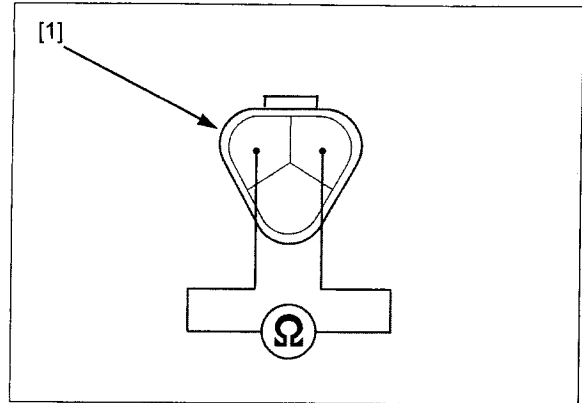
**Connection:** Blue/yellow (+) – Gray (–)  
(Sensor side terminals)

**Standard:** 2.3 – 2.6 k $\Omega$  (20°C/68°F)

*Is the resistance within 2.3 – 2.6 k $\Omega$  (20°C/68°F)?*

**YES** – Replace the ECM with a known good one, and recheck.

**NO** – Faulty ECT sensor



### 4. ECT Sensor Output Line Short Circuit Inspection

Turn the ignition switch OFF.

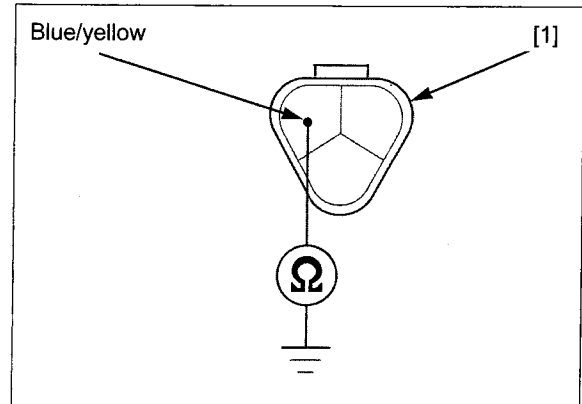
Check for continuity between the ECT sensor 3P (Gray) connector [1] at the wire side and ground.

**Connection:** Blue/yellow – Ground

*Is there continuity?*

**YES** – Short circuit in Blue/yellow wire

**NO** – Replace the ECM with a known good one, and recheck.



## DTC 7-2 (ECT SENSOR HIGH VOLTAGE)

- Before starting the inspection, check for loose or poor contact on the ECT sensor 3P (Gray) connector and ECM 33P connectors, then recheck the DTC.

### 1. ECT Sensor System Inspection

Turn the ignition switch ON and engine stop switch "Q".

Check the ECT sensor with the HDS.

*Is about 5 V indicated?*

**YES** – GO TO STEP 2.

**NO** – Intermittent failure

### 2. ECT Sensor Inspection

Turn the ignition switch OFF.

Disconnect the ECT sensor 3P (Gray) connector [1]. Connect the ECT sensor terminals with a jumper wire [2].

**Connection:** Blue/yellow – Gray

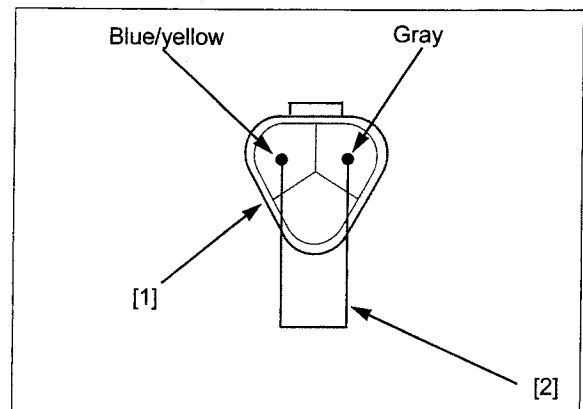
Turn the ignition switch ON and engine stop switch "Q".

Check the ECT sensor with the HDS.

*Is about 0 V indicated?*

**YES** – Inspect the ECT sensor (page 22-15).

**NO** – GO TO STEP 3.



### 3. ECT Sensor Line Inspection

Turn the ignition switch OFF.  
Remove the jumper wire.

Disconnect the ECM 33P (Black) connector [1] and 33P (Gray) connector [2].  
Check for continuity at the Blue/yellow and Gray/white wires between the ECT sensor 3P (Gray) connector [3] and ECM 33P connectors.

**Connection:** C21 – Blue/yellow  
D26 – Gray/white

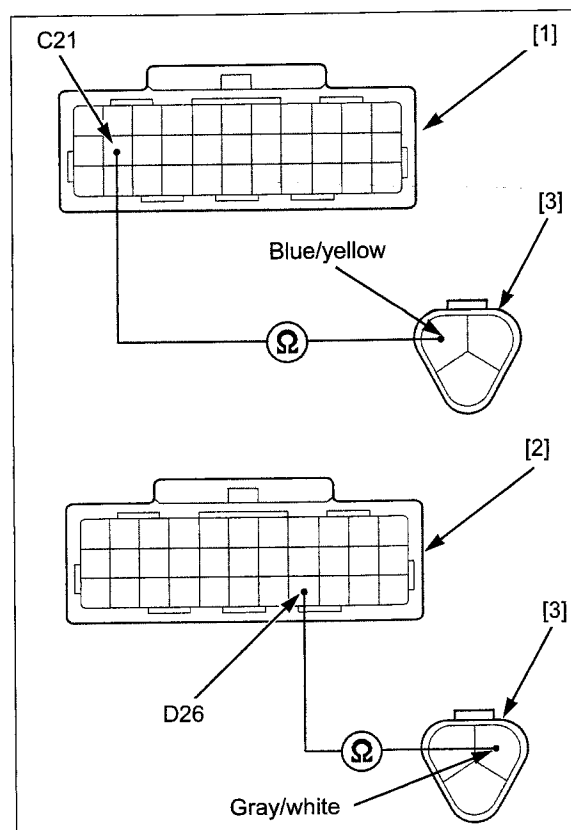
**TOOL:**

**Test probe** 07ZAJ-RDJA110

**Are there continuity?**

**YES** – Replace the ECM with a known good one, and recheck.

**NO** – • Open circuit in Blue/yellow wire  
• Open circuit in Gray/white wire



### DTC 9-1 (IAT SENSOR LOW VOLTAGE)

- Before starting the inspection, check for loose or poor contact on the IAT sensor 2P (Gray) connector and ECM 33P connectors, then recheck the DTC.

#### 1. IAT Sensor System Inspection

Turn the ignition switch ON and engine stop switch "Q".

Check the IAT sensor with the HDS.

**Is about 0 V indicated?**

**YES** – GO TO STEP 2.

**NO** – Intermittent failure

#### 2. IAT Sensor Inspection

Turn the ignition switch OFF.  
Disconnect the IAT sensor 2P (Gray) connector.

Turn the ignition switch ON and engine stop switch "Q".

Check the IAT sensor with the HDS.

**Is about 0 V indicated?**

**YES** – GO TO STEP 3.

**NO** – Faulty IAT sensor

### 3. IAT Sensor Output Line Short Circuit Inspection

Turn the ignition switch OFF.

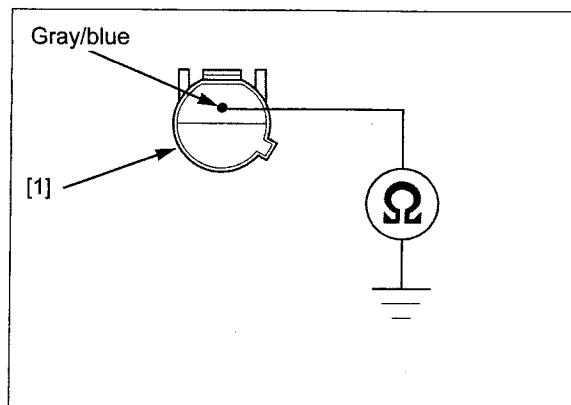
Check for continuity between the IAT sensor 2P (Gray) connector [1] at the wire side and ground.

**Connection: Gray/blue – Ground**

**Is there continuity?**

**YES** – Short circuit in Gray/blue wire

**NO** – Replace the ECM with a known good one, and recheck.



### DTC 9-2 (IAT SENSOR HIGH VOLTAGE)

- Before starting the inspection, check for loose or poor contact on the IAT sensor 2P (Gray) connector and ECM 33P connectors, then recheck the DTC.

#### 1. IAT Sensor System Inspection

Turn the ignition switch ON and engine stop switch "Q".

Check the IAT sensor with the HDS.

**Is about 5 V indicated?**

**YES** – GO TO STEP 2.

**NO** – Intermittent failure

#### 2. IAT Sensor Inspection

Turn the ignition switch OFF.

Disconnect the IAT sensor 2P (Gray) connector [1]. Connect the IAT sensor terminals with a jumper wire [2].

**Connection: Gray/blue – Gray/white**

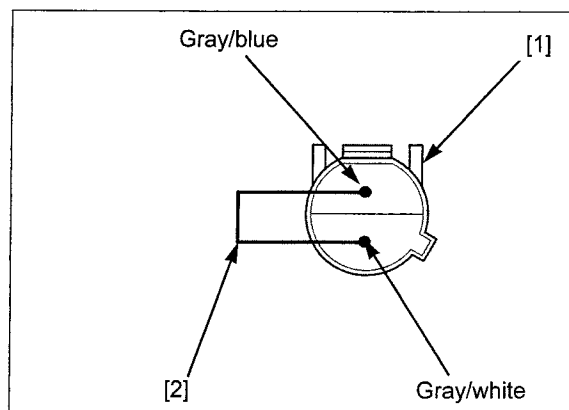
Turn the ignition switch ON and engine stop switch "Q".

Check the IAT sensor with the HDS.

**Is about 0 V indicated?**

**YES** – Faulty IAT sensor

**NO** – GO TO STEP 3.



### 3. IAT Sensor Line Inspection

Turn the ignition switch OFF.

Disconnect the ECM 33P (Black) connector [1] and 33P (Gray) connector [2].

Check for continuity at the Gray/blue and Gray/white wire between the IAT sensor 2P connector [3] and ECM 33P connectors.

**Connection:** C31 – Gray/blue  
D26 – Gray/white

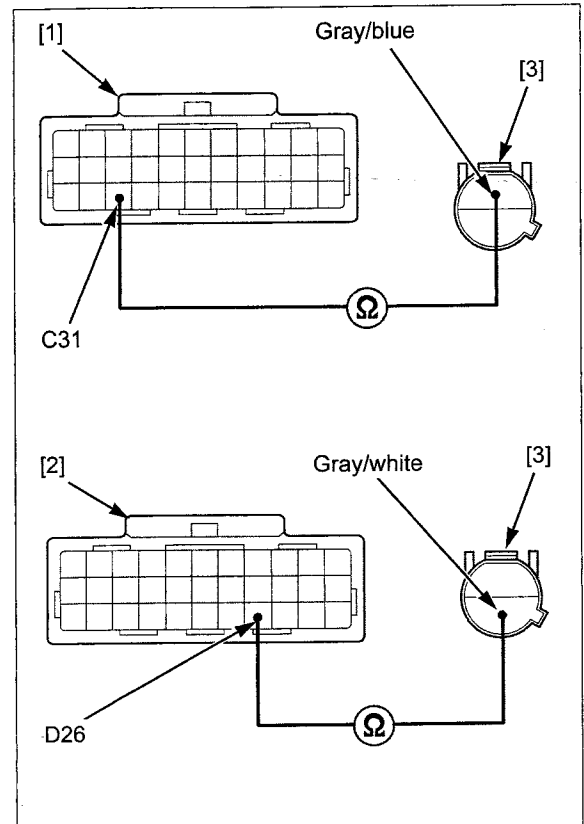
**TOOL:**

**Test probe** 07ZAJ-RDJA110

**Is there continuity?**

**YES** – Replace the ECM with a known good one, and recheck.

**NO** – • Open circuit in Gray/blue wire  
• Open circuit in Gray/white wire



### DTC 11-1 (REAR WHEEL SPEED SENSOR)

- Before starting the inspection, check for loose or poor contact on the rear wheel speed sensor 2P (Orange) connector and ECM 33P connectors, then recheck the DTC.

#### 1. Rear Wheel Speed Sensor System Inspection

Clear the DTC's (page 6-12).

Test ride the motorcycle.

Stop the engine.

Turn the ignition switch ON and engine stop switch "Q".

Check the rear wheel speed sensor with the HDS.

**Is DTC 11-1 indicated?**

**NO** – GO TO STEP 2.

**YES** – Intermittent failure

#### 2. Rear wheel Speed Sensor Inspection

Check for operation of rear wheel speed sensor (page 18-17).

**Does the rear wheel speed sensor operate normally?**

**YES** – GO TO STEP 3.

**NO** – Faulty rear wheel speed sensor.

## FUEL SYSTEM (PGM-FI)

### 3. Rear Wheel Speed Sensor Signal Line Short Circuit Inspection

Turn the ignition switch OFF.

Disconnect the ECM 33P (Black) connector [1].

Check for continuity between the ECM 33P (Black) connector at the wire side and ground.

**Connection: C27 – Ground**

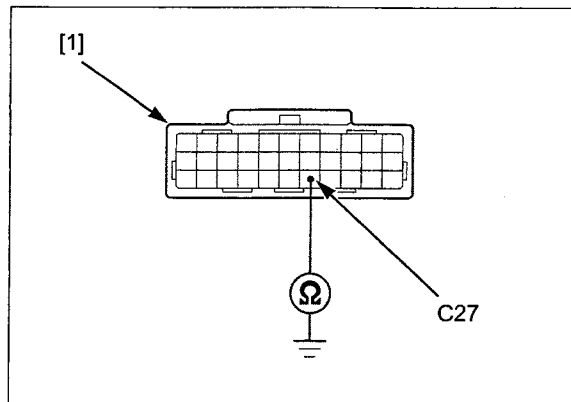
**TOOL:**

**Test probe 07ZAJ-RDJA110**

**Is there continuity?**

**YES** – Short circuit in the Pink/green wire

**NO** – GO TO STEP 4.



### 4. Rear Wheel Speed Sensor Line Inspection

Turn the ignition switch OFF.

Disconnect the ABS modulator 26P connector [1] (page 18-5).

Check for continuity at the Pink/green wire between the ABS modulator 26P connector and ECM 33P (Black) connector [2].

**Connection: C27 – Pink/green**

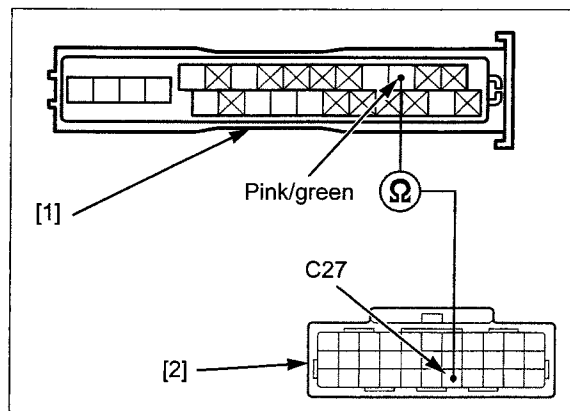
**TOOL:**

**Test probe 07ZAJ-RDJA110**

**Is there continuity?**

**YES** – Replace the ECM with a known good one, and recheck.

**NO** – Open circuit in Pink/green wire



## DTC 12-1 (No.1 INJECTOR)

- Before starting the inspection, check for loose or poor contact on the injector 2P (Gray) connectors and ECM 33P connectors, then recheck the DTC.

DTC	IN-JEC-TOR	POWER INPUT LINE	SIGNAL LINE	SIGNAL AT ECM
12-1	No.1	Black/white	Red/yellow	D8
13-1	No.2	Black/white	Red/blue	D7
14-1	No.3	Black/white	Red/green	D6
15-1	No.4	Black/white	Red/black	D5

### 1. Injector System Inspection

Clear the DTC's (page 6-12).

Start the engine and check the injector with the HDS.

**Is the DTC 12-1 indicated?**

**YES** – GO TO STEP 2.

**NO** – Intermittent failure

## 2. Injector Input Voltage Inspection

Turn the ignition switch OFF.

Disconnect the injector 2P (Gray) connector.  
Turn the ignition switch ON and engine stop switch "O".

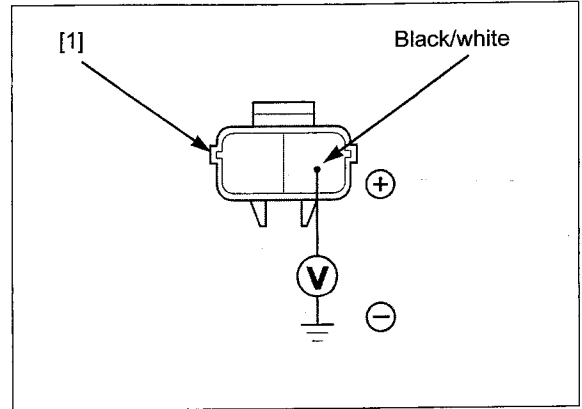
Measure the voltage between the injector 2P (Gray) connector [1] of the wire side and ground.

**Connection: Black/white (+) – Ground (–)**

**Is there battery voltage?**

**YES** – GO TO STEP 3.

**NO** – Open circuit in Black/white wire



## 3. Injector Resistance Inspection

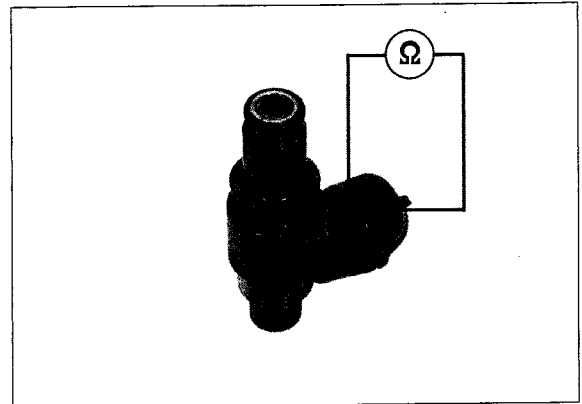
Turn the ignition switch OFF.

Disconnect the injector 2P (Gray) connector.  
Measure the resistance of the injector terminals.

**Is the resistance within 11.6 – 12.4  $\Omega$  (20°C/68°F)?**

**YES** – GO TO STEP 4.

**NO** – Faulty injector



## 4. Injector Signal Line Open Circuit Inspection

Disconnect the ECM 33P (Gray) connector [1].  
Check the continuity between ECM 33P (Gray) connector [1] and injector 2P (Gray) connector [2].

**Connection: SIGNAL LINE – SIGNAL AT ECM**

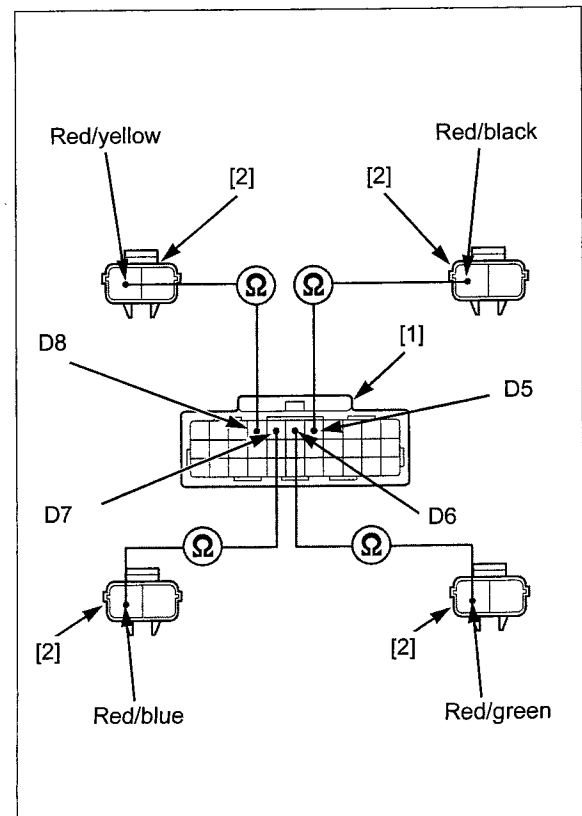
**TOOL:**

Test probe 07ZAJ-RDJA110

**Is there continuity?**

**YES** – GO TO STEP 5.

**NO** – Open circuit in SIGNAL LINE wire



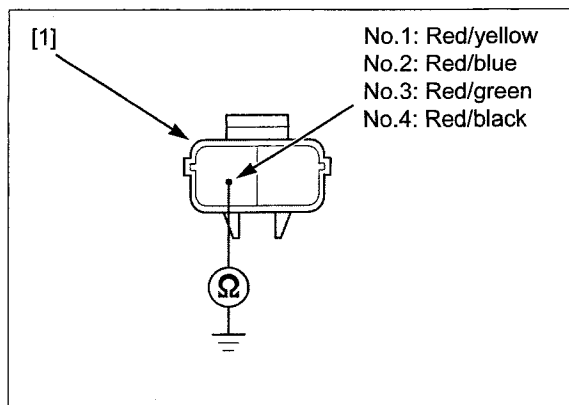
### 5. Injector Signal Line Short Circuit Inspection

Check for continuity between the injector 2P (Gray) connector [1] of the wire harness side and ground.

**Connection: SIGNAL LINE – Ground**

**Is there continuity?**

- YES** – • Short circuit in SIGNAL LINE wire  
• Faulty injector
- NO** – Replace the ECM with a known good one, and recheck.



### DTC 13-1 (No.2 INJECTOR)

(page 6-24)

### DTC 14-1 (No.3 INJECTOR)

(page 6-24)

### DTC 15-1 (No.4 INJECTOR)

(page 6-24)

### DTC 18-1 (CMP SENSOR)

- Before starting the inspection, check for loose or poor contact on the CMP sensor 3P (Black) connector and ECM 33P connectors, then recheck the DTC.

#### 1. CMP Sensor System Inspection 1

Clean the DTC's (page 6-12).  
Crank the engine for ten seconds or more.

**Is DTC 18-1 indicated?**

- YES** – GO TO STEP 2.
- NO** – Intermittent failure

#### 2. CMP Sensor System Inspection 2

Turn the ignition switch OFF.  
Disconnect the CMP sensor 3P (Black) connector [1].

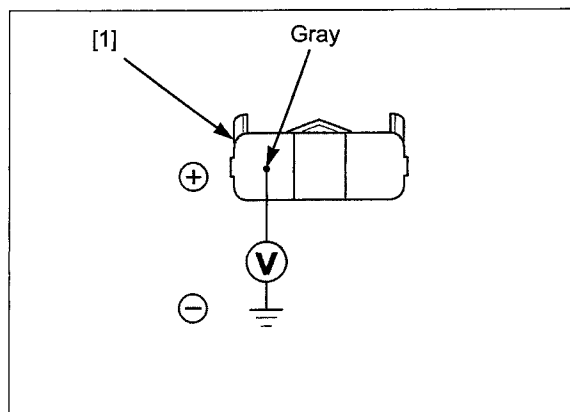
Turn the ignition switch ON and engine stop switch "○".

Measure the voltage at the wire harness side.

**Connection: Gray (+) – Ground (–)**

**Is the voltage within 4.75 – 5.25V?**

- YES** – GO TO STEP 3.
- NO** – GO TO STEP 4.



### 3. CMP Sensor Input Voltage Inspection

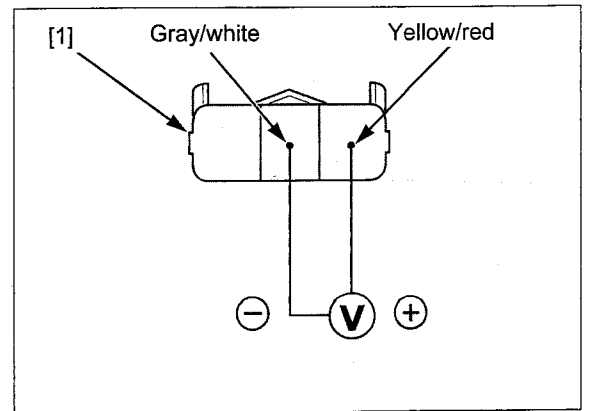
Measure the voltage at the CMP sensor 3P (Black) connector [1] wire side.

**Connection:** Yellow/red (+) – Gray/white (–)

*Is the voltage within 4.75 – 5.25V?*

**YES** – Faulty CMP sensor

**NO** – • Open circuit in Yellow/red wire  
• Open circuit in Gray/white wire



### 4. CMP Sensor Signal Line Open Circuit Inspection

Turn the ignition switch OFF.

Disconnect the ECM 33P (Black) connector [1].

Check the continuity at the Gray wire between the CMP sensor 3P (Black) connector [2] and ECM 33P (Black) connector.

**Connection:** C18 – Gray

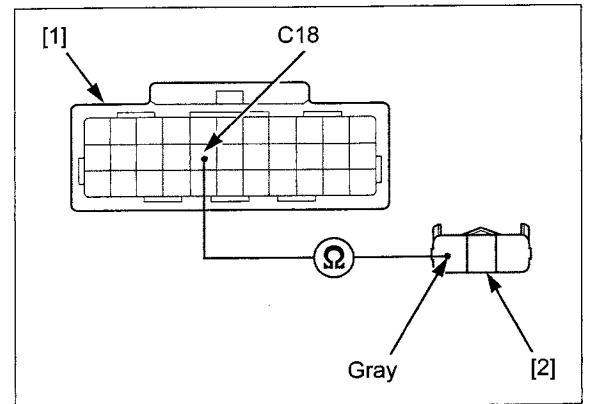
**TOOL:**

Test probe 07ZAJ-RDJA110

*Is there continuity?*

**YES** – Replace the ECM with a known good one, and recheck.

**NO** – Open circuit in Gray wire



## DTC 19-1 (CKP SENSOR)

- Before starting the inspection, check for loose or poor contact on the CKP sensor 2P (Black) connector and ECM 33P connectors, then recheck the DTC.

### 1. CKP sensor Peak Voltage Inspection

Turn the ignition switch OFF.

Disconnect the CKP sensor 2P (Black) connector [1].

Turn the ignition switch ON and engine stop switch "Q".

Crank the engine with the starter motor, and measure the CKP sensor peak voltage at the CKP sensor 2P (Black) connector.

**Connection:** Yellow (+) – White/yellow (–)

**TOOL:**

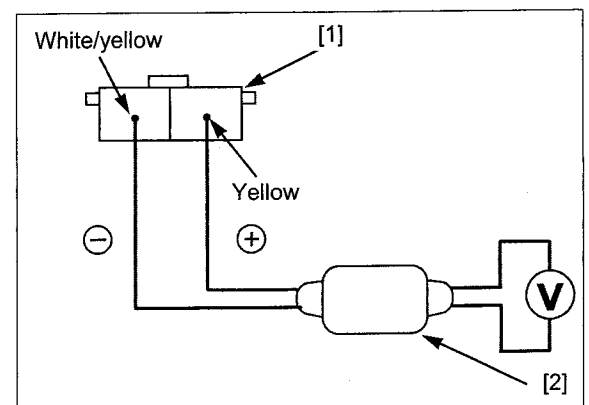
[2] IgnitionMate peak voltage tester (U.S.A. only) or  
Peak voltage adaptor 07HGJ-0020100  
(Not available in U.S.A.)

with commercially available digital multimeter (impedance 10 MΩ/DCV minimum) or peak voltage tester

*Is the voltage more than 0.7 V (20°C/68°F)?*

**YES** – GO TO STEP 2.

**NO** – Faulty CKP sensor





### 2. CKP sensor Circuit Inspection

Turn the ignition switch OFF.

Disconnect the ECM 33P (Black) connector [1].

Check for continuity at the Yellow and White/yellow wire between the CKP sensor 2P (Black) connector [2] and ECM 33P (Black) connector.

**Connection: C7 – Yellow**

**C28 – White/yellow**

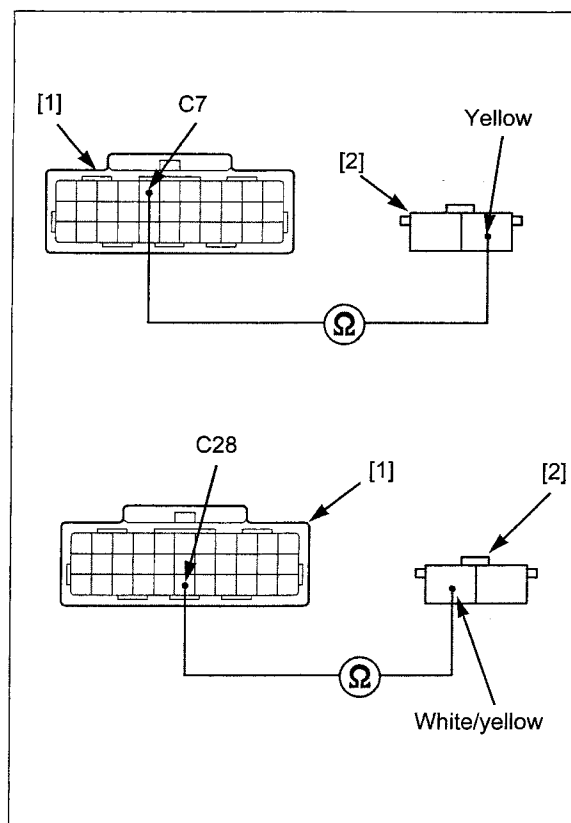
**TOOL:**

**Test probe 07ZAJ-RDJA110**

**Is there continuity?**

**YES** – Short circuit in Yellow wire

**NO** – • Open circuit in Yellow wire  
• Open circuit in White/yellow wire



### DTC 21-1 (No.1/4 O<sub>2</sub> SENSOR)

- Before starting the inspection, check for loose or poor contact on the O<sub>2</sub> sensor 4P (Blue) connector and ECM 33P connectors, then recheck the DTC.

#### 1. O<sub>2</sub> Sensor System Inspection

Warm the engine until the coolant temperature is 80°C (176°F).

Check the O<sub>2</sub> sensor with the HDS.

**Standard: 0.1 V – 0.3 V**

**Is the voltage as specified?**

**YES** – • Check the fuel pressure (page 6-62).  
• If the system is correct, GO TO STEP 4.

**NO** – GO TO STEP 2.

## 2. O<sub>2</sub> Sensor Open Circuit Inspection

Turn the ignition switch OFF.  
Disconnect the O<sub>2</sub> sensor 4P (Blue) connector [1], ECM 33P (Blue) connector [2] and ECM 33P (Gray) connector [3].

Check the continuity between the O<sub>2</sub> sensor 4P (Blue) connector and ECM 33P (Blue), ECM 33P (Gray) connectors.

**Connection:** A20 – Black/red  
D26 – Gray/white

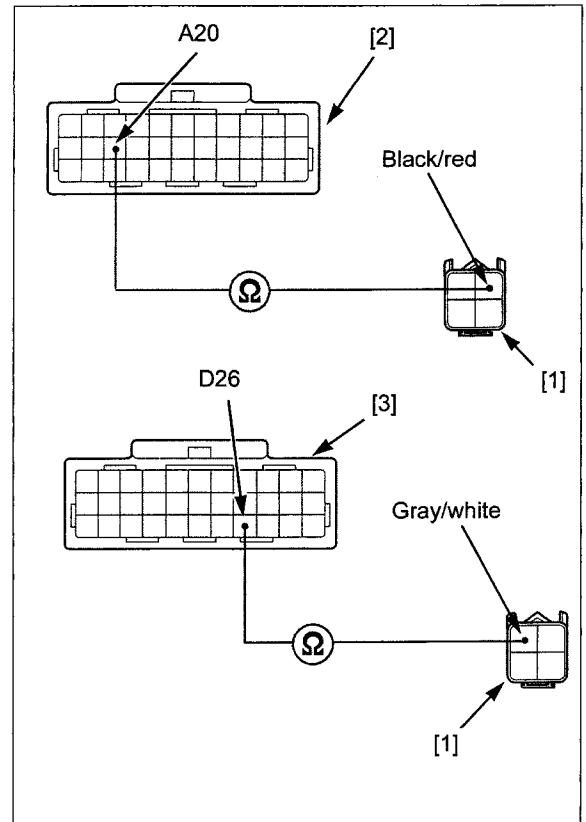
**TOOL:**

Test probe 07ZAJ-RDJA110

*Is there continuity?*

**YES** – GO TO STEP 3.

**NO** – • Open circuit in Black/red wire  
• Open circuit in Gray/white wire



## 3. O<sub>2</sub> Sensor System Short Circuit Inspection

Connect the O<sub>2</sub> sensor 4P (Blue) connector and disconnect the ECM 33P connectors.

Check the continuity between the ECM 33P (Blue) connector [1] and ground.

**Connection:** A20 – Ground

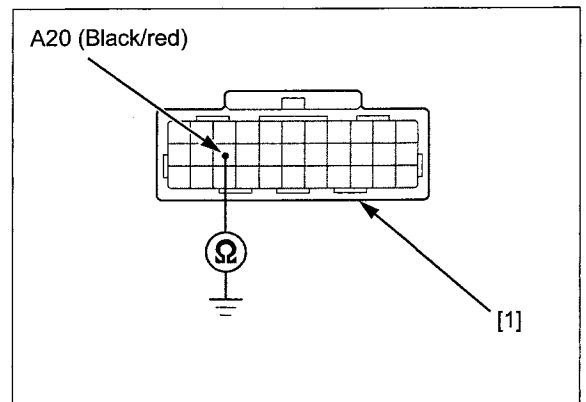
**TOOL:**

Test probe 07ZAJ-RDJA110

*Is there continuity?*

**YES** – Short circuit in Black/red wire

**NO** – GO TO STEP 4.



## 4. O<sub>2</sub> Sensor Inspection

Replace the O<sub>2</sub> sensor with a known good one (page 6-89).

Clean the DTC's (page 6-12).

Turn the ignition switch ON and engine stop switch "Q".

Warm the engine until the coolant temperature is 80°C(176°F).

Check the O<sub>2</sub> sensor with the HDS.

*Is DTC 21-1 indicated?*

**NO** – Faulty original O<sub>2</sub> sensor

**YES** – Replace the ECM with a known good one, and recheck.

## DTC 22-1 (No.2/3 O<sub>2</sub> SENSOR)

- Before starting the inspection, check for loose or poor contact on the O<sub>2</sub> sensor 4P (Black) connector and ECM 33P connectors, then recheck the DTC.

### 1. O<sub>2</sub> Sensor System Inspection

Warm the engine until the coolant temperature is 80°C (176°F).

Check the O<sub>2</sub> sensor with the HDS.

**Standard: 0.1 V – 0.3 V**

**Is the voltage as specified?**

**YES** – • Check the fuel pressure (page 6-62).  
• If the system is correct,  
GO TO STEP 4.

**NO** – GO TO STEP 2.

### 2. O<sub>2</sub> Sensor Open Circuit Inspection

Turn the ignition switch OFF.

Disconnect the O<sub>2</sub> sensor 4P (Black) connector [1] and ECM 33P (Blue) connector [2] and ECM 33P (Gray) connector [3].

Check the continuity between the O<sub>2</sub> sensor 4P (Black) connector and ECM 33P (Blue), ECM 33P (Gray) connectors.

**Connection: A21 – Black/blue**  
**D26 – Gray/white**

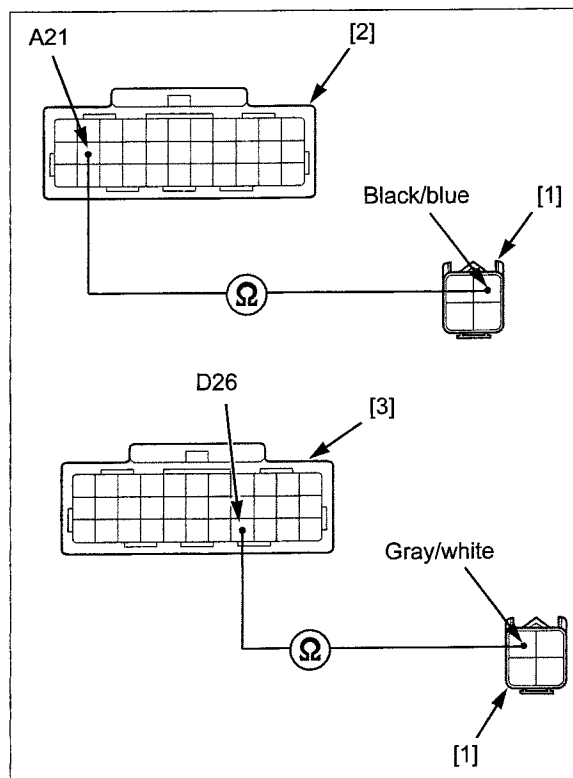
**TOOL:**

**Test probe 07ZAJ-RDJA110**

**Is there continuity?**

**YES** – GO TO STEP 3.

**NO** – • Open circuit in Black/blue wire  
• Open circuit in Gray/white wire



### 3. O<sub>2</sub> Sensor System Short Circuit Inspection

Connect the O<sub>2</sub> sensor 4P (Black) connector.

Check the continuity between the ECM 33P (Blue) connector [1] terminal and ground.

**Connection: A21 – Ground**

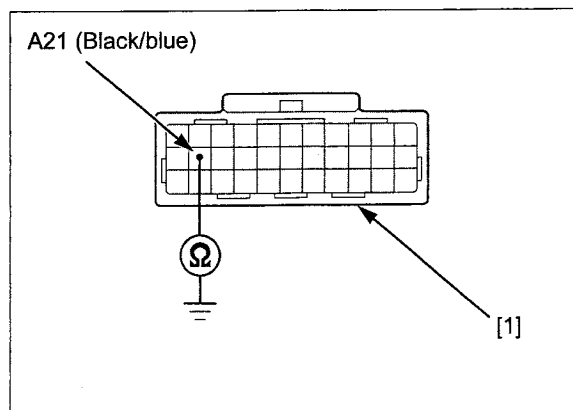
**TOOL:**

**Test probe 07ZAJ-RDJA110**

**Is there continuity?**

**YES** – Short circuit in Black/blue wire

**NO** – GO TO STEP 4.



#### 4. O<sub>2</sub> Sensor Inspection

Replace the O<sub>2</sub> sensor with a known good one (page 6-89).

Clean the DTC's (page 6-12).

Warm the engine until the coolant temperature is 80°C (176°F).

Check the O<sub>2</sub> sensor with the HDS.

**Is DTC 22-1 indicated?**

**NO** – Faulty original O<sub>2</sub> sensor

**YES** – Replace the ECM with a known good one, and recheck.

### DTC 23-1 (No.1/4 O<sub>2</sub> SENSOR HEATER)

- Before starting the inspection, check for loose or poor contact on the O<sub>2</sub> sensor (Blue) connector and ECM 33P connectors, then recheck the DTC.

#### 1. O<sub>2</sub> Sensor System Inspection

Clean the DTC's (page 6-12).

Start the engine and check the O<sub>2</sub> sensor heater with the HDS.

**Is the DTC 23-1 indicated?**

**YES** – GO TO STEP 2.

**NO** – Intermittent failure

#### 2. O<sub>2</sub> Sensor Heater Resistance Inspection

Turn the ignition switch OFF.

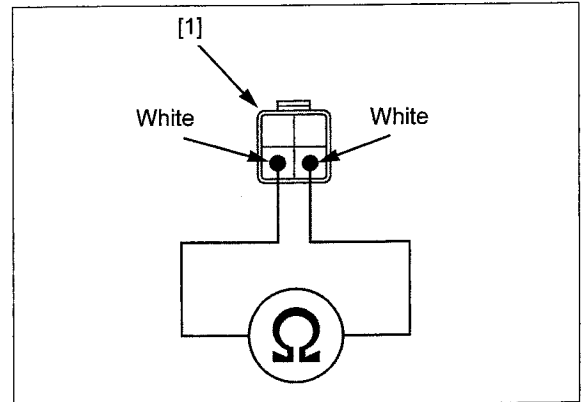
Disconnect the O<sub>2</sub> sensor 4P (Blue) connector [1] and measure the resistance at the sensor side connector.

**Connection: White – White**  
(Sensor side terminals)

**Is the resistance within 10 – 40 Ω (20°C/68°F)?**

**YES** – GO TO STEP 3.

**NO** – Faulty O<sub>2</sub> sensor



#### 3. O<sub>2</sub> Sensor Heater Input Voltage Inspection

Turn the ignition switch ON and engine stop switch "○".

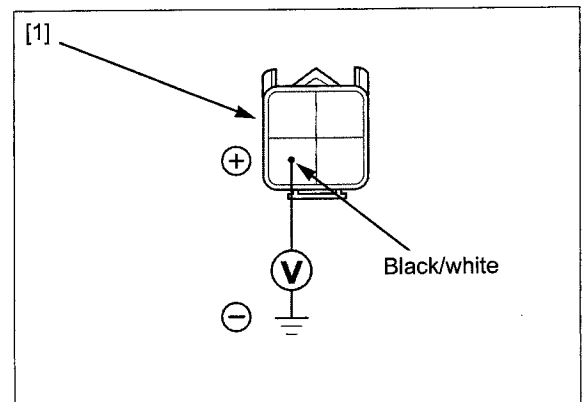
Measure the voltage between the O<sub>2</sub> sensor 4P (Blue) connector [1] at the wire side and ground.

**Connection: Black/white – Ground**

**Is there the battery voltage?**

**YES** – GO TO STEP 4.

**NO** – Open circuit in Black/white wire



## FUEL SYSTEM (PGM-FI)

### 4. O<sub>2</sub> Sensor Heater Open Circuit Inspection

Turn the ignition switch OFF.

Disconnect the ECM 33P (Black) connector [1].

Check the continuity between the ECM 33P (Black) connector and O<sub>2</sub> sensor 4P (Blue) connector [2].

**Connection: C3 – Ground**

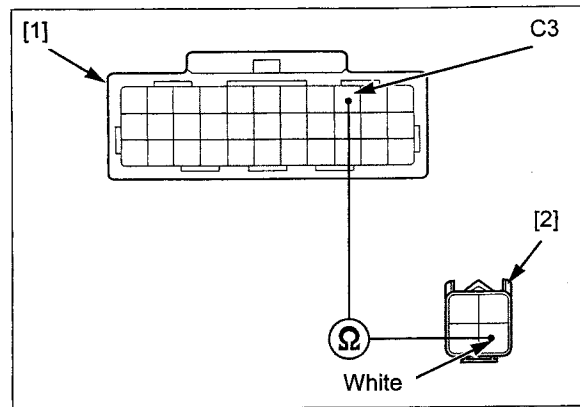
**TOOL:**

**Test probe 07ZAJ-RDJA110**

**Is there continuity?**

**YES** – Open circuit in White wire

**NO** – GO TO STEP 5.



### 5. O<sub>2</sub> Sensor Heater Short Circuit Inspection

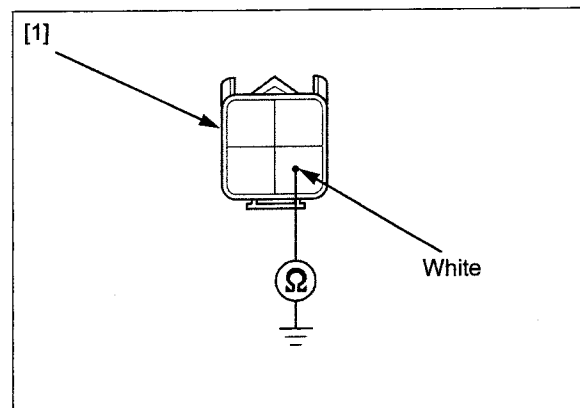
Check for continuity between the O<sub>2</sub> sensor 4P (Blue) connector [1] and ground.

**Connection: White – Ground**

**Is there continuity?**

**YES** – Short circuit in White wire

**NO** – Replace the ECM with a known good one, and recheck.



## DTC 24-1 (No.2/3 O<sub>2</sub> SENSOR HEATER)

- Before starting the inspection, check for loose or poor contact on the O<sub>2</sub> sensor 4P (Black) connector and ECM 33P connectors, then recheck the DTC.

### 1. O<sub>2</sub> Sensor System Inspection

Clear the DTC's (page 6-12).

Start the engine and check the O<sub>2</sub> sensor heater with the HDS.

**Is the DTC 24-1 indicated?**

**YES** – GO TO STEP 2.

**NO** – Intermittent failure

### 2. O<sub>2</sub> Sensor Heater Resistance Inspection

Turn the ignition switch OFF.

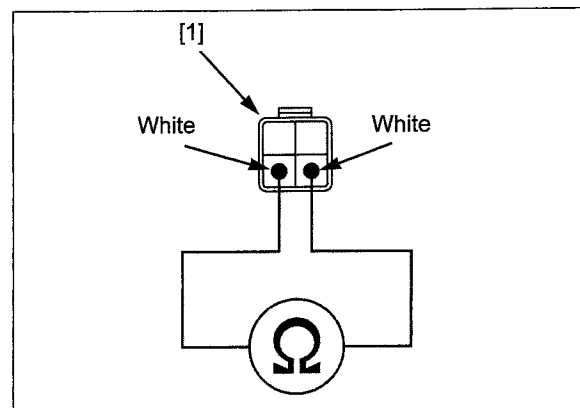
Disconnect the O<sub>2</sub> sensor 4P (Black) connector [1] and measure the resistance at the sensor side connector.

**Connection: White – White**  
(Sensor side terminals)

**Is the resistance within 10 – 40 Ω (20°C/68°F)?**

**YES** – GO TO STEP 3.

**NO** – Faulty O<sub>2</sub> sensor



### 3. O<sub>2</sub> Sensor Heater Input Voltage Inspection

Turn the ignition switch ON and engine stop switch "O".

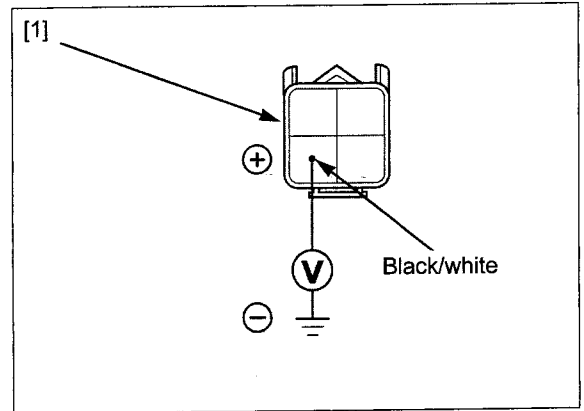
Measure the voltage between O<sub>2</sub> sensor 4P (Black) connector [1] at the wire side and ground.

**Connection: Black/white – Ground**

**Is there the battery voltage?**

**YES** – GO TO STEP 4.

**NO** – Open circuit in Black/white wire



### 4. O<sub>2</sub> Sensor Heater Open Circuit Inspection

Turn the ignition switch OFF.

Disconnect the ECM 33P (Black) connector [1].

Check the continuity between the ECM 33P (Black) connector and O<sub>2</sub> sensor 4P (Black) connector [2].

**Connection: C4 – Ground**

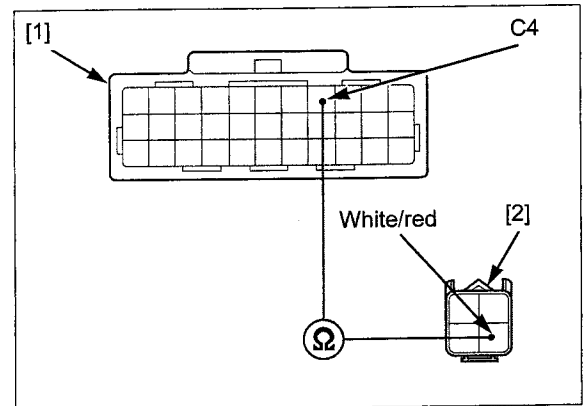
**TOOL:**

**Test probe 07ZAJ-RDJA110**

**Is there continuity?**

**YES** – Open circuit in White/red wire

**NO** – GO TO STEP 5.



### 5. O<sub>2</sub> Sensor Heater Short Circuit Inspection

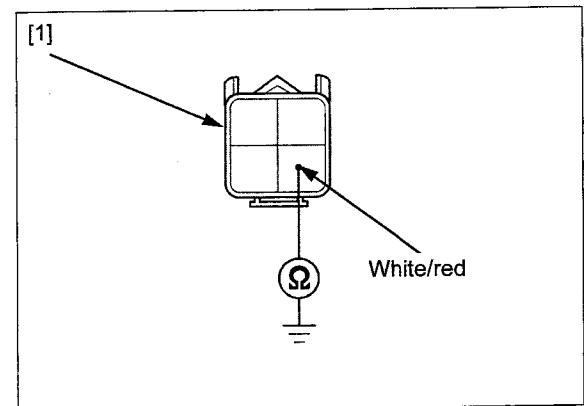
Check for continuity between the O<sub>2</sub> sensor 4P (Black) connector [1] and ground.

**Connection: White/red – Ground**

**Is there continuity?**

**YES** – Short circuit in White/red wire

**NO** – Replace the ECM with a known good one, and recheck.



### DTC 25-1 (KNOCK SENSOR NO INPUT VOLTAGE)

- Before starting the inspection, check for loose or poor contact on the knock sensor 3P (Black) connector and ECM 33P connectors, then recheck the DTC.

#### 1. Knock Sensor System Inspection

Clean the DTC's (page 6-12).  
Place the motorcycle on its sidestand.  
Start the engine and recheck the knock sensor with the HDS.

**Is DTC 25-1 indicated?**

**YES** – GO TO STEP 2.

**NO** – Intermittent failure

#### 2. Knock Sensor Input Voltage Inspection

Turn the ignition switch OFF.  
Disconnect the knock sensor 3P (Black) connector [1].

Turn the ignition switch ON and engine stop switch "Q".

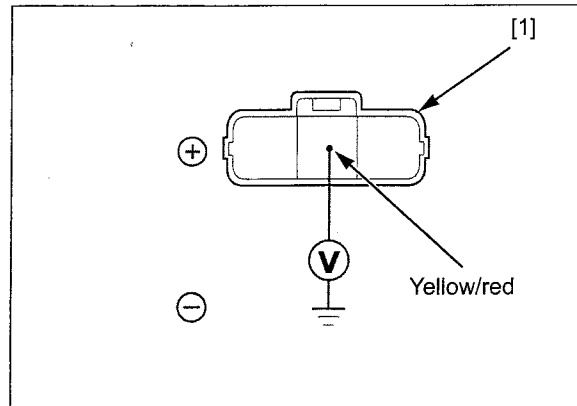
Measure the voltage at the wire side.

**Connection: Yellow/red (+) – Ground (–)**

**Is the voltage within 4.75 – 5.25 V?**

**YES** – GO TO STEP 4.

**NO** – GO TO STEP 3.



#### 3. Knock Sensor Input Line Inspection

Turn the ignition switch OFF.  
Disconnect the ECM 33P (Gray) connector [1].

Check for continuity at the Yellow/red wire between the knock sensor 3P (Black) connector [2] and ECM 33P (Gray) connector.

**Connection: D28 – Yellow/red**

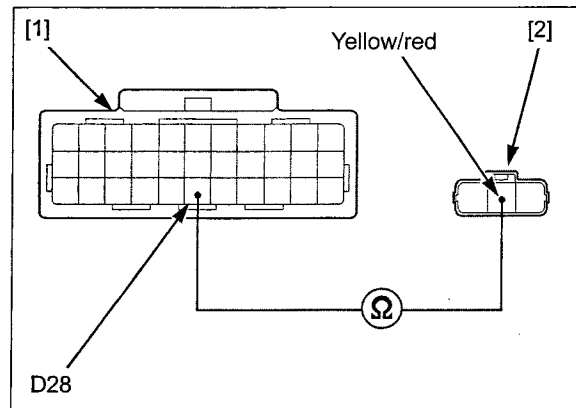
**TOOL:**

**Test probe 07ZAJ-RDJA110**

**Is there continuity?**

**YES** – Replace the ECM with a known good one, and recheck.

**NO** – Open circuit in Yellow/red wire



#### 4. Open Circuit Detection Line Inspection

Turn the ignition switch OFF.  
Disconnect the ECM 33P (Black) connector [1].

Check the continuity between the knock sensor 3P (Black) connector [2] and the ECM 33P (Black) connector.

**Connection: C30 – Gray**

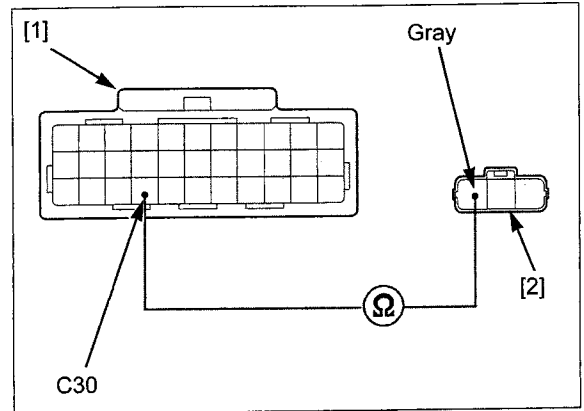
**TOOL:**

**Test probe 07ZAJ-RDJA110**

**Is there continuity?**

**YES** – GO TO STEP 5.

**NO** – Open circuit in Gray wire



#### 5. Knock Sensor Inspection

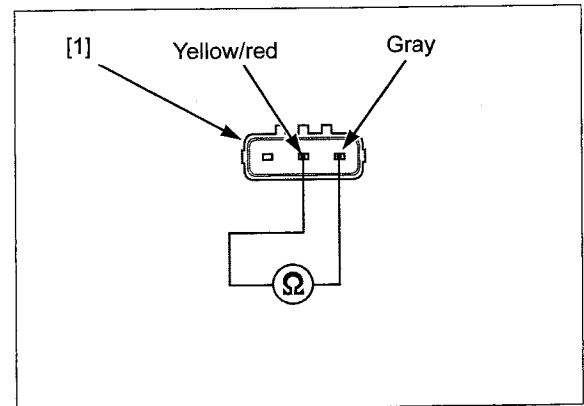
Check for continuity at the knock sensor 3P (Black) connector [1] terminals.

**Connection: Yellow/red – Gray  
(Sensor side terminals)**

**Is there continuity?**

**YES** – Replace the ECM with a known good one, and recheck.

**NO** – Faulty knock sensor



### DTC 25-2 (KNOCK SENSOR LOW VOLTAGE)

- Before starting the inspection, check for loose or poor contact on the knock sensor 3P (Black) connector and ECM 33P connectors, then recheck the DTC.

#### 1. Knock Sensor System Inspection

Clean the DTC's (page 6-12).  
Place the motorcycle on its sidestand.

Start the engine and recheck the knock sensor with the HDS.

**Is the DTC 25-2 indicated?**

**YES** – GO TO STEP 2.

**NO** – Intermittent failure



## FUEL SYSTEM (PGM-FI)

### 2. Knock Sensor Output Line Short Circuit Inspection 1

Turn the ignition switch OFF.  
Disconnect the knock sensor 3P (Black) connector [1].

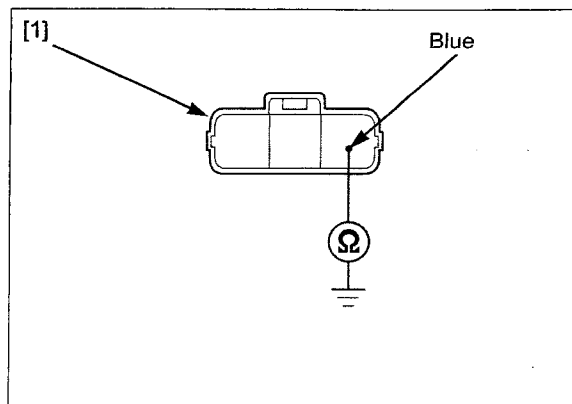
Check for continuity at the Blue wire between the knock sensor 3P (Black) connector [1] at the wire side and ground.

**Connection: Blue – Ground**

**Is there continuity?**

**YES** – Short circuit in blue wire

**NO** – GO TO STEP 3.



### 3. Knock Sensor Output Line Short Circuit Inspection 2

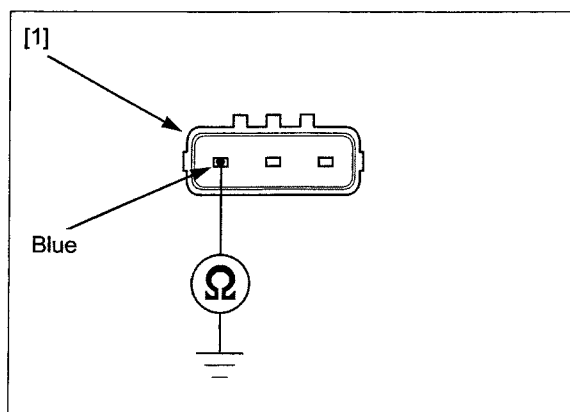
Check for continuity between the knock sensor 3P (Black) connector [1] of the sensor side and ground.

**Connection: Blue – Ground  
(Sensor side terminals)**

**Is there continuity?**

**YES** – Faulty knock sensor

**NO** – Replace the ECM with a known good one, and recheck.



## DTC 34-1 (ECV POT LOW VOLTAGE)

- Before starting the inspection, check for loose or poor contact on the EGCA 6P (Black) connector and ECM 33P connectors, then recheck the DTC.

### 1. ECV POT System Inspection

Turn the ignition switch ON and engine stop switch "Q".

Check the ECV POT with the HDS provided ECV closed.

**Is the indicated voltage within 0.6 – 2.2 V?**

**YES** – Intermittent failure

**NO** – GO TO STEP 2.

## 2. ECV POT Input Voltage Inspection

Turn the ignition switch OFF.  
Disconnect the EGCA 6P (Black) connector [1].  
Turn the ignition switch ON and engine stop switch "O".

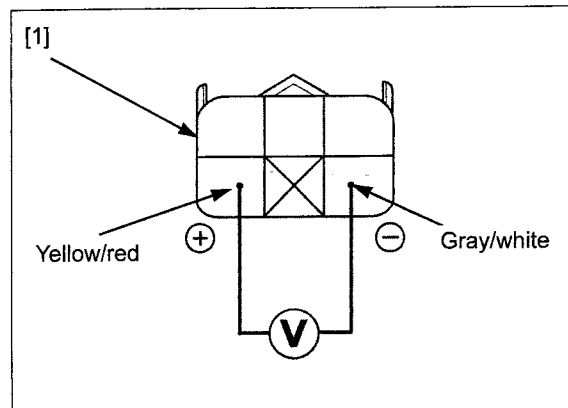
Measure the voltage at the wire harness side.

**Connection: Yellow/red (+) – Gray/white (–)**

**Is the voltage within 4.75 – 5.25 V?**

**YES** – GO TO STEP 4.

**NO** – GO TO STEP 3.



## 3. ECV POT Circuit Inspection

Turn the ignition switch OFF.  
Disconnect the ECM 33P (Gray) connector [1].  
Check the continuity between the EGCA 6P (Black) connector [2] and ECM 33P (Gray) connector.

**Connection: D28 – Yellow/red**

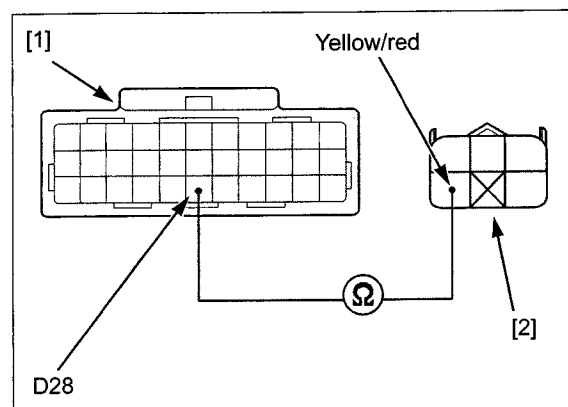
**TOOL:**

**Test probe 07ZAJ-RDJA110**

**Is there continuity?**

**YES** – Replace the ECM with a known good one, and recheck.

**NO** – Open circuit in Yellow/red wire



## 4. ECV POT Output Line Open Circuit Inspection

Turn the ignition switch OFF.  
Disconnect the ECM 33P (Black) connector [1].  
Check for continuity at the Light green/black wire between the EGCA 6P (Black) connector [2] and ECM 33P (Black) connector.

**Connection: C26 – Light green/black**

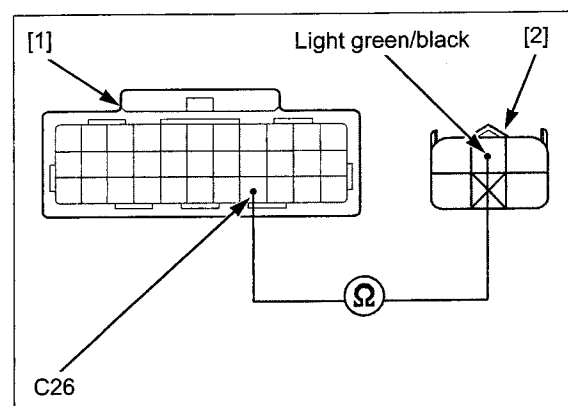
**TOOL:**

**Test probe 07ZAJ-RDJA110**

**Is there continuity?**

**YES** – GO TO STEP 5.

**NO** – Open circuit in Light green/black wire



## 5. ECV POT Output Line Short Circuit Inspection

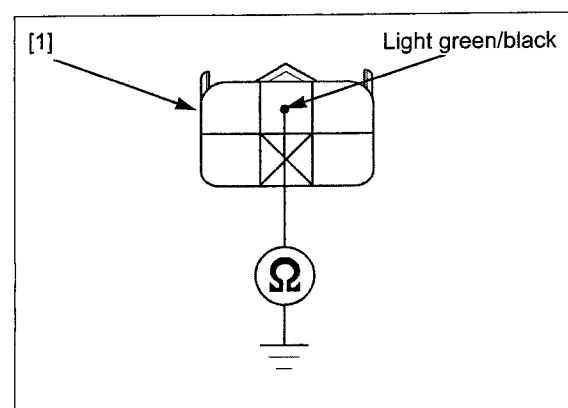
Check for continuity between the EGCA 6P (Black) connector [1] at the wire side and ground.

**Connection: Light green/black – Ground**

**Is there continuity?**

**YES** – Short circuit in Light green/black wire

**NO** – GO TO STEP 6.



### 6. ECV POT Inspection

Replace the EGCA with a known good one.  
Clean the DTC's (page 6-12).  
Turn the ignition switch ON and engine stop switch "O".  
Check the ECV POT with the HDS.

**Is the DTC 34-1 indicated?**

- YES** – Replace the ECM with a known good one, and recheck.  
**NO** – Faulty original EGCA

### DTC 34-2 (ECV POT HIGH VOLTAGE)

- Before starting the inspection, check for loose or poor contact on the EGCA 6P (Black) connector and ECM 33P connectors, then recheck the DTC.

#### 1. ECV POT System Inspection

Turn the ignition switch ON and engine stop switch "O".  
Check the ECV POT with the HDS.

**Is about 5V indicated?**

- YES** – GO TO STEP 2.  
**NO** – Intermittent failure

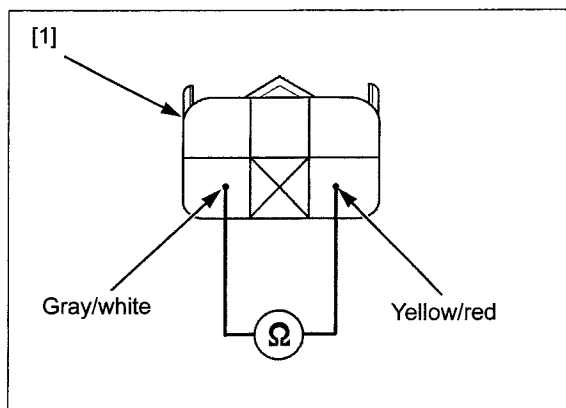
#### 2. ECV POT Resistance Inspection

Turn the ignition switch OFF.  
Disconnect the EGCA 6P (Black) connector [1].  
Measure the voltage at the ECV POT side.

**Connection: Yellow/red – Gray/white**  
(EGCA side terminals)

**Is the resistance within 3.5 – 6.5 k $\Omega$  (20°C/68°F)?**

- YES** – GO TO STEP 3.  
**NO** – Faulty EGCA



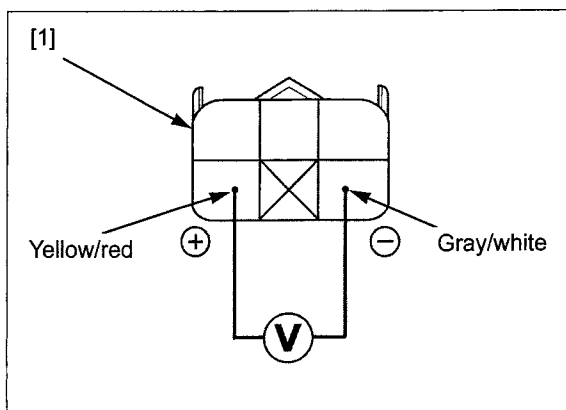
#### 3. ECV POT Input Voltage Inspection

Turn the ignition switch ON and engine stop switch "O".  
Measure the voltage at the EGCA 6P (Black) connector [1] wire side.

**Connection: Yellow/red (+) – Gray/white (-)**

**Is the voltage within 4.75 – 5.25 V?**

- YES** – Replace the ECM with a known good one, and recheck.  
**NO** – Open circuit in Gray/white wire



## DTC 35-1 (EGCA LOCK)

- Before starting the inspection, check for loose or poor contact on the EGCA 6P (Black) connector and ECM 33P connectors, then recheck the DTC.

### 1. EGCA Operating Inspection

Disconnect the EGCA cable from the EGCA pulley (page 6-90).

Turn the ignition switch ON and engine stop switch "O".

Check the EGCA pulley rotation when shorting the DLC with the SCS connector.

**Does the EGCA pulley operate correctly?**

- YES** – • Check the EGCA cable binding, sticking or lock.  
• Check the ECV at muffler side.

**NO** – GO TO STEP 2.

### 2. EGCA Inspection

Turn the ignition switch OFF.

Remove the EGCA (page 6-90).

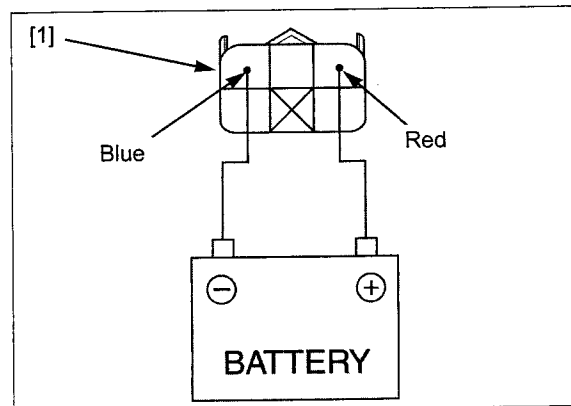
Connect a 12V battery to the EGCA 6P (Black) connector [1] terminals and check the servomotor function.

**Connection: Red (+) – Blue (-)**  
(EGCA side terminals)

**Does the EGCA operate normally?**

**YES** – GO TO STEP 3.

**NO** – Faulty EGCA



### 3. ECM Output Line Inspection

Disconnect the ECM 33P (Gray) connector [1].

Check for continuity at the Red and Blue wires between the EGCA 6P (Black) connector [2] and ECM 33P (Gray) connector.

**Connection: Red – D4**  
**Blue – D9**

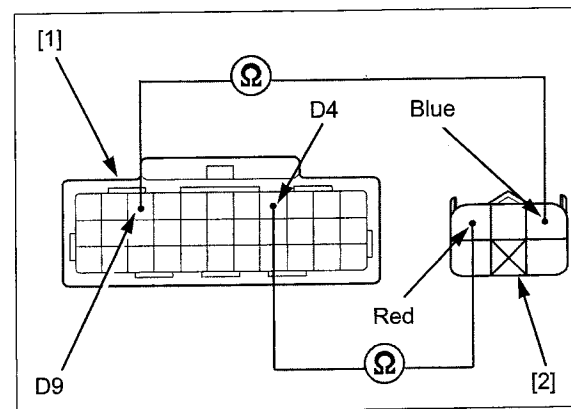
**TOOL:**

**Test probe 07ZAJ-RDJA110**

**Is there continuity?**

**YES** – Replace the ECM with a known good one, and recheck.

**NO** – • Open circuit in Red wire  
• Open circuit in Blue wire



### DTC 41-1 (GEAR POSITION SENSOR)

- Before starting the inspection, check for loose or poor contact on the gear position sensor 8P (Black) connector and ECM 33P connectors, then recheck the DTC.

#### 1. Gear Position Sensor System Inspection

Clear the DTC's (page 6-12).

Turn the ignition switch ON and engine stop switch "O".

*Is the DTC 41-1 indicated?*

**YES** – GO TO STEP 2.

**NO** – Intermittent failure

#### 2. Gear Position Sensor Inspection 1

Disconnect the ECM 33P (Gray) connector [1].

Check for continuity between each terminal of the wire side connector and ground, when shifting the transmission into the gear.

There should be continuity in each gear position as follows:

<b>Neutral:</b>	<b>D31 – Ground</b>
<b>1st:</b>	<b>D19 – Ground</b>
<b>2nd:</b>	<b>D30 – Ground</b>
<b>3rd:</b>	<b>D20 – Ground</b>
<b>4th:</b>	<b>D21 – Ground</b>
<b>5th:</b>	<b>D22 – Ground</b>
<b>6th:</b>	<b>D29 – Ground</b>

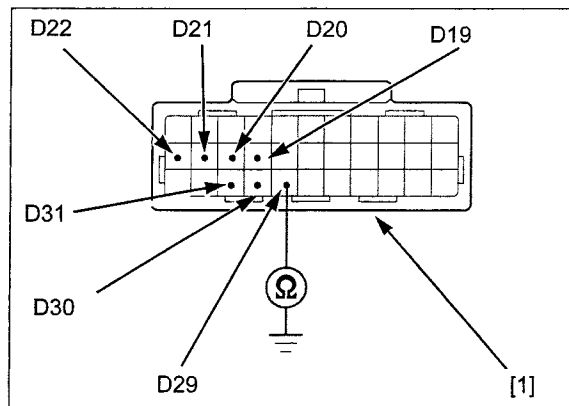
**TOOL:**

**Test probe 07ZAJ-RDJA110**

*Is there continuity?*

**YES** – Replace the ECM with a known good one, and recheck.

**NO** – Check the gear position sensor (page 22-21).



### DTC 56-1 (KNOCK SENSOR IC)

#### 1. Knock Sensor System Inspection

Clean the DTC's (page 6-12).

Place the motorcycle on its sidestand.

Start the engine and recheck the knock sensor with the HDS.

*Is the DTC 56-1 indicated?*

**YES** – Replace the ECM with a known good one, and recheck.

**NO** – Intermittent failure

## DTC 71-1 (TP SENSOR 1 LOW VOLTAGE)

- Before starting the inspection, check for loose or poor contact on the TBW 6P (Black) connector and ECM 33P connectors, then recheck the DTC.

### 1. TP Sensor 1 System Inspection

Turn the ignition switch ON and engine stop switch "O".

Check the TP sensor with the HDS when the throttle is fully closed.

**Is about 0.096 V or below indicated?**

**YES** – GO TO STEP 2.

**NO** –

- Intermittent failure
- Loose or poor contact on the TBW 6P (Black) connector

### 2. TP Sensor 1 Input Voltage Inspection

Turn the ignition switch OFF.

Disconnect the TBW 6P (Black) connector [1].

Turn the ignition switch ON and engine stop switch "O".

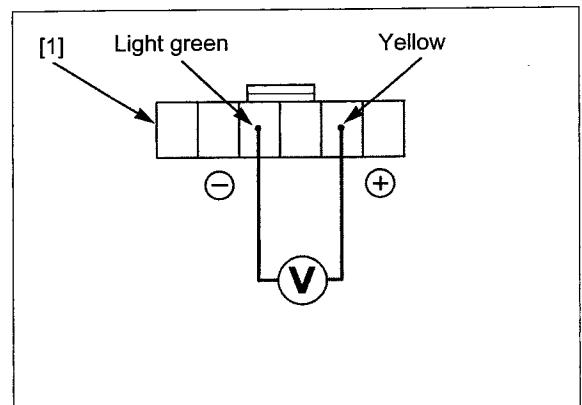
Measure the voltage at the wire side.

**Connection: Yellow (+) – Light green (–)**

**Is the voltage within 4.75 – 5.25V?**

**YES** – GO TO STEP 4.

**NO** – GO TO STEP 3.



### 3. TP Sensor 1 Input Line Inspection

Turn the ignition switch OFF.

Disconnect the ECM 33P (Gray) connector [1].

Check for continuity at the Yellow wire between the TBW 6P (Black) connector [2] and ECM 33P (Gray) connector.

**Connection: D27 – Yellow**

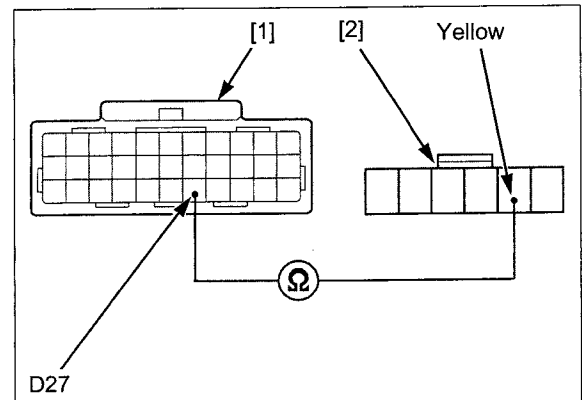
**TOOL:**

**Test probe 07ZAJ-RDJA110**

**Is there continuity?**

**YES** – Replace the ECM with a known good one, and recheck.

**NO** – Open circuit in Yellow wire



## FUEL SYSTEM (PGM-FI)

### 4. TP Sensor 1 Output Line Short Circuit Inspection

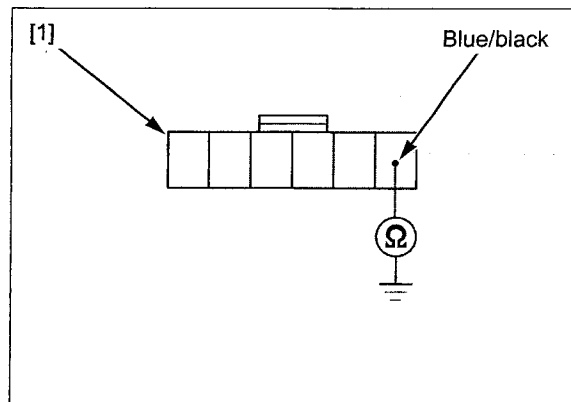
Check for continuity between the TBW 6P (Black) connector [1] at the wire side and ground.

**Connection: Blue/black – Ground**

**Is there continuity?**

**YES** – Short circuit in Blue/black wire

**NO** – GO TO STEP 5.



### 5. TP Sensor 1 Inspection

*TP sensor 1 cannot be replaced. If the TP sensor 1 is faulty, replace the throttle body.*

Replace the throttle body (page 6-71).

Clear the DTC's (page 6-12).

Turn the ignition switch ON and engine stop switch

" $\odot$ ".

Check the TP sensor 1 with the HDS.

**Is DTC 71-1 indicated?**

**YES** – Replace the ECM with a known good one, and recheck.

**NO** – Faulty original throttle body

## DTC 71-2 (TP SENSOR 1 HIGH VOLTAGE)

- Before starting the inspection, check for loose or poor contact on the TBW 6P (Black) connector and ECM 33P connectors, then recheck the DTC.

### 1. TP Sensor 1 System Inspection

Turn the ignition switch ON and engine stop switch

" $\odot$ ".

Check the TP sensor with the HDS.

**Is about 4.762 V or above indicated?**

**YES** – GO TO STEP 2.

**NO** – • Intermittent failure  
• Loose or poor contact on the TBW connector

### 2. TP Sensor 1 Line Inspection

Turn the ignition switch OFF.

Disconnect the ECM 33P (Black) connector [1].

Check for continuity at the Blue/black wire between the TBW 6P (Black) connector [2] and ECM 33P (Black) connector.

**Connection: C13 – Blue/black**

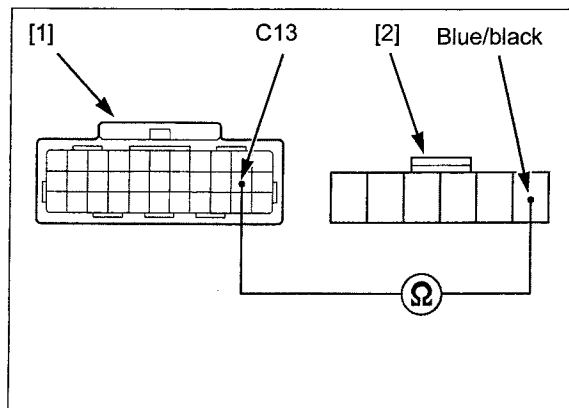
**TOOL:**

Test probe 07ZAJ-RDJA110

**Is there continuity?**

**YES** – GO TO STEP 3.

**NO** – Open circuit in Blue/black



### 3. TBW Ground Line Inspection

Turn the ignition switch OFF.  
Disconnect the ECM 33P (Gray) connector [1].

Check for continuity at the Light green wire between the TBW 6P (Black) connector [2] and ECM 33P (Gray) connector.

**Connection: D25 – Light green**

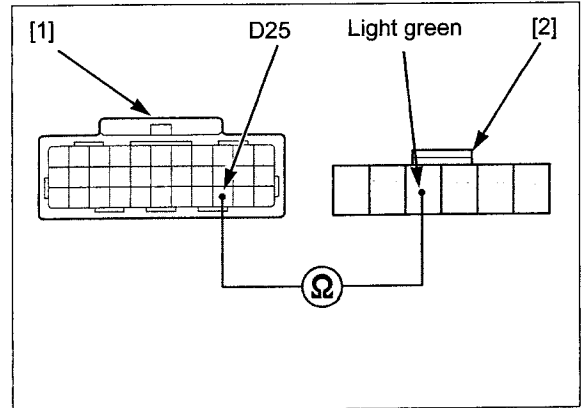
**TOOL:**

**Test probe 07ZAJ-RDJA110**

**Is there continuity?**

**YES** – GO TO STEP 4.

**NO** – Open circuit in Light green wire



### 4. TP Sensor Inspection

*TP sensor 1 cannot be replaced. If the TP sensor 1 is faulty, replace the throttle body.*

Replace the throttle body (page 6-71).  
Clean the DTC's (page 6-12).  
Turn the ignition switch ON and engine stop switch "Q".  
Check the TP sensor 1 with the HDS.

**Is DTC 71-2 indicated?**

**YES** – Replace the ECM with a known good one, and recheck.

**NO** – Faulty original throttle body

## DTC 72-1 (TP SENSOR 2 LOW VOLTAGE)

- Before starting the inspection, check for loose or poor contact on the TBW 6P (Black) connector and ECM 33P connectors, then recheck the DTC.

### 1. TP Sensor 2 System Inspection

Turn the ignition switch ON and engine stop switch "Q".  
Check the TP sensor with the HDS when the throttle is fully closed.

**Is about 0.063 V or below indicated?**

**YES** – GO TO STEP 2.

**NO** – • Intermittent failure  
• Loose or poor contact on the TBW connector

### 2. TP Sensor 2 Input Voltage Inspection

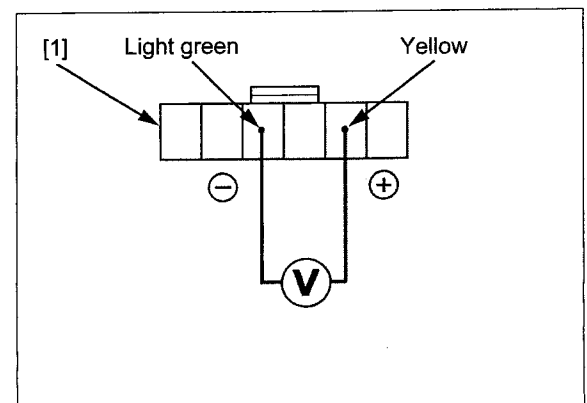
Turn the ignition switch OFF.  
Disconnect the TBW 6P (Black) connector [1].  
Turn the ignition switch ON and engine stop switch "Q".  
Measure the voltage at the wire harness side.

**Connection: Yellow (+) – Light green (–)**

**Is the voltage within 4.75 – 5.25V?**

**YES** – GO TO STEP 4.

**NO** – GO TO STEP 3.





## FUEL SYSTEM (PGM-FI)

### 3. TP Sensor 2 Input Line Inspection

Turn the ignition switch OFF.  
Disconnect the ECM 33P (Gray) connector [1].

Check for continuity at the Yellow wire between the TBW 6P (Black) connector [2] and ECM 33P (Gray) connector.

**Connection: D27 – Yellow**

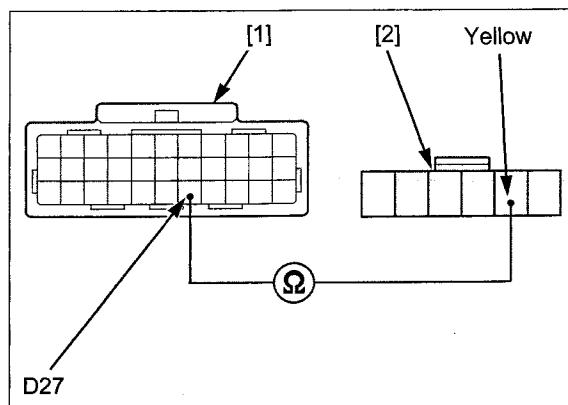
**TOOL:**

**Test probe 07ZAJ-RDJA110**

**Is there continuity?**

**YES** – Replace the ECM with a known good one, and recheck.

**NO** – Open circuit in Yellow wire



### 4. TP Sensor 2 Output Line Short Circuit Inspection

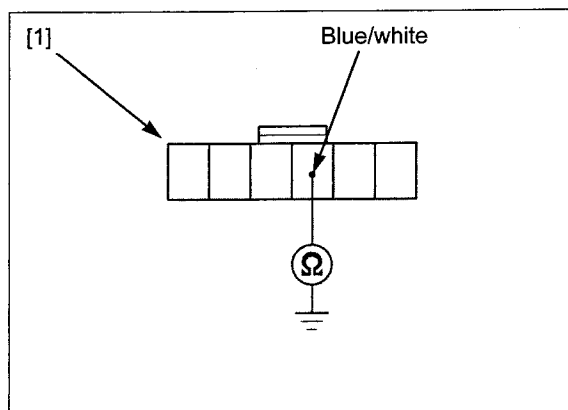
Check for continuity between the TBW 6P (Black) connector [1] at the wire side and ground.

**Connection: Blue/white – Ground**

**Is there continuity?**

**YES** – Short circuit in Blue/white wire

**NO** – GO TO STEP 5.



### 5. TP Sensor Inspection

*TP sensor 2 cannot be replaced. If the TP sensor 2 is faulty, replace the throttle body.*

Replace the throttle body (page 6-71).

Clear the DTC's (page 6-12).

Turn the ignition switch ON and engine stop switch

" $\odot$ ".

Check the TP sensor 2 with the HDS.

**Is DTC 72-1 indicated?**

**YES** – Replace the ECM with a known good one, and recheck.

**NO** – Faulty original throttle body

### DTC 72-2 (TP SENSOR 2 HIGH VOLTAGE)

- Before starting the inspection, check for loose or poor contact on the TBW 6P (Black) connector and ECM 33P connectors, then recheck the DTC.

#### 1. TP Sensor 2 System Inspection 1

Turn the ignition switch ON and engine stop switch

" $\odot$ ".

Check the TP sensor with the HDS.

**Is about 4.761 V or above indicated?**

**YES** – GO TO STEP 2.

**NO** –

- Intermittent failure
- Loose or poor contact on the TBW connector

## 2. TP Sensor 2 Line Inspection 2

Turn the ignition switch OFF.  
Disconnect the ECM 33P (Black) connector [1].

Check for continuity at the Blue/white wire between the TBW 6P (Black) connector [2] and ECM 33P (Black) connector.

**Connection: C24 – Blue/white**

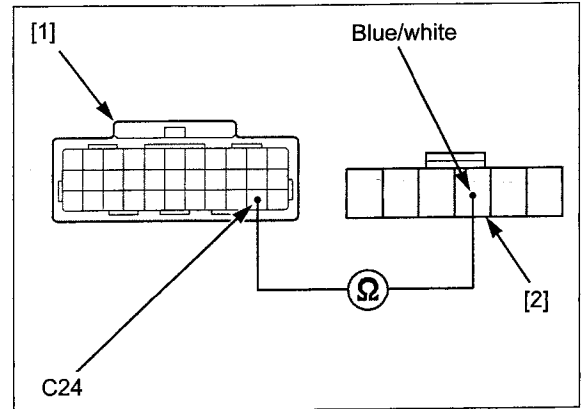
**TOOL:**

**Test probe 07ZAJ-RDJA110**

**Is there continuity?**

**YES** – GO TO STEP 3.

**NO** – Open circuit in Blue/white



## 3. TBW Ground Line Inspection

Turn the ignition switch OFF.  
Disconnect the ECM 33P (Gray) connector [1].

Check for continuity at the Light green wire between the TBW sensor 6P (Black) connector [2] and ECM 33P (Gray) connector.

**Connection: D25 – Light green**

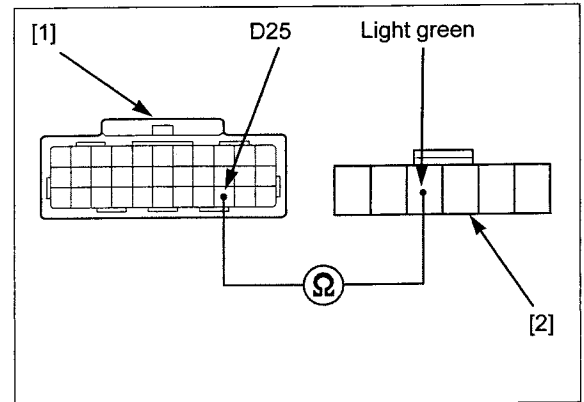
**TOOL:**

**Test probe 07ZAJ-RDJA110**

**Is there continuity?**

**YES** – GO TO STEP 4.

**NO** – Open circuit in Light green wire



## 4. TP Sensor Inspection

*TP sensor 2 cannot be replaced. If the TP sensor 2 is faulty, replace the throttle body.*

Replace the throttle body (page 6-71).  
Clean the DTC's (page 6-12).  
Turn the ignition switch ON and engine stop switch "Q".

Check the TP sensor 2 with the HDS.

**Is the DTC 72-2 indicated?**

**YES** – Replace the ECM with a known good one, and recheck.

**NO** – Faulty original throttle body

## DTC 73-1 (TP SENSOR 1-2 VOLTAGE CORRELATION FAILURE)

- Before starting the inspection, check for loose or poor contact on the TBW 6P (Black) connector and ECM 33P connectors, then recheck the DTC.

### 1. TP Sensor 1-2 System Inspection

Clear the DTC's (page 6-12).  
Turn the ignition switch ON and engine stop switch "Q".

Check the TP sensor with the HDS.

**Is the DTC 73-1 indicated?**

**YES** – GO TO STEP 2.

**NO** – Intermittent failure

## FUEL SYSTEM (PGM-FI)

### 2. Throttle Valve Operation Inspection

Turn the ignition switch OFF.  
Remove the air cleaner housing (page 6-68).  
Turn the ignition switch ON and engine stop switch "○".  
Visually check the throttle valve.

**Does the valve fully close position?**

**YES** – GO TO STEP 4.

**NO** – GO TO STEP 3.

### 3. TP sensor 1 and TP sensor 2 Short Circuit Inspection 2

Disconnect the TBW 6P (Black) connector.  
Check for continuity between the ECM 33P (Black) connector terminal C13 and C24.

**Connection: C13 – C24**

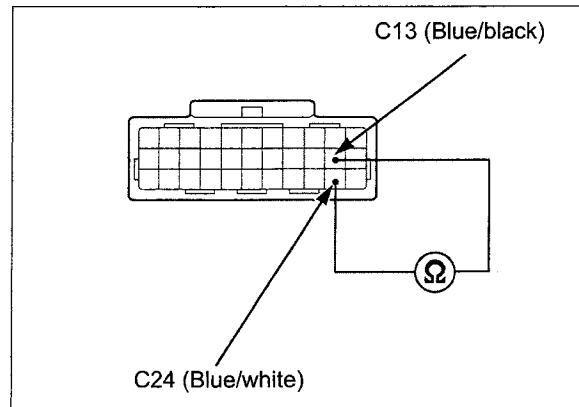
**TOOL:**

**Test probe 07ZAJ-RDJA110**

**Is there continuity?**

**YES** – • Short circuit in Blue/black wire  
• Short circuit in Blue/white wire

**NO** – GO TO STEP 4.



### 4. TP Sensor Inspection

*TP sensors cannot be replaced. If the TP sensors are faulty, replace the throttle body.*

Replace the throttle body (page 6-71).  
Clear the DTC's (page 6-12).  
Turn the ignition switch ON and engine stop switch "○".

Check the TP sensor with the HDS.

**Is the DTC 73-1 indicated?**

**YES** – Replace the ECM with a known good one, and recheck.

**NO** – Faulty original throttle body

### DTC 73-2 (TP SENSOR 1-2 SHORT CIRCUIT)

Perform the troubleshooting according to the DTC 73-1 (page 6-45).

**DTC 74-1 (TCP SENSOR 1 LOW VOLTAGE)**

- Before starting the inspection, check for loose or poor contact on the TCP sensor 6P (Black) connector and ECM 33P connectors, then recheck the DTC.

**1. TCP Sensor 1 System Inspection**

Turn the ignition switch ON and engine stop switch "○".

Check the TCP sensor 1 with the HDS when the throttle is fully closed.

**Is about 0.137 V or below indicated?**

**YES** – GO TO STEP 2.

**NO** – • Intermittent failure  
• Loose or poor contact on the TCP sensor 6P (Black) connector

**2. VCC 1 Input Voltage Inspection**

Turn the ignition switch OFF.  
Disconnect the TCP sensor 6P (Black) connector [1].

Turn the ignition switch ON and engine stop switch "○".

Measure the voltage at the wire side.

**Connection: Yellow/red (+) – Green/black (–)**

**TOOL:**

**Test probe 07ZAJ-RDJA110**

**Is the voltage within 4.75 – 5.25V?**

**YES** – GO TO STEP 3.

**NO** – GO TO STEP 5.

**3. TCP Sensor 1 Output Line Short Circuit Inspection**

Check for continuity between the TCP sensor 6P (Black) connector [1] at the wire side and ground.

**Connection: White/black – Ground**

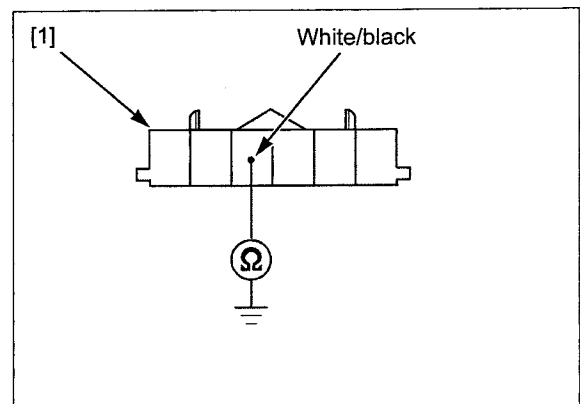
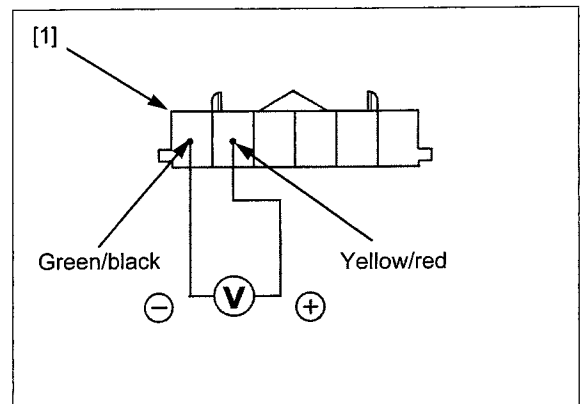
**TOOL:**

**Test probe 07ZAJ-RDJA110**

**Is there continuity?**

**YES** – Short circuit in White/black wire

**NO** – GO TO STEP 4.



### 4. TCP Sensor 1 Output Line Open Circuit Inspection

Check for continuity at the White/black wire between the TCP sensor 6P (Black) [1] connector and ECM 33P (Black) connector [2].

**Connection: C14 – White/black**

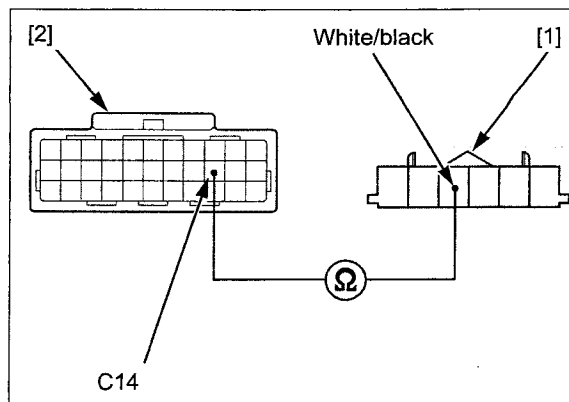
**TOOL:**

**Test probe 07ZAJ-RDJA110**

**Is there continuity?**

**YES** – GO TO STEP 6.

**NO** – Open circuit in White/black wire



### 5. VCC 1 Line Open Circuit Inspection

Check for continuity at the Yellow/red wire between the TCP sensor 6P (Black) connector [1] and ECM 33P (Gray) connector [2].

**Connection: D16 – Yellow/red**

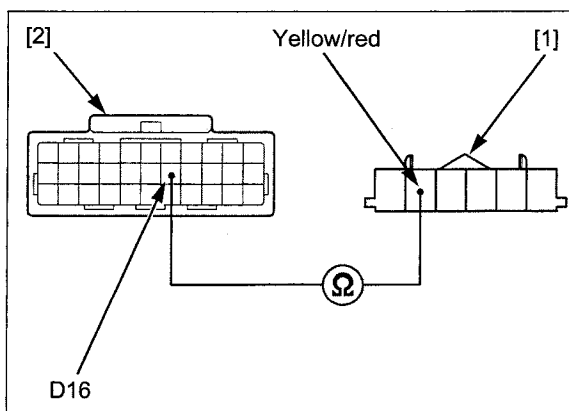
**TOOL:**

**Test probe 07ZAJ-RDJA110**

**Is there continuity?**

**YES** – GO TO STEP 6.

**NO** – Open circuit in Yellow/red wire



### 6. TCP Sensor Inspection

Replace the TCP sensor (page 6-75).

Clear the DTC's (page 6-12).

Turn the ignition switch ON and engine stop switch

" $\Omega$ ".

— Check the TCP sensor with the HDS.

**Is the DTC 74-1 indicated?**

**YES** – Replace the ECM with a known good one, and recheck.

**NO** – Faulty original TCP sensor

### DTC 74-2 (TCP SENSOR 1 HIGH VOLTAGE)

- Before starting the inspection, check for loose or poor contact on the TCP sensor 6P (Black) connector and ECM 33P connectors, then recheck the DTC.

#### 1. TCP Sensor 1 System Inspection

Turn the ignition switch ON and engine stop switch

" $\Omega$ ".

Check the TCP sensor 1 with the HDS when the throttle is fully closed.

**Is about 4.902 V or above indicated?**

**YES** – GO TO STEP 2.

**NO** –

- Intermittent failure
- Loose or poor contact on the TCP sensor 6P (Black) connector

## 2. VCC 1 Input Voltage Inspection

Turn the ignition switch OFF.  
Disconnect the TCP sensor 6P (Black) connector [1].

Turn the ignition switch ON and engine stop switch "○".

Measure the voltage at the wire side.

**Connection:** Yellow/red (+) – Green/black (–)

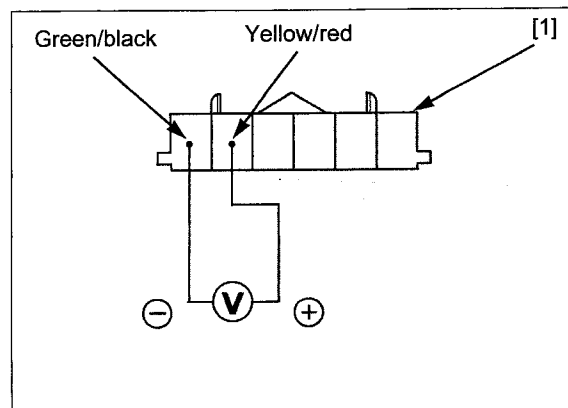
**TOOL:**

Test probe 07ZAJ-RDJA110

**Is the voltage within 4.75 – 5.25V?**

**YES** – GO TO STEP 4.

**NO** – GO TO STEP 3.



## 3. VCC 1 Line Open Circuit Inspection

Check for continuity at the Yellow/red and Green/black wire between the TCP sensor 6P (Black) connector [1] and ECM 33P (Gray) connector [2].

**Connection:** D16 – Yellow/red  
D14 – Green/black

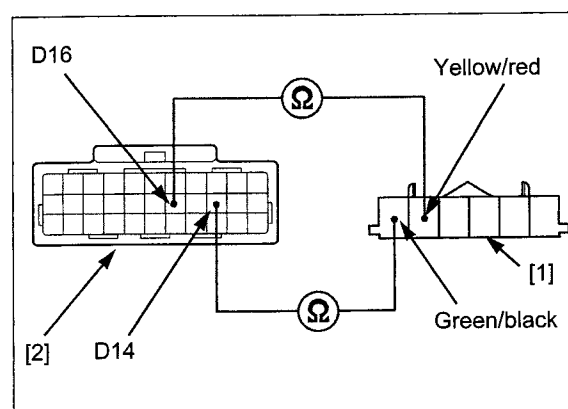
**TOOL:**

Test probe 07ZAJ-RDJA110

**Is there continuity?**

**YES** – GO TO STEP 4.

**NO** – • Open circuit in Yellow/red wire  
• Open circuit in Green/black wire



## 4. TCP Sensor Inspection

Replace the TCP sensor (page 6-75).

Clear the DTC's (page 6-12).

Turn the ignition switch ON and engine stop switch "○".

Check the TCP sensor with the HDS.

**Is the DTC 74-2 indicated?**

**YES** – Replace the ECM with a known good one, and recheck.

**NO** – Faulty original TCP sensor

## DTC 75-1 (TCP SENSOR 2 LOW VOLTAGE)

- Before starting the inspection, check for loose or poor contact on the TCP sensor 6P (Black) connector and ECM 33P connectors, then recheck the DTC.

### 1. TCP Sensor 2 System Inspection

Turn the ignition switch ON and engine stop switch "○".

Check the TCP sensor 2 with the HDS when the throttle is fully closed.

**Is about 0.137 V or below indicated?**

**YES** – GO TO STEP 2.

**NO** – • Intermittent failure  
• Loose or poor contact on the TCP sensor 6P (Black) connector

### 2. VCC 2 Input Voltage Inspection

Turn the ignition switch OFF.  
Disconnect the TCP sensor 6P (Black)  
connector [1].

Turn the ignition switch ON and engine stop switch  
"  $\odot$  ".

Measure the voltage at the wire side.

**Connection: Yellow/red (+) – Gray (-)**

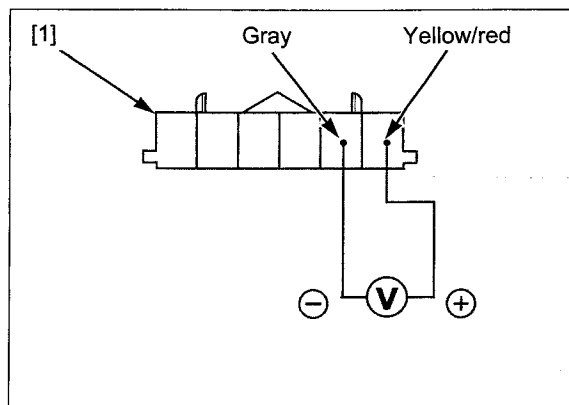
**TOOL:**

**Test probe 07ZAJ-RDJA110**

***Is the voltage within 4.75 – 5.25V?***

**YES** – GO TO STEP 3.

**NO** – GO TO STEP 5.



### 3. TCP Sensor 2 Output Line Short Circuit Inspection

Check for continuity between the TCP sensor 6P (Black)  
connector [1] at the wire side and ground.

**Connection: White/blue – Ground**

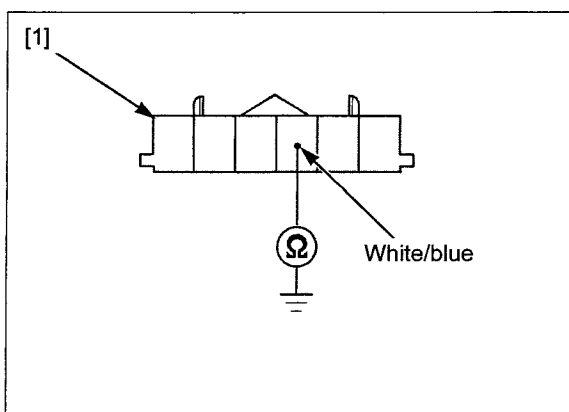
**TOOL:**

**Test probe 07ZAJ-RDJA110**

***Is there continuity?***

**YES** – Short circuit in White/blue wire

**NO** – GO TO STEP 4.



### 4. TCP Sensor 2 Output Line Open Circuit Inspection

Check for continuity at the White/blue wire between  
the TCP sensor 6P (Black) connector [1] and ECM  
33P (Black) connector [2].

**Connection: C25 – White/blue**

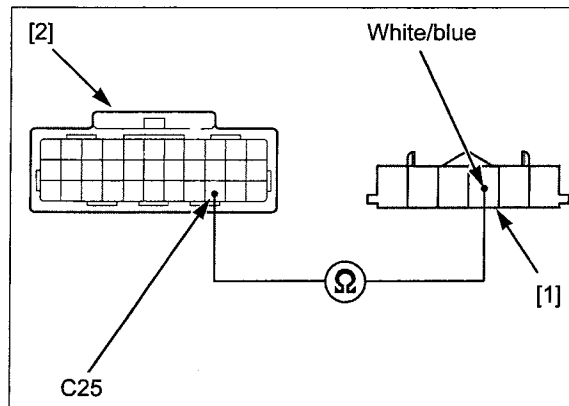
**TOOL:**

**Test probe 07ZAJ-RDJA110**

***Is there continuity?***

**YES** – GO TO STEP 6.

**NO** – Open circuit in White/blue wire



### 5. VCC 2 Line Open Circuit Inspection

Check for continuity at the Yellow/red wire between the TCP sensor 6P (Black) connector [1] and ECM 33P (Gray) connector [2].

**Connection: D17 – Yellow/red**

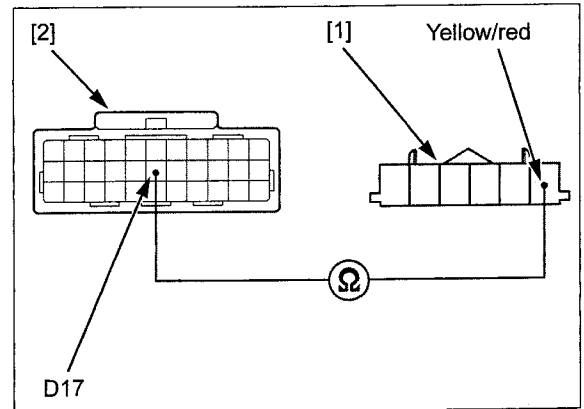
**TOOL:**

**Test probe 07ZAJ-RDJA110**

**Is there continuity?**

**YES** – GO TO STEP 6.

**NO** – Open circuit in Yellow/red wire



### 6. TCP Sensor Inspection

Replace the TCP sensor (page 6-75).

Clear the DTC's (page 6-12).

Turn the ignition switch ON and engine stop switch "O".

Check the TCP sensor with the HDS.

**Is the DTC 75-1 indicated?**

**YES** – Replace the ECM with a known good one, and recheck.

**NO** – Faulty original TCP sensor

## DTC 75-2 (TCP SENSOR 2 HIGH VOLTAGE)

- Before starting the inspection, check for loose or poor contact on the TCP sensor 6P (Black) connector and ECM 33P connectors, then recheck the DTC.

### 1. TCP Sensor 2 System Inspection

Turn the ignition switch ON and engine stop switch "O".

Check the TCP sensor 2 with the HDS when the throttle is fully closed.

**Is about 4.902 V or above indicated?**

**YES** – GO TO STEP 2.

**NO** – • Intermittent failure  
• Loose or poor contact on the TCP sensor connector

### 2. VCC 2 Input Voltage Inspection

Turn the ignition switch OFF.

Disconnect the TCP sensor 6P (Black) connector [1].

Turn the ignition switch ON and engine stop switch "O".

Measure the voltage at the wire side.

**Connection: Yellow/red (+) – Gray (–)**

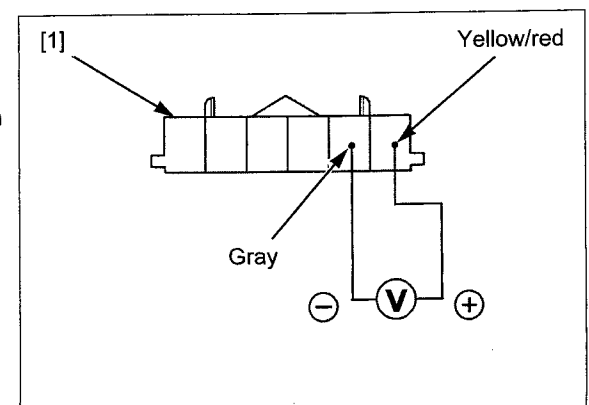
**TOOL:**

**Test probe 07ZAJ-RDJA110**

**Is the voltage within 4.75 – 5.25V?**

**YES** – GO TO STEP 4.

**NO** – GO TO STEP 3.





## FUEL SYSTEM (PGM-FI)

### 3. VCC 2 Line Open Circuit Inspection

Check for continuity at the Yellow/red and Gray wire between the TCP sensor 6P (Black) connector [1] and ECM 33P (Gray) connector [2].

**Connection:** D17 – Yellow/red  
D15 – Gray

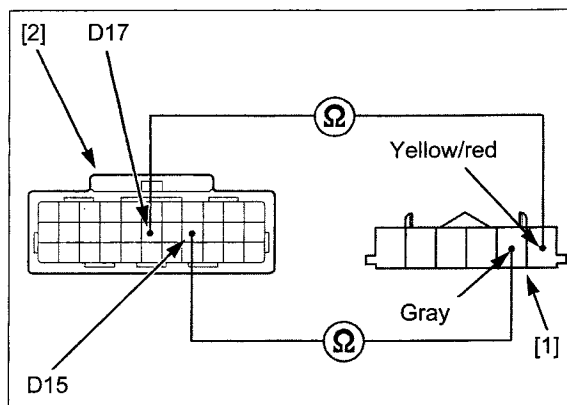
**TOOL:**

Test probe 07ZAJ-RDJA110

**Is there continuity?**

**YES** – GO TO STEP 4.

**NO** – • Open circuit in Yellow/red wire  
• Open circuit in Gray wire



### 4. TCP sensor Inspection

Replace the TCP sensor (page 6-75).

Clear the DTC's (page 6-12).

Turn the ignition switch ON and engine stop switch

"○".

Check the TCP sensor with the HDS.

**Is the DTC 75-2 indicated?**

**YES** – Replace the ECM with a known good one, and recheck.

**NO** – Faulty original TCP sensor

## DTC 76-1 (TCP SENSOR 1-2 VOLTAGE CORRELATION FAILURE)

- Before starting the inspection, check for loose or poor contact on the TCP sensor 6P (Black) connector and ECM 33P connectors, then recheck the DTC.

### 1. TCP Sensor System Inspection

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

Clean the DTC's (page 6-12).

Turn the ignition switch ON and engine stop switch

"○".

Open the throttle and check the TCP sensor with the HDS.

**Is the DTC 76-1 indicated?**

**YES** – GO TO STEP 2.

**NO** – Intermittent failure

## 2. TCP Sensor 1 and TCP Sensor 2 Short Circuit Inspection 2

Disconnect the TCP sensor 6P (Black) connector. Check for continuity between the ECM 33P (Black) connector terminal C14 and C25.

**Connection: C14 – C25**

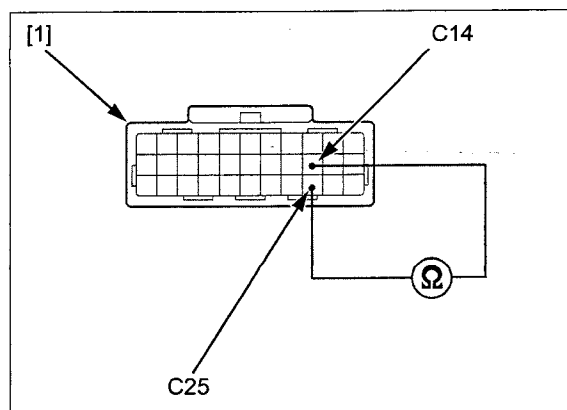
**TOOL:**

**Test probe 07ZAJ-RDJA110**

**Is there continuity?**

**YES** – • Short circuit in White/black wire  
• Short circuit in White/blue wire

**NO** – GO TO STEP 3.



## 3. TCP sensor Inspection

Replace the TCP sensor (page 6-75).

Clear the DTC's (page 6-12).

Turn the ignition switch ON and engine stop switch

" ⌚ ".

Check the TCP sensor with the HDS.

**Is the DTC 76-1 indicated?**

**YES** – Replace the ECM with a known good one, and recheck.

**NO** – Faulty original TCP sensor

## DTC 77-1 (TBW RETURN SPRING FAILURE)

- Before starting the inspection, check for loose or poor contact on the TBW 6P (Black) connector and ECM 33P connectors, then recheck the DTC.

### 1. TBW System Inspection

Clear the DTC's (page 6-12).

Start the engine and let it idle.

Turn the ignition switch OFF, and wait 10 seconds.

Turn the ignition switch ON and engine stop switch

" ⌚ ".

Check the DTC's with the HDS.

**Is the DTC 77-1 indicated?**

**YES** – GO TO STEP 2.

**NO** – Intermittent failure

### 2. Throttle Valve Inspection

Remove the air cleaner housing (page 6-68).

Open the throttle valve with fingers.

**Does the throttle valve return?**

**YES** – Recheck the DTC's with the HDS

**NO** – GO TO STEP 3.

*Be careful not to damage the throttle valves.*

### 3. Throttle body Inspection

*TBW return spring cannot be replaced. If the TBW return spring is faulty, replace the throttle body.*

Replace the throttle body (page 6-71).  
Clear the DTC's (page 6-12).  
Turn the ignition switch ON and engine stop switch "  $\odot$  ".  
Check the DTC's with the HDS.

#### **Is the DTC 77-1 indicated?**

**YES** – Replace the ECM with a known good one, and recheck.

**NO** – Faulty original throttle body

## DTC 78-1 (TBW MOTOR FAILURE)

- Before starting the inspection, check for loose or poor contact on the TBW 6P (Black) connector and ECM 33P connectors, then recheck the DTC.

### 1. Recheck DTC

Clear the DTC's (page 6-12).  
Turn the ignition switch ON and engine stop switch "  $\odot$  ".  
Check the TBW motor with the HDS.

#### **Is the DTC 78-1 indicated?**

**YES** – GO TO STEP 2.

**NO** – Intermittent failure

### 2. TBW Motor Line Open Circuit Inspection

Disconnect the ECM 33P (Blue) connector [1].  
Check for continuity between the ECM 33P (Blue) connector A9 and A10.

**Connection: A9 – A10**

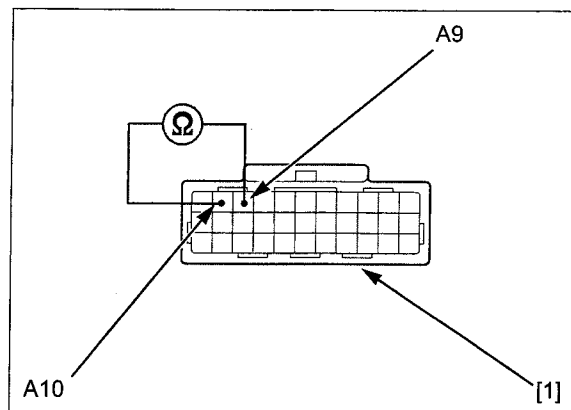
#### **TOOL:**

**Test probe 07ZAJ-RDJA110**

#### **Is there continuity?**

**YES** – GO TO STEP 3.

**NO** – • Open circuit in Blue/red wire  
• Open circuit in Blue wire



### 3. Throttle body Inspection

*TBW motor cannot be replaced. If the TBW motor is faulty, replace the throttle body.*

Replace the throttle body (page 6-71).  
Clear the DTC's (page 6-12).  
Turn the ignition switch ON and engine stop switch "  $\odot$  ".  
Check the DTC's with the HDS.

#### **Is the DTC 78-1 indicated?**

**YES** – Replace the ECM with a known good one, and recheck.

**NO** – Faulty original throttle body.

## DTC 79-1 (TBW SYSTEM CONTROL CORRELATION FAILURE)

- Before starting the inspection, check for loose or poor contact on the TBW 6P (Black) connector and ECM 33P connectors, then recheck the DTC.

### 1. Recheck DTC

Clear the DTC's (page 6-12).  
Turn the ignition switch ON and engine stop switch "O".  
Check the TBW system with the HDS.

**Is the DTC 79-1 indicated?**

**YES** – GO TO STEP 2.

**NO** – Intermittent failure

### 2. Throttle body Inspection

Replace the throttle body (page 6-71).  
Clear the DTC's (page 6-12).  
Turn the ignition switch ON and engine stop switch "O".  
Check the DTC's with the HDS.

**Is the DTC 79-1 indicated?**

**YES** – Replace the ECM with a known good one, and recheck.

**NO** – Faulty original throttle body.

## DTC 83-1 (EOP SENSOR LOW VOLTAGE)

- Before starting the inspection, check for loose or poor contact on the EOP sensor 3P (Black) and ECM 33P connectors, then recheck the DTC.

### 1. EOP Sensor System Inspection

Clear the DTC's (page 6-12).  
Turn the ignition switch ON and engine stop switch "O".  
Check the EOP sensor with the HDS.

**Is the DTC 83-1 indicated?**

**YES** – GO TO STEP 2.

**NO** – Intermittent failure

### 2. EOP Sensor Input Voltage Inspection

Turn the ignition switch OFF.  
Disconnect the EOP sensor 3P (Black) connector [1].

Turn the ignition switch ON and engine stop switch "O".

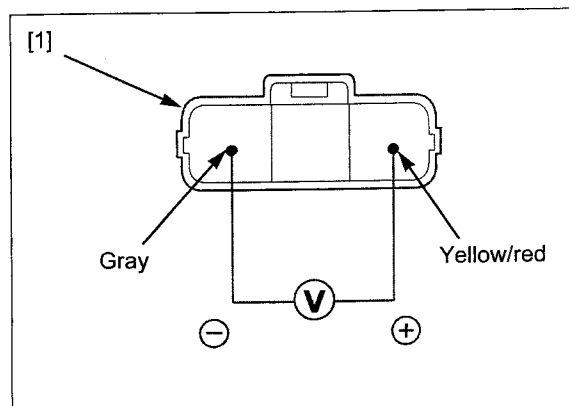
Measure the voltage at the wire side.

**Connection: Yellow/red (+) – Gray (-)**

**Is the voltage within 4.75 – 5.25V?**

**YES** – GO TO STEP 4.

**NO** – GO TO STEP 3.



## FUEL SYSTEM (PGM-FI)

### 3. EOP Sensor Input Line Inspection

Turn the ignition switch OFF.

Disconnect the ECM 33P (Gray) connector [1].

Check for continuity at the Yellow/red wire between the EOP sensor 3P (Black) connector [2] and ECM 33P (Gray) connector.

**Connection: D28 – Yellow/red**

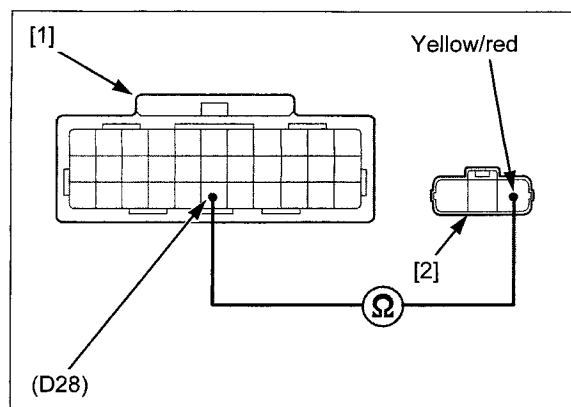
**TOOL:**

**Test probe 07ZAJ-RDJA110**

**Is there continuity?**

**YES** – Replace the ECM with a known good one, and recheck.

**NO** – Open circuit in Yellow/red wire



### 4. EOP Sensor Output Line Short Circuit Inspection

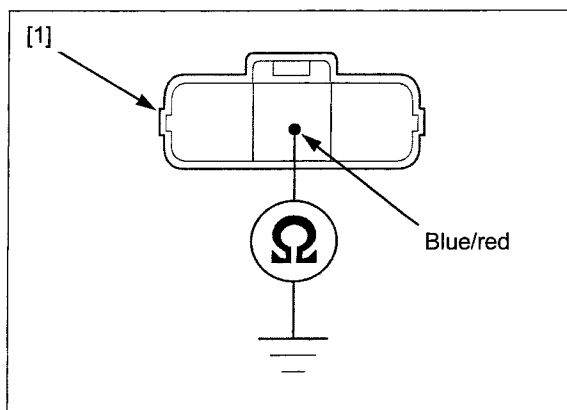
Check for continuity between the EOP sensor 3P (Black) connector [1] at the wire side and ground.

**Connection: Blue/red – Ground**

**Is there continuity?**

**YES** – Short circuit in Blue/red wire

**NO** – GO TO STEP 5.



### 5. EOP Sensor Inspection

Replace the EOP sensor with a known good one.

Clear the DTC's (page 6-12).

Turn the ignition switch ON and engine stop switch

" $\odot$ ".

Check the EOP sensor with the HDS.

**Is the DTC 83-1 indicated?**

**YES** – Replace the ECM with a known good one, and recheck.

**NO** – Faulty original EOP sensor

## DTC 83-2 (EOP SENSOR HIGH VOLTAGE)

- Before starting the inspection, check for loose or poor contact on the EOP sensor 3P (Black) and ECM 33P connectors, then recheck the DTC.

### 1. EOP Sensor System Inspection 1

Clear the DTC's (page 6-12).

Turn the ignition switch ON and engine stop switch

" $\odot$ ".

Check the EOP sensor with the HDS.

**Is the DTC 83-2 indicated?**

**YES** – GO TO STEP 2.

**NO** – Intermittent failure

## 2. EOP Sensor Input Voltage Inspection

Turn the ignition switch OFF.

Turn the ignition switch ON and engine stop switch "○".

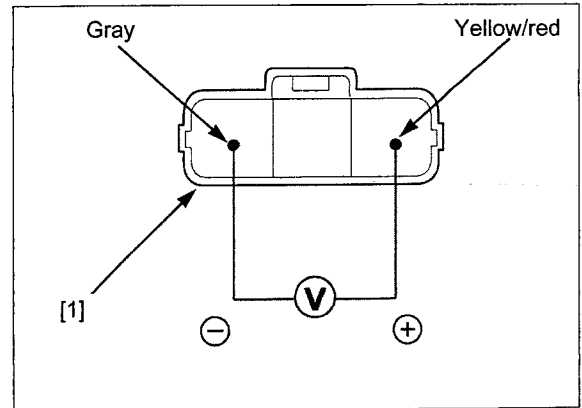
Measure the voltage at the EOP sensor 3P (Black) connector [1] at the wire harness side.

**Connection:** Yellow/red (+) – Gray (–)

**Is the voltage within 4.75 – 5.25V?**

**YES** – GO TO STEP 3.

**NO** – • Open circuit in Yellow/red wire  
• Open circuit in Gray wire



## 3. EOP Sensor Output Line Open Circuit Inspection

Disconnect the ECM 33P (Black) connector [1].

Check for continuity at the Blue/red wire between the EOP sensor 3P (Black) connector [2] and ECM 33P (Gray) connector.

**Connection:** C8 – Blue/red

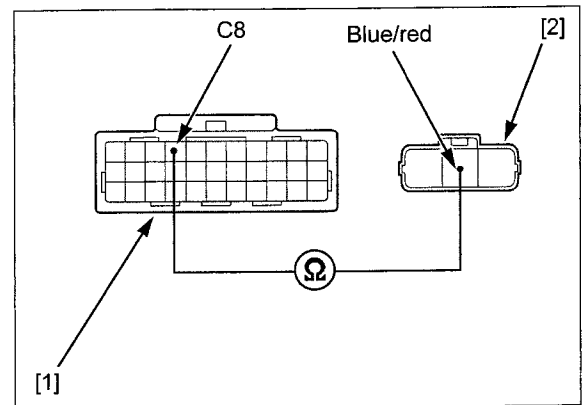
**TOOL:**

Test probe 07ZAJ-RDJA110

**Is there continuity?**

**YES** – GO TO STEP 4.

**NO** – Open circuit in Blue/red wire



## 4. EOP Sensor Inspection

Replace the EOP sensor with a known good one.

Clear the DTC's (page 6-12).

Turn the ignition switch ON and engine stop switch "○".

Check the EOP sensor with the HDS.

**Is the DTC 83-2 indicated?**

**YES** – Replace the ECM with a known good one, and recheck.

**NO** – Faulty original EOP sensor

### DTC 84-1 (ECM PROCESSOR FAILURE)

- Before starting the inspection, check for loose or poor contact on the ECM 33P connectors and recheck the DTC.

#### 1. Recheck DTC

Clear the DTC's (page 6-12).

Turn the ignition switch ON and engine stop switch

" $\bigcirc$ ".

Recheck the ECM processor malfunction with HDS.

**Is the DTC 84-1 indicated?**

**YES** – Replace the ECM with a known good one, and recheck.

**NO** – Intermittent failure

### DTC 85-1 (TBW RELAY FAILURE - ON SIDE)

- Before starting the inspection, check for loose or poor contact on the TBW relay connector and ECM 33P connectors, then recheck the DTC.

#### 1. Recheck DTC

Inspect the TBW relay (page 6-84).

Clear the DTC's (page 6-12).

Turn the ignition switch ON and engine stop switch

" $\bigcirc$ ".

Check the TBW relay with the HDS.

**Is DTC 85-1 indicated?**

**YES** – GO TO STEP 2.

**NO** – Intermittent failure

#### 2. TBW Relay Voltage Inspection

Remove the TBW relay (page 6-84).

Turn the ignition switch ON and engine stop switch

" $\bigcirc$ ".

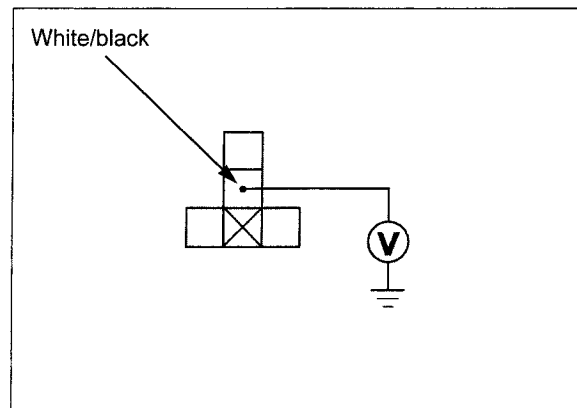
Measure the voltage at the TBW relay terminals.

**Connection: White/black – Ground**

**Is there battery voltage?**

**YES** – GO TO STEP 3.

**NO** – Blown TBW fuse



### 3. TBW RELAY Line Open Circuit Inspection

Check the continuity between the ECM 33P (Blue) [1], ECM 33P (Black) [2] connectors and TBW relay connector [3] terminals.

**Connection:** A7 – Brown/green  
A8 – Brown/green  
C5 – Violet/white

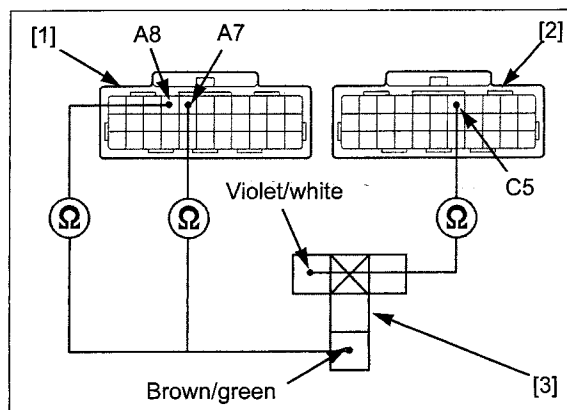
**TOOL:**

**Test probe** 07ZAJ-RDJA110

*Is there continuity?*

**YES** – GO TO STEP 4.

**NO** – • Open circuit in Violet/white wire  
• Open circuit in Brown/green wire



### 4. TBW RELAY Line Short Circuit Inspection

Disconnect the ECM 33P connectors.

Check the continuity between the ECM 33P (Blue) [1], ECM 33P (Black) [2] connectors and ground.

**Connection:** A7 – Ground  
A8 – Ground  
C5 – Ground

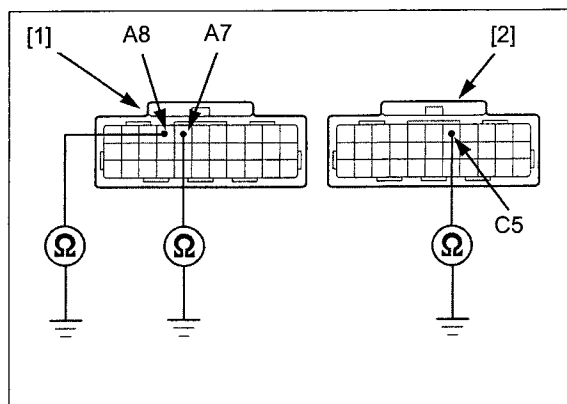
**TOOL:**

**Test probe** 07ZAJ-RDJA110

*Is there continuity?*

**YES** – • Short circuit in Violet/white wire  
• Short circuit in Brown/green wire

**NO** – Replace the ECM with a known good one, and recheck.



## DTC 85-2 (TBW RELAY FAILURE - OFF SIDE)

Perform the troubles shooting according to the DTC 85-1 (page 6-58).

## MIL CIRCUIT TROUBLESHOOTING

If the engine can be started but the MIL does not come on when the ignition switch is turned ON and the engine stop switch is in "Q", check as follows:

- If they do not function, check the combination meter power input line (page 22-11).
- If they function properly, check as follows:

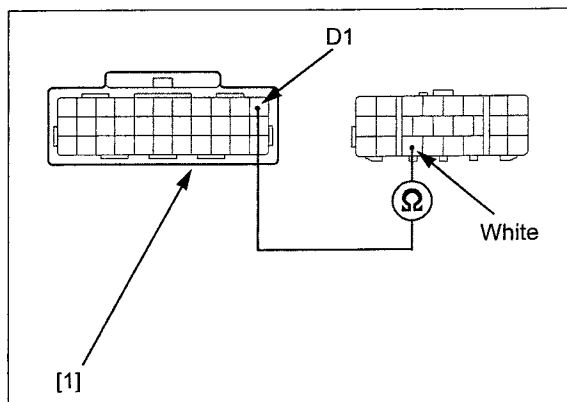
Turn the ignition switch to OFF, disconnect the ECM 33P (Gray) connector [1].

Check for open circuit in the White wire between the combination meter 20P connector [2] and ECM.

**TOOL:**

**Test probe** 07ZAJ-RDJA110

If the wire and combination meter are OK, replace ECM.





# FUEL LINE INSPECTION

### FUEL PRESSURE RELIEVING/QUICK CONNECT FITTING REMOVAL

- Before disconnecting the fuel hose, relieve pressure from the system as follows.

1. Turn the ignition switch OFF.

Lift and support the fuel tank (page 4-5).

Remove the quick connect fitting cover [1] (fuel pump side only).

2. Disconnect the fuel pump 2P (Brown) connector [2].

3. Start the engine, and let it idle until the engine stalls.

4. Turn the ignition switch OFF.

5. Disconnect the battery negative (-) cable (page 19-6).

6. Check the fuel quick connect fitting for dirt, and clean if necessary.

Place a shop towel over the quick connect fitting.

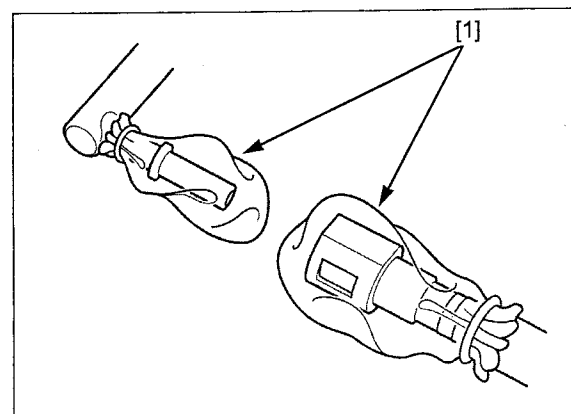
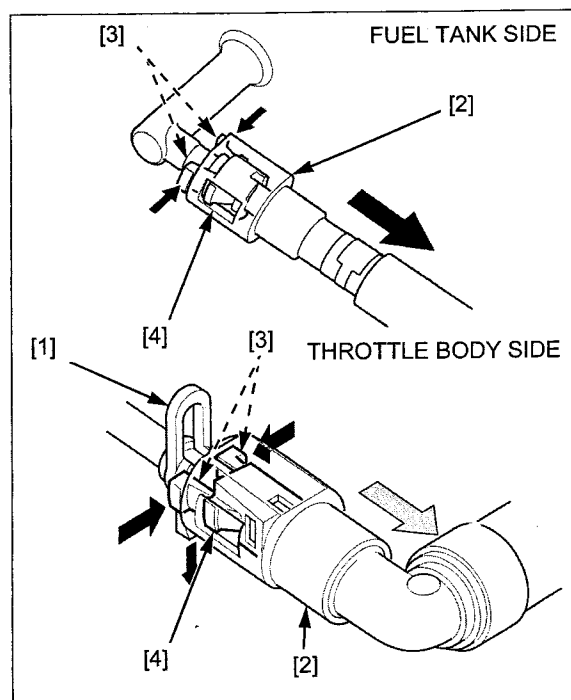
7. Pull and release the rubber cap [1] from the retainer (throttle body side only).

8. Hold the connector [2] with one hand and squeeze the retainer tabs [3] with the other hand to release them from the locking pawls [4].

Pull the connector off, then remove the rubber cap (throttle body side only) and retainer from the fuel joint.

- Absorb the remaining fuel in the fuel hose from flowing out with a shop towel.
- Be careful not to damage the hose or other parts.
- Do not use tools.
- If the connector does not move, keep the retainer tabs pressed down, and alternately pull and push the connector until it comes off easily.

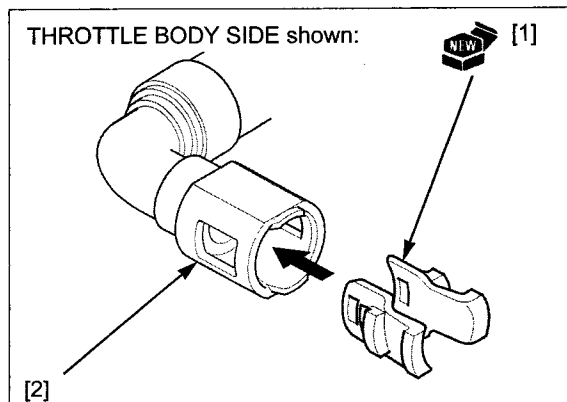
9. To prevent damage and keep foreign matter out, cover the disconnected connector and fuel joint with plastic bags [1].



## QUICK CONNECT FITTING INSTALLATION

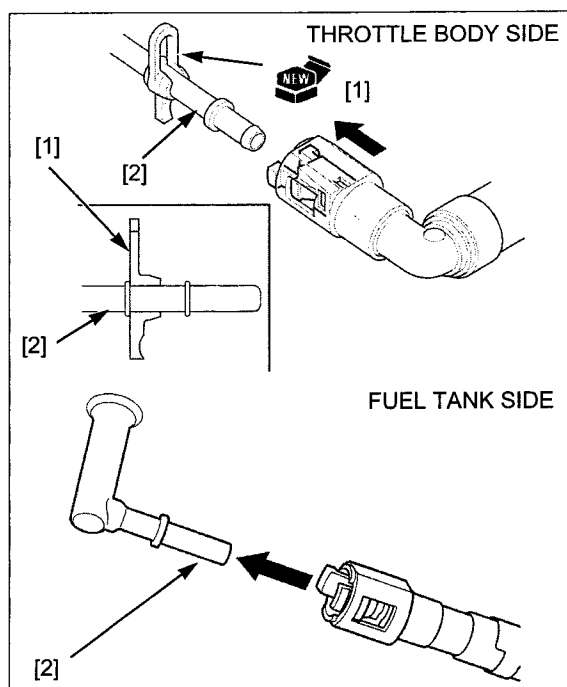
- Always replace the retainer and rubber cap of the quick connect fitting when the fuel hose is disconnected.
- Do not bend or twist the fuel hose.
- If any retainer needs replacing, use the same manufacturer's retainer as the ones being removed (The various manufactures feature different retainer specification).

1. Insert a new retainer [1] into the connector [2].
- Align new retainer locking pawls with the connector grooves.

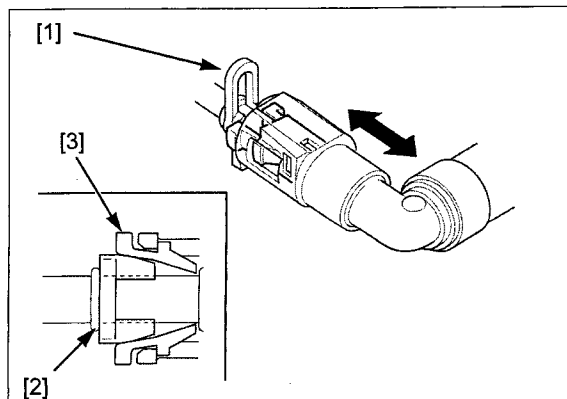


2. Install a new rubber cap [1] and seat it onto the fuel joint [2] as shown (throttle body side only). Align the quick connect fitting with the fuel joint. Then press the quick connect fitting onto the pipe until both retainer pawls lock with a "CLICK".

If it is hard to connect, put a small amount of engine oil on the pipe end.



3. Make sure the connection is secure and that the pawls are firmly locked into place by pulling on the connector and visually checking.
4. Make sure the rubber cap [1] (throttle body side only) is in place (between the flange [2] and retainer tab [3]).



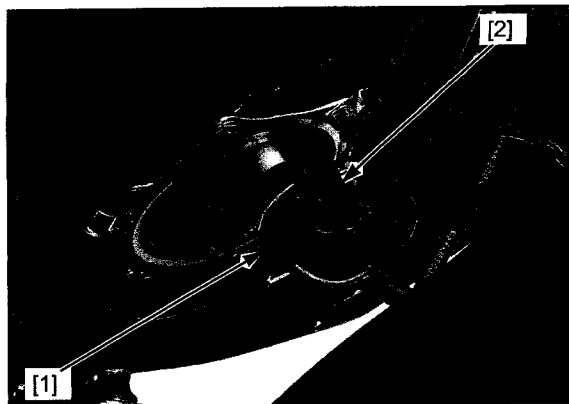
## FUEL SYSTEM (PGM-FI)

5. Connect the fuel pump 2P (Brown) connector [1].
6. Connect the battery negative (–) cable to the battery (page 19-6).
7. Install the quick connect fitting cover [2] (fuel pump side only).
8. Turn the ignition switch ON and engine stop switch "O".

The fuel pump will run for about 2 seconds, and fuel pressure will rise.

Repeat 2 or 3 times, and check that there is no leakage in the fuel supply system.

Installation is in the reverse order of removal.



### FUEL PRESSURE TEST

Relieve the fuel pressure and disconnect the quick connect fitting [1] (page 6-60).



Attach the fuel pressure gauge, hoses, attachment joint and manifold.

#### TOOLS:

Fuel pressure gauge	[1] 07406-0040004
Pressure gauge manifold	[2] 07ZAJ-S5A0111
Hose attachment, 9 mm/9 mm	[3] 07ZAJ-S5A0120
Hose attachment, 8 mm/9 mm	[4] 07ZAJ-S7C0100
Attachment joint, 8 mm/9 mm	[5] 07ZAJ-S7C0200

#### U.S.A. TOOLS:

Fuel pressure gauge	07406-004000B
Pressure manifold hose	07AMJ-HW3A100
Adaptor, male	07AAJ-S6MA200
Adaptor, female	07AAJ-S6MA400

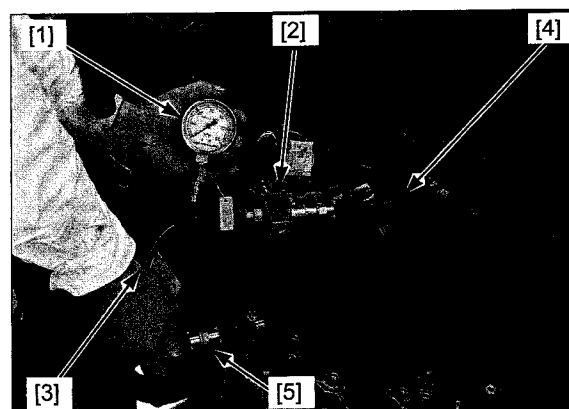
Temporarily connect the battery negative (–) cable to the battery.

Connect the fuel pump 2P (Brown) connector.

Start the engine and let it idle.

Read the fuel pressure.

**Standard: 343 kPa (3.5 kgf/cm<sup>2</sup>, 50 psi)**



If the fuel pressure is higher than specified, replace the fuel pump assembly (faulty fuel pump or fuel pressure regulator).

If the fuel pressure is lower than specified, inspect the following:

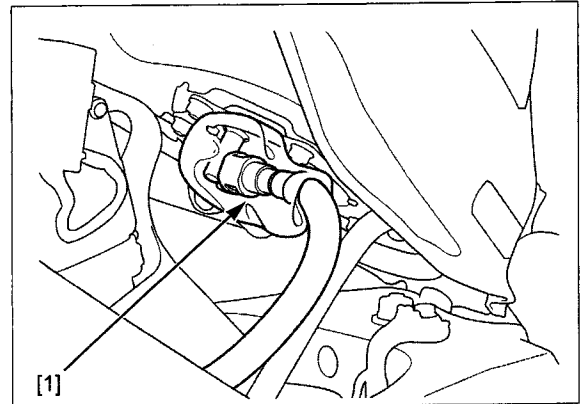
- fuel line leaking
- pinched or clogged fuel hose or fuel tank breather hose
- fuel pump (page 6-64)
- clogged fuel strainer screen (Assembly of the fuel pump: page 6-65)

*Wrap a shop towel around the attachment to soak up any spilled fuel.*

After inspection, relieve the fuel pressure by disconnecting the quick connect fitting (page 6-60).

Remove the fuel pressure gauge, hoses attachment joint and manifold.

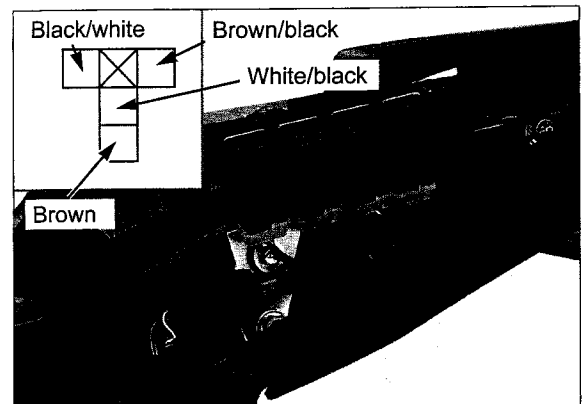
Connect the quick connect fitting [1] (page 6-61).



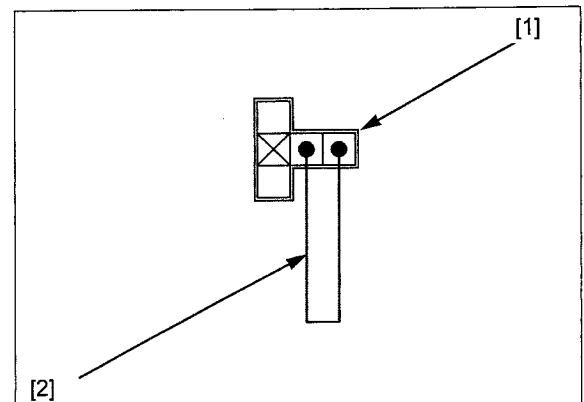
## FUEL FLOW INSPECTION

Remove the left rear cowl (page 3-4).

Remove the fuel pump relay with the terminal color as shown on the illustration.



Jump the Brown and White/black wire terminals at the wire harness side [1] using a jumper wire [2].



## FUEL SYSTEM (PGM-FI)

Disconnect the quick connect fitting from the fuel joint (page 6-60).

Attach the hose attachment [1] to the fuel joint.

### TOOL:

Hose attachment, 8 mm/9 mm 07ZAJ-S7C0100

### U.S.A. TOOLS:

Fuel pressure gauge 07406-004000B

Pressure manifold hose 07AMJ-HW3A100

Adaptor, female 07AAJ-S6MA400

- Place an approved gasoline container and drain the gasoline.
- Wipe off spilled gasoline.

Connect the fuel pump 2P (Brown) connector (page 6-62).

Connect the battery negative (-) cable (page 19-6).

Turn the ignition switch ON and engine stop switch "O" for 10 seconds.

Measure the amount of fuel flow.

### Amount of fuel flow:

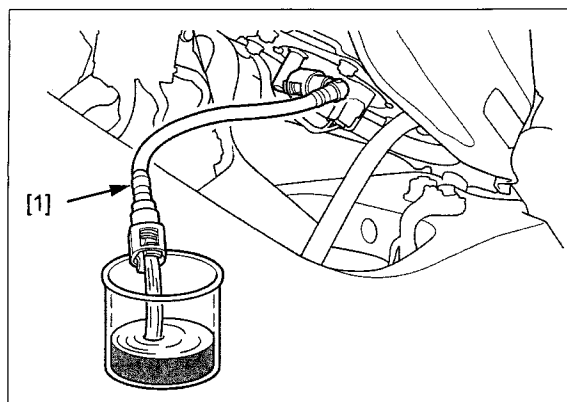
320 cm<sup>3</sup> (10.8 US oz, 11.3 Imp oz) minimum/10 seconds at 12 V

If the fuel flow is less than specified, inspect the following:

- clogged fuel strainer screen (Assembly of the fuel pump: page 6-66)
- pinched or clogged fuel hose
- fuel pump unit (page 6-64)

Disconnect the hose attachment from the fuel joint.

Connect the quick connect fitting (page 6-61).



## FUEL PUMP UNIT

### INSPECTION

Turn the ignition switch ON and engine stop switch "O" then confirm that the fuel pump operates for a few seconds.

If the fuel pump does not operate, inspect as follows:

Turn the ignition switch OFF.

Lift and support the fuel tank (page 4-5).

Disconnect the fuel pump unit 2P (Brown) connector [1].



Turn the ignition switch ON and engine stop switch "O", measure the voltage between the fuel pump unit 2P (Brown) connector [1] terminals on the wire side.

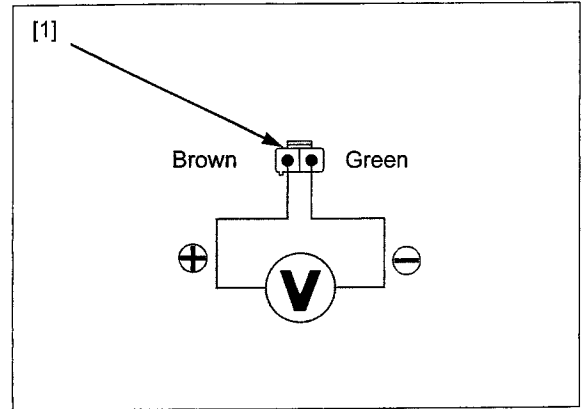
**Connection: Brown (+) – Green (–)**

There should be battery voltage for a few seconds.

If there is battery voltage for a few seconds, replace the fuel pump unit.

If there is no battery voltage, inspect the following:

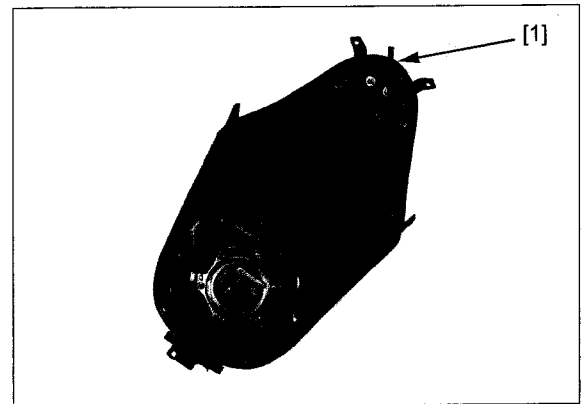
- main fuse 30 A
- sub fuse (BANK ANGLE 10 A)
- sub fuse (FI 10 A)
- engine stop switch (page 22-18)
- fuel pump relay (page 6-67)
- engine stop relay (page 6-83)
- bank angle sensor (page 6-81)
- ECM (page 6-85)



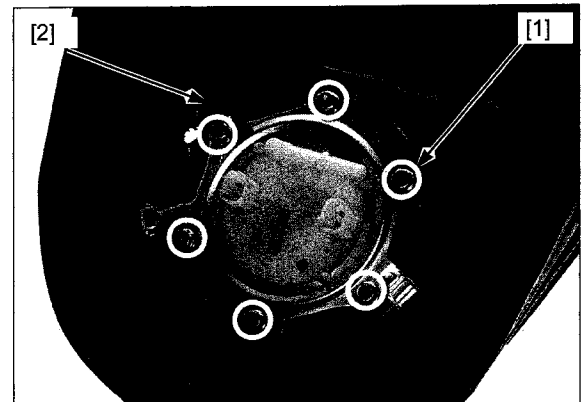
## REMOVAL

Remove the fuel tank (page 6-67).

Disconnect the overflow hoses [1] from the fuel tank.

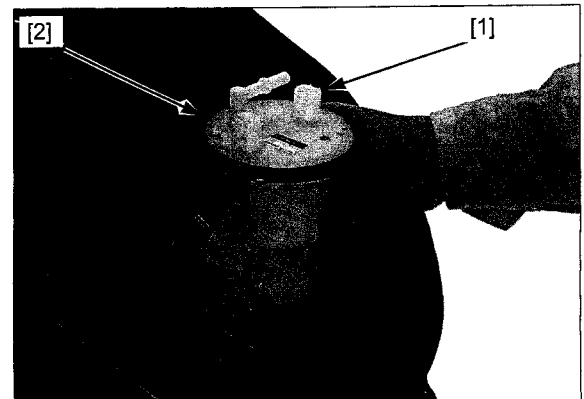


Remove the fuel pump unit mounting nuts [1] and clamp [2].



*Be careful not to damage the pump wire and fuel level gauge.*

Remove the fuel pump unit [1] and packing [2].

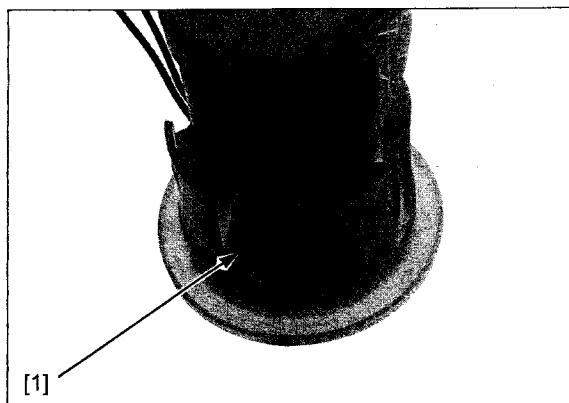


## FUEL SYSTEM (PGM-FI)

### INSPECTION

Check the fuel pump unit for wear or damage, replace it if necessary.

Clean the fuel strainer screen [1] with non-flammable or high flash point solvent.



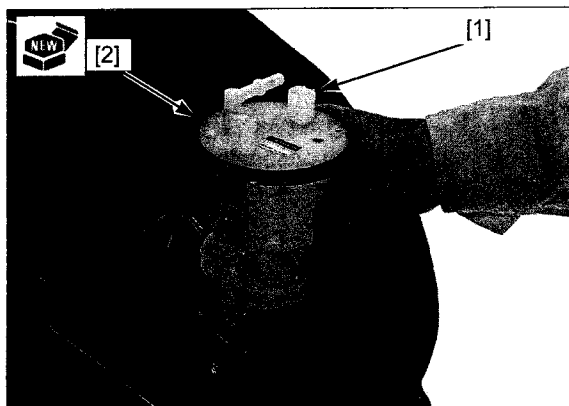
### INSTALLATION

*Always replace the old packing with new one.*

Place a new packing onto the fuel pump unit [2].

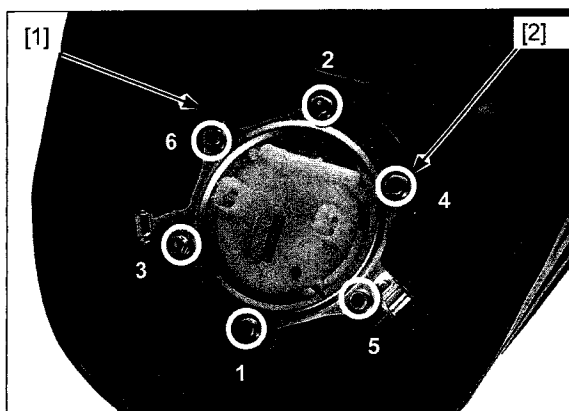
*Be careful not to damage the pump wire and fuel level gauge.*

Install the fuel pump unit to the fuel tank.



Install the clamp [1] and tighten the fuel pump mounting nuts [2] to the specified torque in the specified sequence as shown.

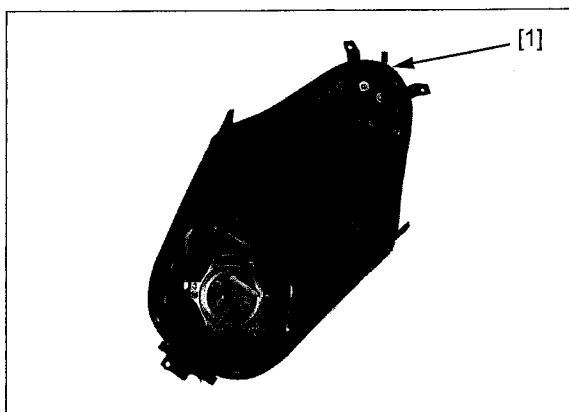
**TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)**



*Route the hoses properly (page 1-22).*

Connect the overflow hoses to the fuel tank securely.

Install the fuel tank (page 6-68).

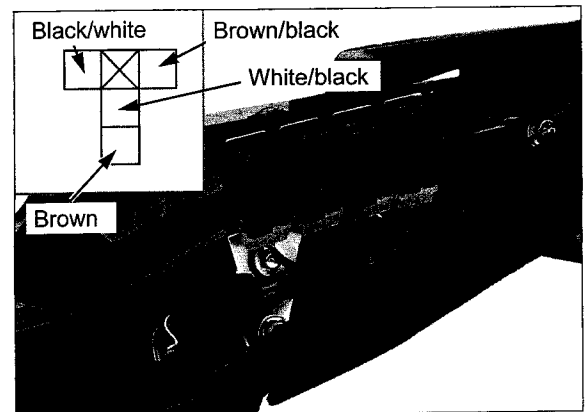


## FUEL PUMP RELAY

### INSPECTION

Remove the left rear cowl (page 3-4).

Remove the fuel pump relay with the terminal color as shown on the illustration.



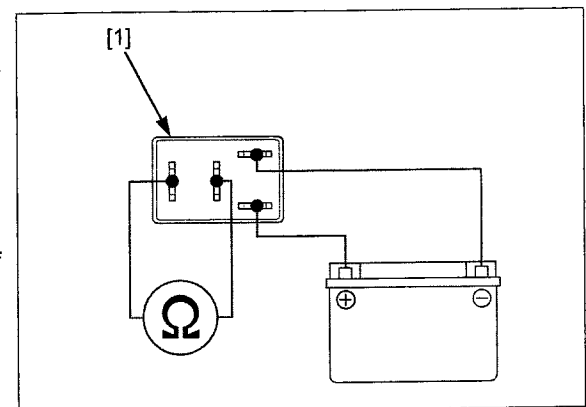
Connect an ohmmeter to the fuel pump relay [1] terminals.

Connect a 12 V battery to the fuel pump relay connector terminals as shown.

There should be continuity only when 12 V battery is connected.

If there is no continuity when the 12 V battery is connected, replace the fuel pump relay.

Install the removed parts in the reverse order of removal.

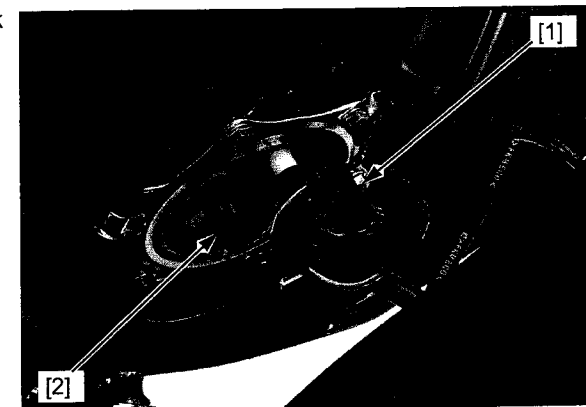


## FUEL TANK

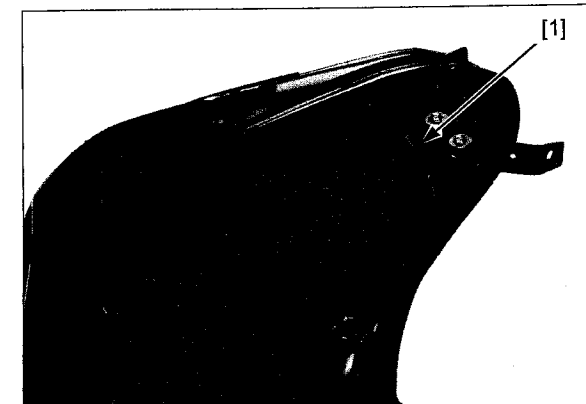
### REMOVAL

Relieve the fuel pressure and disconnect the quick connect fitting [1] (page 6-60).

Disconnect the fuel level sensor 2P (Black) connector [2].



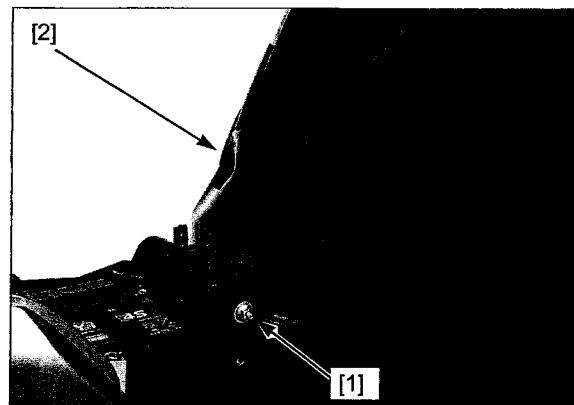
Disconnect the air vent hose [1] from the fuel tank.





## FUEL SYSTEM (PGM-FI)

Remove the fuel tank pivot bolt, washer and mounting nut [1], then remove the fuel tank [2].



### INSTALLATION

Install the fuel tank in the reverse order of removal.

#### NOTICE

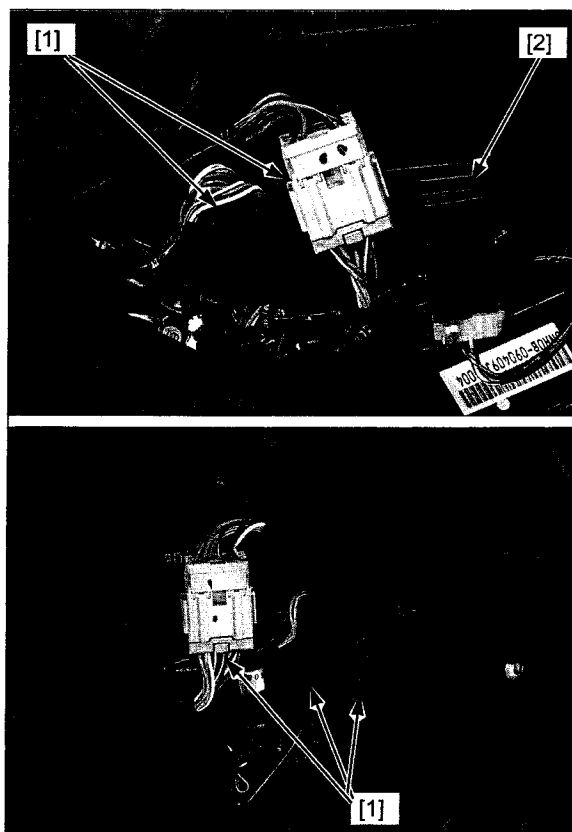
- Route the hoses, wires and harness properly.
- Be careful not to damage the harness and hose.
- After installing the fuel tank, make sure the drain, air vent, overflow hose and fuel hoses are not kinked or bound.

## AIR CLEANER HOUSING

### REMOVAL/INSTALLATION

Remove the fuel tank (page 6-67)

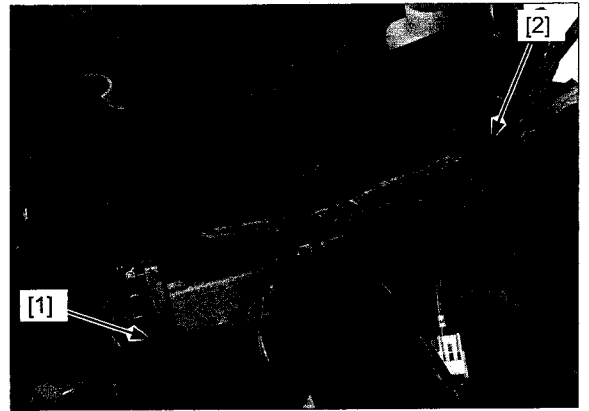
Release left side and right side connectors [1] and relay [2] from the air cleaner housing.



Remove the air cleaner element (page 4-6).

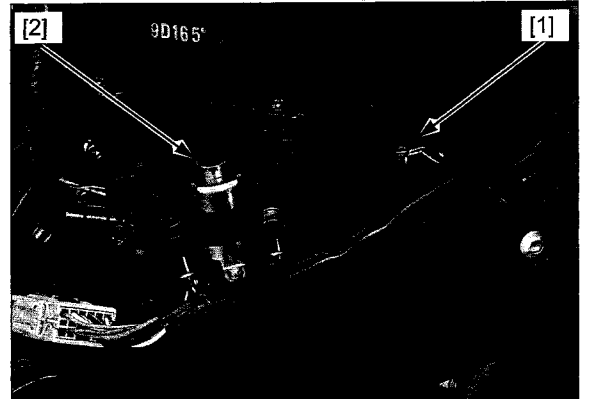
Pull up the heat guard rubber [1] from the air cleaner housing.

Release wire harness [2] from the air cleaner housing guides.

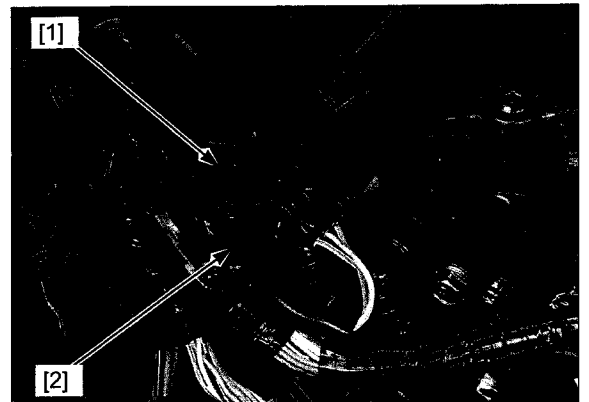


Disconnect the PAIR air hose [1] from the air cleaner housing.

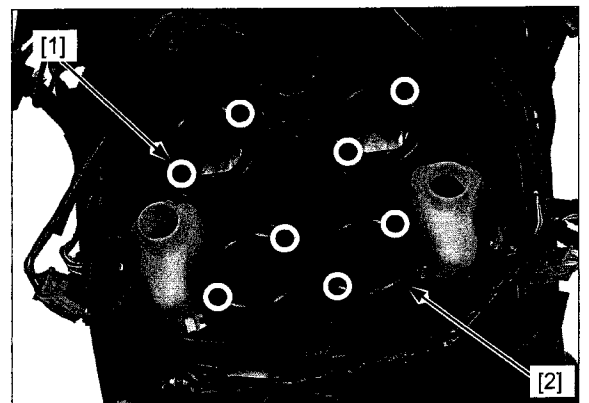
Release the PAIR control solenoid valve [2] from the air cleaner housing.



Disconnect the MAP sensor 3P (Black) connector [1] and MAP sensor vacuum hose [2].



Remove the air funnel/air cleaner housing mounting screws [1], then remove the air funnels [2].



## FUEL SYSTEM (PGM-FI)

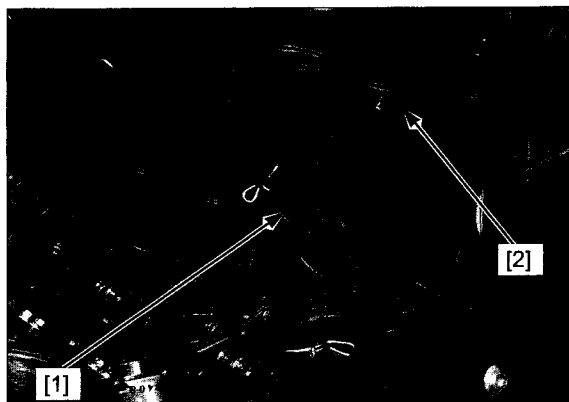
Disconnect the PAIR air hose [1] from the air cleaner housing [2] then, remove the air cleaner housing.

Installation is in the reverse order of removal.

### TORQUE:

Air funnel mounting screw:

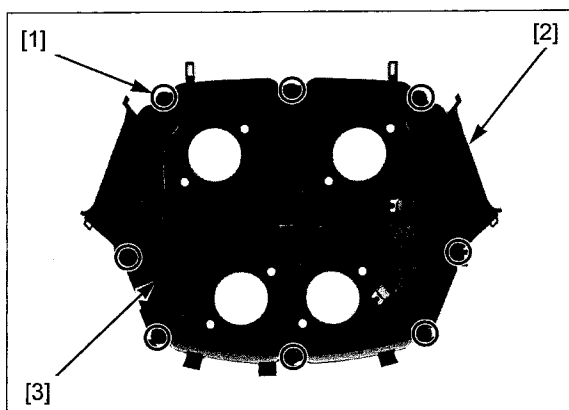
4.2 N·m (0.4 kgf·m, 3.1 lbf·ft)



### DISASSEMBLY/ASSEMBLY

Remove the screws [1] then, remove the upper air cleaner housing [2].

Remove the air cleaner housing packings [3].



Remove the MAP sensor mounting screw [1], then remove the MAP sensor [2] from air cleaner housing.

Assembly is in the reverse order of disassembly.

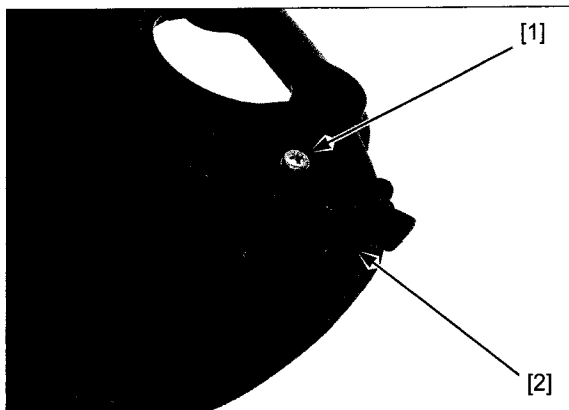
### TORQUE:

Air cleaner case screw:

0.8 N·m (0.1 kgf·m, 0.6 lbf·ft)

MAP sensor mounting screw

1.1 N·m (0.1 kgf·m, 0.8 lbf·ft)



## THROTTLE BODY/TCP SENSOR/ INJECTOR

### REMOVAL

#### NOTICE

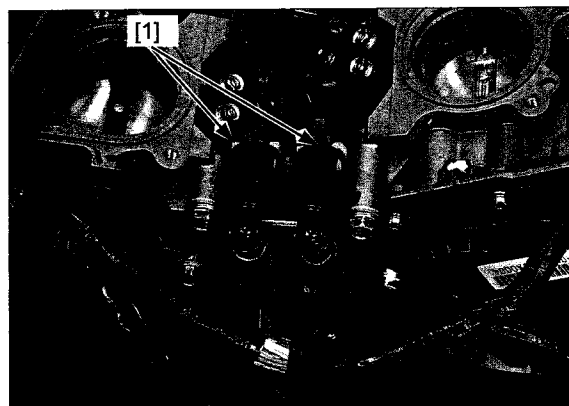
- *Bending or twisting the control cables will impair smooth operation and could cause the cables to stick or bind, resulting in loss of vehicle control.*

Remove the following:

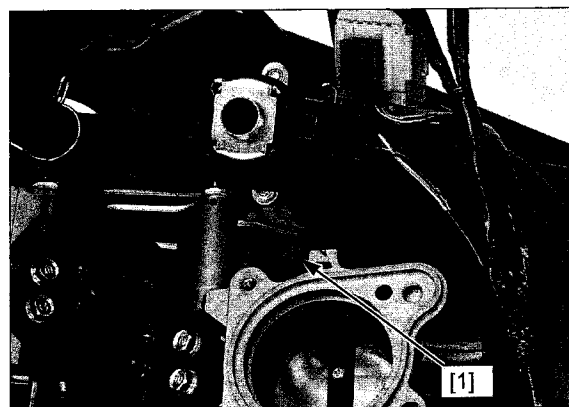
- fuel tank (page 6-67)
- air cleaner housing (page 6-68)

Disconnect purge control solenoid valve-to-throttle valve hose from the EVAP purge control solenoid valve (page 6-91).

Relieve the fuel pressure and disconnect the quick connect fittings [1] from the fuel rail (page 6-60).



Release the clip [1] from the throttle body.

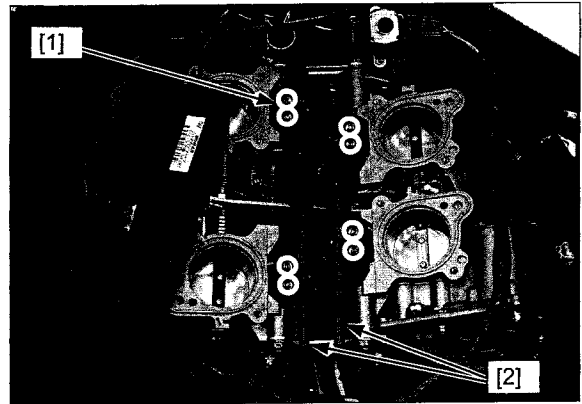


Disconnect the injector sub-harness 12P (Black) connector [1] and TBW 6P (Black) connector [2].

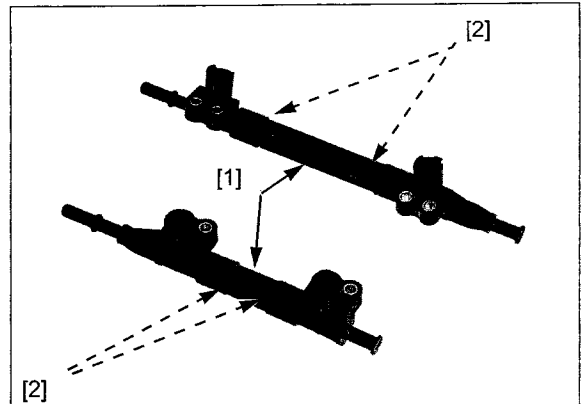


## FUEL SYSTEM (PGM-FI)

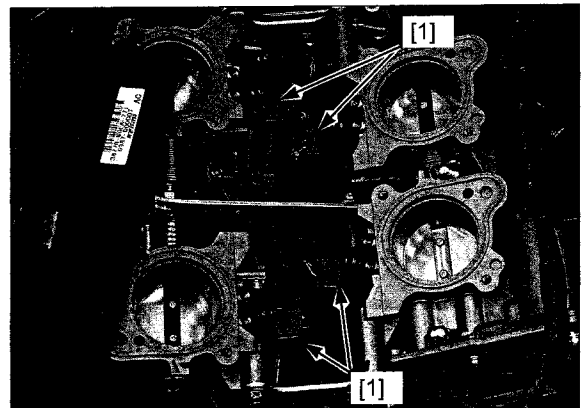
Remove the fuel rail mounting bolts [1] then, remove the fuel rails [2].



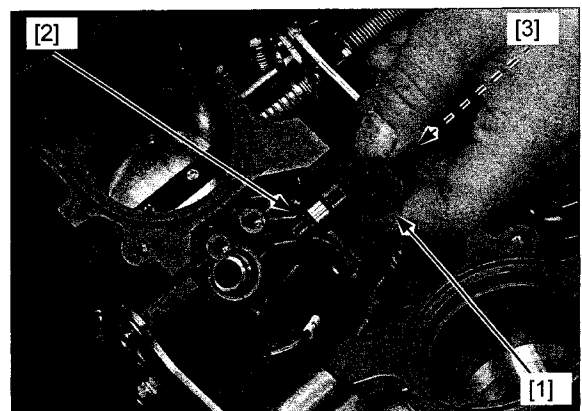
Remove the fuel rails from the fuel rail joint [1].  
Remove the O-rings [2] from the fuel rail joints.



Disconnect the injector 2P (Gray) connectors [1].

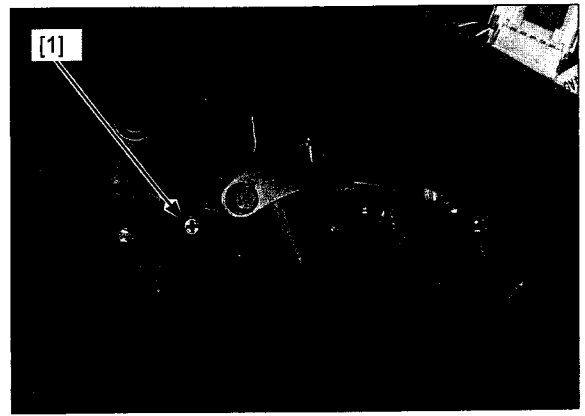


Remove the injectors [1] from the throttle body.  
Remove the seal rings [2] and O-rings [3] from each injector.



Loosen the throttle body side insulator band screws (4 places) [1] using a long type phillips screwdriver through the frame hole.

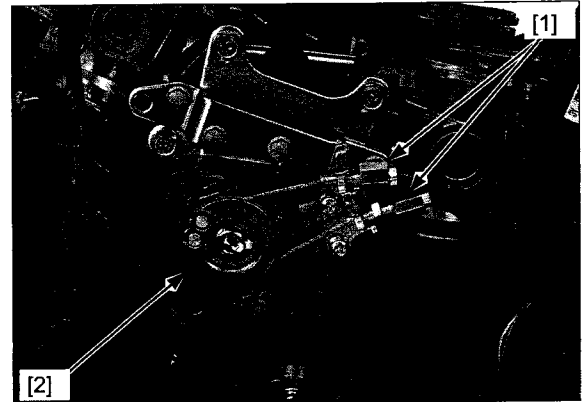
Remove the throttle body from the insulators.



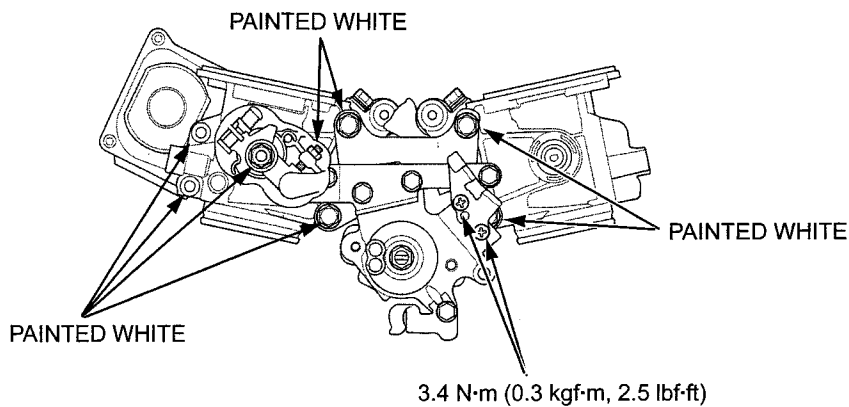
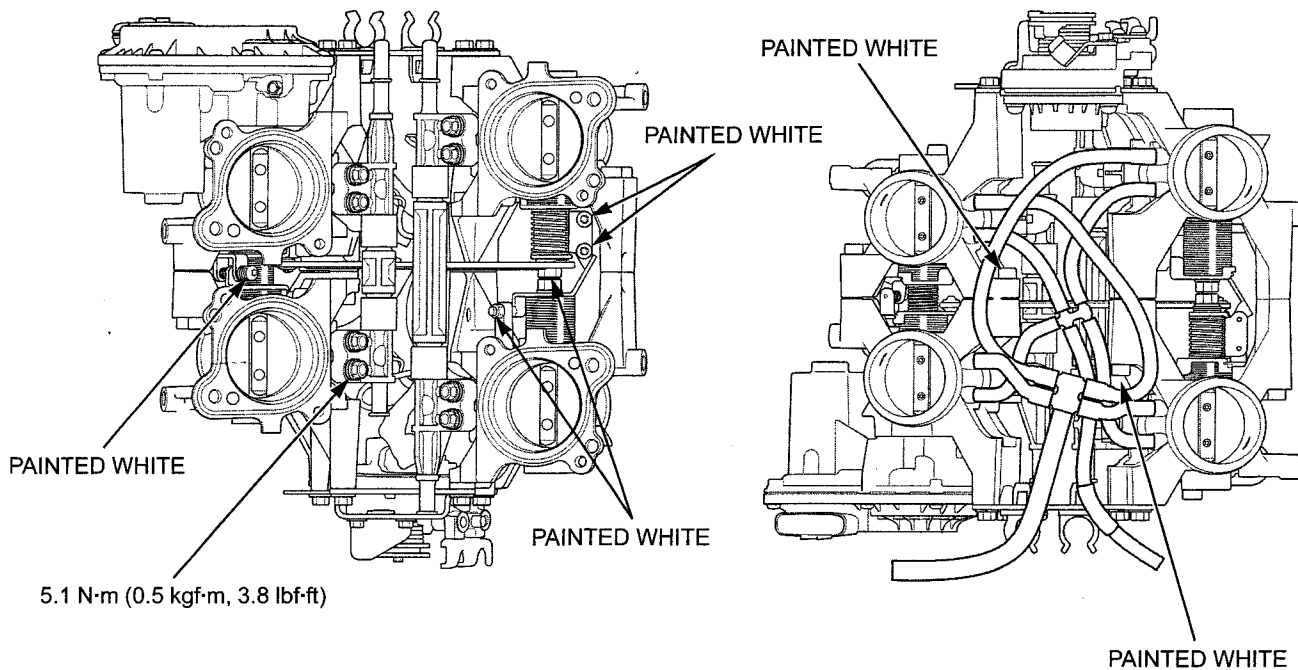
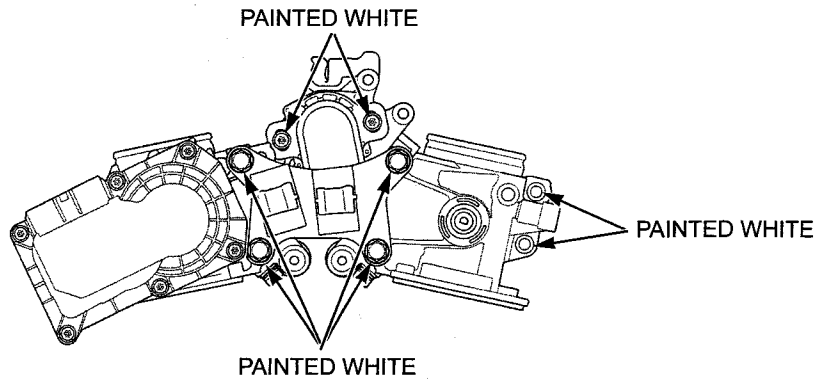
*Do not snap the throttle drum of the TCP sensor from fully open to fully closed after the throttle cable has been removed. It may cause incorrect operation.*

Loosen the lock nuts, adjusting nuts and disconnect the throttle cables [1] from throttle drum of the TCP sensor [2], then remove the throttle body.

Seal the cylinder head intake ports with tape or a clean cloth to keep dirt and debris from entering the intake ports after the throttle body has been removed.



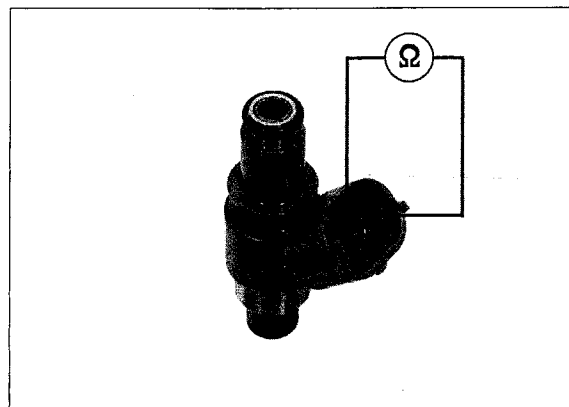
**NOTICE**



## INSPECTION

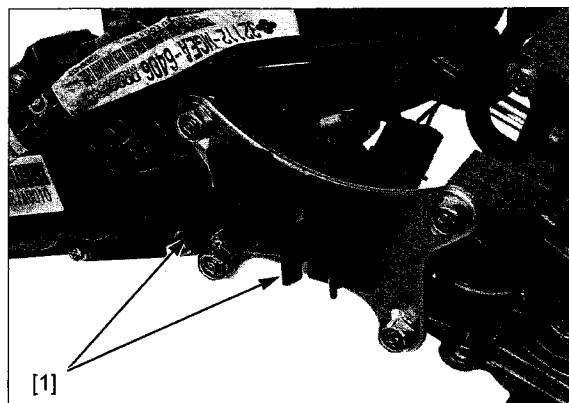
Measure the resistance between the injector connector terminals.

**Standard:** 11.6 – 12.4  $\Omega$  (20°C/68°F)



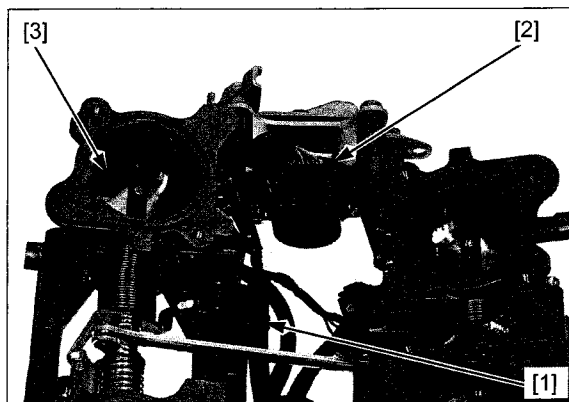
## DISASSEMBLY/ASSEMBLY

Remove the clamps [1] from the throttle body.

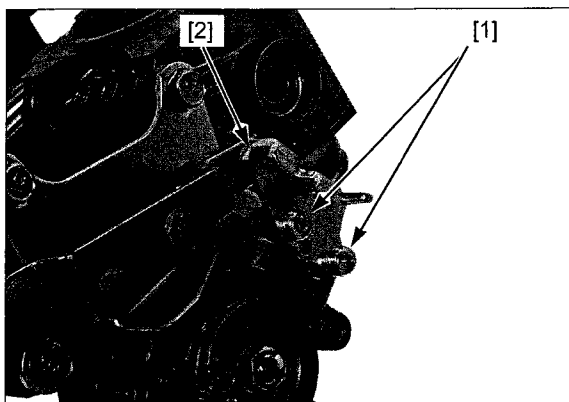


*Do not snap the throttle valve [3] from fully open to fully closed by hand. It may cause incorrect operation.*

Remove the clip [1] and disconnect the TCP sensor 6P (Black) connector [2].



Remove the throttle cable stay screws [1], then remove the throttle cable stay [2].

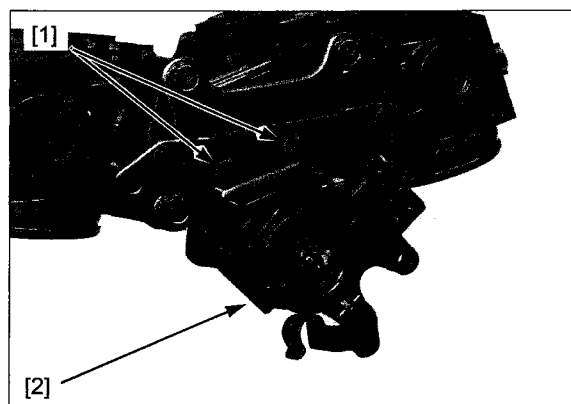




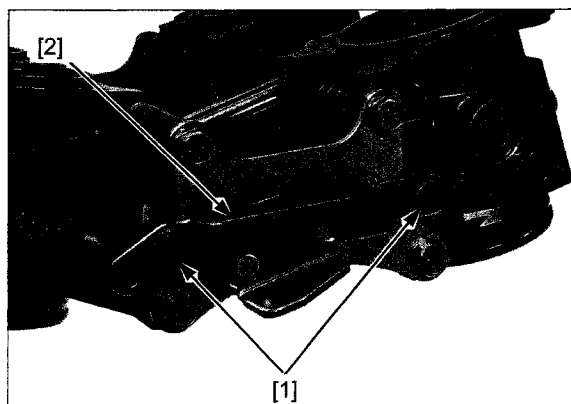
## FUEL SYSTEM (PGM-FI)

Remove the TCP sensor mounting bolts [1].

Remove the TCP sensor [2].



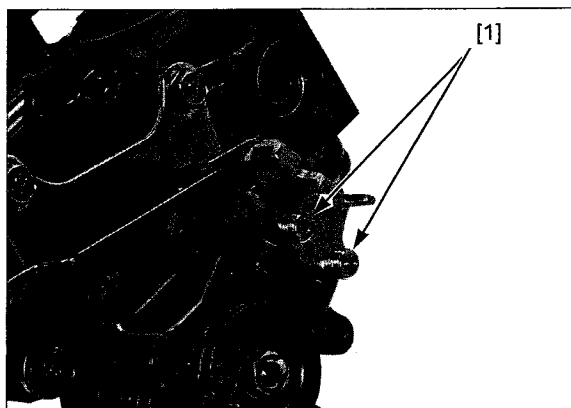
Remove the TCP sensor stay mounting bolts [1], then remove the TCP sensor stay [2].



Assembly is in the reverse order of disassembly.

Tighten the TCP sensor throttle cable stay screws [1] to the specified torque.

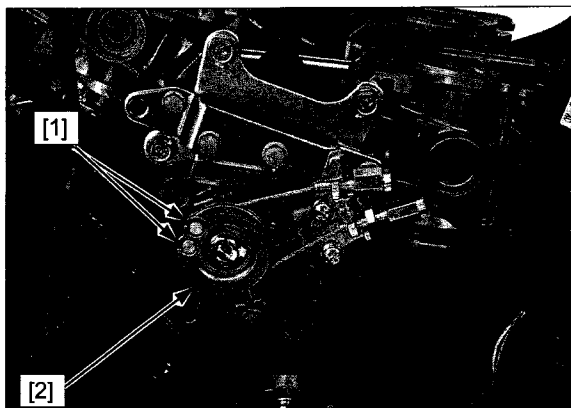
**TORQUE: 3.4 N·m (0.3 kgf·m, 2.5 lbf·ft)**



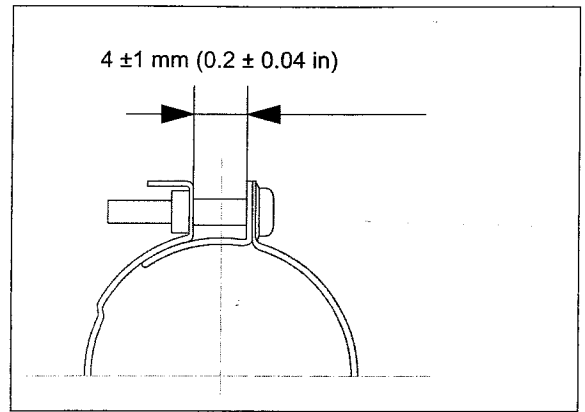
## INSTALLATION

*Route the throttle cables properly (page 1-22).*

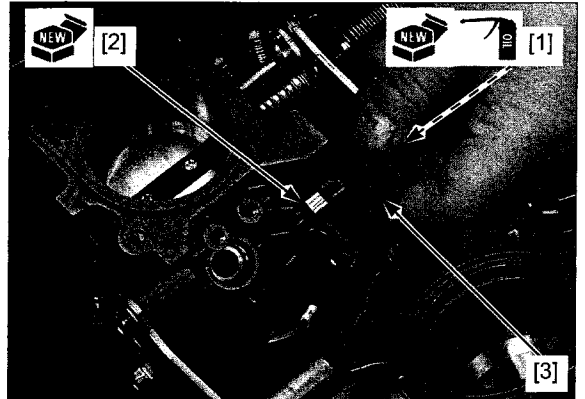
Connect the throttle cable ends [1] to the throttle drum of the TCP sensor [2].



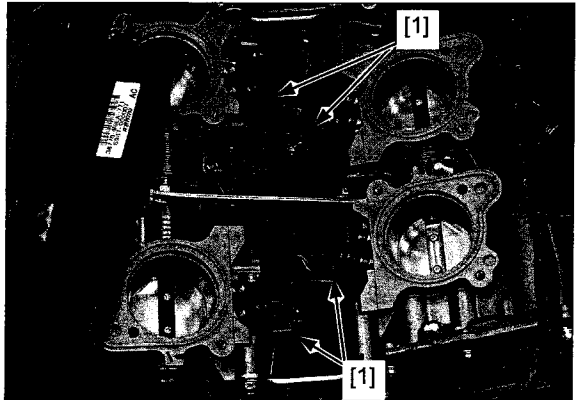
Install the throttle body into the insulators, tighten the throttle body side insulator band so that the insulator band distance is  $4 \pm 1$  mm ( $0.2 \pm 0.04$  in).



Apply small amount of engine oil to new O-rings [1].  
Install new seal rings [2] and new O-rings to each injectors [3].  
Install the injectors [3] to the throttle body.

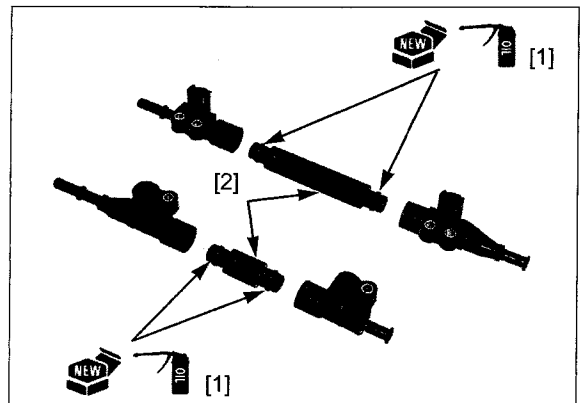


Connect the injector 2P (Gray) connectors [1].



Apply engine oil to new O-rings [1] of the fuel rail joints [2].

Install the O-rings onto the fuel rail joints.  
Install the fuel rails to the fuel rail joints.

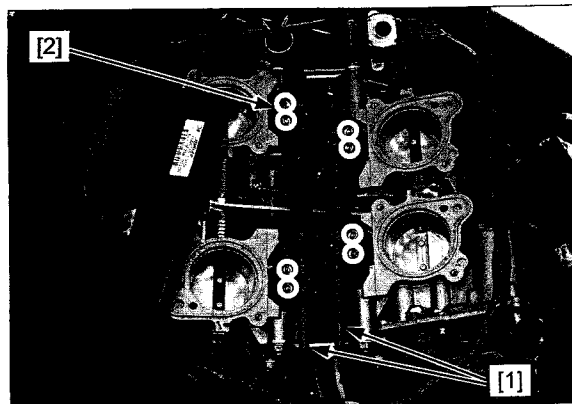


## FUEL SYSTEM (PGM-FI)

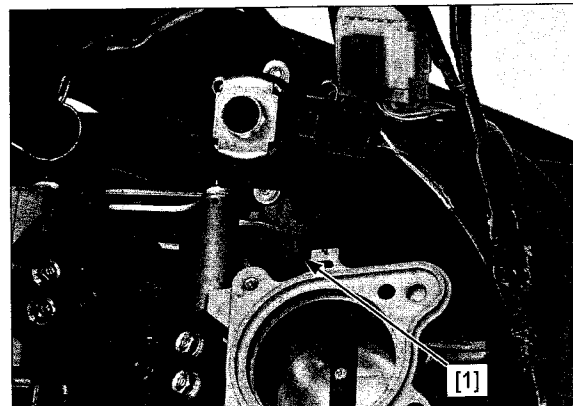
Install the fuel rails [1] onto the throttle body.

Install and tighten the fuel rail mounting bolts [2] to the specified torque.

**TORQUE: 5.1 N·m (0.5 kgf·m, 3.8 lbf·ft)**



Install the clip [1] to the throttle body.

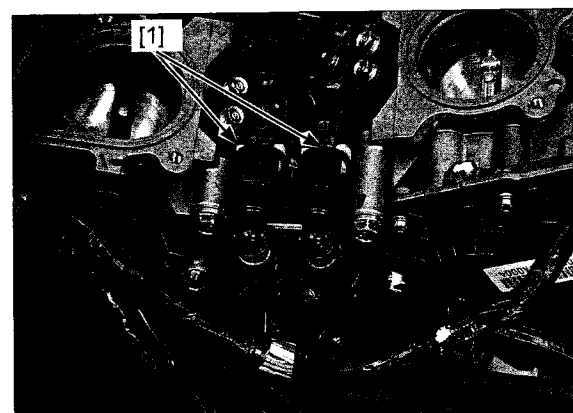


Connect the quick connect fittings [1] (page 6-61).

Install the following:

- air cleaner housing (page 6-68)
- fuel tank (page 6-68)

Connect purge control solenoid valve-to-throttle valve hose to the EVAP purge control solenoid valve (page 6-91).



## ENGINE IDLE SPEED

### IDLE SPEED INSPECTION

- Inspect the idle speed after all other engine maintenance items have been performed and are within specifications.
- Before checking the idle speed, inspect the following items.
  - no DTC and MIL blinking
  - spark plug condition (page 4-8)
  - air cleaner condition (page 4-7)
- The engine must be warm for accurate idle speed inspection.
- This system eliminates the need for manual idle speed adjustment compared to previous designs.
- Use a tachometer with graduations of 50 rpm or smaller that will accurately indicate a 50 rpm change.

Lift and support the fuel tank (page 4-5).

Start the engine and warm it up to coolant temperature 80°C (176°F).

Stop the engine and connect a tachometer according to the tachometer manufacturer's operating instructions. Start the engine and let it idle. Check the idle speed.

**ENGINE IDLE SPEED: 1,150 ± 100 rpm**

If the idle speed is out of the specification, check the following:

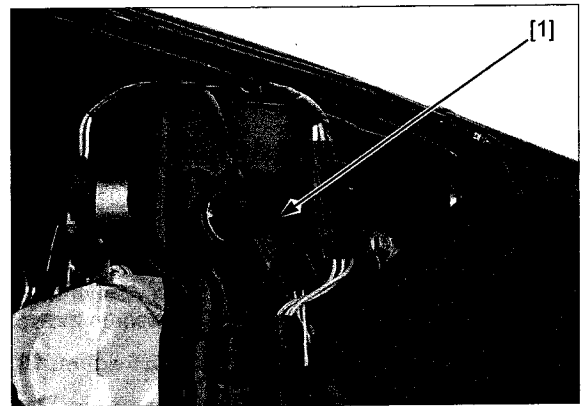
- Throttle operation and throttle grip freeplay (page 4-5)
- Intake air leak or engine top-end problem (page 9-3)
- Check the DTC's (page 6-14)

## KNOCK SENSOR

### REMOVAL/INSTALLATION

Remove the throttle body (page 6-71).

Disconnect the knock sensor 3P (Black) connector [1].



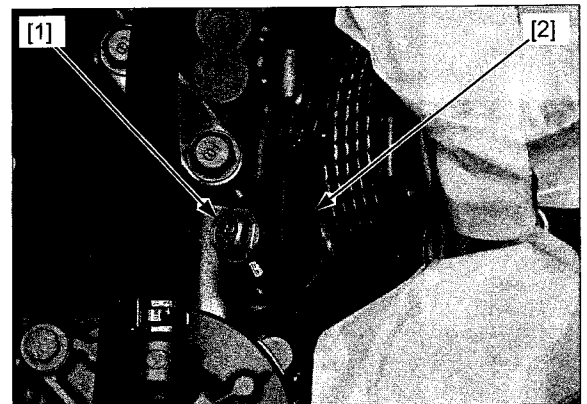
Remove the bolt [1] and knock sensor [2].

Installation is in the reverse order of removal.

*Route the wire properly (page 1-22).*

#### TORQUE:

**Knock sensor mounting bolt:**  
24 N·m (2.4 kgf·m, 18 lbf·ft)



## MAP SENSOR

### REMOVAL/INSTALLATION

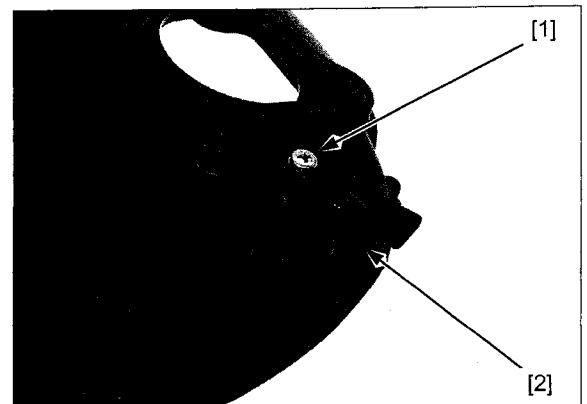
Remove the air cleaner housing (page 6-68).

Remove the screw [1] and MAP sensor [2] from the air cleaner housing.

Install the removed parts in the reverse order of removal.

#### TORQUE:

**MAP sensor mounting screw:**  
1.1 N·m (0.1 kgf·m, 0.8 lbf·ft)



## IAT SENSOR

### REMOVAL/INSTALLATION

Lift and support the fuel tank (page 4-5).

Disconnect the IAT sensor 2P (Gray) connector [1].

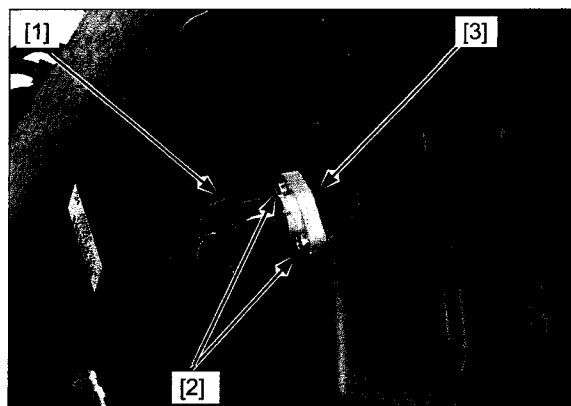
Remove the screws [2] and IAT sensor [3] from the air cleaner housing cover.

Installation is in the reverse order of removal.

#### TORQUE:

**IAT sensor mounting screw:**

**1.1 N·m (0.1 kgf·m, 0.8 lbf·ft)**



## ECT SENSOR

### REMOVAL/INSTALLATION

*Replace the ECT sensor while the engine is cold.*

Drain the coolant from the system (page 7-6).

Remove the throttle body (page 6-71).

Disconnect the ECT sensor 3P (Gray) connector [1].

Remove the ECT sensor [2] and sealing washer [3].

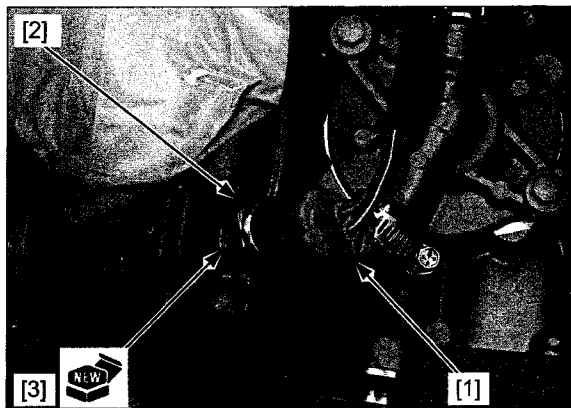
*Always replace the sealing washer with a new one.*

Install a new sealing washer and ECT sensor.

Tighten the ECT sensor to the specified torque.

**TORQUE: 25 N·m (2.5 kgf·m, 18 lbf·ft)**

Installation is in the reverse order of removal.

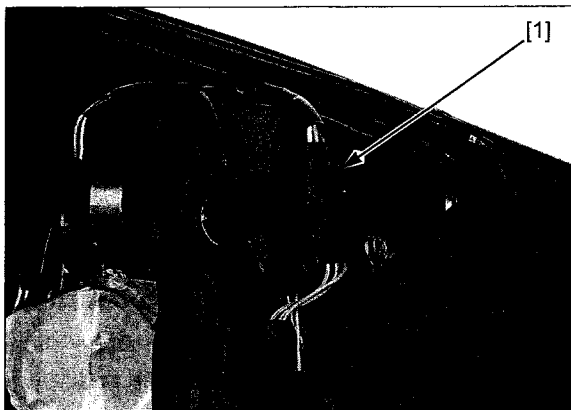


## CMP SENSOR

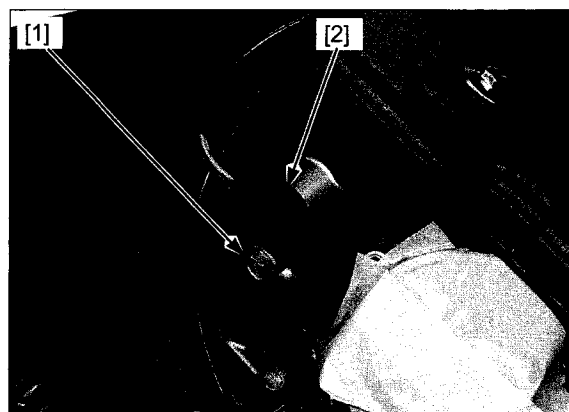
### REMOVAL

Remove the throttle body (page 6-71).

Disconnect the CMP sensor 3P (Black) connector [1].



Remove the bolt [1] and CMP sensor [2].



## INSTALLATION

Apply oil to a new O-ring [1] and install it onto the CMP sensor [2].

Install the CMP sensor into the cylinder head.

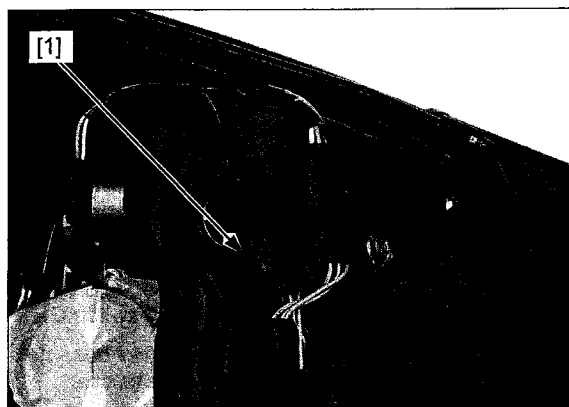
Tighten the mounting bolt securely.



*Route the wire properly (page 1-22).*

Route the CMP sensor wire, connect the CMP sensor 3P (Black) connector [1].

Install the throttle body (page 6-76).

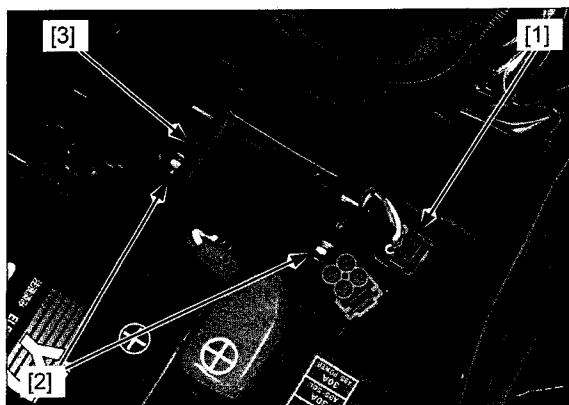


## BANK ANGLE SENSOR

### REMOVAL/INSTALLATION

Disconnect the bank angle sensor 3P (Black) connector [1].

Remove the bolts/washers [2] and bank angle sensor [3].



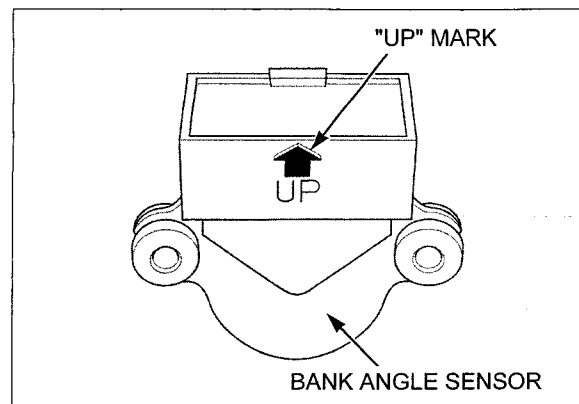
## FUEL SYSTEM (PGM-FI)

Install the bank angle sensor with its "UP" mark facing up.

Installation is in the reverse order of removal.

Install and tighten the bank angle sensor mounting bolts to the specified torque.

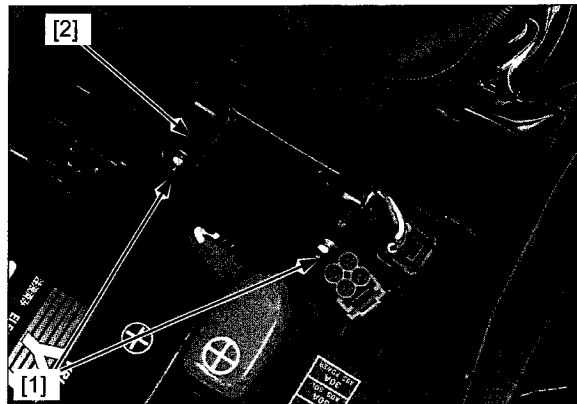
**TORQUE: 1.5 N·m (0.2 kgf·m, 1.1 lbf·ft)**



## INSPECTION

### SYSTEM INSPECTION

Remove the bolts/washers [1] and bank angle sensor [2].



Place the bank angle sensor horizontal as shown, and ignition switch ON.

The bank angle sensor is normal if the engine stop relay clicks and there is no power supply.

Incline the bank angle sensor approximately 60° to the left or right with the ignition switch ON.

The bank angle sensor is normal if the engine stop relay clicks and there is power supply.

If you repeat this test, first turn the ignition switch OFF, then turn the ignition switch ON.

If the engine stop relay does not click, inspect the bank angle sensor line as follows:

### INPUT LINE INSPECTION

Disconnect the bank angle sensor 3P (Black) connector (page 6-81).

Turn the ignition switch ON.

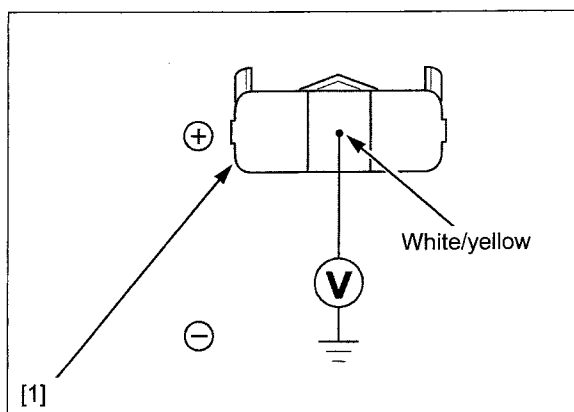
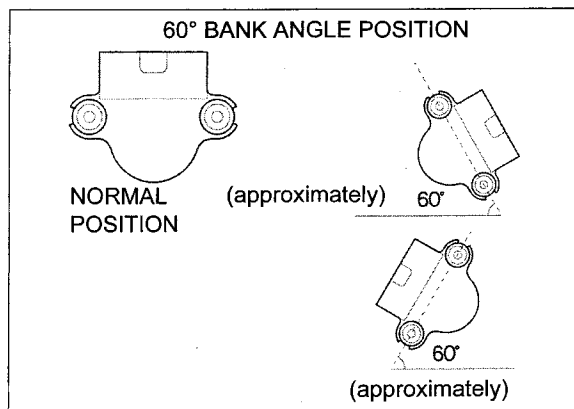
Measure the voltage between the bank angle sensor 3P (Black) connector [1] at the wire side and ground.

**Connection: White/yellow (+) – Ground (–)**

There should be battery voltage.

If there is no battery voltage, inspect the following:

- battery
- main fuse (30A)
- sub fuse (BANK ANGLE 10A)
- ignition switch
- wire harness open circuit



### GROUND LINE INSPECTION

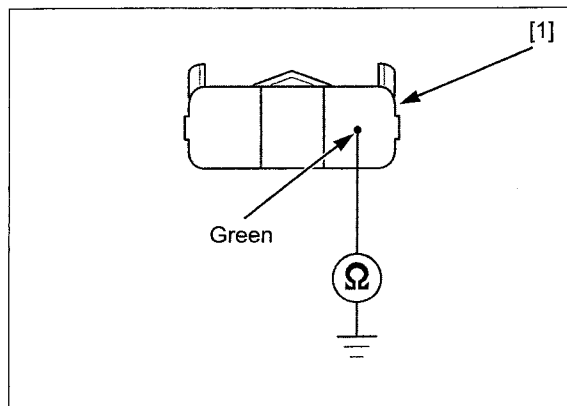
Turn the ignition switch OFF.

Measure the voltage between the bank angle sensor 3P (Black) connector [1] at the wire side and ground.

**Connection: Green (+) – Ground (–)**

There should be continuity.

If there is no continuity, inspect the Green wire open circuit.



### ENGINE STOP RELAY COIL LINE INSPECTION

Turn the ignition switch ON and engine stop switch "O".

Measure the voltage between the bank angle sensor 3P (Black) connector [1] at the wire side and ground.

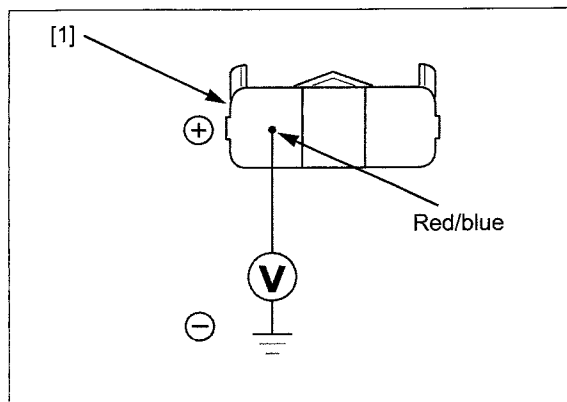
**Connection: Red/blue (+) – Ground (–)**

There should be battery voltage.

If there is no battery voltage, inspect the following:

- red/blue wire open circuit
- engine stop switch
- engine stop relay

If all items are normal, replace the bank angle sensor with a know good one and recheck.

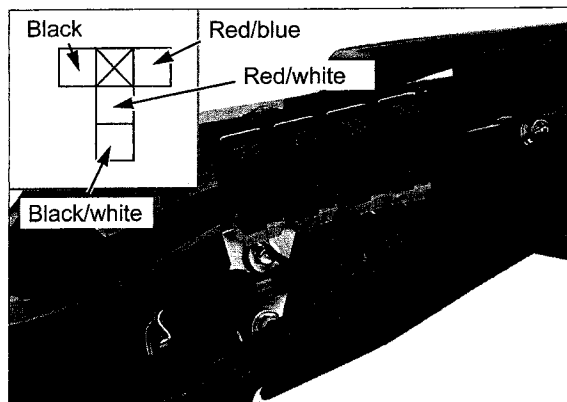


## ENGINE STOP RELAY

### INSPECTION

Remove the left rear cowl (page 3-4).

Remove the engine stop relay with the terminal color as shown on the illustration.



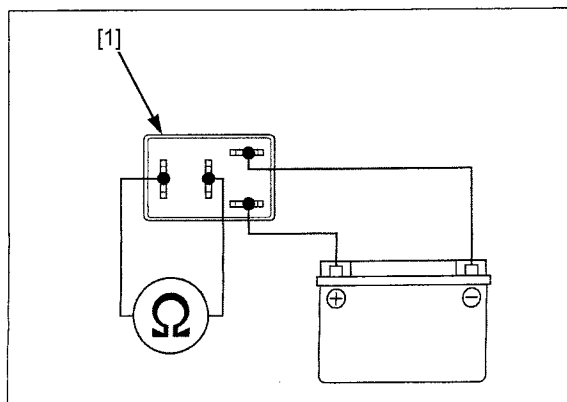
Connect an ohmmeter to the engine stop relay [1] terminals.

Connect a 12 V battery to the engine stop relay connector terminals as shown.

There should be continuity only when 12 V battery is connected.

If there is no continuity when the 12 V battery is connected, replace the engine stop relay.

Install the removed parts in the reverse order of removal.



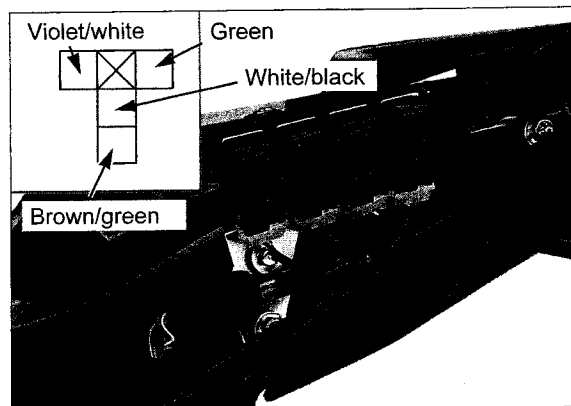


### TBW RELAY

#### INSPECTION

Remove the left rear cowl (page 3-4).

Remove the TBW relay with the terminal color as shown on the illustration.

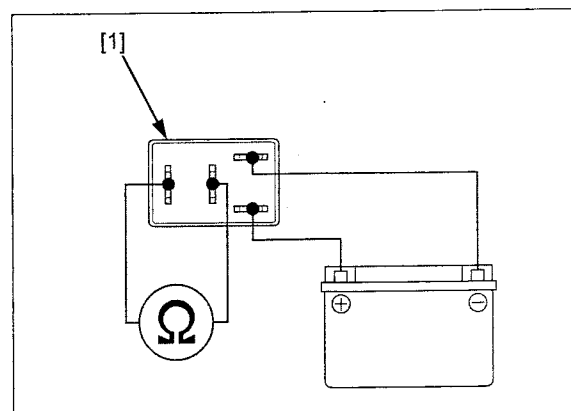


Connect an ohmmeter to the TBW relay [1] terminals. Connect a 12 V battery to the TBW relay connector terminals as shown.

There should be continuity only when 12 V battery is connected.

If there is no continuity when the 12 V battery is connected, replace the TBW relay.

Install the removed parts in the reverse order of removal.

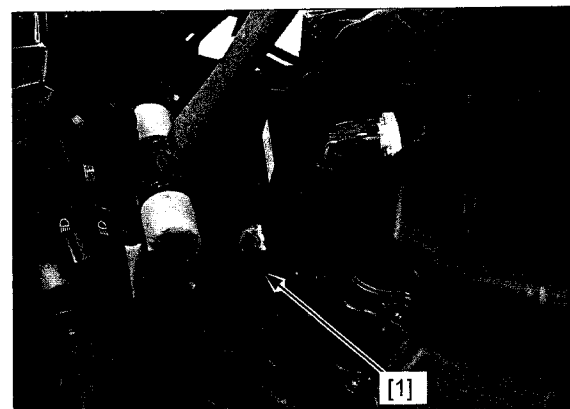


### ECM

#### REMOVAL/INSTALLATION

Lift and support the fuel tank (page 4-5).

Release the ignition switch 2P (Brown) connector [1] from the ECM stay.



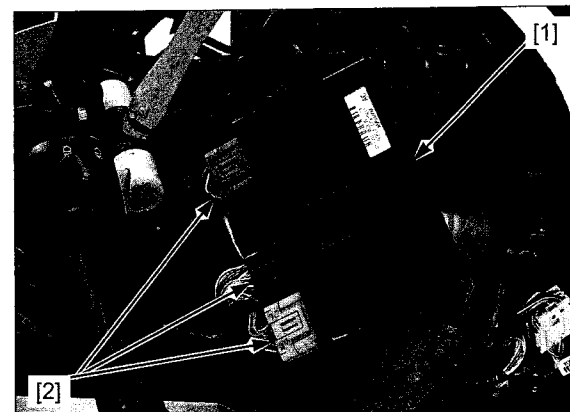
Lift and support the fuel tank (page 4-5).

Remove the ignition switch 2P (Brown) connector from the ECM stay.

Pull out the ECM [1] from the air cleaner stay.

Disconnect the ECM 33P (Blue), 33P (Black) and 33P (Gray) connectors [2].

Installation is in the reverse order of removal.



## POWER/GROUND LINE INSPECTION

### ENGINE DOES NOT START (MIL DOES NOT BLINK)

#### 1. ECM Power Input Voltage Inspection

Pull out the ECM (page 6-84).

Disconnect the ECM 33P connectors.

Turn the ignition switch ON and engine stop switch "O".

Measure the voltage at the ECM 33P (Blue) connector [1] terminals and ground.

**Connection:** A11 (+) – Ground (–)

A22 (+) – Ground (–)

**TOOL:**

Test probe

07ZAJ-RDJA110

*Is there battery voltage?*

**YES** – GO TO STEP 2.

**NO** – GO TO STEP 3.

#### 2. ECM Ground Line Inspection

Turn the ignition switch OFF.

Check for continuity between the ECM 33P (Blue) [1] and 33P (Gray) [2] connector terminal and ground.

**Connection:** A4 – Ground

A5 – Ground

A15 – Ground

A26 – Ground

A27 – Ground

D23 – Ground

D24 – Ground

**TOOL:**

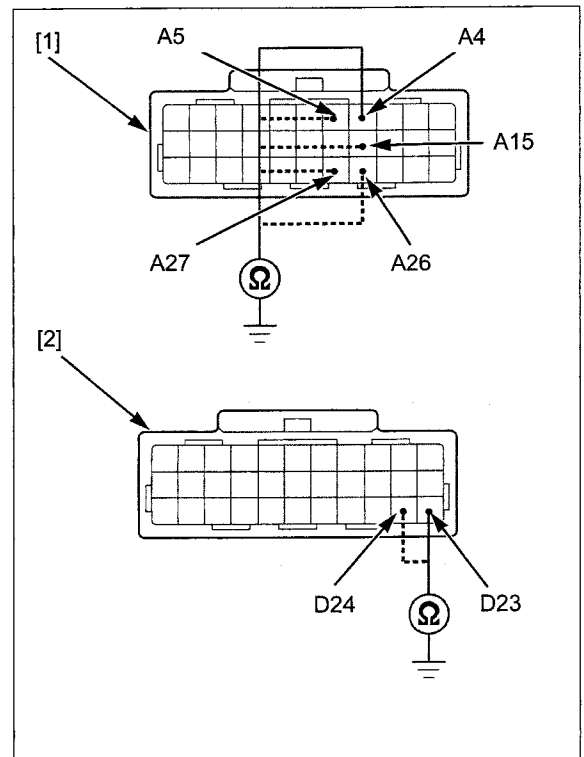
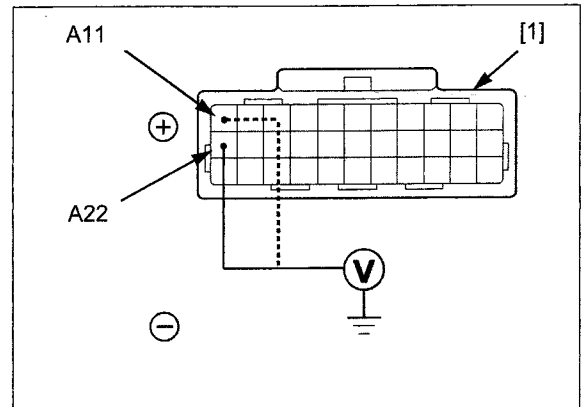
Test probe

07ZAJ-RDJA110

*Is there continuity?*

**YES** – Replace the ECM with a known good one, and recheck.

**NO** – Open circuit in Ground line



## 3. Engine Stop Relay Inspection 1

Turn the ignition switch OFF.  
Remove the engine stop relay (page 6-83).

Turn the ignition switch ON and engine stop switch "O".

Measure the voltage at the engine stop relay connector [1] terminals.

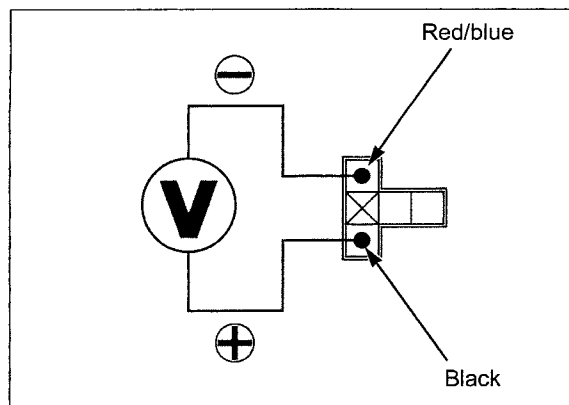
**Connection: Black (+) – Red/blue (–)**

**Is there battery voltage?**

**YES** – GO TO STEP 4.

**NO** –

- Inspect the bank angle sensor (page 6-81).
- Inspect the engine stop switch (page 22-18).
- Blown fuse (BANK ANGLE 10 A)



## 4. Engine Stop Relay Inspection 2

Turn the ignition switch OFF.  
Jump the engine stop relay connector [1] terminals.

**Connection: Red/white – Black/white**

Turn the ignition switch ON.  
Measure the voltage at the ECM 33P (Blue) connector [2] terminals and ground.

**Connection: A11 (+) – Ground (–)**

**A22 (+) – Ground (–)**

**TOOL:**

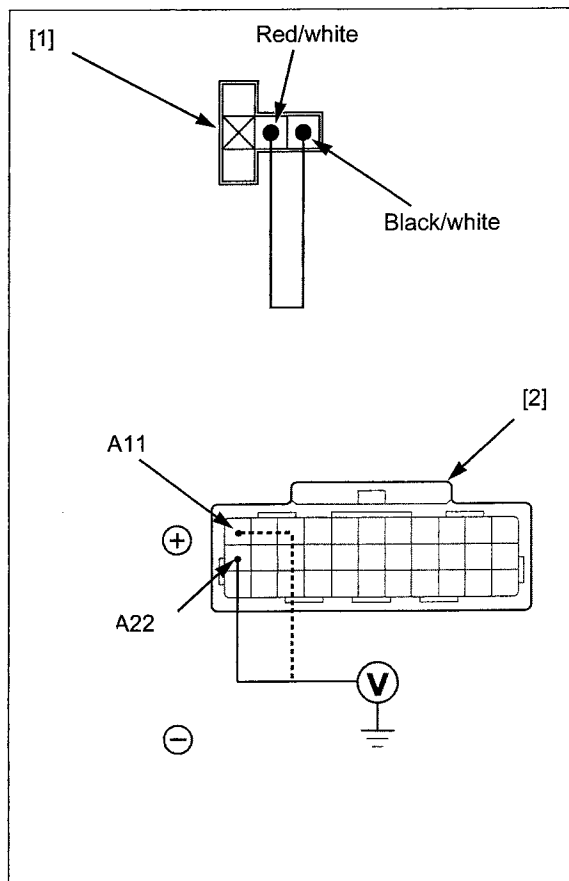
Test probe 07ZAJ-RDJA110

**Is there battery voltage?**

**YES** –

- Inspect the engine stop relay (page 6-83)
- Inspect the bank angle sensor (page 6-81)
- Inspect the engine stop switch

**NO** – Open circuit in power input line (Black/white, Red/white) between the battery and ECM



## SECONDARY AIR SUPPLY SYSTEM

### SYSTEM INSPECTION

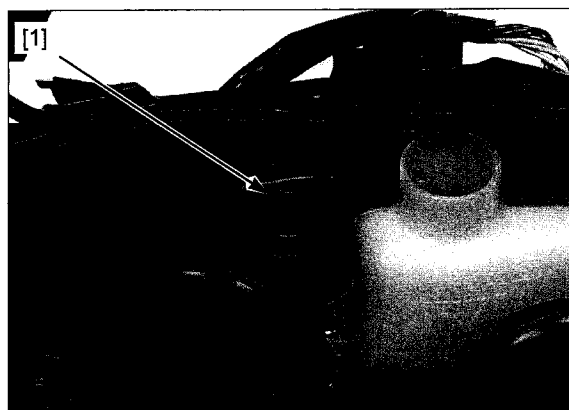
Start the engine and warm it up to coolant temperature is 80°C (176°F).

Stop the engine.

Remove the air cleaner element (page 4-6).

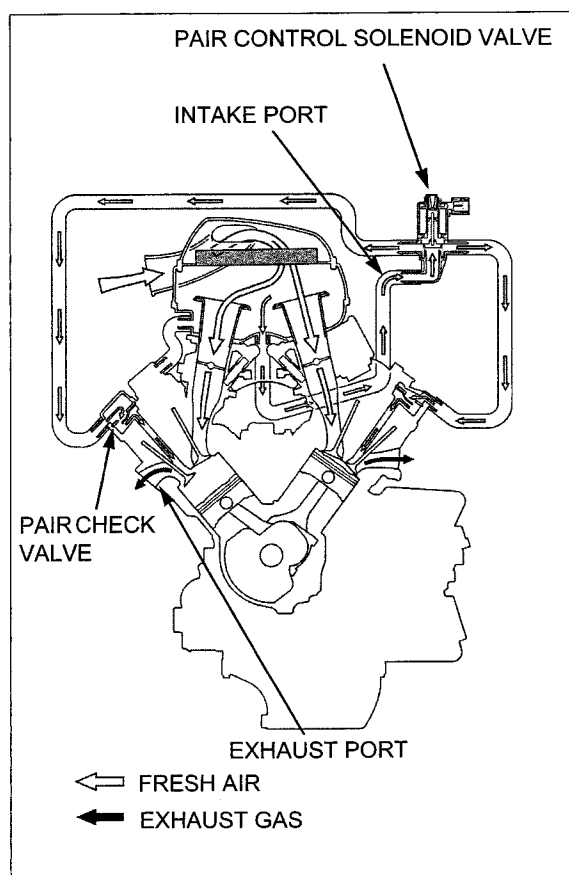
Check that the secondary air intake port [1] is clean and free of carbon deposits.

If the port is carbon fouling, check the PAIR check valves (page 6-89).



Start the engine and open the throttle slightly to be certain that air is sucked in through the air intake port.

If the air is not drawn in, check the air suction hoses for clogs and PAIR solenoid valve.



### PAIR CONTROL SOLENOID VALVE

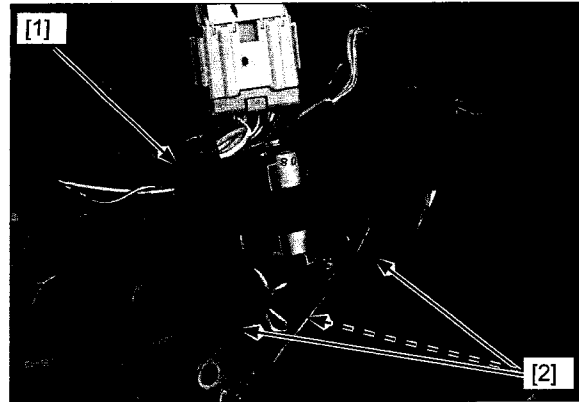
#### REMOVAL/INSTALLATION

Lift and support the fuel tank (page 4-5).

Disconnect the PAIR control solenoid valve 2P (Black) connector [1].

Disconnect the PAIR air suction hoses.

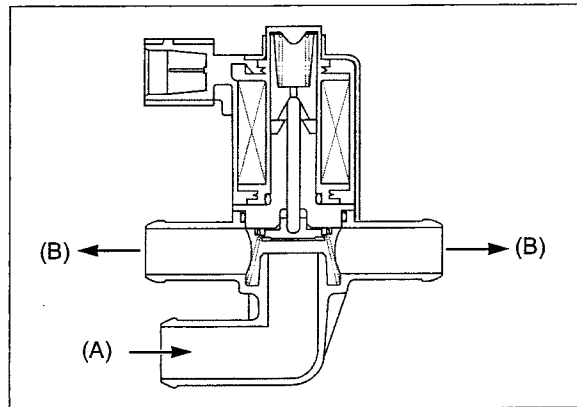
Installation is in the reverse order of removal.



#### INSPECTION

Remove the PAIR control solenoid valve.

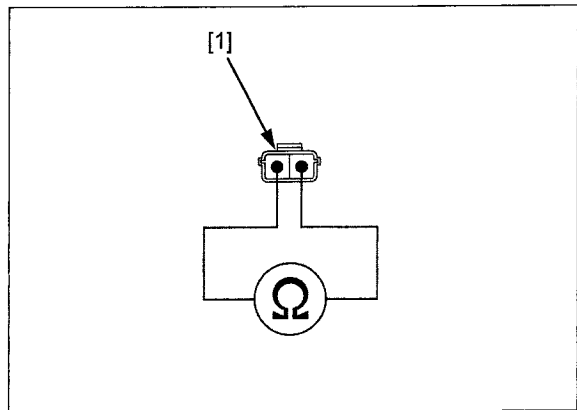
Check that air does not flow (A) to (B) when a 12 V battery is connected to the PAIR control solenoid valve terminals. Air should flow (A) to (B) when there is no voltage applied to the PAIR valve terminals.



Check the resistance between the terminals of the PAIR control solenoid valve [1].

**Standard: 23 – 27  $\Omega$  (20°C/68°F)**

If the resistance is out of specification, replace the PAIR control solenoid valve.



## PAIR CHECK VALVE

### REMOVAL/INSTALLATION

Front: Remove the engine heat guard (page 9-9).  
Rear: Lift and support fuel tank (page 4-5).

Remove the bolts [1], PAIR check valve covers [2] and PAIR check valves [3] from the cylinder head covers.

Installation is in the reverse order of removal.

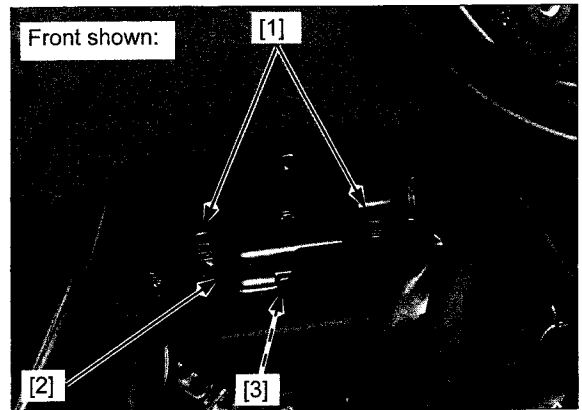
### TORQUE:

Front PAIR check reed valve cover bolt:

13 N·m (1.3 kgf·m, 10 lbf·ft)

Rear PAIR check reed valve cover bolt:

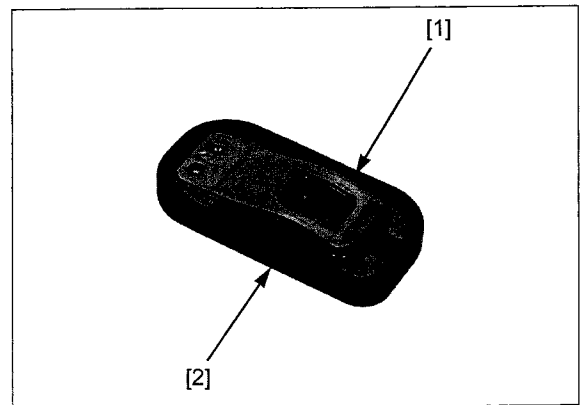
6.9 N·m (0.7 kgf·m, 5.1 lbf·ft)



### INSPECTION

Check the reed [1] for damage of fatigue. Replace if necessary.

Replace the PAIR check valve if the seat rubber [2] is cracked, deteriorated or damaged or if there is clearance between the reed and seat.



## O<sub>2</sub> SENSOR

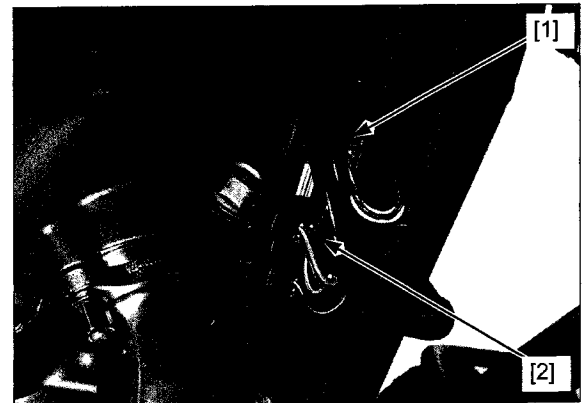
### REMOVAL/INSTALLATION

#### NOTICE

- Do not service the O<sub>2</sub> sensor while it is hot.
- Handle the O<sub>2</sub> sensor with care.
- Do not get grease, oil or other materials in the O<sub>2</sub> sensor air hole.

Remove the radiator (page 7-9).

Disconnect the O<sub>2</sub> sensor 4P (Blue) [1] and 4P (Black) [2] connectors.



## FUEL SYSTEM (PGM-FI)

Remove the O<sub>2</sub> sensors [1] using the special tool.

### TOOL:

FRXM17 (Snap on) or equivalent [2]

### NOTICE

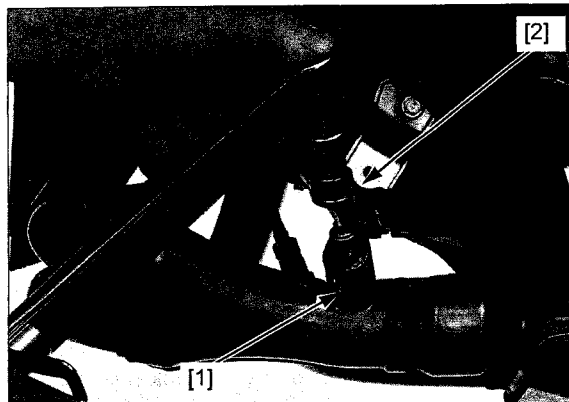
- Be careful not to damage the sensor wire.
- Do not use an impact wrench while removing or installing the O<sub>2</sub> sensor.

Installation is in the reverse order of removal.

### TORQUE:

O<sub>2</sub> sensor:

24.5 N·m (2.5 kgf·m, 18 lbf·ft)



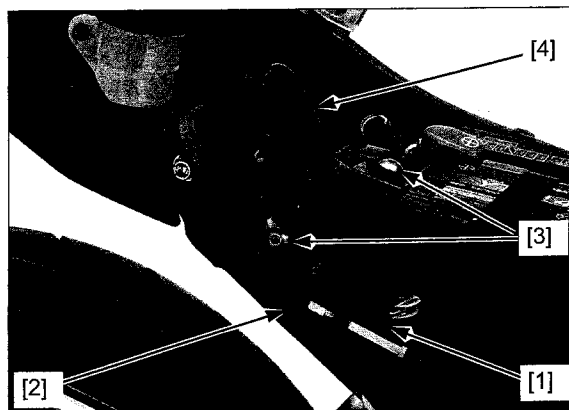
## EGCA

### REMOVAL/INSTALLATION

Remove the rear cowl (page 3-4).

Disconnect the servo motor 6P (Black) connector [1].  
Release the EGCA control cable [2] from the wire guides.

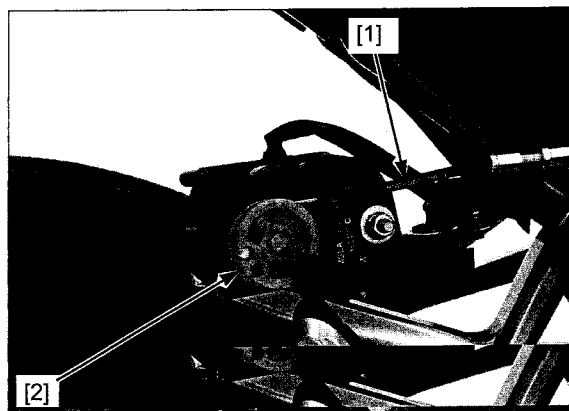
Remove the bolts [3], collar and EGCA [4].



Disconnect the EGCA control cables [1] from the servo motor pulley [2].

Installation is in the reverse order of removal.

Check the operation of the EGCA cable (page 4-17).

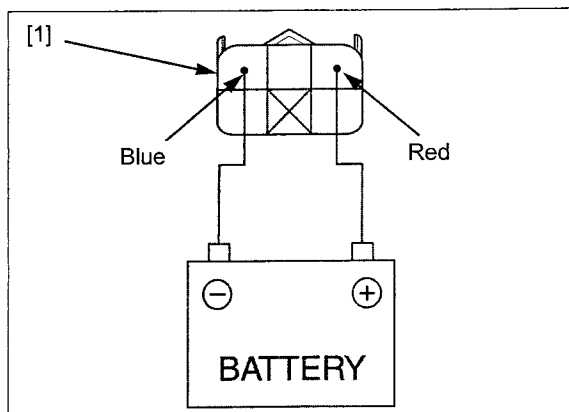


### INSPECTION

Connect a 12 V battery to the servo motor 6P (Black) connector [1] terminals and check that the motor operation.

**Connection: Red (+) – Blue (–)**  
(EGCA-side terminals)

If the servo motor does not turn, replace the servo motor with a new one.



Measure the resistance between the servo motor 6P (Black) connector [1] terminals.

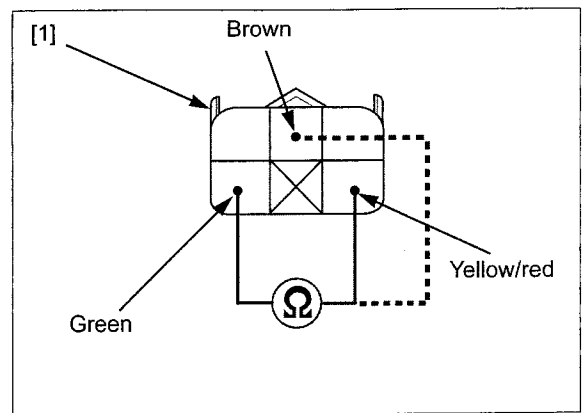
**Connection:** Yellow/red – Green

**Standard:** 5 k $\Omega$   
(EGCA side terminals)

**Connection:** Brown – Green

**Standard:** 0 – 5 k $\Omega$   
(EGCA side terminals)

If the resistance is out of range, replace the servo motor.



## EVAP PURGE CONTROL SOLENOID VALVE/CANISTER

### REMOVAL/INSTALLATION

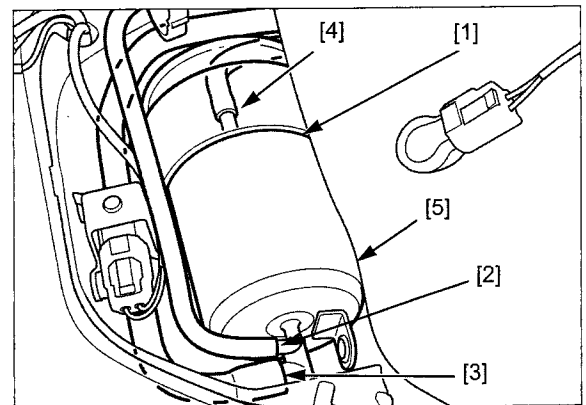
Remove the fuel tank (page 6-67).

Remove the EVAP canister band [1].

Disconnect the following from the canister:

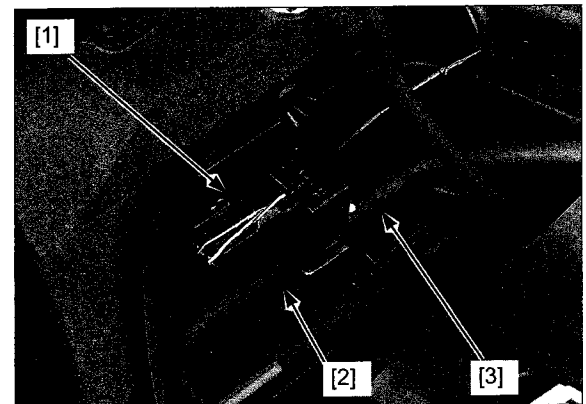
- fuel tank breather hose (to fuel tank) [2].
- canister-to-purge control solenoid valve hose [3].
- EVAP canister drain hose [4].

Remove the canister [5].

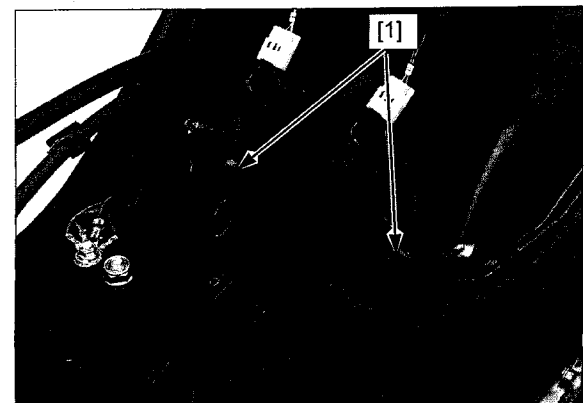


Disconnect the following:

- EVAP purge control solenoid valve 2P (Black) connector [1].
- canister-to-purge control solenoid valve hose [2] from the EVAP purge control solenoid valve
- purge control solenoid valve-to-throttle valve hose [3] from the EVAP purge control solenoid valve



Remove the bolts [1], then remove the canister tray [1].

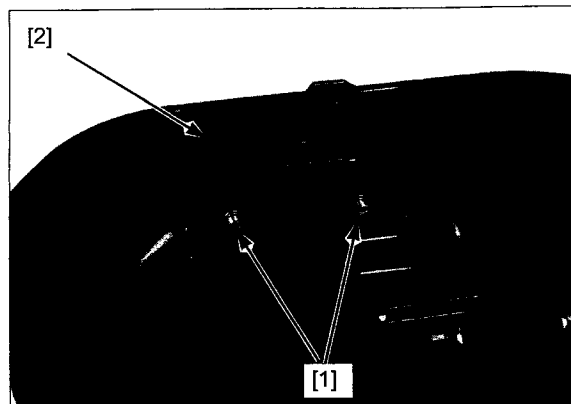




## FUEL SYSTEM (PGM-FI)

Remove the bolts and nut [1], then remove the EVAP purge control solenoid valve [2].

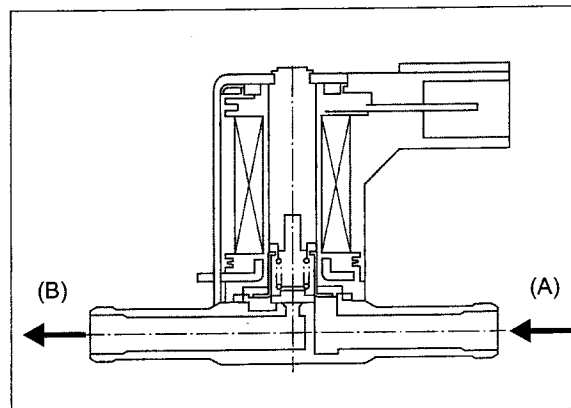
Installation is in the reverse order of removal



### INSPECTION

Remove the EVAP purge control solenoid valve (page 6-91).

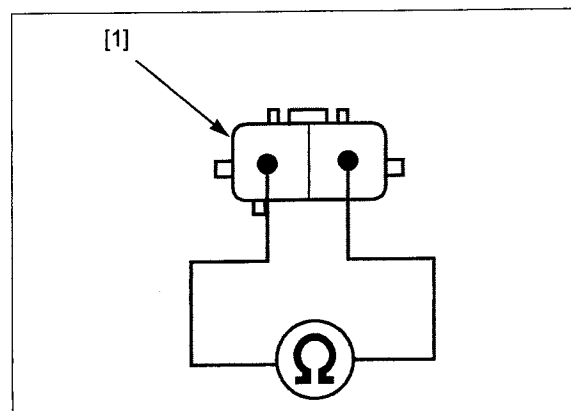
Check that air should not flow (A) to (B), only when a 12V battery is connected to the EVAP purge control solenoid valve terminals.



Check the resistance between the terminals of the EVAP purge control solenoid valve [1].

**STANDARD: 30 – 34  $\Omega$  (20°C/68°F)**

If the resistance is out of specification, replace the EVAP purge control solenoid valve.

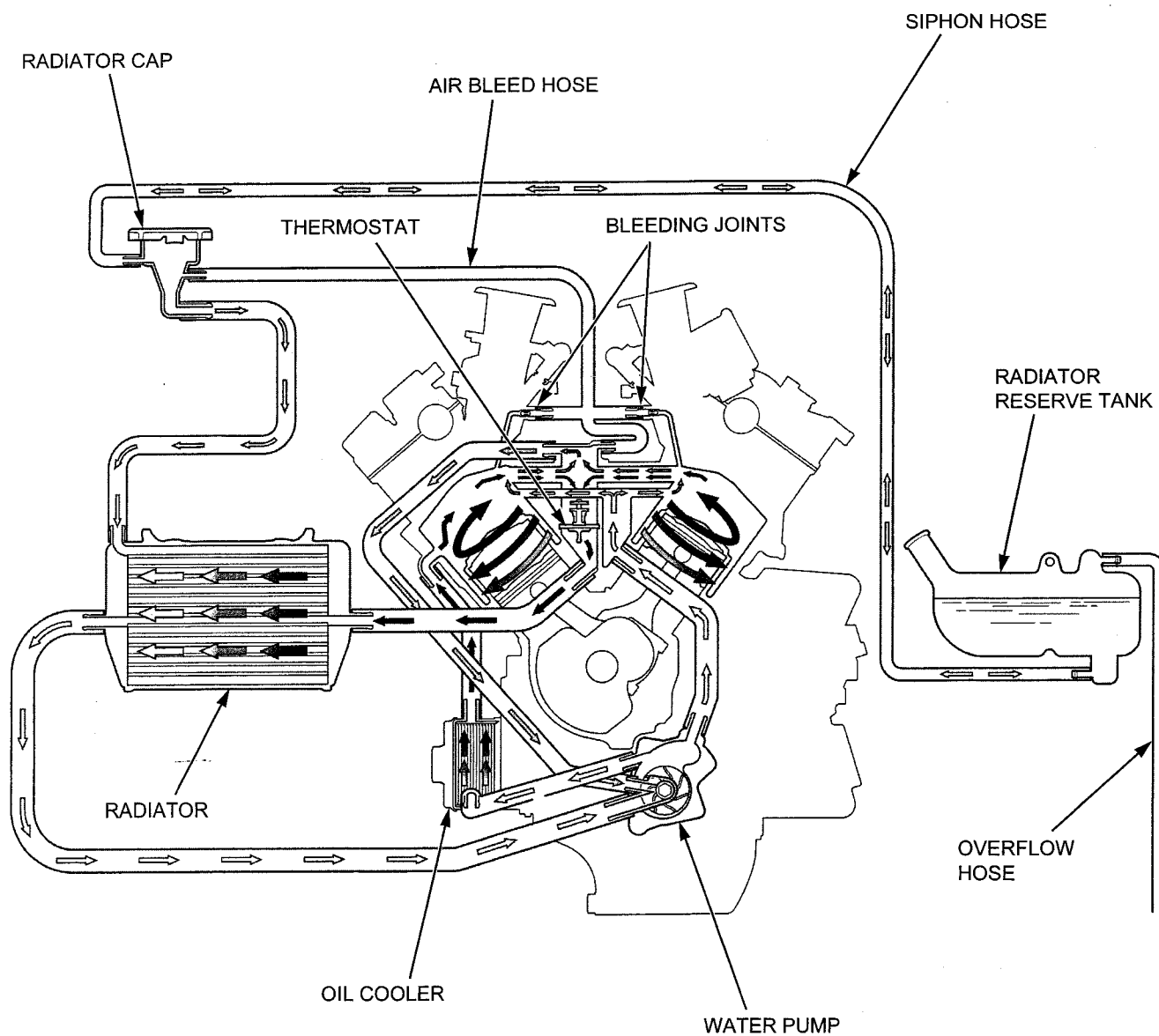


# 7. COOLING SYSTEM

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COMPONENT LOCATION .....	7-2	CYLINDER HEAD BLEEDING JOINT .....	7-8
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COMPONENT LOCATION



## SERVICE INFORMATION

### GENERAL

#### ⚠ WARNING

Removing the radiator cap while the engine is hot can allow the coolant to spray out, seriously scalding you. Always let the engine and radiator cool down before removing the radiator cap.

#### NOTICE

Using coolant with silicate corrosion inhibitors may cause premature wear of water pump seals or blockage of radiator passages. Using tap water may cause engine damage.

- Add coolant 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 inspection for the ECT sensor (page 22-14).

### SPECIFICATIONS

ITEM		SPECIFICATIONS
Coolant capacity	Radiator and engine	3.6 liter (3.8 US qt, 3.2 Imp qt)
	Reserve tank	1.0 liter (1.1 US qt, 0.9 Imp qt)
Radiator cap relief pressure		108 – 137 kPa (1.1 – 1.4 kgf/cm <sup>2</sup> , 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
Recommended antifreeze		Pro Honda HP coolant or equivalent high quality ethylene glycol antifreeze containing silicate-free corrosion inhibitors
Standard coolant concentration		50% mixture with distilled water

### TORQUE VALUES

Water pump cover flange bolt	13 N·m (1.3 kgf·m, 10 lbf·ft)	CT bolt
Fan motor shroud mounting bolt	8.4 N·m (0.9 kgf·m, 6.2 lbf·ft)	
Cooling fan nut	2.7 N·m (0.3 kgf·m, 2.0 lbf·ft)	Apply a locking agent to the threads.
Fan motor mounting bolt	5.1 N·m (0.5 kgf·m, 3.8 lbf·ft)	
Cylinder head bleeding joint	12 N·m (1.2 kgf·m, 9 lbf·ft)	Apply a locking agent to the threads.

## TROUBLESHOOTING

#### Engine temperature too high

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

#### Engine temperature too low

- Faulty temperature gauge or ECT sensor
- Thermostat stuck open
- Faulty fan motor relay

#### Coolant leak

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

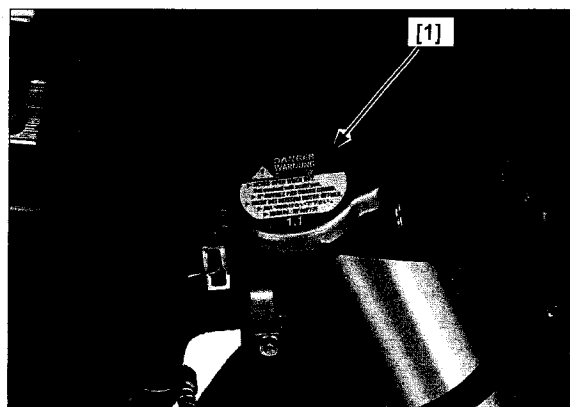
## SYSTEM TESTING

### COOLANT (HYDROMETER TEST)

Remove the right middle cowl (page 3-7).

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

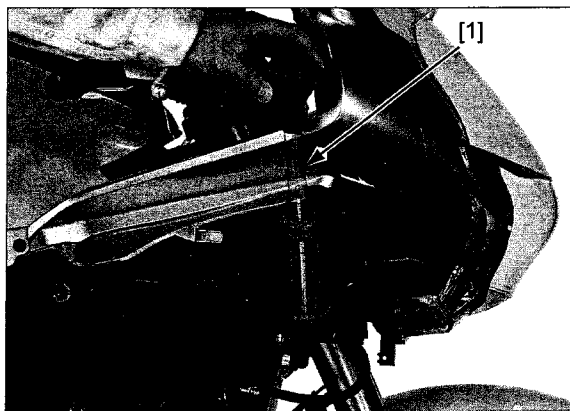
Remove the radiator cap [1].



Test the coolant gravity using a hydrometer [1] (see below for "Coolant gravity chart").

For maximum corrosion protection, a 50 – 50 % solution of ethylene glycol and distilled water is recommended (page 7-5).

Look for contamination and replace the coolant if necessary.



### COOLANT GRAVITY CHART

		Coolant temperature °C (°F)										
		0 (32)	5 (41)	10 (50)	15 (59)	20 (68)	25 (77)	30 (86)	35 (95)	40 (104)	45 (113)	50 (122)
Coolant ratio%	5	1.009	1.009	1.008	1.008	1.007	1.006	1.005	1.003	1.001	0.999	0.997
	10	1.018	1.017	1.017	1.016	1.015	1.014	1.013	1.011	1.009	1.007	1.005
	15	1.028	1.027	1.026	1.025	1.024	1.022	1.020	1.018	1.016	1.014	1.012
	20	1.036	1.035	1.034	1.033	1.031	1.029	1.027	1.025	1.023	1.021	1.019
	25	1.045	1.044	1.043	1.042	1.040	1.038	1.036	1.034	1.031	1.028	1.025
	30	1.053	1.052	1.051	1.049	1.047	1.045	1.043	1.041	1.038	1.035	1.032
	35	1.063	1.062	1.060	1.058	1.056	1.054	1.052	1.049	1.046	1.043	1.040
	40	1.072	1.070	1.068	1.066	1.064	1.062	1.059	1.056	1.053	1.050	1.047
	45	1.080	1.078	1.076	1.074	1.072	1.069	1.066	1.063	1.060	1.057	1.054
	50	1.086	1.084	1.082	1.080	1.077	1.074	1.071	1.068	1.065	1.062	1.059
	55	1.095	1.093	1.091	1.088	1.085	1.082	1.079	1.076	1.073	1.070	1.067
	60	1.100	1.098	1.095	1.092	1.089	1.086	1.083	1.080	1.077	1.074	1.071

## RADIATOR CAP/SYSTEM PRESSURE INSPECTION

Remove the radiator cap (page 7-4).

*Before installing the cap in the tester [2], wet the sealing surfaces.*

Pressure test the radiator cap [1]. Replace the radiator cap if it does not hold pressure, or if relief pressure is too high or too low. It must hold the specified pressure for at least six seconds.

### RADIATOR CAP RELIEF PRESSURE:

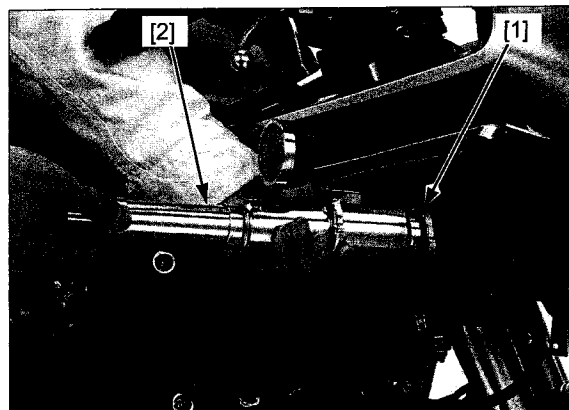
108 – 137 kPa (1.1 – 1.4 kgf/cm<sup>2</sup>, 16 – 20 psi)

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

### NOTICE

*Excessive pressure can damage the cooling system components. Do not exceed 137 kPa (1.4 kgf/cm<sup>2</sup>, 20 psi).*

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



## COOLANT REPLACEMENT

### PREPARATION

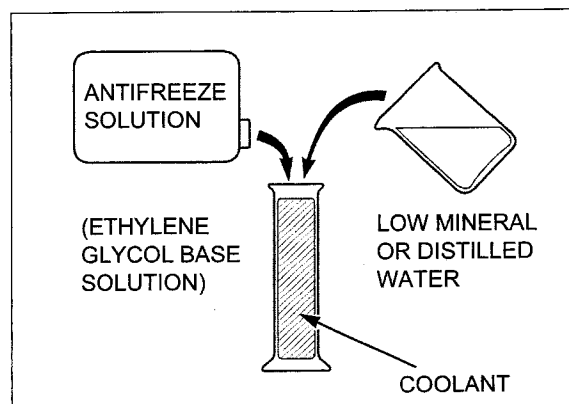
- The effectiveness of coolant decreases with the accumulation of rust or if there is a change in the mixing proportion during usage. Therefore, for best performance change the coolant regularly as specified in the maintenance schedule.
- Mix only distilled, low mineral water with the antifreeze.

### RECOMMENDED ANTIFREEZE:

**Pro Honda HP coolant or equivalent high quality ethylene glycol antifreeze containing silicate-free corrosion inhibitors**

### RECOMMENDED MIXTURE:

**1 : 1 (distilled water and antifreeze)**



### REPLACEMENT/AIR BLEEDING

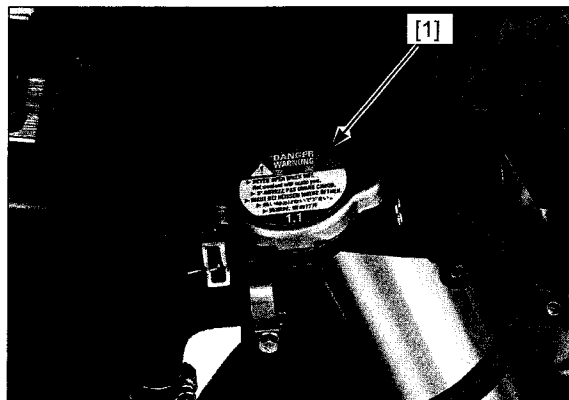
#### NOTE:

Refer to procedure for the radiator reserve tank removal/installation (page 7-12).

Remove the following:

- under cowl (page 3-6)
- right middle cowl (page 3-7)

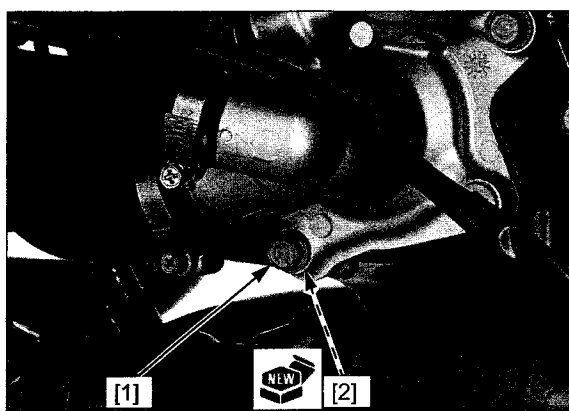
Remove the radiator cap.



Remove the drain bolt [1] and sealing washer [2] on the water pump cover and drain the system coolant.

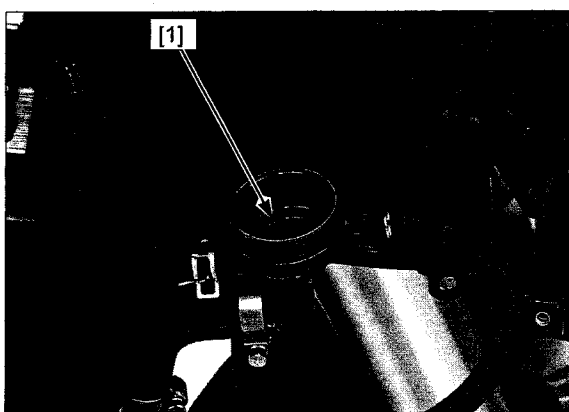
Reinstall the drain bolt (water pump cover bolt) with a new sealing washer.

**TORQUE: 13 N·m (1.3 kgf·m, 10 lbf·ft)**



*Whenever checking or adding coolant to the system, place the motorcycle in a vertical position on a flat, level surface.*

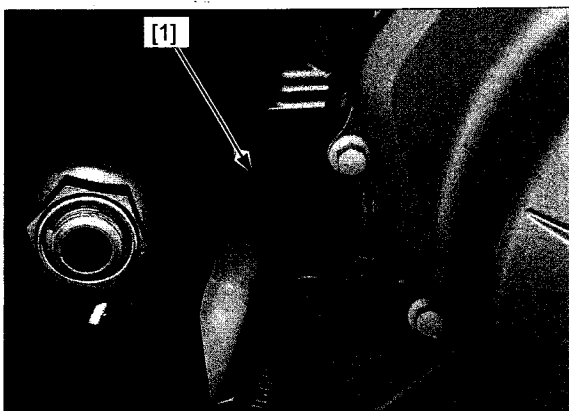
Fill the system with the recommended coolant through the filler opening up to filler neck [1].



Remove the radiator reserve tank cap [1] and fill the reserve tank to the upper level line (page 4-15).

Bleed air from the system as follows:

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/INSTALLATION

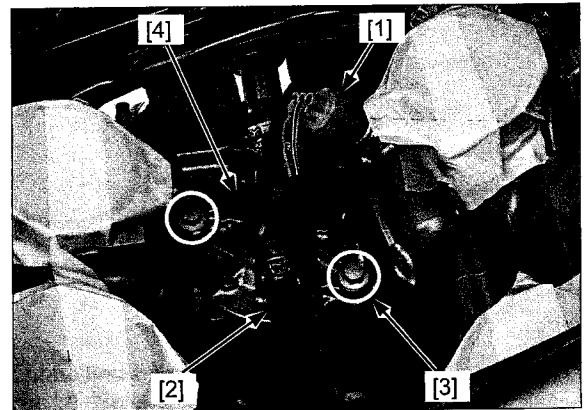
Drain the coolant (page 7-6).

Remove the throttle body (page 6-71).

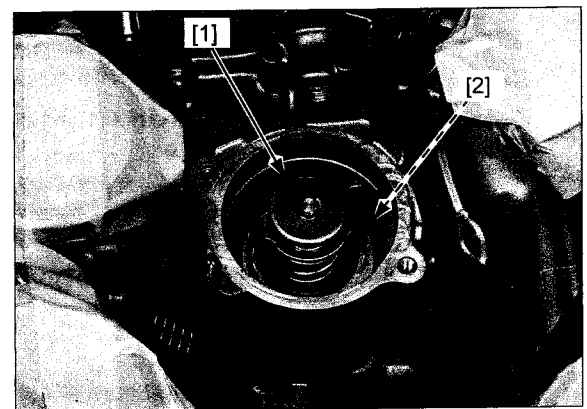
Disconnect the ECT sensor 3P (Gray) connector [1].

Disconnect the breather hose [2] from the thermostat cover.

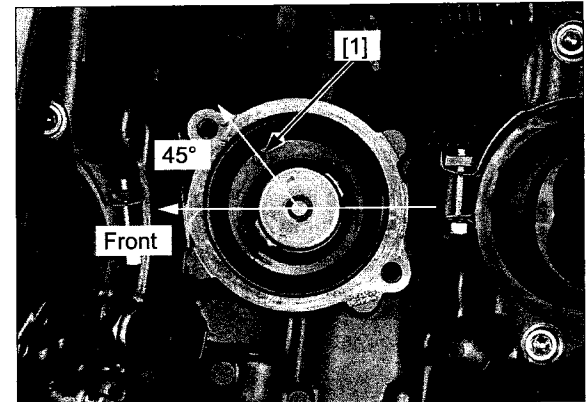
Remove the bolts [3] and thermostat cover [4].



Remove the thermostat [1] and washer [2] from the upper crankcase.

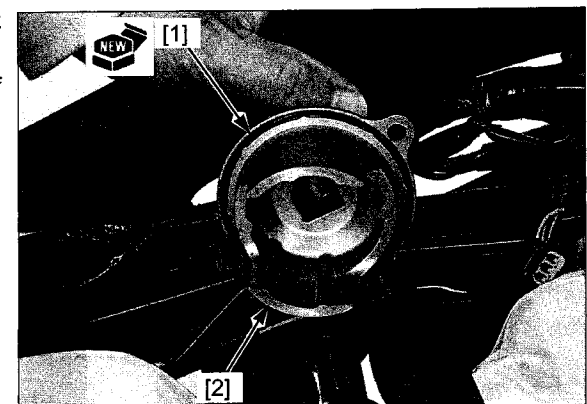


At the installation of the thermostat, turn the bleeding plug [1] in the direction as shown.



Install a new O-ring [1] into the groove of the thermostat cover [2].

Install the removed parts in the reverse order of removal.

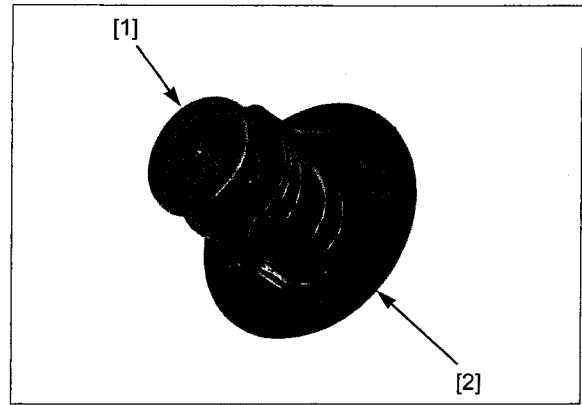




## COOLING SYSTEM

### INSPECTION

Visually inspect the thermostat [1] for damage.  
Check the seal ring [2] for deterioration or damage.



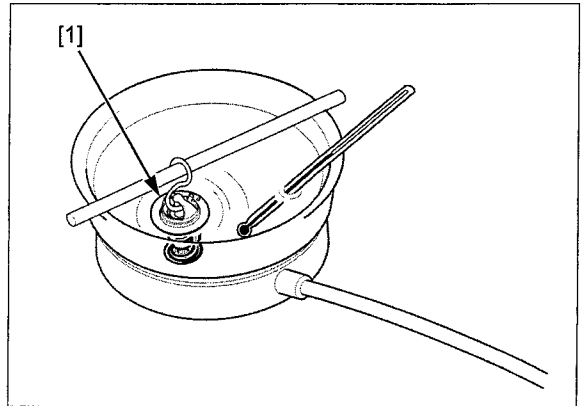
Wear insulated gloves and adequate eye protection.  
Keep flammable materials away from the electric heating element.

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

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

Suspend the thermostat [1] in heated water to check its operation.

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°C (176 – 183°F)

#### VALVE LIFT:

8 mm (0.3 in) minimum at 95°C (203°F)

## CYLINDER HEAD BLEEDING JOINT

### REMOVAL/INSTALLATION

Remove the throttle body (page 6-71).

Disconnect the air bleed hose [1] from the cylinder head bleeding joint [2].

Remove the bleeding joint and sealing washer [3].

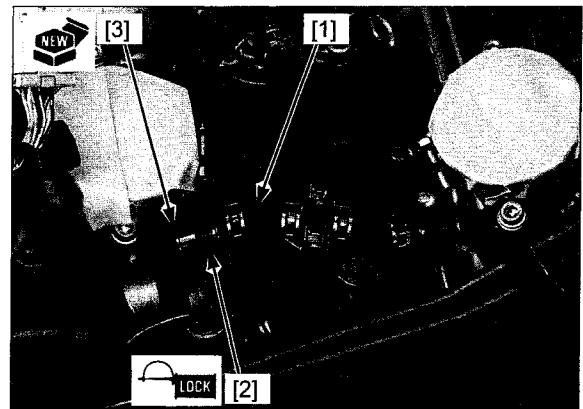
Clean the threads of the bleeding joint and apply a locking agent.

Install the bleeding joint with a new sealing washer.

**TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)**

Connect the air bleed hose to the bleeding joint securely.

Install the throttle body (page 6-76).

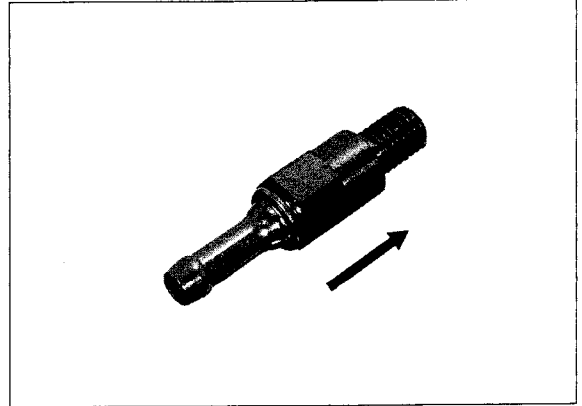


## INSPECTION

Check the bleeding joint for clogs.

### NOTE:

- Air can be easily passed in both direction of the bleeding joint.
- Water can be easily passed in the direction of the arrow, and is difficult to pass in the opposite direction.



## RADIATOR

### REMOVAL/INSTALLATION

Remove the following:

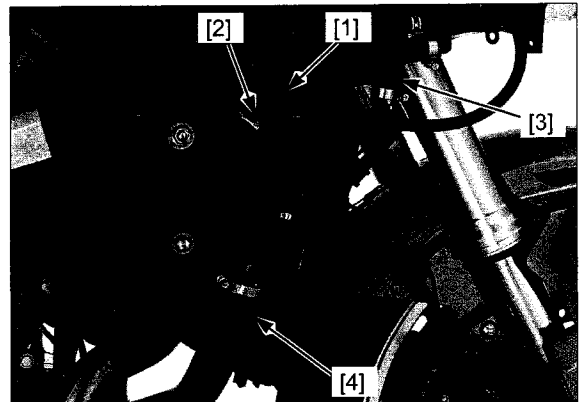
- under cowl (page 3-6)
- inner lower cowl (page 3-6)
- right and left middle cowls (page 3-7)

Drain the coolant (page 7-6).

Disconnect the right fan motor 2P (Black) connector [1].

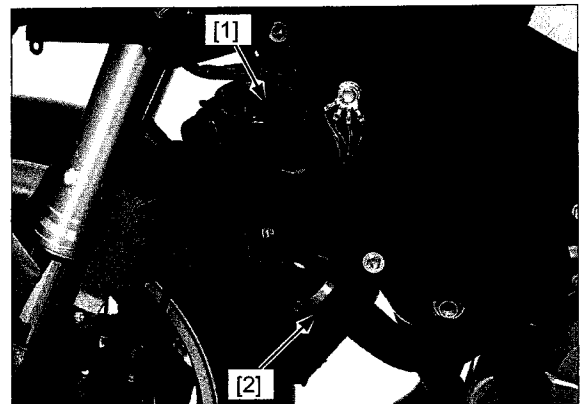
Remove the CKP sensor 2P (Black) connector [2] from the fan motor shroud.

Loosen the hose band screws and disconnect the filler neck joint hose [3] and right radiator hose [4].

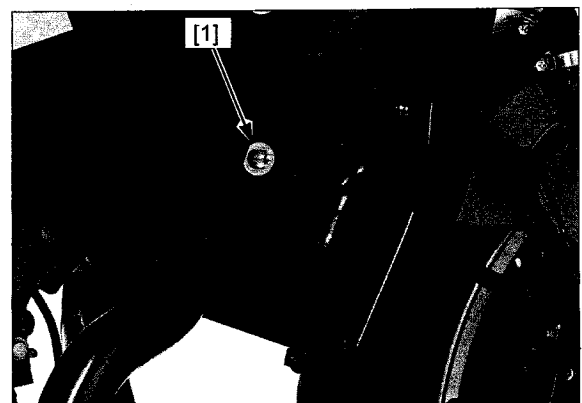


Disconnect the left fan motor 2P (Black) connector [1].

Loosen the hose band screw and disconnect the left radiator hose [2].

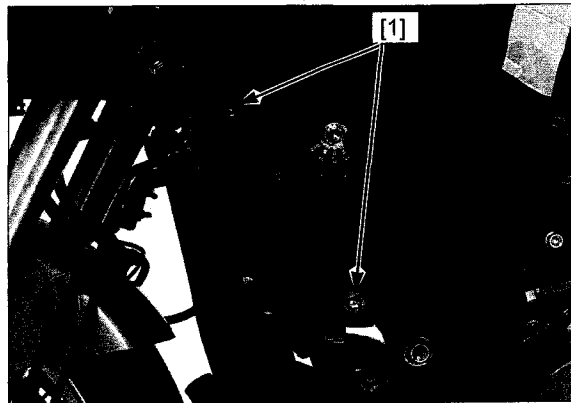


Remove the radiator right mounting bolt [1].



## COOLING SYSTEM

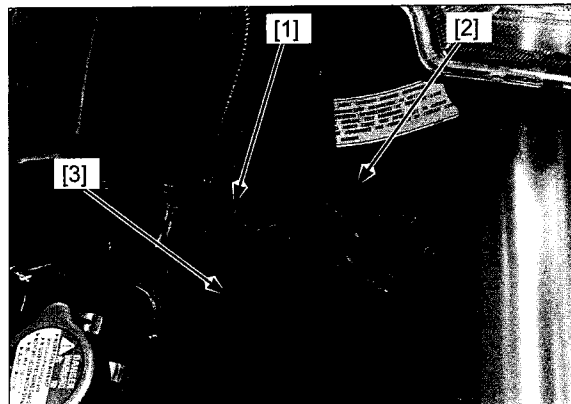
Remove the radiator left and upper mounting bolts [1].



Remove the wire clip [1] from the fan motor shroud.

*Be careful not to damage the radiator core.*

Release the upper mount grommet [2] from the boss and then remove the radiator [3].



Install the radiator in the reverse order of removal.

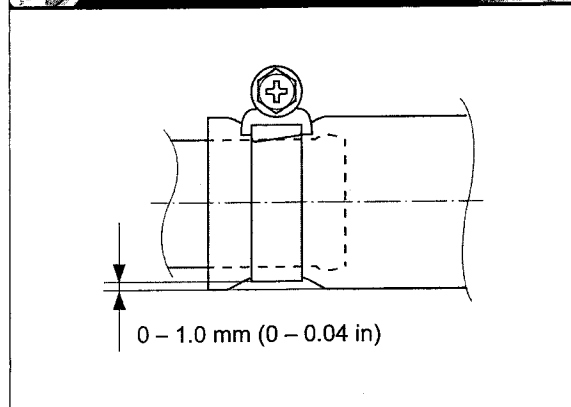
### NOTE:

- Route the wires and hoses properly (page 1-22).
- Set the boss in the radiator grommet securely.
- Tighten the hose band screws as shown.

Fill and bleed the cooling system (page 7-5).

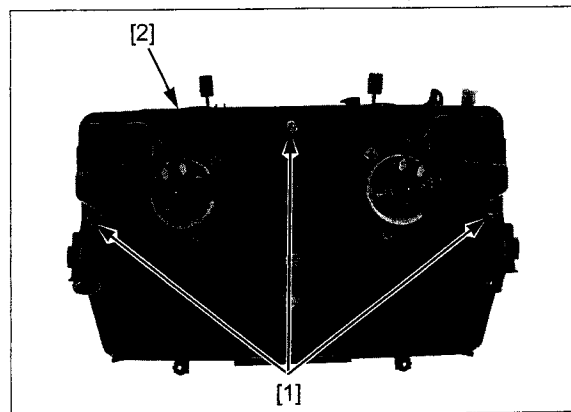
Install the following:

- right and left middle cowls (page 3-7)
- inner lower cowl (page 3-6)
- under cowl (page 3-6)

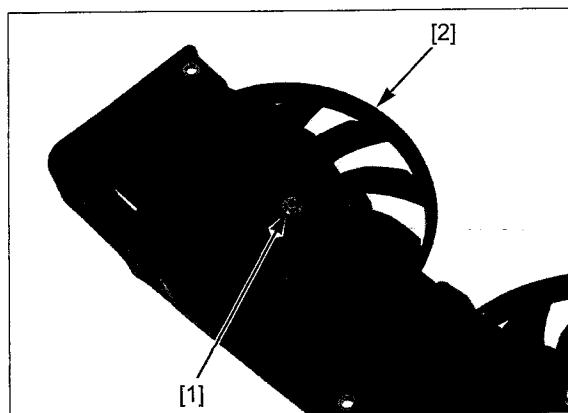


## DISASSEMBLY

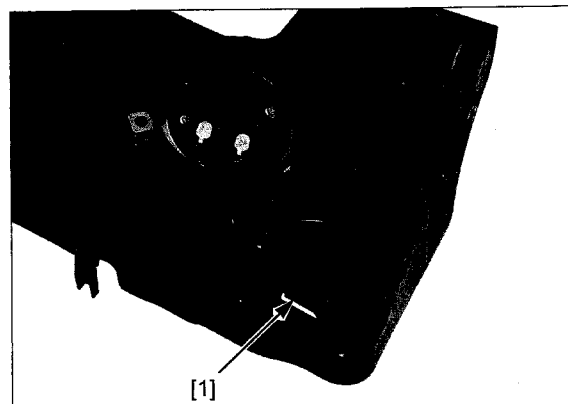
Remove the bolts [1] and fan motor shroud [2].



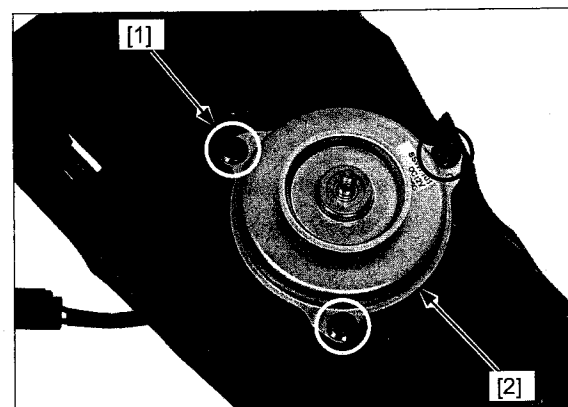
Remove the nut [1] and cooling fan [2] from the fan motor.



Remove the fan motor 2P (Black) connector [1] from the fan motor shroud tab.

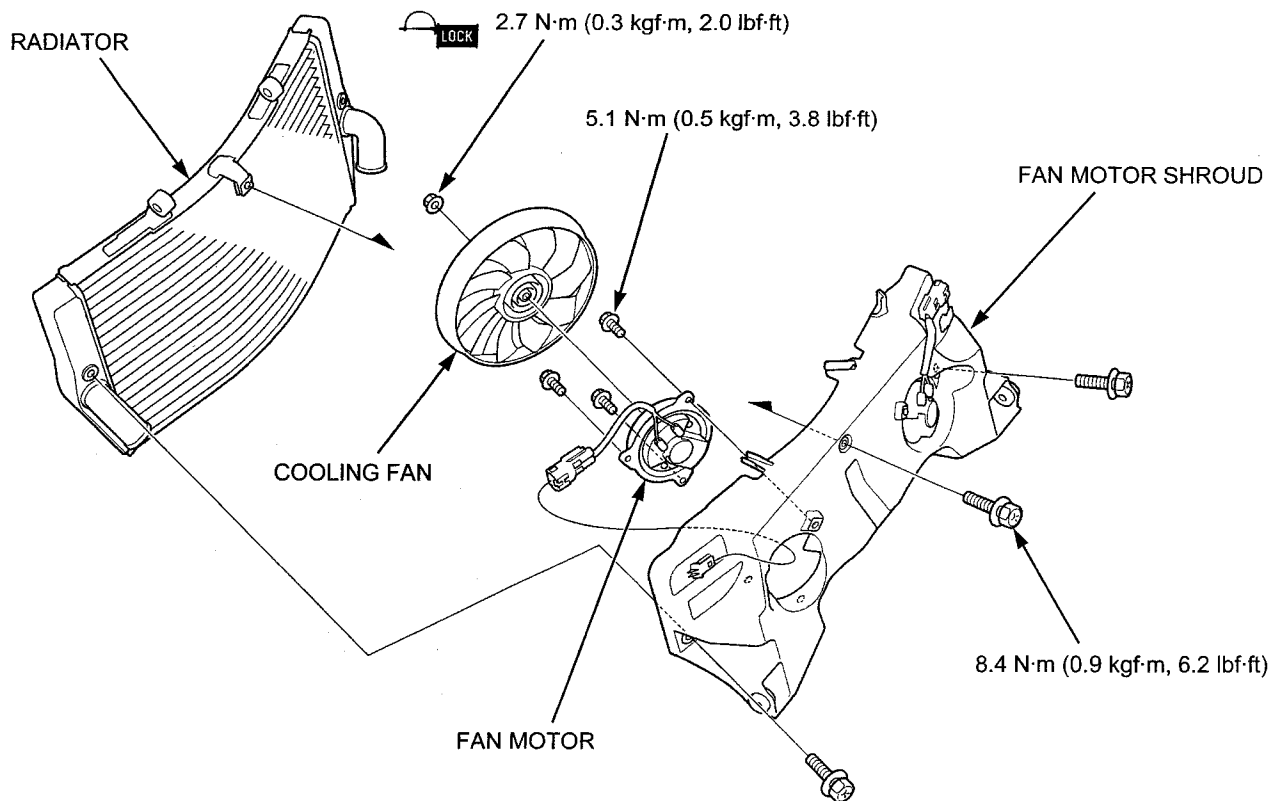


Remove the mounting bolts [1] and fan motor [2].  
Remove another fan motor in the same manner.



## COOLING SYSTEM

### ASSEMBLY



Assembly is in the reverse order of disassembly.

#### NOTE:

Note the installation direction of the fan motor wire.

#### TORQUE:

Fan motor mounting bolt:

5.1 N·m (0.5 kgf·m, 3.8 lbf·ft)

Cooling fan nut (apply a locking agent):

2.7 N·m (0.3 kgf·m, 2.0 lbf·ft)

Fan motor shroud mounting bolt:

8.4 N·m (0.9 kgf·m, 6.2 lbf·ft)

## RADIATOR RESERVE TANK

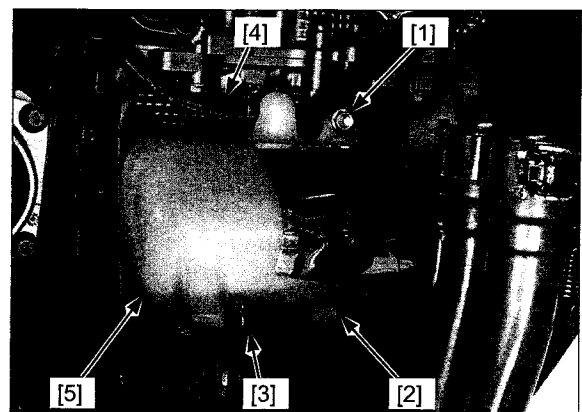
### REMOVAL/INSTALLATION

Remove the swingarm (page 16-12).

Remove the radiator reserve tank mounting bolt [1].

Pull the reserve tank boss [2] from the frame and drain the coolant from the filler neck.

Disconnect the siphon hose [3] and overflow hose [4] from the reserve tank [5].

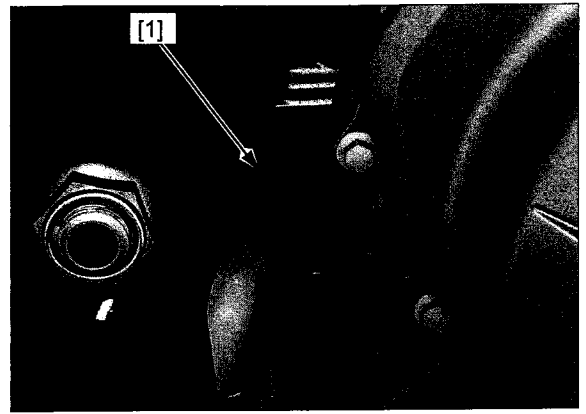


Installation is in the reverse order of removal.

Fill the system with the recommended coolant to the upper level line (page 7-5).

Install the reserve tank cap [1].

Install the swingarm (page 16-19).



## WATER PUMP

### MECHANICAL SEAL INSPECTION

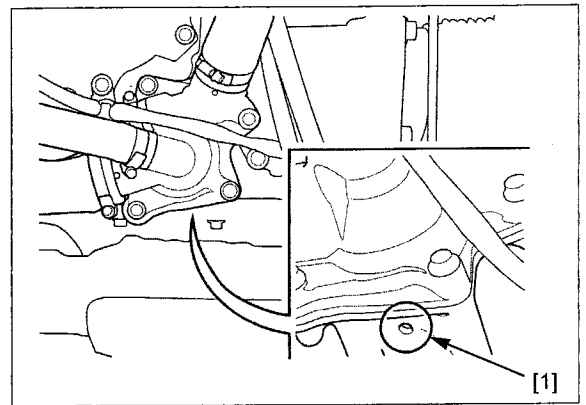
Remove the under cowl (page 3-6).

Check the bleed hole [1] of the water pump for signs of coolant leakage.

#### NOTE:

- A small amount of coolant weeping from the bleed hole is normal.
- Make sure there is no continuous coolant leakage from the bleed hole while the engine is running.

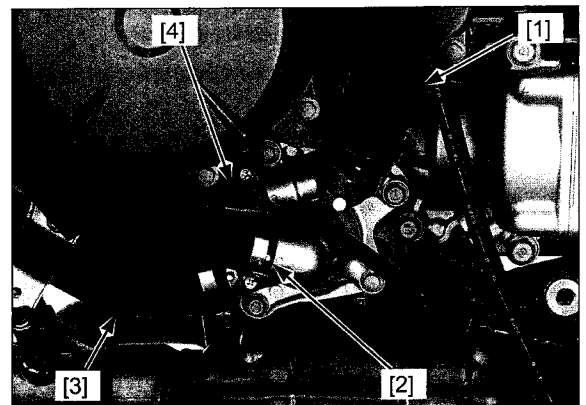
Replace the water pump as an assembly if necessary.



### REMOVAL

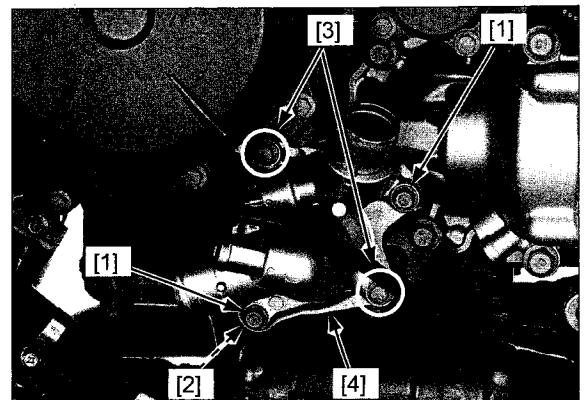
Drain the coolant (page 7-6).

Loosen the hose band screws and disconnect the water hose [1], water bottom hose [2], radiator hose [3] and oil cooler hose [4].



Remove the following:

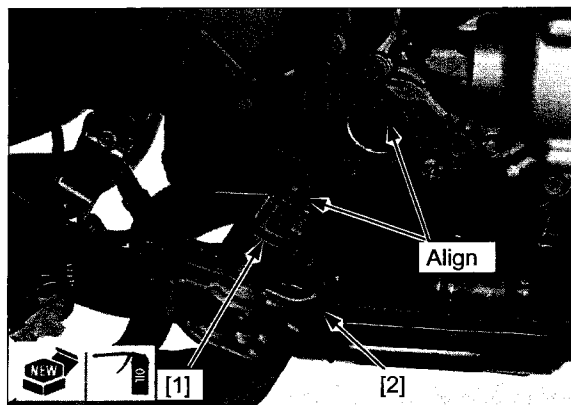
- cover bolts [1] and sealing washer [2]
- water pump mounting (small head) bolts [3]
- water pump cover/body [4]



### INSTALLATION

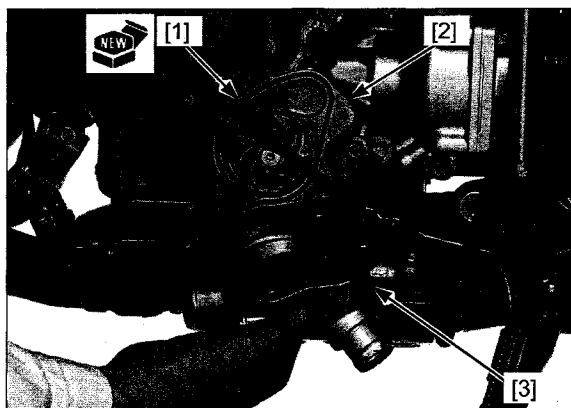
Apply engine oil to a new O-ring [1] and install it onto the stepped portion of the water pump body [2].

Install the water pump body into the crankcase while aligning the water pump shaft groove with the oil pump shaft end by turning the water pump impeller.



Install a new O-ring [1] into the groove in the water pump body [2].

Install the water pump cover [3].

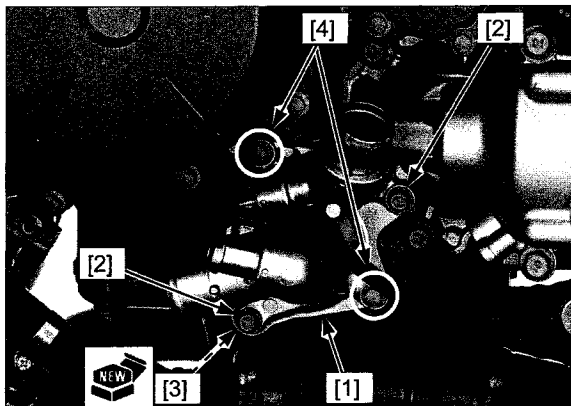


Align the bolt holes in the water pump body and crankcase, then install the water pump cover [1] with the cover bolts [2] and a new sealing washer [3].

Install and tighten the water pump mounting (small head) bolts [4] securely.

Tighten the water pump cover bolts to the specified torque.

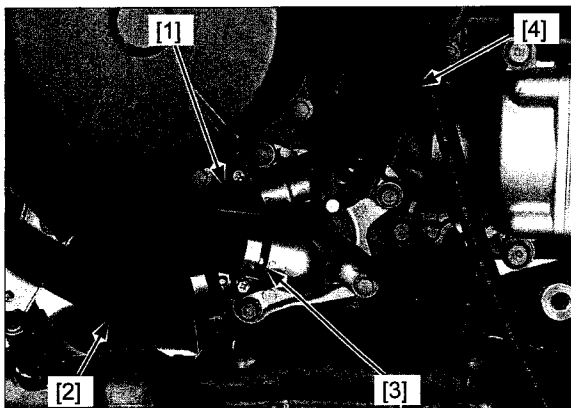
**TORQUE: 13 N·m (1.3 kgf·m, 10 lbf·ft)**



Connect the oil cooler water hose [1], radiator hose [2], water bottom hose [3] and water hose [4].

Fill and bleed the cooling system (page 7-5).

Install the under cowl (page 3-6).

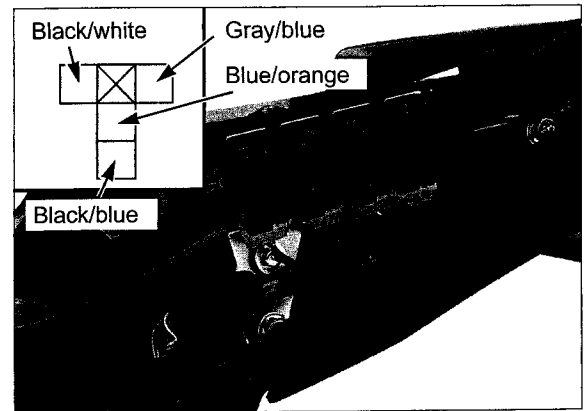


## FAN MOTOR RELAY

### INSPECTION

Remove the left rear cowl (page 3-4).

Remove the fan motor relay with the terminal color as shown on the illustration.



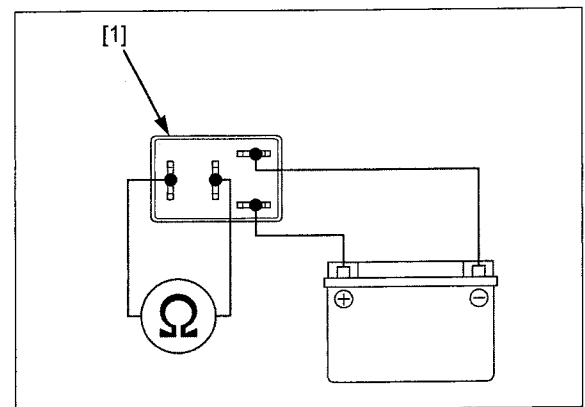
Connect an ohmmeter to the fan motor relay [1] terminals.

Connect a 12 V battery to the fan motor relay connector terminals as shown.

There should be continuity only when 12 V battery is connected.

If there is no continuity when the 12 V battery is connected, replace the fan motor relay.

Install the removed parts in the reverse order of removal.





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# MEMO

# 8. ENGINE REMOVAL/INSTALLATION

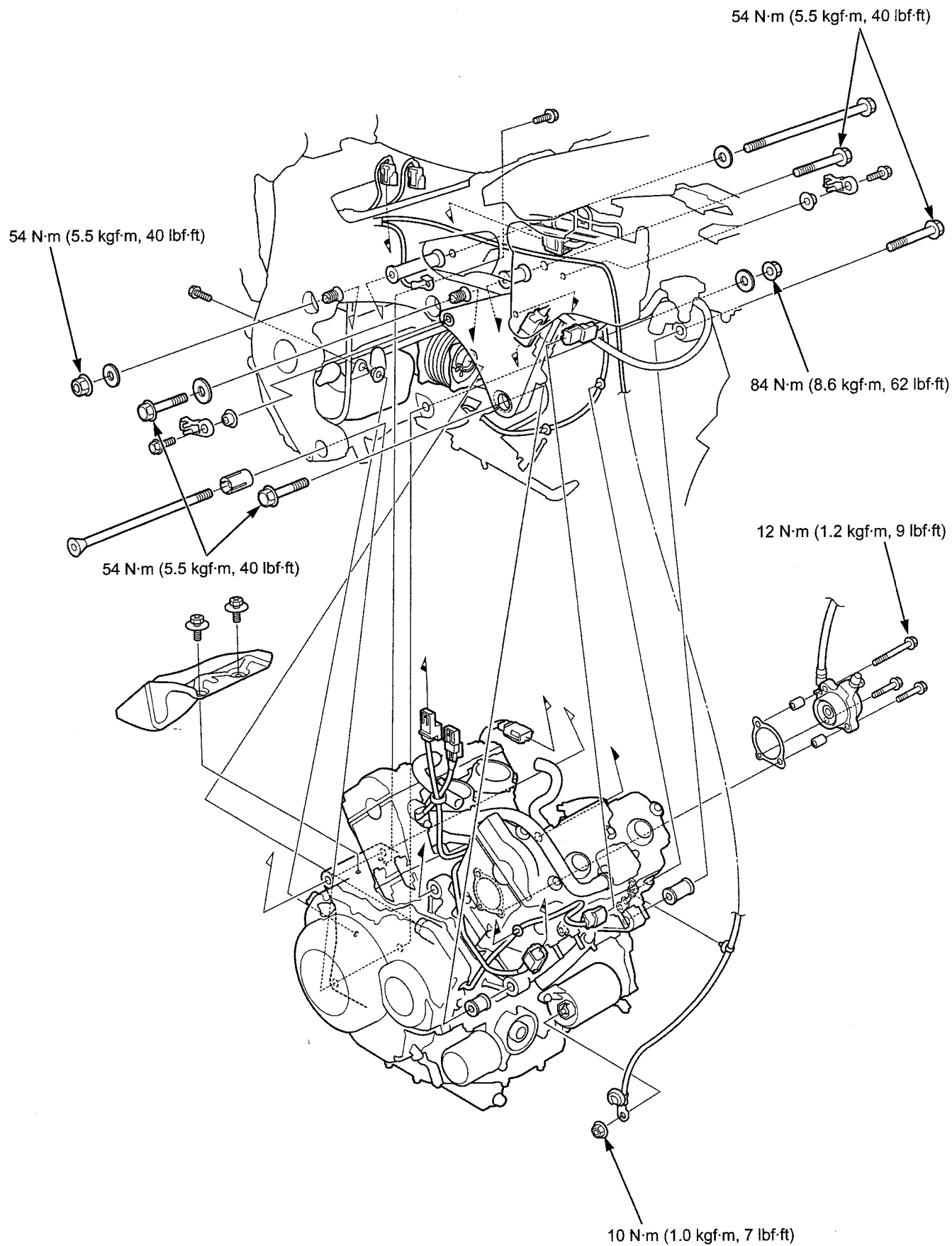
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COMPONENT LOCATION .....	8-2	ENGINE REMOVAL .....	8-4
SERVICE INFORMATION .....	8-3	ENGINE INSTALLATION .....	8-9

**ENGINE REMOVAL/INSTALLATION**

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**COMPONENT LOCATION**



## SERVICE INFORMATION

### GENERAL

- A hoist or equivalent is required to support the motorcycle when removing and installing the engine.
- A floor jack or other adjustable support is required to support and maneuver the engine.

### NOTICE

*Do not use the oil filter as a jacking point.*

- The following components can be serviced with the engine installed in the frame.
  - Alternator (page 11-4)
  - Clutch (page 10-14)
  - Flywheel/starter clutch (page 11-9)
  - Gearshift linkage (page 10-25)
  - Oil cooler (page 5-13)
  - Oil pump (page 5-7)
  - Rear camshaft/rocker arms (page 9-11)
  - Rear cylinder head/valves (page 9-20)
  - Water pump (page 7-13)
- The following components require engine removal for service.
  - Cam chain tensioners (page 9-31)
  - Crankcase/transmission (page 12-14)
  - Crankshaft (page 13-5)
  - Front camshaft/rocker arms (page 9-13)
  - Front cylinder head/valves (page 9-20)
  - Piston/cylinder (page 13-13)

### SERVICE DATA

ITEM		SPECIFICATIONS
Engine dry weight		88.8 kg (195.8 lbs)
Engine oil capacity	After disassembly	4.0 liter (4.2 US qt, 3.5 Imp qt)
Coolant capacity	Radiator and engine	3.6 liter (3.8 US qt, 3.2 Imp qt)

### TORQUE VALUES

Front engine hanger bolt	54 N·m (5.5 kgf·m, 40 lbf·ft)
Upper engine hanger bolt	54 N·m (5.5 kgf·m, 40 lbf·ft)
Rear upper engine hanger nut	54 N·m (5.5 kgf·m, 40 lbf·ft)
Rear lower engine hanger nut	84 N·m (8.6 kgf·m, 62 lbf·ft)
Engine hanger adjusting bolt	5.0 N·m (0.5 kgf·m, 3.7 lbf·ft)
Starter motor cable nut	10 N·m (1.0 kgf·m, 7 lbf·ft)

### ENGINE REMOVAL

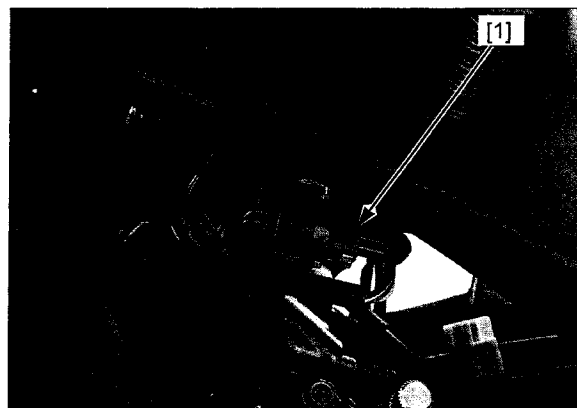
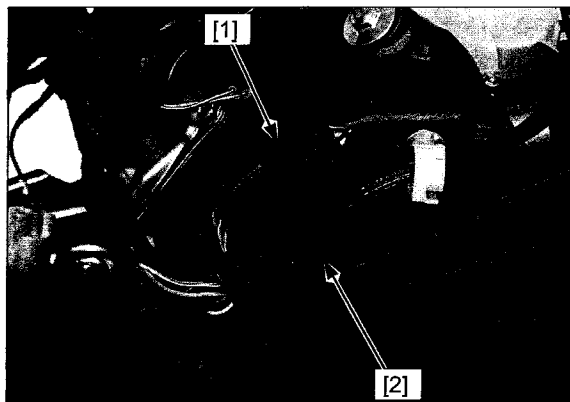
Remove the following:

- right and left middle cowls (page 3-7)
- under cowl (page 3-6)
- radiator (page 7-9)
- muffler and exhaust pipe (page 3-24)
- oil cooler (page 5-13)
- fuel tank (page 6-67)
- throttle body (page 6-71)
- clutch slave cylinder (not necessary to disconnect the hose) (page 10-11)
- gearshift arm (page 10-25)

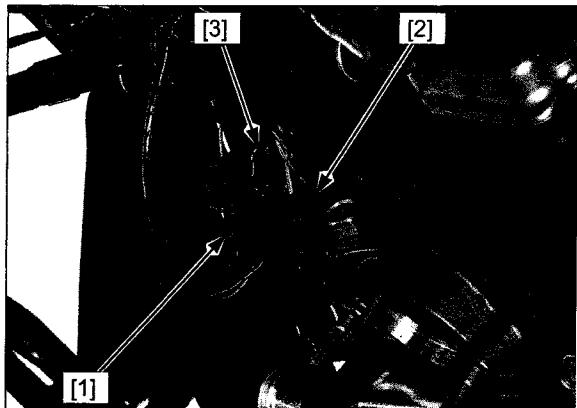
Remove the left engine heat guard and disconnect the alternator wire terminals (page 11-4).

Disconnect the knock sensor 3P (Black) connector [1] and CMP sensor 3P (Black) connector [2].

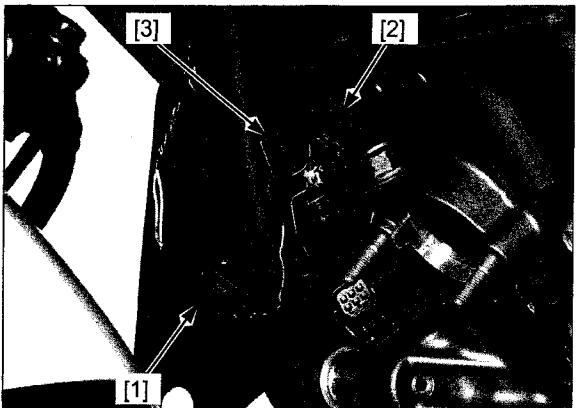
Disconnect the gear position sensor 8P (Black) connector [1].



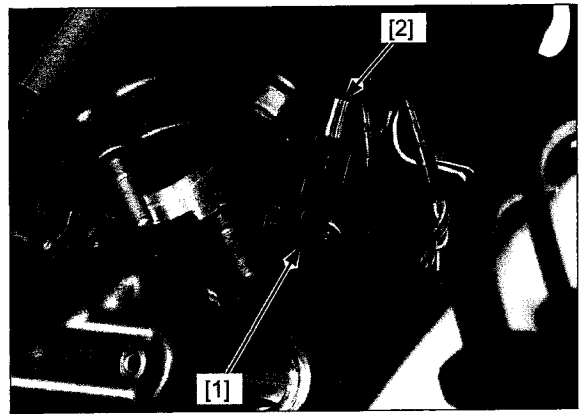
Remove the front wheel speed sensor 2P (Blue) connector [1] and engine sub-harness 6P (Black) connector [2] from the connector stay [3]. Disconnect the engine sub-harness 6P (Black) connector.



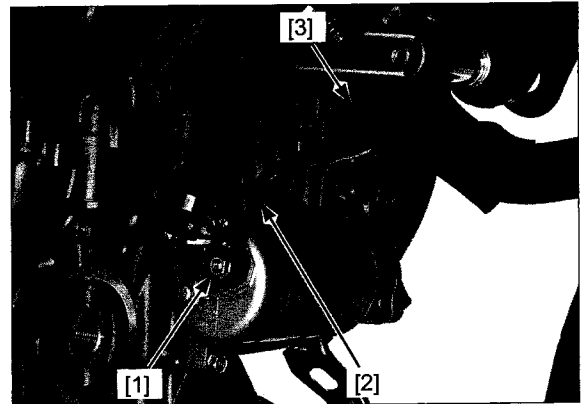
Disconnect the CKP sensor 2P (Black) connector [1]. Remove the wire clamp [2] from the connector stay [3].



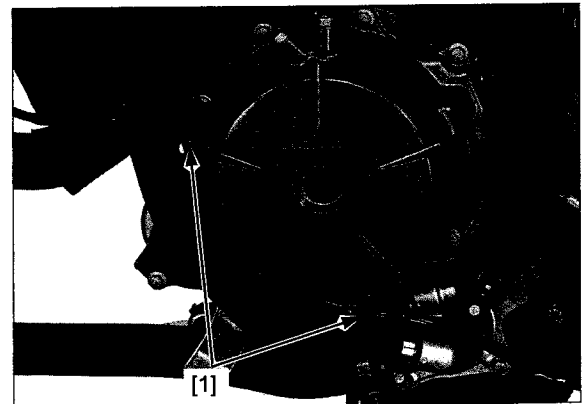
Remove the sidestand 2P (Black) connector [1] from the connector stay [2] and disconnect it.



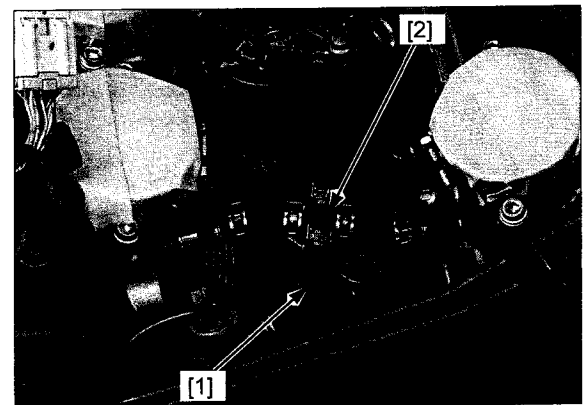
Remove the terminal nut [1] and disconnect the starter motor cable [2].  
Remove the wire clamp [3] from the stay.



Remove the wire clamps [1] from the stays.

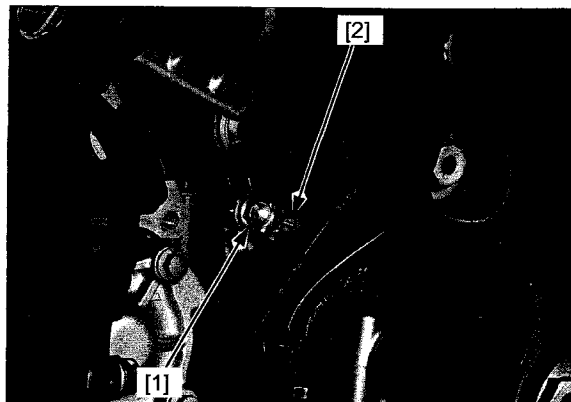


Disconnect the air bleed hose [1] from the hose joint [2].

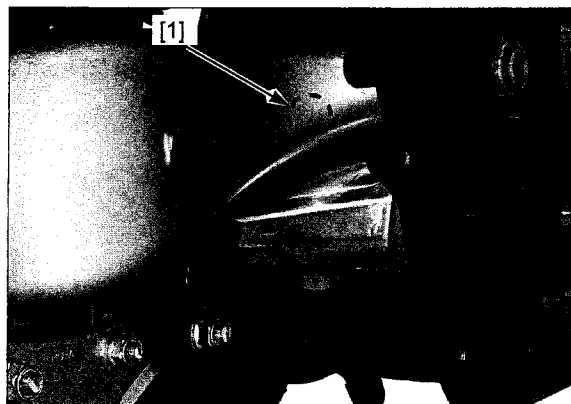


## ENGINE REMOVAL/INSTALLATION

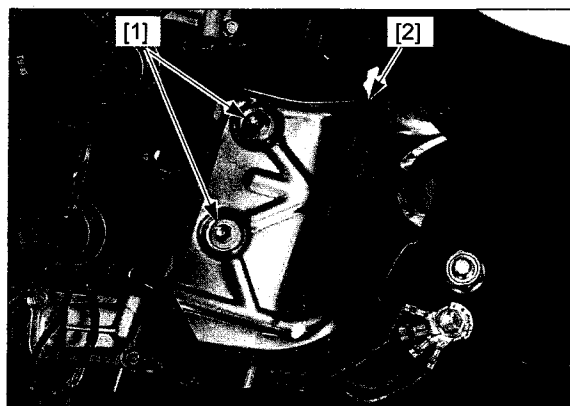
Remove the bolt [1] and ground cable [2].



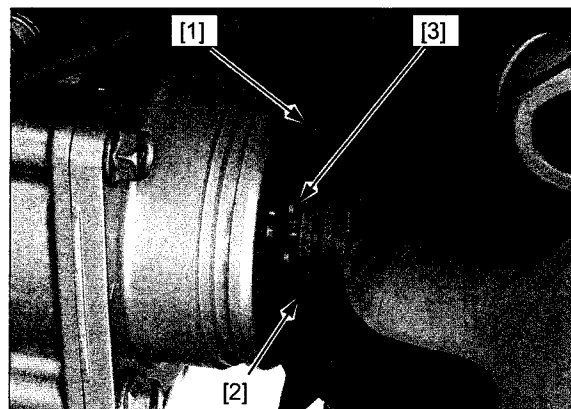
Remove the radiator reservoir tank mounting bolt [1].



Remove the bolts [1] and heat guard plate [2].



Open the drive shaft boot [1].  
Rotate the drive shaft [2] slowly until the snap ring [3] appears as shown.  
Remove the snap ring from the output shaft groove and slide the drive shaft rearward.

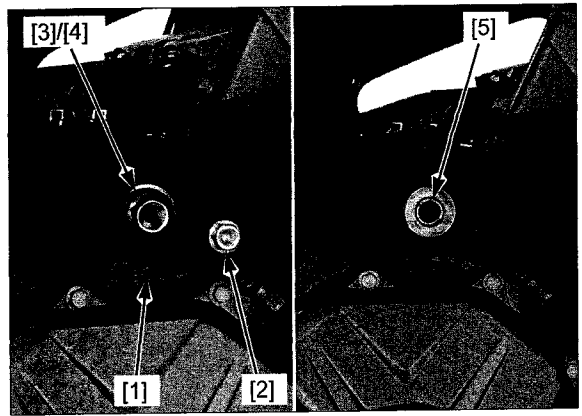


## ENGINE REMOVAL/INSTALLATION

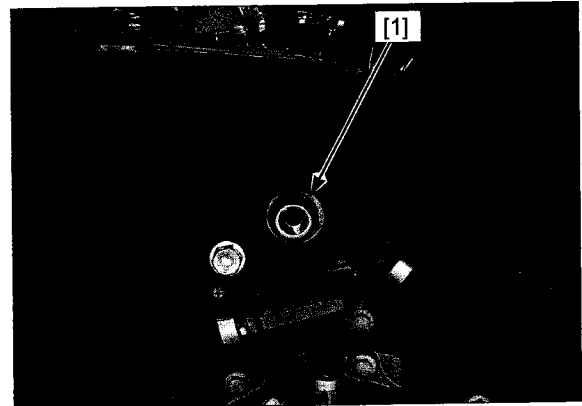
If the engine hanger bolt interferes with the right middle cowl stay [1], remove the bolt [2] and middle cowl stay.

Remove the right upper engine hanger bolt [3] and washer [4].

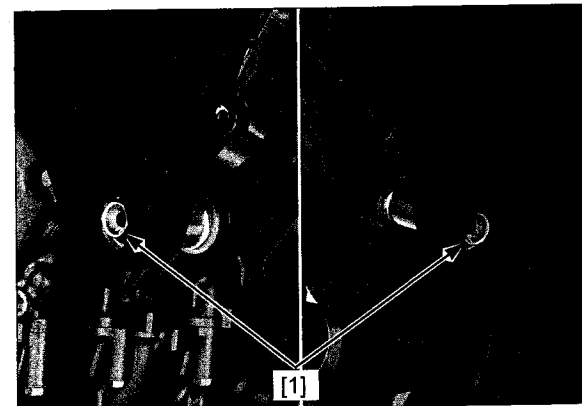
Turn the right upper adjusting bolt [5] counterclockwise fully.



Loosen the left upper engine hanger bolt [1].

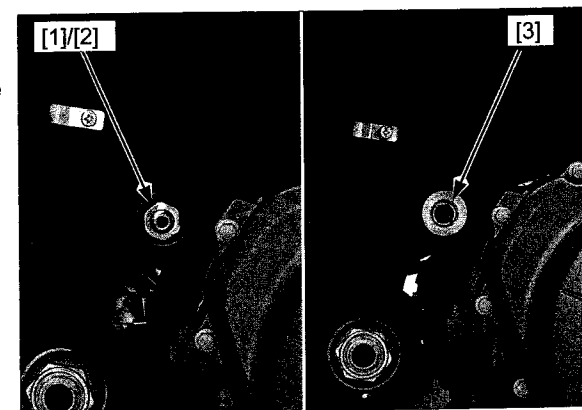


Loosen the right and left front engine hanger bolts [1].



Remove the rear upper engine hanger nut [1] and washer [2].

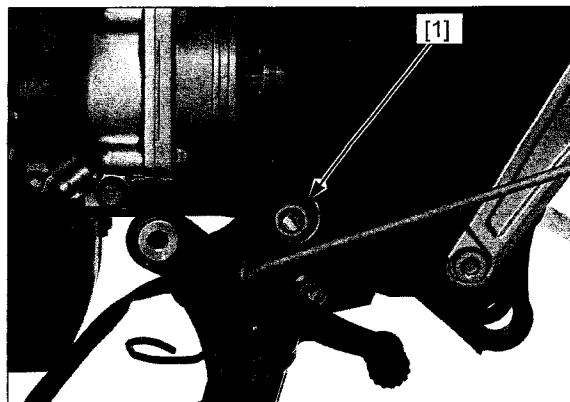
Turn the rear upper adjusting bolt [3] counterclockwise fully.





## ENGINE REMOVAL/INSTALLATION

Remove the rear lower engine hanger nut [1].



Support the motorcycle securely with a hoist or equivalent.

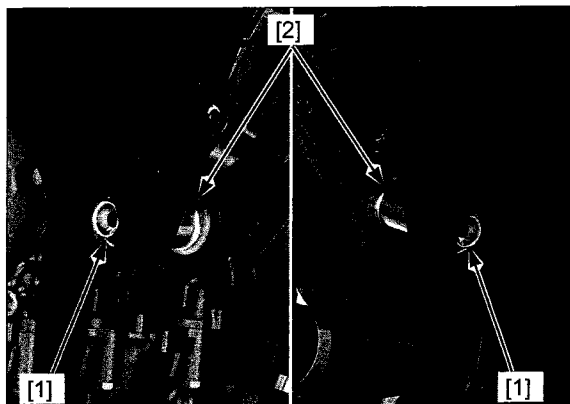
*Do not use the oil filter as a jacking point.*

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

### NOTE:

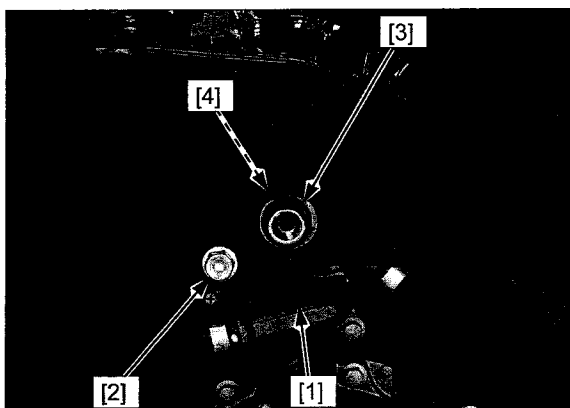
The jack height must be continually adjusted to relieve stress for ease of bolt removal.

Remove the right and left front engine hanger bolts [1]/ collars [2].

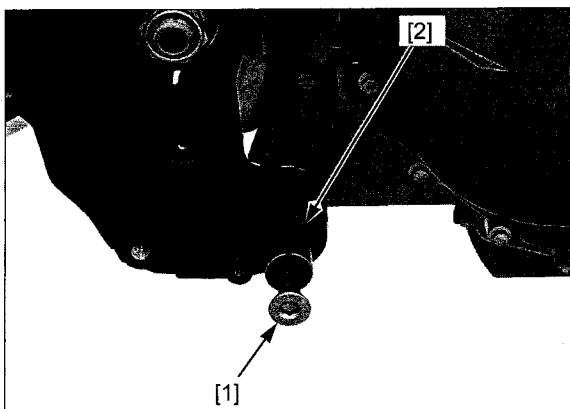


If the engine hanger bolt interferes with the left middle cowl stay [1], remove the bolt [2] and middle cowl stay.

Remove the left upper engine hanger bolt [3] and collar [4].

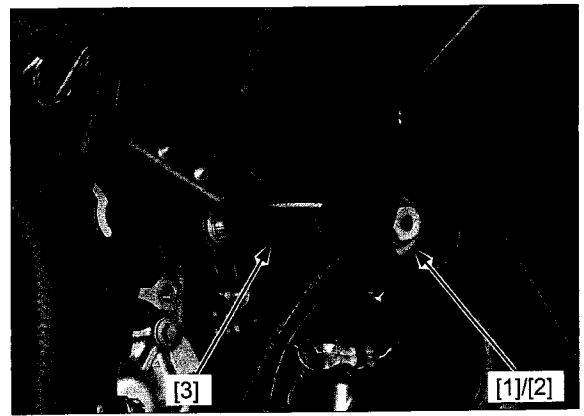


Remove the rear lower engine hanger bolt [1] and adjusting collar [2].

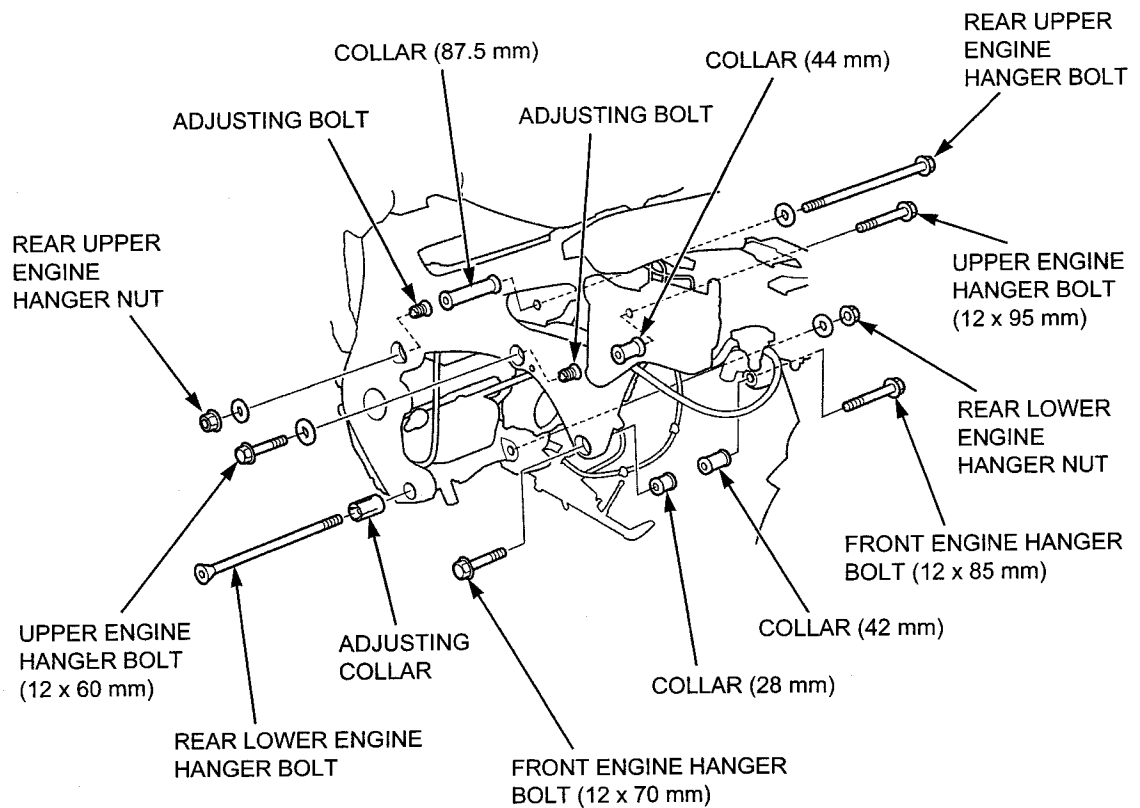


Remove the rear upper engine hanger bolt [1], washer [2] and collar [3].

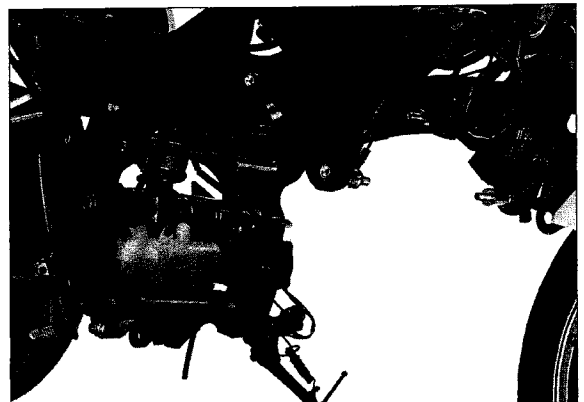
Carefully lower the jack or adjustable support, then remove the engine from the frame.



## ENGINE INSTALLATION

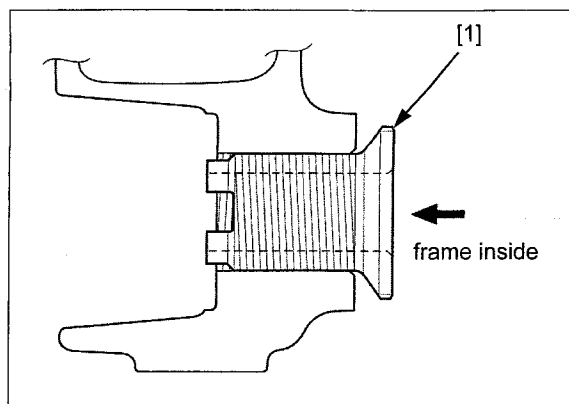


- Note the direction of the hanger bolts, collars and adjusting bolts.
- The jack height must be continually adjusted to relieve stress from the mounting fasteners.
- Route the wires, hoses and cables properly (page 1-22).
- Be sure to tighten all engine mounting fasteners to the specified torque in the specified sequence described on the following pages. If you make a mistake with the tightening torque or sequence, loosen all mounting fasteners, then tighten them again to the specified torque in the specified sequence.

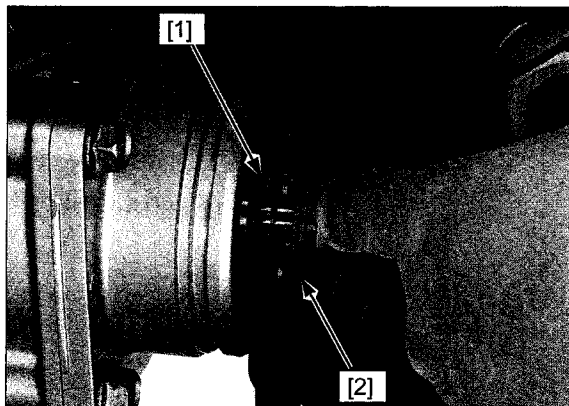


## ENGINE REMOVAL/INSTALLATION

Make sure that the upper engine hanger and rear upper engine hanger adjusting bolts [1] are fully seated on the frame.



Install the engine while aligning the splines of the output shaft [1] and drive shaft [2].

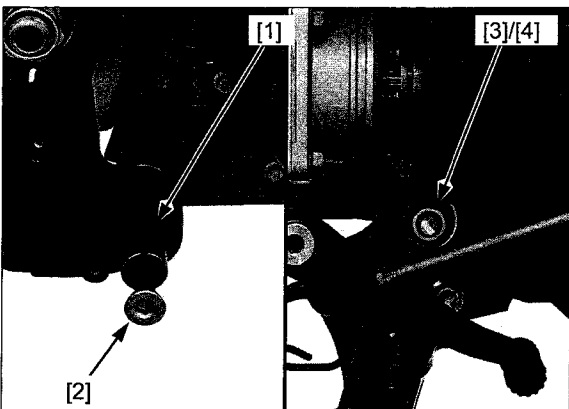


Install the collar (87.5 mm) [1] between the engine and frame, then install the rear upper engine hanger bolt [2] and washer [3] from the left side.

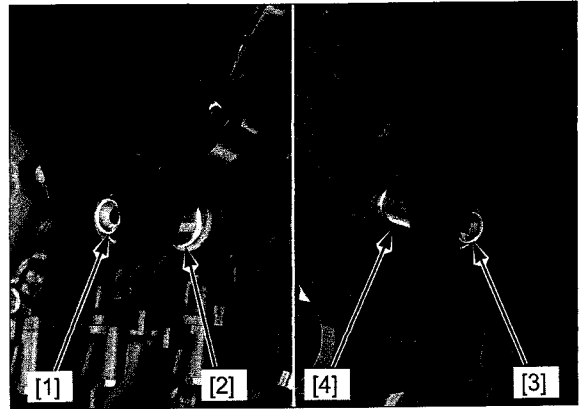


Install the adjusting collar [1] and rear lower engine hanger bolt [2] from the right side.

Install the washer [3] and rear lower engine hanger nut [4].

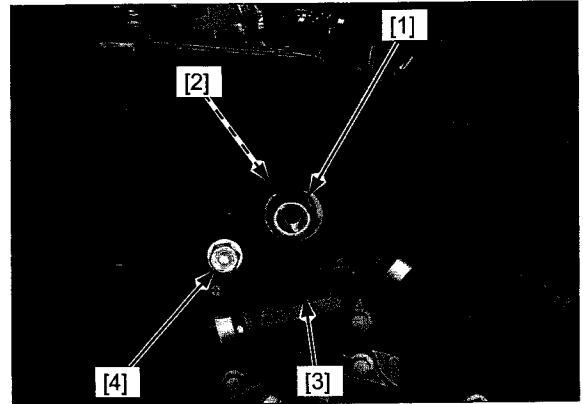


Install the right front engine hanger bolt (12 x 70 mm) [1] with the 28 mm collar [2] and left front engine hanger bolt (12 x 85 mm) [3] with the 42 mm collar [4].



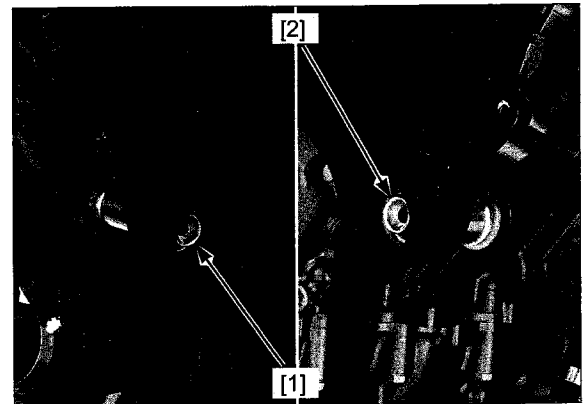
Install the left upper engine hanger bolt (12 x 95 mm) [1] with the collar (44 mm) [2].

Install the left middle cowl stay [3] and tighten the bolt [4] securely if they were removed.



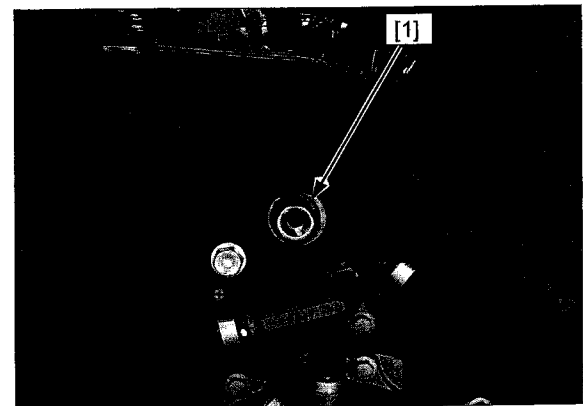
Tighten the left front engine hanger bolt [1], then the right front engine hanger bolt [2] to the specified torque.

**TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)**



Tighten the left upper engine hanger bolt [1] to the specified torque.

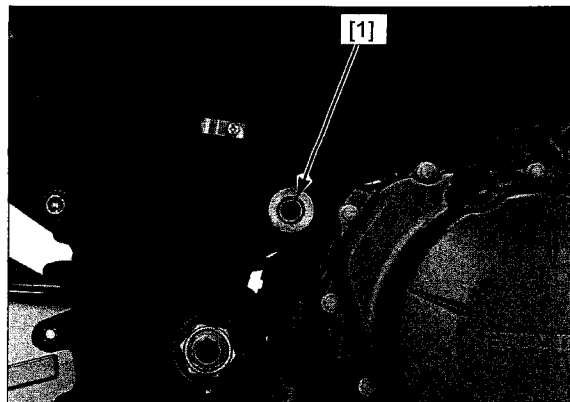
**TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)**



## ENGINE REMOVAL/INSTALLATION

Turn the rear upper engine hanger adjusting bolt [1] clockwise until it seats to the engine, then tighten it to the specified torque.

**TORQUE: 5.0 N·m (0.5 kgf·m, 3.7 lbf·ft)**



Turn the upper engine hanger adjusting bolt [1] clockwise until it seats to the engine, then tighten it to the specified torque.

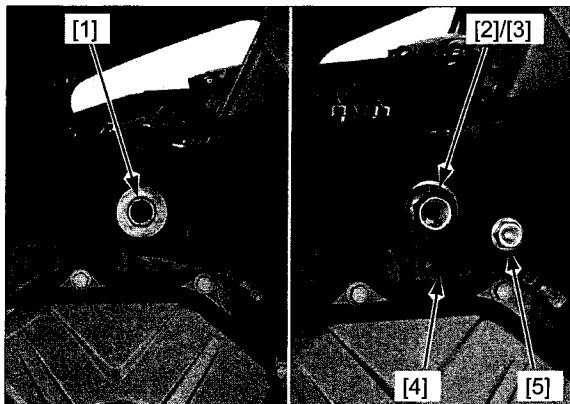
**TORQUE: 5.0 N·m (0.5 kgf·m, 3.7 lbf·ft)**

Install the washer [2] and right upper engine hanger bolt (12 x 60 mm) [3].

Tighten the bolts to the specified torque.

**TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)**

Install the right middle cowl stay [4] and tighten the bolt [5] securely if they were removed.

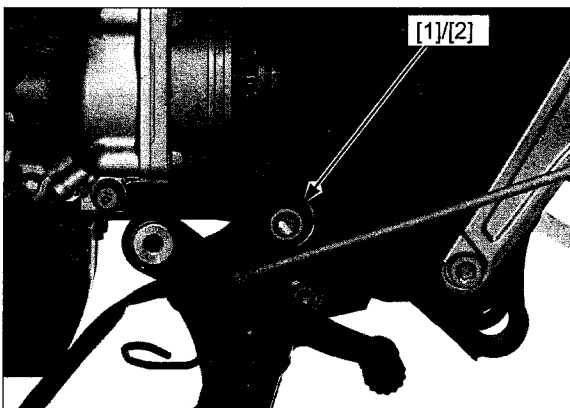


Install the washer [1] and rear lower engine hanger nut [2].

Tighten the nut to the specified torque.

**TORQUE: 84 N·m (8.6 kgf·m, 62 lbf·ft)**

*Hold the hanger bolt from the right side if it turns together with the nut.*

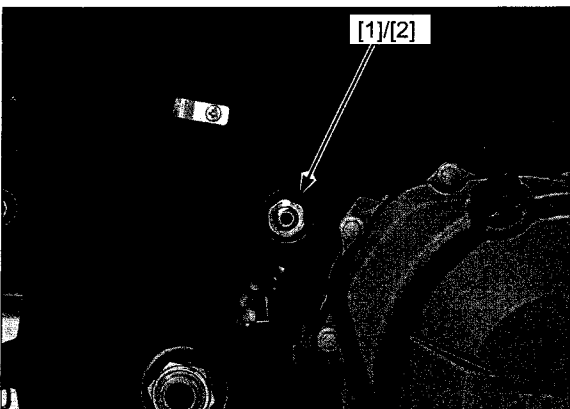


Install the washer [1] and rear upper engine hanger nut [2].

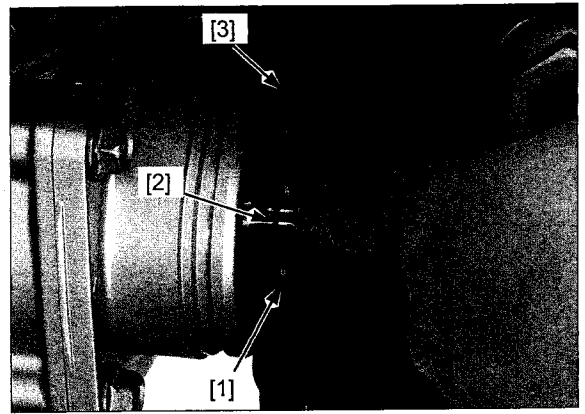
Tighten the nut to the specified torque.

**TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)**

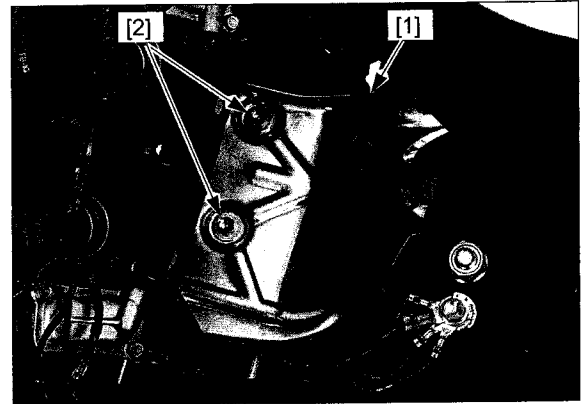
*Hold the hanger bolt from the left side if it turns together with the nut.*



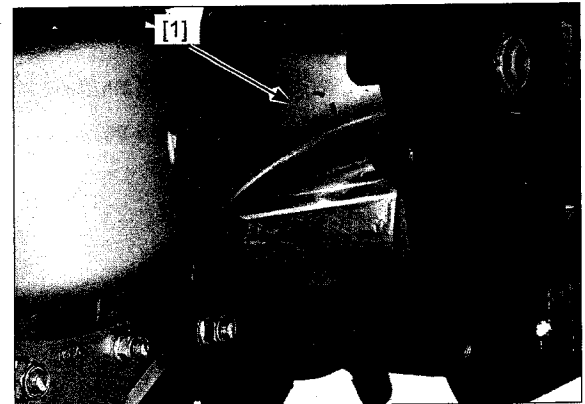
Set the snap ring [1] into the output shaft groove [2] securely.  
Install the drive shaft boot [3] securely.



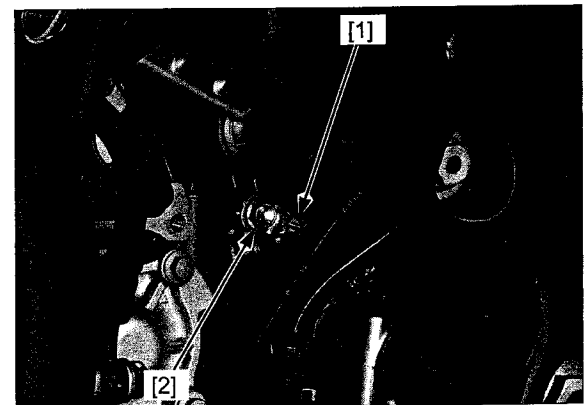
Install the heat guard plate [1] and tighten the bolts [2] securely.



Install and tighten the radiator reservoir tank mounting bolt [1].

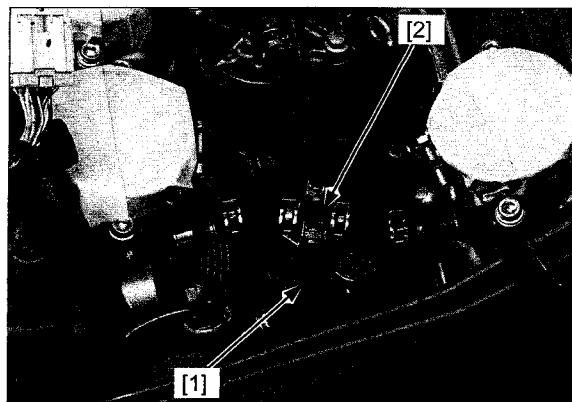


Install the ground cable [1] and tighten the bolt [2] securely.

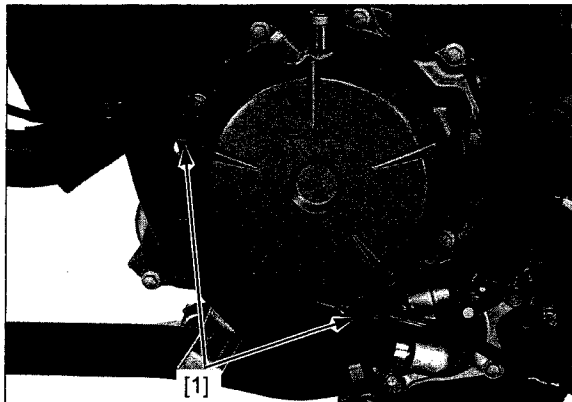


## ENGINE REMOVAL/INSTALLATION

Connect the air bleed hose [1] to the hose joint [2].



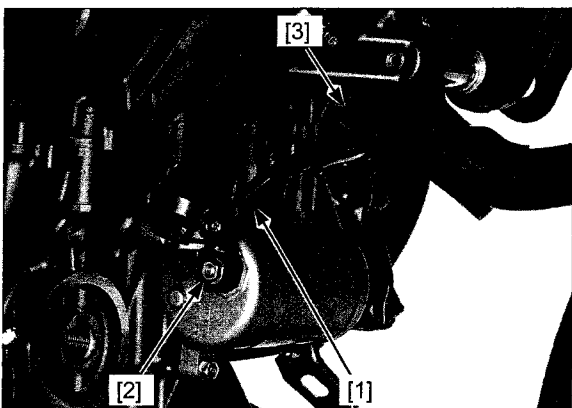
Install the wire clamps [1].



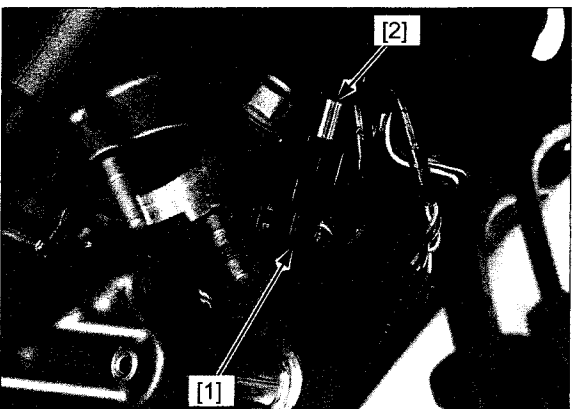
Connect the starter motor cable [1] and tighten the terminal nut [2] securely.

**TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)**

Install the clamp [3] to the stay.

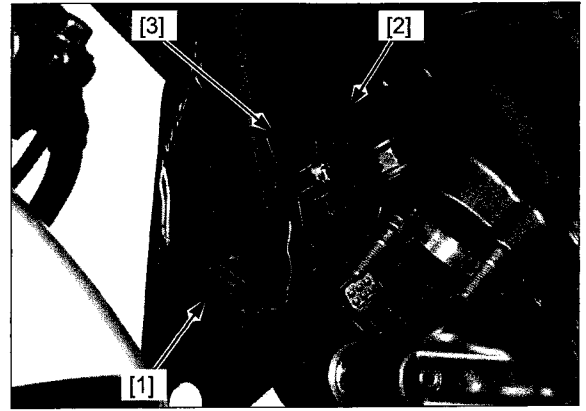


Connect the sidestand 2P (Black) connector [1] and install it to the connector stay [2].

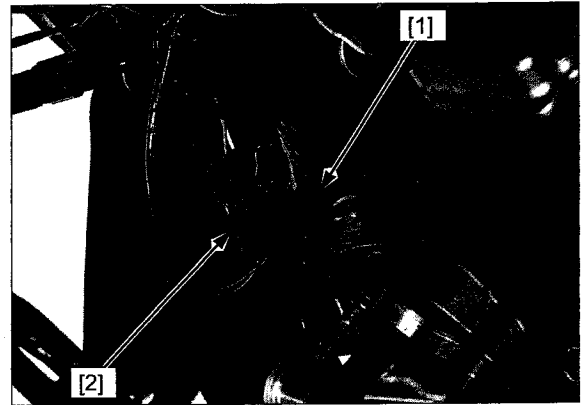


Connect the CKP sensor 2P (Black) connector [1].

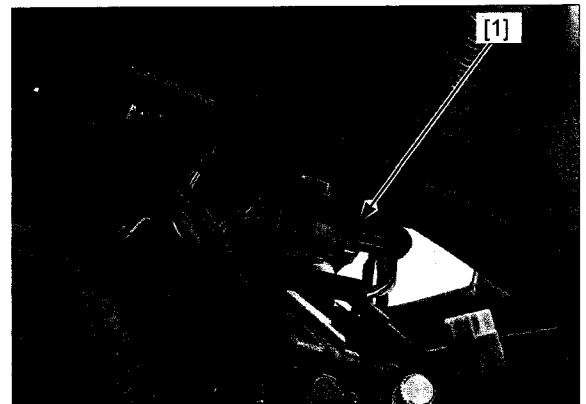
Install the wire clamp [2] to the connector stay [3], then install the 2P connector.



Install the engine sub-harness 6P (Black) connector [1] and front wheel speed sensor 2P (Blue) connector [2] to the connector stay.



Connect the gear position sensor 8P (Black) connector [1].



Connect the CMP sensor 3P (Black) connector [1] and knock sensor 3P (Black) connector [2].

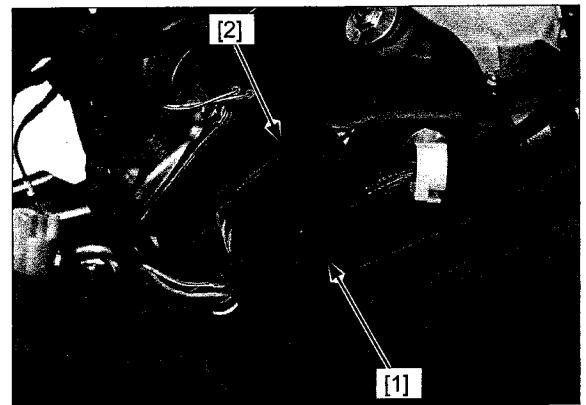
Connect the alternator wire terminals and install the left engine heat guard (page 11-6).

Install the following:

- gearshift arm (page 10-29)
- clutch slave cylinder with a new gasket (page 10-12)
- throttle body (page 6-76)
- fuel tank (page 6-68)
- muffler and exhaust pipe (page 3-27)
- oil cooler (page 5-13)
- radiator (page 7-9)
- right and left middle cowls (page 3-7)
- under cowl (page 3-6)

Fill the crankcase with the recommended engine oil (page 4-12).

Fill and bleed the cooling system (page 7-5).





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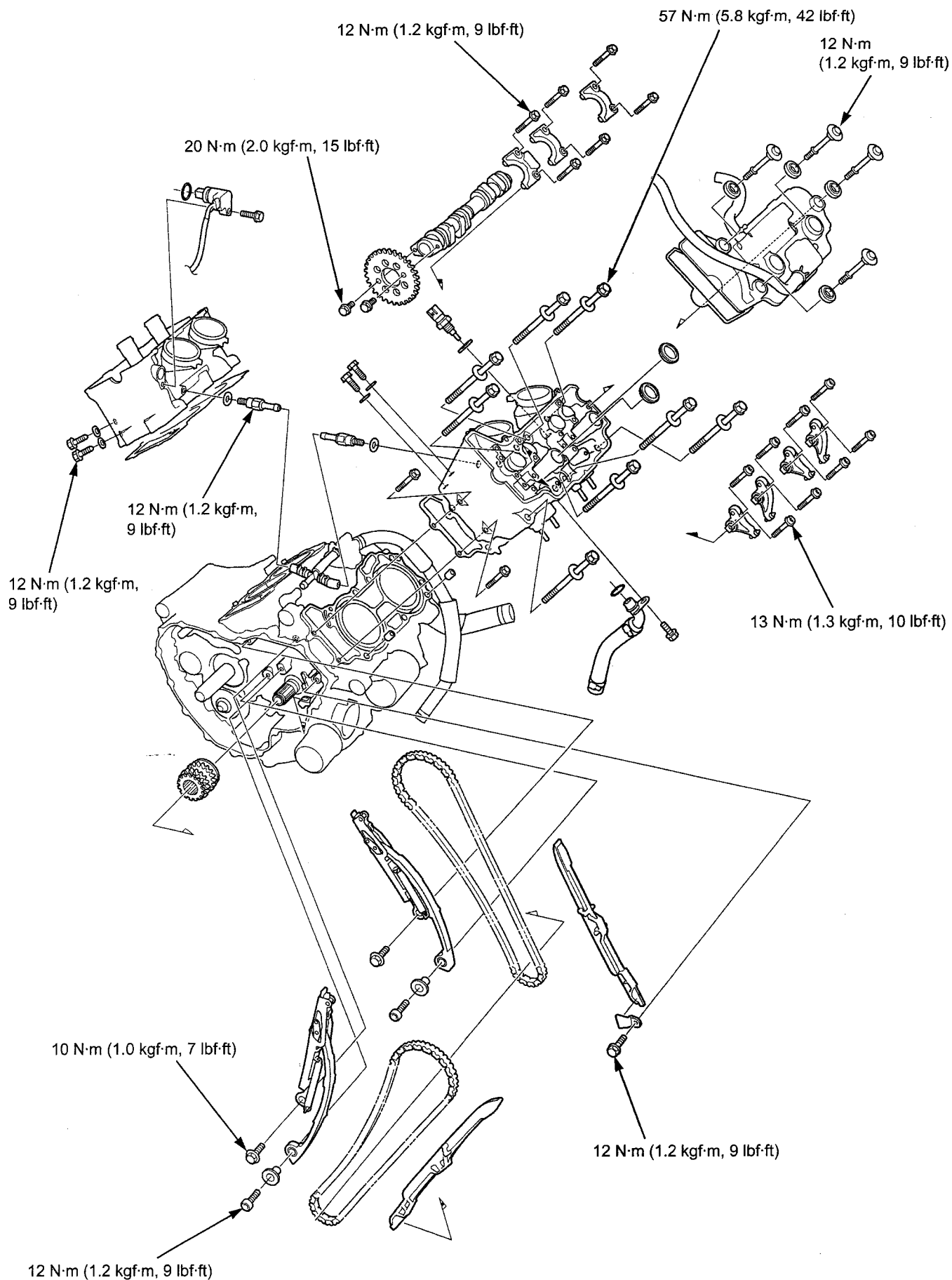
# MEMO

## 9. CYLINDER HEAD/VALVES

---

COMPONENT LOCATION .....	9-2	CYLINDER HEAD DISASSEMBLY .....	9-21
SERVICE INFORMATION .....	9-3	CYLINDER HEAD INSPECTION .....	9-22
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COMPONENT LOCATION



## SERVICE INFORMATION

### GENERAL

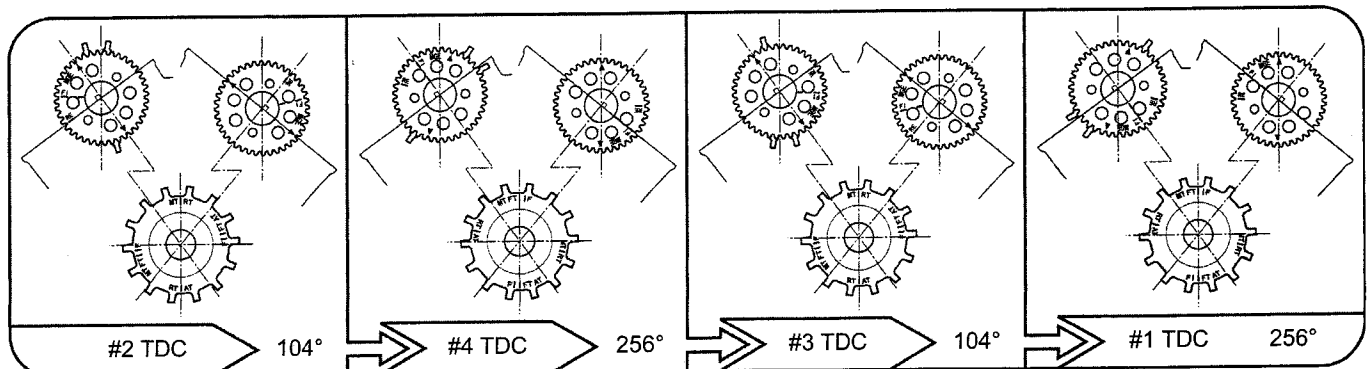
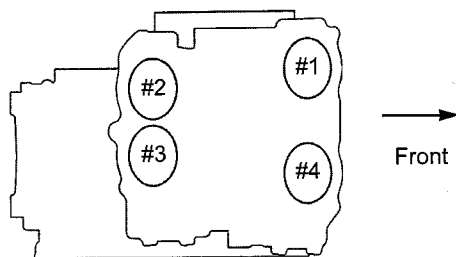
- This section covers service of the cylinder head, valves, camshaft and rocker arms.
- The camshaft, rocker arms and rear cylinder head services can be done with the engine installed in the frame.
- The front cylinder head cannot be removed with the engine installed in the frame.
- When disassembling, 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 not to damage the mating surfaces when removing the cylinder head cover and cylinder head.

### SPECIFICATIONS

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Cylinder compression			1,600 kPa (16.32 kgf/cm <sup>2</sup> , 232 psi) at 300 rpm	—
Valve clearance	IN		0.16 ± 0.03 (0.006 ± 0.001)	—
	EX	Valve side	0.30 ± 0.02 (0.012 ± 0.001)	—
		Roller side	0.21 ± 0.02 (0.008 ± 0.001)	—
Camshaft	Cam lobe height	IN	37.12 – 37.20 (1.461 – 1.465)	37.10 (1.461)
		EX	34.86 – 34.94 (1.372 – 1.376)	34.84 (1.372)
	Runout		—	0.05 (0.002)
Valve lifter	Oil clearance		0.020 – 0.062 (0.0008 – 0.0024)	0.10 (0.004)
	Valve lifter O.D.		28.978 – 28.993 (1.1409 – 1.1415)	28.97 (1.141)
	Valve lifter bore I.D.		29.010 – 29.026 (1.1421 – 1.1428)	29.04 (1.143)
Valve, valve guide	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/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)	0.075 (0.0030)
		EX	0.020 – 0.047 (0.0008 – 0.0019)	0.085 (0.0033)
	Valve guide projection above cylinder head	IN	13.40 – 13.70 (0.528 – 0.539)	—
		EX	22.50 – 22.80 (0.886 – 0.898)	—
	Valve seat width		0.90 – 1.10 (0.035 – 0.043)	1.5 (0.06)
Valve spring free length	IN	Outer	37.06 (1.459)	36.30 (1.429)
		Inner	33.24 (1.309)	32.50 (1.280)
	EX		43.01 (1.693)	42.30 (1.665)
Cylinder head warpage			—	0.10 (0.004)

### VALVE TIMING/CYLINDER NUMBER

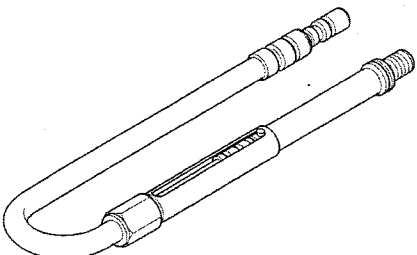
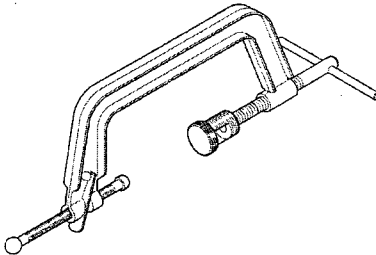
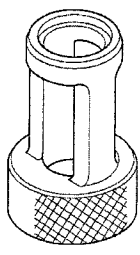
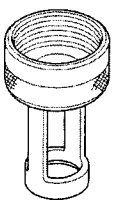
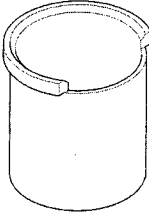
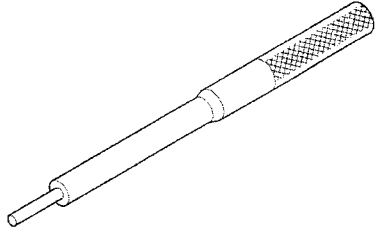


## CYLINDER HEAD/VALVES

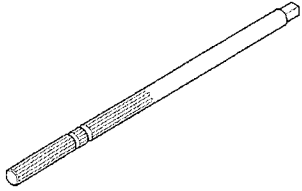
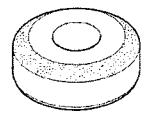
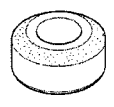
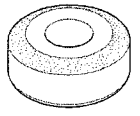
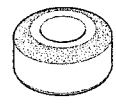
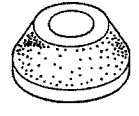
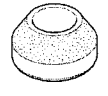
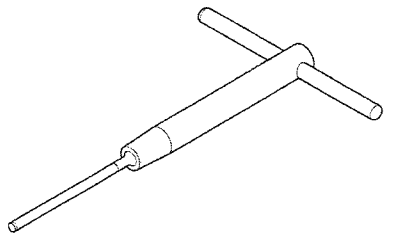
### TORQUE VALUES

Cylinder head mounting bolt	57 N·m (5.8 kgf·m, 42 lbf·ft)	Apply oil to the threads and seating surface.
Rocker arm shaft socket bolt	13 N·m (1.3 kgf·m, 10 lbf·ft)	Apply oil to the threads and seating surface.
Camshaft holder bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	Apply oil to the threads and seating surface.
Cylinder head bleeding joint	12 N·m (1.2 kgf·m, 9 lbf·ft)	Apply a locking agent to the threads.
Insulator socket bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	
Cam sprocket bolt (front)	20 N·m (2.0 kgf·m, 15 lbf·ft)	Apply a locking agent to the threads.
Cam sprocket UBS bolt (rear)	20 N·m (2.0 kgf·m, 15 lbf·ft)	Apply a locking agent to the threads.
Cylinder head stud bolt (exhaust pipe stud)	See page 3-27	
Cam chain tensioner bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	
Cam chain tensioner base special bolt	10 N·m (1.0 kgf·m, 7 lbf·ft)	Apply a locking agent to the threads.
Cam chain tensioner pivot socket bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	Apply a locking agent to the threads.
Rear cam chain guide set plate bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	Apply a locking agent to the threads.
Cylinder head cover bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	

### TOOLS

<p>Compression gauge attachment 07RMJ-MY50100</p>  <p>or equivalent commercially available in U.S.A.</p>	<p>Valve spring compressor 07757-0010000</p> 	<p>Valve spring compressor attachment 07959-KM30101</p>  <p>for intake valve spring</p>
<p>Valve spring compressor attachment 07JME-KY20100</p>  <p>for exhaust valve spring</p>	<p>Tappet hole protector 07HMG-MR70002</p>  <p>Not available in U.S.A. (Make your own tool from a 35 mm film container)</p>	<p>Valve guide driver, 4.5 mm 07HMD-ML00101</p> 

# CYLINDER HEAD/VALVES

<p>Valve guide reamer, 4.5 mm 07HMH-ML00101</p>  <p>or 07HMH-ML0010B (U.S.A. only)</p>	<p>Valve seat cutter, 35 mm (45° IN) 07780-0010400</p>  <p>or equivalent commercially available in U.S.A.</p>	<p>Valve seat cutter, 27.5 mm (45° EX) 07780-0010200</p>  <p>or equivalent commercially available in U.S.A.</p>
<p>Flat cutter, 35 mm (32° IN) 07780-0012300</p>  <p>or equivalent commercially available in U.S.A.</p>	<p>Flat cutter, 28 mm (32° EX) 07780-0012100</p>  <p>or equivalent commercially available in U.S.A.</p>	<p>Interior cutter, 34 mm (60° IN) 07780-0014700</p>  <p>or equivalent commercially available in U.S.A.</p>
<p>Interior cutter, 26 mm (60° EX) 07780-0014500</p>  <p>or equivalent commercially available in U.S.A.</p>	<p>Cutter holder, 4.5 mm 07781-0010600</p>  <p>or equivalent commercially available in U.S.A.</p>	

### 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 hose. If the hose is smoky, check for a seized piston ring (page 13-13).

#### **Compression too low, hard starting 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 (page 13-13)

#### **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 (page 13-13)

#### **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
  - Worn or damaged cam chain tensioner
  - Worn cam sprocket teeth
- Worn cylinder, piston or piston rings (page 13-13)

#### **Rough idle**

- Low cylinder compression

## CYLINDER COMPRESSION TEST

Warm up the engine to normal operating temperature. Stop the engine and remove all the direct ignition coils and spark plugs (page 4-7).

Install a compression gauge [1] with the attachment into the spark plug hole.

### TOOL:

**Compression gauge attachment [2]**

**07RMJ-MY50100 or equivalent commercially available in U.S.A.**

Shift the transmission into neutral.

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.

### Compression pressure:

**1,600 kPa (16.32 kgf/cm<sup>2</sup>, 232 psi) at 300 rpm**

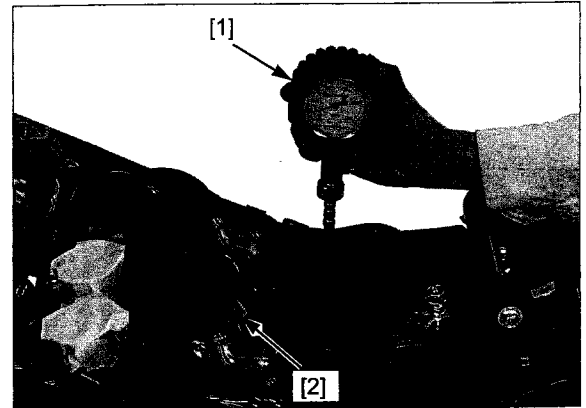
Low compression can be caused by:

- 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

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



## CYLINDER HEAD COVER

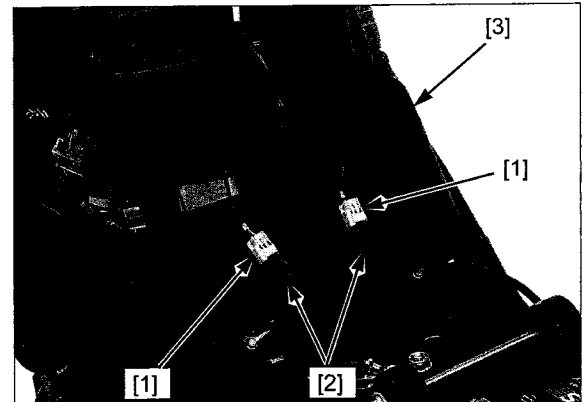
### REAR CYLINDER HEAD COVER

#### REMOVAL

Remove the fuel tank (page 6-67)

Disconnect the 2P (White) connectors [1] and remove the direct ignition coils [2].

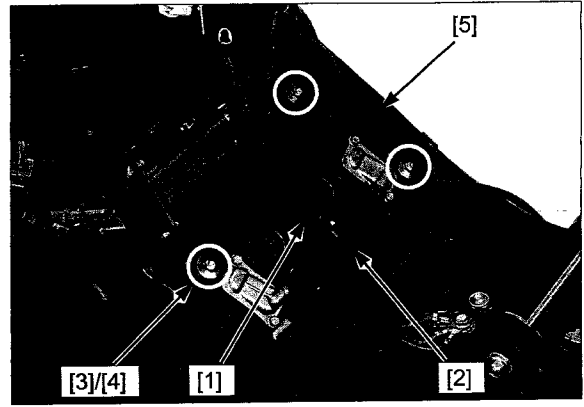
Remove the heat guard rubber [3].





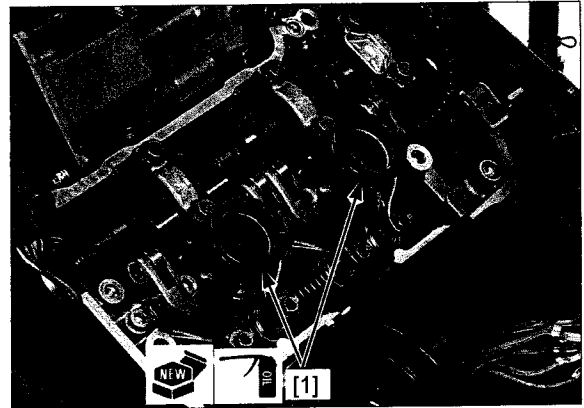
## CYLINDER HEAD/VALVES

Disconnect the PAIR air hose [1] from the hose joint [2].  
Remove the head cover bolts [3], mount rubbers [4] and rear cylinder head cover [5].  
Remove the plug hole seal rings.

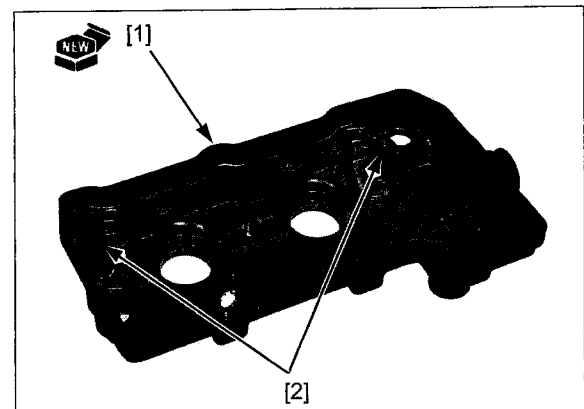


### INSTALLATION

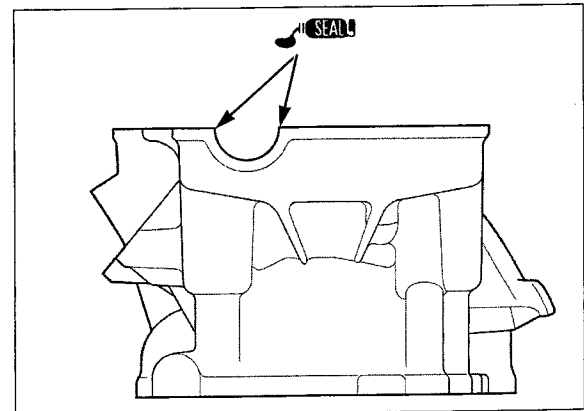
Apply engine oil to new plug hole seal ring inside surfaces.  
Install the plug hole seal rings [1].



Install a new gasket [1] into the cylinder head cover groove.  
Install new O-rings [2] to the PAIR air joints.



Apply sealant (ThreeBond 5211C, SSKE45T or equivalent) to the cylinder head semi-circular areas (both sides) as shown.



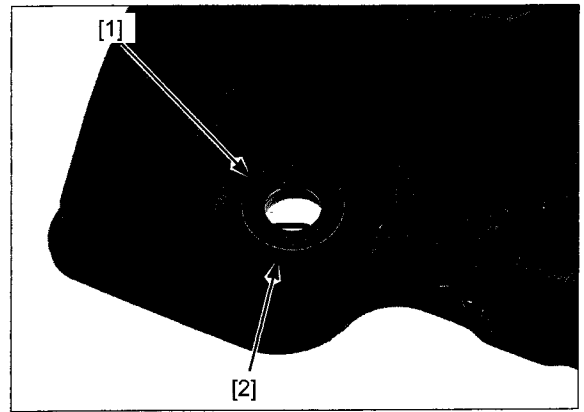
Install the head cover with the gasket onto the cylinder head.

Install the mount rubbers [1] onto the head cover with its "UP" marks [2] facing up.

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

**TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)**

Install the removed parts in the reverse order of removal.

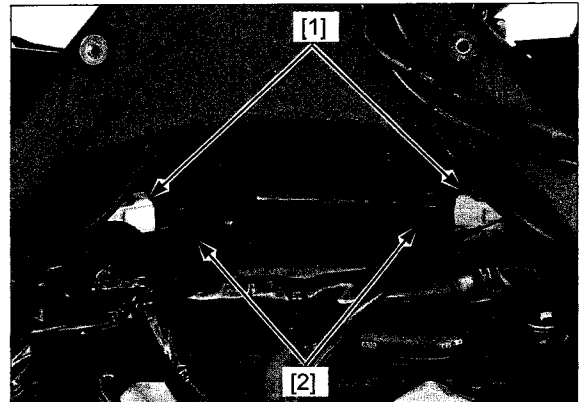


## FRONT CYLINDER HEAD COVER

### REMOVAL

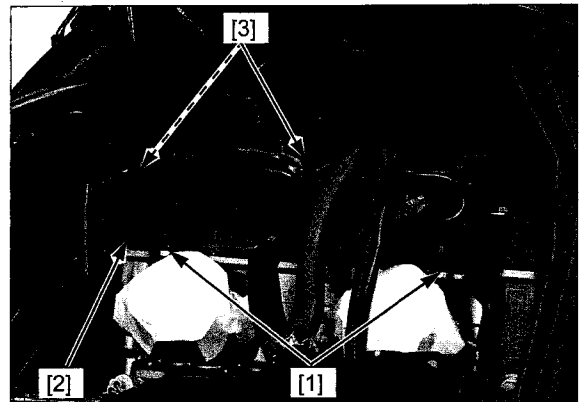
Remove the throttle body (page 6-71).

Disconnect the 2P (White) connectors [1] and remove the direct ignition coils [2].



Pull off the bosses [1] of the engine heat guard [2] from the cylinder head.

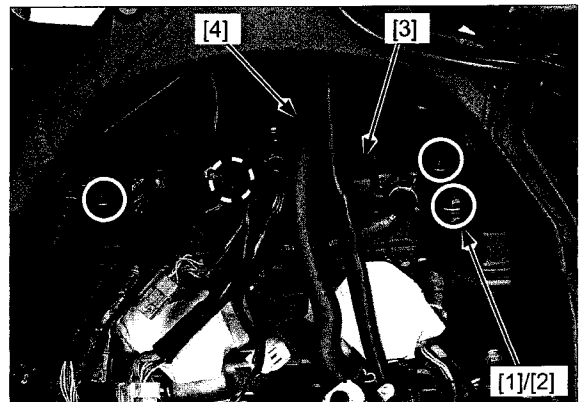
Remove the wire band clips [3] from the engine heat guard, then remove the engine heat guard.



Remove the head cover bolts [1], mount rubbers [2] and front cylinder head cover [3].

Disconnect the PAIR air hose [4] from the PAIR check reed valve cover.

Remove the plug hole seal rings.

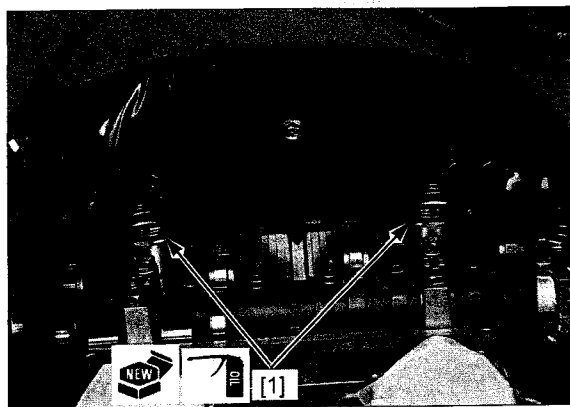


## CYLINDER HEAD/VALVES

### INSTALLATION

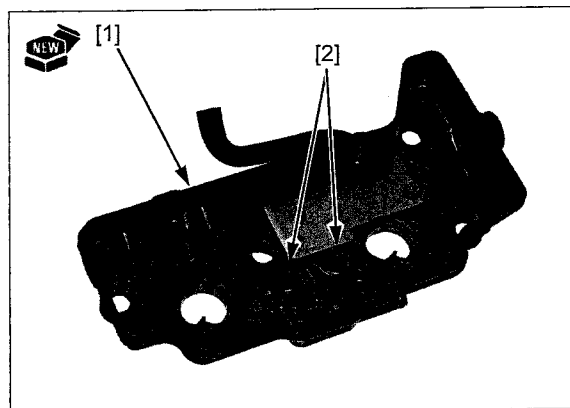
Apply engine oil to new plug hole seal ring inside surfaces.

Install the plug hole seal rings [1].

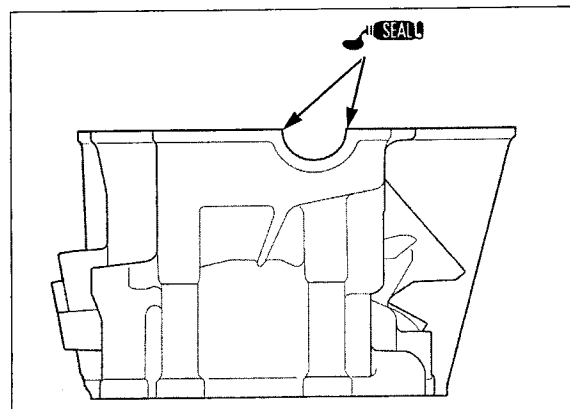


*Make certain that the gasket is installed on the PAIR air joints properly.*

Install a new gasket [1] into the cylinder head cover groove and onto the PAIR air joints [2].



Apply sealant (ThreeBond 5211C, SSKE45T or equivalent) to the cylinder head semi-circular areas (both sides) as shown.



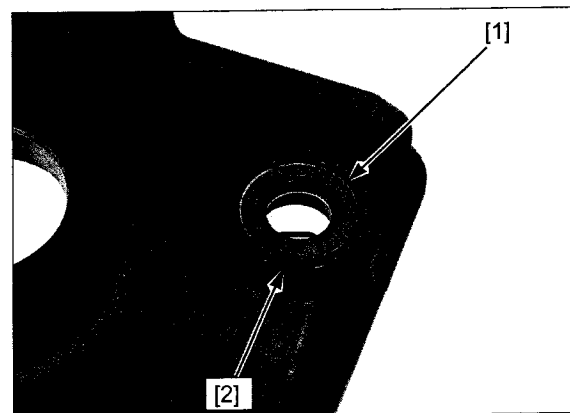
Install the head cover with the gasket onto the cylinder head.

Install the mount rubbers [1] onto the head cover with its "UP" marks [2] facing up.

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

**TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)**

Install the removed parts in the reverse order of removal.



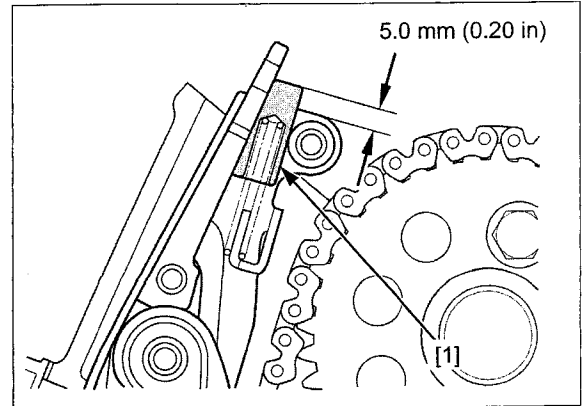
## CAMSHAFT/ROCKER ARMS

Remove the cylinder head cover (page 9-7).

Before releasing the cam chain tensioner, measure the length of the wedge B [1] from the tensioner bracket surface as shown.

Replace the cam chain with a new one if the length exceeds 5.0 mm (0.20 in).

To replace the cam chain, remove the cylinder head (page 9-20).

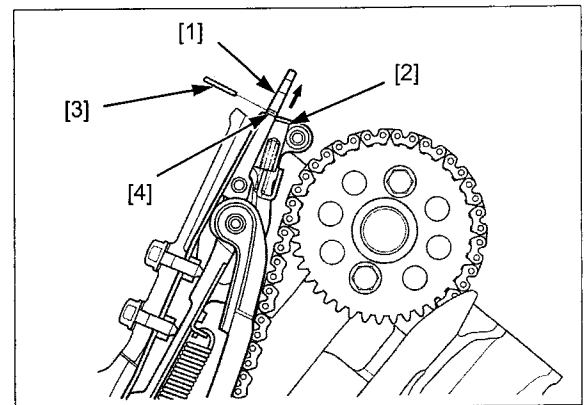


## REAR CAMSHAFT/ROCKER ARMS REMOVAL

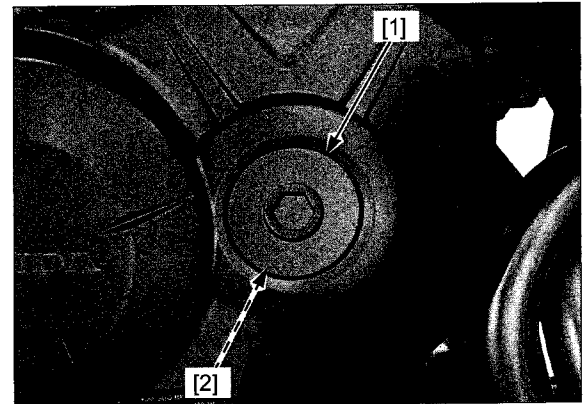
Remove the rear cylinder head cover (page 9-7).

Set a commercially available spring hook or equivalent into the hole of the wedge A.

Release the tensioner by pulling the wedge A [1] straight up while holding the wedge B [2] down, then install a 2 mm pin [3] into the hole [4] of the wedge A.

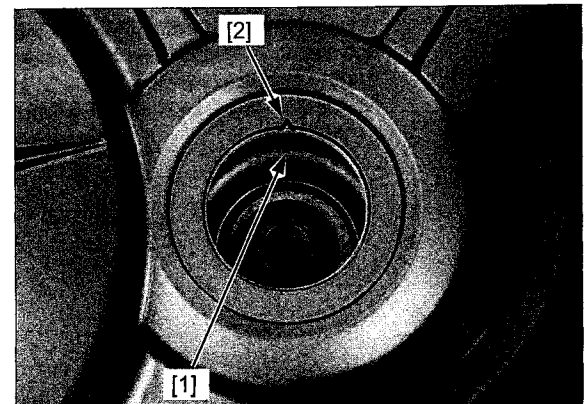


Remove the timing hole cap [1] and O-ring [2].



Turn the crankshaft clockwise and align the "MT RT" mark [1] with the index notch [2] on the right crankcase cover.

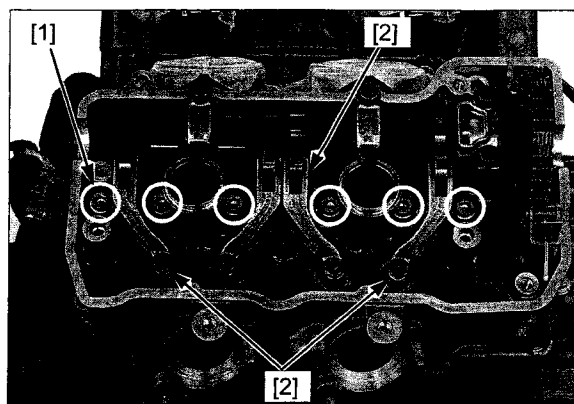
Make sure the #3 piston is at TDC on the compression stroke.



## CYLINDER HEAD/VALVES

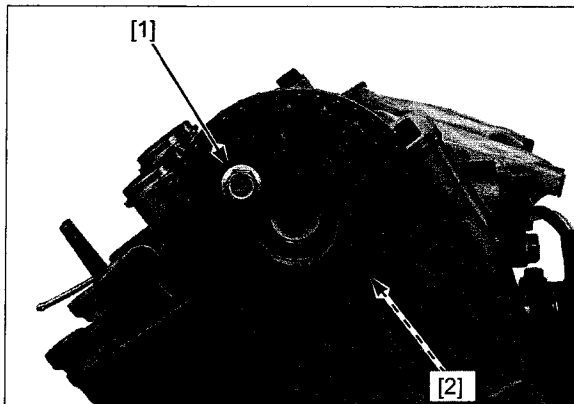
Loosen the rocker arm shaft bolts [1] gradually and alternately in several steps.

Remove the bolts and rocker arms/shafts [2].



Loosen the cam sprocket bolt [1], then turn the crankshaft clockwise one full turn (360°) and remove the other cam sprocket bolt [2].

Turn the crankshaft one full turn (360°) and remove the cam sprocket bolt.

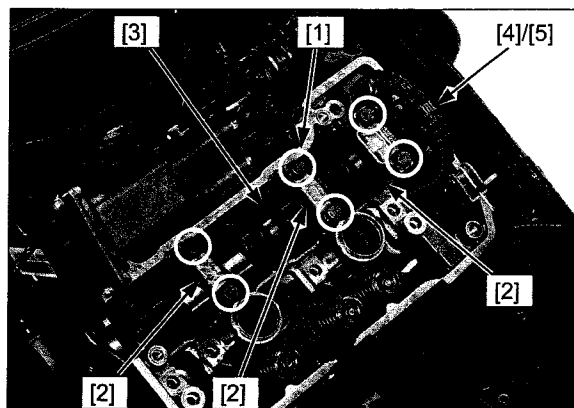


Loosen the camshaft holder bolts [1] gradually and alternately in several steps, then remove the bolts and camshaft holders [2].

Remove the camshaft [3] from the cam sprocket [4].

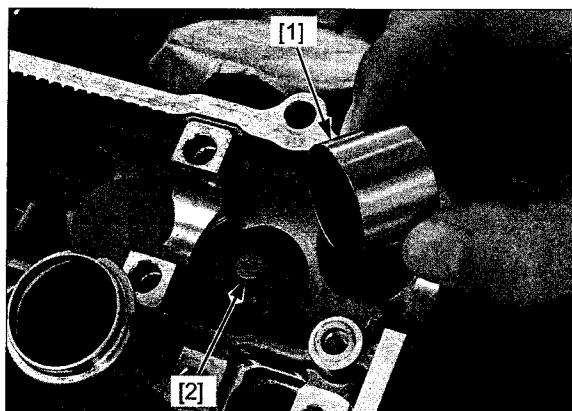
Remove the cam sprocket from the cam chain [5].

*Suspend the cam chain with a piece of wire to prevent the chain from falling into the crankcase.*



Remove the valve lifters [1] and shims [2].

- 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.
- 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 a magnet.



## FRONT CAMSHAFT/ROCKER ARMS REMOVAL

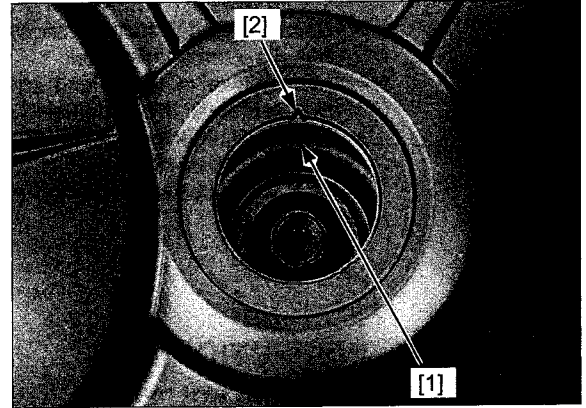
Remove the front cylinder head cover (page 9-9).

Release the cam chain tensioner (page 9-11).

Remove the timing hole cap and O-ring (page 9-11).

Turn the crankshaft clockwise and align the "MT FT" mark [1] with the index notch [2] on the right crankcase cover.

Make sure the #1 piston is at TDC on the compression stroke.

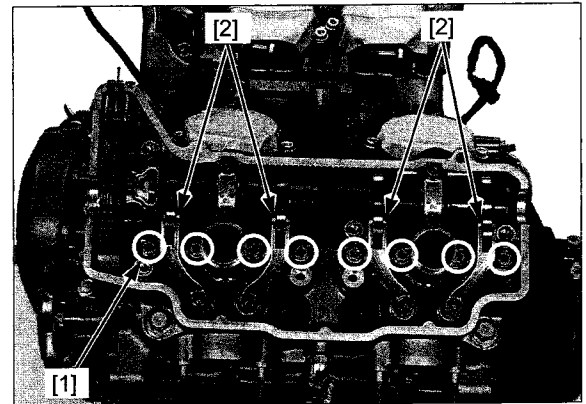


Loosen the rocker arm shaft bolts [1] gradually and alternately in several steps.

Remove the bolts and rocker arms/shafts [2].

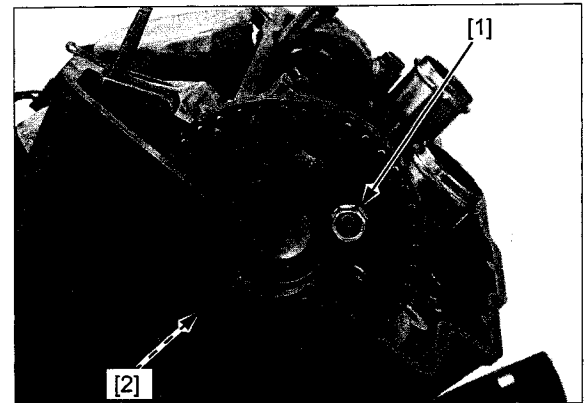
### NOTE:

Mark all rocker arms/shafts to ensure correct reassembly in their original locations.



Loosen the cam sprocket bolt [1], then turn the crankshaft clockwise one full turn (360°) and remove the other cam sprocket bolt [2].

Turn the crankshaft one full turn (360°) and remove the cam sprocket bolt.

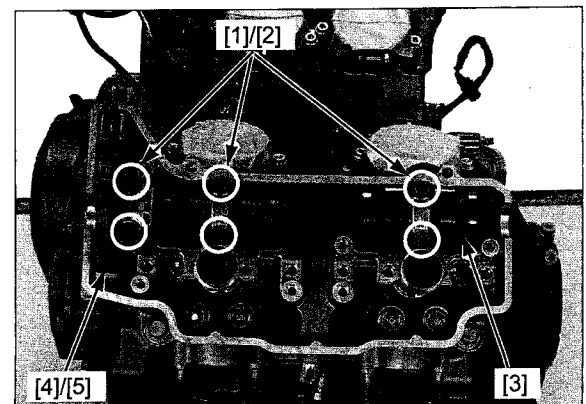


Loosen the camshaft holder bolts [1] gradually and alternately in several steps, then remove the bolts and camshaft holders [2].

Remove the camshaft [3] from the cam sprocket [4].

Remove the cam sprocket from the cam chain [5].

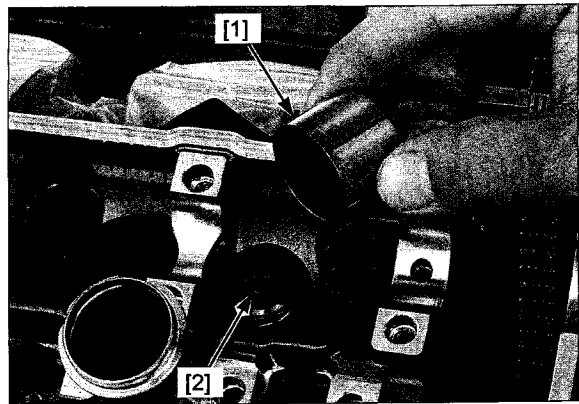
*Suspend the cam chain with a piece of wire to prevent the chain from falling into the crankcase.*



## CYLINDER HEAD/VALVES

Remove each valve lifter [1] and shim [2] from the intake valve lifter bore.

- 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.
- 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 a magnet.



## INSPECTION

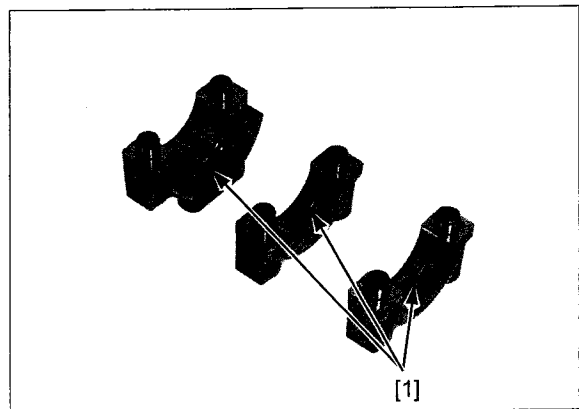
### CAMSHAFT HOLDER

Inspect the camshaft journal sliding surfaces of the camshaft holders for scoring, scratches or evidence of insufficient lubrication.

Inspect the oil paths [1] of the holders for clogs.

#### NOTE:

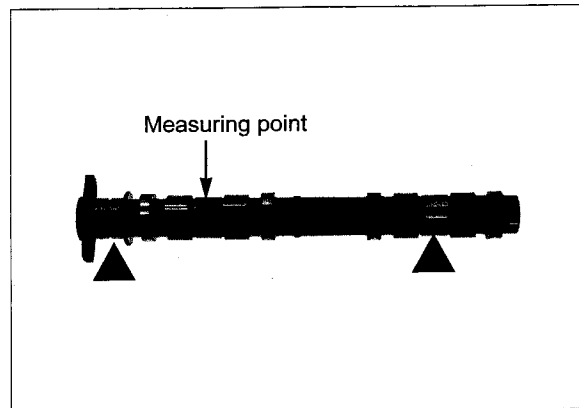
If camshaft holder replacement is required, replace the holder and cylinder head as an assembly.



### CAMSHAFT RUNOUT

Support the camshaft journals with V-blocks and check the camshaft runout with a dial gauge.

**SERVICE LIMIT: 0.05 mm (0.002 in)**



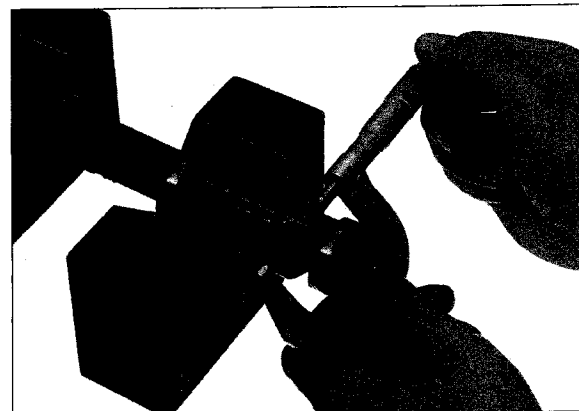
### CAM LOBE HEIGHT

Using a micrometer, measure each cam lobe height.

#### SERVICE LIMIT:

IN: 37.10 mm (1.461 in)

EX: 34.84 mm (1.372 in)



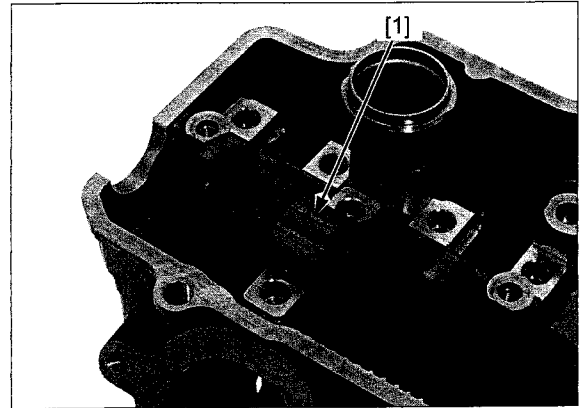
**CAMSHAFT OIL CLEARANCE**

Remove the cylinder head (page 9-20).

Clean off any oil from the cylinder head, camshaft holders and camshaft journals.

Install the camshaft onto the cylinder head.

Put a strip of plastigauge [1] lengthwise on each camshaft journal avoiding the oil hole.



*Do not rotate the camshaft during inspection.*

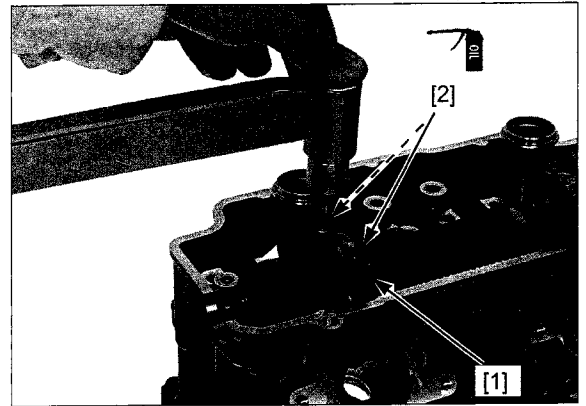
Carefully install the camshaft holders A and B [1]:

- Front camshaft holder (page 9-17)
- Rear camshaft holder (page 9-19)

Apply engine oil to the camshaft holder bolt threads and seating surface.

Install the holder bolts [2] and tighten them alternately in several steps.

**TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)**

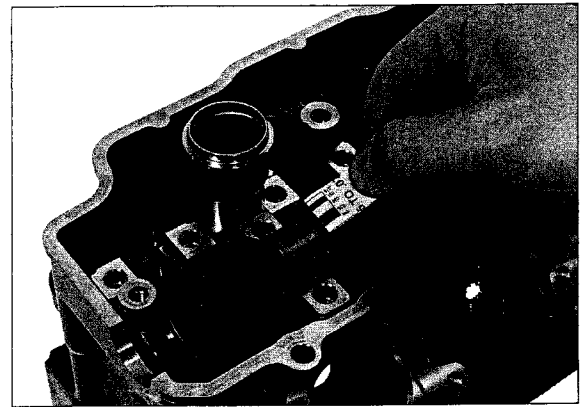


Remove the bolts and camshaft holders.

Measure the compressed plastigauge at its widest point on the journal to determine the oil clearance.

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

If the oil clearance exceeds the service limit, 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.

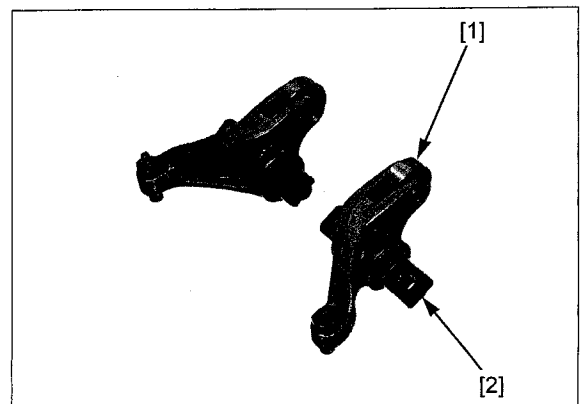
**ROCKER ARM/SHAFT**

Check the roller [1] and rocker arm shaft [2] for smooth movement.

Check the roller of the rocker arm for wear or damage.

If necessary, replace the rocker arm/shaft as an assembly.

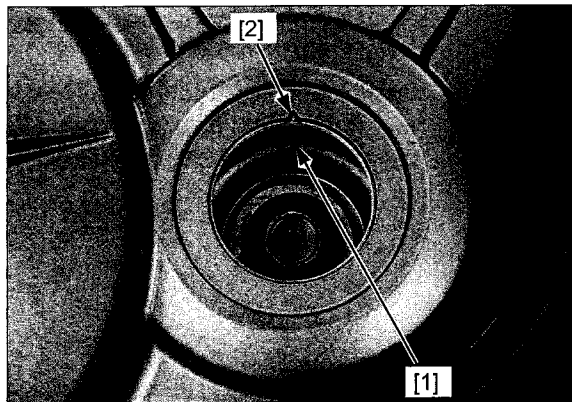
*If the roller is damaged or abnormally worn, check the cam lobes for damage.*





### FRONT CAMSHAFT/ROCKER ARMS INSTALLATION

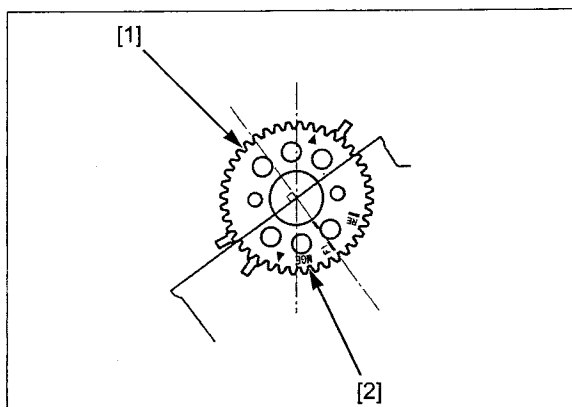
Turn the crankshaft clockwise and align the "MT FT" mark [1] with the index notch [2] on the right crankcase cover.



If the rear camshaft has not been removed, remove the rear cylinder head cover (page 9-7).

Make sure that the rear cam sprocket [1] is at the position as shown.

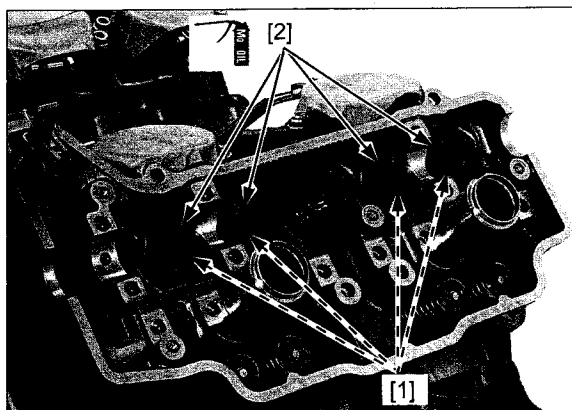
If the "MGE" mark [2] faces up, turn the crankshaft clockwise one full turn (360°).



Install the valve shims [1] in their original locations.

Coat the outer surfaces of the valve lifters [2] with molybdenum oil solution.

Install the valve lifters in their original locations, being careful not to damage the sliding surfaces of the lifters and bores.



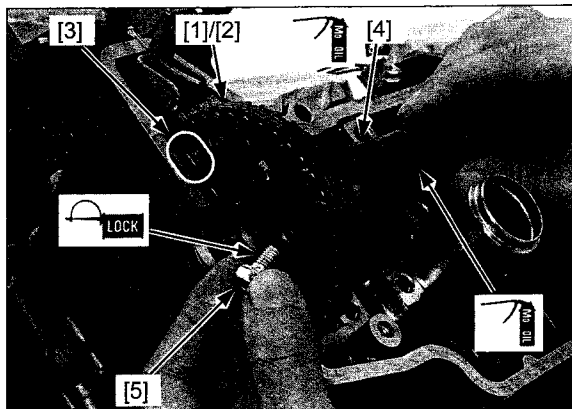
Set the cam sprocket [1] to the cam chain [2] carefully so the "FI" mark [3] on the sprocket is flush with the front cylinder head surface.

Apply molybdenum oil solution to the camshaft journals, cam lobes and thrust surfaces.

Install the front camshaft [4] to the cam sprocket with the #1 intake cam lobes facing intake side.

Apply a locking agent to the threads of the cam sprocket bolt.

Align the bolt holes and install the cam sprocket bolt [5].



Install the camshaft holder A with its arrow mark facing intake side.

Install the camshaft holders A and B [1].

**NOTE:**

Camshaft holder has the following identification mark:

- F: Front cylinder camshaft holder B (cam sprocket side)
- FC: Front cylinder camshaft holder A
- FL: Front cylinder camshaft holder A (alternator side)

Apply engine oil to the camshaft holder bolt threads and seating surfaces.

Install the holder bolts [2] and tighten them gradually and alternately in several steps.

**TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)**

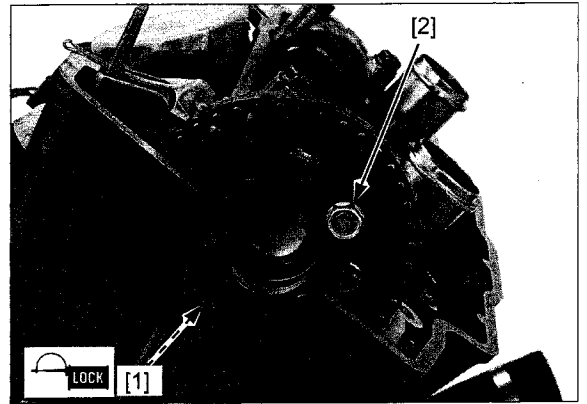
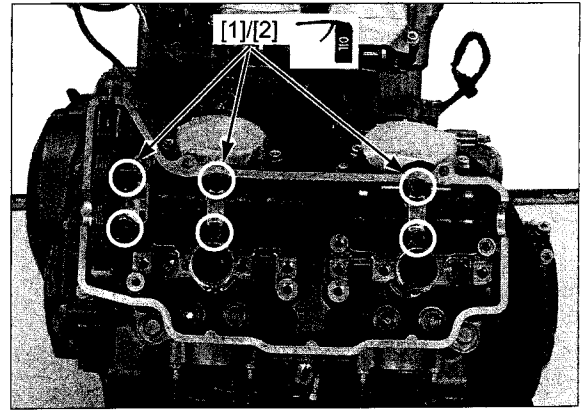
Apply a locking agent to the threads of the remaining cam sprocket bolt [1].

Turn the crankshaft one full turn (360°) and install the sprocket bolt.

Tighten the sprocket bolt while holding the crankshaft.

**TORQUE: 20 N·m (2.0 kgf·m, 15 lbf·ft)**

Turn the crankshaft one full turn and tighten the other bolt [2] to the same torque.



Apply molybdenum oil solution to the rocker arm roller, shaft sliding surface and exhaust valve stem contact area of the valve adjusting screw.

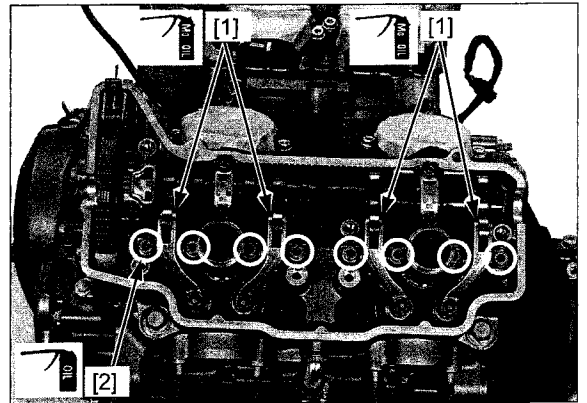
Install the rocker arms/shafts [1] in their original locations.

Apply engine oil to the rocker arm shaft socket bolt threads and seating surfaces.

Install the socket bolts [2] and tighten them gradually and alternately in several steps.

**TORQUE: 13 N·m (1.3 kgf·m, 10 lbf·ft)**

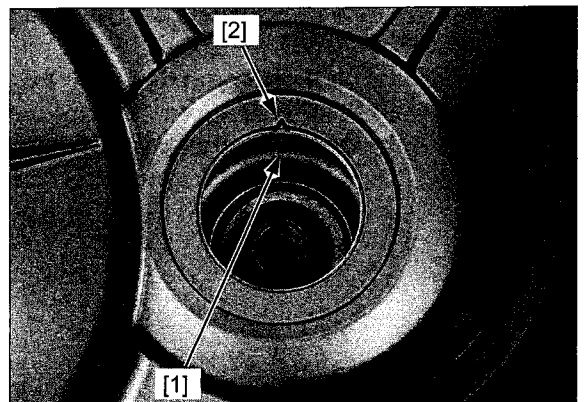
Install the rear camshaft (page 9-17).



## REAR CAMSHAFT/ROCKER ARMS INSTALLATION

Install the front camshaft (page 9-16).

Turn the crankshaft clockwise and align the "MT RT" mark [1] with the index notch [2] on the right crankcase cover.

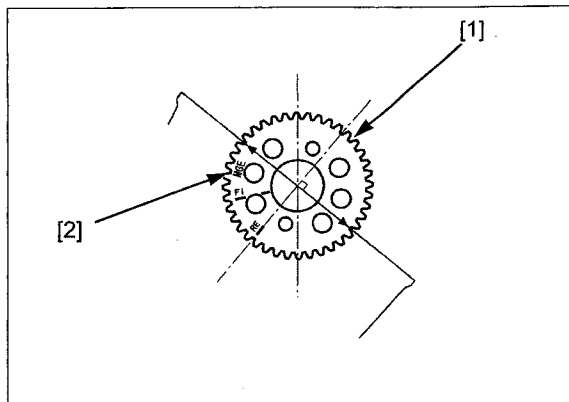


## CYLINDER HEAD/VALVES

The #3 piston is at TDC on the compression stroke.

Make sure that the front cam sprocket [1] is at the position as shown.

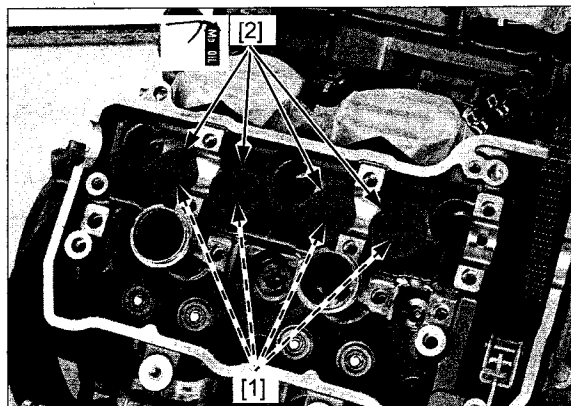
If the "MGE" mark [2] faces up, turn the crankshaft clockwise one full turn (360°).



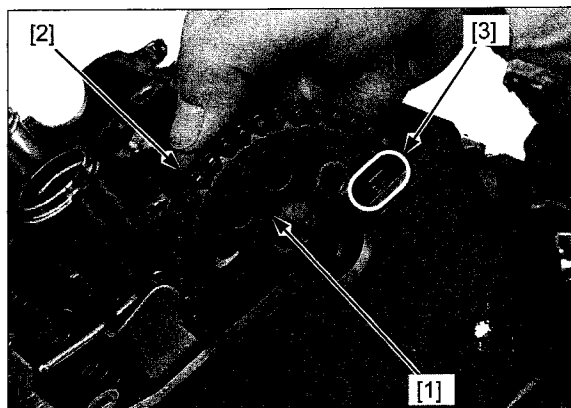
Install the valve shims [1] in their original locations.

Coat the outer surfaces of the valve lifters [2] with molybdenum oil solution.

Install the valve lifters in their original locations, being careful not to damage the sliding surfaces of the lifters and bores.



Set the rear cam sprocket [1] to the cam chain [2] carefully so the "RE" mark [3] on the sprocket is flush with the rear cylinder head surface as shown ("MGE" mark faces down and cannot be seen).



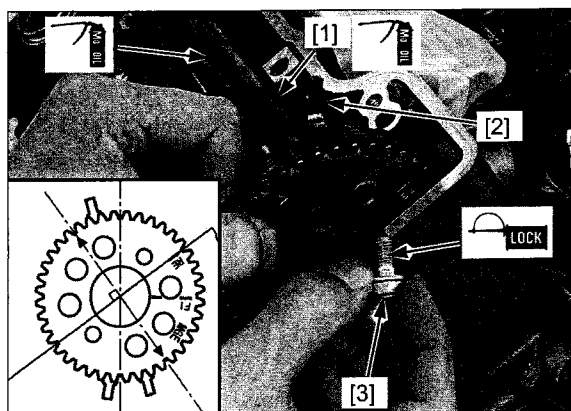
Apply molybdenum oil solution to the camshaft journals, cam lobes and thrust surfaces.

Note that the CMP sensor rotor direction.

Install the rear camshaft [1] and CMP sensor rotor [2] to the cam sprocket with the #3 intake cam lobes facing exhaust side.

Apply a locking agent to the threads of the cam sprocket bolt.

Align the bolt holes and install the cam sprocket bolt [3].



Install the camshaft holder A with its arrow mark facing intake side.

Install the camshaft holders A and B [1].

## NOTE:

Camshaft holder has the following identification mark:

- R: Rear cylinder camshaft holder B (cam sprocket side)
- RC: Rear cylinder camshaft holder A
- RL: Rear cylinder camshaft holder A (alternator side)

Apply engine oil to the camshaft holder bolt threads and seating surfaces.

Install the holder bolts [2] and tighten them gradually and alternately in several steps.

**TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)**

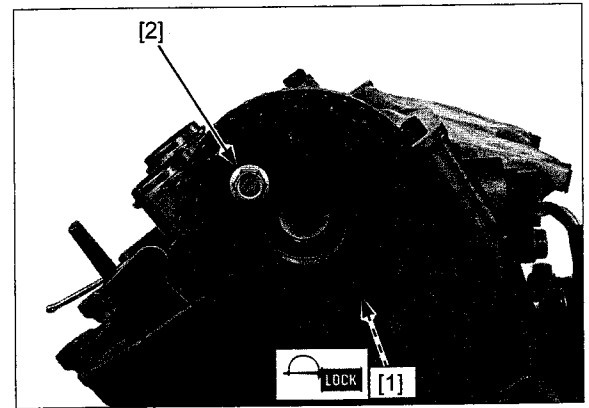
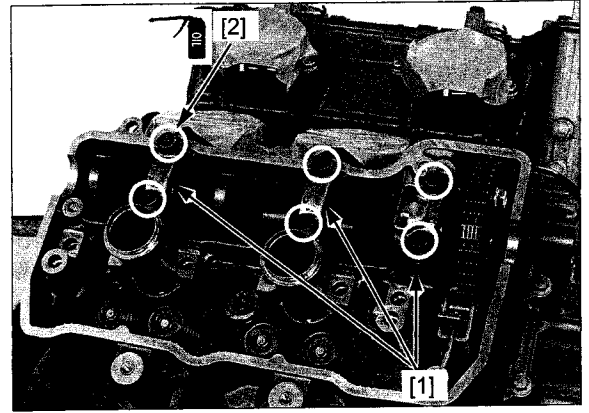
Apply a locking agent to the threads of the remaining cam sprocket bolt [1].

Turn the crankshaft one full turn (360°) and install the sprocket bolt.

Tighten the sprocket bolt while holding the crankshaft.

**TORQUE: 20 N·m (2.0 kgf·m, 15 lbf·ft)**

Turn the crankshaft one full turn and tighten the other bolt [2] to the same torque.



Apply molybdenum oil solution to the rocker arm roller, shaft sliding surface and exhaust valve stem contact area of the valve adjusting screw.

Install the rocker arms/shafts [1].

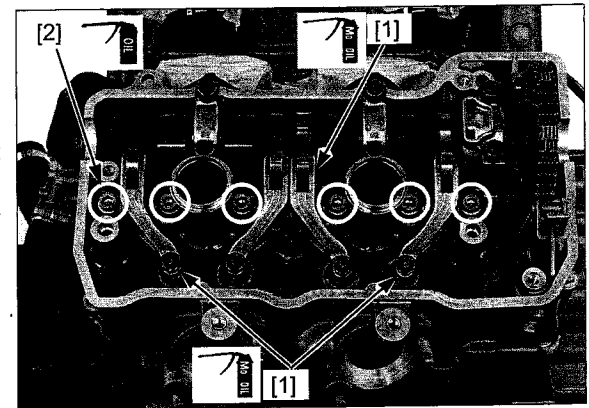
Apply engine oil to the rocker arm shaft socket bolt threads and seating surfaces.

Install the socket bolts [2] and tighten them gradually and alternately in several steps.

**TORQUE: 13 N·m (1.3 kgf·m, 10 lbf·ft)**

Install the following:

- cylinder head covers (page 9-7)
- timing hole cap (page 4-12)



### CYLINDER HEAD REMOVAL

- The rear cylinder head can be removed without removing the engine from the frame.
- The front cylinder head removal requires engine removal.
- The procedure of the front cylinder head removal is described below. The rear cylinder head removal is similar to the front cylinder head.

Drain the coolant from the system (page 7-6).

#### NOTICE

*Before cylinder head removal, gently tilt the engine back and forth, right and left several times to drain residual coolant from the water pump cover completely. If the cylinder head had been removed without these actions, coolant will come into the crankcase.*

Remove the following:

- cylinder head cover (page 9-7)
- camshaft/rocker arms (page 9-11)
- muffler and exhaust pipe (page 3-24)

*Front cylinder head only:*

Remove the bolt [1], front water joint [2] and O-ring [3].

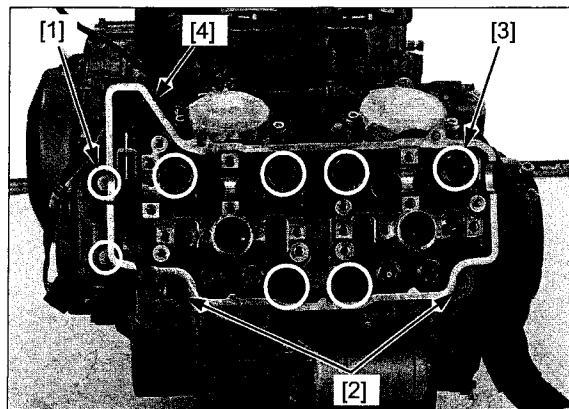
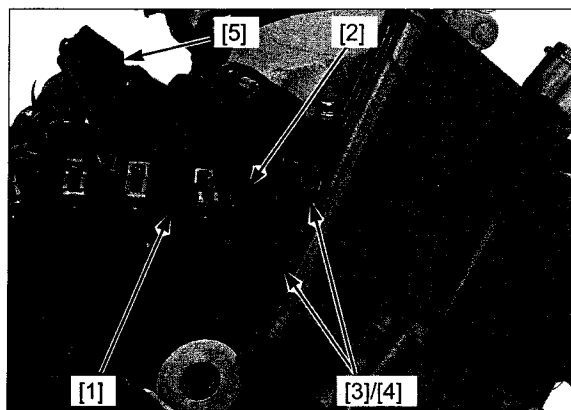
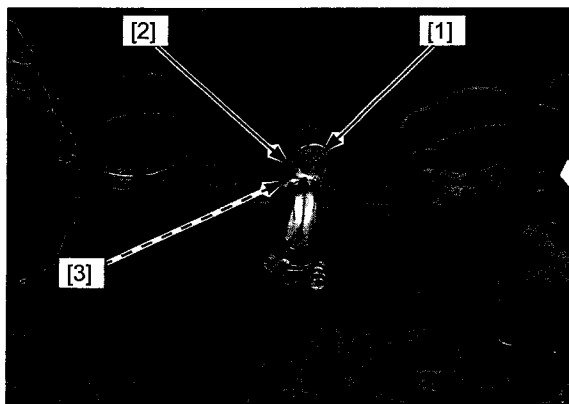
Disconnect the hose [1] from the bleeding joint [2]. Remove the cam chain tensioner bolts [3] and sealing washers [4].

*Front cylinder head only:*

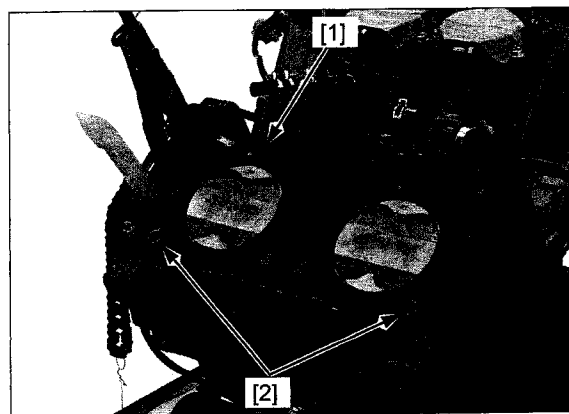
Disconnect the ECT sensor 3P (Gray) connector [5].

Remove the following:

- 6 mm bolts [1]
- 10 mm bolts/washers (10 x 110 mm) (front cylinder head only) [2]
- 10 mm bolts/washers (10 x 105 mm) [3]
- cylinder head [4]



Remove the gasket [1] and dowel pins [2].

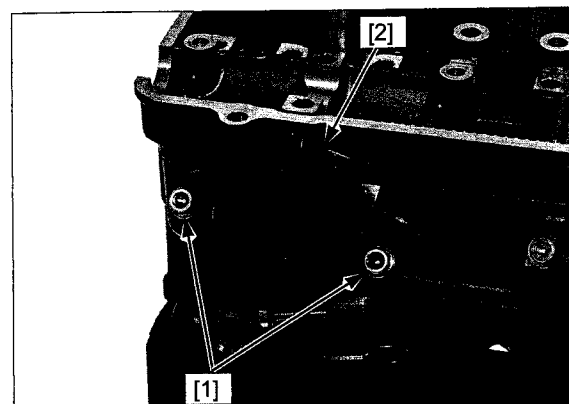


## CYLINDER HEAD DISASSEMBLY

Remove the following:

- spark plugs (page 4-7)
- cylinder head bleeding joint (page 7-8)
- CMP sensor (rear cylinder head only) (page 6-80)
- ECT sensor (front cylinder head only) (page 6-80)

Remove the socket bolts [1] and insulators [2].

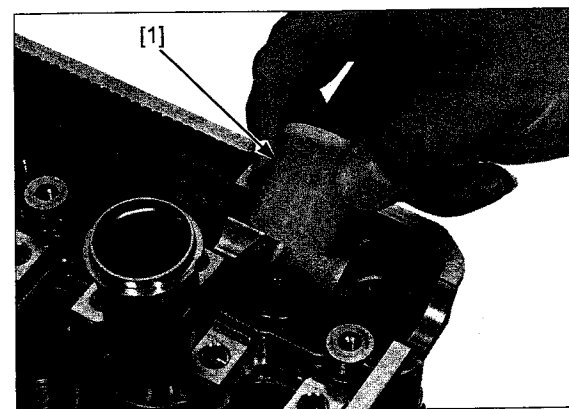


Install the tappet hole protector [1] into the intake valve lifter bore.

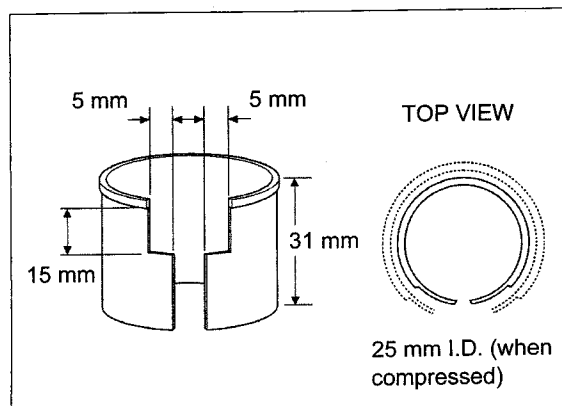
**TOOL:**

**Tappet hole protector**

**07HMG-MR70002**  
(Not available in  
U.S.A.)



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



## CYLINDER HEAD/VALVES

Remove the normal valve spring cotters [1] using the special tools as shown.

### TOOLS:

Valve spring compressor [2] 07757-0010000  
Valve spring compressor attachment [3]  
07959-KM30101  
(for intake valve)

Valve spring compressor attachment [3]  
07JME-KY20100  
(for exhaust valve)

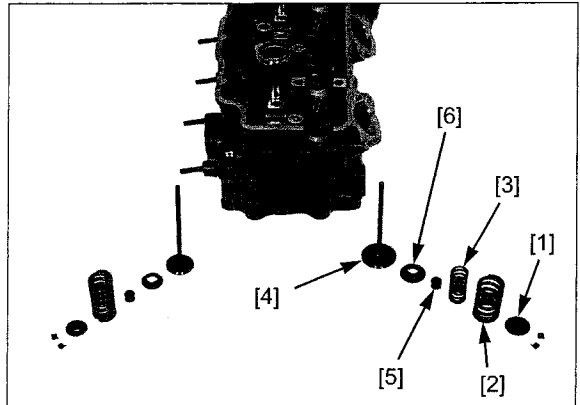
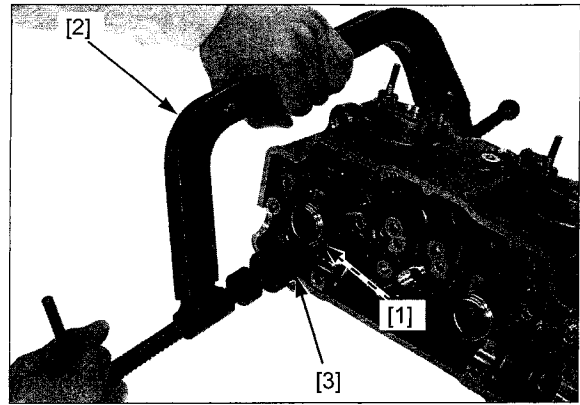
### NOTICE

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

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

Remove the following:

- valve retainer [1]
- outer valve spring [2]
- inner valve spring (intake side only) [3]
- valve [4]
- stem seal [5]
- valve spring seat [6]



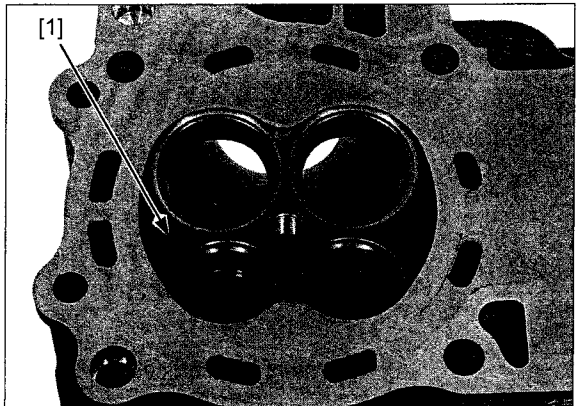
## CYLINDER HEAD INSPECTION

### CYLINDER HEAD

Avoid damaging the gasket surface.

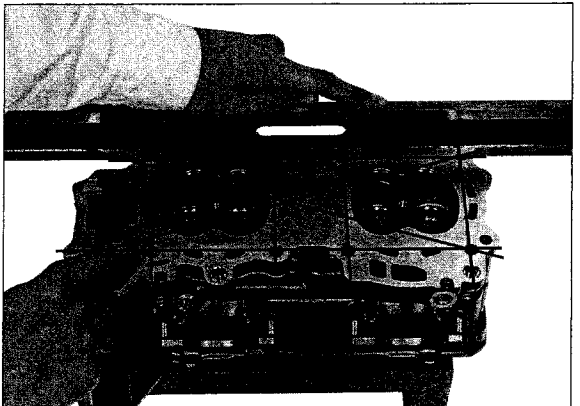
Remove carbon deposits from the combustion chamber [1], being careful not to damage the gasket surface.

Check the spark plug hole and valve areas for cracks.



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

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



**VALVE SPRING**

Measure the normal side valve spring free length.

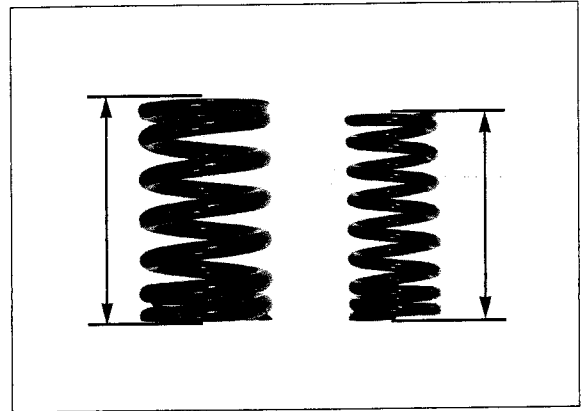
**SERVICE LIMITS:**

IN: Outer: 36.30 mm (1.429 in)

Inner: 32.50 mm (1.280 in)

EX: 42.30 mm (1.665 in)

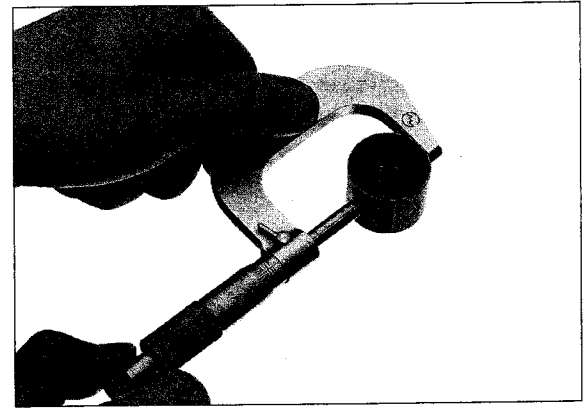
Replace the springs if they are shorter than the service limits.

**VALVE LIFTER**

Inspect each valve lifter for scratches or abnormal wear.

Measure the each valve lifter O.D.

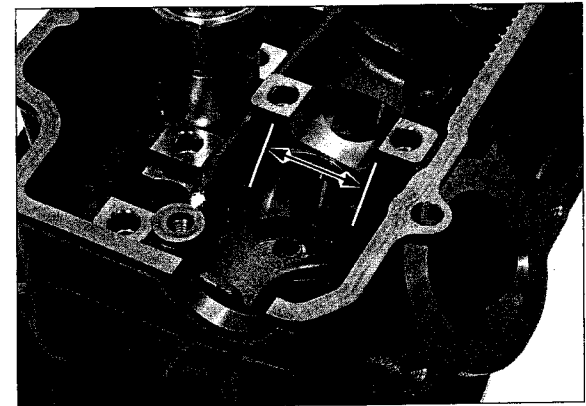
**SERVICE LIMIT: 28.97 mm (1.141 in)**

**VALVE LIFTER BORE**

Inspect each valve lifter bore for scratches or abnormal wear.

Measure the each valve lifter bore I.D.

**SERVICE LIMIT: 29.04 mm (1.143 in)**

**VALVE/VALVE GUIDE**

Check that the valve moves smoothly in the guide.

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

Measure and record each valve stem O.D.

**SERVICE LIMITS:**

IN: 4.465 mm (0.1758 in)

EX: 4.455 mm (0.1754 in)





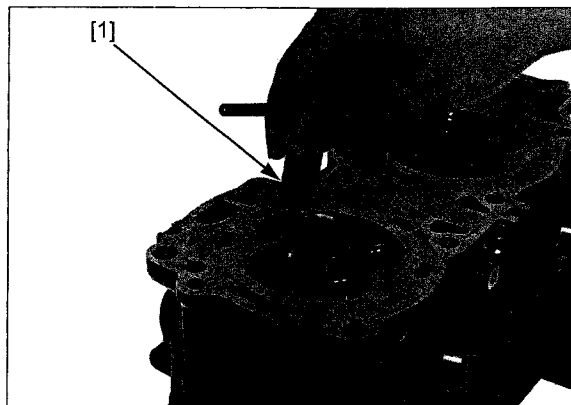
## CYLINDER HEAD/VALVES

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

Insert the reamer [1] from the combustion chamber side of the head and always rotate the reamer clockwise.

**TOOL:**

Valve guide reamer, 4.5 mm      07HMH-ML00101 or  
07HMH-ML0010B  
(U.S.A. only)



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.

**SERVICE LIMITS:**

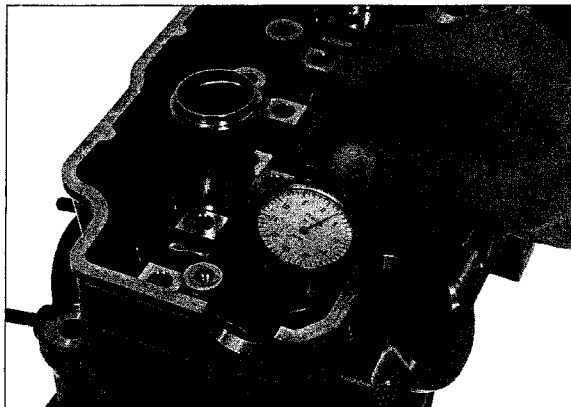
IN: 0.075 mm (0.0030 in)

EX: 0.085 mm (0.0033 in)

*Reface the valve seats whenever the valve guides are replaced (page 9-25).*

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

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



## 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.

**NOTICE**

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

Support the cylinder head and drive out the valve guides [1] from the combustion chamber side of the cylinder head.

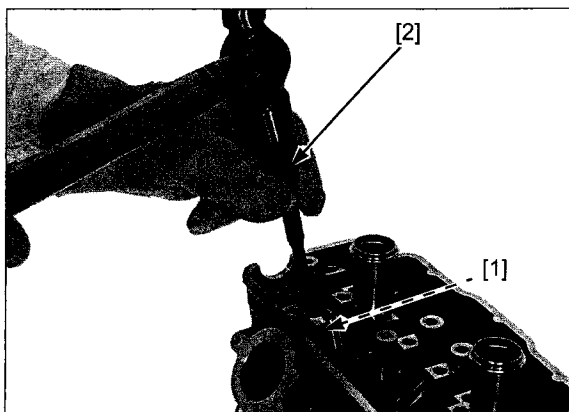
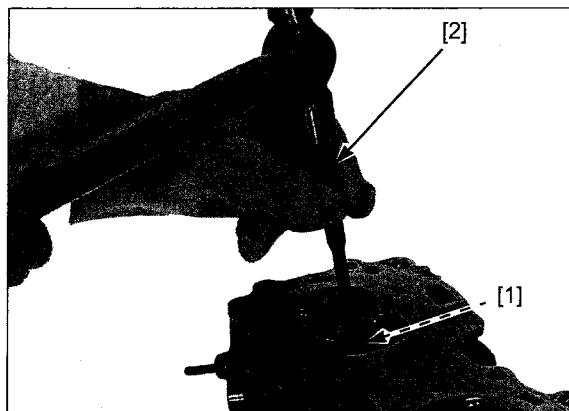
**TOOL:**

Valve guide driver, 4.5 mm [2]      07HMD-ML00101

Drive in the guide [1] to the specified depth from the top of the cylinder head.

**TOOL:**

Valve guide driver, 4.5 mm [2]      07HMD-ML00101



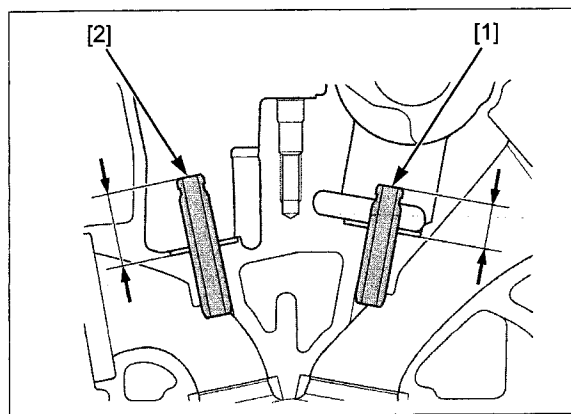
Install the intake valve guides [1] and exhaust valve guides [2] while measuring the valve guide height from the cylinder head.

## SPECIFIED DEPTH:

**IN:** 13.40 – 13.70 mm (0.528 – 0.539 in)

**EX:** 22.50 – 22.80 mm (0.886 – 0.898 in)

Let the cylinder head cool to room temperature.



*Use cutting oil on the reamer during this operation*

Ream the new valve guide after installation.

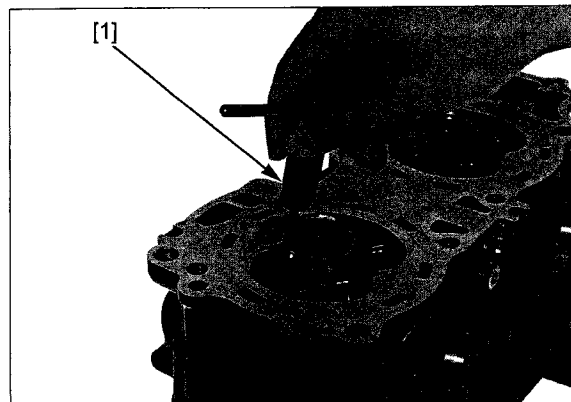
Insert the reamer [1] from the combustion chamber side of the head and also always rotate the reamer clockwise.

## TOOL:

Valve guide reamer, 4.5 mm 07HMH-ML00101 or 07HMH-ML0010B (U.S.A. only)

Clean the cylinder head thoroughly to remove any metal particles.

Reface the valve seat (page 9-25).

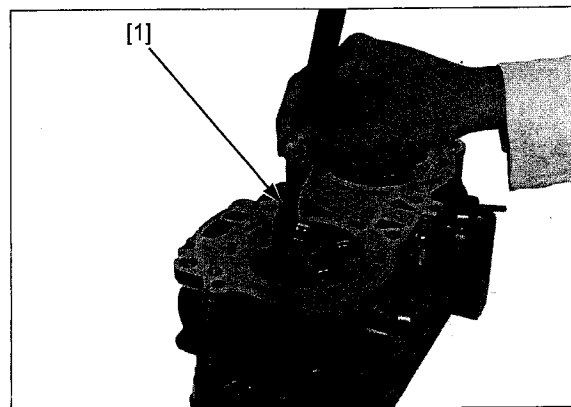


# VALVE SEAT INSPECTION/REFACING

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

Apply a light coating of Prussian Blue to the valve seats.

Tap the valves and seats using a rubber hose or other hand-lapping tool [1].



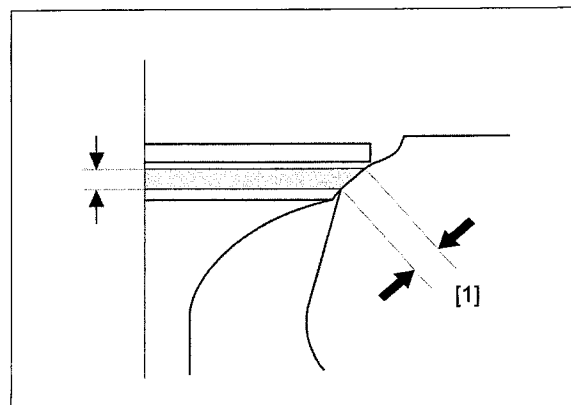
Remove the valve and inspect the valve seat face.

The valve seat contact should be within the specified width and even all around the circumference.

**STANDARD:** 0.90 – 1.10 mm (0.035 – 0.043 in)

**SERVICE LIMIT:** 1.5 mm (0.06 in)

If the seat width [1] is not within specification, reface the valve seat (page 9-25).



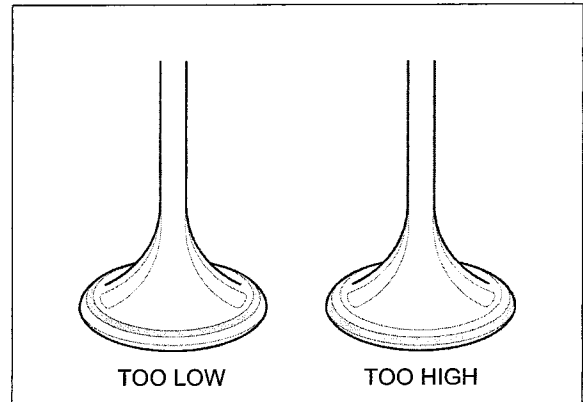
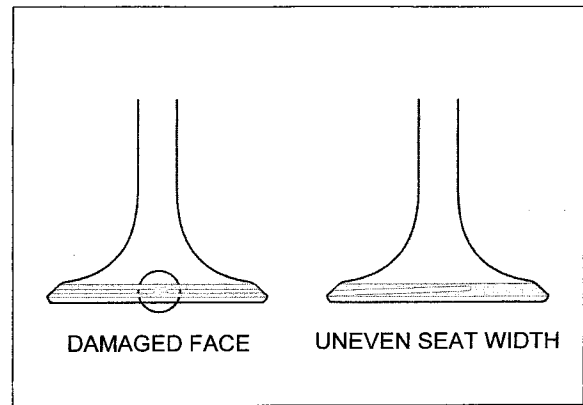
## CYLINDER HEAD/VALVES

Inspect the valve seat face for:

- Uneven seat width:
  - Replace the valve and reface the valve seat.
- Damaged face:
  - Replace the valve and reface the valve seat.

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

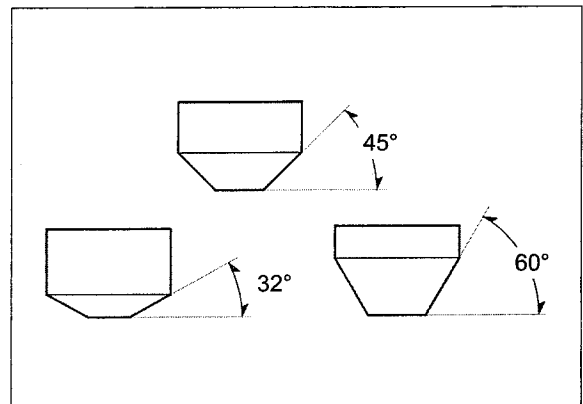
- Contact area (too high or too low)
  - Reface the valve seat.



### VALVE SEAT REFACING

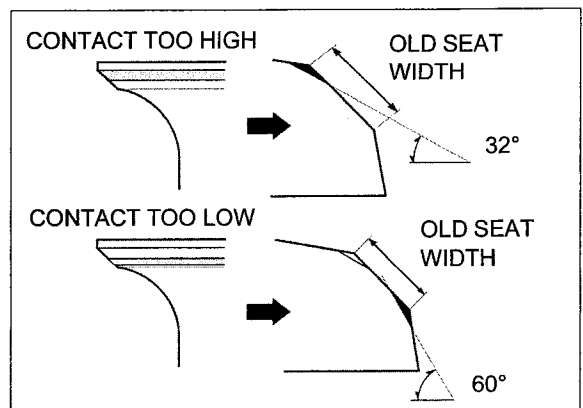
*Follow the refacing manufacturer's operating instructions.*

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



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

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



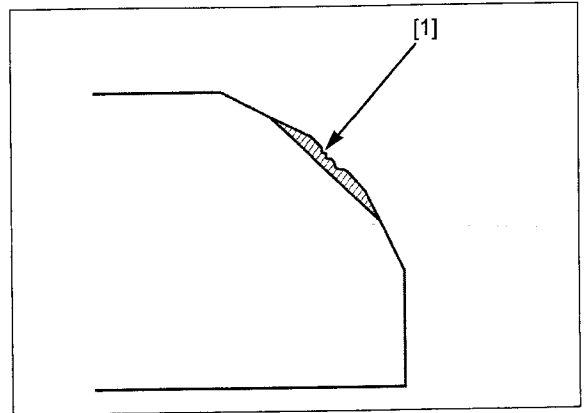
Reface the seat with a 45-degree cutter whenever a valve guide is replaced.

Use a 45° seat cutter to remove any roughness [1] or irregularities from the seat.

## TOOLS:

Seat cutter, 35 mm (IN)	07780-0010400
Seat cutter, 27.5 mm (EX)	07780-0010200
Cutter holder, 4.5 mm	07781-0010600

or equivalent commercially available in U.S.A.

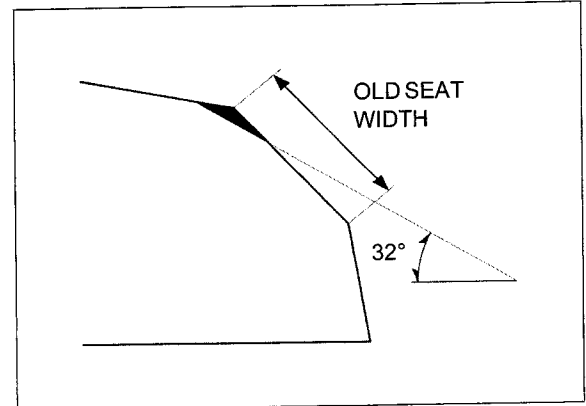


Use a 32° flat cutter to remove the top 1/4 of the existing valve seat material.

## TOOLS:

Flat cutter, 35 mm (IN)	07780-0012300
Flat cutter, 28 mm (EX)	07780-0012100
Cutter holder, 4.5 mm	07781-0010600

or equivalent commercially available in U.S.A.

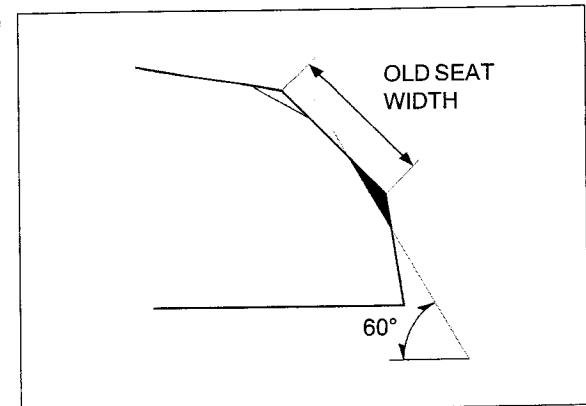


Use a 60° interior cutter to remove the bottom 1/4 of the old seat.

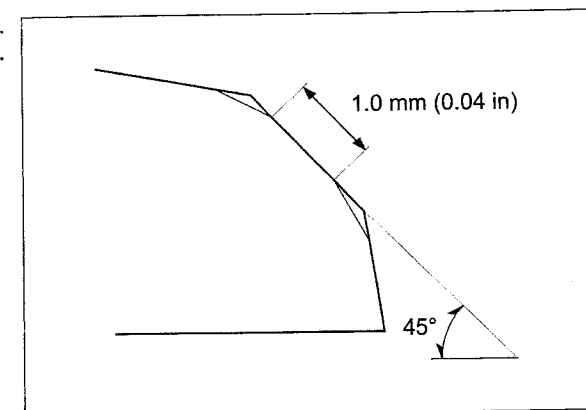
## TOOLS:

Interior cutter, 34 mm (IN)	07780-0014700
Interior cutter, 26 mm (EX)	07780-0014500
Cutter holder, 4.5 mm	07781-0010600

or equivalent commercially available in U.S.A.



Using a 45° seat cutter, cut the seat to the proper width. Make sure that all pitting and irregularities are removed. Refinish if necessary.



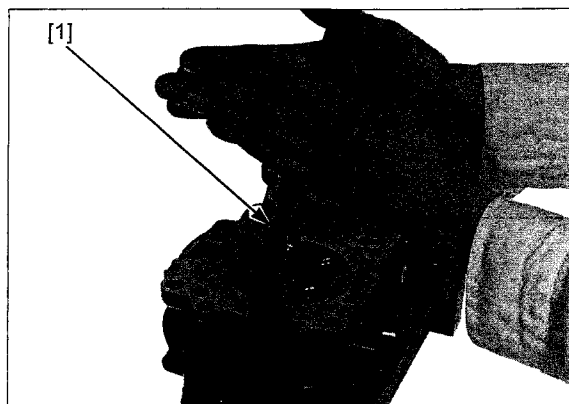
## CYLINDER HEAD/VALVES

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

### NOTICE

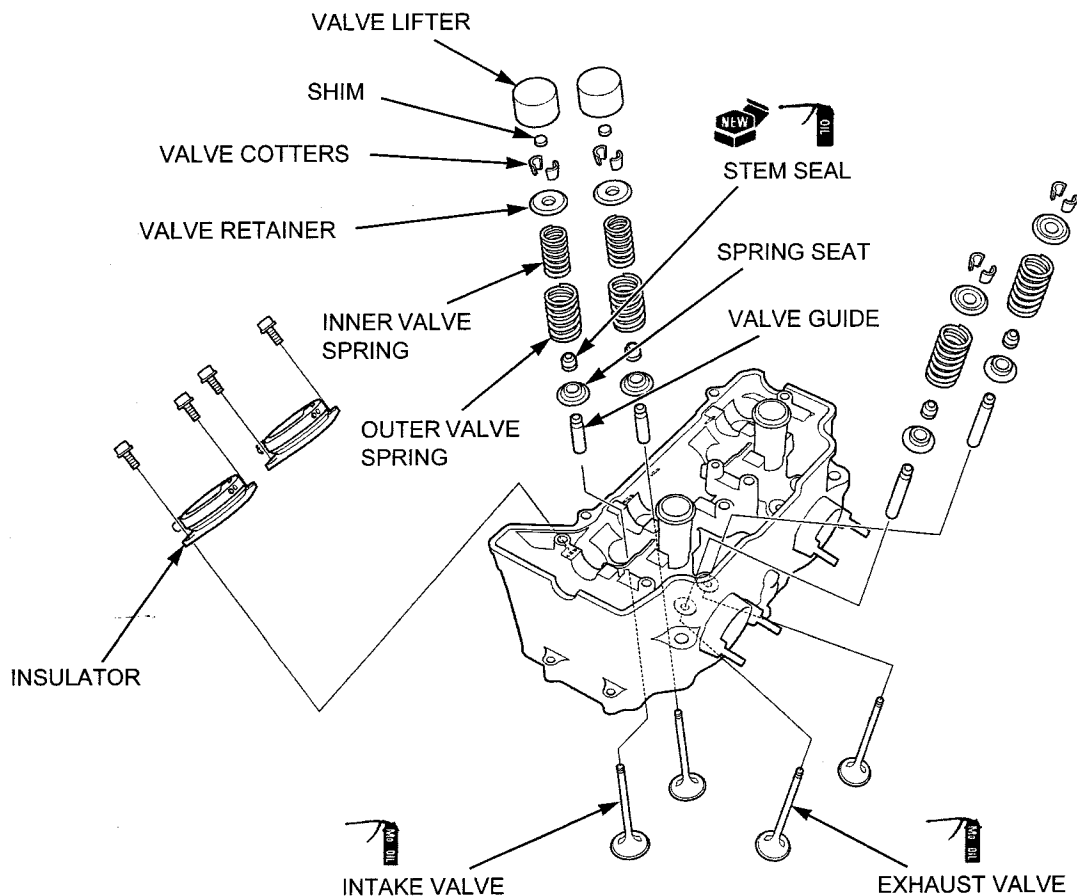
- Excessive lapping pressure may deform or damage the seat.
- Change the angle of lapping tool [1] frequently to prevent uneven seat wear.
- Do not allow lapping compound to enter the guides.

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



## CYLINDER HEAD ASSEMBLY

Front cylinder head shown, rear cylinder head similar:



Blow through all oil passages in the cylinder head with compressed air.

Install the valve spring seats [1].

Apply engine oil to the inner surfaces of new stem seals.

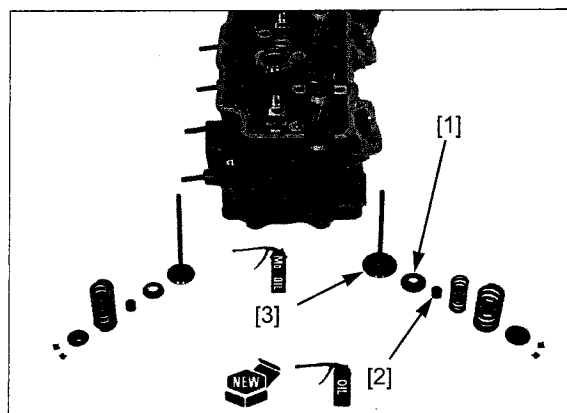
Install the stem seals [2].

### NOTE:

Do not interchange the intake and exhaust stem seals. The intake stem seal has silver spring and the exhaust stem seal has black spring.

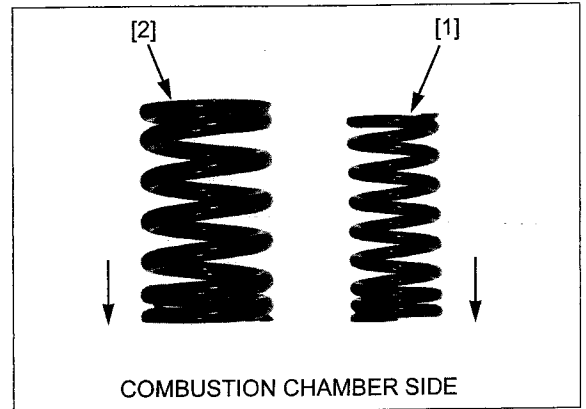
Lubricate the valve stem sliding surface with molybdenum oil solution.

Insert the valve [3] into the guide while turning it slowly to avoid damage to the stem seal.



Install the inner valve spring [1] (intake side only) and outer valve spring [2] with the tightly wound coils facing the combustion chamber.

Install the valve retainer.

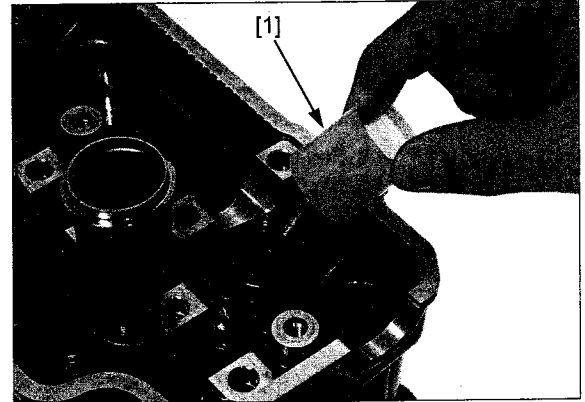


Install the tappet hole protector [1] into the intake valve lifter bore.

## TOOL:

Tappet hole protector

07HMG-MR70002  
(Not available in U.S.A.; refer to page 9-21 on how to make your own tool)



Grease the cotters to ease installation.

Install the valve spring cotters [1] using the special tool as shown.

## NOTICE

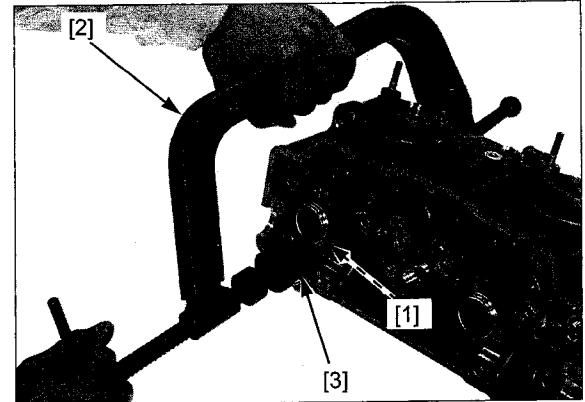
To prevent loss of tension, do not compress the valve spring more than necessary.

## TOOLS:

Valve spring compressor [2] 07757-0010000

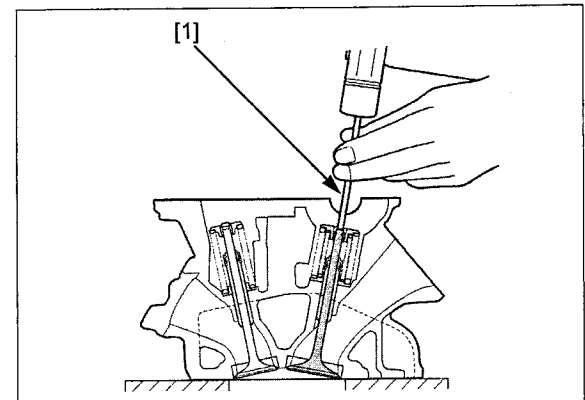
Valve spring compressor attachment [3] 07959-KM30101  
(for intake valve)

Valve spring compressor attachment [3] 07JME-KY20100  
(for exhaust valve)



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

Tap the valve stems gently with plastic hammer and pin driver [1] as shown to seat the cotters firmly.



## CYLINDER HEAD/VALVES

Refer to "CABLE & HARNESS ROUTING" for the insulator band screw direction (page 1-22).

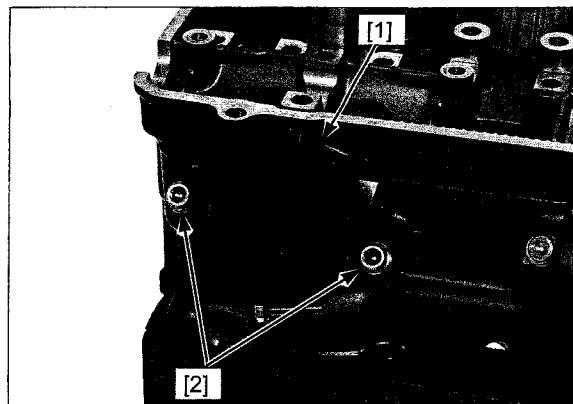
Install the insulators [1] and socket bolts [2].

Tighten the bolts to the specified torque.

**TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)**

Install the following:

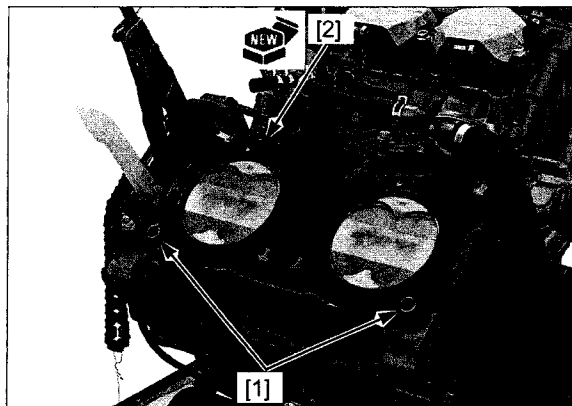
- ECT sensor (front cylinder head only) (page 6-80)
- CMP sensor (rear cylinder head only) (page 6-80)
- spark plugs (page 4-9)
- cylinder head bleeding joint (page 7-8)



## CYLINDER HEAD INSTALLATION

- The procedure of the front cylinder head installation is described below. The rear cylinder head installation is similar to the front cylinder head.

Install the dowel pins [1] and a new cylinder head gasket [2].



Install the cylinder head [1].

Apply oil to the cylinder head 10 mm bolt threads and seating surface.

Front cylinder head only:

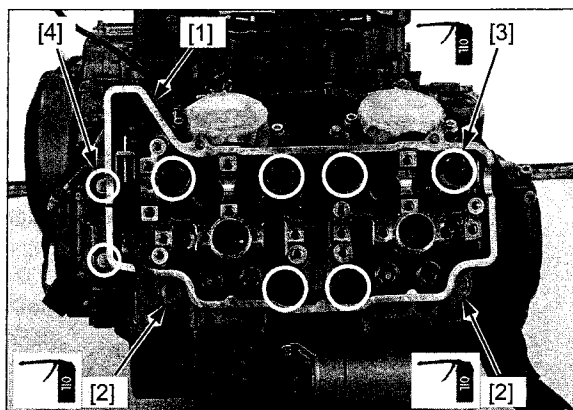
Install the cylinder head 10 mm bolts/washers (10 x 110 mm) [2] (front cylinder head only).

Install the cylinder head 10 mm bolts/washers (10 x 105 mm) [3].

Tighten the 10 mm bolts in a crisscross pattern in 2 or 3 steps.

**TORQUE: 57 N·m (5.8 kgf·m, 42 lbf·ft)**

Install and tighten the 6 mm bolts [4] securely.

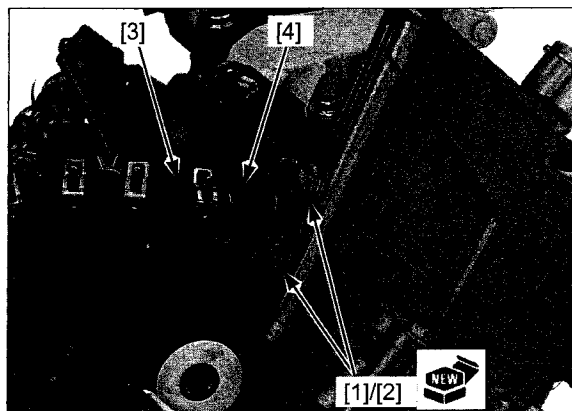


Install the cam chain tensioner bolts [1] with new sealing washers [2].

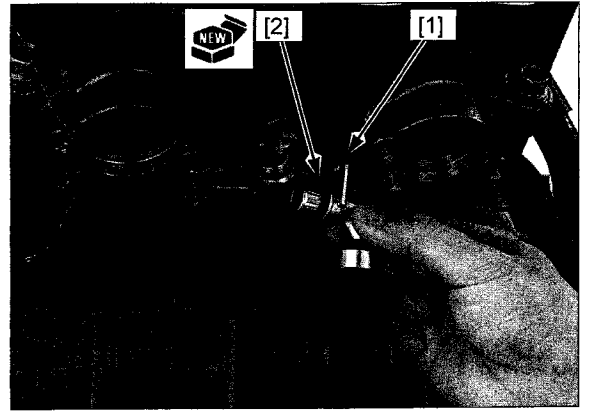
Tighten the bolts to the specified torque.

**TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)**

Connect the hose [3] to the bleeding joint [4].



- Front cylinder head only:* Install the front water joint [1] with a new O-ring [2]. Install and tighten the water joint bolt securely.
- Install the engine if the front cylinder head has been serviced.
- Install the following:
- exhaust pipe and muffler (page 3-27)
  - camshaft/rocker arms (page 9-11)
  - cylinder head cover (page 9-7)
- Fill and bleed the cooling system (page 7-6).  
Fill the crankcase with the recommended oil (page 4-13).



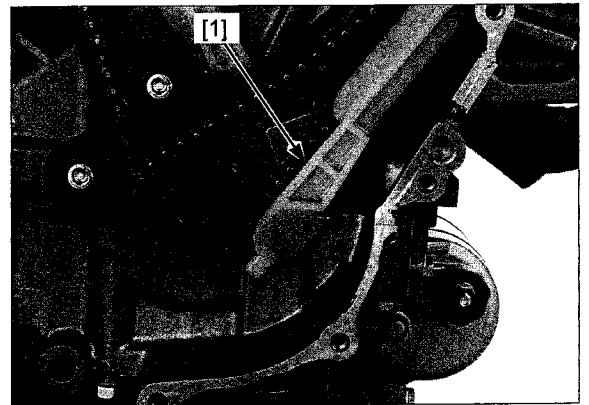
## CAM CHAIN TENSIONER

### REMOVAL

Remove the following:

- front and rear cylinder heads (page 9-20)
- primary drive gear (page 10-30)

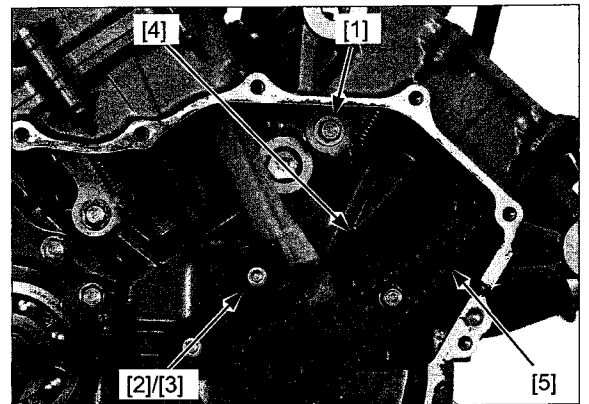
Remove the front cam chain guide [1].



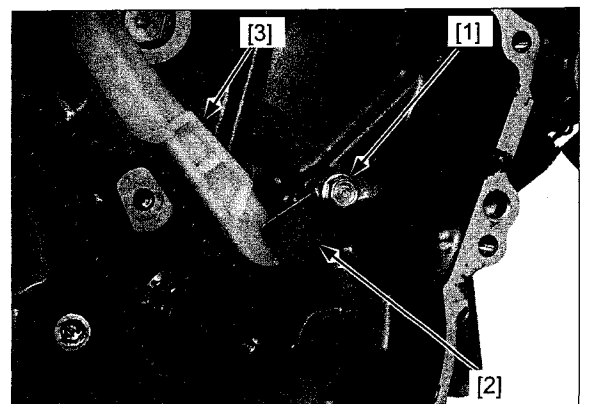
Remove the cam chain tensioner base special bolt [1].

Remove the socket bolt [2], pivot collar [3] and front cam chain tensioner [4].

Remove the cam chain [5] from the timing sprocket.



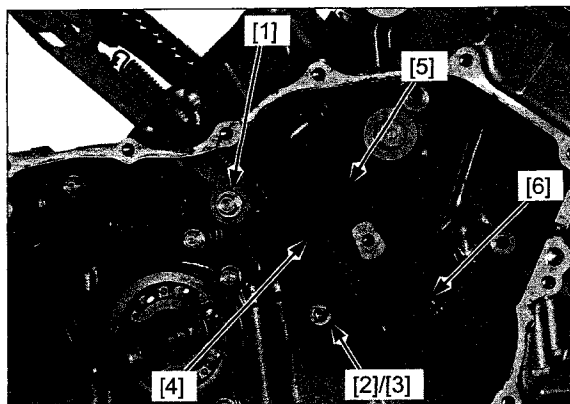
Remove the bolt [1], set plate [2] and rear cam chain guide [3].





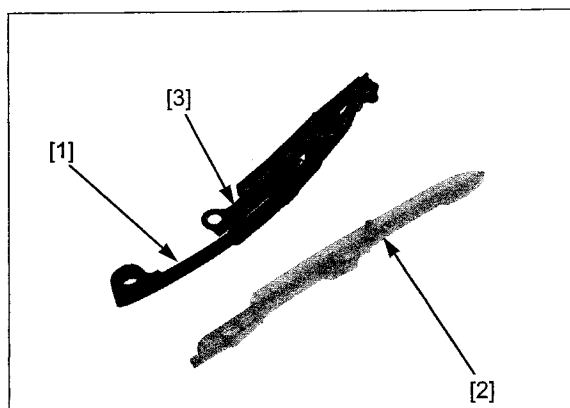
## CYLINDER HEAD/VALVES

Remove the cam chain tensioner base special bolt [1].  
Remove the socket bolt [2], pivot collar [3] and rear cam chain tensioner [4].  
Remove the cam chain [5] from the timing sprocket.  
Remove the timing sprocket [6].



### INSPECTION

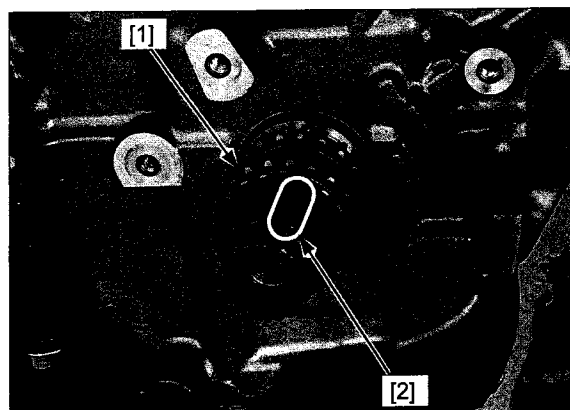
Check the cam chain tensioner [1] and cam chain guide [2] for excessive wear or damage, replace if necessary.  
Check the cam chain tensioner spring [3] for fatigue or damage, replace if necessary.



### INSTALLATION

*Be careful not to install the timing sprocket wrong side out.*

Install the timing sprocket [1] onto the crankshaft, aligning its wide groove with the wide tooth [2] of the crankshaft.



Install the rear cam chain [1] onto the timing sprocket through the upper crankcase.

Apply a locking agent to the threads of the tensioner pivot socket bolt [2] (page 1-19).

Install the rear cam chain tensioner [3], pivot collar [4] and socket bolt.

Tighten the socket bolt to the specified torque.

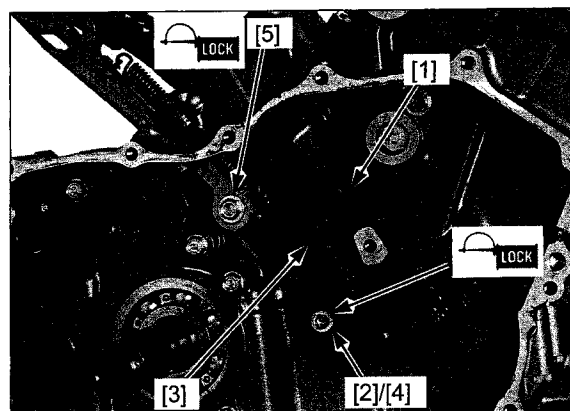
**TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)**

Apply a locking agent to the threads of the tensioner base special bolt [5] (page 1-19).

Align the bolt holes and install the tensioner base special bolt.

Tighten the bolt to the specified torque.

**TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)**

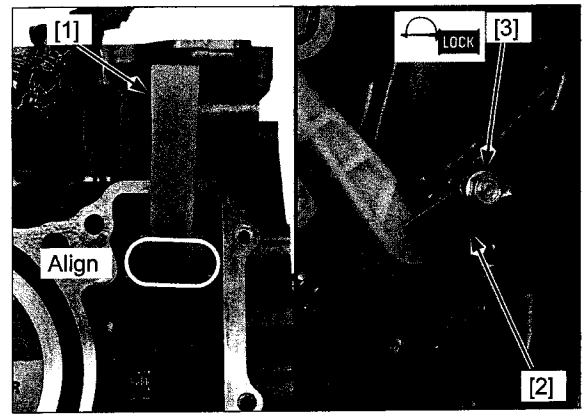


Install the cam chain guide [1], aligning its end and lugs with the grooves on the crankcase.

Apply a locking agent to the set plate bolt threads (page 1-19).

Install the set plate [2] and bolt [3], and tighten the bolt to the specified torque.

**TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)**



Install the front cam chain [1] onto the timing sprocket through the upper crankcase.

Apply a locking agent to the threads of the tensioner pivot socket bolt [2] (page 1-19).

Install the front cam chain tensioner [3], pivot collar [4] and socket bolt.

Tighten the socket bolt to the specified torque.

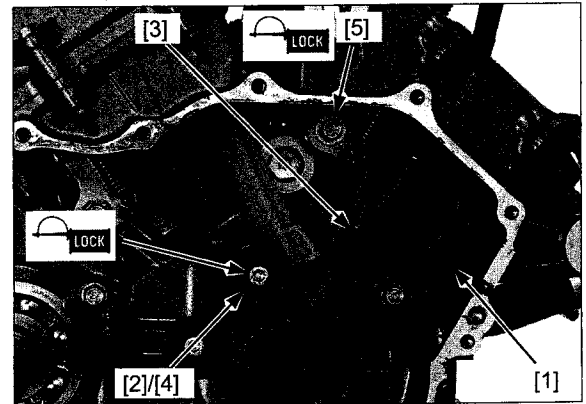
**TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)**

Apply a locking agent to the threads of the tensioner base special bolt [5] (page 1-19).

Align the bolt holes and install the tensioner base special bolt.

Tighten the bolt to the specified torque.

**TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)**

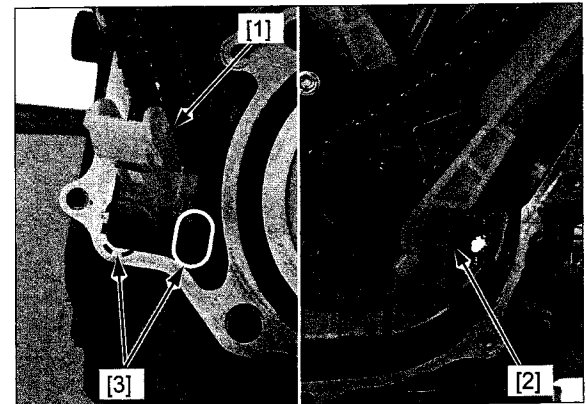


Install the front cam chain guide [1].

Set the groove on the cam chain guide to the guide [2] on the crankcase and align the lugs [3] with the grooves on the crankcase.

Install the following:

- primary drive gear (page 10-31)
- cylinder heads (page 9-30)



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# MEMO

# 10. CLUTCH/GEARSHIFT LINKAGE

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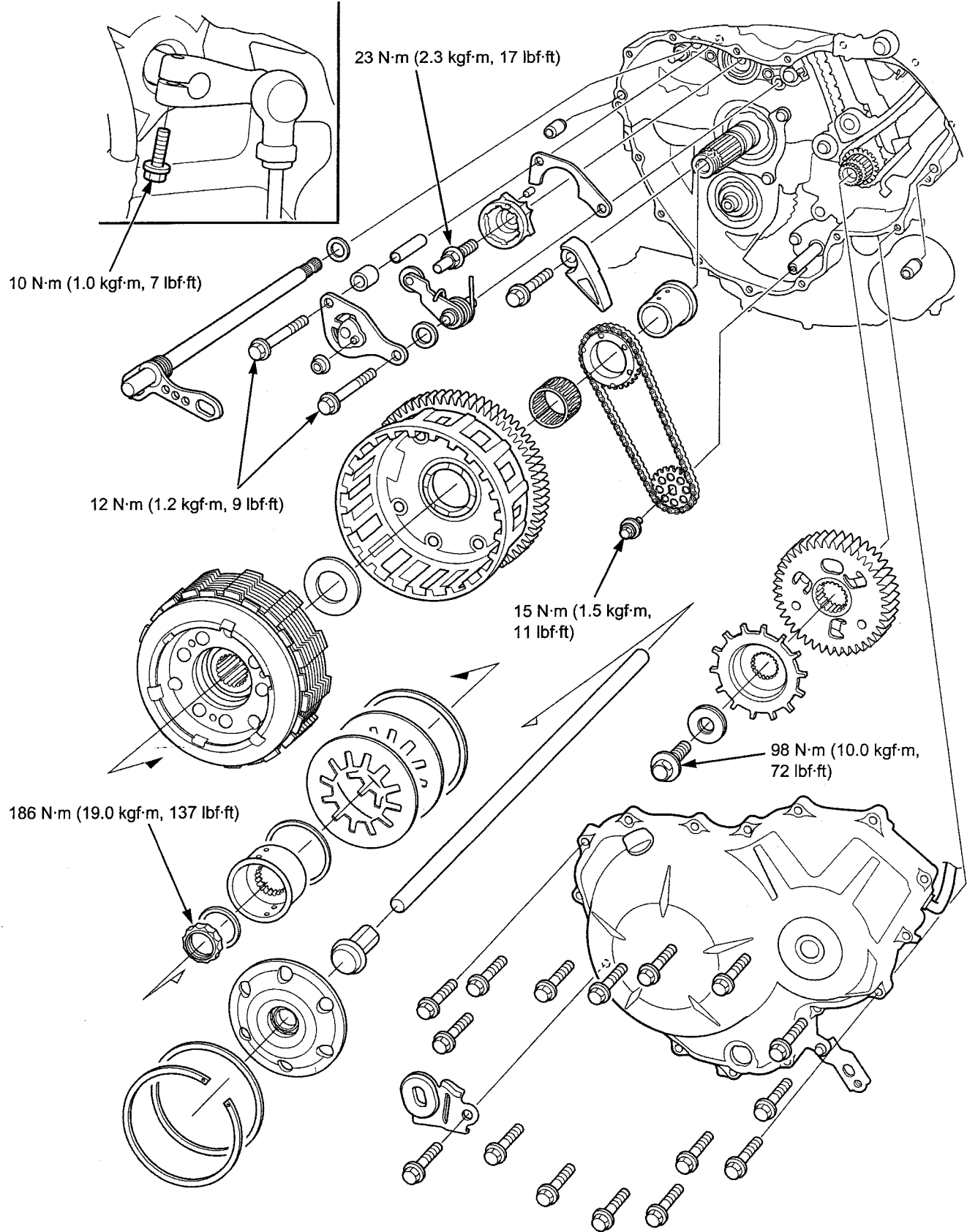
COMPONENT LOCATION .....	10-2
SERVICE INFORMATION .....	10-4
TROUBLESHOOTING.....	10-5
CLUTCH FLUID REPLACEMENT/ AIR BLEEDING .....	10-6
CLUTCH MASTER CYLINDER.....	10-7
CLUTCH SLAVE CYLINDER .....	10-11

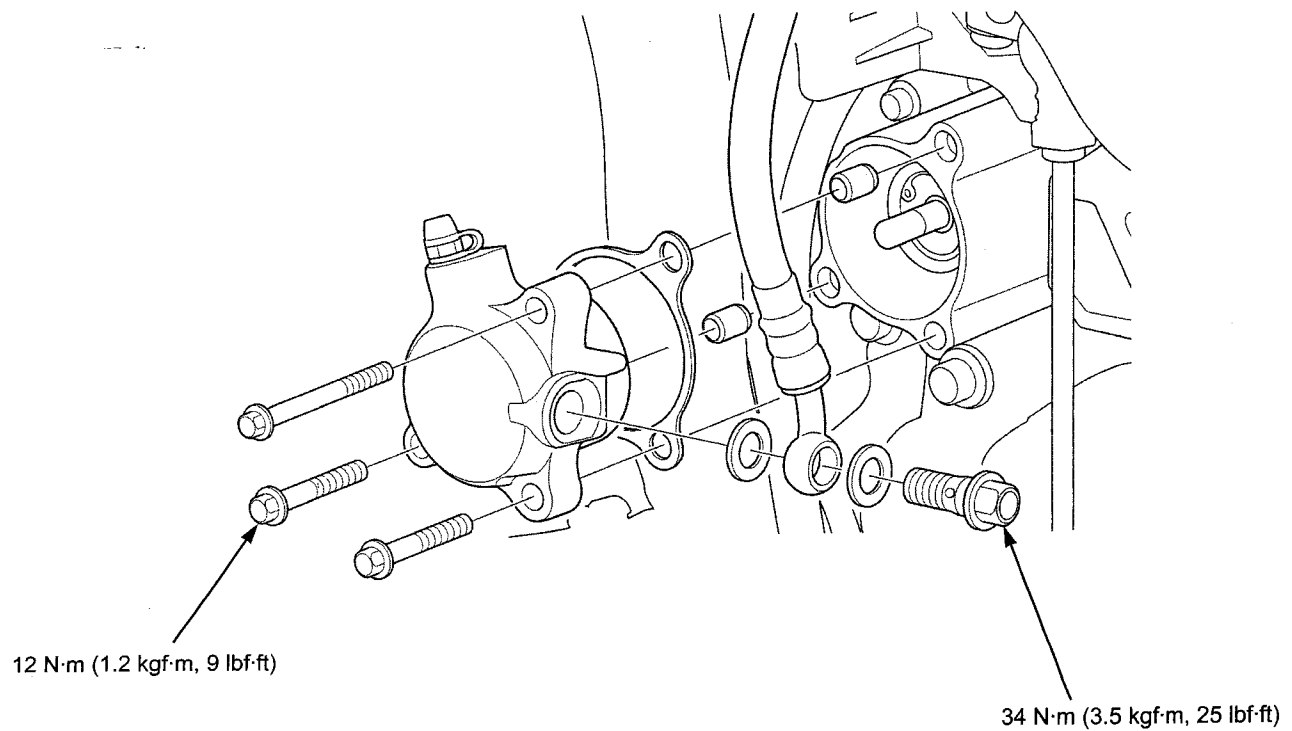
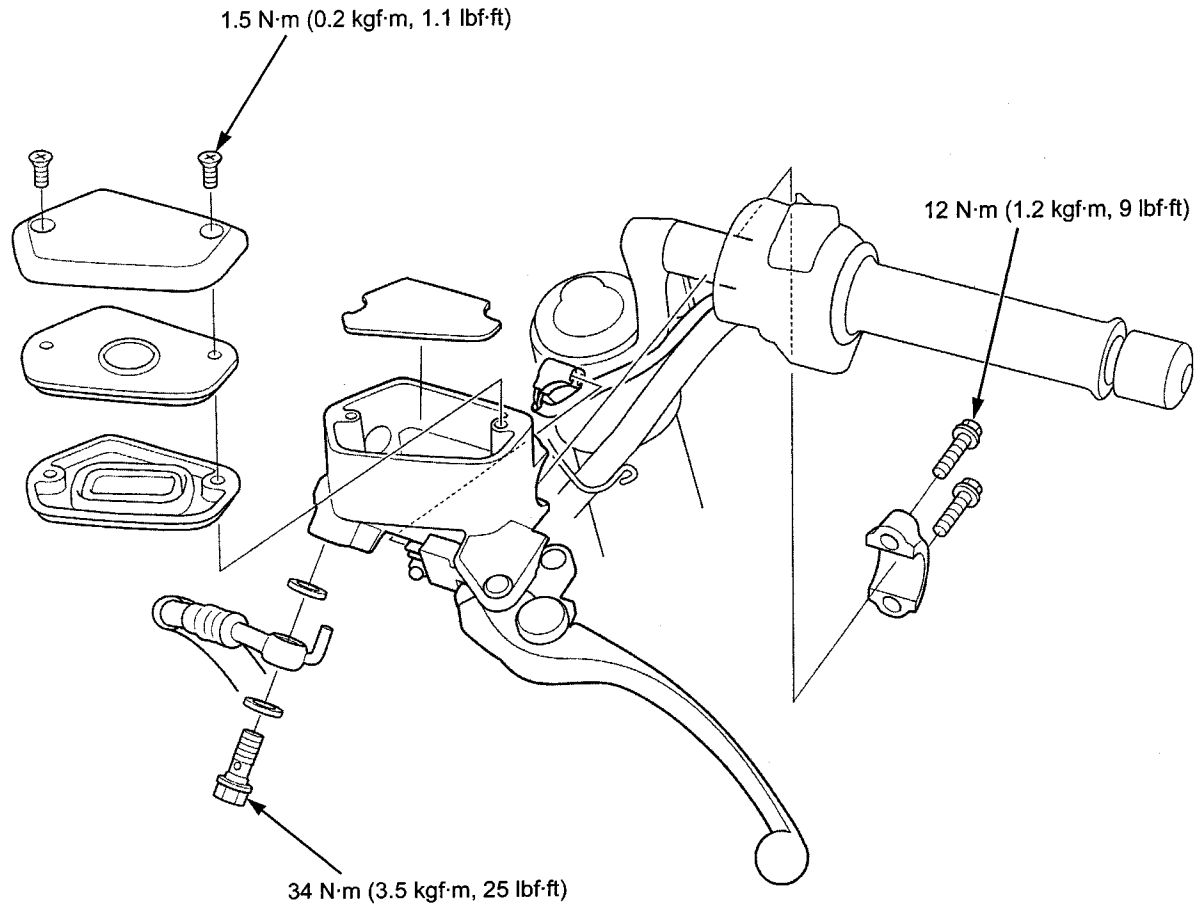
RIGHT CRANKCASE COVER REMOVAL .....	10-13
CLUTCH .....	10-14
GEARSHIFT LINKAGE .....	10-25
PRIMARY DRIVE GEAR .....	10-30
RIGHT CRANKCASE COVER INSTALLATION .....	10-32

**CLUTCH/GEARSHIFT LINKAGE**

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**COMPONENT LOCATION**





## CLUTCH/GEARSHIFT LINKAGE

# SERVICE INFORMATION

## GENERAL

### NOTICE

Spilled clutch (brake) fluid will severely damage the plastic parts and painted surfaces. It is also harmful to some rubber parts. Be careful whenever you remove the reservoir cap; make sure the reservoir is horizontal first.

- This section covers service of the clutch, primary drive gear and gearshift linkage. All service can be done with the engine installed in the frame.
- DOT 4 brake fluid is used for the hydraulic clutch and is referred to as clutch fluid in this section. Do not use other types of fluid as they are not compatible.
- Never allow contaminants (dirt, water, etc.) to get into an open reservoir.
- Once the hydraulic system has been opened, 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 as they may not be compatible.
- Engine oil viscosity and level and the use of oil additives have an effect on clutch disengagement. Oil additives of any kind are specifically not recommended. When the clutch does not disengage or the motorcycle creeps with the clutch lever fully activated, inspect the engine oil viscosity and level before servicing the clutch system.

## SPECIFICATIONS

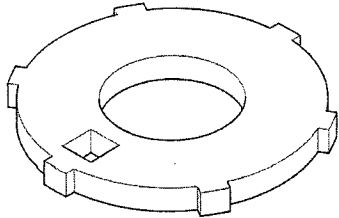
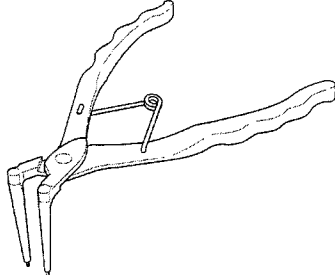
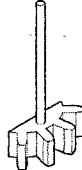
Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Specified clutch fluid			DOT 4 brake fluid	—
Clutch master cylinder I.D.			12.700 – 12.743 (0.5000 – 0.5017)	12.755 (0.5022)
Clutch master piston O.D.			12.657 – 12.684 (0.4983 – 0.4994)	12.645 (0.4978)
Clutch	Spring free height		6.70 (0.264)	5.70 (0.224)
	Disc thickness	Disc A, C	3.22 – 3.38 (0.127 – 0.133)	3.1 (0.12)
		Disc B	3.72 – 3.88 (0.146 – 0.153)	3.6 (0.14)
	Plate warpage		—	0.30 (0.012)
Clutch outer guide		I.D.	28.000 – 28.021 (1.1024 – 1.1032)	28.030 (1.1035)
		O.D.	34.975 – 34.991 (1.3770 – 1.3776)	34.965 (1.3766)
Oil pump drive sprocket I.D.			35.025 – 35.145 (1.3789 – 1.3837)	35.155 (1.3841)
Mainshaft O.D. at clutch outer guide			27.980 – 27.990 (1.1016 – 1.1020)	27.96 (1.101)

## TORQUE VALUES

Clutch center lock nut	186 N·m (19.0 kgf·m, 137 lbf·ft)	Apply oil to the thread and flange surface. Stake the nut.
Change guide plate bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	Apply a locking agent to the threads.
Shift drum center pin bolt	23 N·m (2.3 kgf·m, 17 lbf·ft)	Apply a locking agent to the threads.
Gearshift spindle return spring pin	23 N·m (2.3 kgf·m, 17 lbf·ft)	
Right crankcase cover rubber plate bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	Apply a locking agent to the threads.
CKP sensor rotor/primary drive gear flange bolt	98 N·m (10.0 kgf·m, 72 lbf·ft)	Apply oil to the threads and seating surface. Left-hand threads
Gearshift spindle plate bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	Apply a locking agent to the threads.
Oil pump driven sprocket bolt	15 N·m (1.5 kgf·m, 11 lbf·ft)	Apply a locking agent to the threads.
Clutch slave cylinder mounting bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	
Clutch slave cylinder bleeder screw	9.0 N·m (0.9 kgf·m, 6.6 lbf·ft)	
Clutch hose oil bolt	34 N·m (3.5 kgf·m, 25 lbf·ft)	
Clutch master cylinder reservoir cap screw	1.5 N·m (0.2 kgf·m, 1.1 lbf·ft)	
Clutch master cylinder holder bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	
Clutch lever pivot bolt	1.0 N·m (0.1 kgf·m, 0.7 lbf·ft)	
Clutch lever pivot nut	5.9 N·m (0.6 kgf·m, 4.4 lbf·ft)	
Clutch lever switch screw	1.2 N·m (0.1 kgf·m, 0.9 lbf·ft)	
Gearshift arm pinch bolt	10 N·m (1.0 kgf·m, 7 lbf·ft)	ALOC bolt; replace with a new one.
Oil pump chain guide bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	Apply a locking agent to the threads.
Gearshift pedal pivot bolt	22 N·m (2.2 kgf·m, 16 lbf·ft)	

## TOOLS

<p>Clutch center holder 070MB-MFL0100</p>  <p>or 070MB-MFLA100 (U.S.A. only)</p>	<p>Snap ring pliers 07914-SA50001</p> 	<p>Gear holder, M2.5 07724-0010100</p>  <p>or 07724-001A100 (U.S.A. only)</p>
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## TROUBLESHOOTING

**Clutch lever soft or spongy**

- Air in hydraulic system
- Low fluid level
- Hydraulic system leaking

**Clutch lever hard to pull in**

- Slicking master cylinder piston
- Sticking slave cylinder piston
- Clogged hydraulic system
- Damaged clutch lifter mechanism
- Faulty clutch lifter bearing
- Clutch lifter piece installed improperly

**Clutch slips when accelerating**

- Slicking master cylinder piston
- Sticking slave cylinder piston
- Clogged hydraulic system
- Worn clutch disc
- Weak clutch spring
- Engine oil mixed with molybdenum or graphite additive

**Clutch will not disengage or motorcycle creeps with the clutch lever fully activated**

- Air in hydraulic system
- Low clutch fluid level
- Hydraulic system leaking or clogged
- Clutch plate warped
- Loose clutch center lock nut
- Oil level too high
- Improper oil viscosity or oil additive used
- Damaged clutch lifter mechanism
- Clutch lifter piece installed improperly

**Hard to shift**

- Improper clutch operation
- Improper oil viscosity

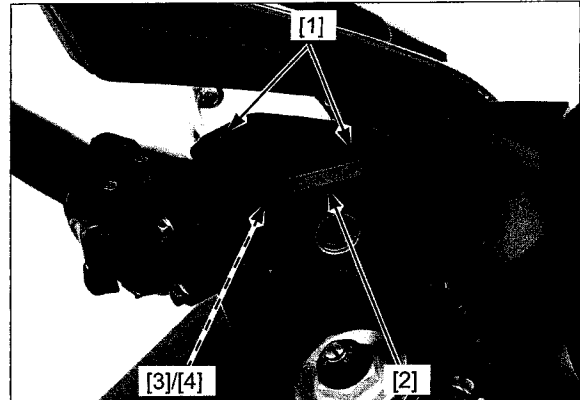


# CLUTCH FLUID REPLACEMENT/AIR BLEEDING

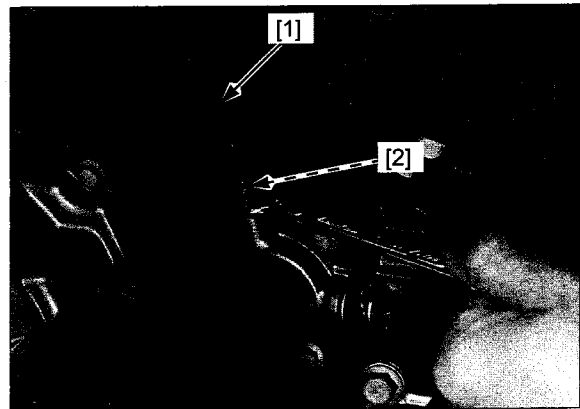
### CLUTCH FLUID DRAINING

Turn the handlebar to the right until the reservoir is parallel to the ground, before removing the reservoir cap.

Remove the screws [1], reservoir cap [2], set plate [3] and diaphragm [4].



Connect a bleed hose [1] to the bleed valve [2] of the clutch slave cylinder. Loosen the bleed valve and pump the clutch lever until fluid stops flowing out of the bleed valve.



### CLUTCH FLUID FILLING/BLEEDING

Close the bleed valve.

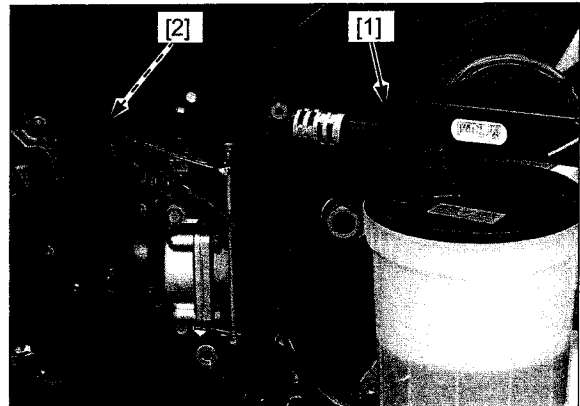
Fill the reservoir with DOT 4 brake fluid from a sealed container.

Connect a commercially available brake bleeder [1] to the bleed valve [2].

Operate the brake bleeder and loosen the bleed valve.

- Check the fluid level often while bleeding the clutch system to prevent air from being pumped into the system.
- When using a brake bleeding tool, follow the manufacturer's operating instruction.

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

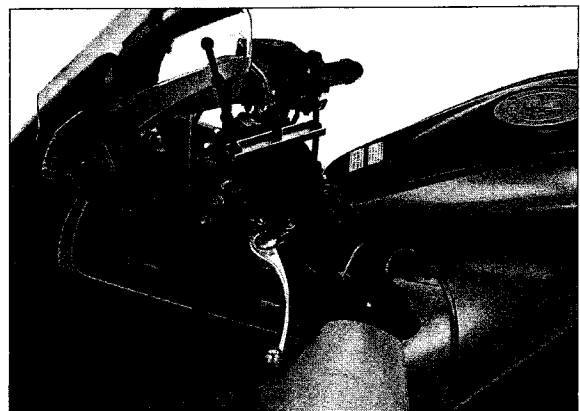


If an automatic refill system is not used, add brake fluid when the fluid level in the reservoir is low.

Repeat the above procedures until new fluid flows out of the bleed valve and air bubbles do not appear in the plastic hose.

Close the bleed valve.

**TORQUE: 9.0 N·m (0.9 kgf·m, 6.6 lbf·ft)**



If a brake bleeder is not available, use the following procedure.  
Pump the clutch lever until lever resistance is felt.

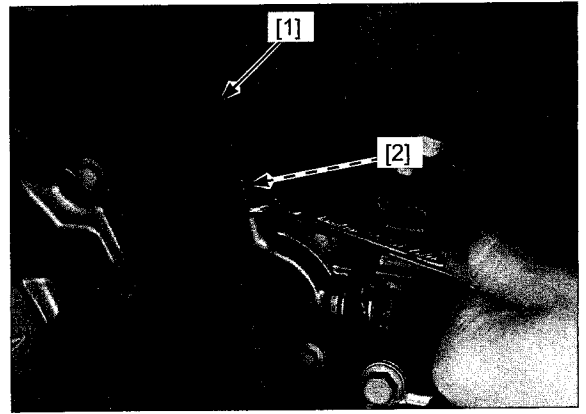
Connect a bleed hose [1] to the bleed valve [2] and bleed the system as follows:

1. Squeeze the clutch lever, open the bleed valve 1/4 of a turn and then close it. Do not release the clutch lever until the bleed valve has been closed.
2. Release the clutch lever slowly and wait several seconds after it reaches the end of its travel.

Repeat steps 1 and 2 until air bubbles do not appear in the bleed hose.

Tighten the bleed valve to the specified torque.

**TORQUE: 9.0 N·m (0.9 kgf·m, 6.6 lbf·ft)**



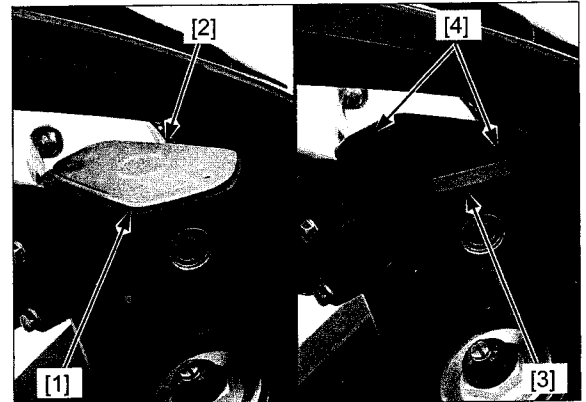
*Do not allow foreign material to enter the system when filling the reservoir.*

Fill the reservoir to the casting ledge with DOT 4 brake fluid from a sealed container.

Install the diaphragm [1], set plate [2] and reservoir cap [3], and tighten the cap screws [4] to the specified torque.

**TORQUE: 1.5 N·m (0.2 kgf·m, 1.1 lbf·ft)**

Check the clutch operation (page 4-25).



## CLUTCH MASTER CYLINDER

### REMOVAL

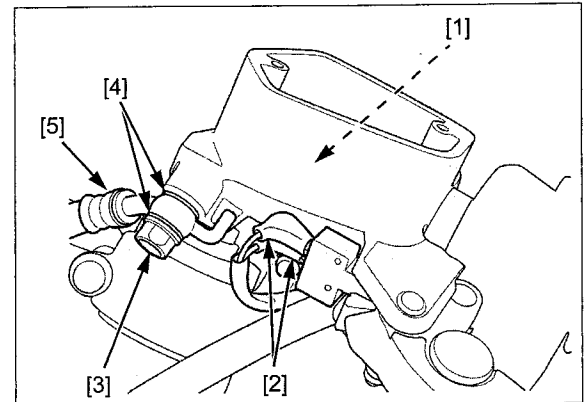
Drain the clutch hydraulic system (page 10-6).

Remove the float [1] from the master cylinder.

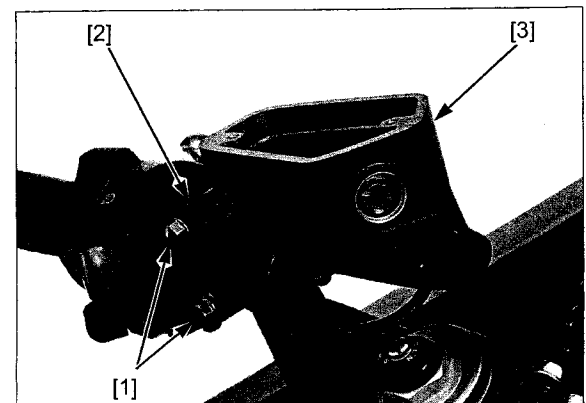
Disconnect the clutch switch wire connectors [2].

*Avoid spilling fluid on painted, plastic, or rubber parts. Place a shop towel over these parts whenever servicing the system.*

Remove the clutch hose oil bolt [3] and sealing washers [4], then disconnect the clutch hose [5].



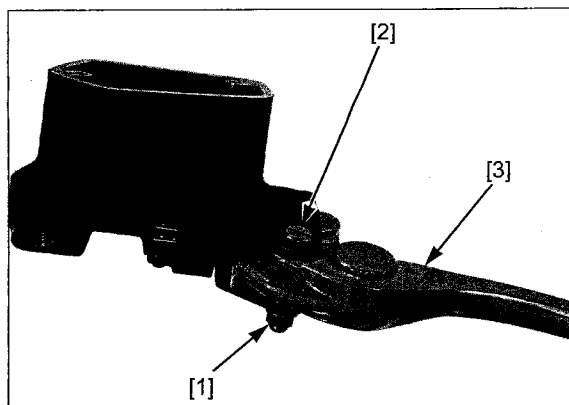
Remove the holder bolts [1], holder [2] and clutch master cylinder [3].



## CLUTCH/GEARSHIFT LINKAGE

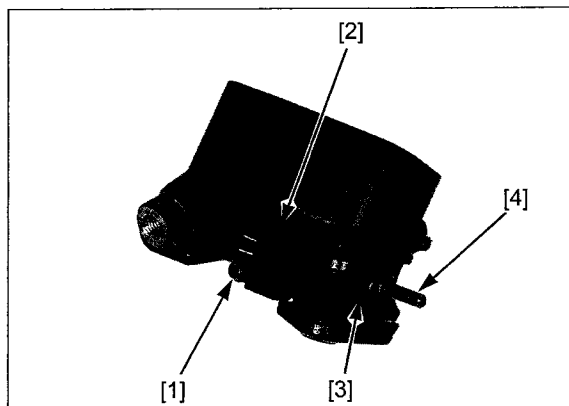
### DISASSEMBLY

Remove the nut [1], pivot bolt [2] and clutch lever assembly [3].



Remove the screw [1] and clutch switch [2].

Remove the boot [3] and push rod [4].



Remove the snap ring [1] from the master cylinder body using the special tool as shown.

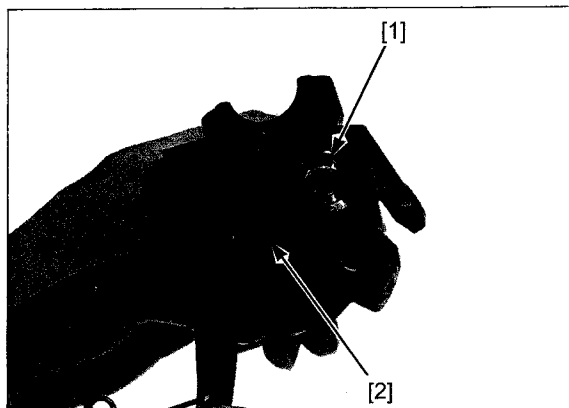
#### TOOL:

Snap ring pliers [2]

07914-SA50001

Remove the master piston assembly and spring from the master cylinder.

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



### INSPECTION

Check the piston boot, primary cup and secondary cup for fatigue or damage.

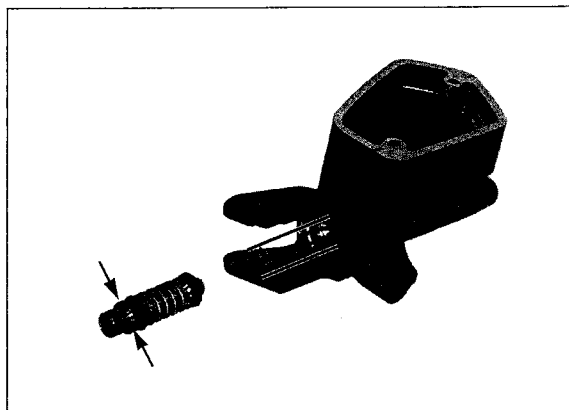
Check the master cylinder and piston for abnormal scratches.

Measure the master cylinder I.D.

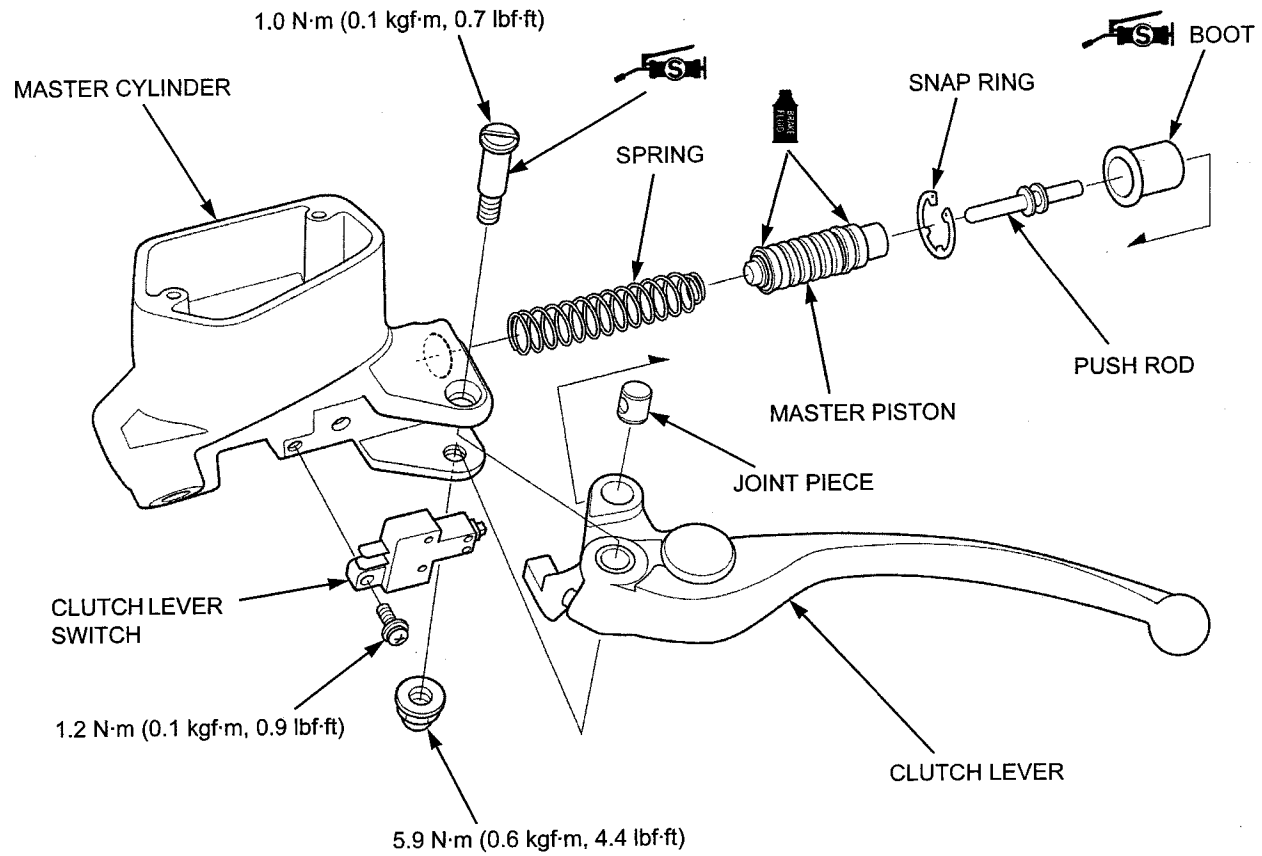
**SERVICE LIMIT: 12.755 mm (0.5022 in)**

Measure the master piston O.D.

**SERVICE LIMIT: 12.645 mm (0.4978 in)**



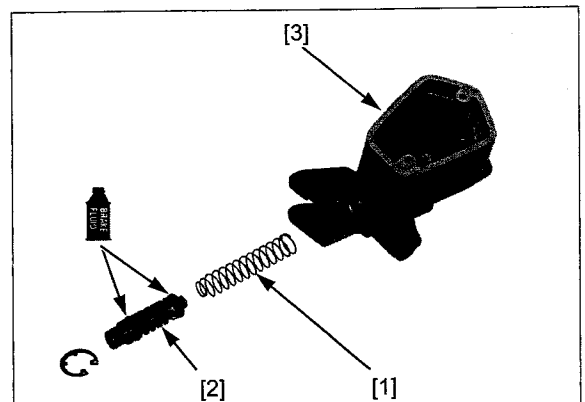
## ASSEMBLY



Coat the master piston and piston cups with clean brake fluid.  
Install the spring [1] to the master piston [2].

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

Install the spring and master piston assembly into the master cylinder [3].

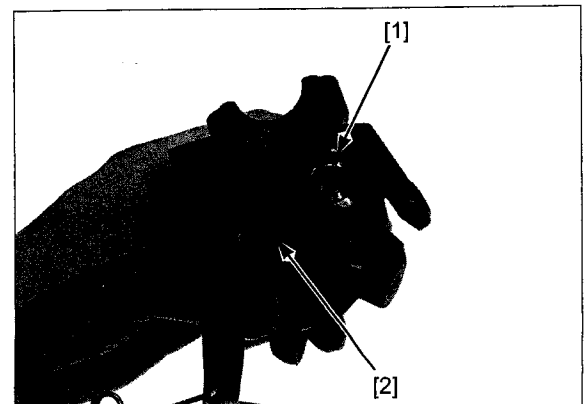


*Be certain the snap ring is firmly seated in the groove.*

Install the snap ring [1] using the special tool.

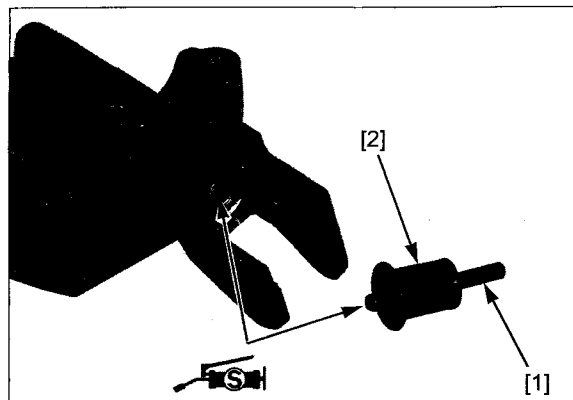
**TOOL:**  
**Snap ring pliers [2]**

**07914-SA50001**



## CLUTCH/GEARSHIFT LINKAGE

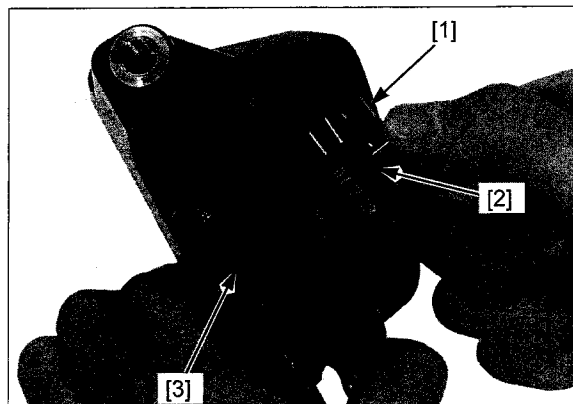
Apply silicone grease to the boot inside, tip of the push rod and master piston end.  
Install the push rod [1] and boot [2].



Install the clutch switch [1] by aligning its boss [2] with the hole [3] on the master cylinder.

Install and tighten the screw to the specified torque.

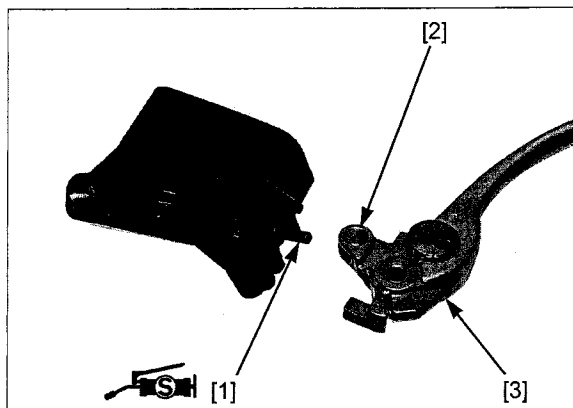
**TORQUE: 1.2 N·m (0.1 kgf·m, 0.9 lbf·ft)**



Apply silicone grease to the top of the push rod [1].

Install the joint piece [2] into the clutch lever [3].

Install the clutch lever assembly [3] by aligning the hole of the joint piece [2] with the tip of the push rod [1].



Apply silicone grease to the clutch lever pivot bolt sliding surface.

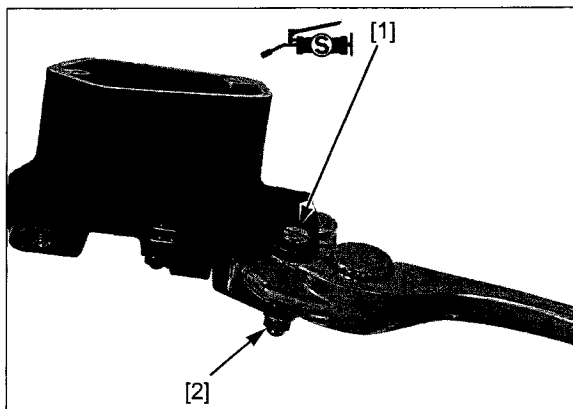
Install and tighten the pivot bolt [1] to the specified torque.

**TORQUE: 1.0 N·m (0.1 kgf·m, 0.7 lbf·ft)**

Install the pivot nut [2].

Hold the pivot bolt and tighten the pivot nut to the specified torque.

**TORQUE: 5.9 N·m (0.6 kgf·m, 4.4 lbf·ft)**



**INSTALLATION**

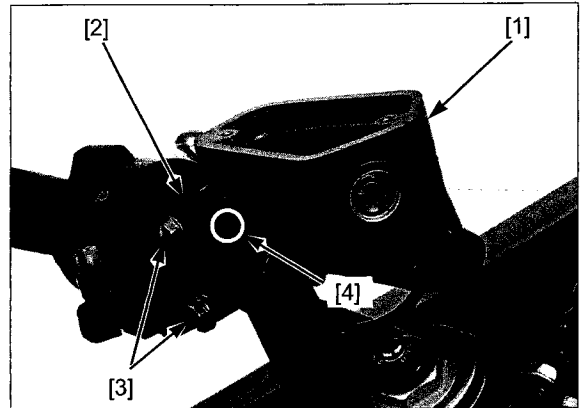
*Install the master cylinder holder with its "UP" mark facing up.*

Install the master cylinder [1], holder [2] and holder bolts [3].

Align the end of the master cylinder with the punch mark [4] on the handlebar.

Tighten the upper bolt first, then the lower bolt.

**TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)**



Connect the clutch hose [1] with the oil bolt [2] and new sealing washers [3].

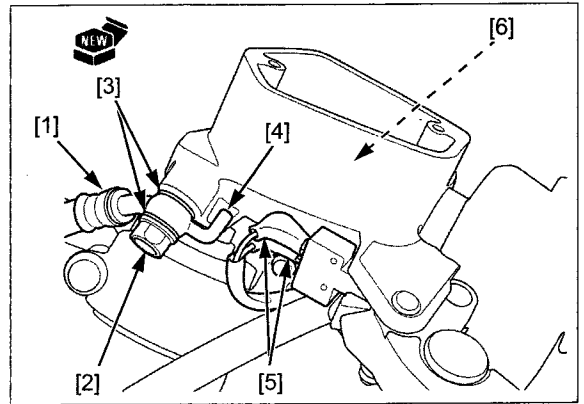
While pushing the clutch hose stopper [4] against the master cylinder body, tighten the oil bolt to the specified torque.

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

Connect the clutch switch connectors [5].

Install the float [6] into the master cylinder.

Fill the reservoir to the upper level and bleed the hydraulic system (page 10-6).

**CLUTCH SLAVE CYLINDER****REMOVAL**

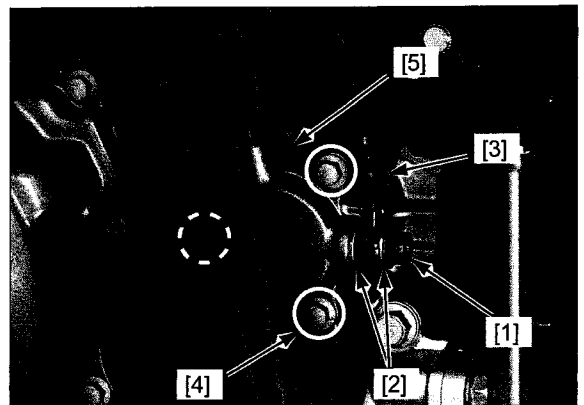
Drain the clutch hydraulic system (page 10-6).

*Avoid spilling fluid on painted, plastic, or rubber parts. Place a shop towel over these parts whenever servicing the system.*

Remove the hose oil bolt [1], sealing washers [2] and clutch hose eyelet [3].

Remove the bolts [4] and clutch slave cylinder assembly [5].

Remove the gasket and dowel pins.

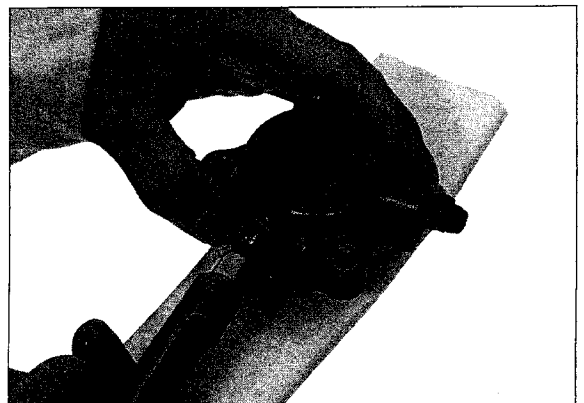
**DISASSEMBLY**

Place a shop towel over the piston.

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

Position the slave cylinder body with the piston down and apply small squirts of air pressure to the fluid inlet to remove the piston.

Remove the slave cylinder piston and spring.



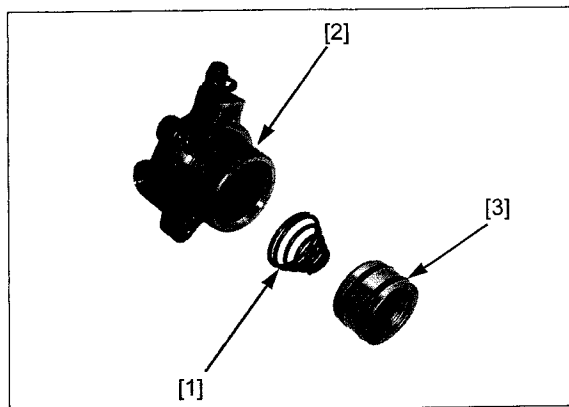
## CLUTCH/GEARSHIFT LINKAGE

### INSPECTION

Check the piston spring [1] for weakness or damage.

Check the slave cylinder [2] for scoring or other damage.

Check the slave cylinder piston [3] for scratches, scoring or other damage.

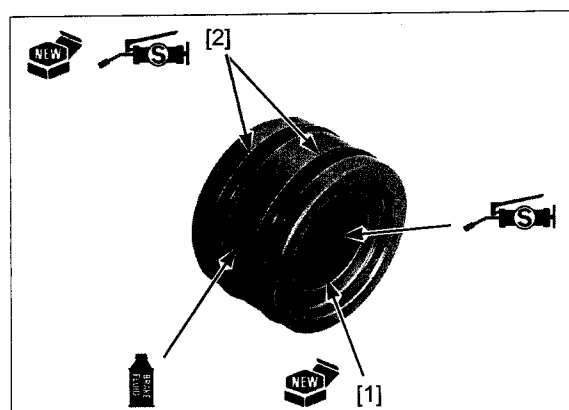


### ASSEMBLY

Apply silicone grease to new oil seal lip and install the oil seal [1] into the piston.

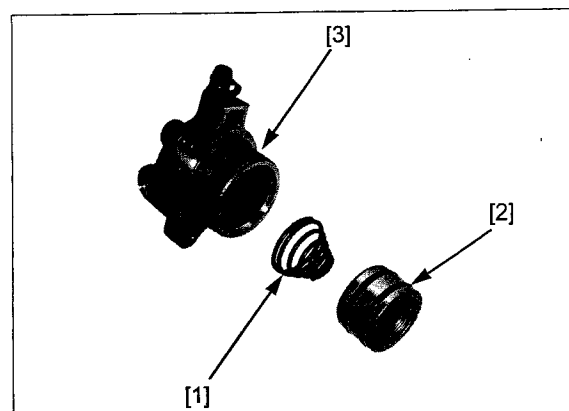
Apply clean brake fluid to the piston outer surface.

Apply silicone grease to new O-rings [2] and install them into the piston grooves.



Install the spring [1] to the boss of the piston [2].

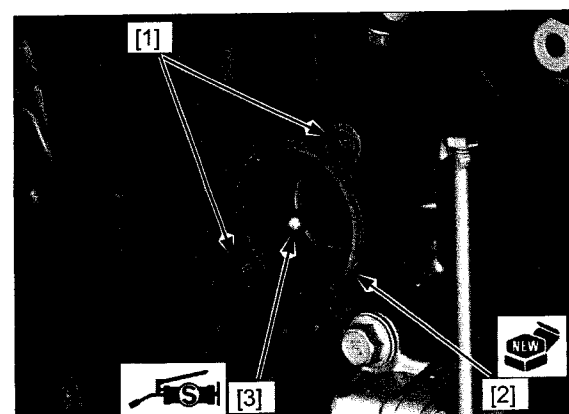
Install the spring and piston into the slave cylinder [3].



### INSTALLATION

Install the dowel pins [1] and a new gasket [2].

Apply silicone grease to the top of the push rod [3].



Install the slave cylinder [1] onto the crankcase.

Install the mounting bolts [2] and tighten them to the specified torque.

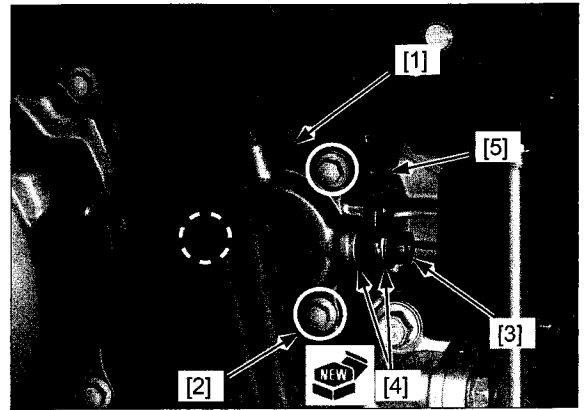
**TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)**

Install the clutch hose eyelet with the oil bolt [3] and new sealing washers [4].

While pushing the clutch hose [5] against the stopper and tighten the oil bolt to the specified torque.

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

Fill the reservoir to the upper level and bleed the hydraulic system (page 10-6).



## RIGHT CRANKCASE COVER REMOVAL

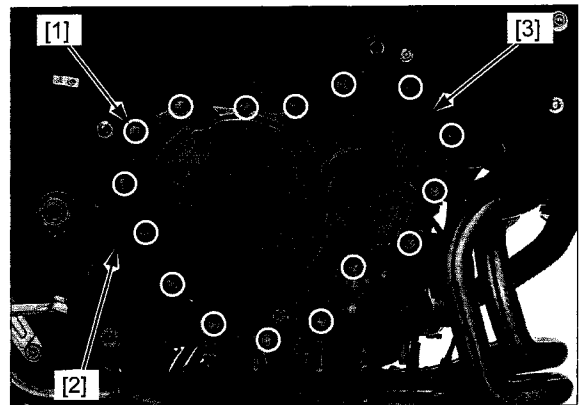
Remove the following:

- under cowl (page 3-6)
- right middle cowl (page 3-7)

Drain the engine oil (page 4-13).

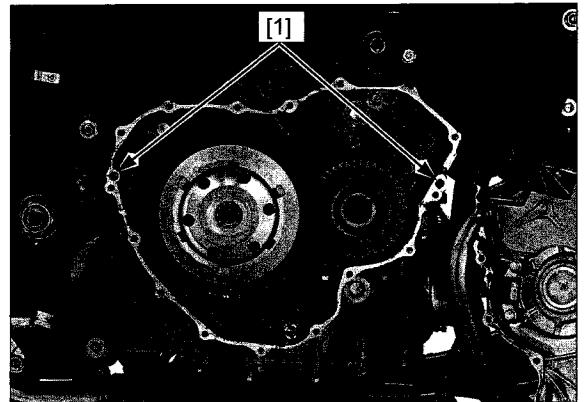
*Support the right crankcase cover so that it does not hang from the CKP sensor wire.*

Remove the bolts [1], under cowl stay [2] and right crankcase cover [3].



Remove the dowel pins [1].

Refer to procedure for the CKP sensor removal/installation (page 20-8).



## RIGHT CRANKCASE COVER RUBBER REPLACEMENT

Remove the crankcase cover from the CKP sensor (page 20-8).

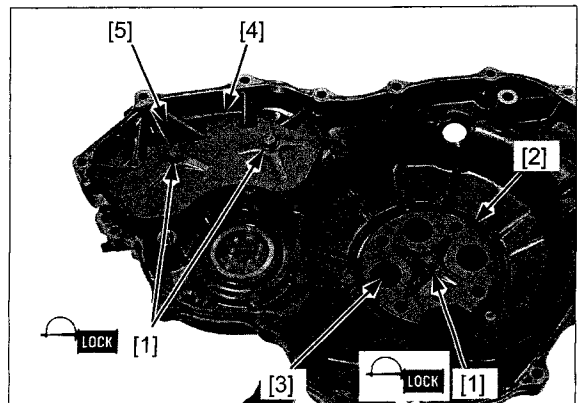
Remove the bolts [1], plate A [2], rubber A [3], plate B [4] and rubber B [5].

Install the rubber A, plate A, rubber B and plate B onto the right crankcase cover.

Apply a locking agent to the threads of the rubber plate bolts (page 1-19).

Install the plate bolts and tighten them to the specified torque.

**TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)**



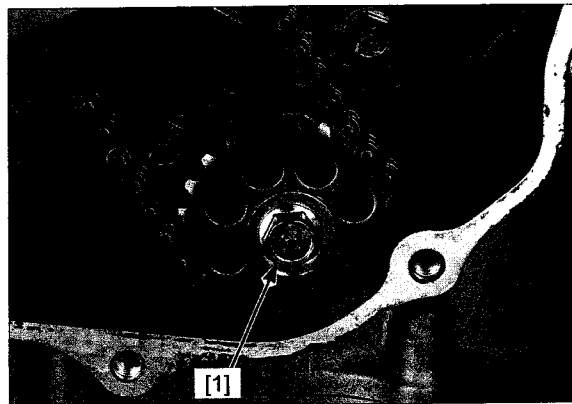


### CLUTCH

#### REMOVAL

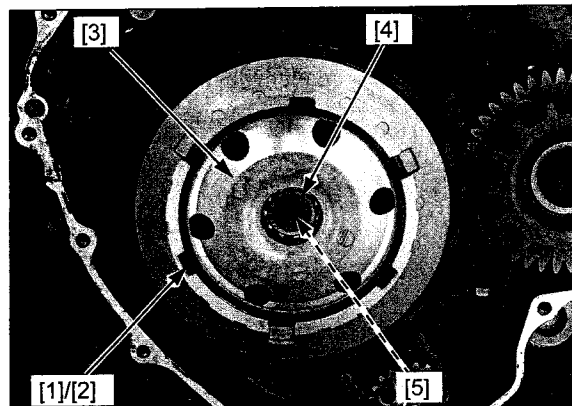
Remove the right crankcase cover (page 10-13).

If the oil pump chain and sprockets will be removed, loosen the oil pump driven sprocket bolt [1].



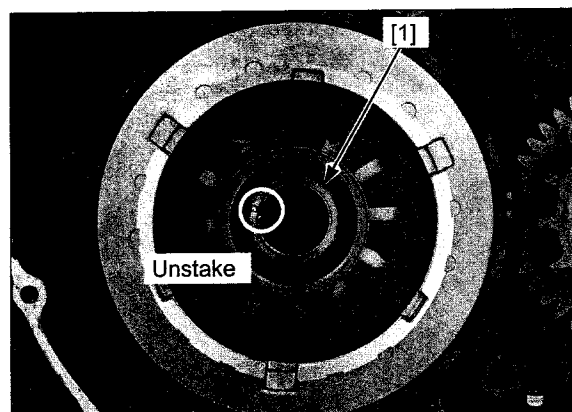
Remove the snap ring [1] and clutch lifter seat [2].

Remove the clutch lifter plate/lifter bearing [3], lifter piece [4] and lifter rod [5].



*Be careful not to damage the mainshaft threads.*

Unstake the clutch center lock nut [1].

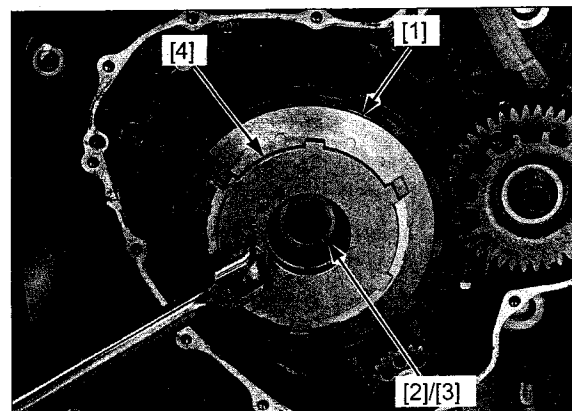


Hold the pressure plate [1] with the special tool and remove the clutch center lock nut [2] and washer [3].

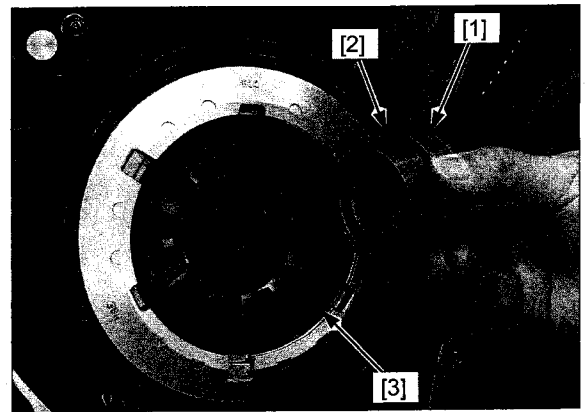
#### TOOL:

Clutch center holder [4]

070MB-MFL0100 or  
070MB-MFLA100  
(U.S.A. only)

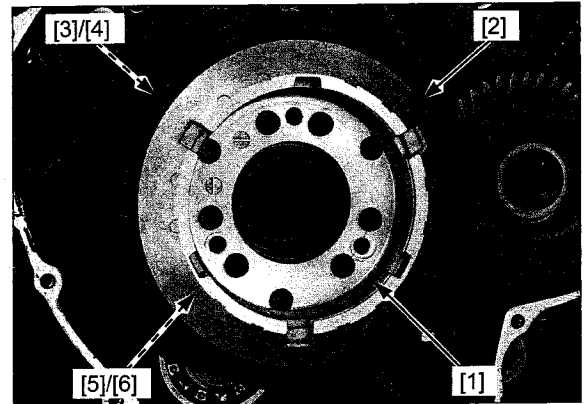


Remove the clutch spring holder [1], clutch spring seat B [2] and clutch springs [3].

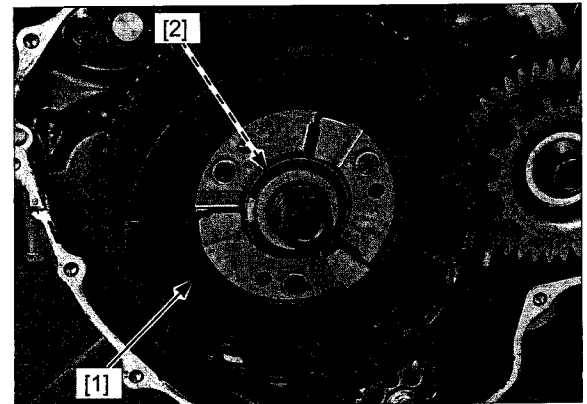


Remove the clutch spring seat [1].

Remove the pressure plate [2], clutch discs [3], clutch plates [4], judder spring [5] and spring seat [6].



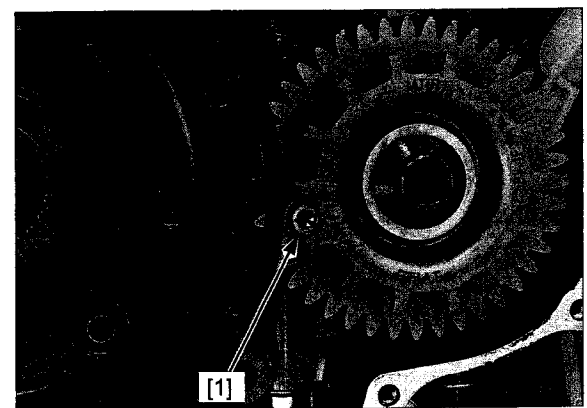
Remove the clutch center [1] and thrust washer [2].



To align the sub-gear teeth with the primary drive gear teeth before removing the clutch outer, temporarily install a suitable socket bolt (6 x 10 mm) [1] to the primary drive gear, and then tighten it securely to retain the sub-gear.

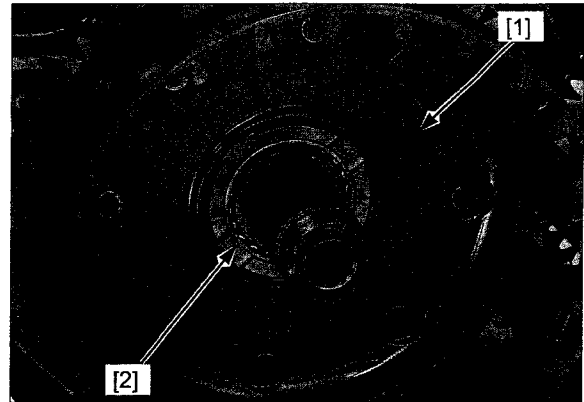
### NOTE:

For ease of the clutch outer installation, do not remove the socket bolt.

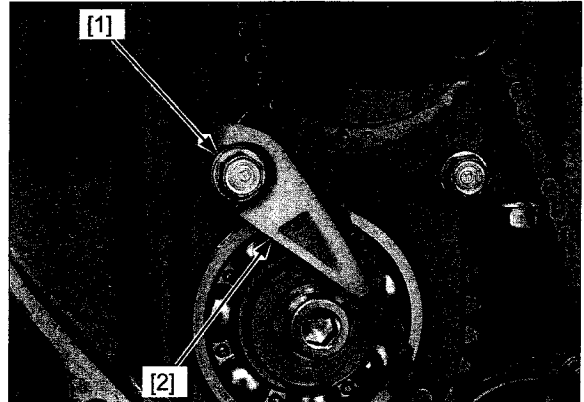


## CLUTCH/GEARSHIFT LINKAGE

Remove the clutch outer [1] and needle bearing [2].



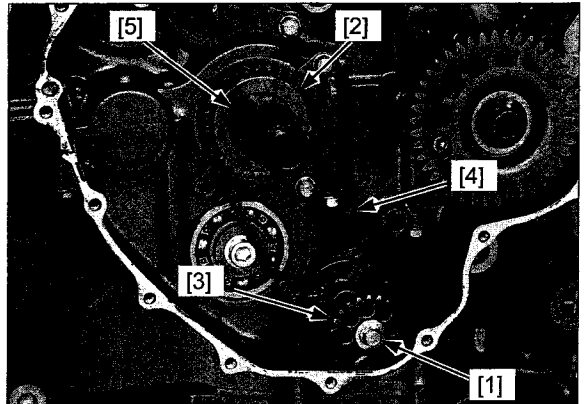
Remove the bolt [1] and oil pump chain guide [2].



Remove the oil pump driven sprocket bolt [1].

Remove the oil pump drive sprocket [2], driven sprocket [3] and drive chain [4] as an assembly.

Remove the clutch outer guide [5].



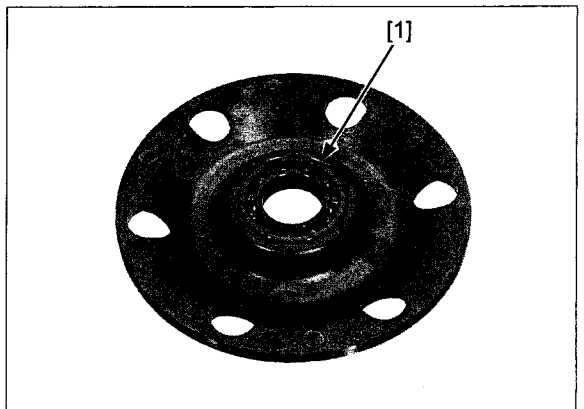
## INSPECTION

### Clutch lifter bearing

Turn the inner race of the lifter bearing [1] with your finger.

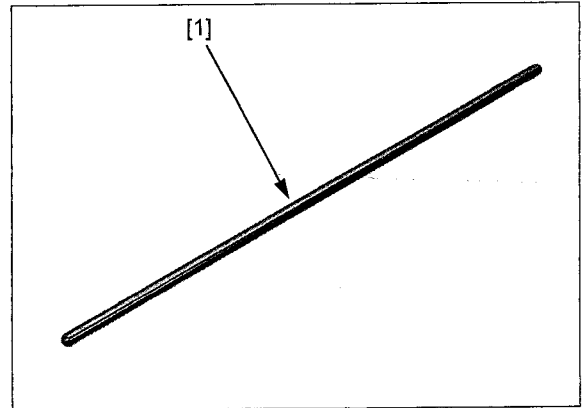
The bearing should turn smoothly and quietly. Also check that the outer race of the bearing fits tightly in the pressure plate.

Replace the bearing if the inner race does not turn smoothly, quietly, or if the outer race fit loosely in the pressure plate.



## Clutch lifter rod

Check the clutch lifter rod [1] for bending or damage.



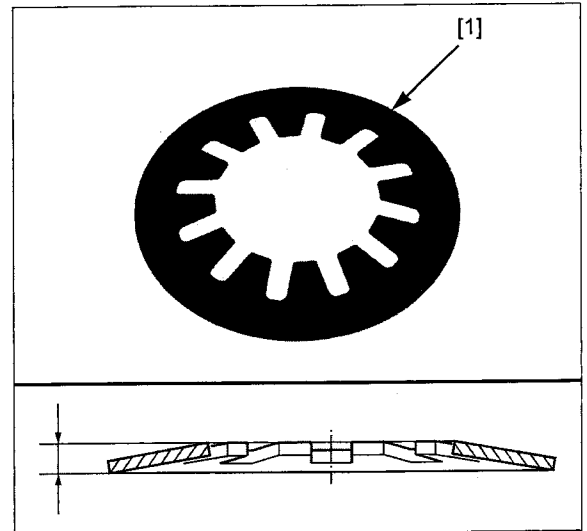
## Clutch spring

*Replace the clutch springs as a set.*

Check the clutch spring [1] for damage or distortion.

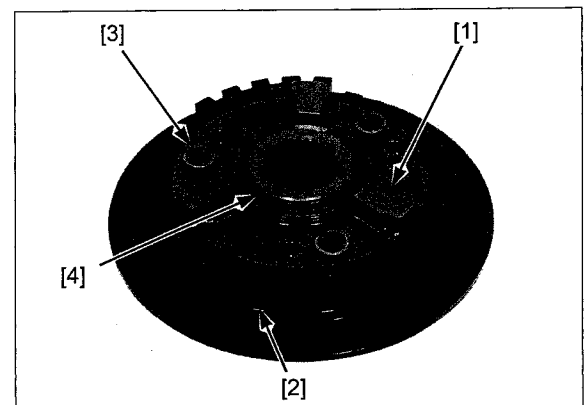
Measure the height of the clutch spring.

**SERVICE LIMIT: 5.70 mm (0.224 in)**



## Clutch center

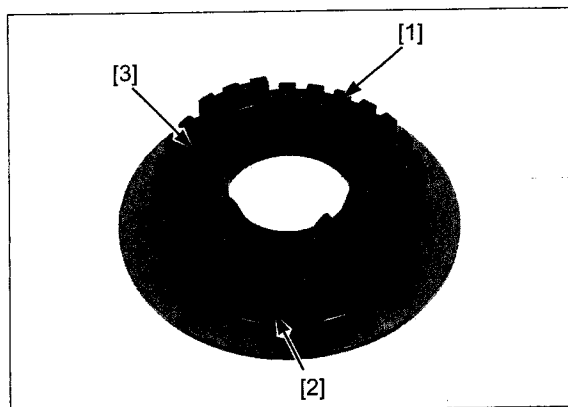
Check the clutch center cogs [1] for wear or damage.  
 Check the grooves [2] for nicks, indentations or abnormal wear made by the clutch plates.  
 Check the rivets [3] and stopper ring [4] for loosening.



## CLUTCH/GEARSHIFT LINKAGE

### Clutch pressure plate

Check the pressure plate cogs [1] for wear or damage.  
Check the grooves [2] for nicks, indentations or abnormal wear made by the clutch plates.  
Check the rivets [3] for loosening.



### Clutch disc

*Replace the clutch discs and plates as a set.*

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

Measure the disc thickness of each disc.

#### SERVICE LIMITS:

Disc A/C: 3.1 mm (0.12 in)

Disc B: 3.6 mm (0.14 in)



### Clutch plate

*Replace the clutch discs and plates as a set.*

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

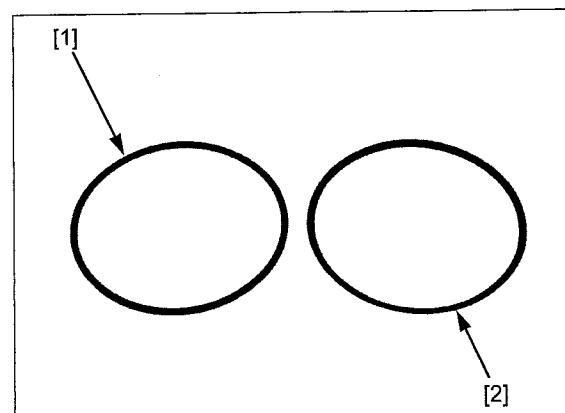
**SERVICE LIMIT: 0.30 mm (0.012 in)**



### Judder spring/spring seat

Check the judder spring [1] and spring seat [2] for wear or other damage, replace if necessary.

Replace if necessary.

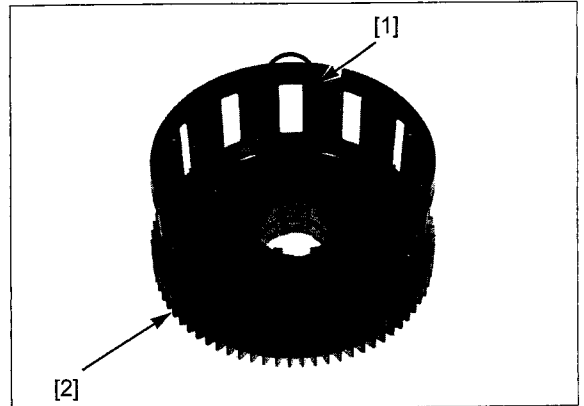


## Clutch outer/needle bearing

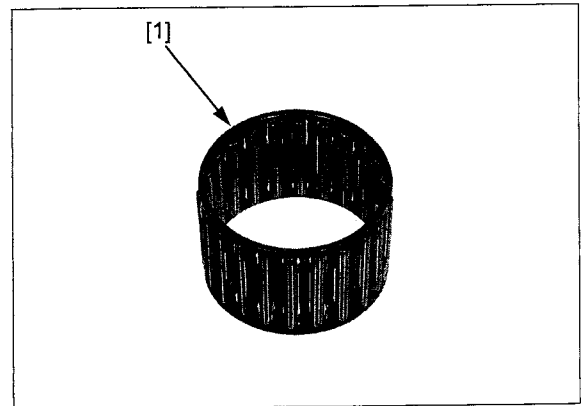
Check the slots [1] of the clutch outer for damage or wear caused by the clutch discs.

Check the primary driven gear [2] for wear or damage.

Replace if necessary.



Check the clutch outer needle bearing [1] for wear or damage, replace if necessary.



## Clutch outer guide/oil pump drive sprocket

Measure the I.D. of the clutch outer guide [1].

### SERVICE LIMITS:

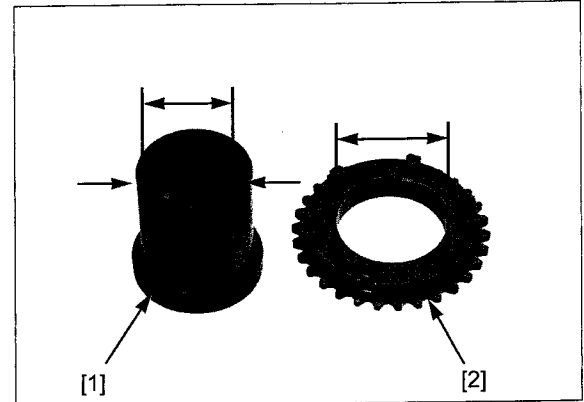
I.D.: 28.030 mm (1.1035 in)

O.D.: 34.965 mm (1.3766 in)

Check the oil pump drive sprocket teeth for wear or damage.

Measure the I.D. of the oil pump drive sprocket [2].

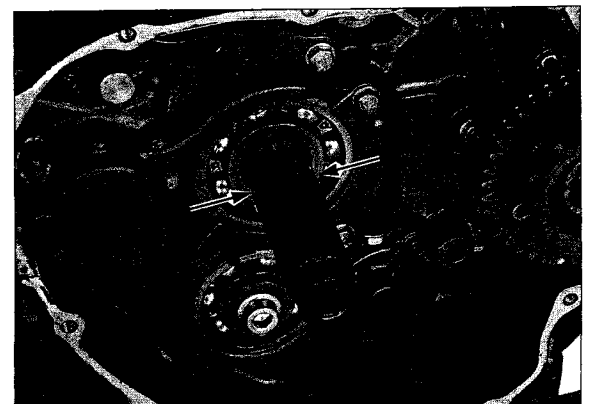
**SERVICE LIMIT: 35.155 mm (1.3841 in)**



## Mainshaft

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

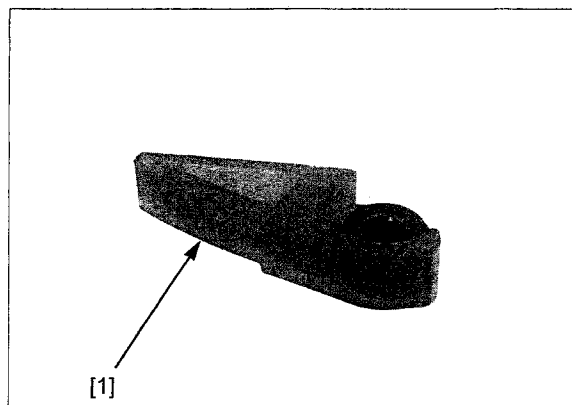
**SERVICE LIMIT: 27.96 mm (1.101 in)**



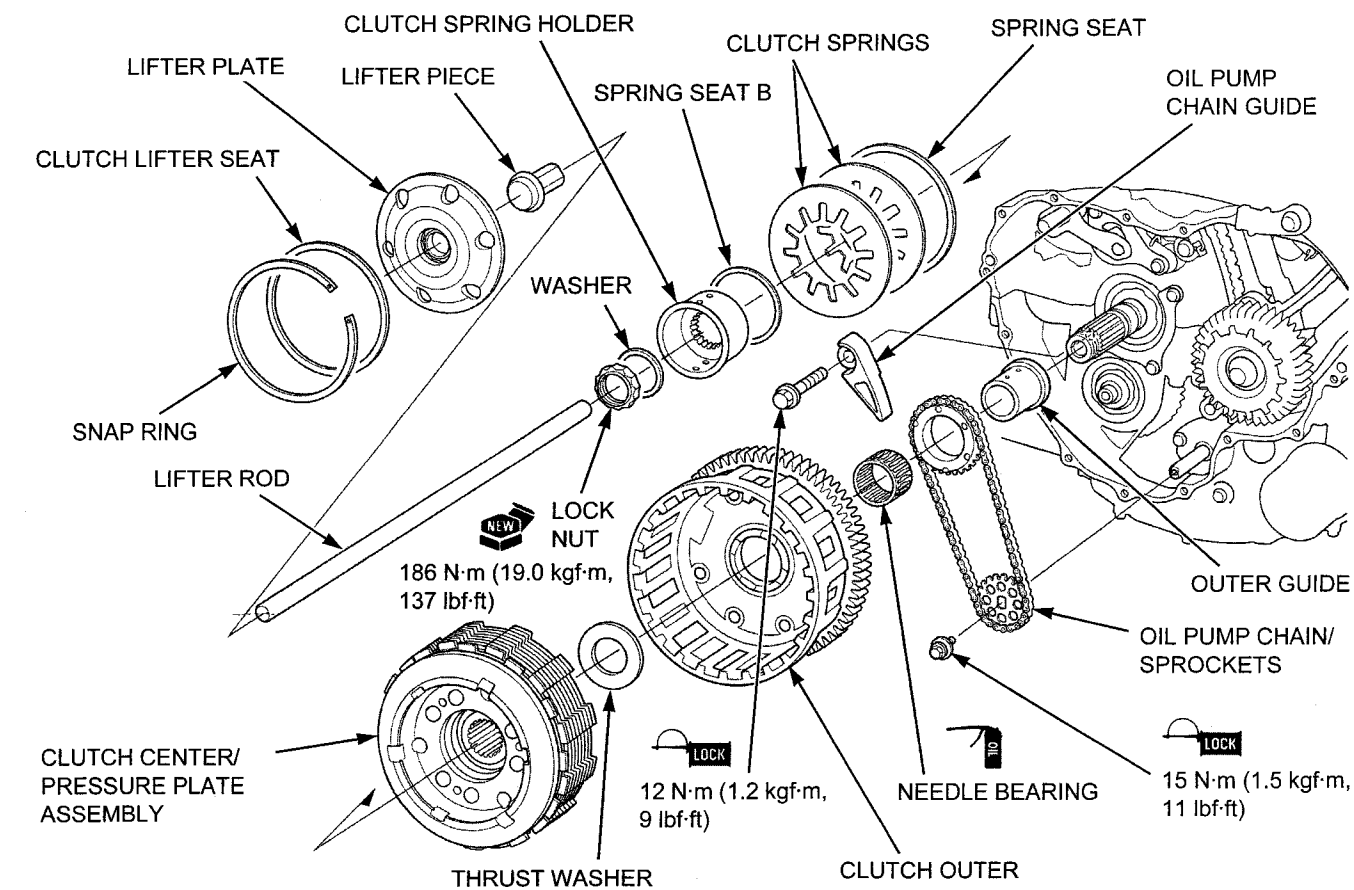
## CLUTCH/GEARSHIFT LINKAGE

### Oil pump chain guide

Check the oil pump chain guide [1] for excessive wear or damage, replace if necessary.



## INSTALLATION



Install the clutch outer guide [1] onto the mainshaft.

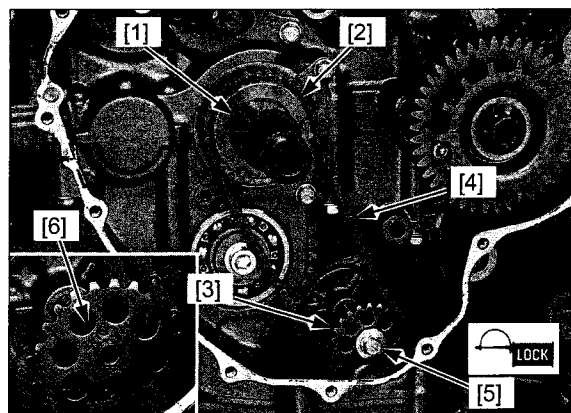
*Install the driven sprocket with its "OUT" mark [6] facing out and align the flats of the shaft and sprocket.*

Install the oil pump drive sprocket [2], driven sprocket [3] and oil pump chain [4] as an assembly.

Apply a locking agent to the threads of the oil pump driven sprocket bolt [5] (page 1-19).

Tighten the driven sprocket bolt to the specified torque.

**TORQUE: 15 N·m (1.5 kgf·m, 11 lbf·ft)**

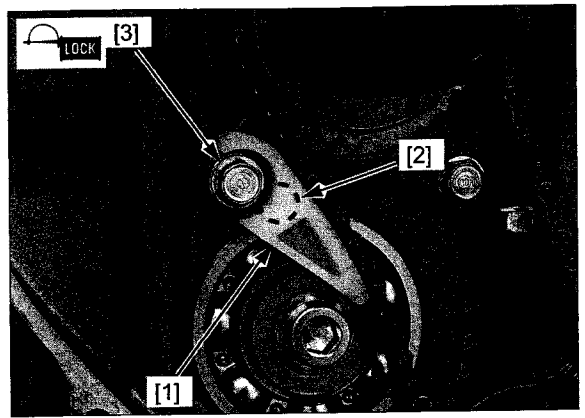


Install the oil pump chain guide [1] by aligning its cut-out with the boss [2] on the crankcase.

Apply a locking agent to the threads of the oil pump chain guide bolt [3] (page 1-19).

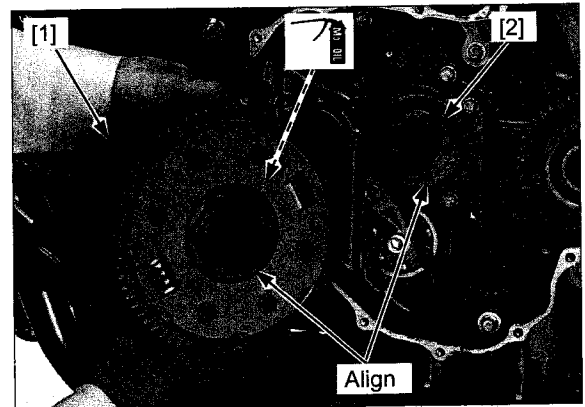
Install and tighten the bolt to the specified torque.

**TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)**



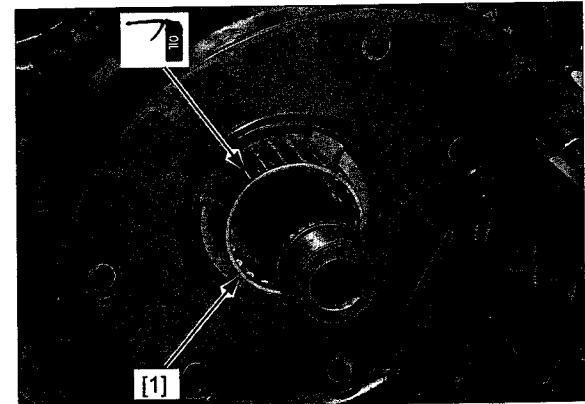
Lubricate the sliding surfaces between the clutch outer and primary driven gear with molybdenum disulfide oil.

Install the clutch outer [1] onto the mainshaft and align the holes on the outer with the bosses on the oil pump drive sprocket [2].



Apply engine oil to the needle bearing [1].

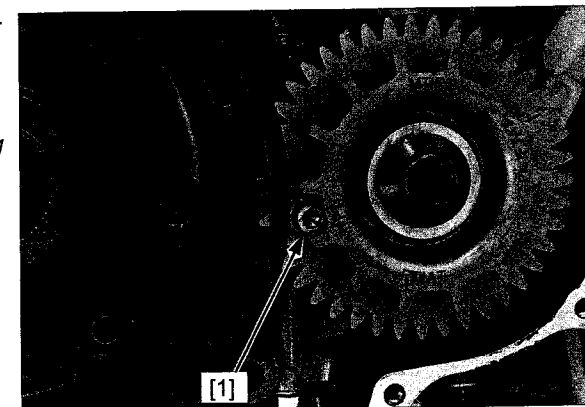
Install the needle bearing into the clutch outer.



Remove the socket bolt [1] from the primary drive sub-gear.

## NOTICE

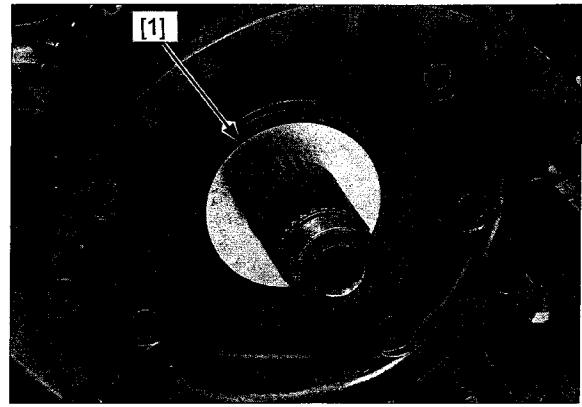
*Do not forget to remove the socket bolt after installing the clutch outer.*



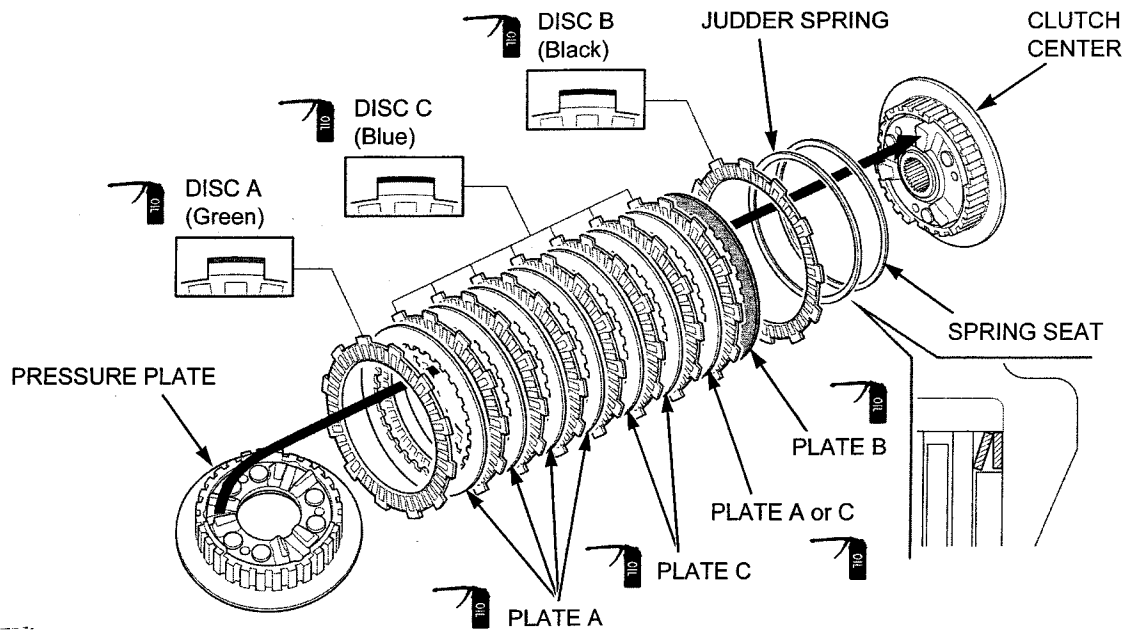


## CLUTCH/GEARSHIFT LINKAGE

Install the thrust washer [1].



### Clutch discs/plates assembly



#### NOTE:

Replace the clutch discs/plates as an assembly.

Coat the clutch discs and plates with clean engine oil.

*Stack the clutch discs and plates as shown.*

Install the following onto the clutch center:

- spring seat
- judger spring
- clutch disc B (large I.D.)
- clutch plate B
- seven clutch discs C
- seven clutch plates A and C
- clutch disc A

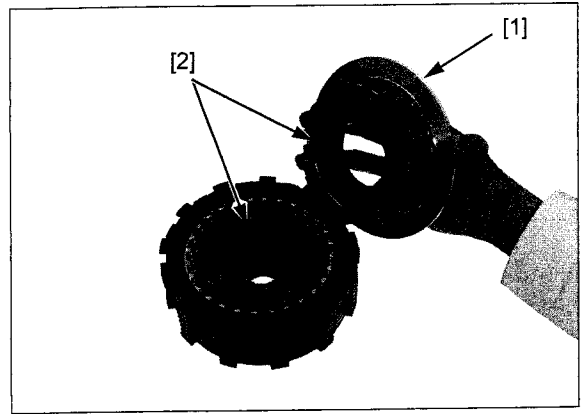
#### IDENTIFICATION OF CLUTCH DISC:

- Clutch disc A: Green paint on the tab
- Clutch disc B: Black paint on the tab (large I.D.)
- Clutch disc C: Blue paint on the tab

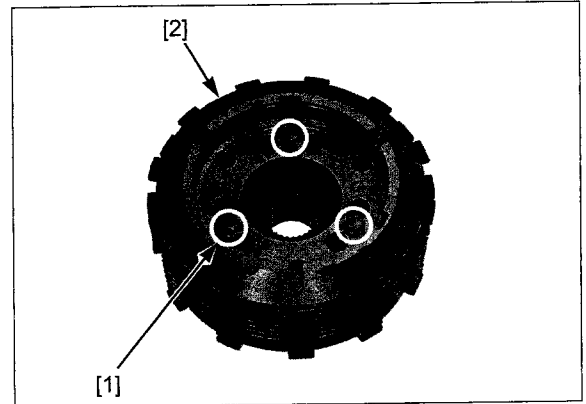
#### IDENTIFICATION OF CLUTCH PLATE:

- Clutch plate A: Silver (thin)
- Clutch plate B: Gray (thick/thin)
- Clutch plate C: Silver (thick)

Install the pressure plate [1] while aligning the clutch plates with the grooves of the pressure plate, and engage the cogs [2] of the pressure plate and clutch center.



For ease of the clutch center/pressure plate installation, temporarily install suitable bolts (6 x 35 mm) [1] to the pressure plate [2] loosely.



## Clutch center/pressure plate/clutch spring installation

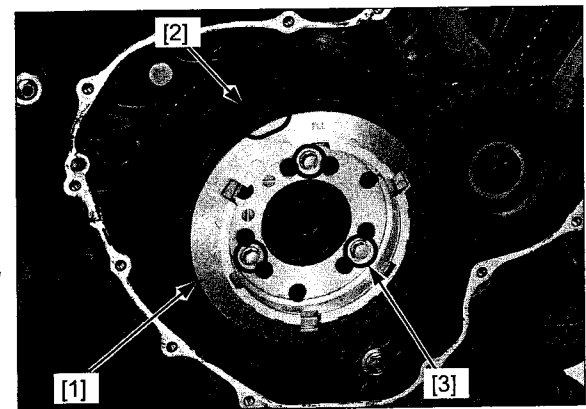
Install the clutch center/pressure plate assembly [1] by aligning the clutch disc tabs with the grooves of the clutch outer one by one.

Install the tabs of the clutch disc A into the clutch outer shallow slots [2] as shown.

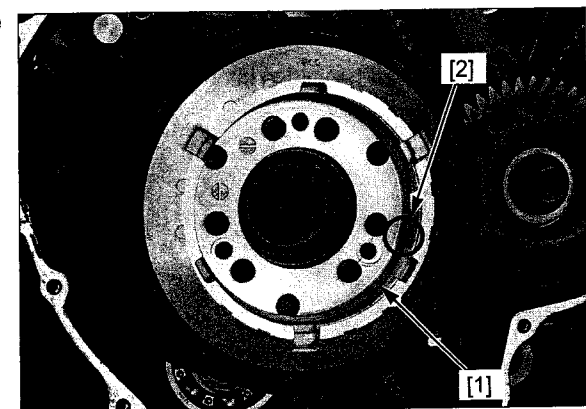
Remove the temporarily installed 6 mm bolts [3].

### NOTICE

*Do not forget to remove the 6 mm bolts after installing the clutch center/pressure plate assembly.*



Install the clutch spring seat [1] with its concave side (black paint) [2] facing out.

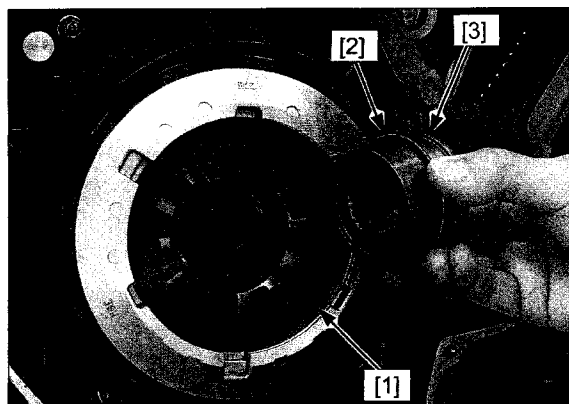


## CLUTCH/GEARSHIFT LINKAGE

Install the clutch springs [1], spring seat B [2] and clutch spring holder [3].

**NOTE:**

Be certain to align the splines of the clutch spring holder with the mainshaft.

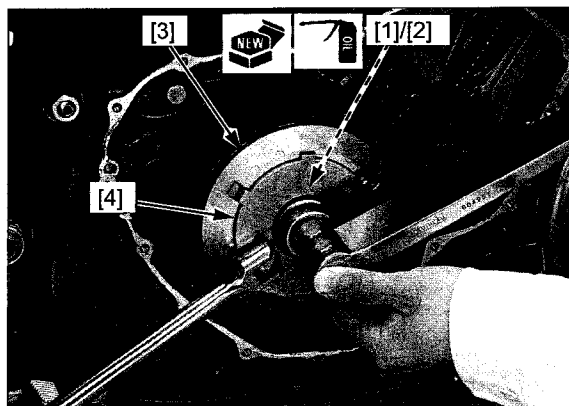


Apply clean engine oil to the thread and seating surface of a new clutch center lock nut [1].

Install the washer [2] and clutch center lock nut. Hold the pressure plate [3] with the special tool, then tighten the lock nut to the specified torque.

**TOOL:**

Clutch center holder [4] 070MB-MFL0100 or 070MB-MFLA100 (U.S.A. only)



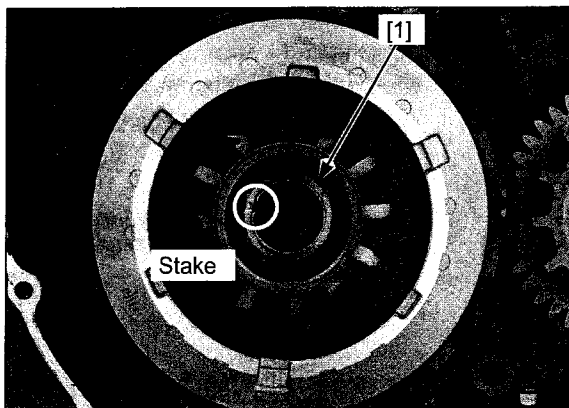
**TORQUE:** 186 N·m (19.0 kgf·m, 137 lbf·ft)

**NOTE:**

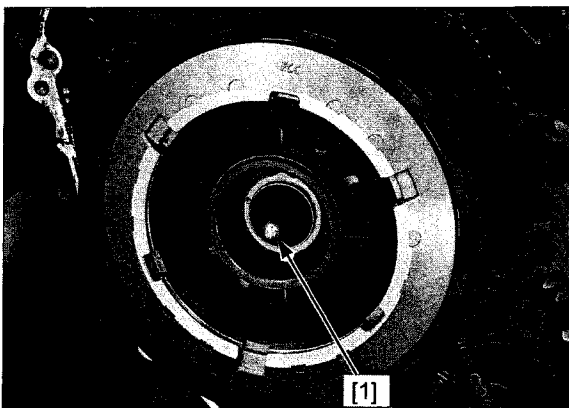
Hold the clutch center holder securely so that the centers of the mainshaft and pressure plate should not be misaligned, or installation of the clutch lifter/lifter piece becomes difficult.

*Be careful not to damage the mainshaft threads.*

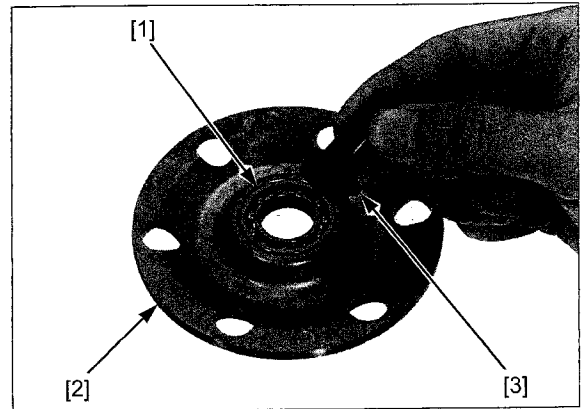
Stake the lock nut [1] into the mainshaft groove with a punch.



Install the clutch lifter rod [1].



Install the lifter bearing [1] into the clutch lifter [2].  
Install the clutch lifter piece [3] into the lifter bearing.



Install the clutch lifter plate/lifter piece [1].

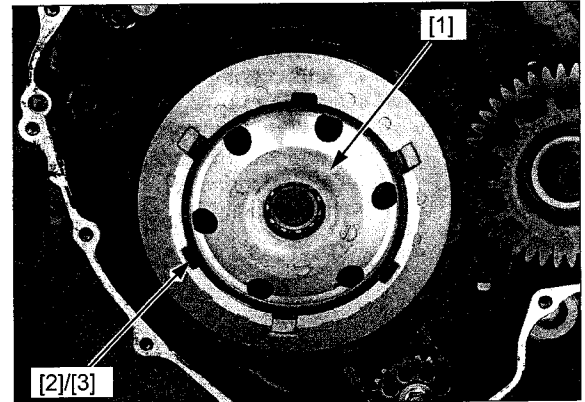
*After installing the snap ring, always rotate it in its groove to be sure it is fully seated.*

Install the clutch lifter seat [2] and snap ring [3] securely.

**NOTE:**

Do not align the snap ring ends with the slots on the pressure plate.

Install the right crankcase cover (page 10-32).

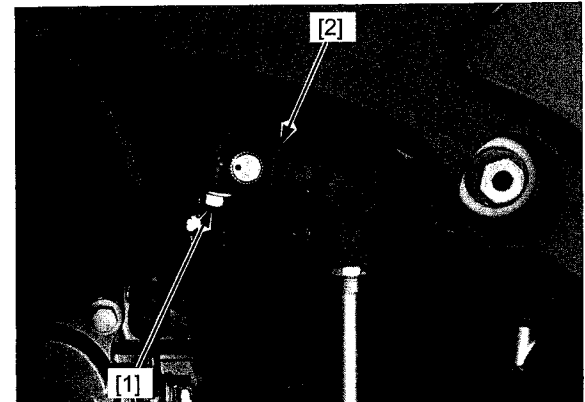


## GEARSHIFT LINKAGE

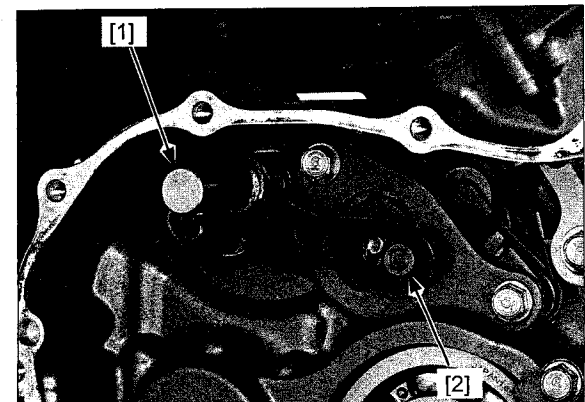
### REMOVAL

Remove the clutch (page 10-14).

Remove the pinch bolt [1] and gearshift arm [2] from the spindle.

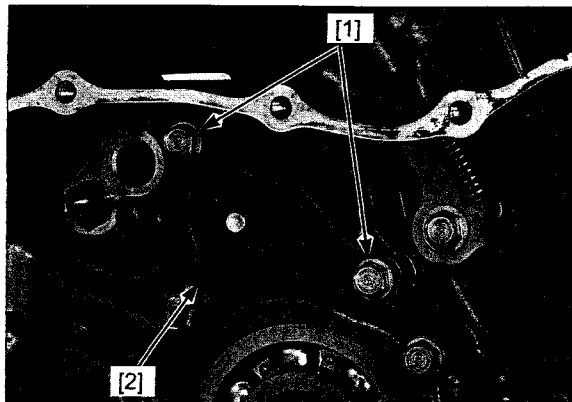


Remove the gearshift spindle [1] and shifter collar [2].



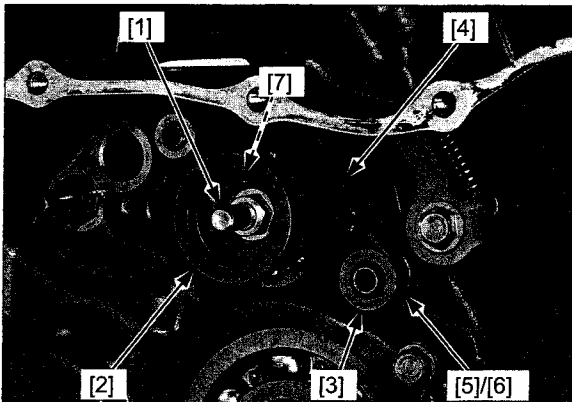
## CLUTCH/GEARSHIFT LINKAGE

Remove the bolts [1] and change guide plate/drum shifter assembly [2].

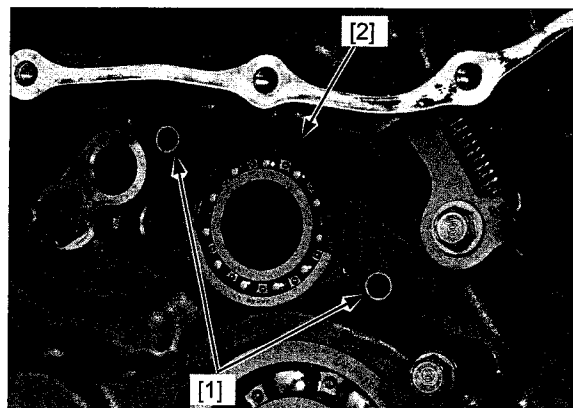


Remove the following:

- shift drum center pin [1]
- shift drum center [2]
- washer [3]
- shift drum stopper arm [4]
- stopper arm collar [5]
- return spring [6]
- dowel pin [7]



Remove the dowel pins [1] and shift drum bearing set plate [2].

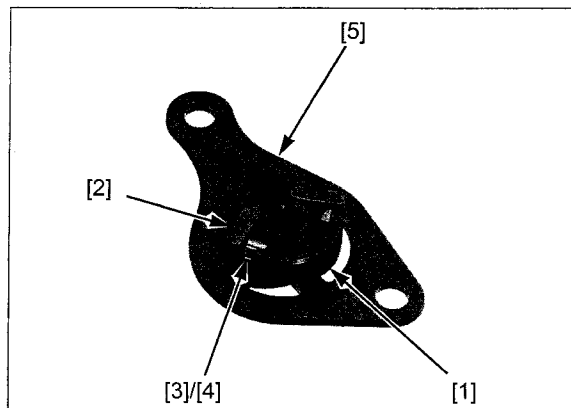


## INSPECTION

Remove the drum shifter [1], ratchet pawls [2], plungers [3] and plunger springs [4] from the guide plate [5].

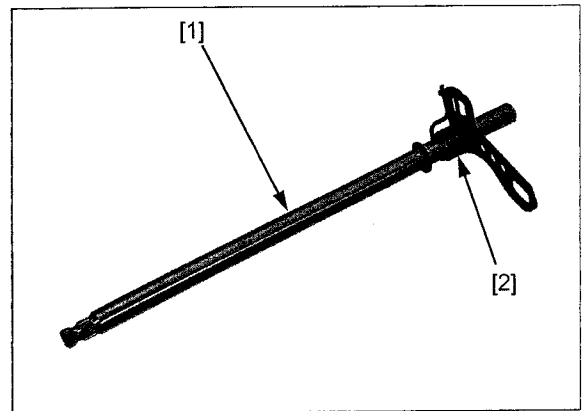
Clean the ratchet pawls, plungers, springs and drum shifter with clean engine oil.

Check each part for wear or damage.



Check the gearshift spindle [1] for bend, wear or damage.

Check the return spring [2] for fatigue or damage.



## GEARSHIFT SPINDLE OIL SEAL/NEEDLE BEARING REPLACEMENT

Check the following:

- gearshift spindle oil seal [1] for deterioration or damage
- needle bearing [2] for wear or damage

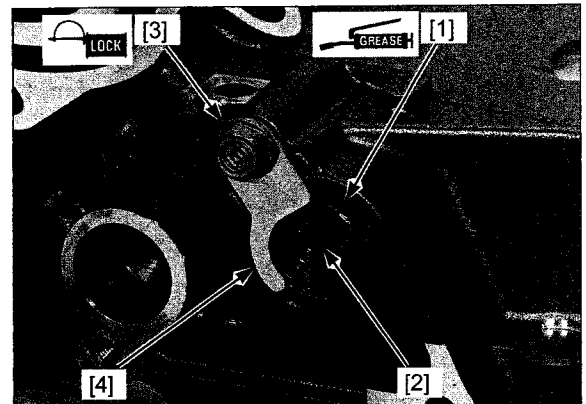
Remove the bolt [3] and spindle plate [4], then replace the oil seal and needle bearing if necessary.

Apply grease to new oil seal lip and install the oil seal.

Apply a locking agent to the spindle plate bolt threads (page 1-19).

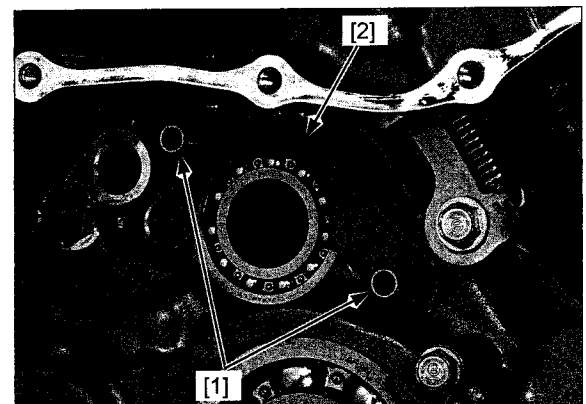
Install the spindle plate and bolt, and tighten the bolt to the specified torque.

**TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)**

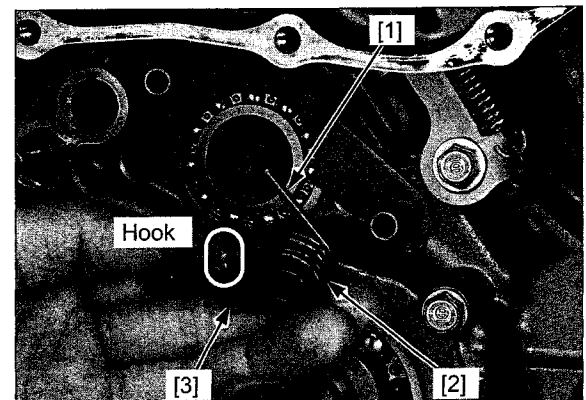


## INSTALLATION

Install the dowel pins [1] and shift drum bearing set plate [2].



*Hook the spring end to the stopper arm groove.* Install the return spring [1], stopper arm collar [2] and shift drum stopper arm [3].

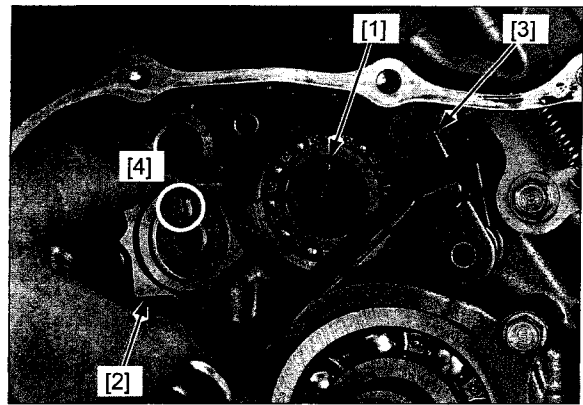


## CLUTCH/GEARSHIFT LINKAGE

Install the dowel pin [1] into the shift drum.

*Align the cut-out [4] on the shift drum center with the dowel pin.*

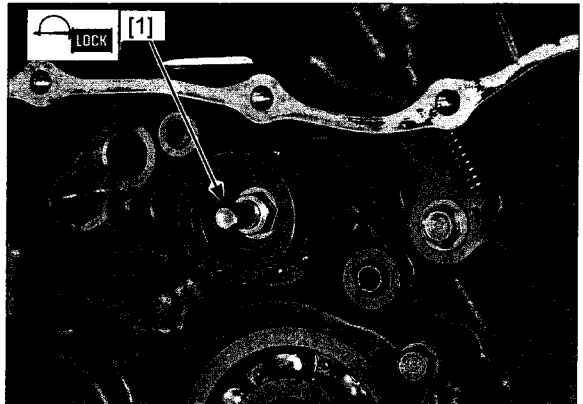
Install the shift drum center [2] while holding the stopper arm [3] using a screwdriver.



Apply a locking agent to the threads of the shift drum center pin bolt.

Install the shift drum center pin bolt and tighten it to the specified torque.

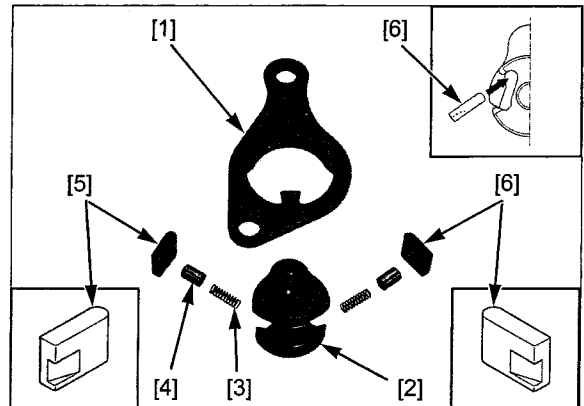
**TORQUE: 23 N·m (2.3 kgf·m, 17 lbf·ft)**



Assemble the guide plate [1], drum shifter [2], plunger springs [3], plungers [4] and ratchet pawls A [5] and B [6] as shown.

**NOTE:**

Do not interchange the ratchet pawls A and B.



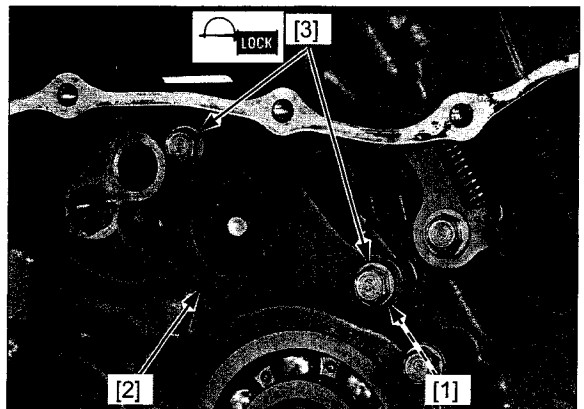
Install the washer [1] onto the stopper arm collar.

Install the change guide plate/drum shifter assembly [2].

Apply a locking agent to the change guide plate bolt threads (page 1-19).

Install the change guide plate bolts [3] and tighten them to the specified torque.

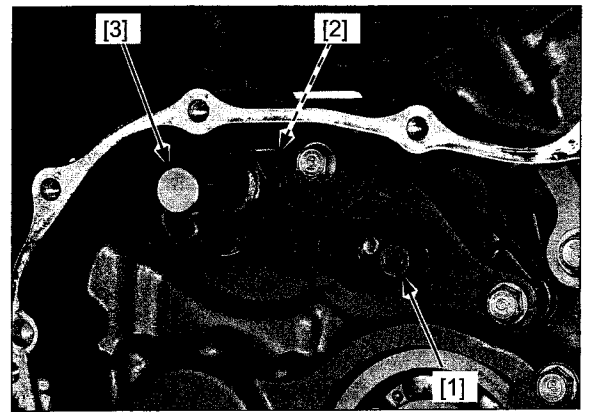
**TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)**



Install the shifter collar [1] onto the drum shifter.

*Align the spindle arm hole with the shifter collar, also the return spring ends with the spring pin.*

Install the washer [2] and gearshift spindle [3].

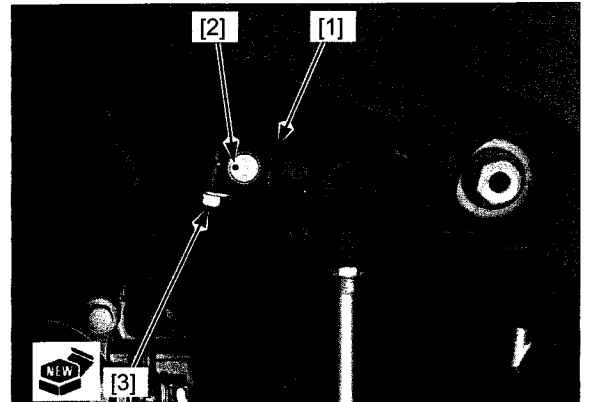


Install the gearshift arm [1] onto the spindle, aligning the slit of the arm with the punch mark [2] on the spindle.

Install new gearshift arm pinch bolt [3] and tighten it to the specified torque.

**TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)**

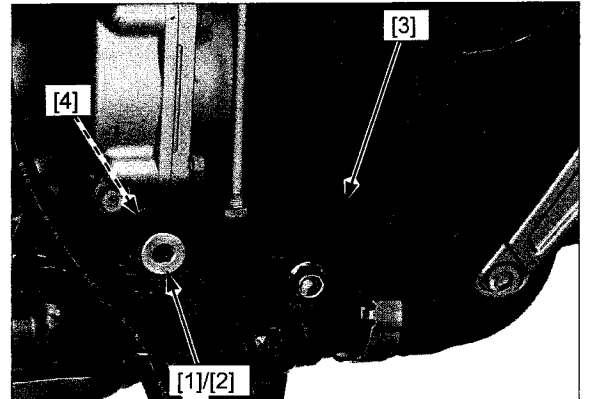
Install the clutch (page 10-20).



## GEARSHIFT PEDAL REMOVAL/INSTALLATION

Remove the gearshift arm from the spindle (page 10-25).

Remove the pivot bolt [1], wave washer [2], gearshift pedal [3] and washer [4].



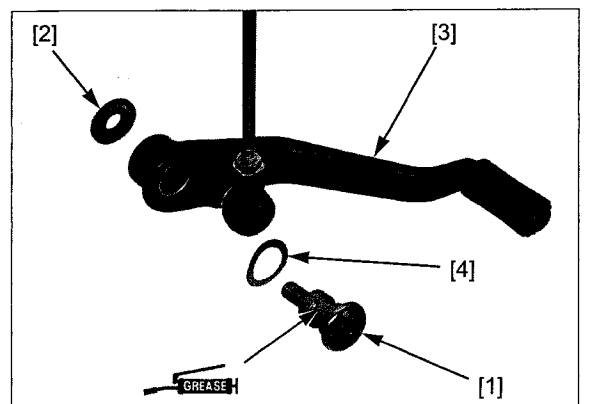
Apply grease to the gearshift pedal sliding surface of the pivot bolt [1].

Install the washer [2], gearshift pedal [3], wave washer [4] and pivot bolt.

Tighten the pivot bolt to the specified torque.

**TORQUE: 22 N·m (2.2 kgf·m, 16 lbf·ft)**

Install the gearshift arm to the spindle with a new pinch bolt (page 10-29).





### PRIMARY DRIVE GEAR

#### REMOVAL

*Do not remove the 6 mm socket bolt that retains the sub-gear before removal.*

Remove the clutch assembly (page 10-14).

Temporarily install the clutch outer and needle bearing onto the mainshaft.

*Primary drive gear flange bolt has left-hand threads.*

Install the gear holder [1] between the primary drive and driven gears, then loosen the primary drive gear flange bolt [2].

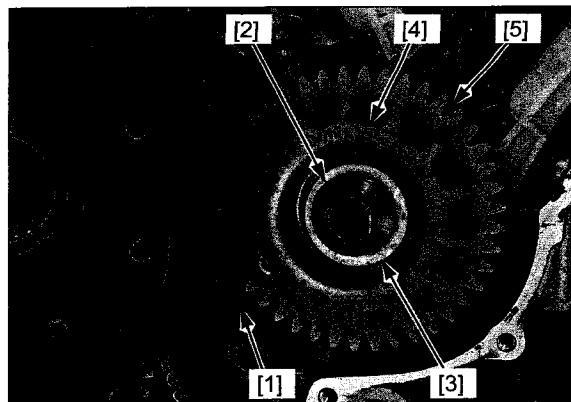
#### TOOL:

**Gear holder, M2.5**

**07724-0010100  
or 07724-001A100  
(U.S.A. only)**

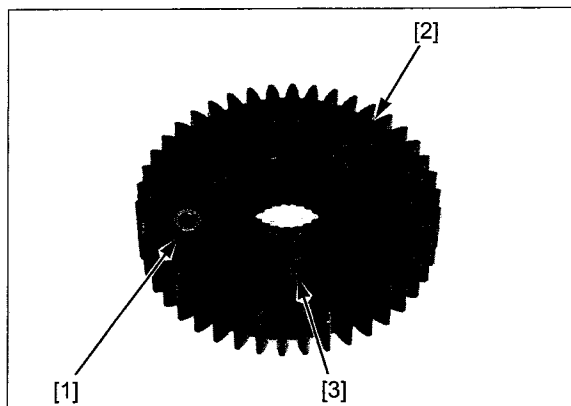
Remove the flange bolt [2], special washer [3], CKP sensor rotor [4] and primary drive gear/sub-gear [5].

Remove the gear holder.



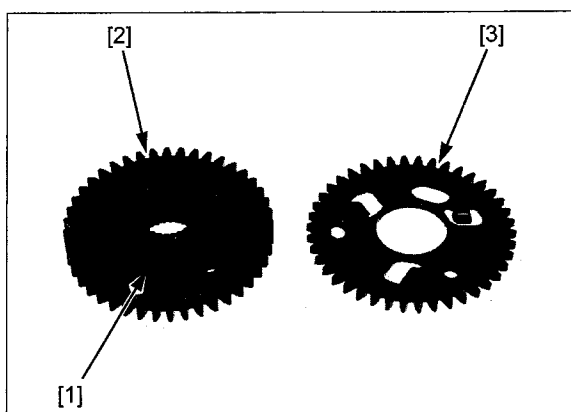
#### DISASSEMBLY/ASSEMBLY

Remove the socket bolt [1], then remove the sub-gear [2] and damper springs [3].



Inspect the damper springs [1] for fatigue or other damage, replace if necessary.

Inspect the primary drive gear [2] and sub-gear [3] teeth for wear or damage.



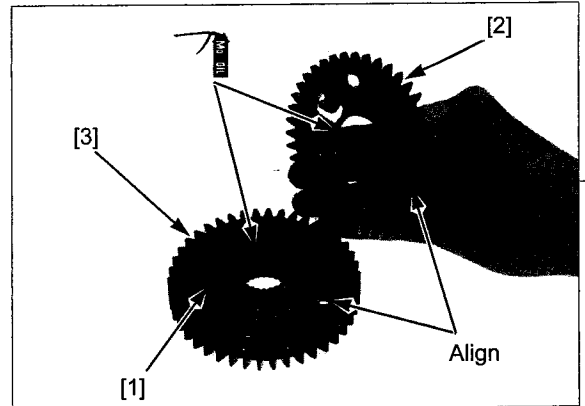
## INSTALLATION

Install the damper springs [1] into the primary drive gear grooves.

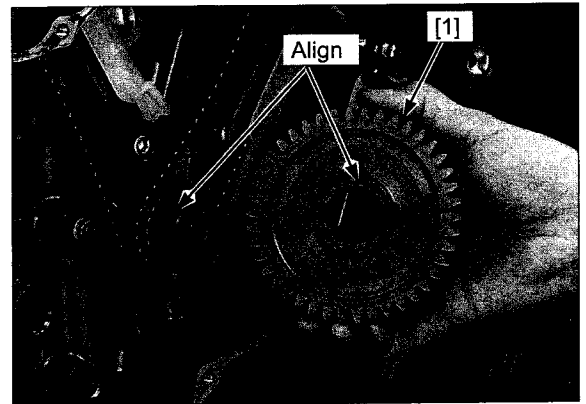
Apply molybdenum oil solution to the sliding surfaces of the primary drive gear and sub-gear.

*Align the holes of the primary drive gear and sub-gear.*

Install the sub-gear [2] onto the primary drive gear [3].



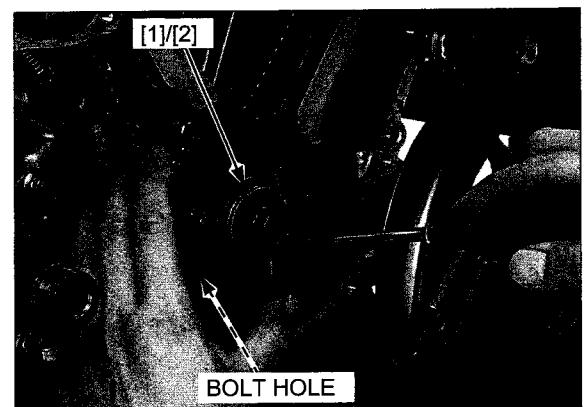
Install the primary drive gear assembly [1] by aligning its wide groove with the wide tooth on the crankshaft.



Temporarily install the primary drive gear bolt [1] and special washer [2] so that the sub-gear does not disengage from the primary drive gear.

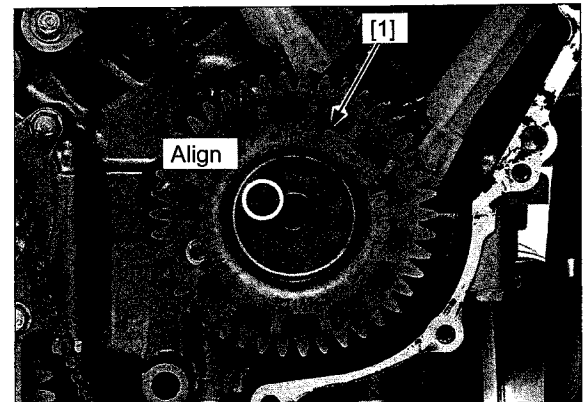
*Press the sub-gear against the primary drive gear firmly.*

Align the sub-gear teeth with the primary drive gear teeth using a screwdriver, then install the socket bolt (6 x 10 mm) to the primary drive gear and tighten it securely to retain the sub-gear.



Remove the primary drive gear bolt and special washer.

Install the CKP sensor rotor [1] by aligning its wide groove with the wide tooth of the crankshaft.



## CLUTCH/GEARSHIFT LINKAGE

Temporarily install the clutch outer and needle bearing.

Apply engine oil to the threads and seating surface of the primary drive gear bolt [1].

*The primary drive gear bolt has left-hand threads.*

Install the special washer [2] and primary drive gear bolt [1].

Install the gear holder [3] between the primary drive and driven gears as shown.

### TOOL:

**Gear holder, M2.5**

**07724-0010100  
or 07724-001A100  
(U.S.A. only)**

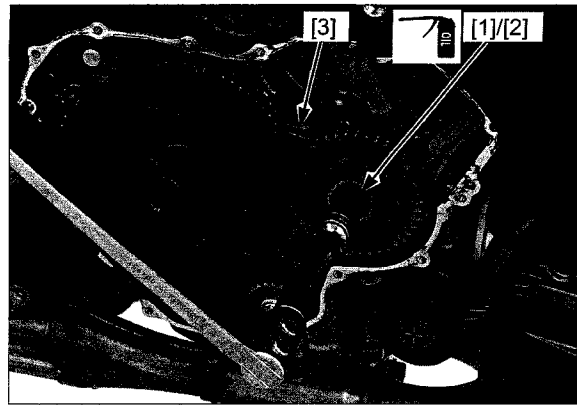
Tighten the bolt to the specified torque.

**TORQUE: 98 N·m (10.0 kgf·m, 72 lbf·ft)**

Remove the gear holder.

*Do not forget to remove the temporarily installed socket bolt.*

Install the clutch assembly (page 10-20).

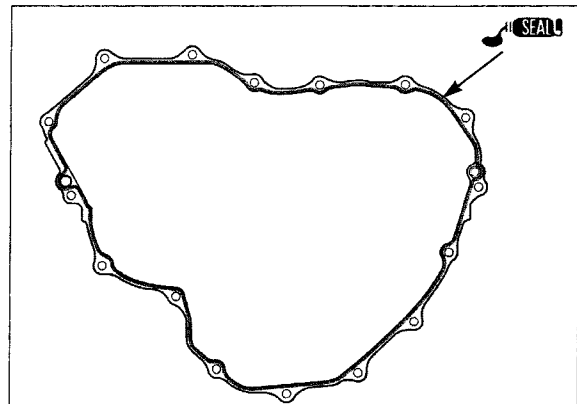


## RIGHT CRANKCASE COVER INSTALLATION

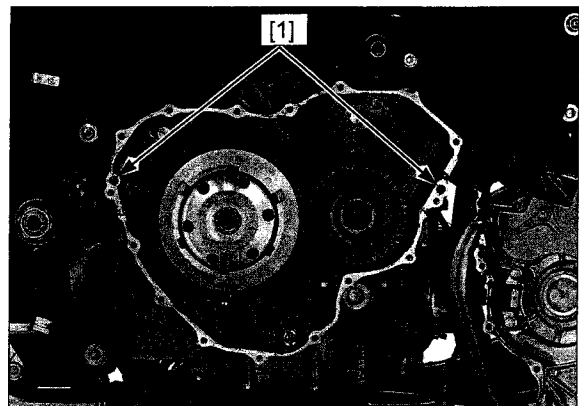
Clean the mating surfaces of the crankcase and right crankcase cover, being careful not to damage them.

*Do not apply more sealant than necessary.*

Apply sealant (ThreeBond 1207B or an equivalent) to the right crankcase cover mating surfaces as shown.



Install the dowel pins [1].

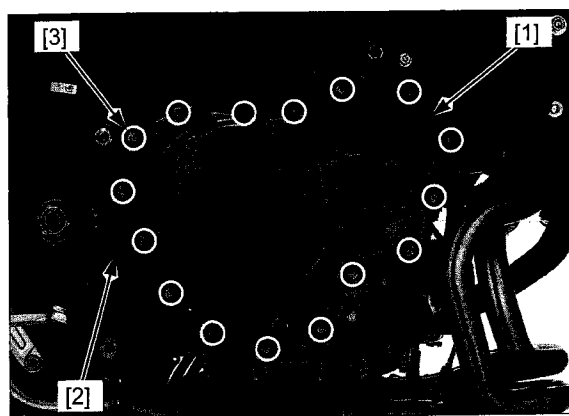


Install the right crankcase cover [1], under cowl stay [2] and cover bolts [3].

Tighten the bolts in a crisscross pattern in 2 or 3 steps.

Add the recommended type and amount of engine oil (page 4-13).

Install the removed parts in the reverse order of removal.



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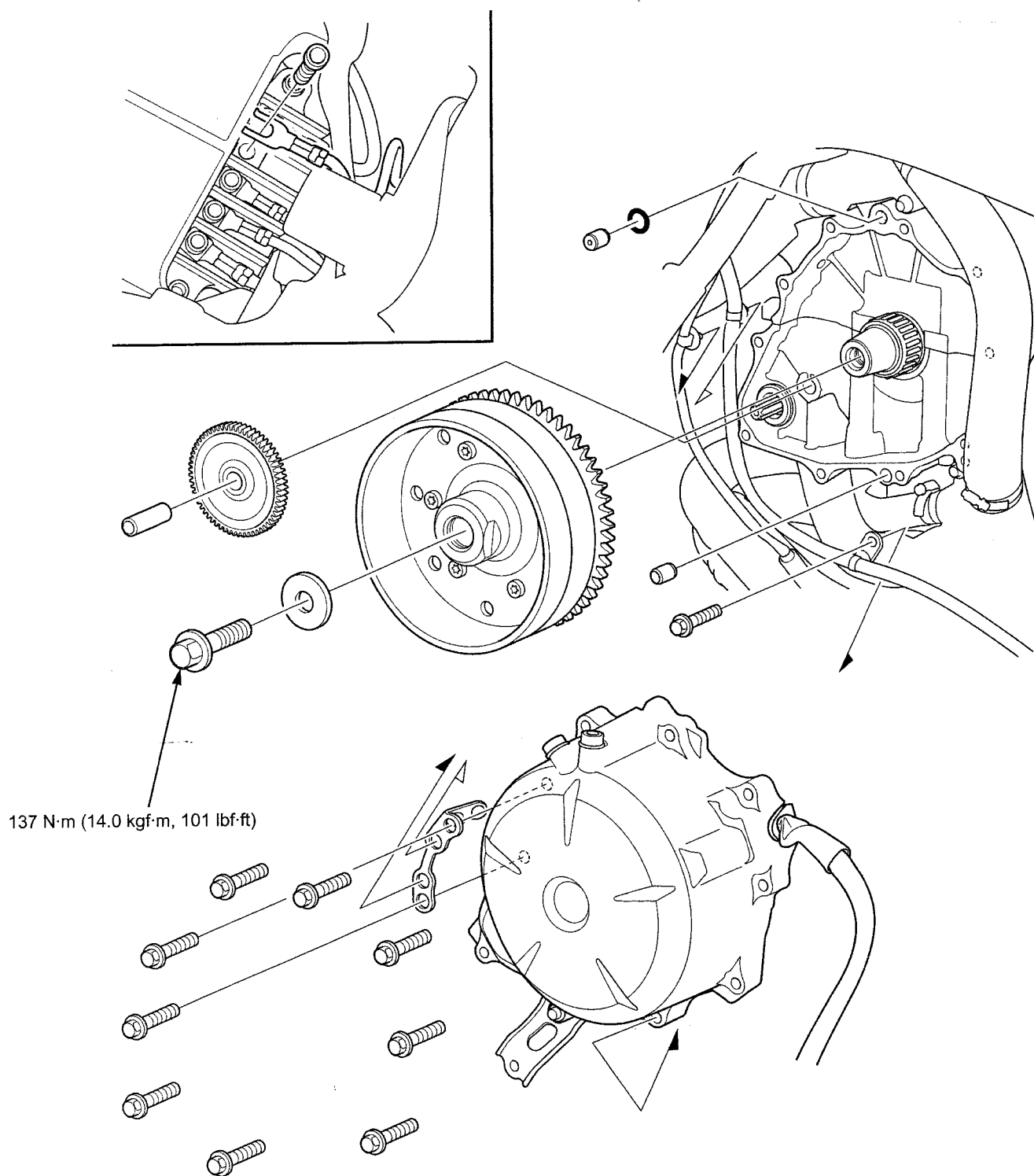
# MEMO

# 11. ALTERNATOR/STARTER CLUTCH

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COMPONENT LOCATION .....	11-2	ALTERNATOR COVER/STATOR .....	11-4
SERVICE INFORMATION .....	11-3	FLYWHEEL .....	11-9
TROUBLESHOOTING.....	11-3	STARTER CLUTCH .....	11-11

# ALTERNATOR/STARTER CLUTCH COMPONENT LOCATION



## SERVICE INFORMATION

### GENERAL

- This section covers service of the alternator stator, flywheel, starter clutch and starter gears. All service can be done with the engine installed in the frame.
- Refer to procedure for starter motor servicing (page 21-6).
- Refer to procedure for stator inspection (page 19-7).

### SPECIFICATIONS

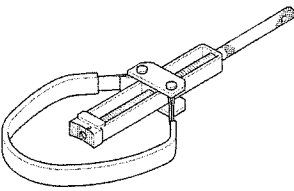
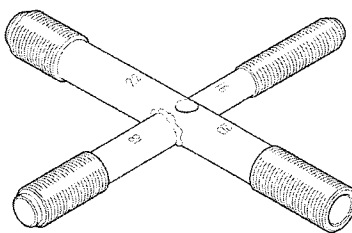
Unit: mm (in)

ITEM	STANDARD	SERVICE LIMIT
Starter driven gear boss O.D.	51.699 – 51.718 (2.0354 – 2.0361)	51.59 (2.031)

### TORQUE VALUES

Stator socket bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	Apply a locking agent to the threads.
Stator wire holder socket bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	Apply a locking agent to the threads.
Flywheel flange bolt	137 N·m (14.0 kgf·m, 101 lbf·ft)	Apply engine oil to the threads and seating surface.
Starter clutch bolt	16 N·m (1.6 kgf·m, 12 lbf·ft)	Apply a locking agent to the threads.
Gearshift arm pinch bolt	10 N·m (1.0 kgf·m, 7 lbf·ft)	ALOC bolt; replace with a new one.

### TOOLS

<p>Flywheel holder 07725-0040001</p>  <p>or equivalent commercially available</p>	<p>Rotor puller 07733-0020001</p>  <p>or 07933-3950000 (U.S.A. only)</p>
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## TROUBLESHOOTING

### Engine does not turn

- Faulty starter clutch
- Damaged starter reduction gear



### ALTERNATOR COVER/STATOR

#### REMOVAL

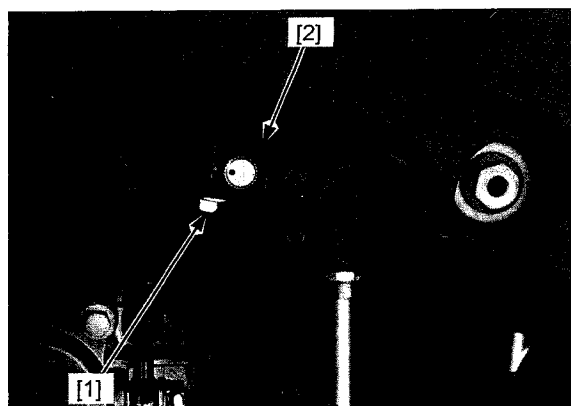
Remove the following:

- under cowl (page 3-6)
- battery (page 19-6)

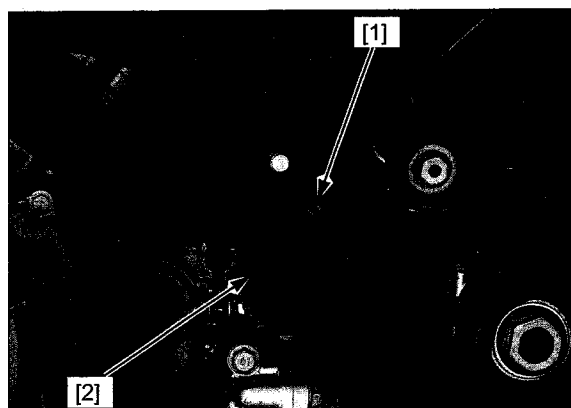
Drain the engine oil (page 4-13).

Drain the coolant (page 7-6).

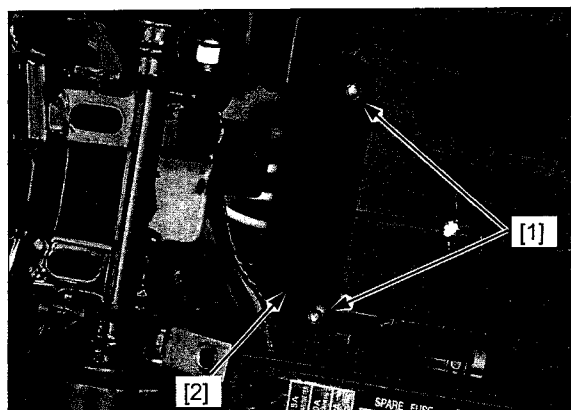
Remove the pinch bolt [1] and gearshift arm [2] from the gearshift spindle.



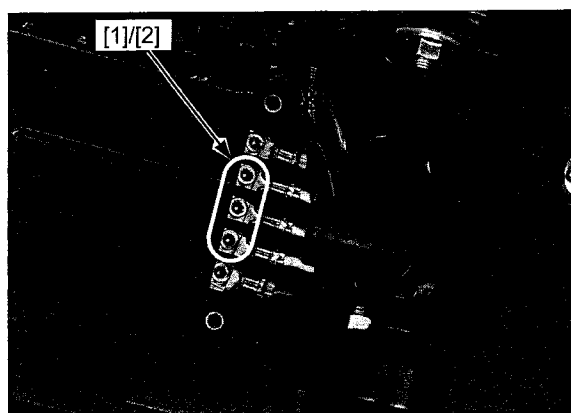
Remove the bolt [1] and left engine heat guard [2].



Remove the bolts [1] and terminal cover [2].

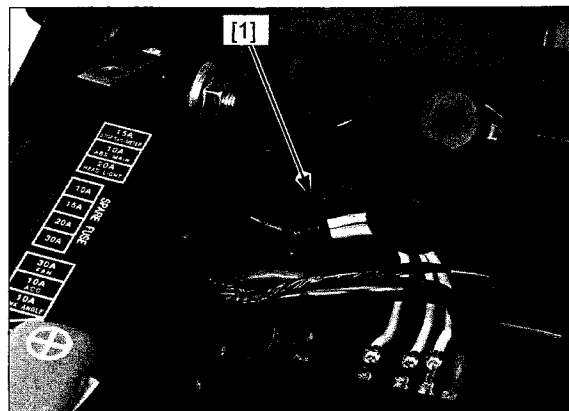


Remove the terminal bolts [1] and disconnect the alternator wires [2] from the regulator/rectifier.

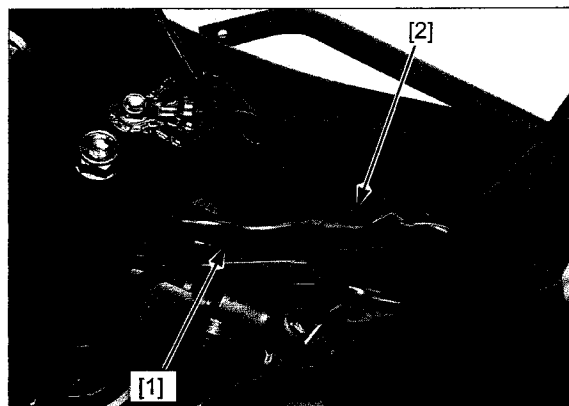


## ALTERNATOR/STARTER CLUTCH

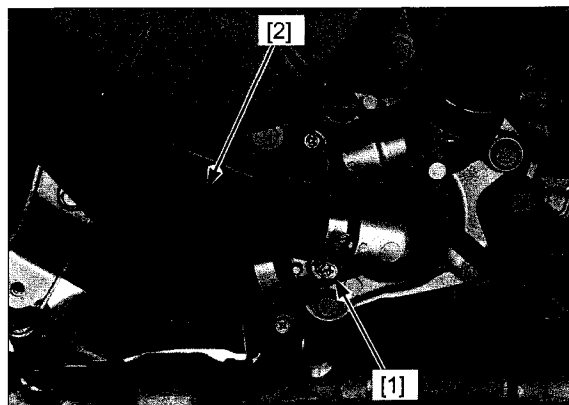
Remove the alternator wire clip [1] from the rear heat guard.



Release the alternator wire [1] from the rear fender rib [2].

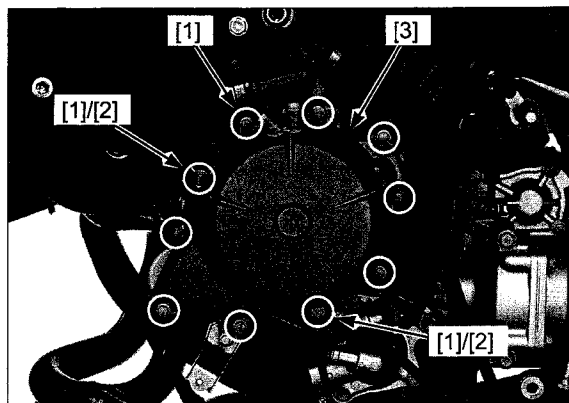


Loosen the hose band screw [1] and disconnect the water hose [2].



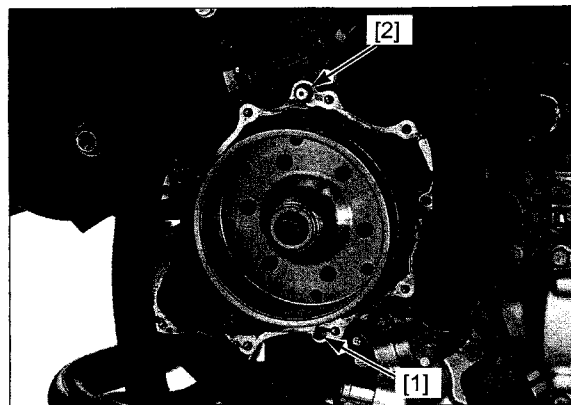
*The alternator cover (stator) is magnetically attracted to the flywheel, be careful during removal.*

Remove the bolts [1], wire clip stays [2] and alternator cover [3].

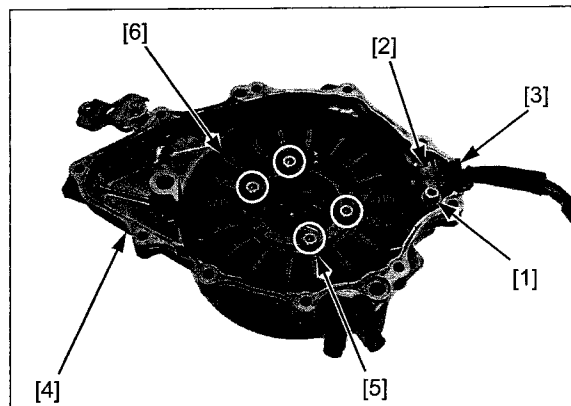


## ALTERNATOR/STARTER CLUTCH

Remove the dowel pin [1] and oil orifice/O-ring [2].  
Check the orifice for clogs.

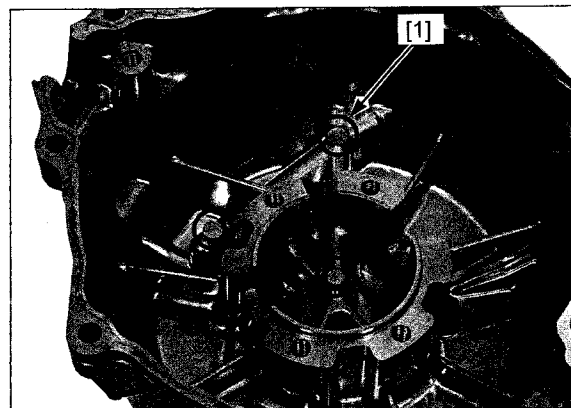


Remove the socket bolt [1] and stator wire holder [2].  
Remove the alternator wire grommet [3] from the alternator cover [4].  
Remove the socket bolts [5] and stator [6].



### INSPECTION

Check the orifices [1] for clogs and clean them if necessary.



### INSTALLATION

Install the stator [1] into the alternator cover [2].  
Apply sealant (ThreeBond 1211, 1207B or equivalent) to the wire grommet [3], then install the wire grommet into the alternator cover groove securely.

Apply a locking agent to the stator socket bolt threads (page 1-19).

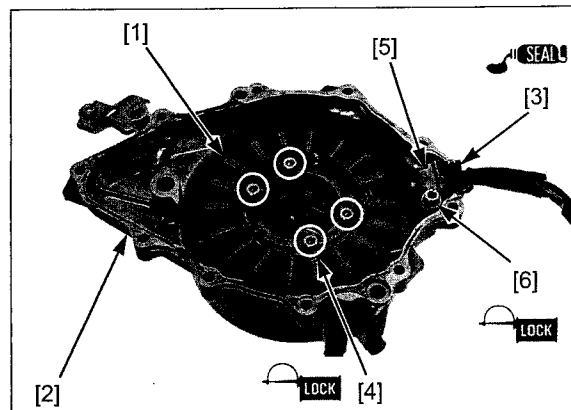
Install and tighten the stator socket bolts [4] to the specified torque.

**TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)**

Apply a locking agent to the wire holder socket bolt threads (page 1-19).

Install the wire holder [5] and socket bolt [6], and tighten it to the specified torque.

**TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)**



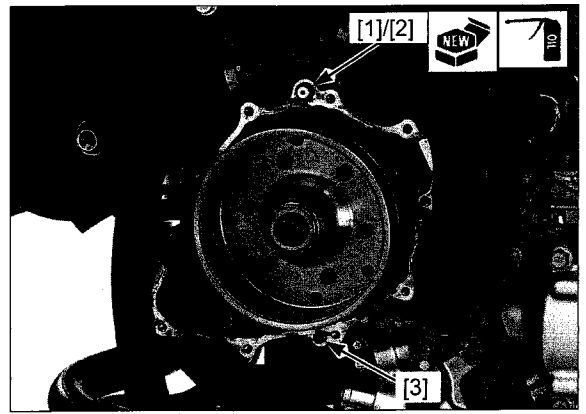
Clean the mating surfaces of the crankcase and alternator cover, being careful not to damage them.

*Be careful not to install the oil orifice wrong side out.*

Install the oil orifice [1] with its small I.D. side facing the crankcase.

Apply engine oil to new O-ring [2] and install it onto the oil orifice [1].

Install the dowel pin [3].

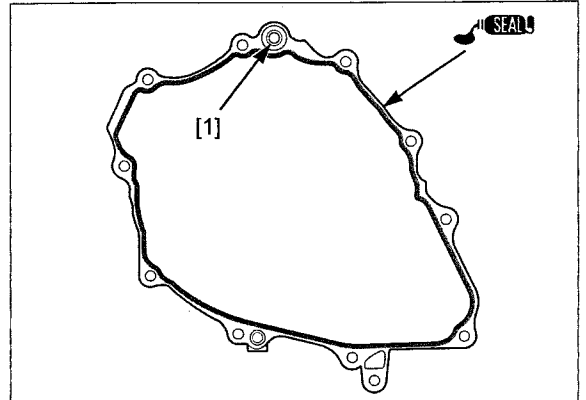


*Do not apply more sealant than necessary.*

Apply sealant (ThreeBond 1207B or an equivalent) to the alternator cover mating surface as shown.

## NOTICE

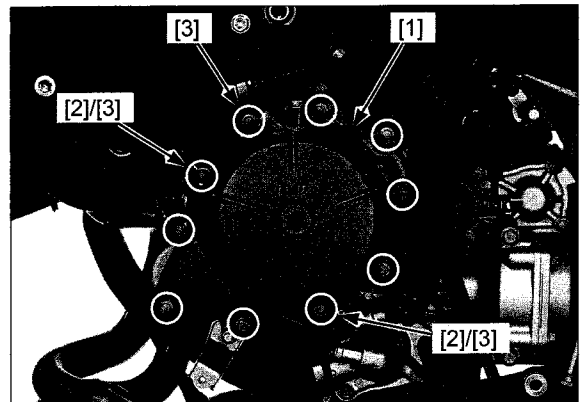
*Be careful not to apply sealant to the orifice hole [1] on the alternator cover.*



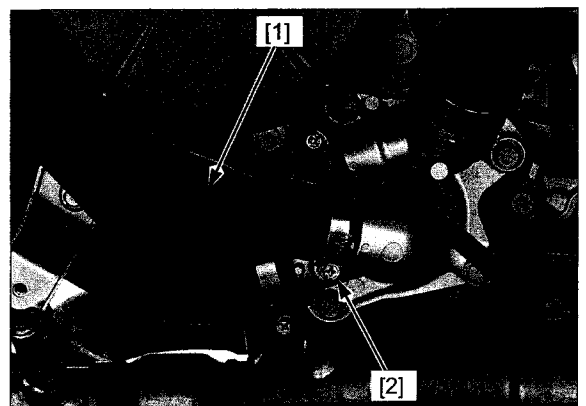
*The alternator cover (stator) is magnetically attracted to the flywheel, be careful during installation.*

Install the alternator cover [1], wire clip stays [2] and alternator cover bolts [3].

Tighten the bolts securely.



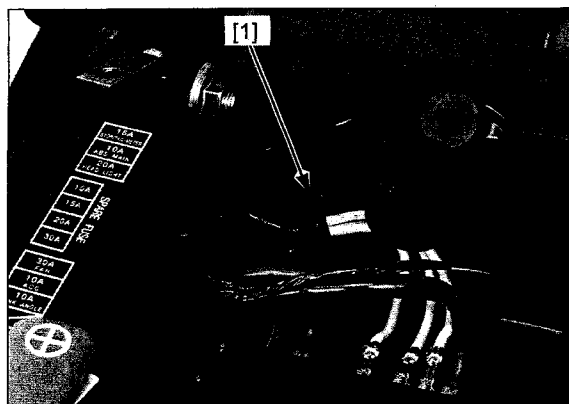
Connect the water hose [1] and tighten the hose band screw [2] securely.



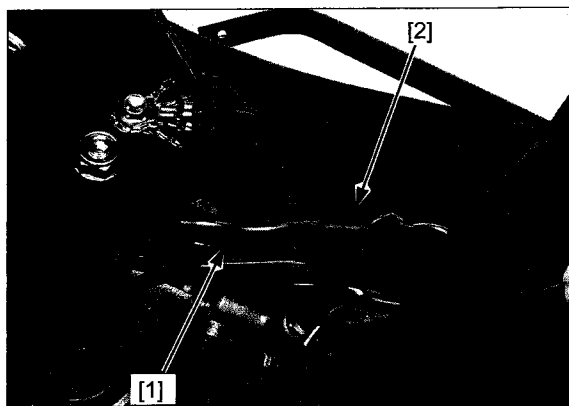
## ALTERNATOR/STARTER CLUTCH

Route the alternator wire properly (page 1-22).

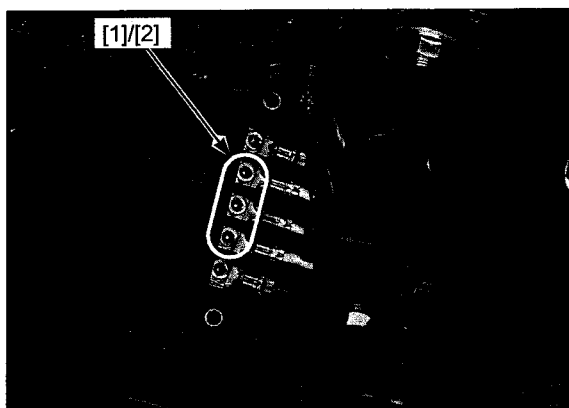
Install the alternator wire clip [1] to the rear heat guard.



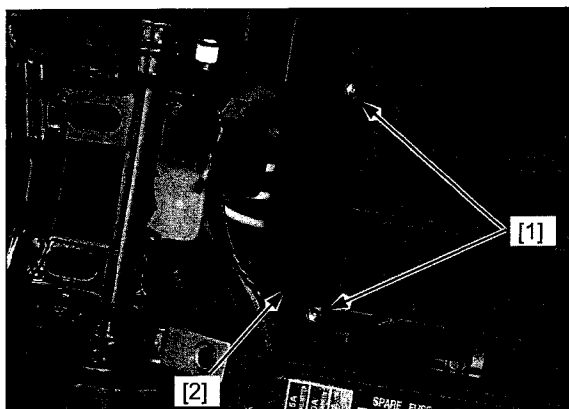
Install the alternator wire [1] in the rear fender rib [2].



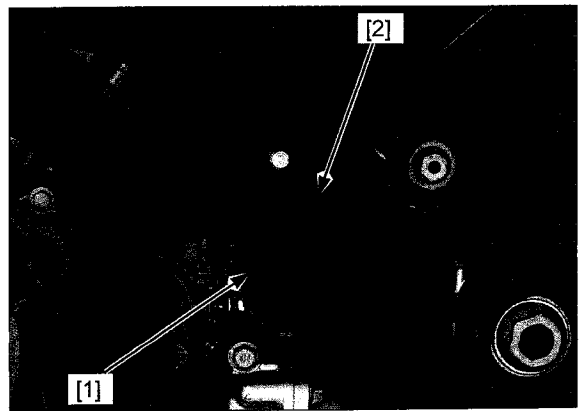
Connect the alternator wires [1] to the regulator/rectifier with the terminal bolts [2].



Install the terminal cover [1] and bolts [2].  
Tighten the bolts securely.



Install the left engine heat guard [1] and tighten the bolt [2] securely.



Install the gearshift arm [1] onto the spindle, aligning the slit of the arm with the punch mark [2] on the spindle.

Install a new gearshift arm pinch bolt [3] and tighten it to the specified torque.

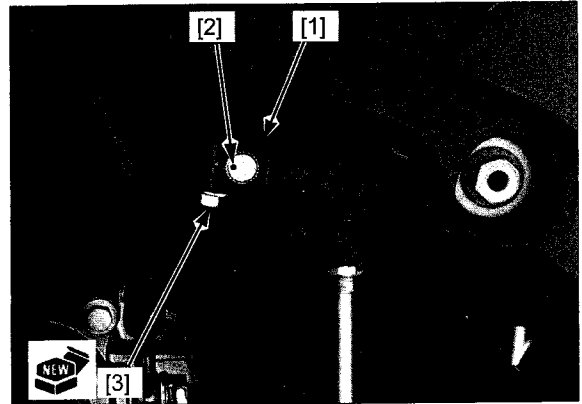
**TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)**

Install the following:

- under cowl (page 3-6)
- battery (page 19-6)

Fill the crankcase with the recommended engine oil (page 4-13).

Fill and bleed the cooling system (page 7-6).

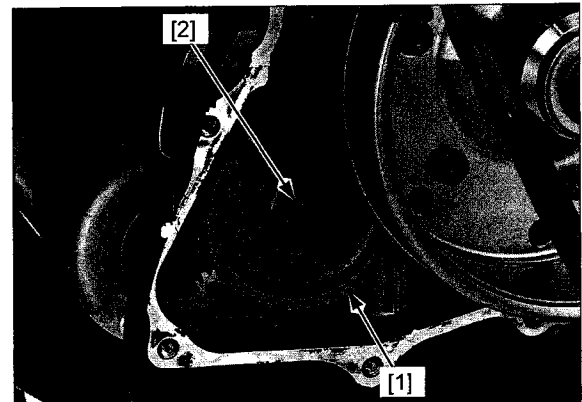


## FLYWHEEL

### REMOVAL

Remove the alternator cover (page 11-4).

Remove the starter reduction gear [1] and shaft [2].



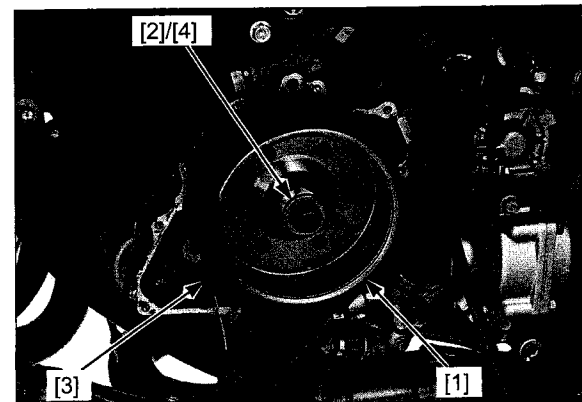
Hold the flywheel [1] with the special tool and loosen the flywheel flange bolt [2].

**TOOL:**

**Flywheel holder [3]**

**07725-0040001  
or equivalent com-  
mercially available**

Remove the flywheel flange bolt and washer [4].



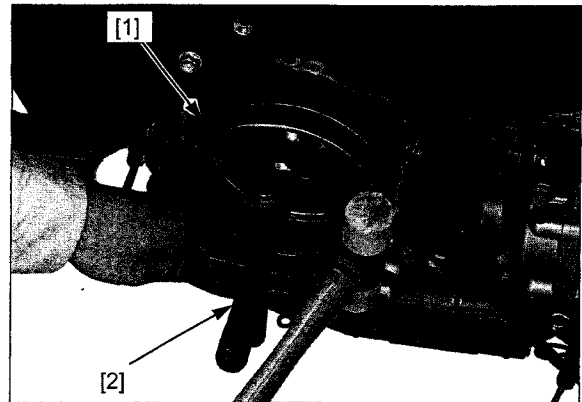
## ALTERNATOR/STARTER CLUTCH

Remove the flywheel [1] using the special tool.

**TOOL:**

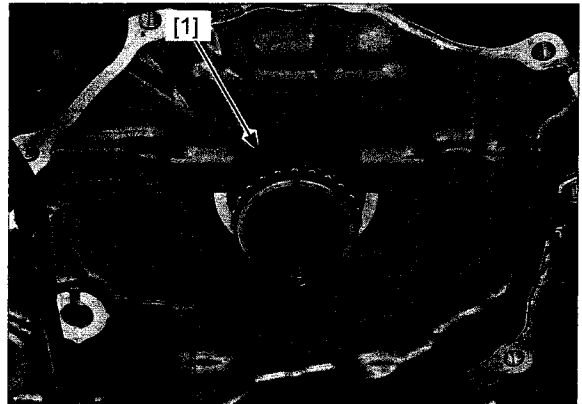
Rotor puller [2]

07733-0020001 or  
07933-3950000  
(U.S.A. only)



Check the needle bearing [1] for wear or damage.

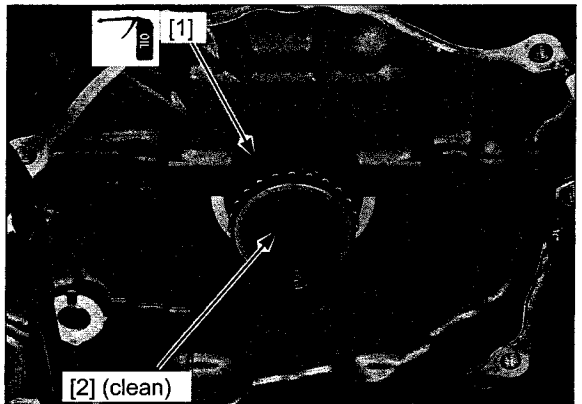
Refer to inspection for the starter clutch and starter reduction gear (page 11-11).



## INSTALLATION

Apply engine oil to the needle bearing [1] and starter driven gear contacting surface.

Clean any oil from the tapered area [2] of the crankshaft and flywheel.



Install the flywheel [1] onto the crankshaft.

Apply engine oil to the flywheel flange bolt threads and seating surface.

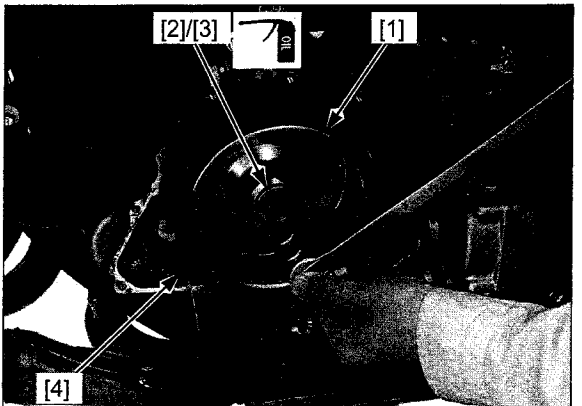
Install the washer [2] and flywheel bolt [3].

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

**TOOL:**

Flywheel holder [4]

07725-0040001  
or equivalent com-  
mercially available

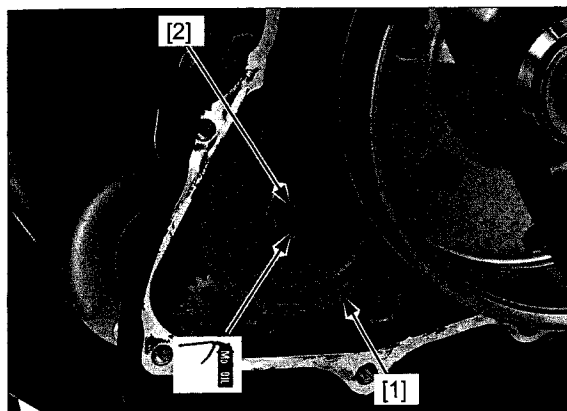


**TORQUE:** 137 N·m (14.0 kgf·m, 101 lbf·ft)

Apply molybdenum oil solution to the starter reduction gear and shaft sliding surface.

Install the reduction gear [1] and shaft [2].

Install the alternator cover (page 11-6).

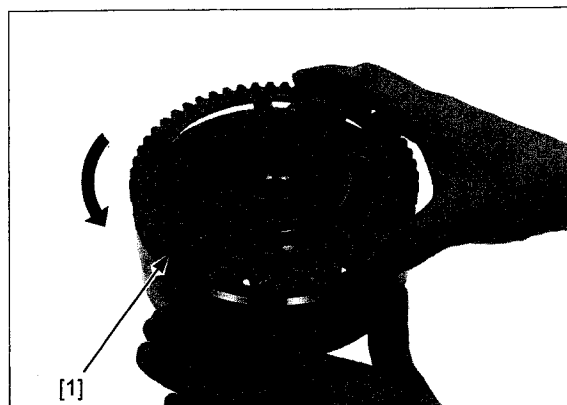


## STARTER CLUTCH

### REMOVAL

Remove the flywheel (page 11-9).

Remove the starter driven gear [1] while turning it counterclockwise.



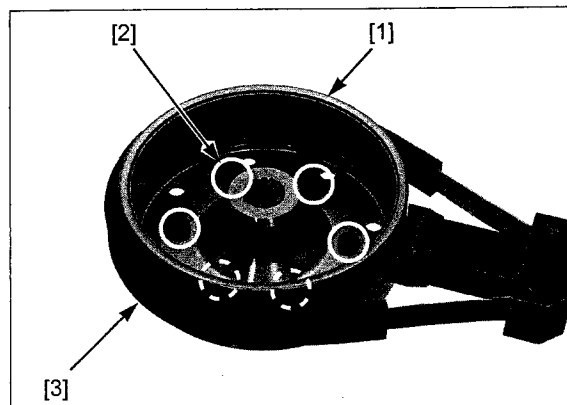
Hold the flywheel [1] with the special tool and remove the starter clutch bolts [2].

### TOOL:

Flywheel holder [3]

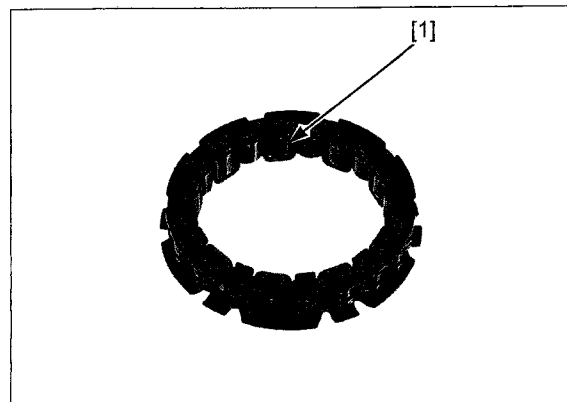
07725-0040001  
or equivalent commercially available

Remove the starter clutch assembly from the flywheel.  
Remove the one-way clutch from the starter clutch outer.



### INSPECTION

Check the sprag [1] of the one-way clutch for abnormal wear or damage.



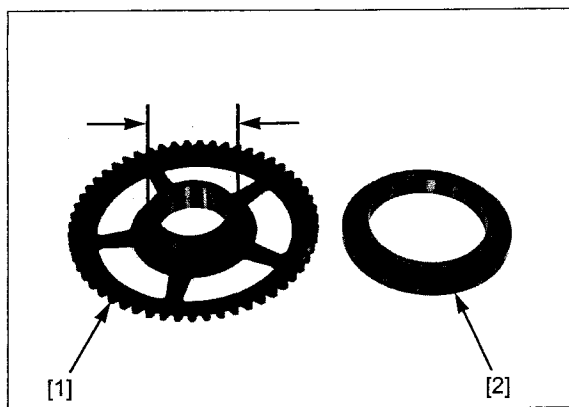


## ALTERNATOR/STARTER CLUTCH

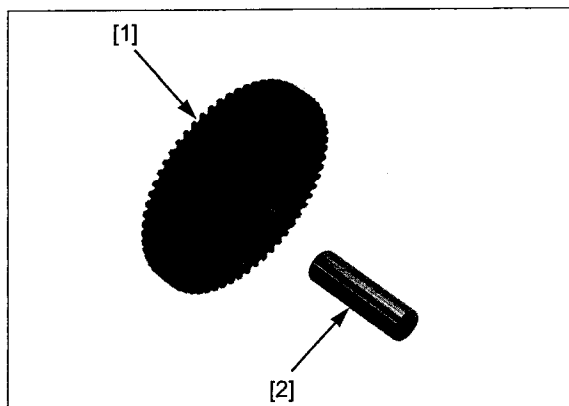
Check the starter driven gear [1] and starter clutch outer [2] for abnormal wear or damage.

Measure the starter driven gear boss O.D.

**SERVICE LIMIT: 51.59 mm (2.031 in)**



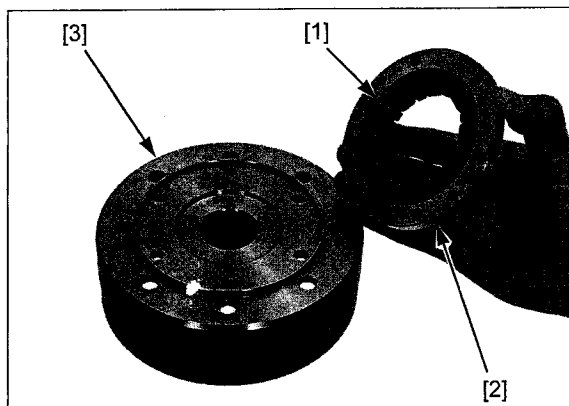
Check the starter reduction gear [1] and shaft [2] for abnormal wear or damage.



### INSTALLATION

Install the one-way clutch [1] into the starter clutch outer [2] with the flanged side toward the flywheel.

Install the starter clutch assembly onto the flywheel [3].



Apply a locking agent to the starter clutch bolt threads and install the bolts [1] (page 1-19).

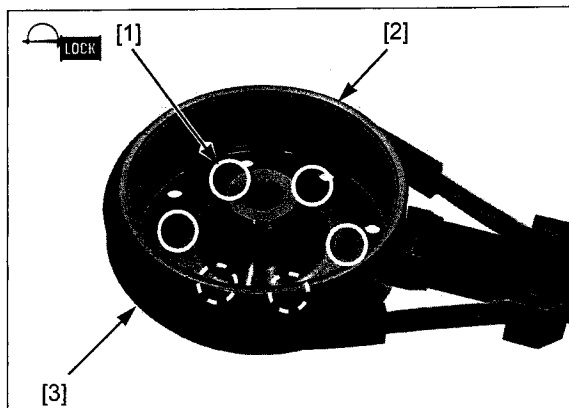
Hold the flywheel [2] with the special tool and tighten the bolts to the specified torque.

#### TOOL:

Flywheel holder [3]

07725-0040001  
or equivalent commercially available

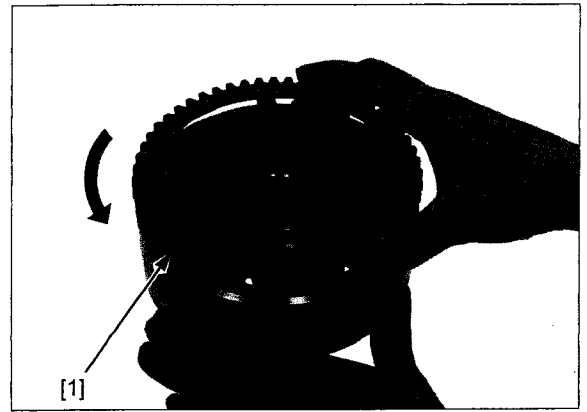
**TORQUE: 16 N·m (1.6 kgf·m, 12 lbf·ft)**



Install the starter driven gear [1] while turning it counterclockwise.

Make sure that the starter driven gear turns counterclockwise smoothly and does not turn clockwise.

Install the flywheel (page 11-10).



---

# MEMO

# 12. CRANKCASE/TRANSMISSION

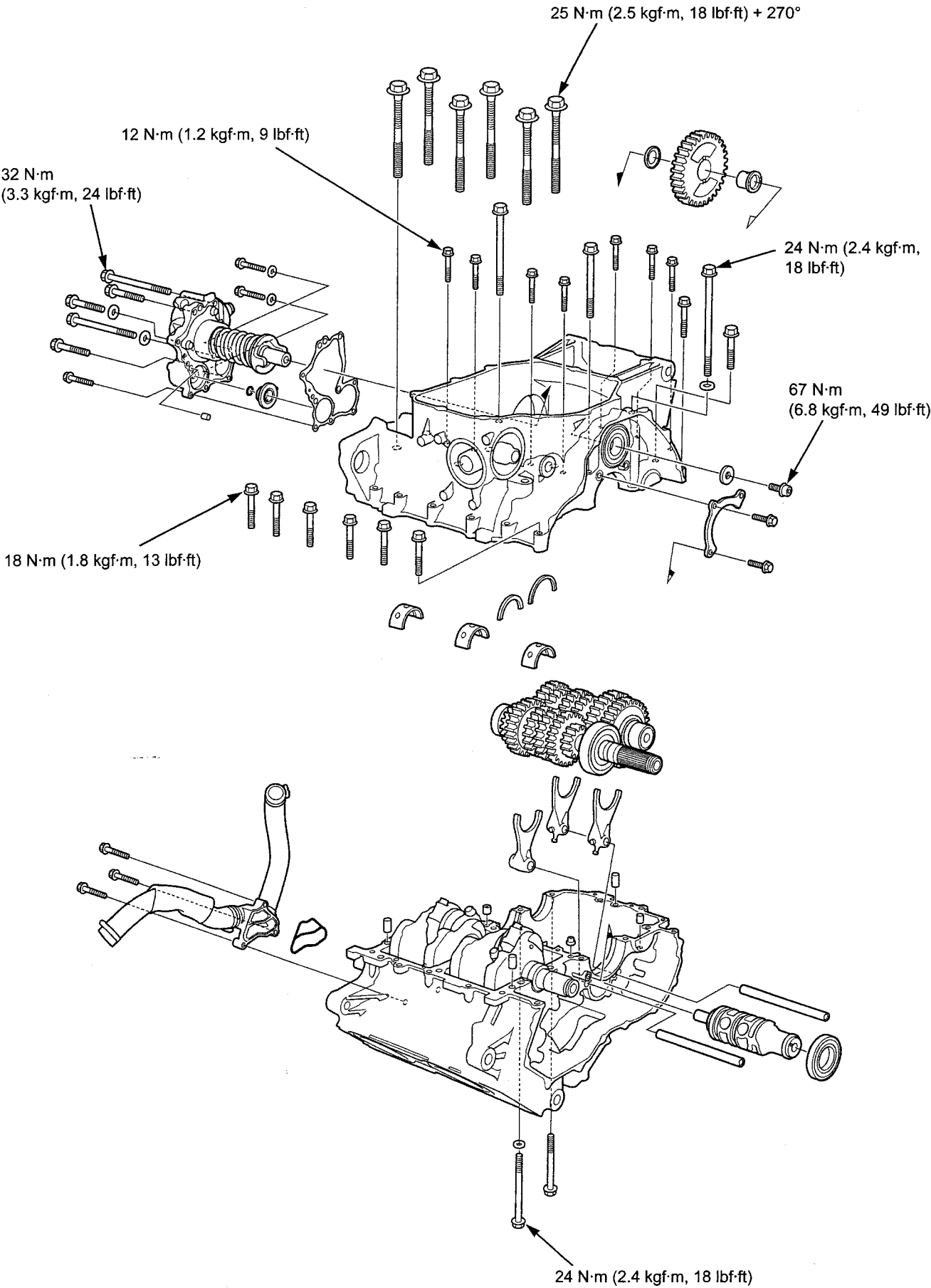
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COMPONENT LOCATION .....	12-2	CRANKCASE SEPARATION .....	12-14
SERVICE INFORMATION .....	12-3	TRANSMISSION .....	12-15
TROUBLESHOOTING.....	12-5	SHIFT FORKS/SHIFT DRUM.....	12-21
SIDE GEAR CASE .....	12-6	CRANKCASE ASSEMBLY.....	12-23

**CRANKCASE/TRANSMISSION**

---

**COMPONENT LOCATION**



# SERVICE INFORMATION

## GENERAL

- The main journal 9 mm bolts are tightened using the Plastic Region Tightening Method.
- Always use new main journal 9 mm bolts when assembling.
- The main journal 9 mm bolt is pre-coated with an oil additive for axial tension stability. Do not remove the oil additive from the new 9 mm bolt surface.
- Must be follow the tightening procedure for crankcase bolt tightening (page 12-23).
- The crankcase must be separated to service the following:
  - Crankshaft (page 13-5)
  - Piston/connecting rod (page 13-13)
  - Transmission (page 12-15)
- The following components must be removed before separating the crankcase:
  - Cam chain tensioners (page 9-31)
  - Clutch (page 10-14)
  - Cylinder head (page 9-20)
  - Engine (page 8-4)
  - EOP sensor (page 22-16)
  - Flywheel (page 11-9)
  - Gearshift linkage (page 10-25)
  - Oil pump (page 5-7)
  - Side gear case (page 12-6)
  - Starter motor (page 21-6)
  - Thermostat (page 7-7)
  - Water pump (page 7-13)
- Be careful not to damage the crankcase mating surfaces when servicing.
- Prior to assembling the crankcase halves, apply sealant to their mating surfaces. Wipe off excess sealant thoroughly.

## SPECIFICATIONS

Unit: mm (in)

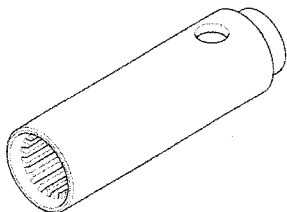
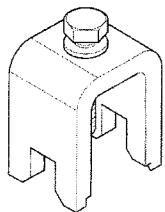
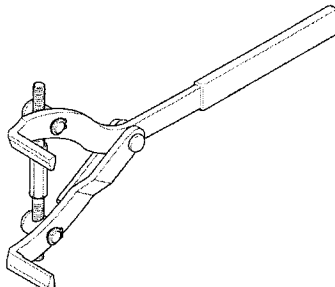
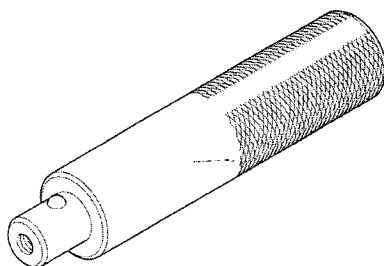
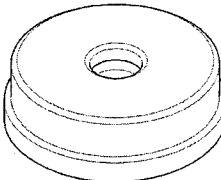

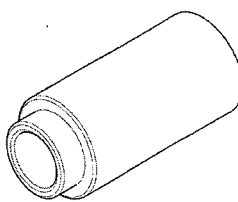

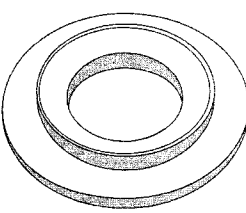
ITEM			STANDARD	SERVICE LIMIT
Transmission	Gear I.D.	M5, M6	31.000 – 31.025 (1.2205 – 1.2215)	31.04 (1.222)
		C1	35.000 – 35.025 (1.3780 – 1.3789)	35.04 (1.380)
		C2	30.000 – 30.021 (1.1811 – 1.1819)	30.04 (1.183)
		C3, C4	33.000 – 33.025 (1.2992 – 1.3002)	33.04 (1.301)
	Gear busing O.D.	M5	30.955 – 30.980 (1.2187 – 1.2197)	30.935 (1.2179)
		M6	30.950 – 30.975 (1.2185 – 1.2195)	30.93 (1.218)
		C3, C4	32.950 – 32.975 (1.2972 – 1.2982)	32.93 (1.296)
	Gear-to-bushing clearance	M5	0.020 – 0.070 (0.0008 – 0.0028)	0.10 (0.004)
		M6	0.025 – 0.075 (0.0010 – 0.0030)	0.11 (0.004)
		C3, C4	0.025 – 0.075 (0.0010 – 0.0030)	0.11 (0.004)
Gear bushing I.D.	M5	27.985 – 28.006 (1.1018 – 1.026)	28.016 (1.1030)	
Mainshaft O.D.	at M5	27.967 – 27.980 (1.1011 – 1.1016)	27.957 (1.1007)	
Bushing-to-shaft clearance	M5	0.005 – 0.039 (0.0002 – 0.0015)	–	
Shift fork, fork shaft	Fork I.D.		12.000 – 12.018 (0.4724 – 0.4731)	12.03 (0.474)
	Claw thickness		5.93 – 6.00 (0.233 – 0.236)	5.9 (0.23)
	Shift fork shaft O.D.		11.957 – 11.968 (0.4707 – 0.4712)	11.95 (0.470)
Output drive train	Final driven gear I.D.		30.000 – 30.013 (1.1811 – 1.1816)	30.03 (1.182)
	Final driven gear bushing	I.D.	25.026 – 25.041 (0.9853 – 0.9859)	25.05 (0.986)
		O.D.	29.959 – 29.980 (1.0220 – 1.0228)	29.95 (1.179)
	Final shaft O.D.		24.980 – 24.993 (0.4707 – 0.4712)	24.962 (0.9828)
	Final driven gear-to-bushing clearance		0.020 – 0.054 (0.0008 – 0.0021)	0.079 (0.0031)
	Final driven gear bushing-to-shaft clearance		0.033 – 0.061 (0.0013 – 0.0024)	0.090 (0.0035)
	Final shaft damper spring free length		114.5 (4.51)	110 (4.3)
	Final shaft/output shaft gear backlash		0.08 – 0.23 (0.003 – 0.009)	0.40 (0.016)
	Backlash difference between measurements		–	0.10 (0.004)

## CRANKCASE/TRANSMISSION

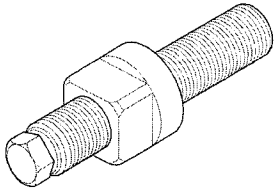
### TORQUE VALUES

Main journal 9 mm bolt	25 N·m (2.5 kgf·m, 18 lbf·ft) + 270°	Replace with a new one. See page 12-23
Crankcase bolt, 8 mm	24 N·m (2.4 kgf·m, 18 lbf·ft)	
7 mm	18 N·m (1.8 kgf·m, 13 lbf·ft)	
6 mm	12 N·m (1.2 kgf·m, 9 lbf·ft)	
Countershaft socket bolt	67 N·m (6.8 kgf·m, 49 lbf·ft)	Apply engine oil to the threads and seating surface.
Mainshaft bearing set plate bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	Apply a locking agent to the threads.
Side gear case mounting bolt	32 N·m (3.3 kgf·m, 24 lbf·ft)	UBS bolt
Final shaft socket bolt	67 N·m (6.8 kgf·m, 49 lbf·ft)	Apply engine oil to the threads and seating surface.

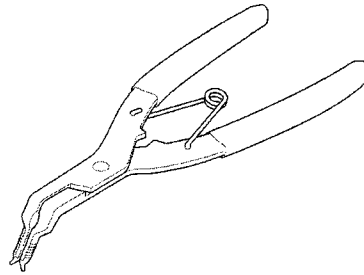
### TOOLS

<p>Spline holder 070MB-MCS0100</p> 	<p>Damper spring compressor 07964-ME90000</p>  <p>Not available in U.S.A.</p>	<p>Clutch center holder 07724-0050002</p>  <p>Equivalent commercially available in U.S.A.</p>
<p>Driver 07749-0010000</p> 	<p>Attachment, 62 x 68 mm 07746-0010500</p> 	<p>Pilot, 22 mm 07746-0041000</p> 
<p>Assembly collar 07965-166030A</p>  <p>or 07965-1660300</p>	<p>Threaded adaptor 07965-KA30000</p> 	<p>Compressor seat 07967-9690200</p> 

Assembly bolt  
07965-1660200



Snap ring pliers  
07914-5670100



Equivalent commercially available in  
U.S.A.

## TROUBLESHOOTING

### Excessive noise in side gear case

- Worn or damaged output shaft and final shaft gears
- Worn or damaged side gear case bearings

### Hard to shift

- Improper clutch operation (page 10-4)
- Incorrect engine oil weight
- Bent shift forks
- Bent shift fork shaft
- Bent shift fork claw
- Damaged shift drum cam grooves
- Bent gearshift spindle

### Transmission jumps out of gear

- Worn gear dogs
- Worn gear shifter groove
- Bent shift fork shaft
- Broken shift drum stopper arm
- Broken shift drum stopper arm spring
- Worn or bent shift forks
- Broken gearshift spindle return spring

### Excessive engine noise

- Worn or damaged transmission gears
- Worn or damaged transmission bearings
- Worn main journal bearings
- Worn crankpin bearings

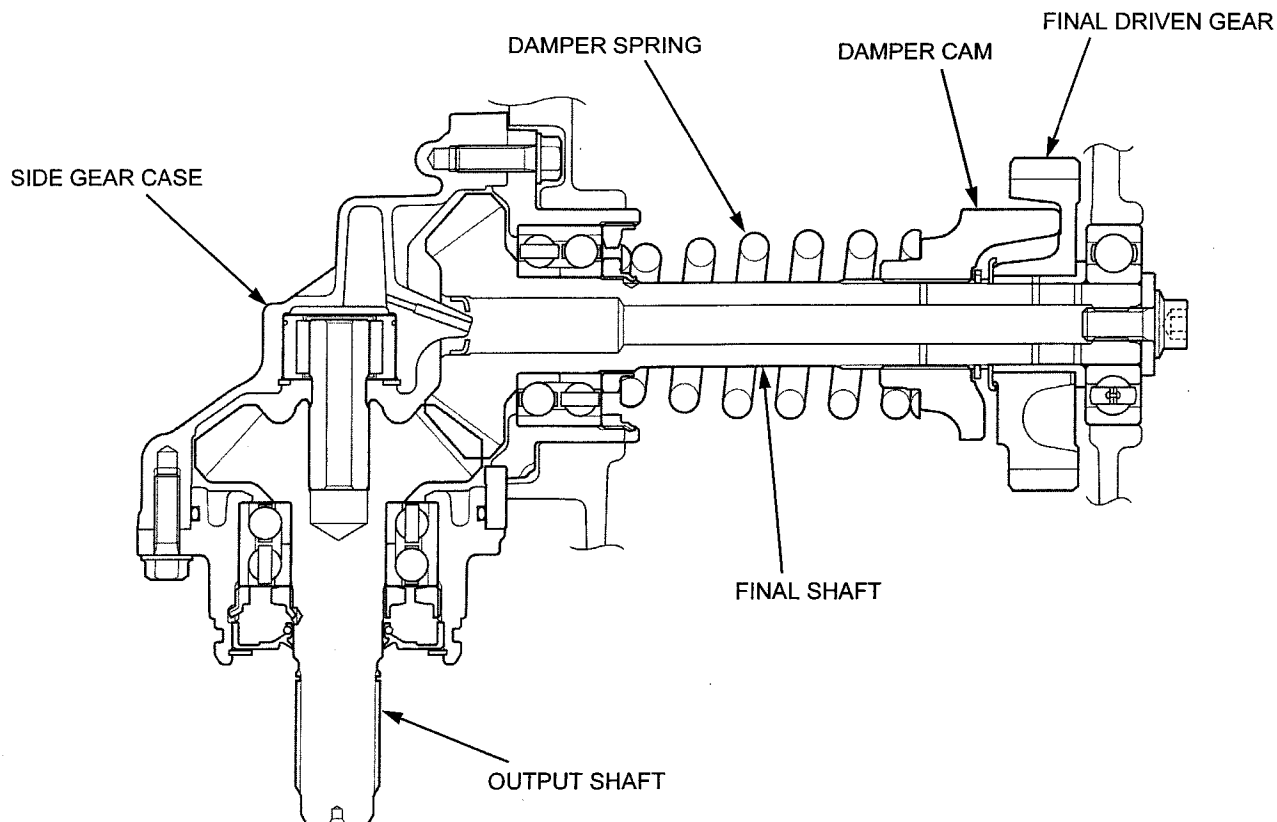


## SIDE GEAR CASE

### NOTICE

- Do not disassemble the side gear case other than the description of this manual.
- Replace the side gear case as an assembly.

Description of side gear case assembly:



### REMOVAL

Remove the engine from the frame (page 8-4).

Remove the following:

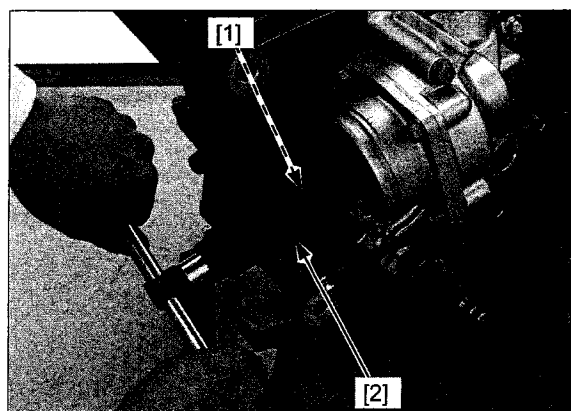
- oil pan/oil strainer (page 5-6)
- oil pump (page 5-7)

Hold the output shaft [1] with the special tool.

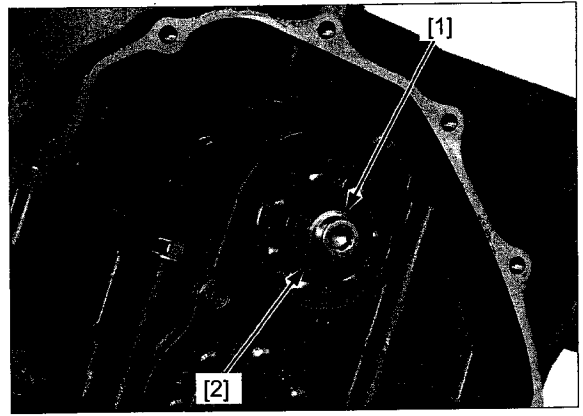
**TOOL:**

Spline holder [2]

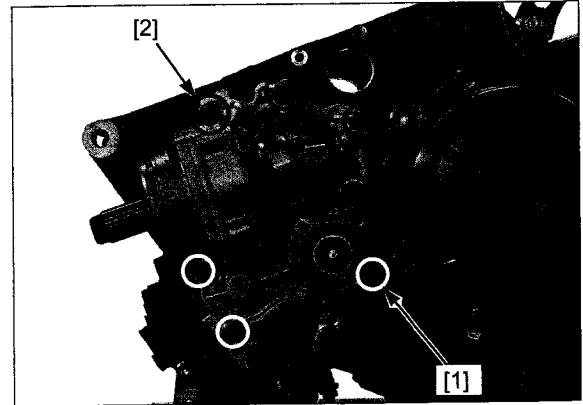
070MB-MCS0100



Remove the final shaft socket bolt [1] and washer [2] while holding the output shaft.

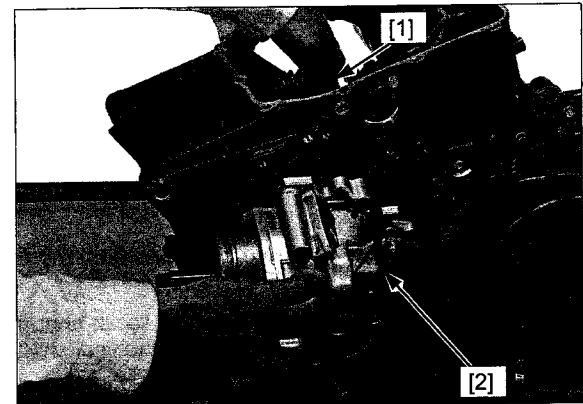


Remove the 6 mm bolts [1], 8 mm bolts [2] and sealing washers.

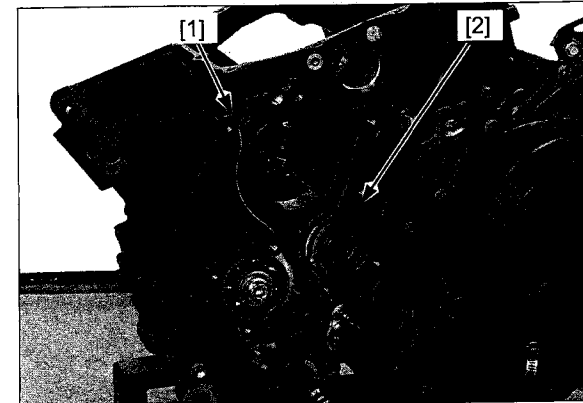


Hold the final driven gear [1] and remove the side gear case assembly [2].

Remove the bushing, final driven gear and washer.



Remove the gasket [1] and dowel pin [2].



### DISASSEMBLY

#### Except U.S.A.:

Set the damper spring compressor [1] onto the damper cam [2] and final shaft [3].

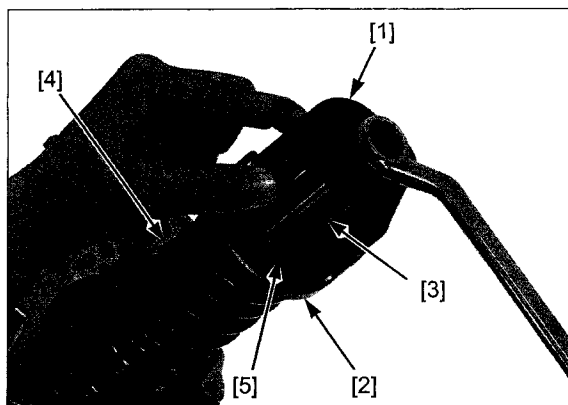
Compress the damper spring [4] by turning the compressor bolt clockwise until the snap ring [5] can be removed.

#### TOOL:

**Damper spring compressor 07964-ME90000**

Remove the snap ring from the final shaft groove using a commercially available snap ring pliers.

Remove the spring compressor, snap ring, damper cam and damper spring from the final shaft.



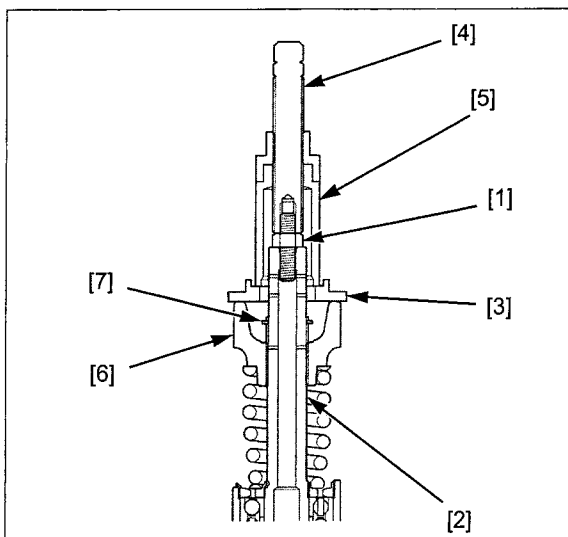
#### U.S.A. only:

Place the threaded adaptor [1] in the end of the final shaft [2] and tighten the adaptor.

Place the compressor seat [3] over the threaded adaptor with the stepped side facing upward.

Install the assembly bolt [4] through the assembly collar [5] and attach it to the threaded adaptor.

Center the compressor seat with the damper cam [6], then begin to tighten the 23 mm nut of the assembly bolt until the snap ring [7] is visible so it can be removed.



#### TOOLS:

**Assembly bolt**

**Assembly collar**

**Compressor seat**

**Threaded adaptor**

**Snap ring pliers**

**07965-1660200**

**07965-166030A**

**or 07965-1660300**

**07967-9690200**

**07965-KA30000**

**07914-5670101**

**(Equivalent commercially available in U.S.A.)**

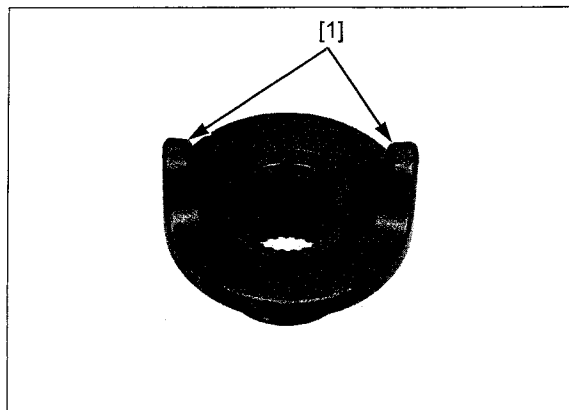
Remove the snap ring from the final shaft groove using the snap ring pliers.

Remove the special tools, snap ring, damper cam and damper spring from the final shaft.

### INSPECTION

#### DAMPER CAM

Check the projections [1] of the damper cam for damage or excessive wear.

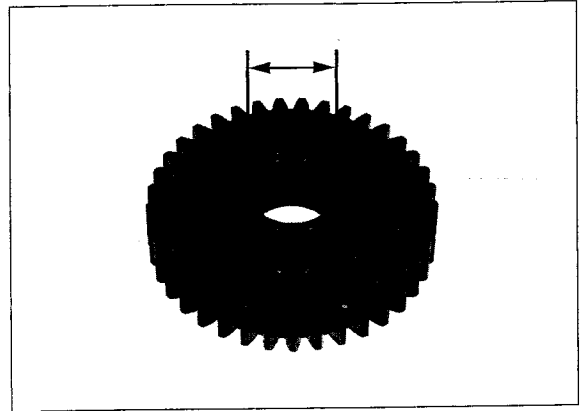


### FINAL DRIVEN GEAR

Check the gear teeth for damage or excessive wear, and the gear dog holes for damage.

Measure the final driven gear I.D.

**SERVICE LIMIT: 30.03 mm (1.182 in)**



### BUSHING

Check the final driven gear bushing for wear or damage.

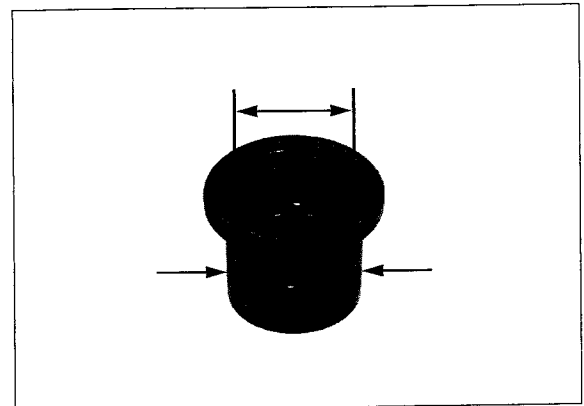
Measure the bushing I.D. and O.D.

**SERVICE LIMITS: O.D.: 29.95 mm (1.179 in)**

**I.D.: 25.05 mm (0.986 in)**

Calculate the gear-to-bushing clearance.

**SERVICE LIMIT: 0.079 mm (0.0031 in)**



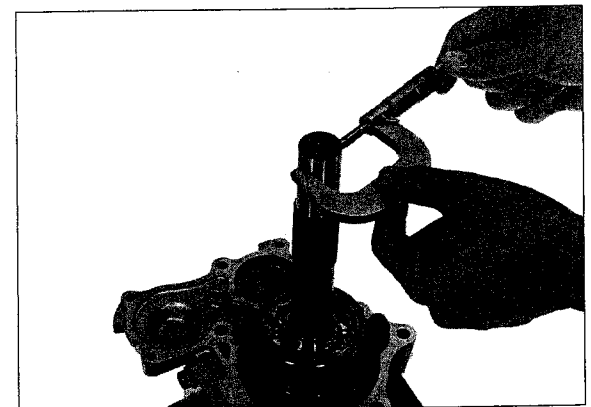
### FINAL SHAFT

Measure the O.D. of the final shaft at the bushing sliding area.

**SERVICE LIMIT: 24.962 mm (0.9828 in)**

Calculate the bushing-to-shaft clearance.

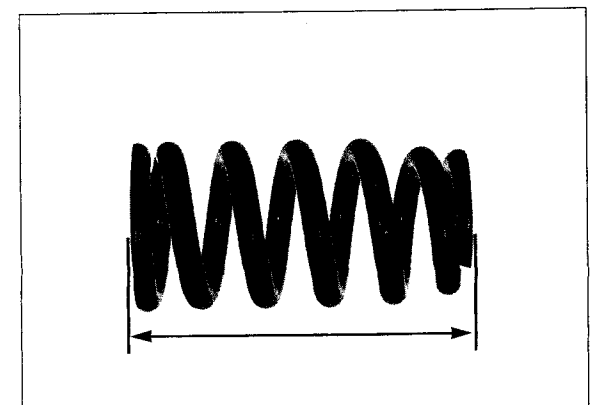
**SERVICE LIMIT: 0.090 mm (0.0035 in)**



### DAMPER SPRING

Measure the damper spring free length.

**SERVICE LIMIT: 110 mm (4.3 in)**



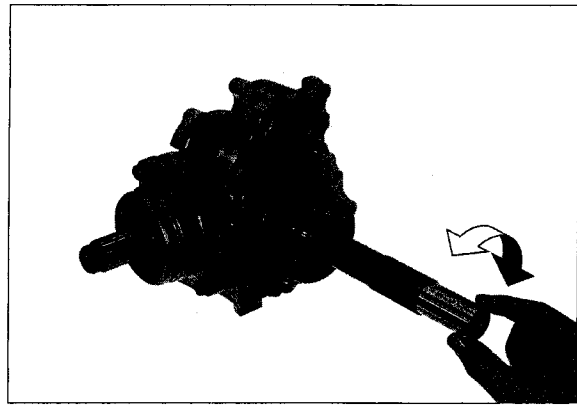
## CRANKCASE/TRANSMISSION

### BACKLASH INSPECTION

Turn the final shaft and check that the output shaft and final shaft turn smoothly and quietly without binding.

If the shafts do not turn smoothly or quietly, the gears and/or bearing may be damaged or faulty.

Replace the side gear case as an assembly.



Set the side gear case in a vise with soft jaws.

Set a horizontal type dial indicator on the final shaft as shown.

Hold the output shaft with the special tool and rotate the final shaft [1] until gear slack is taken up.

#### TOOL:

Spline holder [2]

070MB-MCS0100

Turn the final shaft back and forth to read backlash.

**STANDARD:** 0.08 – 0.23 mm (0.003 – 0.009 in)

**SERVICE LIMIT:** 0.40 mm (0.016 in)

Remove the dial indicator. Turn the drive gear shaft 120° and measure backlash. Repeat this procedure once more.

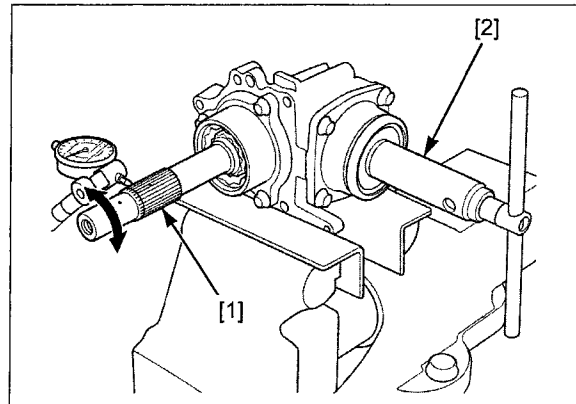
Compare the difference of the three measurements.

**Backlash difference between measurements:**

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

If the difference in measurements exceeds the service limit, it indicates that the bearing is not installed squarely or the case is deformed.

Replace the side gear case as an assembly.



## OIL SEAL REPLACEMENT

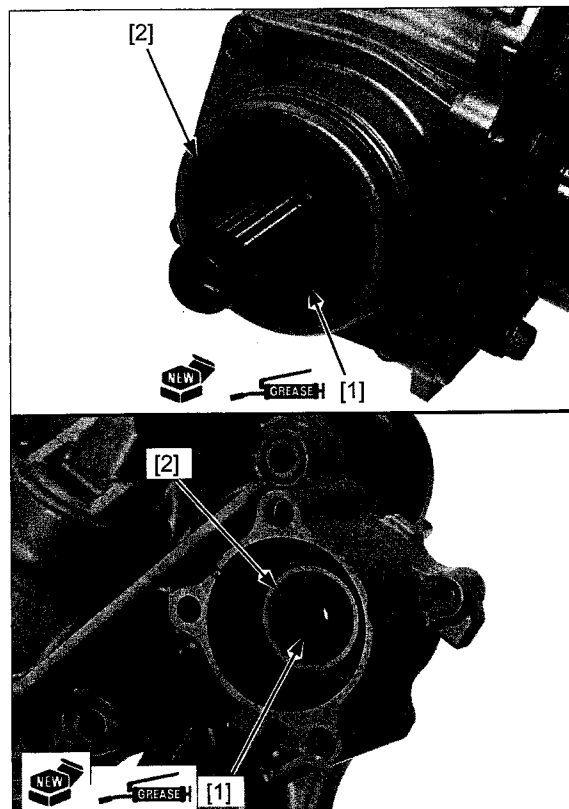
Check the oil seals [1] for deterioration or damage.

Remove the snap ring [2] and replace the oil seal if necessary.

Apply grease to new oil seal lips.

Install the oil seal into the side gear case until the snap ring groove appears.

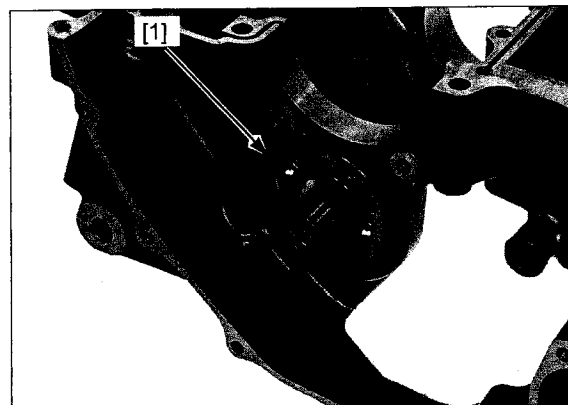
Install the snap ring.



## FINAL SHAFT BEARING REPLACEMENT

Separate the crankcase halves (page 12-14).

Drive the final shaft bearing [1] out of the lower crankcase.



*Install the bearing with its marked side facing up.*

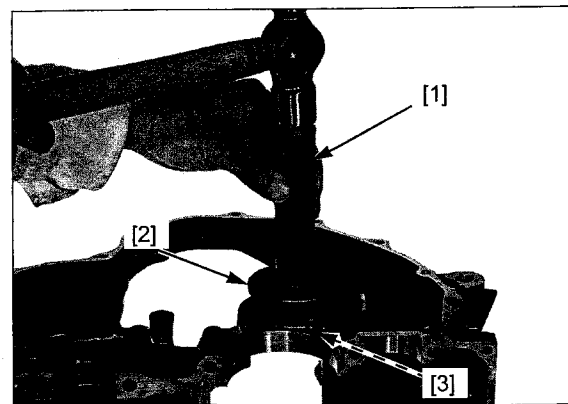
Drive in the final shaft bearing until it is flush with the crankcase surface using the special tools.

### TOOLS:

Driver [1]	07749-0010000
Attachment, 62 x 68 mm [2]	07746-0010500
Pilot, 22 mm [3]	07746-0041000

### NOTE:

This is temporary position. The bearing becomes proper position after tightening the final shaft socket bolt.



## CRANKCASE/TRANSMISSION

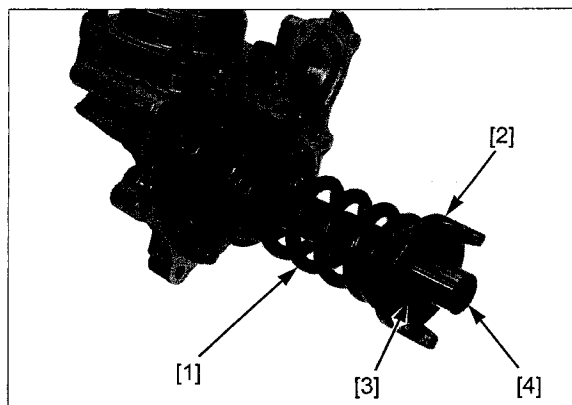
### ASSEMBLY

*Install the damper spring with its tapered end facing gear case.*

Install the damper spring [1], damper cam [2] and snap ring [3] onto the final shaft [4].

**NOTE:**

Install the snap ring with the chamfered edges facing the thrust load side.



**Except U.S.A.:**

Set the damper spring compressor [1] onto the damper cam [2] and final shaft [3].

Compress the damper spring [4] by turning the compressor bolt clockwise until the snap ring groove appears.

**TOOL:**

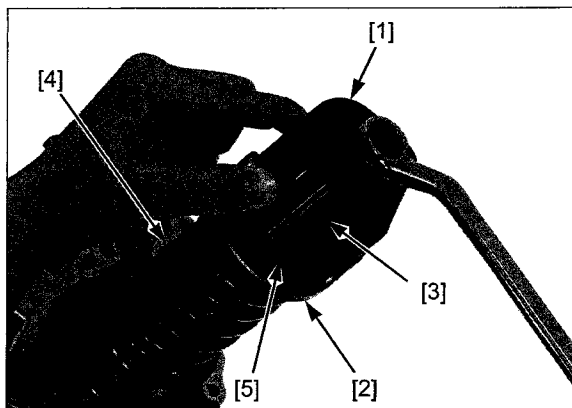
**Damper spring compressor 07964-ME90000**

Install the snap ring [5] into the final shaft groove, using a commercially available snap ring pliers.

Loosen and remove the damper spring compressor.

**NOTE:**

- Do not reuse worn snap ring which could easily spin in the groove.
- Check that the snap ring is seated in the groove.



**U.S.A. only:**

Place the threaded adaptor [1] in the end of the final shaft [2] and tighten the adaptor.

Place the compressor seat [3] over the threaded adaptor with the stepped side facing upward.

Install the assembly bolt [4] through the assembly collar [5] and attach it to the threaded adaptor. Center the compressor seat with the damper cam [6], then begin to tighten the 23 mm nut of the assembly bolt until the snap ring [7] is visible so it can be installed into the groove. Install the snap ring into the groove in the shaft.

**TOOLS:**

**Assembly bolt**

**Assembly collar**

**Compressor seat**

**Threaded adaptor**

**Snap ring pliers**

**07965-1660200**

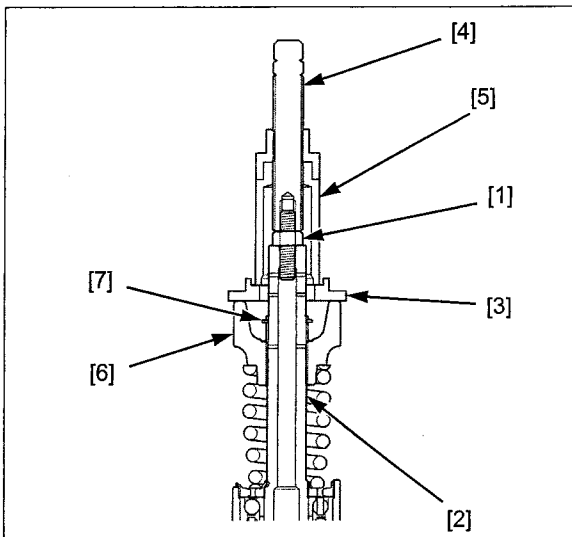
**07965-166030A  
or 07965-1660300**

**07967-9690200**

**07965-KA30000**

**07914-5670101**

**(Equivalent  
commercially avail-  
able in U.S.A.)**



Install the snap ring into the final shaft groove using the snap ring pliers.

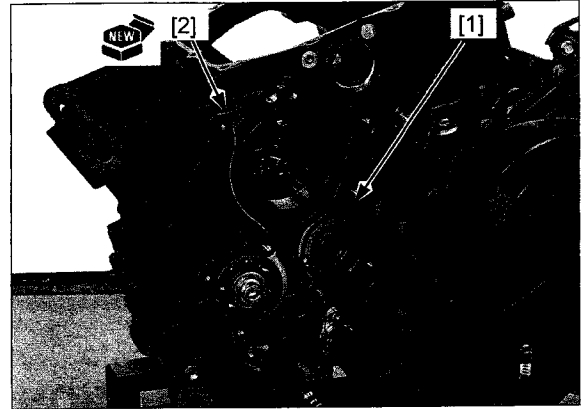
Loosen and remove the special tools.

**NOTE:**

- Do not reuse worn snap ring which could easily spin in the groove.
- Check that the snap ring is seated in the groove.

# INSTALLATION

Install the dowel pin [1] and new gasket [2].



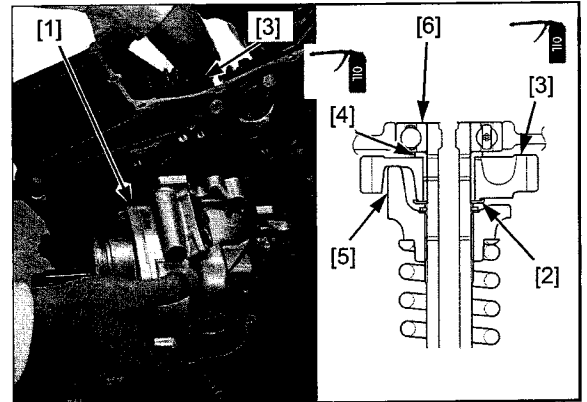
Apply engine oil to the sliding surface of the final driven gear and bushing.

Install the side gear case [1] into the crankcase hole, and then install the washer [2], final driven gear [3] and bushing [4] through the final shaft.

## NOTE:

- Install the washer with its concave side facing final driven gear.
- Install the final driven gear by aligning the damper cam projections [5] with the final driven gear hole.

Install the final shaft end into the bearing [6] and set the side gear case assembly onto the crankcase.



Apply engine oil to the side gear case 8 mm bolt threads and seating surface.

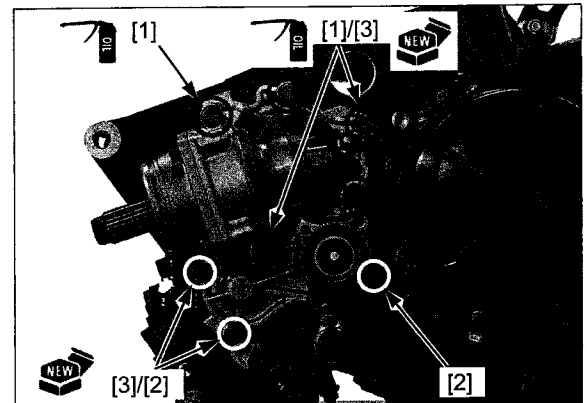
*Install new sealing washers at the "△" marked position.*

Install the 8 mm bolts [1], 6 mm bolts [2] and new sealing washers [3].

Tighten the 8 mm bolts to the specified torque.

**TORQUE: 32 N·m (3.3 kgf·m, 24 lbf·ft)**

Tighten the 6 mm bolts securely.

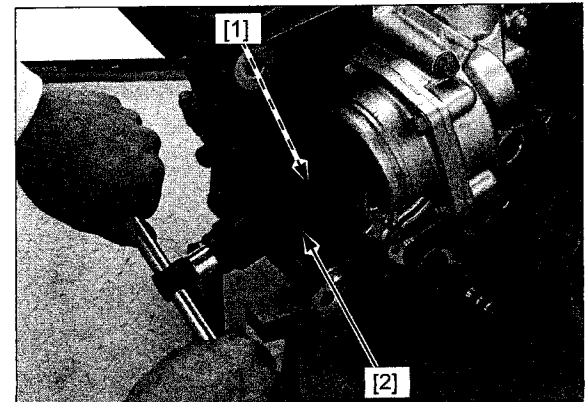


Hold the output shaft [1] with the special tool.

## TOOL:

Spline holder [2]

070MB-MCS0100





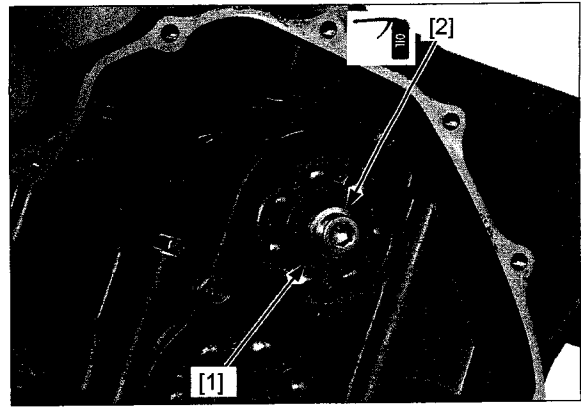
## CRANKCASE/TRANSMISSION

Apply engine oil to the final shaft socket bolt threads and seating surface.

Install the washer [1] and final shaft socket bolt [2].

Tighten the socket bolt to the specified torque, while holding the output shaft.

**TORQUE: 67 N·m (6.8 kgf·m, 49 lbf·ft)**

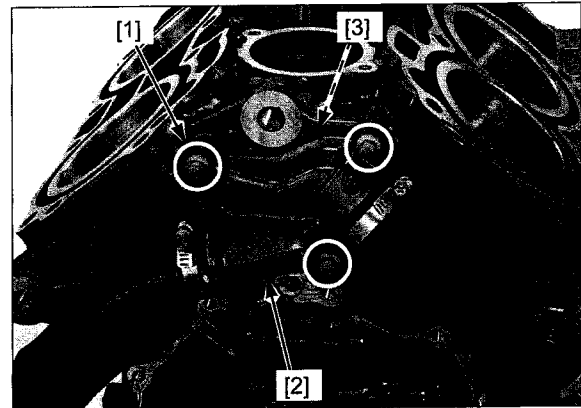


## CRANKCASE SEPARATION

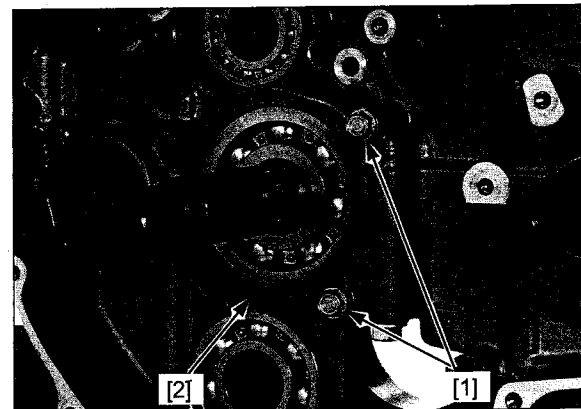
Refer to Service Information for removal of necessary parts before separating the crankcase (page 12-3).

Remove the bolts [1] and cylinder water joint [2] from the upper crankcase.

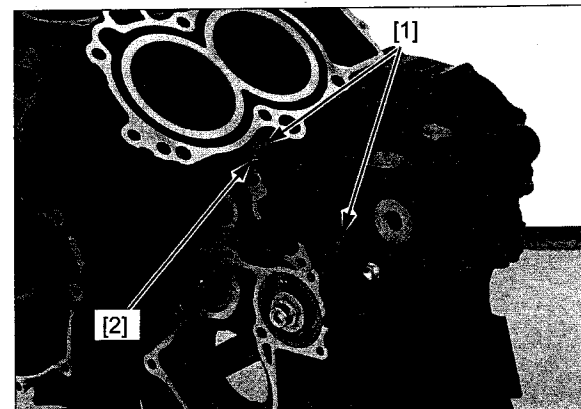
Remove the O-ring [3] from the cylinder water joint.



Remove the bolts [1] and mainshaft bearing set plate [2].

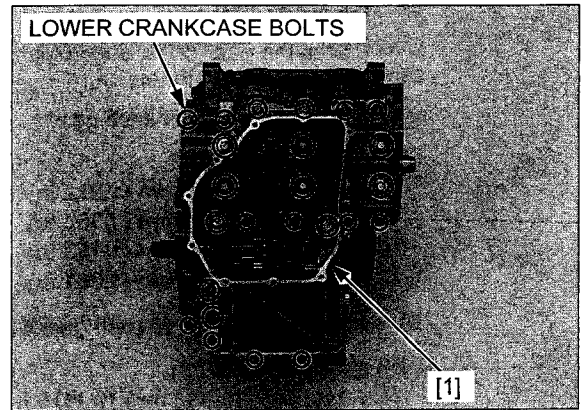


Remove the upper crankcase 8 mm bolts [1] and sealing washer [2].

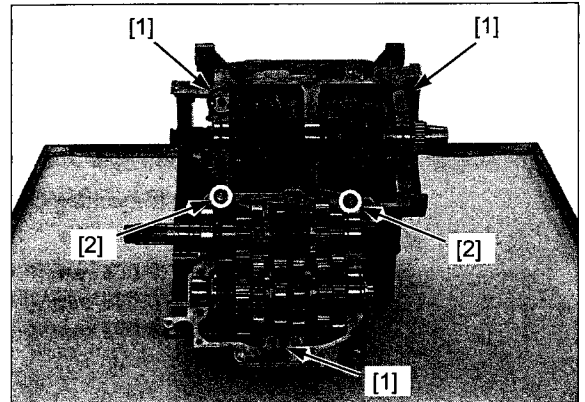


Remove the crankcase 6 mm bolts, 7 mm bolts, 8 mm bolts, sealing washer and main journal 9 mm bolts.

Separate the lower crankcase [1] from the upper crankcase.



Remove the dowel pins [1] and oil orifices [2].



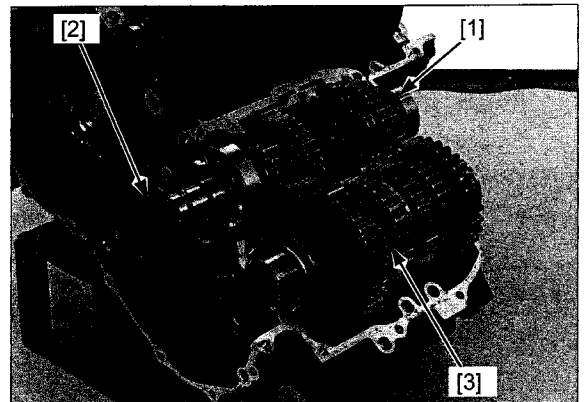
## TRANSMISSION

### REMOVAL

Separate the crankcase halves (page 12-14).

Remove the set ring [1] from the mainshaft bearing.

Remove the mainshaft [2] and countershaft [3] assemblies from the upper crankcase.



### DISASSEMBLY

Hold the final drive gear [1] with the special tool and loosen the countershaft socket bolt [2].

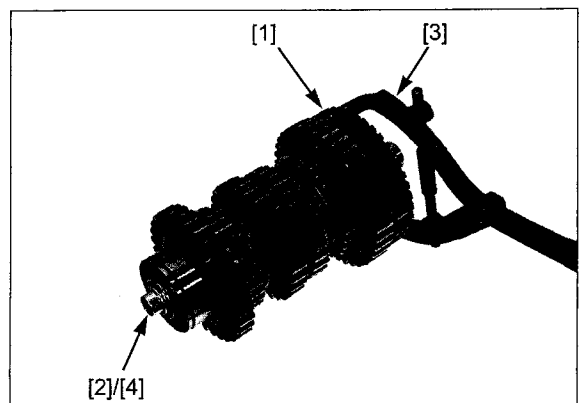
#### TOOL:

Clutch center holder [3]

07724-0050002  
(Equivalent commercially available in U.S.A.)

Remove the socket bolt and washer [4], then disassemble the countershaft.

Disassemble the mainshaft.



### INSPECTION

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: 31.04 mm (1.222 in)

C1: 35.04 mm (1.380 in)

C2: 30.04 mm (1.183 in)

C3, C4: 33.04 mm (1.301 in)

Measure the O.D. of each gear bushing.

#### SERVICE LIMITS:

M5: 30.935 mm (1.2179 in)

M6: 30.93 mm (1.218 in)

C3, C4: 32.93 mm (1.296 in)

Measure the I.D. of the gear bushing.

#### SERVICE LIMIT:

M5: 28.016 mm (1.1030 in)

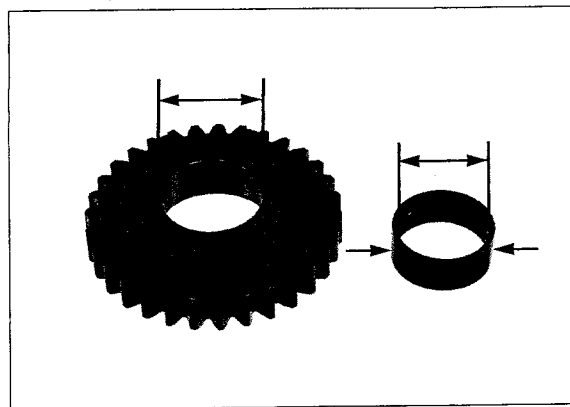
Calculate the gear-to-bushing clearance.

#### STANDARDS:

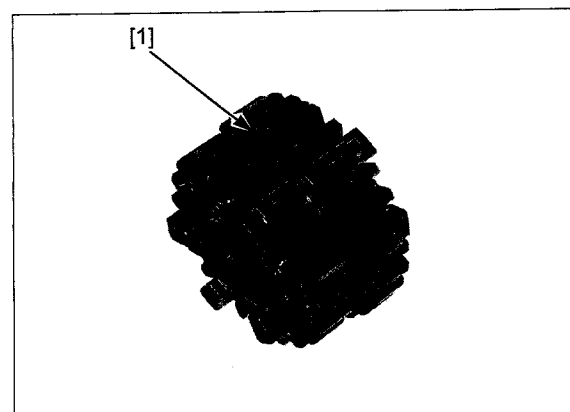
M5: 0.020 – 0.070 mm (0.0008 – 0.0028 in)

M6: 0.025 – 0.075 mm (0.0010 – 0.0030 in)

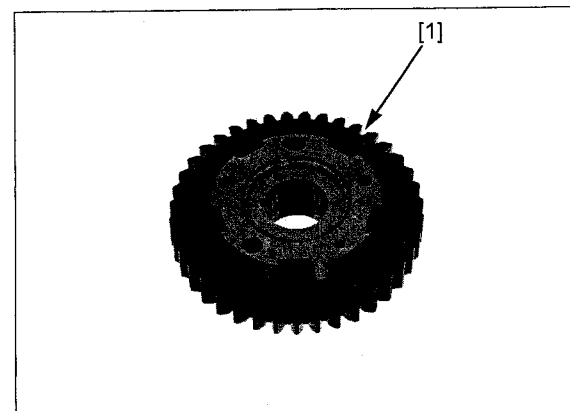
C3, C4: 0.025 – 0.075 mm (0.0010 – 0.0030 in)



Check the shift fork groove [1] of the shifter gear for excessive wear or damage.



Check the final drive gear [1] for wear or damage.



Check the mainshaft [1] and countershaft [2] for abnormal wear or damage.

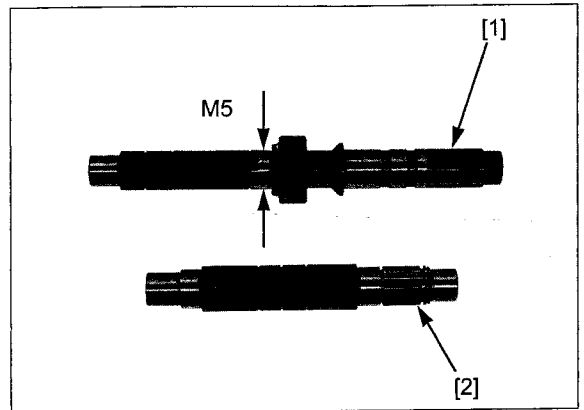
Measure the mainshaft O.D. at the M5 gear.

**SERVICE LIMIT: 27.957 mm (1.1007 in)**

Calculate the gear bushing-to-shaft clearance.

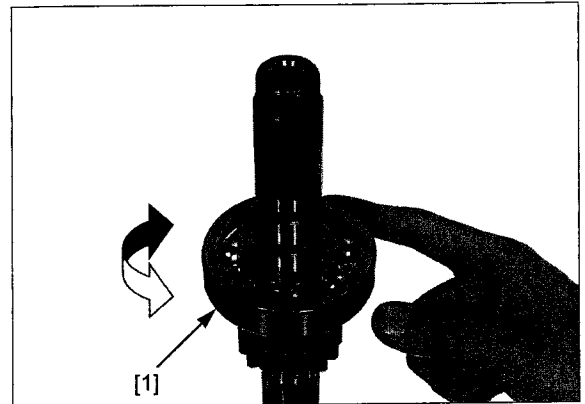
**STANDARD:**

**M5: 0.005 – 0.039 mm (0.0002 – 0.0015 in)**



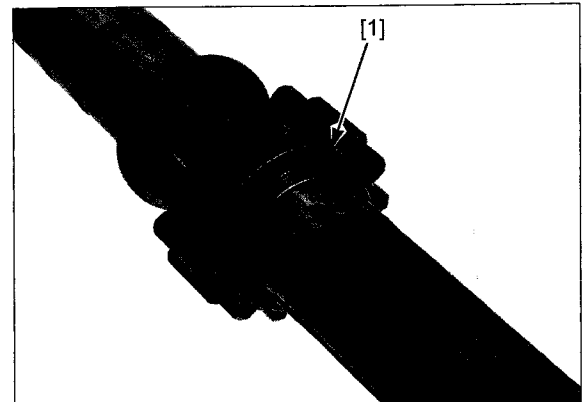
Turn the outer race of each bearing [1] with your finger. The bearings should turn smoothly and quietly. Also check that the bearing inner race fits tightly on the shaft.

Remove and discard the bearing, if the race does not turn smoothly, quietly, or fits loosely on the shaft.



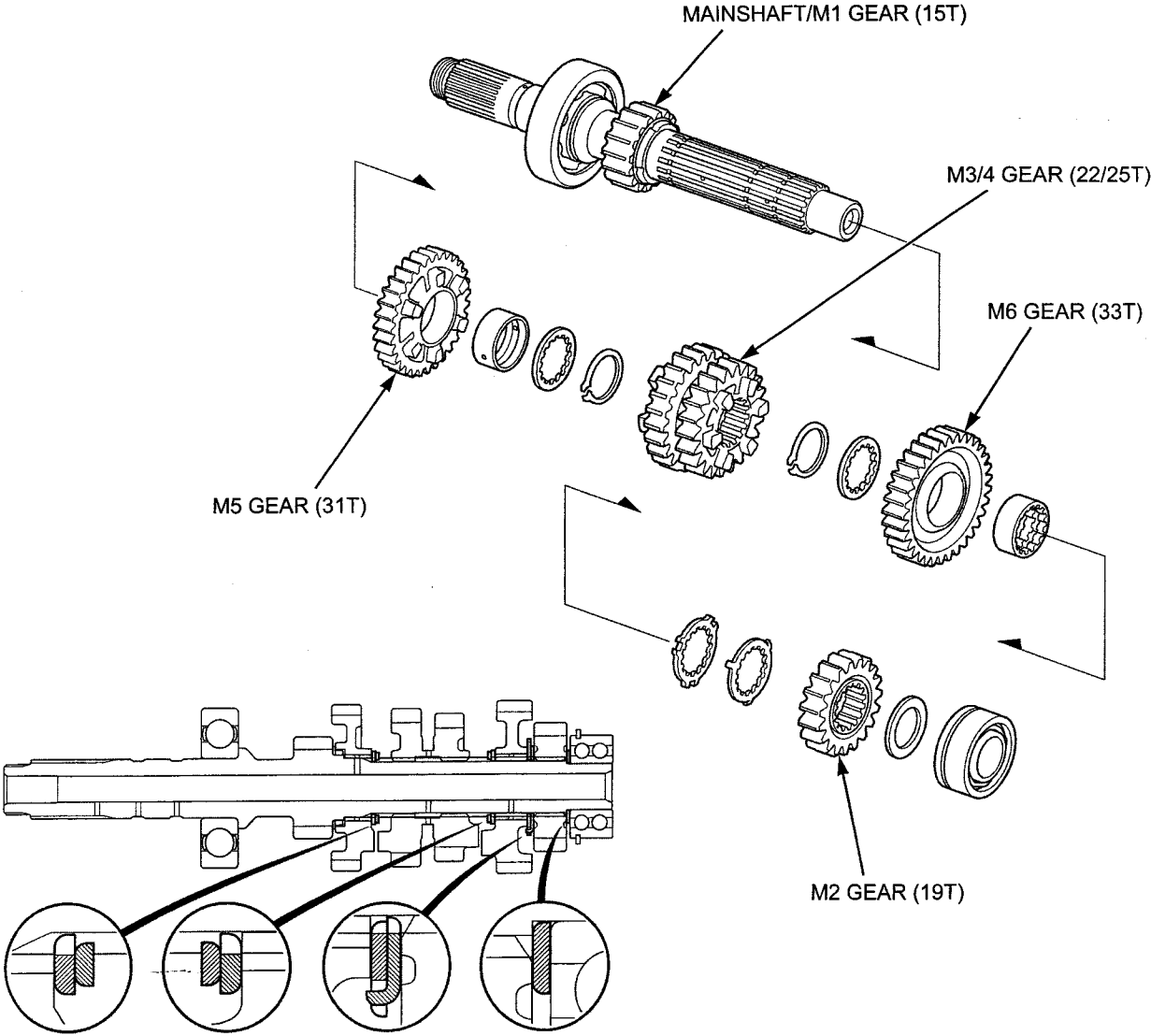
Check the friction damper [1] for wear or damage.

Replace the mainshaft and friction damper as an assembly if the friction damper is faulty.

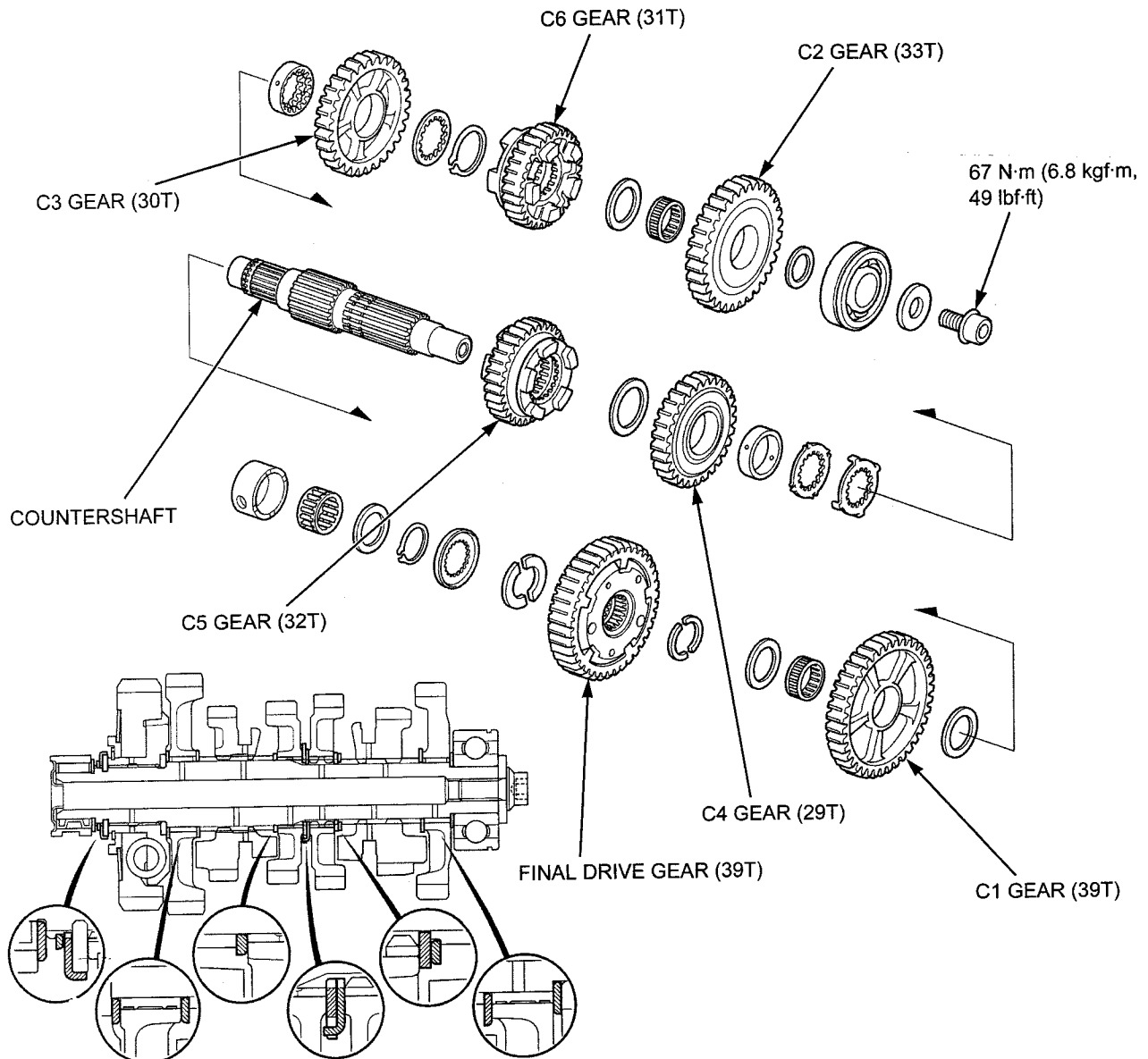


ASSEMBLY

Mainshaft:



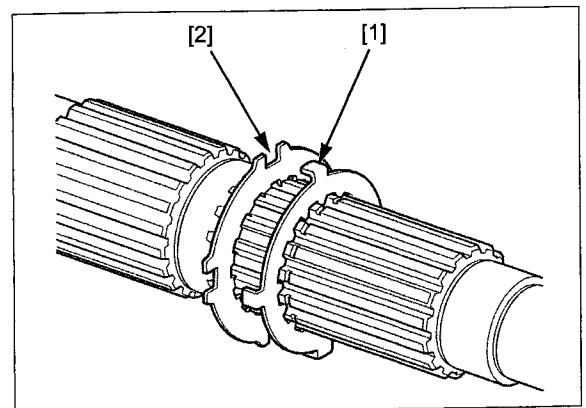
## Countershaft:



Assemble the transmission gear and shafts.

### NOTE:

- Coat each gear teeth, sliding surface and bearing with clean engine oil and check for smooth movement.
- Align the lock washer tabs [1] with the spline washer grooves [2].
- Always install the thrust washer and snap ring with the chamfered edge facing away from the thrust road.
- Install the snap ring so that its end gap aligns with the groove in the splines.
- Make sure that the snap ring is fully seated in the shaft groove after installing it.



## CRANKCASE/TRANSMISSION

Apply molybdenum oil solution to the bearing contact surface of the countershaft, then install the countershaft bearing [1].

Apply engine oil to the countershaft socket bolt threads and seating surface.

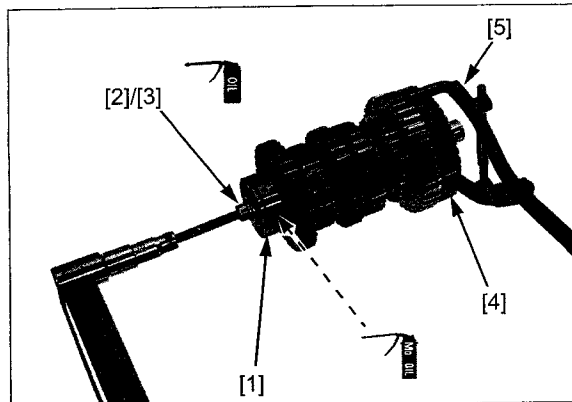
Install the washer [2] and countershaft socket bolt [3].

Hold the final drive gear [4] with the special tool and tighten the countershaft socket bolt to the specified torque.

### TOOL:

Clutch center holder [5]

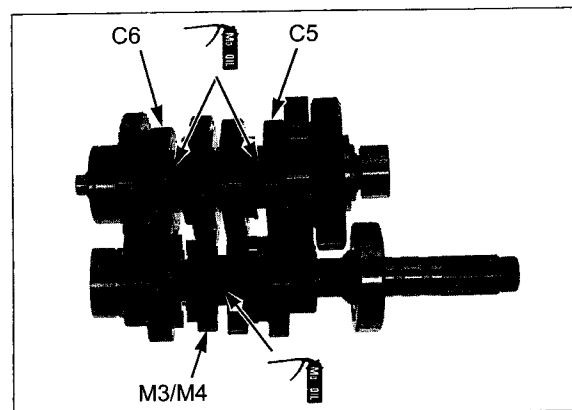
07724-0050002  
(Equivalent commercially available in U.S.A.)



**TORQUE: 67 N·m (6.8 kgf·m, 49 lbf·ft)**

Coat each gear with clean engine oil and check for smooth movement.

Apply molybdenum oil solution to the shift fork grooves in the M3/4, C5 and C6 gear.



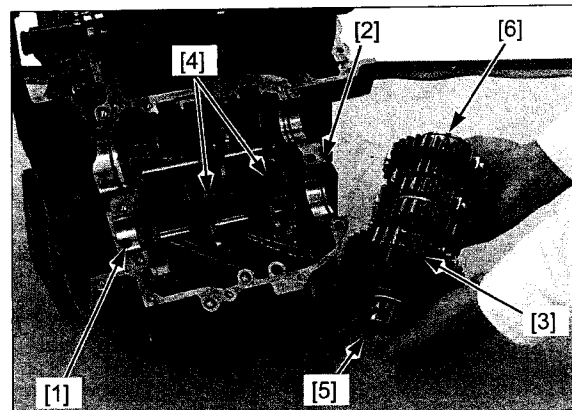
## INSTALLATION

Install the dowel pin [1] into the upper crankcase hole.

Install the countershaft bearing set ring [2] into the upper crankcase groove.

Install the countershaft [3] onto the upper crankcase, aligning the shifter grooves (C5 and C6 gears) with the shift forks [4].

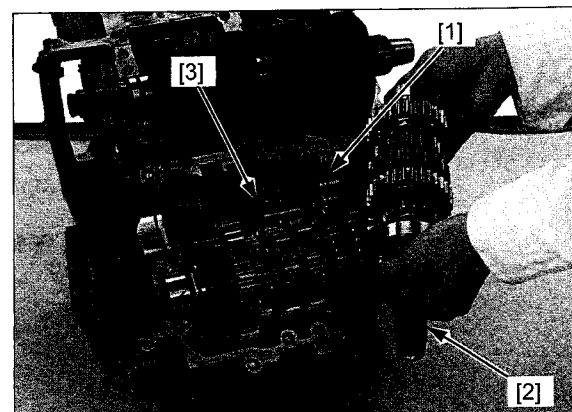
Align the hole on the needle bearing [5] with the dowel pin [1], and also the groove in the ball bearing [6] with the set ring [2].



Install the mainshaft bearing set ring [1] into the groove on the crankcase.

Install the mainshaft [2] onto the upper crankcase, aligning the M3/M4 gear shifter groove with the shift fork [3].

Make sure that each gear engages properly.

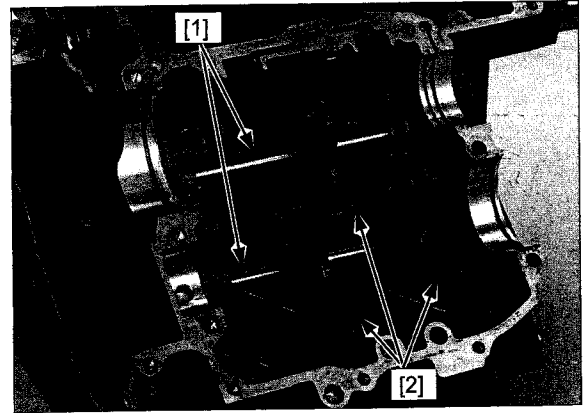


## SHIFT FORKS/SHIFT DRUM

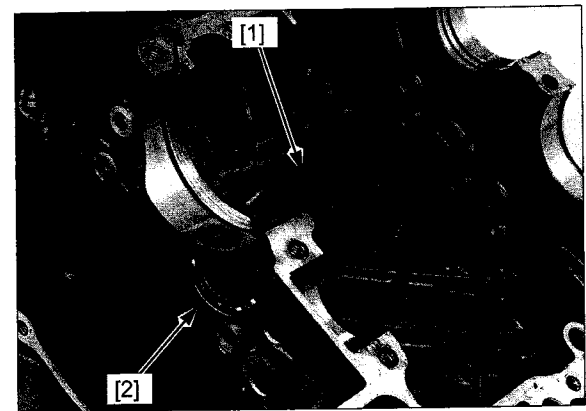
### REMOVAL

Remove the transmission (page 12-15).

Pull the shift fork shafts [1] out and remove the shift forks [2].



Remove the shift drum [1] and bearing [2].



### INSPECTION

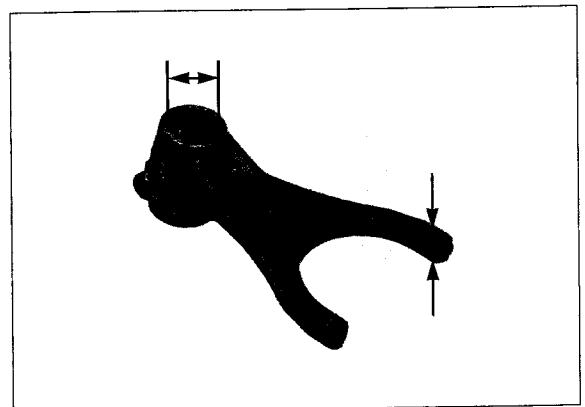
Check the shift fork guide pin for abnormal wear or damage.

Measure the shift fork I.D.

**SERVICE LIMIT: 12.03 mm (0.474 in)**

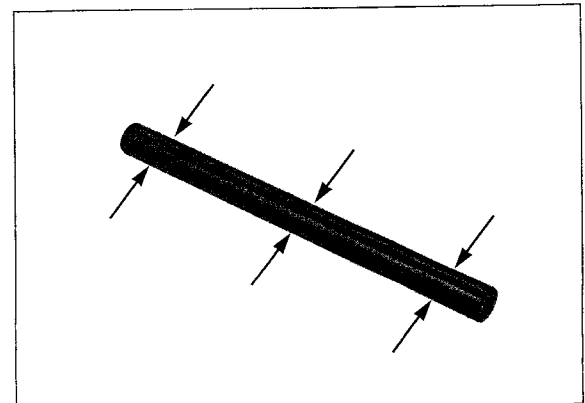
Measure the shift fork claw thickness.

**SERVICE LIMIT: 5.9 mm (0.23 in)**



Measure the shift fork shaft O.D.

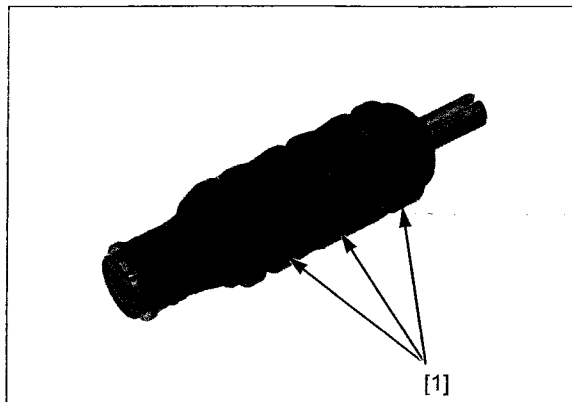
**SERVICE LIMIT: 11.95 mm (0.470 in)**



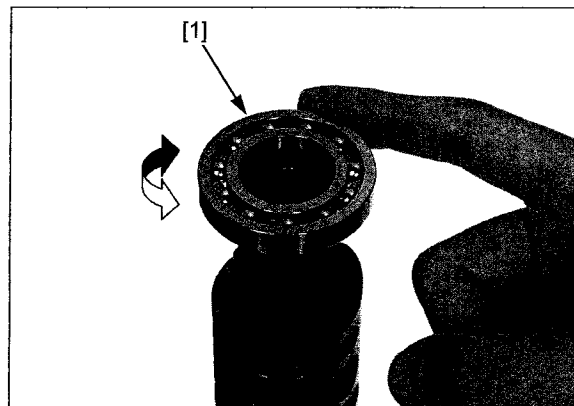


## CRANKCASE/TRANSMISSION

Inspect the shift drum grooves [1] for wear or damage.



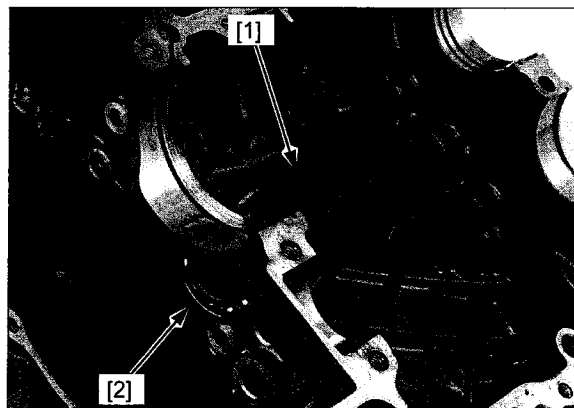
Turn the outer race of the shift drum bearing [1] with your finger.  
The bearing should turn smoothly and freely without excessive play.  
If necessary, replace the bearing.



### INSTALLATION

*Install the bearing with its marked side facing out.*

Install the shift drum [1] and bearing [2].

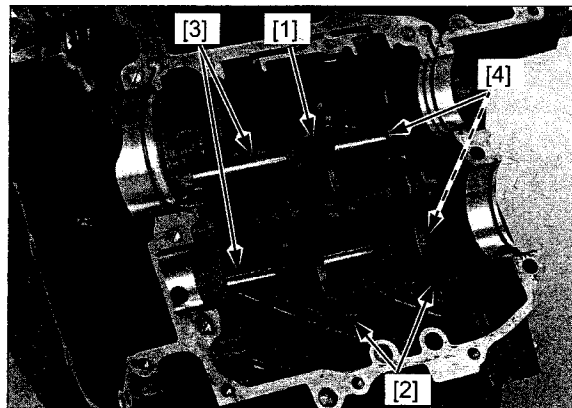


*Install the shift forks with its "MGE" mark facing clutch side.*

Set the guide pins of the center shift fork (small) [1] and right/left shift forks (large) [2] onto the shift drum guide pin grooves, and then install the shift fork shafts [3] into the crankcase holes [4] securely.

#### NOTE:

The right and left shift forks are the same parts.  
Install the transmission (page 12-20).

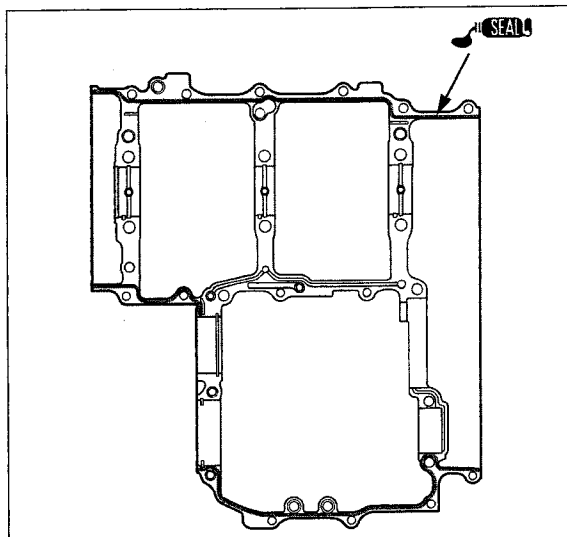


# CRANKCASE ASSEMBLY

Clean the upper and lower crankcase mating surfaces thoroughly, being careful not to damage them.

*Do not apply more sealant than necessary.*

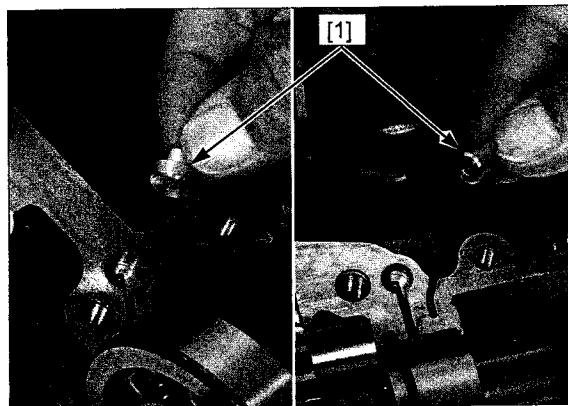
Apply a light, but thorough, coating of liquid sealant (ThreeBond 1207B or an equivalent) to the crankcase mating surface except to the main journal 9 mm bolt area and the oil passage area as shown.



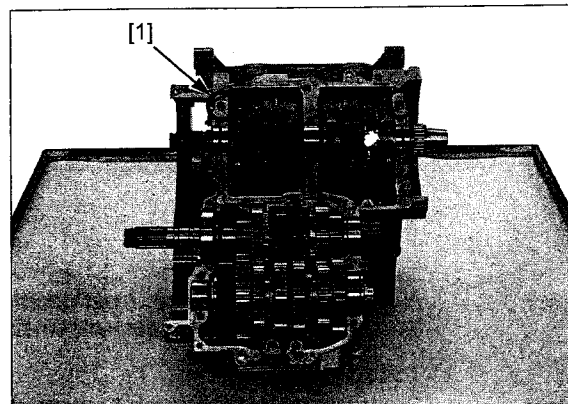
Check the oil orifices [1] and crankcase oil passages for clogs, and clean them if necessary.

*Install the oil orifices with their large I.D. side facing the upper crankcase.*

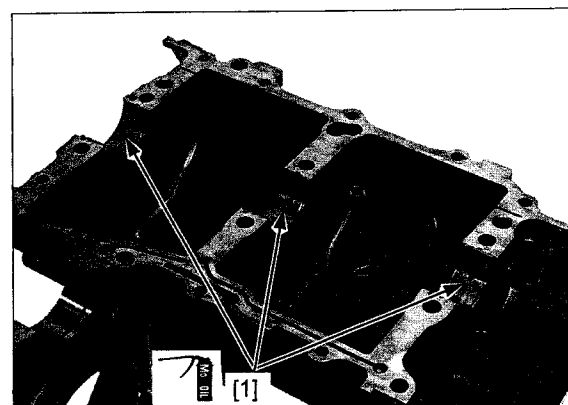
Install the oil orifices onto the upper crankcase.



Install the dowel pins [1].



Apply molybdenum oil solution to the main journal bearing sliding surfaces [1] on the lower crankcase.



## CRANKCASE/TRANSMISSION

Install the lower crankcase onto the upper crankcase.

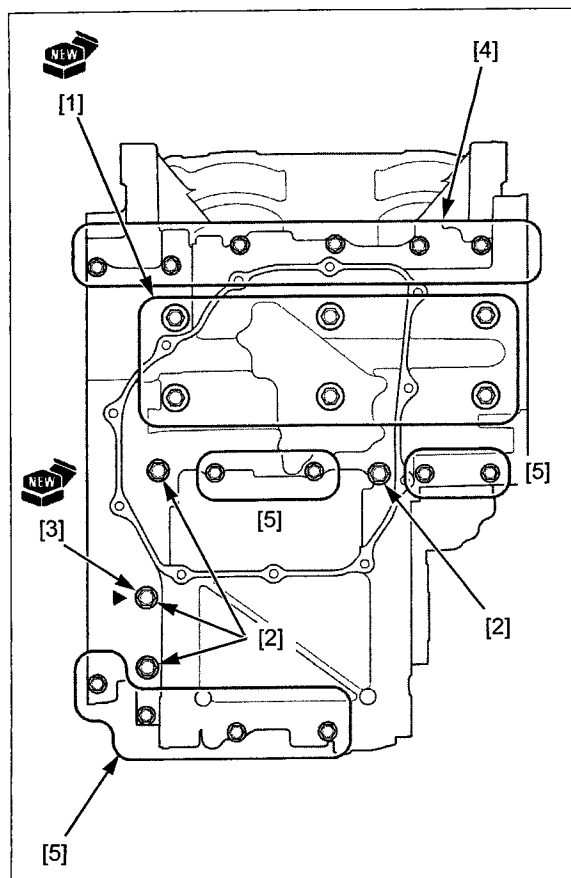
Install the 8 mm bolt with new sealing washer onto "△" marked bolt hole.

Install the following:

- new main journal 9 mm bolts [1]
- 8 mm bolts [2] and a new sealing washer [3]
- 7 mm bolts [4]
- 6 mm bolts [5]

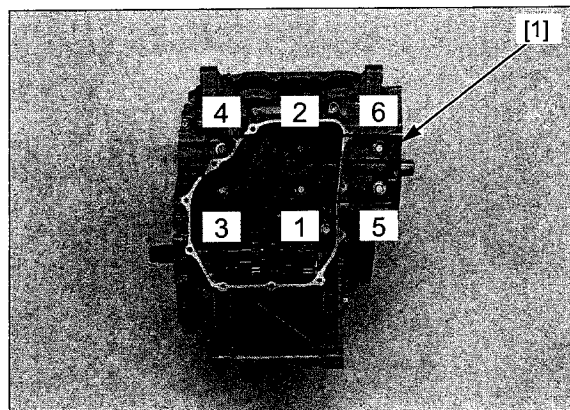
Make sure the upper and lower crankcase are seated securely.

- Tighten the main journal 9 mm bolts using the Plastic Region Tightening Method.
- Do not reuse the main journal 9 mm bolts, because the correct axial tension will not be obtained.
- The main journal 9 mm bolts are pre-coated with an oil additive for stability of axial tension. Do not remove the oil additive from the new 9 mm bolts surfaces.



Tighten the main journal 9 mm bolts in the numerical order in several steps, then tighten them to the specified torque.

**TORQUE: 25 N·m (2.5 kgf·m, 18 lbf·ft)**



Further tighten the main journal 9 mm bolts 270° (example; 90° at three times) in numerical order.

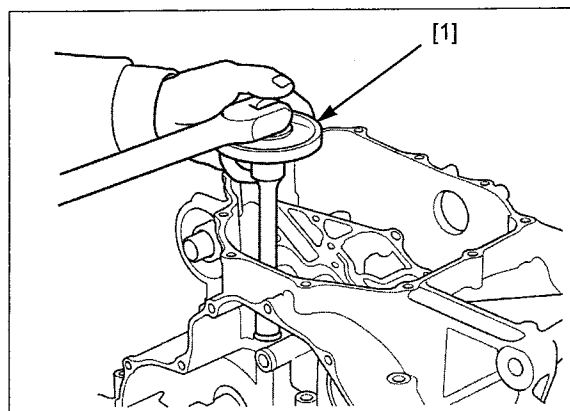
**TOOL:**

**Commercially torque angle gauge adaptor [1]  
TA360 1/2" or TA358 3/8" drive**

Tighten the lower crankcase bolts in a crisscross pattern in several steps.

**TORQUE:**

- 8 mm bolt: 24 N·m (2.4 kgf·m, 18 lbf·ft)
- 7 mm bolt: 18 N·m (1.8 kgf·m, 13 lbf·ft)
- 6 mm bolt: 12 N·m (1.2 kgf·m, 9 lbf·ft)

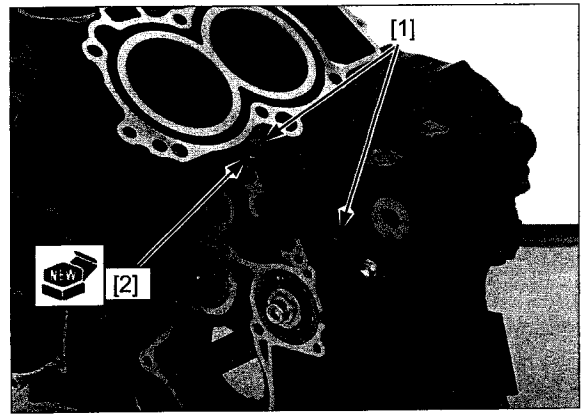


The sealing washer location is indicated on the upper crankcase using a "△" mark.

Install the upper crankcase 8 mm bolts [1] with a new sealing washer [2].

Tighten the 8 mm bolts to the specified torque.

**TORQUE: 24 N·m (2.4 kgf·m, 18 lbf·ft)**

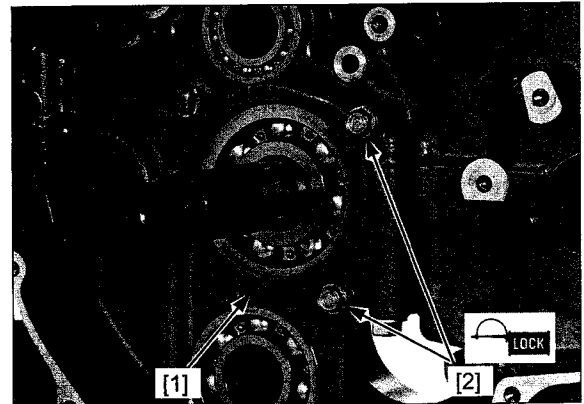


Apply a locking agent to the threads of the mainshaft bearing set plate bolts (page 1-19).

Install the set plate with its "OUTSIDE" mark facing out.

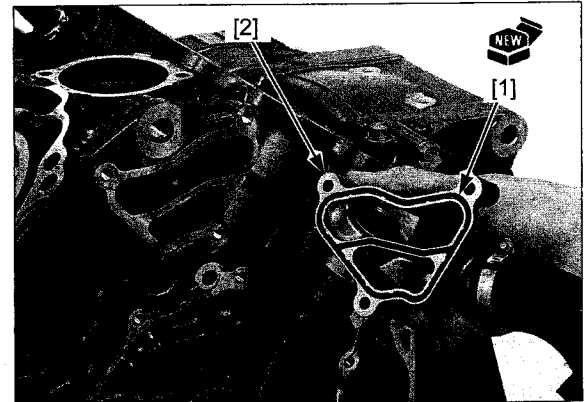
Install the mainshaft bearing set plate [1] and bolts [2]. Tighten the bolts to the specified torque.

**TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)**



Install a new O-ring [1] into the water joint groove. Install the cylinder water joint [2] to the upper crankcase. Install and tighten the water joint mounting bolts securely.

Install the removed parts in the reverse order of removal.



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# MEMO

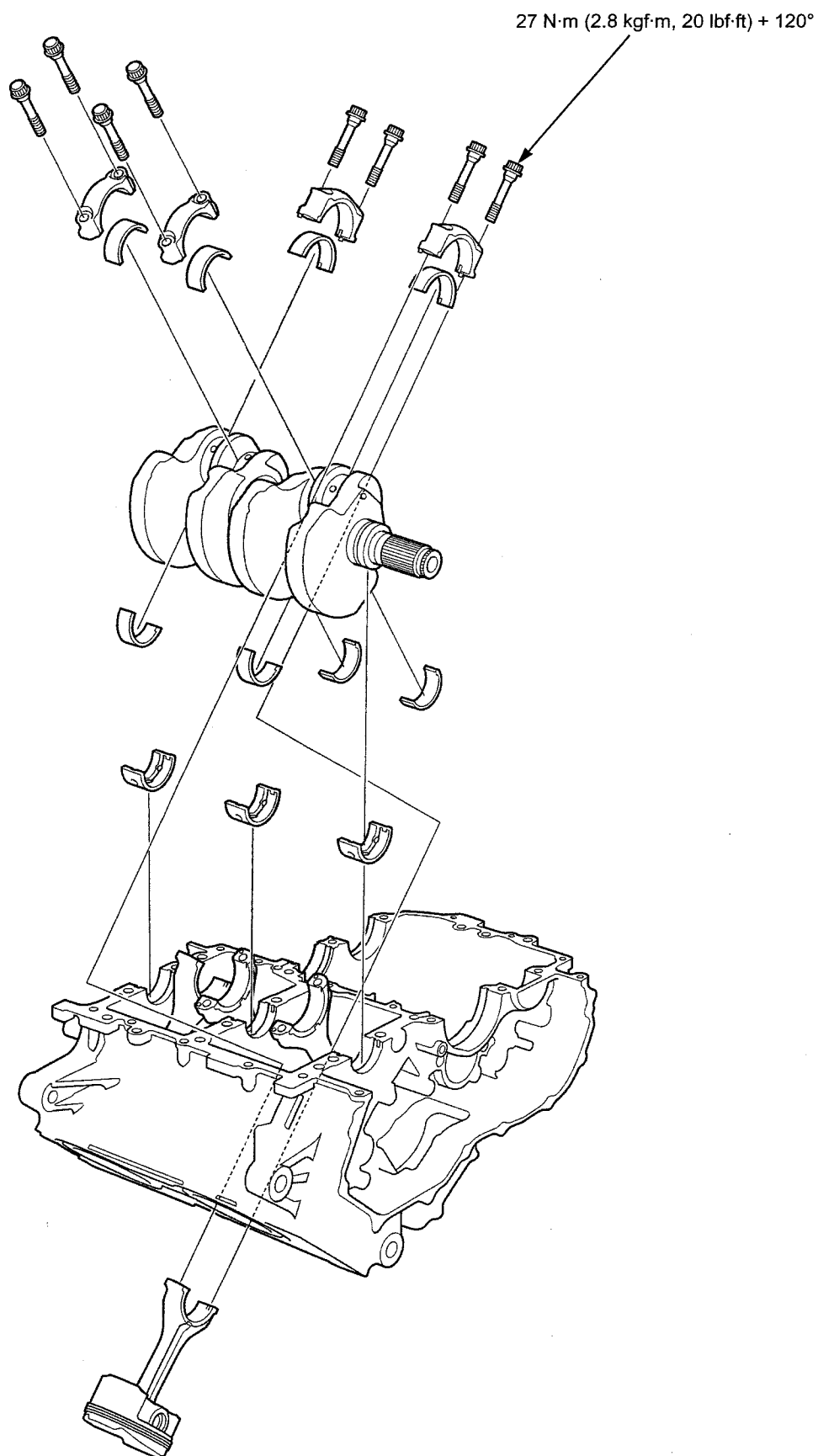
# 13. CRANKSHAFT/PISTON/CYLINDER

---

COMPONENT LOCATION .....	13-2	MAIN JOURNAL BEARING.....	13-7
SERVICE INFORMATION .....	13-3	CRANKPIN BEARING .....	13-10
TROUBLESHOOTING.....	13-4	PISTON/CYLINDER .....	13-13
CRANKSHAFT .....	13-5		

# CRANKSHAFT/PISTON/CYLINDER

## COMPONENT LOCATION



# SERVICE INFORMATION

## GENERAL

- The crankcase must be separated to service the crankshaft and piston/connecting rod. Refer to procedures for the crankcase separation (page 12-14).
- Mark and store the connecting rods, bearing caps, pistons and bearing inserts to be sure of their correct locations for reassembly.
- The crankpin and main journal bearing inserts are select fit and are identified by color codes. Select replacement bearings from the code tables. After selecting new bearings, recheck the oil clearance with a plastigauge. Incorrect oil clearance can cause major engine damage.

## SPECIFICATIONS

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Crankshaft	Connecting rod side clearance		0.15 – 0.30 (0.006 – 0.012)	0.40 (0.016)
	Runout		–	0.05 (0.002)
	Main journal bearing oil clearance		0.017 – 0.035 (0.0007 – 0.0014)	0.05 (0.002)
Cylinder	I.D.		81.000 – 81.015 (3.1890 – 3.1896)	81.025 (3.1900)
	Out of round		–	0.10 (0.004)
	Taper		–	0.10 (0.004)
	Warpage		–	0.10 (0.004)
Piston, piston rings	Piston O.D. at 8.0 mm (0.31 in) from bottom		80.960 – 80.980 (3.1874 – 3.1882)	80.89 (3.185)
	Piston pin hole I.D.		18.002 – 18.008 (0.7087 – 0.7090)	18.02 (0.709)
	Piston pin O.D.		17.994 – 18.000 (0.7084 – 0.7087)	17.98 (0.708)
	Piston-to-piston pin clearance		0.002 – 0.014 (0.0001 – 0.0006)	0.04 (0.002)
	Piston ring end gap	Top	0.15 – 0.25 (0.006 – 0.010)	0.45 (0.018)
		Second	0.320 – 0.470 (0.0126 – 0.0185)	0.65 (0.026)
		Oil (side rail)	0.20 – 0.70 (0.008 – 0.028)	0.9 (0.04)
	Piston ring-to-ring groove clearance	Top	0.015 – 0.050 (0.0006 – 0.0020)	0.065 (0.0026)
		Second	0.015 – 0.045 (0.0006 – 0.0018)	0.06 (0.002)
Cylinder-to-piston clearance			0.020 – 0.055 (0.0008 – 0.0022)	0.10 (0.004)
Connecting rod small end I.D.			18.010 – 18.042 (0.7091 – 0.7103)	18.05 (0.711)
Connecting rod-to-piston pin clearance			0.010 – 0.048 (0.0004 – 0.0019)	0.06 (0.002)
Crankpin bearing oil clearance			0.034 – 0.052 (0.0013 – 0.0020)	0.06 (0.002)

## TORQUE VALUES

Connecting rod bearing cap bolt	27 N·m (2.8 kgf·m, 20 lbf·ft) + 120°	Apply engine oil to the threads and seating surface. See page 13-6
Oil jet mounting bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	Apply a locking agent to the threads.
Main journal 9 mm bolt	25 N·m (2.5 kgf·m, 18 lbf·ft) + 270°	See page 13-8



### TROUBLESHOOTING

**Cylinder compression is too low, hard to starting or poor performance at low speed**

- Leaking cylinder head gasket
- Worn, stuck or broken piston ring
- Worn or damaged cylinder and piston

**Cylinder compression too high, overheats or knocks**

- Excessive carbon built-up on piston head or combustion chamber

**Excessive smoke**

- Worn cylinder, piston or piston rings
- Improper installation of piston rings
- Scored or scratched piston or cylinder wall

**Abnormal noise**

- Worn piston pin or piston pin hole
- Worn connecting rod small end
- Worn cylinder, piston or piston rings
- Worn main journal bearings
- Worn crankpin bearings

**Engine vibration**

- Excessive crankshaft runout

## CRANKSHAFT

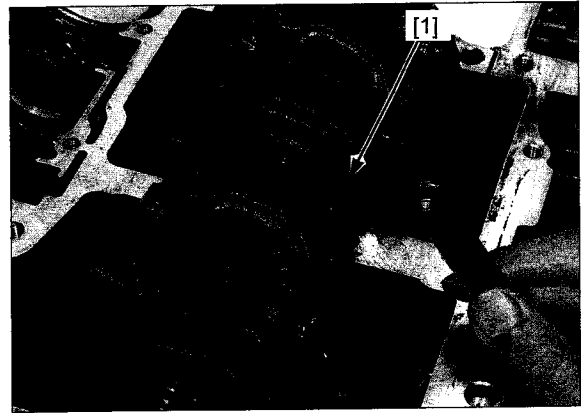
### SIDE CLEARANCE INSPECTION

Separate the crankcase halves (page 12-14).

Measure the connecting rod side clearance using a feeler gauge [1].

**SERVICE LIMIT: 0.40 mm (0.016 in)**

If the clearance exceeds the service limit, replace the connecting rod.  
Recheck and if still out of limit, replace the crankshaft.



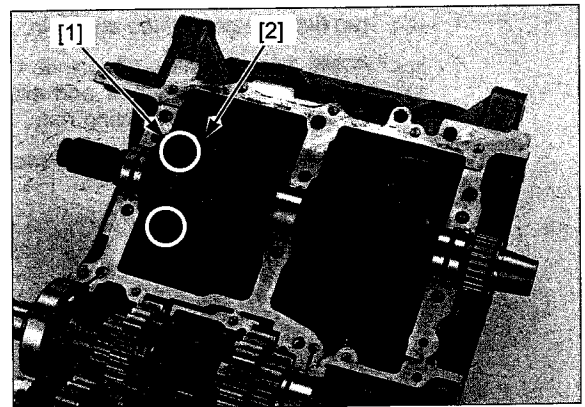
### REMOVAL

Separate the crankcase halves (page 12-14).

Mark the bearing caps and bearings as you remove them to indicate the correct cylinder for reassembly.

*Be careful not to damage the crankpin, main journal and bearing inserts.*

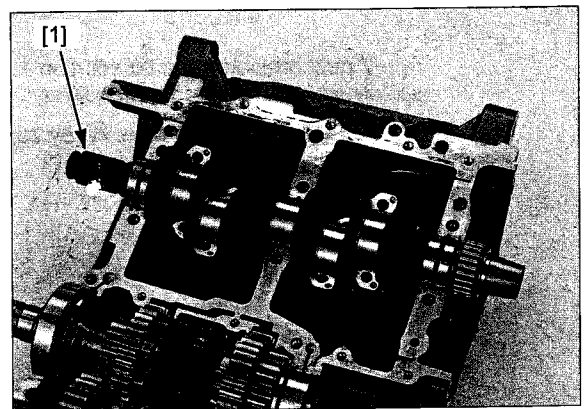
Remove the connecting rod bearing cap bolts [1] and bearing caps [2].  
Tap the side of the bearing cap lightly if it is hard to remove.



### NOTICE

*Before removing the crankshaft, position all the pistons at TDC (Top Dead Center) to prevent the connecting rod from damaging the crankpin.*

Remove the crankshaft [1].



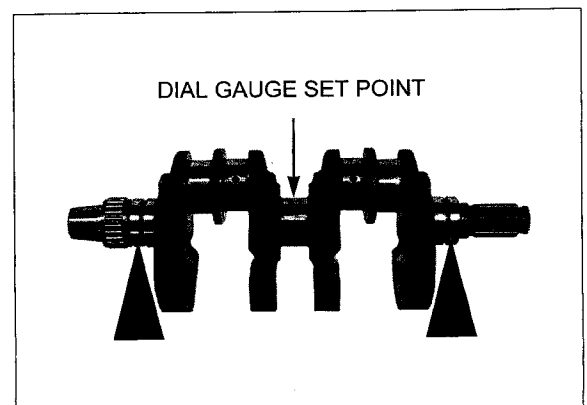
### INSPECTION

Place the crankshaft on a stand or V-blocks.

Set a dial gauge on the center main journal of the crankshaft.

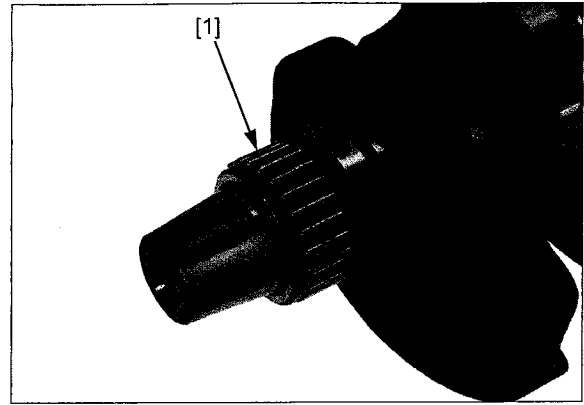
Rotate the crankshaft two revolutions and read the runout.

**SERVICE LIMIT: 0.05 mm (0.002 in)**



## CRANKSHAFT/PISTON/CYLINDER

Check the crankshaft needle bearing [1] for wear or damage.



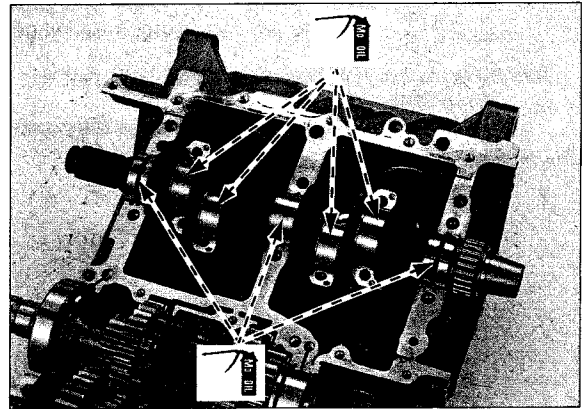
### INSTALLATION

#### NOTICE

*Before installing the crankshaft, position all the pistons at TDC (Top Dead Center) to prevent the connecting rod from damaging the crankpin.*

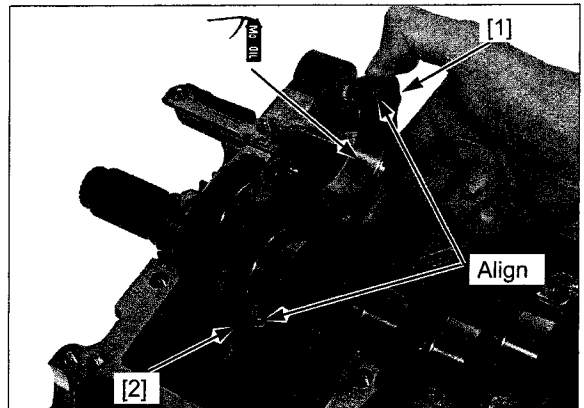
Apply molybdenum oil solution to the main journal bearing sliding surfaces and crankpin bearing sliding surfaces on the connecting rods.

Install the crankshaft and set each connecting rod onto the crankpins.



Apply molybdenum oil solution to the crankpin bearing sliding surfaces on the bearing caps.

Install the bearing caps [1] by aligning its pins with the holes on the connecting rod [2].

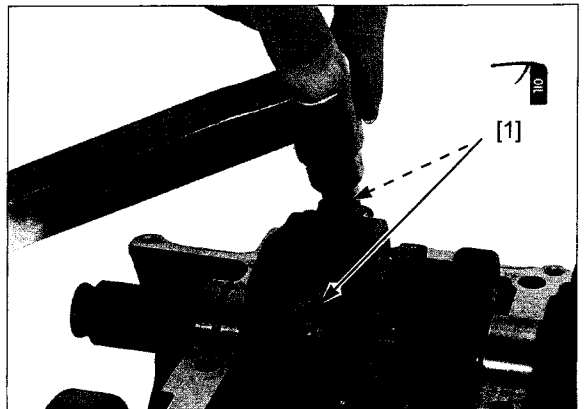


Apply engine oil to the bearing cap bolt threads and seating surface.

Install the bearing cap bolts [1] and tighten them alternately 2 or 3 steps.

Tighten the bearing cap bolts [1] to the specified torque.

**TORQUE: 27 N·m (2.8 kgf·m, 20 lbf·ft)**

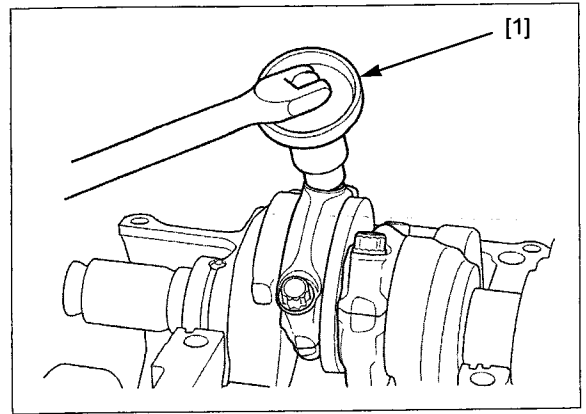


Further tighten the bearing cap bolts 120°.

**TOOL:**

**Commercially torque angle gauge adaptor [1]  
TA360 1/2"  
or TA358 3/8" drive**

Assemble the crankcase halves (page 12-21).



## MAIN JOURNAL BEARING

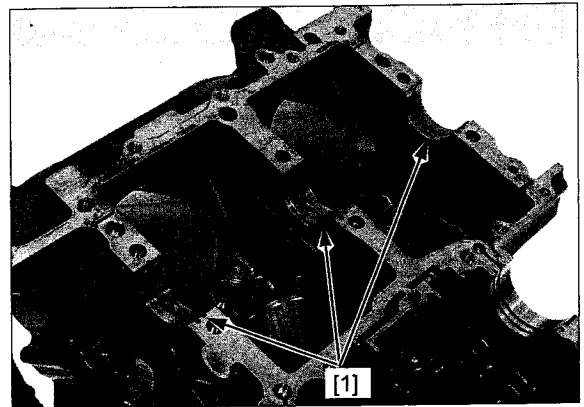
### NOTICE

*Do not interchange the bearing inserts. They must be installed in their original locations or the correct bearing oil clearance may not be obtained, resulting in engine damage.*

Remove the crankshaft (page 13-5).

### BEARING INSPECTION

Inspect the main journal bearing inserts [1] on the upper and lower crankcase for unusual wear or peeling. Check the bearing tabs for damage.



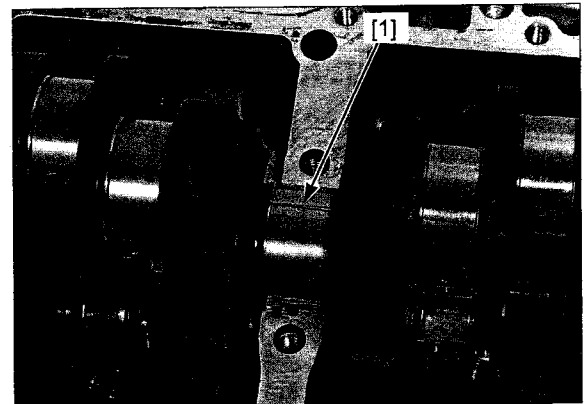
### OIL CLEARANCE INSPECTION

Clean off any oil from the bearing inserts and main journals.

*Be careful not to damage the crankpin with the connecting rod.*

Install the crankshaft onto the upper crankcase.

Put a strip of plastigauge [1] lengthwise on each main journal avoiding the oil hole.



## CRANKSHAFT/PISTON/CYLINDER

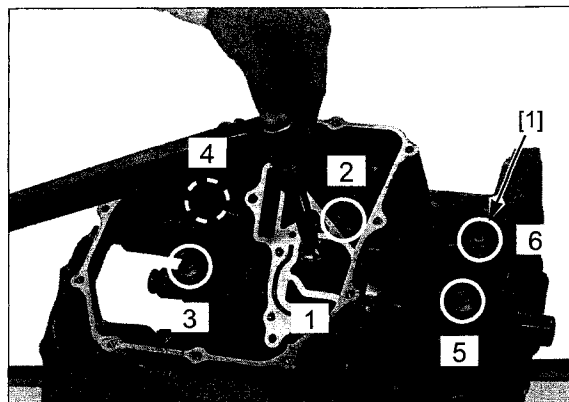
Install the dowel pins into the lower crankcase (page 12-23).

*Do not rotate the crankshaft during inspection.*

Carefully install the lower crankcase on the upper crankcase.

Install the main journal 9 mm bolts [1] and tighten them in numerical order as shown.

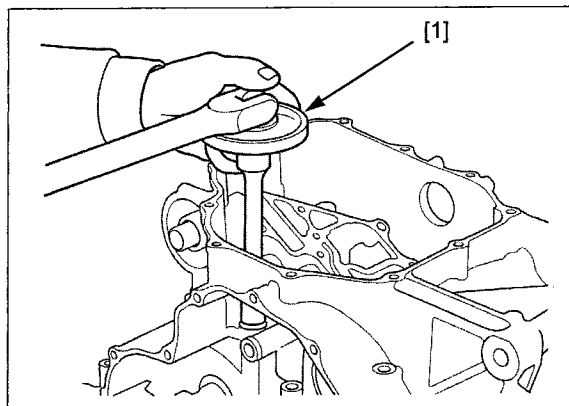
**TORQUE: 25 N·m (2.5 kgf·m, 18 lbf·ft)**



Further tighten the main journal 9 mm bolts 270° (example; 90° at three times) in numerical order.

### TOOL:

**Commercially torque angle gauge adaptor [1]  
TA360 1/2"  
or TA358 3/8" drive**

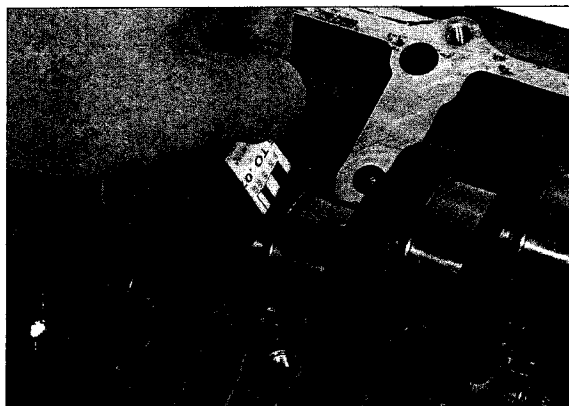


Remove the 9 mm bolts and lower crankcase.

Measure the compressed plastigauge at its widest point on each main journal to determine the oil clearance.

**SERVICE LIMIT: 0.05 mm (0.002 in)**

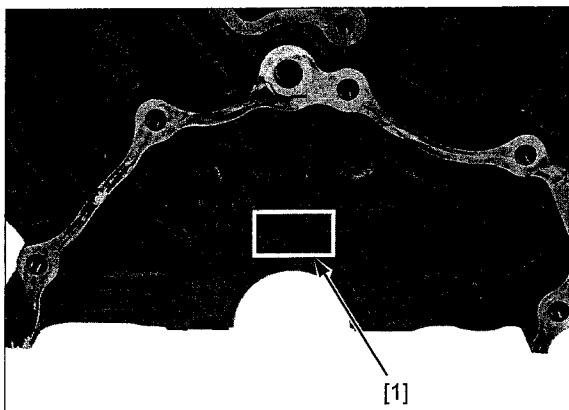
If the oil clearance exceeds the service limit, select the correct replacement bearings.



## BEARING SELECTION

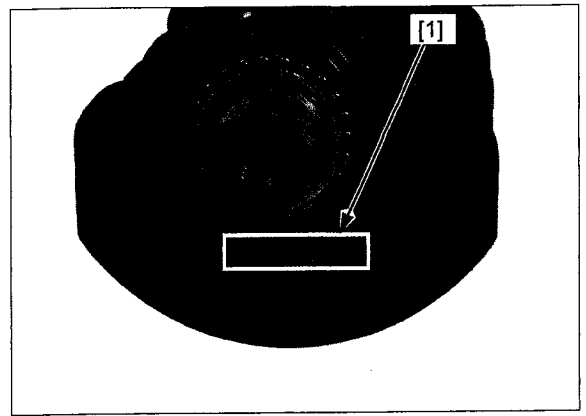
*Letters (A, B or C) on the left side of upper crankcase are the codes for the bearing support I.D.s from left to right.*

Record the crankcase bearing support I.D. code letters on the left side of the upper crankcase as shown.



Numbers (1, 2 or 3) on the crank weight are the codes for the main journal O.D.s from left to right.

Record the corresponding main journal O.D. code [1] from the crank weight.  
Cross reference the main journal and bearing support codes to determine the replacement bearing color code.



**MAIN JOURNAL BEARING SELECTION TABLE:**

			BEARING SUPPORT I.D. CODE		
			A	B	C
			42.000 – 42.006 mm (1.6535 – 1.6538 in)	42.006 – 42.012 mm (1.6538 – 1.6540 in)	42.012 – 42.018 mm (1.6540 – 1.6542 in)
MAIN JOURNAL O.D. CODE	1	39.000 – 39.006 mm (1.5354 – 1.5357 in)	E (Yellow)	D (Green)	C (Brown)
	2	38.994 – 39.000 mm (1.5352 – 1.5354 in)	D (Green)	C (Brown)	B (Black)
	3	38.988 – 38.994 mm (1.5350 – 1.5352 in)	C (Brown)	B (Black)	A (Blue)

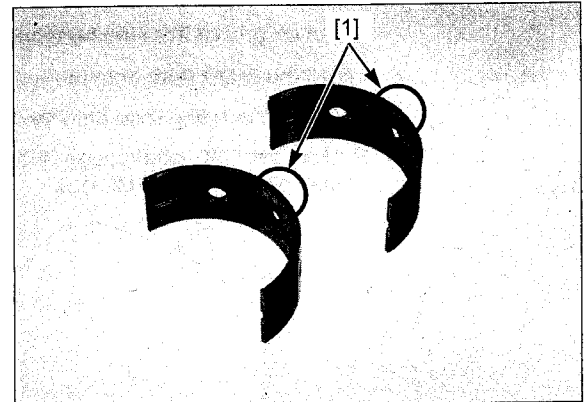
Bearing insert has a color code [1] to identify its thickness.

## BEARING THICKNESS:

A (Blue): Thick  
B (Black): ↑  
C (Brown): Middle  
D (Green): ↓  
E (Yellow): Thin

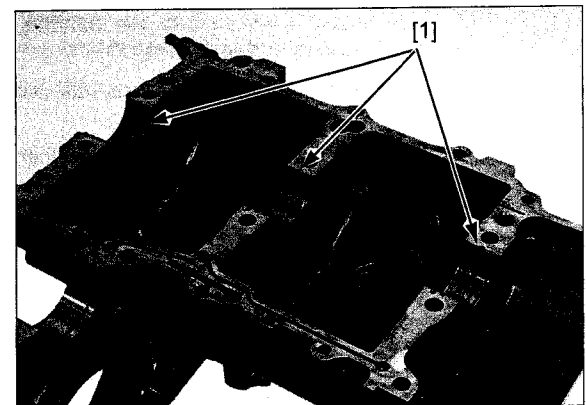
## NOTICE

After selecting new bearings, recheck the clearance with a plastigauge. Incorrect clearance can cause severe engine damage.



## BEARING INSTALLATION

Clean the bearing outer surfaces and crankcase bearing supports.  
Install the main journal bearing inserts [1] onto the crankcase bearing supports, aligning each tab with each groove.



### CRANKPIN BEARING

#### NOTICE

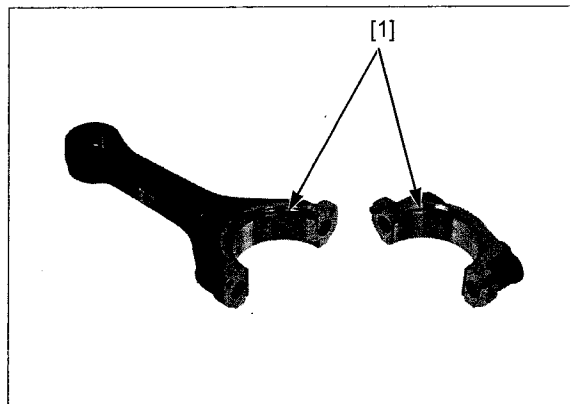
*Do not interchange the bearing inserts. They must be installed in their original locations or the correct bearing oil clearance may not be obtained, resulting in engine damage.*

Remove the crankshaft (page 13-5).

#### BEARING INSPECTION

Check the bearing inserts [1] for unusual wear or peeling.

Check the bearing tabs for damage.



#### OIL CLEARANCE INSPECTION

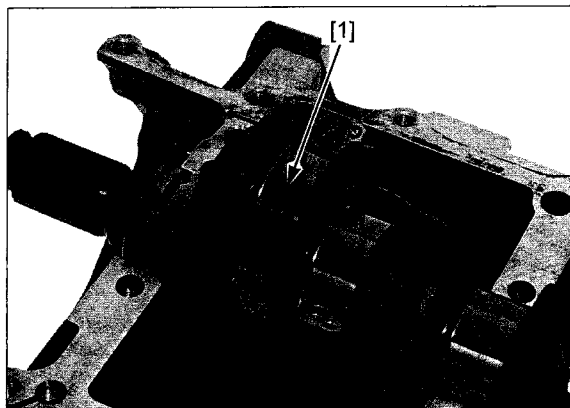
Clean off any oil from the bearing inserts and crankpins.

*Be careful not to damage the crankpin with the connecting rod.*

Install the crankshaft onto the upper crankcase.

Set the connecting rods onto the crankpins.

Put a strip of plastigauge [1] lengthwise on each crankpin avoiding the oil hole.



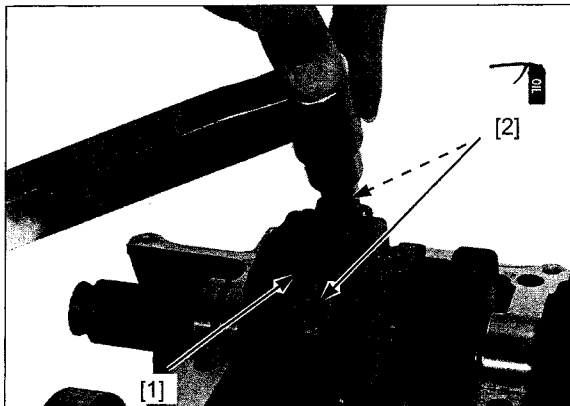
*Do not rotate the crankshaft during inspection.*

Carefully install the bearing caps [1] by aligning its pins with the holes on the connecting rod.

Apply engine oil to the bearing cap bolt threads and seating surfaces and install them.

Tighten the bolts [2] gradually and alternately in 2 or 3 steps.

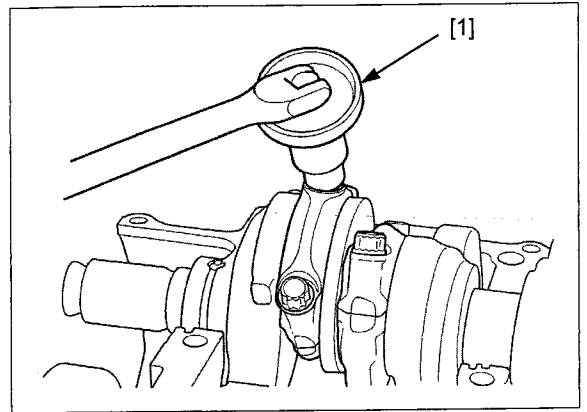
**TORQUE: 27 N·m (2.8 kgf·m, 20 lbf·ft)**



Further tighten the bolts 120°.

## TOOL:

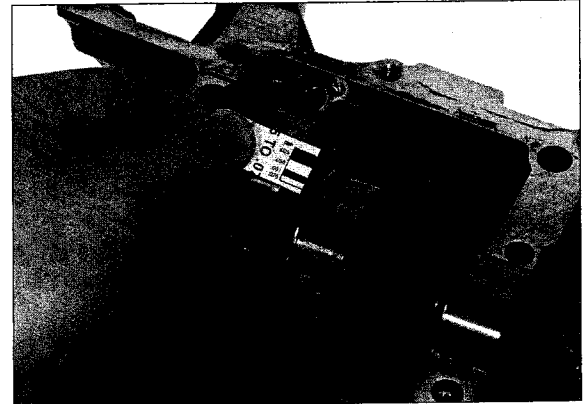
**Commercially torque angle gauge adaptor [1]  
TA360 1/2"  
or TA358 3/8" drive**



Remove the bolts and bearing caps.  
Measure the compressed plastigauge at its widest point  
on the crankpin to determine the oil clearance.

**SERVICE LIMIT: 0.06 mm (0.002 in)**

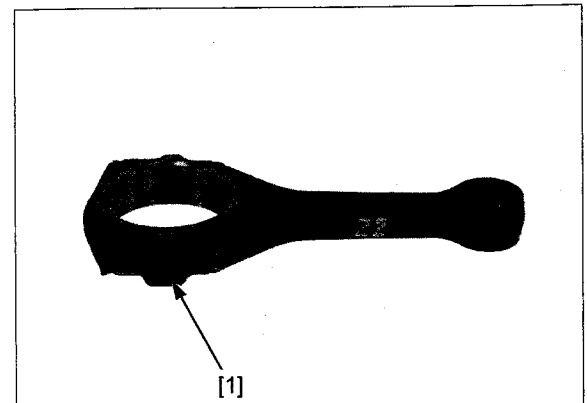
If the oil clearance exceeds the service limit, select the  
correct replacement bearings.



## BEARING SELECTION

*Numbers (1, 2 or 3)  
on the connecting  
rods are the codes  
for the connecting  
rod I.D.*

Record the connecting rod I.D. code (1, 2 or 3) [1] or  
measure the I.D. with the bearing cap installed without  
bearing inserts.

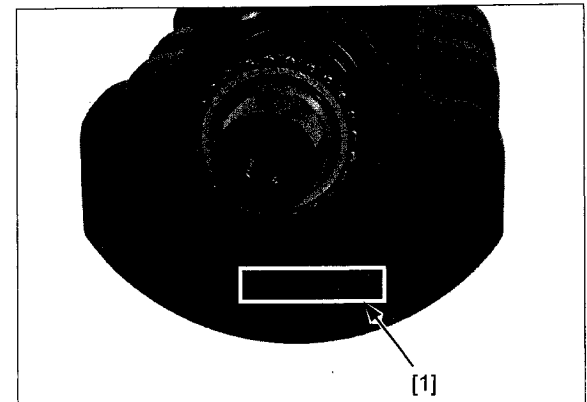


*Letters (A, B or C)  
on the crank weight  
are the codes for  
the crankpin O.D.s  
from left to right.*

If you are replacing the crankshaft, record the  
corresponding crankpin O.D. code (A, B or C) [1].

If you are reusing the crankshaft, measure the crankpin  
O.D. with micrometer.

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





## CRANKSHAFT/PISTON/CYLINDER

CRANKPIN BEARING SELECTION TABLE:

			CONNECTING ROD I.D. CODE		
			1	2	3
			44.500 – 44.506 mm (1.7520 – 1.7522 in)	44.506 – 44.512 mm (1.7522 – 1.7524 in)	44.512 – 44.518 mm (1.7524 – 1.7527 in)
CRANK PIN O.D. CODE	A	41.497 – 41.503 mm (1.6337 – 1.6340 in)	E (Yellow)	D (Green)	C (Brown)
	B	41.491 – 41.497 mm (1.6335 – 1.6337 in)	D (Green)	C (Brown)	B (Black)
	C	41.485 – 41.491 mm (1.6333 – 1.6335 in)	C (Brown)	B (Black)	A (Blue)

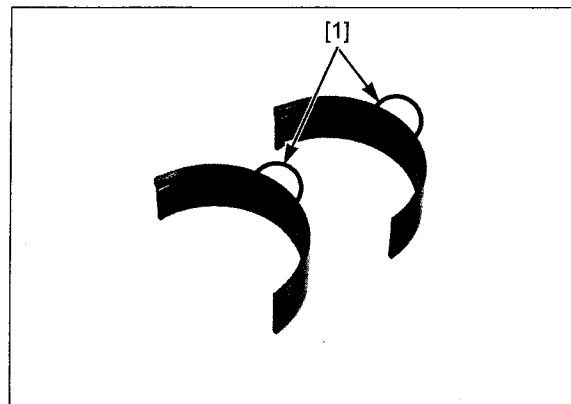
Bearing insert has a color code [1] to identify its thickness.

**BEARING THICKNESS:**

A (Blue): Thick  
          ↑  
B (Black):  
C (Brown): Middle  
          ↓  
D (Green):  
E (Yellow): Thin

**NOTICE**

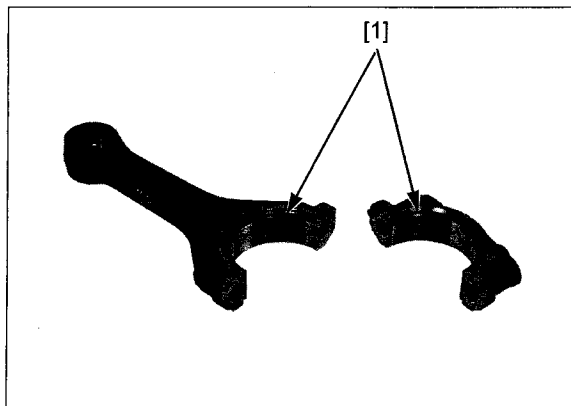
*After selecting new bearings, recheck the clearance with a plastigauge. Incorrect clearance can cause severe engine damage.*



**BEARING INSTALLATION**

Clean the bearing outer surfaces, bearing cap and connecting rod.

Install the crankpin bearing inserts [1] onto the bearing cap and connecting rod, aligning each tab with each groove.



# PISTON/CYLINDER

Mark all the parts  
as you remove  
them to indicate the  
correct cylinder for  
reassembly.

## PISTON/CONNECTING ROD REMOVAL

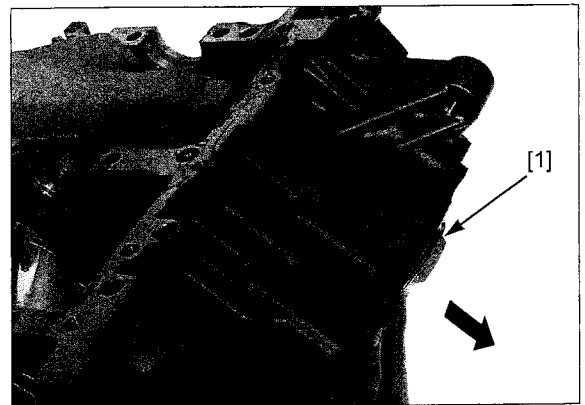
### NOTICE

- This motorcycle is equipped with aluminum cylinder sleeves. Before piston removal, place a clean shop towel around the connecting rod to prevent damaging the cylinder sleeve.
- Do not try to remove the piston/connecting rod assembly from the bottom of the cylinder; the assembly will get stuck in the gap between the cylinder liner and the upper crankcase.
- Do not interchange the bearing inserts. They must be installed in their original locations or the correct bearing oil clearance may not be obtained, resulting in engine damage.

Remove the following:

- transmission (page 12-15)
- crankshaft (page 13-5)

Remove the piston/connecting rod assembly [1] from the top of the cylinder.

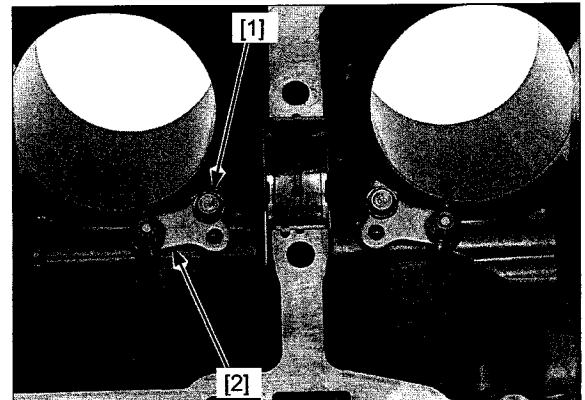


## PISTON OIL JET

### REMOVAL/INSTALLATION

Remove the bolt [1] and piston oil jet [2].

Check the piston oil jet for clogs or damage.



Clean the oil passage on the upper crankcase and oil jet with compressed air.

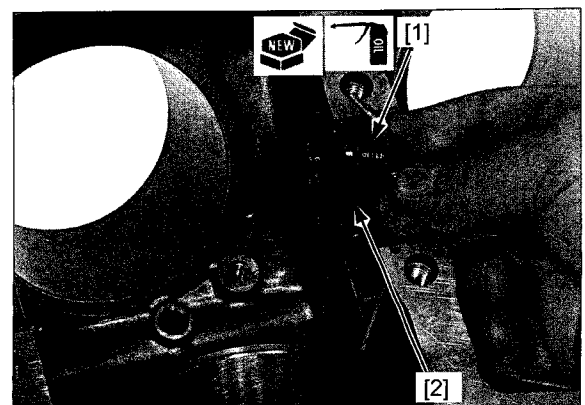
Apply oil to new O-ring [1] and install it to the oil jet groove.

Install the piston oil jet [2].

Clean the threads of the piston oil jet mounting bolt and apply a locking agent (page 1-19).

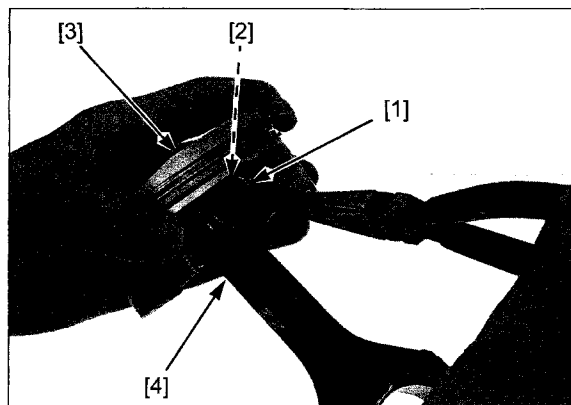
Install the mounting bolt and tighten it to the specified torque.

**TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)**



### PISTON REMOVAL

Remove the piston pin clip [1] with pliers. Push the piston pin [2] out of the piston [3] and connecting rod [4], then remove the piston.



### PISTON RING REMOVAL

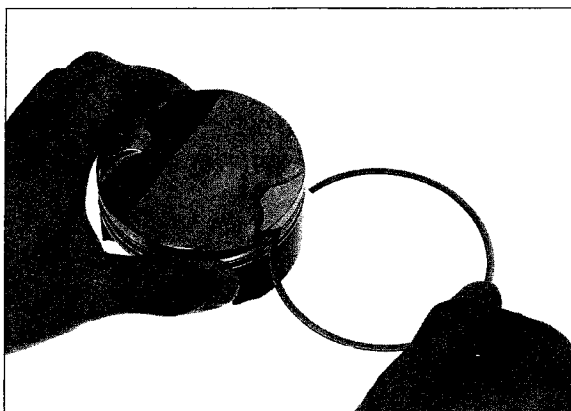
*Do not damage the piston ring by spreading the ends too far.*

Spread each piston ring and remove it by lifting up at a point opposite the gap.



*Clean carbon deposits from the ring grooves with a ring that will be discarded. Never use a wire brush; it will scratch the groove.*

Remove any carbon deposits from the piston ring grooves.



### PISTON INSPECTION

Temporarily install the piston rings to their proper position with the mark facing up.

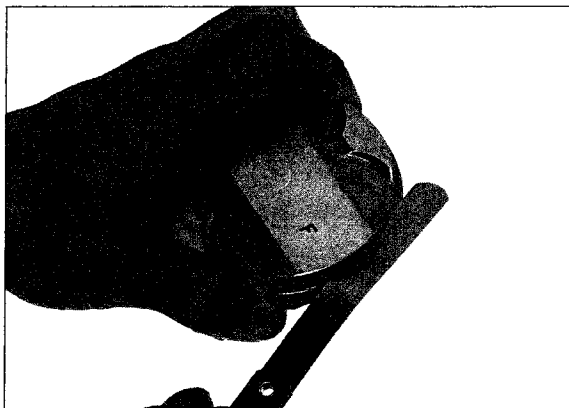
Inspect the piston rings for movement by rotating the rings. The rings should be able to move in their grooves without catching.

Measure the piston ring-to-ring groove clearance with the rings pushed into the grooves.

#### SERVICE LIMITS:

Top: 0.065 mm (0.0026 in)

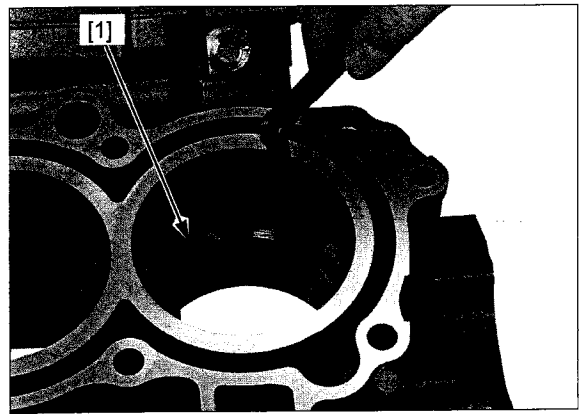
Second: 0.06 mm (0.002 in)



Insert the piston ring [1] into the bottom of the cylinder squarely using the piston, and measure the ring end gap.

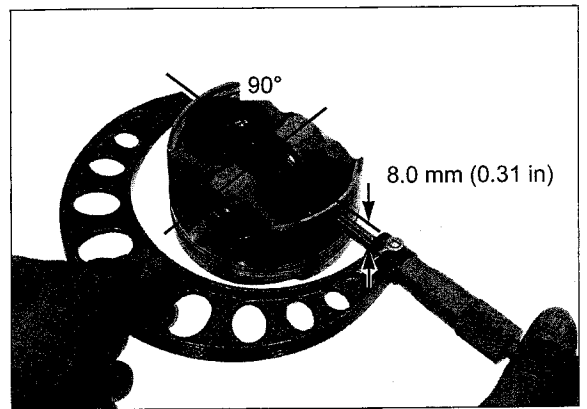
## SERVICE LIMITS:

Top: 0.45 mm (0.018 in)  
 Second: 0.65 mm (0.026 in)  
 Oil (side rail): 0.9 mm (0.04 in)



Measure the piston O.D. at a point 8.0 mm (0.31 in) from the bottom and 90° to the piston pin hole.

**SERVICE LIMIT: 80.89 mm (3.185 in)**



Measure the piston pin hole I.D.

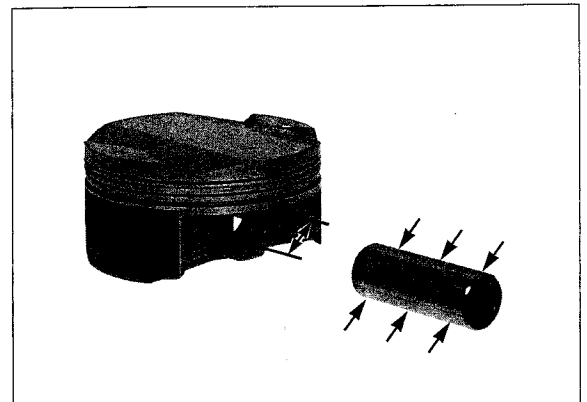
**SERVICE LIMIT: 18.02 mm (0.709 in)**

Measure the piston pin O.D. at piston and connecting rod sliding areas.

**SERVICE LIMIT: 17.98 mm (0.708 in)**

Calculate the piston-to-piston pin clearance.

**SERVICE LIMIT: 0.04 mm (0.002 in)**



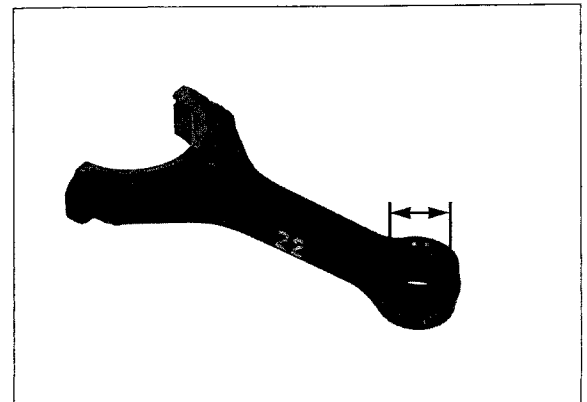
## CONNECTING ROD INSPECTION

Measure the connecting rod small end I.D.

**SERVICE LIMIT: 18.05 mm (0.711 in)**

Calculate the connecting rod-to-piston pin clearance.

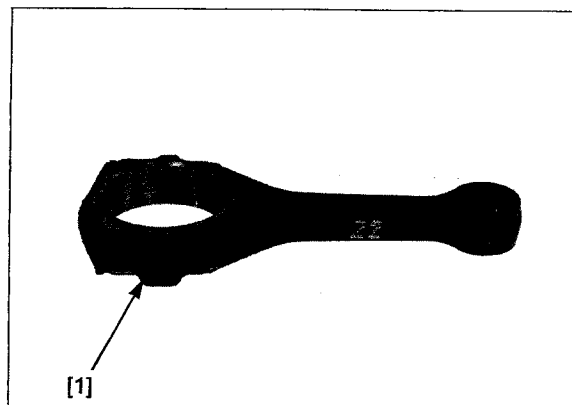
**SERVICE LIMIT: 0.06 mm (0.002 in)**



### CONNECTING ROD SELECTION

The weight code [1] stamped on the connecting rod using an alphabetical code.

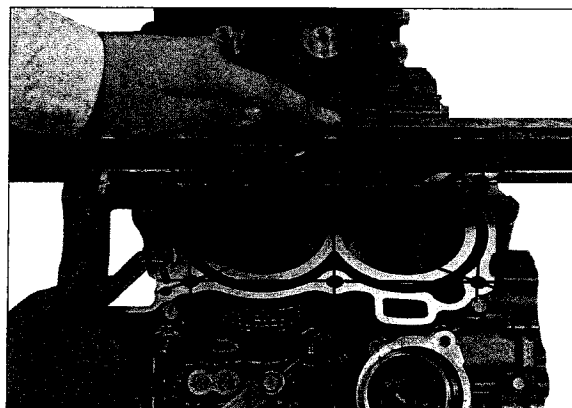
The replacement connecting rod is available only weight code B. If the original connecting rod weight code is either A or C, you can use weight code B connecting rod.



### CYLINDER INSPECTION

Inspect the top of the cylinder for warpage with a straight edge and feeler gauge.

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

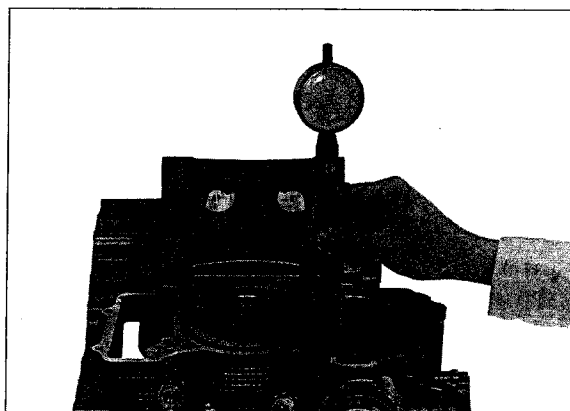


Inspect the cylinder bore for scratches or wear. Measure the cylinder I.D. in an X and Y axis at three levels. Take the maximum reading to determine the cylinder wear.

**SERVICE LIMIT: 81.025 mm (3.1900 in)**

Calculate the cylinder-to-piston clearance. Take a maximum reading to determine the clearance. Refer procedures for measurement of the piston O.D. (page 13-15).

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



Calculate the cylinder taper and out of round in an X and Y axis at three levels.

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)**

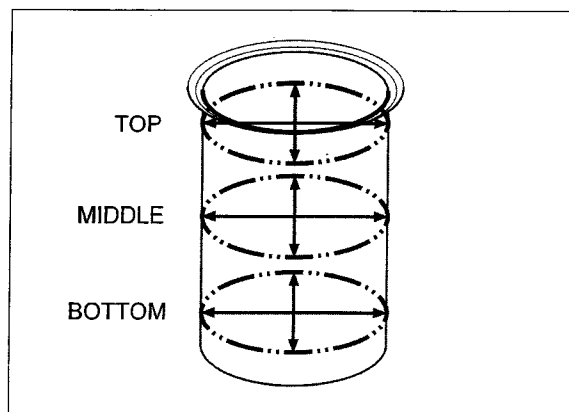
The cylinder must be rebored and an oversize piston fitted if the service limits are exceeded.

**The following oversize pistons are available:**

**0.25 mm (0.010 in)**

**0.50 mm (0.020 in)**

The cylinder to piston clearance for the oversize piston must be: 0.020 – 0.055 mm (0.0008 – 0.0022 in).



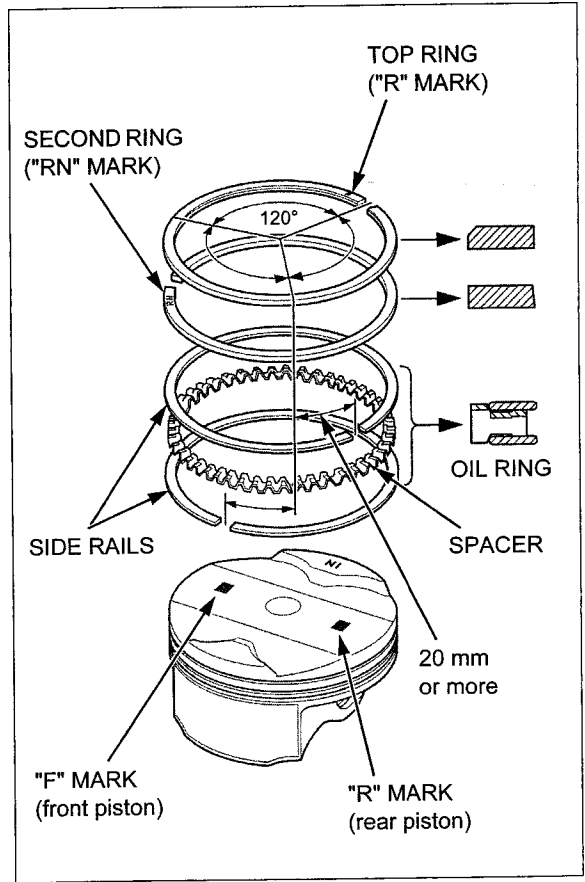
## PISTON RING INSTALLATION

Carefully install the piston rings into the piston ring grooves with their marking facing up.

- Apply oil to the piston rings.
- Avoid piston and piston ring damage during installation.
- Install the piston rings with the marking facing up.
  - Top ring: "R" mark
  - Second ring: "RN" mark
- Do not interchange the top and second rings.

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

Stagger the side rail end gaps as shown.

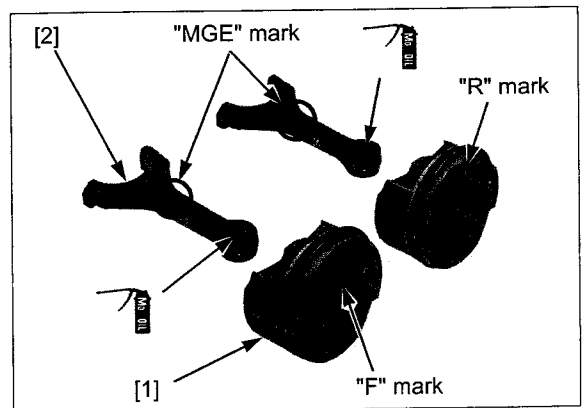


## PISTON INSTALLATION

Apply molybdenum oil solution to the connecting rod small end inner surfaces, piston pin holes and piston pin outer surfaces.

Assemble the piston [1] and connecting rod [2].

- Install the connecting rod [2] with its "MGE" mark facing the "F" or "R" mark on the piston crown.

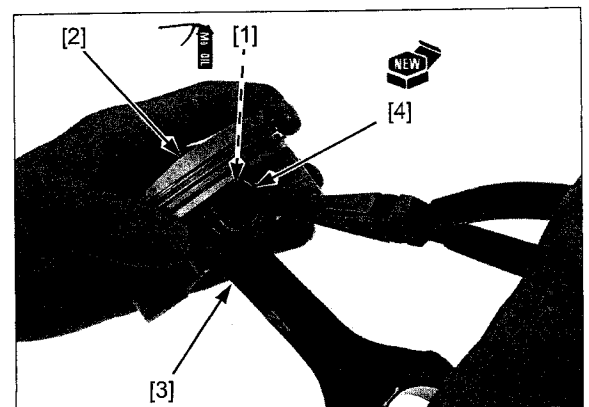


Apply molybdenum oil solution to the piston pin outer surface and connecting rod small end inner surface.

Install the piston pin [1] into the piston [2] and connecting rod [3].

Secure the piston pin using new piston pin clips [4].

- Make sure that the piston pin clips are seated securely.
- Do not align the piston pin clip end gap with the piston cut-out.

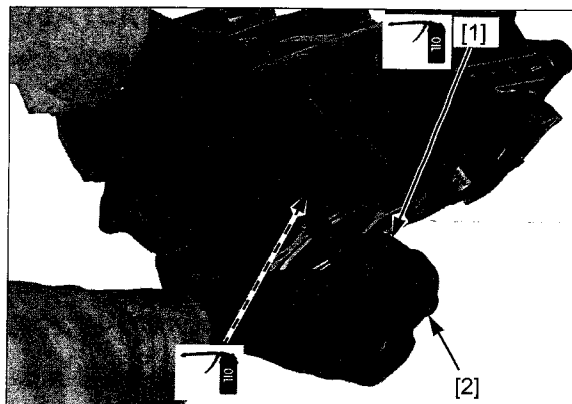


## CRANKSHAFT/PISTON/CYLINDER

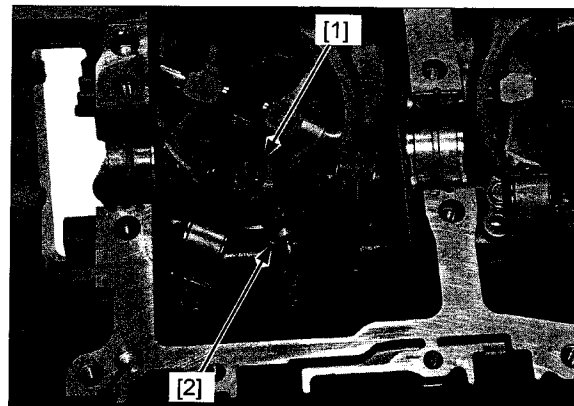
Apply engine oil to the cylinder wall, piston and piston rings.

Set the piston/connecting rod assembly [1] into the cylinder while holding the connecting rod.

- The piston has an identification mark [2].
  - Front piston (#1 and #4): "F" mark
  - Rear piston (#2 and #3): "R" mark



Install the piston/connecting rod assembly [1] into the cylinder carefully so that the connecting rod does not interfere in the piston oil jet [2].

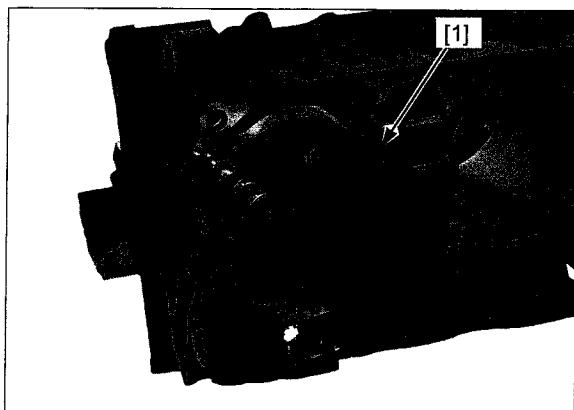


### NOTICE

*While installing the piston, be careful not to damage the top surface of the cylinder, especially around the cylinder bore.*

*Make sure the ring compressor tool sits flush with top surface of the cylinder.*

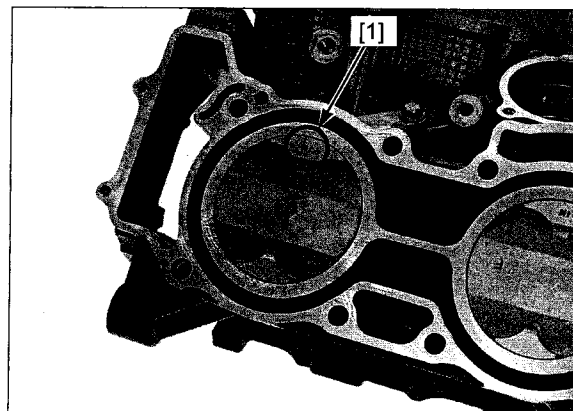
Install the piston rings into the cylinder bore using a commercially available piston ring compressor tool [1].



Turn each piston "IN" mark [1] to the intake side of the cylinder.

Install the following:

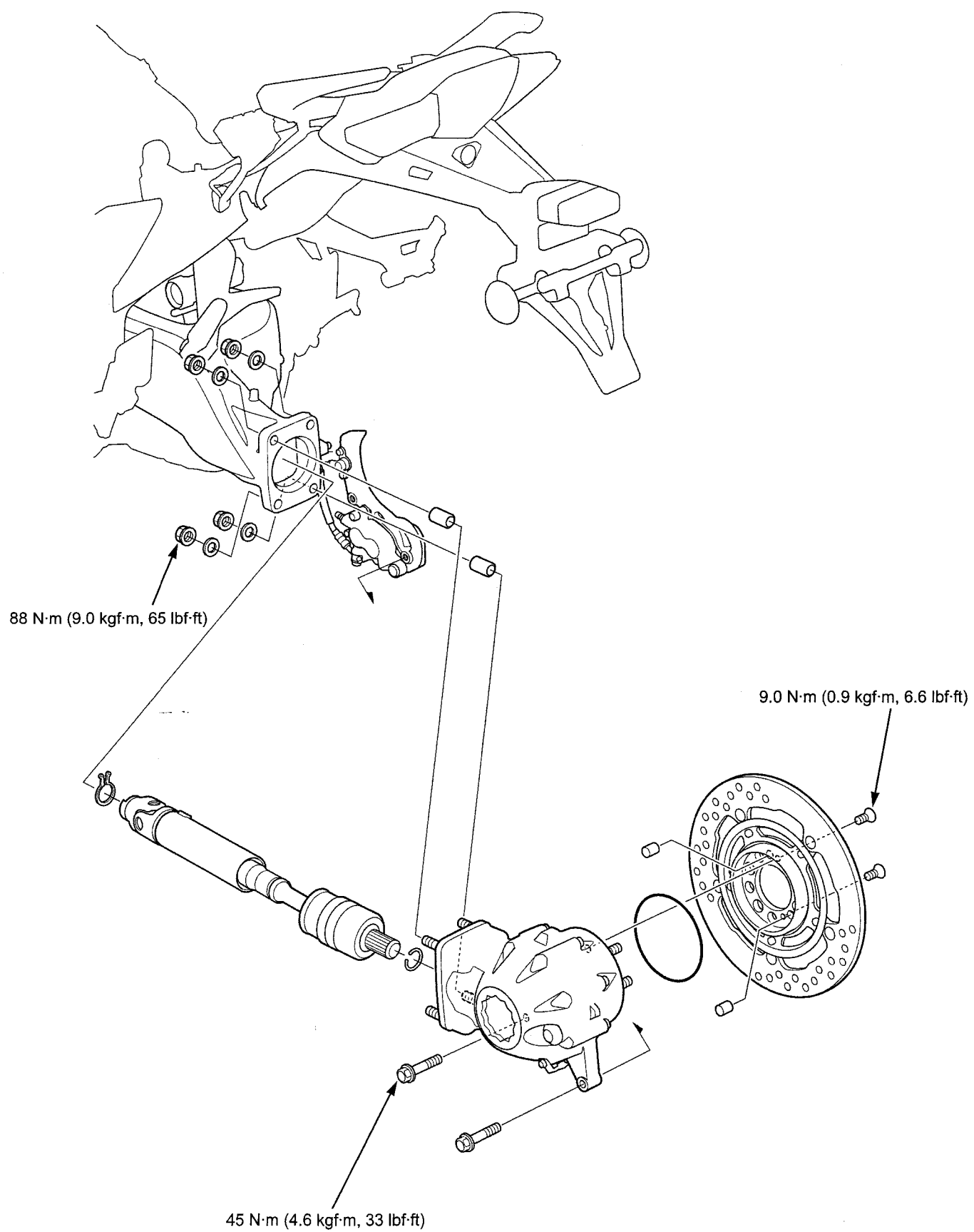
- crankshaft (page 13-6)
- transmission (page 12-20)



COMPONENT LOCATION .....	14-2	FINAL DRIVE DISASSEMBLY/ INSPECTION .....	14-8
SERVICE INFORMATION .....	14-3	FINAL DRIVE ASSEMBLY .....	14-19
TROUBLESHOOTING .....	14-5	FINAL DRIVE INSTALLATION .....	14-23
FINAL DRIVE REMOVAL .....	14-6		



## COMPONENT LOCATION



## SERVICE INFORMATION

### GENERAL

- The final gear assembly and final drive shaft must be removed together.
- Replace the ring and pinion gears as a set.
- Perform the gear contact pattern and backlash inspection whenever you replace the bearings, gears or gear case. The extension lines from the gear engagement surfaces should intersect at one point.
- Protect the gear case with a shop towel or soft jaws while holding it in a vise. Do not clamp the gear case too tightly or it could be damaged.

### SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Recommended final drive oil		Hypoid gear oil, SAE #80	—
Final drive oil capacity	After draining	200 cm <sup>3</sup> (6.8 US oz, 7.0 Imp oz)	—
	After disassembly	240 cm <sup>3</sup> (8.1 US oz, 8.4 Imp oz)	—
Final gear backlash		0.05 – 0.15 (0.002 – 0.006)	0.30 (0.012)
Backlash difference between measurements		—	0.10 (0.004)
Final gear assembly preload		0.1 – 2.9 N·m (1 – 29 kgf·cm, 0.1 – 2.1 lbf·ft)	—

### TORQUE VALUES

Final gear case cover 10 mm bolt  
 Final gear case cover 8 mm bolt  
 Ring gear shaft bearing retainer

62 N·m (6.3 kgf·m, 46 lbf·ft)  
 25 N·m (2.5 kgf·m, 18 lbf·ft)  
 221 N·m (22.5 kgf·m, 163 lbf·ft)

Apply a locking agent to the threads.  
 Apply a locking agent to the threads.  
 Replace with a new one and stake.  
 Apply grease or gear oil to the threads.  
 ALOC bolt: replace with a new one.  
 Apply grease or gear oil to the threads.  
 Replace with a new one and stake.  
 Replace with a new one and stake.  
 Apply a locking agent to the threads.

Final gear case bolt

221 N·m (22.5 kgf·m, 163 lbf·ft)

Pinion gear bearing retainer

235 N·m (24.0 kgf·m, 173 lbf·ft)

Pinion gear lock nut

206 N·m (21.0 kgf·m, 152 lbf·ft)

Final gear assembly stud bolt

See page 14-23

Final gear assembly mounting nut

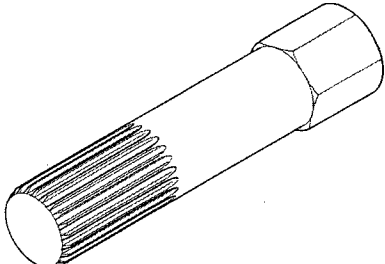
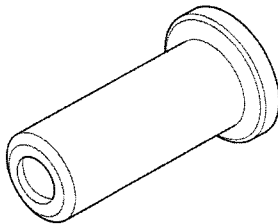
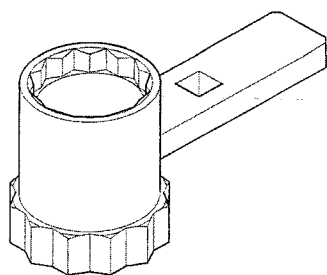
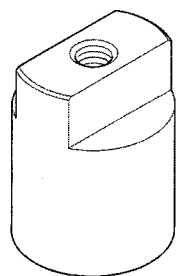
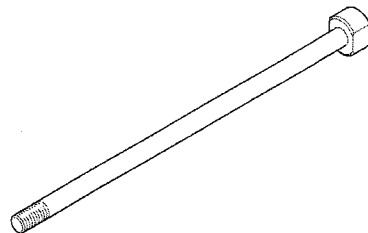
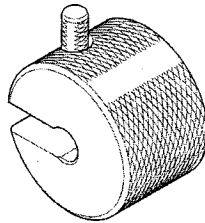
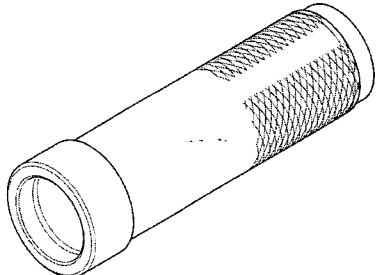
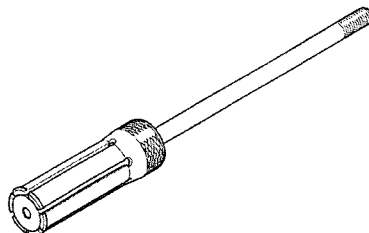
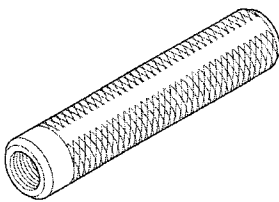
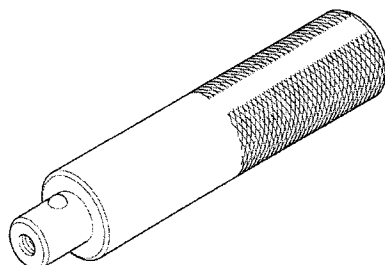
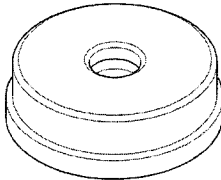
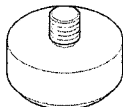
88 N·m (9.0 kgf·m, 65 lbf·ft)

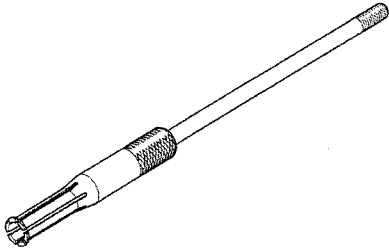
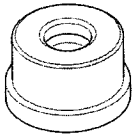
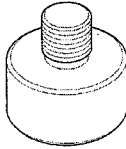
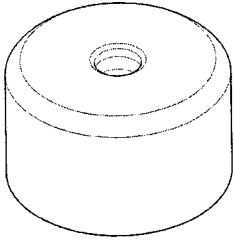
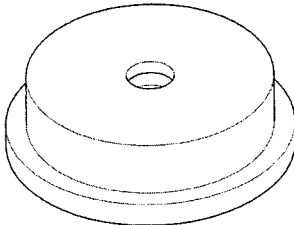
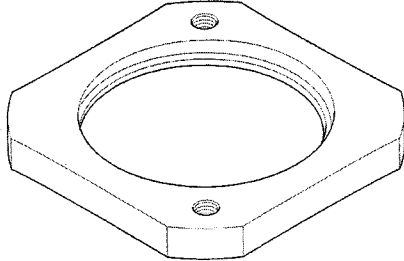
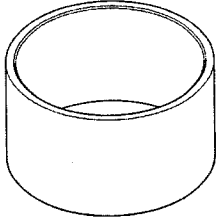
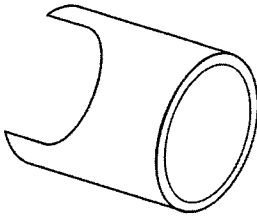
Rear brake disc flange mounting screw

9.0 N·m (0.9 kgf·m, 6.6 lbf·ft)

## FINAL DRIVE

### TOOLS

<p>Involute spline holder 070MB-MGE0100</p>  <p>or 070MB-MGEA100 (U.S.A. only)</p>	<p>Bearing race insert attachment 07931-4630301 (Need to find alternative tools for U.S.A.)</p>  <p>Not available in U.S.A.</p>	<p>Lock nut wrench 42/56 070MA-MGE0100</p>  <p>or 070MA-MGEA100 (U.S.A. only)</p>
<p>Pinion shaft attachment 070MC-MGE0100</p>  <p>or 070MC-MGEA100 (U.S.A. only)</p>	<p>Sliding shaft 12 07736-0010101</p>  <p>Use a commercially available 3/8" x 16 thread Slide Hammer in U.S.A. only</p>	<p>Remover weight 07741-0010201</p>  <p>or 07936-371020A (U.S.A. only)</p>
<p>Driver, 40 mm I.D. 07746-0030100</p> 	<p>Bearing remover, 35 mm 07936-3710400</p> 	<p>Remover handle 07936-3710100</p> 
<p>Driver 07749-0010000</p> 	<p>Attachment, 62 x 68 mm 07746-0010500</p> 	<p>Pilot, 35 mm 07746-0040800</p> 

<p>Bearing remover, 20 mm 07936-3710600</p> 	<p>Attachment, 32 x 35 mm 07746-0010100</p> 	<p>Pilot, 19 mm 07746-0041400</p> 
<p>Attachment, 70 mm 07LAD-PW50500</p> 	<p>Attachment, 78 x 90 mm 07GAD-SD40101</p> 	<p>Attachment, 78.5 mm 07JME-MR10100</p>  <p>Not available in U.S.A.</p>
<p>Base 105 x 115 x 65 mm 07ZMF-MCA0300</p>  <p>or 07ZMF-MCAA300 (U.S.A. only)</p>	<p>Bearing clip compressor, 35 mm 07ZME-MCAA100</p> 	

## TROUBLESHOOTING

### Excessive noise

- Worn or damaged bearings
- Worn ring gear and shaft
- Worn pinion gear and shaft
- Worn pinion gear and ring gear splines
- Worn or damaged universal joint and constant velocity joint
- Excessive backlash between pinion and ring gears
- Oil level too low

### Oil leak

- Oil level too high
- Damaged seals
- Loose case cover bolts

### Excessive rear wheel backlash

- Worn drive shaft splines
- Excessive backlash between pinion and ring gears
- Excessive play in final drive case bearings
- Worn or damaged universal joint and constant velocity joint
- Excessive play or worn universal joint bearing

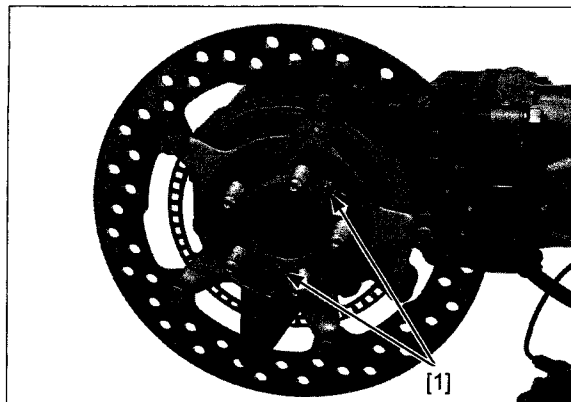
### FINAL DRIVE REMOVAL

Drain the final drive oil (page 4-20).

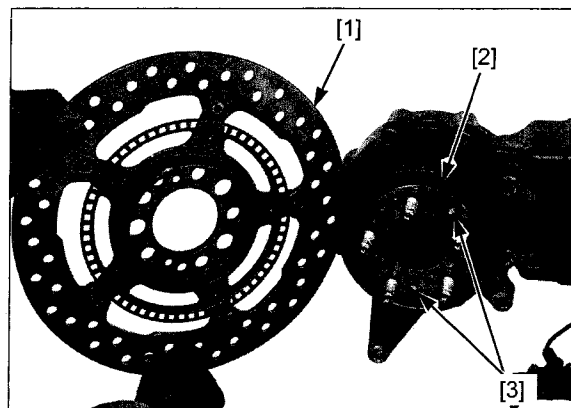
Remove the following:

- rear wheel (page 16-5)
- rear brake caliper (page 17-34)

Remove the rear brake disc flange mounting screws [1].



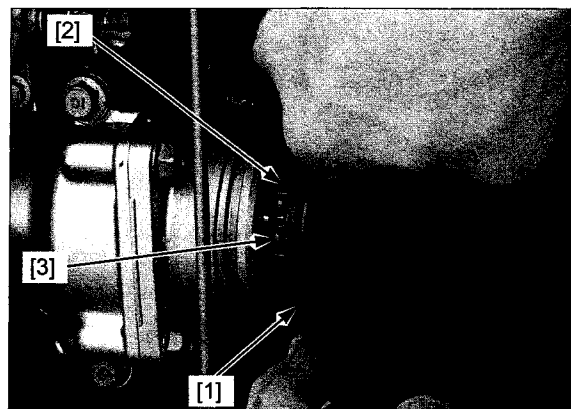
Remove the rear brake disc flange [1], O-ring [2] and dowel pins [3].



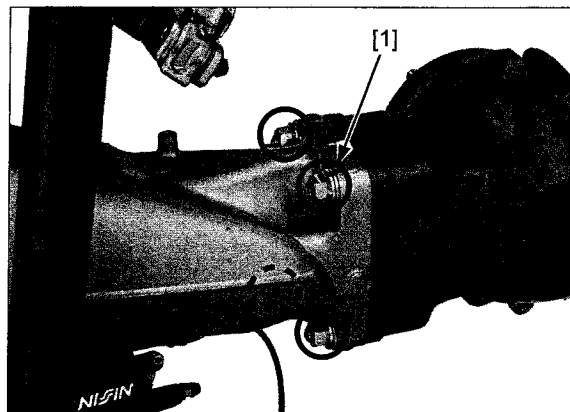
Open the drive shaft boot [1].

Rotate the drive shaft [2] slowly until the snap ring [3] appears as shown.

Remove the snap ring from the output shaft groove and slide the drive shaft rearward.



Remove the final gear case assembly mounting nuts [1].

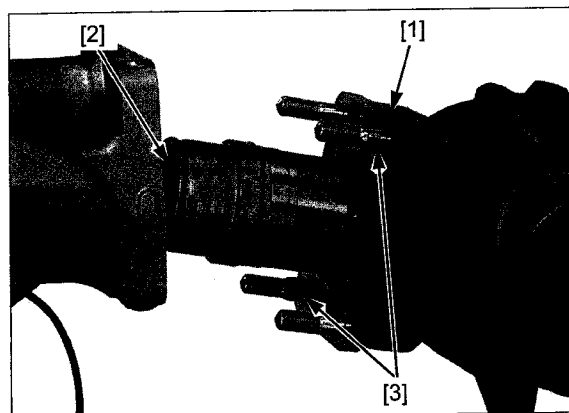


Pull the final gear case assembly [1] out the swingarm gently.

**NOTE:**

Be careful not to tear the constant velocity joint boot [2].

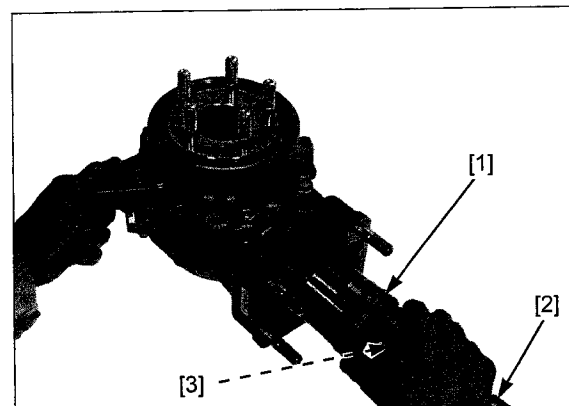
Remove the dowel pins [3] from the final gear case assembly.



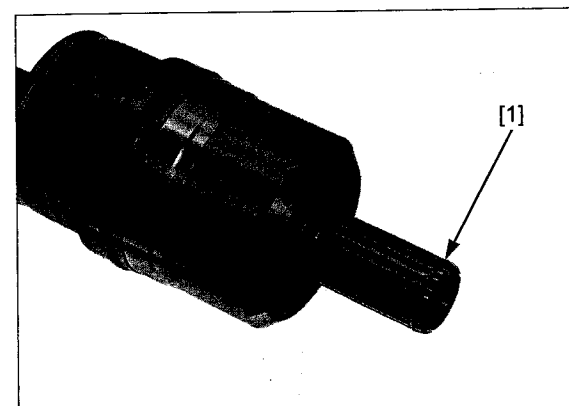
Remove the drive shaft assembly from the final gear case by gently turning the constant velocity joint [1] and pulling it.

**NOTE:**

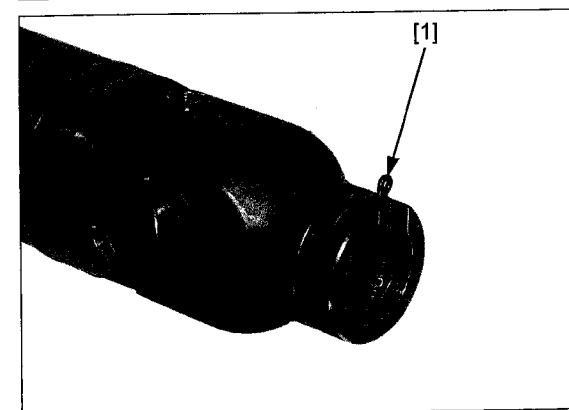
Do not pull the drive shaft [2] because the constant velocity joint boot [3] may tear.



Remove the stopper ring [1] from the drive shaft assembly.



Remove the snap ring [1] from the universal joint.



## FINAL DRIVE

### INSPECTION

*Replace the drive shaft as an assembly.*

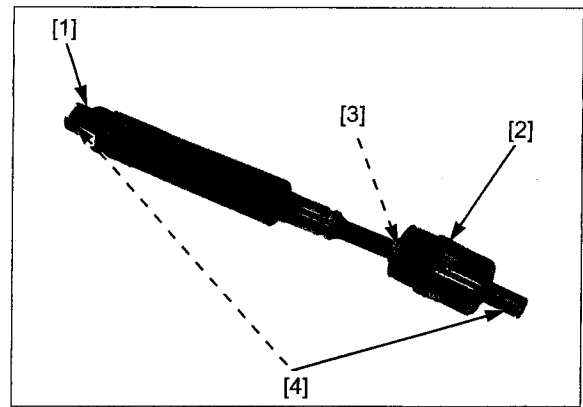
Check the operations of the universal joint [1] and constant velocity joint [2]. They should move smoothly without binding or noise.

Check the constant velocity joint boot [3] for tears or other damage.

Check the drive shaft for bend or damage.

Check the splines [4] of the drive shaft for damage or wear.

If the splines of the drive shaft are damaged, check the output shaft (side gear case) and pinion gear splines (final gear case) also.

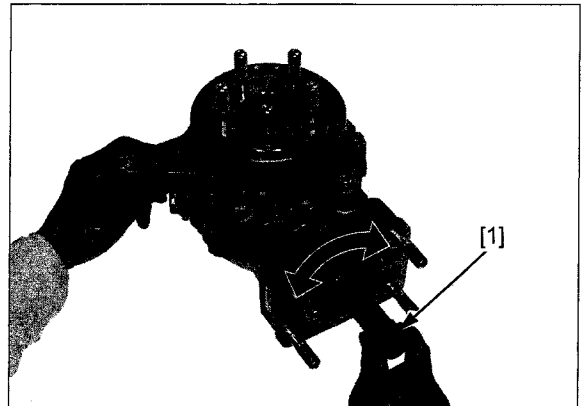


Turn the pinion gear using the special tool, and check that the pinion and ring gears turn smoothly and quietly without binding.

#### TOOL:

**Involute spline holder [1] 070MB-MGE0100 or 070MB-MGEA100 (U.S.A. only)**

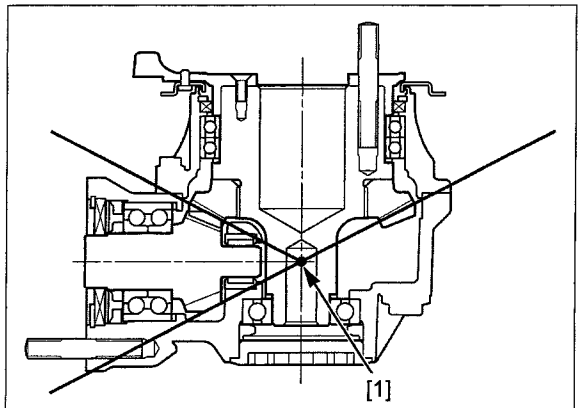
If the gears do not turn smoothly or quietly, the gears and/or bearing may be damaged or faulty. They must be checked after disassembly; replace faulty parts as required.



## FINAL DRIVE DISASSEMBLY/INSPECTION

#### NOTE:

Perform the backlash inspection and contact pattern check whenever you replace the pinion gear, ring gear, bearings and gear case. The extension lines from the gear engagement surfaces should intersect at one point [1].



## BACKLASH INSPECTION

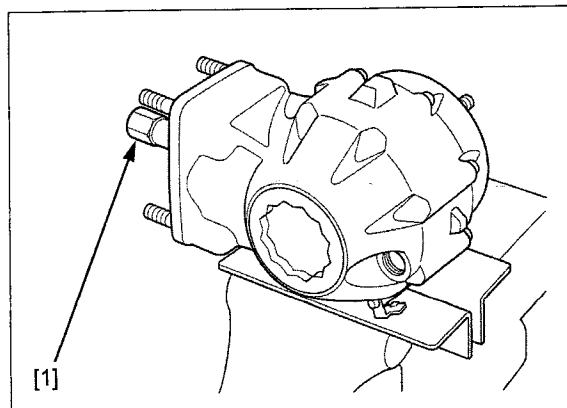
Hold the final gear case assembly in a vise with soft jaws.

Remove the oil filler cap.

Install the special tool into the pinion gear to hold it.

### TOOL:

**Involute spline holder [1]** 070MB-MGE0100 or  
070MB-MGEA100  
(U.S.A. only)



Set a horizontal type dial indicator [1] on the ring gear [2], through the oil filler hole.

Turn the ring gear back and forth to read the backlash.

**STANDARD:** 0.05 – 0.15 mm (0.002 – 0.006 in)

**SERVICE LIMIT:** 0.30 mm (0.012 in)

Remove the dial indicator. Turn the ring gear 120° and measure the backlash. Repeat this procedure once more.

Compare the difference of the three measurements.

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

If the difference in measurements exceeds the service limit, it indicates that the bearing is not installed squarely, or the case is deformed. Inspect the bearings and case.

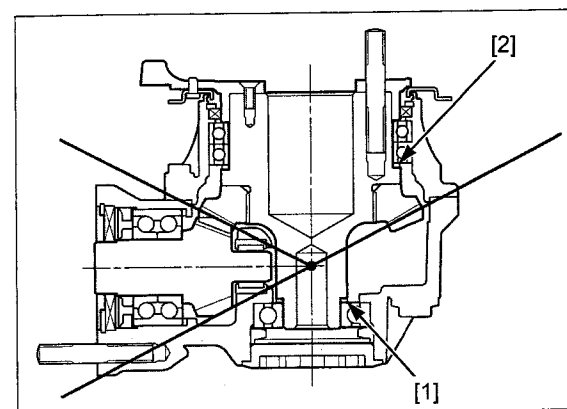
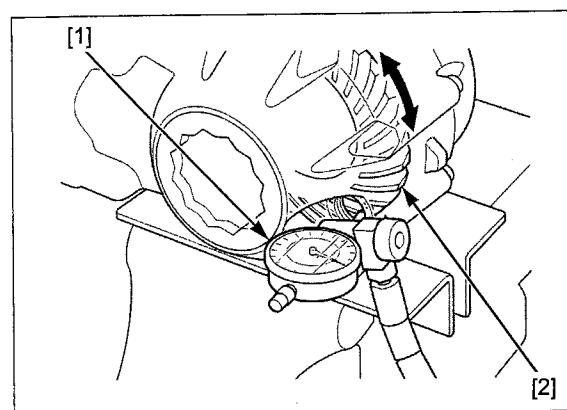
If the backlash is excessive, replace the ring gear shaft shim [1] with a thinner one.

If the backlash is too small, replace the ring gear shaft shim with a thicker one.

Change the ring gear shaft shim thickness in an opposite amount of what the ring gear shim [2] was changed; if the ring gear shim was replaced with a 0.12 mm (0.005 in) thicker one, replace the ring gear shaft shim with a 0.12 mm (0.005 in) thinner one.

For ring gear shaft shim replacement (page 14-10).

For ring gear shim replacement (page 14-12).



### SHAFT SHIMS:

A: 1.73 mm (0.068 in)  
B: 1.76 mm (0.069 in)  
C: 1.79 mm (0.070 in)  
D: 1.82 mm (0.072 in)  
E: 1.85 mm (0.073 in)  
F: 1.88 mm (0.074 in)  
G: 1.91 mm (0.075 in)  
H: 1.94 mm (0.076 in)  
I: 1.97 mm (0.078 in)  
J: 2.00 mm (0.079 in)  
K: 2.03 mm (0.080 in)  
L: 2.06 mm (0.081 in)  
M: 2.09 mm (0.082 in)  
N: 2.12 mm (0.083 in)  
O: 2.15 mm (0.085 in)  
P: 0.45 mm (0.018 in)

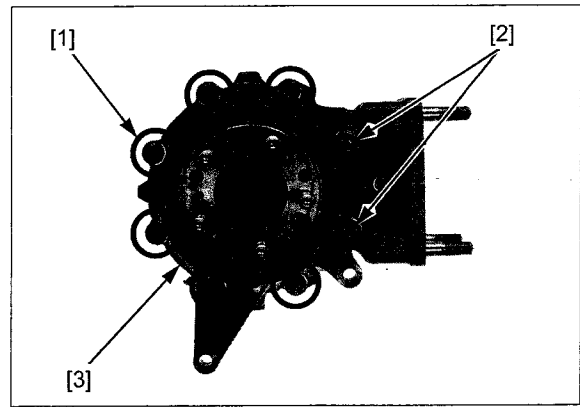
### RING GEAR SHIMS:

A: 1.82 mm (0.072 in)  
B: 1.88 mm (0.074 in)  
C: 1.94 mm (0.076 in)  
D: 2.00 mm (0.079 in)  
E: 2.06 mm (0.081 in)  
F: 2.12 mm (0.083 in)  
G: 2.18 mm (0.086 in)  
H: 2.24 mm (0.088 in)  
I: 2.30 mm (0.091 in)  
J: 2.36 mm (0.093 in)  
K: 2.42 mm (0.095 in)  
L: 2.48 mm (0.098 in)  
M: 2.54 mm (0.100 in)  
N: 2.60 mm (0.102 in)  
P: 2.66 mm (0.105 in)



## FINAL GEAR CASE SEPARATION

Loosen the 8 mm [1] and 10 mm [2] cover bolts in a crisscross pattern in several steps and remove them. Pry the gear case cover [3] and remove it from the case.



## GEAR TOOTH CONTACT PATTERN CHECK

Description of the tooth:

COAST SIDE

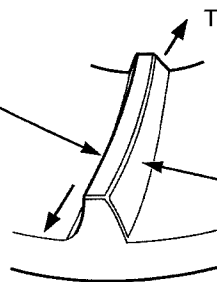
(contacts when engine braking is applied)

TOE (inside of gear)

HEEL (out side of gear)

DRIVE SIDE

(contacts when engine power is applied)



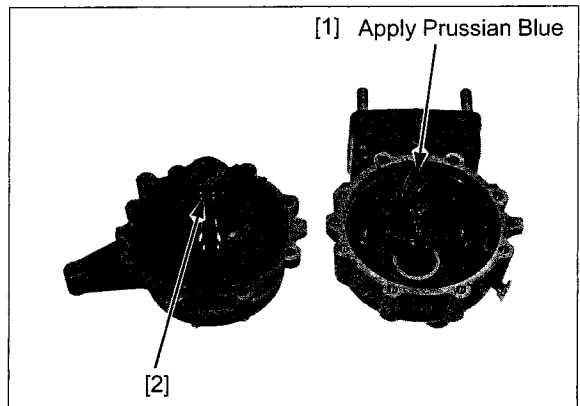
Keep dust and dirt out of the case and cover.

Clean the sealing material off the mating surfaces of the gear case and cover, being careful not to damage them.

Apply a thin coat of Prussian Blue to the pinion gear teeth [1].

Select the replacement shaft shim [2] (page 14-9).

Install the shaft shim.



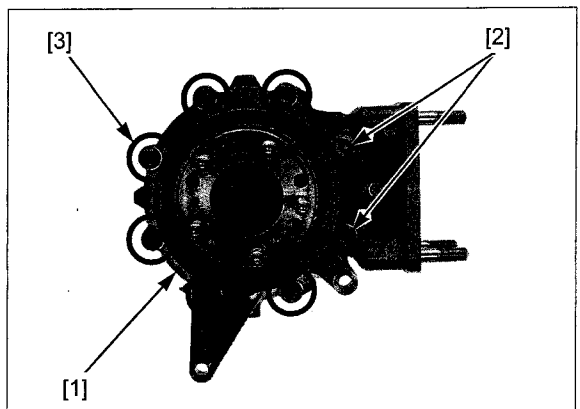
Install the case cover [1], 10 mm bolts [2], 8 mm bolts [3] and tighten the bolts in a crisscross pattern in several steps until the cover evenly touches the gear case.

Tighten the 10 mm bolts to the specified torque in several steps alternately.

**TORQUE: 62 N·m (6.3 kgf·m, 46 lbf·ft)**

Tighten the 8 mm bolts to the specified torque in a crisscross pattern in several times.

**TORQUE: 25 N·m (2.5 kgf·m, 18 lbf·ft)**

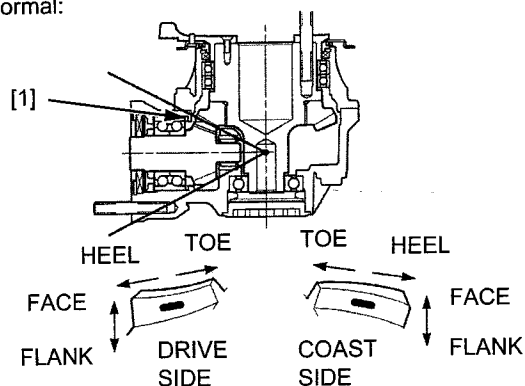


Remove the oil filler cap.  
 Rotate the ring gear several times in normal direction of rotation.  
 Check the gear tooth contact pattern through the oil filler hole.

Contact is normal if the Prussian Blue is transferred to the approximate center of each tooth and slightly towards the face.

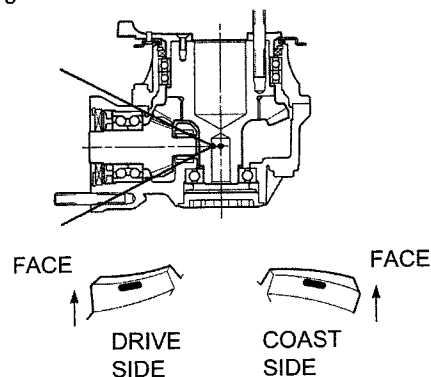
If the patterns are not correct, remove and replace the pinion gear shim [1] with a suitable one (page 14-14).

Normal:



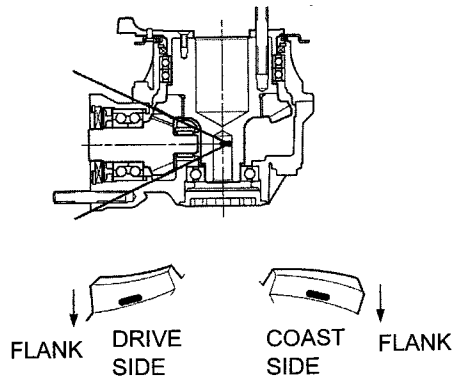
Replace the pinion gear shim with a thinner one if the contact pattern is too high, toward the face.

Too High:



Replace the pinion gear shim with a thicker one if the contact pattern is too low, toward the flank.

Too Low:



## PINION GEAR SHIMS:

- A: 1.32 mm (0.052 in)
- B: 1.38 mm (0.054 in)
- C: 1.44 mm (0.057 in)
- D: 1.50 mm (0.059 in)
- E: 1.56 mm (0.061 in)
- F: 1.62 mm (0.064 in)
- G: 1.68 mm (0.066 in)

For pinion gear shim replacement (page 14-14).

### RING GEAR REMOVAL/SHIM REPLACEMENT

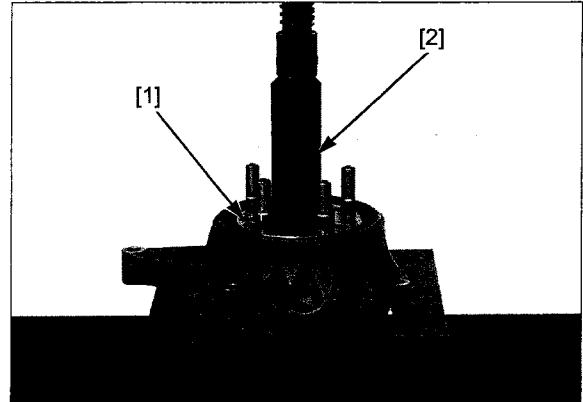
Separate the final gear case (page 14-10).

Press the ring gear [1] out of the gear case cover using the special tool and hydraulic press.

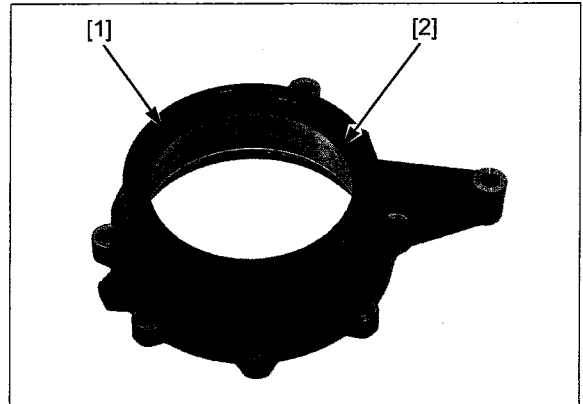
**TOOL:**

Bearing race insert attachment [2] 07931-4630301

Not available in U.S.A. (Need to find alternative tools)



Remove the snap ring [1] and oil seal [2].



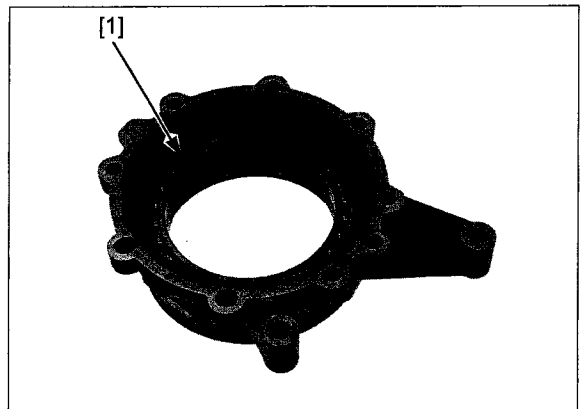
*Be sure to wear insulated gloves when handling the heated gear case.*

Heat the gear case cover to 80°C (176°F) evenly using a heat gun.

**NOTE:**

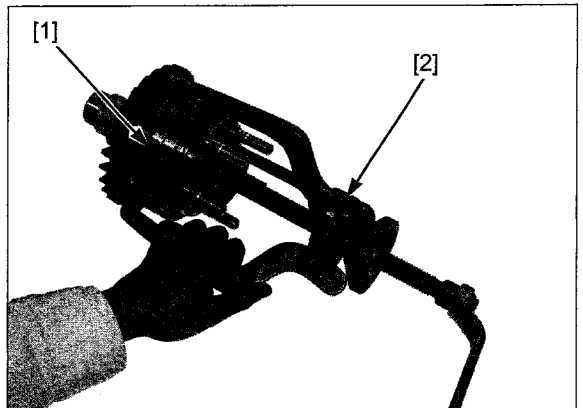
Do not use a torch to heat the gear case cover; it may cause warping.

Tap the gear case lightly and remove the ring gear bearings [1].

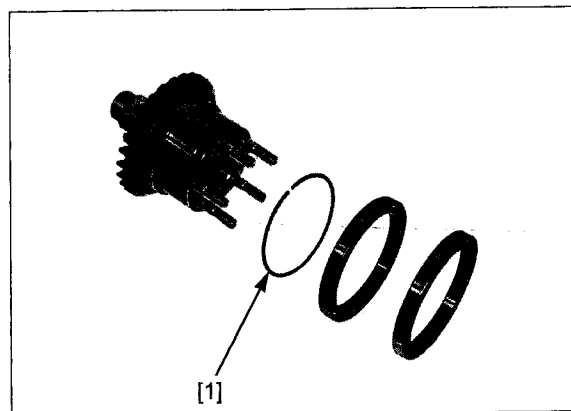


If the bearings remained on the ring gear, remove them as follows:

Remove the ring gear bearings [1] using a commercially available bearing puller [2].

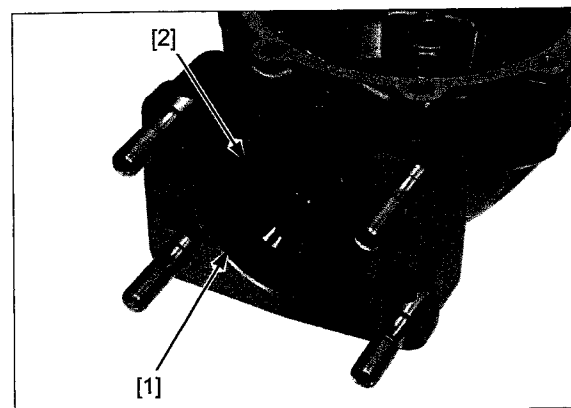


Select the replacement shim (page 14-9).



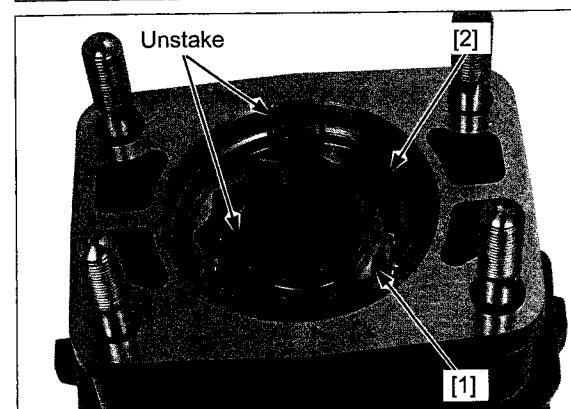
## PINION GEAR REMOVAL

Remove the stopper ring [1] and oil seal [2].



*Be careful not to damage the pinion gear and gear case.*

Unstake the pinion gear lock nut [1] and bearing retainer [2].



Hold the gear case in a vise with soft jaws.

Hold the pinion gear and remove the pinion gear lock nut [1] using the special tools.

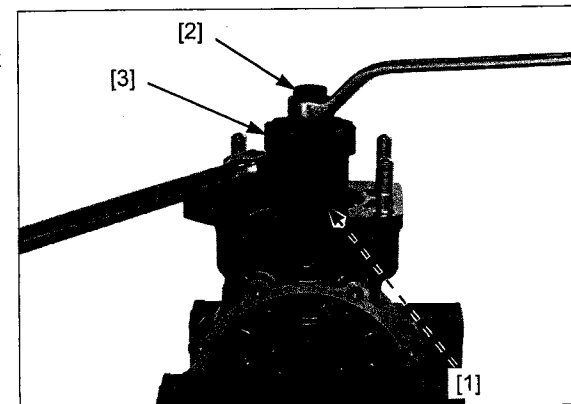
### TOOLS:

Involute spline holder [2]

070MB-MGE0100 or  
070MB-MGEA100  
(U.S.A. only)

Lock nut wrench 42/56 [3]

070MA-MGE0100 or  
070MA-MGEA100  
(U.S.A. only)

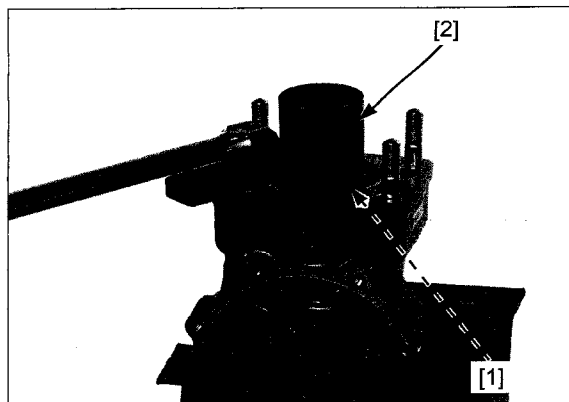


## FINAL DRIVE

Remove the pinion gear bearing retainer [1] using the special tool.

**TOOL:**

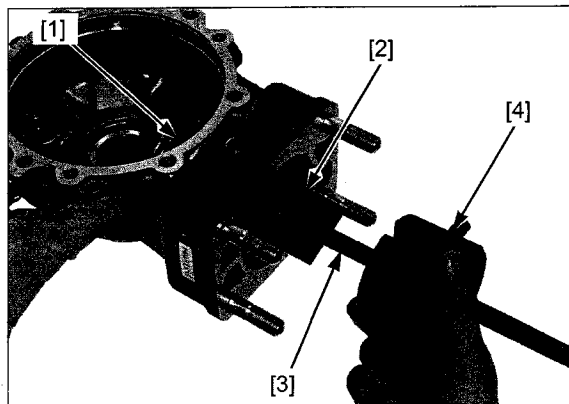
Lock nut wrench 42/56 [2]      070MA-MGE0100 or  
070MA-MGEA100  
(U.S.A. only)



Remove the pinion gear assembly [1] using the special tools.

**TOOLS:**

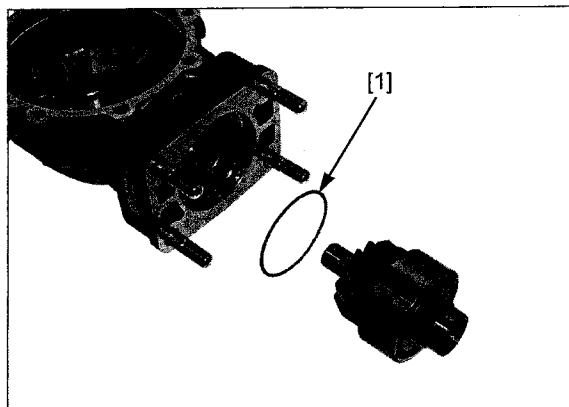
Pinion shaft attachment [2]      070MC-MGE0100  
Sliding shaft 12 [3]      07736-0010101  
(Use a commercially available 3/8" x 16 thread Slide  
Hammer in U.S.A. only)  
Remover weight [4]      07741-0010201 or  
07936-371020A  
(U.S.A. only)



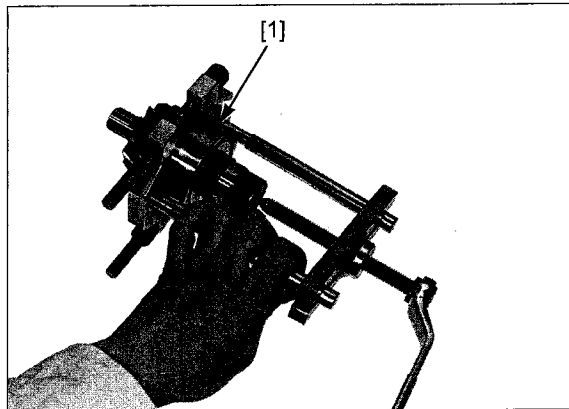
Remove the special tools from the pinion gear assembly.

### PINION GEAR BEARING/SHIM REPLACEMENT

Remove the pinion gear shim [1] from the gear case.  
Select the replacement shim (page 14-11).



Pull the pinion gear bearing [1] from the pinion gear with a commercially available bearing puller.

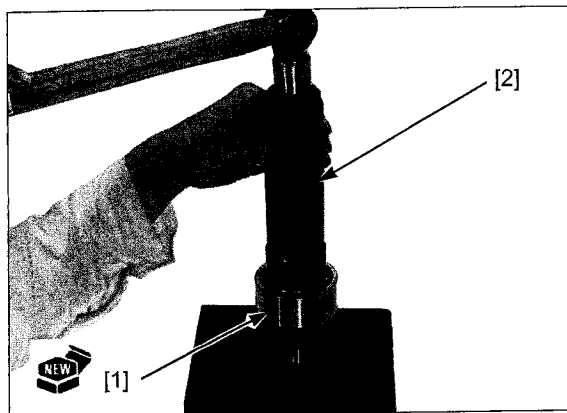


Drive a new bearing [1] with the marked side facing up using the special tool.

**TOOL:**

Driver, 40 mm I.D. [2]

07746-0030100



## CASE BEARING REPLACEMENT

### RING GEAR BEARING

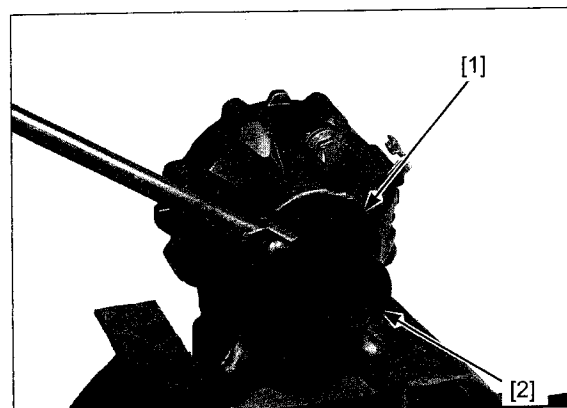
Hold the gear case in a vise with soft jaws.

Remove the gear case bolt [1] from the gear case using the special tool.

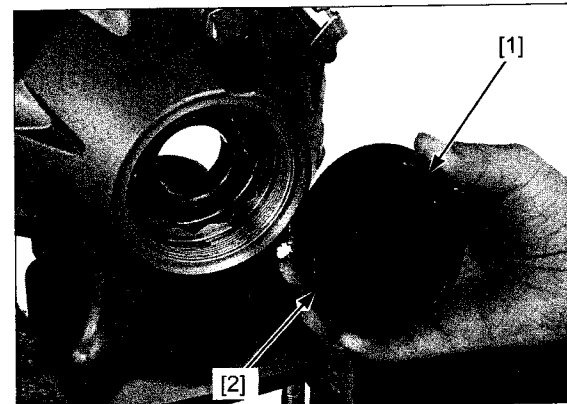
**TOOL:**

Lock nut wrench 42/56 [2]

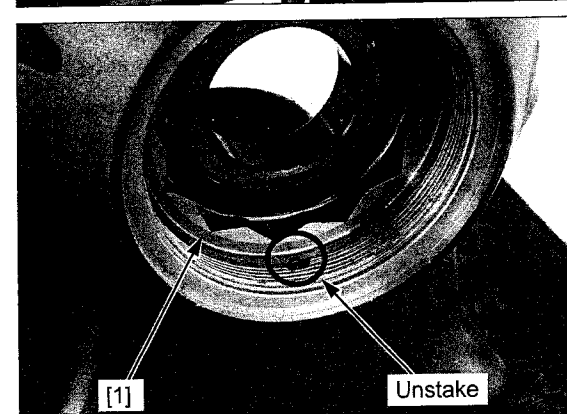
070MA-MGE0100 or  
070MA-MGEA100  
(U.S.A. only)



Remove the O-ring [1] from the gear case bolt [2].



*Be careful not to damage the gear case.* Unstake the ring gear shaft bearing retainer [1].

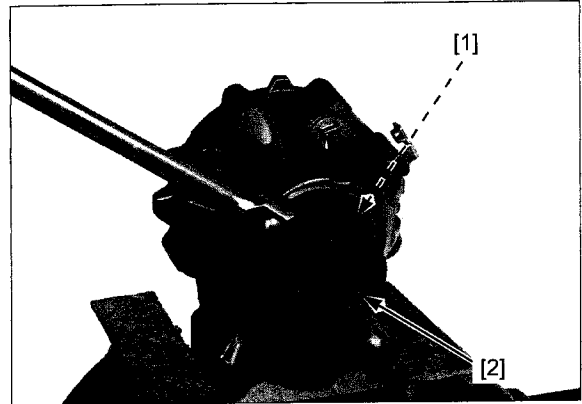


## FINAL DRIVE

Remove the ring gear shaft bearing retainer [1] using the special tool.

**TOOL:**

Lock nut wrench 42/56 [2]      070MA-MGE0100 or  
070MA-MGEA100  
(U.S.A. only)



*Be sure to wear insulated gloves when handling the heated gear case.*

Heat the gear case to 80°C (176°F) evenly using a heat gun.

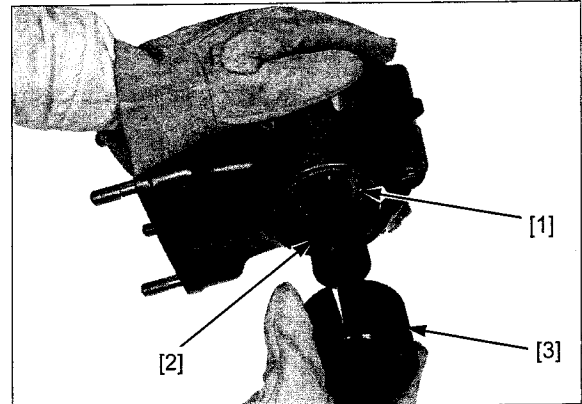
**NOTE:**

Do not use a torch to heat the gear case; it may cause warping.

Remove ring gear shaft bearing [1] from the gear case using the special tools.

**TOOLS:**

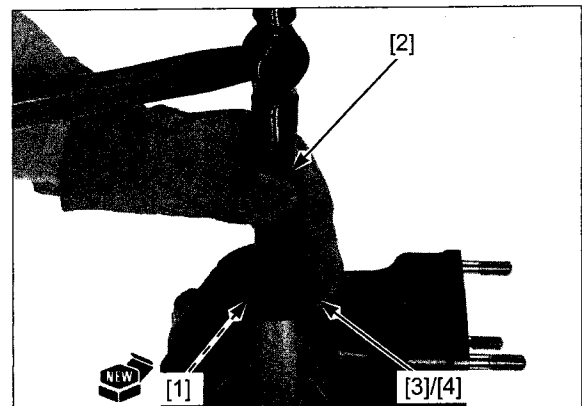
Bearing remover, 35 mm [2]      07936-3710400  
Remover handle      07936-3710100  
Remover weight [3]      07741-0010201 or  
07936-371020A  
(U.S.A. only)



Drive a new ring gear shaft bearing [1] into the gear case until it is fully seated using the special tools.

**TOOLS:**

Driver [2]      07749-0010000  
Attachment, 62 x 68 mm [3]      07746-0010500  
Pilot, 35 mm [4]      07746-0040800



Hold the gear case in a vise with soft jaws.

Apply grease or gear oil to a new ring gear shaft bearing retainer [1] threads.

Install the ring gear shaft bearing retainer.

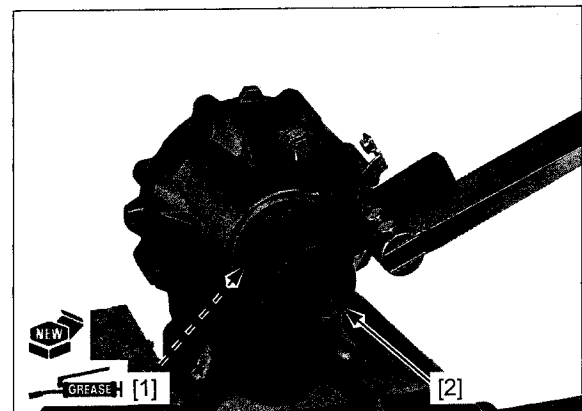
Tighten the retainer to the specified torque using the special tool.

**TOOL:**

Lock nut wrench 42/56 [2]      070MA-MGE0100 or  
070MA-MGEA100  
(U.S.A. only)

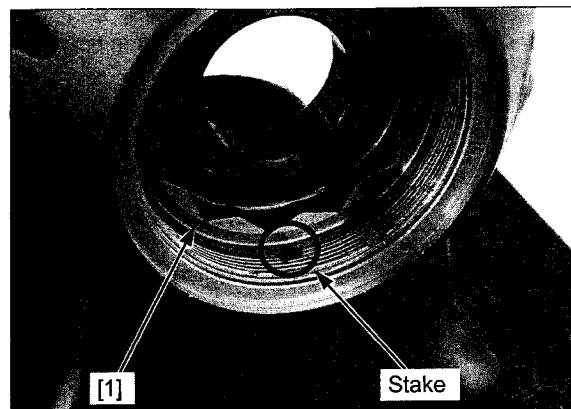
**TORQUE:** 221 N·m (22.5 kgf·m, 163 lbf·ft)

*The lock nut wrench (60 mm off-set from the center) increases the torque wrench's leverage, so the torque wrench reading will be less than the torque actually applied to the retainer.*



Be careful not to damage the gear case.

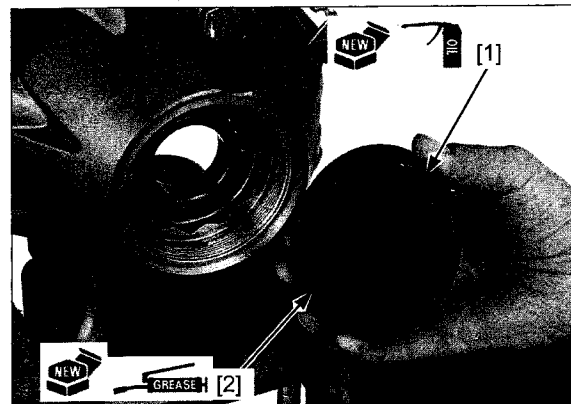
Stake the ring gear shaft bearing retainer [1].



Apply oil to a new O-ring and install it onto a new gear case bolt [2].

Apply grease or gear oil to the gear case bolt threads.

Install the gear case bolt to the gear case.



The lock nut wrench (60 mm off-set from the center) increases the torque wrench's leverage, so the torque wrench reading will be less than the torque actually applied to the gear case bolt.

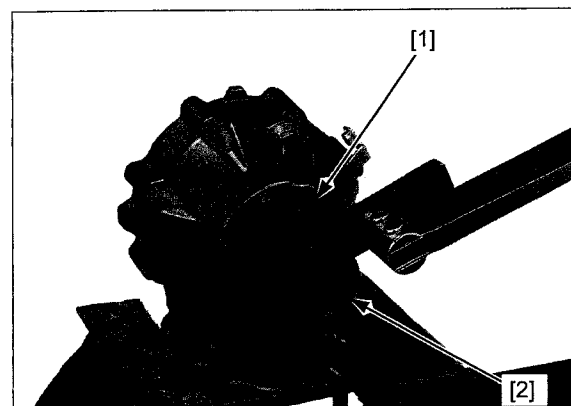
Tighten the gear case bolt [1] to the specified torque using the special tool.

## TOOL:

Lock nut wrench 42/56 [2]

070MA-MGE0100 or  
070MA-MGEA100  
(U.S.A. only)

**TORQUE: 221 N·m (22.5 kgf·m, 163 lbf·ft)**

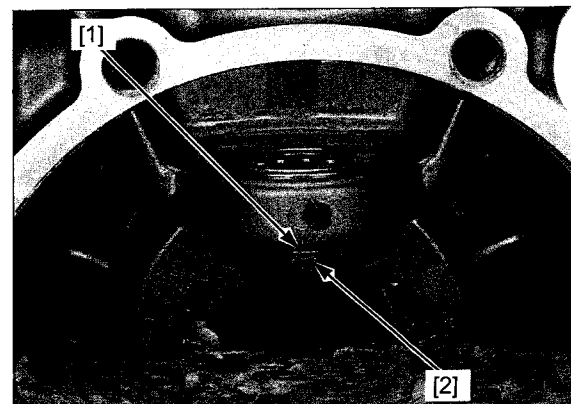


## PINION GEAR SHAFT BEARING

Rotate the stopper ring [1] until the end of the stopper ring appears in the access hole [2].

Strike gently near the end of the ring with a punch to bend the end upward.

Grasp the end of the ring with needle-nose pliers and pull the stopper ring out through the access hole.





## FINAL DRIVE

*Be sure to wear insulated gloves when handling the heated gear case.*

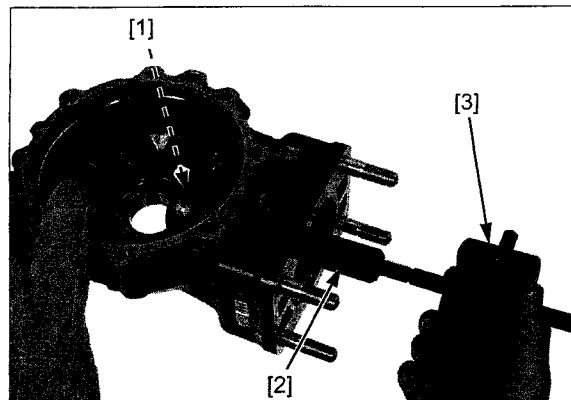
Heat the gear case to 80°C (176°F) and remove the needle bearing [1] using the special tools.

### NOTE:

Do not use a torch to heat the gear case; it may cause warping.

### TOOLS:

Bearing remover, 20 mm [2]	07936-3710600
Remover handle	07936-3710100
Remover weight [3]	07741-0010201 or 07936-371020A (U.S.A. only)



Install a new stopper ring [1] into the groove of a new bearing [2] securely.

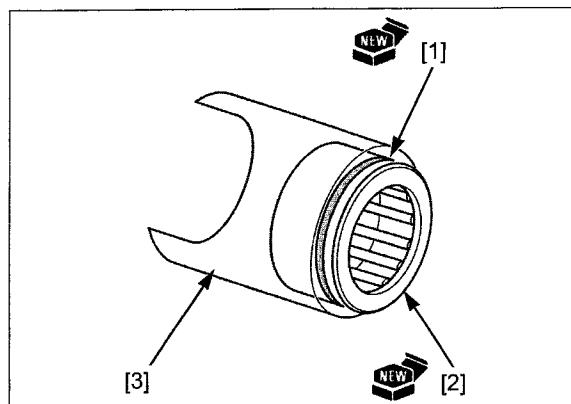
Install the bearing into the special tool until the bearing is flush with the end of the tool.

### TOOL:

Bearing clip compressor,	07ZME-MCAA100
35 mm [3]	

Freeze the needle bearing with the tool on ice or in a freezer.

Heat the gear case to 80°C (176°F).



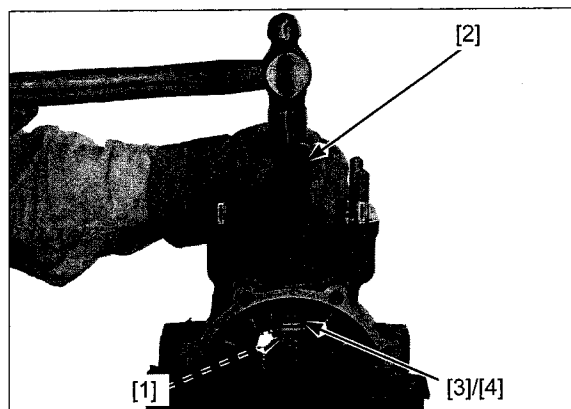
*Tape the clip compressor to the driver for bearing installation.*

Remove the needle bearing [1] from the freezer and drive it into the gear case until it is fully seated using the special tools.

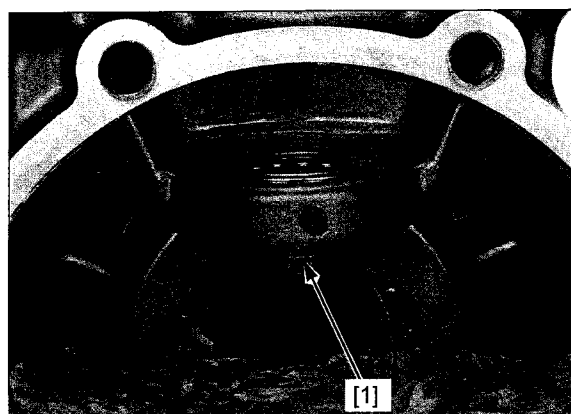
### TOOLS:

Driver [2]	07749-0010000
Attachment, 32 x 35 mm [3]	07746-0010100
Pilot, 19 mm [4]	07746-0041400

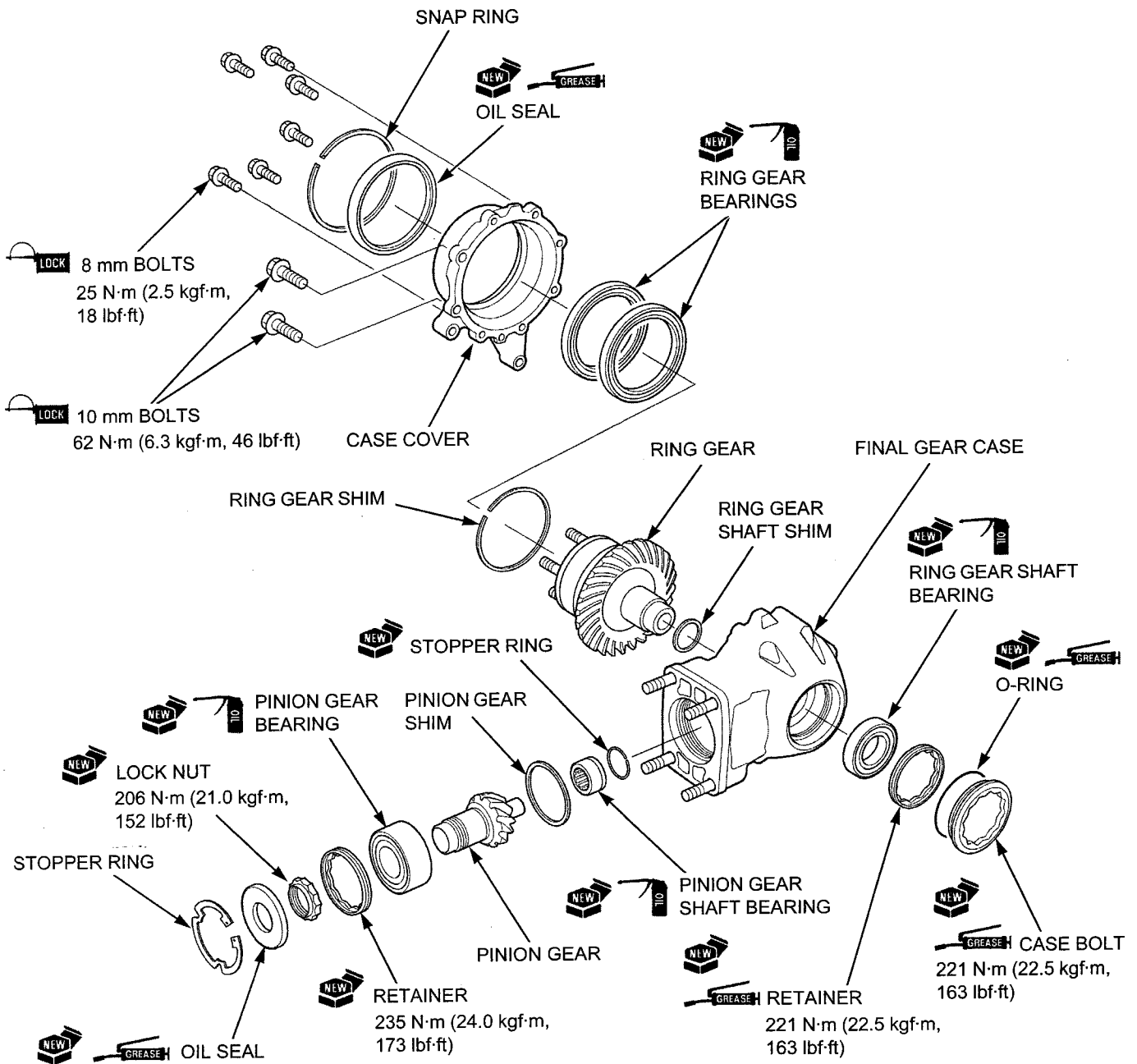
Only strike the driver once. If you strike it more than once, the stopper ring may slip out of the groove. If this happens, remove the ring and bearing, and install a new one again.



Make sure the stopper ring [1] is securely set in the groove of the gear case.

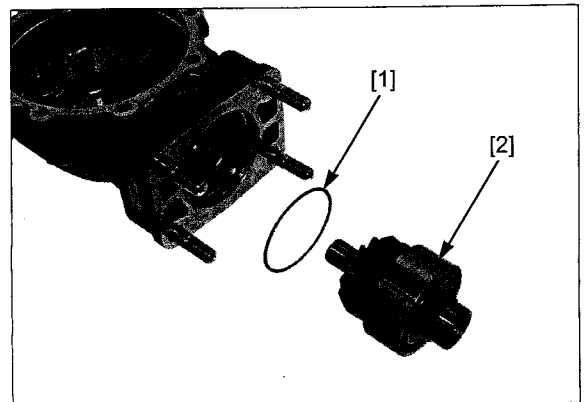


# FINAL DRIVE ASSEMBLY



## PINION GEAR INSTALLATION

Install the pinion gear shim [1] and pinion gear assembly [2] into the gear case.



## FINAL DRIVE

*Make sure that the pinion gear shaft sets into the needle bearing properly.*

Drive the pinion gear assembly [1] into the gear case until it is fully seated using the special tool.

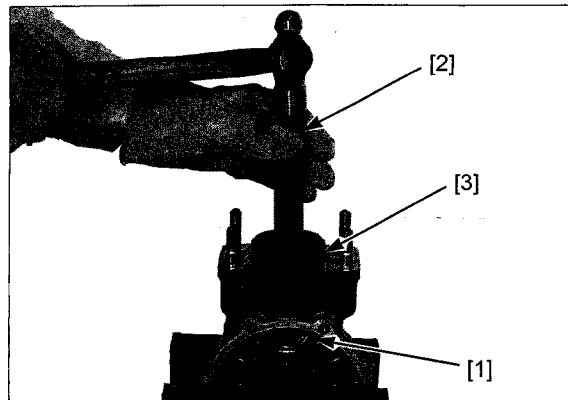
### TOOLS:

Driver [2]

Attachment, 70 mm [3]

07749-0010000

07LAD-PW50500



Hold the gear case in a vise with soft jaws.

Install a new pinion gear bearing retainer [1].

Tighten the retainer to the specified torque using the special tool.

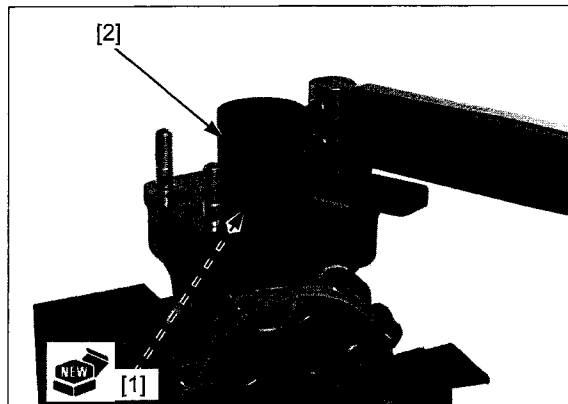
### TOOL:

Lock nut wrench 42/56 [2]

070MA-MGE0100 or  
070MA-MGEA100  
(U.S.A. only)

**TORQUE: 235 N·m (24.0 kgf·m, 173 lbf·ft)**

*The lock nut wrench (60 mm off-set from the center) increases the torque wrench's leverage, so the torque wrench reading will be less than the torque actually applied to the retainer.*



Install a new pinion gear lock nut [1].

Hold the pinion gear and tighten the lock nut to the specified torque using the special tools.

### TOOLS:

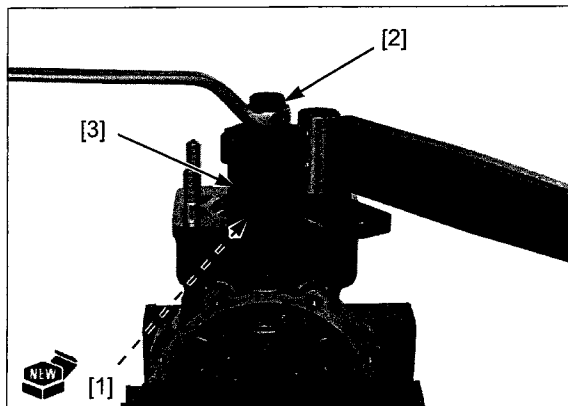
Involute spline holder [2]

Lock nut wrench 42/56 [3]

070MB-MGE0100  
070MA-MGE0100 or  
070MA-MGEA100  
(U.S.A. only)

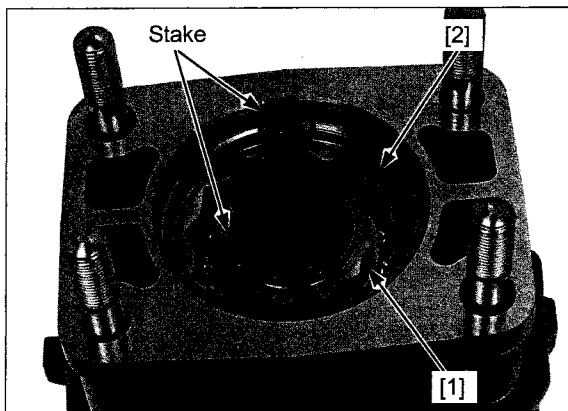
**TORQUE: 206 N·m (21.0 kgf·m, 152 lbf·ft)**

*The lock nut wrench (60 mm off-set from the center) increases the torque wrench's leverage, so the torque wrench reading will be less than the torque actually applied to the lock nut.*



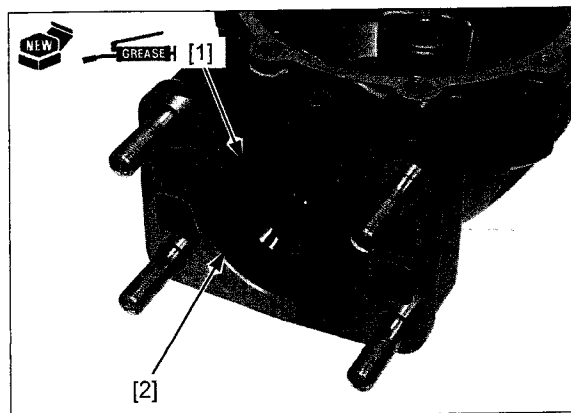
*Be careful not to damage the pinion gear and gear case.*

Stake the pinion gear lock nut [1] and bearing retainer [2].



Apply grease to a new oil seal [1] lips.

Install the oil seal and set the stopper ring [2] into the gear case groove securely.



## RING GEAR INSTALLATION

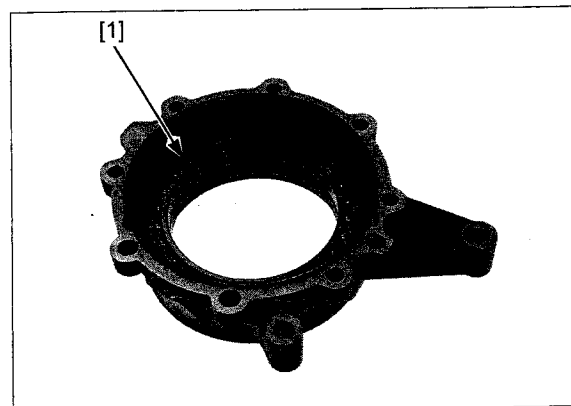
*Be sure to wear insulated gloves when handling the heated gear case.*

Heat the gear case cover to 80°C (176°F) evenly using a heat gun.

### NOTE:

Do not use a torch to heat the gear case cover; it may cause warping.

Install the ring gear bearings [1] and drive them into the gear case cover until they are fully seated.



Apply grease to a new oil seal [1] lips.

Drive a new oil seal until it is fully seated using the special tools.

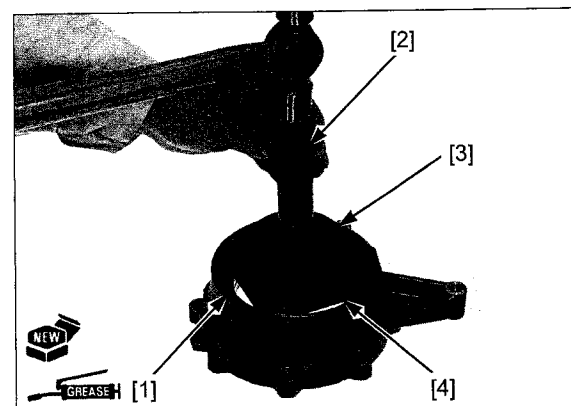
### TOOLS:

Driver [2]

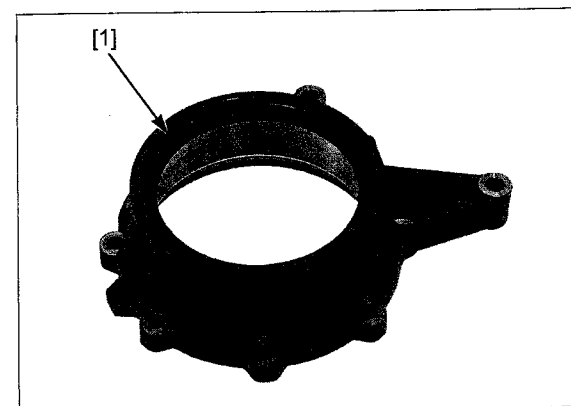
Attachment, 78 x 90 mm [3]

Attachment, 78.5 mm [4]

07749-0010000  
07GAD-SD40101  
07JME-MR10100  
(Not available in U.S.A.)



Set the snap ring [1] into the gear case groove securely.

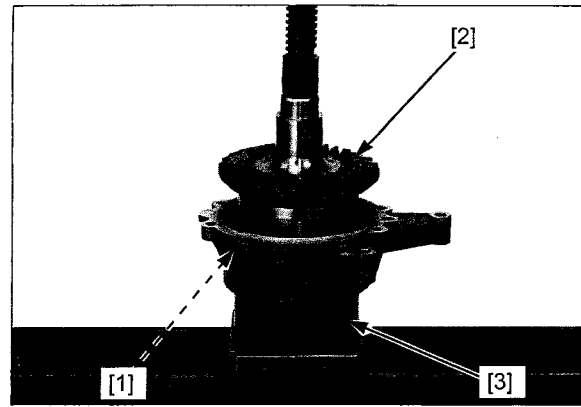


## FINAL DRIVE

Install the shim [1] onto the ring gear [2].  
Support the bearing inner race with the special tool and press the ring gear into the bearings using a hydraulic press.

**TOOL:**

Base 105 x 115 x 65 mm [3]    07ZMF-MCA0300 or  
07ZMF-MCAA300  
(U.S.A. only)



## FINAL GEAR CASE ASSEMBLY

**NOTE:**

When the gear set, bearing and/or gear case has been replaced, check the following:

- tooth contact pattern (page 14-10)
- gear case backlash (page 14-9)

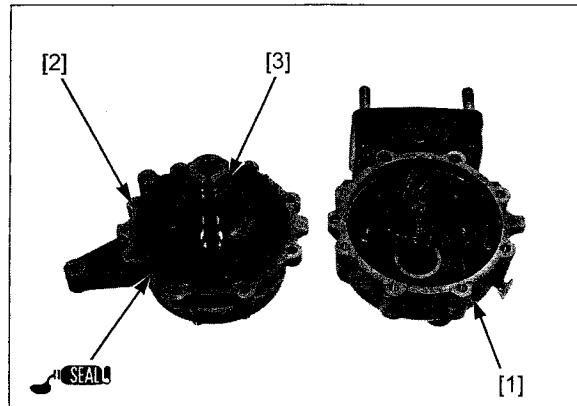
*Keep dust and dirt out of the case and cover.*

Clean the mating surface of the gear case [1] and cover [2], being careful not to damage them.

Apply liquid sealant to the mating surface of the gear case.

Install the shaft shim [3].

Install the gear case onto the case cover.



Clean and apply a locking agent to the threads of the case cover 10 mm bolts [1] and 8 mm bolts [2].

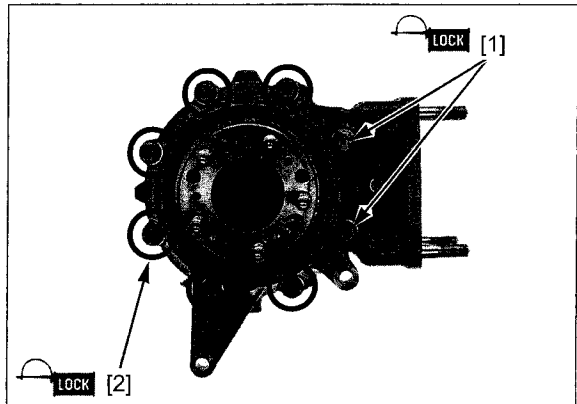
Install the bolts, and tighten them in a crisscross pattern in several steps until the cover evenly touches the gear case.

Tighten the two 10 mm bolts to the specified torque in several steps alternately.

**TORQUE: 62 N·m (6.3 kgf·m, 46 lbf·ft)**

Tighten the six 8 mm bolts to the specified torque in a crisscross pattern in several steps.

**TORQUE: 25 N·m (2.5 kgf·m, 18 lbf·ft)**



Check that the gear assembly turns smoothly without binding using the special tool.

**TOOL:**

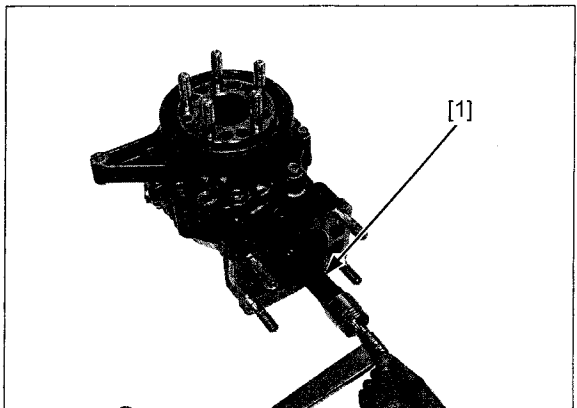
Involute spline holder [1] 070MB-MGE0100

Measure the final gear assembly preload.

**STANDARD:**

0.1 – 2.9 N·m (1 – 29 kgf·cm, 0.1 – 2.1 lbf·ft)

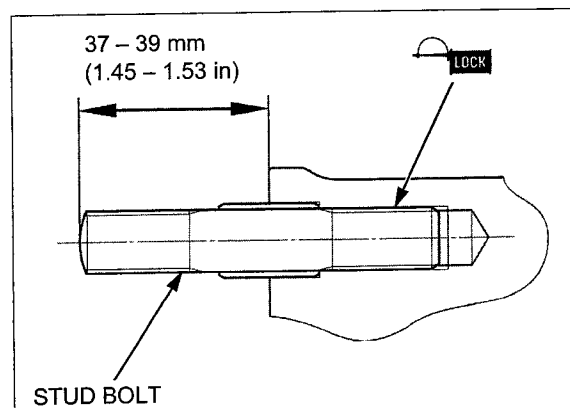
If the preload reading does not fall within the specification, check the bearings for proper installation.



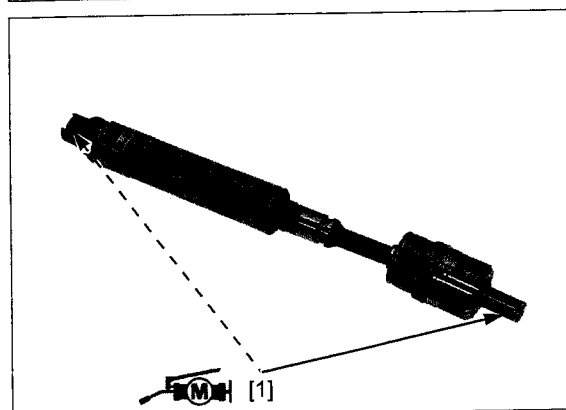
## FINAL DRIVE INSTALLATION

Check that the gear case stud bolts are tight. If any are loose, remove them and clean their threads with contact cleaner, then install them using a locking agent (page 1-21).

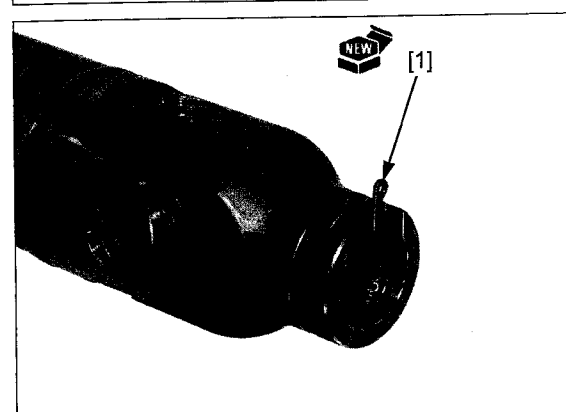
After installing, be sure to measure the distance from the top of each stud to the gear case surface as shown.



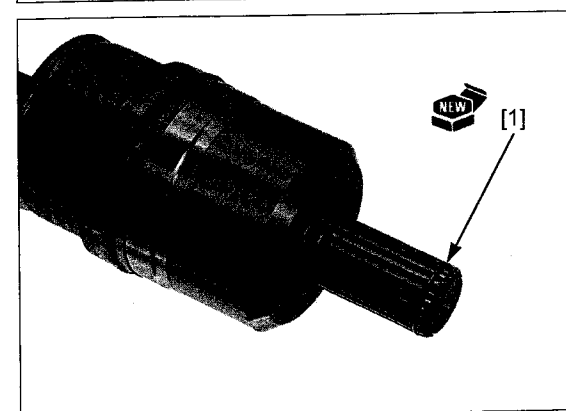
Apply molybdenum disulfide grease to the splines [1] of the drive shaft assembly.



Install a new snap ring [1] into the universal joint groove.



Install a new stopper ring [1] into the drive shaft groove.

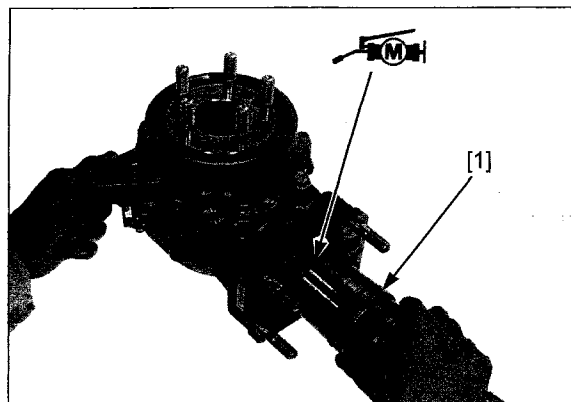


## FINAL DRIVE

Apply 1.0 – 1.5 g (0.04 – 0.05 oz) of molybdenum disulfide grease to the pinion shaft splines.

*Make sure the stopper ring is seated properly by pulling on the drive shaft lightly.*

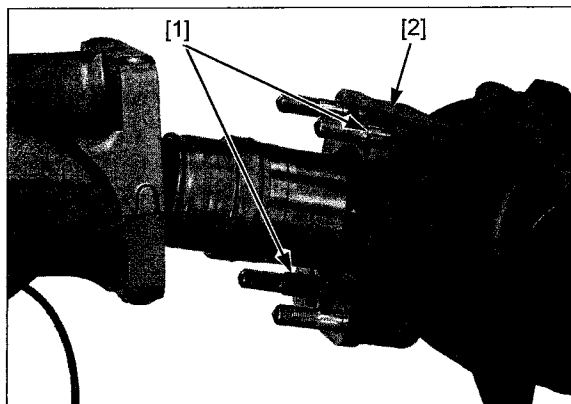
Install the drive shaft assembly [1] into the pinion shaft until the stopper ring seats in the pinion shaft spline groove.



Apply grease to the splines of output shaft.

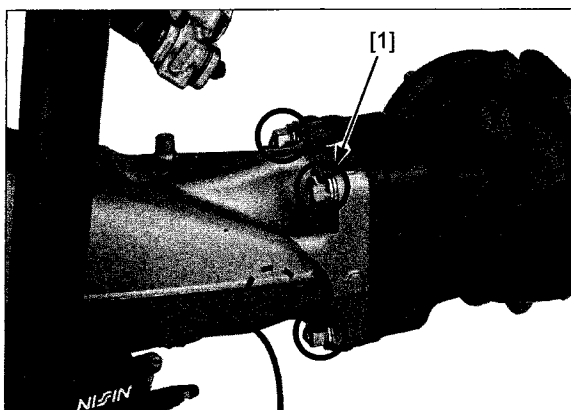
Install the dowel pins [1] to the final gear case assembly.

Insert the final drive assembly [2] into the swingarm and align the drive shaft splines with the output shaft splines.



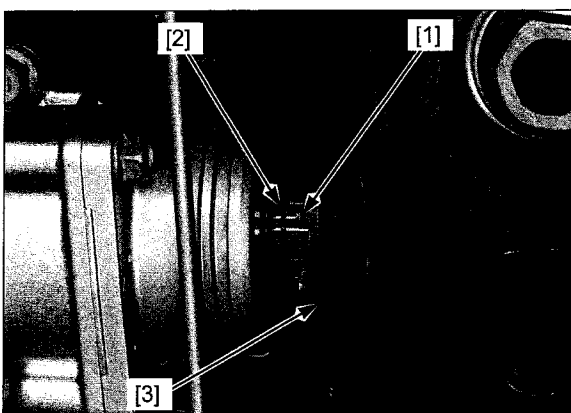
Install the final gear case assembly mounting nuts [1] and tighten them to the specified torque in a crisscross pattern in several steps.

**TORQUE:** 88 N·m (9.0 kgf·m, 65 lbf·ft)



Set the snap ring [1] into the output shaft groove [2] securely.

Install the drive shaft boot [3] securely.



Install the two dowel pins [1] to the ring gear.

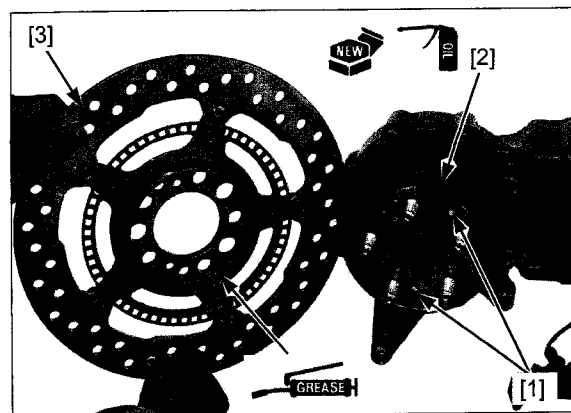
Apply oil to a new O-ring [2] and install it to the ring gear groove securely.

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

Apply grease to rear brake disc flange [3] inner surface.

*Be careful not to pinch the final gear case oil seal lips.*

Install the rear brake disc flange to the final gear case by aligning the disc flange holes with the dowel pins.



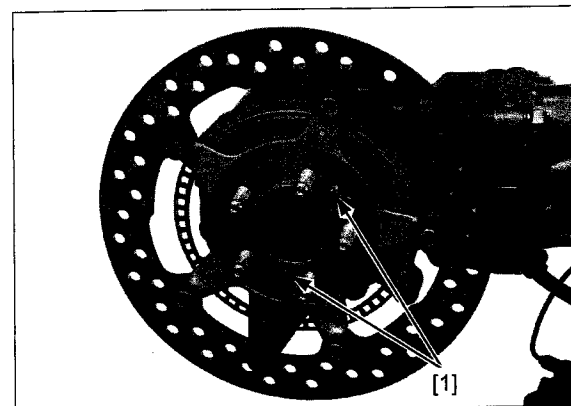
Install the rear brake disc flange mounting screws [1] to the specified torque.

**TORQUE: 9.0 N·m (0.9 kgf·m, 6.6 lbf·ft)**

Install the following:

- rear brake caliper (page 17-37)
- rear wheel (page 16-5)

Fill the final gear case with the recommended gear oil (page 4-20).





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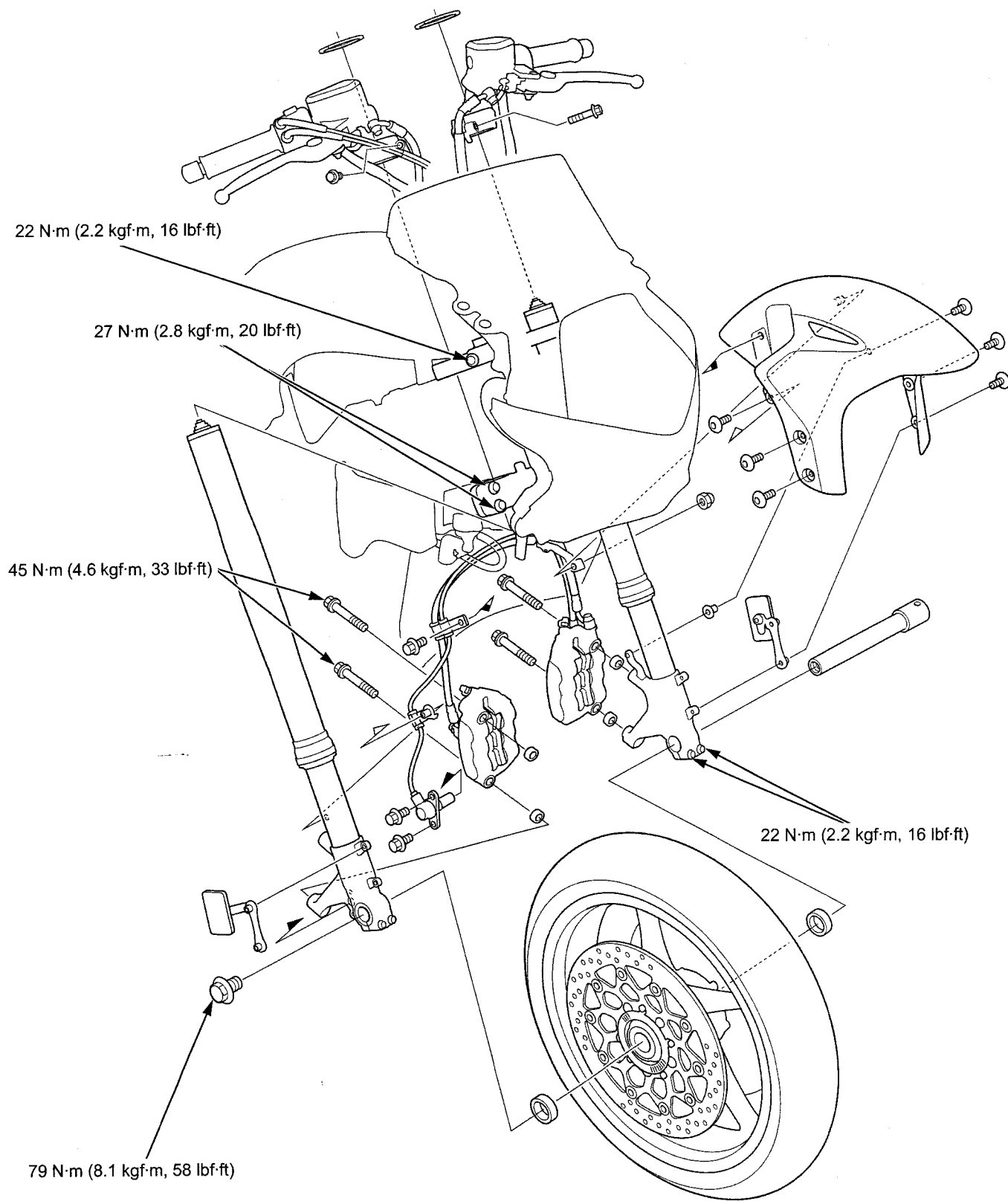
# MEMO

# 15. FRONT WHEEL/SUSPENSION/STEERING

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COMPONENT LOCATION .....	15-2	FRONT WHEEL .....	15-13
SERVICE INFORMATION .....	15-3	FORK.....	15-19
TROUBLESHOOTING.....	15-6	STEERING STEM .....	15-30
HANDLEBARS .....	15-7		

COMPONENT LOCATION



# SERVICE INFORMATION

## GENERAL

- When servicing the front wheel, fork or steering stem, support the motorcycle using a safety stand or hoist.
- A contaminated brake disc or pad reduces stopping power. Discard contaminated pads and clean a contaminated disc with a high quality brake degreasing agent.
- After the front wheel installation, check the brake operation by applying the brake lever and pedal.
- Refer to the brake system information (page 17-4).
- Use only tires marked "TUBELESS" and tubeless valve stems on rim marked "TUBELESS TIRE APPLICABLE".

## SPECIFICATIONS

Unit: mm (in)

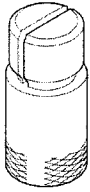
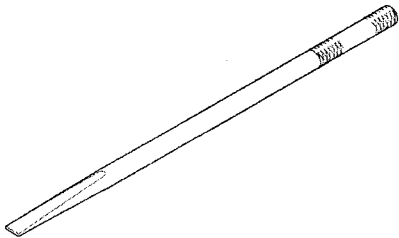
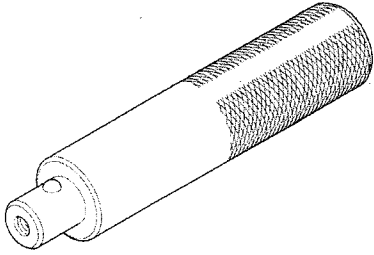
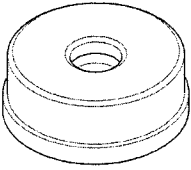

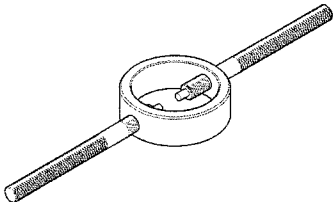
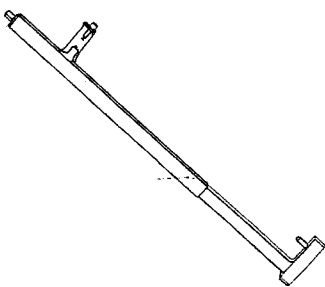
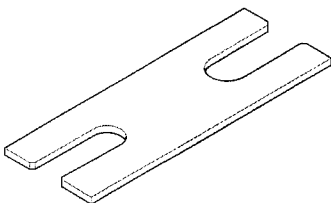
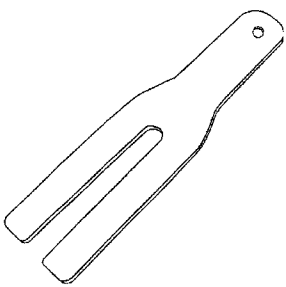
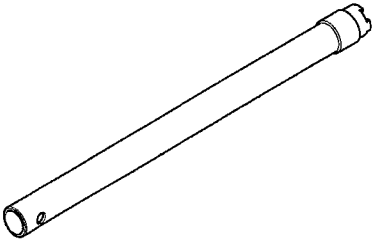
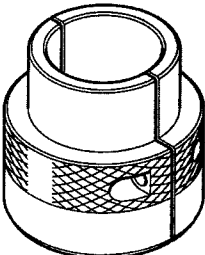
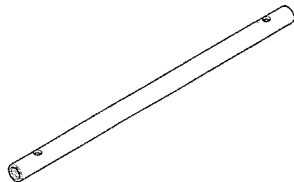
ITEM		STANDARD	SERVICE LIMIT
Minimum tire tread depth		—	1.5 (0.06)
Cold tire pressure	Up to 90 kg (200 lb) load	250 kPa (2.50 kgf/cm <sup>2</sup> , 36 psi)	—
	Up to maximum weight capacity	250 kPa (2.50 kgf/cm <sup>2</sup> , 36 psi)	—
Axle runout		—	0.2 (0.01)
Wheel rim runout	Radial	—	2.0 (0.08)
	Axial	—	2.0 (0.08)
Wheel balance weight		—	60 g (2.1 oz) max.
Fork	Spring free length	232.8 (9.17)	228.1 (8.98)
	Tube runout	—	0.20 (0.008)
	Pre-load adjuster initial setting	9 mm (0.4 in) from top surface of fork bolt	—
	Rebound damping adjuster initial setting	6 clicks from fully hard position	—
	Recommended fork fluid	KHL 15-10 (KYB)	—
	Fluid level	160 (6.3)	—
	Fluid capacity	497 ± 3 cm <sup>3</sup> (16.8 ± 0.1 US oz, 17.5 ± 0.1 Imp oz)	—
Steering head bearing pre-load		16.7 – 20.6 N (1.7 – 2.1 kgf, 3.7 – 4.6 lbf)	—

## TORQUE VALUES

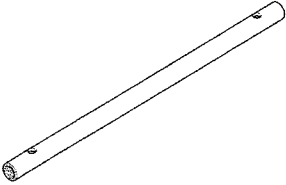
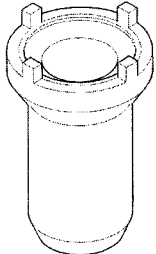
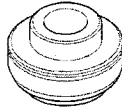
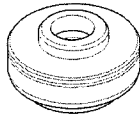
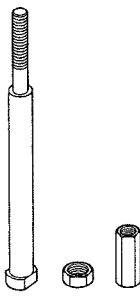
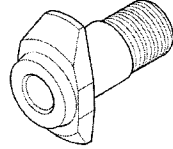
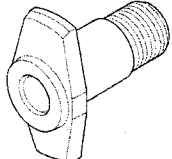
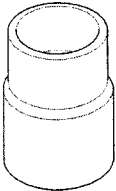
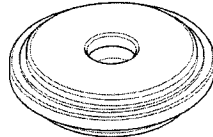
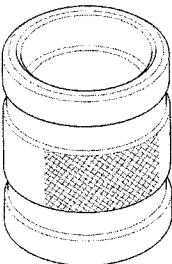
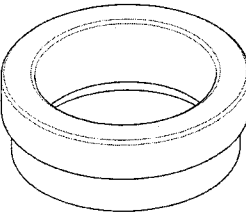
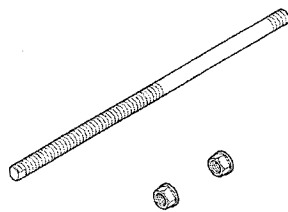
Handlebar weight mounting screw	10 N·m (1.0 kgf·m, 7 lbf·ft)	ALOC screw; replace with a new one.
Left handlebar switch housing screw	2.5 N·m (0.3 kgf·m, 1.8 lbf·ft)	
Clutch master cylinder holder bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	
Right handlebar switch/throttle housing screw	2.5 N·m (0.3 kgf·m, 1.8 lbf·ft)	
Front brake disc bolt	20 N·m (2.0 kgf·m, 14 lbf·ft)	ALOC bolt; replace with a new one.
Front wheel pulser ring mounting bolt	7.0 N·m (0.7 kgf·m, 5.2 lbf·ft)	ALOC bolt; replace with a new one.
Front axle bolt	79 N·m (8.1 kgf·m, 58 lbf·ft)	
Front axle holder pinch bolt	22 N·m (2.2 kgf·m, 16 lbf·ft)	
Front brake caliper mounting bolt	45 N·m (4.6 kgf·m, 33 lbf·ft)	ALOC bolt; replace with a new one.
Fork socket bolt	20 N·m (2.0 kgf·m, 15 lbf·ft)	Apply a locking agent to the threads.
Fork damper rod lock nut	15.5 N·m (1.6 kgf·m, 11 lbf·ft)	
Fork bottom bridge pinch bolt	27 N·m (2.8 kgf·m, 20 lbf·ft)	
Fork bolt	22 N·m (2.2 kgf·m, 16 lbf·ft)	
Fork top bridge pinch bolt	22 N·m (2.2 kgf·m, 16 lbf·ft)	
Steering bearing adjusting nut	—	See page 15-37
Steering bearing adjusting lock nut	—	See page 15-37
Brake hose clamped stay bolt	10 N·m (1.0 kgf·m, 7 lbf·ft)	
Steering stem nut	103 N·m (10.5 kgf·m, 76 lbf·ft)	

# FRONT WHEEL/SUSPENSION/STEERING

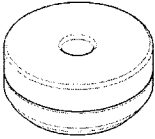
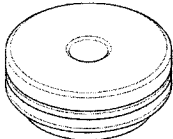

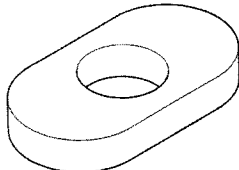
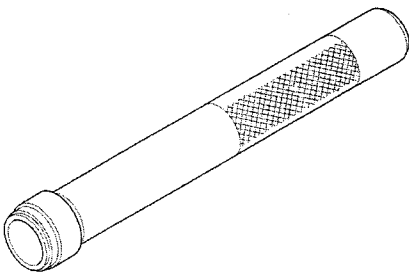
## TOOLS

<p>Bearing remover head, 25 mm 07746-0050800</p> 	<p>Bearing remover shaft 07GGD-0010100</p> 	<p>Driver 07749-0010000</p> 
<p>Attachment, 52 x 55 mm 07746-0010400</p> 	<p>Pilot, 25 mm 07746-0040600</p> 	<p>Spring collar holder 070MF-MBZC110</p>  <p>NOTE: This tool is a part of fork damper install set (P/N 070MF-MBZC100) (Not available in U.S.A.)</p>
<p>Fork spring compressor 07AMC-MFJA100 (U.S.A. only)</p> 	<p>Stopper plate 070MF-MBZC130</p>  <p>NOTE: This tool is a part of fork damper install set (P/N 070MF-MBZC100) (Not available in U.S.A.)</p>	<p>Fork rod stopper 07AMB-KZ3A100 (U.S.A. only)</p> 
<p>Fork damper holder 07YMB-MCF0101</p>  <p>or 07YMB-MCFA100 (U.S.A. only)</p>	<p>Fork seal driver 07YMD-MCF0100</p>  <p>or 07NMD-KZ3010A (U.S.A. only)</p>	<p>Damper rod holder 070MF-MBZC120</p>  <p>NOTE: This tool is a part of fork damper install set (P/N 070MF-MBZC100) (Not available in U.S.A.)</p>

# FRONT WHEEL/SUSPENSION/STEERING

<p>Damper rod holder 070MF-MBZA120 (U.S.A. only)</p> 	<p>Steering stem socket 07916-3710101</p> 	<p>Installer attachment, 47 x 5.5 mm 07946-KM90100</p>  <p>(not available in U.S.A.)</p>
<p>Installer attachment, 55 x 6 mm 07946-KM90200</p>  <p>(not available in U.S.A.)</p>	<p>Installer shaft 07946-KM90301</p>  <p>(Not available in U.S.A.)</p>	<p>Remover attachment, 43 mm 07946-KM90401</p>  <p>(not available in U.S.A.)</p>
<p>Remover attachment, 47 mm 07946-KM90500</p>  <p>(not available in U.S.A.)</p>	<p>Base, 48.4/56 07946-KM90600</p>  <p>(not available in U.S.A.)</p>	<p>Main bearing installer, 50 x 54 mm 07946-ME90200</p> 
<p>Fork seal driver weight, 45.5 x 54.3 mm 07947-KA50100</p> 	<p>Oil seal driver, 58 x 72 mm 07965-MA60000</p> 	<p>Installer shaft 15 x 370L 07VMF-KZ30200 (U.S.A. only)</p> 

## FRONT WHEEL/SUSPENSION/STEERING

Installer attachment A 07VMF-MAT0100 (U.S.A. only) 	Installer attachment B 07VMF-MAT0200 (U.S.A. only) 	Remover attachment A 07VMF-MAT0300 (U.S.A. only) 
Remover attachment B 07VMF-MAT0400 (U.S.A. only) 	Steering stem driver 07946-MB00000 	

## TROUBLESHOOTING

### Hard steering

- Steering head bearing adjustment nut too tight
- Worn or damaged steering head bearings
- Bent steering stem
- Insufficient tire pressure

### Steers to one side or does not track straight

- Damaged or loose steering head bearings
- Bent forks
- Bent axle
- Bent frame
- Worn or damaged wheel bearings
- Worn or damaged swingarm pivot bearings

### Front wheel wobbling

- Bent rim
- Worn or damaged front wheel bearings
- Faulty tire
- Unbalanced front tire and wheel

### Front wheel hard to turn

- Faulty front wheel bearing
- Bent front axle
- Front brake drag

### Soft suspension

- Insufficient fluid in fork
- Incorrect fork fluid weight
- Weak fork springs
- Insufficient tire pressure

### Stiff suspension

- Bent fork tubes
- Too much fluid in fork
- Incorrect fork fluid weight
- Clogged fork fluid passage

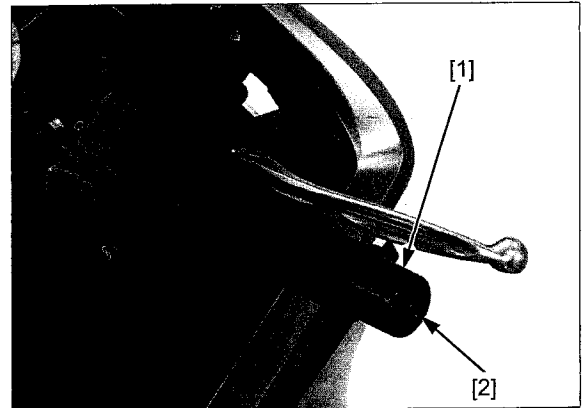
### Front suspension noise

- Insufficient fluid in fork
- Loose fork fasteners

## HANDLEBARS

### RIGHT HANDLEBAR REMOVAL

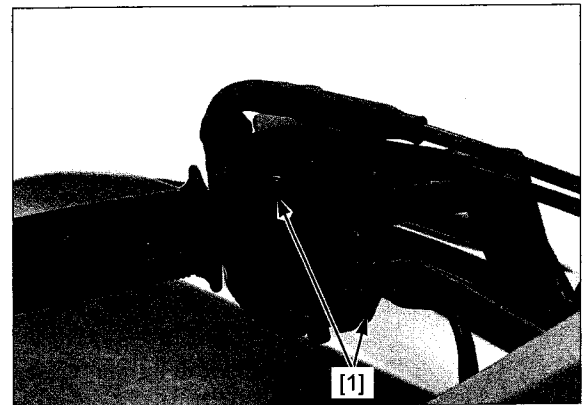
Hold the handlebar weight [1] and remove the mounting screw [2] and the weight.



*Without removing the brake hose from the front brake master cylinder and keep the front brake master reserve tank upright to prevent air from entering the hydraulic system.*

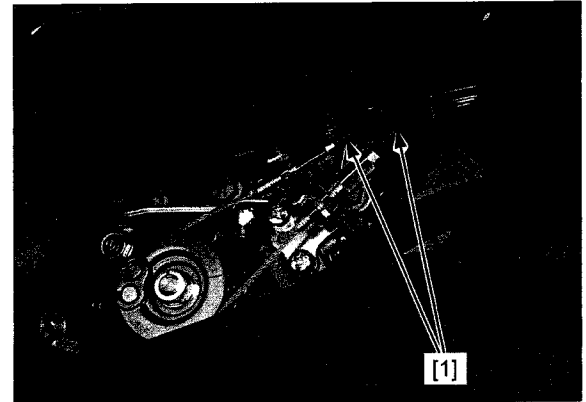
Remove the front brake master cylinder (page 17-18).

Remove the screws [1] and right handlebar switch/throttle upper housing.



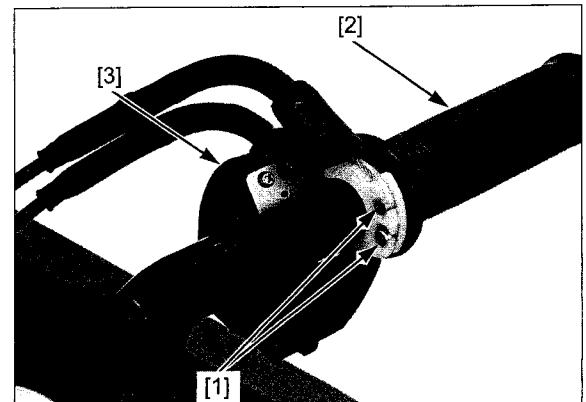
Remove the right middle cowl (page 3-7).

Loosen the lock nut, adjusting nuts and disconnect the throttle cables [1] from the throttle drum.



Disconnect the throttle cables [1] from the throttle pipe and remove the throttle grip [2] from the right handlebar.

Remove the right handlebar switch/throttle housing [3] from the handlebar.

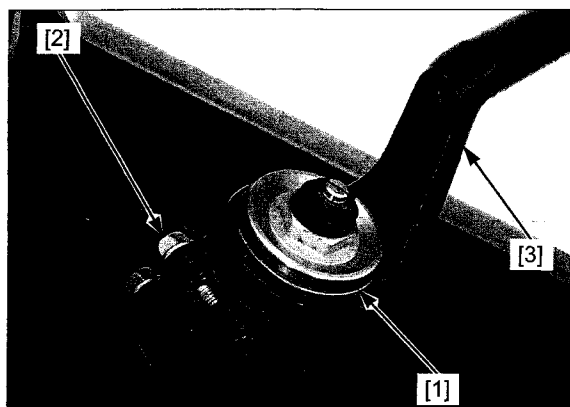




## FRONT WHEEL/SUSPENSION/STEERING

Remove the stop ring [1] from the fork slider.

Loosen the pinch bolt [2] and remove the handlebar [3].

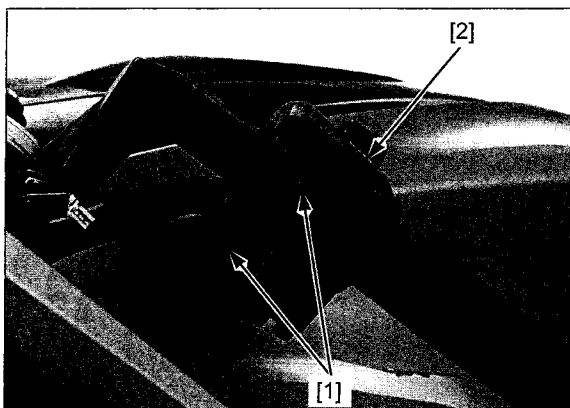


### LEFT HANDLEBAR REMOVAL

*Without removing the clutch hose from the clutch master cylinder and keep the clutch master reserve tank upright to prevent air from entering the hydraulic system.*

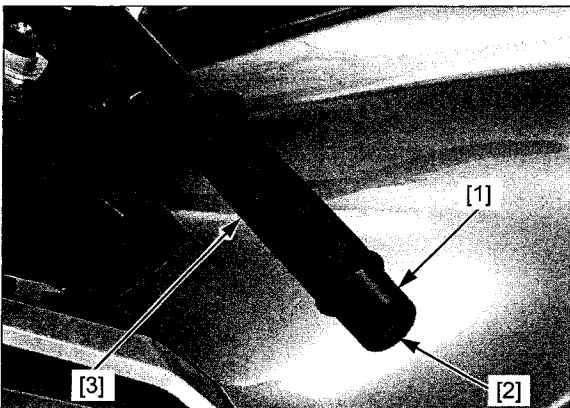
Remove the clutch master cylinder (page 10-7).

Remove the screws [1] and left handlebar switch housing [2].



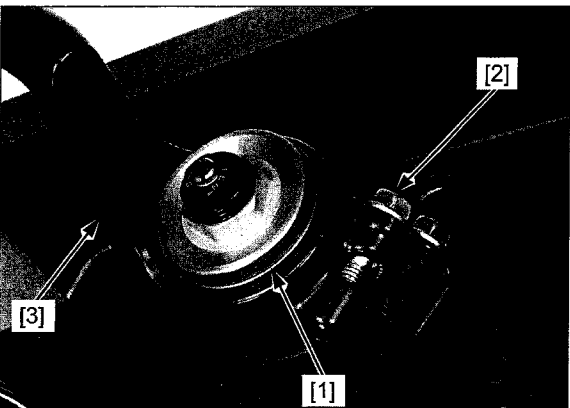
Hold the handlebar weight [1] and remove the mounting screw [2] and the weight.

Remove the handle grip [3] from the handlebar.



Remove the stop ring [1] from the fork slider.

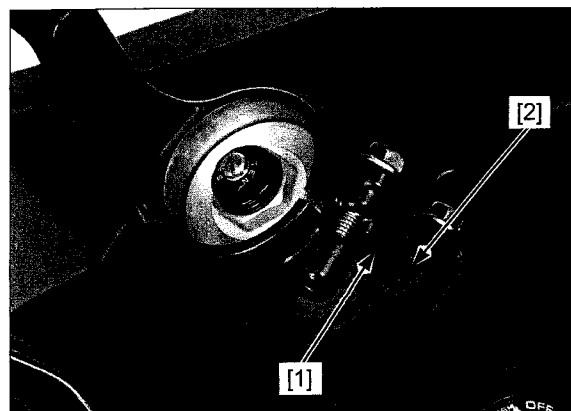
Loosen the handlebar pinch bolt [2] and remove the handlebar [3].



## LEFT HANDLEBAR INSTALLATION

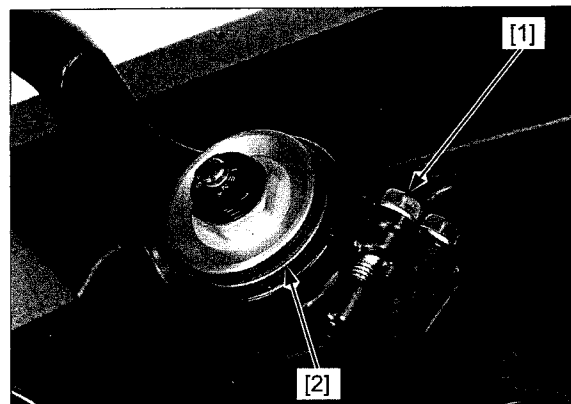
Install the left handlebar onto the fork slider, aligning its boss [1] with the groove [2] in the fork top bridge.

Make sure the handlebar is seated on the top bridge.



Tighten the handlebar pinch bolt [1] securely.

Install the stop ring [2] into the fork tube groove.

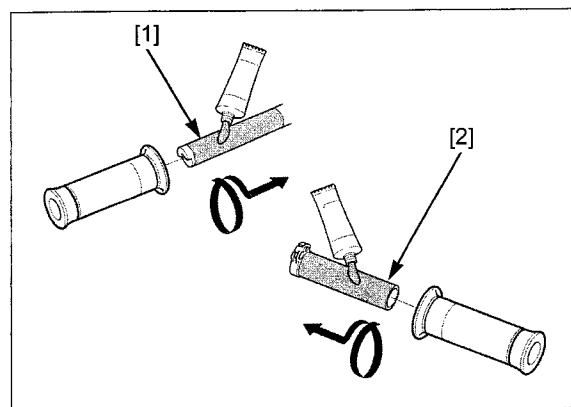


Apply Honda Bond A or equivalent to the inside of the grip and to the clean surfaces of the left handlebar [1] and throttle grip [2].

Wait 3 – 5 minutes and install the grip.

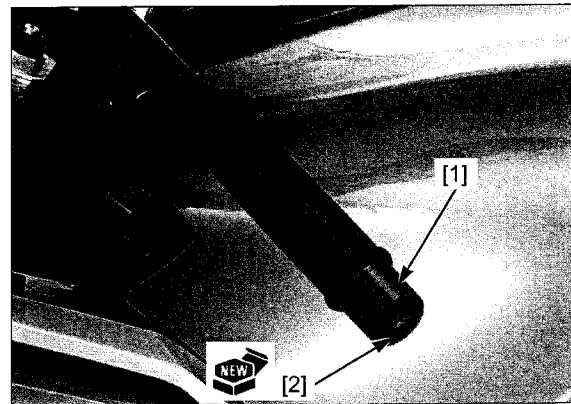
*Allow the adhesive to dry for an hour before using.*

Rotate the grip for even application of the adhesive.



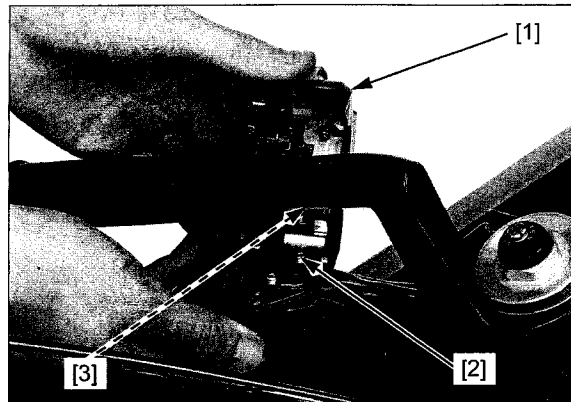
Install the left handlebar weight [1] and tighten a new screw [2] to the specified torque while holding the handlebar weight.

**TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)**



## FRONT WHEEL/SUSPENSION/STEERING

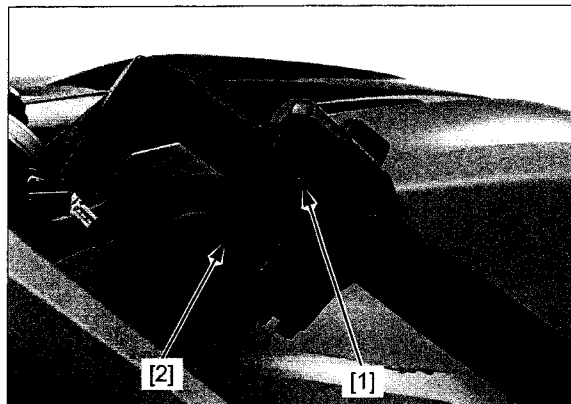
Install the left handlebar switch housing [1] aligning its locating pin [2] with the hole [3] in the handlebar.



Tighten the forward screw [1] first, then the rear screw [2] to the specified torque.

**TORQUE: 2.5 N·m (0.25 kgf·m, 1.8 lbf·ft)**

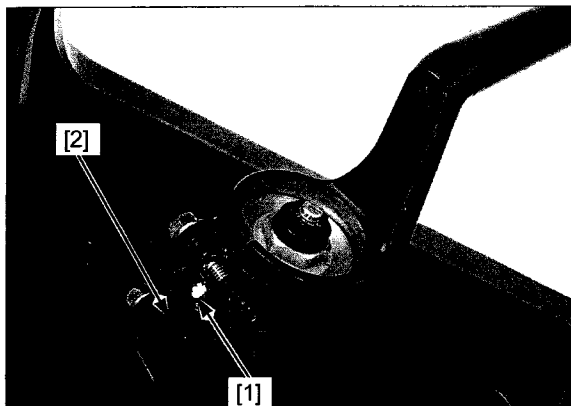
Install the clutch master cylinder (page 10-7).



### RIGHT HANDLEBAR INSTALLATION

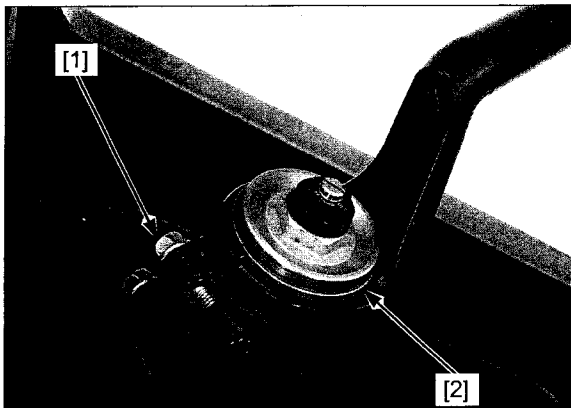
Install the right handlebar onto the fork slider while aligning its boss [1] with the groove [2] of the top bridge.

Make sure the handlebar is seated on the top bridge.

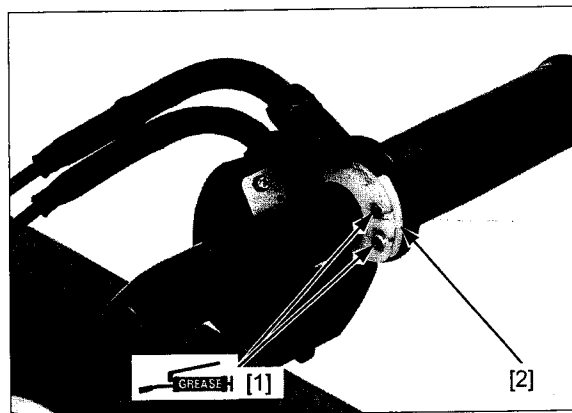


Tighten the handlebar pinch bolt [1] securely.

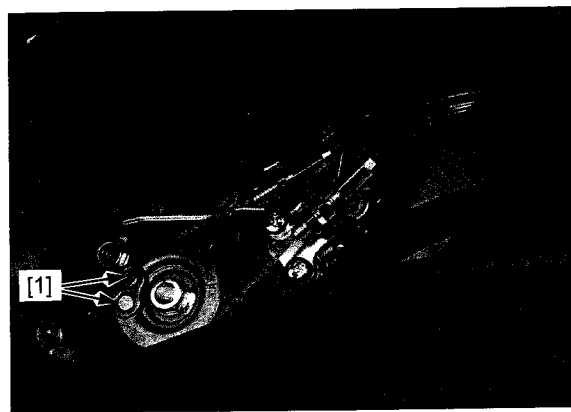
Install the stop ring [2] into the fork slider groove.



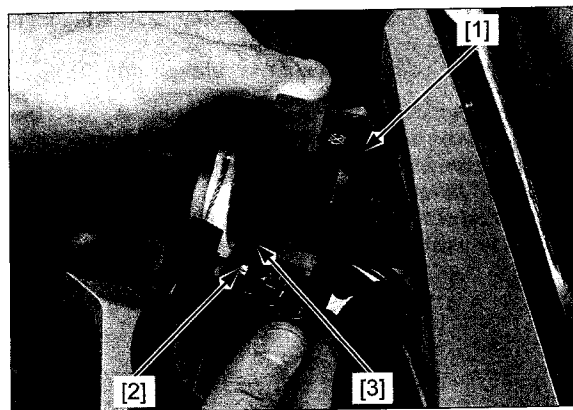
Apply grease to the throttle cable ends [1].  
Connect the throttle cables to the throttle pipe [2].



*Adjust the throttle grip freeplay After the installation.* Connect the throttle cable ends [1] to the throttle drum.  
Tighten the lock nuts securely.



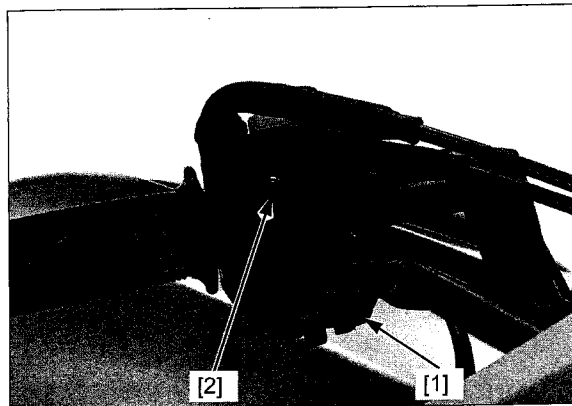
Install the right handlebar switch/throttle housing [1] by aligning its locating pin [2] with the hole [3] in the handlebar.



Tighten the forward screw [1] first, then the rear screw [2] to the specified torque.

**TORQUE: 2.5 N·m (0.25 kgf·m, 1.8 lbf·ft)**

Install the front brake master cylinder (page 17-18).

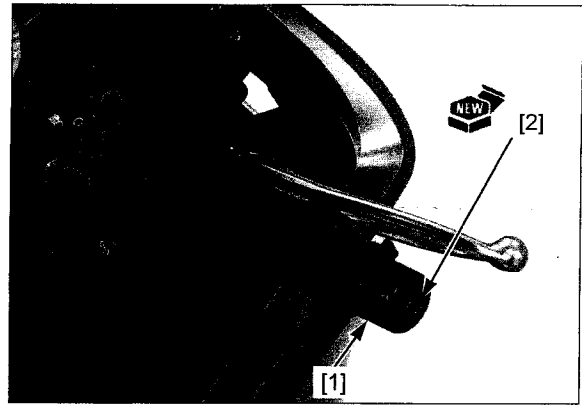


## FRONT WHEEL/SUSPENSION/STEERING

Install the handlebar weight [1] and tighten a new mounting screw [2] to the specified torque while holding the handlebar weight.

**TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)**

Adjust the throttle grip freeplay (page 4-5).

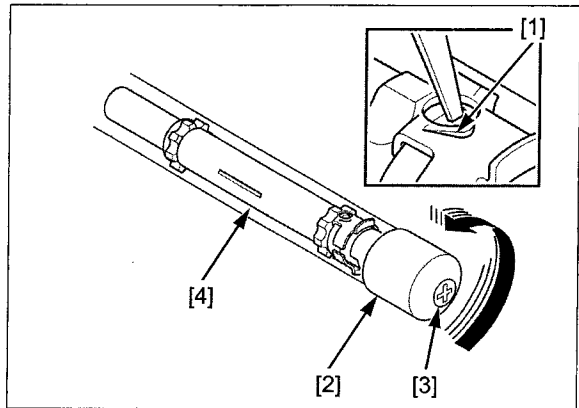


### Handlebar Weight Replacement

Remove the left grip and throttle pipe from the handlebar.  
Straighten the weight retainer tab [1] with a screwdriver or punch.

*Apply lubricant spray through the tab locking hole to the rubber for easy removal.*

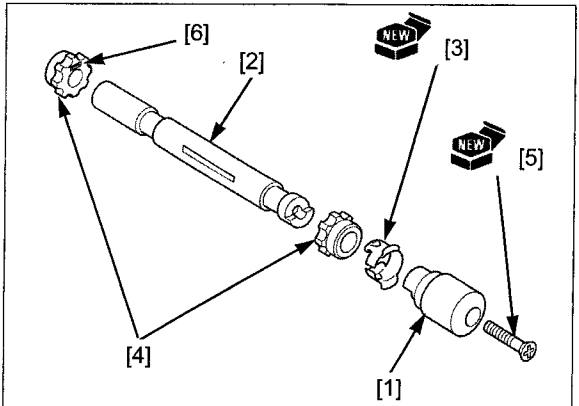
Temporarily install the handlebar weight [2] and screw [3], then remove the inner weight assembly [4] by turning the grip end.



Remove the handlebar weight [1] from the inner weight [2].  
Discard the retainer ring [3].

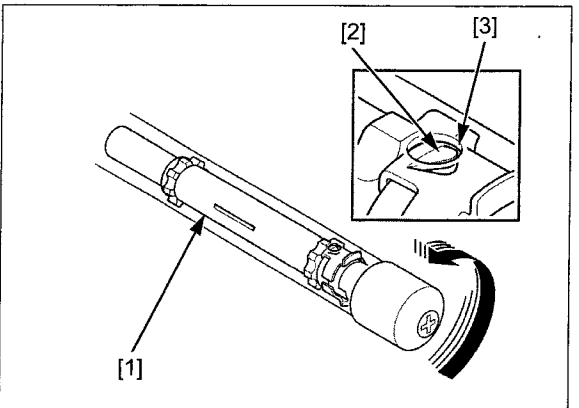
*Install the rubber cushion with identification mark "MB 6" [6] to the inward of inner weight.*

Install the rubber cushions [4] onto the inner weight. Install the new retainer onto the inner weight, aligning the flats with each other. Tighten the screw [5] while holding the weight securely.



Insert the handlebar weight assembly [1] into the handlebar.  
Turn the handlebar weight and hook the retainer tab [2] with the hole [3] in the handlebar.

Install the left grip and throttle pipe to the handlebar.



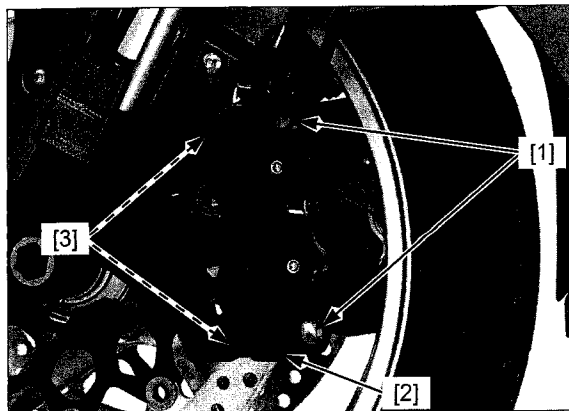
## FRONT WHEEL

### REMOVAL

Remove the bolts [1], brake calipers [2] and dowel pins [3].

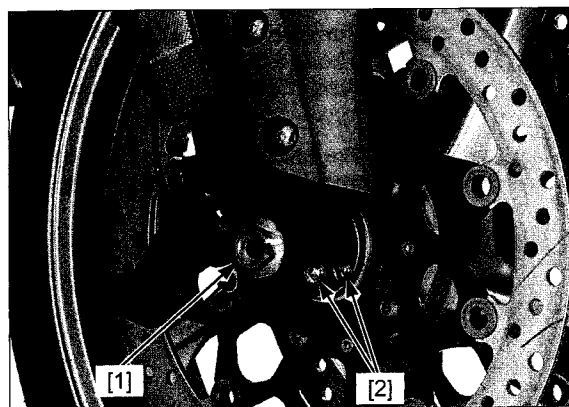
*Do not operate the brake lever or pedal after the brake caliper is removed.*

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.



Remove the axle bolt [1].

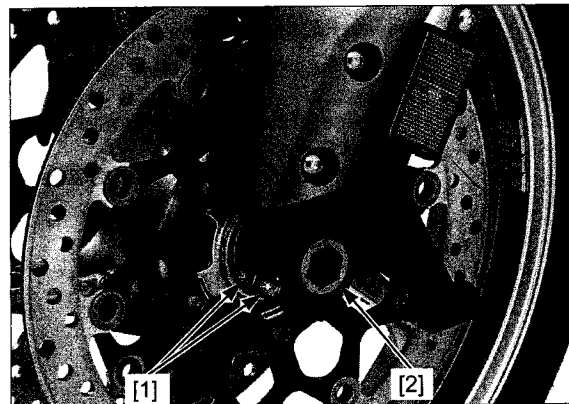
Loosen the right axle holder pinch bolts [2].



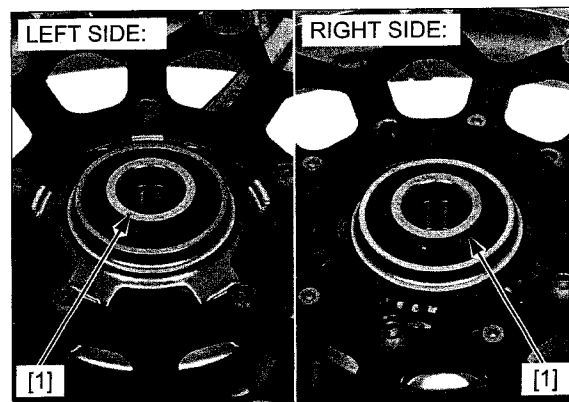
Loosen the left axle holder pinch bolts [1].

Support the motorcycle securely and raise the front wheel off the ground using a safety stand or a hoist.

Remove the axle shaft [2] and the front wheel.



Remove the right and left side collars [1].



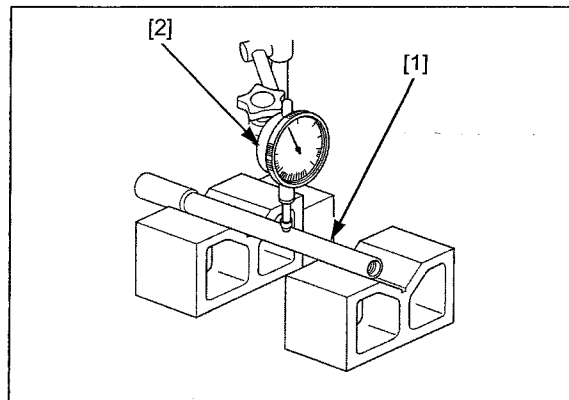
## FRONT WHEEL/SUSPENSION/STEERING

### INSPECTION

#### Axle

Set the axle shaft [1] in V-blocks.  
Turn the axle shaft and measure the runout using a dial indicator [2].  
Actual runout is 1/2 the total indicator reading.

**SERVICE LIMIT: 0.2 mm (0.01 in)**

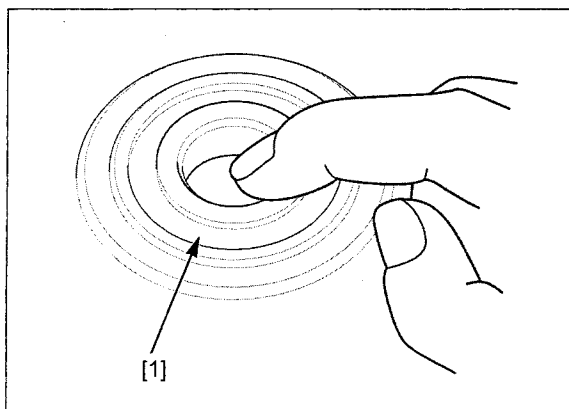


#### Wheel Bearing

Turn the inner race of each bearing [1] with your finger.  
The bearings should turn smoothly and quietly.  
Also check that the bearing outer race fits tightly in the hub.

*Replace the wheel bearings in pairs.*

Remove and discard the bearings if the races do not turn smoothly and quietly, or if they fit loosely in the hub (page 15-15).



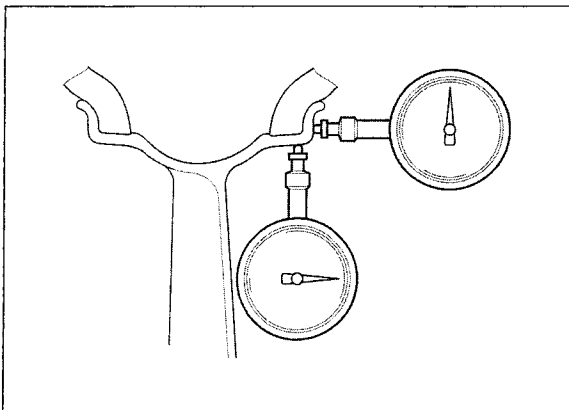
#### Wheel Rim Runout

Check the rim runout by placing the wheel in a truing stand.  
Spin the wheel slowly and read the runout using a dial indicator.  
Actual runout is 1/2 the total indicator reading.

#### SERVICE LIMITS:

**Radial: 2.0 mm (0.08 in)**

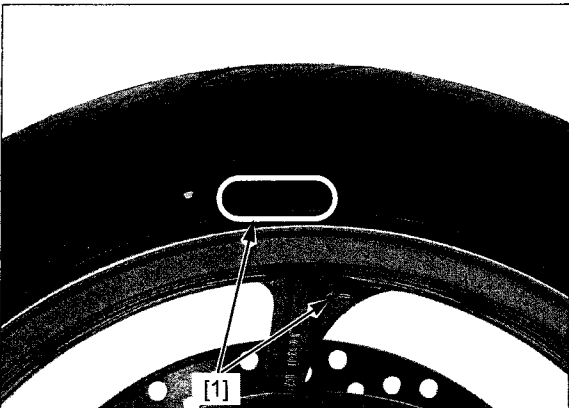
**Axial: 2.0 mm (0.08 in)**



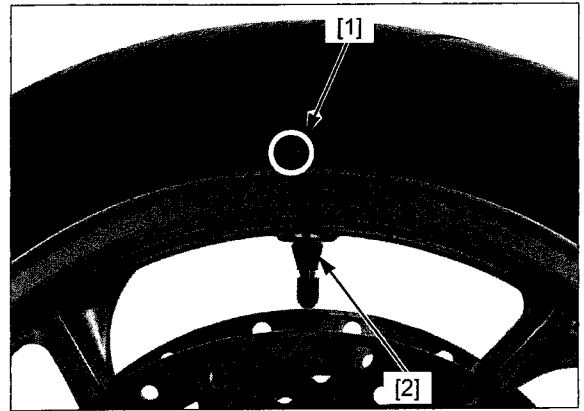
#### Wheel Balance

*Wheel balance directly affects the stability, handling and overall safety of the motorcycle. Carefully check balance before installing the wheel.*

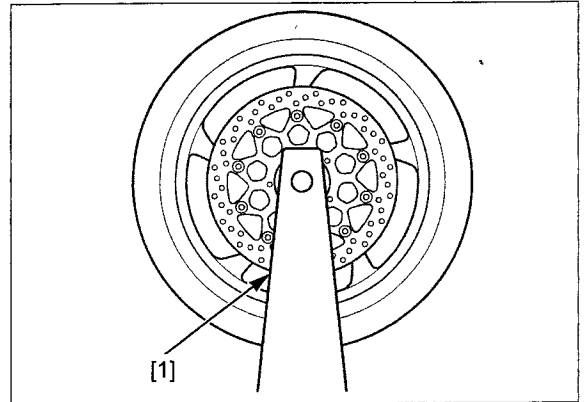
Note the rotating direction marks [1] on the wheel and tire, and upon tire installation, always fit the tire so the marks face the same direction.



- For optimum balance, the tire balance mark [1] (a paint dot on the side wall) must be located next to the valve stem [2]. Remount the tire if necessary.
- This motorcycle uses stick-type balance weight.
  - Before installing the weights, remove any adhesive from the rim thoroughly and clean the area where new weights are to be placed with a degreasing agent. Take care not to scratch the rim surface.
  - Do not touch the adhesive surface of the weight with your bare hands when installing.
  - The balance weights are always replaced with new ones whenever they are removed. Do not reuse them.



Remove the dust seals from the wheel.  
 Mount the wheel, tire and brake discs assembly in an inspection stand [1].  
 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.



*Attach a balance weight on the left side of the front wheel rim in the direction as shown.*

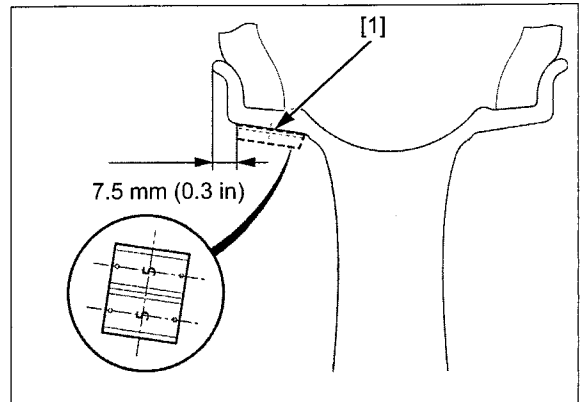
To balance the wheel, install a balance weight [1] on the lightest side of the rim, on the side opposite the chalk marks. Add just enough weight so the wheel will no longer stop in the same position when it is spun.

## NOTE:

- Use Honda genuine balance weight.
- Do not add more than 60 g (2.1 oz) to the wheel.

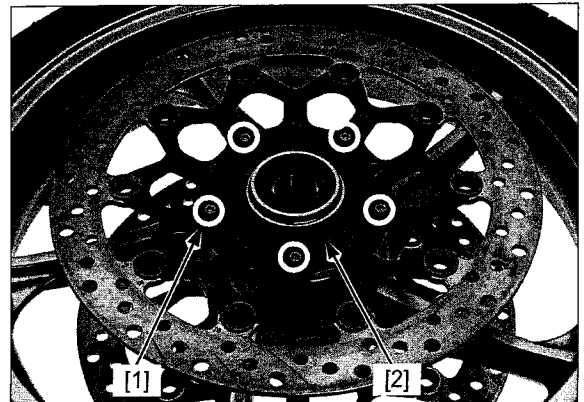
Press the weights by your hands firmly and make sure they are not come off the rim.

Install the dust seals.



## DISASSEMBLY

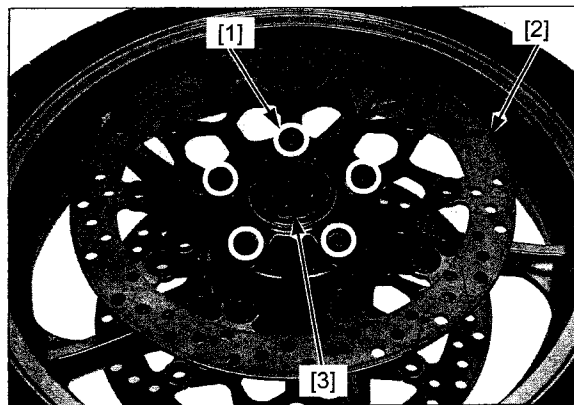
Remove the bolts [1] and front pulser ring [2] from the right brake disc.





## FRONT WHEEL/SUSPENSION/STEERING

Do not reuse the bolts. Remove the bolts [1] and brake discs [2].  
Remove the dust seals [3].

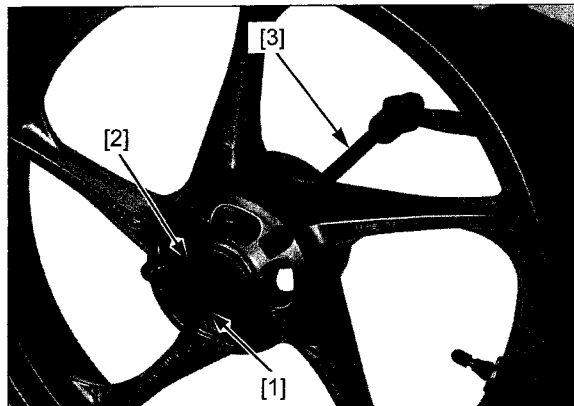


Replace the wheel bearings in pairs. Do not reuse old bearings.

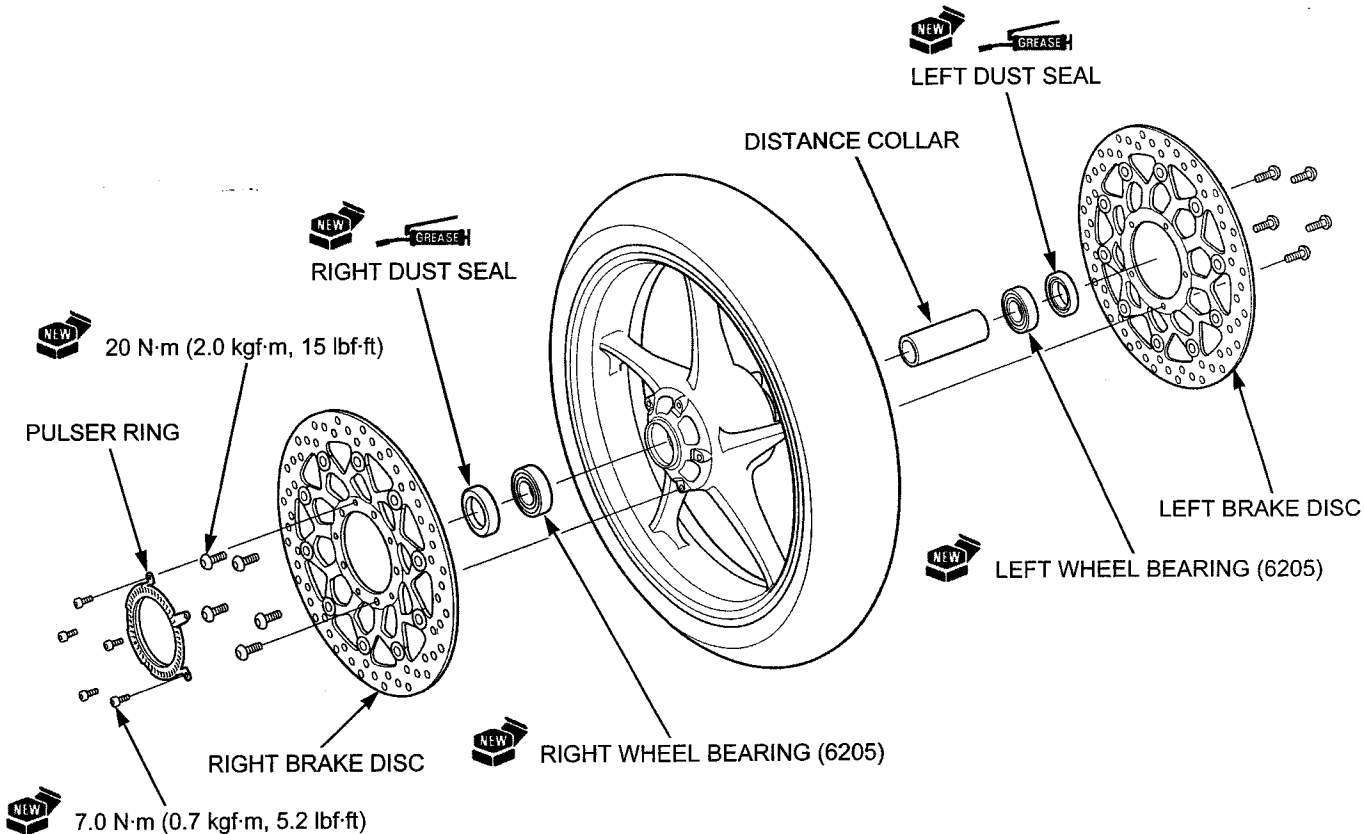
Install the bearing remover head [1] into the bearing [2]. From the opposite side, install the bearing remover shaft [3] and drive the bearing out of the wheel hub. Remove the distance collar and drive out the other bearing.

### TOOLS:

Bearing remover head, 25 mm 07746-0050800  
Bearing remover shaft 07GGD-0010100



## ASSEMBLY



Never install the old bearings. Once the bearings have been removed, the bearings must be replaced with new ones.

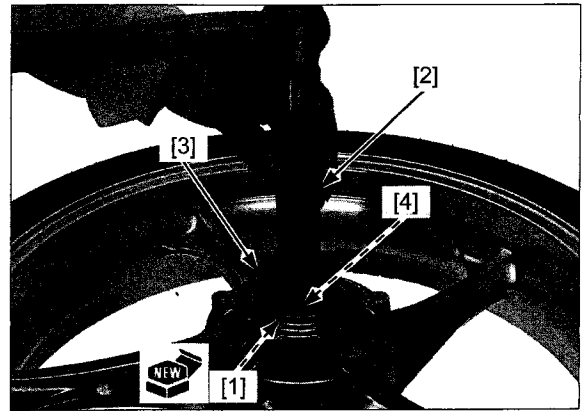
Drive in a new right bearing [1] squarely with the marked side facing up until fully seated. Install the distance collar. Drive in a new left bearing squarely with the marked side facing up until it is seated on the collar.

## TOOLS:

Driver [2] 07749-0010000  
Attachment, 52 x 55 mm [3] 07746-0010400  
Pilot, 25 mm [4] 07746-0040600

## NOTE:

Replace the wheel bearings in pairs.



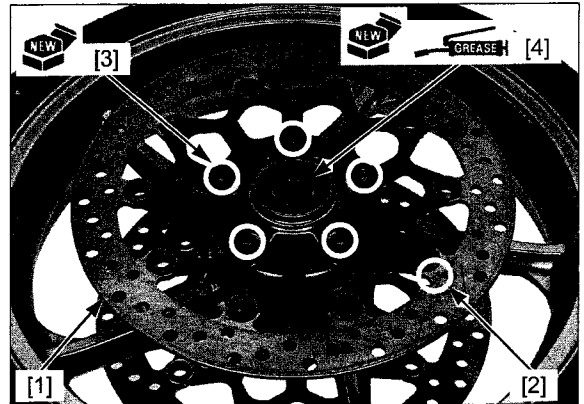
Check the spokes on the wheel for the direction mark.

Install the brake discs [1] with the arrow mark [2] facing in the direction of rotation. Install new disc bolts [3] and tighten them in a crisscross pattern in several steps.

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

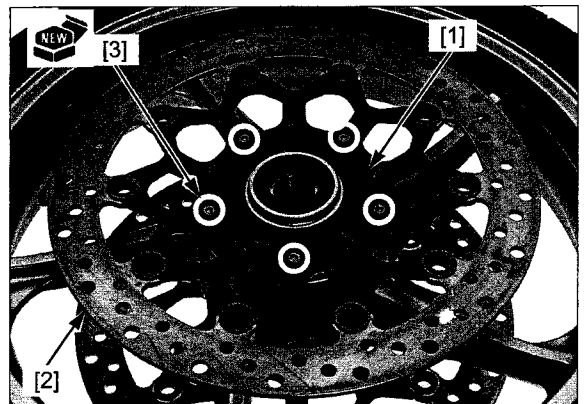
Do not get grease on the brake discs or stopping power will be reduced.

Apply grease to new dust seal lips [4], then install them into the wheel hub.



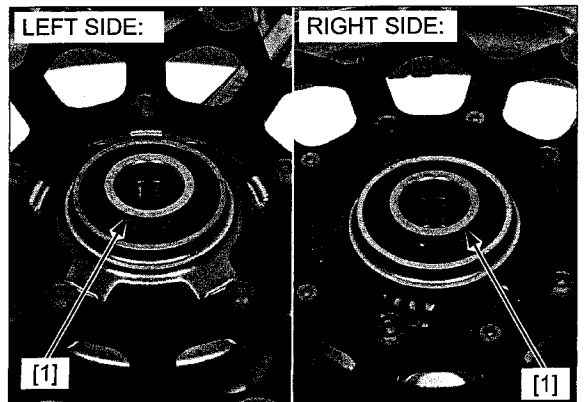
Install the front pulser ring [1] onto the right brake disc [2], then tighten new bolts [3] to the specified torque.

**TORQUE: 7.0 N·m (0.7 kgf·m, 5.2 lbf·ft)**



## INSTALLATION

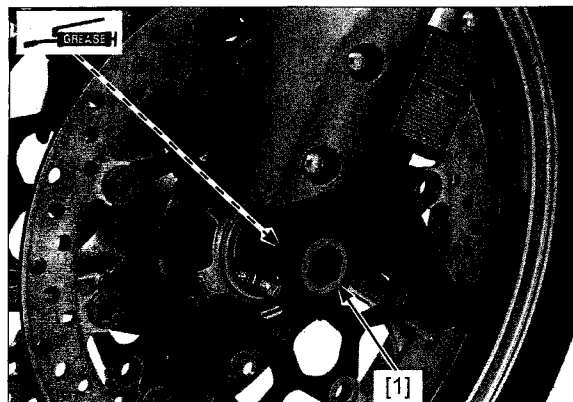
Install the right and left side collars [1].



## FRONT WHEEL/SUSPENSION/STEERING

Install the front wheel between the fork legs.

Apply a thin layer of grease to the axle shaft [1] surface.  
Install the axle shaft from the left side.

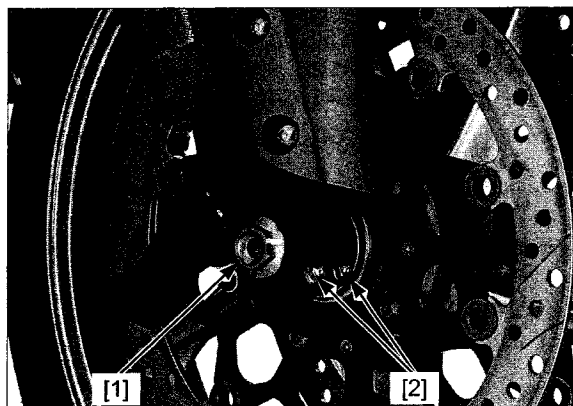


Hold the axle shaft and tighten the axle bolt [1] to the specified torque.

**TORQUE: 79 N·m (8.1 kgf·m, 58 lbf·ft)**

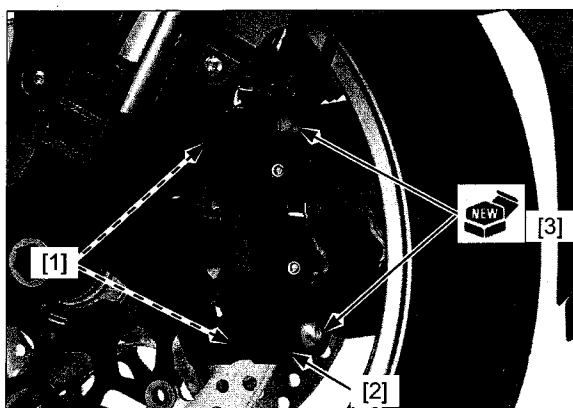
Tighten the right axle holder pinch bolts [2] to the specified torque.

**TORQUE: 22 N·m (2.2 kgf·m, 16 lbf·ft)**

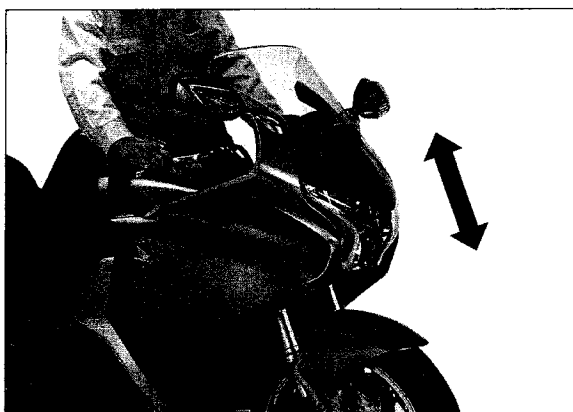


Install the dowel pins [1], brake calipers [2] and tighten new mounting bolts [3] to the specified torque.

**TORQUE: 45 N·m (4.6 kgf·m, 33 lbf·ft)**

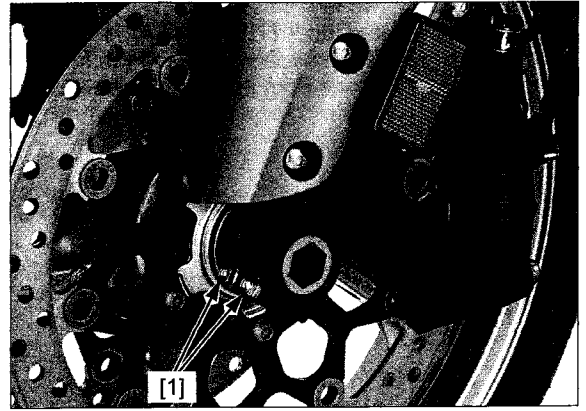


With the front brake applied, pump the fork up and down several times to seat the axle and check the brake operation by applying the brake lever and pedal.

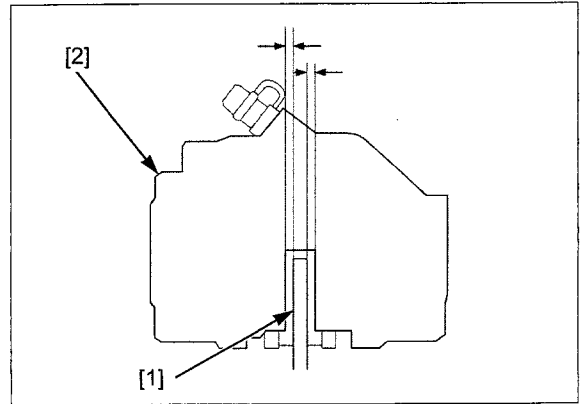


Tighten the left axle holder pinch bolts [1] to the specified torque.

**TORQUE: 22 N·m (2.2 kgf·m, 16 lbf·ft)**



Check that the clearances between the left and right surface of the brake disc [1] and brake caliper body [2] (not the brake pads) are symmetrical.



## FORK

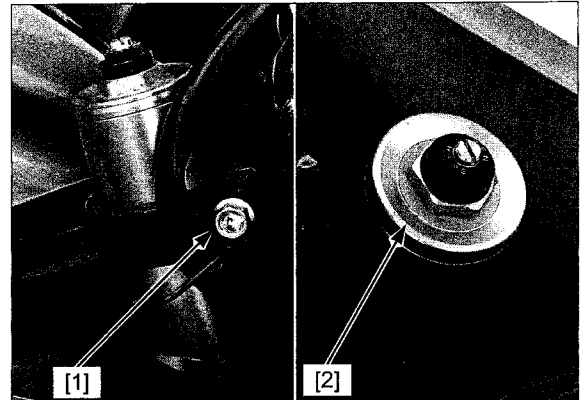
### REMOVAL

Remove the following:

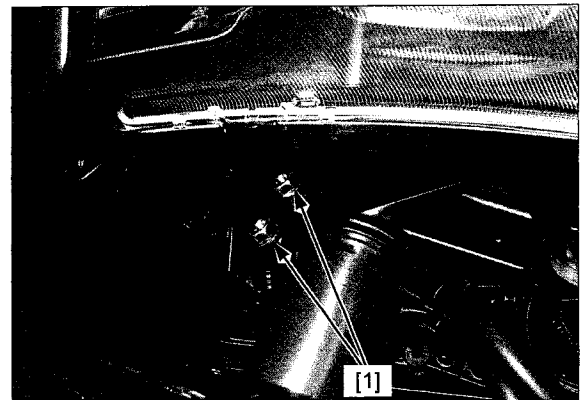
- front speed sensor (page 18-25)
- handlebars (page 15-7)
- front fender (page 3-11)
- front wheel (page 15-13)

Loosen the top bridge pinch bolt [1].

If the fork leg will be disassembled, loosen the fork bolt [2] but do not remove yet.

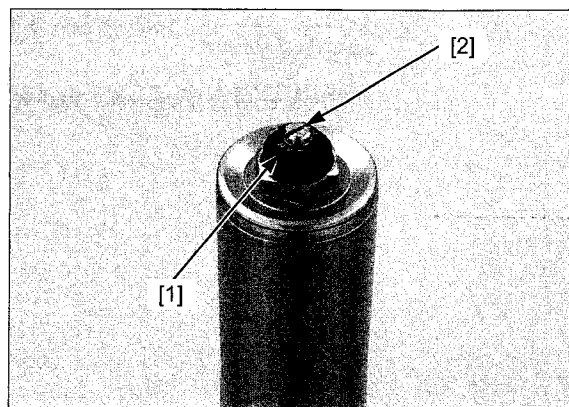


While holding the fork leg, loosen the fork bottom bridge pinch bolts [1] and remove the fork slider from the fork bridges.



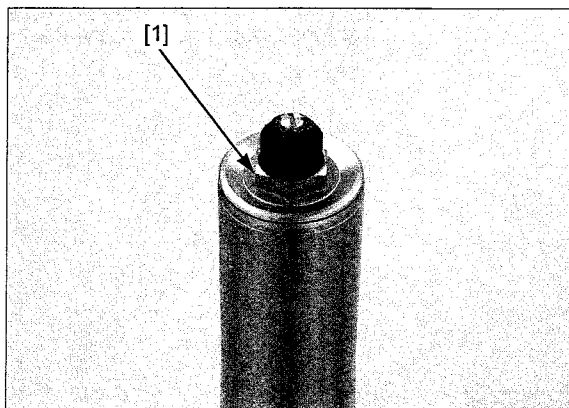
## FRONT WHEEL/SUSPENSION/STEERING

When disassembling the fork leg, turn the pre-load adjuster [1] and rebound adjuster [2] counterclockwise to the softest position (be sure to record the number of turns from the starting position).

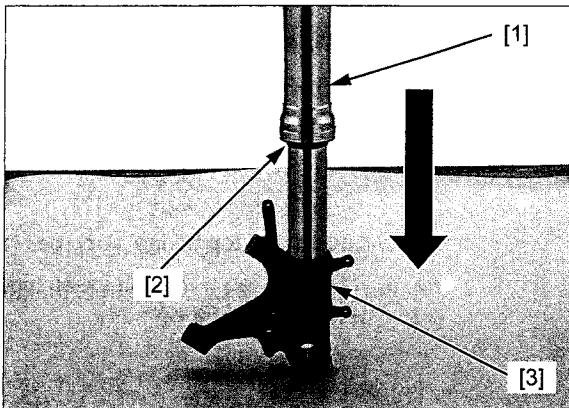


### DISASSEMBLY

Remove the fork bolt [1] from the fork slider.



Push the fork slider [1] slowly down, and gently seat the dust seal [2] onto the axle holder [3].



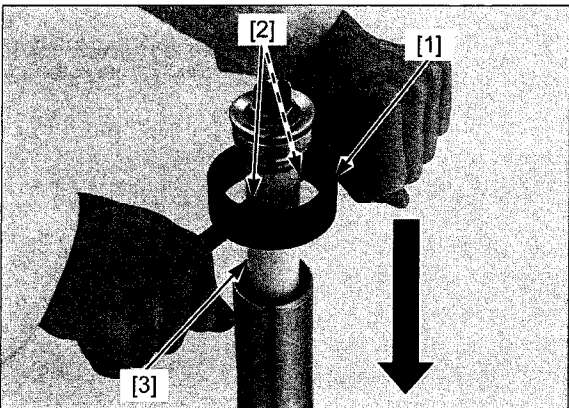
*Except U.S.A. tool:* Attach the spring collar holder [1] to the spring collar holes [2].  
*Be careful not to damage the spring collar holes.*

#### TOOL:

**Spring collar holder**

**070MF-MBZC110  
(Not available in  
U.S.A.)**

Compress the spring collar [3] with the spring collar holder.



*U.S.A. tool:* Attach the fork leg to the fork spring compressor post [1] as shown.

**TOOL:**

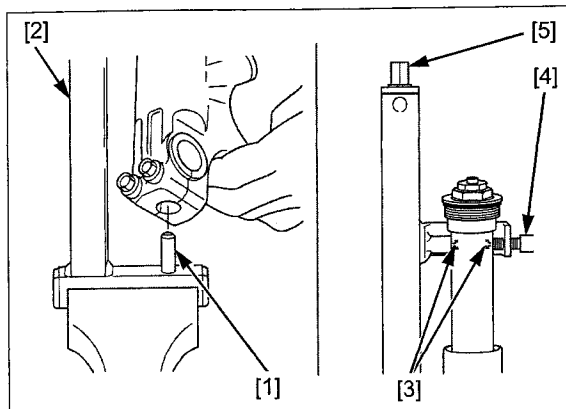
**[2] Fork spring compressor**

**07AMC-MFJA100**  
(U.S.A. only)

Align the spring collar holes with the pins [3].

To hold the spring collar, tighten the thumb screw [4] securely.

Tighten the nut [5] and compress the fork.



Insert the stopper plate [1] between the lock nut [2] and spring collar.

**TOOL:**

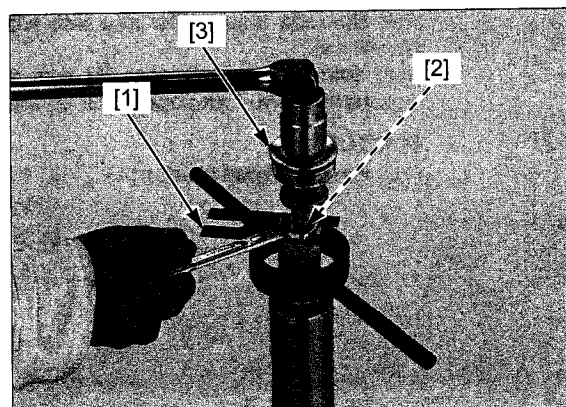
**Stopper plate**

**070MF-MBZC130**  
(Not available in U.S.A.) or

**Fork rod stopper**

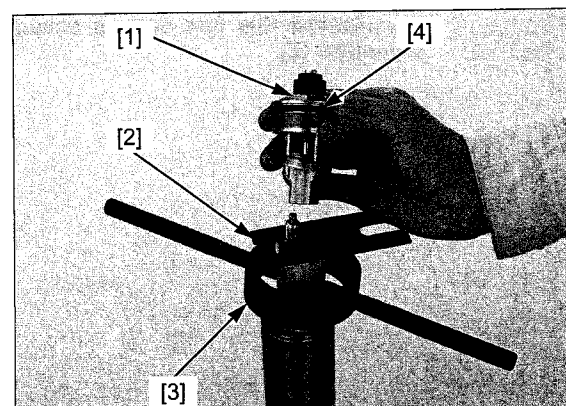
**07AMB-KZ3A100**  
(U.S.A. only)

Loosen the lock nut while holding the fork bolt [3].



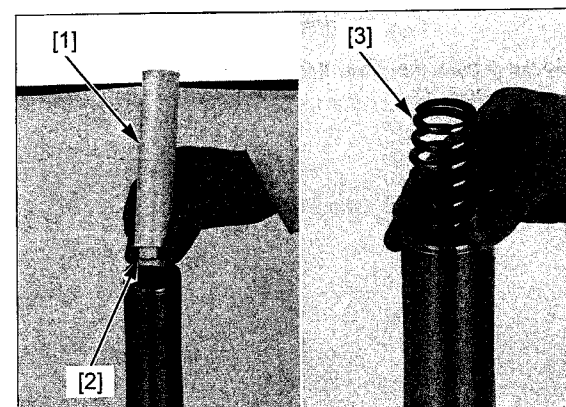
Remove the fork bolt [1].  
Remove the stopper plate [2] and spring collar holder [3].

Remove the O-ring [4] from the fork bolt.



Remove the following:

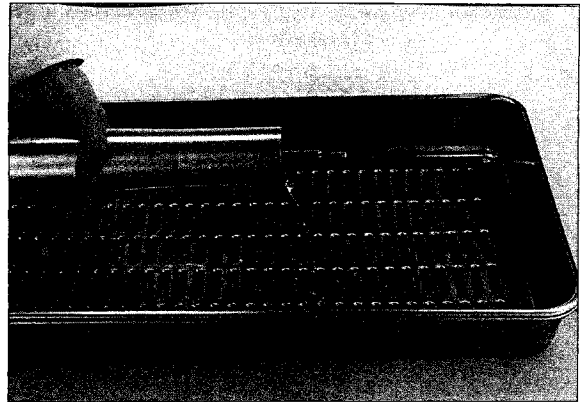
- spring collar [1]
- washer [2]
- fork spring [3]



## FRONT WHEEL/SUSPENSION/STEERING

Pour out the fork fluid by pumping the fork tube several times.

Pour out the fork fluid from the fork damper by pumping the damper rod several times.



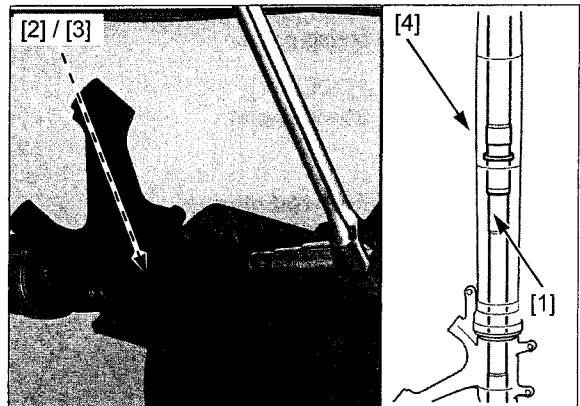
Hold the axle holder in a vise with soft jaws or a shop towel.

Hold the fork damper [1] with the special tool, then remove the fork socket bolt [2] and sealing washer [3].

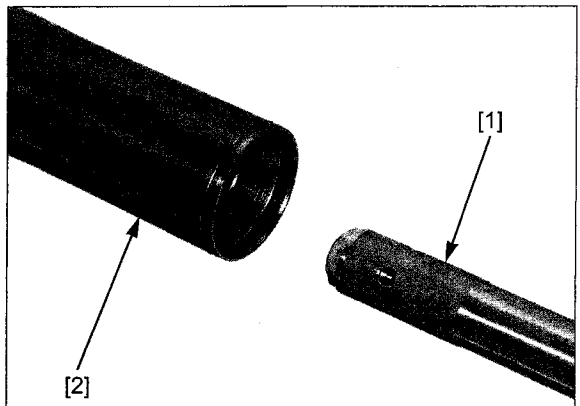
### TOOL:

Fork damper holder [4]

07YMB-MCF0101 or  
07YMB-MCFA100  
(U.S.A. only)



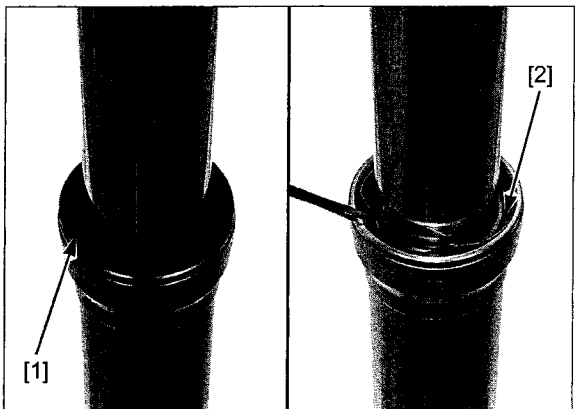
Remove the fork damper assembly [1] from the fork slider [2].



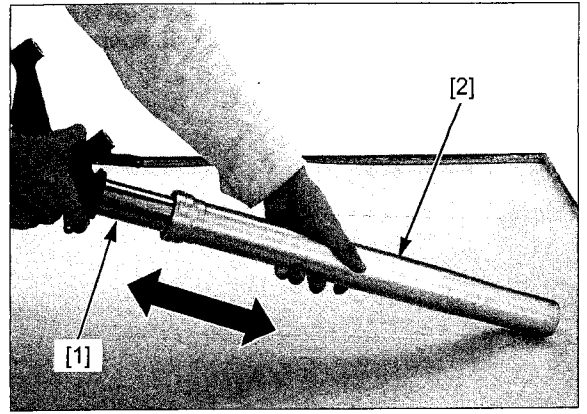
Remove the dust seal [1].

*Do not scratch the  
fork tube sliding  
surface.*

Remove the oil seal stopper ring [2].

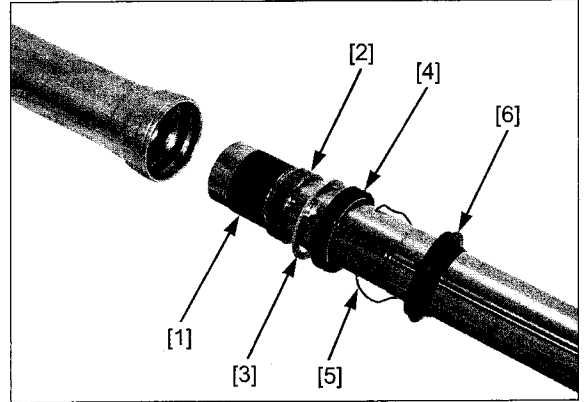


Pull the fork tube [1] out until you feel resistance from the slider bushing. Then move it in and out, tapping the bushing lightly until the fork tube separates from the fork slider [2]. The slider bushing will be forced out by the fork tube bushing.



Remove the following:

- fork tube bushing [1]
- slider bushing [2]
- back up ring [3]
- oil seal [4]
- stopper ring [5]
- dust seal [6]

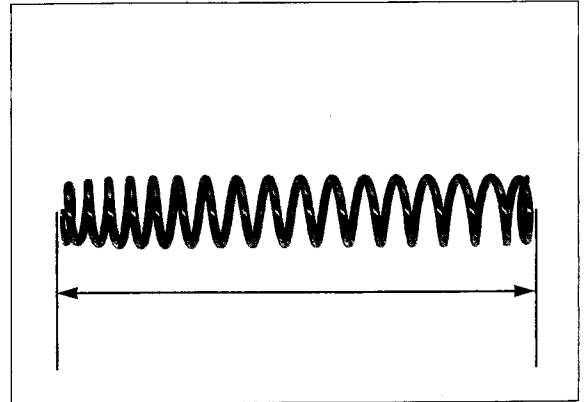


## INSPECTION

### Fork spring

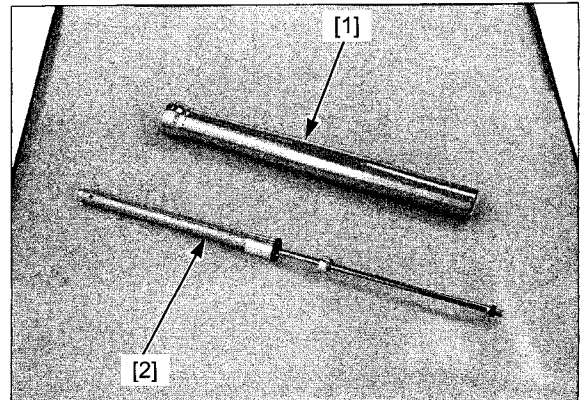
Measure the fork spring free length.

**SERVICE LIMIT: 228.1 mm (8.98 in)**



### Fork tube/slider/damper

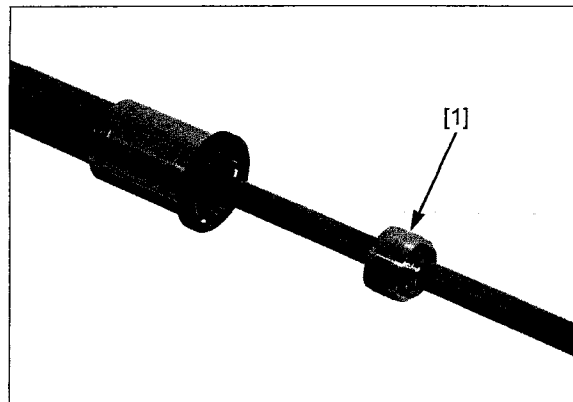
Check the fork slider [1] for damage or deformation. Check the fork damper [2] for bend or damage. Replace any components which are damaged.





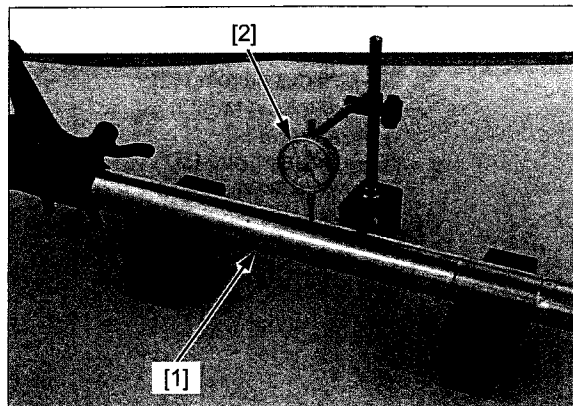
## FRONT WHEEL/SUSPENSION/STEERING

Check the oil lock valve [1] for wear or damage.  
Replace the fork damper assembly, if any components are damaged.



Check the fork tube [1] for score marks, scratches, or excessive or abnormal wear.  
Place the fork tube on V-blocks and measure the runout using the dial gauge [2].  
Actual runout is 1/2 the total indicator reading.

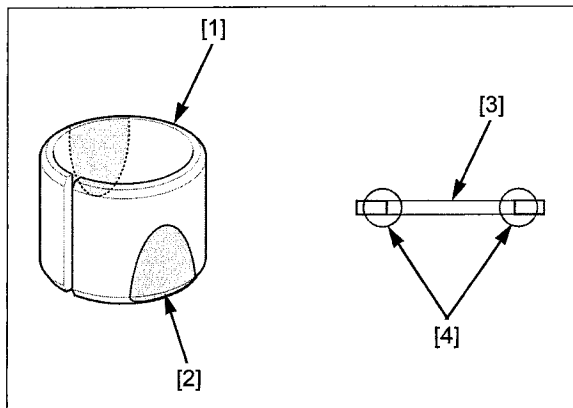
**SERVICE LIMIT: 0.20 mm (0.008 in)**



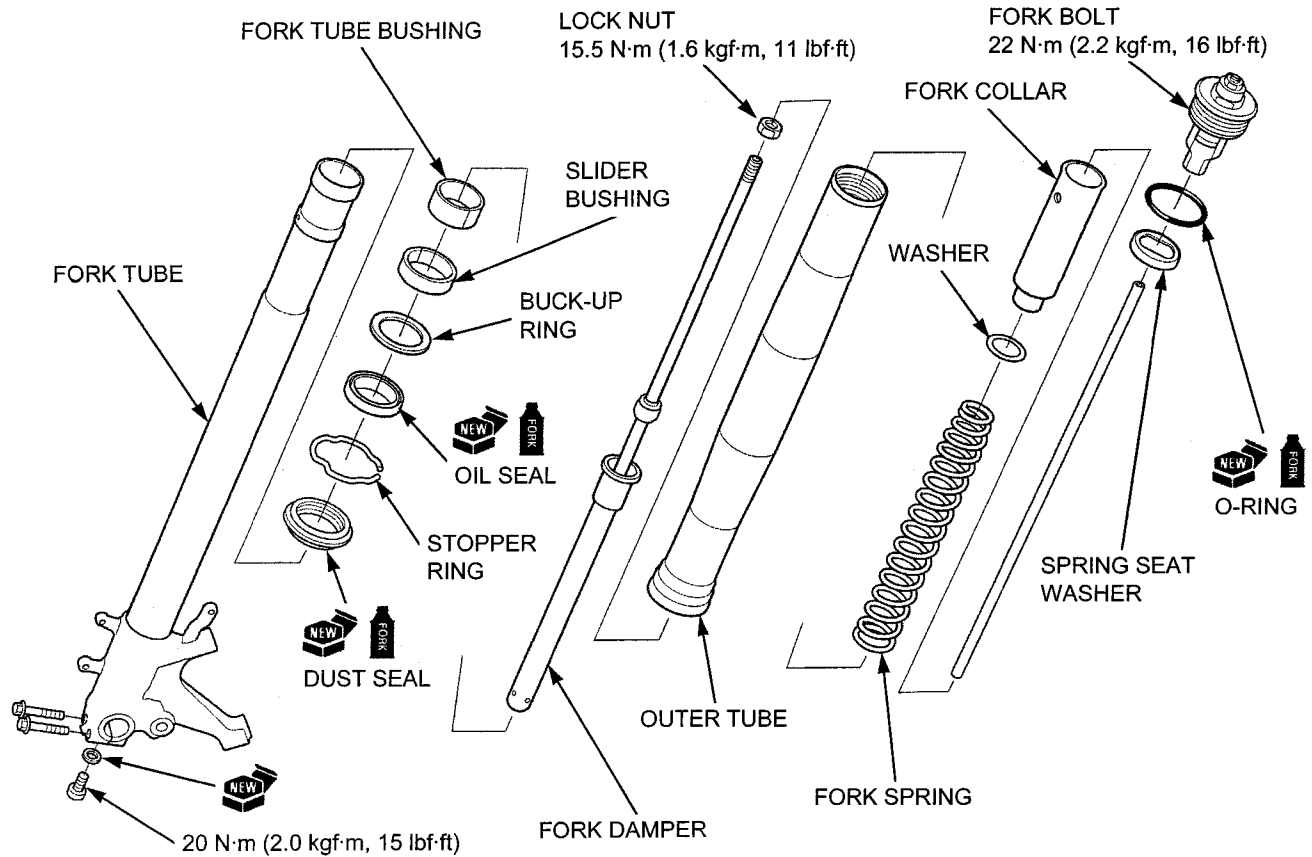
### Fork tube bushing/back up ring

Visually inspect the slider and fork tube bushings [1].  
Replace the bushings if there is excessive scoring or scratching, or if the teflon is worn so that the copper surface [2] appears on more than 3/4 of the entire surface.

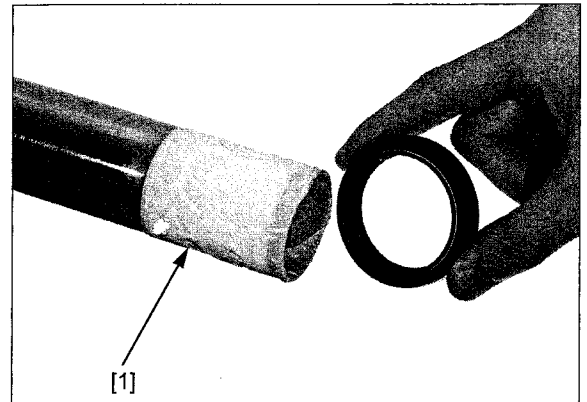
Check the back-up ring [3]; replace it if there is any distortion at the points [4] shown.



ASSEMBLY



- Before assembly, wash all parts with a high flash or non-flammable solvent and blow them dry.
- When installing the fork dust seal and oil seal, wrap the edge and groove of the fork tube with tape [1].



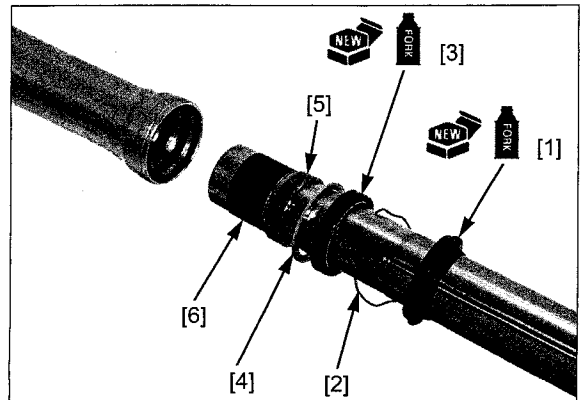
Apply fork fluid to new dust seal and oil seal lips.

Install the oil seal with its marked side facing toward the axle holder.

Install the dust seal [1], stopper ring [2] and oil seal [3].

Remove any burrs from the slider bushing mating surface, being careful not to peel off the coating.

Install the back up ring [4], slider bushing [5] and fork tube bushing [6].  
Install the fork tube into the fork slider.



## FRONT WHEEL/SUSPENSION/STEERING

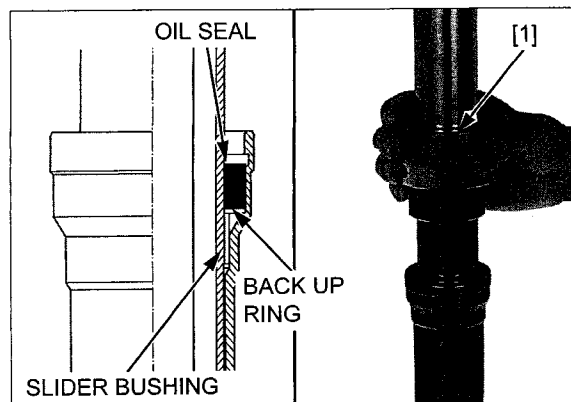
See illustration for correct seating.

Drive the oil seal in using the special tool.

### TOOLS:

Fork seal driver [1]

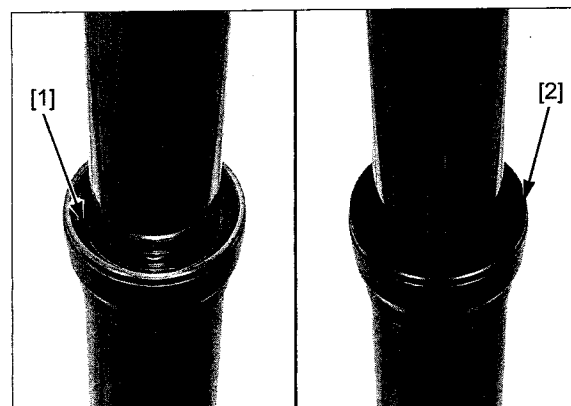
07YMD-MCF0100 or  
07NMD-KZ3010A  
(U.S.A. only)



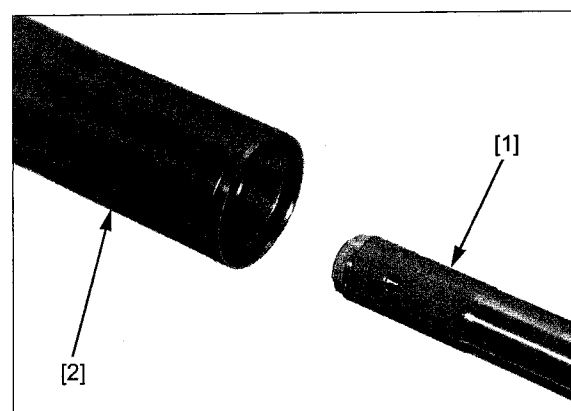
Do not scratch the fork tube sliding surface.

Install the stopper ring [1] into the fork slider groove securely.

Install the dust seal [2] into the fork slider.

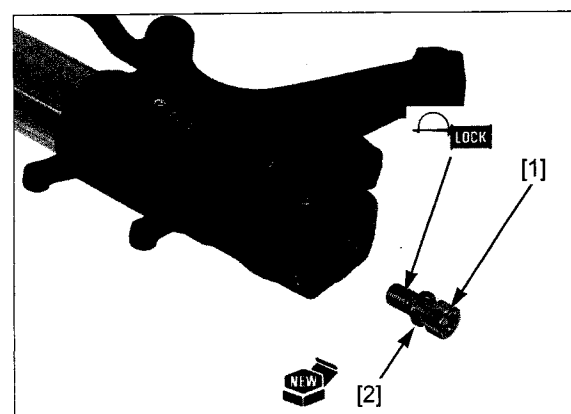


Install the fork damper assembly [1] into the fork slider [2].



Apply a locking agent to the socket bolt threads.

Install the socket bolt [1] with a new sealing washer [2].



Hold the axle holder in a vise with soft jaws or a shop towel.

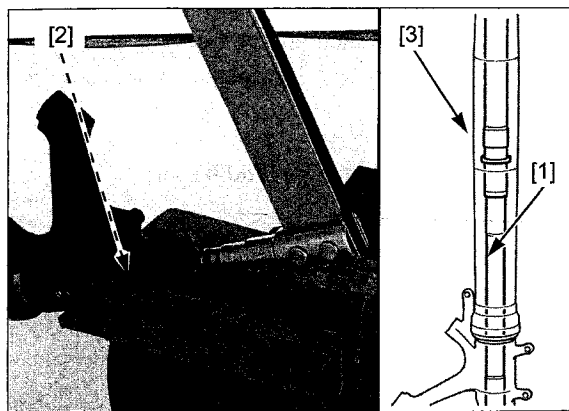
Hold the fork damper [1] with the special tool, then tighten the fork socket bolt [2] to the specified torque.

## TOOL:

Fork damper holder [3]

07YMB-MCF0101 or  
07YMB-MCFA100  
(U.S.A. only)

**TORQUE:** 20 N·m (2.0 kgf·m, 15 lbf·ft)



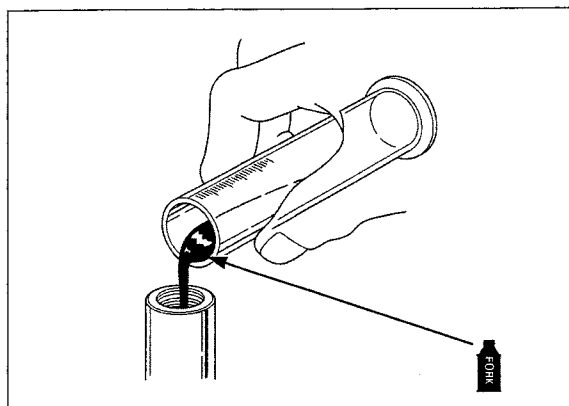
Pour the specified amount of recommended fork fluid into the fork slider.

## RECOMMENDED FORK FLUID:

KYB KHL 15-10

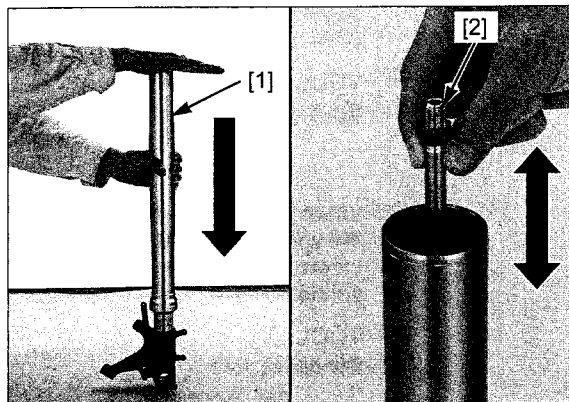
## FORK FLUID CAPACITY:

$497 \pm 3 \text{ cm}^3$  (16.8  $\pm$  0.1 US oz, 17.5  $\pm$  0.1 Imp oz)



Bleed the air from the fork leg as follows:

1. Extend the fork, cover the top of the fork slider [1] with your hand and compress the fork leg slowly.
2. Remove your hand and extend the fork slowly. Repeat above procedure 2 or 3 times.
3. Pump the fork damper rod [2] slowly 8 – 10 times.

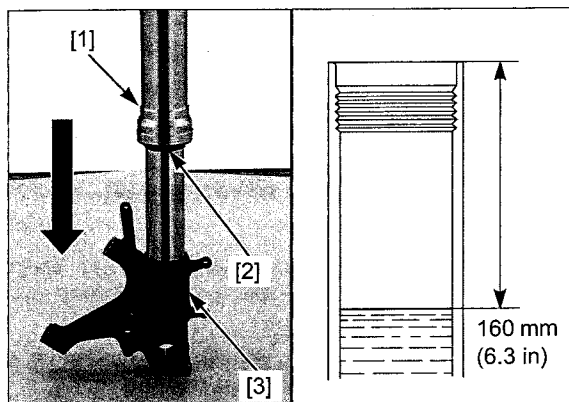


Slowly push the fork slider [1], and gently seat the dust seal [2] onto the axle holder [3] and leave it for 5 minutes.

*Be sure the oil level  
is the same in the  
both forks.*

After the oil level stabilizes, measure the oil level from the top of the fork slider.

**FORK FLUID LEVEL:** 160 mm (6.3 in)



## FRONT WHEEL/SUSPENSION/STEERING

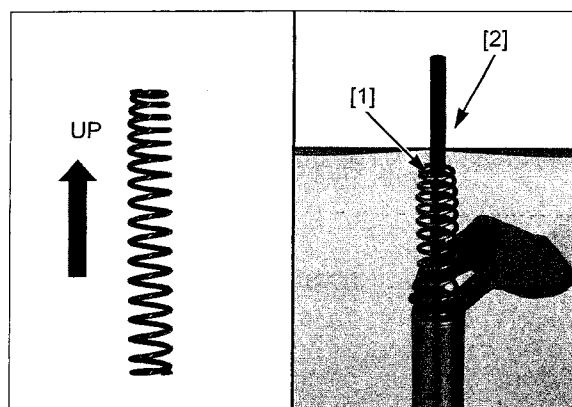
Install the fork spring [1] into the fork slider with the tapered end facing up.

Install the damper rod holder [2] to the fork damper rod.

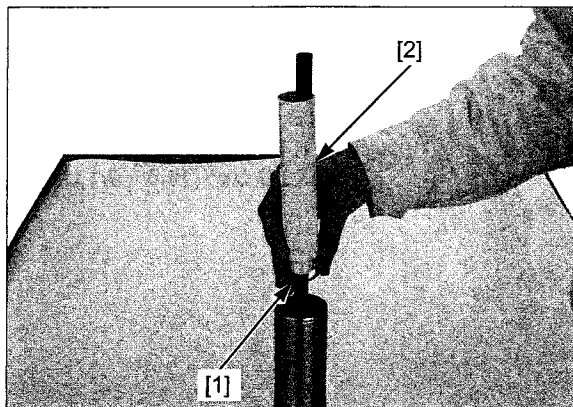
**TOOL:**

**Damper rod holder**

**070MF-MBZC120**  
(Not available in  
U.S.A.) or  
**070MF-MBZA120**



Install the washer [1] and spring collar [2].



*Except U.S.A. tool:* Attach the spring collar holder [1] to the spring collar holes [2].

**TOOL:**

**Spring collar holder**

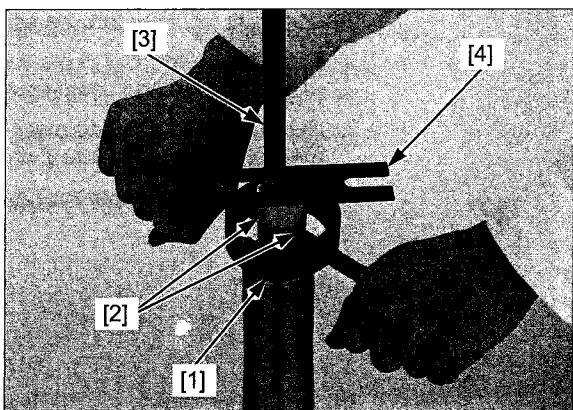
**070MF-MBZC110**  
(Not available in  
U.S.A.)

While pulling the damper rod holder [3] up, compress the spring collar with the spring collar holder. Insert the stopper plate [4] between the lock nut and spring collar.

**TOOL:**

**Stopper plate**

**070MF-MBZC130**  
(Not available in  
U.S.A.)



Remove the damper rod holder.

*U.S.A. tool:* Attach the fork leg to the fork spring compressor post [1] as shown.

**TOOL:**

**Fork spring compressor [2]**

**07AMC-MFJA100**  
(U.S.A. only)

Align the spring collar holes with the pins [3]. To hold the spring collar, tighten the thumb screw [4] securely.

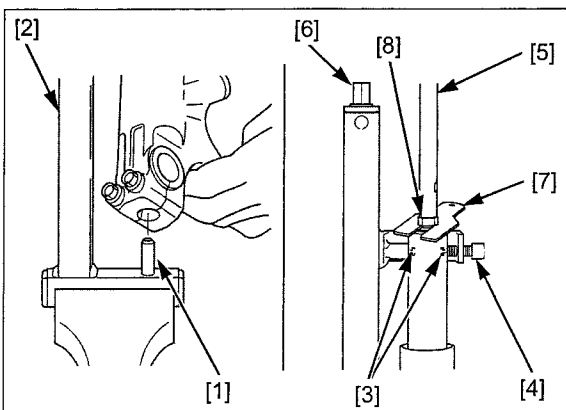
While pulling the damper rod holder [5] up, tighten the nut [6] to compress the fork spring.

Insert the fork rod stopper [7] between the lock nut [8] and spring seat stopper, then remove the damper rod holder.

**TOOL:**

**Fork rod stopper**

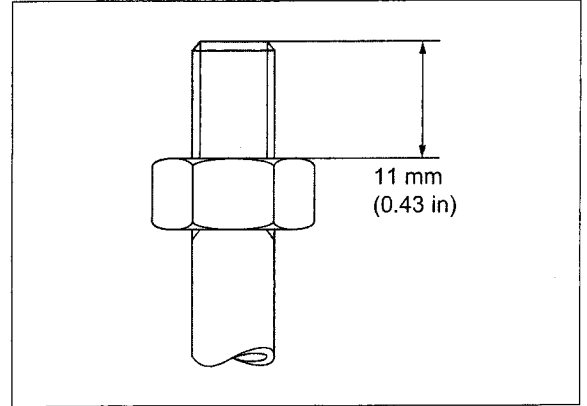
**07AMB-KZ3A100**  
(U.S.A. only)



Remove the damper rod holder.

Check the length between the lock nut end and damper rod end.

**STANDARD: 11 mm (0.43 in)**



## NOTE:

When installing the fork bolt, turn the rebound adjuster [1] counterclockwise to the softest position.

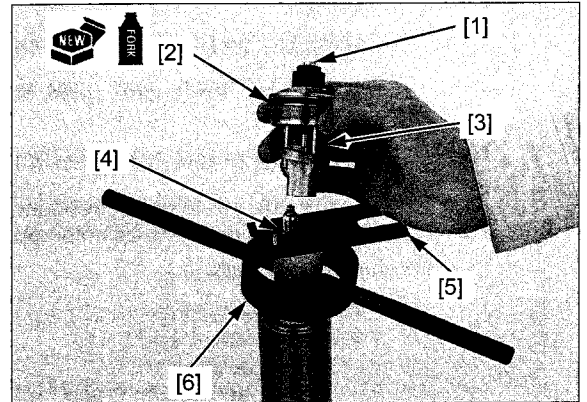
Apply fork fluid to a new O-ring [2] and install it to the fork bolt [3].

Install the fork bolt to the fork damper.

Tighten the fork bolt to the specified with holding the lock nut [4].

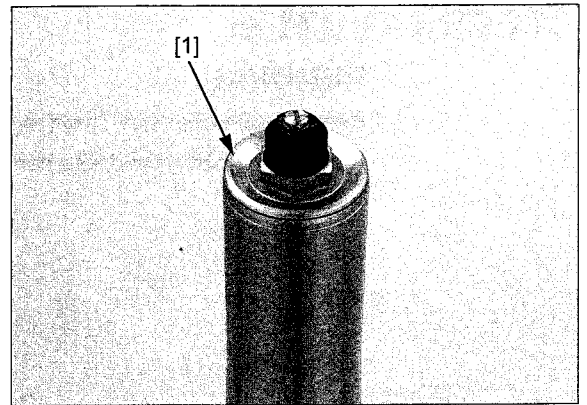
**TORQUE: 20 N·m (2.0 kgf·m, 15 lbf·ft)**

Remove the stopper plate [5] and spring collar holder [6].



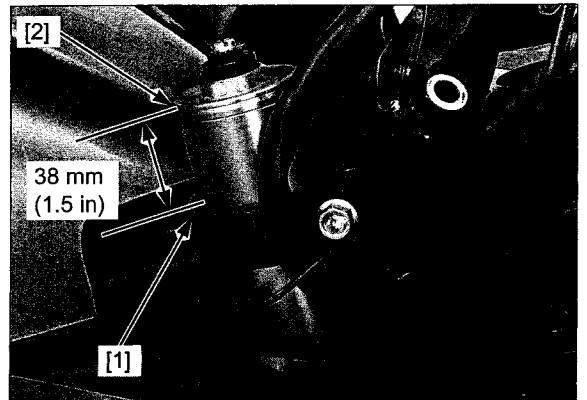
*Tighten the fork bolt after installing the fork.*

Install the fork bolt to the fork slider.



## INSTALLATION

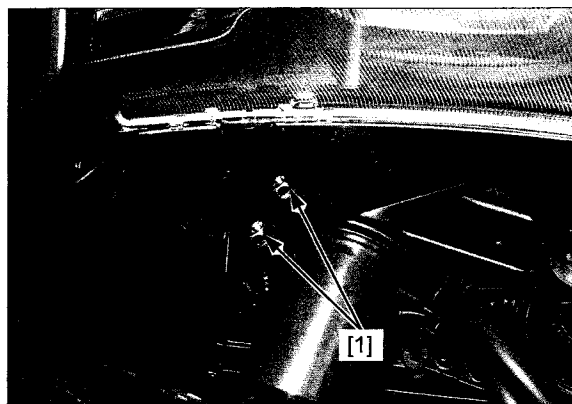
Install the fork leg through the bottom bridge and top bridge so that the height from the top bridge [1] upper surface to the fork slider [2] end is 38 mm (1.5 in).



## FRONT WHEEL/SUSPENSION/STEERING

Tighten the bottom bridge pinch bolts [1] to the specified torque.

**TORQUE: 27 N·m (2.8 kgf·m, 20 lbf·ft)**



If the fork bolt [1] is loosened, tighten it to the specified torque.

**TORQUE: 22 N·m (2.2 kgf·m, 16 lbf·ft)**

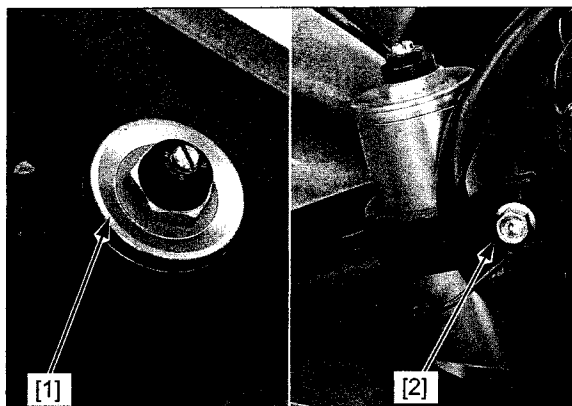
Tighten the top bridge pinch bolt [2] to the specified torque.

**TORQUE: 22 N·m (2.2 kgf·m, 16 lbf·ft)**

Return the pre-load and rebound damping adjusters to the original positions as noted during disassembly.

Install the following:

- front wheel (page 15-17)
- front fender (page 3-11)
- handlebars (page 15-7)
- front speed sensor (page 18-25)

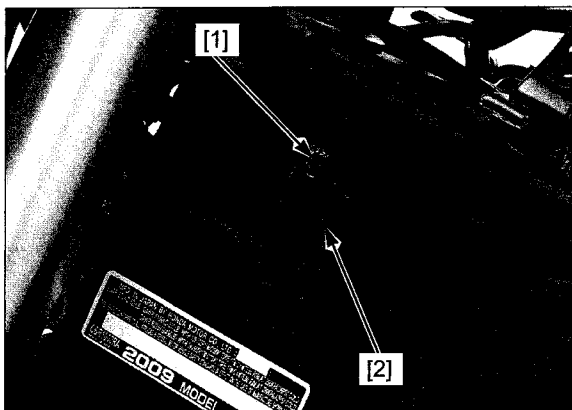


## STEERING STEM

### REMOVAL

Remove the upper side cowl (page 3-9).

Remove the bolt [1] and wire harness clumper [2].



Lift and support the fuel tank (page 4-5).

Disconnect the ignition switch 2P (Brown) connector [1].

Close the fuel tank (page 4-5).

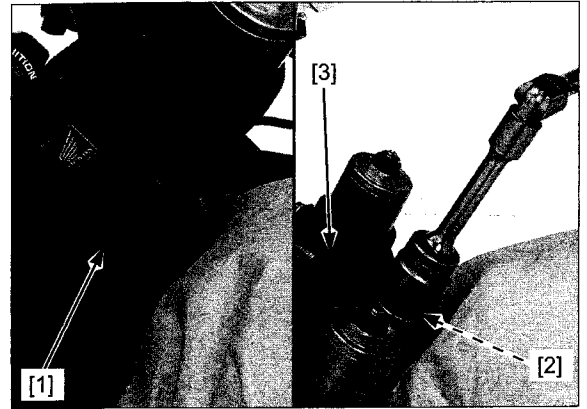


Remove the handlebars (page 15-7).

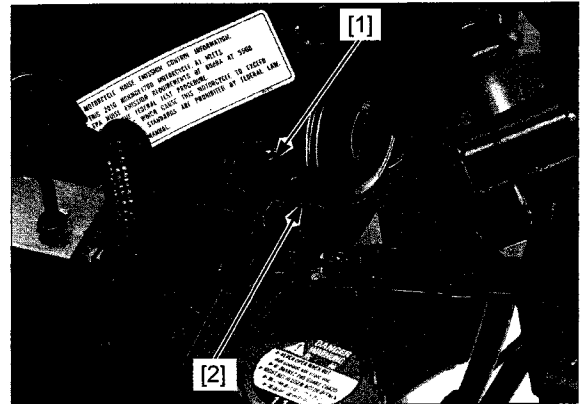
Remove the following:

- steering stem nut cap [1]
- stem nut [2]
- top bridge [3]

Remove the front fork (page 15-19).

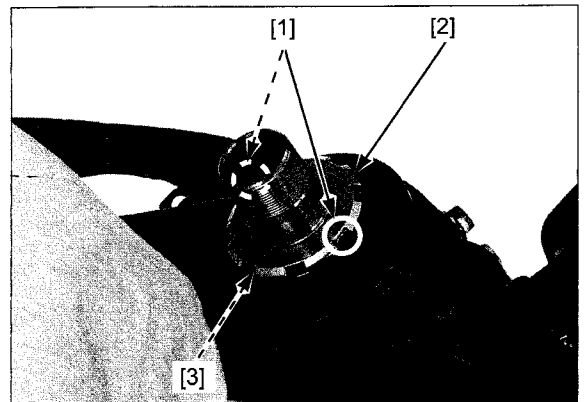


Remove the bolt [1] and the brake hose joint stay [2].



Straighten the lock washer tabs [1].

Remove the lock nut [2] and lock washer [3].

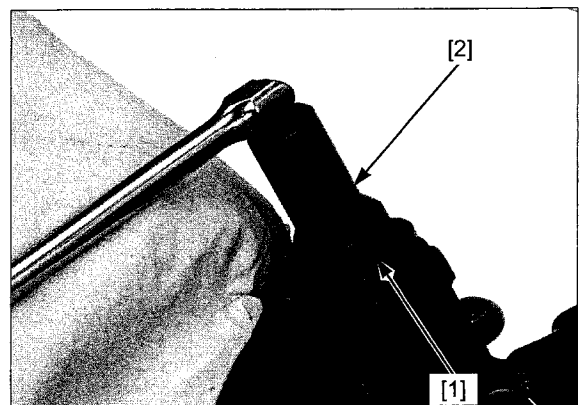


Remove the steering stem adjusting nut [1] using the special tool.

**TOOL:**

Steering stem socket [2]

07916-3710101

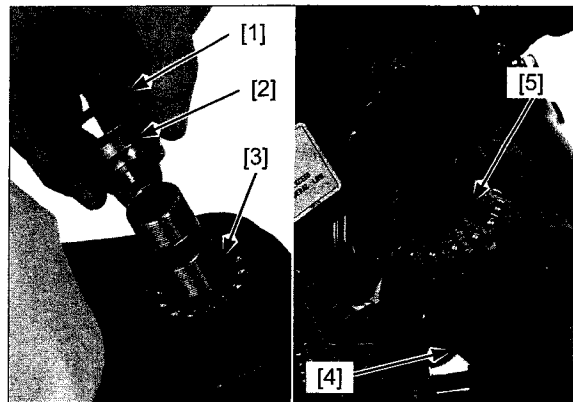




## FRONT WHEEL/SUSPENSION/STEERING

Remove the following:

- dust seal [1]
- upper bearing inner race [2]
- upper bearing [3]
- steering stem [4]
- lower bearing [5]



### BEARING REPLACEMENT

*Always replace the bearings and races as a set.*

Replace the races using the special tools as described in the following procedure.

**Except U.S.A.:**

**TOOLS: (Not available in U.S.A.)**

Ball race remover set

Installer attachment, 47 x 5.5 mm [1] 07946-KM90002

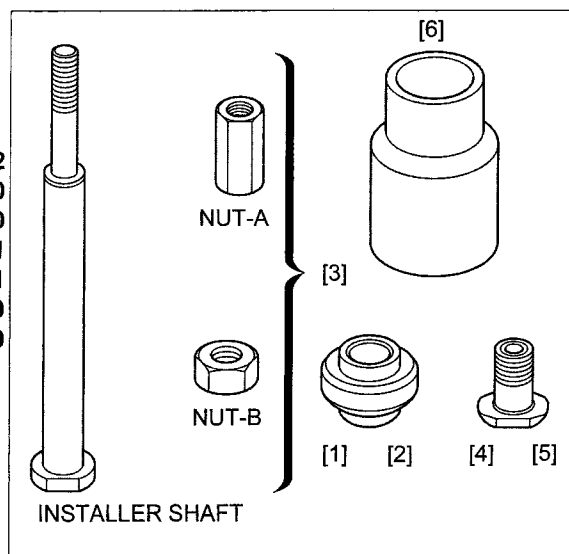
Installer attachment, 55 x 6 mm [2] 07946-KM90200

Installer shaft [3] 07946-KM90301

Remover attachment, 43 mm [4] 07946-KM90401

Remover attachment, 47 mm [5] 07946-KM90500

Base, 48.4/56 [6] 07946-KM90600

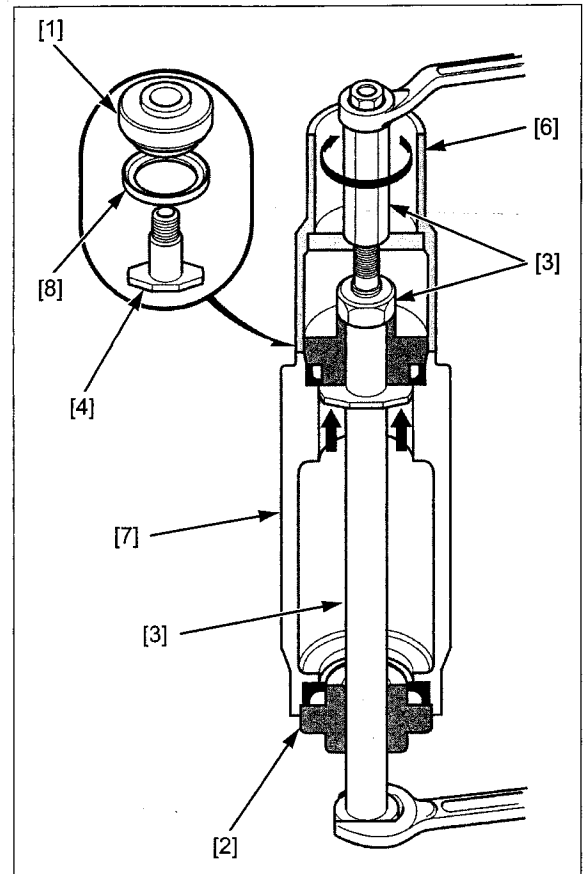


Note the installation direction of the assembly base [6]; the large I.D. side facing the upper attachment [1].

Install the special tools into the steering head [7] as shown.

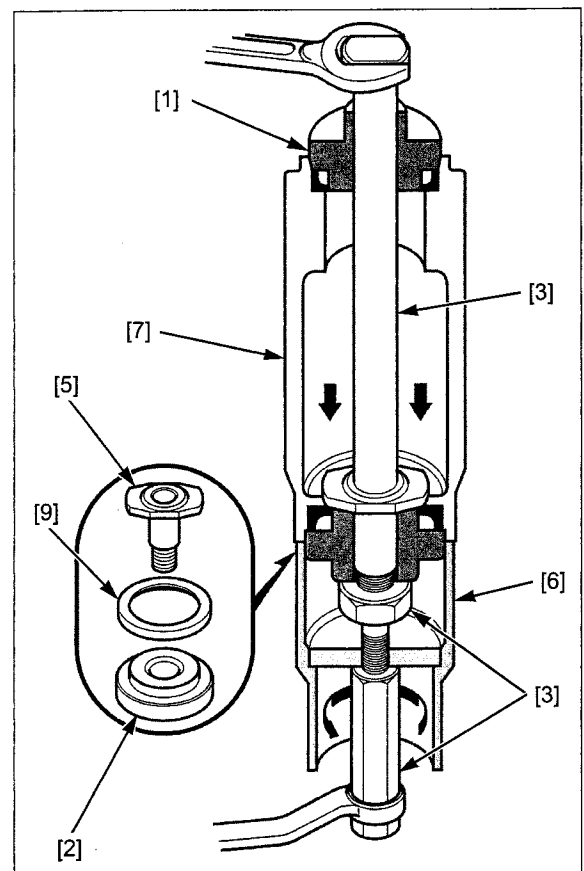
Align the bearing remover with the grooves in the steering head. Lightly tighten the nut-B with a wrench.

Holding the installer shaft [3] with a wrench, turn the nut-A gradually to remove the upper outer race [8].



Note the installation direction of the assembly base [6]; the large I.D. side facing the lower attachment [2].

Install the special tools into the steering head [7] as shown and remove the lower outer race [9] using the same procedure as for the upper outer race.

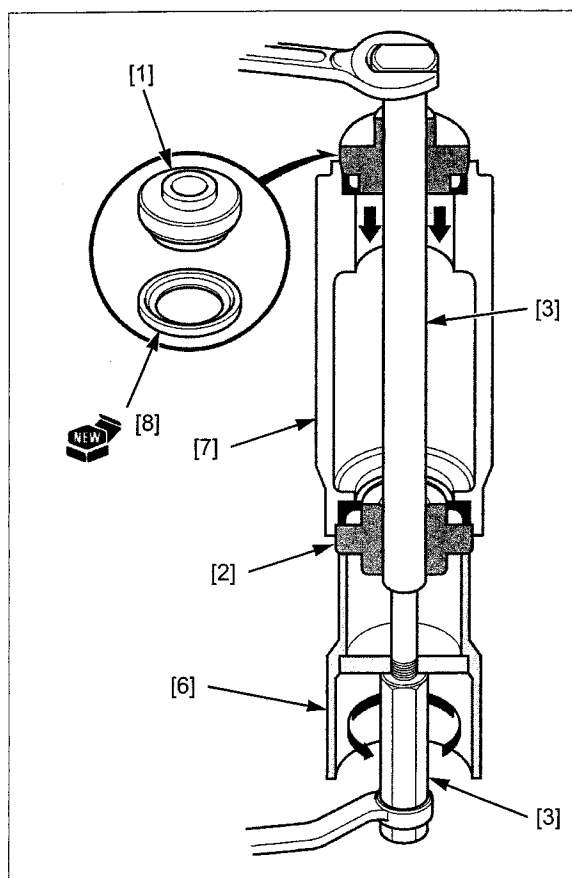


## FRONT WHEEL/SUSPENSION/STEERING

Remove any burrs from the outer race installation surface of the steering head [7].

*Note the installation direction of the assembly base [6]; the large I.D. side facing the lower attachment [2].*

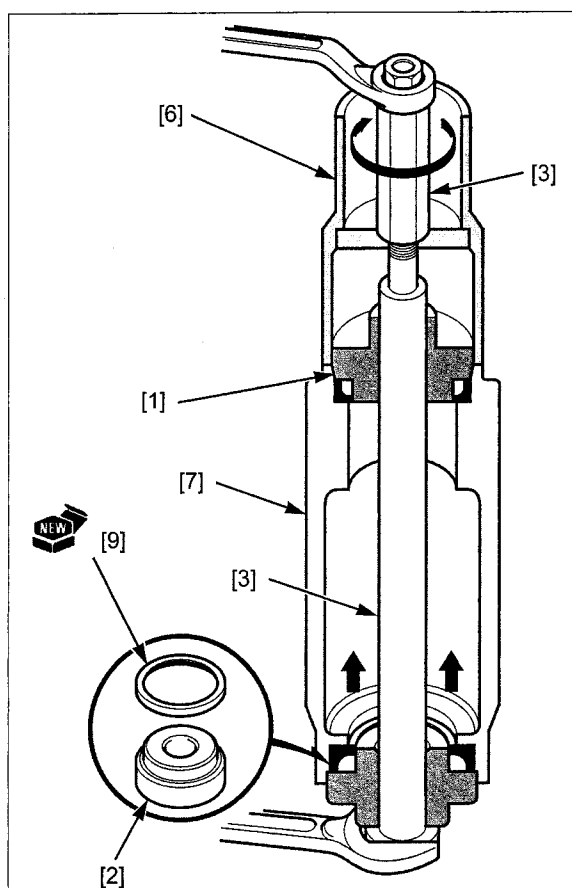
Install a new upper outer race [8] with the special tools as shown.  
Hold the installer shaft [3] with a wrench and turn the nut-A gradually until upper outer race is fully seated.



Remove any burrs from the outer race installation surface of the steering head [7].

*Note the installation direction of the assembly base [6]; the large I.D. side facing the upper attachment [1].*

Install a new lower outer race [9] with the special tools as shown.  
Hold the installer shaft [3] with a wrench and turn the nut-A gradually until lower outer race is fully seated.



## U.S.A. only:

Place the steering head bearing outer races using the special tools listed below.

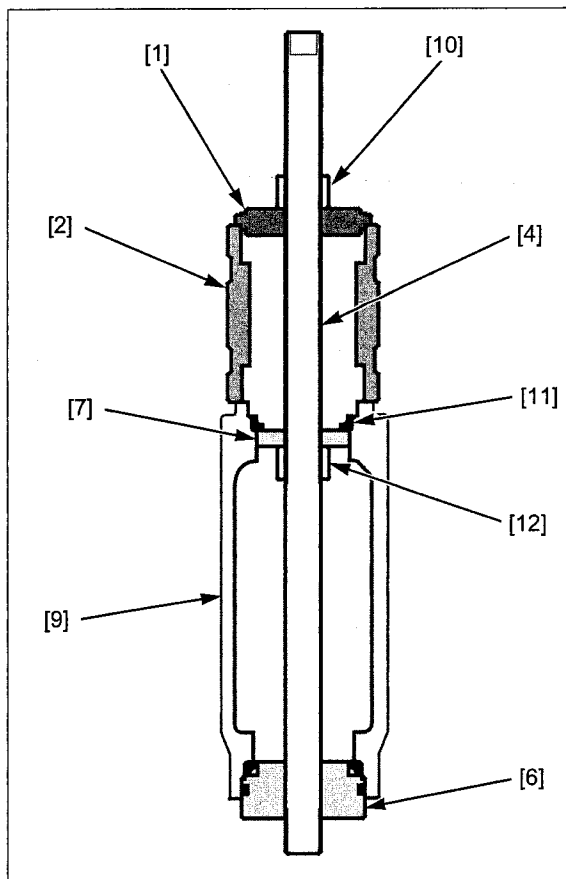
### TOOLS:

Main bearing installer, 50 x 54 mm [1]	07946-ME90200
Fork seal driver weight, 45.5 x 54.3 mm [2]	07947-KA50100
Oil seal driver, 58 x 72 mm [3]	07965-MA60000
Installer shaft, 15 x 370L [4]	07VMF-KZ30200
Installer attachment A [5]	07VMF-MAT0100
Installer attachment B [6]	07VMF-MAT0200
Remover attachment A [7]	07VMF-MAT0300
Remover attachment B [8]	07VMF-MAT0400

Install the special tools into the steering head pipe [9] as shown.

Align the remover attachment A with the grooves in the steering head.

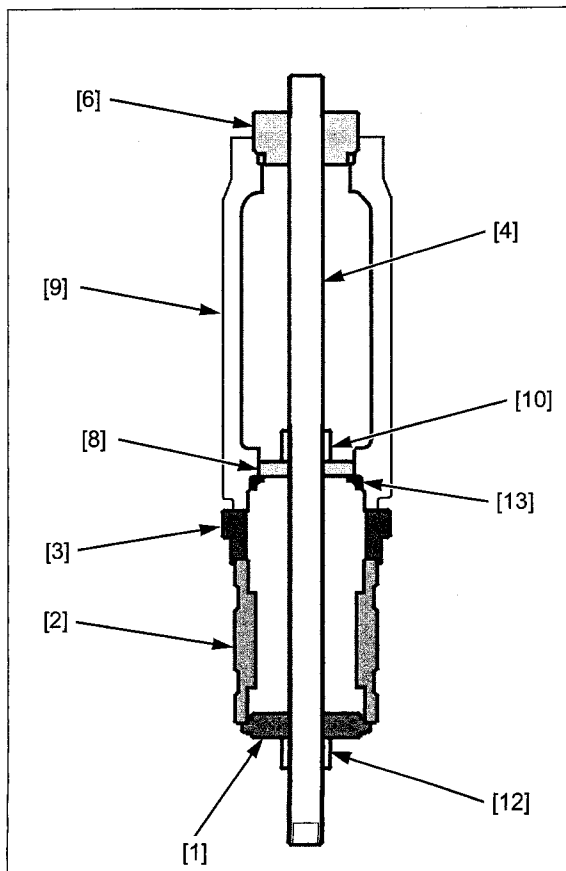
While holding the installer shaft with the wrench, turn the upper nut [10] gradually to remove the upper bearing outer race [11].



Install the special tools into the steering head pipe [9] as shown.

Align the remover attachment B [8] with the grooves in the steering head.

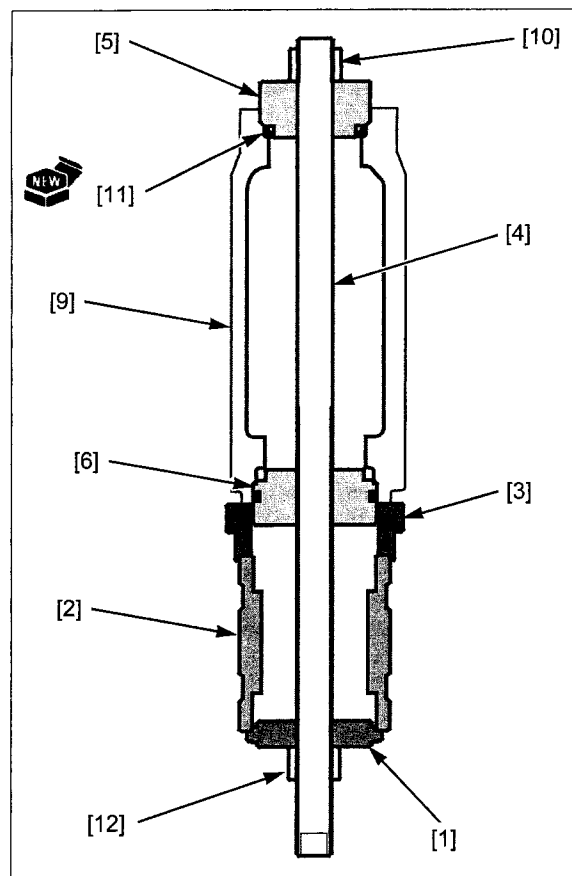
While holding the installer shaft [4] with a wrench, turn the lower nut [12] gradually to remove the lower bearing outer race [13].



## FRONT WHEEL/SUSPENSION/STEERING

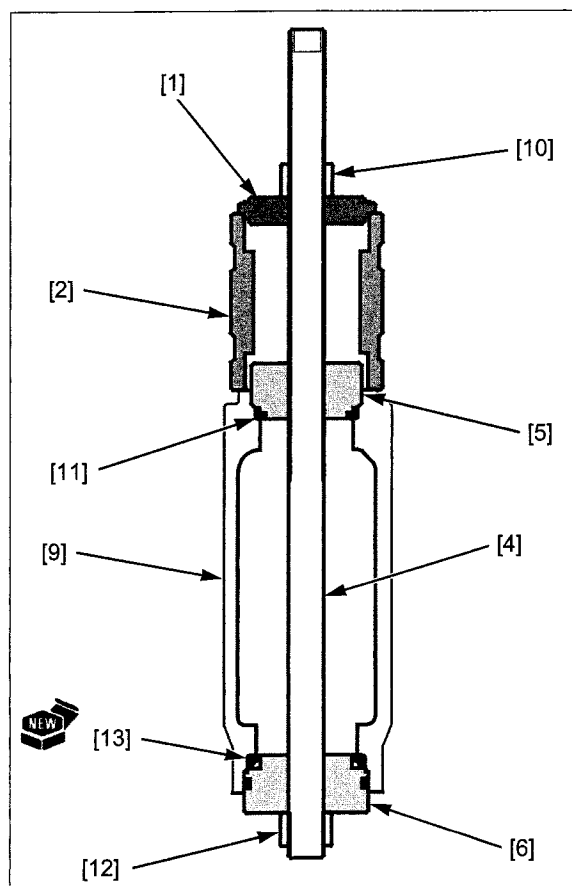
Install a new upper bearing outer race [11] with the special tools as shown.

While holding the installer shaft [4] with the wrench, turn the lower nut [12] gradually until the groove in installer attachment A [5] aligns with the upper end of the steering head. This will allow you to install the upper bearing outer race.



Install a new lower bearing outer race [13] with the special tools as shown.

While holding the installer shaft [4] with the wrench, turn the upper nut [10] gradually until the groove in installer attachment B [6] aligns with the lower end of the steering head. This will allow the installation of the lower bearing outer race.

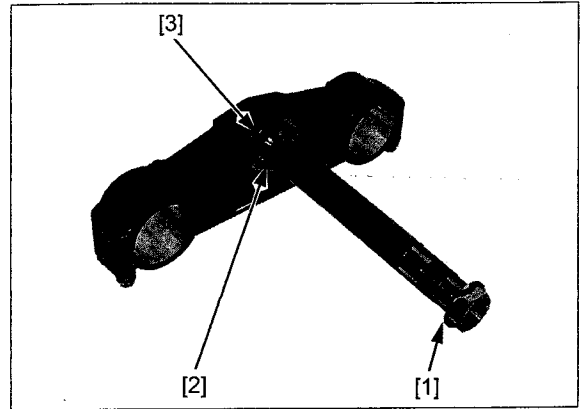


## LOWER INNER RACE REPLACEMENT

Temporarily install the steering stem nut [1] onto the stem to prevent the threads from being damaged when removing the lower bearing inner race [2] 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 [3].

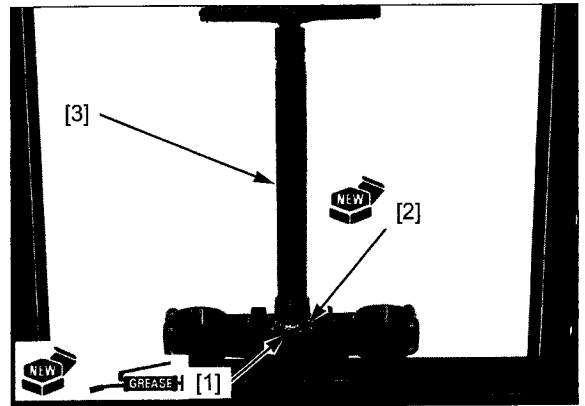


Apply specified grease (page 1-21) to a new dust seal [1] lips and install it over the steering stem. Install a new lower bearing inner race [2] using a special tool and a hydraulic press.

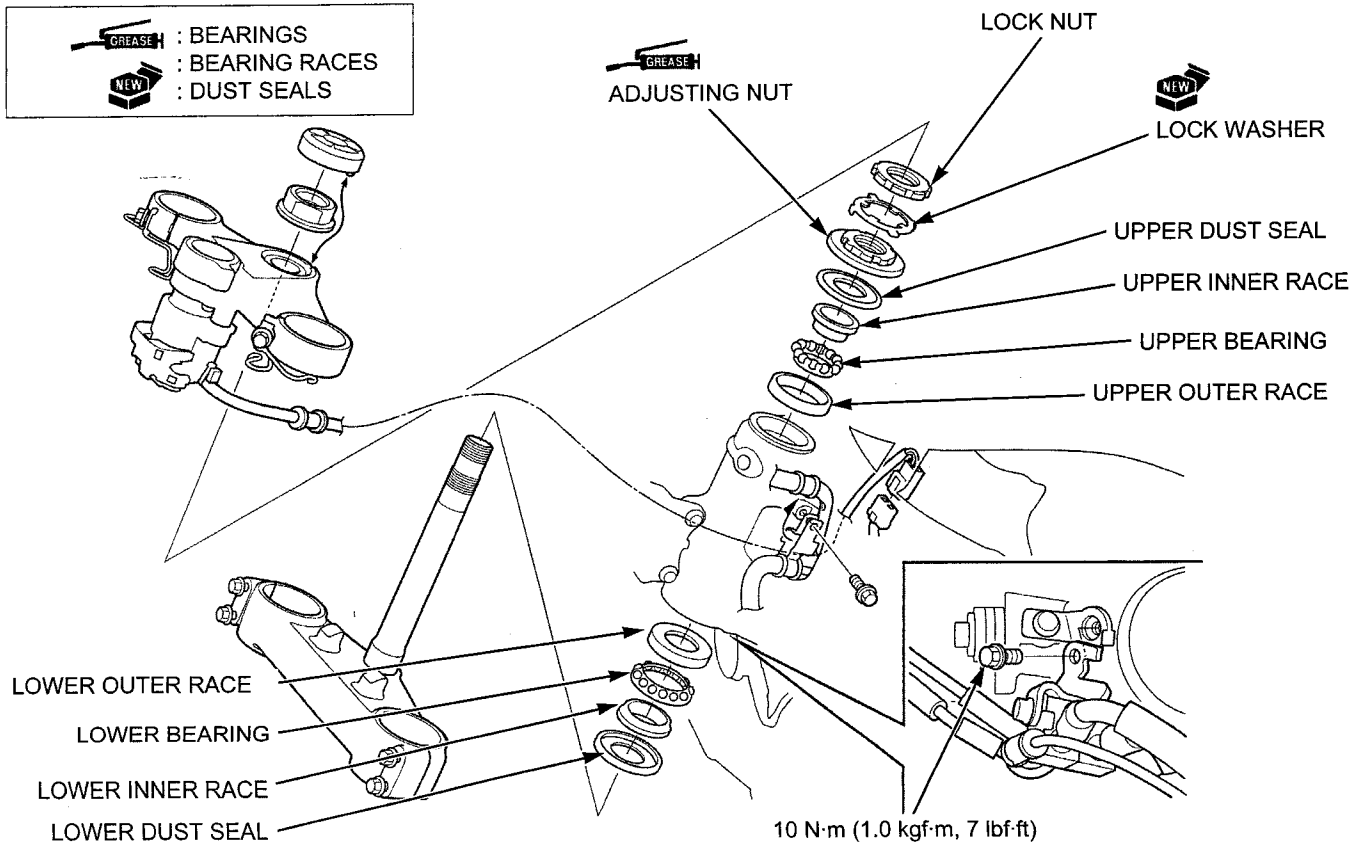
### TOOL:

Steering stem driver [3]

07946-MB00000



## INSTALLATION

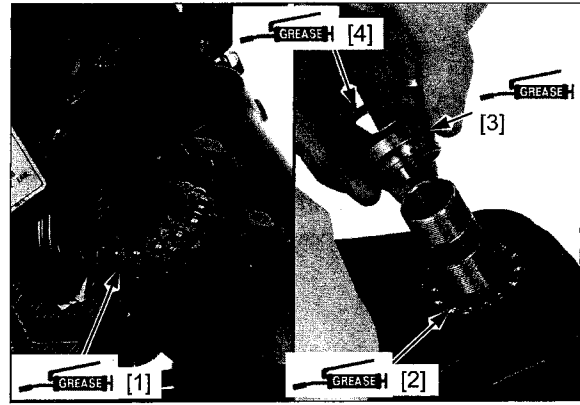


## FRONT WHEEL/SUSPENSION/STEERING

Apply specified grease (page 1-21) to the upper and lower bearings and bearing races.

Install the lower bearing [1] onto the steering stem. Insert the steering stem into the steering head pipe.

Install the upper bearing [2], inner race [3] and dust seal [4].



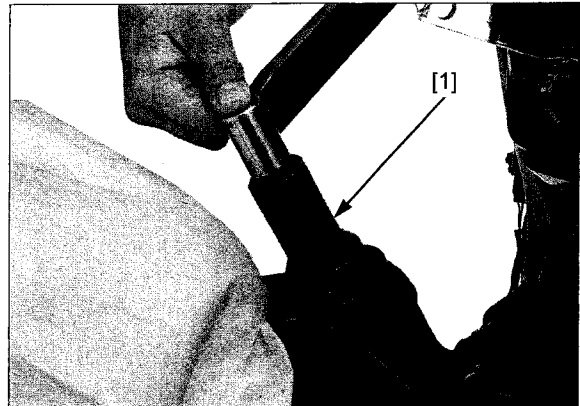
Apply the specified grease to the steering stem adjusting nut threads (page 1-21).

Tighten the steering stem adjusting nut to the initial torque.

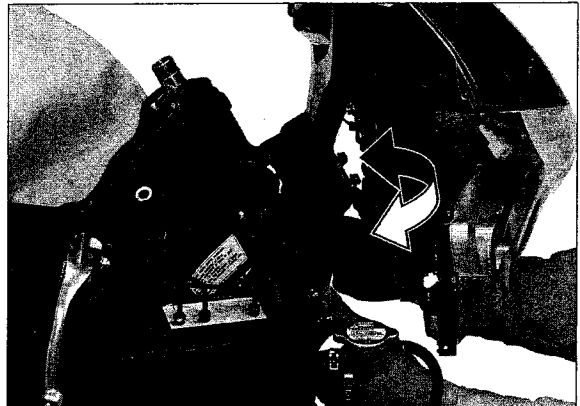
### TOOL:

Steering stem socket [1]                      07916-3710101

**TORQUE: 45 N·m (4.6 kgf·m, 33 lbf·ft)**



Move the steering stem right and left, lock-to-lock, five times to seat the bearings.



Retighten the steering stem adjusting nut to the specified torque.

**TORQUE: 45 N·m (4.6 kgf·m, 33 lbf·ft)**

Recheck that the steering stem moves smoothly without play or binding.



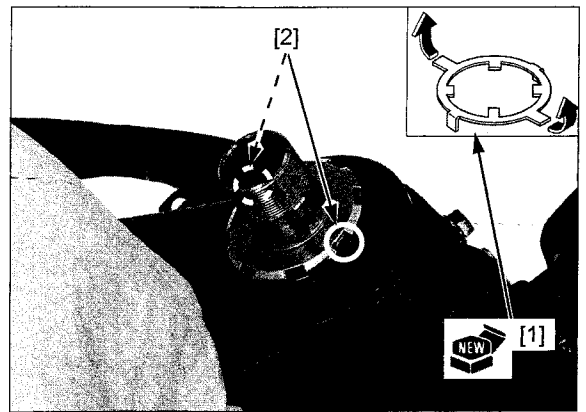
Install a new lock washer [1] onto the steering stem.

Align the tabs of the lock washer with the grooves in the adjusting nut.

Install and finger tighten the lock nut.

Hold the adjusting nut and further tighten the lock nut within 1/4 turn (90°) enough to align its grooves with the lock washer tabs [2].

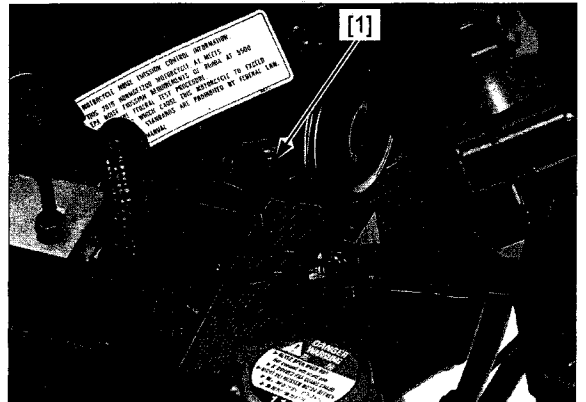
Bend the lock washer tabs up into the lock nut grooves.



*Route the brake hose properly (page 1-22).*

Install the front brake hose clamber and tighten the bolt [1] to the specified torque.

**TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)**



Install the top bridge [1] and stem nut [2].

Install the fork legs into the bottom and top bridges, but do not tighten the top bridge pinch bolts yet (page 15-29).

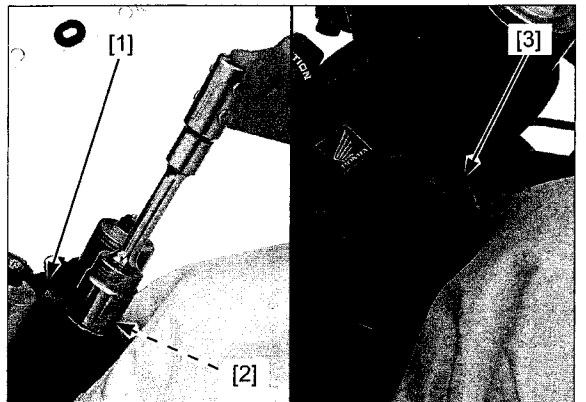
Tighten the steering stem nut to the specified torque.

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

Turn the steering stem left and right, lock-to-lock several times to make sure the steering stem moves smoothly, without play or binding.

Install the stem nut cap [3].

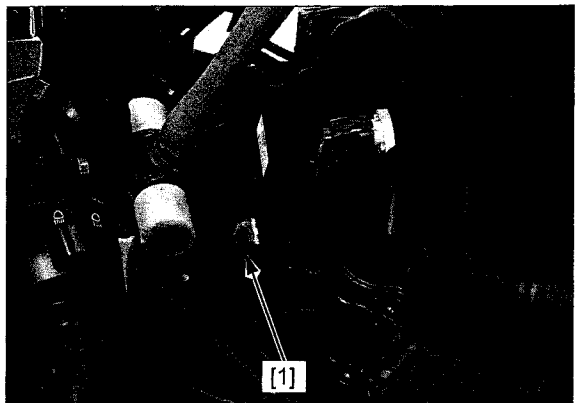
Install the handlebars (page 15-7).



Lift and support the fuel tank (page 4-5).

Connect the ignition switch 2P (Brown) connector [1].

*Route the ignition switch wire properly (page 1-22).*



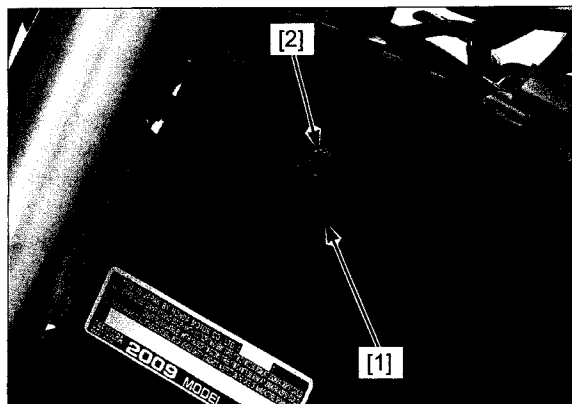


## FRONT WHEEL/SUSPENSION/STEERING

Install the wire harness clumper [1] and tighten the bolt [2] securely.

Install the upper side cowl (page 3-9).

Check the steering head bearing pre-load (page 15-40).



### STEERING HEAD BEARING PRE-LOAD

Jack up the motorcycle to raise the front wheel off the ground.

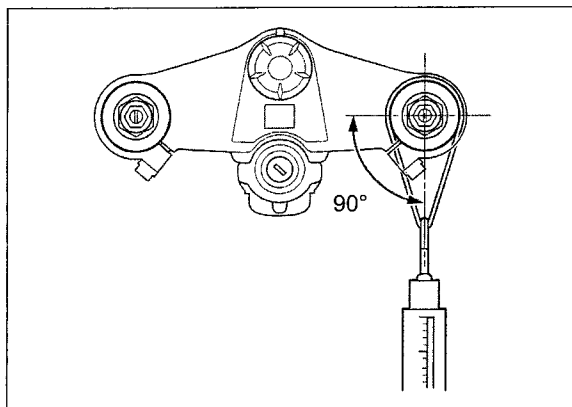
Position the steering stem to the straight ahead position.

*Make sure that there is no cable or wire harness interference.*

Hook a spring scale to the fork slider and measure the steering head bearing pre-load.

**Standard: 16.7 – 20.6 N (1.7 – 2.1 kgf, 3.7 – 4.6 lbf)**

If the readings do not fall within the standard value, adjust the steering stem adjusting nut (page 15-30).

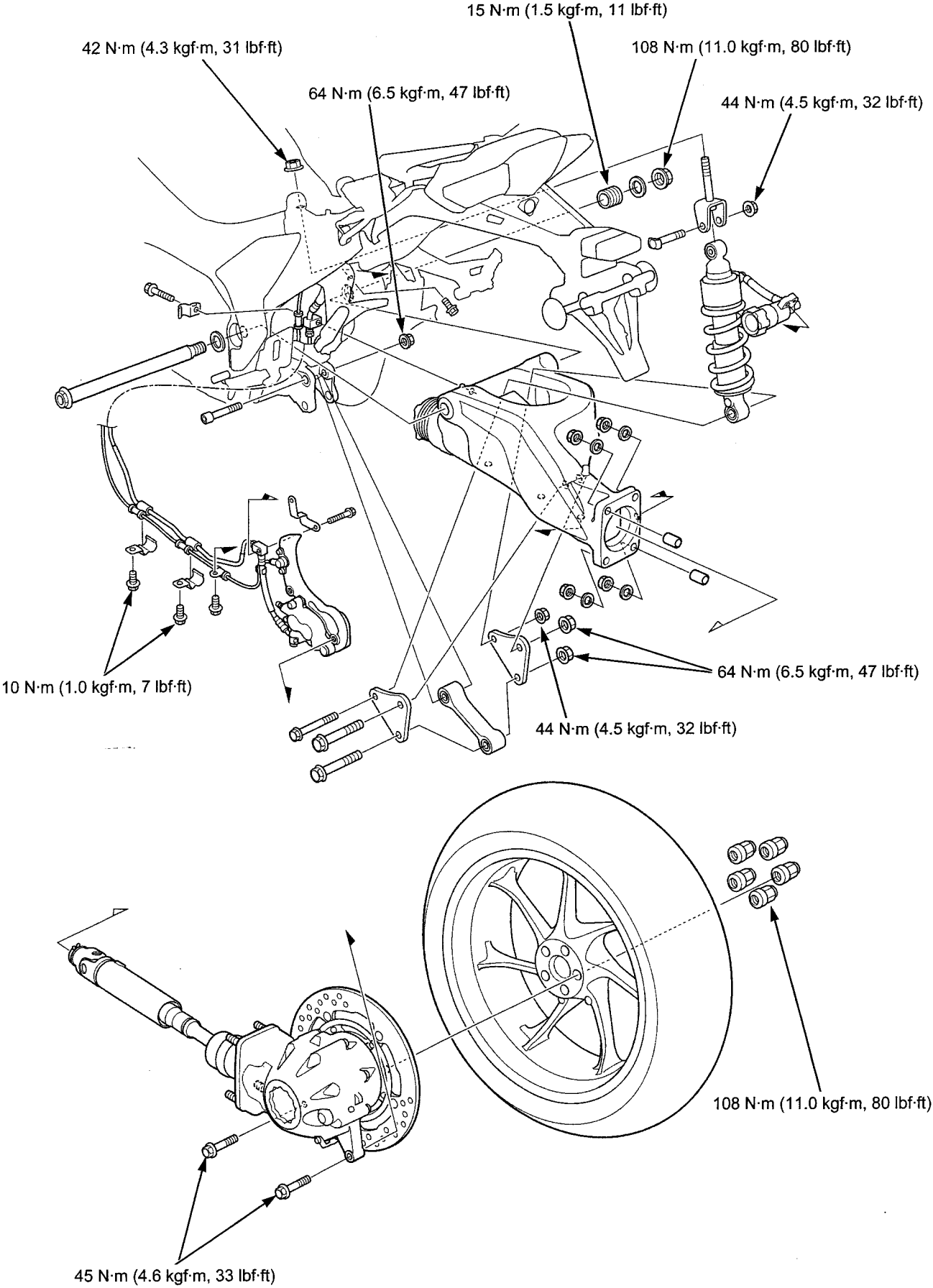


# 16. REAR WHEEL/SUSPENSION

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COMPONENT LOCATION .....	16-2	SHOCK ABSORBER .....	16-6
SERVICE INFORMATION .....	16-3	SUSPENSION LINKAGE .....	16-10
REAR WHEEL .....	16-5	SWINGARM .....	16-12

COMPONENT LOCATION



# SERVICE INFORMATION

## GENERAL

- Riding on damaged rims impairs safe operation of the vehicle.
- 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 16-8).
- When servicing the rear wheel, shock absorber, or swingarm, raise the rear wheel off the ground by supporting the frame securely.
- Use only tires marked "TUBELESS" and tubeless valves on rim marked "TUBELESS TIRE APPLICABLE".
- Use only Honda Genuine replacement bolts and nuts for all suspension pivot and mounting points.
- For brake system information (page 17-4).

## SPECIFICATIONS

Unit: mm (in)

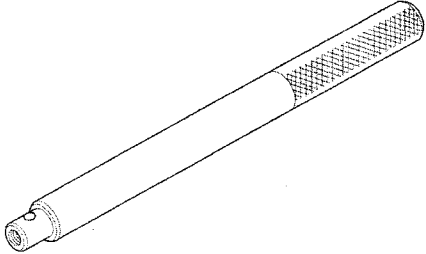
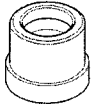



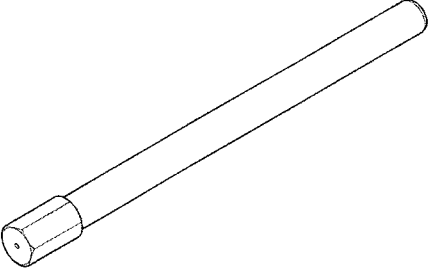
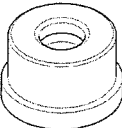

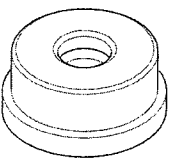

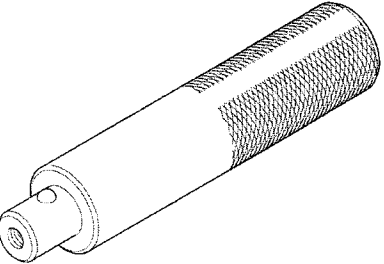
ITEM		STANDARD	SERVICE LIMIT
Minimum tire tread depth		—	2.0 (0.08)
Cold tire pressure	Up to 90 kg (200 lb) load	290 kPa (2.90 kgf/cm <sup>2</sup> , 42 psi)	—
	Up to maximum weight capacity	290 kPa (2.90 kgf/cm <sup>2</sup> , 42 psi)	—
Wheel rim runout	Radial	—	2.0 (0.08)
	Axial	—	2.0 (0.08)
Wheel balance weight		—	60 g (2.1 oz) max.
Shock absorber	Spring pre-load adjuster standard position	11 clicks out from lower position	—
	Rebound adjuster initial setting	3/4 turn out from full hard	

## TORQUE VALUES

Rear wheel nut	108 N·m (11.0 kgf·m, 80 lbf·ft)	
Exhaust pipe muffler band	17 N·m (1.7 kgf·m, 13 lbf·ft)	
Rear shock absorber bracket mounting nut	42 N·m (4.3 kgf·m, 31 lbf·ft)	U-nut
Rear shock absorber upper mounting nut	44 N·m (4.5 kgf·m, 32 lbf·ft)	U-nut
Rear shock absorber lower mounting nut	44 N·m (4.5 kgf·m, 32 lbf·ft)	U-nut
Shock arm-to-shock link plate nut	64 N·m (6.5 kgf·m, 47 lbf·ft)	U-nut
Shock arm-to-frame pivot nut	64 N·m (6.5 kgf·m, 47 lbf·ft)	U-nut
Shock link plate-to-swingarm nut	64 N·m (6.5 kgf·m, 47 lbf·ft)	U-nut
Swingarm pivot adjust bolt	15 N·m (1.5 kgf·m, 11 lbf·ft)	
Swingarm pivot nut	108 N·m (11.0 kgf·m, 80 lbf·ft)	U-nut
Rear brake pipe clamber bolt	10 N·m (1.0 kgf·m, 7 lbf·ft)	ALOC bolt: replace with a new one.

REAR WHEEL/SUSPENSION

TOOLS

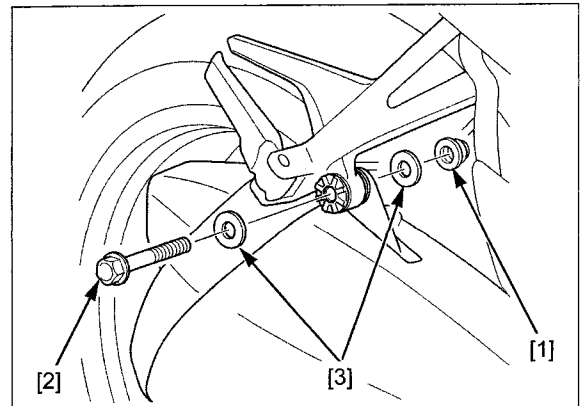
<p>Driver handle, 15 x 280L 07949-3710001</p> 	<p>Attachment, 22 x 24 mm 07746-0010800</p> 	<p>Pilot, 17 mm 07746-0040400</p> 
<p>Attachment, 24 x 26 mm 07746-0010700</p> 	<p>Pilot, 20 mm 07746-0040500</p> 	<p>Pivot guide 070MG-MGE0100</p>  <p>or 070MG-MGEA100 (U.S.A. only)</p>
<p>Attachment, 32 x 35 mm 07746-0010100</p> 	<p>Pilot, 32 mm 07MAD-PR90200</p> 	<p>Attachment, 40 x 42 mm 07746-0010900</p>  <p>or 070MG-MGEA100 (U.S.A. only)</p>
<p>Pilot, 25mm 07746-0040600</p> 	<p>Driver handle, 15 x 135L 07749-0010000</p> 	

# REAR WHEEL

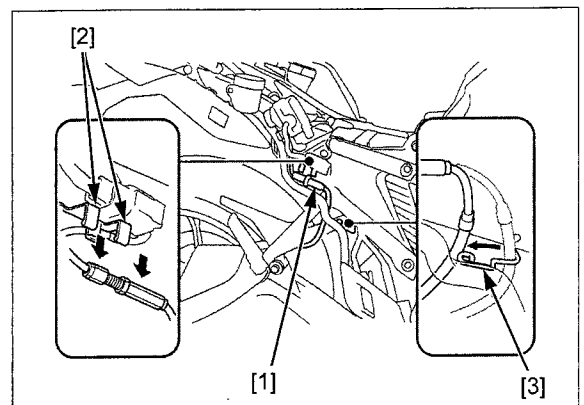
## REMOVAL/INSTALLATION

Remove the right rear cowl (page 3-4).

Remove the muffler mounting nut [1], bolt [2] and washers [3].

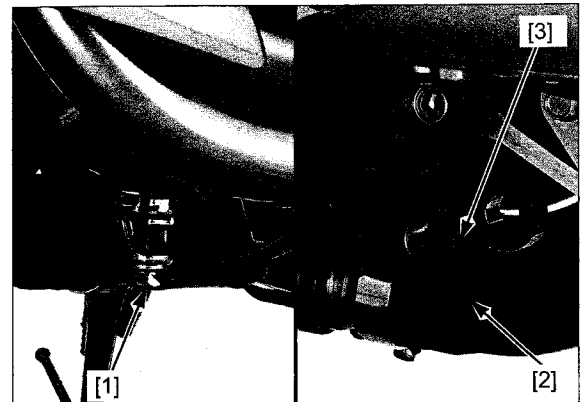


Release the EGCA cable [1] from the hooks [2] and guide [3].



Loosen the muffler band bolt [1].

Swing the muffler to outside until the stopper [2] of muffler contacts the frame [3].



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

Remove the wheel nuts [1] and rear wheel.

Installation is in the reverse order of removal.

### TORQUE:

**Rear wheel nut:**

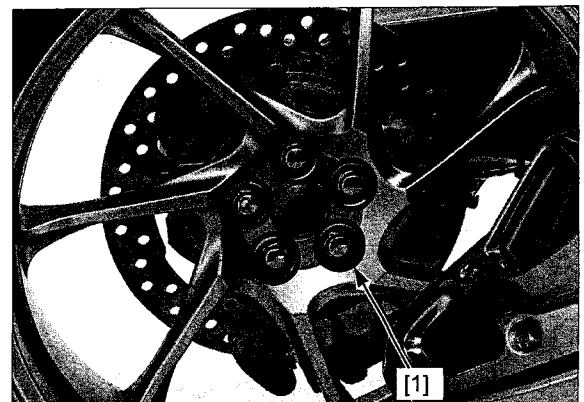
108 N·m (11.0 kgf·m, 80 lbf·ft)

**Muffler band bolt:**

17 N·m (1.7 kgf·m, 13 lbf·ft)

After installation, inspect the exhaust system for leaks.

Check the EGCA operation (page 4-17).



## REAR WHEEL/SUSPENSION

### INSPECTION

#### Wheel Rim Runout

Remove the wheel center cap.

Check the rim runout by placing the wheel in a truing stand [1].

Spin the wheel slowly and read the runout using a dial indicator.

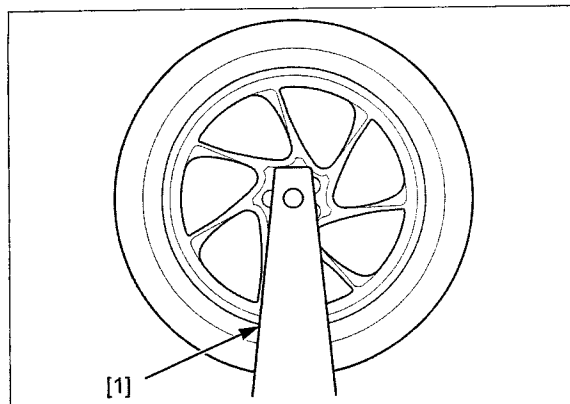
Actual runout is 1/2 the total indicator reading.

#### SERVICE LIMITS:

Radial: 2.0 mm (0.08 in)

Axial: 2.0 mm (0.08 in)

For wheel balance servicing (page 15-14).



## SHOCK ABSORBER

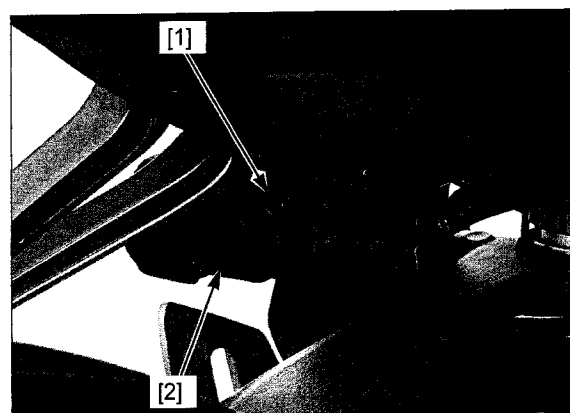
### REMOVAL

Remove the muffler (page 3-21).

Lift and support the fuel tank (page 4-5).

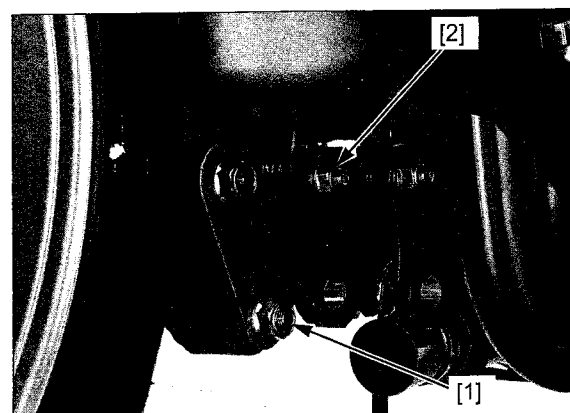
Support the motorcycle securely and raise the rear wheel off the ground.

Remove the bolt [1] and pre-load adjuster [2] from the bracket.

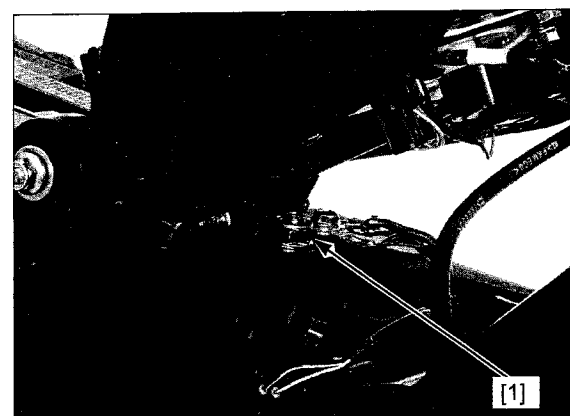


Remove the shock arm bolt/nut [1] (link plate side).

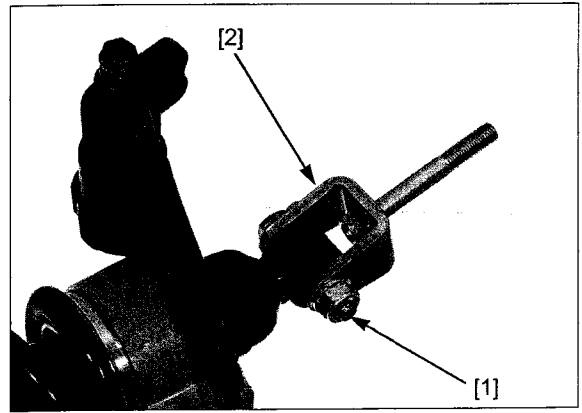
Remove the shock absorber lower mounting bolt/nut [2].



Remove the shock absorber upper mounting nut [1] and lower the shock absorber/upper bracket assembly.



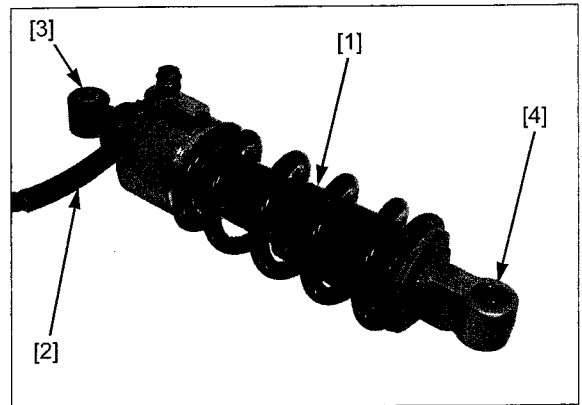
Remove the shock absorber upper mounting bolt/nut [1], then remove the shock absorber upper bracket [2].



## INSPECTION

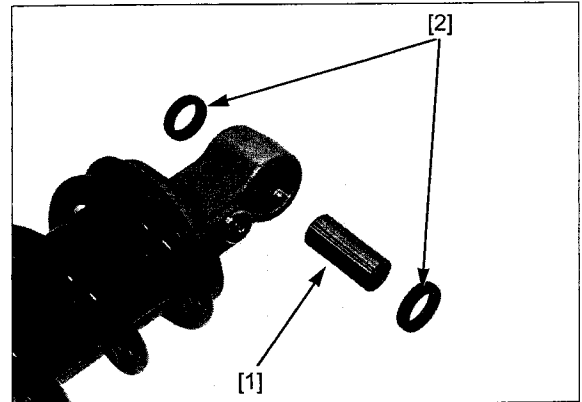
Check the damper unit [1], reservoir hose [2] and reservoir for leakage or other damage.  
Check the upper bushing [3] for wear or damage.  
Replace the shock absorber assembly if necessary.

Remove the lower pivot collar [4].  
Check the needle bearing, pivot collar and dust seals for wear or damage.



## NEEDLE BEARING REPLACEMENT

Remove the pivot collar [1] and dust seals [2].



Press the needle bearing [1] out of the shock absorber lower mount using the special tools and a hydraulic press.

### TOOLS:

Driver handle, 15 x 280L [2]

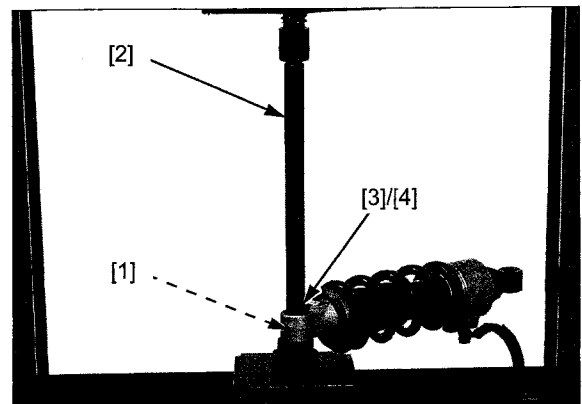
07949-3710001

Attachment, 22 x 24 mm [3]

07746-0010800

Pilot, 17 mm [4]

07746-0040400





## REAR WHEEL/SUSPENSION

*Press the needle bearing into the lower mount with the marked side facing up.*

Pack a new needle bearing [1] with molybdenum disulfide grease. Press the needle bearing into the lower mount so that the needle bearing surface is 6.0 mm (0.24 in) from the end of the lower mount using the special tools and a hydraulic press.

### TOOLS:

Driver handle, 15 x 280L [2]

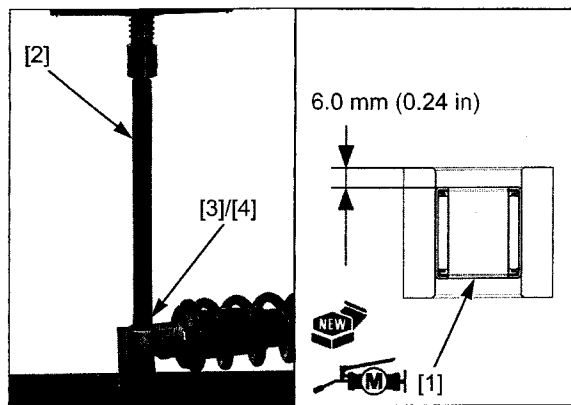
07949-3710001

Attachment, 22 x 24 mm [3]

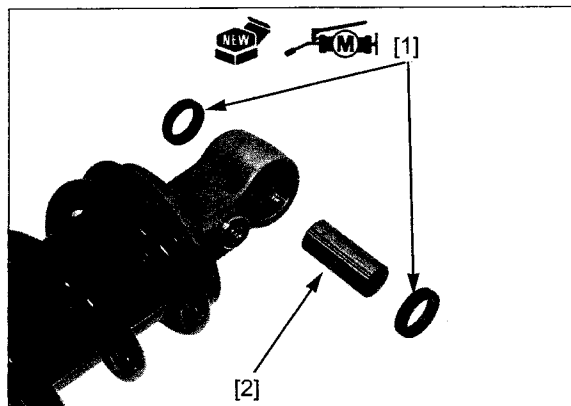
07746-0010800

Pilot, 17 mm [4]

07746-0040400



Apply molybdenum disulfide grease to new dust seal [1] lips, install them into the lower mount. Install the pivot collar [2].



## SHOCK ABSORBER DISPOSAL PROCEDURE

Center punch the damper to mark the drilling point.

Wrap the damper unit inside a plastic bag.

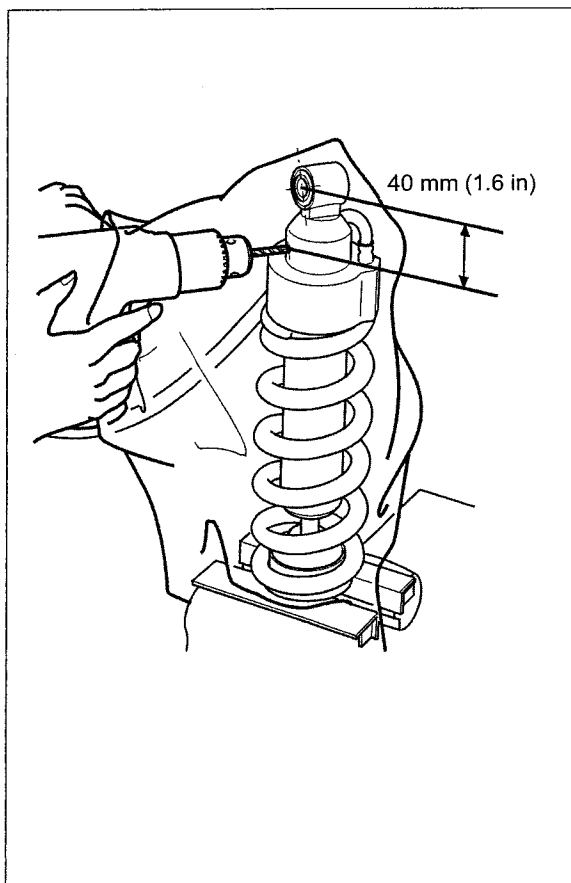
Support the damper in a vise as shown.

Through the open end of the bag, insert a drill motor with a sharp 2 – 3 mm (5/64 – 1/8 in) drill bit.

### NOTICE

- Point the valve away from you to prevent debris getting in your eyes.

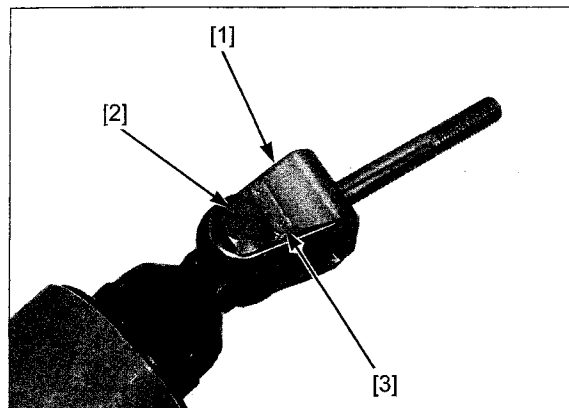
Hold the bag around the drill motor and briefly run the drill motor inside the bag; this will inflate the bag with air from the motor and help keep the bag from getting caught in the bit when you start.



## INSTALLATION

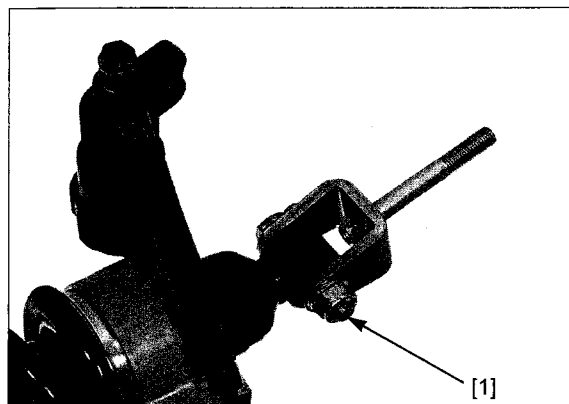
Install the upper bracket [1] to the shock absorber.

Install the mounting bolt [2] against the stopper [3] of upper bracket.



Install the mounting nut [1] and tighten it to the specified torque.

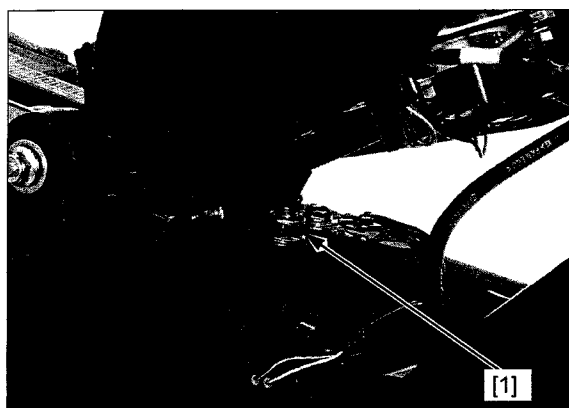
**TORQUE: 44 N·m (4.5 kgf·m, 32 lbf·ft)**



Install the shock absorber/upper bracket assembly into the frame with the rebound damping adjuster facing to the left side.

Install and tighten the upper bracket nut [1] to the specified torque.

**TORQUE: 42 N·m (4.3 kgf·m, 31 lbf·ft)**



Install the shock absorber lower mounting bolt from the left side through the link plates [1].

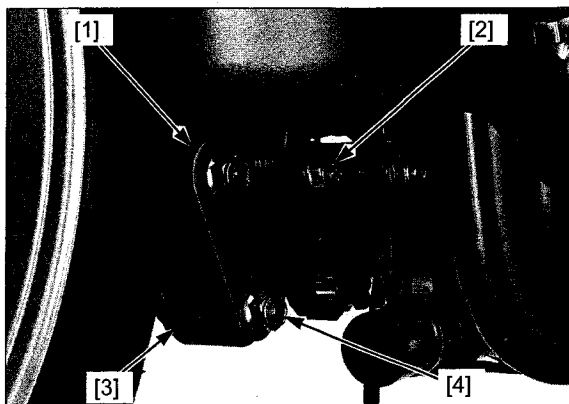
Install and tighten the lower mounting nut [2] to the specified torque.

**TORQUE: 44 N·m (4.5 kgf·m, 32 lbf·ft)**

Install the shock arm bolt from the left side through the shock arm [3] and link plates.

Install and tighten the shock arm nut [4] to the specified torque.

**TORQUE: 64 N·m (6.5 kgf·m, 47 lbf·ft)**

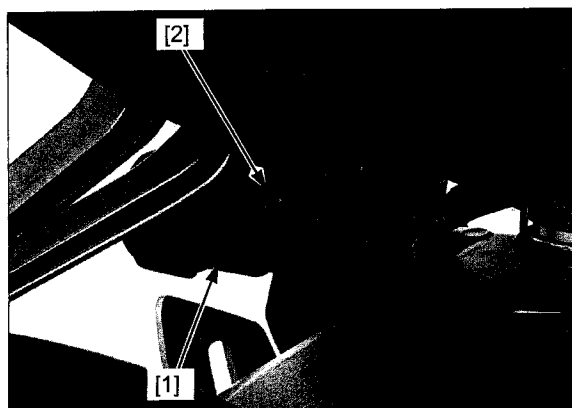


## REAR WHEEL/SUSPENSION

Install the pre-load adjuster [1] onto the bracket and tighten the mounting bolt [2] securely.

Close the fuel tank (page 4-5).

Install the muffler (page 3-23).



## SUSPENSION LINKAGE

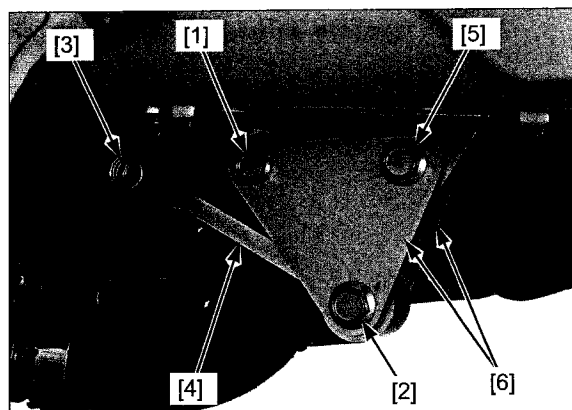
### REMOVAL

*Do not service the suspension linkage while the exhaust system is hot.*

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

Remove the following:

- shock absorber lower mounting bolt/nut [1]
- shock arm bolt/nut (link plate side) [2]
- shock arm bolt/nut (frame side) [3]
- shock arm [4]
- shock link plate-to-swingarm bolt/nut [5]
- shock link plates [6]



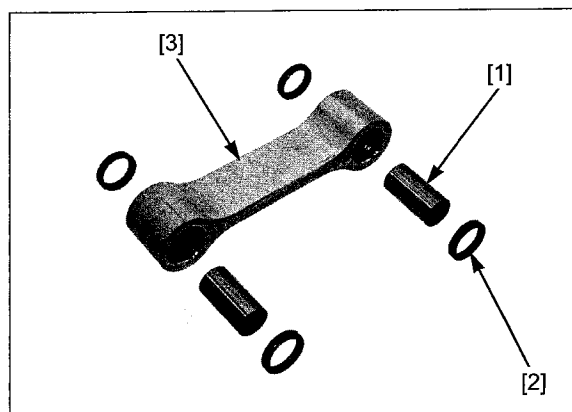
### INSPECTION

Remove the pivot collars [1] and dust seals [2].

Check the dust seals and collars for wear, damage or fatigue.

Check the needle bearings for damage or loose fit.

Check the shock arm [3] for cracks or damage.



### SHOCK ARM BEARING REPLACEMENT

Remove the pivot collars and dust seals.

Press the needle bearings [1] out of the shock arm using the special tools and a hydraulic press.

#### TOOLS:

Driver handle, 15 x 280L [2]

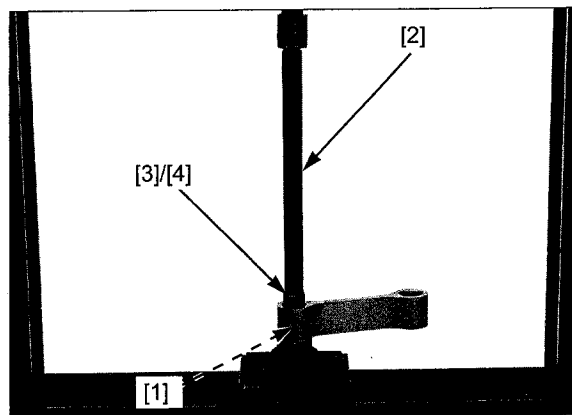
Attachment 24 x 26 mm [3]

Pilot, 20 mm [4]

07949-3710001

07746-0010700

07746-0040500



Press the needle bearing into the shock arm with the marked side facing up.

Pack new needle bearings [1] with molybdenum disulfide grease. Press the needle bearings into the shock arm so that the needle bearings surface are 7.6 – 8.1 mm (0.30 – 0.32 in) from the end of the shock arm using the special tools and a hydraulic press.

## TOOLS:

Driver handle, 15 x 280L [2]

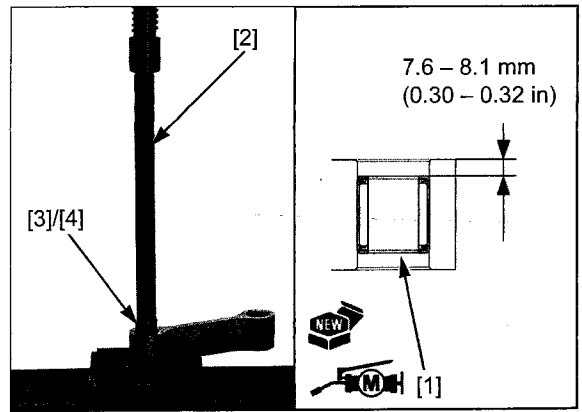
07949-3710001

Attachment 24 x 26 mm [3]

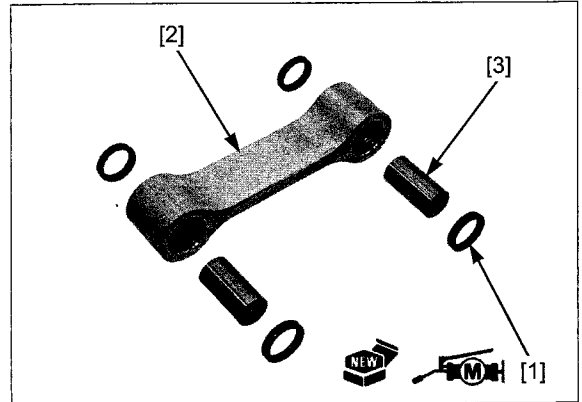
07746-0010700

Pilot, 20 mm [4]

07746-0040500



Apply molybdenum disulfide grease to new dust seal [1] lips, install them into the shock arm [2]. Install the pivot collars [3].



## INSTALLATION

Install the following:

- shock arm [1]
- shock arm bolt/nut (frame side) [2]
- shock link plates [3] with their arrow mark [4] facing to the forward
- shock link plate-to-swingarm bolt/nut [5]
- shock arm bolt/nut (link plate side) [6]
- shock absorber lower mounting bolt/nut [7]

Tighten the shock arm nut (frame side) to the specified torque.

**TORQUE: 64 N·m (6.5 kgf·m, 47 lbf·ft)**

Tighten the shock link plate-to-swingarm nut to the specified torque.

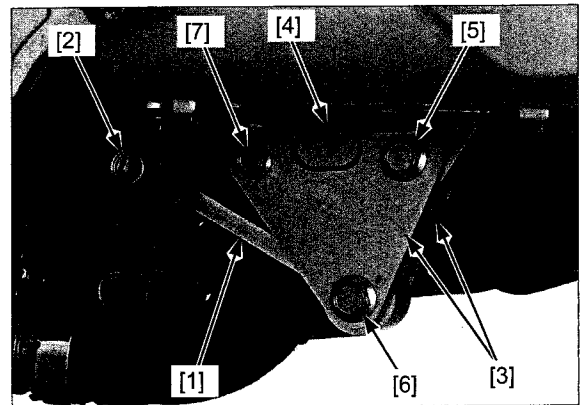
**TORQUE: 64 N·m (6.5 kgf·m, 47 lbf·ft)**

Tighten the shock arm nut (link plate side) to the specified torque.

**TORQUE: 64 N·m (6.5 kgf·m, 47 lbf·ft)**

Tighten the shock absorber lower mounting nut to the specified torque.

**TORQUE: 44 N·m (4.5 kgf·m, 32 lbf·ft)**



### SWINGARM

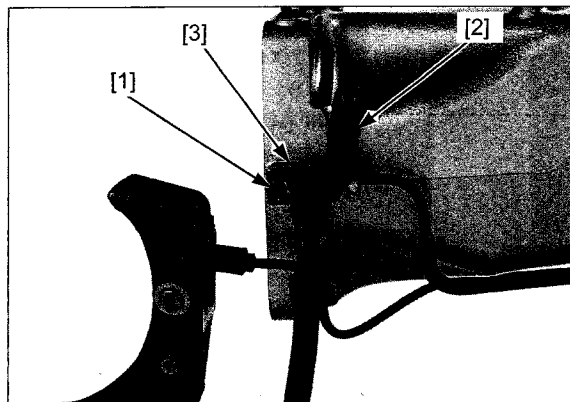
#### REMOVAL

Remove the following:

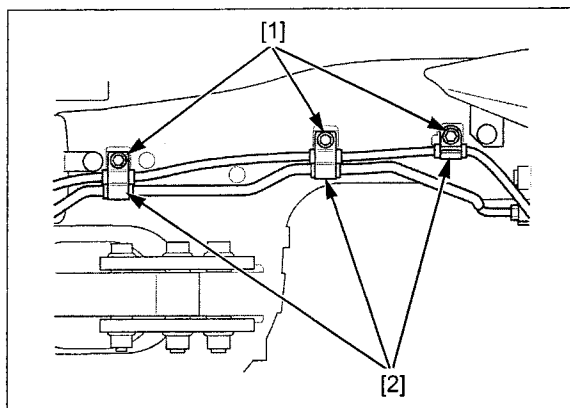
- rear exhaust pipe (page 3-24)
- shock absorber (page 16-6)
- suspension linkage (page 16-10)
- final drive (page 14-6)

*Be careful not to bend or damage the brake pipe.*

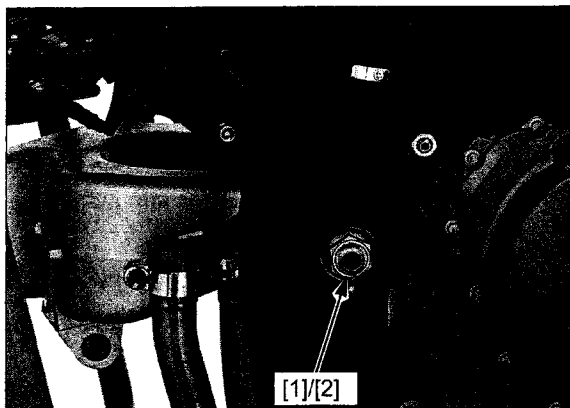
Remove the bolt [1], stay [2] and brake pipe joint [3] from the swingarm.



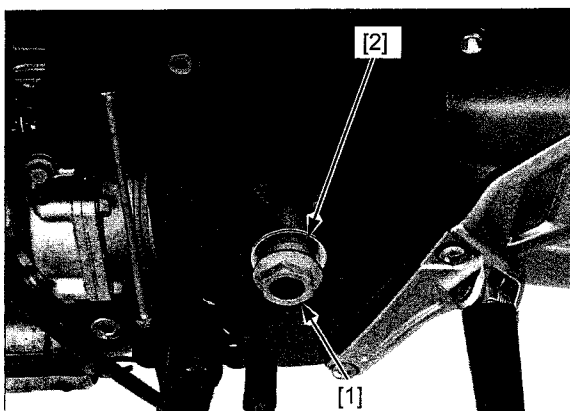
Remove the bolts [1] and wire clampers [2] from the swingarm.



Remove the swingarm pivot nut [1] and washer [2].



Remove the swingarm pivot bolt [1] and washer [2].



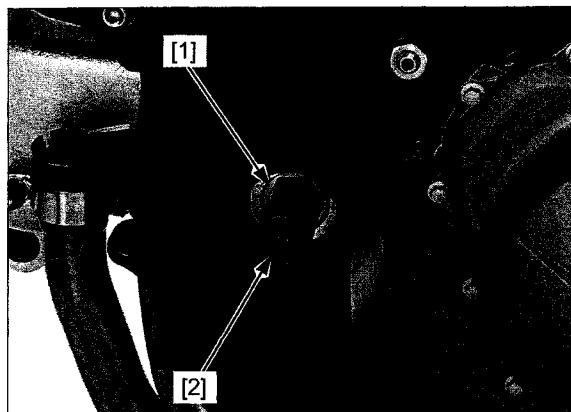
Remove the adjust bolt [1] using the special tool.

## TOOL:

Pivot guide [2]

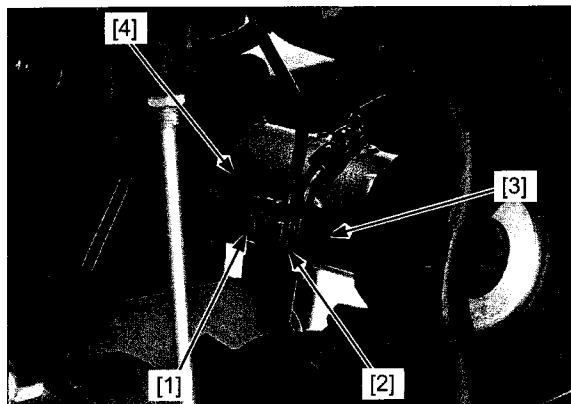
070MG-MGE0100 or  
070MG-MGEA100  
(U.S.A. only)

Remove the special tool, adjust bolt and pull the swingarm rearward slightly.



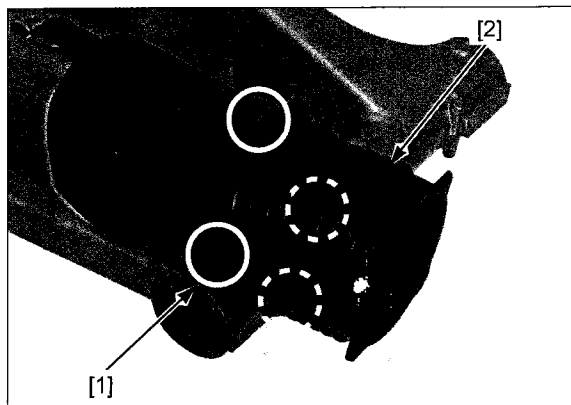
*Be careful not to bend or damage the brake pipe.*

Remove the bolt [1], wire clammer [2] and brake pipe joint [3], then remove the swingarm [4].

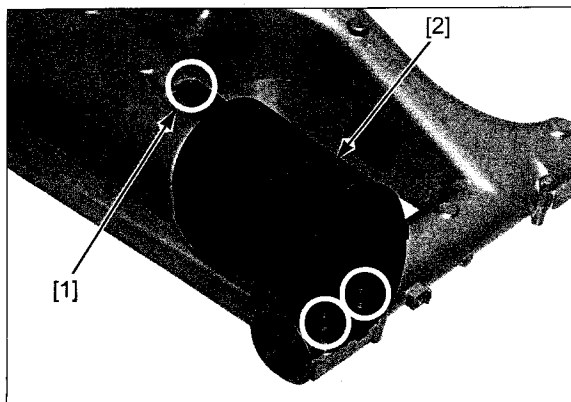


## DISASSEMBLY/INSPECTION

Release the four tabs [1] and remove the joint boot [2].

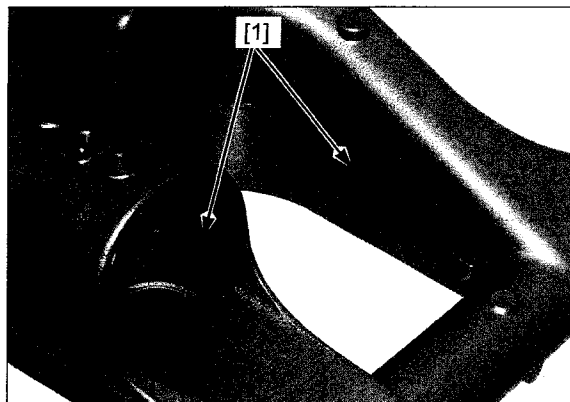


Remove the bolts [1] and drive shaft cover [2].

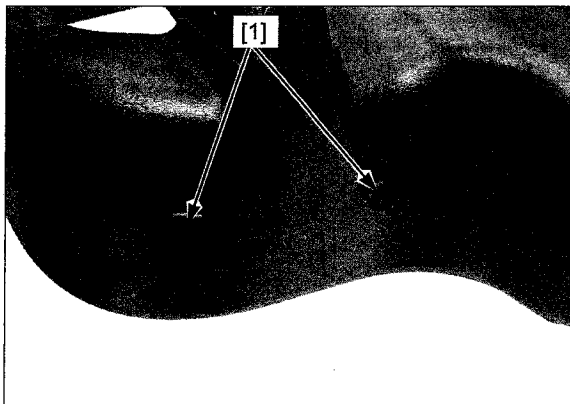


## REAR WHEEL/SUSPENSION

Remove the grommets [1] from the swingarm.

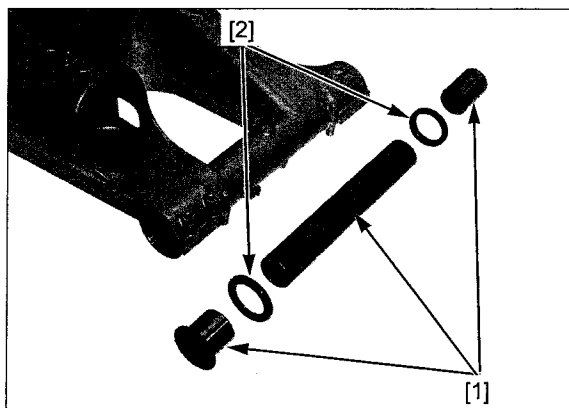


Remove the clips [1] from the swingarm.



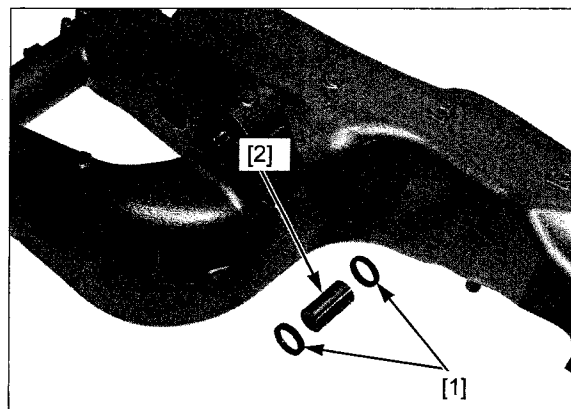
Remove the pivot collars [1] and dust seals [2] from the swingarm pivot.

Check the dust seals and pivot collars for wear or damage.



Remove the dust seals [1] and shock link plate pivot collar [2] from the swingarm.

Check the dust seals and pivot collar for wear or damage.



## PIVOT BEARING REPLACEMENT

Remove the right pivot needle bearing [1] from the right swingarm pivot using the special tool and a hydraulic press.

### TOOLS:

Driver handle, 15 x 280L [2]

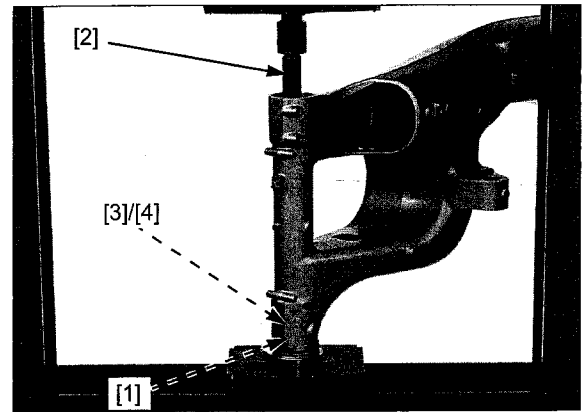
07949-3710001

Attachment 32 x 35 mm [3]

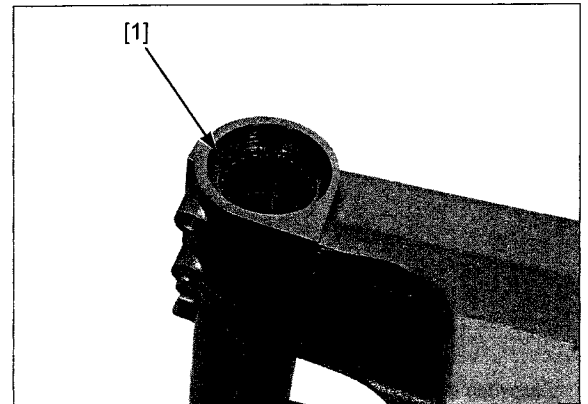
07746-0010100

Pilot, 32 mm [4]

07MAD-PR90200



Remove the snap ring [1] from the left swingarm pivot.



Remove the left pivot needle bearing [1] and pivot ball bearing [2] from the left swingarm pivot using the special tool and a hydraulic press.

### TOOLS:

Driver handle, 15 x 280L [3]

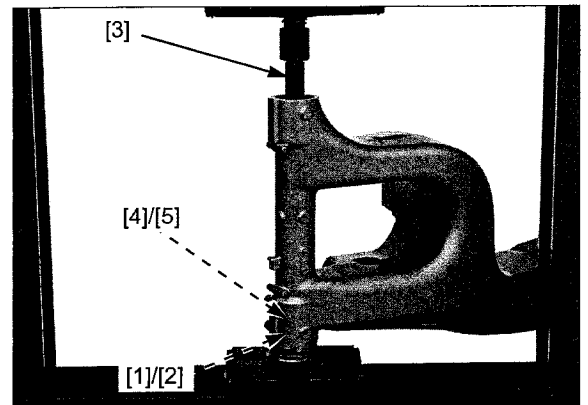
07949-3710001

Attachment 40 x 42 mm [4]

07746-0010900

Pilot, 25 mm [5]

07746-0040600



*Press the ball bearing into the swingarm with the marked side facing up.*

Pack a new left ball bearing [1] with molybdenum disulfide grease. Press the ball bearing in left swingarm pivot until it is fully seated using the special tools and a hydraulic press.

### TOOLS:

Driver handle, 15 x 135L [2]

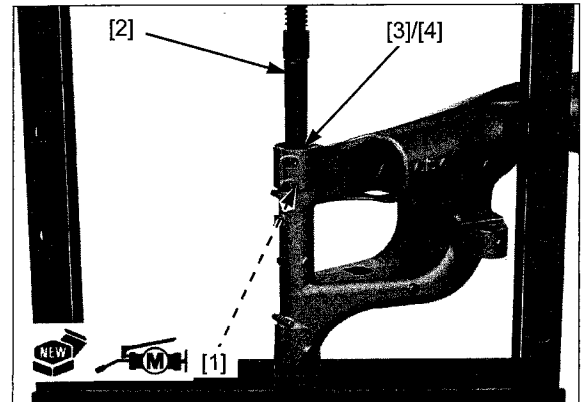
07749-0010000

Attachment 40 x 42 mm [3]

07746-0010900

Pilot, 25 mm [4]

07746-0040600





## REAR WHEEL/SUSPENSION

Pack a new left needle bearing [1] with molybdenum disulfide grease.  
Press the needle bearing in left swingarm pivot until it is fully seated using the special tools and a hydraulic press.

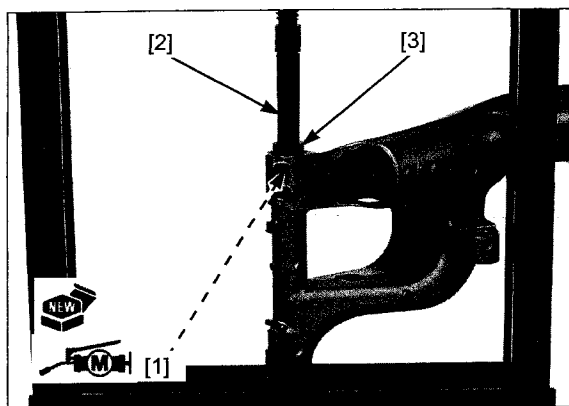
### TOOLS:

Driver handle, 15 x 135L [2]

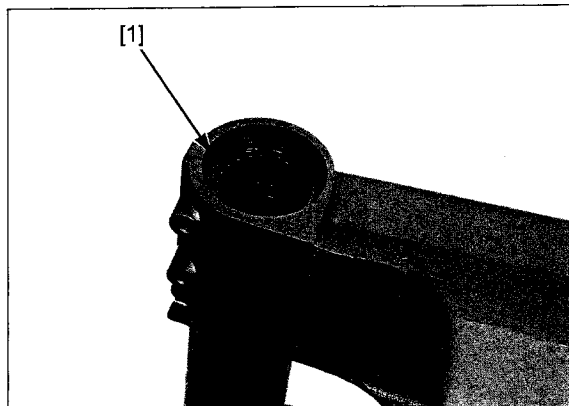
07749-0010000

Attachment 40 x 42 mm [3]

07746-0010900



Install the snap ring [1] into the groove securely.



*Press the needle bearing into the swingarm with the marked side facing up.*

Pack a new right needle bearing [1] with molybdenum disulfide grease.

Press the needle bearing in right swingarm pivot until it is fully seated using the special tools and a hydraulic press.

### TOOLS:

Driver handle, 15 x 135L [2]

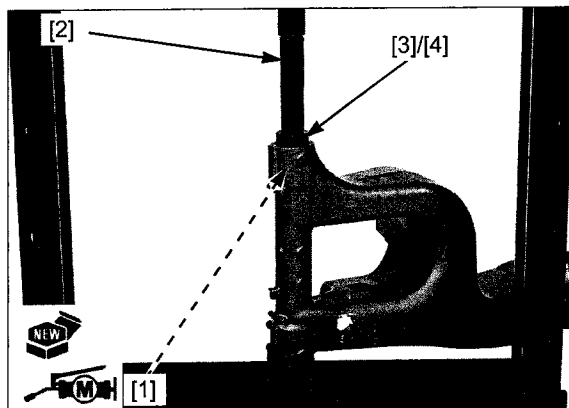
07749-0010000

Attachment 40 x 42 mm [3]

07746-0010900

Pilot, 32 mm [4]

07MAD-PR90200



## SHOCK LINK PLATE BEARING REPLACEMENT

Remove the shock link plate needle bearing [1] from the swingarm using the special tool and a hydraulic press.

### TOOLS:

Driver handle, 15 x 280L [2]

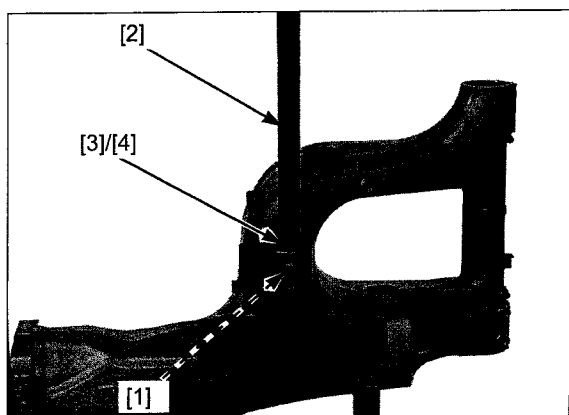
07949-3710001

Attachment 24 x 26 mm [3]

07746-0010700

Pilot, 20 mm [4]

07746-0040500



Press the needle bearing into the swingarm with the marked side facing up.

Pack a new shock link plate needle bearing [1] with molybdenum disulfide grease. Press the needle bearing in swingarm so that the needle bearing surface is 8.0 – 8.5 mm (0.31 – 0.33 in) from the end of swingarm surface, using the special tools and a hydraulic press.

## TOOLS:

Driver handle, 15 x 280L [2]

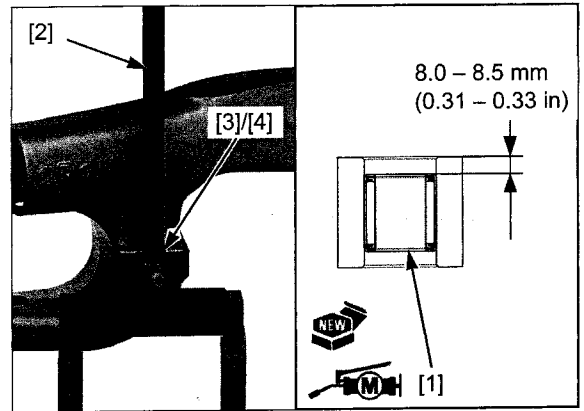
07949-3710001

Attachment 24 x 26 mm [3]

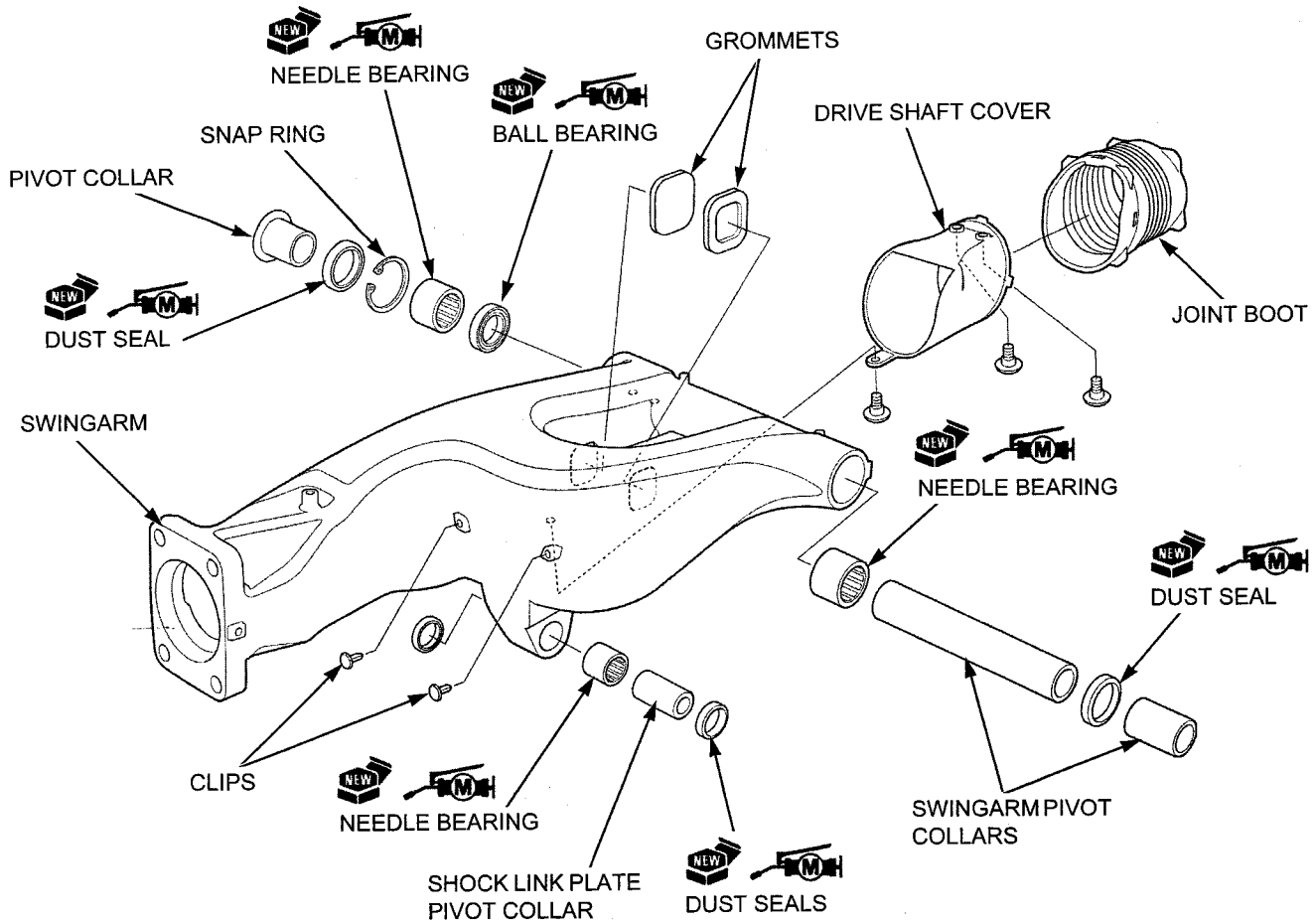
07746-0010700

Pilot, 20 mm [4]

07746-0040500

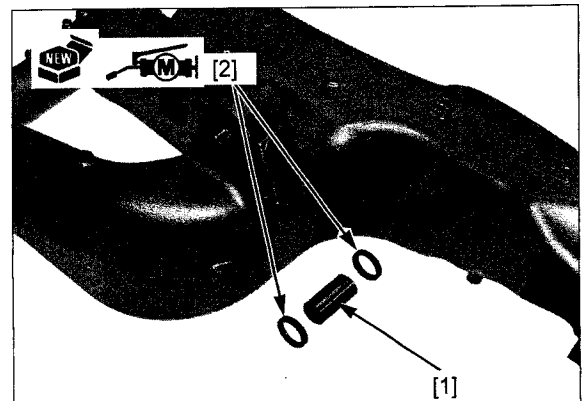


## ASSEMBLY



Install the shock link plate pivot collar [1] to the swingarm.

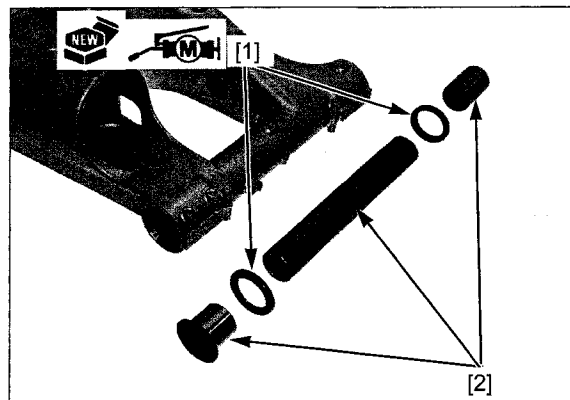
Apply molybdenum disulfide grease to new dust seal [2] lips, then install the dust seals into the swingarm.



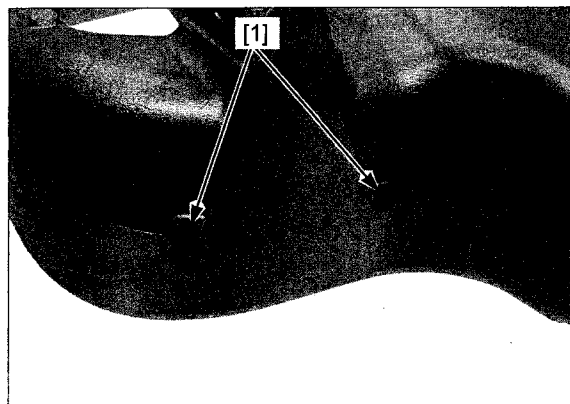
## REAR WHEEL/SUSPENSION

Apply molybdenum disulfide grease to new dust seal [1] lips.

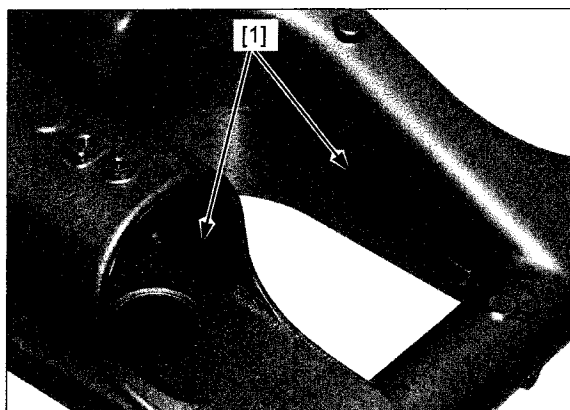
Install the dust seals and pivot collars [2] to the swingarm pivot.



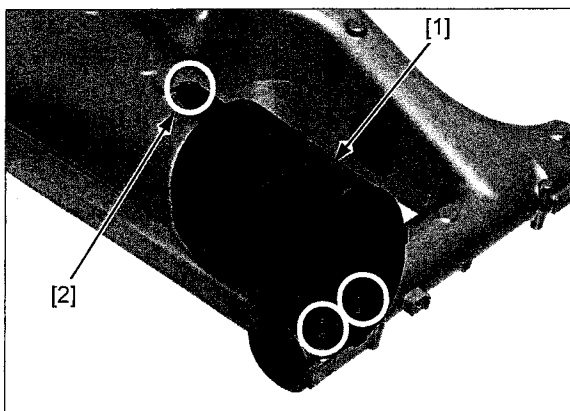
Install the clips [1] to the swingarm securely.



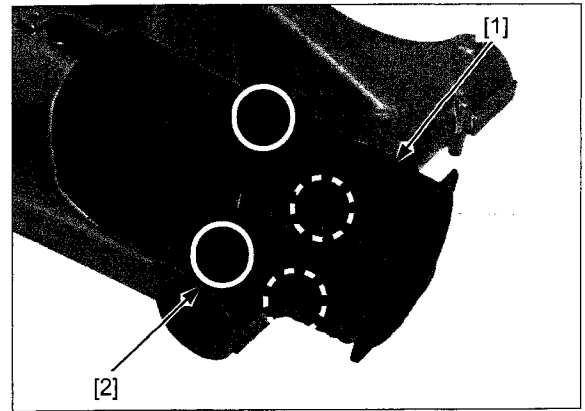
Install the grommets [1] to the swingarm securely.



Install the drive shaft cover [1] and tighten the bolts [2] securely.



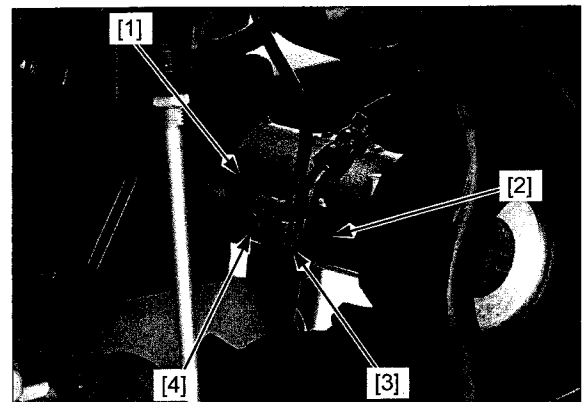
Install the joint boot [1] by aligning its slits with the four tabs [2] of the drive shaft cover.



## INSTALLATION

*Be careful not to bend or damage the brake pipe.*

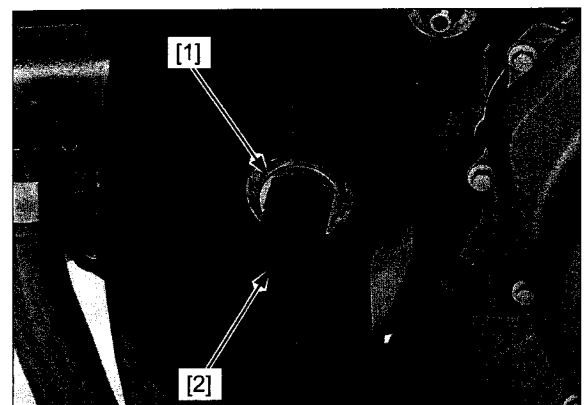
Set the swingarm [1] into the frame. Install the brake pipe joint [2], wire clammer [3] with the speed sensor wire and tighten the bolt [4] securely.



Set the swingarm into the frame and install the adjust bolt [1] with special tool.

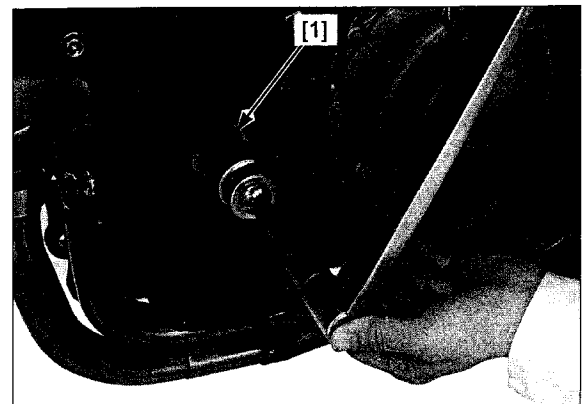
**TOOL:**  
Pivot guide [2]

**070MG-MGE0100 or  
070MG-MGEA100  
(U.S.A. only)**



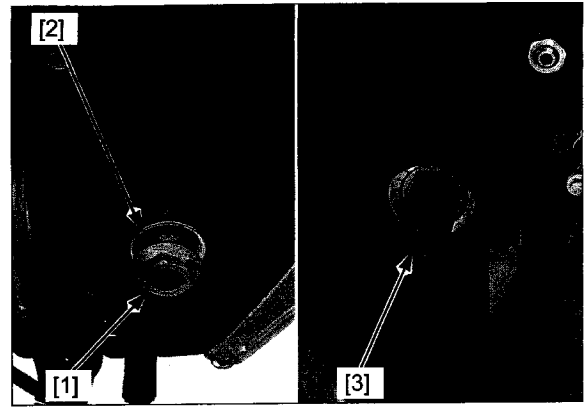
Tighten the adjust bolt [1] to the specified torque.

**TORQUE: 15 N·m (1.5 kgf·m, 11 lbf·ft)**



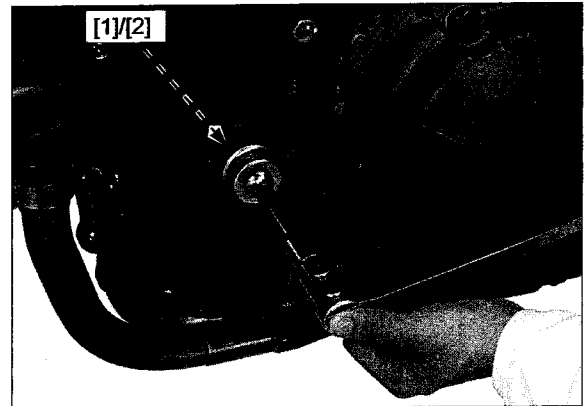
## REAR WHEEL/SUSPENSION

Install the swingarm pivot bolt [1] and washer [2] from the left side while pushing out the special tool [3].



Install the washer [1] and pivot nut [2], and tighten the pivot nut to the specified torque while holding the pivot bolt.

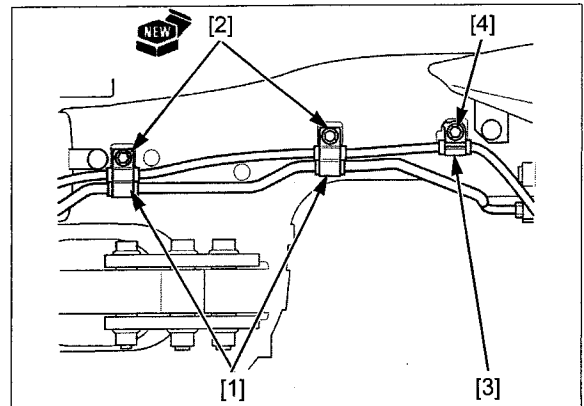
**TORQUE: 108 N·m (11.0 kgf·m, 80 lbf·ft)**



*Route the brake hose and speed sensor wire properly (page 1-22).* Install the wire clampers [1] with the brake hose and speed sensor wire. Push the wire clampers against the stoppers of swingarm, then tighten new bolts [2] to the specified torque.

**TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)**

Install the wire clammer [3] with the speed sensor wire. Push the wire clammer against the stopper of swingarm, then tighten the bolt securely.

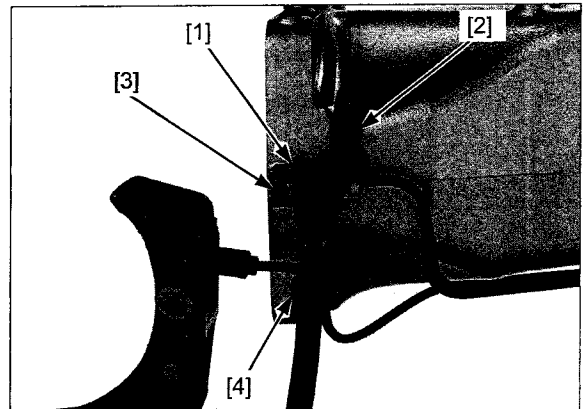


*Be careful not to bend or damage the brake pipe.* Install the brake hose joint [1] and stay [2], and tighten the bolt [3] securely.

Secure the speed sensor and brake hose with the clip [4].

Install the following:

- final drive (page 14-23)
- suspension linkage (page 16-11)
- shock absorber (page 16-9)
- rear exhaust pipe (page 3-27)



# 17. HYDRAULIC BRAKE

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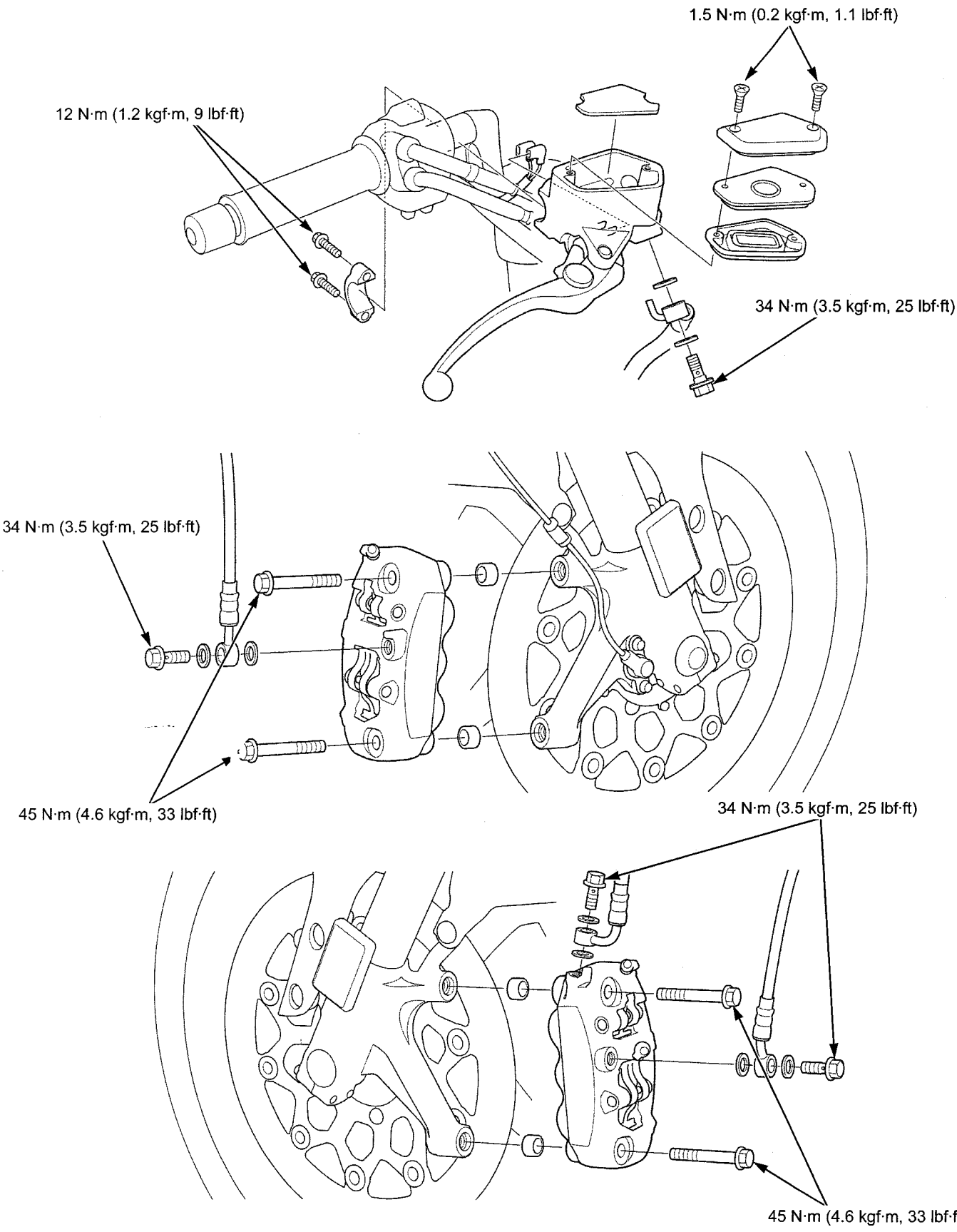
COMPONENT LOCATION .....	17-2
SERVICE INFORMATION .....	17-4
TROUBLESHOOTING.....	17-6
BRAKE FLUID REPLACEMENT/ AIR BLEEDING .....	17-7
BRAKE PAD/DISC .....	17-14
FRONT MASTER CYLINDER .....	17-18

REAR MASTER CYLINDER/BRAKE LIGHT SWITCH/BRAKE PEDAL .....	17-23
FRONT BRAKE CALIPER.....	17-29
REAR BRAKE CALIPER .....	17-34
PCV .....	17-38
DELAY VALVE.....	17-38

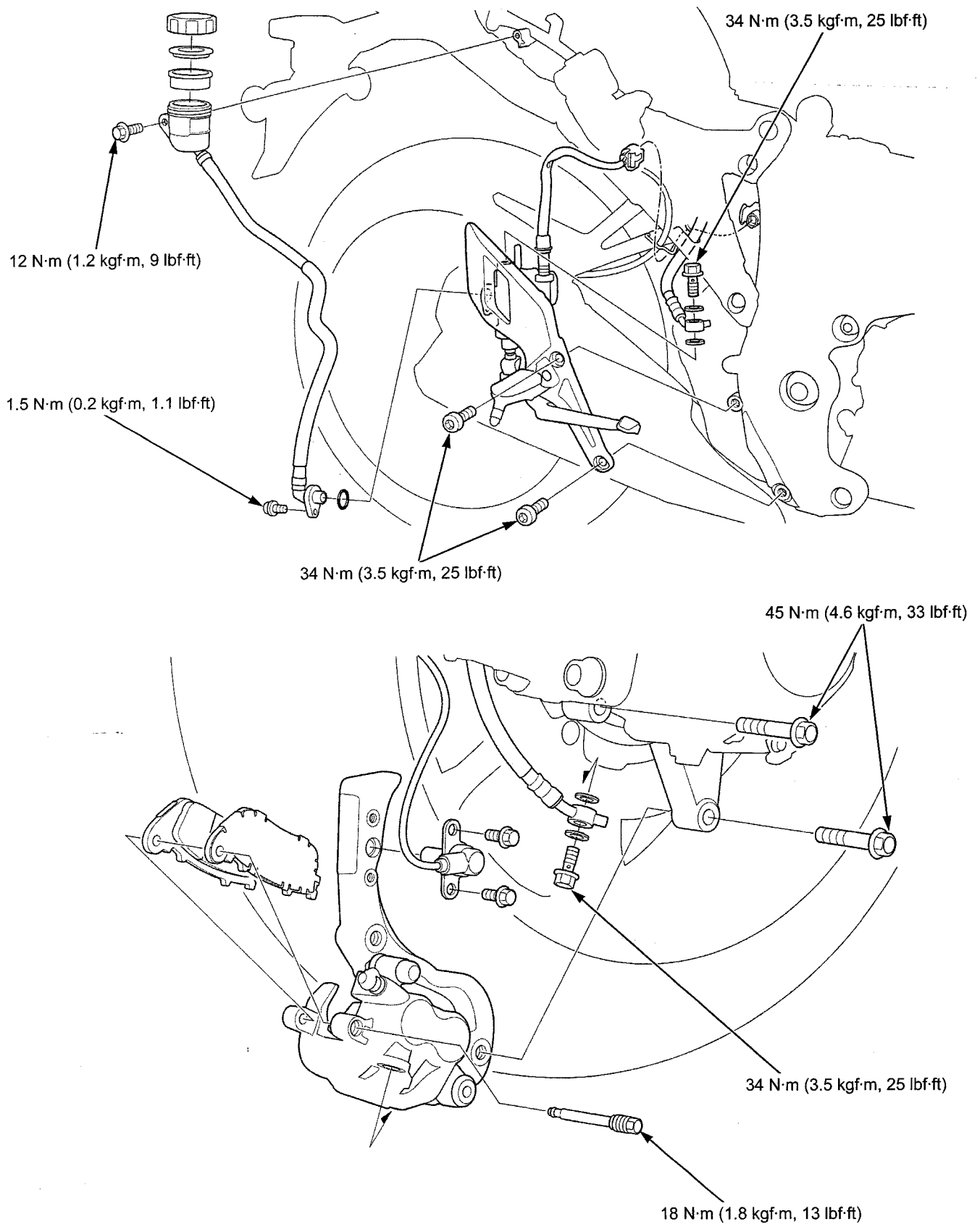
HYDRAULIC BRAKE

COMPONENT LOCATION

FRONT:



REAR:





## SERVICE INFORMATION

## GENERAL

**CAUTION**

Frequent inhalation of brake pad dust, regardless of material composition could be hazardous to your health.

- Avoid breathing dust particles.
- Never use an air hose or brush to clean brake assemblies. Use an OSHA-approved vacuum cleaner.

**NOTICE**

*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.*

- This model is equipped with a Combined Brake System. The system air bleeding procedure must be followed (page 17-7).
- A contaminated brake disc or pad reduces stopping power. Discard contaminated pads and clean a contaminated disc with a high quality brake degreasing agent.
- Check the brake system by applying the brake lever or pedal after the air bleeding.
- Never allow contaminants (e.g., dirt, water) to enter an open reservoir.
- Always use fresh DOT 4 brake fluid from a sealed container when servicing the system. Do not mix different types of fluid as they may not be compatible.
- Once the hydraulic system has been opened, or if the brake feels spongy, the system must be bled.
- This section covers service of the standard brake components of the brake system. For Anti-lock Brake System (ABS) service, see page 18-4.
- Always check brake operation before riding the motorcycle.

## SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Front	Specified brake fluid	DOT 4 brake fluid	—
	Brake disc thickness	4.5 ± 0.1 (0.18 ± 0.004)	3.5 (0.14)
	Brake disc warpage	—	0.20 (0.008)
	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)
	Right caliper cylinder I.D.	Upper	25.400 – 25.450 (1.0000 – 1.0020)
		Middle	25.400 – 25.450 (1.0000 – 1.0020)
		Lower	25.400 – 25.450 (1.0000 – 1.0020)
	Right caliper piston O.D.	Upper	25.318 – 25.368 (0.9968 – 0.9987)
		Middle	25.318 – 25.368 (0.9968 – 0.9987)
		Lower	25.318 – 25.368 (0.9968 – 0.9987)
	Left caliper cylinder I.D.	Upper	27.000 – 27.050 (1.0630 – 1.0650)
		Middle	30.230 – 30.280 (1.1902 – 1.1921)
		Lower	27.000 – 27.050 (1.0630 – 1.0650)
	Left caliper piston O.D.	Upper	26.918 – 26.968 (1.0598 – 1.0617)
		Middle	30.148 – 30.198 (1.1869 – 1.1889)
		Lower	26.918 – 26.968 (1.0598 – 1.0617)
Rear	Specified brake fluid	DOT 4 brake fluid	—
	Master cylinder push rod length	67.5 ± 1 (2.66 ± 0.04)	—
	Brake disc thickness	6.0 ± 0.2 (0.24 ± 0.008)	5.0 (0.20)
	Brake disc warpage	—	0.30 (0.012)
	Master cylinder I.D.	17.460 – 17.503 (0.6874 – 0.6891)	17.515 (0.6896)
	Master piston O.D.	17.417 – 17.444 (0.6857 – 0.6868)	17.405 (0.6852)
	Caliper cylinder I.D.	Front	27.000 – 27.050 (1.0630 – 1.0650)
		Rear	27.000 – 27.050 (1.0630 – 1.0650)
	Caliper piston O.D.	Front	26.918 – 26.968 (1.0598 – 1.0617)
		Rear	26.918 – 26.968 (1.0598 – 1.0617)

## TORQUE VALUES

Brake caliper bleed valve	5.4 N·m (0.6 kgf·m, 4.0 lbf·ft)
Front master cylinder reservoir cap screw	1.5 N·m (0.2 kgf·m, 1.1 lbf·ft)
Front brake caliper mounting bolt	45 N·m (4.6 kgf·m, 33 lbf·ft)
Pad pin	18 N·m (1.8 kgf·m, 13 lbf·ft)
Rear brake disc bolt	42 N·m (4.3 kgf·m, 31 lbf·ft)
Front brake light switch screw	1.2 N·m (0.1 kgf·m, 0.9 lbf·ft)
Front brake lever pivot bolt	1.0 N·m (0.1 kgf·m, 0.7 lbf·ft)
Front brake lever pivot nut	5.9 N·m (0.6 kgf·m, 4.4 lbf·ft)
Front master cylinder holder bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)
Brake hose oil bolt	34 N·m (3.5 kgf·m, 25 lbf·ft)
Rear master cylinder push rod joint nut	18 N·m (1.8 kgf·m, 13 lbf·ft)
Rear master cylinder mounting nut	12 N·m (1.2 kgf·m, 9 lbf·ft)
Rear master cylinder reservoir hose joint screw-washer	1.5 N·m (0.2 kgf·m, 1.1 lbf·ft)
Rider footpeg bracket socket bolt	34 N·m (3.5 kgf·m, 25 lbf·ft)
Rear brake caliper main slide pin	23 N·m (2.3 kgf·m, 17 lbf·ft)
Rear brake caliper sub slide pin	13 N·m (1.3 kgf·m, 9 lbf·ft)
Rear brake caliper mounting bolt	45 N·m (4.6 kgf·m, 33 lbf·ft)
Brake pipe joint nut	14 N·m (1.4 kgf·m, 10 lbf·ft)
PCV mounting nut	10 N·m (1.0 kgf·m, 7 lbf·ft)

ALOC bolt: replace with a new one.

ALOC bolt: replace with a new one.

Apply a locking agent to the threads.

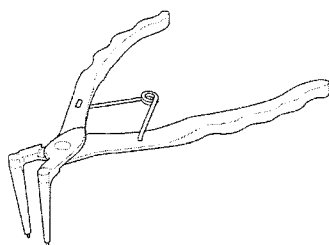
Apply a locking agent to the threads.

ALOC bolt: replace with a new one.

Apply brake fluid to the threads.

## TOOL

Snap ring pliers  
07914-SA50001



# TROUBLESHOOTING

### Brake lever/pedal soft or spongy

- Air in hydraulic system
- Low brake fluid level
- Leaking hydraulic system
- Clogged fluid passage
- Contaminated brake pad/disc
- Worn caliper piston seals
- Worn master cylinder piston cups
- Worn brake pad/disc
- Contaminated caliper
- Caliper not sliding properly (rear)
- Warped/deformed brake disc
- Sticking/worn caliper piston
- Sticking/worn master piston
- Contaminated master cylinder
- Bent brake lever/pedal

### Brake lever/pedal hard

- Clogged/restricted hydraulic system
- Sticking/worn caliper piston
- Caliper not sliding properly (rear)
- Clogged/restricted fluid passage
- Worn caliper piston seal
- Sticking/worn master piston
- Bent brake lever/pedal

### Brake drag

- Contaminated brake pad/disc
- Misaligned wheel
- Clogged/restricted brake hose joint
- Warped/deformed brake disc
- Caliper not sliding properly (rear)
- Clogged/restricted brake hydraulic system
- Sticking/worn caliper piston
- Clogged master cylinder port

## BRAKE FLUID REPLACEMENT/AIR BLEEDING

### NOTICE

*Spilled fluid can damage painted, plastic, or rubber parts. Place a rag over these parts whenever the system is serviced.*

#### NOTE:

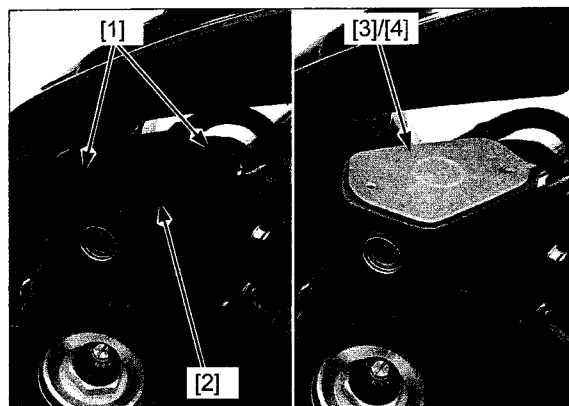
- Do not allow foreign material to enter the system when filling the reservoir.
- When using a commercially available brake bleeder, follow the manufacturer's operating instructions.

### BRAKE FLUID DRAINING

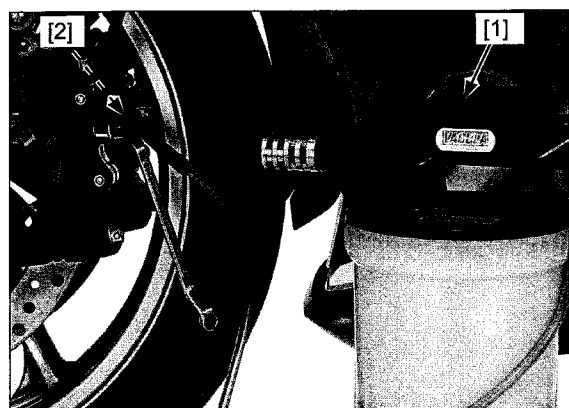
#### LEVER BRAKE LINE:

Turn the handlebar until the front master cylinder reservoir is level before removing the reservoir cap.

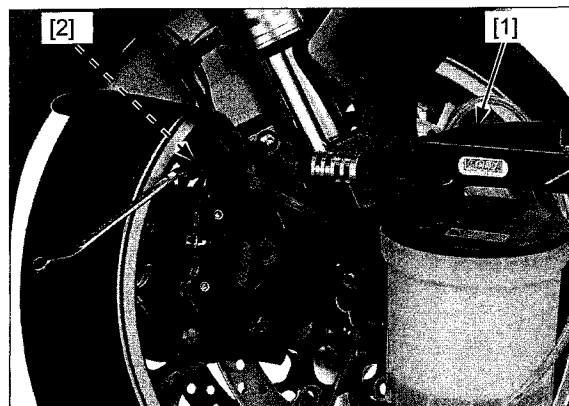
Remove the screws [1] and reservoir cap [2].  
Remove the set plate [3] and diaphragm [4].



Connect a commercially available brake breeder [1] to the left front brake caliper center bleed valve [2].  
Loosen the valve and operate the air bleed tool.  
Drain the brake fluid.



Connect a commercially available brake breeder [1] to the right front brake caliper bleed valve [2].  
Loosen the valve and operate the air bleed tool.  
Drain the brake fluid.



## HYDRAULIC BRAKE

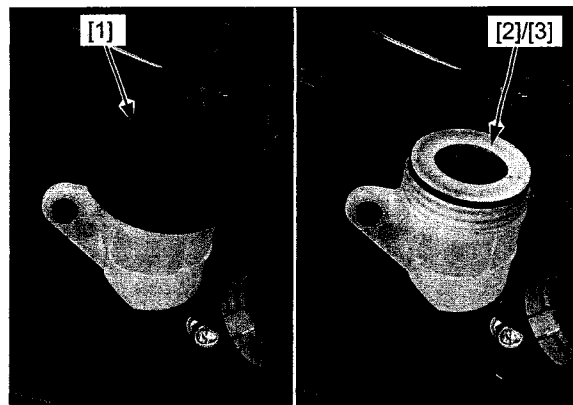
### PEDAL BRAKE LINE:

Place the motorcycle on a level surface.

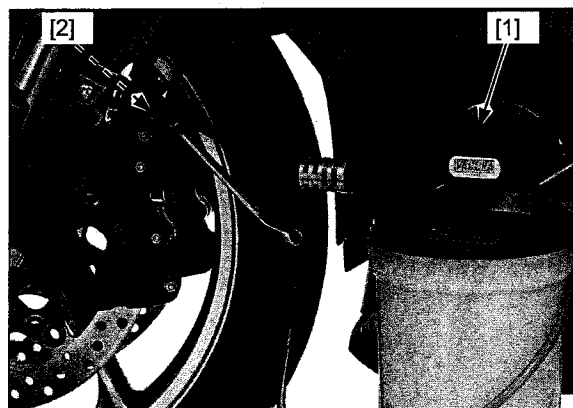
Remove the right rear cowl (page 3-4).

Remove the reservoir cap [1].

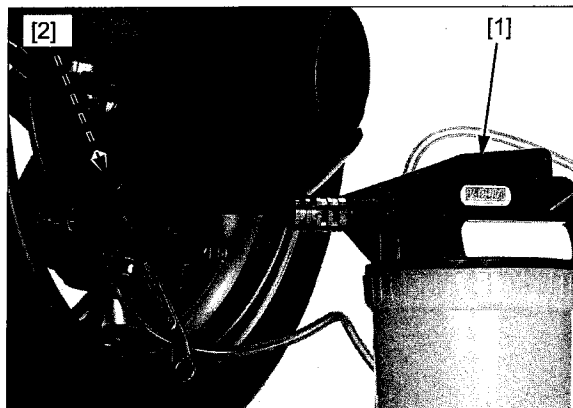
Remove the set plate [2] and diaphragm [3].



Connect a commercially available brake bleeder [1] to the left front brake caliper upper bleed valve [2].  
Loosen the bleed valve and operate an air bleed tool.  
Drain the brake fluid.

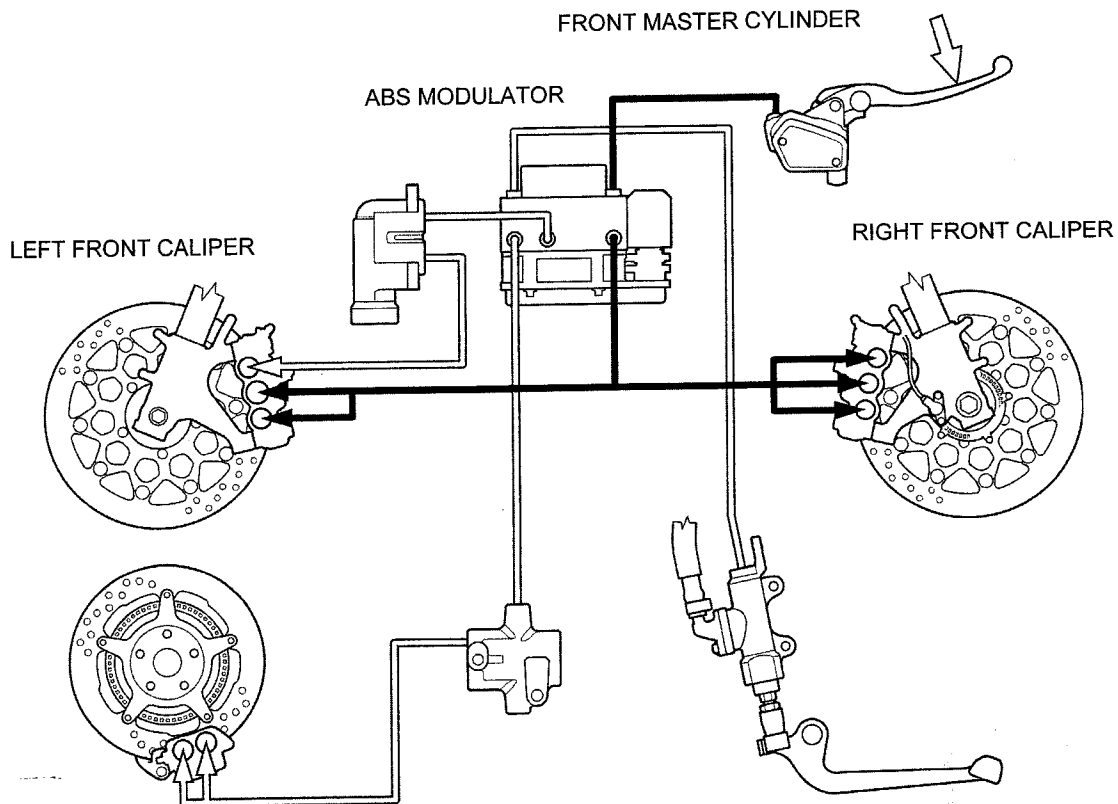


Connect a commercially available brake bleeder [1] to the rear brake caliper bleed valve [2].  
Loosen the bleed valve and operate an air bleed tool.  
Drain the brake fluid.

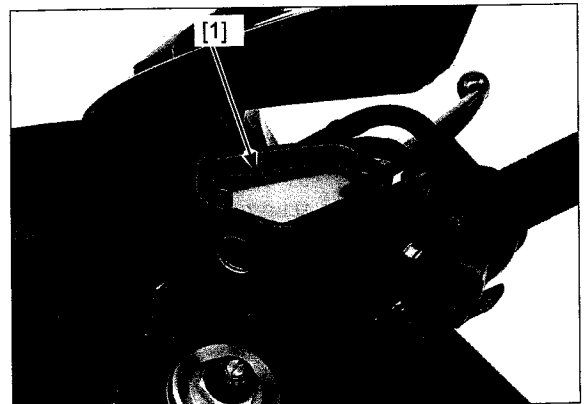


**BRAKE FLUID FILLING/BLEEDING****NOTE:**

- Use only DOT 4 brake fluid from a sealed container.
- Do not mix different types of fluid, they are not compatible.
- Check the fluid level often while bleeding to prevent air from being pumped into the system.
- If air is entering the bleeder from around the bleed valve threads, seal the threads with teflon tape.

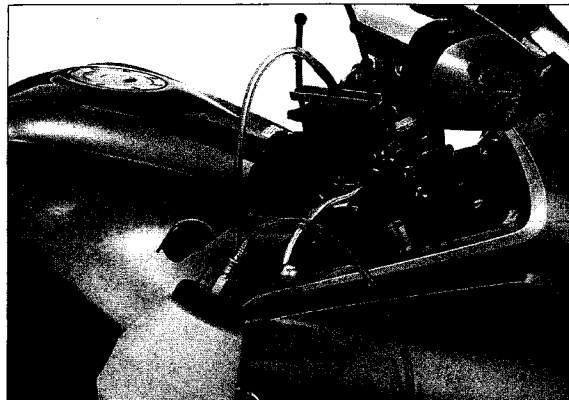
**LEVER BRAKE LINE:**

Tighten the front brake caliper bleed valves securely and fill the reservoir to the upper level line [1] with DOT 4 brake fluid from a sealed container.



## HYDRAULIC BRAKE

If an automatic refill system is not used, add brake fluid when the fluid level in the reservoir is low.



Connect a commercially available brake bleeder [1] to the left front brake caliper center bleed valve [2].

Loosen the bleed valve and operate the brake bleeder until air bubbles do not appear in the bleed hose.

Close the bleed valve to the specified torque.

**TORQUE: 5.4 N·m (0.6 kgf·m, 4.0 lbf·ft)**



Connect a commercially available brake bleeder [1] to the right front brake caliper bleed valve [2].

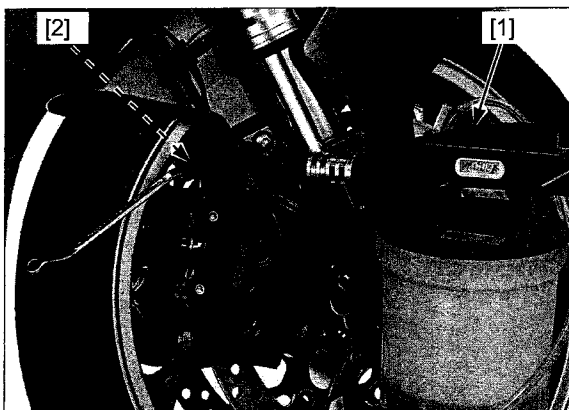
Loosen the bleed valve and operate the brake bleeder until air bubbles do not appear in the bleed hose.

Close the bleed valve to the specified torque.

**TORQUE: 5.4 N·m (0.6 kgf·m, 4.0 lbf·ft)**

Perform the bleeding procedure until the system is completely flushed/bled.

Operate the brake lever. If it is still spongy, bleed the system again.

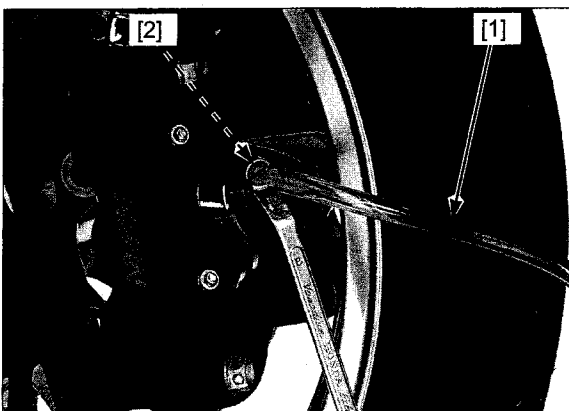


If a brake bleeder is not available, use the following procedure:

Fill the reservoir with DOT 4 brake fluid from a sealed container.

Connect a bleed hose [1] to the left front caliper center bleed valve [2].

Pressurize the system with the brake lever until lever resistance is felt.

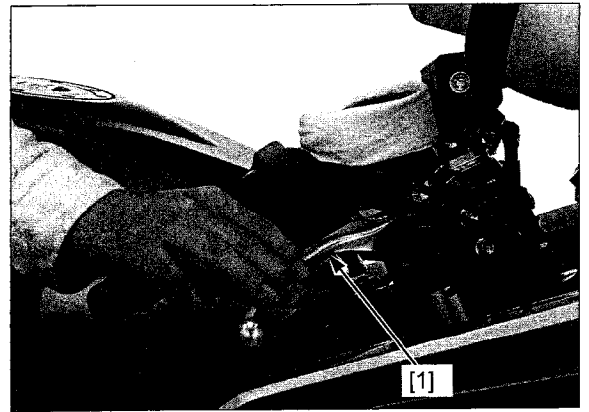


*Do not release the lever until the bleed valve has been closed.*

1. Squeeze the brake lever [1], open the left front caliper center bleed valve 1/4 turn and then close it.
2. Release the brake lever slowly and wait several seconds after it reaches the end of its travel.
3. Repeat steps 1 and 2 until air bubbles do not appear in the bleed hose.

After bleeding the air completely, tighten the left front caliper center bleed valve to the specified torque.

**TORQUE: 5.4 N·m (0.6 kgf·m, 4.0 lbf·ft)**



Fill the reservoir with DOT 4 brake fluid from a sealed container.

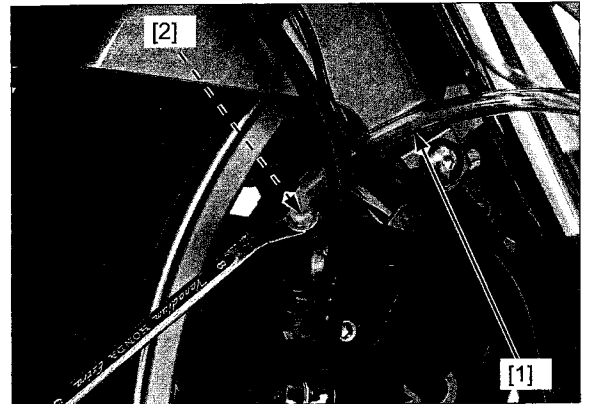
Connect a bleed hose [1] to the right front caliper bleed valve [2].

*Do not release the lever until the bleed valve has been closed.*

1. Squeeze the brake lever, open the right front caliper bleed valve 1/4 turn and then close it.
2. Release the brake lever slowly and wait several seconds after it reaches the end of its travel.
3. Repeat steps 1 and 2 until air bubbles do not appear in the bleed hose.

After bleeding the air completely, tighten the right front caliper bleed valve to the specified torque.

**TORQUE: 5.4 N·m (0.6 kgf·m, 4.0 lbf·ft)**

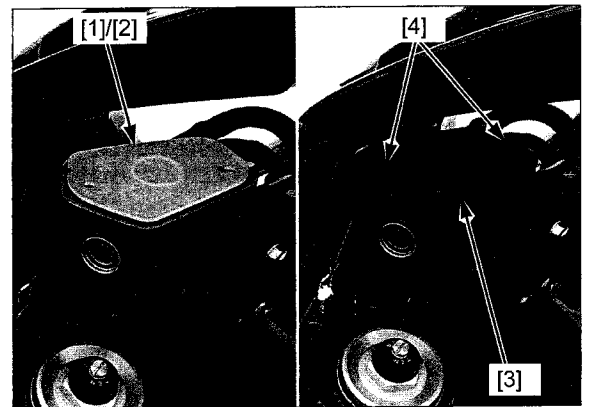


Fill the reservoir to the upper level line with DOT 4 brake fluid.

Install the diaphragm [1] and set plate [2].

Install the reservoir cap [3] and tighten the screws [4] to the specified torque.

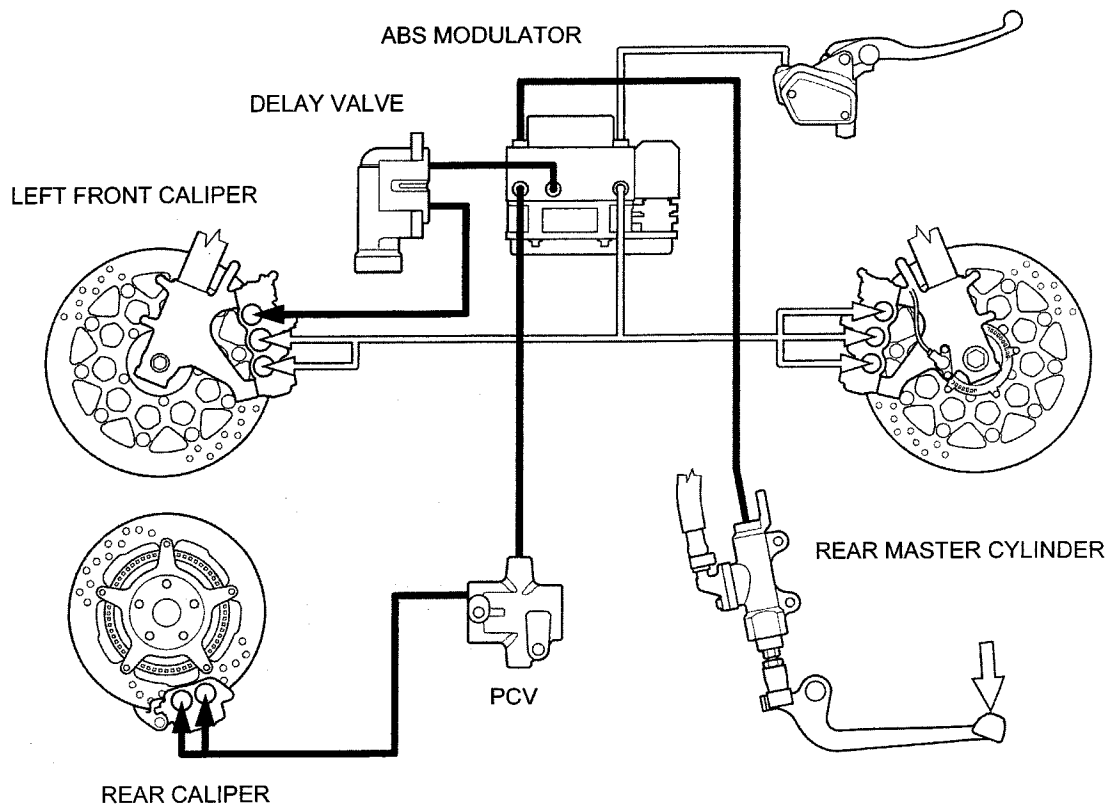
**TORQUE: 1.5 N·m (0.2 kgf·m, 1.1 lbf·ft)**





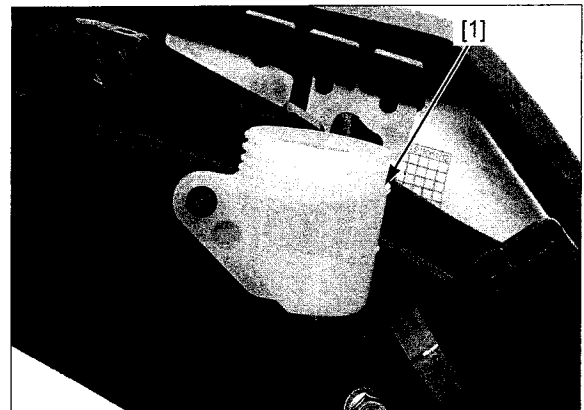
## HYDRAULIC BRAKE

### PEDAL BRAKE LINE:



*If an automatic refill system is not used, add brake fluid when the fluid level in the reservoir is low.*

Tighten the left front brake caliper upper and rear brake caliper bleed valves securely and fill the reservoir to the "UPPER" level [1] with DOT 4 brake fluid from a sealed container.

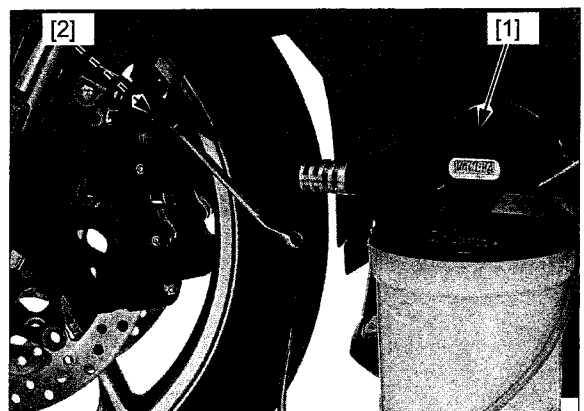


Connect a commercially available brake bleeder [1] to the left front brake caliper upper bleed valve [2].

Loosen the bleed valve and operate the brake bleeder until air bubbles do not appear in the bleed hose.

Close the bleed valve to the specified torque.

**TORQUE: 5.4 N·m (0.6 kgf·m, 4.0 lbf·ft)**



Connect a commercially available brake bleeder [1] to the rear brake caliper bleed valve [2].

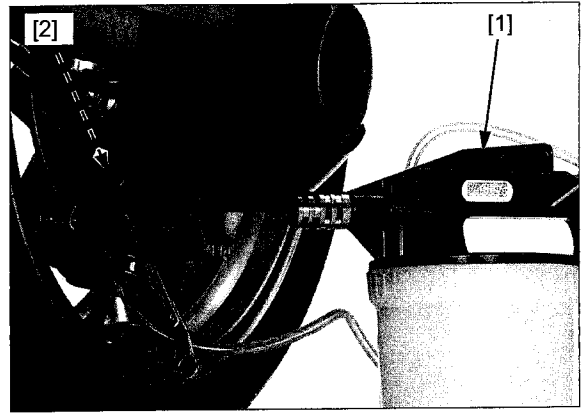
Loosen the bleed valve and operate the brake bleeder until air bubbles do not appear in the bleed hose.

Close the bleed valve to the specified torque.

**TORQUE: 5.4 N·m (0.6 kgf·m, 4.0 lbf·ft)**

Perform the bleeding procedure until the system is completely flushed/bled.

Operate the brake pedal. If it is still spongy, bleed the system again.

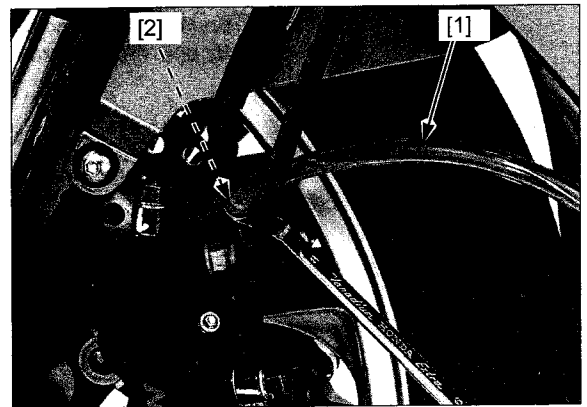


If a brake bleeder is not available, use the following procedure:

Fill the reservoir with DOT 4 brake fluid from a sealed container.

Connect a bleed hose [1] to the left front caliper upper bleed valve [2].

Pressurize the system with the brake pedal until pedal resistance is felt.



*Do not release the pedal until the bleed valve has been closed.*

1. Operate the brake pedal, open the bleed valve 1/4 turn and then close it.
2. Release the brake pedal slowly and wait several seconds after it reaches the end of its travel.
3. Repeat steps 1 and 2 until a sufficient amount of the fluid flows out of the caliper upper bleed valve.

After bleeding the air completely, tighten the left front caliper upper bleed valve to the specified torque.

**TORQUE: 5.4 N·m (0.6 kgf·m, 4.0 lbf·ft)**

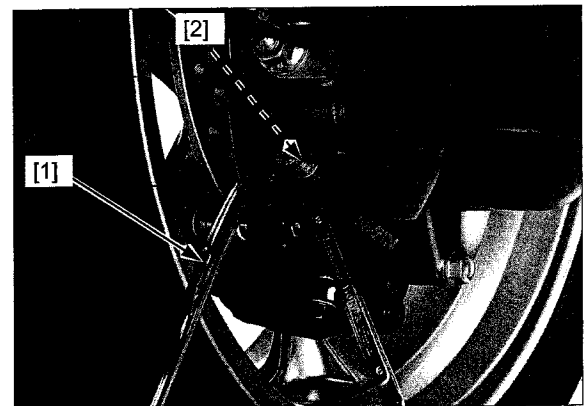
Fill the reservoir with DOT 4 brake fluid from a sealed container.

Connect a bleed hose [1] to the rear caliper bleed valve [2].

1. Operate the brake pedal, open the bleed valve 1/4 turn and then close it.
2. Release the brake pedal slowly and wait several seconds after it reaches the end of its travel.
3. Repeat steps 1 and 2 until a sufficient amount of the fluid flows out of the caliper bleed valve.

After bleeding the air completely, tighten the rear caliper bleed valve to the specified torque.

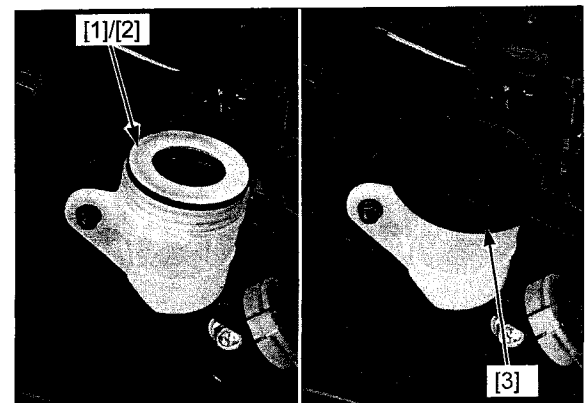
**TORQUE: 5.4 N·m (0.6 kgf·m, 4.0 lbf·ft)**



Fill the reservoir to the upper level line with DOT 4 brake fluid.

Install the diaphragm [1], set plate [2] and reservoir cap [3].

Install the right rear cowl (page 3-4).

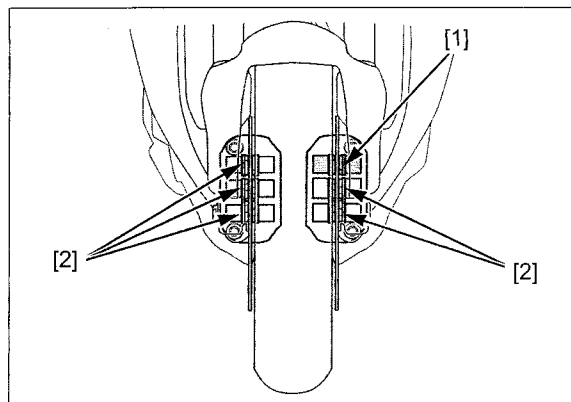


### BRAKE PAD/DISC

#### FRONT BRAKE PAD REPLACEMENT

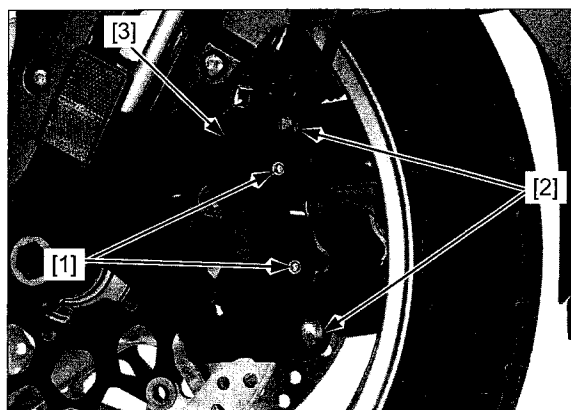
**NOTE:**

- The front brake caliper of the new brake system has the 4 separate brake pads.  
The small brake pads [1] of left caliper are combined with the rear brake pedal.  
Inspect the conventional brake pads [2] and combined brake pads individually.
  - Conventional brake: Always replace the right all brake pads and left large brake pads with the set to assure even disc pressure.
  - Combined brake: Always replace the left small brake pads in pairs to assure even disc pressure.
- After the brake pad replacement, check the brake operation by applying the brake lever or pedal.



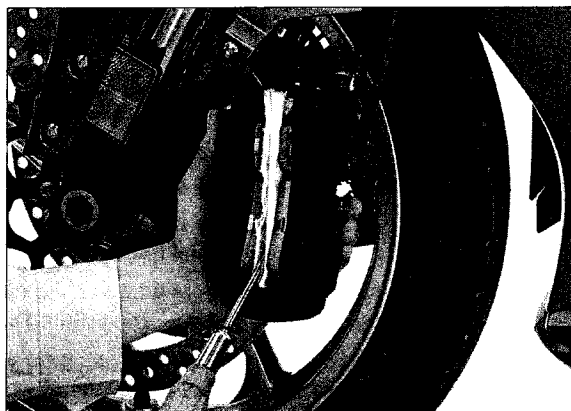
Loosen the pad pins [1].

Remove the caliper mounting bolts [2] and brake caliper [3].

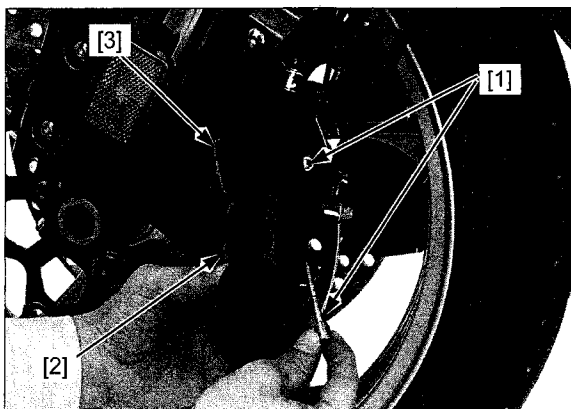


*Check the brake fluid level in the reservoir as this operation causes the level to rise.*

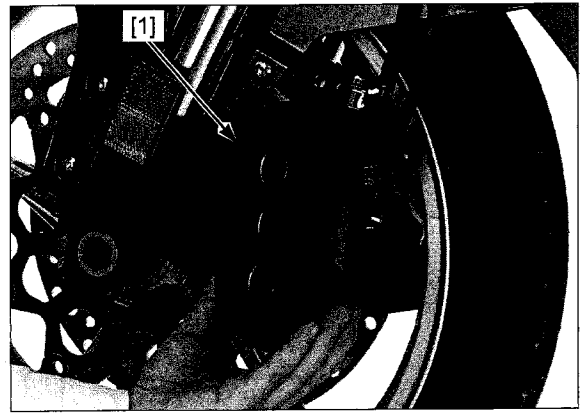
Push the caliper pistons all the way in to allow installation of new pads.



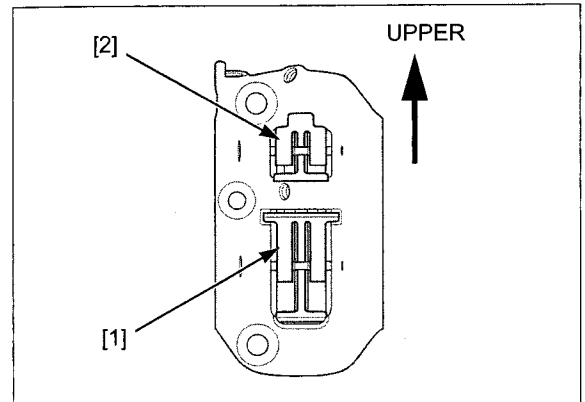
Remove the pad pins [1], large brake pads [2], small brake pads [3] and pad springs.



Clean the inside of the caliper [1] especially around the caliper pistons.

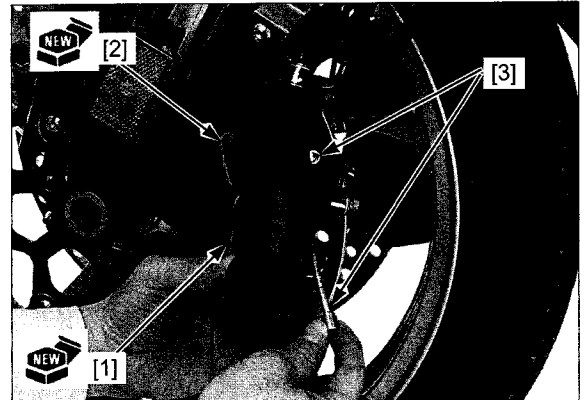


Install the large pad spring [1] and small pad spring [2] to the brake caliper as shown.



Install new large brake pads [1], new small brake pads [2] to the brake caliper.

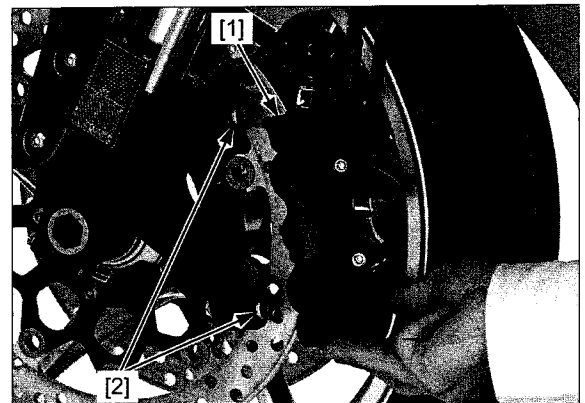
Install the pad pins [3] through the pad springs while pushing in the brake pads against the pad springs.



Install the brake caliper [1] to the fork leg so that the disc is positioned between the pads.

## NOTE:

- Be careful not to damage the brake pads.
- Make sure that the dowel pins [2] are installed into the caliper bracket properly.



## HYDRAULIC BRAKE

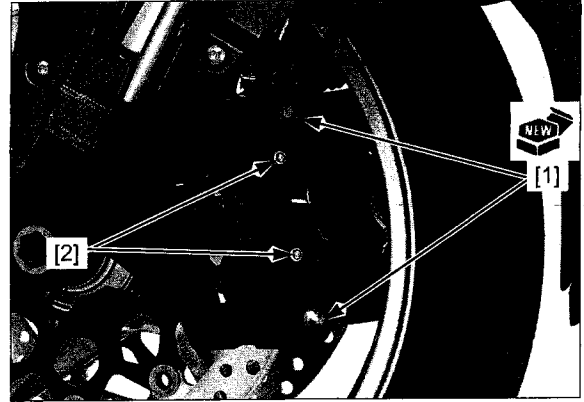
Install and tighten new brake caliper mounting bolts [1] to the specified torque.

**TORQUE: 45 N·m (4.6 kgf·m, 33 lbf·ft)**

Tighten the pad pin [2] to the specified torque.

**TORQUE: 18 N·m (1.8 kgf·m, 13 lbf·ft)**

Operate the brake lever and pedal to seat the caliper pistons against the pads.



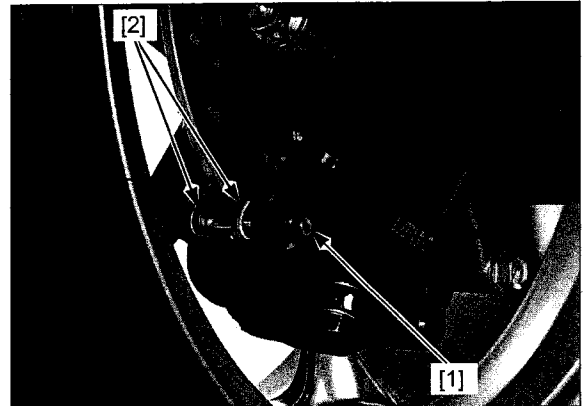
## REAR BRAKE PAD REPLACEMENT

*Check the brake fluid level in the reservoir as this operation causes the level to rise.*

Push the caliper pistons all the way in to allow installation of new brake pads.



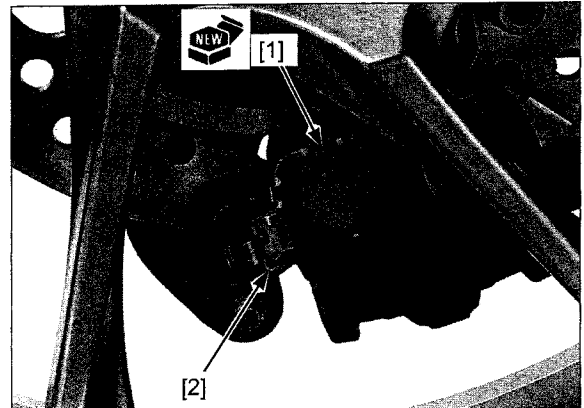
Remove the pad pin [1] and brake pads [2].



Make sure the pad spring is installed correctly.

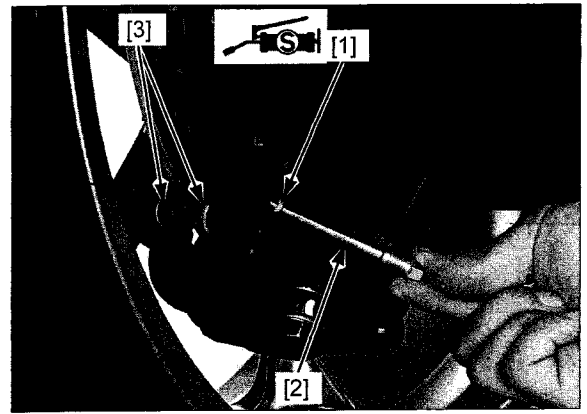
*Always replace the brake pads in pairs.*

Install new brake pads [1] into the caliper so their ends rest into the pad retainer [2] on the bracket properly.



Coat the stopper ring [1] on the pad pin [2] end with the silicone grease.

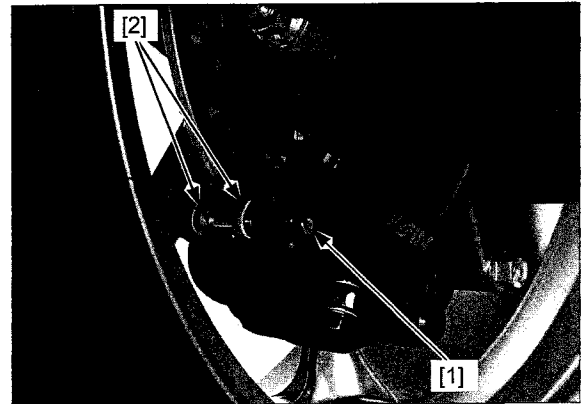
Install the pad pin by pushing in the pads [3] against the pad spring to align the pad pin holes in the pads and caliper body.



Tighten the pad pin to the specified torque.

**TORQUE: 18 N·m (1.8 kgf·m, 13 lbf·ft)**

Operate the brake pedal to seat the caliper pistons against the pads.

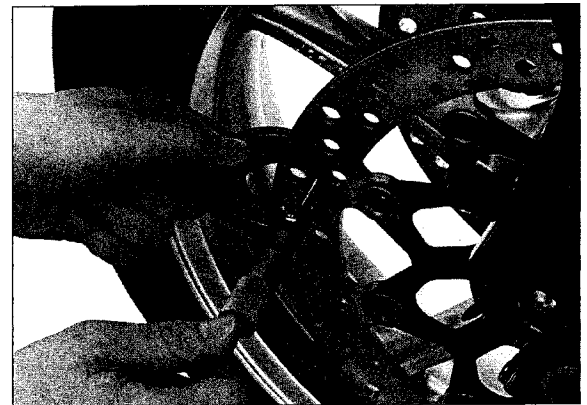


## BRAKE DISC INSPECTION

Visually inspect the disc for damage or cracks.

Measure the brake disc thickness at several points.

**SERVICE LIMITS: FRONT: 3.5 mm (0.14 in)**  
**REAR: 5.0 mm (0.20 in)**

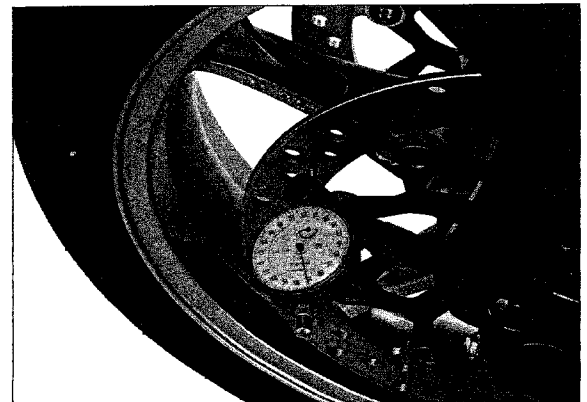


Measure the brake disc warpage with a dial indicator.

**SERVICE LIMITS: FRONT: 0.20 mm (0.008 in)**  
**REAR: 0.30 mm (0.012 in)**

Check the bearing for excessive play, if the warpage exceeds the service limit.

Replace the brake disc if the bearings are normal.



## HYDRAULIC BRAKE

### REAR BRAKE DISC REMOVAL/ INSTALLATION

#### NOTE:

For front brake disc removal/installation, refer to the front wheel disassembly (page 15-15).

Remove the following:

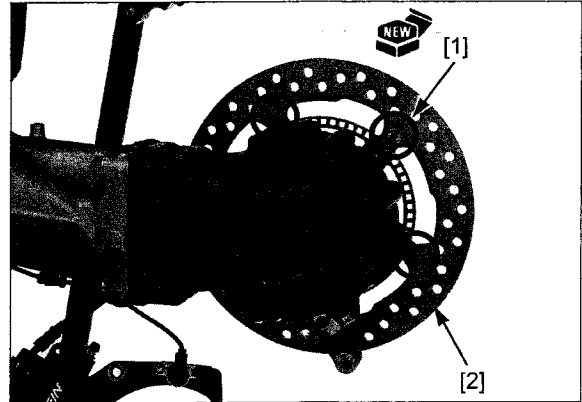
- rear wheel (page 16-5)
- rear brake caliper (page 17-34)

Remove the mounting bolts [1] and rear brake disc [2] from the flange.

Install the rear brake disc with new mounting bolts. Tighten the mounting bolts to the specified torque.

**TORQUE: 42 N·m (4.3 kgf·m, 31 lbf·ft)**

Install the removed parts in the reverse order of removal.

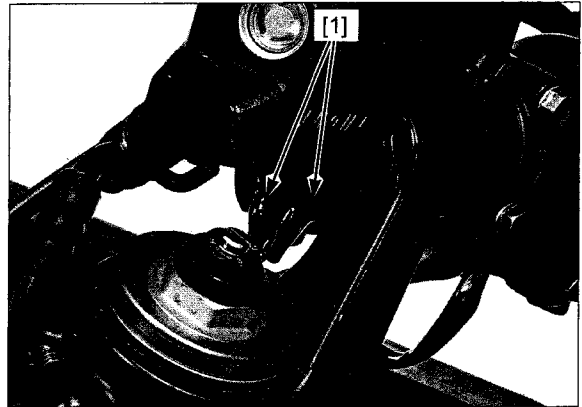


## FRONT MASTER CYLINDER

### REMOVAL

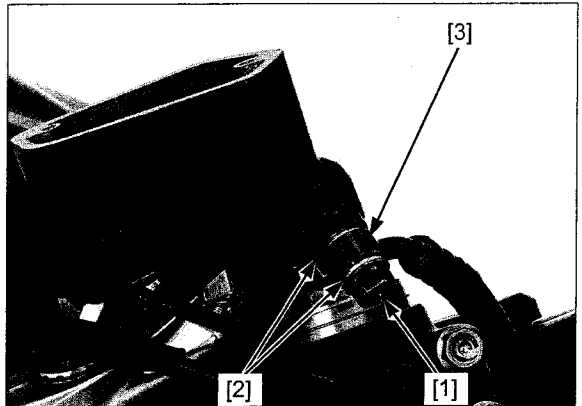
Drain the lever brake line hydraulic system (page 17-7).

Disconnect the brake light switch wire connectors [1].



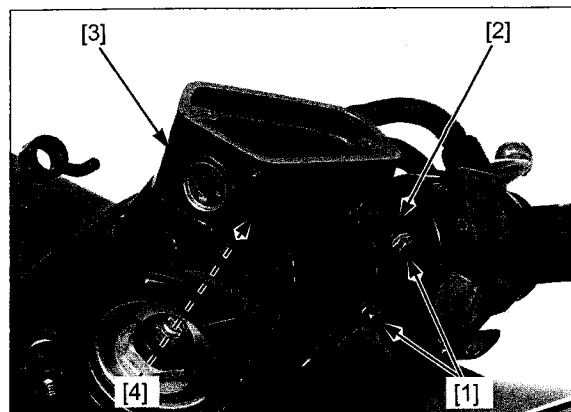
*Avoid spilling fluid on painted, plastic, or rubber parts.*

Remove the brake hose oil bolt [1], sealing washers [2] and brake hose eyelet [3].



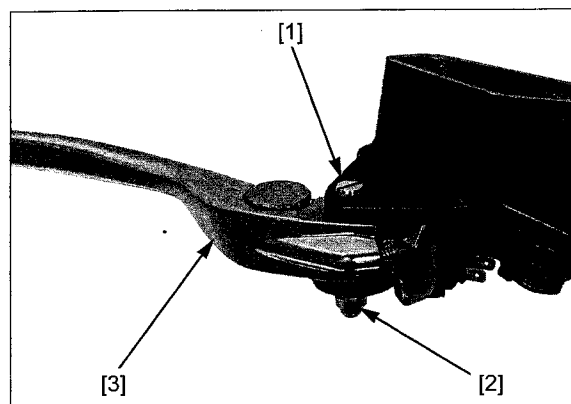
Remove the bolts [1], master cylinder holder [2] and master cylinder assembly [3].

Remove the float [4] from the master cylinder.



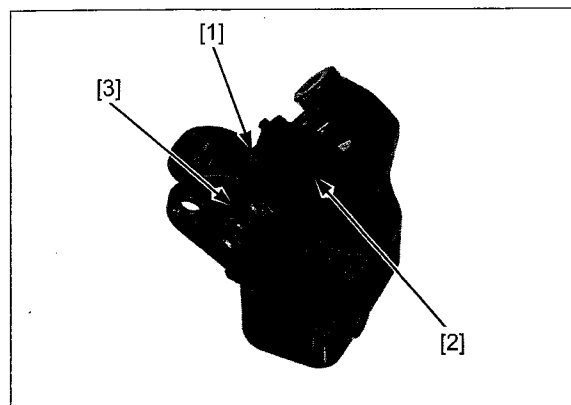
## DISASSEMBLY

Remove the pivot bolt [1]/nut [2] and brake lever assembly [3].



Remove the screw [1] and brake light switch [2].

Remove the boot [3].



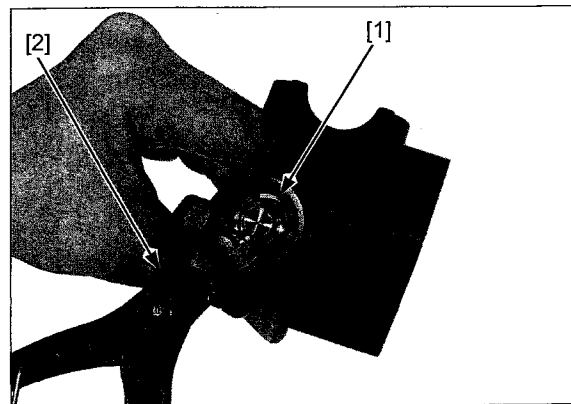
Remove the snap ring [1] from the master cylinder body using the special tool as shown.

### TOOL:

Snap ring pliers [2]

07914-SA50001

Remove the master piston, spring and spring guide.





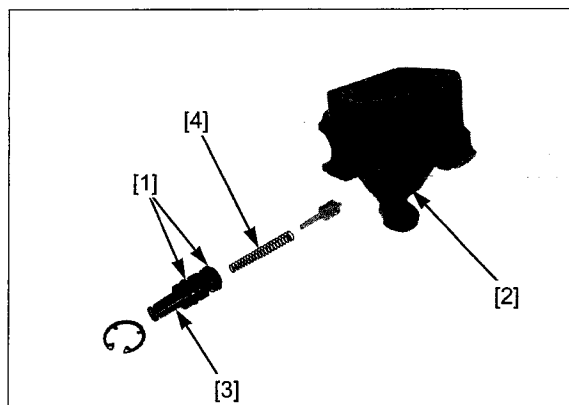
## HYDRAULIC BRAKE

### INSPECTION

Clean the inside of the cylinder, reservoir and piston with brake fluid.

Check the piston cups [1] for damage or deterioration. Check the master cylinder [2] and piston [3] for abnormal scratches.

Check the spring [4] for fatigue or damage.

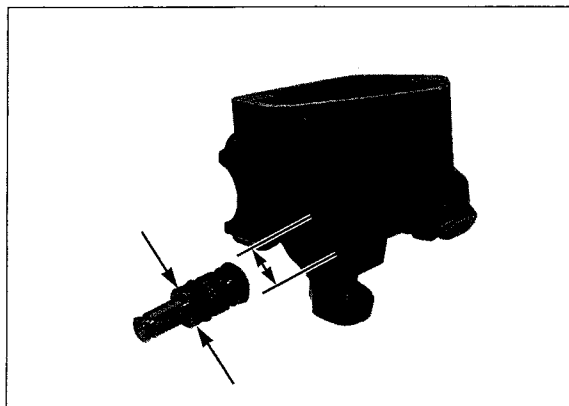


Measure the master cylinder I.D.

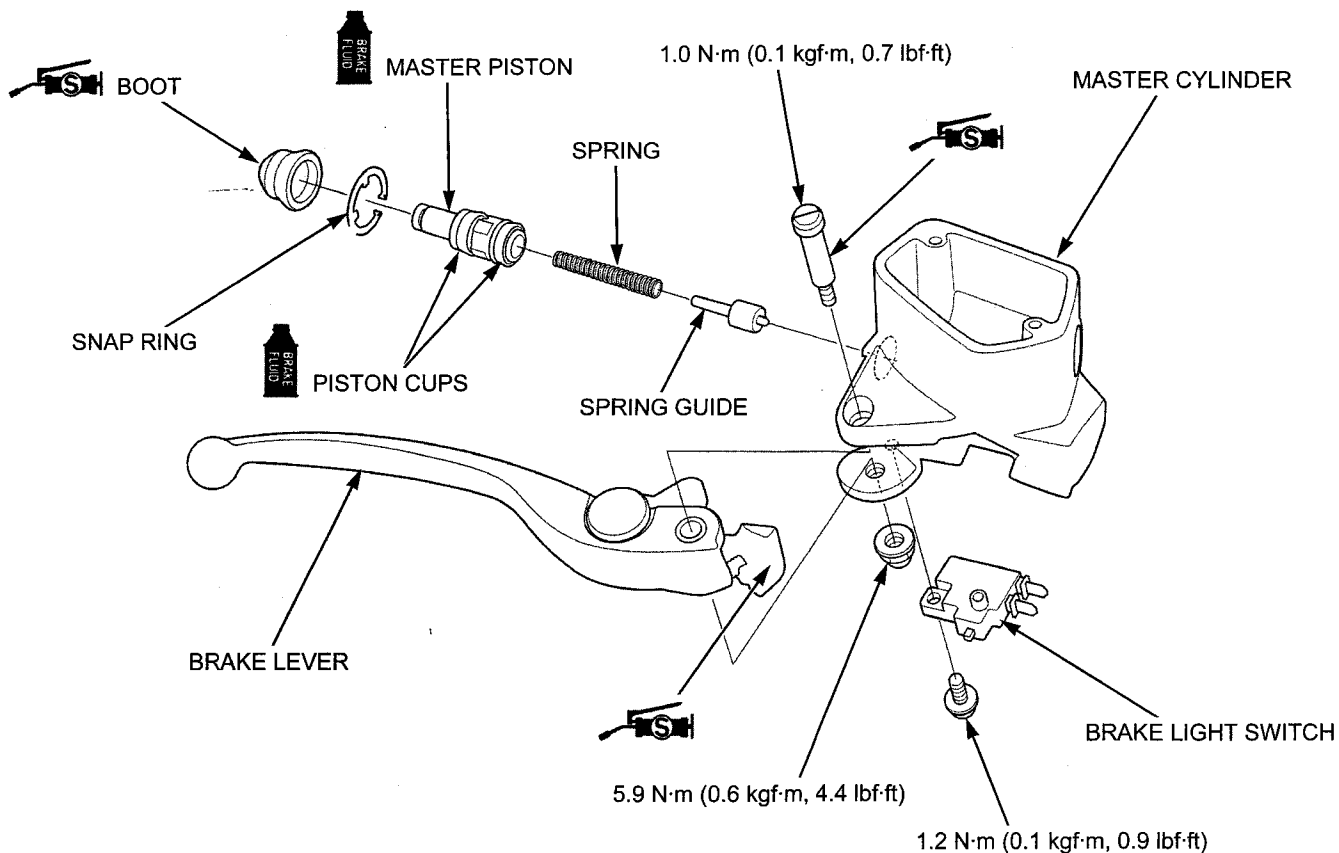
**SERVICE LIMIT: 15.925 mm (0.6270 in)**

Measure the master cylinder piston O.D.

**SERVICE LIMIT: 15.815 mm (0.6226 in)**



### ASSEMBLY



## NOTE:

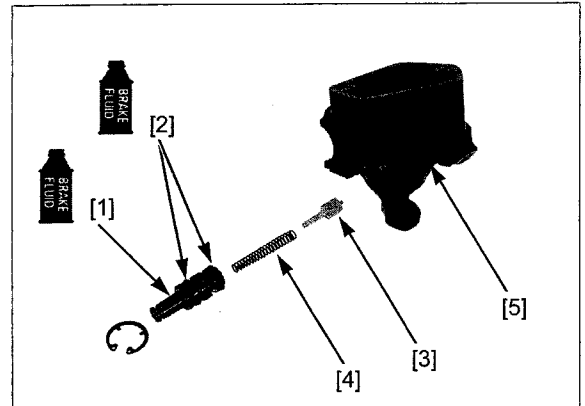
Keep the piston, cups, spring, snap ring and boot as a set; do not substitute individual parts.

Coat the master piston [1] and piston cups [2] with clean brake fluid before assembly.

Install the spring guide [3] into the spring [4].

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

Install the spring guide/spring and master piston into the master cylinder [5].



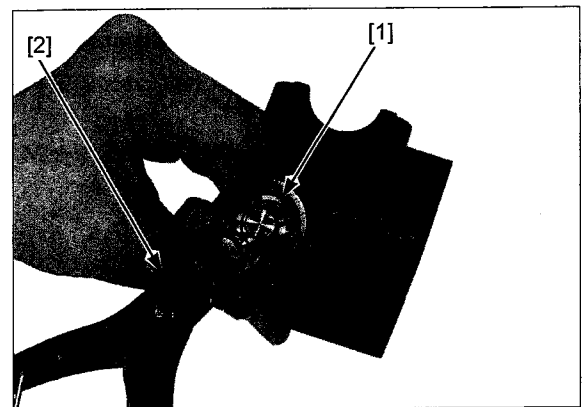
*Be certain the snap ring is firmly seated in the groove.*

Install the snap ring [1] using the special tool.

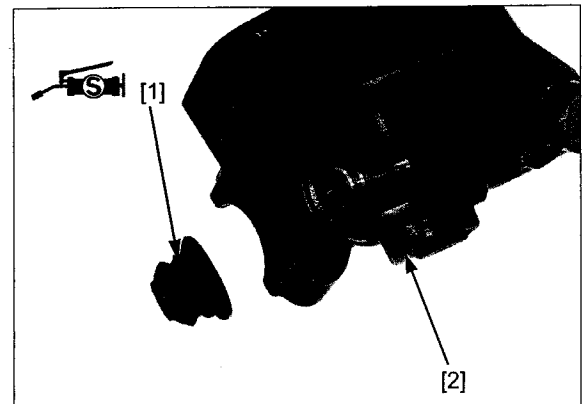
## TOOL:

Snap ring pliers [2]

07914-SA50001



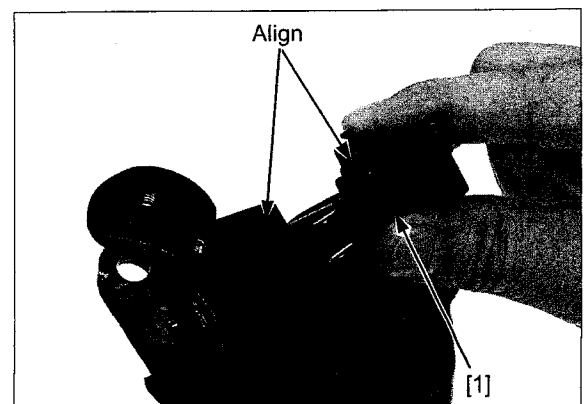
Apply silicone grease to the inside of the boot [1] and install it to the master cylinder [2].



Install the brake light switch [1] by aligning its boss with the hole.

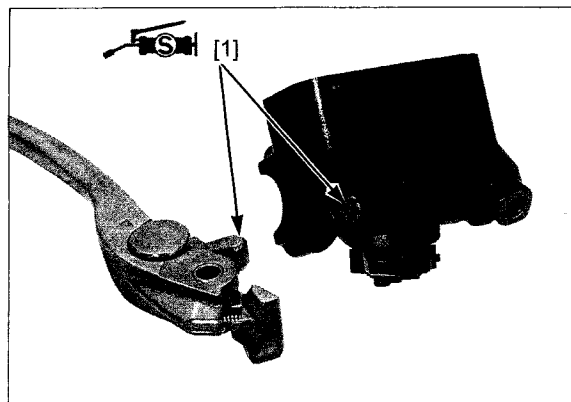
Install and tighten the screw to the specified torque.

**TORQUE: 1.2 N·m (0.1 kgf·m, 0.9 lbf·ft)**



## HYDRAULIC BRAKE

Apply silicone grease to the contact surfaces [1] of the brake lever and piston tip.

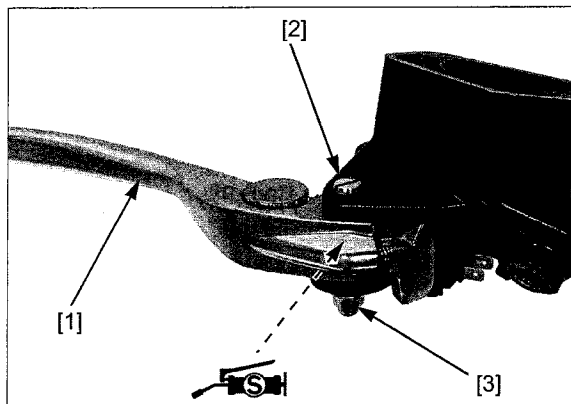


Apply silicone grease to the brake lever pivot bolt sliding surface.  
Install the brake lever assembly [1], tighten the pivot bolt [2] to the specified torque.

**TORQUE: 1.0 N·m (0.1 kgf·m, 0.7 lbf·ft)**

Hold the pivot bolt and tighten the pivot nut [3] to the specified torque.

**TORQUE: 5.9 N·m (0.6 kgf·m, 4.4 lbf·ft)**



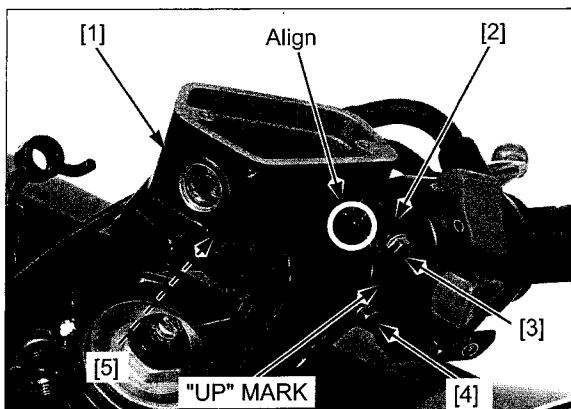
Place the master cylinder assembly [1] on the handlebar.  
Align the end of the master cylinder with the punch mark on the handlebar.

Install the master cylinder holder [2] with the "UP" mark facing up.

Tighten the upper bolt [3] first, then the lower bolt [4] to the specified torque.

**TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)**

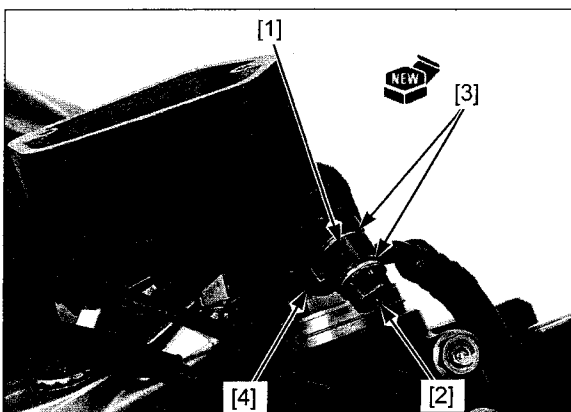
Install the float [5] into the master cylinder.



Install the brake hose eyelet [1] with the oil bolt [2] and new sealing washers [3].

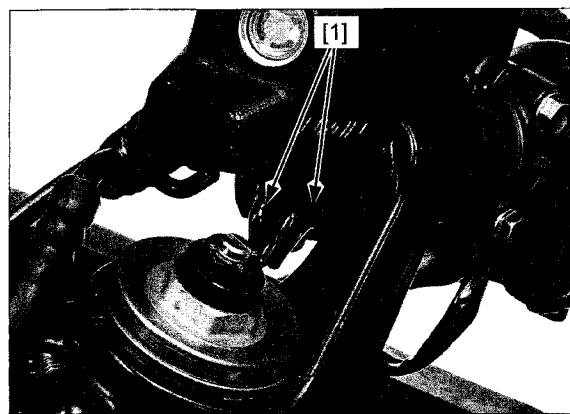
Push the eyelet joint stopper [4] against the master cylinder, then tighten the oil bolt to the specified torque.

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



Connect the brake light switch wire connectors [1].

Fill brake fluid and bleed air from the lever brake line hydraulic system (page 17-9).



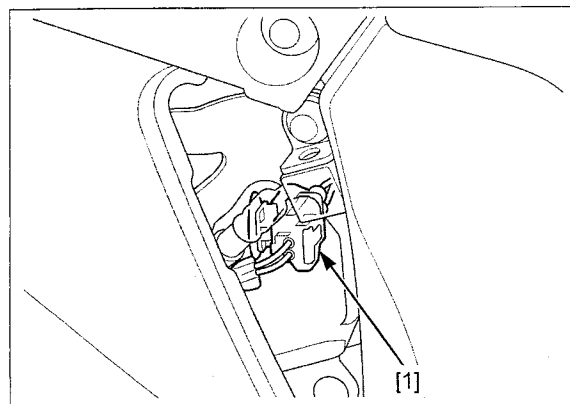
## REAR MASTER CYLINDER/BRAKE LIGHT SWITCH/BRAKE PEDAL

### REMOVAL

Drain the pedal brake line hydraulic system (page 17-8).

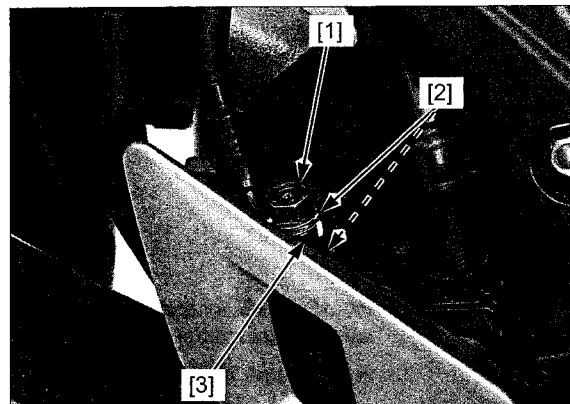
Remove the right pivot plate cover (page 3-5).

Disconnect the rear brake light switch 2P (Black) connector [1].

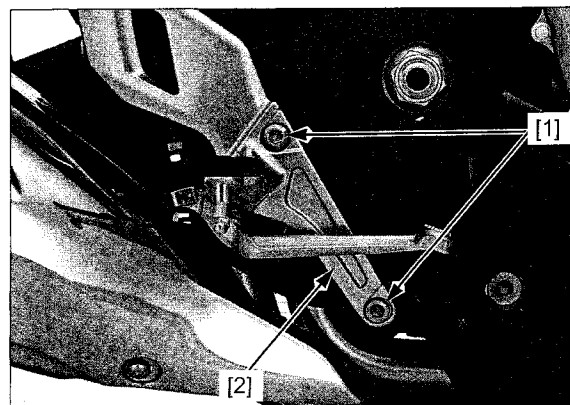


*Avoid spilling fluid on painted, plastic, or rubber parts.*

Remove the brake hose oil bolt [1], sealing washers [2] and brake hose eyelet joint [3].



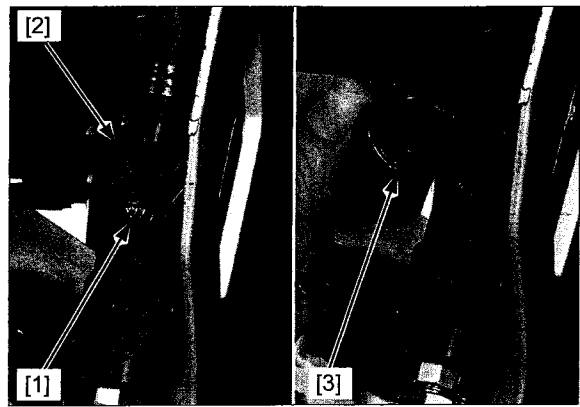
Remove the socket bolts [1] and right footpeg bracket assembly [2].



## HYDRAULIC BRAKE

Remove the screw-washer [1] and reservoir hose joint [2] from the master cylinder.

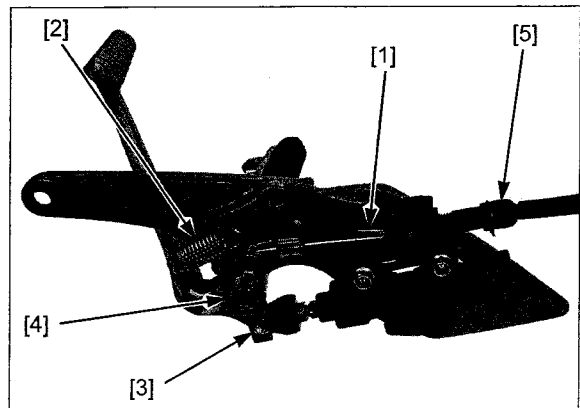
Remove the O-ring [3] from the reservoir hose joint.



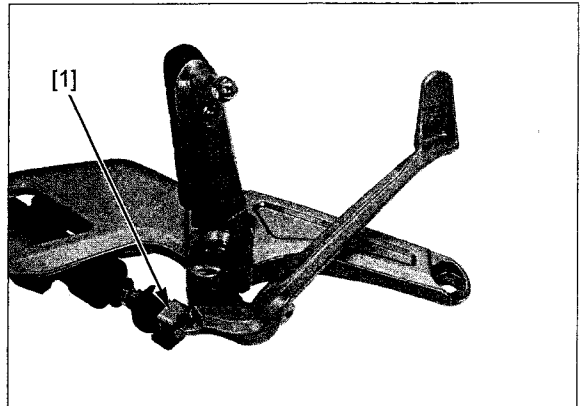
### DISASSEMBLY

Unhook the brake light switch spring [1] and brake pedal return spring [2].

Remove the brake pedal joint cotter pin [3], snap ring/set plate [4] and brake light switch [5].



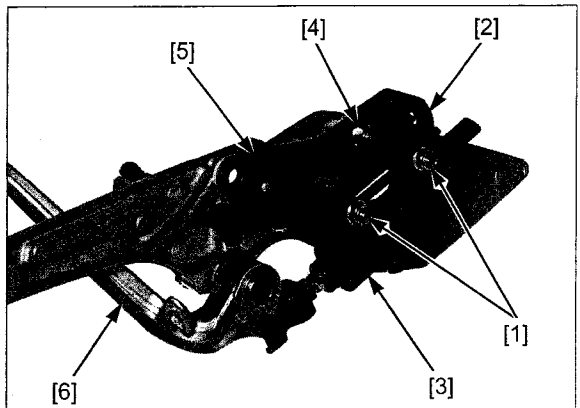
Remove the brake pedal joint pin [1].



Remove the master cylinder mounting nuts [1], brake light switch cover [2] and master cylinder [3].

Remove the bolt [4] and master cylinder stay [5].

Remove the brake pedal [6] from the footpeg bracket.



Remove the boot [1].

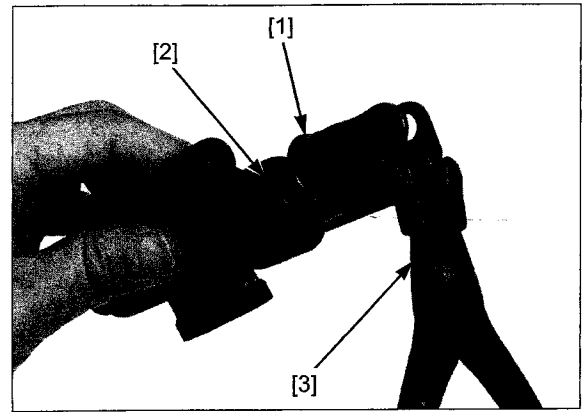
Remove the snap ring [2] from the master cylinder body using the special tool as shown.

## TOOL:

**Snap ring pliers [3]**

**07914-SA50001**

Remove the push rod/master piston, primary cup and spring.

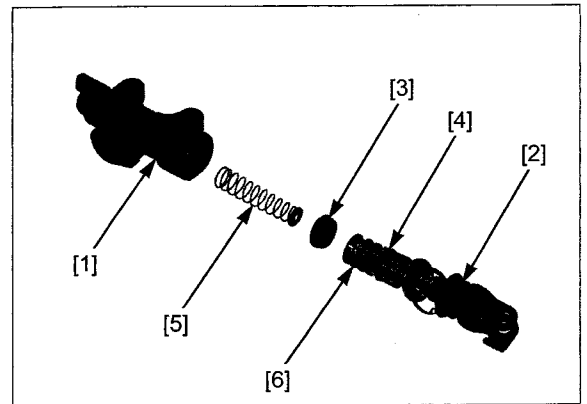


## INSPECTION

Clean the inside of the cylinder [1] with brake fluid.

Check the piston boot [2], primary cup [3], secondary cup [4] and spring [5] for fatigue or damage.

Check the master cylinder and piston [6] for abnormal scratches.

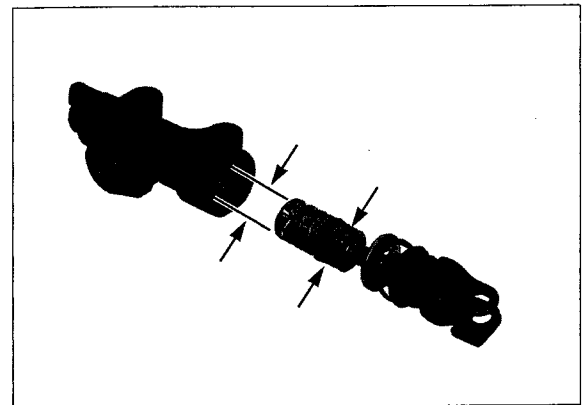


Measure the master cylinder I.D.

**SERVICE LIMIT: 17.515 mm (0.6896 in)**

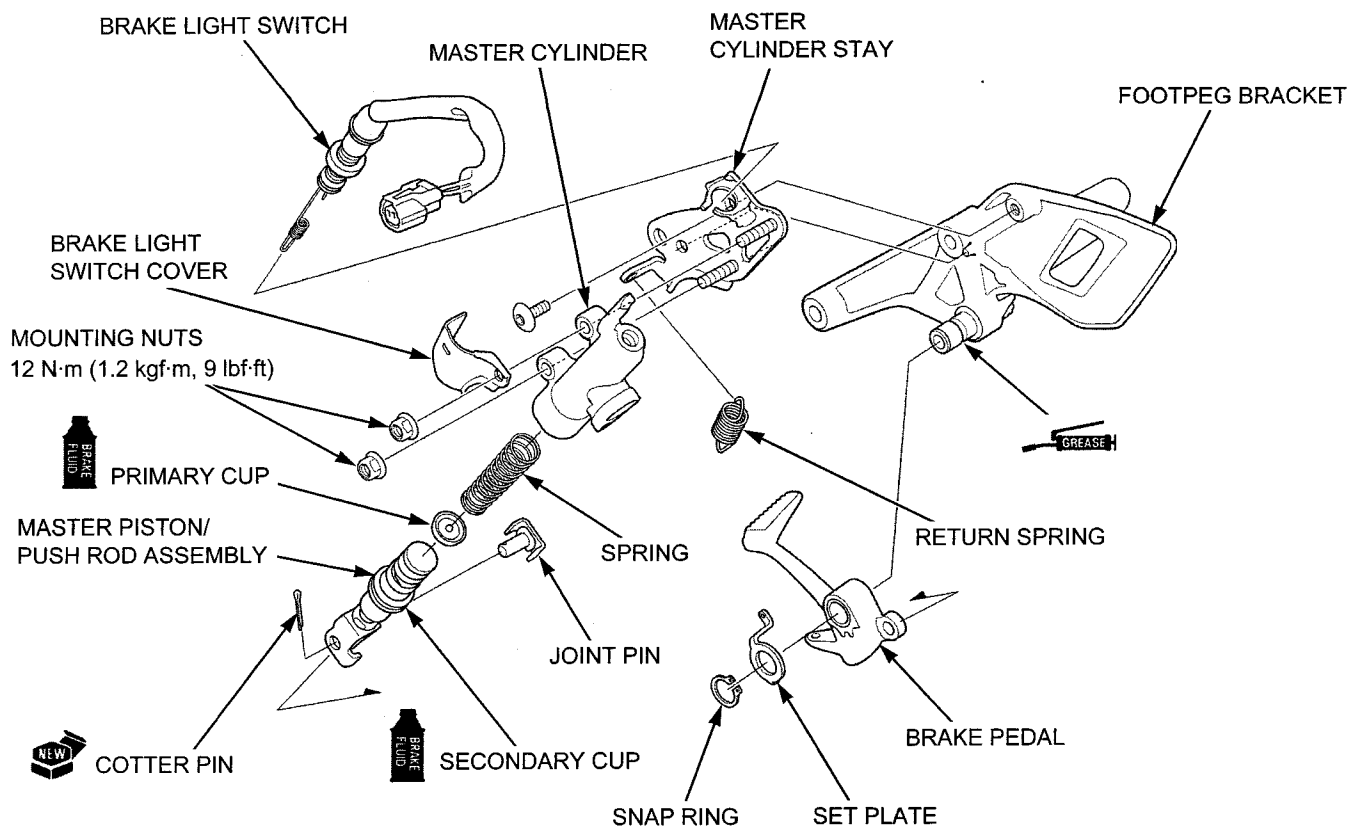
Measure the master cylinder piston O.D.

**SERVICE LIMIT: 17.405 mm (0.6852 in)**



# HYDRAULIC BRAKE

## ASSEMBLY



### NOTE:

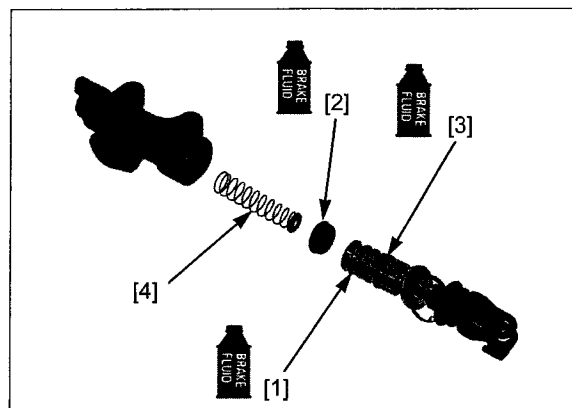
Keep the piston, cups, spring, snap ring and boot as a set; do not substitute individual parts.

Coat the master piston [1], primary cup [2] and secondary cup [3] with clean brake fluid before assembly.

Install the primary cup to the spring [4].

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

Install the spring/primary cup and master piston/push rod assembly.



*Be certain the snap ring is firmly seated in the groove.*

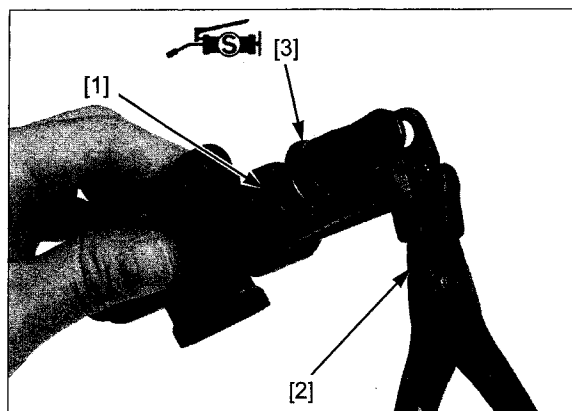
Install the snap ring [1] using the special tool.

### TOOL:

Snap ring pliers [2]

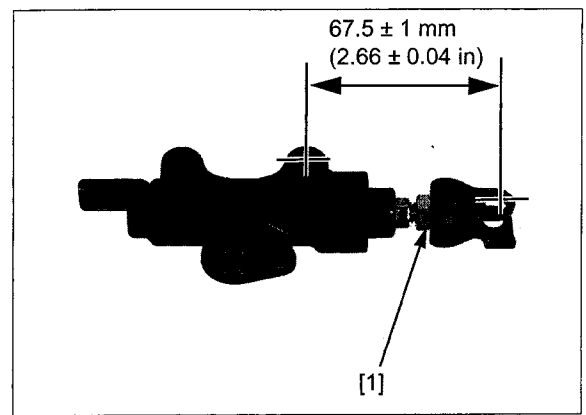
07914-SA50001

Apply silicone grease to the push rod boot [3] inside. Install the boot into the master cylinder.



If the push rod is disassembled, adjust the push rod length so that the distance between the centers of the master cylinder lower mounting hole and joint pin hole is  $67.5 \pm 1$  mm ( $2.66 \pm 0.04$  in).  
After adjustment, tighten the lock nut [1] to the specified torque.

**TORQUE: 18 N·m (1.8 kgf·m, 13 lbf·ft)**



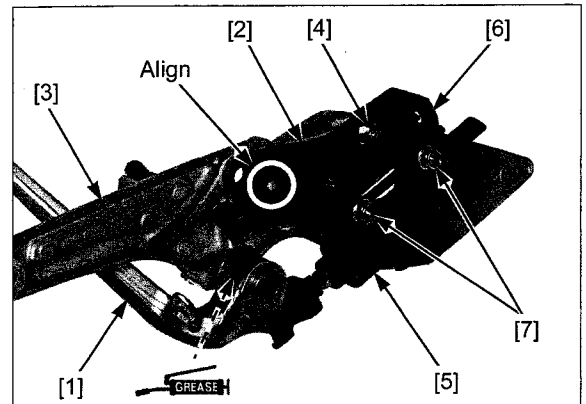
Apply grease to the brake pedal pivot sliding surface.  
Install the brake pedal [1] to the brake pedal shaft.

Install the master cylinder stay [2] by aligning its hole with the boss of footpeg bracket [3].  
Install and tighten the bolt [4] securely.

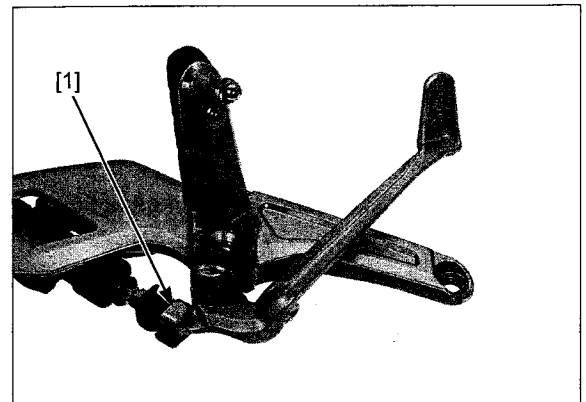
Install the master cylinder [5], brake light switch cover [6].

Install and tighten the master cylinder mounting nuts [7] to the specified torque.

**TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)**



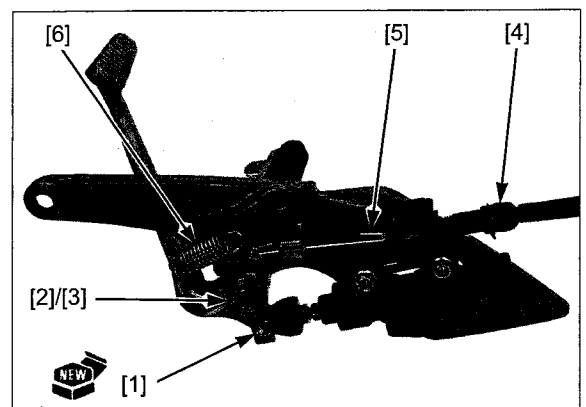
Install the brake pedal joint pin [1].



Secure the brake pedal joint pin with a new cotter pin [1].

Install the set plate [2] and secure the brake pedal pivot with the snap ring [3].

Install the brake light switch [4] and hook the brake light switch spring [5] and brake pedal return spring [6].





## HYDRAULIC BRAKE

### INSTALLATION

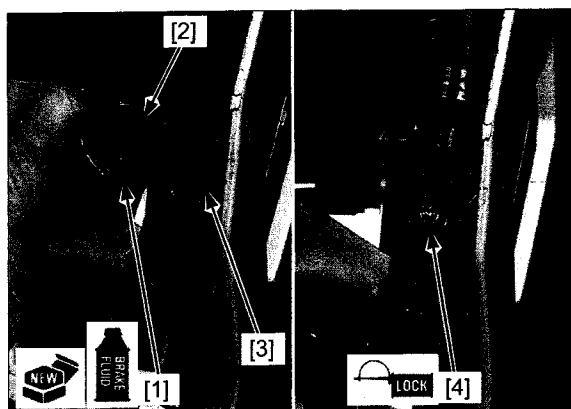
Apply brake fluid to a new O-ring [1] and install it onto the reservoir hose joint [2].

Install the reservoir hose joint into the master cylinder [3].

Apply a locking agent to the reservoir hose joint screw-washer [4] threads.

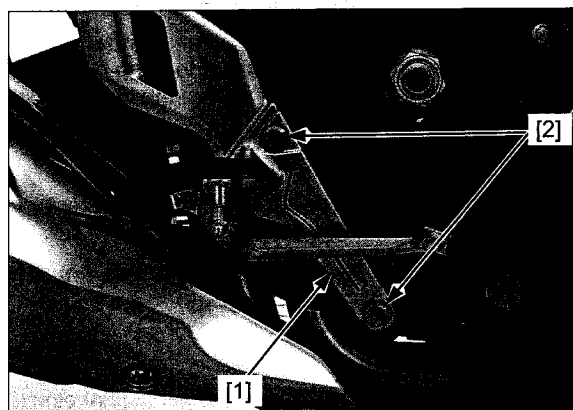
Install and tighten the screw-washer to the specified torque.

**TORQUE: 1.5 N·m (0.2 kgf·m, 1.1 lbf·ft)**



Install the right footpeg bracket assembly [1] to the frame and tighten the socket bolts [2] to the specified torque.

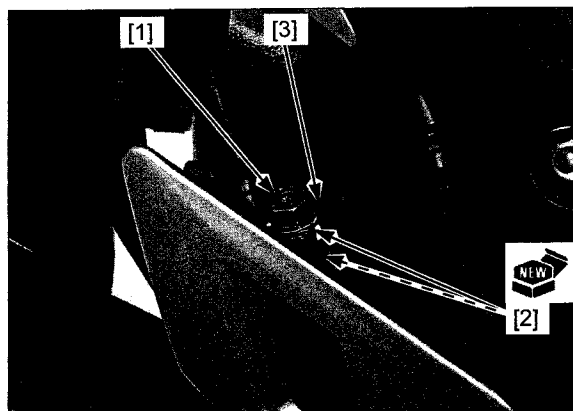
**TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)**



Install the brake hose with the oil bolt [1] and new sealing washers [2].

Push the eyelet joint stopper [3] against the master cylinder body, then tighten the oil bolt to the specified torque.

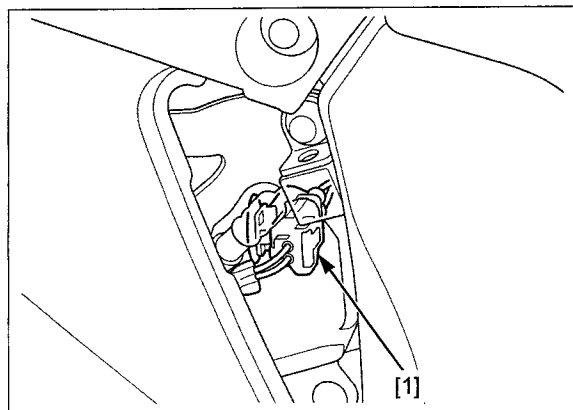
**TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)**



Route the brake light switch wire properly (page 1-22). Connect the rear brake light switch 2P (Black) connector [1].

Install the right pivot plate cover (page 3-5).

Fill brake fluid and bleed air from the pedal brake line hydraulic system (page 17-12).



## FRONT BRAKE CALIPER

### NOTE:

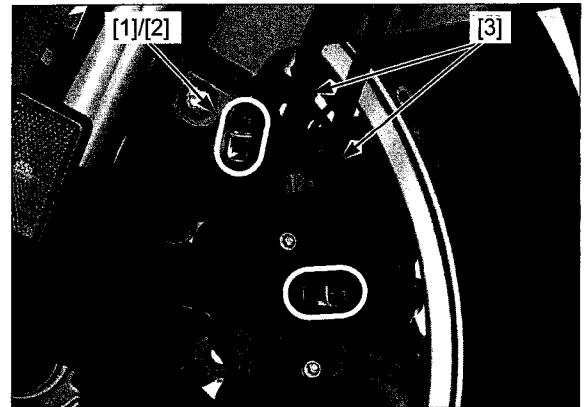
When removing the oil bolt, cover the end of the hose to prevent contamination.

### LEFT CALIPER REMOVAL

Drain the brake fluid from the hydraulic systems (page 17-7).

Remove the oil bolts [1], sealing washers [2] and brake hoses [3].

Remove the brake pads (page 17-14).

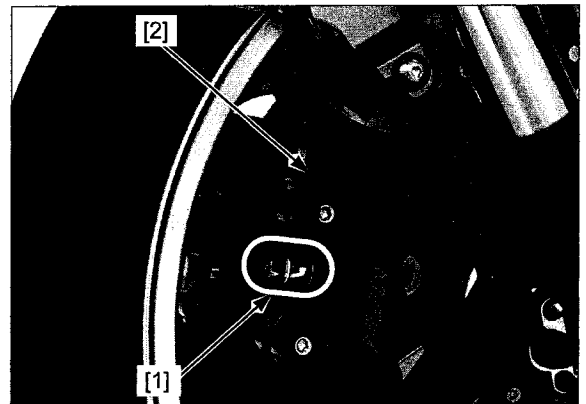


### RIGHT CALIPER REMOVAL

Drain the brake fluid from the hydraulic systems (page 17-7).

Remove the oil bolt [1], sealing washers and brake hose [2].

Remove the brake pads (page 17-14).



## DISASSEMBLY

### OUTSIDE PISTONS REMOVAL

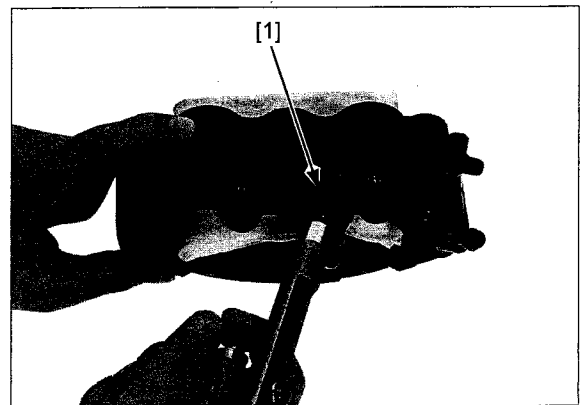
#### NOTE:

Mark the pistons to ensure correct reassembly.

Place a shop towel over the pistons.

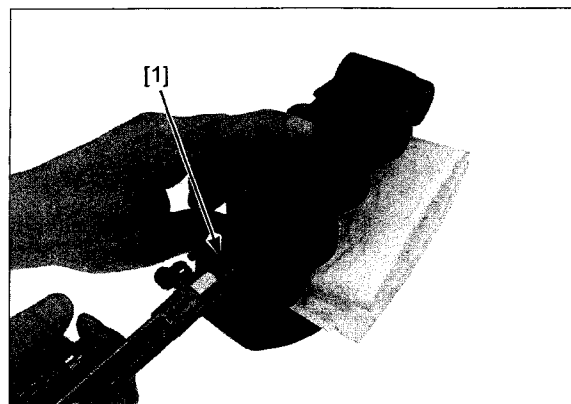
*Do not use high pressure air or bring the nozzle too close the inlet.*

Position the caliper body with the outside pistons facing down and apply small squirts of air pressure to the center fluid inlet [1] to remove the pistons.



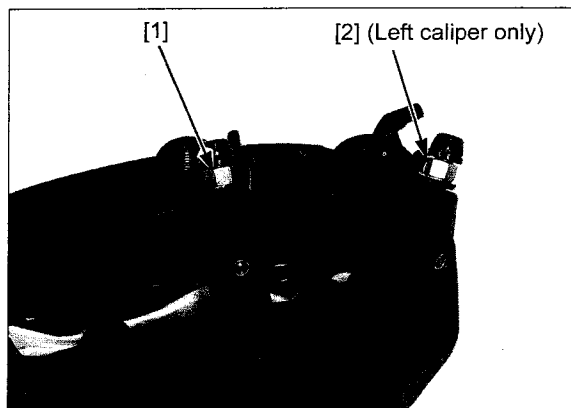
## HYDRAULIC BRAKE

*Left caliper only:* Apply small squirts of air pressure to the upper fluid inlet [1] to remove the piston (combined brake).



### INSIDE PISTONS REMOVAL

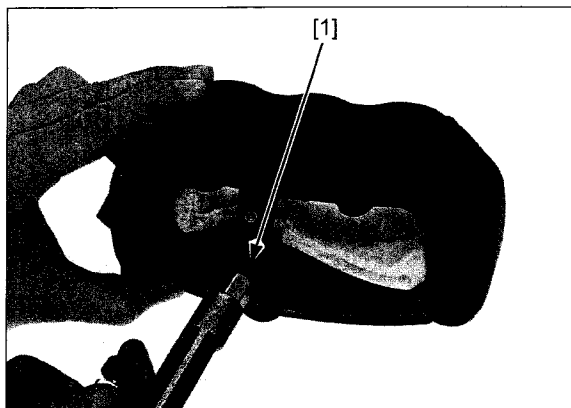
Remove the center bleed valve [1] and upper bleed valve [2] (left caliper only).



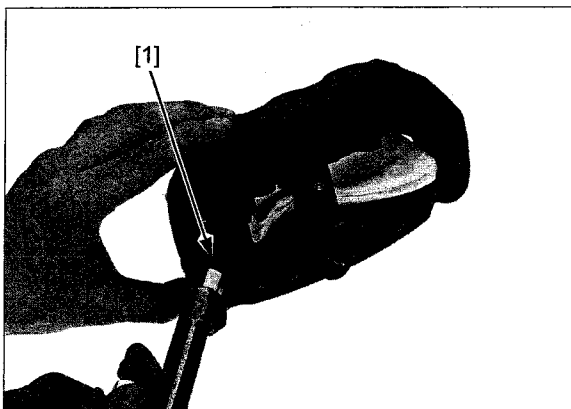
Place a shop towel over the pistons.

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

Position the caliper body with the inside pistons facing down and apply small squirts of air pressure to the center bleed outlet [1] to remove the pistons.



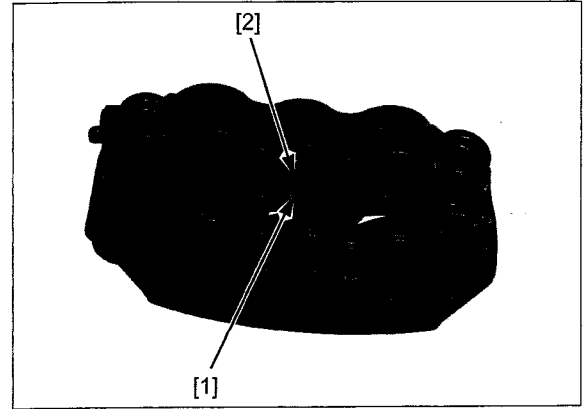
*Left caliper only:* Apply small squirts of air pressure to the upper bleed outlet [1] to remove the piston (combined brake).



*Be careful not to damage the piston sliding surface.*

Push the dust seals [1] and piston seals [2] in and lift them out from the inside and outside caliper cylinders.

Clean the seal grooves, caliper cylinders and pistons with clean brake fluid.



## INSPECTION

Check the caliper cylinders and pistons for scoring, scratches or damage.

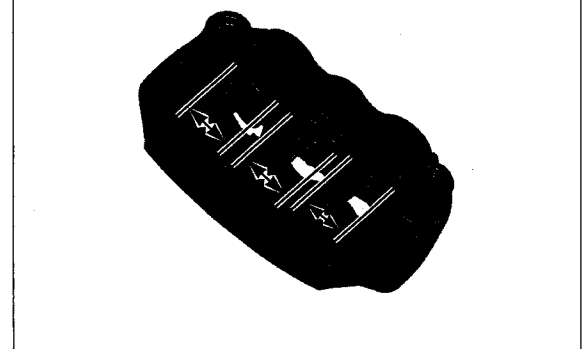
Measure the left caliper cylinder I.D.

**SERVICE LIMITS:** Upper: 27.060 mm (1.0654 in)  
Center: 30.290 mm (1.1925 in)  
Lower: 27.060 mm (1.0654 in)

Measure the right caliper cylinder I.D.

**SERVICE LIMITS:** Upper: 25.460 mm (1.0024 in)  
Center: 25.460 mm (1.0024 in)  
Lower: 25.460 mm (1.0024 in)

LEFT CALIPER shown:



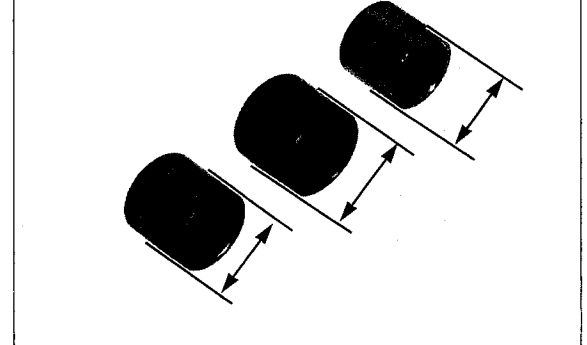
Measure the left caliper piston O.D.

**SERVICE LIMITS:** Upper: 26.910 mm (1.0594 in)  
Center: 30.140 mm (1.1866 in)  
Lower: 26.910 mm (1.0594 in)

Measure the right caliper piston O.D.

**SERVICE LIMITS:** Upper: 25.310 mm (0.9965 in)  
Center: 25.310 mm (0.9965 in)  
Lower: 25.310 mm (0.9965 in)

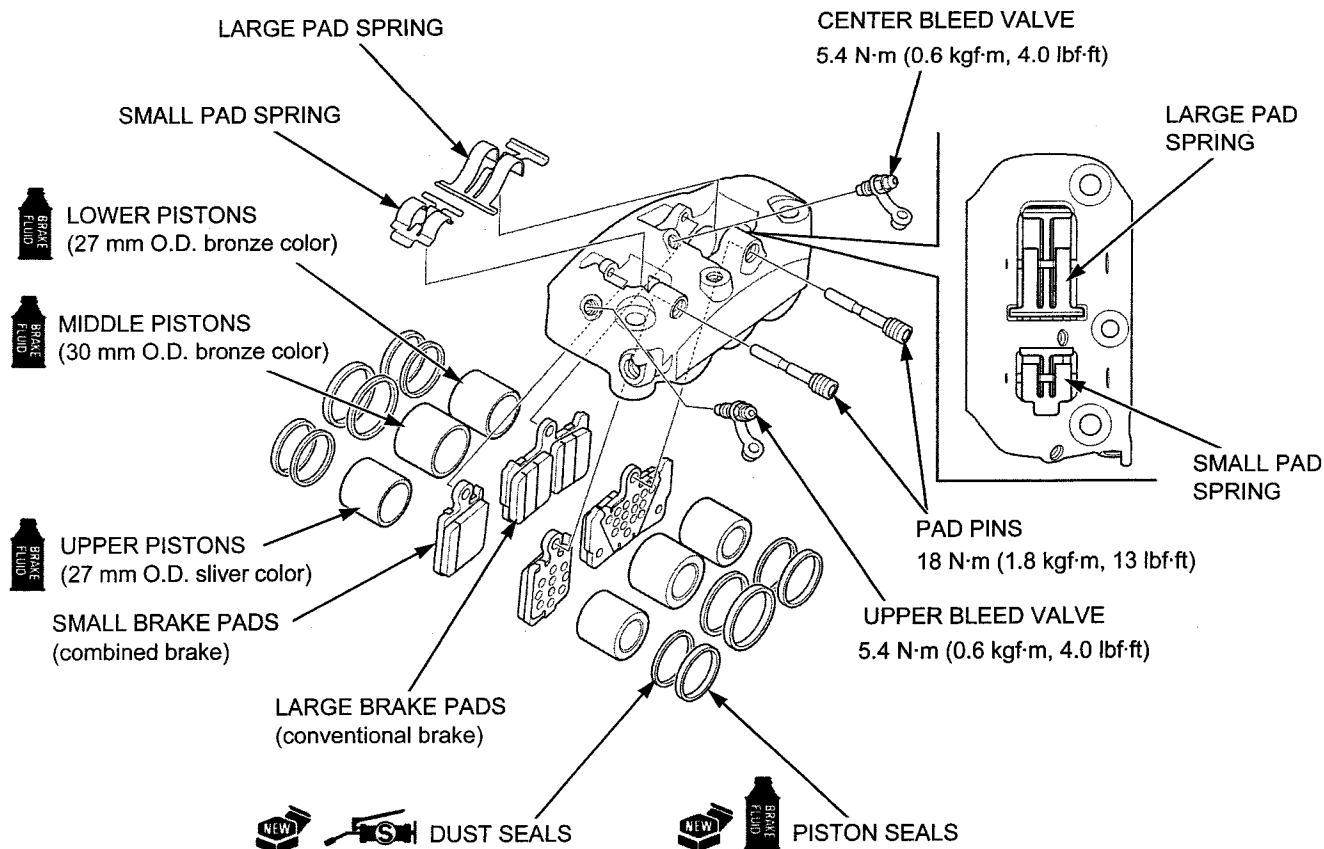
LEFT CALIPER PISTONS shown:



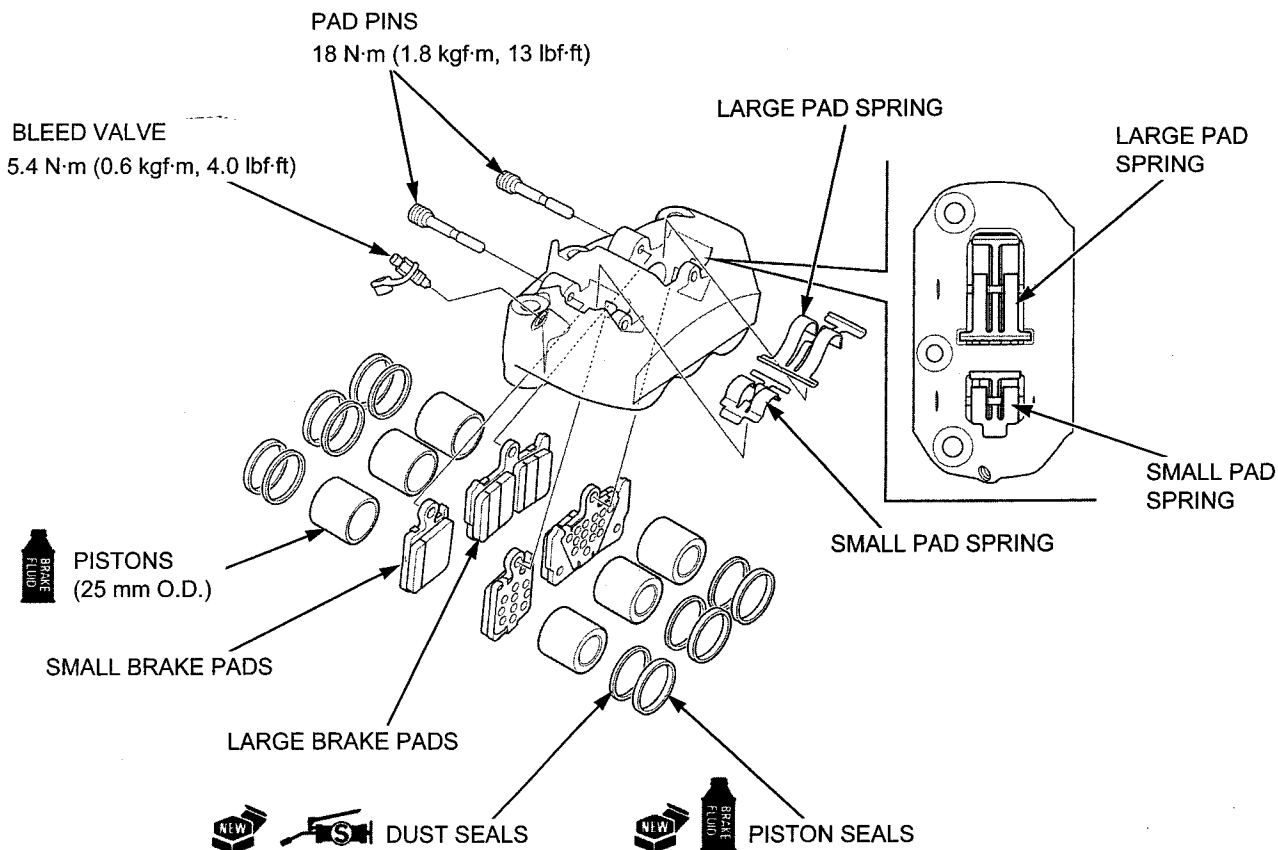
# HYDRAULIC BRAKE

## ASSEMBLY

### LEFT CALIPER



### RIGHT CALIPER



Coat new piston seals [1] with clean brake fluid.  
Coat new dust seals [2] with silicone grease.

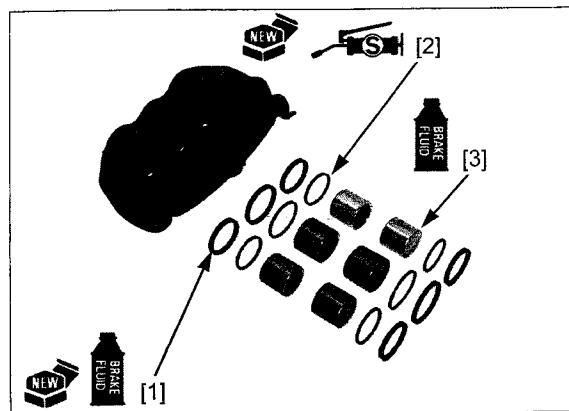
Install the piston and dust seals into the seal grooves in the caliper.

Coat the caliper pistons [3] with clean brake fluid and install them into the caliper cylinders with the opening toward the pads.

## NOTE:

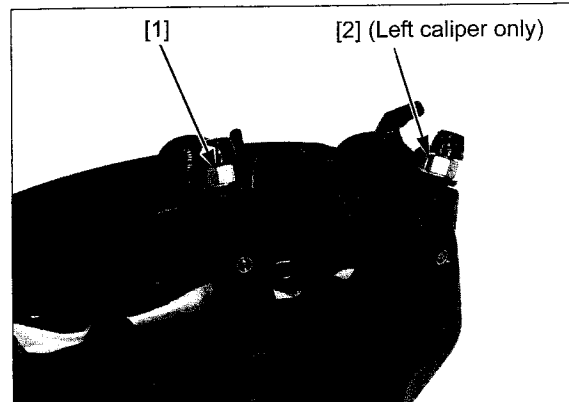
Do not confuse the left upper pistons (combined brake) and left lower pistons (conventional brake).

- Upper pistons: silver color
- Lower pistons: bronze color



Install the center bleed valve [1] and upper bleed valve [2] (left caliper only), and tighten them to the specified torque.

**TORQUE: 5.4 N·m (0.6 kgf·m, 4.0 lbf·ft)**



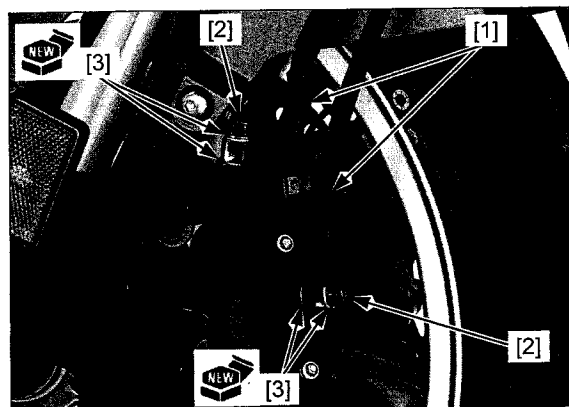
## LEFT CALIPER INSTALLATION

Install the brake pads (page 17-14).

Connect the brake hoses [1] to the caliper with the oil bolts [2] and new sealing washers [3].  
Push the brake hose eyelet joints against the caliper body, then tighten the oil bolts to the specified torque.

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

Fill brake fluid and bleed air from the hydraulic systems (page 17-9).



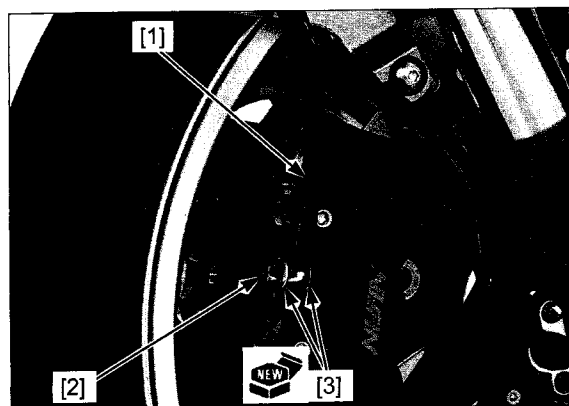
## RIGHT CALIPER INSTALLATION

Install the brake pads (page 17-14).

Connect the brake hose [1] to the caliper with the oil bolt [2] and new sealing washers [3].  
Push the brake hose eyelet joint against the caliper body, then tighten the oil bolt to the specified torque.

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

Fill brake fluid and bleed air from the hydraulic systems (page 17-9).



### REAR BRAKE CALIPER

#### REMOVAL

##### NOTE:

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

Remove the final gear cover (page 3-5).

Drain the brake fluid from the pedal brake line hydraulic system (page 17-8).

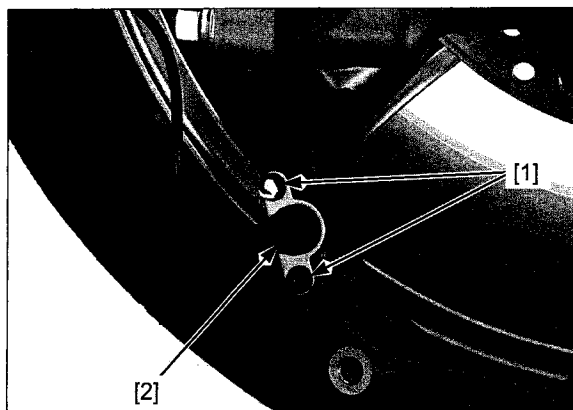
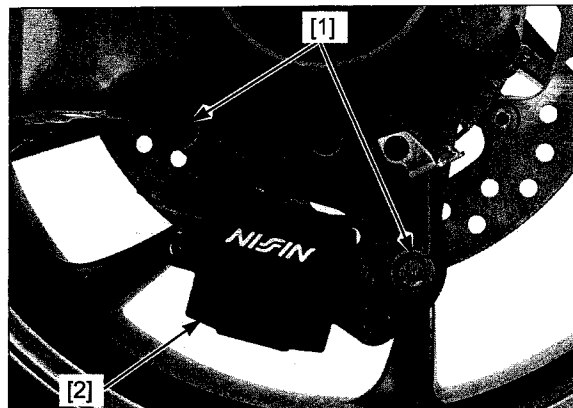
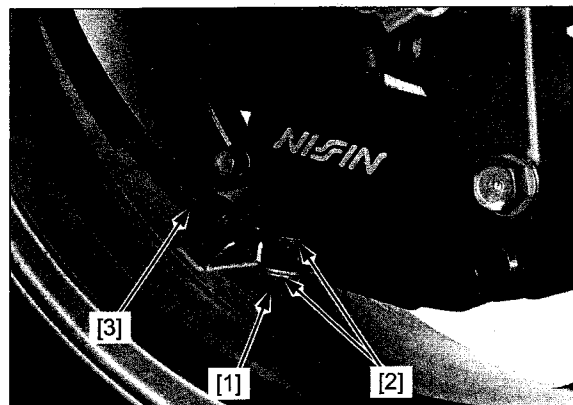
Remove the oil bolt [1], sealing washers [2] and brake hose [3].

Remove the brake pads (page 17-16).

*Be careful not to damage the wheel rim when removing the caliper assembly.*

Remove the mounting bolts [1] and caliper assembly [2].

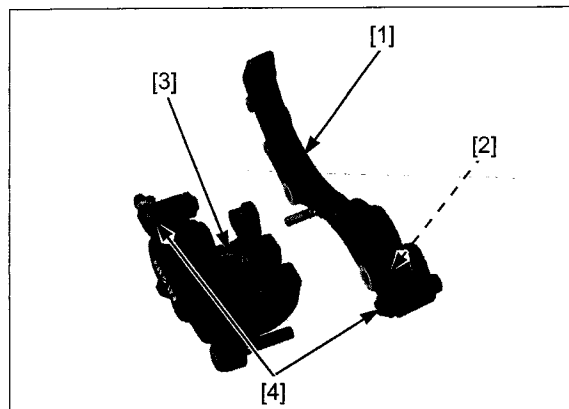
Remove the mounting bolts [1] and rear wheel speed sensor [2].



## DISASSEMBLY

Remove the following:

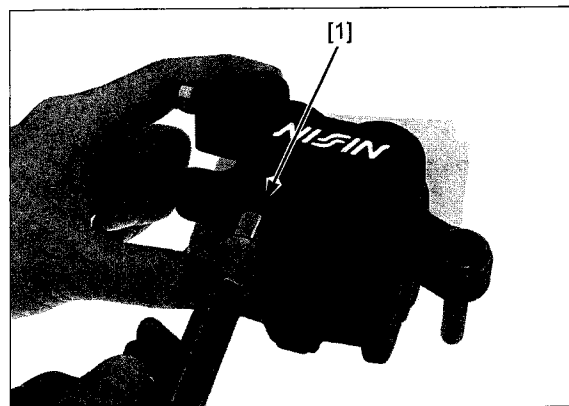
- caliper bracket [1]
- pad retainer [2]
- pad spring [3]
- pin boots [4]



Place a shop towel over the pistons.

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

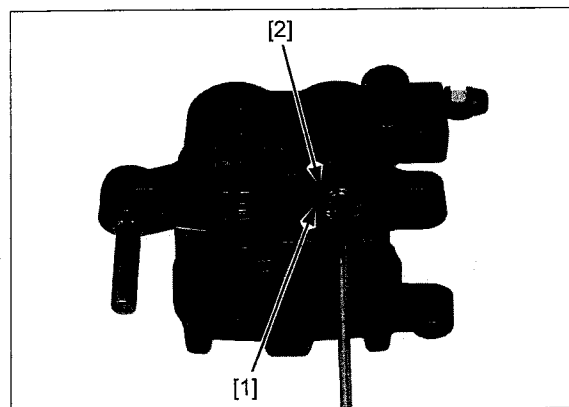
Position the caliper body with the pistons facing down and apply small squirts of air pressure to the fluid inlet [1] to remove the pistons.



*Be careful not to damage the piston sliding surface.*

Push the dust seals [1] and piston seals [2] in and lift them out.

Clean the seal grooves, caliper cylinders and pistons with clean brake fluid.



## INSPECTION

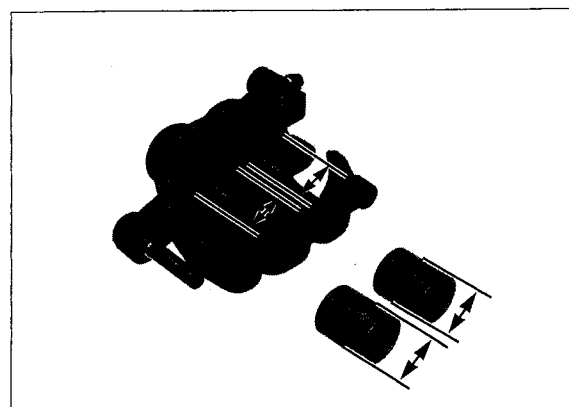
Check the caliper cylinders and pistons for scoring, scratches or damage.

Measure the caliper cylinder I.D.

**SERVICE LIMIT: 27.060 mm (1.0654 in)**

Measure the caliper piston O.D.

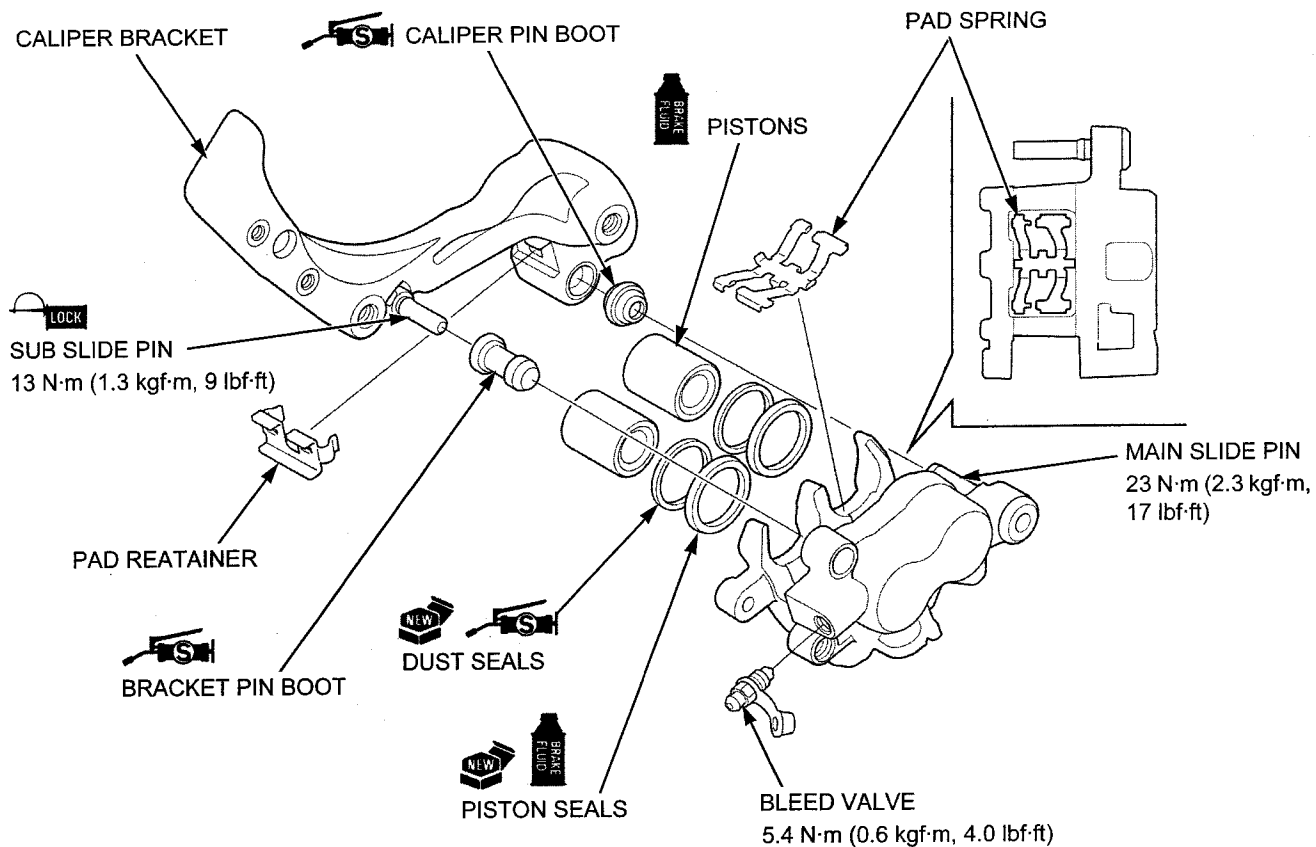
**SERVICE LIMIT: 26.910 mm (1.0594 in)**





# HYDRAULIC BRAKE

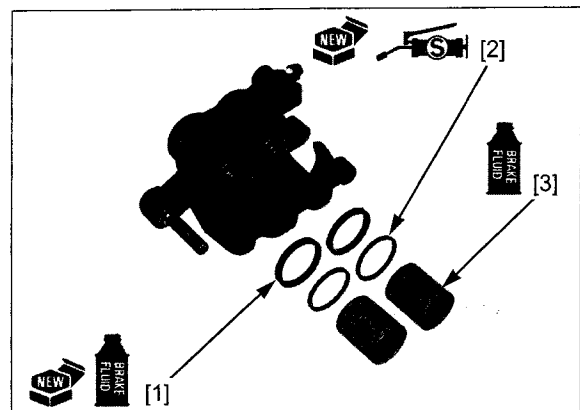
## ASSEMBLY



Coat new piston seals [1] with clean brake fluid.  
Coat new dust seals [2] with silicone grease.

Install the piston and dust seals into the seal grooves in the caliper.

Coat the caliper pistons [3] with clean brake fluid and install them into the caliper cylinders with the opening toward the pads.



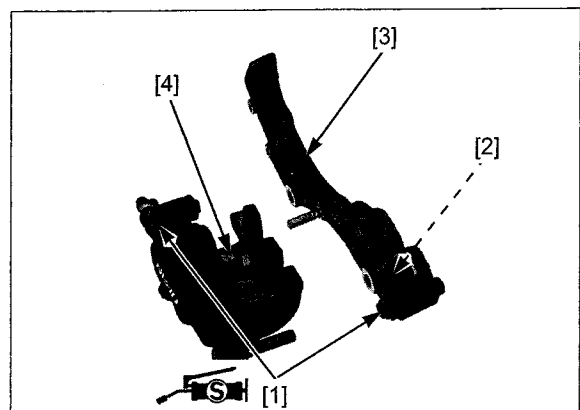
Apply silicone grease to the inner surface of the pin boots [1].

Install the caliper pin boot to the caliper.  
Install the bracket pin boot to the bracket.

Apply Honda bond A or equivalent to the installing surface of the pad retainer [2].  
Install the pad retainer to the bracket [3].

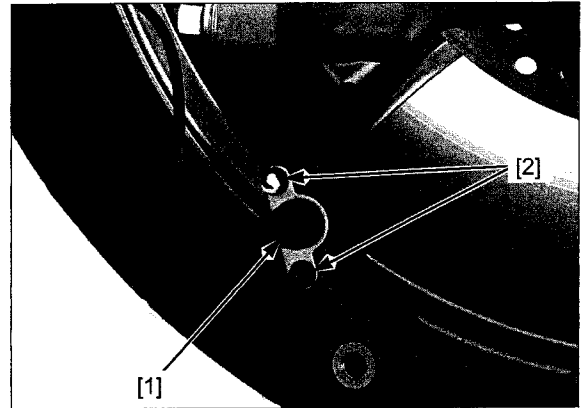
Install the pad spring [4] in the caliper.

Assemble the caliper bracket and the caliper body.



**INSTALLATION**

Install the rear wheel speed sensor [1] and tighten the mounting bolts [2] securely.

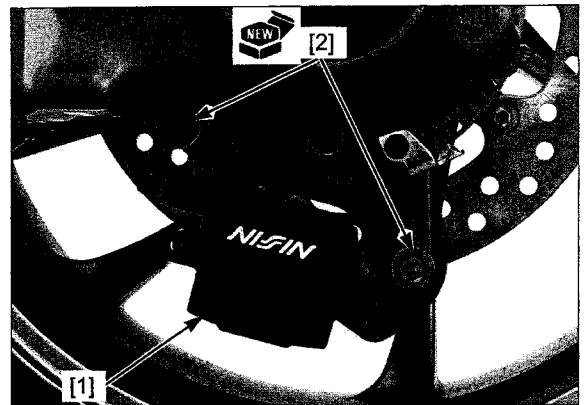


*Be careful not to damage the wheel rim when installing the caliper assembly.*

Install the rear caliper assembly [1] to the final gear case.

Install and tighten new mounting bolts [2] to the specified torque.

**TORQUE: 45 N·m (4.6 kgf·m, 33 lbf·ft)**



Install the brake pad (page 17-16).

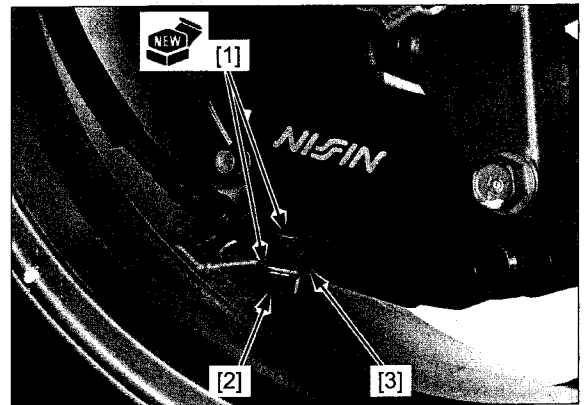
Install the brake hose eyelet to the caliper body with new sealing washers [1] and oil bolt [2]. Push the brake hose eyelet stopper [3] against the caliper body, then tighten the oil bolt to the specified torque.

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

Install the final gear cover (page 3-5).

Fill brake fluid and bleed air from the pedal brake line hydraulic system (page 17-12).

Check the rear wheel speed sensor clearance (page 18-24).



### PCV

#### REMOVAL/INSTALLATION

##### NOTE:

- When removing the brake pipe joint nut, cover the end of the pipe to prevent contamination.
- Be careful not to bend or damage the brake pipes.

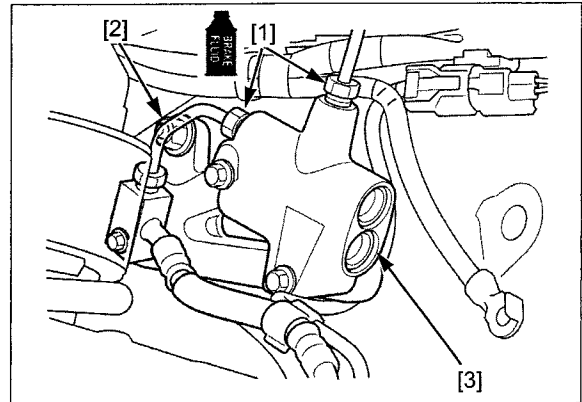
Drain the brake fluid from the hydraulic systems (page 17-7).

Remove the following:

- left pivot plate cover (page 3-5)
- canister tray (page 6-91)

Remove the brake pipe joint nuts [1].

Remove the mounting bolt/washer/nut [2] and PCV/stay assembly [3].



Remove the mounting bolts/nuts [1] and PCV [2] from the stay.

*Apply brake fluid to the brake pipe joint nut threads.*

Installation is in the reverse order of removal.

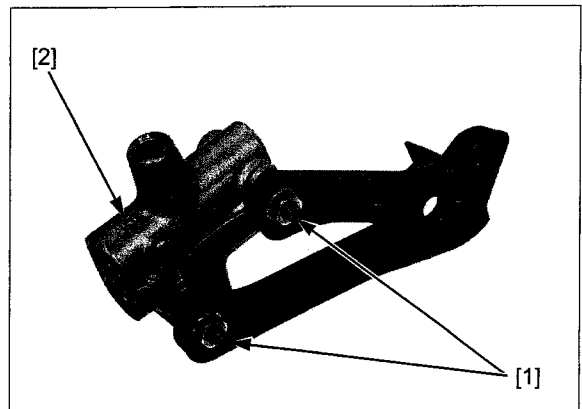
##### TORQUE:

Brake pipe joint nut:

14 N·m (1.4 kgf·m, 10 lbf·ft)

PCV mounting nut:

10 N·m (1.0 kgf·m, 7 lbf·ft)



### DELAY VALVE

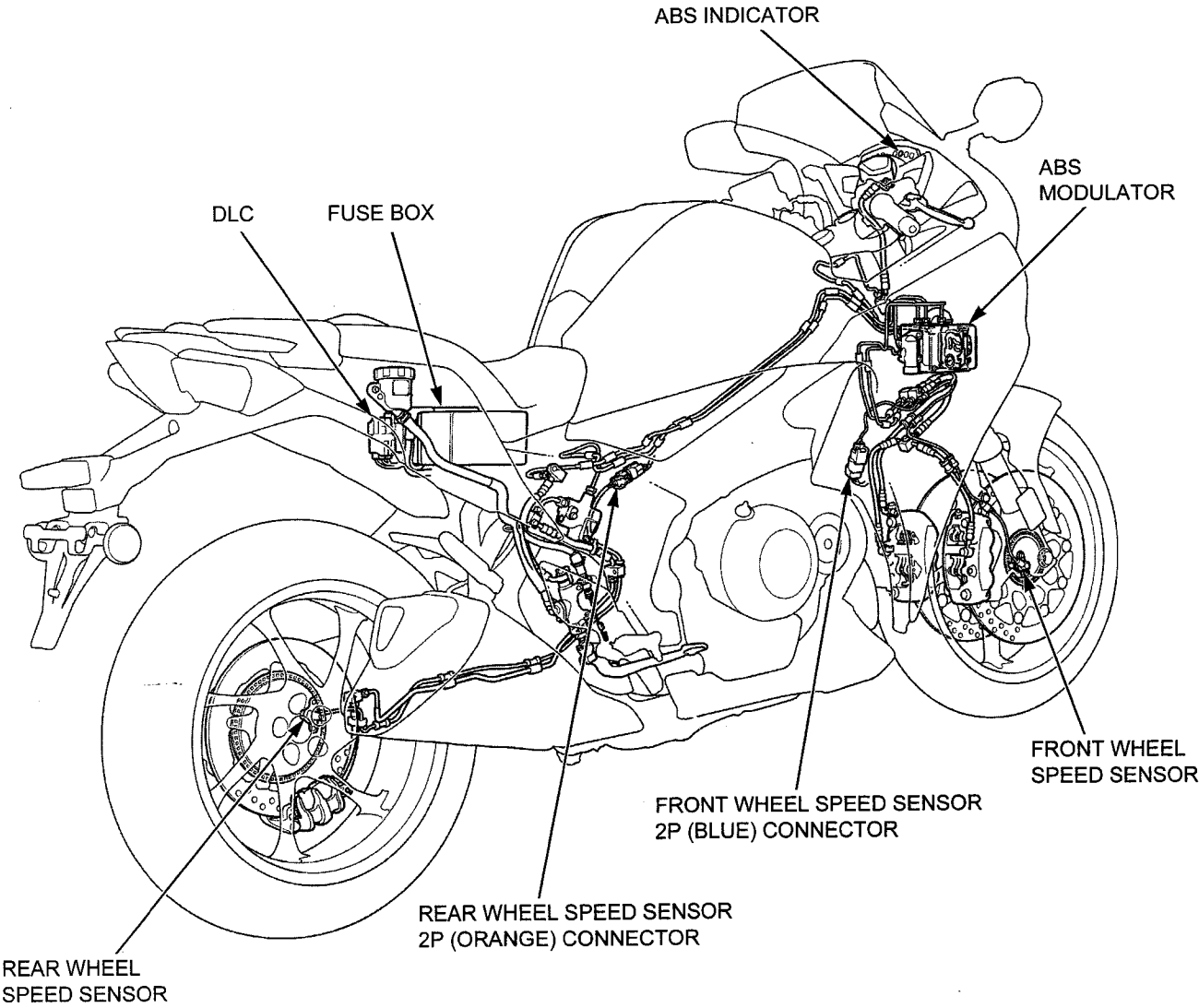
For delay valve removal/installation, refer to ABS module removal/installation (page 18-27).

# 18. ANTI-LOCK BRAKE SYSTEM (ABS)

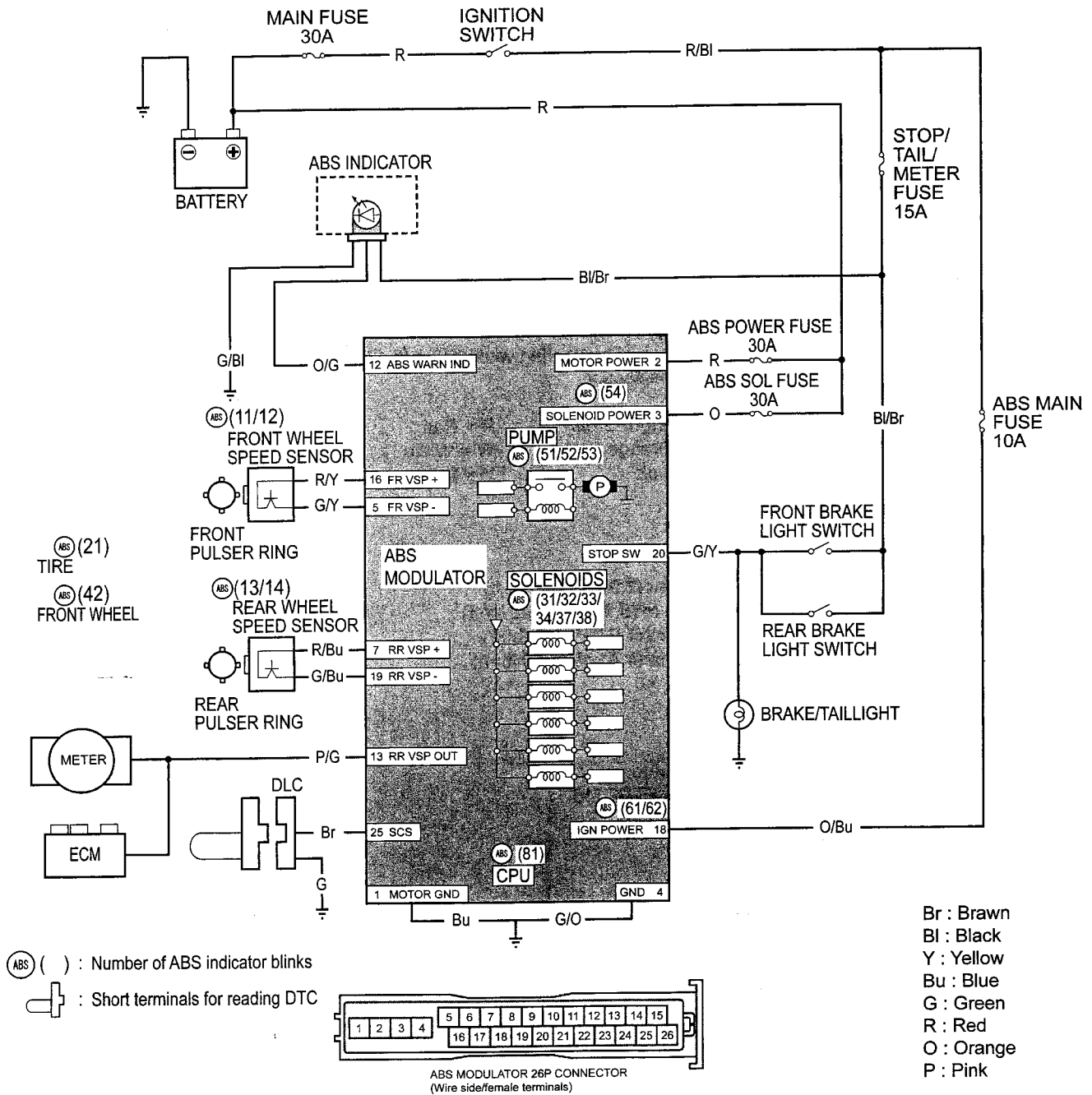
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ABS SYSTEM LOCATION .....	18-2	ABS INDICATOR PROBLEM CODE INDEX .....	18-10
ABS SYSTEM DIAGRAM .....	18-3	ABS TROUBLESHOOTING .....	18-11
SERVICE INFORMATION .....	18-4	WHEEL SPEED SENSOR .....	18-24
ABS CONNECTOR LOCATIONS .....	18-5	ABS MODULATOR .....	18-27
ABS TROUBLESHOOTING INFORMATION .....	18-7		

ABS SYSTEM LOCATION



# ABS SYSTEM DIAGRAM



## ANTI-LOCK BRAKE SYSTEM (ABS)

### SERVICE INFORMATION

#### GENERAL

##### NOTICE

The ABS modulator may be damaged if dropped. Also if a connector is disconnected when current is flowing, the excessive voltage may damage the control unit. Always turn off the ignition switch before servicing.

- This section covers service of the Anti-lock Brake System. For conventional brake service, see page 17-4.
- Pre-start self-diagnosis starts when the ignition switch is turned ON. The ABS modulator control unit receives signals and detects whether the ABS system functions normally. Pre-start self-diagnosis starts when the vehicle speed goes above 10 km/h (6 mph) approximately. The ABS system and the vehicle running condition are monitored constantly after pre-start self-diagnosis until the ignition switch is turned OFF.
- When the ABS modulator control unit detects a problem, the ABS indicator blinks to notify the rider of the problem. To detect the faulty part, retrieve the problem code by shorting the DLC terminals.
- Read "ABS Troubleshooting Information" carefully, inspect and troubleshoot the ABS system according to the Diagnostic Troubleshooting flow chart. Observe each step of the procedures one by one. Write down the problem code and probable faulty part before starting diagnosis and troubleshooting.
- Use a fully charged battery. Do not diagnose with a charger connected to the battery.
- When the ABS control unit detects a problem, it stops the ABS function and switches back to the conventional brake operation, and the ABS indicator blinks or stays on. Take care during the test ride.
- Troubles not resulting from a faulty ABS (e.g. brake disc squeak, unevenly worn brake pad) cannot be recognized by the ABS diagnosis system.
- When the wheel speed sensor and/or pulser ring is replaced, check the clearance (air gap) between both components.
- The ABS control unit (ECU) is mounted on the modulator (the modulator with the built-in ECU). Do not disassemble the ABS modulator. Replace the ABS modulator as an assembly when it is faulty.
- Be careful not to damage the wheel speed sensor and pulser ring when removing and installing the wheel.
- The following color codes are used throughout this section.

Bu = Blue  
Bl = Black  
Br = Brown

G = Green  
Gr = Gray  
Lb = Light Blue

Lg = Light Green  
O = Orange  
P = Pink

R = Red  
W = White  
Y = Yellow

#### TORQUE VALUES

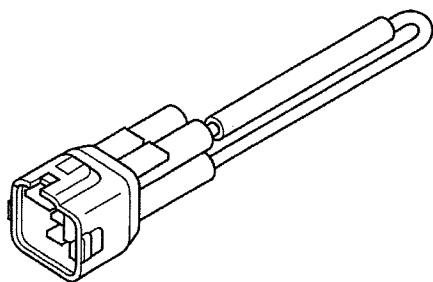
Rear brake pipe clamber bolt	10 N·m (1.0 kgf·m, 7 lbf·ft)
Rear wheel pulser ring mounting bolt	7.0 N·m (0.7 kgf·m, 5.2 lbf·ft)
Delay valve mounting bolt	10 N·m (1.0 kgf·m, 7 lbf·ft)
Brake pipe joint nut	14 N·m (1.4 kgf·m, 10 lbf·ft)

ALOC bolt: replace with a new one.  
ALOC bolt: replace with a new one.

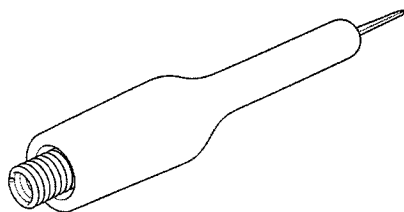
Apply brake fluid to the threads.

#### TOOLS

SCS connector  
070PZ-ZY30100



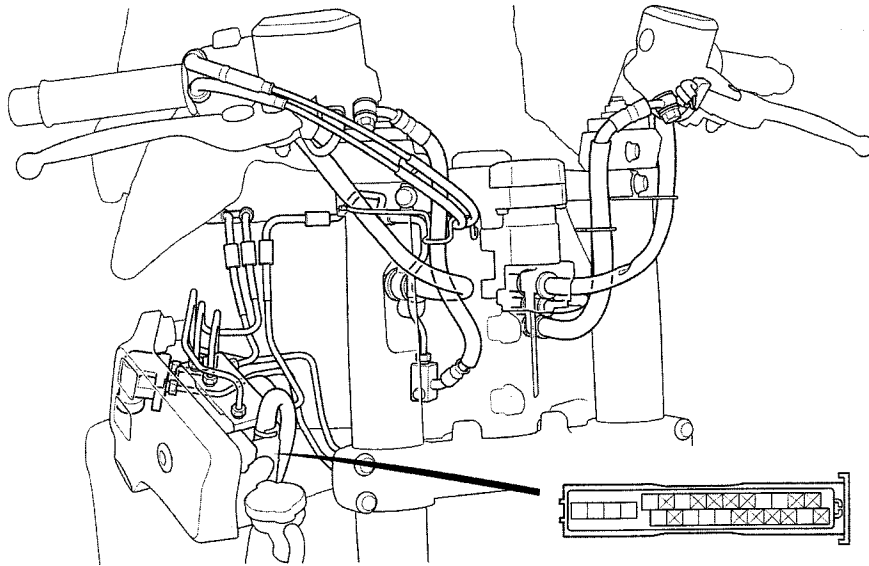
Test probe  
07ZAJ-RDJA110



## ABS CONNECTOR LOCATIONS

**NOTE:**

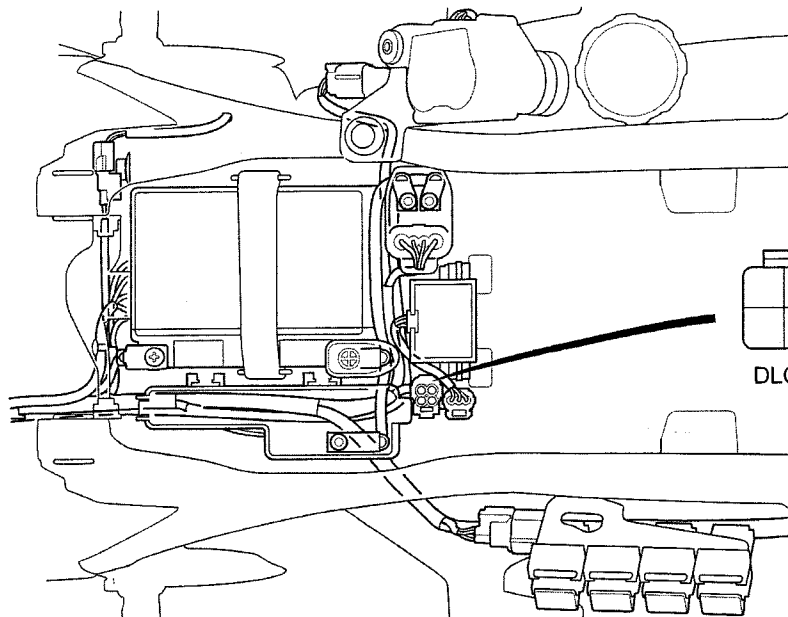
Remove the right middle cowl (page 3-7).



ABS MODULATOR 26P CONNECTOR

**NOTE:**

Remove the seat (page 3-4).

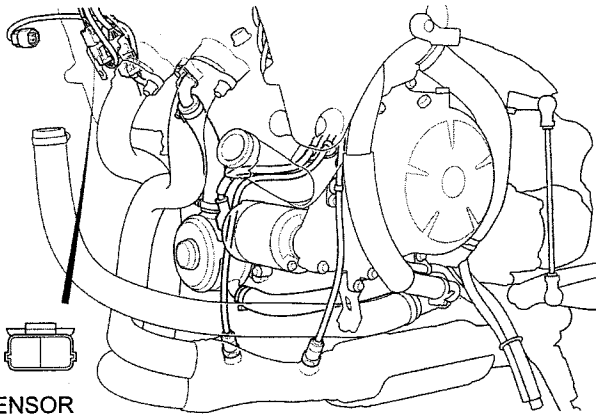


DLC 4P (RED) CONNECTOR



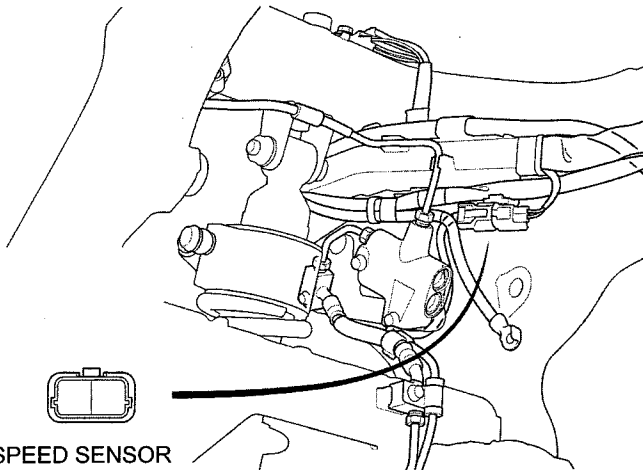
ANTI-LOCK BRAKE SYSTEM (ABS)

NOTE:  
Remove the radiator (page 7-9).



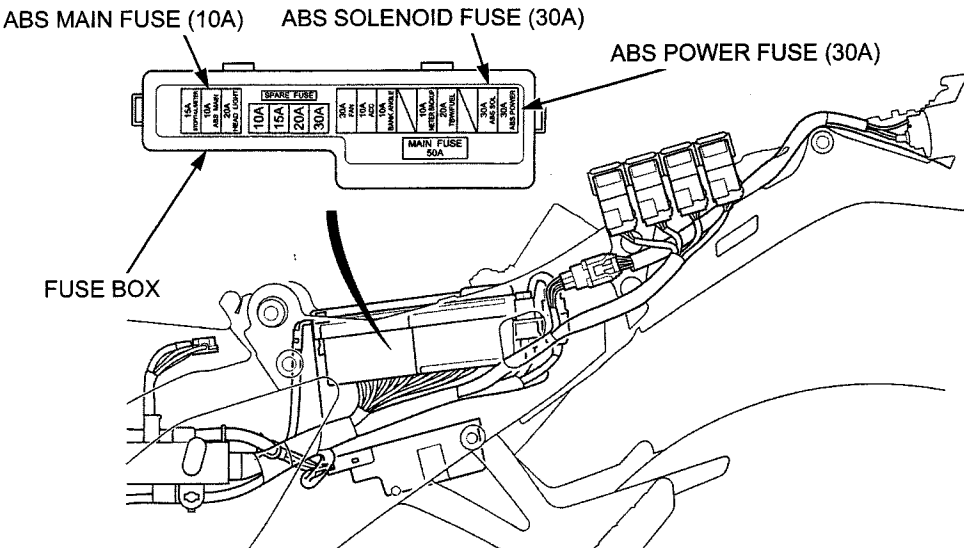
FRONT WHEEL SPEED SENSOR  
2P (BLUE) CONNECTOR

NOTE:  
Remove the canister tray (page 6-91).



REAR WHEEL SPEED SENSOR  
2P (ORANGE) CONNECTOR

NOTE:  
Remove the seat (page 3-4).



# ABS TROUBLESHOOTING INFORMATION

## SYSTEM DESCRIPTION

### SUMMARY OF ABS PRE-START SELF-DIAGNOSIS SYSTEM

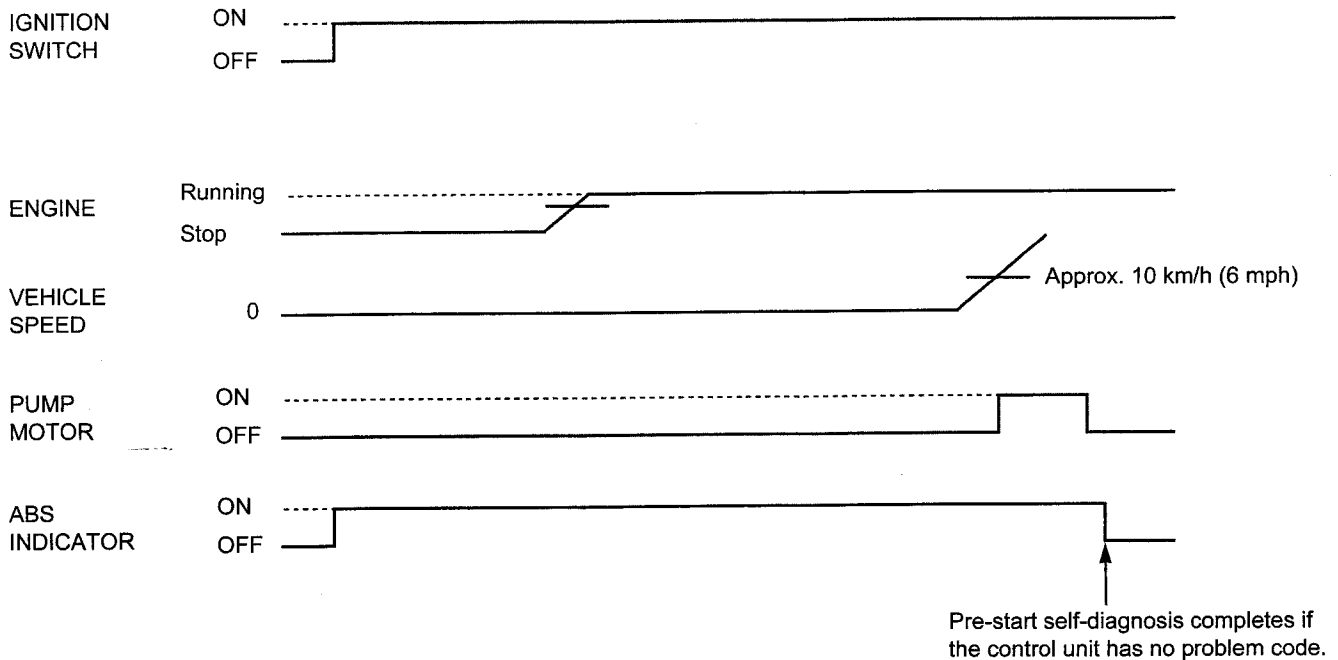
The ABS pre-start self-diagnosis system diagnoses the electrical system as well as the operating status of the modulator. When there is any abnormality, the problem and the problematic part can be detected by retrieving the problem code.

When the vehicle is running, pulse signals generated at the front/rear wheel speed sensors are sent to the ABS control unit. When the ABS control unit detects that vehicle speed goes approximately 10 km/h (6 mph) or more, the pump motor is temporarily operated to check if the ABS system functions normally. If the system is normal, pre-start self-diagnosis is complete and the ABS indicator goes off.

If a problem is detected, the ABS indicator blinks or comes on and stays on to notify the rider of the problem. The self-diagnosis is also made while the motorcycle is running, and the indicator blinks when a problem is detected. When the indicator blinks, follow the specified procedure to retrieve the problem code.

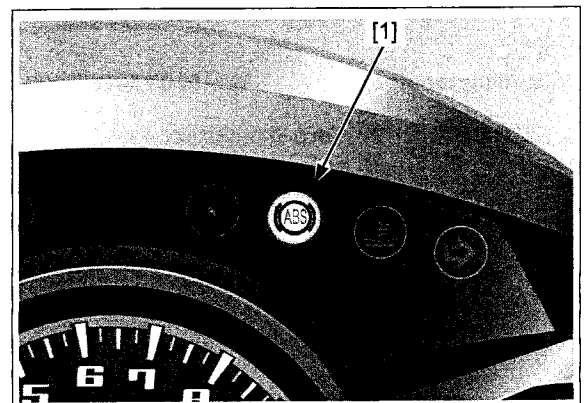
If the ABS indicator does not come on when the ignition switch is turned ON, or the ABS indicator stays on after the pre-start self-diagnosis procedure is complete, the ABS indicator may be faulty. Follow the troubleshooting (page 18-11).

Pre-start self-diagnosis when normal:



### PRE-START SELF-DIAGNOSIS PROCEDURE

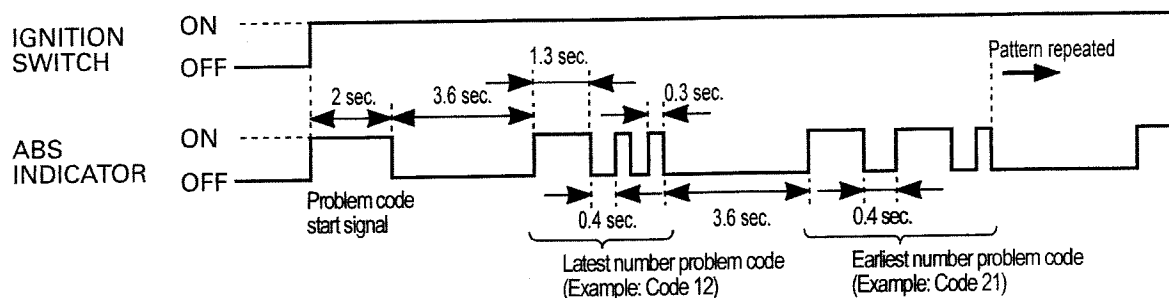
1. Turn the ignition switch ON and engine stop switch to "O".
2. Make sure the ABS indicator comes on.
3. Start the engine.
4. Ride the motorcycle and increase the vehicle speed to approximately 10 km/h (6 mph).
5. The ABS is normal if the ABS indicator will go off.



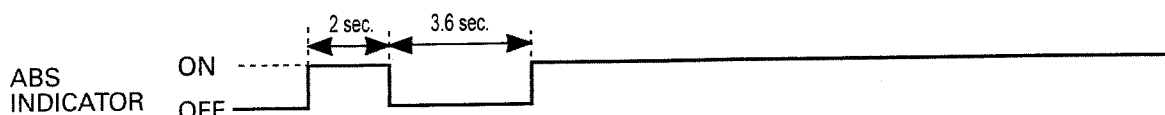
# ANTI-LOCK BRAKE SYSTEM (ABS)

## PROBLEM CODE INDICATION PATTERN

- The ABS indicator indicates the problem code by blinking a specified number of times. The indicator has two types of blinkings, a long blink and short blink. The long blink lasts for 1.3 seconds, the short blink lasts for 0.3 seconds. When one long blink occurs, and two short blinks, that problem code is 12 (one long blink = 1 blink, two short blinks = 2 blinks). Then, go to troubleshooting and see problem code 12.
- When the ABS control unit stores six problem codes, the ABS indicator shows the problem codes in the order from the latest problem code to earliest problem code.



When the problem code is not stored:



## PROBLEM CODE READOUT

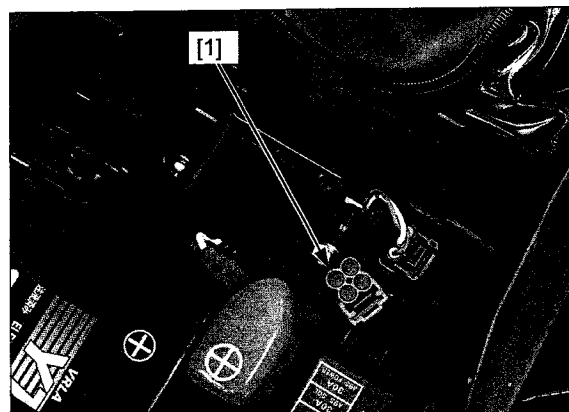
### NOTE:

- The problem code is not erased by turning the ignition switch to OFF while the problem code is being output. Note that turning the ignition switch to ON again does not indicate the problem code. To show the problem code again, repeat the problem code retrieval procedures from the beginning. Do not apply the front or rear brake during retrieval.
- After diagnostic troubleshooting, erase the problem code(s) and perform the pre-start self-diagnosis to be sure that there is no problem in the ABS indicator (indicator is operating normally).

- Turn the ignition switch OFF.

Remove the seat (page 3-4).

Remove the dummy connector [1] from the DLC.

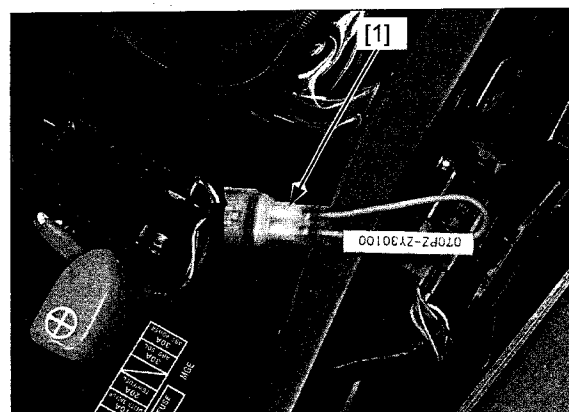


- Short the DLC terminals using the special tool.

### TOOL:

SCS connector [1]                      070PZ-ZY30100

CONNECTION:    Brown – Green



3. Turn the ignition switch ON.

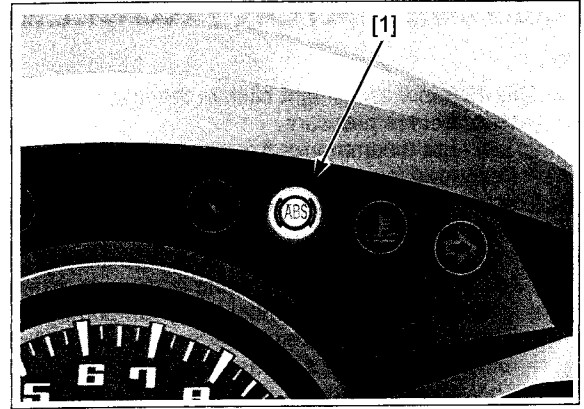
The ABS indicator starts problem code indication.

Note how many times the ABS indicator blinks, and determine the cause of the problem (page 18-10).

4. Turn the ignition switch OFF and remove the special tool.

Connect the dummy connector to the DLC.

Install the seat (page 3-4).



## CLEARING PROBLEM CODE

1. Turn the ignition switch OFF.

Remove the seat (page 3-4).

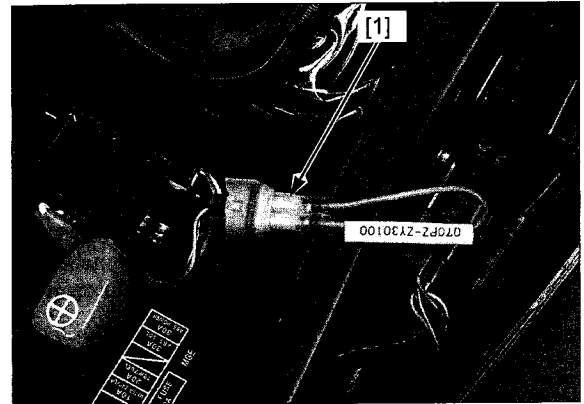
Remove the dummy connector and short DLC terminals using the special tool.

### TOOL:

SCS connector [1]

070PZ-ZY30100

CONNECTION: Brown – Green

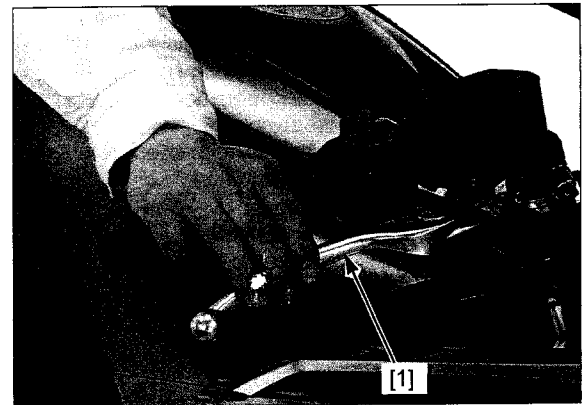


2. Turn the ignition switch ON and engine stop switch to "O" while squeezing the brake lever [1].

The ABS indicator should come on for 2 seconds and go off.

3. Release the brake lever immediately after the ABS indicator is off. The ABS indicator should come on.

4. Squeeze the brake lever immediately after the ABS indicator is on. The ABS indicator should go off.



5. Release the brake lever immediately after the ABS indicator is off. When code erasure is complete, the ABS indicator blinks 2 times and stays on.

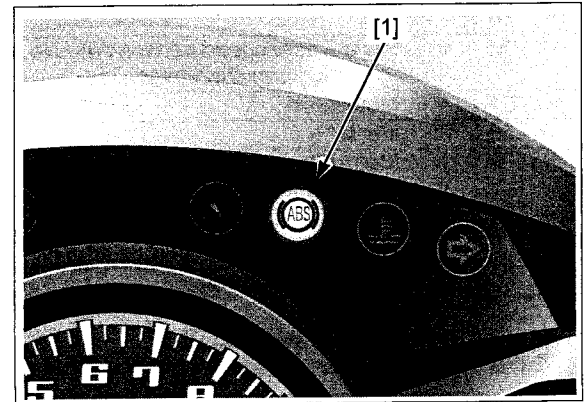
If the ABS indicator does not blink 2 times, the data has not been erased, so try again.

If the ABS indicator blinks 2 times and blinks, faulty ABS system, go to ABS trouble shooting (page 18-11).

6. Turn the ignition switch to OFF and remove the special tool.

Connect the dummy connector to the DLC.

Install the seat (page 3-4).



## ANTI-LOCK BRAKE SYSTEM (ABS)

### ABS INDICATOR PROBLEM CODE INDEX

#### NOTE:

- The ABS indicator might blink in the following cases. Correct the faulty part.
  - Incorrect tire pressure.
  - Tires not recommended for the motorcycle were installed (incorrect tire size).
  - Deformation of the wheel or tire.
- The ABS indicator might blink while riding under the following conditions. This is temporary failure. Be sure to erase the problem code (page 18-10).  
Then, test ride the motorcycle above 10 km/h (6 mph) and check the problem code by retrieving the self-diagnosis system (page 18-8). Ask the rider for the riding conditions in detail when the motorcycle is brought in for inspection.
  - The motorcycle has continuously run bumpy roads.
  - The front wheel leaves the ground for a long time when riding (wheelie).
  - Only either the front or rear wheel rotates.
  - The ABS operates continuously.
  - The ABS control unit has been disrupted by an extremely powerful radio wave (electromagnetic interference).

Problem Code	Function failure	Detection		Symptom/Fail-safe function	Refer to
		A	B		
—	ABS indicator circuit malfunction • Indicator related wires • Combination meter • ABS modulator			• ABS indicator never come ON at all	18-11
				• ABS indicator stays ON at all	18-12
11	Front wheel speed sensor circuit malfunction • Wheel speed sensor or related wires	O	O	• Stops ABS operation	18-15
12	Front wheel speed sensor malfunction • Wheel speed sensor, pulser ring or related wires • Electromagnetic interference • Riding condition		O	• Stops ABS operation	18-15
13	Rear wheel speed sensor circuit malfunction • Wheel speed sensor or related wires	O	O	• Stops ABS operation	18-17
14	Rear wheel speed sensor malfunction • Wheel speed sensor, pulser ring or related wires • Electromagnetic interference • Riding condition		O	• Stops ABS operation	18-17
21	Wheel slipping • Riding condition • Incorrect tire size		O	• Stops ABS operation	18-19
31	Solenoid valve malfunction	O	O	• Stops ABS operation	18-19
32					
33					
34					
37					
38					
42	Front wheel speed sensor/Wheelie • Riding condition (wheelie)		O	• Stops ABS operation	18-15
51	Motor/Stick		O	• Stops ABS operation	18-20
52	Motor/Run	O	O	• Stops ABS operation	
53	Motor/Stop	O	O	• Stops ABS operation	
54	Valve relay/Abnormal voltage	O	O	• Stops ABS operation	18-21
61	Power circuit/Under-voltage	O	O	• Stops ABS operation	18-22
62	Power circuit/Over-voltage	O	O	• Stops ABS operation	
81	CPU (ABS control unit)	O	O	• Stops ABS operation	18-24

(A) Pre-start self-diagnosis (page 18-7)

(B) Ordinary self-diagnosis: diagnoses while the motorcycle is running (after pre-start self-diagnosis)

# ABS TROUBLESHOOTING

**NOTE:**

- Perform inspection with the ignition switch turned OFF, unless otherwise specified.
- Refer to the ABS connector locations (page 18-5). All connector diagrams in the troubleshooting are viewed from the terminal side.
- Use a fully charged battery. Do not diagnose with a charger connected to the battery.
- When the ABS modulator assembly is detected to be faulty, recheck the wire harness and connector connections closely before replacing it.
- After diagnostic troubleshooting, erase the problem code (page 18-9). Then test ride the motorcycle above 10 km/h (6 mph) and check the other problem code by retrieving the self-diagnosis system (page 18-8).

## NO PROBLEM CODE FAILURE

**ABS INDICATOR DOES NOT COME ON** (when the ignition switch turned ON)

### 1. Combination Meter Power/ground Line Inspection

Check the combination meter power and ground lines (page 22-11).

**Are the wires normal?**

**YES** – GO TO STEP 2.

**NO** – Open circuit in related wires.

### 2. Indicator Operation Inspection

Remove the right middle cowl (page 3-7).

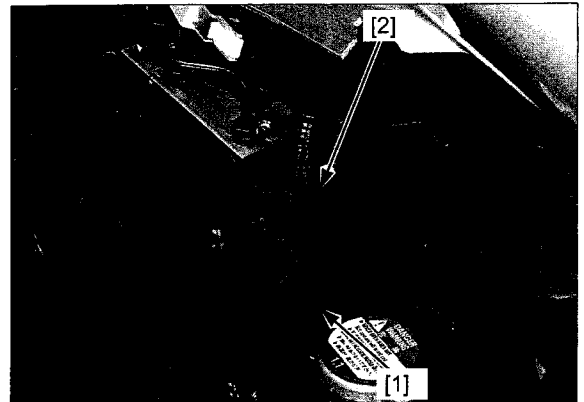
Pull up the lock lever [1] and disconnect the ABS modulator 26P connector [2].

Turn the ignition switch ON and check the ABS indicator.

**Does the indicator come on?**

**YES** – Faulty ABS modulator.

**NO** – GO TO STEP 3.



### 3. Indicator Signal Line Short Circuit Inspection

Check for continuity between the ABS modulator 26P connector [1] of the wire harness side and ground.

**TOOL:**

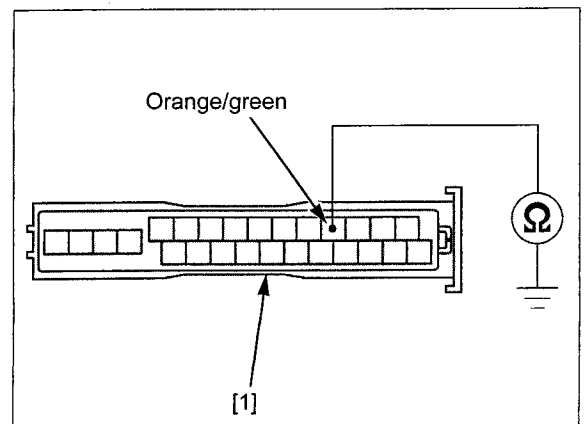
**Test probe** 07ZAJ-RDJA110

**CONNECTION:** Orange/green – Ground

**Is there continuity?**

**YES** – Short circuit in Orange/green wire.

**NO** – Faulty combination meter.

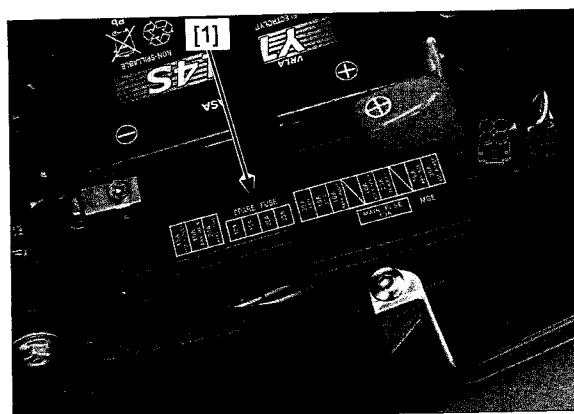


## ANTI-LOCK BRAKE SYSTEM (ABS)

**ABS INDICATOR STAYS ON** (Indicator does not go off when the motorcycle is running, Problem code is not indicated by the retrieval procedure)

### 1. Fuse Inspection

Remove the seat (page 3-4).  
Remove the fuse box cover [1].

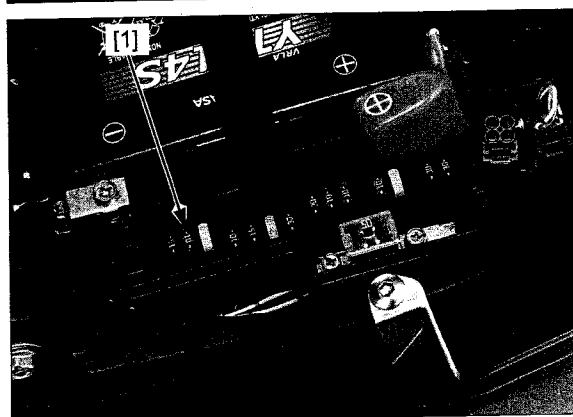


Check the ABS MAIN fuse (10 A) [1] in the fuse box.

**Is the fuse blown?**

**YES** – GO TO STEP 2.

**NO** – GO TO STEP 3.



### 2. ABS Power Input Line Short Circuit Inspection

Disconnect the ABS modulator 26P connector (page 18-11).

Check for continuity between the ABS modulator connector [1] of the wire harness side and ground with ABS MAIN fuse removed.

**TOOL:**

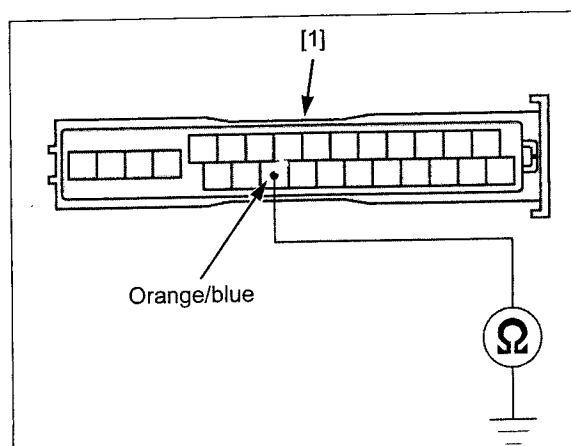
**Test probe** 07ZAJ-RDJA110

**CONNECTION:** Orange/blue – Ground

**Is there continuity?**

**YES** – Short circuit in Orange/blue wire between the fuse box and ABS modulator.

**NO** – Intermittent failure. Replace the ABS MAIN fuse (10 A) with a new one, and recheck.



## 3. ABS Power Input Line Open Circuit Inspection

Install the ABS MAIN fuse.

Disconnect the ABS modulator 26P connector (page 18-11).

Measure the voltage between the ABS modulator [1] of the wire harness side with the ignition switch turned ON.

**TOOL:**

Test probe

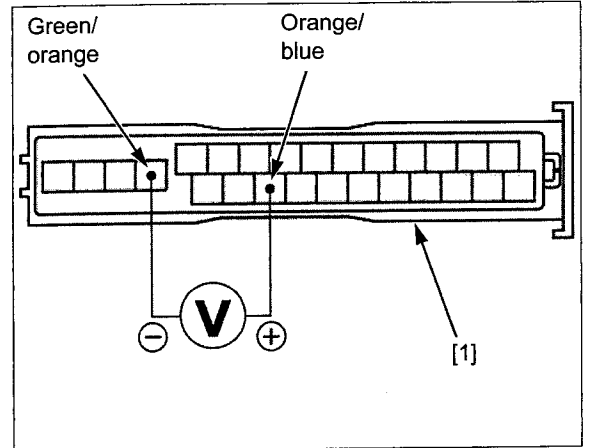
07ZAJ-RDJA110

**CONNECTION:** Orange/blue (+) – Green/orange (–)

*Is there battery voltage?*

**YES** – GO TO STEP 4.

**NO** – • Open circuit in Orange/blue wire between the fuse box and ABS modulator.  
• Open circuit in Green/orange wire between the ABS modulator and body ground.



## 4. Service Check Line Short Circuit Inspection

Turn the ignition switch OFF.

Disconnect the ECM 33P (Gray) connector (page 6-84).

Remove the dummy connector from the DLC [1] (page 18-8).

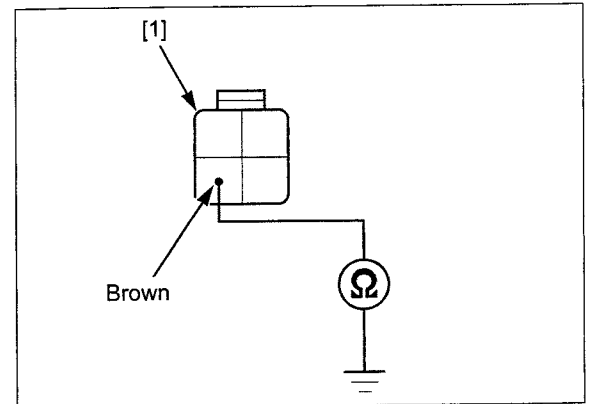
Check for continuity between the DLC and ground.

**CONNECTION:** Brown – Ground

*Is there continuity?*

**YES** – Short circuit in Brown wire between the service check connector and ABS modulator.

**NO** – GO TO STEP 5.





## ANTI-LOCK BRAKE SYSTEM (ABS)

### 5. Indicator Operation Inspection

Remove the upper center cowl (page 3-10).

With the combination meter 20P connector [1] connected, short the Orange/black wire terminal of the combination meter and ground with a jumper wire.

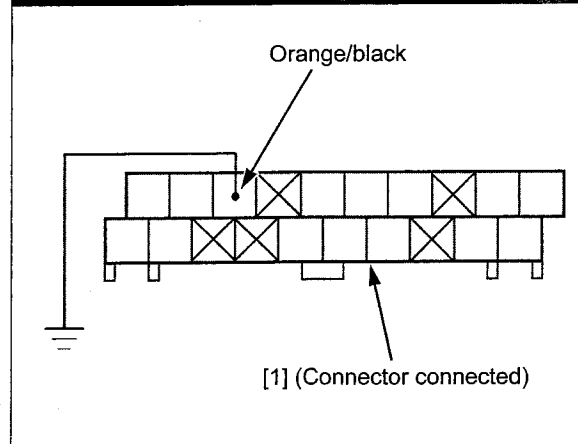
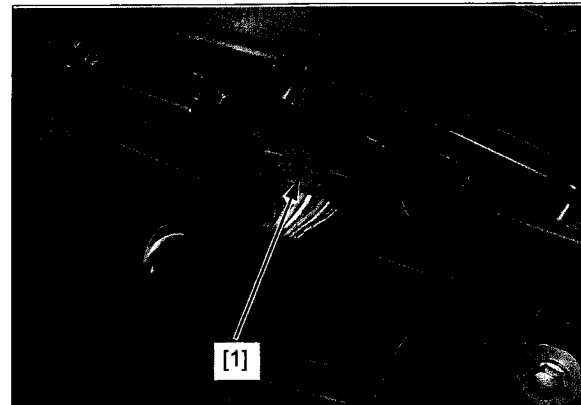
Check the ABS indicator with the ignition switch turned ON.

**CONNECTION:** Orange/black – Ground

*Does the ABS indicator go off?*

**YES** – GO TO STEP 6.

**NO** – Faulty combination meter.



### 6. Indicator Signal Line Open Circuit Inspection

Turn the ignition switch OFF.

Remove the jumper wire from the combination meter 20P connector.

Short the Orange/green wire terminal of the ABS modulator 26P connector [1] and ground with a jumper wire.

Check the ABS indicator with the ignition switch turned ON.

**TOOL:**

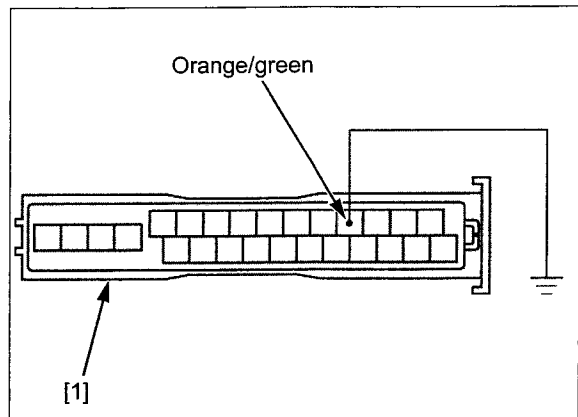
**Test probe** 07ZAJ-RDJA110

**CONNECTION:** Orange/green – Ground

*Does the ABS indicator go off?*

**YES** – Faulty ABS modulator.

**NO** – Open circuit in Orange/green and/or Orange/ black wires between the combination meter and ABS modulator.



## PROBLEM CODE 11, 12 or 42 (Front Wheel Speed Sensor)

### NOTE:

- The ABS indicator might blink under unusual riding or conditions (page 18-10).  
This is temporary failure. Erase the problem code (page 18-9).  
Then test ride the motorcycle above 10 km/h (6 mph) and check the problem code by retrieving the self-diagnosis system (page 18-8).
- If the problem code 12 is indicated, check the front brake for drag.

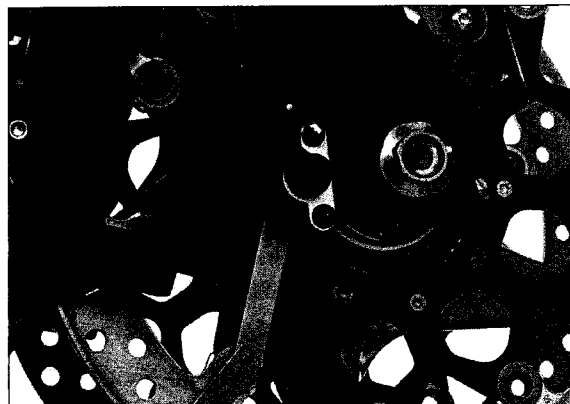
### 1. Speed Sensor Air Gap Inspection

Measure the clearance (air gap) between the sensor and pulser ring (page 18-24).

*Is the air gap correct?*

**YES** – GO TO STEP 2.

**NO** – Check each part for deformation and looseness and correct accordingly.  
Recheck the air gap.



### 2. Speed Sensor Condition Inspection

Inspect the area around the front wheel speed sensor [1]:

Check that there is no iron or other magnetic deposits between the pulser ring [2] and wheel speed sensor, and check the pulser ring slots for obstructions.

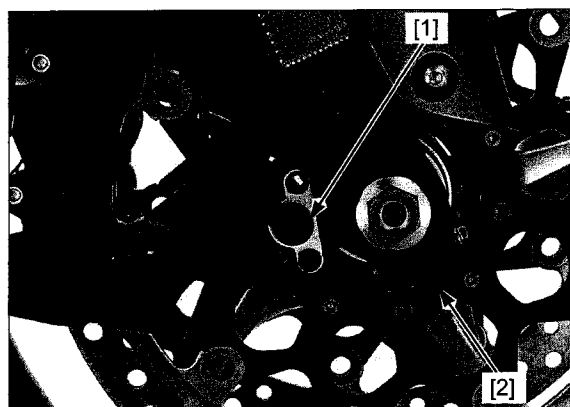
Check installation condition of the pulser ring or wheel speed sensor for looseness.

Check the pulser ring and sensor tip for deformation or damage (e.g., chipped pulser ring teeth).

*Are the sensor and pulser ring in good condition?*

**YES** – GO TO STEP 3.

**NO** – Remove any deposits. Install properly or replace faulty part.



### 3. Speed Sensor Input Voltage Inspection

Disconnect the front wheel speed sensor 2P (Blue) connector [1].

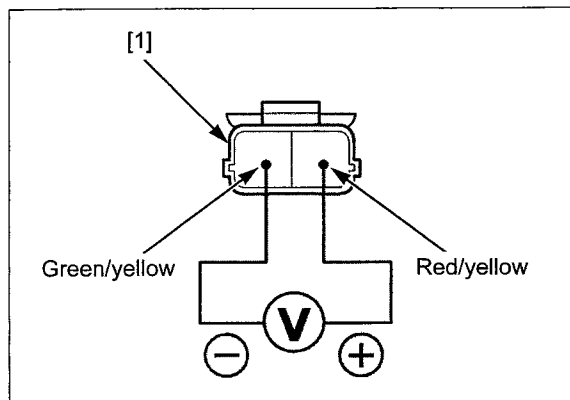
Measure the voltage at the front wheel speed sensor 2P (Blue) connector of the wire harness side with the ignition switch turned ON.

**CONNECTION:** Red/yellow (+) – Green/yellow (–)

*Is there battery voltage?*

**YES** – Faulty front wheel speed sensor.

**NO** – GO TO STEP 4.



## ANTI-LOCK BRAKE SYSTEM (ABS)

### 4. Speed Sensor Line Open Circuit Inspection

Turn the ignition switch OFF.

Disconnect the ABS modulator 26P connector (page 18-11).

Check for continuity at the Red/yellow and Green/yellow terminals between front wheel speed sensor 2P (Blue) connector [1] and ABS modulator 26P connector [2].

**TOOL:**

Test probe

07ZAJ-RDJA110

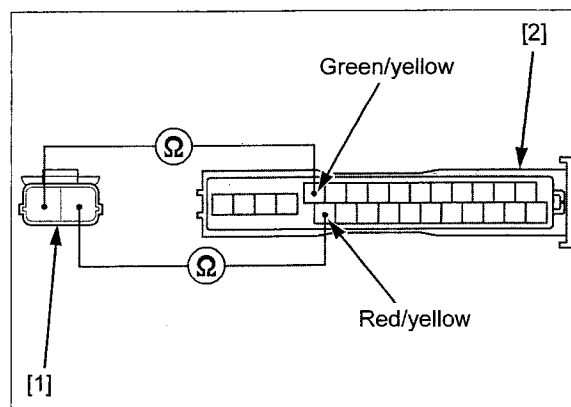
**CONNECTION:** Red/yellow – Red/yellow

Green/yellow – Green/yellow

*Is there continuity?*

**YES** – GO TO STEP 5.

**NO** – Open circuit in wire between the ABS modulator and speed sensor.



### 5. Speed Sensor Line Short Circuit Inspection

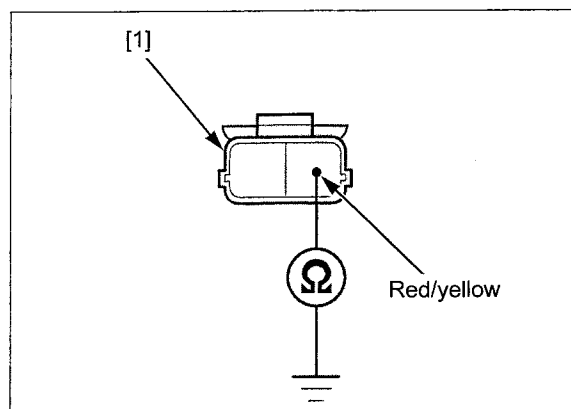
Check for continuity at the front wheel speed sensor 2P (Blue) connector [1] of the wire harness side and ground.

**CONNECTION:** Red/yellow – Ground

*Is there continuity?*

**YES** – Short circuit in Red/yellow wire.

**NO** – GO TO STEP 6.



### 6. Failure Reproduction with a New Speed Sensor

Replace the front wheel speed sensor with a new one (page 18-25).

Connect the ABS modulator 26P connector.

Erase the problem code (page 18-9).

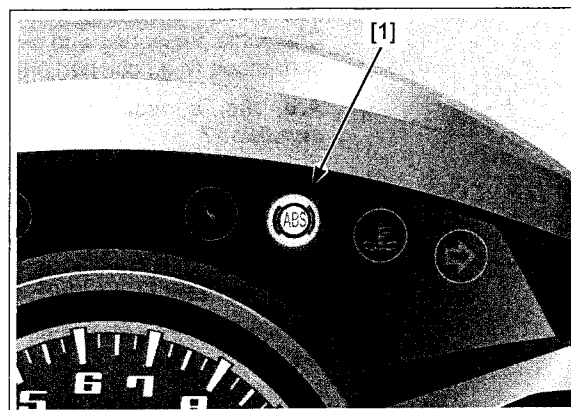
Test ride the motorcycle above 10 km/h (6 mph).

Retrieve the problem code (page 18-8).

**Dose the indicator blink 11, 12 or 42 times?**

**YES** – Faulty ABS modulator.

**NO** – Faulty removed front wheel speed sensor.



## PROBLEM CODE 13 or 14 (Rear Wheel Speed Sensor)

### NOTE:

- The ABS indicator might blink under unusual riding or conditions (page 18-10).  
This is temporary failure. Erase the problem code (page 18-9).  
Then test ride the motorcycle above 10 km/h (6 mph) and check the problem code by retrieving the self-diagnosis system (page 18-8).
- If the problem code 14 is indicated, check the rear brake for drag.

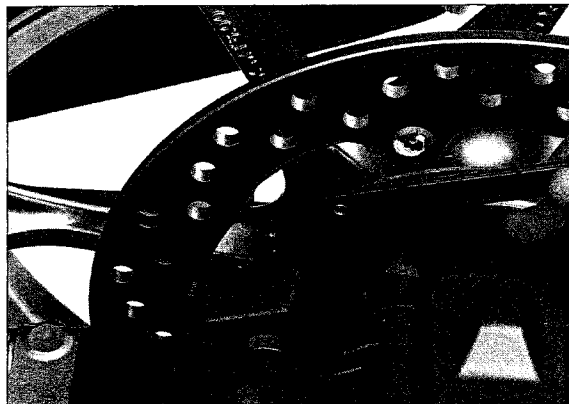
### 1. Speed Sensor Air Gap Inspection

Measure the clearance (air gap) between the sensor and pulser ring (page 18-24).

*Is the air gap correct?*

**YES** – GO TO STEP 2.

**NO** – Check each part for deformation and looseness and correct accordingly.  
Recheck the air gap.



### 2. Speed Sensor Condition Inspection

Inspect the area around the rear wheel speed sensor [1]:

Check that there is no iron or other magnetic deposits between the pulser ring [2] and wheel speed sensor, and check the pulser ring slots for obstructions.

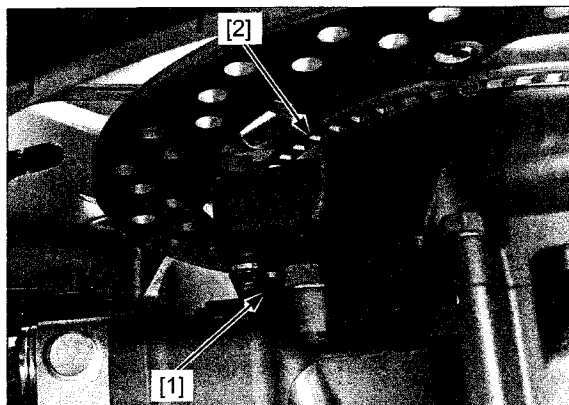
Check installation condition of the pulser ring or wheel speed sensor for looseness.

Check the pulser ring and sensor tip for deformation or damage (e.g., chipped pulser ring teeth).

*Are the sensor and pulser ring in good condition?*

**YES** – GO TO STEP 3.

**NO** – Remove any deposits. Install properly or replace faulty part.



### 3. Speed Sensor Input Voltage Inspection

Disconnect the rear wheel speed sensor 2P (Orange) connector [1].

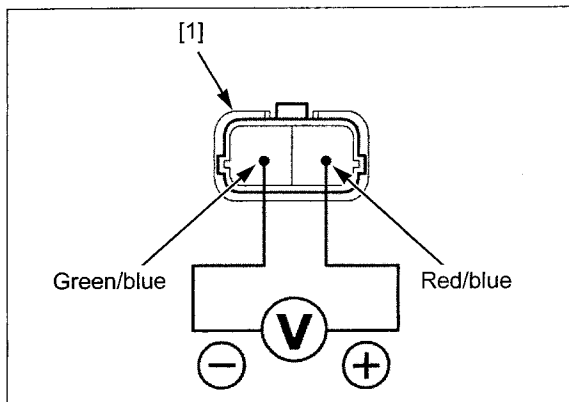
Measure the voltage at the rear wheel speed sensor 2P (Orange) connector of the wire harness side with the ignition switch turned ON.

**CONNECTION:** Red/blue (+) – Green/blue (–)

*Is there battery voltage?*

**YES** – Faulty rear wheel speed sensor.

**NO** – GO TO STEP 4.



## ANTI-LOCK BRAKE SYSTEM (ABS)

### 4. Speed Sensor Line Open Circuit Inspection

Turn the ignition switch OFF.

Disconnect the ABS modulator 26P connector (page 18-11).

Check for continuity at the Red/blue and Green/blue terminals between rear wheel speed sensor 2P (Orange) connector [1] and ABS modulator 26P connector [2].

#### TOOL:

Test probe

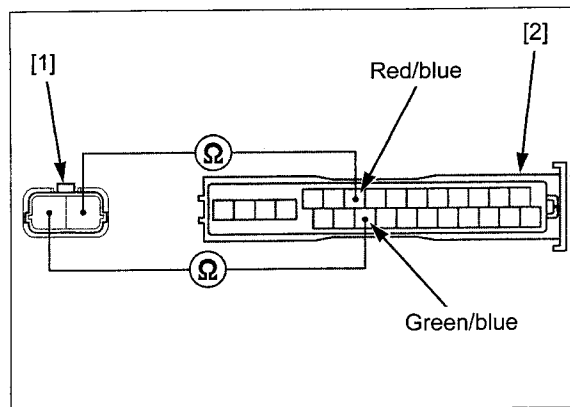
07ZAJ-RDJA110

**CONNECTION:** Red/blue – Red/blue  
Green/blue – Green/blue

*Is there continuity?*

**YES** – GO TO STEP 5.

**NO** – Open circuit in wire between the ABS modulator and speed sensor.



### 5. Speed Sensor Line Short Circuit Inspection

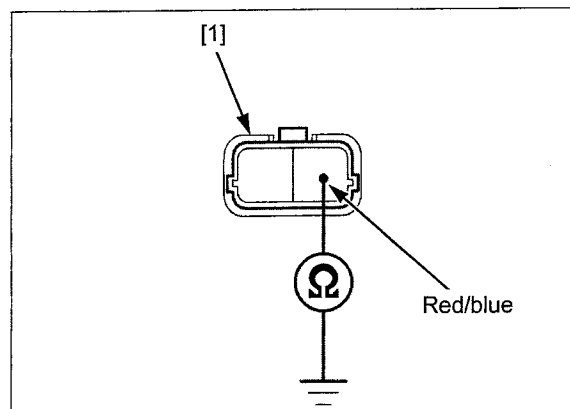
Check for continuity at the rear wheel speed sensor 2P (Orange) connector [1] of the wire harness side and ground.

**CONNECTION:** Red/Blue – Ground

*Is there continuity?*

**YES** – Short circuit in Red/blue wire.

**NO** – GO TO STEP 6.



### 6. Failure Reproduction with a New Speed Sensor

Replace the rear wheel speed sensor with a new one (page 18-26).

Connect the ABS modulator 26P connector.

Erase the problem code (page 18-9).

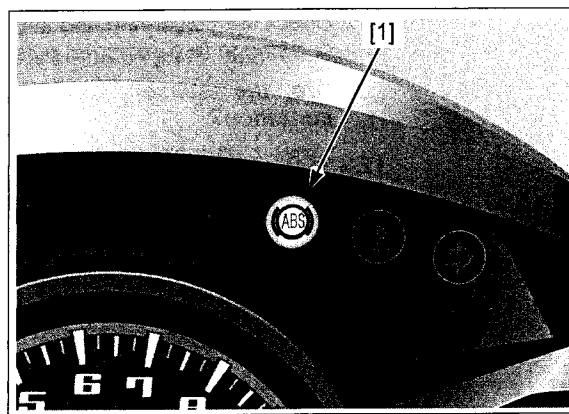
Test ride the motorcycle above 10 km/h (6 mph).

Retrieve the problem code (page 18-8).

*Dose the indicator blink 13 or 14 times?*

**YES** – Faulty ABS modulator.

**NO** – Faulty removed rear wheel speed sensor.



## PROBLEM CODE 21 (Wheel slipping)

### NOTE:

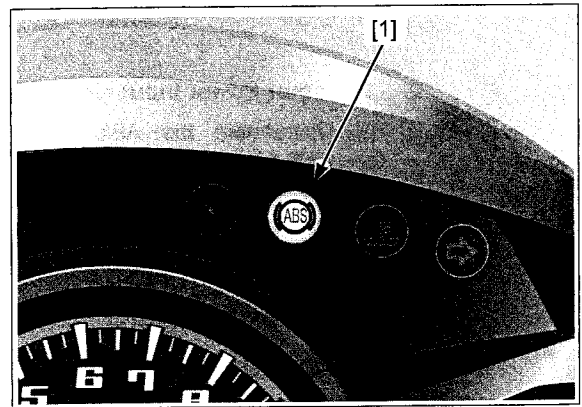
- The ABS indicator might blink under unusual riding or conditions (page 18-10).  
This is temporary failure. Erase the problem code (page 18-9).  
Then test ride the motorcycle above 10 km/h (6 mph) and check the problem code by retrieving the self-diagnosis system (page 18-8).
- Check the following and correct the faulty part.
  - Incorrect tire pressure.
  - Tires not recommended for the motorcycle were installed (incorrect tire size).
  - Deformation of the wheel or tire.

### 1. Failure Reproduction

If the above items are normal, recheck the problem code indication:  
Erase the problem code (page 18-9).  
Test ride the motorcycle above 10 km/h (6 mph).  
Retrieve the problem code (page 18-8).

**Does the indicator blink 21 times?**

- YES** – Faulty ABS modulator.  
**NO** – Tire size is normal (temporary failure).



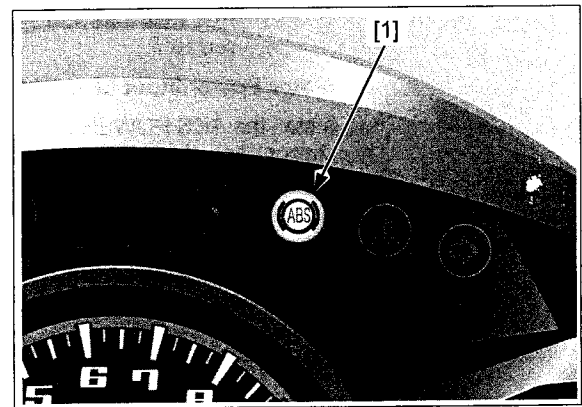
## PROBLEM CODE 31, 32, 33, 34, 37 or 38 (Solenoid Valve)

### 1. Failure Reproduction

Erase the problem code (page 18-9).  
Test ride the motorcycle above 10 km/h (6 mph).  
Retrieve the problem code (page 18-8).

**Does the indicator blink 31, 32, 33, 34, 37 or 38 times?**

- YES** – Faulty ABS modulator.  
**NO** – Solenoid valve is normal (temporary failure).



## ANTI-LOCK BRAKE SYSTEM (ABS)

### PROBLEM CODE 51, 52 or 53 (Pump Motor)

#### 1. Fuse Inspection

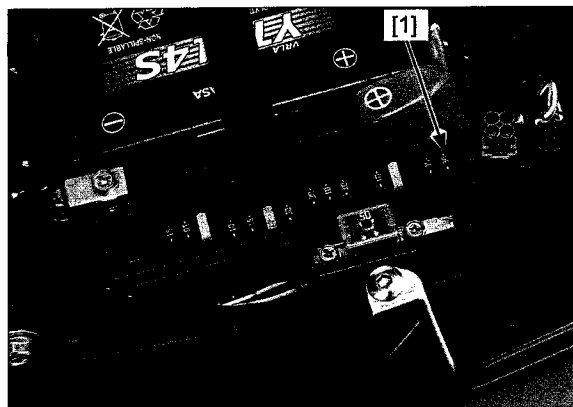
Remove the fuse box cover (page 18-12).

Check the ABS POWER fuse (30 A) [1] in the fuse box for blown.

**Is the fuse blown?**

**YES** – GO TO STEP 2.

**NO** – GO TO STEP 3.



#### 2. Motor Power Input Line Short Circuit Inspection

Disconnect the ABS modulator 26P connector (page 18-11).

Check for continuity between the ABS modulator 26P connector [1] of the wire harness side and ground with ABS POWER fuse removed.

**TOOL:**

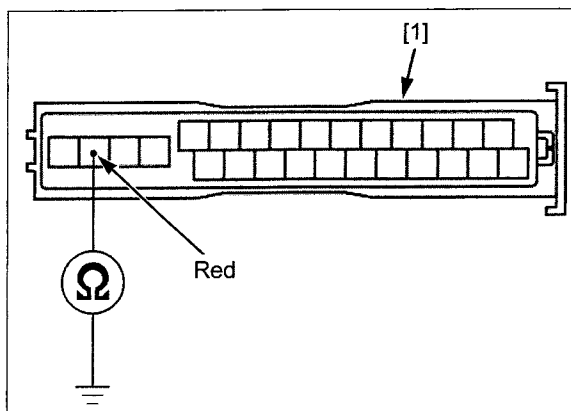
**Test probe** 07ZAJ-RDJA110

**CONNECTION:** Red – Ground

**Is there continuity?**

**YES** – Short circuit in Red wire between the fuse box and ABS modulator.

**NO** – Temporary failure. Replace the ABS POWER fuse (30 A) with a new one and recheck.



#### 3. Motor Power Input Line Open Circuit Inspection

Install the ABS POWER fuse.

Disconnect the ABS modulator 26P connector (page 18-11).

Measure the voltage at the ABS modulator 26P connector [1] from the wire harness side with the ignition switch turned ON.

There should be battery voltage at all times.

**TOOL:**

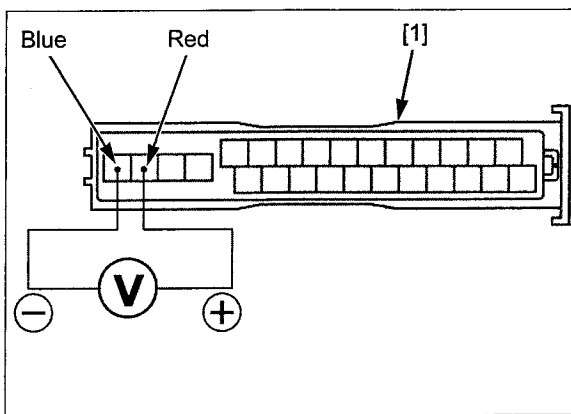
**Test probe** 07ZAJ-RDJA110

**CONNECTION:** Red (+) – Blue (–)

**Is there battery voltage?**

**YES** – GO TO STEP 4.

**NO** – • Open circuit in Red wire.  
• Open circuit in Blue wire.



## 4. Failure Reproduction

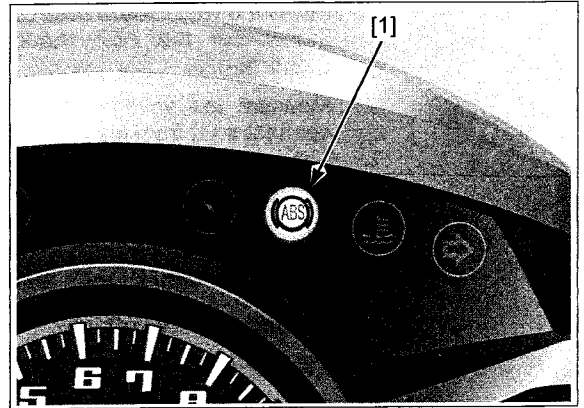
Turn the ignition switch OFF.  
Connect the ABS modulator 26P connector.

Erase the problem code (page 18-9).  
Test ride the motorcycle above 10 km/h (6 mph).  
Retrieve the problem code (page 18-8).

**Does the indicator blink 51, 52, or 53 times?**

**YES** – Faulty ABS modulator.

**NO** – Pump motor is normal (temporary failure).



## PROBLEM CODE 54 (Valve Relay)

### 1. Fuse Inspection

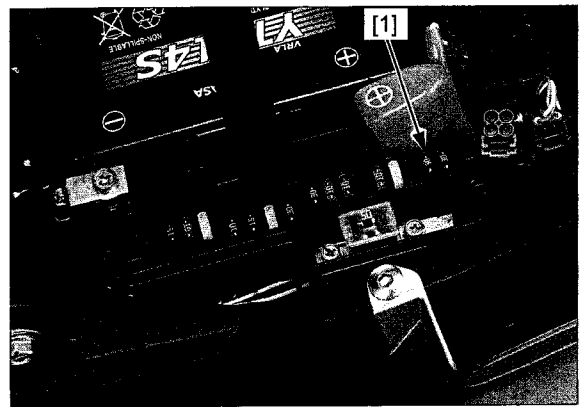
Remove the fuse box cover (page 18-12).

Check the ABS SOLENOID fuse (30 A) in the fuse box for blown.

**Is the fuse blown?**

**YES** – GO TO STEP 2.

**NO** – GO TO STEP 3.



### 2. Relay Power Input Line Short Circuit Inspection

Disconnect the ABS modulator 26P connector (page 18-11).

Check for continuity between the ABS modulator 26P connector [1] of the wire harness side and ground with ABS SOLENOID fuse removed.

**TOOL:**

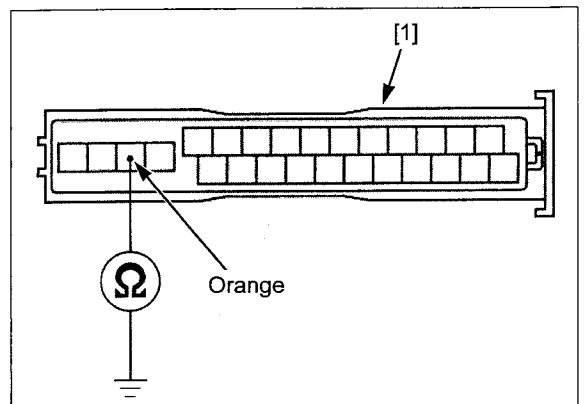
**Test probe** 07ZAJ-RDJA110

**CONNECTION:** Orange – Ground

**Is there continuity?**

**YES** – Short circuit in Orange wire between the fuse box and ABS modulator.

**NO** – Temporary failure. Replace the ABS SOLENOID fuse (30 A) with a new one and recheck.





## ANTI-LOCK BRAKE SYSTEM (ABS)

### 3. Relay Power Input Line Open Circuit Inspection

Install the ABS SOLENOID fuse (30 A).  
Disconnect the ABS modulator 26P connector (page 18-11).

Measure the voltage at the ABS modulator 26P connector [1] from the wire harness side.  
There should be battery voltage at all times.

**TOOL:**

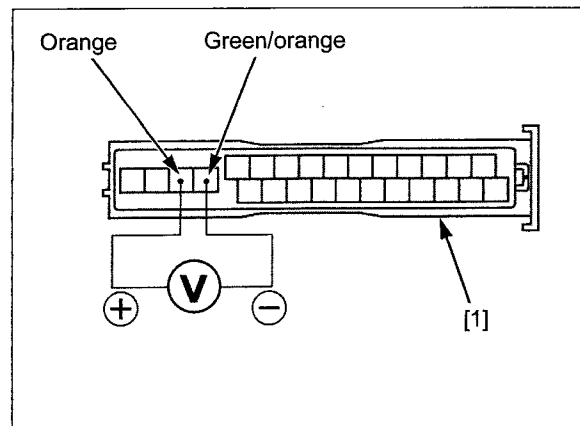
**Test probe** 07ZAJ-RDJA110

**CONNECTION:** Orange (+) – Green/orange (–)

**Is there battery voltage?**

**YES** – GO TO STEP 4.

**NO** – • Open circuit in Orange wire.  
• Open circuit in Green/orange wire.



### 4. Failure Reproduction

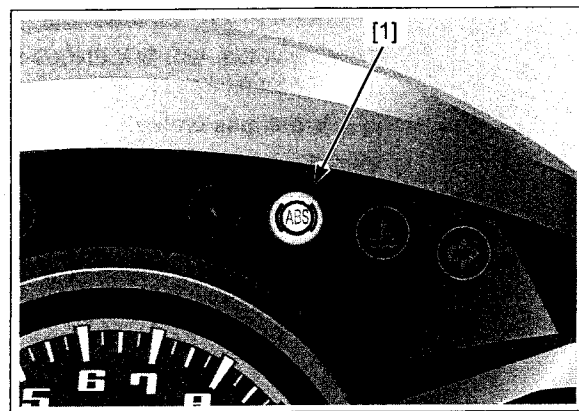
Turn the ignition switch OFF.  
Connect the ABS modulator 26P connector.

Erase the problem code (page 18-9).  
Test ride the motorcycle above 10 km/h (6 mph).  
Retrieve the problem code (page 18-8).

**Does the indicator blink 54 times?**

**YES** – Faulty ABS modulator.

**NO** – Valve relay is normal (temporary failure).



## PROBLEM CODE 61 or 62 (Power Circuit)

### 1. Fuse Inspection

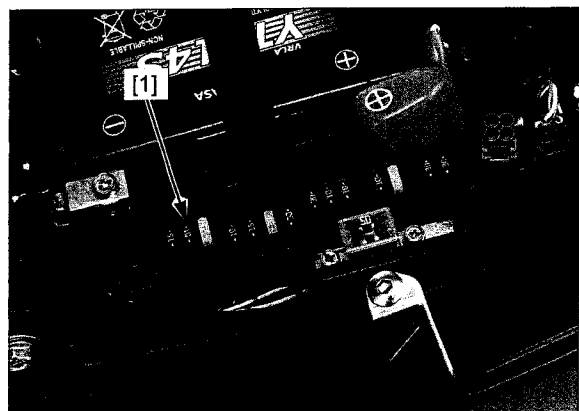
Remove the fuse box cover (page 18-12).

Check the ABS MAIN fuse (10 A) in the fuse box.

**Is the fuse blown?**

**YES** – GO TO STEP 2.

**NO** – GO TO STEP 3.



## 2. ABS Power Input Line Short Circuit Inspection

Disconnect the ABS modulator 26P connector (page 18-11).

Check for continuity at the ABS modulator connector [1] of the wire harness side and ground with ABS MAIN fuse removed.

**TOOL:**

Test probe

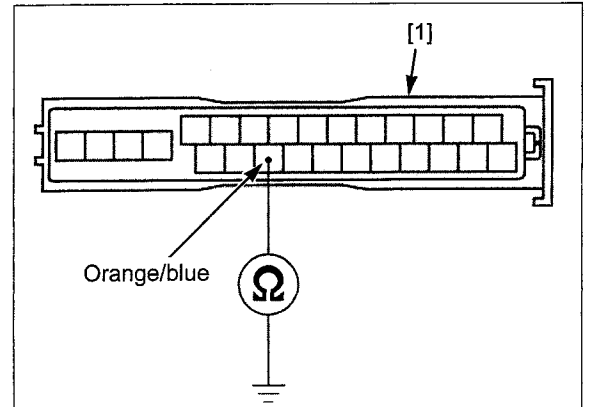
07ZAJ-RDJA110

**CONNECTION:** Orange/blue – Ground

*Is there continuity?*

**YES** – Short circuit in Orange/blue wire between the fuse box and ABS modulator.

**NO** – Intermittent failure. Replace the ABS MAIN fuse (10 A) with a new one, and recheck.



## 3. ABS Power Input Line Open Circuit Inspection

Install the ABS MAIN fuse.

Disconnect the ABS modulator 26P connector (page 18-11).

Measure the voltage at the ABS modulator [1] of the wire harness side with the ignition switch turned ON.

**TOOL:**

Test probe

07ZAJ-RDJA110

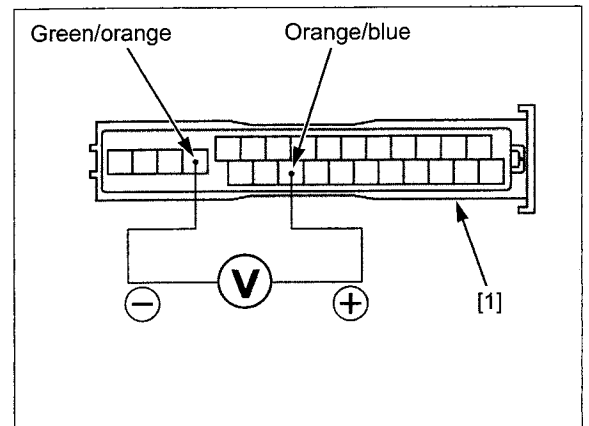
**CONNECTION:**

Orange/blue (+) – Green/orange (–)

*Is there battery voltage?*

**YES** – GO TO STEP 4.

**NO** – • Open circuit in Orange/blue wire.  
• Open circuit in Green/orange wire.



## 4. Failure Reproduction

Turn the ignition switch OFF.

Connect the ABS modulator 26P connector.

Erase the problem code (page 18-9).

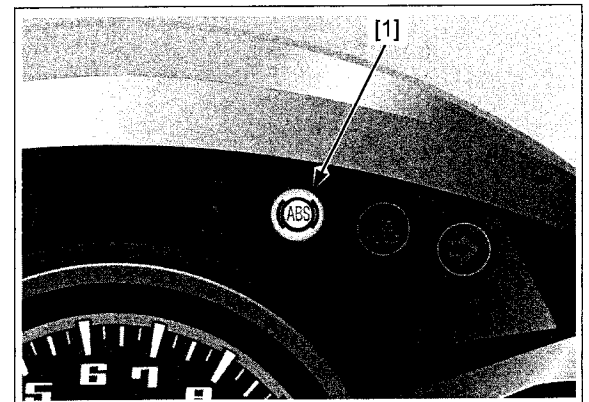
Test ride the motorcycle above 10 km/h (6 mph).

Retrieve the problem code (page 18-8).

*Does the indicator blink 61 or 62 times?*

**YES** – Faulty ABS modulator.

**NO** – Power circuit is normal (temporary failure).



## ANTI-LOCK BRAKE SYSTEM (ABS)

### PROBLEM CODE 81 (CPU; ABS Control Unit)

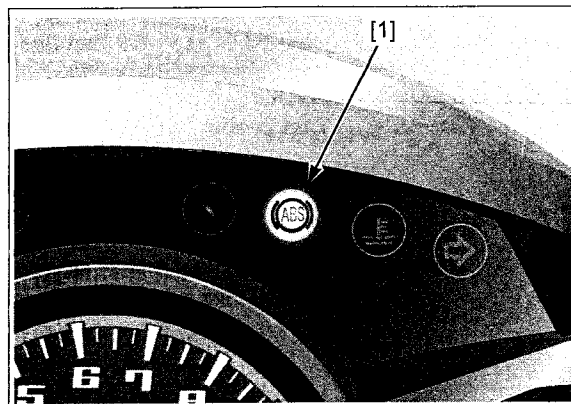
#### 1. Failure Reproduction

Erase the problem code (page 18-9).  
Test ride the motorcycle above 10 km/h (6 mph).  
Retrieve the problem code (page 18-8).

**Does the indicator blink 81 times?**

**YES** – Faulty ABS modulator.

**NO** – CPU is normal (temporary failure).



## WHEEL SPEED SENSOR

### INSPECTION

Support the motorcycle securely using a hoist or equivalent and raise the wheels off the ground.

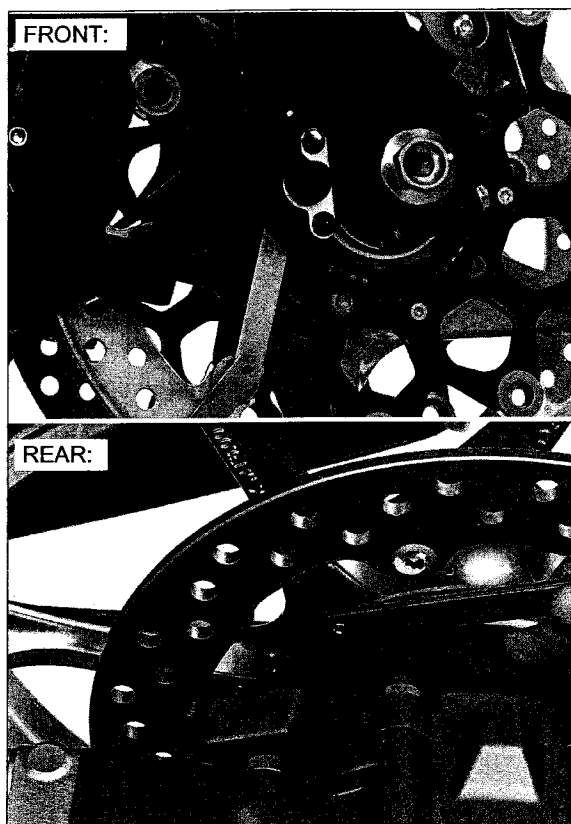
Measure the clearance (air gap) between the sensor and pulser ring at several points by turning the wheel slowly.

It must be within specification.

**STANDARD: 0.4 – 1.2 mm (0.02 – 0.05 in)**

The sensor air gap cannot be adjusted.

If it is not within specification, check each installation part for deformation, looseness and damage.

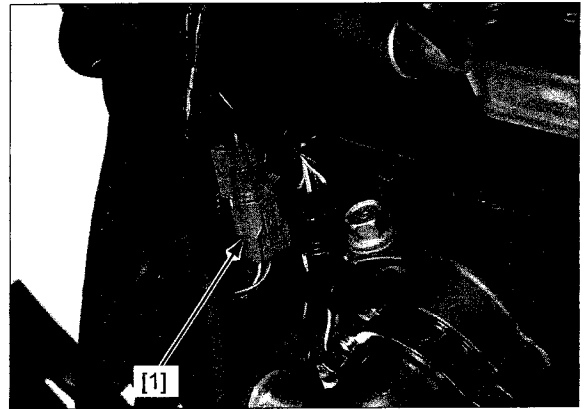


## REMOVAL/INSTALLATION

### FRONT

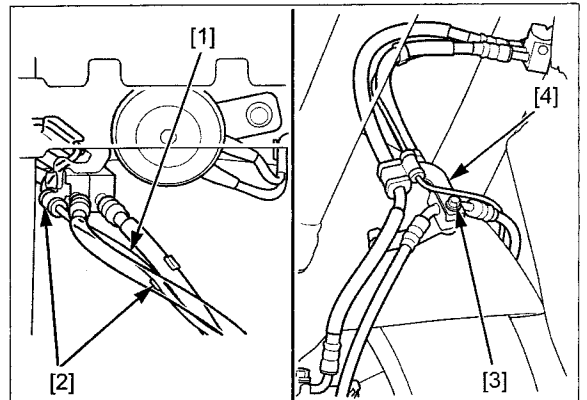
Remove the radiator (page 7-9).

Remove the front wheel speed sensor 2P (Blue) connector [1] from the frame and disconnect it.



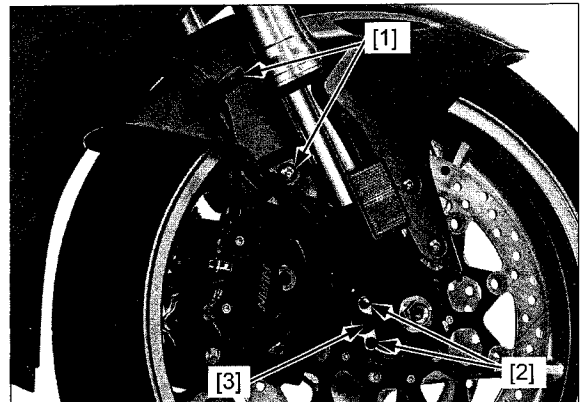
Release the front wheel speed sensor wire [1] from the clamps [2].

Remove the bolt [3] and wire clamp stay [4].



Remove the bolts [1] and wire clamps.

Remove the mounting bolts [2] and front wheel speed sensor [3].

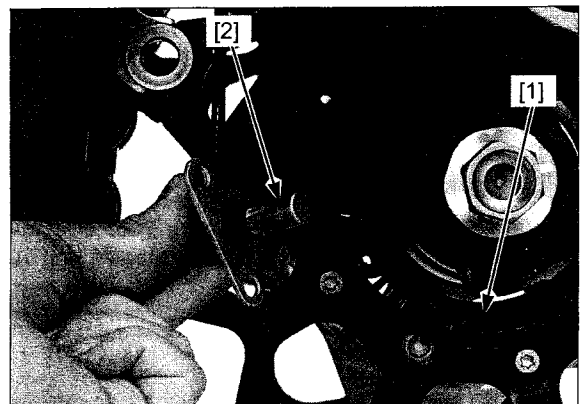


Check that there is iron or other magnetic deposits between the pulser ring [1] and front wheel speed sensor [2].  
Remove any deposits.

Check the sensor tip for deformation or damage (e.g., chipped pulser ring teeth).  
Replace the front wheel speed sensor if necessary.

Installation is in the reverse order of removal.

After installing the speed sensor, measure the clearance (air gap) between the sensor and pulser ring (page 18-24).



*Route the sensor wire properly (page 1-22).*

## ANTI-LOCK BRAKE SYSTEM (ABS)

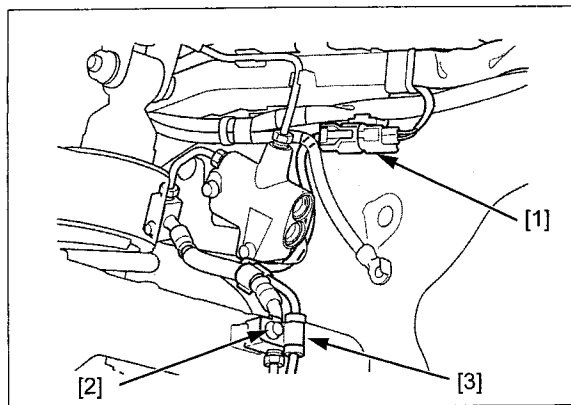
### REAR

Remove the following:

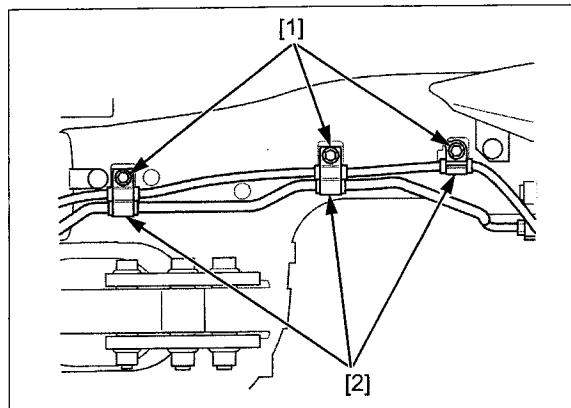
- canister tray (page 6-91)
- left engine heat guard (page 11-4)

Remove the rear wheel speed sensor 2P (Orange) connector [1] from the harness protector and disconnect it.

Remove the bolt [2] and wire clamber [3] from the swingarm.

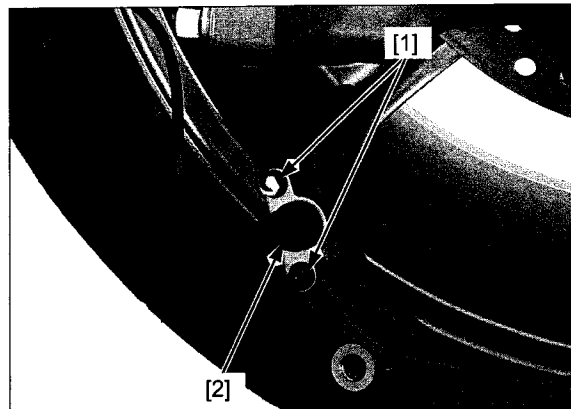


Remove the bolts [1] and wire clammers [2].



Remove the caliper assembly (page 17-34).

Remove the bolts [1] and rear wheel speed sensor [2].



Check that there is no iron or other magnetic deposits between the pulser ring and rear wheel speed sensor [1].

Remove any deposits.

Check the sensor tip for deformation or damage (e.g., chipped pulser ring teeth).

Replace the speed sensor if necessary.

Installation is in the reverse order of removal.

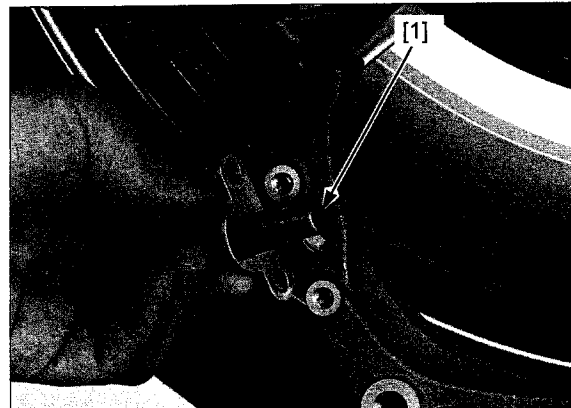
- For proper speed sensor wire installation, refer to swingarm installation (page 16-19).

### TORQUE:

Rear brake pipe  
clamber bolt:

10 N·m (1.0 kgf·m, 7 lbf·ft)

After installing the speed sensor, measure the clearance (air gap) between the sensor and pulser ring (page 18-24).



*Replace the rear  
brake pipe clamber  
bolts with new ones.*

## PULSER RING REMOVAL/ INSTALLATION

*Front:* Refer to front wheel disassembly (page 15-15).

*Rear:* Remove the rear brake disc flange (page 14-6).  
Remove the bolts [1] and pulser ring [2].

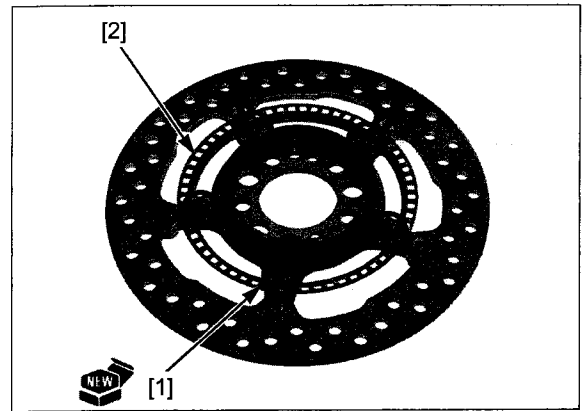
*Replace the pulser  
ring mounting bolts  
with new ones.*

Installation is in the reverse order of removal.

### TORQUE:

**Pulser ring mounting bolt:**

**7.0 N·m (0.7 kgf·m, 5.2 lbf·ft)**



## ABS MODULATOR

### REMOVAL

#### NOTE:

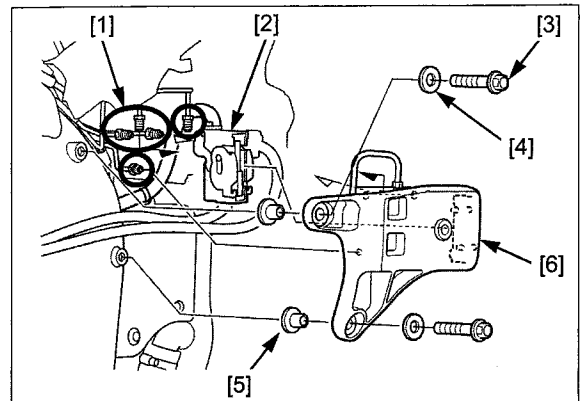
- When removing the brake pipe joint nut, cover the end of the pipe to prevent contamination.
- Be careful not to bend or damage the brake pipes.

Drain the brake fluid from the hydraulic systems (page 17-7).

Loosen the brake pipe joint nuts [1] and disconnect the brake pipes.

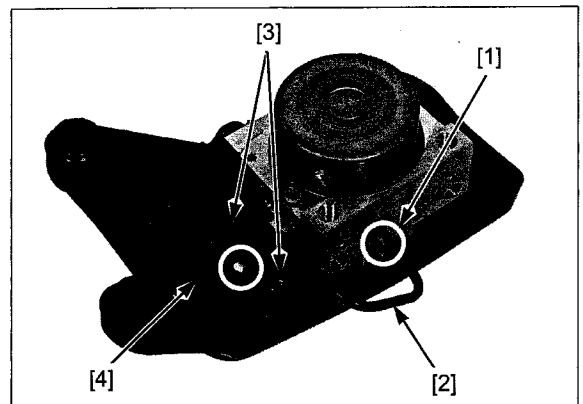
Disconnect the ABS modulator 26P connector [2] (pull the lock lever up to disconnect it).

Remove the bracket mounting bolts [3], washers [4], collars [5] and ABS modulator/bracket [6].



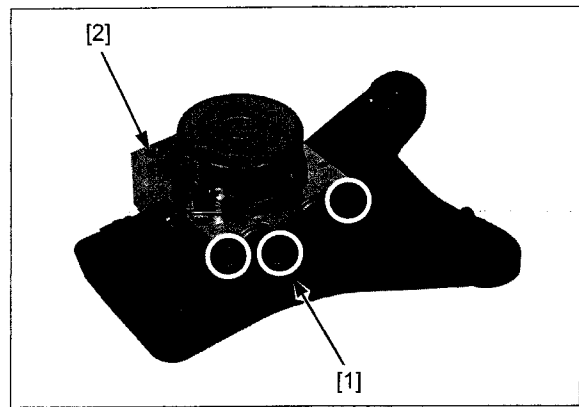
Loosen the brake pipe joint nuts [1] and disconnect the brake pipe [2].

Remove the mounting bolts [3] and delay valve [4].



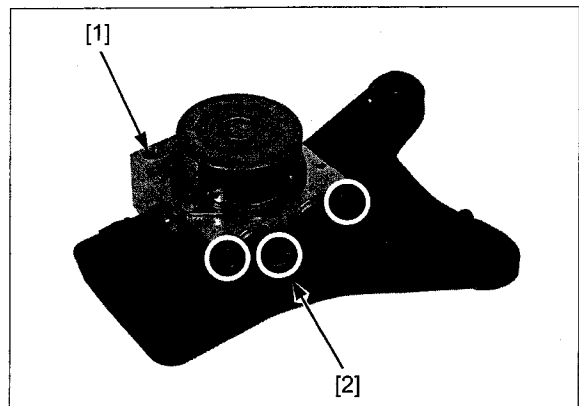
## ANTI-LOCK BRAKE SYSTEM (ABS)

Remove the modulator mounting bolts [1] and modulator [2] from the bracket.



### INSTALLATION

Install the modulator [1] to the bracket and tighten the mounting bolts [2] securely.



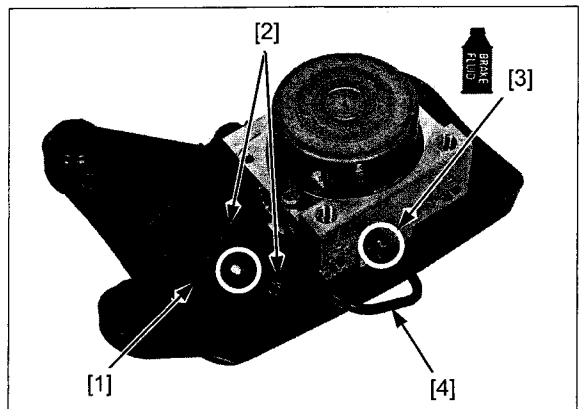
Install the delay valve [1] to the bracket and tighten mounting bolts [2] to the specified torque.

**TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)**

Apply brake fluid to the brake pipe joint nut [3] threads.

Connect the brake pipe [4] and tighten the brake pipe joint nut to the specified torque.

**TORQUE: 14 N·m (1.4 kgf·m, 10 lbf·ft)**



Install the collars [1], ABS modulator/bracket [2], washers [3] and tighten the bracket mounting bolts [4].

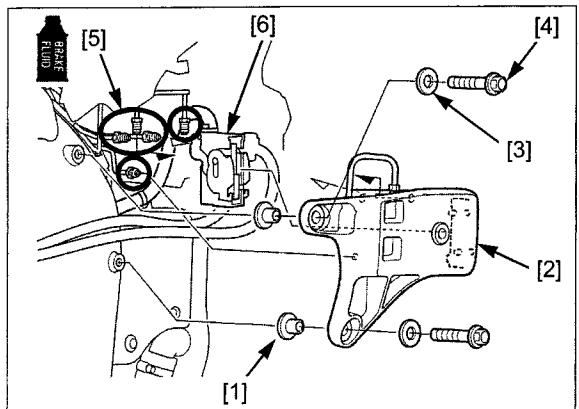
Apply brake fluid to the brake pipe joint nut threads [5].

Connect the brake pipes and tighten the brake pipe joint nuts to the specified torque.

**TORQUE: 14 N·m (1.4 kgf·m, 10 lbf·ft)**

Connect the ABS modulator 26P connector [6] and push down the lock lever.

Fill brake fluid and bleed air from the hydraulic systems (page 17-9).



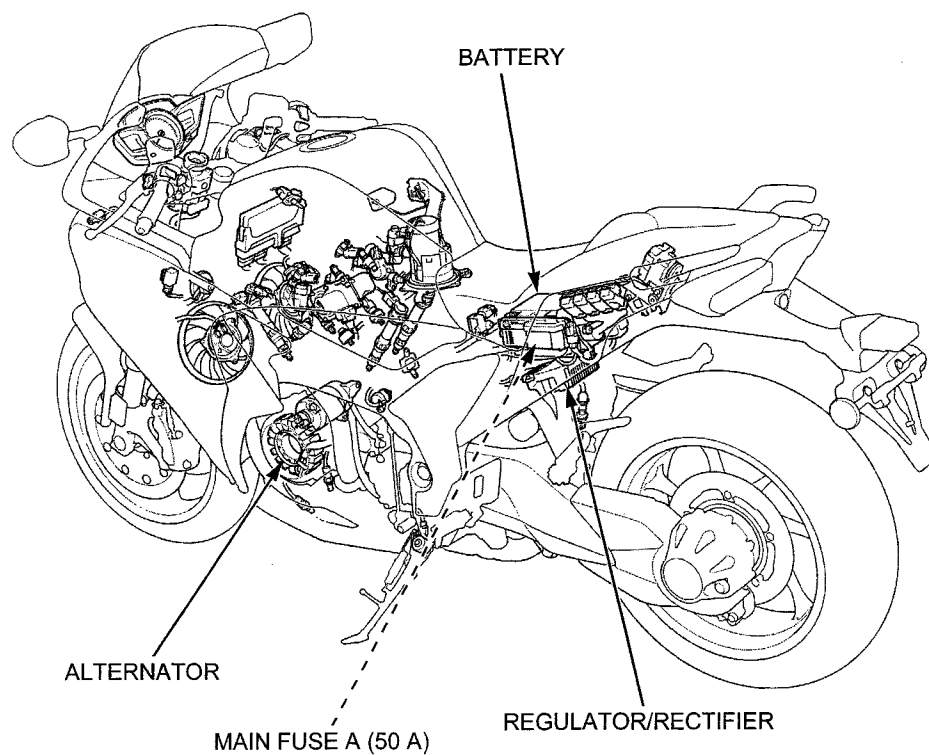
# 19. BATTERY/CHARGING SYSTEM

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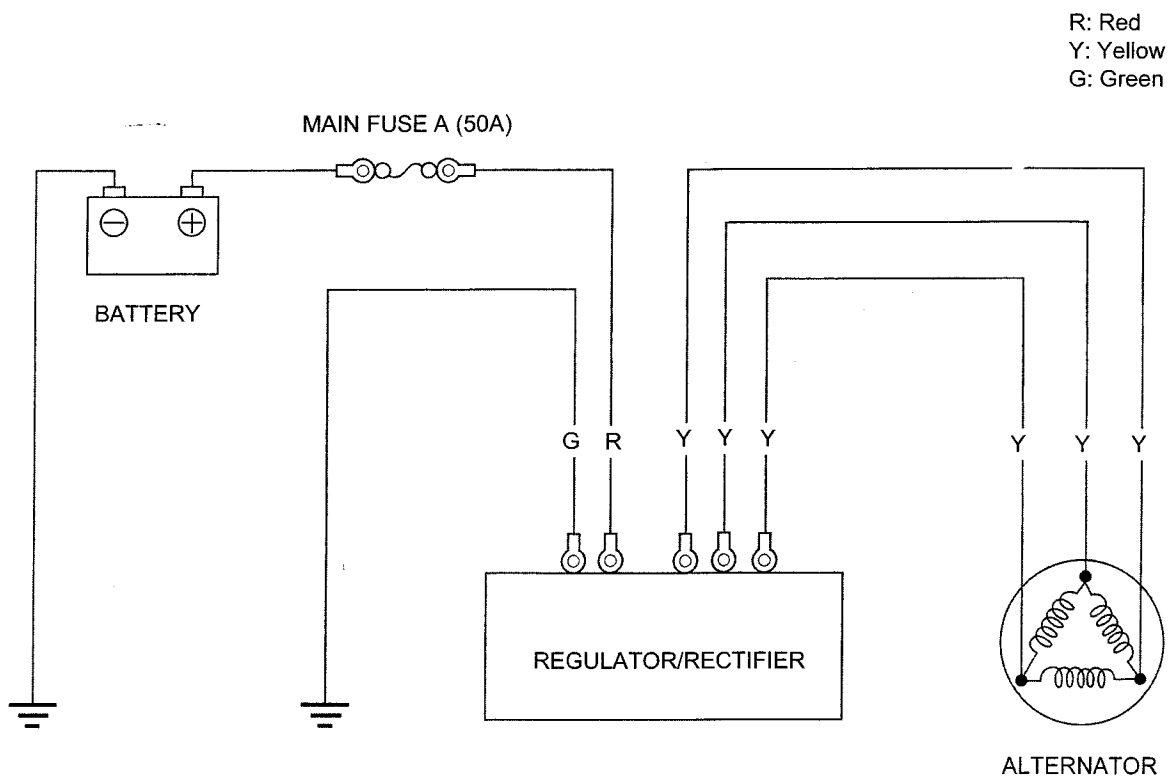
SYSTEM LOCATION.....	19-2	BATTERY.....	19-6
SYSTEM DIAGRAM .....	19-2	CHARGING SYSTEM INSPECTION .....	19-6
SERVICE INFORMATION .....	19-3	ALTERNATOR CHARGING COIL .....	19-7
TROUBLESHOOTING.....	19-5	REGULATOR/RECTIFIER .....	19-8



**SYSTEM LOCATION**



**SYSTEM DIAGRAM**



## SERVICE INFORMATION

### GENERAL

#### ⚠ 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 call your local Poison Control Center or call a physician immediately.

#### NOTICE

- Always turn OFF the ignition switch before disconnecting any electrical component.
- 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.
- The maintenance free battery must be replaced when it reaches the end of its service life.
- The battery can be damaged if overcharged or undercharged, or if left to discharge for a long period. These same conditions contribute to shortening 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 as the problem. Battery overcharge often results from problems in the battery itself, which may appear to be an overcharging 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 occurring.
- When checking the charging system, always follow the steps in the troubleshooting flow chart (page 19-5).
- For alternator removal and disassembly, refer to see 11-4.

### BATTERY CHARGING

- Turn power ON/OFF at the charger, not at the battery terminal.
- 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.
- Quick charging should only be done in an emergency; slow charging is preferred.

### BATTERY TESTING

Refer to the instructions in the Operation Manual for the recommended battery tester for details about battery testing. The recommended battery tester puts a load on the battery so that the actual battery condition can be measured.

**Recommended battery tester: Micro 404XL (U.S.A. only), BM-210 or equivalent**

## SPECIFICATIONS

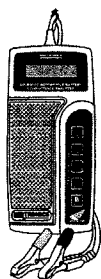
ITEM			SPECIFICATIONS
Battery	Capacity		12 V – 11.2 Ah
	Current leakage		1.2 mA max.
	Voltage (20°C/68°F)	Fully charged	13.0 – 13.2 V
		Needs charging	Below 12.3 V
	Charging current	Normal	1.1 A/5 – 10 h
		Quick	5.5 A/ h
Alternator	Capacity		0.57 kW/5,000 rpm
	Charging coil resistance (20°C/68°F)		0.1 – 1.0 Ω

## BATTERY/CHARGING SYSTEM

---

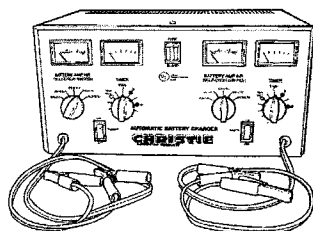
### TOOLS

Motorcycle battery analyzer  
Micro 404XL (U.S.A. only)



or BM-210 or equivalent

Christie battery charger  
MC1012/2 (U.S.A. only)



## TROUBLESHOOTING

### BATTERY IS DAMAGED OR WEAK

#### 1. BATTERY TEST

Remove the battery (page 19-6).

Check the battery condition using the recommended battery tester.

##### RECOMMENDED BATTERY TESTER:

Micro 404XL (U.S.A. only), BM-210 or equivalent

*Is the battery in good condition?*

YES – GO TO STEP 2.

NO – Faulty battery.

#### 2. CURRENT LEAKAGE TEST

Install the battery (page 19-6).

Check the battery current leakage test (page 19-6).

*Is the current leakage below 1.2 mA?*

YES – GO TO STEP 4.

NO – GO TO STEP 3.

#### 3. CURRENT LEAKAGE TEST WITHOUT REGULATOR/RECTIFIER WIRES

Disconnect the regulator/rectifier wires and recheck the battery current leakage.

*Is the current leakage below 1.2 mA?*

YES – Faulty regulator/rectifier.

NO – • Shorted wire harness.  
• Faulty ignition switch.

#### 4. ALTERNATOR CHARGING COIL INSPECTION

Check the alternator charging coil (page 19-7).

*Is the alternator charging coil resistance within 0.1 – 1.0  $\Omega$  (20 °C/68 °F)?*

YES – GO TO STEP 5.

NO – Faulty charging coil.

#### 5. CHARGING VOLTAGE INSPECTION

Measure and record the battery voltage using a digital multimeter (page 19-6).

Start the engine.

Measure the charging voltage (page 19-7).

Compare the measurement to result of the following calculation.

##### STANDARD:

Measured BV < Measured CV < 15.5 V

- BV= Battery Voltage
- CV= Charging Voltage

*Is the measured charging voltage within the standard voltage?*

YES – Faulty battery.

NO – GO TO STEP 6.

#### 6. REGULATOR/RECTIFIER SYSTEM INSPECTION

Check the continuity and resistance at the regulator/rectifier wires (page 19-8).

*Are the results of checked resistance and continuity correct?*

YES – Faulty regulator/rectifier.

NO – • Open circuit in related wire.  
• Loose or poor contacts of related terminal.  
• Shorted wire harness.

### BATTERY

#### REMOVAL/INSTALLATION

*Always turn the ignition switch OFF before removing the battery.*

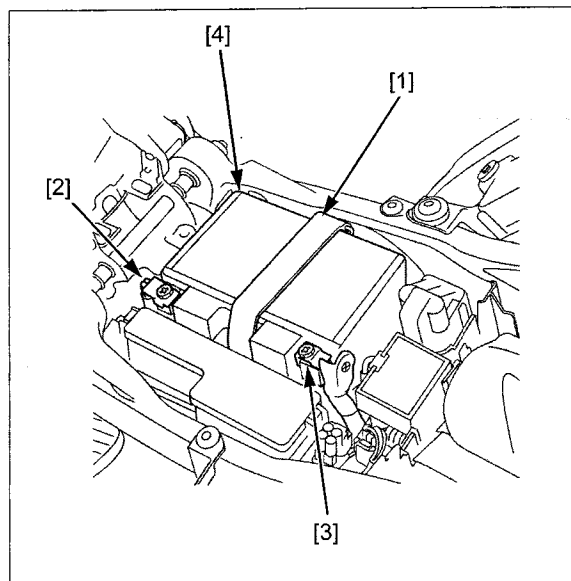
Remove the seat (page 3-4).

Remove the battery holder band [1].

Disconnect the negative cable [2] and then the positive cable [3], and remove the battery [4].

*Connect the positive terminal first and then the negative cable.*

Install the battery in the reverse order of removal with the proper wiring as shown.



#### VOLTAGE INSPECTION

Measure the battery voltage using a digital multimeter.

##### VOLTAGE:

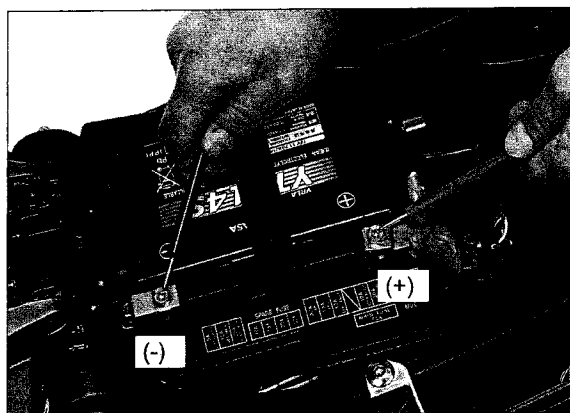
Fully charged: 13.0 – 13.2 V

Under charged: Below 12.3 V

##### TOOL:

Digital multimeter

Commercially  
available in U.S.A.



### CHARGING SYSTEM INSPECTION

#### CURRENT LEAKAGE INSPECTION

Turn the ignition switch OFF and disconnect the negative battery cable [1] from the battery.

Connect the ammeter (+) probe [2] to the negative cable and the ammeter (-) probe [3] to the battery (-) terminal [4].

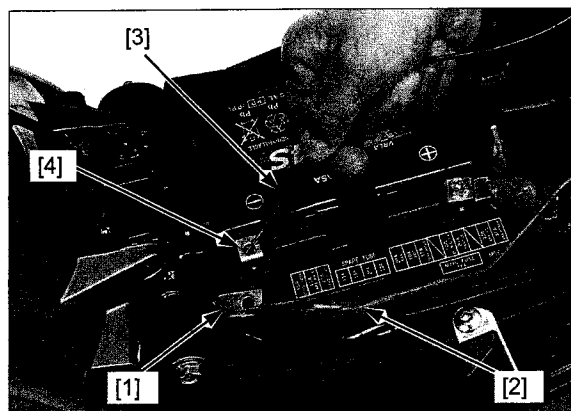
With the ignition switch off, check for current leakage.

- 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:** 1.2 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.



## CHARGING VOLTAGE INSPECTION

Be sure the battery is in good condition before performing this test.

*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.*

Warm up the engine to normal operating temperature. Stop the engine, and connect the multimeter as shown.

- To prevent a short, make absolutely certain which are the positive and negative terminals or cable.

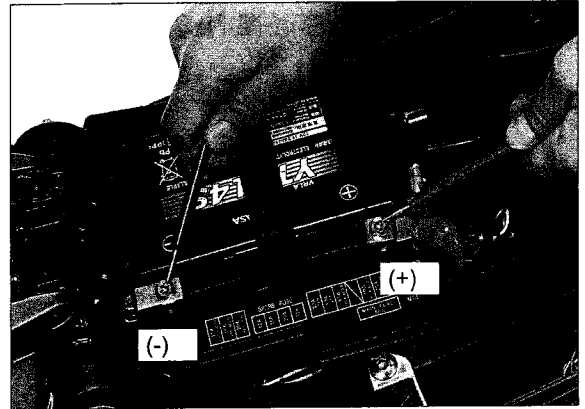
Restart the engine.

With the headlight on Hi beam, measure the voltage on the multimeter when the engine runs at 5,000 rpm.

**Standard:**

**Measured BV < Measured CV < 15.5 V**

- BV = Battery Voltage (page 19-6)
- CV = Charging Voltage



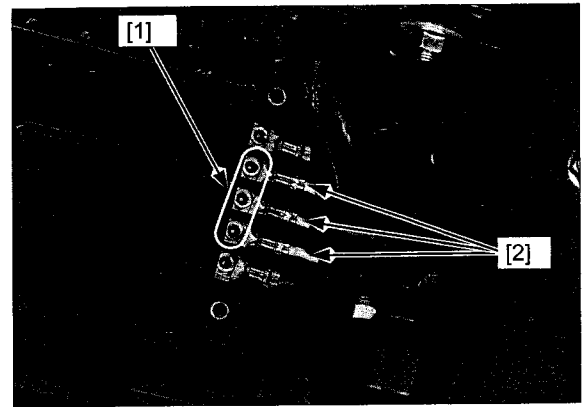
## ALTERNATOR CHARGING COIL INSPECTION

Remove the battery (page 19-6).

Remove the terminal cover (page 11-4).

*It is not necessary to remove the stator coil to conduct this test.*

Remove the socket bolts [1] and disconnect the alternator wires [2].



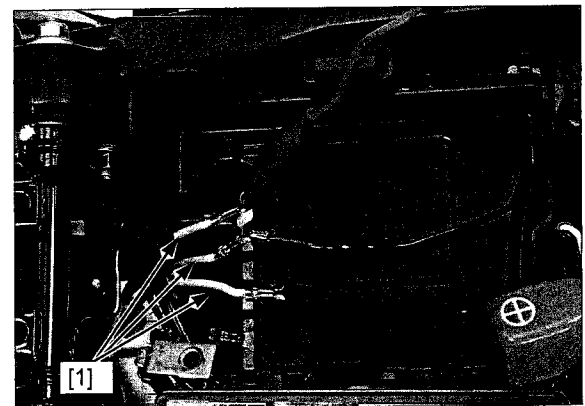
Check the resistance between all three Yellow wires [1].

**STANDARD: 0.1 – 1.0  $\Omega$  (at 20° C/68° F)**

Check for continuity between all three Yellow wires and ground.

There should be no continuity.

If readings are far beyond the standard, or if any wire has continuity to ground, replace the alternator stator (page 11-4).



## REGULATOR/RECTIFIER

### SYSTEM INSPECTION

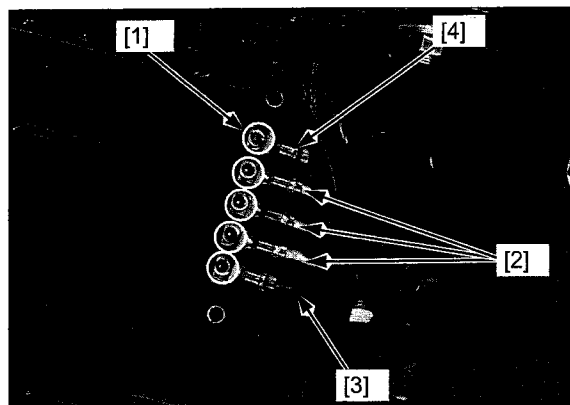
#### NOTE:

Before system inspection, check for blown the main fuse A (50 A).

Remove the battery (page 19-6).

Remove the terminal cover (page 11-4).

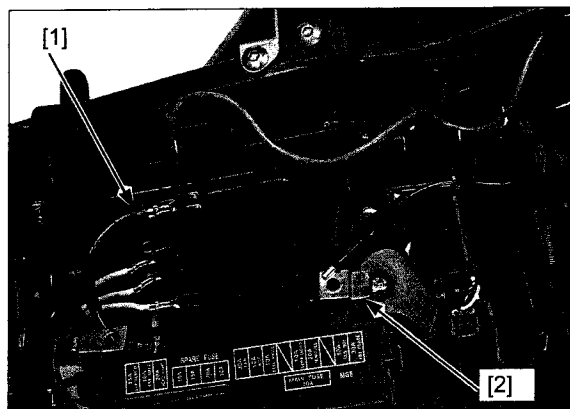
Remove the socket bolts [1] and disconnect the alternator wires [2], battery wire [3] and ground wire [4].



If the regulated voltage reading (page 19-7) is out of the specification, measure the voltage between wire terminals as follows:

Item	Terminal	Specification
Battery charging line	Red [1] and battery positive cable [2]	Continuity should exist
Charging coil line	Yellow and Yellow	0.1 – 1.0 $\Omega$ 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 wires, replace the regulator/rectifier unit.



### REMOVAL/INSTALLATION

Remove the rear fender (page 3-11).

Remove the terminal cover (page 11-4).

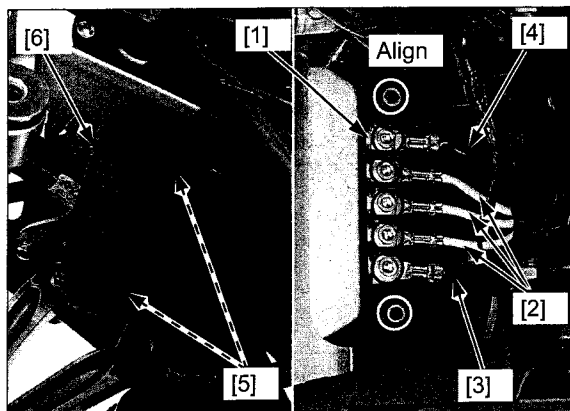
Remove the socket bolts [1] and disconnect the alternator wires [2], battery wire [3] and ground wire [4].

Remove the regulator/rectifier unit mounting bolts [5] and regulator/rectifier [6].

Install the regulator/rectifier unit in the reverse order of removal.

#### NOTE:

At installation, align the holes of the regulator/rectifier with the collars on the rear heat guard.



## 20. IGNITION SYSTEM

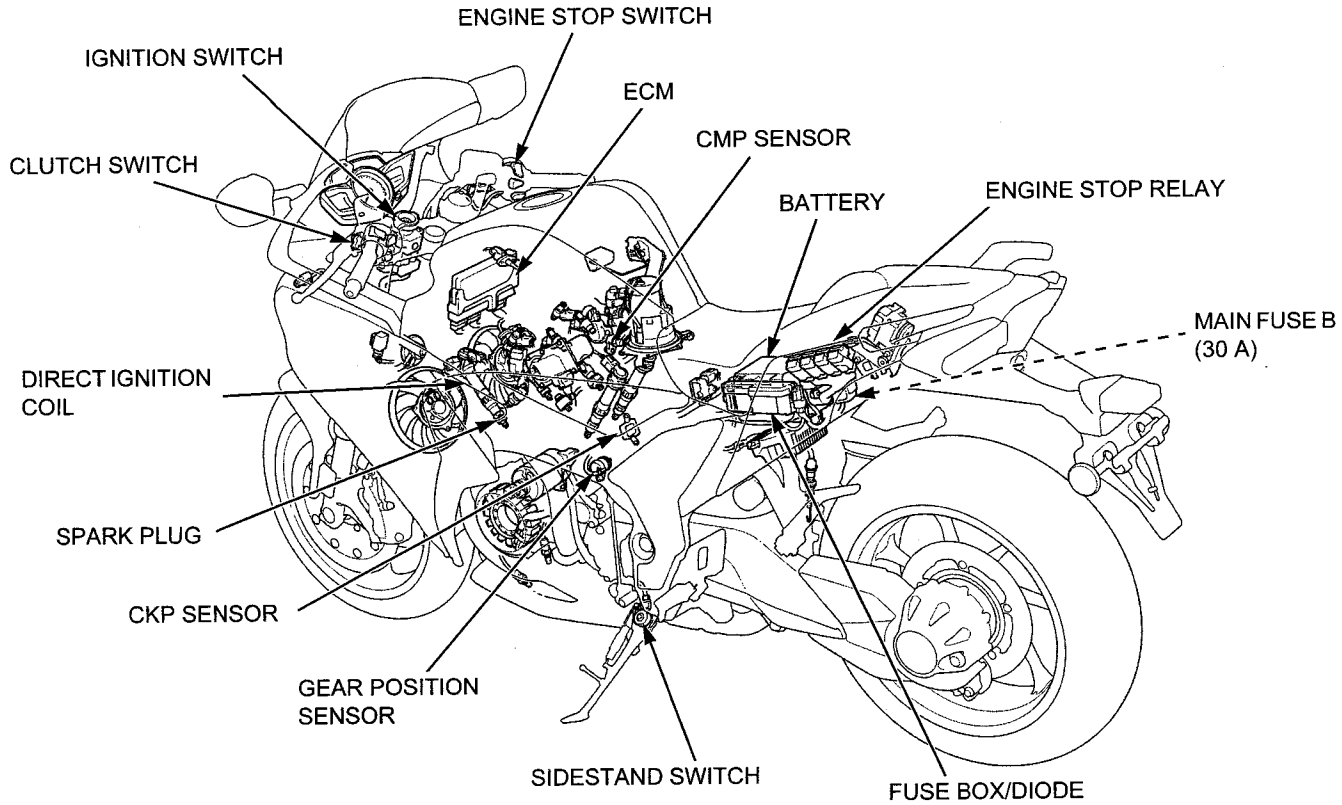
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SYSTEM LOCATION.....	20-2	IGNITION SYSTEM INSPECTION .....	20-5
SYSTEM DIAGRAM .....	20-2	CKP SENSOR .....	20-8
SERVICE INFORMATION .....	20-3	IGNITION TIMING .....	20-8
TROUBLESHOOTING.....	20-4		

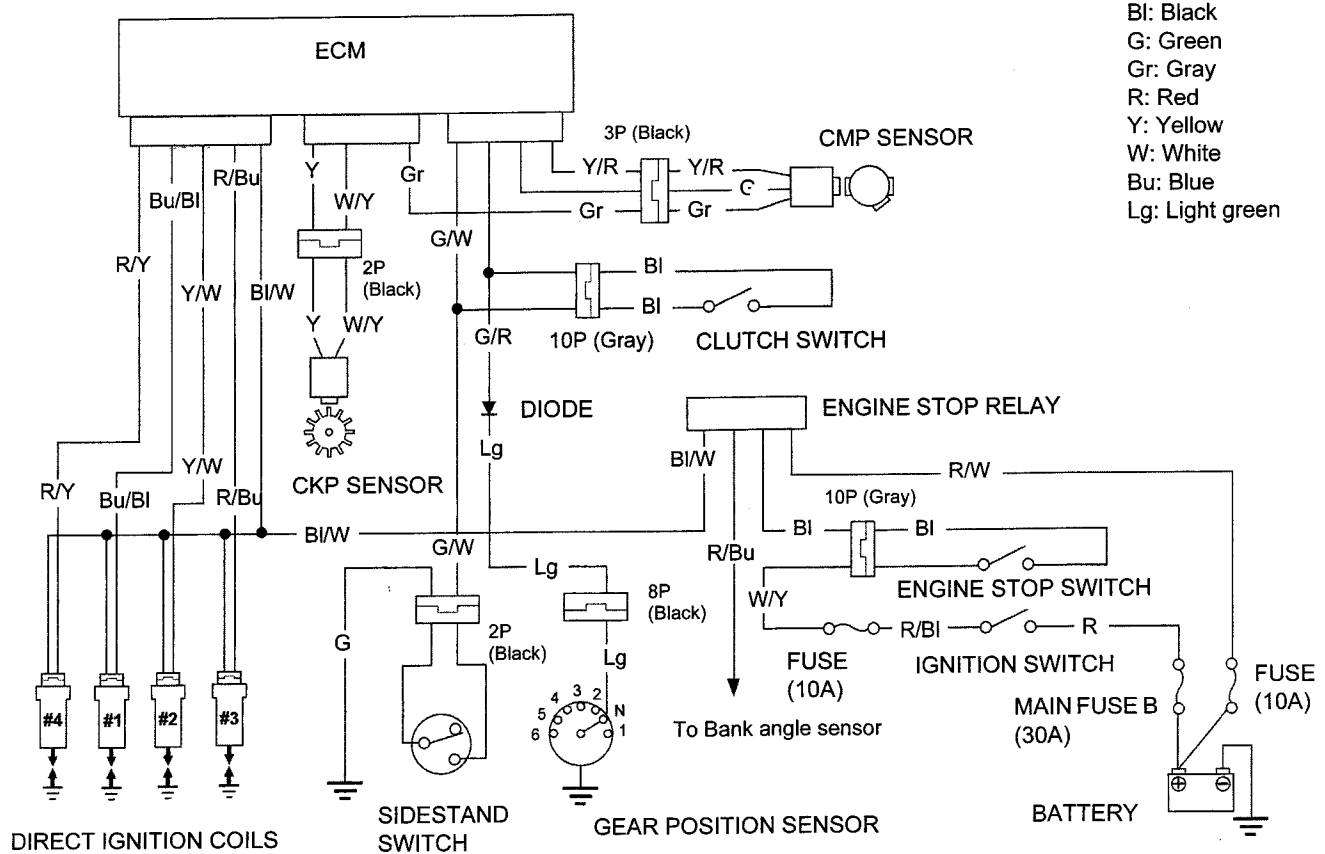


## IGNITION SYSTEM

### SYSTEM LOCATION



### SYSTEM DIAGRAM



# SERVICE INFORMATION

## GENERAL

- 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 (page 20-4).
- This motorcycle's ICM is built into the ECM.
- The ignition timing does not normally need to be adjusted since the ECM is factory preset.
- The ECM 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 plug.
- Use spark plugs of the correct heat range. Using spark plugs with an incorrect heat range can damage the engine.
- This motorcycle features direct ignition coils, where the ignition coils and spark plug caps are integrated.
- Refer to the following components information
  - CKP sensor (page 20-8)
  - Clutch switch (page 22-20)
  - ECM (page 6-84)
  - Engine stop switch (page 22-18)
  - Engine stop relay (page 6-83)
  - Gear position sensor (page 22-21)
  - Ignition switch (page 22-17)
  - Sidestand switch (page 22-22)

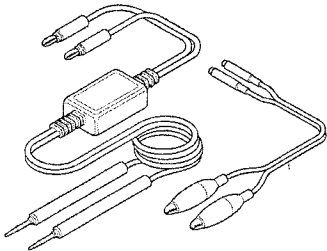
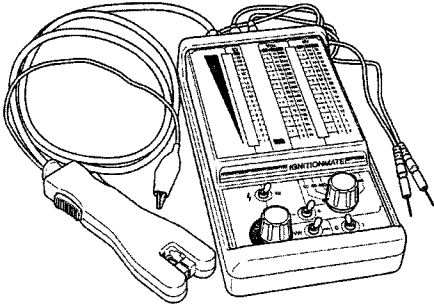
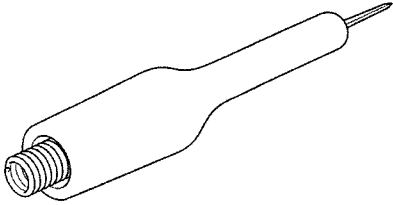
## SPECIFICATIONS

ITEM	SPECIFICATIONS
Spark plug	IMR9E-9HES (NGK)
	VUH27ES (DENSO)
Spark plug gap	0.80 – 0.90 mm (0.031 – 0.035 in)
CKP sensor peak voltage	0.7 V minimum
Ignition timing ("F"mark)	8.4° BTDC at idle

## TORQUE VALUES

Spark plug	16 N·m (1.6 kgf·m, 12 lbf·ft)	
Timing hole cap	17 N·m (1.7 kgf·m, 13 lbf·ft)	Apply grease to the threads.
CKP sensor mounting bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	Apply a locking agent to the threads.

## TOOLS

<p>Peak voltage adaptor 07HGJ-0020100 (not available in U.S.A.)</p>  <p>with commercially available digital multimeter (impedance 10 MΩ/DCV minimum)</p>	<p>IgnitionMate peak voltage tester MTP07-0286 (U.S.A. only)</p> 	<p>Test probe 07ZAJ-RDJA110</p> 
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## IGNITION SYSTEM

### TROUBLESHOOTING

- Inspect the following before diagnosing the system.
  - Faulty spark plug
  - Loose direct ignition coil and spark plug connection
  - Loose direct ignition coil connectors
  - Water got into the direct ignition coil (shorting the ignition coil secondary voltage)
- If there is no spark at one cylinder, temporarily exchange the direct ignition coil with the other good one and perform the spark test. If there is spark, the original direct ignition coil is faulty.
- "Initial voltage" of the ignition primary coil is battery voltage with the ignition switch turned ON and engine stop switch turned "O" (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 the ignition switch ON and engine stop switch turned "O" (other electrical components are normal).	<ol style="list-style-type: none"><li>1. Faulty engine stop switch.</li><li>2. Loose or poor connect of the direct ignition coil primary wire terminal, or an open circuit in primary coil (Check at the ECM connector).</li><li>3. Faulty ECM (in case when the initial voltage is normal while disconnecting ECM connector).</li></ol>
	Initial voltage is normal, but it drops down to 2 – 4 V while cranking the engine.	<ol style="list-style-type: none"><li>1. Undercharged battery.</li><li>2. An open circuit or loose connection in ECM Green/red wire.</li><li>3. An open circuit or loose connection in Blue/black, Yellow/white, Red/blue and Red/yellow wires between the direct ignition coils and ECM.</li><li>4. Faulty sidestand switch, clutch switch or gear position sensor.</li><li>5. An open circuit or loose connection in No. 4 related circuit wires.<ul style="list-style-type: none"><li>– Clutch switch line: Green/white wire</li><li>– Sidestand switch line: Green/white wire</li><li>– Gear position sensor line: Light green wire</li></ul></li><li>6. Faulty CKP sensor (measure the peak voltage).</li><li>7. Faulty ECM (in case when above No. 1 – 6 are normal).</li><li>8. Faulty direct ignition coil.</li></ol>
	Initial voltage is normal, but does not spark.	<ol style="list-style-type: none"><li>1. Faulty spark plug or leaking ignition coil secondary current ampere.</li><li>2. Faulty direct ignition coil (s).</li><li>3. Faulty CKP sensor.</li><li>4. Faulty CMP sensor.</li></ol>
CKP sensor	Peak voltage is lower than standard value.	<ol style="list-style-type: none"><li>1. The multimeter impedance is too low; below 10 M<math>\Omega</math>/DCV</li><li>2. Cranking speed is too low (battery under charged).</li><li>3. The sampling timing of the tester and measured pulse were not synchronized (system is normal if measured voltage is over the standard voltage at least once).</li><li>4. Faulty CKP sensor (in case when above No. 1 – 3 are normal).</li></ol>
	No peak voltage.	<ol style="list-style-type: none"><li>1. Faulty peak voltage adaptor.</li><li>2. Faulty CKP sensor.</li></ol>

## IGNITION SYSTEM INSPECTION

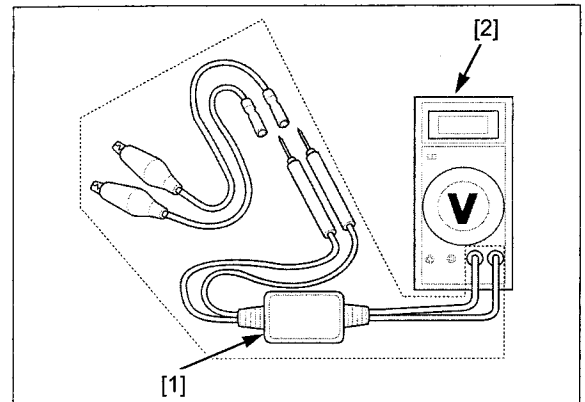
- If there is no spark at any plug, check all connections for loose or poor contact before measuring each peak voltage.
- Check all spark plug condition before measuring each peak voltage (page 4-7).
- Use the recommended digital multimeter or commercially available digital multimeter with an impedance of 10 M $\Omega$ /DCV minimum.
- The display value differs depending upon the internal impedance of the multimeter.
- If the peak voltage tester (U.S.A. only) is used, follow the manufacturer's instruction.

Connect the peak voltage tester or peak voltage adaptor [1] to the digital multimeter [2].

### TOOL:

**IgnitionMate peak voltage tester** MTP07-0286  
(U.S.A. only) or  
**Peak voltage adaptor** 07HGJ-0020100  
(Not available in U.S.A.)

with commercially available digital multimeter (impedance 10 M $\Omega$ /DCV minimum)



## IGNITION COIL INITIAL VOLTAGE

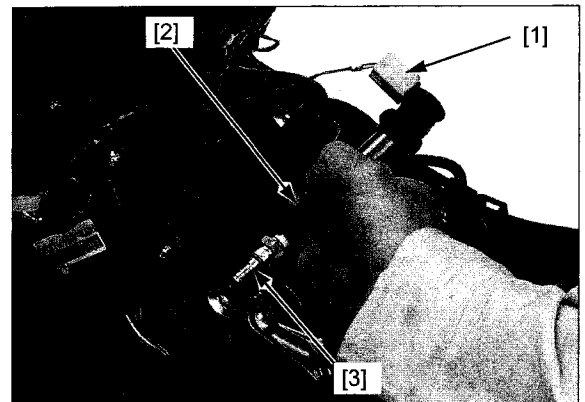
- Check all system connections before inspection. If the system is disconnected, incorrect initial voltage might be measured.
- Check cylinder compression and check that the spark plugs are installed correctly.

Disconnect the direct ignition coils from the spark plugs (page 4-7).

Connect the direct ignition coil 2P (White) connectors [1] to the direct ignition coil [2].

Shift the transmission into neutral.

Connect a known-good spark plug [3] to the direct ignition coil and ground the spark plug to the cylinder head as done in a spark test.



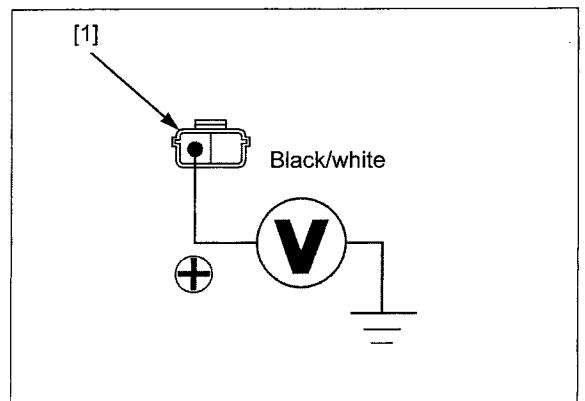
Disconnect the direct ignition coil 2P (White) connector [1].

Turn the ignition switch ON and engine stop switch "O".

Measure the initial voltage.

**Connection: Black/white (+) – Ground (–)**

**Standard: Battery voltage**



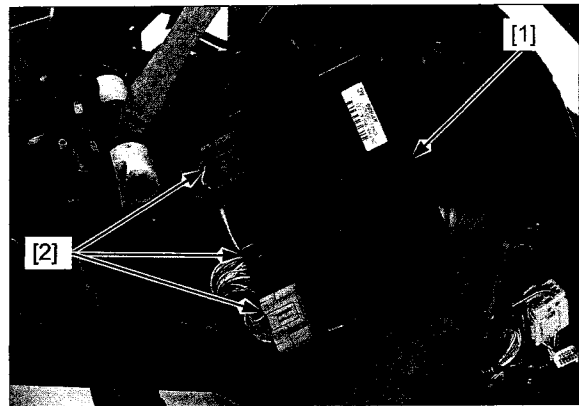
### CKP SENSOR PEAK VOLTAGE

- 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.

Lift and support the fuel tank (page 4-5).

Remove the ECM [1] from the air cleaner housing (page 6-84).

Disconnect the ECM 33P connectors [2] from the ECM.



Connect the peak voltage tester or peak voltage adaptor [1] probes to the ECM 33P (Black) connector terminal of the wire side [2].

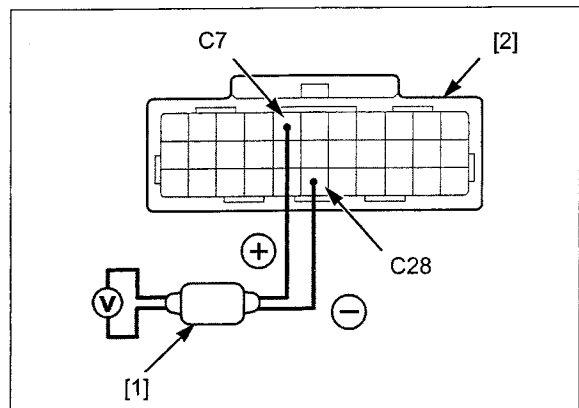
**Connection: C7 (+) – C28 (–)**

#### TOOLS:

**IgnitionMate peak voltage tester** MTP07-0286  
(U.S.A. only) or  
**Peak voltage adaptor** 07HGJ-0020100  
(Not available in  
U.S.A.)

with commercially available digital multimeter (impedance 10 M $\Omega$ /DCV minimum)

**Test probe (2 requires)** 07ZAJ-RDJA110



Crank the engine and read the peak voltage.

**Peak voltage: 0.7 V minimum**

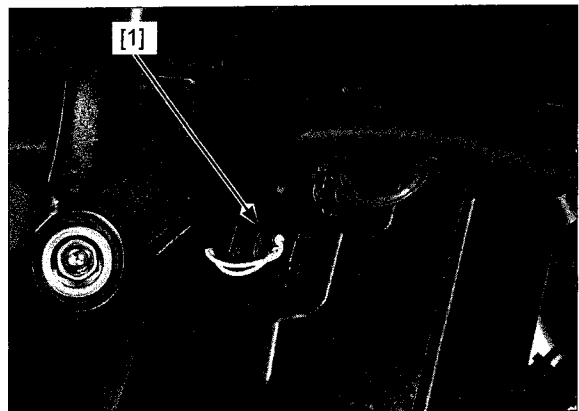
If the peak voltage measured at ECM connector is abnormal, measure the peak voltage at the CKP sensor 2P (Black) connector.

Remove the middle cowl (page 3-7).

Disconnect the CKP sensor 2P (Black) connector [1] and connect the tester probes to the terminal (Yellow and White/yellow).

In the same manner as at the ECM connector, measure the peak voltage and compare it to the voltage measured at the ECM connector.

- If the peak voltage measured at the ECM is abnormal and the one measured at the CKP sensor is normal, check the 2P (Black) connector for loose connection and the wire harness for an open circuit or loose connection.
- If both peak voltage measured are abnormal, check each item in the troubleshooting chart (page 20-4). If all items are normal, the CKP sensor is faulty. For CKP sensor replacement (page 20-8).



## CMP SENSOR INSPECTION

### SYSTEM INSPECTION

Remove the throttle body (page 6-71).

Disconnect the CMP sensor 3P (Black) connector [1].

Turn the ignition switch ON and engine stop switch "O".

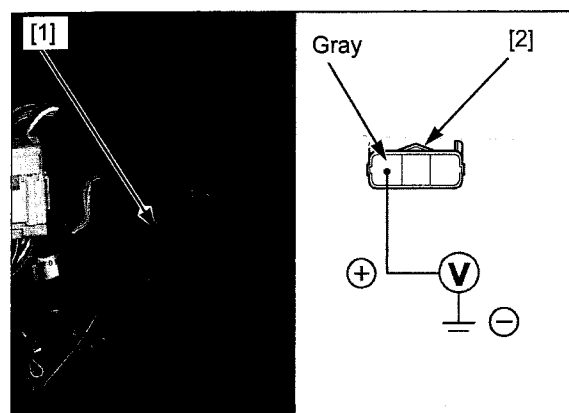
Measure the voltage at the CMP sensor 3P (Black) connector wire harness side [2].

**Connection:** Gray (+) – Ground (–)

**Standard:** 4.75 – 5.25 V

If there is specification, check the input voltage inspection (page 20-7).

If there is out of specification, check the signal line inspection (page 20-7).



### INPUT VOLTAGE INSPECTION

Disconnect the CMP 3P (Black) connector.

Turn the ignition switch ON and engine stop switch "O".

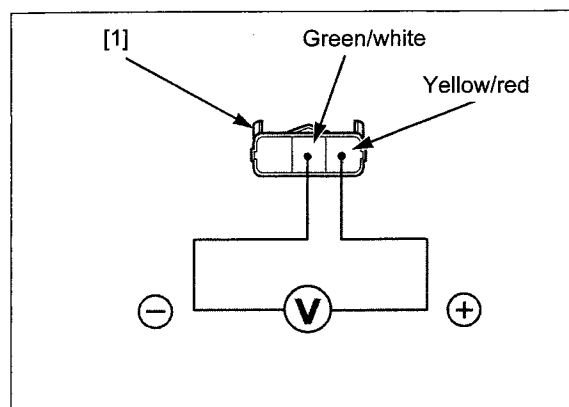
Measure the voltage at the CMP sensor 3P (Black) connector wire harness side [1].

**Connection:** Yellow/red (+) – Green/white (–)

**Standard:** 4.75 – 5.25 V

If it is within specification, replace the CMP sensor (page 6-80).

If it is not within specification, replace the main wire harness.



### SIGNAL LINE INSPECTION

Turn the ignition switch OFF.

Disconnect the ECM 33P (Black) connector.

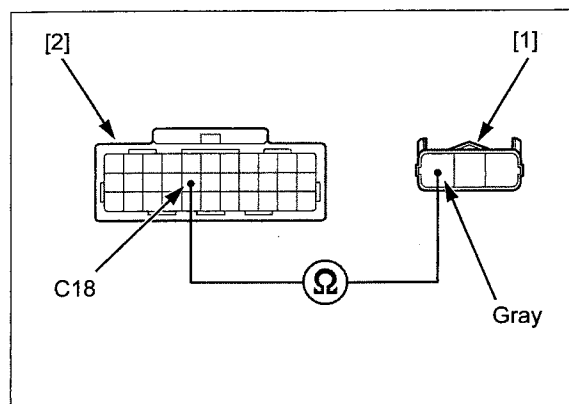
Check for continuity between the CMP 3P (Black) connector wire harness side [1] and ECM 33P (Black) connector wire harness side [2].

**Connection:** C18 – Gray

**Standard:** Continuity

If there is continuity, replace the ECM with a new one.

If there is no continuity, replace the main wire harness.



## IGNITION SYSTEM

### CKP SENSOR

#### REMOVAL/INSTALLATION

Remove the right middle cowl (page 3-7).

Disconnect the CKP sensor 2P (Black) connector [1].

Remove the CKP sensor wire from the clip on the frame.



Remove the right crankcase cover (page 10-13).

Remove the CKP sensor mounting bolts [1].

Release the wire grommet [2] from the right crankcase cover groove, then remove the CKP sensor [3].

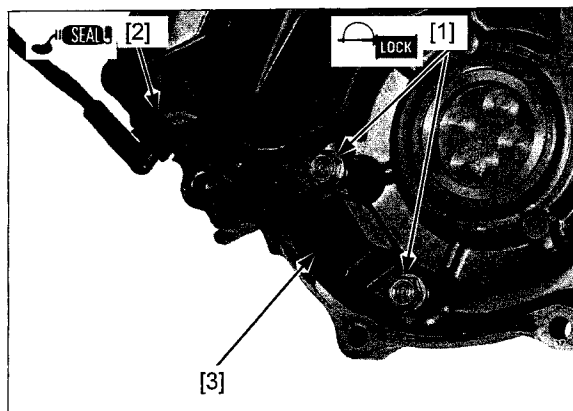
Apply sealant (ThreeBond 1211, 1207B or equivalent) to the grommet, then install it into the groove of the cover.

Apply a locking agent the CKP sensor mounting bolt threads.

Tighten the CKP sensor mounting bolts to the specified torque.

**TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)**

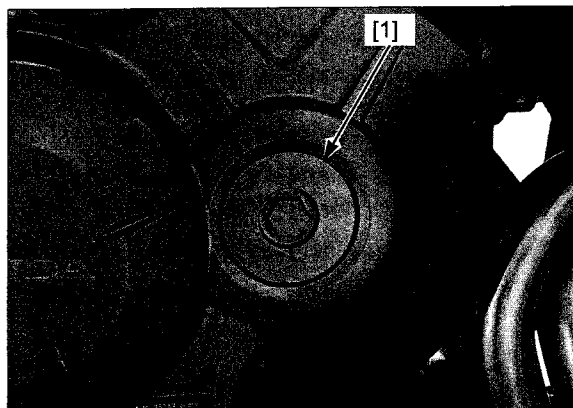
Installation is in the reverse order of removal.



### IGNITION TIMING

Warm up the engine.

Stop the engine and remove the timing hole cap [1].



*Read the instructions for timing light operation.*

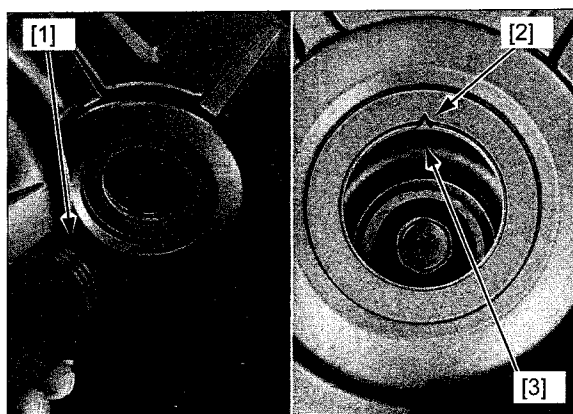
Connect the timing light [1] to the No.1 direct ignition coil wire.

Start the engine and let it idle.

**IDLE SPEED: 1,150 ± 100 rpm**

The ignition timing is correct if the index mark [2] on the right crankcase cover aligns the "F" mark [3] on the CKP sensor rotor as shown.

Increase the engine speed by turning the throttle grip and make sure the "F" mark begins to move counterclockwise when the engine speeds at approximately 2,400 rpm.

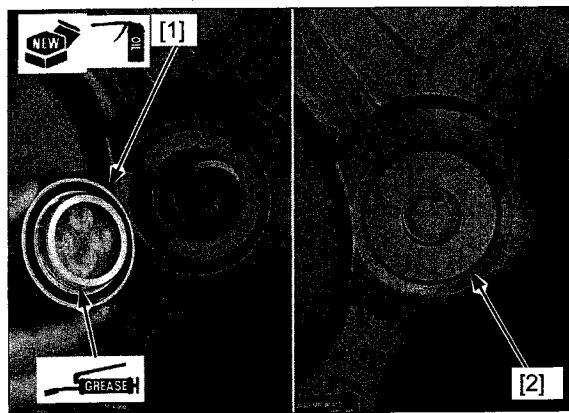


Apply engine oil to a new O-ring [1] and install it to the crankshaft hole cap [2].

Apply grease to the timing hole cap threads.

Tighten the timing hole cap to the specified torque.

**TORQUE: 17 N·m (1.7 kgf·m, 13 lbf·ft)**





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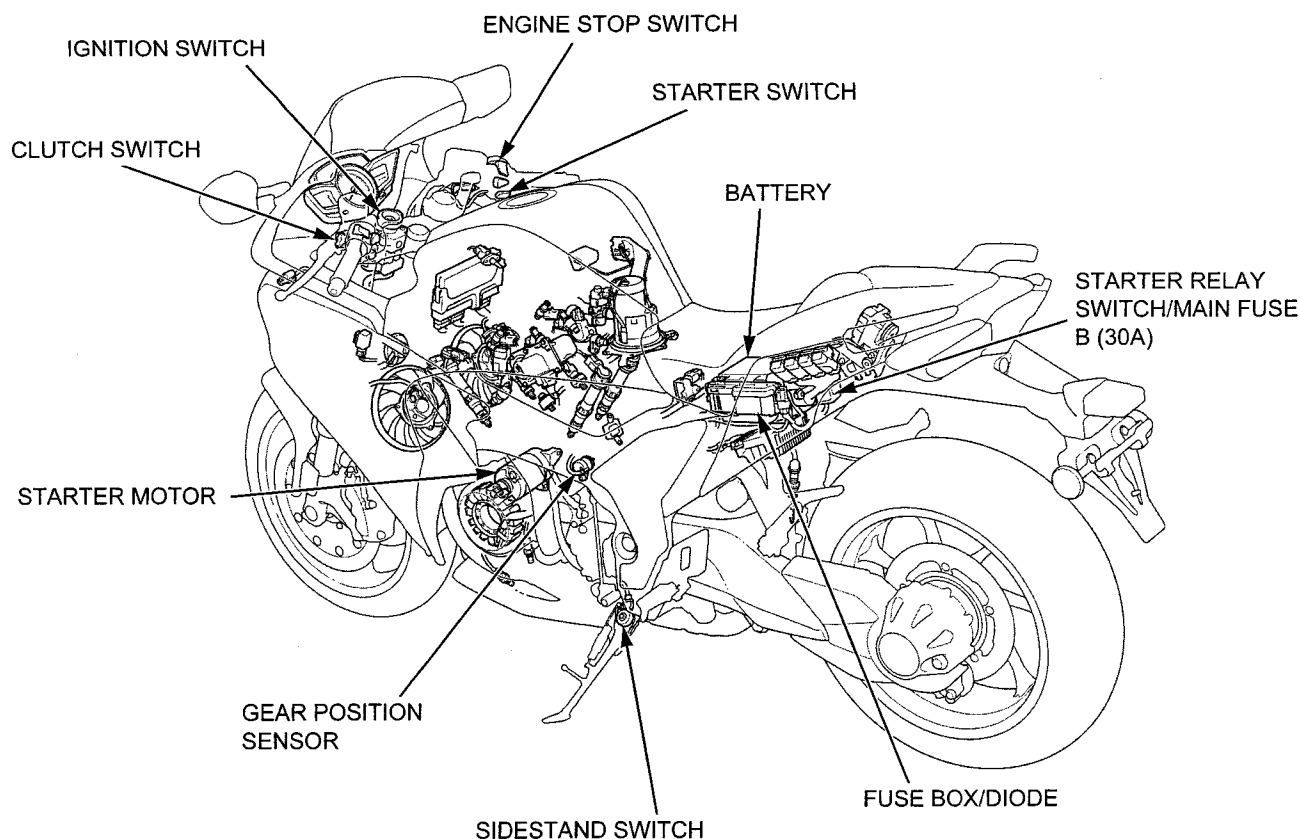
# MEMO

# 21. ELECTRIC STARTER

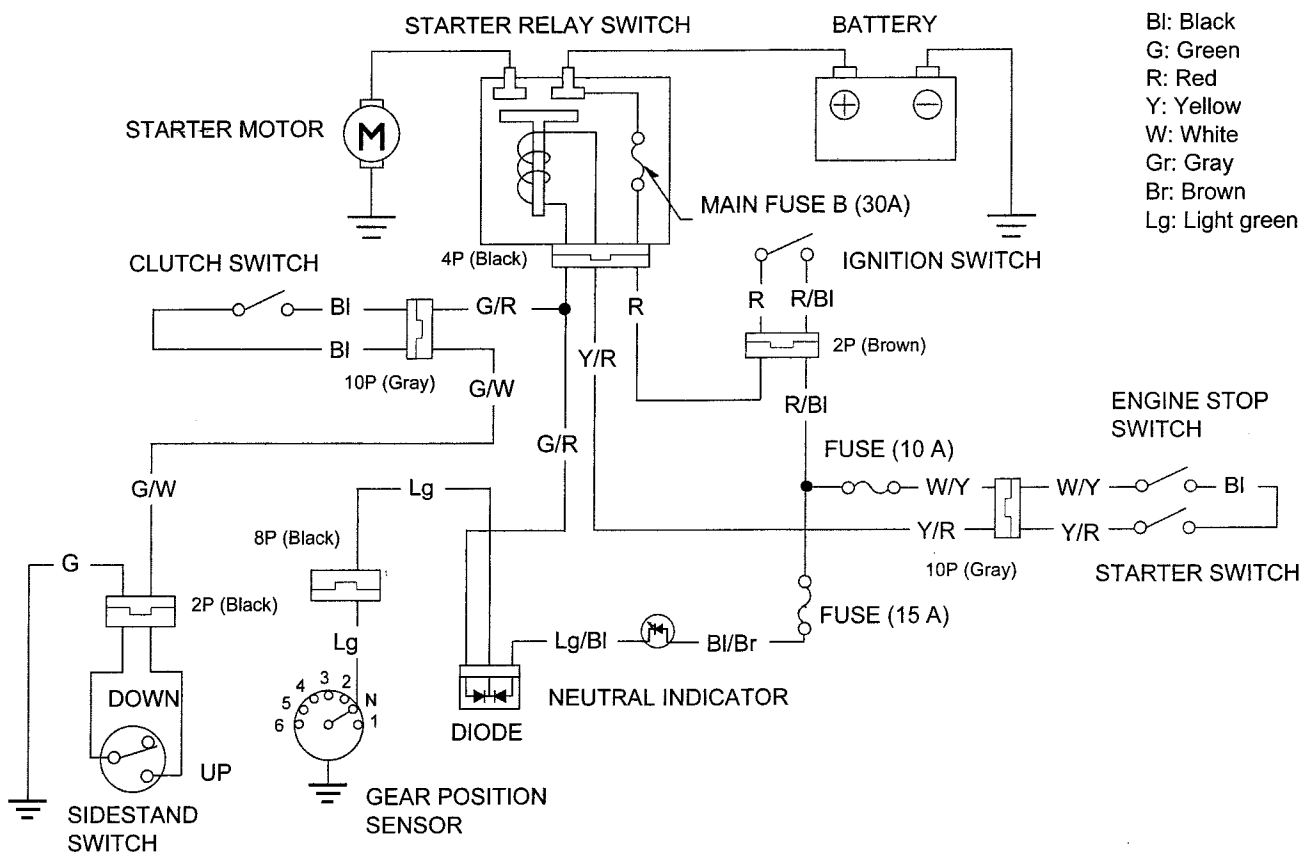
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SYSTEM LOCATION.....	21-2	STARTER MOTOR .....	21-6
SYSTEM DIAGRAM .....	21-2	STARTER RELAY SWITCH .....	21-13
SERVICE INFORMATION .....	21-3	DIODE .....	21-15
TROUBLESHOOTING.....	21-4		

# ELECTRIC STARTER SYSTEM LOCATION



## SYSTEM DIAGRAM



## SERVICE INFORMATION

### GENERAL

- Always turn the ignition switch OFF before servicing the starter motor. The motor could suddenly start, causing serious injury.
- When checking the starter system, always follow the steps in the troubleshooting flow chart (page 21-4).
- A weak battery may be unable to turn the starter motor quickly enough, or supply adequate ignition current.
- If the current is kept flowing through the starter motor to turn it while the engine is not cranking over, the starter motor may be damaged.
- Refer to the following components information.
  - Clutch switch (page 22-20)
  - Engine stop switch (page 22-18)
  - Gear position sensor (page 22-21)
  - Ignition switch (page 22-17)
  - Sidestand switch (page 22-22)
  - Starter switch (page 22-18)

### SPECIFICATIONS

Unit: mm (in)

ITEM	STANDARD	SERVICE LIMIT
Starter motor brush length	12.0 (0.47)	6.5 (0.26)

### TORQUE VALUE

Starter motor cable nut	10 N·m (1.0 kgf·m, 7 lbf·ft)
Starter motor terminal nut	12 N·m (1.2 kgf·m, 9 lbf·ft)
Negative brush mounting screw	3.7 N·m (0.4 kgf·m, 2.7 lbf·ft)
Starter motor case bolt	4.9 N·m (0.5 kgf·m, 3.6 lbf·ft)

# TROUBLESHOOTING

### **Starter motor does not turn**

#### **1. Fuse Inspection**

Check for blown main fuse B (30 A) or sub fuses (Bank angle 10 A, Stop/tail/meter 15 A).

##### ***Is the fuse blown?***

**YES** – Replace the fuse.

**NO** – GO TO STEP 2.

#### **2. Battery Inspection**

Make sure the battery is fully charged and in good condition.

##### ***Is the battery in good condition?***

**YES** – GO TO STEP 3.

**NO** – Charge or replace the battery (page 19-6).

#### **3. Starter Relay Switch Operation**

Check the starter relay switch operation.

You should hear the relay "CLICK" when the starter switch button is depressed.

##### ***Does the relay "CLICK"?***

**YES** – GO TO STEP 4.

**NO** – GO TO STEP 5.

#### **4. Starter Motor Inspection**

Apply battery voltage to the starter motor directly and check the operation.

##### ***Does the starter motor turn?***

**YES** – • Poorly connected starter motor cable.  
• Faulty starter relay switch (page 21-13).

**NO** – Faulty starter motor (page 21-6).

#### **5. Relay Coil Ground Wire Lines Inspection**

Check the ground line of the starter relay switch (page 21-14).

1. Green/red terminal – diode – gear position sensor line (with the transmission in neutral and clutch lever released).
2. Green/red terminal/clutch switch – sidestand switch line (in any gear except neutral, and with the clutch lever pulled in and the sidestand up).

##### ***Is the ground line normal?***

**YES** – GO TO STEP 6.

**NO** – • Faulty gear position sensor (page 22-21).  
• Faulty diode (page 21-15).  
• Faulty clutch switch (page 22-20).  
• Faulty sidestand switch (page 22-22).  
• Loose or poor contact connector.  
• Open circuit in wire harness.

#### **6. Relay Coil Power Input Line Inspection**

Check the power input line of the starter relay switch (page 21-14).

##### ***Is the power input line normal?***

**YES** – GO TO STEP 7.

**NO** – • Faulty ignition switch (page 22-17).  
• Faulty engine stop switch (page 22-18).  
• Faulty starter switch (page 22-18).  
• Blown main or sub-fuse.  
• Loose or poor contact connector.  
• Open circuit in wire harness.

**7. Starter Relay Switch Continuity Inspection**

Check the starter relay switch operation (page 21-14).

**Is there battery voltage?**

**YES** – Loose or poor contact starter relay switch connector.

**NO** – Faulty starter relay switch.

**The starter motor turns when the transmission is in neutral, but does not turn with the transmission in any position except neutral, with the sidestand up and the clutch lever pulled in.**

**1. Clutch Switch Inspection**

Check the clutch switch operation.

**Is the clutch switch operation normal?**

**YES** – GO TO STEP 2.

**NO** – Faulty clutch switch (page 10-8).

**2. Sidestand Switch Inspection**

Check the sidestand switch operation.

**Is the sidestand switch operation normal?**

**YES** – • Open circuit in wire harness.  
• Loose or poor contact connector.

**NO** – Faulty sidestand switch (page 22-22).

**Starter 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

Remove the oil cooler (page 5-13).

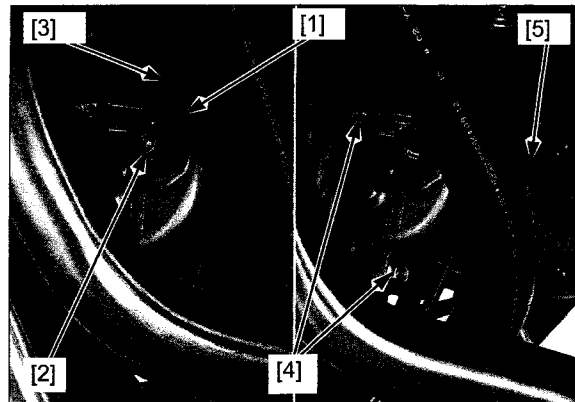
Disconnect the battery negative (–) terminal (page 19-6).

Remove the rubber cap [1].

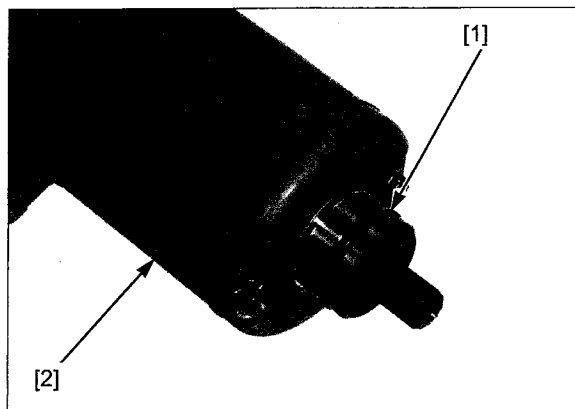
Remove the starter motor cable nut [2] and the starter motor cable [3] from the starter motor.

Remove the starter motor mounting bolts [4].

Pull the starter motor [5] out of the crankcase.



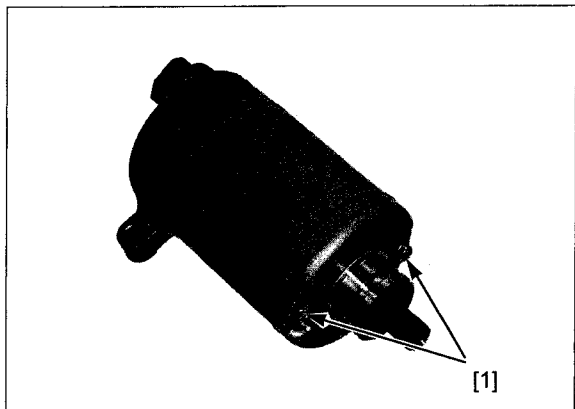
Remove the O-ring [1] from the starter motor [2].



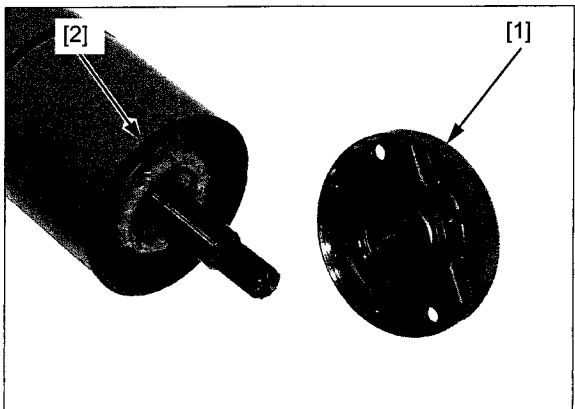
### DISASSEMBLY

Remove the following:

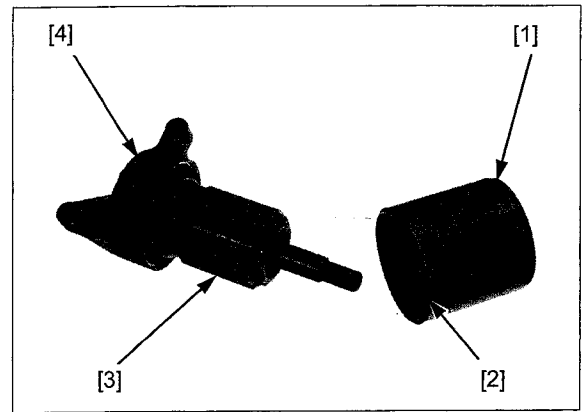
- starter motor case bolts/O-rings [1]



- front cover [1]
- seal ring [2]

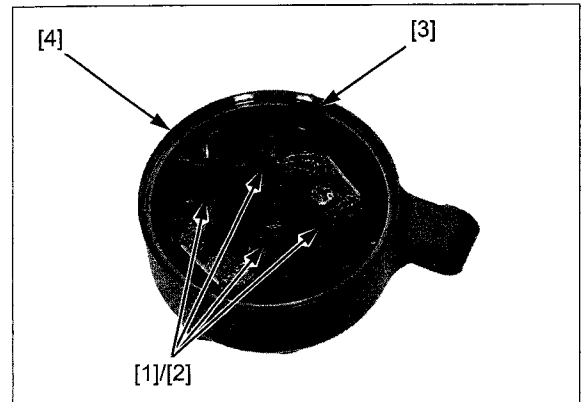


- starter motor case [1]
- seal ring [2]
- armature [3]
- rear cover [4]



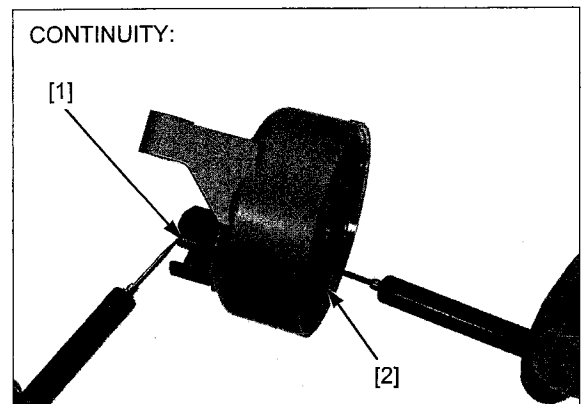
Remove the brushes [1] and springs [2] from the brush holder.

Remove the stopper [3] from the rear cover [4].



Check for continuity between the starter motor cable terminal [1] and positive brushes [2].

There should be continuity.

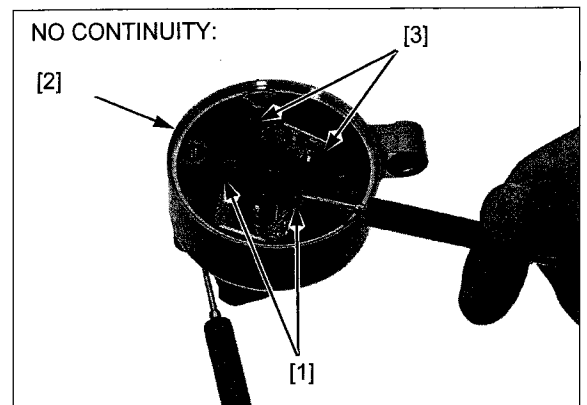


Check for continuity between the positive brushes [1] and the rear cover [2].

There should be no continuity.

Check for continuity between the positive and negative brushes [3].

There should be no continuity.

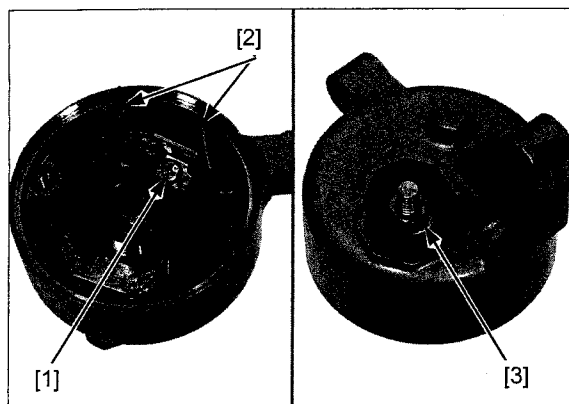




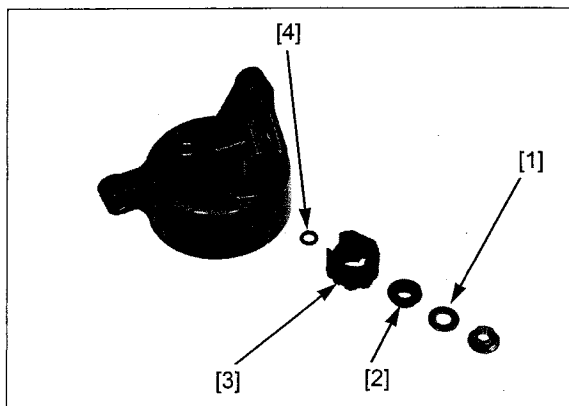
## ELECTRIC STARTER

Remove the following:

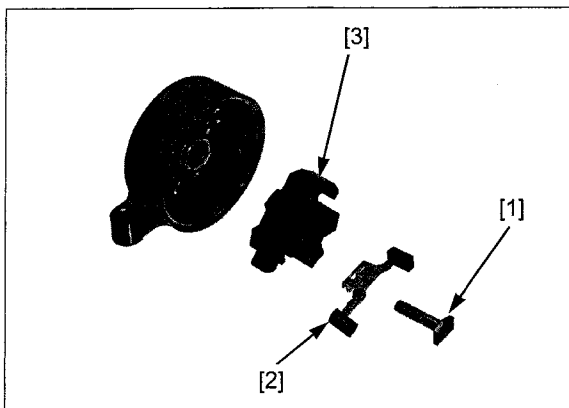
- screw [1]
- negative brushes [2]
- terminal nut [3]



- washer [1]
- insulator [2]
- terminal stopper [3]
- O-ring [4]



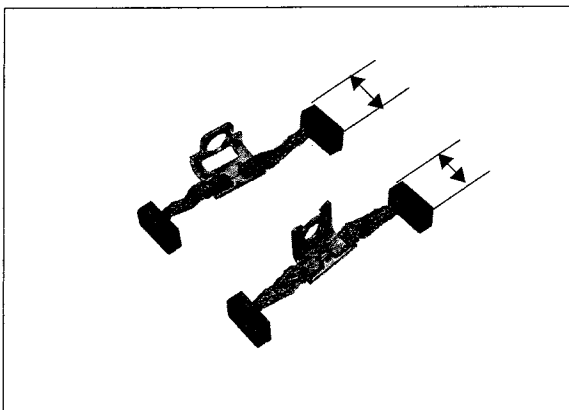
- terminal bolt [1]
- positive brushes [2]
- brush holder [3]



### INSPECTION

Inspect the brushes for damage and measure the brush length.

**SERVICE LIMIT: 6.5 mm (0.26 in)**



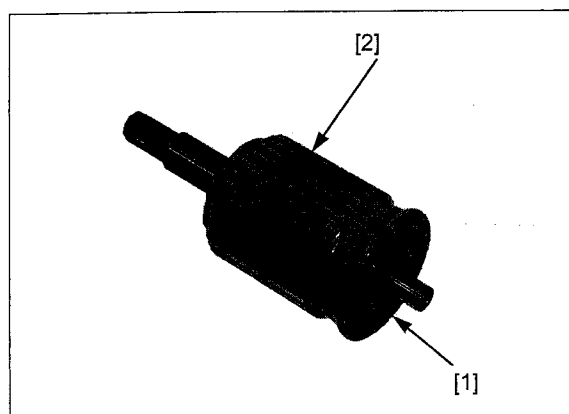
Check the commutator bars [1] for damage or abnormal wear.

*Do not use emery or sandpaper on the commutator.*

Check the commutator bars of the armature [2] for discoloration.

Clean any metal debris from between commutator bars.

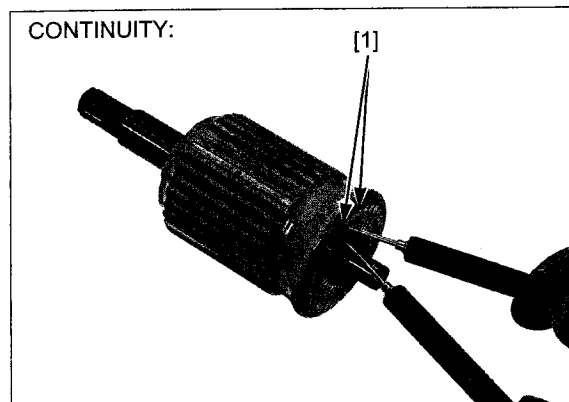
Replace the armature with a new one if necessary.



Check for continuity between pairs of commutator bars [1].

There should be continuity.

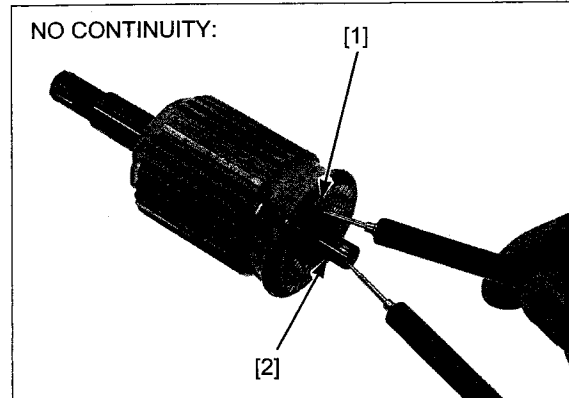
CONTINUITY:



Check for continuity between each commutator bar [1] and the armature shaft [2].

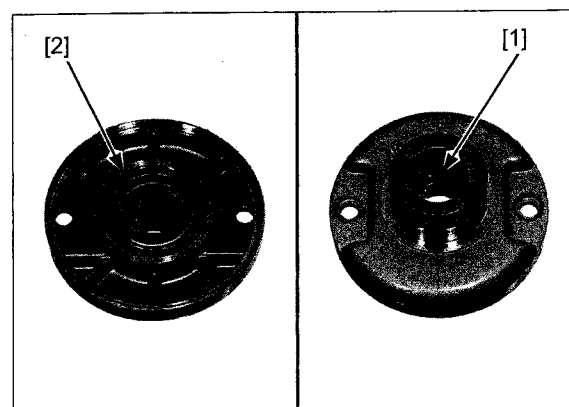
There should be no continuity.

NO CONTINUITY:



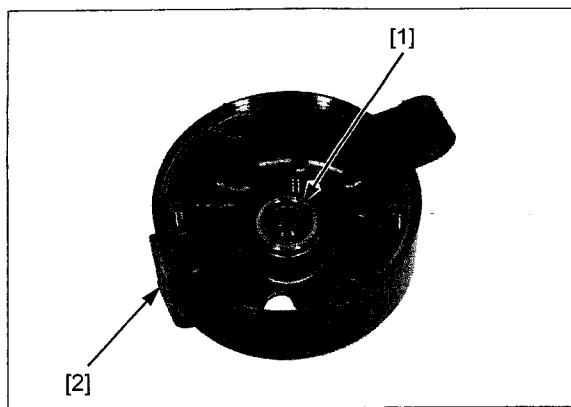
Check the oil seal [1] and ball bearing [2] in the front cover for deterioration, wear or damage.

Check the ball bearing rotates smoothly.

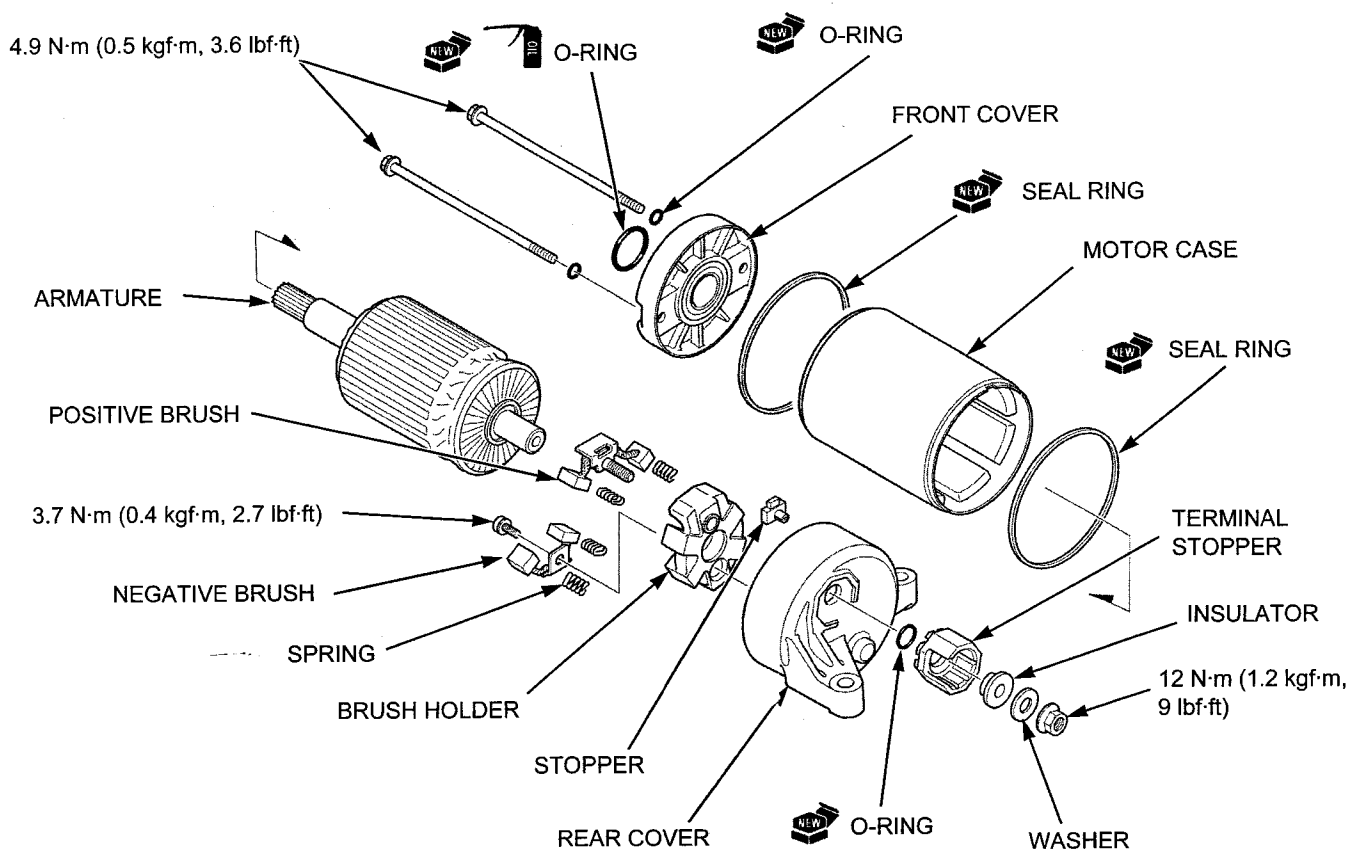


## ELECTRIC STARTER

Check the bushing [1] in the rear cover [2] for wear or damage.

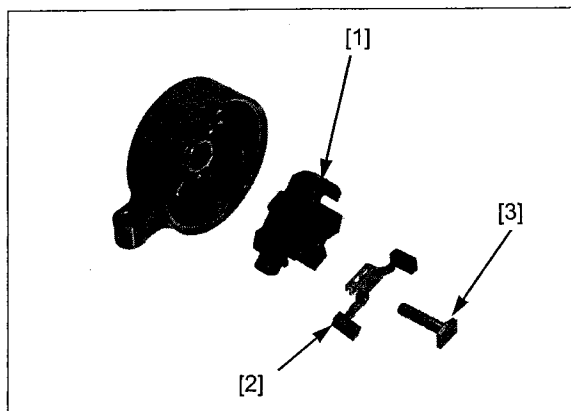


### ASSEMBLY

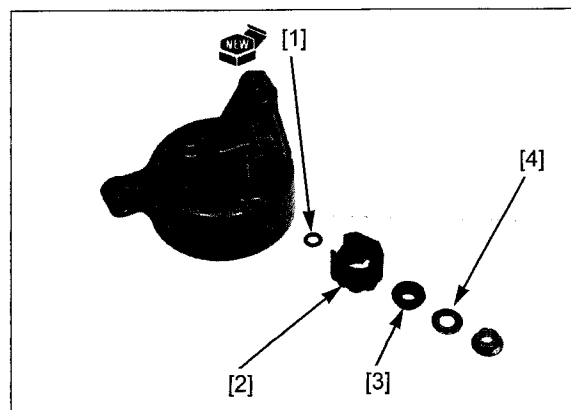


Install the following:

- brush holder [1]
- positive brushes [2]
- terminal bolt [3]

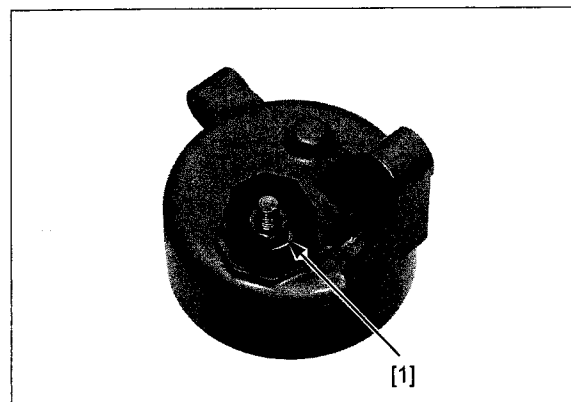


- new O-ring [1]
- terminal stopper [2]
- insulator [3]
- washer [4]



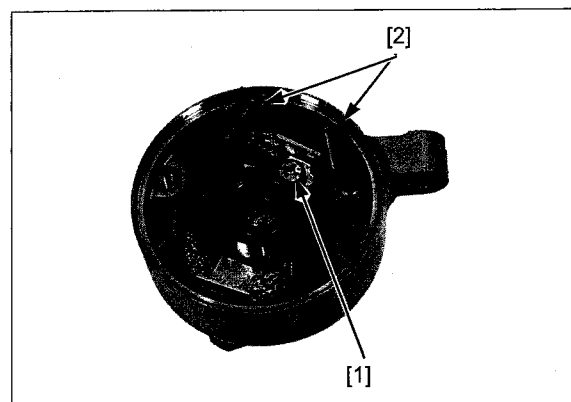
Install and tighten the terminal nut [1] to the specified torque.

**TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)**

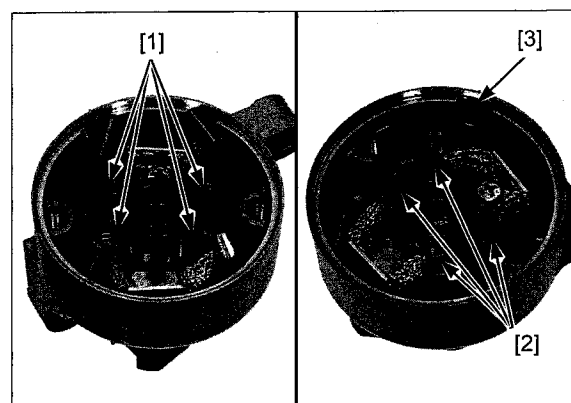


Install the negative brushes [1] and tighten the screw [2] to the specified torque.

**TORQUE: 3.7 N·m (0.4 kgf·m, 2.7 lbf·ft)**

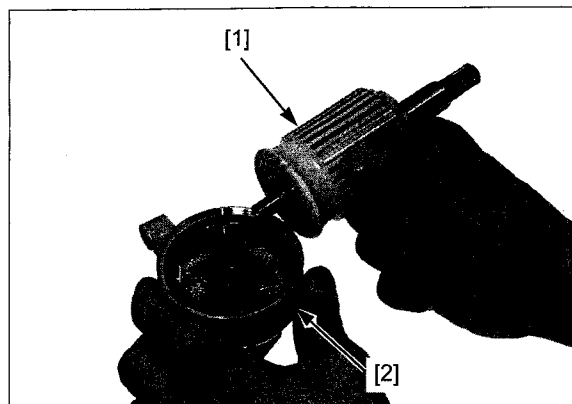


Install the brush springs [1] to the brush holder grooves.  
Install the brushes [2] to the brush holder.  
Install the stopper [3] to the rear cover.



## ELECTRIC STARTER

Install the armature [1] to the rear cover [2].

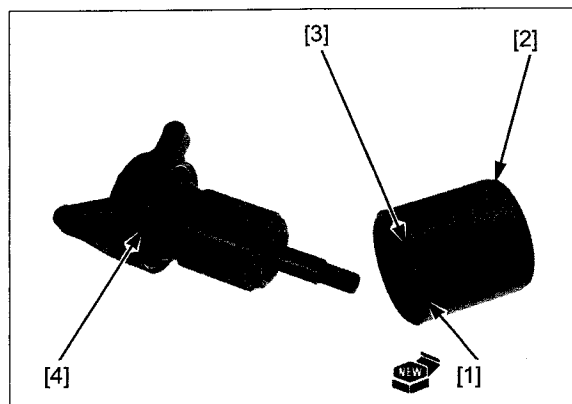


Install a new seal ring [1] onto the starter motor case [2].

Install the starter motor case with its groove [3] to the stopper [4] on the rear cover.

### NOTICE

*The coil may be damaged if the magnet pulls the armature against the case.*

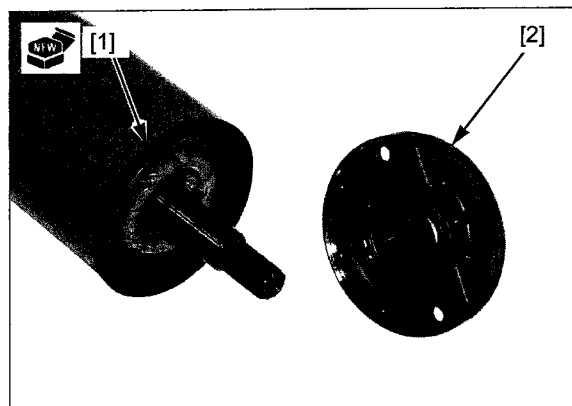


Install a new seal ring [1] onto the starter motor case.

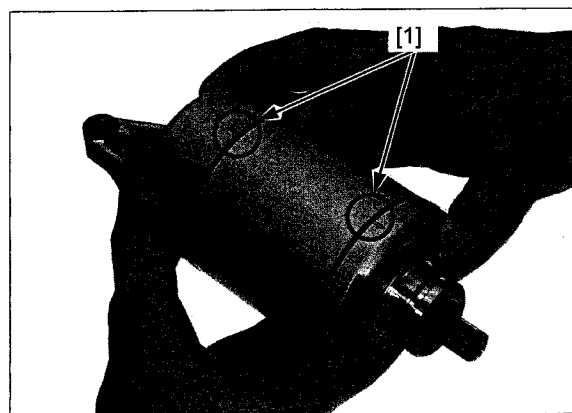
Install the front cover [2] to the starter motor case.

### NOTICE

*When installing the front cover, take care to prevent damaging the dust seal lip with the armature shaft.*



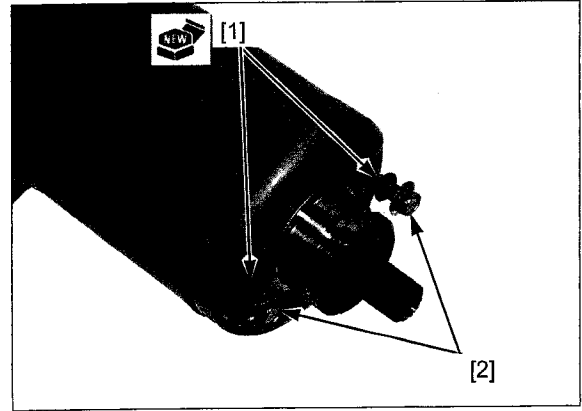
Align the index marks [1] on the front cover, starter motor case and rear cover.



Install new O-rings [1] to the starter motor case bolts [2].

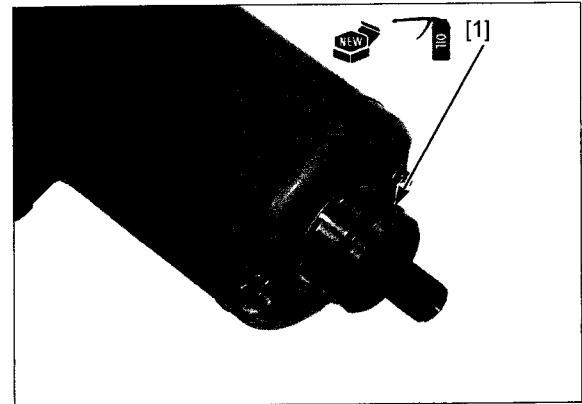
Install and tighten the starter motor case bolts to the specified torque.

**TORQUE: 4.9 N·m (0.5 kgf·m, 3.6 lbf·ft)**



## INSTALLATION

Coat a new O-ring [1] with engine oil and install it into the starter motor groove.



Install the starter motor [1] into the crankcase. Install and tighten the starter motor mounting bolts [2] securely.

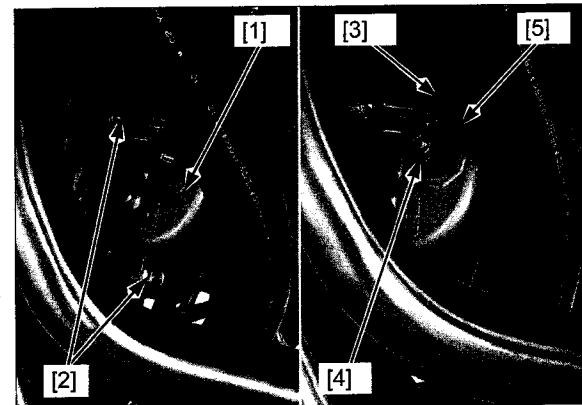
Route the starter motor cable [3].

Install the starter motor cable, then tighten the cable nut [4] to the specified torque.

**TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)**

Install the rubber cap [5] securely.

Install the removed parts in the reverse order of removal.



## STARTER RELAY SWITCH

### OPERATION INSPECTION

Remove the seat (page 3-4).

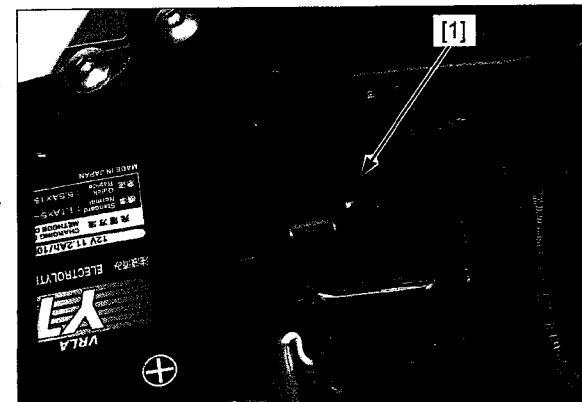
Shift the transmission into neutral.

Turn the ignition switch ON and engine stop switch to "O".

Press the starter switch button.

The coil is normal if the starter relay switch [1] clicks.

If you don't hear the switch "CLICK", inspect the relay switch using the procedure below.



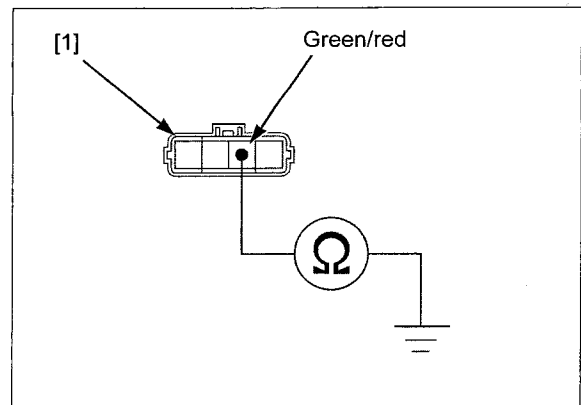
## ELECTRIC STARTER

### GROUND LINE INSPECTION

Disconnect the starter relay switch 4P (Black) connector [1].

Check for continuity between the Green/red wire (ground line) and ground.

If there is continuity when the transmission is in neutral or when the clutch is disengaged and the sidestand switch is retracted, the ground circuit is normal (In neutral, there is a slight resistance due to the diode).

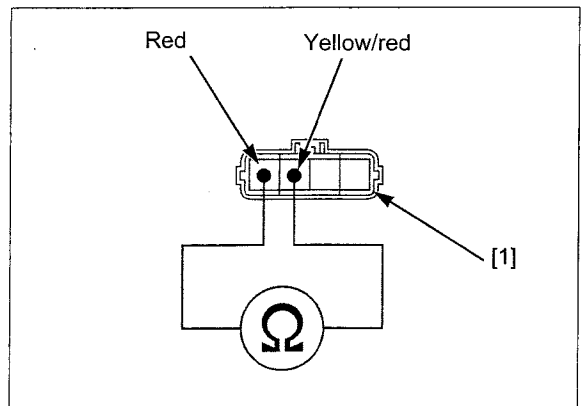


### INPUT LINE INSPECTION

Disconnect the starter relay switch 4P (Black) connector [1].

Check for continuity between the Red wire and Yellow/red wire.

If there is continuity when the starter switch is pushed with the ignition switch ON and engine stop switch at "O", the input line is normal.



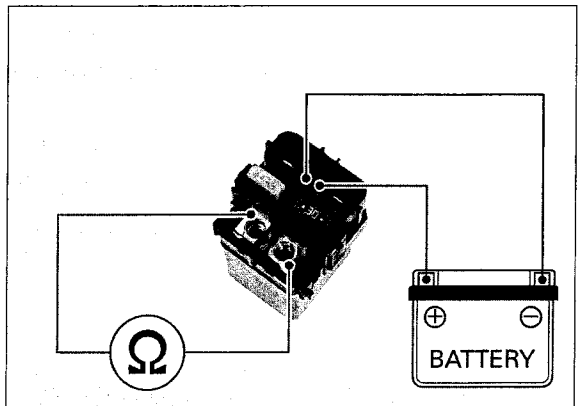
### CONTINUITY INSPECTION

Remove the starter relay switch.

Connect a fully charged 12 V battery positive wire to the relay switch Yellow/red wire terminal and negative wire to the Green/red wire terminal.

Connect an ohmmeter to the starter relay switch large terminals.

There should be continuity between the large terminals when the battery is connected, and no continuity when the battery is disconnected.



### REMOVAL/INSTALLATION

Remove the seat (page 3-4).

Disconnect the battery negative cable (page 19-6).

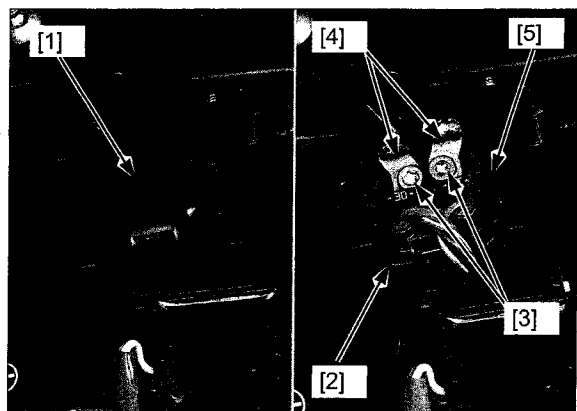
Remove the starter relay switch cover [1].

Disconnect the starter relay switch 4P (Black) connector [2].

Remove the terminal bolts [3] and disconnect the starter relay switch cables [4].

Pull the starter relay switch [5] out from the stay.

Installation is in the reverse order of removal.



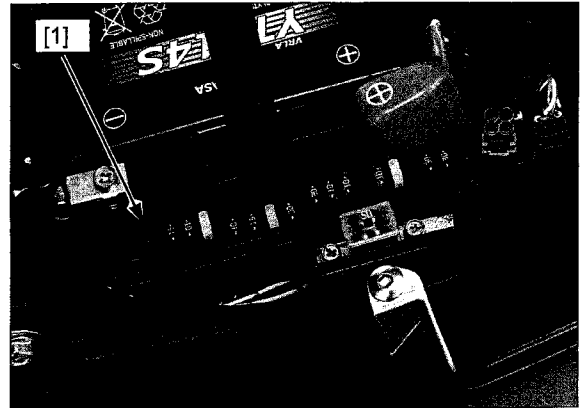
## DIODE

### REMOVAL/INSTALLATION

Remove the seat (page 3-4).

Open the fuse box cover and remove the diode [1].

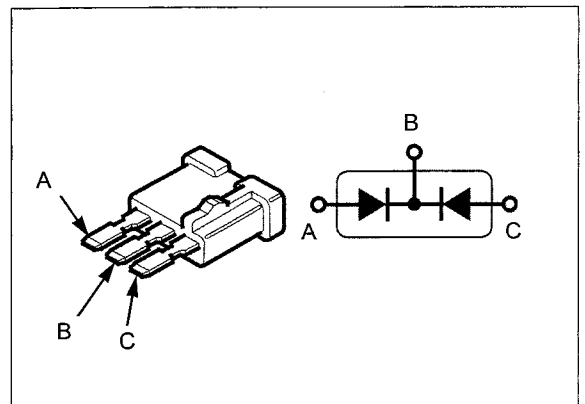
Installation is in the reverse order of removal.



### INSPECTION

Check for continuity between the diode terminals. When there is continuity, a small resistance value will register.

If there is continuity, in one direction, the diode is normal.





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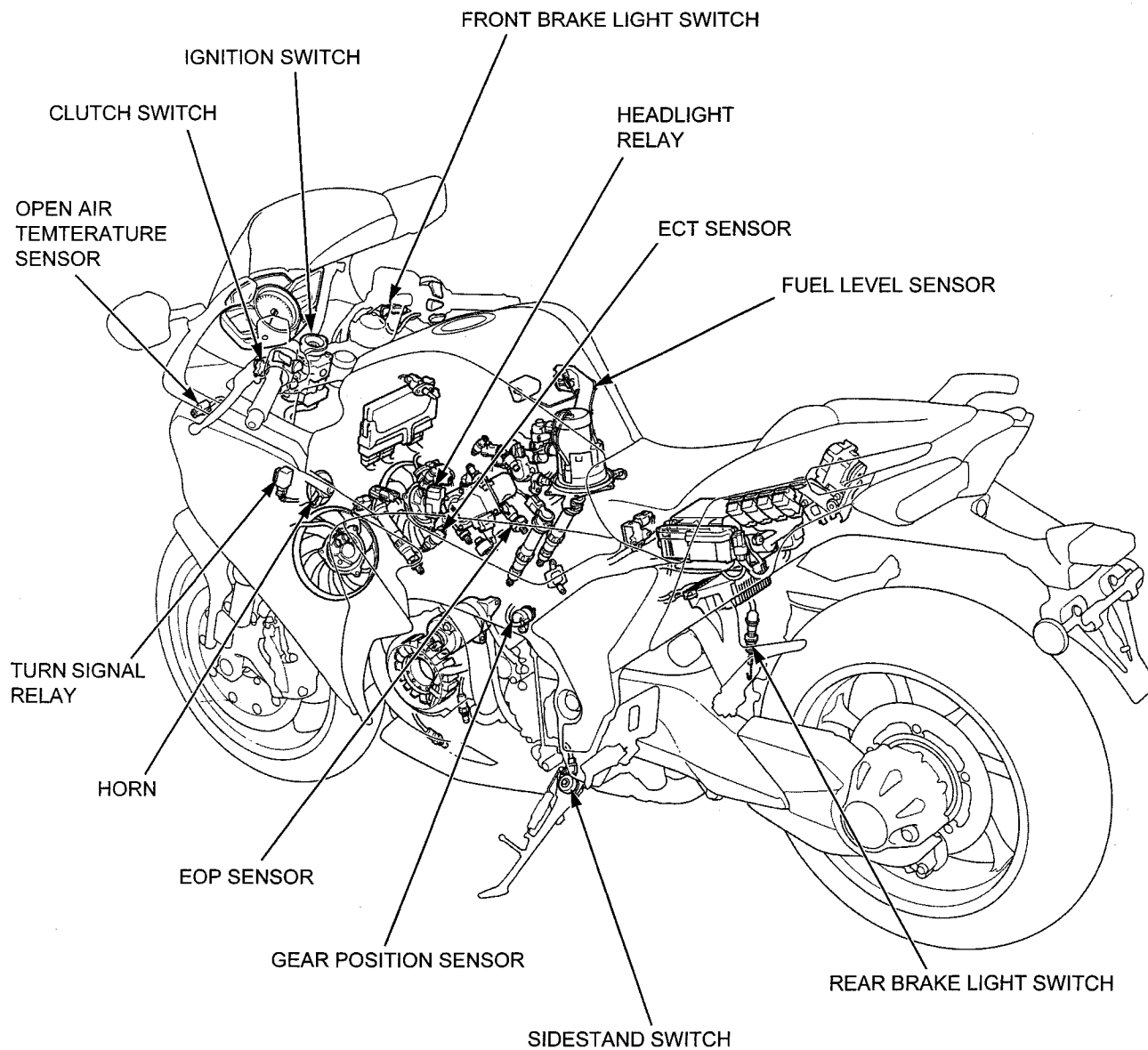
# MEMO

## 22. LIGHTS/METERS/SWITCHES

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SYSTEM LOCATION.....	22-2	HIGH COOLANT TEMPERATURE INDICATOR/ECT SENSOR .....	22-14
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OPEN AIR TEMPERATURE SENSOR .....	22-14	TURN SIGNAL RELAY .....	22-24

**SYSTEM LOCATION**



## SERVICE INFORMATION

### GENERAL

- A halogen headlight bulb becomes very hot while the headlight is ON, and will 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 ECT sensor inspection. Keep 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 it 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 low oil pressure indicator might come on while the front wheel leaves the ground when riding (wheelie).
- The following color codes are used throughout this section.

Bu = Blue  
Bl = Black  
Br = Brown

G = Green  
Gr = Gray  
Lb = Light blue

Lg = Light green  
O = Orange  
P = Pink

R = Red  
W = White  
Y = Yellow

### SPECIFICATIONS

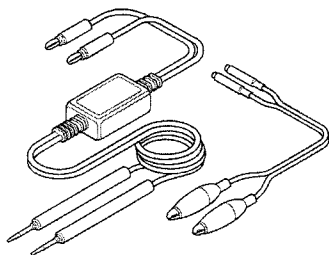
ITEM			SPECIFICATIONS
Bulbs	Headlight	Hi	12 V – 55 W
		Lo	12 V – 55 W
	Taillight		12 V – 5 W
	Brake/taillight		12 V – 21/5 W
	Position light		LED
	Front turn signal light		12 V – 21W x 2
	Rear turn signal light		12 V – 21 W x 2
	License light		12 V – 5 W
	Instrument light		LED
	Turn signal indicator		LED
	High beam indicator		LED
	Neutral indicator		LED
	Low oil pressure indicator		LED
	PGM-FI malfunction indicator		LED
	High coolant temperature indicator		LED
	ABS indicator		LED
Fuse	Main fuse	A	50 A
		B	30 A
	PGM-FI fuse		10 A
	Sub fuse		30 A x 3, 20 A x 2, 15 A x 1, 10 A x 4
Tachometer peak voltage			10.5 V minimum
ECT sensor resistance		80°C (176°F)	2.1 – 2.6 kΩ
		120°C (248°F)	0.65 – 0.73 kΩ
Open air temperature sensor resistance (25°C/77°F)			3 – 7 Ω

### TORQUE VALUES

Ignition switch mounting bolt	24 N·m (2.4 kgf·m, 18 lbf·ft)	Replace with a new one.
Sidestand switch bolt	10 N·m (1.0 kgf·m, 7 lbf·ft)	ALOC bolt: replace with a new one.
EOP sensor	22 N·m (2.2 kgf·m, 16 lbf·ft)	
Meter screw	1.0 N·m (0.1 kgf·m, 0.7 lbf·ft)	
Taillight SH bolt	9.8 N·m (1.0 kgf·m, 7.2 lbf·ft)	
Front turn signal cover screw	1.5 N·m (0.2 kgf·m, 1.1 lbf·ft)	

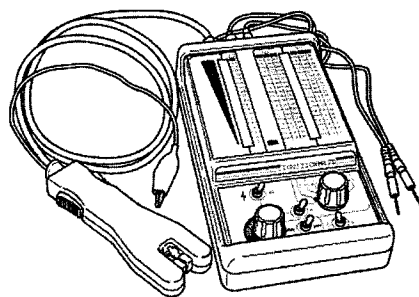
### TOOLS

Peak voltage adaptor  
07HGJ-0020100 (not available in  
U.S.A)

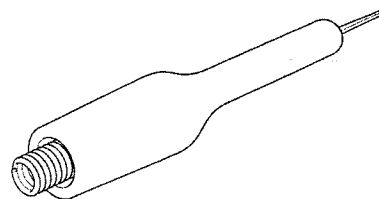


with commercially available digital mul-  
timeter (impedance 10 M $\Omega$ /DCV mini-  
mum)

IgnitionMate peak voltage tester  
MTP07-0286 (U.S.A. only)



Test probe  
07ZAJ-RDJA110



## TROUBLESHOOTING

### SPEED SENSOR/SPEEDOMETER

The odometer/trip meter indicates "-----"  
Faulty EEPROM in ECM

The speedometer operation is abnormal

#### 1. Fuse Inspection

Check for blown main fuse or sub fuse.

*Is the fuse blown?*

**YES** – Replace the fuse

**NO** – GO TO STEP 2.

#### 2. Battery Inspection

Make sure the battery is fully charged and in good condition.

*Is the battery in good condition?*

**YES** – GO TO STEP 3.

**NO** – Charge or replace the battery (page 19-6).

#### 3. Rear Wheel Speed Sensor Inspection (between the speed sensor and ABS modulator)

Check for loose or poor contact of the rear wheel speed sensor 2P (Orange) connector.

Inspect the rear wheel speed sensor (page 18-24).

*Is the rear wheel speed sensor normal?*

**YES** – GO TO STEP 4.

**NO** – • Faulty rear wheel speed sensor  
• Open or short circuit between rear wheel speed sensor and ABS modulator  
• Faulty ABS modulator

#### 4. Speed Sensor Signal Line Inspection

With the ignition switch OFF, check for continuity of the Pink/green wire between the terminals of the ABS modulator and speedometer.

*Is there continuity?*

**YES** – GO TO STEP 5.

**NO** – Open circuit in Pink/green wire

#### 5. Speed Sensor Signal Inspection

Support the motorcycle using a hoist or other support to raise the rear wheel off the ground.

Measure the output voltage (sensor signal) at the speedometer with the ignition switch ON while slowly turning the rear wheel by your hand.

**CONNECTION:** Pink/green (+) – Green (–)

**STANDARD:** Repeat 0 to 5 V

*Is the voltage within specified value?*

**YES** – Faulty speedometer

**NO** – • Faulty speed sensor  
• Loose speed sensor mounting bolts

# HEADLIGHT

## BULB REPLACEMENT

Turn the socket cover [1] counterclockwise and remove it from the headlight unit.

Disconnect the headlight bulb connector [2].

*Avoid touching halogen headlight bulb. Finger prints can create hot spots that cause a bulb to break.*

Unhook the bulb retainer [3] and remove the headlight bulb [4].

If you touch the bulb with your bare hands, clean it with cloth moistened with denatured alcohol to prevent early bulb failure.

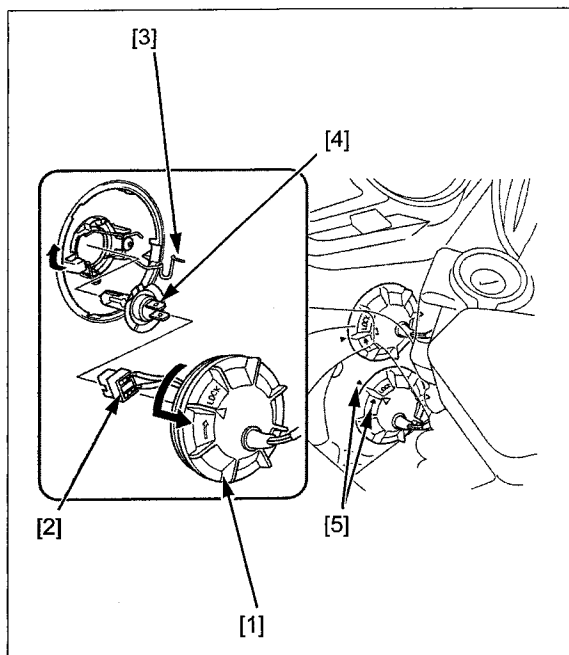
Install a new headlight bulb aligning its tabs with the groove in the headlight unit.

Hook the bulb retainer into the headlight unit groove.

Connect the headlight connectors.

Install the bulb socket while aligning its aligning mark [5] with the aligning mark on the headlight unit.

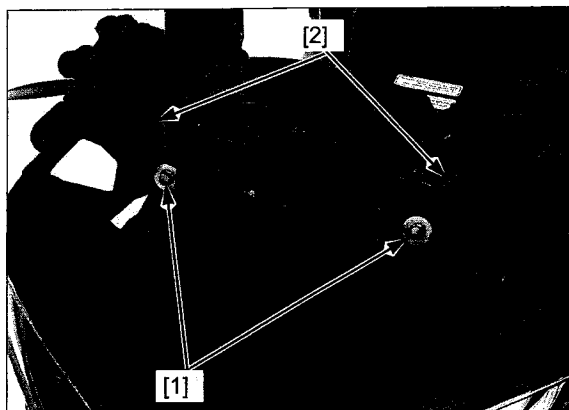
Turn the bulb socket clockwise until its lock.



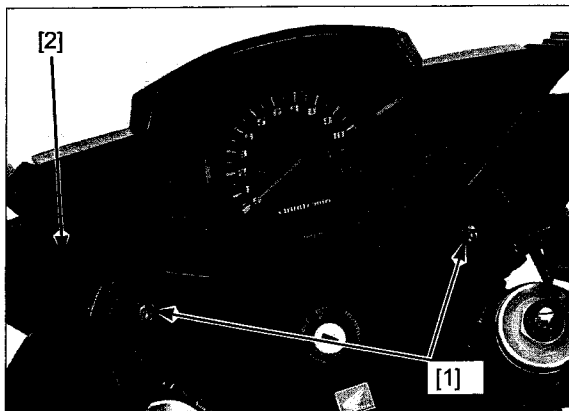
## REMOVAL/INSTALLATION

Remove the upper center cowl (page 3-10).

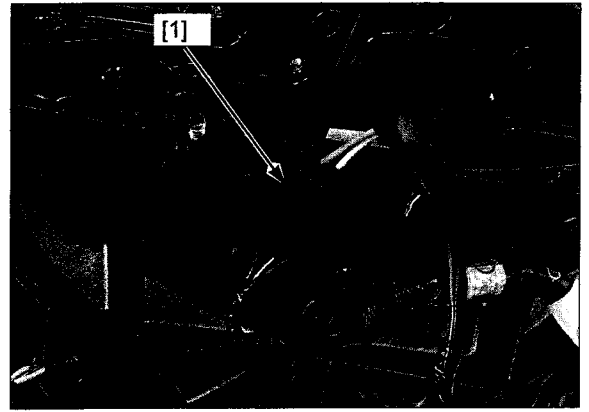
Remove the bolts/washers [1] and right/left front upper cover B [2].



Remove the nuts [1] and headlight unit [2].



Disconnect the headlight 3P (Black) connector [1].  
Installation is in the reverse order of removal.

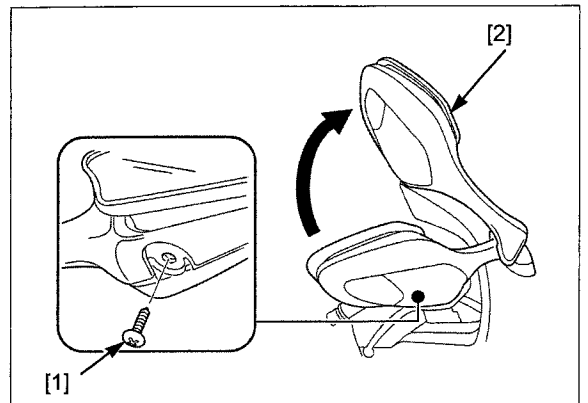


## TURN SIGNAL

### BULB REPLACEMENT

#### FRONT:

Remove the screw [1] and turn the rearview mirror [2] for ease removal of the front cover as shown.

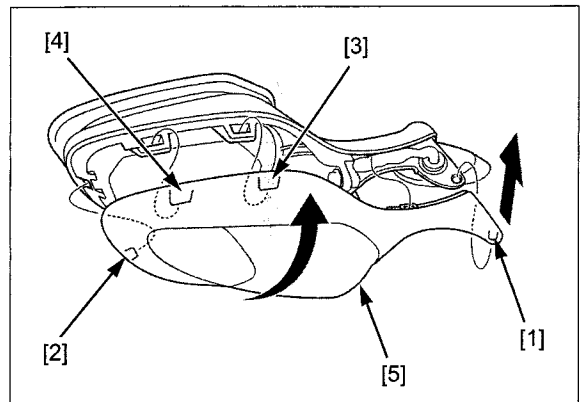


*Be careful not to damage the boss and tabs.*

Release the front cover boss [1] then, release the tabs in the specified sequence following.

1. Side tab [2]
2. Upper/inner tab [3]
3. Upper/outer tab [4]

Remove the front cover [5].



Turn the bulb socket [1] counterclockwise and remove it.

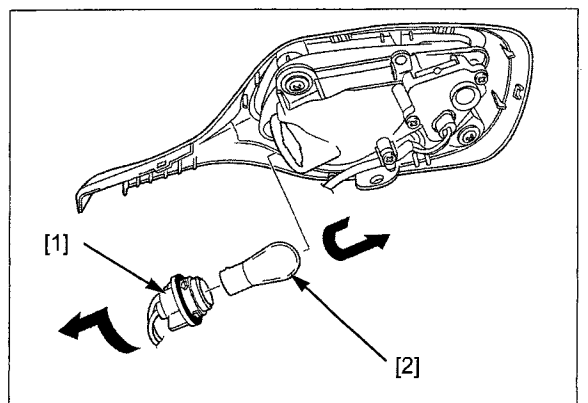
While pushing in, turn the bulb [2] counterclockwise to remove it and replace with a new one.

Installation is in the reverse order of removal.

#### TORQUE:

Front turn signal cover screw:

1.5 N·m (0.2 kgf-m, 1.1 lbf-ft)





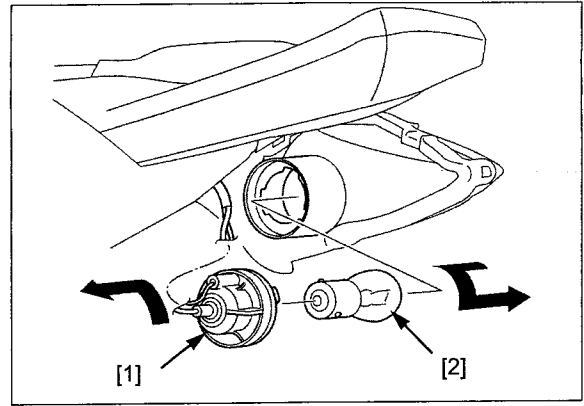
### REAR:

Remove the turn signal cover (page 3-5).

Turn the bulb socket [1] counterclockwise and remove it from the rear combination light unit.

While pushing in the bulb [2] counterclockwise to remove it and replace it with a new one.

Install the turn signal bulb socket in the reverse order of removal.



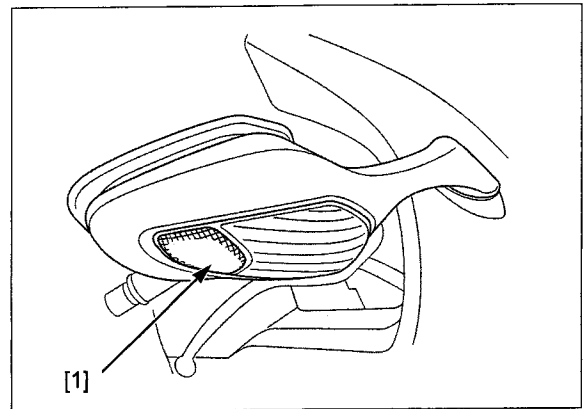
## POSITION LIGHT

### INSPECTION

Turn the ignition switch ON, and check the position light [1] operation.

Check that the LED in the position light illuminate with the ignition switch ON.

If the LED does not turn on, replace the front cover assembly (page 22-7).



## REAR COMBINATION LIGHT

### BRAKE/TAILLIGHT BULB REPLACEMENT

Remove the seat (page 3-4).

Remove the taillight bulb socket [1] from the rear combination light unit.

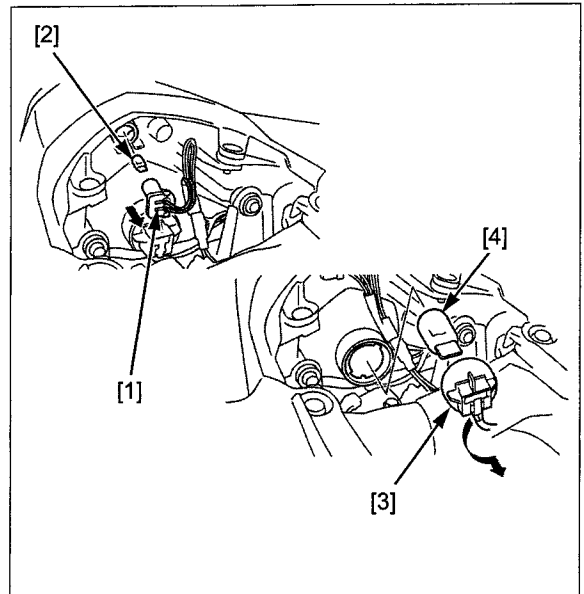
Remove the taillight bulb [2] from the bulb socket and replace it with a new one.

Install the taillight bulb socket in the reverse order of removal.

Turn the brake/taillight bulb socket [3] counterclockwise, then remove it from the rear combination light unit.

Remove the brake/taillight bulb [4] from the bulb socket and replace it with a new one.

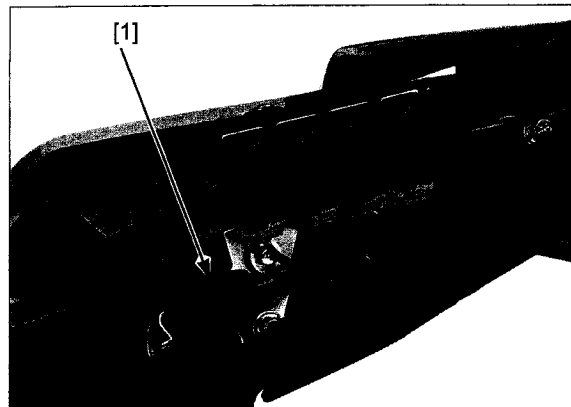
Install the brake/taillight bulb socket in the reverse order of removal.



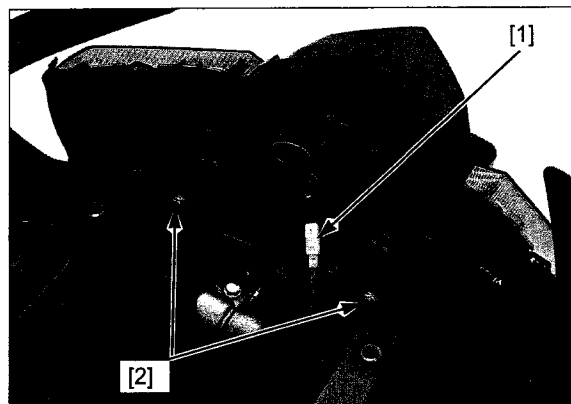
## REMOVAL/INSTALLATION

Remove the left rear cowl (page 3-5).  
Remove the turn signal cover/rear center cowl (page 3-5).

Disconnect the rear combination light 6P (Black) connector [1].

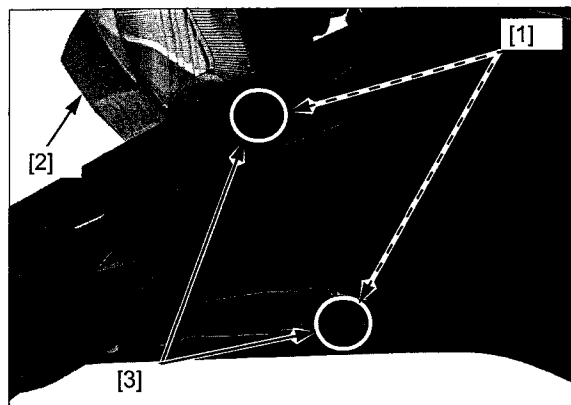


Disconnect the license light 1P (White) connector [1].  
Remove the bolts/collars [2].



Remove the tabs [1] on the rear combination light [2] from the grommets [3] of the rear fender.

Installation is in the reverse order of removal.



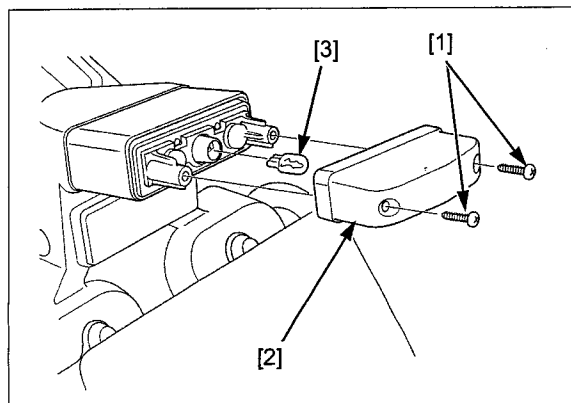
## LICENSE LIGHT

### BULB REPLACEMENT

Remove the screws [1], license light cover/lens [2].

Remove the license light bulb [3] and replace with a new one.

Installation is in the reverse order of removal.



## COMBINATION METER

### REMOVAL/INSTALLATION

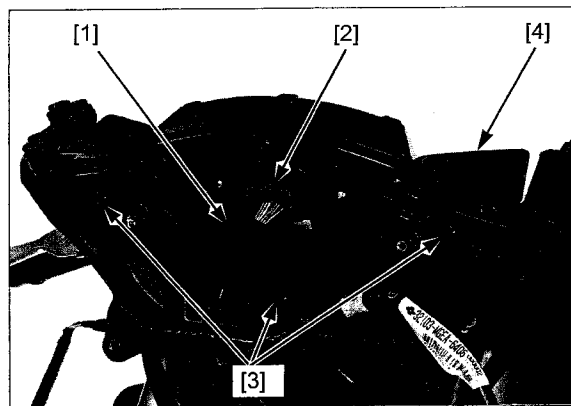
Remove the headlight unit (page 22-6).

Remove the combination meter connector dust cover [1].

Disconnect the combination meter 20P connector [2].

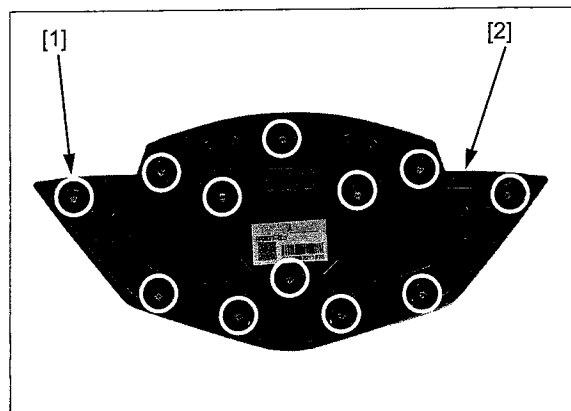
Remove the screws [3] and combination meter [4].

Installation is in the reverse order of removal.

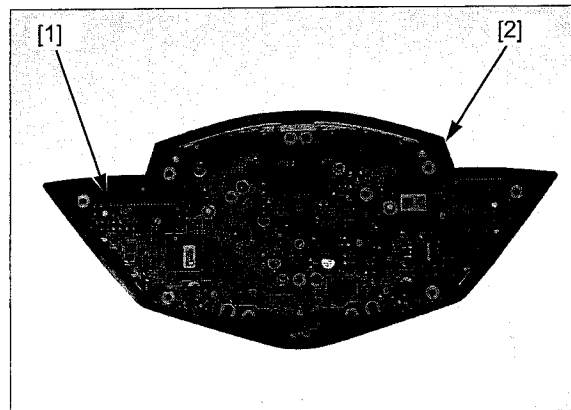


### DISASSEMBLY/ASSEMBLY

Remove the screws [1] and lower case [2].



Remove the print board [1] from upper case [2].

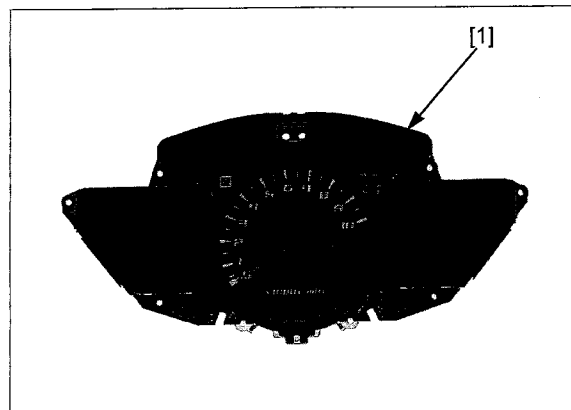


Check the print board [1] for damage.

Assembly is in the reverse order of disassembly.

### TORQUE:

Meter screw: 1.0 N·m (0.1 kgf·m, 0.7 lbf·ft)

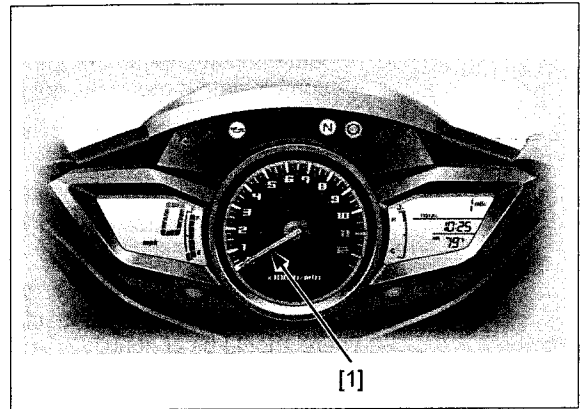


## COMBINATION METER SYSTEM INSPECTION

- Check for loose or poor contact terminals at the combination meter 20P connector and sub-harness 23 P (Black) connector.

Turn the ignition switch ON, check that the tachometer needle [1] move to full scale and then returns to zero.

If the needle does not show initial function, check the combination meter power input line (page 22-11).



## POWER/GROUND LINE INSPECTION

Remove the upper center cowl (page 3-10).

Remove the dust cover [1] and disconnect the combination meter 20P connector [2].

Check the following at the wire harness side connector terminals of the combination meter.

### Power input line

Measure the voltage between the Black/brown wire terminal (+) and Ground (-).

There should be battery voltage with the ignition switch ON.

If there is no voltage, check for open circuit in Black/brown wire.

### Back-up voltage line

Measure the voltage between the White/green wire terminal (+) and Ground (-).

There should be battery voltage at all times.

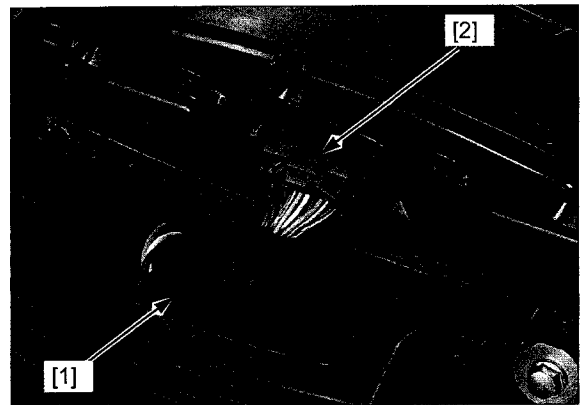
If there is no voltage, check for open circuit in White/green wire.

### Ground line

Measure the continuity between the Green/black wire terminal and Ground.

There should be continuity.

If there is no continuity, check for open circuit in Green/black wire.



## TXD LINE INSPECTION

Remove the upper center cowl (page 3-10).

Check the combination meter TXD line, if followings;

- MIL does not operate properly (page 6-11).
- combination meter does not indicate gear position.

Check the combination meter power/ground line inspection (page 22-11).

Turn the ignition switch to OFF, disconnect the ECM 33P (Gray) connector [1] and combination meter 20P connector [2].

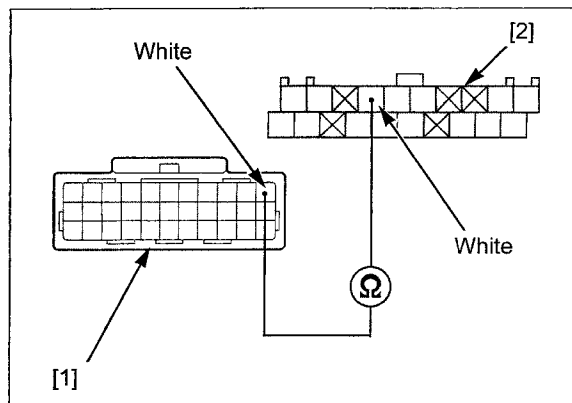
Check the White wire for continuity between the combination meter 20P connector and ECM. There should be continuity.

### TOOL:

**Test probe 07ZAJ-RDJA110**

If there is continuity, replace the print board (page 22-10).

If there is no continuity, replace the wire harness.



## SPEEDOMETER/REAR WHEEL SPEED SENSOR

### SYSTEM INSPECTION

Perform the combination meter system inspection (page 22-11).

If the system fails the inspection, perform the power and ground line inspection of the combination meter (page 22-11).

Check the followings function properly;

- tachometer
- coolant temperature gauge
- indicators

Remove the dust cover [1].

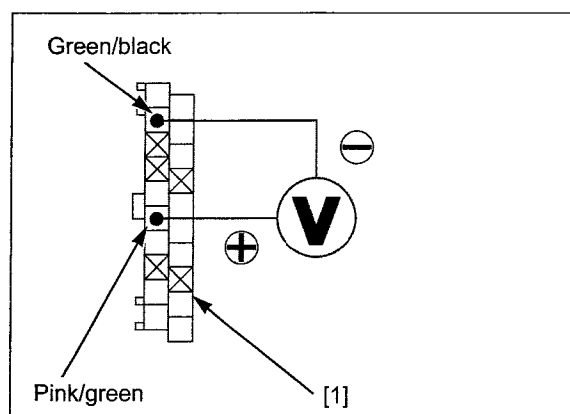
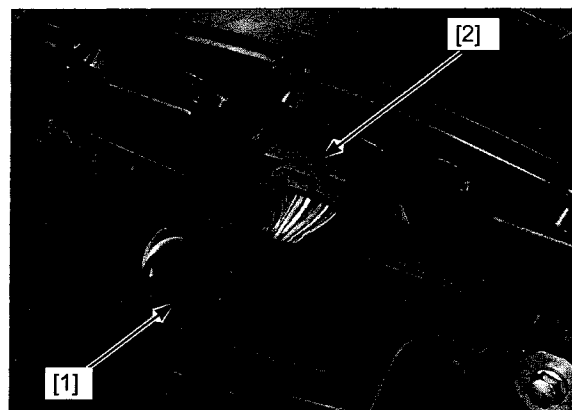
If the system fails the inspection, shift the transmission into neutral, the combination meter 20P connector [2] is connected, then turn the ignition switch ON.

Measure the voltage between the Pink/green wire terminal (+) and Green/black wire terminal (-) of the wire harness side connector [1].

Slowly turn the rear wheel by hand.

There should be 0 to 5 V pulse voltage.

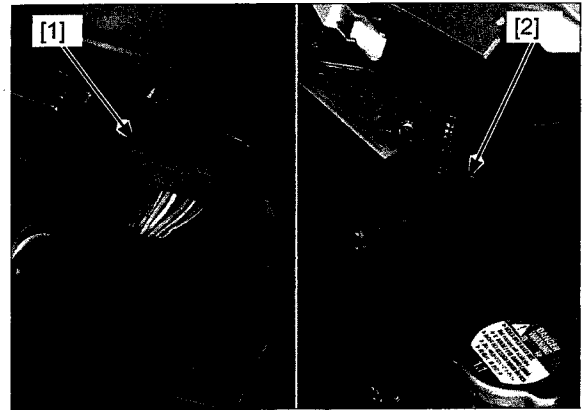
- If pulse voltage appears, replace the combination meter print board.
  - If pulse voltage does not appear, check for open or short circuit in Pink/green wire.
- If the Pink/green wire is OK, check for the rear wheel speed sensor signal line (page 22-13).



## REAR WHEEL SPEED SENSOR SIGNAL LINE INSPECTION

Check the ABS indicator and inspect the rear wheel speed sensor (page 18-24).

If there is normal, disconnect the combination meter 20P connector [1] and ABS modulator 26P (Black) connector [2].



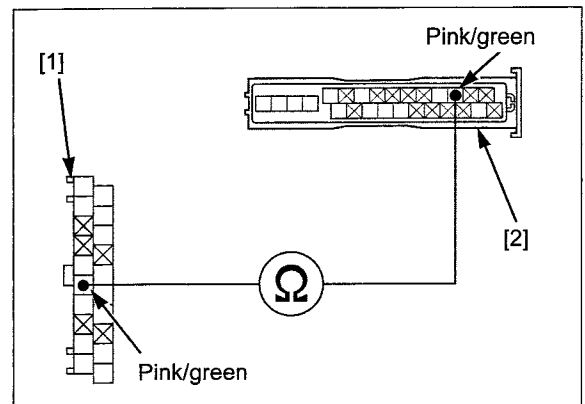
Check for continuity between the combination meter 20P connector wire harness side [1] and ABS modulator 26P (Black) connector wire harness side [2].

### TOOL:

Test probe 07ZAJ-RDJA110

### CONNECTION: Pink/green – Pink/green

If there is no continuity, check for open circuit in Pink/green wire and loose contact of the wire harness connectors.



## TACHOMETER

### SYSTEM INSPECTION

Check the combination meter system inspection (page 22-11)

Remove the upper center cowl (page 3-10).

Remove the dust cover and check for loose or poor contact the combination meter 20P connector [1]. Connect the peak voltage tester or peak voltage adaptor [2] to the combination meter 20P connector with the combination meter 20P connector is connected.

### TOOLS:

IgnitionMate peak voltage tester MTP07-0286  
(U.S.A. only) or  
Peak voltage adaptor 07HGJ-0020100  
(not available in  
U.S.A.)

with commercially available digital multimeter (impedance 10 MΩ/DCV minimum)

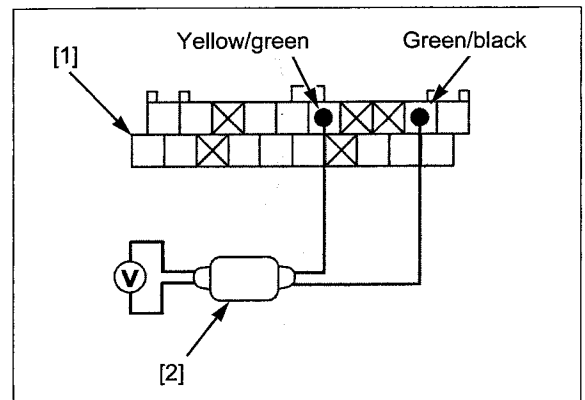
### CONNECTION: Yellow/green (+) and Green/black (–)

Start the engine and measure the tachometer input peak voltage.

### PEAK VOLTAGE: 10.5 V minimum

If the value is normal, replace the print board (page 22-10).

If the measured value is below 10.5 V, replace the ECM (page 6-84).



## LIGHTS/METERS/SWITCHES

If the value is 0 V, check for continuity between the combination meter 20P connector [1] terminal and the ECM 33P (Black) connector [2] Yellow/green terminals.

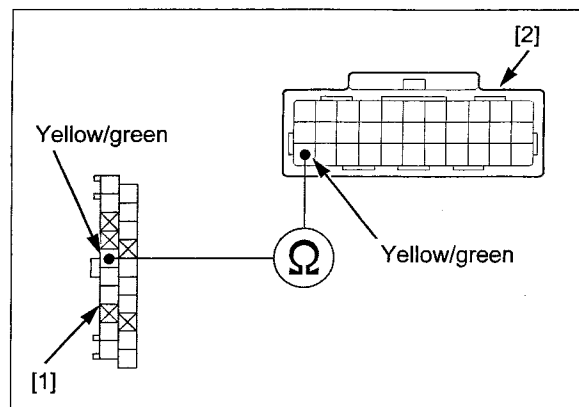
### TOOL:

Test probe

07ZAJ-RDJA110

If there is no continuity, check the wire harness and combination meter sub-harness for an open circuit.

If there is continuity, replace the combination meter printed board (page 22-10).



## OPEN AIR TEMPERATURE SENSOR

### INSPECTION

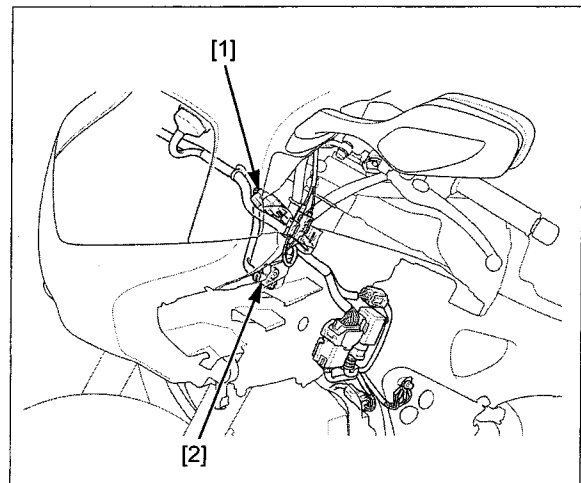
Remove the upper side cowl (page 3-9).

Disconnect the open air temperature sensor 2P (Black) connector [1].

Measure the resistance of the open air temperature sensor at the 2P (Black) connector sensor [2] side.

**STANDARD: 3 – 7 Ω (25°C (77°F))**

If the resistance is out of specification, replace the open air temperature sensor (page 3-9).



## HIGH COOLANT TEMPERATURE INDICATOR/ECT SENSOR

### SYSTEM INSPECTION

Perform the combination meter system inspection (page 22-11)

If the system fails the inspection, perform the power and ground line inspection of the combination meter (page 22-11).

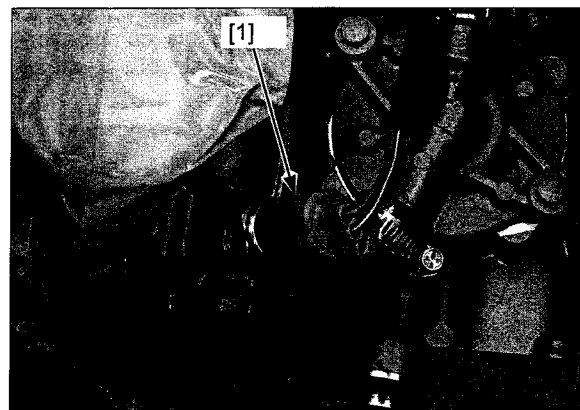
Check the followings function properly;

- tachometer
- speedometer
- indicators

Remove the throttle body (page 6-71).

Disconnect the ECT sensor 3P (Gray) connector [1].

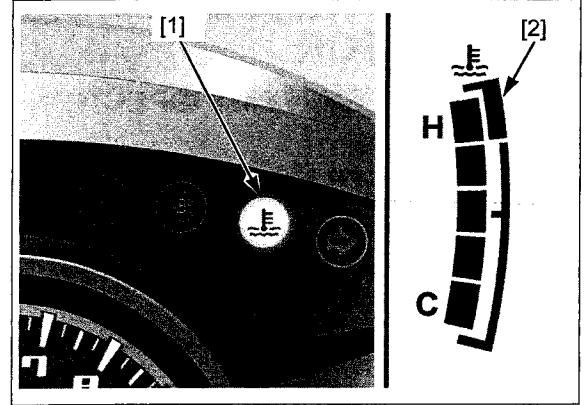
Short the Gray/red wire terminal of the ECT sensor 3P (Gray) connector wire harness side with the ground using a jumper wire.



The high coolant temperature indicator [1] comes on and coolant temperature gauge [2] indicate "H" with the ignition switch is ON.

If the high coolant temperature indicator does not come on, check the sub-fuse (15 A) and wires for loose connection or an open circuit.

If the high coolant temperature indicator and coolant temperature gauge is normal, inspect the ECT sensor unit.

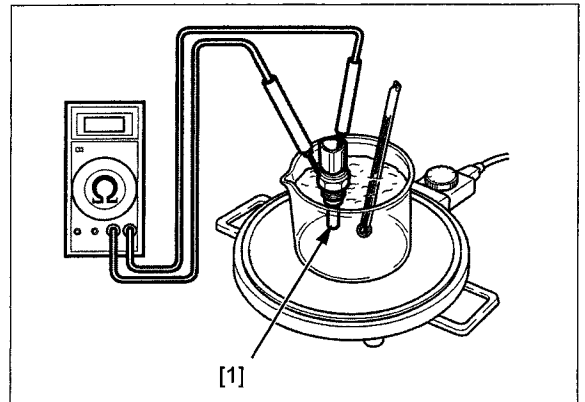


## ECT SENSOR UNIT INSPECTION

Remove the ECT sensor (page 6-80).

Suspend the ECT sensor [1] in a pan of coolant (50 – 50 mixture) on an electric heating element and measure the resistance through the sensor as the coolant heats up.

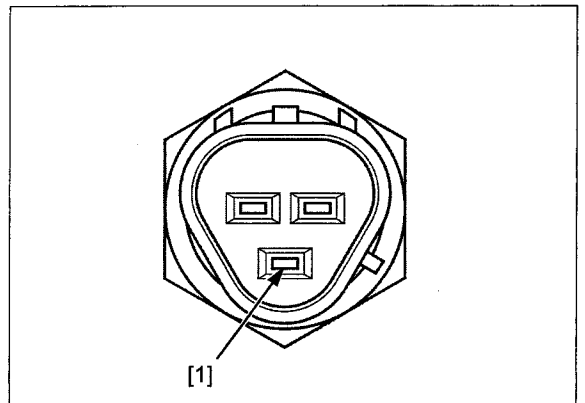
- Soak the ECT sensor in coolant up to its threads with at least 40 mm (1.6 in) from the bottom of the pan to the bottom of the sensor.
- Keep the temperature constant for 3 minutes before testing. A sudden change of temperature will result in incorrect readings. Do not let the thermometer or ECT sensor touch the pan.



The ECT sensor terminal [1] is shown in the illustration.

Replace the sensor if it is out of specification by more than 10% at any temperature listed.

Temperature	80° C (176° F)	120° C (248° F)
Resistance	2.1 – 2.6 kΩ	0.65 – 0.73 kΩ





## LOW OIL PRESSURE INDICATOR/ EOP SENSOR

### SYSTEM INSPECTION

#### NOTE:

The low oil pressure indicator [1] comes on when the ignition switch is turned ON, then goes off when the engine starts.

The low oil pressure indicator does not go out when the engine running;

Check the oil level and pressure before inspection (page 5-5).

If the oil level and pressure are normal, check the MIL (page 6-14).

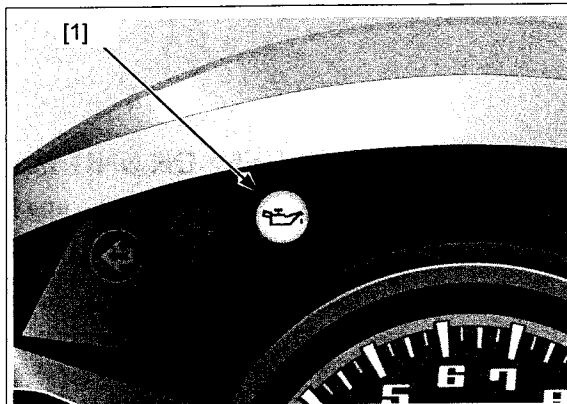
Replace the EOP sensor, if necessary.

The low oil pressure indicator does not come on with the ignition switch ON;

Check the sub-fuse (15A) and connector for a loose connection or an open circuit.

If the sub-fuse (15A) and connectors are normal, check the MIL (page 6-14).

Replace the EOP sensor, if necessary.



### REMOVAL/INSTALLATION

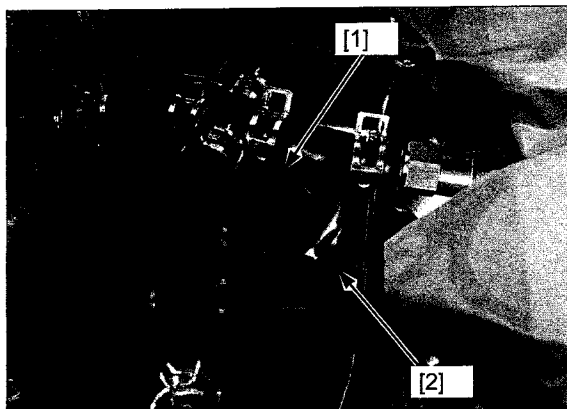
Remove the throttle body (page 6-71).

Disconnect the EOP sensor 3P (Black) connector [1].

Remove the EOP sensor [2] from the crankcase.

Installation is in the reverse order of removal.

**TORQUE: 22 N·m (2.2 kgf·m, 16 lbf·ft)**



## FUEL LEVEL SENSOR

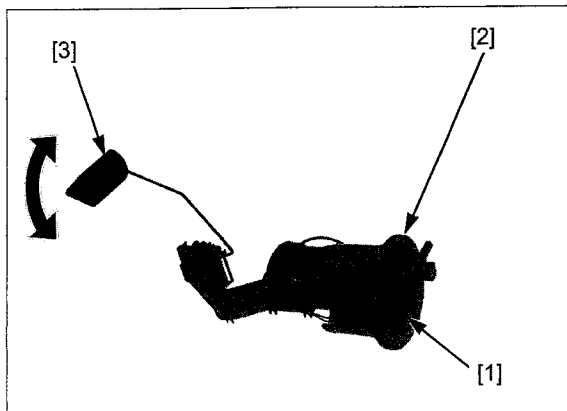
### FUEL LEVEL SENSOR INSPECTION

Remove the fuel pump unit (page 6-65).

Connect the ohmmeter to the fuel level sensor Green/yellow and Green terminals of the fuel level sensor connector [1] on the fuel pump [2].

Inspect the resistance of the float [3] at the top and bottom positions.

	FULL	EMPTY
Resistance	12 – 14 kΩ	119 – 121 kΩ



## FUEL METER INSPECTION

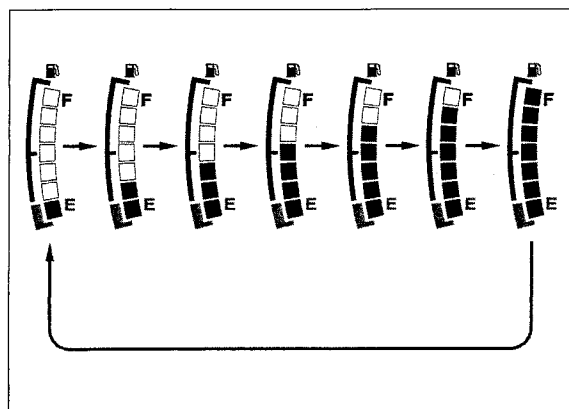
Remove the fuel pump unit (page 6-65).

Connect the fuel sensor 2P (Black) connector to the fuel pump and move the float from empty to full to check the fuel meter display indication.

Turn the ignition switch to ON.

If the fuel meter does not indicate properly, check for open or short circuit in wire harness.

If the wire harness is good, replace the print board with a new one (page 22-10).

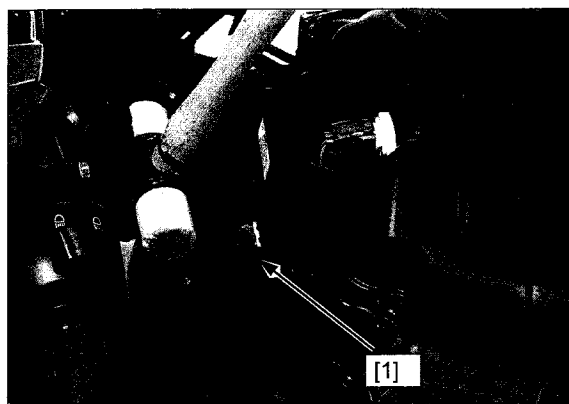


## IGNITION SWITCH

### INSPECTION

Lift and support the fuel tank (page 4-5).

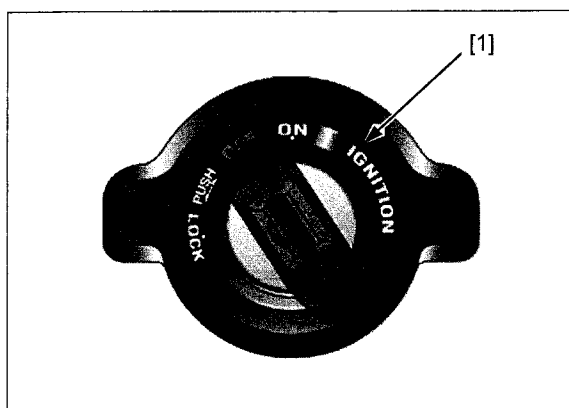
Disconnect the ignition switch 2P (Brown) connector [1].



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 [1]

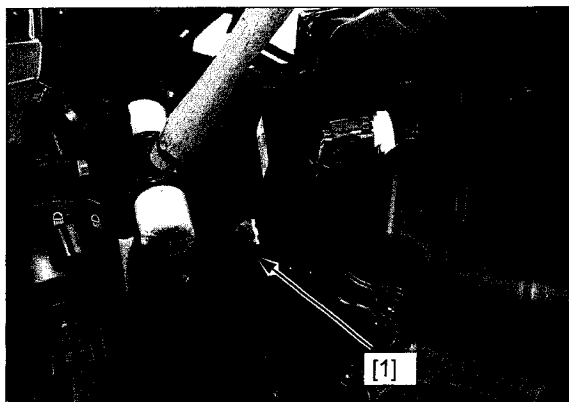
	BAT1	IG
ON	○—○	
OFF		
LOCK		
CODE COLOR	R	R/BI



### REMOVAL/INSTALLATION

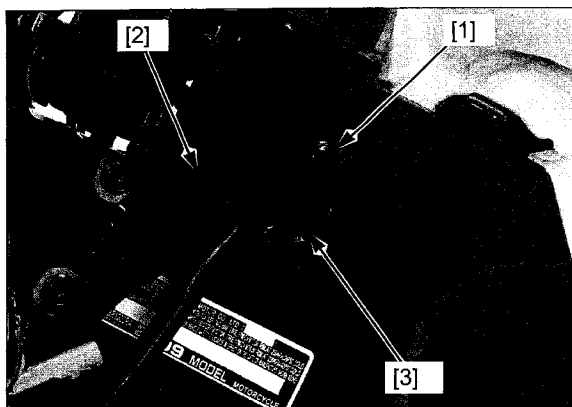
Lift and support the fuel tank (page 4-5).

Disconnect the ignition switch 2P (Brown) connector [1].



## LIGHTS/METERS/SWITCHES

Remove the bolt [1], then release the ignition switch wire [2] from the clamp [3].



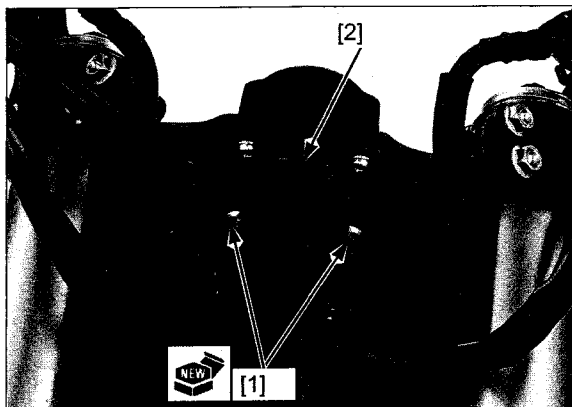
Remove the headlight unit (page 22-6).  
Remove the combination meter (page 22-10).

Remove the bolts [1] and ignition switch [2].

Install the ignition switch in the reverse order of removal.

Tighten the new ignition switch mounting bolts to the specified torque.

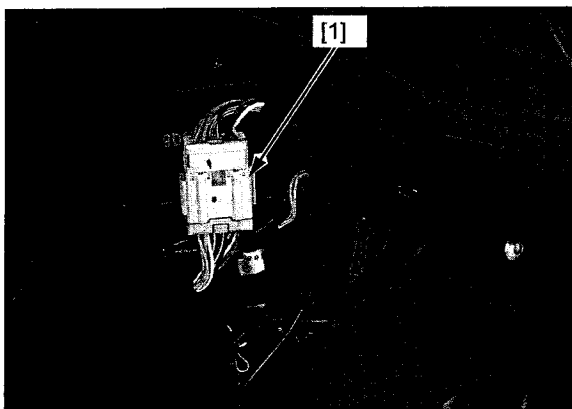
**TORQUE: 24 N·m (2.4 kgf·m, 18 lbf·ft)**



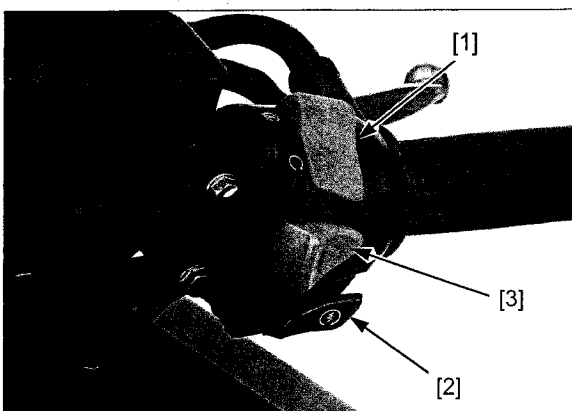
## HANDLEBAR SWITCHES

### RIGHT HANDLEBAR SWITCHES

Disconnect the handlebar switch 10P (Gray) connector [1].



Check for continuity between the wire terminals of the right handlebar switch 10P (Gray) connector. Continuity should exist between the color coded wire terminals as follows:



ENGINE STOPSWITCH [1]/STARTER SWITCH [2]/HAZARD SWITCH [3]

ENGINE STOP SWITCH

	IG	BAT4
CODE COLOR	BI	W/Y

STARTER SWITCH

	IG	ST	BAT5	HL
FREE				
PUSH				
CODE COLOR	BI	Y/R	W/Bu	Bu/W

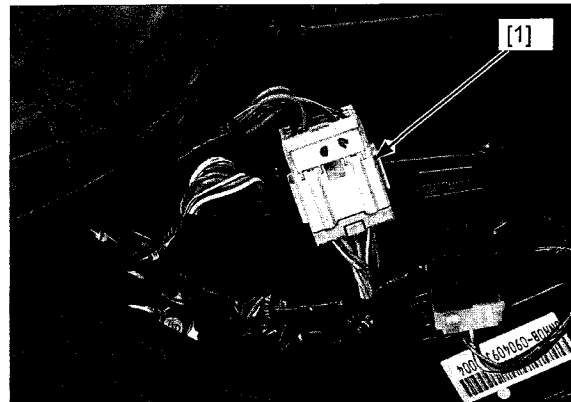
HAZARD SWITCH

	W1	WR	WL
ON			
OFF			
CODE COLOR	Gr	Lb	O

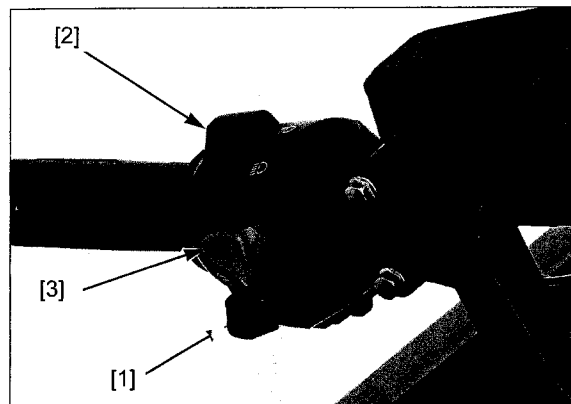
LEFT HANDLEBAR SWITCHES

Lift and support the fuel tank (page 4-5).

Disconnect the left handlebar switch 10P (Gray) connector [1].



Check for continuity between the wire terminals of the left handlebar switch 10P (Gray) connector. Continuity should exist between the color coded wire terminals as follows:



[1]TURN SIGNAL SWITCH [1]/DIMMER SWITCH [2]/HORN SWITCH [3]

TURN SIGNAL SWITCH

	W	R	L
N			
CODE COLOR	Gr	Lb	O

DIMMER SWITCH

	HL	Lo	Hi
(N)			
CODE COLOR	Bu/W		Bu

HORN SWITCH

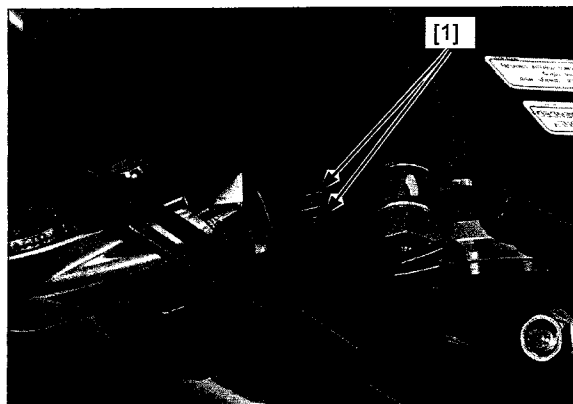
	Ho	BAT3
FREE		
PUSH		
CODE COLOR	BI/G	BI/Br

## BRAKE LIGHT SWITCH

### FRONT

Disconnect the front brake light switch connectors and check for continuity between the terminals [1].

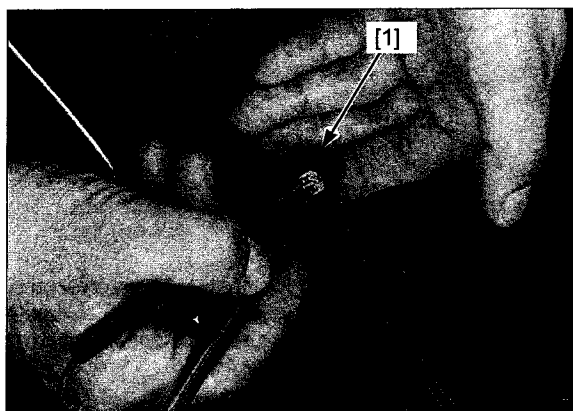
There should be continuity with the brake lever applied, and there should be no continuity with the brake lever released.



### REAR

Disconnect the rear brake light switch 2P (Black) connector [1] and check for continuity between the terminals.

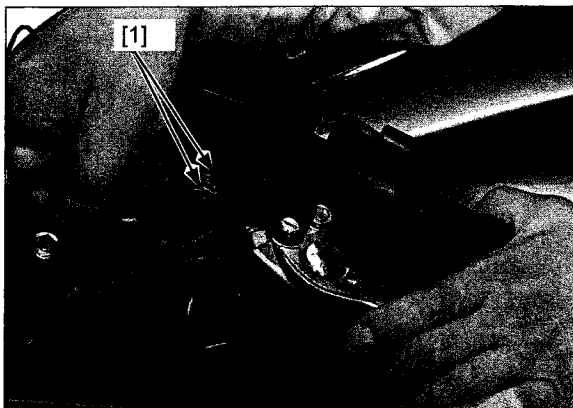
There should be continuity with the brake pedal applied, and there should be no continuity with the brake pedal released.



## CLUTCH SWITCH

Disconnect the clutch switch connectors and check for continuity between the terminals [1].

There should be continuity with the clutch lever applied, and there should be no continuity with the clutch lever released.



# GEAR POSITION SENSOR

## INSPECTION

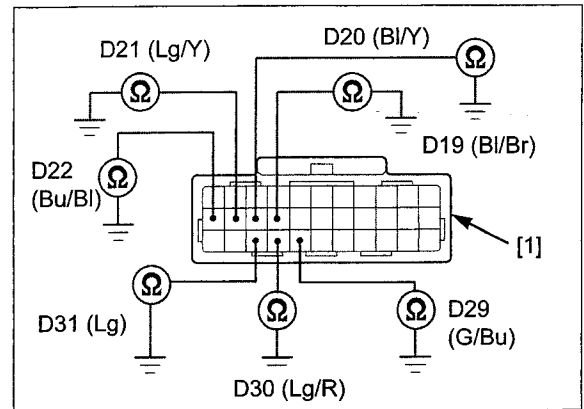
Lift and support the fuel tank (page 4-5).

Turn the ignition switch OFF.

Disconnect the ECM 33P (Gray) connector [1].

Check for continuity between each gear position sensor wire terminal of the ECM 33P (Gray) connector wire harness side and ground.

There should be continuity only at the terminals that correspond to the each gear position shown below, and there should be no continuity at the other terminals.



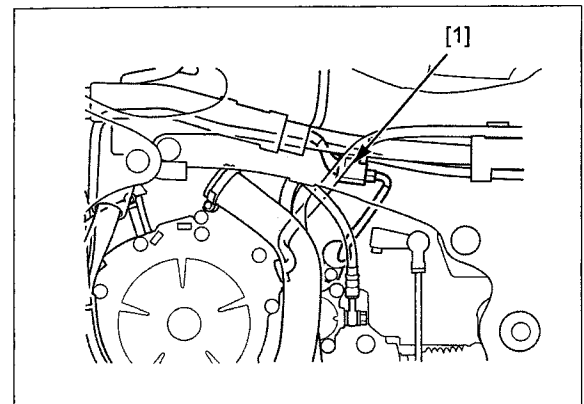
You must test each of the seven wires in each change pedal position. Therefore, you need to make 49 tests, between each gear position sensor wire terminal and ground.

If the test result is abnormal, disconnect the gear position sensor 8P (Black) connector.

POSITION	COLOR							GND
	Bl/Br	Lg	Lg/R	Bl/Y	Lg/Y	Bu/Bl	G/Bu	
1	1	2	3	4	5	6	7	8
Neutral	8	9	10	11	12	13	14	15
2	15	16	17	18	19	20	21	22
3	22	23	24	25	26	27	28	29
4	29	30	31	32	33	34	35	36
5	36	37	38	39	40	41	42	43
6	43	44	45	46	47	48	49	50

Perform the continuity test at the 8P (Black) connector in the same manner (page 22-21).

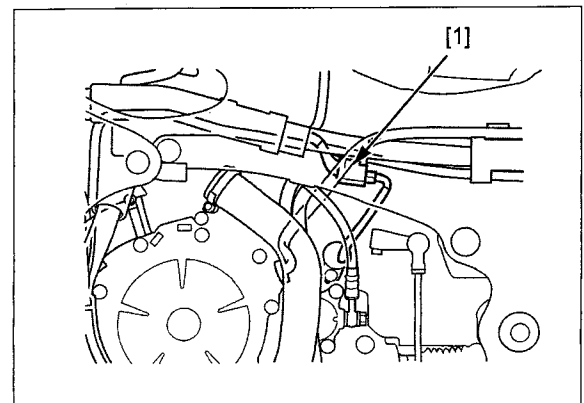
- If the test result at the ECM 33P (Gray) connector is abnormal and the one at the gear position sensor 8P (Black) connector [1] is normal, check for open or short circuit, or loose or poor connector contact.
- If the both test results are abnormal, replace the gear position sensor.



## REPLACEMENT

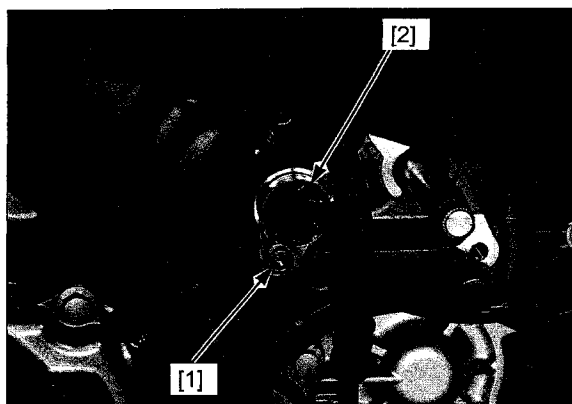
Remove the engine heat guard (page 11-4).

Disconnect the gear position sensor 8P (Black) connector [1].



## LIGHTS/METERS/SWITCHES

Shift the transmission into neutral.  
Remove the socket bolt [1] and the gear position sensor [2] from the crankcase cover.



Coat a new O-ring (large) [1] with engine oil and install it onto a gear position sensor [2].

Install a new collar [3] to a gear position sensor.

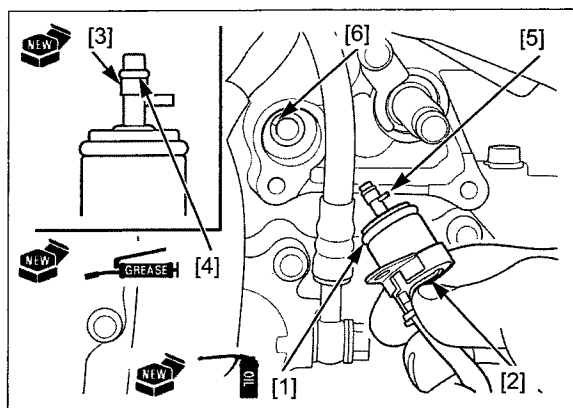
Apply grease to a new O-ring (small) [4] and install it onto a gear position sensor.

Install the gear position sensor by aligning the switch pin [5] with the slot [6] in the crankcase being careful not to damage the switch pin.

Install the socket bolt and tighten it securely.

Connect the gear position sensor 8P (Black) connector.

Install the engine heat guard (page 11-6).



*Route the gear position sensor wire properly (page 1-22).*

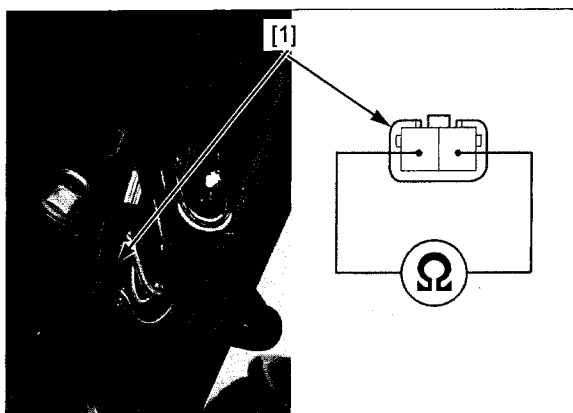
## SIDESTAND SWITCH

### INSPECTION

Remove the radiator (page 7-9).

Disconnect the sidestand switch 2P (Black) connector [1].

Check for continuity between the wire terminals of the sidestand switch 2P (Black) connector switch side. Continuity should exist only when the sidestand is up.

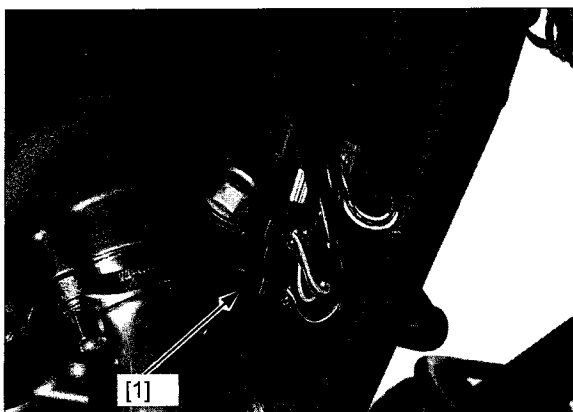


### REMOVAL/INSTALLATION

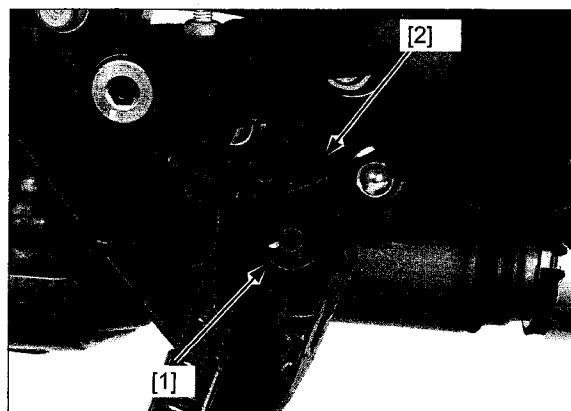
Remove the radiator (page 7-9).

Disconnect the sidestand switch 2P (Black) connector [1].

Remove the sidestand switch wire from the clamps.



Remove the bolt [1] and sidestand switch [2].



## INSTALLATION

Install the sidestand switch [1] by aligning the switch pin [2] with the sidestand hole [3] and the switch groove [4] with the return spring holding pin [5].

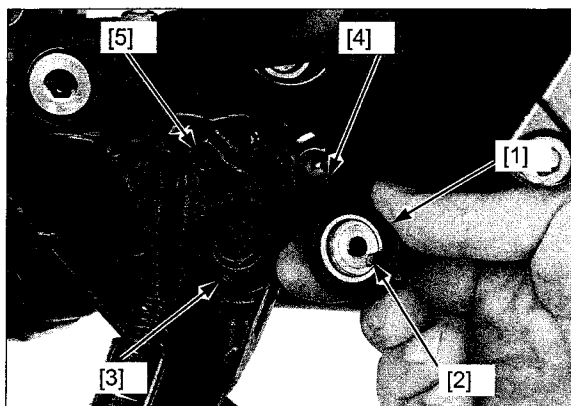
Secure the sidestand switch with a new bolt.

**TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)**

*Route the sidestand switch wire properly (page 1-22).*

Connect the sidestand switch 2P (Black) connector.

Install the radiator (page 7-9).

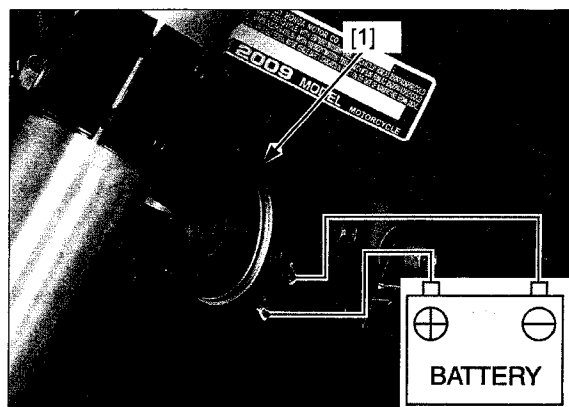


## HORN

### INSPECTION

Disconnect the wire connectors from the horn [1].

Connect the 12V battery to the horn terminal directly. The horn is normal if it sounds when the 12 V battery is connected across the horn terminals.

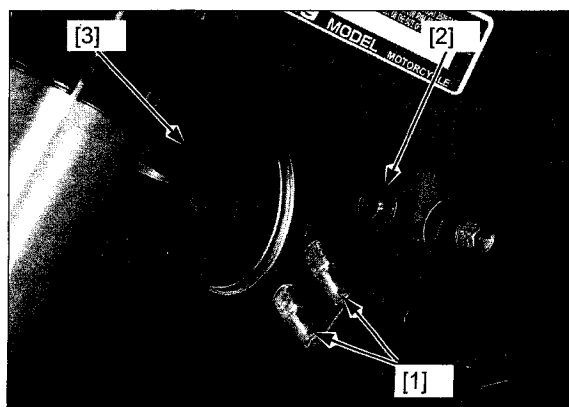


### REMOVAL/INSTALLATION

Disconnect the wire connectors [1] from the horn.

Remove the bolt [2] and horn [3].

Installation is in the reverse order of removal.

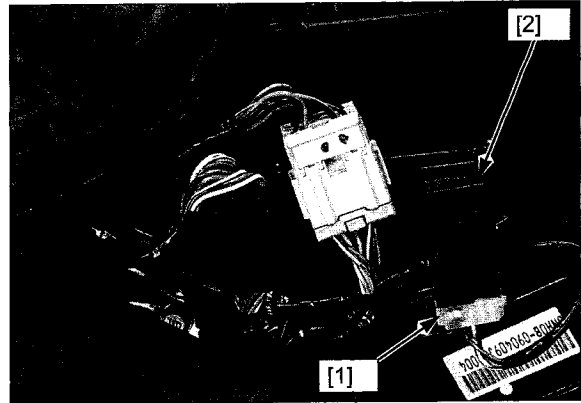




## HEADLIGHT RELAY

Lift and support the fuel tank (page 4-5).

Disconnect the headlight relay 4P connector [1], then remove the headlight relay [2].



Connect the ohmmeter to the headlight relay [1] connector terminals.

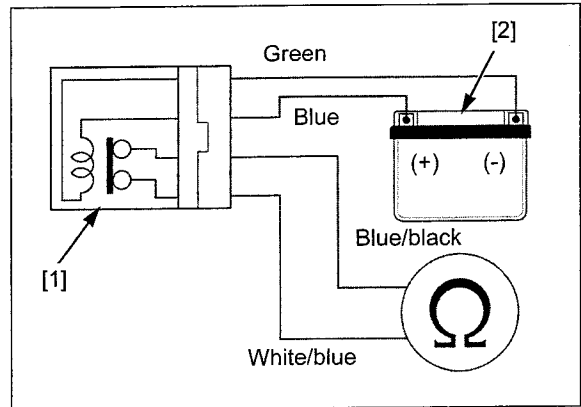
**CONNECTION:** Blue/black – White/blue

Connect the 12 V battery [2] to the following headlight relay connector terminals.

**CONNECTION:** Blue – Green

There should be continuity only when the 12 V battery is connected.

If the continuity is not exist when the 12 V battery is connected, replace the headlight relay.



## TURN SIGNAL RELAY

### INSPECTION

#### 1. Recommended Inspection

Check the following:

- battery condition
- burned out bulb or non-specified wattage
- blown fuse
- ignition switch and turn signal switch function
- loose connector

Check for the above items.

**Are the above items in good condition?**

**YES** – GO TO STEP 2.

**NO** – Replace or repair the faulty part(s)

#### 2. Turn Signal Circuit Inspection

Remove the left middle cowl (page 3-7).

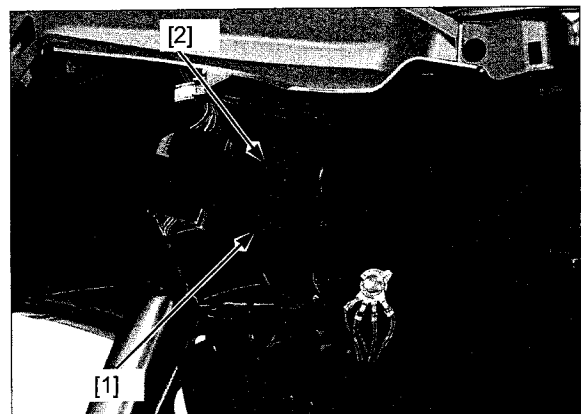
Disconnect the turn signal relay 4P (Natural) connector [1] from the relay [2].

Short the Gray and White/green terminals of the turn signal relay connector with a jumper wire. Turn the ignition switch ON and check the turn signal light.

**Is the light come on?**

**YES** – GO TO STEP 3.

**NO** – Open circuit in related wires



**3. Ground Line Inspection**

Check the continuity between the turn signal relay  
4P (Natural) connector Green terminal and ground.

***Is there continuity?***

- YES**    –    • Faulty turn signal switch  
                  • Loose or poor contact of the connector  
                  terminals
- NO**        – Open circuit in Green wire

---

# MEMO

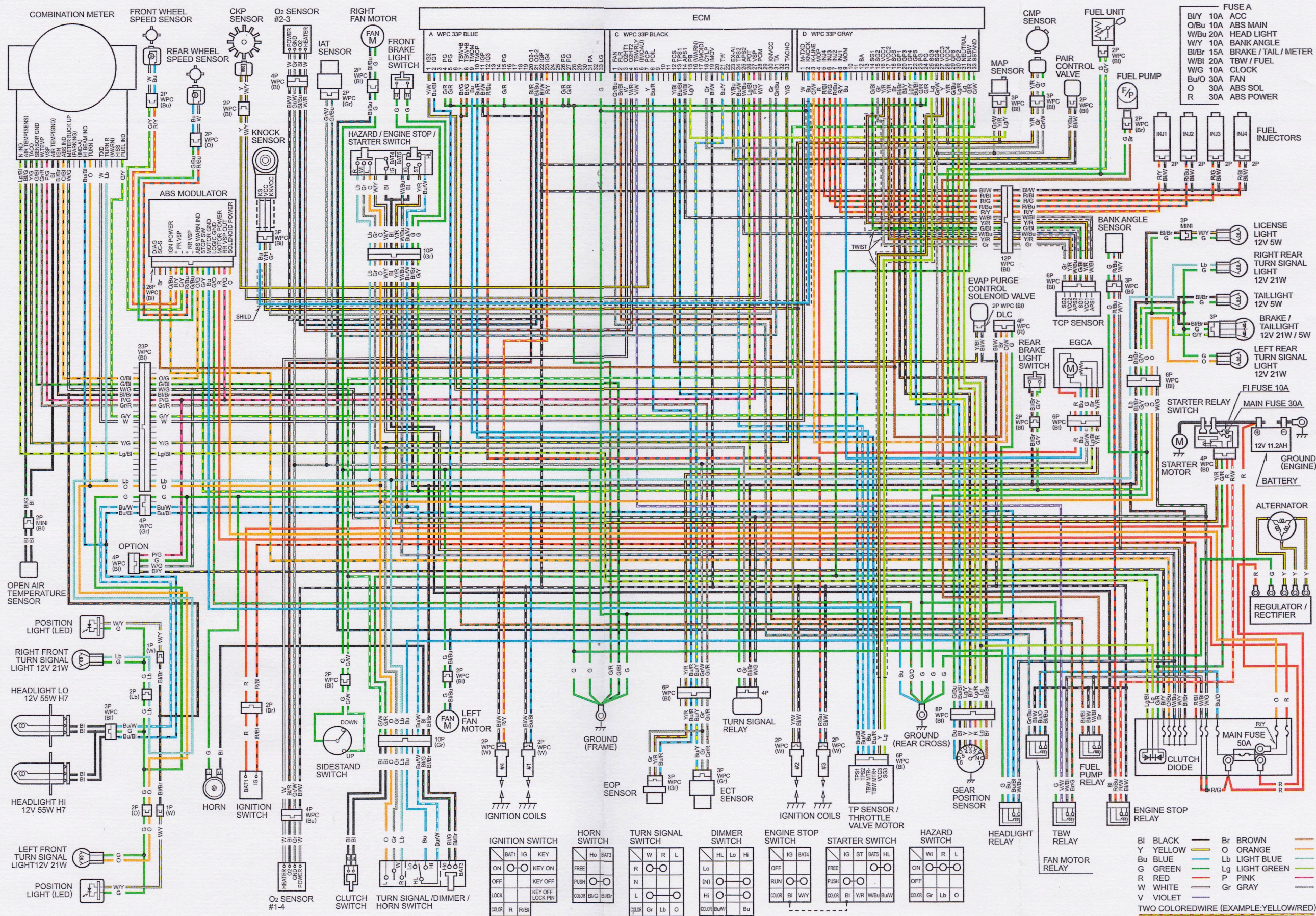
## 23. WIRING DIAGRAMS

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WIRING DIAGRAM.....23-2



# WIRING DIAGRAM





## 24. TROUBLESHOOTING

---

ENGINE DOES NOT START OR  
IS HARD TO START .....24-2

ENGINE LACKS POWER .....24-3

POOR PERFORMANCE AT IDLE AND LOW  
SPEED.....24-5

POOR PERFORMANCE AT HIGH  
SPEED.....24-6

POOR HANDLING .....24-6

# ENGINE DOES NOT START OR IS HARD TO START

### 1. Spark Plug Inspection

Remove and inspect spark plug.

***Are the spark plugs in good condition?***

- NO** – • Incorrect spark plug heat range  
• Incorrect spark plug gap  
• Dirty air cleaner

**YES** – GO TO STEP 2.

### 2. Spark Test

Perform spark test.

***Is the spark quality good?***

- NO** – • Faulty spark plug  
• Loose or disconnected ignition system wires  
• Faulty direct ignition coil  
• Faulty CKP sensor  
• Faulty CMP sensor  
• Faulty engine stop switch  
• Faulty ECM

**YES** – GO TO STEP 3.

### 3. Fuel Pump Inspection

Check for operation of the fuel pump, inspect the fuel pressure and fuel flow.

***Is the fuel pump unit normal?***

- NO** – Faulty fuel pump unit (page 6-62)

**YES** – GO TO STEP 4.

### 4. PGM-FI System Inspection

Check the fuel injection system.

***Is the fuel injection system normal?***

- NO** – Faulty fuel injection system.

**YES** – GO TO STEP 5.

### 5. Cylinder compression Inspection

Test the cylinder compression.

***Is the compression as specified?***

- NO** – • Valve stuck open  
• Worn cylinder and piston rings  
• Damaged cylinder head gasket  
• Seized valve  
• Improper valve timing

**YES** – GO TO STEP 6.

### 6. Engine Start Condition

Start by following the normal procedure.

***Does the engine start but stops?***

- Yes** – • Leaking insulator  
• Improper ignition timing (Faulty ECM, CKP sensor or CMP sensor)  
• Contaminated fuel

## ENGINE LACKS POWER

### 1. Drive Train Inspection

Raise wheel off the ground and spin by hand.

***Does the wheel spin freely?***

- NO** – • Brake dragging  
• Worn or damaged wheel bearings  
• Wheel installed improperly

**YES** – GO TO STEP 2.

### 2. Tire Pressure Inspection

Check the tire pressure.

***Are the tire pressures correct?***

- NO** – • Faulty tire valve  
• Punctured tire

**YES** – GO TO STEP 3.

### 3. Clutch Inspection

Accelerate rapidly low to second.

***Does the engine speed change accordingly when clutch is released?***

- NO** – • Clutch slipping  
• Worn clutch discs/plates  
• Warped clutch discs/plates  
• Weak clutch spring  
• Faulty hydraulic assist system  
• Additive in engine oil

**YES** – GO TO STEP 4.

### 4. Engine Performance Inspection

Accelerate lightly.

***Does the engine speed increase?***

- NO** – • Clogged air cleaner  
• Restricted fuel flow  
• Clogged muffler  
• Faulty ECV

**YES** – GO TO STEP 5.

### 5. Spark Plug Inspection

Remove and inspect spark plug.

***Are the spark plugs in good condition?***

- NO** – • Plugs not serviced frequently enough  
• Incorrect spark plug heat range  
• Incorrect spark plug gap

**YES** – GO TO STEP 6.

### 6. Engine Oil Inspection

Check the oil level and condition.

***Is the engine oil in good condition?***

- NO** – • Oil level too high  
• Oil level too low  
• Contaminated oil

**YES** – GO TO STEP 7.



### 7. Ignition Timing Inspection

Check the ignition timing.

***Is the ignition timing as specified?***

- NO** – • Faulty ECM  
• Faulty CKP sensor  
• Faulty CMP sensor  
• Faulty knock sensor  
• Faulty rear wheel speed sensor  
• Improper valve timing

**YES** – GO TO STEP 8.

### 8. Cylinder compression Inspection

Test the cylinder compression.

***Is the compression as specified?***

- NO** – • Valve clearance too small  
• Worn cylinder and piston rings  
• Damaged cylinder head gasket  
• Improper valve timing

**YES** – GO TO STEP 9.

### 9. Fuel Pump Inspection

Check for operation of the fuel pump, inspect the fuel pressure and fuel flow.

***Is the fuel pump unit normal?***

- NO** – Faulty fuel pump unit (page 6-62)

**YES** – GO TO STEP 10.

### 10. PGM-FI System Inspection

Check the fuel injection system.

***Is the fuel injection system normal?***

- NO** – Faulty fuel injection system.

**YES** – GO TO STEP 11.

### 11. Lubrication Inspection

Remove cylinder head cover and inspect lubrication.

***Is the valve train lubricated properly?***

- NO** – • Oil level too low  
• Faulty oil pump drive mechanism  
• Faulty oil pump

**YES** – GO TO STEP 12.

### 12. Over Heating Inspection

Check for engine over heating.

***Is the engine overheating?***

- YES** – • Coolant level too low  
• Fan motor not working (Faulty fan motor relay)  
• Thermostat stuck closed  
• Excessive carbon build-up in combustion chamber  
• Use of poor quality fuel  
• Clutch slipping

**NO** – GO TO STEP 13.

**13. Engine Knocking Inspection**

Accelerate or run at high speed.

***Is the engine knocking?***

- YES** – • Worn piston and cylinder  
• Wrong type of fuel  
• Thermostat stuck closed  
• Excessive carbon build-up in combustion chamber  
• Ignition timing too advance (Faulty ECM)  
• Faulty CKP sensor  
• Faulty CMP sensor  
• Faulty knock sensor  
• Faulty rear wheel speed sensor
- NO** – • Engine does not knock

**POOR PERFORMANCE AT IDLE AND LOW SPEED****1. Spark Plug Inspection**

Remove and inspect spark plugs.

***Are the spark plugs in good condition?***

- NO** – • Plugs not serviced frequently enough  
• Incorrect spark plug heat range  
• Incorrect spark plug gap

**YES** – GO TO STEP 2.

**2. Ignition Timing Inspection**

Check the ignition timing.

***Is the ignition timing as specified?***

- NO** – • Faulty ECM  
• Faulty CKP sensor  
• Faulty CMP sensor  
• Improper valve timing  
• Faulty knock sensor  
• Faulty rear wheel speed sensor

**YES** – GO TO STEP 3.

**3. Fuel Pump Inspection**

Check for operation of the fuel pump, inspect the fuel pressure and fuel flow.

***Is the fuel pump unit normal?***

- NO** – Faulty fuel pump unit (page 6-62)
- YES** – GO TO STEP 4.

**4. PGM-FI System Inspection**

Check the fuel injection system.

***Is the fuel injection system normal?***

- NO** – Faulty fuel injection system
- YES** – GO TO STEP 5.

**5. Intake Pipe Leaking Inspection**

Check for leaks intake manifold pipe.

***Are there leaks?***

- YES** – • Loose insulator  
• Damaged insulator

### POOR PERFORMANCE AT HIGH SPEED

#### 1. Ignition Timing Inspection

Check the ignition timing.

*Is the ignition timing as specified?*

- NO** – • Faulty ECM  
• Faulty CKP sensor  
• Faulty CMP sensor  
• Improper valve timing

**YES** – GO TO STEP 2.

#### 2. Fuel Pump Inspection

Check for operation of the fuel pump, inspect the fuel pressure and fuel flow.

*Is the fuel pump unit normal?*

**NO** – Faulty fuel pump unit (page 6-62)

**YES** – GO TO STEP 3.

#### 3. PGM-FI System Inspection

Check the fuel injection system.

*Is the fuel injection system normal?*

**NO** – Faulty fuel injection system.

**YES** – GO TO STEP 4.

#### 4. Valve Timing Inspection

Check the valve timing.

*Is the valve timing correct?*

**NO** – Camshafts not installed properly

**YES** – GO TO STEP 5.

#### 5. Valve Spring Inspection

Check the valve springs.

*Is the valve spring free length as specified?*

**NO** – Faulty valve spring

**YES** – Not weak

### POOR HANDLING

#### Steering is heavy

- Steering bearing adjustment nut too tight
- Damaged steering head bearings

#### Either wheel is wobbling

- Excessive wheel bearing play
- Bent rim
- Improper installed wheel hub
- Swingarm pivot bearing excessively worn
- Bent frame

#### The motorcycle pulls to one side

- Front and rear wheel not aligned
- Faulty shock absorber
- Bent fork
- Bent swingarm
- Bent axle
- Bent frame

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