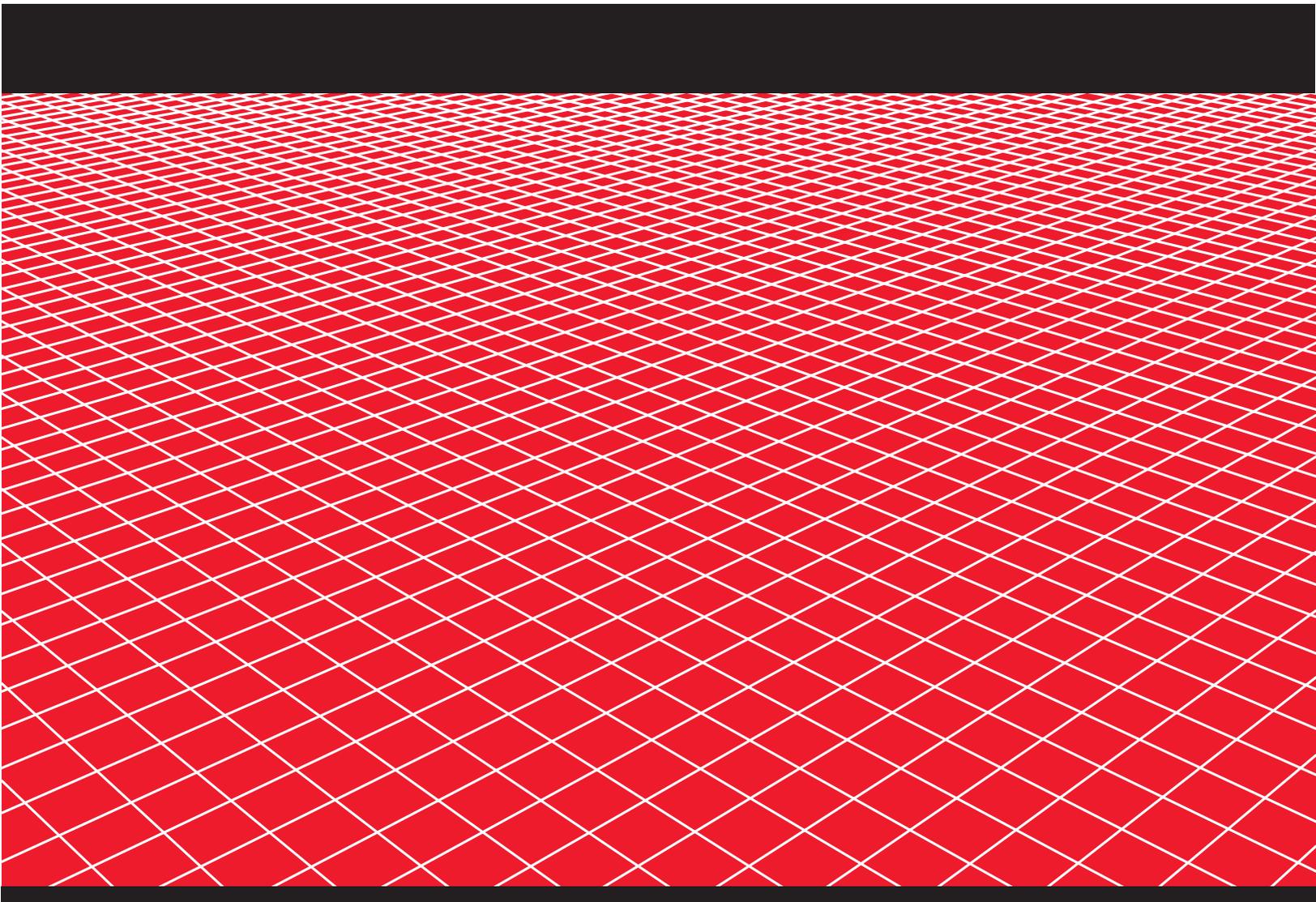




# **SERVIÇE MANUAL**

## **LEAD 110**

### **2009**



## **TYPE CODE**

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

CODE	AREA TYPE
HVN	Vietnam

## ***A Few Words About Safety***

### **Service Information**

The service and repair information contained in this manual is intended for use by qualified, professional technicians. Attempting service or repairs without the proper training, tools, and equipment could cause injury to you or others. It could also damage the vehicle or create an unsafe condition.

This manual describes the proper methods and procedures for performing service, maintenance, and repairs. Some procedures require the use of specially designed tools and dedicated equipment. Any person who intends to use a replacement part, service procedure or a tool that is not recommended by Honda, must determine the risks to their personal safety and the safe operation of the vehicle.

If you need to replace a part, use genuine Honda parts with the correct part number or an equivalent part. We strongly recommend that you do not use replacement parts of inferior quality.

### **For Your Customer's Safety**

Proper service and maintenance are essential to the customer's safety and the reliability of the vehicle. Any error or oversight while servicing a vehicle can result in faulty operation, damage to the vehicle, or injury to others.

### **For Your Safety**

Because this manual is intended for the professional service technician, we do not provide warnings about many basic shop safety practices (e.g., Hot parts—wear gloves). If you have not received shop safety training or do not feel confident about your knowledge of safe servicing practice, we recommend that you do not attempt to perform the procedures described in this manual.

Some of the most important general service safety precautions are given below. However, we cannot warn you of every conceivable hazard that can arise in performing service and repair procedures. Only you can decide whether or not you should perform a given task.

### **Important Safety Precautions**

Make sure you have a clear understanding of all basic shop safety practices and that you are wearing appropriate clothing and using safety equipment. When performing any service task, be especially careful of the following:

- Read all of the instructions before you begin, and make sure you have the tools, the replacement or repair parts, and the skills required to perform the tasks safely and completely.
- Protect your eyes by using proper safety glasses, goggles or face shields any time you hammer, drill, grind, pry or work around pressurized air or liquids, and springs or other stored-energy components. If there is any doubt, put on eye protection.
- Use other protective wear when necessary, for example gloves or safety shoes. Handling hot or sharp parts can cause severe burns or cuts. Before you grab something that looks like it can hurt you, stop and put on gloves.
- Protect yourself and others whenever you have the vehicle up in the air. Any time you lift the vehicle, either with a hoist or a jack, make sure that it is always securely supported. Use jack stands.

Make sure the engine is off before you begin any servicing procedures, unless the instruction tells you to do otherwise. This will help eliminate several potential hazards:

- Carbon monoxide poisoning from engine exhaust. Be sure there is adequate ventilation whenever you run the engine.
- Burns from hot parts or coolant. Let the engine and exhaust system cool before working in those areas.
- Injury from moving parts. If the instruction tells you to run the engine, be sure your hands, fingers and clothing are out of the way.

Gasoline vapors and hydrogen gases from batteries are explosive. To reduce the possibility of a fire or explosion, be careful when working around gasoline or batteries.

- Use only a nonflammable solvent, not gasoline, to clean parts.
- Never drain or store gasoline in an open container.
- Keep all cigarettes, sparks and flames away from the battery and all fuel-related parts.

#### **⚠ WARNING**

Improper service or repairs can create an unsafe condition that can cause your customer or others to be seriously hurt or killed.

Follow the procedures and precautions in this manual and other service materials carefully.

#### **⚠ WARNING**

Failure to properly follow instructions and precautions can cause you to be seriously hurt or killed.

Follow the procedures and precautions in this manual carefully.

# HOW TO USE THIS MANUAL

This service manual describes the service procedures for the NHX110-9.

Follow the Maintenance Schedule (Section 4) recommendations to ensure that the vehicle is in peak operating condition.

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

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

Section 5 through 21 describe parts of the scooter, 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 scooter, read Technical Feature in Section 2.

If you don't know the source of the trouble, go to section 23 Troubleshooting.

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.

**ALL INFORMATION, ILLUSTRATIONS, DIRECTIONS AND SPECIFICATIONS INCLUDED IN THIS PUBLICATION ARE BASED ON THE LATEST PRODUCT INFORMATION AVAILABLE AT THE TIME OF APPROVAL FOR PRINTING. Honda Motor Co., Ltd. RESERVES THE RIGHT TO MAKE CHANGES AT ANY TIME WITHOUT NOTICE AND WITHOUT INCURRING ANY OBLIGATION WHATSOEVER. NO PART OF THIS PUBLICATION MAY BE REPRODUCED WITHOUT WRITTEN PERMISSION. THIS MANUAL IS WRITTEN FOR PERSONS WHO HAVE ACQUIRED BASIC KNOWLEDGE OF MAINTENANCE ON Honda MOTORCYCLES, MOTOR SCOOTERS OR ATVS.**

Honda Motor Co., Ltd.  
SERVICE PUBLICATION OFFICE

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# 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.

	<p>Replace the part(s) with new one(s) before assembly.</p>
	<p>Use recommended engine oil, unless otherwise specified.</p>
	<p>Use molybdenum oil solution (mixture of the engine oil and molybdenum grease in a ratio of 1: 1).</p>
	<p>Use multi-purpose grease (Lithium based multi-purpose grease NLGI #2 or equivalent).</p>
	<p>Use molybdenum disulfide grease (containing more than 3% molybdenum disulfide, NLGI #2 or equivalent).            Example: Molykote® BR-2 plus manufactured by Dow Corning U.S.A.            Multi-purpose M-2 manufactured by Mitsubishi Oil, Japan</p>
	<p>Use molybdenum disulfide paste (containing more than 40% molybdenum disulfide, NLGI #2 or equivalent).            Example: Molykote® G-n Paste manufactured by Dow Corning U.S.A.            Honda Moly 60 (U.S.A. only)            Rocol ASP manufactured by Rocol Limited, U.K.            Rocol Paste manufactured by Sumico Lubricant, Japan</p>
	<p>Use silicone grease.</p>
	<p>Apply a locking agent. Use a middle strength locking agent unless otherwise specified.</p>
	<p>Apply sealant.</p>
	<p>Use DOT 3 or DOT 4 brake fluid. Use the recommended brake fluid unless otherwise specified.</p>
	<p>Use Fork or Suspension Fluid.</p>

# 1. GENERAL INFORMATION

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## GENERAL INFORMATION

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### SERVICE RULES

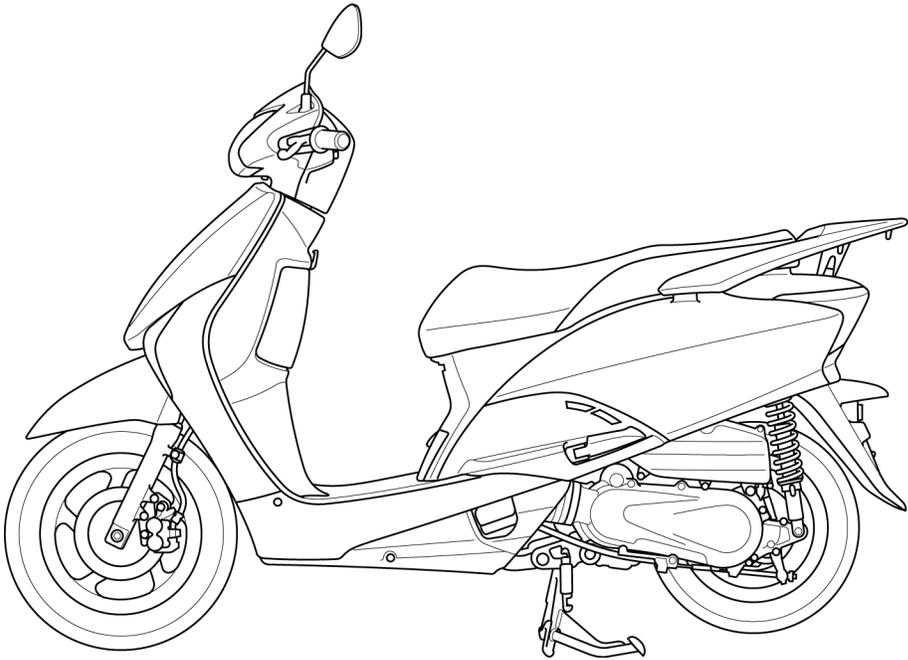
1. Use genuine Honda or Honda-recommended parts and lubricants or their equivalents. Parts that do not meet Honda's design specifications may cause damage to the scooter.
2. Use the special tools designed for this product to avoid damage and incorrect assembly.
3. Use only metric tools when servicing the scooter. 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 shown in the Cable and Harness Routing (page 1-17).

### ABBREVIATION

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

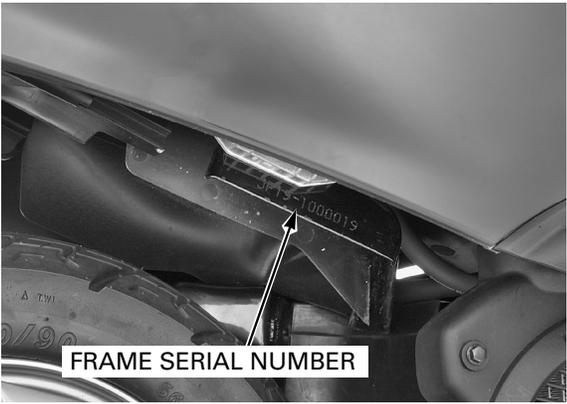
<b>Abbrev. term</b>	<b>Full term</b>
PGM-FI	Programmed Fuel Injection
MAP sensor	Manifold Absolute Pressure sensor
TP sensor	Throttle Position sensor
ECT sensor	Engine Coolant Temperature sensor
IAT sensor	Intake Air Temperature sensor
CKP sensor	Crankshaft Position sensor
IACV	Idle Air Control Valve
ECM	Engine Control Module
EEPROM	Electrically Erasable Programmable Read Only Memory
DLC	Data Link Connector
SCS connector	Service Check Short connector
MIL	Malfunction Indicator Lamp
PCV	Positive Crankcase Ventilation

**MODEL IDENTIFICATION**

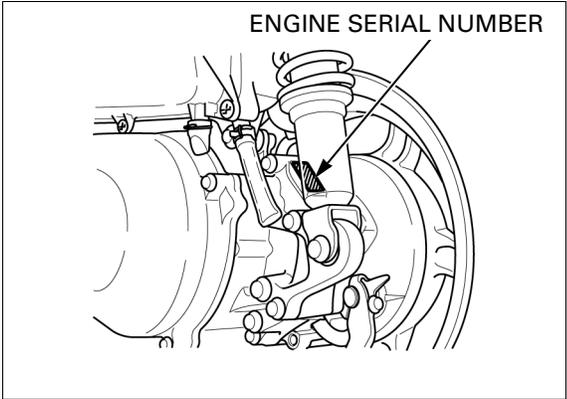


**SERIAL NUMBERS**

The frame serial number is stamped on the right side of the frame near the regulator.



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

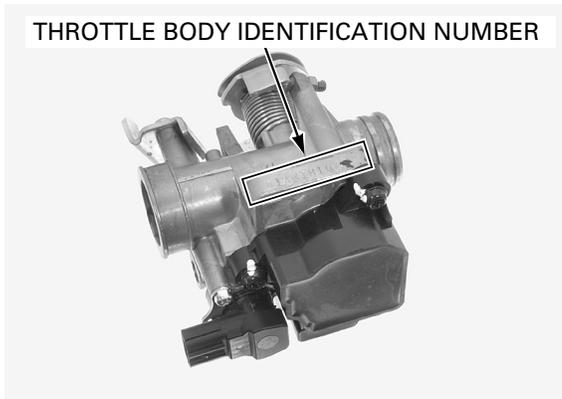


## GENERAL INFORMATION

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The throttle body identification number is stamped on the lower side of the throttle body.

THROTTLE BODY IDENTIFICATION NUMBER



## GENERAL SPECIFICATIONS

	ITEM	SPECIFICATIONS
DIMENSIONS	Overall length Overall width Overall height Wheelbase Seat height Footpeg height Ground clearance Curb weight	1,838 mm (72.4 in) 668 mm (26.3 in) 1,125 mm (44.3 in) 1,274 mm (50.2 in) 740 mm (29.1 in) 289 mm (11.4 in) 115 mm (4.5 in) 113 kg (249 lbs)
FRAME	Frame type Front suspension Front axle travel Rear suspension Rear axle travel Front tire size Rear tire size Front tire brand Rear tire brand Front brake Rear brake Caster angle Trail length Fuel tank capacity	Under bone type Telescopic fork 80 mm (3.1 in) Unit swing 70 mm (2.8 in) 90/90 – 12M/C 44J 100/90 – 10M/C 56J C-922 (CHENG SHIN), MB60(IRC) C-922 (CHENG SHIN), MB47(IRC) Hydraulic disc brake Mechanical leading trailing 26° 30' 74 mm (2.91 in) 6.5 liter (1.72 US gal, 1.43 Imp gal)
ENGINE	Bore and stroke Displacement Compression ratio Valve train Intake valve opens Intake valve closes Exhaust valve opens Exhaust valve closes Lubrication system Oil pump type Cooling system Air filtration Engine dry weight	50.0 x 55.0 mm (1.97 x 2.17 in) 108.0 cm <sup>3</sup> (6.59 cu-in) 11.0: 1 2 valve, single chain driven SOHC 10° BTDC (at 1 mm lift) 25° ABDC (at 1 mm lift) 35° BBDC (at 1 mm lift) 5° BTDC (at 1 mm lift) Forced pressure and wet sump Trochoid Liquid cooled Viscous paper element 27.5 kg (60.6 lbs)
FUEL DELIV- ERY SYSTEM	Type Throttle bore	PGM-FI 20 mm (0.8 in)
DRIVE TRAIN	Clutch system Drive belt ratio Final reduction	Dry, automatic centrifugal clutch 2.59: 1 – 0.88: 1 9.423 (50/20 x 49/13)
ELECTRICAL	Ignition system Starting system Charging system Regulator/rectifier Lighting system	Full transistorized Electric starter motor Triple phase output alternator SCR shorted/triple phase full-wave rectification Battery

## GENERAL INFORMATION

# LUBRICATION SYSTEM SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Engine oil capacity	After draining	0.7 liter (0.7 US qt, 0.6 Imp qt)	–
	After disassembly	0.8 liter (0.8 US qt, 0.7 Imp qt)	–
Recommended engine oil		API service classification: SG or higher (except oils labeled as energy conserving on the circular API service label) Viscosity: SAE 10W-30 JASO T 903 standard: MB	–
Oil pump rotor	Tip clearance	0.15 (0.006)	0.20 (0.008)
	Body clearance	0.15 – 0.21 (0.006 – 0.008)	0.35 (0.014)
	Side clearance	0.05 – 0.10 (0.002 – 0.004)	0.12 (0.005)

## FUEL SYSTEM (PGM-FI) SPECIFICATIONS

ITEM	SPECIFICATIONS
Throttle body identification number	GQQ2A
Engine idle speed	1,700 ± 100 min <sup>-1</sup> (rpm)
Throttle grip freeplay	2 – 6 mm (0.08 – 0.24 in)
Fuel injector resistance (at 20°C /68°F)	9 – 12 Ω
PCV solenoid valve resistance (at 20°C /68°F)	30 – 34 Ω
Fuel pressure	294 kPa (3.0 kgf/cm <sup>2</sup> , 43 psi)
Fuel pump flow (at 12 V)	98 cm <sup>3</sup> (3.3 US oz, 3.5 Imp oz) minimum/10 seconds

## COOLING SYSTEM SPECIFICATIONS

ITEM	SPECIFICATIONS	
Coolant capacity	Radiator and engine	0.41 liter (0.43 US qt, 0.36 Imp qt)
	Reserve tank	0.10 liter (0.11 US qt, 0.09 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	74.5 – 77.5 °C (166 – 172 °F)
	Fully open	85 °C (185 °F)
	Valve lift	3.5 mm (0.1 in) minimum
Recommended coolant		Honda PRE-MIX COOLANT

## CYLINDER HEAD/VALVES SPECIFICATIONS

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Cylinder compression			1,098 kPa (11.2 kgf/cm <sup>2</sup> , 159 psi) at 550 rpm	–
Cylinder head warpage			–	0.05 (0.002)
Rocker arm	Rocker arm I.D.	IN/EX	10.000 – 10.015 (0.3937 – 0.3943)	10.10 (0.398)
	Rocker arm shaft O.D.	IN/EX	9.972 – 9.987 (0.3926 – 0.3932)	9.91 (0.390)
	Arm-to-shaft clearance	IN/EX	0.013 – 0.043 (0.0005 – 0.0017)	0.08 (0.003)
Camshaft	Cam lobe height	IN	32.542 – 32.782 (1.2812 – 1.2906)	32.52 (1.280)
		EX	32.263 – 32.503 (1.2702 – 1.2796)	32.24 (1.269)
Valve, valve guide	Valve clearance	IN	0.16 ± 0.02 (0.006 ± 0.001)	–
		EX	0.25 ± 0.02 (0.010 ± 0.001)	–
	Valve stem O.D.	IN	4.975– 4.990 (0.1959 – 0.1965)	4.90 (0.193)
		EX	4.955 – 4.970 (0.1951 – 0.1957)	4.90 (0.193)
	Valve guide I.D.	IN/EX	5.000 – 5.012 (0.1969 – 0.1973)	5.03 (0.198)
	Stem-to-guide clearance	IN	0.010 – 0.037 (0.0004 – 0.0015)	0.08 (0.003)
		EX	0.030 – 0.057 (0.0012 – 0.0022)	0.10 (0.004)
	Valve guide projection above cylinder head	IN/EX	9.1 – 9.3 (0.36 – 0.37)	–
Valve seat width	IN/EX	0.90 – 1.10 (0.035 – 0.043)	1.5 (0.06)	
Valve spring free length	IN/EX	Outer	38.33 (1.509)	37.04 (1.458)
		Inner	31.53 (1.241)	30.66 (1.207)

## CYLINDER/PISTON SPECIFICATIONS

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT	
Cylinder	I.D.		50.000 – 50.010 (1.9685 – 1.9689)	50.10 (1.972)	
	Out-of-round		–	0.05 (0.002)	
	Taper		–	0.05 (0.002)	
	Warpage		–	0.05 (0.002)	
Piston, piston ring, piston pin	Piston O.D.		49.970 – 49.990 (1.9673 – 1.9681)	49.95 (1.967)	
	Piston O.D. measurement point		10 (0.4) from bottom of skirt	–	
	Piston pin bore I.D.		13.002 – 13.008 (0.5119 – 0.5121)	13.04 (0.513)	
	Piston pin O.D.		12.994 – 13.000 (0.5116 – 0.5118)	12.96 (0.510)	
	Piston-to-piston pin clearance		0.002 – 0.014 (0.0001 – 0.0006)	0.02 (0.001)	
	Piston ring-to-ring groove clearance	Top		0.015 – 0.045 (0.0006 – 0.0018)	0.08 (0.003)
		Second		0.015 – 0.045 (0.0006 – 0.0018)	0.08 (0.003)
	Piston ring end gap	Top		0.10 – 0.25 (0.004 – 0.010)	0.45 (0.018)
		Second		0.10 – 0.25 (0.004 – 0.010)	0.45 (0.018)
Oil (side rail)			0.20 – 0.70 (0.008 – 0.028)	–	
Cylinder-to-piston clearance			0.010 – 0.040 (0.0004 – 0.0016)	0.09 (0.004)	
Connecting rod small end I.D.			13.010 – 13.028 (0.5122 – 0.5129)	13.05 (0.514)	
Connecting rod-to-piston pin clearance			0.010 – 0.034 (0.0004 – 0.0013)	0.05 (0.002)	
Stud bolt projection above crankcase			177.5 – 178.5 (6.99 – 7.03)	–	

## GENERAL INFORMATION

# DRIVE PULLEY/DRIVEN PULLEY/CLUTCH SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Drive belt width		18.5 (0.73)	17.5 (0.69)
Movable drive face	Bushing I.D.	22.035 – 22.085 (0.8675 – 0.8695)	22.11 (0.870)
	Boss O.D.	22.010 – 22.025 (0.8665 – 0.8671)	21.98 (0.865)
	Weight roller O.D.	17.92 – 18.08 (0.706 – 0.712)	17.5 (0.69)
Clutch	Lining thickness	–	2.0 (0.08)
	Clutch outer I.D.	125.0 – 125.2 (4.92 – 4.93)	125.5 (4.94)
Driven pulley	Face spring free length	111.4 (4.39)	108.0 (4.25)
	Driven face boss O.D.	33.965 – 33.985 (1.3372 – 1.3380)	33.94 (1.336)
	Movable driven face I.D.	34.000 – 34.025 (1.3386 – 1.3396)	34.06 (1.341)

## FINAL REDUCTION SPECIFICATIONS

ITEM		SPECIFICATIONS
Final reduction oil capacity	After draining	0.10 liter (0.11 US qt, 0.09 Imp qt)
	After disassembly	0.12 liter (0.13 US qt, 0.11 Imp qt)
Recommended final reduction oil		API service classification: SG or higher (except oils labeled as energy conserving on the circular API service label) Viscosity: SAE 10W-30 JASO T 903 standard: MB

## CRANKCASE/CRANKSHAFT SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Crankshaft	Connecting rod side clearance	0.10 – 0.35 (0.004 – 0.014)	0.55 (0.022)
	Connecting rod radial clearance	0.004 – 0.016 (0.0002 – 0.0006)	0.05 (0.002)
	Runout	–	0.10 (0.004)

## FRONT WHEEL/SUSPENSION/STEERING SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Minimum tire tread depth		-	To the indicator
Cold tire pressure	Driver only	175 kPa (1.75 kgf/cm <sup>2</sup> , 25 psi)	-
	Driver and passenger	175 kPa (1.75 kgf/cm <sup>2</sup> , 25 psi)	-
Axle runout		-	0.2 (0.01)
Wheel rim runout	Radial	-	2.0 (0.08)
	Axial	-	2.0 (0.08)
Fork	Spring free length	218.0 (8.58)	213.6 (8.41)
	Pipe runout	-	0.2 (0.01)
	Recommended fluid	Fork fluid	-
	Fluid level	52 (2.0)	-
	Fluid capacity	89.0 ± 1.0 cm <sup>3</sup> (3.01 ± 0.03 US oz, 3.13 ± 0.04 Imp oz)	-

## REAR WHEEL/SUSPENSION SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Minimum tire tread depth		-	To the indicator
Cold tire pressure	Driver only	200 kPa (2.00 kgf/cm <sup>2</sup> , 29 psi)	-
	Driver and passenger	225 kPa (2.25 kgf/cm <sup>2</sup> , 33 psi)	-
Wheel rim runout	Radial	-	2.0 (0.08)
	Axial	-	2.0 (0.08)

## BRAKE SYSTEM SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Front disc brake	Specified brake fluid	DOT 3 or DOT 4	-
	Brake disc thickness	3.3 – 3.7 (0.13 – 0.15)	3.0 (0.12)
	Brake disc warpage	-	0.30 (0.012)
	Master cylinder I.D.	12.700 – 12.743 (0.5000 – 0.5017)	12.755 (0.5022)
	Master piston O.D.	12.657 – 12.684 (0.4983 – 0.4994)	12.645 (0.4978)
	Caliper cylinder I.D.	27.000 – 27.050 (1.0630 – 1.0650)	27.060 (1.0654)
	Caliper piston O.D.	26.918 – 26.968 (1.0598 – 1.0617)	26.91 (1.059)
Rear drum brake	Brake lever freeplay	10 – 20 (0.4 – 0.8)	-
	Brake drum I.D.	130.0 – 130.2 (5.12 – 5.13)	131.0 (5.16)

## GENERAL INFORMATION

### BATTERY/CHARGING SYSTEM SPECIFICATIONS

ITEM			SPECIFICATIONS
Battery	Capacity		12 V – 6 Ah
	Current leakage		0.1 mA max.
	Voltage (20°C/68°F)	Fully charged	Above 12.8 V
		Needs charging	Below 12.3 V
	Charging current	Normal	0.6 A/5 – 10 h
Quick		3.0 A/1.0 h	
Alternator	Capacity		0.22 kW/5,000 min <sup>-1</sup> (rpm)
	Charging coil resistance (20°C/68°F)		0.1 – 1.0 Ω

### IGNITION SYSTEM SPECIFICATIONS

ITEM		SPECIFICATIONS
Spark plug	Standard	CR7EH-9 (NGK), U22FER9 (DENSO)
	For extended high speed riding	CR8EH-9 (NGK), U24FER9 (DENSO)
Spark plug gap		0.80 – 0.90 mm (0.031 – 0.035 in)
Ignition coil primary peak voltage		100 V minimum
CKP sensor peak voltage		0.7 V minimum
Ignition timing ("F"mark)		14° BTDC at engine idle speed

### ELECTRIC STARTER SPECIFICATIONS

Unit: mm (in)

ITEM	STANDARD	SERVICE LIMIT
Starter motor brush length	7.0 (0.28)	3.5 (0.14)

### LIGHTS/METERS/SWITCHES SPECIFICATIONS

ITEM			SPECIFICATIONS
Bulbs	Headlight	Hi	12 V – 35 W
		Lo	12 V – 30 W
	Brake/tail light		12 V – 21/5 W
	Turn signal light		12 V – 21 W x 4
	License light		12 V – 5 W
	Instrument light		12 V – 1.7 W x 2
	Turn signal indicator		12 V – 3 W x 2
	High beam indicator		12 V – 1.7 W
PGM-FI malfunction indicator lamp (MIL)		LED	
Fuse	Main fuse		20 A
	Sub fuse		10 A x 3

## 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 (0.53, 3.8)	5 mm screw	4.2 (0.43, 3.1)
6 mm hex bolt and nut (Include SH flange bolt)	10 (1.0, 7)	6 mm screw	9 (0.92, 6.6)
8 mm hex bolt and nut	22 (2.2, 16)	6 mm flange bolt (Include NSHF) and nut	12 (1.2, 8.9)
10 mm hex bolt and nut	34 (3.5, 25)	8 mm flange bolt and nut	27 (2.8, 20)
12 mm hex bolt and nut	54 (5.5, 40)	10 mm flange bolt and nut	39 (4.0, 29)

## ENGINE & FRAME TORQUE VALUES

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

### FRAME/BODY PANELS/EXHAUST SYSTEM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Front fender mounting bolt	4	6	10 (1.0, 7)	Apply locking agent to the threads.
Floor panel mounting bolt	4	6	7 (0.71, 5.2)	
Exhaust pipe joint nut	2	6	14 (1.4, 10)	
Muffler mounting bolt	2	10	59 (6.0, 44)	
Exhaust pipe stud bolt	2	–	–	See page 3-13

### MAINTENANCE

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Throttle cable lock nut (Throttle body side)	2	8	8.5 (0.87, 6.3)	Apply engine oil to the threads and seating surface.
Air cleaner element screw	4	5	1.1 (0.11, 0.8)	
Air cleaner housing cover screw	7	5	1.1 (0.11, 0.8)	
Spark plug	1	10	16 (1.6, 12)	
Valve adjusting screw lock nut	2	5	10 (1.0, 7)	
Engine oil drain bolt	1	12	24 (2.4, 18)	
Engine oil strainer screen cap	1	30	20 (2.0, 15)	
Final reduction oil check bolt	1	8	13 (1.3, 10)	
Final reduction oil drain bolt	1	8	13 (1.3, 10)	
Equalizer connecting cable lock nut	1	8	6.4 (0.65, 4.7)	
Headlight adjusting bolt	1	4	1.8 (0.18, 1.3)	

### LUBRICATION SYSTEM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Oil pump plate screw	1	4	3 (0.31, 2.2)	
Oil pump mounting bolt	2	6	10 (1.0, 7)	

## GENERAL INFORMATION

### FUEL SYSTEM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Fuel pump mounting nut	7	6	12 (1.2, 9)	See page 6-37
Left floor panel side frame mounting bolt	1	10	49 (5.0, 36)	
Air connecting hose band	–	–	–	See page 6-40
Sensor unit mounting torx screw	3	5	3.4 (0.35, 2.5)	
Throttle cable bracket screw	1	5	3.4 (0.35, 2.5)	See page 6-41
IACV mounting torx screw	2	4	2.1 (0.21, 1.5)	
Insulator band	–	–	–	
Injector mounting bolt	2	6	12 (1.2, 9)	
Bank angle sensor mounting screw	2	4	1.2 (0.12, 0.9)	
ECT sensor	1	12	25 (2.5, 18)	
O <sub>2</sub> sensor	1	12	25 (2.5, 18)	See page 6-58
Intake pipe stud bolt	2	–	–	
PCV solenoid valve mounting bolt	2	5	6 (0.61, 4.4)	

### COOLING SYSTEM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Radiator drain bolt	1	10	1 (0.10, 0.7)	
Cooling fan bolt	3	6	8 (0.82, 5.9)	
Water pump impeller	1	6	10 (1.0, 7)	

### ENGINE REMOVAL/INSTALLATION

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Engine hanger link pivot nut (Frame side)	1	10	69 (7.0, 51)	
Engine hanger link pivot nut (Engine side)	1	10	49 (5.0, 36)	

### CYLINDER HEAD/VALVES

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Cylinder head cover special bolt	2	6	12 (1.2, 9)	Apply engine oil to the threads and seating surface.
Camshaft holder nut	4	7	18 (1.8, 13)	
Cam sprocket socket bolt	2	5	8 (0.82, 5.9)	
Cam chain tensioner lifter screw	1	6	4 (0.41, 3.0)	

### CYLINDER/PISTON

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Cylinder stud bolt	–	–	–	See page 10-7

### DRIVE PULLEY/DRIVEN PULLEY/CLUTCH

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Drive pulley face nut	1	14	108 (11.0, 80)	Apply engine oil to the threads and seating surface.
Left crankcase cover air duct band	–	–	–	
Clutch/driven pulley nut	1	28	54 (5.5, 40)	See page 6-37
Clutch outer nut	1	12	49 (5.0, 36)	

### ALTERNATOR

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Stator mounting socket bolt	3	6	10 (1.0, 7)	
Flywheel nut	1	12	59 (6.0, 44)	

**FRONT WHEEL/SUSPENSION/STEERING**

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Front brake disc socket bolt	4	8	42 (4.3, 31)	ALOC bolt; replace with a new one.
Front axle nut	1	12	59 (6.0, 44)	U-nut
Fork socket bolt	2	8	20 (2.0, 15)	Apply locking agent to the threads.
Fork pinch bolt	4	10	49 (5.0, 36)	
Fork cap bolt	2	26	23 (2.3, 17)	
Handlebar post nut	1	10	33 (3.4, 24)	See page 15-22
Steering stem lock nut	1	BC 1	-	See page 15-26
Steering stem adjusting nut	1	BC 1	-	See page 15-26

**REAR WHEEL/SUSPENSION**

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Rear axle nut	1	16	118 (12.0, 87)	Apply engine oil to the threads and seating surface. U-nut

**BRAKE SYSTEM**

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Brake caliper bleed valve	1	8	5.4 (0.55, 4.0)	
Master cylinder reservoir cap screw	2	4	1.5 (0.15, 1.1)	
Brake caliper mounting bolt	2	8	30 (3.1, 22)	ALOC bolt; replace with a new one.
Brake pad pin	2	10	17.2 (1.8, 13)	
Brake pad pin plug	2	10	2.4 (0.25, 1.8)	
Front brake light switch screw	1	4	1.2 (0.12, 0.9)	
Front brake lever pivot screw	1	6	1.0 (0.10, 0.7)	
Front brake lever pivot nut	1	6	5.9 (0.60, 4.4)	
Brake master cylinder holder bolt	2	6	12 (1.2, 9)	
Brake hose oil bolt	2	10	34 (3.5, 25)	
Rear brake lever pivot screw	1	5	1.0 (0.10, 0.7)	
Rear brake lever pivot nut	1	5	4.5 (0.46, 3.3)	U-nut
Equalizer rod pivot screw	1	5	1.0 (0.10, 0.7)	
Equalizer rod pivot nut	1	5	4.5 (0.5, 3.3)	U-nut
Equalizer bracket cover screw	2	5	4.2 (0.43, 3.1)	
Equalizer bracket cover special screw	1	5	4.2 (0.43, 3.1)	
Rear brake arm bolt	1	6	10 (1.0, 7)	ALOC bolt; replace with a new one.

## GENERAL INFORMATION

### ELECTRIC STARTER

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Starter motor case screw	3	4	2 (0.20, 1.5)	

### LIGHTS/METERS/SWITCHES

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Ignition switch protector socket bolt	1	6	8.5 (0.87, 6.3)	One way bolt; replace with a new one.

### OTHERS

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Brake shoe anchor pin nut (When using the stake nut)	1	8	20(2.0, 15)	Stake after tightening.
(When using the normal nut)	1	8	18(1.8, 13)	
Centerstand spring bolt	1	8	22 (2.2, 16)	U-nut
Reflector mounting nut	1	5	1.7 (0.17, 1.3)	
Throttle cable lock nut (Throttle housing side)	1	10	1.5 (0.15, 1.1)	
Left crankcase cover plate screw	3	4	3 (0.31, 2.2)	
Crankcase breather hose joint plate screw	1	4	3 (0.31, 2.2)	

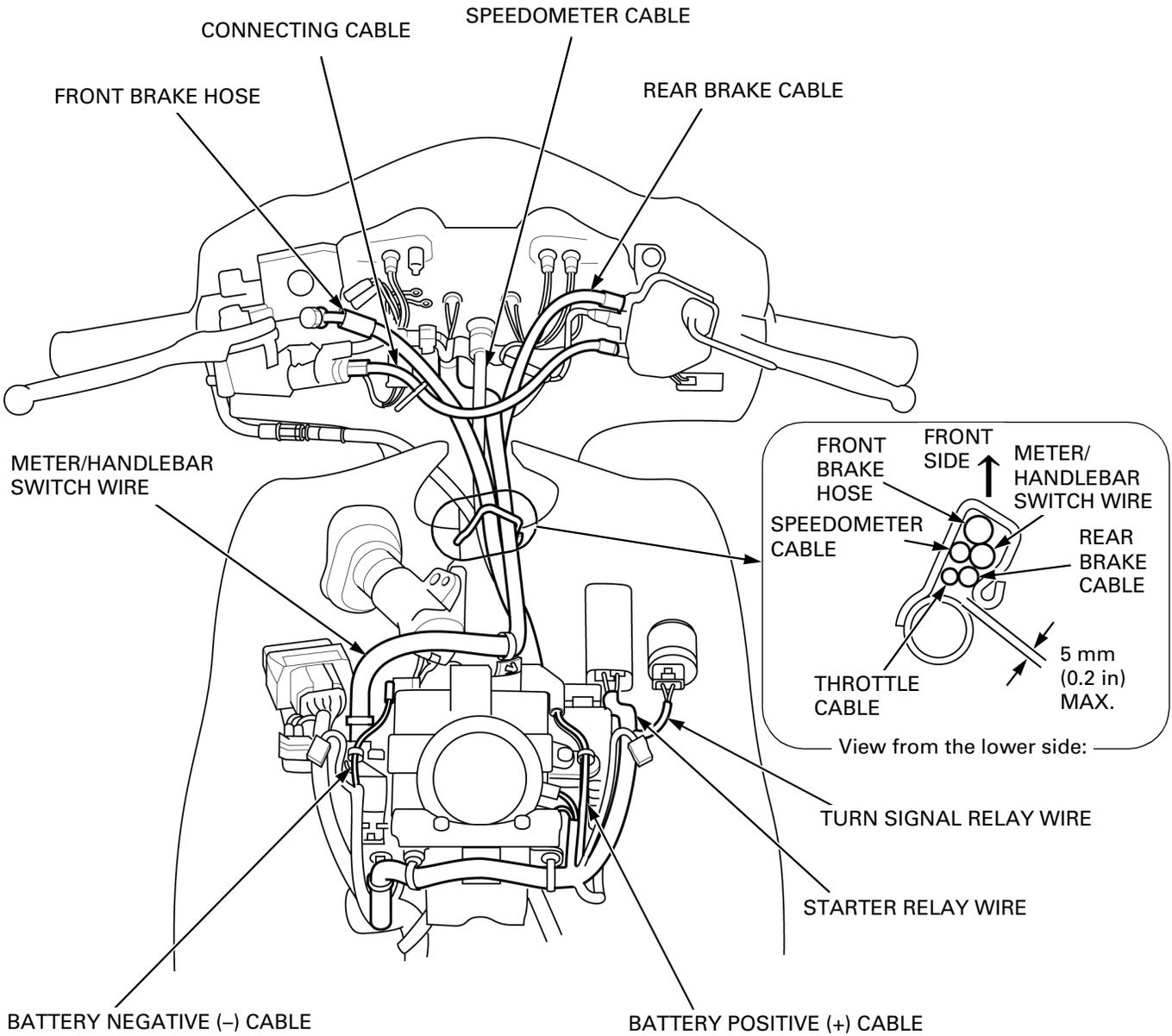


## GENERAL INFORMATION

### FRAME

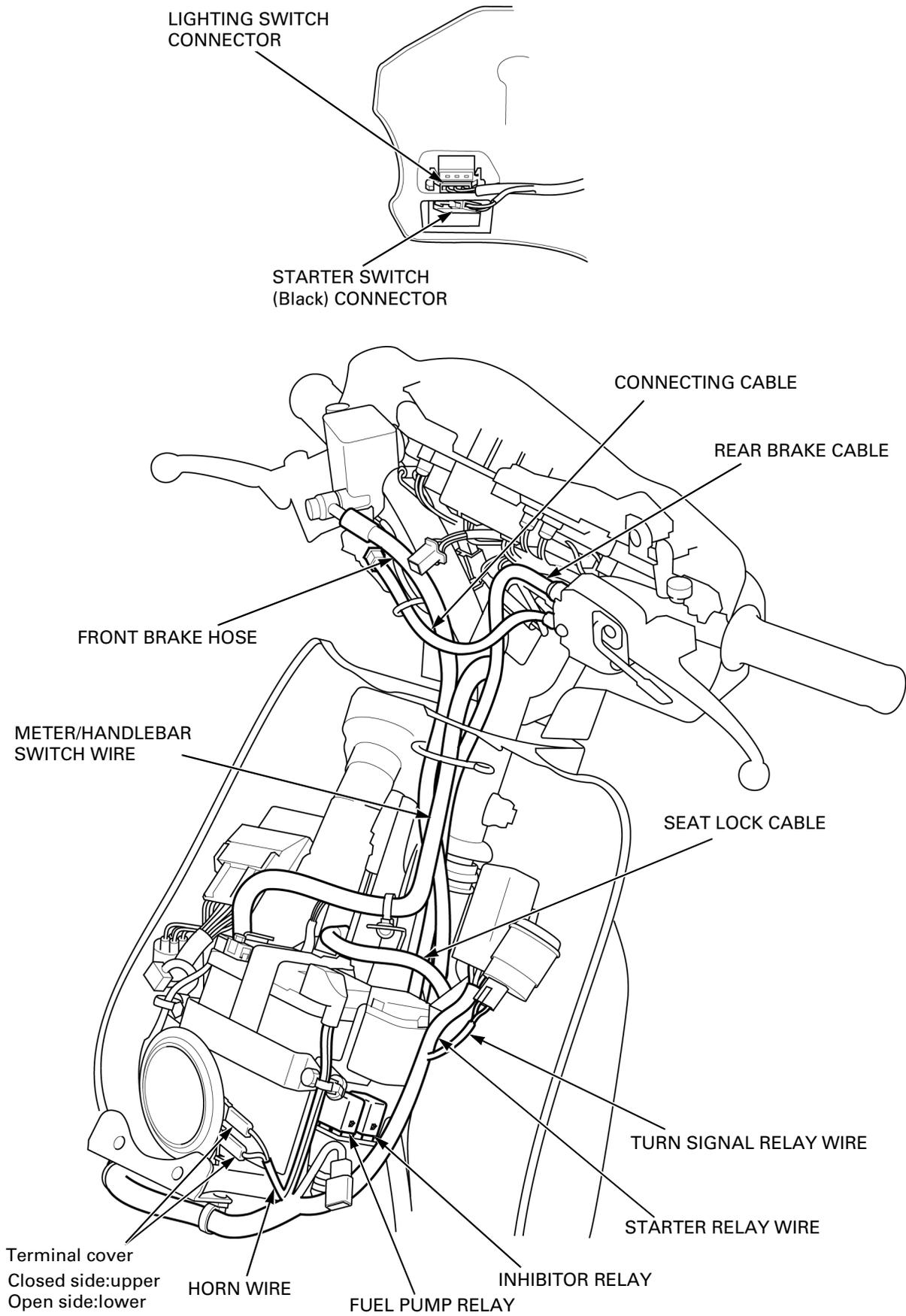
MATERIAL	LOCATION	REMARKS
Multi-purpose grease with extreme pressure agent (recommended: EXCELIGHT EP2 manufactured by KYODO YUSHI, japan. or Shell ALVANIA EP2 or equivalent)	Steering bearing race and bearing Steering stem dust seal lip	Apply 3 – 5 g
Multi-purpose grease	Speedometer gearbox inside Front wheel dust seal lip Front axle bolt Speedometer gearbox dust seal lip Rear brake cam pivot and rolling area Rear brake anchor pin sliding area Rear brake dust seal lip Rear brake lever pivot bolt sliding surface Equalizer rod pivot bolt sliding surface Equalizer sliding area Seat catch contact area Pillion step pin sliding area and steel ball Main stand pivot area Throttle cable sliding area and end or seat area	Apply 0.2 – 0.3 g Apply 0.2 – 0.3 g  Apply 0.1 – 0.2 g
Silicone grease	Front brake lever pivot bolt sliding surface Front brake lever-to-master piston contact area Brake caliper pin sliding area Brake equalizer cable cap boot inside Rear brake cable cap boot inside Speedometer cable Throttle cable boot inside	Apply 0.1 g Apply 0.1 g Apply 0.4 g minimum  Fill up 0.1 cc
Brake fluid (DOT 3 or DOT 4)	Master cylinder inside and sliding area Brake caliper piston seal whole surface Master cylinder piston cup	
Fork fluid	Fork dust seal and oil seal lips	
Adhesive (Honda bond A or equivalent)	Handlebar grip rubber inside Air cleaner connecting hose-to-housing mating area	

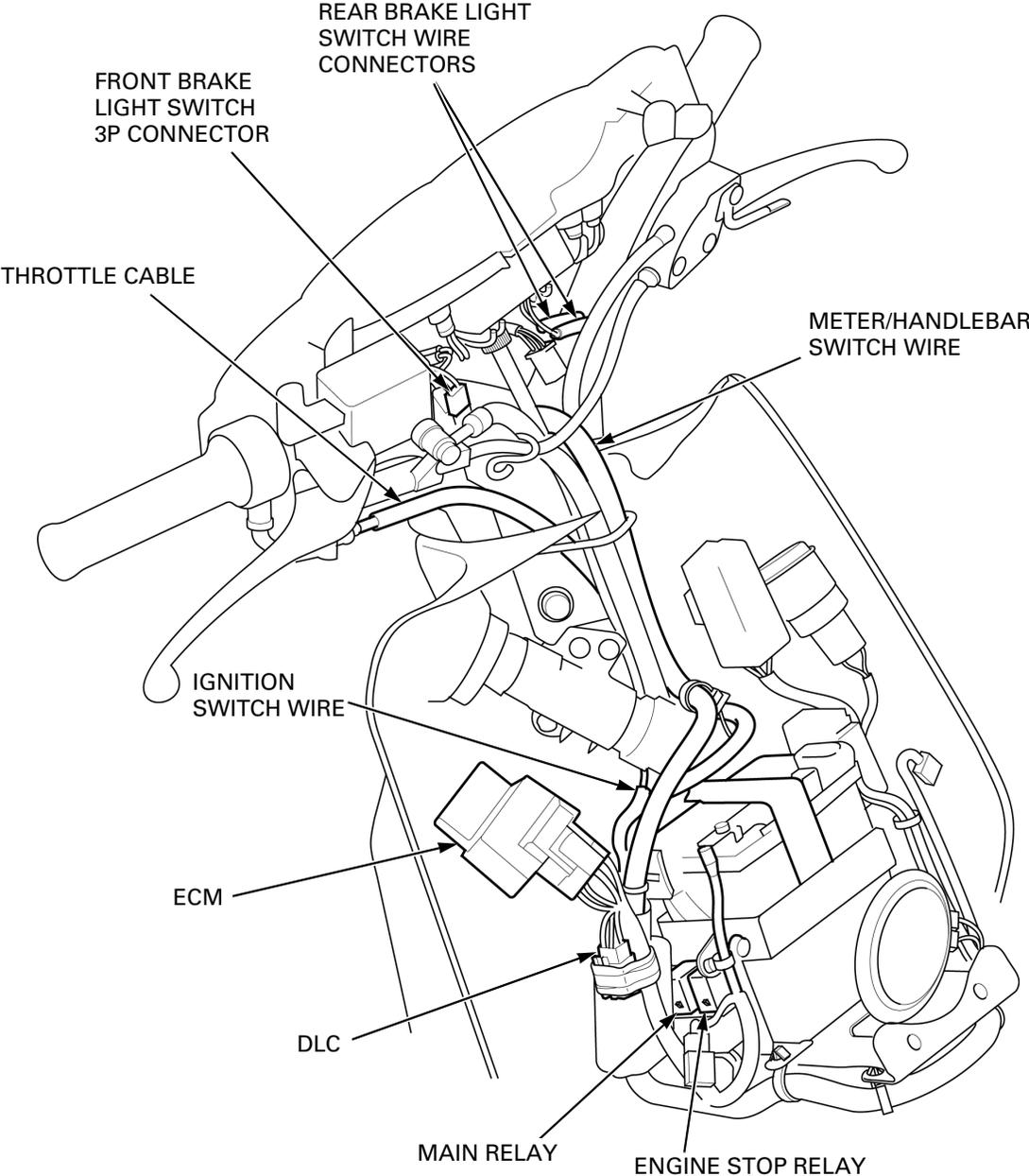
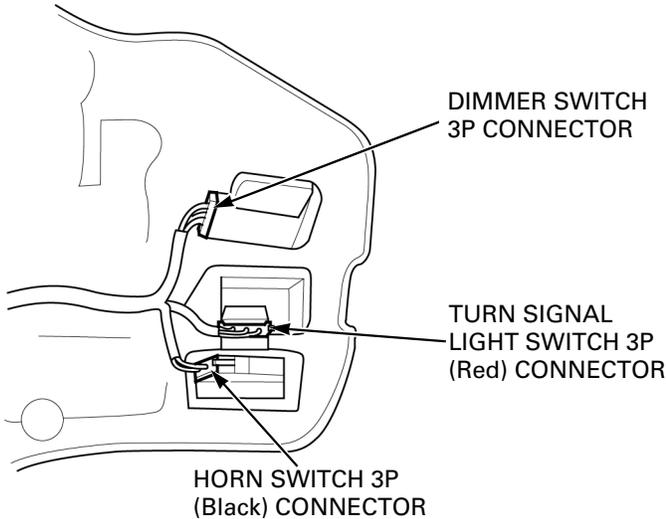
# CABLE & HARNESS ROUTING



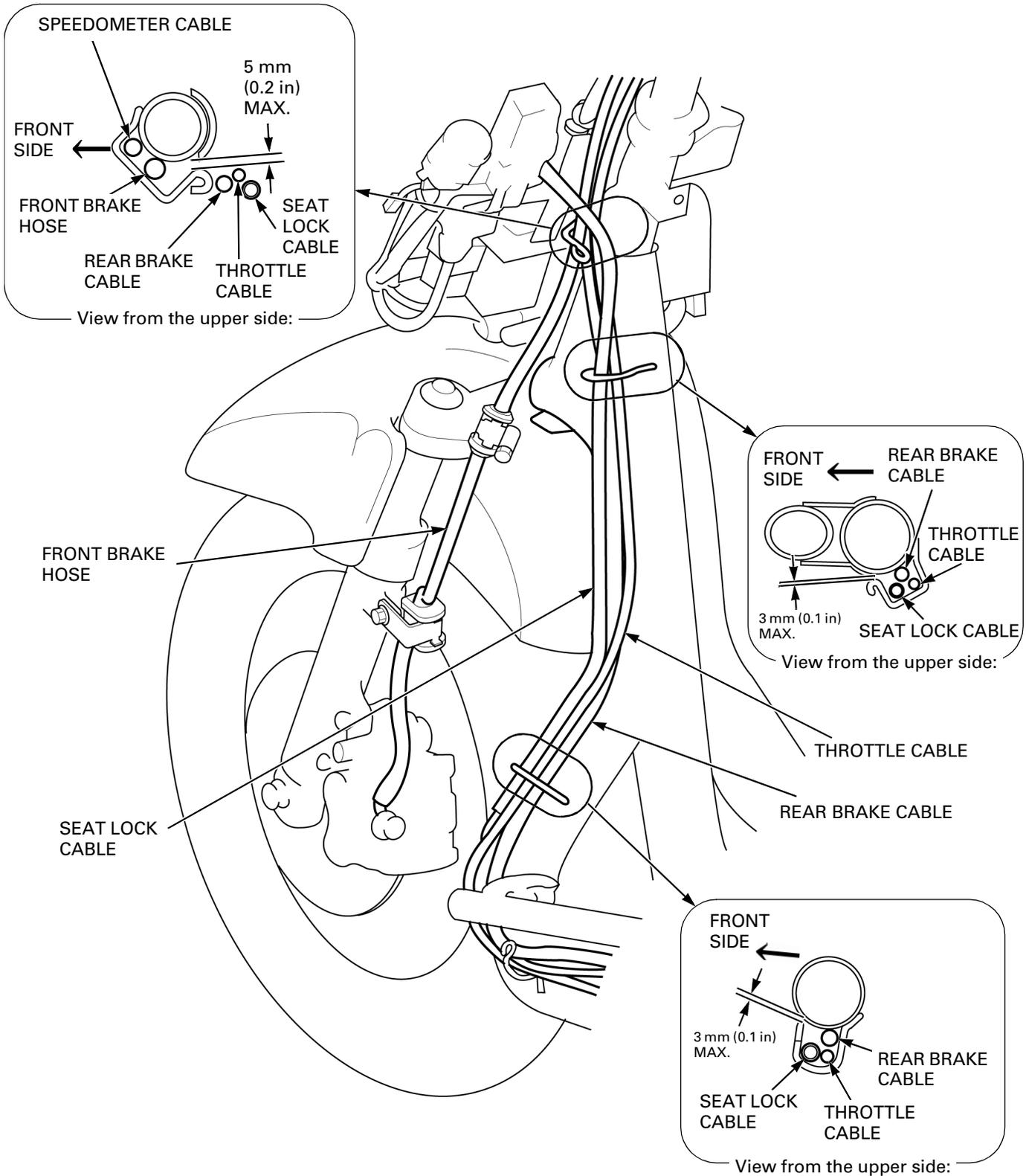
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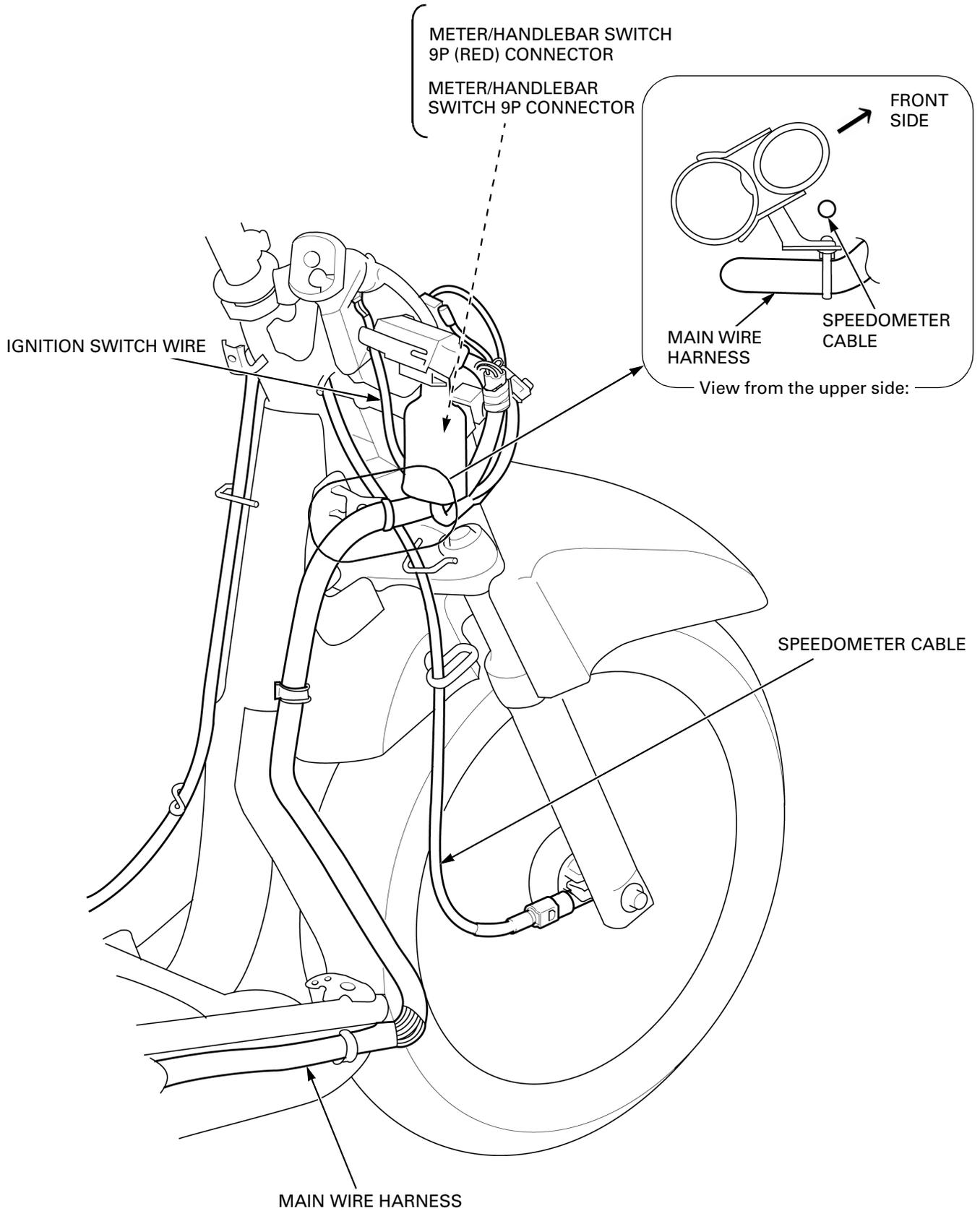
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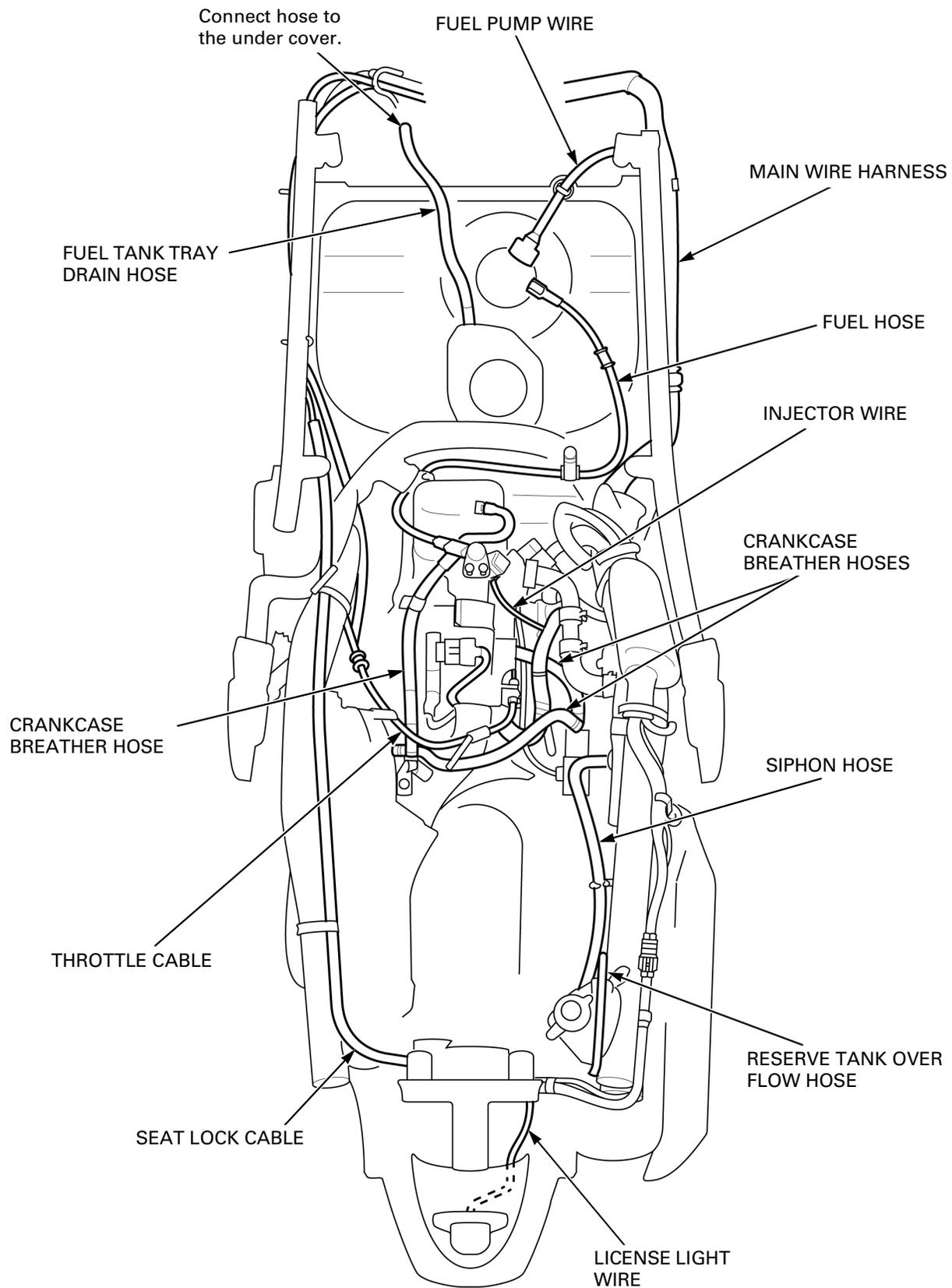
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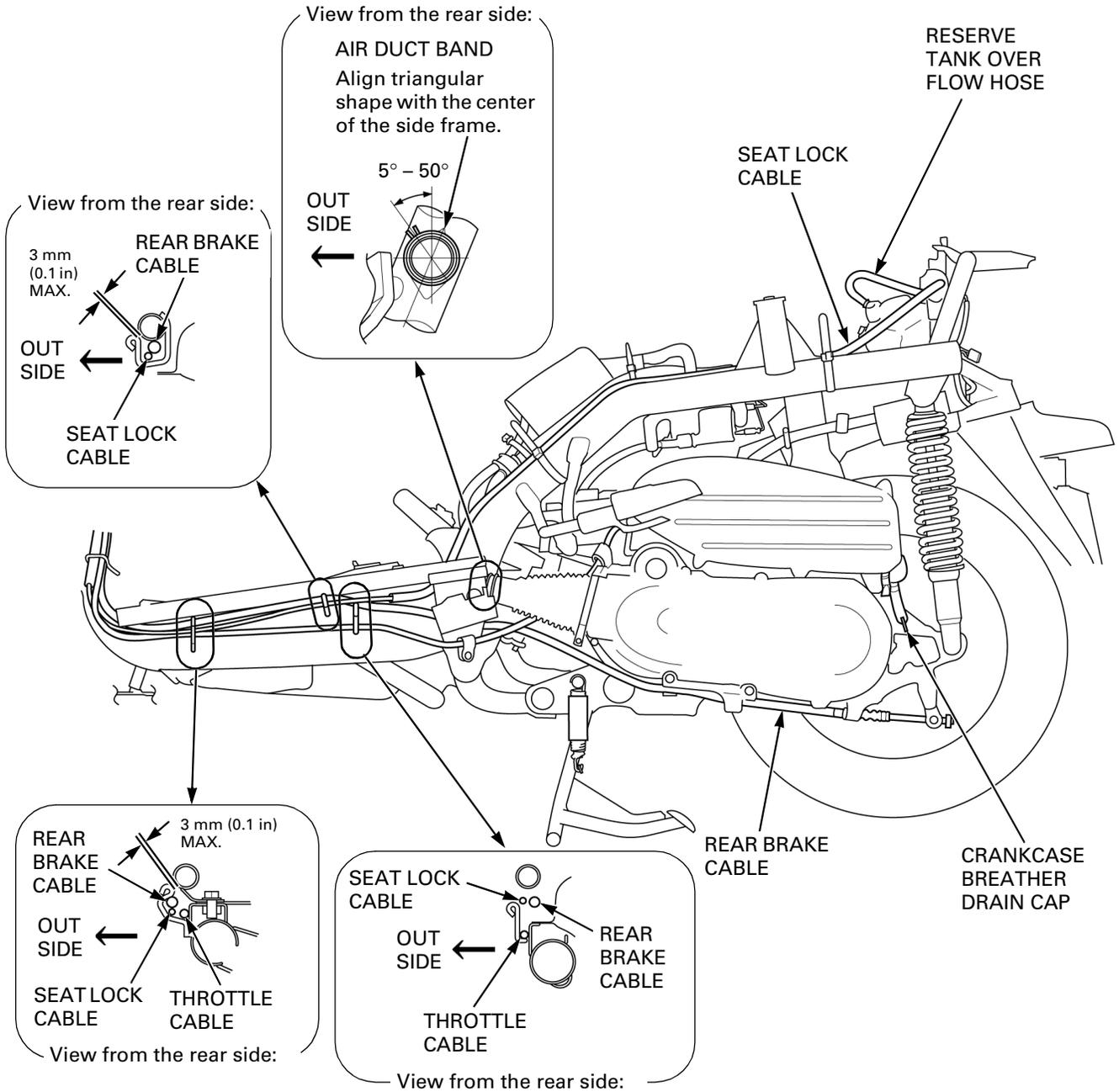




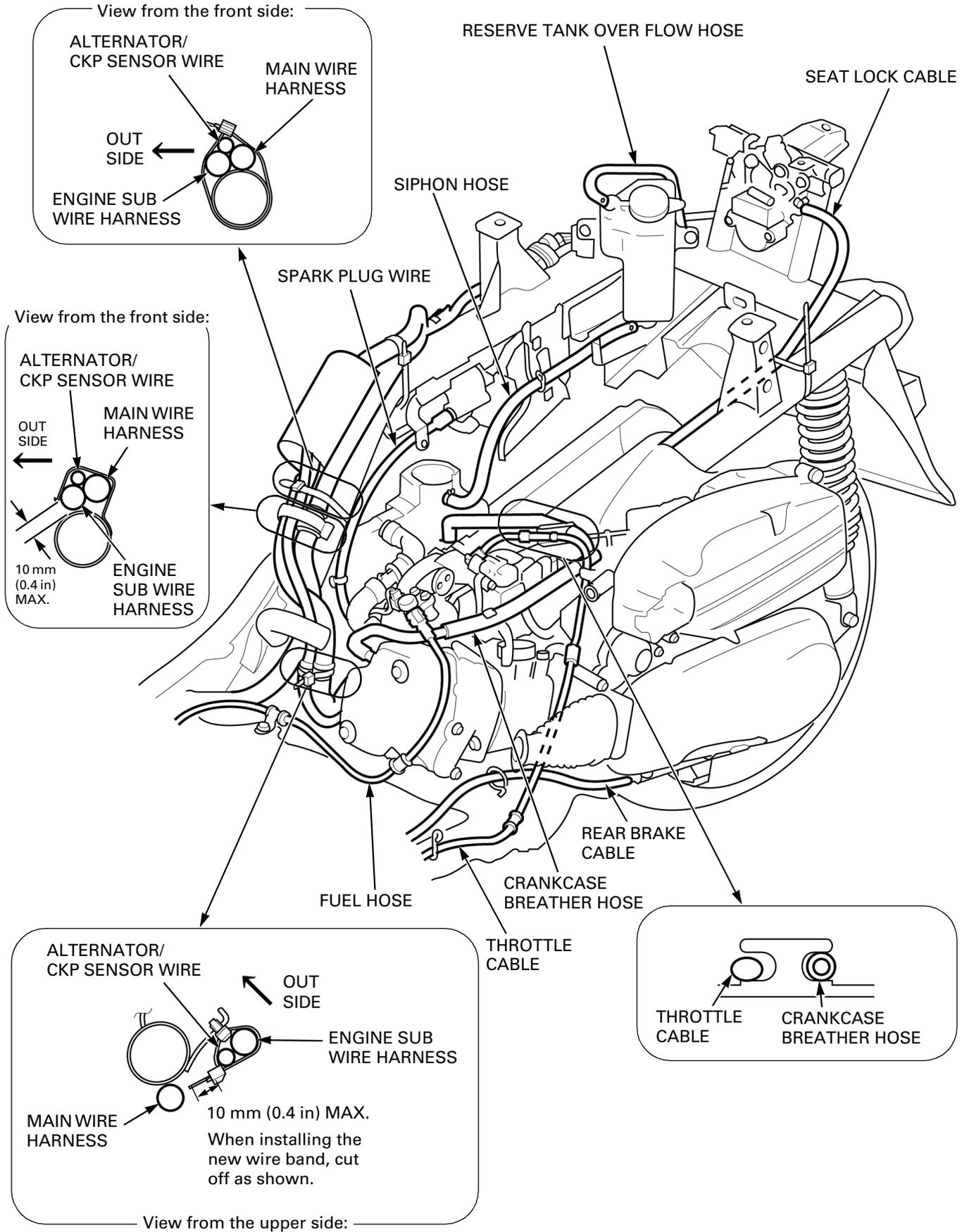
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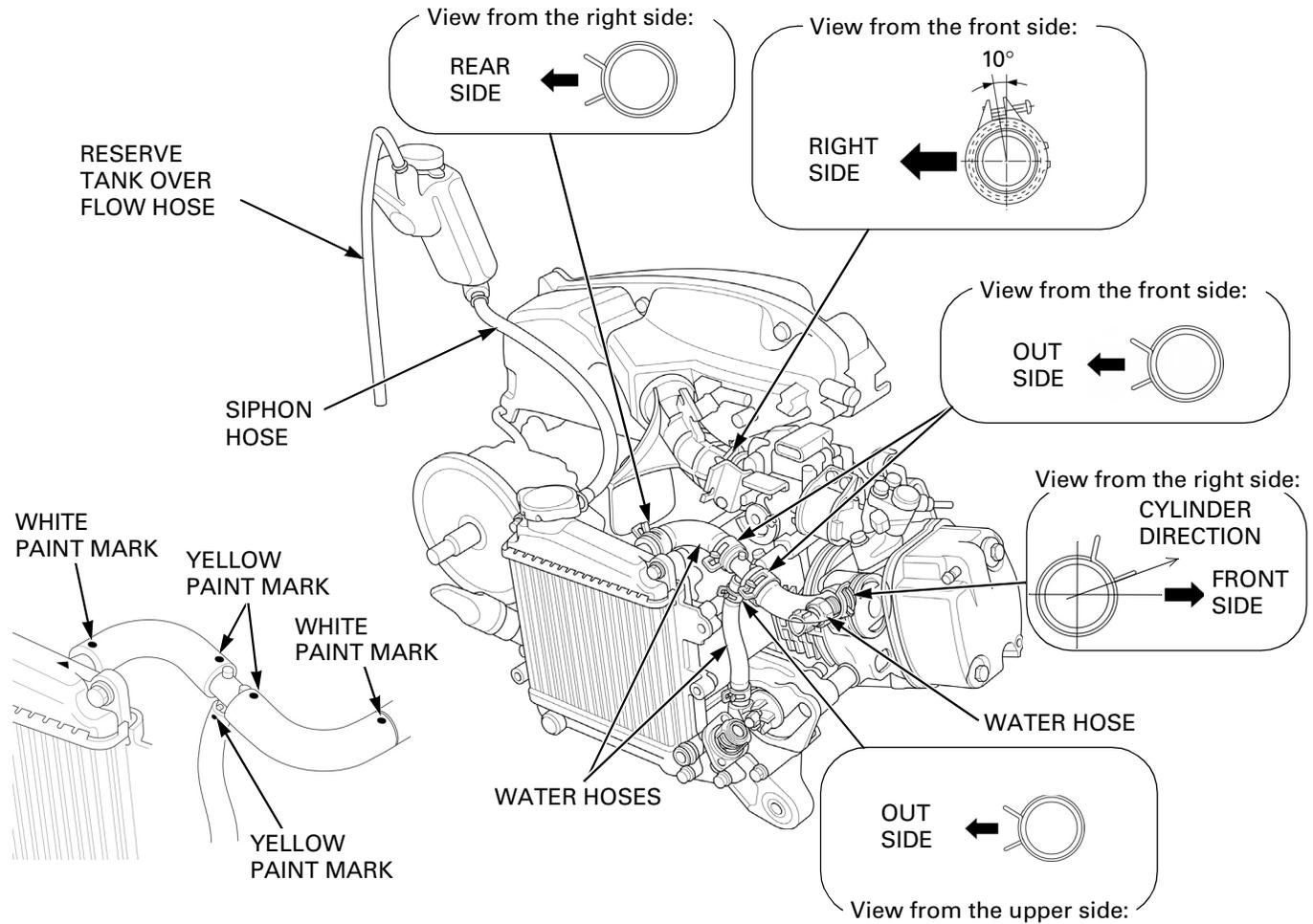
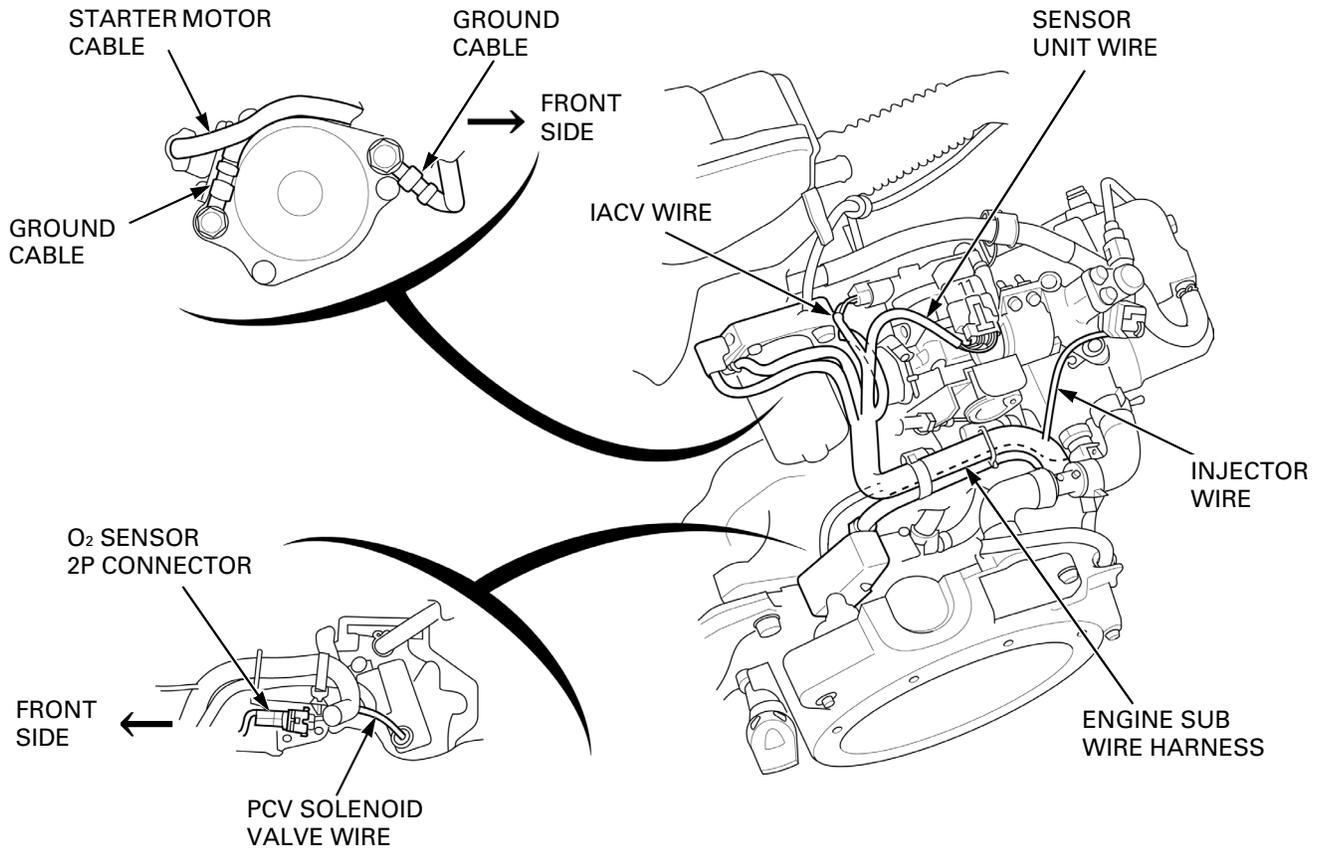
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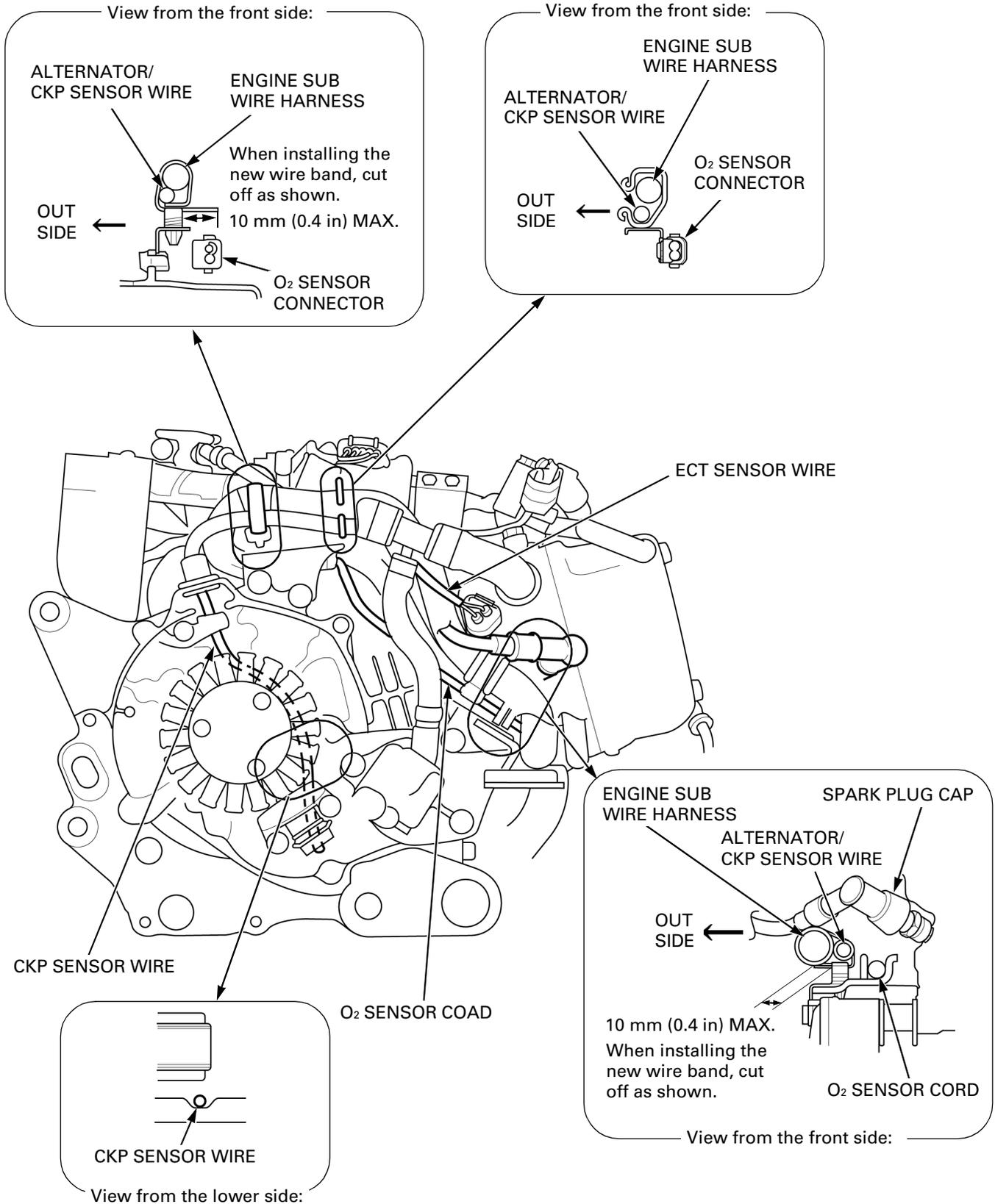


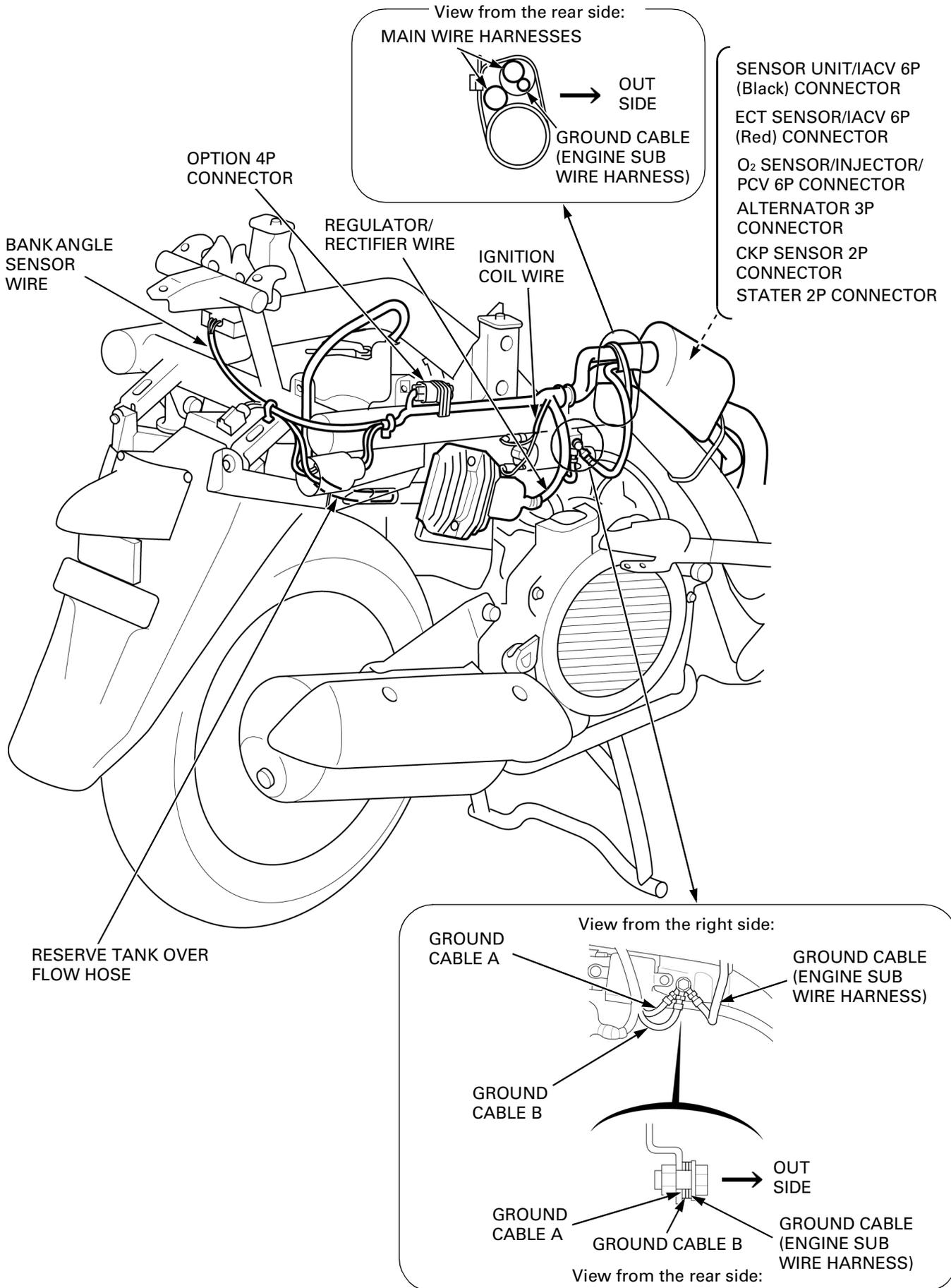
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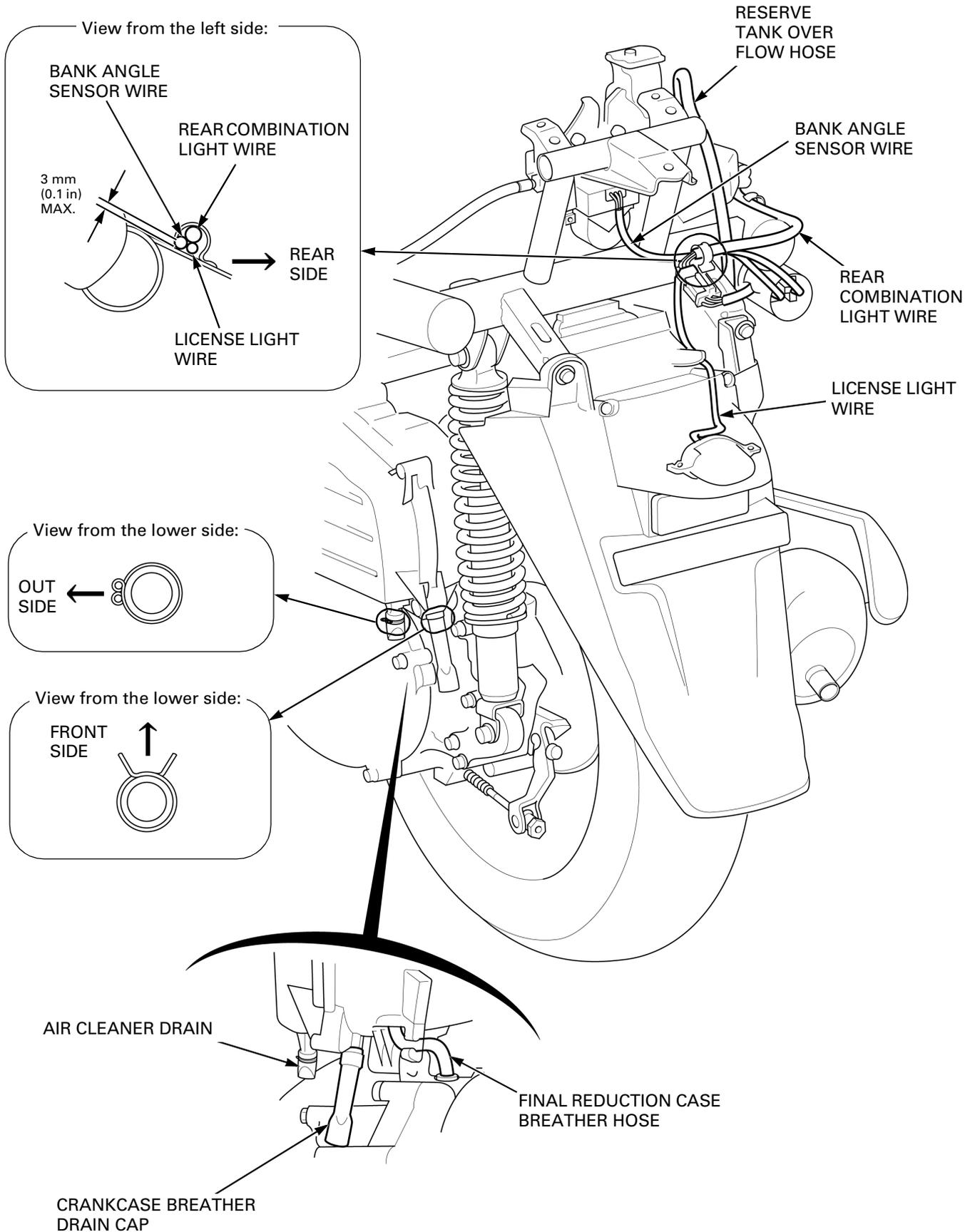


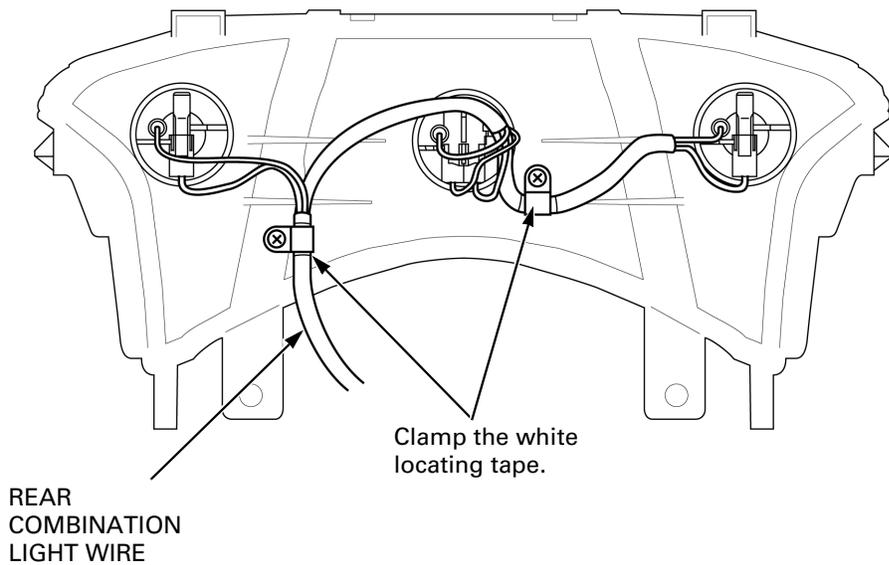
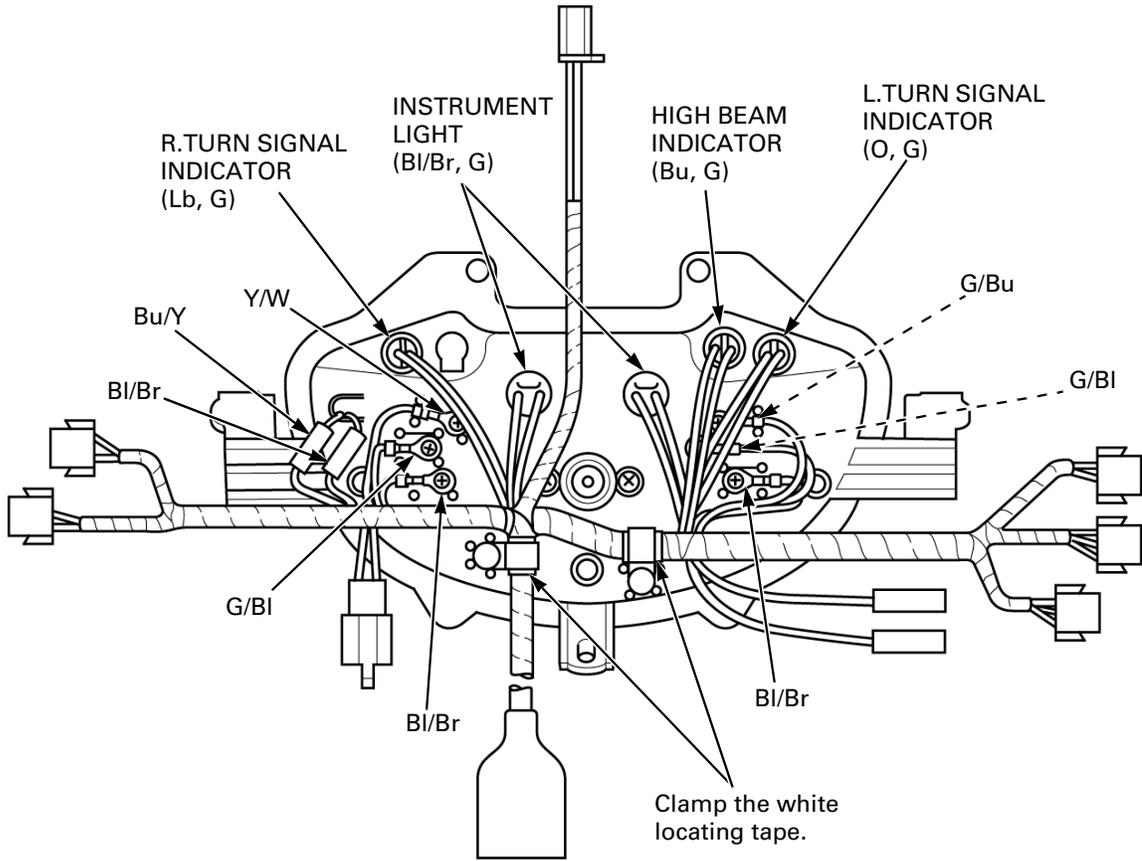
# GENERAL INFORMATION





# GENERAL INFORMATION





## GENERAL INFORMATION

# EMISSION CONTROL SYSTEMS

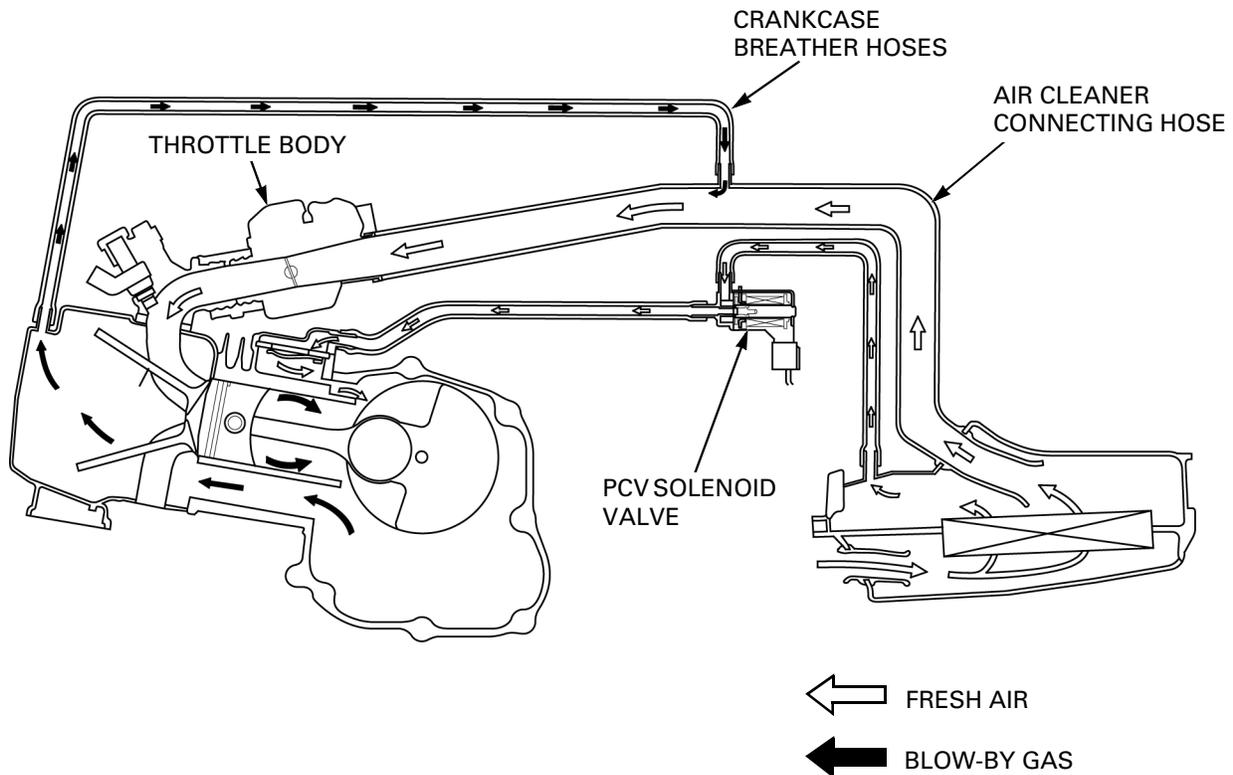
## SOURCE OF EMISSIONS

The combustion process produces carbon monoxide, oxides of nitrogen and hydrocarbons. Control of hydrocarbons and oxides of nitrogen is very important because, under certain conditions, they react to form photochemical smog when subjected to sunlight. Carbon monoxide does not react in the same way, but it is toxic.

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

## 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 crankcase breather hose, air cleaner connecting hose and throttle body.



## **EXHAUST EMISSION CONTROL SYSTEM**

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

No adjustments should be made. The exhaust emission control system is separate from the crankcase emission control system.

### **THREE-WAY CATALYTIC CONVERTER**

This scooter is equipped with a three-way catalytic converter.

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

No adjustment to the system should be made, although periodic inspection of the components is recommended.

## **NOISE EMISSION CONTROL SYSTEM**

**TAMPERING WITH THE NOISE EMISSION CONTROL SYSTEM IS PROHIBITED:** Local law prohibits the following acts or the causing thereof: (1) The removal or rendering inoperative by any person, other than for the purposes of maintenance, repair or replacement, of any device or element of design incorporated into any vehicle for the purpose of noise control prior to its sale or delivery to the ultimate customer or while it is in use; or (2) the use of any 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 of or puncturing of the muffler, baffles, header pipes or any other component which conducts exhaust gases.
2. Removal of, 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.

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**MEMO**

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# 2. TECHNICAL FEATURES

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**PGM-FI (Programmed Fuel Injection)  
SYSTEM ..... 2-2**

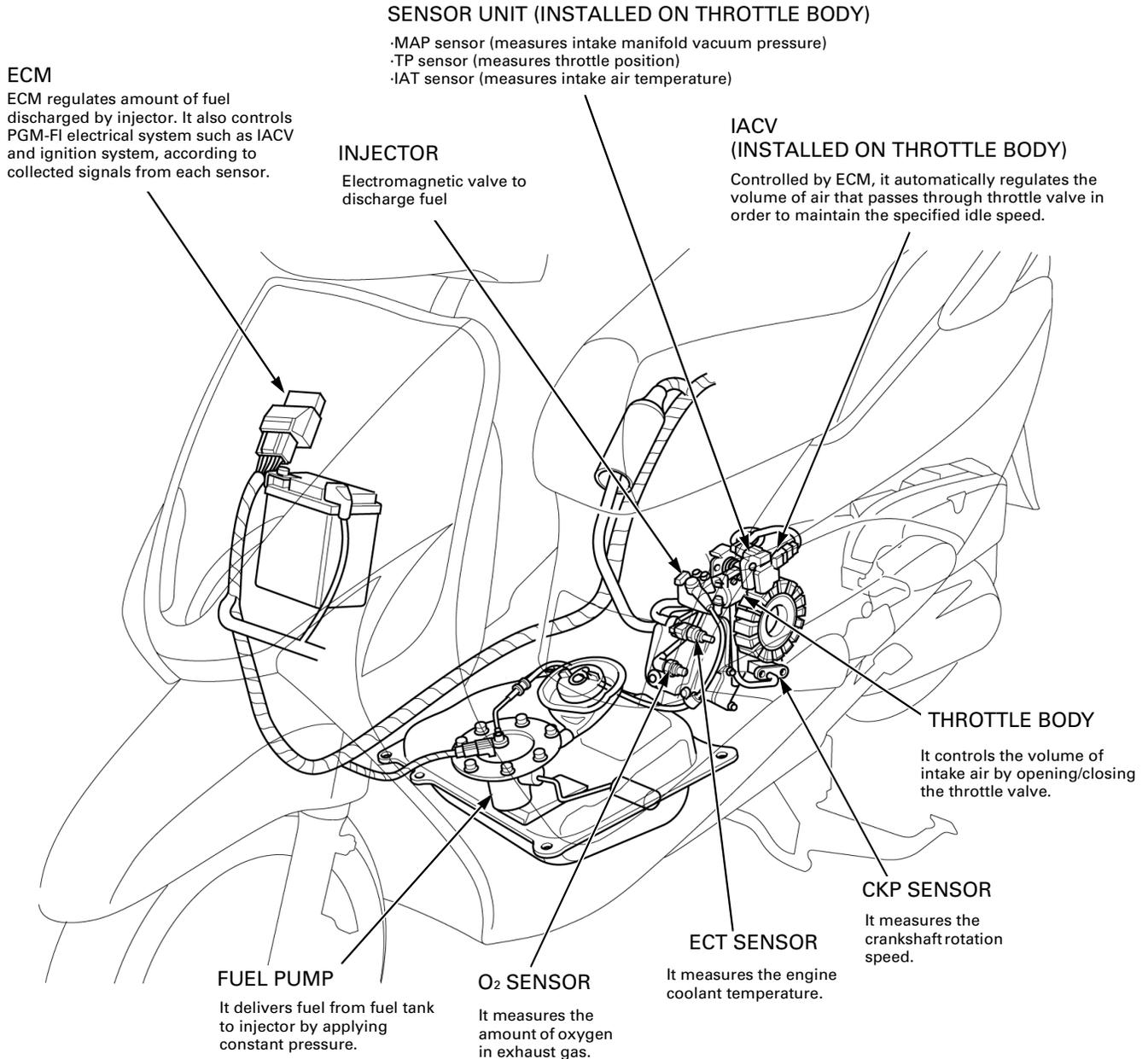
**PCV (Positive Crankcase Ventilation)  
SYSTEM ..... 2-27**

## TECHNICAL FEATURES

# PGM-FI (Programmed Fuel Injection) SYSTEM

## SYSTEM COMPONENTS

This model utilizes PGM-FI (Programmed Fuel Injection) system, instead of conventional carburetor system. This system consists of the following: Injector, throttle body, ECM, fuel pump, sensor unit (MAP/TP/IAT sensors), CKP sensor, ECT sensor, O<sub>2</sub> sensor and IACV.



PGM-FI	Programmed Fuel Injection	IAT SENSOR	Intake Air Temperature Sensor
MAP SENSOR	Manifold Absolute Pressure Sensor	CKP SENSOR	Crankshaft Position Sensor
TP SENSOR	Throttle Position Sensor	IACV	Idle Air Control Valve
ECT SENSOR	Engine Coolant Temperature Sensor	ECM	Engine Control Module

**COMPARISON BETWEEN CARBURETOR AND PGM-FI SYSTEM**

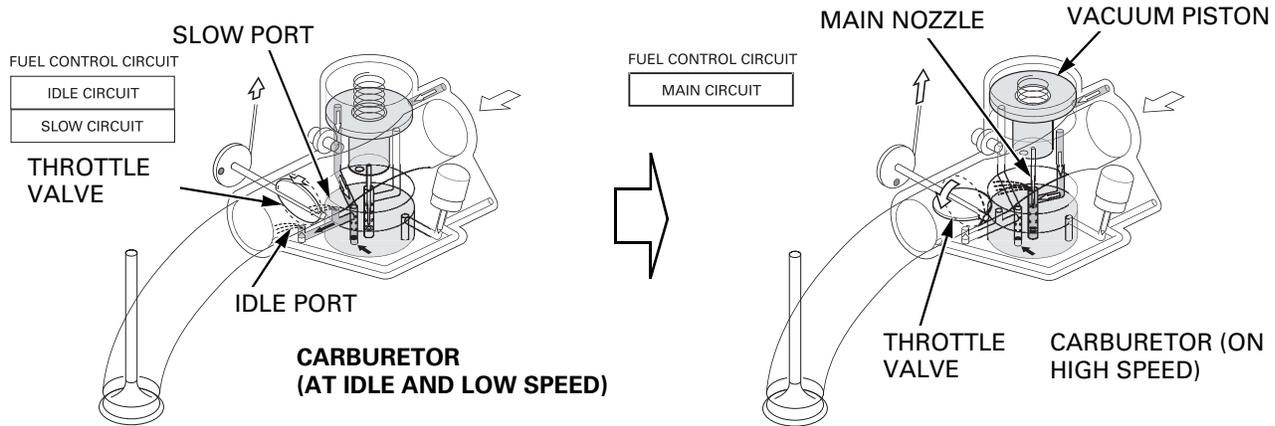
**BASIC OPERATION FROM IDLE TO HIGH SPEED**

**BASIC OPERATION:**

Carburetor and PGM-FI system controls the power output of engine by regulating the volume of fuel/air mixture introduced into engine by means of opening/closing the throttle valve. They both are designed to provide an ideal air-fuel ratio depending on the volume of incoming air.

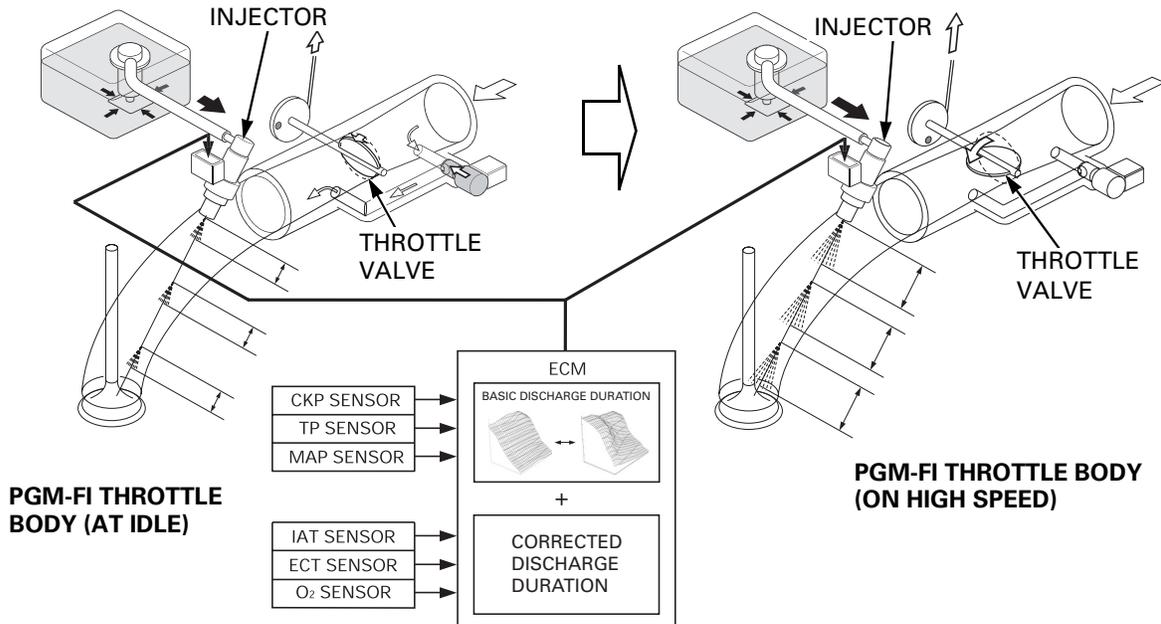
**CARBURETOR BASIC OPERATION:**

- At idle and low speed, with throttle valve in slightly opened position, fuel drawn from pilot screw port (idle port) and slow port becomes atomized while being mixed with incoming air. The mixture is delivered to the engine.
- In low to intermediate range, vacuum piston rises in accordance with the throttle valve position. Larger the venturi becomes as the piston lifts up, larger the volume of fuel drawn from the main nozzle and intake air become. The mixture of atomized fuel from the main nozzle/slow port and intake air is delivered to the engine.
- On high speed, with the vacuum piston and throttle valve in fully opened position, venturi size becomes the largest. Thus maximum amount of fuel drawn from the main nozzle becomes atomized while being mixed with intake air. The mixture is delivered to the engine.



**PGM-FI BASIC OPERATION:**

- Throughout idle to high speed, preset amount of fuel is discharged from the injector, controlled by ECM which collects output voltage signals from each sensor, in accordance with the volume of incoming air regulated by the throttle valve.
- The injector discharges proper amount of fuel into the intake manifold, depending on volume of intake air, by adding corrected fuel discharge duration (※ 2) to basic fuel discharge duration (※ 1).  
 ※ 1 Basic fuel discharge duration is determined by 2 kinds of Map (page 2-8) memorized in the ECM which looks at engine revs and volume of intake air (calculated by a preset formula which applies the following: output voltage from MAP, CKP and TP sensor).  
 ※ 2 Corrected fuel discharge duration is determined by ECM which looks at output voltage from each sensor and measures the running condition of the engine.



## TECHNICAL FEATURES

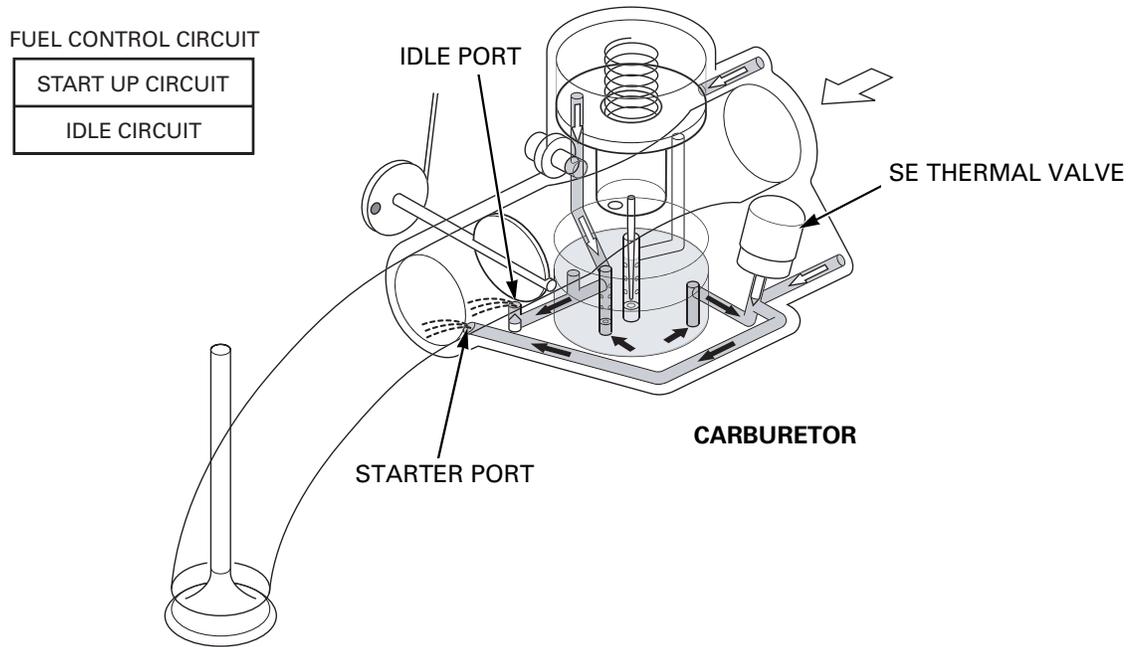
### FUEL ENRICHMENT FOR COLD ENGINE

ENGINE RUNNING CONDITION WHEN IT IS STILL COLD:

Fuel does not vaporize well in a cold engine and air-fuel ratio becomes very lean, causing unstable idle.

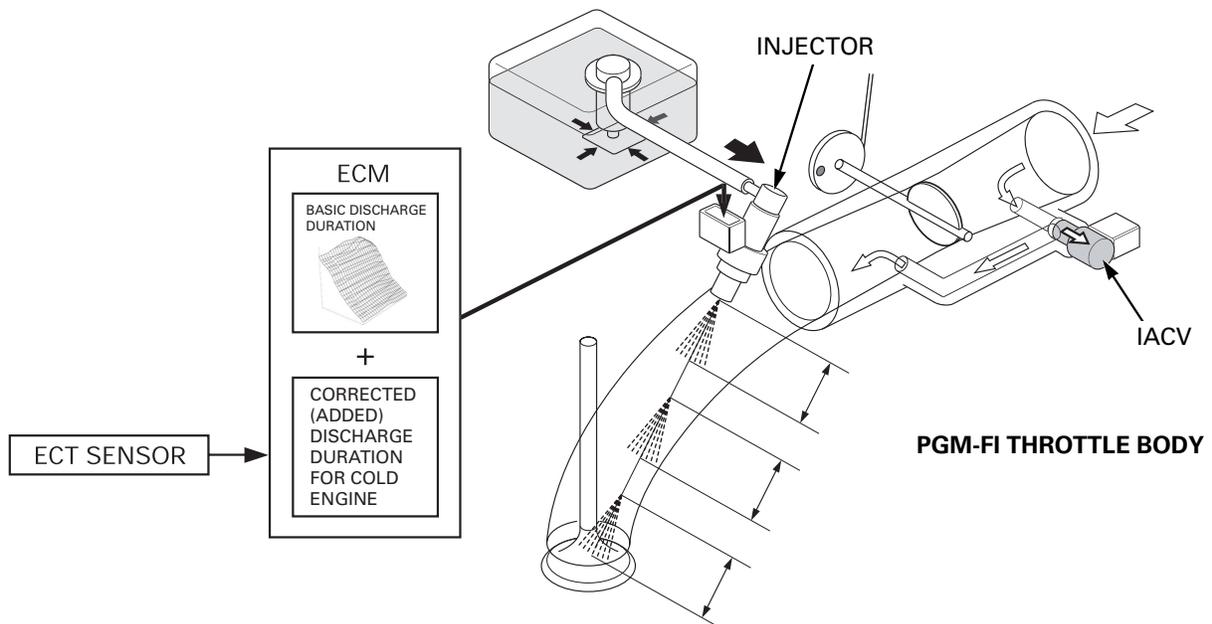
COLD ENGINE WITH CARBURETOR (WITH SE THERMAL VALVE):

When engine is cold, proper air/fuel ratio and fast idle speed are maintained by means of SE thermal valve, which introduces additional fuel/air from starter port, supplementing the fuel from idle port.



COLD ENGINE WITH PGM-FI:

When engine is cold, ECM regulates the amount of fuel by lengthening the opening duration of injector, in accordance with output voltage from ECT sensor, depending on engine condition, while controlling IACV which introduces additional air in order to maintain fast idle speed.



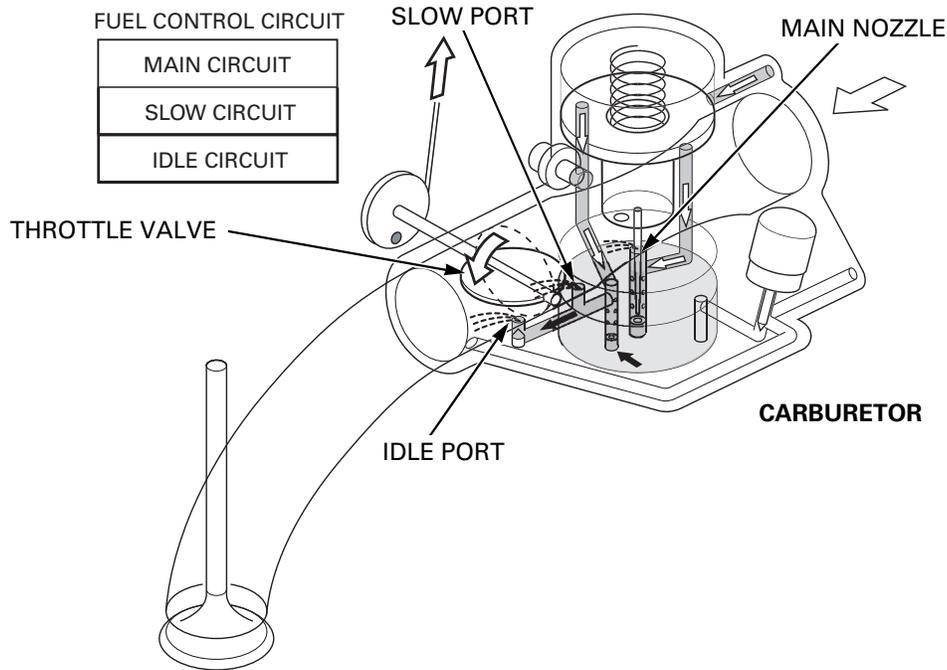
**FUEL ENRICHMENT FOR QUICK ACCELERATION**

**ENGINE CONDITION UNDER QUICK ACCELERATION:**

When throttle valve is opened suddenly, excess volume of intake air flows into the engine. Smaller intake manifold vacuum pressure causes lack of fuel and air-fuel ratio becomes lean, resulting in temporary lack of engine power.

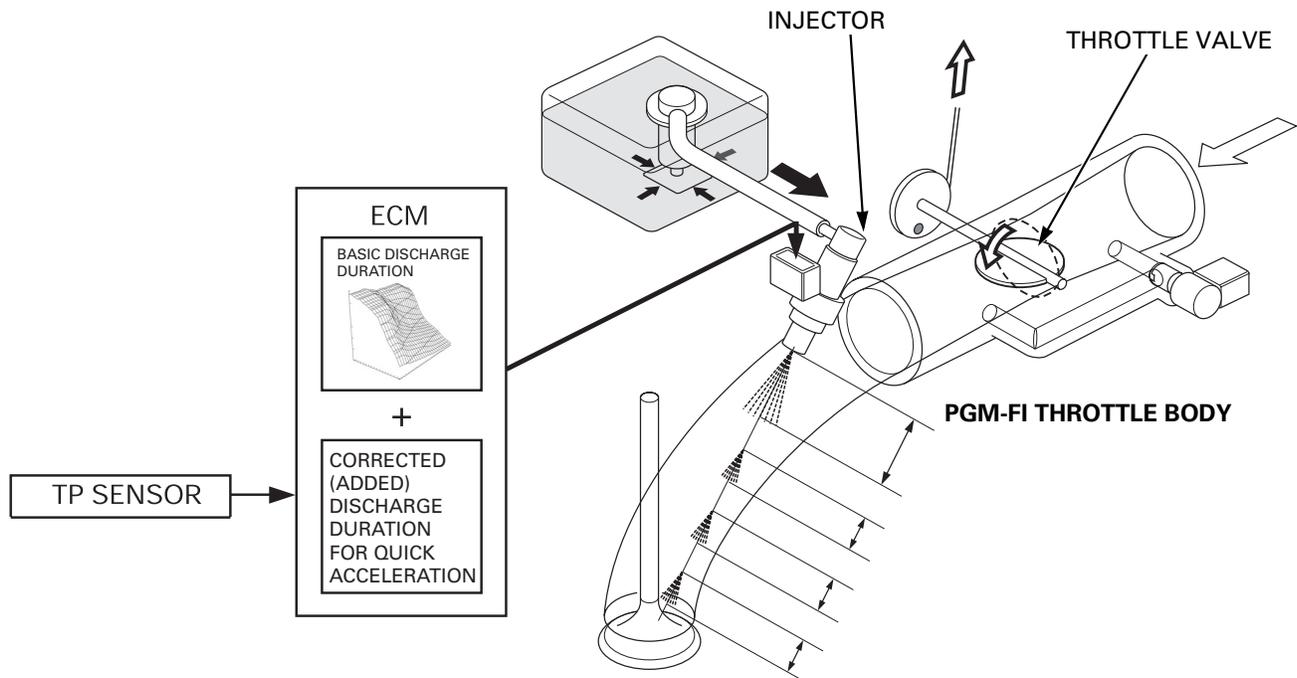
**QUICK ACCELERATION WITH CARBURETOR:**

When throttle valve is opened abruptly, the vacuum piston responds rather slowly, causing larger vacuum pressure in venturi, resulting in more fuel drawn out from main nozzle. This supplemental fuel produces ideal air-fuel ratio.



**QUICK ACCELERATION WITH PGM-FI:**

When throttle valve is opened abruptly, ECM regulates the amount of fuel according to output voltages from TP sensor, depending on engine condition. The injector is kept open longer than usual in order to send more fuel into the cylinder, producing ideal air-fuel ratio.



# TECHNICAL FEATURES

## FUEL SUPPLY CUT ON ENGINE BRAKING

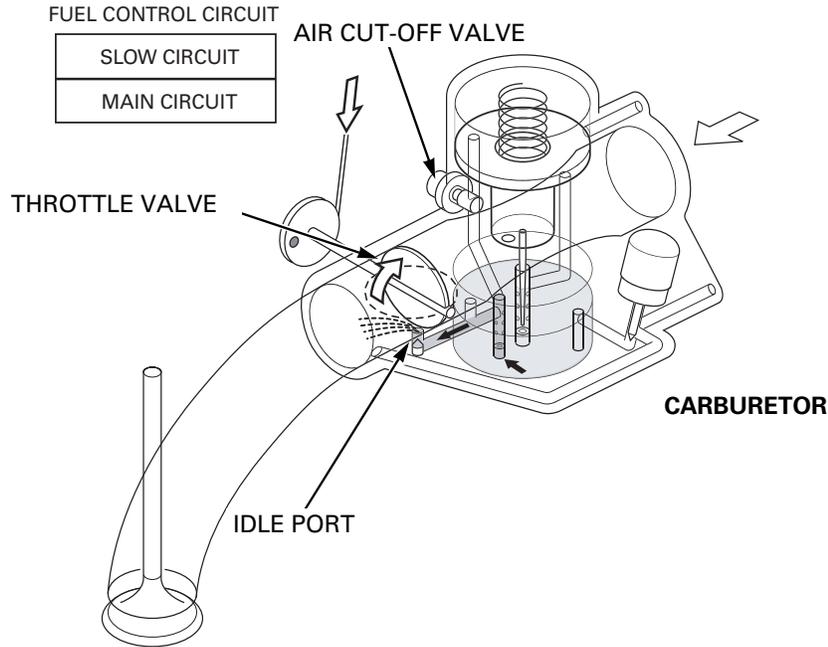
### ENGINE CONDITION UNDER ENGINE BRAKING:

When throttle valve is closed and engine braking is used, engine lacks incoming air. As a result, misfiring occurs and unburned gas is discharged into atmosphere.

### DECELERATION WITH CARBURETOR:

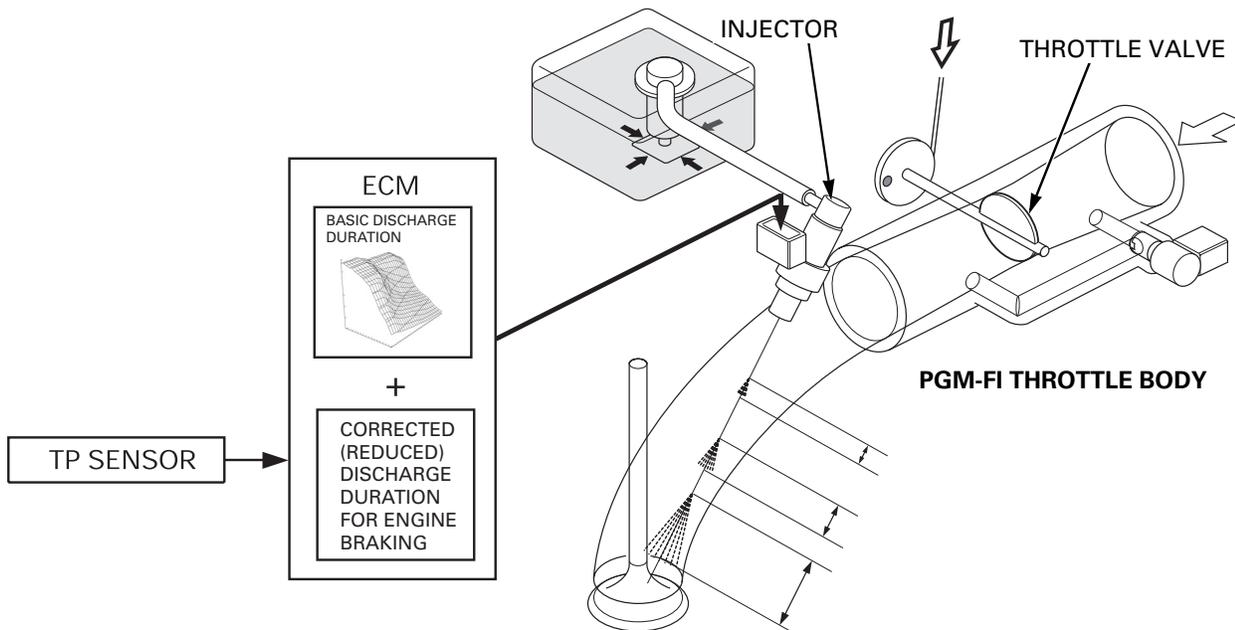
When throttle valve is closed and engine braking is used, intake manifold vacuum pressure increases. As air weighs lighter than fuel, more air is drawn into the manifold and air-fuel ratio goes out of proportion, resulting in misfiring.

Air cut-off valve temporarily provides richer air-fuel mixture by closing idle/slow air circuit in order to prevent misfiring which results in unburned gas being discharged into atmosphere.



### DECELERATION WITH PGM-FI:

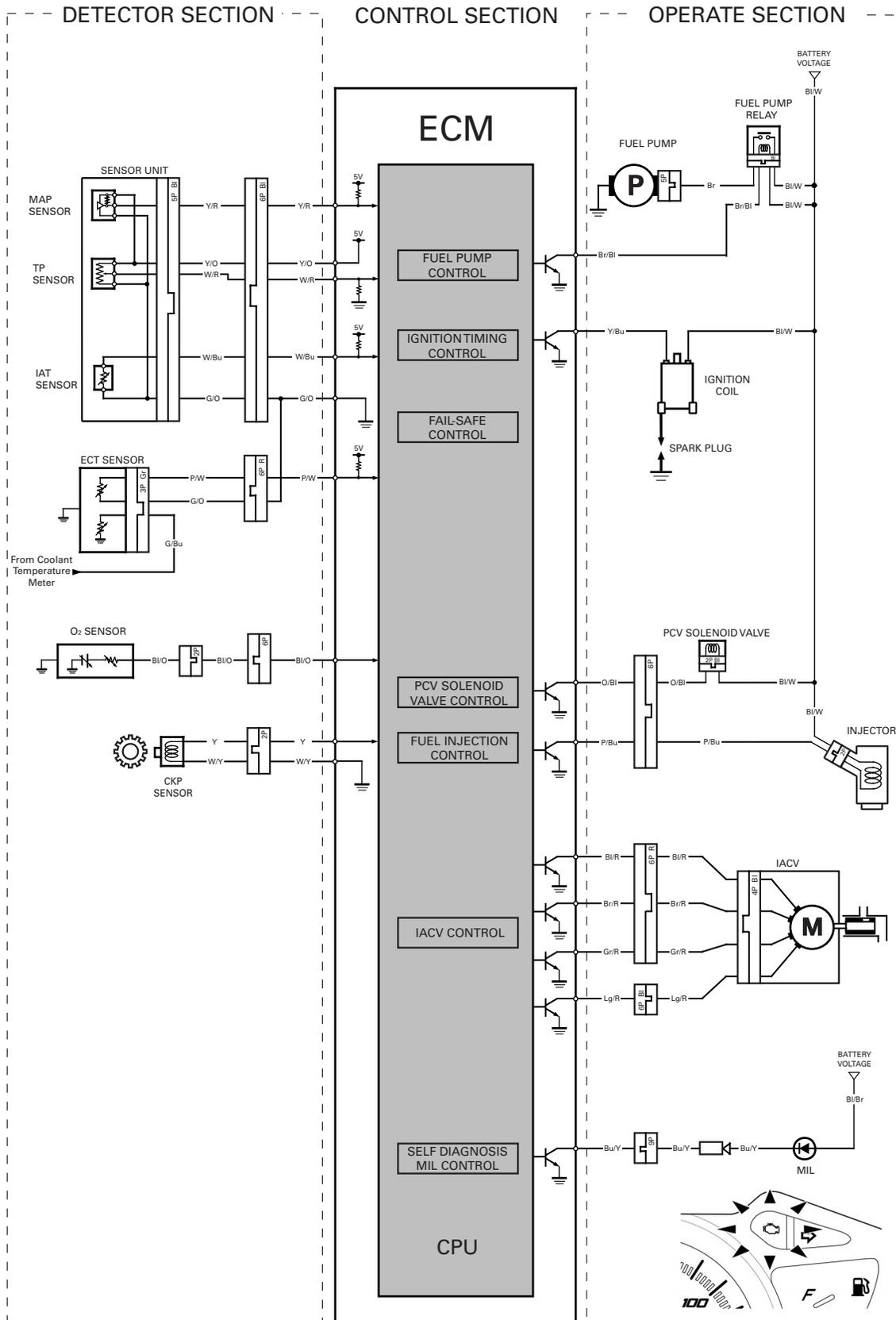
When throttle valve is closed and the engine braking is used, ECM detects completely closed throttle, according to output signal from TP sensor and CKP sensor. It cuts off the fuel supply into the cylinder by setting the fuel discharge duration to zero, preventing unburned gas from being discharged into atmosphere while saving fuel, resulting in better gas mileage.



PGM-FI ELECTRICAL CONTROL SYSTEM

SYSTEM OVERVIEW

ECM controls engine's running condition by operating the components such as injector and fuel pump depending on output signals from each sensor.



## TECHNICAL FEATURES

### CONTROLLING FUEL DISCHARGE DURATION/2 PROGRAM MAP SYSTEM

Basic fuel discharge duration is determined depending on intake air volume and engine revs which are measured by output voltages from MAP sensor, CKP sensor and TP sensor.

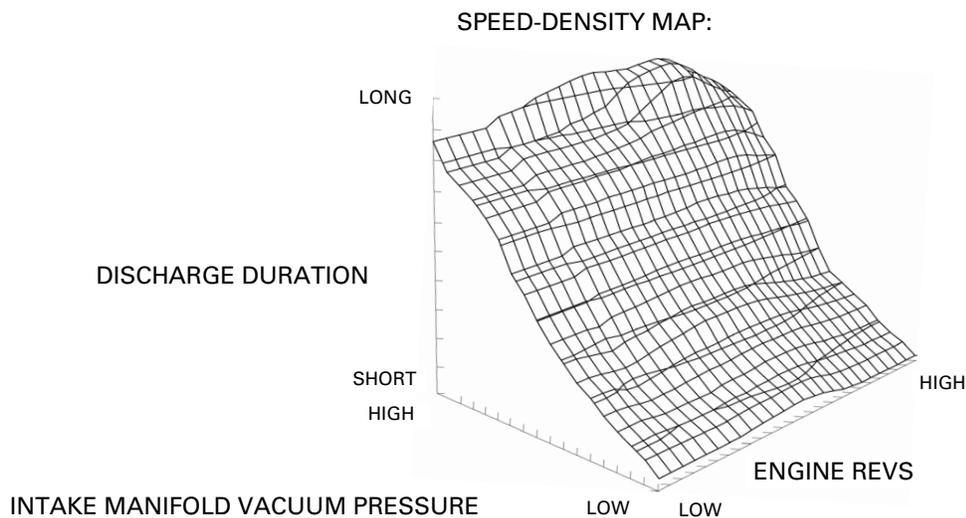
It utilizes two types of program MAP system that regulates the fuel discharge duration: For smaller throttle opening/larger intake manifold vacuum pressure, "Speed-density map" is used while "Speed-throttle map" is used for larger throttle opening/smaller intake manifold vacuum pressure.

MAP: The program that determines the fuel discharge duration depending on two elements (engine revs/intake manifold vacuum pressure or throttle position), shown on the three dimensional graphs below.

Either MAP system program is tailored to the engine, intake and exhaust system which come with the scooter. Replacing any engine parts, intake and exhaust system with the parts that are not designed for this scooter will cause malfunction.

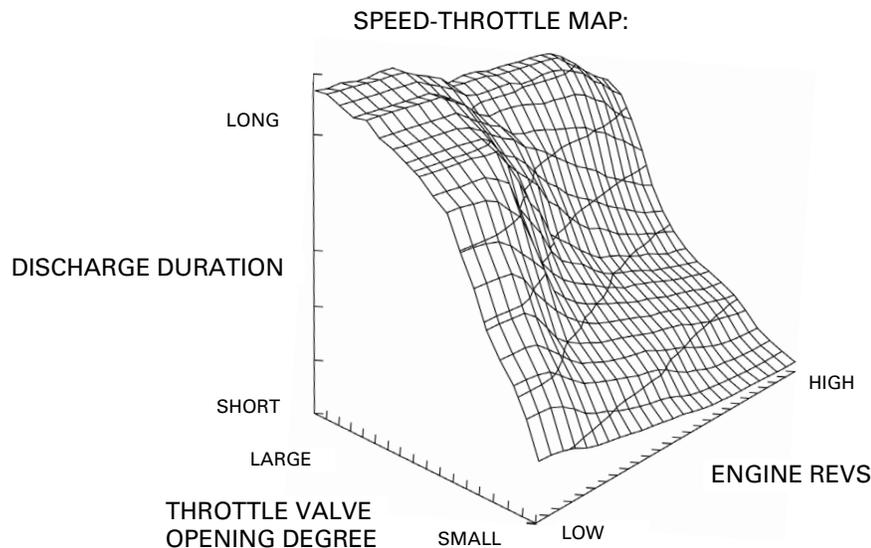
- **SMALL THROTTLE OPENING/HIGH INTAKE MANIFOLD VACUUM PRESSURE**

Basic discharge duration is determined by speed-density map that looks at intake manifold vacuum pressure detected by the MAP sensor and engine revs detected by the CKP sensor.



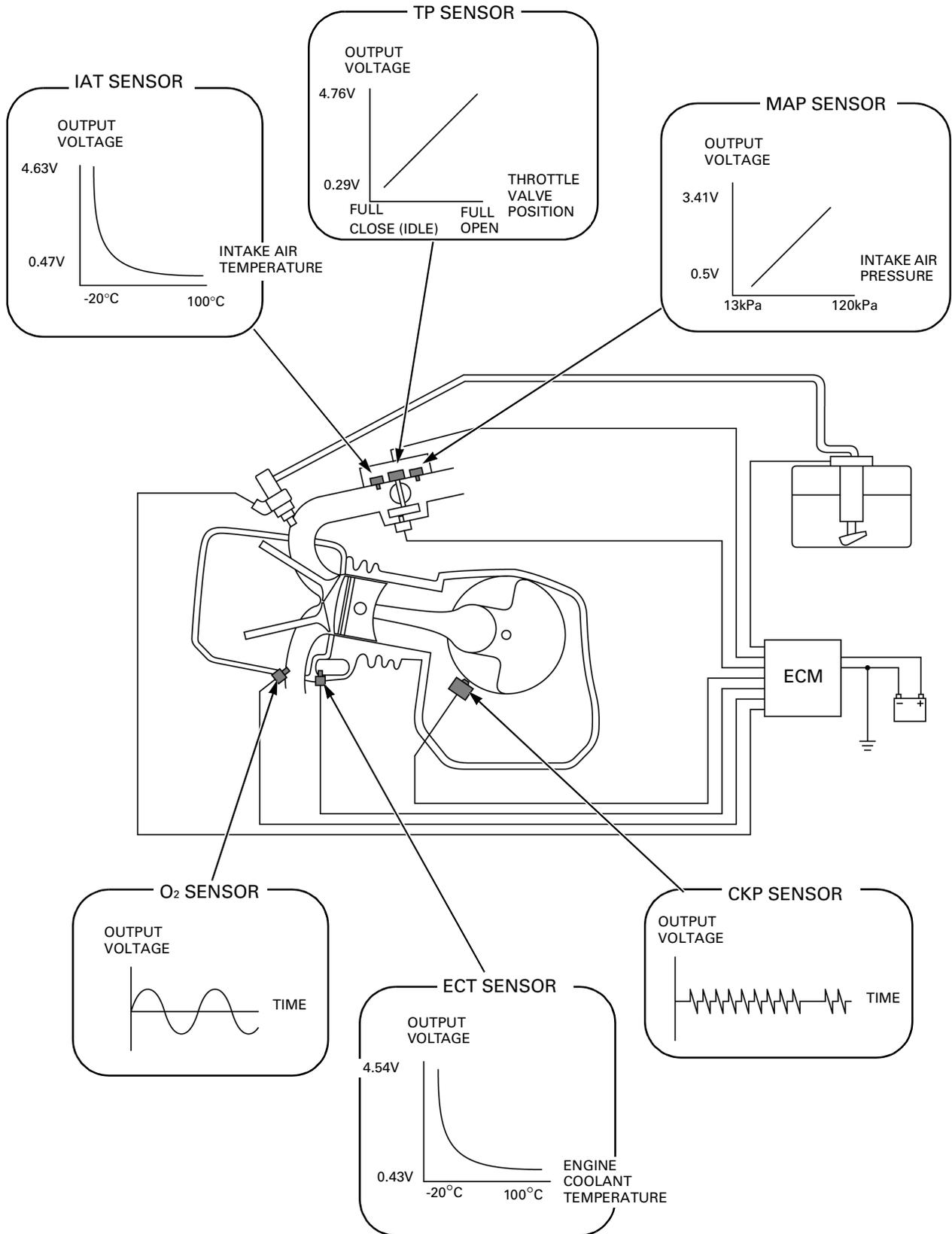
- **LARGE THROTTLE OPENING/LOW INTAKE MANIFOLD VACUUM PRESSURE**

Basic discharge duration is determined by speed-throttle map that looks at throttle position detected by the TP sensor and engine revs detected by the CKP sensor.



**ROLE OF EACH SENSOR**

Each sensor provides information with ECM by interpreting physical information such as temperature and pressure into electronic signals (voltage).



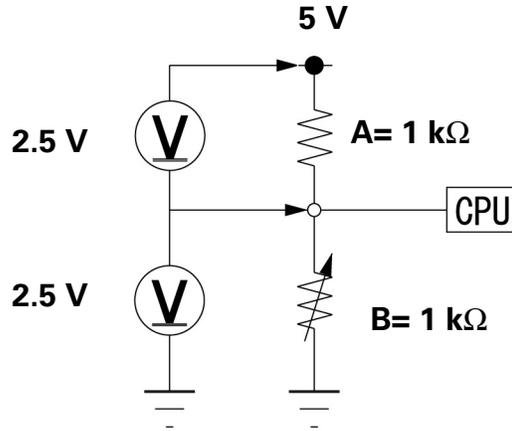
# TECHNICAL FEATURES

## SENSORS

There are two kinds of sensor output: One translates changes of the electrical resistance into changes of voltage, the other produces its own voltage or current.

### OUTPUT VOLTAGE SENT TO ECM

As shown on the diagram below, two resistors divide the source voltage when connected to the source in series.



When resistor A and B have same resistance value, source voltage would be divided equally. When one of them has larger resistance value than the other, it would receive larger share of the load.

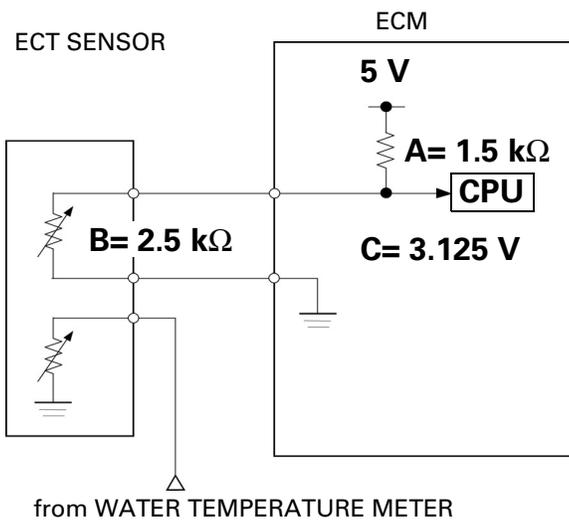
ECT sensor and IAT sensor utilize this principle.

ECM receives changes of physical information (changes of temperature, pressure etc.) as variable voltage by reading it at both ends of resistor B (Resistor A: fixed resistor/Resistor B: variable resistor that reacts to physical changes).

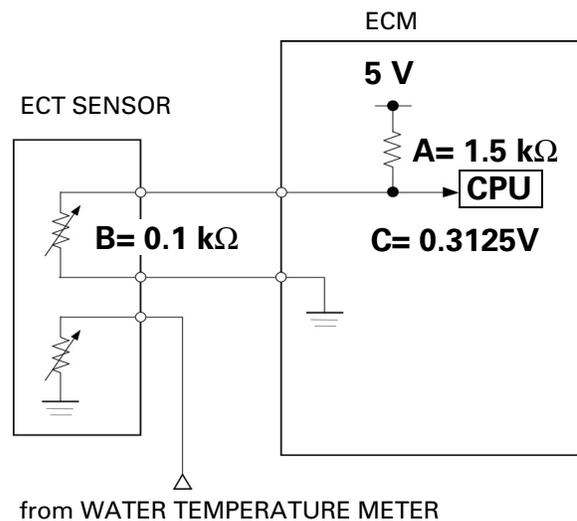
For example, when source voltage is 5 V, resistance value of resistor A is 1.5 kΩ , resistance value of resistor B is 2.5 kΩ , the voltage measured at point C would be 3.125 V as shown below. If the value of resistor B is 0.1 kΩ , the voltage measured at point C would be 0.3125 V.

### e.g.: ECT (engine coolant temperature) SENSOR

#### WHEN ENGINE COOLANT TEMPERATURE IS 20°C:

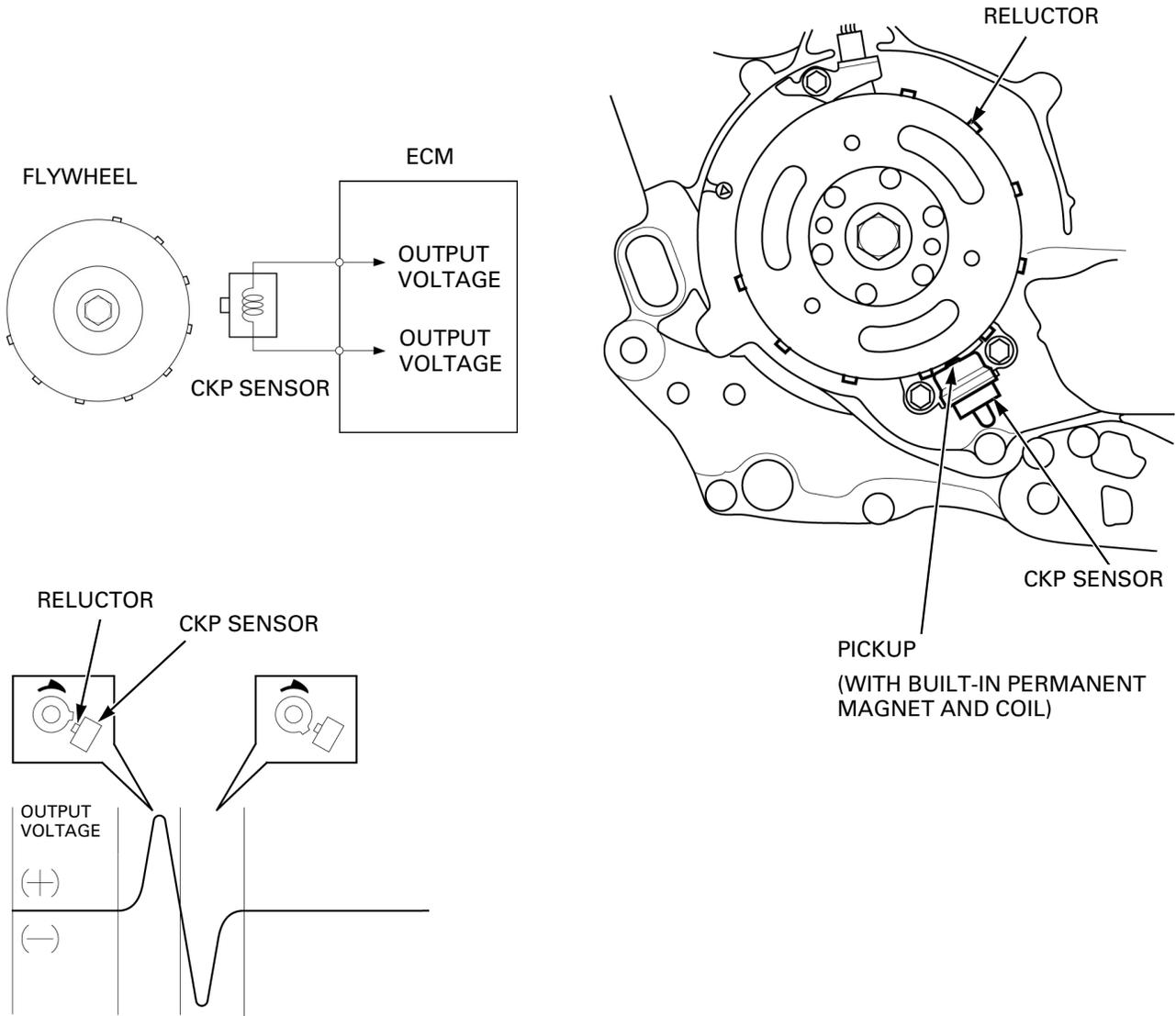


#### WHEN ENGINE COOLANT TEMPERATURE IS 110°C:



**CKP SENSOR**

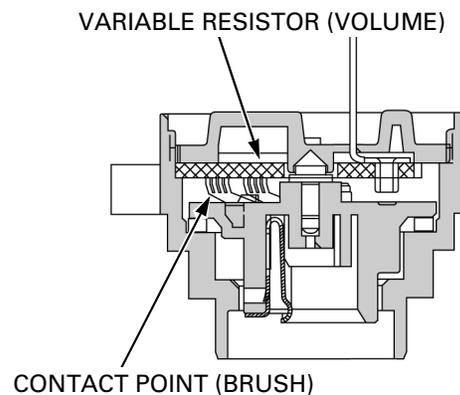
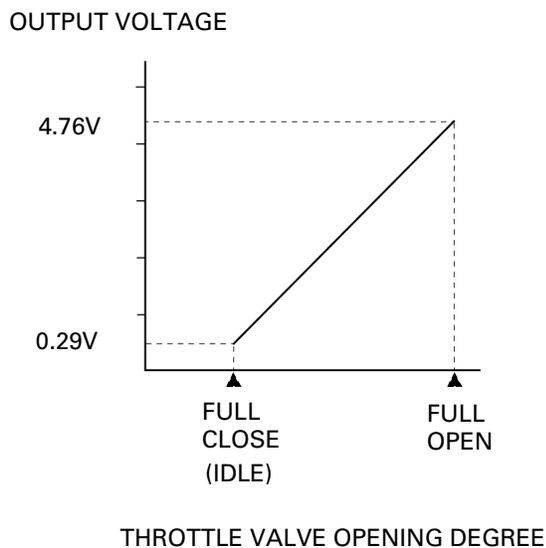
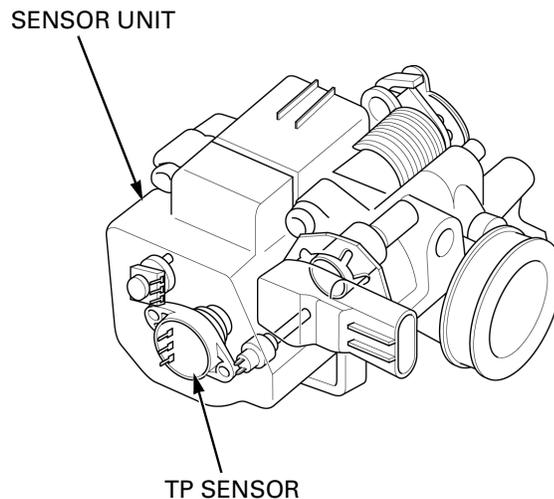
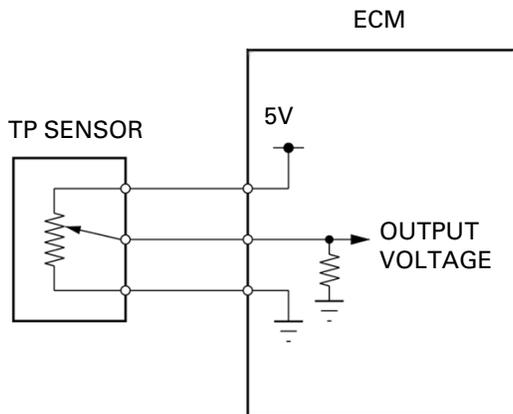
- CKP sensor detects engine revs and crankshaft angle.
- CKP sensor consists of the reluctors on the flywheel (9 projections) and the pickup in CKP sensor with built-in permanent magnet and coil.
- When reluctors on the flywheel cross CKP sensor as the crankshaft rotates, changes of magnetic flux in the pickup coil occur. CKP sensor detects the changes by converting them into pulse voltages and sends the pulse into ECM (9 pulses per 1 crankshaft rotation).
- Depending on output voltage, ECM controls the following:
  - determines timing of fuel discharge
  - determines basic discharge duration (with TP sensor and MAP sensor)
  - cuts off fuel supply on deceleration (with TP sensor)
  - determines ignition timing



## TECHNICAL FEATURES

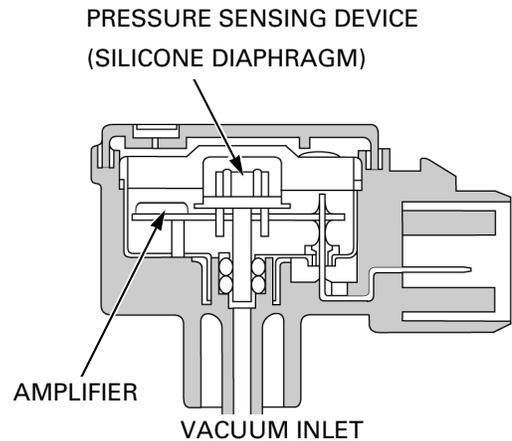
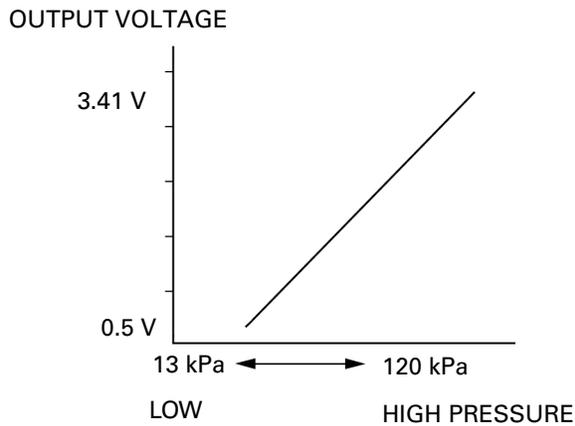
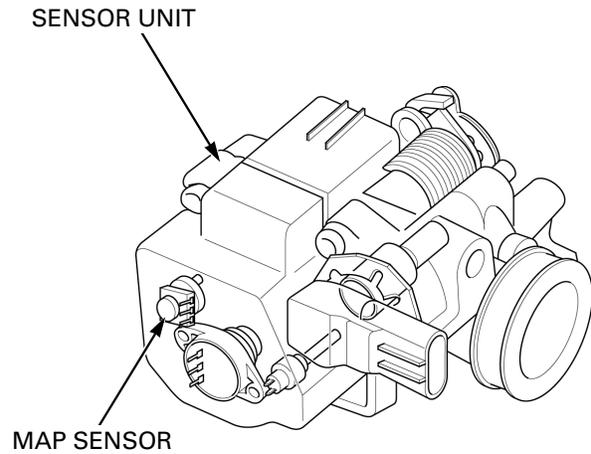
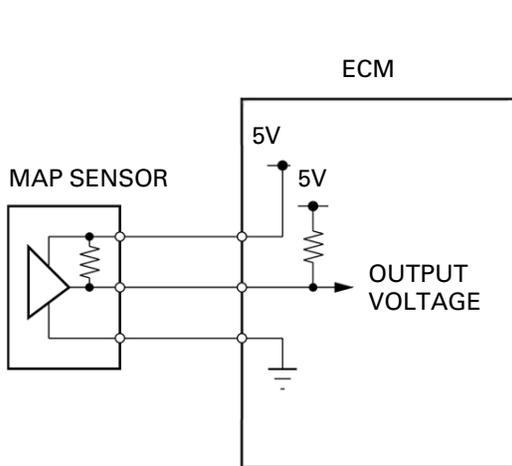
### TP SENSOR

- TP sensor detects the opening degree of throttle valve.
- TP sensor consists of a variable resistor (volume) located on the same axis with throttle valve and a contact point (brush) that moves above the variable resistor in accordance with the throttle valve.
- TP sensor detects the changes of brush angle synchronized with throttle valve movement by converting them into variable resistance values. The input voltage from ECM becomes regulated by this varying resistance value and comes back into ECM.
- Output voltage sent back to ECM is low when throttle opening is small. The voltage becomes higher as throttle opening becomes larger.
- Depending on output voltage, ECM controls the following:
  - determines basic discharge duration and cuts off fuel supply on deceleration (with CKP sensor)
  - increases the amount of fuel injected on acceleration



**MAP SENSOR**

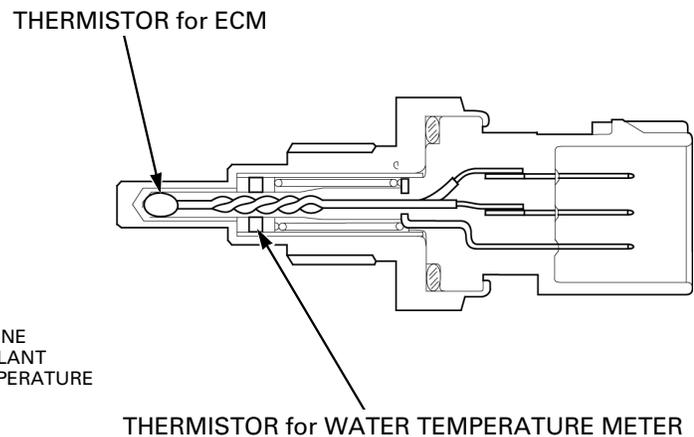
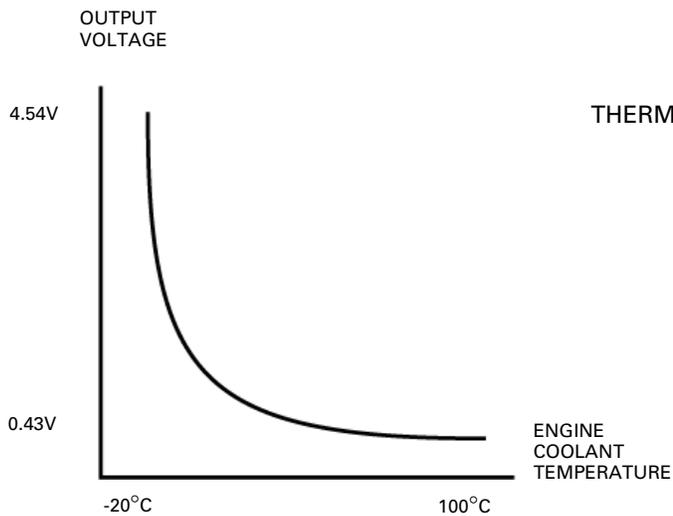
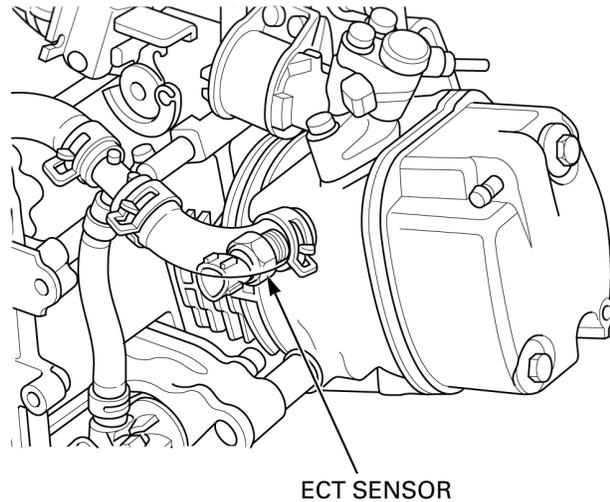
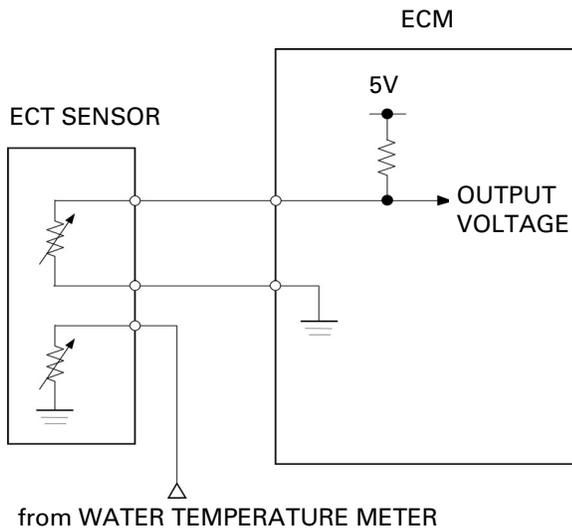
- MAP sensor detects the changes of vacuum pressure inside the intake manifold.
- MAP sensor consists of the following: a pressure sensing device (silicone diaphragm) that varies its resistance value when pressure is applied, and an amplifier that boosts tiny changes of voltage.
- MAP sensor outputs the changes of vacuum pressure by converting them into changes of resistance value and amplifies them. ECM inputs the values by converting them into variable voltages.
- Output voltage into ECM is low when intake manifold vacuum pressure is low. The voltage becomes higher as vacuum pressure becomes greater.
- Depending on output voltage, ECM determines basic discharge duration with CKP sensor.



## TECHNICAL FEATURES

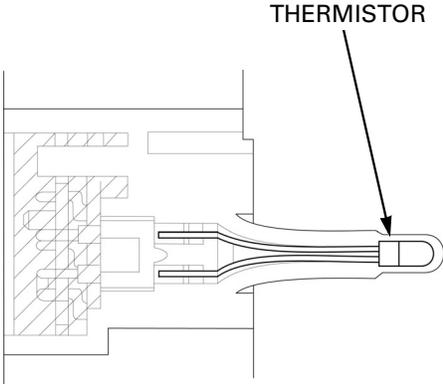
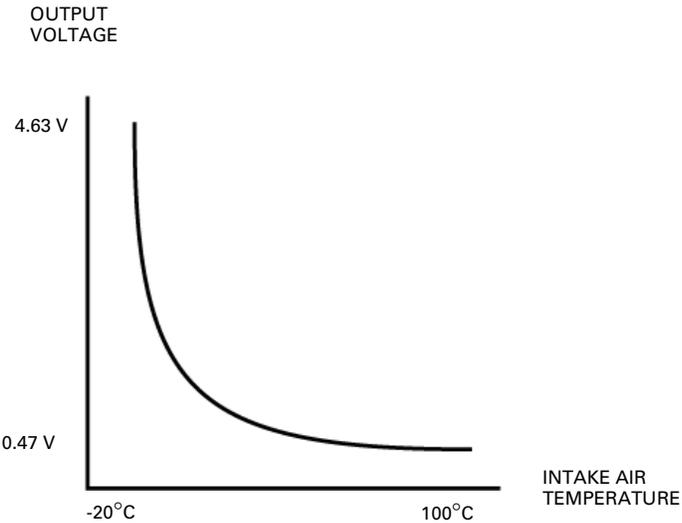
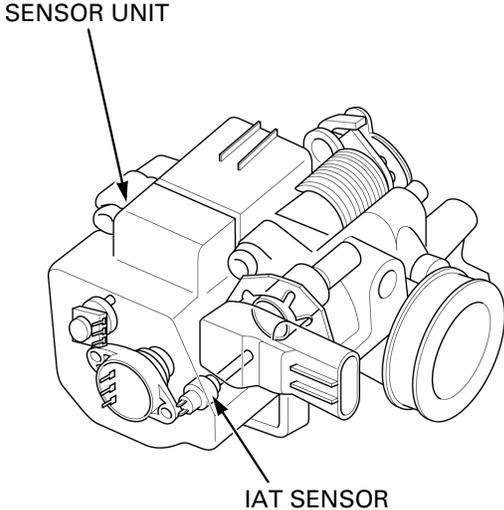
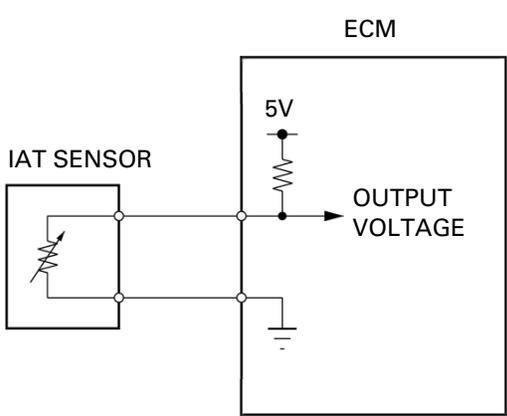
### ECT SENSOR

- ECT sensor detects engine coolant temperature.
- ECT sensor consists of a thermistor that varies its resistance value according to changes of temperature.
- ECT sensor detects the changes of engine coolant temperature by converting them into the changes of thermistor's resistance values. ECM receives the output signal from the sensor as variable voltages.
- Output voltage into ECM is high when engine coolant temperature is low. The voltage becomes lower as temperature increases.
- Depending on output voltage, ECM corrects discharge duration corresponding with engine coolant temperature.



IAT SENSOR

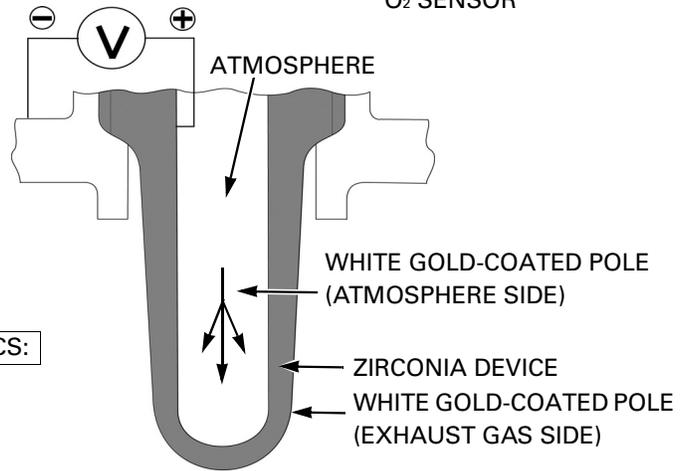
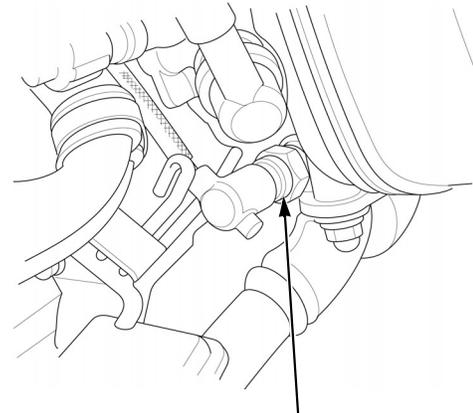
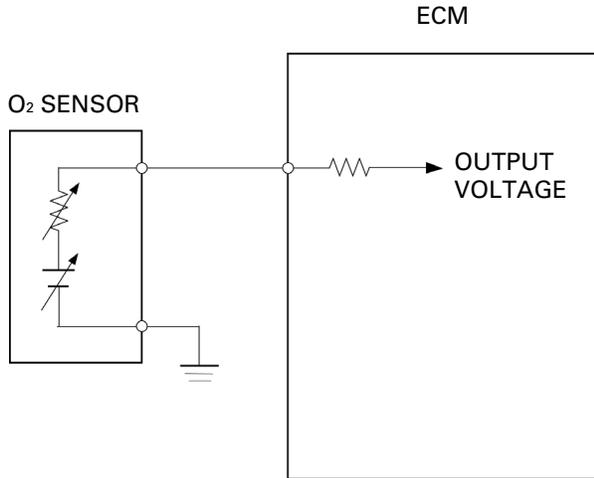
- IAT sensor detects temperature of incoming air into engine.
- IAT sensor consists of a thermistor that varies its resistance value according to changes of temperature.
- IAT sensor detects changes of intake air temperature by converting them into the changes of thermistor's resistance values. ECM inputs the resistance values by converting them into variable voltages.
- Output voltage into ECM is high when intake air temperature is low. The voltage becomes lower as temperature increases.
- Depending on output voltage, ECM corrects discharge duration corresponding with intake air temperature.



# TECHNICAL FEATURES

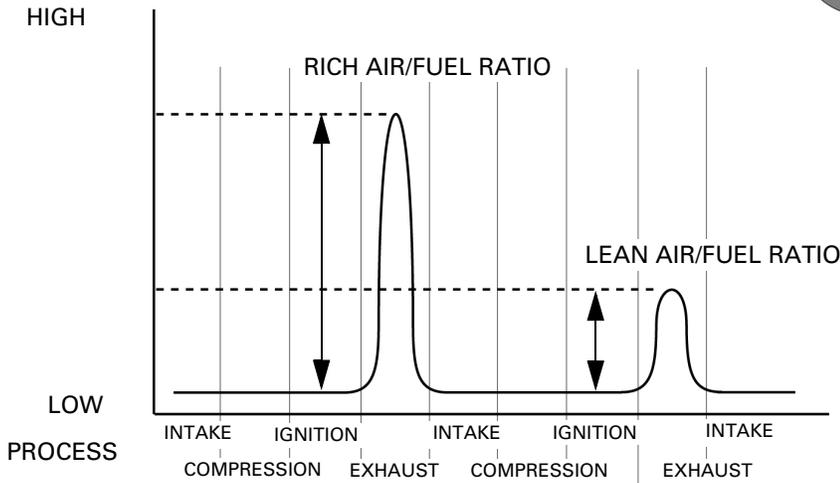
## O<sub>2</sub> SENSOR

- O<sub>2</sub> sensor detects the amount of oxygen in exhaust gas.
- O<sub>2</sub> sensor consists of a cylindrical-shaped, white gold-coated zirconia device. The inside of the device is exposed to atmosphere, whereas its outside is exposed to exhaust gas.
- Zirconia device: produces electromotive force by difference of oxygen concentration between atmosphere and exhaust gas when temperature is higher than certain.
- O<sub>2</sub> sensor detects changes of oxygen concentration in exhaust gas by measuring the electromotive force. ECM receives the values as voltages.
- The output voltage of O<sub>2</sub> sensor is about 0 V when the difference of oxygen concentration between the atmosphere and the exhaust gas is very small (when air/fuel ratio is lean), whereas about 1 V when the difference is very big (when air/fuel ratio is rich).
- Depending on output voltage, ECM corrects discharge duration corresponding with oxygen concentration in exhaust gas.



### GENERAL IDEA OF O<sub>2</sub> SENSOR OUTPUT CHARACTERISTICS:

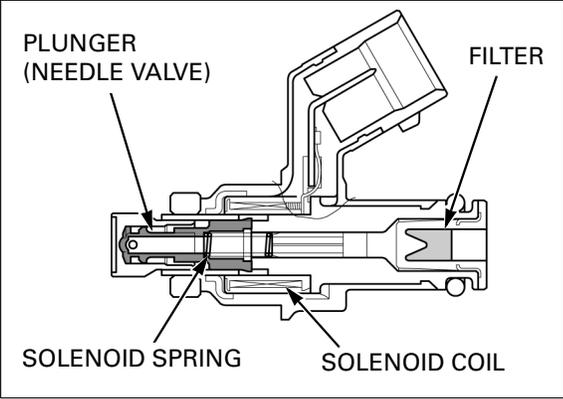
ELECTROMOTIVE FORCE (VOLTAGE)



**INJECTOR**

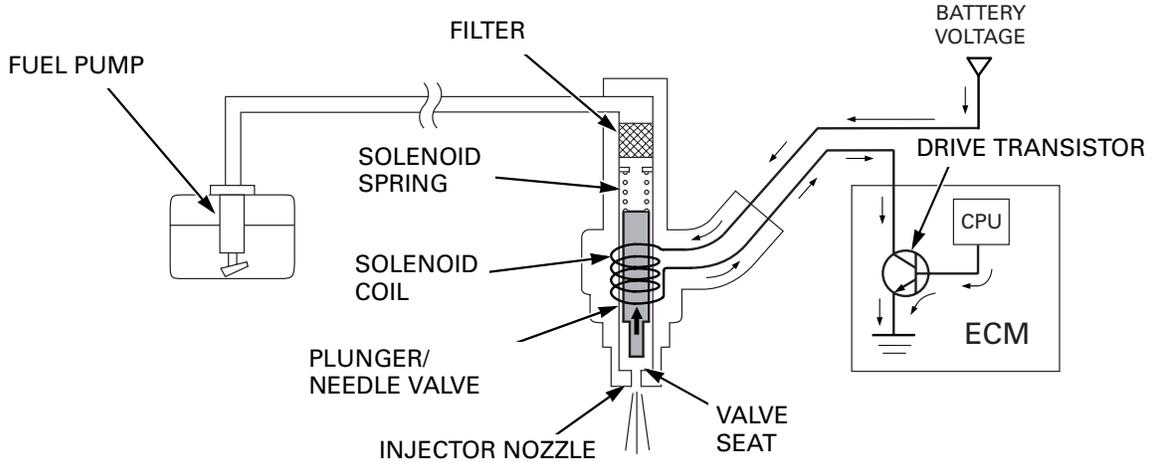
**SUMMARY**

- Fuel injector is a solenoid valve that consists of needle valve/plunger, solenoid coil, solenoid spring and filter.
- Constantly pressurized fuel (294 kPa (3 kgf/cm<sup>2</sup>, 43 psi)) is supplied to the injector. It sprays the proper amount of fuel through idle to maximum engine revs.
- The injector is either fully closed or fully open with fixed stroke. The amount of fuel injected is dependent on how long the injector is kept open.
- The ignition switch supplies constant power for the injector. When ECM starts up the drive transistor, current flows through the solenoid coil and injector opens.

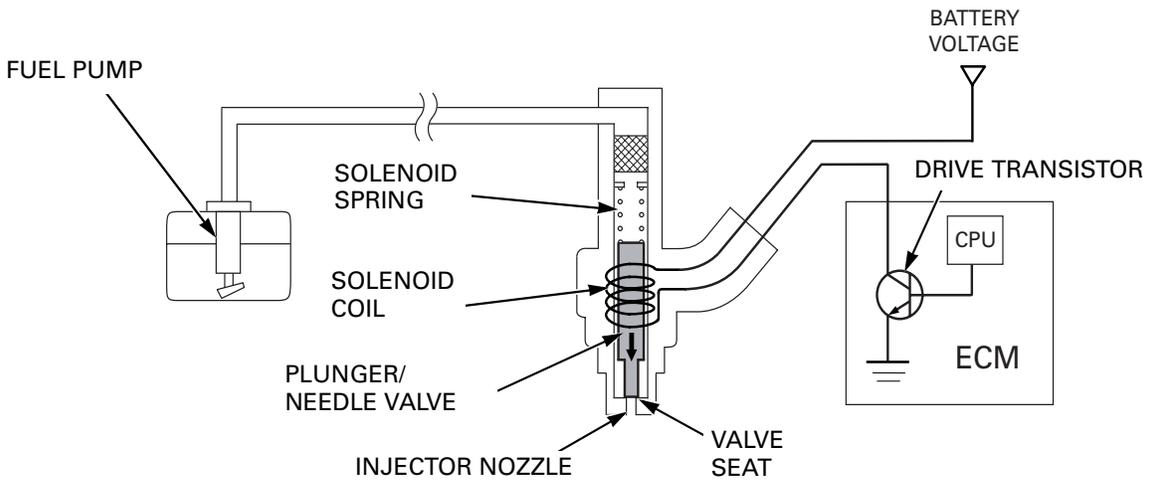


**OPERATION**

1. The fuel pressurized by the fuel pump is blocked at the injector nozzle that consists of plunger/needle valve and valve seat.
2. When ECM turns the drive transistor ON, current flows through the solenoid coil in the injector. The electromagnetized coil pulls up the plunger/needle valve while compressing the solenoid spring.
3. Nozzle opens as the plunger/needle valve lifts up. The fuel blocked at the injector nozzle passes the filter and then sprays into the intake manifold.



4. When ECM turns the drive transistor OFF, current no longer flows through the solenoid coil in the injector. The solenoid spring closes the nozzle and injecting stops in result.

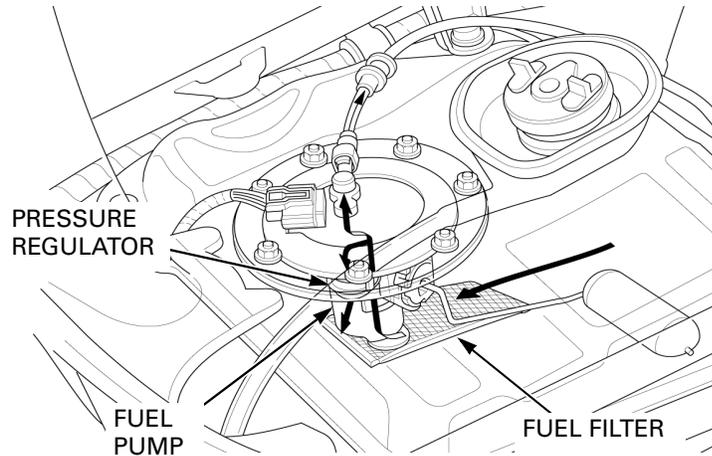


## TECHNICAL FEATURES

### FUEL PUMP SYSTEM

#### SUMMARY

- Fuel pump is located inside the fuel tank.
- Fuel pump draws in the fuel via fuel filter and delivers it to the injector.  
The pressure regulator maintains fuel pressure in constant at 294 kPa (3 kgf/cm<sup>2</sup>, 43 psi).



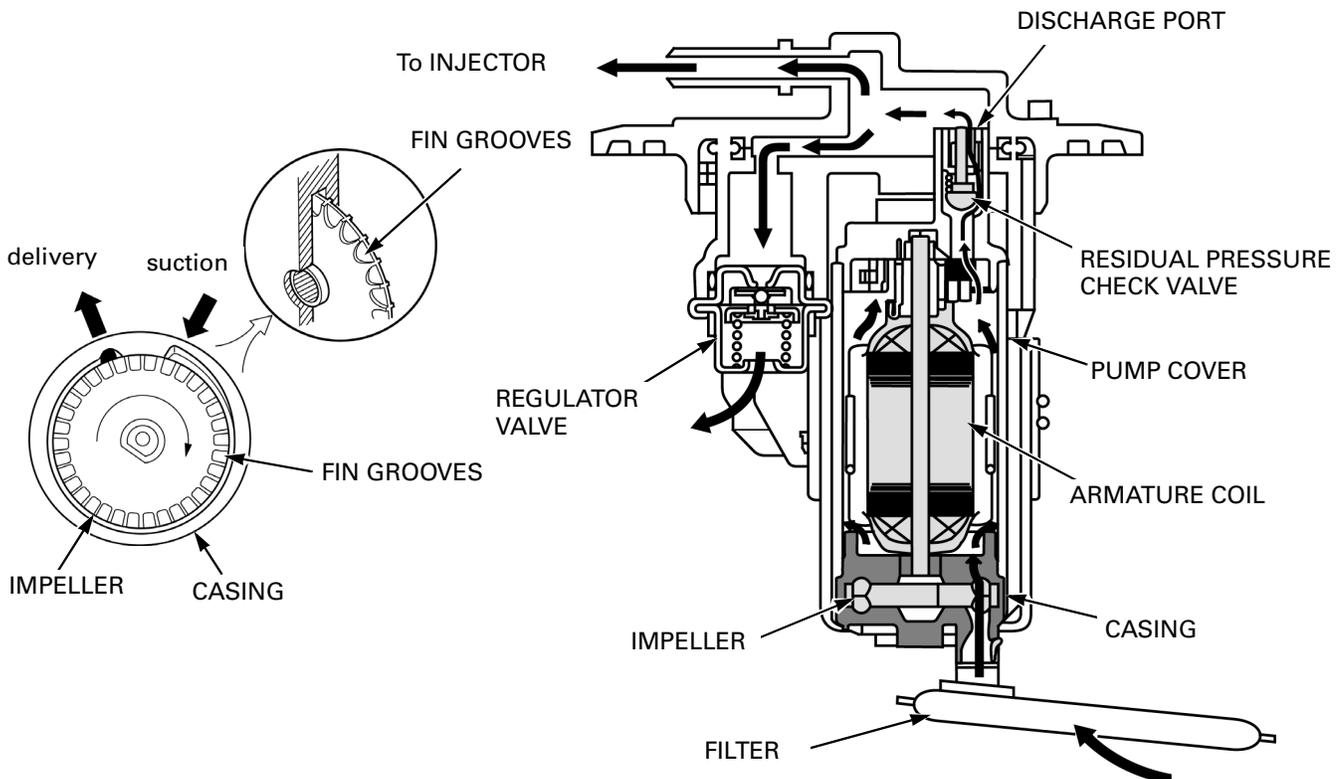
#### FUEL PUMP CONSTRUCTION

Fuel pump assembly consists of armature coil, pump section, residual pressure check valve, suction port and discharge port.

The pump section consists of armature coil-driven impeller and pump chamber composed of pump casing and pump cover.

#### FUEL PUMP OPERATION

- When the motor turns, fin grooves located on impeller circumference produce pressure difference due to hydro-friction force, fuel is drawn into the pump, then delivered out of the pump.
- The drawn fuel via the filter circulates inside the motor and passes the residual pressure check valve, then becomes delivered through the discharge port.
- When engine is turned OFF and fuel pump is not operating, the check valve maintains residual fuel pressure to ease engine restarting.
- Fuel pressure regulator maintains fuel pressure in constant by the regulator valve that opens when fuel pressure in discharge circuit (between the pump and injector) becomes higher than certain.

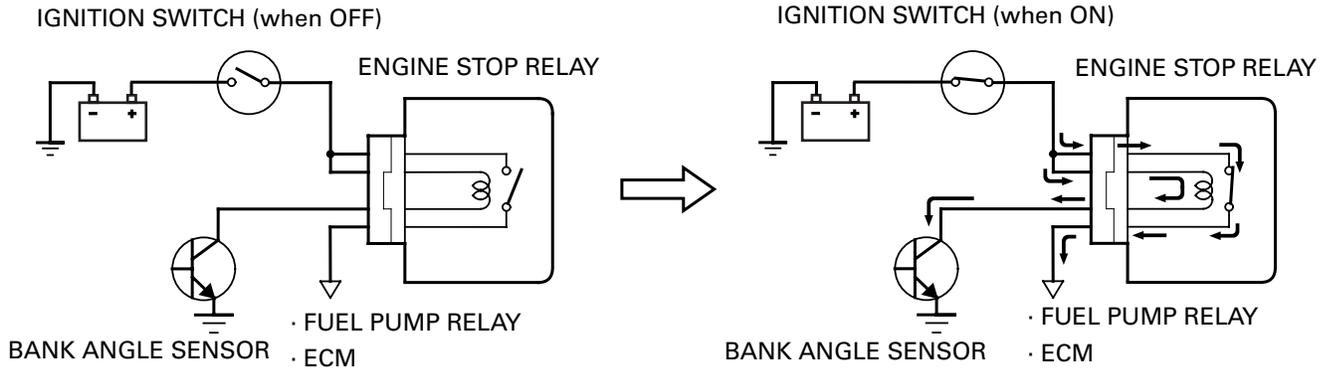


**ENGINE STOP RELAY**

Connected to ignition switch, engine stop relay turns ON/OFF the ECM, fuel pump relay and fuel pump.

When ignition switch is ON, current flows through the coil inside the engine stop relay. The electromagnetized coil turns the engine stop relay switch ON (only when bank angle sensor is ON).

The ECM and fuel pump relay receive power supply from battery via engine stop relay when the engine stop relay switch is ON.

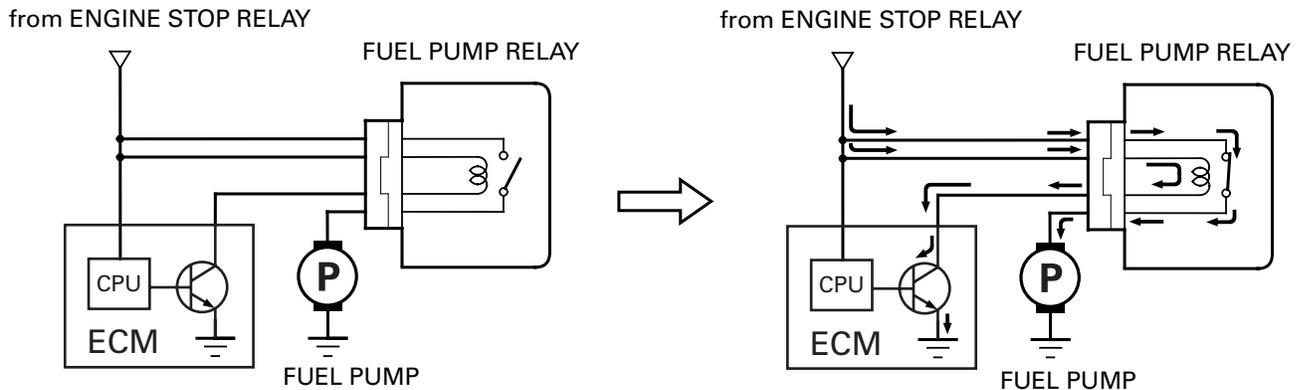
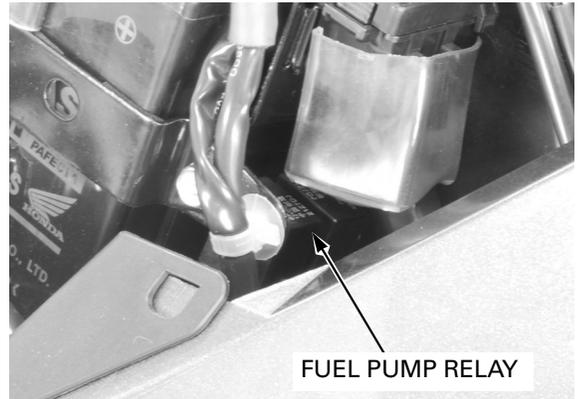


**FUEL PUMP RELAY**

Fuel pump relay turns ON/OFF the fuel pump.

When engine stop relay is ON, power from the battery is supplied to the coil inside the fuel pump relay. The coil becomes electromagnetized when ECM grounds the power and turns ON the fuel pump relay switch.

The fuel pump receives power supply from battery via engine stop relay and fuel pump relay when the fuel pump relay switch is ON.



## TECHNICAL FEATURES

### BANK ANGLE SENSOR

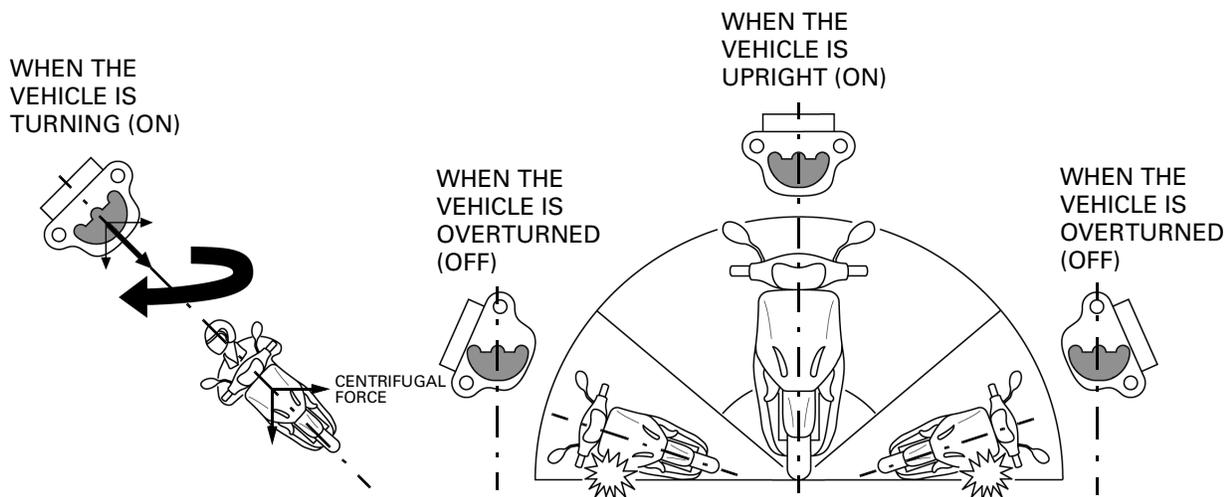
When a vehicle equipped with carburetor is overturned, engine stops automatically because change of fuel level in the float chamber occurs and fuel is no longer supplied, whereas engine with PGM-FI system would not stop as the pressurized fuel keeps spraying.

In order to stop the engine with PGM-FI when the vehicle is overturned, bank angle sensor, which detects angle of the vehicle, is equipped. When the vehicle is tipped more than  $49 \pm 4^\circ$ , it cuts off the power supply to fuel pump and PGM-FI system by cutting off current to engine stop relay.



The center line of pendulum inside the bank angle sensor would be kept straight with the center line of vehicle when turning as the centrifugal force is applied to the pendulum, while it would be offset when the vehicle is overturned as the centrifugal force does not work.

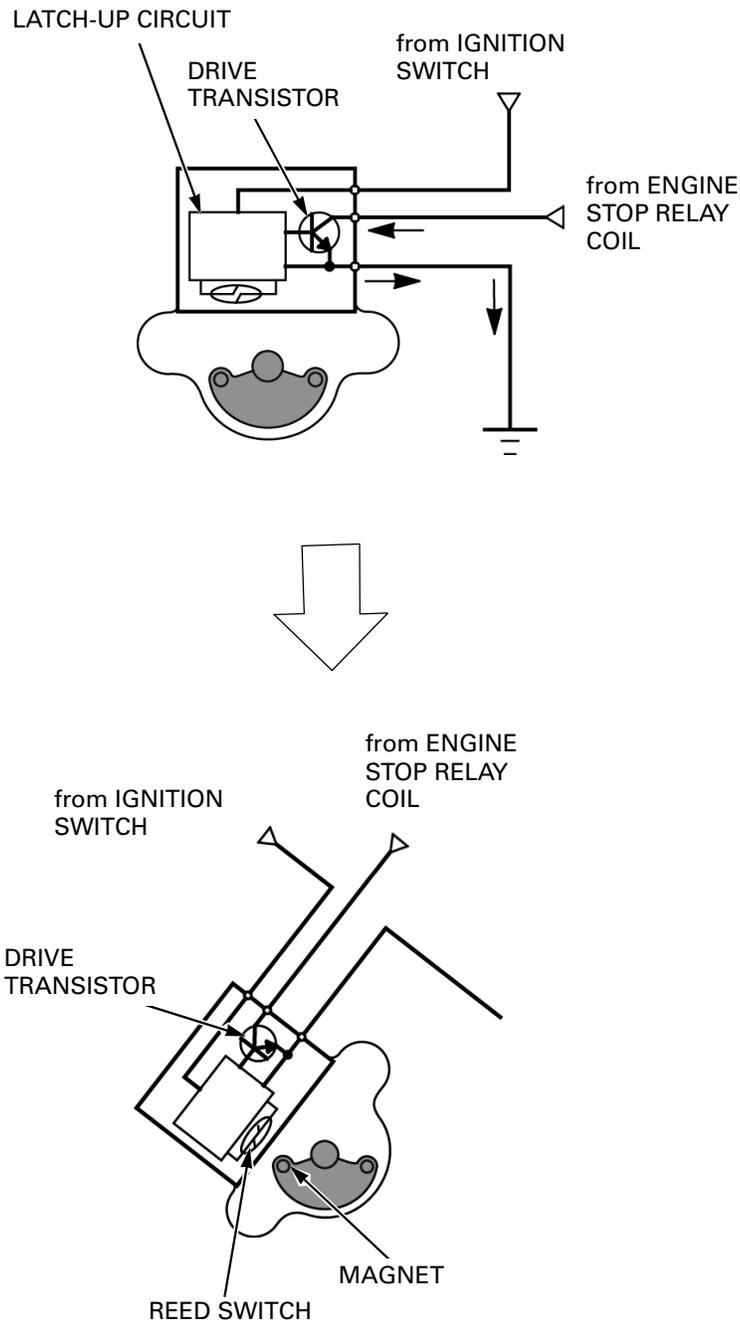
When the center lines of pendulum and the vehicle is offset more than specified angle, bank angle sensor stops the engine by shutting off the power supply from engine stop relay.



**BANK ANGLE SENSOR OPERATION**

1. When ignition switch is turned ON, power flows through the latch-up circuit, turning the engine stop relay drive transistor ON.
2. With drive transistor ON, current from engine stop relay flows through the bank angle sensor transistor to ground. Engine stop relay turns ON.
3. When the vehicle is tipped more than  $49 \pm 4^\circ$ , magnet in the sensor pendulum closes the reed switch.
4. When the reed switch is ON, drive transistor is turned OFF, opening the circuit between the engine stop relay and ground. This stops power to fuel pump and PGM-FI system.
5. Once the vehicle is tipped more than  $49 \pm 4^\circ$ , latch-up circuit keeps the drive transistor OFF, even the vehicle is set upright.

To turn the drive transistor ON, reset the latch-up circuit by turning the ignition switch OFF.

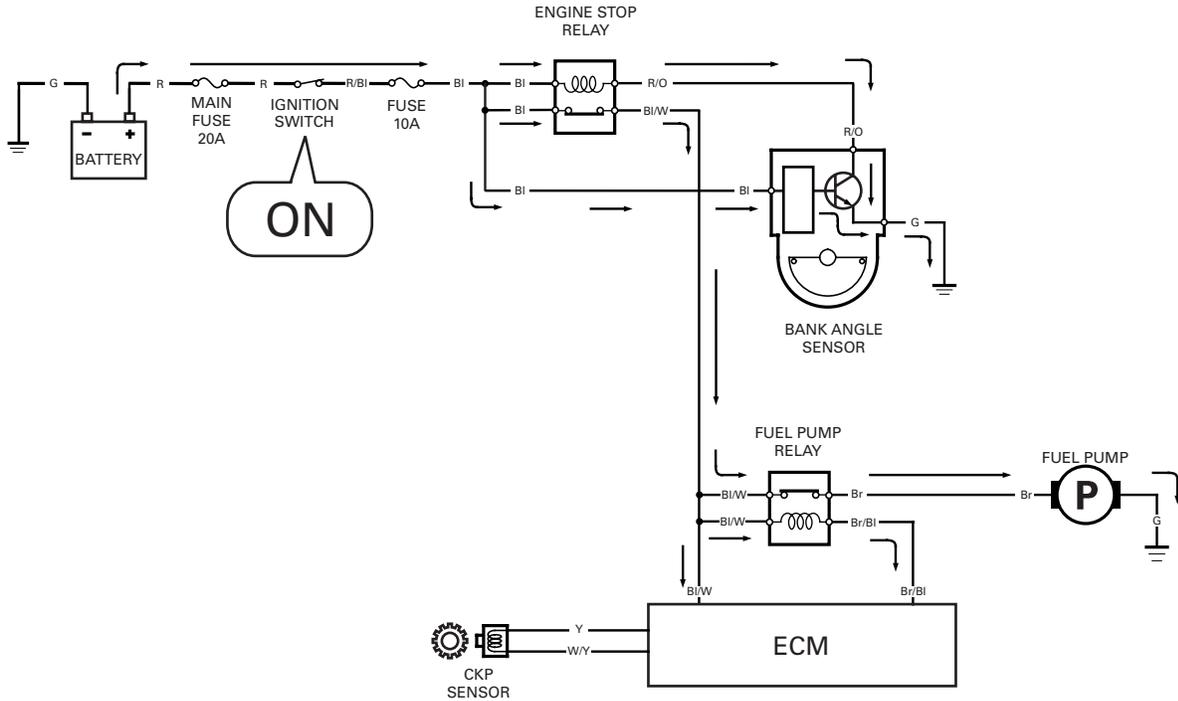


## TECHNICAL FEATURES

### FUEL PUMP CONTROL CIRCUIT

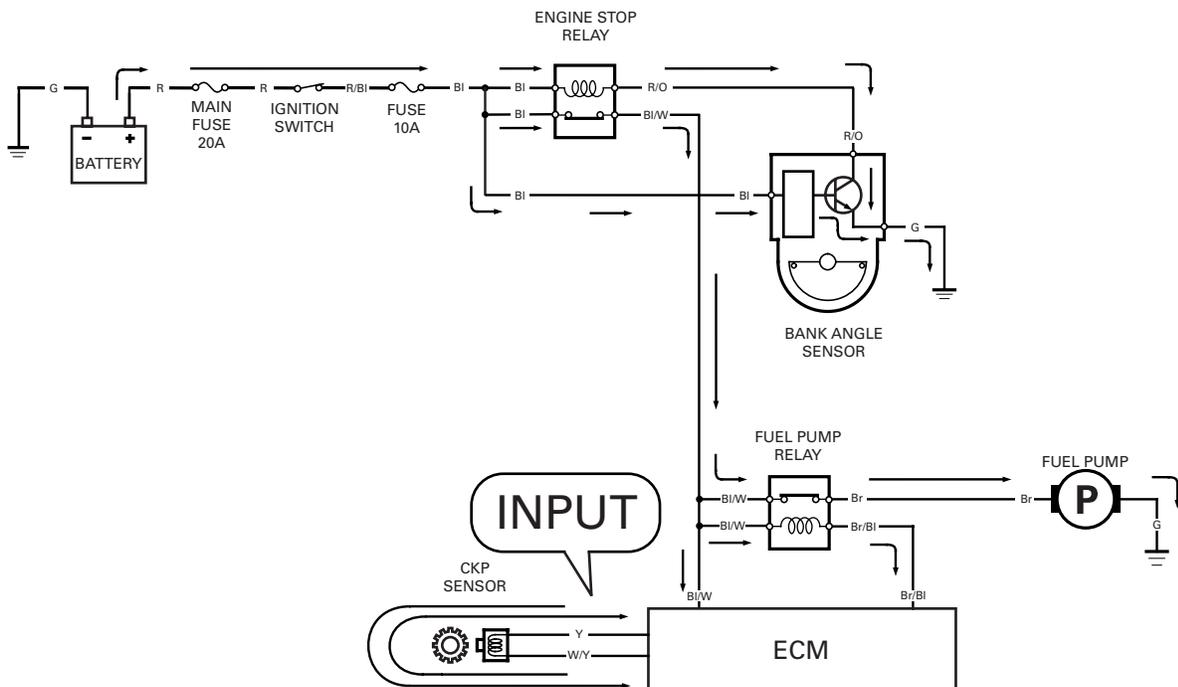
#### <WHEN IGNITION SWITCH IS TURNED ON>

1. When ignition switch is turned ON, power from battery is supplied to bank angle sensor via main fuse (20 A), ignition switch and sub fuse (10 A). When the bank angle sensor is ON, current flows through the coil of engine stop relay and relay turns ON.
2. Power from battery is supplied to ECM when engine stop relay is turned ON. ECM controls the fuel pump relay in order to operate the fuel pump. Current flows through the coil of fuel pump relay for about 2 seconds and the relay becomes ON for about two seconds, and then fuel pump operates for about 2 seconds as a result.



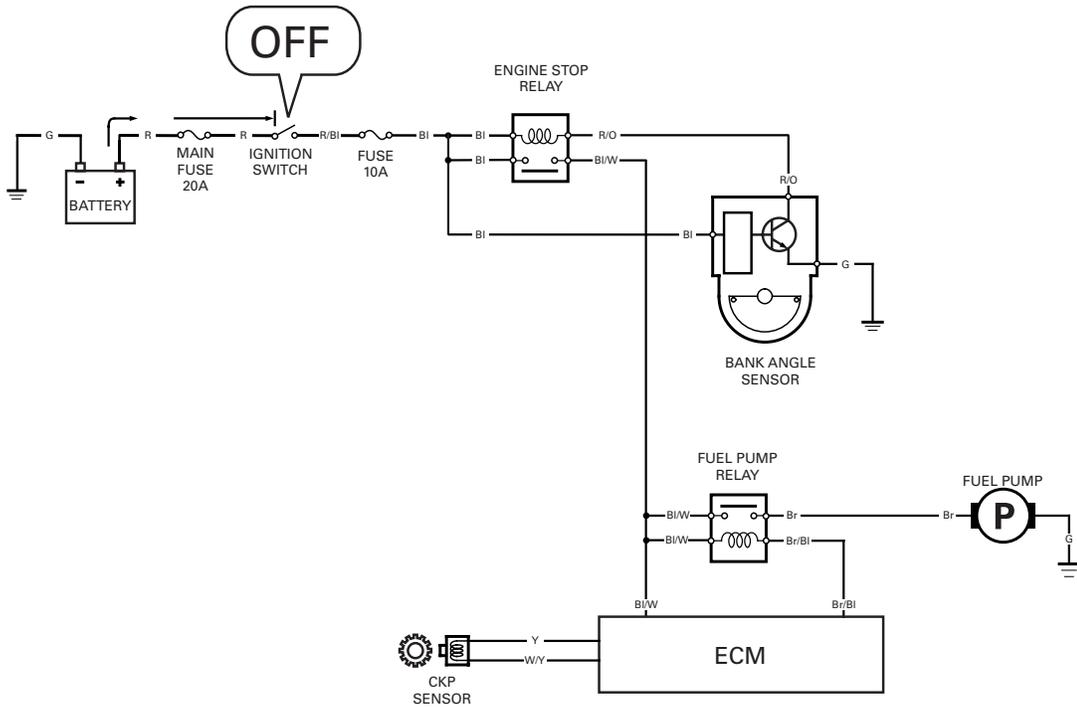
#### <DURING ENGINE START-UP>

As the crankshaft rotates, ECM receives input signal from CKP sensor. ECM turns ON the fuel pump relay and operates the fuel pump.



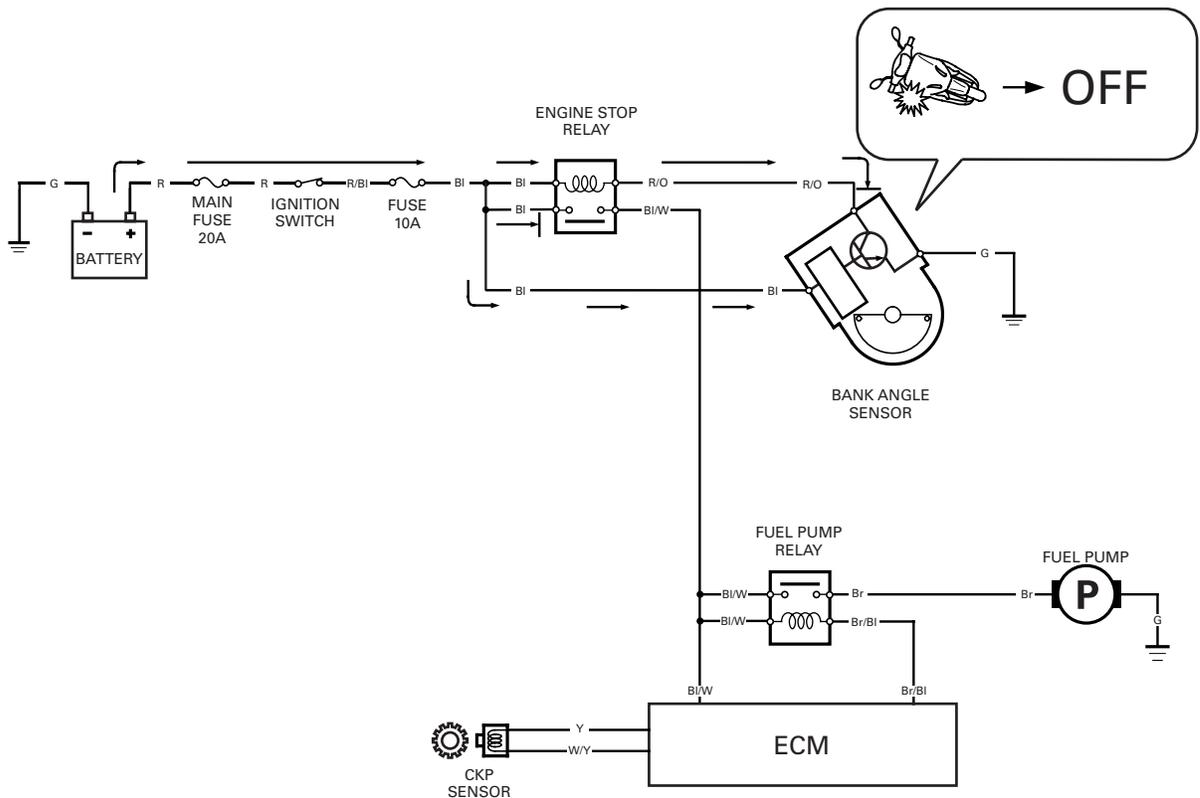
**<WHEN IGNITION SWITCH IS TURNED OFF>**

When ignition switch is turned OFF, fuel pump operation stops as the power supply to ECM and fuel pump relay is cut off.



**<WHEN VEHICLE IS OVERTURNED (BANK ANGLE SENSOR IS TURNED OFF)>**

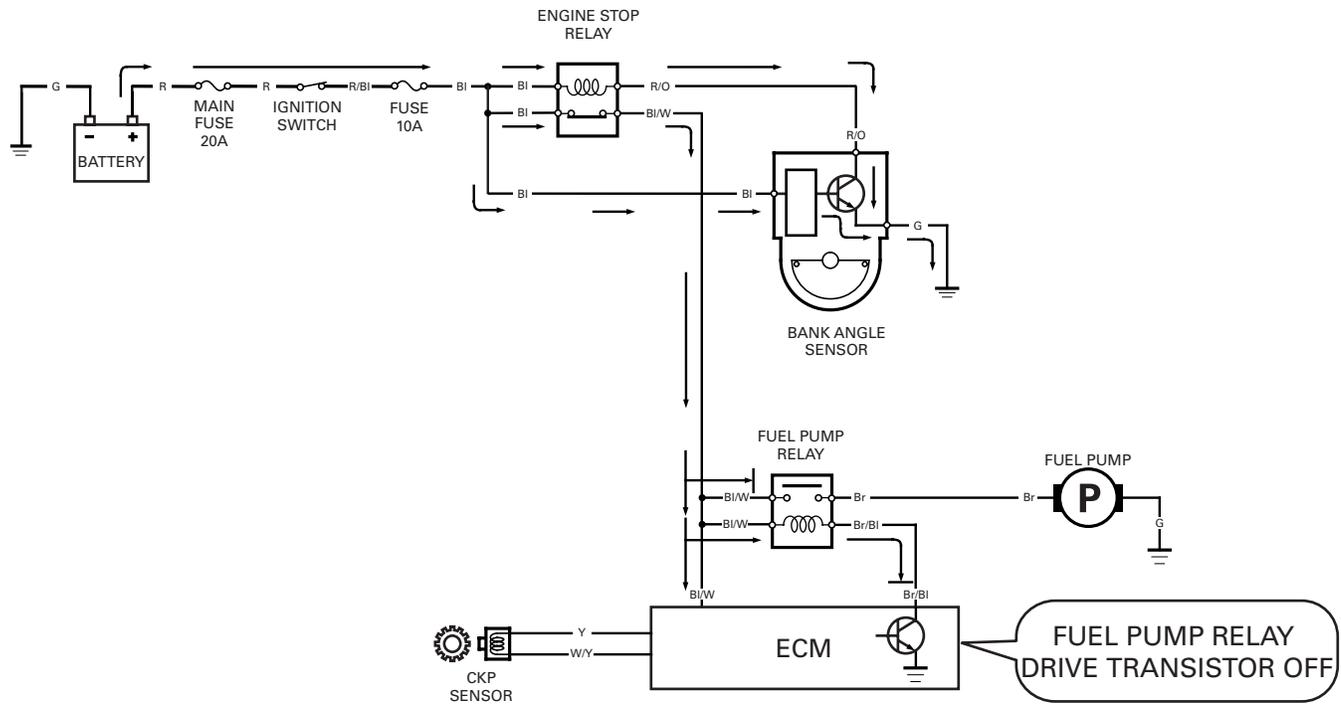
1. When the vehicle is overturned and bank angle sensor detects it, engine stop relay turns OFF.
2. When engine stop relay is OFF, fuel pump operation stops as the power supply to ECM and fuel pump relay is cut off.



## TECHNICAL FEATURES

<WHEN ECM STOPS FUEL PUMP OPERATION AS MALFUNCTION ON CKP SENSOR etc. IS DETECTED (FAIL SAFE OPERATED)>

1. Fuel pump relay is turned OFF as ECM shuts off the power supplied to coil side of fuel pump relay.
2. Fuel pump operation stops.

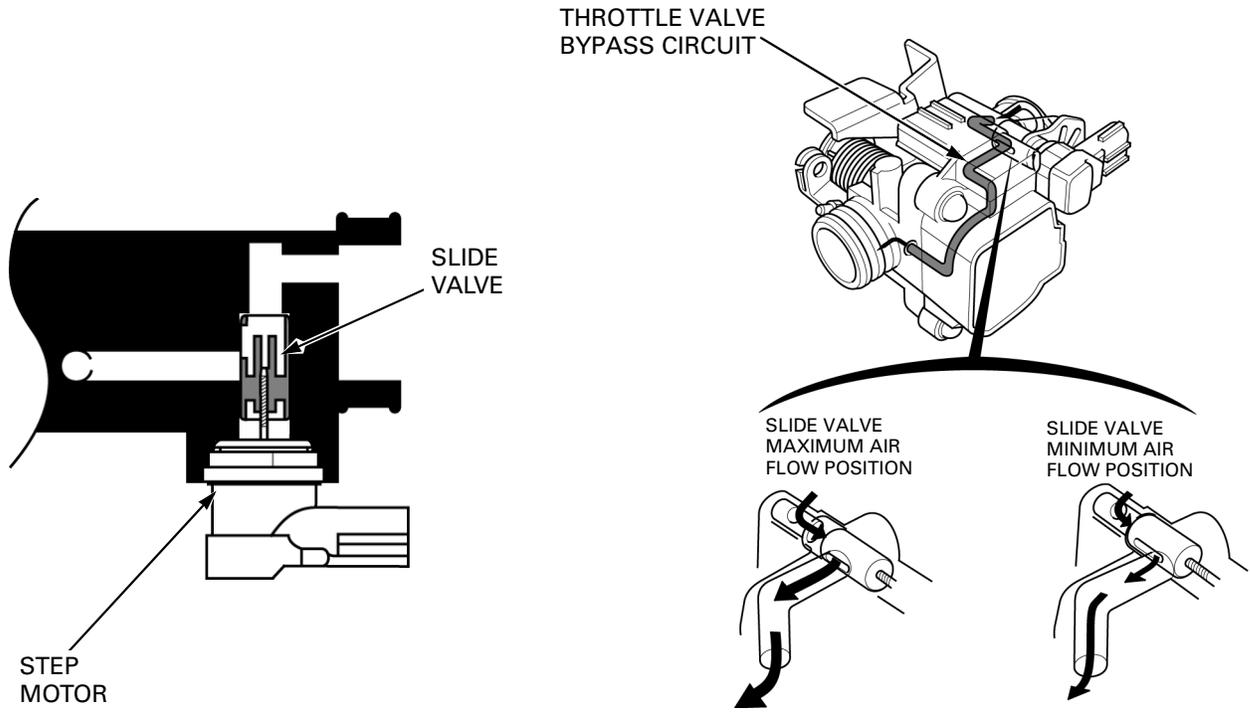


**IDLE AIR CONTROL VALVE (IACV)**

**SUMMARY**

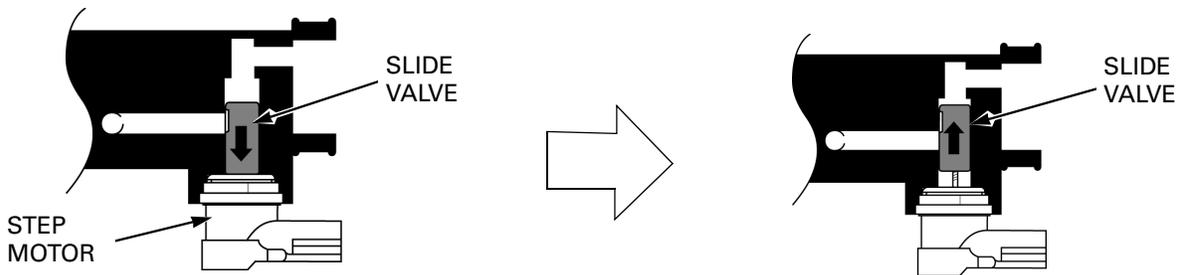
IACV consists of ECM, step motor, slide valve and bypass circuit.

IACV regulates the amount of air flow through the throttle valve by operating the slide valve in accordance with the input signal from ECM in order to maintain specified engine idle speed at  $1,700 \pm 100 \text{ min}^{-1}$  (rpm).



**WHEN IGNITION SWITCH IS TURNED ON**

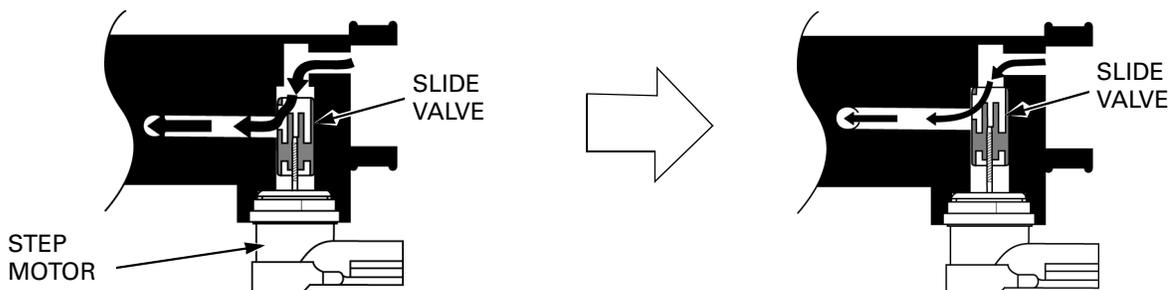
When ignition switch is turned ON, ECM turns the step motor and it pulls the slide valve toward itself. While detecting engine coolant temperature, ECM drives the motor in order to slide the valve back to proper position where necessary amount of incoming air for starting the engine can be obtained.



**DURING WARM UP**

When the engine is still cold, ECM controls the slide valve position in order to increase the amount of incoming air. As a result, engine idle speed is maintained at  $1,900 \pm 100 \text{ min}^{-1}$  (rpm)

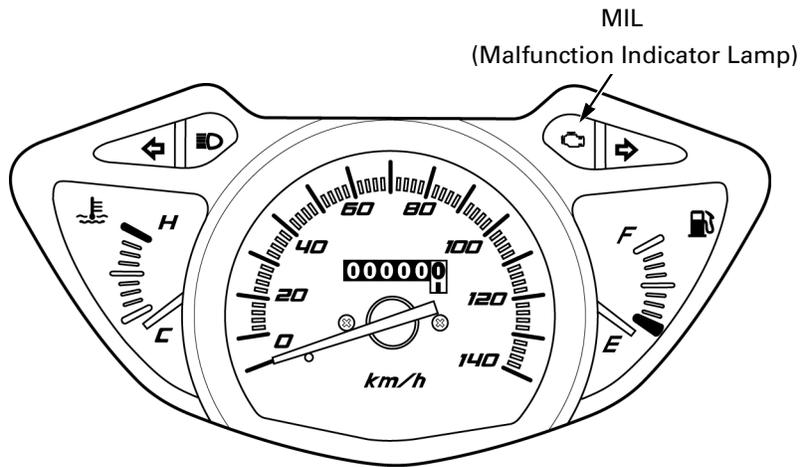
As the engine gets warmed up, slide valve returns toward its original position. ECM decreases the amount of incoming air by controlling the position of the slide valve in order to obtain specified engine idle speed at  $1,700 \pm 100 \text{ min}^{-1}$  (rpm).



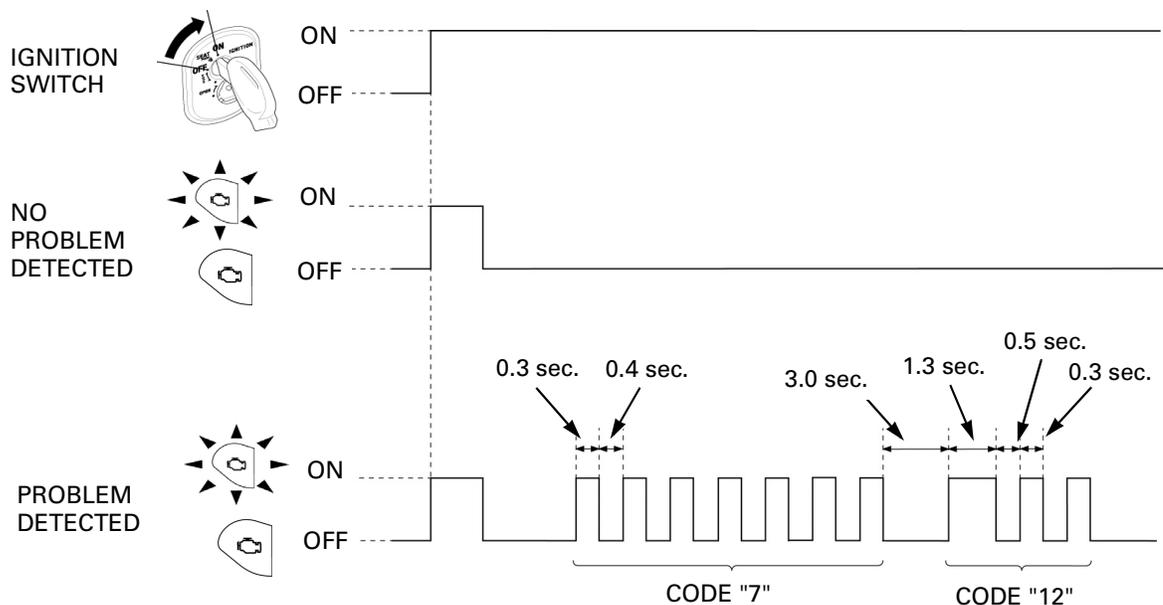
## TECHNICAL FEATURES

### SELF DIAGNOSIS FUNCTION

#### MIL (Malfunction Indicator Lamp)



- When ignition switch is turned ON, PGM-FI malfunction indicator lamp (MIL) will stay on for a few seconds, then go off.
- When ECM detects an abnormal response from the electrical system, MIL blinks according to the self-diagnosis function of the system in order to remind the user of a problem.
- MIL blinks only when the ignition switch is ON with engine stopped, or the engine rev is below 2,200 min<sup>-1</sup>(rpm).
- The malfunction detected by self-diagnosis function is either open circuit or short circuit.
- ECM stores a failure code when problem is detected. Once recorded, the code remains in erasable memory until the clearing procedure is performed.
- PGM-FI system is provided with a fail-safe function that maintains a minimum running capability by using a programmed value in the simulated map even when there is problem in the system. When any abnormality is detected in injector and/or crankshaft position (CKP) sensor, the fail-safe function stops the engine to protect it from serious damage.
- The time of blinks represents each failure code (0 – 29). The MIL uses two kinds of blink duration, long blink lasts 1.3 second, whereas the short blink lasts 0.3 second.



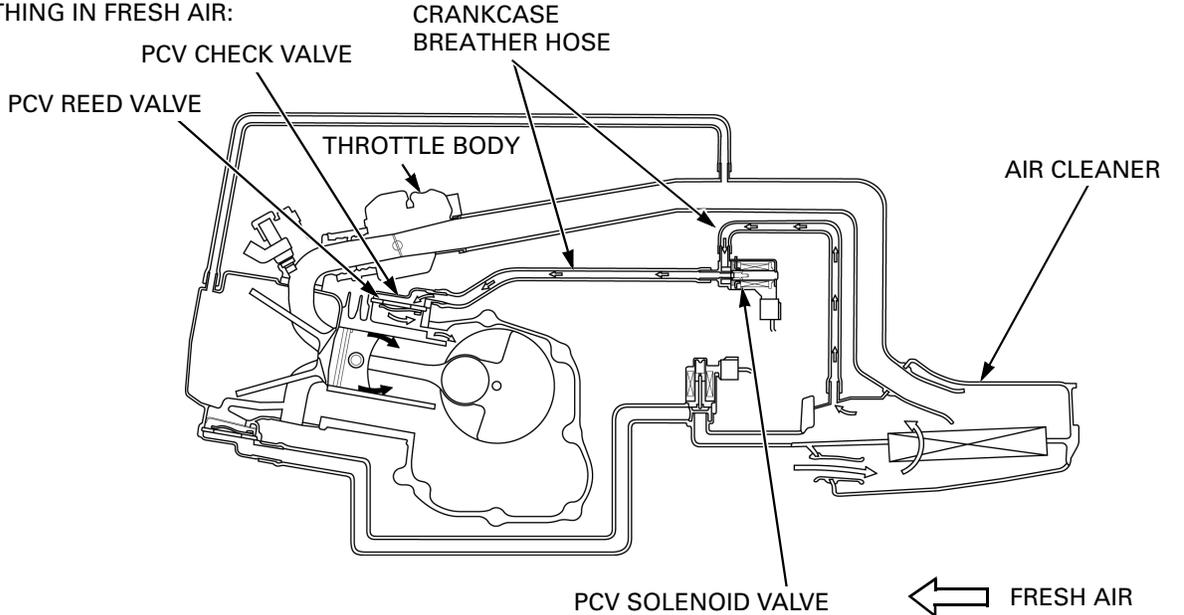
# PCV (Positive Crankcase Ventilation) SYSTEM

This scooter utilizes PCV (positive crankcase ventilation) system which ventilates the crankcase by injecting fresh air. Properly ventilating the crankcase prevents the stagnant blow-by gas that contains gasoline or water vapor from contaminating the engine oil under the driving conditions that result in low engine oil temperature.

The PCV system consists of the air cleaner, PCV solenoid valve and PCV check valve with PCV reed valve.

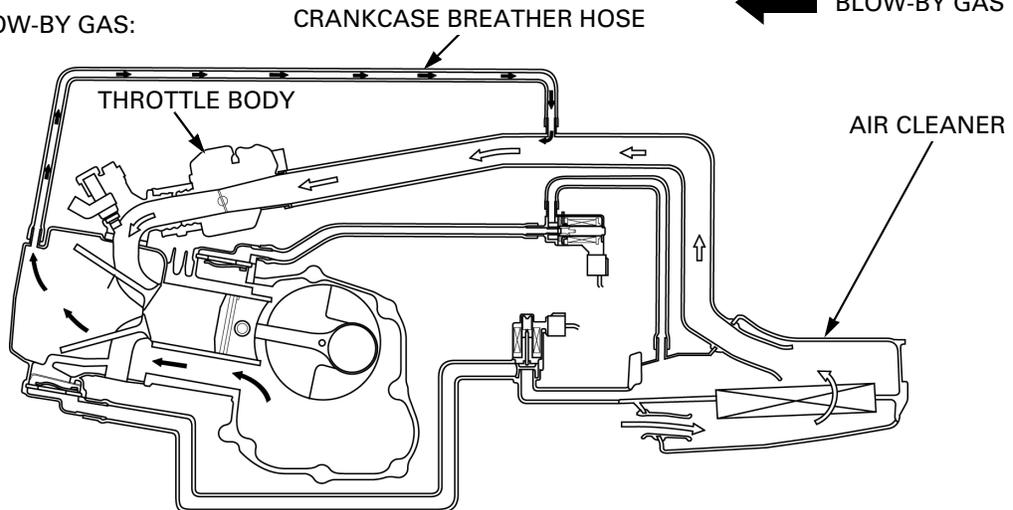
The PCV reed valve prevents the back-flow of blow-by gas to the air cleaner case.

BREATHING IN FRESH AIR:



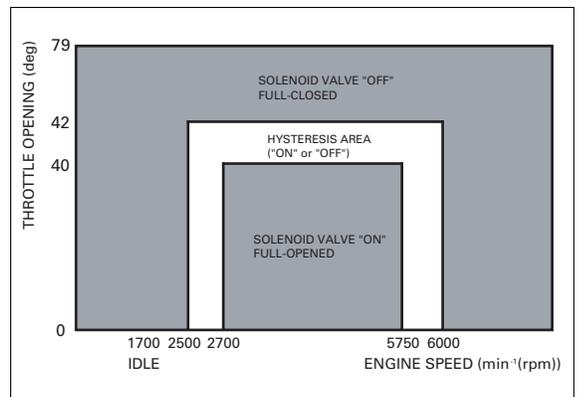
← FRESH AIR  
 ← BLOW-BY GAS

BREATHING OUT BLOW-BY GAS:



The solenoid valve maintains consistent engine idle speed by controlling the crankcase air flow depending on throttle opening and engine speed.

- The ECM signals the solenoid valve to choke airflow to maintain a stable idle speed.
- When throttle opening and engine speed increase, the ECM signals the solenoid valve to open and ventilate crankcase. The solenoid valve closes when the engine speed goes up to certain point.



---

**MEMO**

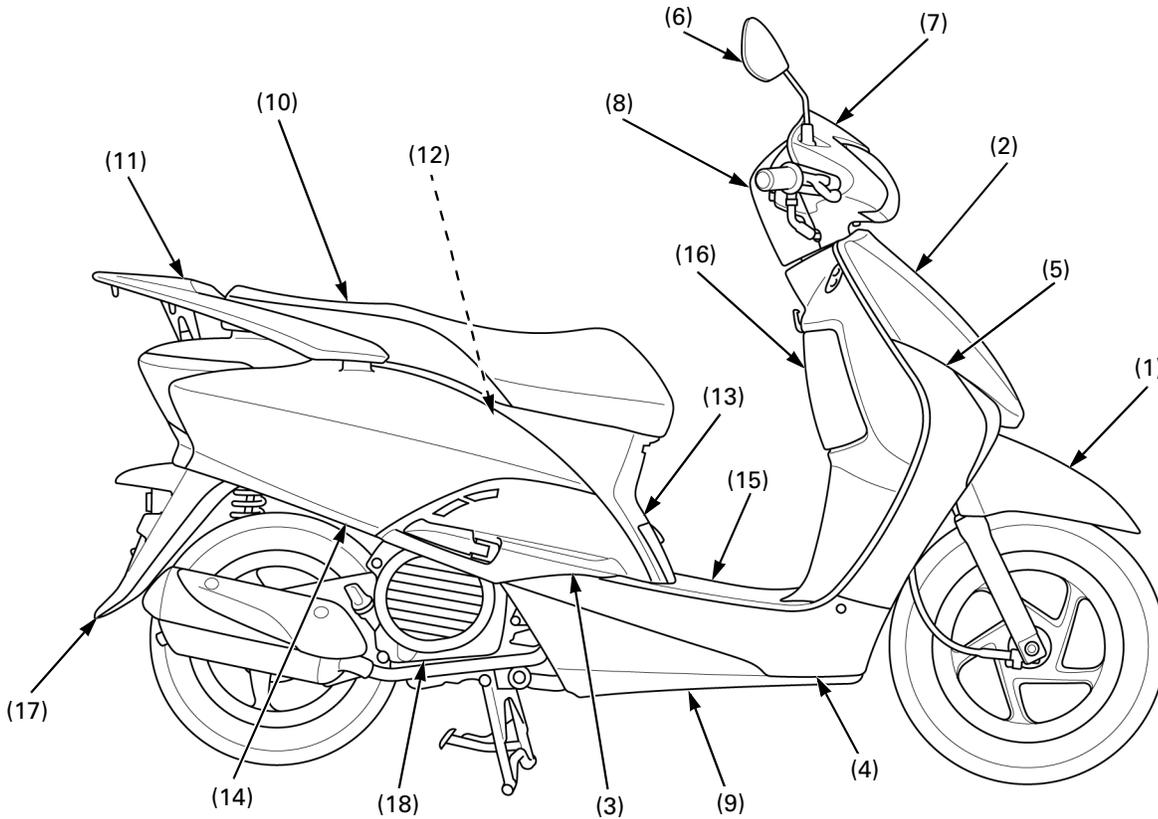
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# 3. FRAME/BODY PANELS/EXHAUST SYSTEM

---

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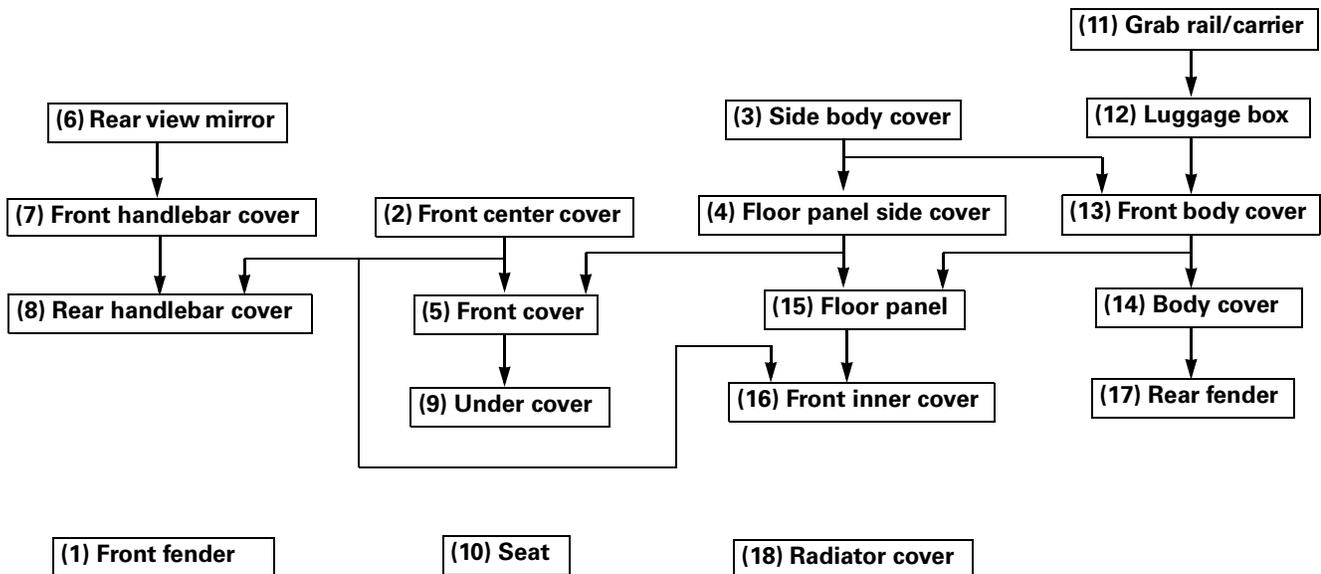
# BODY PANEL LOCATIONS



- |                                       |                                      |                                    |
|---------------------------------------|--------------------------------------|------------------------------------|
| (1) Front fender (page 3-4)           | (7) Front handlebar cover (page 3-6) | (13) Front body cover (page 3-9)   |
| (2) Front center cover (page 3-4)     | (8) Rear handlebar cover (page 3-7)  | (14) Body cover (page 3-9)         |
| (3) Side body cover (page 3-4)        | (9) Under cover (page 3-7)           | (15) Floor panel (page 3-11)       |
| (4) Floor panel side cover (page 3-5) | (10) Seat (page 3-8)                 | (16) Front inner cover (page 3-12) |
| (5) Front cover (page 3-6)            | (11) Grab rail/carrier (page 3-8)    | (17) Rear fender (page 3-12)       |
| (6) Rear view mirror (page 3-6)       | (12) Luggage box (page 3-8)          | (18) Radiator cover (page 3-13)    |

# BODY PANEL REMOVAL CHART

• This chart shows removal order of frame covers.



## **SERVICE INFORMATION**

### **GENERAL**

- This section covers removal and installation of the body panels and exhaust system.
- When installing the body panels, make sure the mating areas are aligned properly before tightening the fasteners.
- Always replace the exhaust pipe gasket after removing the exhaust pipe from the engine.
- When installing the exhaust system, loosely install all of the fasteners. Always tighten the exhaust joint 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**

Front fender mounting bolt	10 N·m (1.0 kgf·m, 7 lbf·ft)	Apply locking agent to the threads.
Floor panel mounting bolt	7 N·m (0.71 kgf·m, 5.2 lbf·ft)	
Exhaust pipe joint nut	14 N·m (1.4 kgf·m, 10 lbf·ft)	
Muffler mounting bolt	59 N·m (6.0 kgf·m, 44 lbf·ft)	

## **TROUBLESHOOTING**

### **Excessive exhaust noise**

- Broken exhaust system
- Exhaust gas leak

### **Poor performance**

- Deformed exhaust system
- Exhaust gas leak
- Clogged muffler

**FRONT FENDER**

**REMOVAL/INSTALLATION**

Turn the handlebar to the right or left so that the upper bolt is accessible.

Remove the upper bolt and three lower bolts.  
Remove the cable holder from the front fender.  
Remove the front fender.

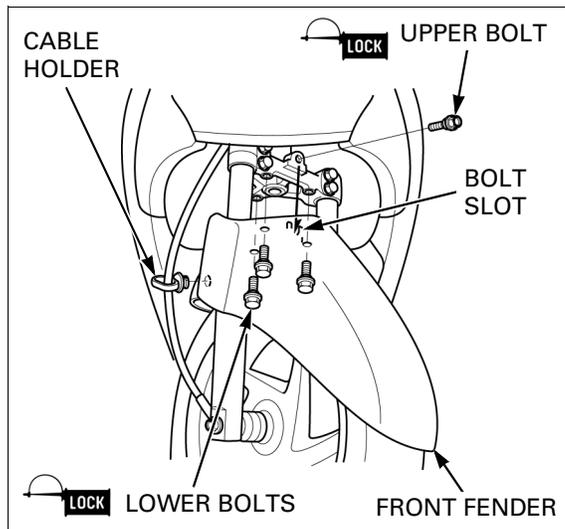
Apply locking agent to the upper and lower mounting bolt threads.

Install the upper bolt and the front fender while aligning the bolt slot with the upper bolt.

Install the lower bolts and tighten lower and upper bolts to the specified torque.

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

Install the cable holder.



**FRONT CENTER COVER**

**REMOVAL/INSTALLATION**

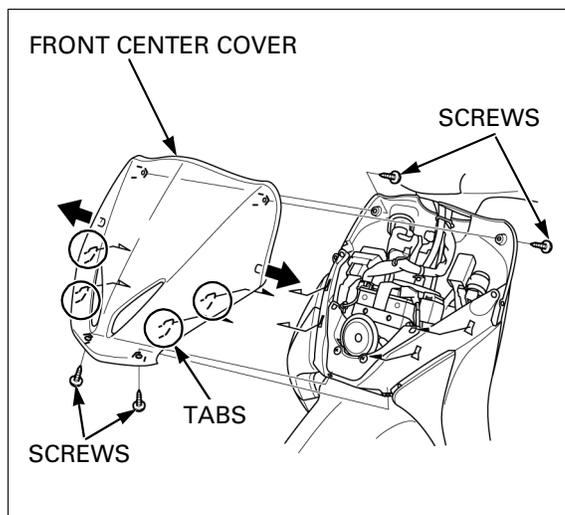
Remove the following:

- Two screws from the rear side
- Two screws from the lower side

Unhook the two bosses by slightly spreading the front center cover, release the four tabs from the slots by slightly pulling down the cover.

Remove the front center cover.

Installation is in the reverse order of removal.

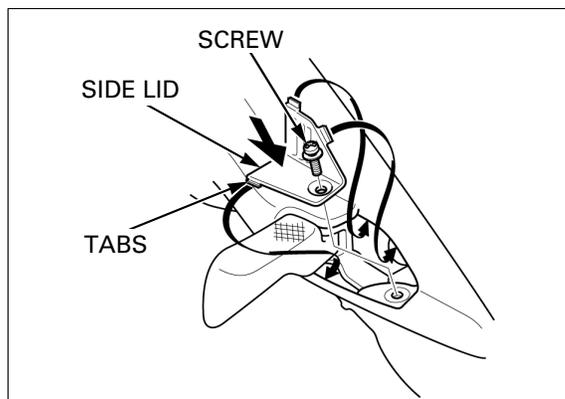


**SIDE BODY COVER**

**REMOVAL/INSTALLATION**

Remove the screw.

Release the tabs from the slots and remove the side lid.

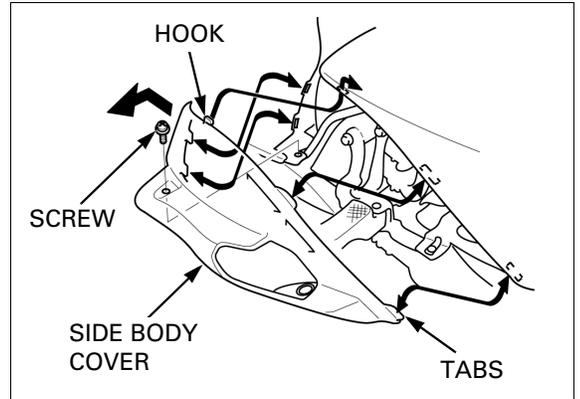


Remove the screw.

Release the four tabs and hook of the side body cover from the slots by slightly pulling the cover backward.

Remove the side body cover.

Installation is in the reverse order of removal.



## FLOOR PANEL SIDE COVER

### REMOVAL/INSTALLATION

Remove the side body cover (page 3-4).

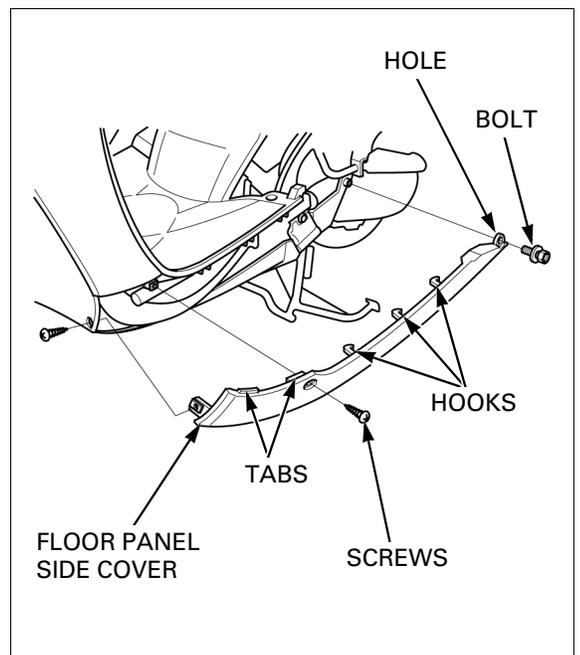
Remove the bolt and screws.

Release the following:

- Tabs of the front side
- Hole of the rear side from the frame
- Three hooks by slightly pulling the cover forward

Remove the floor panel side cover.

Installation is in the reverse order of removal.



**FRONT COVER**

**REMOVAL/INSTALLATION**

Remove the following:

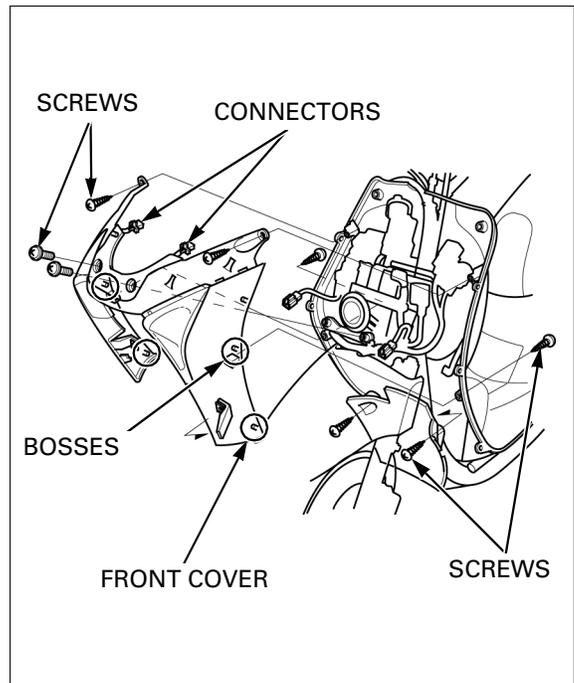
- Front center cover (page 3-4)
- Floor panel side cover (page 3-5)

Remove the following:

- Four screws from the front upper side
- Two screws from the front lower side
- Two screws from the rear side

Unhook the four bosses by slightly spreading the front cover, remove the front cover and disconnect the front turn signal light 2P connectors.

Installation is in the reverse order of removal.

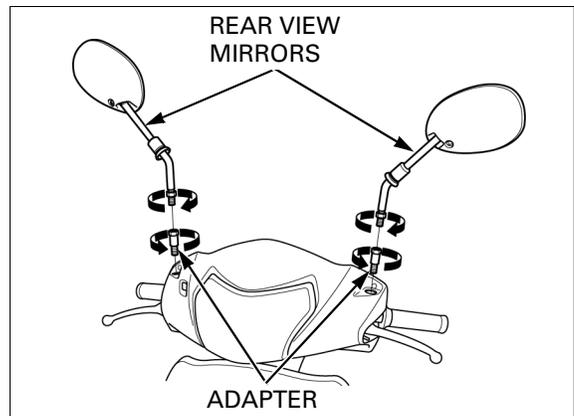


**REAR VIEW MIRROR**

**REMOVAL/INSTALLATION**

Remove the adapters and rear view mirrors.

Installation is in the reverse order of removal.



**FRONT HANDLEBAR COVER**

**REMOVAL/INSTALLATION**

Remove the rear view mirrors (page 3-6).

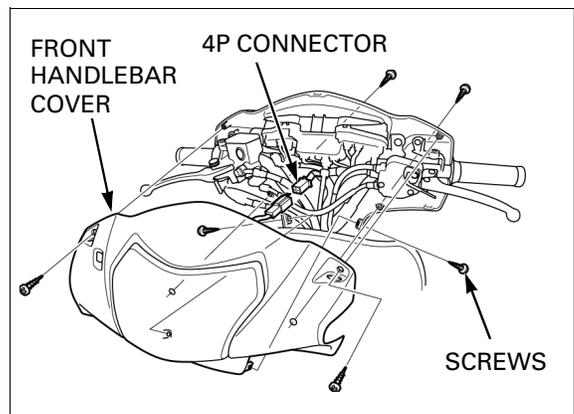
Remove the following:

- Two screws from the front side
- Two screws from the rear side
- Two screws from the both side

Remove the handlebar cover.

Disconnect the headlight 4P connector.

Installation is in the reverse order of removal.



## REAR HANDLEBAR COVER

### REMOVAL/INSTALLATION

Remove the following:

- Front center cover (page 3-4)
- Front handlebar cover (page 3-6)

Release the Meter/handlebar switch wire harness band bosses from the frame.

Release the Meter/handlebar switch wire harness from the clamp.

Disconnect the following:

- Meter/handlebar switch 9P connectors
- Front brake light switch 3P connector
- Rear brake light switch wire connectors
- Speedometer cable

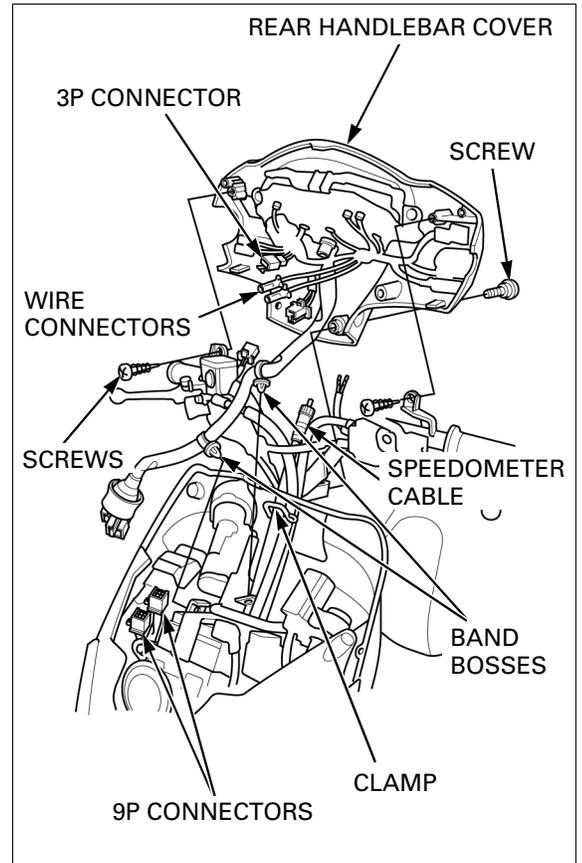
Remove the following:

- Two screws from the front side
- Screw from the rear side

Remove the rear handlebar cover.

Installation is in the reverse order of removal.

*Route the wire harness properly (page 1-17).*



## UNDER COVER

### REMOVAL/INSTALLATION

Remove the front cover (page 3-6).

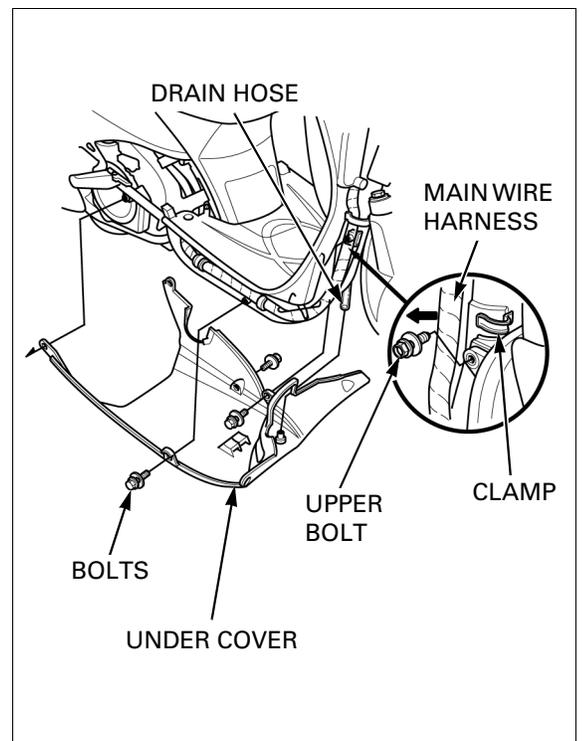
Release the main wire harness from the clamp and move it, then remove the upper bolt.

Remove the two bolts from the both side.

Remove the under cover and disconnected the fuel tank tray drain hose.

Installation is in the reverse order of removal.

*Connect the fuel tank tray drain hose properly (page 1-17).*



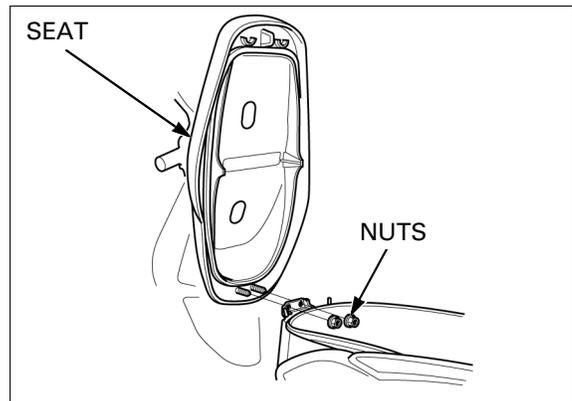
**SEAT**

**REMOVAL/INSTALLATION**

Unlock the seat with ignition key.  
Open the seat.

Hold the seat and remove the two nuts.  
Remove the seat.

Installation is in the reverse order of removal.



**GRAB RAIL/CARRIER**

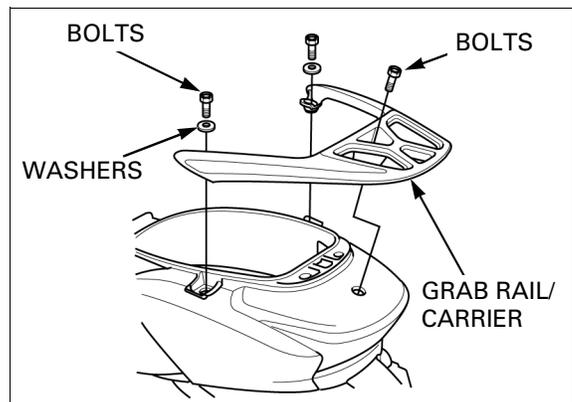
**REMOVAL/INSTALLATION**

Unlock the seat with ignition key.  
Open the seat.

Remove the two bolts and washers from the front side.

Remove the bolt from the rear side and grab rail/cARRIER.

Installation is in the reverse order of removal.



**LUGGAGE BOX**

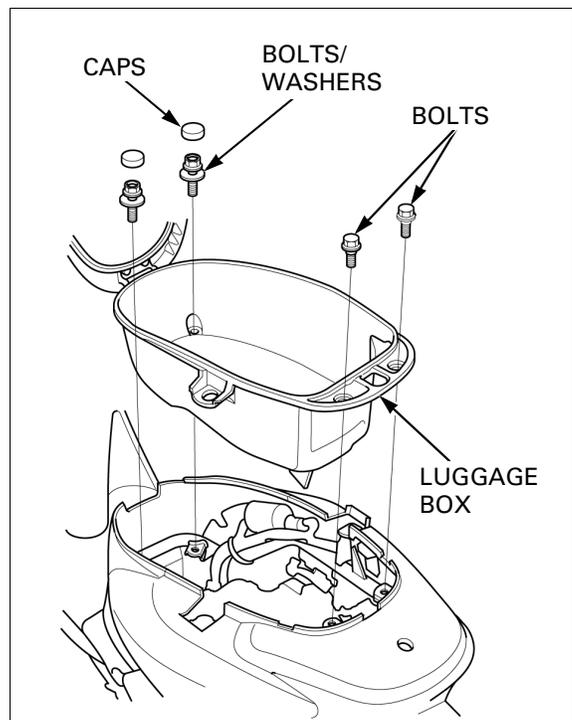
**REMOVAL/INSTALLATION**

Remove the grab rail/cARRIER (page 3-8).

Remove the two caps and two bolts/washers.

Remove the two bolts and luggage box.

Installation is in the reverse order of removal.



## FRONT BODY COVER

### REMOVAL/INSTALLATION

Remove the following:

- Side body cover (page 3-4)
- Luggage box (page 3-8)

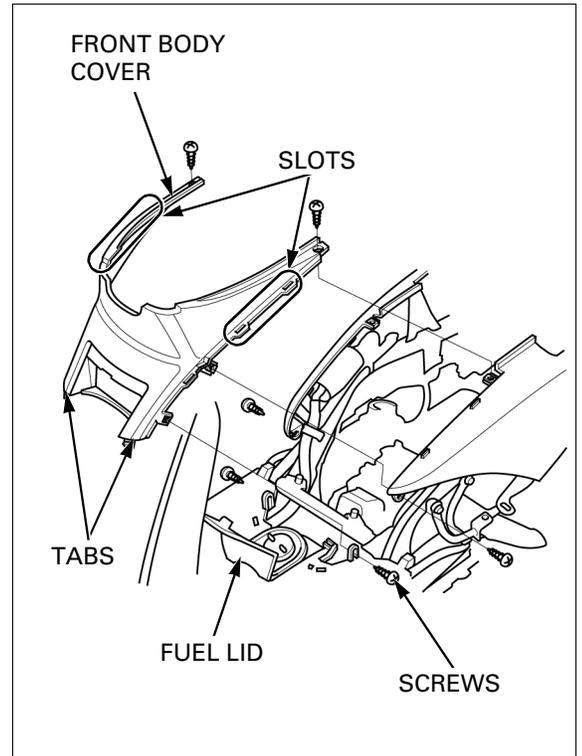
Open the fuel lid.

Remove the six screws.

Release the four slots of the front body cover from the tabs by slightly pulling it lowered.

Release the two tabs of the front body cover from the slots, then remove the front body cover.

Installation is in the reverse order of removal.



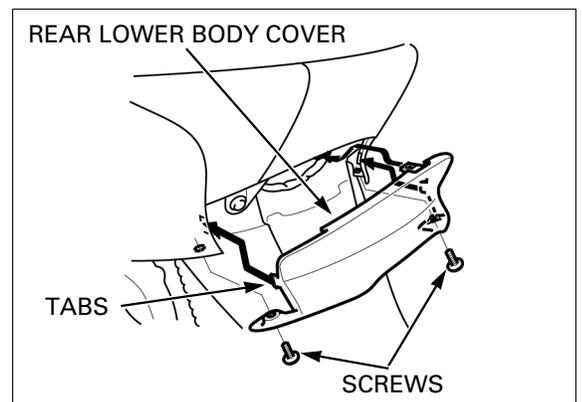
## BODY COVER

### REMOVAL/INSTALLATION

Remove the front body cover (page 3-9).

Remove the screws.

Release the tabs and remove the rear lower body cover.



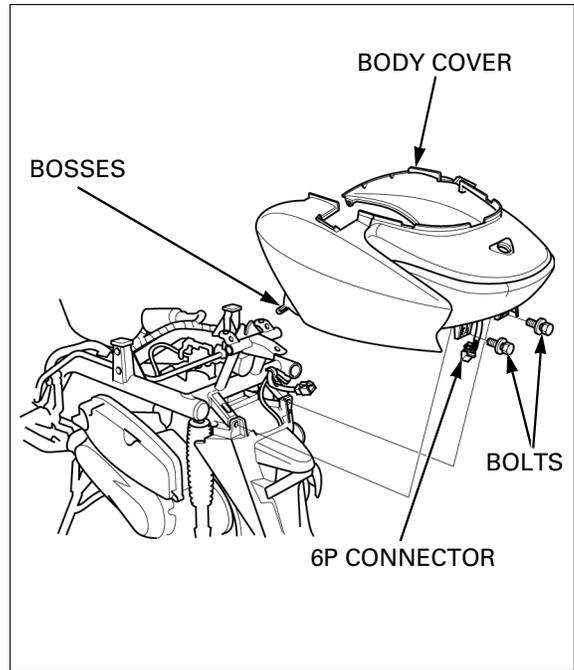
## FRAME/BODY PANELS/EXHAUST SYSTEM

Remove the two bolts.

Release the both side boss of the body cover from the holes.

Remove the body cover with disconnect the rear combination light 6P connector.

Installation is in the reverse order of removal.



### DISASSEMBLY/ASSEMBLY

#### RIGHT/LEFT BODY COVER

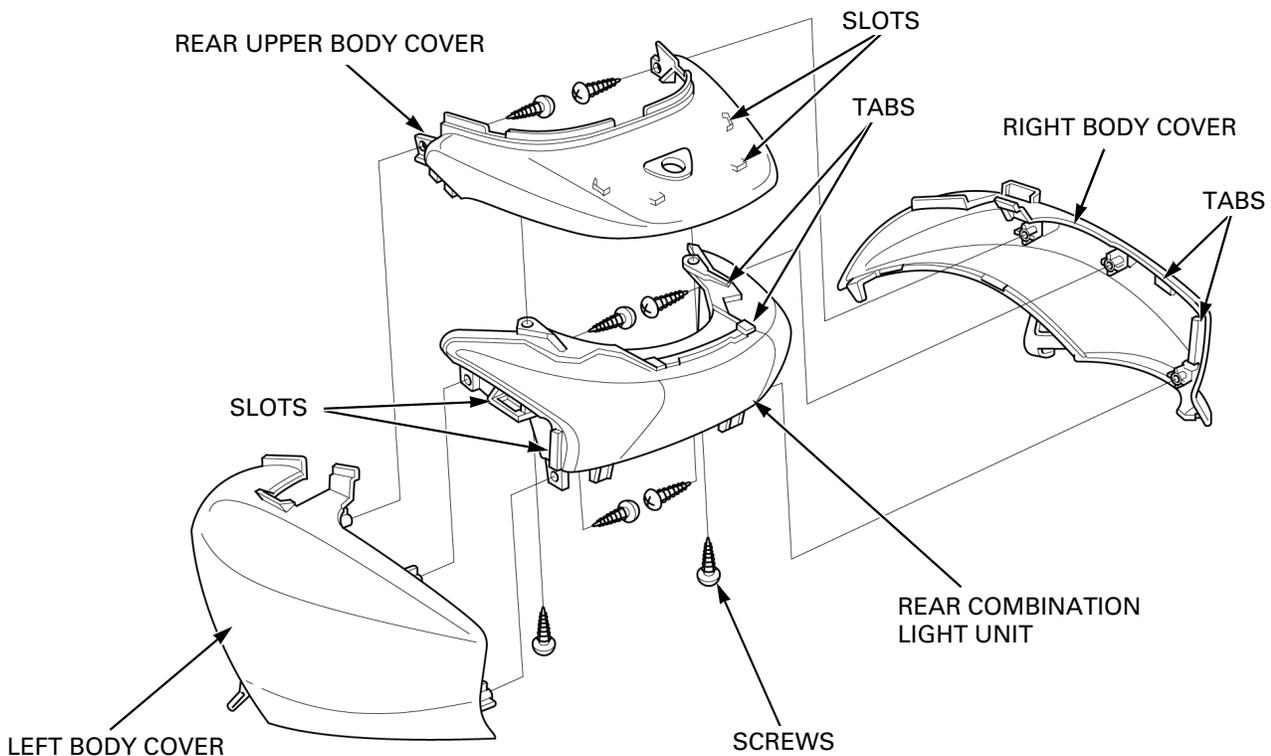
Remove six screws and right/left body cover by releasing the tabs from the slots.

#### REAR UPPER BODY COVER

Remove two screws.

Remove rear center body cover by releasing the tabs from the cover slots.

Assembly is in the reverse order of disassembly.



## FLOOR PANEL

### REMOVAL

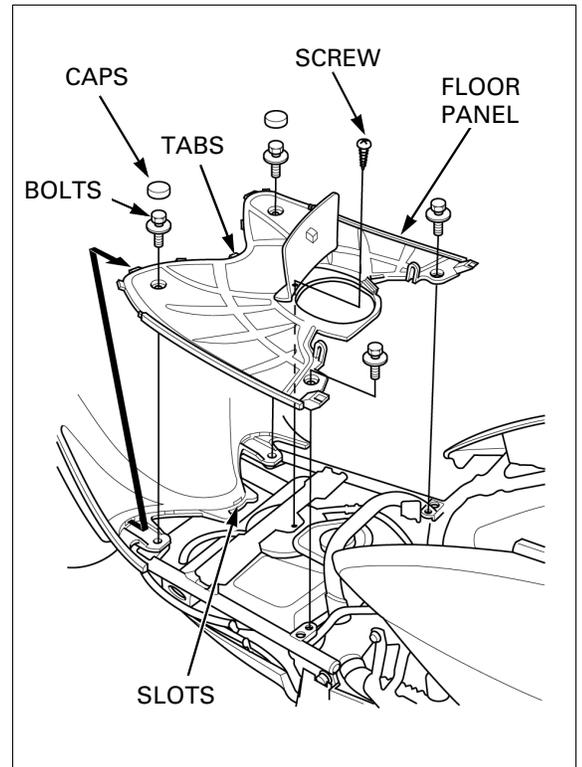
Remove the following:

- Floor panel side cover (page 3-5)
- Front body cover (page 3-9)

Remove the two caps.

Remove the four bolts and screw.

Remove the floor panel by pulling it backward and releasing the tabs from the inner cover slots.



### INSTALLATION

Install the floor panel by aligning tabs and inner cover slots.

- Align the tabs and slots by pushing the front inner cover from inner side.

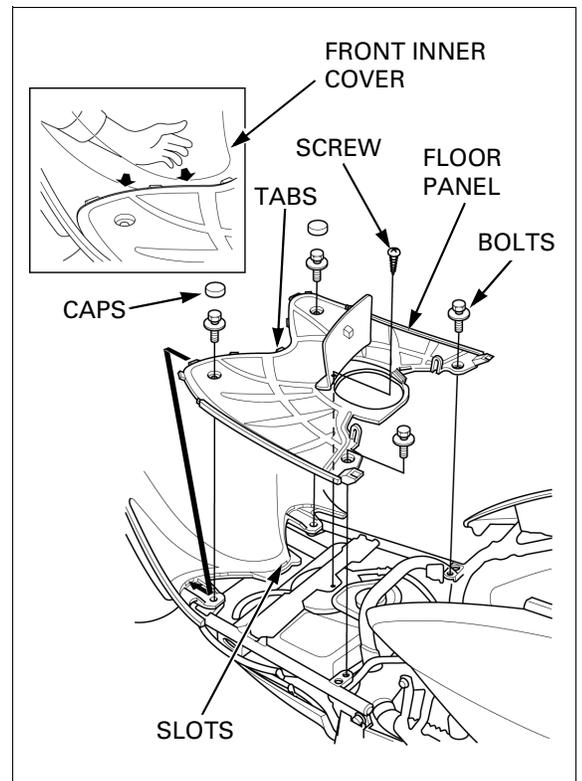
Install the four bolts and screw.

**TORQUE: Floor panel mounting bolt**  
**7 N·m (0.71 kgf·m, 5.2 lbf·ft)**

Install the two caps.

Install the following:

- Front body cover (page 3-9)
- Floor panel side cover (page 3-5)



**FRONT INNER COVER**

**REMOVAL/INSTALLATION**

Remove the following:

- Front center cover (page 3-4)
- Floor panel (page 3-11)

Remove the following:

- Two screws from the inner cover front side
- Two screws from the inner cover rear side

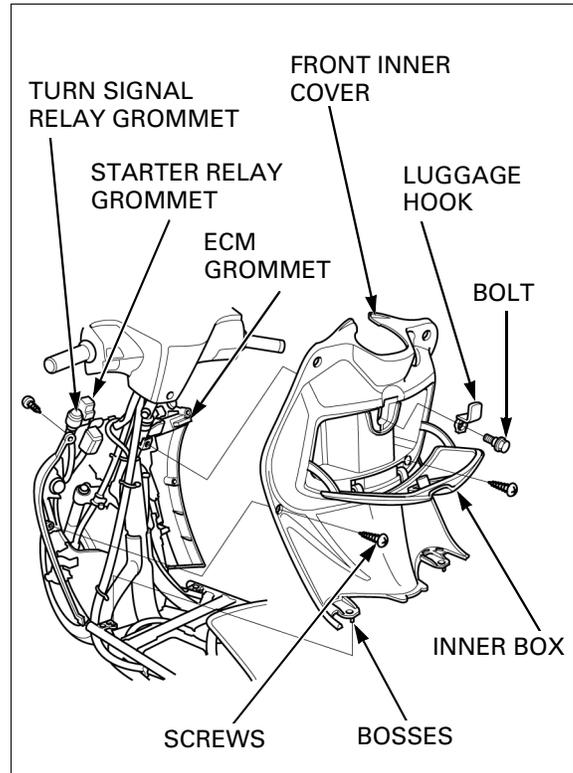
Release the following:

- ECM grommet from the front inner cover stay
- Turn signal relay grommet and starter relay grommet from the front inner cover stay

Open the inner box, then remove the bolt and luggage hook.

Release the two bosses from the holes and remove the front inner cover.

Installation is in the reverse order of removal.



**REAR FENDER**

**REMOVAL/INSTALLATION**

Remove the body cover (page 3-9).

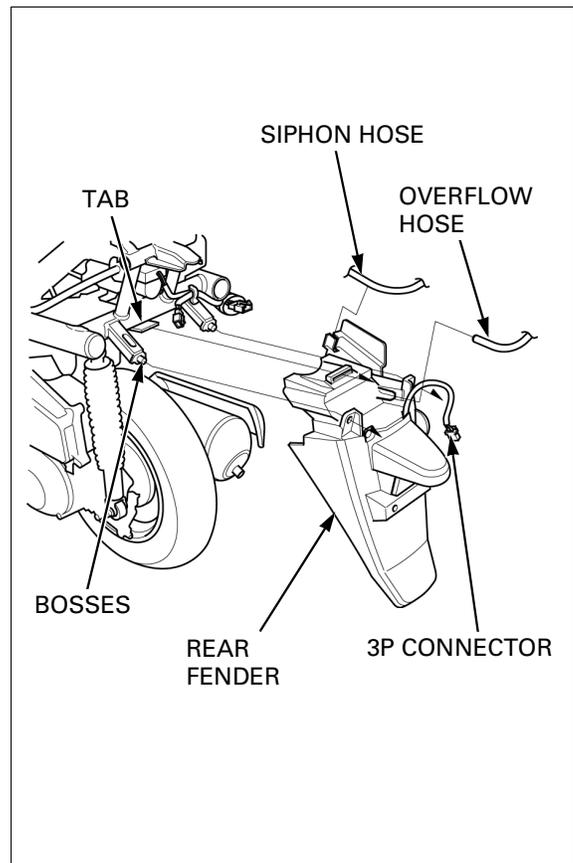
Release the following:

- Radiator reserve tank overflow hose
- Siphon hose

Disconnect the license light 3P connector.

Remove the rear fender by slightly pulling it backward and releasing the tab and bosses.

Installation is in the reverse order of removal.

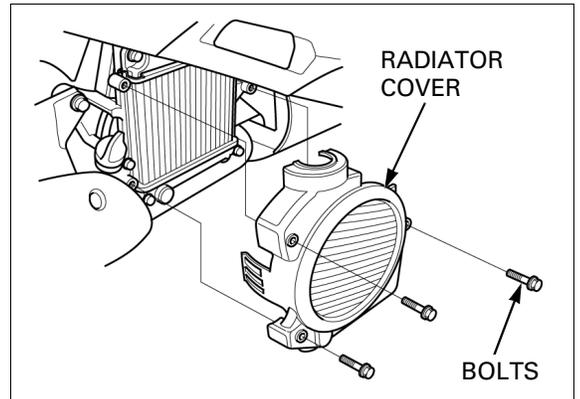


## RADIATOR COVER

### REMOVAL/INSTALLATION

Remove the three bolts and radiator cover, being careful not to damage the fins.

Installation is in the reverse order of removal.



## EXHAUST PIPE/MUFFLER

### REMOVAL/INSTALLATION

Remove the exhaust pipe joint nuts.

Remove the muffler mounting bolts and exhaust pipe/muffler.

Replace the exhaust pipe gasket with a new one.

Align the exhaust pipe flange with the stud bolts and install the joint nuts, but do not tighten yet.

Install the mounting bolts, but do not tighten yet.

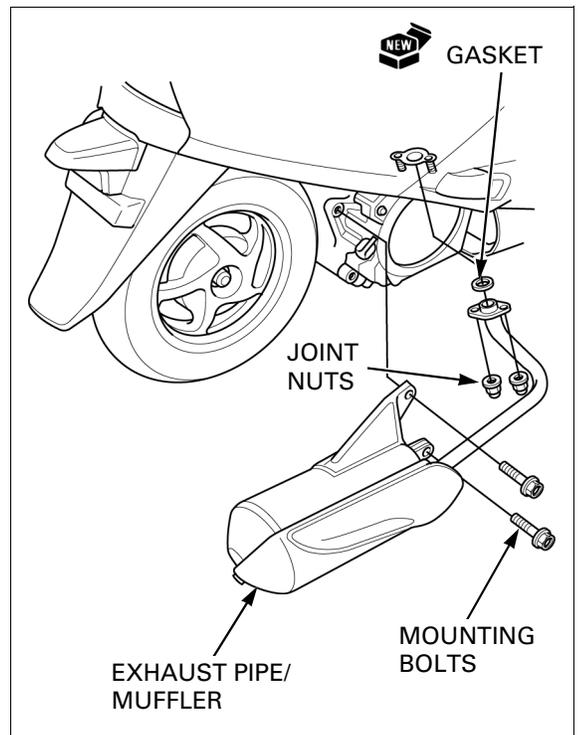
Tighten the joint nuts to the specified torque.

**TORQUE: 14 N·m (1.4 kgf·m, 10 lbf·ft)**

Tighten the mounting bolts to the specified torque.

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

After installation, make sure the exhaust system does not leak.



### STUD BOLT REPLACEMENT

Remove the exhaust pipe/muffler (page 3-13).

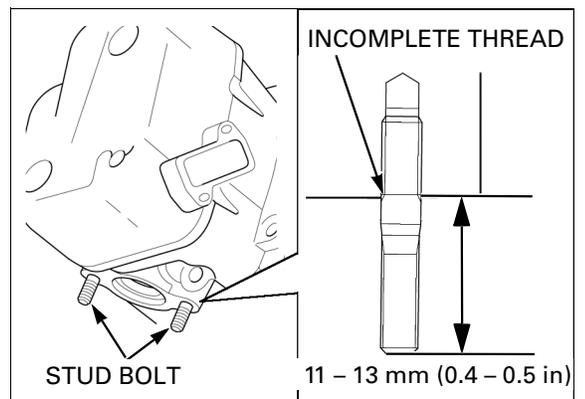
Thread two nuts onto the stud and tighten them together, and use wrench on them to turn the stud bolt out.

Install new stud bolts into the cylinder head and tighten them until incomplete thread embed.

After installation, check that the length from the bolt head to the cylinder head surface is within specification.

**SPECIFIED LENGTH: 11 – 13 mm (0.4 – 0.5 in)**

Install the exhaust pipe/muffler (page 3-13).



## CENTERSTAND

### REMOVAL/INSTALLATION

Retract the centerstand and support the scooter securely.

Remove the cotter pin and washer.

Remove the following:

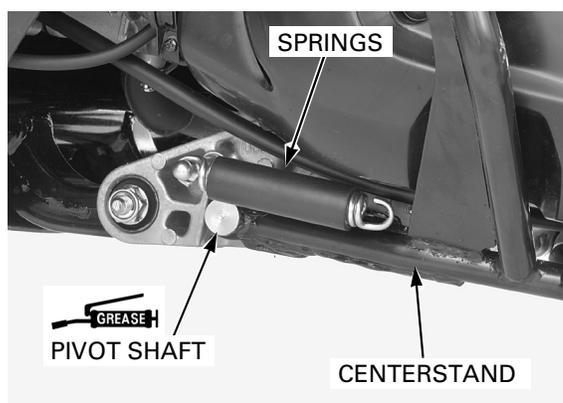
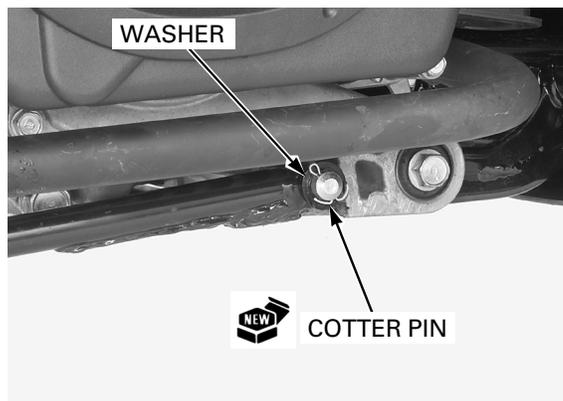
- Springs
- Pivot shaft
- Centerstand

Installation is in the reverse order of removal.

- Apply grease to the pivot areas.
- Always replace the cotter pin with new one.

NOTE:

The centerstand could become noisy when retracted if the pivot area lacks proper lubrication.



SERVICE INFORMATION .....	4-2	DRIVE BELT .....	4-14
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FUEL LINE .....	4-5	BRAKE FLUID .....	4-16
THROTTLE OPERATION.....	4-5	BRAKE SHOES/PADS WEAR .....	4-16
AIR CLEANER.....	4-6	BRAKE SYSTEM.....	4-17
CRANKCASE BREATHER.....	4-7	BRAKE LIGHT SWITCH .....	4-20
SPARK PLUG .....	4-8	BRAKE LOCK OPERATION .....	4-20
VALVE CLEARANCE.....	4-9	HEADLIGHT AIM .....	4-20
ENGINE OIL.....	4-10	CLUTCH SHOES WEAR .....	4-21
ENGINE OIL STRAINER SCREEN .....	4-12	SUSPENSION .....	4-21
ENGINE IDLE SPEED .....	4-13	NUTS, BOLTS, FASTENERS.....	4-22
RADIATOR COOLANT .....	4-13	WHEELS/TIRES .....	4-22
COOLING SYSTEM.....	4-14	STEERING HEAD BEARINGS .....	4-24

## MAINTENANCE

# SERVICE INFORMATION

## GENERAL

- Place the scooter on a level ground before starting any work.
- 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 – 6 mm (0.08 – 0.24 in)	
Spark plug	Standard	CR7EH-9 (NGK), U22FER9 (DENSO)	
	For extended high speed riding	CR8EH-9 (NGK), U24FER9 (DENSO)	
Spark plug gap		0.80 – 0.90 mm (0.031 – 0.035 in)	
Valve clearance	IN	0.16 ± 0.02 mm (0.006 ± 0.001 in)	
	EX	0.25 ± 0.02 mm (0.010 ± 0.001 in)	
Recommended engine oil		API classification: SG or higher (except oils labeled as energy conserving on the circular API service label) Viscosity: SAE 10W-30 JASO T 903 standard: MB	
Engine oil capacity	After draining	0.7 liter (0.7 US qt, 0.6 Imp qt)	
	After disassembly	0.8 liter (0.8 US qt, 0.7 Imp qt)	
Drive belt width		Service limit: 17.5 mm (0.69 in)	
Recommended final reduction oil		API service classification: SG or higher (except oils labeled as energy conserving on the circular API service label) Viscosity: SAE 10W-30 JASO T 903 standard: MB	
Final reduction oil capacity	After draining	0.10 liter (0.11 US qt, 0.09 Imp qt)	
	After disassembly	0.12 liter (0.13 US qt, 0.11 Imp qt)	
Rear brake lever freeplay		10 – 20 mm (0.4 – 0.8 in)	
Recommended brake fluid		DOT 3 or DOT 4	
Clutch lining thickness		Service limit: 2.0 mm (0.08 in)	
Cold tire pressure	Driver only	Front	175 kPa (1.75 kgf/cm <sup>2</sup> , 25 psi)
		Rear	200 kPa (2.00 kgf/cm <sup>2</sup> , 29 psi)
	Driver and passenger	Front	175 kPa (1.75 kgf/cm <sup>2</sup> , 25 psi)
		Rear	225 kPa (2.25 kgf/cm <sup>2</sup> , 33 psi)
Tire size	Front	90/90 – 12M/C 44J	
	Rear	100/90 – 10M/C 56J	
Tire brand	CHENG SHIN	Front	C-922
		Rear	C-922
	IRC	Front	MB60
		Rear	MB47
Minimum tire tread depth	Front	To the indicator	
	Rear	To the indicator	

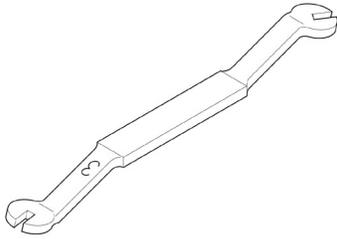
**TORQUE VALUES**

Throttle cable lock nut (Throttle body side)	8.5 N·m (0.87 kgf·m, 6.3 lbf·ft)
Air cleaner element screw	1.1 N·m (0.11 kgf·m, 0.8 lbf·ft)
Air cleaner housing cover screw	1.1 N·m (0.11 kgf·m, 0.8 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)
Engine oil drain bolt	24 N·m (2.4 kgf·m, 18 lbf·ft)
Engine oil strainer screen cap	20 N·m (2.0 kgf·m, 15 lbf·ft)
Final reduction oil check bolt	13 N·m (1.3 kgf·m, 10 lbf·ft)
Final reduction oil drain bolt	13 N·m (1.3 kgf·m, 10 lbf·ft)
Equalizer connecting cable lock nut	6.4 N·m (0.65 kgf·m, 4.7 lbf·ft)
Headlight adjusting bolt	1.8 N·m (0.18 kgf·m, 1.3 lbf·ft)

Apply engine oil to the threads and seating surface.

**TOOL**

Valve adjusting wrench  
07908-KE90000



## 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	WHICHEVER COMES FIRST  ↓  NOTE	ODOMETER READING (NOTE 1)				REFER TO PAGE		
			X 1,000 km	1	4	8		12	
			X 1,000 mi	0.6	2.5	5		7.5	
			MONTH		6	12	18		
* FUEL LINE					I	I	I		4-5
* THROTTLE OPERATION					I	I	I		4-5
AIR CLEANER		NOTE 2		EVERY 16,000 km (10,000 mi) R					4-6
CRANKCASE BREATHER		NOTE 3			C	C	C		4-7
SPARK PLUG						R			4-8
* VALVE CLEARANCE					I	I	I	I	4-9
ENGINE OIL					R		R		4-10
* ENGINE OIL STRAINER SCREEN								C	4-12
ENGINE IDLE SPEED					I	I	I	I	4-13
RADIATOR COOLANT		NOTE 4					I		4-13
* COOLING SYSTEM							I		4-14
* DRIVE BELT				EVERY 8,000 km (5,000 mi) I, EVERY 24,000 km (1,5000 mi) R					4-14
* FINAL DRIVE OIL		NOTE 4							4-15
BRAKE FLUID		NOTE 4			I	I	I		4-16
BRAKE SHOES/PADS WEAR					I	I	I		4-16
BRAKE SYSTEM					I	I	I	I	4-17
* BRAKE LIGHT SWITCH						I	I	I	4-20
* BRAKE LOCK OPERATION					I	I	I	I	4-20
* HEADLIGHT AIM						I	I	I	4-20
** CLUTCH SHOES WEAR							I		4-21
* SUSPENSION						I	I	I	4-21
* NUTS, BOLTS, FASTENERS					I		I		4-22
** WHEELS/TIRES						I	I	I	4-22
** STEERING HEAD BEARINGS					I			I	4-24

\* 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.

Honda recommends that an authorized Honda dealer should road test the scooter after each periodic maintenance is carried out.

### NOTES:

- At higher odometer readings, repeat at the frequency interval established here.
- Service at every 16,000 km (10,000 mi) or more frequently when riding in unusually wet or dusty areas. (cleaning is prohibited)
- Service more frequently when riding in rain or at full throttle.
- Replace every 2 years. Replacement requires mechanical skill.

## FUEL LINE

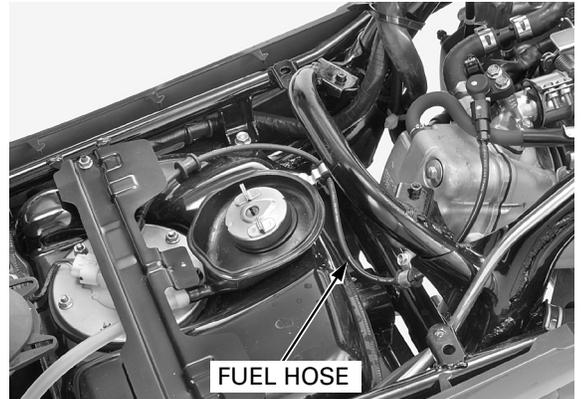
Remove the floor panel (page 3-11).

Check the fuel hose for deterioration, damage or leakage.

Replace the fuel hose if necessary (page 6-32).

Also, check the fuel feed fittings for leakage.

Install the removed parts in the reverse order of removal.



## THROTTLE OPERATION

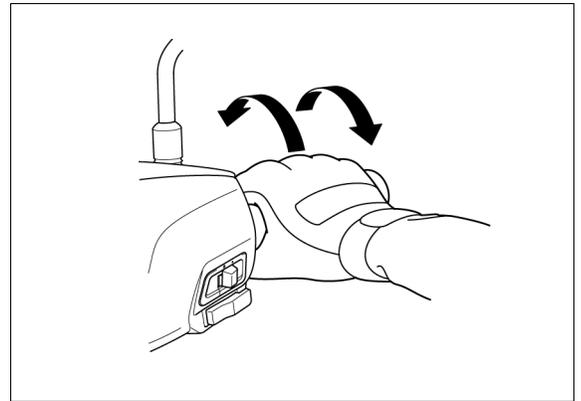
*Reusing an abnormally bent or kinked throttle cable can prevent proper throttle slide operation.*

Check for any deterioration or damage to the throttle cable. Check the throttle grip for smooth operation. Check that the throttle opens and automatically closes in all steering positions.

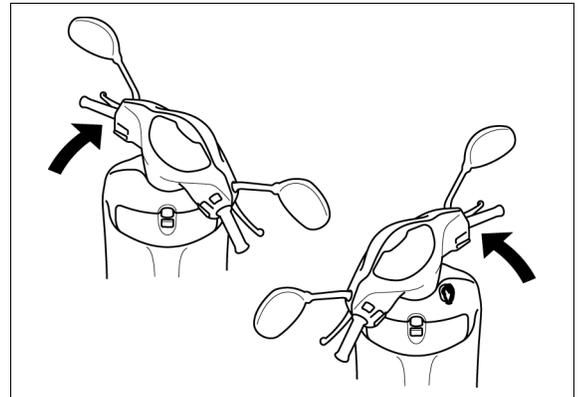
If the throttle grip does not return properly, lubricate the throttle cable.

For cable lubrication, disconnect the throttle cable at their pivot points and apply commercially available cable lubricant or light weight oil.

If the throttle grip still does not return properly, replace the throttle cable.

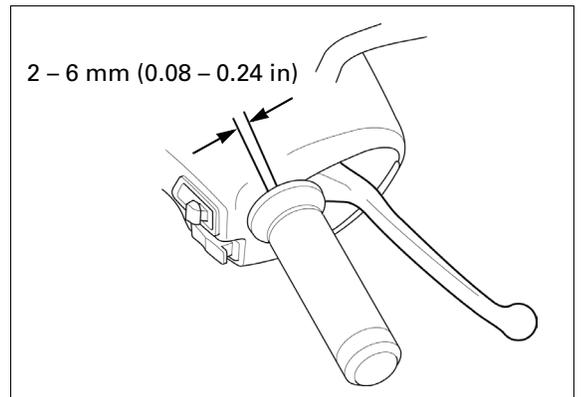


With the engine idling, turn the handlebar all the way to the right and left to ensure that the idle speed does not change. If idle speed increases, check the throttle grip freeplay and throttle cable connection.



Measure the throttle grip freeplay at the throttle grip flange.

**FREEPLAY: 2 – 6 mm (0.08 – 0.24 in)**



## MAINTENANCE

Throttle grip freeplay can be adjusted at either end of the throttle cable. Minor adjustments are made with the upper adjuster.

Loosen the lock nut and turn the adjuster as required.

Tighten the lock nut.

- An O-ring is incorporated in the root part of adjusting nut. Do not disassemble the throttle cable as it could damage the O-ring. If damaged, moisture gets inside the cable, preventing the smooth cable operation.

Major adjustments are made with the lower adjuster.

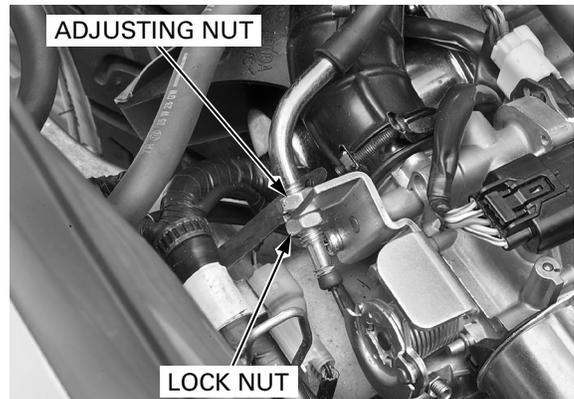
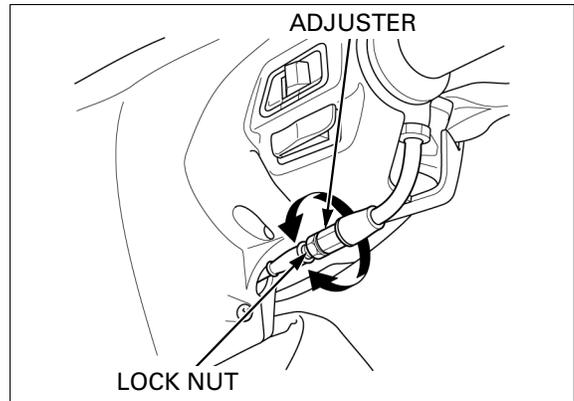
Remove the luggage box (page 3-8).

Loosen the lock nut, turn the adjusting nut as required and tighten the adjusting nut and lock nut.

**TORQUE: 8.5 N·m (0.87 kgf·m, 6.3 lbf·ft)**

Recheck the throttle operation.

Install the removed parts in the reverse order of removal.

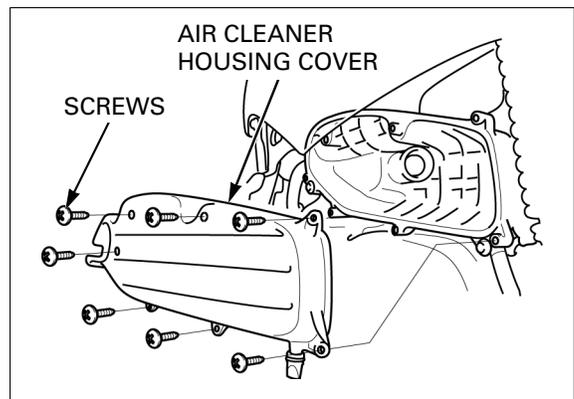


## AIR CLEANER

- The viscous paper element type air cleaner cannot be cleaned because the element contains a dust adhesive.
- If the scooter is used in unusually wet or dusty areas, more frequent inspections are required.

Remove the left side body cover (page 3-4).

Remove the seven screws and air cleaner housing cover.



Remove the air cleaner holder from the air cleaner housing cover.

Remove the screws and air cleaner element.

Replace the element in accordance with the maintenance schedule (page 4-4) or any time it is excessively dirty or damaged.

Clean the inside of the air cleaner housing and cover.

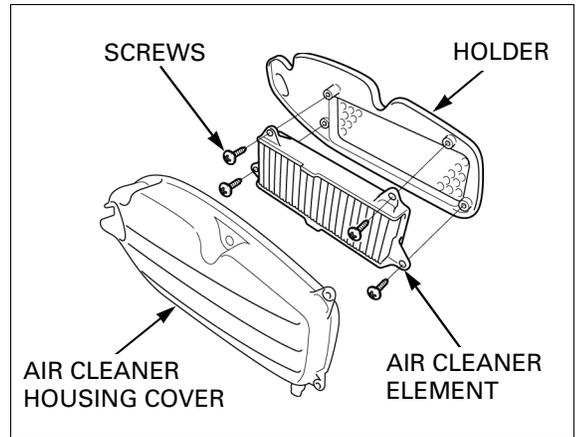
Make sure the rubber seals in the housing and cover are in position and in good condition.

Install a new element to the holder, and tighten the screws.

**TORQUE: 1.1 N·m (0.11 kgf·m, 0.8 lbf·ft)**

Install the cover, and tighten the screws.

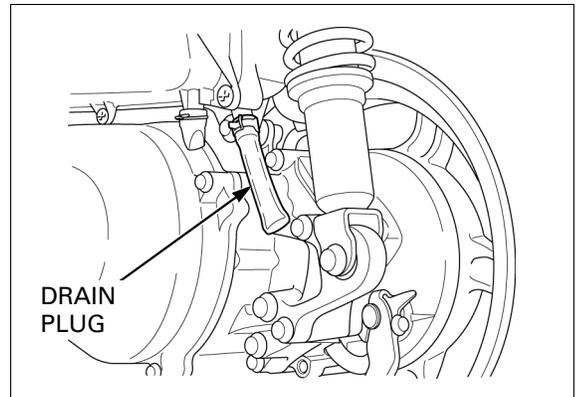
**TORQUE: 1.1 N·m (0.11 kgf·m, 0.8 lbf·ft)**



## CRANKCASE BREATHER

- Service more frequently when ridden in rain, at full throttle, or after the scooter is washed or overturned. Service if the deposit level can be seen in the transparent section of the drain hose.

Remove the crankcase breather drain plug and drain deposits into a suitable container, then install it securely.



Remove the luggage box (page 3-8).

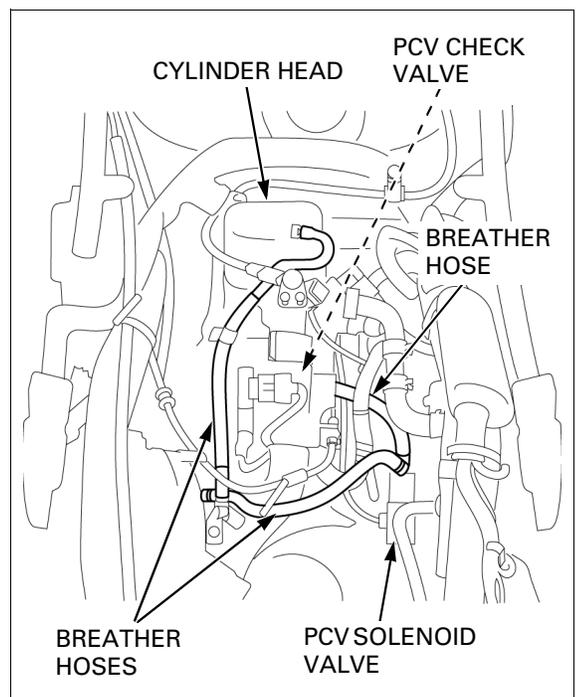
Check the following crankcase breather hoses for deterioration, damage or leakage.

- Hose between the cylinder head and air cleaner
- Hose between the PCV solenoid valve and air cleaner
- Hose between the PCV solenoid valve and PCV check valve

Also check the crankcase breather hose fittings for leakage.

Replace the crankcase breather hoses if necessary.

Install the removed parts in the reverse order of removal.

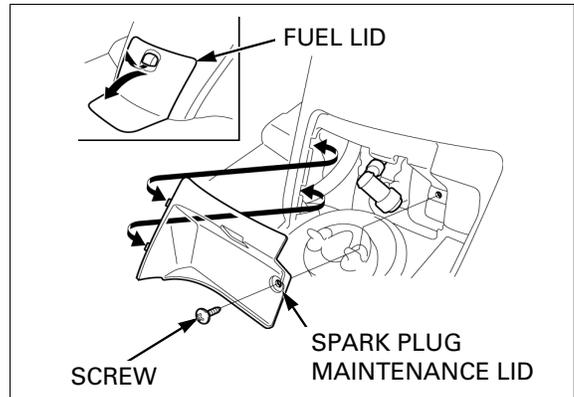


## MAINTENANCE

# SPARK PLUG

Open the fuel lid.

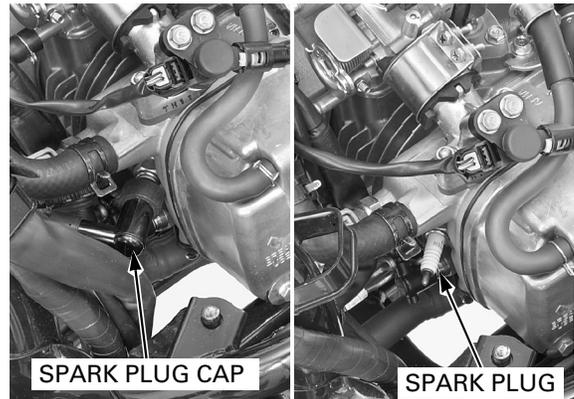
Remove the screw and spark plug maintenance lid.



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

Disconnect the spark plug cap and clean around the spark plug base.

Remove the spark plug.



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

Check the following and replace if necessary.

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

If the electrode is contaminated with carbon deposits, clean the electrode using a spark plug cleaner.

Always use the specified spark plug on this scooter.

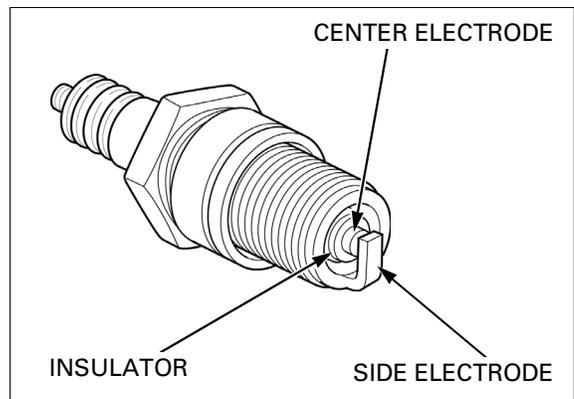
### **SPECIFIED SPARK PLUG:**

#### **Standard:**

**CR7EH-9 (NGK), U22FER9 (DENSO)**

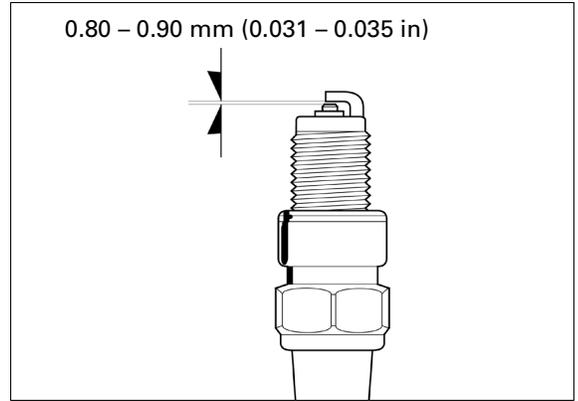
#### **For extended high speed riding:**

**CR8EH-9 (NGK), U24FER9 (DENSO)**



Measure the spark plug gap between the center and side electrodes with a feeler gauge of a wire type. If necessary, adjust the gap by bending the side electrode carefully.

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

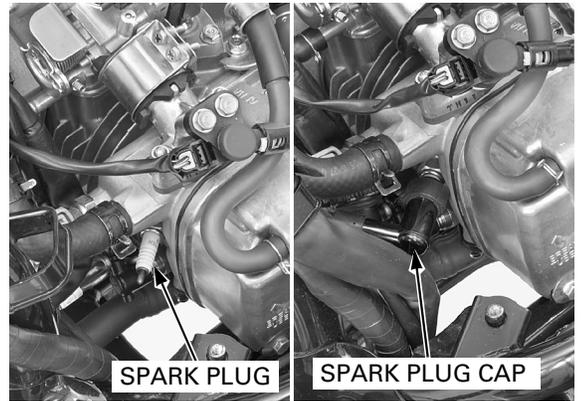


Install the spark plug in to the cylinder head and hand tighten, then tighten it to the specified torque.

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

Connect the spark plug cap.

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).
- Check the engine idle speed (page 4-13) after the valve clearance inspection.

Remove the following:

- Radiator cover (page 3-13)
- Cylinder head cover (page 9-6)

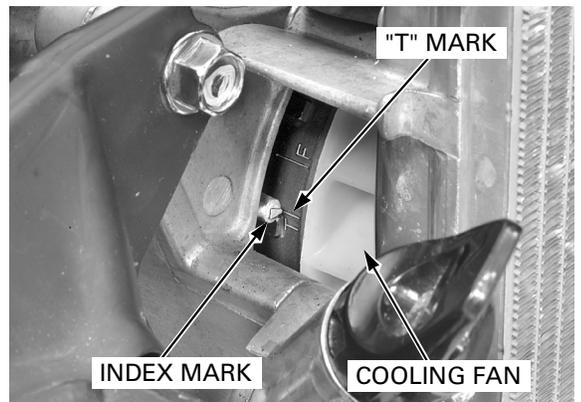
Rotate the cooling fan (crankshaft) clockwise with your finger and align the "T" mark on the flywheel with the index mark.

Make sure the piston is at TDC (Top Dead Center) on the compression stroke.

This position can be confirmed by checking that there is slack in the rocker arm.

If there is no slack, it is because the piston is moving through the exhaust stroke to TDC.

Rotate the crankshaft one full turn and match up the "T" mark again.



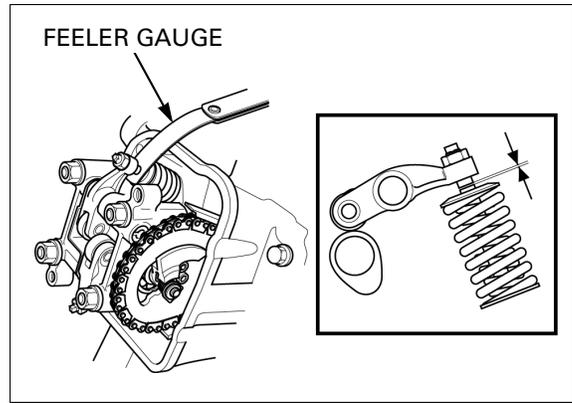
## MAINTENANCE

Check the clearance of each valve by inserting a feeler gauge between the adjusting screw and valve stem.

### VALVE CLEARANCE:

IN:  $0.16 \pm 0.02$  mm ( $0.006 \pm 0.001$  in)

EX:  $0.25 \pm 0.02$  mm ( $0.010 \pm 0.001$  in)



## ADJUSTMENT

If the valve clearance is incorrect, loosen the valve adjusting screw lock nut and adjust the valve clearance by turning the adjusting screw until there is a slight drag on the feeler gauge.

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

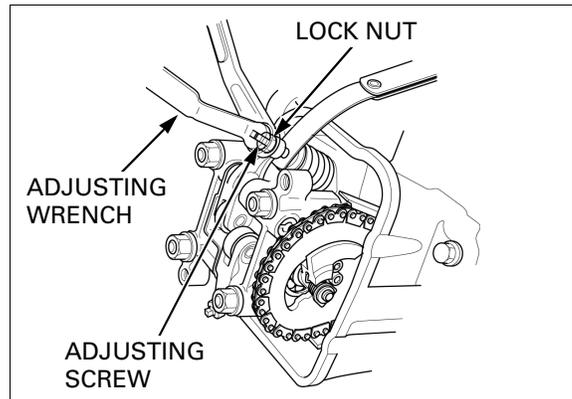
### TOOL:

Valve adjusting wrench **07908-KE90000**

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

After tightening the lock nut, recheck the valve clearance.

Install the removed parts in the reverse order of removal.



## ENGINE OIL

### OIL LEVEL CHECK

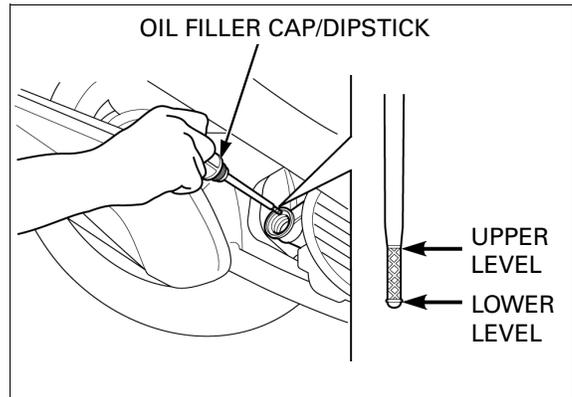
Support the scooter with its centerstand on a level surface.

Start the engine and let it idle for 3 - 5 minutes. Stop the engine and wait for 2 - 3 minutes.

Remove the oil filler cap/dipstick and wipe off the oil from the dipstick with a clean cloth.

Insert the oil filler cap/dipstick without screw it in, remove it and check the oil level.

The level should be between the "UPPER" and "LOWER" level lines of the oil filler cap/dipstick.



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

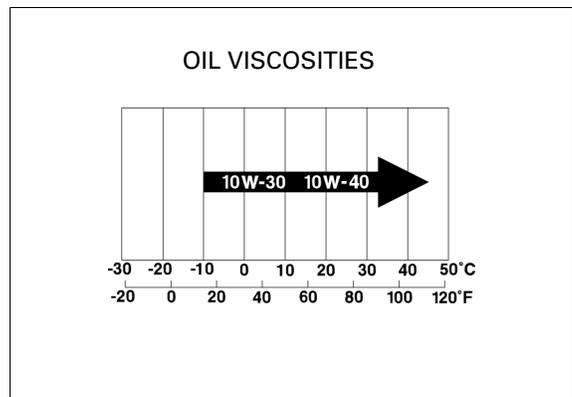
If the oil level is below or near the lower level line on the dipstick, add the recommended oil to the upper level.

### RECOMMENDED ENGINE OIL:

**API service classification: SG or higher (except oils labeled as energy conserving on the circular API service label)**

**Viscosity: SAE 10W-30**

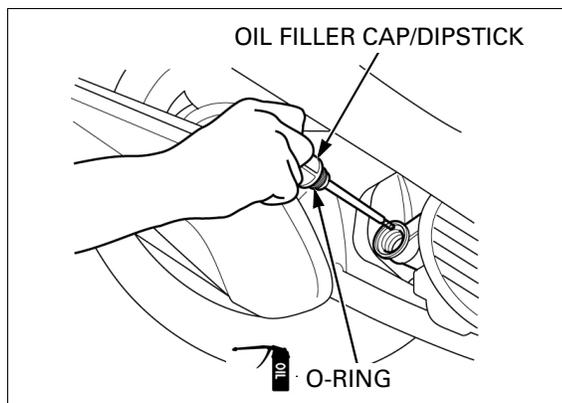
**JASO T 903 standard: MB**



Make sure the O-ring is good condition and replace it if necessary.

Coat the O-ring with engine oil.

Install the oil filler cap/dipstick with the O-ring.

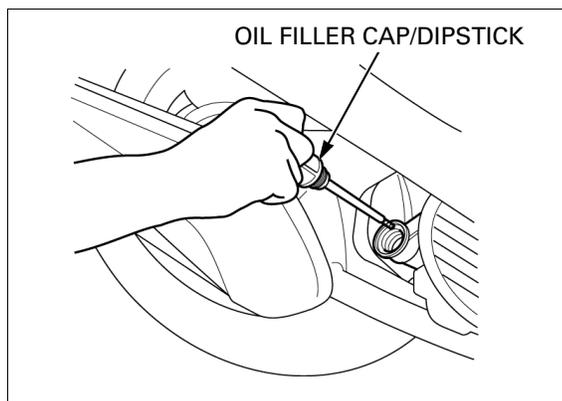


**OIL CHANGE**

Support the scooter with its centerstand.

Start the engine, warm it up and stop it.

Remove the oil filler cap/dipstick.



Place an oil drain pan under the engine to collect the oil, then remove the engine oil drain bolt and sealing washer.

After draining the oil completely, install the new sealing washer and drain bolt.

Tighten the drain bolt to the specified torque.

**TORQUE: 24 N·m (2.4 kgf·m, 18 lbf·ft)**

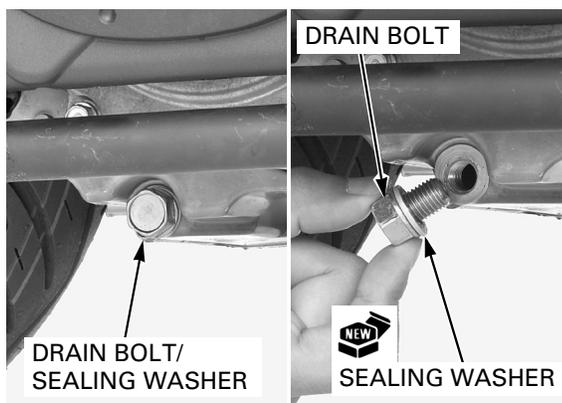
Fill the crankcase with recommended engine oil.

**RECOMMENDED ENGINE OIL:**

**API service classification: SG or higher (except oils labeled as energy conserving on the circular API service label)**

**Viscosity: SAE 10W-30**

**JASO T 903 standard: MB**



**ENGINE OIL CAPACITY:**

**0.7 liter (0.7 US qt, 0.6 Imp qt) after draining**

**0.8 liter (0.8 US qt, 0.7 Imp qt) after disassembly**

Check the engine oil level (page 4-10).

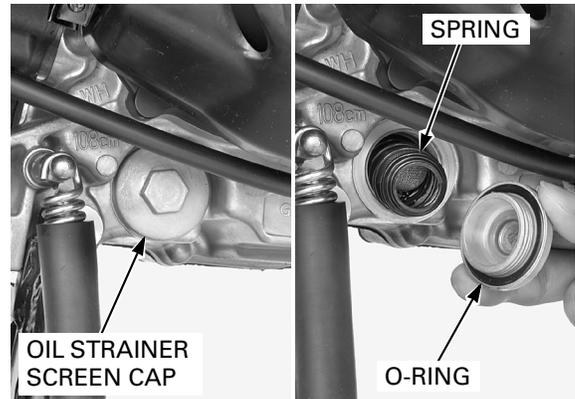
Make sure that there are no oil leaks.

## MAINTENANCE

# ENGINE OIL STRAINER SCREEN

Drain the engine oil (page 4-11).

Remove the engine oil strainer screen cap, O-ring, spring.



Remove the engine oil strainer screen.

Wash the strainer screen thoroughly in non-flammable or high flash point cleaning solvent until all accumulated dirt has been removed. Blow it dry with compressed air to clean completely.

Before installing the strainer screen, it should be examined closely for damage and make sure the sealing rubber is in good condition.



Make sure the O-ring is in good condition and replace it if necessary.

Install the engine oil strainer screen and spring with the strainer sealing rubber facing the crankcase.

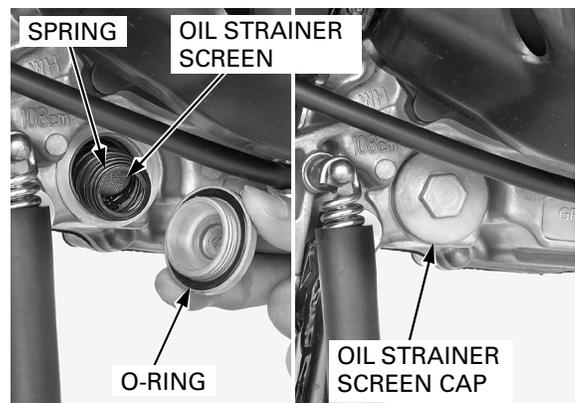
Coat the O-ring with engine oil and install the engine oil strainer screen cap.

Tighten the engine oil strainer screen cap to the specified torque.

**TORQUE: 20 N·m (2.0 kgf·m, 15 lbf·ft)**

Fill the crankcase with recommended engine oil and check the engine oil level (page 4-10).

Make sure that there are no oil leaks.



## ENGINE IDLE SPEED

- Inspect the idle speed after all other engine maintenance items have been performed and are within specifications.
- Before checking the idle speed, inspect following items.
  - No MIL blinking
  - Spark plug condition (page 4-8)
  - Air cleaner condition (page 4-6)
  - Valve clearance (page 4-9)
  - Cylinder compression (page 9-6)
- The engine must be warm for accurate idle speed inspection.
- This system eliminates the need for manual idle speed adjustment.

Support the scooter with its centerstand.

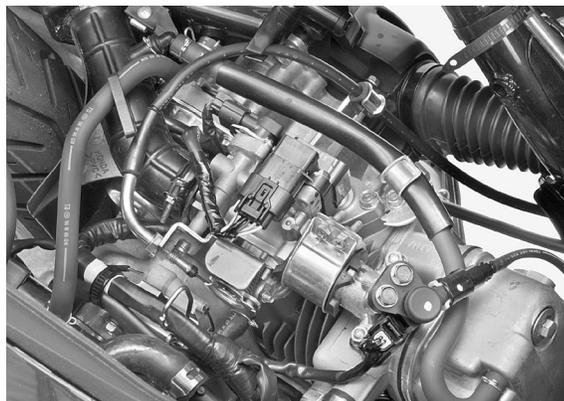
Warm up the engine about ten minutes.

Connect the tachometer and check the idle speed.

**ENGINE IDLE SPEED:  $1,700 \pm 100 \text{ min}^{-1}$  (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 9-5).
- IACV operation (page 6-56).



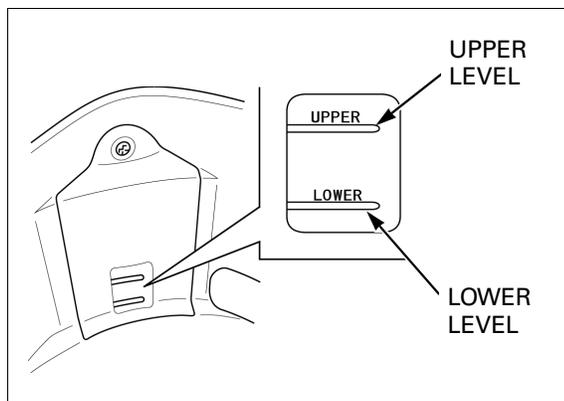
## RADIATOR COOLANT

Support the scooter with its centerstand.

Unlock the seat with ignition key.

Open the seat.

Check the coolant level of the reserve tank with the engine running at normal operating temperature. The level should be between the "UPPER" and "LOWER" level lines with the scooter upright on a level surface.



If the level is low, fill as follows:

Remove the screw and reserve tank lid.

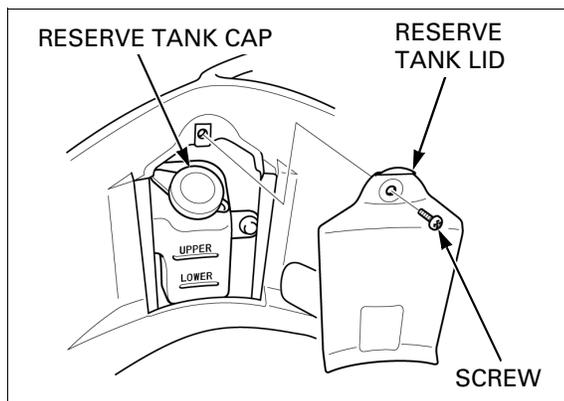
Remove the reserve tank cap and fill the tank to the upper level line with the recommended coolant.

**RECOMMENDED COOLANT:**  
**Honda PRE-MIX COOLANT**

Check to see if there are any coolant leaks when the coolant level decreases very rapidly.

If the reserve tank becomes completely empty, there is a possibility of air getting into the cooling system.

Be sure to remove all air from the cooling system (page 7-8).



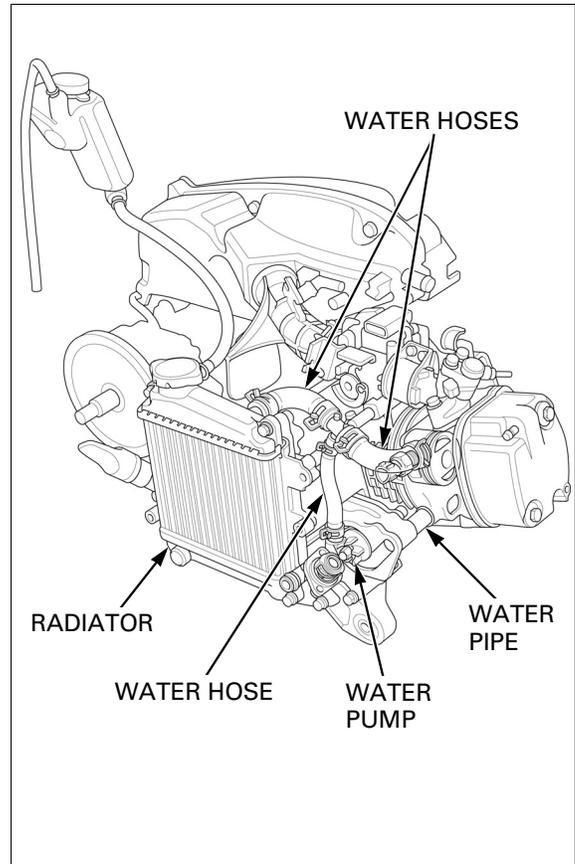
## MAINTENANCE

### COOLING SYSTEM

Remove the following:

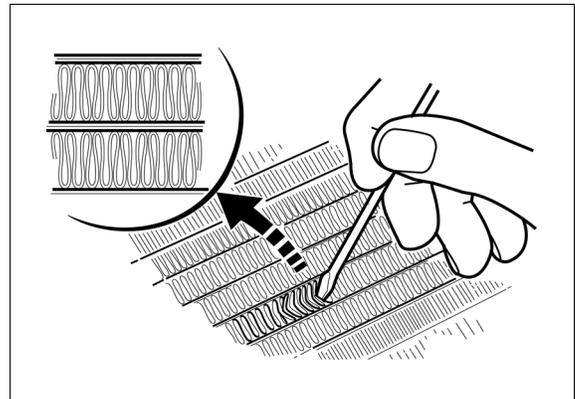
- Side body cover (page 3-4)
- Luggage box (page 3-8)
- Radiator cover (page 3-13)

Check the radiator for leakage.  
Check for coolant leakage from the water pump, water pipe, water hoses and hose joints.  
Check the water hoses for cracks or deterioration and replace if necessary.  
Check that all hose clamps are tight.



Check the radiator air passage for clogs or damage. Straighten bent fins with a small, flat blade screwdriver and remove insects, mud or other obstructions with compressed air or low pressure water. Replace the radiator if the air flow is restricted over more than 20% of the radiating surface.

Install the removed parts in the reverse order of removal.



### DRIVE BELT

Remove the drive belt (page 11-6).

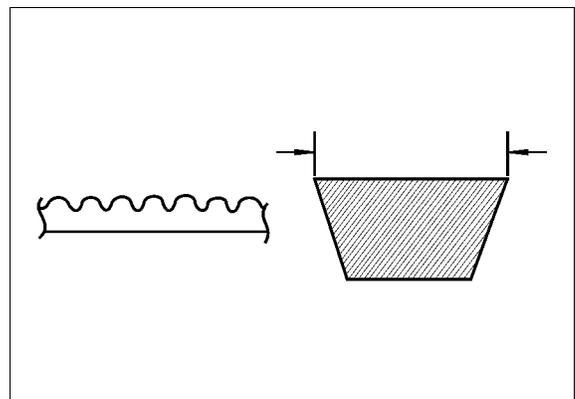
Check the drive belt for cracks, separation or abnormal or excessive wear and replace it if necessary (page 4-2).

Measure the drive belt width.

**SERVICE LIMIT: 17.5 mm (0.69 in)**

Replace the drive belt if it is less than the service limit (page 11-6).

Install the drive belt (page 11-6).



## FINAL DRIVE OIL

### OIL LEVEL CHECK

Make sure that the final reduction case has no oil leaks.

Support the scooter with its centerstand.

Remove the final reduction oil check bolt and sealing washer.

Check whether the oil flows out from the final reduction check bolt hole.

If the level is low (oil does not flow out), add the recommended oil as described below.

### RECOMMENDED FINAL DRIVE OIL:

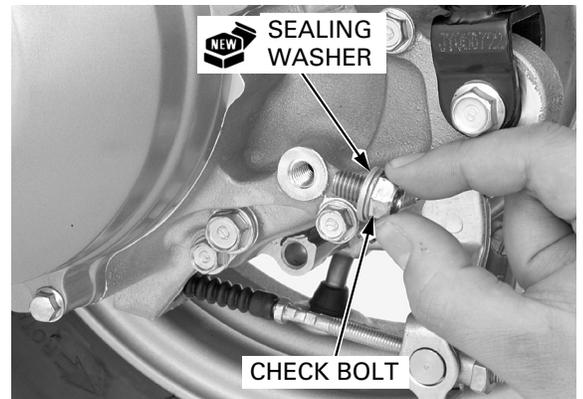
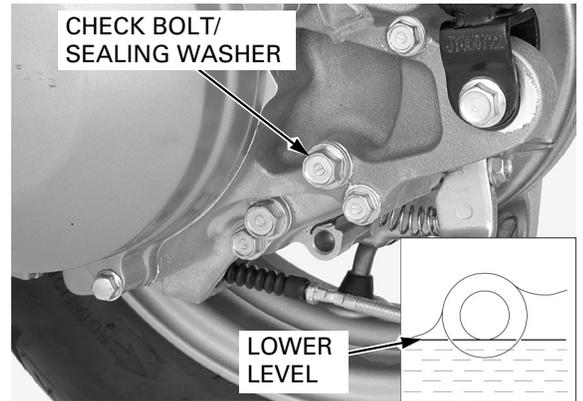
**API service classification: SG or higher (except oils labeled as energy conserving on the circular API service label)**

**Viscosity: SAE 10W-30**

**JASO T 903 standard: MB**

Install the final reduction oil check bolt with a new sealing washer and tighten it to the specified torque.

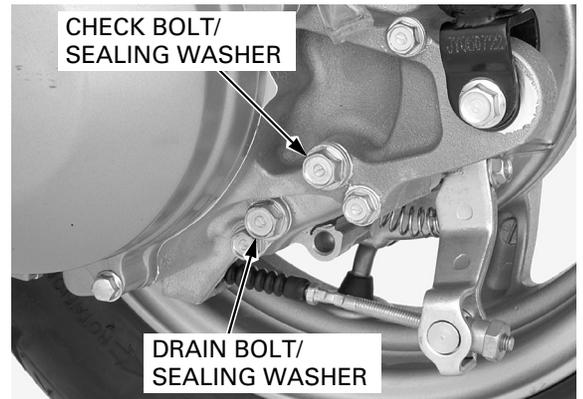
**TORQUE: 13 N·m (1.3 kgf·m, 10 lbf·ft)**



### OIL CHANGE

Place an oil drain pan under the final reduction case to collect the oil, then remove the final reduction oil check bolt, final reduction oil drain bolt and sealing washers.

Slowly turn the rear wheel and drain the oil.



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

**TORQUE: 13 N·m (1.3 kgf·m, 10 lbf·ft)**

Fill the final reduction case with recommended oil up to the correct level (page 4-15).

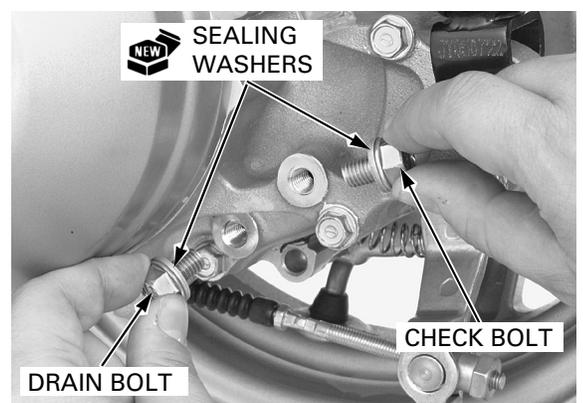
### FINAL REDUCTION OIL CAPACITY:

**0.10 liter (0.11 US qt, 0.09 Imp qt) at draining**

**0.12 liter (0.13 US qt, 0.11 Imp qt) at disassembly**

Install the check bolt with a new sealing washer and tighten it to the specified torque.

**TORQUE: 13 N·m (1.3 kgf·m, 10 lbf·ft)**



## MAINTENANCE

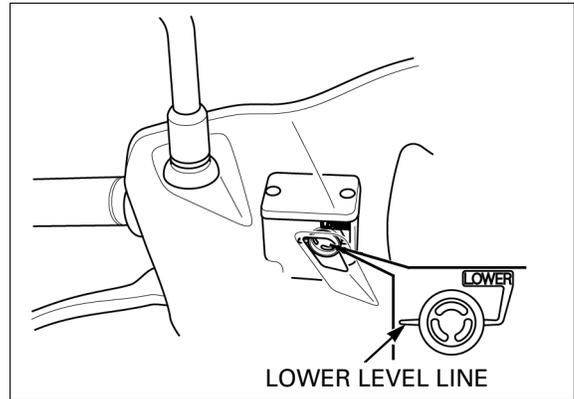
### BRAKE FLUID

- 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.
- Spilling fluid can damage painted, plastic or rubber parts. Place a rag over these parts whenever the system is serviced.

Turn the handlebar to the left so the reservoir is level and check the front brake reservoir fluid level through the sight glass.

If the level is near the lower level line, check the brake pads for wear (page 4-16).

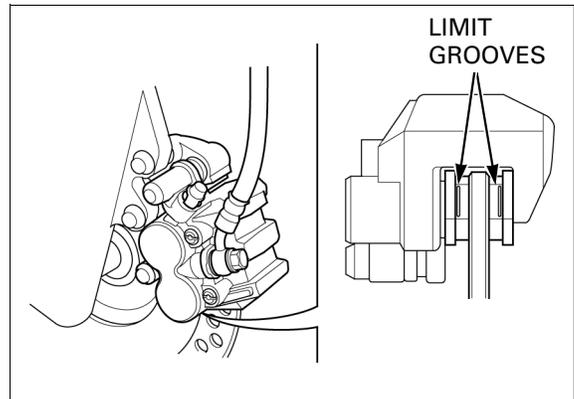
A low fluid level may be due to wear of the brake pads. If the brake pads are worn, the caliper piston is pushed out, and this accounts for a low reservoir level. If the brake pads are not worn and the fluid level is low, check entire system for leaks (page 4-17).



### BRAKE SHOES/PADS WEAR

#### FRONT DISC BRAKE PADS

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



*Always replace the brake pads as a set to assure even disc pressure.*

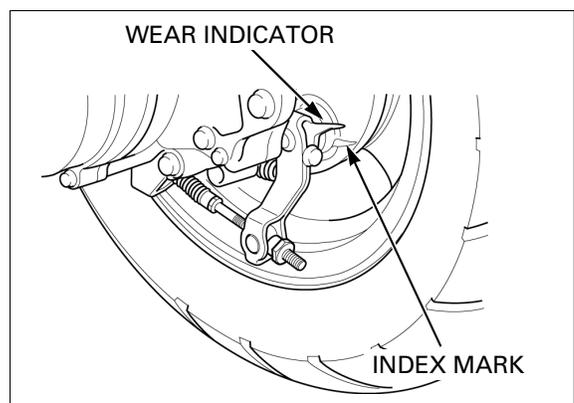
Refer to brake pad replacement (page 17-8).

#### REAR DRUM BRAKE SHOES

Check the wear indicator position when the brake lever is applied.

If the indicator aligns with the index mark, inspect the brake drum (page 17-24).

If the drum I.D. is within service limit, replace the brake shoes (page 17-24).



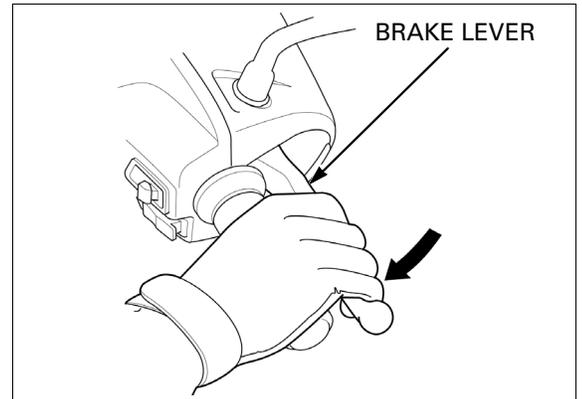
## BRAKE SYSTEM

### FRONT DISC BRAKE

Firmly apply the brake 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.

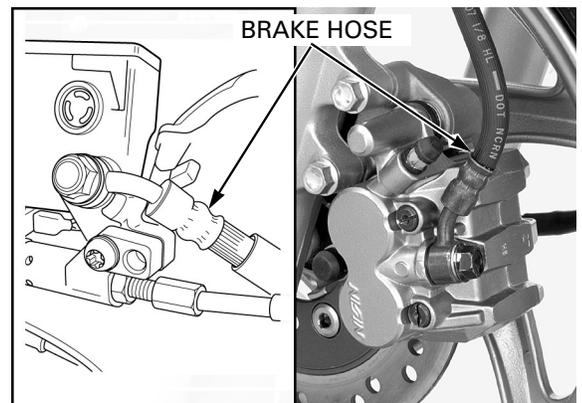
Refer to air bleeding procedures (page 17-5).



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

Tighten any loose fittings.

Replace hose and fittings as required.

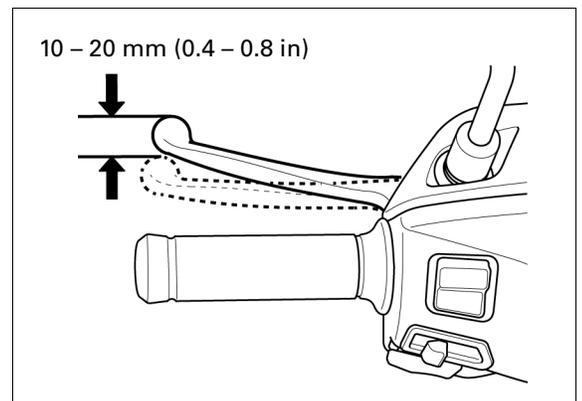


### REAR DRUM BRAKE

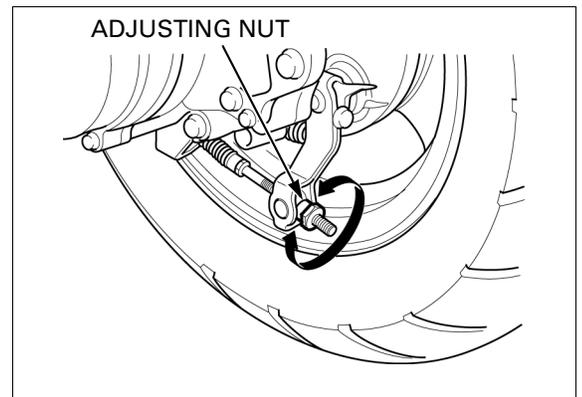
Check the brake cable and brake lever for loose connections, excessive play or other damage. Replace or repair if necessary.

Measure the rear brake lever freeplay at the end of the lever.

**FREEPLAY: 10 – 20 mm (0.4 – 0.8 in)**



Adjust the rear brake lever freeplay by turning the rear brake arm adjusting nut.

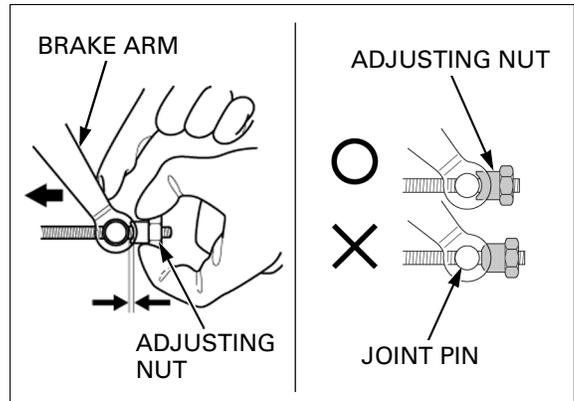


## MAINTENANCE

Adjust the rear brake lever freeplay by turning the rear brake arm adjusting nut.

After adjustment, make sure the following:

- Push the brake arm to confirm that there is a gap between the adjusting nut and the joint pin.
- The cutout on the adjusting nut is seated on the joint pin.

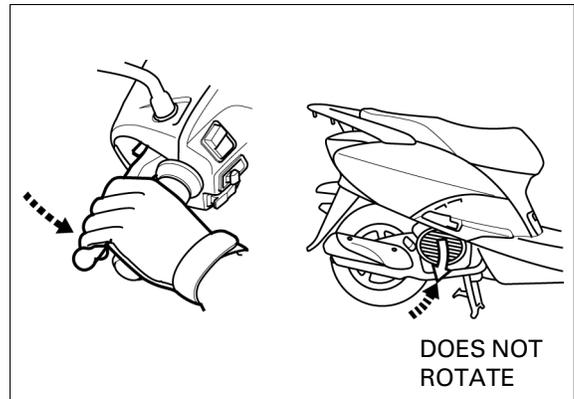


### COMBINED BRAKE SYSTEM INSPECTION

- This model is equipped with combined brake system.
- Before inspection, check the front brake fluid (page 4-16).

Lift the rear wheel off the ground and apply the rear brake lever.

Make sure that the rear wheel does not rotate while the rear brake lever is applied.



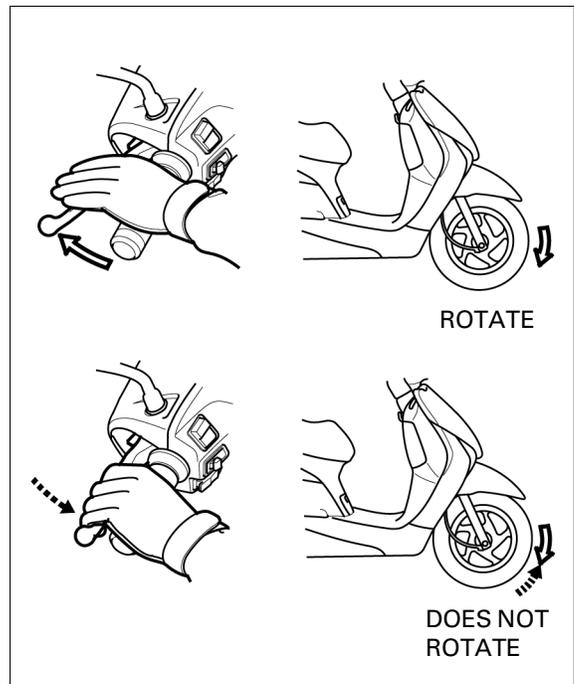
Lift the front wheel off the ground and rotate it by hand.

Make sure that the front wheel rotates smoothly.

Lift the front wheel off the ground and apply the rear brake lever.

Make sure that the front wheel does not rotate while the rear brake lever is applied.

If it is abnormal, inspect as follows:



Remove the front handlebar cover (page 3-6).

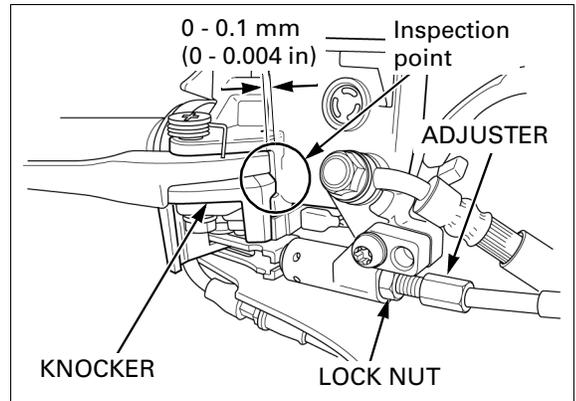
Check the rear brake lever freeplay (page 4-17).

Measure the distance between the edge surface of the knocker and the edge surface of the master cylinder body with the feeler gauge.

**STANDARD: 0 – 0.1 mm (0 – 0.004 in)**

If the distance exceeds the standard, adjust the connecting cable as follows:

Loosen the lock nut and turn the adjuster until the distance between the edge surfaces is within standard.



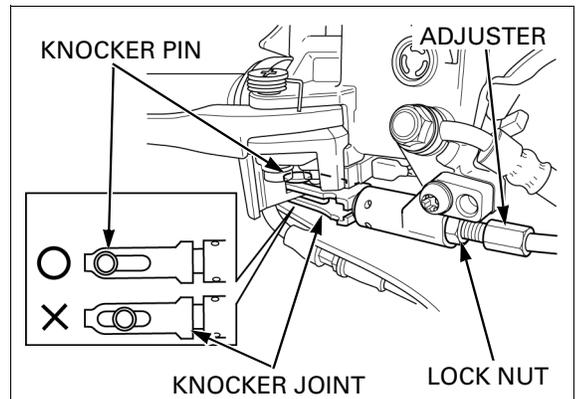
Check that there is no gap between the knocker pin and the end of the slot of the knocker joint.

If there is any gap, loosen the lock nut and turn the adjuster until there is no gap between the knocker pin and the end of the slot of the knocker joint.

After the adjustment, hold the adjuster and tighten the lock nut to the specified torque.

**TORQUE: 6.4 N·m (0.65 kgf·m, 4.7 lbf·ft)**

After tightening the lock nut, check the rear brake lever freeplay again (page 4-17) and, check that there is no gap between the knocker pin and the end of the slot of the knocker joint.



Apply rear brake lever firmly about 10 times so to fit the brake cables. Check that the distance between the edges has not been changed after applying the brake.

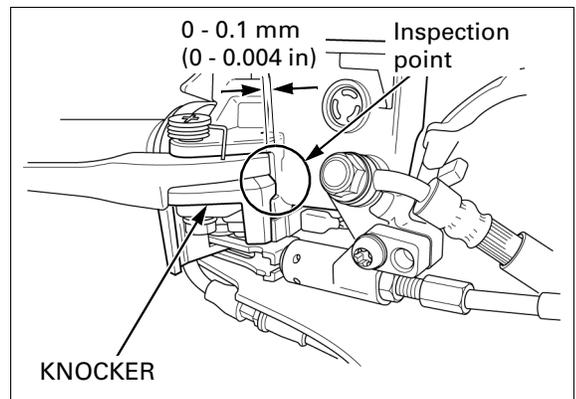
Recheck that the distance between the edge surface of the knocker and the edge surface of the master cylinder body is within standard.

**STANDARD: 0 – 0.1 mm (0 – 0.004 in)**

Recheck the combined brake system (page 4-18).

If the combined brake system adjustment is normal, but the front wheel rotates abnormally, check for other malfunction parts.

Install the front handlebar cover (page 3-6).



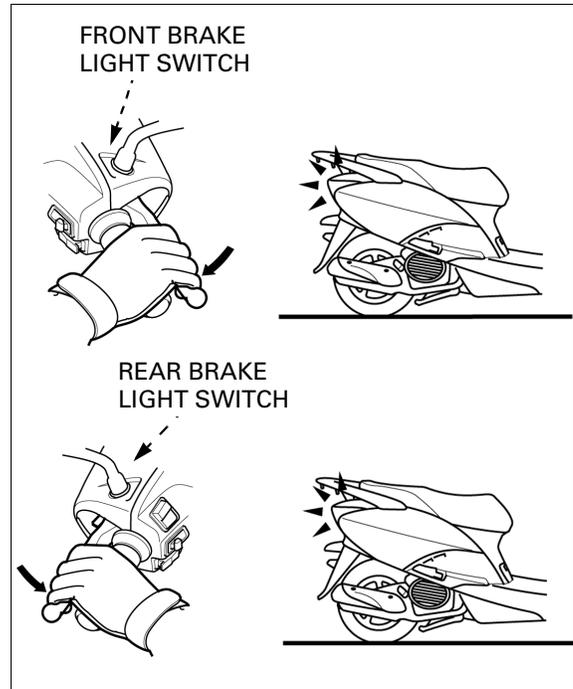
## MAINTENANCE

### BRAKE LIGHT SWITCH

- The brake light switch on the brake lever cannot be adjusted. If the brake light switch actuation and brake engagement are not synchronized, either replace the switch or malfunction parts of the system.

Check that the brake light comes on just prior to the brake actually being engaged.

Refer to brake light switch inspection (page 21-13).

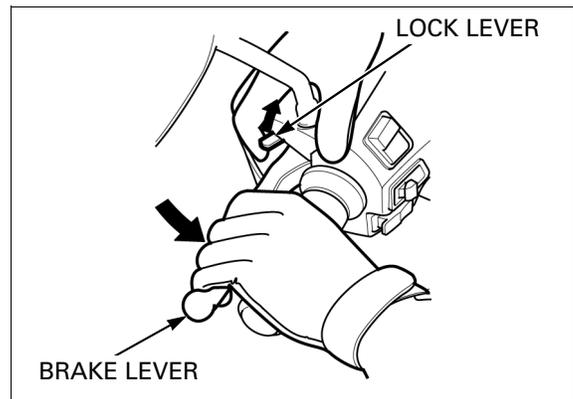


### BRAKE LOCK OPERATION

Check the brake lock operation after the rear brake lever freeplay is checked and adjusted (page 4-17).

Squeeze the rear brake lever and set the lock lever by pulling it up.

Check that the rear wheel is locked.



### HEADLIGHT AIM

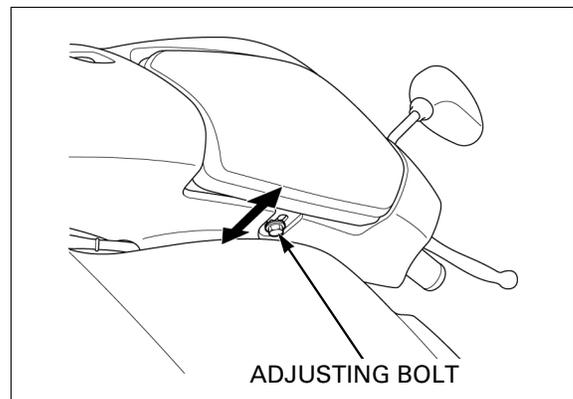
Adjust the headlight beam as specified by local laws and regulations.

Place the scooter on a level ground.

Adjust the headlight beam vertically by loosening the headlight aim adjusting bolt.

Hold the headlight and tighten the adjusting bolt.

**TORQUE: 1.8 N·m (0.18 kgf·m, 1.3 lbf·ft)**



## CLUTCH SHOES WEAR

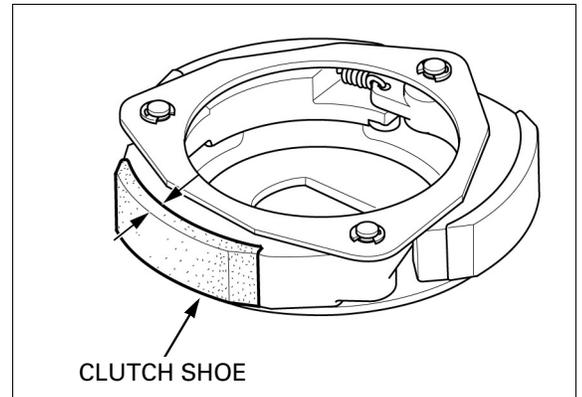
Remove the clutch assembly (page 11-13).

Check the clutch shoes for wear or damage.  
Measure the thickness of each shoe.

**SERVICE LIMIT: 2.0 mm (0.08 in)**

Replace the clutch shoes if it is below service limit  
(page 11-14).

Install the removed parts in the reverse order of  
removal.



## SUSPENSION

### FRONT

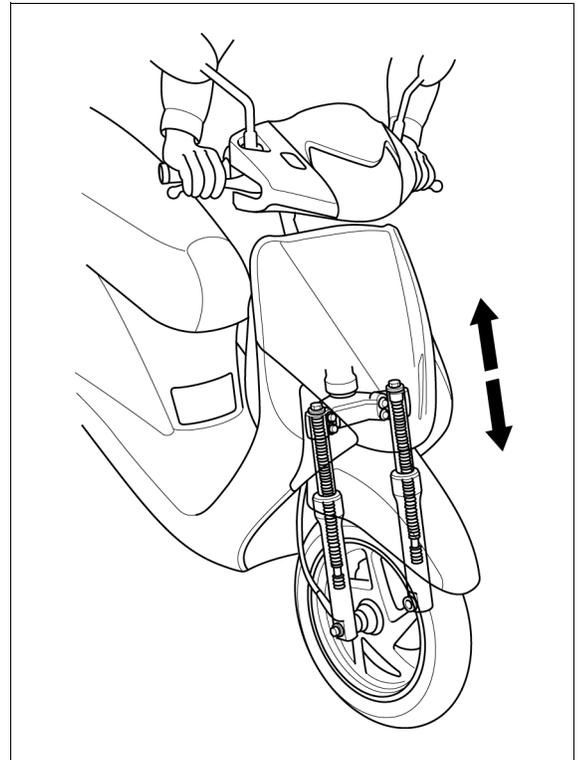
Check the action of the forks by operating the front  
brake and compressing the front suspension several  
times.

Check the entire assembly for signs of leaks, dam-  
age or loose fasteners.

Replace damaged components which cannot be  
repaired.

Tighten all nuts and bolts.

Refer to fork service (page 15-12).



### REAR

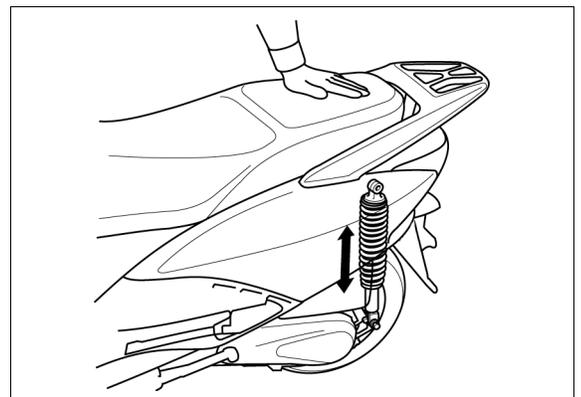
Check the action of the rear shock absorber by com-  
pressing it several times.

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.

Refer to shock absorber service (page 16-5).

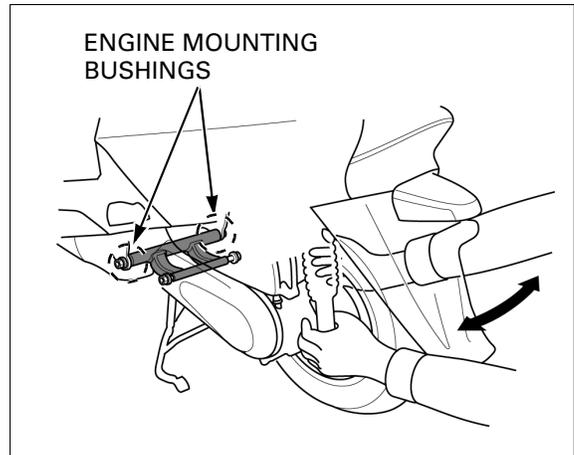


## MAINTENANCE

Support the scooter with its centerstand.

Check for worn engine mounting bushings by grabbing the engine and attempting to move it side to side.

Replace the parts if any looseness is noted (page 8-6).



## NUTS, BOLTS, FASTENERS

Check that all chassis nuts and bolts are tightened to their correct torque values (page 1-11).

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

## WHEELS/TIRES

Support the scooter with its centerstand.

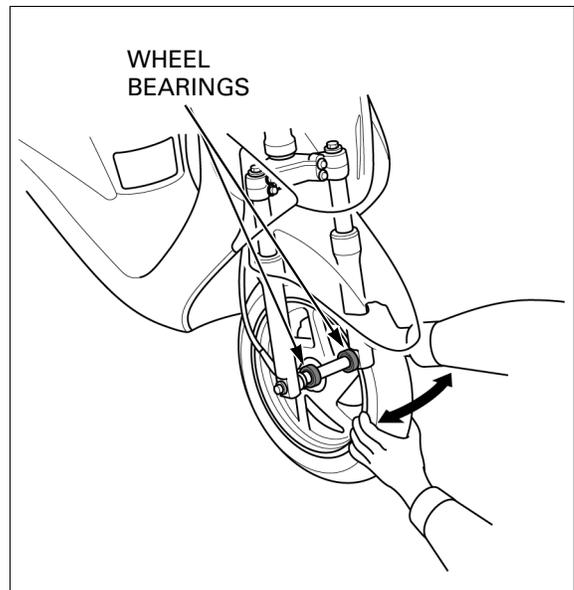
Making sure that the fork is not allowed to move, raise the front wheel and check for play.

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

Replace the front wheel bearings if any looseness is noted (page 15-6).

Turn the wheel and check that it rotates smoothly with no unusual noises.

If any abnormal conditions are suspected, inspect the front wheel bearings (page 15-6).



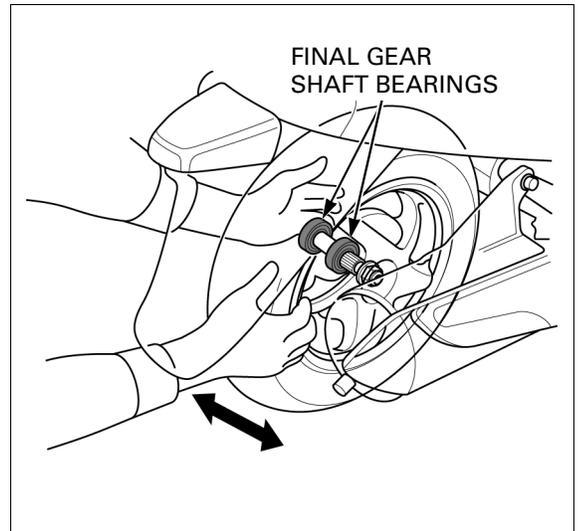
Support the scooter securely and raise the rear wheel.

Check for worn final gear shaft bearings by grabbing the rear wheel and attempting to move the wheel side to side.

Replace the final gear shaft bearings if any looseness is noted (page 12-7).

Turn the wheel and check that it rotates smoothly with no unusual noises.

If any abnormal conditions are suspected, check the final reduction (page 12-6).



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

**RECOMMENDED TIRE PRESSURE:**

**Driver only:**

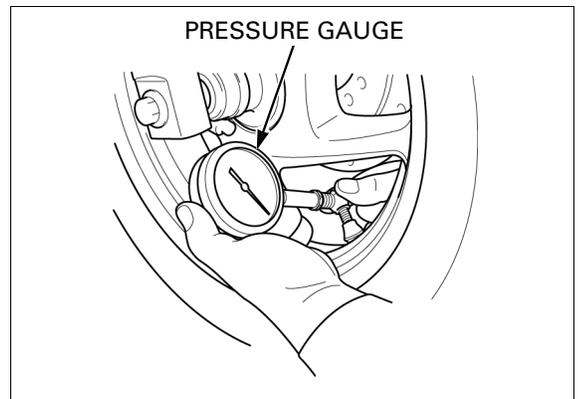
**FRONT:** 175 kPa (1.75 kgf/cm<sup>2</sup>, 25 psi)

**REAR:** 200 kPa (2.00 kgf/cm<sup>2</sup>, 29 psi)

**Driver and passenger:**

**FRONT:** 175 kPa (1.75 kgf/cm<sup>2</sup>, 25 psi)

**REAR:** 225 kPa (2.25 kgf/cm<sup>2</sup>, 33 psi)



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

Check the front wheel and rear wheel for trueness.

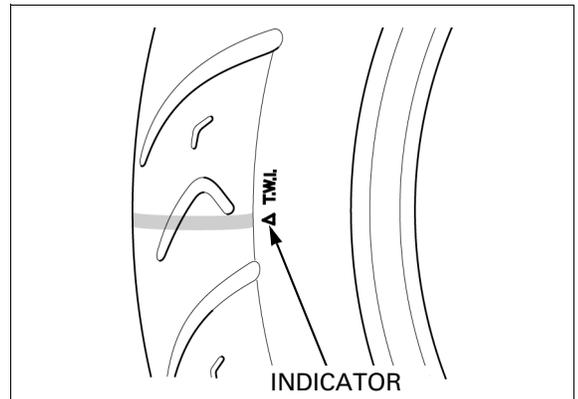
**RECOMMENDED TIRE SIZE AND TIRE BRAND:**

		FRONT	REAR
Tire size		90/90 – 12M/C 44J	100/90 – 10M/C 56J
Tire brand	CHENG	C-922	C-922
	SHIN		
	IRC		

Check the tread depth at the center of the tires. Replace the tires when the tread depth reaches the following limit.

**MINIMUM TREAD DEPTH:**

**FRONT/REAR:** To the indicator



## MAINTENANCE

### STEERING HEAD BEARINGS

Support the scooter with its centerstand and raise the front wheel off the ground.

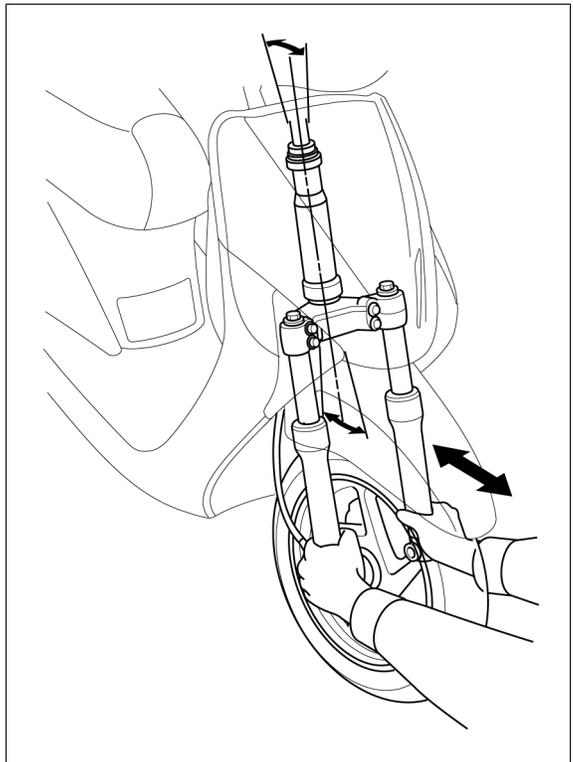
Check that the handlebar moves freely from side-to-side.

If the handlebar moves unevenly or binds, inspect the steering head bearings (page 15-23).



Hold the scooter and check the steering head bearings for wear by moving the fork forward and backward.

If the steering stem has vertical movement, inspect the steering head bearings (page 15-23).



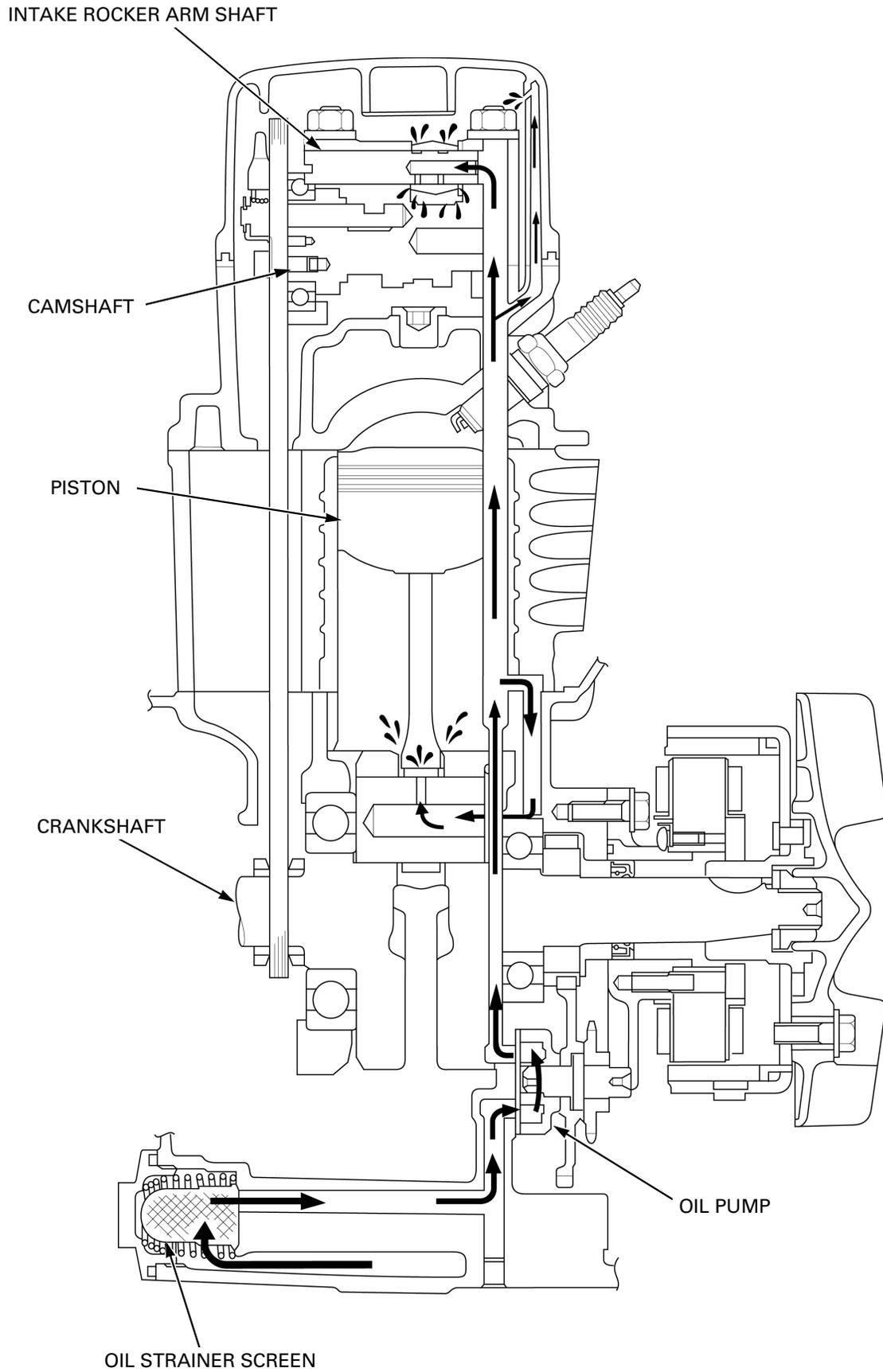
# 5. LUBRICATION SYSTEM

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SERVICE INFORMATION .....	5-3	OIL PUMP .....	5-4

# LUBRICATION SYSTEM

## 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.

### SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Engine oil capacity	After draining	0.7 liter (0.7 US qt, 0.6 Imp qt)	–
	After disassembly	0.8 liter (0.8 US qt, 0.7 Imp qt)	–
Recommended engine oil		API service classification: SG or higher (except oils labeled as energy conserving on the circular API service label) Viscosity: SAE 10W-30 JASO T 903 standard: MB	–
Oil pump rotor	Tip clearance	0.15 (0.006)	0.20 (0.008)
	Body clearance	0.15 – 0.21 (0.006 – 0.008)	0.35 (0.014)
	Side clearance	0.05 – 0.10 (0.002 – 0.004)	0.12 (0.005)

### TORQUE VALUES

Oil pump plate screw	3 N·m (0.31 kgf·m, 2.2 lbf·ft)
Oil pump mounting bolt	10 N·m (1.0 kgf·m, 7 lbf·ft)

## TROUBLESHOOTING

#### Engine oil level too low

- Oil consumption
- External oil leak
- Worn piston rings or incorrect piston ring installation (page 10-7)
- Worn cylinder (page 10-4)
- Worn valve guide or seal (page 9-14)

#### Oil contamination

- Oil not changed often enough
- Faulty cylinder head gasket
- Worn piston rings (page 10-7)

## LUBRICATION SYSTEM

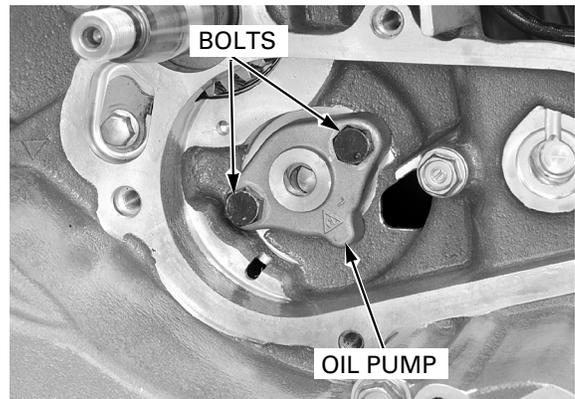
### OIL PUMP

#### REMOVAL

- When removing the oil pump, do not allow dust or dirt to enter the engine.

Remove the stator base/water pump (page 7-15).

Remove the oil pump mounting bolts and oil pump.



#### DISASSEMBLY/ASSEMBLY

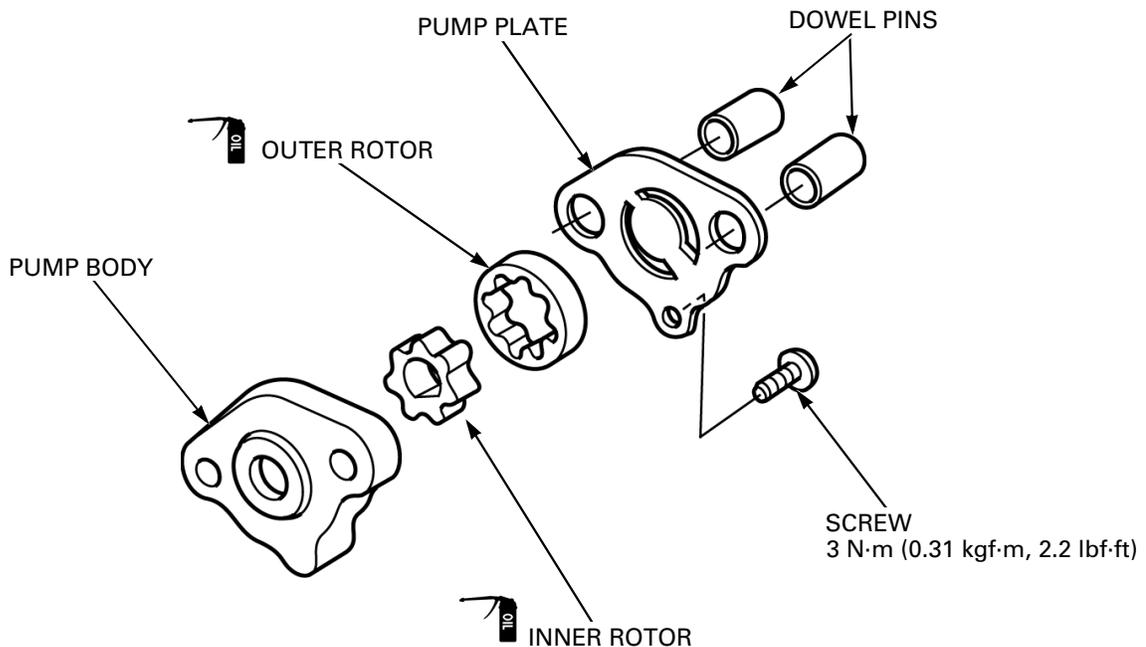
Remove the following:

- Dowel pins
- Oil pump plate screw
- Pump plate
- Outer rotor
- Inner rotor

*Apply engine oil to the inner rotor and outer rotor.*

Assembly is in the reverse order of disassembly.

**TORQUE: Oil pump plate screw**  
**3 N·m (0.31kgf·m, 2.2 lbf·ft)**



**INSPECTION**

**TIP CLEARANCE**

- Measure at several points and use the largest reading to compare the service limit.

Temporarily install the outer rotor and inner rotor to pump body and oil pump shaft into the oil pump inner rotor.

Measure the clearance between the outer rotor and the inner rotor with a feeler gauge.

**SERVICE LIMIT: 0.20 mm (0.008 in)**

TIP CLEARANCE:



**BODY CLEARANCE**

Measure the clearance between the oil pump body and the outer rotor with a feeler gauge.

**SERVICE LIMIT: 0.35 mm (0.014 in)**

BODY CLEARANCE:



**SIDE CLEARANCE**

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

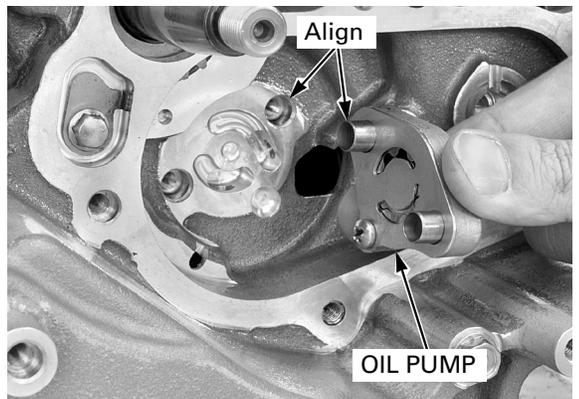
**SERVICE LIMIT: 0.12 mm (0.005 in)**

SIDE CLEARANCE:



**INSTALLATION**

Install the oil pump to the crankcase by aligning the dowel pins and holes.



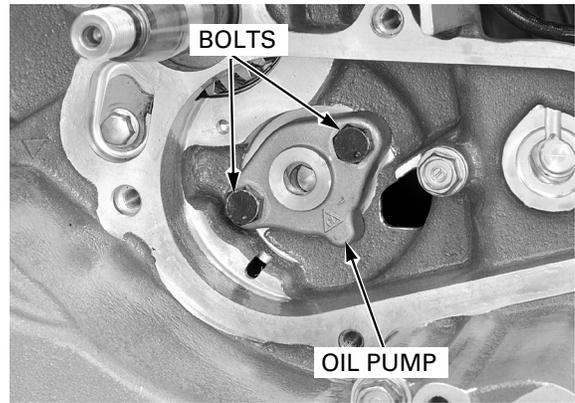
## LUBRICATION SYSTEM

---

Install and tighten the oil pump mounting bolts to the specified torque.

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

Install the stator base/water pump (page 7-19).



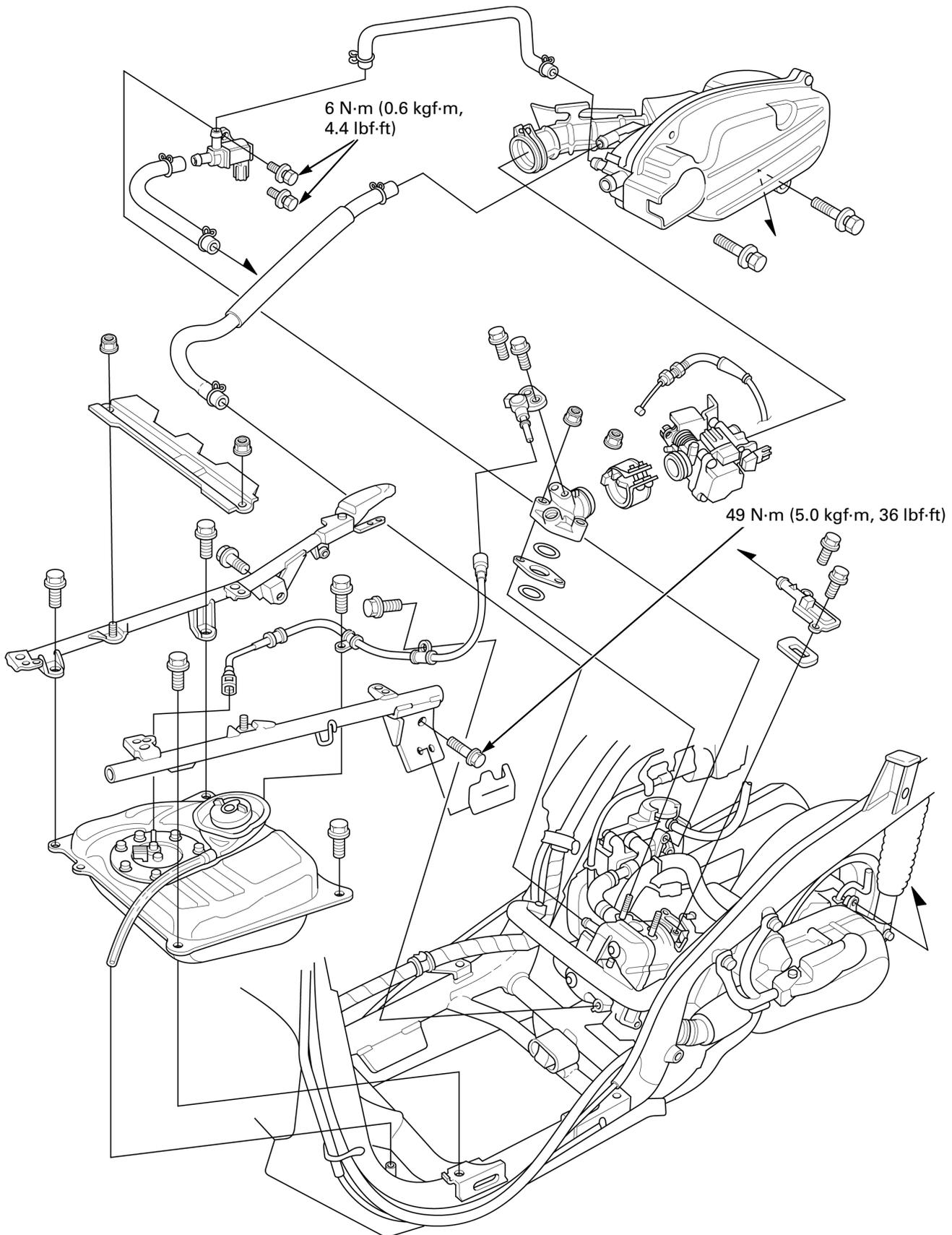
# 6. FUEL SYSTEM (Programmed Fuel Injection)

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# FUEL SYSTEM (Programmed Fuel Injection)

## COMPONENT LOCATION



# SERVICE INFORMATION

## GENERAL

- Before disconnecting fuel hose, relieve pressure from the system by starting the engine with the fuel pump connector disconnected (page 6-32).
- Bending or twisting the control cable will impair smooth operation and could cause the cable to stick or bend, resulting in loss of vehicle control.
- Work in a well ventilated area. Smoking or allowing flames or sparks in the work area or where gasoline is stored can cause a fire or explosion.
- Do not apply commercially available carburetor cleaners to the inside of the throttle bore, which is coated with molybdenum.
- Do not snap the throttle valve from full open to full close after the throttle cable has been removed. It may cause incorrect idle operation.
- Seal the cylinder head intake port with tape or a clean cloth to keep dirt and debris from entering the intake port after the throttle body has been removed.
- Do not damage the throttle body. It may cause incorrect throttle valve operation.
- Prevent dirt and debris from entering the throttle bore and fuel feed hose, clean them using compressed air.
- The throttle body is factory pre-set. Do not disassemble in a way other than shown in this manual.
- Do not loosen or tighten the white painted nut of the throttle drum. Loosening or tightening it can cause throttle body malfunction.
- Always replace the packing when the fuel pump is removed.
- It is impossible to disassemble the fuel pump after removing it.
- The PGM-FI (Programmed Fuel Injection) system is equipped with the Self-Diagnostic System described on page 6-13. If the MIL (Malfunction Indicator Lamp) blinks, follow the Self-Diagnostic Procedures to fix the problem.
- When checking the PGM-FI, always follow the steps in the troubleshooting flow chart (MIL trouble shooting;page 6-22).
- The PGM-FI system is provided with fail-safe function to secure a minimum running capability even when there is any trouble 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 the simulated program map. It must be remembered, however, that when any abnormality is detected in injector the fail safe function stops the engine from the standpoint of protecting it.
- Refer to PGM-FI system location (page 6-5).
- A faulty PGM-FI system is often related to poorly connected or corroded connectors. Check those connections before proceeding.
- When disassembling the programmed fuel injection parts, note the location of the O-rings. Replace them with new ones upon reassembly.
- Use a digital tester for PGM-FI system inspection.
- Refer to procedures for fuel level sensor inspection (page 21-10).

## SPECIFICATIONS

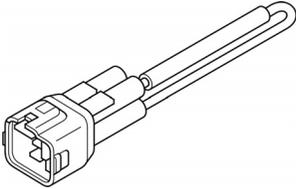
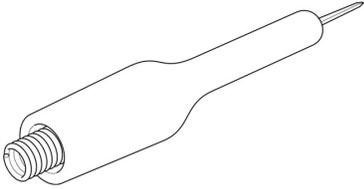
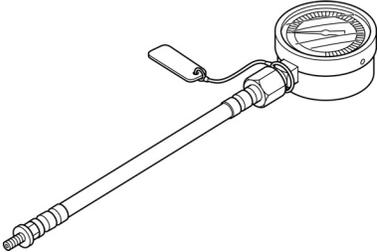
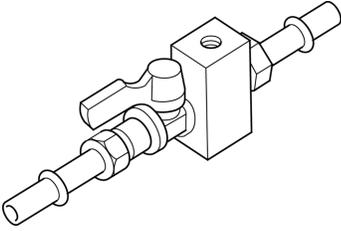
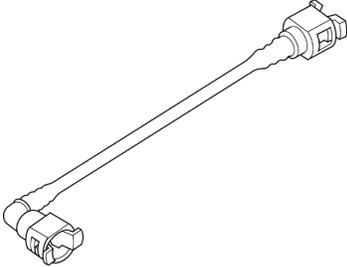
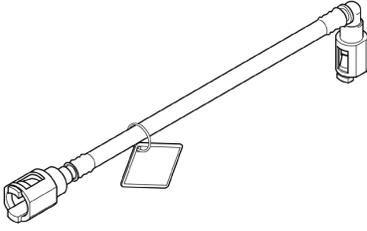
ITEM	SPECIFICATIONS
Throttle body identification number	GQQ2A
Engine idle speed	$1,700 \pm 100 \text{ min}^{-1}$ (rpm)
Throttle grip freeplay	2 – 6 mm (0.08 – 0.24 in)
Fuel injector resistance (at 20°C /68°F)	9 – 12 $\Omega$
PCV solenoid valve resistance (at 20°C /68°F)	30 – 34 $\Omega$
Fuel pressure	294 kPa (3.0 kgf/cm <sup>2</sup> , 43 psi)
Fuel pump flow (at 12 V)	98 cm <sup>3</sup> (3.3 US oz, 3.5 Imp oz) minimum/10 seconds

## FUEL SYSTEM (Programmed Fuel Injection)

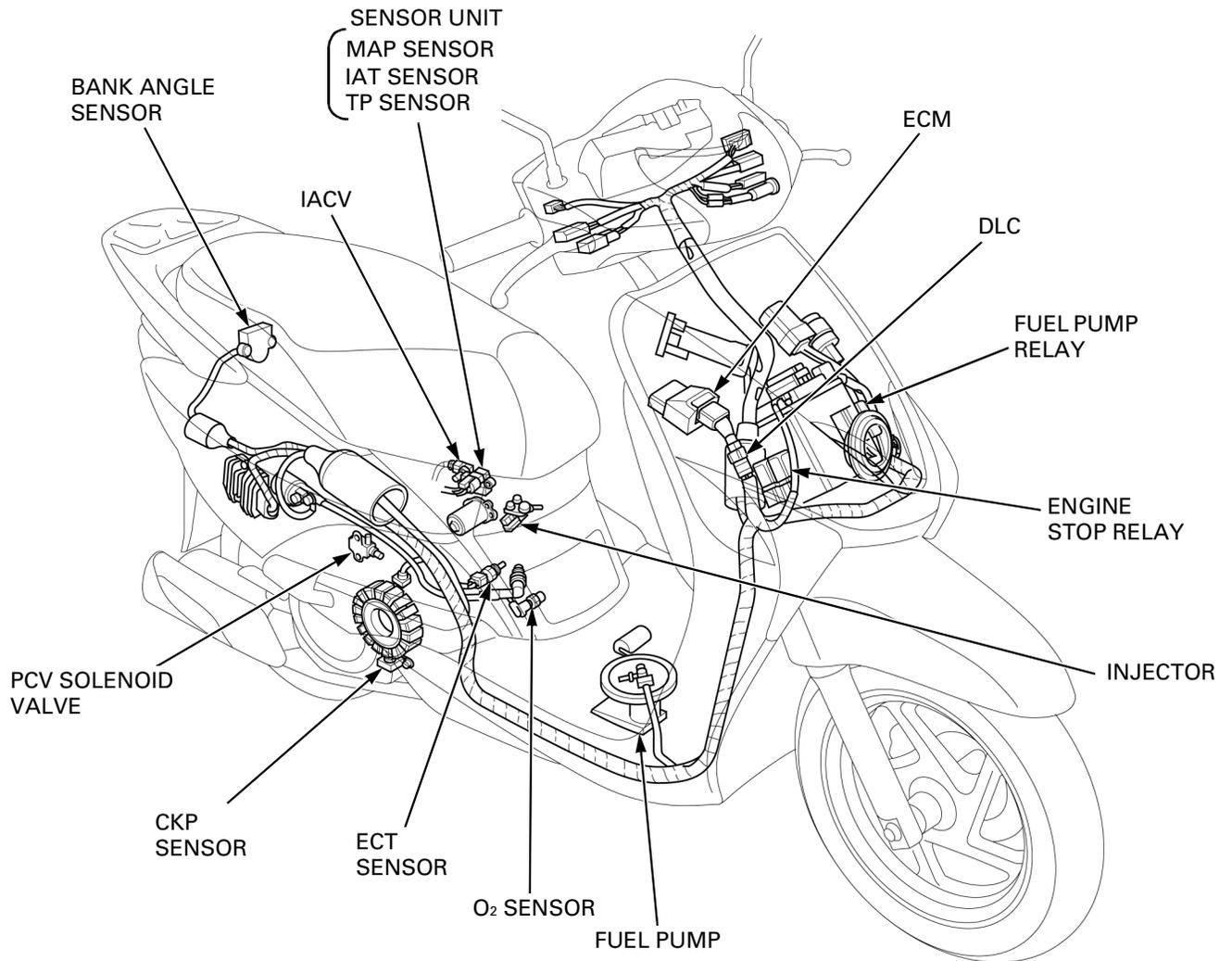
### TORQUE VALUES

Fuel pump mounting nut	12 N·m (1.2 kgf·m, 9 lbf·ft)
Left floor panel side frame mounting bolt	49 N·m (5.0 kgf·m, 36 lbf·ft)
Sensor unit mounting torx screw	3.4 N·m (0.3 kgf·m, 2.5 lbf·ft)
Throttle cable bracket screw	3.4 N·m (0.3 kgf·m, 2.5 lbf·ft)
IACV mounting torx screw	2.1 N·m (0.2 kgf·m, 1.5 lbf·ft)
Bank angle sensor mounting screw	1.2 N·m (0.1 kgf·m, 0.9 lbf·ft)
PCV solenoid valve mounting bolt	6 N·m (0.6 kgf·m, 4.4 lbf·ft)
ECT sensor	25 N·m (2.5 kgf·m, 18 lbf·ft)
O <sub>2</sub> sensor	25 N·m (2.5 kgf·m, 18 lbf·ft)

### TOOLS

<p>DLC short connector 070PZ-ZY30100</p> 	<p>Test probe 07ZAJ-RDJA110</p> 	<p>Fuel pressure gauge 07406-0040004</p> 
<p>Pressure gauge manifold 07ZAJ-S5A0111</p> 	<p>Pressure gauge hose attachment 07ZAJ-S5A0120</p> 	<p>Pressure gauge hose attachment 07ZAJ-S5A0130</p> 
<p>Pressure gauge hose joint 07ZAJ-S5A0150</p> 		

**SYSTEM LOCATION**



**ABBREVIATION**

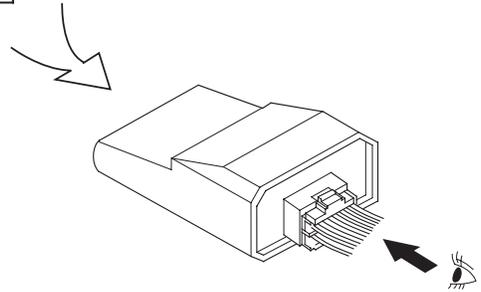
Throughout this manual, the following abbreviations are used to identify the respective parts or systems.

Abbrev. term	Full term	Abbrev. term	Full term
PGM-FI	Programmed Fuel Injection	IACV	Idle Air Control Valve
MAP sensor	Manifold Absolute Pressure sensor	ECM	Engine Control Module
TP sensor	Throttle Position sensor	DLC	Data Link Connector
ECT sensor	Engine Coolant Temperature sensor	MIL	Malfunction Indicator Lamp
IAT sensor	Intake Air Temperature sensor	PCV	Positive Crankcase Ventilation
CKP sensor	Crankshaft Position sensor		



ECM TERMINAL ARRANGEMENT

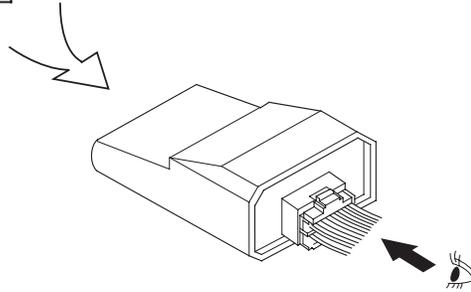
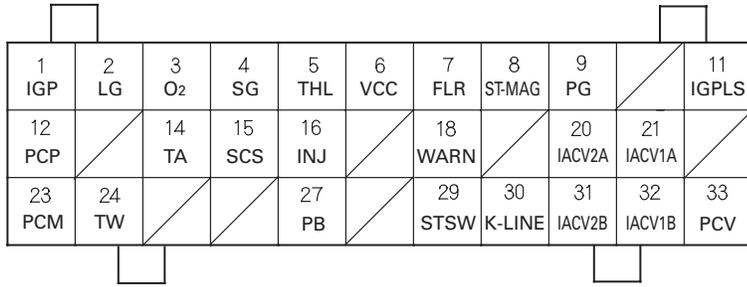
1	2	3	4	5	6	7	8	9		11
IGP	LG	O <sub>2</sub>	SG	THL	VCC	FLR	ST-MAG	PG		IGPLS
12		14	15	16		18		20	21	
PCP		TA	SCS	INJ		WARN		IACV2A	IACV1A	
23	24			27		29	30	31	32	33
PCM	TW			PB		STSW	K-LINE	IACV2B	IACV1B	PCV



IG-ON: Ignition switch ON  
 IG-OFF: Ignition switch OFF

	COLOR	NAME	FUNCTION	DESCRIPTION	SIGNAL
1	BI/W	IGP	INPUT-ECM POWER	ECM control circuit input power line	
2	G	LG	LOGIC GND	ECM control circuit ground line	-
3	BI/O	O <sub>2</sub>	INPUT-O <sub>2</sub> SENSOR	O <sub>2</sub> SENSOR input signal	
4	G/O	SG	SENSOR GND	sensor ground line	-
5	W/R	THL	INPUT-TP SENSOR	TP sensor input signal	
6	Y/O	VCC	OUTPUT-5V POWER	output power line for sensors	
7	Br/BI	FLR	DRIVER FUEL PUMP RELAY	fuel pump relay coil drive signal	

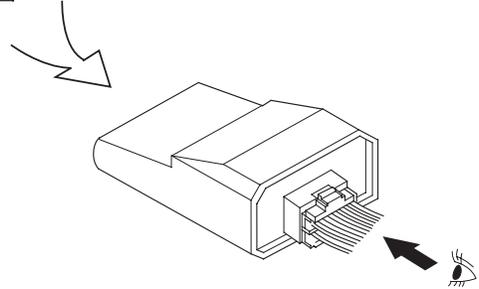
# FUEL SYSTEM (Programmed Fuel Injection)



	COLOR	NAME	FUNCTION	DESCRIPTION	SIGNAL
8	Y/G	ST-MAG	ST-MAG	starter relay coil drive signal	<p>12 V 0 V IG-OFF IG-ON IG-ON, BRAKE LIGHT SWITCH ON and STARTER SWITCH ON</p>
9	G/P	PG	POWER GND	ECM power circuit ground line	-
11	Y/Bu	IGPLS	DRIVER IGNITION PULSE	ignition primary coil pulse signal	<p>12 V 0 V Engine is running</p>
12	Y	PCP	INPUT-CKP SENSOR (+)	CKP sensor input signal (+)	<p>+ V 0 V Engine is running</p>
14	W/Bu	TA	INPUT-IAT SENSOR	IAT sensor input signal	<p>4.63 V 0.47 V Low temperature High temperature</p>
15	Br	SCS	INPUT-SERVICE CHECK SIGNAL	failure code drive signal	<p>5 V 0 V IG-OFF IG-ON</p>

## FUEL SYSTEM (Programmed Fuel Injection)

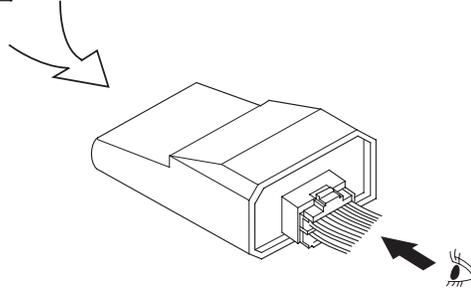
1	2	3	4	5	6	7	8	9		11
IGP	LG	O <sub>2</sub>	SG	THL	VCC	FLR	ST-MAG	PG		IGPLS
12		14	15	16		18		20	21	
PCP		TA	SCS	INJ		WARN		IACV2A	IACV1A	
23	24			27		29	30	31	32	33
PCM	TW			PB		STSW	K-LINE	IACV2B	IACV1B	PCV



Pin	COLOR	NAME	FUNCTION	DESCRIPTION	SIGNAL
16	P/Bu	INJ	DRIVER INJECTOR	injector drive signal	<p>12 V 0 V Engine is running</p>
18	Bu/Y	WARN	OUTPUT-WARNING LIGHT	MIL blinking signal	<p>12 V 0 V MIL OFF      MIL ON with IGNITION SWITCH ON</p>
20	Br/R	IACV2A	DRIVER IACV2A	IACV drive signal	-
21	Lg/R	IACV1A	DRIVER IACV1A	IACV drive signal	-
23	W/Y	PCM	INPUT-CKP SENSOR (-)	crankshaft input signal (-)	<p>0 V - V Engine is running</p>
24	P/W	TW	INPUT-ECT SENSOR	ECT sensor input signal	<p>4.54 V 0.43 V Low temperature      High temperature</p>
27	Y/R	PB	INPUT MAP SENSOR	MAP sensor input signal	<p>3.41 V 0.5 V Low pressure      High pressure</p>

# FUEL SYSTEM (Programmed Fuel Injection)

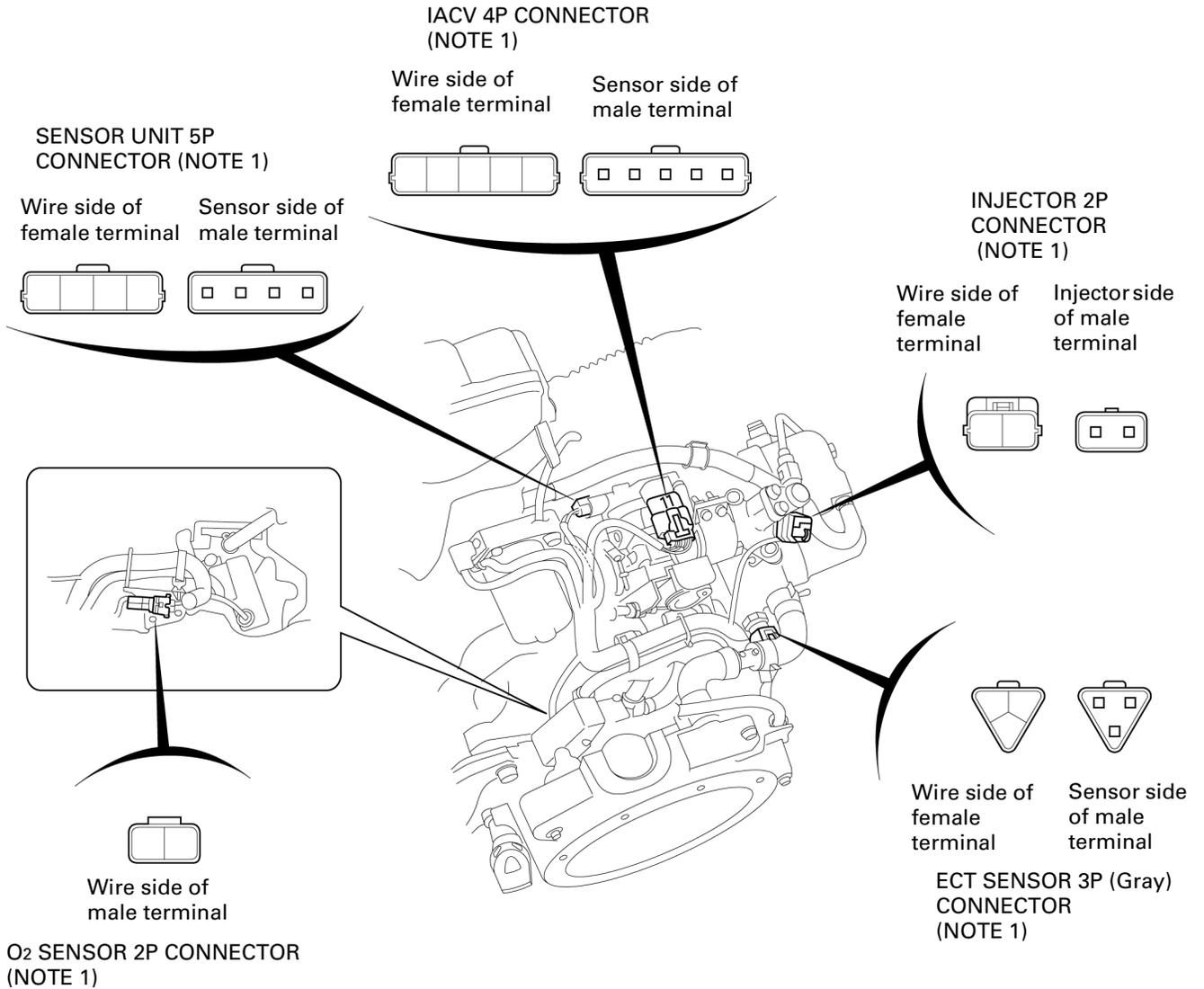
1 IGP	2 LG	3 O <sub>2</sub>	4 SG	5 THL	6 VCC	7 FLR	8 ST-MAG	9 PG	10	11 IGPLS
12 PCP		14 TA	15 SCS	16 INJ		18 WARN		20 IACV2A	21 IACV1A	
23 PCM	24 TW			27 PB		29 STSW	30 K-LINE	31 IACV2B	32 IACV1B	33 PCV



	COLOR	NAME	FUNCTION	DESCRIPTION	SIGNAL
29	W/G	STSW	INPUT-ST SW	Starter switch input signal	
30	O/W	K-LINE	HDS COMMUNICATION LINE	HDS signal output	-
31	Bl/R	IACV2B	DRIVER IACV2B	IACV drive signal	-
32	Gr/R	IACV1B	DRIVER IACV1B	IACV drive signal	-
33	O/Bl	PCV	DRIVER PCV	PCV solenoid valve drive signal	<p>Engine is running</p>

# CONNECTOR LOCATION

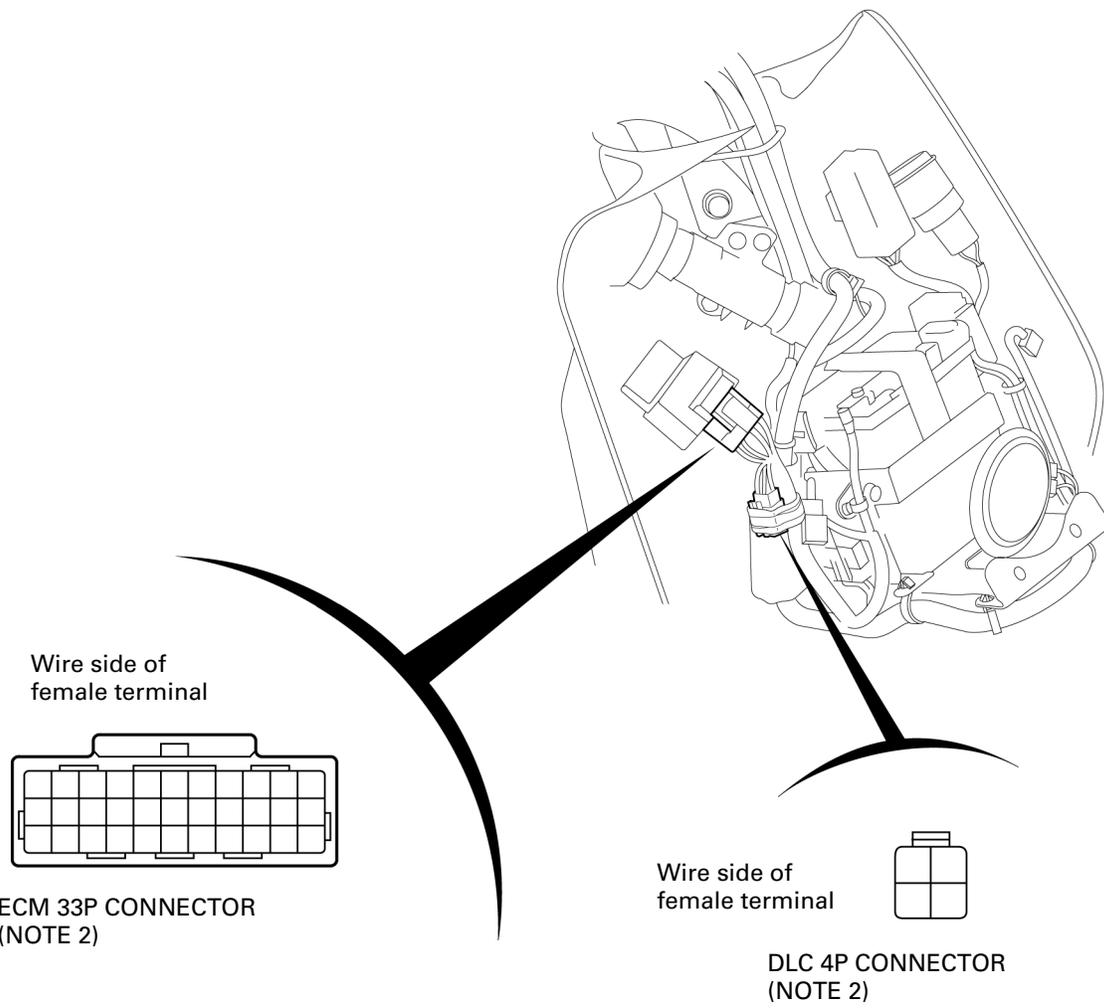
NOTE 1: Remove the luggage box (page 3-8).



# FUEL SYSTEM (Programmed Fuel Injection)

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NOTE 2: Remove the front center cover (page 3-4).



# PGM-FI TROUBLESHOOTING INFORMATION

## SYSTEM DESCRIPTION

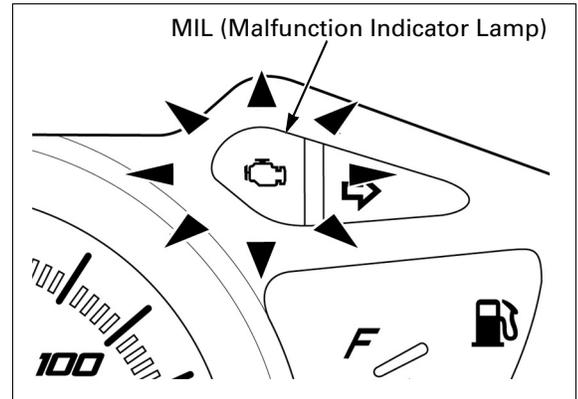
### SELF-DIAGNOSIS SYSTEM

The PGM-FI system is equipped with the self-diagnostic system. When any abnormality occurs in the system, the ECM turns on the MIL (Malfunction Indicator Lamp) and stores a failure code in its erasable memory.

### CURRENT FAILURE CODE/STORED FAILURE CODE

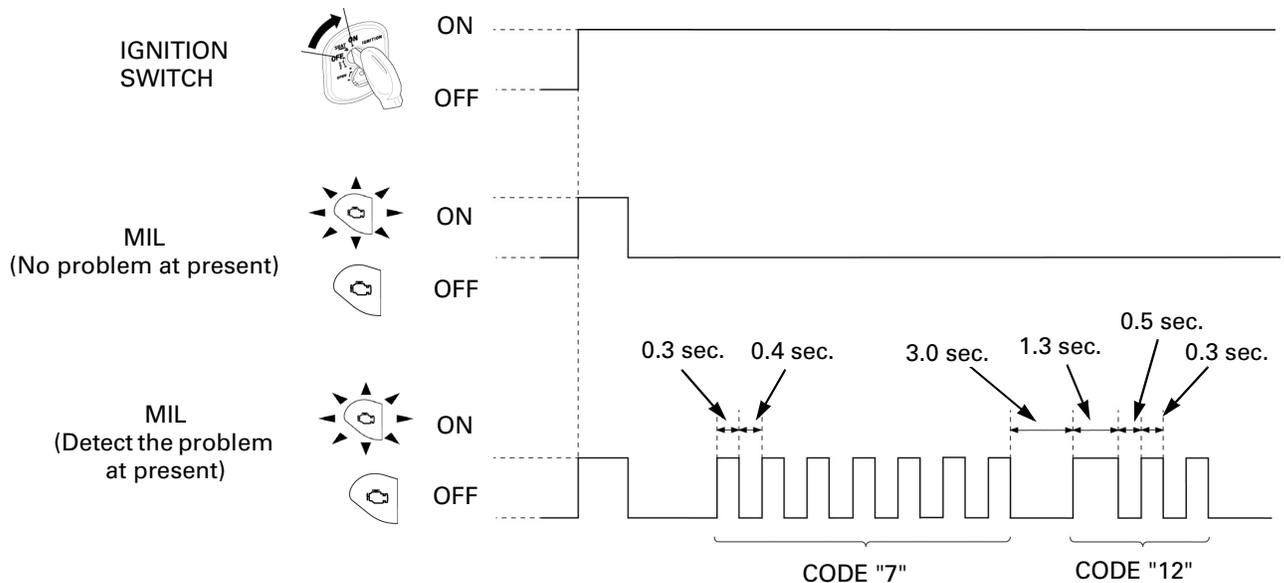
The failure code is indicated in two ways according to the failure status.

- In case the ECM detects the problem at present, the MIL will start blinking as its failure code. It is possible to read out the MIL blink pattern as the current failure code.
- In case the ECM does not detect any problem at present but has a problem stored in its memory, the MIL will not blink. If it is necessary to retrieve the past problem, read out the stored failure code by following the failure code readout procedure (page 6-14).



### MIL BLINK PATTERN

- Failure code can be read by the MIL blink pattern.
- In case the ECM does not detect any problem at present, when the ignition switch is turned "ON", the MIL will stay on for a few seconds, then go off.
- In case the ECM detects the problem at present, when the ignition switch is turned "ON", the MIL will stay on for a few seconds and go off, then the MIL blinks as its failure code.
- 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 0.3 seconds. One long blink is the equivalent to 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).
- The MIL will start blinking when the ignition switch is "ON" or engine revs are below 2,200 min<sup>-1</sup> (rpm). In any other conditions, the MIL will illuminate and stay on.



### MIL CIRCUIT CHECK

If the MIL does not come on or stays on when the ignition switch is turned "ON", troubleshoot the MIL circuit (page 6-31).

### FAIL-SAFE FUNCTION

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

# FUEL SYSTEM (Programmed Fuel Injection)

## FAILURE CODE READOUT

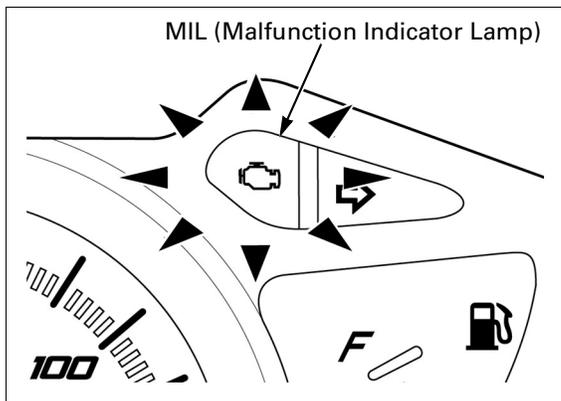
### CURRENT FAILURE CODE

Support the scooter with its centerstand and check the MIL.

- 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, note how many times the MIL blinks and determine the cause of the problem.

If the MIL does not blink, the system is normal at present. If you wish to read the stored failure code, perform the following:



### TO READ THE STORED FAILURE CODE

Turn the ignition switch "OFF".

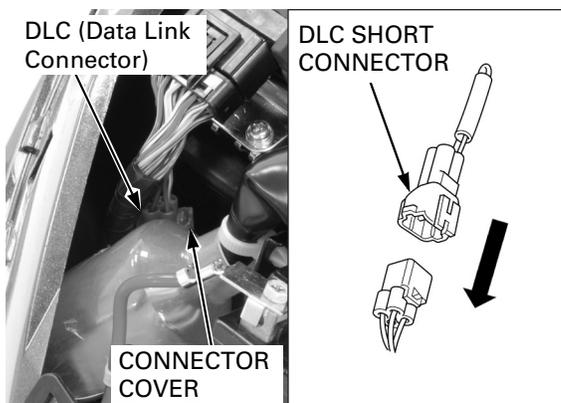
Remove the front center cover (page 3-4).

Remove the DLC (Date Link Connector) from the connector cover and short the DLC terminals using the special tool.

#### TOOL:

**DLC short connector 070PZ-ZY30100**

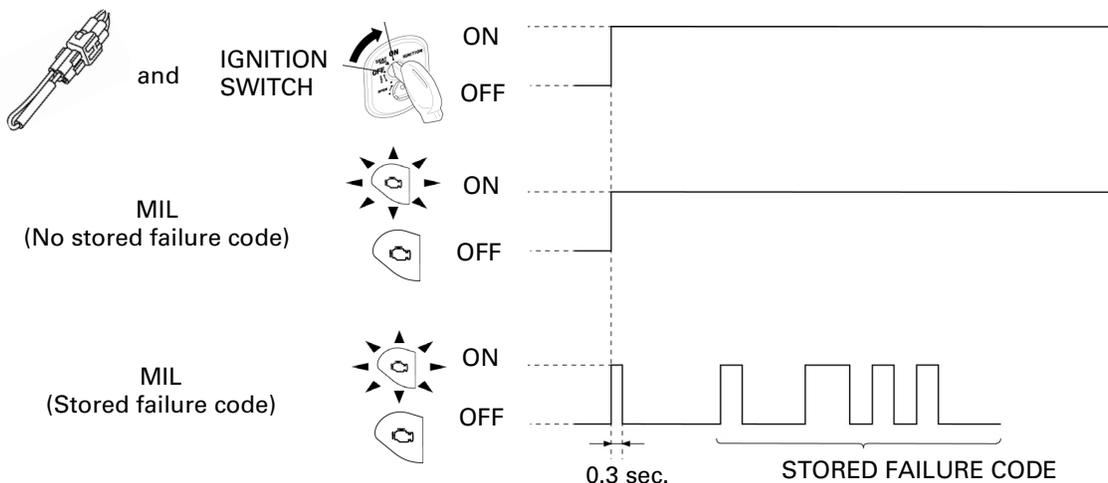
**CONNECTION: Brown – Green**



If the ECM has no stored failure code, the MIL will illuminate, when you turn the ignition switch "ON".

If the ECM has stored failure code, the MIL will illuminate 0.3 seconds and go off, then start blinking as its failure code when you turn the ignition switch "ON".

Note how many times the MIL blinks, and determine the cause of the problem.



## ERASING STORED FAILURE CODE

**NOTE:**

- The stored failure code can not be erased by simply disconnecting the battery negative cable.

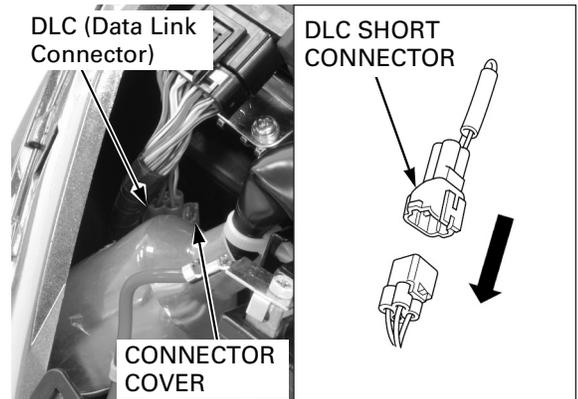
1. Turn the ignition switch "OFF".
2. Remove the front center cover (page 3-4).
3. Remove the DLC from the connector cover and short the DLC terminals using the special tool.

**TOOL:**

**DLC short connector 070PZ-ZY30100**

**CONNECTION: Brown – Green**

4. Turn the ignition switch "ON".

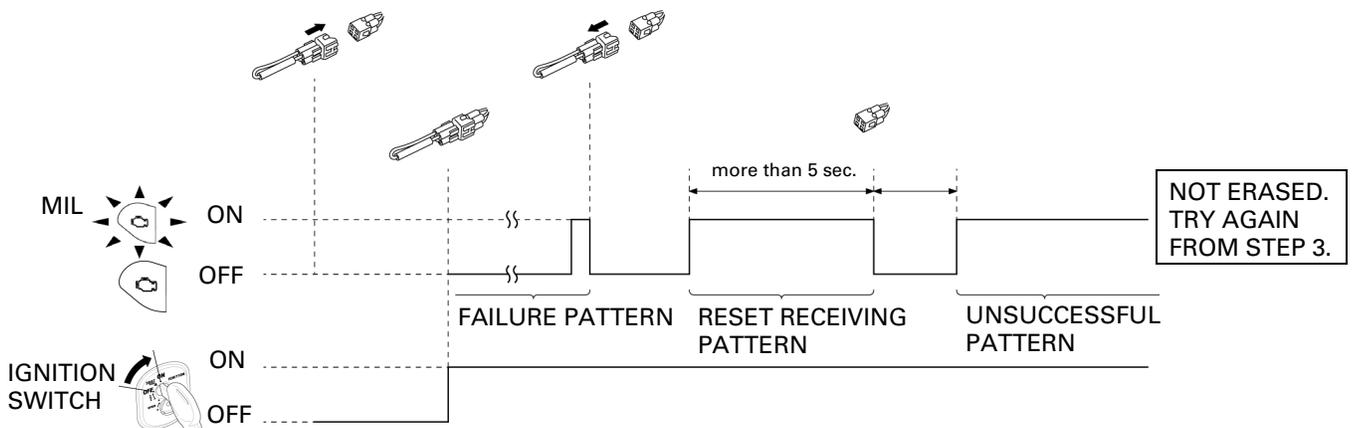
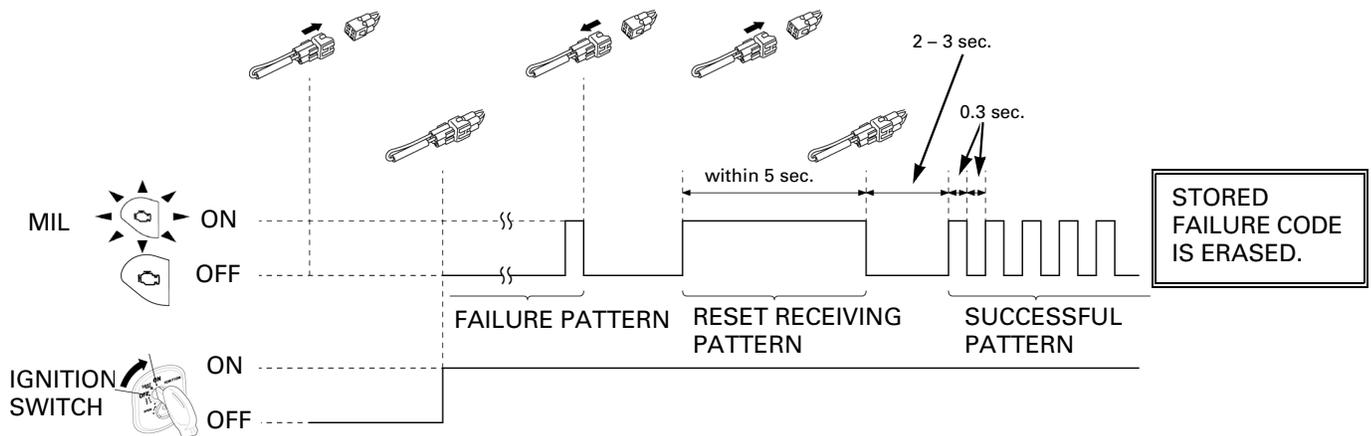
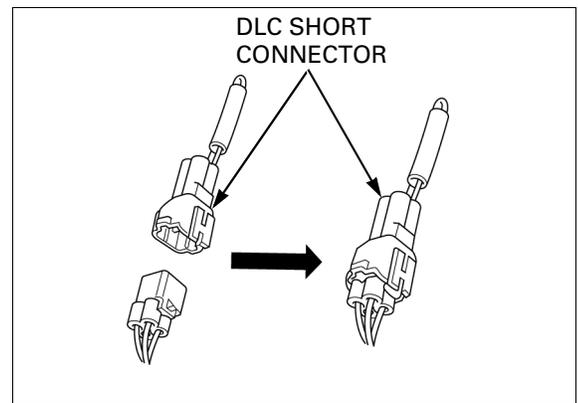


5. Disconnect the special tool from the DLC. Connect the DLC short connector to the DLC again while the MIL stays ON about 5 seconds (reset receiving pattern).

6. The stored failure code is erased if the MIL goes off and starts blinking (successful pattern).

- The DLC must be jumped while the MIL lights. If not, the MIL will go off and stay on (unsuccessful pattern). In that case, turn the ignition switch to "OFF" and try again from step 3.

- Note that the self-diagnostic memory cannot be erased if the ignition switch is turned "OFF" before the MIL starts blinking.



## FUEL SYSTEM (Programmed Fuel Injection)

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### 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. 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 sometimes mean something works, but not the way it's supposed to.

#### If the Engine has problem, and MIL comes on

Refer to FAILURE CODE READOUT (page 6-14).

#### If the Engine has problem, but MIL does not stay on or blink

Do the SYMPTOM TROUBLESHOOTING (page 6-17).

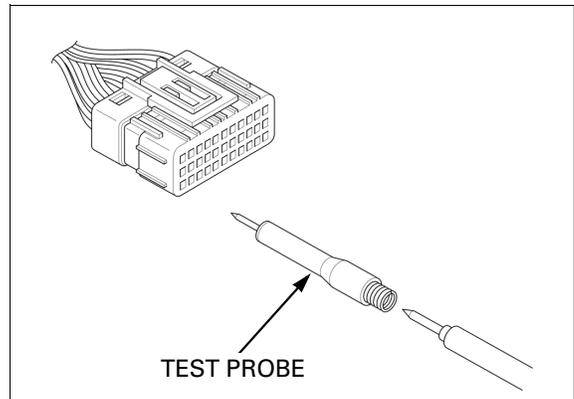
### CIRCUIT INSPECTION

#### INSPECTION AT ECM, SENSOR UNIT AND IACV CONNECTOR

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

#### TOOL:

Test probe      07ZAJ-RDJA110



### SYMPTOM TROUBLESHOOTING

When the scooter has one of these symptoms, check the MIL blinking, refer to the MIL code index (page 6-18) and begin the appropriate troubleshooting procedure. If there are no 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 does not crank (No fuel pump operation sound when turning the ignition switch "ON")	<ol style="list-style-type: none"> <li>1. Inspect the ECM power/ground circuits (page 6-19).</li> <li>2. Inspect the sensor unit power circuit (page 6-21).</li> </ol>	<ul style="list-style-type: none"> <li>• Open or short circuit in the power input wire of the ECM</li> <li>• Open circuit in the 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 ECM</li> <li>• Short circuit in the power input wire of the sensor unit</li> <li>• Faulty sensor unit</li> <li>• Faulty ignition switch</li> </ul>
Engine cranks but won't start (No MIL blinking)	<ol style="list-style-type: none"> <li>1. Crank the starter for more than ten seconds and check the MIL (page 6-13) and execute the troubleshooting according to the MIL.</li> <li>2. Inspect the CKP sensor.</li> <li>3. Inspect the fuel supply system (page 6-32).</li> <li>4. Inspect the injector.</li> <li>5. Inspect the IACV (page 6-56).</li> </ol>	<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 breather 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>• IACV air passage clogged</li> <li>• Faulty ignition system</li> </ul>
Engine stalls, hard to start, rough idling	<ol style="list-style-type: none"> <li>1. Inspect the engine idle speed (page 4-13).</li> <li>2. Inspect the fuel supply system (page 6-32).</li> <li>3. Inspect the ignition system (page 19-5).</li> </ol>	<ul style="list-style-type: none"> <li>• IACV air passage clogged</li> <li>• Restricted fuel feed hose</li> <li>• Contaminated/deteriorated fuel</li> <li>• Intake air leak</li> <li>• Restricted fuel tank breather hose</li> <li>• Faulty ignition system</li> <li>• Low cylinder compression</li> </ul>
Backfiring or misfiring during acceleration	<ol style="list-style-type: none"> <li>1. Inspect the ignition system (page 19-5).</li> </ol>	<ul style="list-style-type: none"> <li>• Faulty ignition system</li> </ul>
Poor performance (driveability) and poor fuel economy	<ol style="list-style-type: none"> <li>1. Inspect the fuel supply system (page 6-32).</li> <li>2. Inspect the injector.</li> <li>3. Inspect the ignition system (page 19-5).</li> <li>4. Inspect the cylinder compression (page 9-6).</li> </ol>	<ul style="list-style-type: none"> <li>• Air cleaner element contaminated</li> <li>• Pinched or clogged fuel feed hose</li> <li>• Faulty pressure regulator in the fuel pump unit</li> <li>• Faulty injector</li> <li>• Faulty ignition system</li> <li>• Low cylinder compression</li> </ul>
MIL stays ON, or MIL never comes ON at all (Engine operates normally)	<ol style="list-style-type: none"> <li>1. Troubleshoot the MIL circuit (page 6-31).</li> </ol>	<ul style="list-style-type: none"> <li>• Faulty MIL circuit</li> </ul>
MIL stays ON (Engine operates normally and No MIL code set)	<ol style="list-style-type: none"> <li>1. Inspect the DLC circuit (Brown wire) for short circuit.</li> </ol>	<ul style="list-style-type: none"> <li>• Short circuit in the DLC related wire</li> </ul>

## FUEL SYSTEM (Programmed Fuel Injection)

### MIL CODE INDEX

MIL	Detected Item	Causes	Symptoms	Refer to
1 and 8 Blinks 	Sensor unit power circuit malfunction	<ul style="list-style-type: none"> <li>Loose or poor contact on sensor unit 5P connector</li> <li>Open circuit in sensor unit power wire</li> </ul>	<ul style="list-style-type: none"> <li>Engine stalls, hard to start, rough idling</li> </ul>	6-21
1, 8, 9 all Blinks 	Sensor unit ground circuit malfunction	<ul style="list-style-type: none"> <li>Loose or poor contact on sensor unit 5P connector</li> <li>Open circuit in sensor unit ground wire</li> <li>Faulty sensor unit</li> </ul>	<ul style="list-style-type: none"> <li>Engine stalls, hard to start, rough idling</li> </ul>	6-21
1 Blink 	MAP sensor circuit malfunction	<ul style="list-style-type: none"> <li>Loose or poor contact on sensor unit 5P connector</li> <li>Open or short circuit in MAP sensor wire on sensor unit</li> <li>Faulty MAP sensor</li> </ul>	<ul style="list-style-type: none"> <li>Engine operates normally</li> <li>Fail-safe value: 760 mmHg/1,013 hPa</li> </ul>	6-22
7 Blinks 	ECT sensor circuit malfunction	<ul style="list-style-type: none"> <li>Loose or poor contact on ECT sensor 3P connector</li> <li>Open or short circuit in ECT sensor wire</li> <li>Faulty ECT sensor</li> </ul>	<ul style="list-style-type: none"> <li>Hard start at low temperature</li> <li>Fail-safe value: 100°C/212°F</li> </ul>	6-23
8 Blinks 	TP sensor circuit malfunction	<ul style="list-style-type: none"> <li>Loose or poor contact on sensor unit 5P connector</li> <li>Open or short circuit in TP sensor wire</li> <li>Faulty TP sensor</li> </ul>	<ul style="list-style-type: none"> <li>Poor engine response and performance when operating the throttle quickly</li> <li>Fail safe value: 0°</li> </ul>	6-24
9 Blinks 	IAT sensor circuit malfunction	<ul style="list-style-type: none"> <li>Loose or poor contact of sensor unit 5P connector</li> <li>Open or short circuit in IAT sensor wire</li> <li>Faulty IAT sensor</li> </ul>	<ul style="list-style-type: none"> <li>Engine operates normally</li> <li>Fail-safe value: 35°C/95°F</li> </ul>	6-25
12 Blinks 	Injector circuit malfunction	<ul style="list-style-type: none"> <li>Loose or poor contact on injector 2P connector</li> <li>Open circuit in injector wire</li> <li>Faulty injector</li> </ul>	<ul style="list-style-type: none"> <li>Engine does not start</li> </ul>	6-26
21 Blinks 	O <sub>2</sub> sensor circuit malfunction	<ul style="list-style-type: none"> <li>Loose or poor contact on O<sub>2</sub> sensor 2P connector and/or O<sub>2</sub> sensor cap</li> <li>Open or short circuit in O<sub>2</sub> sensor wire</li> <li>Faulty O<sub>2</sub> sensor</li> </ul>	<ul style="list-style-type: none"> <li>Engine operates normally</li> </ul>	6-28
29 Blinks 	IACV malfunction	<ul style="list-style-type: none"> <li>Loose or poor contact on IACV 4P connector</li> <li>Open or short circuit in IACV wire</li> <li>Faulty IACV</li> </ul>	<ul style="list-style-type: none"> <li>Engine stalls, hard to start, rough idling</li> </ul>	6-29
57 Blinks 	ECT sensor circuit malfunction	<ul style="list-style-type: none"> <li>Loose or poor contact on ECT sensor 3P connector</li> <li>ECT sensor or its circuit malfunction</li> <li>Engine coolant temperature too high                             <ul style="list-style-type: none"> <li>Engine coolant decrease</li> <li>Passage blocked in radiator, hoses or water jacket</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Vehicle speed is limited below 15 km/h (9 mph)</li> </ul>	6-23

## ECM POWER/GROUND CIRCUIT INSPECTION

### ENGINE DOES NOT START (MIL DOES NOT BLINK)

#### 1. Connector inspection

- Before starting the inspection, check for battery voltage.

Turn the ignition switch "OFF".

Disconnect the ECM 33P connector.  
Check for loose or poor contact on the ECM 33P connector.

Connect the ECM 33P connector.

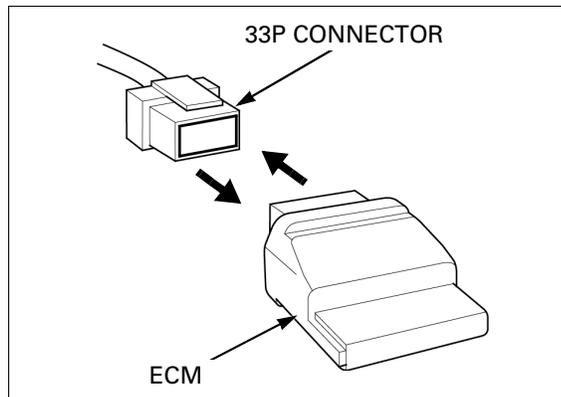
Turn the ignition switch "ON".

Crank the engine with the starter motor.

#### **Does the engine start?**

**YES** - Loose or poor contact on the ECM 33P connector.

**NO** - GO TO STEP 2.



#### 2. ECM Ground Line Inspection

Turn the ignition switch "OFF".

Disconnect the ECM 33P connector.

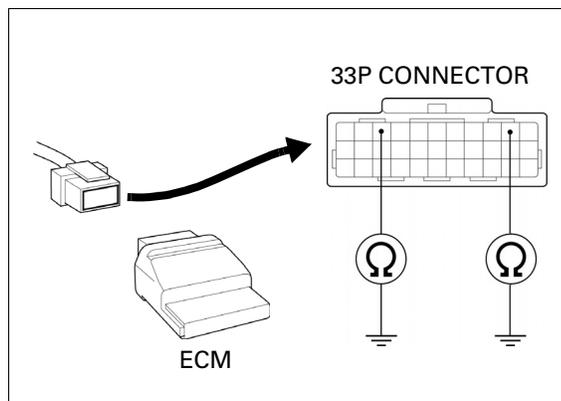
Check for continuity between the ECM 33P connector of the wire harness side and ground.

**CONNECTION: Green – Ground**  
**Green/Pink – Ground**

#### **Is there continuity?**

**NO** - • Open circuit in Green wire.  
• Open circuit in Green/Pink wire.

**YES** - GO TO STEP 3.



#### 3. ECM Power Line Inspection

Turn the ignition switch "ON".

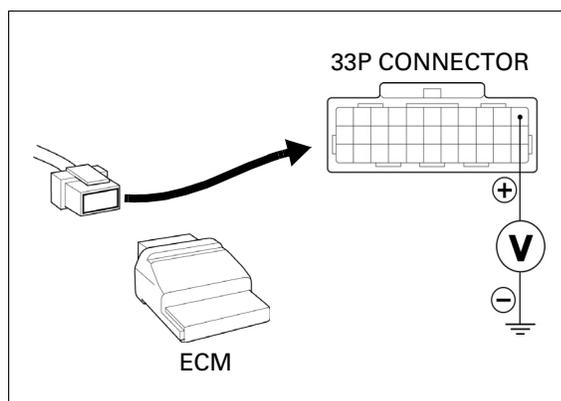
Measure the voltage between the ECM 33P connector of the wire harness side and ground.

**CONNECTION: Black/White (+) – Ground (-)**

#### **Does the battery voltage exist?**

**YES** - Replace the ECM with a new one, and recheck.

**NO** - GO TO STEP 4.



## FUEL SYSTEM (Programmed Fuel Injection)

### 4. Engine Stop Relay Line Inspection

Turn the ignition switch "OFF".

Remove the engine stop relay from the relay connector.

Short the relay connector terminals of the wire harness side with a jumper wire.

**CONNECTION: Black – Black/White**

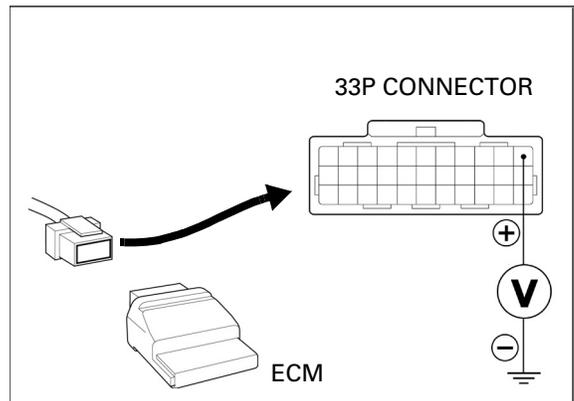
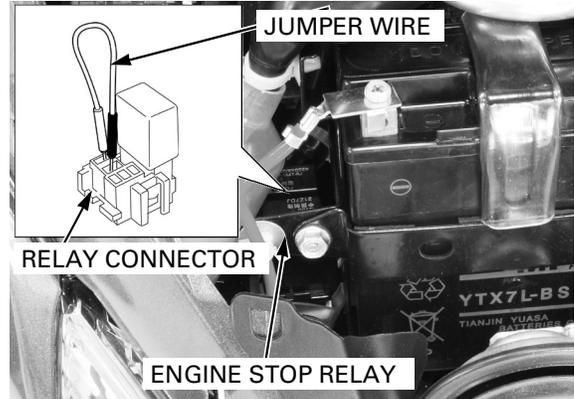
Turn the ignition switch "ON".

Measure the voltage between the ECM 33P connector of the wire harness side and ground.

**CONNECTION: Black/White (+) – Ground (-)**

**Does the battery voltage exist?**

- YES** –
- Inspect the engine stop relay coil line (page 6-63)
  - Inspect the engine stop relay continuity (page 6-63)
  - Inspect the bank angle sensor (page 6-52)
- NO** –
- Open circuit in Black wire between the fuse box and engine stop relay
  - Open circuit in Black/White wire between the engine stop relay and ECM



# SENSOR UNIT POWER/GROUND CIRCUIT INSPECTION

## MIL 1 and 8 BLINKS OR 1,8,9 ALL BLINKS (MAP, TP, IAT SENSOR)

### 1. Connector Inspection

Erase the self diagnosis memory data from the ECM (page 6-15).

Turn the ignition switch "OFF".

Disconnect the sensor unit 5P connector and ECM 33P connector.

Check for loose or poor contact on the sensor unit 5P connector and ECM 33P connector.

Connect the sensor unit 5P connector and ECM 33P connector.

Turn the ignition switch "ON".

Check if the MIL blinks.

#### Is the MIL blinking?

**NO** - Loose or poor contact on the sensor unit 5P connector and ECM 33P connector.

**YES** - GO TO STEP 2.

### 2. Sensor Unit Input Voltage Inspection

Turn the ignition switch "OFF".

Disconnect the sensor unit 5P connector.

Turn the ignition switch "ON".

Measure the voltage between the sensor unit 5P connector of the wire harness side.

**CONNECTION: Yellow/Orange (+) -  
Green/Orange (-)**

**STANDARD: 4.75 - 5.25 V**

#### Is the voltage within 4.75 - 5.25 V?

**YES** - Replace the sensor unit with a new one, and recheck.

**NO** - GO TO STEP 3.

### 3. Sensor Unit Circuit Continuity Inspection

Turn the ignition switch "OFF".

Disconnect the ECM 33P connector.

Check for continuity between the sensor unit 5P connector and the ECM 33P connector of the wire harness side.

CONNECTION	STANDARD
Yellow/Orange - Yellow/Orange	Continuity
Green/Orange - Green/Orange	

Check the continuity between the sensor unit 5P connector of the wire harness side and ground.

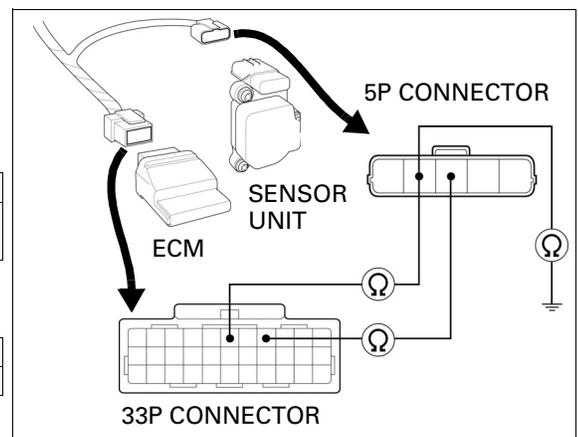
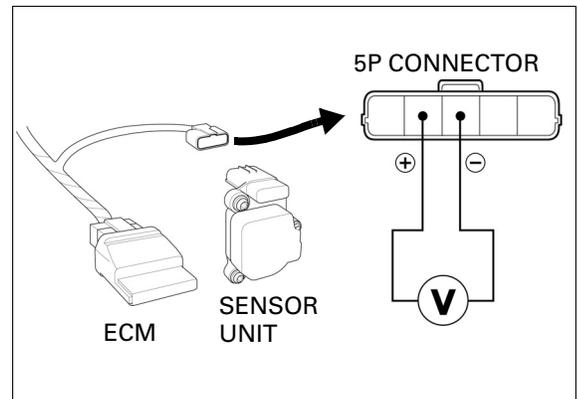
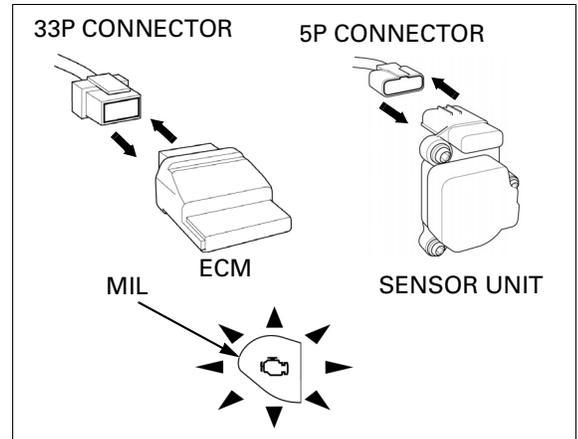
CONNECTION	STANDARD
Yellow/Orange - Ground	No continuity

#### Are the above inspections normal?

**YES** - Replace the ECM with a new one, and recheck.

**NO** -

- Open circuit in Yellow/Orange wire.
- Open circuit in Green/Orange wire.
- Short circuit in Yellow/Orange wire.



# MIL TROUBLESHOOTING

## MIL 1 BLINK (MAP SENSOR)

### 1. Recheck MIL Blinks

Erase the self diagnosis memory data from the ECM (page 6-15).

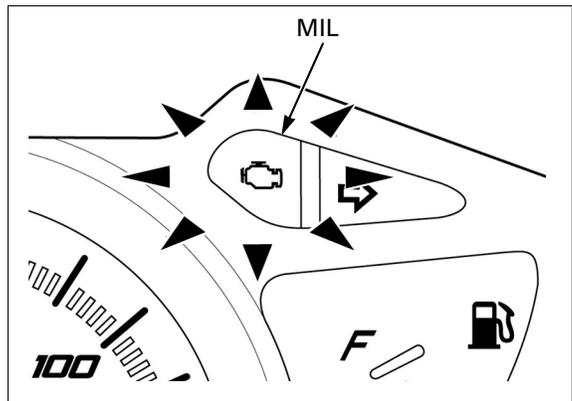
Turn the ignition switch "ON".

Check the MIL blinks.

**How many times does MIL blink?**

**1 and 8 or 1,8,9 all blinks** – GO TO SENSOR UNIT POWER/GROUND CIRCUIT INSPECTION (page 6-21).

**1 blink** – GO TO STEP 2.



### 2. MAP Sensor Input Voltage Inspection

Turn the ignition switch "OFF".

Disconnect the sensor unit 5P connector.

Turn the ignition switch "ON".

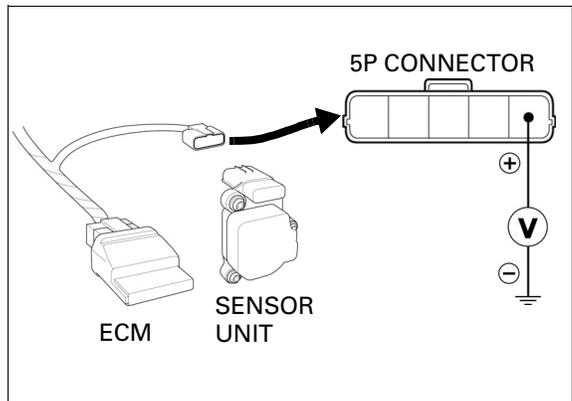
Measure the voltage between the sensor unit 5P connector of the wire harness side and ground.

**CONNECTION: Yellow/Red (+) – Ground (-)**  
**STANDARD: 3.8 – 5.25 V**

**Is the voltage within 3.8 – 5.25 V?**

**YES** – Replace the sensor unit with a new one, and recheck. (Faulty MAP sensor)

**NO** – GO TO STEP 3.



### 3. MAP Sensor Circuit Continuity Inspection

Turn the ignition switch "OFF".

Disconnect the ECM 33P connector.

Check for continuity between the sensor unit 5P connector and the ECM 33P connector of the wire harness side.

CONNECTION	STANDARD
Yellow/Red – Yellow/Red	Continuity

Check the continuity between the sensor unit 5P connector of the wire harness side and ground.

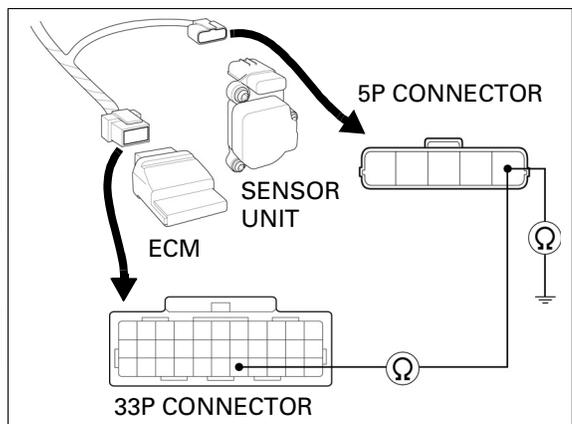
CONNECTION	STANDARD
Yellow/Red – Ground	No continuity

**Are the above inspections normal?**

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

**NO** –

- Open circuit in Yellow/Red wire.
- Short circuit in Yellow/Red wire.



**MIL 7 or 57 BLINKS (ECT SENSOR)**

**1. Connector Inspection**

Erase the self diagnosis memory data from the ECM (page 6-15).

Turn the ignition switch "OFF".

Disconnect the ECT sensor 3P connector.  
Check for loose or poor contact on the ECT sensor 3P connector.

Connect the ECT sensor 3P connectors, turn the ignition switch "ON" and check if the MIL blinks.

**Does the MIL blink 7 or 57 times?**

**NO** - Loose or poor contact on the ECT sensor 3P connector.

**YES** - GO TO STEP 2.

**2. ECT Sensor Resistance Inspection**

Turn the ignition switch "OFF".

Disconnect the ECT sensor 3P connector.

Measure the resistance between the ECT sensor terminals.

**CONNECTION: A - B**

**STANDARD: 2.3 - 2.6 kΩ (20°C/68°F)**

**Is the resistance within 2.3 - 2.6 kΩ (20°C/68°F)?**

**NO** - Inspect the ECT sensor (page 6-52).

**YES** - GO TO STEP 3.

**3. ECT Sensor Short Inspection**

Check the continuity between the ECT sensor terminal and ground.

**CONNECTION: A - Ground**

**Is there continuity?**

**YES** - Faulty ECT sensor.

**NO** - GO TO STEP 4.

**4. ECT Sensor Input Voltage Inspection**

Turn the ignition switch "ON".

Measure the voltage between the ECT sensor 3P connector of the wire harness side.

**CONNECTION: Pink/White (+) - Green/Orange (-)**

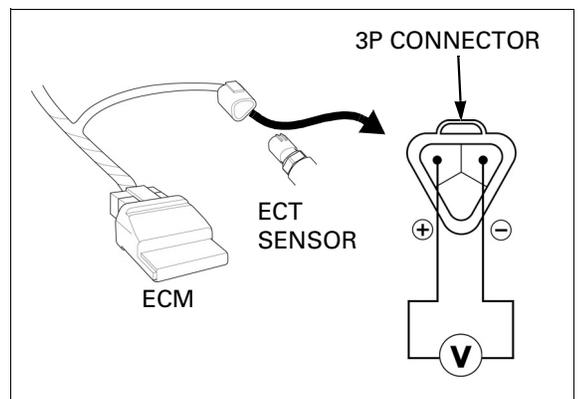
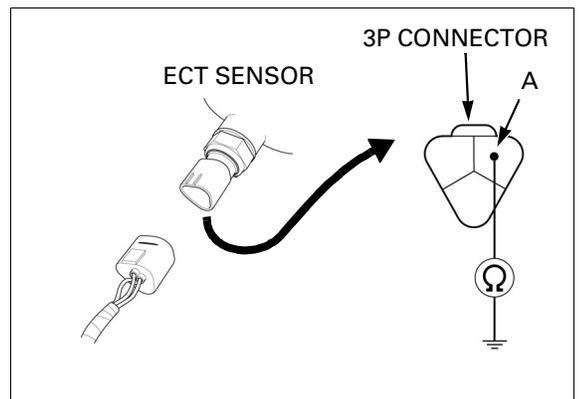
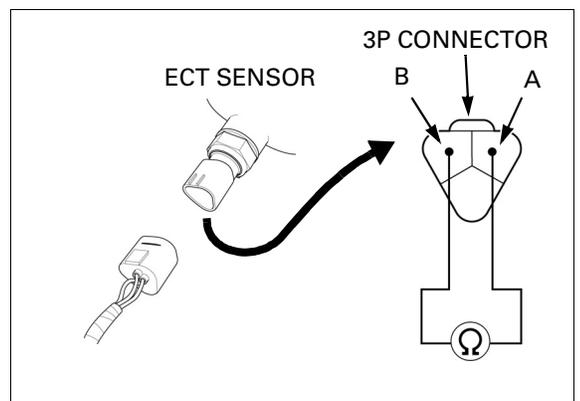
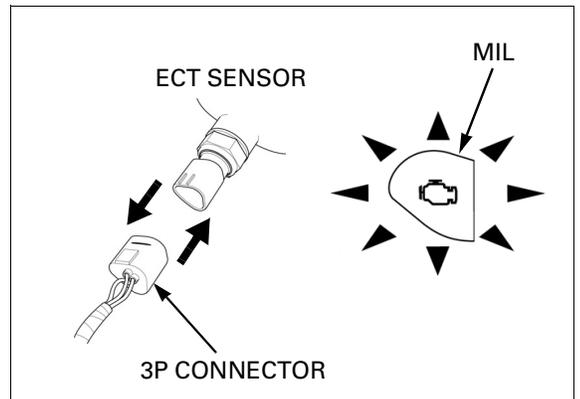
**STANDARD: 4.75 - 5.25 V**

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

**YES** -

- Loose or poor contact on the ECM connector.
- Intermittent failure.

**NO** - GO TO STEP 5.



## FUEL SYSTEM (Programmed Fuel Injection)

### 5. ECT Sensor Circuit Continuity Inspection

Turn the ignition switch "OFF".

Disconnect the ECM 33P connector.

Check for continuities between the ECT sensor 3P connector and the ECM 33P connector of the wire harness side.

CONNECTION	STANDARD
Pink/White – Pink/White	Continuity
Green/Orange – Green/Orange	

Check the continuity between the ECT sensor 3P connector of the wire harness side and ground.

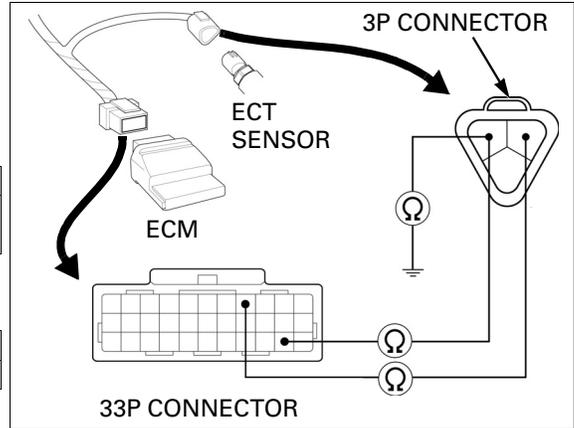
CONNECTION	STANDARD
Pink/White – Ground	No continuity

**Are the above inspections normal?**

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

**NO** –

- Open circuit in Pink/White wire.
- Open circuit in Green/Orange wire.
- Short circuit in Pink/White wire.



### MIL 8 BLINKS (TP SENSOR)

#### 1. Recheck MIL Blinks

Erase the self diagnosis memory data from the ECM (page 6-15).

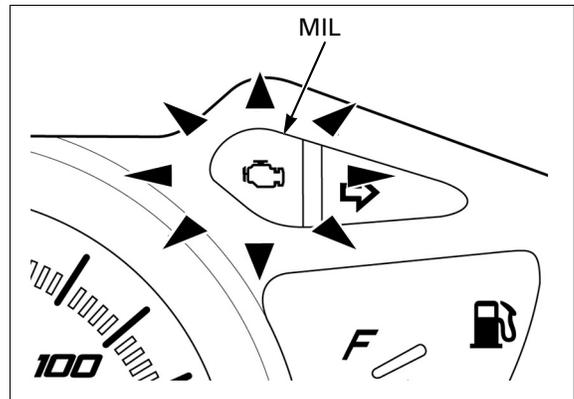
Turn the ignition switch "ON".

Check the MIL blinks.

**How many times does MIL blink?**

**1 and 8 or 1,8,9 all blinks** – GO TO SENSOR UNIT POWER/GROUND CIRCUIT INSPECTION (page 6-21).

**8 blinks** – GO TO STEP 2.



#### 2. TP Sensor Output Voltage Line Inspection

Turn the ignition switch "OFF".

Disconnect the sensor unit 5P connector.

Turn the ignition switch "ON".

Measure the voltage between the sensor unit 5P connector of the wire harness side and ground.

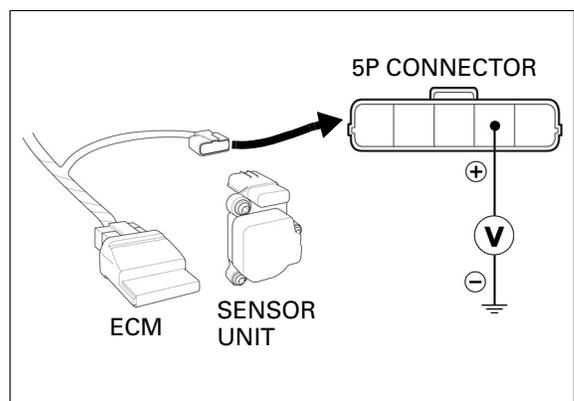
**CONNECTION: White/Red (+) – Ground (-)**

**STANDARD: 20 – 220 mV**

**Is the voltage within 20 – 220 mV?**

**YES** – Replace the sensor unit with a new one, and recheck. (Faulty TP sensor)

**NO** – GO TO STEP 3.



## 3. TP Sensor Circuit Continuity Inspection

Turn the ignition switch "OFF".

Disconnect the ECM 33P connector.

Check for continuity between the sensor unit 5P connector and the ECM 33P connector of the wire harness side.

CONNECTION	STANDARD
White/Red – White/Red	Continuity

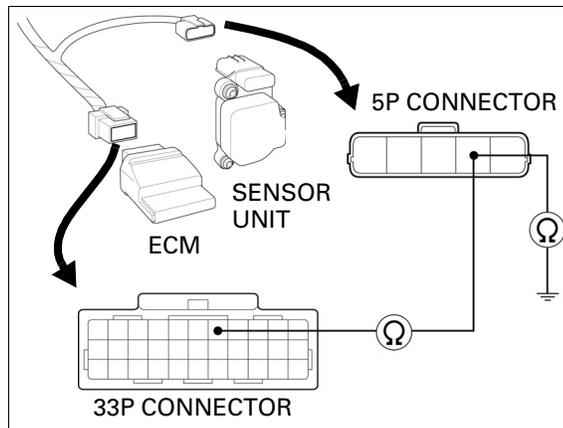
Check the continuity between the sensor unit 5P connector of the wire harness side and ground.

CONNECTION	STANDARD
White/Red – Ground	No continuity

*Are the above inspections normal?*

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

**NO** – • Open circuit in White/Red wire.  
• Short circuit in White/Red wire.



## MIL 9 BLINKS (IAT SENSOR)

### 1. Recheck MIL Blinks

Erase the self diagnosis memory data from the ECM (page 6-15).

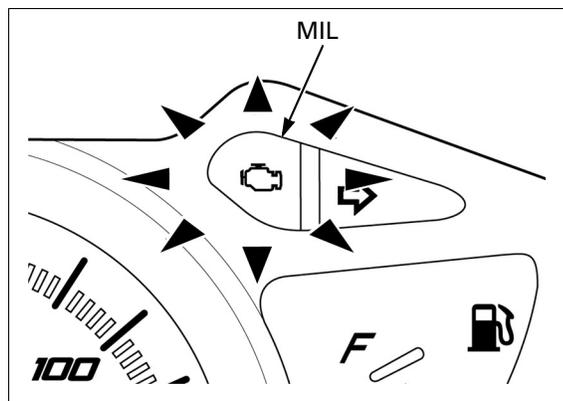
Turn the ignition switch "ON".

Check the MIL blinks.

*How many times does MIL blink?*

**1 and 8 or 1,8,9 all blinks** – GO TO SENSOR UNIT POWER/GROUND CIRCUIT INSPECTION (page 6-21).

**9 blinks** – GO TO STEP 2.



### 2. IAT Sensor Resistance Inspection

Turn the ignition switch "OFF".

Disconnect the sensor unit 5P connector.

Measure the resistance between the sensor unit 5P connector terminals.

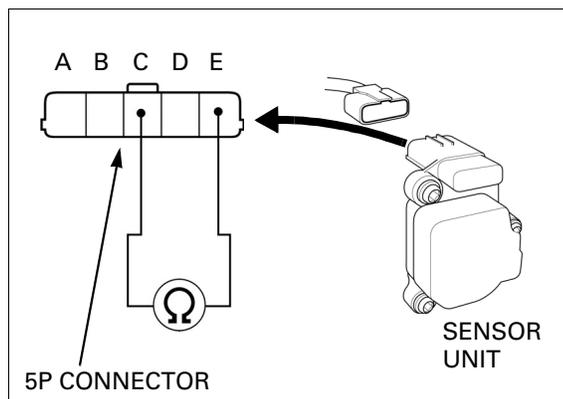
**CONNECTION: C – E**

**STANDARD: 1 – 4 kΩ (20°C/68°F)**

*Is the resistance within 1 – 4 kΩ (20°C/68°F)?*

**NO** – Replace the sensor unit with a new one, and recheck. (Faulty IAT sensor)

**YES** – GO TO STEP 3.



## FUEL SYSTEM (Programmed Fuel Injection)

### 3. IAT Sensor Input Voltage Inspection

Turn the ignition switch "ON".

Measure the voltage between the sensor unit 5P connector of the wire harness side and ground.

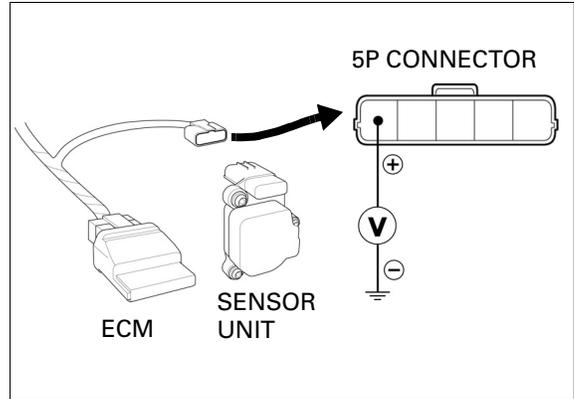
**CONNECTION: White/Blue (+) – Ground (-)**

**STANDARD: 4.75 – 5.25 V**

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

**YES** – • Loose or poor contact on the ECM connector.  
• Intermittent failure.

**NO** – GO TO STEP 4.



### 4. IAT Sensor Circuit Continuity Inspection

Turn the ignition switch "OFF".

Disconnect the ECM 33P connector.

Check for continuity between the sensor unit 5P connector and the ECM 33P connector of the wire harness side.

CONNECTION	STANDARD
White/Blue – White/Blue	Continuity

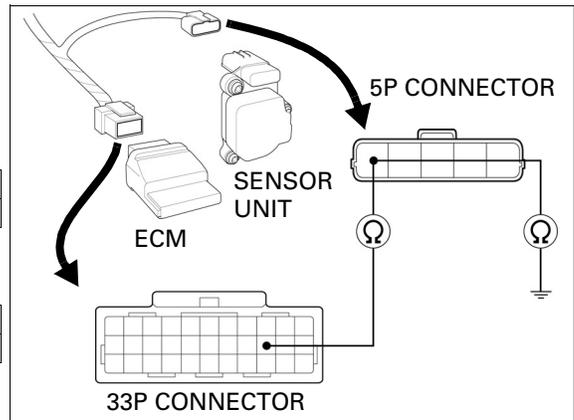
Check the continuity between the sensor unit 5P connector of the wire harness side and ground.

CONNECTION	STANDARD
White/Blue – Ground	No continuity

**Are the above inspections normal?**

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

**NO** – • Open circuit in White/Blue wire.  
• Short circuit in White/Blue wire.



## MIL 12 BLINKS (INJECTOR)

### 1. Connector Inspection

Erase the self diagnosis memory data from the ECM (page 6-15).

Turn the ignition switch "OFF".

Disconnect the injector 2P connector.

Check for loose or poor contact on the injector 2P connector.

Connect the injector 2P connector.

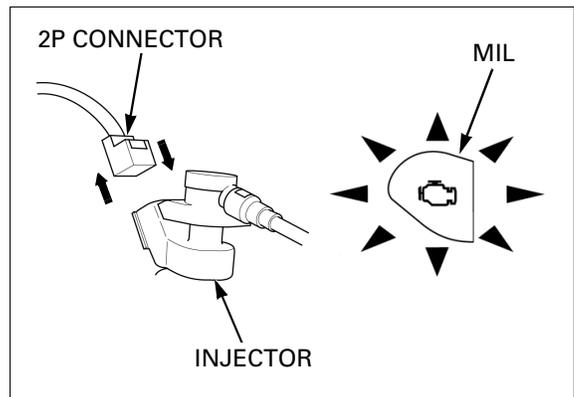
Turn the ignition switch "ON".

Check if the MIL blinks.

**Does the MIL blink 12 times?**

**NO** – Loose or poor contact on the injector 2P connector.

**YES** – GO TO STEP 2.



## 2. Injector Input Voltage Inspection

Turn the ignition switch "OFF".

Disconnect the injector 2P connector.

Turn the ignition switch "ON".

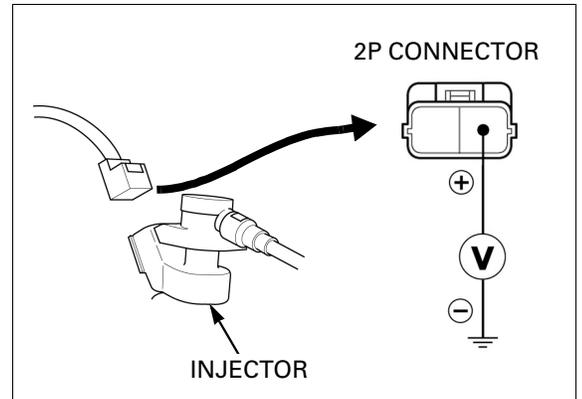
Measure the voltage between the injector connector of the wire harness side and ground.

**CONNECTION: Black/White (+) – Ground (-)**

**Does the battery voltage exist?**

**NO** – Open or poor contact in Black/White wire.

**YES** – GO TO STEP 3.



## 3. Injector Signal Line Circuit Inspection

Turn the ignition switch "OFF".

Disconnect the ECM 33P connector.

Check for continuity between the injector 2P connector and the ECM 33P connector of the wire harness side.

CONNECTION	STANDARD
Pink/Blue – Pink/Blue	Continuity

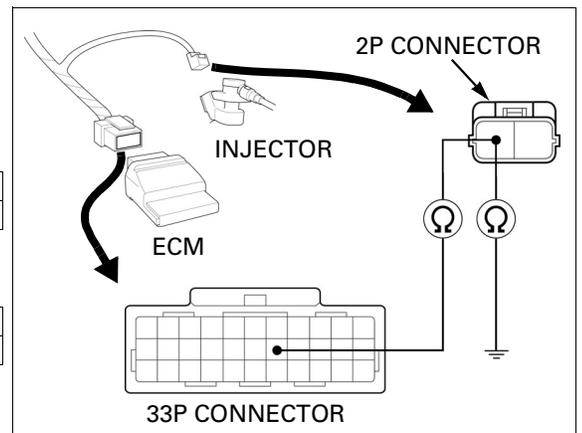
Check the continuity between the injector 2P connector of the wire harness side and ground.

CONNECTION	STANDARD
Pink/Blue – Ground	No continuity

**Are the above inspections normal?**

**NO** – • Open circuit in Pink/Blue wire.  
• Short circuit in Pink/Blue wire.

**YES** – GO TO STEP 4.



## 4. Injector Resistance Inspection

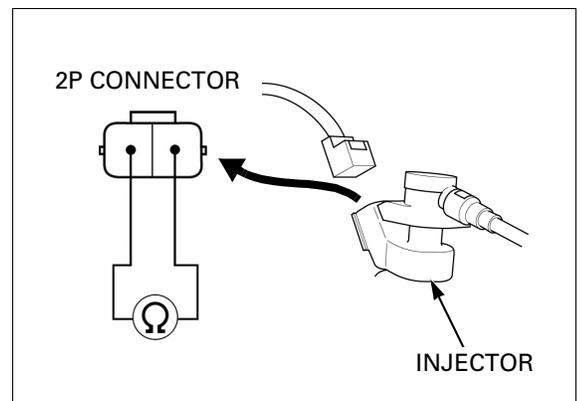
Measure the resistance of the injector 2P connector terminals.

**STANDARD: 9 – 12  $\Omega$  (20°C/68°F)**

**Is the resistance within 9 – 12  $\Omega$  (20°C/68°F)?**

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

**NO** – Faulty injector.



## FUEL SYSTEM (Programmed Fuel Injection)

### MIL 21 BLINKS (O<sub>2</sub> SENSOR)

- Before starting the inspection, check for loose or poor contact on the O<sub>2</sub> sensor cap connector and recheck the MIL.

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

Turn the ignition switch OFF.

Disconnect the ECM 33P connector and O<sub>2</sub> sensor 2P connector.

Check the continuity between the ECM 33P connector of the wire harness side and O<sub>2</sub> sensor 2P connector of the wire harness side.

**Connection: Black/Orange – Black/Orange**  
**STANDARD: Continuity**

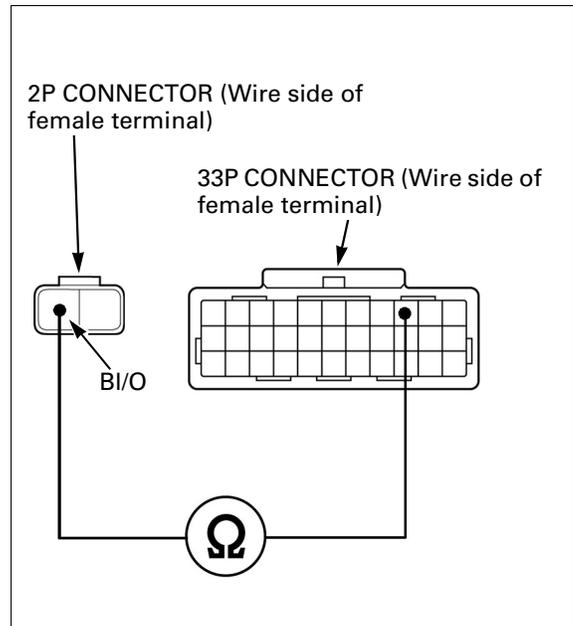
**TOOL:**

**Test probe** 07ZAJ-RDJA110

*Is there continuity?*

**YES** – GO TO STEP 2.

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



#### 2. O<sub>2</sub> Sensor Line Short Circuit Inspection

Disconnect the ECM 33P connector.

Check for continuity between the ECM 33P connector of the wire harness side and ground.

**Connection: Black/orange – Ground**  
**STANDARD: No continuity**

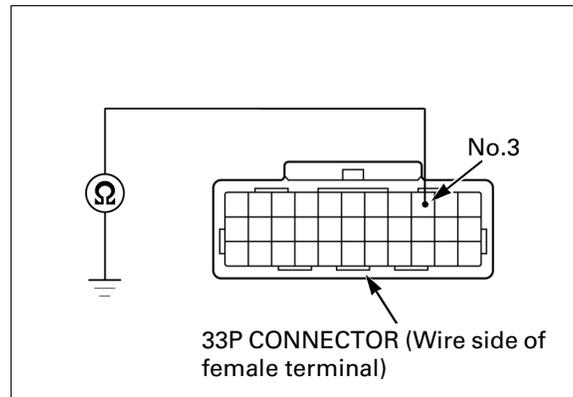
**TOOL:**

**Test probe** 07ZAJ-RDJA110

*Is there continuity?*

**YES** – Short circuit in the Black/Orange wire

**NO** – GO TO STEP 3.



#### 3. O<sub>2</sub> Sensor Inspection

Replace the O<sub>2</sub> sensor/O<sub>2</sub> sensor wire with known good one (page 6-54).

Reset the ECM (page 6-15).

Start the engine and warm the engine up to coolant temperature is 80 °C (176 °C).

Test-ride the scooter and check the MIL blinks.

*Does the MIL blink 21 times?*

**YES** – Replace the ECM with new one and recheck

**NO** – Faulty original O<sub>2</sub> sensor/O<sub>2</sub> sensor wire

**MIL 29 BLINKS (IACV)**

**1. Connector inspection**

Erase the self diagnosis memory data from the ECM (page 6-15).

Turn the ignition switch "OFF".

Disconnect the IACV 4P connector.  
Check for loose or poor contact on the IACV 4P connector.

Connect the IACV 4P connector.  
Turn the ignition switch "ON".  
Check if the MIL blinks.

**Does the MIL blink 29 times?**

**NO** - Loose or poor contact on the IACV 4P connector.

**YES** - GO TO STEP 2.

**2. IACV Resistance Inspection**

Turn the ignition switch "OFF".

Disconnect the IACV 4P connector.

Measure the resistance between the IACV 4P connector terminals.

**CONNECTION: A - D**

**B - C**

**STANDARD: 110 - 150  $\Omega$  (20°C/68°F)**

**Is the resistance within 110 - 150  $\Omega$  (20°C/68°F)?**

**NO** - Replace the IACV with a new one, and recheck.

**YES** - GO TO STEP 3.

**3. IACV Short Inspection**

Check for continuities between the IACV 4P connector terminals.

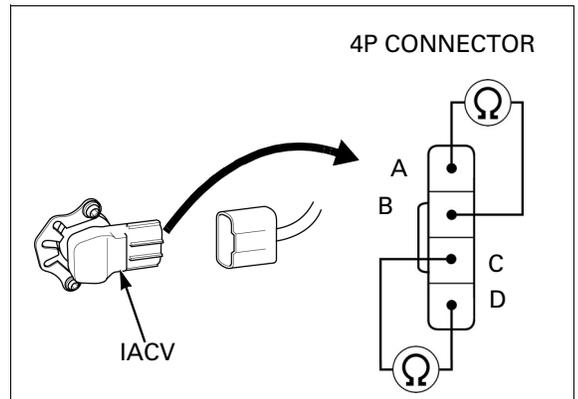
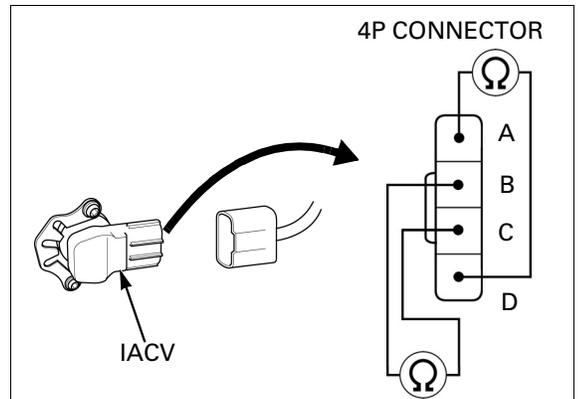
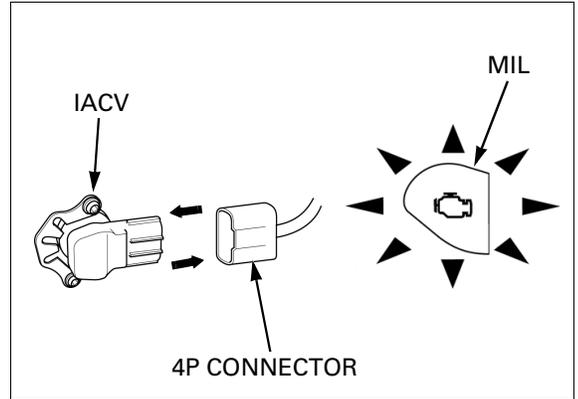
**Connection: A - B**

**C - D**

**Is there continuity?**

**YES** - Faulty IACV.

**NO** - GO TO STEP 4.



## FUEL SYSTEM (Programmed Fuel Injection)

### 4. IACV Input Voltage Inspection

Turn the ignition switch "ON".

Measure the voltage between the IACV 4P connector of the wire harness side and ground.

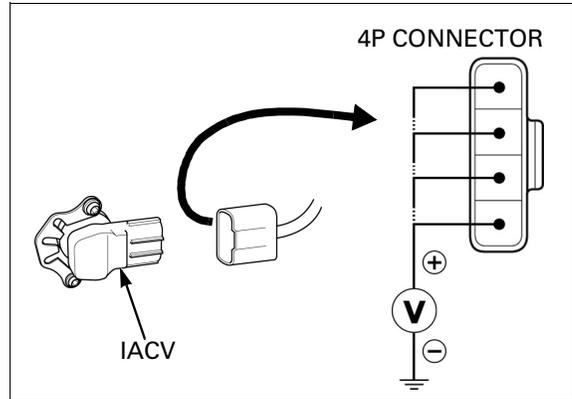
**CONNECTION:** Light green/Red (+) – Ground (-)  
 Gray/Red (+) – Ground (-)  
 Brown/Red (+) – Ground (-)  
 Black/Red (+) – Ground (-)

**STANDARD:** 1.8 – 2.2 V

*Is the voltage within 1.8 – 2.2 V?*

**YES** – • Loose or poor contact on the ECM connectors.  
 • Intermittent failure.

**NO** – GO TO STEP 5.



### 5. IACV Circuit Continuity Inspection

Turn the ignition switch "OFF".

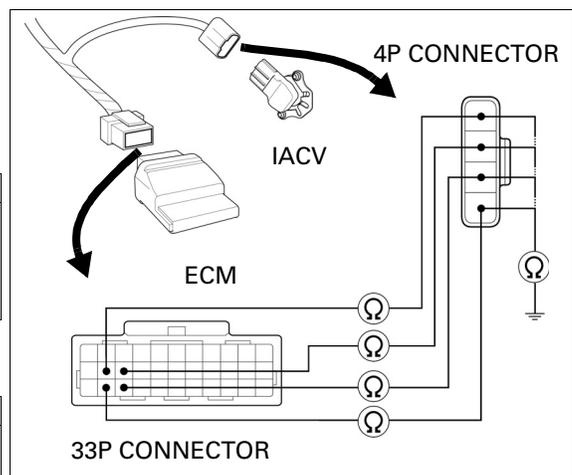
Disconnect the ECM 33P connector.

Check for continuities between the IACV 4P connector and the ECM 33P connector of the wire harness side.

CONNECTION	STANDARD
Light green/Red – Light green/Red	Continuity
Brown/Red – Brown/Red	
Black/Red – Black/Red	
Gray/Red – Gray/Red	

Check the continuities between the IACV 4P connector of the wire harness side and ground.

CONNECTION	STANDARD
Light green/Red – Ground	No continuity
Brown/Red – Ground	
Black/Red – Ground	
Gray/Red – Ground	



*Are the above inspections normal?*

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

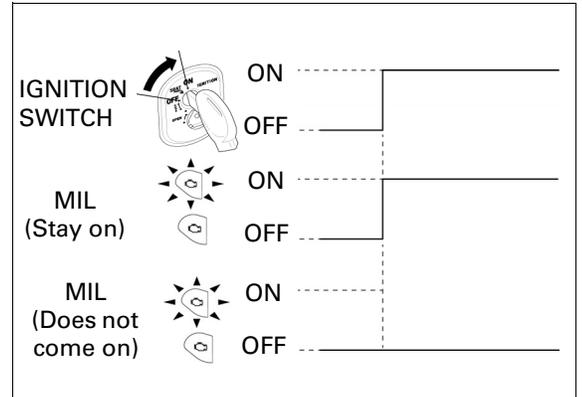
**NO** – • Open or short circuit in Light green/Red wire.  
 • Open or short circuit in Gray/Red wire.  
 • Open or short circuit in Brown/Red wire.  
 • Open or short circuit in Black/Red wire.

## MIL CIRCUIT INSPECTION

If the engine can be started but,

- when the ignition switch "ON", the MIL stays on (does not go off within a few seconds)
- when the ignition switch is "ON", the MIL does not come on

If the symptom above comes out, check as follows:



### 1. Speedometer input voltage Inspection

Remove the front handlebar cover (page 3-6).

Turn the ignition switch "OFF".

Disconnect the speedometer Black/Brown wire connector.

Turn the ignition switch "ON".

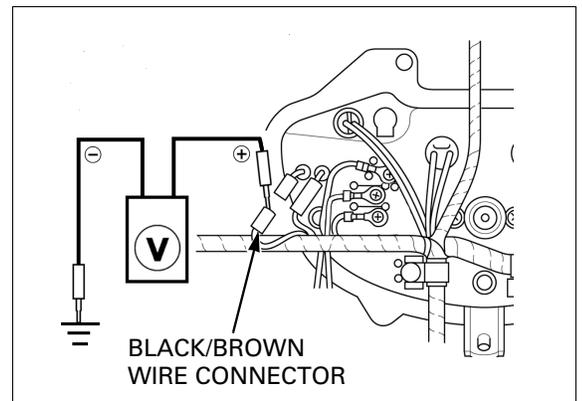
Measure the voltage between the speedometer wire connector of the wire harness side and ground.

**CONNECTION: Black/Brown (+) – Ground (-)**

**Does the battery voltage exist?**

- NO** –
- Open or short circuit in Black/Brown wire.
  - Faulty main relay (page 21-15).

**YES** – GO TO STEP 2.



### 2. Connector Short Inspection

Turn the ignition switch "OFF".

Remove the front center cover (page 3-4).

Connect the speedometer Black/Brown wire connector.

Disconnect the ECM 33P connector.

Connect the Black/Brown wire.

Ground the ECM 33P connector terminal of the wire harness side connector with a jumper wire.

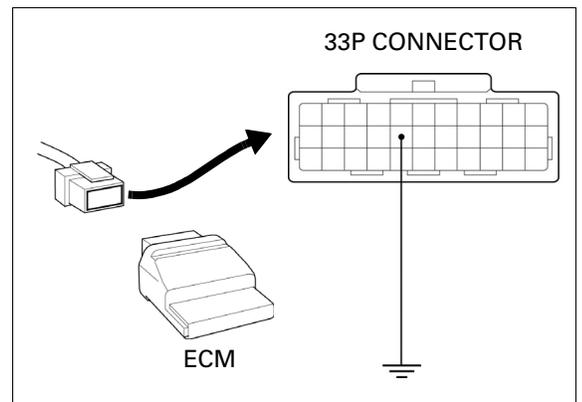
**CONNECTION: Blue/Yellow – Ground**

Turn the ignition switch "ON", the MIL should come on.

**Does the MIL come on?**

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

- NO** – Check for open circuit in the Blue/Yellow wire between the speedometer and ECM.  
If the wire is OK, replace the speedometer.

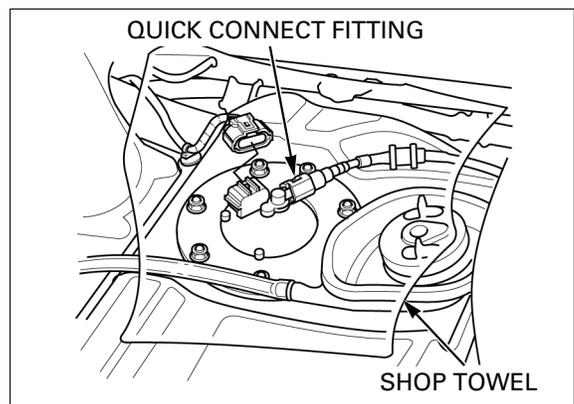
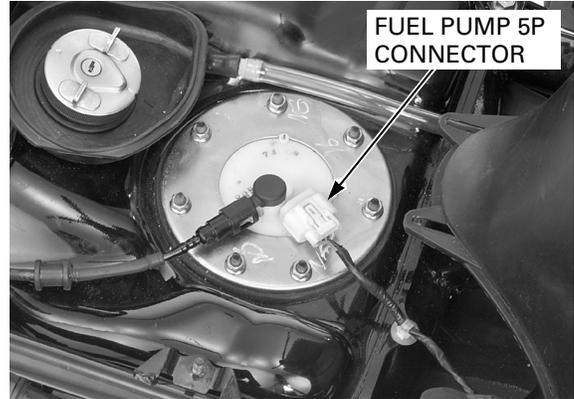


## FUEL SYSTEM (Programmed Fuel Injection)

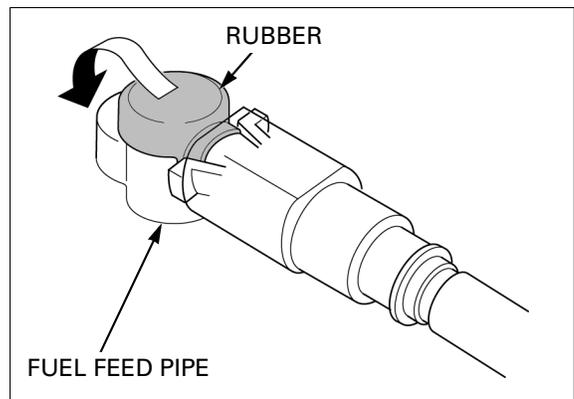
### FUEL LINE INSPECTION

#### FUEL PRESSURE RELIEVING/QUICK CONNECT FITTING REMOVAL

- Before disconnecting fuel hose, relieve pressure from the system by starting the engine with the fuel pump connector disconnected.
1. Turn the ignition switch "OFF".  
Remove the following:
    - Floor panel (page 3-11)
    - Floor panel side frame plate (page 6-39)Disconnect the fuel pump 5P connector.
  2. Turn the ignition switch "ON".
  3. Start the engine, and let it idle until the engine stalls.
  4. Turn the ignition switch "OFF".
  5. Check the fuel quick connect fitting for dirt, and clean if necessary.  
Place a shop towel over the quick connect fitting.



6. Pull the rubber off the fuel feed pipe.

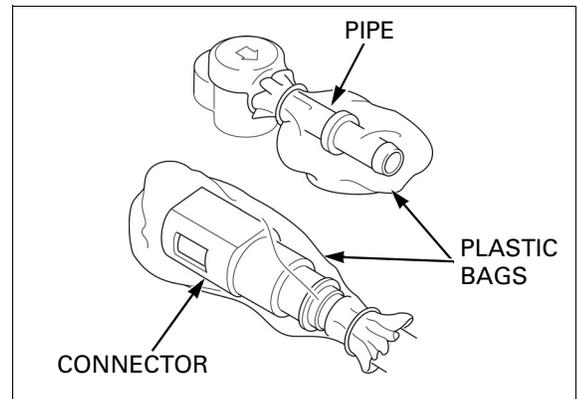
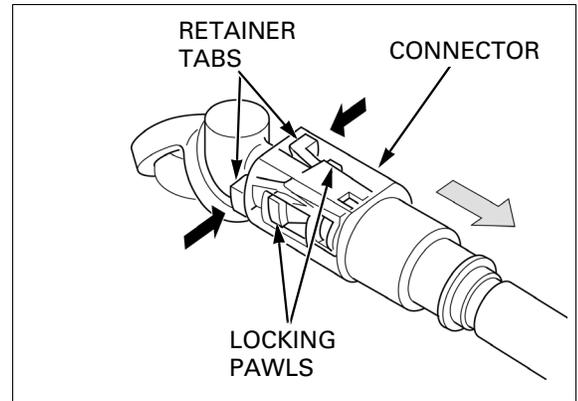


## FUEL SYSTEM (Programmed Fuel Injection)

7. Hold the connector with one hand and squeeze the retainer tabs with the other hand and release them from the locking pawls. Pull the connector off.

- Prevent the remaining fuel in the fuel hose from flowing out using a shop towel.
- Be careful not to damage the hose or other parts.
- Retainer tabs can be released by hand. Do not use tools such as screwdrivers or pliers as they could damage the tabs and joint.
- If the connector does not move, keep the retainer tabs pressed down, and alternately pull and push the connector until it comes off easily.

8. To prevent damage and keep foreign matter out, cover the disconnected connector and pipe end with the plastic bags.



### QUICK CONNECT FITTING INSTALLATION

- Always replace the retainer of the quick connect fitting when the fuel hose is disconnected.
- If any retainer needs replacing, use the same manufacturer's retainer as the ones being removed (The several manufacturers feature different retainer specifications).

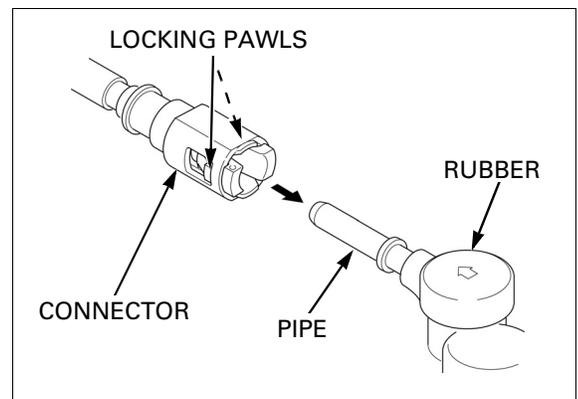
1. Clean around the pipe and set the rubber correctly.

*Do not bend or twist fuel hose.*

Align the quick connect fitting with the pipe and align the new retainer locking pawls with the connector grooves.

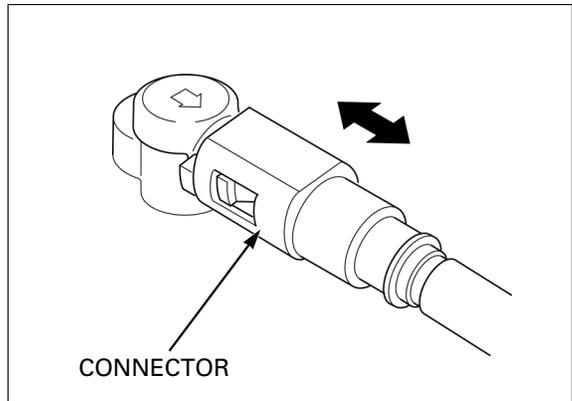
Then press the quick connect fitting onto the pipe until both retainer pawls lock with a "CLICK".

If it is hard to connect, put a small amount of engine oil on the pipe end.

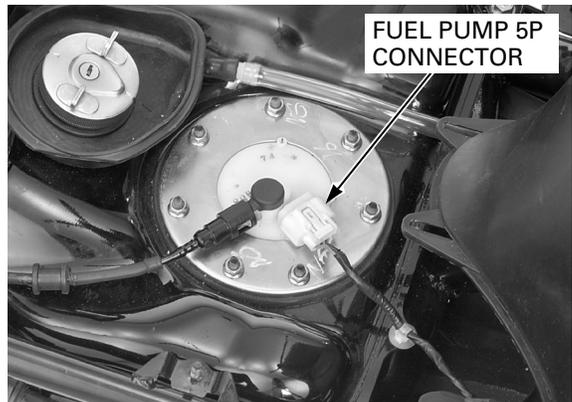


## FUEL SYSTEM (Programmed Fuel Injection)

2. Make sure the connection is secure and that the pawls are firmly locked into place; check visually and by pulling the connector.



3. Connect the fuel pump 5P connector.

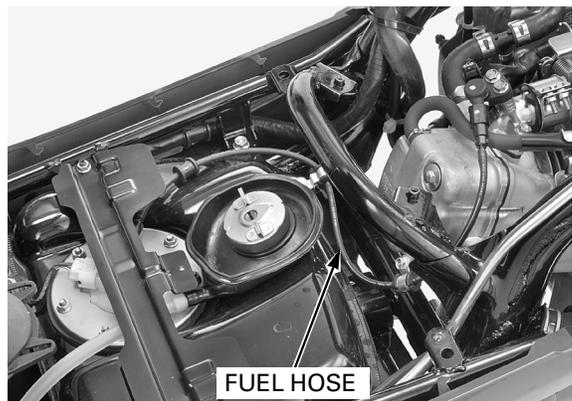


*Do not start the engine.*

4. Turn the ignition switch "ON".  
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.

Install the following:

- Floor panel side frame plate (page 6-39)
- Floor panel (page 3-11)



### FUEL PRESSURE TEST

Relieve the fuel pressure and disconnect the quick connect fitting (page 6-32).

Attach the fuel pressure gauge set and pressure gauge.

#### TOOLS:

Fuel pressure gauge	07406-0040004
Pressure gauge manifold	07ZAJ-S5A0111
Pressure gauge hose joint	07ZAJ-S5A0150
Fuel attachment hose 6-9	07ZAJ-S5A0130
Fuel attachment hose 9-9	07ZAJ-S5A0120

Temporarily connect the positive cable and negative cable to the battery.

Start the engine and let it idle.

Read the fuel pressure.

**STANDARD: 294 kPa (3.0 kgf/cm<sup>2</sup>, 43 psi)**

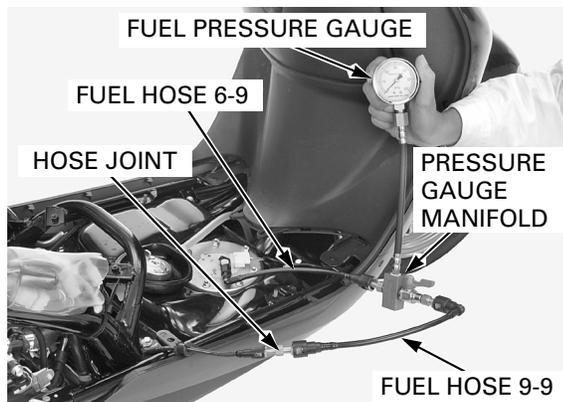
If the fuel pressure is higher than specified, replace the fuel pump assembly.

If the fuel pressure is lower than specified, inspect the following:

- Fuel line leaking
- Fuel pump (page 6-36)
- Clogged fuel filter (Assembly of the fuel pump)

After inspection, remove the fuel pressure gauge and pressure gauge set from the fuel pump.

Connect the quick connect fitting (page 6-33).



### FUEL FLOW INSPECTION

Relieve the fuel pressure and disconnect the quick connect fitting (page 6-32).

Turn the ignition switch "OFF".

Connect the fuel attachment hose to the fuel pump joint.

#### TOOL:

Fuel attachment hose 6-9	07ZAJ-S5A0130
--------------------------	---------------

*Wipe off spilled out gasoline.*

Place the end of the hose into an approved gasoline container.

Turn the ignition switch "ON" and measure the amount of fuel flow.

- The fuel pump operates for 2 seconds. Repeat 5 times to meet the total measuring time.

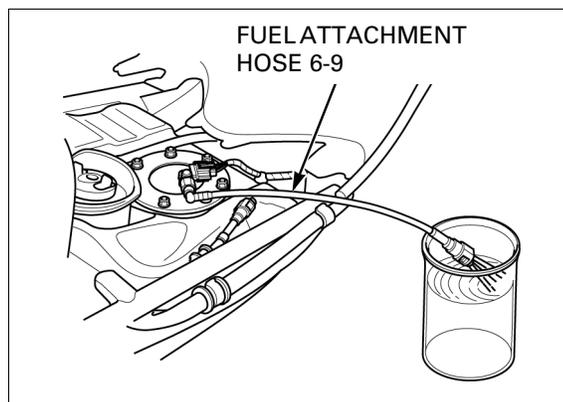
#### Amount of fuel pump flow:

**98 cm<sup>3</sup> (3.3 US oz, 3.5 Imp oz) minimum  
/10 seconds at 12 V**

If the fuel flow is less than specified, inspect the following:

- Fuel pump (page 6-36).
- Clogged fuel filter (Assembly of the fuel pump)

Connect the quick connect fitting (page 6-33).



## FUEL SYSTEM (Programmed Fuel Injection)

### FUEL PUMP

#### SYSTEM INSPECTION

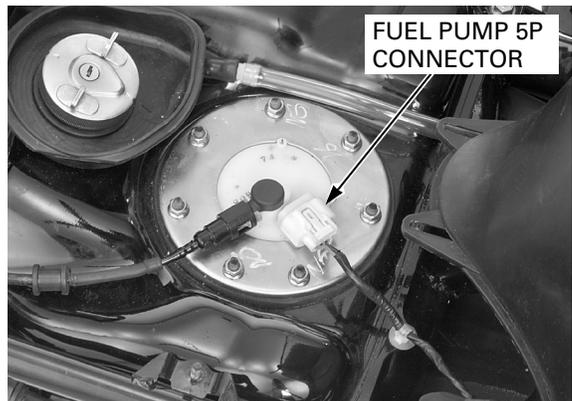
Turn the ignition switch "ON" and confirm that the fuel pump operates for a few seconds. If the fuel pump does not operate, inspect as follows:

Turn the ignition switch "OFF".

Remove the following:

- Floor panel (page 3-11)
- Floor panel side frame plate (page 6-39)

Disconnect the fuel pump 5P connector.



Turn the ignition switch "ON" and measure the voltage between the terminals of the wire harness side.

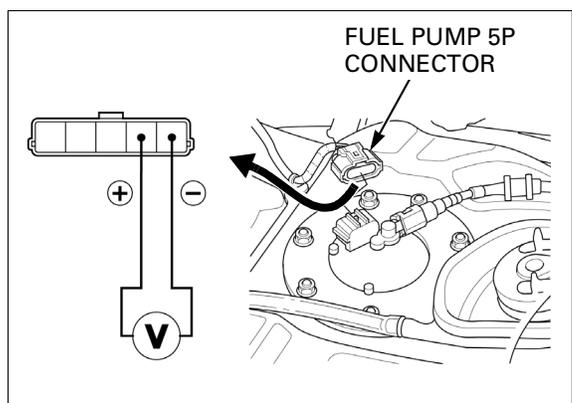
**CONNECTION: Brown (+) – Green (-)**

There should be battery voltage for a few seconds.

If there is battery voltage, replace the fuel pump.

If there is no battery voltage, inspect the following:

- Open circuit in Green wire between the fuel pump and ground
- Fuel pump relay (page 6-63)



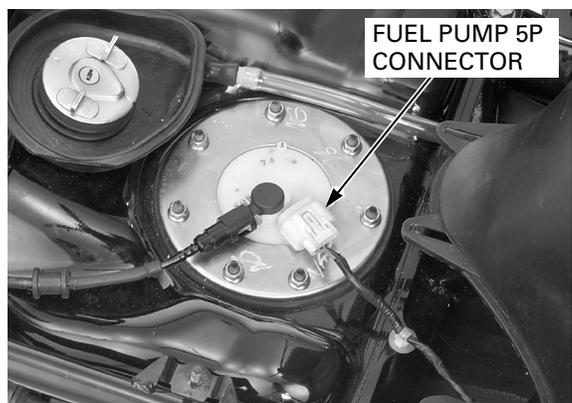
#### REMOVAL

- It is impossible to disassemble the fuel pump after removing it.

Relieve the fuel pressure and disconnect the quick connect fitting (page 6-32).

Clean around the fuel pump.

Disconnect the fuel pump 5P connector.

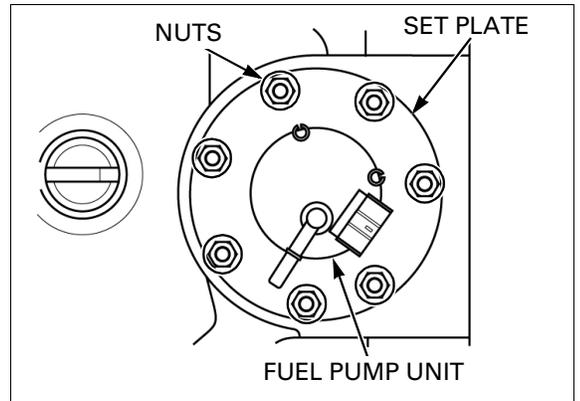


## FUEL SYSTEM (Programmed Fuel Injection)

Remove the fuel pump mounting nuts.

*Be careful not to damage the fuel level sensor float arm and pipe.*

Remove the set plate and fuel pump unit from the fuel tank.



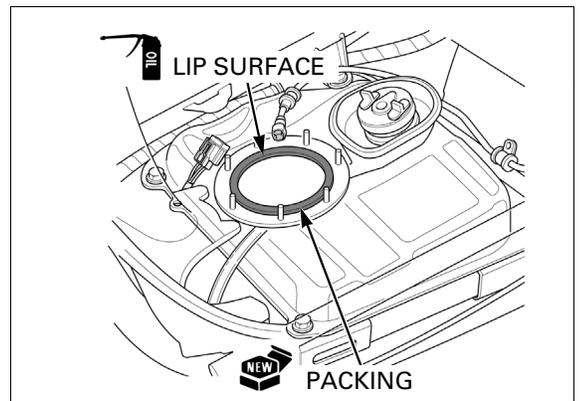
Remove the packing from the fuel pump unit.



### INSTALLATION

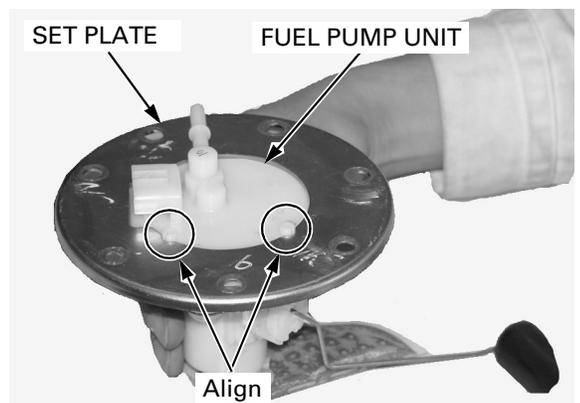
*Always replace packing with a new one.*

Place a new packing onto the fuel tank and apply more than 1.0 g of engine oil to lip surface of the packing.



Install the set plate by aligning its holes with the tabs on the fuel pump unit.

- Be careful not to damage the pipe end when installing the set plate.

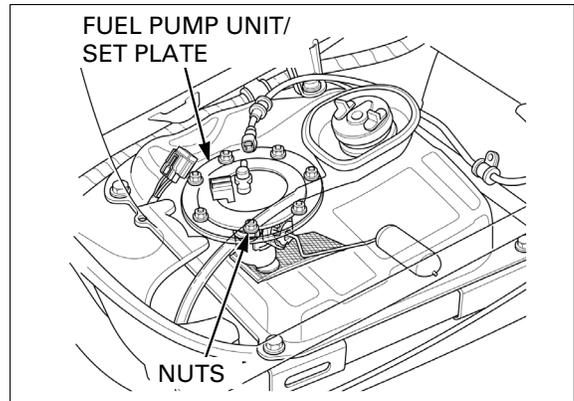


## FUEL SYSTEM (Programmed Fuel Injection)

Install the fuel pump unit/set plate to the fuel tank.

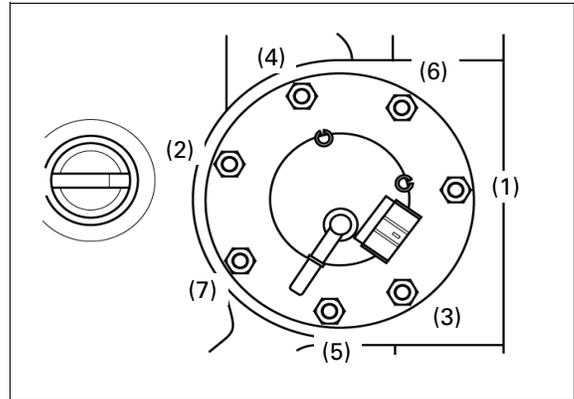
- Be careful not to damage the fuel level sensor when installing the fuel pump unit.
- Be careful not to allow the dirt and debris between the fuel pump and packing.

Install the fuel pump mounting nuts.



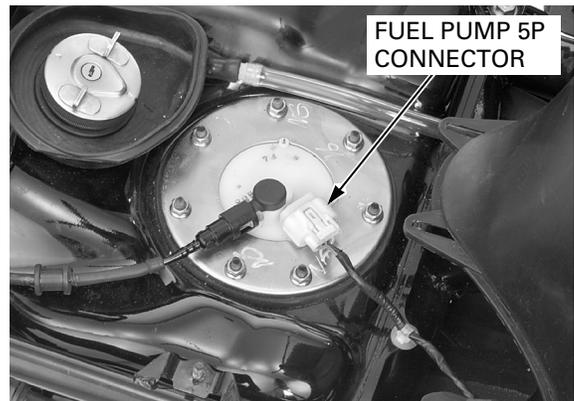
Tighten the fuel pump mounting nuts in the sequence shown.

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



Connect the fuel pump 5P connector.

Connect the quick connect fitting (page 6-33).

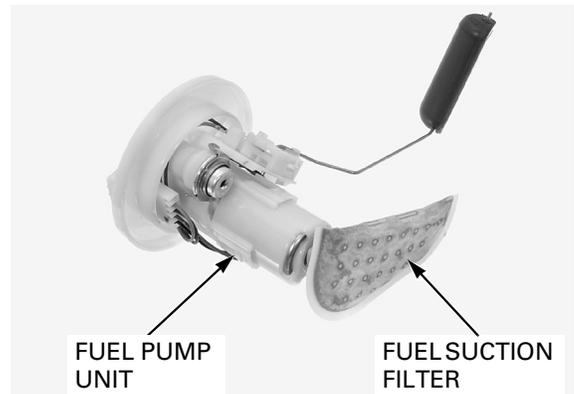


### INSPECTION

Check for fuel pump unit for wear or damage.

Check for fuel suction filter for wear or damage.

Replace the fuel pump unit if necessary.



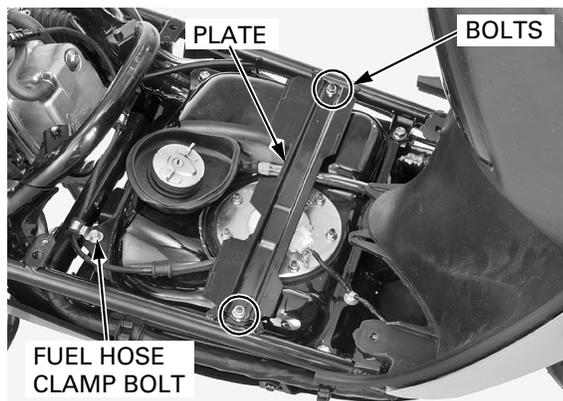
## FUEL TANK

### REMOVAL/INSTALLATION

Remove the floor panel (page 3-11).

Remove the bolts and floor panel side frame plate.

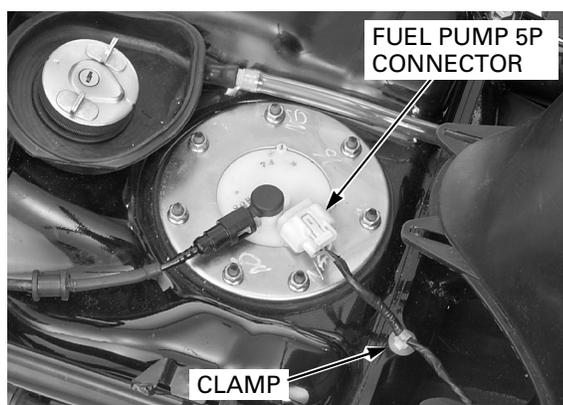
Remove the fuel hose clamp bolt from the fuel tank.



Relieve the fuel pressure and disconnect the quick connect fitting (page 6-32).

Disconnect the fuel pump 5P connector.

Remove the clamp from the fuel tank.



Disconnect the fuel tray drain hose.

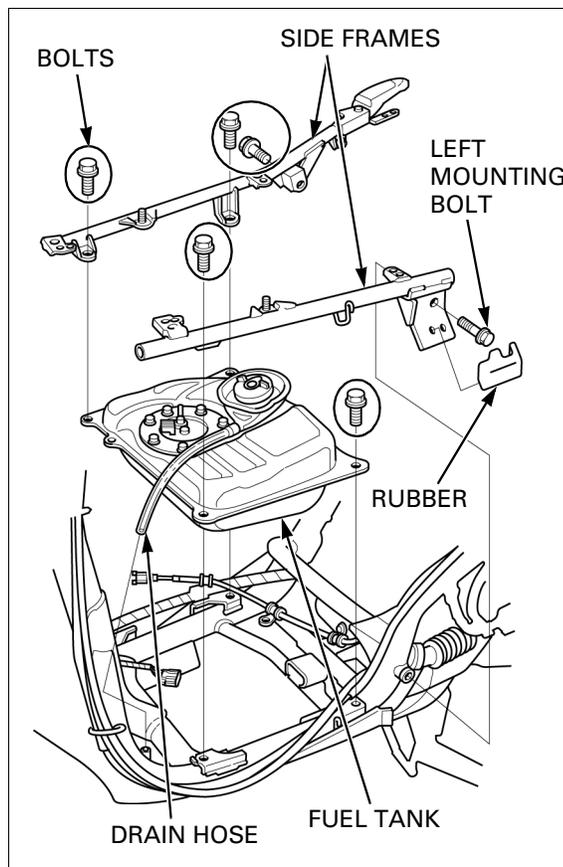
Remove the following:

- Rubber
- Five bolts
- Left floor panel side frame mounting bolt
- Floor panel side frames
- Fuel tank

Installation is in the reverse order of removal.

- Route the fuel tank drain hose properly, not to be kinked or bound.
- Connect the quick connect fitting (page 6-33).

**TORQUE: Left floor panel side frame mounting bolt**  
**49 N·m (5.0 kgf·m, 36 lbf·ft)**



## FUEL SYSTEM (Programmed Fuel Injection)

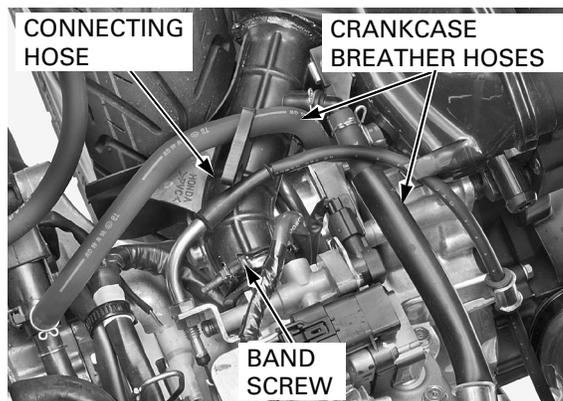
### AIR CLEANER HOUSING

#### REMOVAL/INSTALLATION

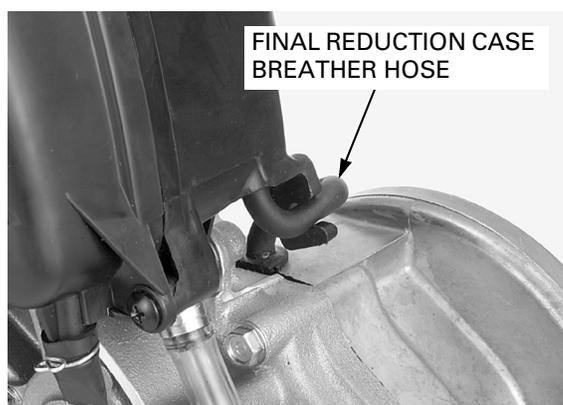
Remove the luggage box (page 3-8).

Disconnect the crankcase breather hoses from the air cleaner housing.

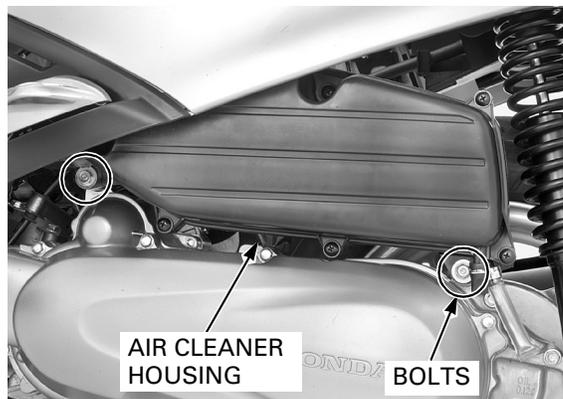
Loosen the connecting hose band screw and disconnect the connecting hose from the throttle body.



Disconnect the final reduction case breather hose from the air cleaner housing.



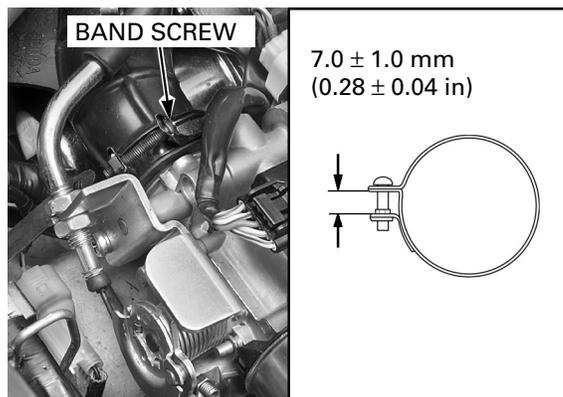
Remove the bolts and air cleaner housing.



*Route the hoses properly (page 1-17).*

Installation is in the reverse order of removal.

- Tighten the connecting hose band screw until the clearance between the screw and band end is  $7.0 \pm 1.0$  mm ( $0.28 \pm 0.04$  in)



## THROTTLE BODY

### REMOVAL

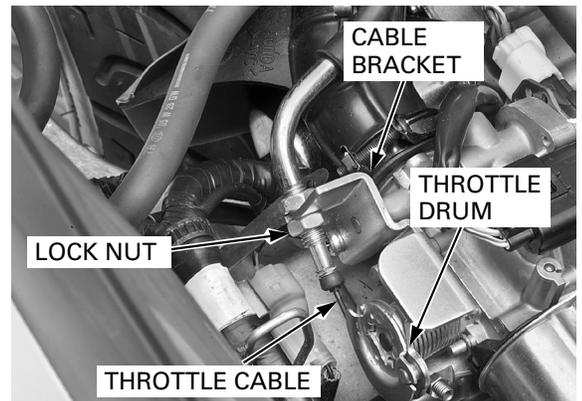
Remove the luggage box (page 3-8).

Loosen the throttle cable lock nut.

Release the throttle cable from the cable bracket.

Disconnect the throttle cable from the throttle drum.

*Be careful not to damage the threads of throttle cable.*

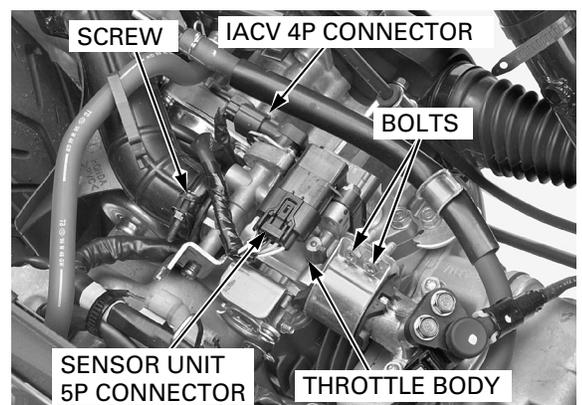


Disconnect the sensor unit 5P connector and IACV 4P connector.

Loosen the connecting hose band screw and insulator band bolts.

Remove the throttle body.

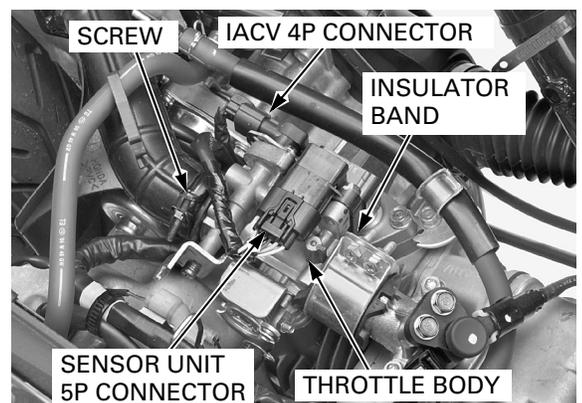
- Seal the intake pipe with a shop towel or cover it with a piece of tape to prevent any foreign material from dropping into the engine.



### INSTALLATION

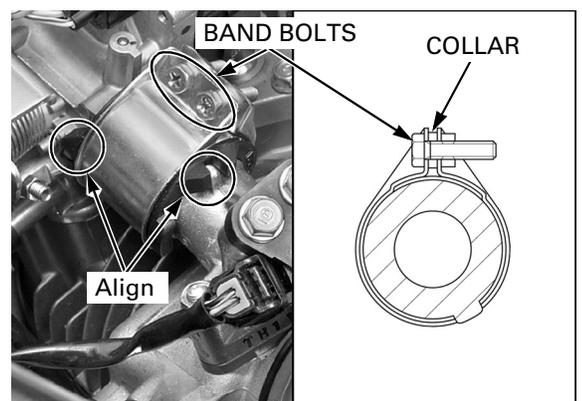
Install the throttle body between the connecting hose and insulator band.

Connect the sensor unit 5P connector and IACV 4P connector.



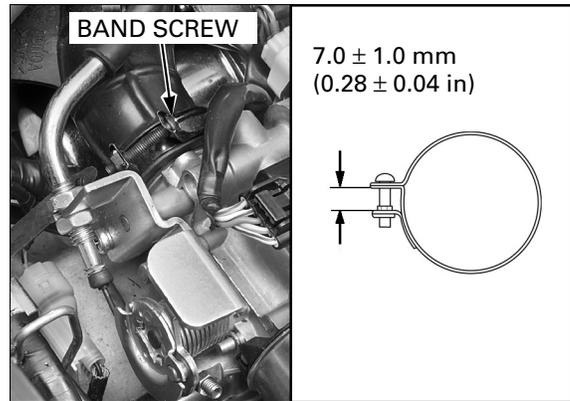
Align the throttle body tab and intake pipe tab with insulator band grooves.

Tighten the insulator band bolts until the band seats on the collar as shown.



## FUEL SYSTEM (Programmed Fuel Injection)

Tighten the connecting hose band screw until the clearance between the screw and band end is  $7.0 \pm 1.0$  mm ( $0.28 \pm 0.04$  in).

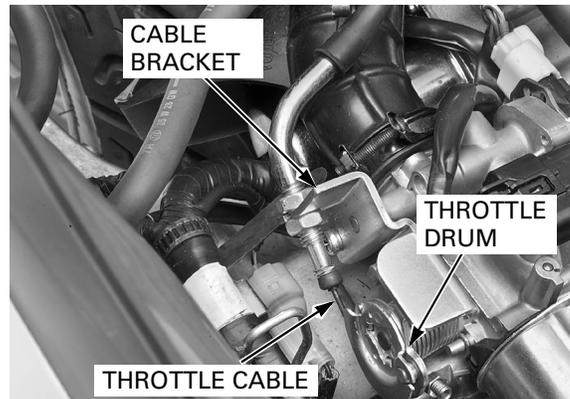


*Be careful not to damage the threads of throttle cable.*

Connect the throttle cable to the throttle drum and set the throttle cable onto the cable bracket, then adjust the throttle grip freeplay (page 4-5).

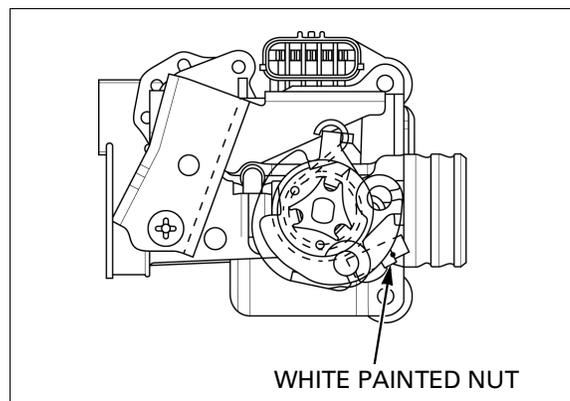
Install the luggage box (page 3-8).

If the sensor unit has been removed, perform the TP sensor reset procedure (page 6-45).



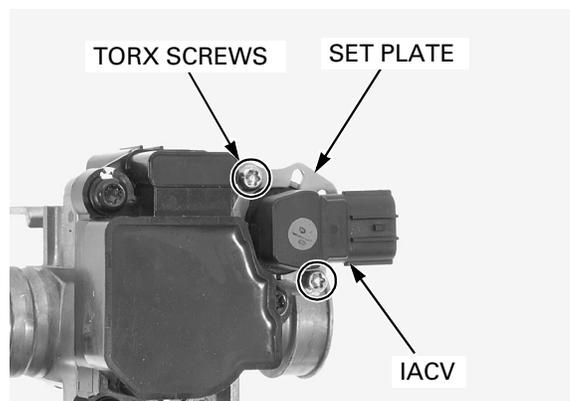
### DISASSEMBLY

- The throttle body is factory pre-set. Do not disassemble in a way other than shown in this manual.
- Do not snap the throttle valve from full open to full close after the throttle cable has been removed. It may cause incorrect idle operation.
- Do not damage the throttle body. It may cause incorrect throttle valve operation.
- Do not loosen or tighten the white painted nut of the throttle drum. Loosening or tightening it can cause throttle body malfunction.



Remove the following:

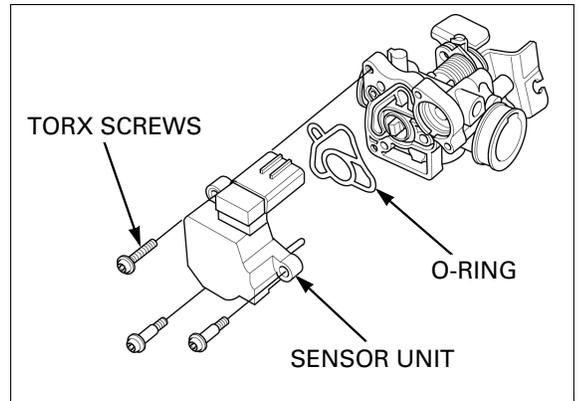
- Torx screws
- Set plate
- IACV



## FUEL SYSTEM (Programmed Fuel Injection)

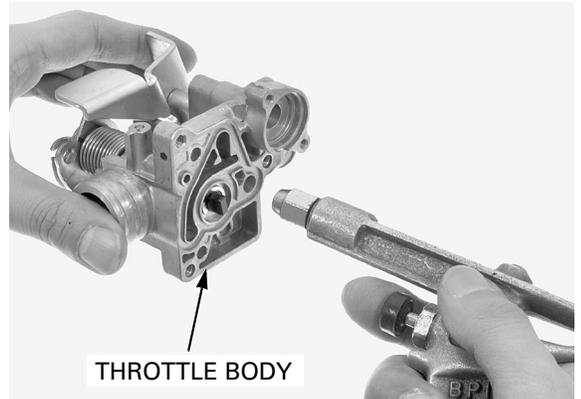
Remove the following:

- Torx screws
- Sensor unit
- O-ring

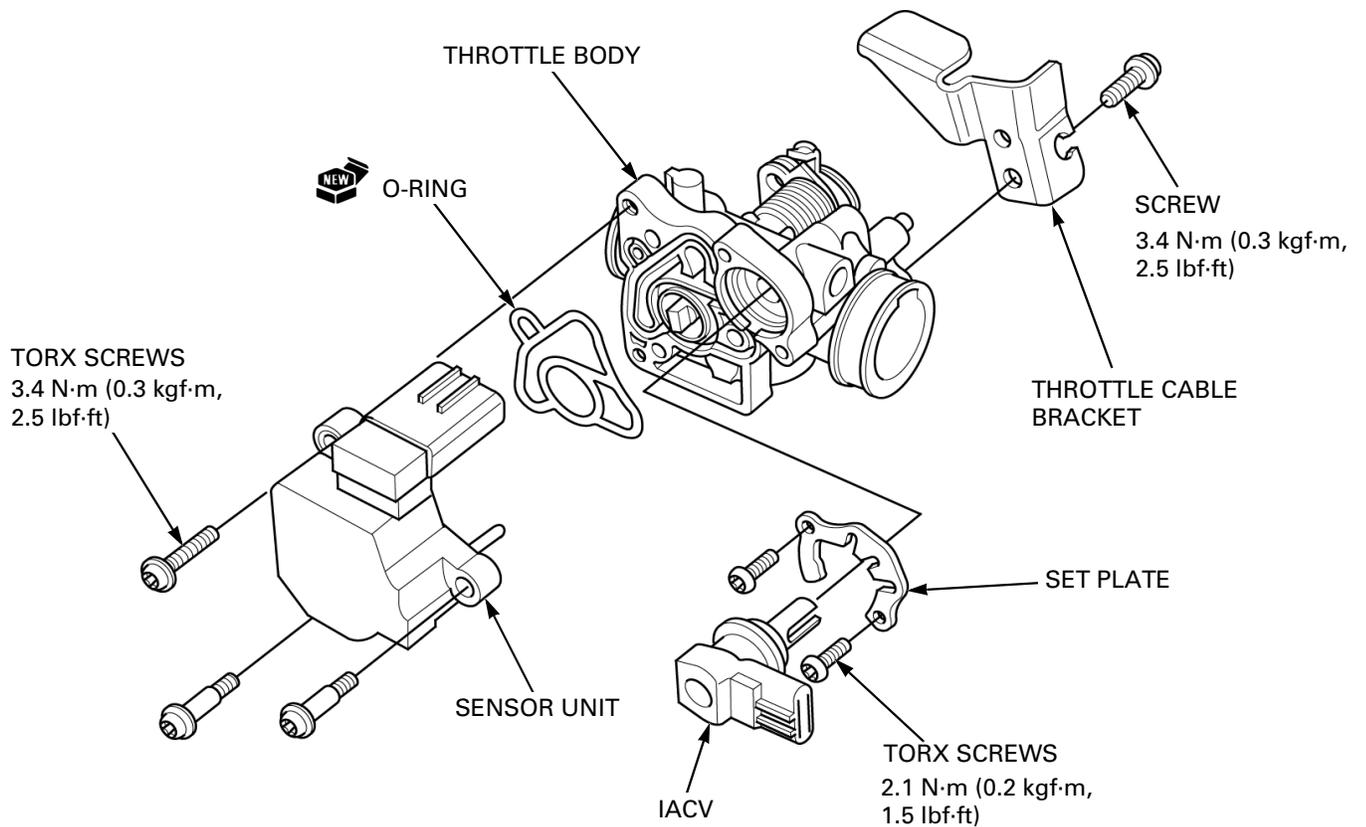


Blow open each air passage in the throttle body with the compressed air.

- Do not use high pressure air or bring the nozzle too close to the throttle body.



### ASSEMBLY



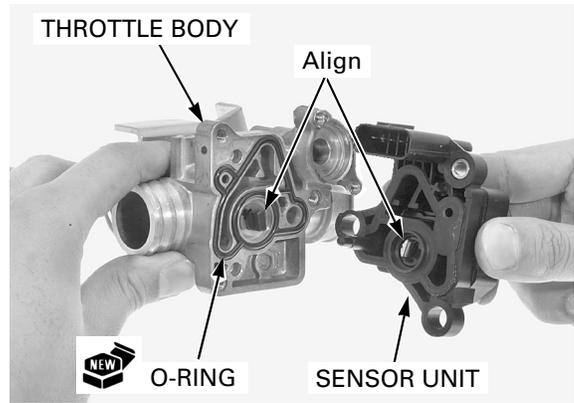
## FUEL SYSTEM (Programmed Fuel Injection)

Install the new O-ring to the throttle body.

- Install the O-ring to the throttle body properly. If the O-ring is not installed properly, the idle air will leak and engine idle speed will be unstable.

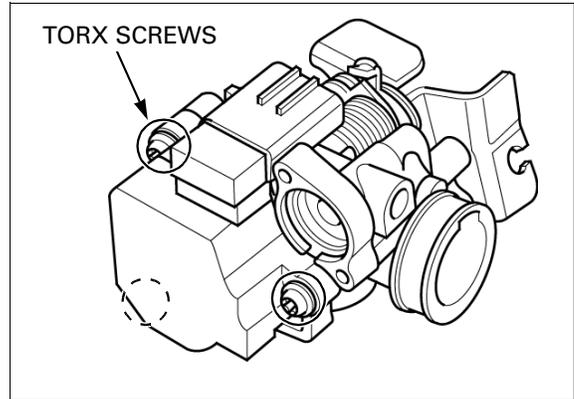
Install the sensor unit to the throttle body by aligning the clip of the TP sensor and boss of the throttle valve.

- The light pressure is sufficient to assemble the sensor unit and throttle body in their correct position. If you cannot assemble them easily, the clip may be misaligned. Do not attempt to force them together and make sure that the clip is aligned.

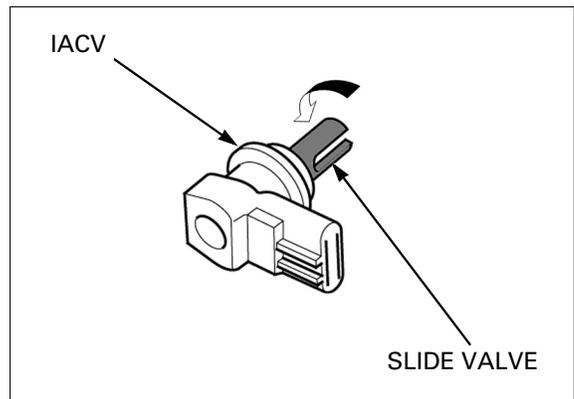


Install and tighten the torx screws to the specified torque.

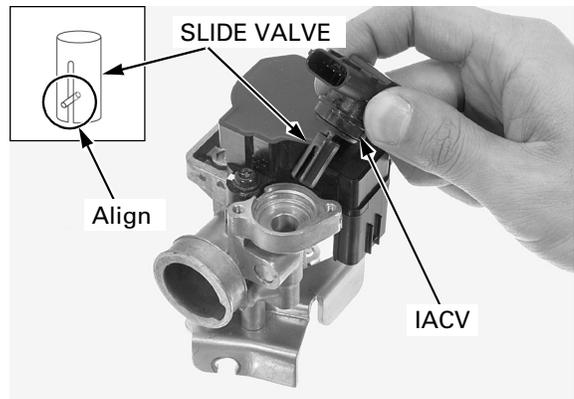
**TORQUE: 3.4 N·m (0.3 kgf·m, 2.5 lbf·ft)**



Turn the slide valve clockwise until lightly seated on IACV.



Install the IACV by aligning the pin with the slide valve slot.

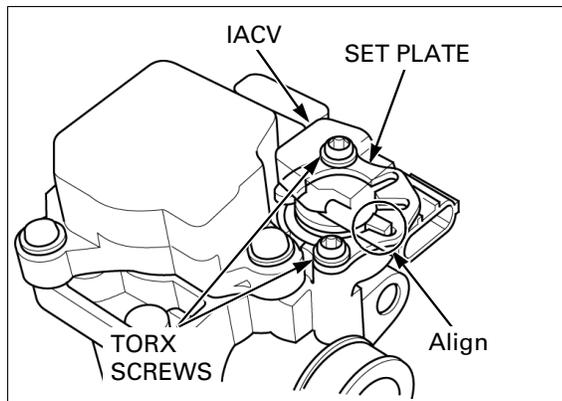


## FUEL SYSTEM (Programmed Fuel Injection)

Install the set plate by aligning the tab of the IACV with the slot of set plate as shown.

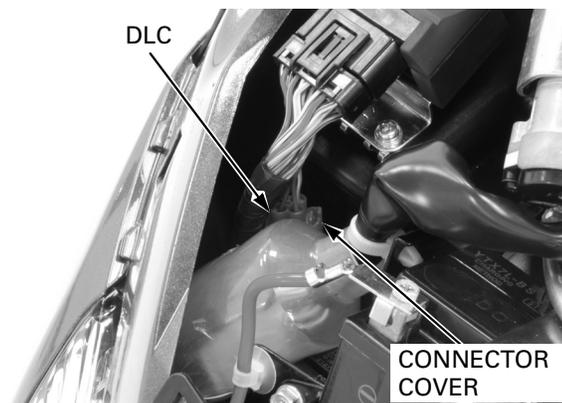
Install and tighten the torx screws to the specified torque.

**TORQUE: 2.1 N·m (0.2 kgf·m, 1.5 lbf·ft)**



### TP SENSOR RESET PROCEDURE

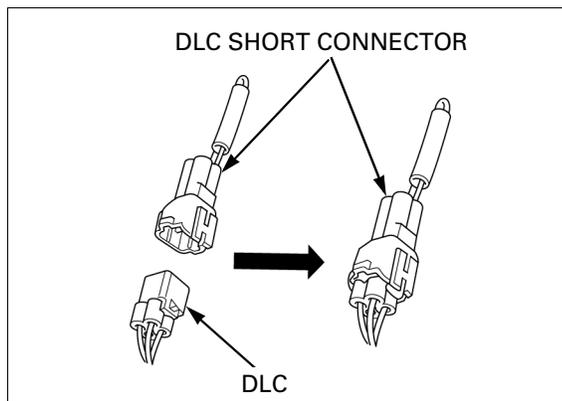
1. Remove the following:
  - Front center cover (page 3-4)
  - Side body cover (page 3-4)
2. Turn the ignition switch "OFF".
3. Remove the DLC from the connector cover.



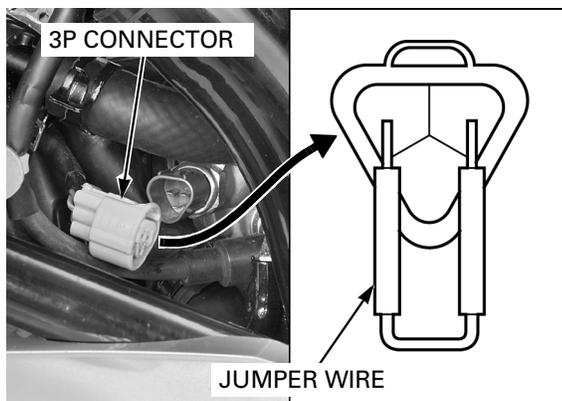
4. Connect the special tool to the DLC.

**TOOL:**

**DLC short connector                      070PZ-ZY30100**

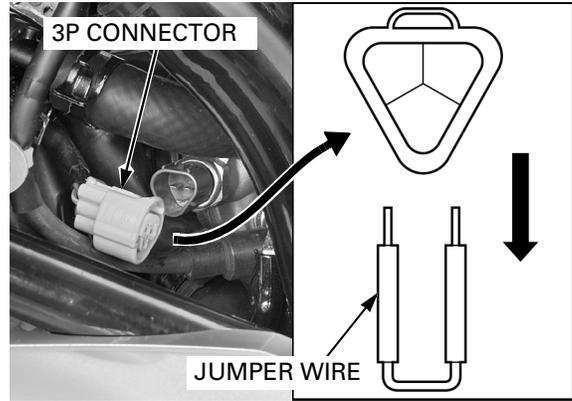


5. Disconnect the ECT sensor 3P connector.  
Short the ECT sensor terminals with jumper wire.  
**CONNECTION: Pink/White – Green/Orange**



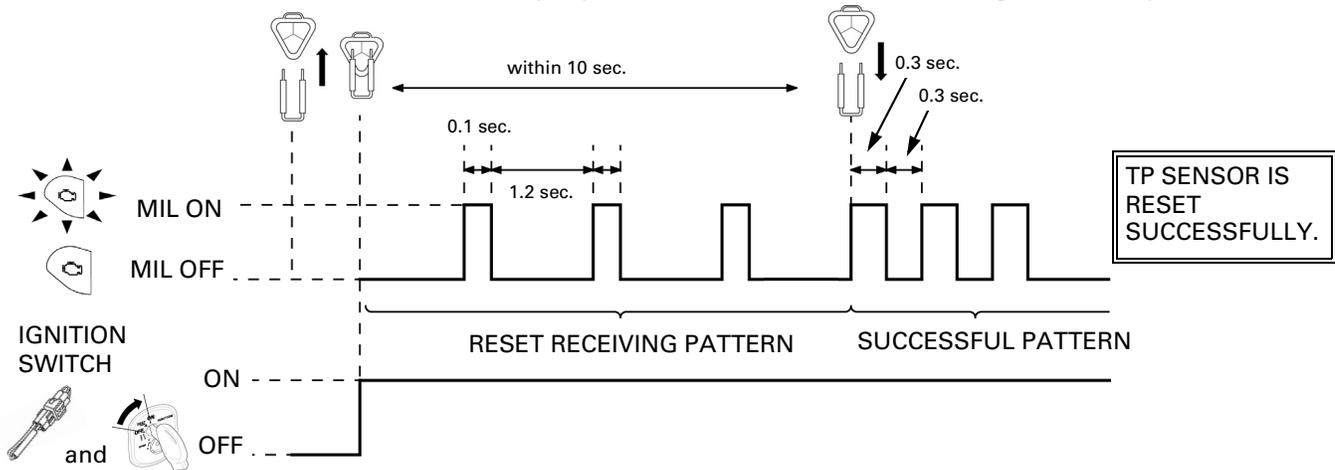
## FUEL SYSTEM (Programmed Fuel Injection)

6. Turn the ignition switch "ON" then disconnect the jumper wire from the ECT sensor 3P connector while the MIL is blinking (reset receiving pattern) for 10 seconds.

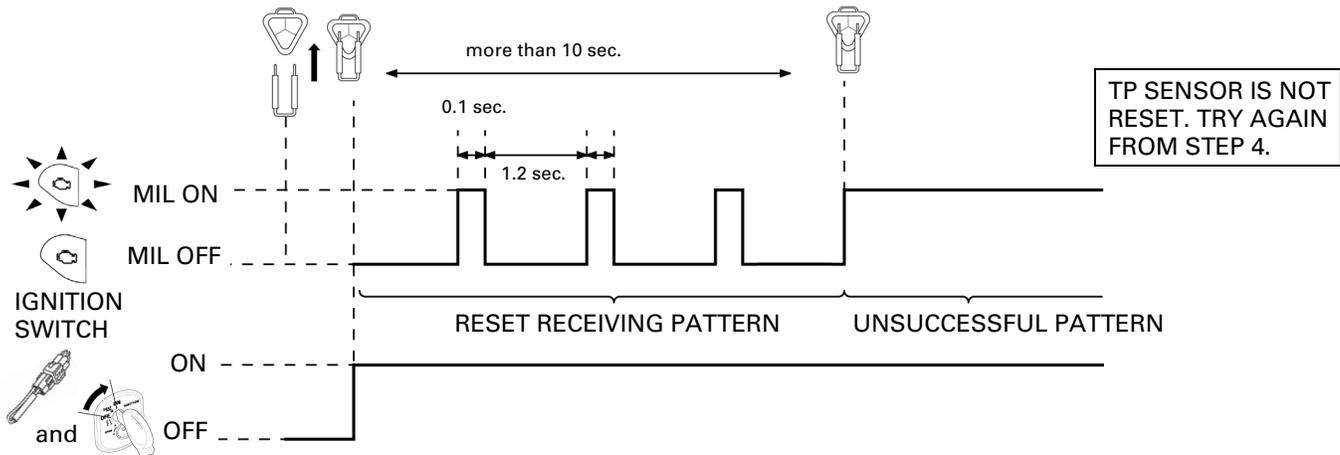


7. Check if the MIL blinks.

After disconnection of the jumper wire, the MIL should start blinking (successful pattern).



If the jumper wire is connected for more than 10 seconds, the MIL will stay ON (unsuccessful pattern). Try again from the step 4.



8. Turn the ignition switch "OFF".

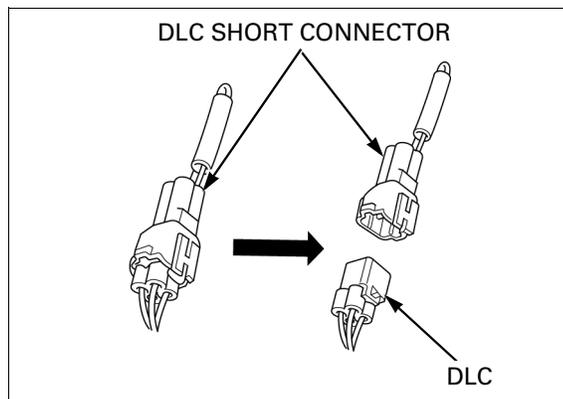
## FUEL SYSTEM (Programmed Fuel Injection)

9. Connect the ECT sensor 3P connector.

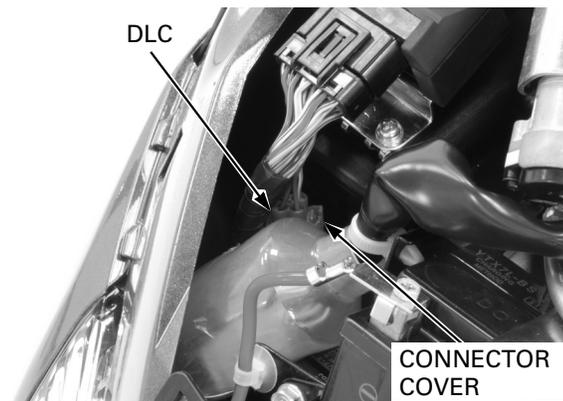


10. Disconnect the special tool from the DLC.

**TOOL:**  
**DLC short connector**                      **070PZ-ZY30100**



11. Install the DLC to the connector cover.



12. Support the scooter with its centerstand.

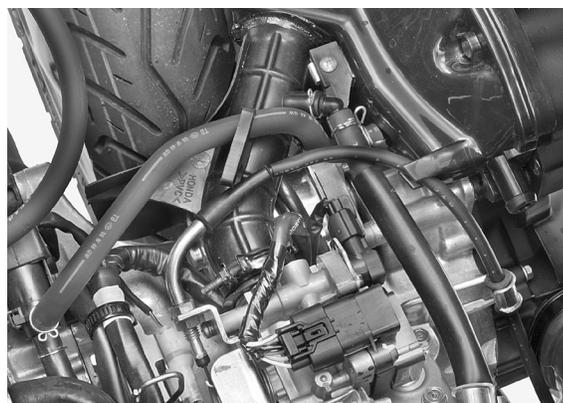
Warm up the engine about ten minutes.

Connect the tachometer and check the idle speed.

**ENGINE IDLE SPEED:  $1,700 \pm 100 \text{ min}^{-1}$  (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.
- IACV operation (page 6-56).



## FUEL SYSTEM (Programmed Fuel Injection)

### ECM (Engine Control Module)

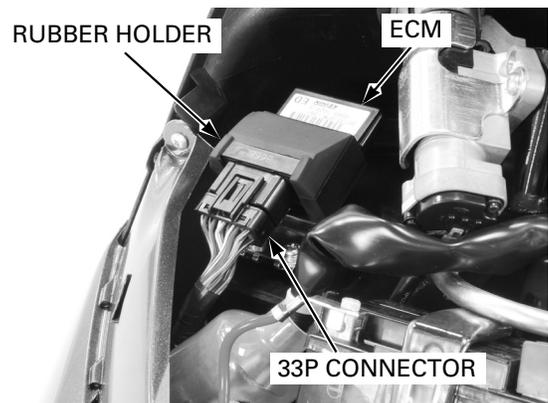
#### REMOVAL/INSTALLATION

Remove the front center cover (page 3-4).

Disconnect the ECM 33P connector.

Remove the ECM from the rubber holder.

Installation is in the reverse order of removal.



### INJECTOR

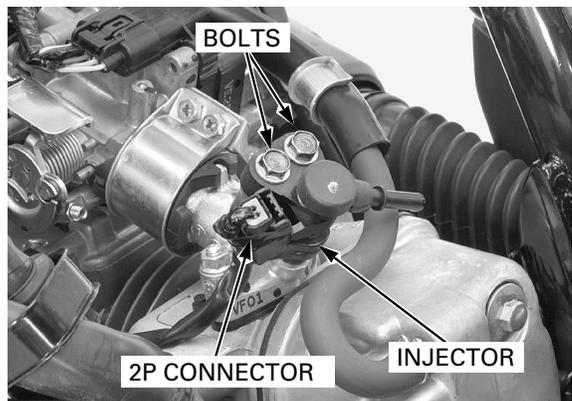
#### REMOVAL

Relieve the fuel pressure and disconnect the quick connect fitting (page 6-32).

Before removal, clean around the injector.

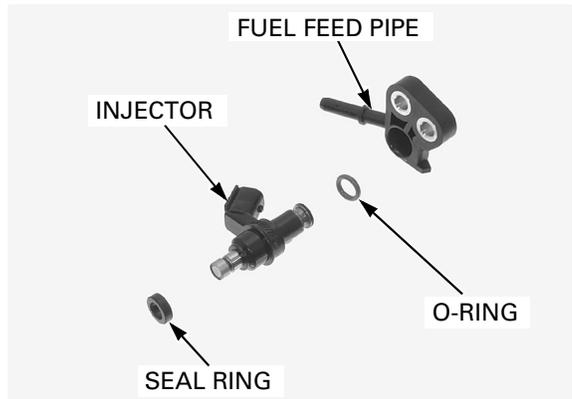
Disconnect the injector 2P connector.

Remove the bolts and injector from the intake pipe.



Remove the following:

- Fuel feed pipe
- O-ring
- Seal ring

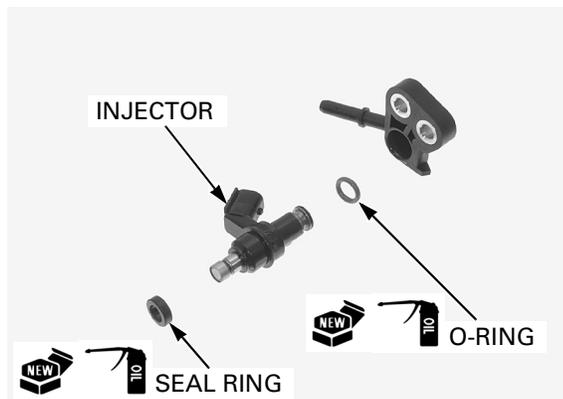


### INSTALLATION

Coat the new O-ring and seal ring with engine oil.

Install the O-ring and seal ring to the injector.

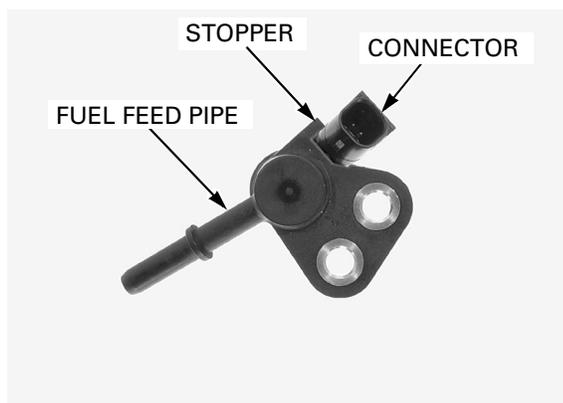
- Replace the O-ring and seal ring with new ones as a set.
- Be careful not to damage the O-ring and seal ring.



Install the fuel feed pipe to the injector so that connector is between the stopper and body of the feed pipe.

#### NOTICE

*Be careful not to allow dirt and debris between the fuel feed pipe and O-ring.*



Install the injector to the intake pipe.

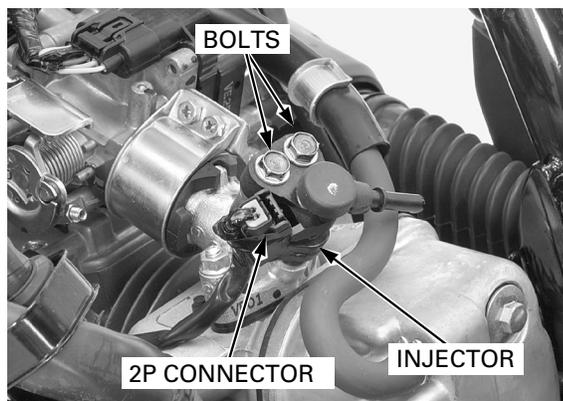
#### NOTICE

*Be careful not to allow dirt and debris between the intake pipe and seal ring.*

Install and tighten the bolts.

Connect the injector 2P connector.

Connect the quick connect fitting (page 6-33).



## FUEL SYSTEM (Programmed Fuel Injection)

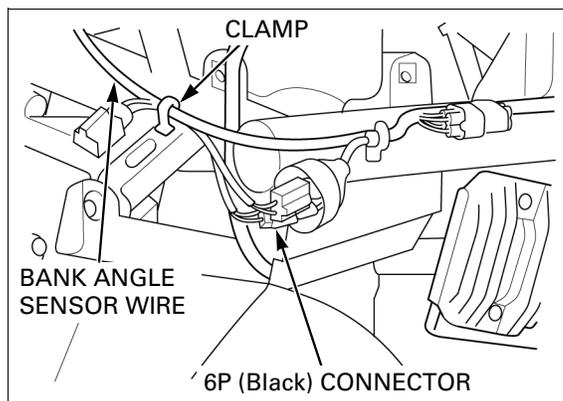
### BANK ANGLE SENSOR

#### REMOVAL

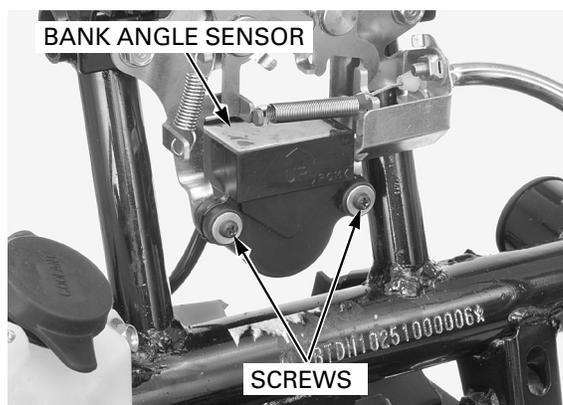
Turn the ignition switch OFF.

Remove the body cover (page 3-9).

Disconnect the bank angle sensor 6P (Black) connector and release the bank angle sensor wire from the clamp.

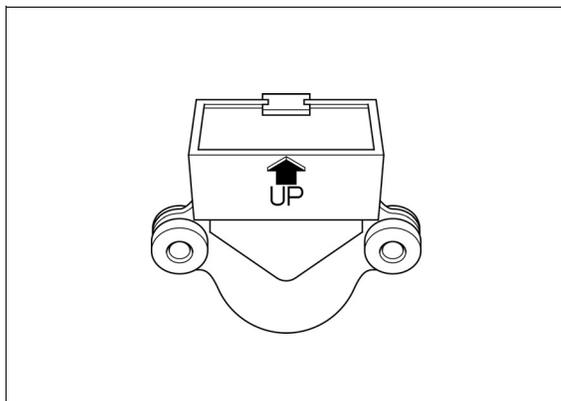


Remove the two screws and bank angle sensor.



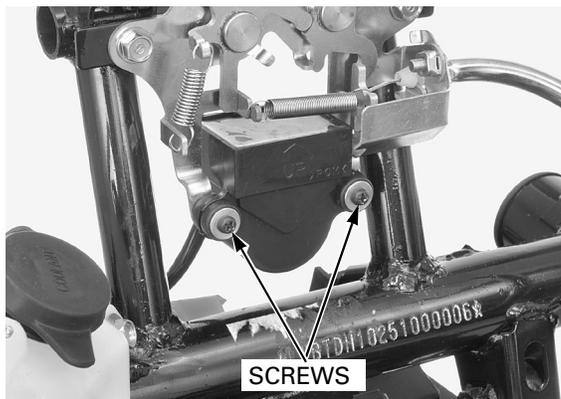
#### INSTALLATION

Install the bank angle sensor with its "UP" mark facing up.



Install and tighten the two screws to the specified torque.

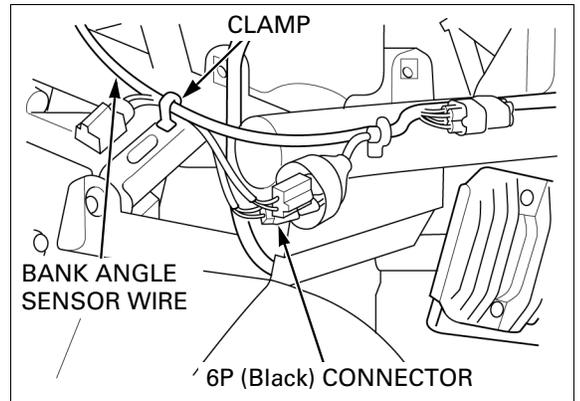
**TORQUE: 1.2 N·m (0.1 kgf·m, 0.9 lbf·ft)**



## FUEL SYSTEM (Programmed Fuel Injection)

Connect the bank angle sensor 6P (Black) connector and clamp the bank angle sensor wire.

Install the body cover (page 3-9)



### SYSTEM INSPECTION

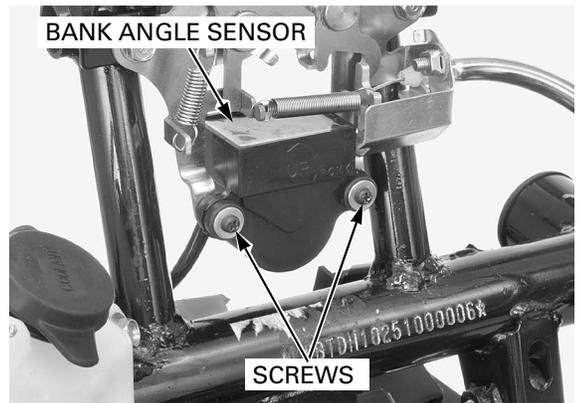
Turn the ignition switch "OFF".

Remove the following:

- Front center cover (page 3-4)
- Luggage box (page 3-8)

Remove the two screws and bank angle sensor.

*Do not disconnect the bank angle sensor connector during inspection.*

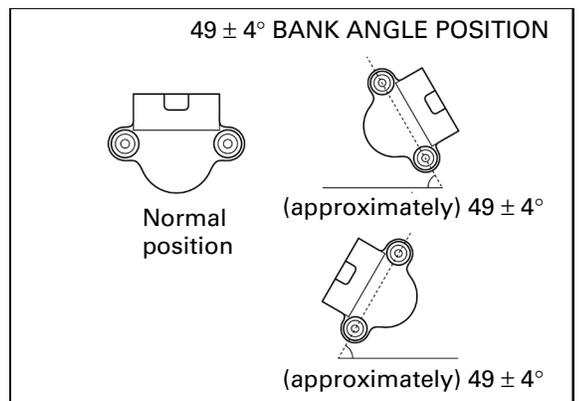


*If you perform this test, turn the ignition switch "OFF", then turn the ignition switch "ON".*

Place the bank angle sensor in normal position as shown, and turn the ignition switch "ON". The bank angle sensor is normal if the engine stop relay clicks, which indicates that circuit is closed.

Incline the bank angle sensor approximately  $49 \pm 4^\circ$  to the left or right while the ignition switch is "ON". The bank angle sensor is normal if the engine stop relay clicks, which indicates that circuit is opened.

If the bank angle sensor does not operate, refer to the circuit inspection (page 6-52), if the circuit inspection is normal, replace the bank angle sensor with a new one and recheck.



## FUEL SYSTEM (Programmed Fuel Injection)

### CIRCUIT INSPECTION

Support the scooter with its centerstand on a level surface.

Remove the body cover (page 3-9).

Disconnect the bank angle sensor 6P (Black) connector.

Turn the ignition switch "ON".

Measure the voltage at the bank angle sensor 6P connector terminals of the wire harness side.

**CONNECTION: Black (+) – Green (-)**

**STANDARD: Battery voltage**

If there is no voltage, check the following:

- Open circuit in Black wire.
- Open circuit in Green wire.

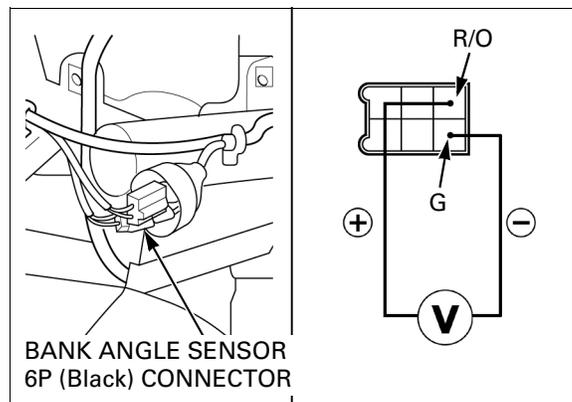
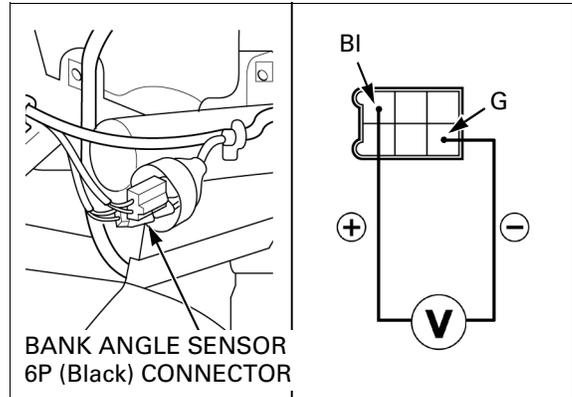
If there is battery voltage, check the following:

Measure the voltage at the bank angle sensor 6P (Black) connector terminals of the wire harness side.

**CONNECTION: Red/Orange (+) – Green (-)**

**STANDARD: Battery voltage**

If there is no voltage, check the open circuit in Red/Orange wire.



## ECT SENSOR

### REMOVAL/INSTALLATION

Drain the coolant (page 7-8).

Remove the side body cover (page 3-4).

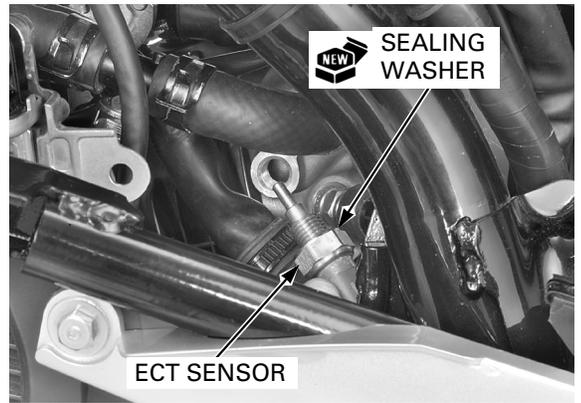
*Remove the ECT sensor while the engine is cold.* Disconnect the ECT sensor 3P connector from the sensor.

Remove the ECT sensor and sealing washer.



Always replace a sealing washer with a new one.

Install the 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)**



Connect the ECT sensor 3P connector.  
Fill the cooling system with recommended coolant (page 7-8).  
Install the side body cover (page 3-4).



## INSPECTION

Remove the ECT sensor (page 6-52).

*Wear insulated gloves and adequate eye protection. Keep flammable materials away from the burner.*

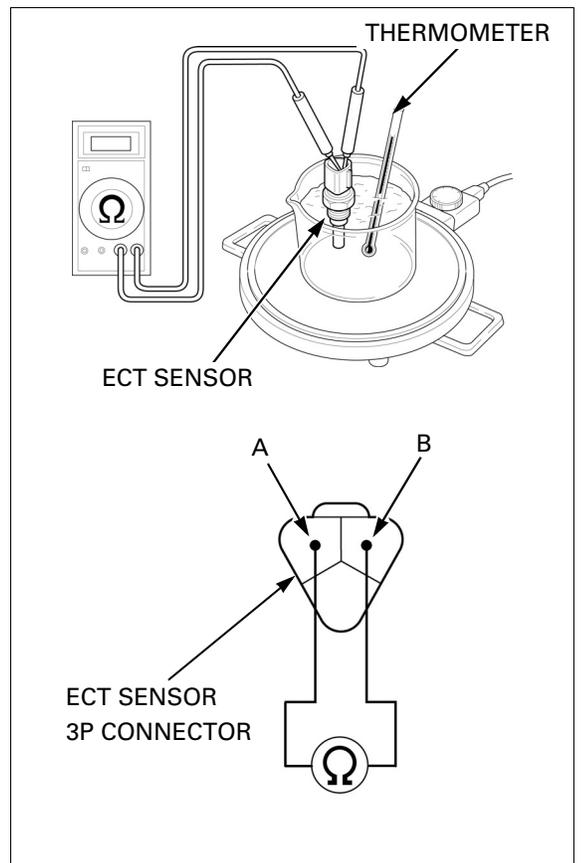
Heat the coolant with an electric heating element. Suspend the ECT sensor in heated coolant and check the continuity through the sensor as the coolant heats up.

- Soak the ECT sensor in coolant up to its threads with at least 40 mm (1.57 in) from the bottom of the pan to the bottom of the switch.
- Keep 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.

### CONNECTION: A - B

Temperature °C (°F)	20 (68)	80 (176)	110 (230)
Resistance (kΩ)	2.3 - 2.6	0.3 - 0.4	0.1 - 0.2

Replace the ECT sensor if it is out of specifications.  
Install the ECT sensor (page 6-52).



## FUEL SYSTEM (Programmed Fuel Injection)

### O<sub>2</sub> SENSOR

#### NOTICE

- Do not get grease, oil or other materials in the O<sub>2</sub> sensor air hole.
- The O<sub>2</sub> sensor may be damaged if dropped. Replace it with a new one, if dropped.
- If the O<sub>2</sub> sensor cap is disconnected, replace the O<sub>2</sub> sensor cord with a new one, do not reuse O<sub>2</sub> sensor cord.

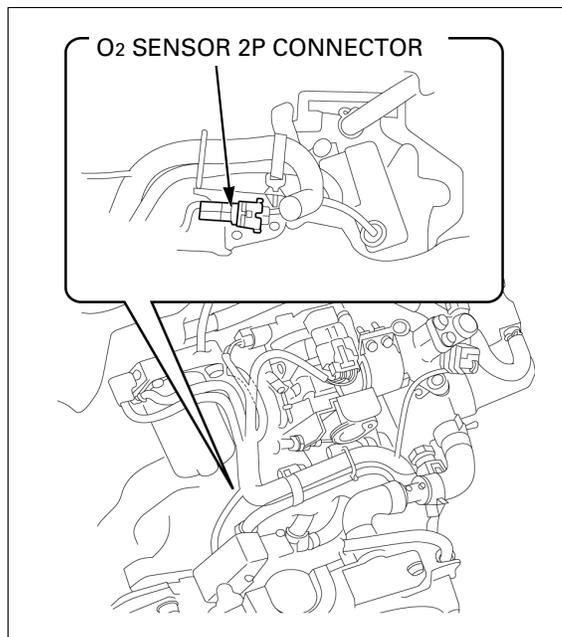
#### REMOVAL

Replace the O<sub>2</sub> sensor while the engine is cold.

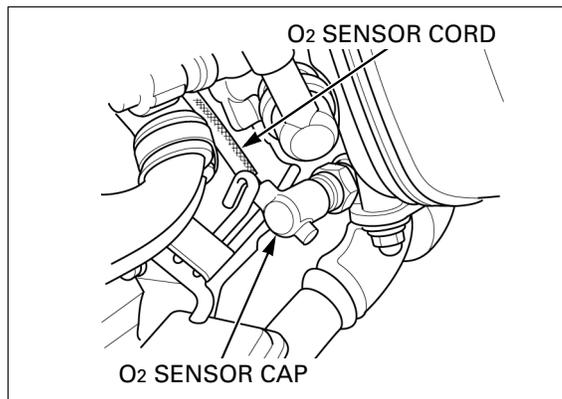
Remove the following:

- Luggage box (page 3-8)
- Floor panel side cover (page 3-5)

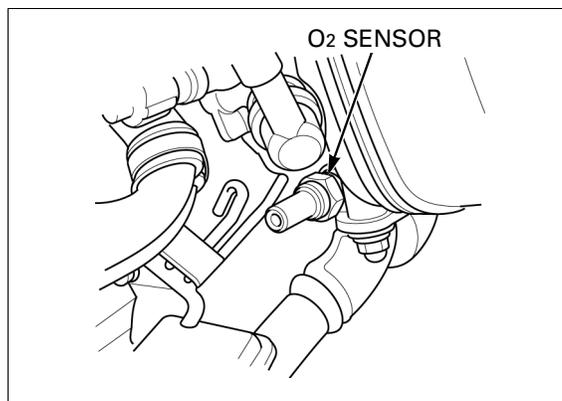
Disconnect the O<sub>2</sub> sensor 2P connector.



Remove the O<sub>2</sub> sensor cap.  
Discard the O<sub>2</sub> sensor cord.



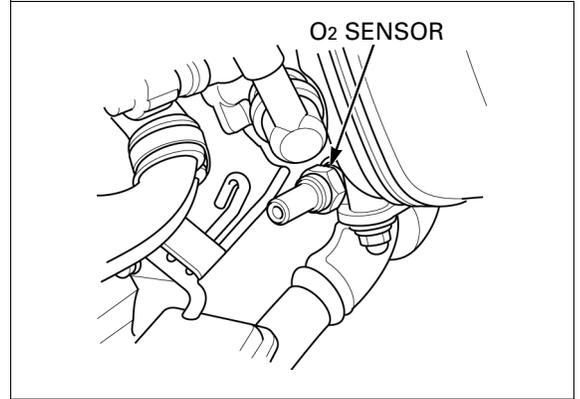
Remove the O<sub>2</sub> sensor from the cylinder head.



### INSTALLATION

Install and tighten the O<sub>2</sub> sensor to the cylinder head to the specified torque.

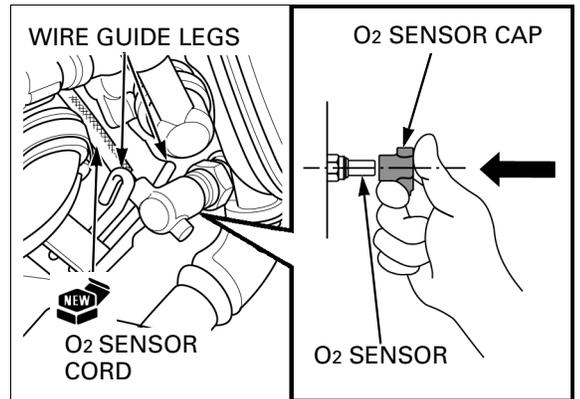
**TORQUE: 25 N·m (2.5 kgf·m, 18 lbf·ft)**



Connect the O<sub>2</sub> sensor cap by installing a new O<sub>2</sub> sensor cord between the wire guide legs.

#### NOTICE

- Take care not to tilt the O<sub>2</sub> sensor cap when connecting the cap to the O<sub>2</sub> sensor.
- Do not turn the O<sub>2</sub> sensor cap, after connecting it.

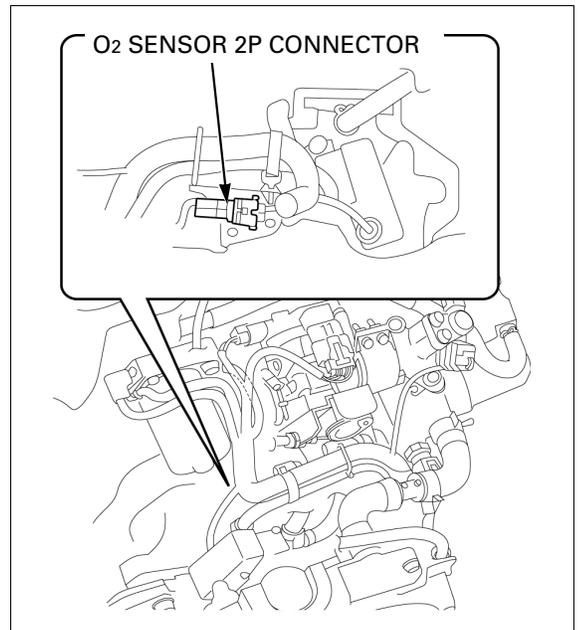


Connect the O<sub>2</sub> sensor 2P connector.

After installation, make sure the exhaust gas does not leak.

Install the following:

- Floor panel side cover (page 3-5)
- Luggage box (page 3-8)



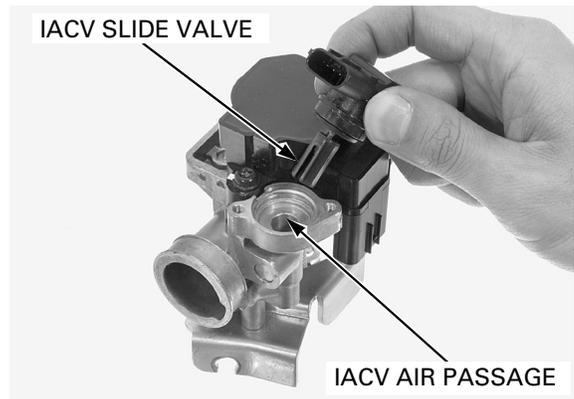
## FUEL SYSTEM (Programmed Fuel Injection)

### IACV (Idle Air Control Valve)

#### INSPECTION

Remove the IACV (page 6-42).

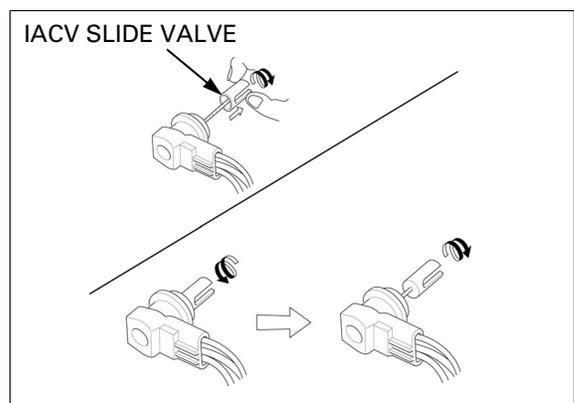
Check the IACV slide valve and IACV air passage in the throttle body for carbon deposits.  
Clean the IACV slide valve and IACV air passage if necessary.



Temporarily connect the IACV 4P connector.  
Turn the IACV slide valve counterclockwise with your finger.  
Hold the IACV and turn the ignition switch "ON".  
The slide valve should rotate while moving back and forth.

Disconnect the IACV 4P connector and install the IACV (page 6-43).

Recheck the engine idle speed (page 4-13).



### INTAKE PIPE

#### REMOVAL

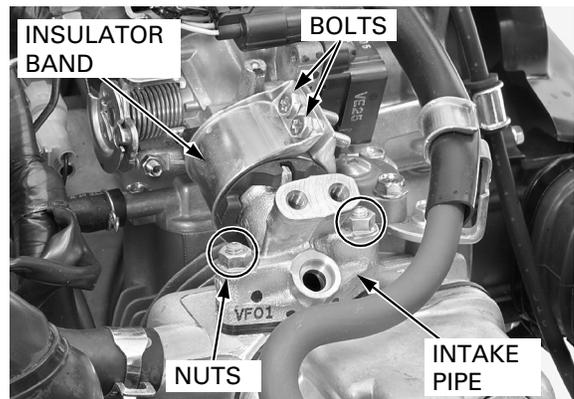
Remove the injector (page 6-48).

Loosen the insulator band bolts.

Remove the following:

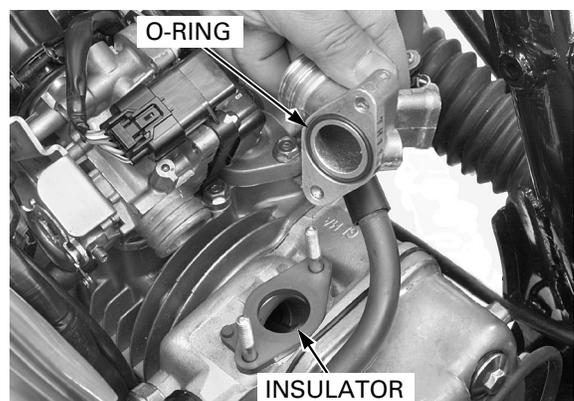
- Intake pipe mounting nuts
- Intake pipe and insulator band

Remove the insulator band from the intake pipe.



Remove the O-ring from the intake pipe.

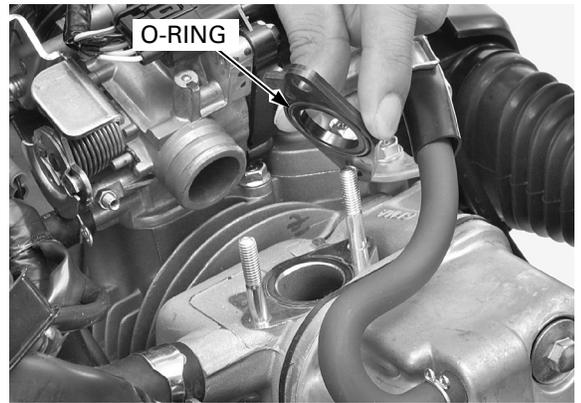
Remove the insulator.



## FUEL SYSTEM (Programmed Fuel Injection)

Remove the O-ring from the insulator.

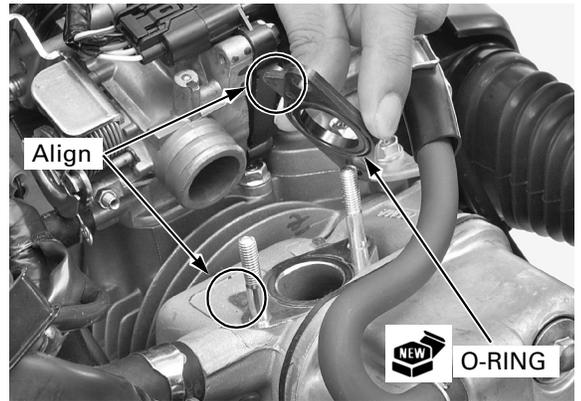
Seal the cylinder head intake port with a shop towel or cover it with a piece of tape to prevent any foreign material from dropping into the engine.



### INSTALLATION

Install a new O-ring to the groove on the insulator.

Install the insulator by aligning the tab of insulator and groove of cylinder head.



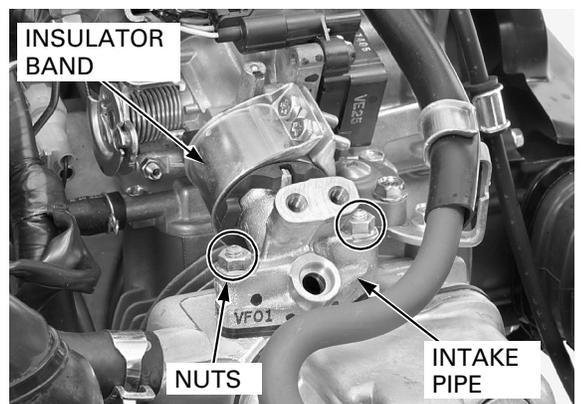
Install a new O-ring to the groove on the intake pipe.



Install the insulator band to the intake pipe.

Install the insulator band/intake pipe.

Install and tighten the intake pipe mounting nuts.

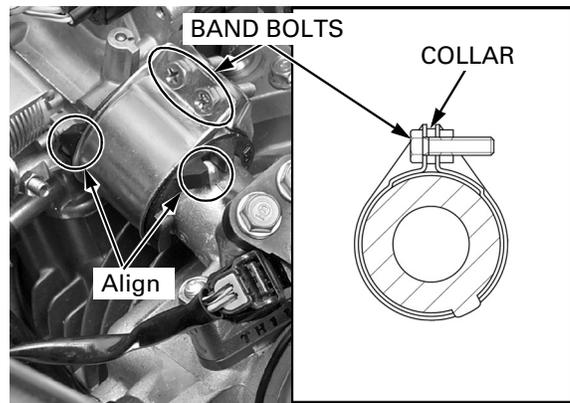


## FUEL SYSTEM (Programmed Fuel Injection)

Align the throttle body tab, intake pipe tab and insulator band grooves.

Tighten the insulator band bolts until the band seats on the collar as shown.

Install the injector (page 6-49).



### STUD BOLT REPLACEMENT

Remove the intake pipe (page 6-56).

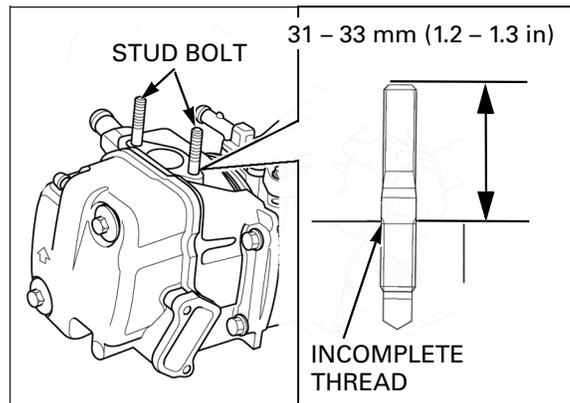
Thread two nuts onto the stud and tighten them together, and use wrench on them to turn the stud bolt out.

Install new stud bolts into the cylinder head and tighten them until incomplete thread embed.

After installation, check that the length from the bolt head to the cylinder head surface is within specification.

**SPECIFIED LENGTH: 31 – 33 mm (1.2 – 1.3 in)**

Install the intake pipe (page 6-57).



## PCV SYSTEM

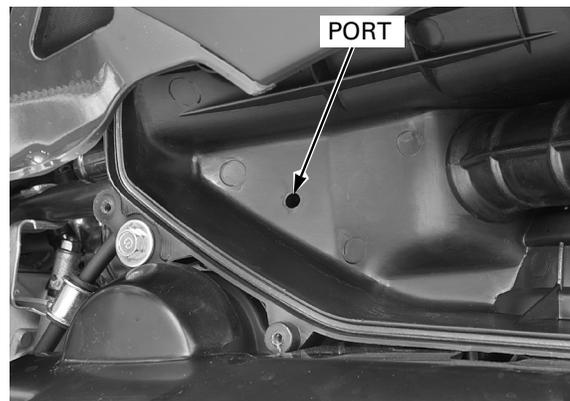
### SYSTEM INSPECTION

Support the scooter with its centerstand.  
Warm up the engine about ten minutes.  
Stop the engine.

Remove the air cleaner element (page 4-6).

Check that the hose joint of air cleaner is clean and free of carbon deposits.

If the port is carbon fouled, check the PCV check valve (page 6-60).



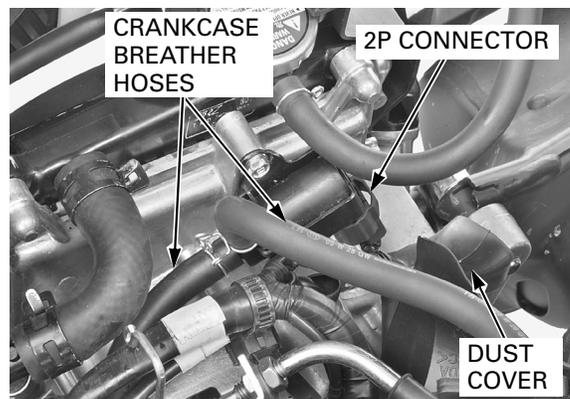
### PCV SOLENOID VALVE

#### REMOVAL/INSTALLATION

Remove the luggage box (page 3-8).

Disconnect the crankcase breather hoses from the solenoid valve.

Pull off the dust cover from the connector and disconnect the PCV solenoid valve 2P connector.

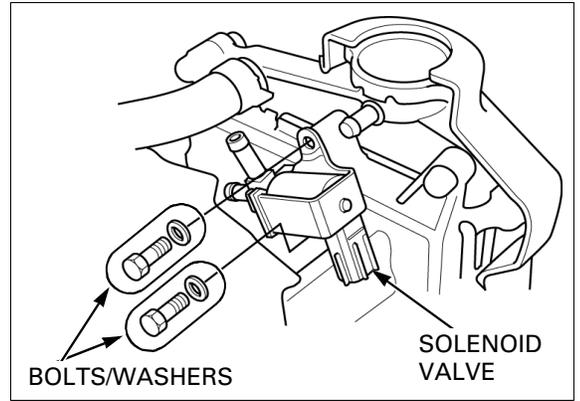


## FUEL SYSTEM (Programmed Fuel Injection)

Be careful not to let the washer fall.

Remove the bolts/washers and PCV solenoid valve. Installation is in the reverse order of removal.

**TORQUE: PCV solenoid valve mounting bolt**  
**6 N·m (0.6 kgf·m, 4.4 lbf·ft)**

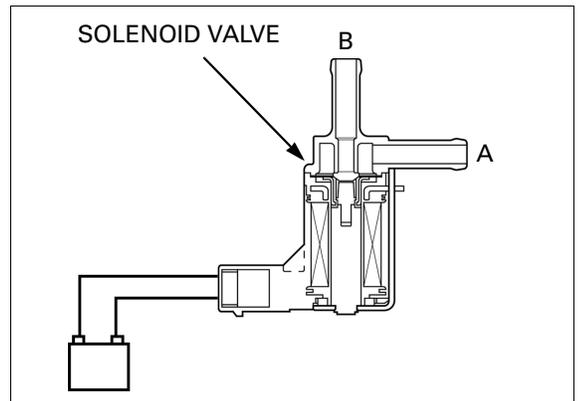


### INSPECTION

Check air flow from A to B. Air should not flow.

Connect the 12 V battery to the solenoid valve side 2P connector terminals.

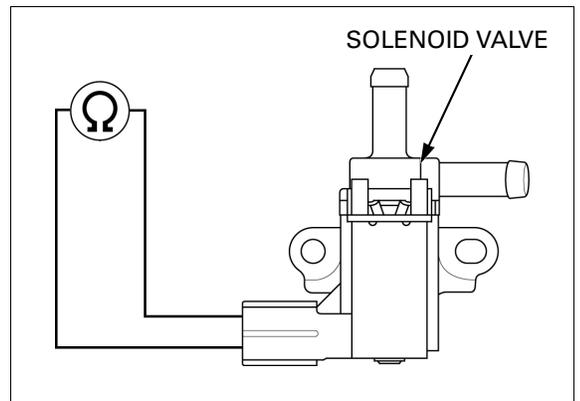
Air should flow from A to B when the battery is connected.



Measure the resistance between the connector terminals.

**STANDARD: 30 – 34  $\Omega$  (20°C/68°F)**

If it is out of the standard, replace the PCV solenoid valve.



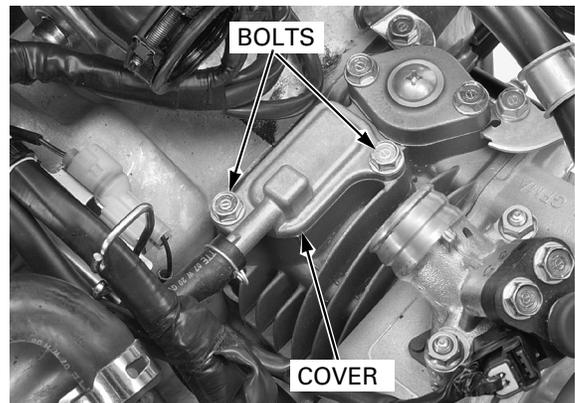
## FUEL SYSTEM (Programmed Fuel Injection)

### PCV CHECK VALVE

#### INSPECTION

Remove the throttle body (page 6-41).

Remove the bolts and PCV check valve cover.



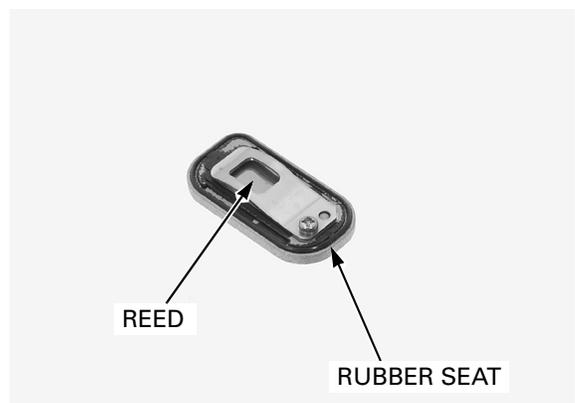
Remove the check valve from the cylinder.



Check the reed for damage or fatigue. Replace if necessary.

Replace the PCV check valve if the rubber seat is cracked, deteriorated or damaged, or if there is clearance between the reed and seat.

Installation is in the reverse order of removal.



## ENGINE STOP RELAY

### REMOVAL/INSTALLATION

Remove the front center cover (page 3-4).

Remove the engine stop relay from the relay connector.

Installation is in the reverse order of removal.



### OPERATION INSPECTION

Remove the front center cover (page 3-4).

Turn the ignition switch "ON".

The engine stop relay coil is normal if the engine stop relay clicks.

If you hear the engine stop relay "CLICK", but malfunction indicator lamp (MIL) stays off and fuel pump does not operate for a few seconds, inspect the following:

- Engine stop relay continuity inspection (page 6-62)
- Engine stop relay switch line inspection (page 6-62)
- If the above inspections and the ECM power/ground circuit (page 6-19) are normal, replace the ECM with a new one, and recheck.

If you do not hear the relay "CLICK", inspect the following:

- Engine stop relay coil line inspection (page 6-63)
- Engine stop relay continuity inspection (page 6-62)
- If the above inspections are normal, inspect the bank angle sensor (page 6-52).



## FUEL SYSTEM (Programmed Fuel Injection)

### CONTINUITY INSPECTION

Turn the ignition switch OFF.

Remove the engine stop relay (page 6-61).

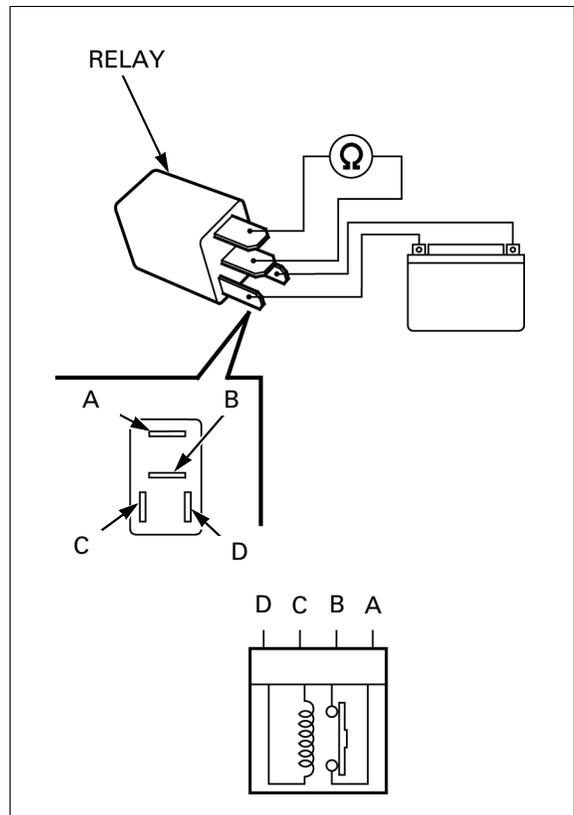
Connect the ohmmeter to the following engine stop relay terminals.

**Connection: A – B**

Connect the 12 V battery to the following engine stop relay terminals.

**Connection: C – D**

There should be continuity between the relay terminals while the battery is connected, and no continuity when the battery is disconnected.



### SWITCH LINE INSPECTION

Turn the ignition switch OFF.

Remove the engine stop relay (page 6-61).

Short the relay connector terminals of the wire harness side with a jumper wire.

**Connection: Black (+) – Black/White (-)**

Disconnect the ECM 33P connector (page 6-48).

Turn the ignition switch "ON".

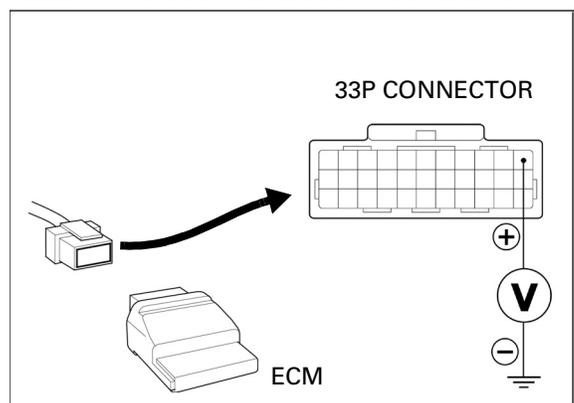
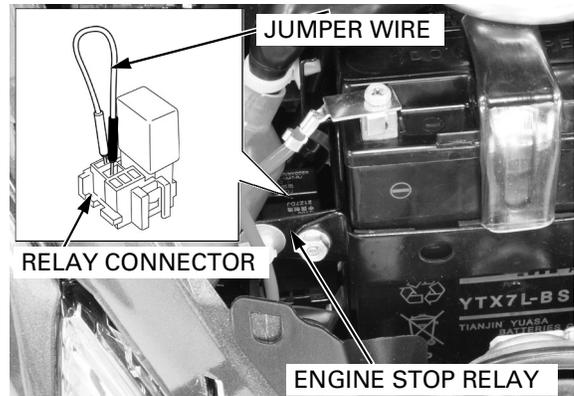
Measure the voltage between the ECM connector of the wire harness side and ground.

**Connection: Black/White (+) – Ground (-)**

If the battery voltage appears, the engine stop relay switch line is normal.

If the battery voltage does not appear, inspect the following:

- Open circuit in Black wire between the fuse box and engine stop relay switch line side
- Open circuit in Black/White wire between the engine stop relay and ECM



### COIL LINE INSPECTION

Turn the ignition switch OFF.

Disconnect the bank angle sensor 6P (Black) connector.

Turn the ignition switch "ON".

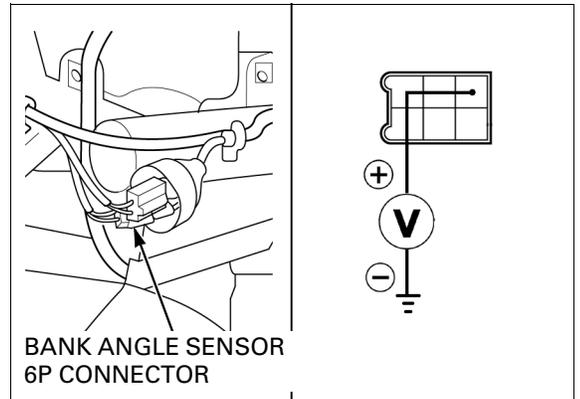
Measure the voltage between the engine stop relay connector of the wire harness side and ground.

**Connection: Red/Orange (+) – Ground (–)**

If the battery voltage appears, the engine stop relay coil line is normal.

If the battery voltage does not appear, inspect the following:

- Open circuit in Black wire between the fuse box and engine stop relay coil line side
- Open circuit in Red/Orange wire between the engine stop relay and ECM
- Inspect the engine stop relay continuity (page 6-64)



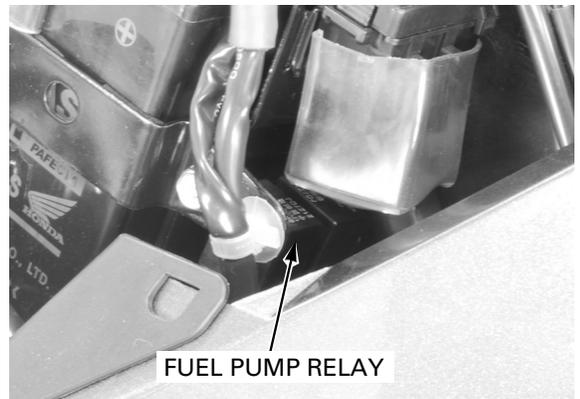
## FUEL PUMP RELAY

### REMOVAL/INSTALLATION

Remove the front center cover (page 3-4).

Remove the fuel pump relay from the relay connector.

Installation is in the reverse order of removal.



### OPERATION INSPECTION

Remove the front center cover (page 3-4).

Turn the ignition switch "ON".

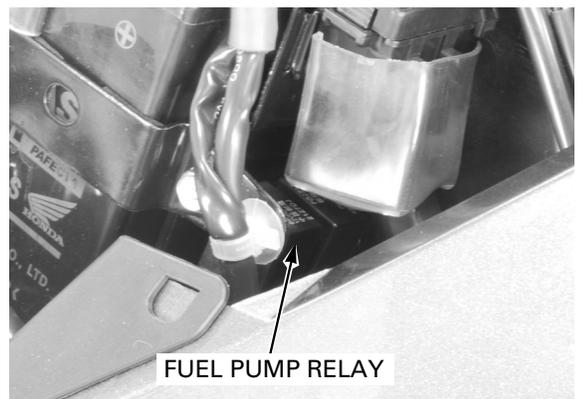
The fuel pump relay coil is normal if the fuel pump relay clicks.

If you hear the fuel pump relay "CLICK", but fuel pump does not operate for a few seconds, inspect the following:

- Fuel pump relay continuity inspection (page 6-64)
- Fuel pump relay switch line inspection (page 6-64)
- If the above inspections are normal, replace the fuel pump with a new one, and recheck.

If you do not hear the relay "CLICK", inspect the following:

- Fuel pump relay coil line (page 6-65)
- Fuel pump relay continuity inspection (page 6-64)
- if the above inspections are normal, Inspect the ECM power/ground line (page 6-19).



## FUEL SYSTEM (Programmed Fuel Injection)

### CONTINUITY INSPECTION

Turn the ignition switch OFF.

Remove the fuel pump relay (page 6-63).

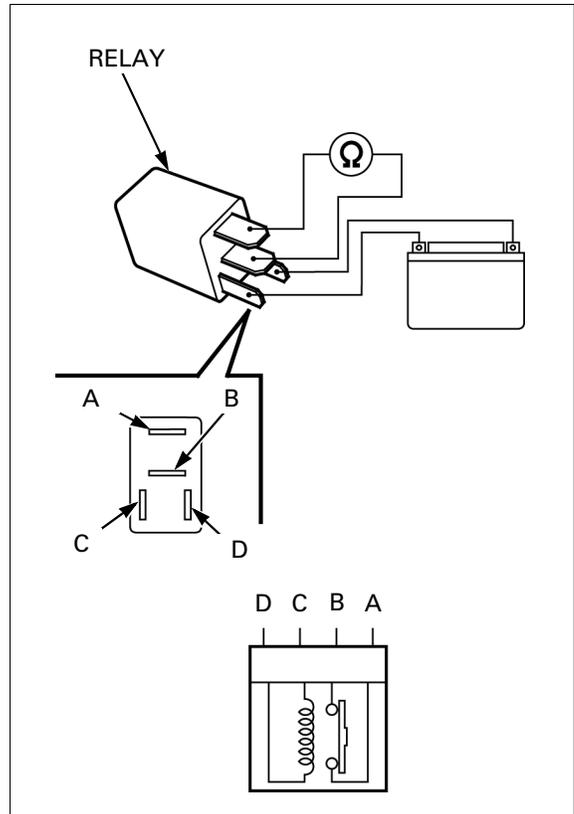
Connect the ohmmeter to the following fuel pump relay terminals.

**Connection: A – B**

Connect the 12 V battery to the following fuel pump relay terminals.

**Connection: C – D**

There should be continuity between the relay terminals while the battery is connected, and no continuity when the battery is disconnected.



### SWITCH LINE INSPECTION

Turn the ignition switch OFF.

Remove the fuel pump relay (page 6-63).

Short the relay connector terminals of the wire harness side with a jumper wire.

**Connection: Black/White (+) – Brown (-)**

Disconnect the fuel pump 5P connector (page 6-36).

Turn the ignition switch "ON".

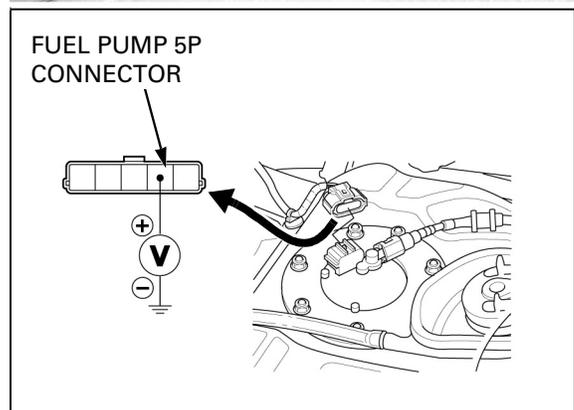
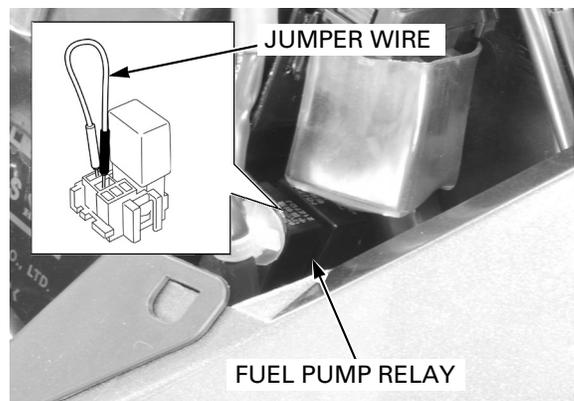
Measure the voltage between the fuel pump connector of the wire harness side and ground.

**Connection: Brown (+) – Ground (-)**

If the battery voltage appears, the engine stop relay switch line is normal.

If the battery voltage does not appear, inspect the following:

- Open circuit in Black/White wire between the engine stop relay and fuel pump relay
- Open circuit in Brown wire between the fuel pump relay and fuel pump



### COIL LINE INSPECTION

Turn the ignition switch "OFF".

Disconnect the ECM 33P connector (page 6-48).

Turn the ignition switch "ON".

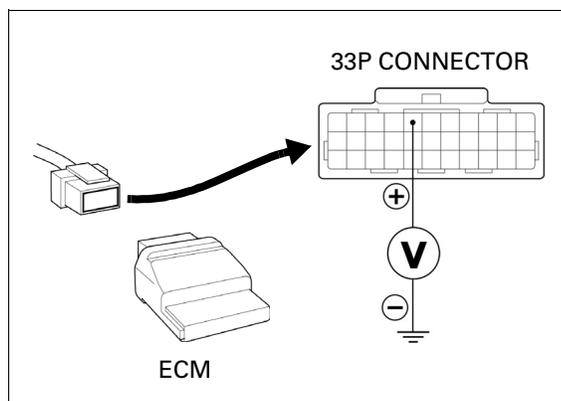
Measure the voltage between the ECM connector of the wire harness side and ground.

#### Connection: Brown/Black – Ground

If the battery voltage appears, the fuel relay coil line is normal.

If the battery voltage does not appear, inspect the following:

- Open circuit in Black/White wire between the engine stop relay and fuel pump relay
- Open circuit in Brown/Black wire between the fuel pump relay and ECM
- Inspect the fuel pump relay continuity (page 6-64)



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**MEMO**

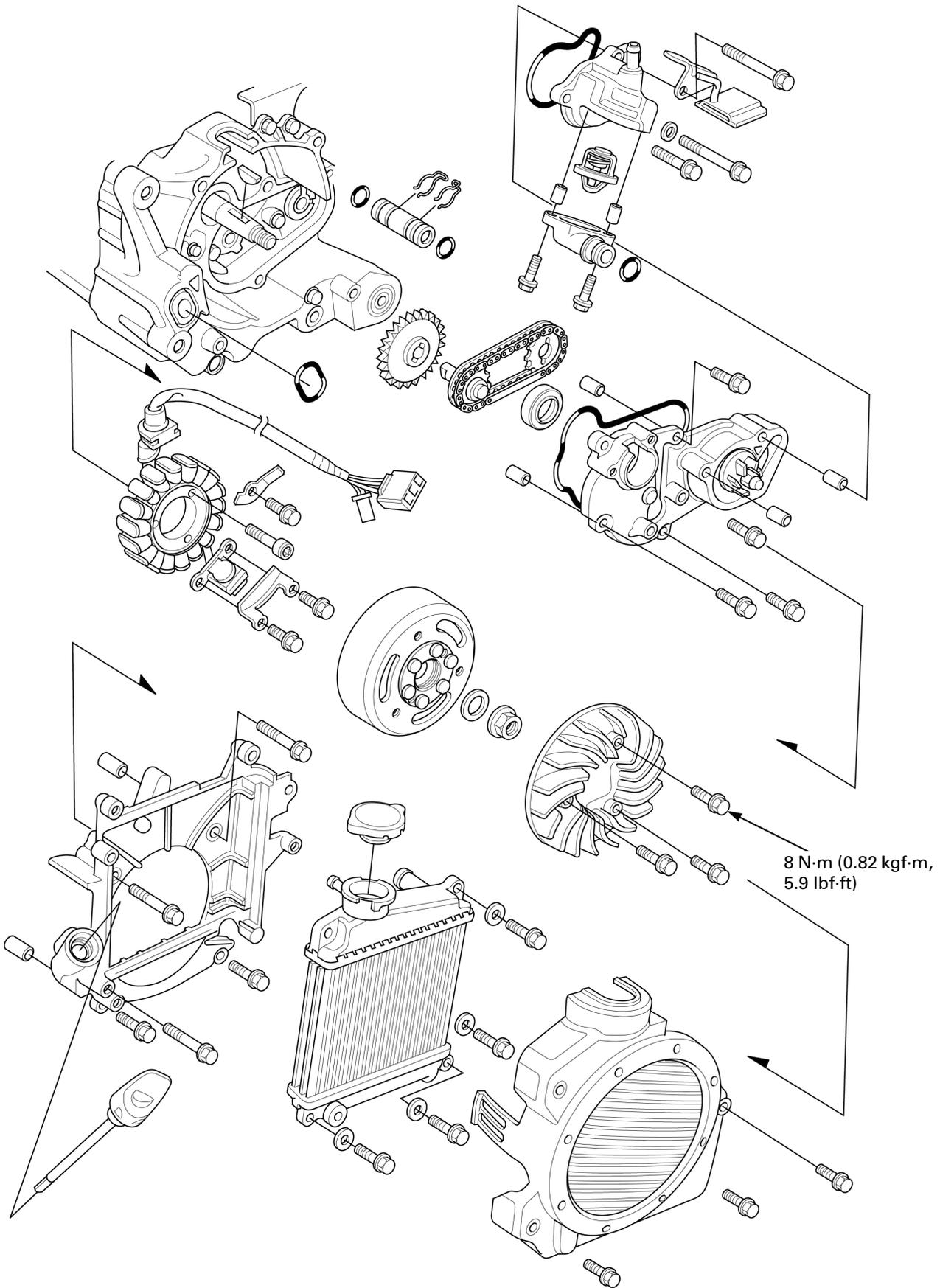
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# 7. COOLING SYSTEM

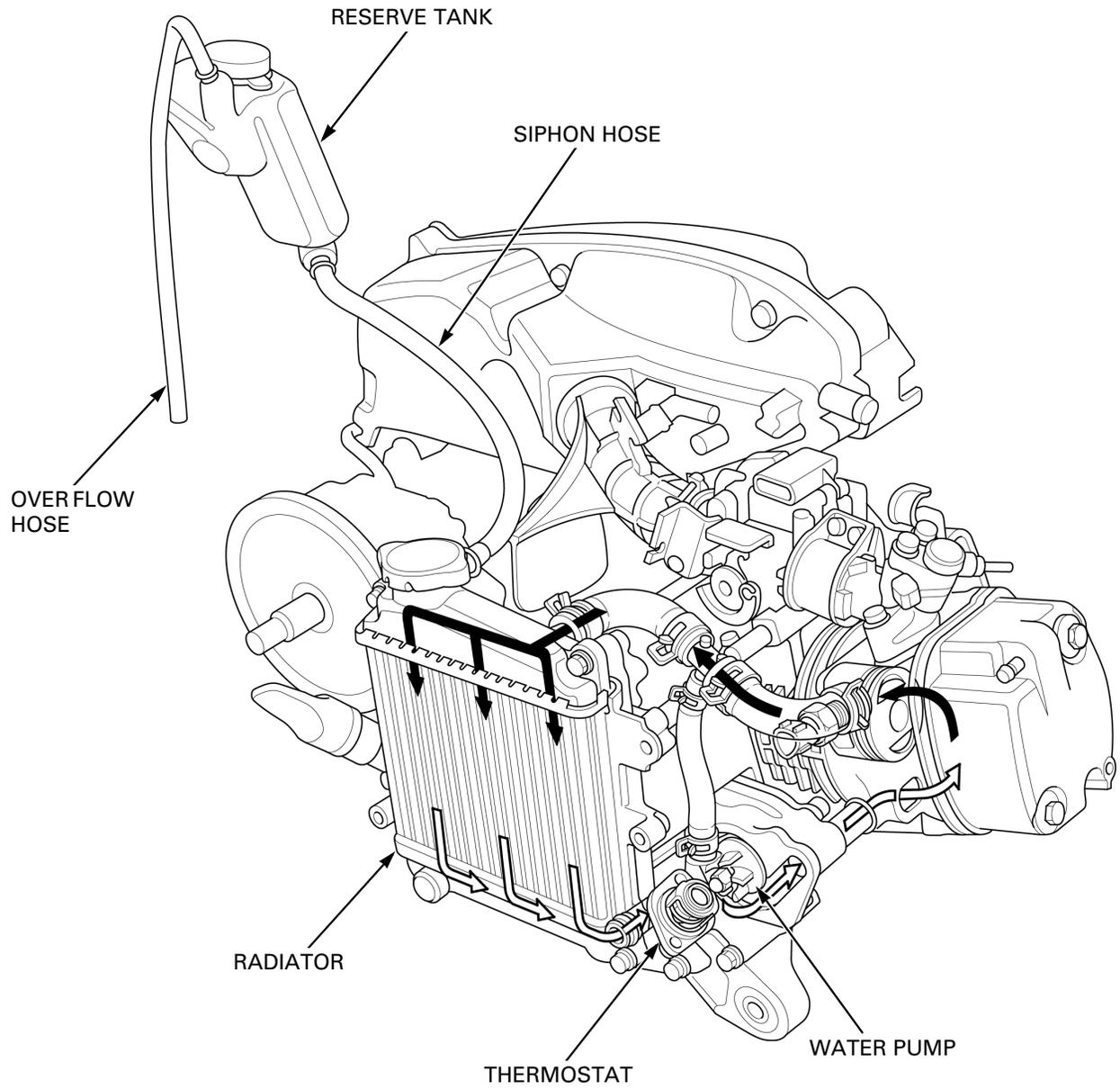
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COMPONENT LOCATION .....	7-2	RADIATOR .....	7-10
SYSTEM FLOW PATTERN .....	7-3	COOLING FAN .....	7-11
SERVICE INFORMATION .....	7-4	RADIATOR RESERVE TANK .....	7-12
TROUBLESHOOTING .....	7-6	THERMOSTAT .....	7-13
SYSTEM TESTING .....	7-7	WATER PUMP .....	7-15
COOLANT REPLACEMENT .....	7-8		

COMPONENT LOCATION



SYSTEM FLOW PATTERN



## COOLING SYSTEM

# 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

- Use only genuine Honda PRE-MIX COOLANT containing corrosion inhibitors, specially recommended for aluminum engines when adding or replacing the coolant.  
Genuine Honda PRE-MIX COOLANT is excellent at preventing corrosion and overheating. The effects last for up to 2 years.
- The coolant should be inspected and replaced properly by following the maintenance schedule (page 4-4).
- Use any genuine Honda PRE-MIX COOLANT without diluting with water.
- DO NOT use non-ethylene glycol coolant, tap water, nor mineral water when adding or replacing the coolant.  
Use of improper coolant may cause damage, such as corrosion in the engine, blockage of the cooling passage or the radiator and premature wear of the water pump seal.
- Add coolant at the reserve tank. Do not remove the radiator cap except when refilling or draining 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.
- For coolant temperature gauge/ECT sensor information (page 21-9).
- This model utilizes ECT sensor that has two thermistors, for coolant temperature meter and PGM-FI systems.
  - Refer to the ECT sensor for coolant temperature meter inspection (page 21-9).
  - Refer to the ECT sensor for PGM-FI systems inspection (page 6-52).

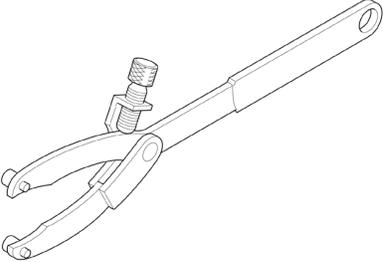
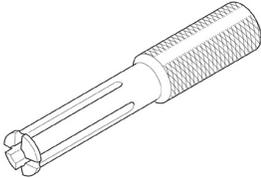
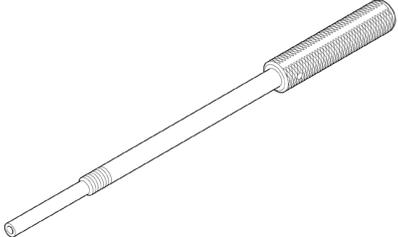
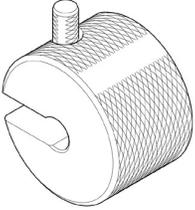
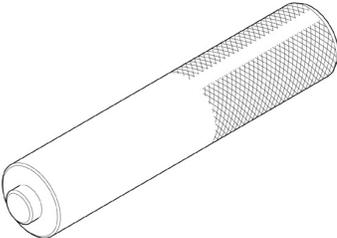
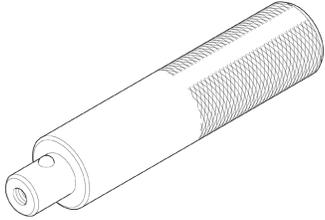
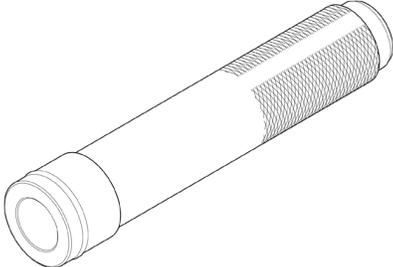
## SPECIFICATIONS

ITEM		SPECIFICATIONS
Coolant capacity	Radiator and engine	0.41 liter (0.43 US qt, 0.36 Imp qt)
	Reserve tank	0.10 liter (0.11 US qt, 0.09 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	74.5 – 77.5 °C (166 – 172 °F)
	Fully open	85 °C (185 °F)
	Valve lift	3.5 mm (0.1 in) minimum
Recommended coolant		Honda PRE-MIX COOLANT

## TORQUE VALUES

Radiator drain bolt	1 N·m (0.10 kgf·m, 0.7 lbf·ft)
Cooling fan bolt	8 N·m (0.82 kgf·m, 5.9 lbf·ft)
Water pump impeller	10 N·m (1.0 kgf·m, 7 lbf·ft)

**TOOLS**

<p>Universal holder 07725-0030000</p> 	<p>Bearing remover head, 12 mm 07936-1660110</p> 	<p>Bearing remover shaft, 12 mm 07936-1660120</p> 
<p>Remover weight 07741-0010201</p> 	<p>Bearing driver 07945-GC80000</p> 	<p>Driver 07749-0010000</p> 
<p>Attachment, 24 x 26 mm 07746-0010700</p> 	<p>Mechanical seal driver attachment 07945-4150400</p> 	<p>Inner driver, 22 mm 07746-0020100</p> 
<p>Attachment, 32 x 35 mm 07746-0010100</p> 		

## COOLING SYSTEM

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### TROUBLESHOOTING

- In case the ECM detects the abnormal rising of engine coolant temperature, ECM turns on or blinks the MIL (Malfunction Indicator Lamp). Check the engine temperature before troubleshooting the ECT sensor (page 7-6).

#### Engine temperature too high

- Faulty radiator cap
- Insufficient coolant
- Passage blocked in radiator, hoses or water jacket
- Air in system
- Faulty water pump
- Thermostat stuck closed

#### Engine temperature too low

- Thermostat stuck open

#### Coolant leak

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

## SYSTEM TESTING

### RADIATOR CAP/SYSTEM PRESSURE INSPECTION

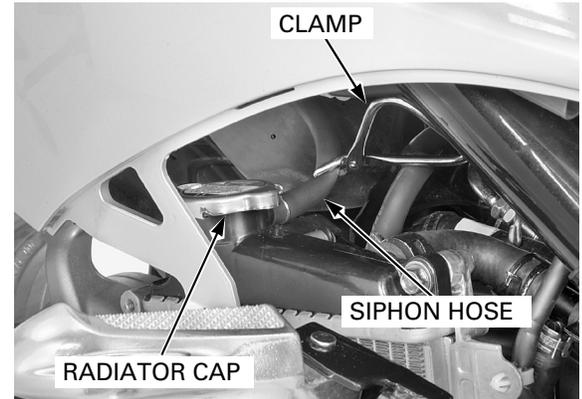
Remove the following:

- Radiator cover (page 3-13)
- Right side body cover (page 3-4)

Pinch the siphon hose using a hose clamp.

Remove the radiator cap.

*The engine must be cool before removing the radiator cap.*

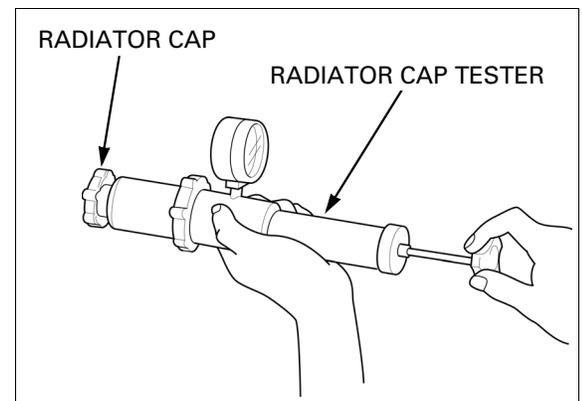


Wet the sealing surfaces of the cap, then install the cap onto the tester.

Pressurize the radiator cap using the tester. Replace the radiator cap if it does not hold pressure, or if relief pressure is too high or too low. The cap must hold the specified pressure for at least 6 seconds.

#### RADIATOR CAP RELIEF PRESSURE:

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



Install the tester to the radiator.

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

#### NOTICE

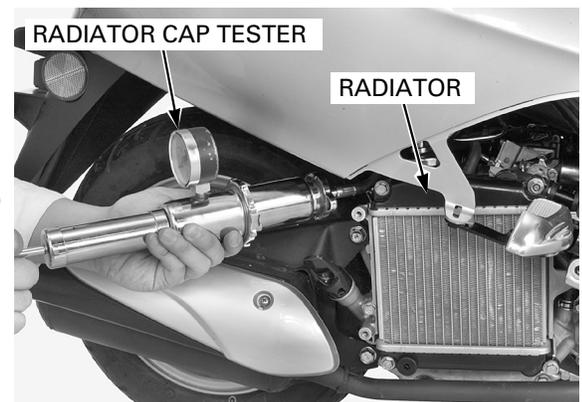
*Excessive pressure can damage the cooling system components. Do not exceed 137 kPa (1.4 kgf/cm<sup>2</sup>, 20 psi).*

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

Remove the tester and install the radiator cap. Remove the hose clamp from the siphon hose.

Install the following:

- Radiator cover (page 3-13)
- Right side body cover (page 3-4)



## COOLING SYSTEM

# COOLANT REPLACEMENT

### REPLACEMENT/AIR BLEEDING

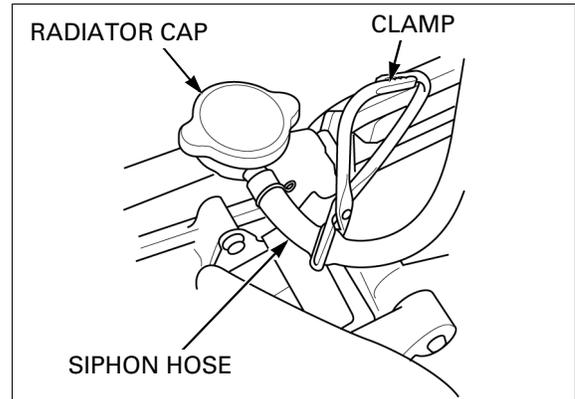
Remove the following:

- Radiator cover (page 3-13)
- Luggage box (page 3-8)

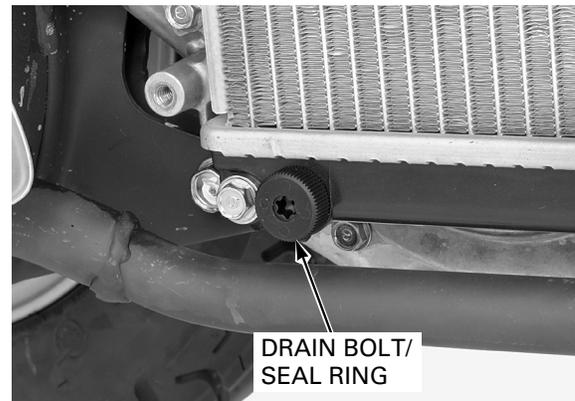
Pinch the siphon hose using a hose clamp.

Remove the radiator cap.

Disconnect the siphon hose from the radiator.  
Remove the hose clamp and drain the coolant into the approved pan, then connect the siphon hose to the radiator.



Remove the drain bolt, seal ring and drain the coolant from the radiator.



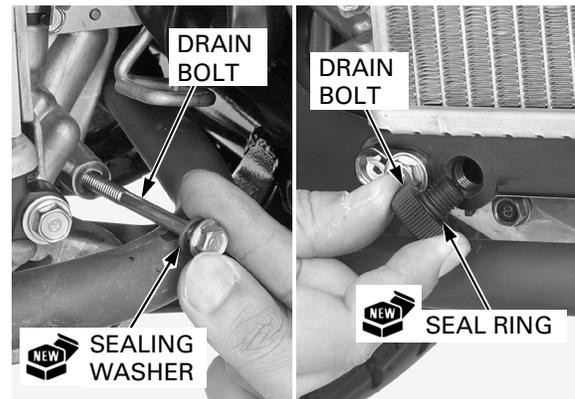
Remove the drain bolt with sealing washer from the water pump cover and drain the coolant from the engine.



Reinstall the drain bolt with a new sealing washer onto the water pump cover.

Reinstall the drain bolt with a new seal ring onto the radiator and tighten the bolt to the specified torque.

**TORQUE: 1 N·m (0.10 kgf·m, 0.7 lbf·ft)**



**NOTICE**

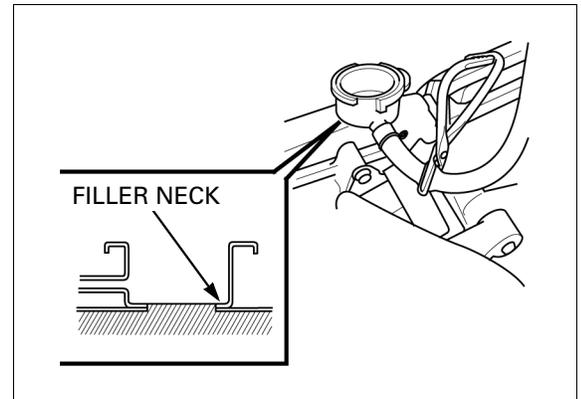
Use only genuine Honda PRE-MIX COOLANT containing corrosion inhibitors recommended for aluminum engines when adding or replacing the coolant.

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

**RECOMMENDED COOLANT:  
Honda PRE-MIX COOLANT**

Bleed air from the system as follows:

1. Start the engine and let it idle for 2 – 3 minutes.
2. Snap the throttle three or four times to bleed air from the system.
3. Stop the engine and add coolant up to the filler neck.
4. Reinstall the radiator cap.



Unlock the seat with ignition key.  
Open the seat.

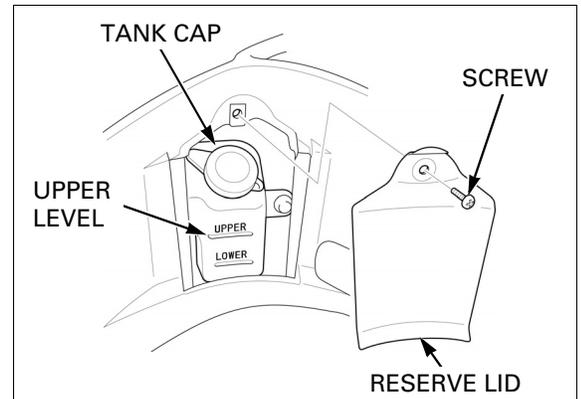
Remove the screw, reserve lid and reserve tank cap.

Fill the reserve tank with the recommended coolant to the upper level line.

**RECOMMENDED COOLANT:  
Honda PRE-MIX COOLANT**

- Bleeding air from the system completely takes time, so check the coolant level of the reserve tank frequently after draining the coolant.

Install the removed parts in the reverse order of removal.



## COOLING SYSTEM

### RADIATOR

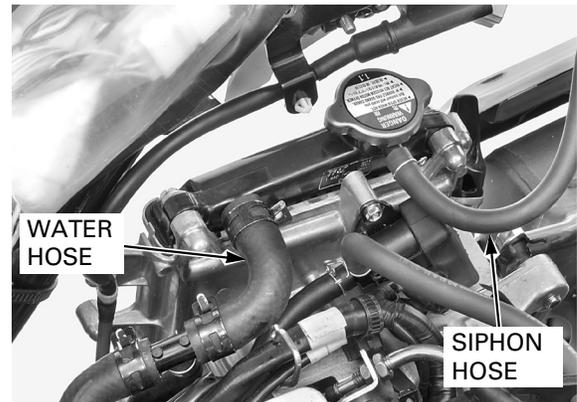
#### REMOVAL

Drain the coolant (page 7-8).

Remove the following:

- Right side body cover (page 3-4)
- Luggage box (page 3-8)

Disconnect the siphon hose and water hose from the radiator.

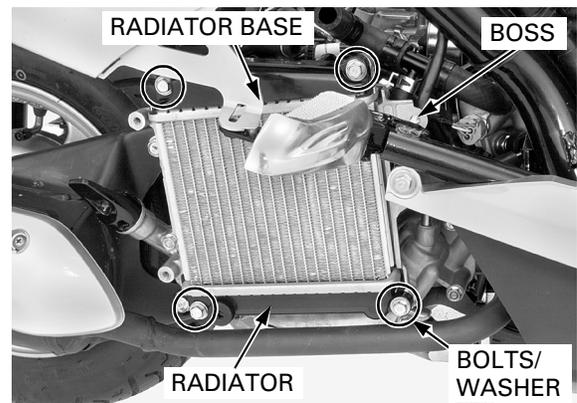


Remove the four radiator mounting bolts/washer.

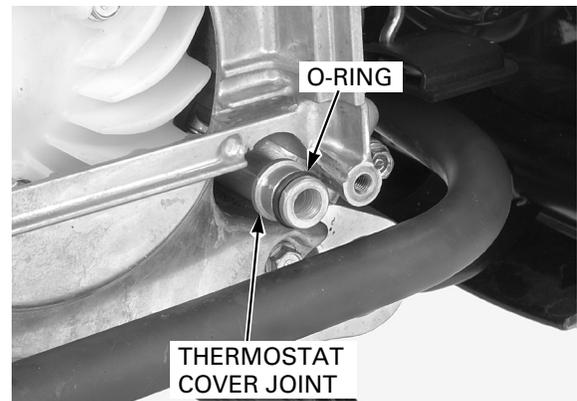
*Be careful not to damage the radiator fins.*

Release the spark plug wire band boss from the radiator base.

Remove the radiator from the radiator base.



Remove the O-ring from the thermostat cover joint.



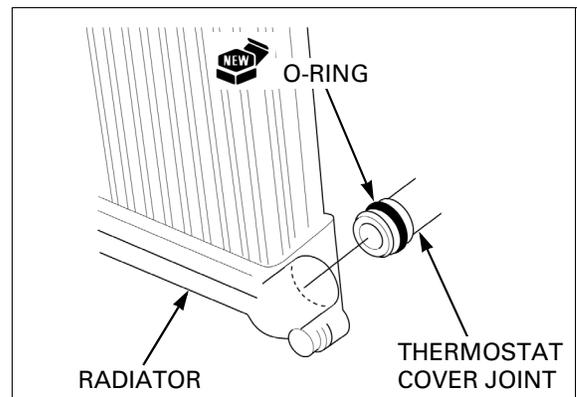
#### INSTALLATION

*Do not apply engine oil to this O-ring.*

Install the new O-ring to the thermostat cover joint groove.

Install the radiator to the thermostat cover and radiator base.

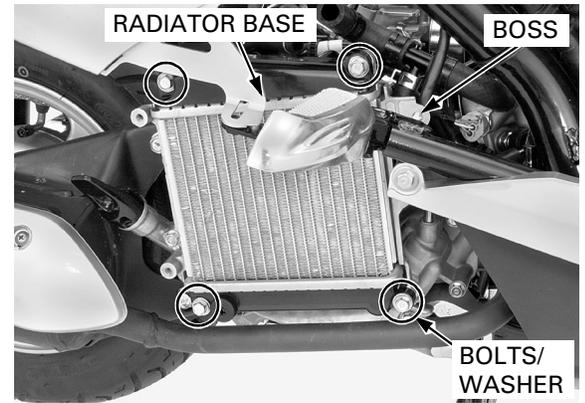
- When installing the radiator to the thermostat cover, be careful not to pinch the O-ring.



*Be careful not to damage the radiator fins.*

Install the four radiator mounting bolts/washer, and tighten the bolts.

Install the spark plug wire band boss from the radiator base.



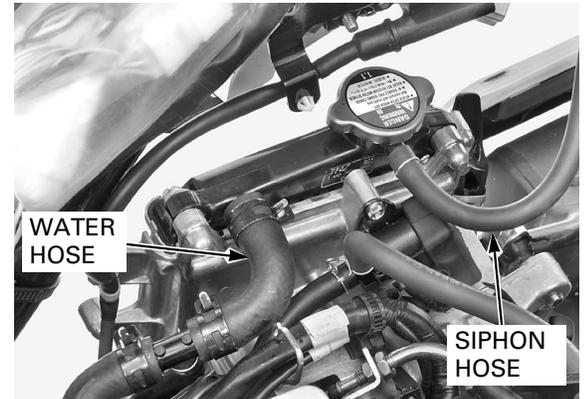
Connect the siphon hose and water hose to the radiator.

Fill and bleed the cooling system (page 7-8).

After installation, make sure the coolant does not leak.

Install the following:

- Luggage box (page 3-8)
- Right side body cover (page 3-4)



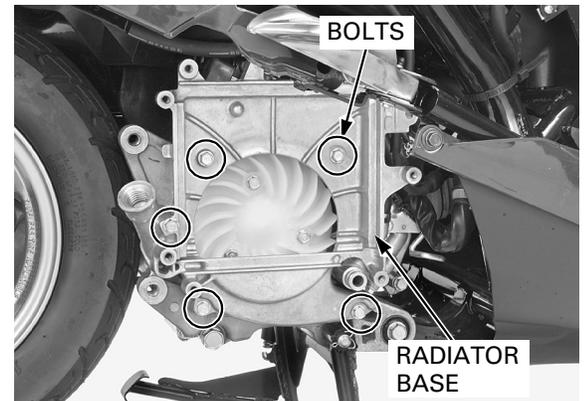
## COOLING FAN

### REMOVAL

Remove the following:

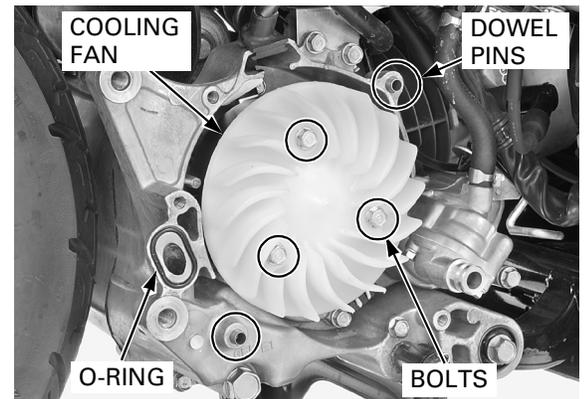
- Oil filler cap/dipstick (page 4-10)
- Exhaust pipe/muffler (page 3-13)
- PCV solenoid valve (page 6-58)
- Radiator (page 7-10)

Remove the bolts and radiator base.



Remove the following:

- O-ring
- Dowel pins
- Three bolts
- Cooling fan



## COOLING SYSTEM

### INSTALLATION

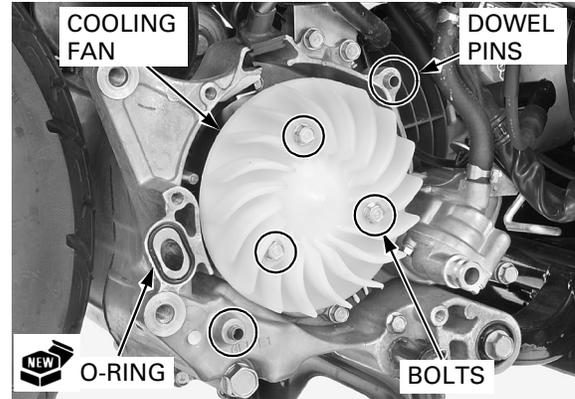
Install the cooling fan.

Install and tighten the bolts to the specified torque.

**TORQUE: 8 N·m (0.82 kgf·m, 5.9 lbf·ft)**

Install the dowel pins.

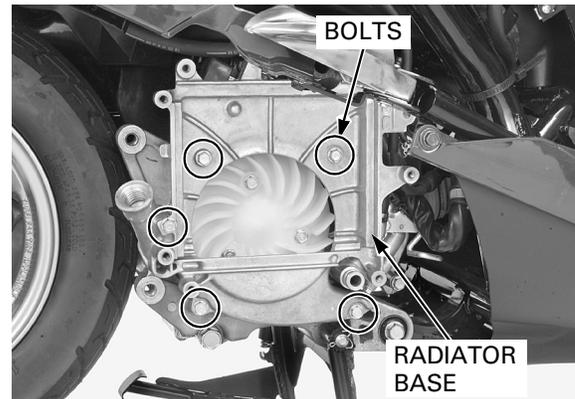
Install a new O-ring.



Install the radiator base and bolts.

Install the following:

- Radiator (page 7-10)
- PCV solenoid valve (page 6-58)
- Exhaust pipe/muffler (page 3-13)
- Oil filler cap/dipstick (page 4-11)



## RADIATOR RESERVE TANK

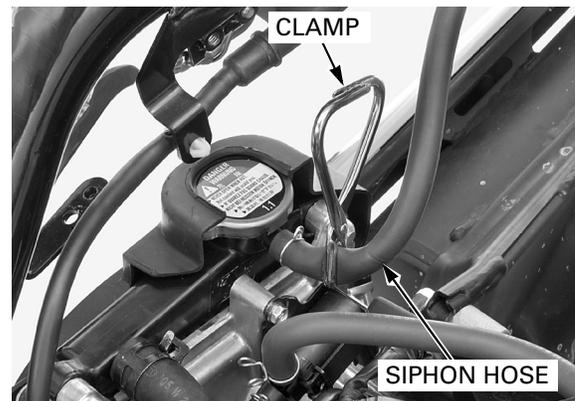
### REMOVAL/INSTALLATION

Remove the luggage box (page 3-8).

Pinch the siphon hose using a hose clamp.

Disconnect the siphon hose from the radiator.

Remove the hose clamp and drain the coolant into the approved pan.



Disconnect the reserve tank overflow hose.

Remove the bolts and reserve tank.

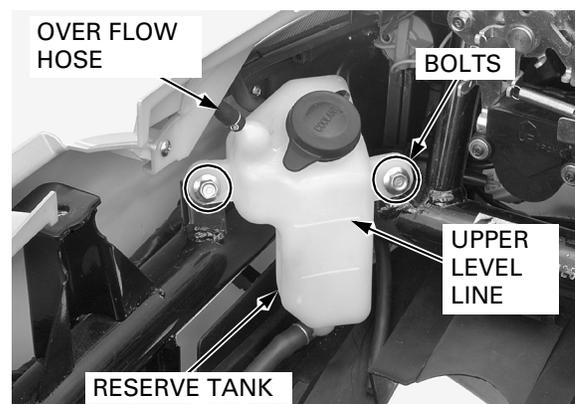
Installation is in the reverse order of removal.

Fill the reserve tank with the recommended coolant to the upper level line.

**RECOMMENDED COOLANT:**  
**Honda PRE-MIX COOLANT**

After installation, make sure the coolant does not leak.

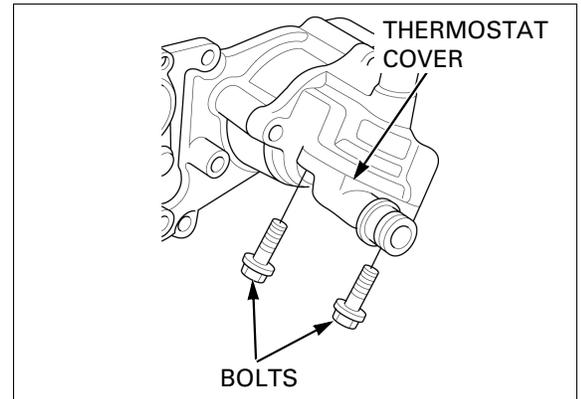
*Make sure that the hose clips are installed in the correct direction (page 1-17).*



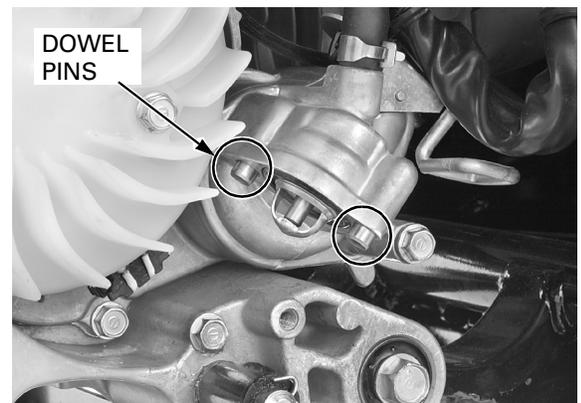
# THERMOSTAT

## REMOVAL

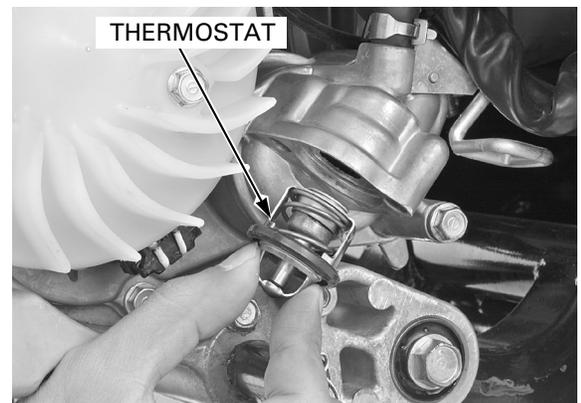
Remove the radiator base (page 7-11).  
Remove the bolts and thermostat cover.



Remove the dowel pins.



Remove the thermostat.



## COOLING SYSTEM

### INSPECTION

Visually inspect the thermostat for damage.  
Replace the thermostat if the valve stays open at room temperature.

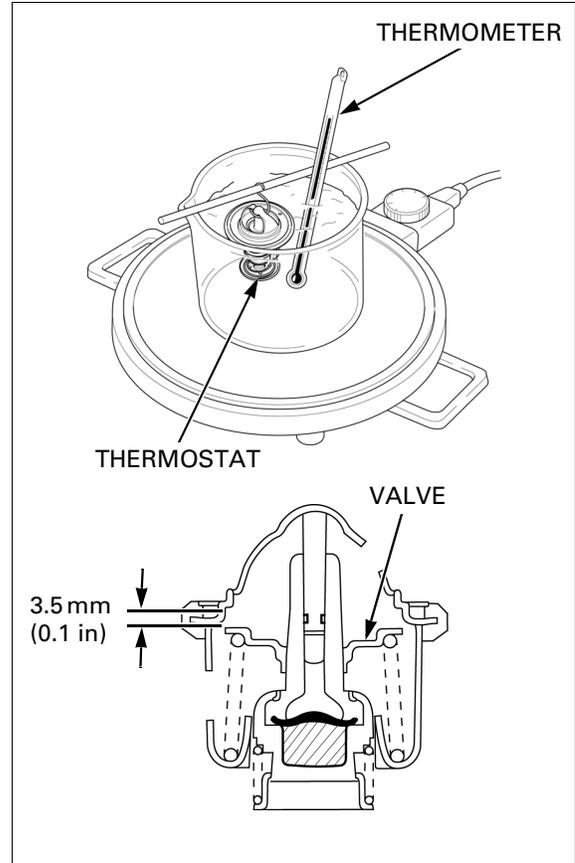
*Do not let the thermostat or thermometer touch the pan, or you will get false readings.*

Heat a pan of water with an electric heating element to operating temperature for 5 minutes.  
Suspend the thermostat in the heated water to check its operation.

**THERMOSTAT BEGINS TO OPEN:**  
**74.5 – 77.5 °C (166 – 172 °F)**

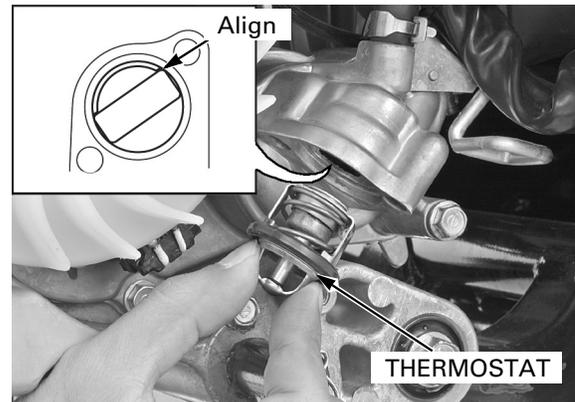
**VALVE LIFT:**  
**3.5 mm (0.1 in) minimum at 85 °C (185 °F)**

Replace the thermostat if it responds at temperatures other than those specified.

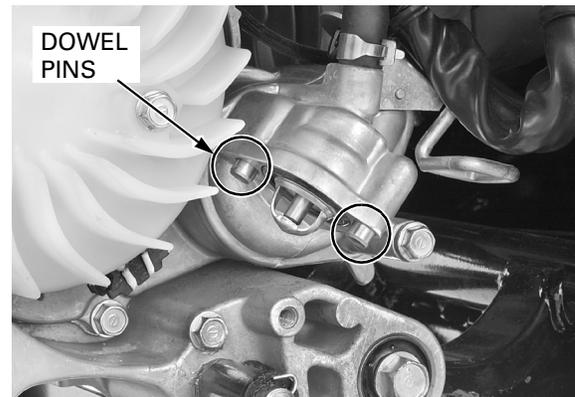


### INSTALLATION

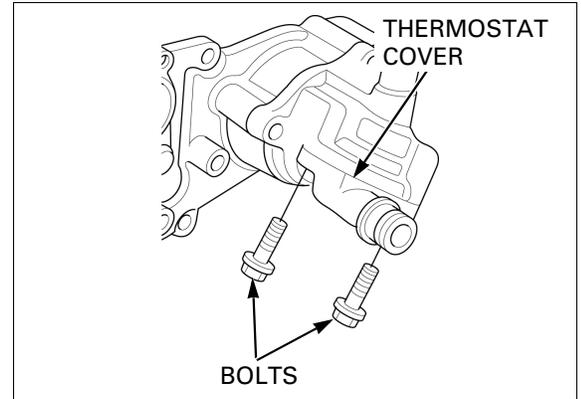
Install the thermostat by aligning its body (spring stopper) with the thermostat housing slot.



Install the dowel pins.



Install the thermostat cover and bolts, tighten them.  
Install the radiator base (page 7-12).



## **WATER PUMP**

### **MECHANICAL SEAL INSPECTION**

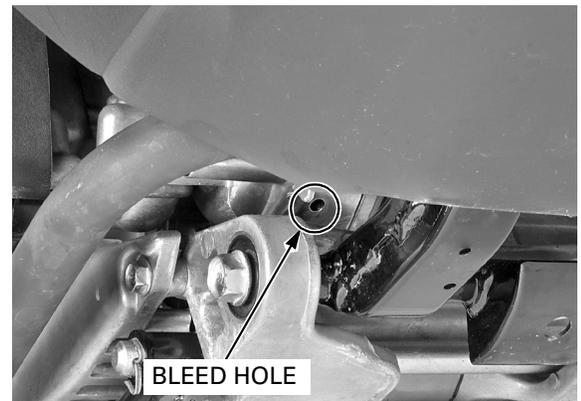
Check for signs of seal leakage.

If water leaks through the bleed hole, replace the mechanical seal (page 7-22).

If oil leaks through the bleed hole, replace the oil seal (page 7-22).

**NOTE:**

A small amount of "weeping" from the inspection hole is normal.



### **REMOVAL**

- Water pump can be serviced with the engine installed on the frame.

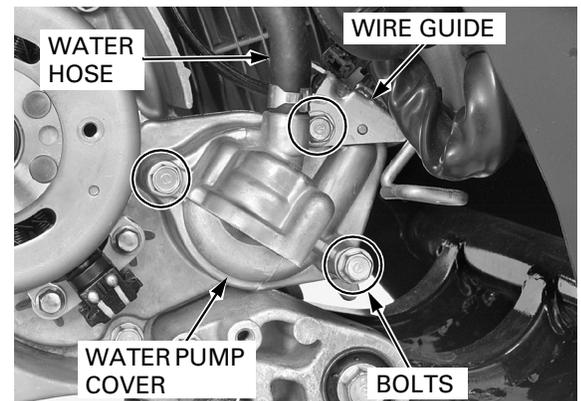
Drain the engine oil (page 4-11).

Remove the following:

- Cooling fan (page 7-11)
- Thermostat (page 7-13)

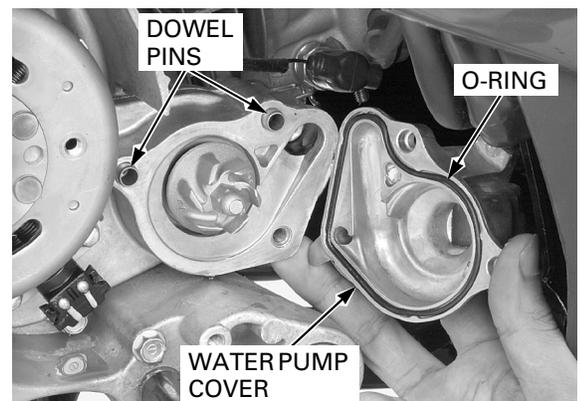
Disconnect the water hose from the water pump cover.

Remove the bolts, wire guide and water pump cover.



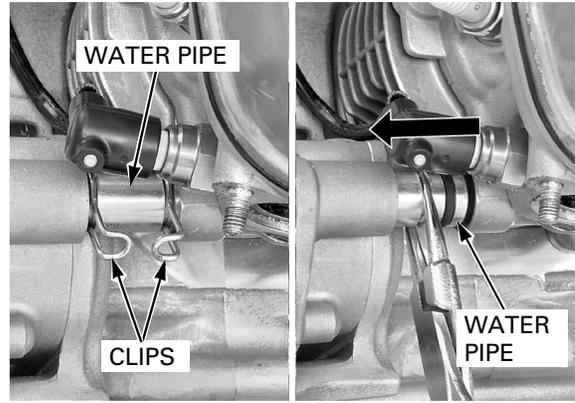
Remove the O-ring from the water pump cover.

Remove the dowel pins.



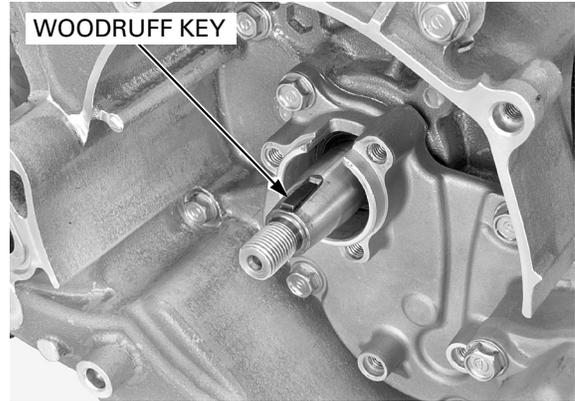
## COOLING SYSTEM

Unhook the clips from the water pipe and slide the water pipe to the stator base side.

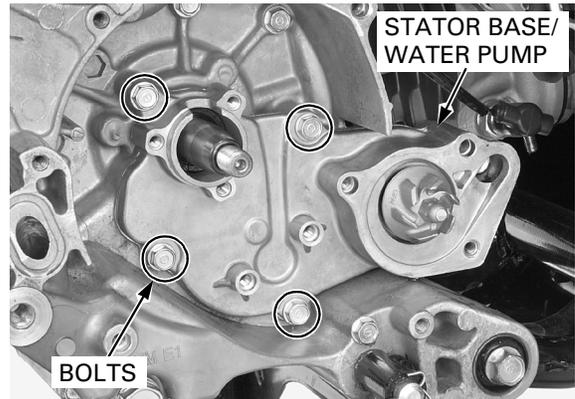


Remove the stator and ignition pulse generator (page 13-4).

Remove the woodruff key.

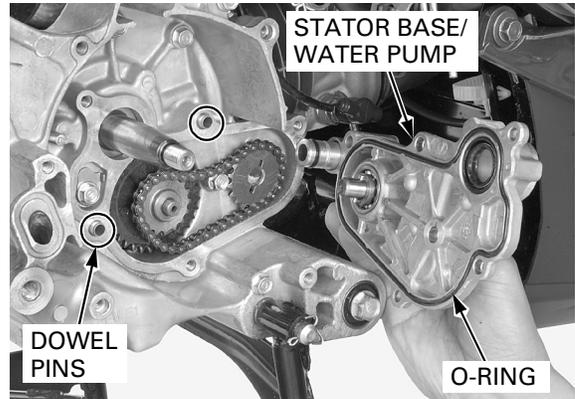


Remove the bolts and the stator base/water pump.

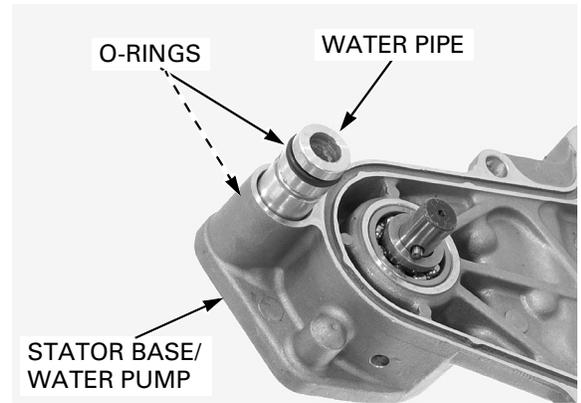


Remove the O-ring from the stator base/water pump.

Remove the dowel pins.

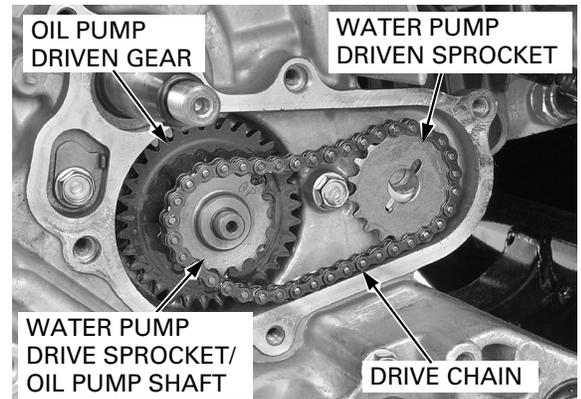


Remove the water pipe and O-rings from the stator base/water pump.



Remove the following:

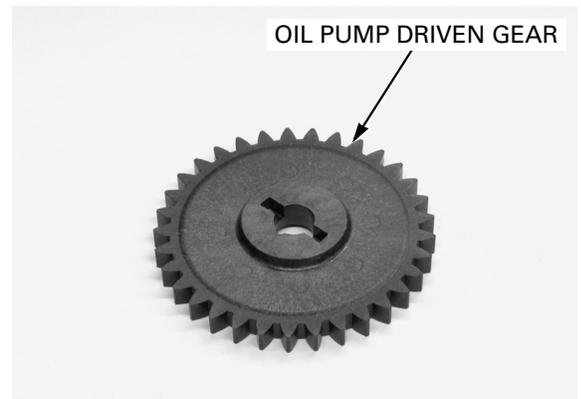
- Water pump drive sprocket/oil pump shaft
- Drive chain
- Water pump driven sprocket
- Oil pump driven gear



## INSPECTION

### OIL PUMP DRIVEN GEAR

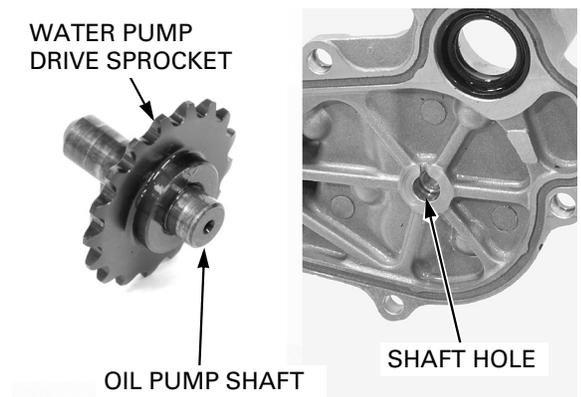
Check the oil pump driven gear teeth for wear or damage.



### WATER PUMP DRIVE SPROCKET/OIL PUMP SHAFT

Check the water pump drive sprocket teeth for wear or damage.

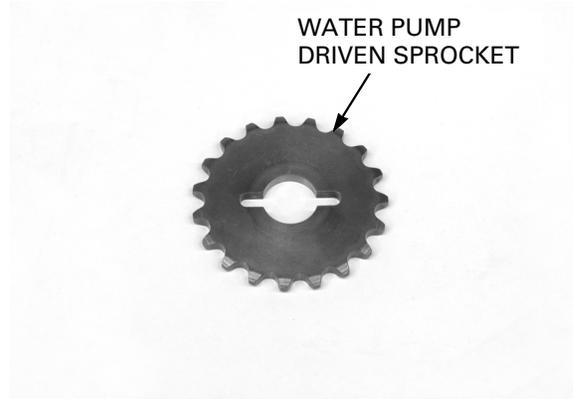
Check the oil pump shaft and shaft hole of the stator base for wear or damage.



## COOLING SYSTEM

### WATER PUMP DRIVEN SPROCKET

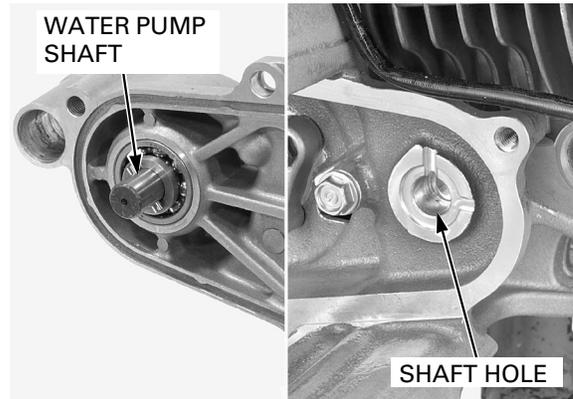
Check the water pump driven sprocket teeth for wear or damage.



WATER PUMP  
DRIVEN SPROCKET

### WATER PUMP SHAFT

Check the water pump shaft and shaft hole of the right crankcase for wear or damage.



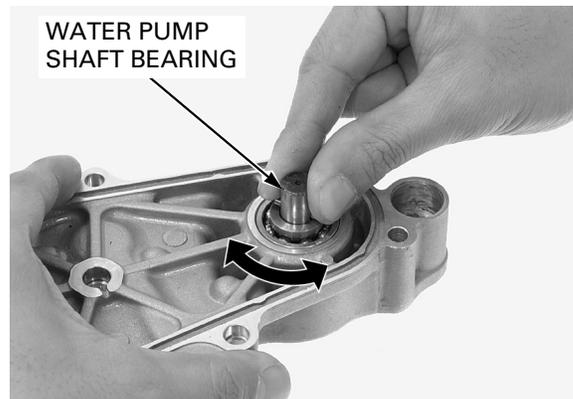
WATER PUMP  
SHAFT

SHAFT HOLE

### PUMP SHAFT BEARING

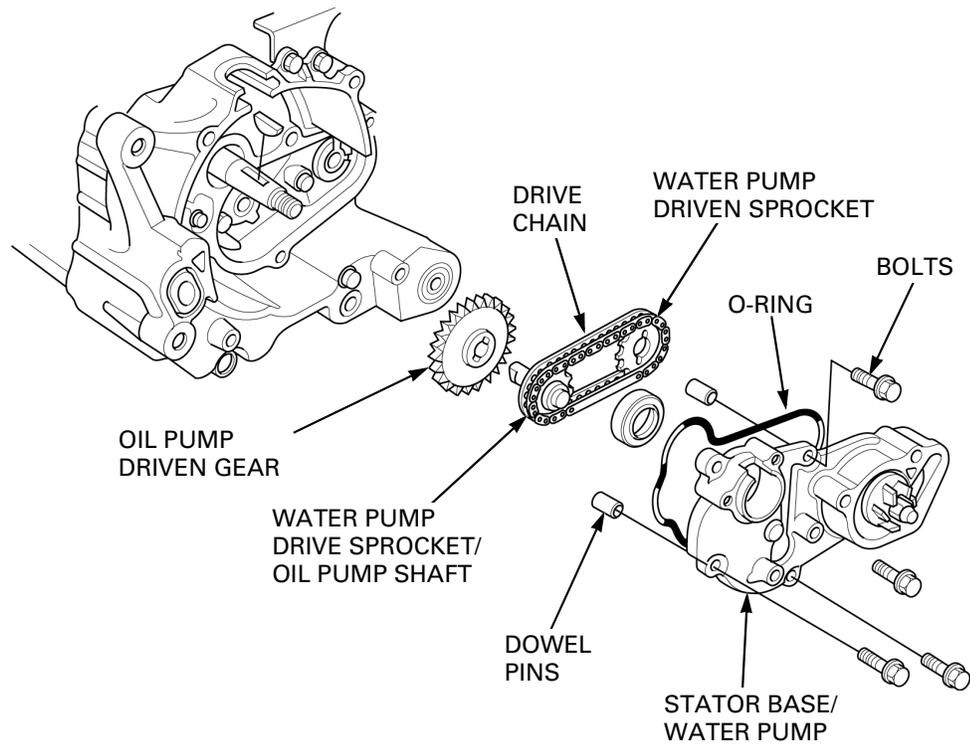
Turn the water pump shaft with your finger. The bearing should turn smoothly and quietly. Also check that the bearing inner race fits tightly on the pump shaft and the bearing outer race fits tightly on the water pump/stator base.

Replace the water pump bearing if the bearing does not turn smoothly, quietly, or if it fits loosely on the pump shaft or stator base/water pump (page 7-22).



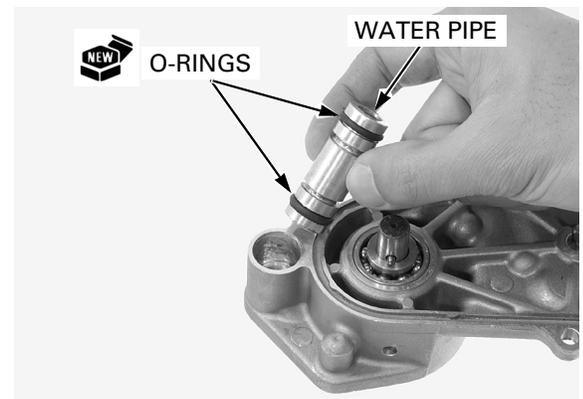
WATER PUMP  
SHAFT BEARING

INSTALLATION



Install the new O-rings into the groove of the water pipe.

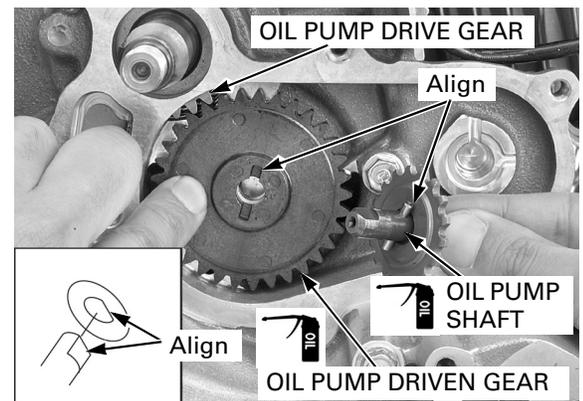
Install the water pipe into the stator base/water pump.



Apply engine oil to the oil pump shaft.  
Apply engine oil to the oil pump driven gear teeth.

Set the oil pump driven gear to the drive gear of the crankshaft as shown.

Install the water pump drive sprocket/oil pump shaft by aligning the oil pump shaft cut-out with the oil pump cut-out, and the pin groove of the oil pump driven gear with the pin of the oil pump shaft.

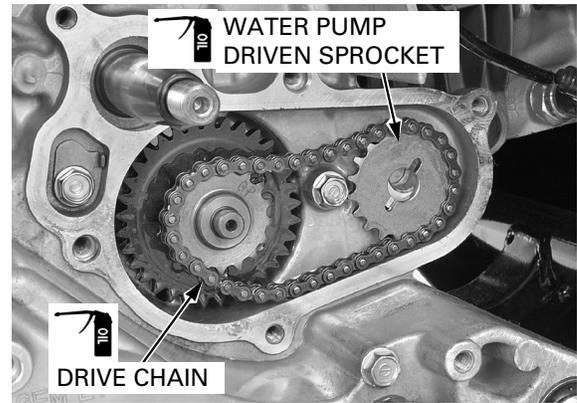


## COOLING SYSTEM

Apply engine oil to the drive chain whole surface and water pump drive/driven sprocket.

Set the drive chain over the water pump drive sprocket and driven sprocket.

Set the water pump driven sprocket as shown.



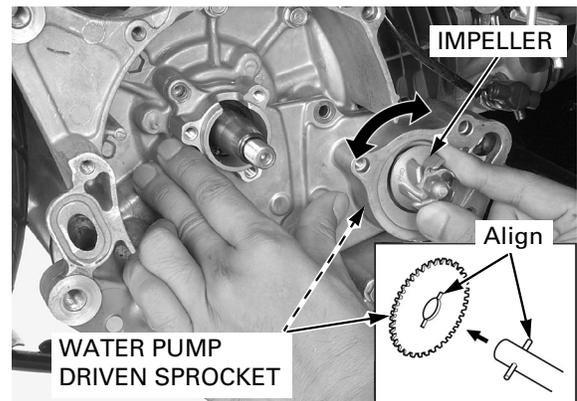
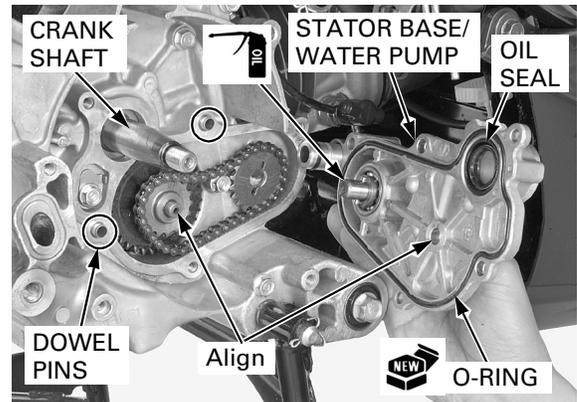
Install a new O-ring into the groove of the stator base/water pump.

Apply engine oil to the water pump shaft.

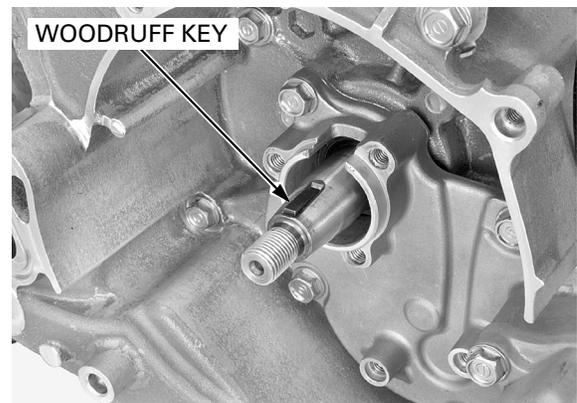
Install the dowel pins.

Install the stator base/water pump to the right crankcase.

1. Pass the crankshaft through the oil seal hole on the stator base/water pump.
2. Align the oil pump shaft with the journal on the stator base/water pump.
3. Align the pin groove of the water pump driven sprocket with the pin of the water pump shaft by rotating the water pump impeller.



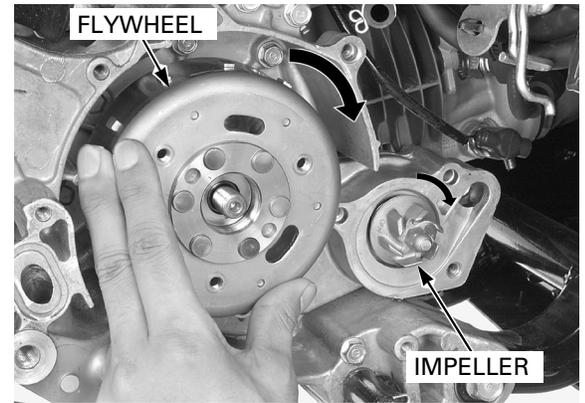
Install the woodruff key into the crankshaft key groove.



Temporarily install the flywheel by aligning the key way in the flywheel with the key on the crankshaft.

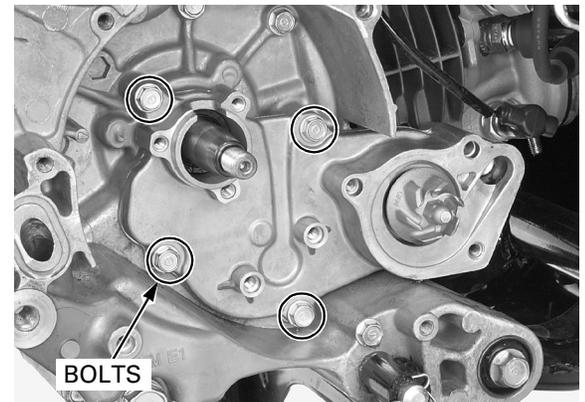
Make sure that the water pump impeller rotates by rotating crankshaft.

After inspection, remove the flywheel.

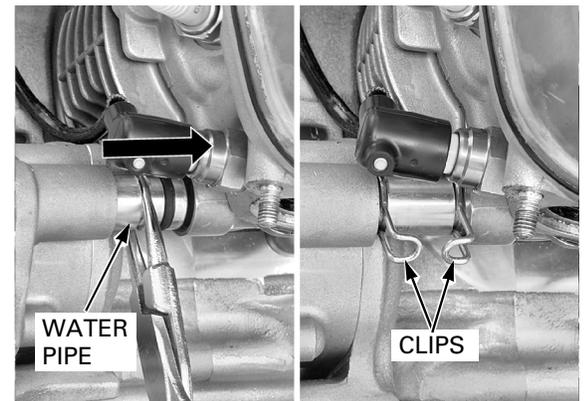


Install and tighten the bolts.

Install the stator/ignition pulse generator and flywheel (page 13-5).

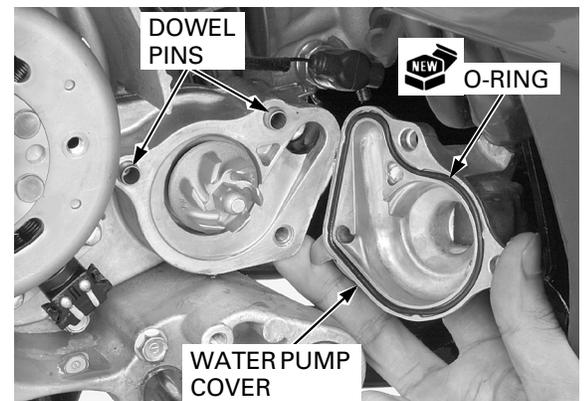


Slide the water pipe into the cylinder.  
Hook the clips to the water pipe grooves.



Install the dowel pins.

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



## COOLING SYSTEM

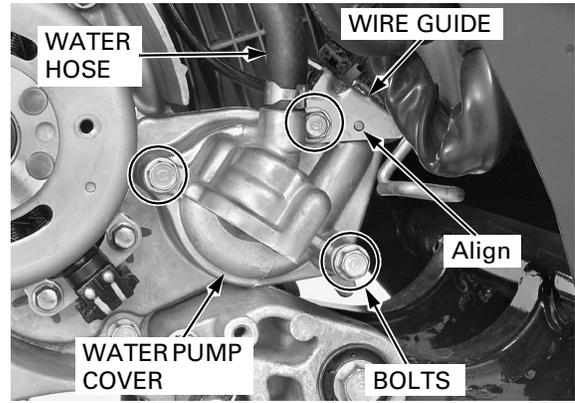
Install the water pump cover.  
Install the wire guide by aligning the pump cover pin with the wire guide hole.  
Tighten the bolts.

Connect the water hose to the water pump cover.

Install the following:

- Thermostat (page 7-14)
- Cooling fan (page 7-12)
- Radiator (page 7-10)

Fill the engine with recommended oil (page 4-10).  
Fill and bleed the cooling system (page 7-8).



## MECHANICAL SEAL/OIL SEAL REPLACEMENT

Remove the water pump cover (page 7-15)

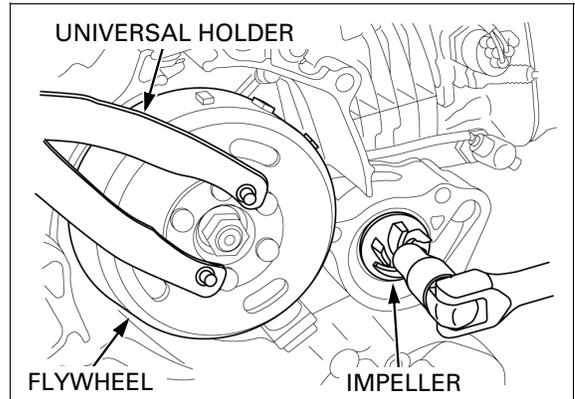
Hold the flywheel with the special tool and loosen the water pump impeller.

### TOOL:

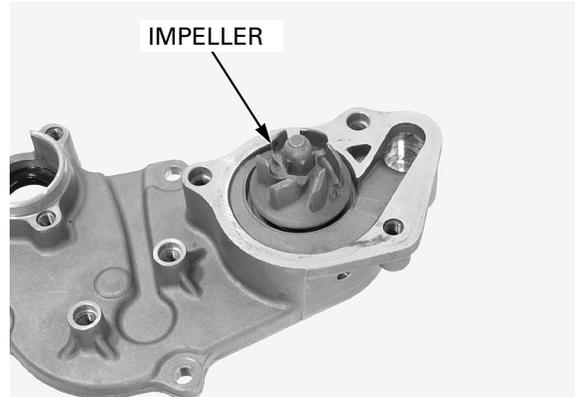
**Universal holder**                      **07725-0030000**

Remove the following:

- Stator and ignition pulse generator (page 13-4)
- Stator base/water pump (page 7-15)



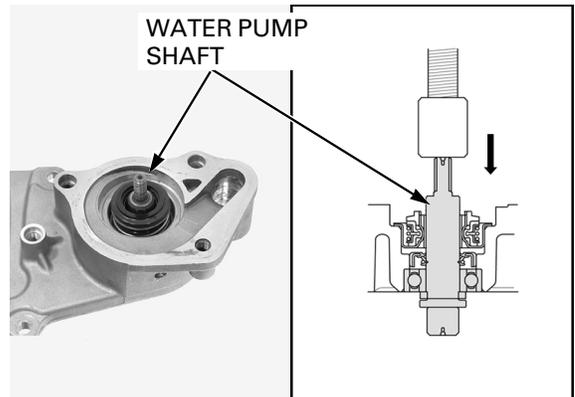
Remove the water pump impeller.



*Be sure to use the hydraulic press. Do not use a hammer.*

*Be careful not to damage the stator base/water pump mating surface.*

Remove the water pump shaft from the stator base/water pump using a hydraulic press.

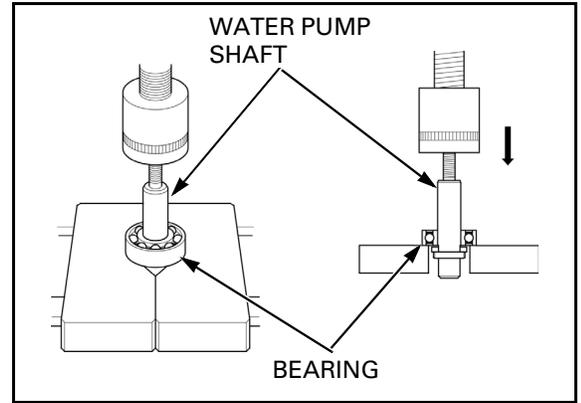


Remove the water pump shaft from the bearing using a hydraulic press.

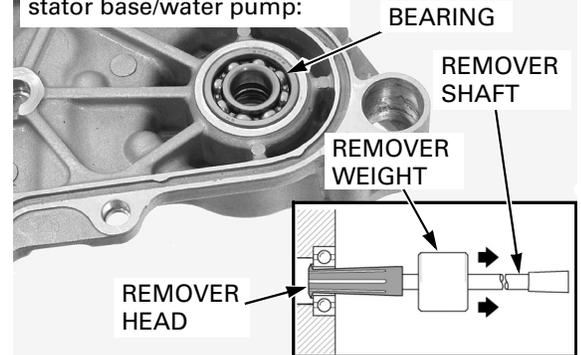
- If the bearing remains in the stator base/water pump, remove the bearing using the special tools.

**TOOLS:**

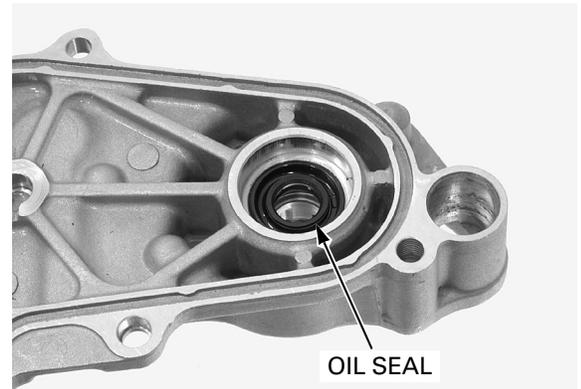
**Bearing remover head, 12mm** 07936-1660110  
**Bearing remover shaft, 12mm** 07936-1660120  
**Remover weight** 07741-0010201



If the bearing remains in the stator base/water pump:



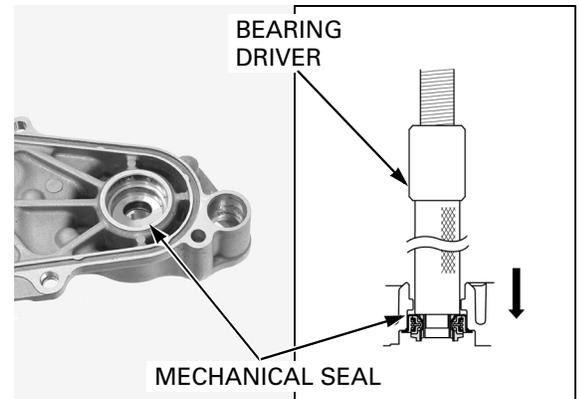
Remove the oil seal from the stator base/water pump.



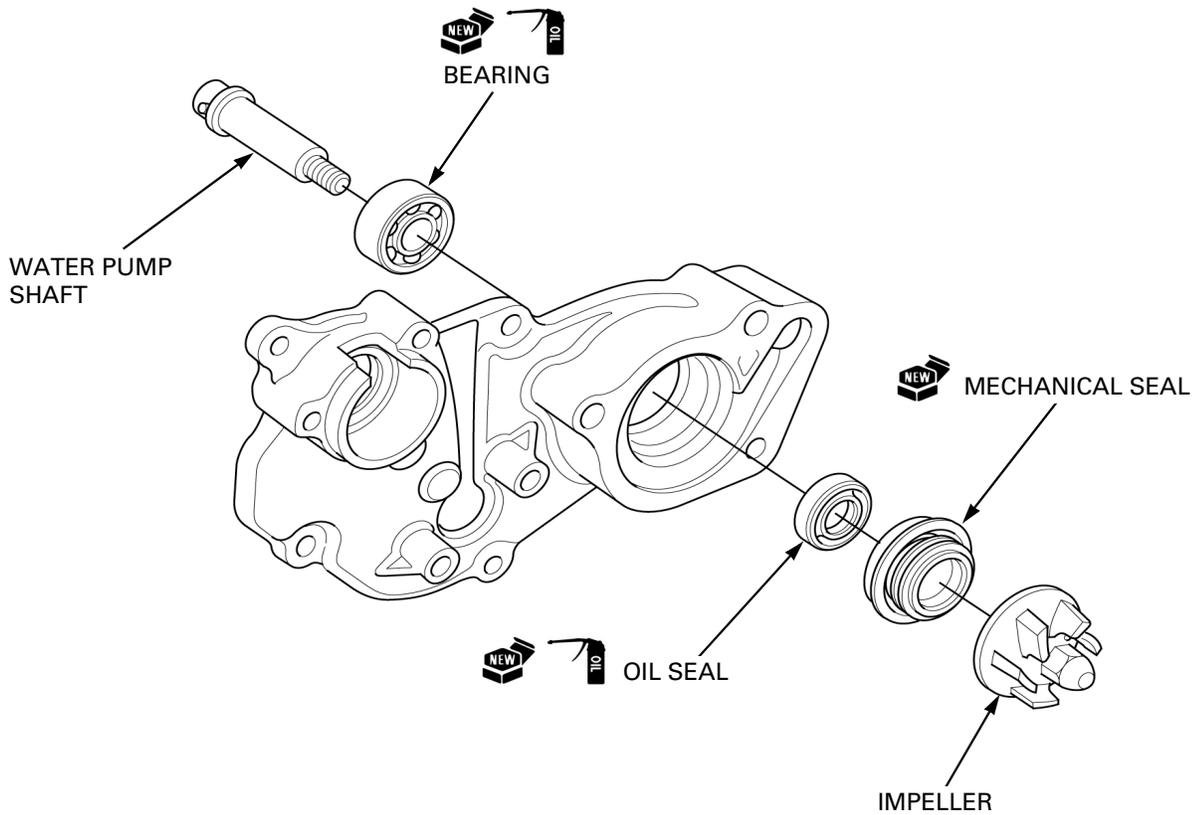
*Be careful not to damage the water pump/stator base mating surface.*

Remove the mechanical seal using a hydraulic press.

**TOOL:**  
**Bearing driver** 07945-GC80000



# COOLING SYSTEM

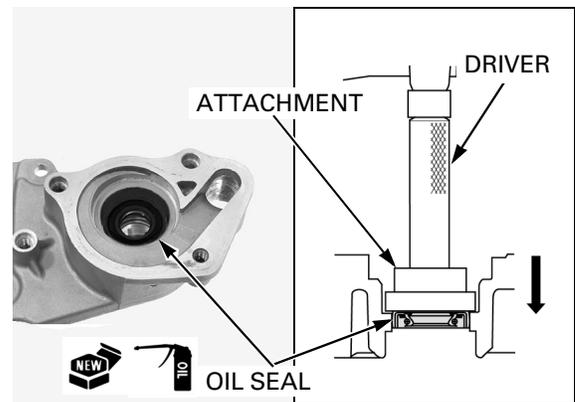


Apply engine oil to a new water pump oil seal lips.

Drive a new water pump oil seal with its marked side facing the impeller until it is flush with the water pump groove.

**TOOLS:**

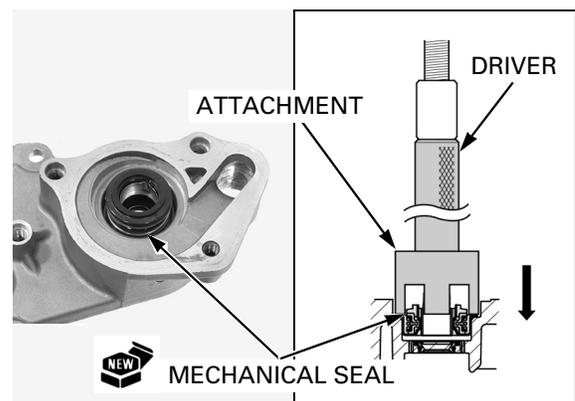
**Driver** 07749-0010000  
**Attachment, 24 x 26 mm** 07746-0010700



Drive a new mechanical seal until it is fully seated on the water pump groove using the special tools and hydraulic press.

**TOOLS:**

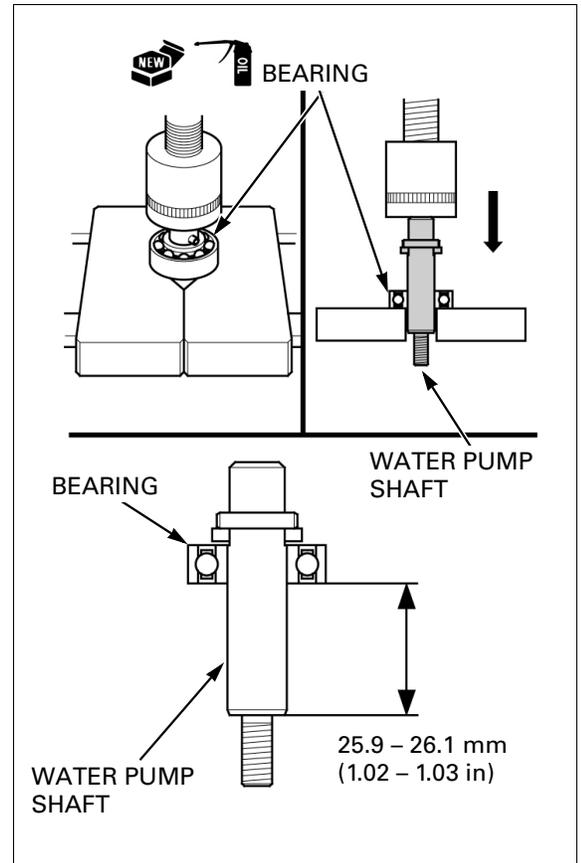
**Driver** 07749-0010000  
**Mechanical seal driver attachment** 07945-4150400



Apply engine oil to the bearing cavity.

Support the inner race of new bearing properly.

Drive the water pump shaft into the new bearing until the distance between the bearing surface and the extended line from the flange of the shaft is 25.9 – 26.1 mm (1.02 – 1.03 in) as shown, using a hydraulic press.



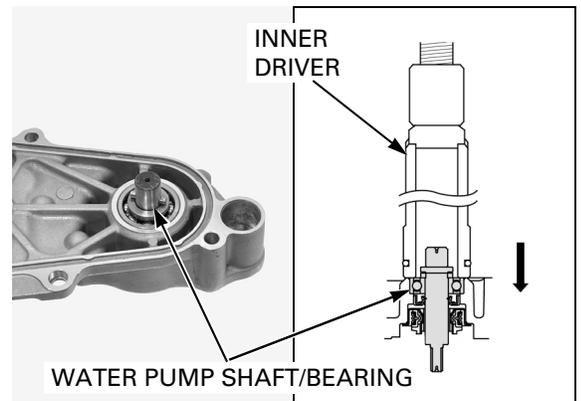
Drive the water pump shaft/bearing squarely until it is fully seated on the stator base/water pump using a hydraulic press.

**TOOL:**

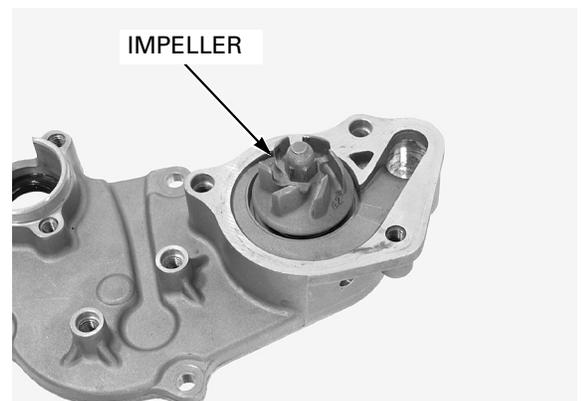
**Inner driver, 22 mm**

**07746-0020100**

After installation, turn the water pump shaft with your finger. The shaft should turn smoothly and quietly. Also check that the bearing inner race fits tightly on the pump shaft and the bearing outer race fits tightly on the stator base/water pump.



Install the water pump impeller, but do not tighten it yet.



## COOLING SYSTEM

Install the following:

- Stator base/water pump (page 7-19)
- Stator/ignition pulse generator and flywheel (page 13-5)

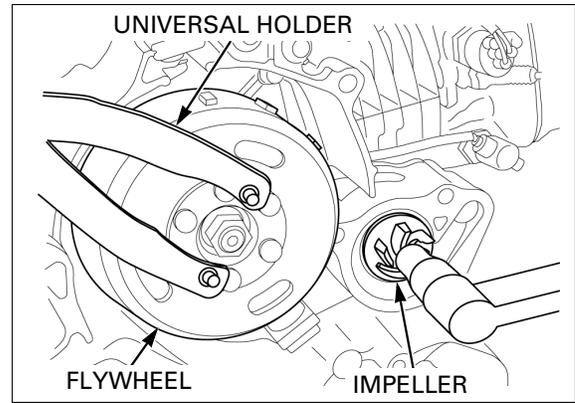
Hold the flywheel with the special tool and tighten the water pump impeller to the specified torque.

**TOOL:**

**Universal holder**                      **07725-003000**

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

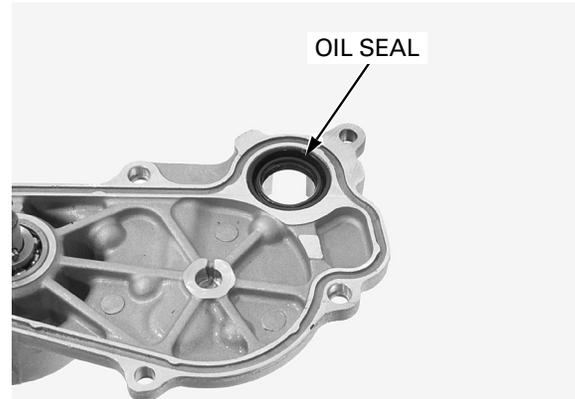
Install the water pump cover (page 7-21).



### CRANKSHAFT OIL SEAL REPLACEMENT

Remove the stator base/water pump (page 7-15).

Remove the crankshaft oil seal from the stator base.



Apply engine oil to a new crankshaft oil seal lips.

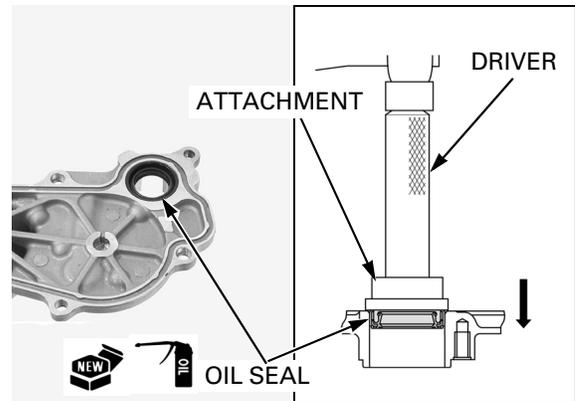
Drive a new crankshaft oil seal with its marked side facing the flywheel until it is flush with the stator base.

**TOOLS:**

**Driver**                                      **07749-001000**

**Attachment, 32 x 35 mm**              **07746-001010**

Install the stator base/water pump (page 7-19).



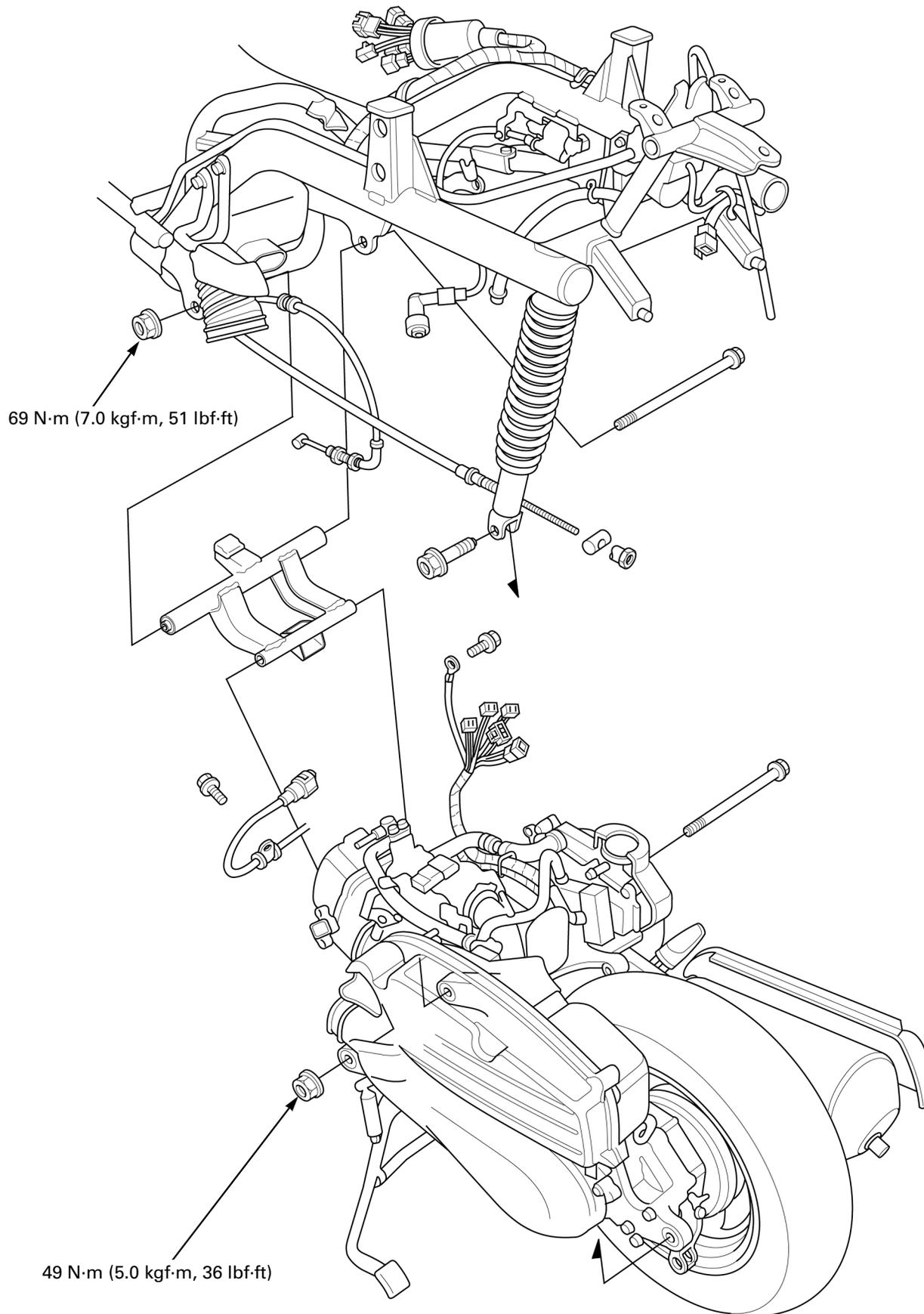
# 8. ENGINE REMOVAL/INSTALLATION

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COMPONENT LOCATION .....	8-2	ENGINE REMOVAL .....	8-4
SERVICE INFORMATION .....	8-3	ENGINE INSTALLATION.....	8-7

# ENGINE REMOVAL/INSTALLATION

## COMPONENT LOCATION



**SERVICE INFORMATION****GENERAL**

- Support the engine using a jack or other adjustable support to ease engine mounting bolt removal.
- When removing/installing the engine, tape the frame around the engine beforehand for frame protection.
- The following components require engine removal for service.
  - Cylinder head/valves
  - Cylinder/piston
  - Crankcase/crankshaft
- The following components can be serviced with the engine installed in the frame.
  - Drive pulley/driven pulley/clutch
  - Final reduction
  - Alternator/starter clutch
  - Water pump
  - Throttle body
  - Oil pump

**SPECIFICATIONS**

ITEM		SPECIFICATIONS
Engine dry weight		27.5 kg (60.6 lbs)
Coolant capacity	Radiator and engine	0.41 liter (0.43 US qt, 0.36 Imp qt)
Engine oil capacity	After draining	0.7 liter (0.7 US qt, 0.6 Imp qt)
	After disassembly	0.8 liter (0.8 US qt, 0.7 Imp qt)

**TORQUE VALUE**

Engine hanger link pivot nut (frame side)	69 N·m (7.0 kgf·m, 51 lbf·ft)
Engine hanger link pivot nut (engine side)	49 N·m (5.0 kgf·m, 36 lbf·ft)

## ENGINE REMOVAL/INSTALLATION

### ENGINE REMOVAL

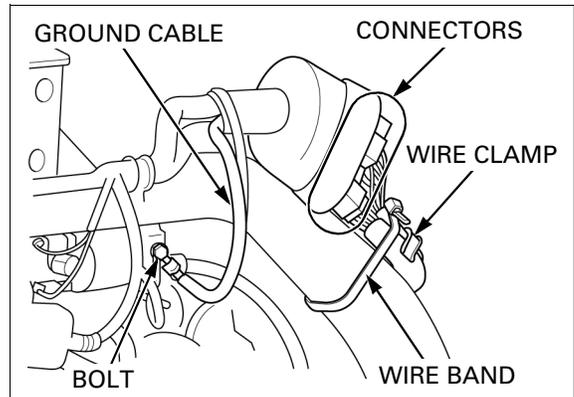
Remove the following:

- Body cover (page 3-9)
- Rear fender (page 3-12)
- Under cover (page 3-7)

Disconnect the all connectors inside the boot.

Release the wires from the wire band and clamp.

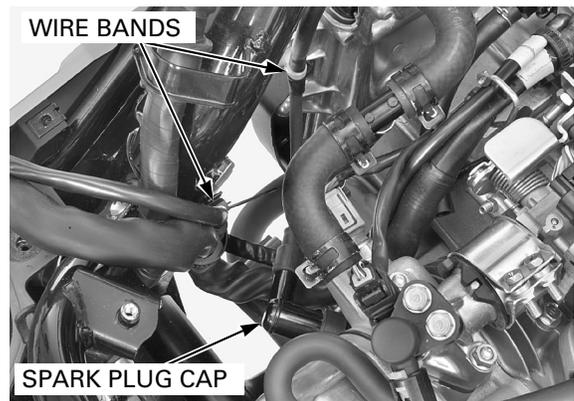
Remove the bolt and disconnect the ground cable from the frame.



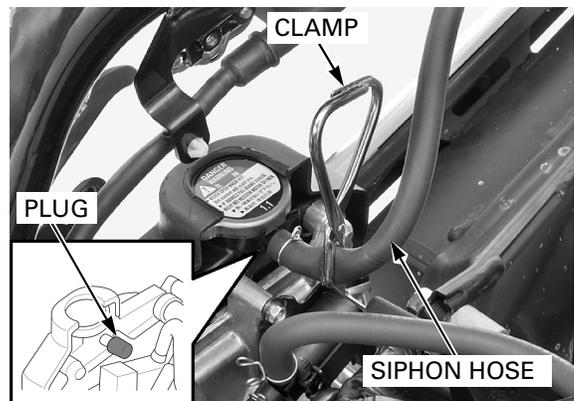
Release the following from the wire band:

- Alternator/CKP sensor wire
- Engine sub harness

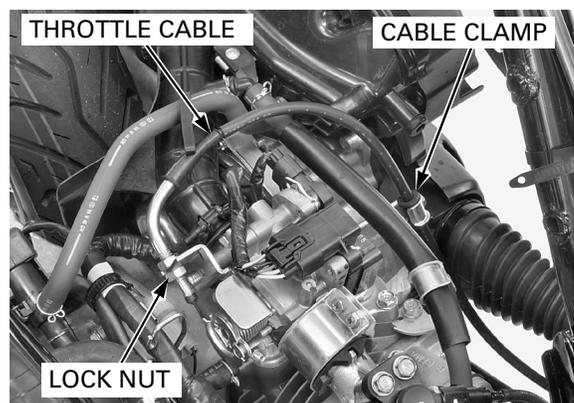
Disconnect the spark plug cap and release the plug wire band from the right side cover.



Clamp the radiator siphon hose and disconnect it from the radiator. Plug the joint of the radiator.



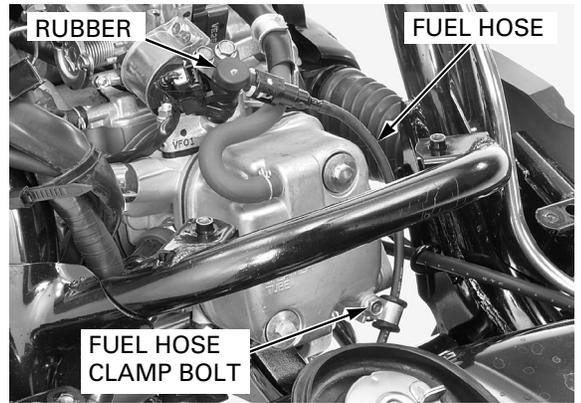
Loosen the lock nut and disconnect the throttle cable. Release the throttle cable from the cable clamp.



Relieve the fuel hose and remove the quick connect fitting (page 6-32).

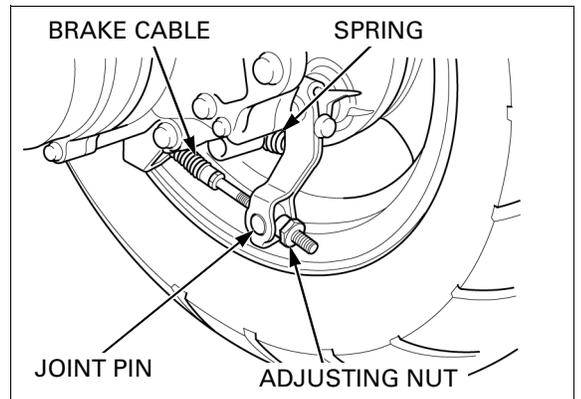
Replace the rubber if it is cracked, deteriorated or damaged.

Remove the fuel hose clamp bolt from the cylinder head cover.

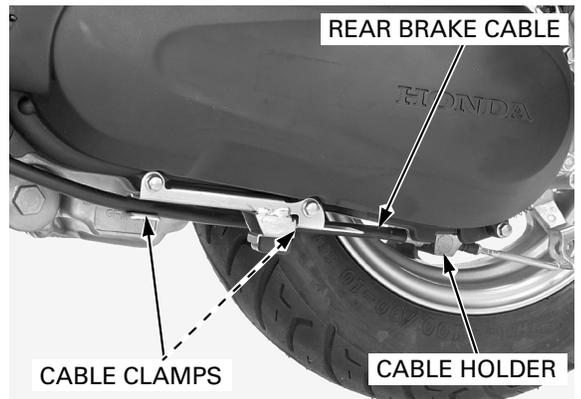


Remove the rear brake adjusting nut and joint pin from the brake cable.

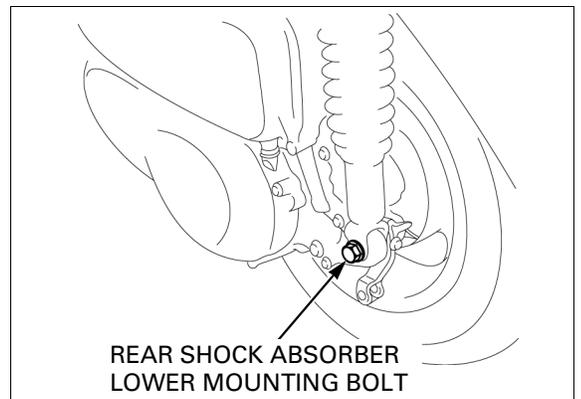
Remove the spring from the brake arm.



Release the rear brake cable from the cable holder and cable clamps.



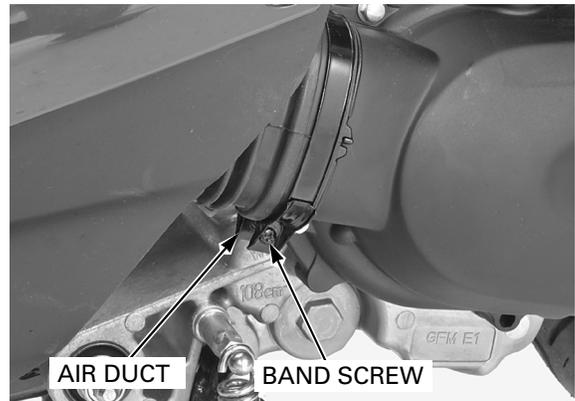
Slightly lift the rear wheel and remove the lower mounting bolt from the rear shock absorber.



## ENGINE REMOVAL/INSTALLATION

Loosen the band screw and disconnect the air duct from the left crankcase cover.

Support the engine with jack.  
Support the rear side of the frame in upright position and hold the front wheel to keep the scooter stable.



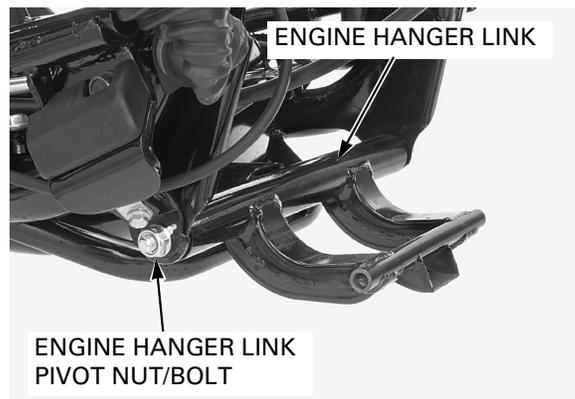
Remove the engine hanger link pivot nut (engine side).  
Pull out the engine hanger link pivot bolt (engine side) from right side.

Pull the engine straight back and release the engine from the engine hanger link.



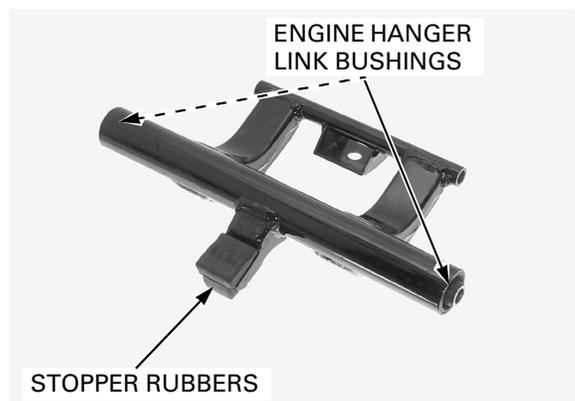
Remove the engine hanger link pivot nut (frame side).  
Pull out the engine hanger link pivot bolt (frame side) from right side.

Remove the engine hanger link.



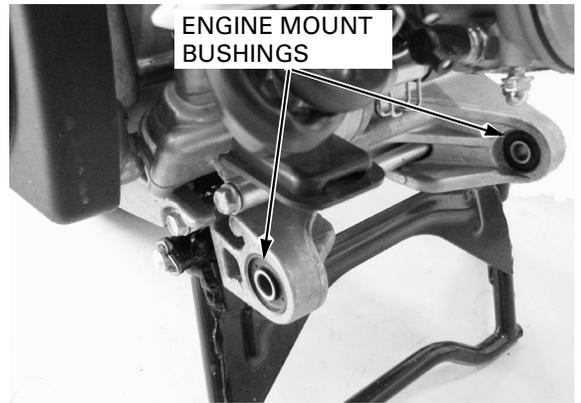
### INSPECTION

Check the engine hanger link bushings and stopper rubbers for wear, deterioration or damage.

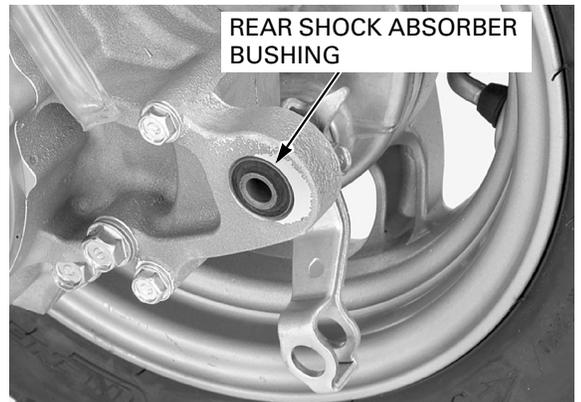


## ENGINE REMOVAL/INSTALLATION

Check the engine mount bushings for wear, deterioration or damage.



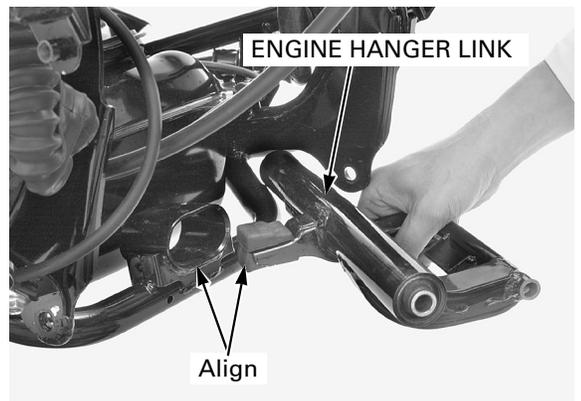
Check the rear shock absorber bushing for wear, deterioration or damage.



## ENGINE INSTALLATION

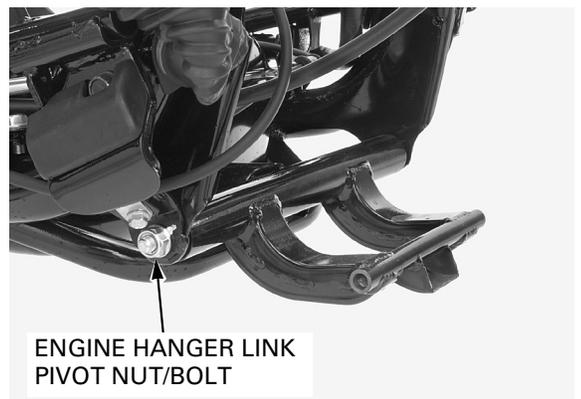
- Before installing the engine, route the wires, hoses, and cables properly (page 1-17).

Install the engine hanger link by aligning stopper rubbers with the frame duct.



Install the engine hanger link pivot bolt (frame side) from the right side of the frame. Install and tighten the nut to the specified torque.

**TORQUE: 69 N·m (7.0 kgf·m, 51 lbf·ft)**



## ENGINE REMOVAL/INSTALLATION

Set the engine to the frame by aligning the bolt holes of the engine and engine hanger link.

Support the engine with jack.

Insert the engine hanger link pivot bolt (engine side) from the right side.

Install and tighten pivot nut to the specified torque.

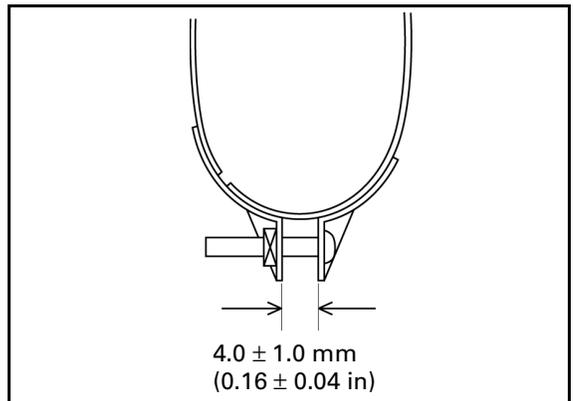
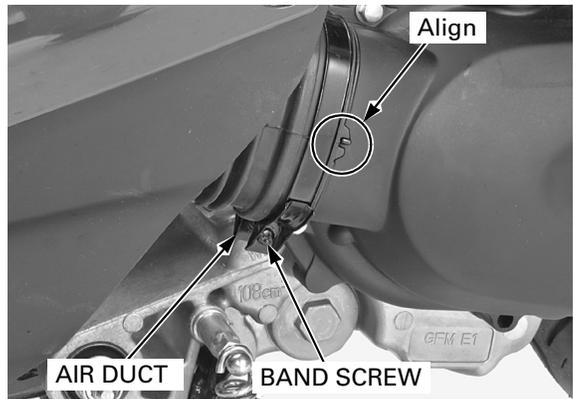
**TORQUE: 49 N·m (5.0 kgf·m, 36 lbf·ft)**



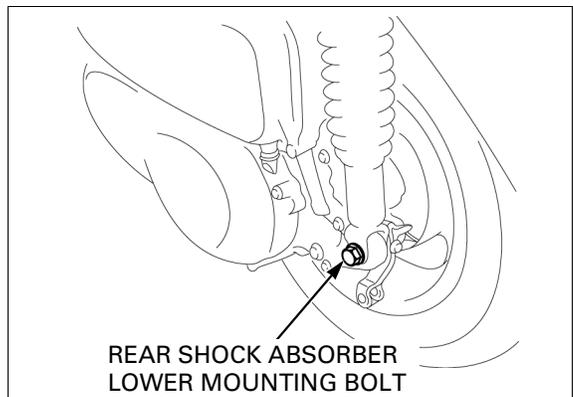
Connect the air duct to the left crankcase cover by aligning the air duct cut-off with the left crankcase cover tab.

Tighten the band screw.

- Tighten the air duct band screw until the clearance between the screw and band end is  $4.0 \pm 1.0$  mm ( $0.16 \pm 0.04$  in)



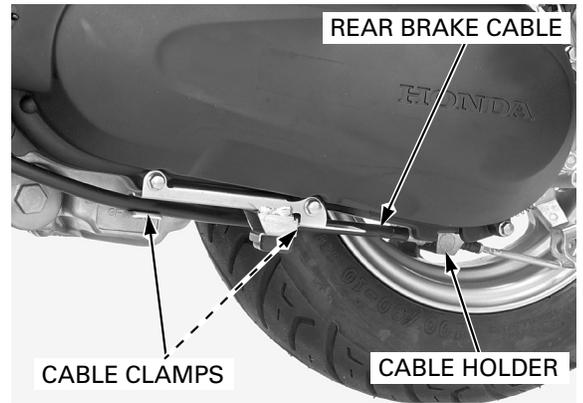
Slightly lift the rear wheel to align the bolt holes and tighten the rear shock absorber lower mounting bolt.



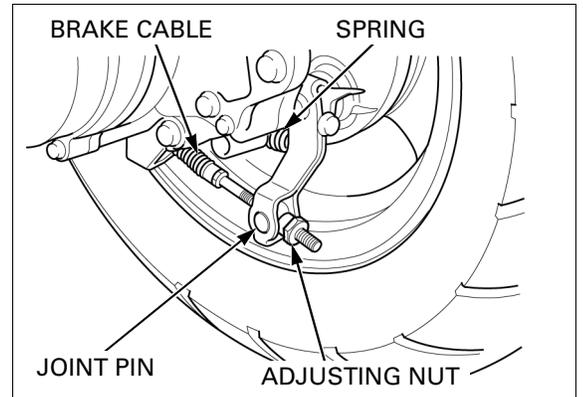
## ENGINE REMOVAL/INSTALLATION

Route the wire harness properly (page 1-17).

Route the rear brake cable through the cable holder and secure it with cable clamps.

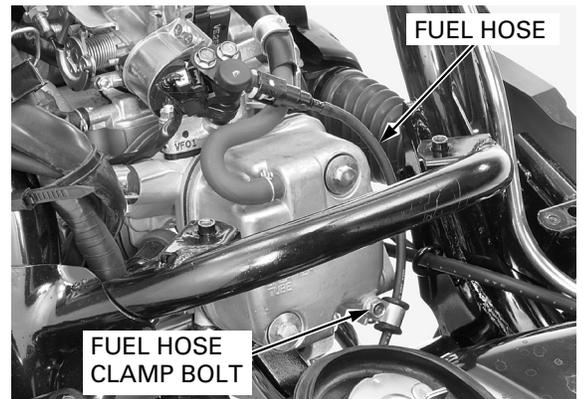


Install the joint pin and adjusting nut to the brake cable and brake arm. Set the return spring ends into the hole on the left crankcase and pin on the brake arm.

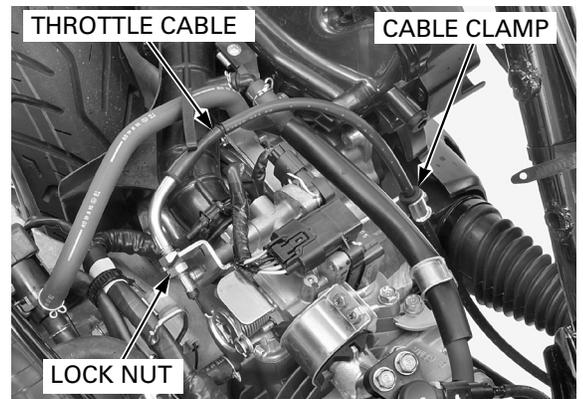


Install a new quick connect fitting and connect the fuel hose (page 6-33).

Set the fuel hose clamp to the cylinder head cover and tighten the bolt.

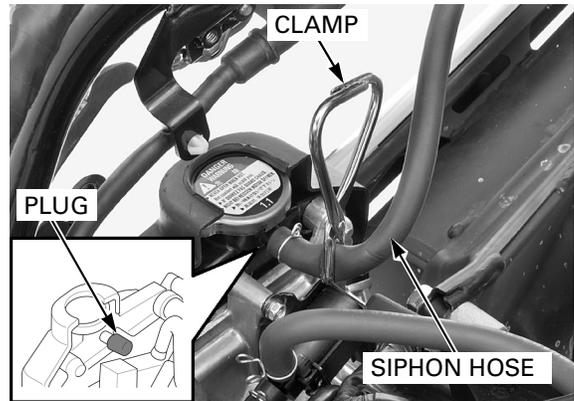


Secure the throttle cable with cable clamp. Connect the throttle cable end to the throttle drum and set it to the throttle cable holder.



## ENGINE REMOVAL/INSTALLATION

Remove the plug from the radiator joint and connect the siphon hose to the radiator.  
Remove the clamp from the siphon hose.

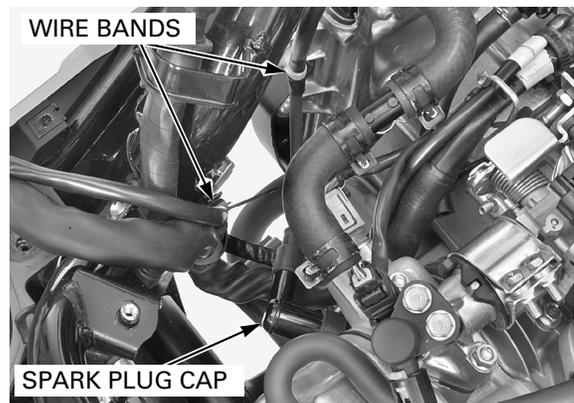


*Route the wire harness properly (page 1-17).*

Secure the following with the wire band:

- Alternator/CKP sensor wire
- Engine sub harness

Connect the spark plug cap and set the plug wire band to the right side cover.



*Route the wire harness properly (page 1-17).*

Connect all connectors inside the boot.

Secure the wires with the wire band and clamp.

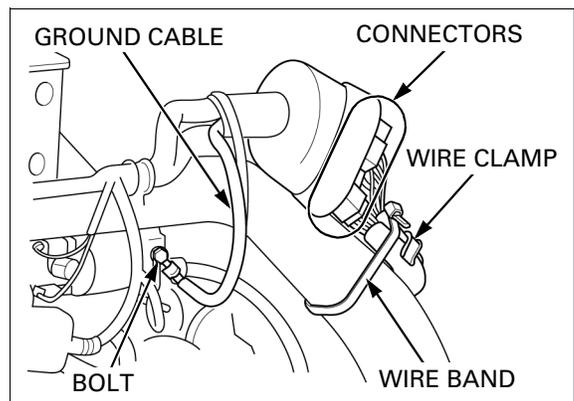
Set the ground cable to the frame and tighten the bolt.

Install the following:

- Under cover (page 3-7)
- Rear fender (page 3-12)
- Body cover (page 3-9)

Adjust the following:

- Throttle grip freeplay (page 4-5)
- Rear brake lever freeplay (page 4-17)



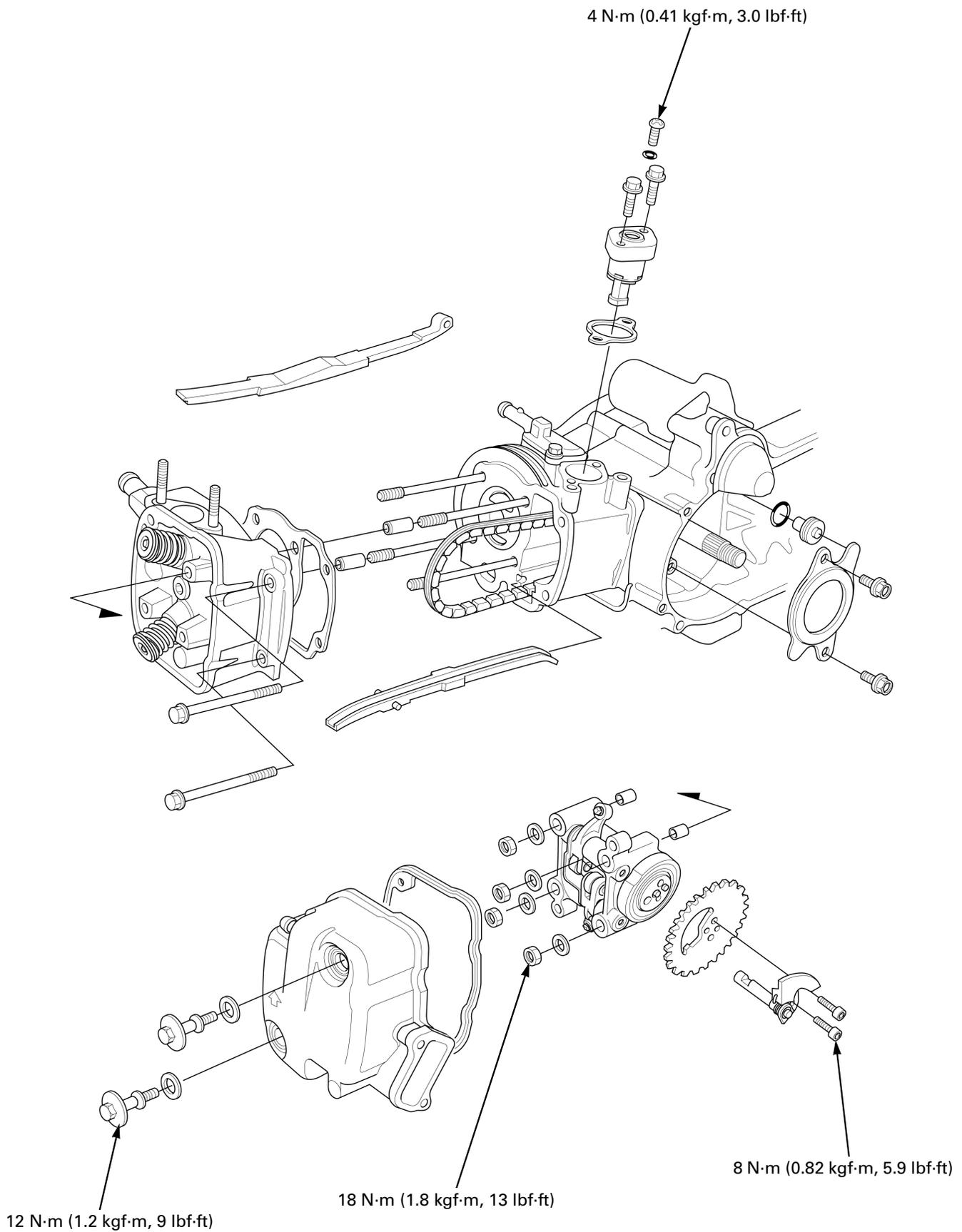
# 9. CYLINDER HEAD/VALVES

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COMPONENT LOCATION .....	9-2	CAMSHAFT/CYLINDER HEAD .....	9-7
SERVICE INFORMATION .....	9-3	CAM CHAIN GUIDE.....	9-24
TROUBLESHOOTING .....	9-5	CAM CHAIN TENSIONER SLIDER.....	9-25
CYLINDER COMPRESSION TEST.....	9-6	CAM CHAIN TENSIONER LIFTER .....	9-26
CYLINDER HEAD COVER .....	9-6		

# CYLINDER HEAD/VALVES

## COMPONENT LOCATION



## SERVICE INFORMATION

### GENERAL

- This section covers service of the cylinder head, valves, rocker arms and camshaft.
- The engine must be removed from the frame to service the rocker arms, camshaft, cylinder head and valves.
- 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.
- The rocker arm and camshaft lubricating oil is fed through the oil passages in the cylinder head and head cover. Clean the oil passages before assembling.
- Be careful not to damage the mating surfaces when removing the cylinder head cover and cylinder head.

### SPECIFICATIONS

Unit: mm (in)

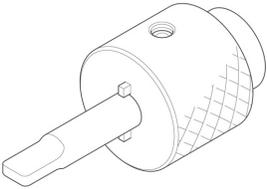
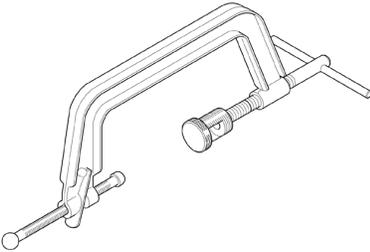
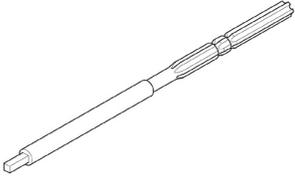
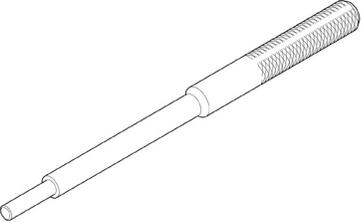
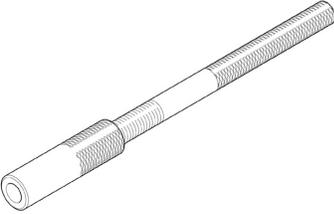
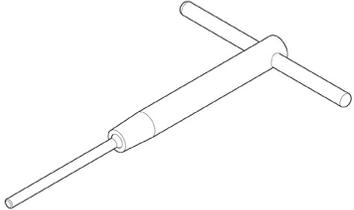
ITEM			STANDARD	SERVICE LIMIT
Cylinder compression			1,098 kPa (11.2 kgf/cm <sup>2</sup> , 159 psi) at 550 rpm	–
Cylinder head warpage			–	0.05 (0.002)
Rocker arm	Rocker arm I.D.	IN/EX	10.000 – 10.015 (0.3937 – 0.3943)	10.10 (0.398)
	Rocker arm shaft O.D.	IN/EX	9.972 – 9.987 (0.3926 – 0.3932)	9.91 (0.390)
	Arm-to-shaft clearance	IN/EX	0.013 – 0.043 (0.0005 – 0.0017)	0.08 (0.003)
Camshaft	Cam lobe height	IN	32.542 – 32.782(1.2812 – 1.2906)	32.52 (1.280)
		EX	32.263 – 32.503 (1.2702 – 1.2796)	32.24 (1.269)
Valve, valve guide	Valve clearance	IN	0.16 ± 0.02 (0.006 ± 0.001)	–
		EX	0.25 ± 0.02 (0.010 ± 0.001)	–
	Valve stem O.D.	IN	4.975– 4.990 (0.1959 – 0.1965)	4.90 (0.193)
		EX	4.955 – 4.970 (0.1951 – 0.1957)	4.90 (0.193)
	Valve guide I.D.	IN/EX	5.000 – 5.012 (0.1969 – 0.1973)	5.03 (0.198)
	Stem-to-guide clearance	IN	0.010 – 0.037 (0.0004 – 0.0015)	0.08 (0.003)
		EX	0.030 – 0.057 (0.0012 – 0.0022)	0.10 (0.004)
Valve guide projection above cylinder head	IN/EX	9.1 – 9.3 (0.36 – 0.37)	–	
Valve spring free length	IN/EX	Outer	38.33 (1.509)	37.04 (1.458)
		Inner	31.53 (1.241)	30.66 (1.207)

### TORQUE VALUES

Cylinder head cover special bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	Apply engine oil to the threads and seating surface.
Camshaft holder nut	18 N·m (1.8 kgf·m, 13 lbf·ft)	
Cam sprocket socket bolt	8 N·m (0.82 kgf·m, 5.9 lbf·ft)	Apply engine oil to the threads and seating surface.
Cam chain tensioner lifter screw	4 N·m (0.41 kgf·m, 3.0 lbf·ft)	

# CYLINDER HEAD/VALVES

## TOOLS

<p>Tensioner lifter stopper 070MG-0010100</p> 	<p>Valve spring compressor 07757-0010000</p> 	<p>Valve guide reamer, 5.0 mm 07984-MA60001</p> 
<p>Valve guide driver, 5.0 mm 07942-MA60000</p> 	<p>Valve guide adjusting driver 07743-0020000</p> 	<p>Seat cutter, 27.5 mm (IN, 45°) 07780-0010200</p> 
<p>Seat cutter, 24 mm (EX, 45°) 07780-0010600</p> 	<p>Flat cutter, 27 mm (IN, 32°) 07780-0013300</p> 	<p>Flat cutter, 22 mm (EX, 32°) 07780-0012601</p> 
<p>Interior cutter, 26 mm (IN, 60°) 07780-0014500</p> 	<p>Interior cutter, 22 mm (EX, 60°) 07780-0014202</p> 	<p>Cutter holder 5.0 mm 07781-0010400</p> 

## **TROUBLESHOOTING**

- Engine top-end problems usually affect engine performance. These problem can be diagnosed by a compression test, or by tracing top-end noise with a sounding rod or 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 10-7).

### **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
  - Valve stuck open
  - Weak valve spring
- Cylinder head:
  - Leaking or damaged cylinder head gasket
  - Warped or cracked cylinder head
  - Loose spark plug
- Cylinder/piston problem (page 10-3)

### **Compression too high, overheating or knocking**

- Excessive carbon build-up on piston head or on combustion chamber
- Decompressor system problem (page 9-12)

### **Excessive smoke**

- Worn valve stem or valve guide
- Damaged stem seal
- Cylinder/piston problem (page 10-3)

### **Excessive noise**

- Incorrect valve adjustment
- Sticking valve or broken valve spring
- Excessive worn valve seat
- Worn or damaged camshaft
- Worn or damaged cam chain
- Worn cam sprocket teeth
- Worn rocker arm and/or shaft
- Worn or damaged cam chain tensioner
- Worn cylinder (page 10-4)
- Worn piston or piston rings (page 10-7)

### **Rough idle**

- Low cylinder compression

## CYLINDER HEAD/VALVES

### CYLINDER COMPRESSION TEST

Warm up the engine to normal operating temperature.

Stop the engine and remove the spark plug cap and spark plug (page 4-8).

Install a compression gauge into the spark plug hole.

*To avoid discharging the battery, do not operate the starter motor for more than 7 seconds.*

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

#### COMPRESSION PRESSURE:

**1,098 kPa (11.2 kg/cm<sup>2</sup>, 159 psi) at 550 rpm**

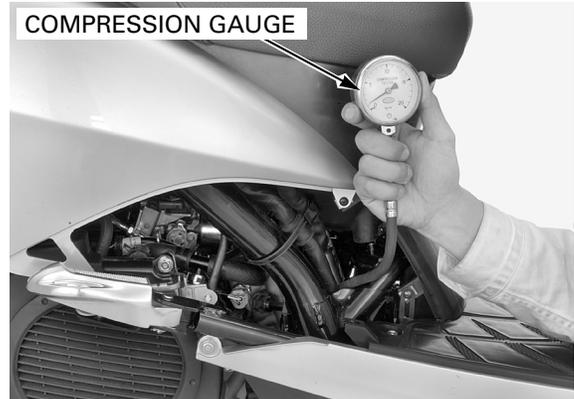
If compression is high, it indicates that auto decompression system problem or carbon deposits have accumulated on the combustion chamber and/or the piston crown.

If compression is low, pour 3 – 5 cc (0.1 – 0.2 oz) of clean engine oil into the cylinder through the spark plug hole and recheck the compression.

If the compression increases from the previous value, check the cylinder, piston and piston rings.

- Leaking cylinder head gasket
- Worn piston ring
- Worn cylinder and piston

If compression is the same as the previous value, check the valves for leakage.



### CYLINDER HEAD COVER

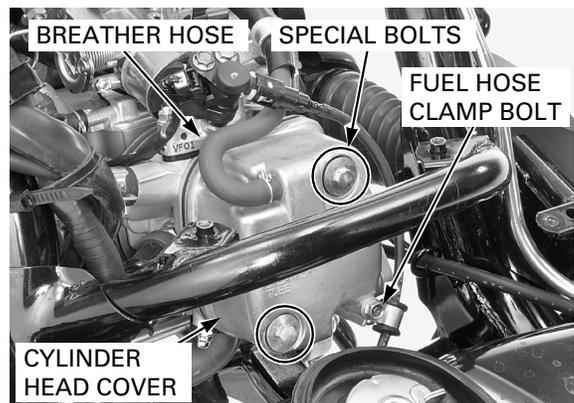
#### REMOVAL

Remove the front body cover (page 3-9).

Disconnect the crankcase breather hose from the cylinder head cover.

Remove the fuel hose clamp bolt.

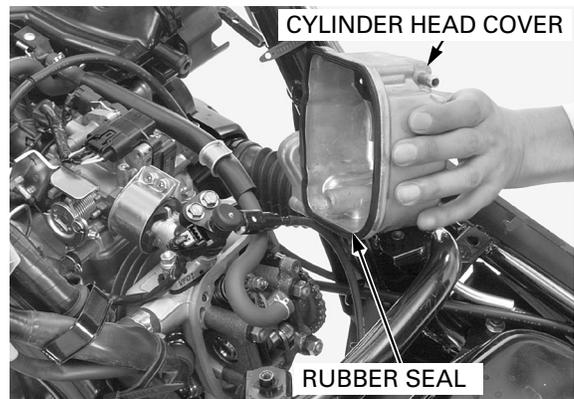
Remove the special bolts and cylinder head cover.



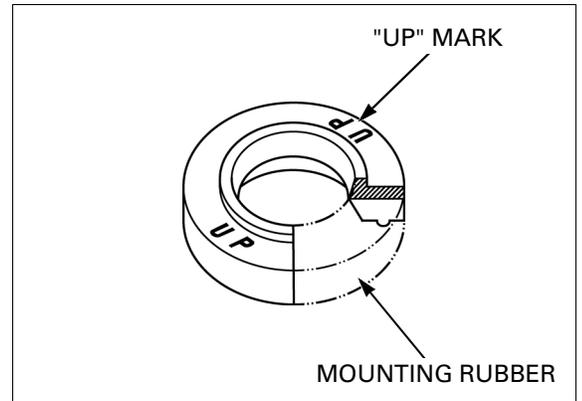
#### INSTALLATION

Make sure the cylinder head cover rubber seal is in good condition and replace it if necessary.

Install the rubber seal into the grooves on the cylinder head cover.



Install the mounting rubber with its "UP" mark facing up.



Install the cylinder head cover onto the cylinder head.

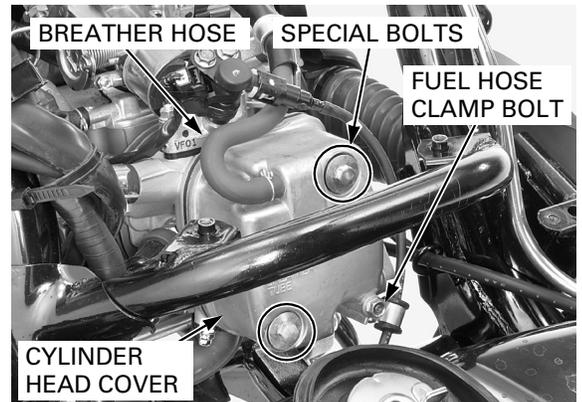
Install the special bolts and tighten them to the specified torque.

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

Connect the crankcase breather hose.  
Set the fuel hose clamp and tighten the bolt.

Install the following:

- Front body cover (page 3-9)
- Luggage box (page 3-8)
- Grab rail/carrier (page 3-8)
- Side body cover (page 3-4)



## CAMSHAFT/CYLINDER HEAD

### CAM SHAFT HOLDER/CYLINDER HEAD REMOVAL

#### NOTICE

- If performing the cylinder head service without disconnecting the O<sub>2</sub> sensor cap, cover the cap to prevent it from being contaminated by the oil.
- Once the camshaft holder is removed, the cylinder head gasket must be replaced with new one.

Drain the coolant (page 7-8).

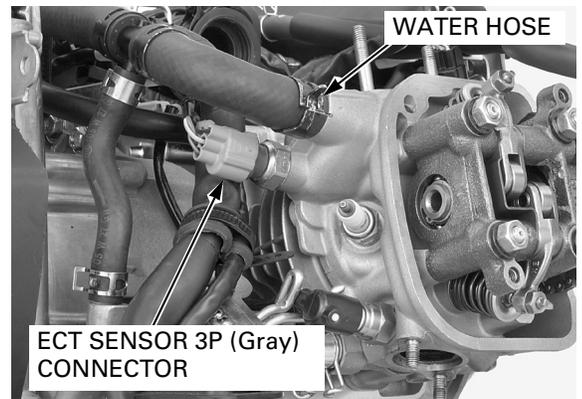
Drain the engine oil (page 4-11).

Remove the following:

- Engine (page 8-4)
- Exhaust pipe/muffler (page 3-13)
- Cylinder head cover (page 9-6)
- Throttle body (page 6-41)
- Intake pipe (page 6-56)

Disconnect the following:

- O<sub>2</sub> sensor connector (page 6-54)
- ECT sensor 3P (Gray) connector
- Water hose



## CYLINDER HEAD/VALVES

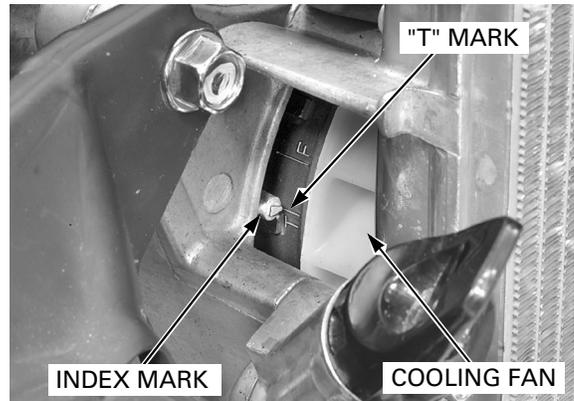
Rotate the crankshaft counterclockwise by rotating the cooling fan and align the "T" mark on the flywheel with the index mark on the right crankcase.

Make sure the piston is at TDC (Top Dead Center) on the compression stroke.

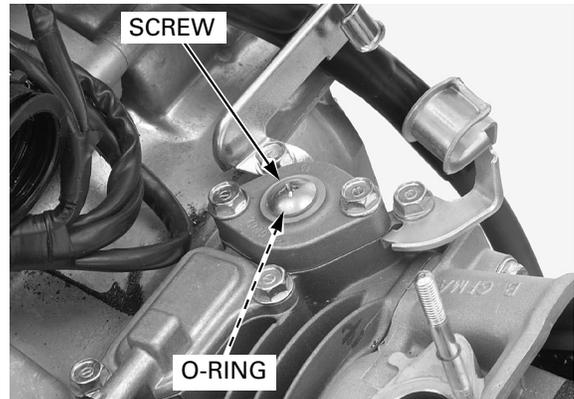
This position can be obtained by confirming that there is slack in the rocker arm.

If there is no slack, it is because the piston is moving through TDC on the exhaust stroke.

Rotate the crankshaft one full turn using the cooling fan and match up the "T" mark again.



Remove the screw and O-ring from the cam chain tensioner lifter.

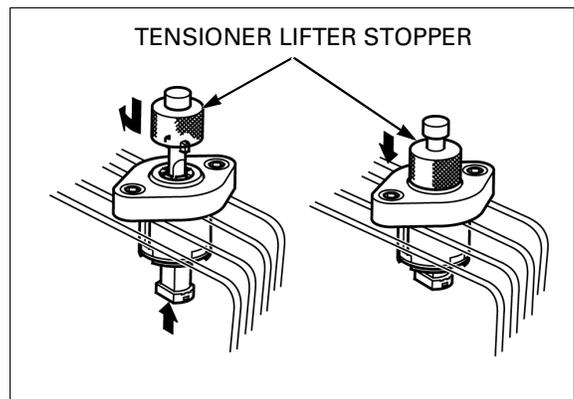


Install the special tool into the tensioner lifter body and turn the tool clockwise until it stops turning. Hold the tensioner lifter by pushing the tool while aligning the tabs of the tool with the grooves of the tensioner lifter.

**TOOL:**

**Tensioner lifter stopper**

**070MG-0010100**

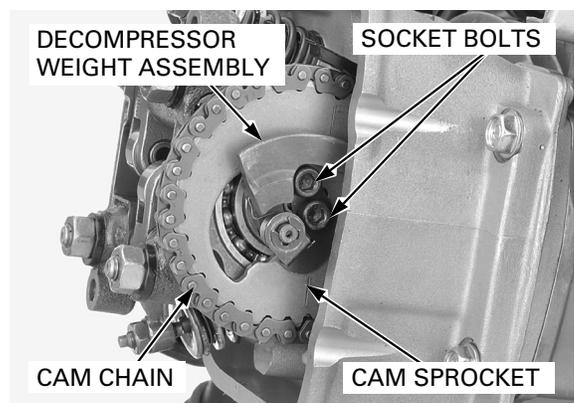


*Be careful not to let the bolts fall into the opening of the cylinder head.*

Remove the cam sprocket socket bolts and decompressor weight assembly from the cam sprocket.

Attach a piece of wire to the cam chain to prevent it from falling into the crankcase.

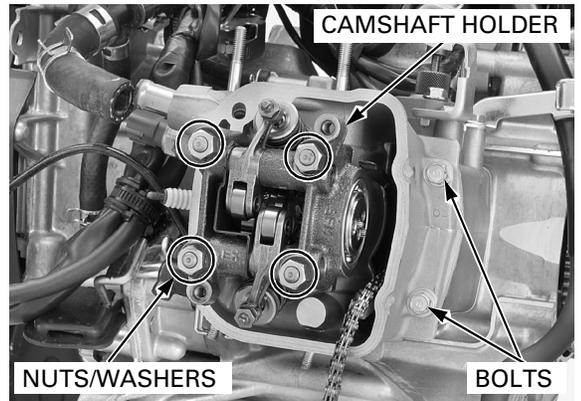
Remove the cam sprocket from the camshaft and cam chain off the cam sprocket.



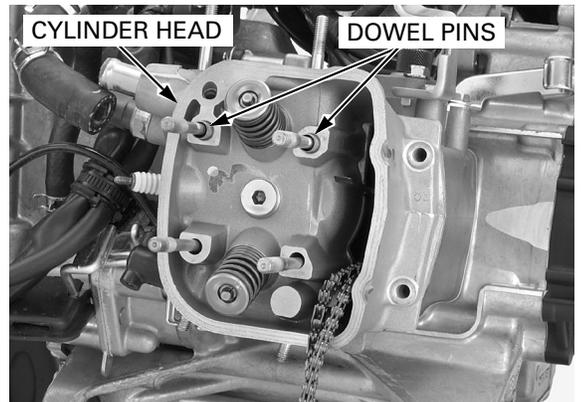
## CYLINDER HEAD/VALVES

Remove the cylinder head bolts.

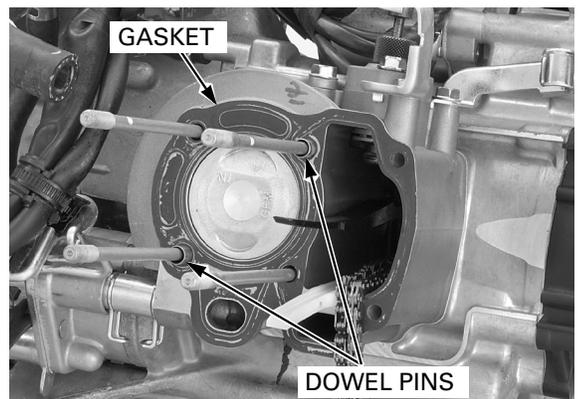
Remove the cam shaft holder nuts in a crisscross pattern in two or three steps.  
Remove the washers and camshaft holder.



Remove the dowel pins from the cylinder head.  
Remove the cylinder head.



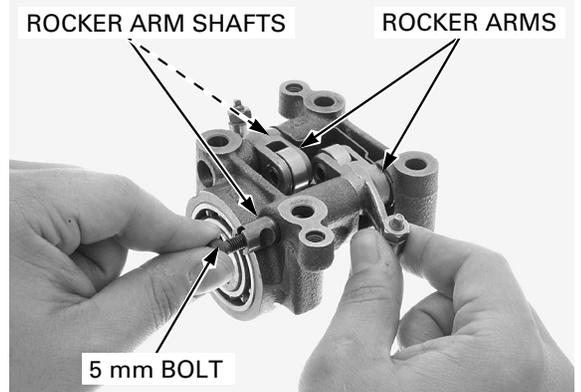
Remove the dowel pins and gasket.



### CAMSHAFT HOLDER DISASSEMBLY

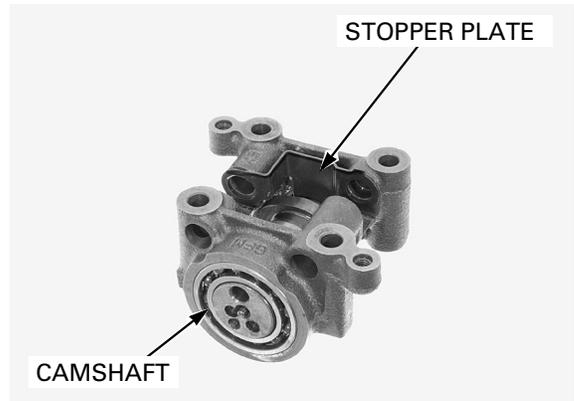
Screw the 5 mm bolt into the threaded hole in the rocker arm shaft and pull it out of the camshaft holder.

Remove the rocker arms.



## CYLINDER HEAD/VALVES

Remove the stopper plate and camshaft.



### INSPECTION

#### ROCKER ARM/SHAFT

Check the rocker arm shafts and rocker arms for wear or damage.

Turn the rocker arm roller with finger.  
The roller should turn smoothly and quietly.

Measure the I.D. of each rocker arm.

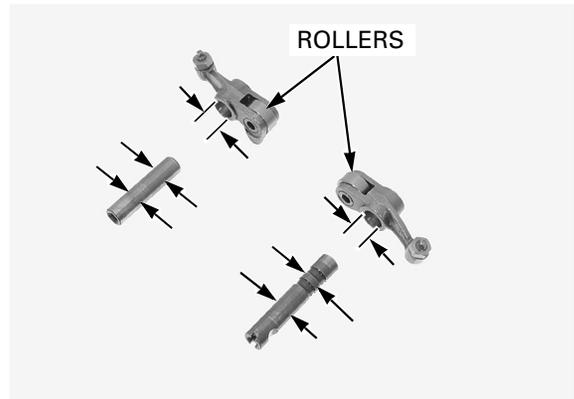
**SERVICE LIMIT: IN/EX: 10.10 mm (0.398 in)**

Measure the O.D. of each rocker arm shaft.

**SERVICE LIMIT: IN/EX: 9.91 mm (0.390 in)**

Calculate the rocker arm-to-shaft clearance.

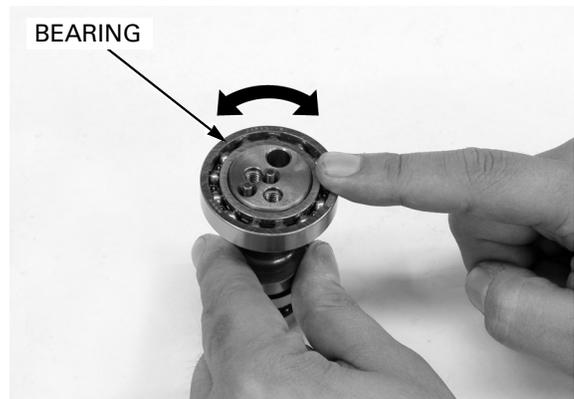
**SERVICE LIMIT: IN/EX: 0.08 mm (0.003 in)**



#### CAMSHAFT

Turn the outer race of each camshaft bearing with your finger. The bearing should turn smoothly and quietly. Also check that the bearing inner race fits tightly in the camshaft.

Replace the camshaft assembly if the bearing does not turn smoothly, quietly, or if they fit loosely on the camshaft.



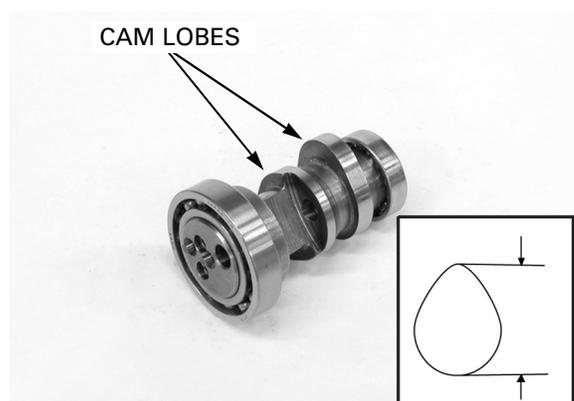
Check the cam lobe for excessive wear and damage.

Measure the height of each cam lobe.

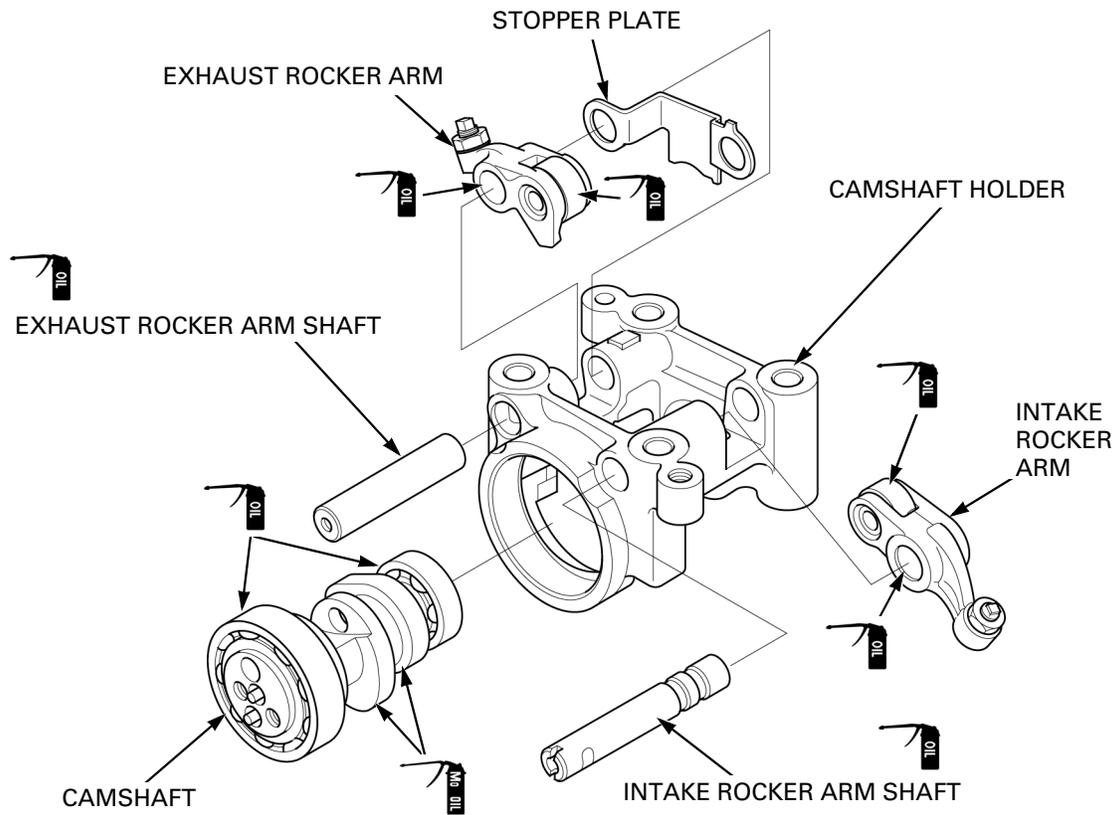
**SERVICE LIMIT:**

**IN: 32.52 mm (1.280 in)**

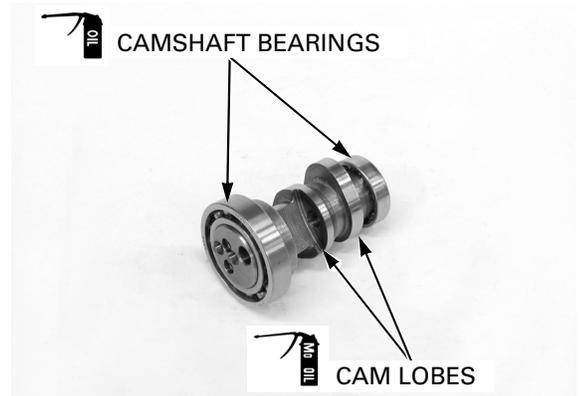
**EX: 32.24 mm (1.269 in)**



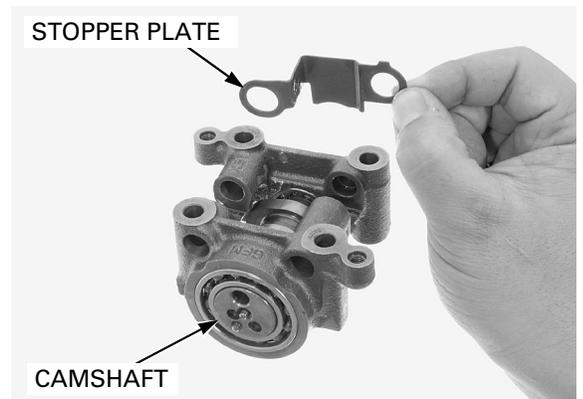
**CAMSHAFT HOLDER ASSEMBLY**



Apply engine oil to the camshaft bearings.  
Apply molybdenum oil solution to the cam lobes.



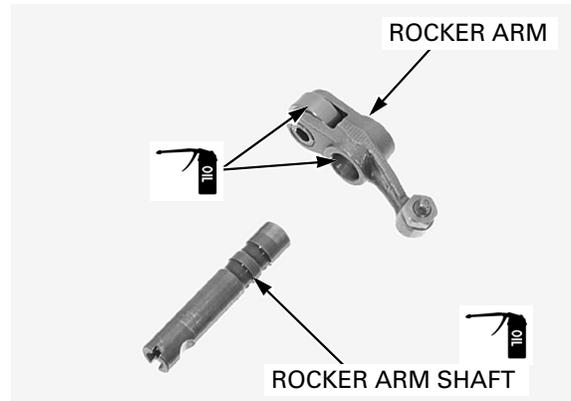
Install the camshaft into the camshaft holder.  
Set the stopper plate and hold the camshaft.



## CYLINDER HEAD/VALVES

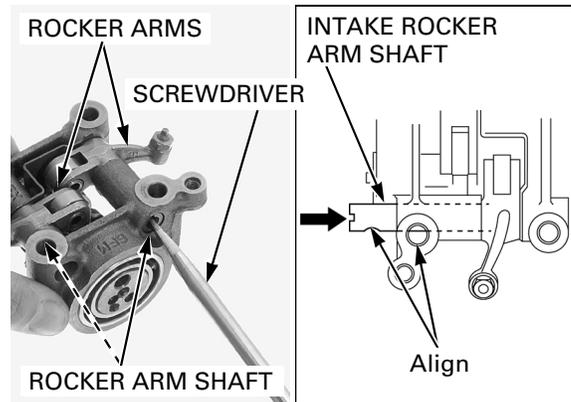
Apply engine oil to the sliding surface and roller surface of the rocker arm.

Apply engine oil to the sliding surface of the rocker arm shaft.



Install the rocker arms to the camshaft holder.

Install the exhaust rocker arm shaft into the camshaft holder while aligning the holes on the stopper plate and rocker arm until it is fully seated.



*Align the groove on the intake rocker arm shaft with the hole of the stud bolt by turning the rocker arm shaft with a screwdriver.*

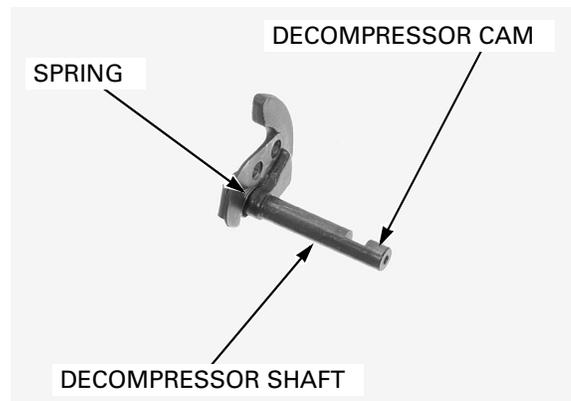
Install the intake rocker arm shaft into the camshaft holder using a screwdriver while aligning the holes on the stopper plate and rocker arm.

## DECOMPRESSOR SYSTEM INSPECTION

Check the shaft of the decompressor weight for bends or damage.

Check the decompressor weight cam area for wear or damage.

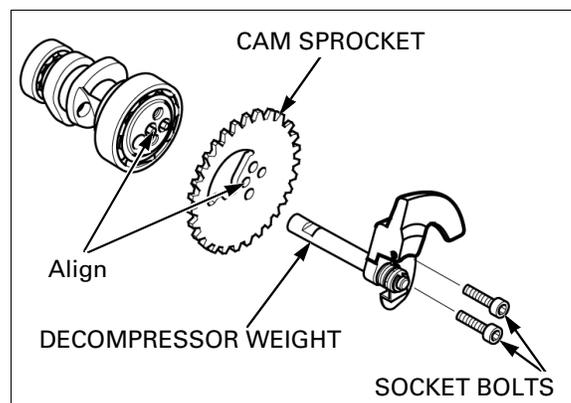
Check the decompressor spring for damage or fatigue.



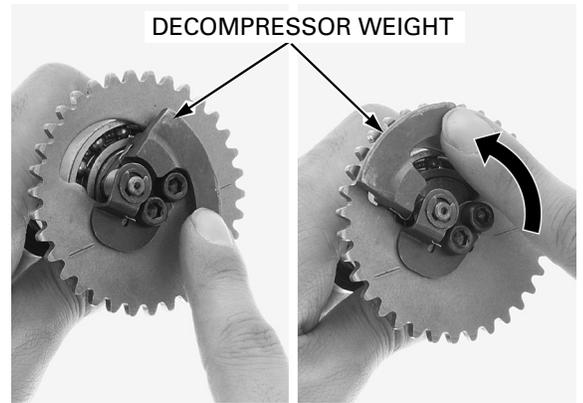
Install the cam sprocket onto the camshaft by aligning the camshaft pins and cam sprocket holes.

Install the decompressor weight by inserting its shaft into the hole on the cam sprocket/camshaft.

Temporarily install the cam sprocket socket bolts.



Check the decompressor weight that it operates smoothly and that the spring returns the decompressor weight in position.

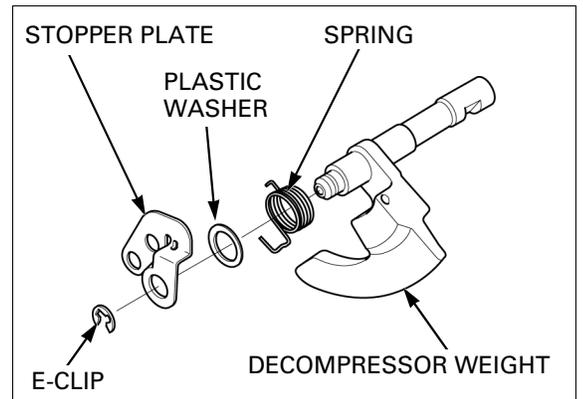


**DECOMPRESSOR WEIGHT DISASSEMBLY**

Remove the E-clip from the decompressor weight.

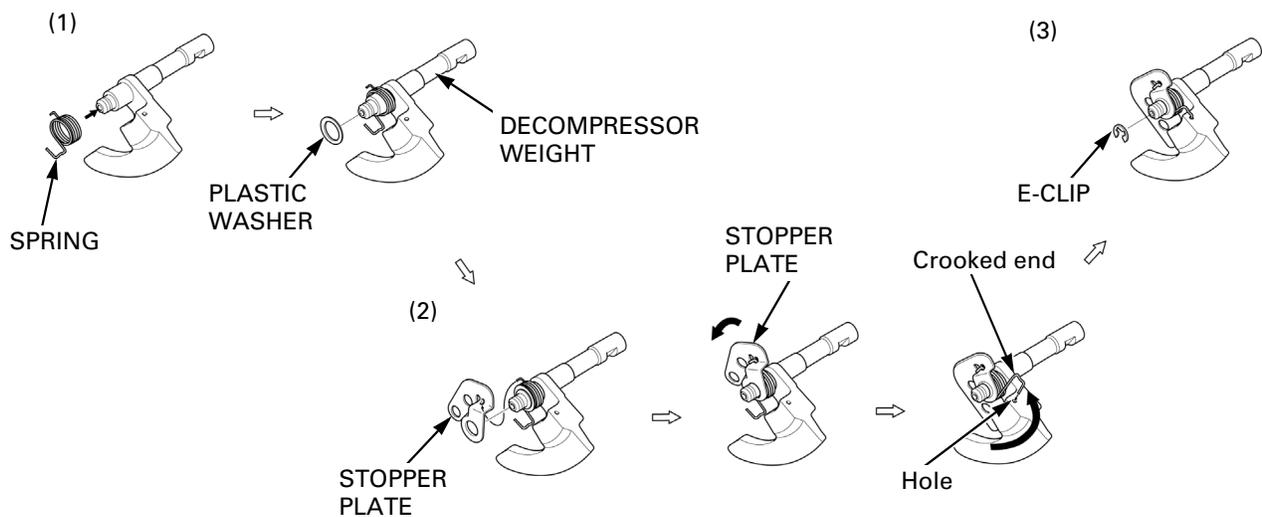
Turn the spring end counterclockwise and unhook it from the decompressor weight.

Remove the stopper plate, spring and plastic washer from the decompressor weight.



**DECOMPRESSOR WEIGHT ASSEMBLY**

1. Install the spring and plastic washer onto the decompressor weight.
2. Hook the spring end onto the stopper plate. Turn the stopper plate and hook the other end of spring into the hole on the decompressor weight.
3. Set the E-clip to the decompressor weight groove.



## CYLINDER HEAD/VALVES

### CYLINDER HEAD DISASSEMBLY

Remove the following:

- Spark plug (page 4-8)
- ECT sensor (page 6-52)
- O<sub>2</sub> sensor (page 6-54)

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

Remove the valve spring cotters using the valve spring compressor.

**TOOL:**

**Valve spring compressor 07757-0010000**

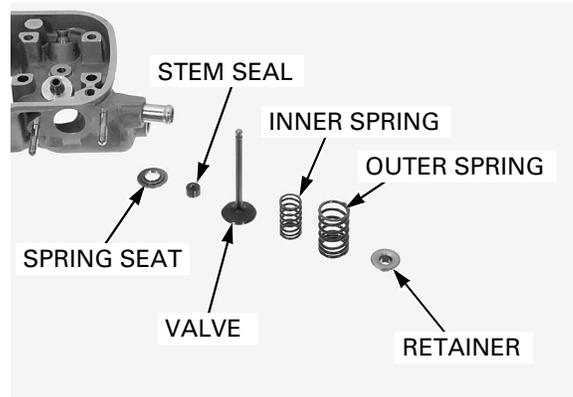
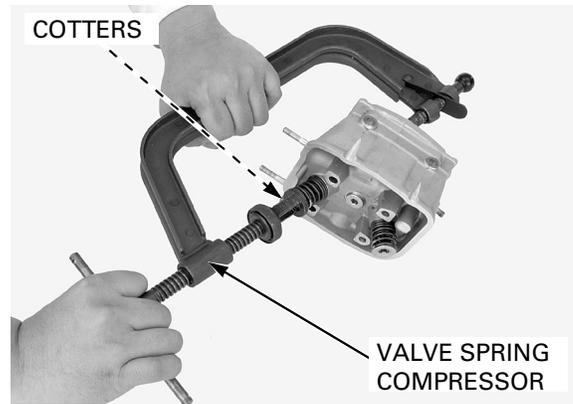
*Mark all parts during disassembly so they can be placed back in their original locations.*

Remove the valve spring compressor, then remove the following:

- Valve spring retainers
- Outer and inner valve springs
- Valve spring seats
- Valves
- Valve stem seals

*Avoid damaging the cylinder mating surface and valve seat surfaces.*

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

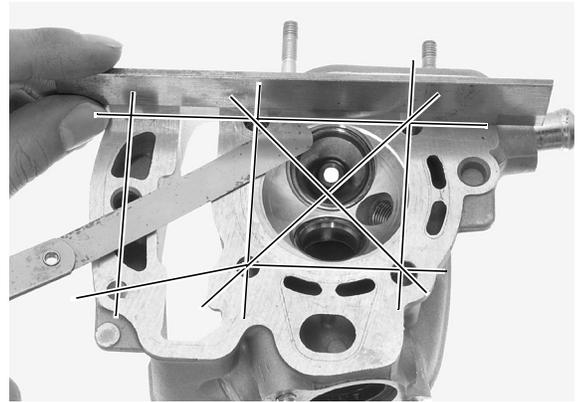


**INSPECTION**

**CYLINDER HEAD**

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: 0.05 mm (0.002 in)**



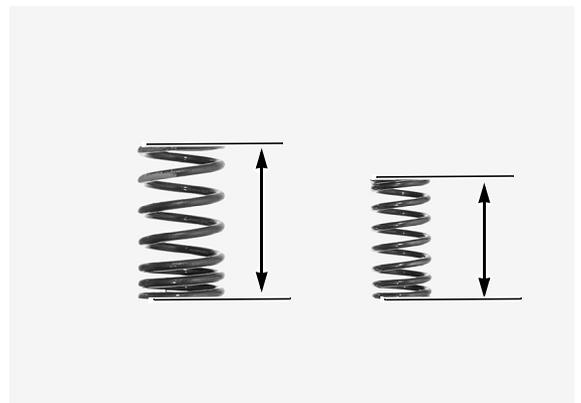
**VALVE SPRING**

Measure the free length of the valve springs.

**SERVICE LIMIT:**

**Outer (IN/EX): 37.04 mm (1.458 in)**

**Inner (IN/EX): 30.66 mm (1.207 in)**



**VALVE/VALVE GUIDE**

Check that the valve moves smoothly in the guide.  
 Check each valve for bends, burns, scratches or abnormal wear.

Measure each valve stem O.D. and record it.

**SERVICE LIMIT: IN/EX: 4.90 mm (0.193 in)**



*Always rotate the reamer clockwise, never counterclockwise when inserting, removing and reaming.*

Ream the valve guide to remove any carbon build up before measuring the guide.

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

**TOOL:**

**Valve guide reamer, 5.0 mm 07984-MA60001**



## CYLINDER HEAD/VALVES

Measure each valve guide I.D. and record it.

**SERVICE LIMIT: IN/EX: 5.03 mm (0.198 in)**

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

**SERVICE LIMIT:**

**IN: 0.08 mm (0.003 in)**

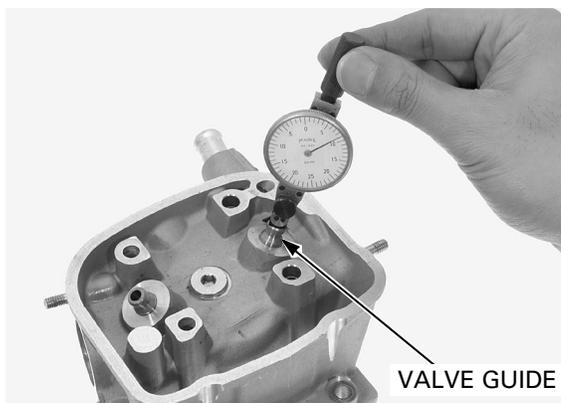
**EX: 0.10 mm (0.004 in)**

*Inspect and reface the valve seats whenever the valve guides are replaced (page 9-16).*

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 (page 9-16).

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



### VALVE GUIDE REPLACEMENT

Chill new valve guides in a freezer for about 1 hour.

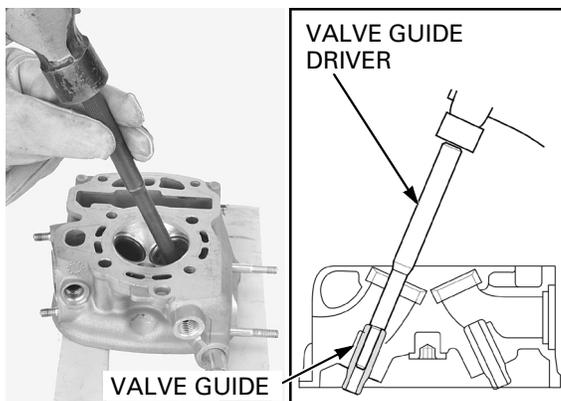
Heat the cylinder head to 130 – 140 °C (275 – 290 °F) with a hot plate or oven. Do not heat the cylinder head beyond 150 °C (300 °F). Use temperature indicator sticks, available from welding supply stores, to be sure the cylinder head is heated to the proper temperature.

*Using a torch to heat the cylinder head may cause warpage.*

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

**TOOL:**

**Valve guide driver, 5.0 mm      07942-MA60000**



Take out new valve guides from the freezer.

*Drive new guides from the camshaft side while the cylinder head is still heated.*

Drive new valve guides into the cylinder head to the specified height from the cylinder head.

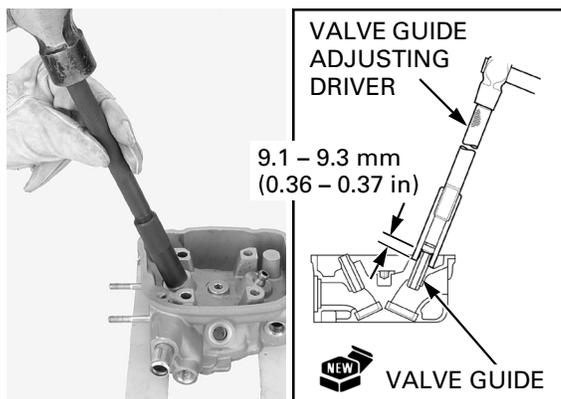
**TOOL:**

**Valve guide adjusting driver      07743-0020000**

**VALVE GUIDE PROJECTION:**

**IN/EX: 9.1 – 9.3 mm (0.36 – 0.37 in)**

Let the cylinder head cool to room temperature.



Ream new valve guides after installation.

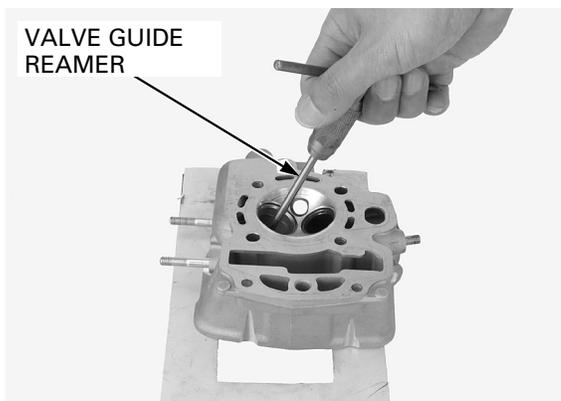
*Take care not to tilt or lean the reamer in the guide while reaming. Use cutting oil on the reamer during this operation.*

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

**TOOL:**

**Valve guide reamer, 5.0 mm      07984-MA60001**

Clean the cylinder head thoroughly to remove any metal particles after reaming and reface the valve seat (page 9-18).

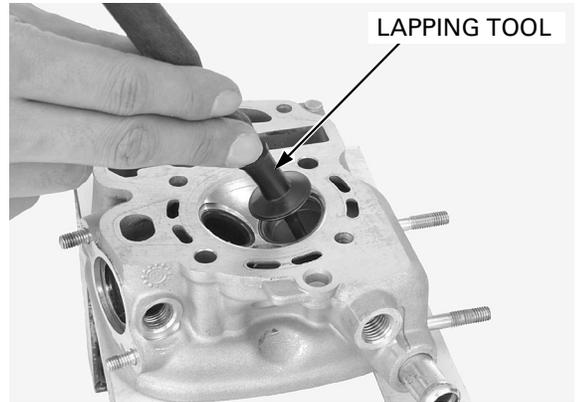


**VALVE SEAT INSPECTION**

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

Apply a light coat of Prussian Blue to the valve seats.

Tap the valve against the valve seat several times using a hand-lapping tool, without rotating the valve, to make a clear pattern.

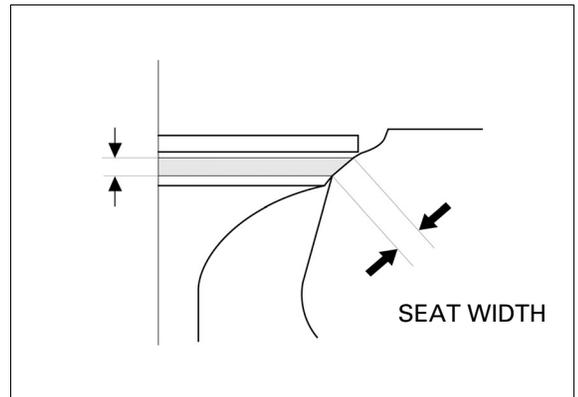


*The valves cannot be ground. If the valve face is burned or badly worn or if it contacts the seat unevenly, replace the valve.*

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.

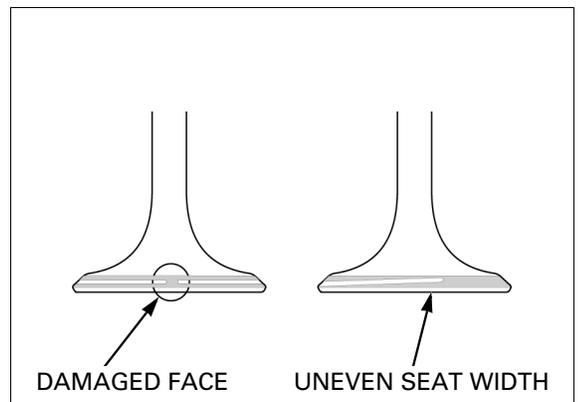
**STANDARD: 0.90 – 1.10 mm (0.035 – 0.043 in)**  
**SERVICE LIMIT: 1.5 mm (0.06 in)**

If the valve seat width is not within specification, reface the valve seat (page 9-18).

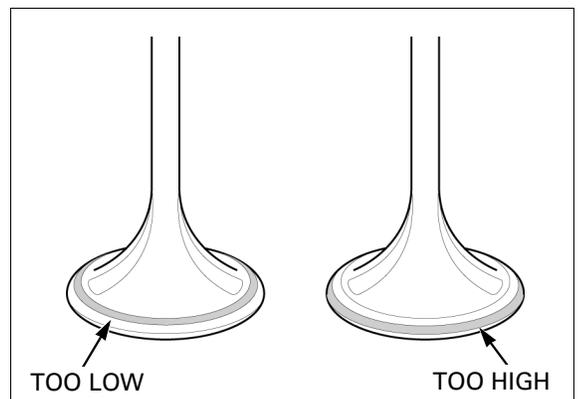


Inspect the valve seat face for:

- Damaged face:
  - Replace the valve and reface the valve seat
- Uneven seat width:
  - Bent or collapsed valve stem; Replace the valve and reface the valve seat



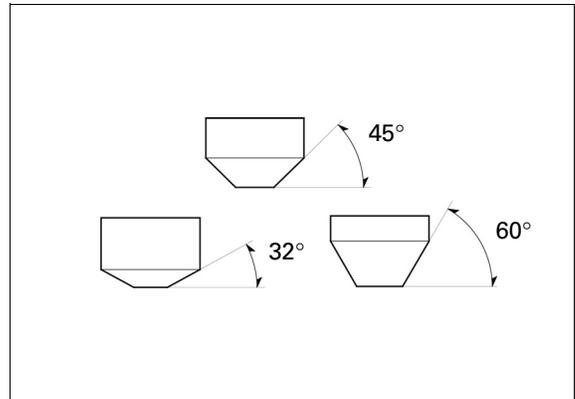
- Contact area (too low or too high area):
  - Reface the valve seat



## CYLINDER HEAD/VALVES

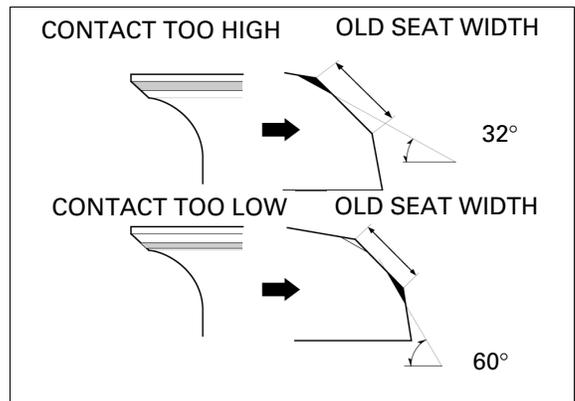
### VALVE SEAT REFACING

- Follow the refacing manufacturer's operating instructions.
- Be careful not to grind the seat more than necessary.



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

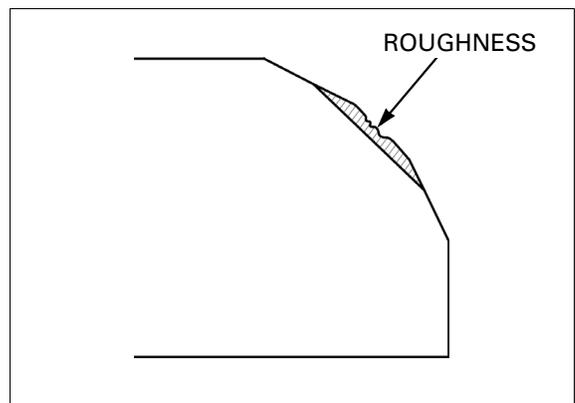


*Reface the seat with a 45-degree cutter whenever a valve guide is replaced.*

Use a 45° seat cutter, remove any roughness or irregularities from the seat.

#### TOOLS:

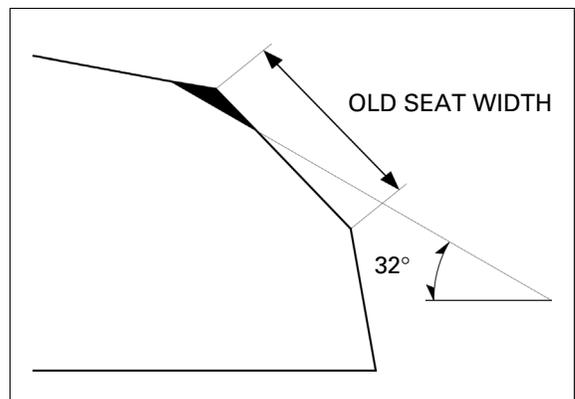
<b>Seat cutter, 27.5 mm (IN, 45°)</b>	<b>07780-0010200</b>
<b>Seat cutter, 24 mm (EX, 45°)</b>	<b>07780-0010600</b>
<b>Cutter holder, 5.0 mm</b>	<b>07781-0010400</b>



Use a 32° flat cutter, remove the top 1/4 of the existing valve seat material.

#### TOOLS:

<b>Flat cutter, 27 mm (IN, 32°)</b>	<b>07780-0013300</b>
<b>Flat cutter, 22 mm (EX, 32°)</b>	<b>07780-0012601</b>
<b>Cutter holder, 5.0 mm</b>	<b>07781-0010400</b>



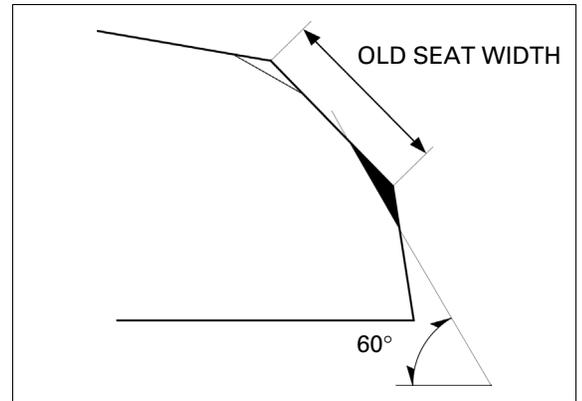
Use a 60° interior cutter, remove the bottom 1/4 of the existing valve seat material.

**TOOLS:**

**Interior cutter, 26 mm (IN, 60°) 07780-0014500**

**Interior cutter, 22 mm (EX, 60°) 07780-0014202**

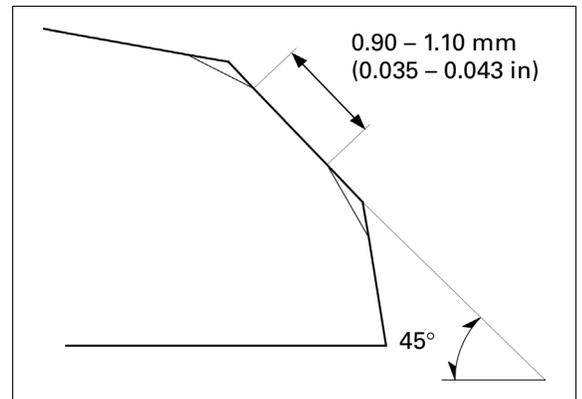
**Cutter holder, 5.0 mm 07781-0010400**



Using a 45° seat cutter, cut the seat to the proper width.

**VALVE SEAT WIDTH: 0.90 – 1.10 mm (0.035 – 0.043 in)**

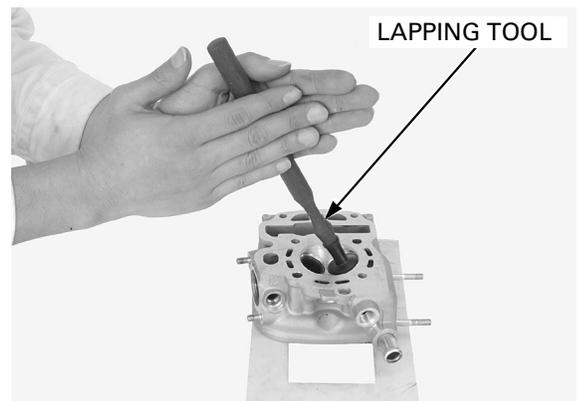
Make sure all pitting and irregularities are removed.



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

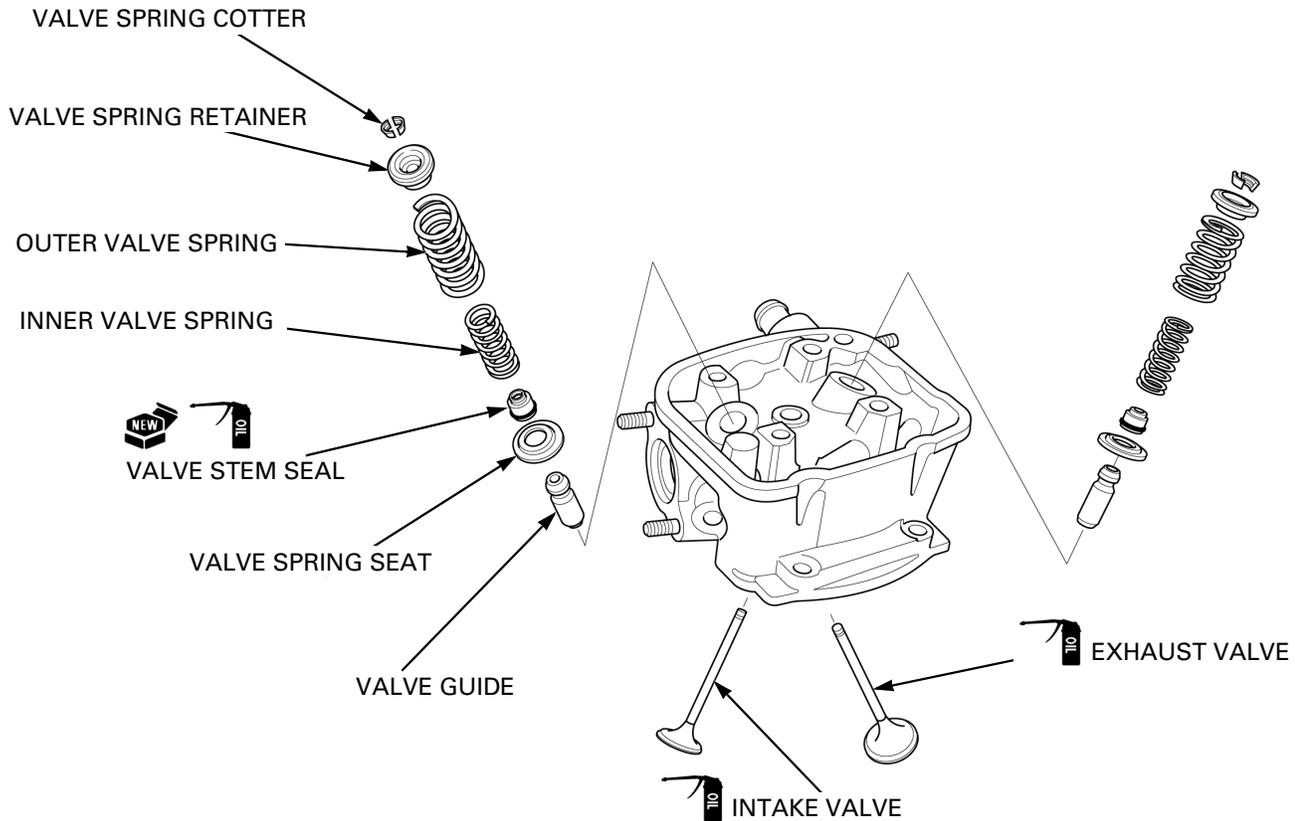
- Excessive lapping pressure may deform or damage the seat.
- Change the angle of the lapping tool frequently to prevent uneven seat wear.
- Do not allow lapping compound to enter the guides.

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



# CYLINDER HEAD/VALVES

## CYLINDER HEAD ASSEMBLY

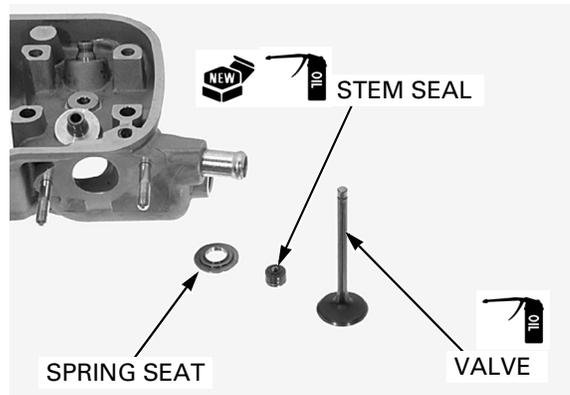


Blow through the oil passage in the cylinder head with compressed air.

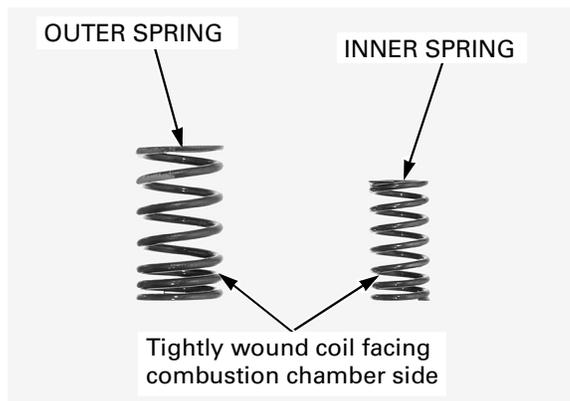
Apply engine oil to the inner surface of new valve stem seals.

Install the valve spring seats and new valve stem seals.

Coat the valve stem sliding surface with engine oil. Insert the valves into the valve guide while turning it slowly to avoid damage to the valve stem seals.



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



Install the valve spring retainer.

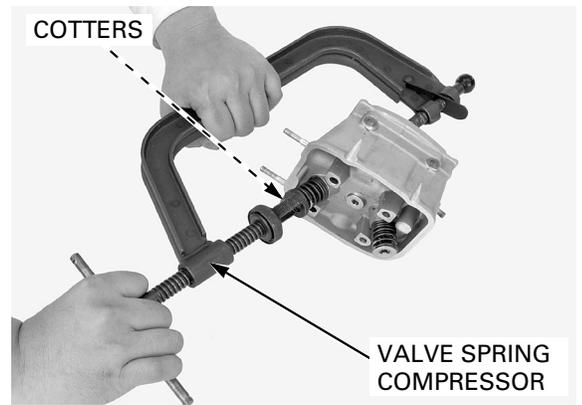
*To prevent loss of tension, do not compress the valve spring more than necessary.*

Install the valve spring cotters using the spring compressor.

**TOOL:**

**Valve spring compressor**

**07757-0010000**

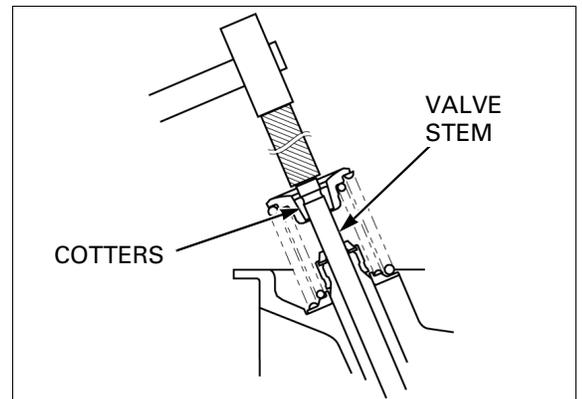


Support the cylinder head.

Tap the valve stems gently as shown to seat the cotters firmly.

Install the following:

- Spark plug (page 4-8)
- ECT sensor (page 6-52)
- O<sub>2</sub> sensor (page 6-55)

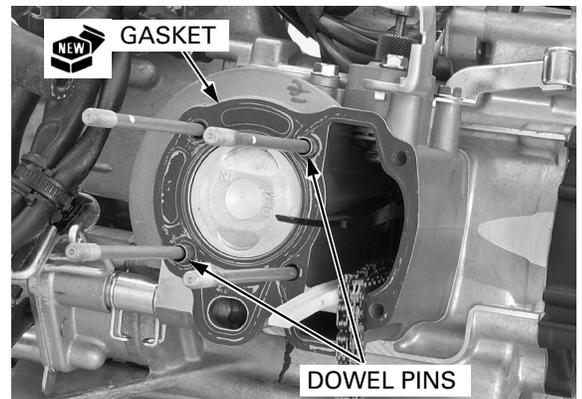


### CYLINDER HEAD/CAMSHAFT HOLDER INSTALLATION

Check the cylinder and crankcase mating area for oil leaks.

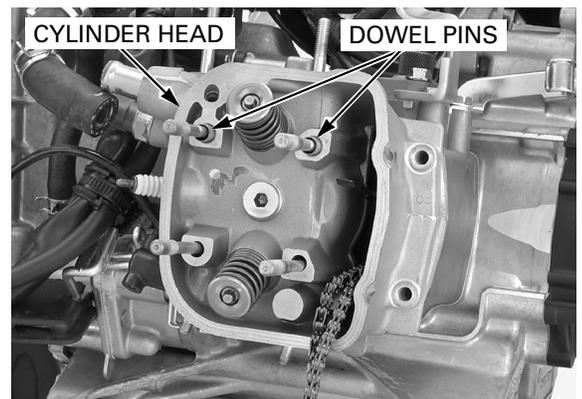
If leaking, remove the cylinder and replace the cylinder gasket with a new one (page 10-4).

Install the dowel pins and a new gasket onto the cylinder.



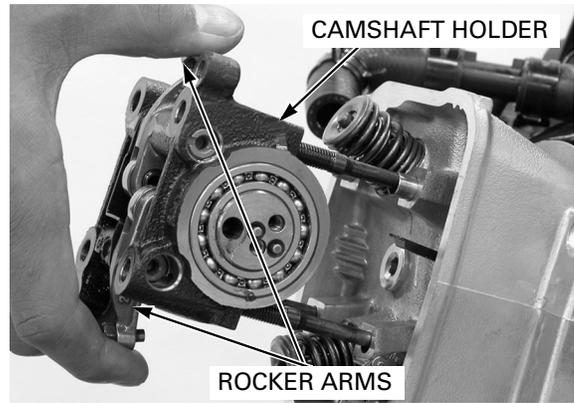
Route the cam chain through the cylinder head and install the cylinder head onto the cylinder.

Install the dowel pins.



## CYLINDER HEAD/VALVES

Install the camshaft holder with cam lobes facing the combustion chamber while holding the rocker arms to prevent the valve adjusting screws from interfering with the valve stems.

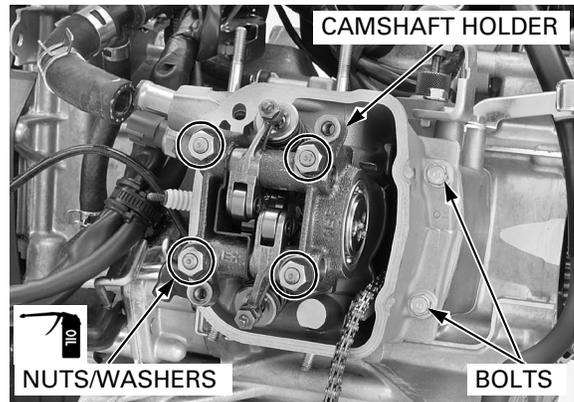


Apply engine oil to the thread and seating surface of the camshaft holder nut.  
Apply engine oil to the whole surface of the camshaft holder nut washer.

Install the washers and tighten the camshaft holder nuts in a crisscross pattern in two or three steps to the specified torque.

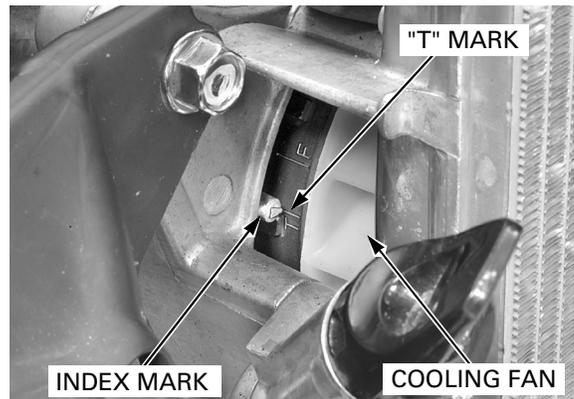
**TORQUE: 18 N·m (1.8 kgf·m, 13 lbf·ft)**

Install and tighten the cylinder head mounting bolts.



*Carefully rotate the crankshaft while holding the cam chain to avoid jamming the cam chain against the timing sprocket of the crankshaft.*

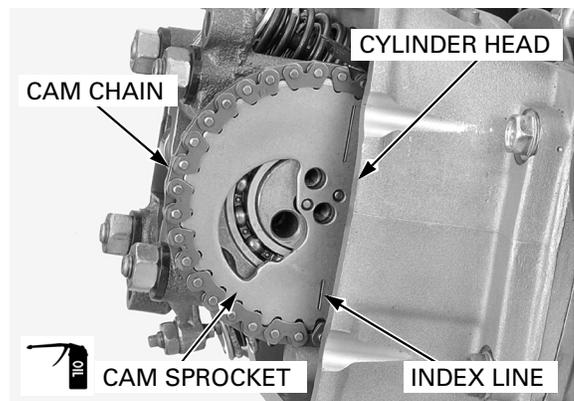
Rotate the crankshaft counterclockwise by rotating the cooling fan and align the "T" mark on the flywheel with the index mark on the right crankcase.



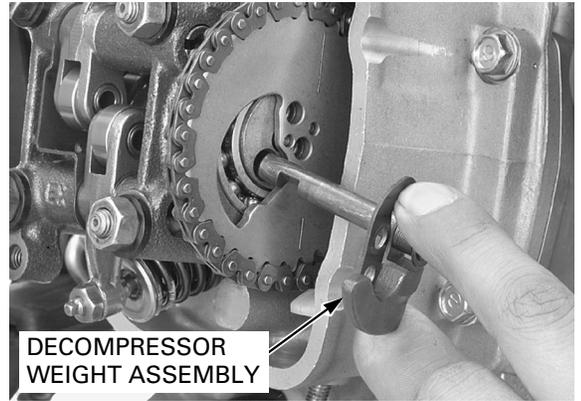
Apply engine oil to the cam chain and cam sprocket teeth.

Set the cam chain onto the cam sprocket.  
Install the cam sprocket onto the camshaft by aligning the camshaft pins and cam sprocket holes.

Make sure that the index line on the cam sprocket is flush with the cylinder head, then check the intake rocker arm and exhaust rocker arm that there is slack (TDC on the compression stroke).



Install the decompressor weight assembly to the camshaft.

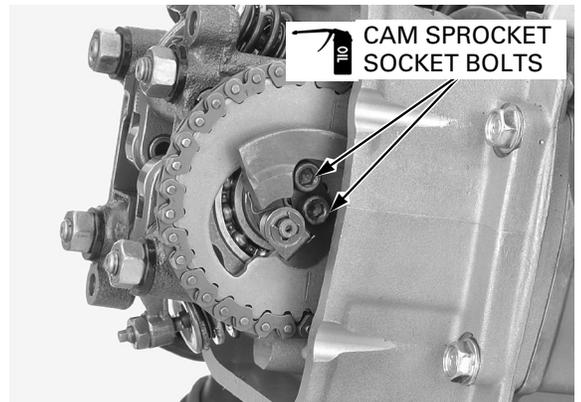


Apply engine oil to the seating surface and threads of the cam sprocket socket bolts.

*Be careful not to let the bolts fall into the opening of the cylinder head.*

Install and tighten the cam sprocket socket bolts to the specified torque.

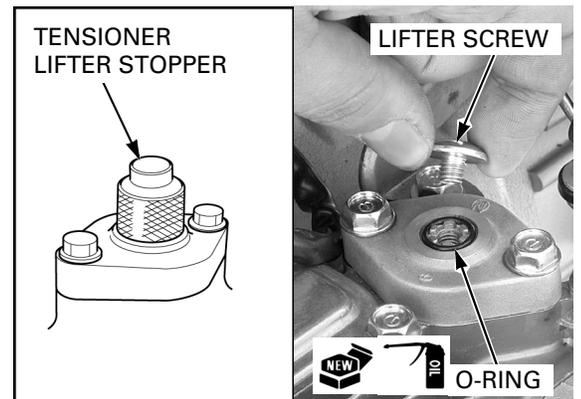
**TORQUE: 8 N·m (0.82 kgf·m, 5.9 lbf·ft)**



Remove the tensioner lifter stopper.

Coat a new O-ring with engine oil and install it into the tensioner lifter groove. Install the lifter screw and tighten it to the specified torque.

**TORQUE: 4 N·m (0.41 kgf·m, 3.0 lbf·ft)**



*Make sure that the water hose clip is installed in the correct direction (page 1-17).*

Connect the following:

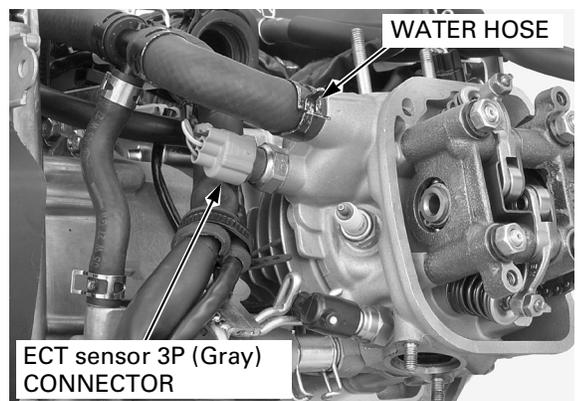
- O<sub>2</sub> sensor connector (page 6-55)
- ECT sensor 3P (Gray) connector (page 3-13)
- Water hose

Install the following:

- Intake pipe (page 6-57)
- Throttle body (page 6-41)
- Cylinder head cover (page 9-6)
- Exhaust pipe/muffler (page 3-13)
- Engine (page 8-7)

Fill and bleed the coolant (page 7-8).

Fill the engine oil (page 4-10).



## CYLINDER HEAD/VALVES

### CAM CHAIN GUIDE

#### REMOVAL

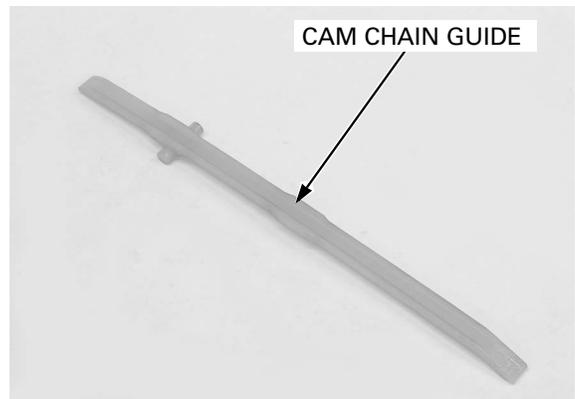
Remove the cylinder head (page 9-7).

Remove the cam chain guide.



#### INSPECTION

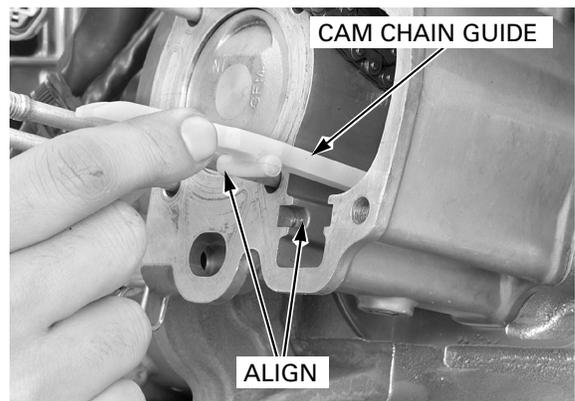
Check the sliding area of the cam chain guide for excessive wear or damage.



#### INSTALLATION

Install the cam chain guide by aligning the bosses of the cam chain guide and grooves of the cylinder.

Install the cylinder head (page 9-21).



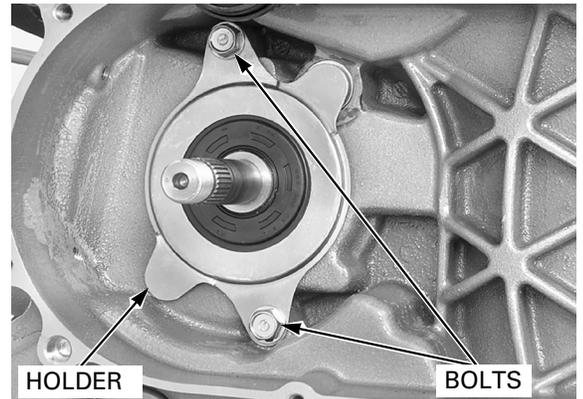
## CAM CHAIN TENSIONER SLIDER

### REMOVAL

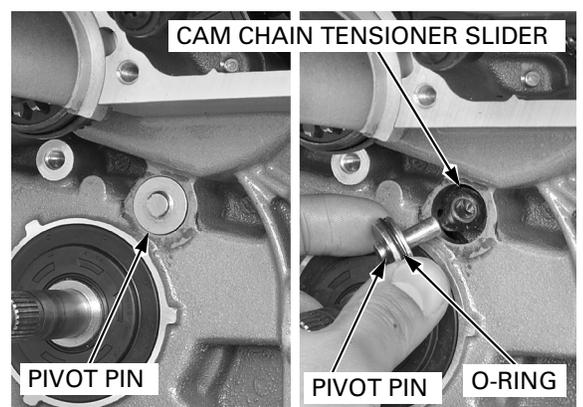
Remove the following:

- Drive pulley (page 11-8)
- Cylinder head (page 9-7)

Remove the bolts and crankshaft oil seal/cam chain tensioner pivot pin holder.

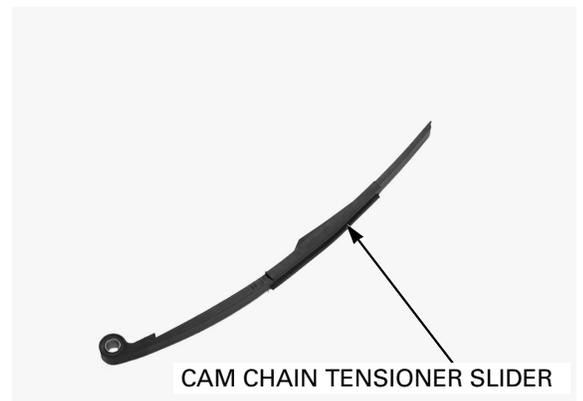


Remove the pivot pin, O-ring and cam chain tensioner slider.



### INSPECTION

Check the sliding area of the cam chain tensioner slider for excessive wear or damage.

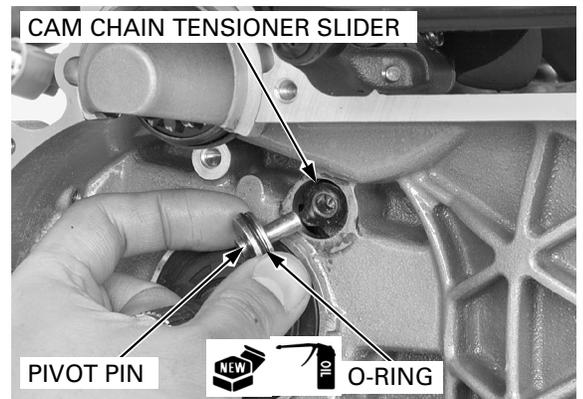


### INSTALLATION

Install the cam chain tensioner slider to the left crankcase.

Coat a new O-ring with engine oil and install it to the pivot pin groove.

Install the pivot pin into the cam chain tensioner slider hole.

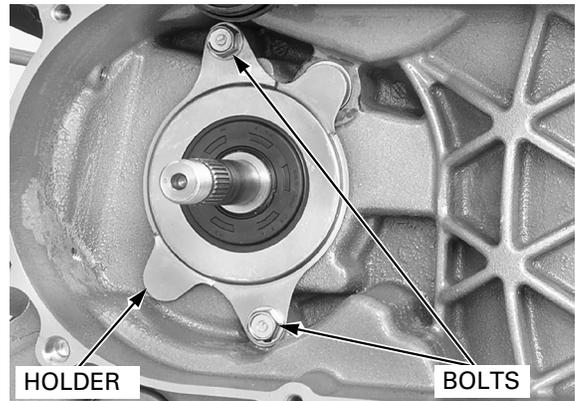


## CYLINDER HEAD/VALVES

Install the crankshaft oil seal/cam chain tensioner pivot pin holder and tighten the bolts.

Install the following:

- Cylinder head (page 9-21)
- Drive pulley (page 11-11)



## CAM CHAIN TENSIONER LIFTER

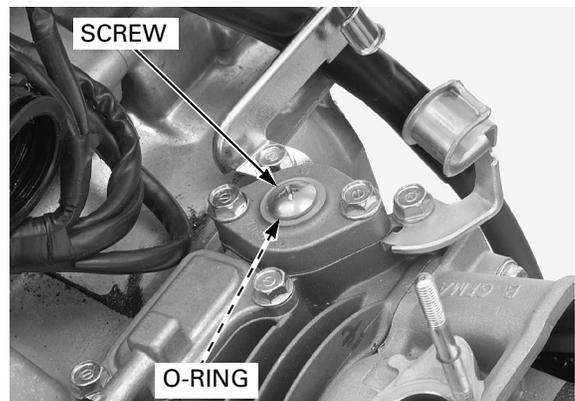
### REMOVAL

- The cam chain tensioner lifter can be serviced with the engine installed in the frame.

Remove the following:

- Luggage box (page 3-8)
- Throttle body (page 6-41)

Remove the tensioner lifter screw and the O-ring.

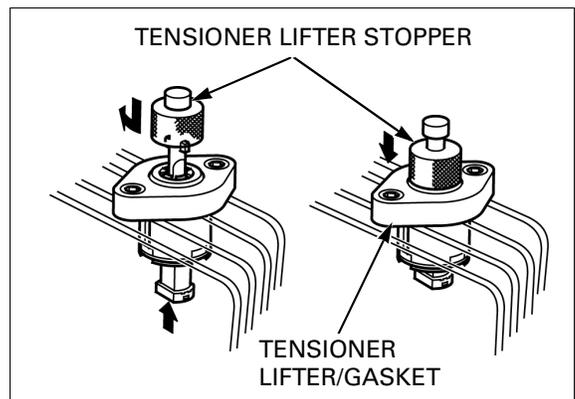


Install the special tool into the tensioner lifter body and turn the tool clockwise until it stops turning. Hold the tensioner lifter by pushing the tool while aligning the tabs of the tool with the grooves of the tensioner lifter.

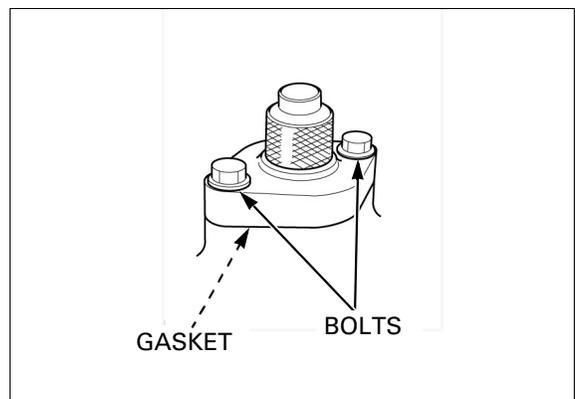
### TOOL:

Tensioner lifter stopper

070MG-0010100



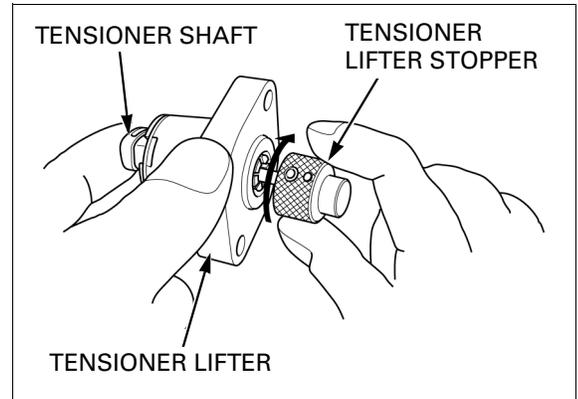
Remove the two bolts, cam chain tensioner lifter and the gasket.



**INSPECTION**

Check the cam chain tensioner lifter operation:

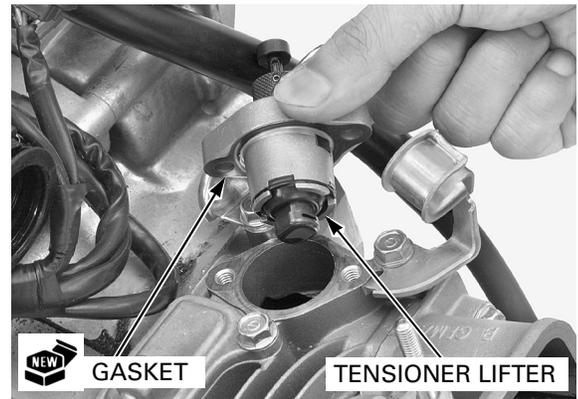
- The tensioner shaft should not go into the body when it is pushed.
- When it is turned clockwise with the tensioner lifter stopper, the tensioner shaft should be pulled into the body. The shaft should protrude from the body as soon as the tensioner lifter stopper is released.



**INSTALLATION**

Install the tensioner lifter stopper and turn the tensioner shaft clockwise with it to retract the tensioner fully.

Install a new gasket and cam chain tensioner lifter.



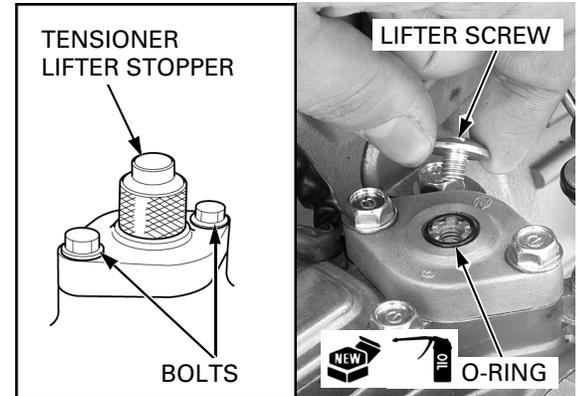
Install and tighten the bolts.  
Remove the tensioner lifter stopper.

Coat a new O-ring with engine oil and install it into the cam chain tensioner lifter groove.  
Install and tighten the cam chain tensioner lifter screw to the specified torque.

**TORQUE: 4 N·m (0.41 kgf·m, 3.0 lbf·ft)**

Install the following:

- Throttle body (page 6-41)
- Luggage box (page 3-8)



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**MEMO**

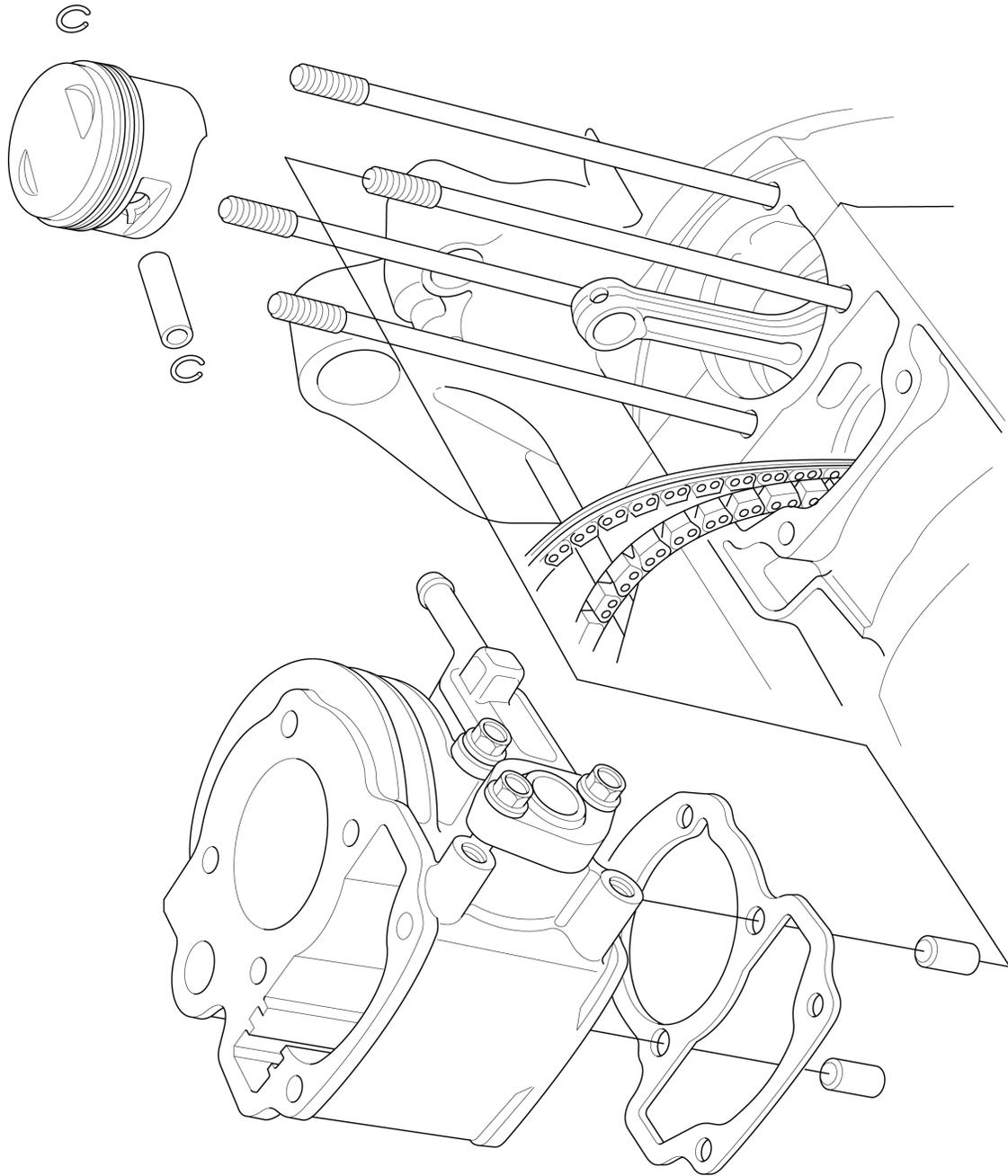
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# 10. CYLINDER/PISTON

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COMPONENT LOCATION .....	10-2	CYLINDER .....	10-4
SERVICE INFORMATION .....	10-3	PISTON .....	10-7
TROUBLESHOOTING .....	10-3		

COMPONENT LOCATION



## SERVICE INFORMATION

### GENERAL

- This section covers maintenance of the cylinder and piston.
- The cylinder and piston can be serviced with the engine installed in the frame.
- Be careful not to damage mating surfaces when removing the cylinder.
- Take care not to damage the cylinder wall and piston.
- Clean all disassembled parts with clean solvent and dry them using compressed air before inspection.
- When removing the piston, clean carbon and sludge from the top of the cylinder.
- The rocker arm and camshaft lubricating oil is fed through the oil passage (stud bolt hole) in the cylinder. Clean the oil passage before installing the cylinder.

### SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT	
Cylinder	I.D.	50.000 – 50.010 (1.9685 – 1.9689)	50.10 (1.972)	
	Out-of-round	–	0.05 (0.002)	
	Taper	–	0.05 (0.002)	
	Warpage	–	0.05 (0.002)	
Piston, piston ring, piston pin	Piston O.D.	49.970 – 49.990 (1.9673 – 1.9681)	49.95 (1.967)	
	Piston O.D. measurement point	10 (0.4) from bottom of skirt	–	
	Piston pin bore I.D.	13.002 – 13.008 (0.5119 – 0.5121)	13.04 (0.513)	
	Piston pin O.D.	12.994 – 13.000 (0.5116 – 0.5118)	12.96 (0.510)	
	Piston-to-piston pin clearance	0.002 – 0.014 (0.0001 – 0.0006)	0.02 (0.001)	
	Piston ring-to-ring groove clearance	Top	0.015 – 0.045 (0.0006 – 0.0018)	0.08 (0.003)
		Second	0.015 – 0.045 (0.0006 – 0.0018)	0.08 (0.003)
	Piston ring end gap	Top	0.10 – 0.25 (0.004 – 0.010)	0.45 (0.018)
		Second	0.10 – 0.25 (0.004 – 0.010)	0.45 (0.018)
		Oil (side rail)	0.20 – 0.70 (0.008 – 0.028)	–
Cylinder-to-piston clearance		0.010 – 0.040 (0.0004 – 0.0016)	0.09 (0.004)	
Connecting rod small end I.D.		13.010 – 13.028 (0.5122 – 0.5129)	13.05 (0.514)	
Connecting rod-to-piston pin clearance		0.010 – 0.034 (0.0004 – 0.0013)	0.05 (0.002)	
Stud bolt projection above crankcase		177.5 – 178.5 (6.99 – 7.03)	–	

## TROUBLESHOOTING

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

- Worn, stuck or broken piston ring
- Worn or damaged cylinder and piston
- Bent connecting rod
- Cylinder head/valve problem (page 9-7)

### Compression too high, overheating or knocking

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

### Excessive smoke

- Worn cylinder, piston or piston ring
- Improper installation of piston rings
- Scored or scratched piston or cylinder wall
- Cylinder head/valve problem (page 9-7)

### Abnormal noise

- Worn piston pin or piston pin hole
- Worn connecting rod small end
- Worn cylinder, piston or piston rings

### Piston ring sticking/scuffing, bearing damage

- Clogged oil gallery or oil strainer screen
- Internal oil leak
- Not using recommended engine oil

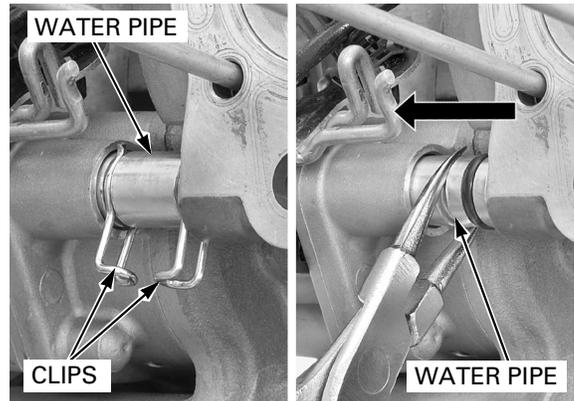
## CYLINDER/PISTON

### CYLINDER

#### REMOVAL

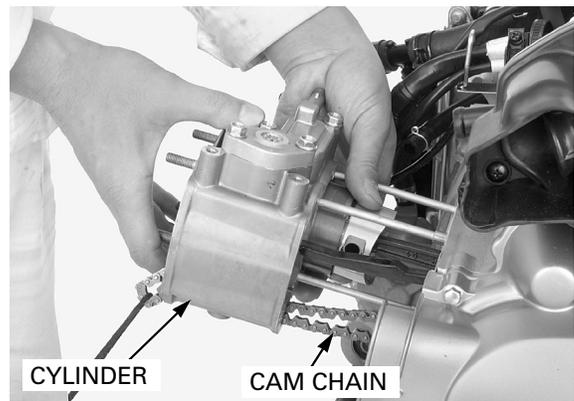
Remove the cylinder head (page 9-7).

Unhook the clips and slide the water pipe into the water pump/stator base.



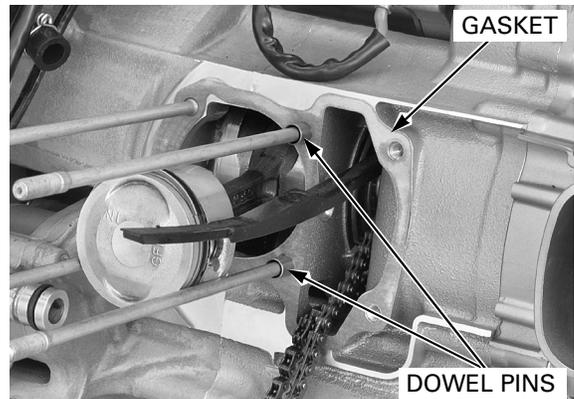
*Attach a piece of wire to the cam chain to prevent it from falling into the crankcase. Be careful not to damage the mating surface.*

Remove the cylinder.



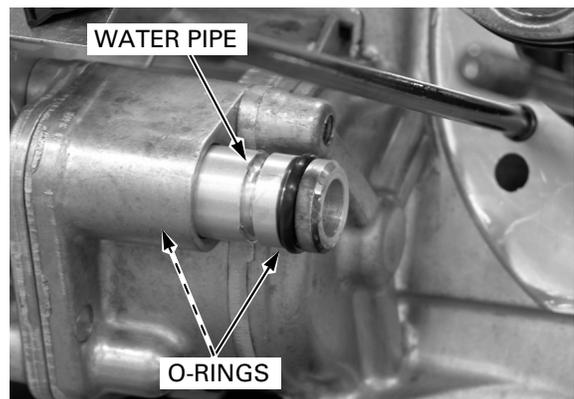
Remove the gasket and dowel pins.

Clean off any gasket material from the cylinder mating surface of the crankcase.



Slide the water pipe out of the water pump/stator base.

Remove the O-rings from the water pipe.



## INSPECTION

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

Take the maximum reading to determine the cylinder wear.

**SERVICE LIMIT: 50.10 mm (1.972 in)**

Calculate the taper and out-of-round at three levels in the X and Y axis. Take the maximum reading to determine both measurements.

**SERVICE LIMIT:**

**Taper: 0.05 mm (0.002 in)**

**Out of round: 0.05 mm (0.002 in)**

The cylinder must be rebored and an oversize piston/piston rings fitted if the service limits are exceeded.

The following oversize pistons/piston rings are available:

**0.25 mm (0.010 in)**

**0.50 mm (0.020 in)**

**0.75 mm (0.030 in)**

**1.00 mm (0.039 in)**

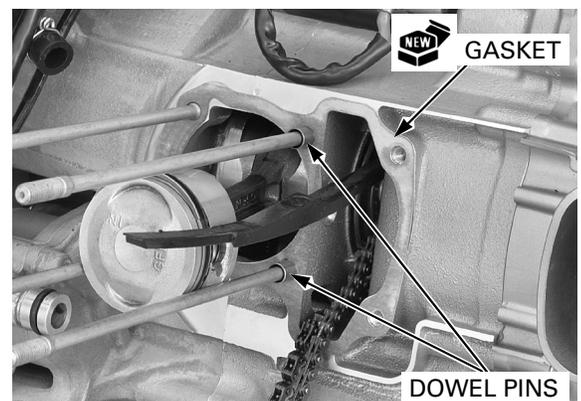
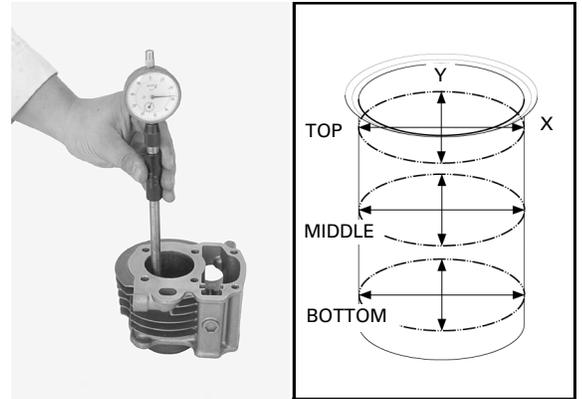
The piston to cylinder clearance for the oversize piston must be: 0.005 – 0.035 mm (0.0002 – 0.0014 in).

Check the cylinder for warpage with a straight edge and feeler gauge in the directions shown.

**SERVICE LIMIT: 0.05 mm (0.002 in)**

## INSTALLATION

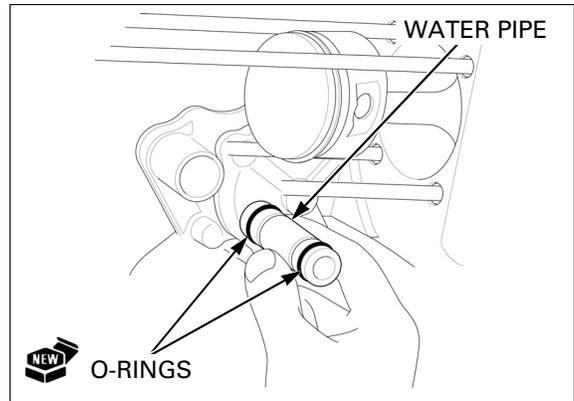
Install the dowel pins and a new gasket.



## CYLINDER/PISTON

Install the new O-rings into the grooves of the water pipe.

Insert the water pipe into the water pump/stator base.

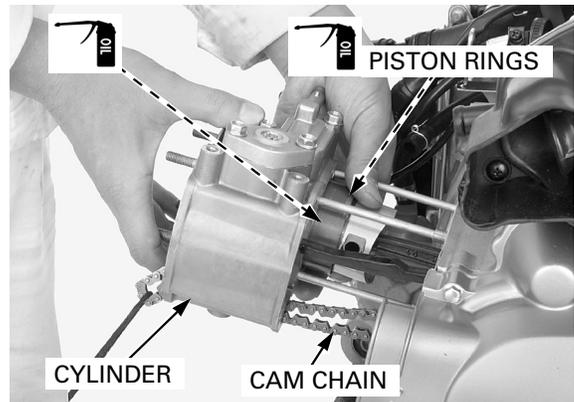


Apply engine oil to the cylinder and piston sliding surface.

Apply engine oil to the piston rings.

*Attach a piece of wire to the cam chain to prevent it from falling into the crankcase.*

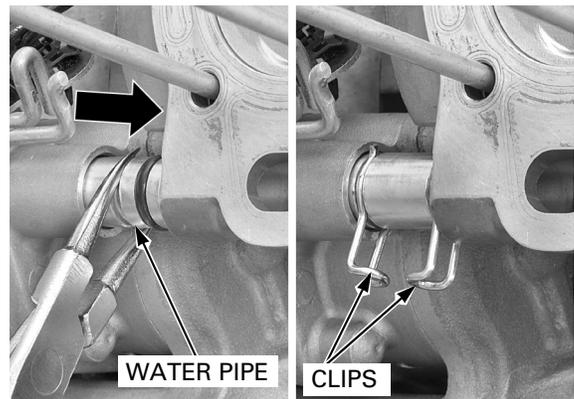
Install the cylinder over the piston while compressing the piston ring with your finger.



Slide the water pipe into the cylinder.

Set the clips to the water pipe as shown.

Install the cylinder head (page 9-21).



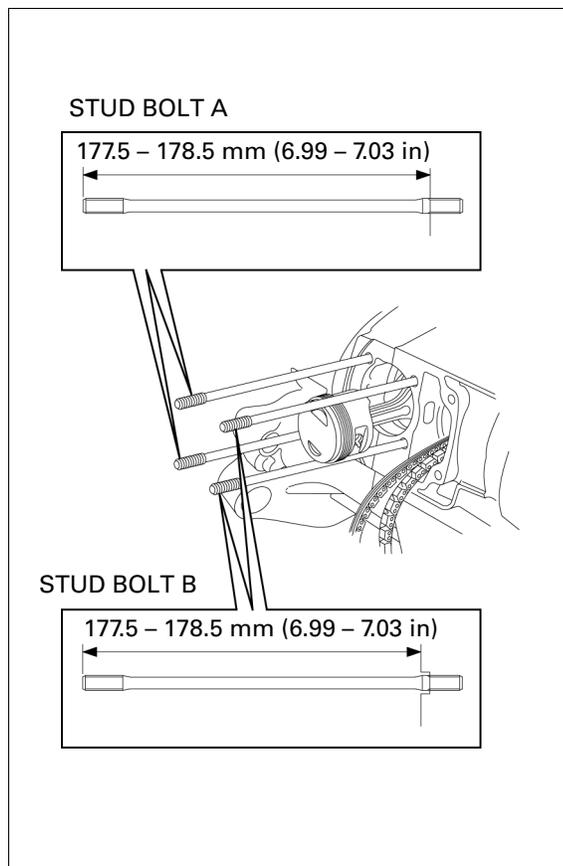
## STUD BOLT REPLACEMENT

Thread two nuts onto the stud and tighten them together, and use wrench on them to turn the stud bolt out.

Install new stud bolts A, B into the crankcase and tighten them.

After crankcase stud bolt installation, check that the length from the bolt head to the crankcase surface is within specification.

**SPECIFIED LENGTH: 177.5 – 178.5 mm (6.99 – 7.03 in)**



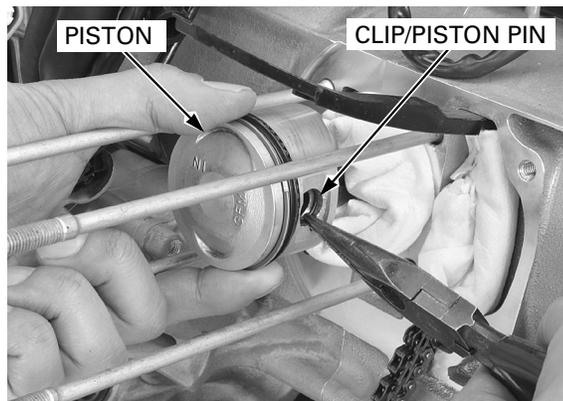
## PISTON

### REMOVAL

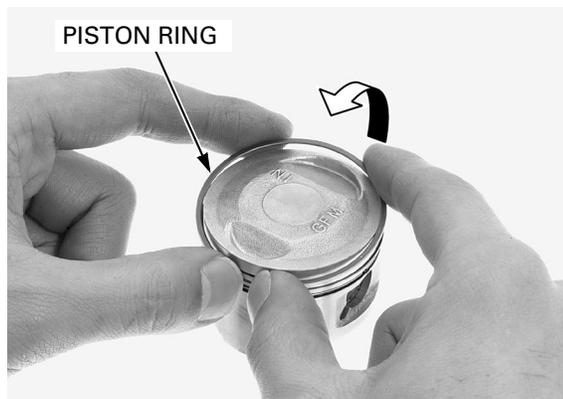
*Be careful not to let the piston pin clips fall into the opening of the crankcase.*

Remove the cylinder (page 10-4).

Remove the piston pin clips with pliers. Push the piston pin out of the piston and connecting rod, then remove the piston.



Spread each piston ring and remove it by lifting up at a point opposite the gap.



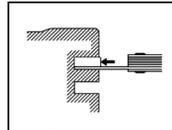
## CYLINDER/PISTON

Clean carbon deposits from the ring grooves with a ring that will be discarded.



### INSPECTION

Inspect the piston rings for movement by rotating the rings. The rings should be able to move in their grooves without catching. Push the ring until the outer surface of the piston ring is nearly flush with the piston and measure the ring-to-groove clearance.

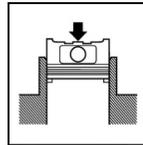


#### SERVICE LIMIT:

Top/Second: 0.08 mm (0.003 in)

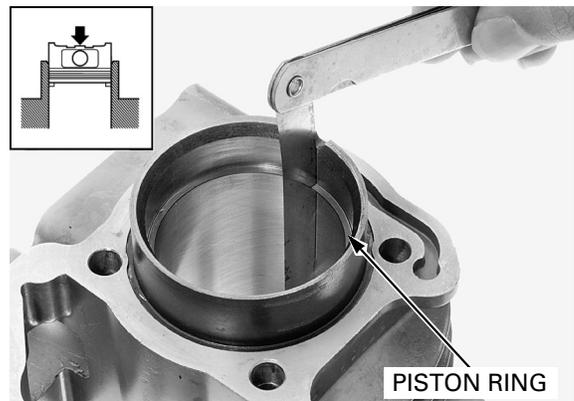


Insert each piston ring into the bottom of the cylinder squarely using the piston. Measure the ring end gap.



#### SERVICE LIMIT:

Top/Second: 0.45 mm (0.018 in)



Check the piston outer surface for scratches or damage.

Measure the piston pin hole. Take the maximum reading to determine I.D.

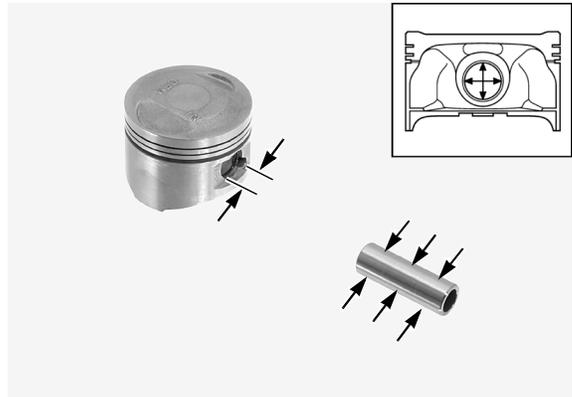
**SERVICE LIMIT: 13.04 mm (0.513 in)**

Measure the piston pin O.D. at piston and connecting rod sliding areas.

**SERVICE LIMIT: 12.96 mm (0.510 in)**

Calculate the piston-to-piston pin clearance.

**SERVICE LIMIT: 0.02 mm (0.001 in)**

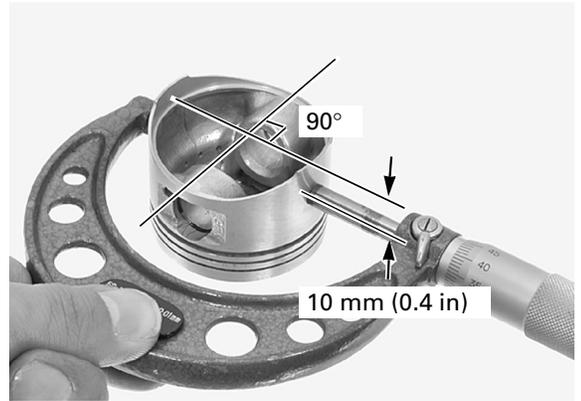


Measure the piston O.D. at the point 10 mm (0.4 in) from the bottom and 90° to the piston pin hole.

**SERVICE LIMIT: 49.95 mm (1.967 in)**

Calculate the cylinder-to-piston clearance (cylinder I.D.: page 10-5).

**SERVICE LIMIT: 0.09 mm (0.004 in)**



Measure the connecting rod small end I.D.

**SERVICE LIMIT: 13.05 mm (0.514 in)**

Calculate the connecting rod-to-piston pin clearance.

**SERVICE LIMIT: 0.05 mm (0.002 in)**



## CYLINDER/PISTON

### INSTALLATION

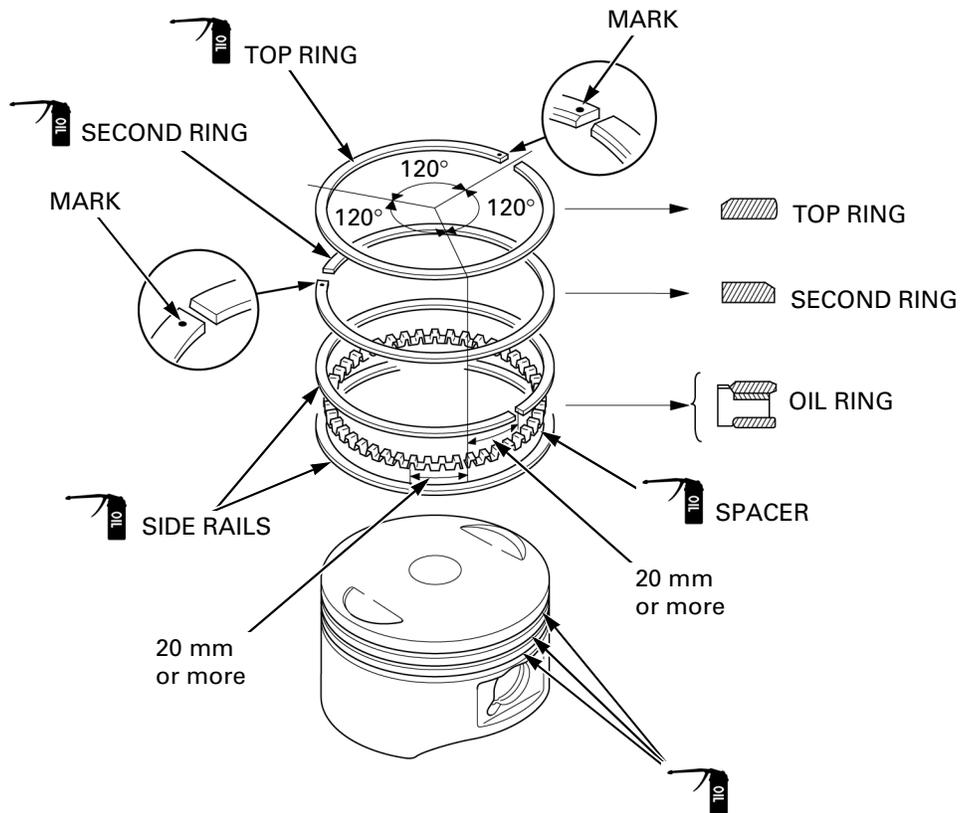
Apply engine oil to the rings and ring grooves.

Carefully install the piston rings into the piston ring grooves with the markings facing up.

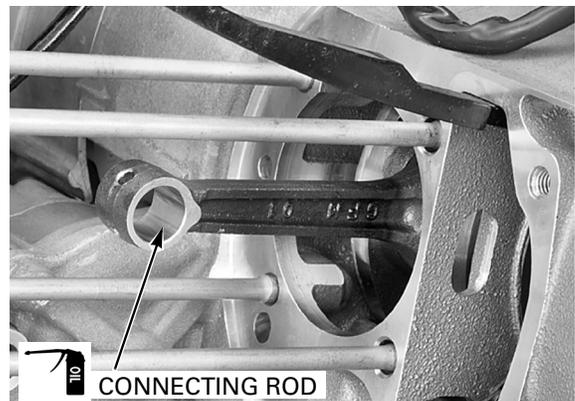
- Do not confuse the top and second rings.
- To install the oil ring, install the spacer first, then install the side rails.
- Install the piston rings with the marking facing up.

Stagger the piston ring end gaps 120 degrees apart from each other.

Stagger the side rail end gaps as shown.



Apply engine oil to the connecting rod small end hole.



Apply engine oil to the piston pin.

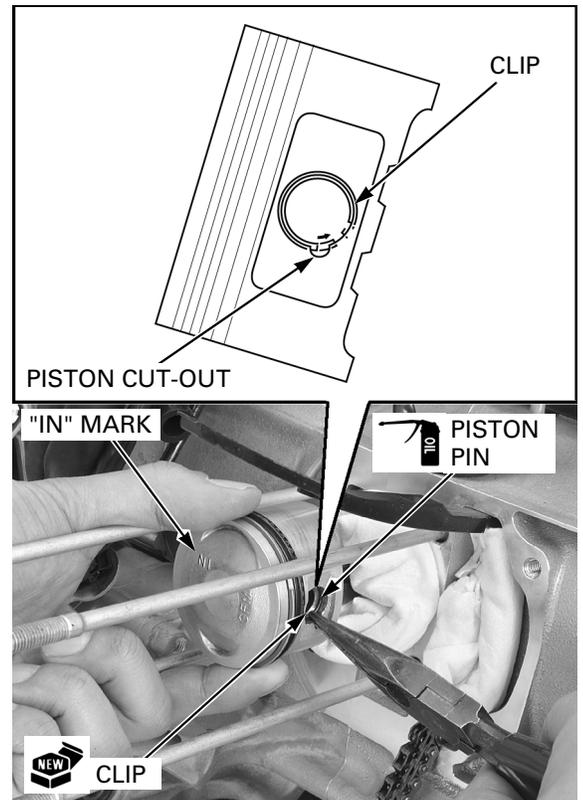
Install the piston with the "IN" mark facing the intake side.

*Be careful not to let the piston pin clips fall into the opening of the crankcase.*

Install the piston pin and new pin clips.

- Make sure the piston pin clips are seated securely.
- Do not align the piston pin clip end gap with the piston cut-out.

Install the cylinder (page 10-5).



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**MEMO**

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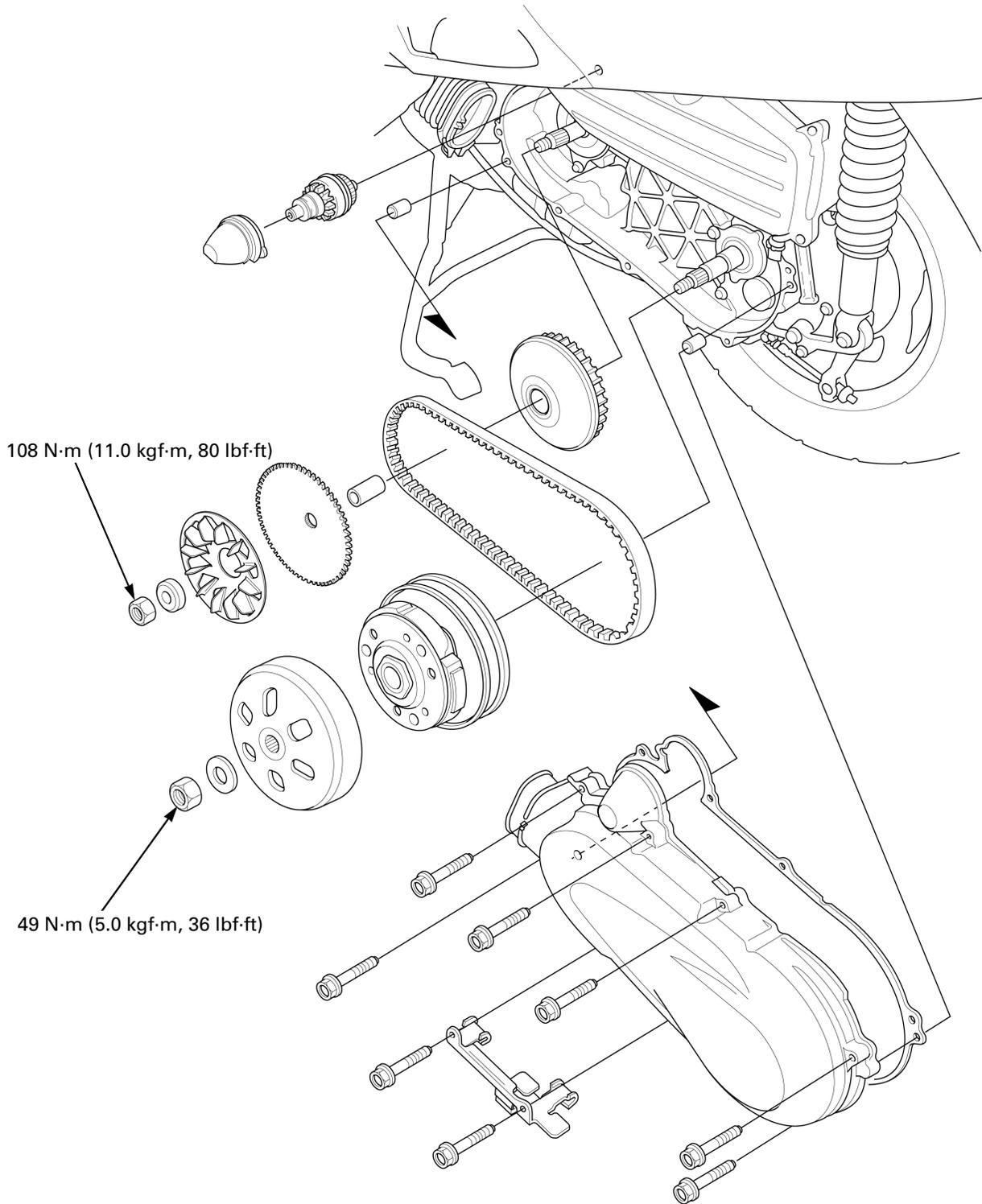
# 11. DRIVE PULLEY/DRIVEN PULLEY/CLUTCH

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COMPONENT LOCATION .....	11-2	DRIVE BELT .....	11-6
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LEFT CRANKCASE COVER .....	11-5	CLUTCH/DRIVEN PULLEY .....	11-13

# DRIVE PULLEY/DRIVEN PULLEY/CLUTCH

## COMPONENT LOCATION



**SERVICE INFORMATION**

**GENERAL**

- This section covers maintenance of the drive pulley, driven pulley and clutch.
- These services can be done with the engine installed in the frame.
- Avoid getting grease and oil on the drive belt and drive/driven pulley faces in order to prevent belt slippage.
- Do not apply grease to the weight rollers.

**SPECIFICATIONS**

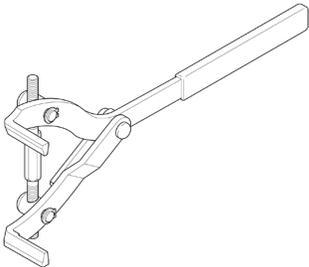
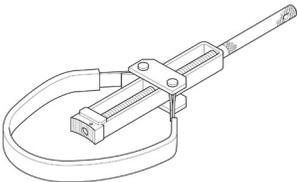
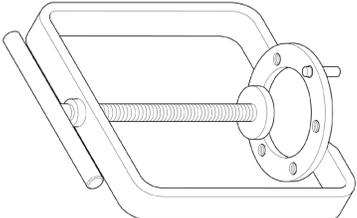
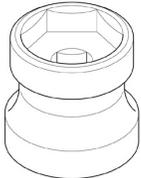
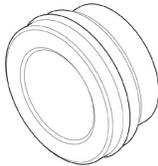
Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Drive belt width		18.5 (0.73)	17.5 (0.69)
Movable drive face	Bushing I.D.	22.035 – 22.085 (0.8675 – 0.8695)	22.11 (0.870)
	Boss O.D.	22.010 – 22.025 (0.8665 – 0.8671)	21.98 (0.865)
	Weight roller O.D.	17.92 – 18.08 (0.706 – 0.712)	17.5 (0.69)
Clutch	Lining thickness	–	2.0 (0.08)
	Clutch outer I.D.	125.0 – 125.2 (4.92 – 4.93)	125.5 (4.94)
Driven pulley	Face spring free length	111.4 (4.39)	108.0 (4.25)
	Driven face boss O.D.	33.965 – 33.985 (1.3372 – 1.3380)	33.94 (1.336)
	Movable driven face I.D.	34.000 – 34.025 (1.3386 – 1.3396)	34.06 (1.341)

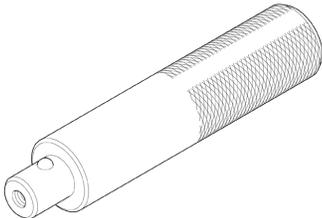
**TORQUE VALUES**

Drive pulley face nut	108 N·m (11.0 kgf·m, 80 lbf·ft)	Apply engine oil to the threads and seating surface
Clutch/driven pulley nut	54 N·m (5.5 kgf·m, 40 lbf·ft)	
Clutch outer nut	49 N·m (5.0 kgf·m, 36 lbf·ft)	

**TOOLS**

<p>Clutch center holder 07724-0050002</p> 	<p>Flywheel holder 07725-0040001</p> 	<p>Clutch spring compressor 07LME-GZ40201</p> 
<p>Socket wrench, 39 x 41 mm 07GMA-KS40100</p> 	<p>Bearing remover, 20 mm 07931-MA70000</p> 	<p>Fork seal driver attachment 07747-0010400</p> 

## DRIVE PULLEY/DRIVEN PULLEY/CLUTCH

<p>Driver 07749-0010000</p> 	<p>Pilot, 28 mm 07746-0041100</p> 	<p>Attachment, 28 x 30 mm 07946-1870100</p> 
<p>Pilot, 20 mm 07746-0040500</p> 		

## TROUBLESHOOTING

### Engine starts but scooter won't move

- Worn drive belt
- Worn or damaged clutch shoe
- Broken driven face spring

### Engine stalls or scooter creeps

- Broken clutch shoe spring

### Poor performance at high speed or lack of power

- Worn drive belt
- Weak driven face spring
- Worn weight rollers
- Contaminated pulley faces

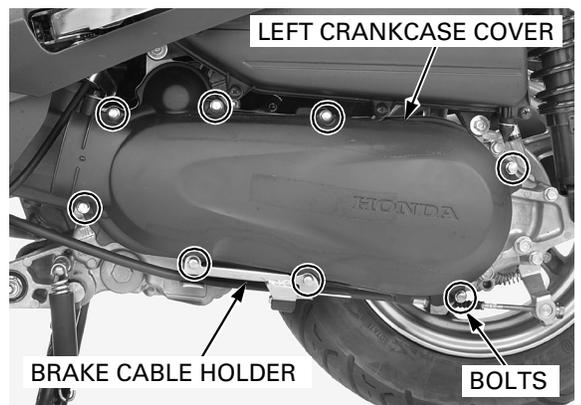
## LEFT CRANKCASE COVER

### REMOVAL

Loosen the band screw and disconnect the air duct from the left crankcase cover.

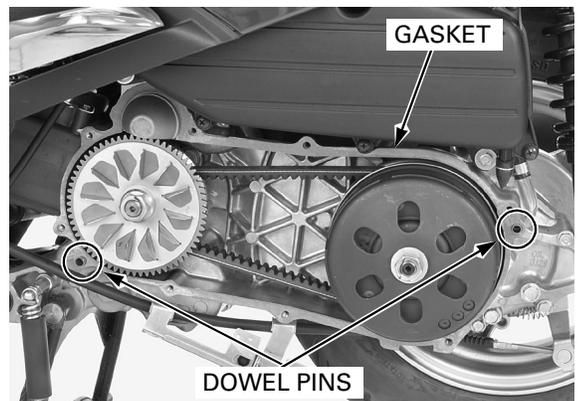


Remove the bolts, brake cable holder and left crankcase cover.



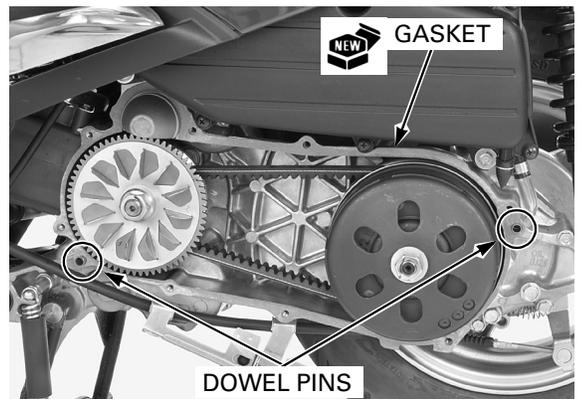
Remove the two dowel pins and cover gasket from the left crankcase.

Clean the gasket mating surface.



### INSTALLATION

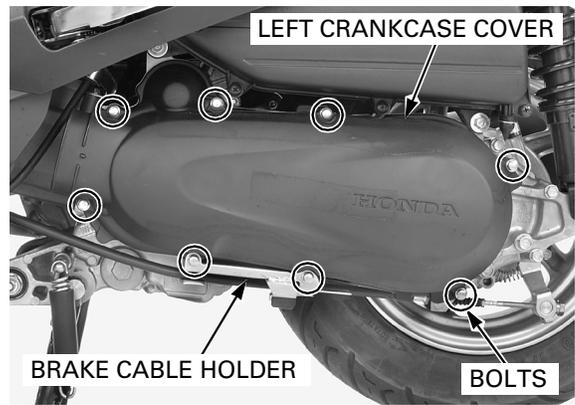
Install the two dowel pins  
Install a new cover gasket.



## DRIVE PULLEY/DRIVEN PULLEY/CLUTCH

Install the left crankcase cover onto the left crankcase by aligning the dowel pins with the holes.

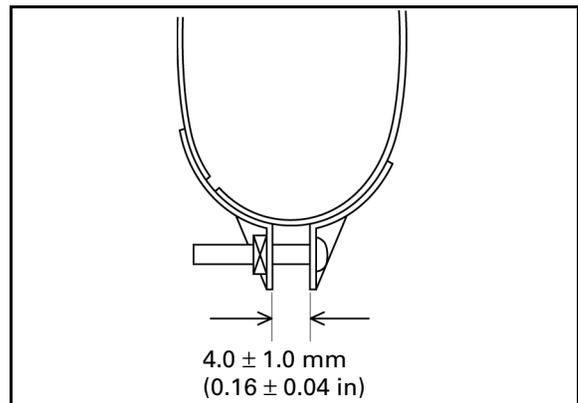
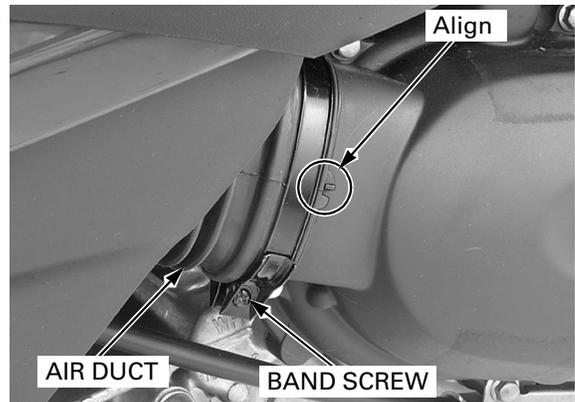
Install the brake cable holder, left crankcase cover bolts and tighten the bolts in a crisscross pattern in two or three steps.



Connect the air duct to the left crankcase cover by aligning the air duct cut-off with the left crankcase cover tab.

Tighten the band screw.

- Tighten the air duct band screw until the clearance between the screw and band end is  $4.0 \pm 1.0$  mm ( $0.16 \pm 0.04$  in)



## DRIVE BELT

### REMOVAL/INSTALLATION

- The drive belt can be serviced with the engine installed in the frame.

Remove the following:

- Drive pulley face (page 11-8)
- Clutch/driven pulley (page 11-13)

Remove the drive belt and replace it if necessary.

Install the following:

- Clutch/driven pulley (page 11-21)
- Drive pulley face (page 11-11)
- Left crankcase cover (page 11-5)



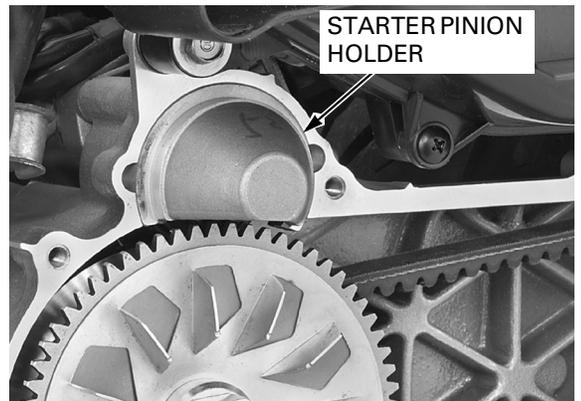
## STARTER PINION

### REMOVAL

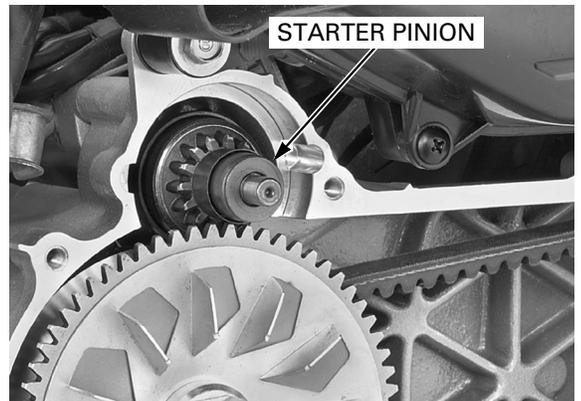
- The starter pinion can be serviced with the engine installed in the frame.

Remove the left crankcase cover (page 11-5).

Remove the starter pinion holder.



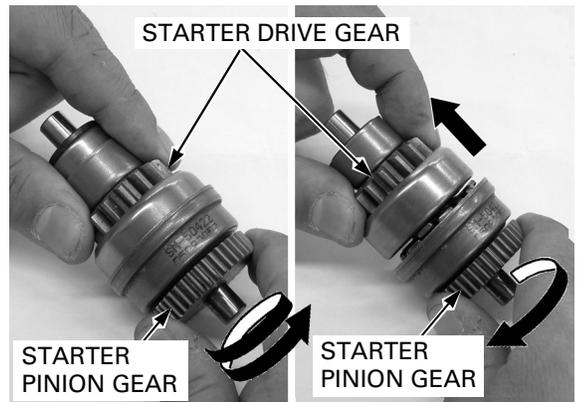
Remove the starter pinion.



### INSPECTION

Hold the starter drive gear and turn the starter pinion gear.

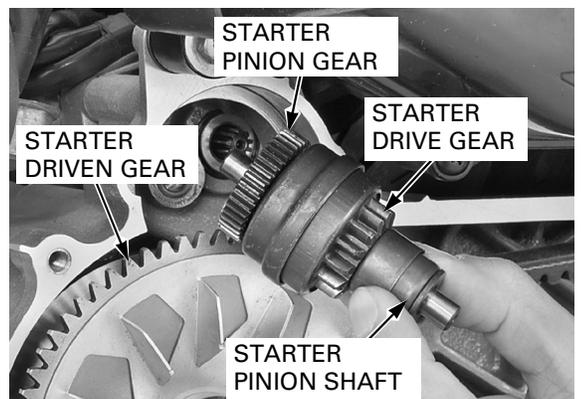
- When turned clockwise, the starter pinion gear should rotate freely.
- When turned counterclockwise, the starter drive gear should protrude smoothly as it rotates.



Check the pinion gear teeth and shaft for wear or damage.

Check the starter drive gear teeth of the starter pinion for wear or damage.

Check the starter driven gear teeth of the drive pulley face for wear or damage.

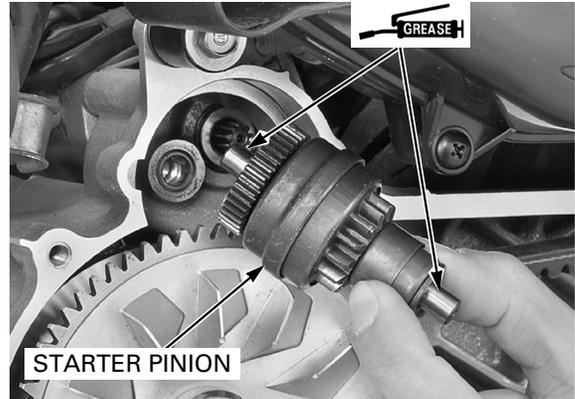


## DRIVE PULLEY/DRIVEN PULLEY/CLUTCH

### INSTALLATION

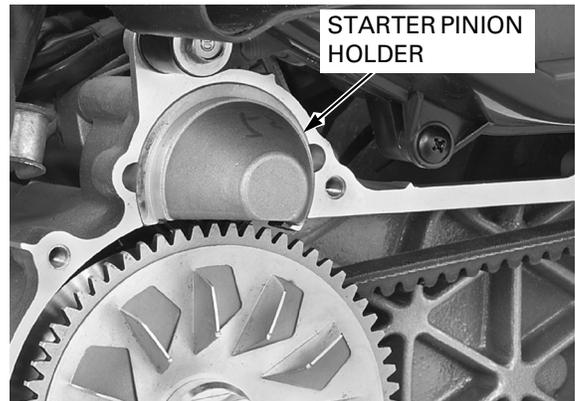
Apply 0.1 – 0.3 g of grease (SHIN-NIHON POWER-NOC WB3 or equivalent) to the ends of the starter pinion.

Install the starter pinion into the left crankcase.



Install the starter pinion holder.

Install the left crankcase cover (page 11-5).

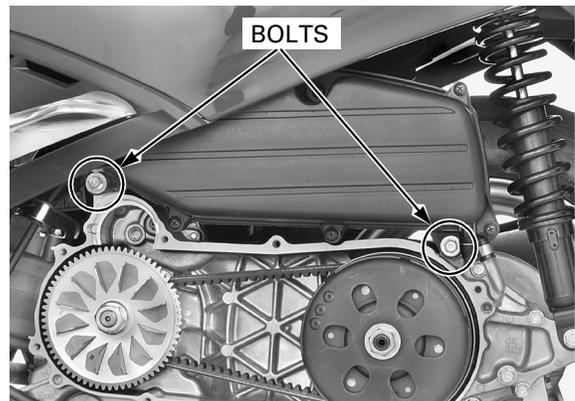


## DRIVE PULLEY

### REMOVAL

Remove the starter pinion (page 11-7).

Remove the air cleaner housing bolts.



*Set the special tool lifting the air cleaner housing.*

Hold the drive pulley face with special tool and loosen the drive pulley face nut.

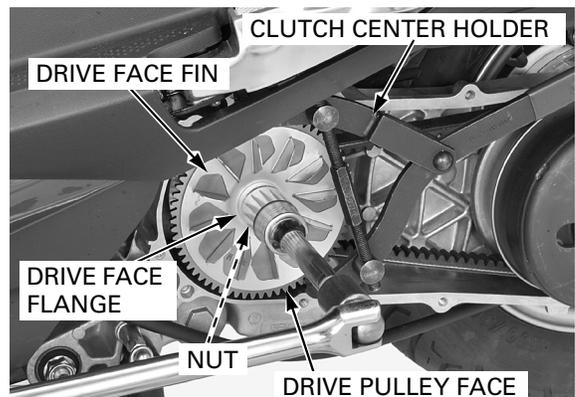
#### TOOL:

**Clutch center holder**

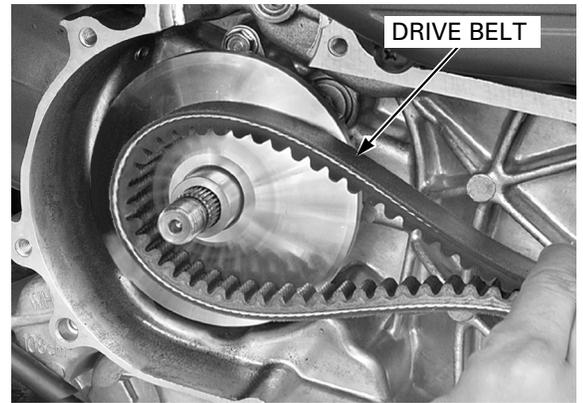
**07724-0050002**

Remove the following:

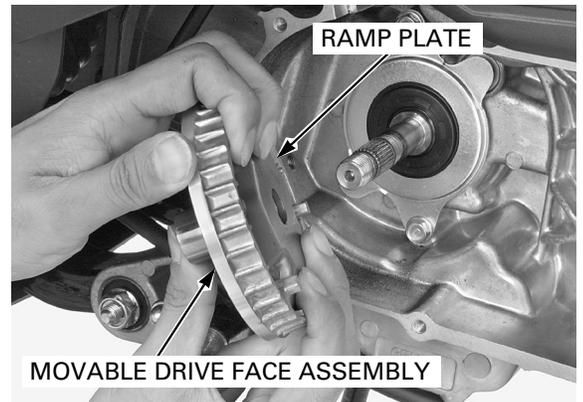
- Nut
- Drive face flange
- Drive face fin
- Drive pulley face



Slide the drive belt off from the drive pulley boss by squeezing the drive belt.



Remove the movable drive face assembly while holding the back of the face (ramp plate) and drive face boss.



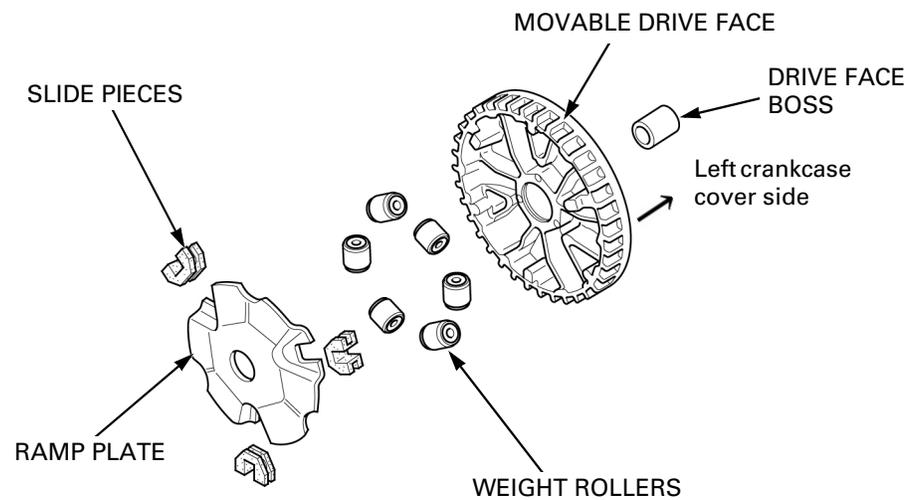
### DISASSEMBLY/ASSEMBLY

Remove the following:

- Drive face boss
- Ramp plate
- Slide pieces
- Weight rollers

Assembly is in the reverse order of disassembly.

- Clean any oil and grease from the weight rollers and movable drive face.

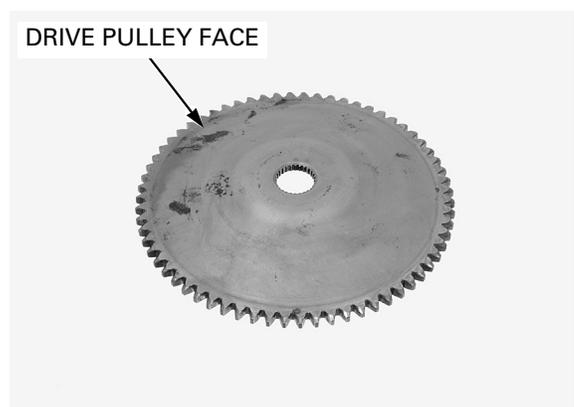


## DRIVE PULLEY/DRIVEN PULLEY/CLUTCH

### INSPECTION

#### DRIVE PULLY FACE

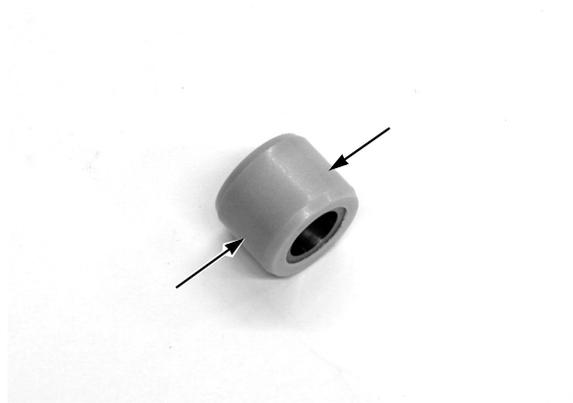
Check the drive pulley face for scratches, scores or damage.



#### WEIGHT ROLLER

Check each roller for abnormal wear.  
Measure the weight roller O.D.

**SERVICE LIMIT: 17.5 mm (0.69 in)**



#### DRIVE FACE BOSS

Check the drive face boss for wear or damage.  
Measure the drive face boss O.D.

**SERVICE LIMIT: 21.98 mm (0.865 in)**

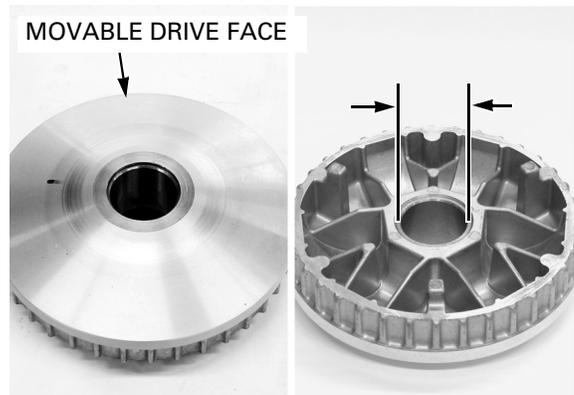


#### MOVABLE DRIVE FACE

Check the movable drive face for scratches, scores or damage.

Measure the drive face bushing I.D.

**SERVICE LIMIT: 22.11 mm (0.870 in)**

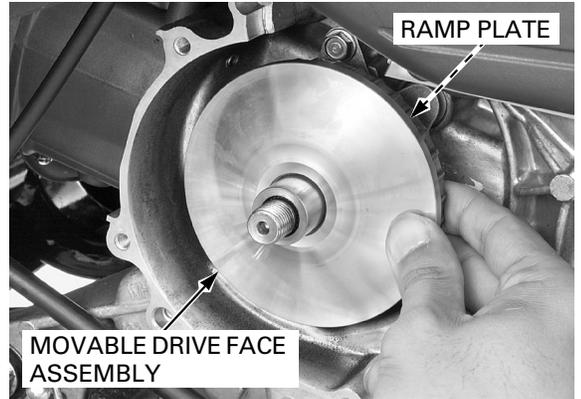


## INSTALLATION

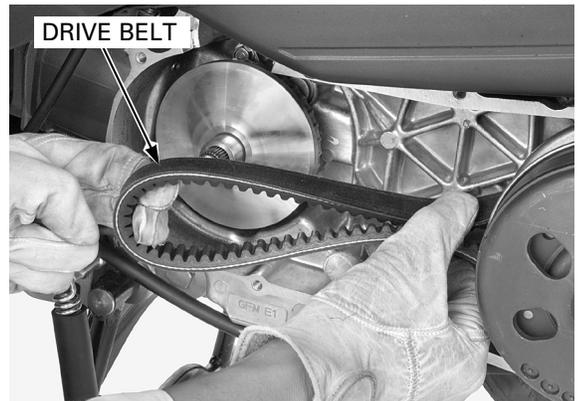
Clean any oil and grease from the drive face and the drive belt.

*Be careful not to get the movable drive face disassembled.*

Install the movable drive face assembly onto the crankshaft until it is fully seated while holding the ramp plate.

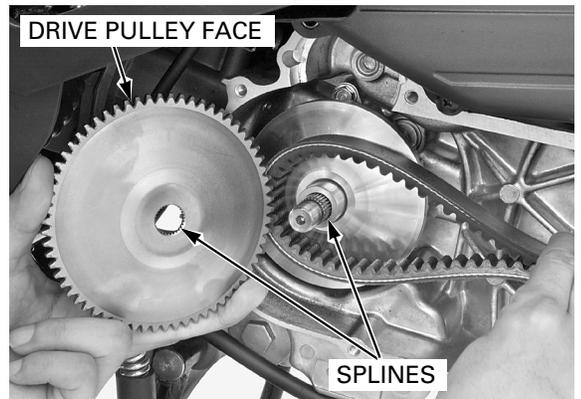


Compress the driven face spring by squeezing the drive belt until there is enough slack to install the drive belt to the drive pulley boss.

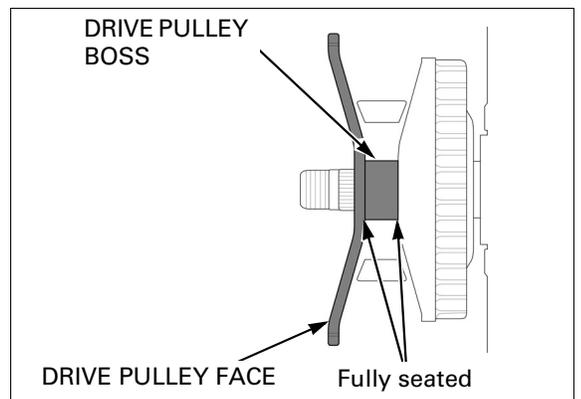


Set the drive belt onto the drive pulley boss by squeezing it to obtain the clearance between the belt and shaft.

Install the drive pulley face while aligning its splines with crankshaft splines.

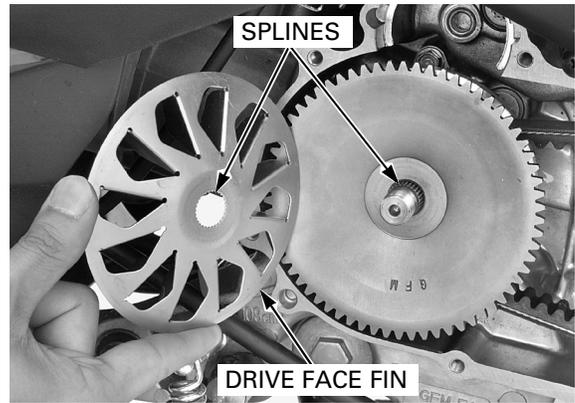


Make sure that the drive pulley face is fully seated on the drive pulley boss.

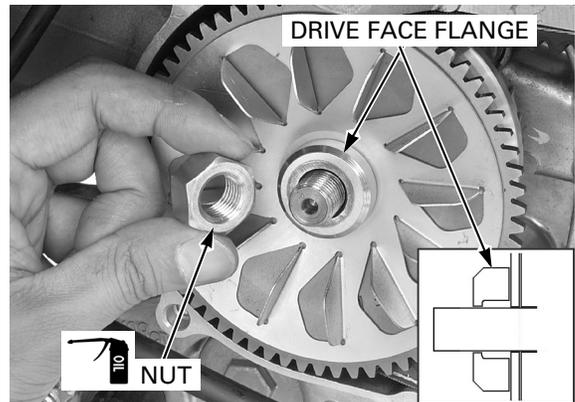


## DRIVE PULLEY/DRIVEN PULLEY/CLUTCH

Install the drive face fin while aligning its splines with crankshaft splines.



Install the drive face flange with the tapered side facing out.  
Apply engine oil to the drive pulley face nut threads and seating surface then install it.

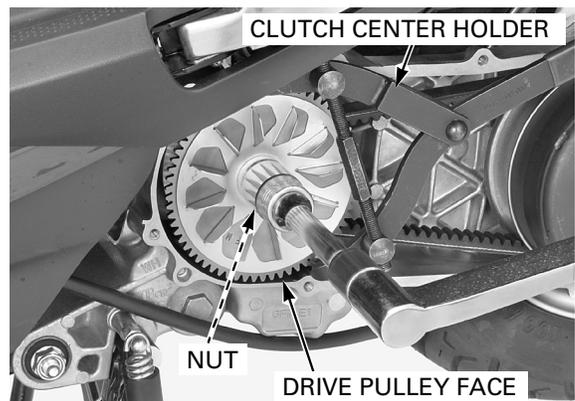


Hold the drive pulley face with the special tool and tighten the nut to the specified torque.

**TOOL:**  
**Clutch center holder**                      **07724-0050002**

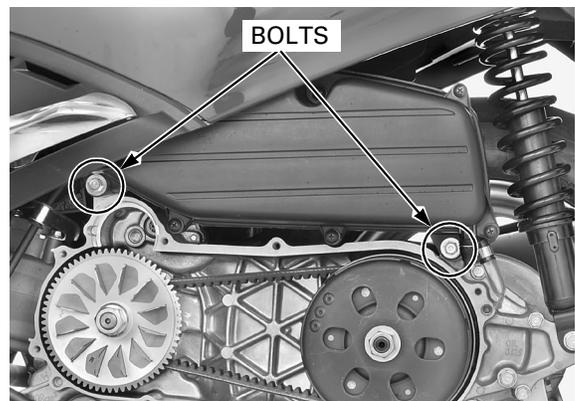
**TORQUE: 108 N·m (11.0 kgf·m, 80 lbf·ft)**

Install the left crankcase cover (page 11-5).



Install the air cleaner housing bolts and tighten them.

Install the starter pinion (page 11-7).



## CLUTCH/DRIVEN PULLEY

### REMOVAL

- The clutch/driven pulley can be serviced with the engine installed in the frame.

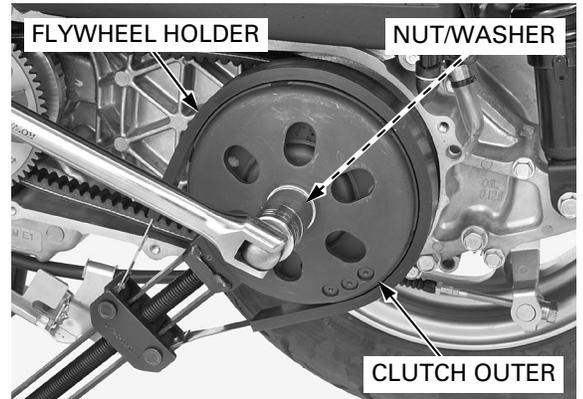
Remove the left crankcase cover (page 11-5).

Hold the clutch outer with the special tool and remove the nut.

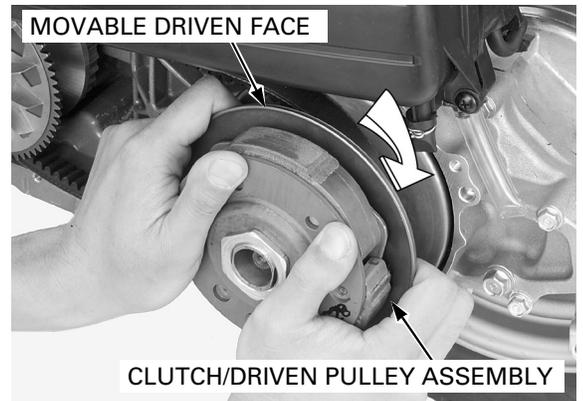
#### TOOL:

**Flywheel holder** 07725-0040001

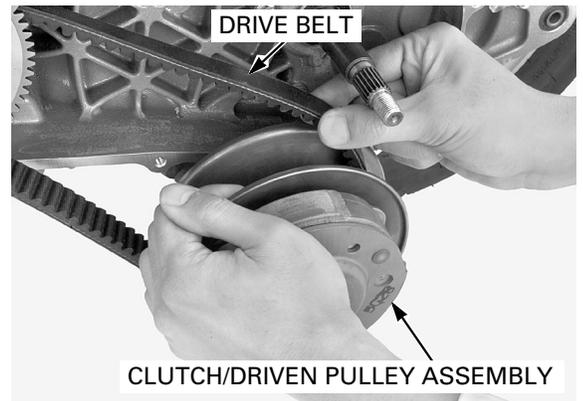
Remove the washer and clutch outer.



Hold the clutch/driven pulley assembly and compress the driven face spring by turning movable driven face clockwise until it is set in lock position.



Remove the clutch/driven pulley assembly from the drive belt by holding the movable driven face.



## DRIVE PULLEY/DRIVEN PULLEY/CLUTCH

### DISASSEMBLY

#### CLUTCH/DRIVEN PULLEY

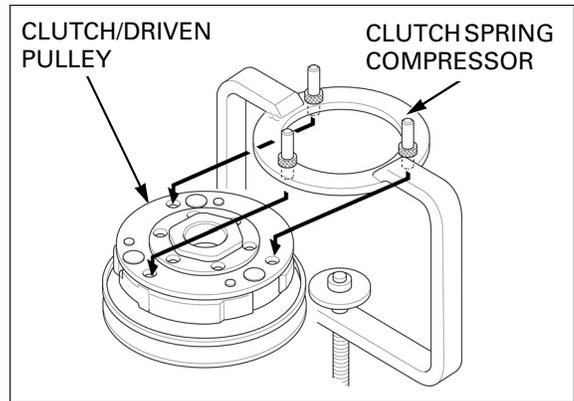
Set the clutch spring compressor onto the clutch/driven pulley by aligning the bosses of the compressor with the holes in the clutch.

#### TOOL:

**Clutch spring compressor 07LME-GZ40201**

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

Hold the clutch/driven pulley by turning the clutch spring compressor clockwise.



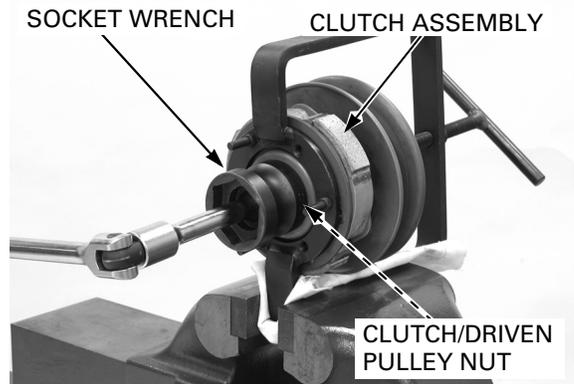
Hold the clutch spring compressor in a vise.

Remove the clutch/driven pulley nut using the special tool.

#### TOOL:

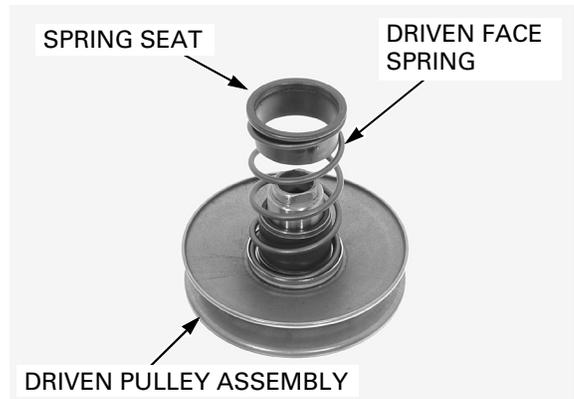
**Socket wrench, 39 x 41 mm 07GMA-KS40100**

Loosen the clutch spring compressor gradually and remove the clutch assembly.



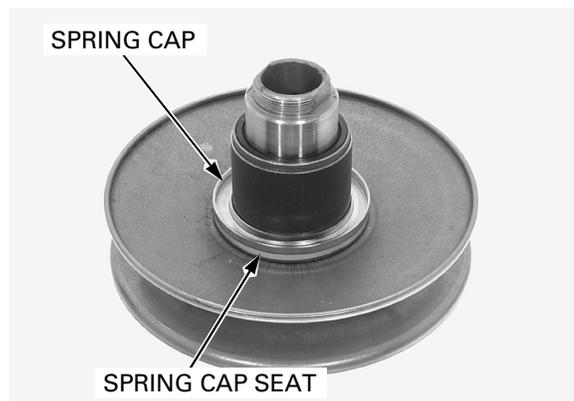
Remove the following:

- Spring seat
- Driven face spring
- Driven pulley assembly



Remove the following:

- Spring cap
- Spring cap seat

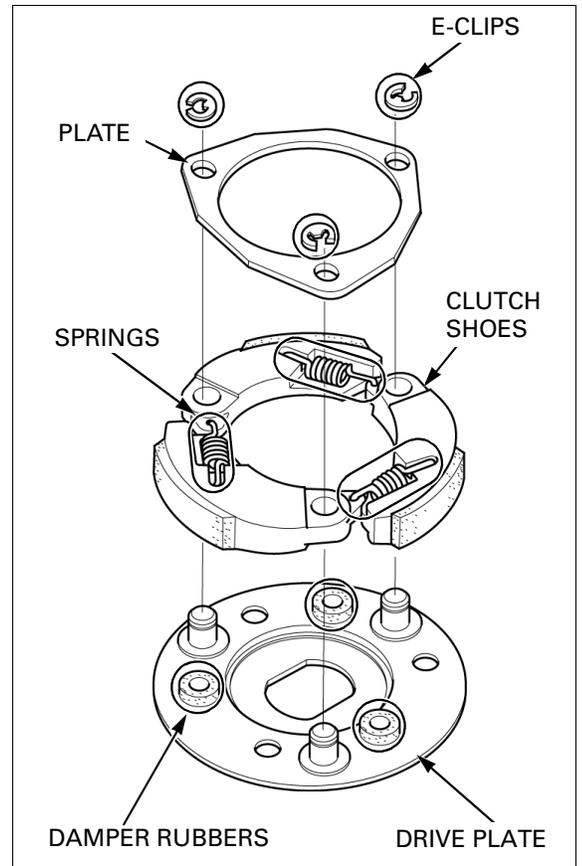


## CLUTCH

Remove the three E-clips and plate.

Remove the clutch shoes from the drive plate.  
Remove the clutch shoe springs from the clutch shoes.

Remove the damper rubbers from the drive plate.

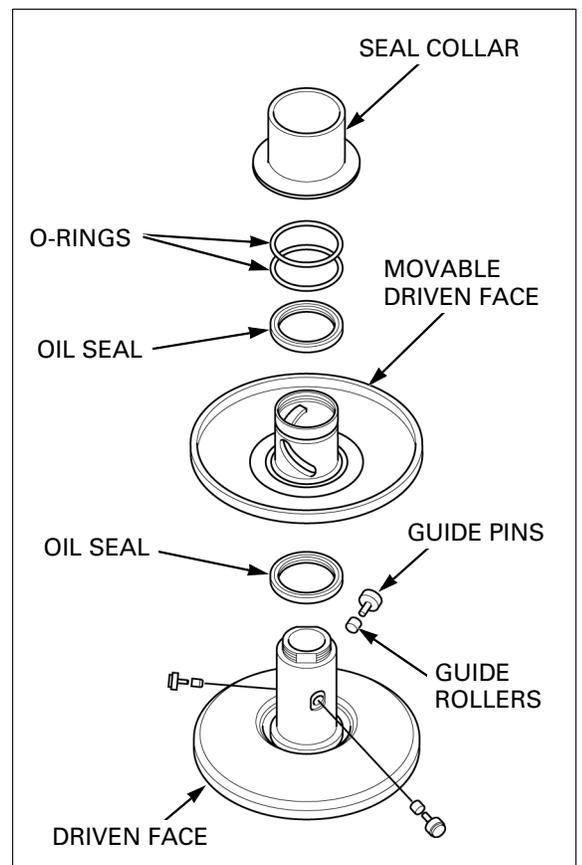


## DRIVEN PULLEY

Remove the seal collar.

Remove the guide pins and guide rollers from the driven face.  
Remove the movable driven face from the driven face.

Remove the O-rings and oil seals from the movable driven face.



## DRIVE PULLEY/DRIVEN PULLEY/CLUTCH

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### CLUTCH/DRIVEN PULLEY INSPECTION

#### CLUTCH OUTER

Check the clutch outer for wear or damage.

Measure the clutch outer I.D.

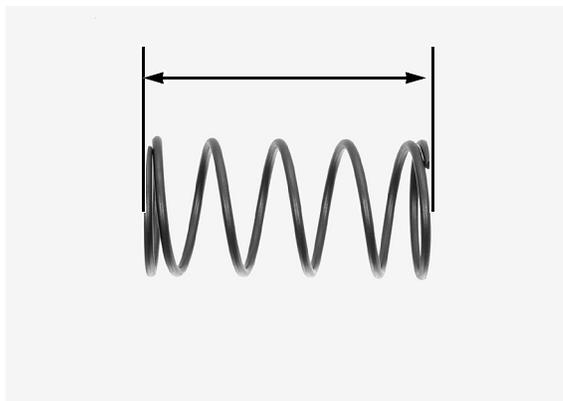
**SERVICE LIMIT: 125.5 mm (4.94 in)**



#### DRIVEN FACE SPRING

Measure the driven face spring free length.

**SERVICE LIMIT: 108.0 mm (4.25 in)**

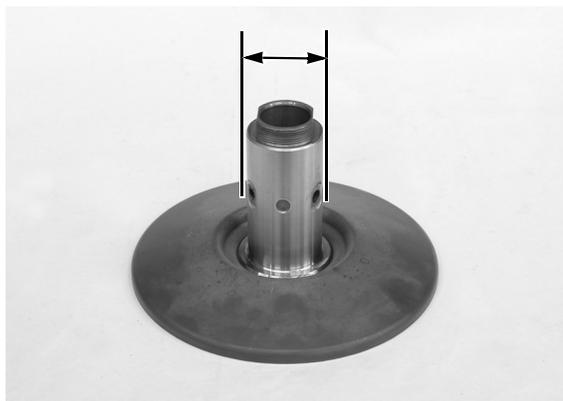


#### DRIVEN FACE

Check the driven face for scratches, scoring or damage.

Measure the driven face boss O.D.

**SERVICE LIMIT: 33.94 mm (1.336 in)**

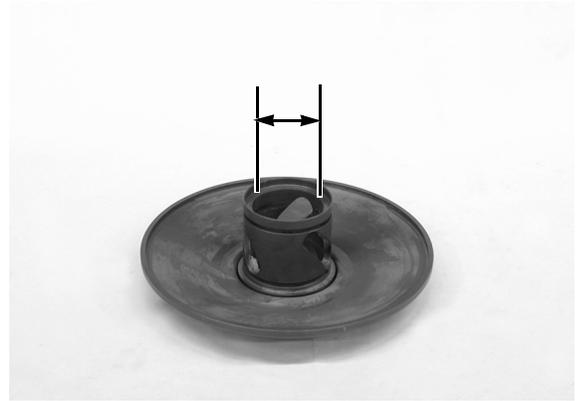


## MOVABLE DRIVEN FACE

Check the movable driven face for scratches, scoring or damage.  
Check the guide grooves for stepped wear or damage.

Measure the movable driven face I.D.

**SERVICE LIMIT: 34.06 mm (1.341 in)**



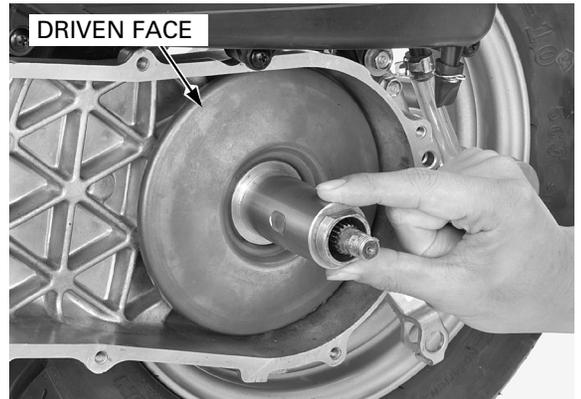
## DRIVEN FACE BEARING INSPECTION

Also check that the bearing outer race fits tightly in the driven face.

Install the driven face to the driveshaft.

Turn the driven face with your finger. The bearing should turn smoothly and quietly.

Replace the bearings if they do not turn smoothly, quietly, or if they fit loosely on the driven face (page 11-17).

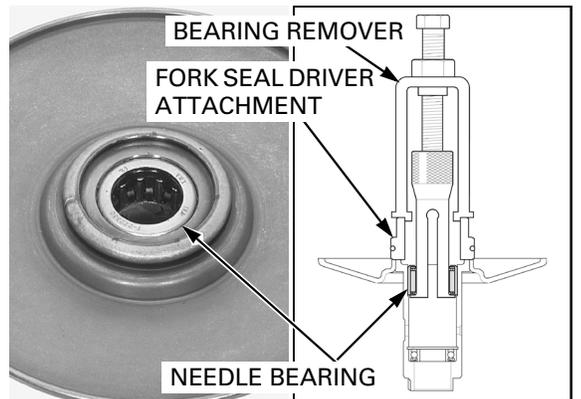


## DRIVEN FACE BEARING REPLACEMENT

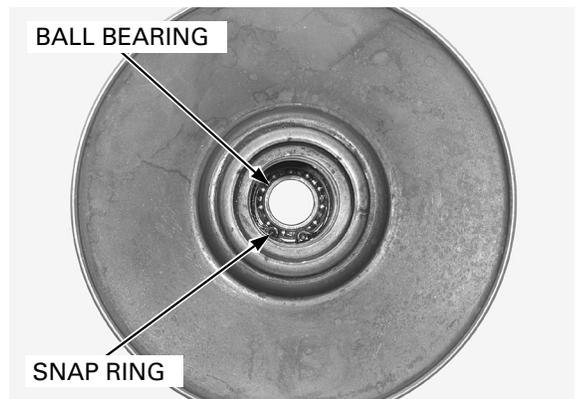
Remove the driven face needle bearing using the special tools.

### TOOLS:

Bearing remover, 20 mm	07931-MA70000
Fork seal driver attachment	07747-0010400



Remove the snap ring and drive the ball bearing out of the driven face.



# DRIVE PULLEY/DRIVEN PULLEY/CLUTCH

Pack new ball bearing with grease.

Press the ball bearing into the driven face squarely with its marked side facing down until it is fully seated, using the special tools.

**TOOLS:**

**Driver** 07749-0010000  
**Pilot, 28 mm** 07746-0041100

Install the snap ring into the groove in the driven face securely.

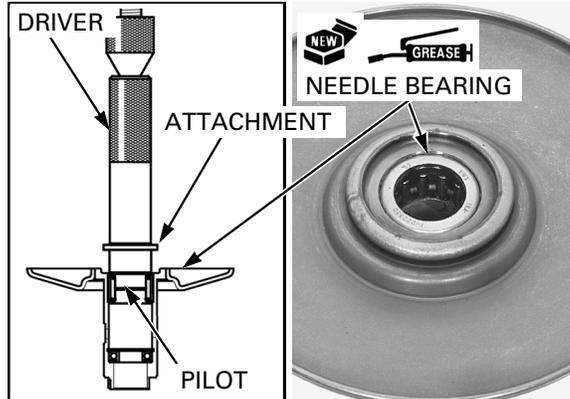
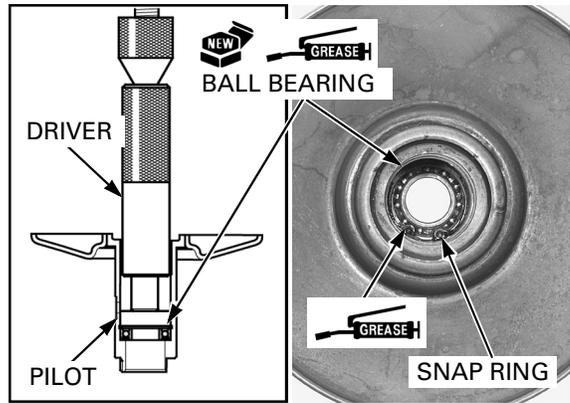
Apply 7 – 8 g of grease (Shell ALVANIA R3 or IDEMITSU AUTOREX B or SHIN-NIHON POWERNOC WB3 or equivalent) to the driven face inner surface.

Apply grease to a new needle bearing.

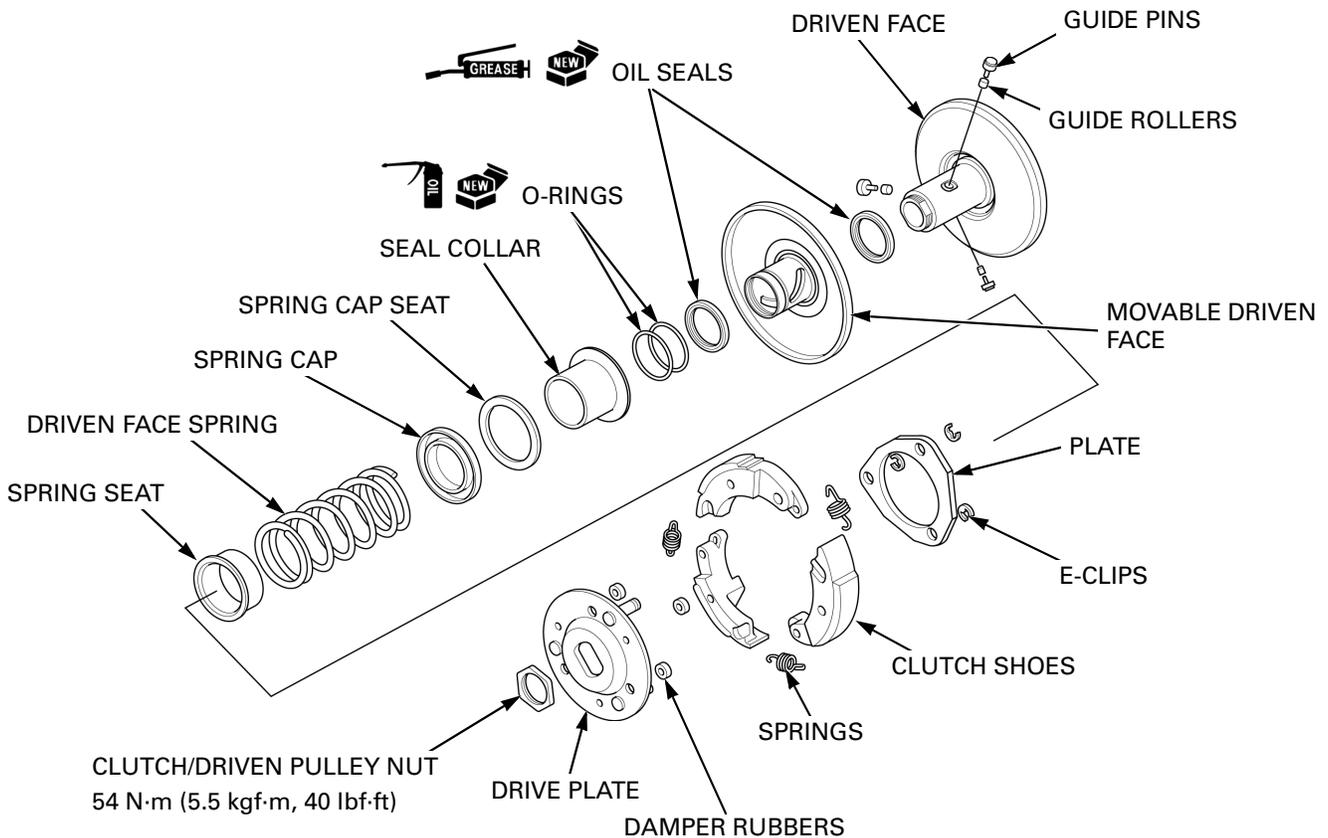
Press the needle bearing into the driven face squarely with its marked side facing up until it is flush with the driven face surface, using the special tools.

**TOOLS:**

**Driver** 07749-0010000  
**Attachment, 28 x 30 mm** 07946-1870100  
**Pilot, 20 mm** 07746-0040500



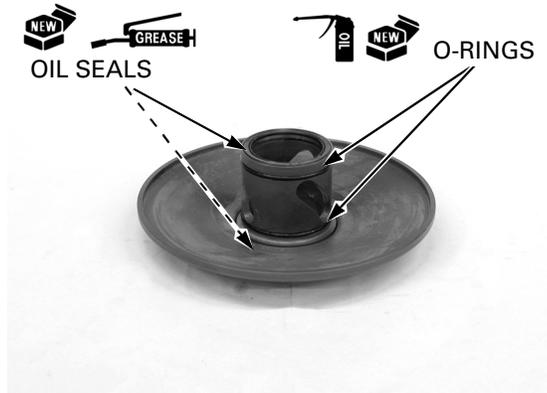
## ASSEMBLY



## DRIVEN PULLEY

Apply grease to new oil seal lips and install them into the movable driven face.

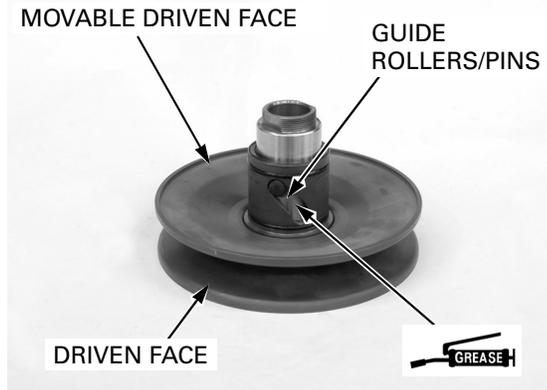
Coat new O-rings with engine oil and install them into the movable driven face grooves.



Clean any oil and grease from the pulley face.

Install the movable driven face onto the driven face. Install the guide rollers and guide pins.

Apply 2.0 – 2.5 g of grease (Shell ALVANIA R3 or IDEMITSU AUTOREX B or SHIN-NIHON POWER-NOC WB3 or equivalent) to each guide groove.

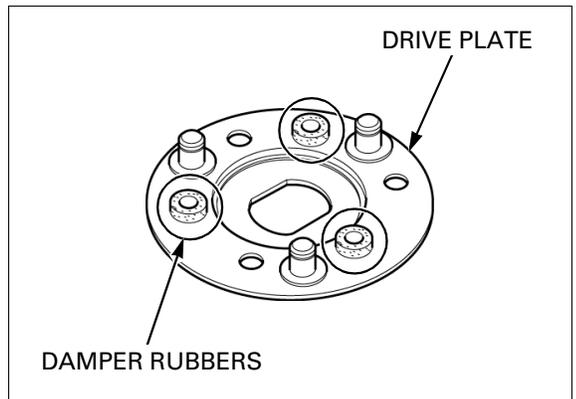


Install the seal collar to the driven pulley.



## CLUTCH

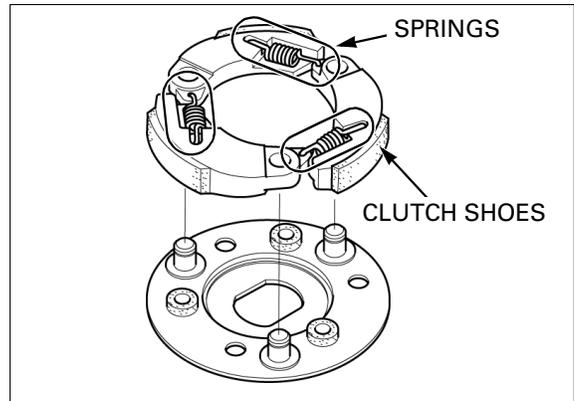
Install the damper rubbers onto the drive plate.



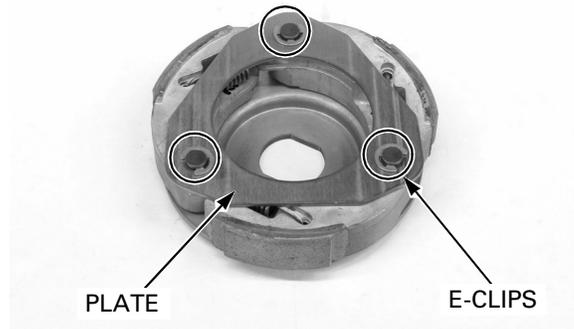
## DRIVE PULLEY/DRIVEN PULLEY/CLUTCH

Install the shoe springs onto the clutch shoes as shown.

Install the clutch shoes onto the drive plate by aligning the shoe grooves and damper rubbers.

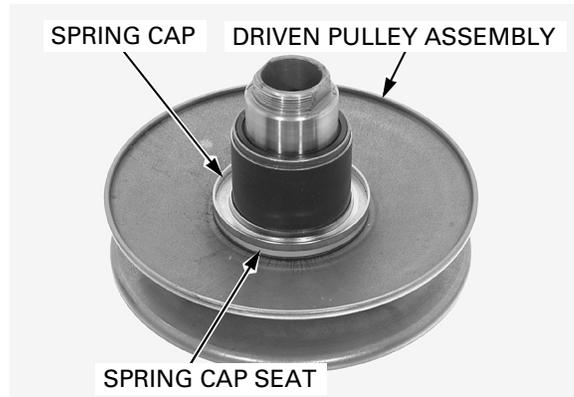


Install the plate and E-clips.



### CLUTCH/DRIVEN PULLEY

Install the spring cap seat and spring cap to the driven pulley assembly.



Install the driven face spring and spring seat.



Set the clutch assembly to the driven pulley.

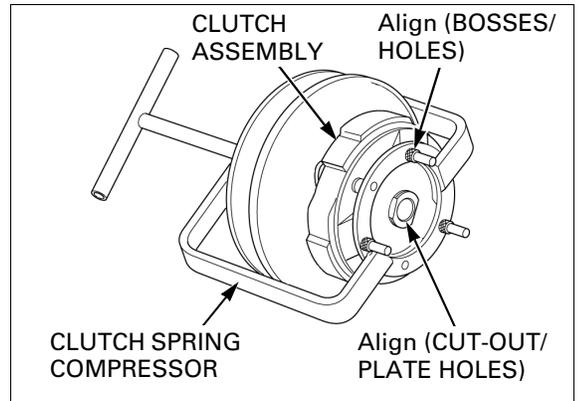
Set the clutch spring compressor over the clutch/driven pulley assembly aligning the bosses of the compressor with the holes of the clutch.

**TOOL:**

**Clutch spring compressor 07LME-GZ40201**

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

Compress the driven face spring while aligning the cut-out of the pulley nut threads with the drive plate hole and install the clutch/driven pulley nut.



Hold the spring compressor in a vice.

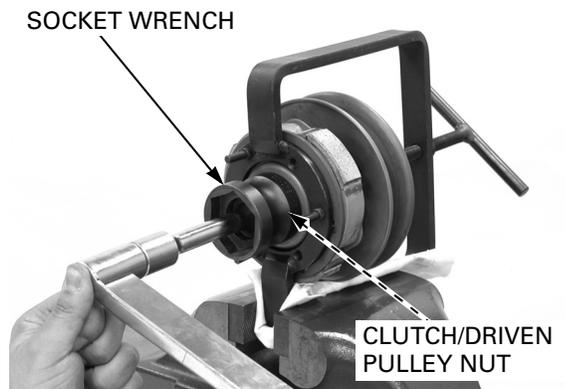
Tighten the clutch/driven pulley nut to the specified torque using the socket wrench.

**TOOL:**

**Socket wrench, 39 x 41 mm 07GMA-KS40100**

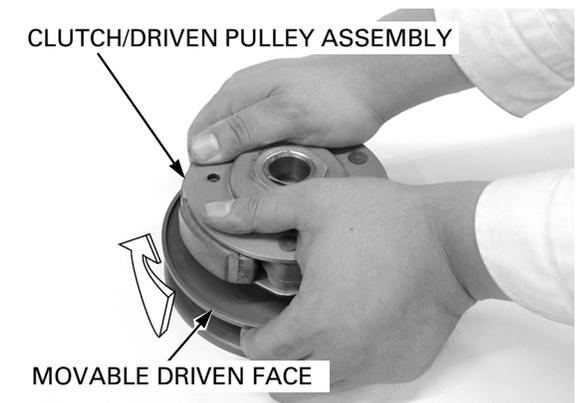
**TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)**

Remove the spring compressor from the clutch/driven pulley assembly.

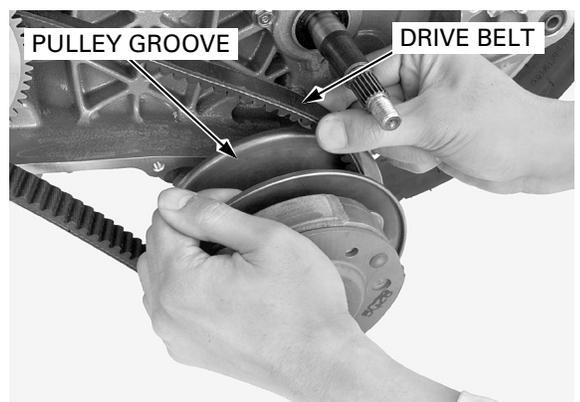


### INSTALLATION

Hold the clutch/driven pulley assembly and compress the driven face spring by turning movable driven face clockwise until it is set in lock position.



Set the drive belt onto the pulley groove while holding the movable driven face.



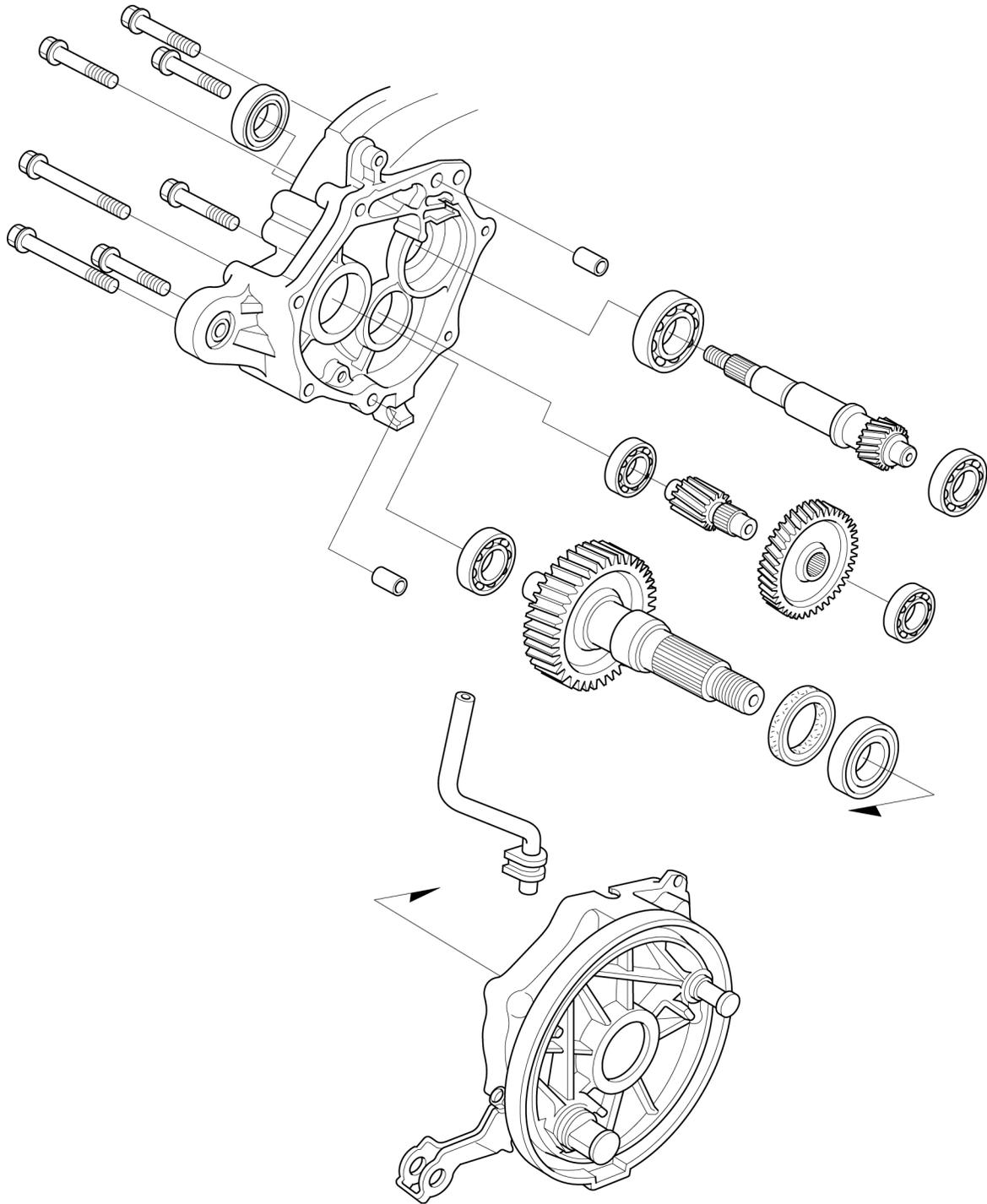


# 12. FINAL REDUCTION

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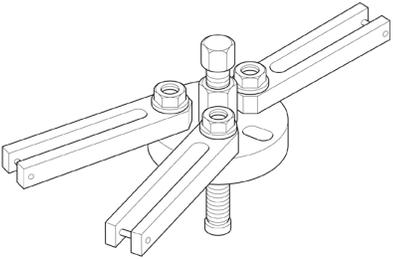
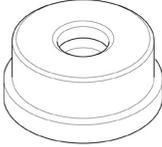
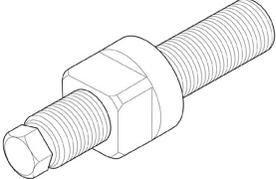
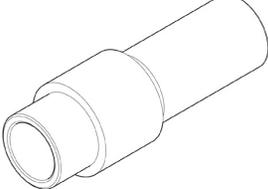
COMPONENT LOCATION .....	12-2	FINAL REDUCTION INSPECTION .....	12-7
SERVICE INFORMATION .....	12-3	FINAL REDUCTION BEARING REPLACEMENT .....	12-9
TROUBLESHOOTING .....	12-5	FINAL REDUCTION CASE ASSEMBLY .....	12-14
FINAL REDUCTION CASE SEPARATION .....	12-6		

COMPONENT LOCATION





# FINAL REDUCTION

<p>Attachment, 32 x 35 mm 07746-0010100</p> 	<p>Pilot, 15 mm 07746-0040300</p> 	<p>Pilot, 12mm 07746-0040200</p> 
<p>Case puller 07SMC-0010001</p> 	<p>Attachment, 42 x 47 mm 07746-0010300</p> 	<p>Pilot, 20 mm 07746-0040500</p> 
<p>Assembly shaft 07965-1660200</p> 	<p>Assembly collar 07965-GM00100</p> 	<p>Assembly collar attachment 07965-GM00200</p> 
<p>Attachment, 37 x 40 mm 07746-0010200</p> 	<p>Attachment, 40 x 42 mm 07746-0010900</p> 	

## TROUBLESHOOTING

### Engine does start but scooter won't move

- Damaged final reduction
- Seized final reduction

### Abnormal noise

- Worn, seized or chipped gears
- Worn or damaged final reduction bearing

### Oil leak

- Oil level too high
- Worn or damaged oil seal
- Cracked crankcase and/or final reduction case

## FINAL REDUCTION

### FINAL REDUCTION CASE SEPARATION

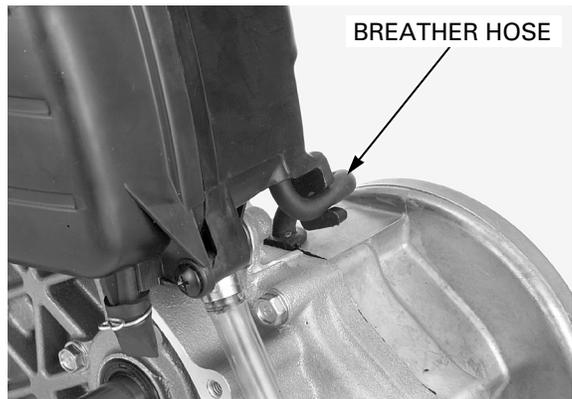
- The final reduction can be serviced with the engine installed in the frame.

Drain the final reduction oil (page 4-15)

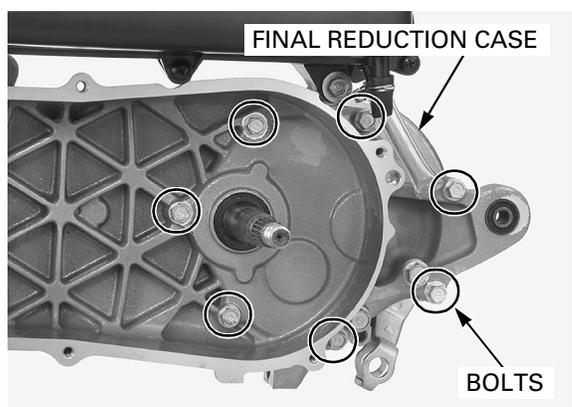
Remove the following:

- Clutch/driven pulley (page 11-13)
- Rear wheel (page 16-4)
- Rear brake shoes (page 17-24)

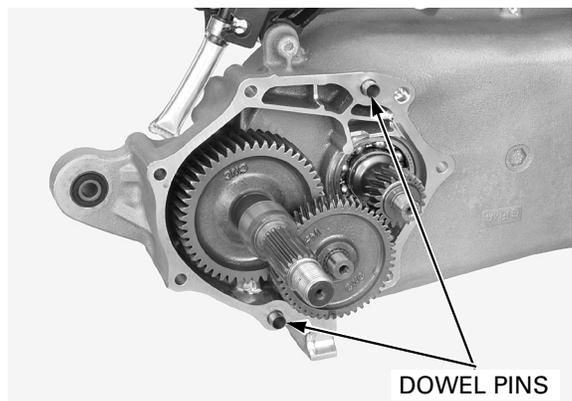
Disconnect the breather hose from the air cleaner housing.



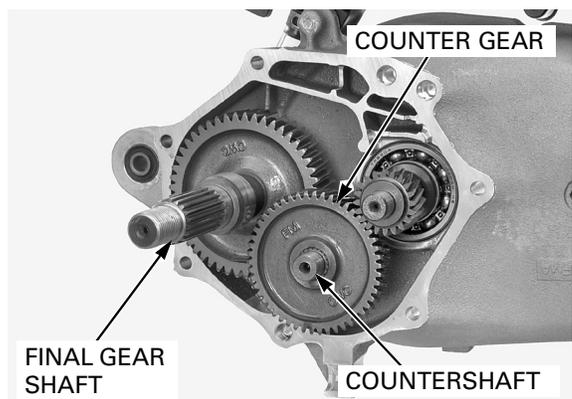
Remove the final reduction case bolts from left crankcase.  
Remove the final reduction case.



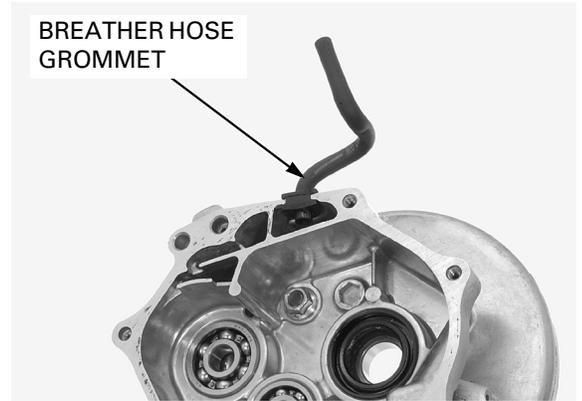
Remove the dowel pins.



Remove the counter gear, countershaft and final gear shaft.



Remove the final reduction case breather hose grommet.



## FINAL REDUCTION INSPECTION

### BEARING

#### LEFT CRANKCASE

Check each bearing for wear or damage.

Turn the inner race of the countershaft and final gear shaft bearings with your finger. The bearing should turn smoothly and quietly. Also check that the bearing outer race fits tightly in the crankcase. Replace the bearings if they do not turn smoothly, quietly, or if they fit loosely on the crankcase.

Turn the driveshaft with your hand. The shaft should turn smoothly and quietly. Also check that the bearing outer race fits tightly in the crankcase and the bearing inner race fits tightly on the driveshaft.

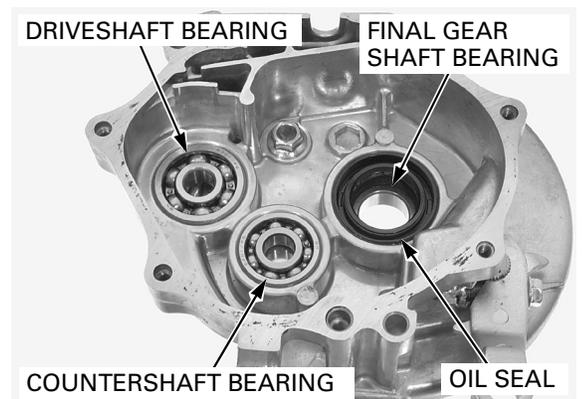
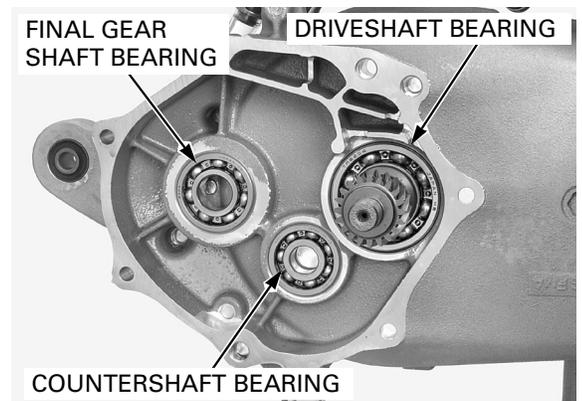
Replace the bearing if it does not turn smoothly, quietly, or if it fits loosely on the crankcase and driveshaft.

#### FINAL REDUCTION CASE

Check the final reduction case bearings and final gear shaft oil seal for wear or damage.

Turn the inner race of each bearing with your finger. The bearing should turn smoothly and quietly. Also check that the bearing outer race fits tightly in the final reduction case.

Replace the bearings if they do not turn smoothly, quietly, or if they fit loosely on the final reduction case.



## FINAL REDUCTION

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### GEAR/SHAFT

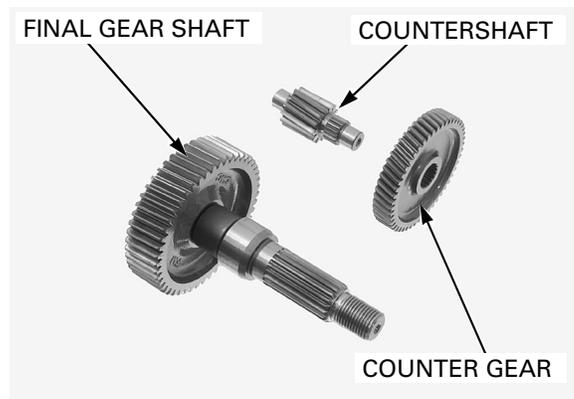
#### DRIVESHAFT

Check the driveshaft for bend, wear or damage.

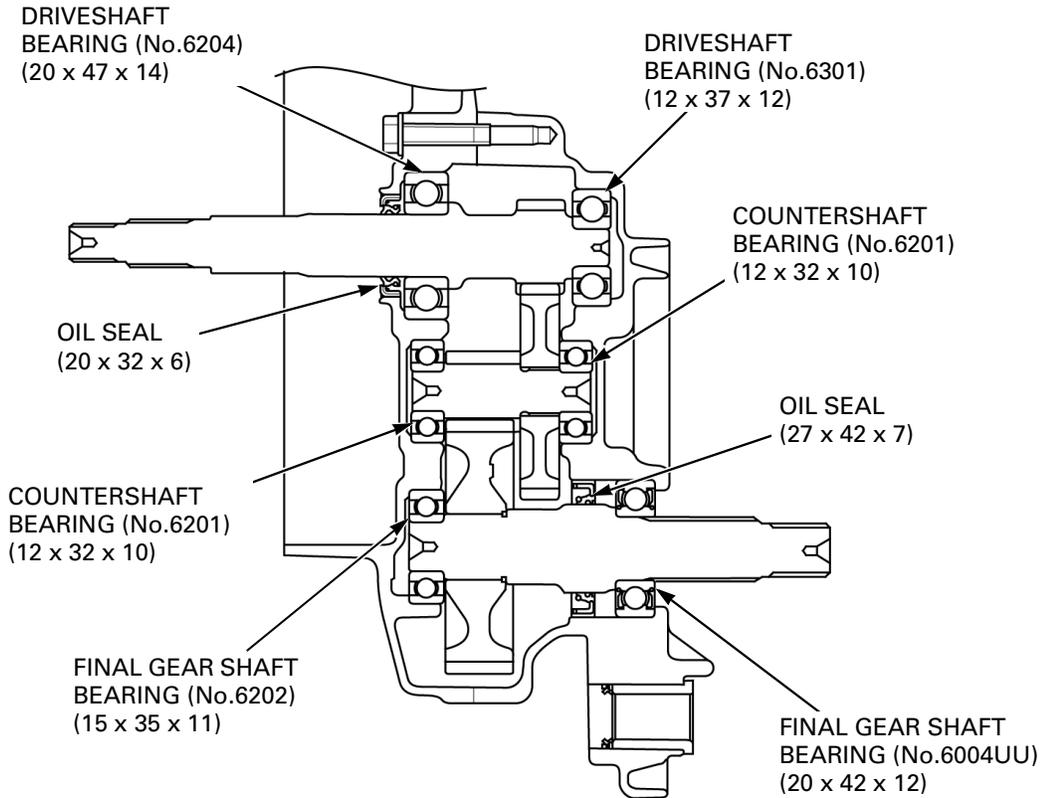


#### COUNTERSHAFT/COUNTER GEAR/FINAL GEAR SHAFT

Check the countershaft, counter gear and final gear shaft for wear or damage.



# FINAL REDUCTION BEARING REPLACEMENT



## LEFT CRANKCASE BEARING

*Be careful not to damage the final reduction case mating surface.*

Remove the countershaft and final gear shaft bearings using the special tools.

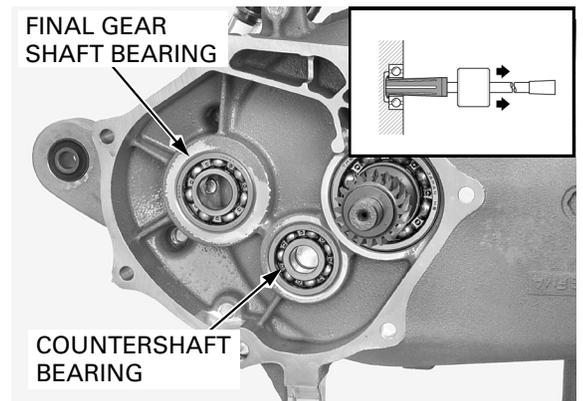
### TOOLS:

#### Countershaft bearing:

Bearing remover head, 12 mm 07936-1660110  
 Bearing remover shaft, 12 mm 07936-1660120  
 Remover weight 07741-0010201

#### Final gear shaft bearing:

Bearing remover head, 15 mm 07936-KC10200  
 Bearing remover shaft, 15mm 07936-KC10100  
 Remover weight 07741-0010201



## FINAL REDUCTION

Apply engine oil to the bearing cavity.

Drive a new countershaft bearing into the left crankcase squarely with its marked side facing up until it is fully seated, using the special tools.

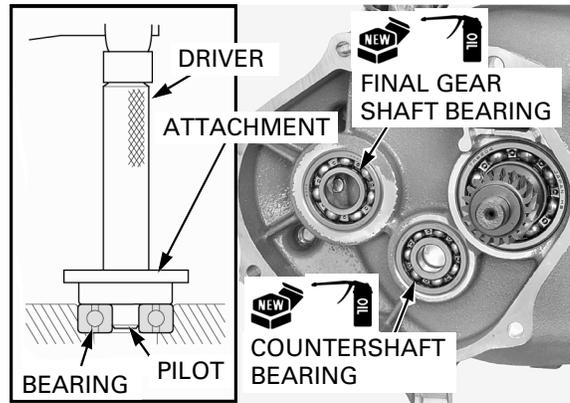
### TOOLS:

<b>Driver</b>	<b>07749-0010000</b>
<b>Attachment, 32 x 35 mm</b>	<b>07746-0010100</b>
<b>Pilot, 12 mm</b>	<b>07746-0040200</b>

Drive a new final gear shaft bearings into the left crankcase squarely until it is fully seated, using the special tools.

### TOOLS:

<b>Driver</b>	<b>07749-0010000</b>
<b>Attachment, 32 x 35 mm</b>	<b>07746-0010100</b>
<b>Pilot, 15 mm</b>	<b>07746-0040300</b>

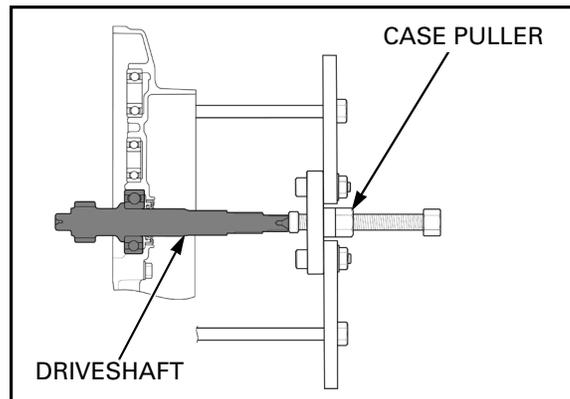
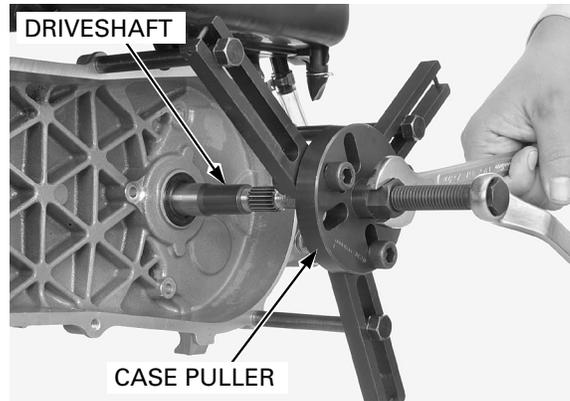


## DRIVESHAFT BEARING

Remove the driveshaft using the special tool.

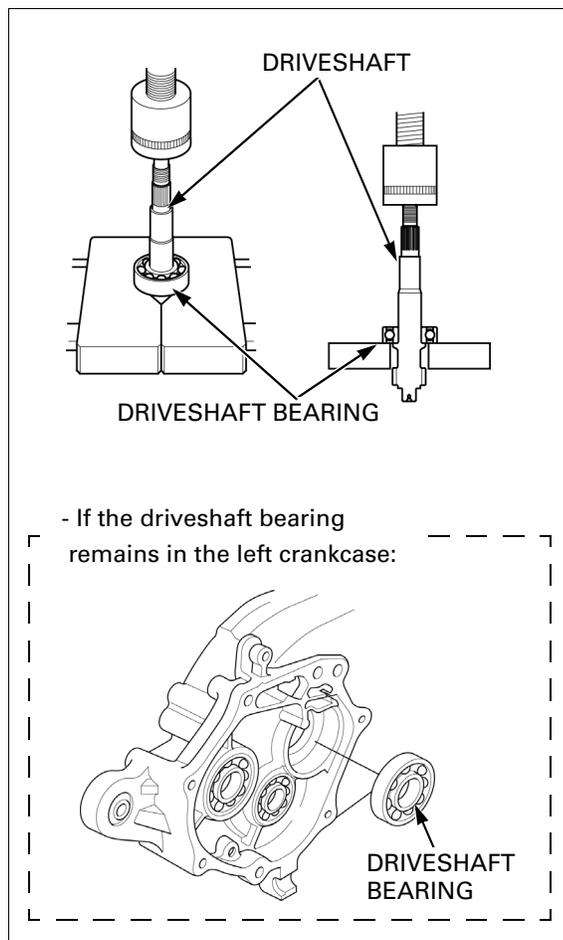
### TOOL:

<b>Case puller</b>	<b>07SMC-0010001</b>
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Remove the driveshaft bearing using a hydraulic press.

- If the driveshaft bearing remains in the left crankcase, remove it to the right side.



Remove the driveshaft oil seal from the left crankcase.



Apply engine oil to the bearing cavity.

Drive a new driveshaft bearing into the left crankcase squarely with its marked side facing up until it is fully seated, using the special tools.

**TOOLS:**

**Driver**

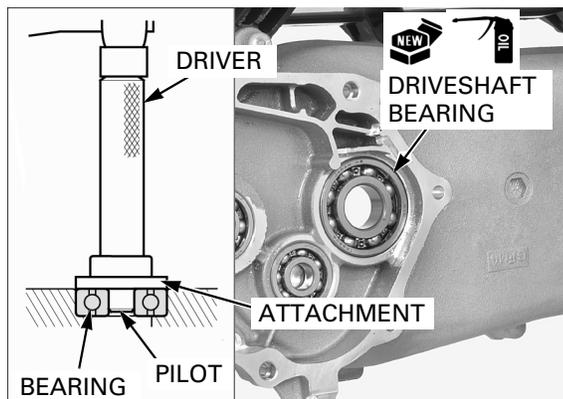
**07749-0010000**

**Attachment, 42 x 47 mm**

**07746-0010300**

**Pilot, 20 mm**

**07746-0040500**

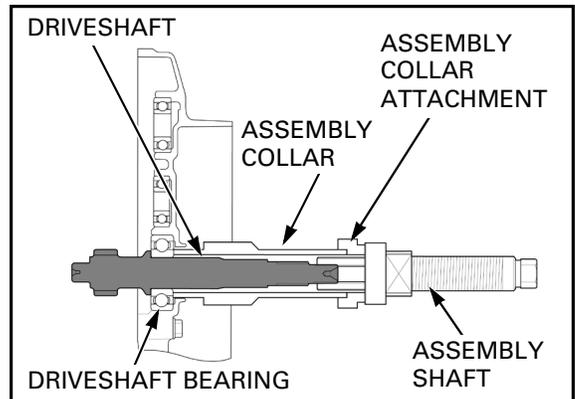
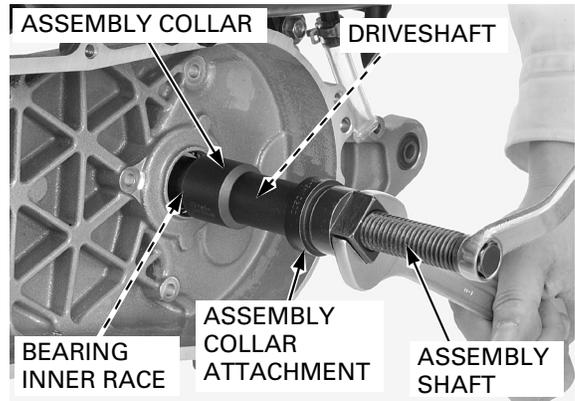


## FINAL REDUCTION

Install the driveshaft into the bearing.  
Position the assembly collar on the driveshaft bearing inner race and pull the drive shaft into the bearing until it is fully seated.

**TOOLS:**

<b>Assembly shaft</b>	<b>07965-1660200</b>
<b>Assembly collar</b>	<b>07965-GM00100</b>
<b>Assembly collar attachment</b>	<b>07965-GM00200</b>



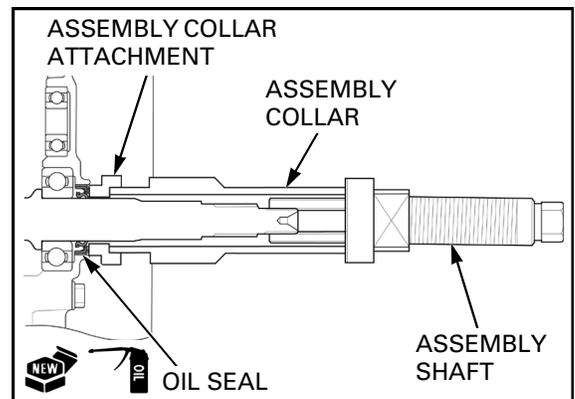
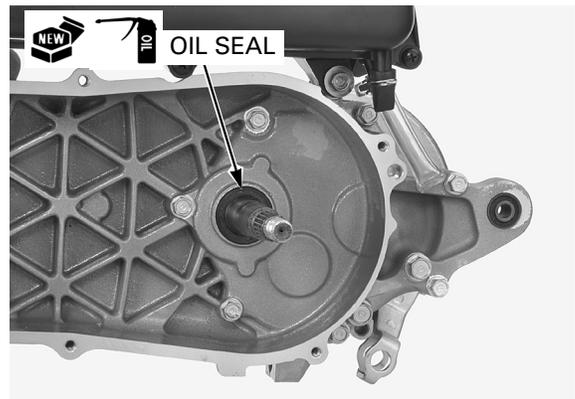
Apply engine oil to a new driveshaft oil seal lip.

*Do not insert the oil seal too far.*

Install the driveshaft oil seal with its marked side facing up until it is flush with the left crankcase, using the special tools.

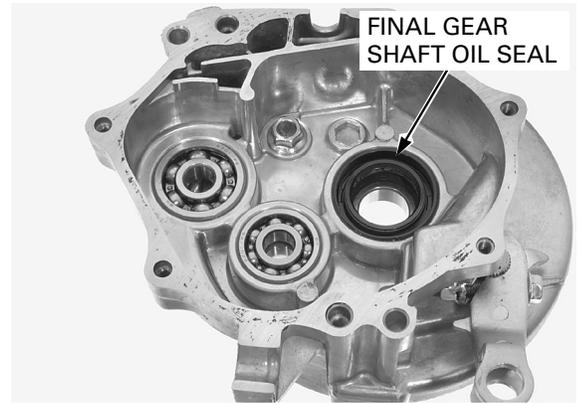
**TOOLS:**

<b>Assembly shaft</b>	<b>07965-1660200</b>
<b>Assembly collar</b>	<b>07965-GM00100</b>
<b>Assembly collar attachment</b>	<b>07965-GM00200</b>



**FINAL REDUCTION CASE**

Remove the final gear shaft oil seal.



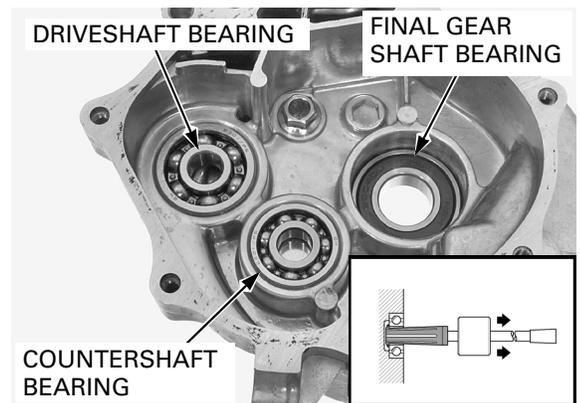
*Be careful not to damage the final reduction case mating surface.*

Remove the final gear shaft bearing.

Remove the driveshaft and countershaft bearings using the special tools.

**TOOLS:**

- Bearing remover head, 12 mm**      07936-1660110
- Bearing remover shaft, 12 mm**    07936-1660120
- Remover weight**                      07741-0010201



Apply engine oil to the bearing cavity.

Drive a new driveshaft bearing into the final reduction case squarely with its marked side facing up until it is fully seated, using the special tools.

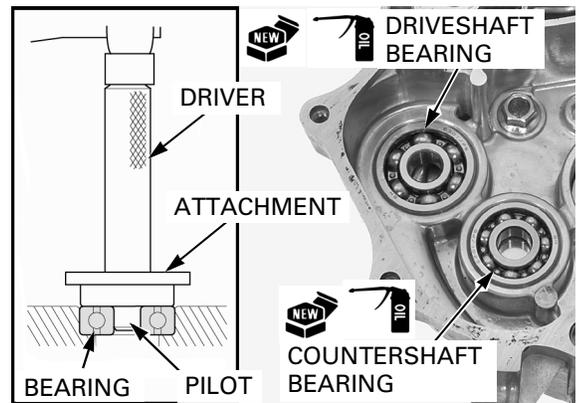
**TOOLS:**

- Driver**                                      07749-0010000
- Attachment, 37 x 40 mm**          07746-0010200
- Pilot, 12 mm**                          07746-0040200

Drive a new countershaft bearing into the final reduction case squarely until it is fully seated, using the special tools.

**TOOLS:**

- Driver**                                      07749-0010000
- Attachment, 32 x 35 mm**          07746-0010100
- Pilot, 12 mm**                          07746-0040200

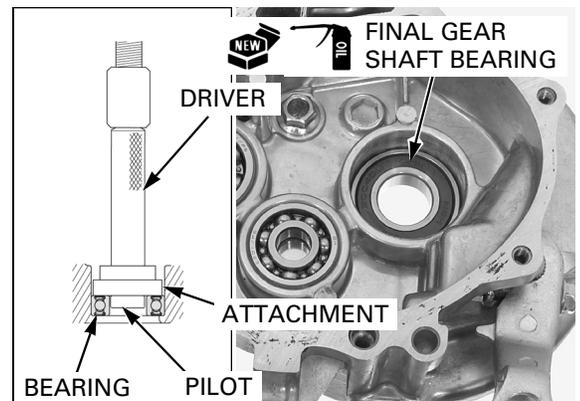


Apply engine oil to the bearing cavity.

Press a new driveshaft bearing into the final reduction case squarely with its marked side facing up until it is fully seated, using the special tools and hydraulic press.

**TOOLS:**

- Driver**                                      07749-0010000
- Attachment, 40 x 42 mm**          07746-0010900
- Pilot, 20 mm**                          07746-0040500

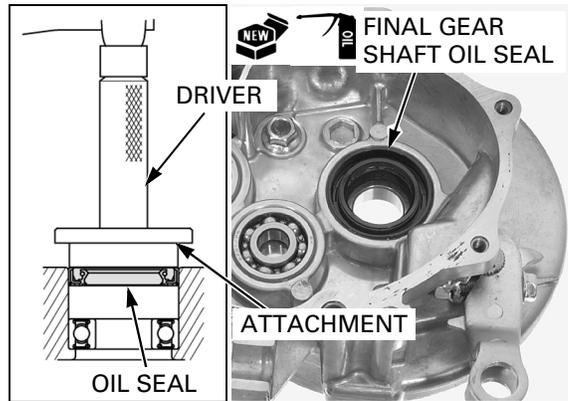


## FINAL REDUCTION

Apply engine oil to a new final gear shaft oil seal lip.  
Install the final gear shaft oil seal with the flat side facing the rear wheel side until it is flush with the final reduction case, using the special tools.

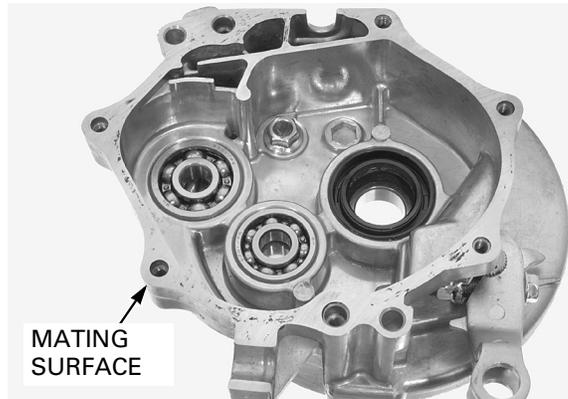
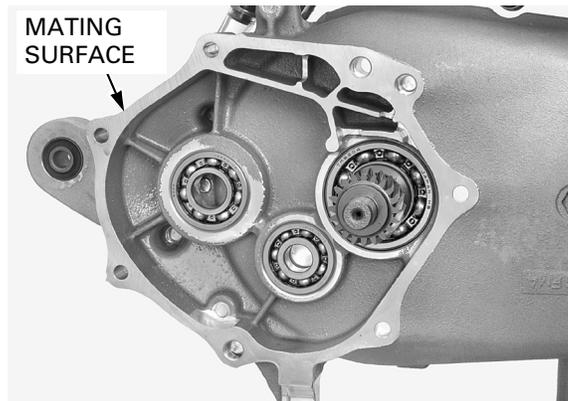
### TOOLS:

**Driver** 07749-0010000  
**Attachment, 42 x 47 mm** 07746-0010300

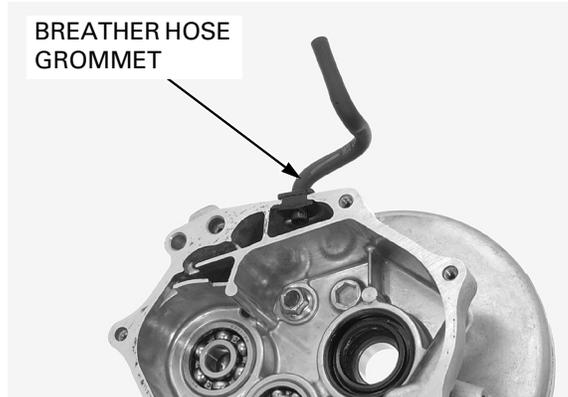


## FINAL REDUCTION CASE ASSEMBLY

*Be careful not to damage the final reduction case mating surface.* Clean the inside and mating surface of the left crankcase and final reduction case. Check for cracks or other damage. Remove any roughness or irregularities with an oil stone.

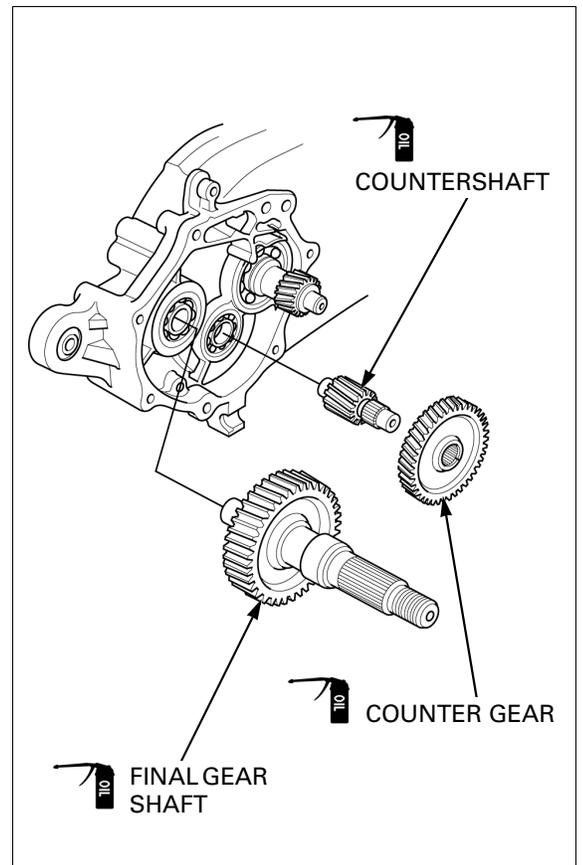


Set the final reduction case breather hose grommet to the final reduction case.

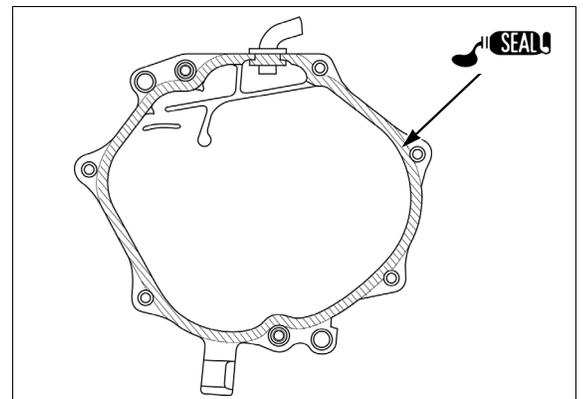


Apply engine oil to each gear teeth and each bearing sliding area of the shafts.

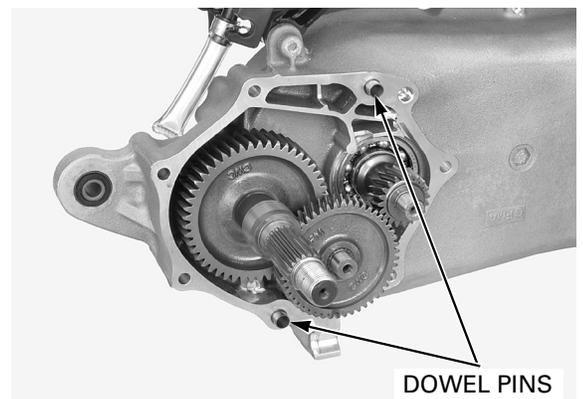
Install the final gear shaft into the left crankcase. Install the countershaft into the counter gear while aligning the countershaft splines with the counter gear splines and install them to the left crankcase.



Apply sealant to the final reduction case mating surface.

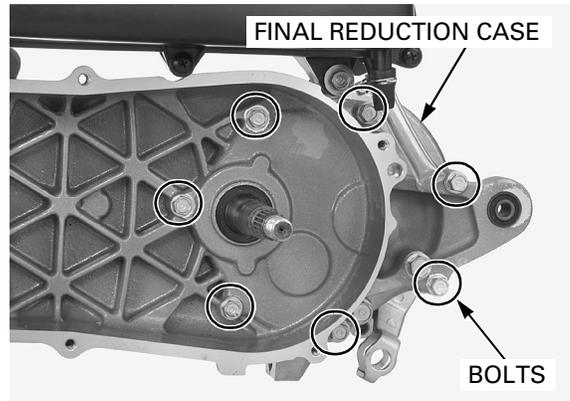


Install the dowel pins to the left crankcase.



## FINAL REDUCTION

Install the final reduction case and tighten the bolts in a crisscross pattern in two or three steps.



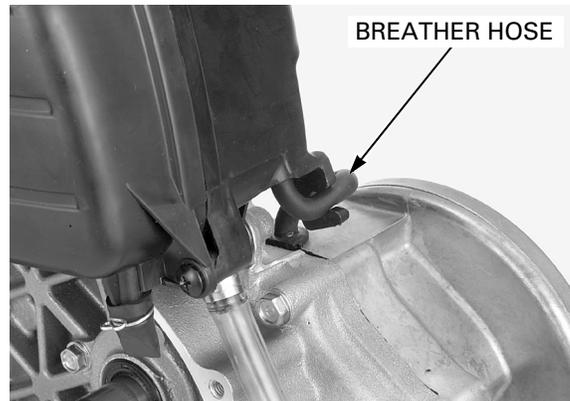
*Connect the breather hose properly (page 1-17).*

Connect the breather hose to the air cleaner housing.

Install the following:

- Rear brake shoes (page 17-25)
- Rear wheel (page 16-4)
- Clutch/driven pulley (page 11-13)

Fill the final reduction case with the recommended oil (page 4-15).



# 13. ALTERNATOR

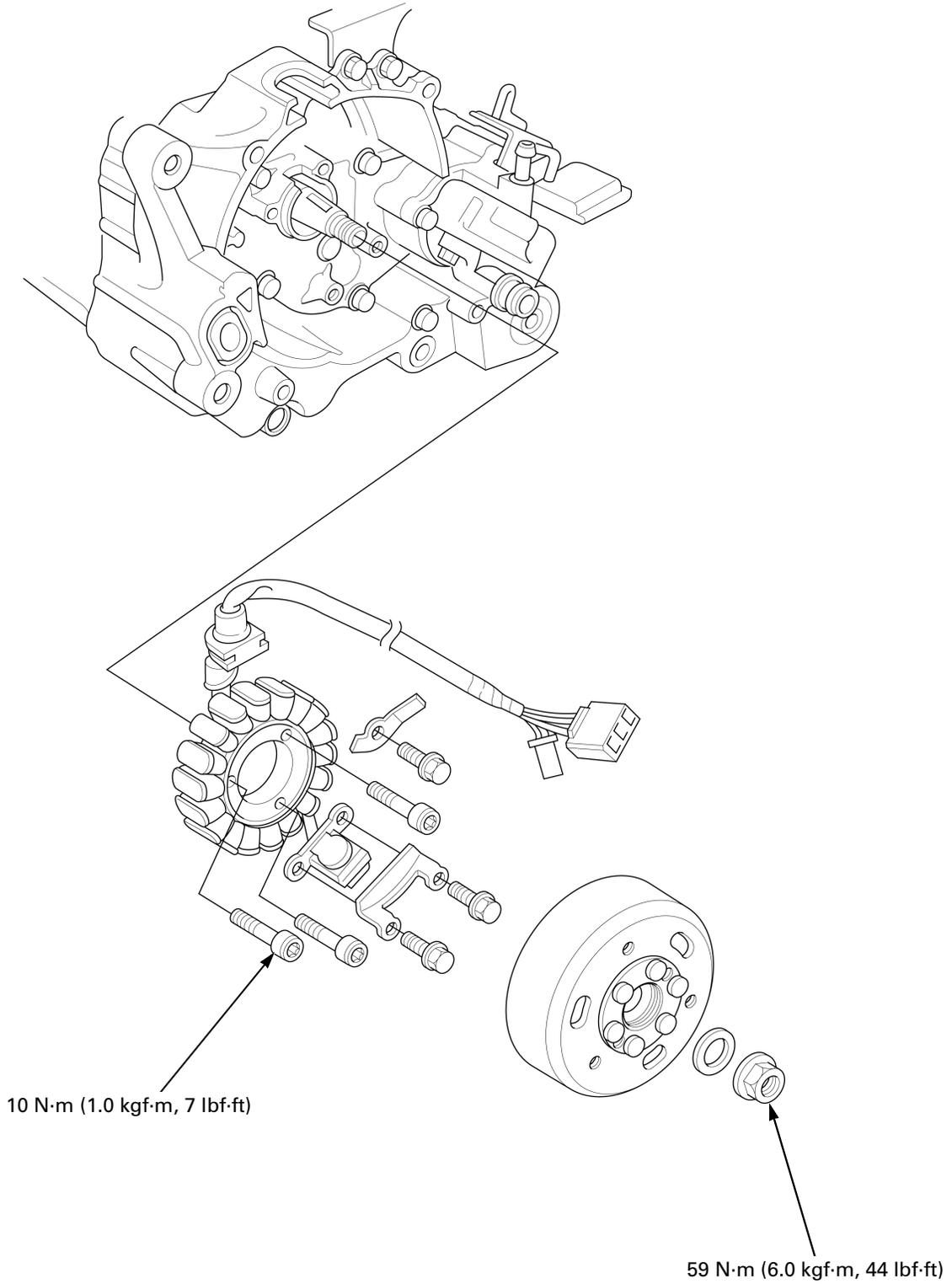
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COMPONENT LOCATION ..... 13-2  
SERVICE INFORMATION ..... 13-3

FLYWHEEL/STATOR..... 13-4

# ALTERNATOR

## COMPONENT LOCATION



## SERVICE INFORMATION

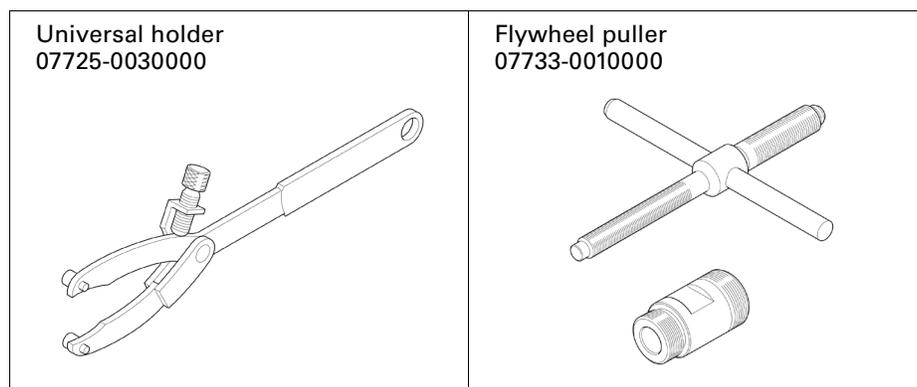
### GENERAL

- This section covers the removal and installation of the flywheel, alternator and CKP sensor.
- These service can be done with the engine installed in the frame.
- Inspect the followings:
  - Alternator (page 18-7)
  - CKP sensor (page 19-6)

### TORQUE VALUES

Stator mounting socket bolt	10 N·m (1.0 kgf·m, 7 lbf·ft)
Flywheel nut	59 N·m (6.0 kgf·m, 44 lbf·ft)

### TOOLS



## ALTERNATOR

### FLYWHEEL/STATOR

#### REMOVAL

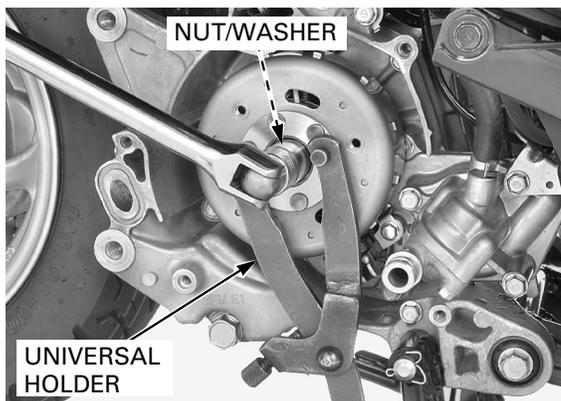
Remove the following:

- Body cover (page 3-9)
- Exhaust pipe/muffler (page 3-13)
- Cooling fan (page 7-11)

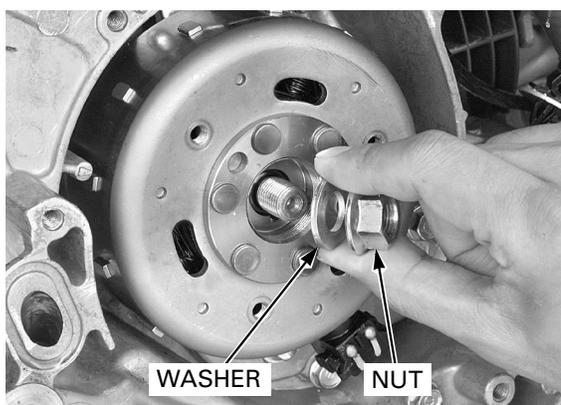
Hold the flywheel with the special tool and loosen the flywheel nut.

#### TOOL:

**Universal holder** **07725-0030000**



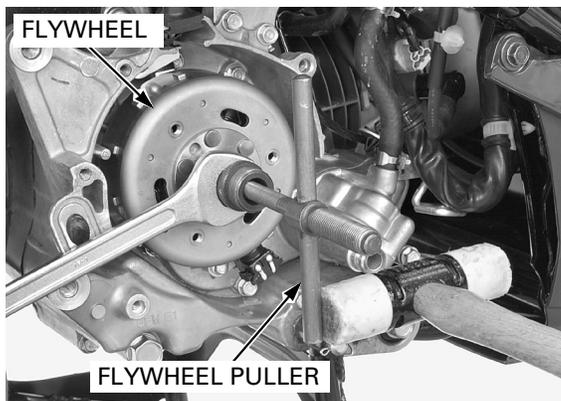
Remove the flywheel nut and washer.



Remove the flywheel using the special tool.

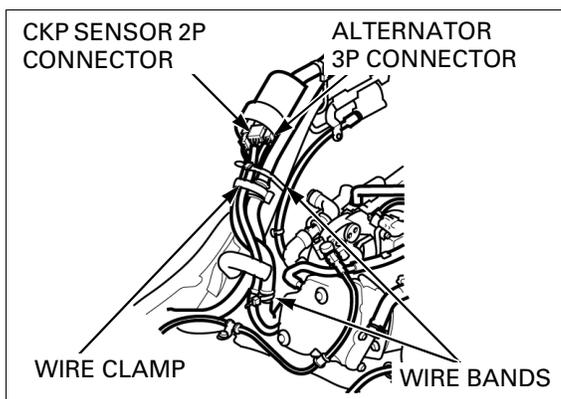
#### TOOL:

**Flywheel puller** **07733-0010000**

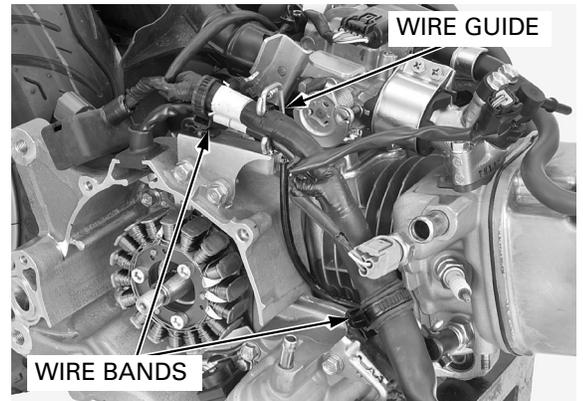


Disconnect the alternator 3P connector and CKP sensor 2P connector.

Release the alternator/CKP sensor wire from the wire bands and wire clamp.



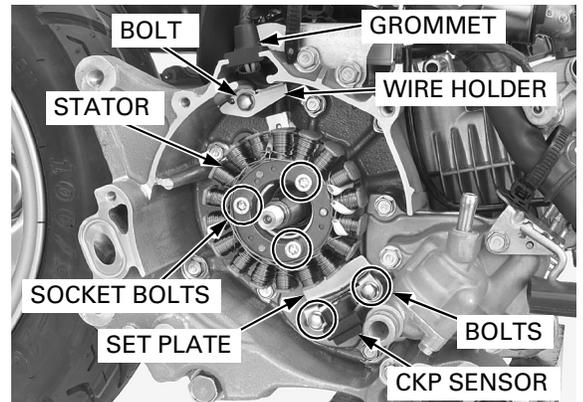
Release the alternator/CKP sensor wire from the wire guide and wire bands.



Remove the bolt, wire holder and release the wire grommet from the right crankcase.

Remove the two bolts and set plate from the CKP sensor.

Remove the three mounting socket bolts, stator and CKP sensor from the water pump/stator base.



**INSTALLATION**

Set the stator and CKP sensor onto the water pump/stator base.

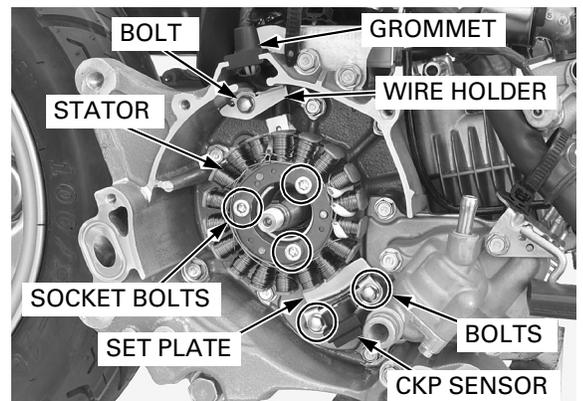
Install and tighten the stator mounting socket bolts to the specified torque.

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

Install the set plate onto the CKP sensor and tighten the mounting bolts.

Route the wire properly and set the wire grommet into the right crankcase groove.

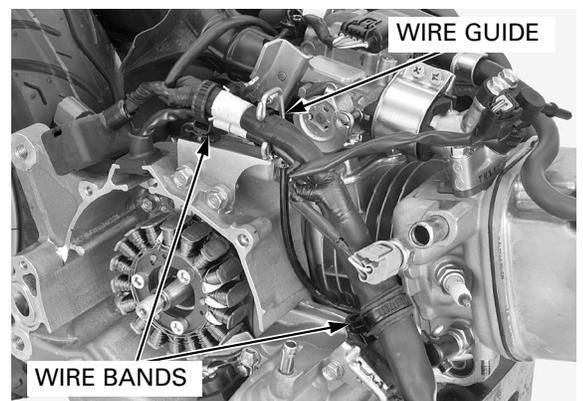
Set the wire holder and tighten the holder bolt.



*Route the alternator/CKP sensor wire properly (page 1-17).*

Secure the alternator/CKP sensor wire with the wire guide.

Secure the alternator/CKP sensor wire with the wire bands.

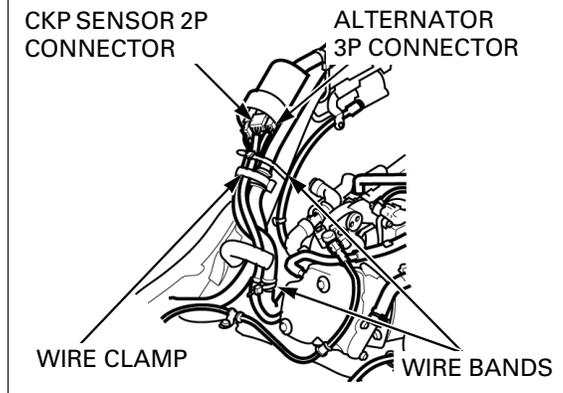


## ALTERNATOR

Route the alternator/CKP sensor wire properly (page 1-17).

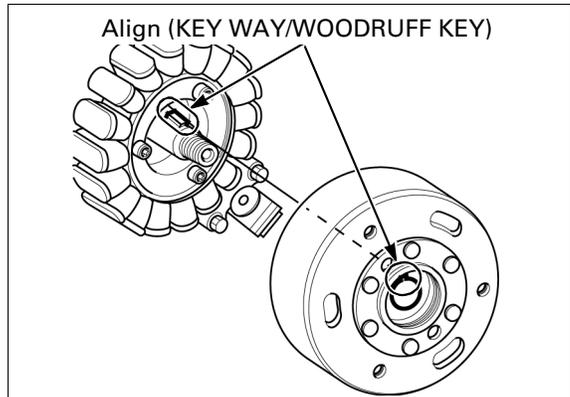
Secure the alternator/CKP sensor wire with the wire clamp and wire bands.

Connect the alternator 3P connector and CKP sensor 2P connector.

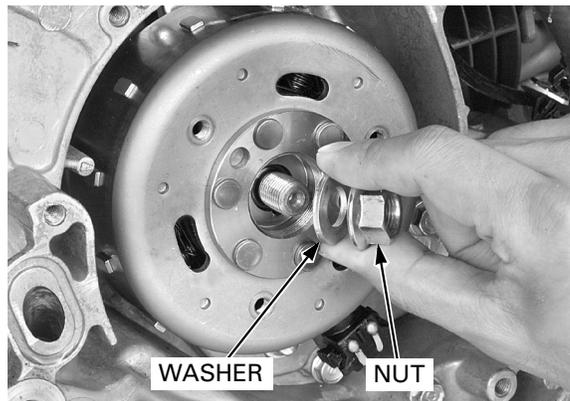


Degrease the mating surface of the crankshaft and flywheel.

Install the flywheel onto the crankshaft by aligning the key way on the flywheel with the woodruff key on the crankshaft.



Install the washer and flywheel nut.



Hold the flywheel with the special tool and tighten the nut to the specified torque.

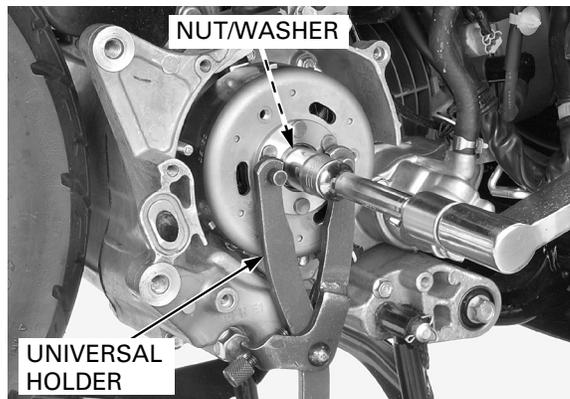
### TOOLS:

Universal holder 07725-0030000

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

Install the following:

- Cooling fan (page 7-12)
- Exhaust pipe/muffler (page 3-13)
- Body cover (page 3-9)



# 14. CRANKCASE/CRANKSHAFT

---

COMPONENT LOCATION .....	14-2	CRANKCASE SEPARATION .....	14-5
SERVICE INFORMATION .....	14-3	CRANKSHAFT INSPECTION.....	14-8
TROUBLESHOOTING .....	14-4	CRANKCASE ASSEMBLY .....	14-9



## SERVICE INFORMATION

### GENERAL

- This section covers the crankcase separation to service the crankshaft.
- The following parts must be removed before separating the crankcase.
  - Engine (page 8-4)
  - Camshaft/cylinder head (page 9-7)
  - Cam chain guide (page 9-24)
  - Cam chain tensioner slider (page 9-25)
  - Cylinder (page 10-4)
  - Piston (page 10-7)
  - Starter pinion (page 11-7)
  - Drive pulley (page 11-8)
  - Clutch/driven pulley (page 11-13)
  - Starter motor (page 20-6)
  - Water pump/stator base (page 7-15)
  - Flywheel/stator (page 13-4)
  - Centerstand (page 3-14)
- Prior to assembling the crankcase halves, apply sealant to their mating surfaces, Wipe off excess sealant thoroughly.
- In addition to the parts listed above, remove the final reduction (page 12-6) when the left crankcase half must be replaced.
- Be careful not to damage the crankcase mating surfaces when separating and assembling the crankcase halves.
- Clean all disassembled parts with clean solvent and dry them using compressed air before inspection.
- When installing the crankshaft, be sure to use the special tools; position the special tools on the bearing inner race and pull the crankshaft into the bearing until it is fully seated.

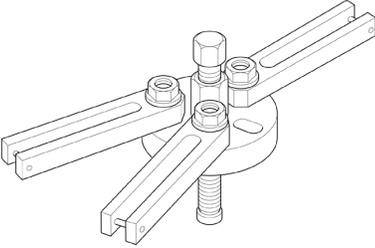
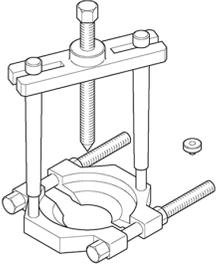
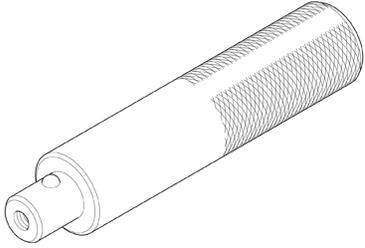
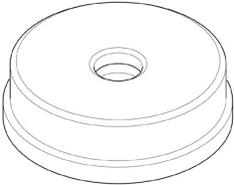
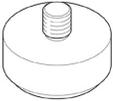
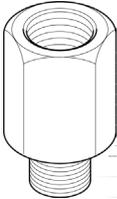
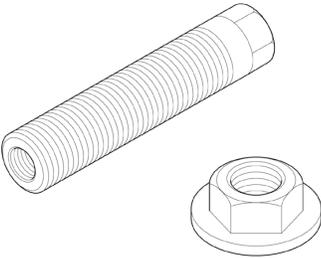
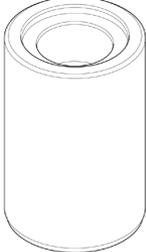
### SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Crankshaft	Connecting rod side clearance	0.10 – 0.35 (0.004 – 0.014)	0.55 (0.022)
	Connecting rod radial clearance	0.004 – 0.016 (0.0002 – 0.0006)	0.05 (0.002)
	Runout	–	0.10 (0.004)

# CRANKCASE/CRANKSHAFT

## TOOLS

<p>Case puller 07SMC-0010001</p>  A technical drawing of a case puller tool. It consists of a central circular base with a threaded hole in the center. Two long, parallel arms extend from the base, each with a threaded end. A central threaded rod passes through the base and the threaded ends of the arms, secured with a nut and a washer.	<p>Universal bearing puller 07631-0010000</p>  A technical drawing of a universal bearing puller. It features a central threaded rod with a conical tip. This rod is held in place by a U-shaped frame with two vertical supports. A nut and washer are used to adjust the tension of the rod.	<p>Driver 07749-0010000</p>  A technical drawing of a driver tool. It is a long, cylindrical shaft with a textured grip section in the middle and a smooth section at the end.
<p>Attachment, 72 x 75 mm 07746-0010600</p>  A technical drawing of a circular attachment. It has a central hole and a slightly raised outer edge.	<p>Pilot, 35 mm 07746-0040800</p>  A technical drawing of a small, cylindrical pilot tool with a threaded end.	<p>Assembly shaft adaptor 07WMF-KFF0200</p>  A technical drawing of an assembly shaft adaptor. It is a hexagonal nut with a threaded end and a smooth end.
<p>Assembly shaft 07965-VM00200</p>  A technical drawing of an assembly shaft. It is a long, threaded shaft with a hexagonal nut and a washer attached to one end.	<p>Assembly collar A 07965-VM00100</p>  A technical drawing of a cylindrical assembly collar A with a flange on one end.	<p>Assembly collar B 07931-KF00100</p>  A technical drawing of a cylindrical assembly collar B with a flange on one end.

## TROUBLESHOOTING

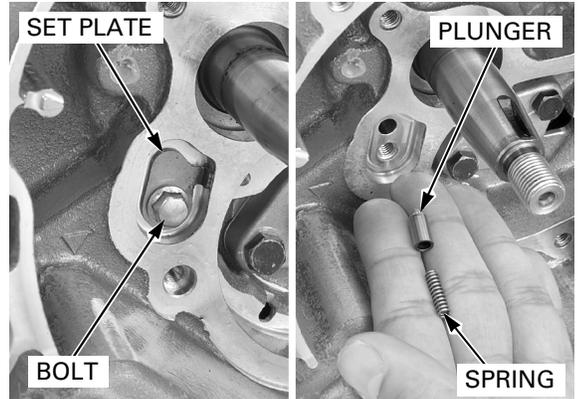
### Abnormal noise

- Worn crankshaft bearing
- Worn connecting rod big end bearing
- Worn connecting rod small end (page 10-7)

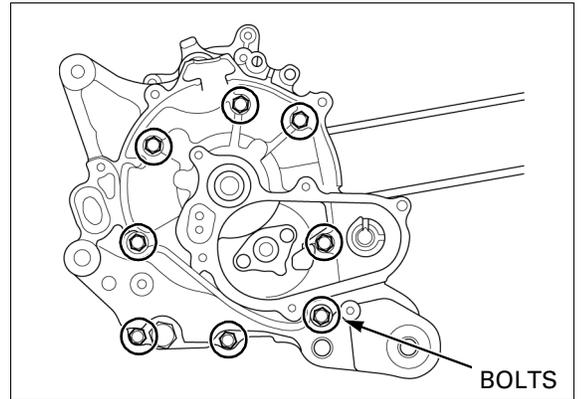
## CRANKCASE SEPARATION

Refer to service information (page 14-3) for the parts which must be removed before separating the crankcase.

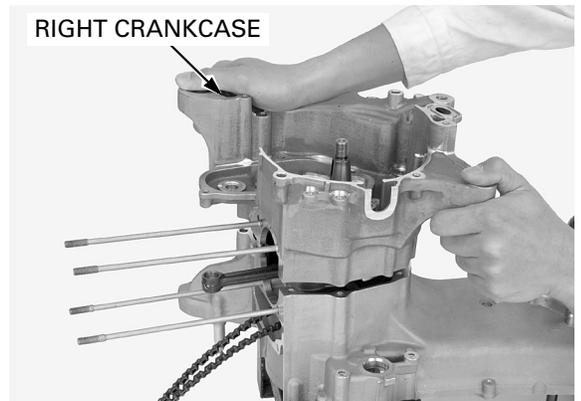
Remove the bolt, set plate, spring and plunger from the right crankcase.



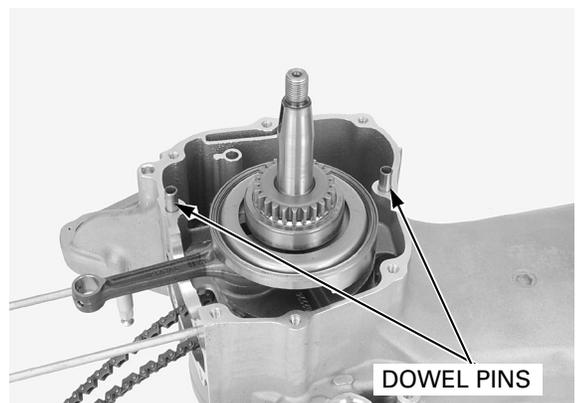
Remove the crankcase bolts from the right crankcase.



*Be careful not to damage the crankcase mating surface.* Place the crankcase with the left crankcase facing down and separate the left and right crankcase.



Remove the dowel pins from the left crankcase.



## CRANKCASE/CRANKSHAFT

Lift the cam chain off the timing sprocket on the crankshaft as shown, using a screwdriver.

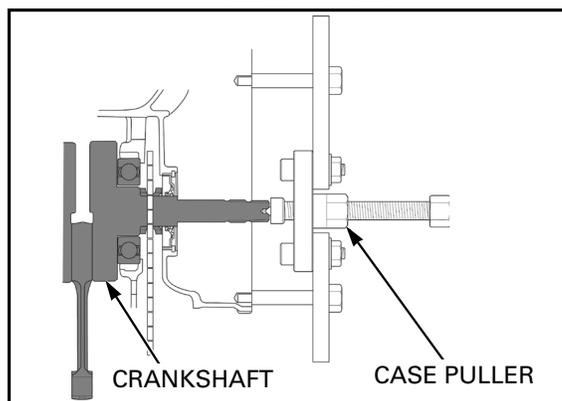
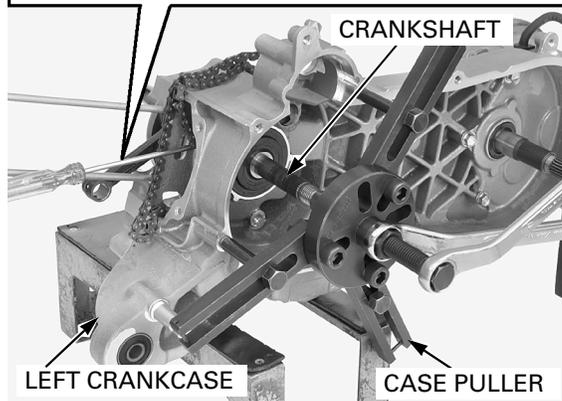
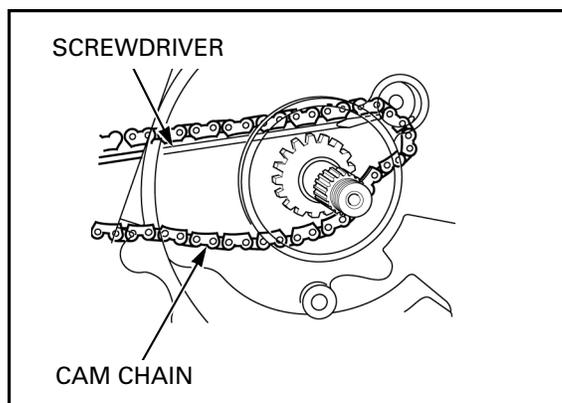
Hold the cam chain off the timing sprocket and remove the crankshaft from the left crankcase using the case puller.

Remove the cam chain.

**TOOL:**

Case puller

07SMC-0010001

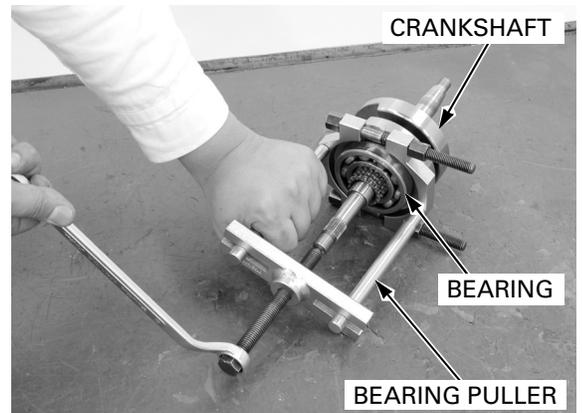


Remove the left crankshaft bearing using the special tool.

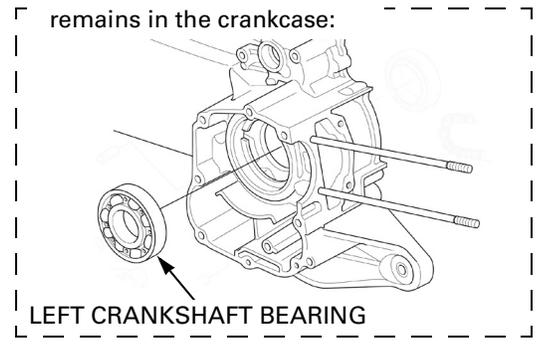
**TOOL:**

**Universal bearing puller 07631-0010000**

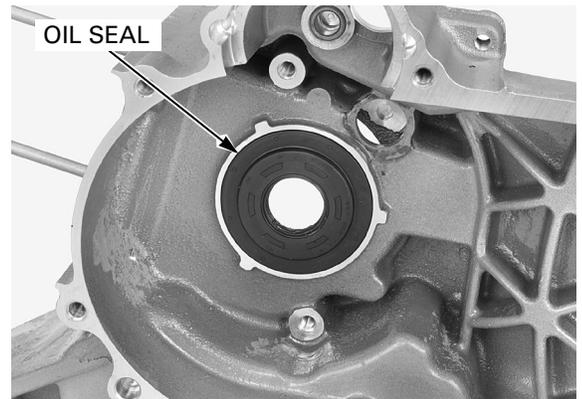
- If the left crankshaft bearing remains in the crankcase, remove it to the right side.



- If the left crankshaft bearing remains in the crankcase:



Remove the oil seal from the left crankcase.



## CRANKCASE/CRANKSHAFT

### CRANKSHAFT INSPECTION

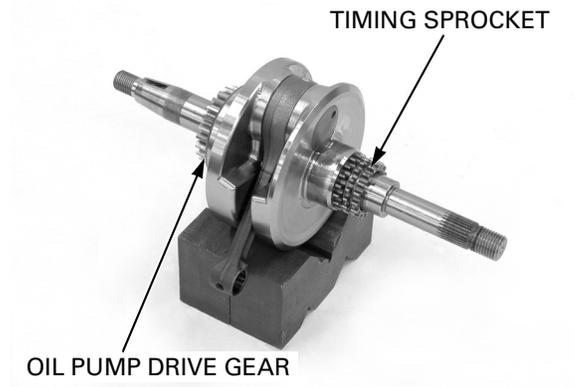
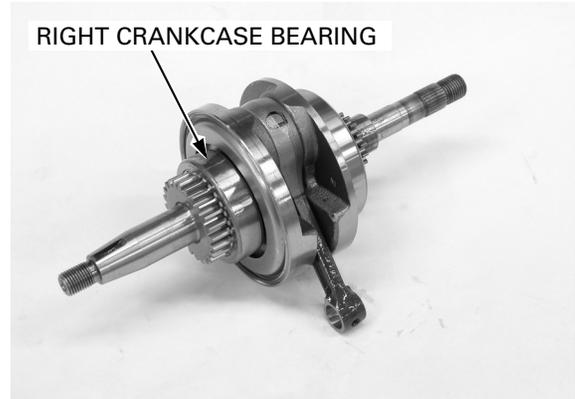
Remove the crankshaft (page 14-5).

Turn the outer race of the right crankshaft bearing with your finger. The bearing should turn smoothly and quietly. Also check that the bearing inner race fits tightly on the right crankshaft.

Replace the bearing if it does not turn smoothly, quietly, or if it fits loosely on the right crankshaft.

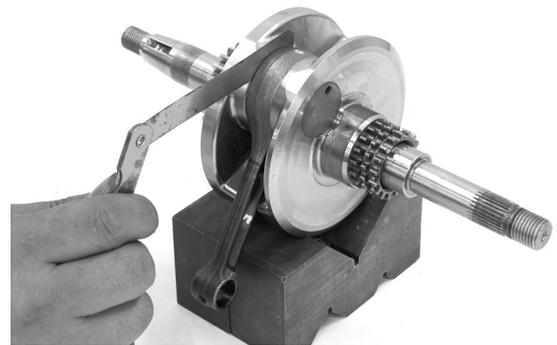
*If the timing sprocket teeth are worn or damaged, check the cam chain, tensioner and cam sprocket.*

Check the oil pump drive gear and timing sprocket teeth for wear or damage.



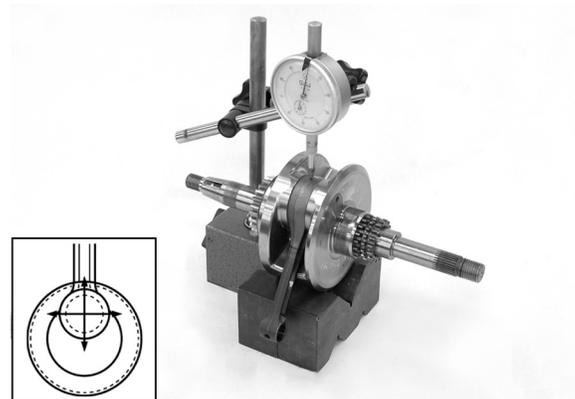
Measure the connecting rod big end side clearance with a feeler gauge.

**SERVICE LIMIT: 0.55 mm (0.022 in)**



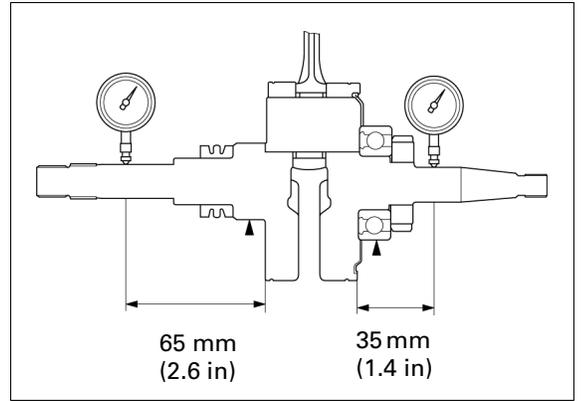
Set the crankshaft on V-blocks and measure the connecting rod big end radial clearance.

**SERVICE LIMIT: 0.05 mm (0.002 in)**



Set the crankshaft on V-blocks and measure the runout using a dial indicator.  
Actual runout is 1/2 of total indicator reading.

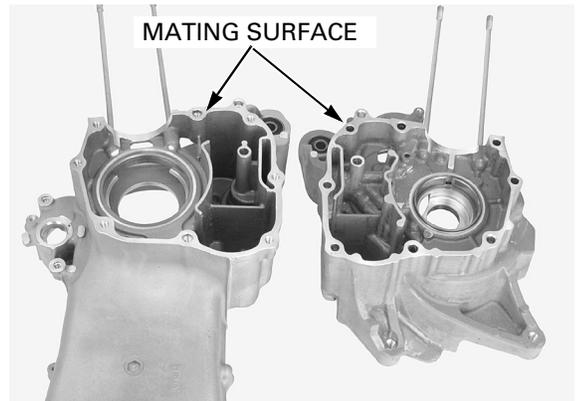
**SERVICE LIMIT: 0.10 mm (0.004 in)**



## CRANKCASE ASSEMBLY

*Be careful not to damage the crankcase mating surface.*

Clean the insides and mating surface of the crankcases.  
Check for cracks or other damage.  
Remove any roughness or irregularities with an oil stone.



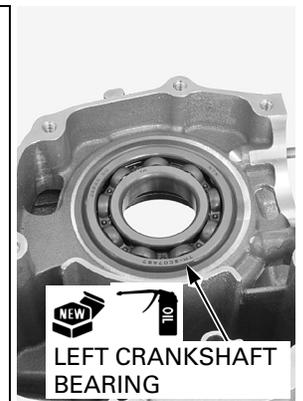
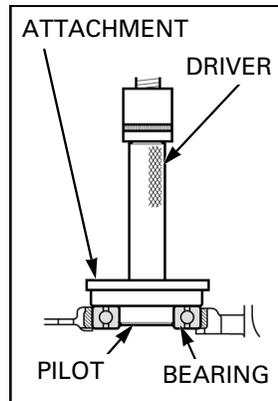
Apply engine oil to the bearing cavity.

Press the left crankcase bearing into the left crankcase squarely until it is fully seated, using the special tool.

**TOOLS:**

- Driver** 07749-0010000
- Attachment, 72 x 75 mm** 07746-0010600
- Pilot, 35 mm** 07746-0040800

Apply 2 cc minimum of engine oil to a new left crankcase bearing.



## CRANKCASE/CRANKSHAFT

Inject more than 3 cc of engine oil to the crankshaft big end bearing.

Install the crankshaft into the left crankcase bearing as follows:

Install the assembly shaft adaptor to the left crankshaft.

Position the assembly collar A on the left crankcase bearing inner race and set the assembly collar B to the assembly collar A.

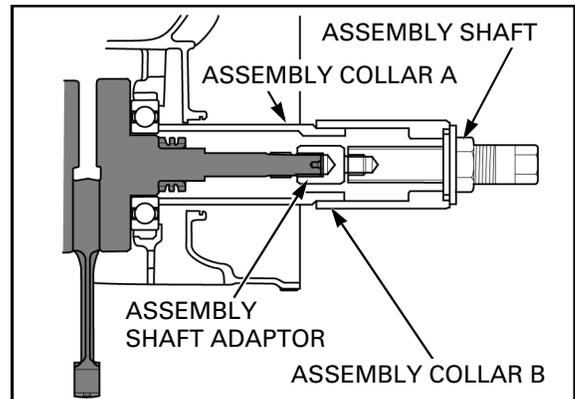
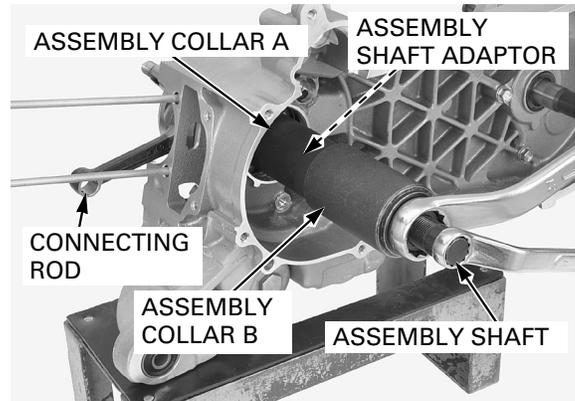
Install the assembly shaft to the assembly collar B and screw it onto the crankshaft while aligning the center of the assembly collar B with the assembly shaft.

- When pulling the crankshaft into the bearing, be careful not to damage the connecting rod.

Pull the crankshaft into the bearing until it is fully seated with holding the connecting rod.

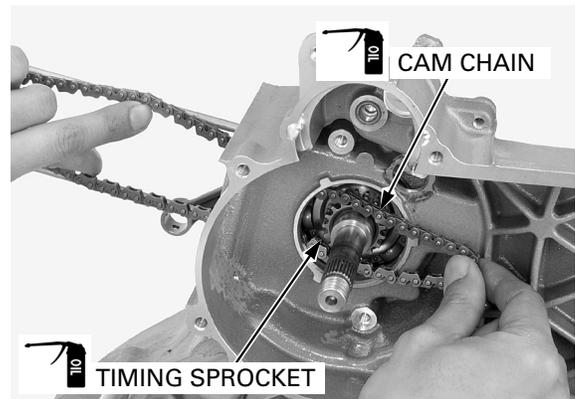
### TOOLS:

Assembly shaft adaptor	07WMF-KFF0200
Assembly shaft	07965-VM00200
Assembly collar A	07965-VM00100
Assembly collar B	07931-KF00100

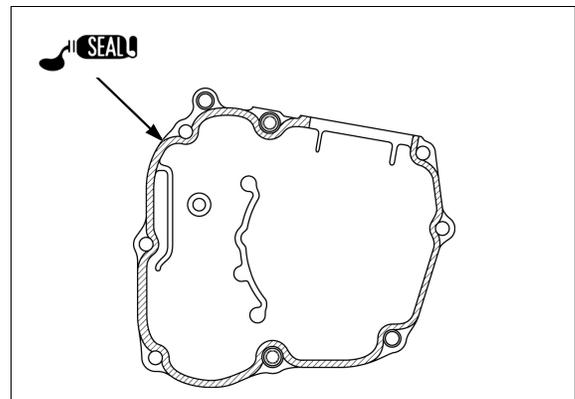


Apply engine oil to the timing sprocket and cam chain.

Install the cam chain to the timing sprocket.



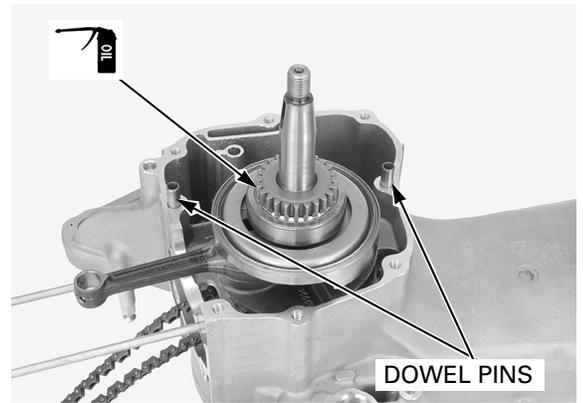
Apply sealant to the right crankcase mating surface.



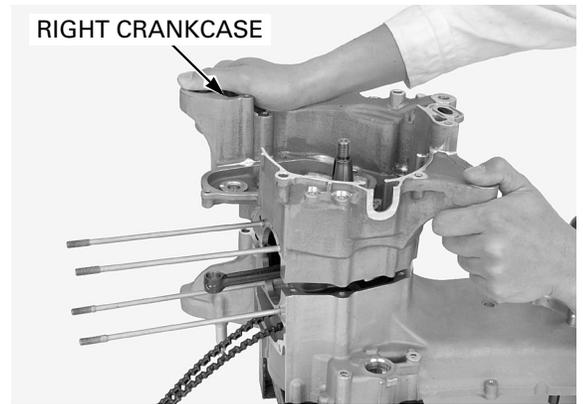
## CRANKCASE/CRANKSHAFT

Apply 2 cc minimum of engine oil to right crankshaft bearing.

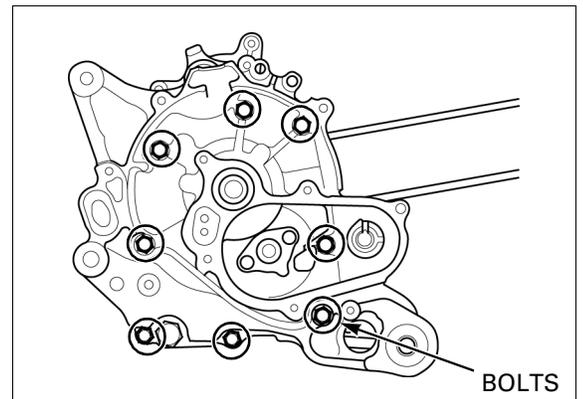
Install the dowel pins to the left crankcase.



Assemble the left and right crankcase.

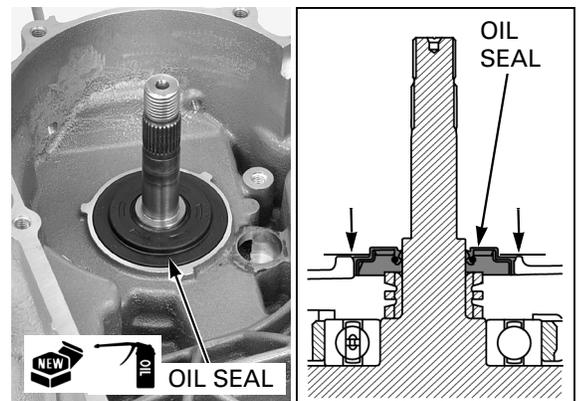


Install the crankcase bolts and tighten them in a crisscross pattern in 2 - 3 steps.



Apply engine oil to a new oil seal lip.

Install the oil seal to the left crankcase squarely with the under flat side facing until it is flush with the crankcase.

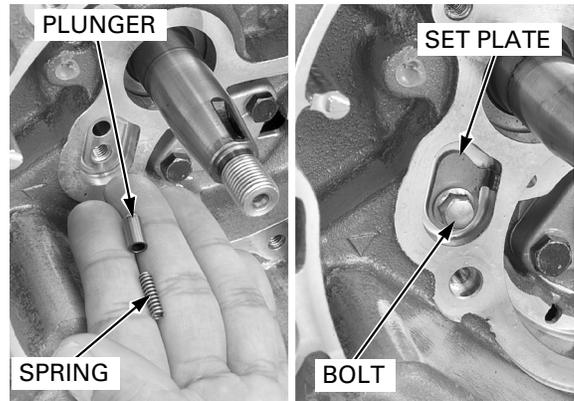


## CRANKCASE/CRANKSHAFT

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Install the plunger, spring, set plate and tighten the bolt.

Refer to service information (page 14-3) for installation of parts removed to perform crankcase service.



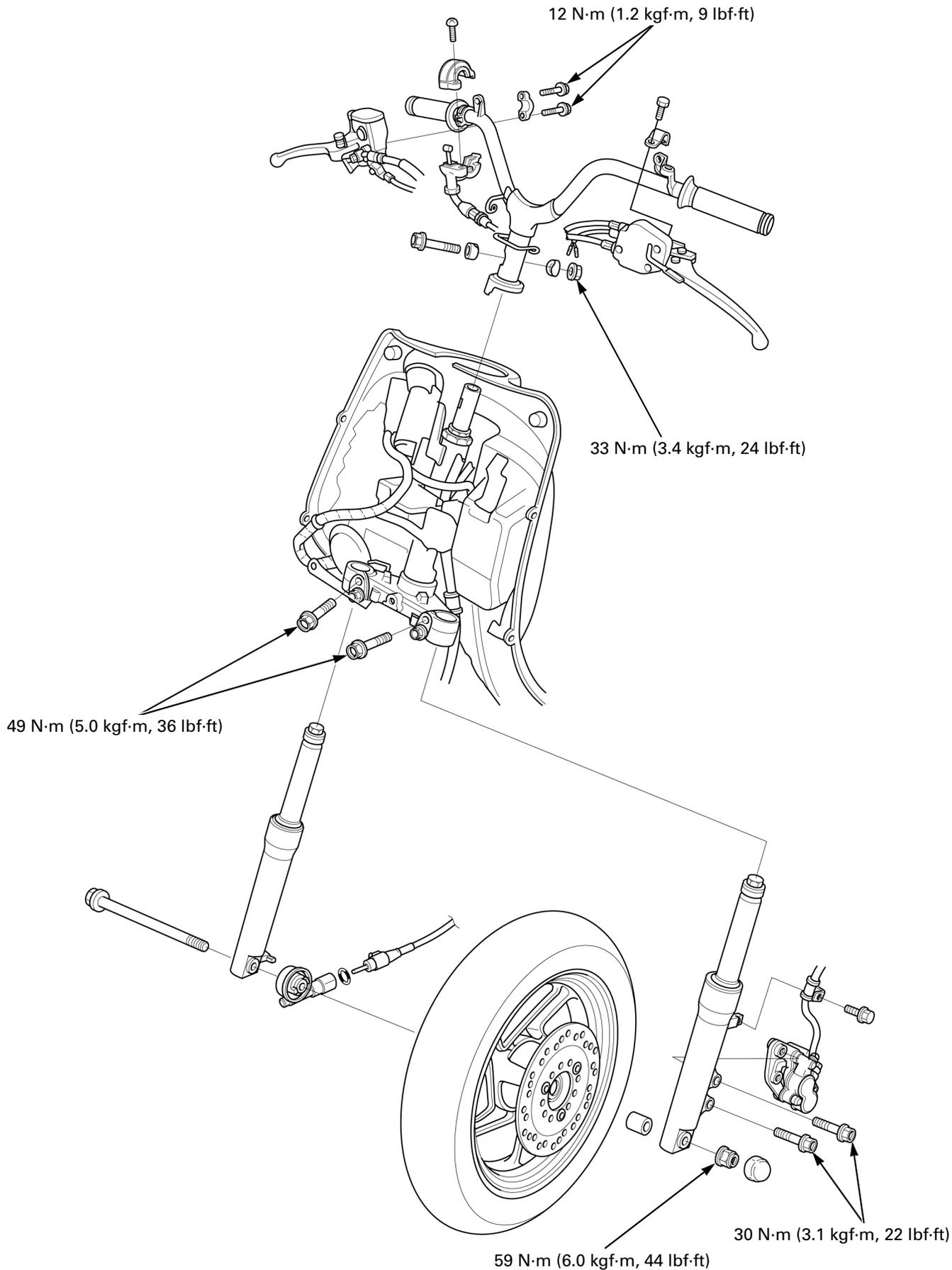
# 15. FRONT WHEEL/SUSPENSION/STEERING

---

COMPONENT LOCATION .....	15-2	FORK .....	15-12
SERVICE INFORMATION .....	15-3	HANDLEBAR.....	15-20
TROUBLESHOOTING .....	15-5	STEERING STEM.....	15-23
FRONT WHEEL .....	15-6		

# FRONT WHEEL/SUSPENSION/STEERING

## COMPONENT LOCATION



## SERVICE INFORMATION

### GENERAL

- This section covers the front wheel, fork, handlebar and steering stem.
- When servicing the front wheel, fork or steering stem, support the scooter using a jack or other support.
- A contaminated brake disc or pad reduces stopping power. Discard contaminated pads and clean a contaminated disc with high quality brake degreasing agent.
- After the front wheel installation, check the brake operation by applying the brake lever.
- For brake system service, refer to the following:
  - Brake fluid replacement/air bleeding (page 17-5)
  - Brake pad/disc (page 17-8)
  - Front brake master cylinder (page 17-11)
  - Brake equalizer (page 17-16)
  - Front brake caliper (page 17-20)
- Use only tires marked "TUBELESS" and tubeless valves on rim marked "TUBELESS TIRE APPLICABLE".
- When using the pin spanner, use a 25 cm (10 in) long deflecting beam type torque wrench. The pin spanner increases the torque wrench's leverage, so the torque wrench reading will be less than the torque actually applied to the steering stem adjusting nut. The specification given on this page is actual torque applied to the steering stem adjusting nut, not the reading on the torque wrench when used with the pin spanner. The procedure later in the text gives the actual and indicated torque.

### SPECIFICATIONS

Unit: mm (in)

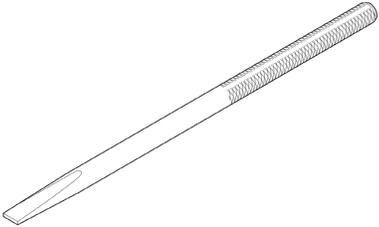
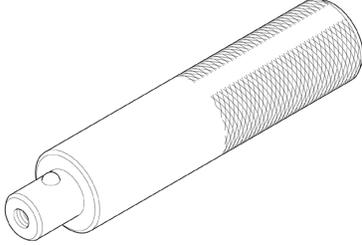
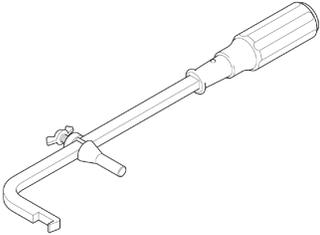
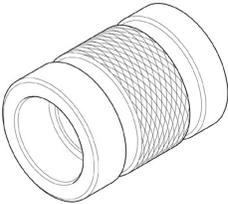
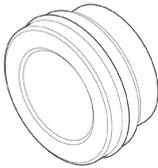
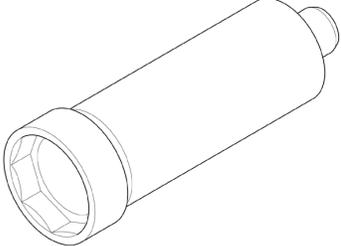
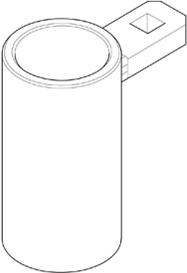
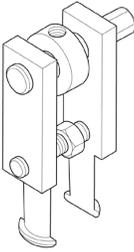
ITEM		STANDARD	SERVICE LIMIT
Minimum tire tread depth		–	To the indicator
Cold tire pressure	Driver only	175 kPa (1.75 kgf/cm <sup>2</sup> , 25 psi)	–
	Driver and passenger	175 kPa (1.75 kgf/cm <sup>2</sup> , 25 psi)	–
Axle runout		–	0.2 (0.01)
Wheel rim runout	Radial	–	2.0 (0.08)
	Axial	–	2.0 (0.08)
Fork	Spring free length	218.0 (8.58)	213.6 (8.41)
	Pipe runout	–	0.2 (0.01)
	Recommended fluid	Fork fluid	–
	Fluid level	52 (2.0)	–
Fluid capacity		89.0 ± 1.0 cm <sup>3</sup> (3.01 ± 0.03 US oz, 3.13 ± 0.04 Imp oz)	–

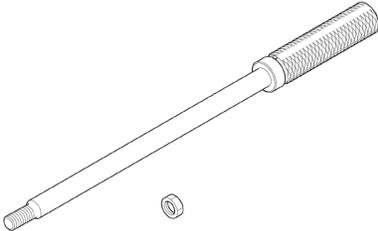
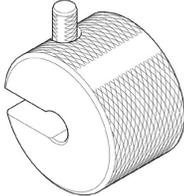
### TORQUE VALUES

Front brake disc socket bolt	42 N·m (4.3 kgf·m, 31 lbf·ft)	ALOC bolt; replace with new ones
Front axle nut	59 N·m (6.0 kgf·m, 44 lbf·ft)	U-nut
Fork socket bolt	20 N·m (2.0 kgf·m, 15 lbf·ft)	Apply locking agent to the threads
Fork pinch bolt	49 N·m (5.0 kgf·m, 36 lbf·ft)	
Fork cap bolt	23 N·m (2.3 kgf·m, 17 lbf·ft)	
Handlebar post nut	33 N·m (3.4 kgf·m, 24 lbf·ft)	See page 15-22
Brake master cylinder holder bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	
Steering stem lock nut	See page 15-26	
Steering stem adjusting nut	See page 15-26	

# FRONT WHEEL/SUSPENSION/STEERING

## TOOLS

<p>Bearing remover shaft 07746-0050100</p> 	<p>Bearing remover head, 12 mm 07746-0050300</p> 	<p>Driver 07749-0010000</p> 
<p>Attachment, 32 x 35 mm 07746-0010100</p> 	<p>Pilot, 12 mm 07746-0040200</p> 	<p>Oil seal remover 07748-0010001</p> 
<p>Fork seal driver body 07747-0010100</p> 	<p>Fork seal driver attachment 07747-0010400</p> 	<p>Socket wrench 07916-KM10000</p> 
<p>Adjusting nut wrench 07SMA-GBC0100</p> 	<p>Inner driver, 30 mm 07746-0030300</p> 	<p>Adjustable remover head 07JAC-PH80100</p> 

<p>Adjustable remover shaft 07JAC-PH80200</p> 	<p>Remover weight 07741-0010201</p> 	<p>Attachment, 44 x 49.5 mm 07945-3330300</p> 
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## TROUBLESHOOTING

### Hard steering

- Insufficient tire pressure
- Faulty tire
- Steering stem adjusting nut too tight
- Faulty steering head bearing
- Faulty steering head bearing race
- Bent steering stem

### Steers to one side or does not track straight

- Bent front axle
- Wheel installed incorrectly
- Worn or damaged front wheel bearings
- Bent fork
- Worn or damaged engine mounting bushings (page 8-6)
- Bent frame
- Faulty steering head bearing

### Front wheel wobbles

- Loose front axle fasteners
- Bent rim
- Worn or damaged front wheel bearings

### Front wheel turns hard

- Front brake drag
- Bent front axle
- Faulty front wheel bearings

### Soft suspension

- Low tire pressure
- Deteriorated fork fluid
- Incorrect fork fluid viscosity
- Insufficient fluid in fork
- Weak fork spring

### Hard suspension

- High tire pressure
- Too much fluid in fork
- Incorrect fork fluid viscosity
- Bent fork pipes
- Clogged fork fluid passage

### Suspension noisy

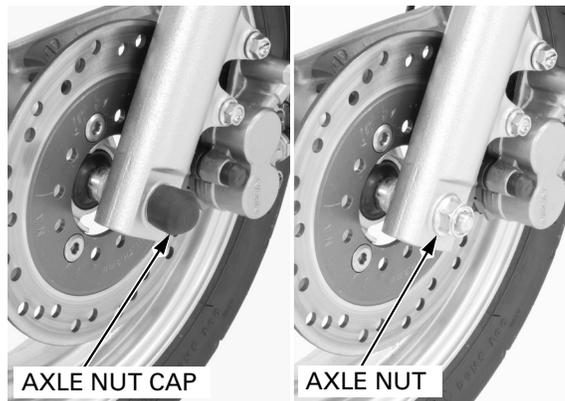
- Worn fork slider guide bushing
- Insufficient fluid in fork
- Loose fork fasteners

## FRONT WHEEL/SUSPENSION/STEERING

### FRONT WHEEL

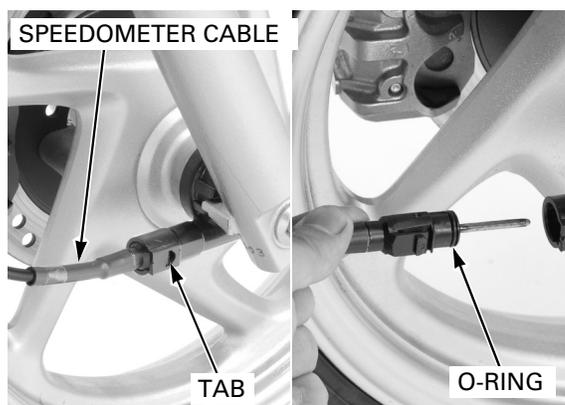
#### REMOVAL

Remove the axle nut cap and loosen the front axle nut.



Disconnect the speedometer cable by releasing the tab.

Remove the O-ring.



Support the scooter securely using a jack or other support and raise the front wheel off the ground.

Remove the front axle nut.

Remove the front axle out and remove the front wheel.

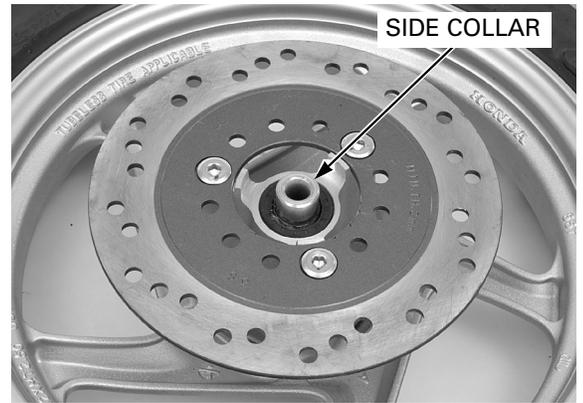
*Do not operate the brake lever after removing the front wheel.*



Remove the speedometer gearbox from the right wheel hub.



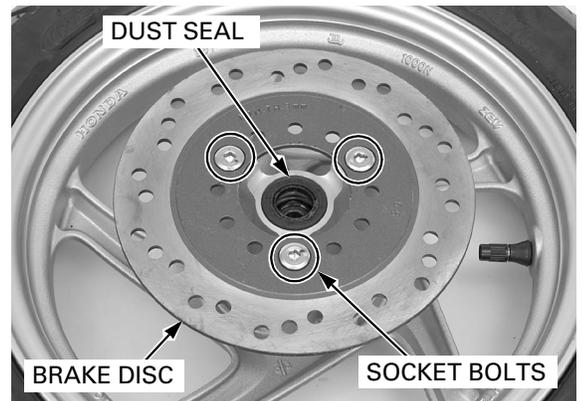
Remove the side collar from the left wheel hub.



### DISASSEMBLY

Remove the dust seal from the left wheel hub.

Remove the socket bolts and brake disc.



Remove the dust seal/retainer from the right wheel hub.



## FRONT WHEEL/SUSPENSION/STEERING

*Do not reuse the old bearings.*

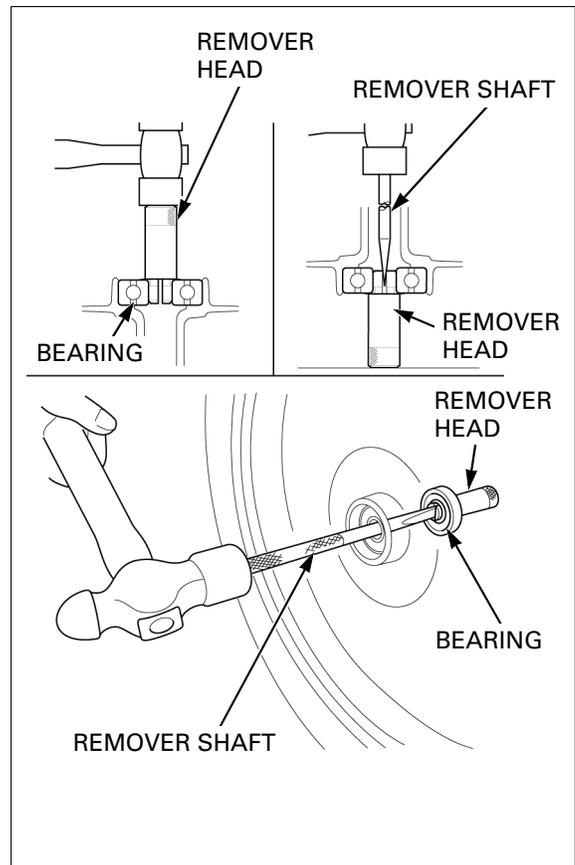
Install the bearing remover head into the bearing. From the opposite side of the wheel, install the bearing remover shaft and drive the bearing out of the wheel hub.

### TOOLS:

**Bearing remover shaft** 07746-0050100

**Bearing remover head, 12 mm** 07746-0050300

Remove the distance collar and drive out the other bearing.

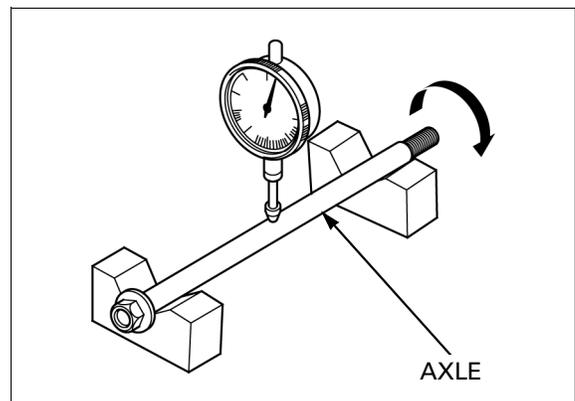


## INSPECTION

### AXLE

Place the axle in V-blocks and measure the runout. Actual runout is 1/2 the total indicator reading.

**SERVICE LIMIT: 0.2 mm (0.01 in)**

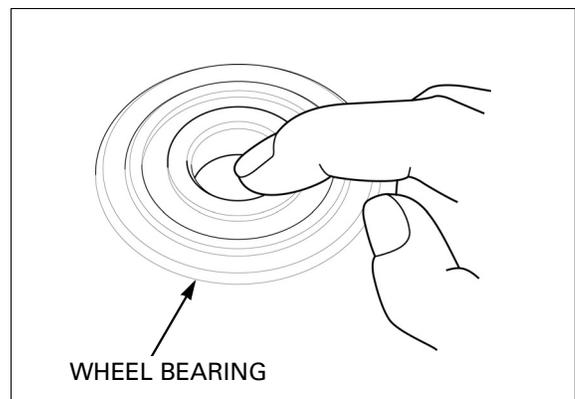


### WHEEL BEARING

Turn the inner race of each bearing with your finger, the bearings should turn smoothly and quietly. Also check that the bearing outer race fits tightly in the hub.

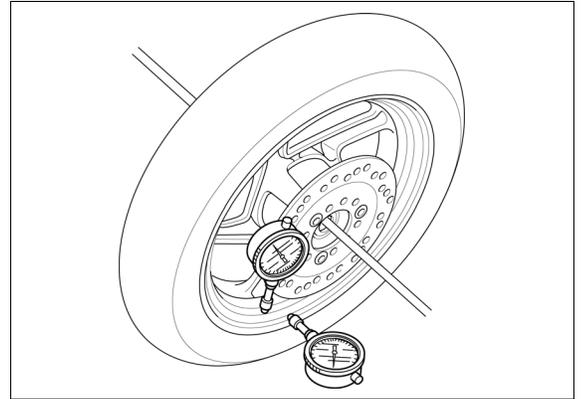
*Replace the wheel bearings in pairs.*

Remove and discard the bearings if the races do not turn smoothly, quietly, or if they fit loosely in the hub.



## WHEEL RIM

Check the rim runout by placing the wheel in a turning stand.  
Spin the wheel slowly and read the runout using a dial indicator.  
Actual runout is 1/2 the total indicator reading.

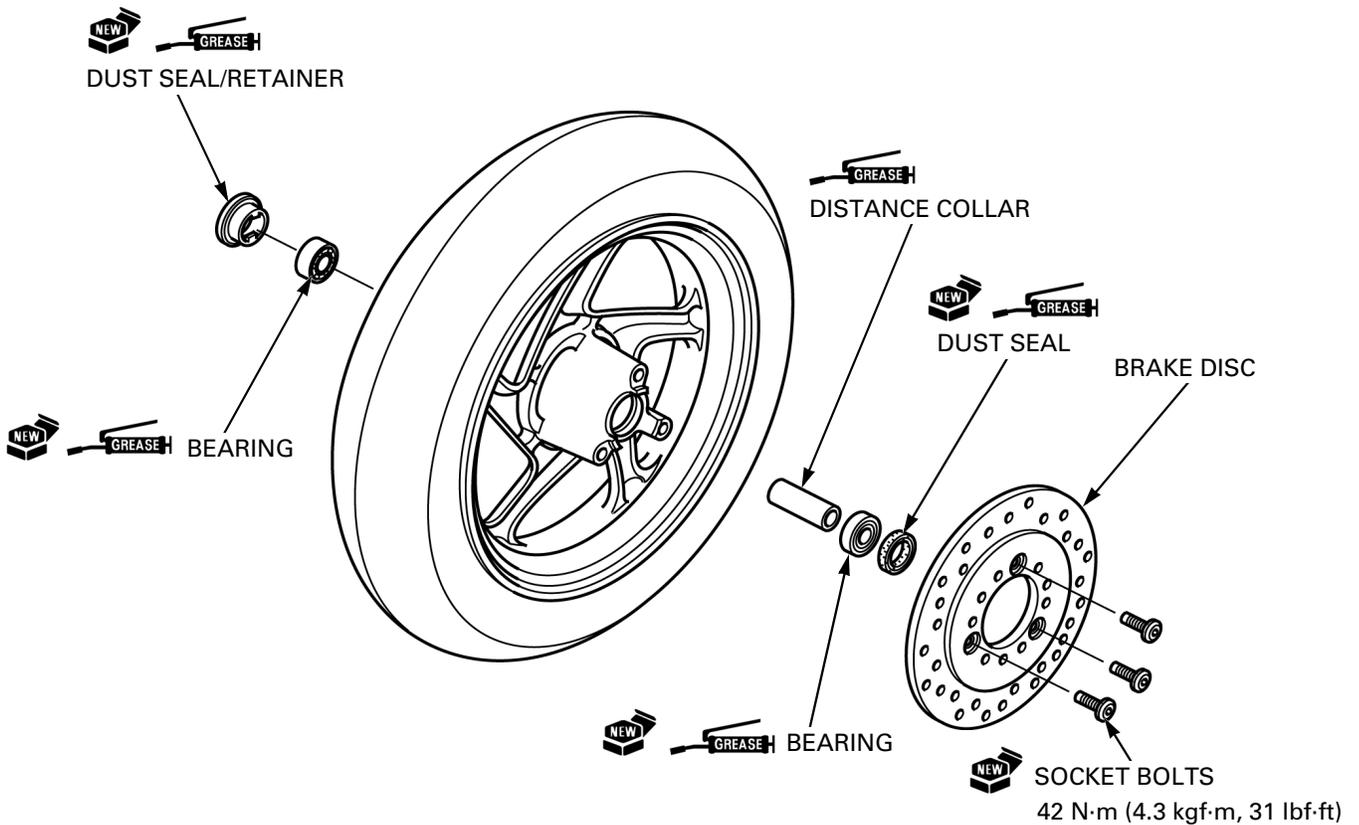


## SERVICE LIMITS:

Radial: 2.0 mm (0.08 in)

Axial: 2.0 mm (0.08 in)

## ASSEMBLY



Pack the bearing cavity with grease.

*Do not reuse the old bearings.*

Drive a new left bearing (brake disc side) squarely with its sealed side facing out until it is fully seated, using the special tools.

### TOOLS:

Driver

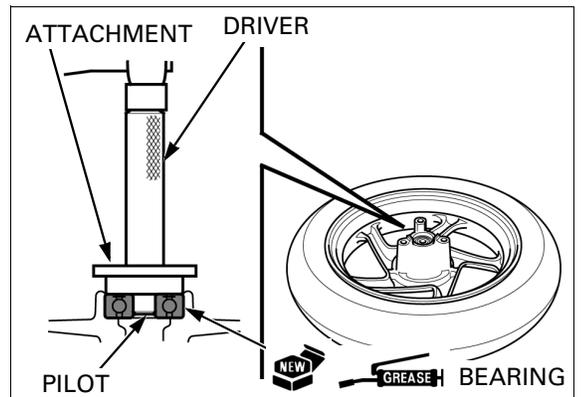
Attachment, 32 x 35 mm

Pilot, 12 mm

07749-001000

07746-0010100

07746-0040200



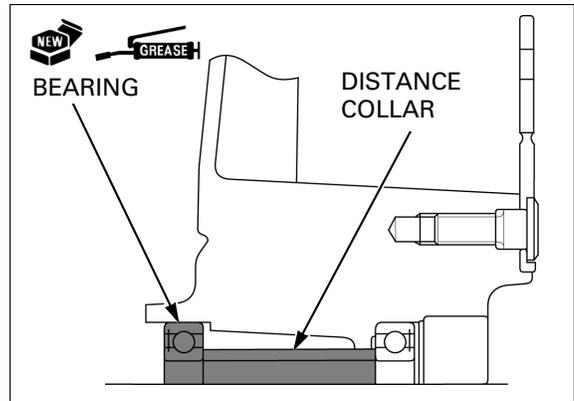
## FRONT WHEEL/SUSPENSION/STEERING

Install it from right side of the wheel.

Drive a new right bearing squarely with its sealed side facing out until it is fully seated, using the special tools.

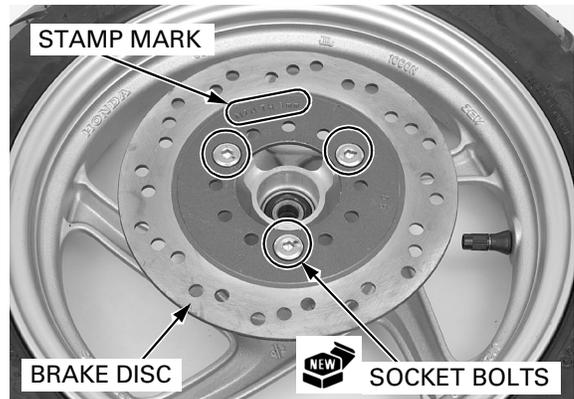
### TOOLS:

Driver	07749-0010000
Attachment, 32 x 35 mm	07746-0010100
Pilot, 12 mm	07746-0040200



Install the brake disc on the left wheel hub with the stamp mark facing up.  
Install and tighten new socket bolts to the specified torque.

**TORQUE: 42 N·m (4.3 kgf·m, 31 lbf·ft)**



Install a new dust seal into the left wheel hub until it is flush with the wheel hub.

Apply grease to the dust seal lip.



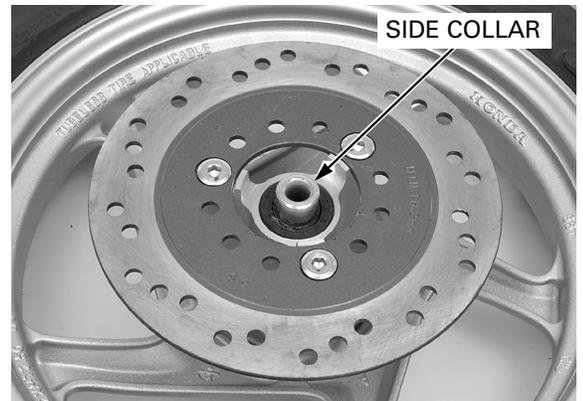
Install a new dust seal/retainer into the right wheel hub until it is fully seated.

Apply grease to the dust seal outer surface.



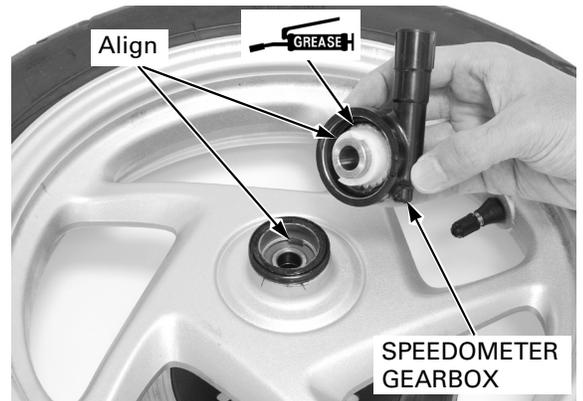
## INSTALLATION

Install the side collar to the left wheel hub.



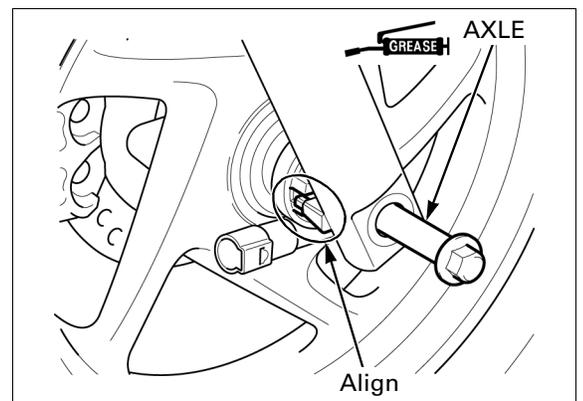
Apply grease to the speedometer gearbox inside.

Install the speedometer gearbox onto the right wheel hub by aligning the gearbox grooves with the retainer tabs.



Install the front wheel by aligning the fork tab on the speedometer gearbox groove so that the brake disc is positioned between the brake pads.

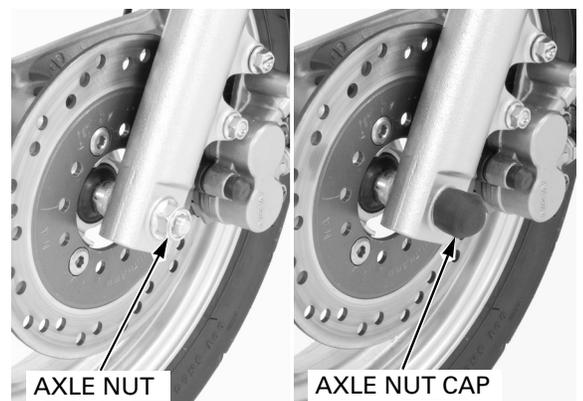
Apply thin coat of grease to the front axle and install it from the right side.



Install the axle nut and tighten it to the specified torque.

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

Install the axle nut cap.

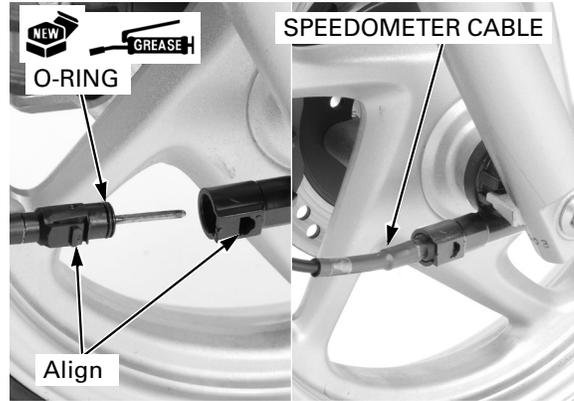


## FRONT WHEEL/SUSPENSION/STEERING

Coat a new O-ring with grease and install it into the groove on the speedometer cable.

Connect the speedometer cable while aligning the slot of the speedometer gearbox with the tab of the speedometer cable.

Turn the front wheel by hand and check that the speedometer moves.



## FORK

### REMOVAL

Remove the following:

- Front wheel (page 15-6)
- Front fender (page 3-4)
- Front cover (page 3-6)

*Support the front brake caliper so it does not hang from the brake hose. Do not twist the brake hose.*

Remove the brake caliper mounting bolts (page 17-20).

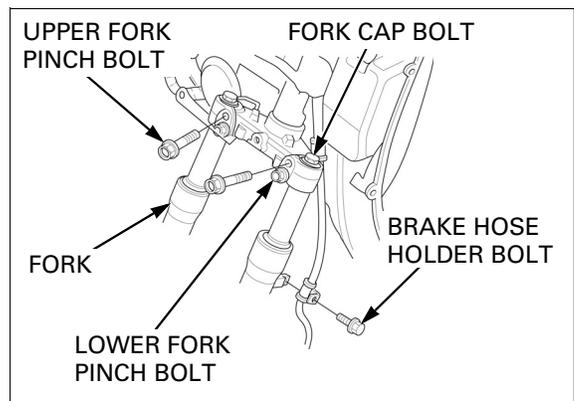
Remove the brake hose holder bolt.

When the fork will be disassembled, loosen the fork cap bolt, but do not remove it yet.

Remove the upper fork pinch bolt.

Hold the fork and loosen the lower fork pinch bolt.

Remove the fork from the steering stem.

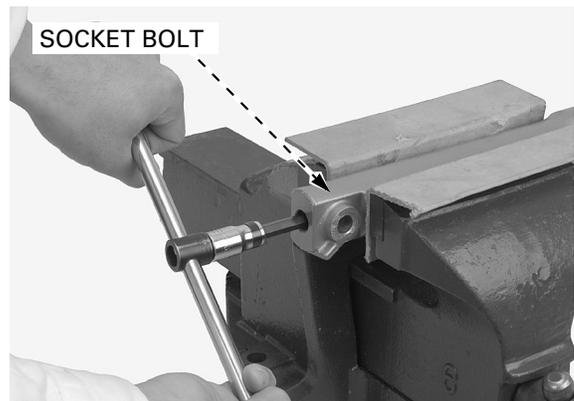


### DISASSEMBLY

Hold the fork slider in a vise with a soft jaws or shop towel.

*Remove the socket bolt after draining the fork fluid.*

Loosen the fork socket bolt, but do not remove yet.

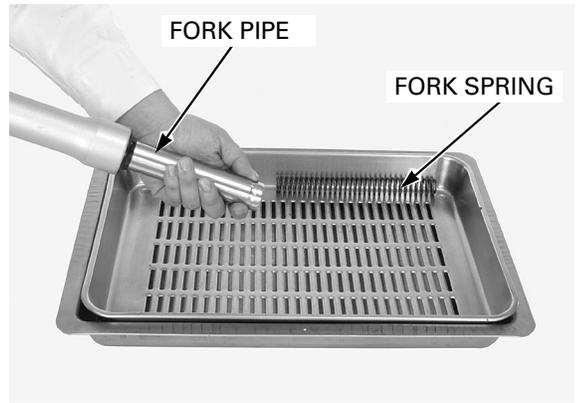


Remove the fork cap bolt and O-ring.

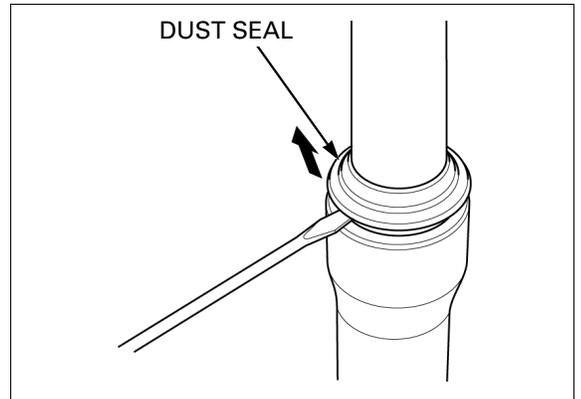


## FRONT WHEEL/SUSPENSION/STEERING

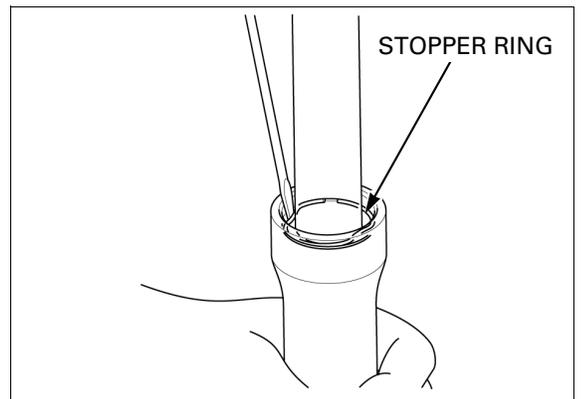
Remove the fork spring from the fork pipe.  
Pour out the fork fluid by pumping the fork pipe several times.



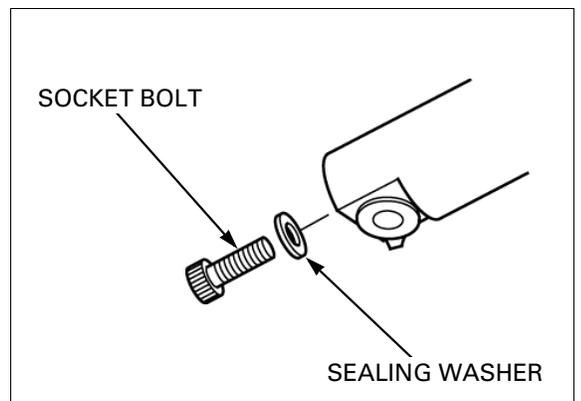
*Be careful not to scratch the fork slider.* Remove the dust seal from the fork slider.



*Be careful not to scratch the fork pipe.* Remove the oil seal stopper ring from the fork slider.

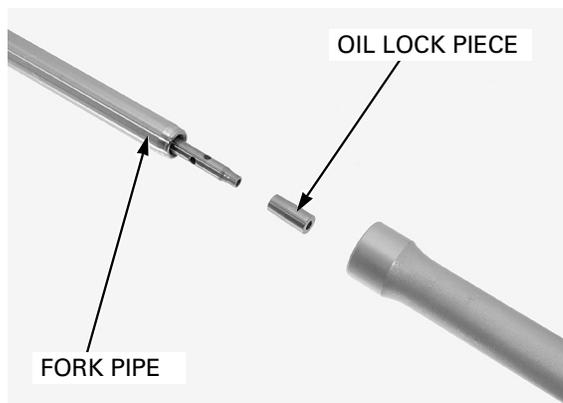


Remove the socket bolt and sealing washer.

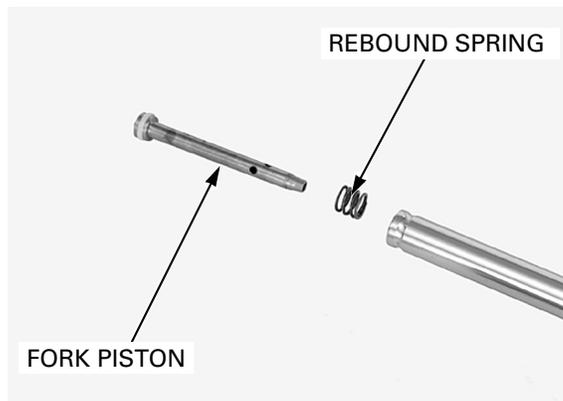


## FRONT WHEEL/SUSPENSION/STEERING

Pull the fork pipe out from the fork slider and remove the oil lock piece.



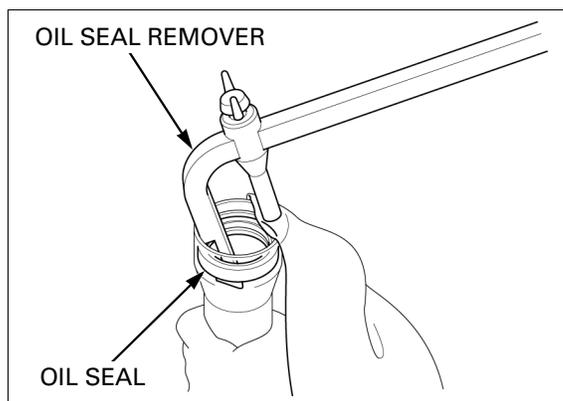
Remove the fork piston and rebound spring from the fork pipe.



Remove the oil seal using the special tool.

**TOOL:**  
Oil seal remover

**07748-0010001 or  
equivalent**



Remove the back-up ring from the fork slider.

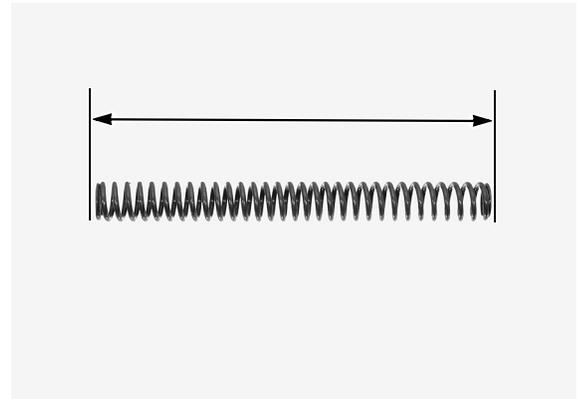


**INSPECTION**

**FORK SPRING**

Check the fork spring for fatigue or damage.  
 Measure the fork spring free length.

**SERVICE LIMIT: 213.6 mm (8.41 in)**



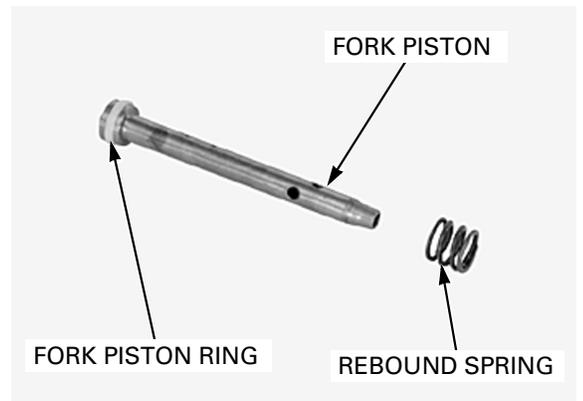
**FORK PISTON**

Check the fork piston for score marks and excessive or abnormal wear.

Check the fork piston ring for wear or damage.

Check the rebound spring for fatigue or damage.

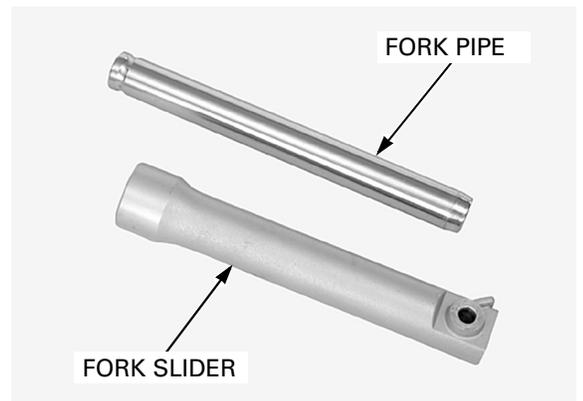
Replace the components if necessary.



**FORK PIPE/FORK SLIDER**

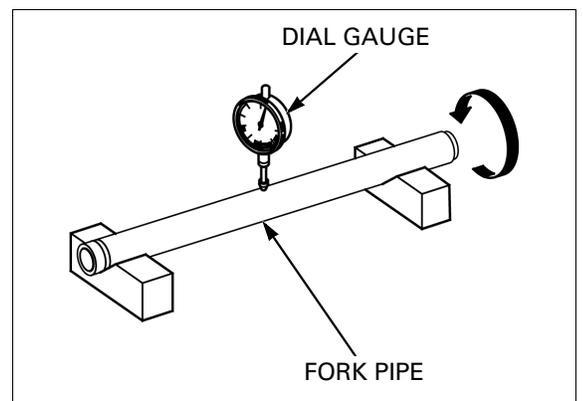
Check the fork pipe and fork slider for score marks and excessive or abnormal wear.

Replace the components if necessary.



Set the fork pipe in V-block and measure the runout with a dial gauge.  
 Actual runout is 1/2 the total indicator reading.

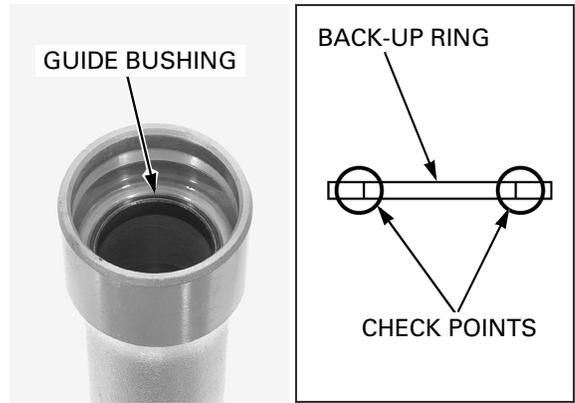
**SERVICE LIMIT: 0.2 mm (0.01 in)**



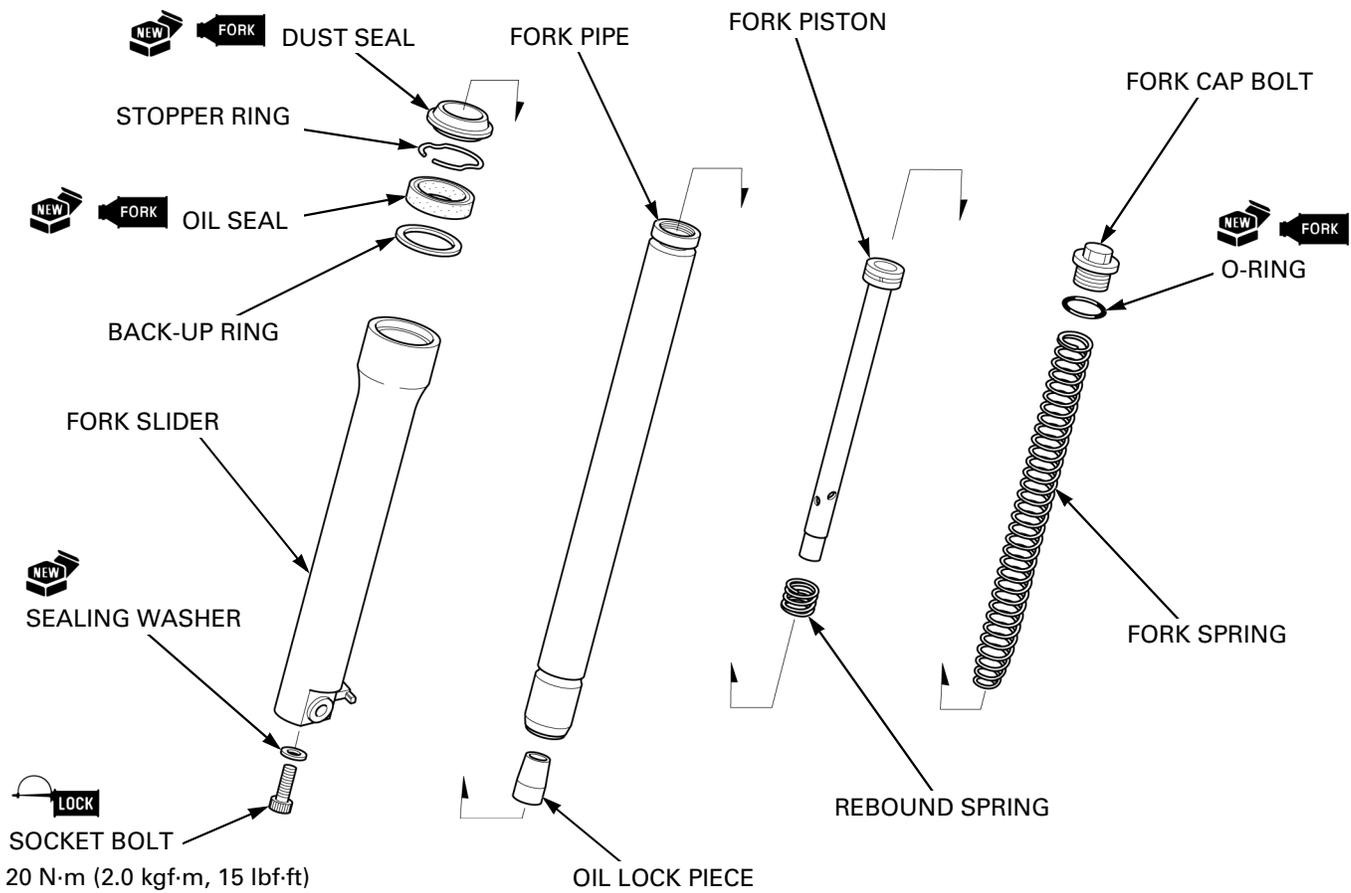
# FRONT WHEEL/SUSPENSION/STEERING

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

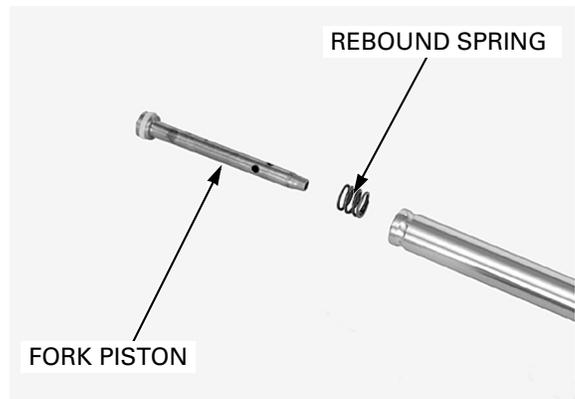
Check the back-up ring; replace it if there is any distortion at the points shown.



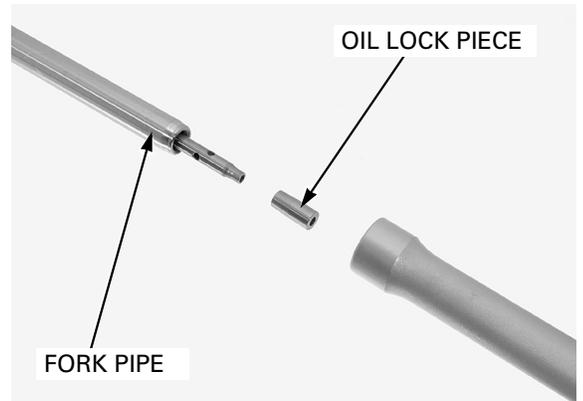
## ASSEMBLY



Before assembly, wash all parts with high flash point or non-flammable solvent and wipe them dry. Install the rebound spring and fork piston into the fork pipe.

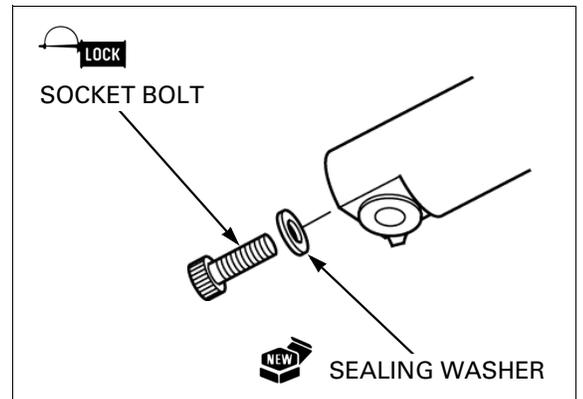


Install the oil lock piece to the fork piston.  
Install the fork pipe into the fork slider.



Clean the socket bolt threads and apply locking agent to the bolt threads.

Install the socket bolt with a new sealing washer into the fork piston.

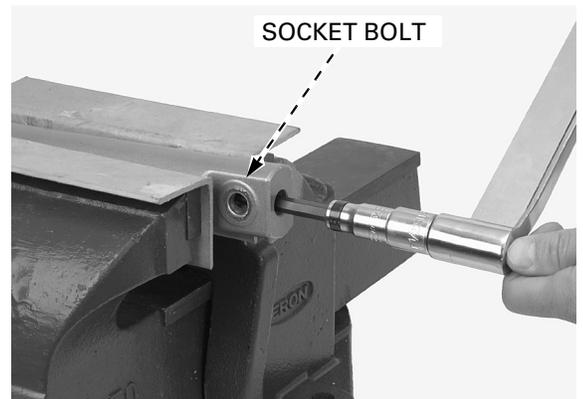


Hold the fork slider in a vise with soft jaws or a shop towel.

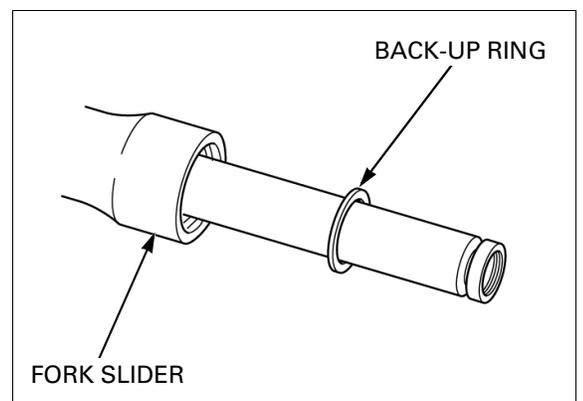
Tighten the fork socket bolt to the specified torque.

**TORQUE: 20 N·m (2.0 kgf·m, 15 lbf·ft)**

If the fork piston turns together with the socket bolt, temporarily install the fork spring and fork cap bolt.



Install the back-up ring over the fork pipe and seat it on the fork slider.

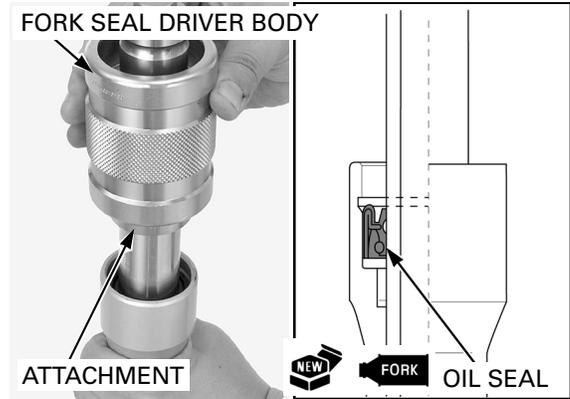


## FRONT WHEEL/SUSPENSION/STEERING

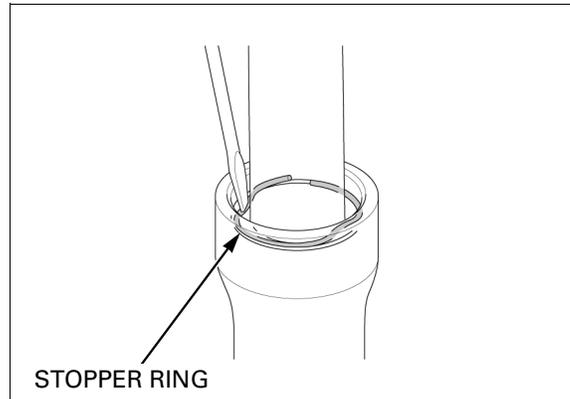
Coat a new oil seal lip with fork fluid and install it into the fork slider using the special tools until it is fully seated.

### TOOLS:

**Fork seal driver body** 07747-0010100  
**Fork seal driver attachment** 07747-0010400

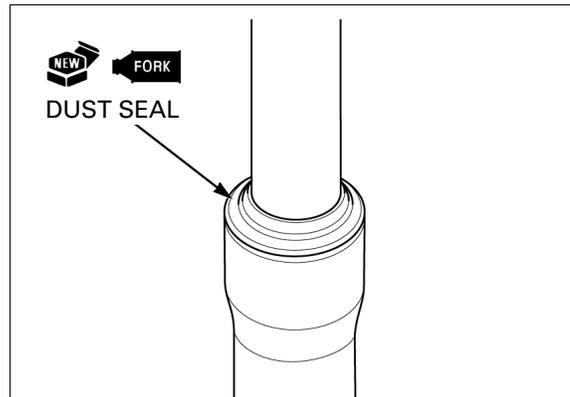


*Be careful not to scratch the fork pipe.* Install the stopper ring into the groove on the fork slider.



Apply fork fluid to a new dust seal lip.

*Do not tap the oil seal lip too hard.* Install the dust seal until it is fully seated on the fork slider.

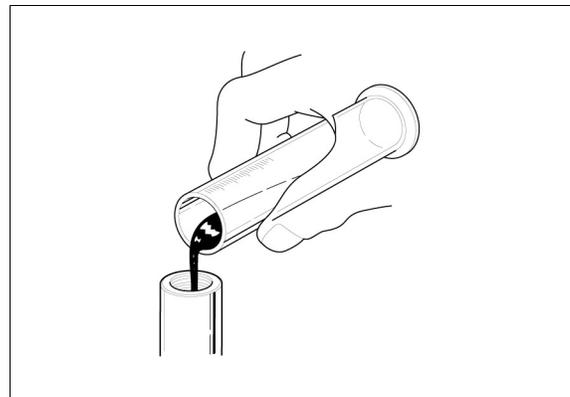


Pour the specified amount of fork fluid into the fork pipe.

### FORK FLUID CAPACITY:

**$89.0 \pm 1.0 \text{ cm}^3$  (3.01  $\pm$  0.03 US oz, 3.13  $\pm$  0.04 Imp oz)**

Slowly pump the fork pipe several times to remove trapped air from the lower portion of the fork pipe.

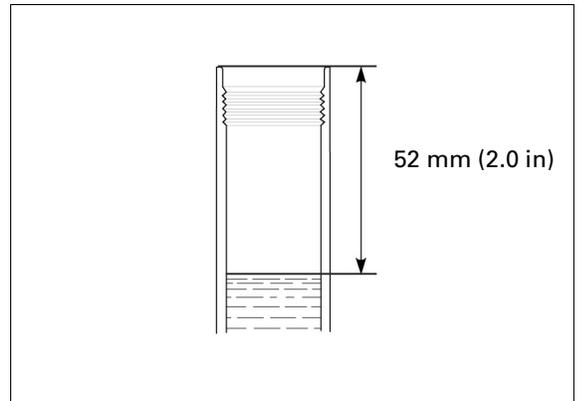


## FRONT WHEEL/SUSPENSION/STEERING

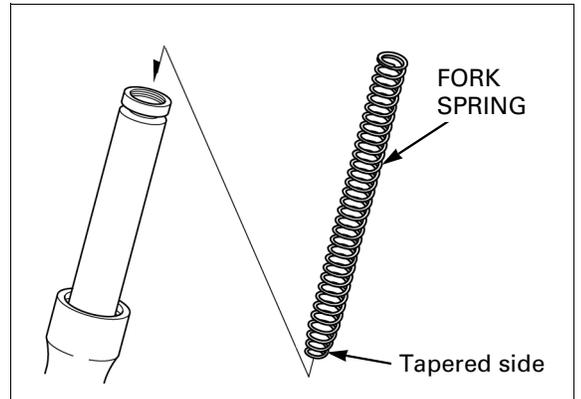
Be sure the oil level is same in the both forks.

Compress the fork pipe fully and measure the oil level from the top of the fork pipe.

**FORK OIL LEVEL: 52 mm (2.0 in)**



Pull the fork pipe up fully. Install the fork spring into the fork pipe with its tapered side facing down.



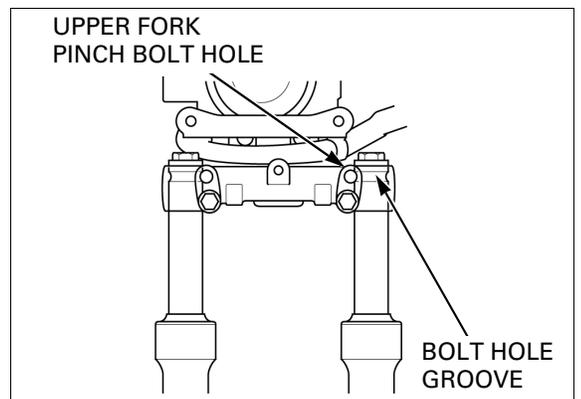
Coat a new O-ring with fork fluid and install it into the groove on the fork cap bolt.

Install the fork cap bolt, but tighten it after installing it to the steering stem.



### INSTALLATION

Install the fork into the steering stem and align the groove on the fork pipe with the upper fork pinch bolt hole on the stem.



## FRONT WHEEL/SUSPENSION/STEERING

Install the upper fork pinch bolt.  
Tighten the upper/lower fork pinch bolts to the specified torque.

**TORQUE: 49 N·m (5.0 kgf·m, 36 lbf·ft)**

If the fork is disassembled, tighten the fork cap bolt to the specified torque.

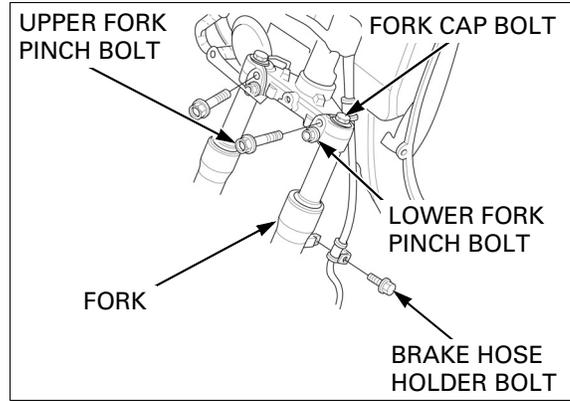
**TORQUE: 23 N·m (2.3 kgf·m, 17 lbf·ft)**

Install the brake caliper mounting bolt (page 17-23).

Set the brake hose holder and tighten the bolt.

Install the following:

- Front cover (page 3-6)
- Front fender (page 3-4)
- Front wheel (page 15-11)



## HANDLEBAR

### REMOVAL

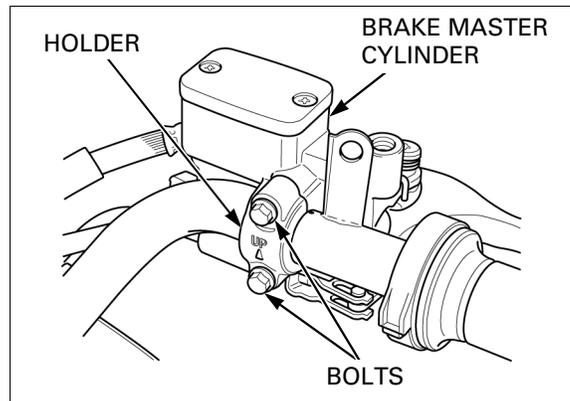
#### BRAKE MASTER CYLINDER

Remove the following:

- Front center cover (page 3-4)
- Front handlebar cover (page 3-6)
- Rear handlebar cover (page 3-7)

*Keep the brake master cylinder upright to prevent air from entering the system.  
Do not twist the brake hose.*

Remove the bolts, holder and brake master cylinder.

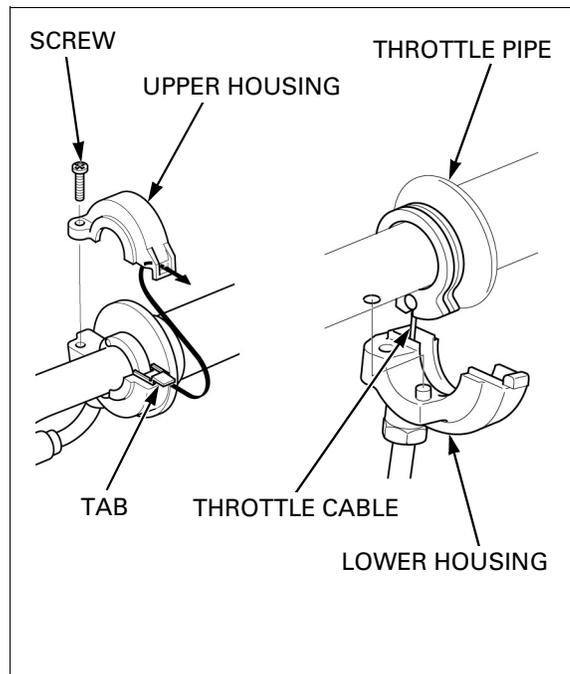


#### THROTTLE HOUSING

Remove the screw and upper throttle housing by releasing its slot from the tab on the lower housing.

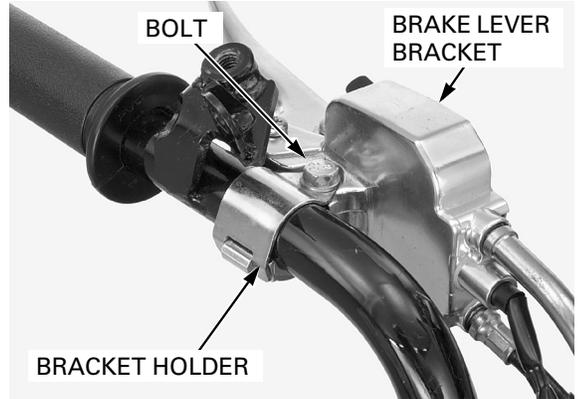
Disconnect the throttle cable from the throttle pipe and remove the lower throttle housing.

Remove the throttle pipe from the handlebar.



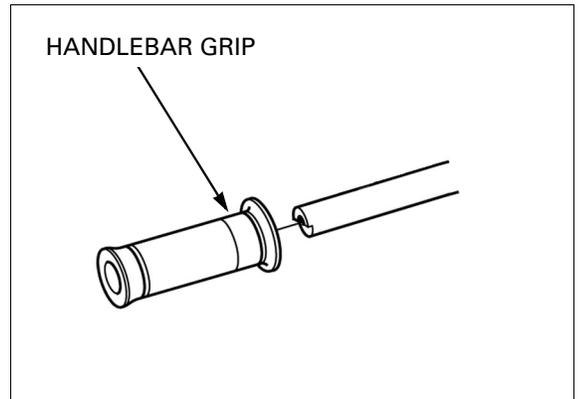
## COMBINED BRAKE EQUALIZER

Hold the rear brake lever bracket and remove the holder bolt.  
Remove the bracket holder and the brake lever bracket.



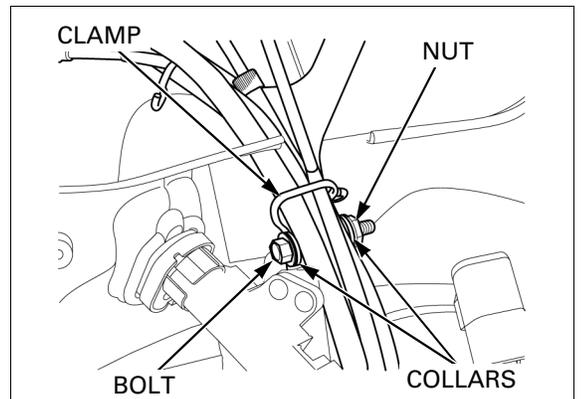
## HANDLEBAR GRIP

Remove the handlebar grip.



## HANDLEBAR POST

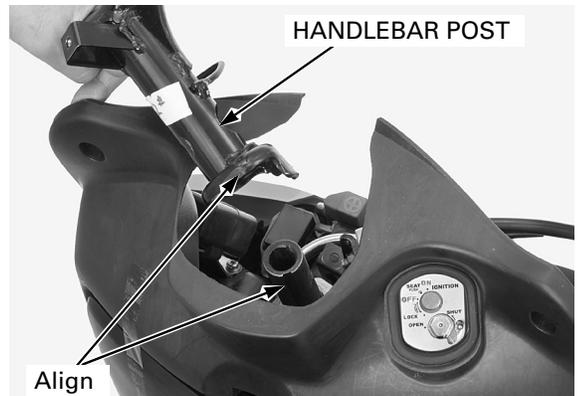
Release the cables from the handlebar post clamp.  
Remove the handlebar post nut, bolt, collars and handlebar post from the steering stem.



## INSTALLATION

### HANDLEBAR POST

Install the handlebar post into the steering stem while aligning the tab of the handlebar post and groove of the steering stem.



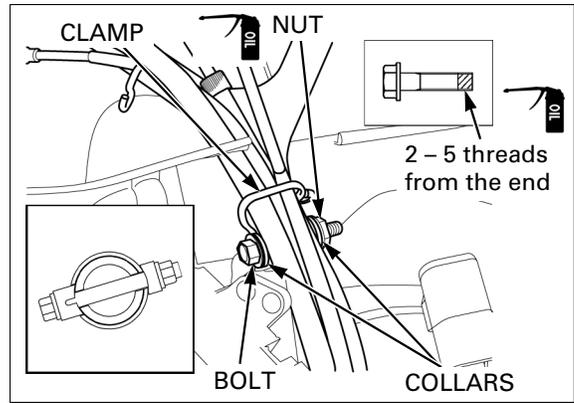
## FRONT WHEEL/SUSPENSION/STEERING

Apply engine oil to the handlebar post nut seating surface and the bolt threads as shown. Install the bolt, collars and nut as shown. Tighten the nut to the specified torque.

**TORQUE: 33 N·m (3.4 kgf·m, 24 lbf·ft)**

*Route the cables properly (page 1-17).*

Secure the cables with the handlebar clamp.

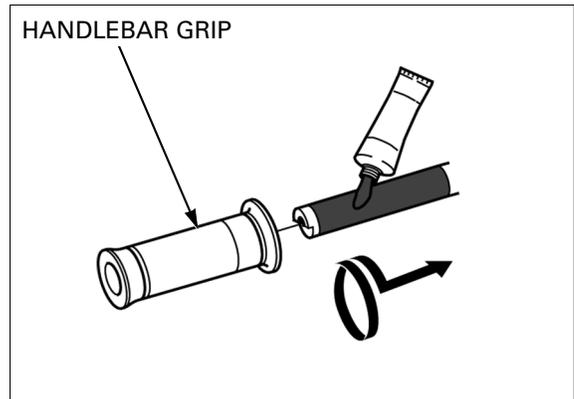


### HANDLEBAR GRIP

Apply Honda Bond A or equivalent to the inside of the grip and to the clean surfaces of the left handlebar.

*Allow the adhesive to dry for 1 hour before using.*

Wait 3 – 5 minutes and install the grip. Rotate the grip for even application of the adhesive.

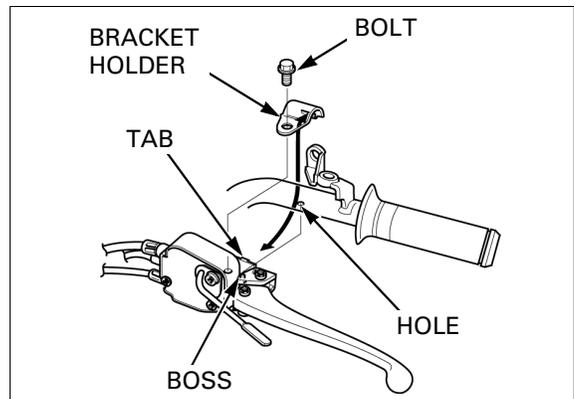


### COMBINED BRAKE EQUALIZER

Align the boss of the rear brake lever bracket with the hole of the handlebar and install the rear brake lever bracket.

Hook the bracket holder to the tab of the rear brake lever bracket while holding the brake lever bracket.

Install and tighten the brake lever bracket holder bolt.



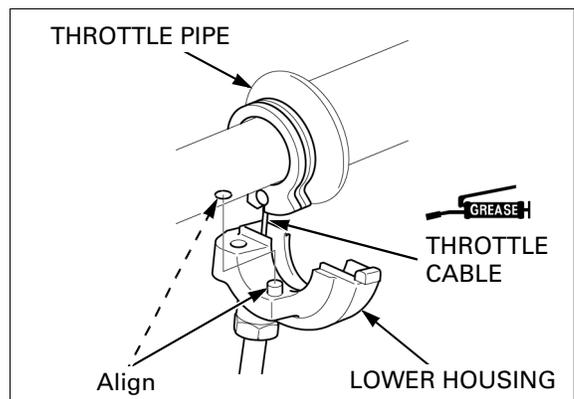
### THROTTLE HOUSING

Install the throttle pipe to the right handlebar.

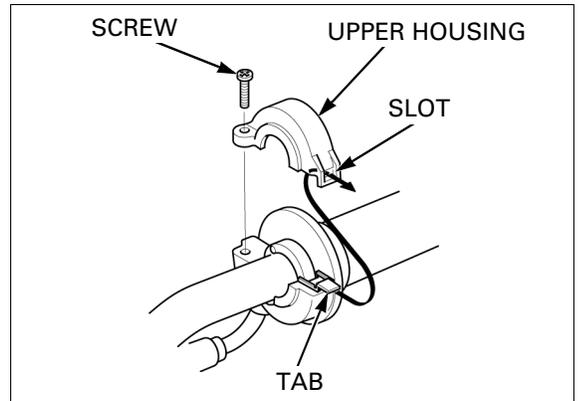
Apply 0.1 – 0.2 g of grease to the throttle cable sliding area and end or seat area.

Connect the throttle cable to the throttle pipe.

Install the lower throttle housing by aligning the hole on the handlebar with the locating pin of the lower throttle housing.



Install the upper throttle housing by aligning its slot with the tab on the lower housing. Install and tighten the screw.



### BRAKE MASTER CYLINDER

Set the brake master cylinder to the right handlebar. Install the master cylinder holder with its "UP" mark facing up.

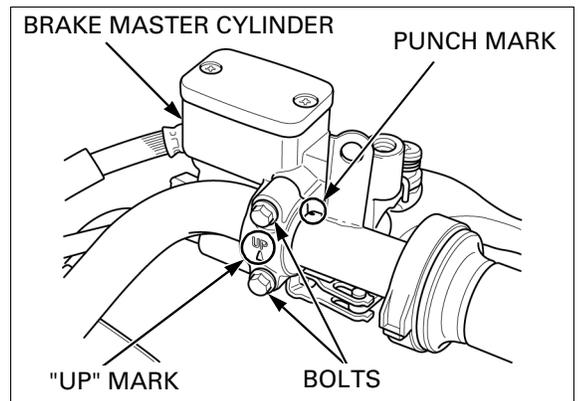
Align the end of the master cylinder with the punch mark on the handlebar and tighten the upper bolt first, then tighten the lower bolt to the specified torque.

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

Install the following:

- Rear handlebar cover (page 3-7)
- Front handlebar cover (page 3-6)
- Front center cover (page 3-4)

Check the combined brake system (page 4-18).



## STEERING STEM

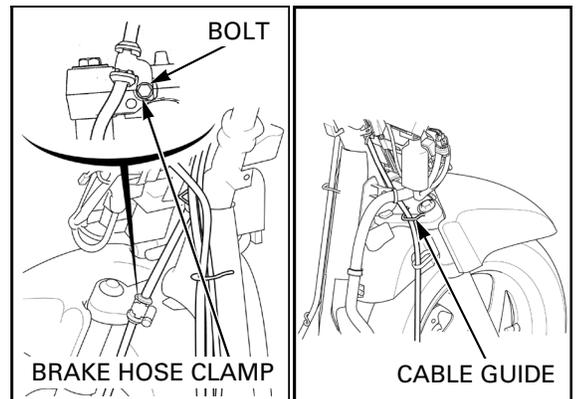
### REMOVAL

Remove the following:

- Front wheel (page 15-6)
- Fork (page 15-12)
- Handlebar (page 15-20)

Remove the brake hose clamp bolt and release the brake hose clamp.

Release the speedometer cable from the cable guide.



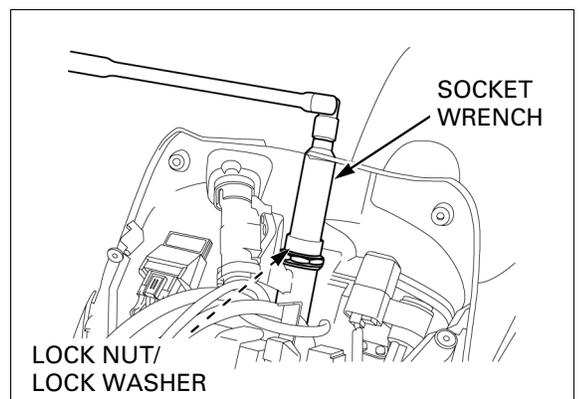
Loosen the steering stem lock nut using the socket wrench.

### TOOL:

**Socket wrench**

**07916-KM10000**

Remove the steering stem lock nut and lock washer.



## FRONT WHEEL/SUSPENSION/STEERING

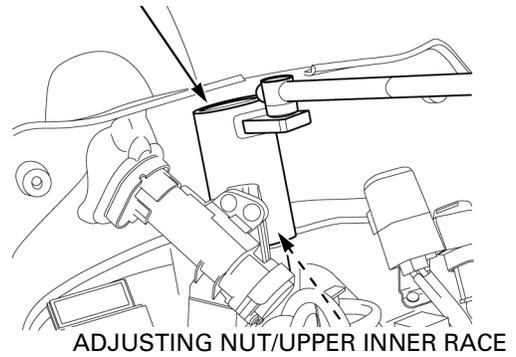
Hold the steering stem and loosen the steering stem adjusting nut/upper inner race using the adjusting nut wrench.

**TOOL:**

**Adjusting nut wrench**

**07SMA-GBC0100**

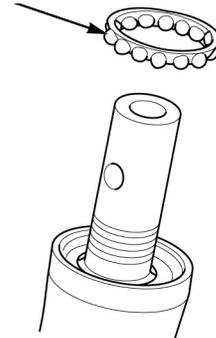
ADJUSTING NUT WRENCH



Hold the steering stem and remove the adjusting nut/upper inner race.

Remove the upper bearing.

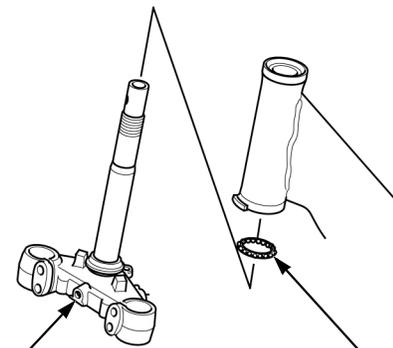
UPPER BEARING



Remove the lower bearing and steering stem.

STEERING STEM

LOWER BEARING



## FRONT WHEEL/SUSPENSION/STEERING

- Always replace the bearings and races as a set.

Install the adjustable remover head into the upper outer race.

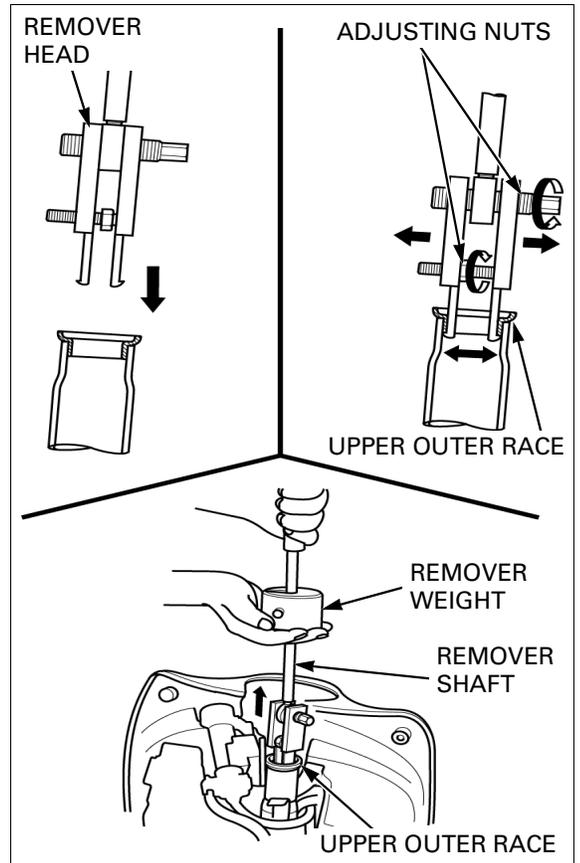
Hold the upper outer race with adjustable remover head hooks by turning its adjusting nuts, making sure it is installed correctly.

Remove the upper outer race from the steering stem pipe.

### TOOLS:

**Adjustable remover head**  
**Adjustable remover shaft**  
**Remover weight**

**07JAC-PH80100**  
**07JAC-PH80200**  
**07741-0010201**

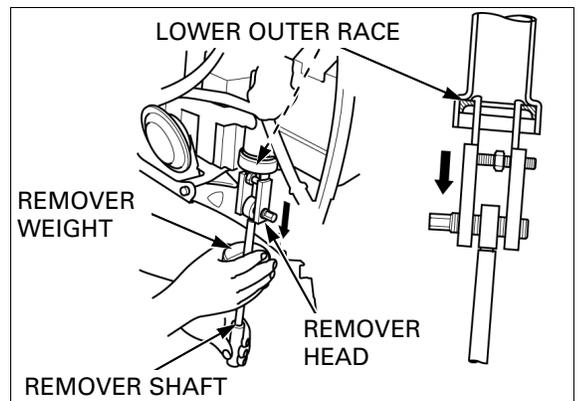


Remove the lower outer race using the following tools.

### TOOLS:

**Adjustable remover head**  
**Adjustable remover shaft**  
**Remover weight**

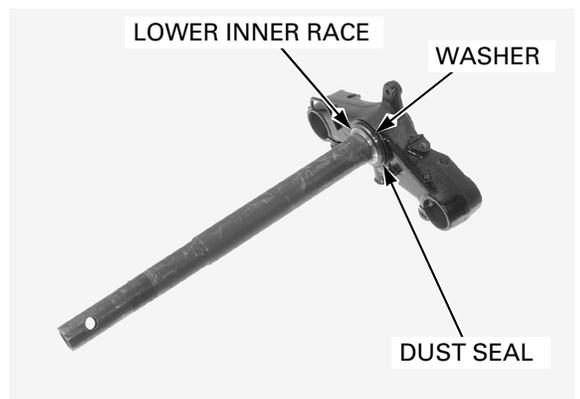
**07JAC-PH80100**  
**07JAC-PH80200**  
**07741-0010201**



Remove the dust seal from the steering stem.

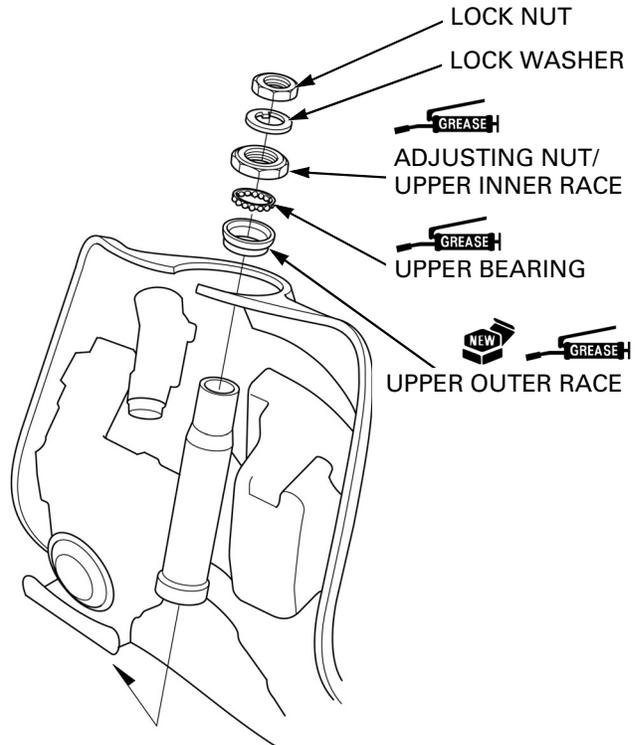
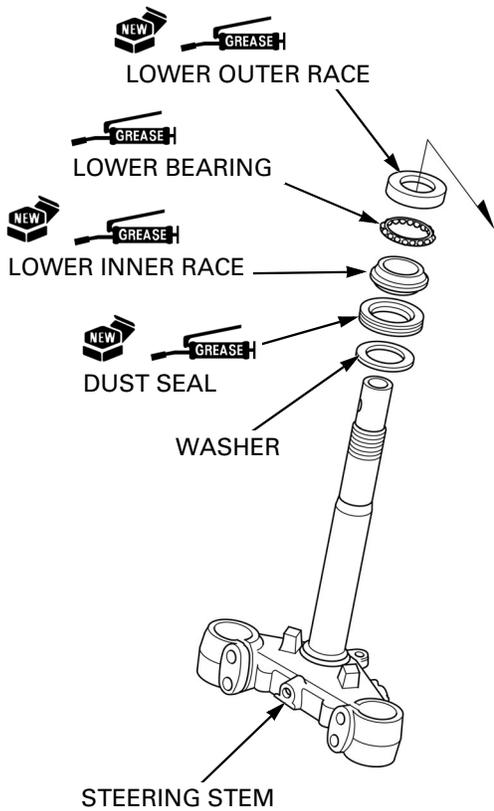
Remove the lower inner race with a chisel or equivalent tool being careful not to damage the stem.

Remove the washer from the steering stem.



# FRONT WHEEL/SUSPENSION/STEERING

## INSTALLATION



GREASE with extreme pressure agent (recommended: EXCELIGHT EP2 manufactured by KYODO YUSHI, japan or Shell ALVANIA EP2 or equivalent)

Install the washer to the steering stem.

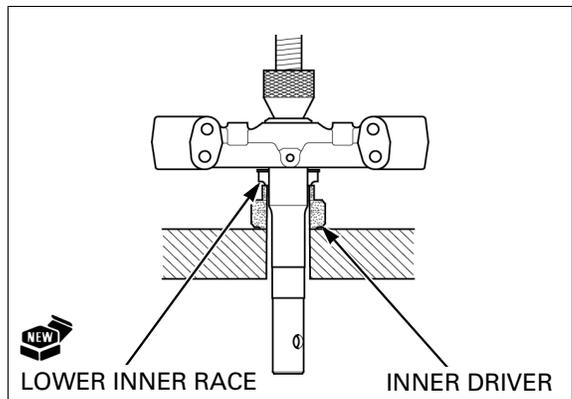
*Do not damage the bearing rolling area of the lower inner race.*

Install a new lower inner race using the following tool and hydraulic press.

**TOOL:**

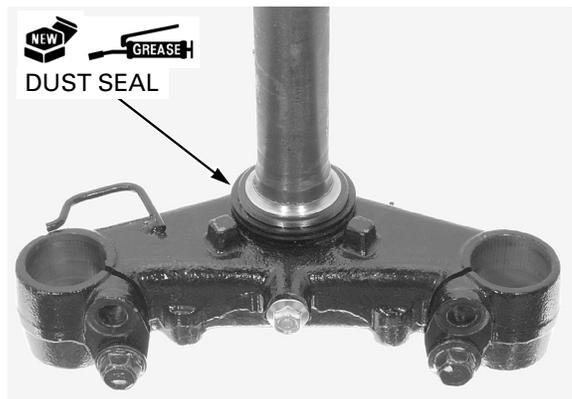
**Inner driver, 30 mm**

**07746-0030300**



Install a new dust seal to the lower inner race groove.

Apply grease with extreme pressure agent (recommended: EXCELIGHT EP2 manufactured by KYODO YUSHI, japan or Shell ALVANIA EP2 or equivalent) to the dust seal lip.

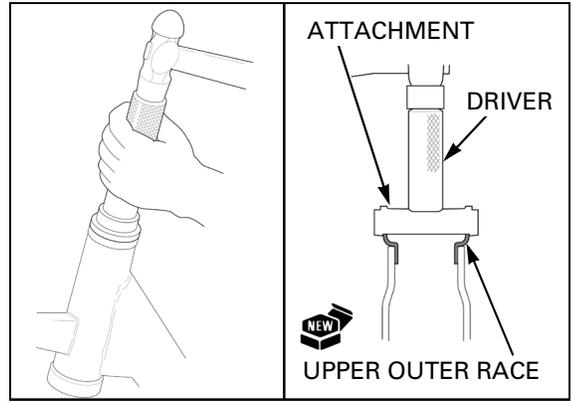


## FRONT WHEEL/SUSPENSION/STEERING

Drive a new upper outer race into the head pipe using the following tools.

**TOOLS:**

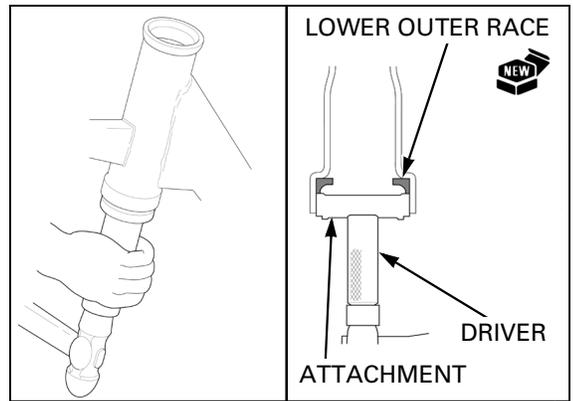
**Driver** 07749-0010000  
**Attachment, 44 x 49.5 mm** 07945-3330300



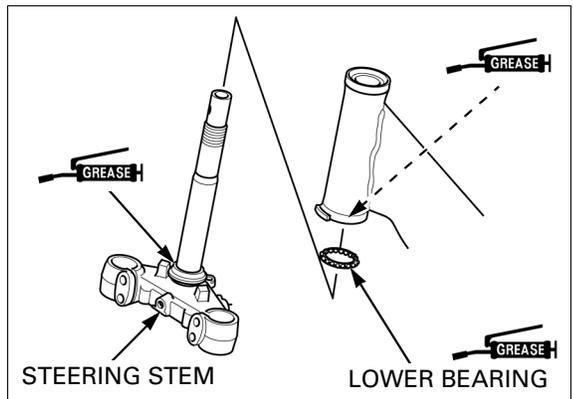
Drive a new lower outer race into the head pipe using the following tools.

**TOOLS:**

**Driver** 07749-0010000  
**Attachment, 44 x 49.5 mm** 07945-3330300

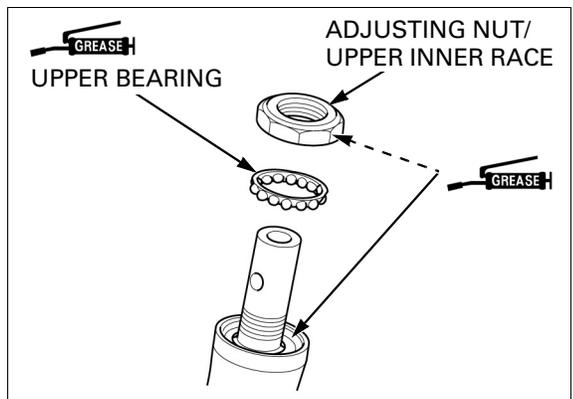


Apply each 3 – 5 g of grease with extreme pressure agent (recommended: EXCELIGHT EP2 manufactured by KYODO YUSHI, japan or Shell ALVANIA EP2 or equivalent) to lower inner race, lower bearing and lower outer race.  
 Install the lower bearing onto the steering stem.



Apply each 3 – 5 g of grease with extreme pressure agent (recommended: EXCELIGHT EP2 manufactured by KYODO YUSHI, japan or Shell ALVANIA EP2 or equivalent) to upper inner race, upper bearing and upper outer race.

Insert the steering stem into the steering head pipe.  
 Install the upper bearing onto the stem.  
 Install the upper adjusting nut/upper inner race onto the upper bearing.



## FRONT WHEEL/SUSPENSION/STEERING

Refer to torque wrench reading information, on service information (page 15-3).

Tighten the steering stem adjusting nut/upper inner race to the specified torque.

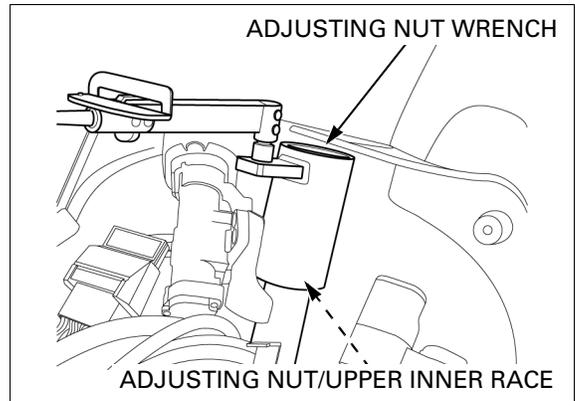
**TOOL:**

**Adjusting nut wrench**                      **07SMA-GBC0100**

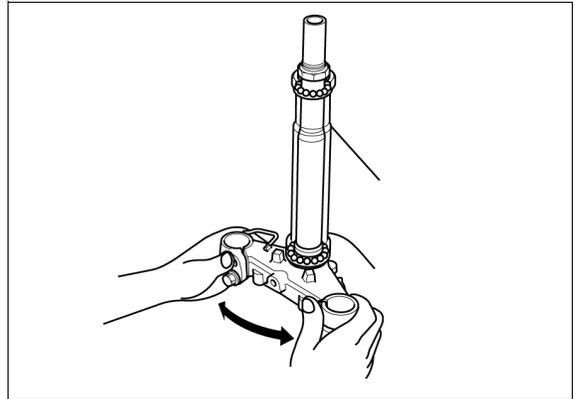
**TORQUE:**

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

**Indicated: 8.1 N·m (0.82 kgf·m, 5.9 lbf·ft)**

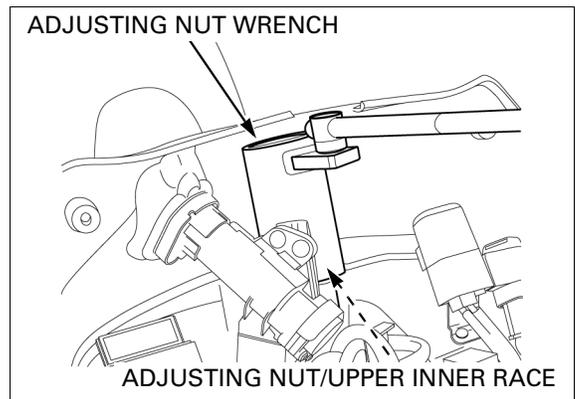


Turn the steering stem lock-to-lock several times to seat the bearing.

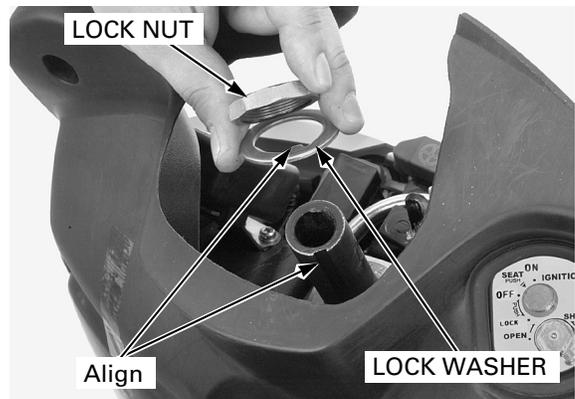


Temporarily loosen the steering stem adjusting nut/upper inner race completely.

Tighten the adjusting nut/upper inner race fully by hand, then loosen it 45°.



Install the lock washer by aligning the tab of the lock washer and groove of the steering stem.  
Install the steering stem lock nut.



Tighten the steering stem lock nut to the specified torque.

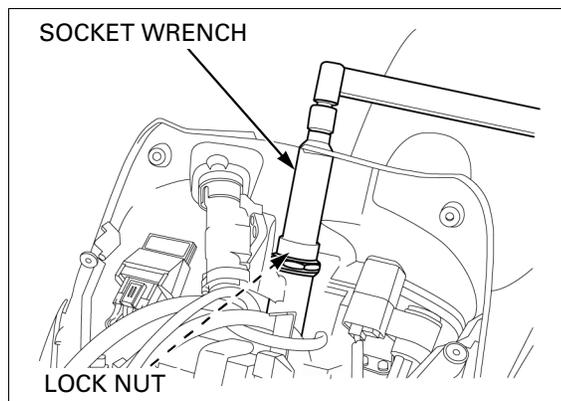
**TOOLS:**

**Socket wrench** **07916-KM10000**

**TORQUE: 68 N·m (6.9 kgf·m, 50 lbf·ft)**

Turn the steering stem lock-to-lock several times to seat the bearing.

Make sure the steering stem moves smoothly without play or binding.

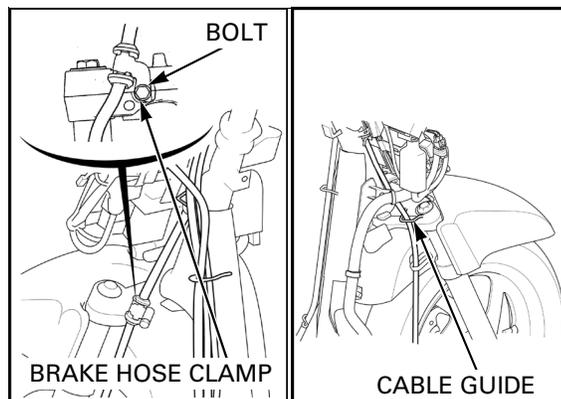


Install the following:

- Fork (page 15-19)
- Front wheel (page 15-11)
- Handlebar (page 15-21)

Route the speedometer cable through the cable guide.

Set the brake hose clamp and tighten the bolt.



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**MEMO**

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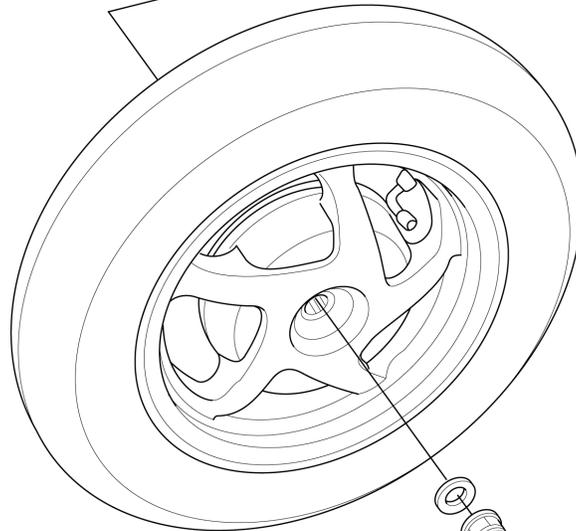
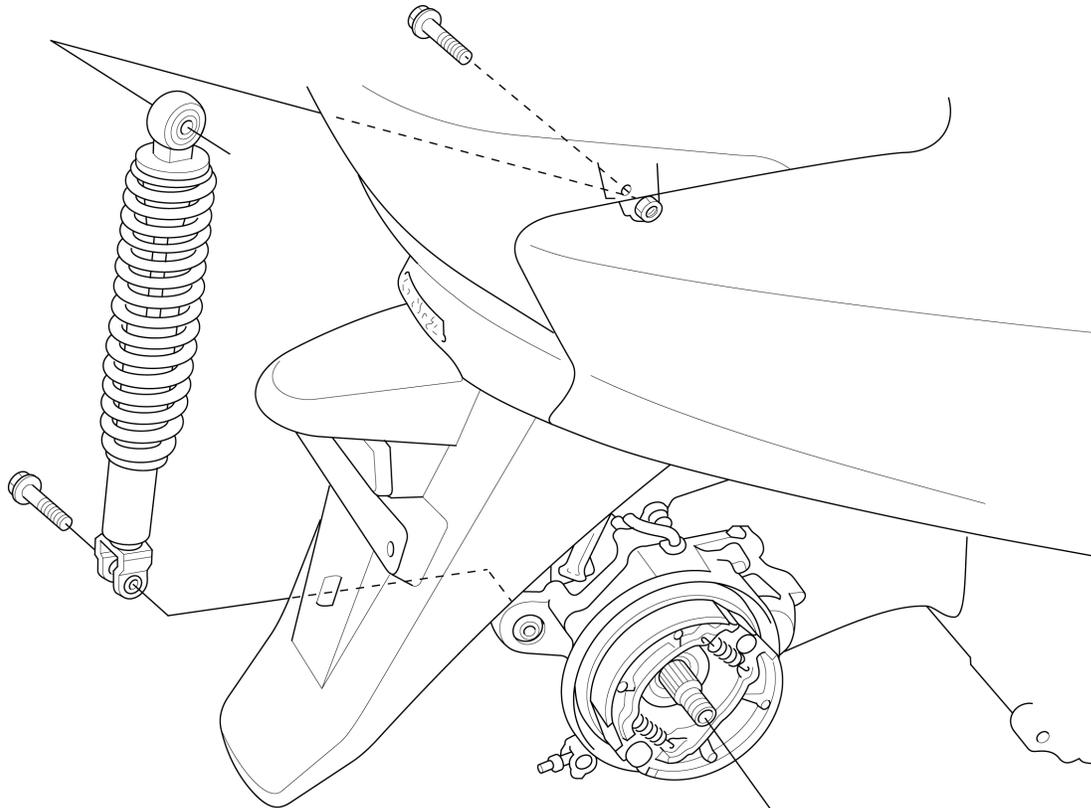
# 16. REAR WHEEL/SUSPENSION

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COMPONENT LOCATION .....	16-2	REAR WHEEL.....	16-4
SERVICE INFORMATION .....	16-3	REAR SHOCK ABSORBER .....	16-5
TROUBLESHOOTING .....	16-3		

**REAR WHEEL/SUSPENSION**

**COMPONENT LOCATION**



118 N·m (12.0 kgf·m, 87 lbf·ft)

## SERVICE INFORMATION

### GENERAL

#### ⚠ CAUTION

Frequent inhalation of brake shoe 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.

- Use only tires marked "TUBELESS" and tubeless valve stems on rims marked "TUBELESS TIRE APPLICABLE".
- Use genuine Honda replacement bolts for all suspension pivots and mounting points.
- For brake system service, refer to the following:
  - Brake equalizer (page 17-16)
  - Rear drum brake (page 17-24)

### SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Minimum tire tread depth		–	To the indicator
Cold tire pressure	Driver only	200 kPa (2.00 kgf/cm <sup>2</sup> , 29 psi)	–
	Driver and passenger	225 kPa (2.25 kgf/cm <sup>2</sup> , 33 psi)	–
Wheel rim runout	Radial	–	2.0 (0.08)
	Axial	–	2.0 (0.08)

### TORQUE VALUES

Rear axle nut

118 N·m (12.0 kgf·m, 87 lbf·ft)

U-nut/Apply engine oil to the threads and seating surface

## TROUBLESHOOTING

#### Rear wheel wobbles

- Bent rim
- Faulty tire
- Axle nut and/or engine mounting bolt not tightened properly
- Loose or worn final gear shaft bearing
- Insufficient tire pressure

#### Soft suspension

- Weak rear shock absorber spring
- Oil leakage from damper unit
- Low tire pressure

#### Stiff suspension

- Bent damper rod
- High tire pressure
- Worn or damaged shock absorber bushings
- Worn or damaged engine mount bushings

#### Rear suspension noisy

- Loose mounting fasteners
- Faulty shock absorber
- Weak rear suspension bushings

## REAR WHEEL/SUSPENSION

### REAR WHEEL

#### REMOVAL

- Support the scooter with its centerstand.
- Remove the exhaust pipe/muffler (page 3-13).
- Remove the rear axle nut, washer and rear wheel.

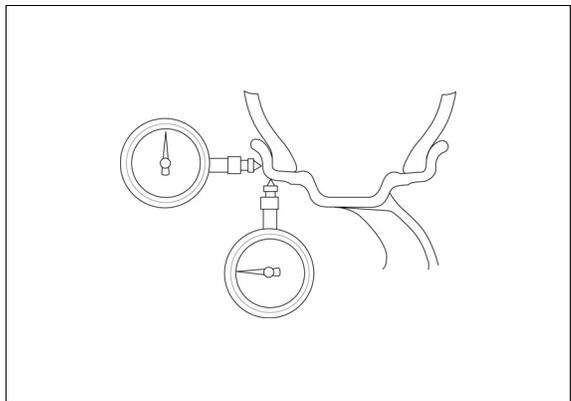


#### INSPECTION

- Check the wheel rim runout using dial indicators.
- Actual runout is 1/2 the total indicator readings.

#### SERVICE LIMITS:

- Radial: 2.0 mm (0.08 in)
- Axial: 2.0 mm (0.08 in)



#### INSTALLATION

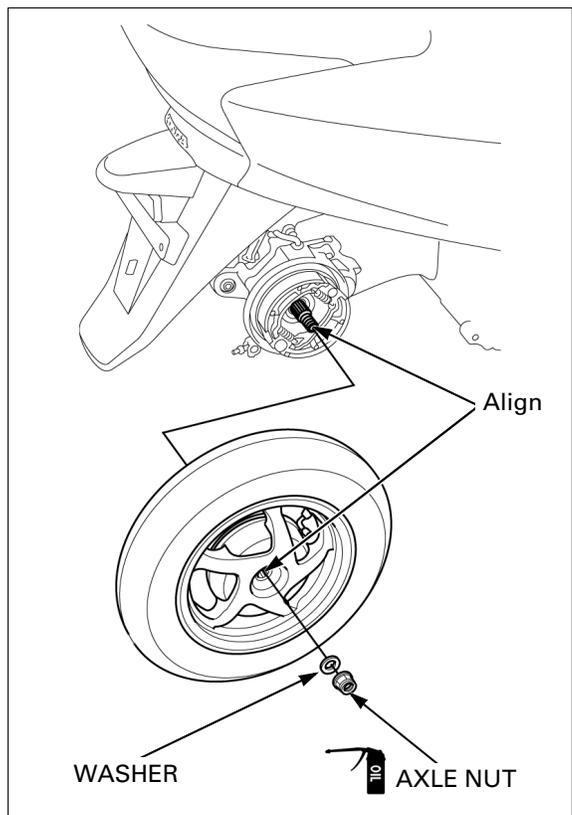
- Install the rear wheel onto the final gear shaft, aligning its splines with the final gear shaft splines.
- Install the washer onto the final gear shaft.

- Apply engine oil to the threads and seating surface of the rear axle nut.

- Install and tighten the rear axle nut to the specified torque.

**TORQUE: 118 N·m (12.0 kgf·m, 87 lbf·ft)**

- Install the exhaust pipe/muffler (page 3-13).

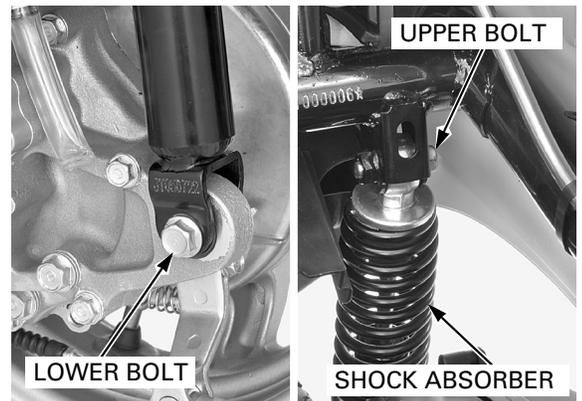


## REAR SHOCK ABSORBER

### REMOVAL

Remove the luggage box (page 3-8).

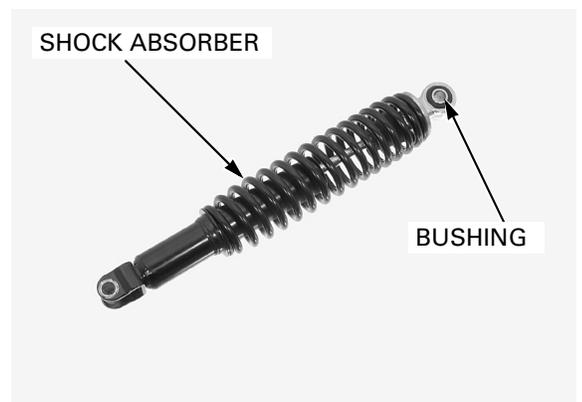
Slightly lift the rear wheel and remove the lower mounting bolt from the rear shock absorber. Remove the upper mounting bolt and rear shock absorber.



### INSPECTION

Check the damper unit for leakage or other damage. Check the shock absorber bushing for wear or damage.

Replace the shock absorber assembly if necessary.

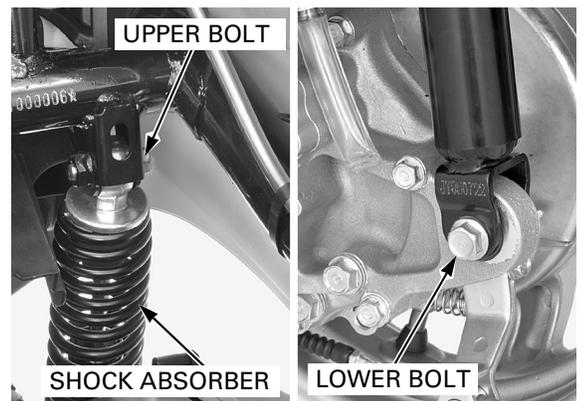


### INSTALLATION

Install the rear shock absorber and tighten the upper mounting bolt.

Slightly lift the rear wheel to align the bolt holes and tighten the lower mounting bolt.

Install the luggage box (page 3-8).



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**MEMO**

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# 17. BRAKE SYSTEM

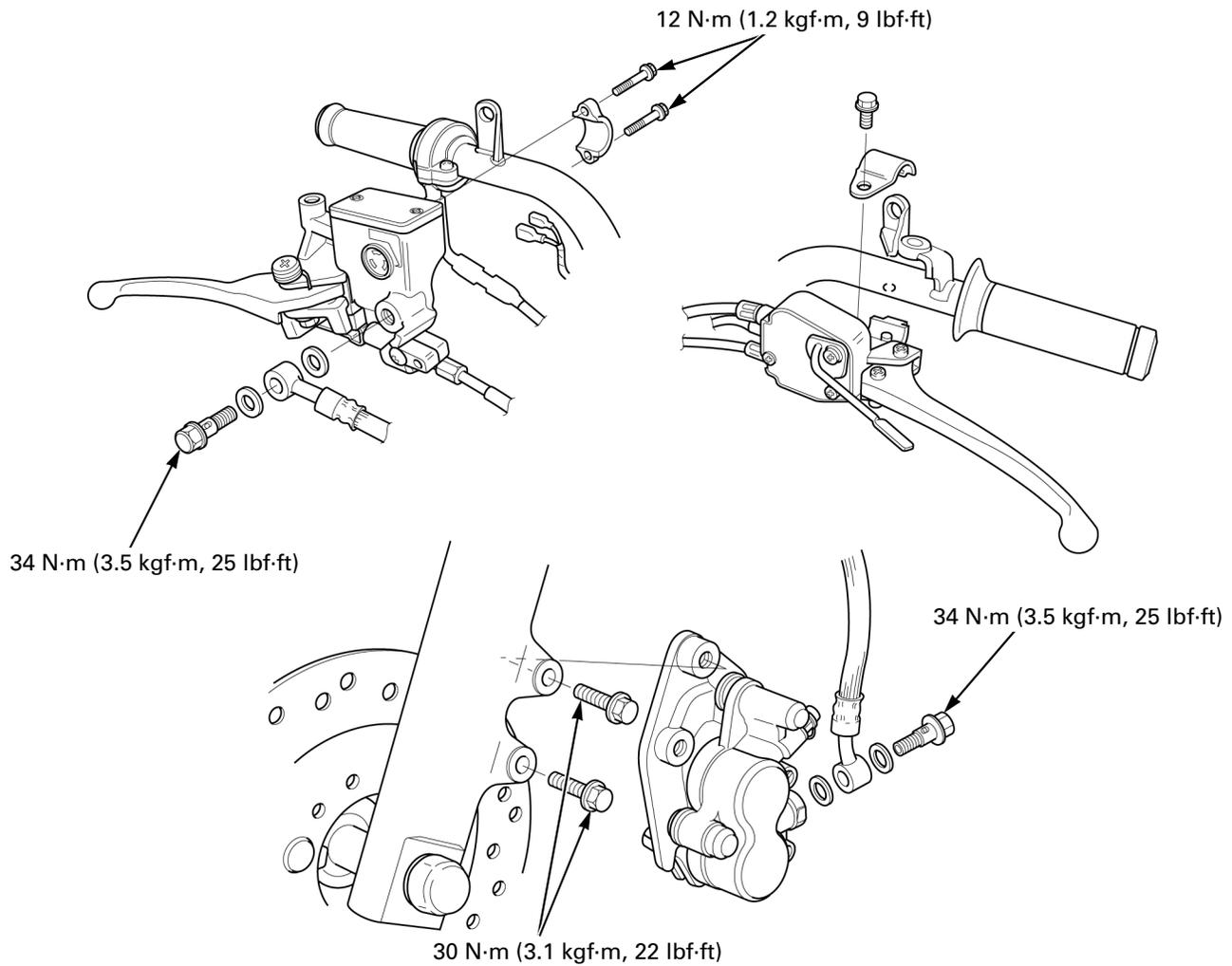
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COMPONENT LOCATION .....	17-2	FRONT BRAKE MASTER CYLINDER .....	17-11
SERVICE INFORMATION .....	17-3	BRAKE EQUALIZER.....	17-16
TROUBLESHOOTING .....	17-4	FRONT BRAKE CALIPER.....	17-20
BRAKE FLUID REPLACEMENT/ AIR BLEEDING .....	17-5	REAR DRUM BRAKE .....	17-24
BRAKE PAD/DISC.....	17-8		

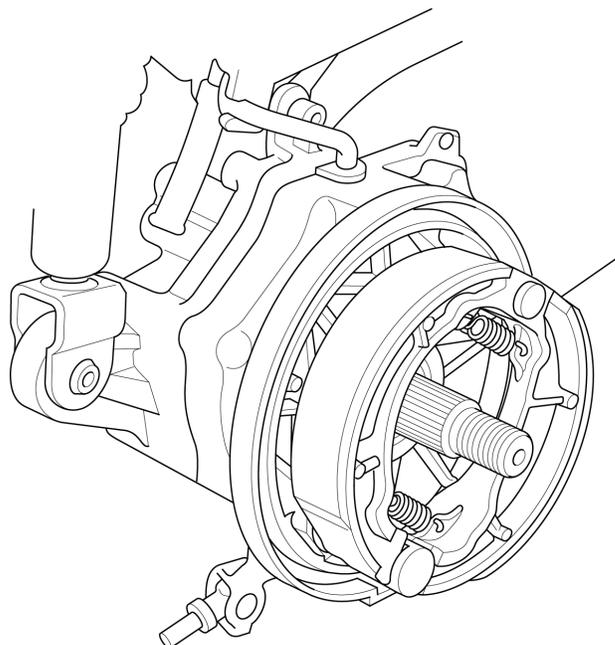
# BRAKE SYSTEM

## COMPONENT LOCATION

### FRONT:



### REAR:



**SERVICE INFORMATION**

**GENERAL**

**⚠ CAUTION**

Frequent inhalation of brake pad and brake shoe 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 and 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 master cylinder reservoir is horizontal first.*

- A contaminated brake disc or pad, brake drum or shoe reduces stopping power. Discard contaminated pads, shoes and clean a contaminated disc, drum with high quality brake degreasing agent.
- Check the brake system by applying the brake levers after the air bleeding.
- Never allow contaminants (dirt, water, etc.) to get into an open reservoir.
- Once the hydraulic system has been opened, or if the brake feels spongy, the system must be bled.
- Always use fresh DOT 3 or DOT 4 brake fluid from a sealed container when servicing the system. Do not mix different types of fluid, they may not be compatible.
- Always check brake operation before riding the scooter.

**SPECIFICATIONS**

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Front disc brake	Specified brake fluid	DOT 3 or DOT 4	–
	Brake disc thickness	3.3 – 3.7 (0.13 – 0.15)	3.0 (0.12)
	Brake disc warpage	–	0.30 (0.012)
	Master cylinder I.D.	12.700 – 12.743 (0.5000 – 0.5017)	12.755 (0.5022)
	Master piston O.D.	12.657 – 12.684 (0.4983 – 0.4994)	12.645 (0.4978)
	Caliper cylinder I.D.	27.000 – 27.050 (1.0630 – 1.0650)	27.060 (1.0654)
Rear drum brake	Caliper piston O.D.	26.918 – 26.968 (1.0598 – 1.0617)	26.910 (1.0594)
	Brake lever freeplay	10 – 20 (0.4 – 0.8)	–
	Brake drum I.D.	130.0 – 130.2 (5.12 – 5.13)	131.0 (5.16)

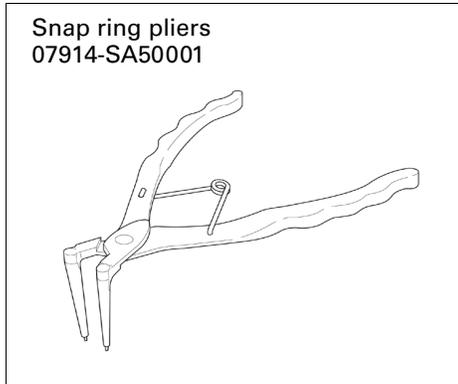
**TORQUE VALUES**

Brake caliper bleed valve	5.4 N·m (0.55 kgf·m, 4.0 lbf·ft)	
Master cylinder reservoir cap screw	1.5 N·m (0.15 kgf·m, 1.1 lbf·ft)	
Brake caliper mounting bolt	30 N·m (3.1 kgf·m, 22 lbf·ft)	ALOC bolt; replace with a new one.
Brake pad pin	17.2 N·m (1.8 kgf·m, 13 lbf·ft)	
Brake pad pin plug	2.4 N·m (0.25 kgf·m, 1.8 lbf·ft)	
Front brake light switch screw	1.2 N·m (0.12 kgf·m, 0.9 lbf·ft)	
Front brake lever pivot screw	1.0 N·m (0.10 kgf·m, 0.7 lbf·ft)	
Front brake lever pivot nut	5.9 N·m (0.60 kgf·m, 4.4 lbf·ft)	
Brake 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)	
Equalizer connecting cable lock nut	6.4 N·m (0.65 kgf·m, 4.7 lbf·ft)	
Rear brake lever pivot screw	1.0 N·m (0.10 kgf·m, 0.7 lbf·ft)	
Rear brake lever pivot nut	4.5 N·m (0.46 kgf·m, 3.3 lbf·ft)	U-nut.
Equalizer rod pivot screw	1.0 N·m (0.10 kgf·m, 0.7 lbf·ft)	
Equalizer rod pivot nut	4.5 N·m (0.46 kgf·m, 3.3 lbf·ft)	U-nut.
Equalizer bracket cover screw	4.2 N·m (0.43 kgf·m, 3.1 lbf·ft)	
Equalizer bracket cover special screw	4.2 N·m (0.43 kgf·m, 3.1 lbf·ft)	U-nut.
Rear brake arm bolt	10 N·m (1.0 kgf·m, 7 lbf·ft)	ALOC bolt; replace with a new one.

## BRAKE SYSTEM

---

### TOOL



## TROUBLESHOOTING

### Poor rear brake performance

- Incorrect adjustment of rear brake lever
- Contaminated brake shoes
- Worn brake shoes
- Worn brake cam
- Worn brake drum
- Improperly installed brake arm

### Front brake lever soft or spongy

- Air in hydraulic system
- Leaking hydraulic system
- Contaminated brake pad/disc
- Worn caliper piston seals
- Worn master cylinder piston cups
- Worn brake pad/disc
- Contaminated caliper
- Contaminated master cylinder
- Caliper not sliding properly
- Low brake fluid level
- Clogged fluid passage
- Warped/deformed brake disc
- Bent brake lever

### Front brake lever hard

- Clogged/restricted brake system
- Sticking/worn caliper piston
- Caliper not sliding properly
- Worn caliper piston seal
- Sticking/worn master cylinder piston
- Bent brake lever

### Front brake drags

- Contaminated brake pad/disc
- Misaligned wheel
- Badly worn brake pad/disc
- Warped/deformed brake disc
- Caliper not sliding properly
- Clogged/restricted brake hydraulic system
- Clogged master cylinder port
- Sticking caliper piston
- Improperly adjusted connecting cable

## 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.

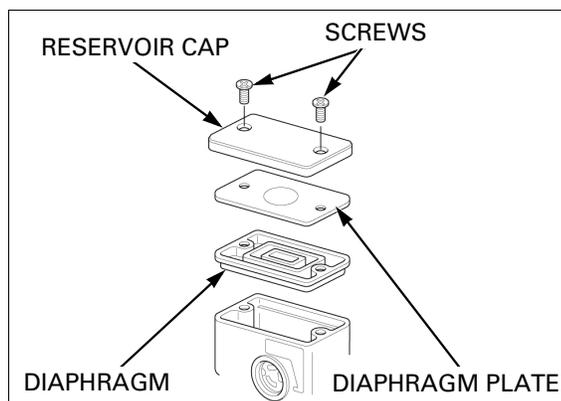
- Do not allow foreign material to enter the system when filling the reservoir.
- When using a commercially available brake bleeder, follow the manufacturer's operating instructions.

### BRAKE FLUID DRAINING

Remove the front handlebar cover (page 3-6).

Turn the handlebar until the reservoir is parallel to the ground, before removing the reservoir cap.

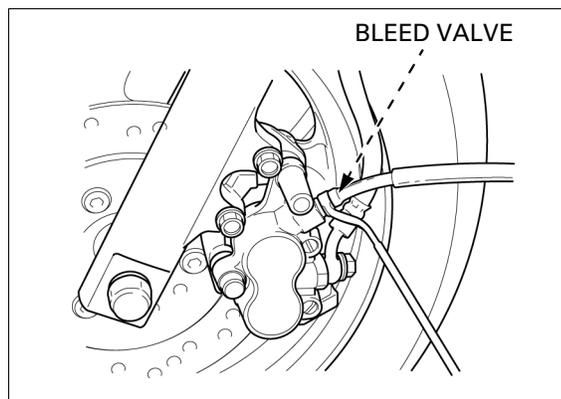
Remove the screws, reservoir cap, diaphragm plate and diaphragm from the brake master cylinder.



Connect a bleed hose to the front brake caliper bleed valve.

Loosen the bleed valve and pump the front brake lever until no more fluid flows out of the bleed valve.

Tighten the bleed valve.

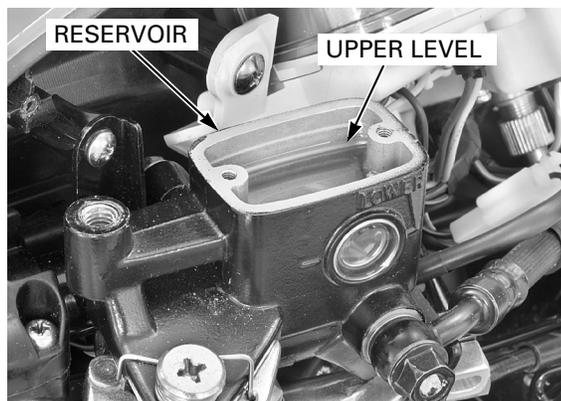


### BRAKE FLUID FILLING/AIR BLEEDING

Fill the reservoir with DOT 3 or DOT 4 brake fluid from a sealed container to the upper level.

### NOTICE

- Do not mix different types of fluid. They are not compatible.
- Use only DOT 3 or DOT 4 brake fluid from a sealed container.



## BRAKE SYSTEM

Connect a commercially available brake bleeder to the brake caliper bleed valve.

Operate the brake bleeder and loosen the bleed valve.

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

Perform the bleeding procedure until the system is completely flushed/bled.

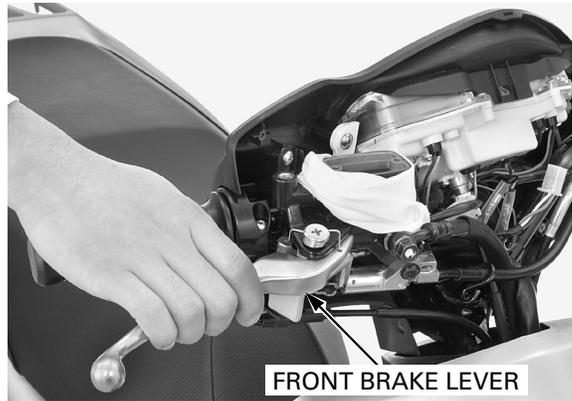
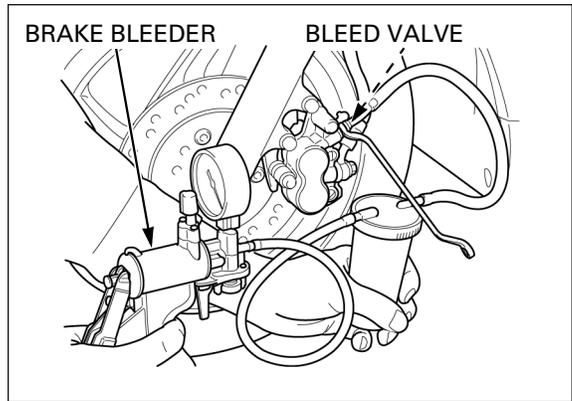
- If air enters the bleeder from around the bleed valve threads, seal the threads with teflon tape.

Close the bleed valve and operate the front brake lever.

If it still feels spongy, bleed the system again.

After bleeding air completely, tighten the brake caliper bleed valve to the specified torque.

**TORQUE: 5.4 N·m (0.55 kgf·m, 4.0 lbf·ft)**



- If the brake bleeder is not available, perform the following procedure.

Fill the reservoir with DOT 3 or DOT 4 brake fluid from a sealed container.

Pump up the system pressure with the front brake lever until there are no air bubbles in the fluid flowing out of the reservoir small hole and front brake lever resistance is felt.

Connect a bleed hose to the bleed valve and bleed the system as follows:

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

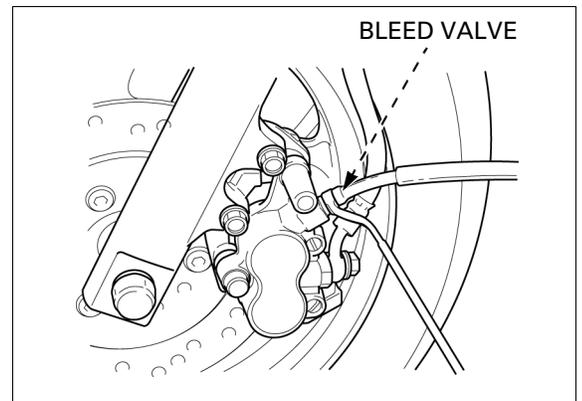


*Do not release the brake lever until the bleed valve has been closed.*

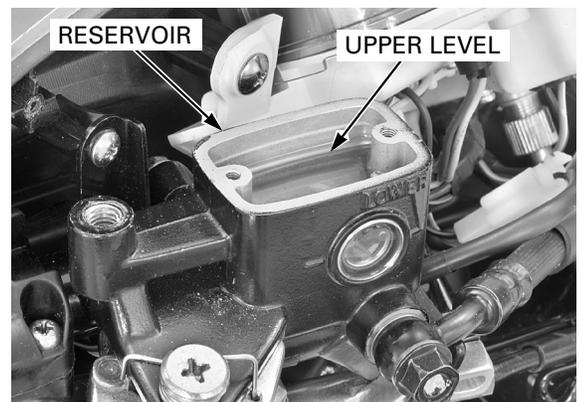
1. Pump the front brake lever several times, then squeeze the front brake lever all the way and loosen the bleed valve 1/2 of a turn. Wait several seconds and then close the bleed valve.
2. Release the front brake lever slowly and wait several seconds after it reaches the end of its travel.
3. Repeat the steps 1 and 2 until there are no air bubbles in the bleed hose.

After bleeding air completely, tighten the brake caliper bleed valve to the specified torque.

**TORQUE: 5.4 N·m (0.55 kgf·m, 4.0 lbf·ft)**



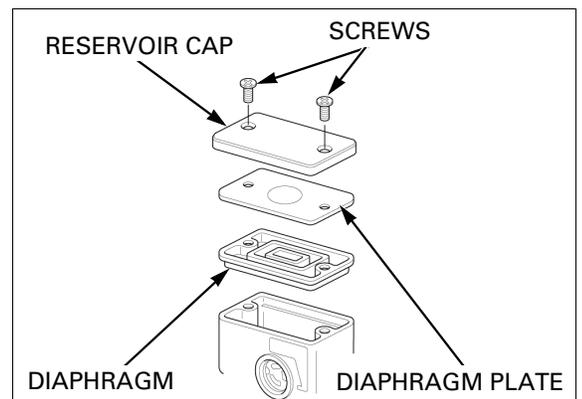
Fill the master cylinder reservoir with DOT 3 or DOT 4 brake fluid from the sealed container to the upper level.



Install the diaphragm and diaphragm plate. Install the reservoir cap and tighten the screws to the specified torque.

**TORQUE: 1.5 N·m (0.15 kgf·m, 1.1 lbf·ft)**

Install the front handlebar cover (page 3-6).



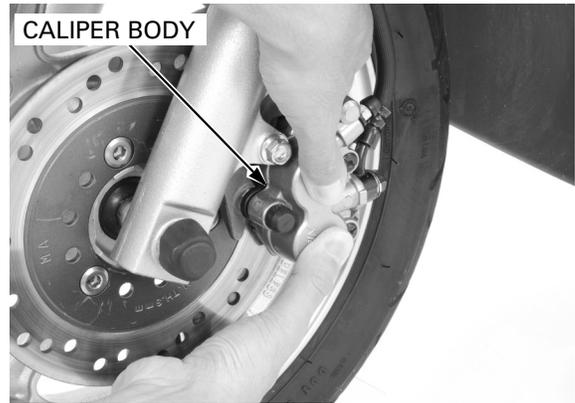
## BRAKE SYSTEM

### BRAKE PAD/DISC

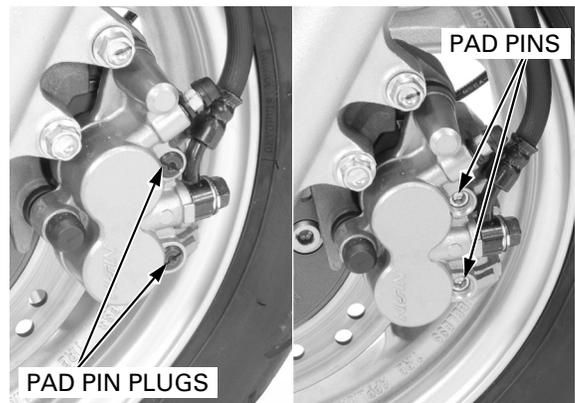
#### BRAKE PAD REPLACEMENT

*Check the fluid level in the master cylinder reservoir as this operation causes the fluid level to rise.*

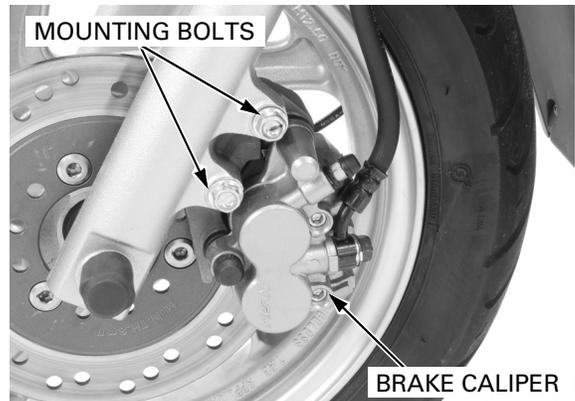
Push the caliper pistons all the way in by pushing the caliper body inward to allow installation of new brake pads.



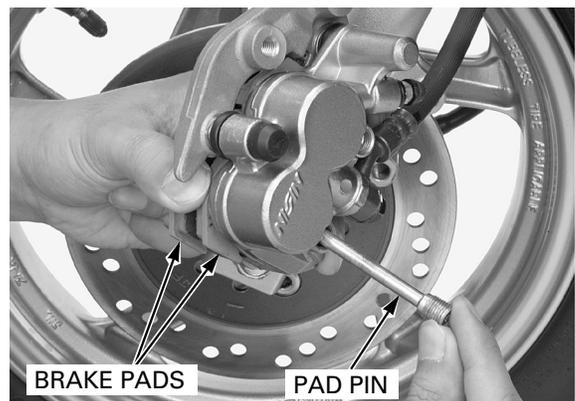
Remove the brake pad pin plugs. Loosen the brake pad pins.



Remove the mounting bolts and remove the brake caliper from the brake disc.



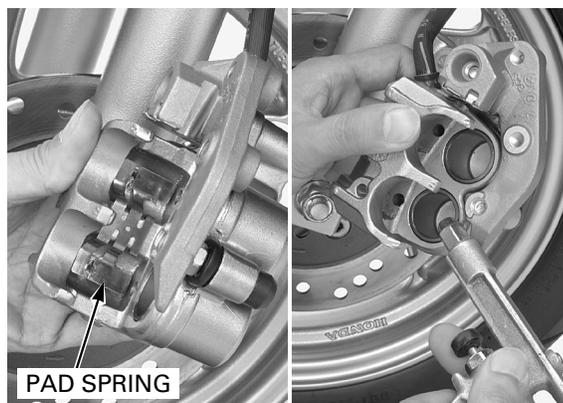
Remove the pad pins and brake pads.



Remove the pad spring.

Clean the inside of the caliper especially around the caliper pistons.

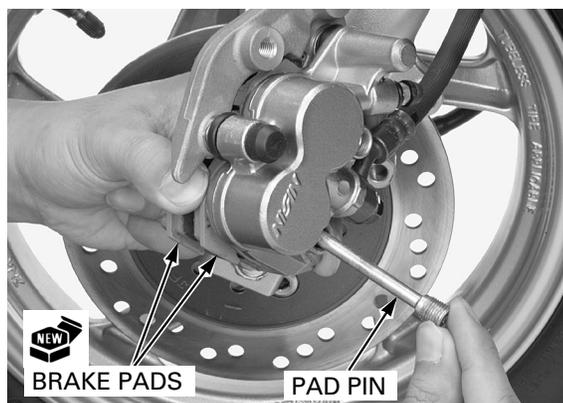
Install the pad spring as shown.



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

Install new brake pads.

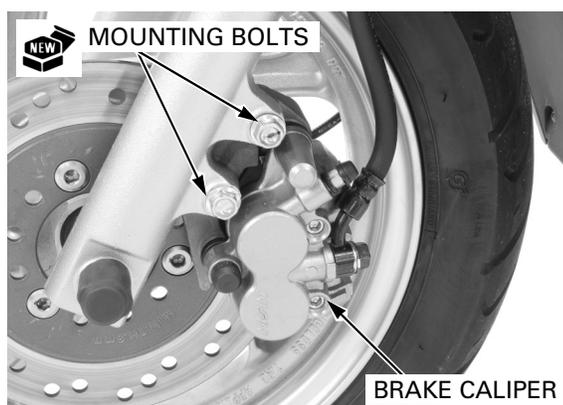
Install the pad pins by pushing the pads against the pad spring to align the pad pin holes on the pads and caliper.



Install the brake caliper to the left fork by setting the brake disc between the pads.

Install and tighten new brake caliper mounting bolts to the specified torque.

**TORQUE: 30 N·m (3.1 kgf·m, 22 lbf·ft)**



Tighten the brake pad pins to the specified torque.

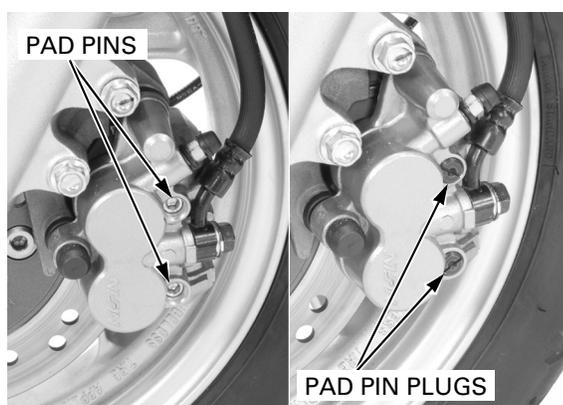
**TORQUE: 17.2 N·m (1.8 kgf·m, 13 lbf·ft)**

Install and tighten the brake pad pin plugs to the specified torque.

**TORQUE: 2.4 N·m (0.25 kgf·m, 1.8 lbf·ft)**

Operate the front brake lever to seat the caliper pistons against the pads.

Check the brake operation by applying the front brake lever.



## BRAKE SYSTEM

---

### BRAKE DISC INSPECTION

Visually inspect the brake disc for damage or crack.

Measure the brake disc thickness at several points.

**SERVICE LIMIT: 3.0 mm (0.12 in)**

Replace the brake disc if the smallest measurement is less than the service limit.

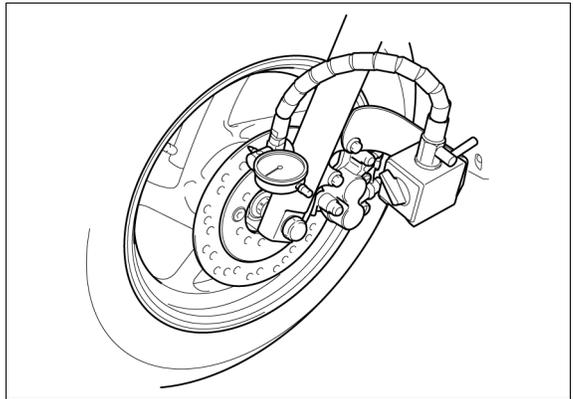


Measure the brake disc warpage.

**SERVICE LIMIT: 0.30 mm (0.012 in)**

If the warpage exceeds the service limit, check the wheel bearings for excessive play.

Replace the brake disc if the wheel bearings are normal.



# FRONT BRAKE MASTER CYLINDER

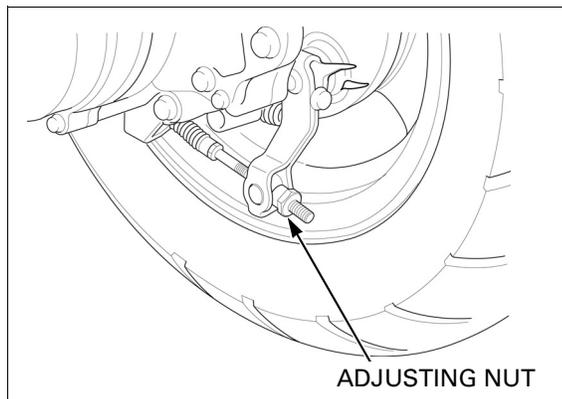
## REMOVAL

Drain the brake fluid (page 17-5).

Remove the following:

- Front handlebar cover (page 3-6)
- Rear handlebar cover (page 3-7)

Loosen the rear brake adjusting nut until the play of the rear brake cable becomes maximum.

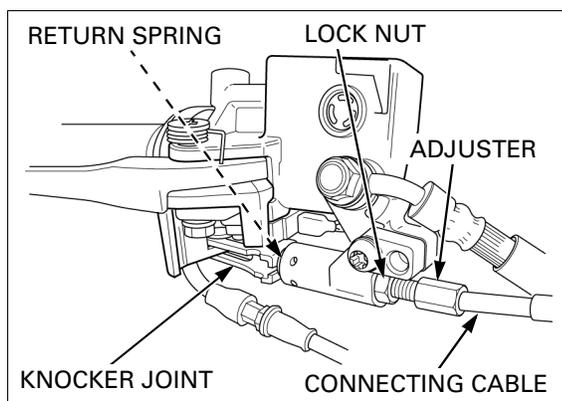


Loosen the lock nut and turn the adjuster until the play of the connecting cable becomes maximum.

Compress the return spring by squeezing the brake lever and disconnect the tip of the connecting cable from the knocker joint.

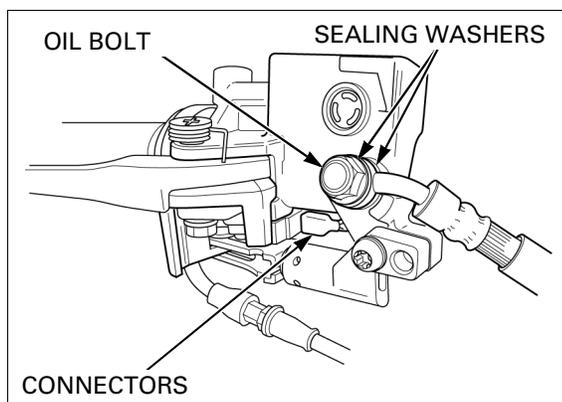
Remove the return spring from the connecting cable holder.

Turn the adjuster and remove the connecting cable from the connecting cable holder.

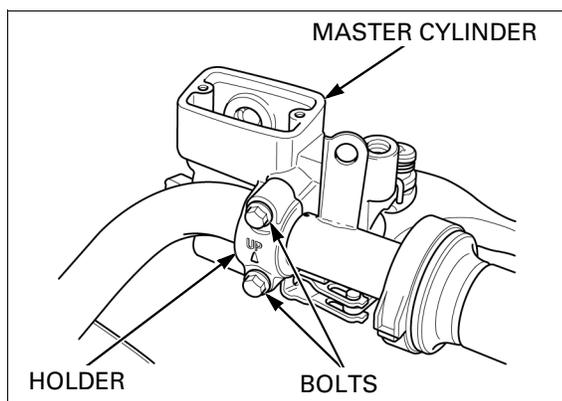


Disconnect the brake light switch connectors.

Remove the oil bolt, sealing washers and brake hose.



Remove the master cylinder holder bolts, holder and master cylinder.

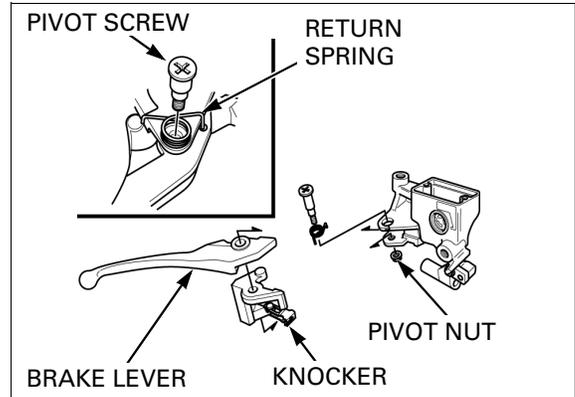


## BRAKE SYSTEM

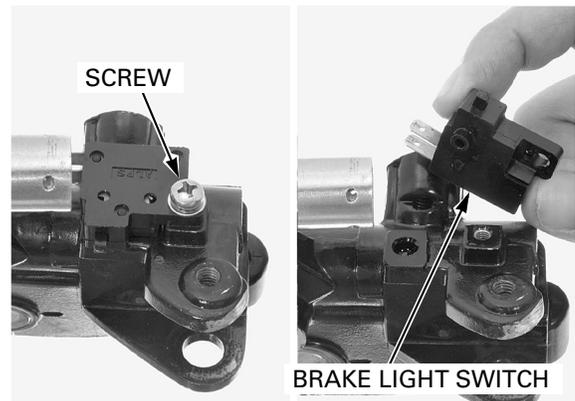
### DISASSEMBLY

Remove the pivot nut.

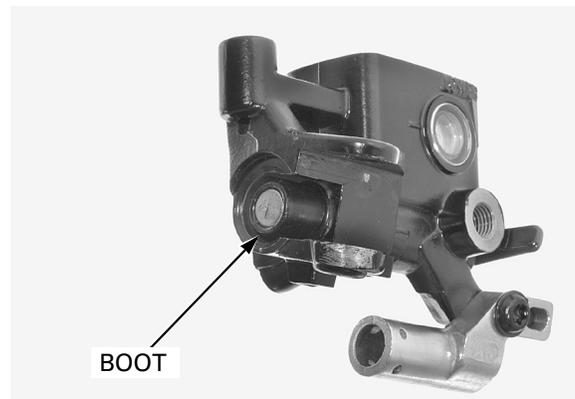
Remove the pivot screw, return spring, brake lever and knocker.



Remove the screw and brake light switch.



Remove the Boot.

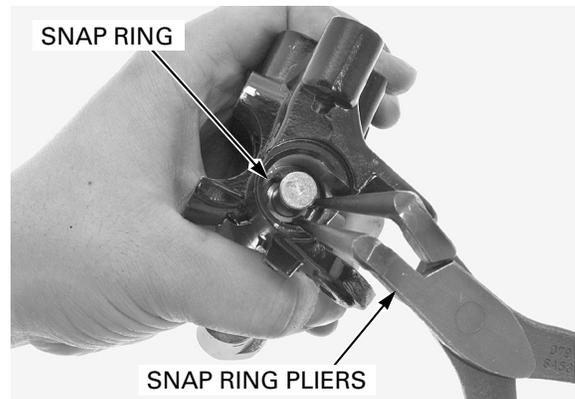


Remove the snap ring from the groove of the master cylinder.

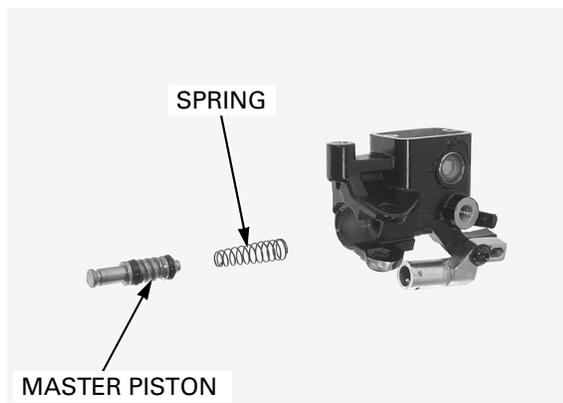
**TOOL:**

**Snap ring pliers**

**07914-SA50001**



Remove the master piston and spring.



**INSPECTION**

Check the piston cups for wear, deterioration or damage.

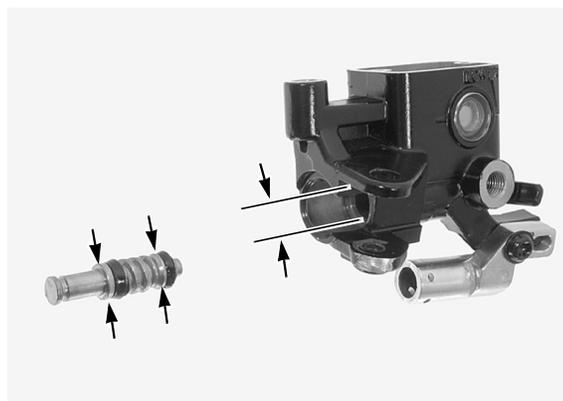
Check the master cylinder inner surface and piston outer surface for scratches or damage.

Measure the master cylinder I.D.

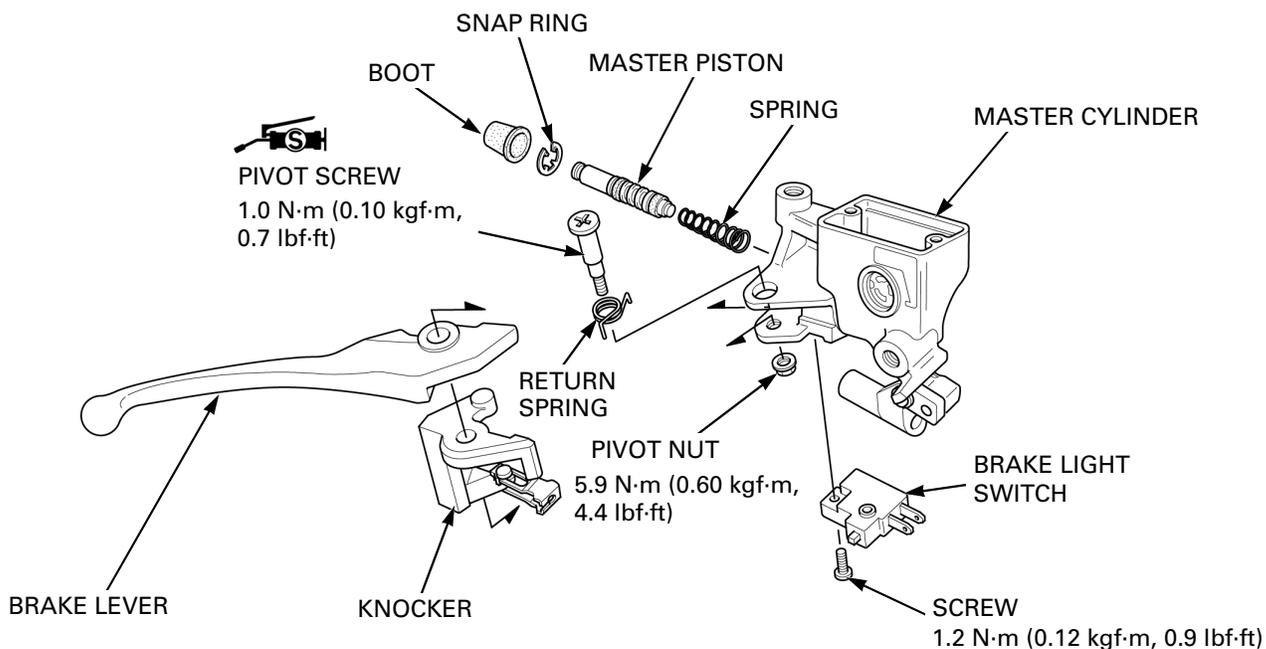
**SERVICE LIMIT: 12.755 mm (0.5022 in)**

Measure the master piston O.D.

**SERVICE LIMIT: 12.645 mm (0.4978 in)**



**ASSEMBLY**



## BRAKE SYSTEM

Replace the piston, cups, spring, snap ring and boot as a set; do not substitute individual parts.

Do not allow the piston cup lips to turn inside out.

Coat the master piston, spring and piston cups with brake fluid.

Install the spring onto the master piston end.

Install the spring/master piston into the master cylinder.

Install the snap ring into the groove of the master cylinder.

**TOOL:**

**Snap ring pliers**

**07914-SA50001**

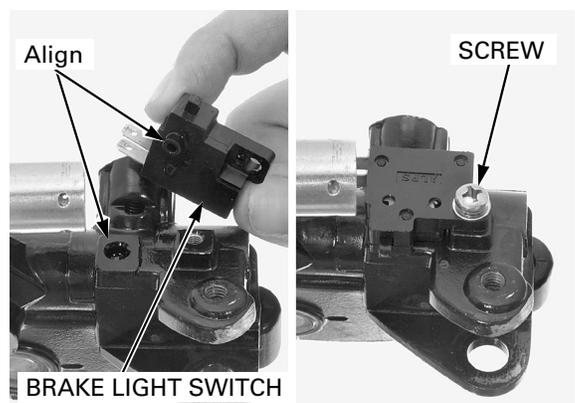
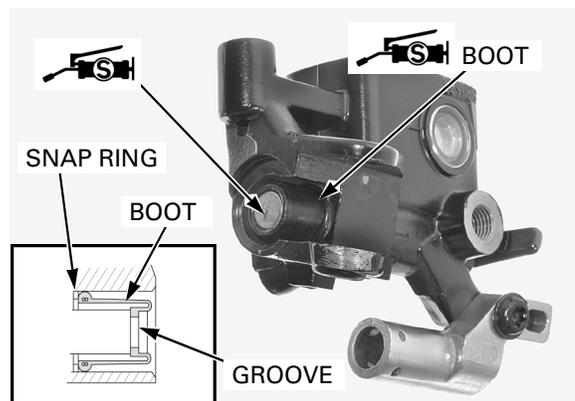
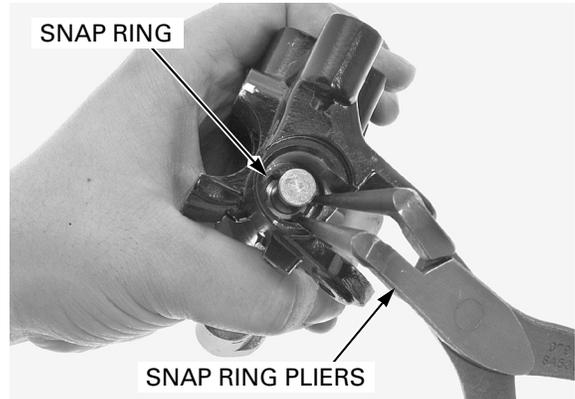
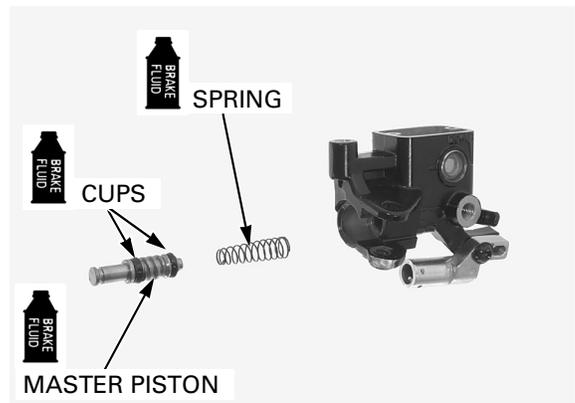
Apply 0.1 g of silicon grease to the inside of the boot.

Install the boot into the master cylinder until it is fully seated on the snap ring and set its lip into the groove of the master piston.

Apply silicone grease to the brake lever contacting surface of the master piston.

Install the brake light switch by aligning the boss of the switch body and hole of the master cylinder. Install and tighten the screw to the specified torque.

**TORQUE: 1.2 N·m (0.12 kgf·m, 0.9 lbf·ft)**



Apply 0.1 g of silicon grease to the brake lever pivot screw rotating surface.

Install the brake lever and knocker to the master cylinder.

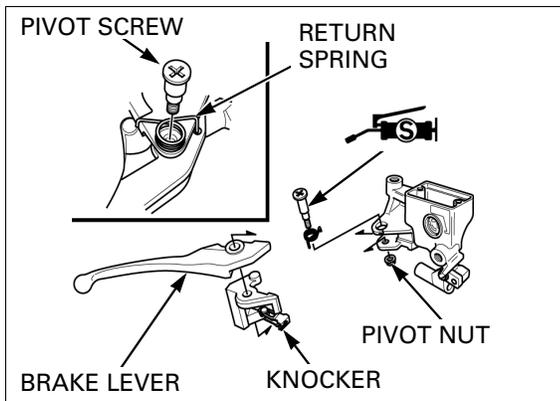
Set the return spring by hooking its ends on the master cylinder and the hole of the brake lever.

Install and tighten the brake lever pivot screw to the specified torque.

**TORQUE: 1.0 N·m (0.10 kgf·m, 0.7 lbf·ft)**

Install and tighten the brake lever pivot nut to the specified torque while holding the pivot screw.

**TORQUE: 5.9 N·m (0.60 kgf·m, 4.4 lbf·ft)**



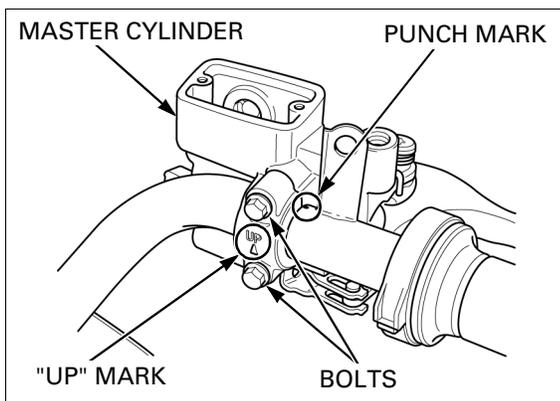
## INSTALLATION

Set the master cylinder onto the handlebar.

Install the master cylinder holder with its "UP" mark facing up.

Align the end of the master cylinder with the punch mark on the handlebar, and tighten the upper bolt first, then tighten the lower bolt to the specified torque.

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

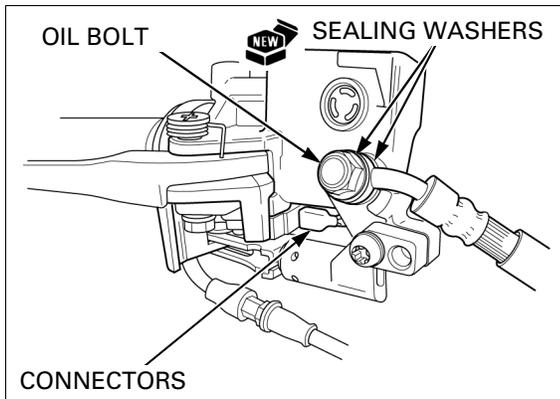


Connect the brake hose eyelet and install the oil bolt to the master cylinder with new sealing washers.

Push the eyelet joint against the stopper and tighten the oil bolt to the specified torque.

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

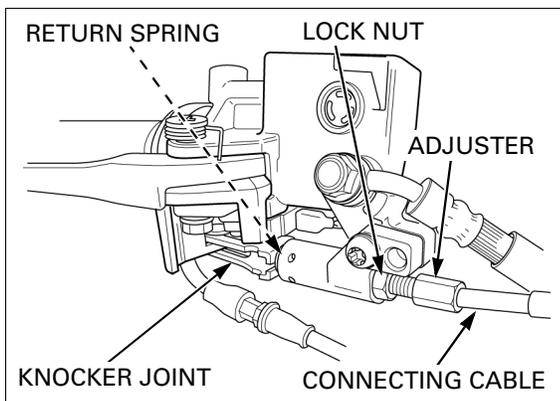
Connect the brake light switch connectors.



Install the connecting cable to the cable holder. Turn in the adjuster completely.

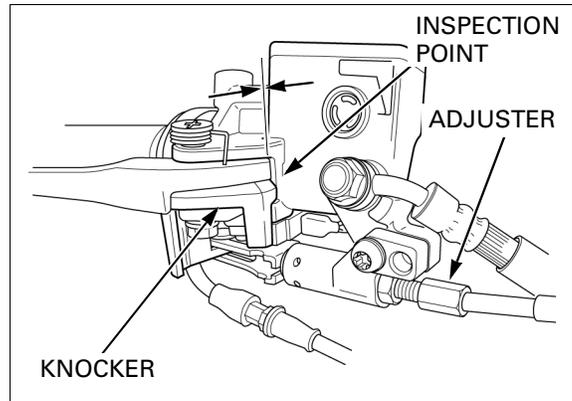
Install the return spring into the cable holder. Compress the return spring and connect the tip of the connecting cable to the knocker joint.

Fill and air bleed the hydraulic system (page 17-5). Adjust the rear brake lever freeplay (page 4-17).



## BRAKE SYSTEM

Turn the adjuster until the edge surface of the knocker seats on the edge surface of the master cylinder body.



Check that there is no gap between the knocker pin and the end of the slot of the knocker joint.

If there is any gap, turn the adjuster until there is no gap between the knocker pin and the end of the slot of the knocker joint.

After adjustment, hold the adjuster and tighten the lock nut to the specified torque.

**TORQUE: 6.4 N·m (0.65 kgf·m, 4.7 lbf·ft)**

After tightening the lock nut, check that there is no gap between the knocker pin and the end of the slot of the knocker joint.

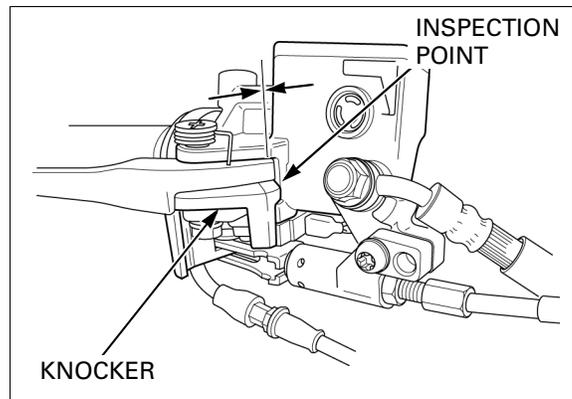
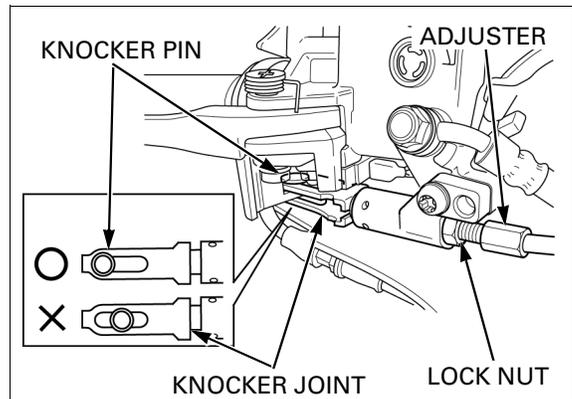
Apply rear brake lever several times and check that the distance between the edges has not been changed after applying the brake.

Recheck the edge surface of the knocker seats on the edge surface of the master cylinder body.

Install the following:

- Rear handlebar cover (page 3-7)
- Front handlebar cover (page 3-6)

Check the brake operation by applying the front brake lever.



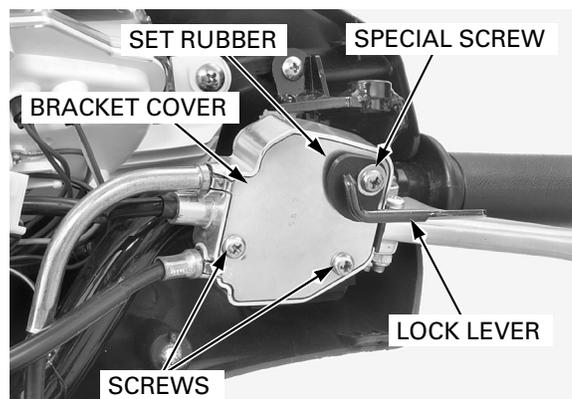
## BRAKE EQUALIZER

### REMOVAL

Remove the front handlebar cover (page 3-6).  
Disconnect the connecting cable (page 17-11).

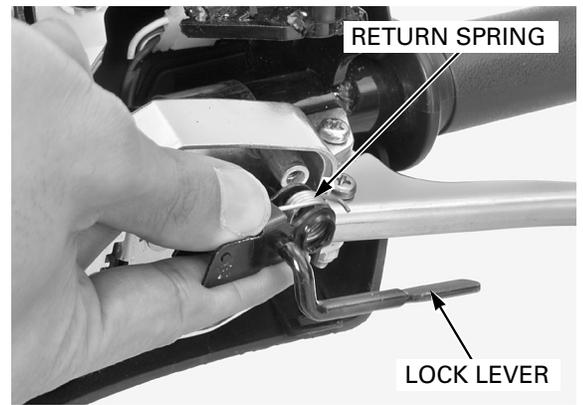
Remove the bracket cover special screw and the set rubber.

Remove two bracket cover screws.  
Remove the bracket cover while holding the lock lever.

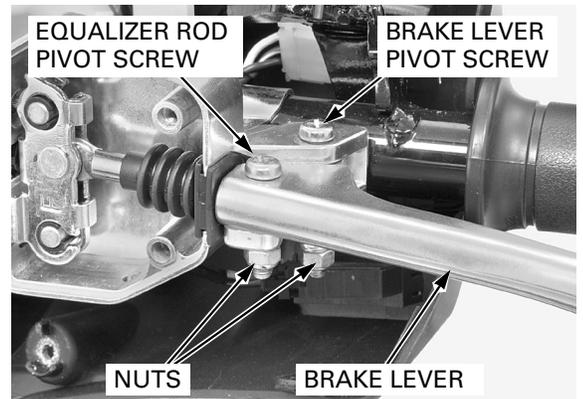


*Be careful when removing the lock lever. The return spring may pop out.*

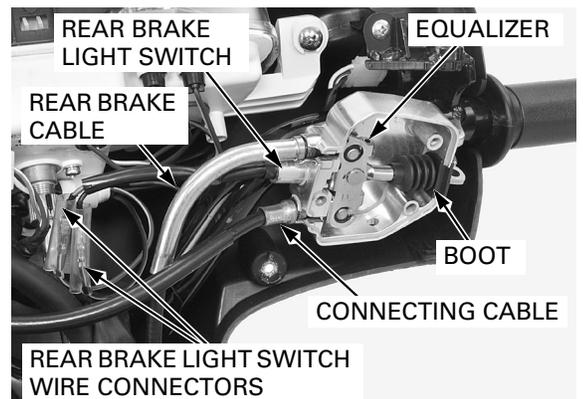
Remove the rear brake lock lever and the return spring.



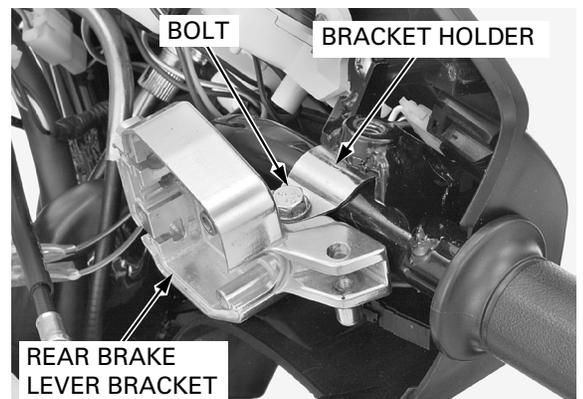
Remove the equalizer rod pivot screw and nut. Remove the rear brake lever pivot screw, nut and brake lever.



Remove the boot from the rear brake lever bracket and equalizer rod. Disconnect the connecting cable and rear brake cable from the equalizer. Disconnect the wire connectors and remove the rear brake light switch.

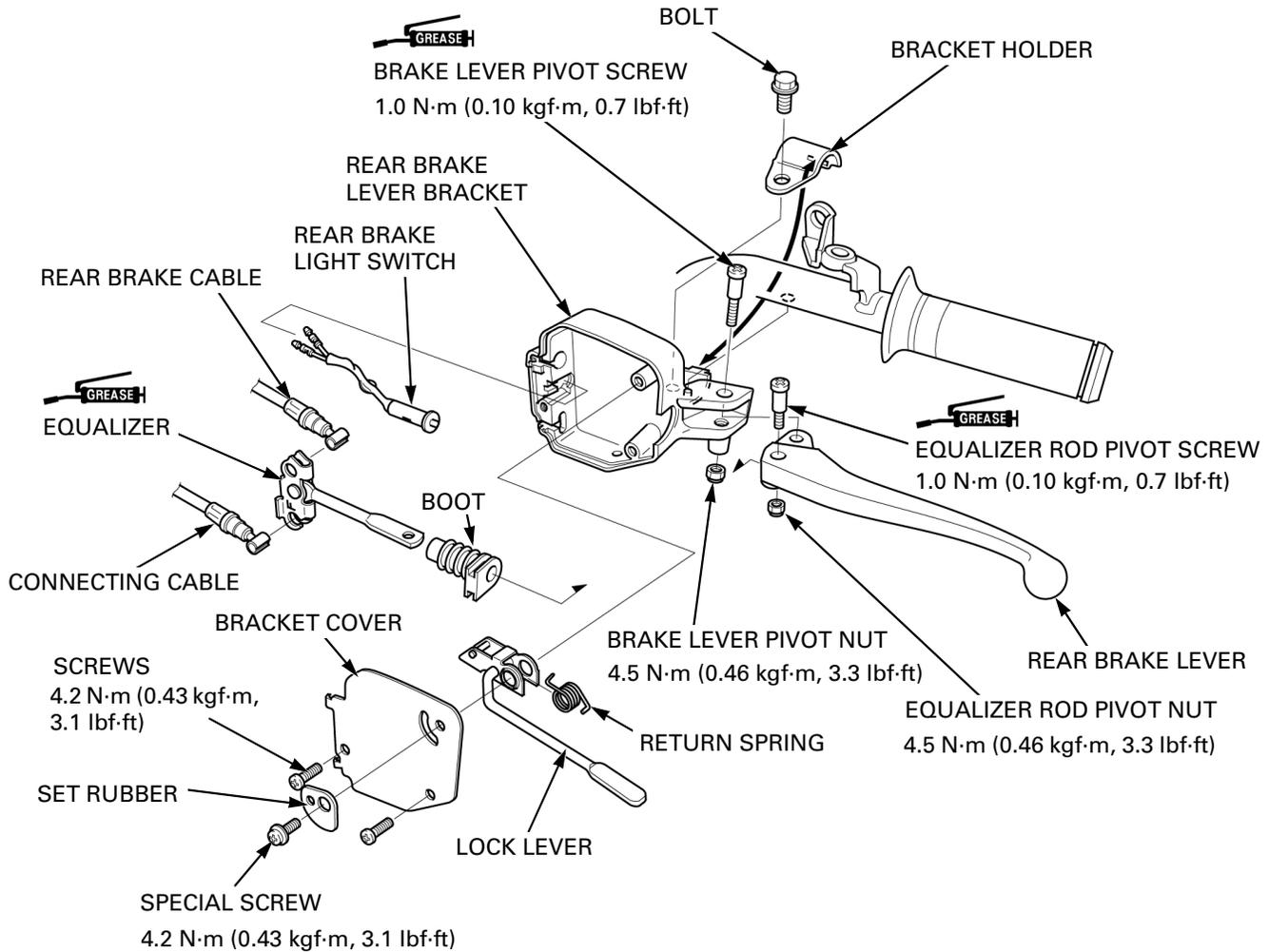


Hold the rear brake lever bracket and remove the bolt, bracket holder and rear brake lever bracket.



# BRAKE SYSTEM

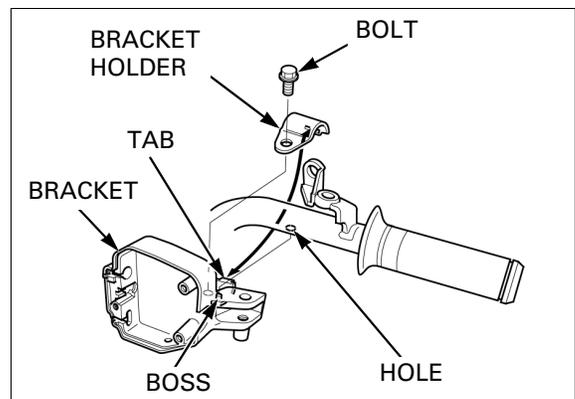
## INSTALLATION



Align the boss of the rear brake lever bracket with the hole of the handlebar and install the rear brake lever bracket.

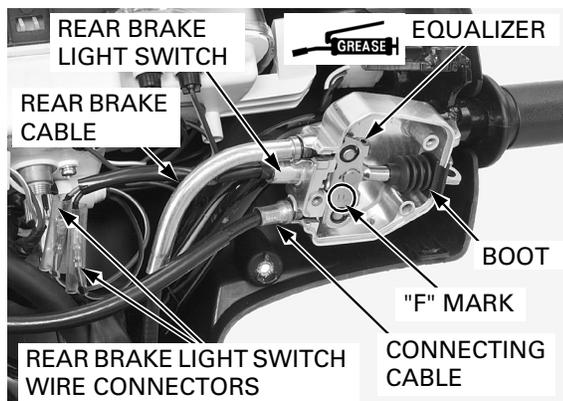
Hook the bracket holder to the tab of the rear brake lever bracket while holding the brake lever bracket.

Install and tighten the brake lever bracket holder bolt.



Install the rear brake light switch.  
 Connect the rear brake light switch wire connectors.  
 Apply grease to the sliding surface of the equalizer.  
 Install the boot over the equalizer rod.

Connect the rear brake cable to the equalizer with the "F" mark of the equalizer facing up and set the rear brake cable to the rear brake lever bracket.  
 Connect the connecting cable to the equalizer and set the connecting cable to the bracket.  
 Install the equalizer boot to the rear brake lever bracket.



Set the rear brake lever to the brake lever bracket and equalizer rod.

Apply grease to the sliding surface of the brake lever pivot screw and tighten it to the specified torque.

**TORQUE: 1.0 N·m (0.10 kgf·m, 0.7 lbf·ft)**

Install the rear brake lever pivot nut and tighten it to the specified torque while holding the pivot screw.

**TORQUE: 4.5 N·m (0.46 kgf·m, 3.3 lbf·ft)**

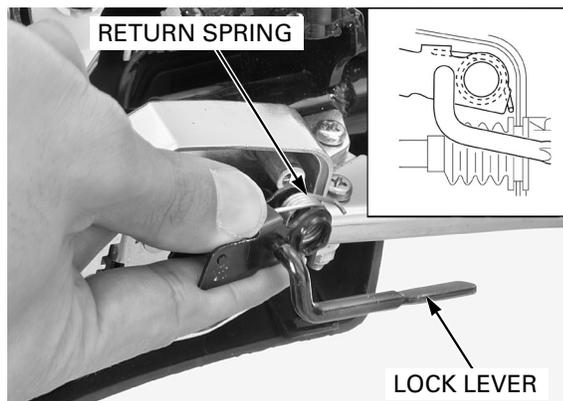
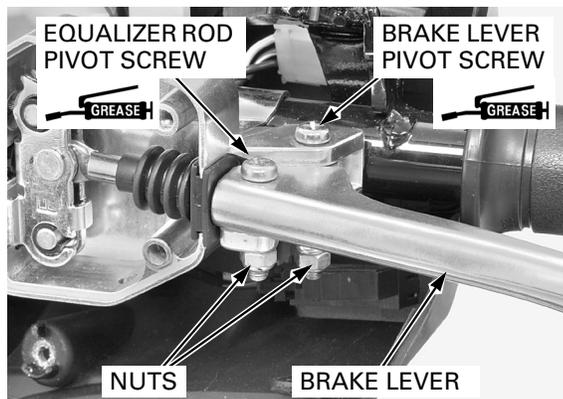
Apply grease to the sliding surface of the equalizer rod pivot screw and tighten it to the specified torque.

**TORQUE: 1 N·m (0.10 kgf·m, 0.7 lbf·ft)**

Install and tighten the equalizer rod pivot nut to the specified torque while holding the pivot screw.

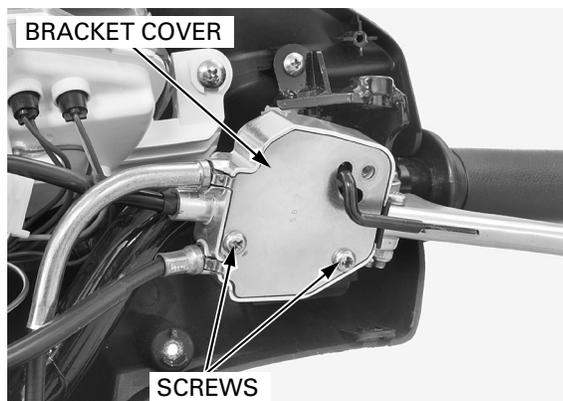
**TORQUE: 4.5 N·m (0.46 kgf·m, 3.3 lbf·ft)**

Set the return spring to the brake lock lever.  
 Install the brake lock lever to the rear brake lever bracket and make sure that the return spring is set in position as shown.



Set the bracket cover to the rear brake lever bracket while holding the lock lever.  
 Install and tighten the two bracket cover screws.

**TORQUE: 4.2 N·m (0.43 kgf·m, 3.1 lbf·ft)**



## BRAKE SYSTEM

Install the set rubber to the lock lever and tighten the bracket cover special screw.

**TORQUE: 4.2 N·m (0.43 kgf·m, 3.1 lbf·ft)**

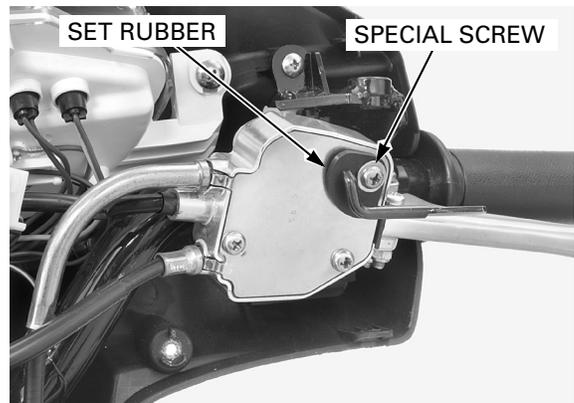
Adjust the following:

- Connecting cable (page 17-15)
- Rear brake lever freeplay (page 4-17)

Check the following:

- Brake lock lever operation (page 4-20)
- Rear brake light operation (page 4-20)

Install the front handlebar cover (page 3-6).



## FRONT BRAKE CALIPER

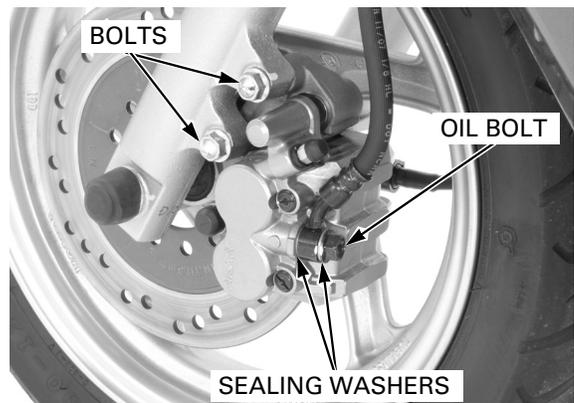
### REMOVAL

Drain the brake fluid (page 17-5).

Disconnect the brake hose from the brake caliper by removing the oil bolt and sealing washers.

Remove the brake pads (page 17-8).

Remove two caliper mounting bolts and the caliper.

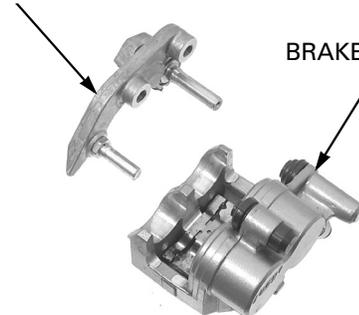


### DISASSEMBLY

Remove the caliper bracket from the brake caliper.

CALIPER BRACKET

BRAKE CALIPER



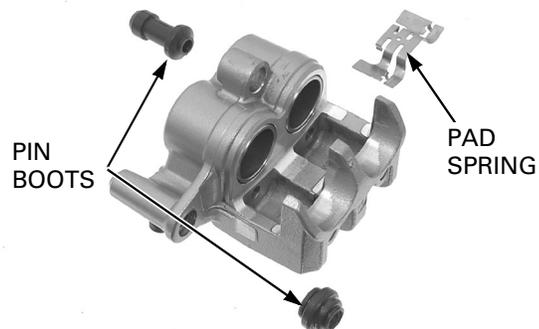
Remove the retainer from the caliper bracket.

CALIPER BRACKET

RETAINER



Remove the pin boots and pad spring from the brake caliper.



Place a shop towel over the piston.

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

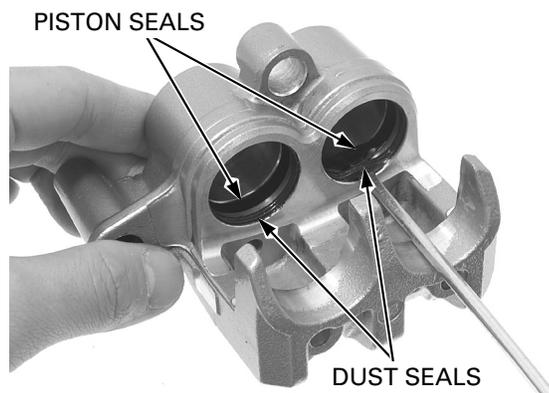
Position the caliper body with the piston down and apply small squirts of air pressure to the fluid inlet to remove the pistons.



*Be careful not to damage the piston sliding surface.*

Push the dust seals and piston seals in and lift them out.

Clean the seal grooves, caliper cylinder and piston with brake fluid.

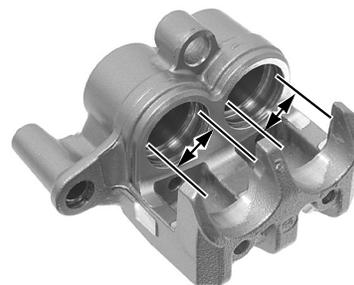


## INSPECTION

Check the caliper cylinder for scoring, scratches or damage.

Measure the caliper cylinder I.D.

**SERVICE LIMIT: 27.060 mm (1.0654 in)**

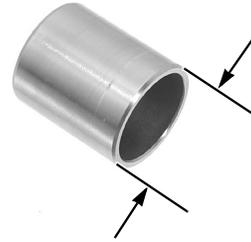


# BRAKE SYSTEM

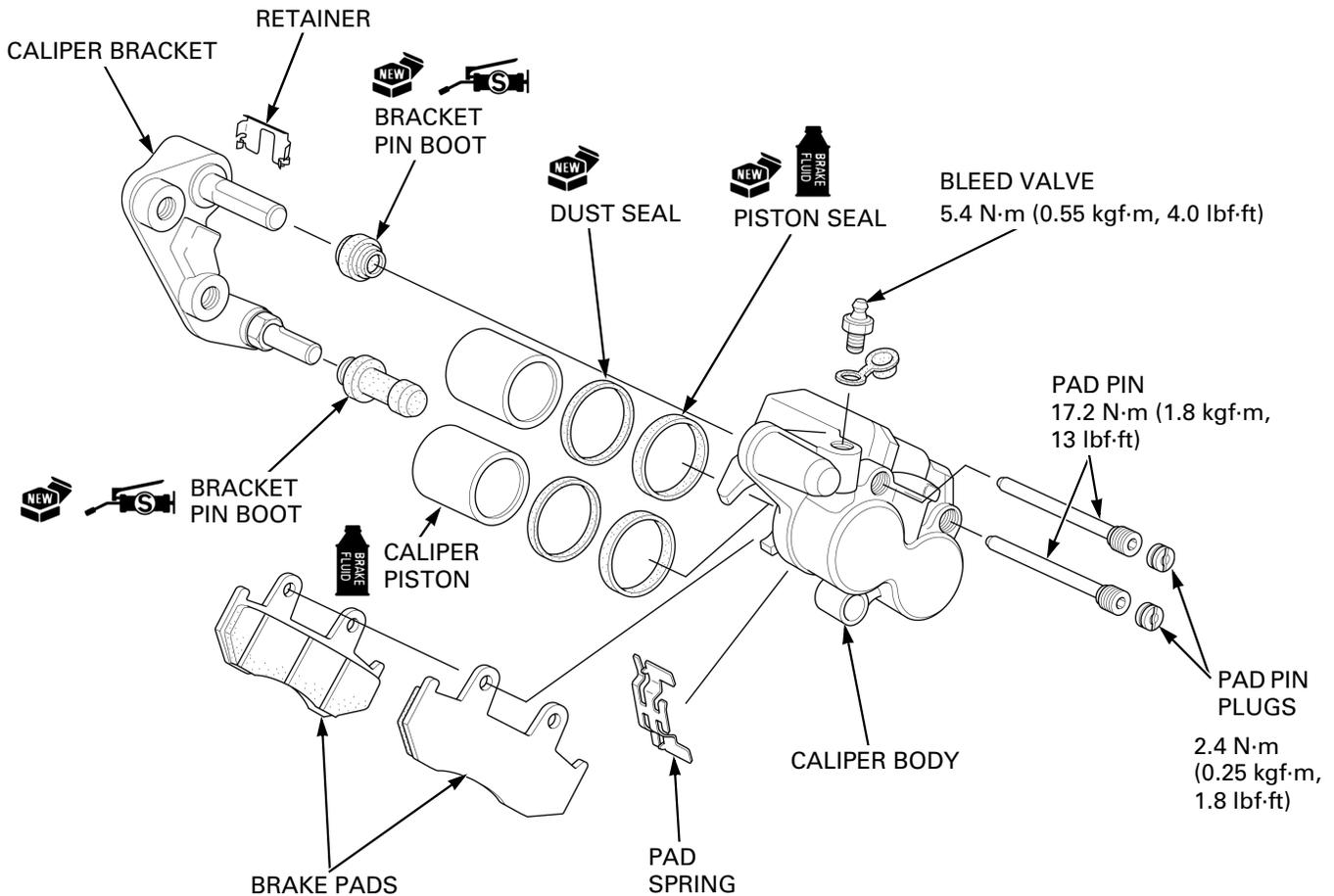
Check the caliper piston for scoring, scratches or damage.

Measure the caliper piston O.D.

**SERVICE LIMIT: 26.910 mm (1.0594 in)**



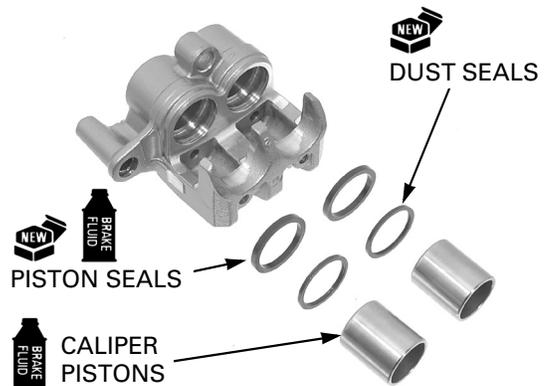
## ASSEMBLY



Coat new piston seals with DOT 3 or DOT 4 brake fluid.

Install the piston seals and dust seals into the seal grooves in the caliper cylinders.

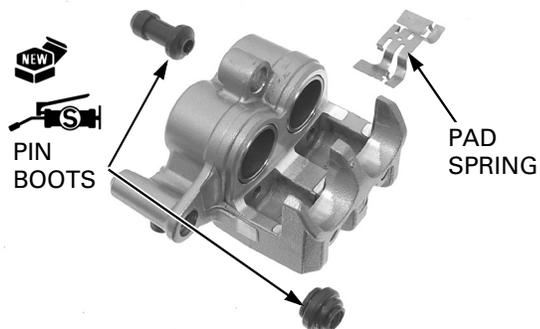
Coat the caliper pistons with DOT 3 or DOT 4 brake fluid and install them into the caliper cylinders with the opening side facing the pad.



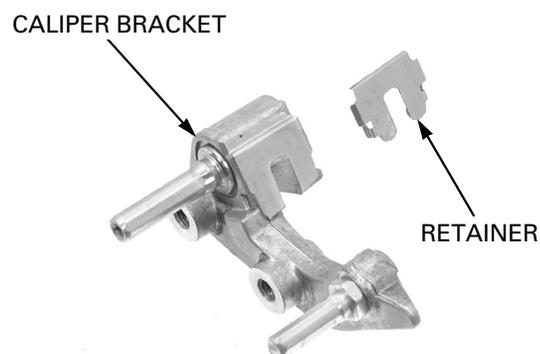
Check the bracket pin boots and replace them if they are deteriorated or damaged.

Apply 0.4 g minimum of silicone grease to the inside of the pin boots, and install them into the caliper body.

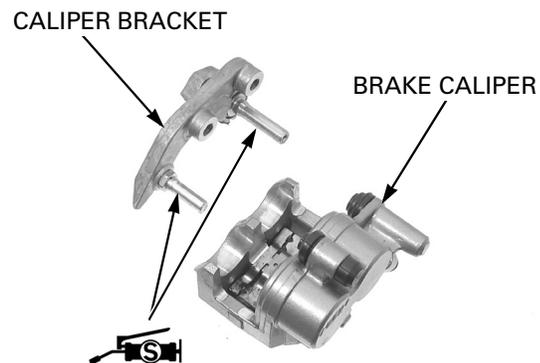
Install the pad spring on the caliper body.



Install the retainer to the caliper bracket.



Apply silicone grease to the caliper pin bolts.  
Install the caliper bracket to the brake caliper.



## INSTALLATION

Install the brake pads (page 17-8).

Set the brake caliper onto the left front fork leg.  
Install new caliper mounting bolts and tighten them to the specified torque.

**TORQUE: 30 N·m (3.1 kgf·m, 22 lbf·ft)**

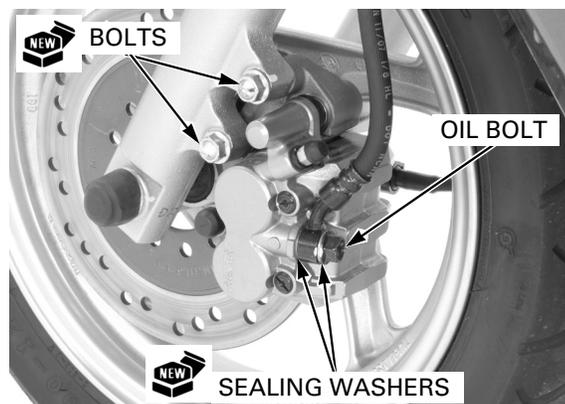
Install the brake pads (page 17-8)

Connect the brake hose to the brake caliper with the oil bolt and new sealing washers.

Push the eyelet joint 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 brake fluid and air bleed the hydraulic brake system (page 17-5).



## BRAKE SYSTEM

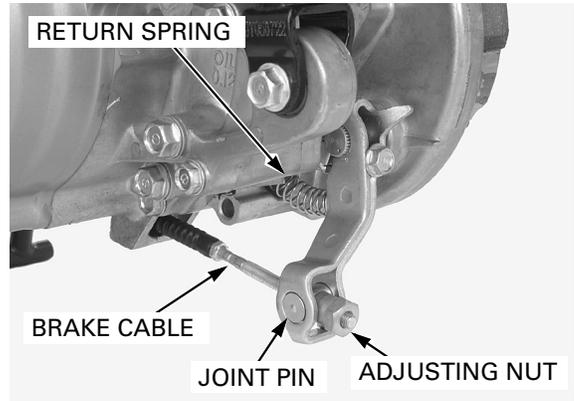
### REAR DRUM BRAKE

#### DISASSEMBLY

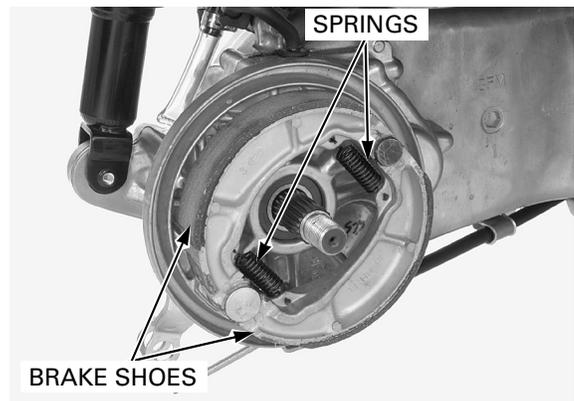
- Always replace the brake shoes as a set.
- Mark all parts during disassembly so they can be placed back in the original locations.

Remove the adjusting nut and brake cable from the joint pin.

Remove the joint pin and return spring.

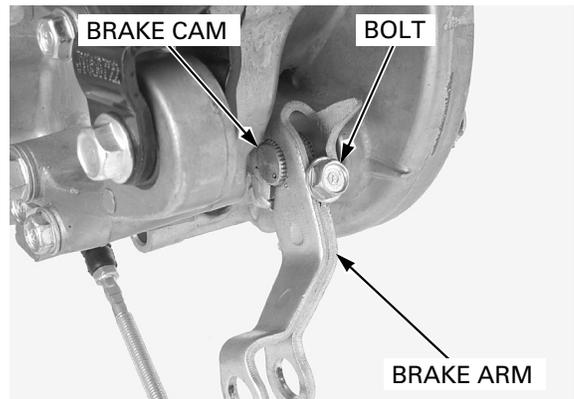


Remove the brake shoes and shoe springs by spreading the brake shoes.



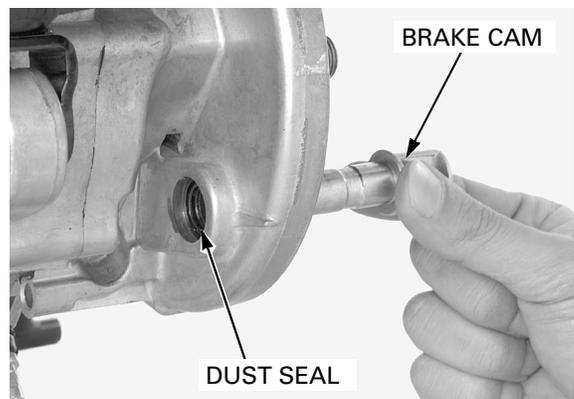
Remove the brake arm bolt.

Remove the brake arm while pulling the brake cam out.



Remove the brake cam from the brake panel.

Remove the dust seal.



**INSPECTION**

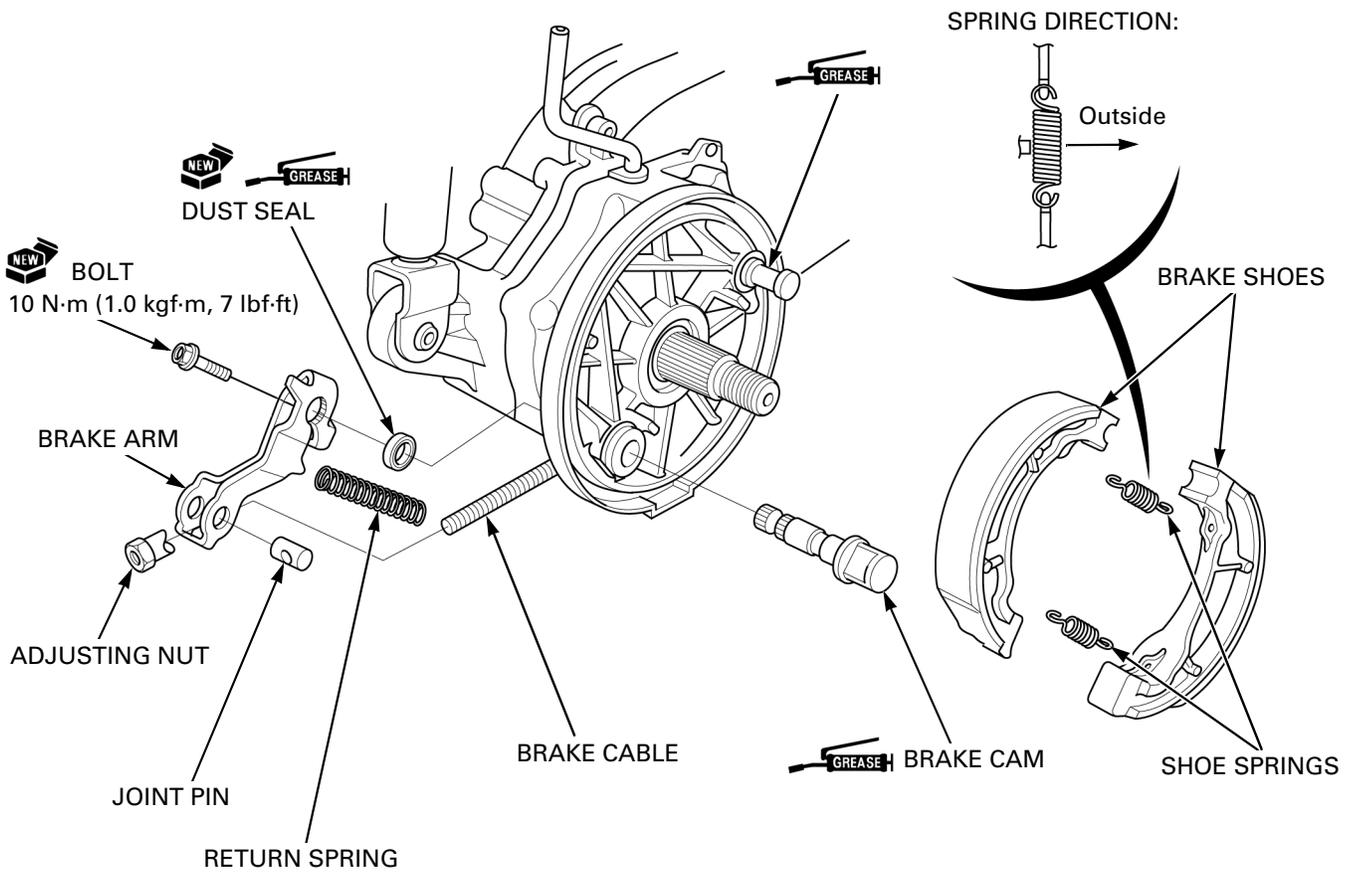
- For brake shoe inspection (page 4-16).

Measure the rear brake drum I.D.

**SERVICE LIMIT: 131.0 mm (5.16 in)**



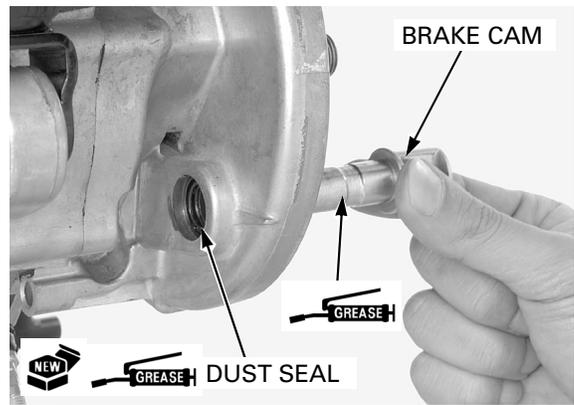
**ASSEMBLY**



## BRAKE SYSTEM

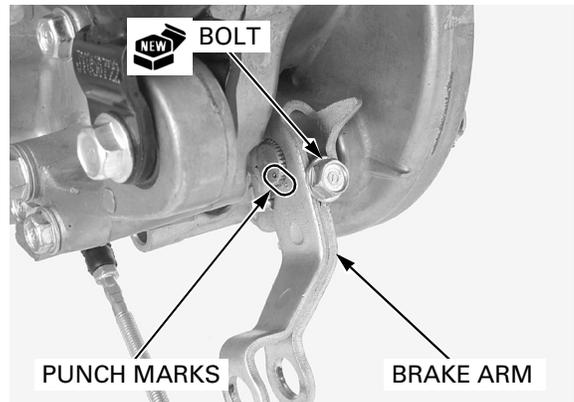
Apply grease to a new dust seal and install it into the brake panel.

Apply grease to the brake cam sliding surface and install it into the brake panel.

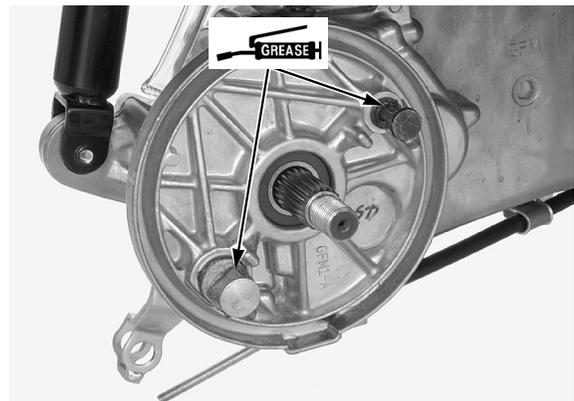


Install the brake arm by aligning the punch marks on the brake arm and brake cam. Install a new brake arm bolt and tighten it to the specified torque.

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



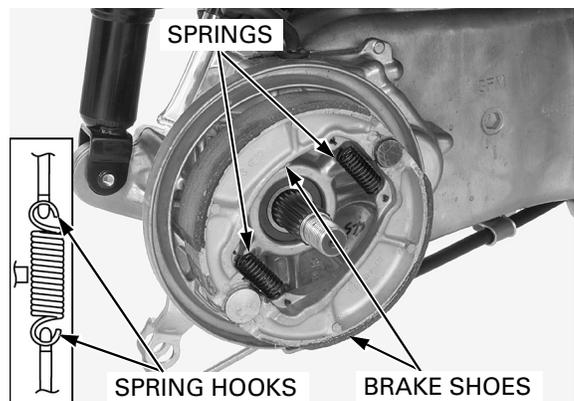
Apply 0.2 – 0.3 g of grease to the anchor pin and brake cam sliding surfaces.



*If the brake shoes and springs are reused, they must be placed back in their original locations.*

Assemble the brake shoes and springs with the open ends of spring hooks facing out as shown.

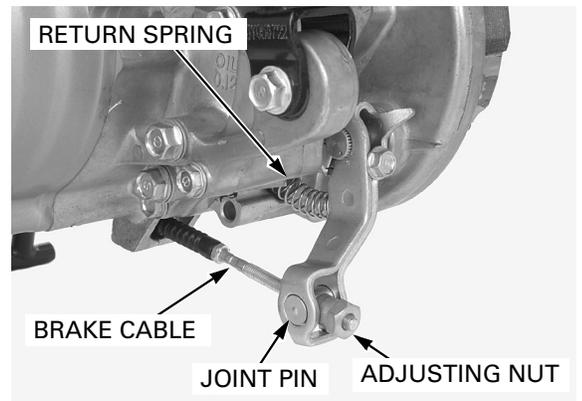
Install the brake shoes and springs onto the brake panel.



Install the return spring between the hole on the left crankcase and pin on the brake arm.  
Install the joint pin on the brake arm.  
Connect the brake cable to the joint pin and install the adjusting nut.

Install the rear wheel (page 16-4).

Adjust the rear brake lever freeplay (page 4-17).



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**MEMO**

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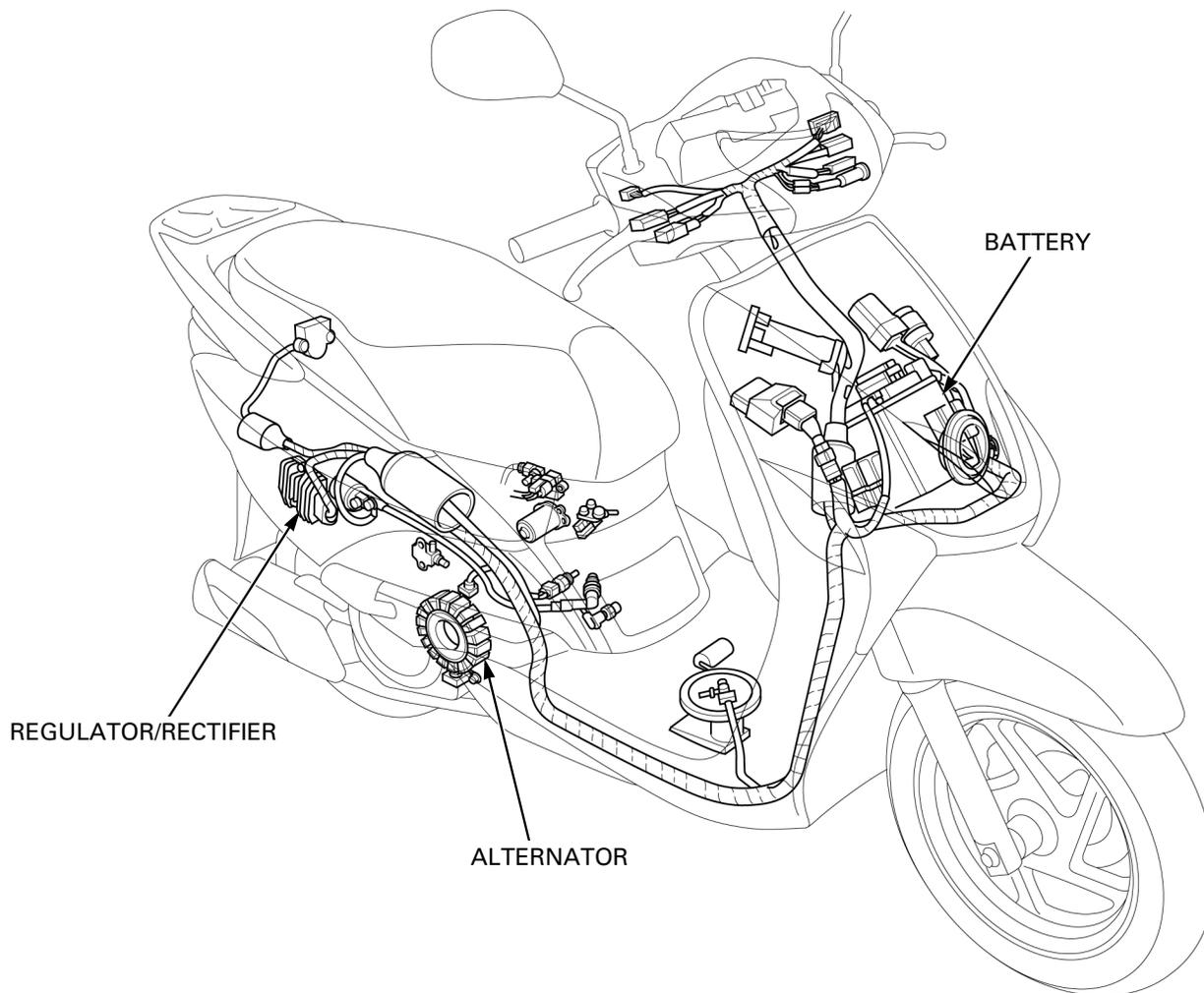
# 18. BATTERY/CHARGING SYSTEM

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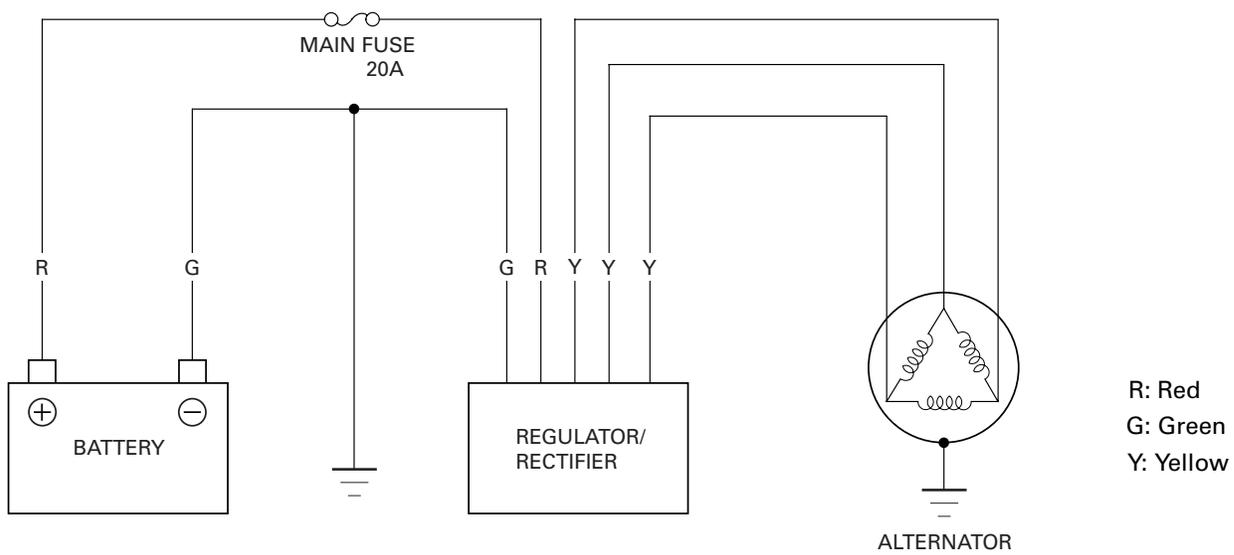
SYSTEM LOCATION.....	18-2	BATTERY .....	18-6
SYSTEM DIAGRAM.....	18-2	CHARGING SYSTEM INSPECTION.....	18-6
SERVICE INFORMATION .....	18-3	ALTERNATOR.....	18-7
TROUBLESHOOTING .....	18-5	REGULATOR/RECTIFIER .....	18-8

# BATTERY/CHARGING SYSTEM

## 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 turned ON and current is present.*
- This model comes with a maintenance free (MF) battery. Remember the following about MF batteries.
  - Use only the electrolyte that comes with the battery.
  - Use all of the electrolyte.
  - Seal the battery properly.
  - Never open the seals after installation.
- 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 scooter, disconnect the negative battery cable from the battery terminal.
- The battery sealing caps should not be removed. Attempting to remove the sealing caps from the cells may damage the battery.
- The maintenance free (MF) 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 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, the 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 scooter.
- The battery will self-discharge when the scooter is not in use. For this reason, charge the battery every two weeks to prevent sulfation from occurring.
- When servicing the charging system, always follow the steps in the troubleshooting flow chart (page 18-5).
- For alternator service, refer to the following:
  - Alternator removal (page 13-4)
  - Alternator installation (page 13-5)

#### BATTERY CHARGING

- Turn the 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 the actual battery condition can be measured.

**Recommended battery tester: BM-210 or BATTERY MATE or equivalent**

## BATTERY/CHARGING SYSTEM

### SPECIFICATIONS

ITEM		SPECIFICATIONS	
Battery	Capacity	12 V – 6 Ah	
	Current leakage	0.1 mA max.	
	Voltage (20°C/68°F)	Fully charged	Above 12.8 V
		Needs charging	Below 12.3 V
	Charging current	Normal	0.6 A/5 – 10 h
Quick		3.0 A/1.0 h	
Alternator	Capacity	0.22 kW/5,000 min <sup>-1</sup> (rpm)	
	Charging coil resistance (20°C/68°F)	0.1 – 1.0 Ω	

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## TROUBLESHOOTING

### BATTERY IS DAMAGED OR WEAK

#### 1. BATTERY TEST

Remove the battery (page 18-6).

Check the battery condition using the recommended battery tester.

#### **RECOMMENDED BATTERY TESTER:**

**BM210 or BATTERY MATE or equivalent**

#### *Is the battery in good condition?*

**YES** – GO TO STEP 2.

**NO** – Faulty battery.

#### 2. CURRENT LEAKAGE TEST

Install the battery (page 18-6).

Check the battery current leakage (Leak test; page 18-6).

#### *Is the current leakage below 0.1 mA?*

**YES** – GO TO STEP 4.

**NO** – GO TO STEP 3.

#### 3. CURRENT LEAKAGE TEST WITHOUT REGULATOR/RECTIFIER

Disconnect the regulator/rectifier 5P (Black) connector and recheck the battery current leakage.

#### *Is the current leakage below 0.1 mA?*

**YES** – Faulty regulator/rectifier.

**NO** –

- Shorted wire harness.
- Faulty ignition switch.

#### 4. CHARGING VOLTAGE INSPECTION

Measure and record the battery voltage using a digital multimeter (page 18-6).

Start the engine.

Measure the charging voltage (page 18-6).

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 5.

#### 5. ALTERNATOR CHARGING COIL INSPECTION

Check the alternator charging coil (page 18-7).

#### *Is the alternator charging coil resistance within 0.1 – 1.0 $\Omega$ (20°C/68°F)*

**YES** – GO TO STEP 6.

**NO** – Faulty charging coil.

#### 6. REGULATOR/RECTIFIER SYSTEM INSPECTION

Check the voltage and resistance at the regulator/rectifier 5P (Black) connector (page 18-8).

#### *Are the results of checked voltage and resistance correct?*

**YES** – Faulty regulator/rectifier.

**NO** –

- Open circuit in related wire.
- Loose or poor contacts of related terminal.
- Shorted wire harness.

## BATTERY/CHARGING SYSTEM

### BATTERY

#### REMOVAL/INSTALLATION

Remove the front center cover (page 3-4).

*Always turn the ignition switch OFF before removing the battery.*

*Disconnect the negative terminal first, then the positive terminal.*

*Connect the positive terminal first, then the negative terminal.*

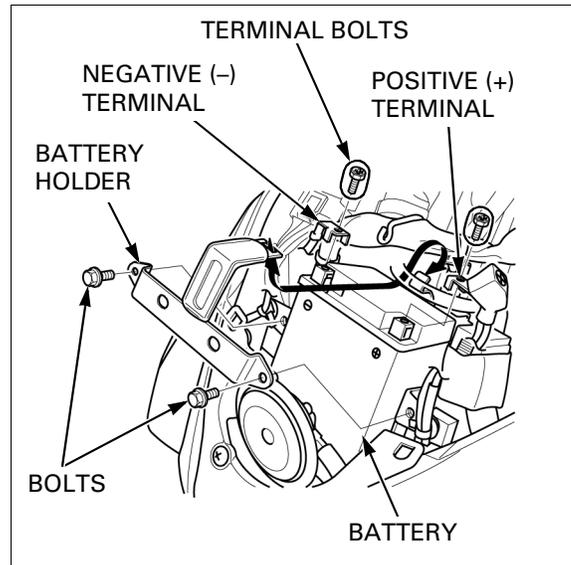
Remove the bolt and disconnect the negative (-) cable.

Remove the bolt and disconnect the positive (+) cable.

Remove the bolts and unhook the battery holder.  
Remove the battery.

Install the battery in the reverse order of removal.

Install the front center cover (page 3-4).



#### VOLTAGE INSPECTION

Remove the front center cover (page 3-4).

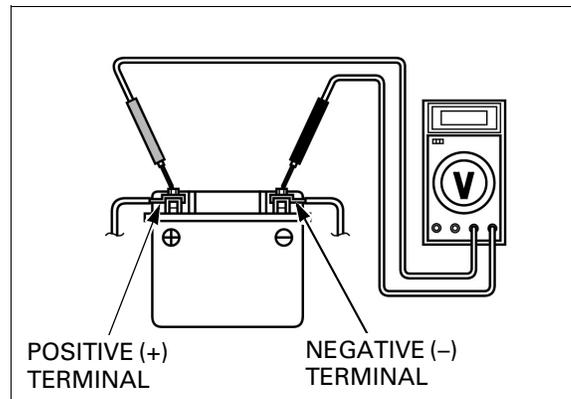
Measure the battery voltage using a digital multimeter.

##### VOLTAGE:

**Fully charged: Above 12.8 V**

**Needs charging: Below 12.3 V**

If the battery voltage is below 12.3 V, charge the battery.



### CHARGING SYSTEM INSPECTION

#### CURRENT LEAKAGE INSPECTION

Remove the front center cover (page 3-4).

Turn the ignition switch OFF and disconnect the negative (-) cable from the battery.

Connect the ammeter (+) probe to the battery (-) cable and the ammeter (-) probe to the battery (-) terminal.

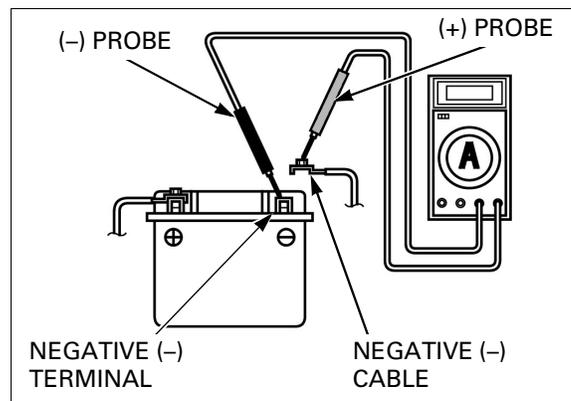
With the ignition switch OFF, check for current leakage.

- 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 the fuse in the tester.
- While measuring current, do not turn the ignition switch ON. A sudden surge of current may blow the fuse in the tester.

**SPECIFIED CURRENT LEAKAGE: 0.1 mA max.**

If current leakage exceeds the specified value, a shorted circuit is likely.

Locate the short by disconnecting connections one by one and measuring the current.



**CHARGING VOLTAGE INSPECTION**

- Make sure the battery is in good condition before performing this test.

Remove the front center cover (page 3-4).

*Do not disconnect the battery or any cable in the charging system without first switching the ignition switch OFF. Failure to do so 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.

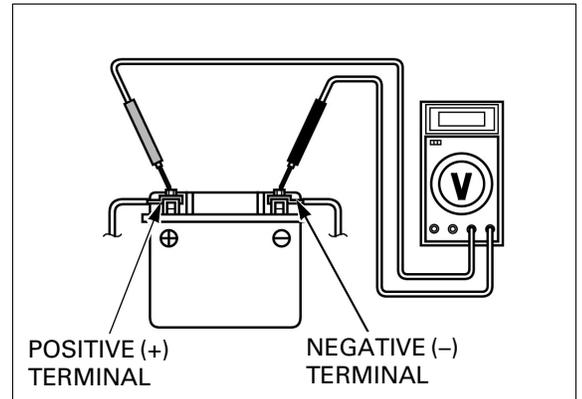
With the headlight on Hi beam, measure the voltage on the multimeter when the engine runs at 5,000 min<sup>-1</sup> (rpm).

**STANDARD:**

**Measured BV < Measured CV < 15.5 V**

- BV = Battery Voltage
- CV = Charging Voltage

If the voltage is abnormal, checks in the troubleshooting flow chart (page 18-5).



**ALTERNATOR**

**INSPECTION**

Remove the luggage box (page 3-8).

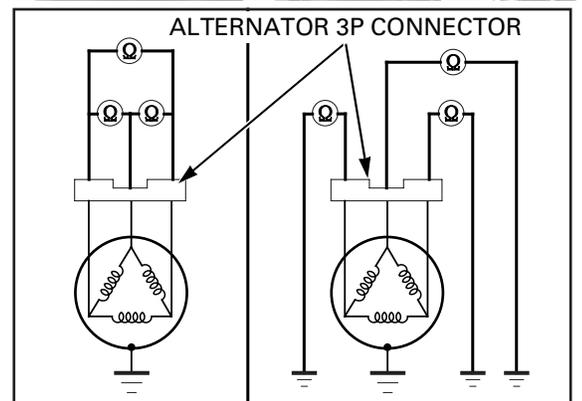
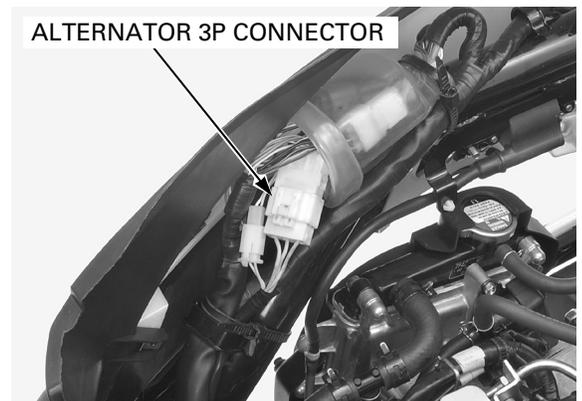
Disconnect the alternator 3P connector.

Measure the resistance between each Yellow wire terminals.

**STANDARD: 0.1 – 1.0 Ω (at 20°C/68°F)**

Check for continuity between each wire terminal of the alternator/stator side connector and ground. There should be no continuity.

Replace the stator if the resistance is out of specification, or if any wire has continuity to ground.



## BATTERY/CHARGING SYSTEM

### REGULATOR/RECTIFIER

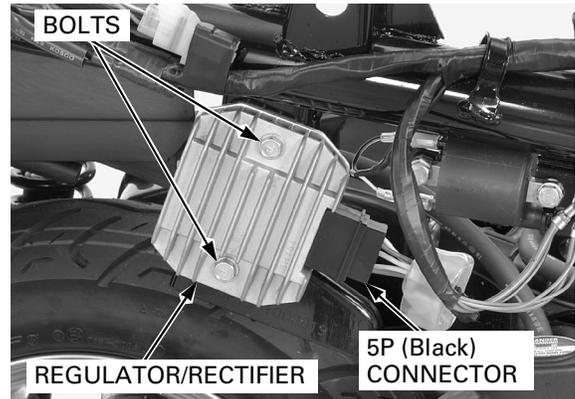
#### REMOVAL/INSTALLATION

Remove the body cover (page 3-9).

Disconnect the regulator/rectifier 5P (Black) connector.

Remove the mount bolts and regulator/rectifier.

Installation is in the reverse order of removal.



#### SYSTEM INSPECTION

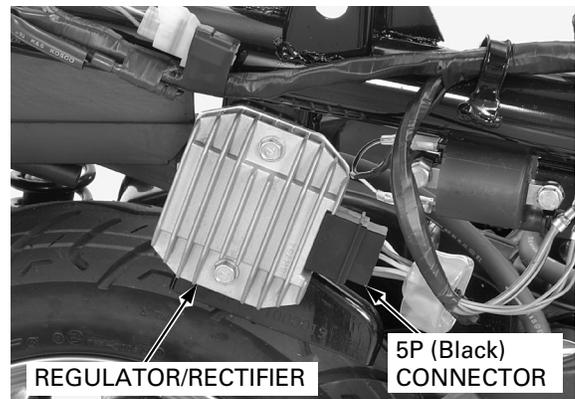
Remove the luggage box (page 3-8).

Disconnect the regulator/rectifier 5P (Black) connector, and check it for loose contact or corroded terminals.

If the charging voltage reading (page 18-7) is out of the specification, check the regulator/rectifier connector terminals (wire harness side) as follows:

Item	Terminal	Specification
Battery charging line	Red (+) and ground (-)	Battery voltage should register
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 5P (Black) connectors, replace the regulator/rectifier unit.



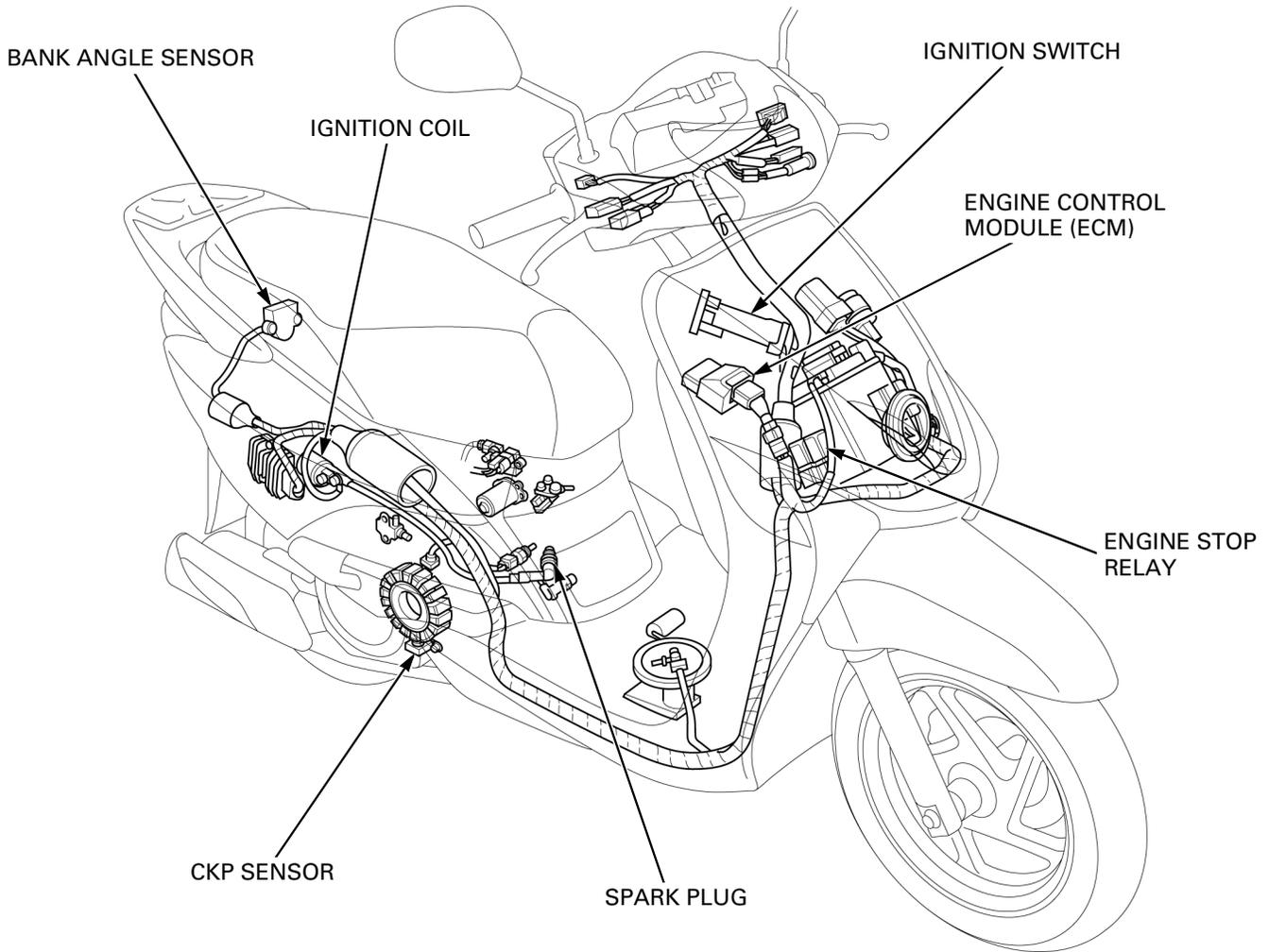
# 19. IGNITION SYSTEM

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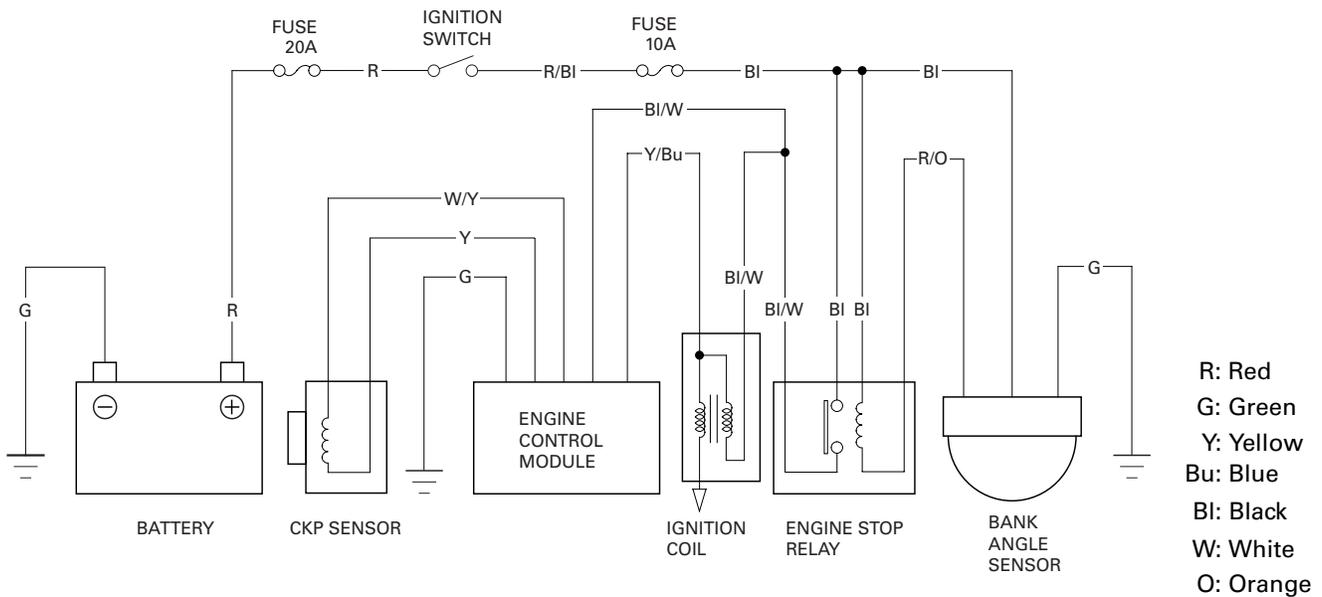
SYSTEM LOCATION.....	19-2	IGNITION SYSTEM INSPECTION.....	19-5
SYSTEM DIAGRAM.....	19-2	IGNITION COIL .....	19-7
SERVICE INFORMATION .....	19-3	IGNITION TIMING .....	19-8
TROUBLESHOOTING .....	19-4		

# IGNITION SYSTEM

## SYSTEM LOCATION



## SYSTEM DIAGRAM



## SERVICE INFORMATION

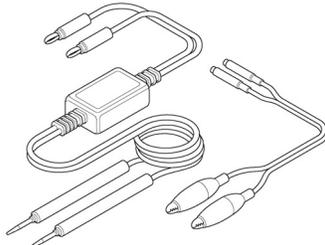
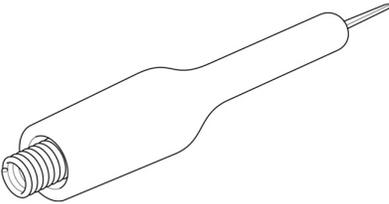
### GENERAL

- The ECM may be damaged if dropped. Also, if the connector is disconnected when current is flowing, the excessive voltage may damage the ECM. Always turn the ignition switch OFF before servicing.
- Use spark plug with the correct heat range. Using spark plug with an incorrect heat range can damage the engine.
- Some electrical components may be damaged if terminals or connectors are connected or disconnected while the ignition switch is turned ON and current is present.
- When servicing the ignition system, always follow the steps in the troubleshooting (page 19-4).
- The ignition timing cannot be adjusted since the ECM is factory preset.
- 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.
- Inspect the following:
  - Spark plug (page 4-8)
  - Ignition switch (page 21-11)
- Refer to CKP sensor service (page 13-4).

### SPECIFICATIONS

ITEM		SPECIFICATIONS
Spark plug	Standard	CR7EH-9 (NGK), U22FER9 (DENSO)
	For extended high speed riding	CR8EH-9 (NGK), U24FER9 (DENSO)
Spark plug gap		0.80 – 0.90 mm (0.031 – 0.035 in)
Ignition coil primary peak voltage		100 V minimum
CKP sensor peak voltage		0.7 V minimum
Ignition timing ("F" mark)		14° BTDC at engine idle speed

### TOOLS

<p>Imrie diagnostic tester (model 625) Peak voltage adaptor 07HGJ-0020100</p>  <p>with commercially available digital multimeter (impedance 10 MΩ/DCV minimum)</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 spark plug cap or spark plug wire connection
  - Water in the spark plug cap (Leaking the ignition coil secondary voltage)
- “Initial voltage” of the ignition primary coil is the battery voltage with the ignition switch turned ON. (The engine is not cranked by the starter motor.)

#### No spark at spark plug

UNUSUAL CONDITION		PROBABLE CAUSE (Check in numerical order)
Ignition coil primary voltage	No initial voltage with the ignition switch turned ON. (Other electrical components are normal)	<ol style="list-style-type: none"> <li>1. An open circuit or loose connection in engine stop relay related circuit.</li> <li>2. Loose or poor connection of the ignition coil primary wire terminal or an open circuit in primary coil.</li> <li>3. Faulty ECM (in case when the initial voltage is normal when ECM 33P connector is disconnected).</li> </ol>
	Initial voltage is normal, but it drops by 2 – 4 V while cranking the engine.	<ol style="list-style-type: none"> <li>1. Incorrect peak voltage adaptor connections. (System is normal if measured voltage is over the specifications with reverse connections.)</li> <li>2. Battery is undercharged. (Voltage drops largely when the engine is started.)</li> <li>3. No voltage at the Black/White wire of the ECM 33P connector, or loose or poorly connected ECM 33P connector.</li> <li>4. Loose or poor connection or an open circuit in Green wire of the ECM.</li> <li>5. Loose or poor connection or an open circuit in Yellow/Blue wire between the ignition coil and ECM.</li> <li>6. A short circuit in the ignition primary coil.</li> <li>7. Faulty CKP sensor. (Measure peak voltage.)</li> <li>8. Faulty ECM (in case when above No. 1 through 7 are normal).</li> </ol>
	Initial voltage is normal but there is no peak voltage while cranking the engine.	<ol style="list-style-type: none"> <li>1. Incorrect peak voltage adaptor connections. (System is normal if measured voltage is over the specifications with reverse connections.)</li> <li>2. Faulty peak voltage adaptor.</li> <li>3. Faulty ECM (in case when above No. 1 and 2 are normal).</li> </ol>
	Initial voltage is normal but peak voltage is lower than the standard value.	<ol style="list-style-type: none"> <li>1. The multimeter impedance is too low; below 10 MΩ/DCV.</li> <li>2. Cranking speed is too slow. (Battery is undercharged.)</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 ECM (in case when above No. 1 through 3 are normal).</li> </ol>
	Initial and peak voltages are normal but no spark jumps.	<ol style="list-style-type: none"> <li>1. Faulty spark plug or leaking ignition coil secondary current.</li> <li>2. Faulty ignition coil.</li> </ol>
CKP sensor	Peak voltage is lower than the standard value.	<ol style="list-style-type: none"> <li>1. The multimeter impedance is too low; below 10 MΩ/DCV.</li> <li>2. Cranking speed is too slow. (Battery is undercharged.)</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 through 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>

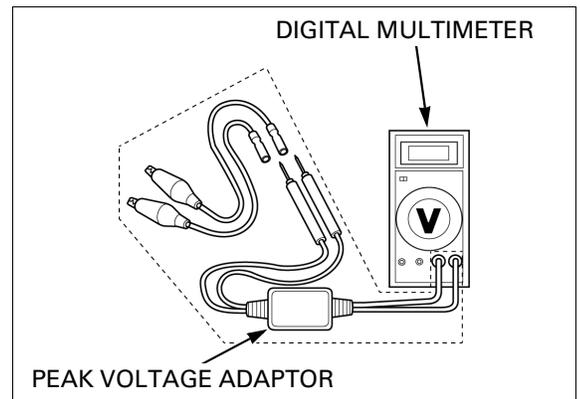
## IGNITION SYSTEM INSPECTION

- If there is no spark present at the plug, check all connections for loose or poor contact before measuring the peak voltage.
- Use a commercially available digital multimeter (impedance 10 M $\Omega$ /DCV minimum).
- The display value differs depending upon the internal impedance of the multimeter.
- If the Imrie diagnostic tester (model 625) is used, follow the manufacturer's instruction.

Connect the peak voltage adapter to the digital multimeter, or use the imrie diagnostic tester.

**TOOL:**

**Imrie diagnostic tester (model 625) or  
Peak voltage adaptor 07HGJ-0020100  
with commercially available digital multimeter  
(impedance 10 M $\Omega$ /DCV minimum)**



### IGNITION COIL PRIMARY PEAK VOLTAGE

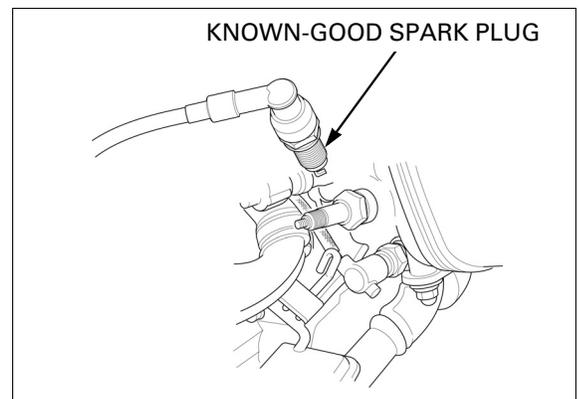
- Check all system connections before inspection. If the system is disconnected, incorrect peak voltage might be measured.
- Check cylinder compression and check that the spark plug is installed correctly.

Support the scooter with its centerstand on a level surface.

Remove the luggage box (page 3-8).

Disconnect the spark plug cap from the spark plug.

Connect a known-good spark plug to the spark plug cap and ground it to the cylinder as done in a spark test.



## IGNITION SYSTEM

With the ignition coil primary wires connected, connect the imrie diagnostic tester or peak voltage adaptor probes to the ignition coil primary terminal and ground.

### TOOL:

**Imrie diagnostic tester (model 625) or  
Peak voltage adaptor 07HGJ-0020100  
with commercially available digital multimeter  
(impedance 10 M $\Omega$ /DCV minimum)**

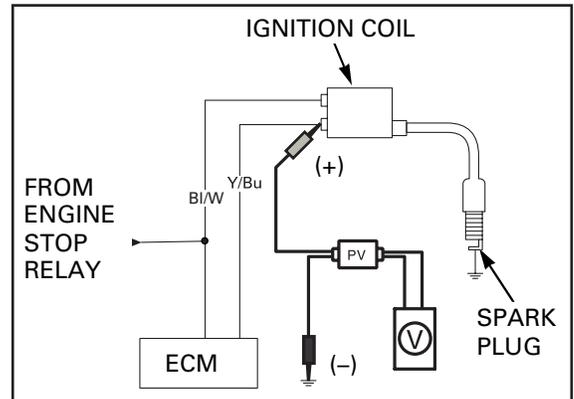
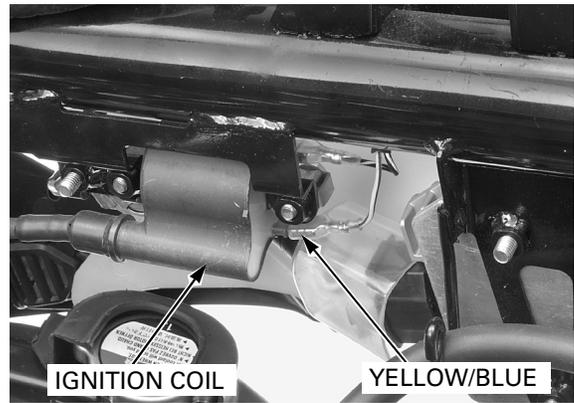
**CONNECTION: Yellow/Blue (+) – Ground (-)**

Turn the ignition switch ON.  
Check the initial voltage at this time.  
The battery voltage should be measured.  
If the initial voltage cannot be measured, follow the checks in the troubleshooting table (page 19-4).

Squeeze the brake lever fully.  
Crank the engine with the starter motor and measure the ignition coil primary peak voltage.

**PEAK VOLTAGE: 100 V minimum**

If the peak voltage is lower than the standard value, follow the checks in the troubleshooting table (page 19-4).



## 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 plug is installed correctly.

Turn the ignition switch OFF.

Disconnect the ECM 33P connector (page 6-48).

Connect the Imrie diagnostic tester or peak voltage adaptor probes to the ECM 33P connector terminals.

### TOOLS:

**Imrie diagnostic tester (model 625) or  
Peak voltage adaptor 07HGJ-0020100  
with commercially available digital multimeter  
(impedance 10 M $\Omega$ /DCV minimum)  
Test probe 07ZAJ-RDJA110**

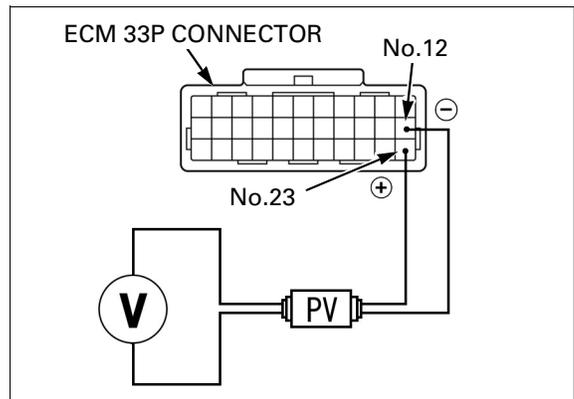
**CONNECTION: No. 23 (White/Yellow) (+) – No. 12 (Yellow) (-)**

Turn the ignition switch ON and squeeze the brake lever fully.

Crank the engine with the starter switch and measure the CKP sensor peak voltage.

**PEAK VOLTAGE: 0.7 V minimum**

If the peak voltage measured at the test harness is abnormal, measure the peak voltage at the CKP sensor 2P connector.



Remove the luggage box (page 3-8).

Turn the ignition switch OFF.

Disconnect the CKP sensor 2P connector and connect the imrie diagnostic tester or peak voltage adaptor probes to the connector terminals of the CKP sensor side.

**TOOL:**

**Imrie diagnostic tester (model 625) or  
Peak voltage adaptor 07HGJ-0020100  
with commercially available digital multimeter  
(impedance 10 M $\Omega$ /DCV minimum)**

**CONNECTION: White/Yellow (+) – Yellow (-)**

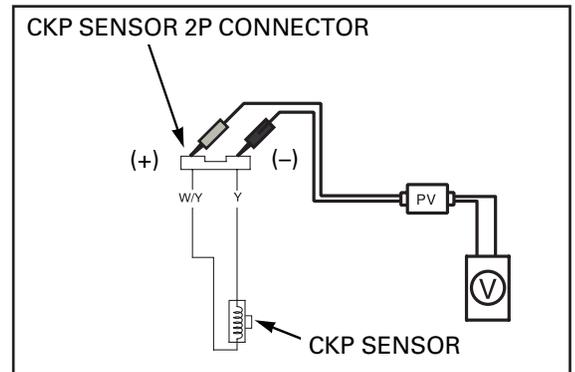
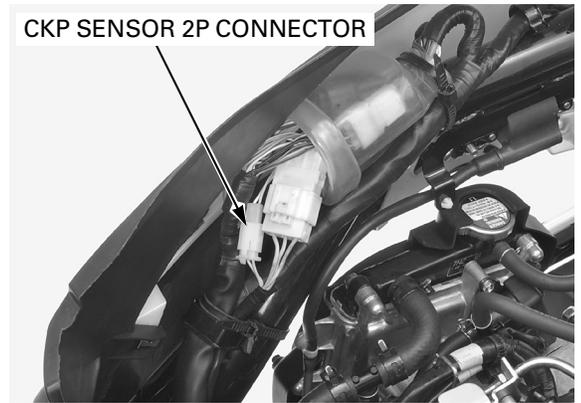
Turn the ignition switch ON and squeeze the brake lever fully.

Crank the engine with the starter motor and measure the CKP sensor peak voltage.

**PEAK VOLTAGE: 0.7 V minimum**

In the same manner as at the ECM 33P connector, measure the peak voltage and compare it to the voltage measured at the ECM 33P connector.

- If the peak voltage measured at the test harness is abnormal and the one measured at the CKP sensor is normal, the wire harness has an open or short circuit, or loose connection.
- If both peak voltages are abnormal, check each item in the troubleshooting chart (page 19-4).  
For CKP sensor replacement (page 13-4).



## IGNITION COIL

### REMOVAL/INSTALLATION

Remove the body cover (page 3-9).

Disconnect the spark plug cap.

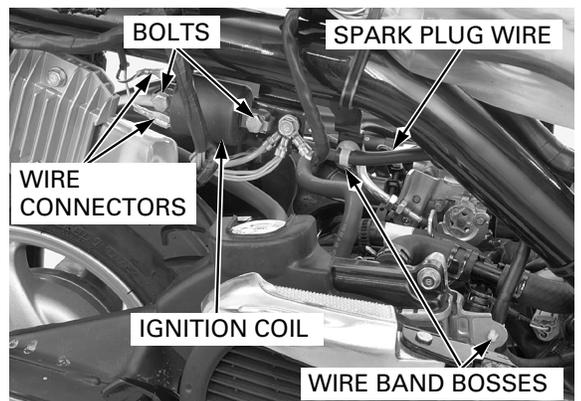
Release the wire band bosses from the frame stay and radiator base.

Disconnect the ignition coil primary wire connectors.

Remove the mount bolts and ignition coil.

Installation is in the reverse order of removal.

*Route the wire harness properly (page 1-17).*



## IGNITION SYSTEM

### IGNITION TIMING

- The ignition timing can not be adjusted since the ECM is factory preset.

Start the engine, warm it up to normal operating temperature and stop it.

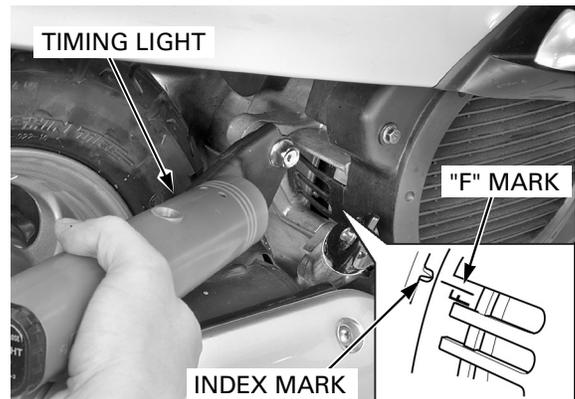
Connect the timing light to the spark plug wire.

Start the engine and let it idle ( $1,700 \text{ min}^{-1}$  (rpm)).

The ignition timing is correct if the index mark on the right crankcase aligns with the "F" mark on the flywheel as shown.

If the ignition timing is incorrect, inspect the CKP sensor (page 19-6).

*Read the instructions for timing light operation.*



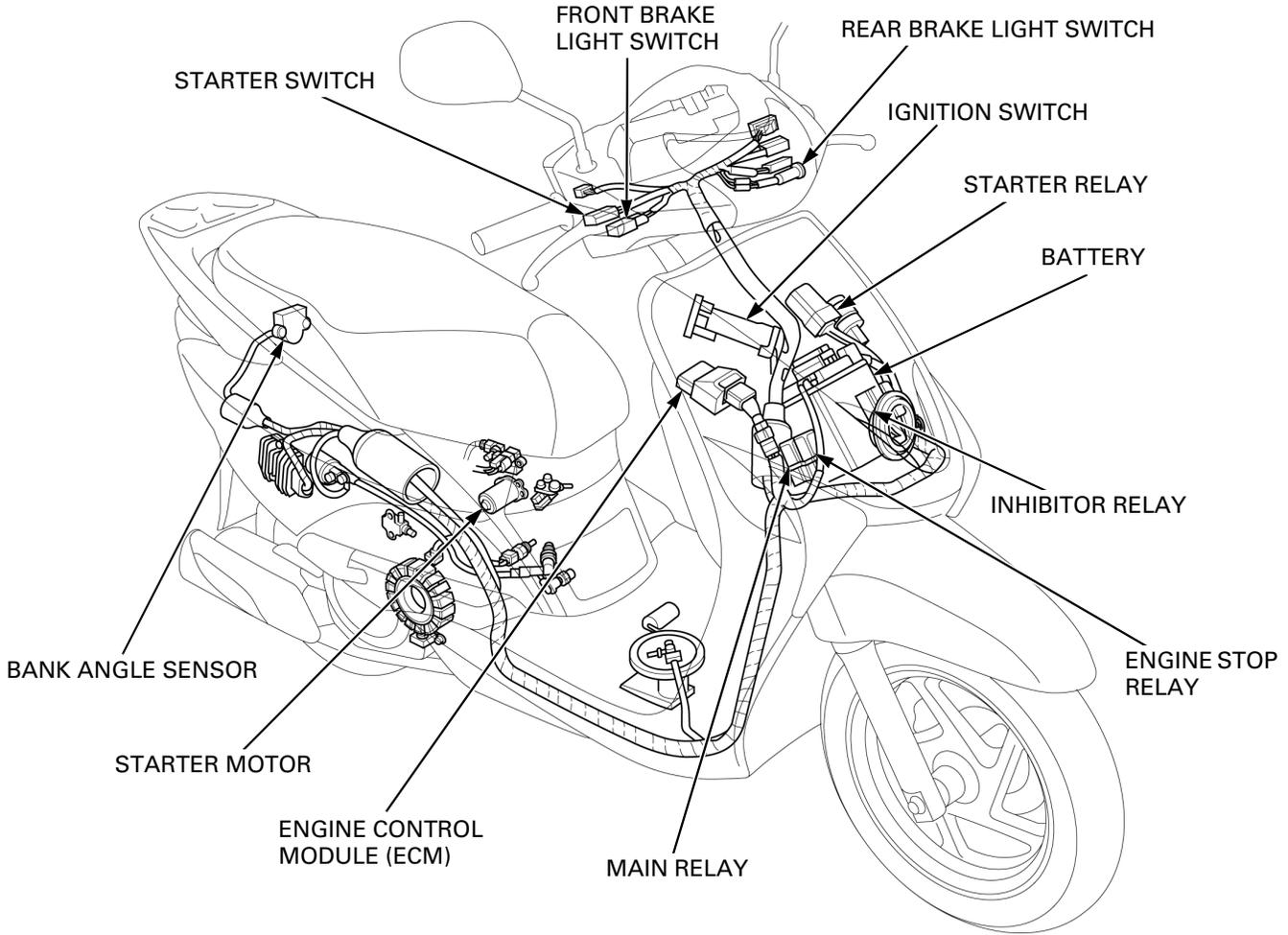
# 20. ELECTRIC STARTER

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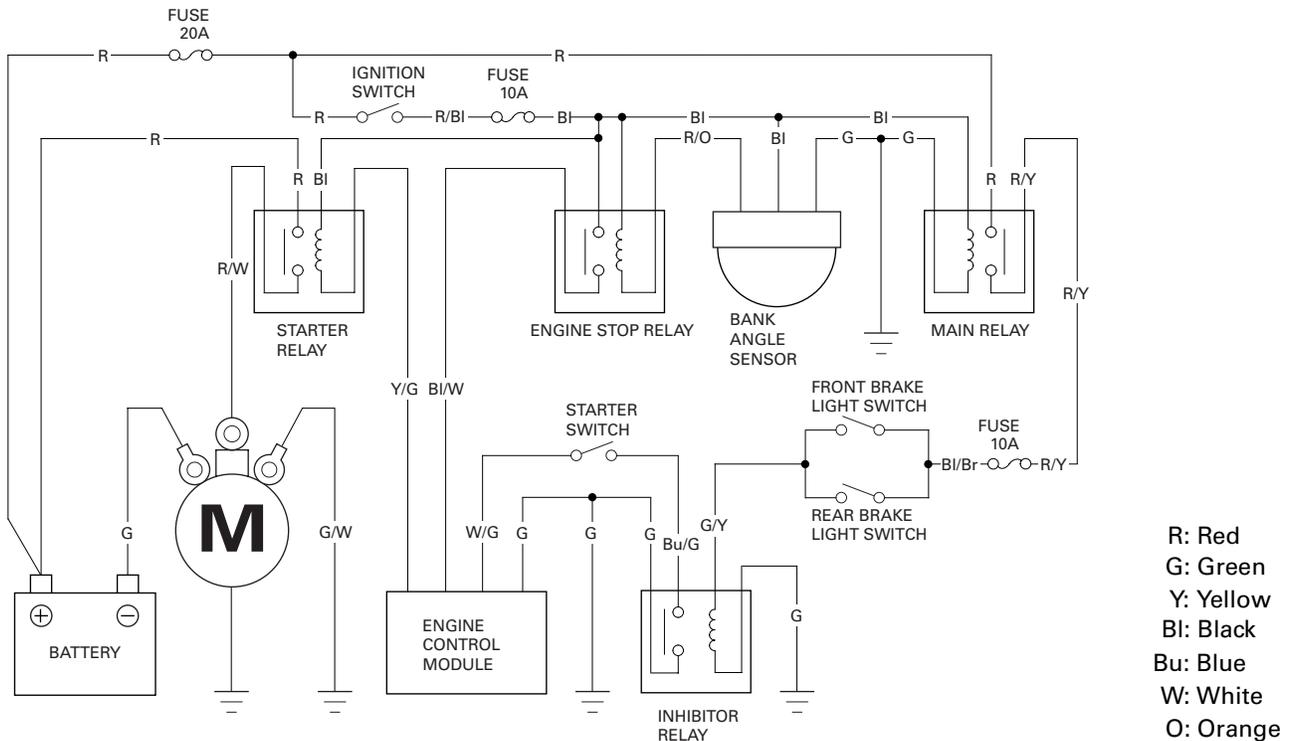
SYSTEM LOCATION.....	20-2	STARTER MOTOR.....	20-6
SYSTEM DIAGRAM.....	20-2	STARTER RELAY.....	20-10
SERVICE INFORMATION.....	20-3	INHIBITOR RELAY.....	20-13
TROUBLESHOOTING.....	20-4		

# 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.
- A weak battery may be unable to turn the starter motor quickly enough, or supply adequate ignition current.
- The starter motor can be serviced with the engine in the frame.
- When checking the starter system, always follow the steps in the troubleshooting (page 20-4).
- If the current is kept flowing through the starter motor to turn it while the engine is not cranking, the starter motor may be damaged.
- Refer to the following component information.
  - Starter pinion (page 11-7)
  - Ignition switch (page 21-11)
  - Starter switch (page 21-12)
  - Brake light switch (page 21-13)
  - Main relay (page 21-15)

### SPECIFICATION

Unit: mm (in)

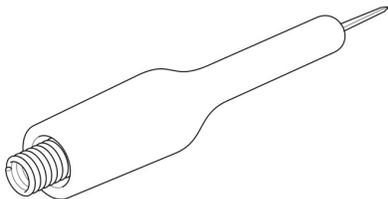
ITEM	STANDARD	SERVICE LIMIT
Starter motor brush length	7.0 (0.28)	3.5 (0.14)

### TORQUE VALUE

Starter motor case screw      2 N·m (0.20 kgf·m, 1.5 lbf·ft)

### TOOL

Test probe  
07ZAJ-RDJA110



# TROUBLESHOOTING

### Starter motor does not turn

#### 1. Standard inspection

Check the following:

- Battery condition
- Burned fuse
- Brake light operation

**Are the above items in good condition?**

**YES** - Replace or repair the malfunction part(s).

**NO** - GO TO STEP 2.

#### 2. Starter relay operation

Turn the ignition switch ON.

Squeeze the brake lever fully and push the starter switch.

You should hear the relay "CLICK" when the starter switch is depressed.

**Is the "CLICK" heard?**

**YES** - GO TO STEP 3.

**NO** - GO TO STEP 5.

#### 3. Starter motor inspection

Turn the ignition switch OFF.

Apply battery voltage to the starter motor directly and check the operation. (A large amount of current flows, so do not use a thin wire.)

**Does the starter motor turn?**

**YES** - GO TO STEP 4.

**NO** - Inspect the starter motor (page 20-7).

#### 4. Starter relay continuity inspection

Check the starter relay for continuity (page 20-12).

**Is there continuity?**

- YES** -
- Loose or poorly connected starter motor cable.
  - Loose or poorly connected starter relay connector terminal.
  - Open circuit in starter motor ground cable.
  - Open circuit in Red wire between the battery and starter relay.
  - Open circuit in Red/white wire between the starter relay and starter motor.

**NO** - Faulty starter relay.

#### 5. Engine control module (ECM) system circuit inspection

Turn the ignition switch ON and check the PGM-FI malfunction indicator lamp (MIL).

**Does the indicator stay off?**

**YES** - Inspect the ECM power/ground line (page 6-19).

**NO** - GO TO STEP 6.

#### 6. Starter relay coil line inspection

Turn the ignition switch OFF.

Disconnect the ECM 33P connector.

Turn the ignition switch ON and measure the battery voltage between the ECM 33P connector and ground.

**CONNECTION: Yellow/Green (+) - Ground (-)**

**Does the battery voltage exist?**

**YES** - GO TO STEP 7.

- NO** -
- Loose or poorly connected connector.
  - Open circuit in Black wire and/or Red/Black wire between the starter relay and ignition switch.
  - Open circuit in Red/White and/or Red wire between the ignition switch and battery.
  - Open circuit in Yellow/Green wire between the starter relay and ECM.

**7. Brake light switch line inspection**

Remove the inhibitor relay.  
Turn the ignition switch ON.  
Squeeze the brake lever fully and measure the battery voltage between the inhibitor relay (Black) connector and ground.

**CONNECTION: Green/Yellow (+) – Ground (-)**

***Does the battery voltage exist?***

**YES** – GO TO STEP 8.

**NO** – • Loose or poorly connected connector.  
• Open circuit in Green/Yellow wire between the inhibitor relay and brake light switch.

**8. Starter switch line inspection**

Turn the ignition switch ON.  
Push the starter switch and measure the voltage between the inhibitor relay (Black) connector of the wire harness side and ground.

**CONNECTION: Blue/Green – Ground**

**STANDARD: 4.75 – 5.25 V**

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

**YES** – GO TO STEP 9.

**NO** – • Loose or poorly connected connector.  
• Faulty starter switch (page 21-12).  
• Open or short circuit in Blue/Green wire between the inhibitor relay and starter switch.  
• Open or short circuit in White/Green wire between the starter switch and ECM.

**9. Inhibitor relay ground line inspection**

Turn the ignition switch OFF.  
Check for continuity between the inhibitor relay (Black) connector of the wire harness side and ground.

**CONNECTION: Green – Ground**

***Is there continuity?***

**YES** – GO TO STEP 10.

**NO** – • Loose or poorly connected connector.  
• Open circuit in Green wire.

**10. Inhibitor relay inspection**

Turn the ignition switch OFF.  
Check the inhibitor relay for continuity (page 20-14).

***Is there continuity?***

**YES** – Replace the ECM with a new one and recheck.

**NO** – Faulty inhibitor relay.

**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 pinion.

**Starter relay "CLICK", but engine does not turn**

- Crankshaft does not turn due to engine problems.

## ELECTRIC STARTER

# STARTER MOTOR

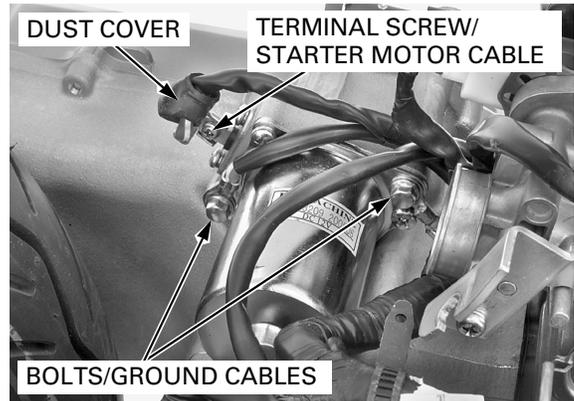
### REMOVAL

Remove the air cleaner housing (page 6-40).

Pull off the dust cover.

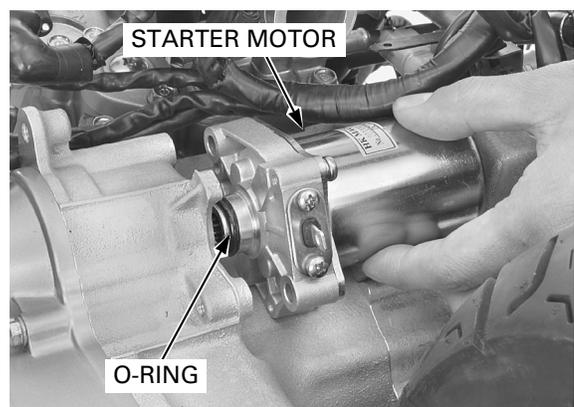
Remove the terminal screw and disconnect the starter motor cable.

Remove the mounting bolts and disconnect the ground cables.



Remove the starter motor from the left crankcase.

Remove the O-ring from the starter motor.

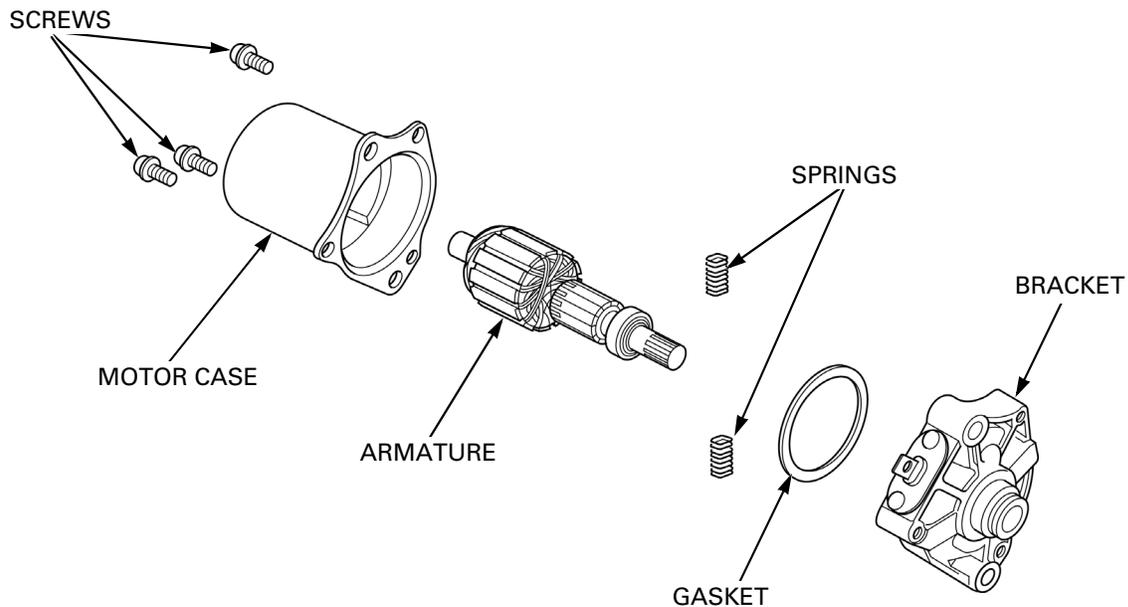


### DISASSEMBLY

Remove the screws and starter motor case.

Remove the following:

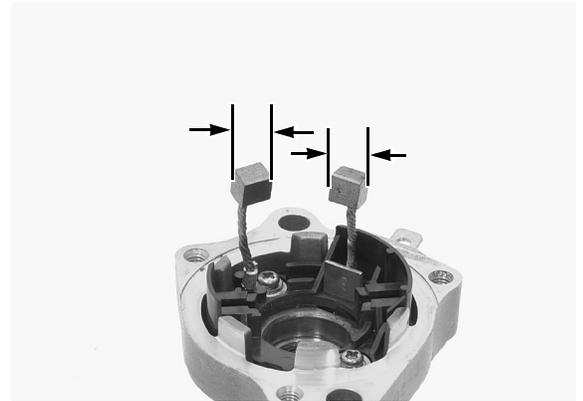
- Armature
- Bracket
- Springs
- Gasket



## INSPECTION

Inspect the brushes for damage and measure the brush length.

**SERVICE LIMIT: 3.5 mm (0.14 in)**

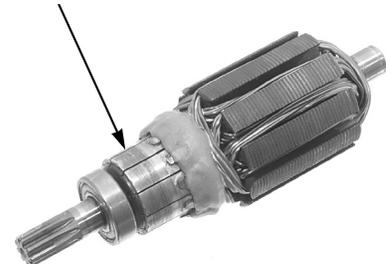


Inspect the commutator bars of the armature for discoloration.

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

Bars discolored in pairs indicate shorted coils.

COMMUTATOR BARS



Check for continuity between pair of commutator bars.  
There should be continuity.



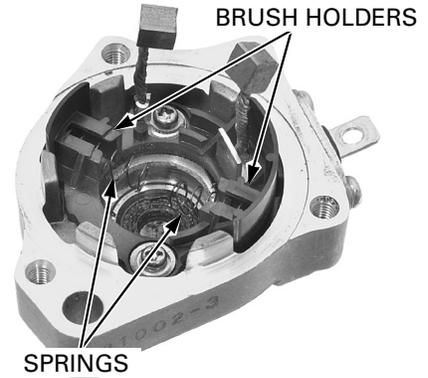
Check for continuity between each commutator bar and the armature shaft.  
These should be no continuity.



# ELECTRIC STARTER

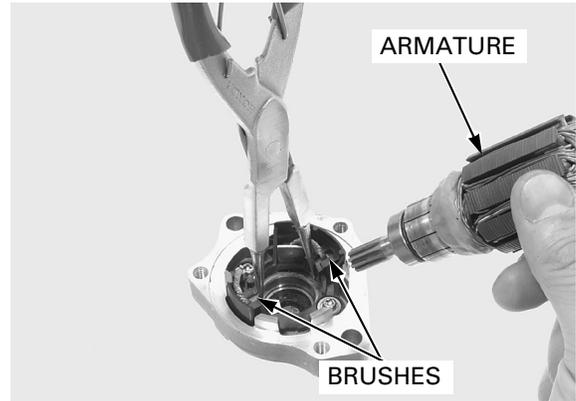
## ASSEMBLY

Install the brush springs into the brush holders.



*Be careful not to damage the commutator bars and brushes.*

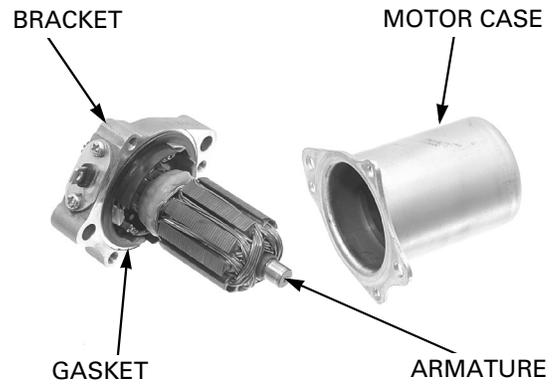
Set the brushes into the brush holder by compressing the brush springs. Install the armature into the bracket while holding the brushes.



Make sure the gasket is in good condition.

*The coil may be damaged if the magnet pulls the armature against the case.*

Install the bracket/armature to the motor case by holding the bracket side armature shaft tightly.



Install the motor case screws and tighten them to the specified torque.

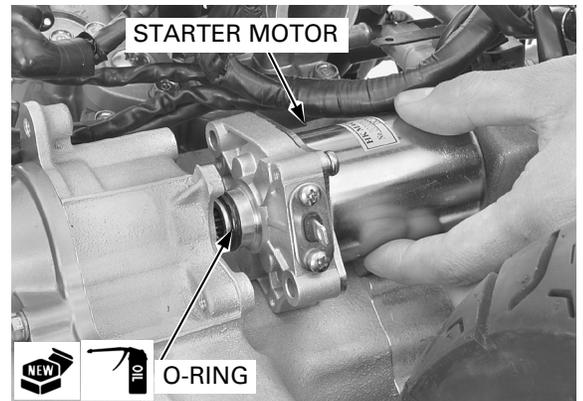
**TORQUE: 2 N·m (0.20 kgf·m, 1.5 lbf·ft)**



## INSTALLATION

Coat a new O-ring with engine oil and install it into the starter motor groove.

Install the starter motor to the left crankcase.



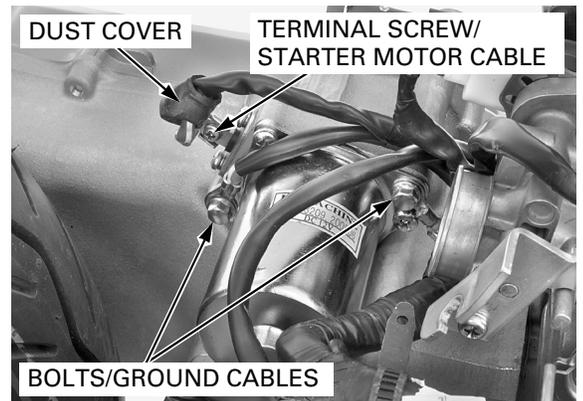
*Route the starter motor cable and ground cable properly (page 1-17).*

Connect the ground cables and tighten the mounting bolts.

Connect the starter motor cable and tighten the terminal screw.

Put the dust cover back in the appropriate position.

Install the air cleaner housing (page 6-40).



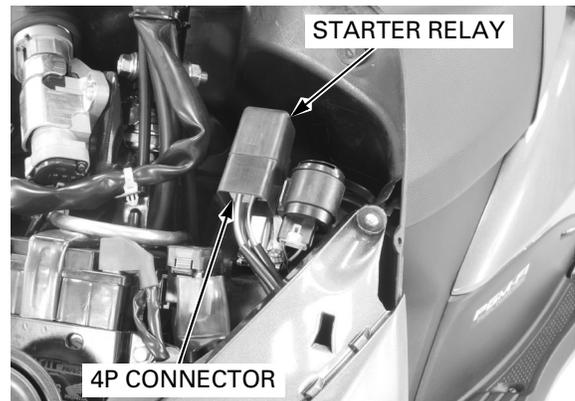
# STARTER RELAY

### REMOVAL/INSTALLATION

Remove the front center cover (page 3-4).

Remove the starter relay from the inner cover stay.  
Disconnect the starter relay 4P connector.

Installation is in the reverse order of removal.



### OPERATION INSPECTION

Remove the front center cover (page 3-4).

Turn the ignition switch ON.

Squeeze the brake lever fully and push the starter switch.

The coil is normal if the starter relay clicks.

If you hear the relay "CLICK", but starter does not turn, perform the starter relay continuity inspection (page 20-12).

If you do not hear the relay "CLICK", turn the ignition switch OFF and inspect the following:

- Starter relay coil line inspection (page 20-11)
- Brake light switch line inspection (page 20-11)
- Starter switch line inspection (page 20-12)
- Inhibitor relay ground line inspection (page 20-13)
- Inhibitor relay inspection (page 20-14)
- If the PGM-FI malfunction indicator lamp (MIL) stays off when the ignition switch is turned ON, check the ECM power/ground line inspection (page 6-19).



**STARTER RELAY COIL LINE INSPECTION**

Turn the ignition switch OFF.

Disconnect the ECM 33P connector.

Turn the ignition switch ON.

Measure the voltage between the ECM 33P connector of the wire harness side and ground.

**TOOL:**

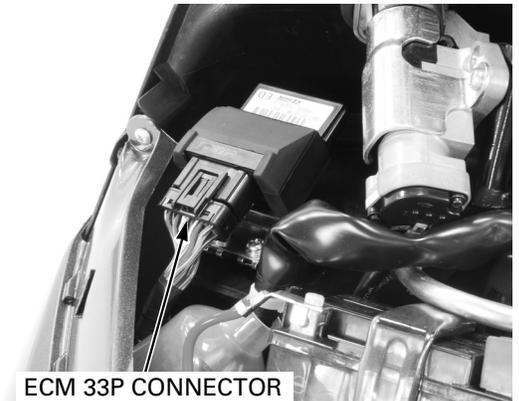
**Test probe** **07ZAJ-RDJA110**

**CONNECTION: Yellow/Green (+) – Ground (-)**

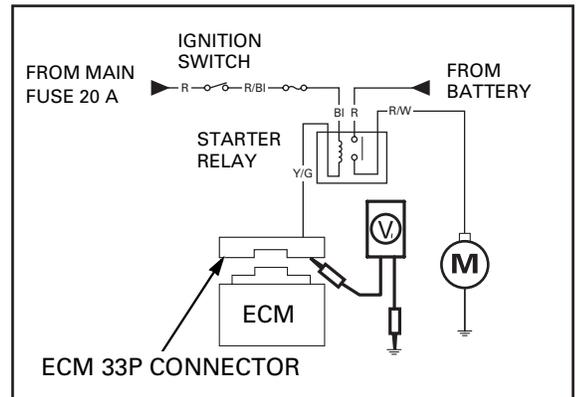
If the battery voltage appears when the ignition switch is turned ON, the starter relay coil line is normal.

If the battery voltage does not appear, check the following:

- Loose or poorly connected connector.
- Open circuit in Yellow/Green wire between the starter relay and ECM.
- Open circuit in Black wire and/or Red/Black wire between the starter relay and ignition switch.
- Faulty ignition switch (page 21-11).
- Open circuit in Red/White and/or Red wire between the ignition switch and battery.



**ECM 33P CONNECTOR**



**BRAKE LIGHT SWITCH LINE INSPECTION**

Turn the ignition switch OFF.

Remove the inhibitor relay (page 20-13).

Turn the ignition switch ON.

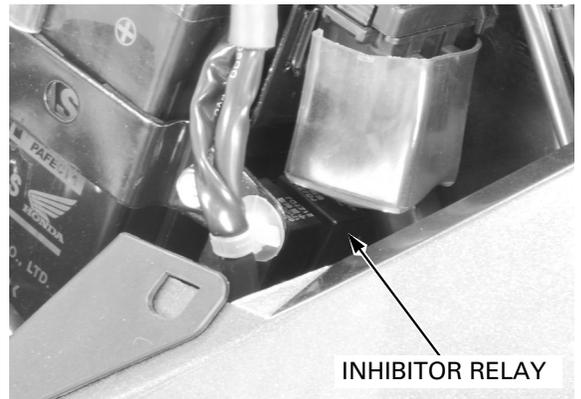
Measure the voltage between the relay connector of the wire harness side and ground.

**CONNECTION: Green/Yellow (+) – Ground (-)**

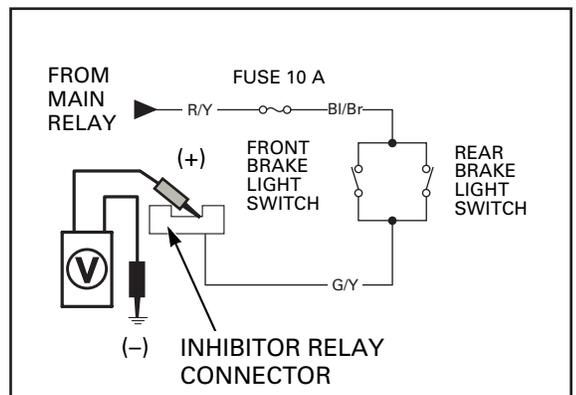
If the battery voltage appears only when the ignition switch is turned ON with the brake lever fully squeezed, the brake light switch line is normal.

If the battery voltage does not appear, check the following:

- Loose or poorly connected connector.
- Open circuit in Green/Yellow wire between the inhibitor relay and brake light switch.
- Main relay (page 21-15)



**INHIBITOR RELAY**



# ELECTRIC STARTER

## STARTER SWITCH LINE INSPECTION

Turn the ignition switch OFF.

Remove the inhibitor relay (page 20-13).

Turn the ignition switch ON.

Squeeze the brake lever fully and measure the voltage between the relay connector of the wire harness side and ground.

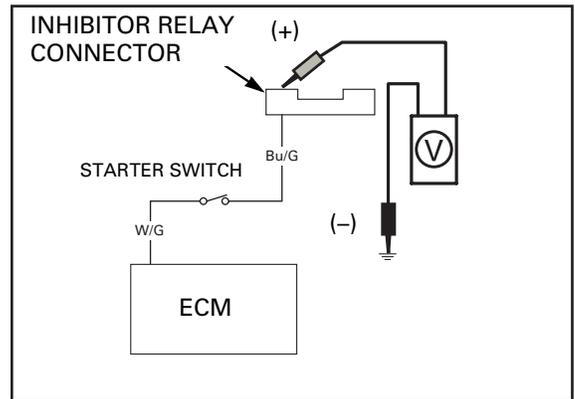
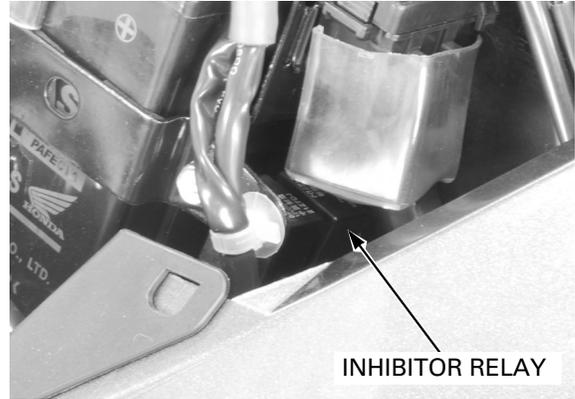
**CONNECTION: Blue/Green (+) – Ground (-)**

**STANDARD: 4.75 – 5.25 V**

If the standard voltage appears only when the ignition switch is turned ON and starter switch pushed, the starter switch line is normal.

If the battery voltage does not appear, check the following:

- Loose or poorly connected connector.
- Faulty starter switch (page 21-12).
- Open or short circuit in Blue/Green wire between the inhibitor relay and starter switch.
- Open or short circuit in White/Green wire between the starter switch and ECM.



## STARTER RELAY CONTINUITY INSPECTION

Remove the starter relay (page 20-10).

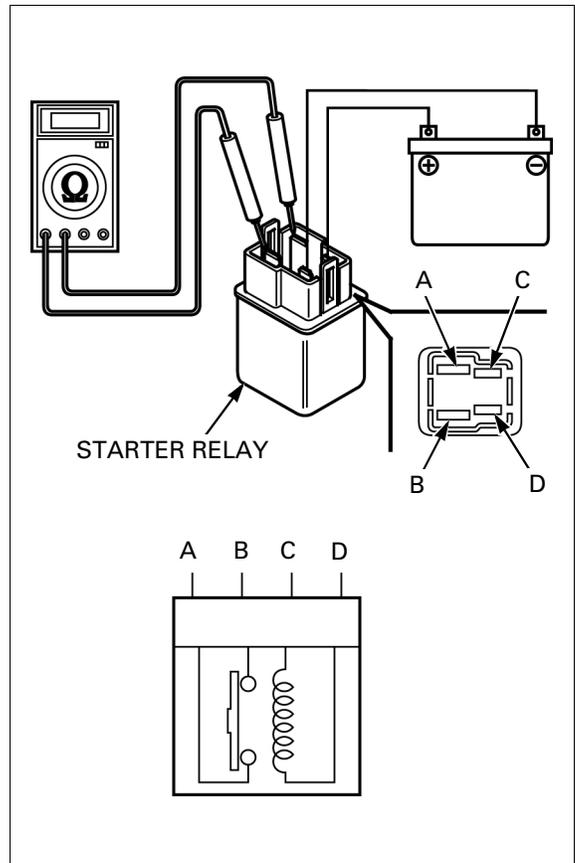
Connect the ohmmeter to the following starter relay terminals.

**Connection: A – B**

Connect the 12 V battery to the following starter relay terminals.

**Connection: C – D**

There should be continuity between the relay terminals while the battery is connected, and no continuity when the battery is disconnected.



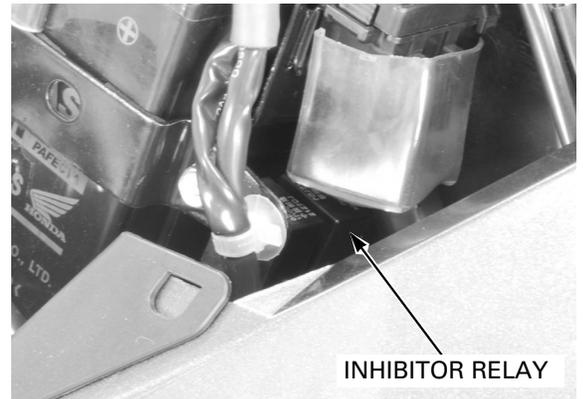
## INHIBITOR RELAY

### REMOVAL/INSTALLATION

Remove the front center cover (page 3-4).

Remove the inhibitor relay from the relay (Black) connector.

Installation is in the reverse order of removal.



### RELAY GROUND LINE INSPECTION

Turn the ignition switch OFF.

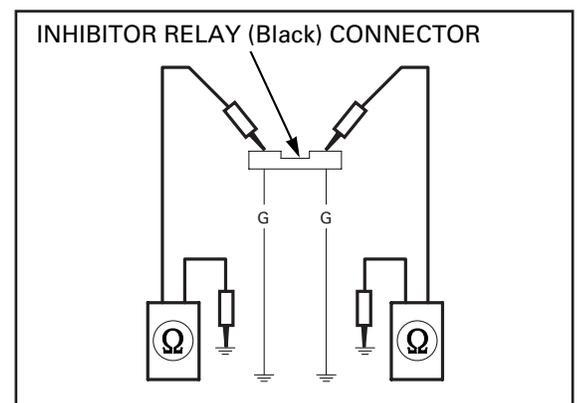
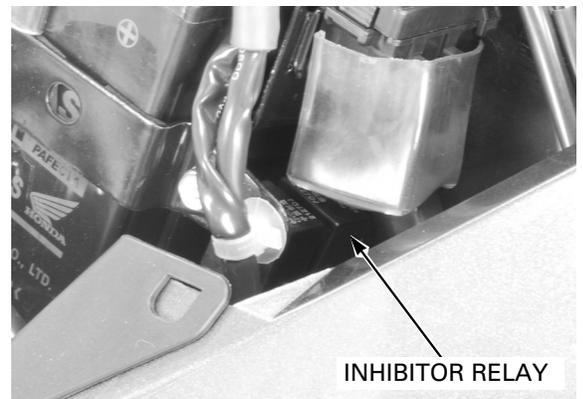
Remove the front center cover (page 3-4).

Remove the inhibitor relay (page 20-13).

Check for continuity between the relay connector of the wire harness side and ground.

**Connection: Green – Ground**

There should be continuity at all time.



## ELECTRIC STARTER

### RELAY INSPECTION

Remove the inhibitor relay (page 20-13).

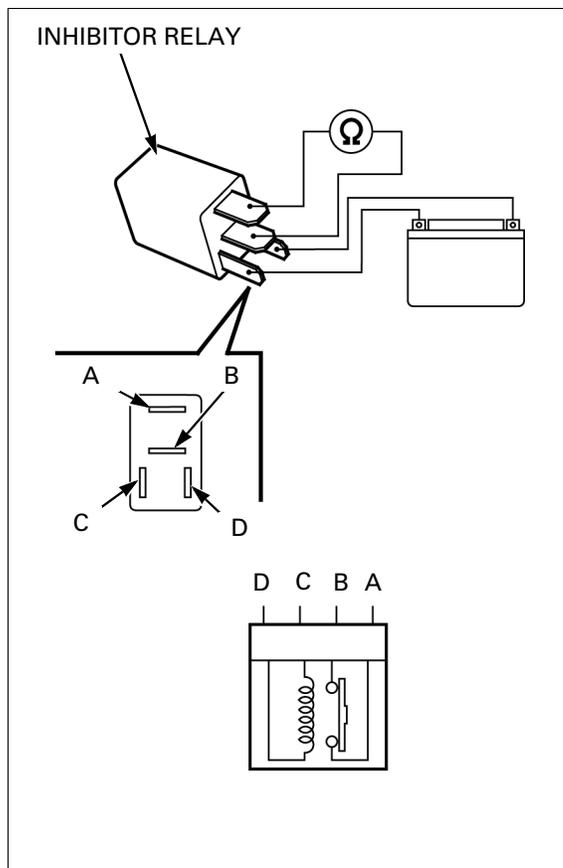
Connect the ohmmeter to the following inhibitor relay terminals.

**Connection: A – B**

Connect the 12 V battery to the following inhibitor relay terminals.

**Connection: C – D**

There should be continuity between the relay terminals while the battery is connected, and no continuity when the battery is disconnected.

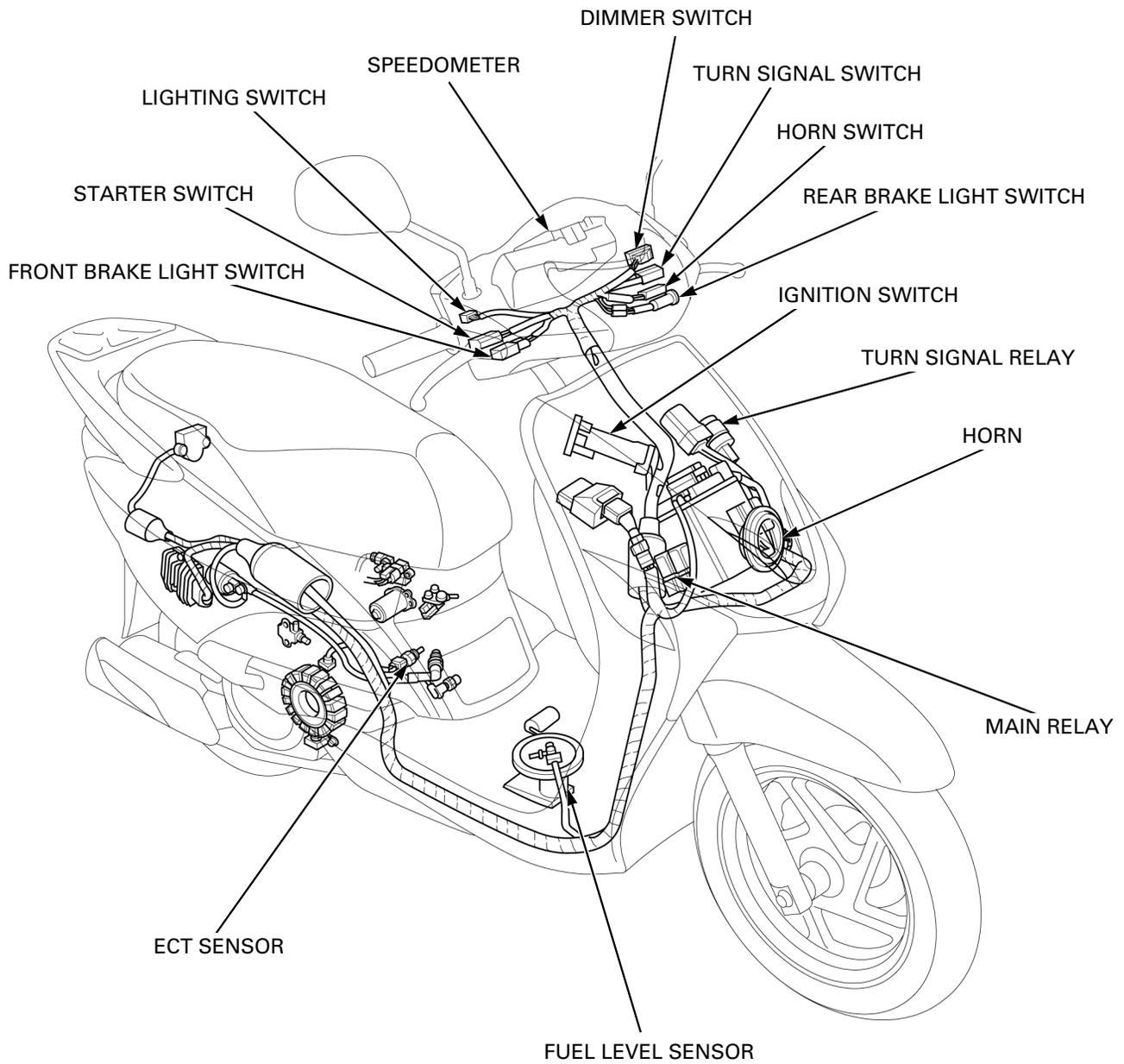


# 21. LIGHTS/METERS/SWITCHES

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SYSTEM LOCATION.....	21-2	FUEL METER/FUEL LEVEL SENSOR.....	21-10
SERVICE INFORMATION .....	21-3	IGNITION SWITCH .....	21-11
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FRONT TURN SIGNAL LIGHT.....	21-5	BRAKE LIGHT SWITCH .....	21-13
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LICENSE LIGHT.....	21-6	TURN SIGNAL RELAY .....	21-15
SPEEDOMETER .....	21-7	MAIN RELAY .....	21-15
COOLANT TEMPERATURE METER/ ECT SENSOR .....	21-9		

SYSTEM LOCATION



## SERVICE INFORMATION

### GENERAL

#### NOTICE

Note the following when replacing the halogen headlight bulb.

- Wear clean gloves while replacing the headlight bulb. Do not put fingerprints 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.
- A halogen headlight bulb becomes very hot while the headlight is on, and remains hot for a while after it is turned off. Be sure to let it cool down before servicing.
- Check the battery condition before performing any inspection that requires proper battery voltage.
- Use an electric heating element to heat the water/coolant mixture for the ECT sensor inspection. Keep all flammable materials away from the electric heating element. Wear protective clothing, insulated gloves and eye protection.
- A continuity test can be made with the switches installed on the scooter.
- Route the wires and cables properly after servicing each component (page 1-17).
- This model utilizes ECT sensor that has two thermistors, for coolant temperature meter and PGM-FI systems. Refer to the ECT sensor for PGM-FI systems inspection (page 6-52).
- The following color codes are used throughout this section.

Bu: Blue	G: Green	Lg: Light Green	W: White
Bl: Black	Gr: Gray	O: Orange	Y: Yellow
Br: Brown	Lb: Light Blue	R: Red	

### SPECIFICATIONS

ITEM		SPECIFICATIONS	
Bulbs	Headlight	Hi	13 V – 35 W
		Lo	13 V – 30 W
	Brake/tail light		12 V – 21/5 W
	Turn signal light		12 V – 21 W x 4
	License light		12 V – 5 W
	Instrument light		12 V – 1.7 W x 2
	Turn signal indicator		12 V – 3 W x 2
	High beam indicator		12 V – 1.7 W
	PGM-FI malfunction indicator lamp (MIL)	LED	
Fuse	Main fuse	20 A	
	Sub fuse	10 A x 3	

### TORQUE VALUES

Ignition switch protector socket bolt      8.5 N·m (0.87 kgf·m, 6.3 lbf·ft)

## HEADLIGHT

### BULB REPLACEMENT

Remove the front handlebar cover (page 3-6).

Pull off the dust cover from the headlight unit.

Disconnect the headlight 3P connector.

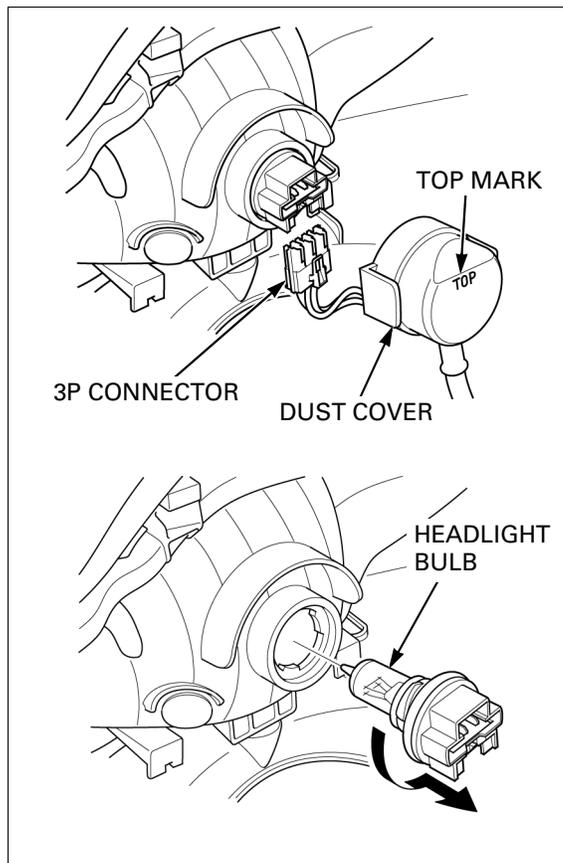
Release the headlight bulb by turning counterclockwise.

Install the headlight bulb to the headlight unit by turning clockwise.

Connect the headlight 3P connector.

Install the dust cover with its TOP mark facing up.

Install the front handlebar cover (page 3-6).



### REMOVAL/INSTALLATION

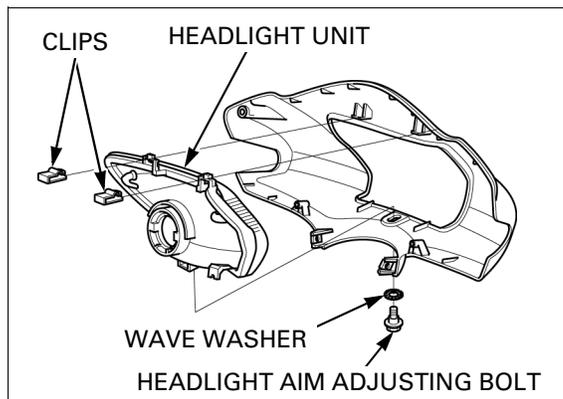
Remove the front handlebar cover (page 3-6).

Remove the headlight aim adjusting bolt and wave washer.

Remove the set clips and headlight unit.

Installation is in the reverse order of removal.

Adjust the headlight aim (page 4-20).



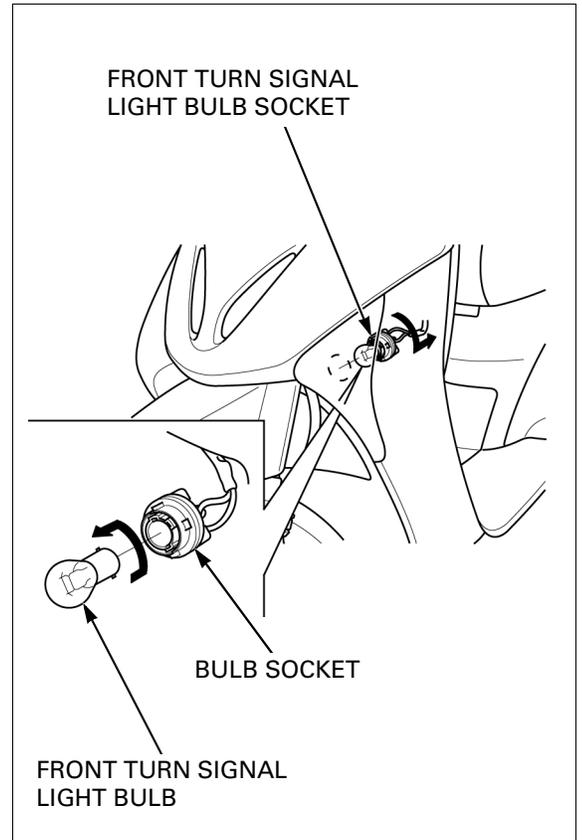
## FRONT TURN SIGNAL LIGHT

### BULB REPLACEMENT

Turn the front turn signal light bulb socket counterclockwise and remove it from the turn signal light unit.

Remove the front turn signal light bulb from the socket by pushing in and turning counterclockwise.

Install the turn signal light bulb socket in the reverse order of removal.

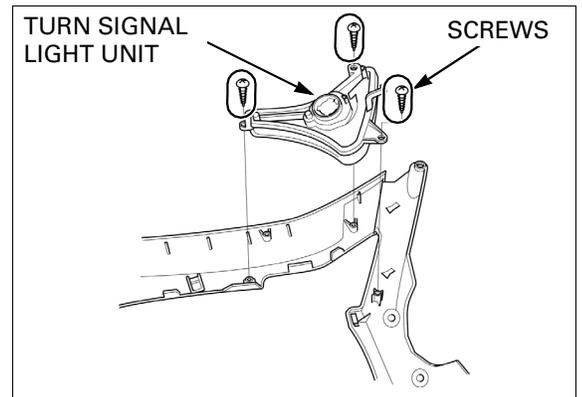


### REMOVAL/INSTALLATION

Remove the front cover (page 3-6).

Remove the screws and front turn signal light unit.

Installation is in the reverse order of removal.



## REAR COMBINATION LIGHT

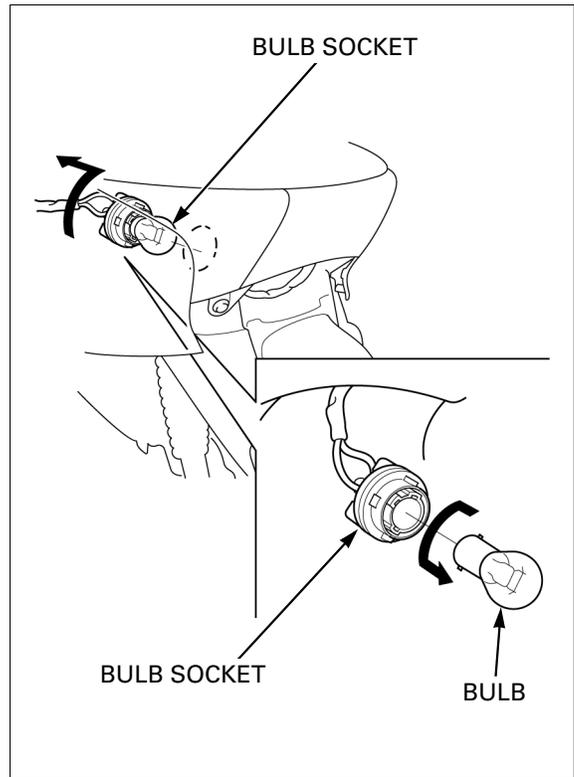
### BRAKE/TAILLIGHT/REAR TURN SIGNAL LIGHT BULB REPLACEMENT

Remove the rear lower body cover (page 3-9).

Turn the bulb socket counterclockwise and remove it from the rear combination light unit.

Remove the bulb from the socket by pushing in and turning counterclockwise.

Installation is in the reverse order of removal.



## LICENSE LIGHT

### BULB REPLACEMENT

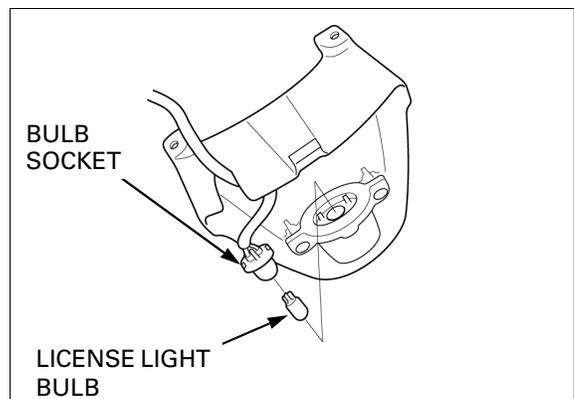
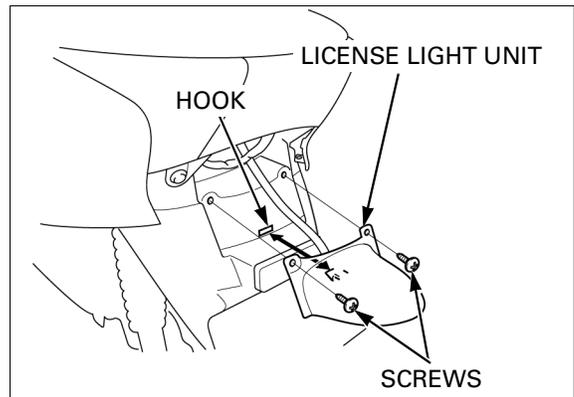
Remove the rear lower body cover (page 3-9).

Remove the screws from the license light unit. Remove the license light unit by unhooking the hook.

Pull out the license light bulb socket from the light unit.

Remove the license light bulb from the socket.

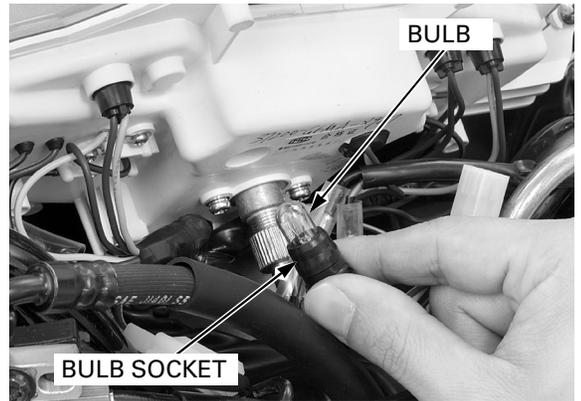
Installation is in the reverse order of removal.



## SPEEDOMETER

### BULB REPLACEMENT

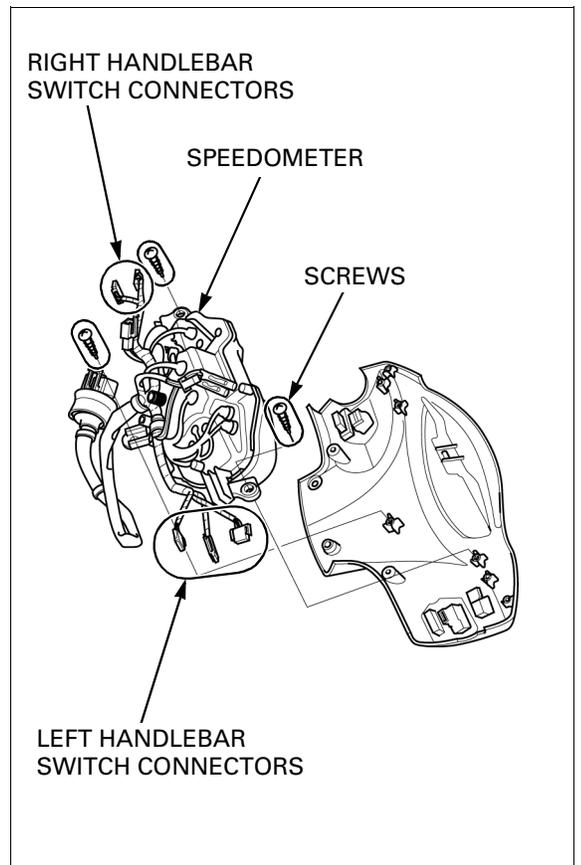
Remove the front handlebar cover (page 3-6).  
 Pull out the bulb socket from the speedometer.  
 Remove the bulb from the socket.  
 Installation is in the reverse order of removal.



### REMOVAL/INSTALLATION

Remove the rear handlebar cover (page 3-7).  
 Disconnect the left and right handlebar switch connectors.  
 Remove the three screws and speedometer.  
 Installation is in the reverse order of removal.

*Route the wire harness properly (page 1-17).*



# LIGHTS/METERS/SWITCHES

## DISASSEMBLY/ASSEMBLY

Remove the four screws and meter lens from the meter case.

Remove the meter plate from the meter case.

Remove the six terminal screws and pull out the five bulb sockets.

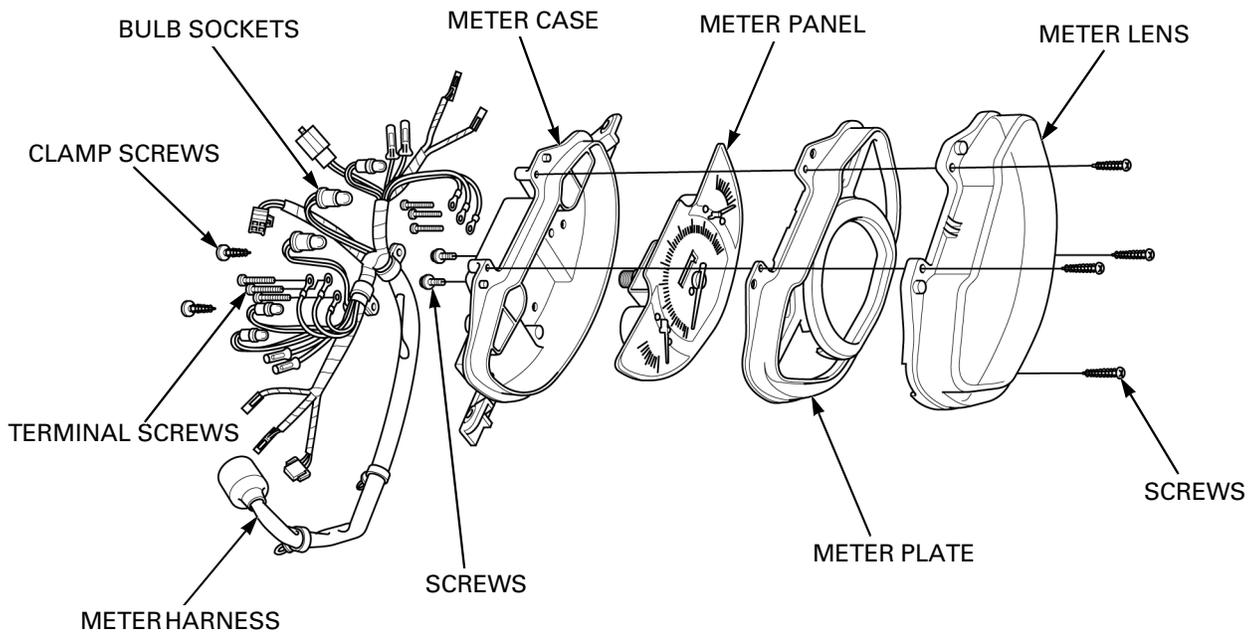
Remove the two clamp screws and meter harness.

Hold the meter panel and remove the two screws and meter panel.

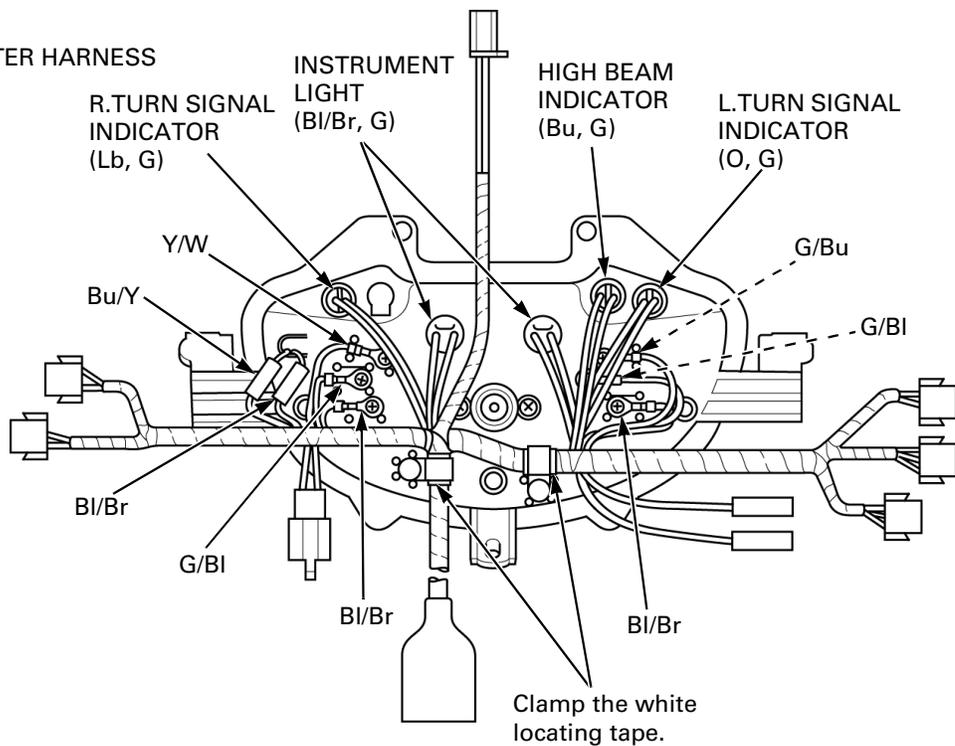
*Route the meter harness as shown in the illustration.*

Assembly is in the reverse order of disassembly.

- Be careful not to put fingerprints on the meter panel.



### SPEEDOMETER HARNESS ROUTING:



# COOLANT TEMPERATURE METER/ECT SENSOR

## SYSTEM INSPECTION

### WHEN ENGINE IS HOT BUT NEEDLE DOES NOT MOVE

Before performing the system inspection, check the following:

- Battery condition
- Burned fuse
- Horn operation

Remove the side body cover (page 3-4).

Disconnect the ECT sensor 3P (Gray) connector.

Short the connector terminal of the wire harness side and ground with the jumper wire.

### CONNECTION: Green/Blue – Ground

*Do not leave the terminal connected with jumper wire for a long time, as it causes damage to the coolant temperature meter.*

Turn the ignition switch ON, check the coolant temperature meter needle move to "H".

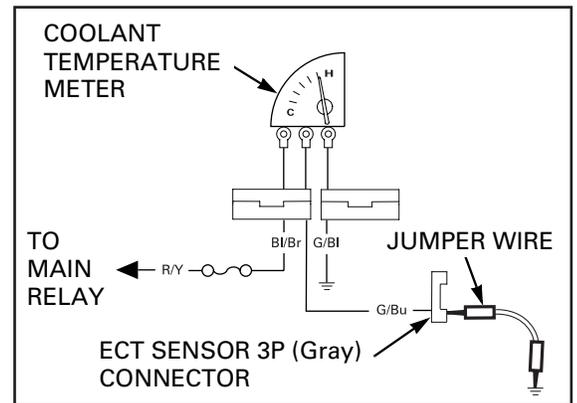
The needle moves if the system circuit is normal. In that case, check the ECT sensor (page 21-9).

If the needle does not move, check the following:

- Green/Blue wire between the ECT sensor and speedometer for open or short circuit
- Black/Brown wire between the fuse box and speedometer for open circuit
- Green/Black wire between the speedometer and ground for open circuit

If the wires are normal, replace the speedometer panel with a new one, and recheck.

After inspection, reset the self-diagnosis memory data from the ECM (page 6-15).



## ECT SENSOR INSPECTION

Remove the ECT sensor (page 6-52).

Suspend the ECT sensor in a pan of coolant on an electric heating element and measure the resistance between the ECT sensor terminal and body as the coolant heats up.

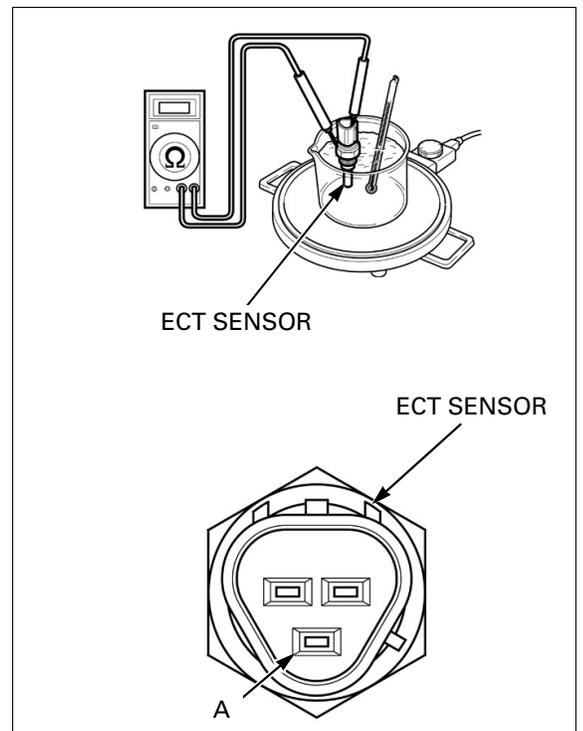
- Dip the ECT sensor in coolant up to its threads while keeping the distance at least 40 mm (1.57 in) from the bottom of the pan to the bottom of the sensor.
- Keep the temperature constant for 3 minutes before testing. A sudden change of temperature will result in incorrect reading. Do not let the thermometer or ECT sensor touch the pan.

Measure the resistance between the ECT sensor terminal and thread.

### CONNECTION: A – Ground

Temperature	50 °C (122 °F)	80 °C (176 °F)
Resistance	130 – 180 Ω	47 – 57 Ω

If the resistance is out of above range by 10% at any temperature listed, replace the ECT sensor.



# FUEL METER/FUEL LEVEL SENSOR

## SYSTEM INSPECTION

### WHEN FUEL IS ABOUT FULL BUT NEEDLE DOES NOT MOVE

Before performing the system inspection, check the following:

- Battery condition
- Burned fuse
- Horn operation

Remove the floor panel (page 3-11).

Disconnect the fuel pump/fuel level sensor 5P connector.

Short the connector terminals of the wire harness side with the jumper wire.

### CONNECTION: Yellow/White – Green/Black

*Do not leave the terminals connected with jumper wire for a long time, as it causes damage to the fuel meter.*

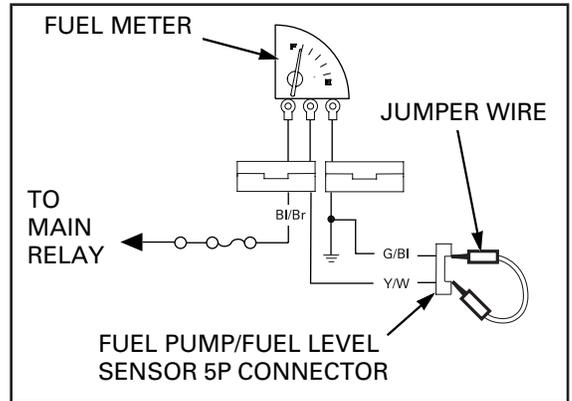
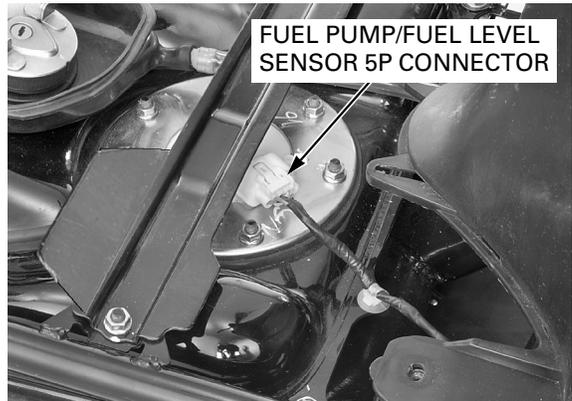
Turn the ignition switch ON, check if the fuel meter needle moves to "F".

The needle moves if the system circuit is normal. In that case, check the fuel level sensor (page 21-10).

If the needle does not move, check the following:

- Yellow/White wire between the fuel pump/fuel level sensor and speedometer for open or short circuit
- Black/Brown wire between the fuse box and speedometer for open circuit
- Green/Black wire between the fuel pump/fuel level sensor and ground for open circuit
- Green/Black wire between the speedometer and ground for open circuit

If the wire is normal, replace the speedometer panel with a new one, and recheck.



## FUEL LEVEL SENSOR INSPECTION

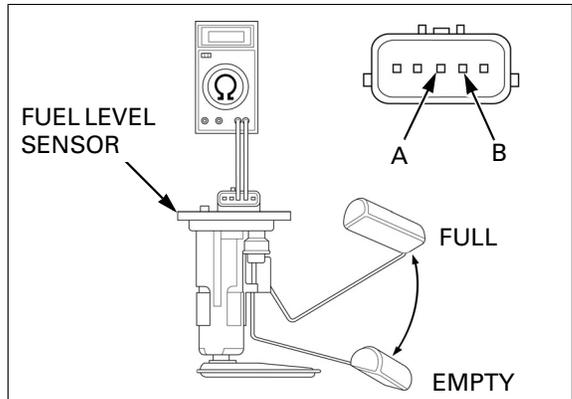
Remove the fuel pump/fuel level sensor (page 6-36).

Measure the resistance between the connector terminals at the float upper (full) and lower (empty) positions.

### CONNECTION: A – B

FLOAT POSITION	(20°C/68°F)	
	FULL	EMPTY
	6 – 10 Ω	90 – 100 Ω

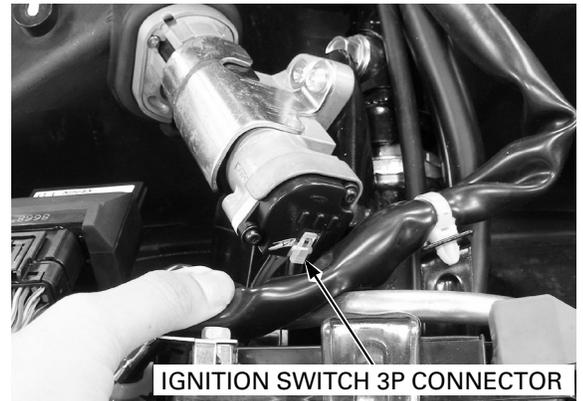
Replace the fuel level sensor if it is out of specification.



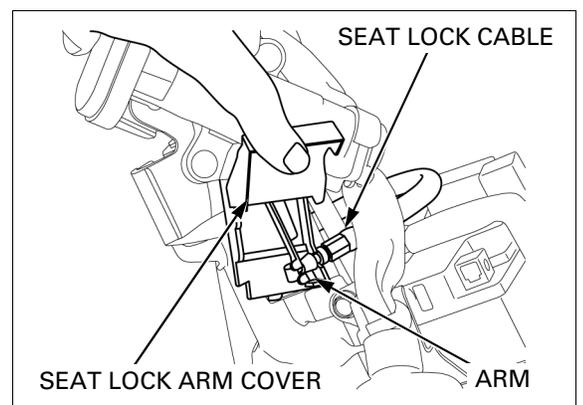
# IGNITION SWITCH

## REMOVAL

Remove the front inner cover (page 3-12).  
 Disconnect the ignition switch 3P connector.



Open the seat lock arm cover and disconnect the seat lock cable from the arm.



Remove the bolt and key shutter.

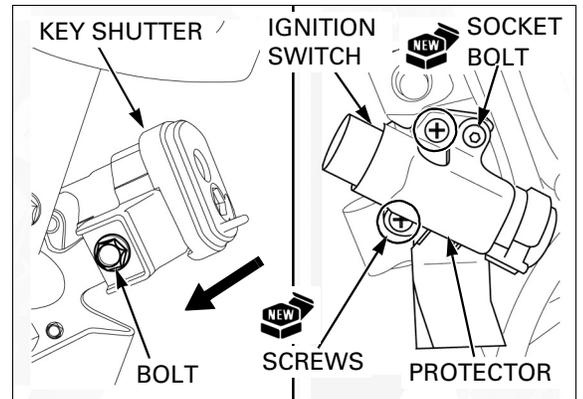
Remove the following:

- Mount screws
- Ignition switch
- Socket bolt
- Protector

Installation is in the reverse order of removal.

- Install the new socket bolt and new mount screw.
- When install the key shutter, push that to the ignition switch. If the key shutter floated, there is the case that can not completely insert the key in.

**TORQUE: Ignition switch protector socket bolt**  
 8.5 N·m (0.87 kgf·m, 6.3 lbf·ft)



## LIGHTS/METERS/SWITCHES

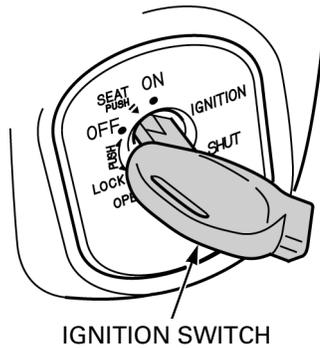
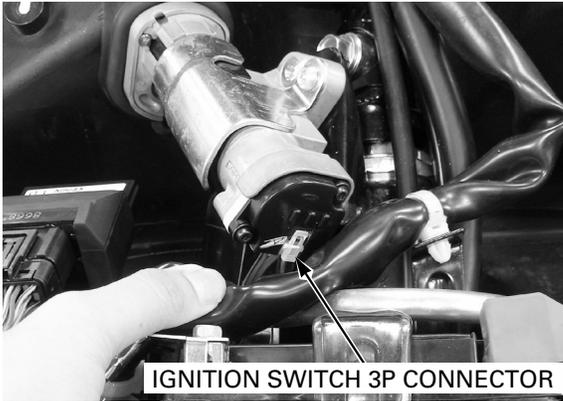
### INSPECTION

Remove the front center cover (page 3-4).

Disconnect the ignition switch 3P connector.

Check for continuity at the terminals of the switch side connector in each switch position.

Continuity should exist between the color coded wires as follows:



IGNITION SWITCH			
	BAT1	BAT	CDI
ON	○	○	
OFF	○		○
LOCK	○		○
COLOR	R	R/BI	P

## HANDLEBAR SWITCHES

### RIGHT HANDLEBAR SWITCH INSPECTION

Remove the front handlebar cover (page 3-6).

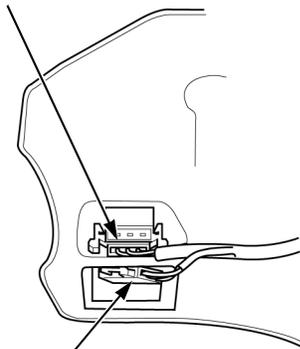
Disconnect the following:

- Starter switch 3P (Black) connector
- Lighting switch 3P connector

Check for continuity between the terminals of the starter switch connector in each switch position.

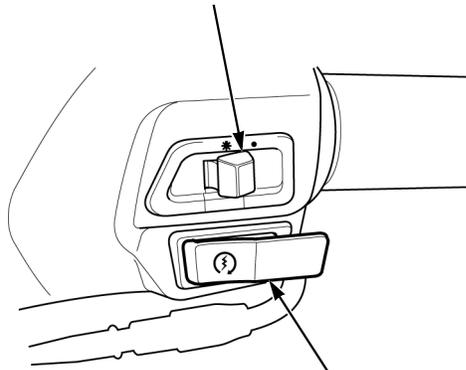
Continuity should exist between the color coded wires as follows:

LIGHTING SWITCH CONNECTOR



STARTER SWITCH (Black) CONNECTOR

LIGHTING SWITCH



STARTER SWITCH

STARTER SWITCH		
	ST1	ST2
FREE		
PUSH	○	○
COLOR	Bu/G	W/G

LIGHTING SWITCH		
	C1	HL
●		
(N)	○	○
H	○	○
COLOR	BI/R	BI/Br

## LEFT HANDLEBAR SWITCH INSPECTION

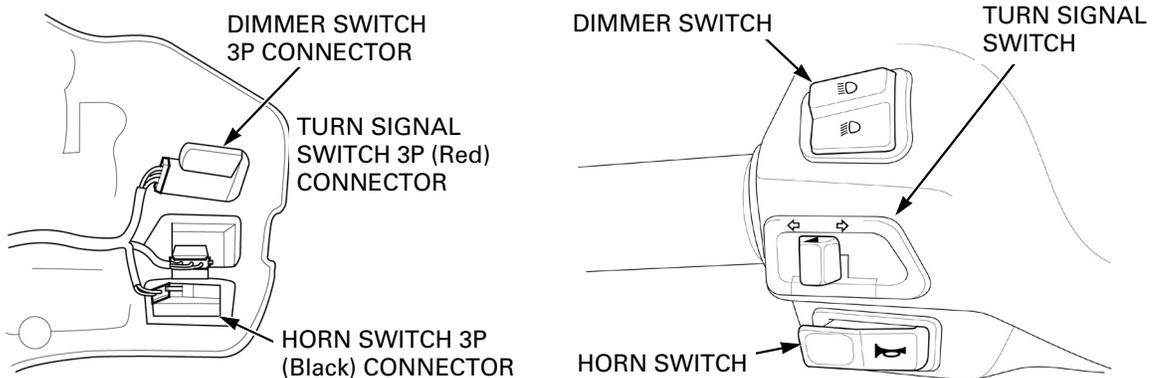
Remove the front handlebar cover (page 3-6).

Disconnect the following:

- Dimmer switch 3P connector
- Turn signal switch 3P (Red) connector
- Horn switch 3P (Black) connector

Check for continuity between the wire terminals of the dimmer switch, turn signal switch and horn switch connector in each switch position.

Continuity should exist between the color coded wires as follows:



DIMMER SWITCH			
	HI	LO	HL
LO		○—○	○
N	○—○	○—○	○
HI	○—○		○
COLOR	Bu	W	Bl/R

TURN SIGNAL SWITCH			
	W	WL	WR
R	○—○		○
N			
L	○—○		
COLOR	Gr	O	Lb

HORN SWITCH		
	HO	BAT
FREE		
PUSH	○—○	
COLOR	Lg	Bl/Br

## BRAKE LIGHT SWITCH

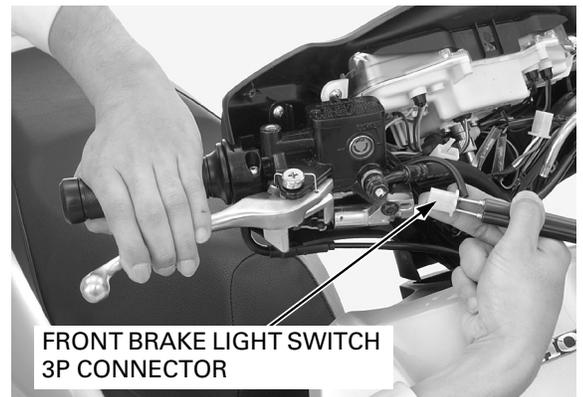
### FRONT

Remove the front handlebar cover (page 3-6).

Disconnect the front brake light switch 3P connector and check for continuity of the switch side.

**CONNECTION: Green/Yellow – Black/Brown**

There should be continuity with the front brake lever squeezed, and there should be no continuity when the front brake lever is released.



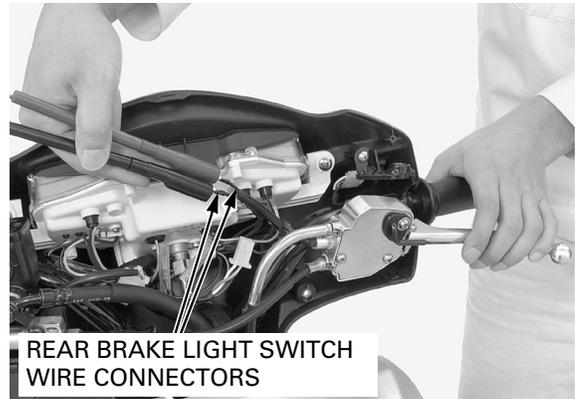
## LIGHTS/METERS/SWITCHES

### REAR

Remove the front handlebar cover (page 3-6).

Disconnect the rear brake light switch wire connectors and check for continuity at the wire connector terminals of the switch side.

There should be continuity with the rear brake lever squeezed, and there should be no continuity when the rear brake lever is released.



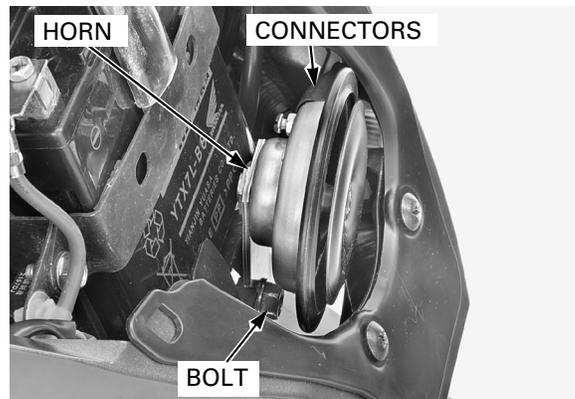
## HORN

### REMOVAL/INSTALLATION

Remove the front center cover (page 3-4).

Disconnect the horn connectors from the horn. Remove the bolt and horn.

Installation is in the reverse order of removal.

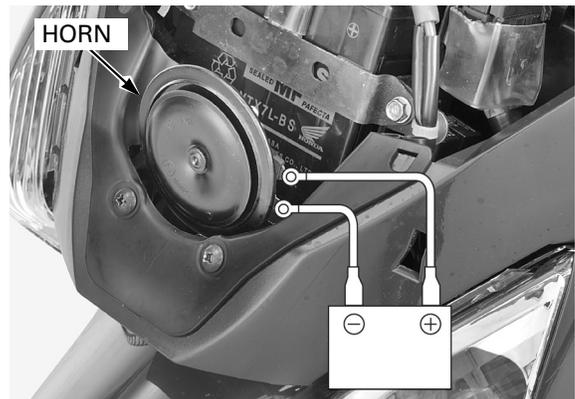


### INSPECTION

Remove the front center cover (page 3-4).

Disconnect the horn connectors from the horn.

Connect a 12V battery to the horn terminals. The horn is normal if it sounds when the 12V battery is connected to the horn terminals.



## TURN SIGNAL RELAY

### INSPECTION

Before performing the inspection, check the following:

- Battery condition
- Burned out bulb or non-specified wattage
- Burned fuse
- Ignition switch and turn signal switch function
- Loose connector

Remove the front center cover (page 3-4).

Disconnect the turn signal relay 3P connector from the relay.

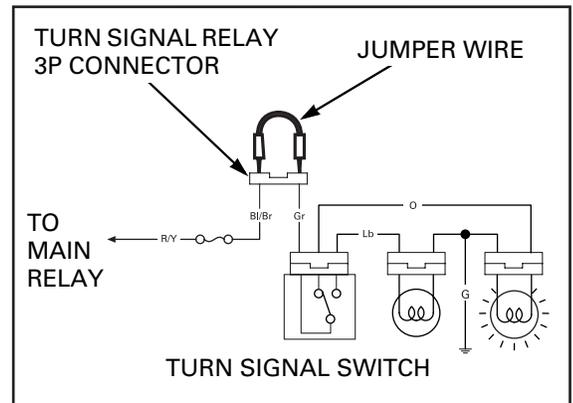
Short the turn signal relay 3P connector terminals of the wire harness side with a jumper wire.

**CONNECTION: Black/Brown – Gray**

Check the turn signal light by turning the switch ON.

If the light comes on, the turn signal relay is faulty or connector has poor connection.

If the light does not come on, the wire harness is broken.



## MAIN RELAY

### REMOVAL/INSTALLATION

Remove the front center cover (page 3-4).

Remove the main relay from the relay (Black) connector.

Installation is in the reverse order of removal.



## LIGHTS/METERS/SWITCHES

### OPERATION INSPECTION

Remove the front center cover (page 3-4).

Turn the ignition switch ON.

The main relay coil is normal if the main relay clicks.

If you hear the main relay "CLICK", but horn does not operate when the horn switch is pushed, inspect the following:

- Main relay continuity inspection (page 21-16)
- Main relay switch line inspection (page 21-17)

If you do not hear the relay "CLICK", inspect the following:

- Main relay coil line inspection (page 21-17)
- Main relay continuity inspection (page 21-16)



### CONTINUITY INSPECTION

Turn the ignition switch OFF.

Remove the main relay (page 21-15).

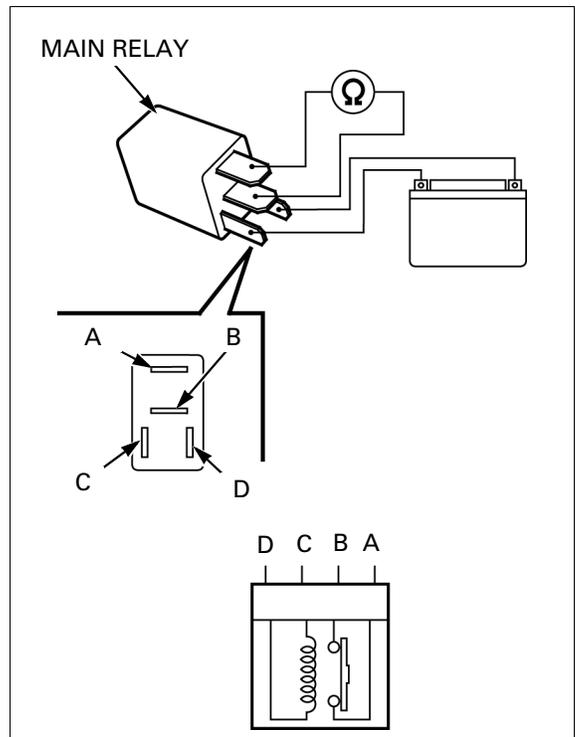
Connect the ohmmeter to the following main relay terminals.

**Connection: A – B**

Connect the 12 V battery to the following main relay terminals.

**Connection: C – D**

There should be continuity between the relay terminals while the battery is connected, and no continuity when the battery is disconnected.



**SWITCH LINE INSPECTION**

Turn the ignition switch OFF.

Remove the main relay (page 21-15).

Short the relay (Black) connector terminals of the wire harness side with a jumper wire.

**Connection: Red – Red/Yellow**

Turn the ignition switch ON.

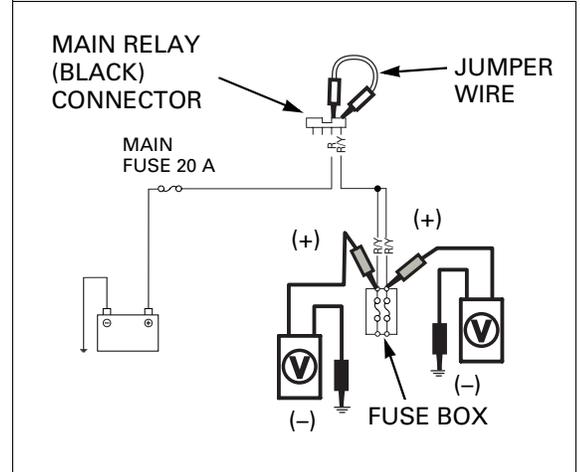
Measure the voltage between the fuse box connector of the wire harness side and ground.

**Connection: Red/Yellow (+) – Ground (-)**

If the battery voltage appears, the main relay switch line is normal.

If the battery voltage does not appear, inspect the following:

- Open circuit in Red wire between the battery and main relay
- Open circuit in Red/Yellow wire between the main relay and fuse box



**COIL LINE INSPECTION**

**COIL POWER LINE**

Turn the ignition switch OFF.

Remove the main relay (page 21-15).

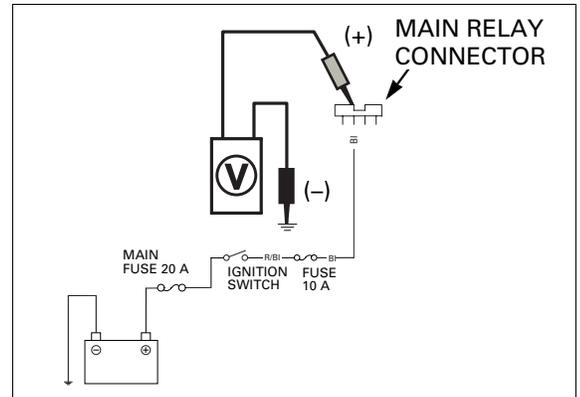
Turn the ignition switch ON.

Measure the voltage between the main relay connector of the wire harness side and ground.

**Connection: Black (+) – Ground (-)**

If the battery voltage appears, the main relay coil power line is normal.

If the battery voltage does not appear, inspect the open circuit in Black wire between the fuse box and main relay.



**COIL GROUND LINE**

Turn the ignition switch OFF.

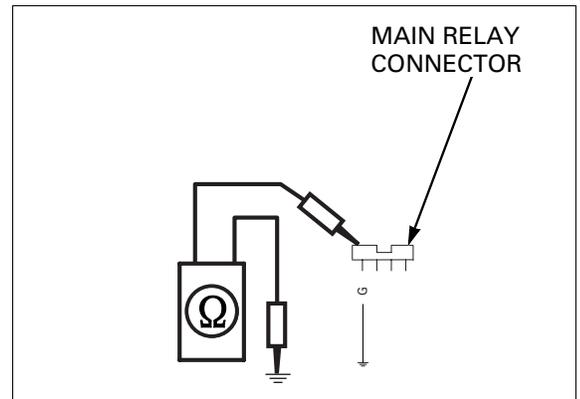
Remove the main relay (page 21-15).

Check for continuity between the main relay connector of the wire harness side and ground.

**Connection: Green – Ground**

If there is continuity, the main relay coil ground line is normal.

If there is no continuity, inspect the open circuit in Green wire between the main relay and ground.



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**MEMO**

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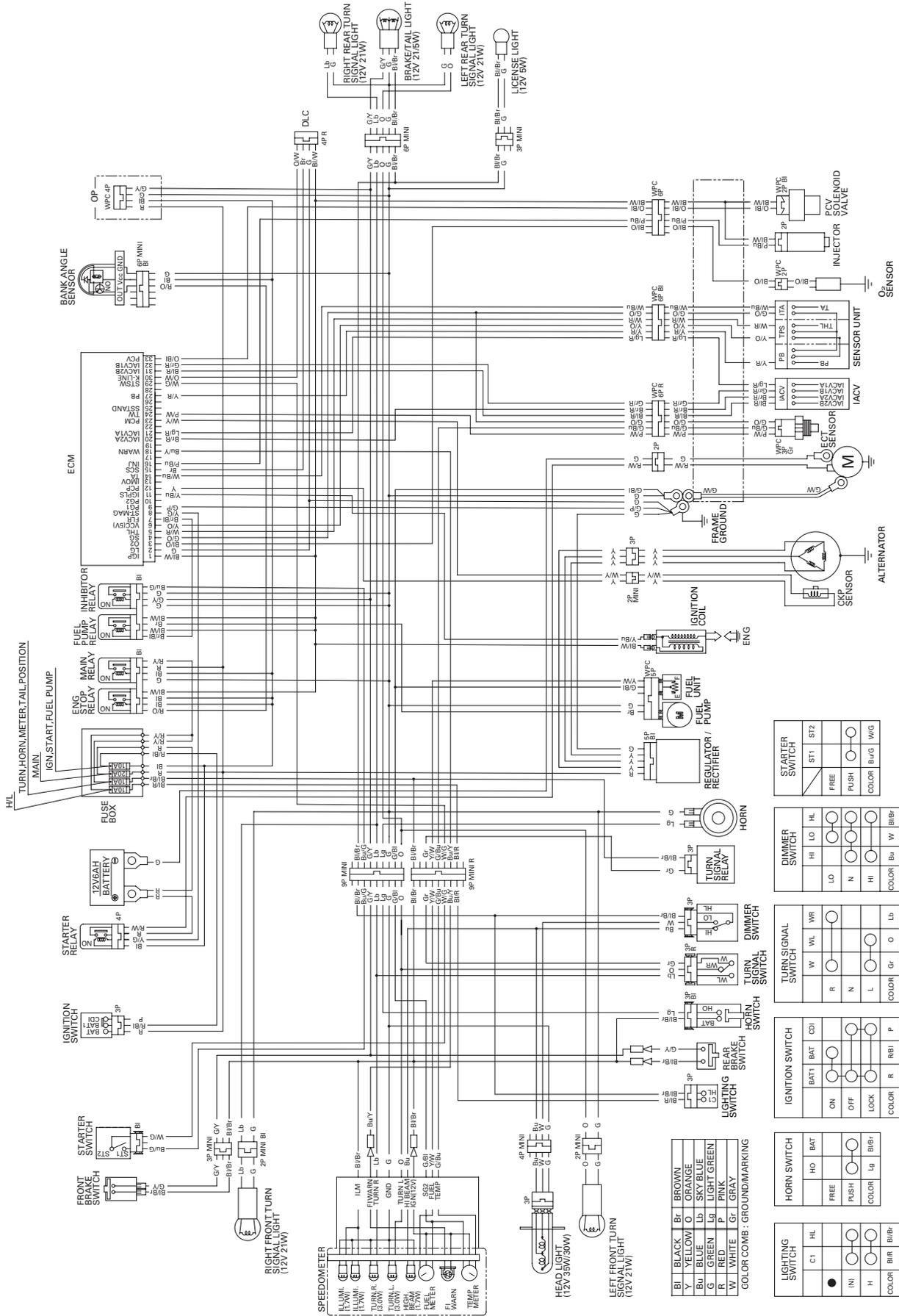
# 22. WIRING DIAGRAM

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WIRING DIAGRAM ..... 22-2

# WIRING DIAGRAM

# WIRING DIAGRAM



# 23. TROUBLESHOOTING

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ENGINE DOES NOT START OR IS HARD TO START .....	23-2	POOR PERFORMANCE AT HIGH SPEED .....	23-6
ENGINE LACKS POWER .....	23-3	POOR HANDLING .....	23-7
POOR PERFORMANCE AT LOW AND IDLE SPEED .....	23-5		

# ENGINE DOES NOT START OR IS HARD TO START

### 1. Spark Plug Inspection

Remove and inspect spark plug.

***Is spark plug in good condition?***

**YES** – GO TO STEP 2.

**NO** –

- Plug not serviced frequently enough
- Incorrect spark plug heat range
- Incorrect spark plug gap
- Dirty air cleaner element

### 2. Spark Test

Perform spark test.

***Is there weak or no spark?***

**YES** –

- Faulty spark plug
- Fouled spark plug
- Opened or shorted spark plug wire
- Broken spark plug cap
- Broken or shorted ignition coil
- Faulty CKP sensor
- Loose or disconnected ignition system wires
- Faulty ECM

**NO** – GO TO STEP 3.

### 3. Fuel Pump Inspection

You should hear the pump hum when the ignition switch is turned ON.

***Is the hum heard?***

**YES** – GO TO STEP 4.

**NO** –

- Broken fuel pump wire
- Faulty fuel pump

### 4. Cylinder Compression Inspection

Test the cylinder compression.

***Is the compression within specification?***

**YES** – GO TO STEP 5.

**NO** –

- Valve stuck open
- Worn cylinder and piston rings
- Damaged cylinder head gasket
- Seized valve
- Incorrect valve seat contact
- Improper valve timing

### 5. Fuel Flow Inspection

Inspect the fuel flow (page 6-35).

***Is the fuel flow within specification?***

**YES** – GO TO STEP 6.

**NO** –

- Clogged fuel feed hose
- Faulty fuel pump

### 6. Engine Start Condition

Start the engine by following the normal procedure.

***Does the engine start but then stops?***

**YES** –

- Intake pipe leaking
- Improper ignition timing (faulty ECM or CKP sensor)
- Contaminated fuel
- Clogged IACV passage

---

## ENGINE LACKS POWER

### 1. Engine Oil Inspection

Check the oil level and condition.

***Is the oil level correct and the oil in good condition?***

**YES** – GO TO STEP 2.

**NO** –

- Oil level too high
- Oil level too low
- Contaminated oil

### 2. Wheel Inspection

Raise the rear wheel off the ground and spin it by hand.

***Does the wheel spin freely?***

**YES** – GO TO STEP 3.

**NO** –

- Brake dragging
- Worn or damaged final reduction and driven pulley bearings
- Bent final gear shaft

### 3. Tire Pressure Inspection

Check the tire pressure.

***Is the tire pressure correct?***

**YES** – GO TO STEP 4.

**NO** –

- Faulty tire valve
- Punctured tire

### 4. Spark Plug Inspection

Remove and inspect the spark plug.

***Is spark plug in good condition?***

**YES** – GO TO STEP 5.

**NO** –

- Plug not serviced frequently enough
- Incorrect spark plug heat range
- Incorrect spark plug gap
- Dirty air cleaner element

### 5. Ignition Timing Inspection

Check the ignition timing.

***Is the ignition timing correct?***

**YES** – GO TO STEP 6.

**NO** –

- Faulty ECM
- Faulty CKP sensor
- Improper valve timing

### 6. Cylinder compression Inspection

Test the cylinder compression.

***Is the compression within specification?***

**YES** – GO TO STEP 7.

**NO** –

- Valve stuck open
- Worn cylinder and piston rings
- Damaged cylinder head gasket
- Seized valve
- Incorrect valve seat contact
- Improper valve timing

## TROUBLESHOOTING

---

### 7. Fuel Flow Inspection

Inspect the fuel flow (page 6-35).

***Is the fuel flow within specification?***

**YES** – GO TO STEP 8.

**NO** –

- Clogged fuel feed hose
- Faulty fuel pump

### 8. Drive Train Inspection

Check the drive train

***Is the drive train normal?***

**YES** – GO TO STEP 9.

**NO** –

- Fouled or faulty drive belt
- Fouled or faulty drive pulley
- Fouled or faulty driven pulley
- Worn clutch shoes

### 9. Overheating Inspection

Check for engine overheating.

***Is the engine overheating?***

**YES** –

- Coolant level too low
- Faulty cooling fan
- Thermostat stuck closed
- Excessive carbon build-up in combustion chamber
- Use of poor quality fuel
- Lean fuel mixture

**NO** – GO TO STEP 10.

### 10. Engine Knocking Inspection

Accelerate or run at high speed.

***Is the engine knocking?***

**YES** –

- Worn piston and cylinder
- Wrong type of fuel
- Excessive carbon build-up in combustion chamber
- Ignition timing too advanced (faulty ECM)
- Lean fuel mixture

**NO** – GO TO STEP 11.

### 11. Cam sprocket Inspection

Check the cam sprocket installation.

***Is the cam sprocket installed correctly?***

**YES** – Perform the TP sensor reset procedure (page 6-45).

**NO** – Cam sprocket not installed properly

---

## POOR PERFORMANCE AT LOW AND IDLE SPEED

### 1. Intake Pipe Leaking Inspection

Check for leaks at the intake pipe.

***Does it leak?***

**YES** – • Loose intake pipe mounting nut  
• Damaged intake pipe O-ring

**NO** – GO TO STEP 2.

### 2. Spark Plug Inspection

Remove and inspect the spark plug.

***Is spark plug in good condition?***

**YES** – GO TO STEP 3.

**NO** – • Plug not serviced frequently enough  
• Incorrect spark plug heat range  
• Incorrect spark plug gap  
• Dirty air cleaner element

### 3. Spark Test

Perform spark test.

***Is there weak or intermittent spark?***

**YES** – GO TO STEP 4.

**NO** – • Faulty spark plug  
• Fouled spark plug  
• Opened or shorted spark plug wire  
• Faulty ignition coil  
• Faulty CKP sensor  
• Faulty ECM

### 4. Ignition Timing Inspection

Check the ignition timing.

***Is the ignition timing correct?***

**YES** – GO TO STEP 5.

**NO** – • Faulty CKP sensor  
• Faulty ECM

### 5. Valve clearance Inspection

Check the valve clearance.

***Is the valve clearance correct?***

**YES** – GO TO STEP 6.

**NO** – Improper valve clearance

### 6. Cylinder Compression Inspection

Test the cylinder compression.

***Is the compression within specification?***

**YES** – GO TO STEP 7.

**NO** – • Valve stuck open  
• Worn cylinder and piston rings  
• Damaged cylinder head gasket  
• Seized valve  
• Incorrect valve seat contact

## TROUBLESHOOTING

---

### 7. Fuel Flow Inspection

Inspect the fuel flow (page 6-35).

***Is the fuel flow within specification?***

- YES** – • Perform the TP sensor reset procedure (page 6-45).  
• Clogged IACV passage
- NO** – • Clogged fuel feed hose  
• Faulty fuel pump

## POOR PERFORMANCE AT HIGH SPEED

### 1. Ignition Timing Inspection

Check the ignition timing.

***Is the ignition timing correct?***

- YES** – GO TO STEP 2.
- NO** – • Faulty ECM  
• Faulty CKP sensor  
• Improper valve timing

### 2. Spark Plug Inspection

Remove and inspect the spark plug.

***Is spark plug in good condition?***

- YES** – GO TO STEP 3.
- NO** – • Plug not serviced frequently enough  
• Incorrect spark plug heat range  
• Incorrect spark plug gap  
• Dirty air cleaner element

### 3. Fuel Flow Inspection

Inspect the fuel flow (page 6-35).

***Is the fuel flow within specification?***

- YES** – GO TO STEP 4.
- NO** – • Clogged fuel feed hose  
• Faulty fuel pump

### 4. Cam sprocket Inspection

Check the cam sprocket installation.

***Is the cam sprocket installed correctly?***

- YES** – GO TO STEP 5.
- NO** – Cam sprocket not installed properly

### 5. Camshaft Inspection

Remove and inspect the camshaft.

***Is the cam lobe height within specification?***

- YES** – GO TO STEP 6.
- NO** – Faulty camshaft

### 6. Valve Spring Inspection

Check the valve springs.

***Is the valve spring free length within specification?***

- YES** – Perform the TP sensor reset procedure (page 6-45).
- NO** – Faulty valve spring

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## POOR HANDLING

### **Steering is heavy**

- Steering stem adjusting nut too tight
- Damaged steering head bearings
- Low tire pressure

### **Either wheel is wobbling**

- Excessive wheel bearing play
- Faulty tire
- Bent rim
- Excessively worn engine mounting bushings
- Bent frame

### **The scooter pulls to one side**

- Front and rear wheels not aligned
- Faulty shock absorber
- Bent fork
- Bent axle
- Bent frame

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**MEMO**

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