

2005-2006



**HONDA**



**SERVICE MANUAL**

**TRX500FE/FM/TM**  
**FOURTRAX FOREMAN®**

## 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 recommended 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 TRX500FE/FM/TM.

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

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

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

Sections 5 through 23 describe parts of the vehicle, 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 vehicle, read Technical Features in Section 2.

If you don't know the source of the trouble, go to section 25 Troubleshooting.


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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

# 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 the 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 medium strength locking agent unless otherwise specified.</p>
	<p>Apply sealant.</p>
	<p>Use 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

### SERVICE RULES

1. Use genuine HONDA or HONDA-recommended parts and lubricants or their equivalents. Parts that don't meet HONDA's design specifications may cause damage to the vehicle.
2. Use the special tools designed for this product to avoid damage and incorrect assembly.
3. Use only metric tools when servicing the vehicle. 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 & Harness routing (page 1-22).

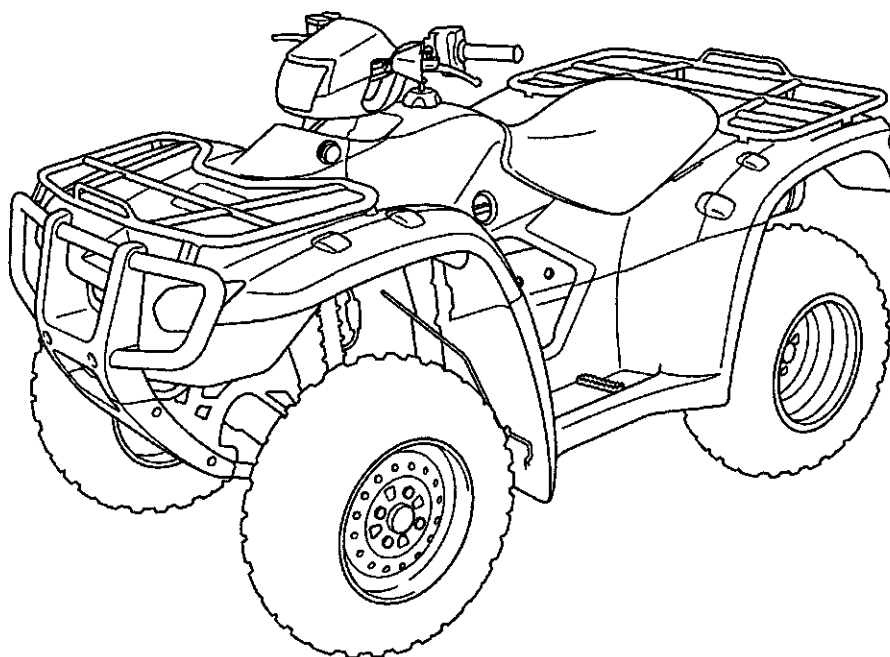
### MODEL IDENTIFICATION

This manual covers 3 types of TRX500 models:

- TM – 2WD/Left foot operated gearshift
- FM – 4WD/Left foot operated gearshift
- FE – 4WD/Electric shift program (ESP)

Be sure to refer to the procedure that pertains to the appropriate version of the TRX500.

**TRX500 FE model shown:**



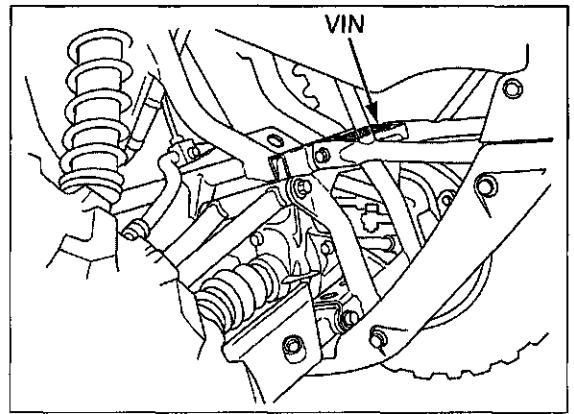
### DESTINATION CODES

Throughout this manual, the following codes are used to identify individual types for each region.

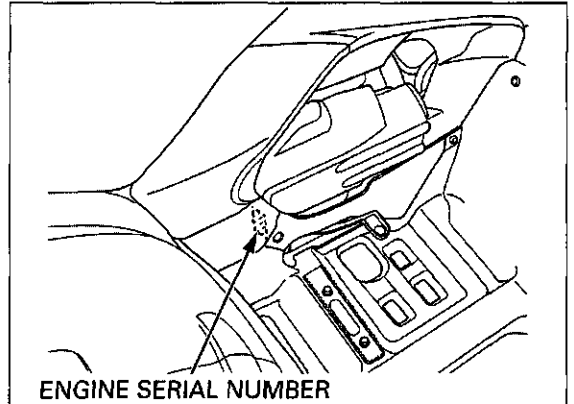
DESTINATION CODE	REGION
A	U.S.A.
CM	Canada
U	Australia (New Zealand)

## GENERAL INFORMATION

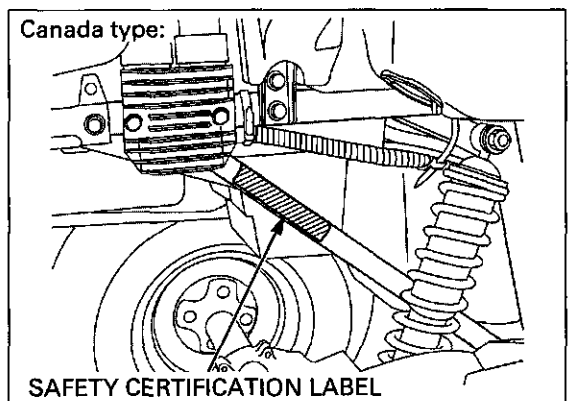
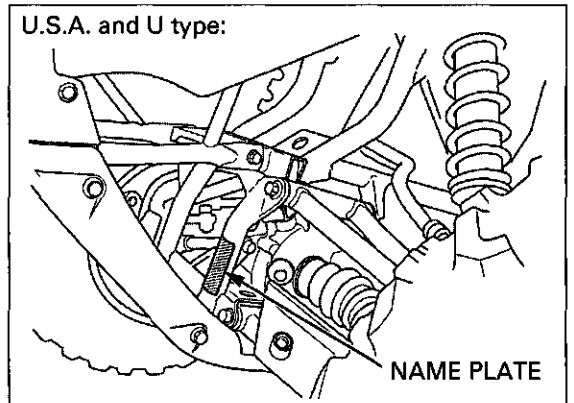
The Vehicle Identification Number (VIN) is stamped on the front side of the frame.



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



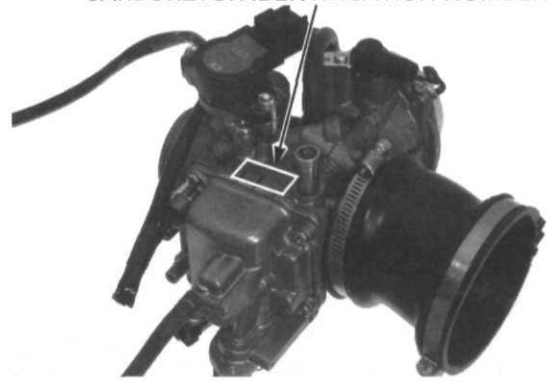
The name plate (U.S.A. and U type) or safety certification label (Canada type) is attached on the right front frame pipe.



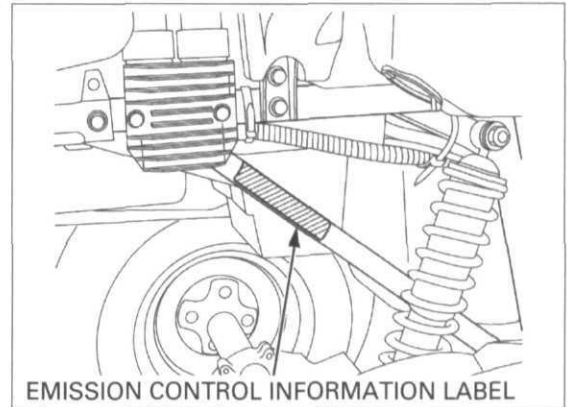
## GENERAL INFORMATION

The carburetor identification number is stamped on the left side of the carburetor body.

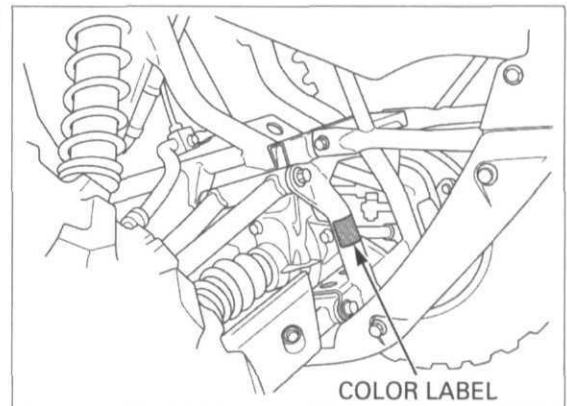
CARBURETOR IDENTIFICATION NUMBER



The vehicle emission information label is attached on the rear fender behind the seat (U.S.A. only).



The color label is attached on the front side of the right front frame pipe. When ordering color-coded parts, always specify the designated color code.





## GENERAL SPECIFICATIONS

## TRX500TM

	ITEM	SPECIFICATIONS
DIMENSIONS	Overall length	2,109 mm (83.0 in)
	Overall width	1,188 mm (46.8 in)
	Overall height	1,169 mm (46.0 in)
	Wheelbase	1,292 mm (50.9 in)
	Front tread	922 mm (36.3 in)
	Rear tread	925 mm (36.4 in)
	Seat height	860 mm (33.9 in)
	Footpeg height	349 mm (13.7 in)
	Ground clearance	190 mm (7.5 in)
	Dry weight	253 kg (558 lbs)
	Curb weight	265 kg (584 lbs)
	Maximum weight capacity	220 kg (485 lbs)
FRAME	Frame type	Double cradle
	Front suspension	Double wishbone
	Front wheel travel	170 mm (6.7 in)
	Front damper	Double tube
	Rear suspension	Swingarm
	Rear wheel travel	170 mm (6.7 in)
	Rear damper	Double tube
	Front tire size	AT25 x 8-12 ★★
	Rear tire size	AT25 x 10-12 ★★
	Front rim size	12 x 6.0 AT
	Rear rim size	12 x 7.5 AT
	Front tire brand	KT181 (Dunlop)
	Rear tire brand	KT185 (Dunlop)
	Front brake	Hydraulic disc brake
	Rear brake	Mechanical drum brake
	Caster angle	5°
	Trail length	17 mm (11/16 in)
Camber angle	0°	
Fuel tank capacity	15.8 liters (4.17 US gal, 3.48 Imp gal)	
Fuel tank reserve capacity	3.3 liters (0.87 US gal, 0.73 Imp gal)	
ENGINE	Cylinder arrangement	Single cylinder, longitudinally installed
	Bore and stroke	92.0 x 71.5 mm (3.62 x 2.81 in)
	Displacement	475.3 cm <sup>3</sup> (28.99 cu-in)
	Compression ratio	8.3 : 1
	Valve train	OHV
	Intake valve	opens closes
	Exhaust valve	opens closes
	Lubrication system	Forced pressure and wet sump
	Oil pump type	Trochoid
	Cooling system	Air cooled (with cooling fan and oil cooler)
	Air filtration	Oiled double urethane foam
Engine dry weight	55.2 kg (121.7 lbs)	
CARBURETOR	Carburetor type	Constant Vacuum (VE type)
	Throttle bore	36 mm (1.42 in)

## GENERAL INFORMATION

	ITEM	SPECIFICATIONS
DRIVE TRAIN	Clutch system Clutch operation system Transmission Primary reduction Secondary reduction Final reduction Gear ratio           1st 2nd 3rd 4th 5th Reverse  Gearshift pattern	Centrifugal and multi-plate, wet Automatic Constant mesh, 5-speeds with reverse 2.103 (61/29) 1.818 (40/22) 3.153 (41/13) 4.231 (55/13) 2.389 (43/18) 1.609 (37/23) 1.179(33/28) 0.848 (28/33) 5.600 (28/15 x 39/13) R - N - 1 - 2 - 3 - 4 - 5 Left foot operated return system
ELECTRICAL	Ignition system Starting system Charging system Regulator/rectifier Lighting system	DC-CDI Electric starter motor and emergency recoil starter Triple phase output alternator FET shorted, triple phase full wave rectification Battery

## TRX500FM/FE

	ITEM	SPECIFICATIONS
DIMENSIONS	Overall length Overall width Overall height Wheelbase Front tread Rear tread Seat height Footpeg height Ground clearance Dry weight  Curb weight  Maximum weight capacity	2,109 mm (83.0 in) 1,188 mm (46.8 in) 1,181 mm (46.5 in) 1,287 mm (50.7 in) 913 mm (35.9 in) 925 mm (36.4 in) 860 mm (33.9 in) 349 mm (13.7 in) 190 mm (7.5 in) FM: 270 kg (595 lbs) FE: 271 kg (597 lbs) FM: 282 kg (622 lbs) FE: 284 kg (626 lbs) 220 kg (485 lbs)

## GENERAL INFORMATION

	ITEM	SPECIFICATIONS
FRAME	Frame type Front suspension Front wheel travel Front damper Rear suspension Rear wheel travel Rear damper Front tire size Rear tire size Front rim size Rear rim size Front tire brand Rear tire brand Front brake Rear brake Caster angle Trail length Camber angle Fuel tank capacity Fuel tank reserve capacity	Double cradle Double wish-bone 170 mm (6.7 in) Double tube Swingarm 170 mm (6.7 in) Double tube AT25 x 8-12 ★★ AT25 x 10-12 ★★ 12 x 6.0 AT 12 x 7.5 AT KT181 (Dunlop) KT185 (Dunlop) Hydraulic disc brake Mechanical drum brake 2° 9 mm (11/32 in) 0° 15.8 liters (4.17 US gal, 3.48 Imp gal) 3.3 liters (0.87 US gal, 0.73 Imp gal)
ENGINE	Cylinder arrangement Bore and stroke Displacement Compression ratio Valve train Intake valve            opens closes Exhaust valve        opens closes Lubrication system Oil pump type Cooling system Air filtration Engine dry weight	Single cylinder, longitudinally installed 92.0 x 71.5 mm (3.62 x 2.81 in) 475.3 cm <sup>3</sup> (28.99 cu-in) 8.3 : 1 OHV 6° BTDC (at 1 mm lift) 44° ABDC (at 1 mm lift) 42° BBDC (at 1 mm lift) 4° ATDC (at 1 mm lift) Forced pressure and wet sump Trochoid Air cooled (with cooling fan and oil cooler) Oiled double urethane foam FM: 55.5 kg (122.4 lbs) FE: 57.7 kg (127.2 lbs)
CARBURETOR	Carburetor type Throttle bore	Constant Vacuum (VE type) 36 mm (1.42 in)
DRIVE TRAIN	Clutch system Clutch operation system Transmission Primary reduction Secondary reduction Final reduction    Front Rear Gear ratio            1st 2nd 3rd 4th 5th Reverse Gearshift pattern	Centrifugal and multi-plate, wet Automatic Constant mesh, 5-speeds with reverse 2.103 (61/29) 1.818 (40/22) 3.230 (42/13) 3.153 (41/13) 4.231 (55/13) 2.389 (43/18) 1.609 (37/23) 1.179(33/28) 0.848 (28/33) 5.600 (28/15 x 39/13) R - N - 1 - 2 - 3 - 4 - 5 FM: Left foot operated return system FE: Electric shift (left hand operated) return system
ELECTRICAL	Ignition system Starting system Charging system Regulator/rectifier Lighting system	DC-CDI Electric starter motor and emergency recoil starter Triple phase output alternator FET shorted, triple phase full wave rectification Battery



## GENERAL INFORMATION

# LUBRICATION SYSTEM SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Engine oil capacity	After draining	2.4 liters (2.5 US qt, 2.1 Imp qt)	-
	After draining/filter change	2.5 liters (2.6 US qt, 2.2 Imp qt)	-
	After disassembly	3.0 liters (3.2 US qt, 2.6 Imp qt)	-
Recommended engine oil		Pro Honda GN4 or HP4 (without molybdenum additives) 4-stroke oil or equivalent motor oil API service classification: SG or Higher JASO T 903 standard: MA Viscosity: SAE 10W-40	-
Oil pump	Tip clearance	0.15 (0.006)	0.20 (0.008)
	Body clearance	0.15 - 0.21 (0.00 - 0.008)	0.25 (0.010)
	Side clearance	0.02 - 0.09 (0.001 - 0.004)	0.11 (0.004)

## FUEL SYSTEM SPECIFICATIONS

ITEM	SPECIFICATIONS
Carburetor identification number	VE6DA
Main jet	#162
Slow jet	#45
Pilot screw opening	See page 6-19
Float level	15.9 mm (0.63 in)
Idle speed	1,400 ± 100 rpm (min <sup>-1</sup> )
Throttle lever free play	3 - 8 mm (1/8 - 5/16 in)

## CYLINDER HEAD/VALVE SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Cylinder compression at 380 rpm (min <sup>-1</sup> )		440 kPa (4.5 kgf/cm <sup>2</sup> , 64 psi)	-
Valve clearance		0.15 ± 0.02 (0.006 ± 0.001)	-
Valve, valve guide	Valve stem O.D.	IN	5.975 - 5.990 (0.2352 - 0.2358)
		EX	5.955 - 5.970 (0.2344 - 0.2350)
	Valve guide I.D.	IN/EX	6.000 - 6.012 (0.2362 - 0.2366)
	Stem-to-guide clearance	IN	0.010 - 0.037 (0.0004 - 0.0015)
		EX	0.030 - 0.057 (0.0012 - 0.0022)
Valve seat width	IN/EX	1.2 (0.05)	
Valve spring	Free length	Inner	42.94 (1.691)
		Outer	43.63 (1.718)
Rocker arm	Arm I.D.	IN/EX	12.000 - 12.018 (0.4724 - 0.4731)
	Shaft O.D.	IN/EX	11.964 - 11.984 (0.4710 - 0.4718)
	Arm-to-shaft clearance	IN/EX	0.016 - 0.054 (0.0006 - 0.0021)
Camshaft and cam follower	Cam lobe height	IN	35.8315 - 35.9915 (1.41069 - 1.41699)
		EX	35.5512 - 35.7112 (1.39965 - 1.40595)
	Cam follower O.D.	IN/EX	22.467 - 22.482 (0.8845 - 0.8851)
	Follower bore I.D.	IN/EX	22.510 - 22.526 (0.8862 - 0.8868)
Follower-to-bore clearance	IN/EX	0.028 - 0.059 (0.0011 - 0.0023)	
Cylinder head warpage		-	0.10 (0.004)

**CYLINDER/PISTON SPECIFICATIONS**

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT	
Cylinder	I.D.	92.000 – 92.010 (3.6220 – 3.3.6224)	92.10 (3.626)	
	Out-of-round	–	0.10 (0.004)	
	Taper	–	0.10 (0.004)	
	Warpage	–	0.10 (0.004)	
Piston, piston pin, piston ring	Piston O.D. at 15 (0.6) from bottom	91.965 – 91.985 (3.6207 – 3.6214)	91.93 (3.619)	
	Piston pin hole I.D.	20.002 – 20.008 (0.7875 – 0.7877)	20.04 (0.789)	
	Piston pin O.D.	19.994 – 20.000 (0.7872 – 0.7874)	19.96 (0.786)	
	Piston-to-piston pin clearance	0.002 – 0.014 (0.0001 – 0.0006)	0.08 (0.003)	
	Piston ring end gap	Top	0.15 – 0.30 (0.006 – 0.012)	0.5 (0.02)
		Second	0.30 – 0.45 (0.012 – 0.018)	0.6 (0.02)
		Oil (side rail)	0.20 – 0.70 (0.008 – 0.028)	0.9 (0.04)
	Piston ring-to-ring groove clearance	Top	0.030 – 0.060 (0.0012 – 0.0024)	0.09 (0.004)
Second		0.030 – 0.060 (0.0012 – 0.0024)	0.09 (0.004)	
Cylinder-to-piston clearance		0.015 – 0.045 (0.0006 – 0.0018)	0.10 (0.004)	
Connecting rod small end I.D.		20.020 – 20.041 (0.7882 – 0.7890)	20.07 (0.790)	
Connecting rod-to-piston pin clearance		0.020 – 0.047 (0.0008 – 0.0019)	0.10 (0.004)	

**CLUTCH/GEARSHIFT LINKAGE SPECIFICATIONS**

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Change clutch	Spring free length	TM/FM	43.8 (1.72)	42.49 (1.673)
		FE	42.5 (1.67)	41.23 (1.623)
	Disc thickness		2.62 – 2.78 (0.103 – 0.109)	2.3 (0.09)
	Plate warpage		–	0.20 (0.008)
	Outer I.D.		29.000 – 29.021 (1.1417 – 1.1426)	29.05 (1.144)
	Outer guide	I.D.	22.000 – 22.021 (0.8661 – 0.8670)	22.05 (0.868)
		O.D.	28.959 – 28.980 (1.1401 – 1.1409)	28.93 (1.139)
Mainshaft O.D. at clutch outer guide			21.967 – 21.980 (0.8648 – 0.8654)	21.93 (0.863)
Centrifugal clutch	Drum I.D.		150.0 – 150.2 (5.906 – 5.913)	150.4 (5.92)
	Weight lining thickness		2.0 (0.08)	1.3 (0.05)
	Clutch spring height		3.72 (0.146)	3.6 (0.14)
	Clutch weight spring free length		23.17 (0.912)	24.10 (0.949)
Primary drive gear	Gear I.D.		29.000 – 29.021 (1.1417 – 1.1426)	29.05 (1.144)
	Crankshaft O.D. at drive gear		28.959 – 28.980 (1.1401 – 1.1409)	28.93 (1.139)

**ALTERNATOR/STARTER CLUTCH SPECIFICATIONS**

Unit: mm (in)

ITEM	STANDARD	SERVICE LIMIT
Starter driven gear boss O.D.	51.705 – 51.718 (2.0356 – 2.0361)	51.69 (2.035)

## GENERAL INFORMATION

# CRANKCASE/TRANSMISSION/CRANKSHAFT/BALANCER SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Shift fork	I.D.	Front, center	13.000 – 13.021 (0.5118 – 0.5126)
		Rear	13.000 – 13.018 (0.5118 – 0.5125)
	Claw thickness	4.93 – 5.00 (0.194 – 0.197)	4.5 (0.18)
	Shaft O.D.	12.966 – 12.984 (0.5105 – 0.5112)	12.96 (0.510)
Transmission	Gear I.D.	M4	25.000 – 25.021 (0.9843 – 0.9851)
		M5	20.000 – 20.021 (0.7874 – 0.7882)
		C1, C2, C3, CR	28.020 – 28.041 (1.1031 – 1.1040)
		Reverse idle	13.000 – 13.021 (0.5118 – 0.5126)
	Gear bushing O.D.	M4	24.959 – 24.980 (0.9826 – 0.9835)
		M5	19.966 – 19.984 (0.7861 – 0.7868)
		C1	27.986 – 28.005 (1.1018 – 1.1026)
		C2, CR	27.979 – 28.000 (1.1015 – 1.1024)
		C3	27.959 – 27.980 (1.1007 – 1.1016)
	Gear-to-bushing clearance	M4	0.020 – 0.062 (0.0008 – 0.0024)
		M5	0.016 – 0.055 (0.0006 – 0.0022)
		C1	0.015 – 0.055 (0.0006 – 0.0022)
		C2, CR	0.020 – 0.062 (0.0008 – 0.0024)
	Gear bushing I.D.	M4	22.000 – 22.021 (0.8661 – 0.8670)
		M5	17.016 – 17.034 (0.6699 – 0.6706)
		Mainshaft O.D.	at M4
at M5	16.976 – 16.987 (0.6683 – 0.6688)		
Reverse idle shaft O.D.		12.966 – 12.984 (0.5105 – 0.5112)	
Bushing-to-shaft clearance	M4	0.020 – 0.062 (0.0008 – 0.0024)	
	M5	0.029 – 0.058 (0.0011 – 0.0023)	
Reverse idle gear-to-shaft clearance		0.016 – 0.055 (0.0006 – 0.0022)	
Crankshaft	Runout	–	0.15 (0.006)
	Big end side clearance		0.05 – 0.65 (0.002 – 0.026)
	Big end radial clearance		0.006 – 0.018 (0.0002 – 0.0007)
			0.05 (0.002)

## FRONT WHEEL/SUSPENSION/STEERING SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Minimum tire tread depth		–	4.0 (0.16)
Cold tire pressure	Standard	25 kPa (0.25 kgf/cm <sup>2</sup> , 3.6 psi)	–
	Minimum	22 kPa (0.22 kgf/cm <sup>2</sup> , 3.2 psi)	–
	Maximum	28 kPa (0.28 kgf/cm <sup>2</sup> , 4.0 psi)	–
	With cargo	25 kPa (0.25 kgf/cm <sup>2</sup> , 3.6 psi)	–
Tie-rod distance between the ball joints	TM	382.5 (15.06)	–
	FM/FE	388.0 (15.28)	–
Toe	TM	Toe-out: 1 ± 15 (1/32 ± 19/32)	–
	FM/FE	Toe-out: 30 ± 15 (1-3/16 ± 19/32)	–

## REAR WHEEL/SUSPENSION SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Minimum tire tread depth		–	4.0 (0.16)
Cold tire pressure	Standard	25 kPa (0.25 kgf/cm <sup>2</sup> , 3.6 psi)	–
	Minimum	22 kPa (0.22 kgf/cm <sup>2</sup> , 3.2 psi)	–
	Maximum	28 kPa (0.28 kgf/cm <sup>2</sup> , 4.0 psi)	–
	With cargo	25 kPa (0.25 kgf/cm <sup>2</sup> , 3.6 psi)	–



## BRAKE SYSTEM SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Front brake	Recommended brake fluid	Honda DOT 4 brake fluid	-
	Disc thickness	3.8 – 4.2 (0.15 – 0.17)	3.0 (0.12)
	Disc runout	-	0.30 (0.012)
	Master cylinder I.D.	14.0 (0.55)	-
	Caliper cylinder I.D.	33.96 (1.3379)	-
Rear brake	Drum I.D.	180.0 (7.09)	181 (7.1)
	Shoe lining thickness	5.3 (0.21)	To index mark

## FRONT DRIVING MECHANISM SPECIFICATIONS (FM/FE models)

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Front differential	Oil capacity	After draining	185 cm <sup>3</sup> (6.3 US oz, 6.5 Imp oz)
		After disassembly	230 cm <sup>3</sup> (7.8 US oz, 8.1 Imp oz)
	Recommended oil	Hypoid gear oil SAE # 80	-
	Gear backlash	0.05 – 0.25 (0.002 – 0.010)	0.4 (0.02)
	Backlash difference	-	0.2 (0.01)
	Slip torque	14 – 17 N·m (1.45 – 1.75 kgf·m, 10 – 13 lbf·ft)	12 N·m (1.2 kgf·m, 9 lbf·ft)
	Face cam-to-housing distance	3.3 – 3.7 (0.13 – 0.15)	3.3 (0.13)
	Differential ring gear depth	6.55 – 6.65 (0.258 – 0.262)	6.55 (0.258)
	Cone spring free height	2.8 (0.11)	2.6 (0.10)

## REAR DRIVING MECHANISM SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Axle runout		-	3.0 (0.12)
Rear final drive	Oil capacity	After draining	75 cm <sup>3</sup> (2.5 US oz, 2.6 Imp oz)
		After disassembly	100 cm <sup>3</sup> (3.4 US oz, 3.5 Imp oz)
	Recommended oil	Hypoid gear oil SAE # 80	-
	Gear backlash	0.05 – 0.25 (0.002 – 0.010)	0.4 (0.02)
	Backlash difference	-	0.2 (0.01)
	Ring gear-to-stop pin clearance	0.3 – 0.6 (0.01 – 0.02)	-

## BATTERY/CHARGING SYSTEM SPECIFICATIONS

ITEM	SPECIFICATIONS		
Battery	Capacity	12 V – 12 Ah	
	Current leakage	1 mA max.	
	Voltage (20°C/68°F)	Fully charged	13.0 – 13.2 V
		Needs charging	Below 12.3 V
	Charging current	Normal	1.4 A x 5 – 10 h
		Quick	6.0 A x 1.0 h
Alternator	Capacity	0.357 kW/5,000 rpm (min <sup>-1</sup> )	
	Charging coil resistance (20°C/68°F)	0.1 – 1.0 Ω	

## GENERAL INFORMATION

### IGNITION SYSTEM SPECIFICATIONS

ITEM	SPECIFICATIONS
Spark plug	BKR5E-11 (NGK), K16PR-U11 (DENSO)
Spark plug gap	1.0 – 1.1 mm (0.039 – 0.043 in)
Ignition coil primary peak voltage	100 V minimum
Ignition pulse generator peak voltage	0.7 V minimum
Ignition timing ("F" mark)	10° BTDC at idle

### ELECTRIC STARTER SPECIFICATIONS

Unit: mm (in)

ITEM	STANDARD	SERVICE LIMIT
Starter motor brush length	12.5 (0.49)	9.0 (0.35)

### LIGHTS/METERS/SWITCHES SPECIFICATIONS

ITEM		SPECIFICATIONS
Bulbs	Headlight (high/low beam)	12 V - 30/30 W x 2
	Assist headlight	12 V - 45 W
	Brake/taillight	12 V - 21/5 W x 2
	Neutral indicator	12 V-1.7 W (A/CM type TM model)
		LED (Except A/CM type TM model)
	Reverse indicator	12 V-1.7 W (A/CM type TM model)
		LED (Except A/CM type TM model)
	Oil temperature indicator	12 V-1.7 W (A/CM type TM model)
4WD indicator (FM/FE only)	LED (Except A/CM type TM model)	
Meter light	LED	
Fuse	Main fuse	LED x 10 (Except A/CM type TM model)
		30 A
	FE	30 A x 2
Sub-fuse	15 A x 2, 10 A x 2	

## STANDARD TORQUE VALUES

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

## ENGINE & FRAME TORQUE VALUES

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

NOTE:

1. Apply locking agent to the threads.
2. Apply engine oil to the threads and seating surface.
3. Apply grease to the threads and seating surface.
4. ALOC bolt: replace with a new one.
5. Lock nut: replace with a new one.
6. Castle nut: tighten to the specified torque and further tighten until its grooves align with the cotter pin hole.
7. Stake.
8. Left hand threads.

### ENGINE

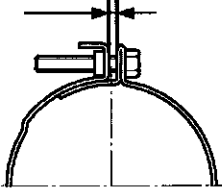
#### MAINTENANCE

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Spark plug	1	14	22 (2.2, 16)	
Valve adjusting lock nut	2	6	17 (1.7, 13)	
Valve adjusting hole cap	2	34	12 (1.2, 9)	
Timing hole cap	1	14	10 (1.0, 7)	
Engine oil drain bolt	1	12	25 (2.5, 18)	
Engine oil filter cover bolt	3	6	10 (1.0, 7)	
Clutch adjusting screw lock nut	1	8	22 (2.2, 16)	

#### LUBRICATION SYSTEM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Relief valve cap	1	14	19 (1.9, 14)	NOTE 1

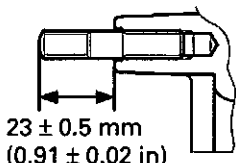
#### FUEL SYSTEM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Carburetor insulator band screw 1.5 – 3.0 mm (0.06 – 0.12 in)	1	5	4 (0.4, 3.0)	
	2	5	3.4 (0.35, 2.5)	

## GENERAL INFORMATION

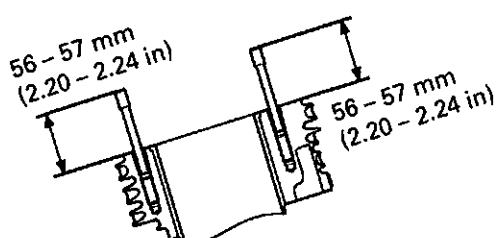
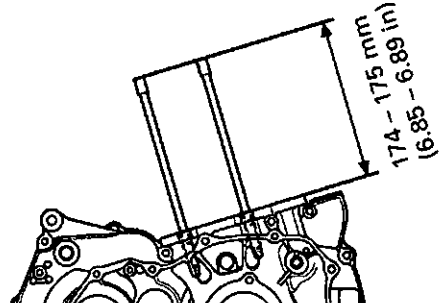
### CYLINDER HEAD/VALVE

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Cylinder head cap nut	6	10	39 (4.0, 29)	NOTE 2
Cam sprocket bolt	2	7	20 (2.0, 15)	NOTE 1
Cam chain tensioner pivot bolt	1	6	12 (1.2, 9)	NOTE 1
Exhaust pipe stud bolt	2	8	6 (0.6, 4.4)	



23 ± 0.5 mm  
(0.91 ± 0.02 in)

### CYLINDER/PISTON

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Cylinder stud bolt	2	10	12 (1.2, 9)	
 Cylinder stud bolt	4	10	12 (1.2, 9)	
				

### CLUTCH/GEARSHIFT LINKAGE:

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Clutch spring bolt	4	6	12 (1.2, 9)	
Centrifugal clutch lock nut	1	20	118 (12.0, 87)	NOTE 2, 7
Change clutch lock nut	1	18	108 (11.0, 80)	NOTE 2, 7
Shift drum stopper arm pivot bolt	1	6	12 (1.2, 9)	NOTE 1
Gearshift cam bolt	1	6	16 (1.6, 12)	NOTE 1
Gearshift spindle return spring pin	1	8	22 (2.2, 16)	NOTE 1

### ALTERNATOR/STARTER CLUTCH:

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Starter clutch bolt	6	8	30 (3.1, 22)	NOTE 1
Recoil starter driven pulley bolt	1	12	108 (11.0, 80)	NOTE 2
Alternator stator bolt	4	6	10 (1.0, 7)	
Ignition pulse generator bolt	2	5	6 (0.6, 4.4)	NOTE 1

### CRANKCASE/TRANSMISSION/CRANKSHAFT/BALANCER:

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Secondary gearshift spindle stopper bolt	1	6	12 (1.2, 9)	NOTE 1

**GENERAL INFORMATION****LIGHTS/METER/SWITCHES**

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N-m (kgf-m, lbf-ft)	REMARKS
Oil temperature sensor	1	12	18 (1.8, 13)	

**ELECTRIC SHIFT PROGRAM (ESP: FE model):**

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N-m (kgf-m, lbf-ft)	REMARKS
Angle sensor bolt	2	5	6 (0.6, 4.4)	NOTE 1
Reverse shift switch	1	10	13 (1.3, 10)	

**FRAME****FRAME/BODY PANELS/EXHAUST SYSTEM**

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N-m (kgf-m, lbf-ft)	REMARKS
Front carrier bolt	4	8	37 (3.8, 27)	
Front carry pipe bolt	4	8	37 (3.8, 27)	
Rear carrier bolt	8	8	37 (3.8, 27)	
Muffler band bolt	2	8	23 (2.3, 17)	
Muffler cover band bolt	2	-	3.2 (0.33, 2.4)	
Exhaust pipe cover band bolt	2	-	3.2 (0.33, 2.4)	
Heat protector band bolt	3	-	5.4 (0.55, 4.0)	
Footpeg bracket bolt	4	8	32 (3.3, 24)	

**MAINTENANCE**

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N-m (kgf-m, lbf-ft)	REMARKS
Front differential oil filler cap (FM/FE only)	1	30	12 (1.2, 9)	
Front differential oil drain bolt (FM/FE only)	1	8	12 (1.2, 9)	
Rear final gear case oil check bolt	1	8	12 (1.2, 9)	
Rear final gear case oil filler cap	1	30	12 (1.2, 9)	
Rear final gear case oil drain bolt	1	8	12 (1.2, 9)	
Spark arrester bolt	3	6	12 (1.2, 9)	
Tie-rod lock nut (knuckle side)	2	12	54 (5.5, 40)	
Tie-rod lock nut (steering arm side)	2	12	54 (5.5, 40)	NOTE 8

**LUBRICATION SYSTEM**

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N-m (kgf-m, lbf-ft)	REMARKS
Cooling fan motor screw	3	5	1.5 (0.15, 1.1)	
Cooling fan nut	1	5	2.7 (0.27, 2.0)	NOTE 1
Cooling fan shroud tapping screw	3	4	0.8 (0.08, 0.6)	

**FUEL SYSTEM**

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N-m (kgf-m, lbf-ft)	REMARKS
Starting enrichment (SE) valve nut	1	14	2.3 (0.23, 1.7)	

**ENGINE REMOVAL/INSTALLATION**

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N-m (kgf-m, lbf-ft)	REMARKS
Lower engine hanger nut (left and right)	2	10	54 (5.5, 40)	
Left lower engine hanger bracket bolt	2	8	32 (3.3, 24)	
Upper engine hanger nut (frame side)	1	10	54 (5.5, 40)	
Upper engine hanger bolt (engine side)	2	8	32 (3.3, 24)	
Gearshift pedal pinch bolt (TM/FM only)	1	6	16 (1.6, 12)	

## GENERAL INFORMATION

### FRONT WHEEL/SUSPENSION/STEERING

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE		REMARKS	
			N-m (kgf-m, lbf-ft)			
Handlebar lower holder nut	2	10	39 (4.0, 29)		NOTE 5	
Throttle housing cover screw	3	4	1.5 (0.15, 1.1)			
Throttle arm nut	1	6	7.0 (0.71, 5.2)			
2WD/4WD select switch screw (FM/FE only)	2	4	1.5 (0.15, 1.1)			
Front wheel nut	8	10	64 (6.5, 47)			
Front wheel hub nut (FM/FE)	2	16	78 (8.0, 58)			NOTE 6
Front wheel hub nut (TM)	2	18	78 (8.0, 58)			NOTE 6
Front brake disc bolt	8	8	42 (4.3, 31)			NOTE 4
Splash guard bolt	6	6	11 (1.1, 8)			NOTE 4
Shock absorber mounting nut	4	10	44 (4.5, 32)			NOTE 5
Upper arm pivot nut	4	10	34 (3.5, 25)			NOTE 5
Lower arm pivot nut	8	10	44 (4.5, 32)			NOTE 5
Upper and lower arm ball joint nut	4	12	29 (3.0, 21)			NOTE 6
Brake hose clamp bolt	6	6	12 (1.2, 9)			
Tie-rod stud joint nut	4	12	54 (5.5, 40)			NOTE 5
Steering shaft end nut	1	14	108 (11.0, 80)			NOTE 5
Steering shaft holder bolt	2	8	32 (3.3, 24)			

### REAR WHEEL/SUSPENSION

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE		REMARKS
			N-m (kgf-m, lbf-ft)		
Rear wheel nut	8	10	64 (6.5, 47)		
Shock absorber upper mounting nut	1	10	34 (3.5, 25)		
Shock absorber lower mounting bolt	1	10	44 (4.5, 32)		
Swingarm left pivot bolt	1	30	112 (11.4, 83)		
Swingarm right pivot bolt	1	30	10 (1.0, 7)		
Swingarm right pivot lock nut	1	30	112 (11.4, 83)		

### BRAKE SYSTEM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE		REMARKS
			N-m (kgf-m, lbf-ft)		
Brake hose oil bolt	3	10	34 (3.5, 25)		
Front brake caliper bleed valve	2	8	5.4 (0.54, 4.0)		
Front master cylinder reservoir cap screw	2	4	2 (0.2, 1.5)		
Front brake light switch screw	1	4	1.2 (0.12, 0.9)		NOTE 1
Front brake lever pivot bolt	1	6	1.0 (0.1, 0.7)		
Front brake lever pivot nut	1	6	5.9 (0.6, 4.4)		
Front master cylinder holder bolt	2	6	12 (1.2, 9)		
Front brake caliper mounting bolt	4	10	44 (4.5, 32)		NOTE 4
Caliper pin bolt	4	8	23 (2.3, 17)		
Brake joint pipe	2	10	17 (1.7, 13)		
Rear brake arm pinch bolt/nut	1	8	20 (2.0, 15)		
Rear brake panel drain bolt	1	8	12 (1.2, 9)		

### FRONT DRIVING MECHANISM (FM/FE models)

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE		REMARKS
			N-m (kgf-m, lbf-ft)		
Differential ring gear bolt	10	8	49 (5.0, 36)		NOTE 4
Front final gear case cover bolt	2	10	49 (5.0, 36)		NOTE 1
	4	8	25 (2.5, 18)		
Front final clutch bolt	3	8	25 (2.5, 18)		NOTE 4
Front final gear case mounting bolt	1	10	44 (4.5, 32)		
Front final gear case mounting nut	1	10	44 (4.5, 32)		NOTE 5
	1	8	22 (2.2, 16)		
Front vehicle speed sensor bolt	2	6	10 (1.0, 7)		
Rear vehicle speed sensor bolt	2	6	10 (1.0, 7)		
Clutch cover stay bolt	1	6	10 (1.0, 7)		
Front final clutch cover bolt	2	6	7 (0.7, 5.2)		

**GENERAL INFORMATION****REAR DRIVING MECHANISM**

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N-m (kgf-m, lbf-ft)	REMARKS
Rear final gear pinion bearing lock nut	1	64	98 (10.0, 72)	NOTE 5, 7
Rear final gear case cover bolt	2	10	49 (5.0, 36)	NOTE 1
	6	8	25 (2.5, 18)	
Rear final gear case mounting nut	4	10	54 (5.5, 40)	NOTE 5
Axle housing nut	12	10	44 (4.5, 32)	NOTE 5
Skid plate bolt	3	8	32 (3.3, 24)	
Rear brake panel nut	4	10	44 (4.5, 32)	NOTE 5
Rear wheel hub nut	2	20	137 (14.0, 101)	NOTE 6

**LIGHTS/METERS/SWITCHES**

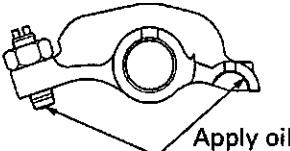
ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N-m (kgf-m, lbf-ft)	REMARKS
Assist headlight/meter bracket nut	2	8	25 (2.5, 18)	

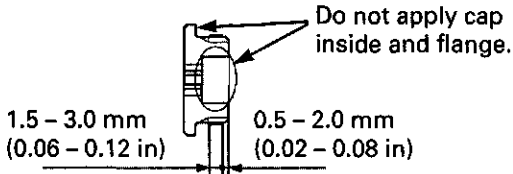
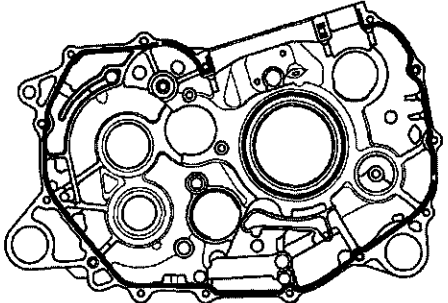
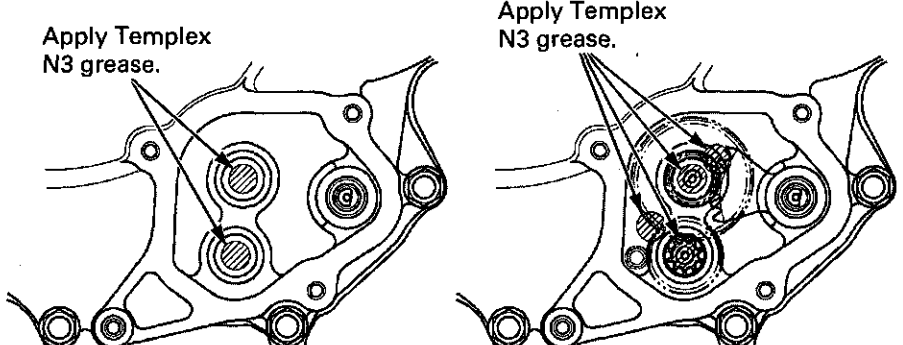


## GENERAL INFORMATION

# LUBRICATION & SEAL POINTS

## ENGINE

LOCATION	MATERIAL	REMARKS
Camshaft cam lobes Rocker arm shaft sliding surface Valve stem (valve guide sliding surface) Change clutch outer guide inner and outer surfaces Piston pin outer surface Starter reduction gear shaft whole surface Starter reduction shaft journals Mainshaft gear and bushing sliding surfaces Countershaft gear and bushing sliding surfaces Starter motor shaft end	Molybdenum oil solution (a mixture of 1/2 engine oil and 1/2 molybdenum disulfide grease)	
Inside of oil filter cover Rocker arm followers and adjusting screw   Cam chain whole surfaces Cam follower whole surfaces Cylinder head cap nut threads and seating surfaces Connecting rod small end inner surface Piston outer surface and piston pin hole Piston ring whole surfaces Cylinder bore Clutch adjusting plate boss outer surface Change clutch disc lining whole surfaces Change clutch lock nut threads and seating surface Centrifugal sprag clutch whole surface Centrifugal clutch drum sprag clutch contacting surface Centrifugal clutch drive plate sprag clutch contacting surface Centrifugal clutch lock nut threads and seating surface Starter reduction gear teeth Reverse stopper shaft journal surface Recoil starter driven pulley bolt threads Starter sprag clutch whole surface Mainshaft and countershaft journal surfaces Shift fork shaft whole surface Shift drum grooves Collar and bushing journal surfaces Each bearing rotating area Each O-ring whole surface Each oil seal lip	Engine oil	
Recoil starter driven pulley oil seal lips	MOBILITH SHC 100	
Recoil starter drive pulley pivot shaft and ratchet sliding surfaces	Multi-purpose grease	

LOCATION	MATERIAL	REMARKS
<p>Oil pressure relief valve cap threads</p>  <p>Do not apply cap inside and flange.</p> <p>1.5 – 3.0 mm (0.06 – 0.12 in)</p> <p>0.5 – 2.0 mm (0.02 – 0.08 in)</p> <p>Cam chain tensioner pivot bolt threads</p> <p>Cam sprocket bolt threads</p> <p>Camshaft bearing retainer bolt threads</p> <p>Shift drum stopper arm pivot bolt threads</p> <p>Gearshift cam bolt threads</p> <p>Gearshift spindle return spring pin threads</p> <p>Secondary gearshift spindle stopper bolt threads</p> <p>Recoil starter center nut threads</p> <p>Starter clutch bolt threads</p> <p>Ignition pulse generator bolt threads</p> <p>Bearing setting plate bolt threads</p> <p>Gear position switch bolt threads</p> <p>Angle sensor bolt threads</p>	<p>Locking agent</p>	<p>Coating width: 6.5 ± 1 mm (0.26 ± 0.04 in)</p> <p>Coating width: 6 ± 1 mm (0.24 ± 0.04 in)</p> <p>Coating width: 6.5 ± 1 mm (0.26 ± 0.04 in)</p> <p>Coating width: 6.5 ± 1 mm (0.26 ± 0.04 in)</p> <p>Coating width: 6.5 ± 1 mm (0.26 ± 0.04 in)</p> <p>Coating width: 6.5 ± 1 mm (0.26 ± 0.04 in)</p> <p>Coating width: 6.5 ± 1 mm (0.26 ± 0.04 in)</p> <p>Coating width: 6.5 ± 1 mm (0.26 ± 0.04 in)</p> <p>Coating width: 6.5 ± 1 mm (0.26 ± 0.04 in)</p> <p>FE only</p> <p>Coating width: 6.5 ± 1 mm (0.26 ± 0.04 in)</p>
<p>Alternator/ignition pulse generator wire grommet seating surface</p> <p>Gear position switch wire grommet seating surface</p> <p>Crankcase mating surface</p> 	<p>Liquid sealant</p>	
<p>Electric shift reduction gear teeth and journals (front crankcase cover)</p>  <p>Apply Templex N3 grease.</p> <p>Apply Templex N3 grease.</p>	<p>Templex N3 grease (ESSO)</p>	<p>FE only</p> <p>Apply 3 – 5 g</p>

## GENERAL INFORMATION

### FRAME

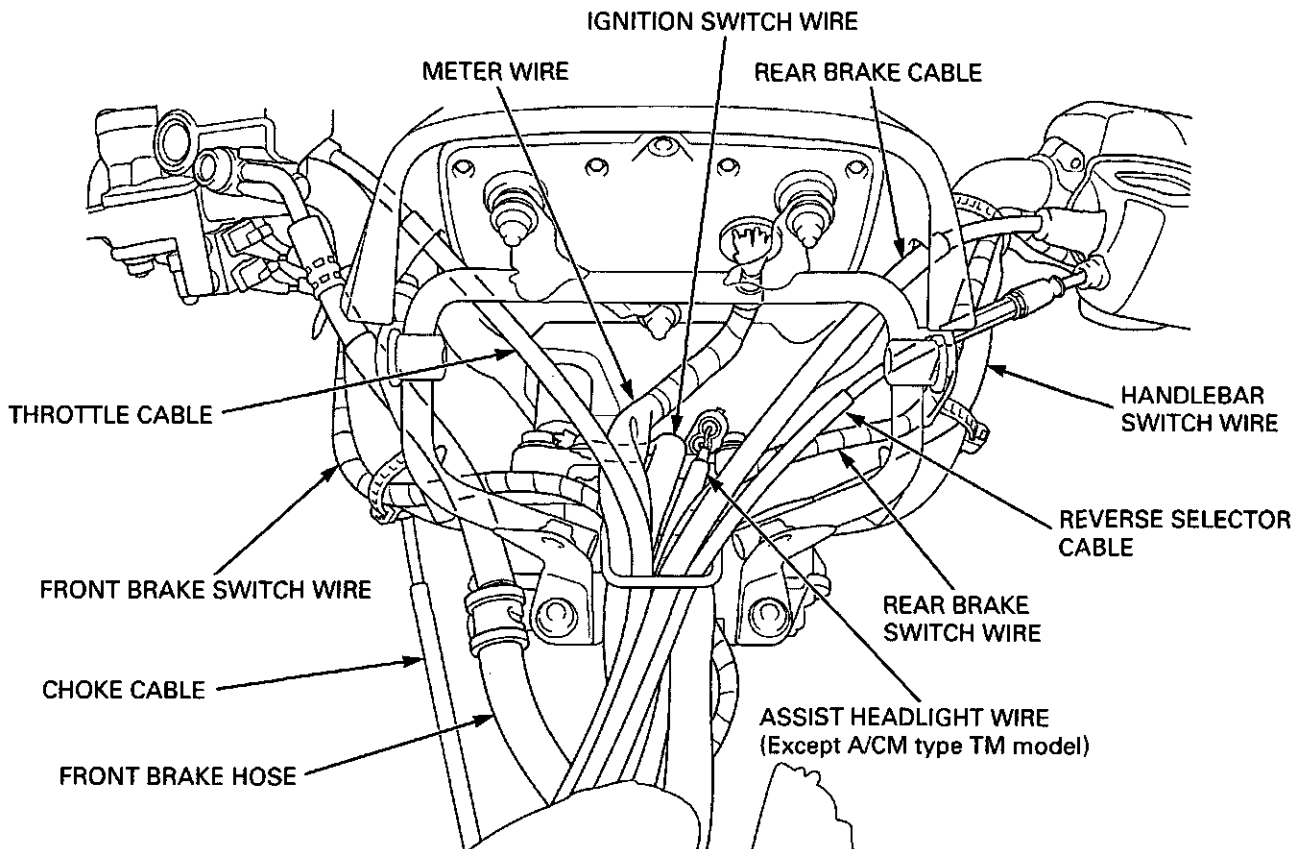
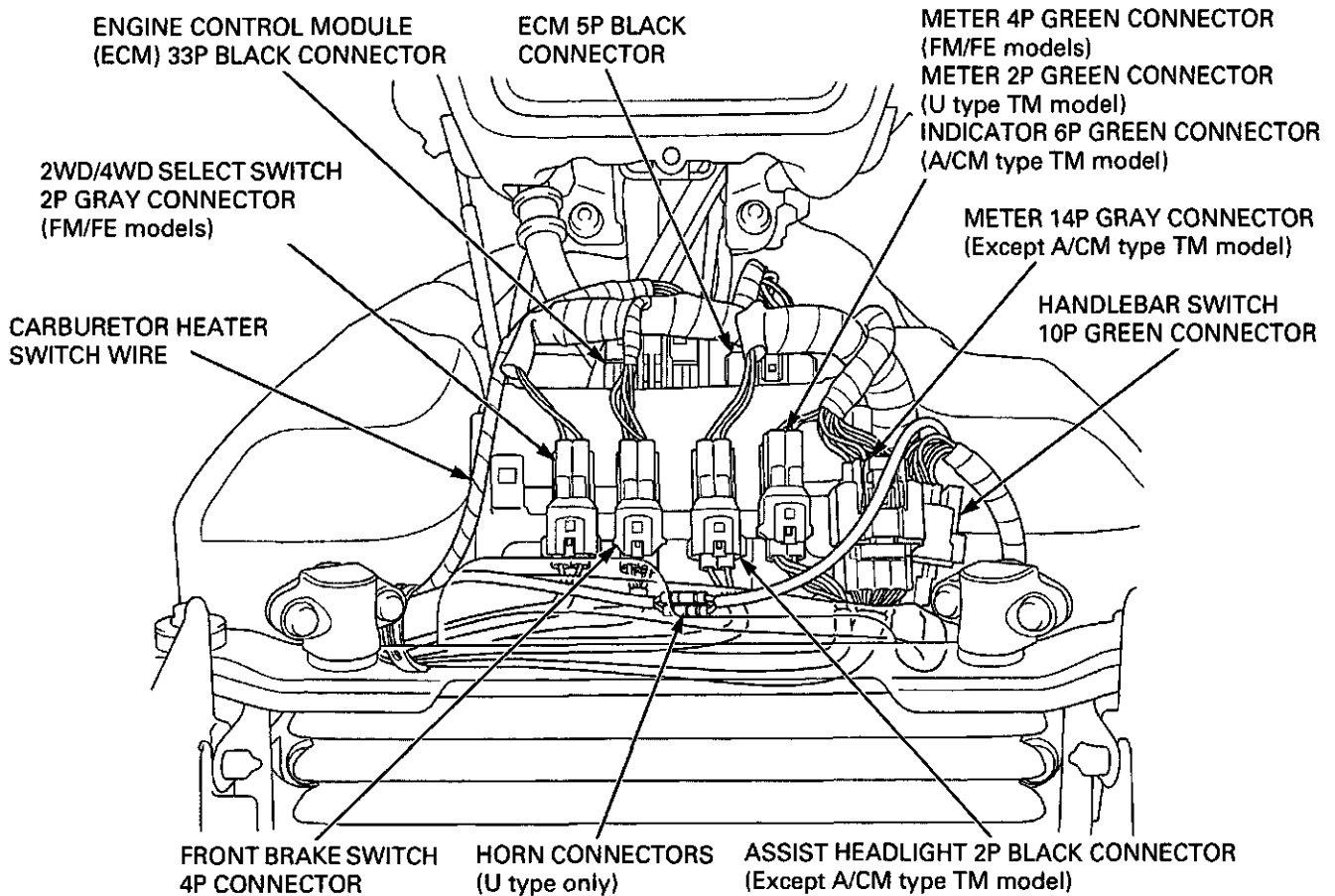
LOCATION	MATERIAL	REMARKS
Throttle cable end (lever side) Throttle lever pivot and dust seal lip Rear (parking) brake lever pivot Parking arm pin Front wheel hub outer dust seal lips Front wheel hub inner dust seal lips and side seal Knuckle outer dust seal lips Knuckle inner dust seal lips and side seal Front upper arm pivot collar outer surfaces Steering shaft bushing sliding surface Steering shaft dust seal lips Front shock absorber lower bearing and dust seal lips Rear shock absorber lower bearing and dust seal lips Swingarm pivot bearing Swingarm pivot dust seal lips Rear brake cam dust seal lips Rear brake cam spindle surface Rear brake cam contacting surface of brake shoes Anchor pin contacting surface of brake shoes Rear brake drum cover dust seal lips and side seal Rear brake pedal pivot Rear brake pedal pivot dust seal lips Rear brake panel dust seal lips Rear brake panel O-ring Rear brake cable ends (for lever and pedal) Front final gear case oil seal lips (for drive shafts) Front final gear oil filler cap O-ring Front final gear speed sensor O-rings Front final clutch case O-ring Left axle housing oil seal lips Rear final gear case oil seal lips (for ring gear) Rear final gear case oil seal lips (for pinion gear) Rear final gear oil filler cap O-ring Rear final gear pinion joint O-ring	Multi-purpose grease	TM only TM only FM/FE only FM/FE only Apply 2 - 3 g Apply 0.5 - 0.1 g Apply 0.5 - 0.1 g Apply 0.5 - 0.1 g FM/FE only FM/FE only FM/FE only FM/FE only
Steering shaft spline Front upper arm dust seal lips Rear wheel hub dust seal lips Front propeller shaft seal lips Front propeller shaft splines (at final clutch) Front propeller shaft splines (at propeller shaft joint) Front final clutch outer ring splines Output shaft splines (at propeller shaft joint) Front drive shaft splines (at wheel side) Rear axle splines (left, right and center) Rear final gear pinion joint splines Universal joint splines Rear drive shaft seal lips	Molybdenum disulfide grease	FM/FE only FM/FE only FM/FE only Fill up 5 - 8 g FM/FE only Fill up 5 - 8 g FM/FE only FM/FE only Fill up 5 - 8 g
Front drive shaft outboard joint inside	NKG205	FM/FE only Fill up 40 - 60 g
Front drive shaft inboard joint inside	NKG106	FM/FE only Fill up 55 - 75 g
Handlebar grip rubber inside Air cleaner case-to-connecting hose mating surface Air cleaner case-to-duct seal mating surface	Honda Bond A or Honda Hand Grip Cement (U.S.A. only) or equivalent	
Rear brake cam felt seal Oil cooler hose joint O-rings	Engine oil	

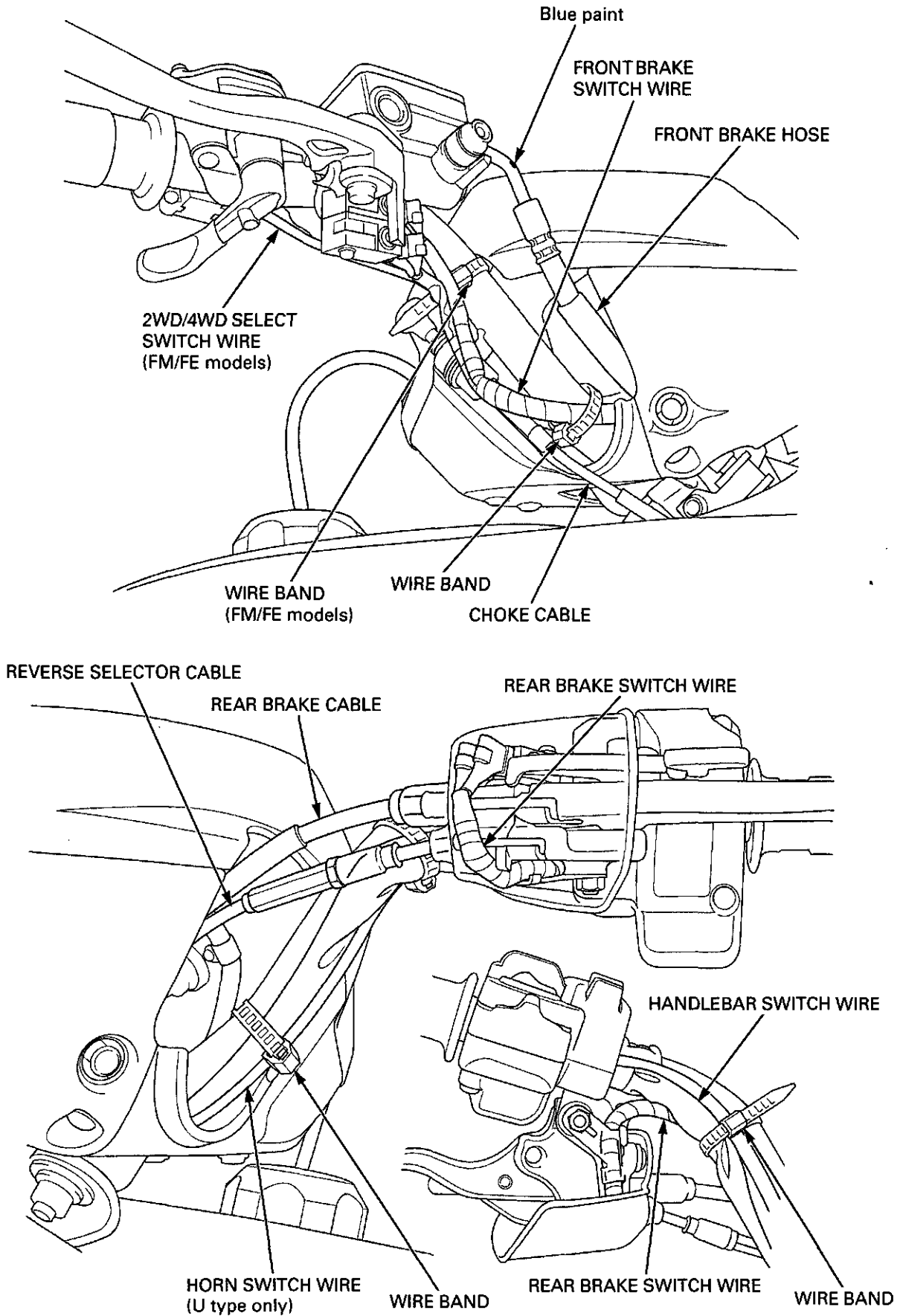
**GENERAL INFORMATION**

<b>LOCATION</b>	<b>MATERIAL</b>	<b>REMARKS</b>
Front brake lever-to-master piston contacting area Front brake lever pivot Front brake caliper piston boot inside Front brake caliper pin sliding surfaces Front brake caliper pin boot inside	Silicone grease	
Throttle inner cable Choke inner cable Rear brake inner cables	Cable lubricant	
Master cylinder piston and cups Caliper cylinder piston and cup	DOT 4 brake fluid	
Rear final gear case cover mating surface	Liquid sealant	FM/FE only
Cooling fan nut threads	Locking agent	

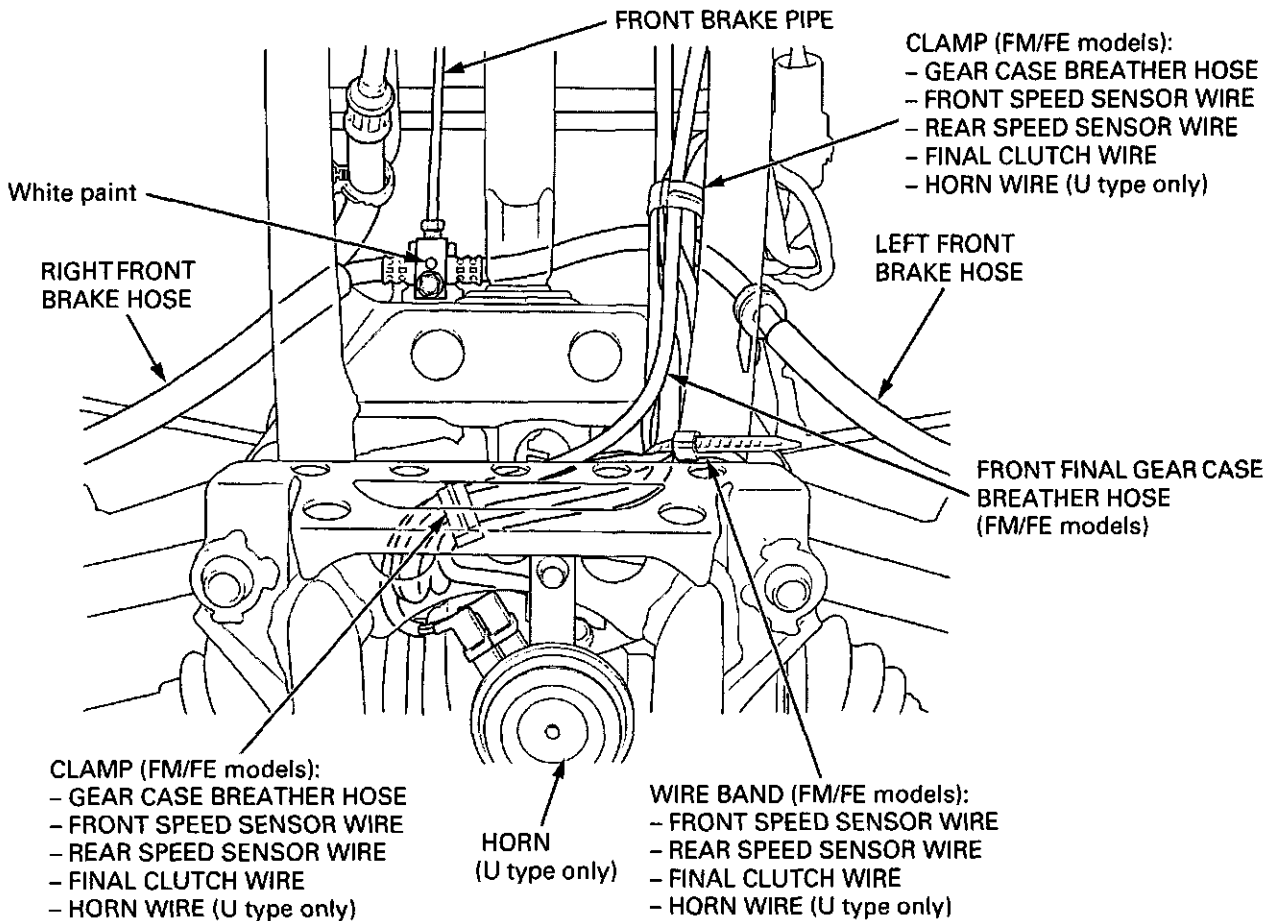
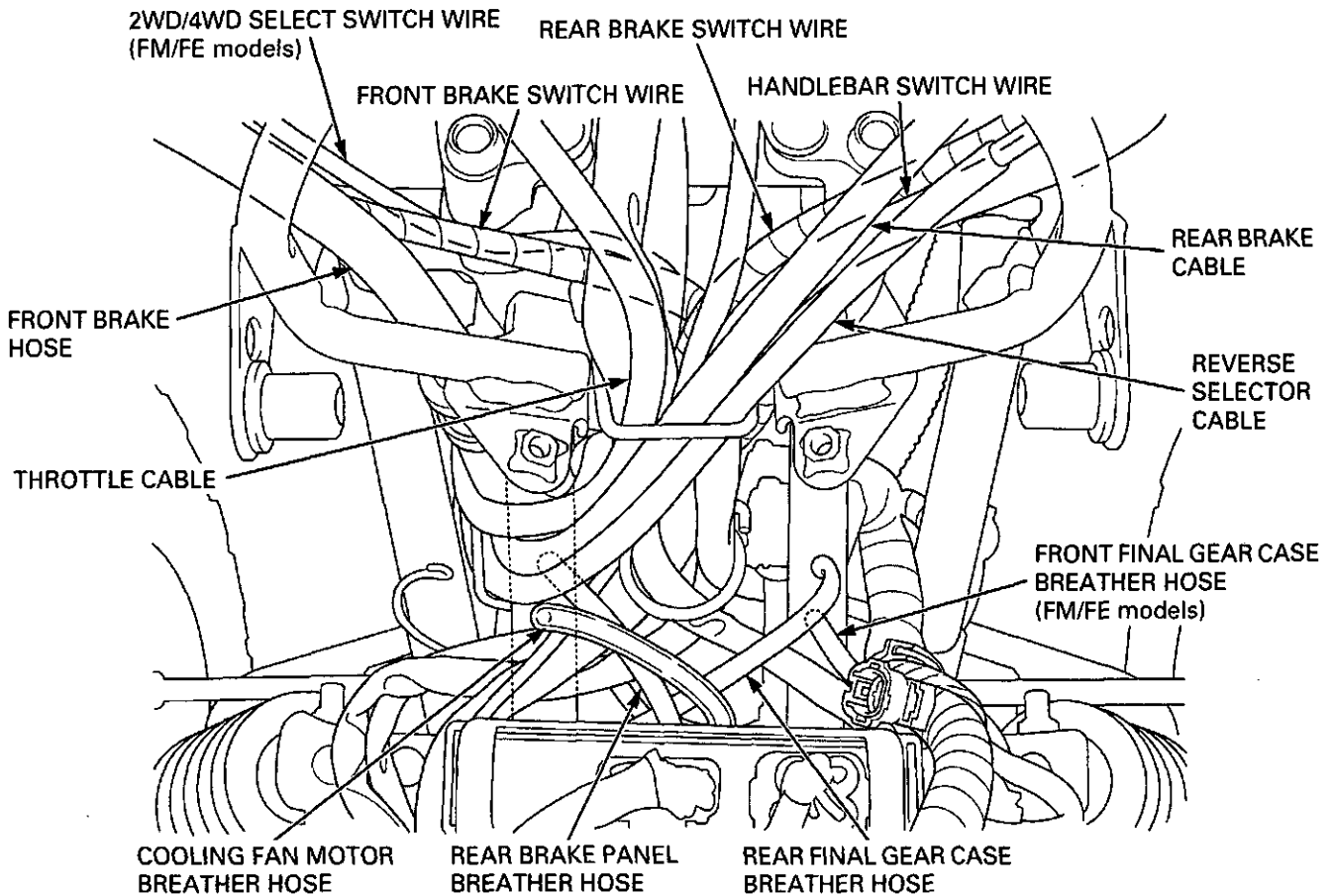
# GENERAL INFORMATION

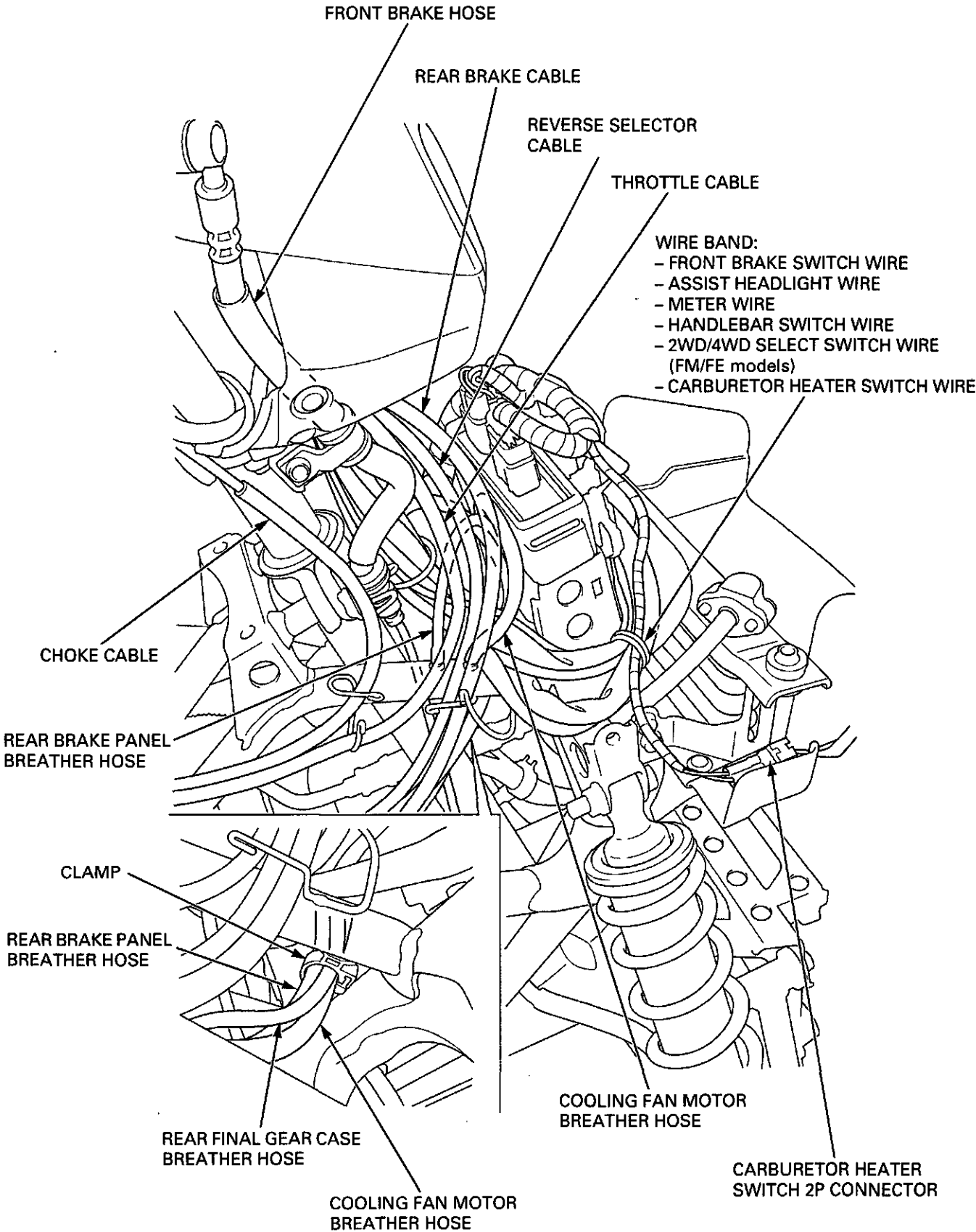
## CABLE & HARNESS ROUTING





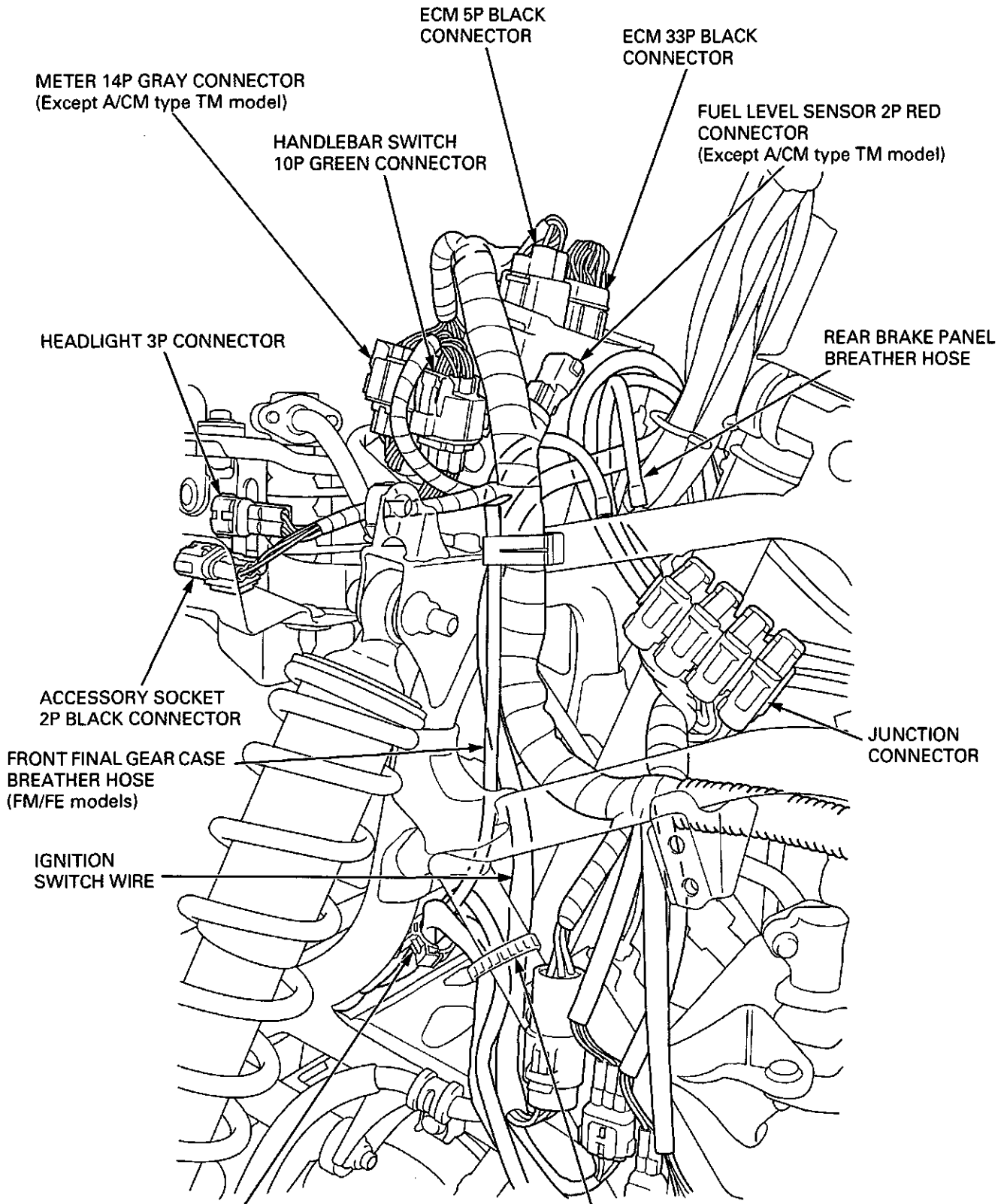
# GENERAL INFORMATION







# GENERAL INFORMATION



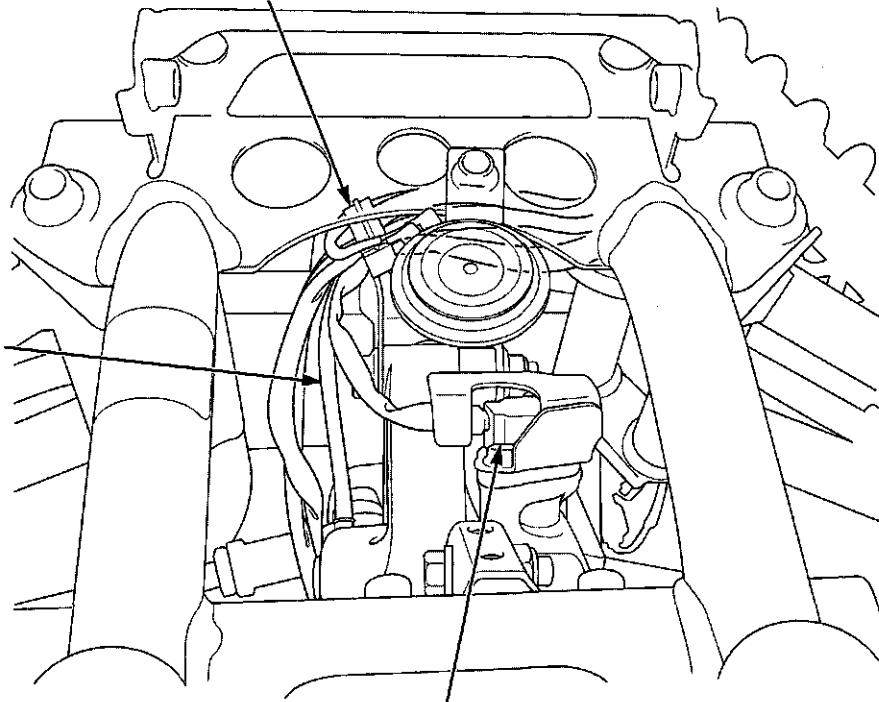
- CLAMP (FM/FE models):**
- FRONT FINAL GEAR CASE BREATHER HOSE
  - FRONT SPEED SENSOR WIRE
  - REAR SPEED SENSOR WIRE
  - FINAL CLUTCH WIRE
  - HORN WIRE (U type only)

- WIRE BAND:**
- FRONT SPEED SENSOR WIRE (FM/FE models)
  - REAR SPEED SENSOR WIRE (FM/FE models)
  - FINAL CLUTCH WIRE (FM/FE models)
  - IGNITION SWITCH WIRE

**FM/FE models:**

- CLAMP:**
- FRONT FINAL GEAR CASE BREATHER HOSE
  - FRONT SPEED SENSOR WIRE
  - REAR SPEED SENSOR WIRE
  - FINAL CLUTCH WIRE
  - HORN WIRE (U type only)

FRONT FINAL GEAR CASE  
BREATHER HOSE

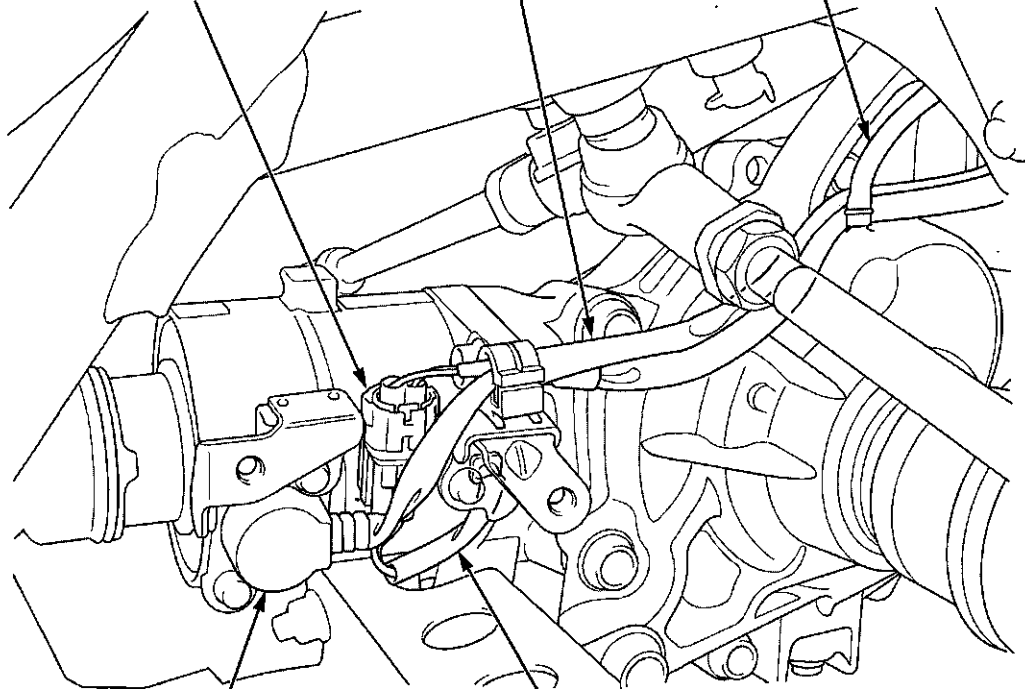


FRONT SPEED SENSOR

FINAL CLUTCH 2P  
GREEN CONNECTOR

REAR SPEED  
SENSOR WIRE

FRONT FINAL GEAR CASE  
BREATHER HOSE

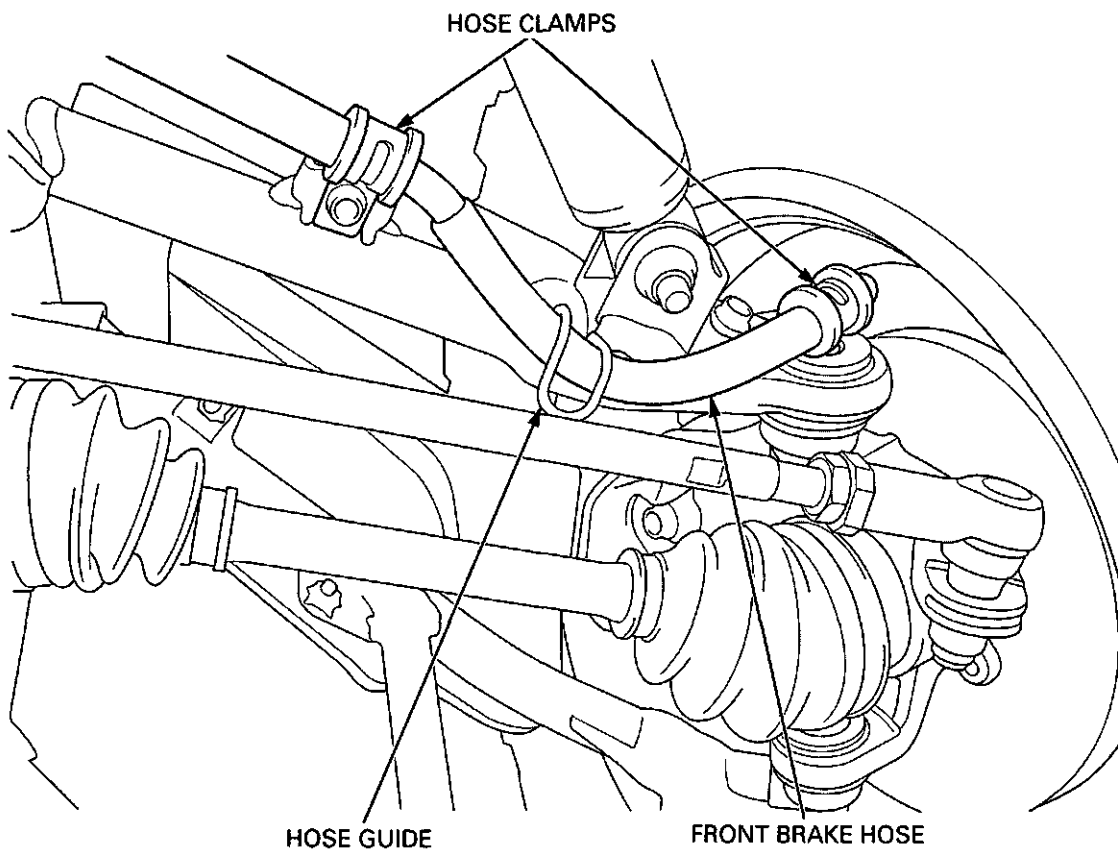
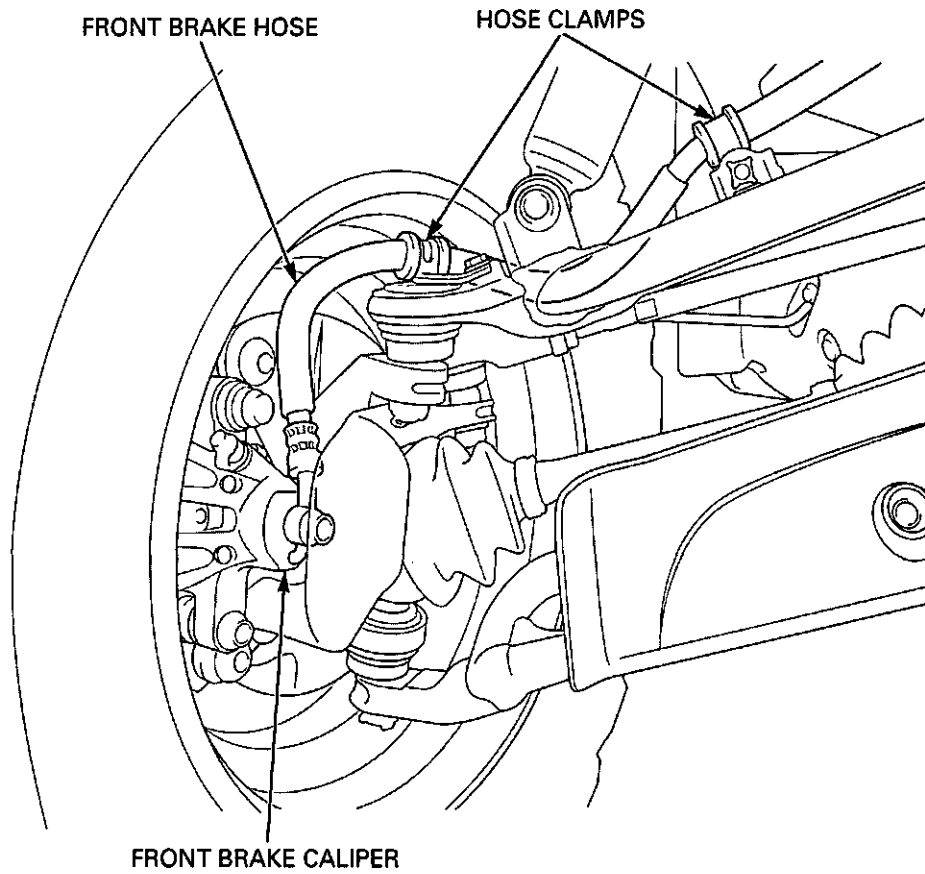


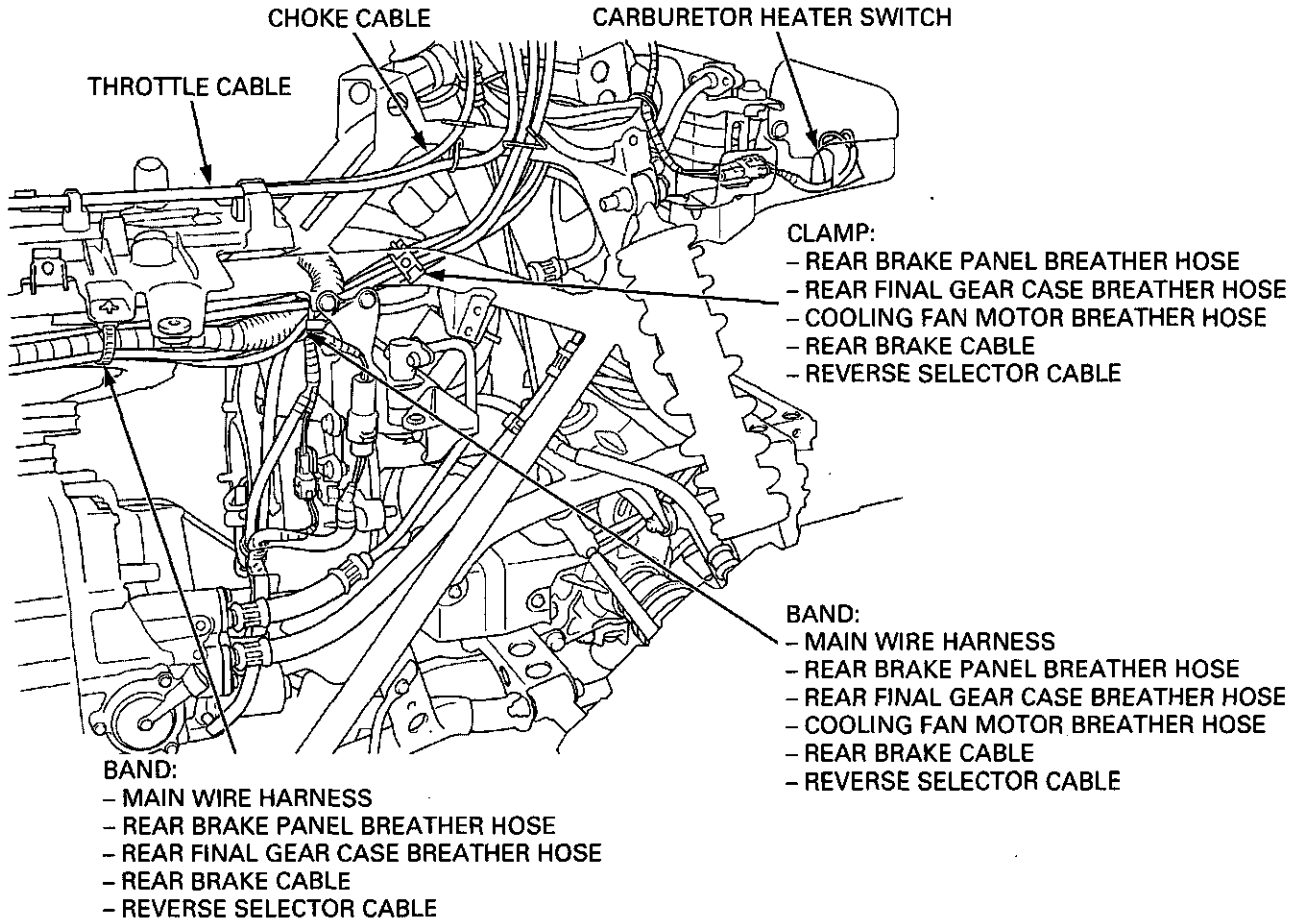
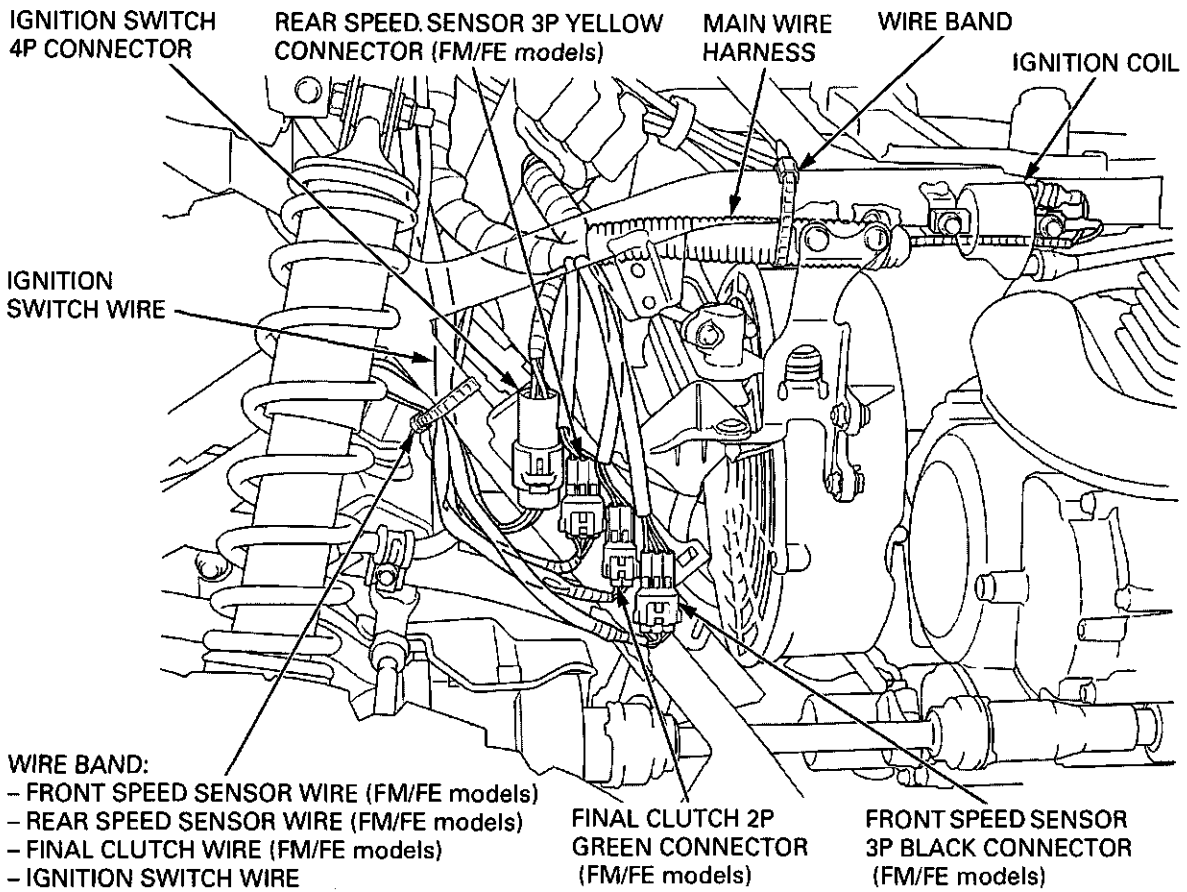
REAR SPEED SENSOR

FINAL CLUTCH WIRE

# GENERAL INFORMATION

FM/FE models shown; TM model similar:





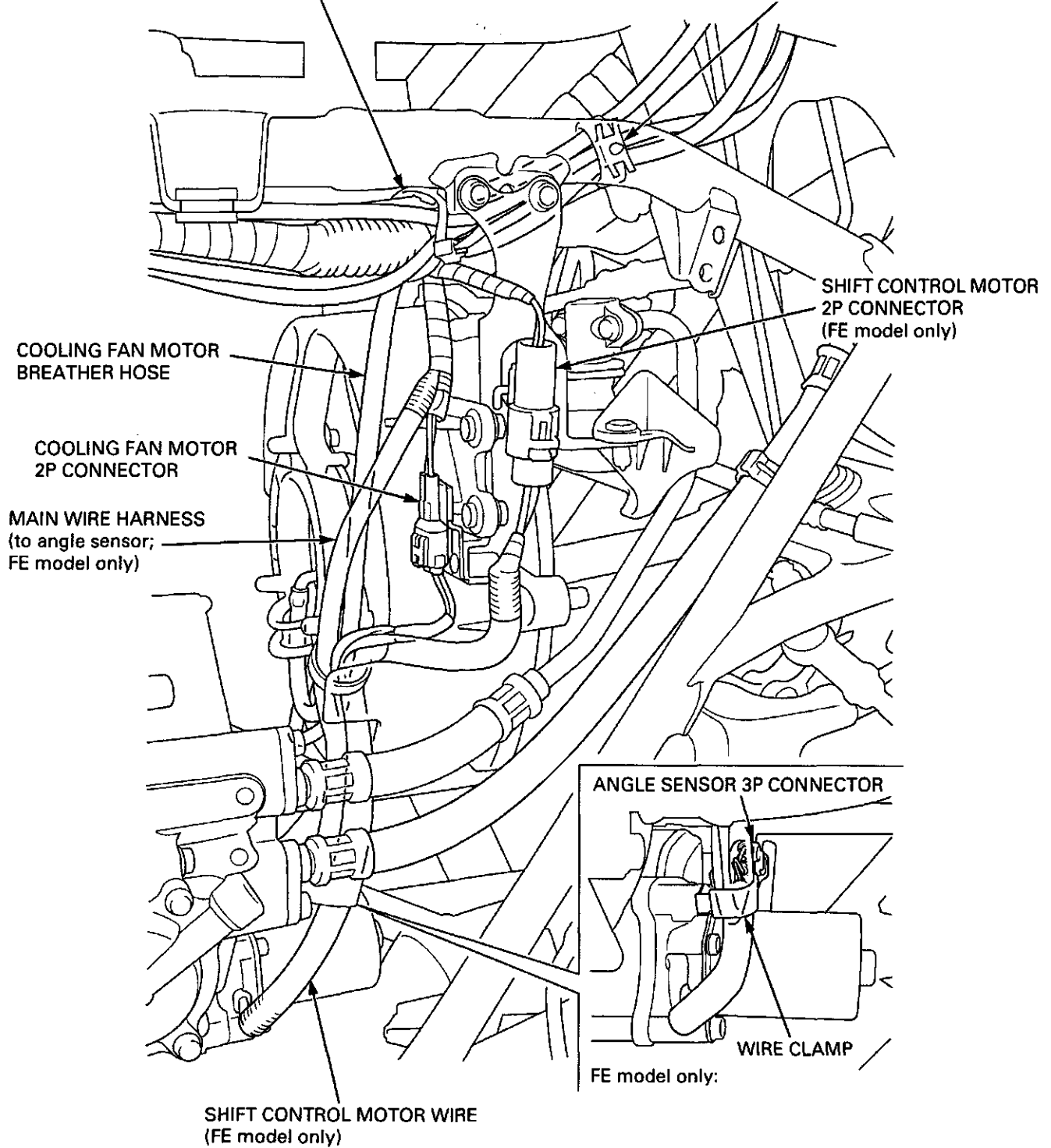
# GENERAL INFORMATION

**BAND:**

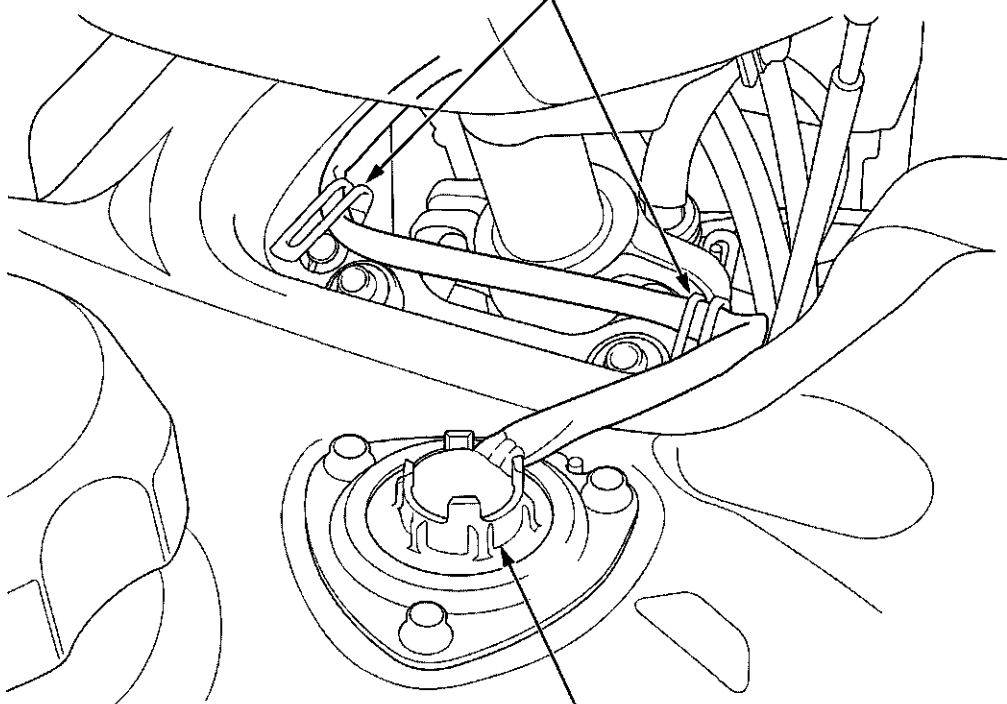
- MAIN WIRE HARNESS
- REAR BRAKE PANEL BREATHER HOSE
- REAR FINAL GEAR CASE BREATHER HOSE
- COOLING FAN MOTOR BREATHER HOSE
- REAR BRAKE CABLE
- REVERSE SELECTOR CABLE

**CLAMP:**

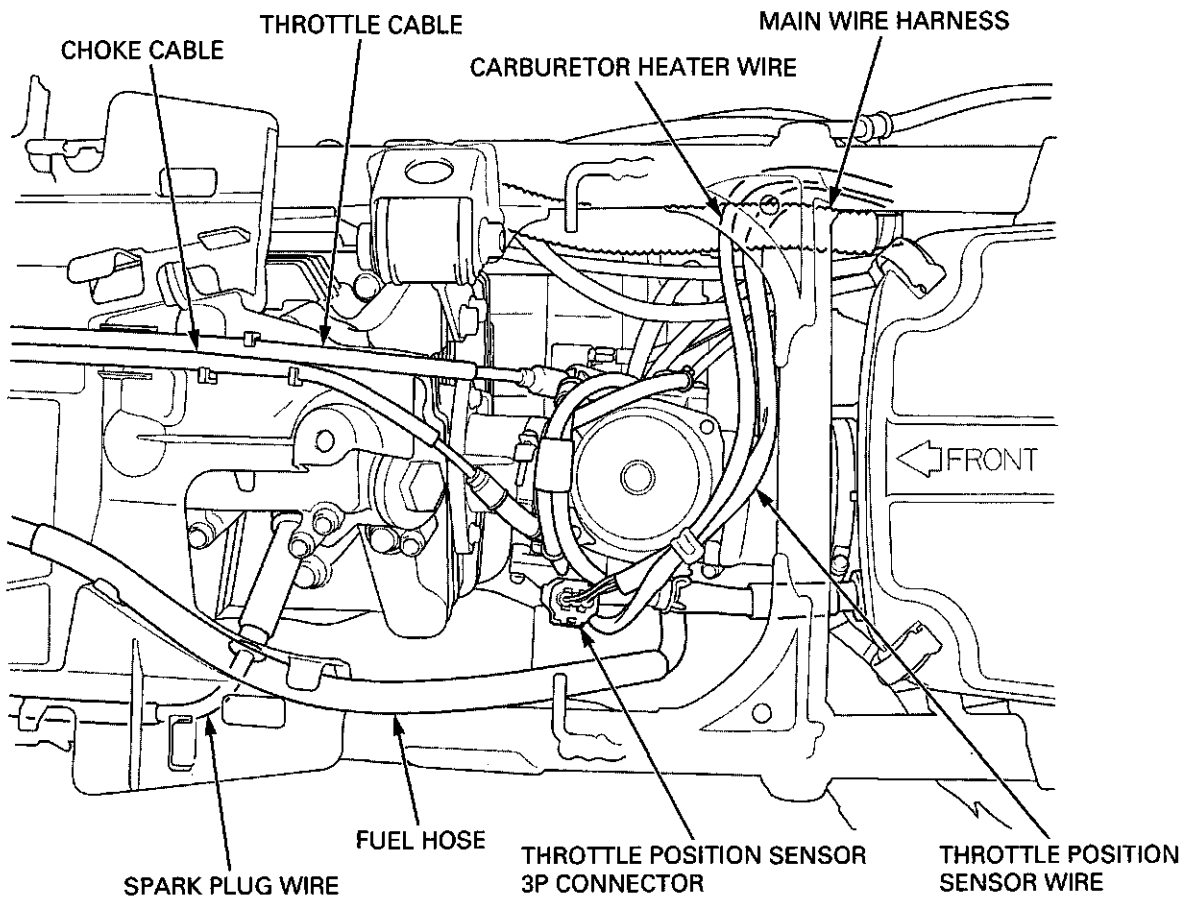
- REAR BRAKE PANEL BREATHER HOSE
- REAR FINAL GEAR CASE BREATHER HOSE
- COOLING FAN MOTOR BREATHER HOSE
- REAR BRAKE CABLE
- REVERSE SELECTOR CABLE



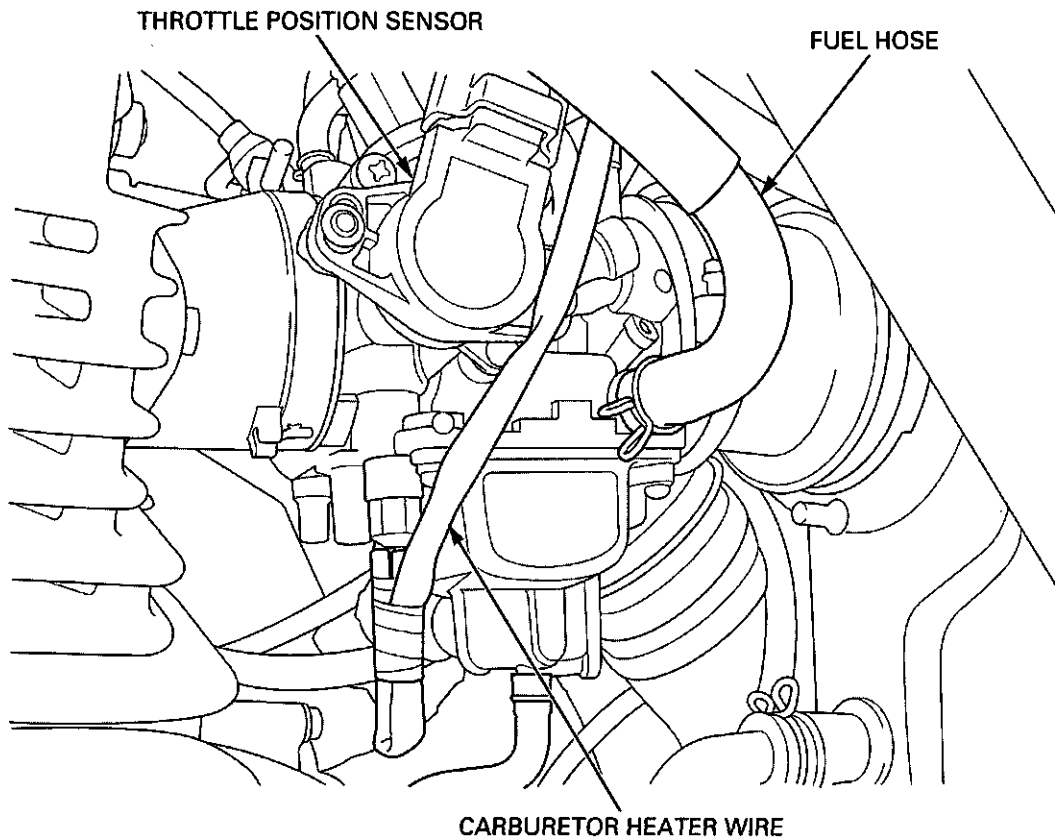
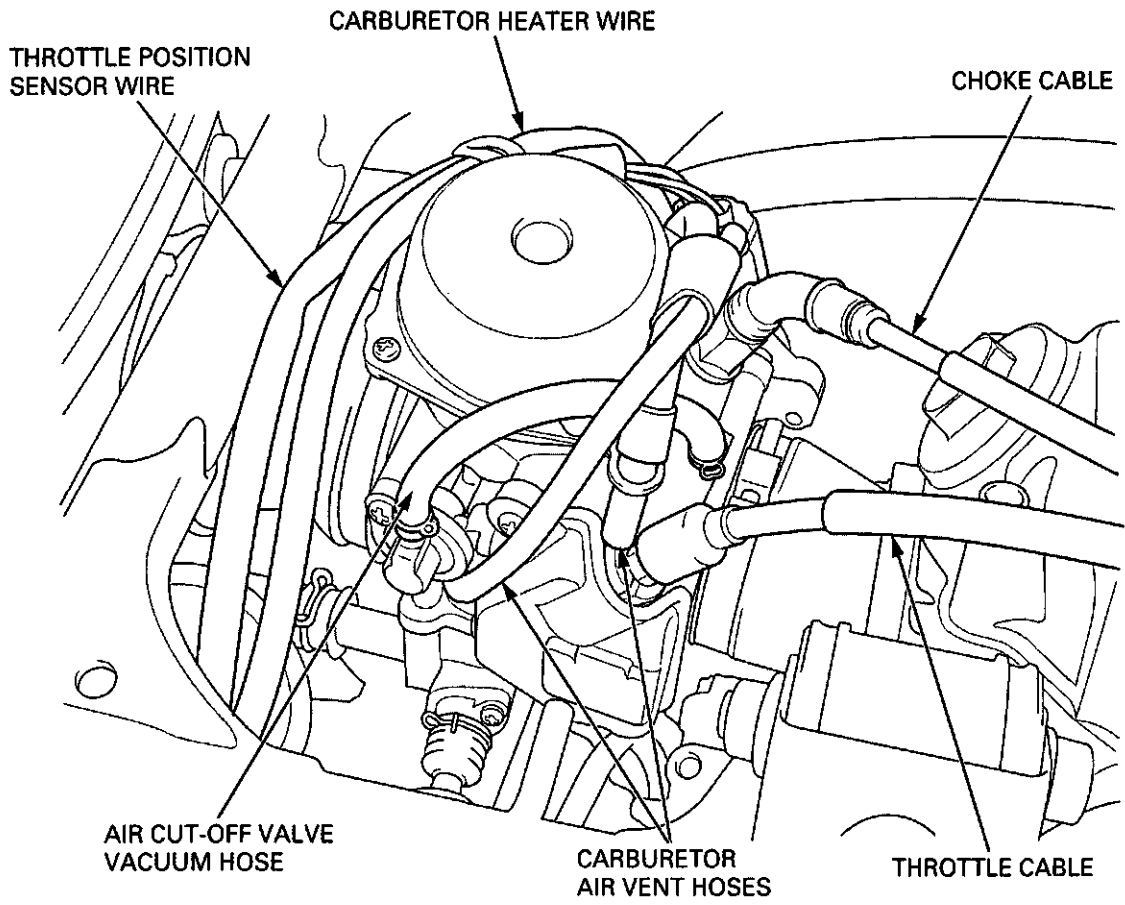
CLAMPS  
(Except A/CM type TM model)



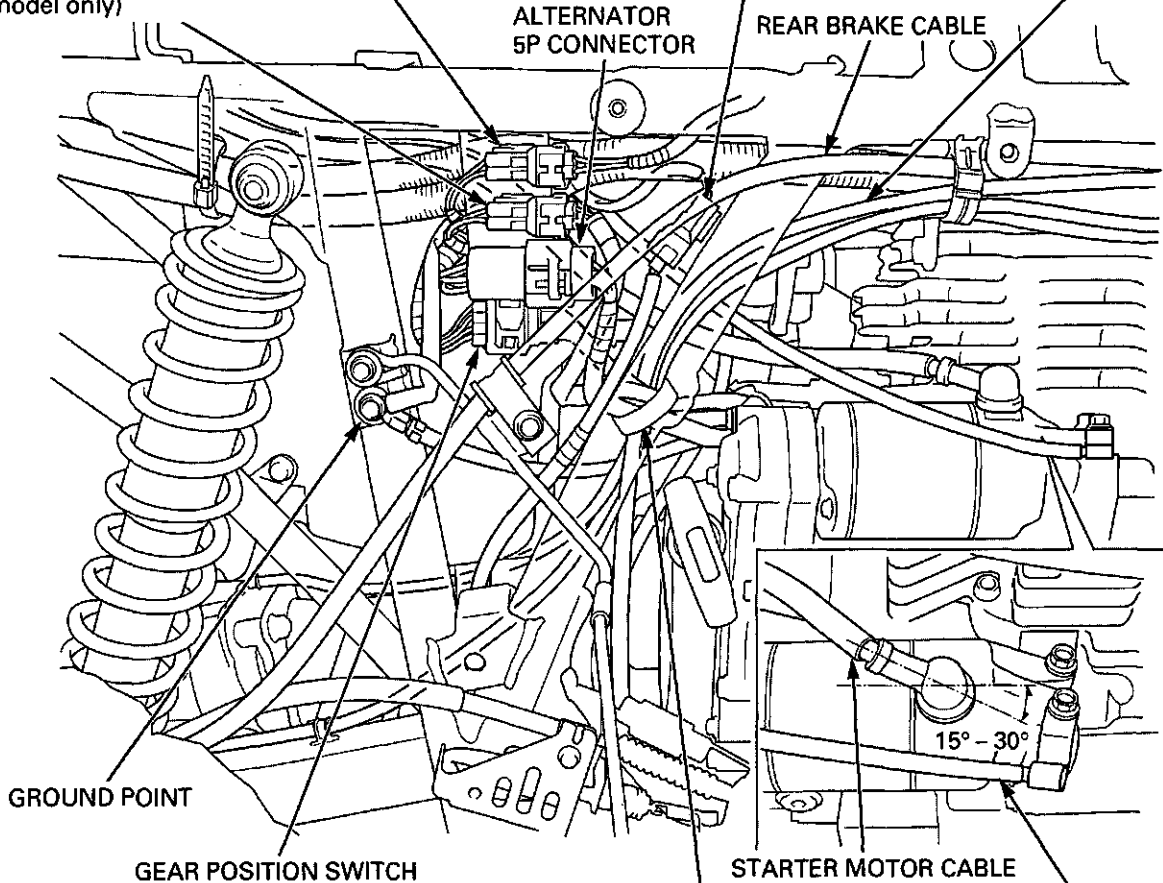
FUEL LEVEL SENSOR  
(Except A/CM type TM model)



# GENERAL INFORMATION

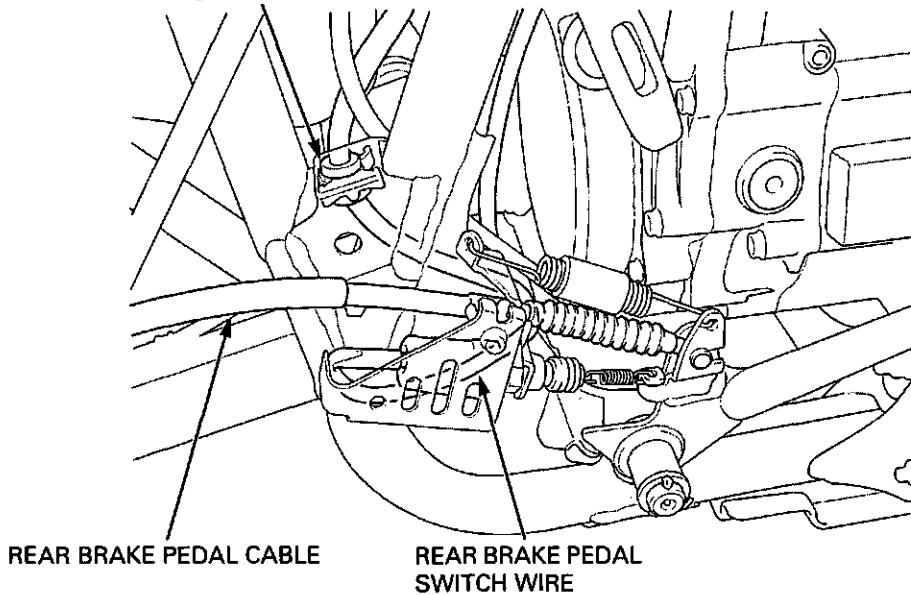


ENGINE SUB-WIRE 2P GREEN CONNECTOR (FE model only)      CARBURETOR HEATER 2P CONNECTOR      REAR BRAKE PEDAL SWITCH 2P CONNECTOR      REVERSE SELECTOR CABLE



- CLAMP:**
- REAR BRAKE PANEL BREATHER HOSE
  - REAR FINAL GEAR CASE BREATHER HOSE
  - GEAR POSITION SWITCH WIRE
  - ENGINE SUB-WIRE
  - ALTERNATOR WIRE
  - REVERSE SELECTOR CABLE
- BATTERY GROUND CABLE

**CLAMP (secure the wire at the grommet.)**

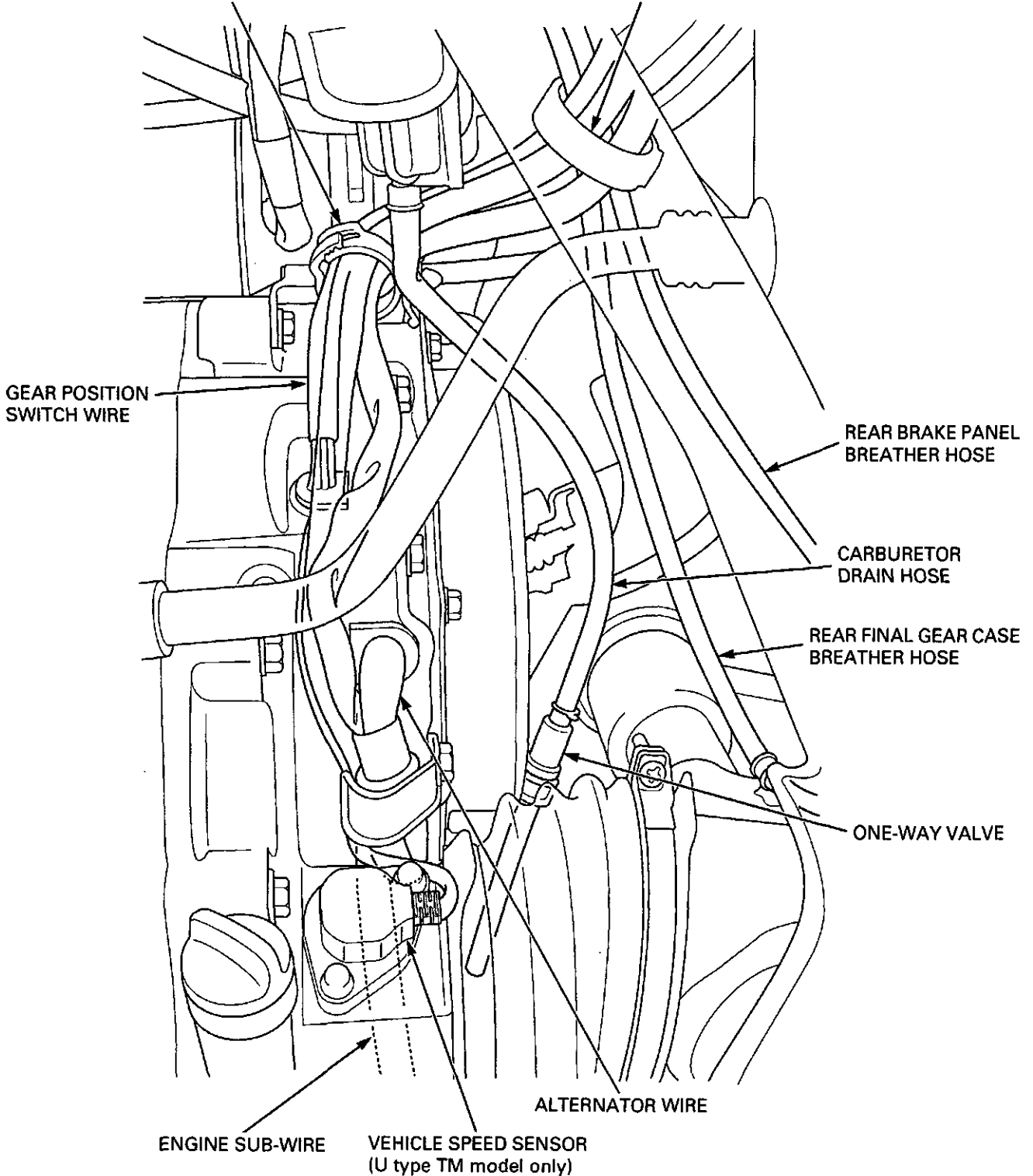


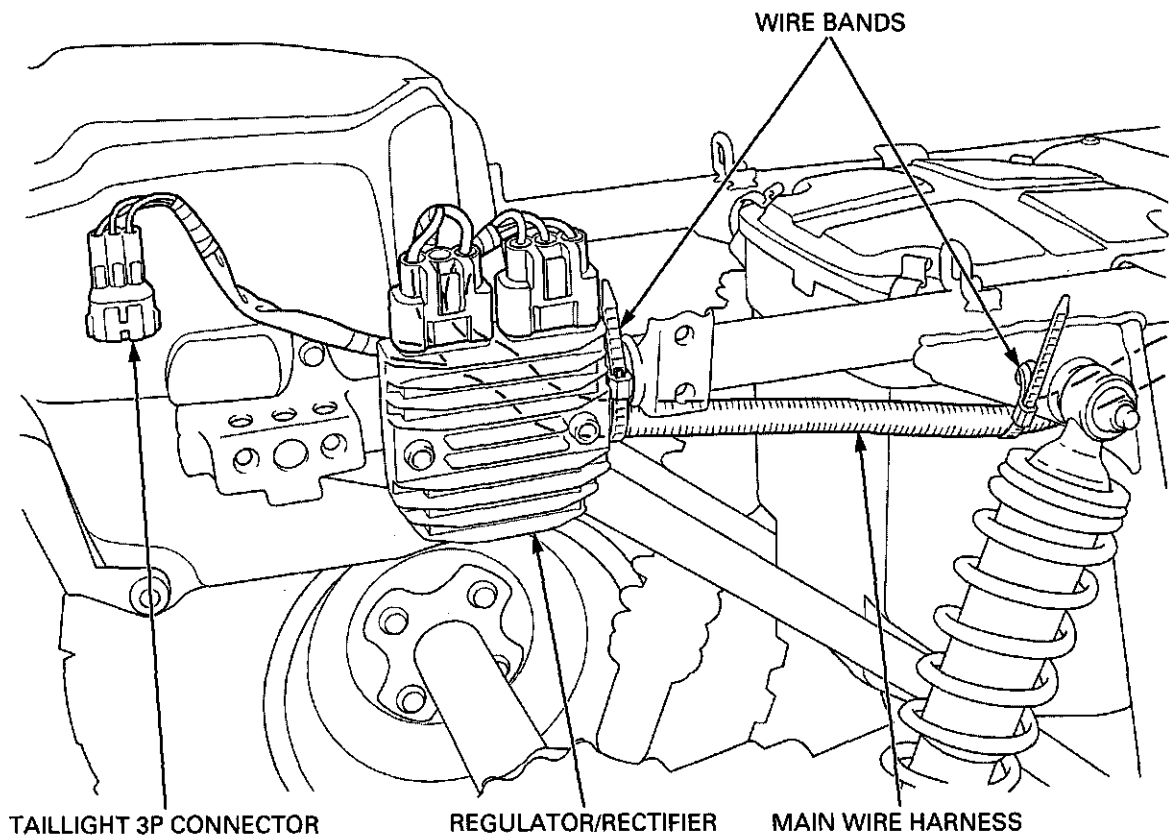
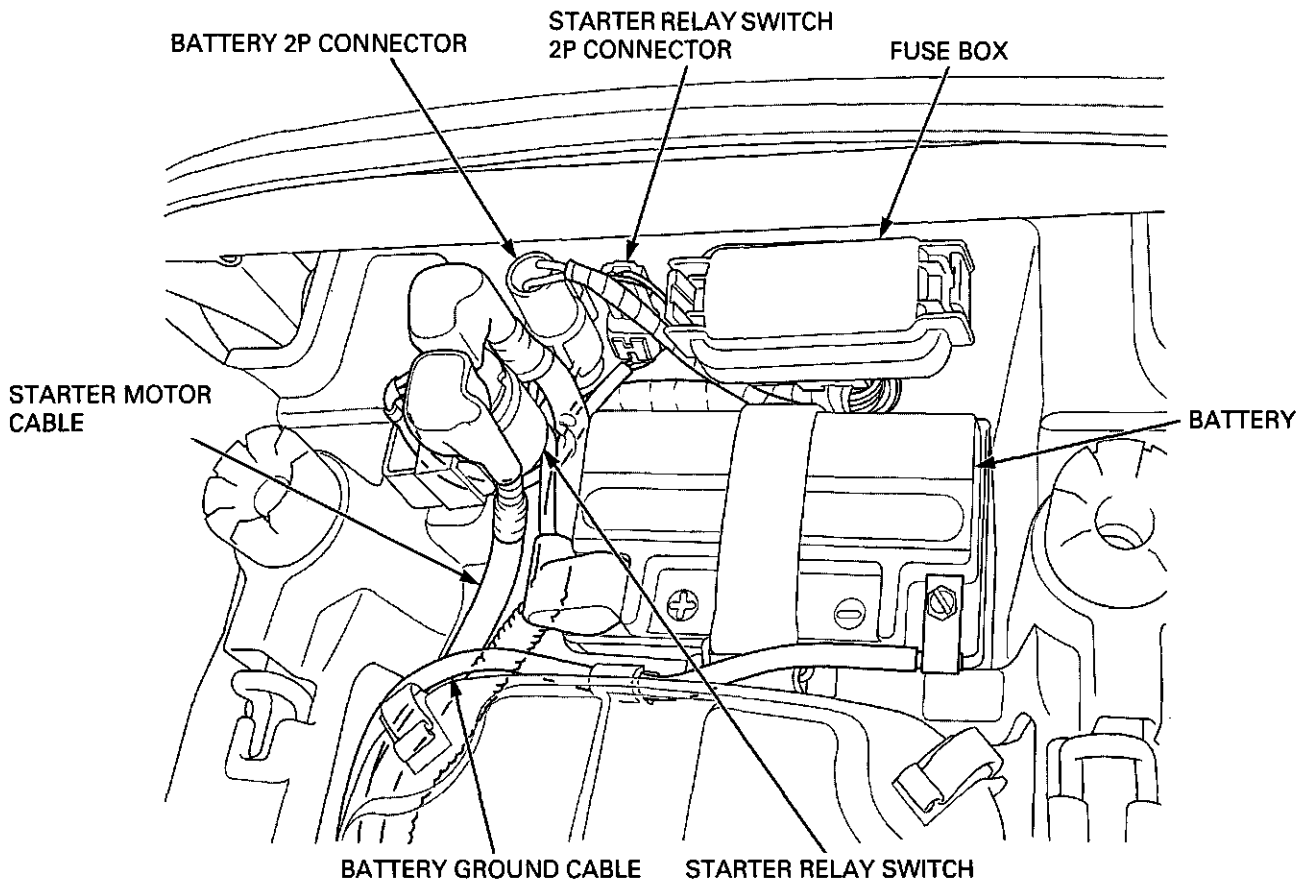


# GENERAL INFORMATION

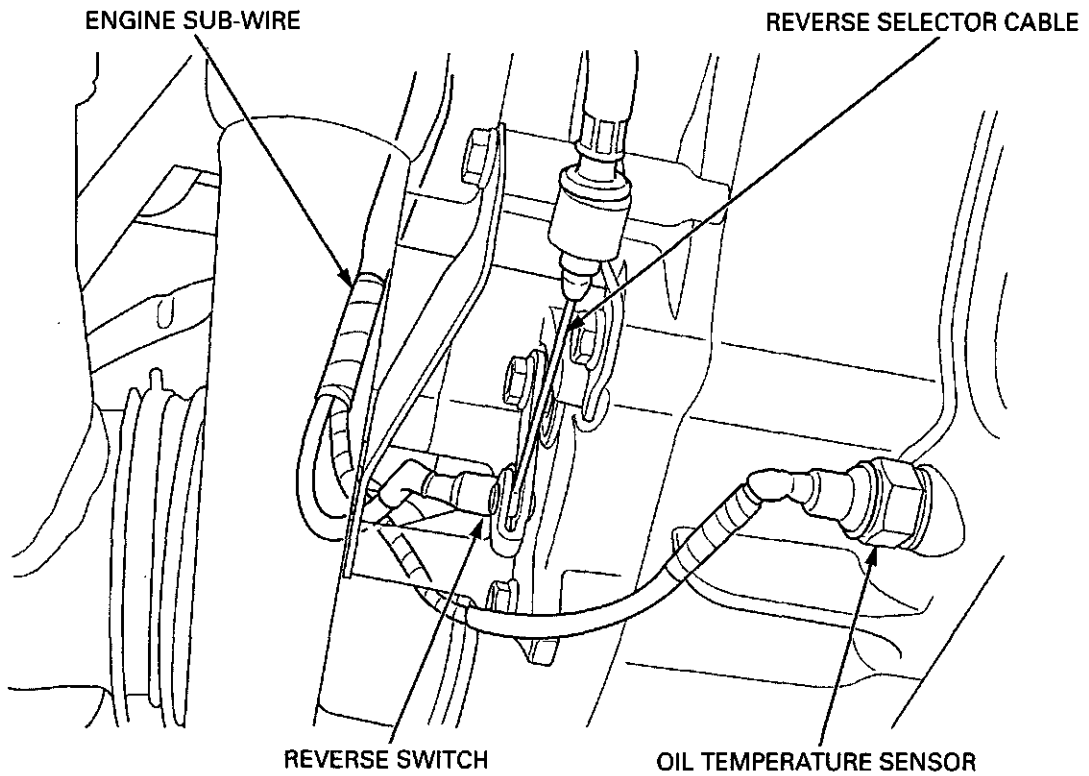
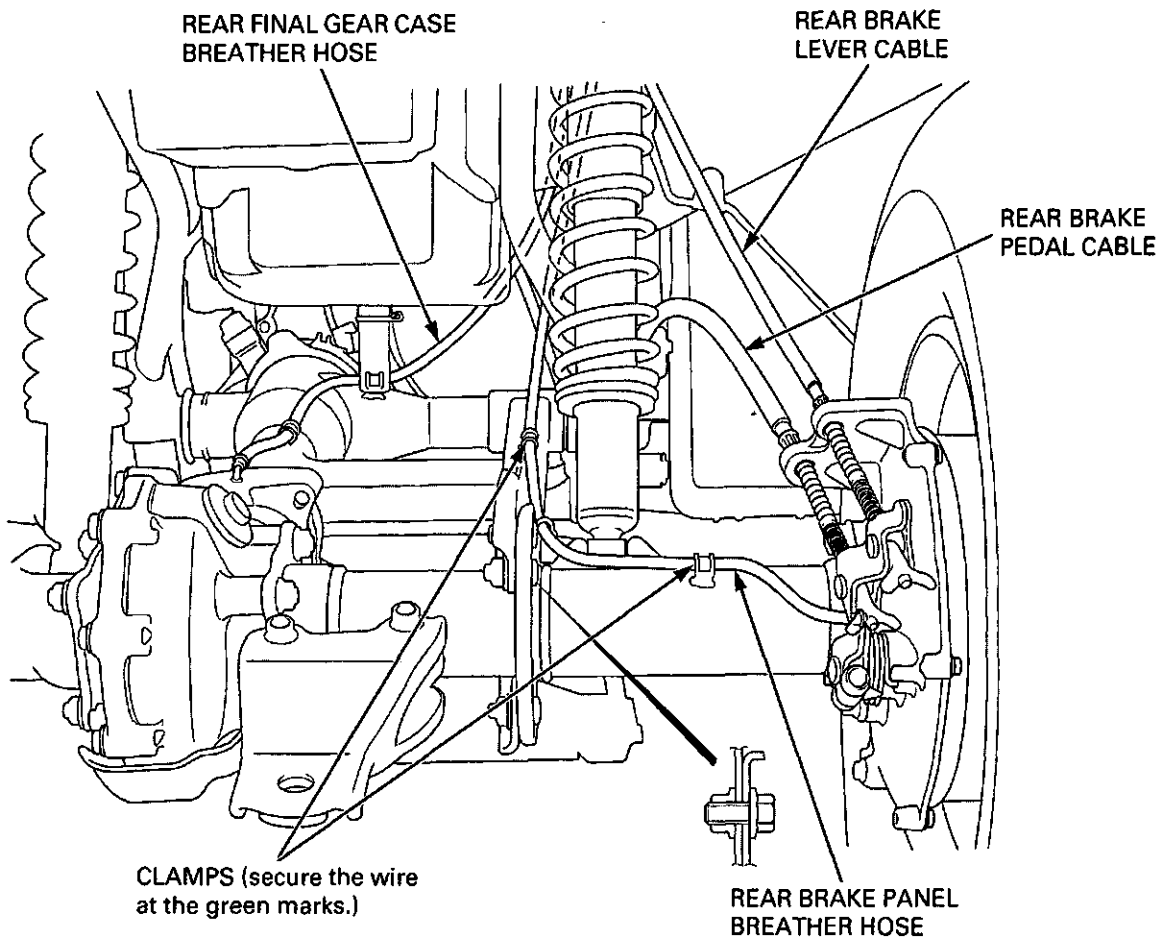
- CLAMP:  
- GEAR POSITION SWITCH WIRE  
- ENGINE SUB-WIRE  
- ALTERNATOR WIRE

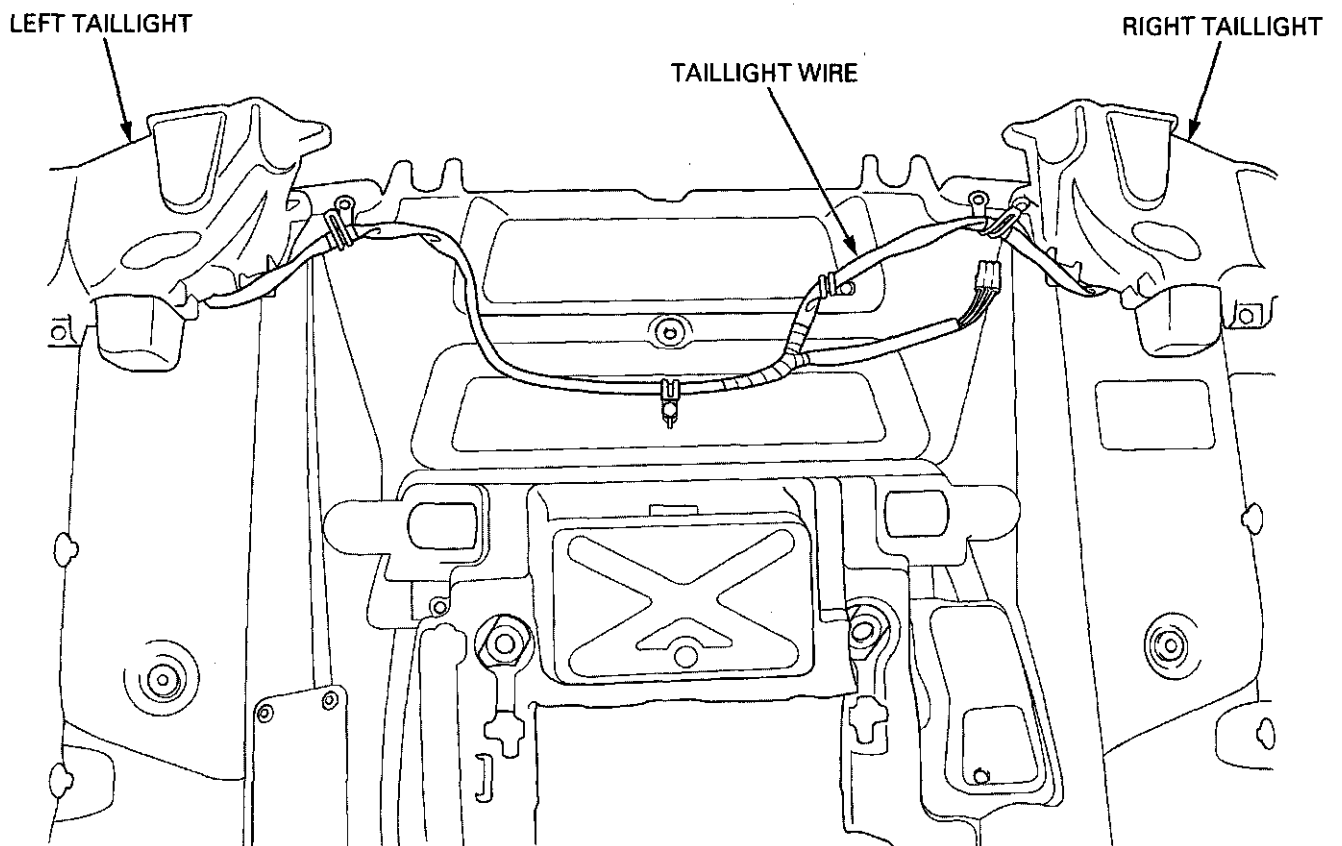
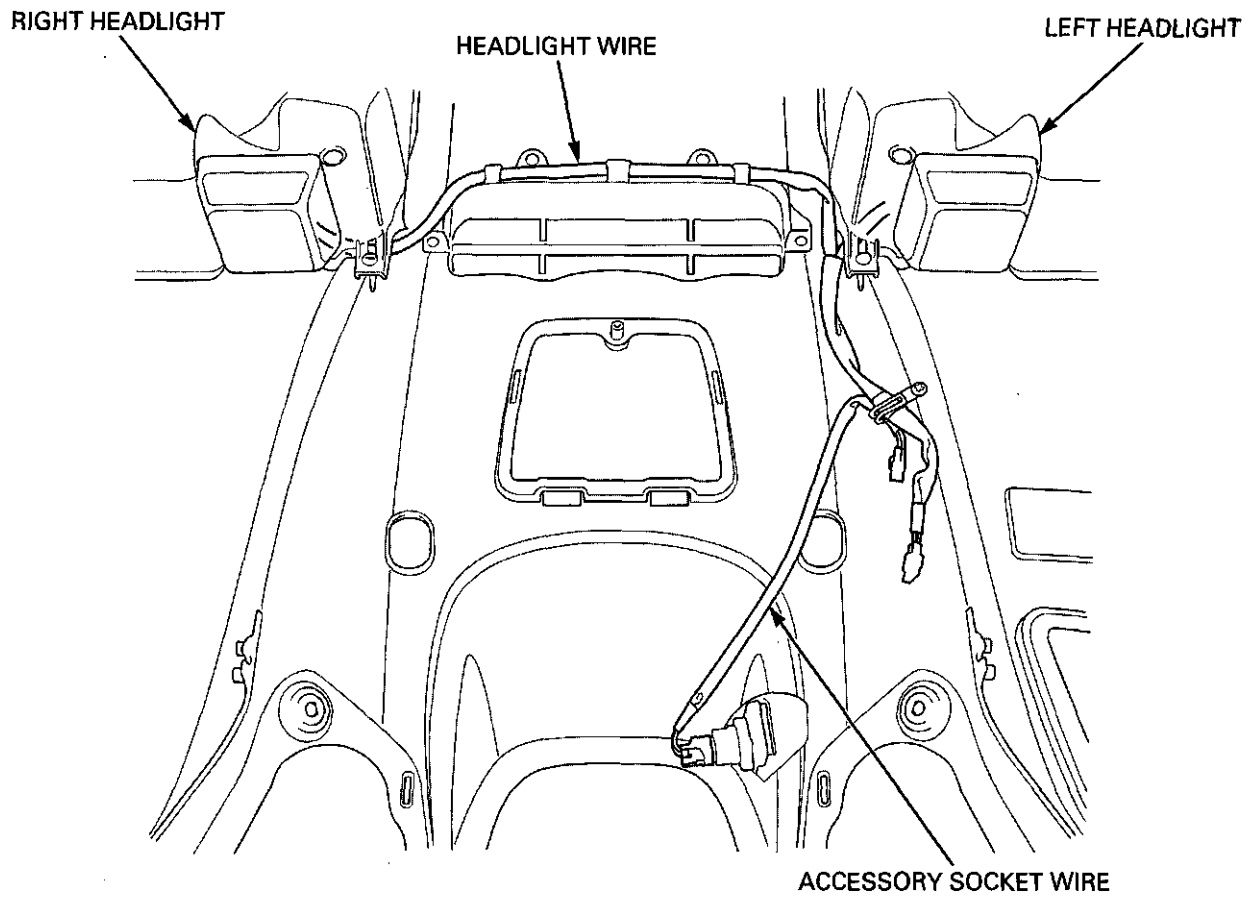
- CLAMP:  
- REAR BRAKE PANEL BREATHER HOSE  
- REAR FINAL GEAR CASE BREATHER HOSE  
- GEAR POSITION SWITCH WIRE  
- ENGINE SUB-WIRE  
- ALTERNATOR WIRE  
- REVERSE SELECTOR CABLE





# GENERAL INFORMATION





## GENERAL INFORMATION

# EMISSION CONTROL SYSTEMS

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

## 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.

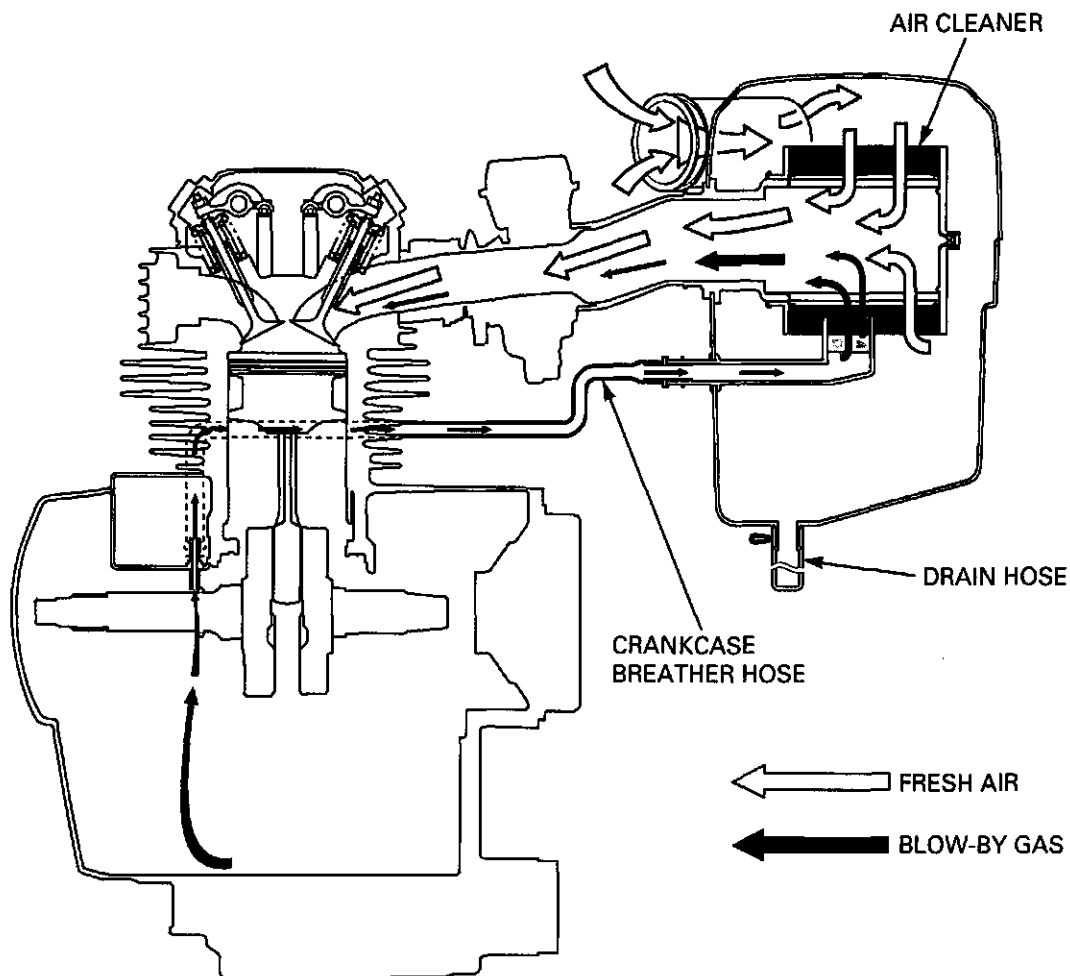
Honda Motor Co., Ltd. utilizes various systems to reduce carbon monoxide, oxides of nitrogen, and hydrocarbons.

## EXHAUST EMISSION CONTROL SYSTEM

The exhaust emission control system is composed of an appropriate carburetor setting, and no adjustments should be made except for high altitude setting and idle speed adjustment with the throttle stop screw. The exhaust emission control system is separate from the crankcase emission control system.

## CRANKCASE EMISSION CONTROL SYSTEM

The engine is equipped with a closed crankcase system to prevent discharging crankcase emissions into the atmosphere. Blow-by gas is returned to the combustion chamber through the air cleaner and carburetor.



**SERVICING THE HONDA****U.S.A. Only**

Maintenance, replacement or repair of the emission control devices and systems may be performed by any ATV repair establishment or individual using parts that are "certified" to EPA standards.

**PROHIBITED ACTIONS**

The following prohibitions apply to everyone with respect to the engine's emission control system.

You may not remove or disable any device or element of design that may affect an engine's emission levels. This restriction applies before and after the engine is placed in service.

Vehicles that are used only for competition are exempt from this prohibition.

**NOISE EMISSION CONTROL SYSTEM (except U type)**

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

**AMONG THOSE ACTS PRESUMED TO CONSTITUTE TAMPERING ARE THE FOLLOWING ACTS:**

1. Removal of, or puncturing 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.

**NOISE EMISSION CONTROL SYSTEM (U type only)**

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

**REBUILT ENGINE**

When you rebuild your engine including a major overhaul in which you replace the engine's pistons or power assemblies or make other changes that significantly increase the service life of the engine, your Honda will continue to comply with all emissions regulations if you:

- Make sure you are technically qualified to rebuild the engine and have the proper tools
- Use only Genuine Honda parts or equivalents
- Make sure to maintain all specifications as described in this Service Manual

# 2. TECHNICAL FEATURES

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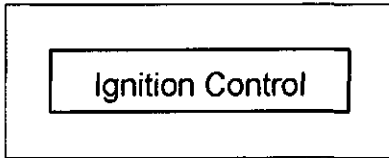
**INTEGRATED ENGINE CONTROL MODULE  
(ECM)..... 2-2**

## TECHNICAL FEATURES

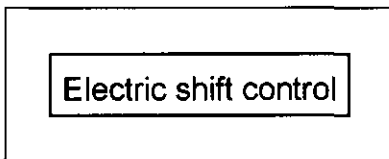
### INTEGRATED ENGINE CONTROL MODULE (ECM)

The ignition control module (ICM), electric shift program (ESP) control unit (FE model only), fan control unit and 2WD/4WD control unit (FM/FE models) are integrated into the ECM to reduce cost and conserve space.

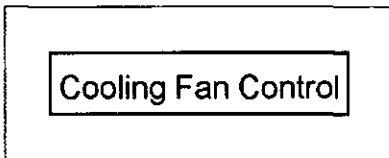
#### ICM



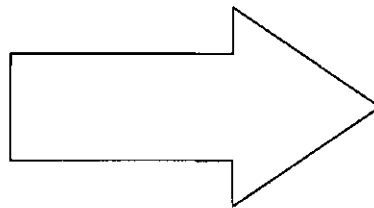
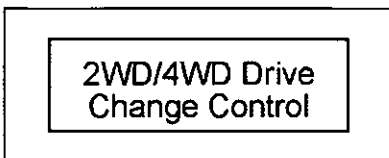
#### ESP CONTROL UNIT



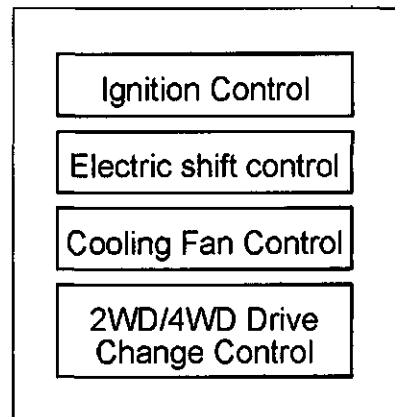
#### FAN CONTROL UNIT



#### 2WD/4WD CONTROL UNIT



#### ECM





# 3. FRAME/BODY PANELS/EXHAUST SYSTEM

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SERVICE INFORMATION.....	3-2	INNER FENDER.....	3-7
TROUBLESHOOTING.....	3-2	FRONT CARRIER/CARRY PIPE.....	3-8
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SEAT.....	3-4	REAR CARRIER.....	3-10
RECOIL STARTER COVER.....	3-4	REAR FENDER.....	3-11
SIDE COVER.....	3-4	ENGINE AIR GUIDE.....	3-12
FUEL TANK COVER.....	3-5	ENGINE GUARD.....	3-12
CENTER MUD GUARD.....	3-6	EXHAUST SYSTEM.....	3-13
FRONT MUD GUARD.....	3-7		

### SERVICE INFORMATION

#### GENERAL

- This section covers removal and installation of the body panels and exhaust system.
- Always replace the gaskets when removing the exhaust system.
- Always inspect the exhaust system for leaks after installation.

#### TORQUE VALUES

Front carrier bolt	37 N·m (3.8 kgf·m, 27 lbf·ft)
Front carry pipe bolt	37 N·m (3.8 kgf·m, 27 lbf·ft)
Rear carrier bolt	37 N·m (3.8 kgf·m, 27 lbf·ft)
Muffler band bolt	23 N·m (2.3 kgf·m, 17 lbf·ft)
Muffler cover band bolt	3.2 N·m (0.33 kgf·m, 2.4 lbf·ft)
Exhaust pipe cover band bolt	3.2 N·m (0.33 kgf·m, 2.4 lbf·ft)
Heat protector band bolt	5.4 N·m (0.55 kgf·m, 4.0 lbf·ft)
Footpeg bracket bolt	32 N·m (3.3 kgf·m, 24 lbf·ft)

### TROUBLESHOOTING

#### **Excessive exhaust noise**

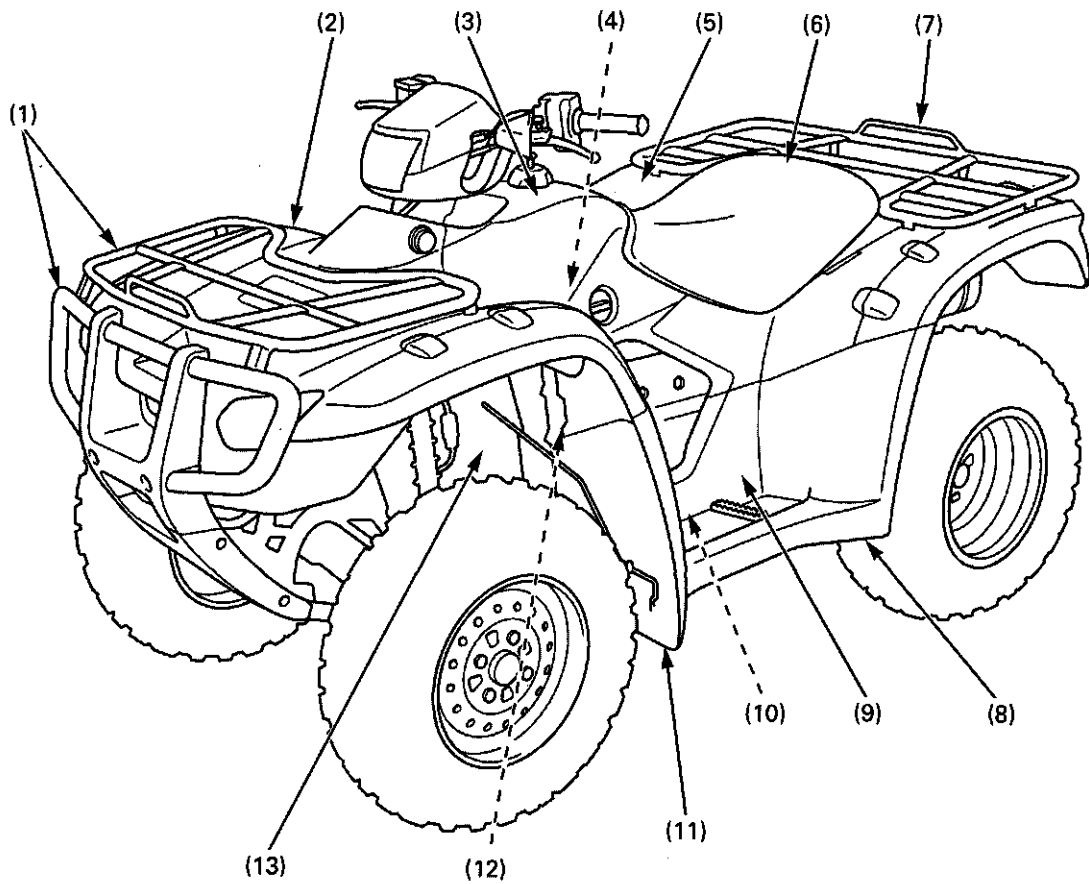
- Broken exhaust system
- Exhaust gas leaks

#### **Poor performance**

- Deformed exhaust system
- Exhaust gas leaks
- Clogged muffler

## BODY PANEL LOCATIONS

TRX500FE model shown:



- (1) FRONT CARRIER/CARRY PIPE (page 3-8)
- (2) FRONT FENDER (page 3-9)
- (3) FUEL TANK COVER (page 3-5)
- (4) RECOIL STARTER COVER (page 3-4)
- (5) REAR FENDER (page 3-11)
- (6) SEAT (page 3-4)
- (7) REAR CARRIER (page 3-10)

- (8) CENTER MUD GUARD (page 3-6)
- (9) SIDE COVER (page 3-4)
- (10) ENGINE GUARD (page 3-12)
- (11) FRONT MUD GUARD (page 3-7)
- (12) ENGINE AIR GUIDE (page 3-12)
- (13) INNER FENDER (page 3-7)

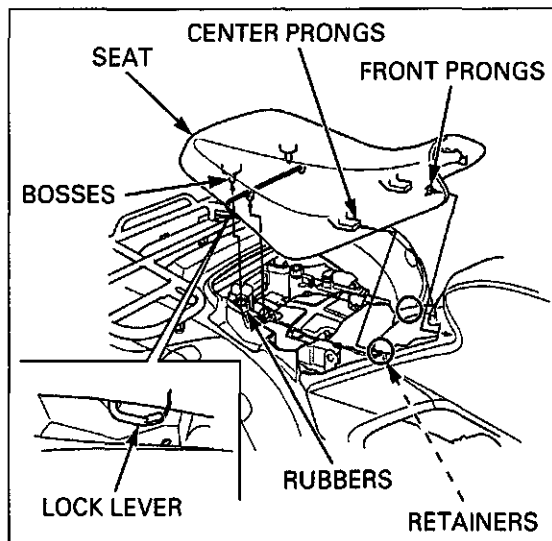
**SEAT**

**REMOVAL**

Unlock the seat by turning the release lever upward. Raise the rear of the seat, slide it rearward and remove it.

**INSTALLATION**

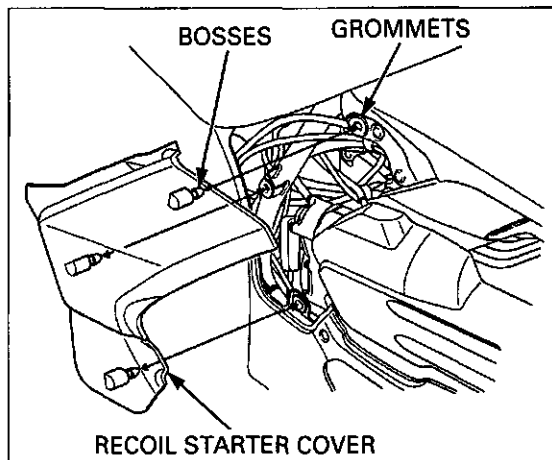
Install the seat by inserting the front prong under fuel tank and hooking the center prongs to the seat retainers of the frame. Push the seat forward and align the mounting bosses with the mounting rubbers, then press down to lock it.



**RECOIL STARTER COVER**

Remove the recoil starter cover by releasing the three bosses from the grommets.

Install the recoil starter cover in the reverse order of removal.



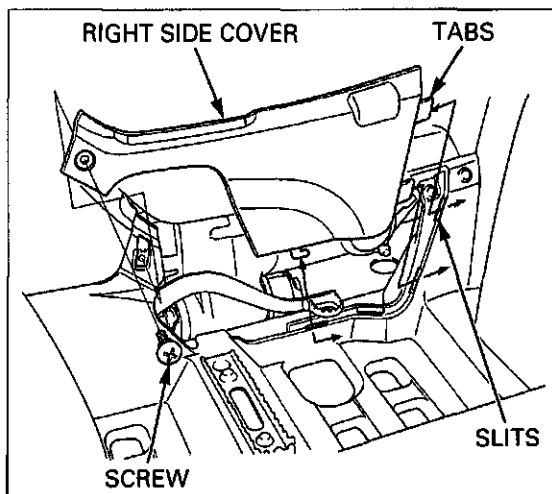
**SIDE COVER**

**RIGHT SIDE COVER**

Remove the recoil starter cover (page 3-4).

Remove the screw and the right side cover by releasing the three tabs from the slits.

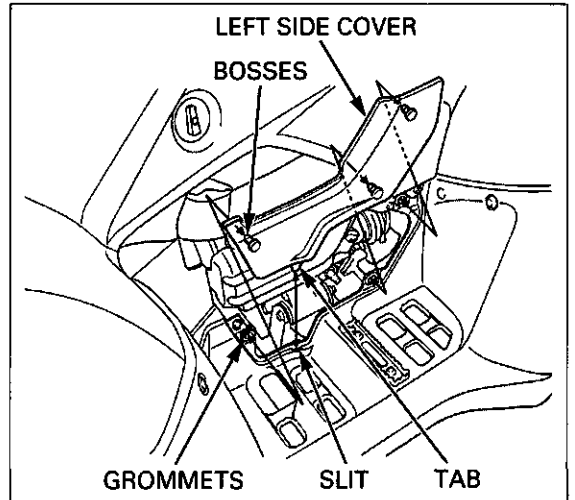
Install the right side cover in the reverse order of removal.



**LEFT SIDE COVER**

Remove the left side cover by releasing the three bosses from the grommets and the tab from the slit.

Install the left side cover in the reverse order of removal.

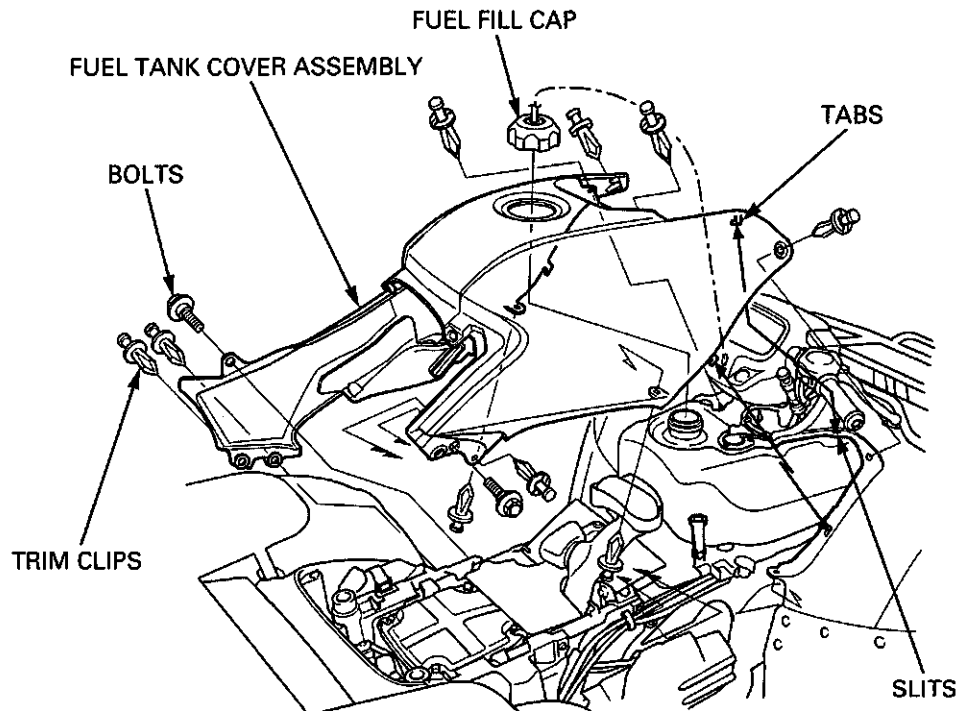
**FUEL TANK COVER****REMOVAL/INSTALLATION**

Remove the following:

- seat (page 3-4)
- recoil starter cover (page 3-4)
- left side cover (page 3-5)
- nine trim clips
- two 6 mm setting bolts
- fuel fill cap
- fuel tank cover assembly by sliding it forward to release the four tabs from the slits

Install the fuel fill cap.

Install the fuel tank cover assembly in the reverse order of removal.

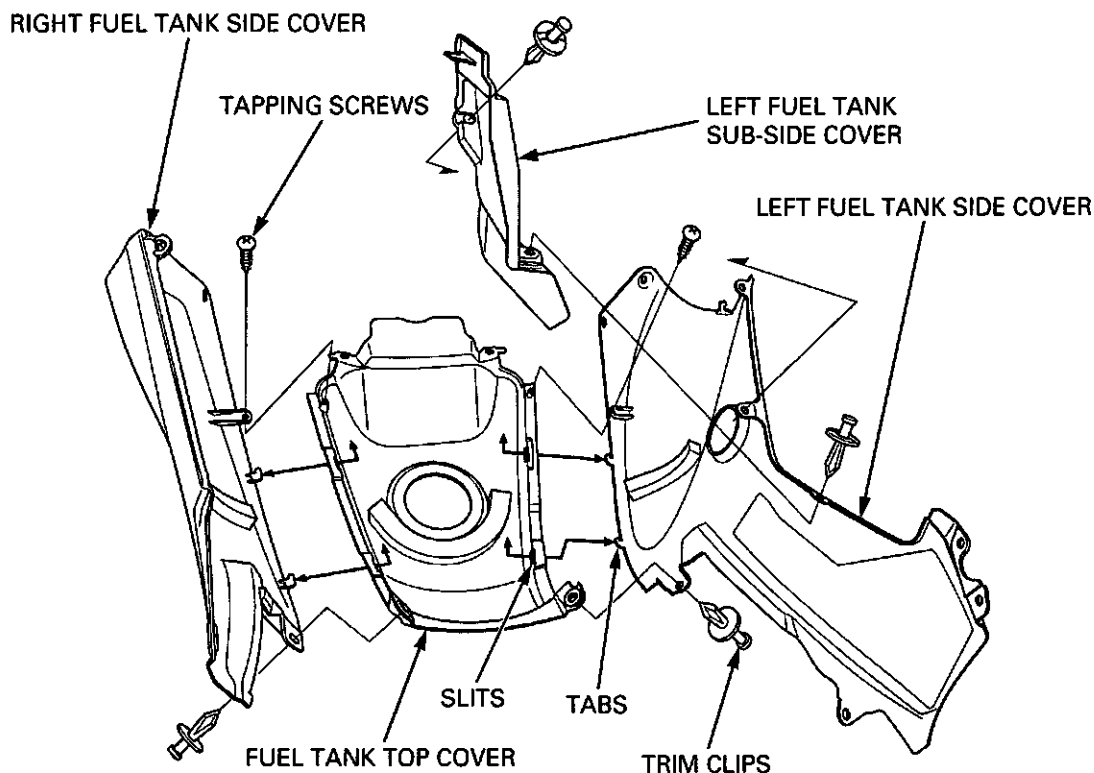


## DISASSEMBLY/ASSEMBLY

Remove the following:

- two trim clips and left fuel tank sub-side cover
- trim clip, tapping screw and left fuel tank side cover by releasing the two tabs from the slits
- trim clip, tapping screw and right fuel tank side cover by releasing the two tabs from the slits

Assemble the fuel tank covers in the reverse order of disassembly.



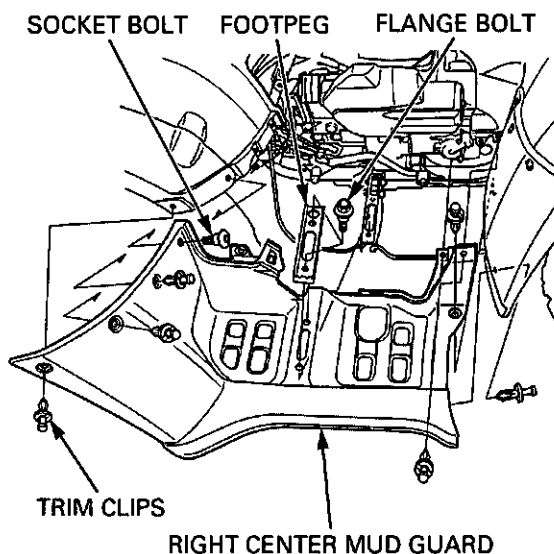
## CENTER MUD GUARD

### RIGHT CENTER MUD GUARD

Remove the following:

- right side cover (page 3-4)
- two flange bolts and foot peg
- socket bolt
- seven trim clips
- right center mud guard

Install the right center mud guard in the reverse order of removal.

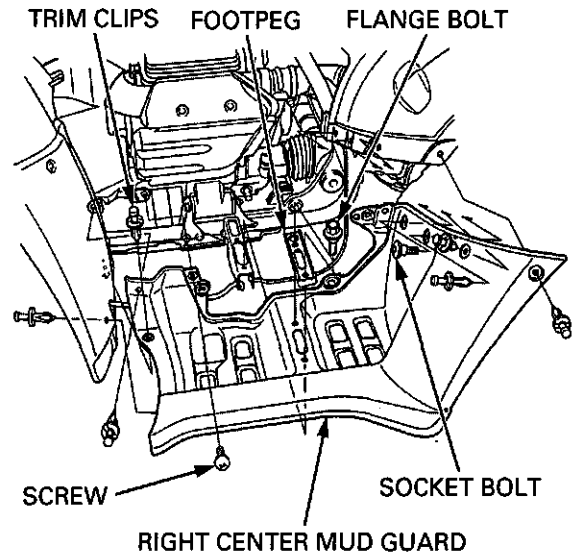


**LEFT CENTER MUD GUARD**

Remove the following:

- left side cover (page 3-4)
- two flange bolts and foot peg
- socket bolt
- screw
- six trim clips
- left center mud guard

Install the left center mud guard in the reverse order of removal.

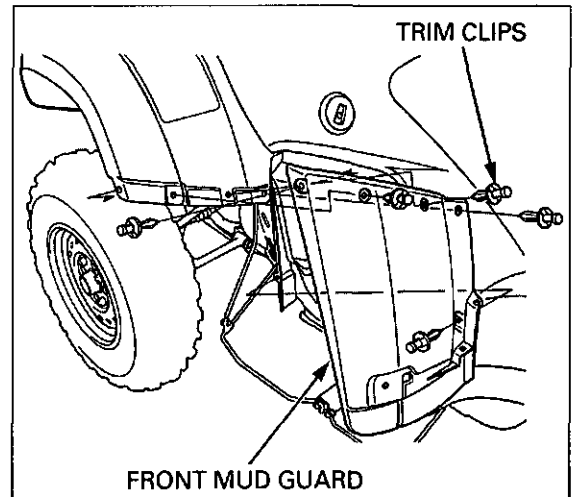


**FRONT MUD GUARD**

Remove the following:

- center mud guard (page 3-6)
- five trim clips
- front mud guard

Install the front mud guard in the reverse order of removal.



**INNER FENDER**

**RIGHT INNER FENDER**

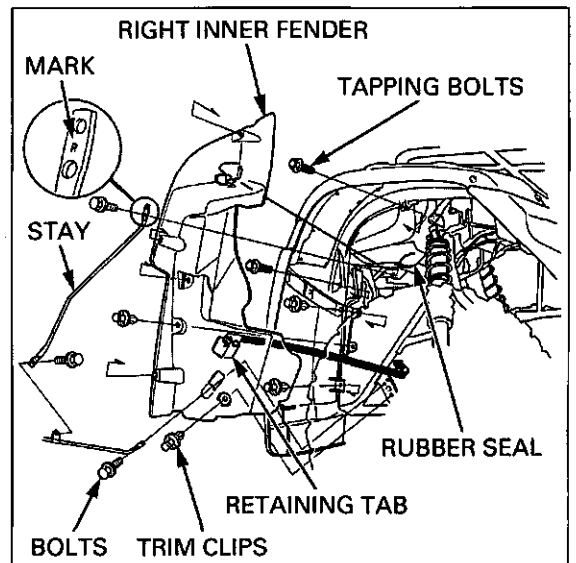
Remove the following:

- three bolts
- right fender stay
- four trim clips
- two tapping bolts

Release the retaining tab from the frame, unhook the rubber seal from the tab and remove the right inner fender.

Install the right inner fender in the reverse order of removal.

*The right fender stay has the "R" mark at the upper end.*



## FRAME/BODY PANELS/EXHAUST SYSTEM

### LEFT INNER FENDER

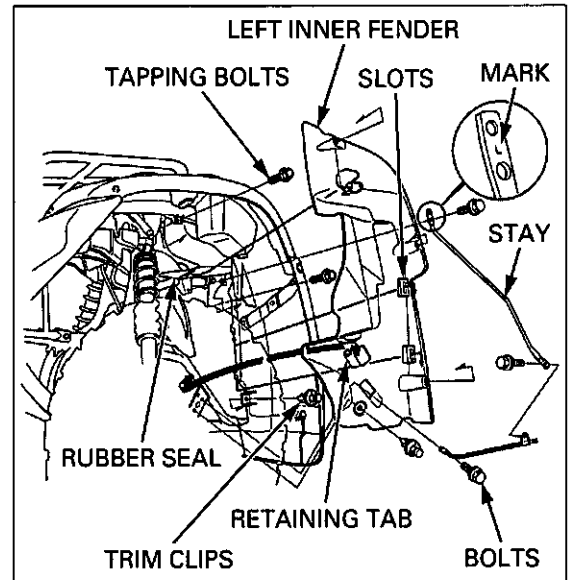
Remove the following:

- three bolts
- left fender stay
- two trim clips
- two tapping bolts

Unhook the two slots in the fender from the tabs. Release the retaining tab from the frame, unhook the rubber seal from the tab and remove the left inner fender.

*The left fender stay has the "L" mark at the upper end.*

Install the left inner fender in the reverse order of removal.



## FRONT CARRIER/CARRY PIPE

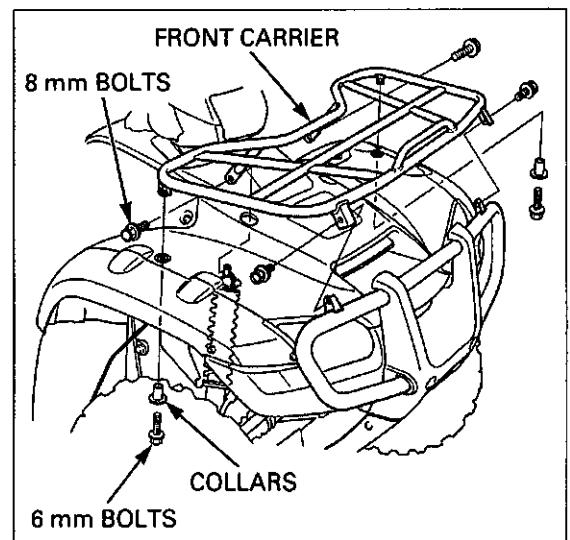
### FRONT CARRIER

Remove the following:

- Be careful not to scratch the front fender.*
- two 6 mm bolts and collars
  - four 8 mm bolts
  - front carrier

Install the front carrier in the reverse order of removal.

**TORQUE: 8 mm bolt: 37 N·m (3.8 kgf·m, 27 lbf·ft)**



### FRONT CARRY PIPE

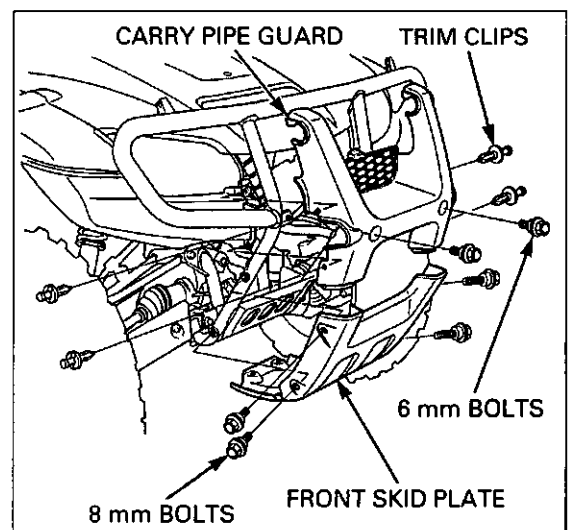
#### CARRY PIPE GUARD/FRONT SKID PLATE

Remove the following:

- Carry pipe guard:
- four trim clips
  - two 6 mm bolts
  - carry pipe guard

- Front skid plate:
- four 8 mm bolts
  - front skid plate

Install the carry pipe guard and front skid plate in the reverse order of removal.





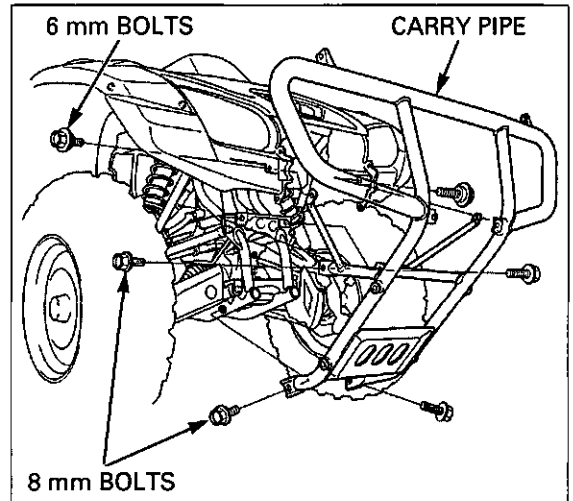
**CARRY PIPE**

Remove the following:

- front carrier (page 3-8)
- carry pipe guard (page 3-8)
- two 6 mm bolts
- four 8 mm bolts
- carry pipe

Install the carry pipe in the reverse order of removal.

**TORQUE: 8 mm bolt: 37 N·m (3.8 kgf·m, 27 lbf·ft)**

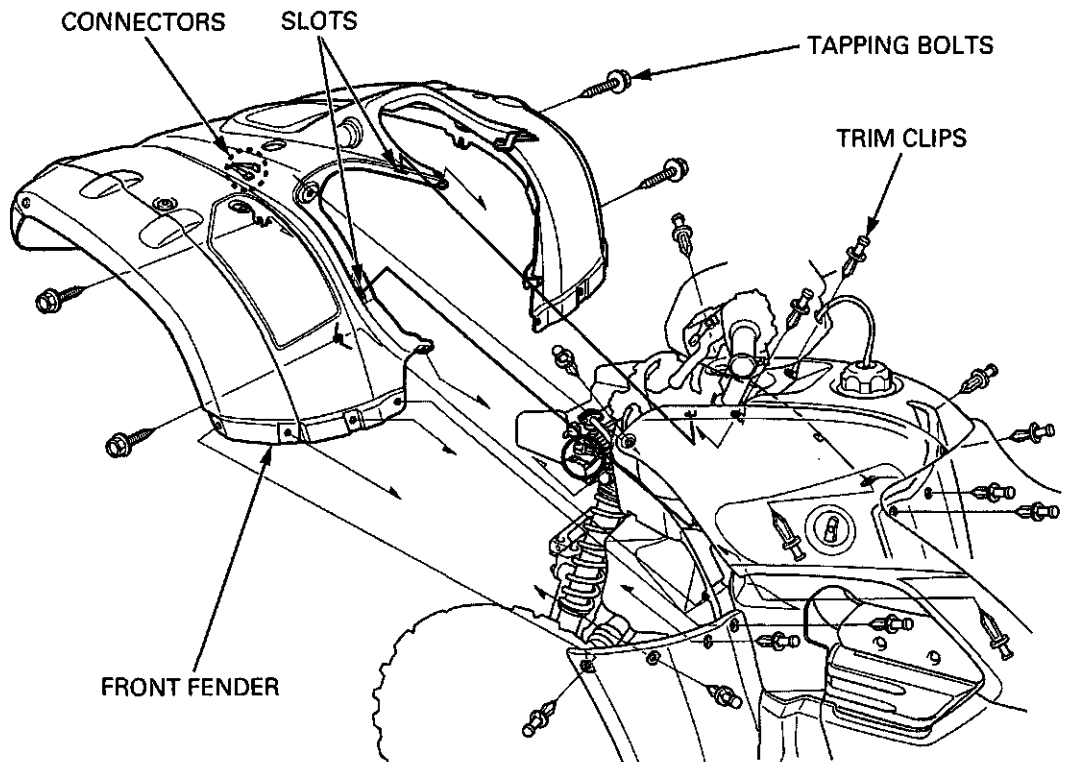


**FRONT FENDER**

Remove the following:

- front carrier and carry pipe (page 3-8)
- headlight and accessory socket connectors
- fourteen trim clips
- four tapping bolts
- front fender by releasing four slots in the front fender from the tabs of the fuel tank cover.

Install the front fender in the reverse order of removal.



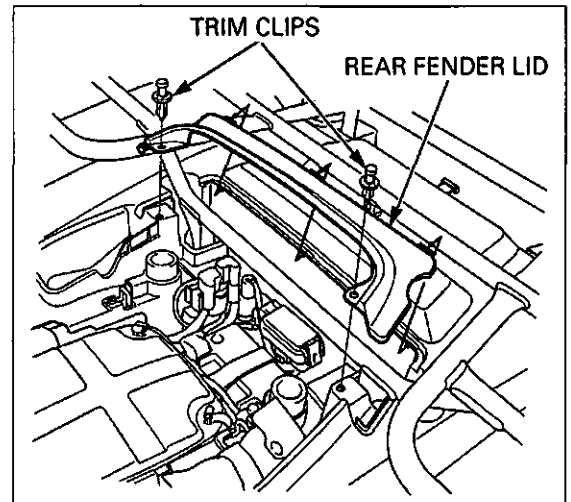
**REAR CARRIER**

**REAR FENDER LID**

Remove the following:

- seat (page 3-4)
- two trim clips
- rear fender lid by releasing the three tabs from the rear fender

Install the rear fender lid in the reverse order of removal.

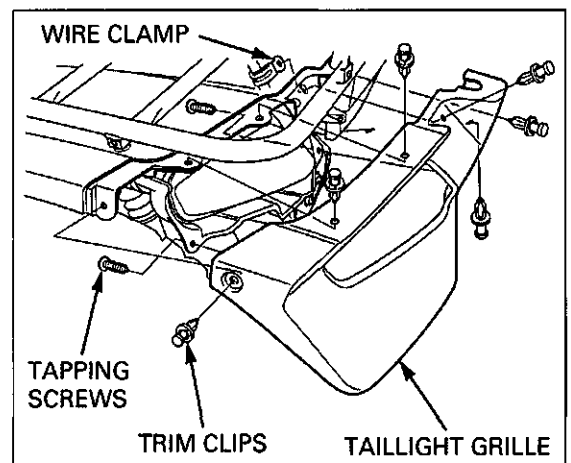


**TAILLIGHT GRILLE**

Remove the following:

- two tapping screws
- six trim clips and wire clamp
- taillight grille

Install the rear taillight grille in the reverse order of removal.



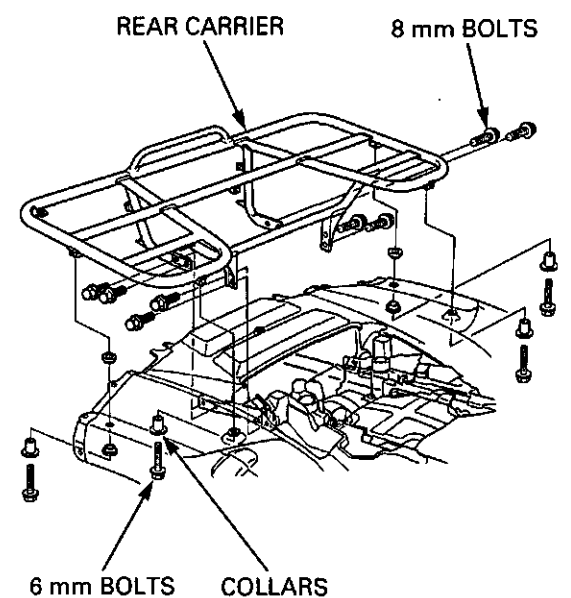
**REAR CARRIER**

Remove the following:

- rear fender lid (page 3-10)
- right and left taillight grilles (page 3-10)
- four 6 mm bolts and collars
- eight 8 mm bolts
- rear carrier

Install the rear carrier in the reverse order of removal.

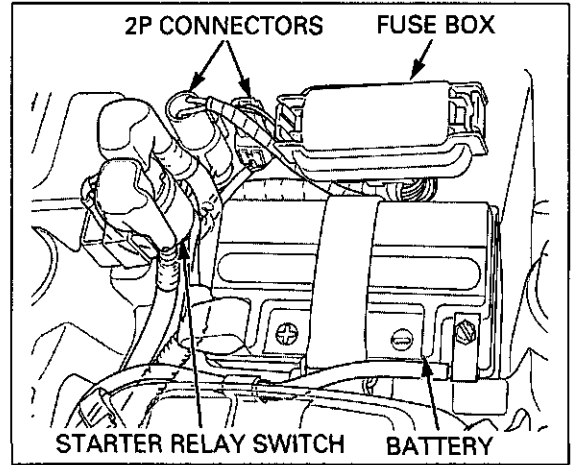
**TORQUE: 8 mm bolt: 37 N·m (3.8 kgf·m, 27 lbf·ft)**



## REAR FENDER

Remove the following:

- recoil starter cover (page 3-4)
- left side cover (page 3-5)
- rear carrier (page 3-10)
- battery (page 18-5)
- fuse box
- starter relay switch 2P connector
- battery 2P connector
- starter relay switch

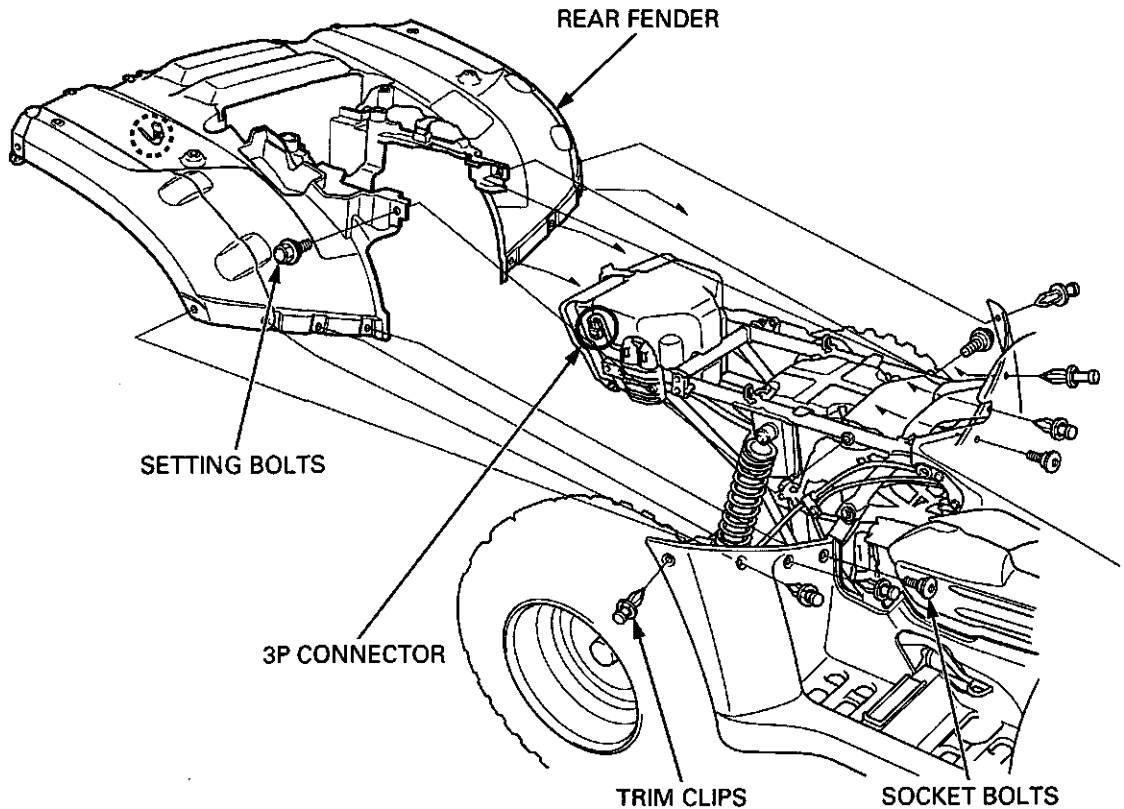


Remove the taillight 3P connector from the storage box and disconnect it.

Remove the following:

- two 6 mm setting bolts
- two socket bolts
- six trim clips
- rear fender

Install the rear fender in the reverse order of removal.



## ENGINE AIR GUIDE

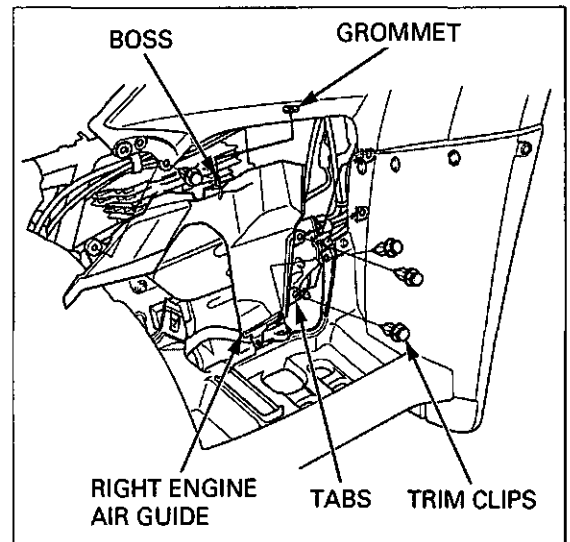
### RIGHT ENGINE AIR GUIDE

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

Remove the four trim clips.

Release the boss from the grommet in the heat guard plate and remove the right engine air guide while releasing the two tabs from the right inner fender.

Install the right engine air guide in the reverse order of removal.



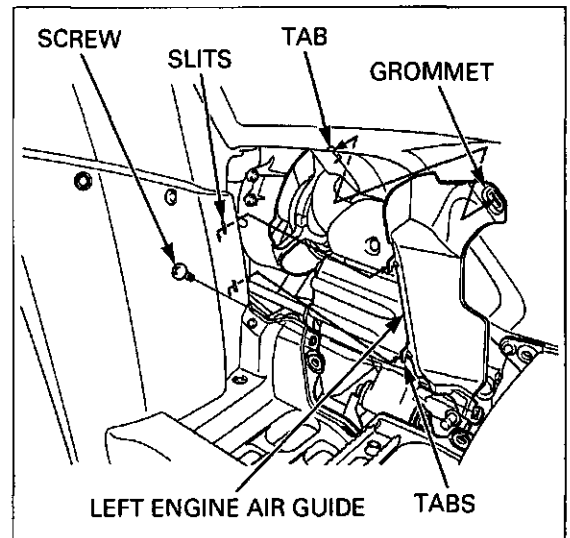
### LEFT ENGINE AIR GUIDE

Remove the left side cover (page 3-5).

Remove the screw.

Release the grommet from the tab of the fuel tank sub-side cover and remove the left engine air guide while unhooking the two tabs from slits in the left inner fender.

Install the left engine air guide in the reverse order of removal.

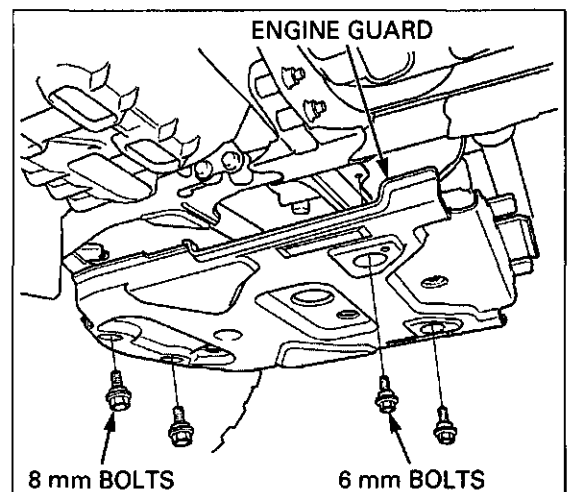


## ENGINE GUARD

Remove the following:

- two 6 mm bolts
- two 8 mm bolts
- engine guard

Install the engine guard in the reverse order of removal.

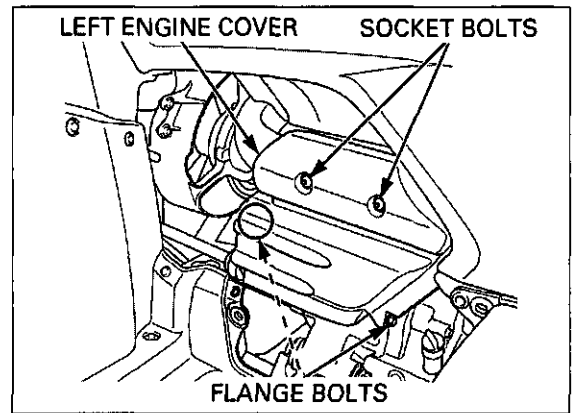


## EXHAUST SYSTEM

### REMOVAL

Remove the following:

- left side cover (page 3-5)
- left engine air guide (page 3-12)
- two socket bolts, flange bolts and left engine cover

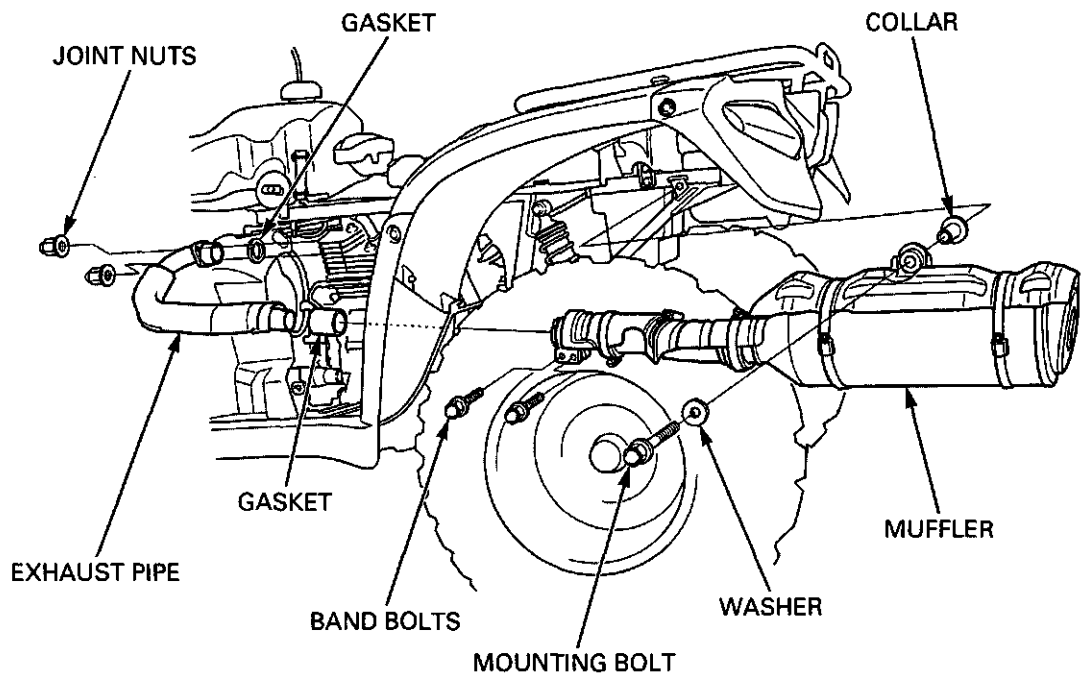


Loosen the muffler band bolts.

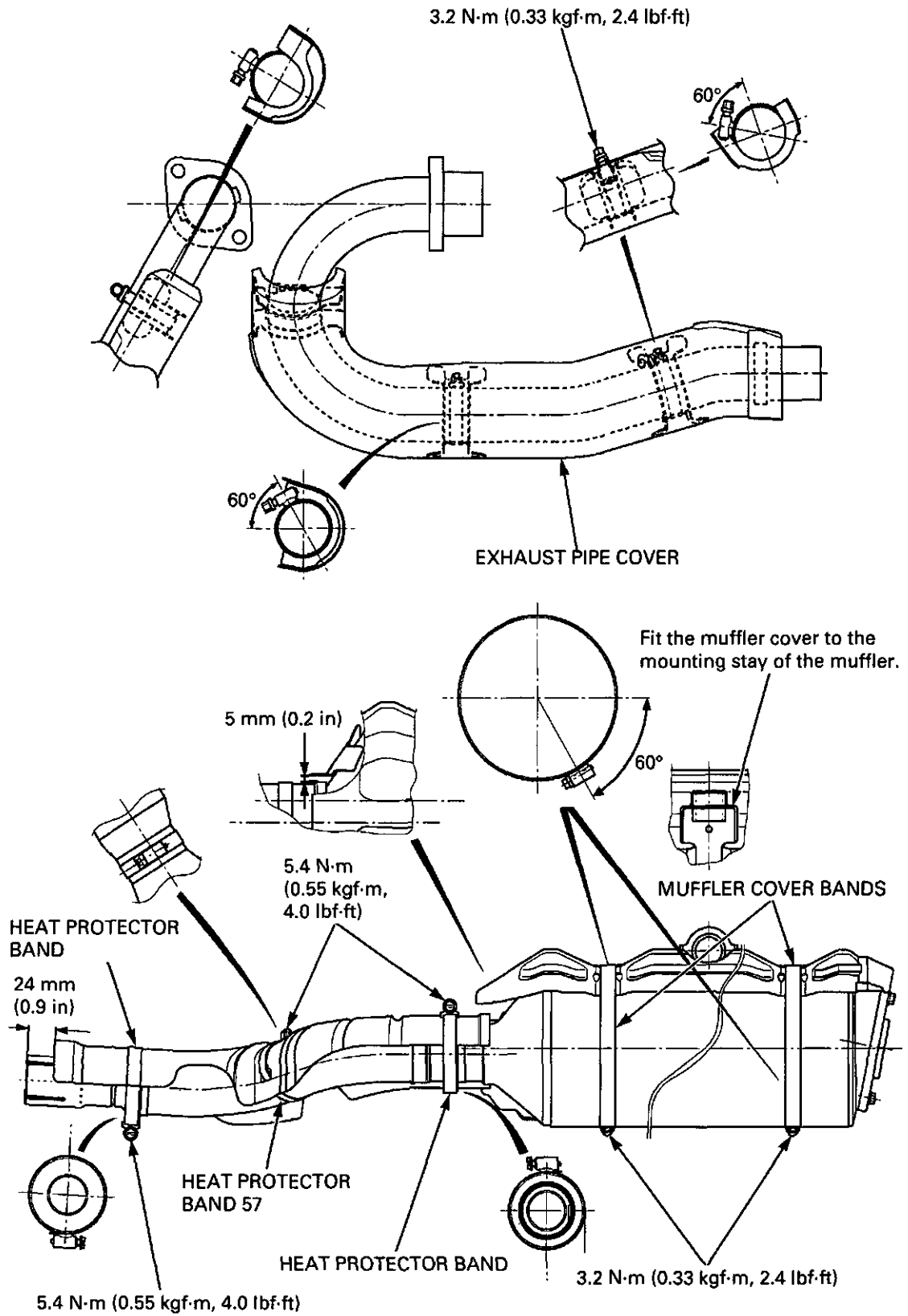
Remove the exhaust pipe joint nuts, exhaust pipe and gasket.

Remove the muffler gasket.

Remove the muffler mounting bolt, washer, collar and the muffler.



**FRAME/BODY PANELS/EXHAUST SYSTEM**  
**DISASSEMBLY/ASSEMBLY**



**INSTALLATION**

Install the collar into the mounting rubber in the muffler stay.

Install the muffler onto the frame and loosely tighten the mounting bolt.

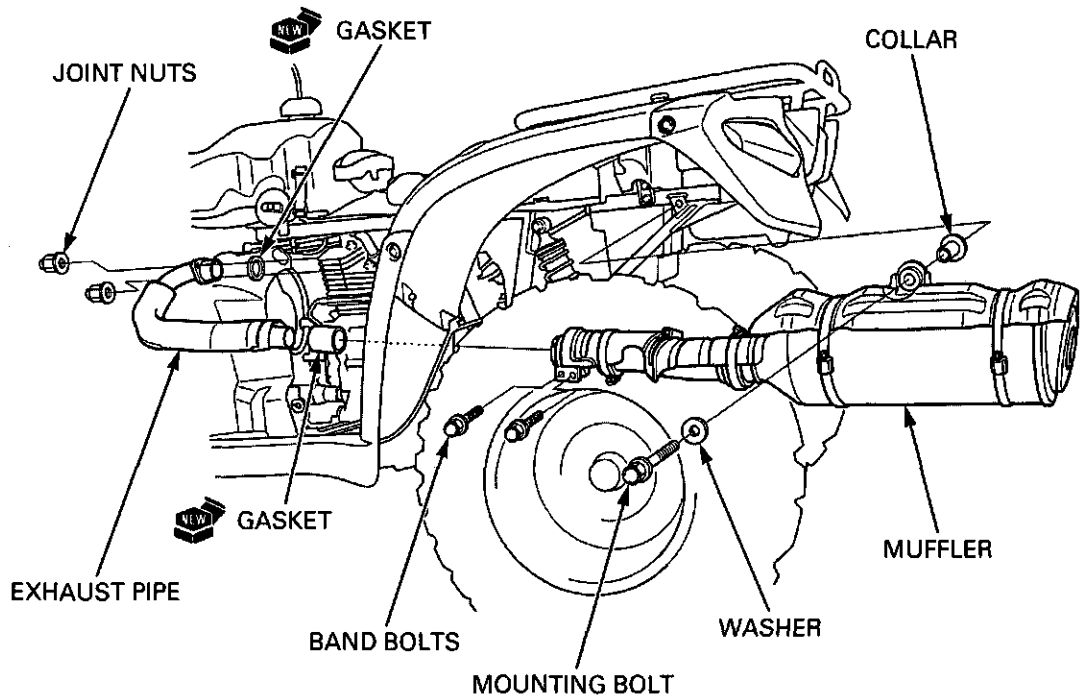
Install the exhaust pipe into the muffler and cylinder head with new gaskets, and loosely tighten the joint nuts and muffler band bolts.

Tighten the exhaust pipe joint nuts.

Tighten the muffler band bolts.

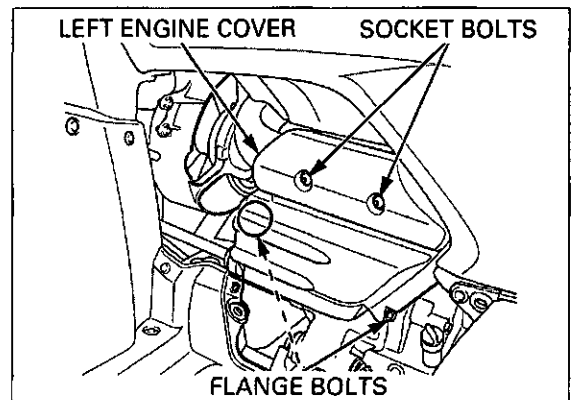
**TORQUE: 23 N·m (2.3 kgf-m, 17 lbf-ft)**

Tighten the muffler mounting bolt.



Install the following:

- two socket bolts, flange bolts and left engine cover
- left engine air guide (page 3-12)
- left side cover (page 3-5)



<b>SERVICE INFORMATION</b> .....	4-2	<b>BRAKE FLUID</b> .....	4-16
<b>MAINTENANCE SCHEDULE</b> .....	4-3	<b>BRAKE SHOES WEAR</b> .....	4-17
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<b>ENGINE OIL</b> .....	4-11	<b>SPARK ARRESTER</b> .....	4-20
<b>ENGINE OIL FILTER</b> .....	4-13	<b>NUTS, BOLTS, FASTENERS</b> .....	4-21
<b>ENGINE IDLE SPEED</b> .....	4-13	<b>WHEELS/TIRES</b> .....	4-21
<b>DRIVE SHAFT BOOTS (FM/FE models)</b> .....	4-14	<b>STEERING SHAFT HOLDER BEARING</b> .....	4-21
<b>REAR FINAL GEAR CASE OIL AND DIFFERENTIAL OIL</b> .....	4-14	<b>STEERING SYSTEM</b> .....	4-22



## MAINTENANCE

# SERVICE INFORMATION

## GENERAL

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

## SPECIFICATIONS

ITEM		SPECIFICATIONS
Throttle lever free play		3 – 8 mm (1/8 – 5/16 in)
Spark plug		BKR5E-11 (NGK), K16PR-U11 (DENSO)
Spark plug gap		1.0 – 1.1 mm (0.039 – 0.043 in)
Valve clearance	IN/EX	0.15 mm ± 0.02 mm (0.006 ± 0.001 in)
Engine oil capacity	After draining	2.4 liters (2.5 US qt, 2.1 Imp qt)
	After draining/filter change	2.5 liters (2.6 US qt, 2.2 Imp qt)
	After disassembly	3.0 liters (3.2 US qt, 2.6 Imp qt)
Recommended engine oil		Pro Honda GN4 or HP4 (without molybdenum additives) 4-stroke oil or equivalent motor oil API service classification: SG or higher JASO T 903 standard: MA Viscosity: SAE 10W-40
Engine idle speed		1,400 ± 100 rpm (min <sup>-1</sup> )
Rear final drive oil capacity	After draining	75 cm <sup>3</sup> (2.5 US oz, 2.6 Imp oz)
	After disassembly	100 cm <sup>3</sup> (3.4 US oz, 3.5 Imp oz)
Recommended final drive oil		Hypoid gear oil SAE #80
Front differential oil capacity (FM/FE models)	After draining	185 cm <sup>3</sup> (6.3 US oz, 6.5 Imp oz)
	After disassembly	230 cm <sup>3</sup> (7.8 US oz, 8.1 Imp oz)
Recommended differential oil (FM/FE models)		Hypoid gear oil SAE #80
Recommended brake fluid		Honda DOT 4 brake fluid
Rear (parking) brake lever free play		15 – 20 mm (19/32 – 25/32 in)
Rear brake pedal free play		15 – 20 mm (19/32 – 25/32 in)
Reverse selector lever free play		2 – 4 mm (3/32 – 5/32 in)
Cold tire pressure (Front/Rear)	Standard	25 kPa (0.25 kgf/cm <sup>2</sup> , 3.6 psi)
	Minimum	22 kPa (0.22 kgf/cm <sup>2</sup> , 3.2 psi)
	Maximum	28 kPa (0.28 kgf/cm <sup>2</sup> , 4.0 psi)
	With cargo	25 kPa (0.25 kgf/cm <sup>2</sup> , 3.6 psi)
Tire size	Front	AT25 x 8-12 ★★
	Rear	AT25 x 10-12 ★★
Tire brand	Front	KT181 (Dunlop)
	Rear	KT185 (Dunlop)
Minimum tread depth (Front/Rear)		4.0 mm (0.16 in)
Toe	TM model	Toe-out: 1 ± 15 mm (1/32 ± 19/32 in)
	FM/FE models	Toe-out: 30 ± 15 mm (1-3/16 ± 19/32 in)

## TORQUE VALUES

Spark plug	22 N·m (2.2 kgf·m, 16 lbf·ft)
Valve adjusting lock nut	17 N·m (1.7 kgf·m, 13 lbf·ft)
Valve adjusting hole cap	12 N·m (1.2 kgf·m, 9 lbf·ft)
Timing hole cap	10 N·m (1.0 kgf·m, 7 lbf·ft)
Engine oil drain bolt	25 N·m (2.5 kgf·m, 18 lbf·ft)
Engine oil filter cover bolt	10 N·m (1.0 kgf·m, 7 lbf·ft)
Front differential oil filler cap (FM/FE only)	12 N·m (1.2 kgf·m, 9 lbf·ft)
Front differential oil drain bolt (FM/FE only)	12 N·m (1.2 kgf·m, 9 lbf·ft)
Rear final gear case oil check bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)
Rear final gear case oil filler cap	12 N·m (1.2 kgf·m, 9 lbf·ft)
Rear final gear case oil drain bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)
Front master cylinder reservoir cap screw	2 N·m (0.2 kgf·m, 1.5 lbf·ft)
Clutch adjusting screw lock nut	22 N·m (2.2 kgf·m, 16 lbf·ft)
Spark arrester bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)
Tie-rod lock nut	54 N·m (5.5 kgf·m, 40 lbf·ft)

# MAINTENANCE SCHEDULE

## TRX500TM model:

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.

ITEMS	FREQUENCY	WHICHEVER COMES FIRST  ↓	→	REGULAR MAINTENANCE INTERVAL			REFER TO PAGE
				INITIAL MAINTENANCE	600	1,200	
				mi	100	1,000	
				km	150	2,000	
		HOURS	20	100	200		
* FUEL LINE					I	4-5	
* THROTTLE OPERATION					I	4-5	
* CARBURETOR CHOKE					I	4-6	
AIR CLEANER	NOTE 1			C	C	4-7	
AIR CLEANER HOUSING DRAIN HOSE	NOTE 2			I	I	4-9	
SPARK PLUG				I	I	4-9	
* VALVE CLEARANCE			I	I	I	4-10	
ENGINE OIL			R	R	R	4-11	
ENGINE OIL FILTER			R	R	R	4-13	
* ENGINE IDLE SPEED			I	I	I	4-13	
REAR FINAL GEAR CASE OIL				(R: Every 2 years)	I	4-14	
* BRAKE FLUID	NOTE 3			I	I	4-16	
* BRAKE SHOES WEAR	NOTE 1				I	4-17	
* BRAKE PADS WEAR	NOTE 1, 2				I	4-17	
* BRAKE LIGHT SWITCH			I	I	I	4-17	
BRAKE SYSTEM			I	I	I	4-18	
* REVERSE LOCK SYSTEM			I	I	I	4-19	
SKID PLATE, ENGINE GUARD				I	I	4-19	
* CLUTCH SYSTEM			I	I	I	4-19	
* SUSPENSION				I	I	4-20	
* SPARK ARRESTER				C	C	4-20	
* NUTS, BOLTS, FASTENERS			I		I	4-21	
** WHEELS/TIRES			I	I	I	4-21	
** STEERING SHAFT HOLDER BEARING					I	4-21	
** STEERING SYSTEM					I	4-22	

\* Should be serviced by your 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 your Honda dealer.

### NOTES:

1. Service more frequently when riding in dusty areas, sand or snow.
2. Service more frequency after riding in very wet or muddy conditions.
3. Replace every 2 years. Replacement requires mechanical skill.

# MAINTENANCE

## TRX500FM/FE models:

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.

ITEMS	FREQUENCY	WHICHEVER COMES FIRST  ↓	→		INITIAL MAINTENANCE	REGULAR MAINTENANCE INTERVAL		REFER TO PAGE
			mi	km		600	1,200	
			HOURS			1,000	2,000	
* FUEL LINE						I		4-5
* THROTTLE OPERATION						I		4-5
* CARBURETOR CHOKE						I		4-6
AIR CLEANER		NOTE 1				C	C	4-7
AIR CLEANER HOUSING DRAIN HOSE		NOTE 2				I	I	4-9
SPARK PLUG						I	I	4-9
* VALVE CLEARANCE				I		I	I	4-10
ENGINE OIL				R		R	R	4-11
ENGINE OIL FILTER				R		R	R	4-13
* ENGINE IDLE SPEED				I		I	I	4-13
DRIVE SHAFT BOOTS						I	I	4-14
REAR FINAL GEAR CASE OIL AND DIFFERENTIAL OIL						(R: Every 2 years)	I	4-14
* BRAKE FLUID		NOTE 3				I	I	4-16
* BRAKE SHOES WEAR		NOTE 1				I	I	4-17
* BRAKE PADS WEAR		NOTE 1, 2				I	I	4-17
* BRAKE LIGHT SWITCH				I		I	I	4-17
BRAKE SYSTEM				I		I	I	4-18
* REVERSE LOCK SYSTEM				I		I	I	4-19
SKID PLATE, ENGINE GUARD						I	I	4-19
* CLUTCH SYSTEM				I		I	I	4-19
* SUSPENSION						I	I	4-20
* SPARK ARRESTER						C	C	4-20
* NUTS, BOLTS, FASTENERS				I		I	I	4-21
** WHEELS/TIRES				I		I	I	4-21
** STEERING SHAFT HOLDER BEARING						I	I	4-21
** STEERING SYSTEM						I	I	4-22

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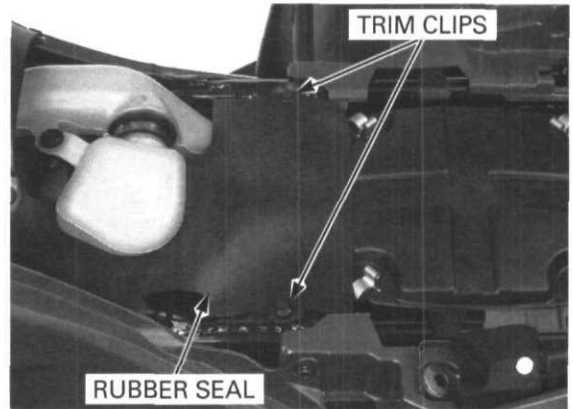
### NOTES:

1. Service more frequently when riding in dusty areas, sand or snow.
2. Service more frequency after riding in very wet or muddy conditions.
3. Replace every 2 years. Replacement requires mechanical skill.

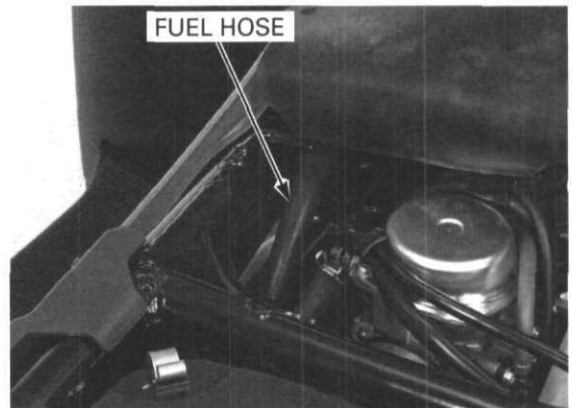
## FUEL LINE

Remove the seat (page 3-4).

Remove the two trim clips and turn over the rubber seal.



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



## THROTTLE OPERATION

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

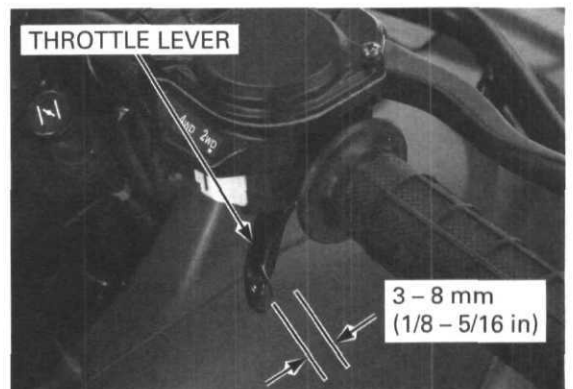
If the throttle lever does not return properly, lubricate the throttle cable and overhaul and lubricate the throttle housing.

If the throttle lever 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 lever free play and the throttle cable connection.

Measure the throttle lever free play at the tip of the throttle lever.

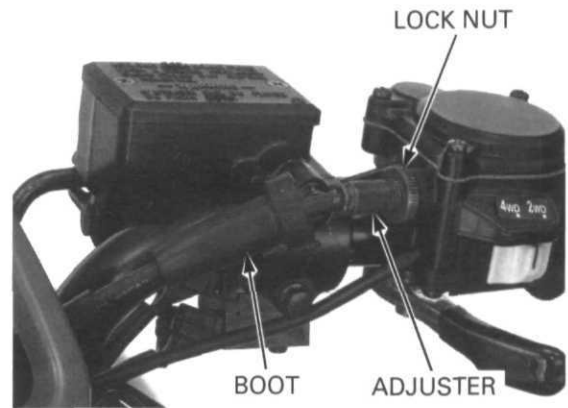
**THROTTLE LEVER FREE PLAY:**  
3 – 8 mm (1/8 – 5/16 mm)



## MAINTENANCE

Throttle lever free play can be adjusted at either end of the throttle cable. Minor adjustments are made with the upper adjuster.

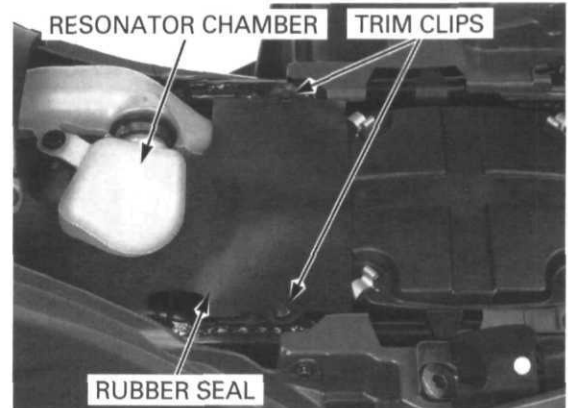
Slide the rubber boot off the adjuster. Loosen the lock nut, turn the adjuster as required and tighten the lock nut. Install the rubber boot securely.



Major adjustments are made with the lower adjuster.

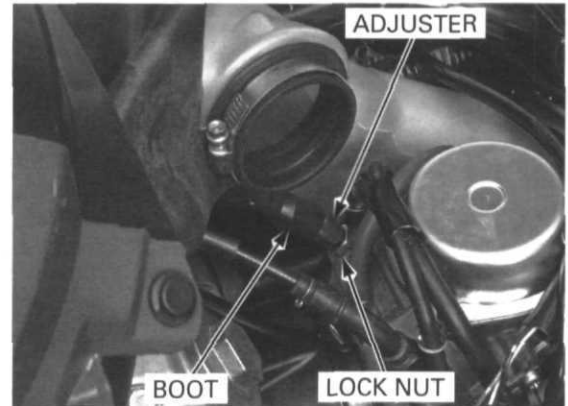
Remove the seat (page 3-4).

Remove the resonator chamber by loosening the band screw and removing the trim clip. Remove the two trim clips and turn over the rubber seal.



Slide the rubber boot off the adjuster. Loosen the lock nut, turn the adjusting nut as required and tighten the lock nut. Install the rubber boot securely.

Recheck the throttle operation and install the removed parts in the reverse order of removal.



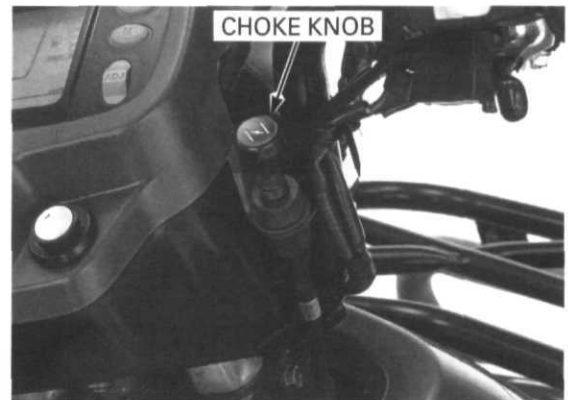
## CARBURETOR CHOKE

This model's choke system uses a fuel enriching circuit controlled by a starting enrichment (SE) valve.

The SE valve opens the enriching circuit via a cable when the choke knob on the handlebar is pulled up.

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

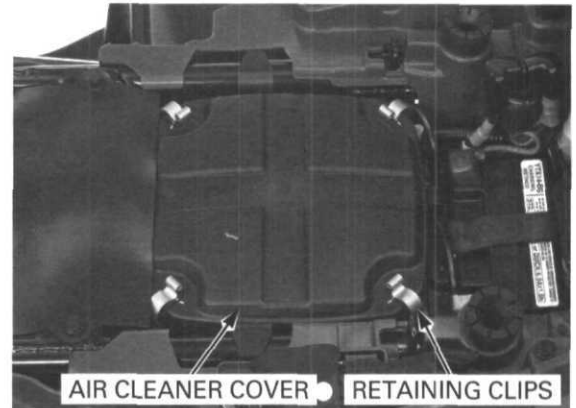
Check the choke cable for frays, kinks or other damage.



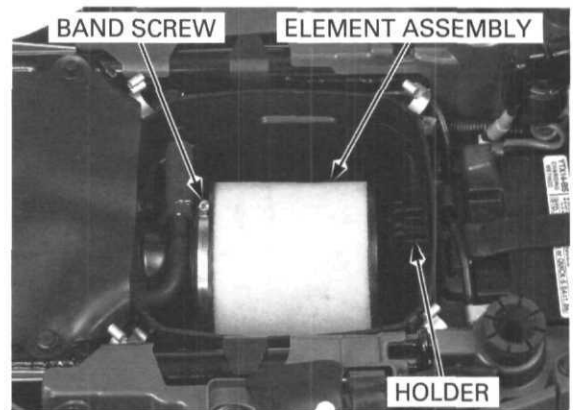
# AIR CLEANER

Remove the seat (page 3-4).

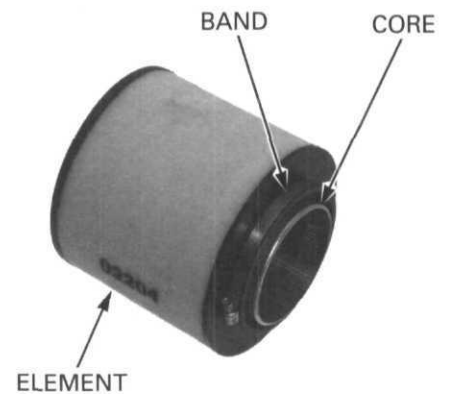
Release the retaining clips from the air cleaner cover and remove the cover.



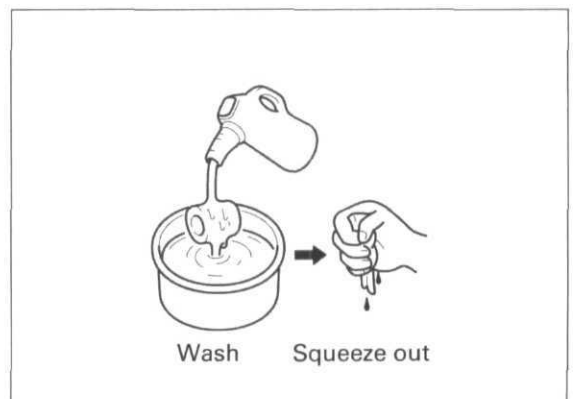
Loosen the air cleaner element band screw. Pull the element holder up and remove the air cleaner element assembly from the housing.



Remove the element band and the element core from the air cleaner element.



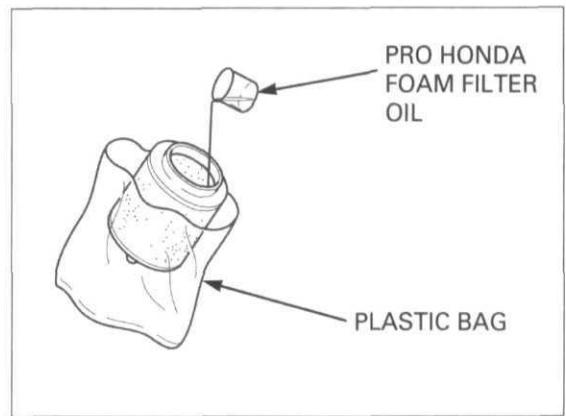
Wash the element in non-flammable or high flash point solvent. Squeeze out the solvent thoroughly, and allow the element to dry.



## MAINTENANCE

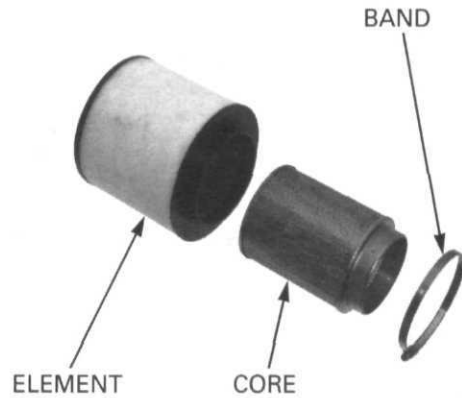
Apply approximately 20 g (0.7 oz) of Pro Honda Foam Filter Oil or equivalent oil from the inside of the element.

Place the element into a plastic bag and spread the oil evenly by hand.



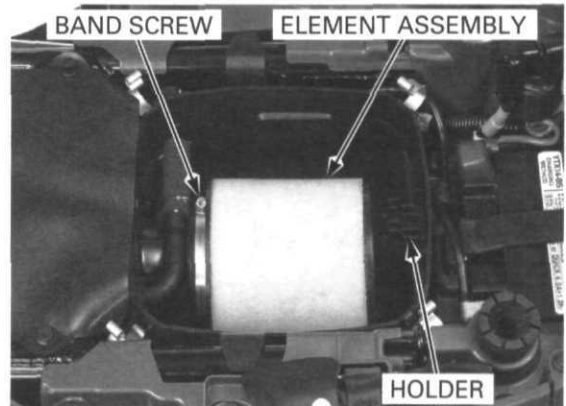
Install the element core into the air cleaner element properly.

Install the element band onto the air cleaner element.



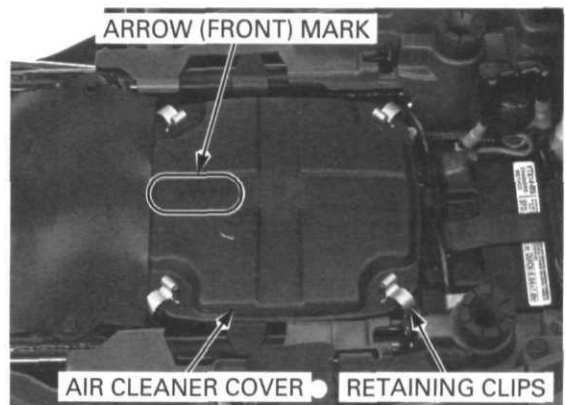
Install the element holder onto the element by aligning the hole with the boss and the element assembly over the connecting tube flange of the housing.

Tighten the band screw.



Install the air cleaner cover with the arrow (FRONT) mark facing forward and secure it with the retaining clips.

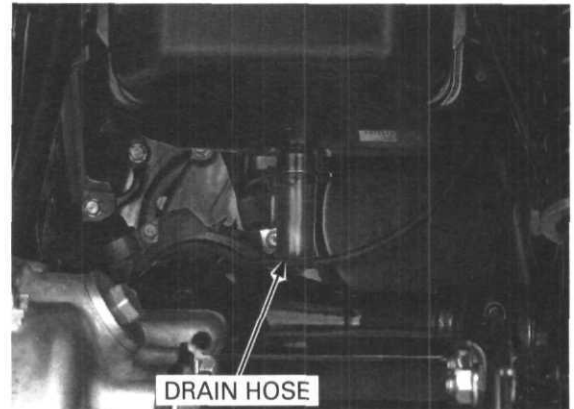
Install the seat (page 3-4).



## AIR CLEANER HOUSING DRAIN HOSE

Remove the drain hose from the bottom of the air cleaner housing to empty any deposits.

Install the drain hose securely.



## SPARK PLUG

Remove the resonator chamber and turn over the rubber seal (page 4-6).

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

**NOTE:**

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

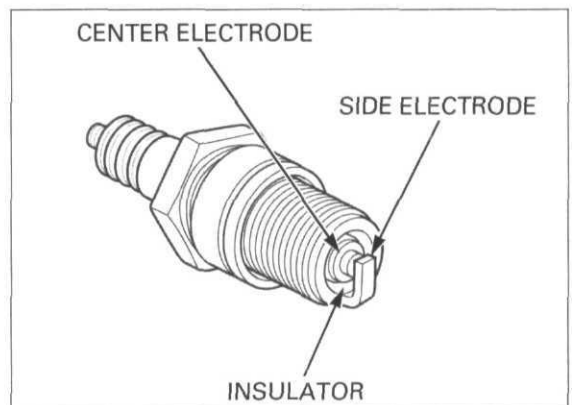
Remove the spark plug.



Check the insulator for cracks or damage, and the electrodes for wear, fouling or discoloration. Replace the plug if necessary.

**RECOMMENDED SPARK PLUG:**

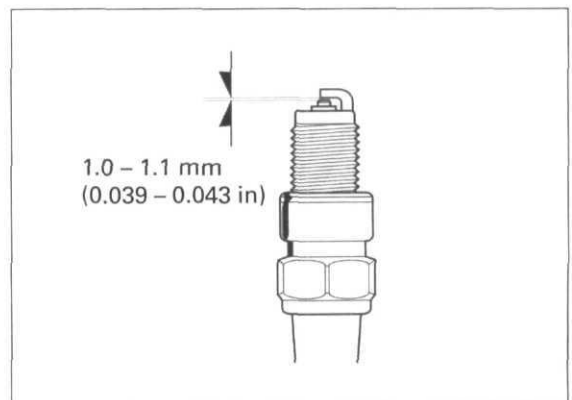
**BKR5E-11 (NGK), K16PR-U11 (DENSO)**



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

Check the gap between the center and side electrodes with a wire-type feeler gauge. If necessary, adjust the gap by bending the side electrode carefully.

**SPARK PLUG GAP: 1.0 – 1.1 mm (0.039 – 0.043 in)**



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

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

**TORQUE: 22 N·m (2.2 kgf·m, 16 lbf·ft)**

Connect the spark plug cap and install the removed parts in the reverse order of removal.



## MAINTENANCE

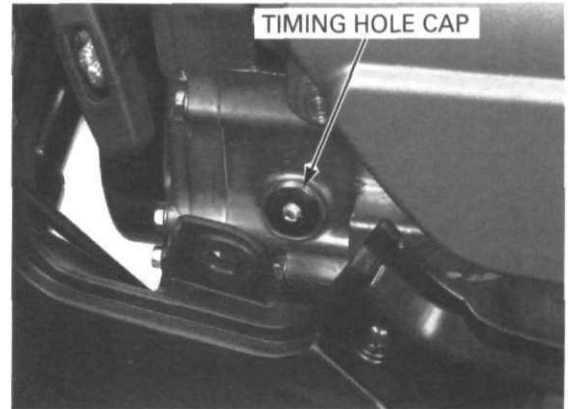
# VALVE CLEARANCE

### NOTE:

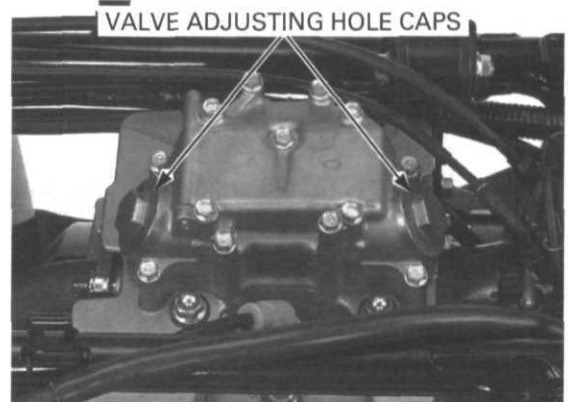
- Inspect and adjust the valve clearance while the engine is cold (below 35°C/95°F).

Remove the following:

- recoil starter cover (page 3-4)
- timing hole cap



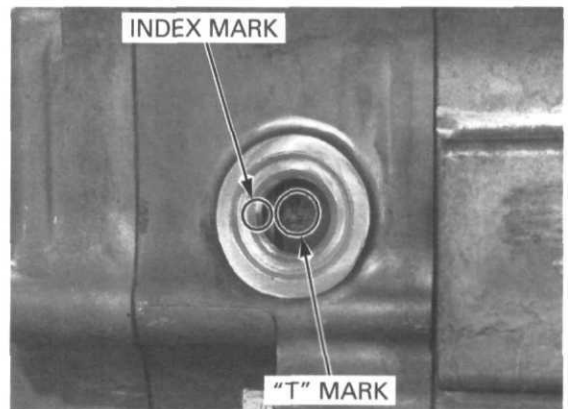
- heat guard plate (page 6-22)
- valve adjusting hole caps



Rotate the crankshaft using the recoil starter knob to align the "T" mark on the flywheel with the index mark on the rear crankcase cover.

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 both rocker arms. If there is no slack, rotate the crankshaft one full turn and match up the "T" mark again.



Check the valve clearances by inserting a feeler gauge between the adjusting screw and valve stem.

### VALVE CLEARANCE:

IN/EX:  $0.15 \pm 0.02$  mm ( $0.006 \pm 0.001$ in)

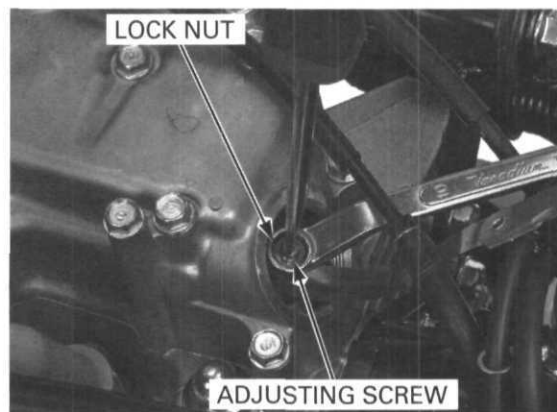


Adjust by loosening the lock nut and turning the adjusting screw until there is a slight drag on the feeler gauge.

Hold the adjusting screw and tighten the lock nut.

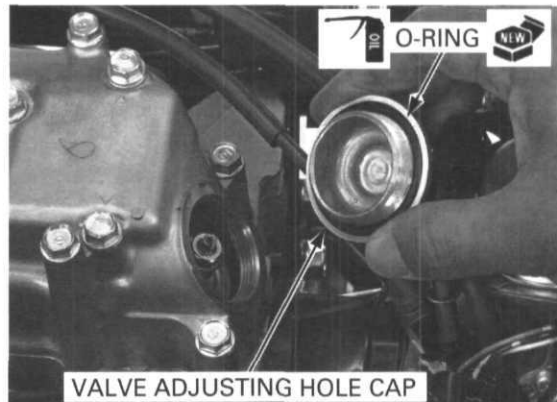
**TORQUE: 17 N·m (1.7 kgf·m, 13 lbf·ft)**

After tightening the lock nut, recheck the valve clearance.



Coat new O-rings with engine oil and install them into the valve adjusting hole caps. Install the valve adjusting hole caps and tighten them.

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

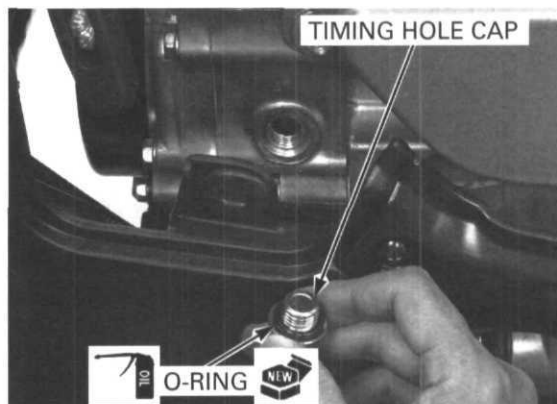


Coat a new O-ring with engine oil and install it onto the timing hole cap.

Install the timing hole cap and tighten it.

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

Install the recoil starter cover (page 3-4).  
Install the heat guard plate (page 6-22).



## ENGINE OIL

### OIL LEVEL CHECK

Remove the left side cover (page 3-5).

Place the vehicle on level ground.

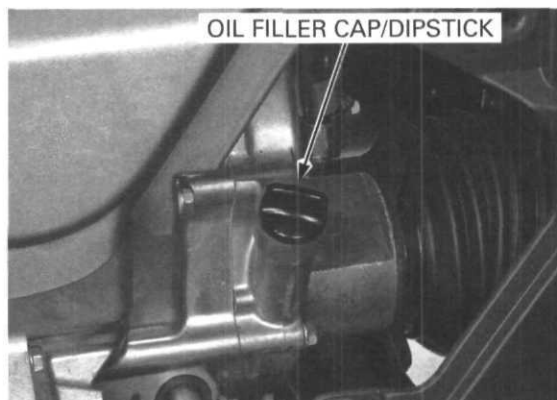
Start the engine and let it idle for 5 minutes.

If the air temperature is below 10°C (50°F), let the engine idle for an additional 5 minutes (a total of 10 minutes).

Stop the engine.

After a few minutes, remove the oil filler cap/dipstick and wipe it clean.

Check the oil level by inserting the oil filler cap/dipstick into the engine without screwing it in.



## MAINTENANCE

The engine contains a sufficient amount of oil if the oil level is between the upper and lower level marks on the dipstick.

If the oil level is near or below the lower level mark, add the recommended engine oil to the upper level mark.

### RECOMMENDED ENGINE OIL:

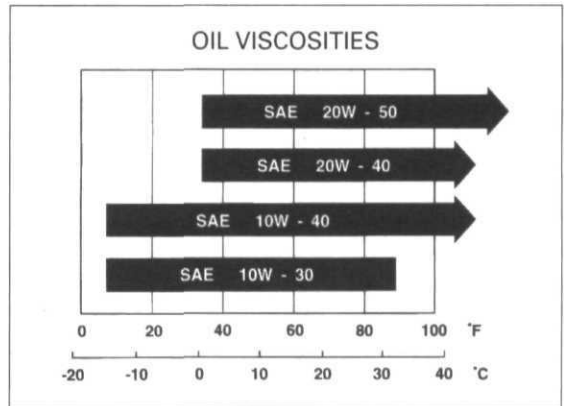
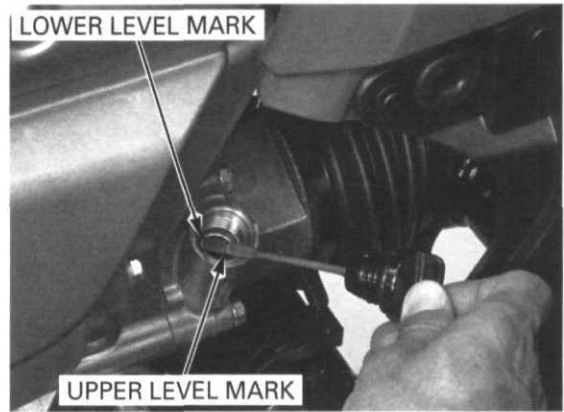
**Pro Honda GN4 or HP4 (without molybdenum additives) 4-stroke oil or equivalent motor oil**  
**API service classification: SG or higher**  
**JASO T 903 standard: MA**  
**Viscosity: SAE 10W-40**

### NOTE:

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

Reinstall the oil filler cap/dipstick.

Install the left side cover (page 3-5).



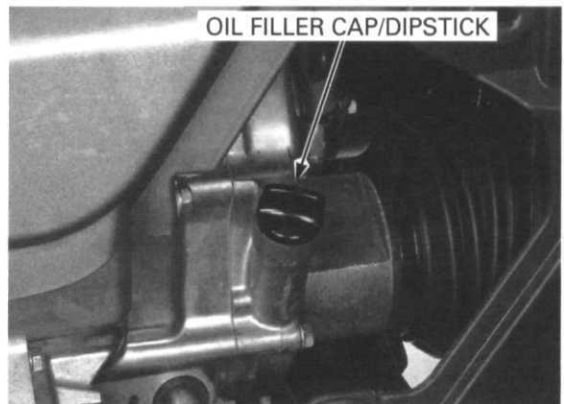
## OIL CHANGE

### NOTE:

- Pour the engine oil after replacing the oil filter (see below).
- Change the oil with the engine warm to assure complete and rapid draining.

Remove the left side cover (page 3-5).

Start the engine and let it idle for a few minutes. Stop the engine and remove the oil filler cap/dipstick.



Remove the drain bolt and drain the engine oil.

After the oil has drained, install the drain bolt with a new sealing washer.

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

Pour the recommended oil into the engine to the upper level mark on the dipstick.

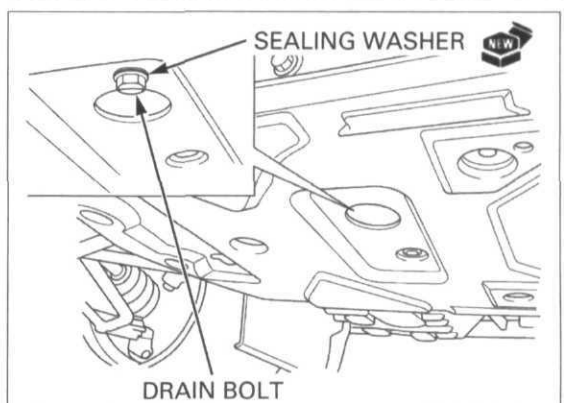
### OIL CAPACITY:

**2.5 liters (2.6 US qt, 2.2 Imp qt) at draining/filter change**

**3.0 liters (3.2 US qt, 2.6 Imp qt) at disassembly**

Install the oil filler cap.

Check the oil level (page 4-11).



## ENGINE OIL FILTER

Drain the engine oil (page 4-12).

Remove the following:

- right side cover (page 3-4)
- cover bolts
- filter cover and O-rings

- oil filter
- spring

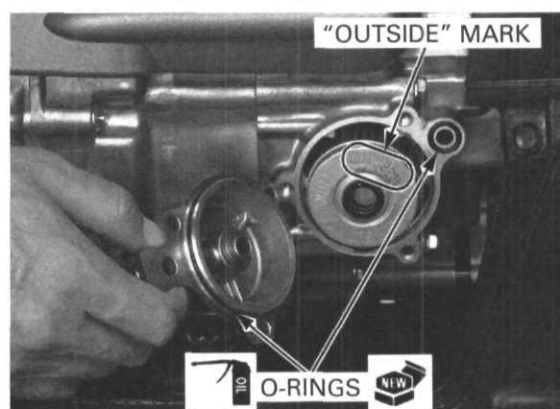
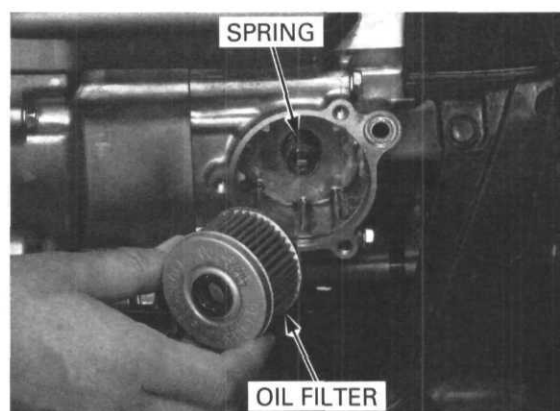
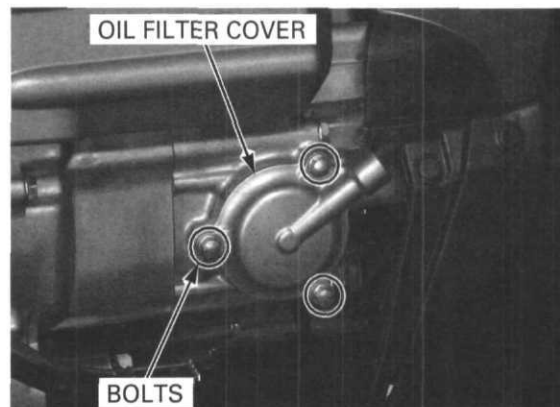
Coat new O-rings with engine oil and install them into the grooves in the filter cover and crankcase cover.

*Installing the oil filter backwards will result in severe engine damage.*

Install the spring onto the lugs and a new oil filter with the "OUT-SIDE" mark facing out, then set the filter cover onto the filter and tighten the bolts.

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

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



## ENGINE IDLE SPEED

NOTE:

- Inspect and adjust the idle speed after all other engine maintenance items have been performed and are within specifications.
- The engine must be warm for accurate adjustment. Ten minutes of stop-and-go riding is sufficient.

Remove the recoil starter cover (page 3-4).

Warm up the engine, shift the transmission into neutral and place the vehicle on a level surface. Check the idle speed and adjust by turning the throttle stop screw as required.

**IDLE SPEED: 1,400 ± 100 rpm (min<sup>-1</sup>)**

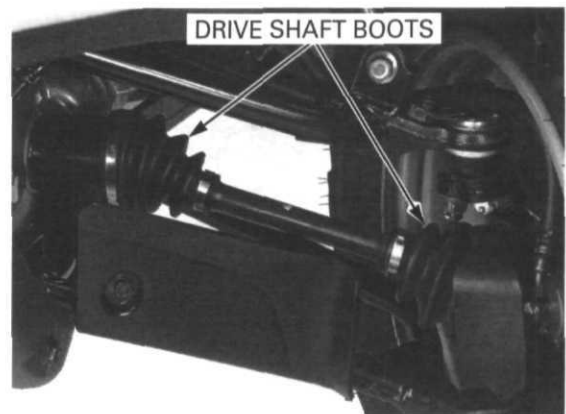


## MAINTENANCE

### DRIVE SHAFT BOOTS (FM/FE models)

Check the drive shaft boots for cuts or other damage.

If a boot is damaged, replace it (page 16-7).



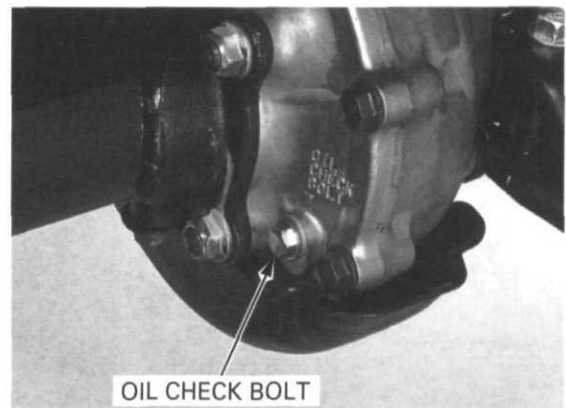
### REAR FINAL GEAR CASE OIL AND DIFFERENTIAL OIL

#### FINAL GEAR CASE OIL LEVEL CHECK

Place the vehicle on a level surface.

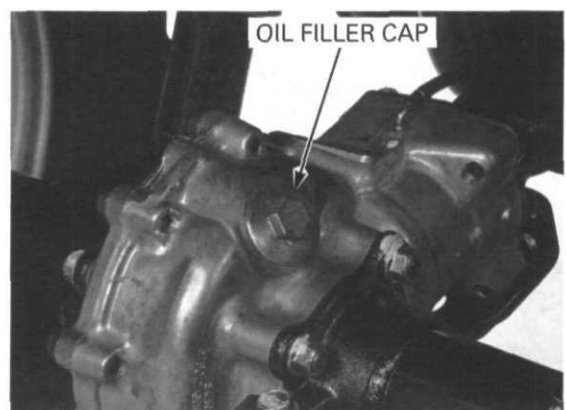
Remove the oil check bolt and check that the oil flows out of the check bolt hole.

Check for leaks if there is no oil flow.



Remove the oil filler cap and pour the oil slowly through the filler hole until oil starts to flow out of the check bolt hole.

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

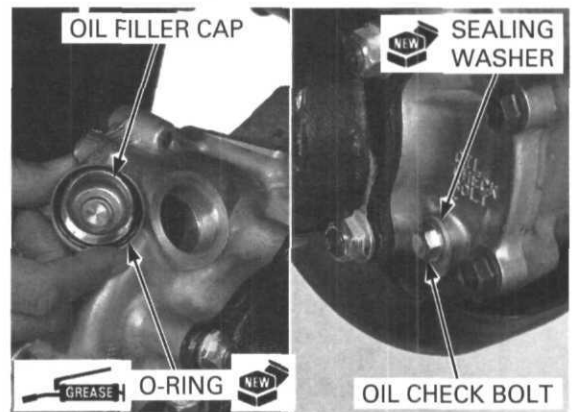


Install the check bolt with a new sealing washer and tighten it.

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

Coat a new O-ring with grease and install it into the filler cap groove.  
Install the filler cap and tighten it.

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



**OIL CHANGE**

Place the vehicle on a level surface.

Remove the oil filler cap and drain bolt to drain the oil.

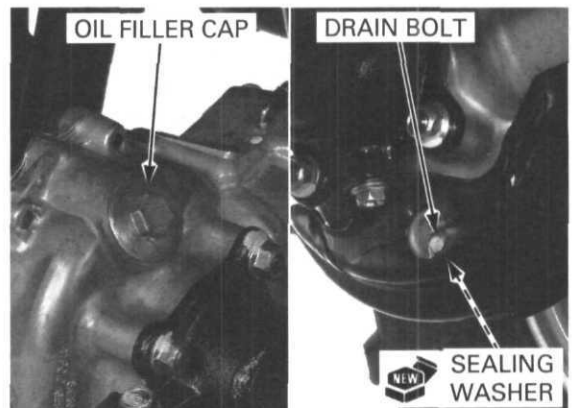
When the oil is completely drained, install the drain bolt with a new sealing washer.

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

Fill the final gear case with the recommended oil (page 4-14).

**OIL CAPACITY:**

- 75 cm<sup>3</sup> (2.5 US oz, 2.6 Imp oz) after draining
- 100 cm<sup>3</sup> (3.4 US oz, 3.5 Imp oz) after disassembly



**DIFFERENTIAL OIL (FM/FE only)**

**LEVEL CHECK**

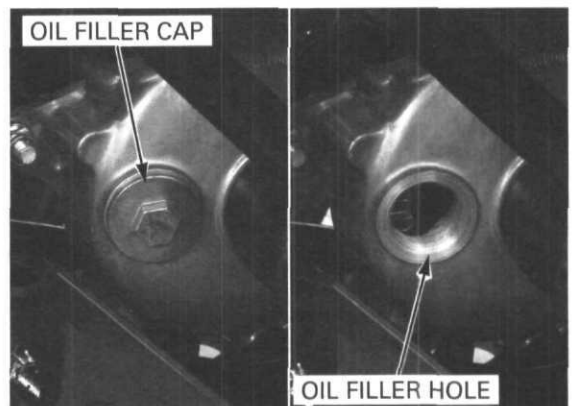
Place the vehicle on a level surface.

Remove the oil filler cap and check that the oil level is up to the lower edge of the oil filler hole.

Check for leaks if the oil level is low.

Pour the oil into the filler hole until it reaches the lower edge of the hole.

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



Coat a new O-ring with grease and install it into the filler cap groove.  
Install the filler cap and tighten it.

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





## MAINTENANCE

### OIL CHANGE

Place the vehicle on a level surface.

Remove the oil filler cap and drain bolt to drain the oil.

When the oil is completely drained, install the drain bolt with a new sealing washer.

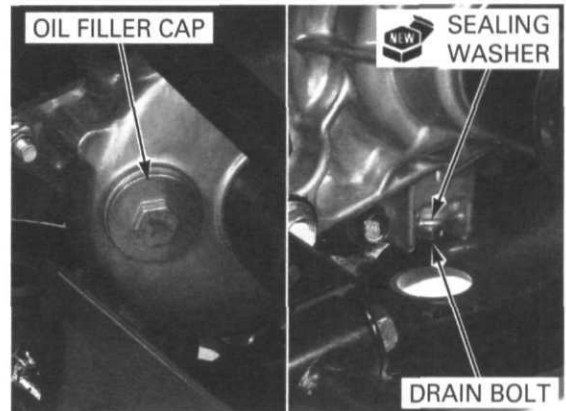
Fill the differential case with the recommended oil (page 4-15).

### OIL CAPACITY:

185 cm<sup>3</sup> (6.3 US oz, 6.5 Imp oz) after draining

230 cm<sup>3</sup> (7.8 US oz, 8.1 Imp oz) after disassembly

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



## BRAKE FLUID

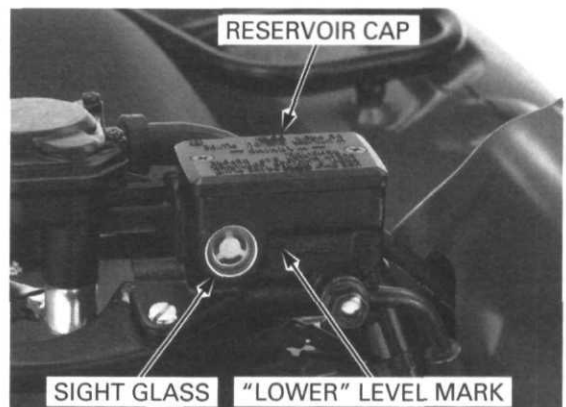
### NOTICE

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

### NOTE:

- Do not mix different types of fluid, as they may not be compatible with each other.
- Do not allow foreign material to enter the system when filling the reservoir.
- When the fluid level is low, check the brake pads for wear (page 4-17). A low fluid level may be due to wear of the brake pads. If the brake pads are worn and the caliper pistons are pushed out, this accounts for a low reservoir level. If the brake pads are not worn and the fluid level is low, check the entire system for leaks (page 4-18).

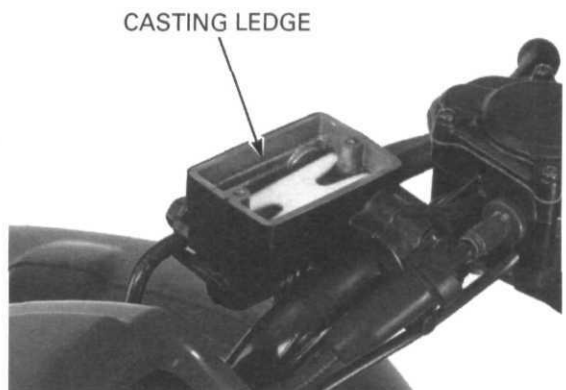
Turn the handlebar to the left side so the reservoir is level and check the fluid level through the sight glass.



If the level is near the “LOWER” level mark, remove the reservoir cap, set plate and diaphragm and fill the reservoir with DOT 4 brake fluid from a sealed container to the casting ledge.

Install the diaphragm, set plate and reservoir cap, and tighten the cap screws.

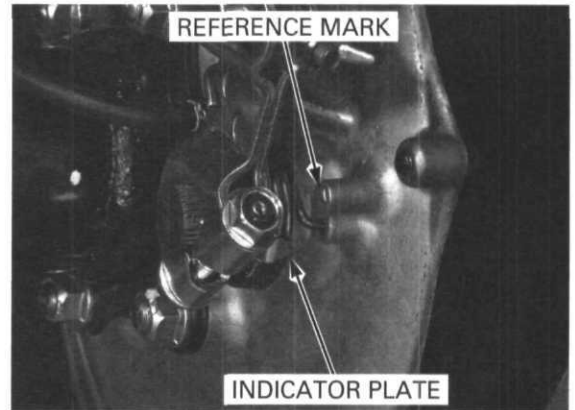
**TORQUE:** 2 N·m (0.2 kgf·m, 1.5 lbf·ft)



## BRAKE SHOES WEAR

Replace the brake shoes if the wear indicator plate aligns with the reference mark on the brake panel when the rear brake lever or brake pedal is applied.

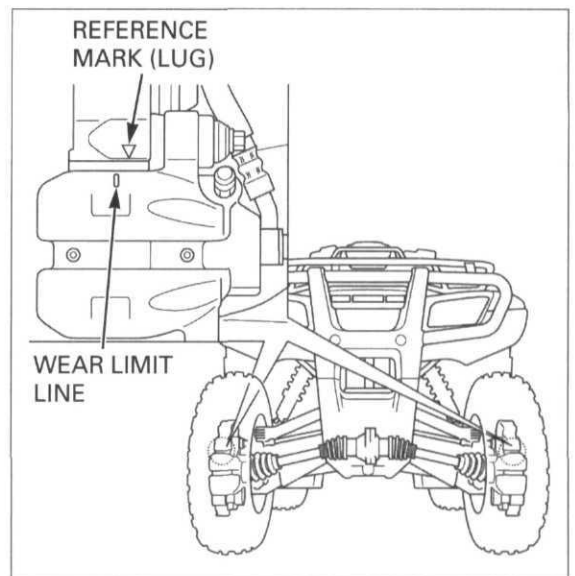
Refer to page 15-15 for brake shoe replacement.



## BRAKE PADS WEAR

Replace the brake pads if the wear limit line on the caliper body aligns with the reference mark (lug) on the caliper bracket when the front brake is applied.

Refer to page 15-6 for brake pad replacement.



## BRAKE LIGHT SWITCH

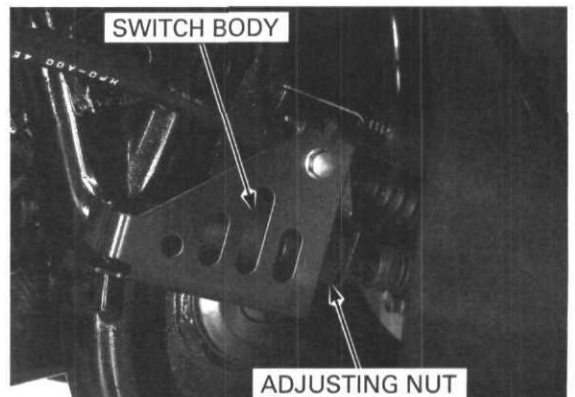
**NOTE:**

- The front brake light switch cannot be adjusted. If the front brake light switch actuation and brake engagement are off, either replace the switch unit or the malfunctioning parts of the system.

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

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

Hold the switch body and turn the adjusting nut. Do not turn the switch body.





## BRAKE SYSTEM

### FRONT BRAKE

Firmly apply the front brake lever and check that no air has entered the system.

If the brake lever feels soft or spongy when operated, bleed the system.

Refer to page 15-5 for air bleeding procedures.

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

Tighten any loose fittings.

Replace hoses, pipes and fittings as required.



### REAR BRAKE

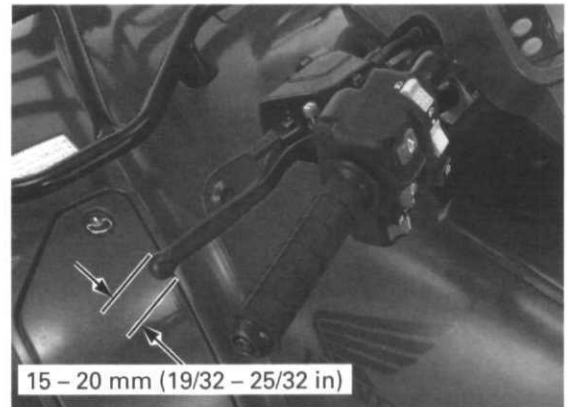
Check the brake cable, brake lever and brake pedal for loose connections, excessive play or other damage.

Replace or repair if necessary.

For cable lubrication: Disconnect the brake cable at the brake lever or pedal. Thoroughly lubricate the cables and their pivot points with a commercially available cable lubricant or a lightweight oil.

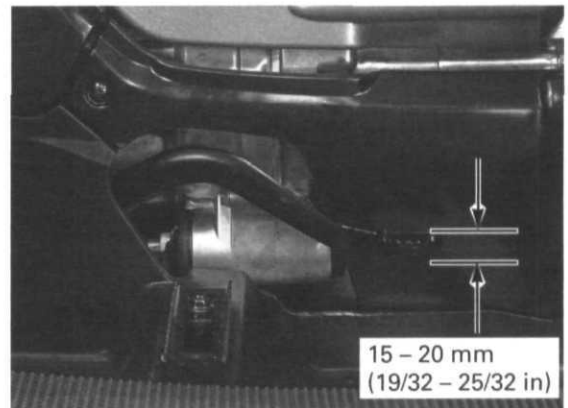
Measure the rear (parking) brake lever free play at the end of the lever.

**FREE PLAY: 15 – 20 mm (19/32 – 25/32 in)**



Measure the rear brake pedal free play at the end of the pedal.

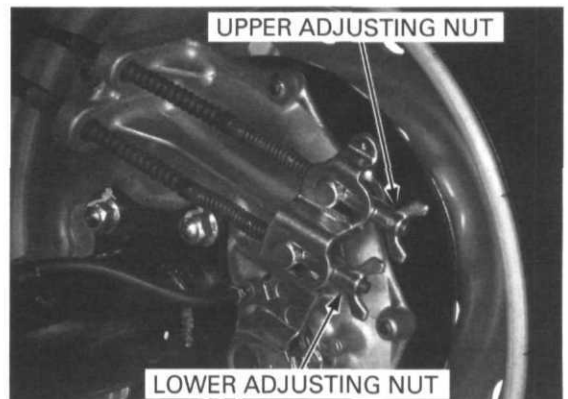
**FREE PLAY: 15 – 20 mm (19/32 – 25/32 in)**



*Make sure the cut-out in the adjusting nut is seated on the brake arm joint.*

Adjust the brake lever free play by turning the upper adjusting nut at the brake arm.

Adjust the brake pedal free play by turning the lower adjusting nut at the brake arm.



## REVERSE LOCK SYSTEM

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

Measure the lever free play at the lever end near the cable.

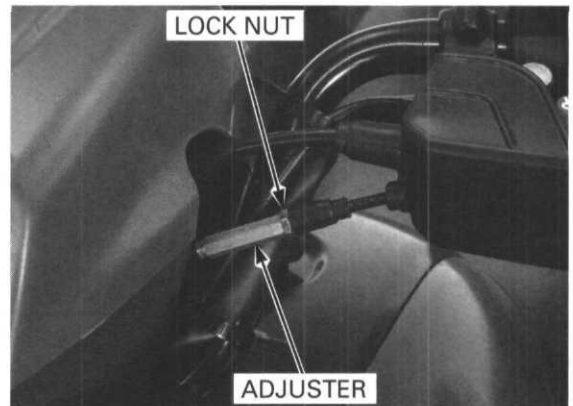
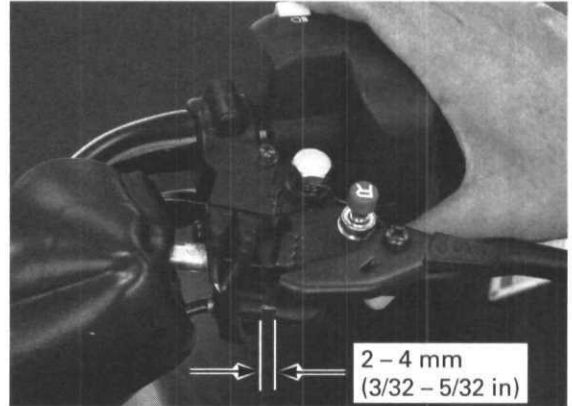
**FREE PLAY: 2 – 4 mm (3/32 – 5/32 in)**

NOTE:

- If necessary, watch the reverse selector arm on the crankcase to see when it moves while determining free play.

Adjust by loosening the lock nut and turning the adjuster.

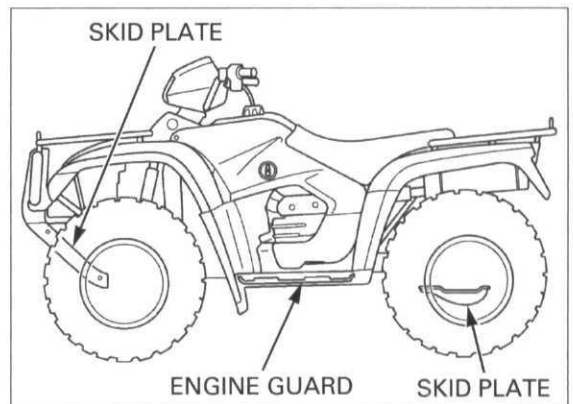
Tighten the lock nut.



## SKID PLATE, ENGINE GUARD

Check the skid plate and engine guard for cracks, damage or looseness.

Tighten any loose fasteners. Replace the skid plate or engine guard as required.



## CLUTCH SYSTEM

Remove the left engine air guide (page 3-12).

Loosen the lock nut and turn the adjusting screw one full turn clockwise.

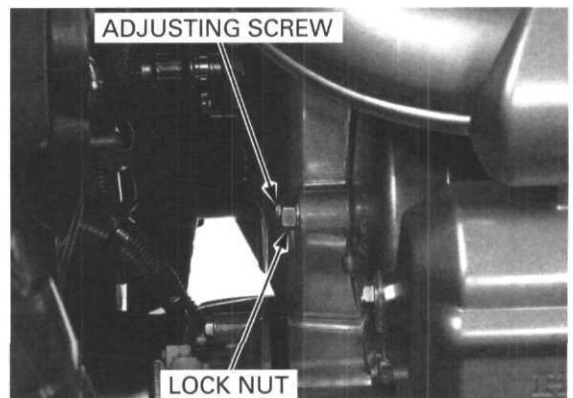
Slowly turn the adjusting screw counterclockwise until resistance is felt, then turn the adjusting screw 1/4 turn clockwise.

Hold the adjusting screw and tighten the lock nut.

**TORQUE: 22 N·m (2.2 kgf·m, 16 lbf·ft)**

Install the left engine air guide (page 3-12).

Start the engine and check for proper clutch operation.



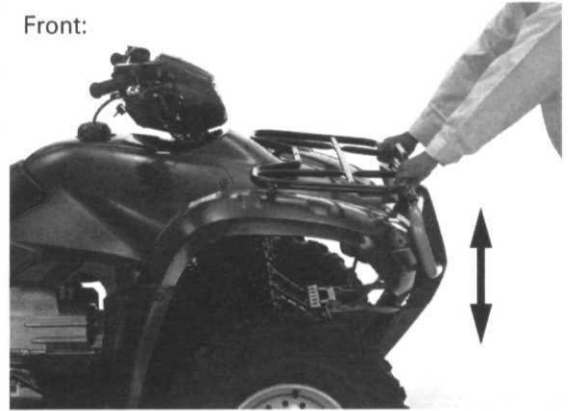
## MAINTENANCE

### SUSPENSION

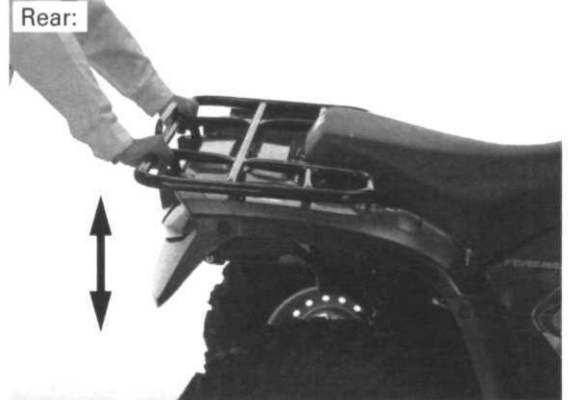
*Loose, worn or damaged suspension parts impair vehicle stability and control.*

Check the action of the front and rear shock absorbers by compressing them 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.

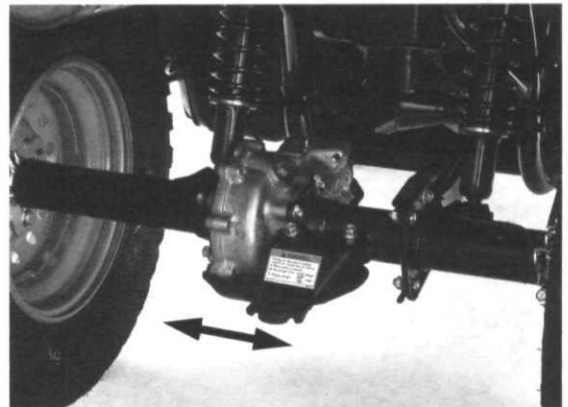
Front:



Rear:

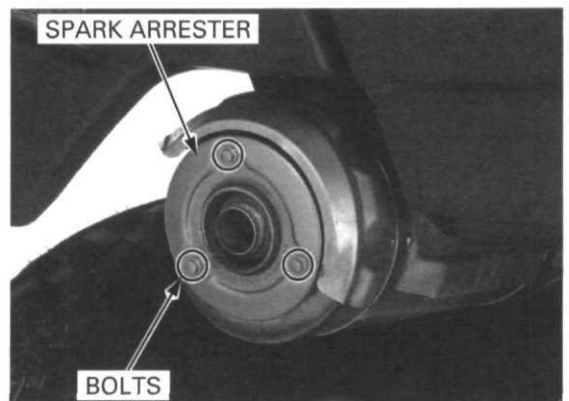


Raise the rear wheel off the ground by supporting the frame securely.  
Check for worn swingarm bearings by grabbing the rear axle and attempting to move the wheels side to side.  
Replace the bearings if any looseness is noted (page 14-8).



### SPARK ARRESTER

Remove the three bolts and spark arrester with the gasket.

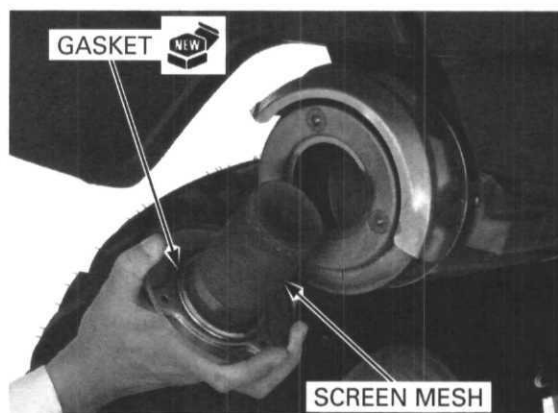


Use a brush to remove carbon deposits from the screen mesh, being careful not to damage the screen mesh.

The screen mesh must be free of breaks and holes. Replace the spark arrester if necessary.

Install the spark arrester with a new gasket and tighten the three bolts.

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



## NUTS, BOLTS, FASTENERS

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

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

## WHEELS/TIRES

*Tire pressure should be checked when the tires are cold.*

Check the tire pressure with a tire pressure gauge.

### RECOMMENDED TIRE PRESSURE (Front/Rear)

**Standard: 25 kPa (0.25 kgf/cm<sup>2</sup>, 3.6 psi)**

**Minimum: 22 kPa (0.22 kgf/cm<sup>2</sup>, 3.2 psi)**

**Maximum: 28 kPa (0.28 kgf/cm<sup>2</sup>, 4.0 psi)**

**With cargo: 25 kPa (0.25 kgf/cm<sup>2</sup>, 3.6 psi)**

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

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

### MINIMUM TREAD DEPTH (Front/Rear):

**4.0 mm (0.16 in)**

Raise the wheel off the ground and check the hub or knuckle and axle bearings for excessive play or abnormal noise.



## STEERING SHAFT HOLDER BEARING

*Make sure the cables do not interfere with the rotation of the handlebar.*

Raise the front wheels off the ground and support the vehicle securely.

Check that the handlebar moves freely from side to side.

If the handlebar moves unevenly, binds, or has horizontal or vertical movement, inspect the steering shaft holder bushing and bearing (page 13-25).



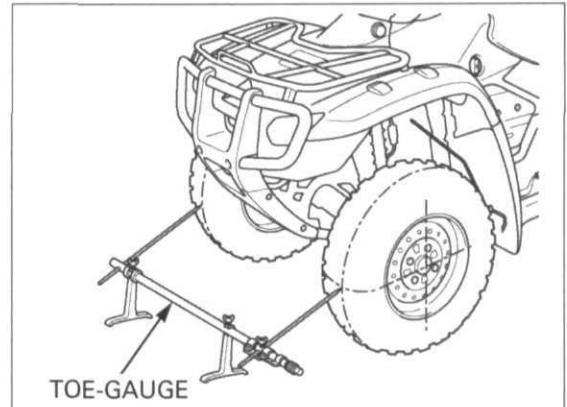
# STEERING SYSTEM

Place the vehicle on level ground with the front wheels facing straight ahead.  
Mark the centers of the tires with chalk to indicate the axle center height.

Align the gauge with the marks on the tires as shown.

Check the readings on the gauge scales.

Slowly move the vehicle back until the wheels have turned 180° so the marks on the tires are aligned with the gauge height on the rear side.



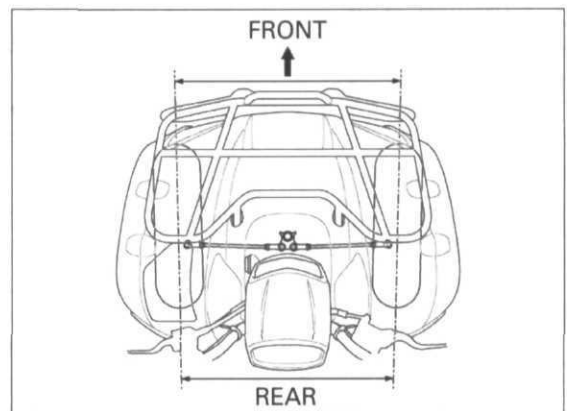
Measure the toe on the rear part of the tires at the same points with no load on the vehicle.

**TM: Toe-out:  $1 \pm 15$  mm ( $1/32 \pm 19/32$  in)**

**FM/FE: Toe-out:  $30 \pm 15$  mm ( $1-3/16 \pm 19/32$  in)**

**NOTE:**

- Toe-out means the front measurement is greater than the rear measurement.

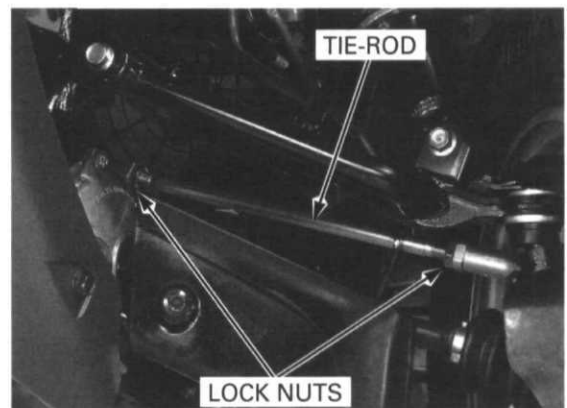


When the toe is out of specification, adjust it by changing the length of the tie-rods equally by loosening the lock nuts and turning the tie-rods while holding the ball joints.

After adjusting each tie-rod, rotate both ball joints in the same direction with the tie-rod axis until they stop against the ball joint stud. Hold them in that position and tighten the tie-rod lock nuts.

**TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)**

After finally tightening the lock nuts, make sure the ball joints operate properly by rotating the tie-rods, to make sure both ball joints have equal play.

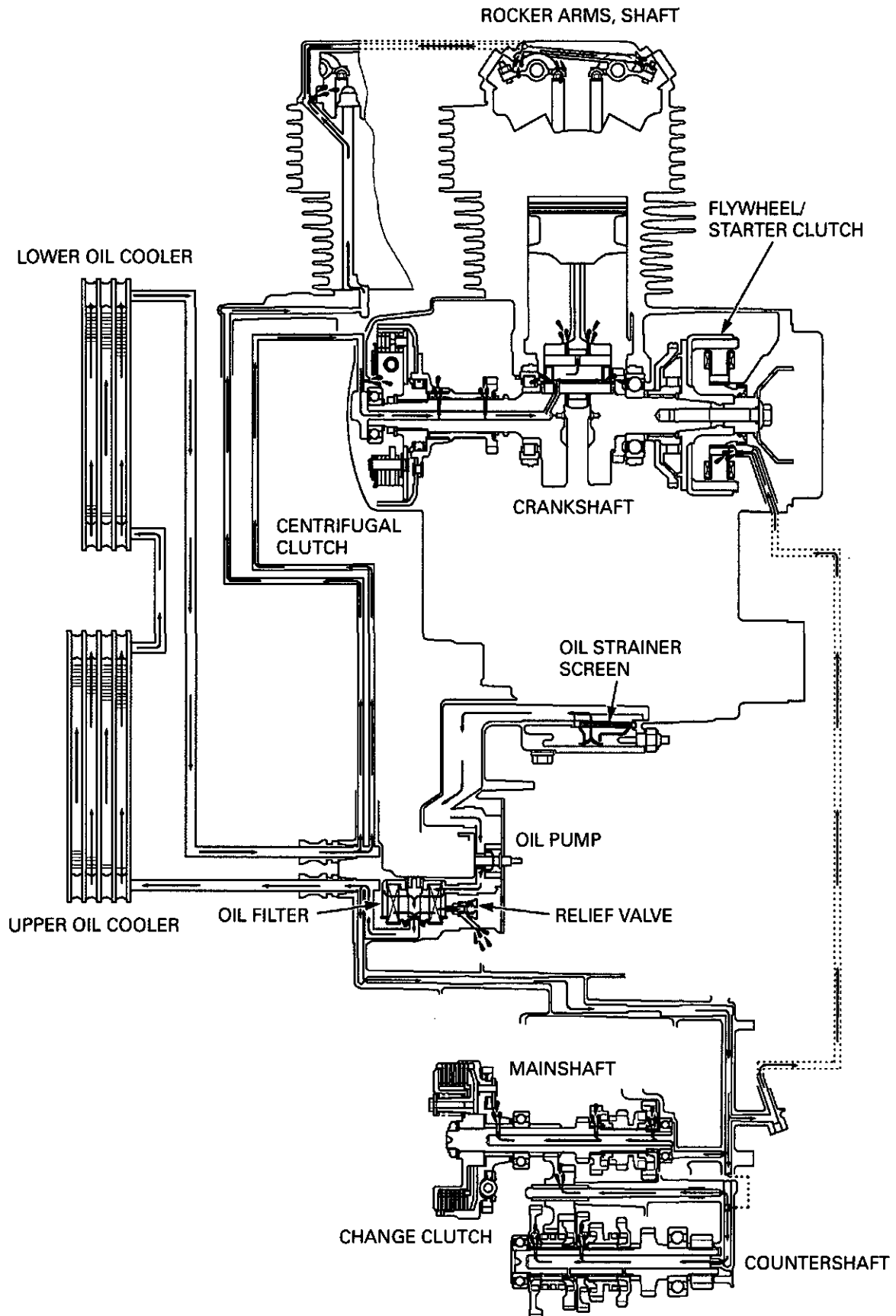


# 5. LUBRICATION SYSTEM

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LUBRICATION SYSTEM DIAGRAM .....	5-2	COOLING FAN .....	5-5
SERVICE INFORMATION .....	5-3	LOWER OIL COOLER.....	5-7
TROUBLESHOOTING .....	5-3	OIL PUMP.....	5-8
UPPER OIL COOLER .....	5-4	RELIEF VALVE .....	5-10

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.

- This section covers service of the oil pump, oil cooler and cooling fan. The service procedures in this section can be performed with the engine installed in the frame.
- 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 and oil cooler have been installed, check that there are no oil leaks.
- Refer to page 4-11 for oil level check and oil change.
- Refer to page 4-13 for oil filter replacement.
- The oil temperature sensor signals the engine control module (ECM) to start the cooling fan motor according to the engine oil temperature. Refer to page 21-15 for oil cooling system inspection.

### SPECIFICATIONS

		Unit: mm (in)	
	ITEM	STANDARD	SERVICE LIMIT
Engine oil capacity	After draining	2.4 liters (2.5 US qt, 2.1 Imp qt)	-
	After draining/filter change	2.5 liters (2.6 US qt, 2.2 Imp qt)	-
	After disassembly	3.0 liters (3.2 US qt, 2.6 Imp qt)	-
Recommended engine oil		Pro Honda GN4 or HP4 (without molybdenum additives) 4-stroke oil or equivalent motor oil API service classification: SG or Higher JASO T 903 standard: MA Viscosity: SAE 10W-40	-
Oil pump	Tip clearance	0.15 (0.006)	0.20 (0.008)
	Body clearance	0.15 - 0.21 (0.00 - 0.008)	0.25 (0.010)
	Side clearance	0.02 - 0.09 (0.001 - 0.004)	0.11 (0.004)

### TORQUE VALUE

Relief valve cap	19 N·m (1.9 kgf·m, 14 lbf·ft)	Apply locking agent to the threads.
Cooling fan motor screw	1.5 N·m (0.15 kgf·m, 1.1 lbf·ft)	
Cooling fan nut	2.7 N·m (0.27 kgf·m, 2.0 lbf·ft)	Apply locking agent to the threads.
Cooling fan shroud tapping screw	1.5 N·m (0.15 kgf·m, 1.1 lbf·ft)	

### TROUBLESHOOTING

#### Oil level too low – high oil consumption

- Normal oil consumption
- External oil leak
- Worn piston rings or incorrect piston ring installation
- Worn cylinder
- Worn valve guides or stem seals

#### Oil contamination

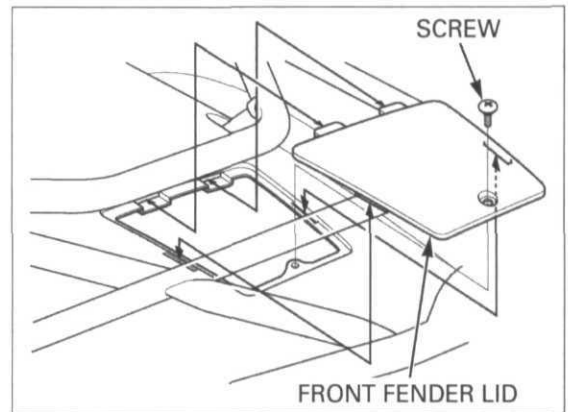
- Oil or filter not changed often enough
- Worn piston rings or incorrect piston ring installation
- Worn valve guides or stem seals
- Clogged oil strainer screen



## UPPER OIL COOLER

### INSPECTION

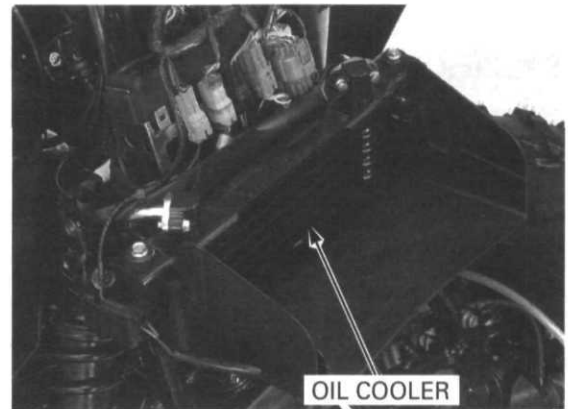
Remove the screw and front fender lid.



Check the oil cooler air passage for clogging or damage.

Straighten bent fins with a small, flat blade screwdriver and remove insects, mud or other obstructions with compressed air.

Check for any oil leakage from the oil cooler and hose joints.

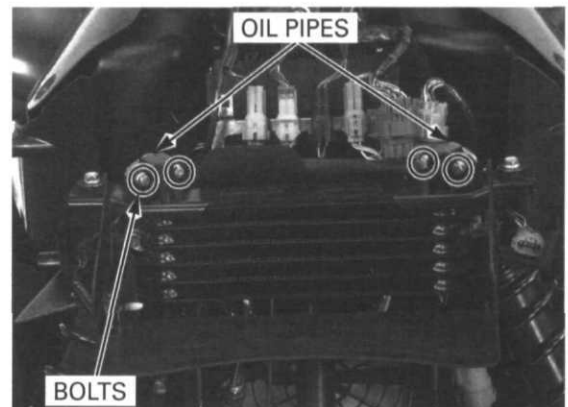


### REMOVAL/INSTALLATION

Drain the engine oil (page 4-12).

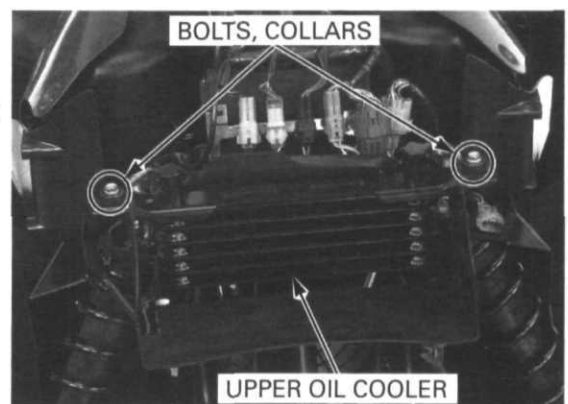
Remove the following:

- front fender (page 3-9)
- bolts
- oil pipes
- O-rings

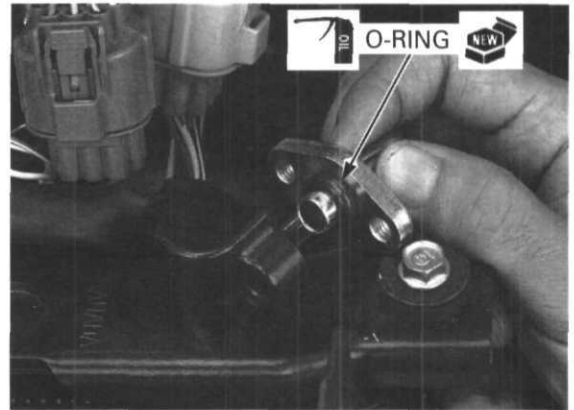


- mounting bolts
- collars
- upper oil cooler

Install the upper oil cooler with the collars and mounting bolts, and tighten the bolts.



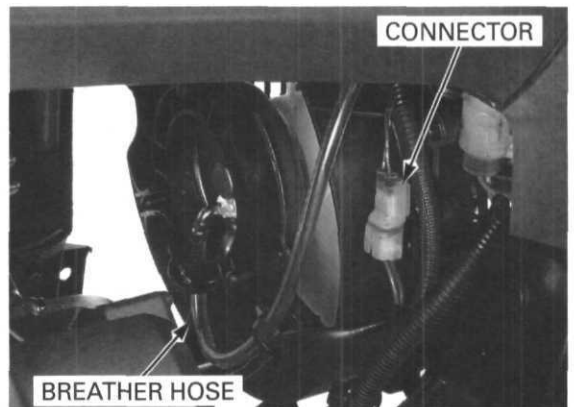
Coat new O-rings with oil and install them onto the oil pipes.  
 Install the oil pipes onto the upper oil cooler and tighten the four bolts securely.  
 Install the front fender (page 3-9).  
 Fill the crankcase with the recommended engine oil (page 4-12).



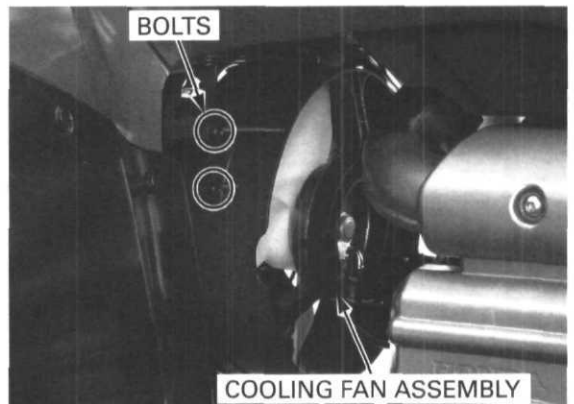
## COOLING FAN

### REMOVAL

Remove both inner fenders (page 3-7).  
 Remove both engine air guides (page 3-12).  
 Disconnect the breather hose from the cooling fan.  
 Disconnect the fan motor 2P connector.



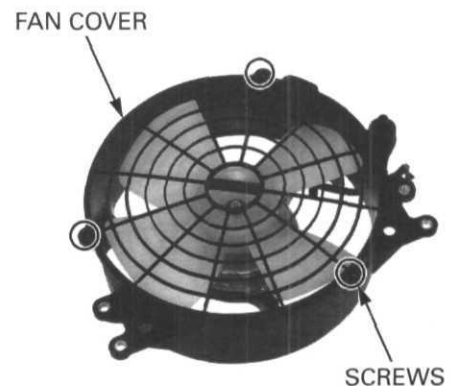
Remove the four mounting bolts and the cooling fan assembly from the frame.



### DISASSEMBLY

Remove the following:

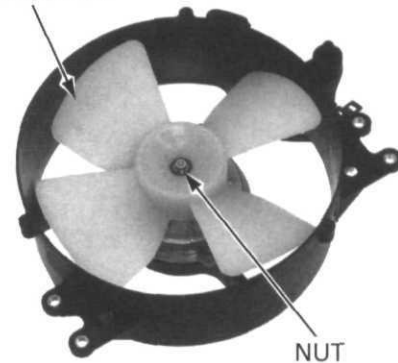
- three tapping screws
- fan cover



## LUBRICATION SYSTEM

- nut
- cooling fan

COOLING FAN



- three screws
- fan motor

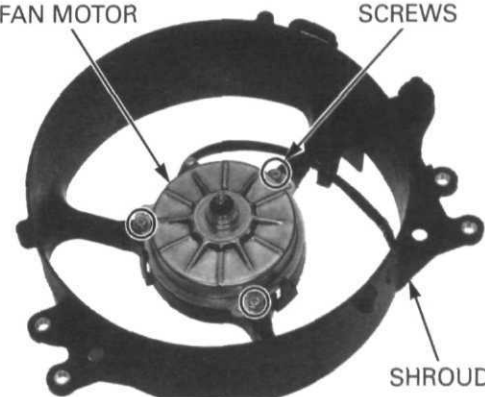
### ASSEMBLY

Install the fan motor on the shroud in the direction as shown and tighten the three screws.

**TORQUE: 1.5 N·m (0.15 kgf·m, 1.1 lbf·ft)**

FAN MOTOR

SCREWS

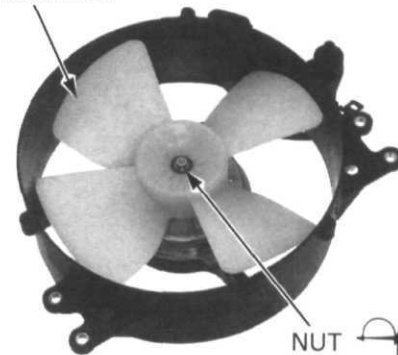


Install the cooling fan on the fan motor shaft by aligning the flat surfaces.

Apply locking agent to the fan nut threads. Install and tighten the fan nut.

**TORQUE: 2.7 N·m (0.27 kgf·m, 2.0 lbf·ft)**

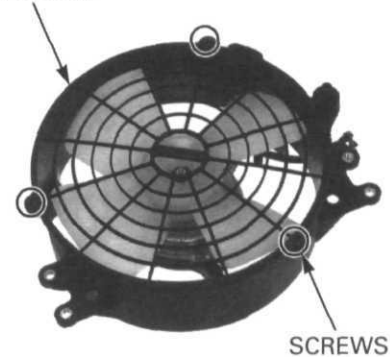
COOLING FAN



Install the fan cover onto the shroud and tighten the three tapping screw.

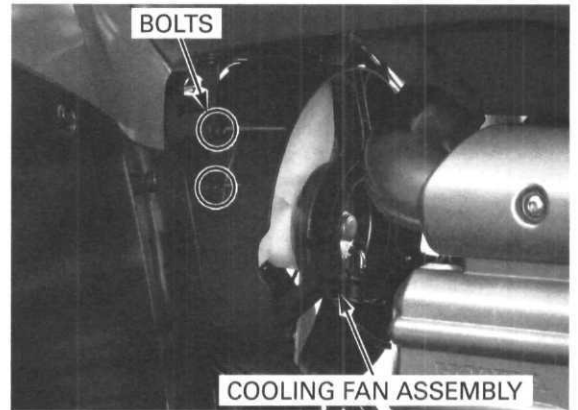
**TORQUE: 0.8 N·m (0.08 kgf·m, 0.06 lbf·ft)**

FAN COVER



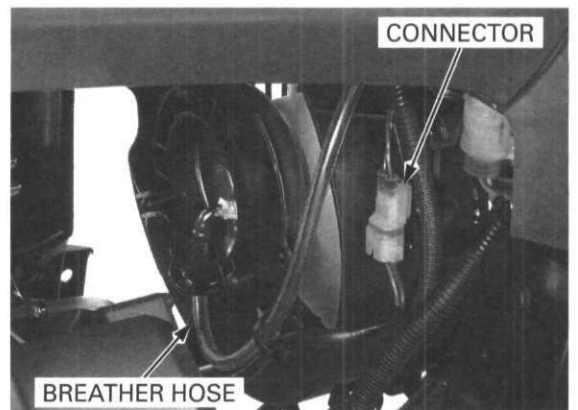
**INSTALLATION**

Install the cooling fan assembly in the frame and tighten the four bolts securely.



*Route the motor wire and breather hose properly as shown.*

Connect the fan motor 2P connector.  
 Connect the breather hose to the cooling fan.  
 Install both engine air guides (page 3-12).  
 Install both inner fenders (page 3-7).



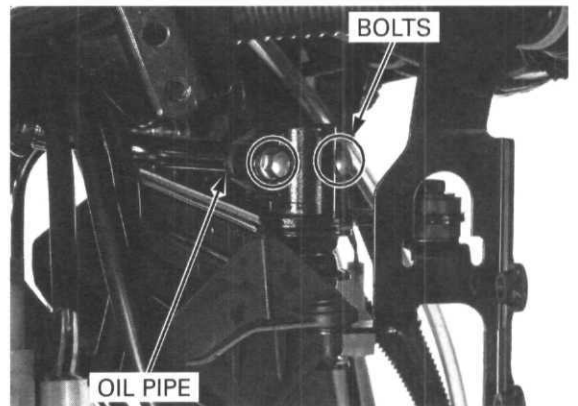
**LOWER OIL COOLER**

**REMOVAL/INSTALLATION**

Drain the engine oil (page 4-12).

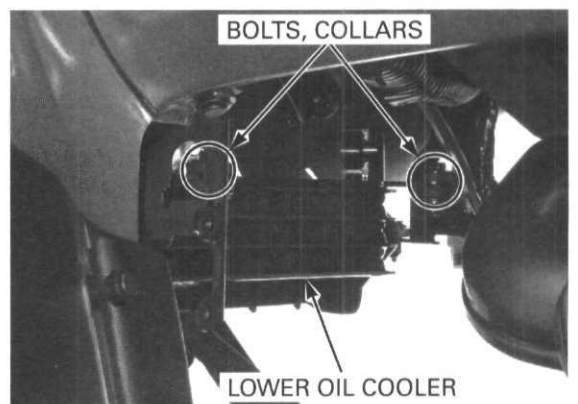
Remove the following:

- cooling fan (page 5-5)
- four bolts
- two oil pipes
- two O-rings



- mounting bolts
- collars
- lower oil cooler

Install the lower oil cooler with the collars and mounting bolts, and tighten the bolts.



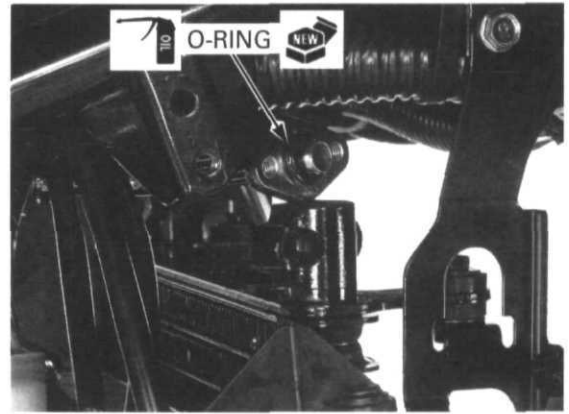
## LUBRICATION SYSTEM

Coat new O-rings with oil and install them onto the oil pipes.

Install the oil pipes onto the lower oil cooler and tighten the four bolts securely.

Install the cooling fan (page 5-7).

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

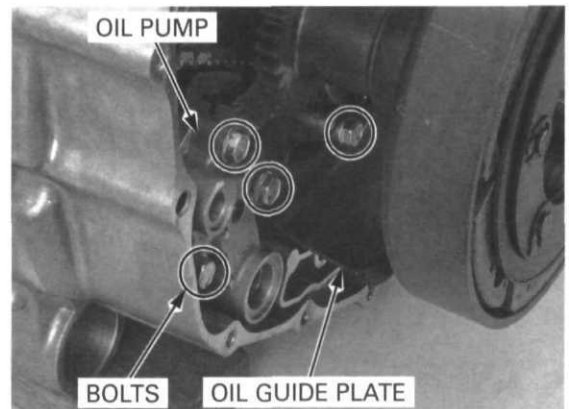


## OIL PUMP

### REMOVAL

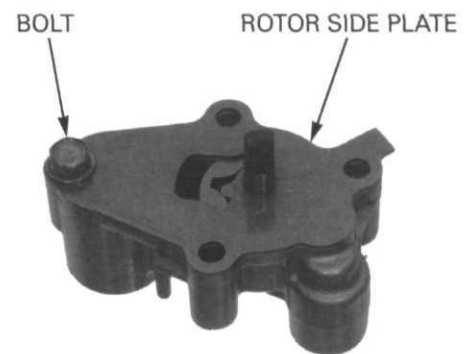
Remove the front crankcase cover (page 10-6).

Remove the four bolts, oil guide plate and oil pump.



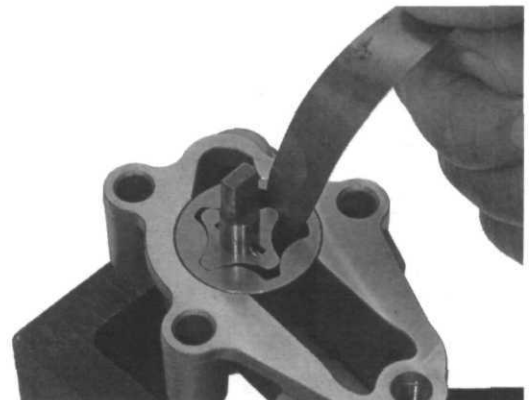
### DISASSEMBLY/INSPECTION

Remove the bolt and rotor side plate.



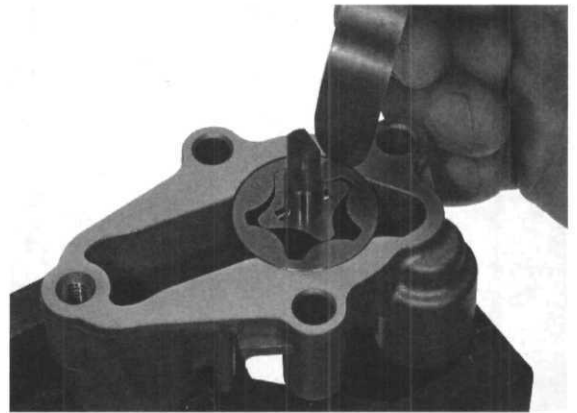
Measure the rotor tip clearance.

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



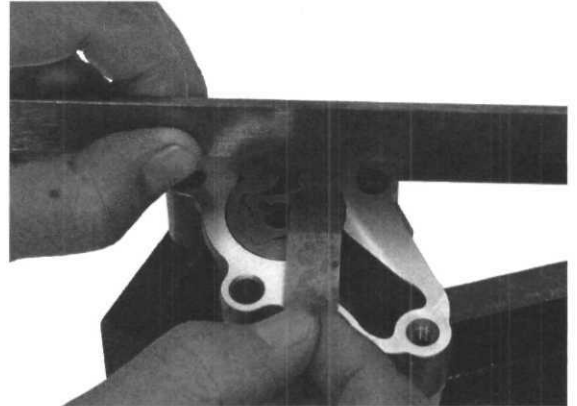
Measure the pump body clearance.

**SERVICE LIMIT: 0.25 mm (0.010 in)**



Remove the oil pump shaft and drive pin, and measure the pump side clearance.

**SERVICE LIMIT: 0.11 mm (0.004 in)**

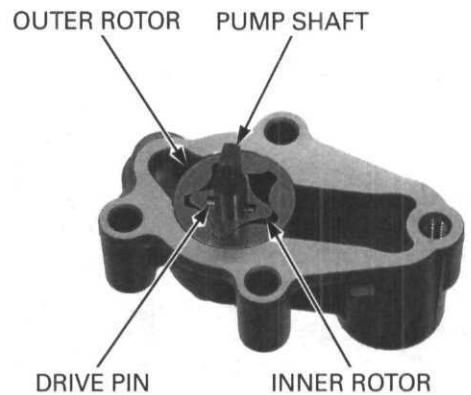


**ASSEMBLY**

Dip all parts in clean engine oil.

Install the outer and inner rotors into the pump body.

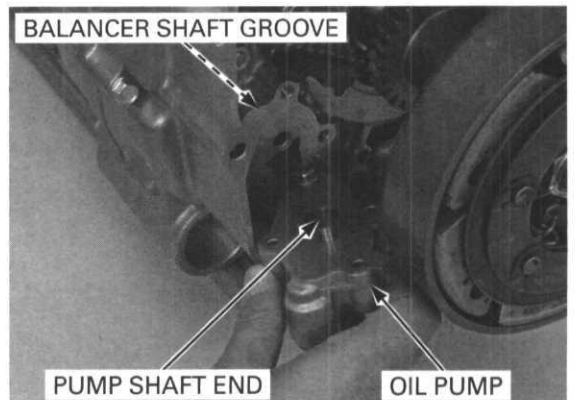
Install the drive pin into the pump shaft, and install the shaft into the inner rotor and pump body by aligning the drive pin with the inner rotor groove.



**INSTALLATION**

*Make sure the cam chain guide is in place before installing the oil pump.*

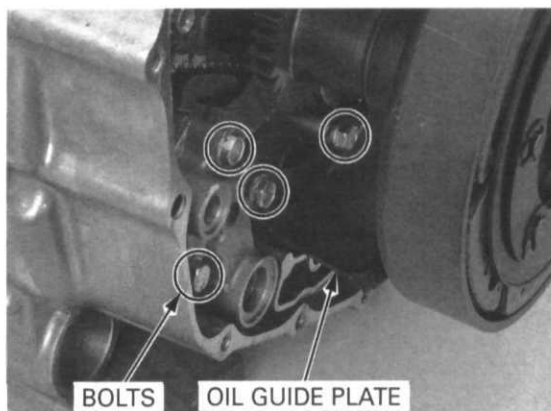
Install the oil pump onto the crankcase while aligning the pump shaft end with the balancer shaft groove.



## LUBRICATION SYSTEM

Install the oil guide plate and tighten the four bolts securely.

Install the front crankcase cover (page 10-23).

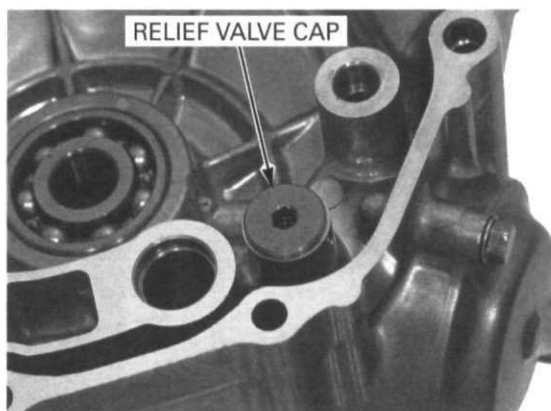


## RELIEF VALVE

### DISASSEMBLY

Remove the front crankcase cover (page 10-6).

Remove the relief valve cap, spring and valve from the front crankcase cover.



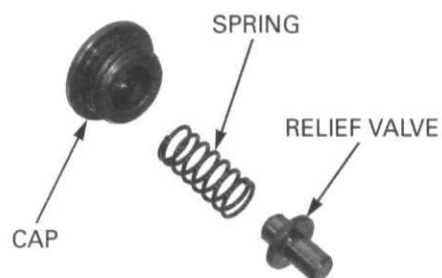
### INSPECTION

Check the relief valve and spring for wear or damage and replace them if necessary.

### ASSEMBLY

Install the relief valve with the long projection side facing in.

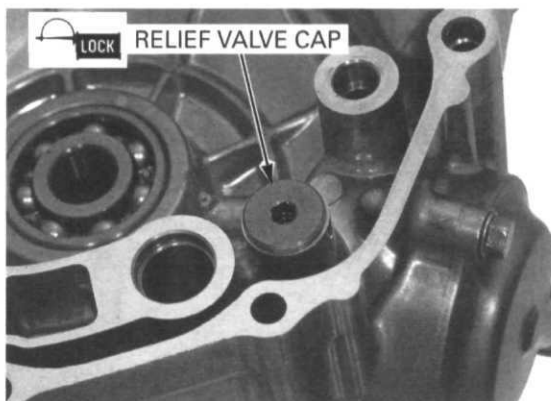
Install the relief valve spring.



Apply locking agent to the relief valve cap threads. Install the relief valve cap and tighten it.

**TORQUE: 19 N·m (1.9 kgf·m, 14 lbf·ft)**

Install the front crankcase cover (page 10-23).

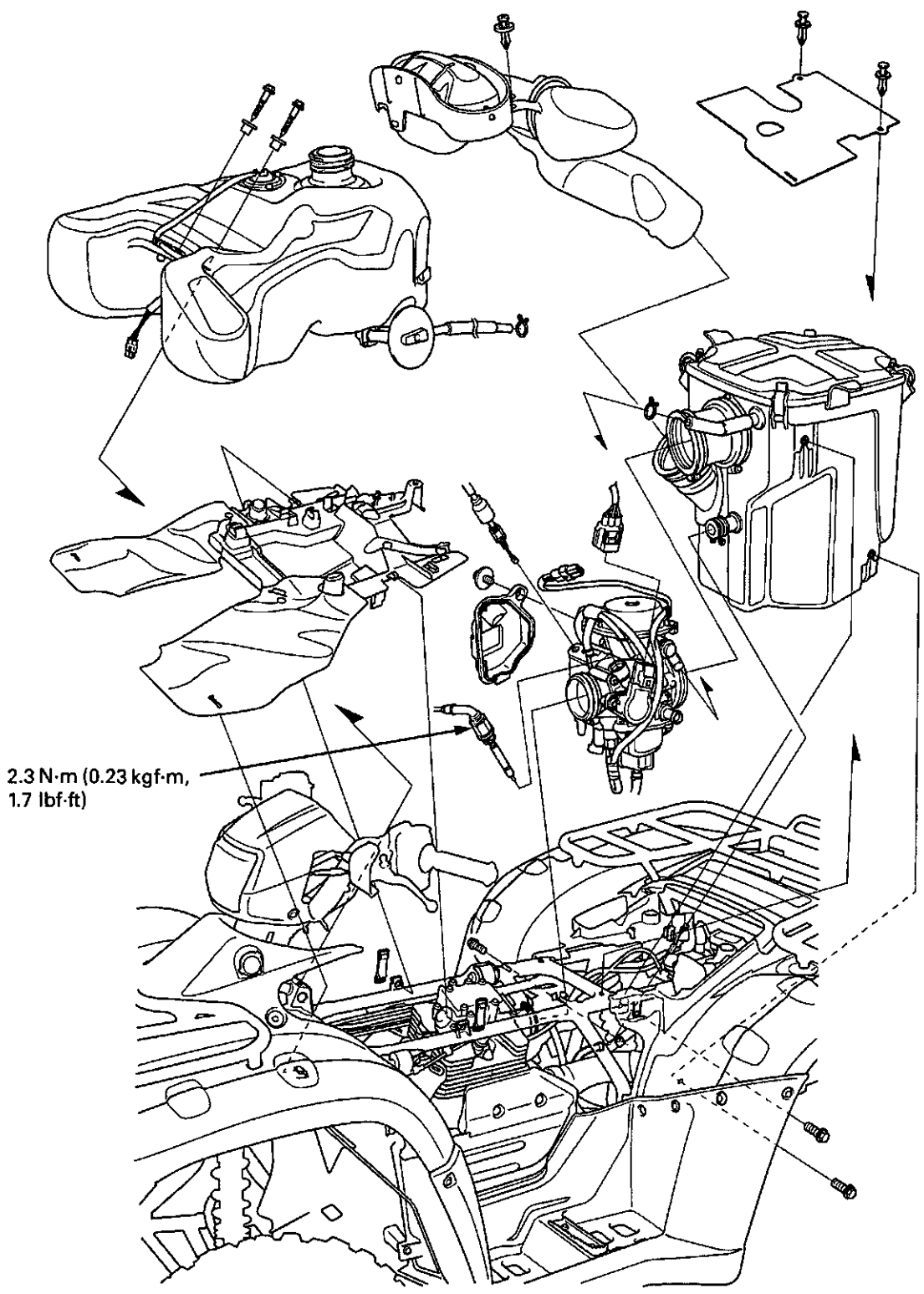


<b>SYSTEM COMPONENTS .....</b>	<b>6-2</b>	<b>CARBURETOR ASSEMBLY.....</b>	<b>6-12</b>
<b>SERVICE INFORMATION .....</b>	<b>6-3</b>	<b>CARBURETOR INSTALLATION .....</b>	<b>6-17</b>
<b>TROUBLESHOOTING .....</b>	<b>6-4</b>	<b>PILOT SCREW ADJUSTMENT.....</b>	<b>6-19</b>
<b>AIR CLEANER HOUSING .....</b>	<b>6-5</b>	<b>HIGH ALTITUDE ADJUSTMENT .....</b>	<b>6-20</b>
<b>CARBURETOR REMOVAL.....</b>	<b>6-6</b>	<b>FUEL TANK .....</b>	<b>6-22</b>
<b>CARBURETOR DISASSEMBLY/ INSPECTION .....</b>	<b>6-7</b>		



FUEL SYSTEM

SYSTEM COMPONENTS



## SERVICE INFORMATION

### GENERAL

- Work in a well ventilated area. Smoking or allowing flames or sparks in the work area or where gasoline is stored can cause a fire or explosion.
- Bending or twisting the control cable will impair smooth operation and could cause the cable to stick or bind, resulting in loss of vehicle control.
- Before removing the carburetor, place an approved fuel container under the drain hose, loosen the drain screw and drain the carburetor.
- After removing the carburetor, cover the intake port of the cylinder head with shop towel to prevent any foreign material from dropping into the engine.
- When disassembling the fuel system parts, note the locations of the O-rings. Replace them with new ones on reassembly.
- If the vehicle is to be stored for more than one month, drain the float chamber. Fuel left in the float chamber may cause clogged jets, resulting in hard starting or poor driveability.
- Refer to page 21-11 for carburetor heater inspection.
- Refer to page 21-19 for throttle position sensor inspection.

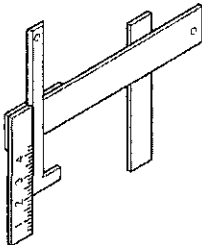
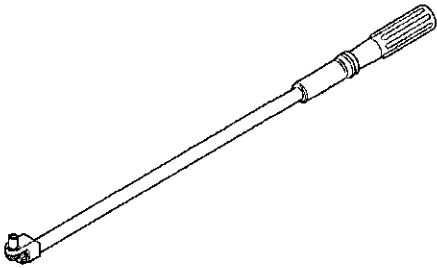
### SPECIFICATIONS

ITEM	SPECIFICATIONS
Carburetor identification number	VE6DA
Main jet	#162
Slow jet	#45
Pilot screw opening	See page 6-19
Float level	15.9 mm (0.63 in)
Idle speed	1,400 ± 100 rpm (min <sup>-1</sup> )
Throttle lever free play	3 – 8 mm (1/8 – 5/16 in)

### TORQUE VALUE

Carburetor insulator band screw	4 N·m (0.4 kgf·m, 3.0 lbf·ft)
Starting enrichment (SE) valve nut	2.3 N·m (0.23 kgf·m, 1.1 lbf·ft)

### TOOLS

<p>Carburetor float level gauge 07401-0010000</p> 	<p>Pilot screw wrench 07KMA-MN90100</p>  <p>or 07KMA-MN9A100 (U.S.A. only)</p>
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## FUEL SYSTEM

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### TROUBLESHOOTING

#### Engine cranks but won't start

- No fuel in tank
- No fuel to carburetor
  - Clogged fuel strainer
  - Clogged fuel line
  - Clogged fuel tank breather hose
- Too much fuel getting to the engine
  - Clogged air cleaner
  - Flooded carburetor
- Intake air leak
- Contaminated/deteriorated fuel
  - Clogged jets
- Clogged starting enrichment (SE) valve circuit
- Improper choke operation
- Improper throttle operation
- No spark at plug (faulty ignition system – See page 19-4)

#### Lean mixture

- Clogged fuel jets
- Faulty float valve
- Float level too low
- Restricted fuel line
- Clogged carburetor air vent hose
- Restricted fuel tank breather hose
- Intake air leak
- Faulty vacuum piston
- Faulty throttle valve

#### Rich mixture

- SE valve open
- Clogged air jets
- Faulty float valve
- Float level too high
- Dirty air cleaner
- Worn jet needle or needle jet
- Faulty vacuum piston

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

- Restricted fuel line
- Fuel mixture too lean/rich
- Contaminated/deteriorated fuel
  - Clogged jets
- Intake air leak
- Misadjusted idle speed
- Misadjusted pilot screw
- Restricted fuel tank breather hose
- Clogged air cleaner
- Clogged slow circuit
- Clogged SE valve circuit
- Faulty ignition system (page 19-4)

#### Afterburn when engine braking is used

- Lean mixture in slow circuit
- Faulty air cut-off valve
- Faulty ignition system (page 19-4)

#### Backfiring or misfiring during acceleration

- Lean mixture
- Faulty ignition system (page 19-4)

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

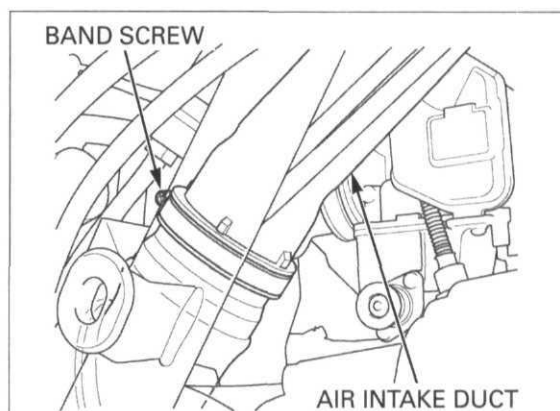
- Clogged fuel system
- Faulty ignition system (page 19-4)

## AIR CLEANER HOUSING

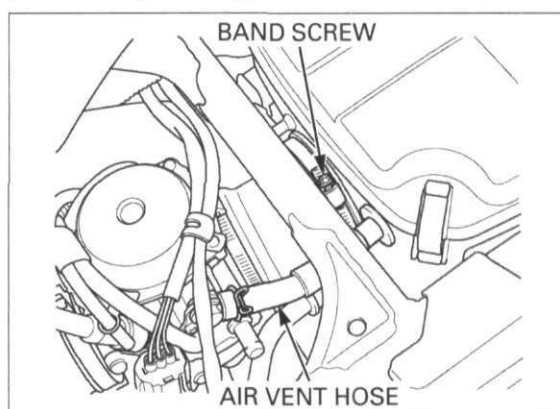
### REMOVAL/INSTALLATION

Remove the following:

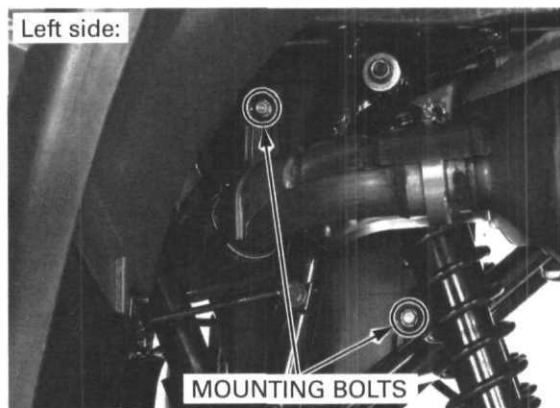
- fuel tank cover (page 3-5)
- left side cover (page 3-5)
- air intake duct by loosening the band screw



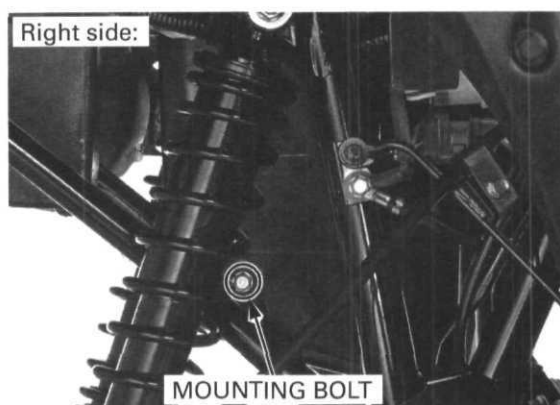
Disconnect the air vent hose from the carburetor.  
Loosen the connecting hose band screw.



Remove the two air cleaner housing mounting bolts from the left side.



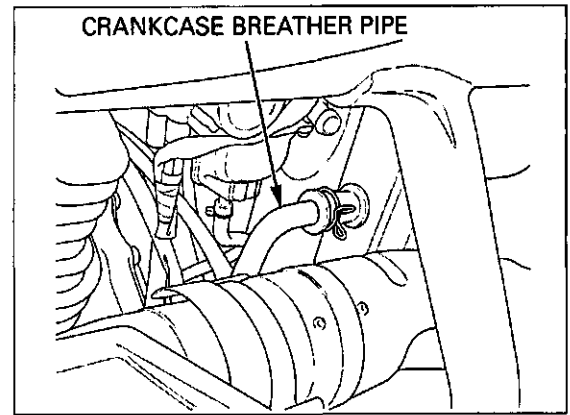
Remove the air cleaner housing mounting bolt from the right side.



## FUEL SYSTEM

Remove the air cleaner housing from the frame while disconnecting the crankcase breather pipe from the housing.

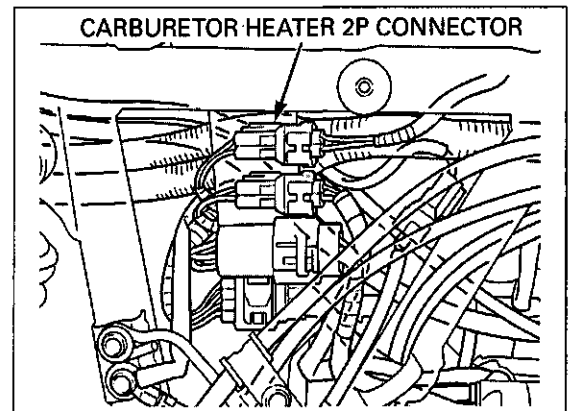
Install the air cleaner housing in the reverse order of removal.



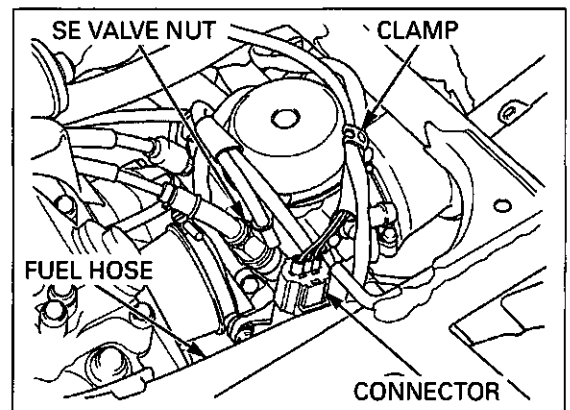
## CARBURETOR REMOVAL

Remove the air cleaner housing (page 6-5).

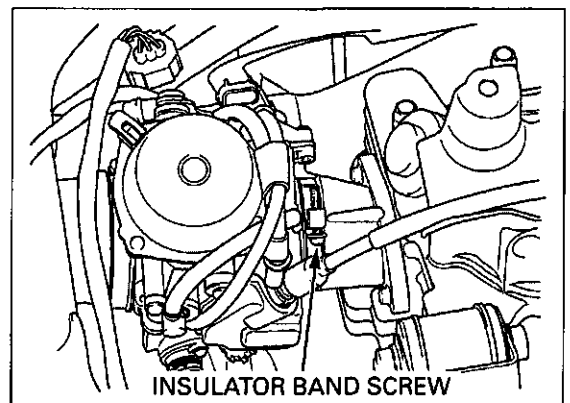
Disconnect the carburetor heater 2P connector.



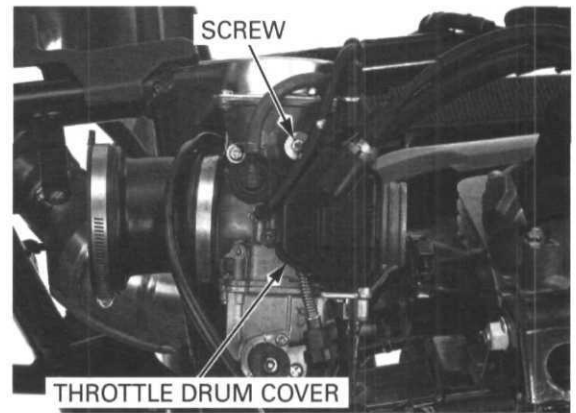
Disconnect the throttle position sensor connector. Remove the carburetor heater and throttle position sensor wires from the clamp. Loosen the starting enrichment (SE) valve nut and remove the valve. Disconnect the fuel hose from the carburetor.



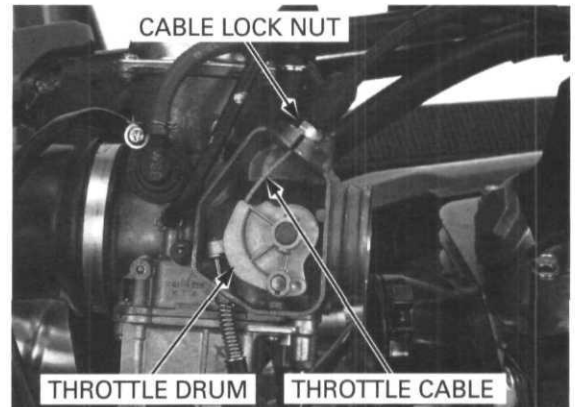
Loosen the carburetor insulator band screw and remove the carburetor from the insulator.



Remove the screw and the throttle drum cover.



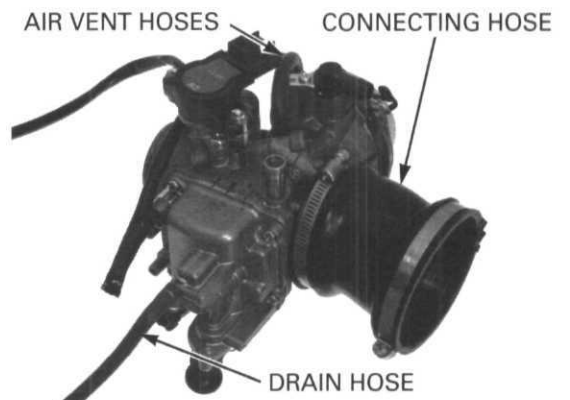
Loosen the throttle cable lock nut and remove the adjuster from the carburetor body, and disconnect the cable from the throttle drum. Remove the carburetor.



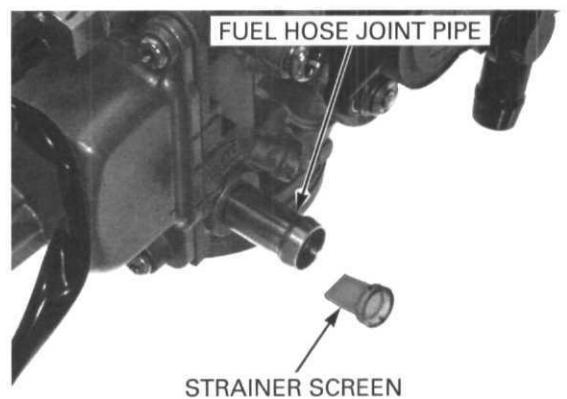
## CARBURETOR DISASSEMBLY/ INSPECTION

Remove the following from the carburetor body:

- air cleaner connecting hose
- carburetor drain hose
- air vent hoses

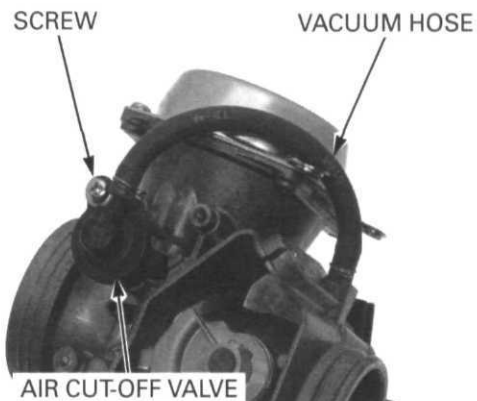


Remove the strainer screen from the fuel hose joint pipe.

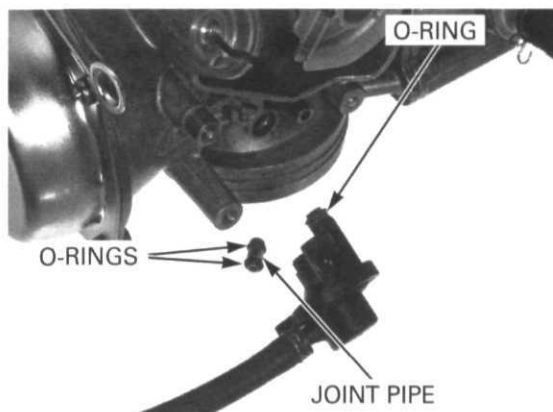


**AIR CUT-OFF VALVE**

Disconnect the vacuum hose from the vacuum joint pipe.  
Remove the attaching screw and air cut-off valve.

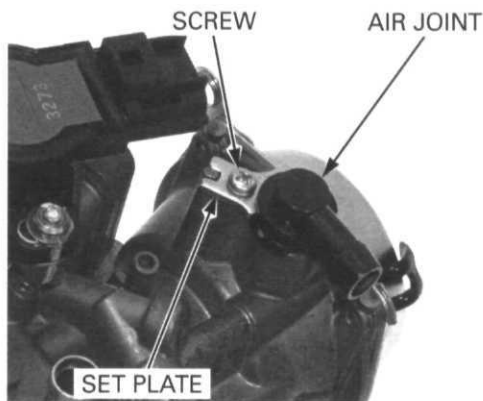


Remove the O-rings and joint pipe.

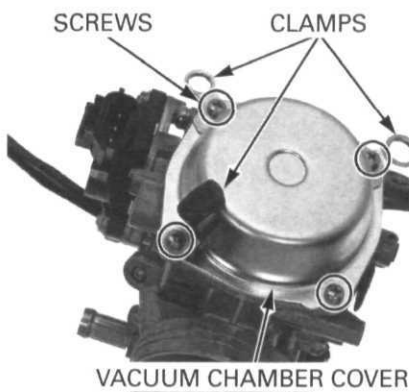


**VACUUM CHAMBER**

Remove the screw, set plate, air joint and O-ring.



Remove the four screws and clamps while holding vacuum chamber cover.



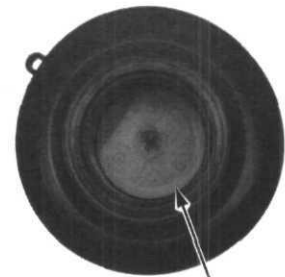
Remove the vacuum chamber cover, compression spring and diaphragm/ vacuum piston from the carburetor body.

VACUUM CHAMBER COVER



*Be careful not to damage the diaphragm.*

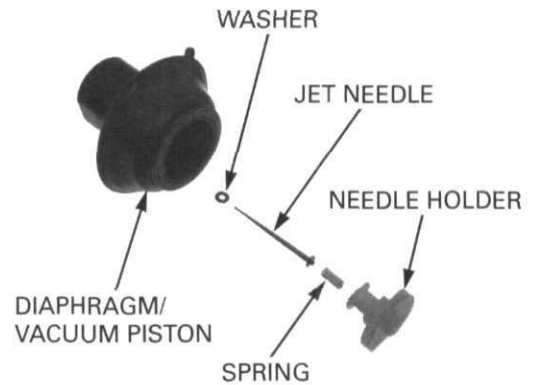
Turn the needle holder counterclockwise by using a screwdriver while pressing it in and release the holder flange from the vacuum piston. Remove the needle holder, spring, jet needle and washer.



NEEDLE HOLDER

Check the jet needle for stepped wear. Check the vacuum piston for wear or damage. Check the diaphragm for pin hole, deterioration or damage. Check the vacuum piston for smooth operation up and down in the carburetor body.

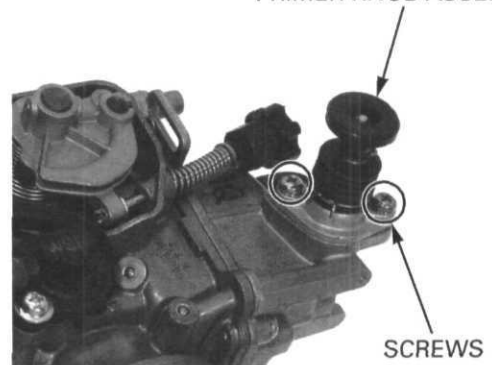
Air will leak out of the vacuum chamber if the diaphragm is damaged in any way, even with just a pin hole.



**PRIMER KNOB**

Remove the two screws while holding the primer knob body.

PRIMER KNOB ASSEMBLY

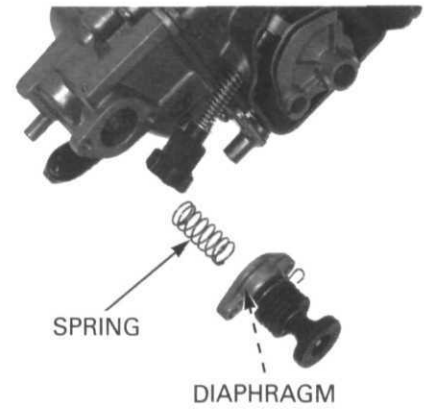




## FUEL SYSTEM

Remove the primer knob assembly and spring.

Check the diaphragm for pin holes, deterioration or damage.



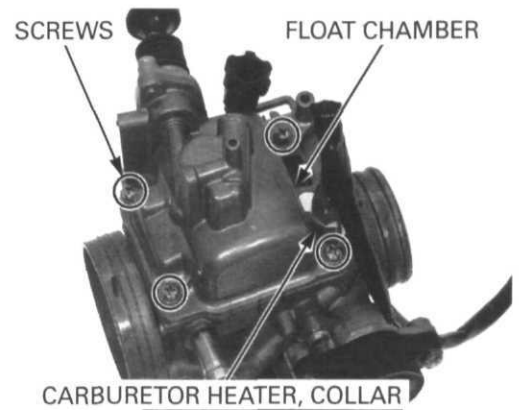
### FLOAT CHAMBER

Remove the diaphragm/vacuum piston (page 6-8).

Remove the four screws and the float chamber.

#### NOTE:

- Remove the carburetor heater and collar after removing the float chamber if necessary.

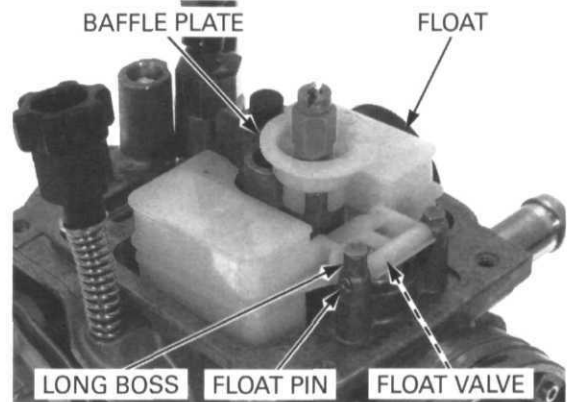


*Tap the float pin gently with suitable pin (O.D. 2 mm) from the long boss side.*

Remove the following:

- baffle plate
- float pin
- float
- float valve

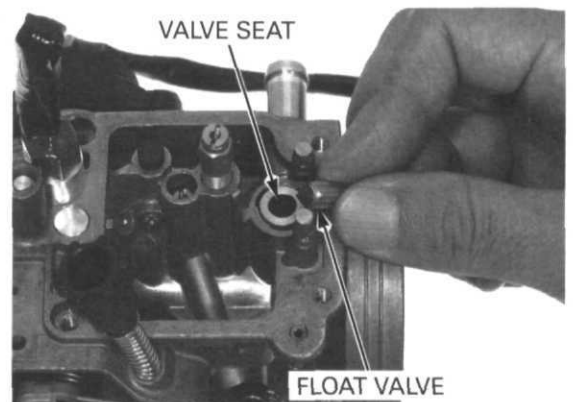
Check the float for damage or fuel in the float.



Check the float valve and valve seat for scoring, scratches, clogging or damage.

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

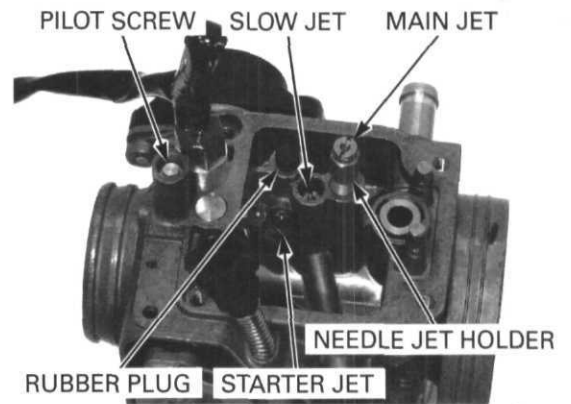
Check the operation of the float valve.



Handle the jets with care. They can easily be scored or scratched.

Remove the following:

- main jet
- needle jet holder
- needle jet
- slow jet
- starter jet
- rubber plug



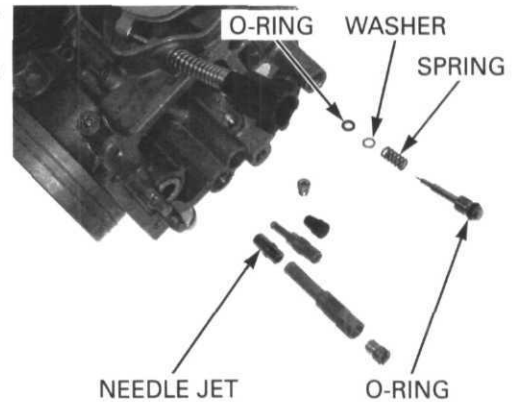
Damage to the pilot screw seat will occur if the pilot screw is tightened against the seat.

Turn the pilot screw in and carefully count the number of turns until it seats lightly. Make a note of this to use as a reference when reinstalling the pilot screw.

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

Check each jet for wear or damage.  
Check the pilot screw for wear or damage.

Clean the jets with cleaning solvent and blow open with compressed air.



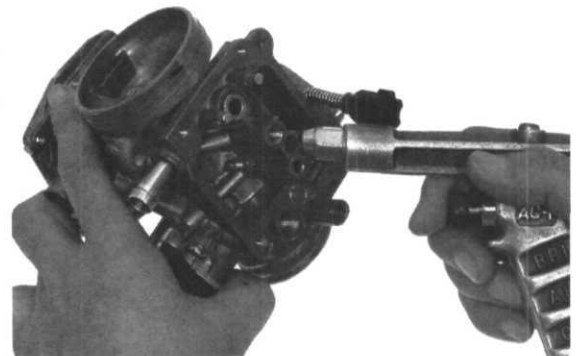
## CARBURETOR CLEANING

Remove the following:

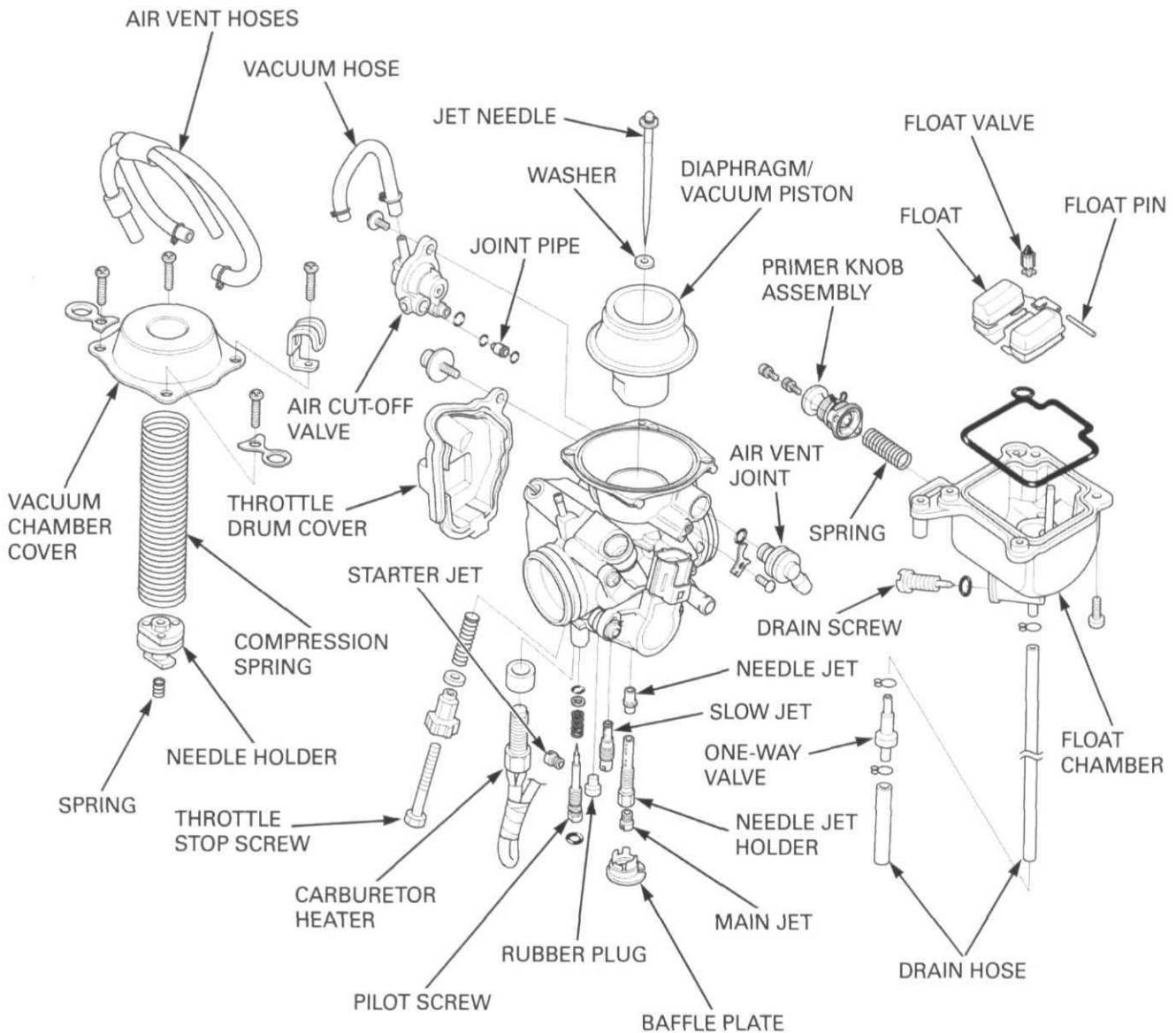
- air cut-off valve (page 6-8)
- diaphragm/vacuum piston (page 6-8)
- all jets and pilot screw (page 6-10)

Cleaning the air and fuel passages with a piece of wire will damage the carburetor body.

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



CARBURETOR ASSEMBLY



**FLOAT AND JETS**

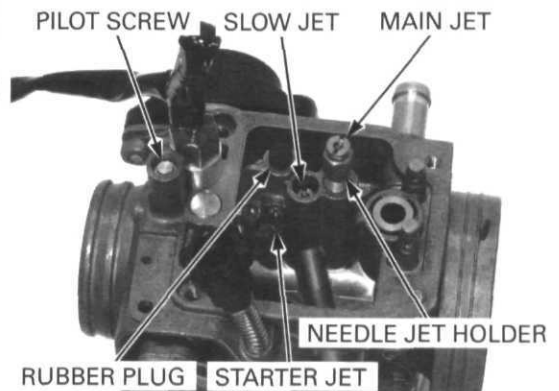
*Damage to the pilot screw seat will occur if the pilot screw is tightened against the seat.*

Install the pilot screw with the spring, washer and new O-rings and return it to its original position as noted during removal. Perform the pilot screw adjustment if a new pilot screw is installed.

*Handle the jets with care. They can easily be scored or scratched.*

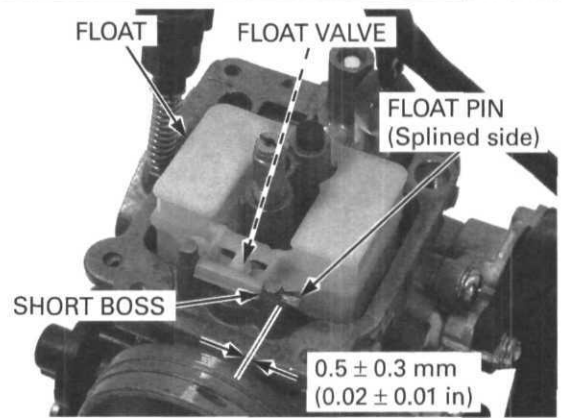
Install the following:

- needle jet
- needle jet holder
- main jet
- slow jet
- starter jet
- rubber plug



Tap the float pin gently with suitable pin (O.D. 2 mm).

Hang the float valve onto the float arm lip. Install the float valve and float. Install the float pin and tap it until the spline end is  $0.5 \pm 0.3$  mm ( $0.02 \pm 0.01$  in) from the short boss surface.



**FLOAT LEVEL INSPECTION**

**NOTE:**

- Check the float level after checking the float valve, valve seat and float.

Set the float level gauge so that it is perpendicular to the float chamber face at the highest point of the float.

With the float valve seated and the float arm just touching the valve, measure the float level with the float level gauge.

**TOOL:**

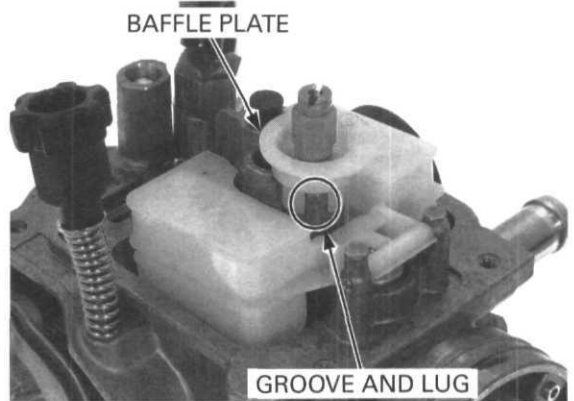
**Carburetor float level gauge 07401-0010000**

**FLOAT LEVEL: 18.5 mm (0.73 in)**

The float cannot be adjusted. Replace the float assembly if the float level is out of specification.



Install the baffle plate by aligning its groove with the lug on the carburetor body as shown.

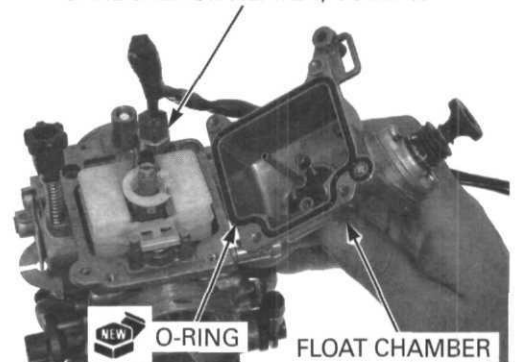


Install the collar and carburetor heater with the stepped side of the collar facing the carburetor and tighten the heater, if they were removed.

Install a new O-ring into the float chamber groove securely. Install the float chamber and tighten the four screws.

Install the diaphragm/vacuum piston (page 6-14).

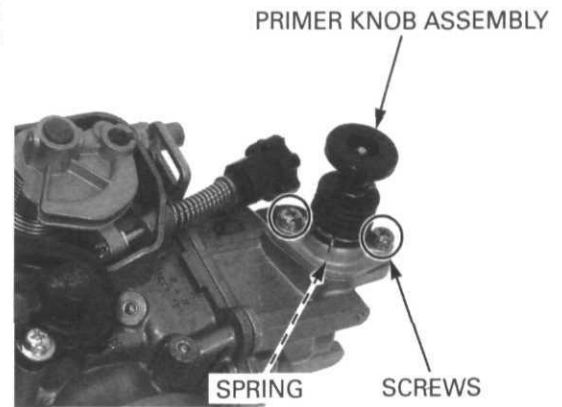
CARBURETOR HEATER, COLLAR



## FUEL SYSTEM

### PRIMER KNOB

Install the primer knob with the spring and tighten the two screws, being careful not to pinch the diaphragm.

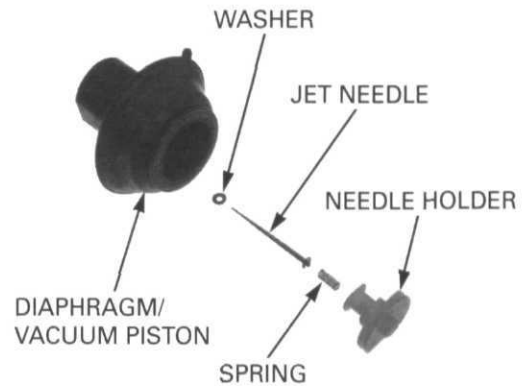


### VACUUM CHAMBER

Install the needle clip onto the jet needle.

Install the washer onto the jet needle and insert the jet needle into the vacuum piston.

Install the spring into the needle holder and set the needle holder into the vacuum piston.



Turn the needle holder clockwise while pressing it until it locks. Holder flange should be fitted the vacuum piston after turning.



*Be careful not to damage the jet needle.*

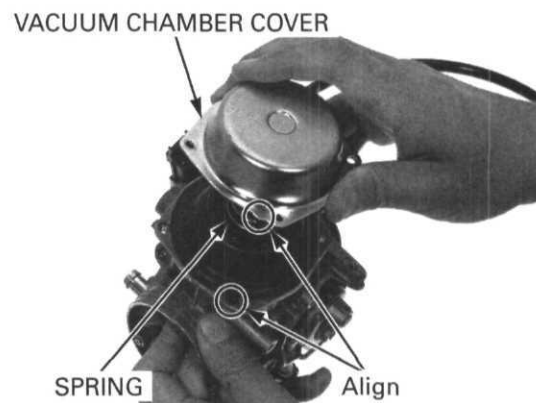
Install the diaphragm/vacuum piston into the carburetor body by aligning the tab of the diaphragm with the air passage, then insert the jet needle into the needle jet.

Lift the bottom of the piston with your finger to set the diaphragm rib into the groove in the carburetor body.

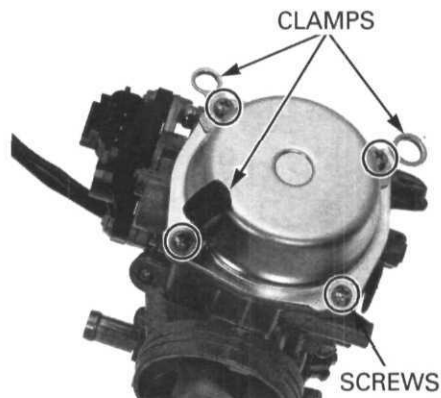


*Be careful not to pinch the diaphragm under the chamber cover, and to keep the spring straight when compressing the spring.*

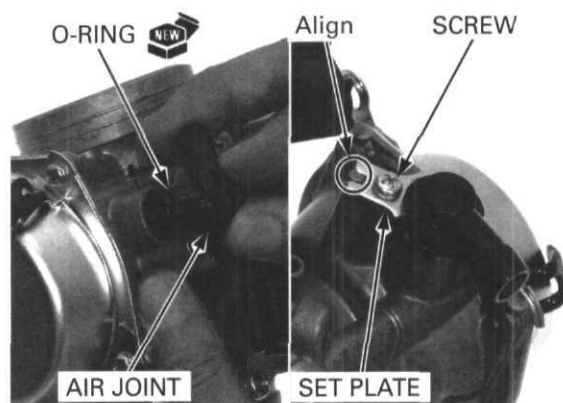
Install the spring and vacuum chamber cover while the piston remains held in place. Align the concave of the cover with the air passage in the carburetor body and secure the cover with at least two screws before releasing the vacuum piston.



Install the screws with the clamps and tighten them.

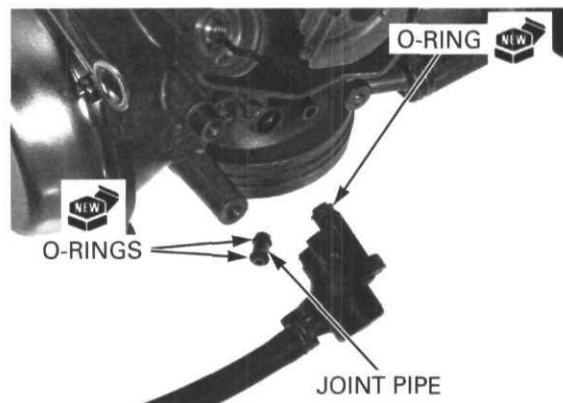


Install a new O-ring into the air joint groove. Set the set plate into the air joint groove. Install the air joint into the carburetor body while aligning the set plate groove with the lug of the carburetor body, and tighten the screw.



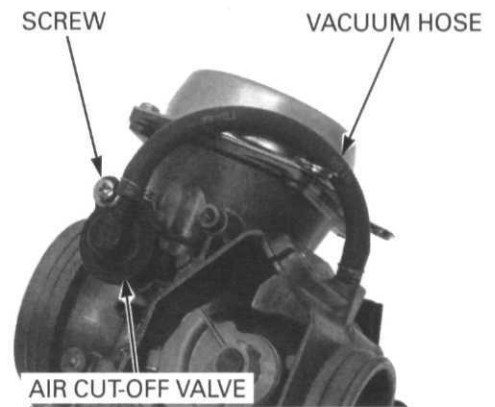
**AIR CUT-OFF VALVE**

Install new O-rings onto the air cut-off valve and joint pipe. Install the joint pipe into the air cut-off valve with the stepped side facing the air cut-off valve.

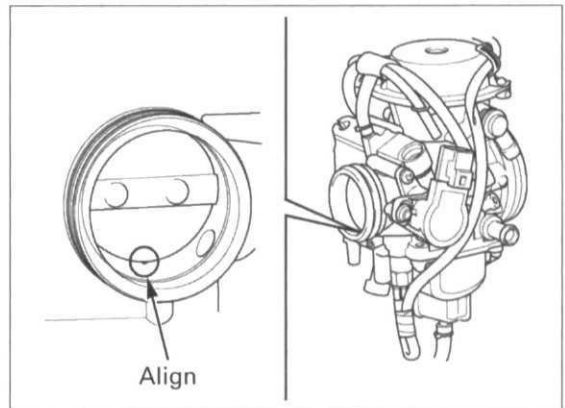


## FUEL SYSTEM

Install the air cut-off valve and secure it with the screw.  
Connect the vacuum hose to the vacuum joint pipe.

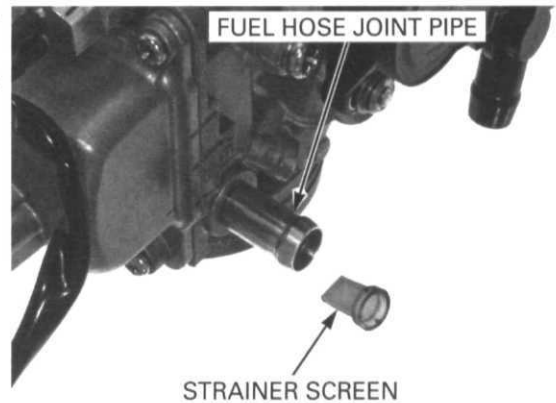


Turn the throttle stop screw to align the butterfly throttle valve with the edge of the outside by-pass hole in the carburetor body, if the throttle stop screw was removed.

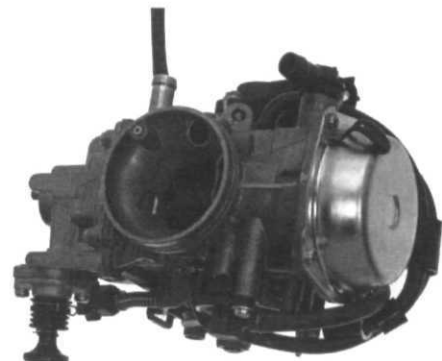


Clean the strainer screen thoroughly with compressed air.

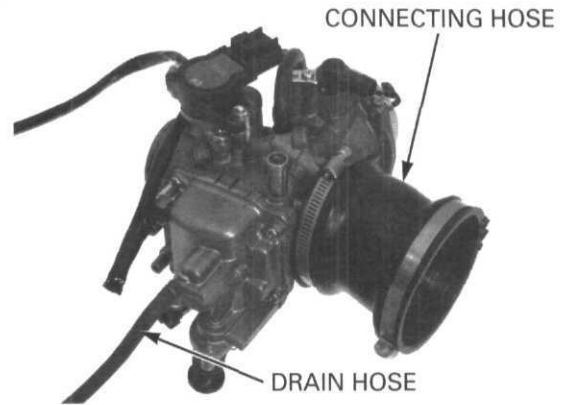
Install the strainer screen into the fuel hose joint pipe.



Install the air vent hoses as shown.

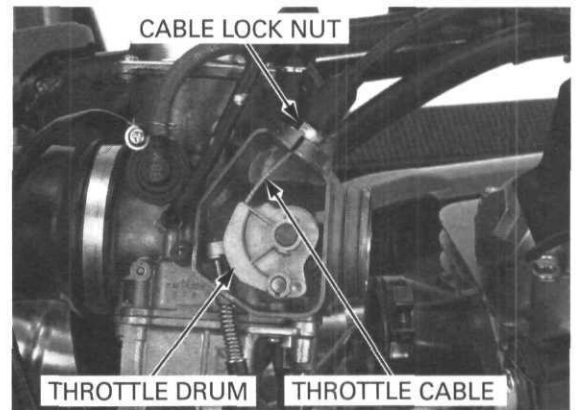


Install the carburetor drain hose and air cleaner connecting hose.

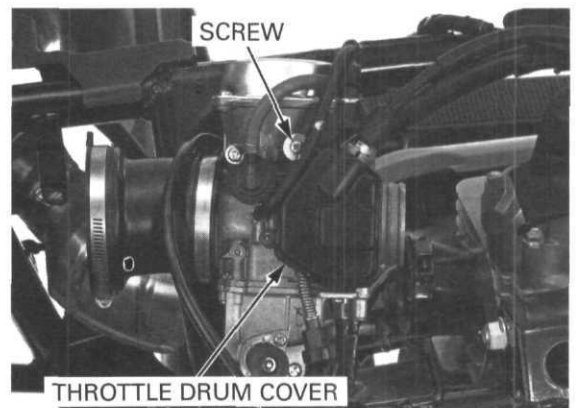


## CARBURETOR INSTALLATION

Connect the throttle cable to the throttle drum. Install the throttle cable adjuster into the carburetor body and temporarily tighten the lock nut.

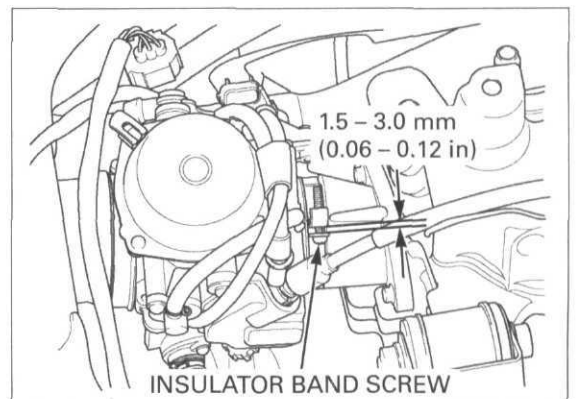


Install the throttle drum cover onto the carburetor and tighten the screw.



Install the carburetor into the insulator and tighten the insulator band screw as shown.

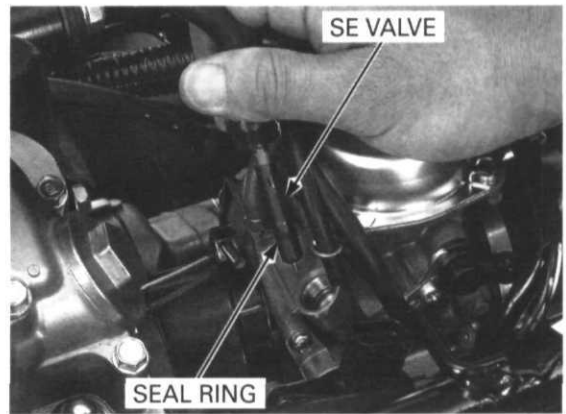
**TORQUE: 4 N·m (0.4 kgf·m, 2.9 lbf·ft)**





## FUEL SYSTEM

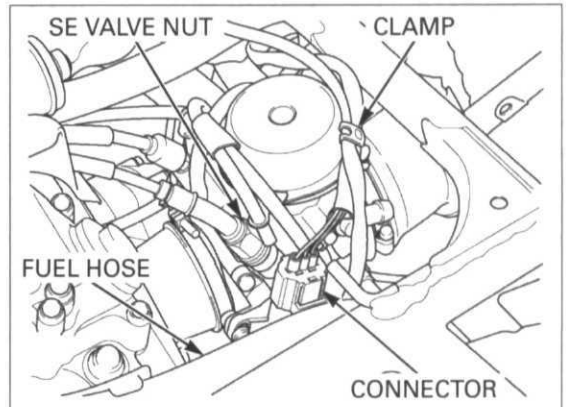
Check the starting enrichment (SE) valve face for scores, scratches or wear.  
Check the SE valve seat at the tip of the valve for stepped wear.  
Check the seal ring for deterioration, wear or damage.  
Replace the SE valve set if necessary.



Install the SE valve into the carburetor and tighten the SE valve nut.

**TORQUE: 2.3 N·m (0.23 kgf·m, 1.7 lbf·ft)**

Connect the fuel hose to the carburetor.  
Clamp the carburetor heater and throttle position sensor wires as shown.  
Connect the throttle position sensor connector.

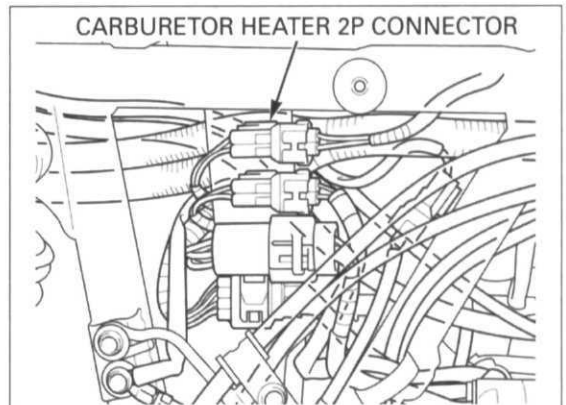


Connect the carburetor heater 2P connector and install it onto the frame stay.

Install the air cleaner housing (page 6-5).

Perform the following inspections and adjustments:  
– engine idle speed (page 4-13)  
– throttle operation (page 4-5)

Adjust the pilot screw if it was replaced (page 6-19).



## PILOT SCREW ADJUSTMENT

### IDLE DROP PROCEDURE

#### NOTE:

- The pilot screw is factory pre-set and no adjustment is necessary unless the pilot screw is replaced.
- Use a tachometer with graduations of 50 rpm ( $\text{min}^{-1}$ ) or smaller that will accurately indicate a 50 rpm ( $\text{min}^{-1}$ ) change.

Remove the recoil starter cover (page 3-4).

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

1. Turn the pilot screw clockwise until it seats lightly, then back it out to the specification given. This is an initial setting prior to the final pilot screw adjustment.

#### TOOL:

**Pilot screw wrench, D type**    **07KMA-MN90101 or 07KMA-MN9A100 (U.S.A. only)**

#### INITIAL OPENING: 1-1/4 turns out

2. Warm up the engine to operating temperature. Stop and go riding for 10 minutes is sufficient.
3. Stop the engine and connect a tachometer according to the tachometer manufacturer's instructions.
4. Start the engine and adjust the idle speed with the throttle stop screw.

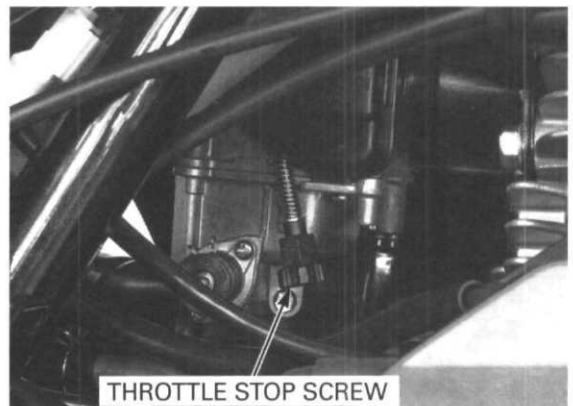
#### IDLE SPEED: 1,400 $\pm$ 100 rpm ( $\text{min}^{-1}$ )

5. Turn the pilot screw in or out slowly to obtain the highest engine speed.
6. Readjust the idle speed with the throttle stop screw.
7. Turn the pilot screw in gradually until the engine speed drops by 100 rpm ( $\text{min}^{-1}$ ).
8. Turn the pilot screw out to the final opening from the position obtained in step 7.

#### FINAL OPENING: 5/8 turns out

9. Readjust the idle speed with the throttle stop screw.

Install the recoil starter cover (page 3-4).



# HIGH ALTITUDE ADJUSTMENT

At high altitude, the standard carburetor air-fuel mixture will be too rich. Performance will decrease, and fuel consumption will increase. A very rich mixture will also foul the spark plug and cause hard starting. Operation at an altitude that differs from that at which this engine was certified, for extended periods of time, may increase emissions.

High altitude performance can be improved by specific modifications to the carburetor. If your customer always operates the ATV at altitudes above 6,500 feet (2,000 meters), you should perform this carburetor modification.

Even with carburetor modification, engine horsepower will decrease about 3.5% for each 1,000-foot (300-meter) increase in altitude. The effect of altitude on horsepower will be greater than this if no carburetor modification is made.

This engine, when operated at high altitude with the carburetor modifications for high altitude use, will meet each emission standard throughout its useful life.

The high altitude carburetor adjustment is performed as follows:

Remove the carburetor (page 6-6) and the float chamber.

Replace the standard main jet with the high altitude type.

### HIGH ALTITUDE MAIN JET: #158

Check that the O-ring on the float chamber is in good condition, replace it if necessary. Install the float chamber and carburetor.

Screw in the pilot screw the specified number of turns from the factory preset position using the special tool.

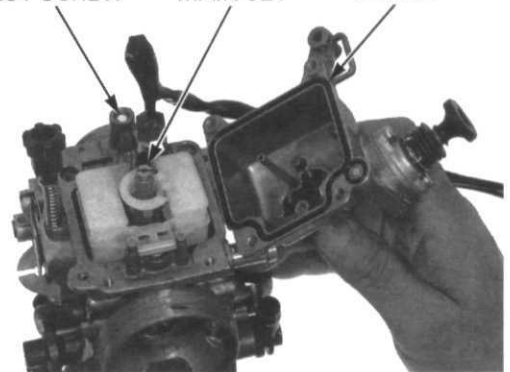
### HIGH ALTITUDE PILOT SCREW OPENING:

**3/8 turn in from the factory preset position**

### TOOL:

Pilot screw wrench, D type  
07KMA-MN90101 or  
07KMA-MN9A100  
(U.S.A. only)

PILOT SCREW      MAIN JET      O-RING



Start the engine and warm it up.  
Adjust the idle speed at high altitude with the throttle stop screw to ensure proper high altitude operation.

**IDLE SPEED:  $1,400 \pm 100$  rpm ( $\text{min}^{-1}$ )**

### NOTICE

*When the carburetor has been modified for high altitude operation, the air-fuel mixture will be too lean for low altitude use. Operation at altitudes below 5,000 feet (1,500 m) with a modified carburetor may cause the engine to overheat, resulting in serious engine damage and increased exhaust emissions.*

*For use at low altitudes, you should return the carburetor to original factory specifications.*

Replace the main jet with the standard main jet, and screw out the pilot screw the specified number of turns from the high altitude setting.

**STANDARD MAIN JET: #162**

**LOW ALTITUDE PILOT SCREW OPENING:**

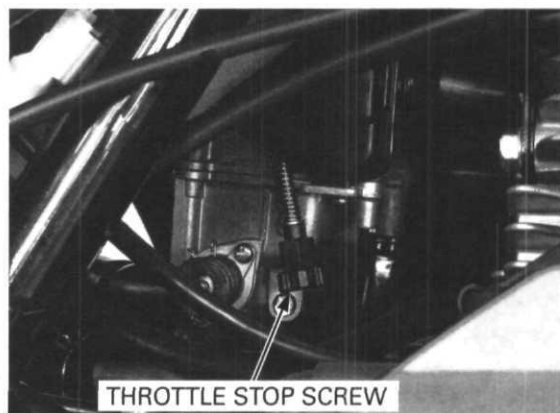
**$3/8$  turn out from the high altitude setting**

**TOOL:**

**Pilot screw wrench, D type    07KMA-MN90101 or  
07KMA-MN9A100  
(U.S.A. only)**

Warm up the engine and adjust the idle speed at low altitude with the throttle stop screw.

**IDLE SPEED:  $1,400 \pm 100$  rpm ( $\text{min}^{-1}$ )**



### FUEL TANK

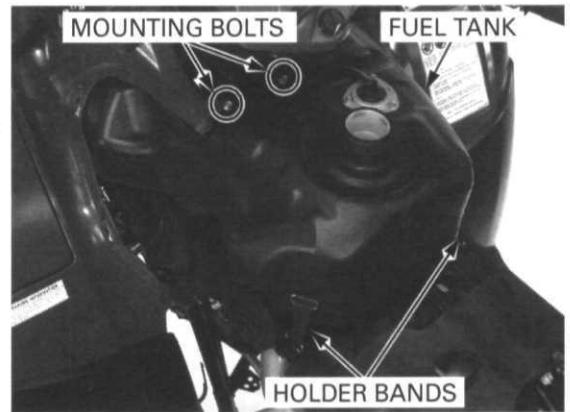
#### REMOVAL/INSTALLATION

Remove the following:

- fuel tank cover (page 3-5)
- air intake duct (page 6-5)

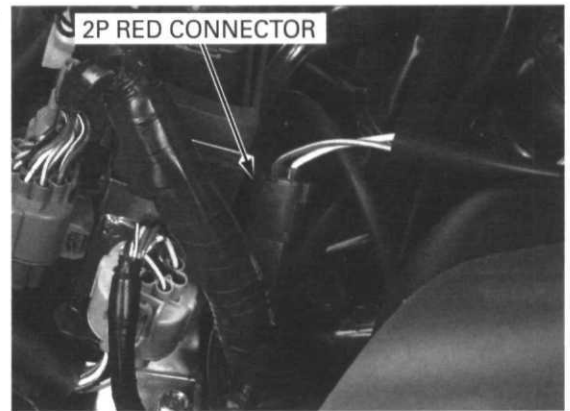
FM/FE models: Remove the fuel level sensor wire from the clamps.

Remove the two holder bands and mounting bolts. Raise the fuel tank and disconnect the fuel hose.



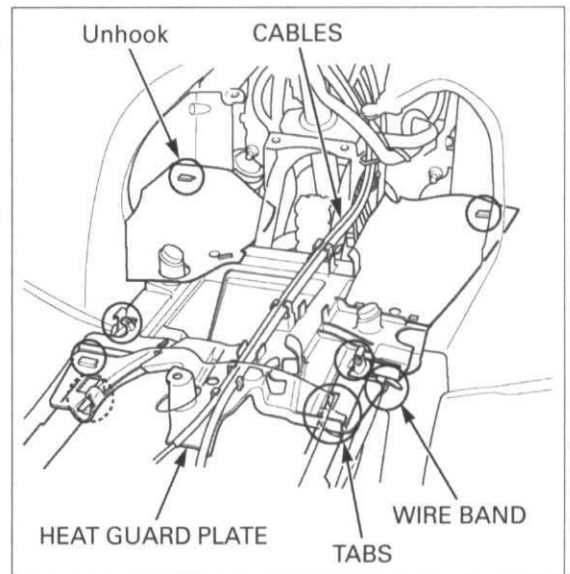
FM/FE models: Slide the fuel tank rearward and disconnect the fuel level sensor 2P red connector.

Remove the fuel tank from the frame.



Unhook the seal rubber from the heat guard plate. Remove the fuel hose, throttle cable and choke cable from the heat guard plate. Remove the main wire harness, breather hoses and cables from the wire band on the heat guard plate. Remove the heat guard plate by releasing tabs from the frame.

Install the heat guard plate and fuel tank in the reverse order of removal.



# 7. ENGINE REMOVAL/INSTALLATION

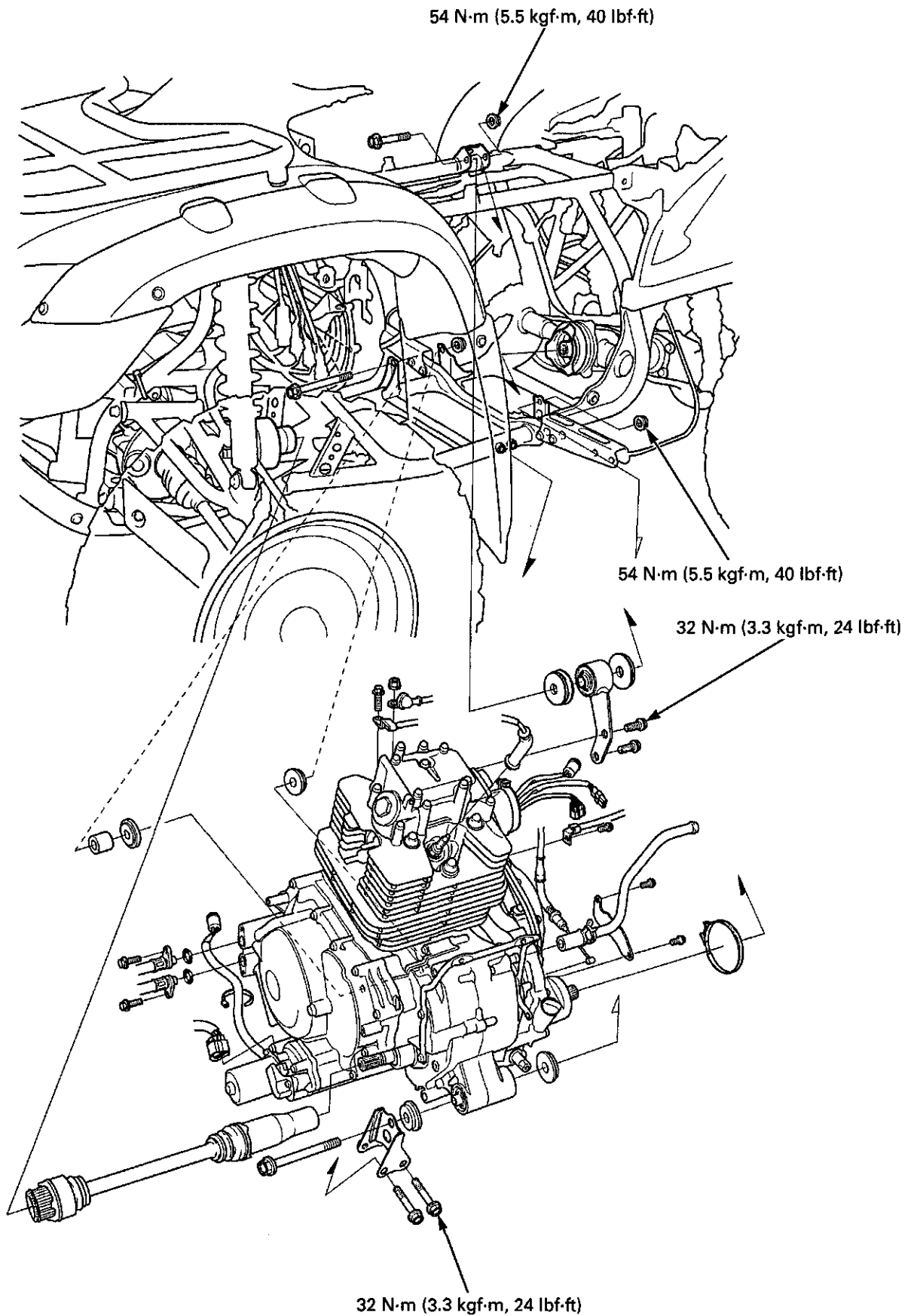
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SYSTEM COMPONENTS .....	7-2	ENGINE REMOVAL .....	7-4
SERVICE INFORMATION .....	7-3	ENGINE INSTALLATION .....	7-8

# ENGINE REMOVAL/INSTALLATION

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## SYSTEM COMPONENTS



**SERVICE INFORMATION**

**GENERAL**

- When removing and installing the engine, tape the frame around the engine beforehand for frame protection.
- The following components require engine removal for service:
  - alternator and starter clutch (page 11-7)
  - transmission (page 12-11)
  - crankshaft and balancer (page 12-20)

**SPECIFICATIONS**

ITEM		SPECIFICATIONS
Engine dry weight	TM model	55.2 kg (121.7 lbs)
	FM model	55.5 kg (122.4 lbs)
	FE model	57.7 kg (127.2 lbs)
Engine oil capacity	After draining	2.4 liters (2.5 US qt, 2.1 Imp qt)
	After draining/filter change	2.5 liters (2.6 US qt, 2.2 Imp qt)
	After disassembly	3.0 liters (3.2 US qt, 2.6 Imp qt)

**TORQUE VALUES**

Lower engine hanger nut (left and right)	54 N·m (5.5 kgf·m, 40 lbf·ft)
Left lower engine hanger bracket bolt	32 N·m (3.3 kgf·m, 24 lbf·ft)
Upper engine hanger nut (frame side)	54 N·m (5.5 kgf·m, 40 lbf·ft)
Upper engine hanger bolt (engine side)	32 N·m (3.3 kgf·m, 24 lbf·ft)
Gearshift pedal pinch bolt (TM/FM only)	16 N·m (1.6 kgf·m, 12 lbf·ft)
10 mm differential mounting bolt	44 N·m (4.5 kgf·m, 32 lbf·ft)
10 mm differential mounting nut	44 N·m (4.5 kgf·m, 32 lbf·ft)
8 mm differential mounting nut	22 N·m (2.2 kgf·m, 16 lbf·ft)



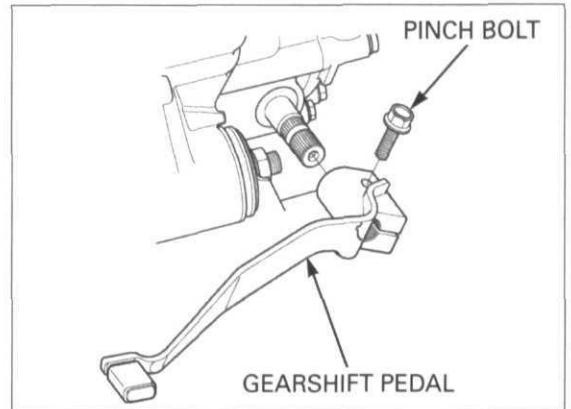
## ENGINE REMOVAL/INSTALLATION

### ENGINE REMOVAL

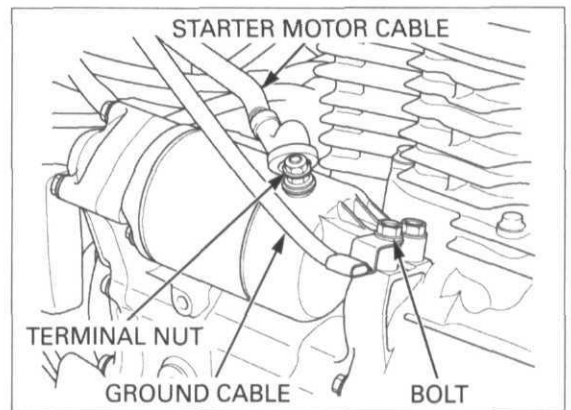
Drain the engine oil (page 4-13).

Remove the following:

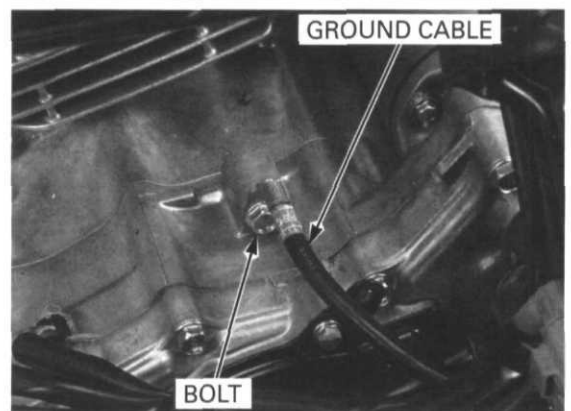
- left and right center mud guards (page 3-6)
- left and right front mud guards (page 3-7)
- left and right inner fenders (page 3-7)
- exhaust system (page 3-13)
- carburetor assembly (page 6-6)
- heat guard plate (page 6-22)
- TM/FM model only: pinch bolt and gearshift pedal



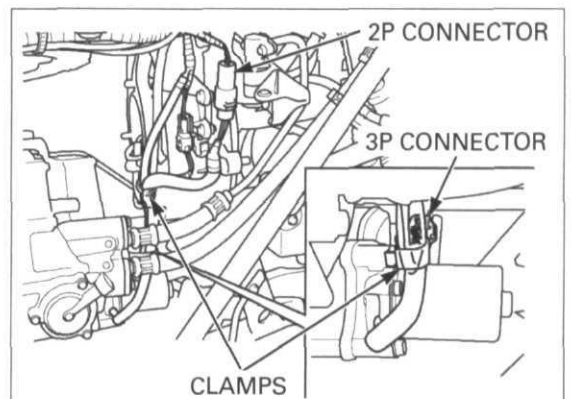
Remove the bolt and battery ground cable.  
Remove the rubber cap, terminal nut and starter motor cable.



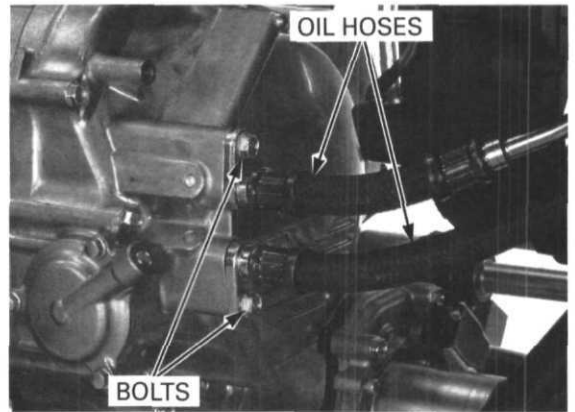
Remove the bolt and frame-to-engine ground cable.



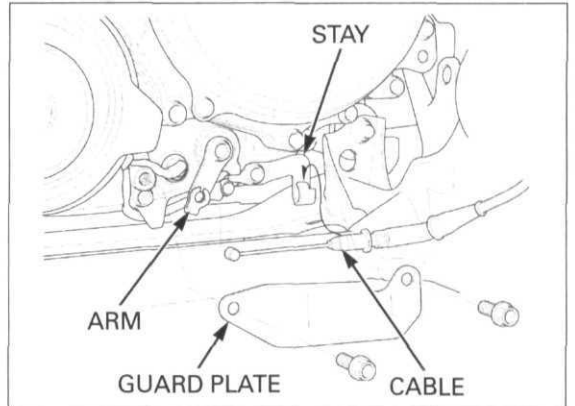
*FE model only:* Remove the wires from the clamps, and disconnect the ESP control motor 2P connector and angle sensor 3P connector.



Remove the bolts, oil cooler hose joints and O-rings.

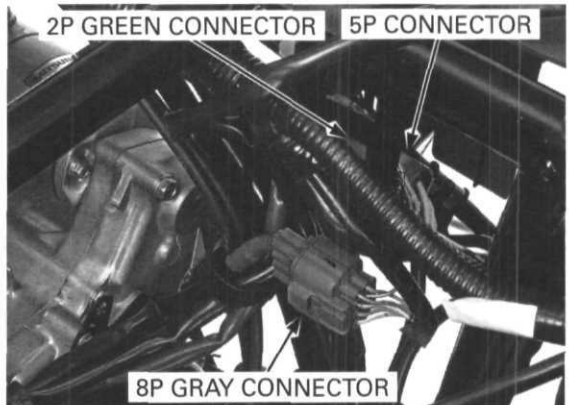


Remove the two bolts and guard plate. Remove the reverse selector cable from the stay and disconnect it from the selector arm.

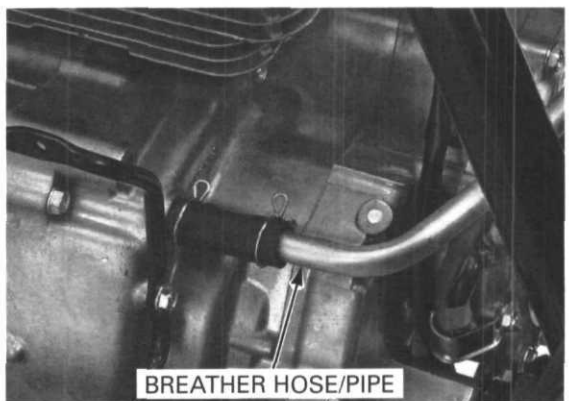


Disconnect the following:

- TM/FM model: oil temperature sensor connector
- FM model: oil temperature sensor/reverse switch 2P green connector
- alternator 5P connector
- gear position switch 8P gray connector

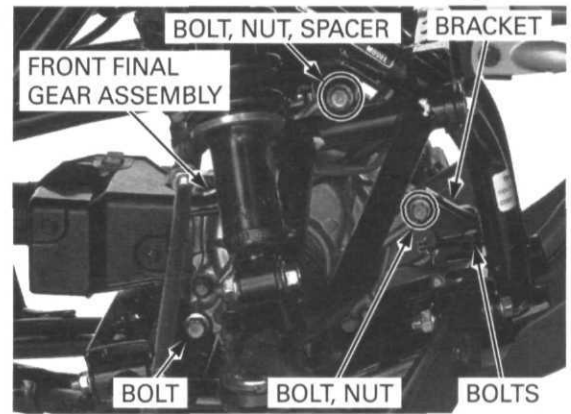


- crankcase breather hose/pipe

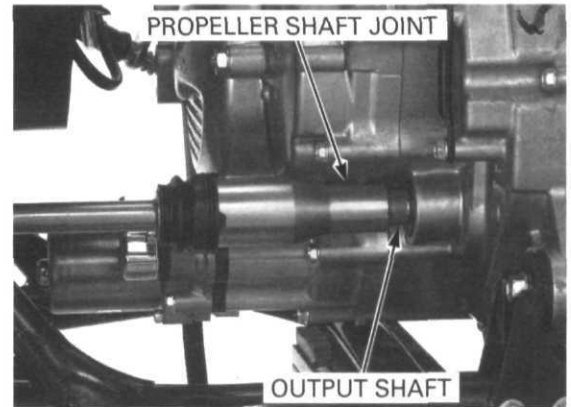


## ENGINE REMOVAL/INSTALLATION

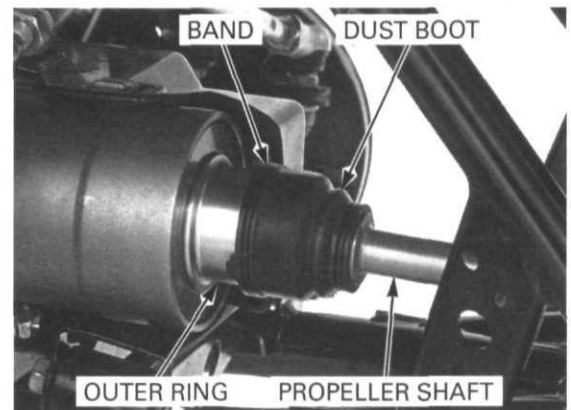
*FM/ME models only:* Remove the front final gear mounting bolts, nuts, spacer and bracket.  
Move the front final gear assembly forward.



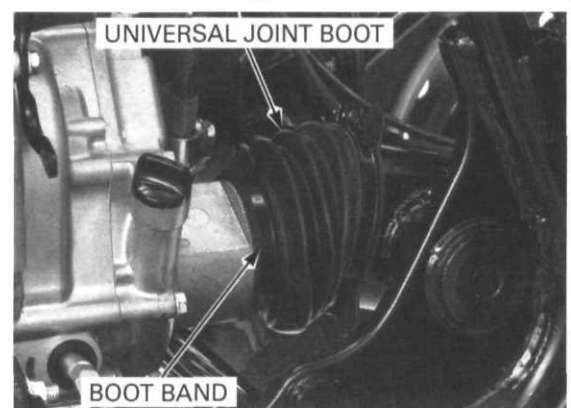
*FM/ME models only:* Pull the propeller shaft joint out of the output shaft.



*FM/ME models only:* Remove the boot band and pull the dust boot off the outer ring of the front final clutch.  
Pull the propeller shaft out of the outer ring.

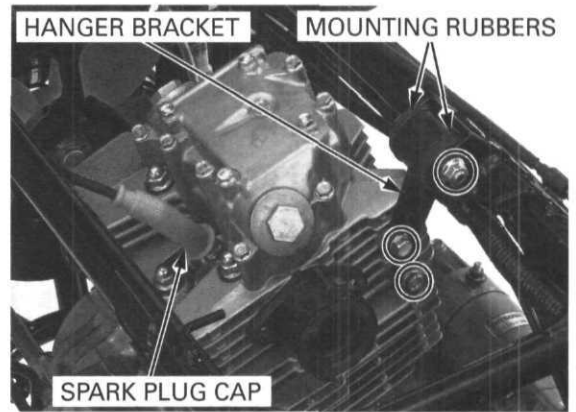


Remove the universal joint boot band screw and band.  
Remove the boot from the engine.



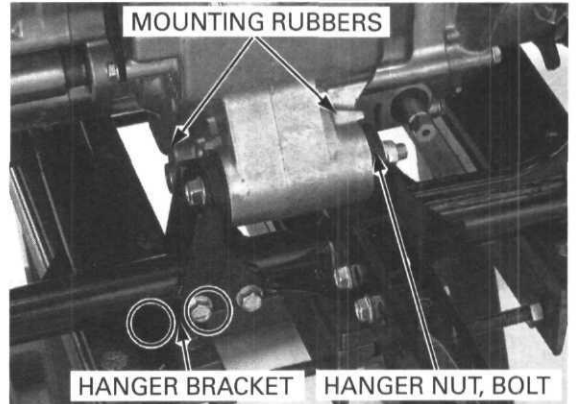
Remove the spark plug cap from the plug.

Remove the upper engine hanger nut, bolts, bracket and mounting rubbers.



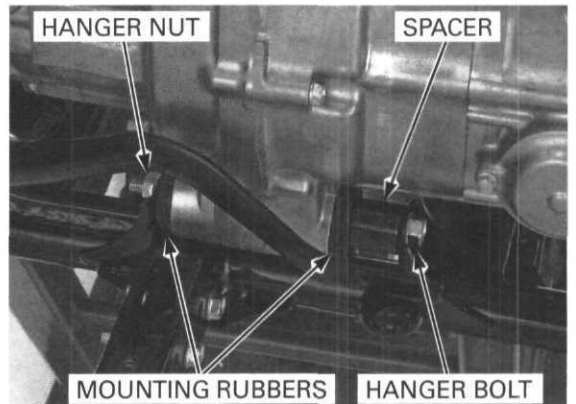
Remove the following:

- left lower engine hanger nut and bolt
- mounting rubbers
- bolts and lower engine hanger bracket

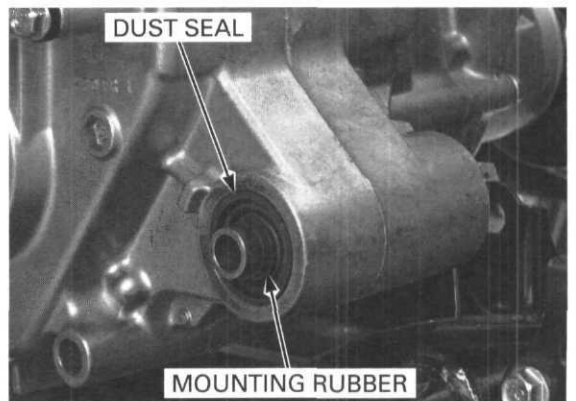


- right lower engine hanger nut and bolt
- spacer and mounting rubbers

Move the engine forward and disconnect the output shaft from the universal joint.  
Remove the engine out of the frame from the left side.

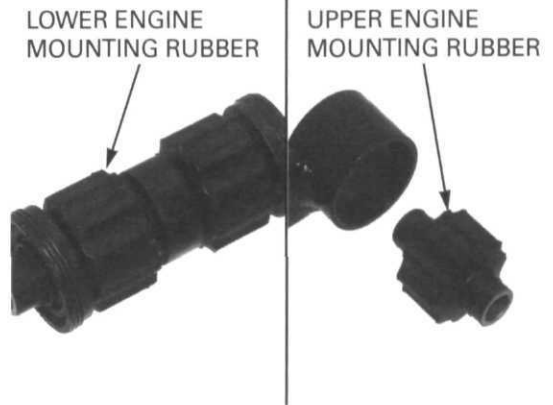


Remove the engine mounting rubbers and dust seals.



## ENGINE REMOVAL/INSTALLATION

Check the mounting rubbers for deterioration, wear or damage.



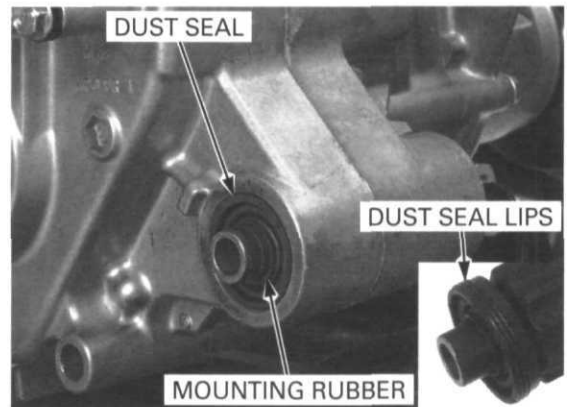
## ENGINE INSTALLATION

NOTE:

- Route the wires, cables and hoses properly (page 1-22).

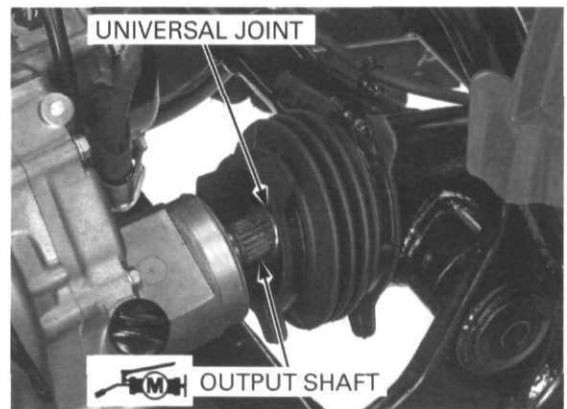
Install the lower engine mounting rubbers into the engine lower mounts.

Install the dust seals with the lip side facing out.



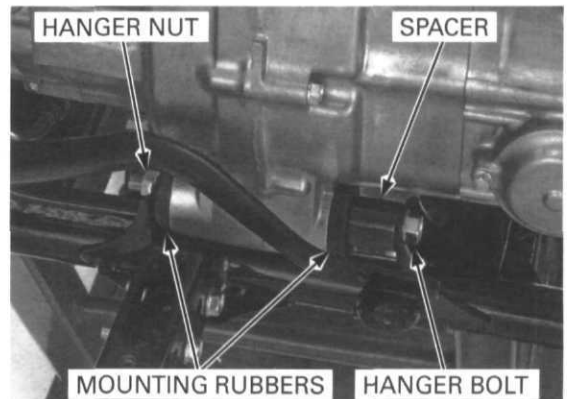
Apply molybdenum disulfide grease to the output shaft splines.

Install the engine in the frame from the left side.  
Engage the output shaft with the universal joint.

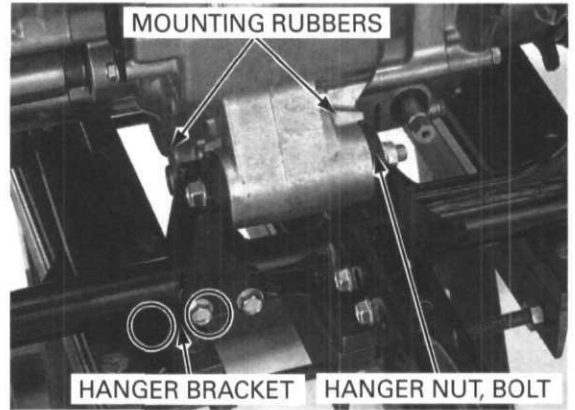


Install the mounting rubbers on the right lower engine mounting rubber with the large I.D. side facing in.

Install the spacer, right lower engine hanger bolt and nut.



Install the mounting rubbers on the left lower engine mounting rubber with the large I.D. side facing in.  
Install the hanger bracket, bolts, left lower engine hanger bolt and nut.



Install the mounting rubbers onto the upper engine hanger bracket with the large I.D. side facing in.  
Install the upper engine hanger bracket, bolts and nut.

Tighten the engine hanger nuts and bolts as follows:

1. left and right lower engine hanger nut

**TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)**

2. left lower engine hanger bracket bolts

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

3. engine side upper engine hanger bolts

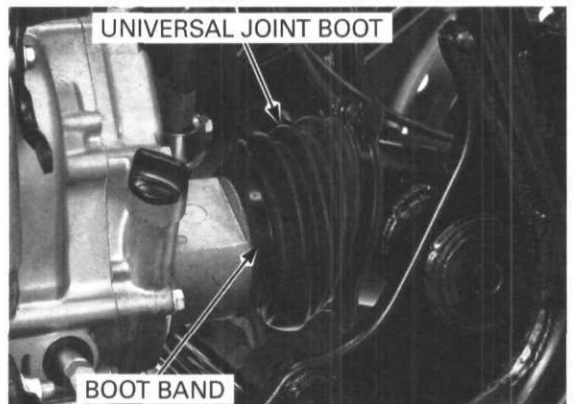
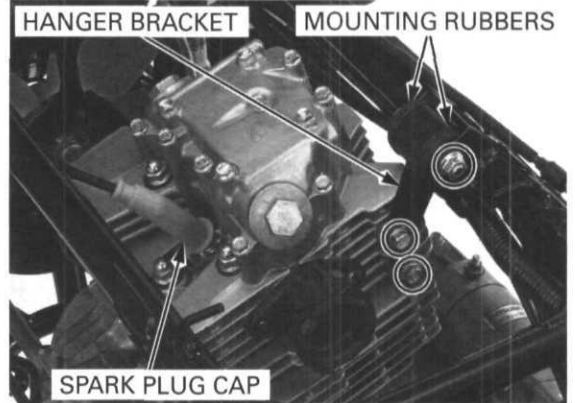
**TORQUE: 32 N·m (3.3 kgf·m, 24 lbf·ft)**

4. frame side upper engine hanger nut

**TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)**

Install the spark plug cap onto the plug.

Install the universal joint boot onto the engine.  
Install the boot band and screw, and tighten the screw securely.

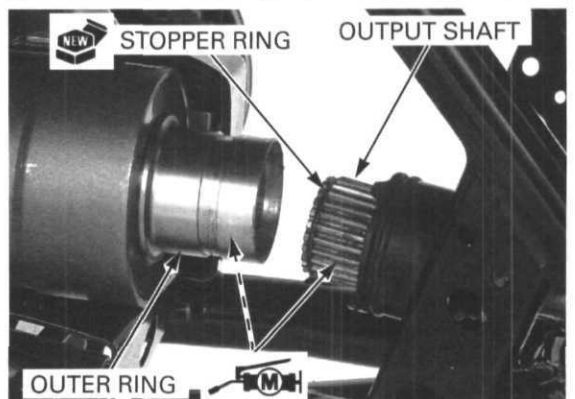


*FM/ME models only:* Install a new stopper ring into the propeller shaft groove.

Apply 5 – 8 g of molybdenum disulfide grease to the outer ring splines of the front final clutch.

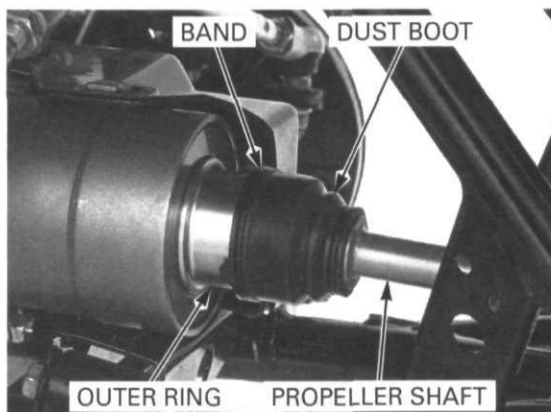
Apply molybdenum disulfide grease to the propeller shaft splines.

Install the propeller shaft into the outer ring by aligning the splines until the stopper ring seats in the groove.

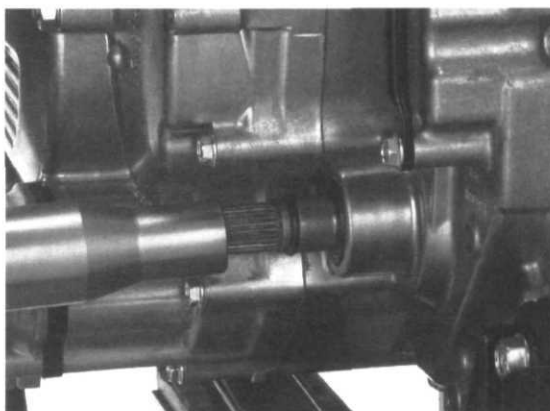


## ENGINE REMOVAL/INSTALLATION

*FM/ME models only:* Install the dust boot onto the outer ring properly and the boot band into the boot groove.



*FM/ME models only:* Install a new O-ring into the output shaft groove. Apply molybdenum disulfide grease to the output shaft splines. Install the propeller shaft joint onto the output shaft by aligning the splines.

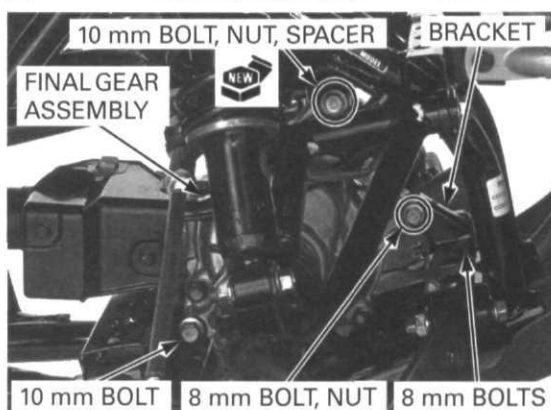


*FM/ME models only:* Move the front final gear assembly rearward. Install the 10 mm bolt into the lower mount. Install the spacer between the left side of the differential and frame, 10 mm bolt and a new nut. Install the bracket, 8 mm bolts and nut. Tighten the 10 mm bolt and nut.

**TORQUE: 44 N·m (4.5 kgf·m, 32 lbf·ft)**

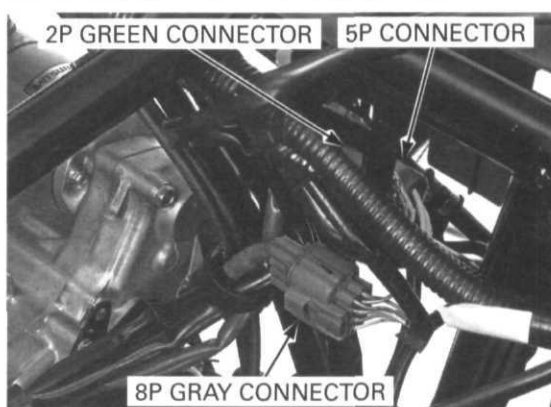
Tighten the 8 mm bolts and nut.

**TORQUE: 22 N·m (2.2 kgf·m, 16 lbf·ft)**



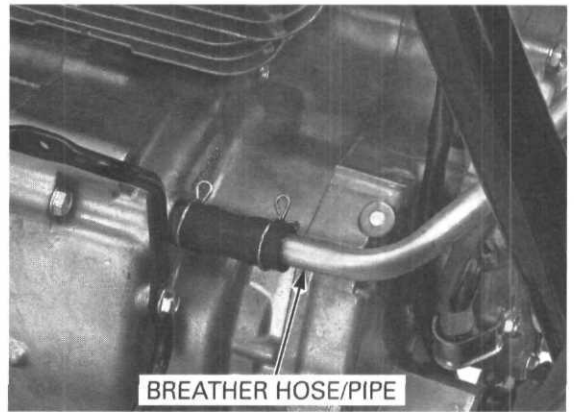
Connect the following:

- TM/FM model: oil temperature sensor connector
- FM model: oil temperature sensor/reverse switch 2P green connector
- alternator 5P connector
- gear position switch 8P gray connector

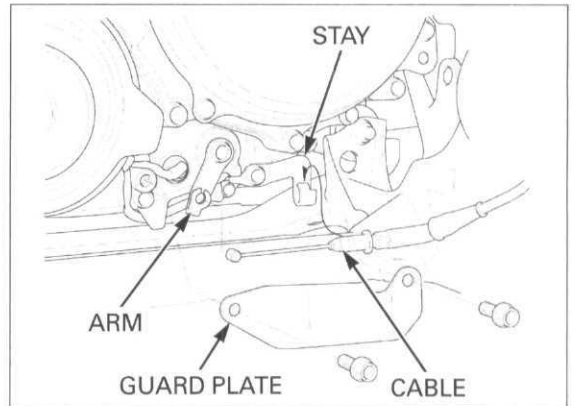




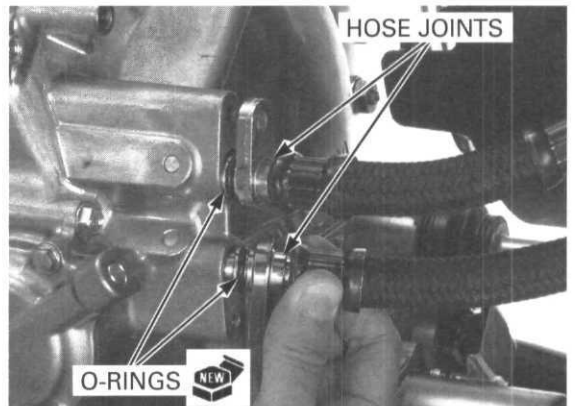
- crankcase breather hose/pipe



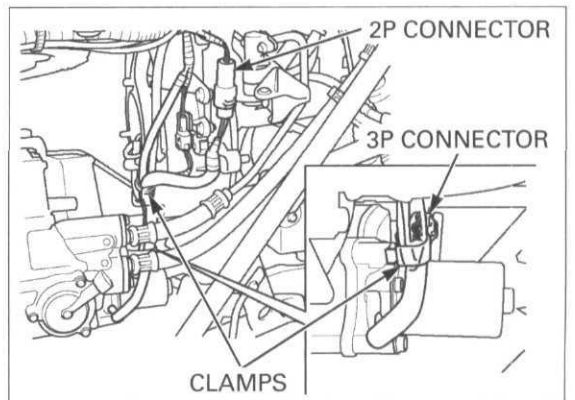
Install the reverse selector cable onto the stay and connect it to the selector arm. Install the guard plate and tighten the two bolts.



Coat new O-rings with engine oil and install them onto the oil cooler hose joints. Install the oil cooler hose joints onto the engine and tighten the bolts securely.



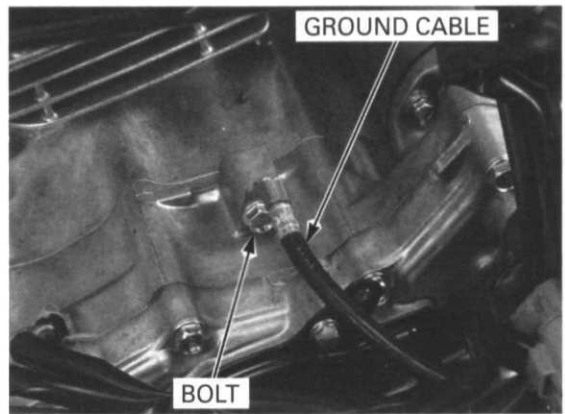
*FE model only:* Connect the ESP control motor 2P connector and angle sensor 3P connector, and install the wire band.



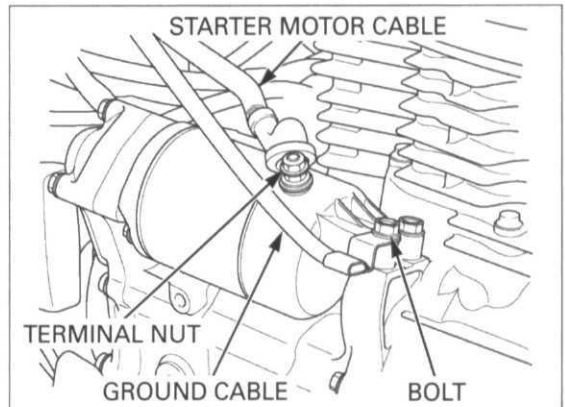


## ENGINE REMOVAL/INSTALLATION

Install frame-to-engine ground cable and tighten the bolt.



Install starter motor cable onto the motor terminal and tighten the terminal nut.  
Install the rubber cap over the terminal properly.  
Install the battery ground cable and tighten the bolt.



FE/FM model only: Install the gearshift pedal so that the lower edge is horizontal, and tighten the pinch bolt.

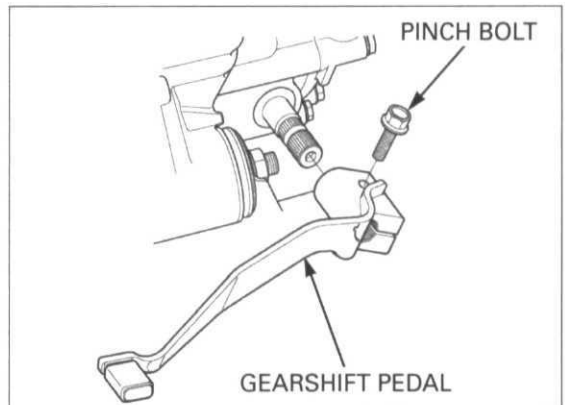
Install the following:

- fuel tank (page 6-22)
- carburetor assembly (page 6-17)
- exhaust system (page 3-13)
- left and right inner fenders (page 3-7)
- left and right front mud guards (page 3-7)
- left and right center mud guards (page 3-6)

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

Perform the following inspections and adjustments:

- throttle operation (page 4-5)
- brake pedal free play (page 4-18)
- reverse selector lever free play (page 4-19)

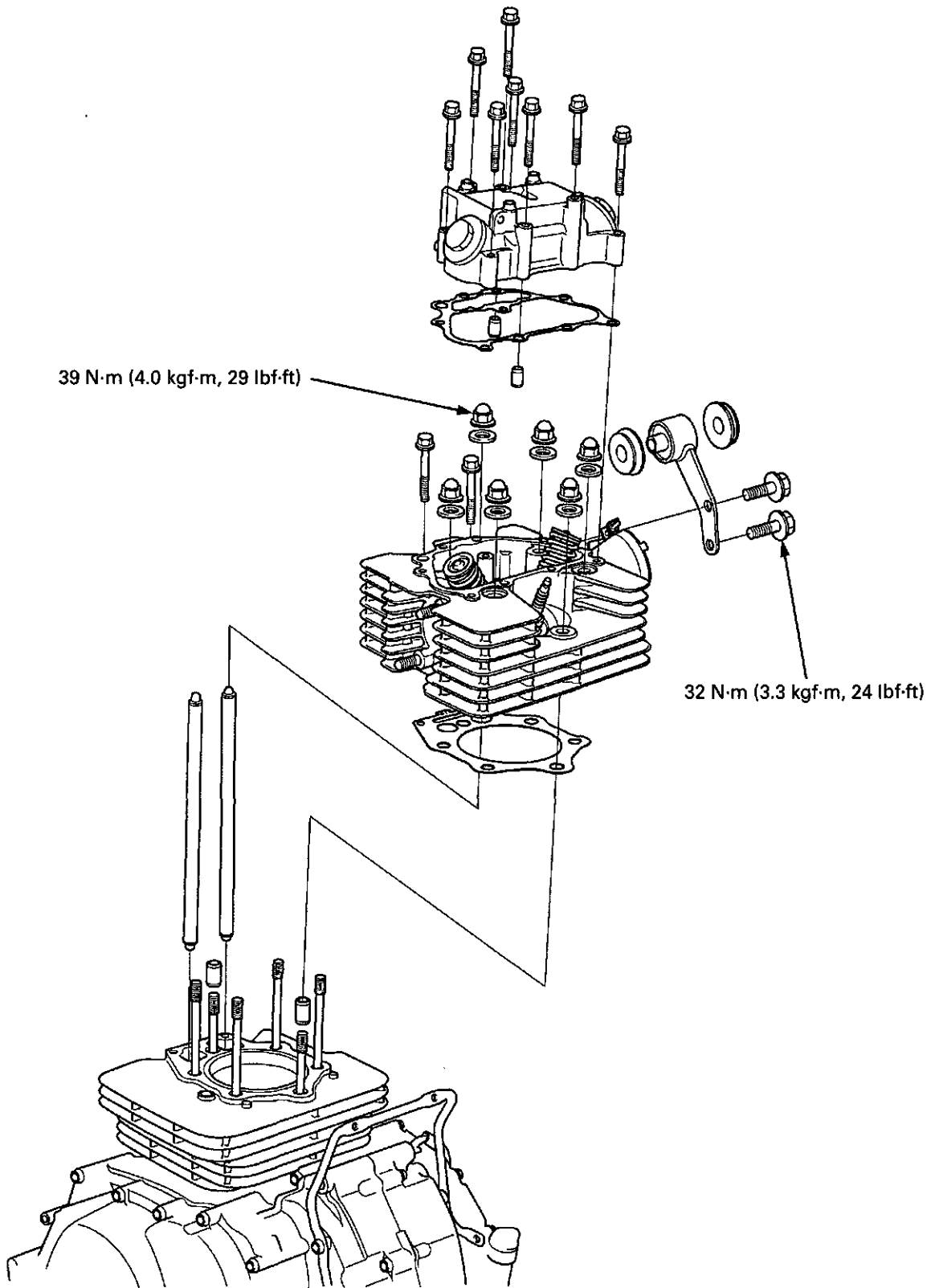


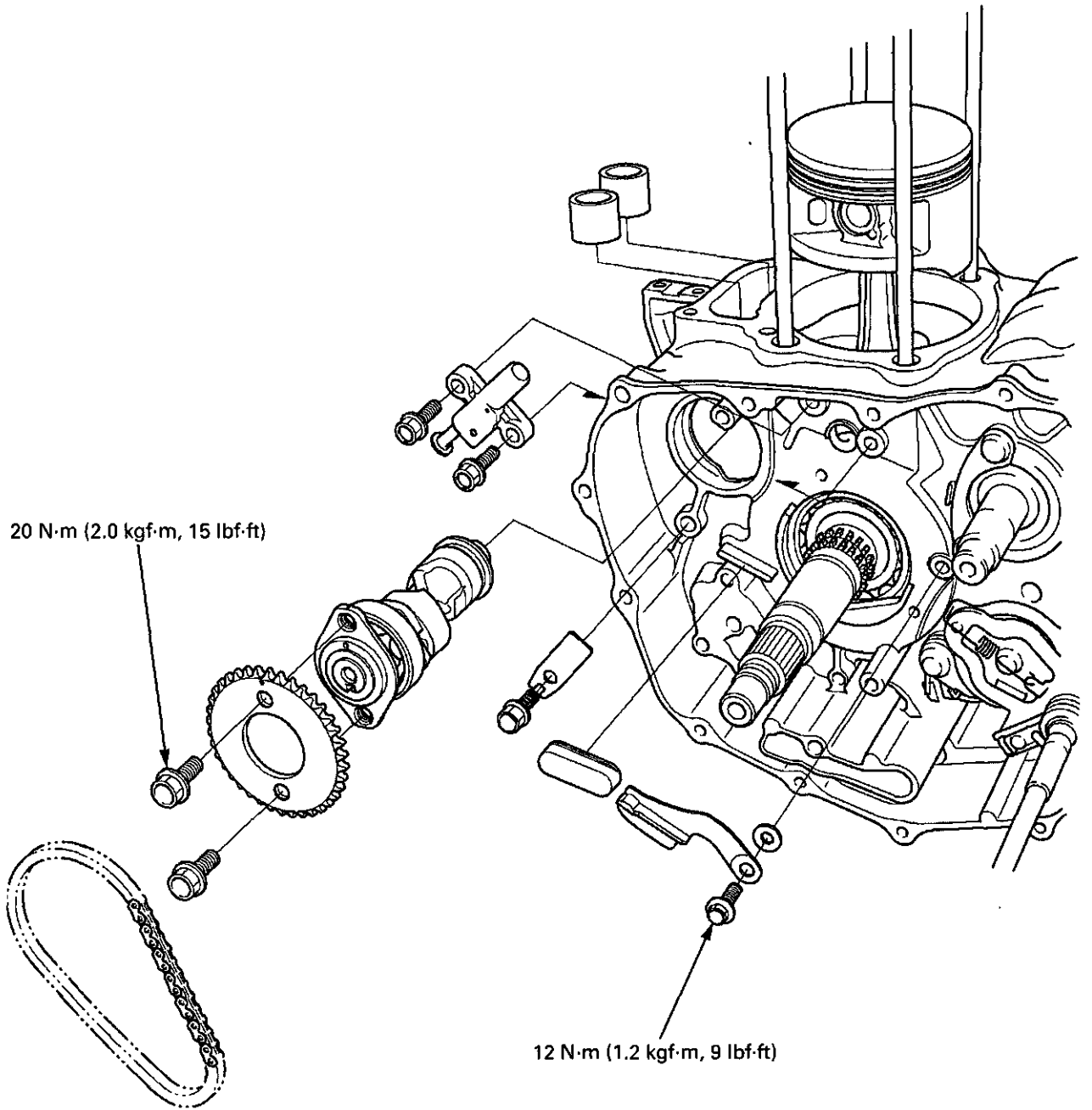
# 8. CYLINDER HEAD/VALVE

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SYSTEM COMPONENTS .....	8-2	VALVE GUIDE REPLACEMENT .....	8-12
SERVICE INFORMATION .....	8-4	VALVE SEAT INSPECTION/REFACING .....	8-13
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CYLINDER COMPRESSION.....	8-7	CYLINDER HEAD INSTALLATION.....	8-18
CYLINDER HEAD COVER REMOVAL/ DISASSEMBLY .....	8-7	CYLINDER HEAD COVER ASSEMBLY/ INSTALLATION.....	8-18
CYLINDER HEAD REMOVAL .....	8-9	CAMSHAFT REMOVAL.....	8-20
CYLINDER HEAD DISASSEMBLY.....	8-10	CAMSHAFT INSTALLATION .....	8-23

**CYLINDER HEAD/VALVE  
SYSTEM COMPONENTS**





## CYLINDER HEAD/VALVE

# SERVICE INFORMATION

### GENERAL

- This section covers service of the rocker arms, cylinder head, valves and camshaft. These services can be done with the engine installed in the frame.
- When disassembling, mark and store the disassembled parts to ensure that they are reinstalled in their original locations.
- Clean all disassembled parts with cleaning solvent and dry them by blowing them off with compressed air before inspection.
- Rocker arm and valve lubricating oil is fed through oil passages in the cylinder head and head cover. Clean the oil passages before assembling cylinder head.
- Be careful not to damage the mating surfaces when removing the cylinder head cover and cylinder head. Do not strike the cylinder head too hard during removal.

### SPECIFICATIONS

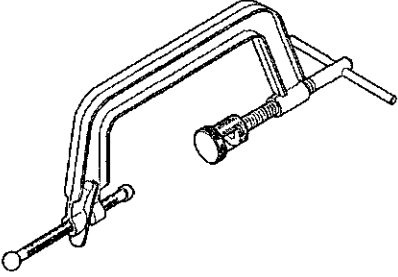
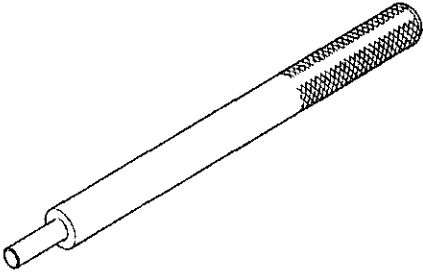
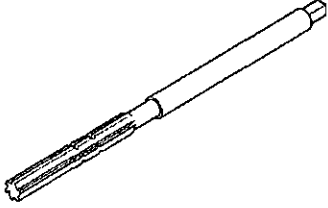
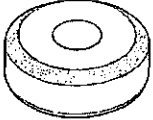
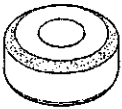
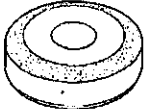
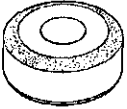
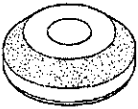

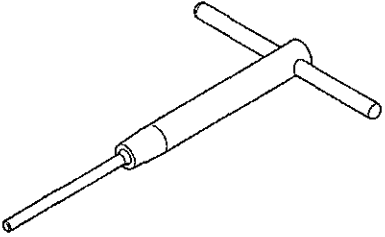
Unit: mm (in)

ITEM		STANDARD		SERVICE LIMIT
Cylinder compression at 380 rpm (min <sup>-1</sup> )		440 kPa (4.5 kgf/cm <sup>2</sup> , 64 psi)		-
Valve clearance		IN/EX	0.15 (0.006)	-
Valve, valve guide	Valve stem O.D.	IN	5.975 - 5.990 (0.2352 - 0.2358)	5.95 (0.234)
		EX	5.955 - 5.970 (0.2344 - 0.2350)	5.93 (0.233)
	Valve guide I.D.	IN/EX	6.000 - 6.012 (0.2362 - 0.2366)	6.02 (0.237)
	Stem-to-guide clearance	IN	0.010 - 0.037 (0.0004 - 0.0015)	0.12 (0.005)
		EX	0.030 - 0.057 (0.0012 - 0.0022)	0.14 (0.006)
	Valve seat width	IN/EX	1.2 (0.05)	1.5 (0.06)
Valve spring	Free length	Inner	42.94 (1.691)	42.08 (1.657)
		Outer	43.63 (1.718)	42.76 (1.683)
Rocker arm	Arm I.D.	IN/EX	12.000 - 12.018 (0.4724 - 0.4731)	12.05 (0.474)
	Shaft O.D.	IN/EX	11.964 - 11.984 (0.4710 - 0.4718)	11.92 (0.469)
	Arm-to-shaft clearance	IN/EX	0.016 - 0.054 (0.0006 - 0.0021)	0.08 (0.003)
Camshaft and cam follower	Cam lobe height	IN	35.8315 - 35.9915 (1.41069 - 1.41699)	35.60 (1.402)
		EX	35.5512 - 35.7112 (1.39965 - 1.40595)	35.38 (1.393)
	Cam follower O.D.	IN/EX	22.467 - 22.482 (0.8845 - 0.8851)	22.46 (0.884)
	Follower bore I.D.	IN/EX	22.510 - 22.526 (0.8862 - 0.8868)	22.54 (0.887)
	Follower-to-bore clearance	IN/EX	0.028 - 0.059 (0.0011 - 0.0023)	0.07 (0.003)
Cylinder head warpage		-		0.10 (0.004)

### TORQUE VALUES

Cylinder head cap nut	39 N·m (4.0 kgf·m, 29 lbf·ft)	Apply engine oil to the threads and seating surface.
Spark plug	22 N·m (2.2 kgf·m, 16 lbf·ft)	
Upper engine hanger nut (frame side)	54 N·m (5.5 kgf·m, 40 lbf·ft)	
Upper engine hanger bolt (engine side)	32 N·m (3.3 kgf·m, 24 lbf·ft)	
Cam sprocket bolt	20 N·m (2.0 kgf·m, 15 lbf·ft)	Apply locking agent to the threads.
Cam chain tensioner pivot bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	Apply locking agent to the threads.

**TOOLS**

<p>Valve spring compressor 07757-0010000</p> 	<p>Valve guide driver, 6.0 mm 07942-6570100</p> 	<p>Valve guide reamer, 6.012 mm 07VMH-MBB0200</p> 
<p>Valve seat cutter, 40 mm (IN 45°) 07780-0010500</p>  <p>or equivalent commercially available in U.S.A.</p>	<p>Valve seat cutter, 33 mm (EX 45°) 07780-0010800</p>  <p>or equivalent commercially available in U.S.A.</p>	<p>Flat cutter, 38.5 mm (IN 32°) 07780-0012400</p>  <p>or equivalent commercially available in U.S.A.</p>
<p>Flat cutter, 33 mm (EX 32°) 07780-0012900</p>  <p>or equivalent commercially available in U.S.A.</p>	<p>Interior cutter, 37.5 mm (IN 60°) 07780-0014100</p>  <p>or equivalent commercially available in U.S.A.</p>	<p>Interior cutter, 34 mm (EX 60°) 07780-0014700</p>  <p>or equivalent commercially available in U.S.A.</p>
<p>Cutter holder, 6.0 mm 07VMH-MBB0100</p>  <p>or equivalent commercially available in U.S.A.</p>		

### TROUBLESHOOTING

- Engine top-end problems usually affect engine performance. These problems 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 a white smoke in the crankcase breather hose. If the hose is smoky, check for seized piston ring (page 9-2).

#### **Compression too low, hard starting or poor performance at low speed**

- Valves
  - Incorrect valve adjustment
  - Burned or bent valves
  - Incorrect valve timing
  - Broken valve spring
  - Uneven valve seating
  - Valve stuck open
- Cylinder head
  - Leaking or damaged cylinder head gasket
  - Warped or cracked cylinder head
  - Loose spark plug
- Cylinder/piston problem (page 9-3)

#### **Compression too high**

- Excessive carbon build-up on piston head or combustion chamber
- Worn or damaged decompressor system

#### **Excessive smoke**

- Worn valve stem or valve guide
- Damaged stem seal
- Cylinder/piston problem (page 9-3)

#### **Excessive noise**

- Incorrect valve clearance
- Sticking valve or broken valve spring
- Excessively worn valve seat
- Worn or damaged camshaft
- Worn rocker arm and/or shaft
- Worn rocker arm follower or valve stem end
- Worn or damaged push rod and/or cam follower
- Worn cam chain
- Worn or damaged cam chain tensioner
- Worn cam sprocket teeth
- Cylinder/piston problem (page 9-3)

#### **Rough idle**

- Low cylinder compression

## CYLINDER COMPRESSION

Warm up the engine to normal operating temperature.

Stop the engine and remove the spark plug (page 4-9).

Install the compression gauge into the spark plug hole.

Shift the transmission in neutral and close the choke knob (OFF).

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

*The cylinder compression specification is comparatively low because the camshaft has a decompression device installed.*

### COMPRESSION PRESSURE:

**440 kPa (4.5 kgf/cm<sup>2</sup>, 64 psi) at 380 rpm (min<sup>-1</sup>)**

Check that there is no leakage at the gauge connection.

Low compression can be caused by:

- blown cylinder head gasket
- improper valve adjustment
- valve leakage
- worn piston ring or cylinder

High compression can be caused by:

- carbon deposits in combustion chamber or on piston head



## CYLINDER HEAD COVER REMOVAL/ DISASSEMBLY

### REMOVAL

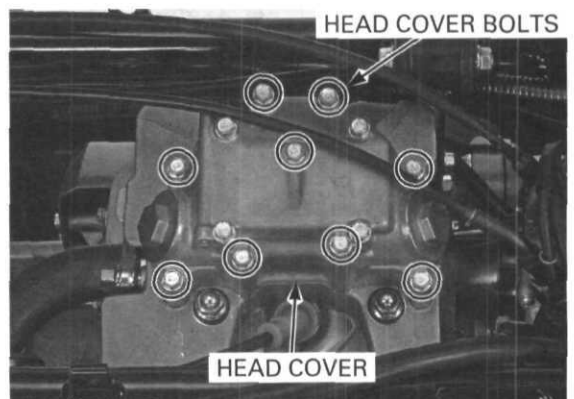
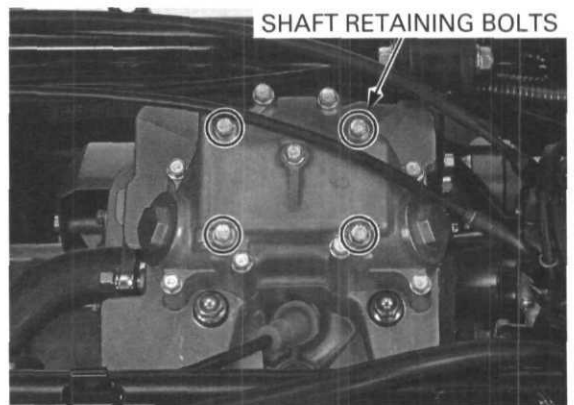
Remove the fuel tank and heat guard plate (page 6-22).

Set the piston position to Top Dead Center on the compression stroke (page 4-10).

If you plan to remove the rocker arms, loosen the rocker arm shaft retaining bolts.

Remove the following:

- nine bolts
- head cover

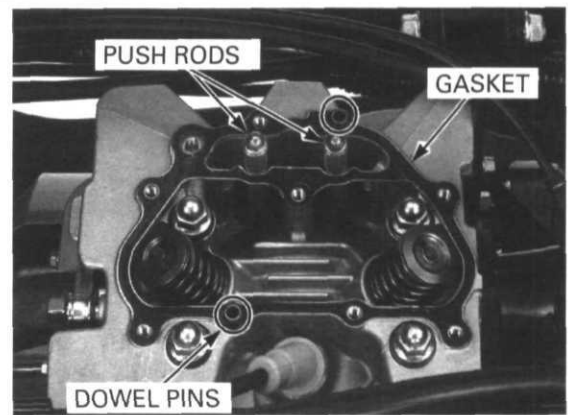




## CYLINDER HEAD/VALVE

Mark the push rods  
so they can be  
placed back in their  
original locations.

- push rods
- gasket
- two dowel pins



### DISASSEMBLY

Remove the four bolts and sealing washers.

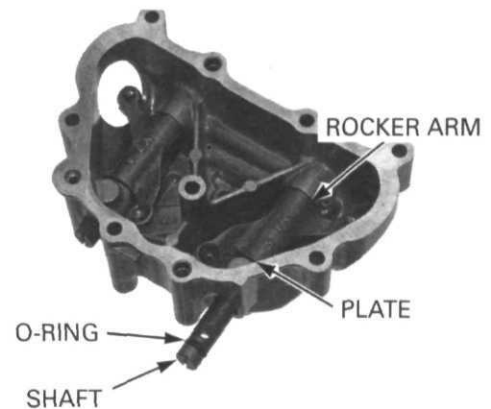
BOLTS AND WASHERS



Push each rocker arm shaft with a small screwdriver through the bolt hole until the O-ring on the shaft is removed out of the head cover.

Remove the following:

- rocker arm shafts
- rocker arms
- setting plates
- O-rings



### INSPECTION

#### ROCKER ARM/SHAFT

Check the rocker arms and shafts for wear or damage.

If the rocker arm follower is worn or damaged, check the push rod and oil passage.

Measure the each rocker arm shaft O.D.

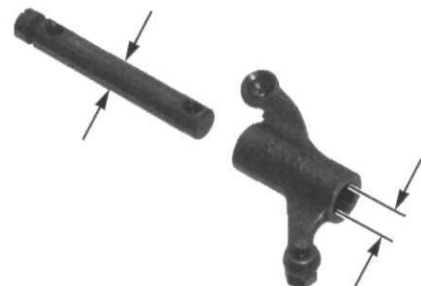
**SERVICE LIMIT: 11.92 mm (0.469 in)**

Measure each rocker arm I.D.

**SERVICE LIMIT: 12.05 mm (0.474 in)**

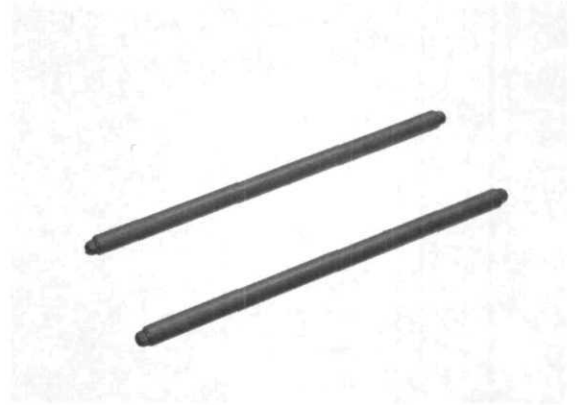
Subtract the rocker arm shaft O.D. from the corresponding rocker arm I.D. to obtain the rocker arm-to-shaft clearance.

**SERVICE LIMIT: 0.08 mm (0.003 in)**



**PUSH ROD**

Check the push rods for wear or damage. If the push rod is worn or damaged, check the cam follower and camshaft (page 8-20).

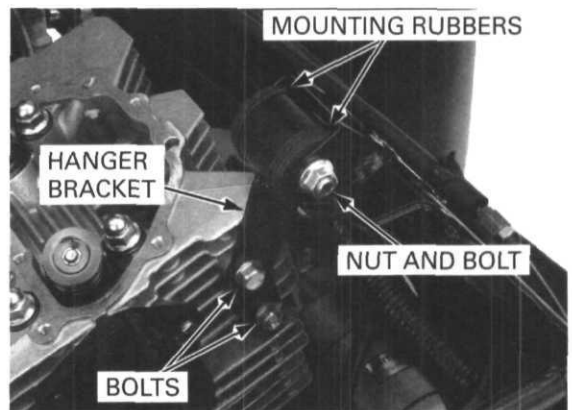


**CYLINDER HEAD REMOVAL**

Remove the following:

- exhaust system (page 3-13)
- carburetor (page 6-6)
- cylinder head cover (page 8-7)
- spark plug

Remove the engine hanger nut and bolts, then remove the hanger bracket and mounting rubbers.



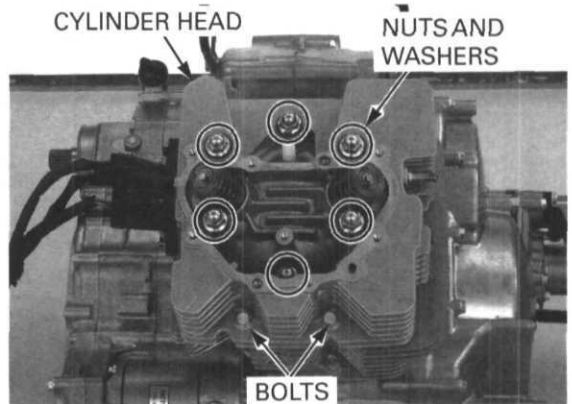
Remove the two bolts.

*Be careful not to let the nuts and washers fall into the cylinder.*

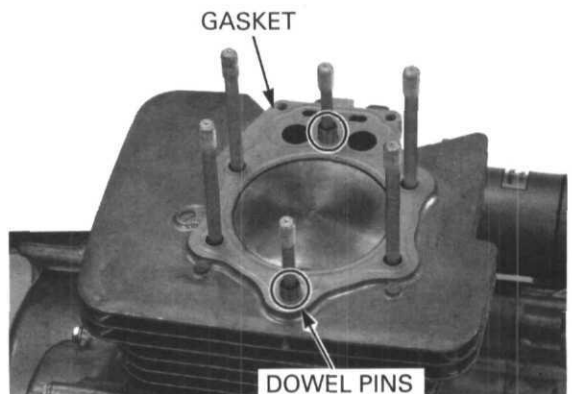
Loosen the six cap nuts in a crisscross pattern in several steps, and remove the nuts and washers.

Remove the cylinder head.

Do not strike the cylinder head too hard and do not damage the mating surface with a screwdriver.



Remove the gasket and the two dowel pins.

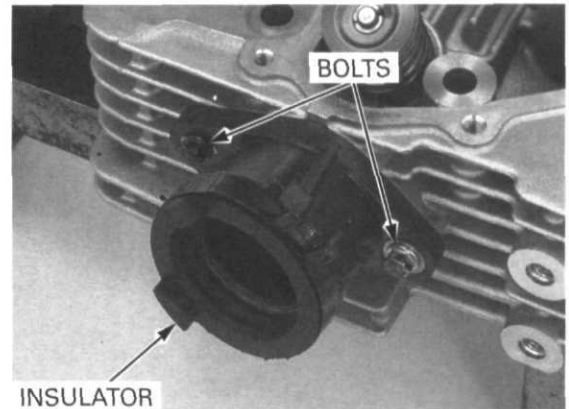


## CYLINDER HEAD/VALVE

### CYLINDER HEAD DISASSEMBLY

Remove the cylinder head (page 8-9).

Remove the two bolts and carburetor insulator.

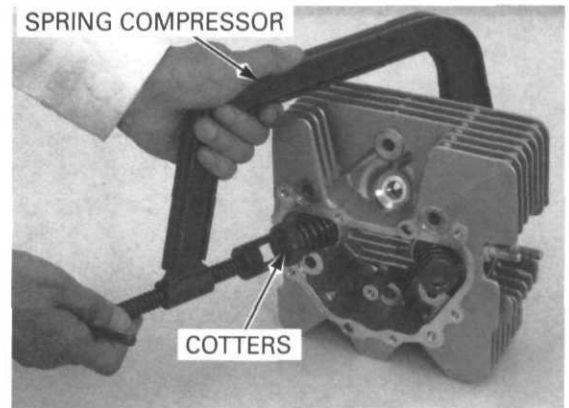


*To prevent loss of tension, do not compress the valve springs more than necessary.*

Remove the valve spring cotters using the valve spring compressor.

**TOOL:**

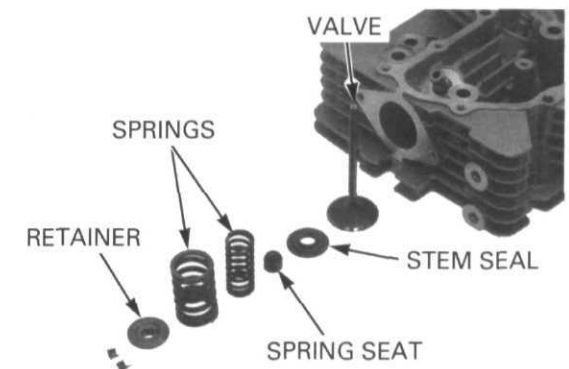
**Valve spring compressor 07757-0010000**



*Mark all the parts so they can be placed back in their original locations.*

Remove the following:

- spring retainer
- outer and inner valve springs
- valve
- stem seal
- spring seat



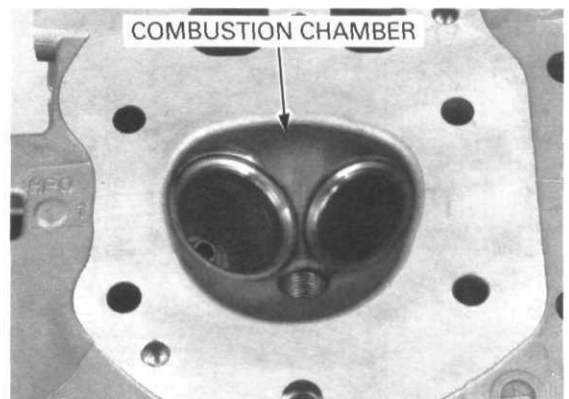
### INSPECTION

#### CYLINDER HEAD

*Be careful not to damage the valve seat and gasket surfaces.*

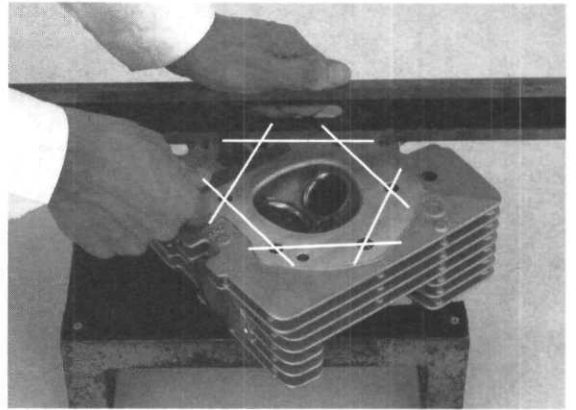
Remove the carbon deposits from the combustion chamber.

Check the spark plug hole and valve areas for cracks.



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

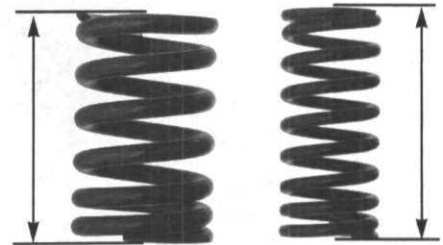
**SERVICE LIMIT: 0.10 mm (0.004 in)**



**VALVE SPRING**

Check the valve springs for fatigue or damage. Measure the valve spring free length.

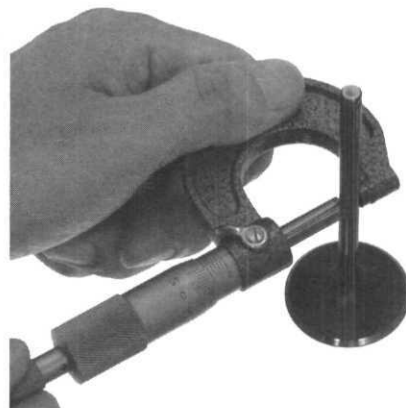
**SERVICE LIMITS: Inner: 42.08 mm (1.657 in)  
Outer: 12.76 mm (1.683 in)**



**VALVE/ VALVE GUIDE**

Check that the valve moves smoothly in the guide. Check the valve for bending, burning or abnormal wear. Measure each valve stem O.D. and record it.

**SERVICE LIMITS: IN: 5.95 mm (0.234 in)  
EX: 5.93 mm (0.233 in)**



Ream the valve guides to remove any carbon build-up before measuring the guide. Insert the reamer from the combustion chamber side of the head and always rotate the reamer clockwise.

**TOOL:**

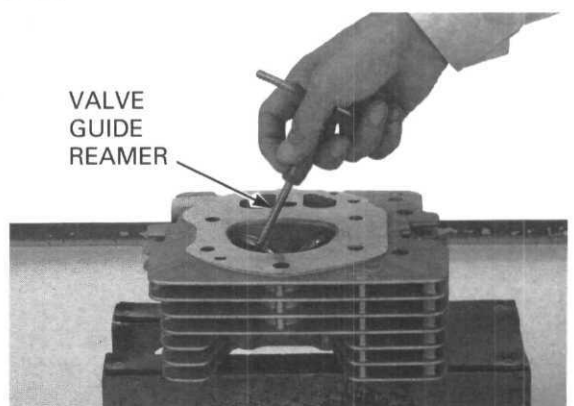
**Valve guide reamer, 6.012 mm 07VMH-MBB0200**

Measure each valve guide I.D. and record it.

**SERVICE LIMIT: IN/EX: 6.02 mm (0.237 in)**

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

**SERVICE LIMITS: IN: 0.12 mm (0.005 in)  
EX: 0.14 mm (0.006 in)**

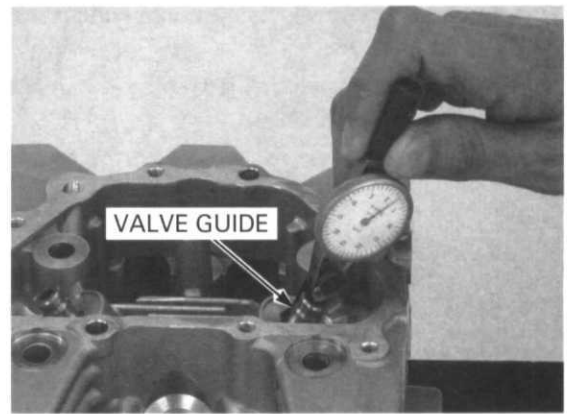


## CYLINDER HEAD/VALVE

*Inspect and reface the valve seats whenever the valve guides are replaced (page 8-13).*

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

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



## VALVE GUIDE REPLACEMENT

Chill the new valve guides in a freezer for about an hour.

*Be sure to wear heavy gloves to avoid burns when handling the heated cylinder head.*

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.

### NOTICE

*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, 6.0 mm 07942-6570100**

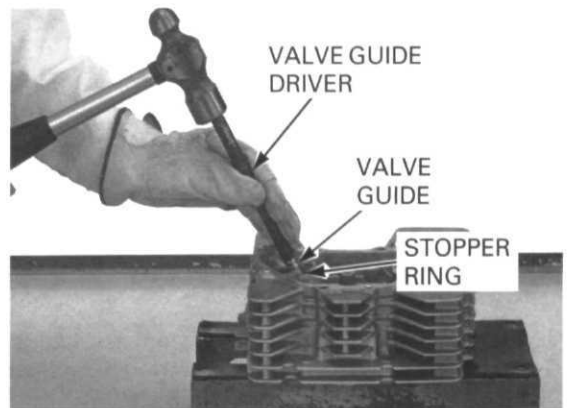
Remove the new valve guides from the freezer. Install the stopper rings into the valve guide grooves.

While the cylinder head is still heated, drive each valve guide in the cylinder head from the rocker arm side until it is fully seated.

#### TOOL:

**Valve guide driver, 6.0 mm 07942-6570100**

Let the cylinder head cool to room temperature.



*Use cutting oil on the reamer during this operation. Take care not to tilt or lean the reamer in the guide while reaming.*

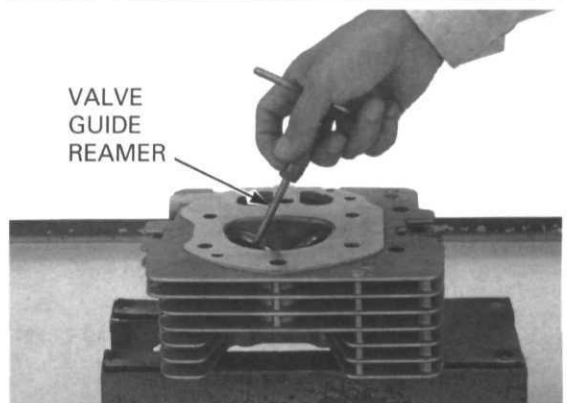
Ream the new valve guides.

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

#### TOOL:

**Valve guide reamer, 6.012 mm 07VMH-MBB0200**

Clean the cylinder head thoroughly to remove any metal particles after reaming and reface the valve seat (page 8-13).



## VALVE SEAT INSPECTION/REFACING

### INSPECTION

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

Apply a light coating of Prussian Blue to each valve seat.

Tap the valve against the valve seat several times without rotating the valve, to check for proper valve seat contact.

*The valve 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.

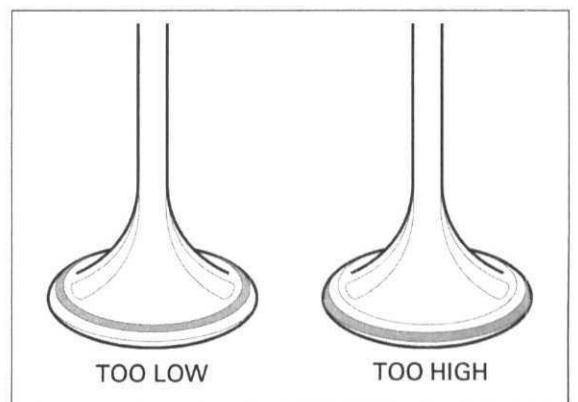
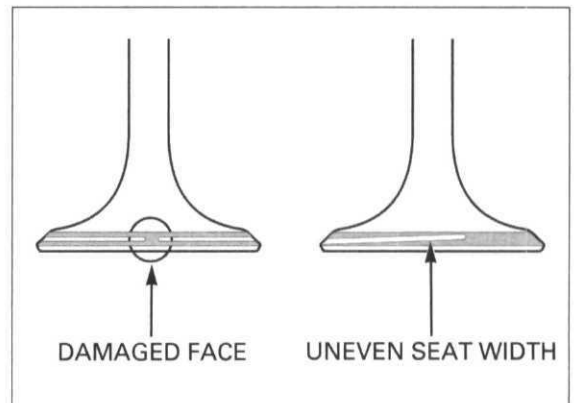
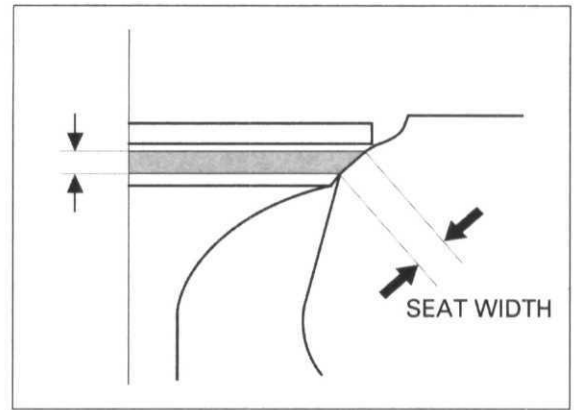
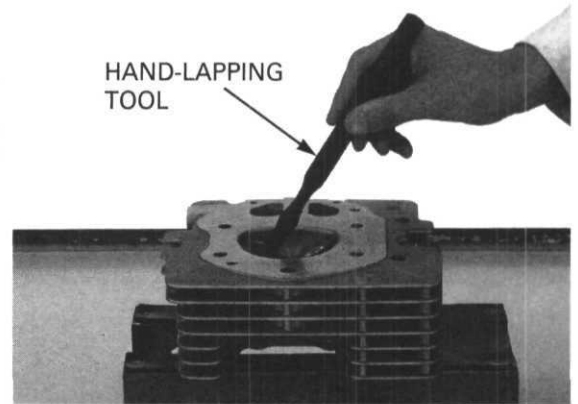
**STANDARD: 1.2 mm (0.05 in)**

**SERVICE LIMIT: 1.5 mm (0.06 in)**

If the seat width is not within specification, reface the valve seat.

Inspect the valve seat face for:

- Damaged face:
  - Replace the valve and reface the valve seat.
- Uneven seat width:
  - Replace the valve and reface the valve seat.
- Contact area (too high or too low)
  - Reface the valve seat.

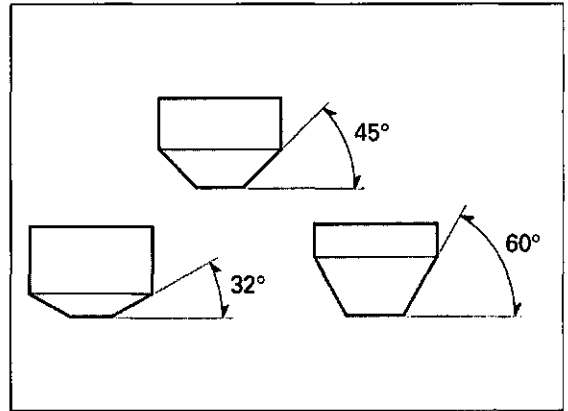


## CYLINDER HEAD/VALVE

### REFACING

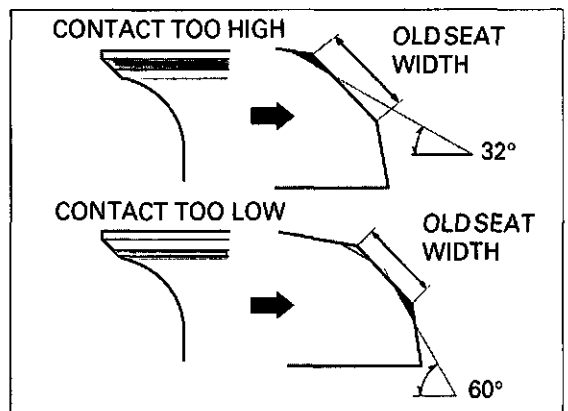
Follow the refacing manufacturer's operating instructions.

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



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

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



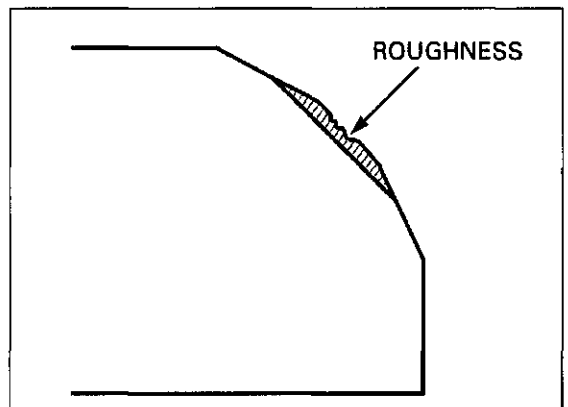
Reface the seat with a 45° cutter whenever a valve guide is replaced.

Using a 45° seat cutter, remove any roughness or irregularities from the seat.

#### TOOLS:

Seat cutter, 40 mm (45° IN)	07780-0010500
Seat cutter, 33 mm (45° EX)	07780-0010800
Cutter holder, 6.0 mm	07VMH-MBB0100

or equivalent commercially available in U.S.A.

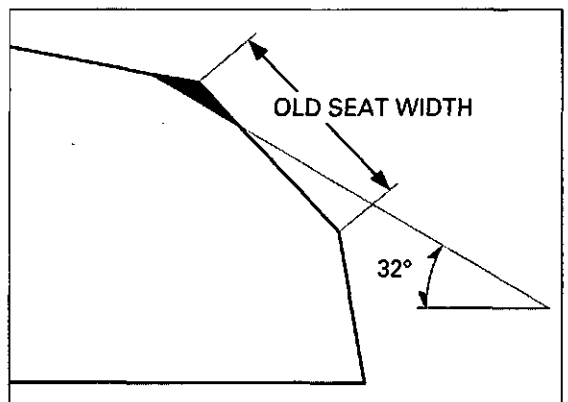


Using a 32° flat cutter, remove 1/4 of the existing valve seat material.

#### TOOLS:

Flat cutter, 38.5 mm (30° IN)	07780-0012400
Seat cutter, 33 mm (30° EX)	07780-0012900
Cutter holder, 6.0 mm	07VMH-MBB0100

or equivalent commercially available in U.S.A.

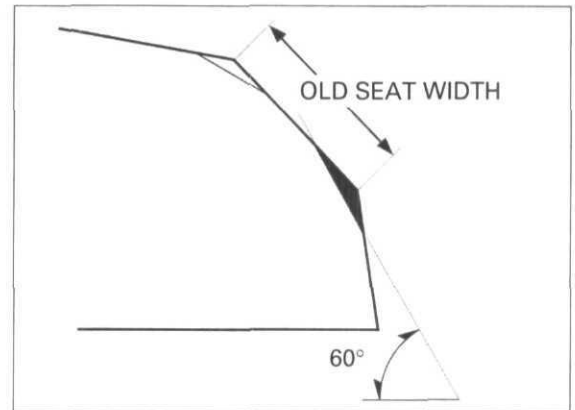


Using a 60° interior cutter, remove 1/4 of the existing valve seat material.

**TOOLS:**

**Interior cutter, 37.5 mm (45° IN) 07780-0014100**  
**Interior cutter, 34 mm (45° EX) 07780-0014700**  
**Cutter holder, 6.0 mm 07VMH-MBB0100**

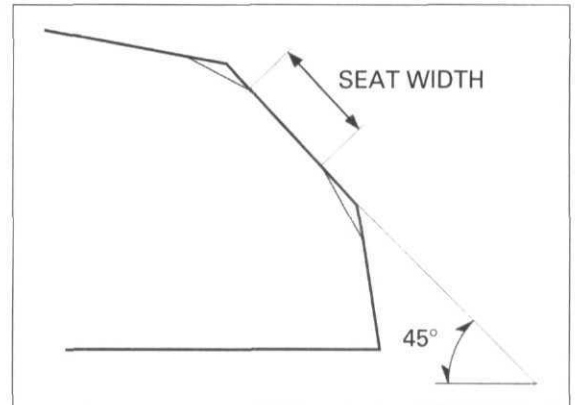
or equivalent commercially available in U.S.A.



Using a 45° seat cutter, cut the seat to the proper width.

**VALVE SEAT WIDTH: 1.2 mm (0.05 in)**

Make sure that all pitting and irregularities are removed.

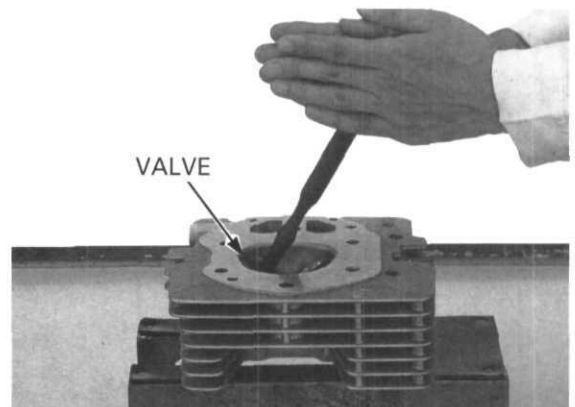


After cutting the seat, apply lapping compound to the valve face, and lap the valve using light pressure.

**NOTE:**

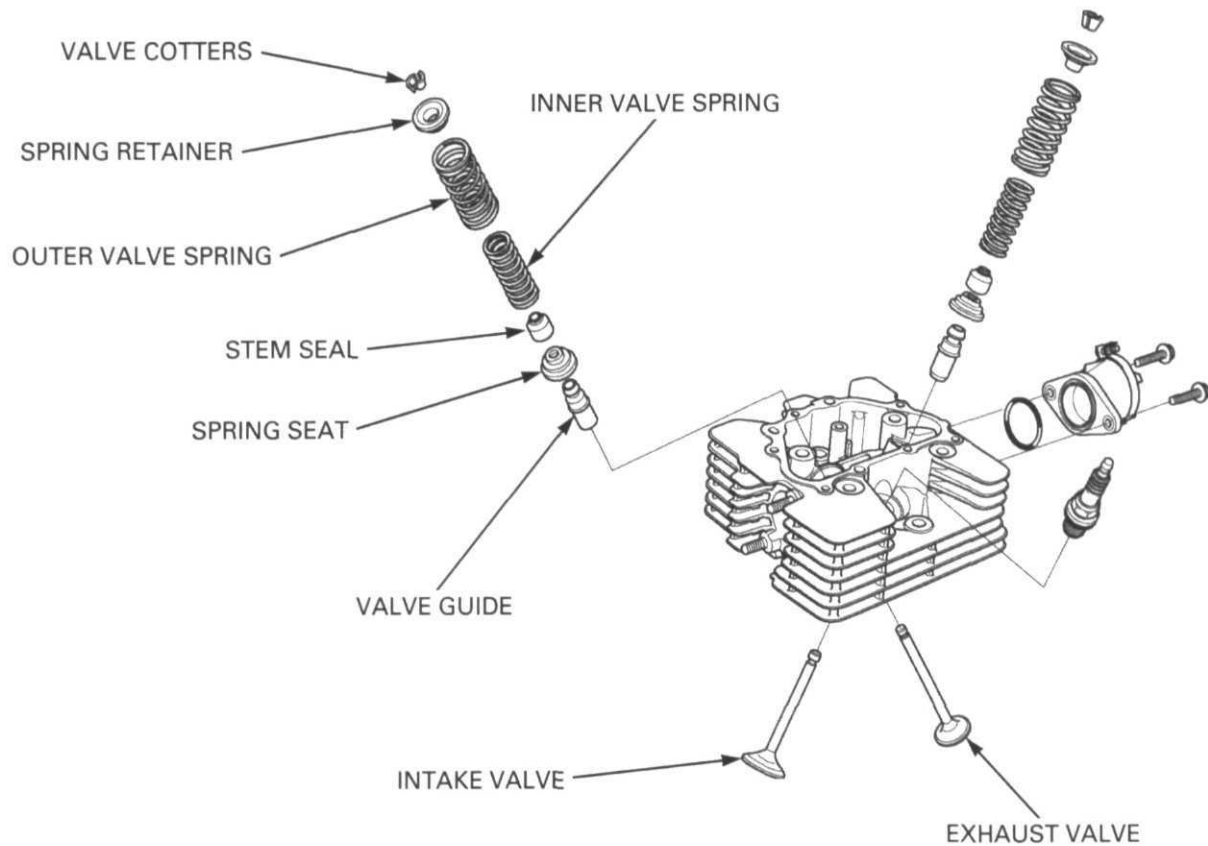
- Excessive lapping pressure may deform or damage the seat.
- Change the angle of the lapping tool frequently to prevent uneven seat wear.
- Do not allow lapping compound to enter the guides.

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

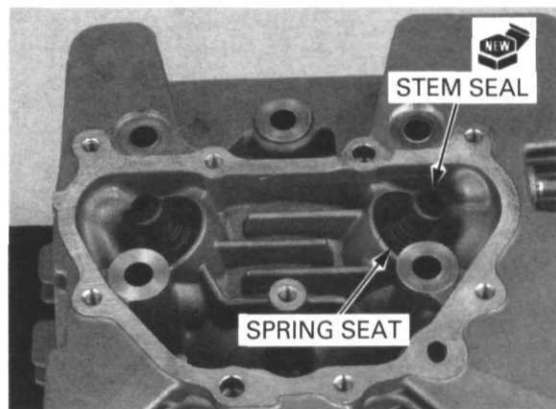




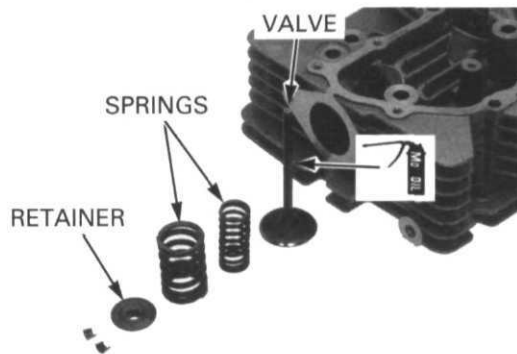
# CYLINDER HEAD ASSEMBLY



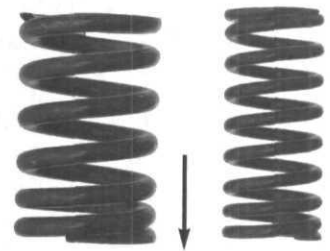
Blow through the oil passage in the cylinder head with compressed air.  
Install the spring seats and new stem seals.



Lubricate the valve stem sliding surface with molybdenum oil solution.  
Insert the valve into the guide while turning it slowly to avoid damaging the stem seal.



Install the inner and outer valve springs with the tightly wound coils facing the combustion chamber.  
Install the spring retainer.



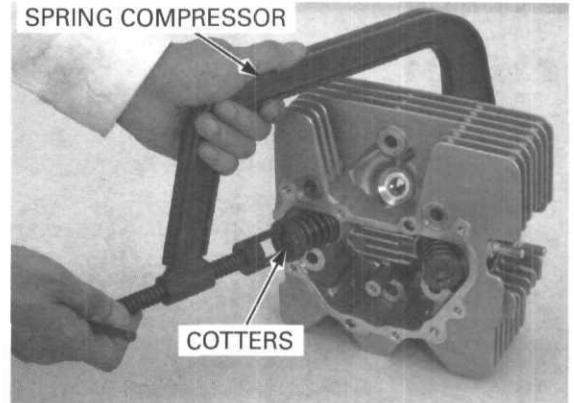
Combustion chamber side

*Grease the cotters to ease installation. To prevent loss of tension, do not compress the valve springs more than necessary.*

Install the valve spring cotters using the valve spring compressor.

**TOOL:**  
**Valve spring compressor**      **07757-0010000**

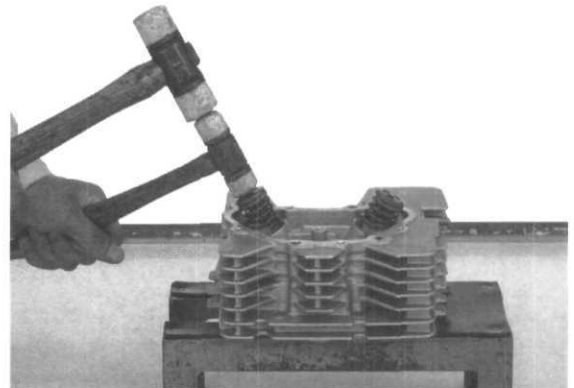
SPRING COMPRESSOR



COTTERS

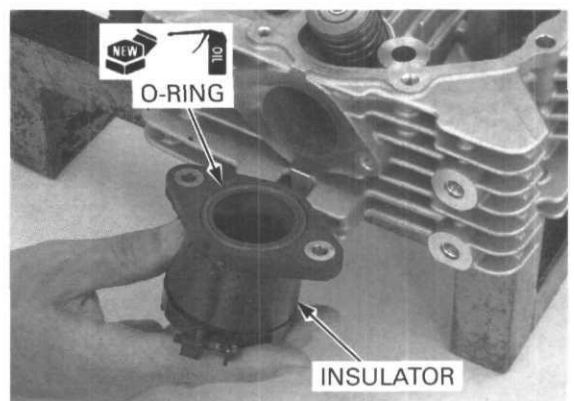
*Support the cylinder head so the valve heads will not contact anything that cause damage.*

Tap the valve stems gently with two plastic hammers as shown to seat the cotters firmly.



Coat a new O-ring with engine oil and install it into the groove in the carburetor insulator. Install the insulator and tighten the two bolts securely.

Install the cylinder head (page 8-18).



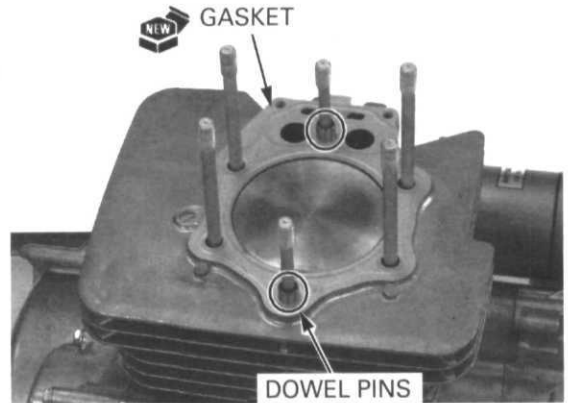
O-RING

INSULATOR

## CYLINDER HEAD INSTALLATION

Clean the mating surfaces of the cylinder and cylinder head, being careful not to damage them.

Install the two dowel pins and a new gasket with the mark facing up.



*Take care not to drop the nuts and washers into the cylinder.*

Apply engine oil to the threads of the cap nuts and install them with the washers. Install the two bolts

Tighten the cap nuts in a crisscross pattern in several steps.

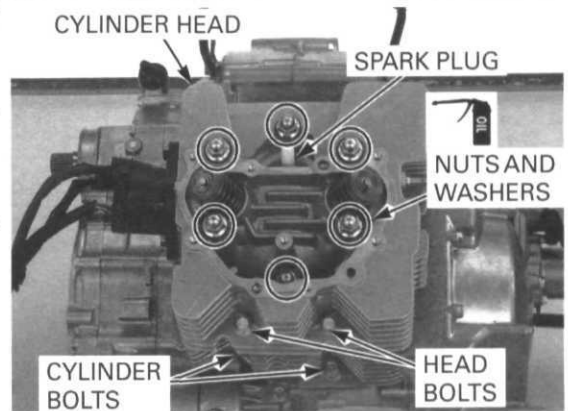
**TORQUE: 39 N·m (4.0 kgf·m, 29 lbf·ft)**

Tighten the two cylinder bolts and two cylinder head bolts securely.

Install the spark plug and tighten it.

**TORQUE: 22 N·m (2.2 kgf·m, 16 lbf·ft)**

Connect the spark plug cap.



*Insert the frame side hanger bolt from the front side.*

Install the mounting rubbers onto the hanger bracket bushing with the large I.D. side facing in. Install the engine hanger bracket with the three bolts and nut.

Tighten the engine hanger fasteners.

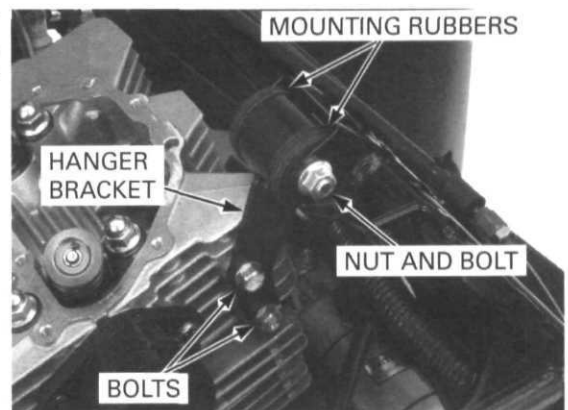
**TORQUE:**

**Frame side (10 mm): 54 N·m (5.5 kgf·m, 40 lbf·ft)**

**Engine side (8 mm): 32 N·m (3.3 kgf·m, 24 lbf·ft)**

Install the following:

- cylinder head cover (page 8-18)
- carburetor (page 6-17)
- exhaust system (page 3-15)



## CYLINDER HEAD COVER ASSEMBLY/INSTALLATION

### ASSEMBLY

Blow through the oil passages in the head cover with compressed air.

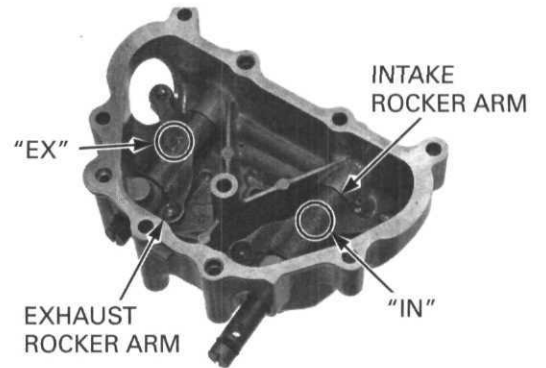
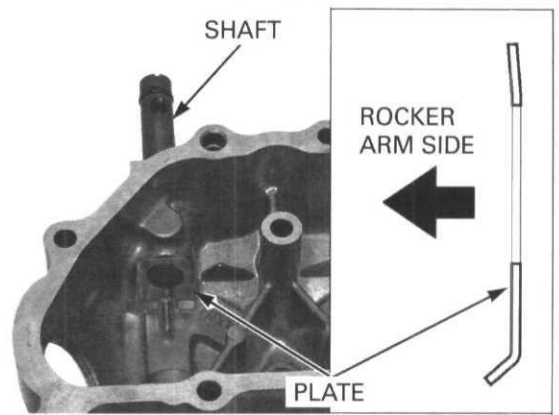
Coat new O-rings with engine oil and install them into each groove in the rocker arm shafts.

Apply molybdenum oil solution to the sliding surfaces of the shafts.



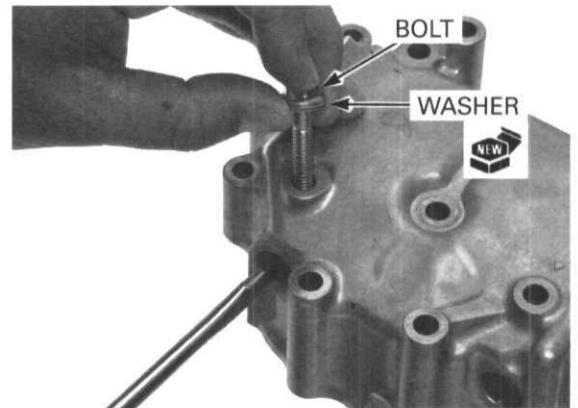
Set the setting plate by aligning the groove with the lug on the head cover and with the bend tab facing in.

Install the rocker arms, setting plates and rocker arm shafts.



Align the bolt holes in the head cover and rocker arm shaft by turning the shaft.

Install the four bolts with new sealing washers.



**INSTALLATION**

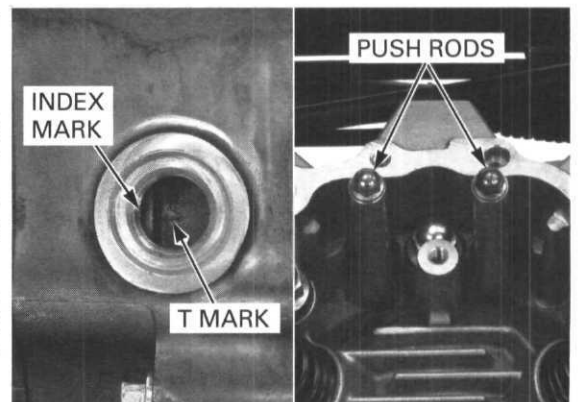
Clean the mating surfaces of the head cover and cylinder head, being careful not to damage them.

Temporarily install the push rods.

Make sure the piston is TDC (Top Dead Center) on the compression stroke by checking the push rod height.

Rotate the crankshaft using the recoil starter knob to align the T mark on the flywheel with the index mark on the crankcase cover.

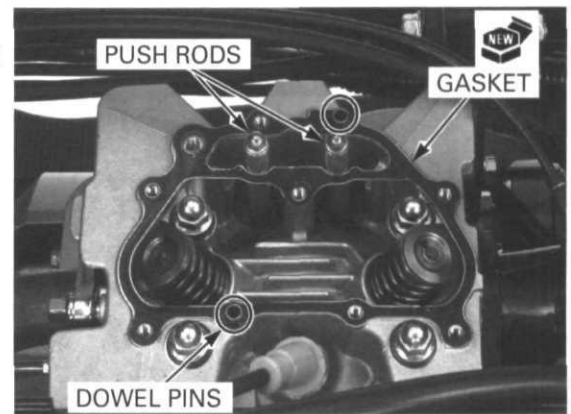
If the push rod height is high (the cam lobes face up), rotate the crankshaft one full turn and match up the T mark again so the push rod height is low (the cam lobes face down).



## CYLINDER HEAD/VALVE

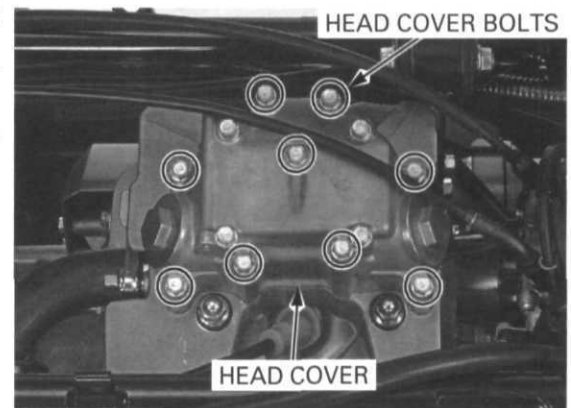
Install the two dowel pins and a new gasket.

Install the push rods onto the cam followers and rest them onto the gasket grooves as shown.



Apply engine oil to the rocker arm followers and adjusting screw tip, and install the head cover. Be sure there are no clearance at the mating surfaces of the cylinder head and head cover.

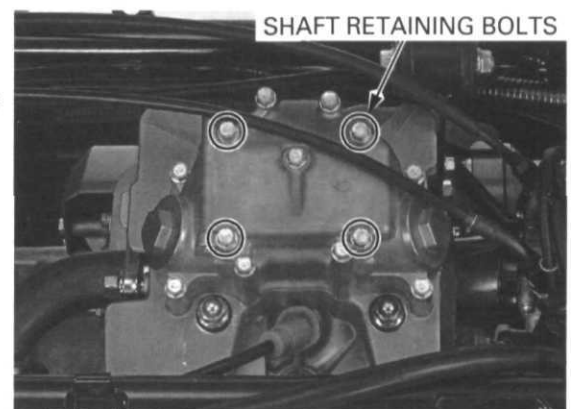
Install the nine bolts and tighten them in a criss-cross pattern in several steps.



Tighten the rocker arm shaft retaining bolts.

Adjust the valve clearance (page 4-10).

Install the heat guard plate and fuel tank (page 6-22).



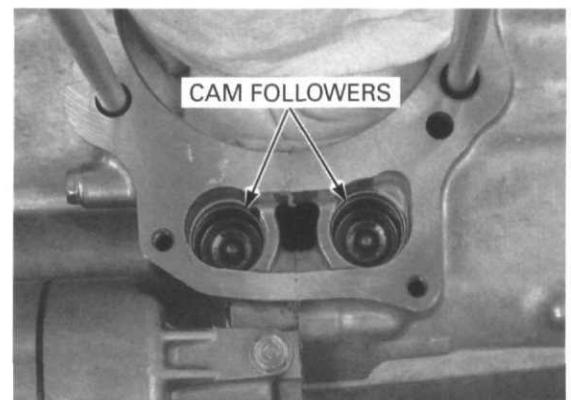
## CAMSHAFT REMOVAL

Remove the following:

- cylinder (page 9-4)
- primary drive gear (page 10-13)
- oil pump (page 5-8)

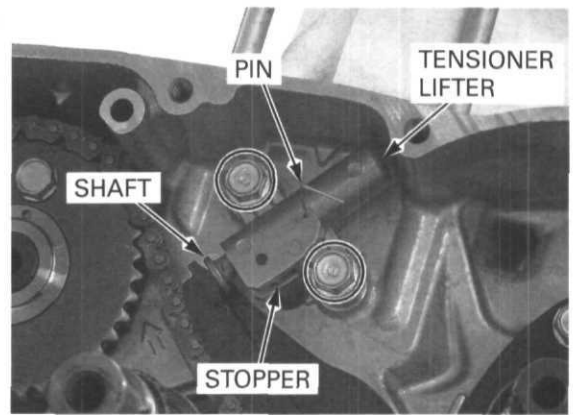
*Mark the followers so they can be placed back in their original locations.*

Remove the cam followers.



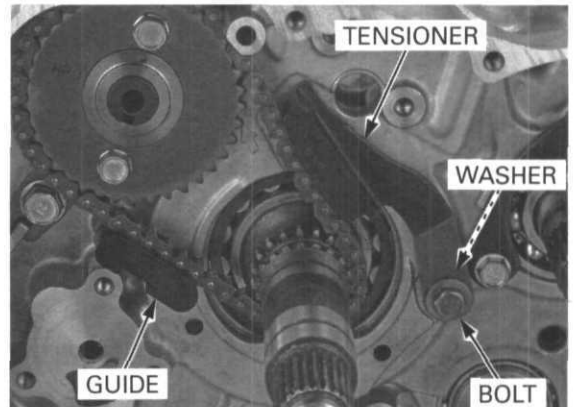
Push in the tensioner lifter shaft while pressing the stopper block and insert a pin to secure it.

Remove the two bolts and cam chain tensioner lifter.

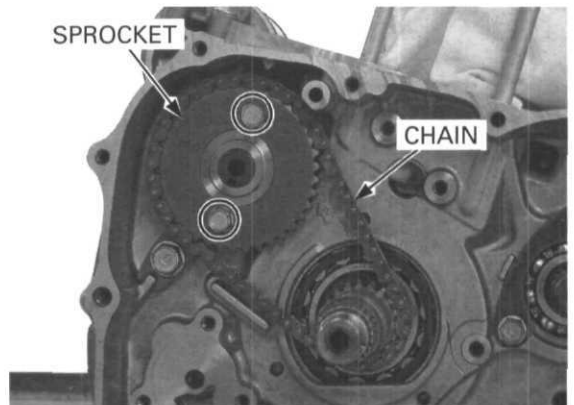


Remove the following:

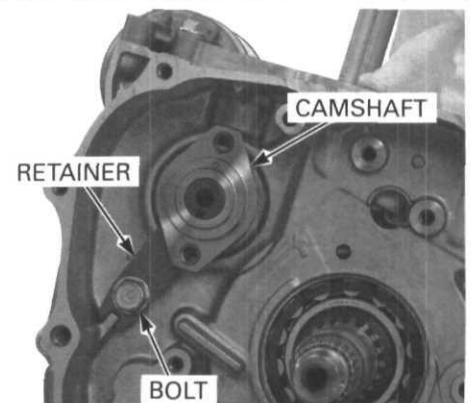
- tensioner pivot bolt
- cam chain tensioner
- washer
- cam chain guide



- sprocket bolts
- cam sprocket
- cam chain



- retainer bolt
- bearing retainer
- camshaft



## CYLINDER HEAD/VALVE

### INSPECTION

#### CAMSHAFT

Check the cam surfaces for scoring, scratches or evidence of insufficient lubrication.  
Check the cam sprocket teeth for wear or damage.

Turn the outer race of each bearing with your finger.  
The bearing should turn smoothly and quietly.  
Replace the camshaft assembly if the bearing does not turn smoothly and quietly.

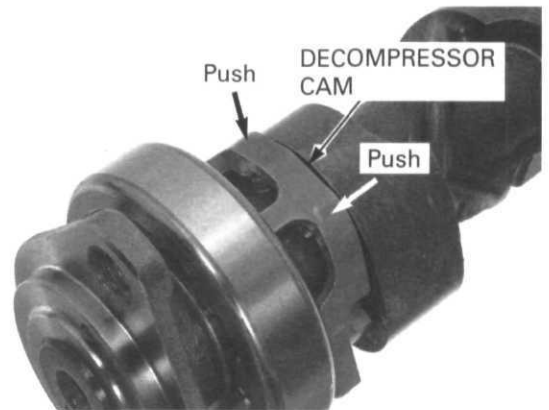


Measure each cam lobe height.

**SERVICE LIMITS: IN: 35.60 mm (1.402 in)**  
**EX: 35.38 mm (1.393 in)**



Check the decompressor cam operation.  
Press on the decompressor cam as shown.  
As you press on one side, the decompressor cam should lock above the base circle of the exhaust cam lobe.  
As you press on other side, the decompressor lobe will drop below the base circle of the exhaust cam lobe.



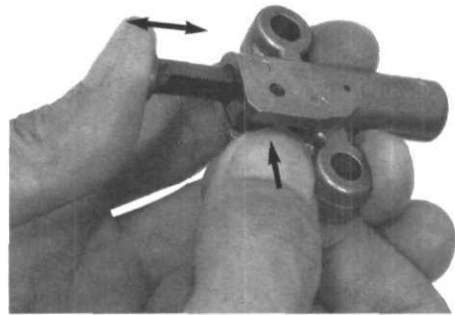
#### CAM CHAIN TENSIONER

Check the slipper surfaces of the tensioner and guide for wear or damage.



Check the tensioner lifter operation:

- The tensioner lifter shaft should not go into the body when it is pushed.
- When the stopper block is pressed in, the tensioner shaft should be pushed into the lifter body and the shaft springs out of the body.

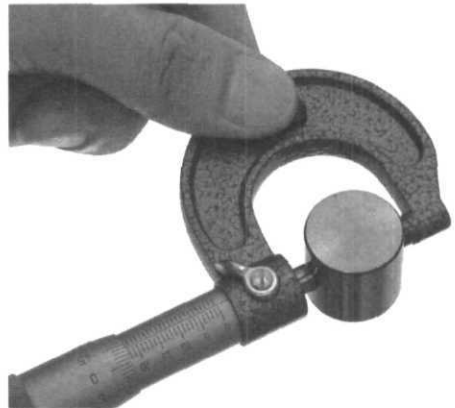


**CAM FOLLOWER**

Check the cam follower and follower bore for scoring, scratches or damage.

Measure each follower O.D.

**SERVICE LIMIT: 22.46 mm (0.884 in)**

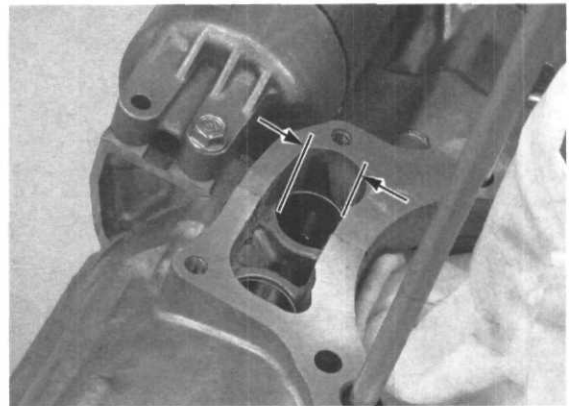


Measure each follower bore I.D.

**SERVICE LIMIT: 22.54 mm (0.887 in)**

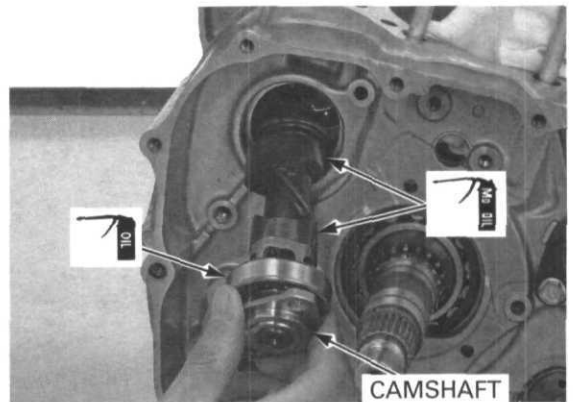
Subtract each follower O.D. from the corresponding bore I.D. to obtain the follower-to-bore clearance.

**SERVICE LIMIT: 0.07 mm (0.003 in)**



**CAMSHAFT INSTALLATION**

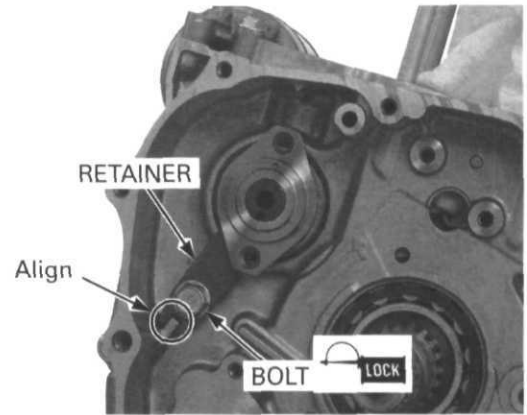
- Lubricate the camshaft bearing with engine oil.
- Apply molybdenum oil solution to the cam lobes.
- Install the camshaft into the crankcase.





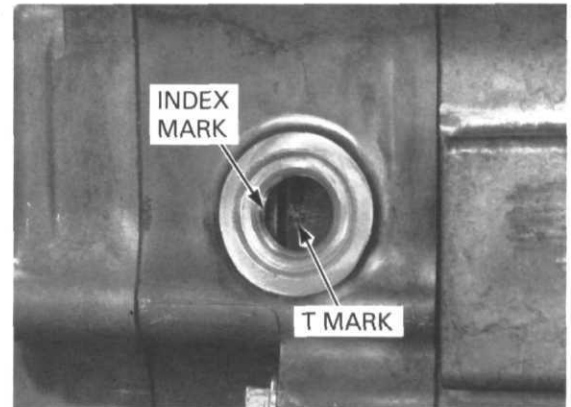
## CYLINDER HEAD/VALVE

Apply locking agent to the retainer bolt threads. Install the retainer by aligning the groove with the crankcase lug and tighten the retainer bolts.



*Cover the piston with a shop towel or equivalent to protect it from damage.*

Rotate the crankshaft to align the T mark on the flywheel with the index mark on the crankcase cover.

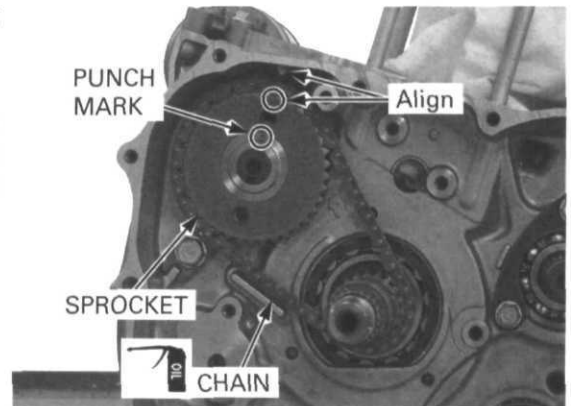


Lubricate the cam chain with engine oil and install it over the cam sprocket.

Turn the camshaft so the punch mark faces up.

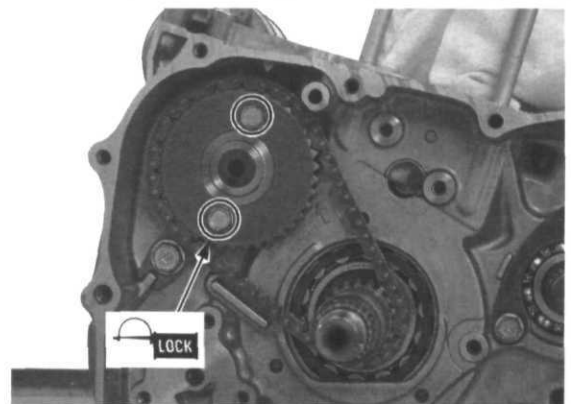
*Do not turn the crankshaft during installation.*

Install the cam chain over the timing sprocket on the crankshaft and the cam sprocket onto the camshaft so the timing mark (punch) is aligned with the index mark (▽) on the crankcase.



Apply locking agent to the cam sprocket bolt threads. Install the sprocket bolt and tighten them.

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

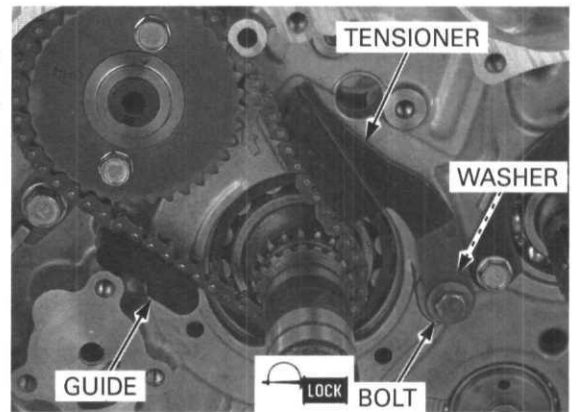


Install the cam chain guide as shown.

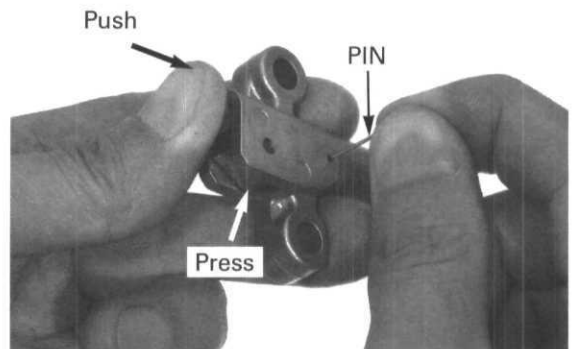
Apply locking agent to the tensioner pivot bolt threads.

Install the cam chain tensioner with the washer (between the tensioner and crankcase) and tighten the pivot bolt.

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



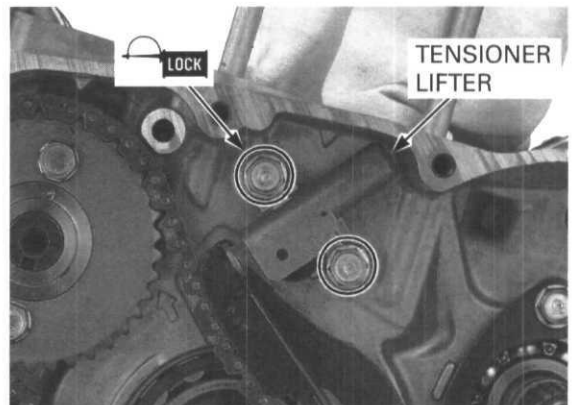
Push the tensioner shaft while pressing the stopper block to retract the tensioner and secure it with a pin.



Apply locking agent to the lifter bolt threads. Install the tensioner lifter and tighten the bolts.

Remove the pin from the tensioner lifter.

Make sure the timing mark (punch) on the cam sprocket is aligned with the index mark (▽) on the crankcase when the T mark on the flywheel is aligned with the index mark on the crankcase cover.

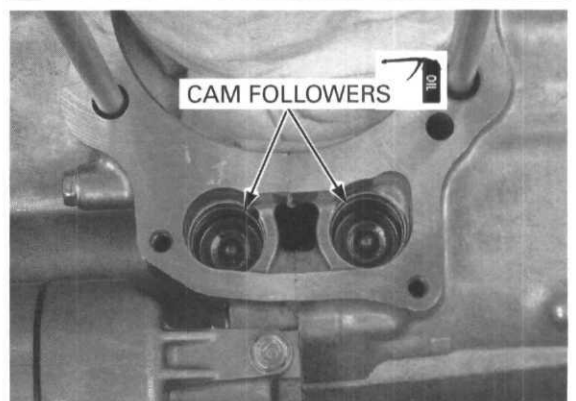


*Be careful not to damage the sliding surfaces of the followers and bores.*

Apply engine oil to the whole surfaces of the cam followers and install them into the crankcase with the opening facing up.

Install the following:

- oil pump (page 5-9)
- clutch (page 10-18)
- cylinder (page 9-8)

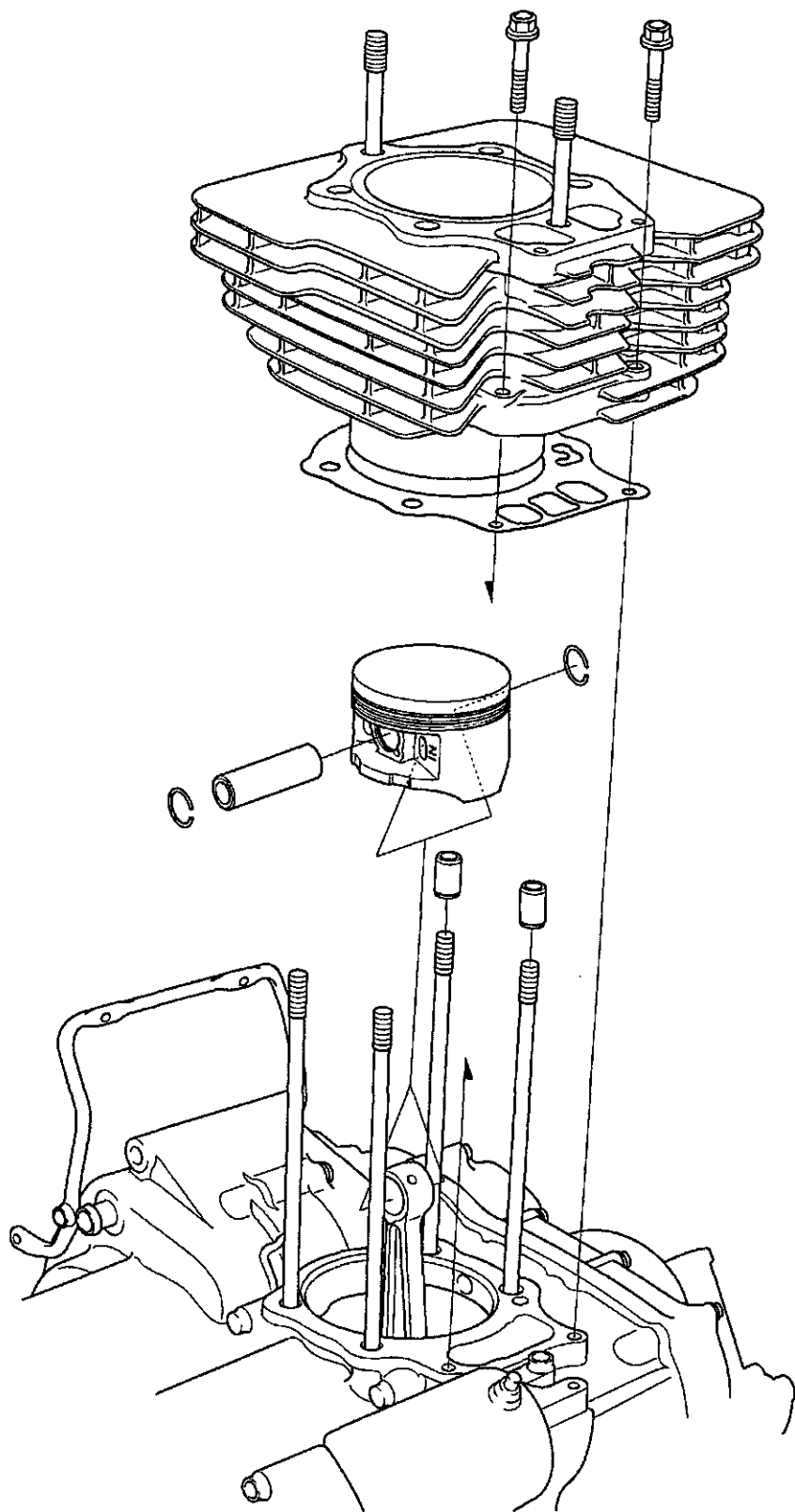


# 9. CYLINDER/PISTON

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<b>SYSTEM COMPONENTS .....</b>	<b>9-2</b>	<b>CYLINDER/PISTON REMOVAL .....</b>	<b>9-4</b>
<b>SERVICE INFORMATION .....</b>	<b>9-3</b>	<b>CYLINDER/PISTON INSTALLATION.....</b>	<b>9-8</b>
<b>TROUBLESHOOTING .....</b>	<b>9-3</b>		

SYSTEM COMPONENTS



## SERVICE INFORMATION

### GENERAL

- The cylinder and piston can be serviced with the engine installed in the frame.
- Take care not to damage the cylinder wall and piston.
- Be careful not to damage the mating surfaces when removing the cylinder. Do not strike the cylinder too hard during removal.
- Rocker arm and valve lubricating oil is fed through the oil passage in the cylinder. Clean the oil passage before installing the cylinder.

### SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT	
Cylinder	I.D.	92.000 – 92.010 (3.6220 – 3.3.6224)	92.10 (3.3.626)	
	Out-of-round	–	0.10 (0.004)	
	Taper	–	0.10 (0.004)	
	Warpage	–	0.10 (0.004)	
Piston, piston pin, piston ring	Piston O.D. at 15 (0.6) from bottom	91.965 – 91.985 (3.6207 – 3.6214)	91.93 (3.619)	
	Piston pin hole I.D.	20.002 – 20.008 (0.7875 – 0.7877)	20.04 (0.789)	
	Piston pin O.D.	19.994 – 20.000 (0.7872 – 0.7874)	19.96 (0.786)	
	Piston-to-piston pin clearance	0.002 – 0.014 (0.0001 – 0.0006)	0.08 (0.003)	
	Piston ring end gap	Top	0.15 – 0.30 (0.006 – 0.012)	0.5 (0.02)
		Second	0.30 – 0.45 (0.012 – 0.018)	0.6 (0.02)
		Oil (side rail)	0.20 – 0.70 (0.008 – 0.028)	–
	Piston ring-to-ring groove clearance	Top	0.030 – 0.060 (0.0012 – 0.0024)	0.09 (0.004)
Second		0.030 – 0.060 (0.0012 – 0.0024)	0.09 (0.004)	
Cylinder-to-piston clearance		0.015 – 0.045 (0.0006 – 0.0018)	0.10 (0.004)	
Connecting rod small end I.D.		20.020 – 20.041 (0.7882 – 0.7890)	20.07 (0.790)	
Connecting rod-to-piston pin clearance		0.020 – 0.047 (0.0008 – 0.0019)	0.10 (0.004)	

### TORQUE VALUE

Cylinder stud bolt 12 N·m (1.2 kgf·m, 9 lbf·ft) page 9-7

## TROUBLESHOOTING

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

- Leaking cylinder head gasket
- Worn, stuck or broken piston ring
- Worn or damaged cylinder and piston

#### Compression too high, overheating or knocking

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

#### Excessive smoke

- Worn cylinder, piston or piston rings
- Improper installation of piston rings
- Scored or scratched piston or cylinder wall

#### Abnormal noise

- Worn piston pin or piston pin hole
- Worn connecting rod small end
- Worn cylinder, piston or piston rings

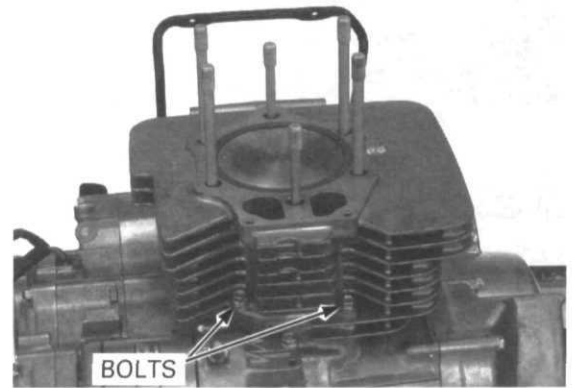
## CYLINDER/PISTON

### CYLINDER/PISTON REMOVAL

#### CYLINDER REMOVAL

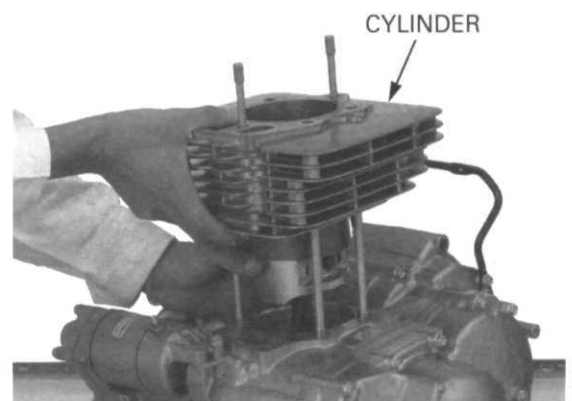
Remove the cylinder head (page 8-7)

Remove the two bolts.

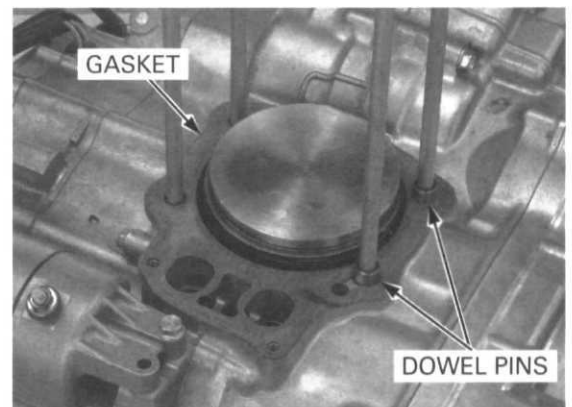


*Do not strike the cylinder too hard and do not damage the mating surface with a screwdriver.*

Lift the cylinder and remove it, being careful not to damage the piston and piston rings with the stud bolts.



Remove the gasket and the two dowel pins.

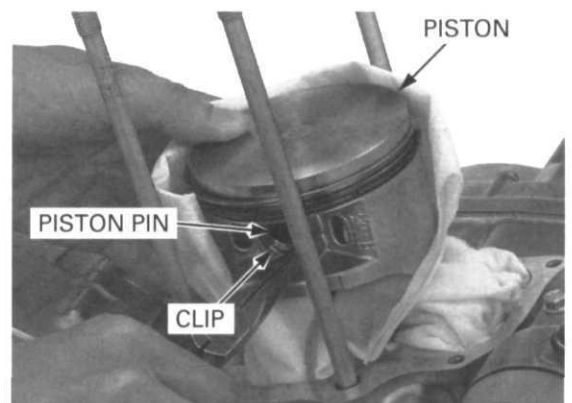


#### PISTON REMOVAL

Place a clean shop towel over the crankcase to prevent the clip from falling into the crankcase.

Remove the piston pin clips with the pliers.

Push the piston pin out of the piston and connecting rod, and remove the piston.



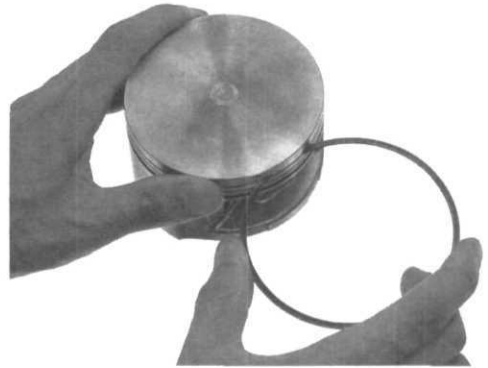
*Do not damage the piston ring by spreading the ends too far.*

Spread each piston ring and remove it by lifting up at a point opposite the gap.



*Never use a wire brush; it will scratch the grooves.*

Clean carbon deposits from the ring grooves with a ring that will be discarded.



**INSPECTION**

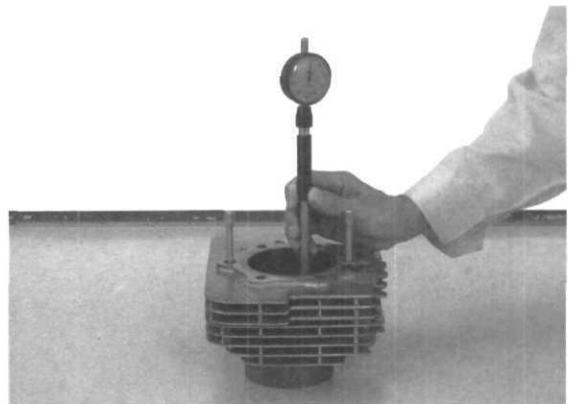
**CYLINDER**

Inspect the cylinder bore for scratch or wear. Measure the cylinder I.D. at three levels in an X and Y axis. Take the maximum reading to determine the cylinder wear.

**SERVICE LIMIT: 92.10 mm (3.626 in)**

Calculate the cylinder-to-piston clearance. Refer to page 9-6 for measurement of the piston O.D.

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



Calculate the cylinder taper and out-of-round at three levels in an X and Y axis. Take the maximum reading to determine the taper and out-of-round.

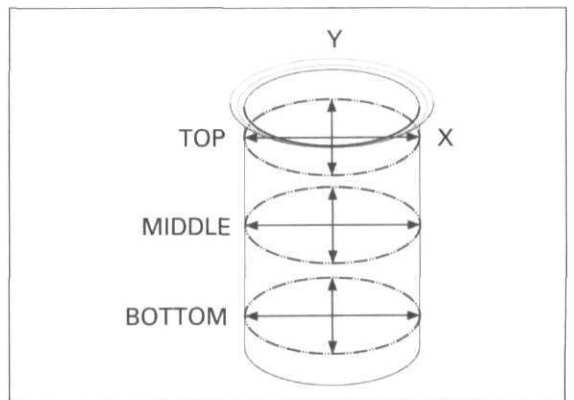
**SERVICE LIMIT: Taper: 0.10 mm (0.004 in)**

**Out-of-round: 0.10 mm (0.004 in)**

The cylinder must be rebored and an oversize piston fitted if the service limits are exceeded.

The four oversize pistons are available from 0.25 mm piston to 1.0 mm piston in intervals of 0.25 mm (0.010 in).

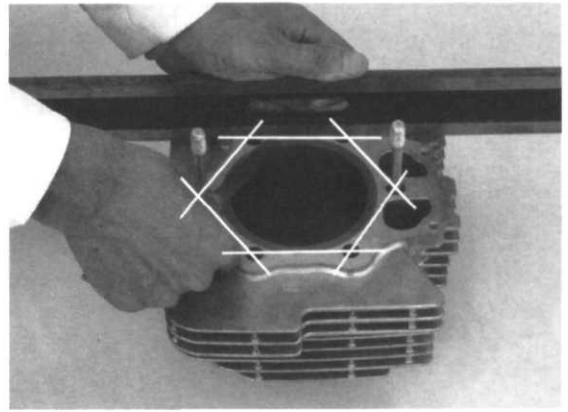
The cylinder must be rebored so the clearance for an oversize piston is 0.015 – 0.045 mm (0.0006 – 0.0018 in).



## CYLINDER/PISTON

Check the top of the cylinder for warpage with a straight edge and feeler gauge across the studs and bolt holes as shown.

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



### PISTON/PISTON RING

Inspect the piston rings for smooth movement by rotating them. 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-ring groove clearance.

**SERVICE LIMIT: Top/Second: 0.09 mm (0.004 in)**



Insert each piston ring into the bottom of the cylinder squarely using the piston. Measure the ring end gap.

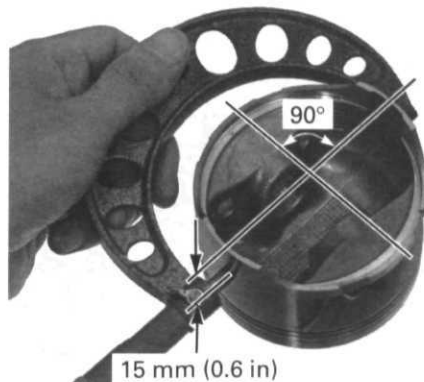
**SERVICE LIMITS: Top: 0.5 mm (0.02 in)  
Second: 0.6 mm (0.02 in)  
Oil (side rail): 0.9 mm (0.04 in)@**



Measure the piston O.D. at a point 15 mm (0.6 in) from the bottom and 90° to the piston pin hole.

**SERVICE LIMIT: 91.93 mm (3.619 in)**

Compare this measurement against the maximum cylinder I.D. measurement and calculate the piston-to-cylinder clearance (page 9-5).





Measure piston pin hole. Take the maximum reading to determine the I.D.

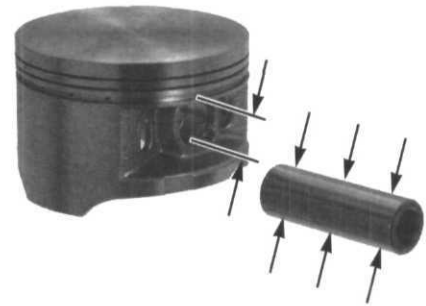
**SERVICE LIMIT: 20.04 mm (0.789 in)**

Measure the piston pin O.D. at three points.

**SERVICE LIMIT: 19.96 mm (0.786 in)@**

Calculate the piston-to-piston pin clearance.

**SERVICE LIMIT: 0.08 mm (0.003 in)**



Measure the connecting rod small end I.D.

**SERVICE LIMIT: 20.07 mm (0.790 in)**

Calculate the connecting rod-to-piston pin clearance.

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



**CYLINDER STUD BOLT REPLACEMENT**

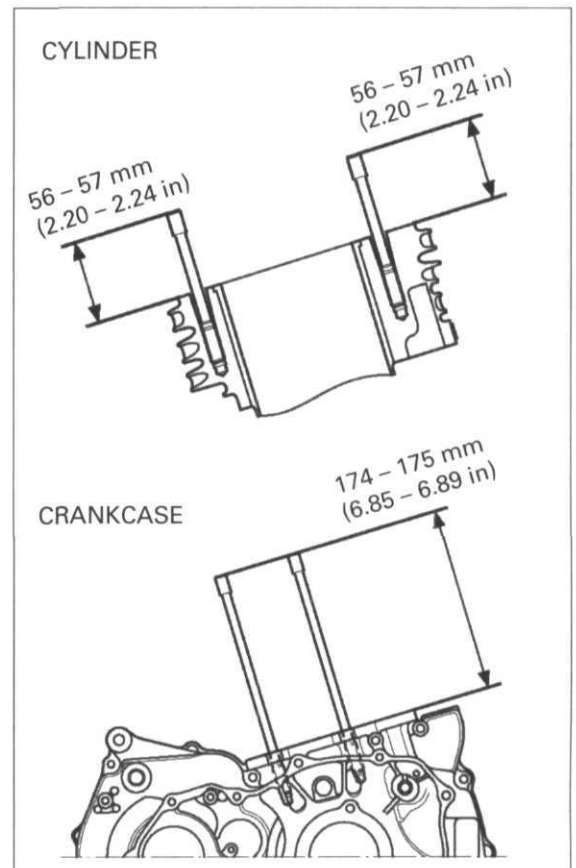
Thread two nuts onto the stud and tighten them together, and use a wrench on them to turn the stud bolt out.

Install new stud bolts in the direction as shown.

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

Be sure to verify the stud height from the mating surface.

Adjust the height if necessary.



## CYLINDER/PISTON INSTALLATION

### PISTON RING INSTALLATION

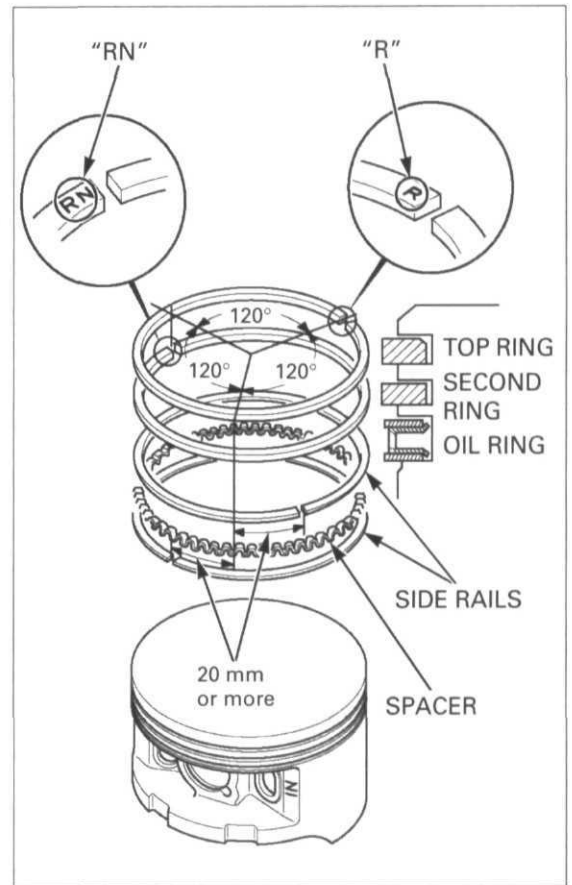
Carefully install the piston rings into the piston ring grooves with the markings facing up.

**NOTE:**

- Do not confuse the top and second rings.
- To install the oil ring, install the spacer first, then install the side rails.

Stagger the piston ring end gaps 120° degrees apart from each other.

Stagger the side rail end gaps as shown.



### PISTON INSTALLATION

Place a clean shop towel over the crankcase to prevent the clip from falling into the crankcase.

Apply engine oil to the piston pin hole and connecting rod inner surface.

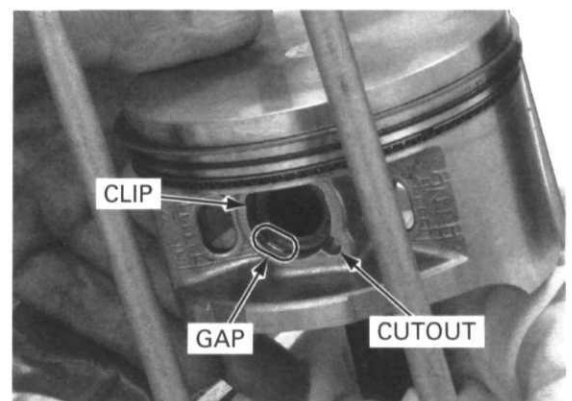
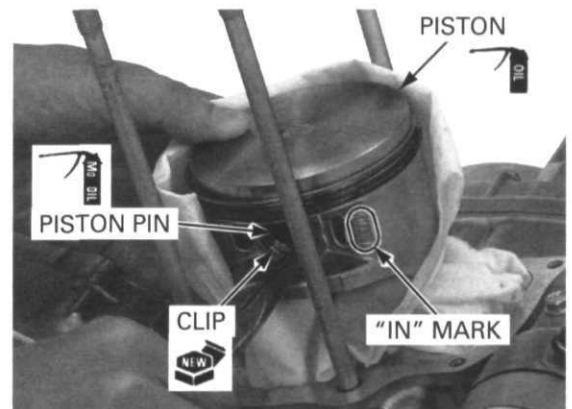
Apply molybdenum oil solution to the piston pin outer surface.

Install the piston with the "IN" mark toward the intake side and insert the piston pin through the piston and connecting rod.

Install new piston pin clips into the grooves in the piston pin hole.

**NOTE:**

- Make sure that the piston pin clips are seated securely.
- Do not align the piston pin clip end gap with the piston cutout.

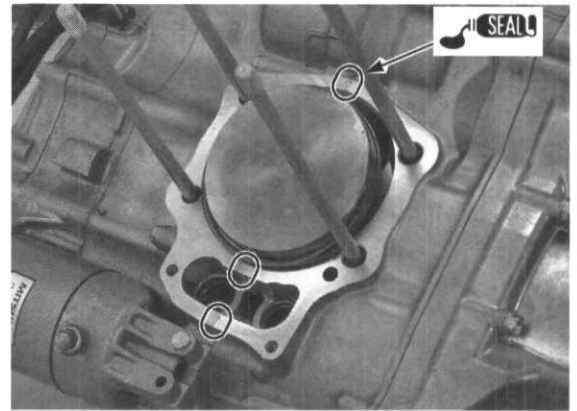


**CYLINDER INSTALLATION**

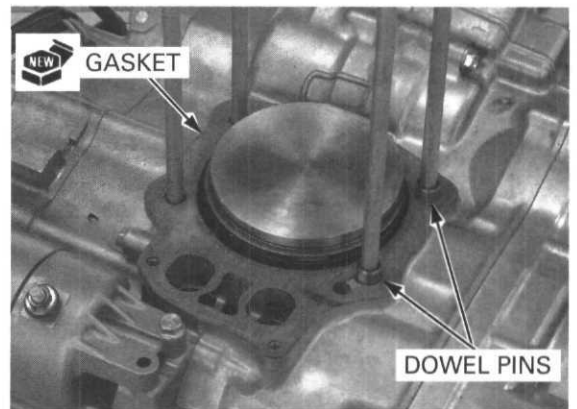
Clean the mating surfaces of the cylinder and crankcase thoroughly, being careful not to damage them, and being careful not to allow gasket material into the crankcase.

Blow through the oil passage in the cylinder with compressed air.

Apply liquid sealant to the crankcase mating areas as shown.

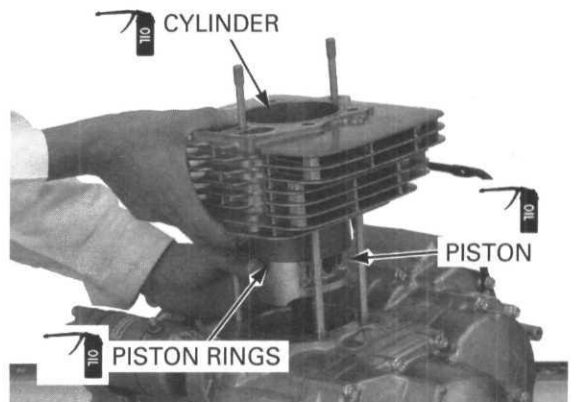


Install the two dowel pins and a new gasket.



Apply engine oil to the cylinder wall, piston outer surface and piston rings.

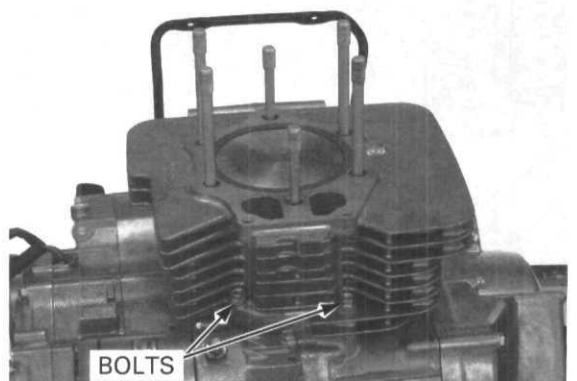
Install the cylinder over the piston while compressing the piston rings with your fingers.



Make sure that the cylinder touches the crankcase evenly.

Install the two bolts and tighten them.

Install the cylinder head (page 8-18).

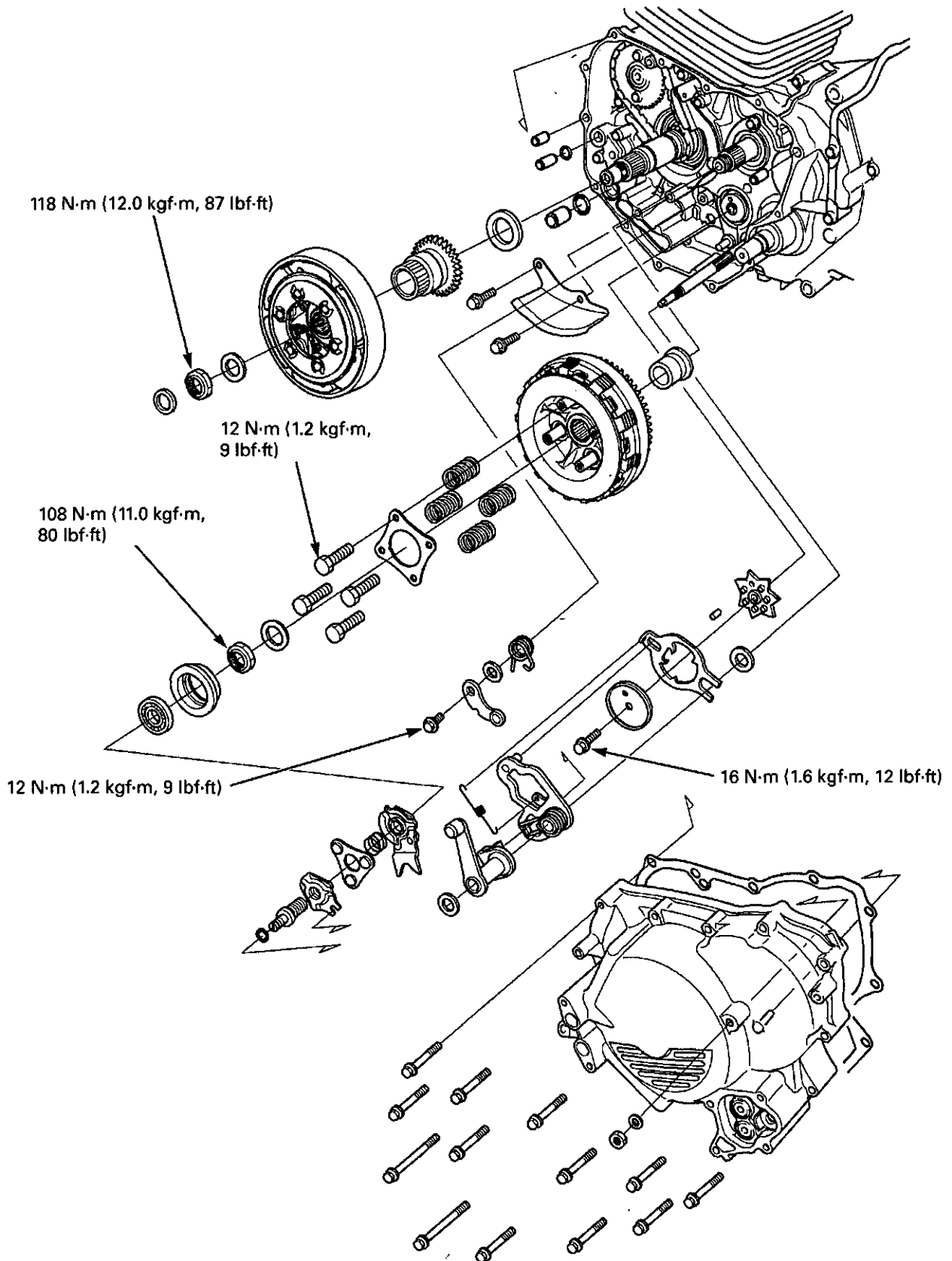


# 10. CLUTCH/GEARSHIFT LINKAGE

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SYSTEM COMPONENTS .....	10-2	CENTRIFUGAL CLUTCH .....	10-8
SERVICE INFORMATION .....	10-3	CHANGE CLUTCH .....	10-13
TROUBLESHOOTING .....	10-5	GEARSHIFT LINKAGE .....	10-20
FRONT CRANKCASE COVER REMOVAL .....	10-6	FRONT CRANKCASE COVER INSTALLATION .....	10-23

# CLUTCH/GEARSHIFT LINKAGE SYSTEM COMPONENTS



## SERVICE INFORMATION

### GENERAL

- This section covers service of the clutch (centrifugal clutch and change clutch) and gearshift linkage. To service the reverse stopper shaft and gearshift spindles, the engine must be removed from the frame.
- The crankcase must be separated when the sub-gearshift spindle, transmission, shift drum and shift forks require service (page 12-2).
- Engine oil viscosity and level and the use of oil additives have an effect on clutch operation. Oil additives of any kind are specifically not recommended. When the clutch does not disengage or the vehicle creeps, inspect the engine oil and oil level before servicing the clutch system.
- Engine lubricating oil is fed through the oil passages in the front crankcase cover. Clean the oil passages before installing the crankcase cover.
- The FE model is equipped with the electric shift program (ESP), see page 22-19 for this service.

### SPECIFICATIONS

Unit: mm (in)

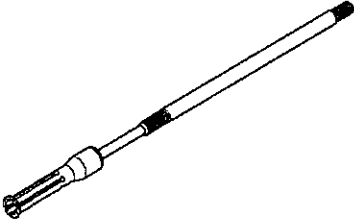
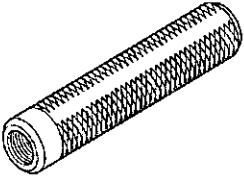
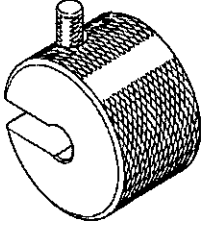
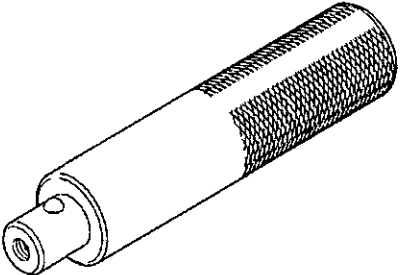
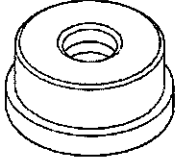

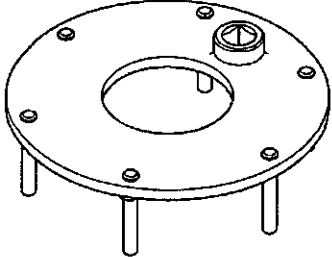
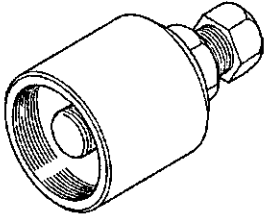
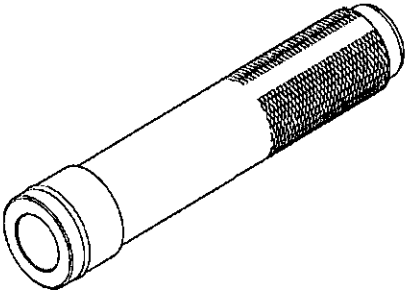
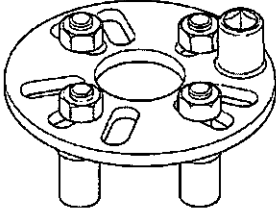
ITEM		STANDARD	SERVICE LIMIT	
Change clutch	Spring free length	TM/FM	43.8 (1.72)	
		FE	42.5 (1.67)	
	Disc thickness	2.62 – 2.78 (0.103 – 0.109)	2.3 (0.09)	
	Plate warpage	-	0.20 (0.008)	
	Outer I.D.	29.000 – 29.021 (1.1417 – 1.1426)	29.05 (1.144)	
	Outer guide	I.D.	22.000 – 22.021 (0.8661 – 0.8670)	22.05 (0.868)
		O.D.	28.959 – 28.980 (1.1401 – 1.1409)	28.93 (1.139)
Mainshaft O.D. at clutch outer guide	21.967 – 21.980 (0.8648 – 0.8654)	21.93 (0.863)		
Centrifugal clutch	Drum I.D.	150.0 – 150.2 (5.906 – 5.913)	150.4 (5.92)	
	Weight lining thickness	2.0 (0.08)	1.3 (0.05)	
	Clutch spring height	3.72 (0.146)	3.6 (0.14)	
	Clutch weight spring free length	23.17 (0.912)	24.10 (0.949)	
Primary drive gear	Gear I.D.	29.000 – 29.021 (1.1417 – 1.1426)	29.05 (1.144)	
	Crankshaft O.D. at drive gear	28.959 – 28.980 (1.1401 – 1.1409)	28.93 (1.139)	

### TORQUE VALUES

Clutch spring bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	
Centrifugal clutch lock nut	118 N·m (12.0 kgf·m, 87 lbf·ft)	Apply engine oil to the threads and seating surface. Stake.
Change clutch lock nut	108 N·m (11.0 kgf·m, 80 lbf·ft)	Apply engine oil to the threads and seating surface. Stake.
Shift drum stopper arm pivot bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	Apply locking agent to the threads.
Gearshift cam bolt	16 N·m (1.6 kgf·m, 12 lbf·ft)	Apply locking agent to the threads.
Gearshift spindle return spring pin	22 N·m (2.2 kgf·m, 16 lbf·ft)	Apply locking agent to the threads.

# CLUTCH/GEARSHIFT LINKAGE

## TOOLS

<p>Bearing remover, 17 mm 07936-3710300</p> 	<p>Remover handle 07936-3710100</p> 	<p>Remover weight 07741-0010201</p>  <p>or 07936-3710200 or 07936-371020A (U.S.A. only)</p>
<p>Driver 07749-0010000</p> 	<p>Attachment, 42 x 47 mm 07746-0010300</p> 	<p>Pilot, 17 mm 07746-0040400</p> 
<p>Clutch holder 07ZMB-HN20000</p>  <p>or 07ZMB-HN2A100 (U.S.A. only)</p>	<p>Puller, 35 x 1.0 mm 07933-HA80000</p>  <p>or 07933-HB3000A (U.S.A. only)</p>	<p>Driver, 22 mm I.D. 07746-0020100</p> 
<p>Clutch center holder 07JMB-MN50301</p>  <p>or 07HGB-001010B or 07HGB-001010A (U.S.A. only) with 07HGB-001020B or 07HGB-001020A (U.S.A. only)</p>		

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**TROUBLESHOOTING****Clutch slips when accelerating**

- Incorrect clutch adjustment (page 4-19)
- Worn clutch discs
- Weak clutch springs
- Faulty clutch lifter
- Improper oil viscosity or oil additive used

**Clutch will not disengage**

- Faulty clutch lifter
- Warped clutch plates

**The vehicle creeps**

- Faulty centrifugal clutch

**Clutch operating feels rough**

- Worn clutch outer and center grooves
- Warped clutch plates
- Loose clutch lock nut
- Faulty clutch lifter
- Improper oil viscosity or oil level

**Hard to shift**

- Incorrect clutch adjustment (page 4-19)
- Worn or damaged gearshift linkage components
- Faulty clutch lifter
- Improper engine oil viscosity
- Faulty gearshift spindle, shift forks/shaft or shift drum (page 12-7)

**Transmission jumps out of gear**

- Broken shift drum stopper arm
- Weak or broken shift linkage return springs
- Worn or damaged gearshift cam
- Faulty gearshift spindle, shift forks/shaft or shift drum (page 12-7)
- Faulty transmission gears (page 12-7)



## FRONT CRANKCASE COVER REMOVAL

Drain the engine oil (page 4-12).

Remove the following:

- cooling fan (page 5-5)
- engine guard (page 3-12)
- left engine cover (page 3-13)
- right engine cover (page 20-6)
- FE model: shift control motor and reduction gears (page 22-20)

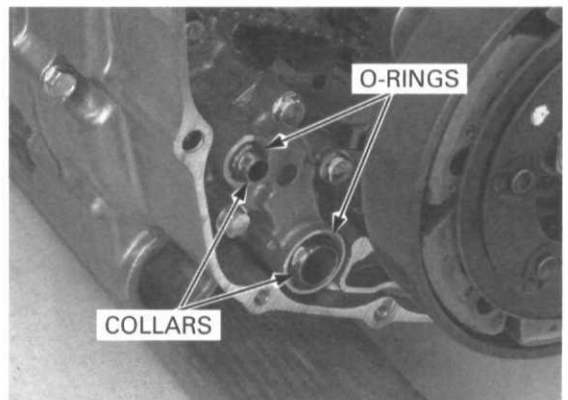
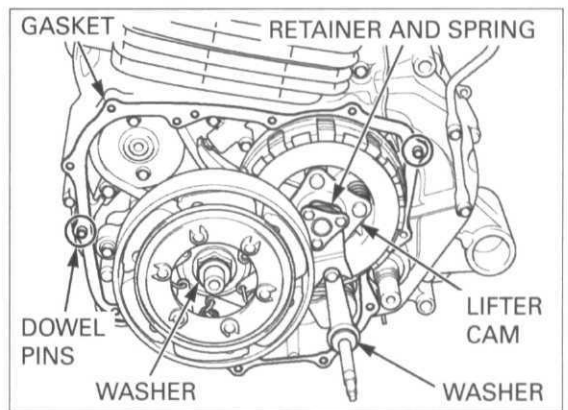
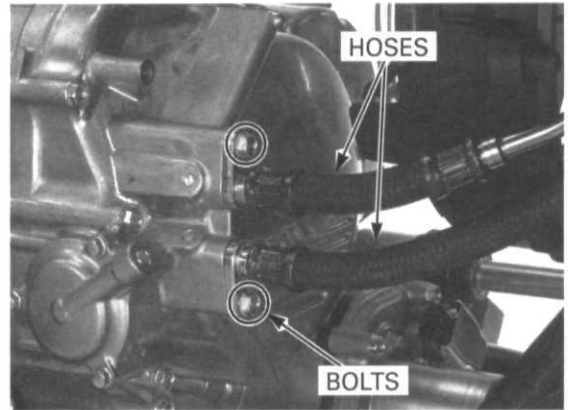
Remove the following:

- joint bolts
- oil cooler hoses
- O-rings

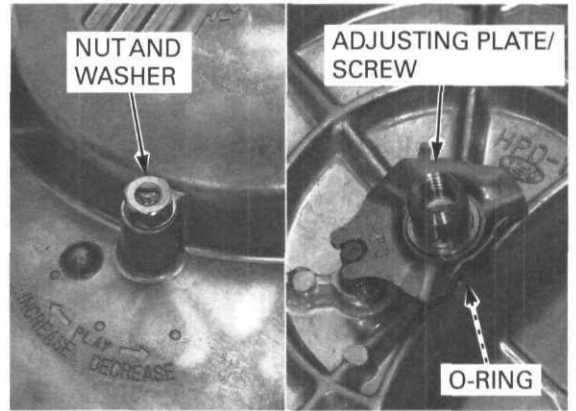
- thirteen bolts
- front crankcase cover
- gearshift spindle oil seal

- ball retainer and spring
- lifter cam
- washers (from the crankshaft and sub-gearshift spindle)
- two dowel pins
- gasket

- joint collars
- O-rings



- lock nut and washer
- adjusting plate/screw
- O-ring



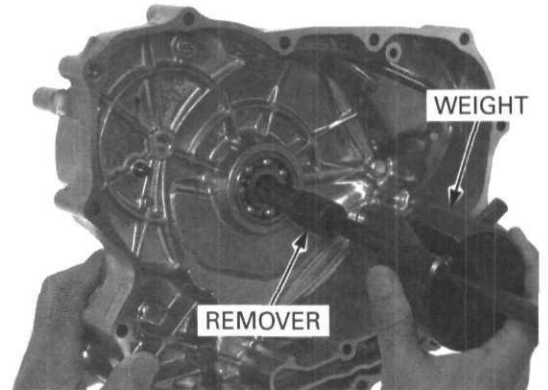
Check the crankshaft end bearing.  
 If the inner race does not turn smoothly, quietly, or if the outer race fits loosely in the cover, replace the bearing as follows.

**BEARING REPLACEMENT**

Remove the crankshaft end bearing with the special tools.

**TOOLS:**

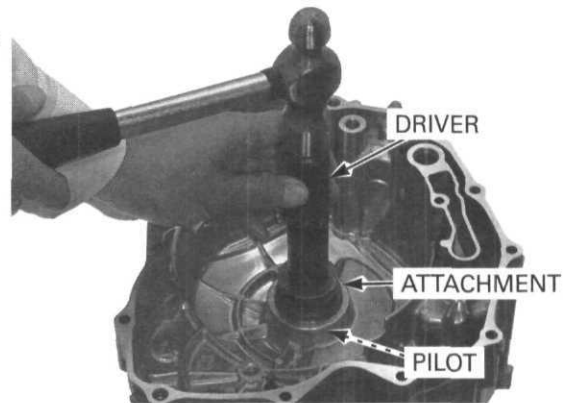
- |                               |                         |
|-------------------------------|-------------------------|
| <b>Bearing remover, 17 mm</b> | <b>07936-3710300</b>    |
| <b>Remover handle</b>         | <b>07936-3710100</b>    |
| <b>Remover weight</b>         | <b>07741-0010201 or</b> |
|                               | <b>07936-3710200 or</b> |
|                               | <b>07936-371020A</b>    |
|                               | <b>(U.S.A. only)</b>    |



Apply engine oil to a new bearing.  
 Drive a new bearing squarely with the sealed side facing down until it is fully seated.

**TOOLS:**

- |                              |                      |
|------------------------------|----------------------|
| <b>Driver</b>                | <b>07749-0010000</b> |
| <b>Attachment, 42 x47 mm</b> | <b>07746-0010300</b> |
| <b>Pilot, 17 mm</b>          | <b>07746-0040400</b> |



# CENTRIFUGAL CLUTCH

## REMOVAL

Remove the front crankcase cover (page 10-6).

*Be careful not to damage the crankshaft threads.*

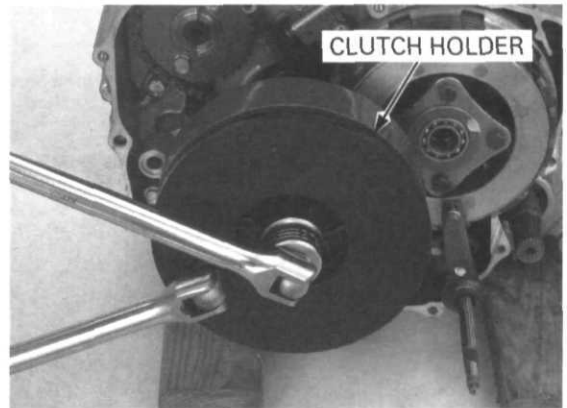
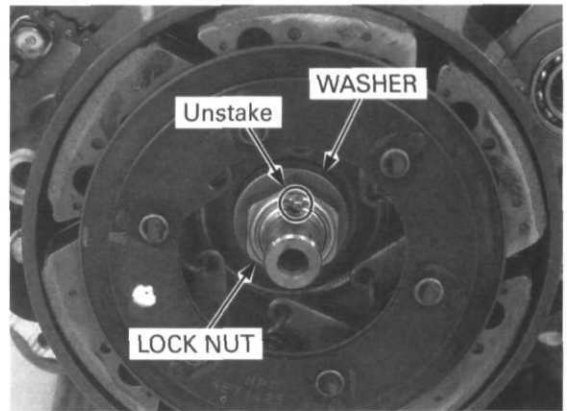
Unstake the clutch lock nut.

Set the special tool into the grooves in the drive plate and hold it, and loosen the lock nut.

**TOOL:**

- Clutch holder                    07ZMB-HN20000
  - holder plate                    07ZMB-HN20100
  - holder pin                        07ZMB-HN20200
- or
- 07ZMB-HN2A100  
(U.S.A. only)

Remove the lock nut and washer.

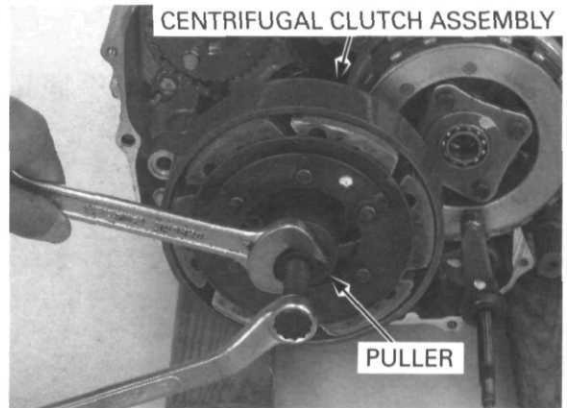


Remove the centrifugal clutch assembly using the special tool.

**TOOL:**

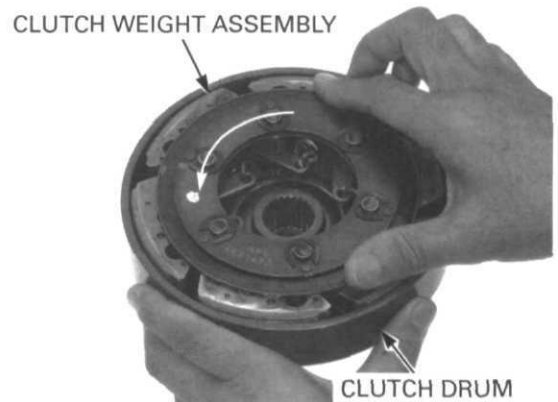
- Puller, 35 x 1.0 mm            07933-HA80000 or
- 07933-HB3000A
- (U.S.A. only)

For primary drive gear removal, see page 10-13 "Change Clutch".



Check the one-way clutch operation. You should be able to turn the clutch weight assembly counterclockwise smoothly, but the assembly should not turn clockwise.

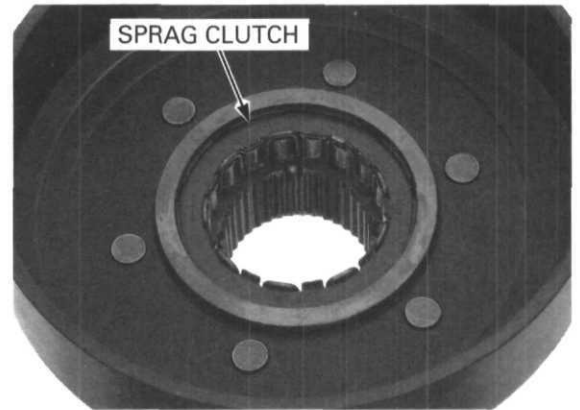
Remove the clutch weight assembly from the clutch drum while turning it counterclockwise.



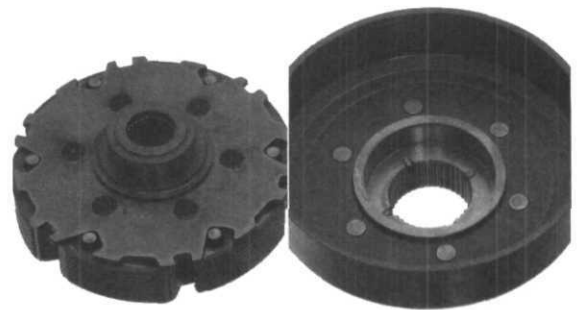
**INSPECTION**

**ONE-WAY CLUTCH**

Check the clutch sprag for abnormal wear, damage or irregular movement.



Check the drive plate boss and clutch drum inner contact surfaces for abnormal wear or damage.

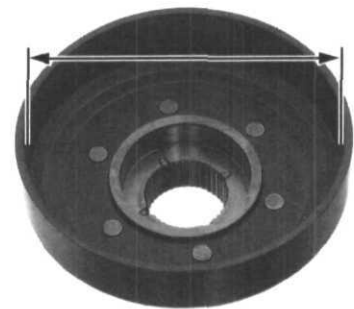


**CLUTCH DRUM AND LINING**

Check the weight contact surface for scratches or abnormal wear.

Measure the drum I.D.

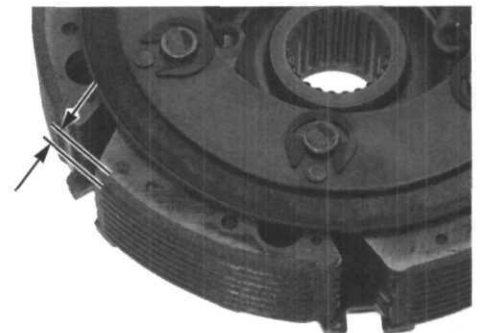
**SERVICE LIMIT: 150.4 mm (5.92 in)**



*Replace the clutch weights as a set.*

Measure the lining thickness.

**SERVICE LIMIT: 1.3 mm (0.05 in)**



## CLUTCH/GEARSHIFT LINKAGE

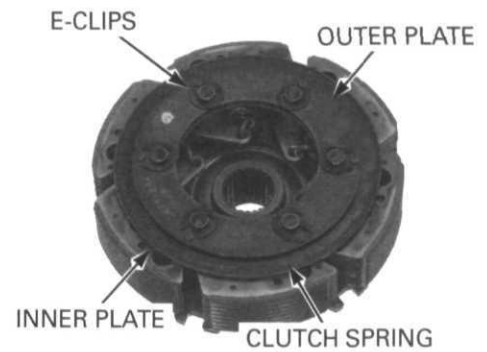
### CLUTCH SPRING

*Be careful not to damage the clutch weights while compressing.*

Remove the E-clips using a screwdriver while compressing the outer plate.

Remove the following:

- outer plate
- clutch spring
- inner plate



Measure the height of the clutch spring.

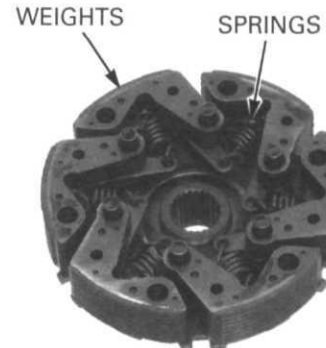
**SERVICE LIMIT: 3.6 mm (0.14 in)**



### WEIGHT SPRING

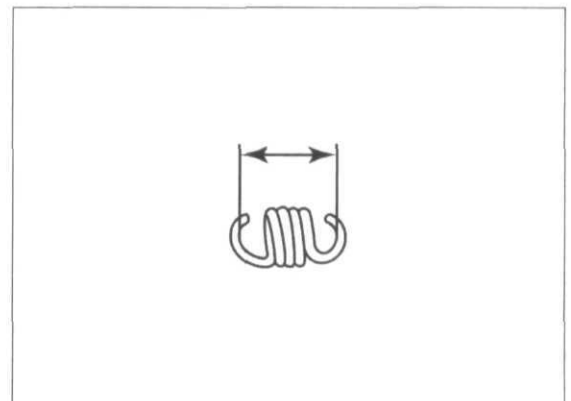
*Replace the springs as a set.*

Check the weight springs for wear or damage. Remove the clutch weights and springs from the drive plate.

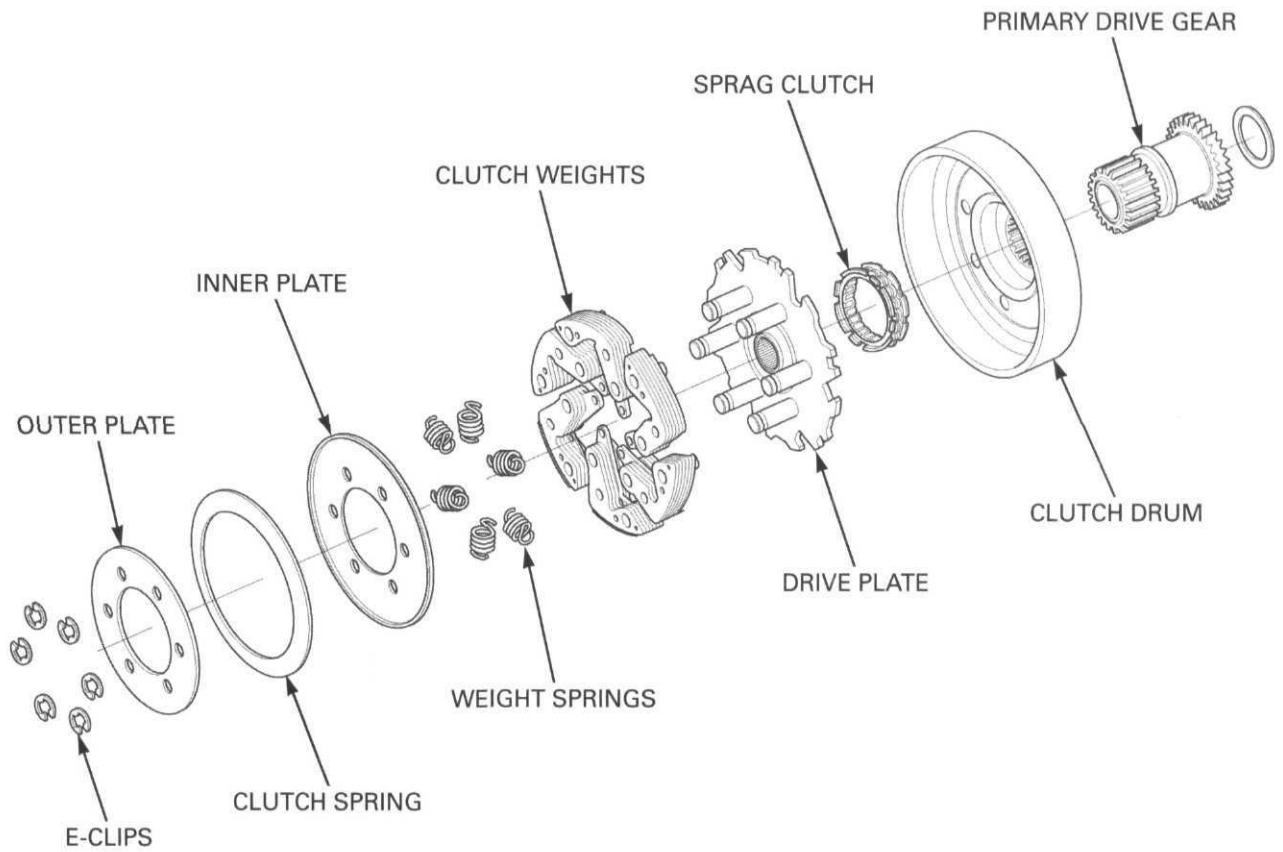


Measure the spring length.

**SERVICE LIMIT: 24.10 mm (0.949 in)**

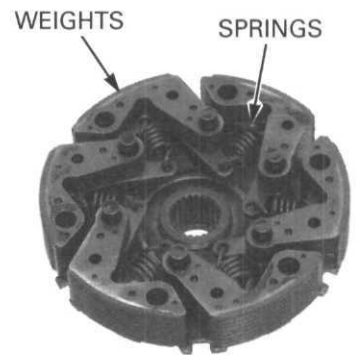


ASSEMBLY



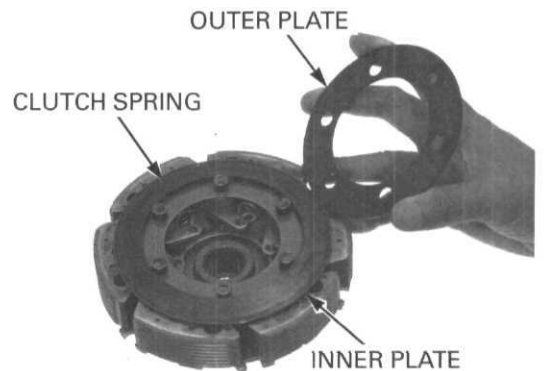
*Install with the spring's open ends facing in.*

Install the clutch weights and springs onto the drive plate as shown.



Install the following:

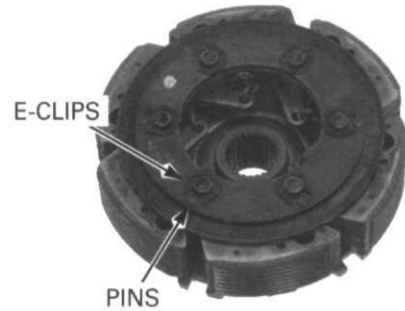
- inner plate (with flange side facing up)
- clutch spring (with concavity side facing down)
- outer plate (with locating pins facing up)



## CLUTCH/GEARSHIFT LINKAGE

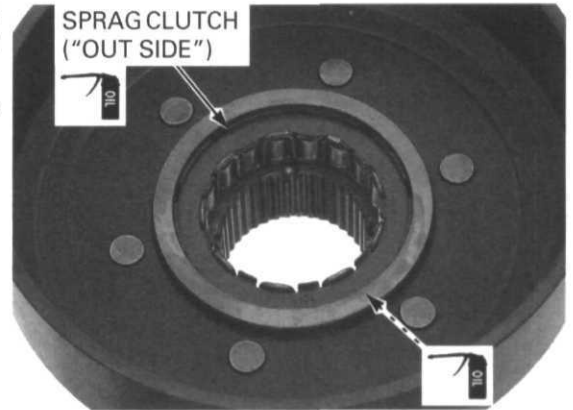
*Be careful not to damage the clutch weights while compressing.*

Install the E-clips into the spindle grooves with its gap facing towards the locating pin by using the pliers while compressing the outer plate.



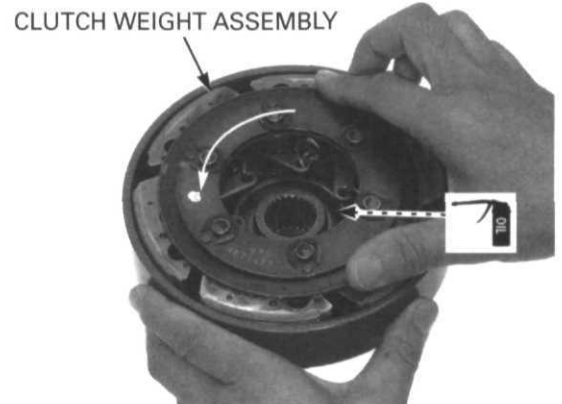
Apply engine oil to the sprag clutch entire surface and the sprag clutch contacting surface of the clutch drum.

Install the sprag clutch into the clutch drum with the "OUT SIDE" mark facing up.



Apply engine oil to the sprag clutch contacting surface of the drive plate boss.

Install the clutch weight assembly while turning it counterclockwise.



### INSTALLATION

Set the centrifugal clutch assembly onto the crankshaft by aligning the splines of the drive plate and crankshaft, then align the splines of the clutch drum and primary drive gear by turning the clutch drum.

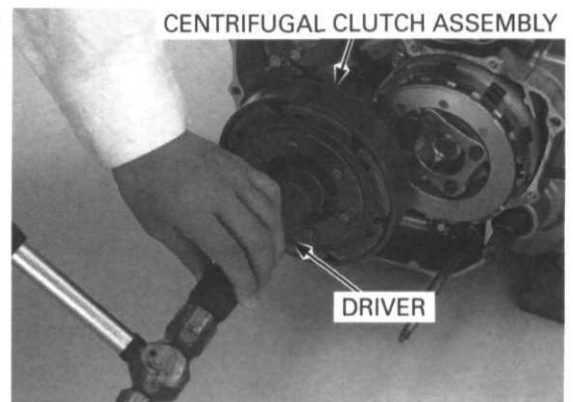
*Be careful not to damage the crankshaft threads.*

Tap the drive plate to seat it.

#### TOOL:

**Driver, 22 mm I.D.**

**07746-0020100**



Apply engine oil to threads of a new lock nut and install it with the washer.

Hold the drive plate of the centrifugal clutch assembly with the special tool and tighten the lock nut.

**TOOL:**

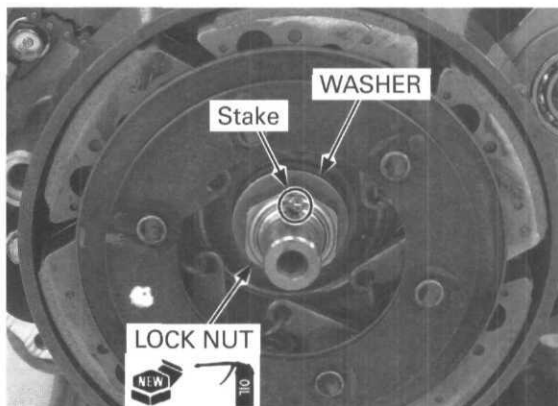
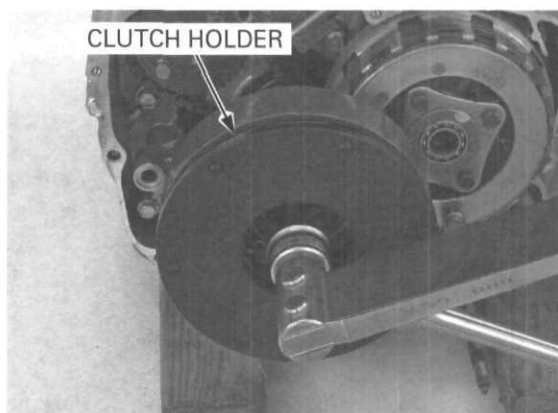
<b>Clutch holder</b>	<b>07ZMB-HN20000</b>
- holder plate	<b>07ZMB-HN20100</b>
- holder pin	<b>07ZMB-HN20200</b>
	<b>or</b>
	<b>07ZMB-HN2A100</b>
	<b>(U.S.A. only)</b>

**TORQUE: 118 N·m (12.0 kgf·m, 87 lbf·ft)**

*Be careful not to damage the crankshaft threads.*

Stake the lock nut into the crankshaft groove.

Install the front crankcase cover (page 10-23).



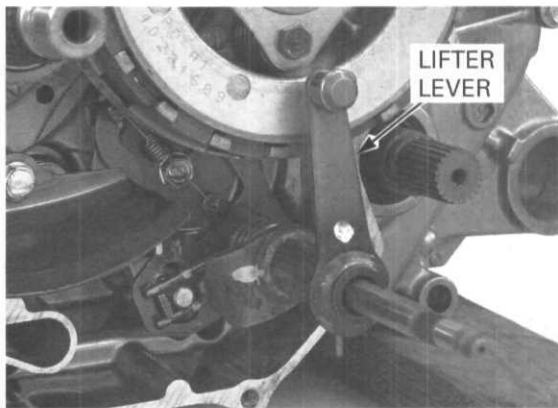
## CHANGE CLUTCH

### REMOVAL

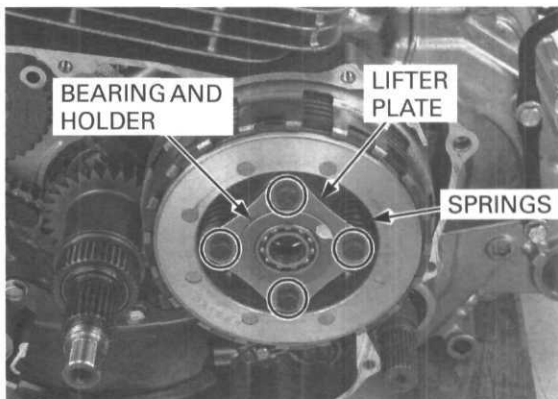
Remove the centrifugal clutch assembly (page 10-8).

Remove the following:

- lifter lever



- Loosen in a criss-cross pattern in several steps.*
- lifter bearing and bearing holder
  - clutch bolts
  - lifter plate
  - springs





## CLUTCH/GEARSHIFT LINKAGE

*Be careful not to damage the mainshaft threads.*

Unstake the clutch center lock nut.

Hold the pressure plate bosses with the special tool and loosen the clutch center lock nut.

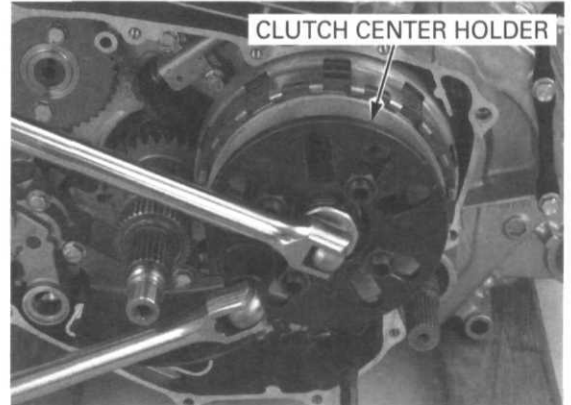
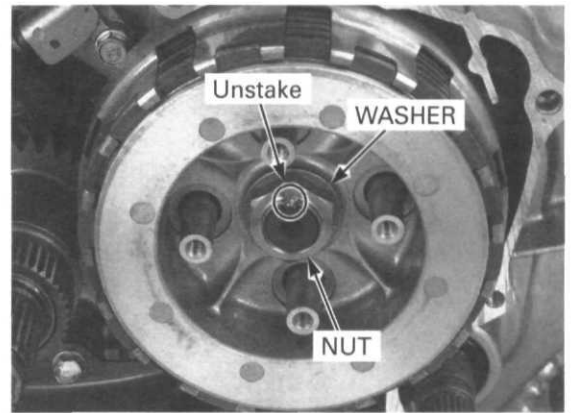
### TOOL:

Clutch center holder 07JMB-MN50301

### U.S.A. TOOLS:

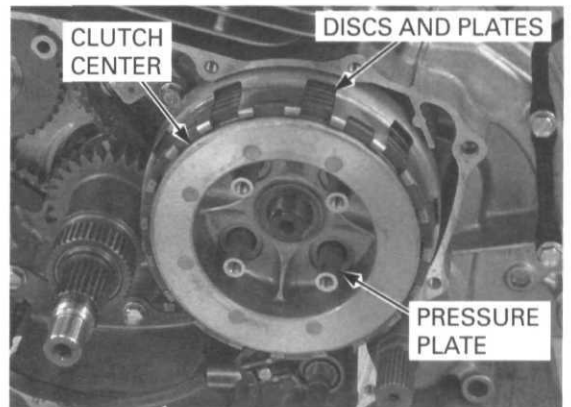
Holder plate 07HGB-001010B or 07HGB-001010A  
with  
Holder collar A 07HGB-001020B or 07HGB-001020A

Remove the lock nut and washer.



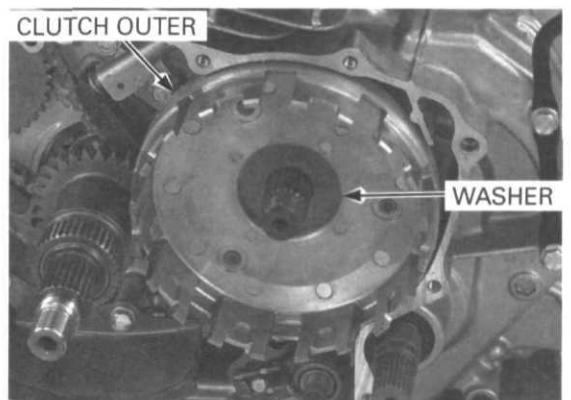
Remove the following as an assembly:

- clutch center
- clutch discs
- clutch plates
- pressure plate

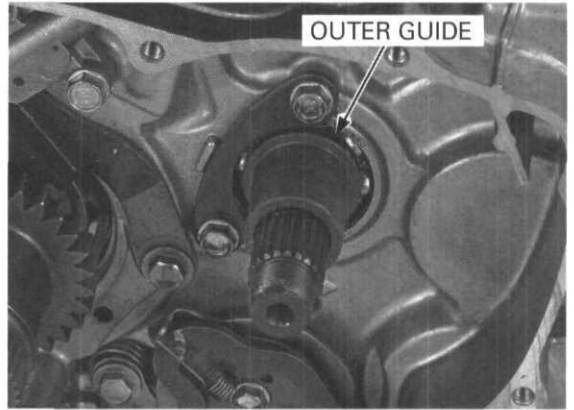


Remove the following:

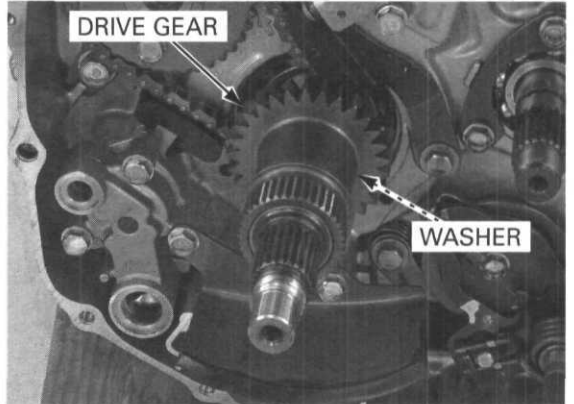
- thrust washer
- clutch outer



- outer guide



Remove the primary drive gear and washer from the crankshaft.



## INSPECTION

### LIFTER BEARING

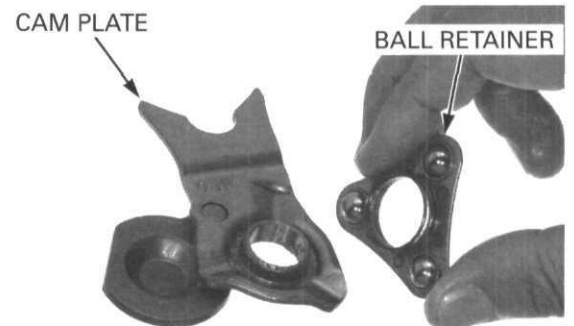
Turn the inner race of the lifter bearing with your finger.  
The bearing should turn smoothly and quietly.  
Replace if necessary.

Check the lifter plate for deformation or damage.



### LIFTER CAM

Check the lifter lever, cam plate and ball retainer for abnormal wear or damage.



## CLUTCH/GEARSHIFT LINKAGE

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Check the adjusting plate for wear or damage.



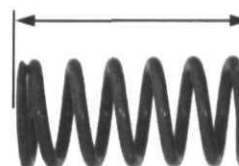
### CLUTCH SPRING

*Replace the clutch springs as a set.*

Measure the clutch spring free length.

**SERVICE LIMIT: TM/FM: 42.49 mm (1.673 in)**

**FE: 41.23 mm (1.623 in)**



### CLUTCH DISC

*Replace the clutch discs and plates as a set.*

Check the clutch discs for signs of scoring or discoloration.

Measure the clutch disc thickness.

**SERVICE LIMIT: 2.3 mm (0.09 in)**



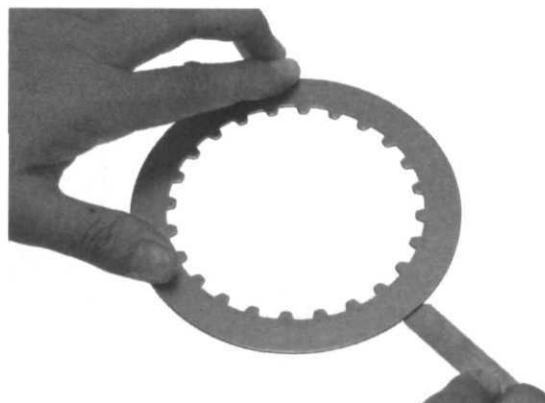
### CLUTCH PLATE

*Replace the clutch discs and plates as a set.*

Check the plates for discoloration.

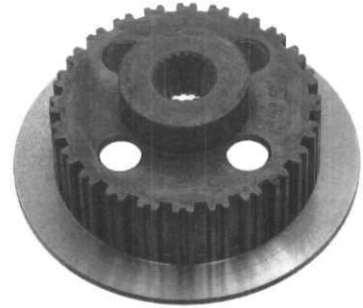
Check the plate warpage on a surface plate using a feeler gauge.

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



## CLUTCH CENTER

Check the clutch center and pressure plate for nicks, indentations or abnormal wear made by the plates.



## CLUTCH OUTER

Check the primary driven gear teeth for wear or damage.

Check the slots in the clutch outer for nicks, indentation or abnormal wear made by the clutch discs.

Measure the clutch outer I.D.

**SERVICE LIMIT: 29.05 mm (1.144 in)**



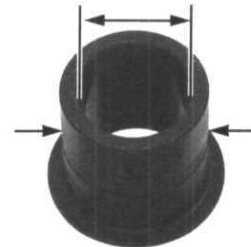
## CLUTCH OUTER GUIDE

Check the outer guide for wear or damage.

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

**SERVICE LIMITS: I.D.: 22.05 mm (0.868 in)**

**O.D.: 28.93 mm (1.139 in)**



## PRIMARY DRIVE GEAR

Check the gear teeth for wear or damage.

Measure the drive gear I.D.

**SERVICE LIMIT: 29.05 mm (1.144 in)**



## CLUTCH/GEARSHIFT LINKAGE

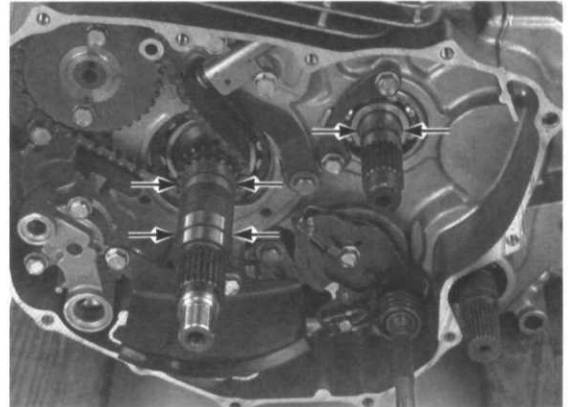
### MAINSHAFT AND CRANKSHAFT

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

**SERVICE LIMIT: 21.93 mm (0.863 in)**

Measure the crankshaft O.D. at the primary drive gear.

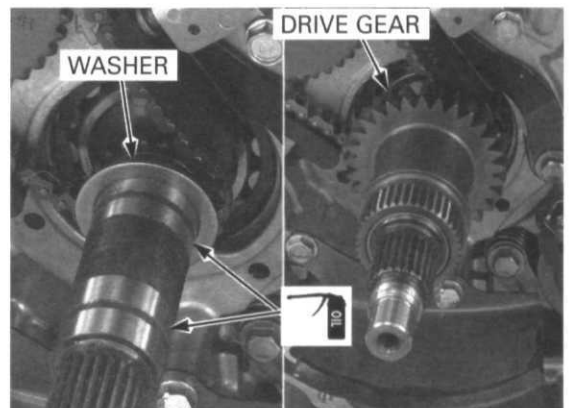
**SERVICE LIMIT: 28.93 mm (1.139 in)**



### ASSEMBLY

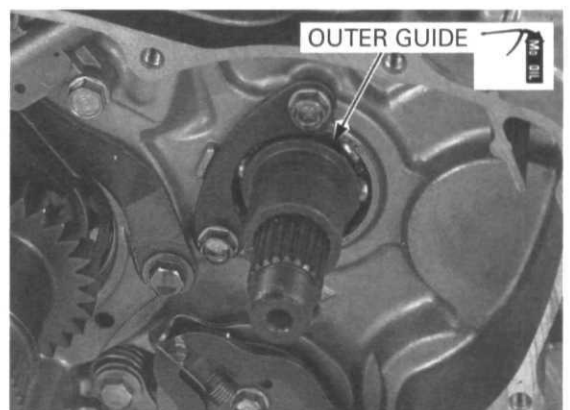
Apply engine oil to the primary drive gear inner surface.

Install the thrust washer and the drive gear onto the crankshaft.

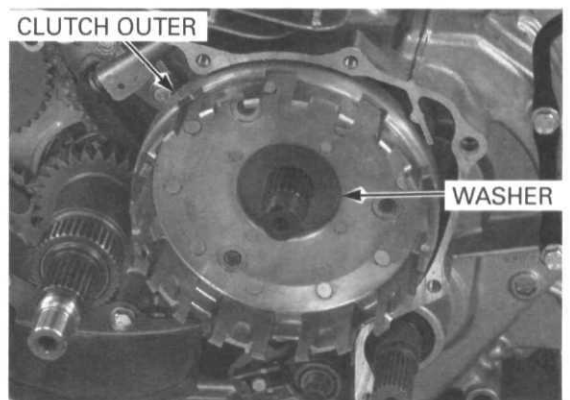


Apply molybdenum oil solution to the inner and outer surfaces of the clutch outer guide.

Install the outer guide onto the mainshaft.



Install the clutch outer and thrust washer.

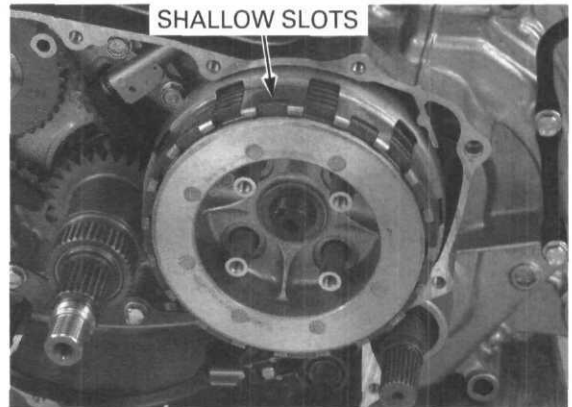
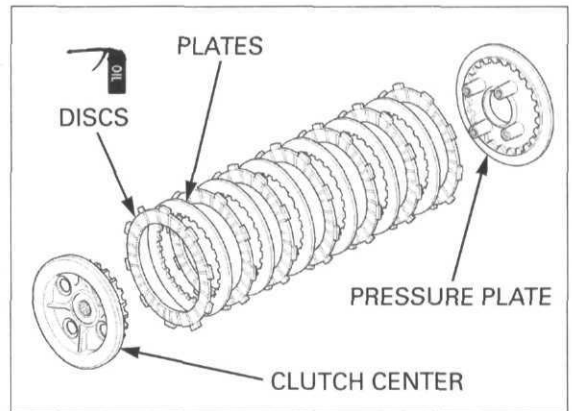


Coat the clutch discs with clean engine oil.

*Install the discs and plate alternately, starting with the disc.  
Set the outside clutch disc tabs into the shallow slots in the clutch outer.*

Assemble the following and install them onto the mainshaft:

- pressure plate
- seven discs
- six plates
- clutch center



Apply engine oil to the threads of a new lock nut and install the washer and lock nut.

Hold the pressure plate bosses with the special tool and tighten the lock nut.

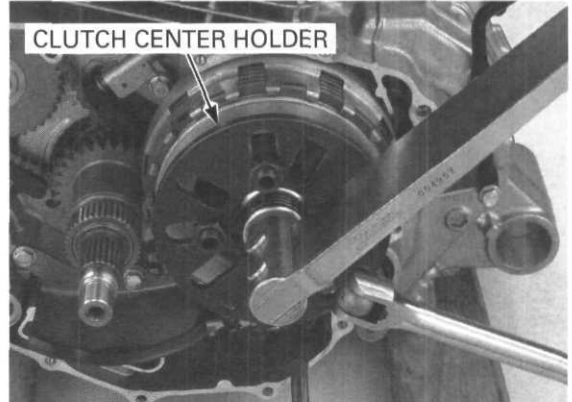
**TOOL:**

**Clutch center holder**                    **07JMB-MN50301**

**U.S.A. TOOLS:**

**Holder plate**                                **07HGB-001010B or  
07HGB-001010A**  
with

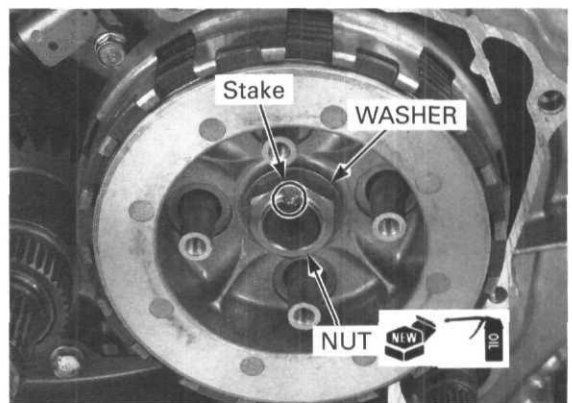
**Holder collar A**                            **07HGB-001020B or  
07HGB-001020A**



**TORQUE: 108 N·m (11.0 kgf·m, 80 lbf·ft)**

*Be careful not to damage the mainshaft threads.*

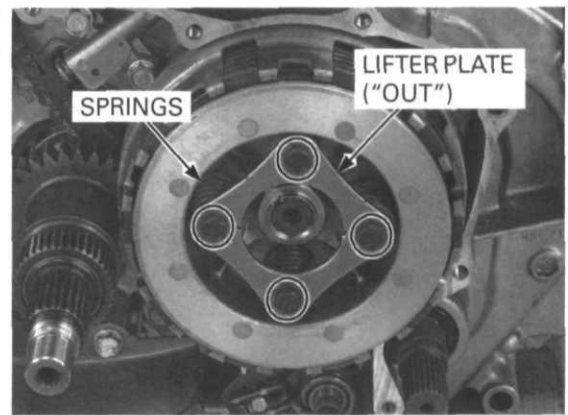
Stake the lock nut into the mainshaft groove.



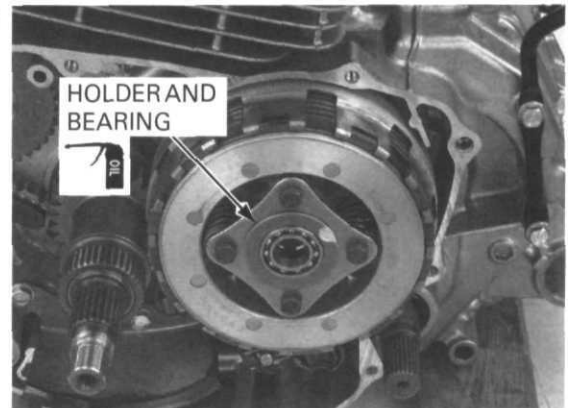
## CLUTCH/GEARSHIFT LINKAGE

Install the clutch springs and the lifter plate with the "OUT" mark facing out. Tighten the clutch bolts in a crisscross pattern in several steps.

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

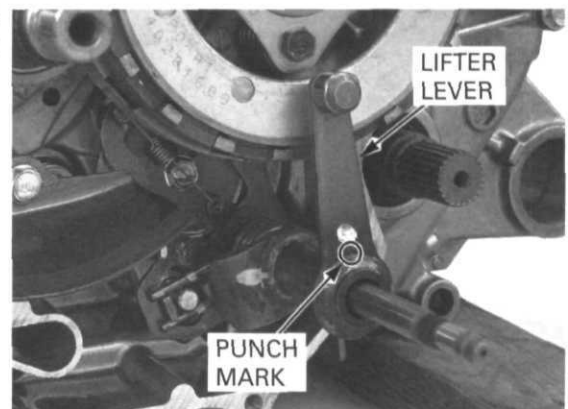


Apply engine oil to the lifter bearing, and install the bearing holder and bearing.



Install the lifter lever by aligning the wide groove (indicated by punch mark) with the wide tooth on the spindle spline.

Install the centrifugal clutch assembly (page 10-12).



## GEARSHIFT LINKAGE

**NOTE:**

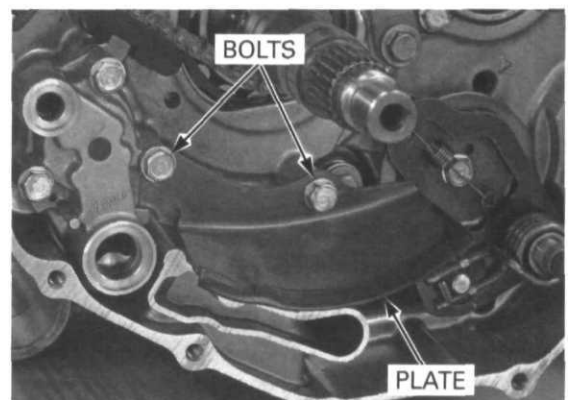
- For gearshift spindle service, see page 12-11.

### REMOVAL

Remove the change clutch (page 10-13).

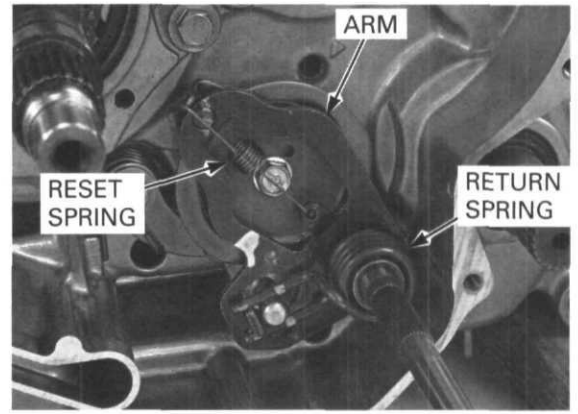
Remove the following:

- two bolts
- oil separator plate

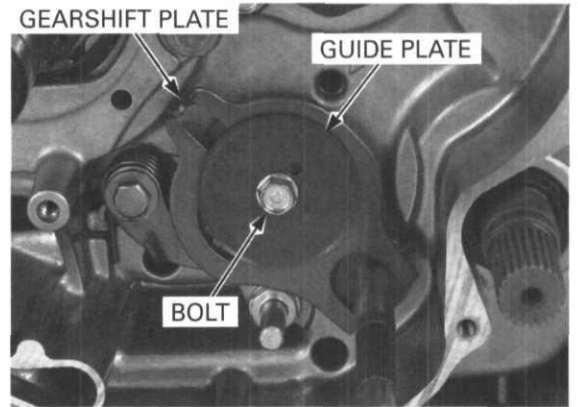


## CLUTCH/GEARSHIFT LINKAGE

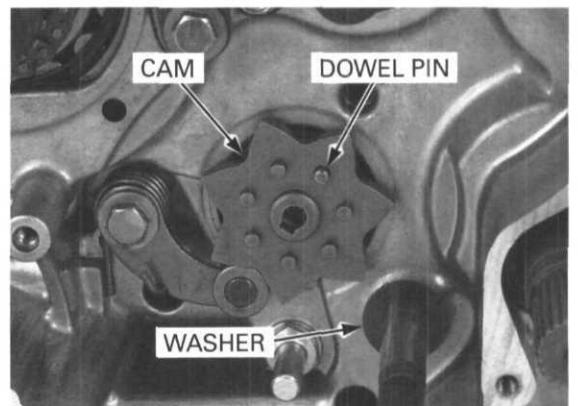
- reset spring
- return spring and gearshift master arm



- bolt
- guide plate
- gearshift plate

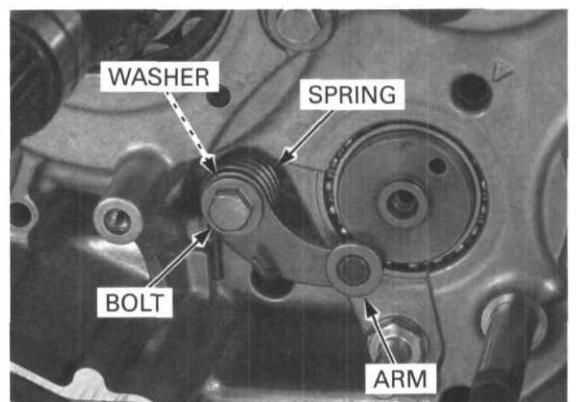


- washer
- gearshift cam (while holding stopper arm with a screwdriver)
- dowel pin



- bolt
- stopper arm
- washer
- return spring

Check the gearshift plate, cam plate and stopper arm for wear or damage.  
Check the return springs for fatigue or damage.





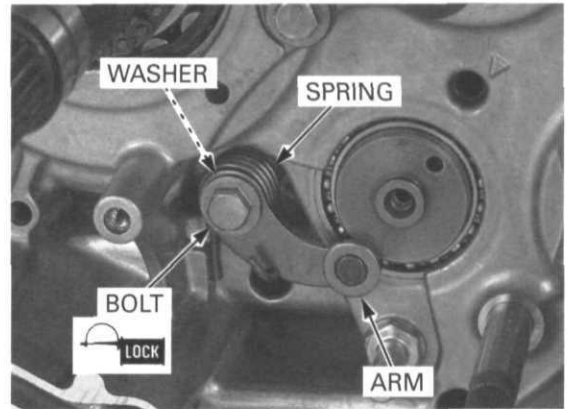
## CLUTCH/GEARSHIFT LINKAGE

### INSTALLATION

Apply locking agent to the stopper arm bolt threads.

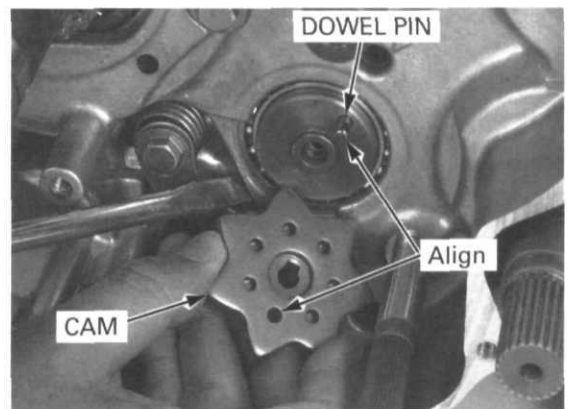
Install the return spring, washer (between the arm and crankcase), stopper arm and bolt, and tighten the bolt.

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



Install the dowel pin into the shift drum.

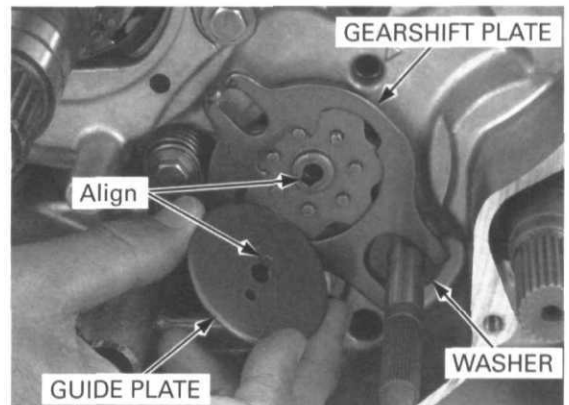
Hold the stopper arm with a screwdriver and install the gearshift cam by aligning the pin hole with the dowel pin.



Install the washer onto the sub-gearshift spindle.

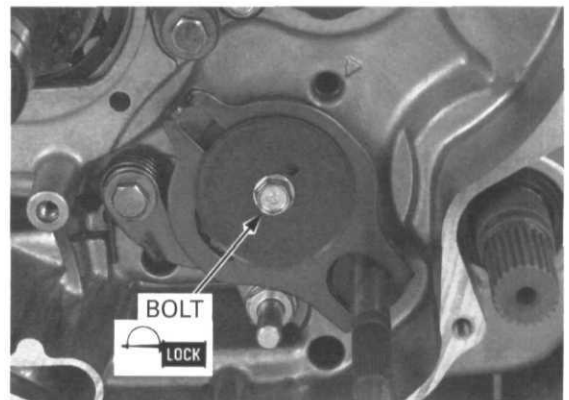
Install the gearshift plate onto the cam and spindle.

Install the guide plate by aligning the tab with the groove in the cam.



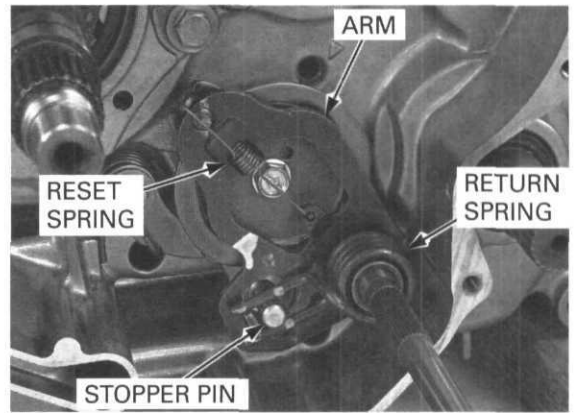
Apply locking agent to the cam bolt threads. Install the cam bolt and tighten it.

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



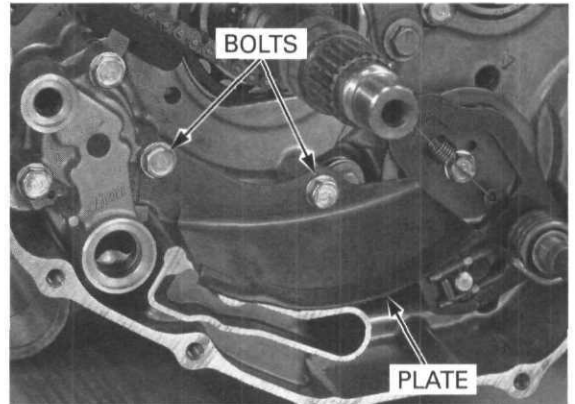
Install the master arm and return spring, aligning the spring ends with the stopper pin.

Install the reset spring as shown.



Install the separator plate and tighten the two bolts securely.

Assemble the change clutch (page 10-18).



## FRONT CRANKCASE COVER INSTALLATION

Clean the mating surfaces of the front crankcase cover and crankcase thoroughly, being careful not to damage them.

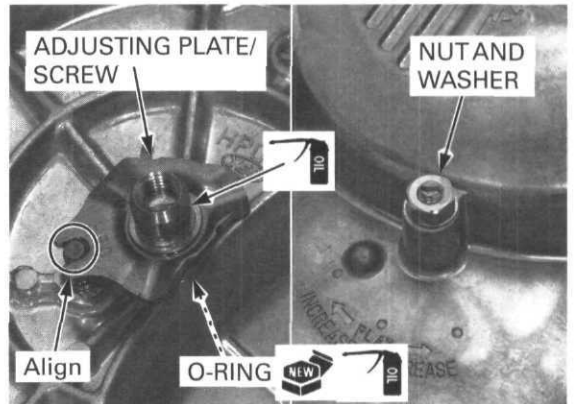
Blow through the oil passages in the crankcase cover with compressed air.

Coat a new O-ring with engine oil and install it onto the clutch adjusting screw.

Install the adjusting plate/screw by aligning the groove with the stopper pin.

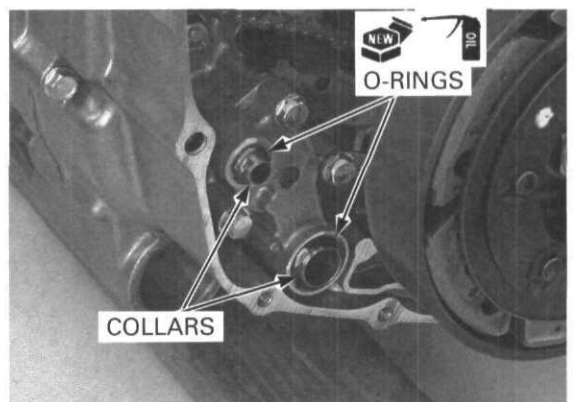
Install the washer and lock nut.

Apply engine oil to the boss of the adjusting plate.



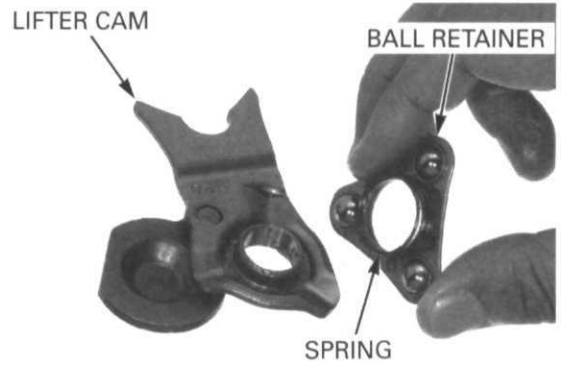
Install the joint collars into the oil pump.

Coat new O-rings with engine oil and install them onto the joint collars.



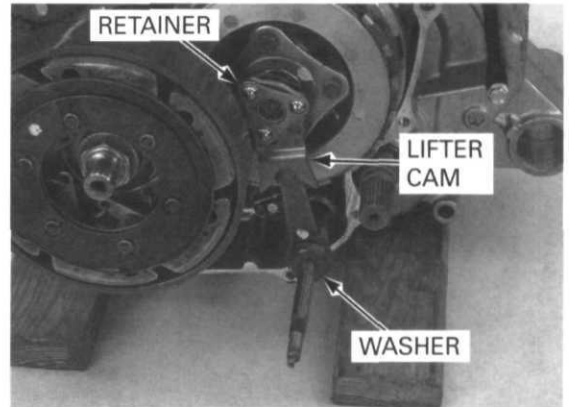
## CLUTCH/GEARSHIFT LINKAGE

Install the spring onto the ball retainer and install them onto the lifter cam.



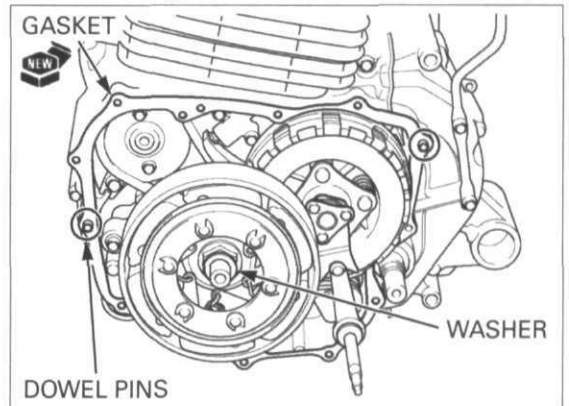
Install the ball retainer/lifter cam into the lifter bearing and onto the lifter lever.

Install the washer onto the sub-gearshift spindle.



Install the washer onto the crankshaft.

Install the two dowel pins and a new gasket.



Apply engine oil to the lips of a new spindle oil seal. Install the oil seal until it is fully seated.

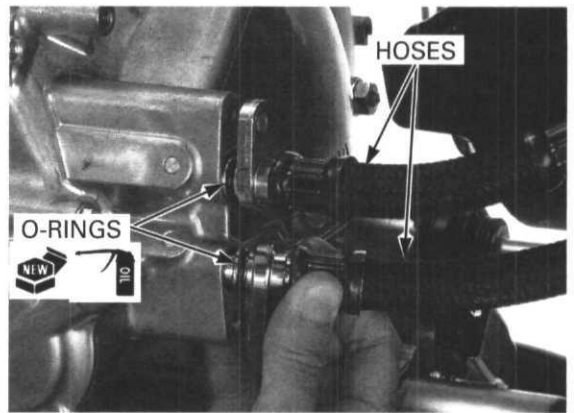
*Take care not to drop the ball retainer and lifter cam.*

Install the crankcase cover, being careful not to damage the oil seal lips.

Install the thirteen bolts and tighten them in a criss-cross pattern in several steps.



Coat new O-rings with engine oil and install them onto the oil cooler hose joints.



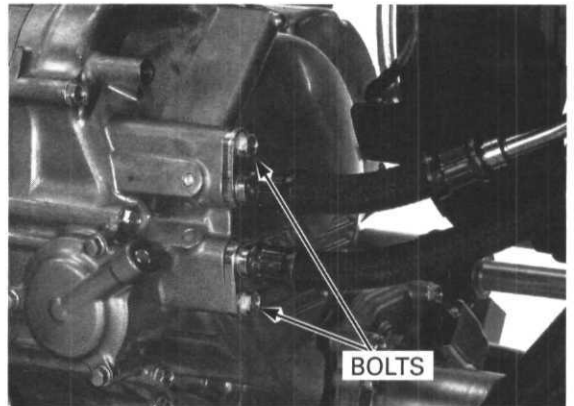
Connect the oil cooler hoses into the crankcase cover and tighten the joint bolts.

Install the following:

- FE model: shift control motor and reduction gears (page 22-20)
- left engine cover (page 3-15)
- right engine cover (page 20-11)
- engine guard (page 3-12)
- cooling fan (page 5-7)

Adjust the clutch system (page 4-19).

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

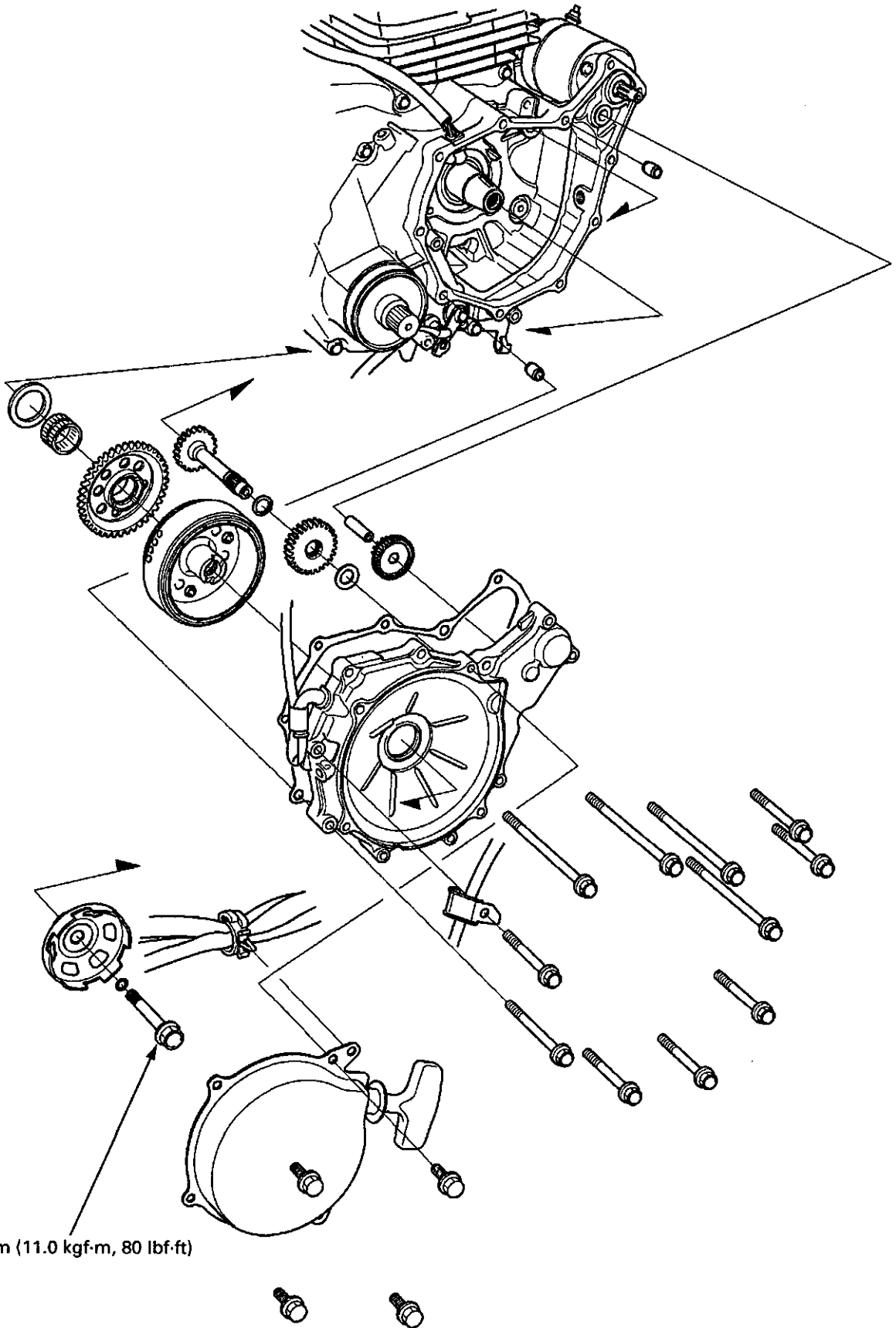


# 11. ALTERNATOR/STARTER CLUTCH

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<b>SYSTEM COMPONENTS</b> .....	<b>11-2</b>	<b>RECOIL STARTER</b> .....	<b>11-4</b>
<b>SERVICE INFORMATION</b> .....	<b>11-3</b>	<b>ALTERNATOR STATOR</b> .....	<b>11-7</b>
<b>TROUBLESHOOTING</b> .....	<b>11-3</b>	<b>FLYWHEEL/STARTER CLUTCH</b> .....	<b>11-10</b>

**ALTERNATOR/STARTER CLUTCH  
SYSTEM COMPONENTS**



## SERVICE INFORMATION

### GENERAL

- The recoil starter can be removed with the engine installed in the frame. To service the alternator stator, flywheel and starter clutch, the engine must be removed from the frame (these items can be serviced by removing the swingarm if no additional engine work is needed).
- Transmission lubricating oil is fed through the oil passages in the rear crankcase and alternator covers. Clean the oil passages before installing each cover.
- See page 18-8 for alternator stator inspection.
- See page 20-6 for starter motor servicing.

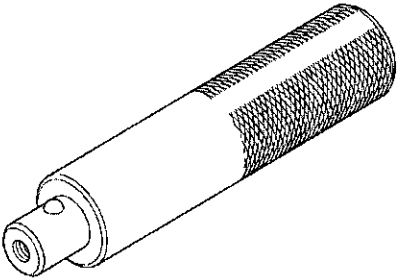
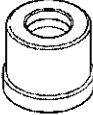

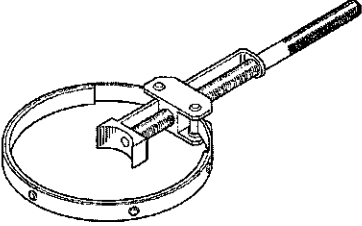
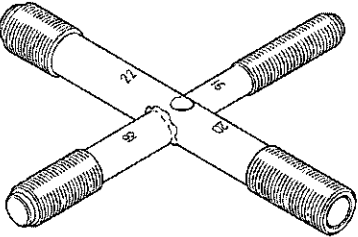
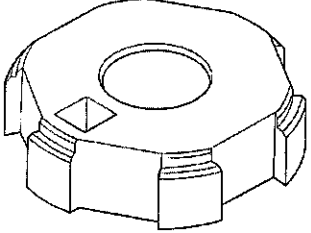
### SPECIFICATIONS

Unit: mm (in)		
ITEM	STANDARD	SERVICE LIMIT
Starter driven gear boss O.D.	51.705 – 51.718 (2.0356 – 2.0361)	51.69 (2.035)

### TORQUE VALUES

Starter clutch bolt	30 N·m (3.1 kgf·m, 22 lbf·ft) Apply locking agent to the threads.
Recoil starter driven pulley bolt	108 N·m (11.0 kgf·m, 80 lbf·ft) Apply engine oil to the threads and seating surface.
Alternator stator bolt	10 N·m (1.0 kgf·m, 7 lbf·ft)
Ignition pulse generator bolt	6 N·m (0.6 kgf·m, 4.4 lbf·ft) Apply locking agent to the threads.

### TOOLS

<p>Driver 07749-0010000</p> 	<p>Attachment, 24 x 26 mm 07746-0010700</p> 	<p>Pilot, 10 mm 07746-0040100</p> 
<p>Flywheel holder 07725-0040000</p>  <p>or equivalent commercially available in U.S.A.</p>	<p>Rotor puller 07733-0020001</p>  <p>or 07933-3950000</p>	<p>Recoil pulley holder 07SMB-HM70100</p> 

### TROUBLESHOOTING

#### Starter motor turns, but engine does not turn

- Faulty starter clutch
- Damaged starter reduction gears

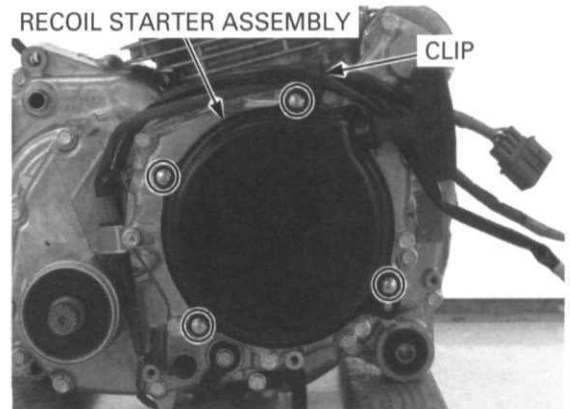
## ALTERNATOR/STARTER CLUTCH

### RECOIL STARTER

#### REMOVAL

Remove the following:

- wire clip (from the starter hosing)
- four bolts
- recoil starter assembly



#### STARTER ROPE REPLACEMENT

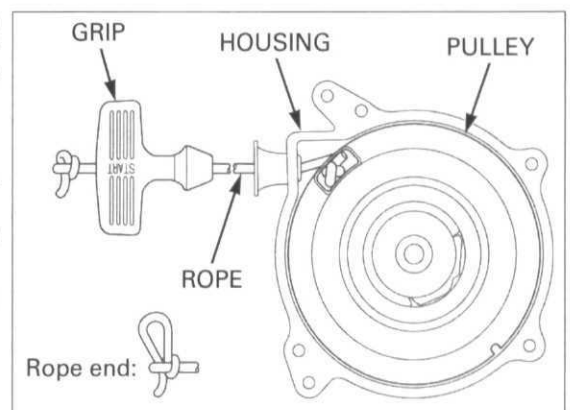
*When the rope has broken or the pulley has rewound, align the rope holes by turning the pulley 6-1/2 turns counter-clockwise and hold it.*

Pull the starter rope fully to align the rope holes in the drive pulley and housing, and secure the pulley with a vise pliers or equivalent tool to prevent the pulley from rewinding.

Untie the starter rope and remove the rope.

Insert a new starter rope through the pulley, housing and grip, and tie the rope ends in a square knot. Set the pulley side rope end into the cavity as shown.

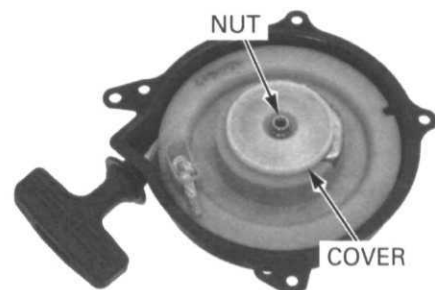
Carefully release the pulley and check the recoil starter for smooth operation by pulling the grip.



#### DISASSEMBLY

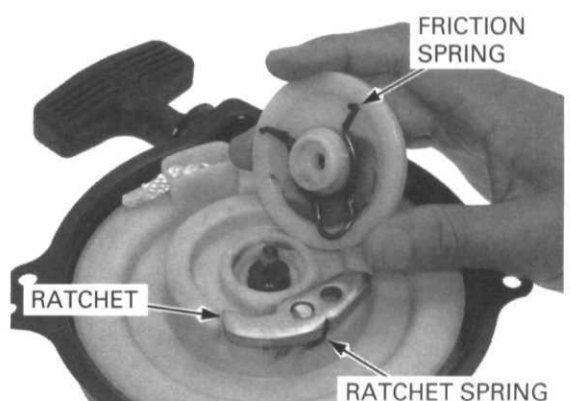
Remove the following:

- center nut
- ratchet cover and friction spring



- ratchet
- ratchet spring

Check each part for wear or damage.

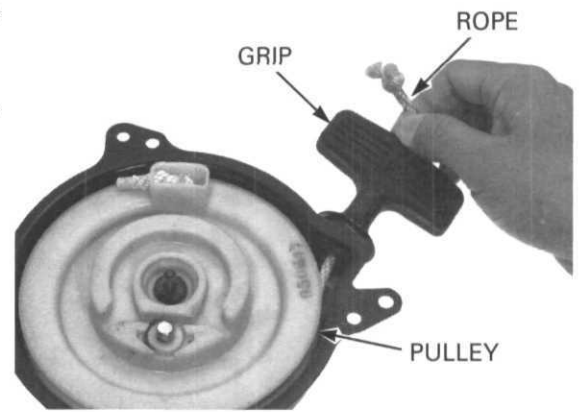




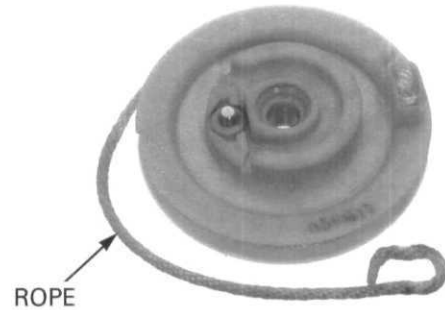
Untie the starter rope and remove the grip while holding the drive pulley.  
Release the starter rope slowly.

*Wear eye protection and use care when removing. The spring may pop out of the housing if care is not used.*

Carefully remove the drive pulley from the starter spring and pulley shaft of the housing.



Remove the starter rope from the drive pulley.  
Check the starter rope for wear or damage.

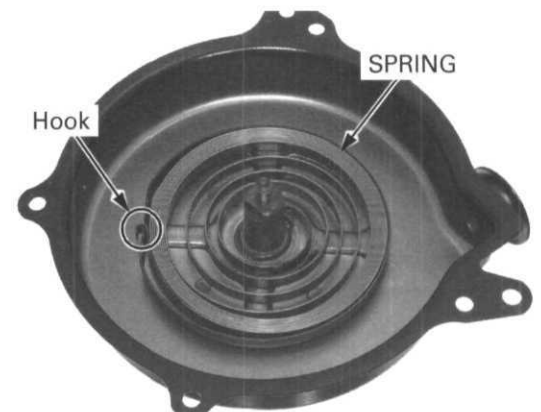


Check the starter spring and replace it with a new one if it is damaged or broken.

### ASSEMBLY

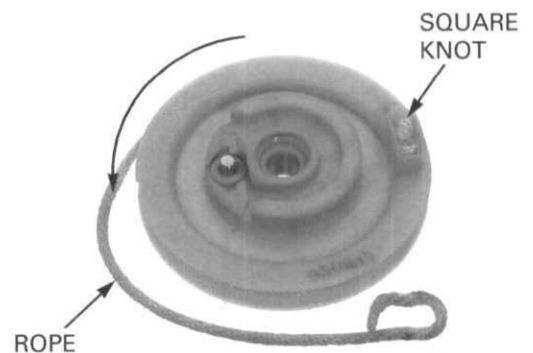
*Ensure that the spring does not pop-out of the housing during installation.*

Install the spring by hooking the outer end onto the starter housing as shown.



Install the starter rope and tie the rope end in a square knot (page 11-4).

Wrap the rope around the drive pulley in a counter-clockwise direction as viewed from the ratchet side as shown.

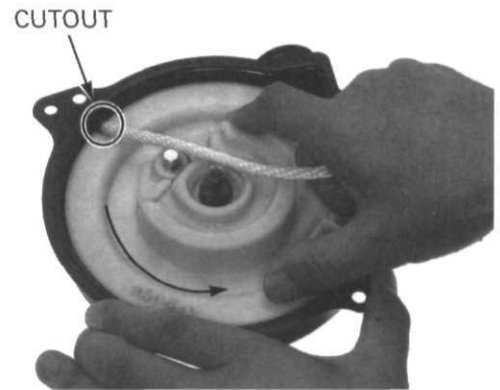
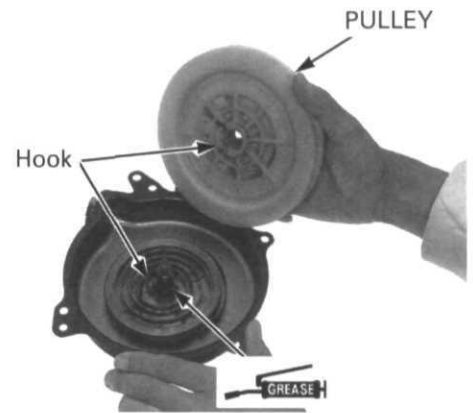


## ALTERNATOR/STARTER CLUTCH

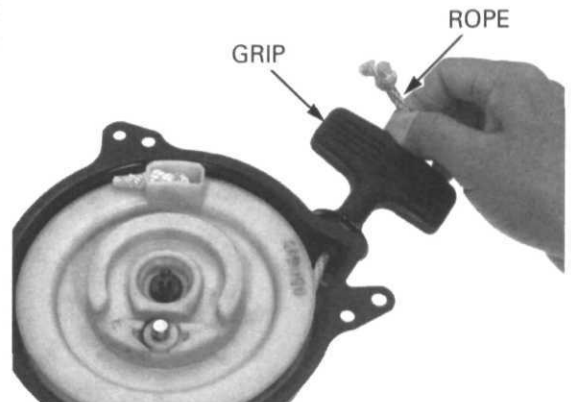
Apply grease to the pulley shaft.

Set the starter rope into the pulley cutout and install the pulley while hooking the spring inner end onto the pulley hook.

Preload the starter spring by turning the pulley 2-1/2 turns counterclockwise and hold it.



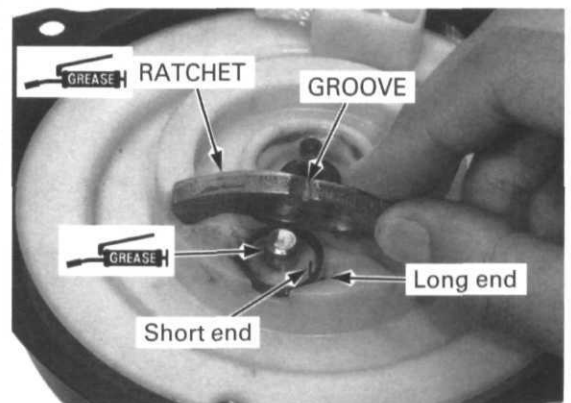
Route the rope end through the starter housing and grip holes while the pulley remains held in place. Tie the rope end in a square knot.



Install the ratchet spring by inserting the long end into the hole in the pulley.

Apply grease to the ratchet pivot pin and the sliding surfaces of the starter ratchet.

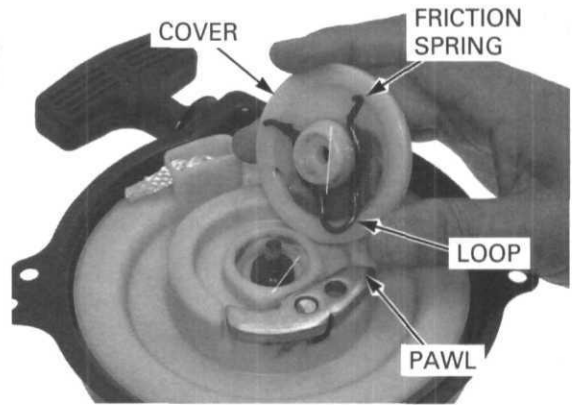
Install the starter ratchet onto the pivot pin while setting the spring short end onto the ratchet groove properly.



## ALTERNATOR/STARTER CLUTCH

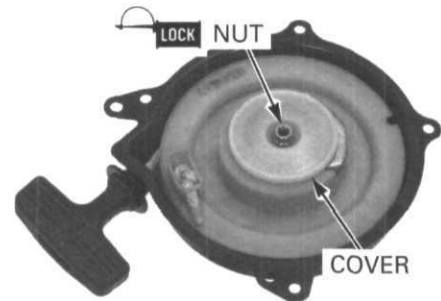
Install the friction spring onto the ratchet cover.

Install the ratchet cover by aligning the flats of the boss and pulley shaft so the friction spring loop is against the ratchet pawl.



Apply locking agent to the center nut threads. Install the nut and tighten it.

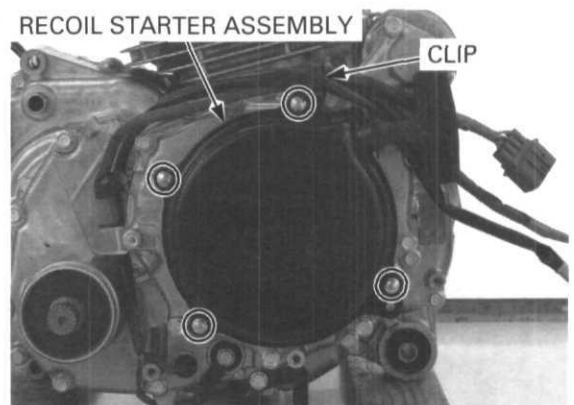
Check that the recoil starter for smooth operation by pulling the grip.



### INSTALLATION

Install the recoil starter assembly and tighten the four mounting bolts.

Install the wire clip into the recoil starter housing.



## ALTERNATOR STATOR

### ALTERNATOR COVER REMOVAL

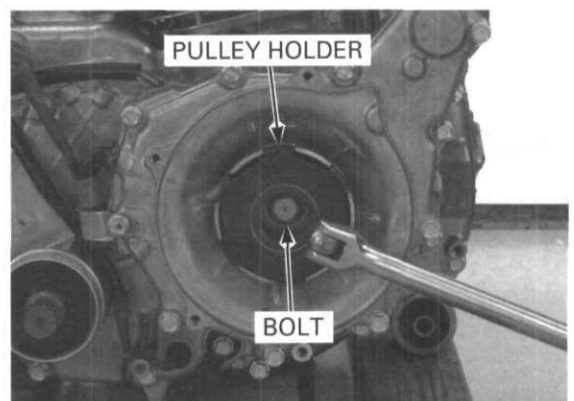
Remove the air cleaner housing (page 6-5).  
Remove the recoil starter (page 11-4).

Hold the recoil starter driven pulley using the special tool and loosen the driven pulley bolt.

#### TOOL:

Recoil pulley holder

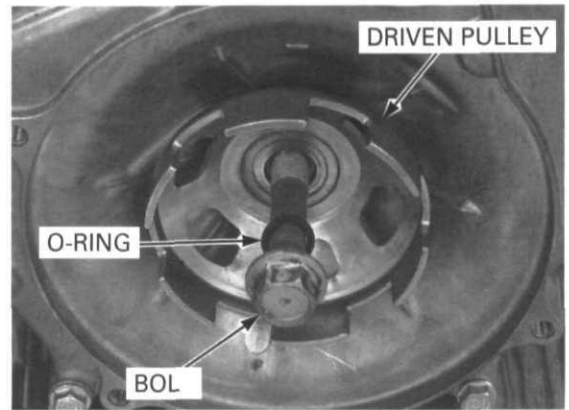
07SMB-HM70100



## ALTERNATOR/STARTER CLUTCH

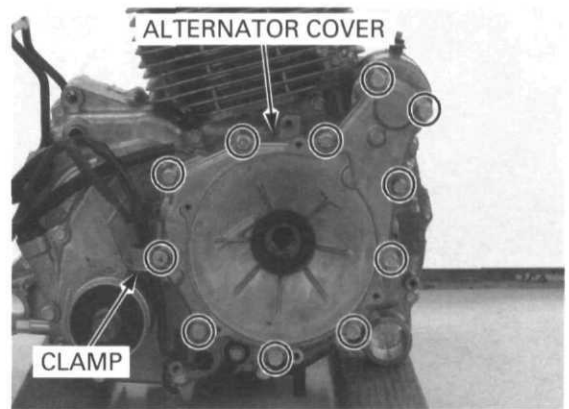
Remove the following:

- bolt and O-ring
- driven pulley

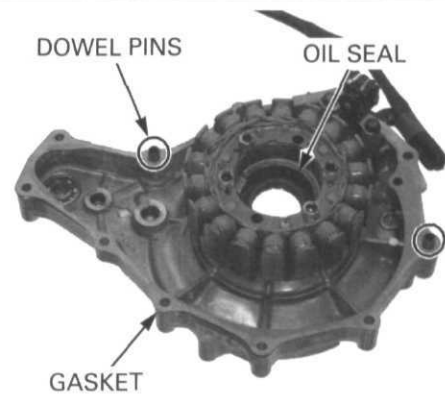


The cover (stator) is magnetically attracted to the fly-wheel, be careful during removal.

- eleven bolts and clamp
- alternator cover



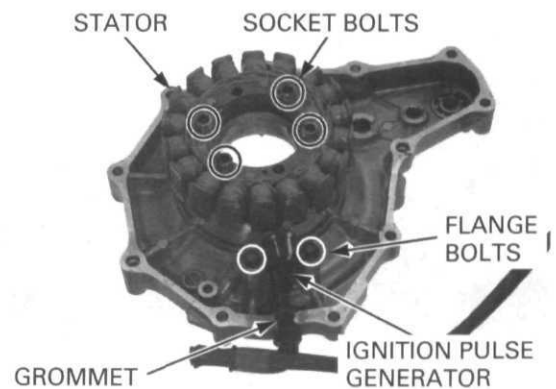
- two dowel pins
- gasket
- oil seal (drive from the stator side, using a 46 mm collar)



## STATOR AND IGNITION PULSE GENERATOR REMOVAL

Remove the following:

- grommet
- two flange bolts
- four socket bolts
- stator/ignition pulse generator assembly



**STATOR AND IGNITION PULSE GENERATOR INSTALLATION**

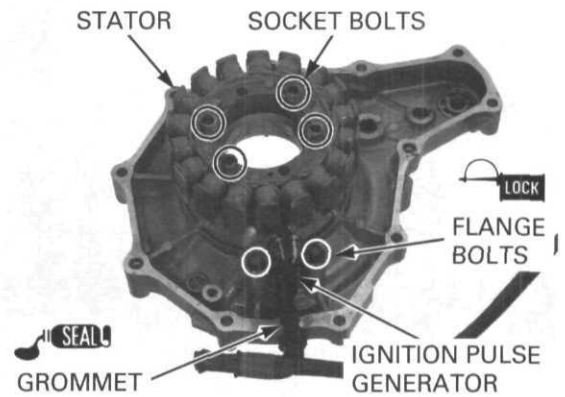
Set the stator/ignition pulse generator assembly onto the alternator cover.  
Install the socket bolts and tighten them.

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

Apply locking agent to the flange bolt threads.  
Install the bolts and tighten them.

**TORQUE: 6 N·m (0.6 kgf·m, 4.4 lbf·ft)**

Apply sealant to the grommet seating surface and install the grommet into the cover groove securely.



**ALTERNATOR COVER INSTALLATION**

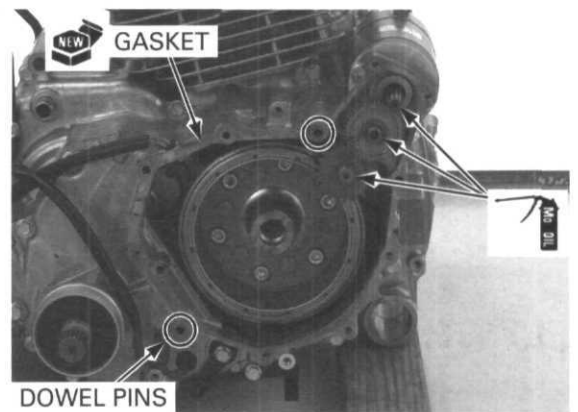
Clean the mating surfaces of the alternator cover and rear crankcase cover thoroughly, being careful not to damage them.

Blow through the oil passage in the alternator cover with compressed air.

Check that the starter reduction gears are installed in position.

Apply molybdenum oil solution to the reduction gear shaft journals and starter motor shaft end.

Install the dowel pins and a new gasket.



*The cover (stator) is magnetically attracted to the flywheel, be careful not to get anything caught between these parts when installing.*

Install the alternator cover.

Install the eleven bolts with the clamp and tighten them in a crisscross pattern several steps.

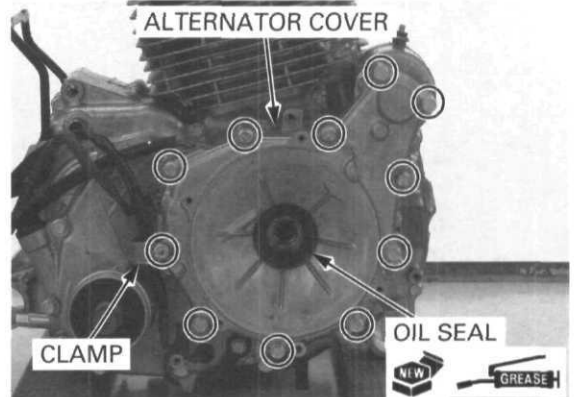
Secure the wires with the clamp.

Apply grease (MOBILITH SHC 100) to the lips of a new oil seal.

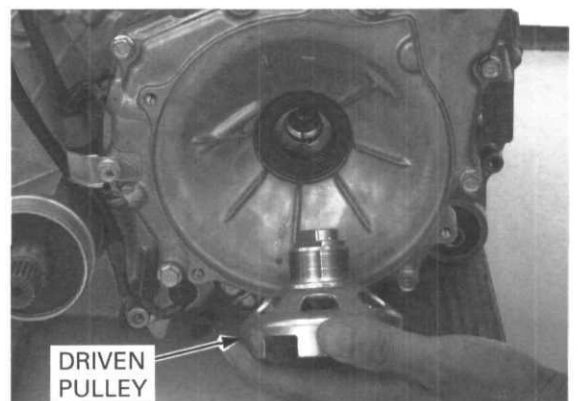
Install the oil seal until it is fully seated.

**TOOLS:**

- Driver** 07749-0010000
- Attachment, 52 x 55 mm** 07746-0010400

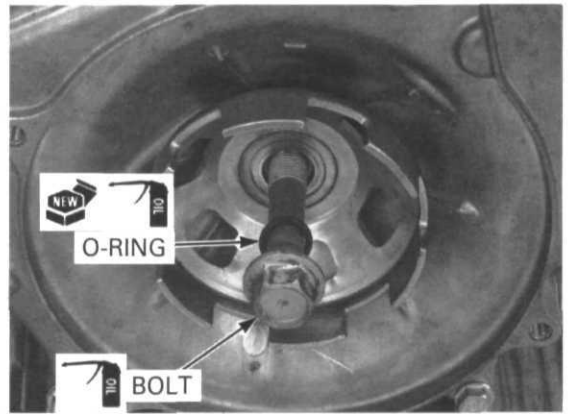


Install the driven pulley into the flywheel by aligning the flat surfaces.



## ALTERNATOR/STARTER CLUTCH

Coat a new O-ring with engine oil and install it onto the driven pulley bolt.  
Apply engine oil to the pulley bolt threads and seating surface, and install the bolt.

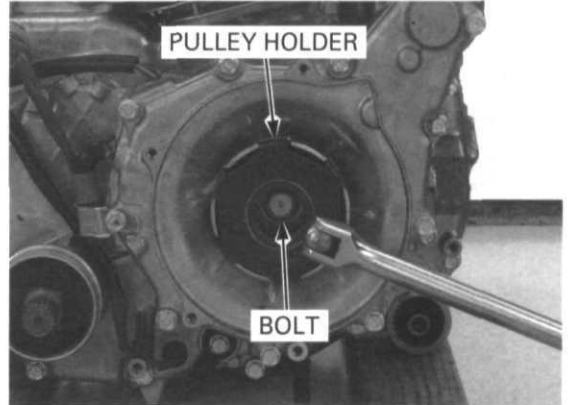


Hold the driven pulley using the special tool and tighten the bolt.

**TOOL:**  
**Recoil pulley holder** 07SMB-HM70100

**TORQUE: 108 N·m (11.0 kgf·m, 80 lbf·ft)**

Install the recoil starter (page 11-7).  
Install the air cleaner housing (page 6-5).



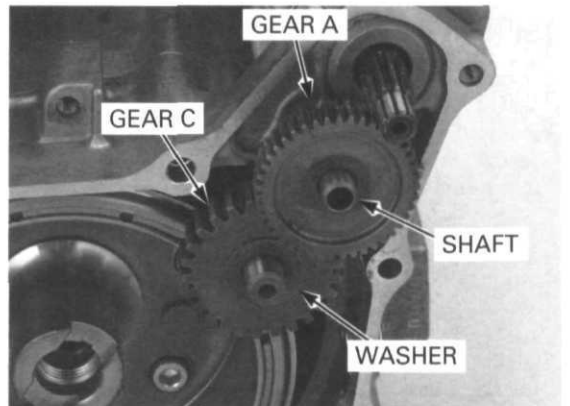
## FLYWHEEL/STARTER CLUTCH

### REMOVAL

Remove the alternator cover (page 11-7).

Remove the following:

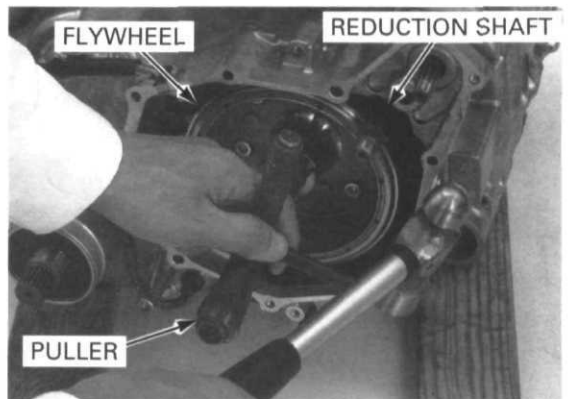
- starter reduction gear A and shaft
- washer and reduction gear C



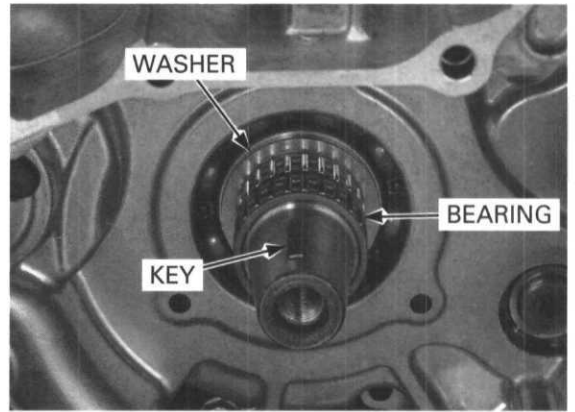
Remove the flywheel and starter driven gear using the special tool.

**TOOL:**  
**Rotor puller** 07733-0020001 or 07933-3950000

Remove the following:  
- starter reduction shaft



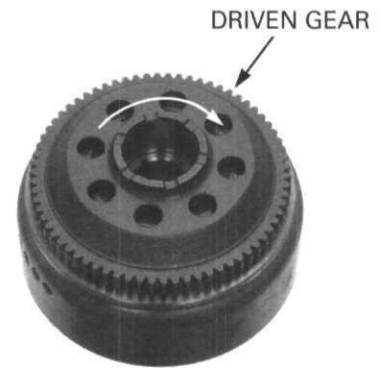
- needle bearing
- washer
- woodruff key



**STARTER CLUTCH DISASSEMBLY**

Make sure that the starter driven gear turns clockwise smoothly and does not turn counterclockwise.

Remove the driven gear while turning it clockwise.

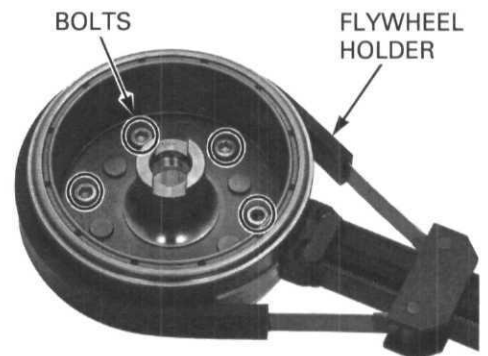


Hold the flywheel with the special tool and remove the starter clutch bolts.

**TOOL:**  
**Flywheel holder**

**07725-0040000 or equivalent commercially available in U.S.A.**

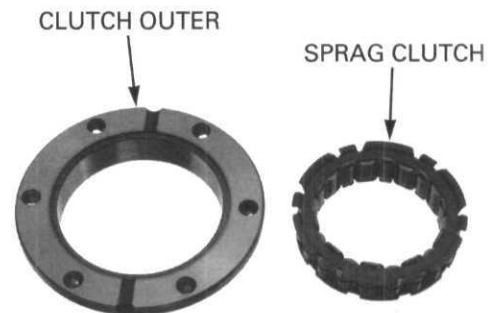
Remove the starter clutch assembly from the flywheel.



Remove the sprag clutch from the clutch outer.

**INSPECTION**

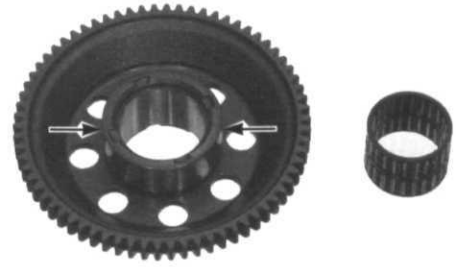
Check the starter clutch outer and sprag clutch for abnormal wear or damage.



## ALTERNATOR/STARTER CLUTCH

Check the starter driven gear teeth and needle bearing for wear or damage.

Measure the driven gear boss O.D.  
**SERVICE LIMIT: 51.69 mm (2.035 in)**



Check the reduction gears and shaft for wear or damage.



Check the starter motor bearing.  
If the inner race does not turn smoothly, quietly, or if the outer race fits loosely in the alternator cover, replace the bearing as follows.

### BEARING REPLACEMENT

Remove the stator and ignition pulse generator (page 11-8).

*Be sure to wear heavy gloves when handling the heated cover.*

Heat the alternator cover to approximately 80°C (176°F) evenly and slowly using a heat gun. Do not heat small areas individually.

#### NOTICE

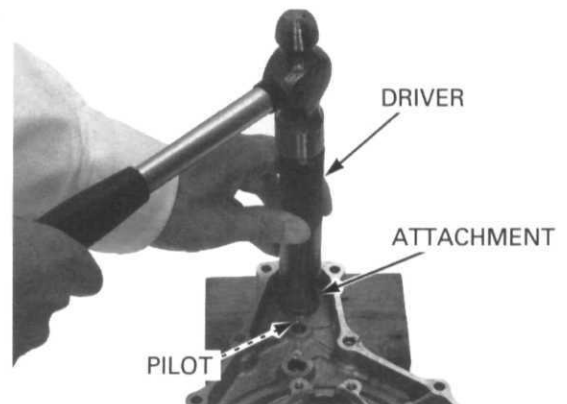
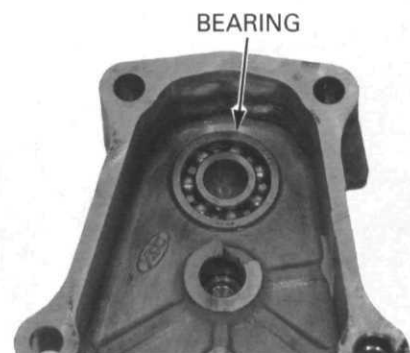
*Using a torch to heat the cover may cause warpage.*

Remove the bearing by tapping the cover.

Drive a new bearing squarely with the marked side facing up until it is fully seated.

#### TOOLS:

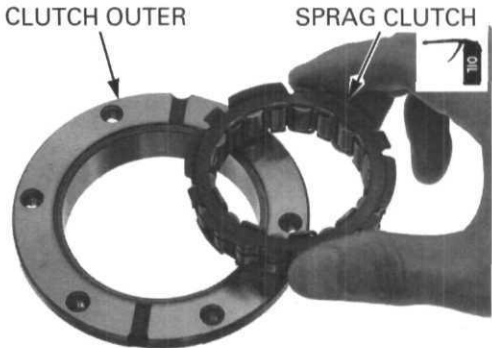
Driver	07749-0010000
Attachment, 24 x 26 mm	07746-0010700
Pilot, 10 mm	07746-0040100





**STARTER CLUTCH ASSEMBLY**

Lubricate the sprag clutch with engine oil and install it into the clutch outer with the flange facing the flywheel side.

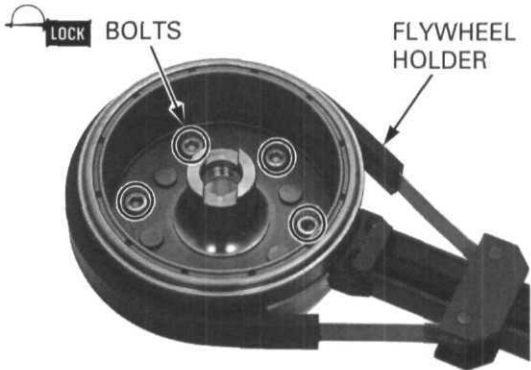


Apply locking agent to the starter clutch bolt threads. Install the flywheel onto the clutch outer and install the bolts.

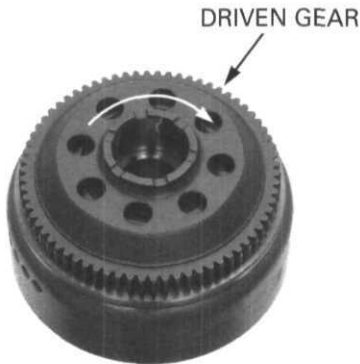
Hold the flywheel with the special tool and tighten the bolts.

**TOOL:**  
**Flywheel holder**                      **07725-0040000 or equivalent commercially available in U.S.A.**

**TORQUE: 30 N-m (3.1 kgf-m, 22 lbf-ft)**



Install the starter driven gear while turning it clockwise.



**INSTALLATION**

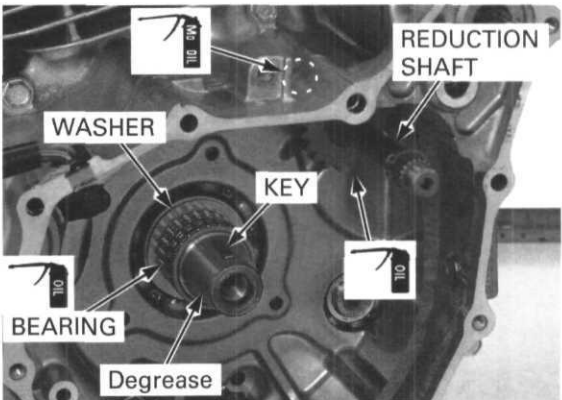
Lubricate the needle bearing with engine oil. Install the washer and needle bearing onto the crankshaft.

Install the woodruff key into the key groove.

Clean any oil from the tapered portions of the crankshaft and flywheel.

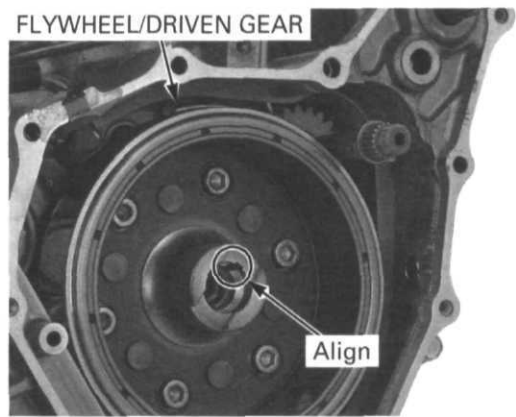
Apply molybdenum oil solution to the journal of the starter reduction shaft and apply engine oil to the gear teeth.

Install the reduction shaft into the crankcase.



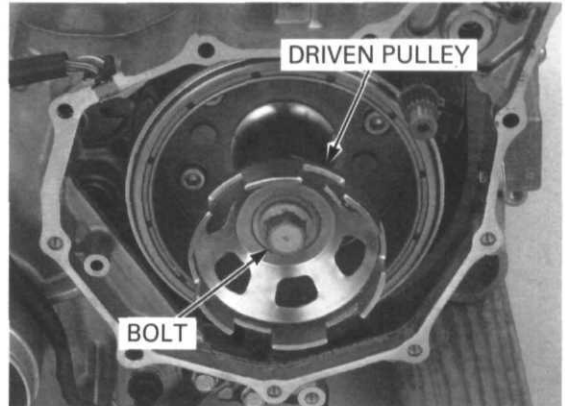
## ALTERNATOR/STARTER CLUTCH

Install the flywheel/starter driven gear, aligning the key way with the key on the crankshaft.  
Be sure to engage the starter driven and reduction gear teeth.

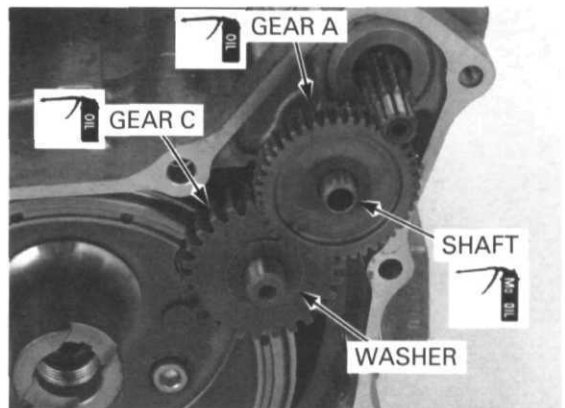


Temporarily install the recoil starter driven pulley and bolt, and tighten it to seat the flywheel (page 11-10).

Remove the bolt and driven pulley.



Apply engine oil to the reduction gear teeth.  
Apply molybdenum oil solution to the gear shaft.  
Install the reduction gears and shaft as shown.  
Install the washer onto the gear C.  
Install the alternator cover (page 11-9).

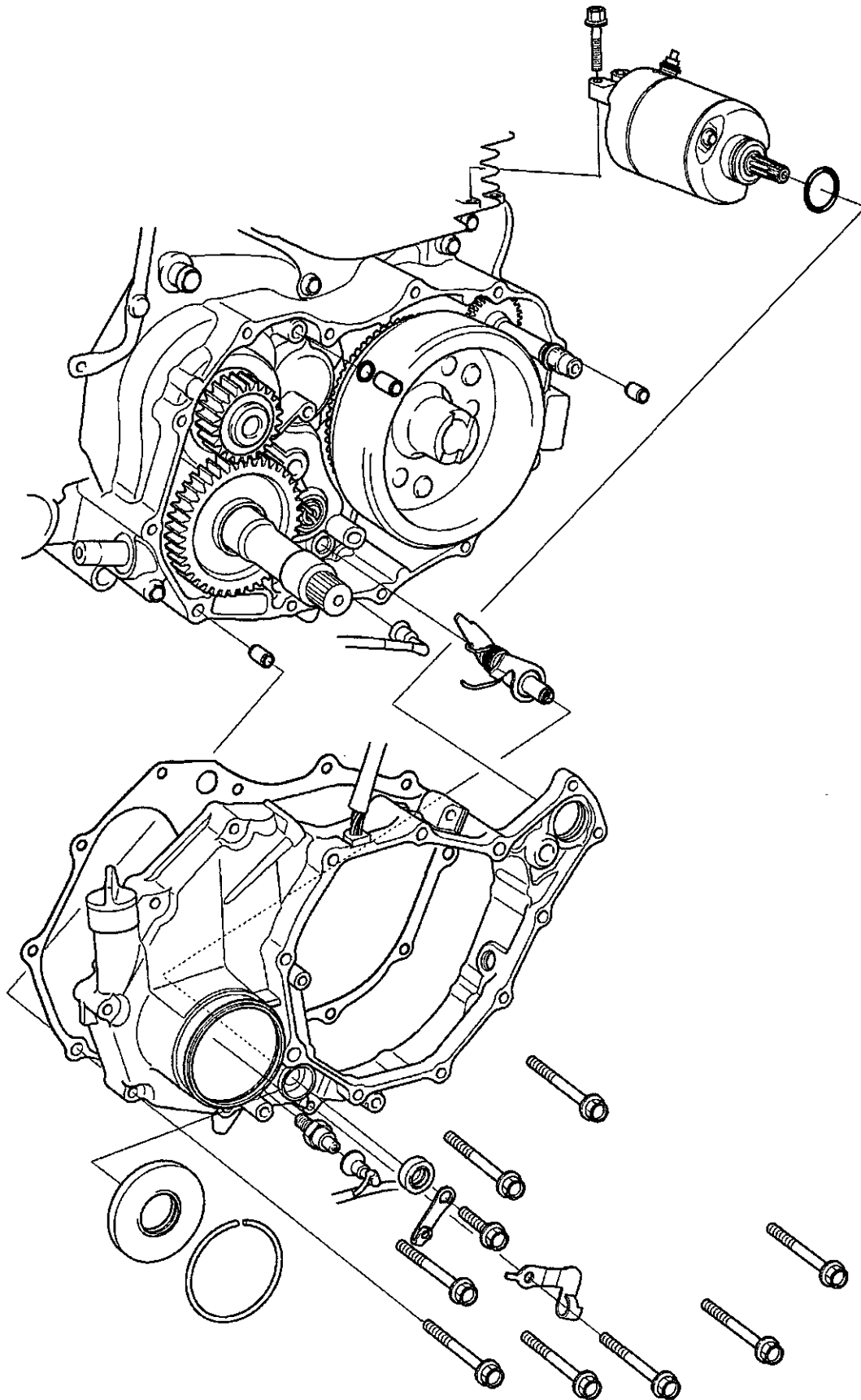


## **12. CRANKCASE/TRANSMISSION/CRANKSHAFT/BALANCER**

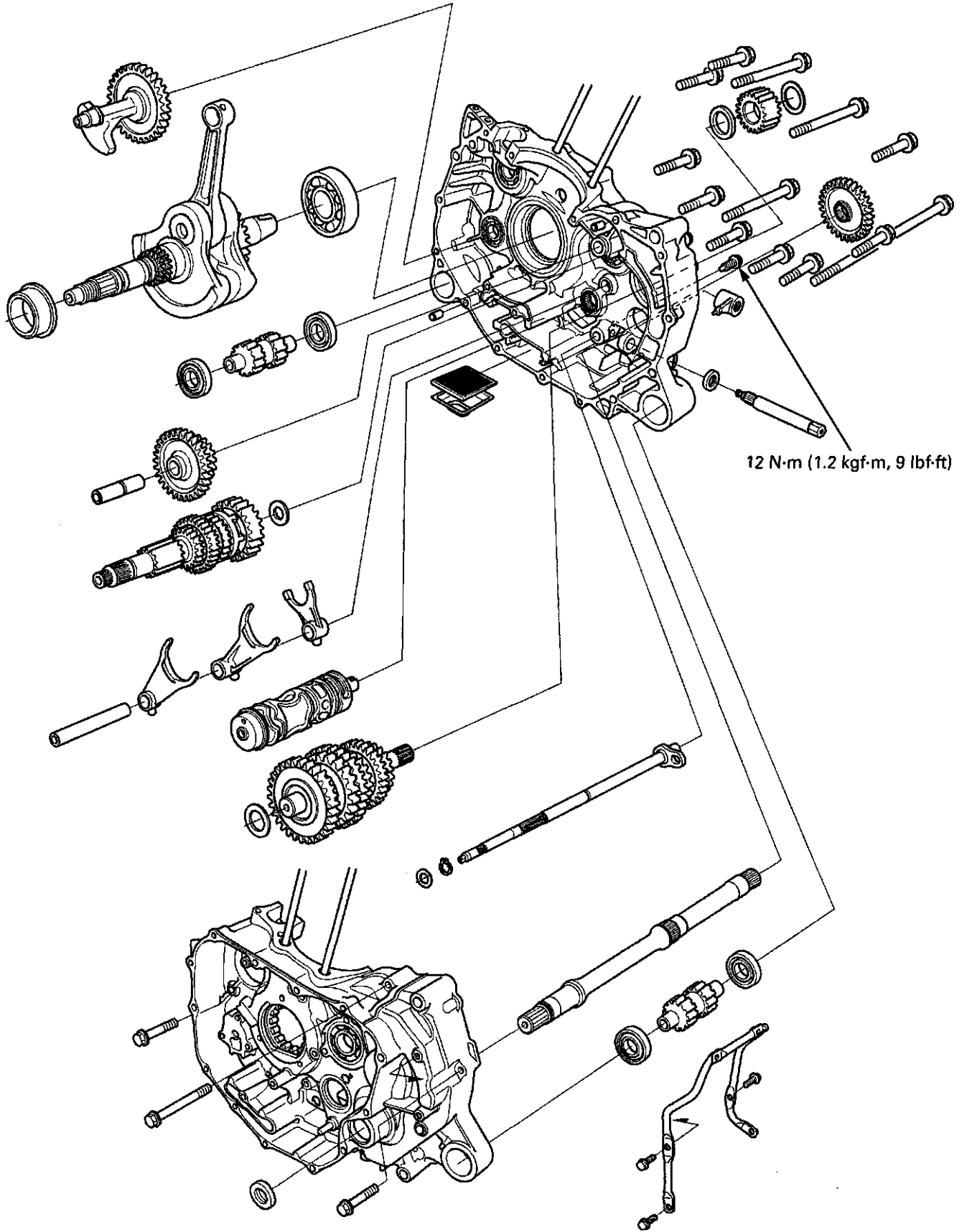
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<b>SYSTEM COMPONENTS .....</b>	<b>12-2</b>	<b>TRANSMISSION.....</b>	<b>12-11</b>
<b>SERVICE INFORMATION .....</b>	<b>12-4</b>	<b>CRANKSHAFT/BALANCER.....</b>	<b>12-20</b>
<b>TROUBLESHOOTING .....</b>	<b>12-7</b>	<b>CRANKCASE BEARING.....</b>	<b>12-24</b>
<b>CRANKCASE SEPARATION.....</b>	<b>12-8</b>	<b>CRANKCASE ASSEMBLY .....</b>	<b>12-27</b>

SYSTEM COMPONENTS



# CRANKCASE/TRANSMISSION/CRANKSHAFT/BALANCER



# CRANKCASE/TRANSMISSION/CRANKSHAFT/BALANCER

## SERVICE INFORMATION

### GENERAL

- The crankcase halves must be separated to service the transmission and crankshaft. To service these parts, the engine must be removed from the frame (page 7-2).
- Be careful not to damage the crankcase mating surfaces when servicing.
- Transmission lubricating oil is fed through the oil passages in the crankcase and crankcase cover. Clean the oil passages before assembling the crankcase halves.

### SPECIFICATIONS

Unit: mm (in)

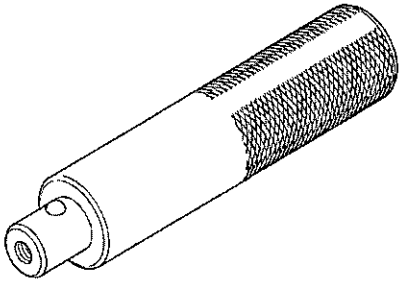
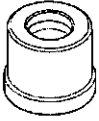
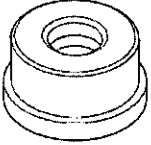
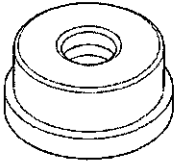
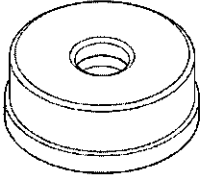
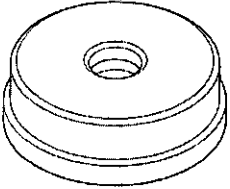
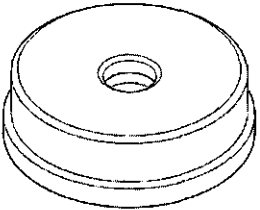




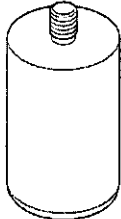
ITEM		STANDARD	SERVICE LIMIT
Shift fork	I.D.	Front, center	13.000 – 13.021 (0.5118 – 0.5126)
		Rear	13.000 – 13.018 (0.5118 – 0.5125)
	Claw thickness		4.93 – 5.00 (0.194 – 0.197)
	Shaft O.D.		12.966 – 12.984 (0.5105 – 0.5112)
Transmission	Gear I.D.	M4	25.000 – 25.021 (0.9843 – 0.9851)
		M5	20.000 – 20.021 (0.7874 – 0.7882)
		C1, C2, C3, CR	28.020 – 28.041 (1.1031 – 1.1040)
		Reverse idle	13.000 – 13.021 (0.5118 – 0.5126)
	Gear bushing O.D.	M4	24.959 – 24.980 (0.9826 – 0.9835)
		M5	19.966 – 19.984 (0.7861 – 0.7868)
		C1	27.986 – 28.005 (1.1018 – 1.1026)
		C2, CR	27.979 – 28.000 (1.1015 – 1.1024)
		C3	27.959 – 27.980 (1.1007 – 1.1016)
	Gear-to-bushing clearance	M4	0.020 – 0.062 (0.0008 – 0.0024)
		M5	0.016 – 0.055 (0.0006 – 0.0022)
		C1	0.015 – 0.055 (0.0006 – 0.0022)
		C2, CR	0.020 – 0.062 (0.0008 – 0.0024)
	Gear bushing I.D.	M4	0.040 – 0.082 (0.0016 – 0.0032)
		M5	0.016 – 0.055 (0.0006 – 0.0022)
		C1	0.015 – 0.055 (0.0006 – 0.0022)
		C2, CR	0.020 – 0.062 (0.0008 – 0.0024)
	Mainshaft O.D.	at M4	21.959 – 21.980 (0.8645 – 0.8654)
		at M5	16.976 – 16.987 (0.6683 – 0.6688)
Reverse idle shaft O.D.		12.966 – 12.984 (0.5105 – 0.5112)	
Bushing-to-shaft clearance	M4	0.020 – 0.062 (0.0008 – 0.0024)	
	M5	0.029 – 0.058 (0.0011 – 0.0023)	
	Reverse idle gear-to-shaft clearance	0.016 – 0.055 (0.0006 – 0.0022)	
Crankshaft	Runout	-	
	Big end side clearance	0.05 – 0.65 (0.002 – 0.026)	
	Big end radial clearance	0.006 – 0.018 (0.0002 – 0.0007)	

### TORQUE VALUE

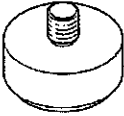
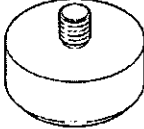
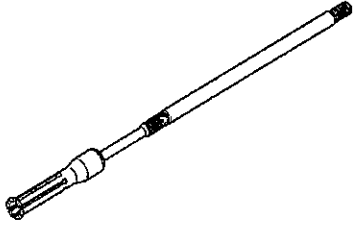
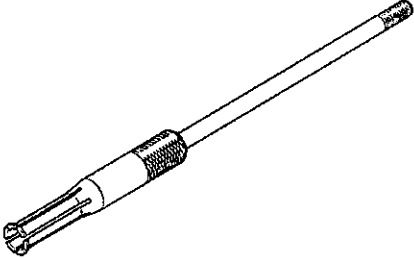
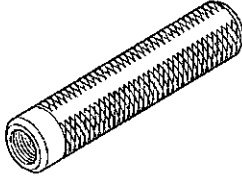
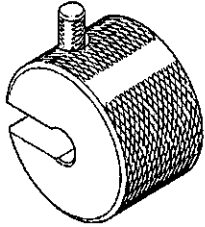
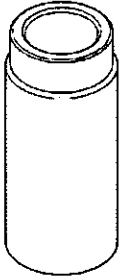
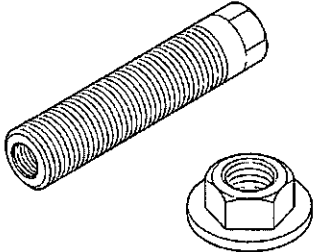
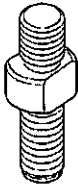
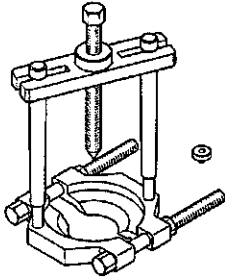
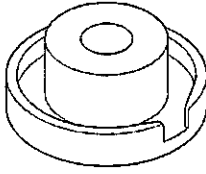
Secondary gearshift spindle stopper bolt 12 N·m (1.2 kgf·m, 9 lbf·ft) Apply locking agent to the threads.

# CRANKCASE/TRANSMISSION/CRANKSHAFT/BALANCER

## TOOLS

<p>Driver 07749-0010000</p> 	<p>Attachment, 24 x 26 mm 07746-0010700</p> 	<p>Attachment, 37 x 40 mm 07746-0010200</p> 
<p>Attachment, 42 x 47 mm 07746-0010300</p> 	<p>Attachment, 52 x 55 mm 07746-0010400</p> 	<p>Attachment, 62 x 68 mm 07746-0010500</p> 
<p>Attachment, 72 x 75 mm 07746-0010600</p> 	<p>Pilot, 17 mm 07746-0040400</p> 	<p>Pilot, 20 mm 07746-0040500</p> 
<p>Pilot, 22 mm 07746-0041000</p> 	<p>Pilot, 25 mm 07746-0040600</p> 	<p>Pilot, 32 mm 07MAD-PR90200</p> 

# CRANKCASE/TRANSMISSION/CRANKSHAFT/BALANCER

<p>Pilot, 35 mm 07746-0040800</p> 	<p>Pilot, 40 mm 07746-0040900</p> 	<p>Bearing remover, 17 mm 07936-3710300</p> 
<p>Bearing remover, 20 mm 07936-3710600</p> 	<p>Remover handle 07936-3710100</p> 	<p>Remover weight 07741-0010201</p>  <p>or 07936-3710200 or 07936-371020A (U.S.A. only)</p>
<p>Assembly collar 07965-VM00100</p> 	<p>Assembly shaft 07965-VM00200</p>  <p>or 07931-ME4010B and 07931-HB3020A (U.S.A. only)</p>	<p>Threaded adapter 07965-VM00300</p>  <p>or 07931-KF00200</p>
<p>Universal bearing puller 07631-0010000</p>  <p>or equivalent commercially available in U.S.A.</p>	<p>Attachment, 58 mm 07JAD-PH80101</p> 	



## TROUBLESHOOTING

### Excessive engine noise

- Worn, seized or chipped transmission gears
- Worn transmission bearings
- Worn connecting rod big end bearing
- Worn crankshaft main journal bearing
- Worn balancer bearing
- Improper balancer installation

### Transmission jumps out of gear

- Worn gear dogs or dog holes
- Worn shift drum guide groove
- Worn shift fork guide pin
- Worn gear shifter groove
- Worn shift fork
- Bent shift fork shaft
- Faulty gearshift linkage (page 10-5)

### Hard to shift

- Damaged shift fork
- Bent shift fork shaft
- Damaged shift fork guide pin
- Damaged shift drum guide groove
- Bent gearshift spindle
- Faulty gearshift linkage (page 10-5)

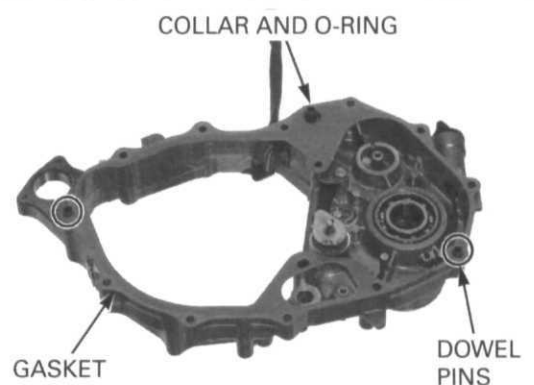
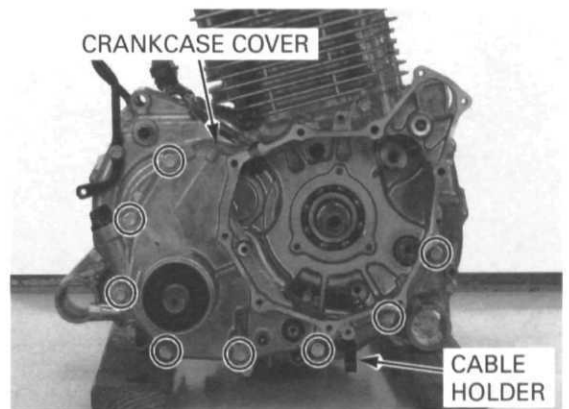
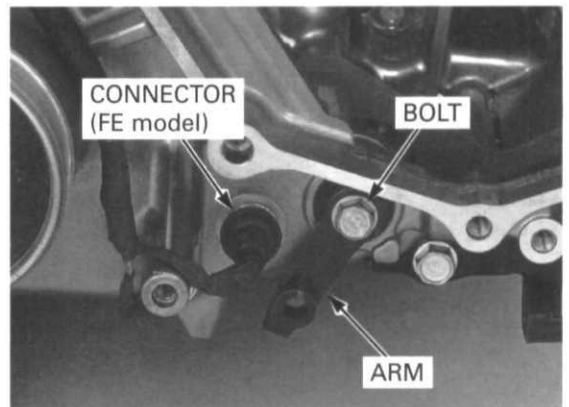
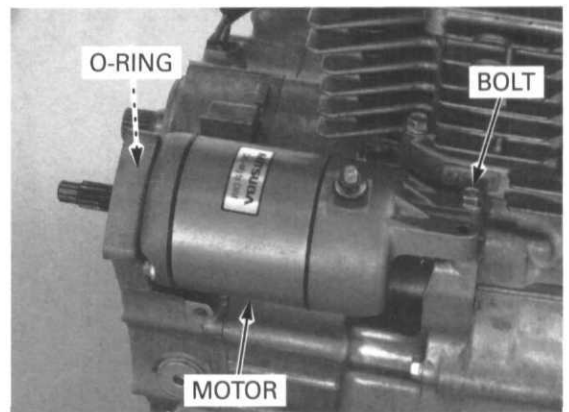
### Abnormal vibration

- Improper balancer timing

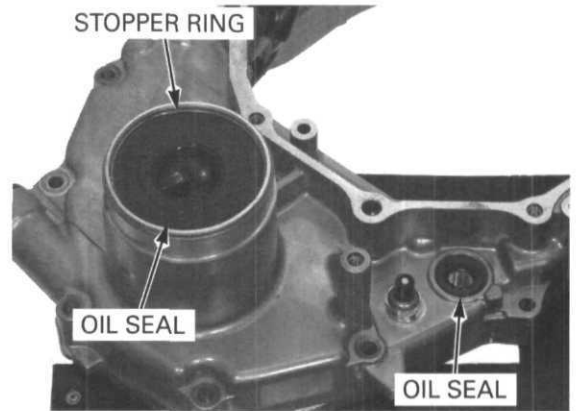
## CRANKCASE SEPARATION

Remove the following:

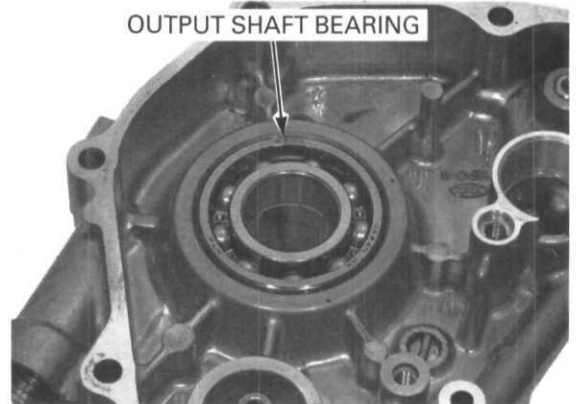
- engine (page 7-2)
  - cylinder head (page 8-9)
  - cylinder and piston (page 9-2)
  - clutch and gearshift linkage (page 10-2)
  - oil pump (page 5-2)
  - flywheel and starter clutch (page 11-2)
  - oil temperature sensor (page 21-18)
  - bolt
  - starter motor
  - O-ring
- 
- FE model: connector (from the reverse switch)
  - bolt
  - reverse stopper arm
- 
- eight bolts
  - cable holder
  - rear crankcase cover
- 
- joint collar and O-ring
  - two dowel pins
  - gasket



- stopper shaft oil seal
- stopper ring
- output shaft oil seal

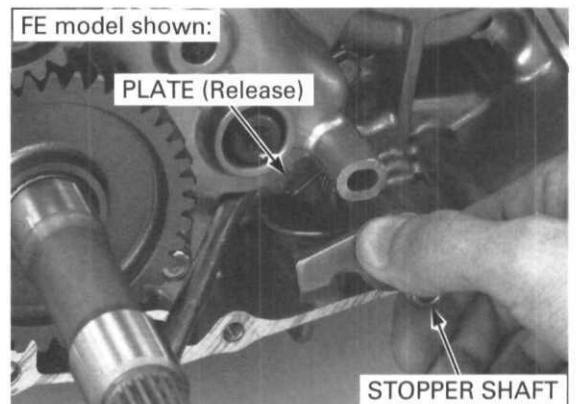


Check the output shaft bearing.  
If the inner race does not turn smoothly, quietly, or if the outer race fits loosely in the cover, replace the bearing (page 12-27).

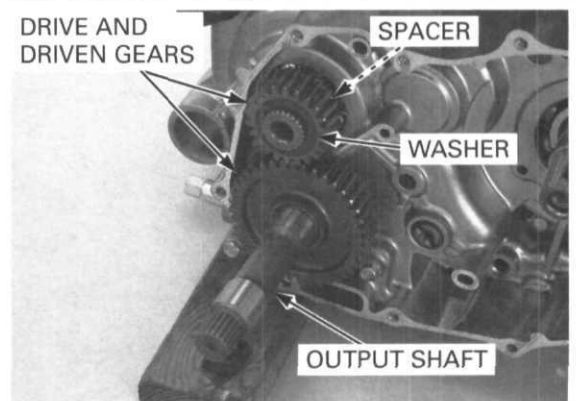


Remove the following:

- TM and FM models: thrust washer (from the reverse stopper shaft)
- stopper shaft (release the stopper plate from the shift drum with a screwdriver, then pull the shaft)



- washer
- output shaft drive gear
- spacer
- driven gear
- output shaft

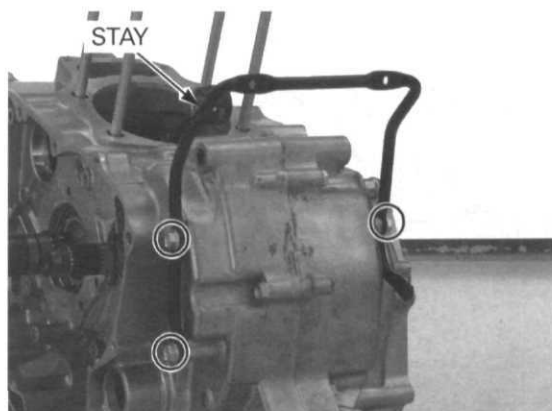


## CRANKCASE/TRANSMISSION/CRANKSHAFT/BALANCER

- oil seal (from the front crankcase)

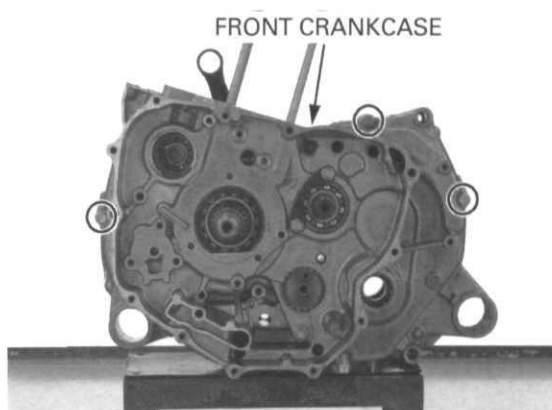


- three bolts
- engine cover stay



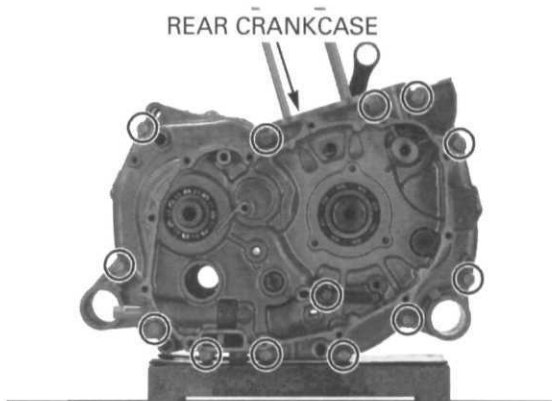
*Loosen the crankcase bolts in a criss-cross pattern in several steps.*

- three front crankcase bolts



- thirteen rear crankcase bolts

Place the crankcase assembly with the rear crankcase down.

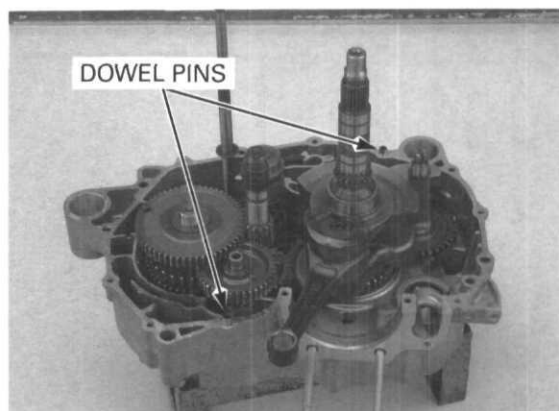


*Do not pry the crankcase apart with a screwdriver.*

Remove the front crankcase while tapping it at several locations with a soft hammer.

Remove the two dowel pins.

Remove any sealant material from the crankcase mating surfaces.



### OIL STRAINER CLEANING

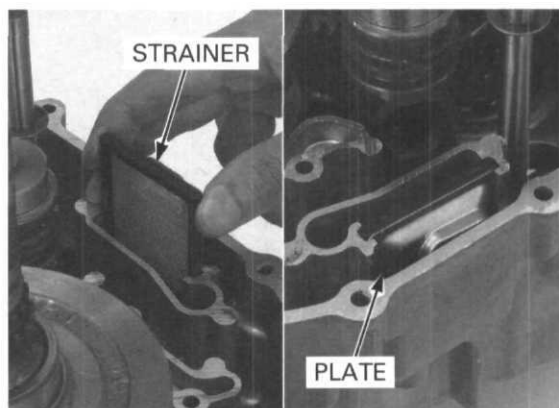
Remove the oil strainer and strainer plate.

Wash the strainer thoroughly in non-flammable or high flash point solvent until all accumulated dirt has been removed.

Blow dry it with compressed air to clean completely.

Before installing the strainer, the screen mesh should be examined closely for damage.

Install the strainer and plate with the wedge facing the crankcase.



## TRANSMISSION

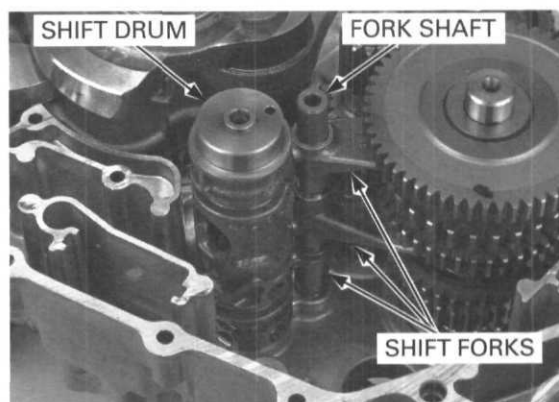
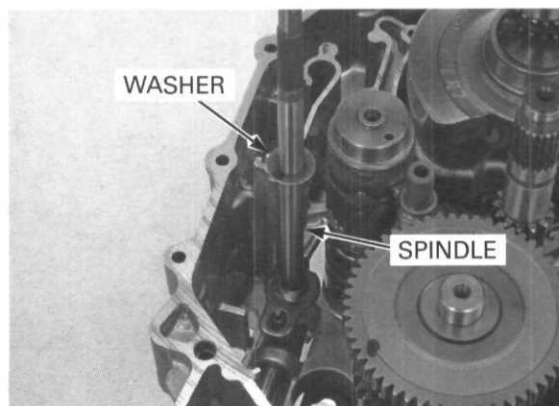
### DISASSEMBLY

Separate the crankcase (page 12-8).

Remove the following:

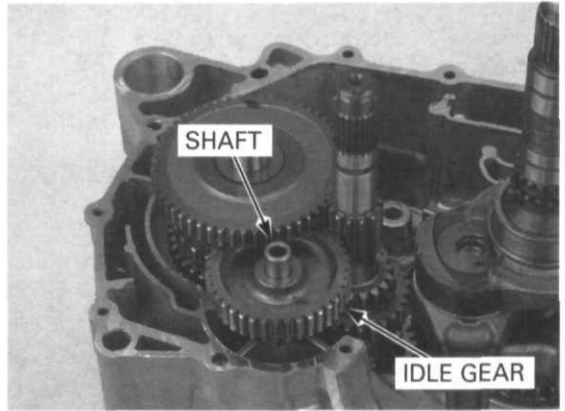
- washer
- sub-gearshift spindle

- shift fork shaft
- shift forks
- shift drum



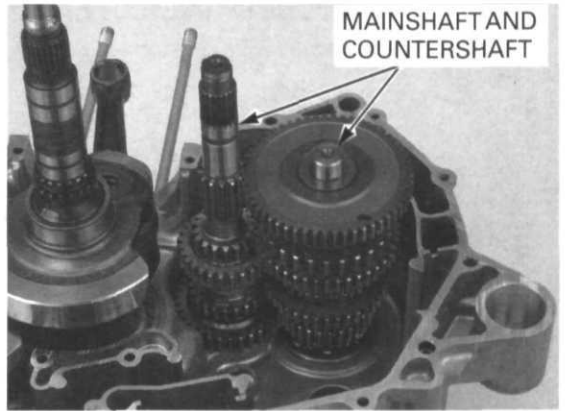
# CRANKCASE/TRANSMISSION/CRANKSHAFT/BALANCER

- reverse idle shaft and idle gear

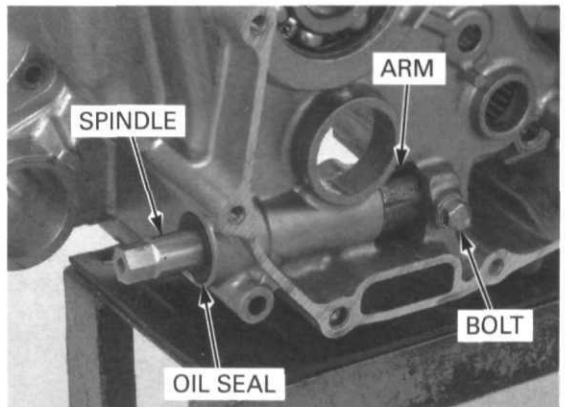


Position the crank weights so that they do not interfere with the mainshaft gears.

- mainshaft and countershaft as an assembly



- stopper bolt
- secondary gearshift spindle
- spindle arm
- oil seal

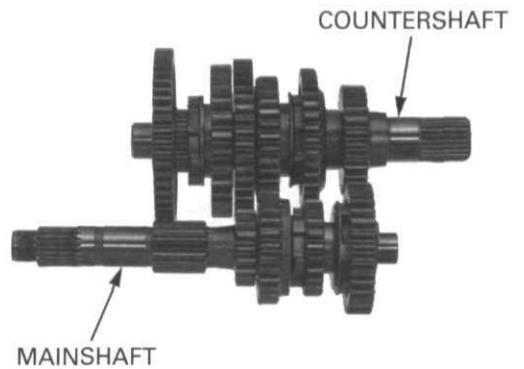


Do not expand the snap ring more than necessary for removal.

Disassemble the mainshaft and countershaft.  
Clean all disassembled parts in solvent thoroughly.

**NOTE:**

- Keep track of the disassembled parts (gears, bushings, washers and snap ring) by sliding them onto a tool or slipping them onto a piece of wire.



**INSPECTION**

**GEAR/BUSHING/SHAFT**

Check the shifter groove for abnormal wear or damage. Check the gear dogs and teeth for abnormal wear or damage.

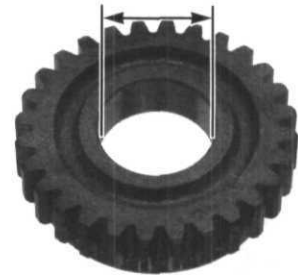
If there is damage to the gear dogs, check the slots or dogs on the corresponding engagement gear for damage.



Measure the I.D. of each gear.

**SERVICE LIMITS:**

- M4: 25.05 mm (0.986 in)
- M5: 20.05 mm (0.789 in)
- C1, C2, C3, CR: 28.07 mm (1.105 in)
- Reverse idle: 13.04 mm (0.513 in)

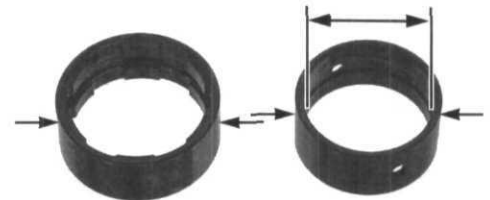


Check the bushings for abnormal wear or damage.

Measure the gear bushing O.D.

**SERVICE LIMITS:**

- M4: 24.93 mm (0.981 in)
- M5: 19.94 mm (0.785 in)
- C1: 27.94 mm (1.100 in)
- C2, CR: 27.93 mm (1.100 in)
- C3: 27.91 mm (1.099 in)



Calculate the gear-to-bushing clearance.

- SERVICE LIMITS:** C1: 0.08 mm (0.003 in)  
 C2, CR: 0.10 mm (0.004 in)  
 C3: 0.15 mm (0.006 in)

Measure the gear bushing I.D.

**SERVICE LIMITS:**

- M4: 22.04 mm (0.868 in)
- M5: 17.06 mm (0.672 in)

## CRANKCASE/TRANSMISSION/CRANKSHAFT/BALANCER

Check the reverse idle shaft, mainshaft and countershaft for abnormal wear or damage.

Measure the shaft O.D.

### SERVICE LIMITS:

At M4: 21.93 mm (0.863 in)

At M5: 16.93 mm (0.667 in)

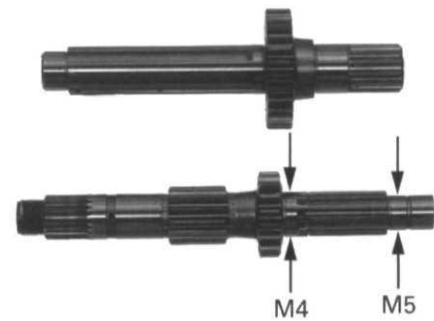
Reverse idle: 12.94 mm (0.509 in)

Calculate the mainshaft gear bushing-to-shaft clearance.

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

Calculate the reverse idle gear-to-shaft clearance.

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



### OUTPUT SHAFT/GEAR

Check the teeth and splines for abnormal wear or damage.



### SHIFT DRUM

Check the guide grooves for abnormal wear or damage.

Check the shift drum journals for scoring, scratches or evidence of insufficient lubrication.





## SHIFT FORK/SHAFT

Check the shift fork shaft for damage or binding.

Measure each shift fork shaft O.D.

**SERVICE LIMIT: 12.96 mm (0.510 in)**

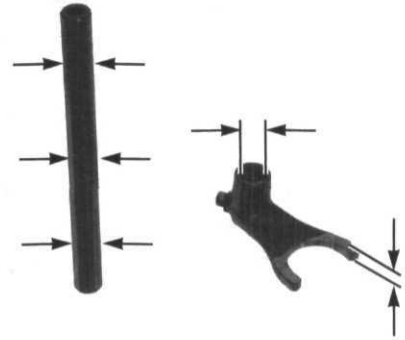
Check the shift forks for abnormal wear or damage.

Measure the I.D. of each shift fork.

**SERVICE LIMIT: 13.04 mm (0.513 in)**

Measure the claw thickness of each shift fork.

**SERVICE LIMIT: 4.5 mm (0.18 in)**



## GEARSHIFT SPINDLE

Check the spindle for damage or bending.

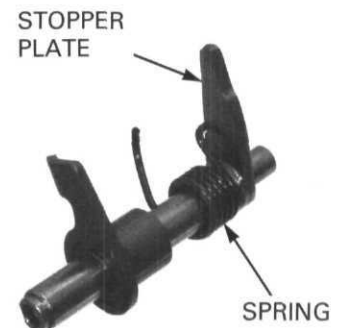
Check the spindle arm for wear or damage.



## REVERSE STOPPER SHAFT

Check the stopper plate for wear, damage or deformation.

Check the return spring for fatigue or damage.



### ASSEMBLY

Install the crankshaft and balancer (page 12-22).

Apply engine oil to the lips of a new gearshift spindle oil seal. Install the oil seal into the rear crankcase until it is fully seated.

Place the spindle arm into the crankcase, then install the secondary gearshift spindle through the crankcase and into the arm by aligning the wide tooth with the wide groove.

Apply locking agent to the stopper bolt threads. Install the bolt and tighten it.

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

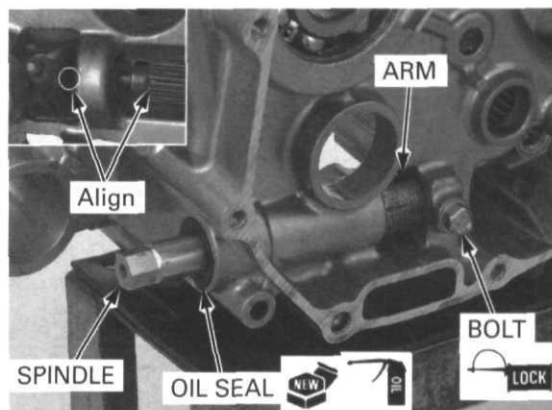
#### NOTE:

- Always install the thrust washers and snap ring with the chamfered (rolled) edge facing away from the thrust load.
- Make sure the snap ring is fully seated in the shaft groove after installing it.

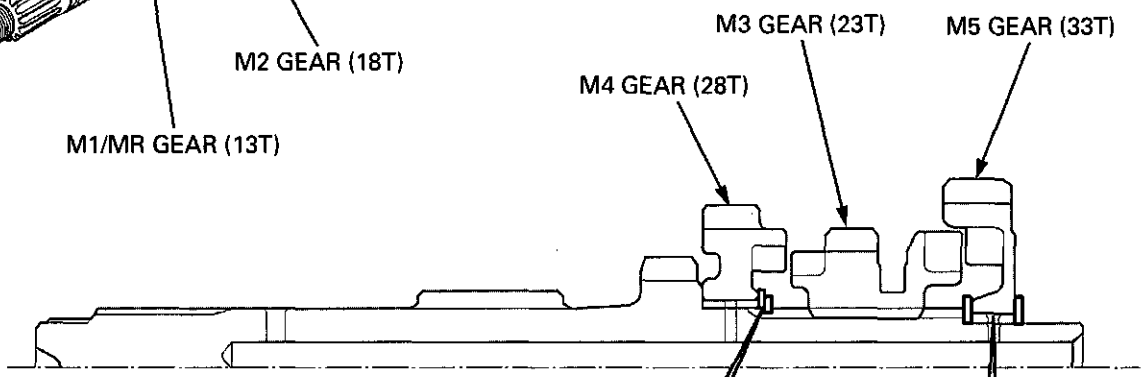
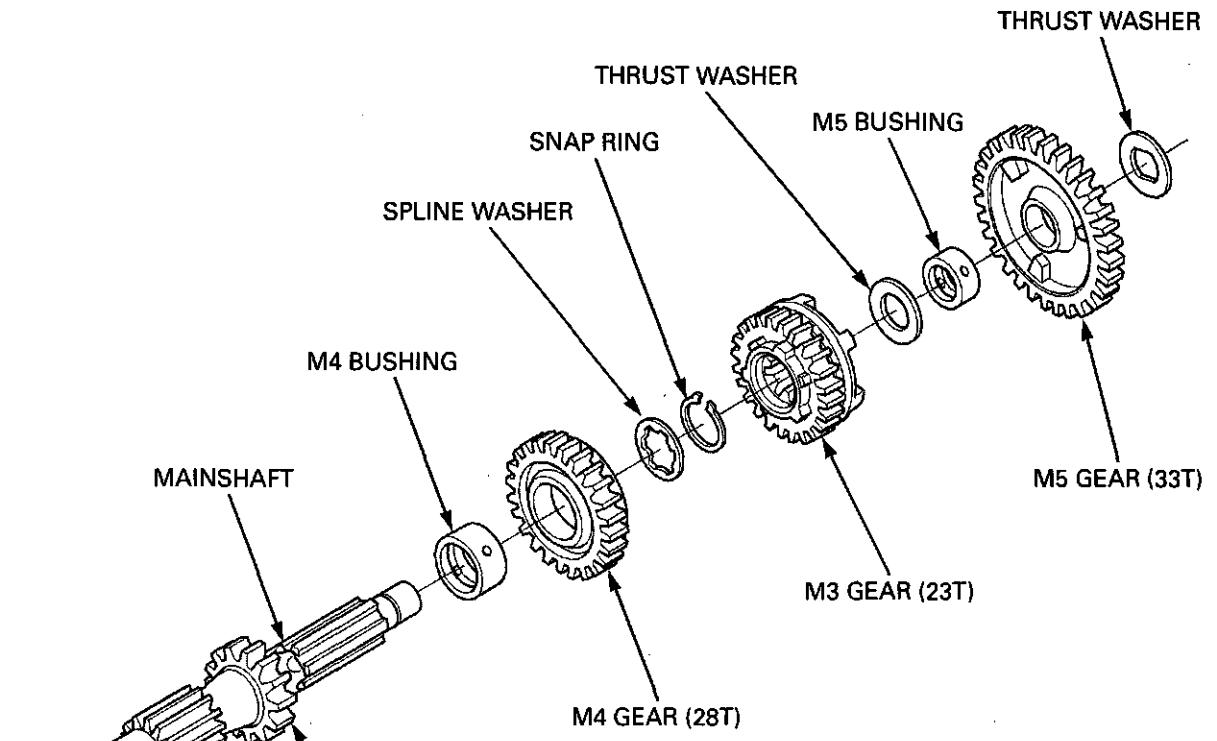
Clean all parts in solvent and dry them thoroughly.


Apply molybdenum oil solution to the gear and bushing sliding surfaces.

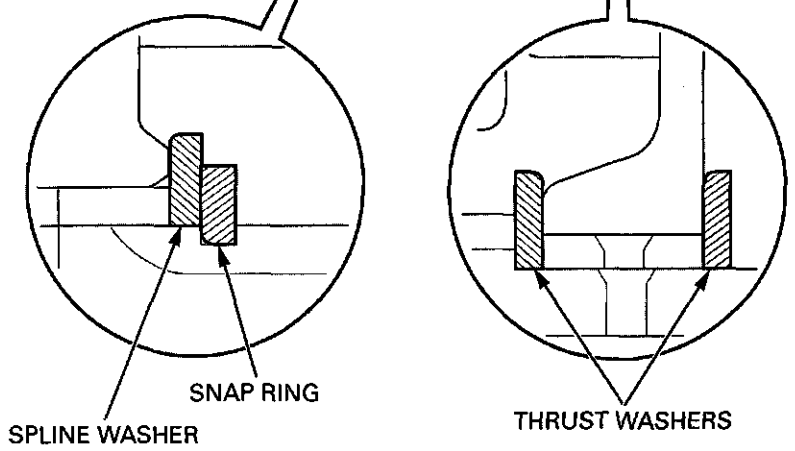
Assemble the mainshaft and countershaft.



MAINSHAFT



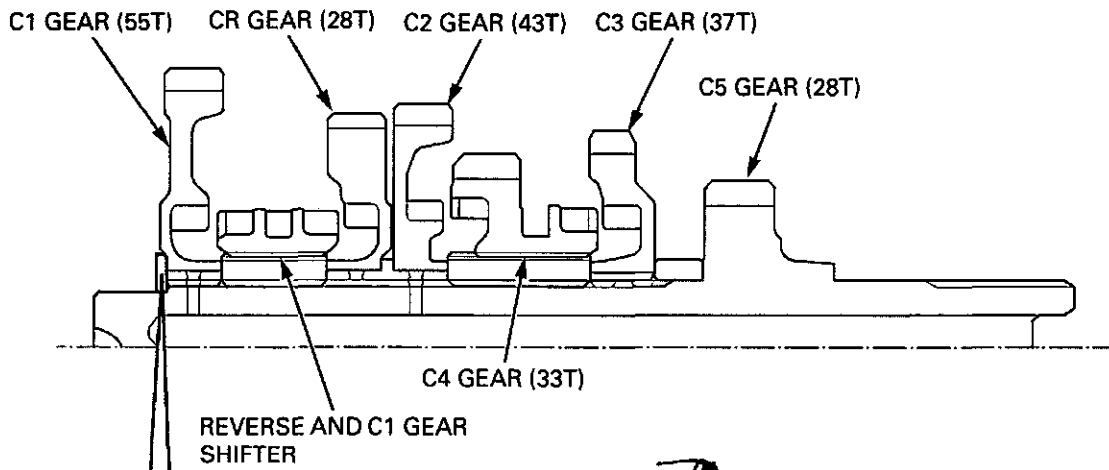
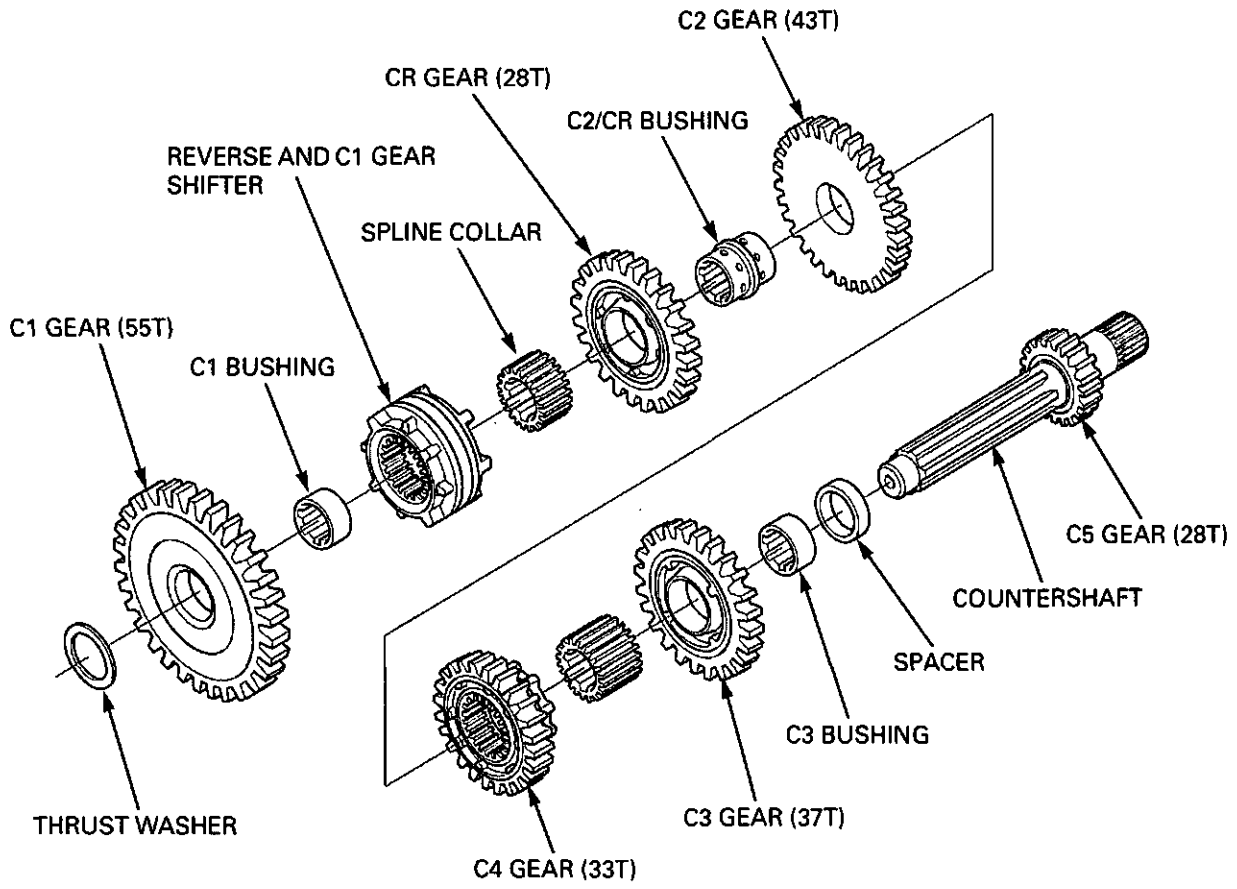
 :Gear and bushing sliding surfaces




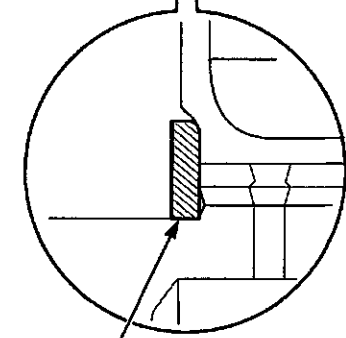
Washer and snap ring direction:

# CRANKCASE/TRANSMISSION/CRANKSHAFT/BALANCER

## COUNTERSHAFT



 : Gear and bushing sliding surfaces



THRUST WASHER

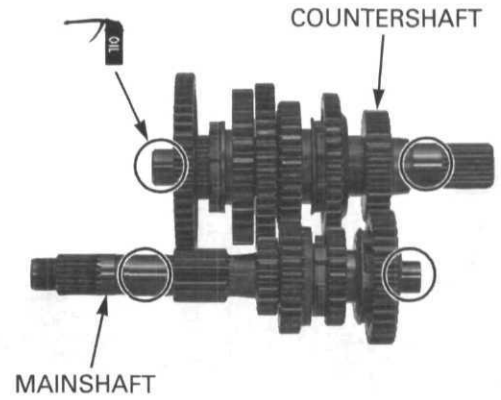
Washer direction:

## CRANKCASE/TRANSMISSION/CRANKSHAFT/BALANCER

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

Apply engine oil to the mainshaft and countershaft journals.

Engage the mainshaft and countershaft gears.



Position the crank weights so that they do not interfere with the mainshaft.

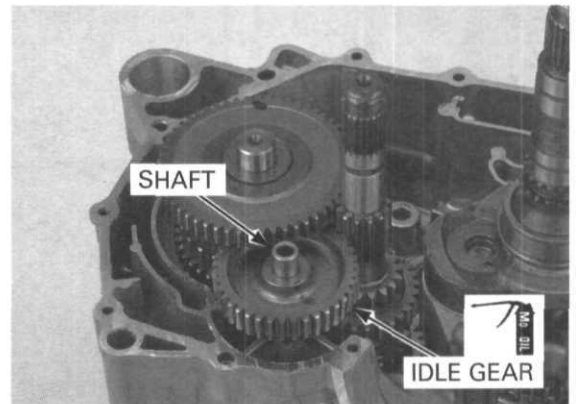
Install the mainshaft and countershaft assemblies as a set into the rear crankcase.

*Be sure to install the thrust washer on the mainshaft.*



Apply molybdenum oil solution to the gear sliding surface.

Install the reverse idle gear and shaft.



Each shift fork has an identification mark; "POR" for the rear fork, "C" for the center fork and "FR" for the front fork.



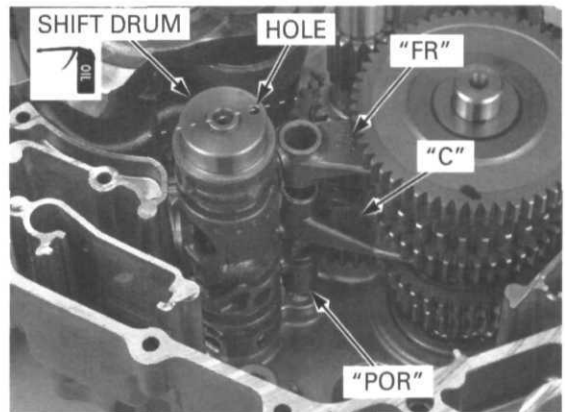
## CRANKCASE/TRANSMISSION/CRANKSHAFT/BALANCER

Apply engine oil to the shift drum guide pin grooves.

Install the shift drum with the dowel pin hole facing the fork shaft side.

Install each shift fork into the gear shifter grooves and shift drum groove with their identification marks facing up (front crankcase side).

- POR fork into M3 gear
- C fork into C4 gear
- FR fork into gear shifter on countershaft



Apply engine oil to the fork shaft.

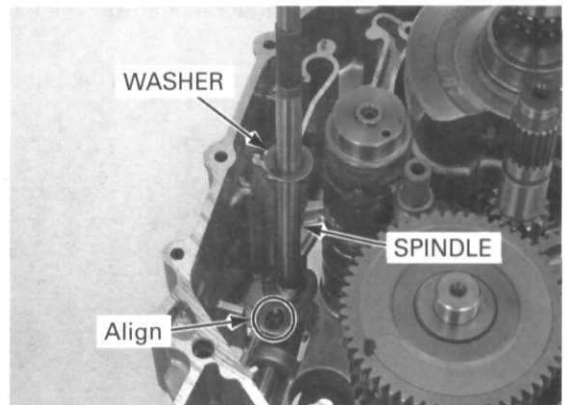
Install the fork shaft through the shift forks and into the crankcase.



Install the sub-gearshift spindle into the crankcase, aligning the arm hole with the spindle arm.

Install the thrust washer.

Assemble the crankcase halves (page 12-27).



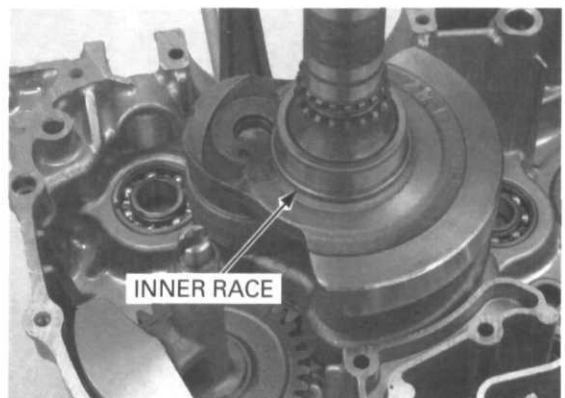
## CRANKSHAFT/BALANCER

### REMOVAL

Separate the crankcase halves (page 12-8).

Remove the transmission (page 12-11).

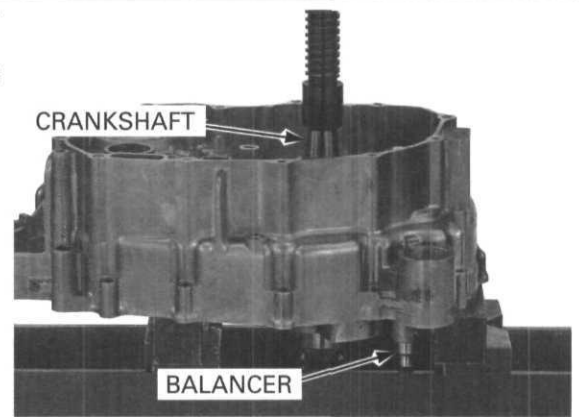
Remove the bearing inner race from the crankshaft.



## CRANKCASE/TRANSMISSION/CRANKSHAFT/BALANCER

*Be careful not to damage the crankcase mating surface and crankshaft assembly.*

Remove the crankshaft and balancer from the rear crankcase using a hydraulic press. Be sure to hold the crankshaft and balancer while pressing them out of the crankcase.



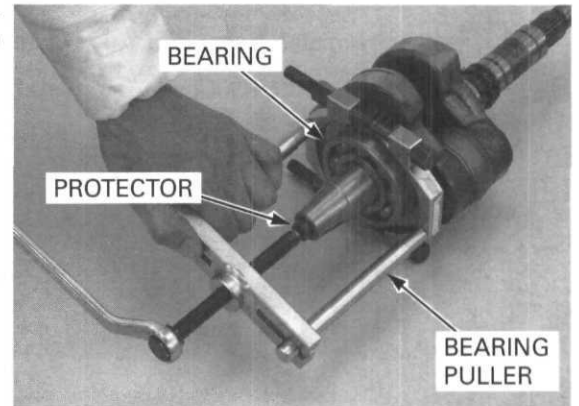
Remove the rear crankshaft bearing using the bearing puller with a suitable protector. Discard the bearing.

### TOOL:

**Universal bearing puller 07631-0010000 or equivalent commercially available in U.S.A.**

### NOTE:

- Always replace the rear crankshaft bearing with a new one when the crankshaft is removed.



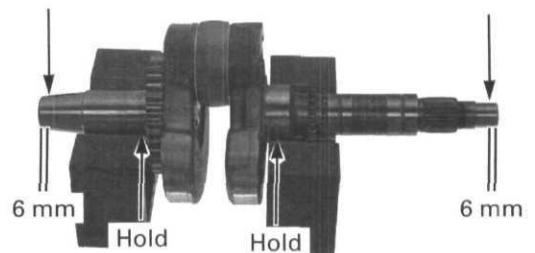
## INSPECTION

Check the balancer drive and driven gears for wear or damage.



Set the crankshaft in a stand or V-blocks and measure the runout using a dial indicator.

**SERVICE LIMIT: 0.15 mm (0.006 in)**



## CRANKCASE/TRANSMISSION/CRANKSHAFT/BALANCER

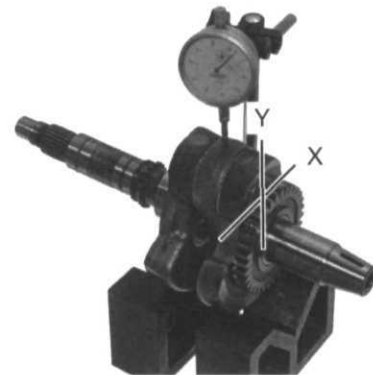
Measure the side clearance between the connecting rod big end and crank weight with a feeler gauge.

**SERVICE LIMIT: 0.8 mm (0.03 in)**



Measure the radial clearance at the connecting rod big end in an X and Y directions.

**SERVICE LIMIT: 0.05 mm (0.002 in)**



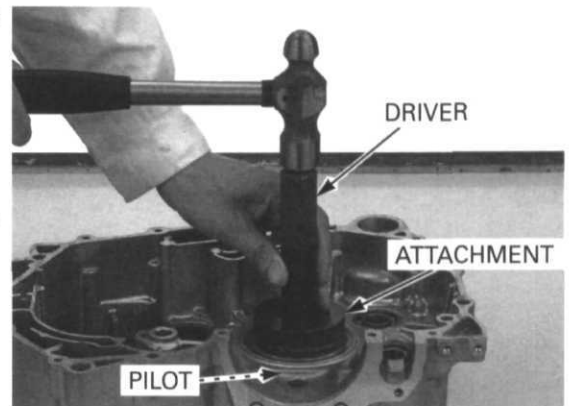
### INSTALLATION

Apply engine oil to a new rear crankshaft bearing. Drive the crankshaft bearing into the rear crankcase with the marking side facing up.

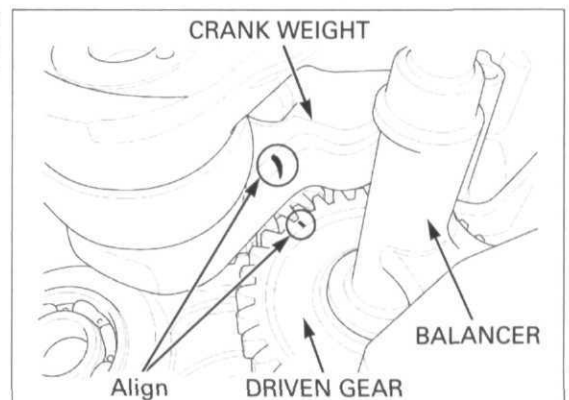
#### TOOLS:

<b>Driver</b>	<b>07749-0010000</b>
<b>Attachment, 72 x 75 mm</b>	<b>07746-0010600</b>
<b>Pilot, 32 mm</b>	<b>07MAD-PR90200</b>

For other bearing replacement in the crankcase halves, see page 12-24.



*Be careful not to disengage the gears.* Engage the balancer and crankshaft by aligning the index lines on the crank weight and balancer driven gear, and install them together into the rear crankcase.





## CRANKCASE/TRANSMISSION/CRANKSHAFT/BALANCER

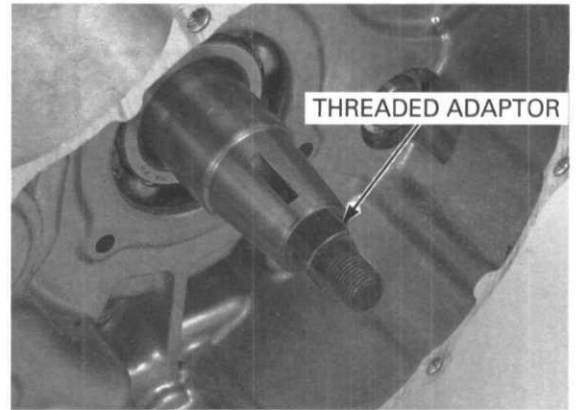
*Take care that the crankshaft and balancer do not fall out of the crankcase when installing the special tools.*

Install the special tool onto the rear crankshaft end.

**TOOL:**

**Threaded adapter**

**07965-VM00300 or  
07931-KF00200  
(U.S.A. only)**



Install the special tools onto the crankshaft and crankshaft bearing.

**TOOLS:**

**Assembly collar**

**07965-VM00100**

**Assembly shaft**

**07965-VM00200**

**U.S.A. TOOLS:**

**Assembly collar**

**07965-VM00100**

**Assembly shaft**

**07931-ME4010B**

**Special nut**

**07931-HB3020A**

*Be careful not to let the connecting rod press against the crankcase mating surface.*

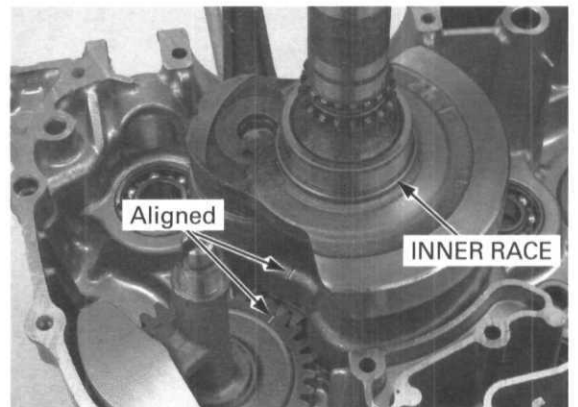
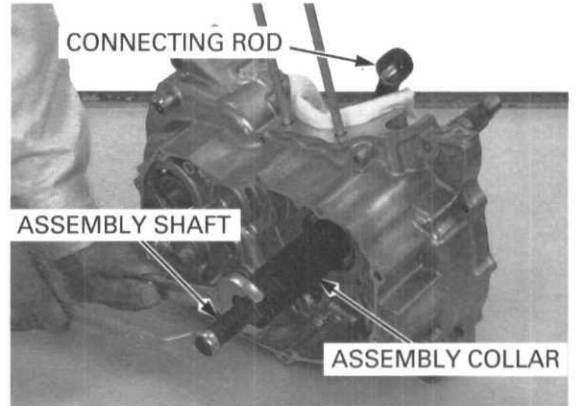
Draw the crankshaft into the bearing inner race.

After installing the crankshaft, make sure the index lines on the crank weight and balancer driven gear are aligned.

Install the bearing inner race onto the crankshaft with the flange side facing in.

Install the transmission (page 12-16).

Assemble the crankcase halves (page 12-27).



## CRANKCASE BEARING

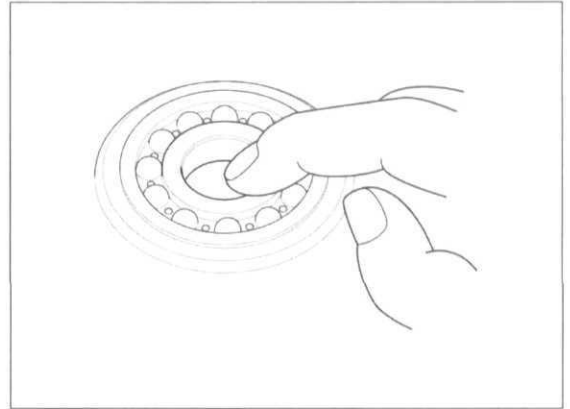
### INSPECTION

Remove the crankshaft and balancer (page 12-20).

Turn the inner race of each crankcase bearing with your finger. The bearing should turn smoothly and quietly.

Also check that the bearing outer race fits tightly in the crankcase.

Replace any bearing if the inner race does not turn smoothly, quietly or if the outer race fits loosely in the crankcase.



### FRONT CRANKCASE BEARING REPLACEMENT

Remove the balancer and countershaft bearing with the special tools.

#### TOOLS:

##### Countershaft bearing:

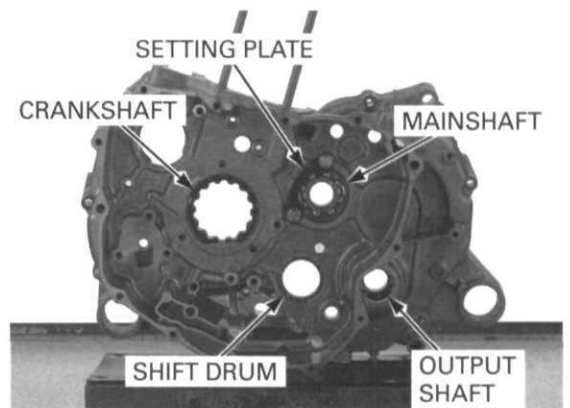
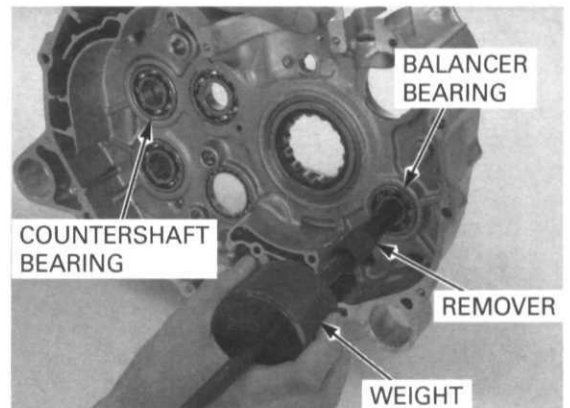
Remover shaft, 20 mm	07936-3710600
Remover handle	07936-3710100
Remover weight	07741-0010201 or 07936-3710200 or 07936-371020A (U.S.A. only)

##### Balancer bearing:

Bearing remover, 17 mm	07936-3710300
Remover handle	07936-3710100
Remover weight	07741-0010201 or 07936-3710200 or 07936-371020A (U.S.A. only)

Remove the two bolts and mainshaft bearing setting plate.

Drive the crankshaft, mainshaft, output shaft and shift drum bearings out of the front crankcase.



## CRANKCASE/TRANSMISSION/CRANKSHAFT/BALANCER

Apply engine oil to new bearings.

Drive the bearings in with the marked side facing up.

### TOOLS:

#### Crankshaft bearing:

Driver	07749-0010000
Attachment, 72 x 75 mm	07746-0010600
Pilot, 40 mm	07746-0040900

#### Balancer bearing:

Driver	07749-0010000
Attachment, 37 x 40 mm	07746-0010200
Pilot, 17 mm	07746-0040400

#### Mainshaft bearing:

Driver	07749-0010000
Attachment, 52 x 55 mm	07746-0010400
Pilot, 22 mm	07746-0041000

#### Countershaft bearing:

Driver	07749-0010000
Attachment, 42 x 47 mm	07746-0010300
Pilot, 20 mm	07746-0040500

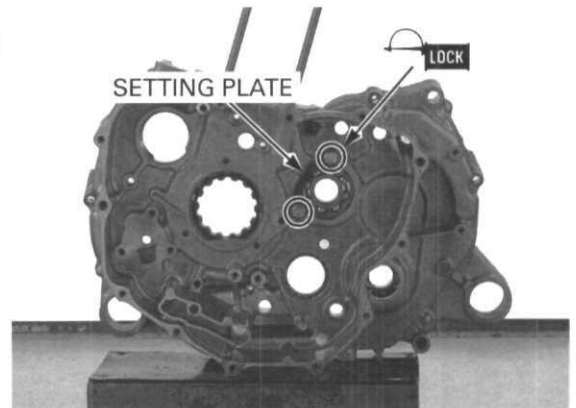
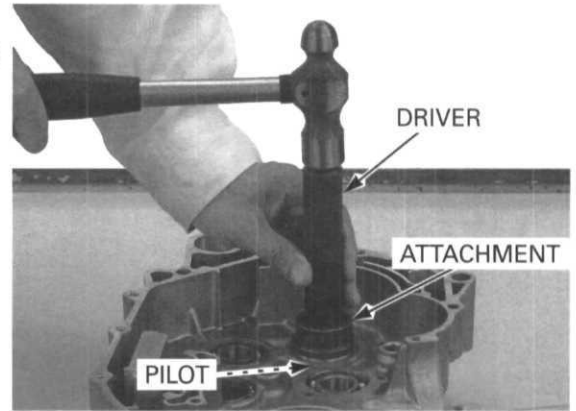
#### Output shaft bearing:

Driver	07749-0010000
Attachment, 42 x 47 mm	07746-0010300
Pilot, 22 mm	07746-0041000

#### Shift drum bearing:

Driver	07749-0010000
Attachment, 42 x 47 mm	07746-0010300
Pilot, 35 mm	07746-0040800

Apply locking agent to the setting plate bolt threads. Install the setting plate and tighten the bolts securely.



# CRANKCASE/TRANSMISSION/CRANKSHAFT/BALANCER

## REAR CRANKCASE BEARING REPLACEMENT

Heat the crankcase to about 80°C (176°F) when removing the shift drum bearing.

Remove the mainshaft, camshaft and shift drum bearings with the special tools.

### TOOLS:

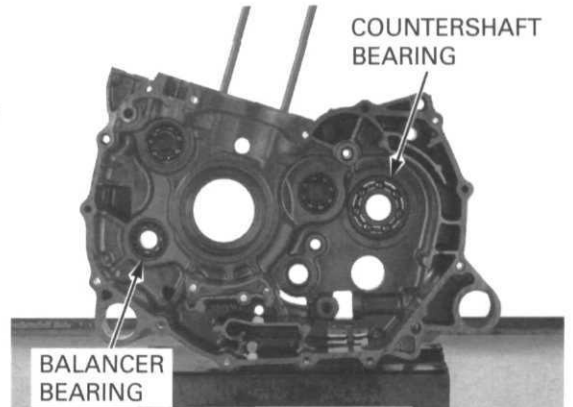
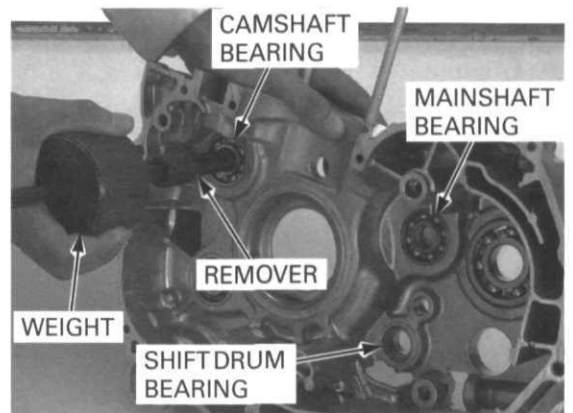
#### Mainshaft and camshaft bearings:

Bearing remover, 17 mm	07936-3710300
Remover handle	07936-3710100
Remover weight	07741-0010201 or 07936-3710200 or 07936-371020A (U.S.A. only)

#### Shift drum bearing:

Bearing remover, 20 mm	07936-3710600
Remover handle	07936-3710100
Remover weight	07741-0010201 or 07936-3710200 or 07936-371020A (U.S.A. only)

Drive the countershaft and balancer bearings out of the rear crankcase.



Apply engine oil to new bearings.

Drive the mainshaft bearing in with the sealed side facing down.

### TOOLS:

#### Mainshaft bearing:

Driver	07749-0010000
Attachment, 37 x 40 mm	07746-0010200
Pilot, 17 mm	07746-0040400

Drive the following bearings in with the marked side facing up.

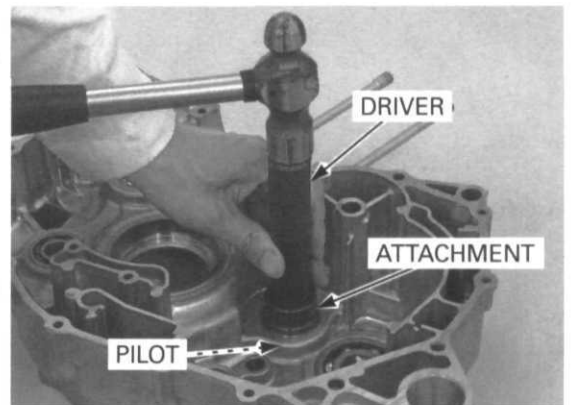
### TOOLS:

#### Balancer and camshaft bearings:

Driver	07749-0010000
Attachment, 37 x 40 mm	07746-0010200
Pilot, 17 mm	07746-0040400

#### Countershaft bearing:

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

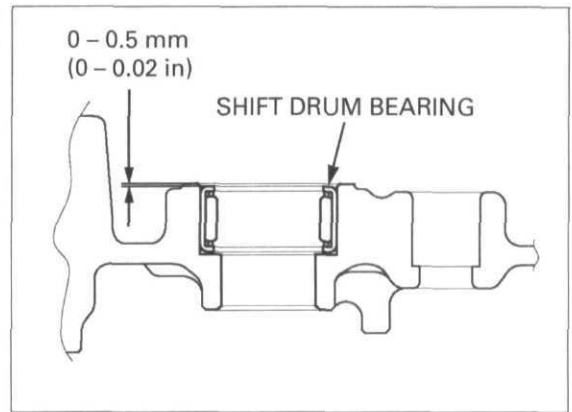


Press the shift drum bearing in with the marked side facing up until the depth from the crankcase surface is 0 – 0.5 mm (0 – 0.02 in).

**TOOLS:**

**Shift drum bearing:**

- Driver** 07749-0010000
- Attachment, 24x 26 mm** 07746-0010700
- Pilot, 20 mm** 07746-0040500



## OUTPUT SHAFT BEARING REPLACEMENT

Remove the gear position switch to avoid damaging it during bearing replacement (page 21-10).

Drive the bearing out of the crankcase cover.

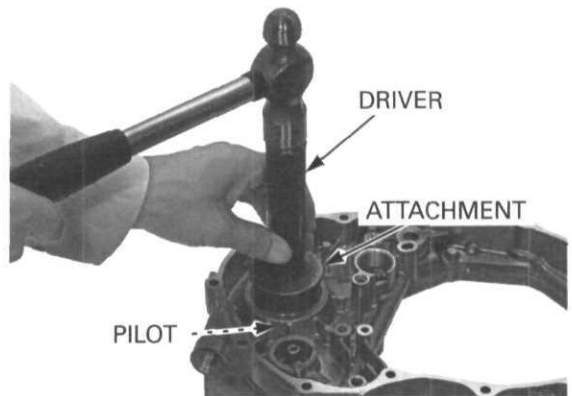
Apply engine oil to a new bearing.

Drive a new bearing squarely with the marked side facing up until it is fully seated.

**TOOLS:**

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

Install the gear position switch (page 21-10).

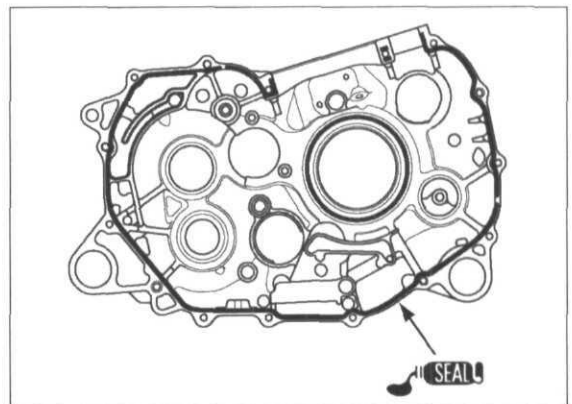


## CRANKCASE ASSEMBLY

Clean the front and rear crankcase mating surfaces thoroughly, being careful not to damage them.

Blow through the oil passages in the crankcases with compressed air.

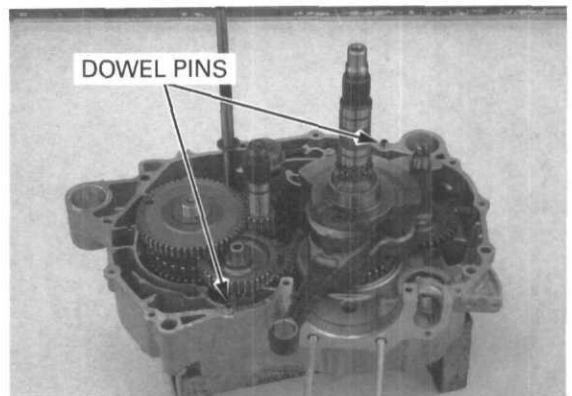
Apply liquid sealant to the mating surface (shaded area) of the front crankcase as shown.



Install the two dowel pins.

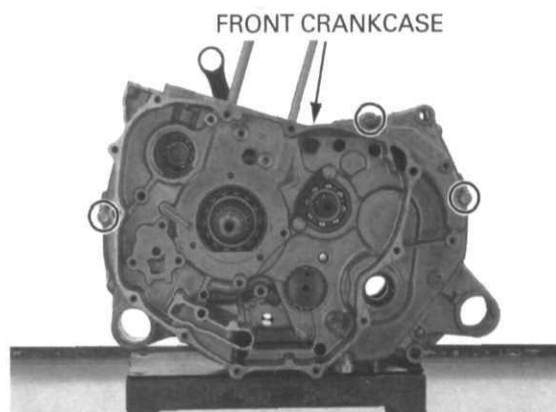
Make sure all the parts are installed in the rear crankcase.

Install the front crankcase over the rear crankcase.



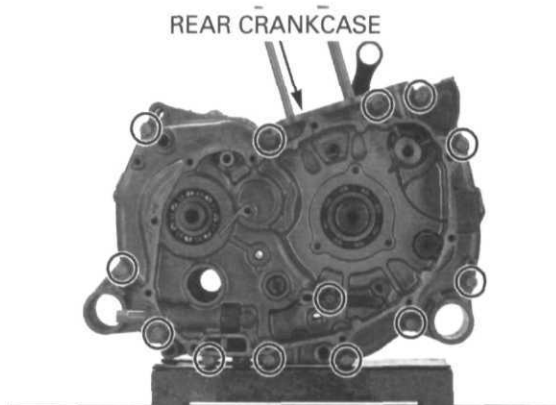
## CRANKCASE/TRANSMISSION/CRANKSHAFT/BALANCER

Install the three front crankcase bolts.

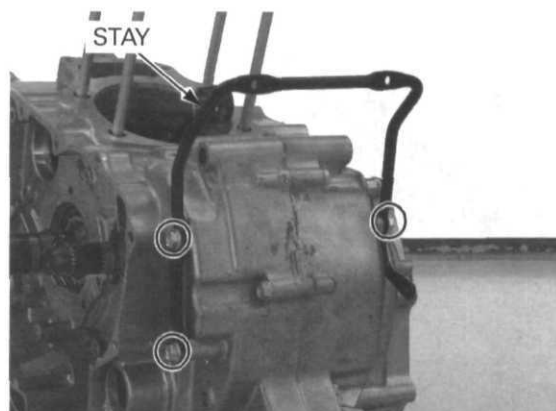


Install the thirteen rear crankcase bolts.

Tighten the all the bolts in a crisscross pattern in several steps.

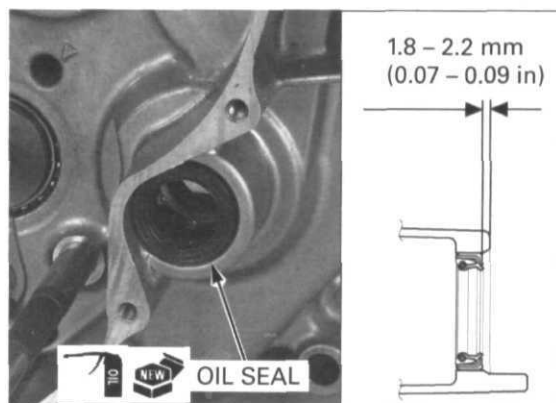


Install the side cover stay and tighten the three bolts.



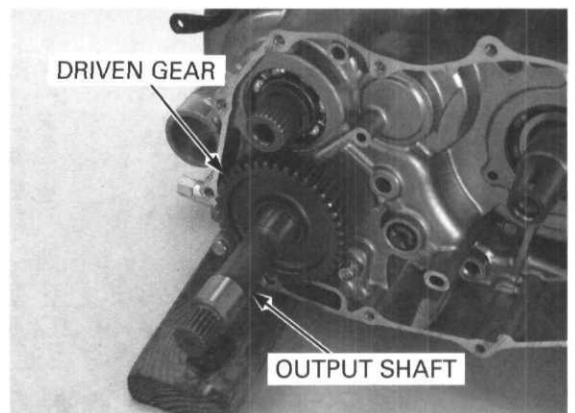
Apply engine oil to the lips of a new output shaft oil seal.

Install the oil seal into the front crankcase until the depth from the crankcase surface is 1.8 – 2.2 mm (0.07 – 0.09 in).

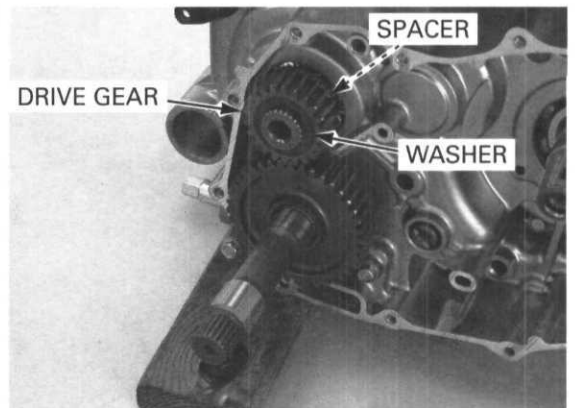


Insert the output shaft into the crankcase while turning it slowly to avoid damaging the oil seal. Be sure to install the shaft against the bearing in the crankcase.

Install the driven gear onto the output shaft.



Install the spacer, output shaft drive gear and washer onto the countershaft.

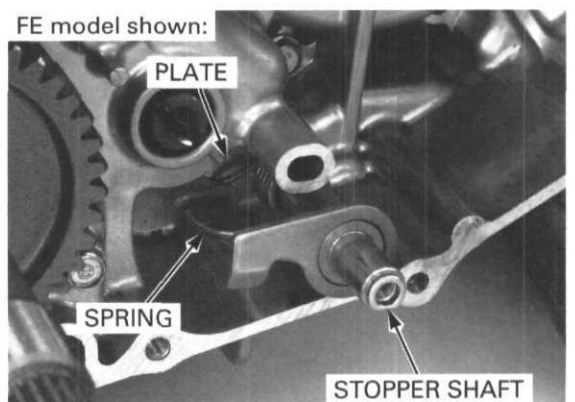


Set the return spring on the reverse stopper shaft as shown.



Install the reverse stopper shaft into the hole in the crankcase while holding the lower end of the spring, then set the stopper plate into the guide groove in the shift drum.

TM and FM models: Install the thrust washer on the stopper shaft.





# CRANKCASE/TRANSMISSION/CRANKSHAFT/BALANCER

Apply engine oil to the lips of a new output shaft oil seal.

*Do not let the crankcase cover rest on the gear position switch.*

Drive the oil seal into the rear crankcase cover squarely until it is fully seated.

**TOOLS:**

**Driver** 07749-0010000  
**Attachment, 58 mm** 07JAD-PH80101

Install the stopper ring into the cover groove properly.

Apply engine oil to the lips of a new stopper shaft oil seal and install it.

Clean the mating surfaces of the crankcase cover and crankcase thoroughly, being careful not to damage them.

Blow through the oil passage in the crankcase cover with compressed air.

Shift the transmission into neutral to align the groove in the shift drum with the lug on the crankcase.

Install the two dowel pins and a new gasket.

Install the joint collar.

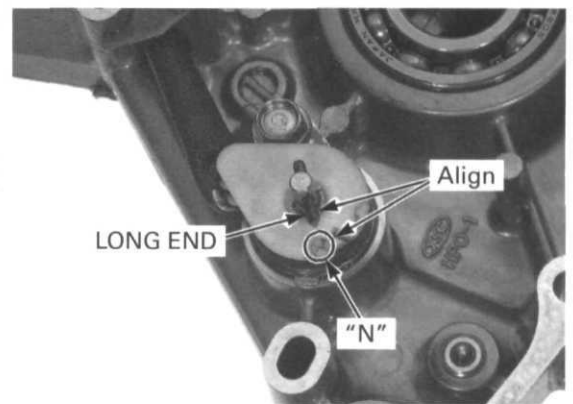
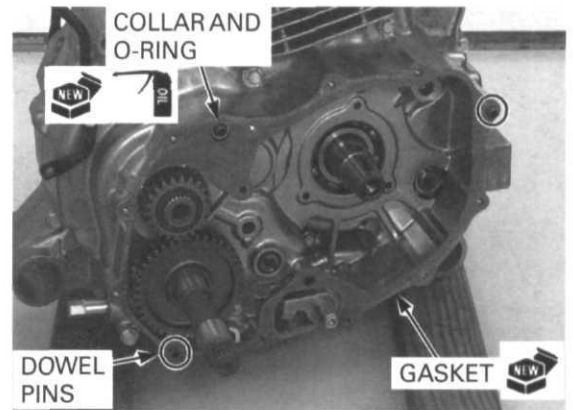
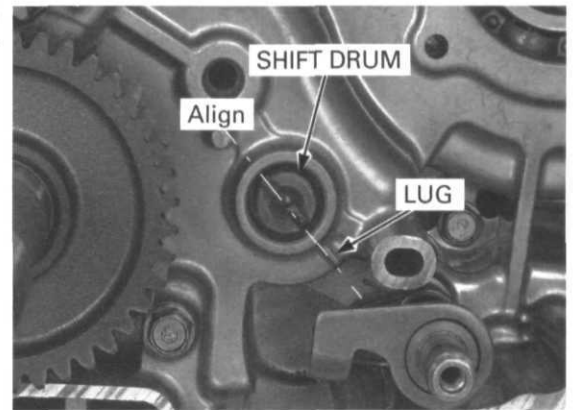
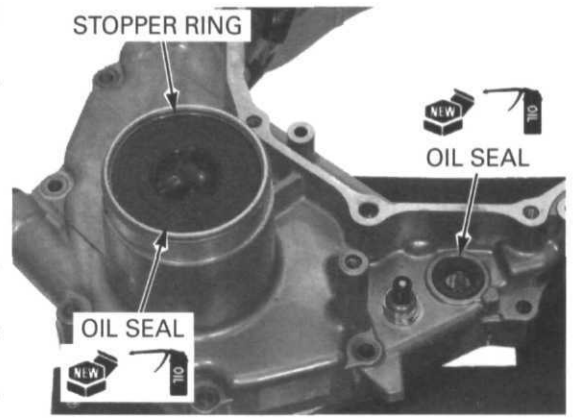
Coat a new O-ring with engine oil and install it onto the joint collar.

Align the long end of the gear position switch pin with the "N" mark on the switch plate.

*Be careful not to damage the switch pin and oil seal lips.*

Install the crankcase cover while aligning the switch pin with the shift drum groove.

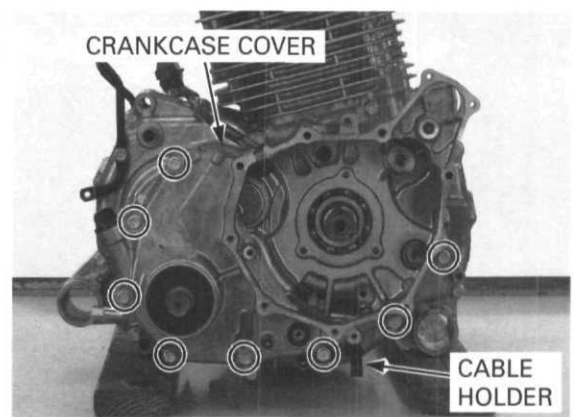
If the cover does not install easily, remove it and check the alignment of the switch pin and shift drum or the switch for damage.





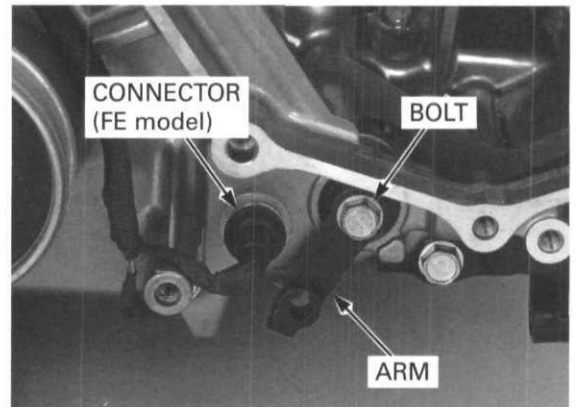
## CRANKCASE/TRANSMISSION/CRANKSHAFT/BALANCER

Install the eight bolts with the cable holder and tighten them in a crisscross pattern in several steps.



Install the reverse stopper arm with the marked side facing out by aligning the flat surfaces, and tighten the arm bolt.

FE model: Connect the reverse switch connector.



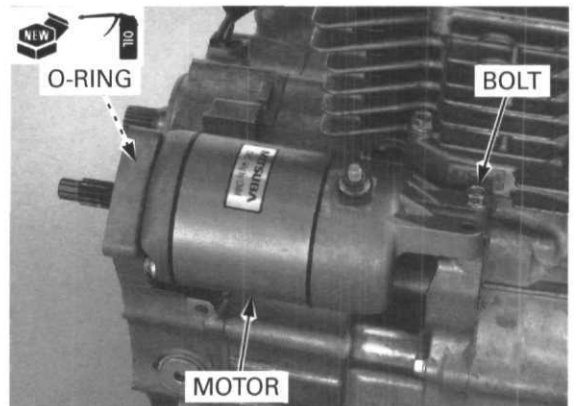
Coat a new O-ring with engine oil and install it into the starter motor groove.

Install the starter motor into the crankcase cover and onto the crankcase.

Install the inside mounting bolt and tighten it.

Install the following:

- oil temperature sensor (page 21-18)
- flywheel and starter clutch (page 11-13)
- oil pump (page 5-9)
- gearshift linkage and clutch (page 10-20)
- cylinder and piston (page 9-8)
- cylinder head (page 8-18)
- engine (page 7-8)



# 13. FRONT WHEEL/SUSPENSION/STEERING

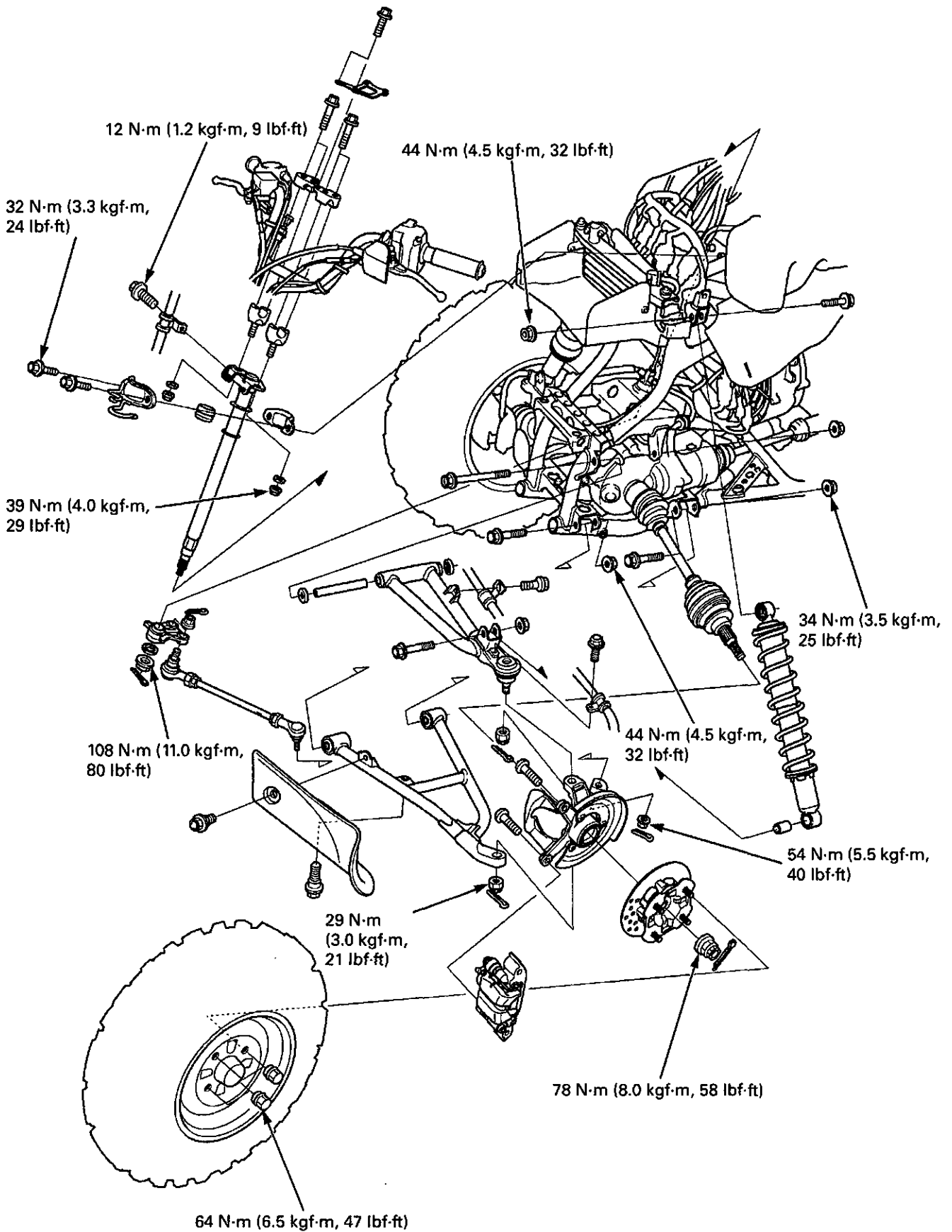
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SYSTEM COMPONENTS .....	13-2	TIRES .....	13-11
SERVICE INFORMATION .....	13-3	WHEEL HUB AND KNUCKLE.....	13-14
TROUBLESHOOTING .....	13-5	SUSPENSION ARM.....	13-20
HANDLEBAR .....	13-6	FRONT SHOCK ABSORBER.....	13-24
THROTTLE HOUSING .....	13-9	STEERING SHAFT .....	13-25
FRONT WHEEL .....	13-10	TIE-ROD.....	13-30

# FRONT WHEEL/SUSPENSION/STEERING

## SYSTEM COMPONENTS

FE model shown:



## SERVICE INFORMATION

### GENERAL

- A contaminated brake disc or pad reduces stopping power. Discard contaminated pads and clean a contaminated disc with a high quality brake degreasing agent.
- A jack or other support is required to support the vehicle.
- Adjust toe whenever the tie-rod, knuckle or steering shaft are replaced or removed (page 4-22).
- Do not twist or bend the brake hose and pipe when servicing.
- Use genuine Honda replacement bolts and nuts for all suspension pivots and mounting points.
- Refer to page 15-3 for brake system information.
- Refer to page 21-8 for handlebar switch inspection.
- Refer to page 21-9 for brake light switch inspection.

### SPECIFICATIONS

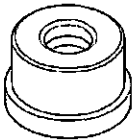
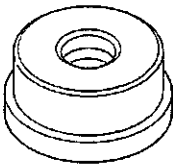
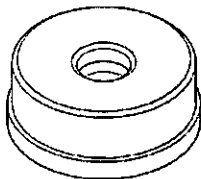

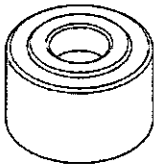
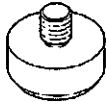

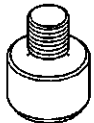
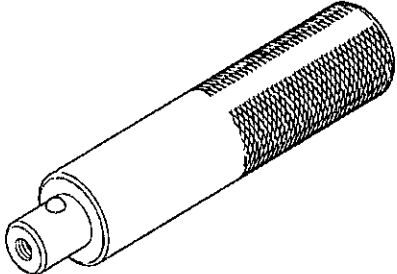
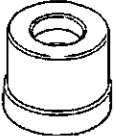
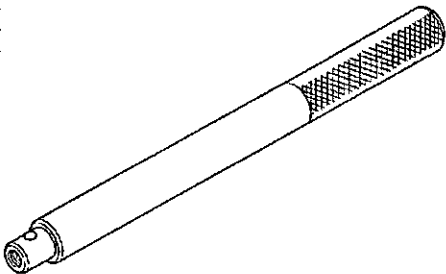
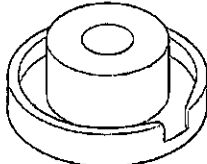
ITEM		STANDARD	Unit: mm (in)
			SERVICE LIMIT
Minimum tire tread depth		-	4.0 (0.16)
Cold tire pressure	Standard	25 kPa (0.25 kgf/cm <sup>2</sup> , 3.6 psi)	-
	Minimum	22 kPa (0.22 kgf/cm <sup>2</sup> , 3.2 psi)	-
	Maximum	28 kPa (0.28 kgf/cm <sup>2</sup> , 4.0 psi)	-
	With cargo	25 kPa (0.25 kgf/cm <sup>2</sup> , 3.6 psi)	-
Tie-rod distance between the ball joints	TM	382.5 (15.06)	-
	FM/FE	388.0 (15.28)	-
Toe	TM	Toe-out: 1 ± 15 (1/32 ± 19/32)	-
	FM/FE	Toe-out: 30 ± 15 (1-3/16 ± 19/32)	-

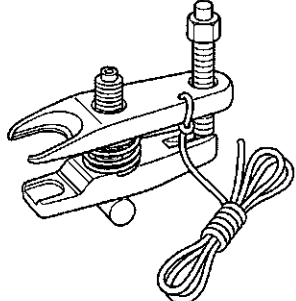
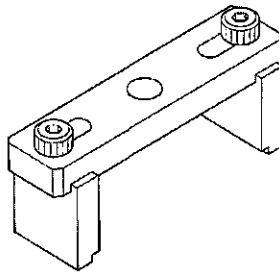
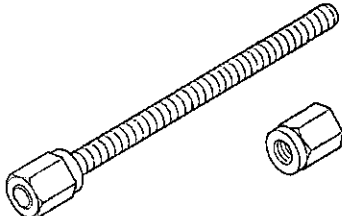
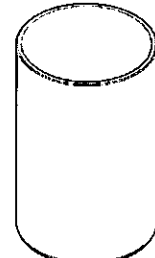
### TORQUE VALUES

Handlebar lower holder nut	39 N·m (4.0 kgf·m, 29 lbf·ft)	Lock nut: replace with a new one.	
Front master cylinder holder bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)		
Throttle housing cover screw	1.5 N·m (0.15 kgf·m, 1.1 lbf·ft)		
Throttle arm nut	7.0 N·m (0.71 kgf·m, 5.2 lbf·ft)		
2WD/4WD select switch screw (FM/FE only)	1.5 N·m (0.15 kgf·m, 1.1 lbf·ft)		
Front wheel nut	64 N·m (6.5 kgf·m, 47 lbf·ft)	Castle nut: tighten to the specified torque and further tighten until its grooves aligns with the cotter pin hole. ALOC bolt: replace with a new one. ALOC bolt: replace with a new one. Lock nut: replace with a new one. Lock nut: replace with a new one. Lock nut: replace with a new one. Castle nut: tighten to the specified torque and further tighten until its grooves aligns with the cotter pin hole.	
Front wheel hub nut	78 N·m (8.0 kgf·m, 58 lbf·ft)		
Front brake disc bolt	42 N·m (4.3 kgf·m, 31 lbf·ft)		
Splash guard bolt	11 N·m (1.1 kgf·m, 8 lbf·ft)		
Shock absorber mounting nut	44 N·m (4.5 kgf·m, 32 lbf·ft)		
Upper arm pivot nut	34 N·m (3.5 kgf·m, 25 lbf·ft)		
Lower arm pivot nut	44 N·m (4.5 kgf·m, 32 lbf·ft)		
Upper and lower arm ball joint nut	29 N·m (3.0 kgf·m, 21 lbf·ft)		
Brake hose clamp bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)		Lock nut: replace with a new one.
Tie-rod stud joint nut	54 N·m (5.5 kgf·m, 40 lbf·ft)		
Tie-rod lock nut	54 N·m (5.5 kgf·m, 40 lbf·ft)	Lock nut: replace with a new one.	
Steering shaft end nut	108 N·m (11.0 kgf·m, 80 lbf·ft)		
Steering shaft holder bolt	32 N·m (3.3 kgf·m, 24 lbf·ft)		

# FRONT WHEEL/SUSPENSION/STEERING

## TOOLS

<p>Attachment, 32 x 35 mm 07746-0010100</p> 	<p>Attachment, 42 x 47 mm 07746-0010300</p> 	<p>Attachment, 52 x 55 mm 07746-0010400</p> 
<p>Attachment, 22 x 24 mm 07746-0010800</p> 	<p>Attachment, 20 mm I.D. 07746-0020400</p> 	<p>Pilot, 30 mm 07746-0040700</p> 
<p>Pilot, 22 mm 07746-0041000</p> 	<p>Pilot, 16 mm 07746-0041300</p> 	<p>Driver 07749-0010000</p> 
<p>Attachment, 28 x 30 mm 07946-1870100</p> 	<p>Driver 07949-3710001</p> 	<p>Oil seal driver 07JAD-PH80101</p> 

<p>Ball joint remover, 28 mm 07MAC-SL00201</p>  <p>07MAC-SL0202 (U.S.A.only) or 07MAC-SL00200 and 07MAC-SL0A300 (U.S.A.only)</p>	<p>Clutch compressor attachment 07LAE-PX40100</p> 	<p>Compressor bolt assembly 07GAE-PG40200</p> 
<p>Ball joint remover/installer 07WMF-HN00100</p> 		

## TROUBLESHOOTING

### Hard steering

- Steering shaft holder too tight
- Damaged steering shaft bearing/bushing
- Insufficient tire pressure

### Steers one side or does not track straight

- Incorrect wheel alignment
- Unequal tire pressure
- Bent tie-rod, suspension arm or frame
- Worn or damaged knuckle bearing or wheel hub bearing
- Weak shock absorber

### Front wheel wobbling

- Bent rim
- Worn or damaged knuckle bearing or wheel hub bearing
- Faulty tire
- Loose wheel hub nut

### Soft suspension

- Weak shock absorber spring
- Faulty shock absorber damper

### Stiff suspension

- Bent shock absorber damper rod
- Improperly installed suspension arms
- Faulty suspension arm bushings

### Front suspension noise

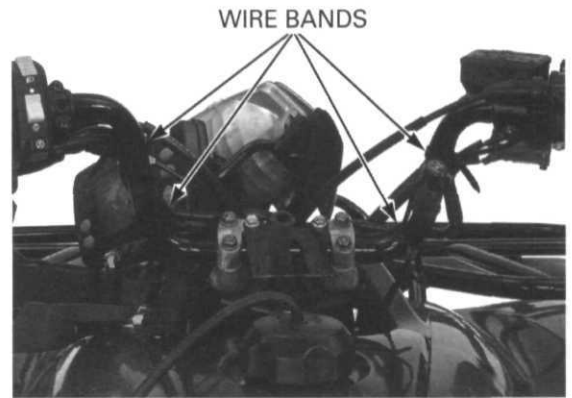
- Loose front suspension fasteners
- Damaged suspension components

## HANDLEBAR

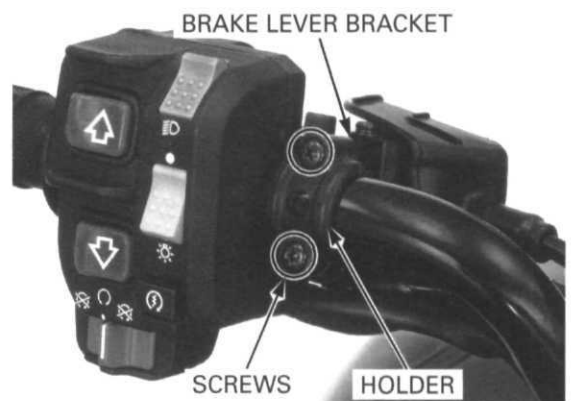
### REMOVAL

Remove the following:

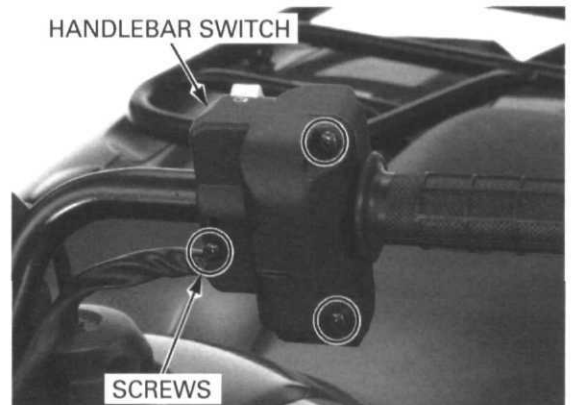
- headlight/meter bracket (page 21-4)
- four wire band



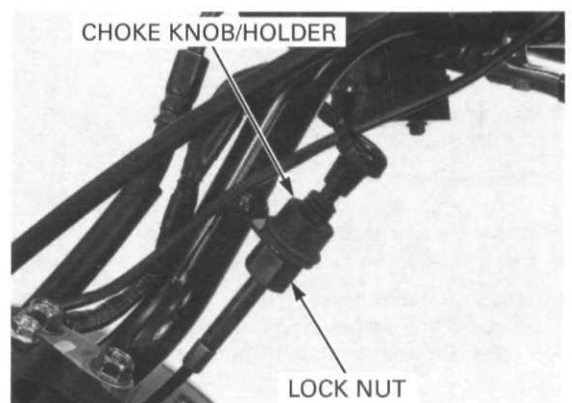
- two screws
- bracket holder
- rear (parking brake) lever bracket



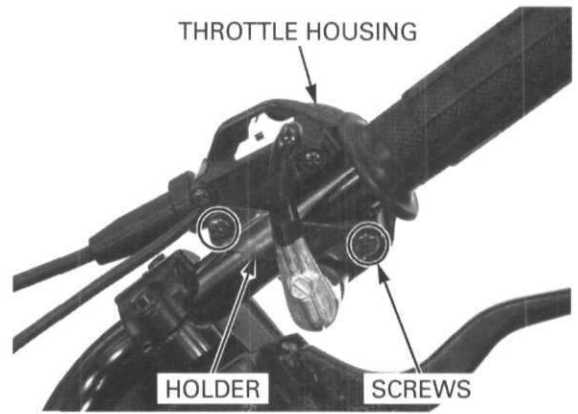
- three screws
- handlebar switch



- lock nut
- choke knob/holder

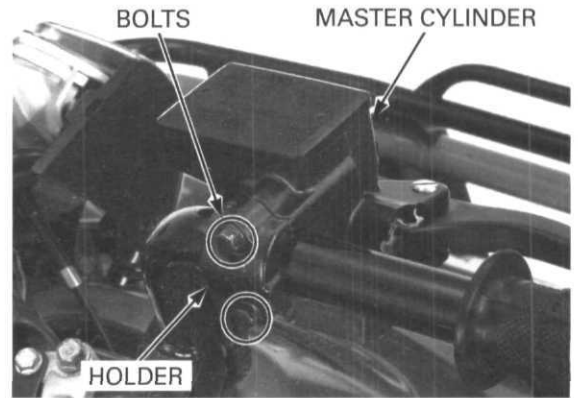


- two screws
- throttle housing holder
- throttle housing

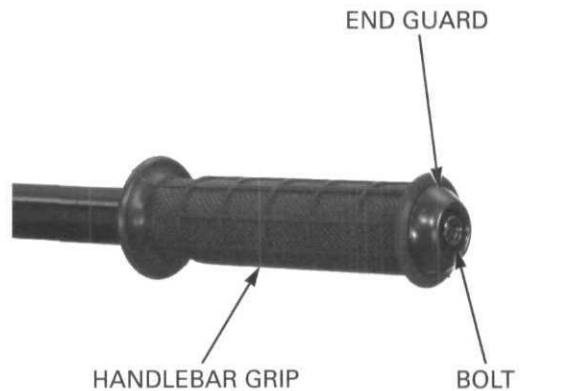


Keep the master cylinder upright to prevent air from entering the hydraulic system.

- two bolt
- master cylinder holder
- front brake master cylinder



- bolts
- handlebar end guards
- handlebar grips



- two bolts
- headlight cover stay
- four bolts
- handlebar upper holders
- handlebar

**INSTALLATION**

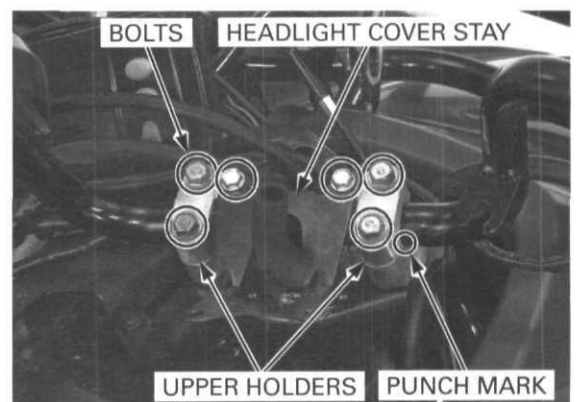
Place the handlebar onto the lower holders and align the punch mark on the handlebar with the top of the lower holder.

Route the wires and cables properly (page 1-22).

Install the upper holders with the bolt holes facing forward. Install the four bolts and tighten the forward bolts first, then tighten the rear bolts.

Install the headlight cover stay and tighten the two bolts.

Apply Honda Bond A or Honda Hand Grip Cement (U.S.A. only) to the inside surfaces of the handlebar grips and to the clean surfaces of the handlebar.

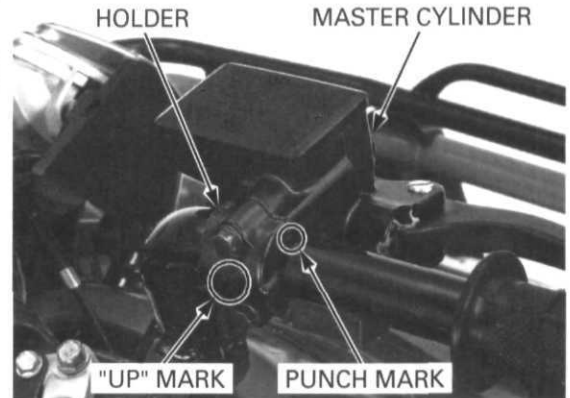




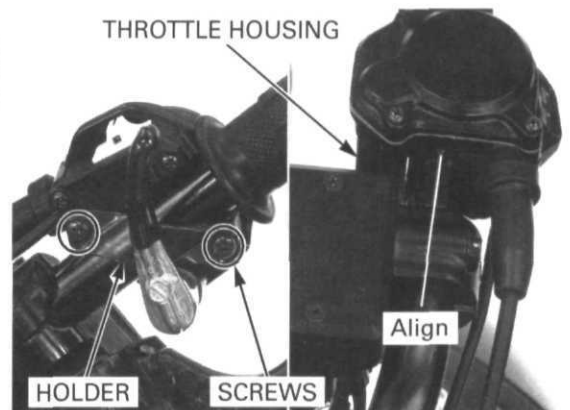
## FRONT WHEEL/SUSPENSION/STEERING

*Allow the adhesive to dry for an hour before using.* Wait 3 – 5 minutes and install the grip. Rotate the grip for even application of the adhesive. Install the grip end guards and tighten the bolts.

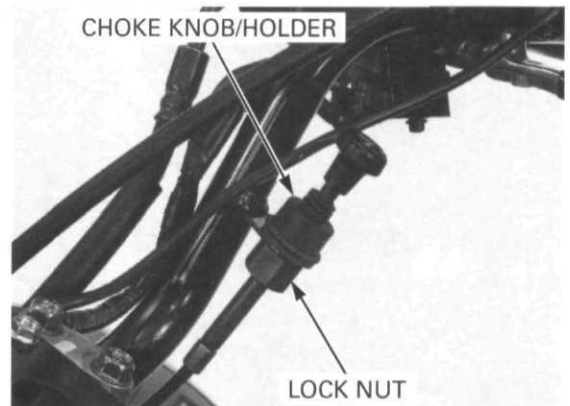
Install the front brake master cylinder and holder with the "UP" mark facing up. Align the edge of the master cylinder with the punch mark on the handlebar, and tighten the upper bolt first, then tighten the lower bolt.



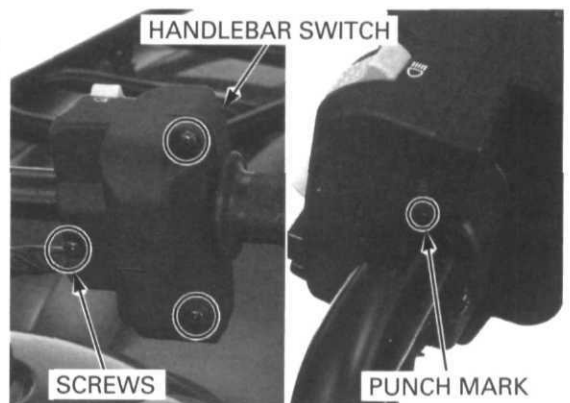
Install the throttle housing and holder. Align the lug of the throttle housing with the mating surface of the master cylinder and holder, and tighten the forward screw first, then tighten the rear screw.



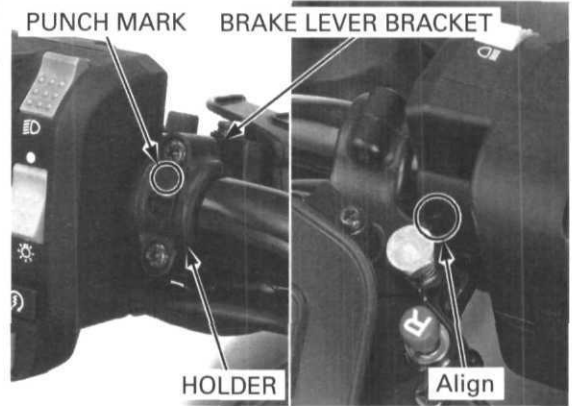
Install the choke knob/holder onto the stay of the handlebar and tighten the lock nut.



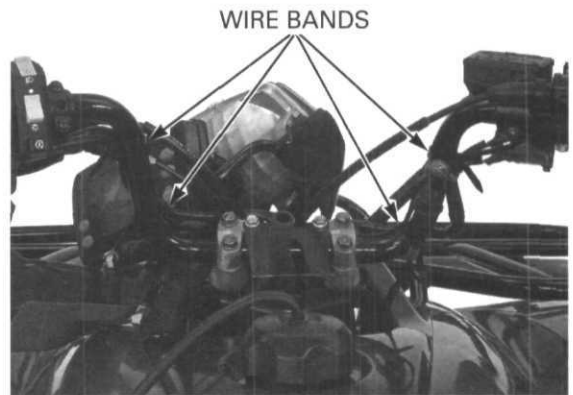
Install the handlebar switch. Align the mating surface with the punch mark on the handlebar, and tighten the upper screw first, then lower screws.



Install the brake lever bracket and holder with the punch mark facing up. Align the locating pin with the hole in the handlebar switch and tighten the upper screw first, then tighten the lower screw.



Install the four wire bands.  
Install the headlight/meter bracket (page 21-4).

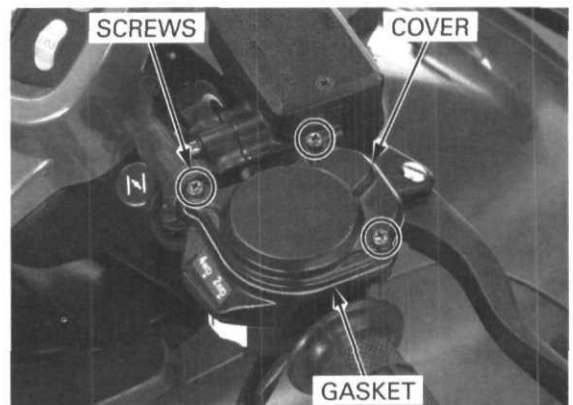


## THROTTLE HOUSING

### DISASSEMBLY

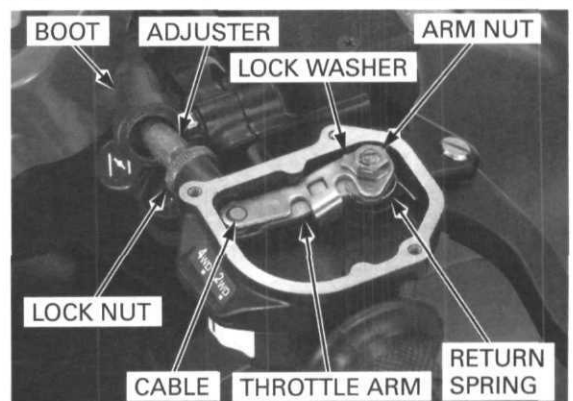
Remove the following:

- three screws
- throttle housing cover
- gasket



Slide the boot off the throttle cable adjuster. Loosen the lock nut and cable adjuster.

Bend down the lock washer tab and remove the throttle arm nut, lock washer, throttle arm and return spring.



## FRONT WHEEL/SUSPENSION/STEERING

Remove the throttle lever with the plastic washer.  
Disconnect the throttle cable from the throttle arm.  
Remove the dust seal from the housing bottom.

### ASSEMBLY

Coat a new dust seal lip with grease and install it into the housing until it is fully seated.

Apply grease to the throttle lever pivot.  
Apply grease to the throttle cable end and connect the cable to the throttle arm.  
Insert the throttle lever with the plastic washer into the housing.

Install the throttle arm with the spring over the throttle lever pivot by aligning the flat surfaces.  
Install a new lock washer and the throttle arm nut, and tighten the nut.

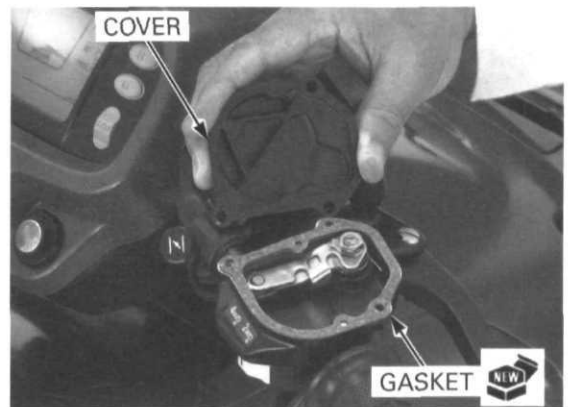
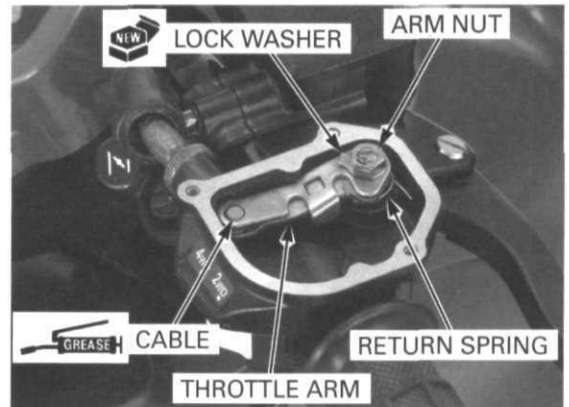
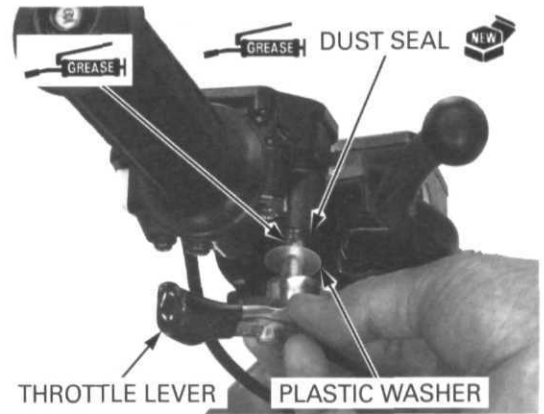
**TORQUE: 7.0 N·m (0.71 kgf·m, 5.2 lbf·ft)**

Bend up the lock washer tab against the nut.

Install the housing cover with a new gasket and tighten the three screws.

**TORQUE: 1.5 N·m (0.15 kgf·m, 1.1 lbf·ft)**

Adjust the throttle lever free play (page 4-5).



## FRONT WHEEL

### REMOVAL

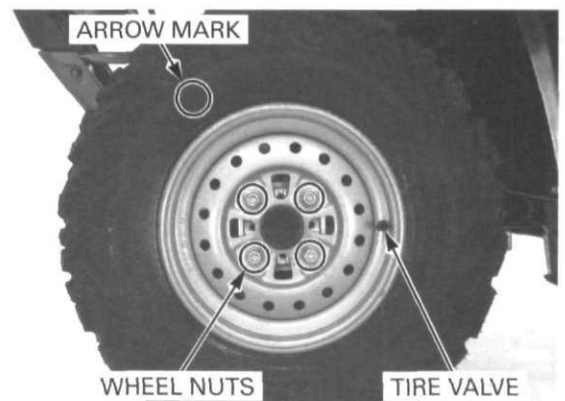
Loosen the wheel nuts.  
Place the support block under the frame to raise the front wheels off the ground.  
Remove the wheel nuts and front wheel.

### INSTALLATION

*Do not interchange the left and right wheels*  
Install the front wheel with the tire valve facing out and the arrow mark facing in the normal rotating direction.

Install the wheel nuts with the tapered side facing inward and tighten them.

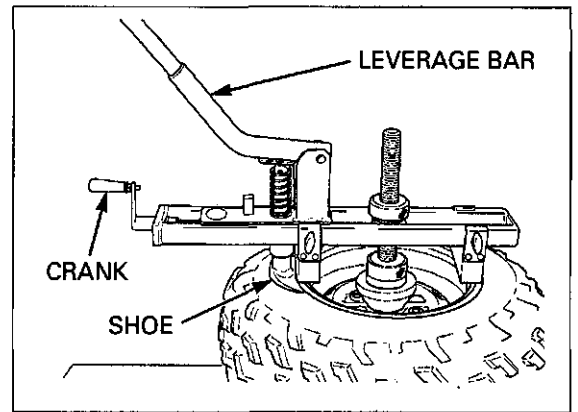
**TORQUE: 64 N·m (6.5 kgf·m, 47 lbf·ft)**



## FRONT WHEEL/SUSPENSION/STEERING

*Failure to back out the breaker shoe two turns will cause the shoe to scratch the bead lock, which may cause the tire to leak.*

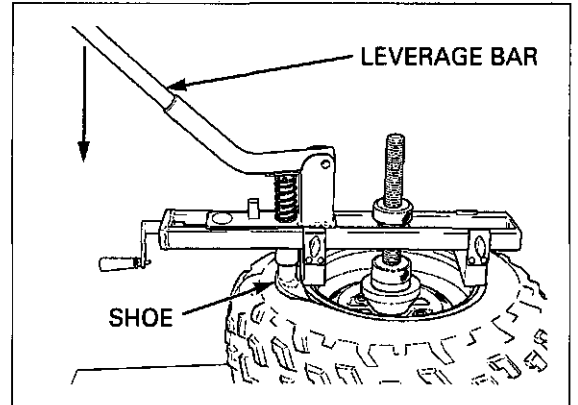
Pull the leverage bar down so the breaker shoe is just below the rim lip. Turn the crank to fully push the breaker shoe between the tire bead and rim. Once the shoe contacts the rim, back the crank out two turns to allow the shoe to clear the rim's bead lock.



Push down on the leverage bar to push the tire bead over the bead lock. Use only short strokes on the handle. While the shoe is still engaged, turn the wheel as far as it will go between strokes as you break the bead around the rim.

Remove the breaker arm assembly and flip the wheel over. Install the breaker arm assembly, adjust the shoe properly and break the other bead by following the above procedures.

Remove the tire from the rim using a tire changing machine or tire irons and rim protectors.

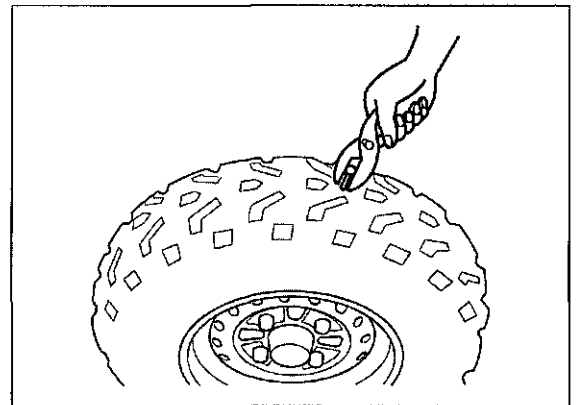


## TIRE REPAIR

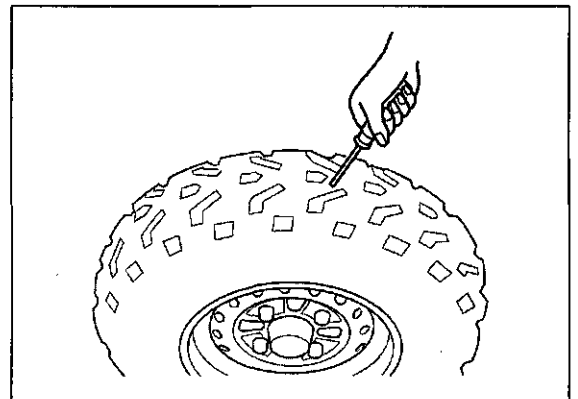
### NOTE:

- Use the manufacturer's instructions for the tire repair kit you are using. If your kit does not have instructions, use the procedures provided here.

Check the tire for puncturing objects. Chalk mark the punctured area and remove the puncturing object. Inspect and measure the injury. Tire repairs for injuries larger than 15 mm (5/8 in) should be a section repair. Section repairs should be done by a professional tire repair shop. If the injury is smaller than 15 mm (5/8 in), proceed with the repair as described here.



Install a rubber plug into the injury as follows: Apply a cement to a plug inserting needle and work the needle into the injury to clean and lubricate it. Do this three times. Do not let the cement dry.



*Be careful not to push the plug all the way into the tire to prevent it from falling inside.*

Insert and center a rubber plug through the eye of the inserting needle.

Apply cement to the rubber plug. Push the inserting needle with plug into the injury until the plug is slightly above the tire. Twist the needle and remove it from the tire; the plug will stay in the tire.

**TIRES**

**REMOVAL**

**NOTE:**

- This service requires the ATV Bead Buster (KLS379024).
- Remove and install the tire from the rim side opposite the valve stem.

Remove the core from the valve stem.

Use a pneumatic tire changer or equivalent to remove the tire from the rim. If a tire changer is not available, rim protectors and tire irons may be used.

Adjust the bottom rim supports to the proper rim size. Align the flat side of the support with the corresponding rim size indicator.

*Use only water as a lubricant when removing or mounting tires. Soap or some mounting lubricants may leave a slippery residue which can cause the tire to shift on the rim and lose tire pressure during riding.*

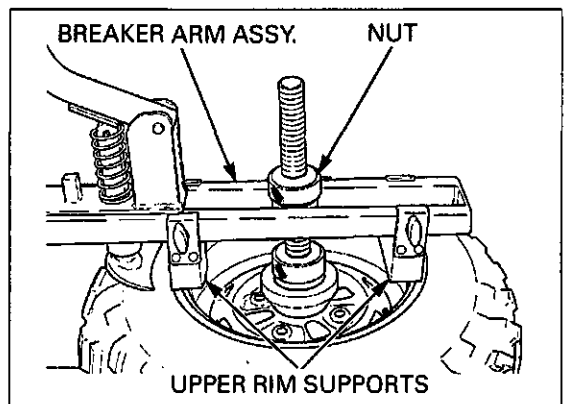
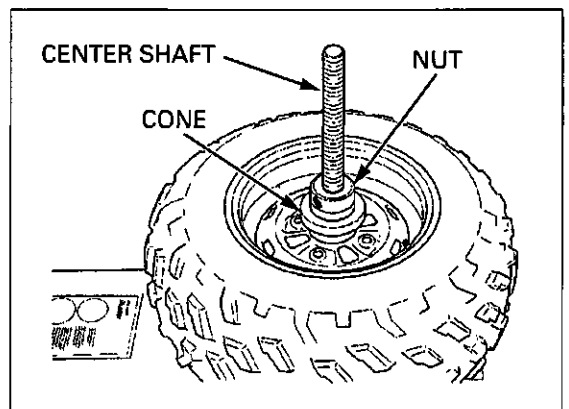
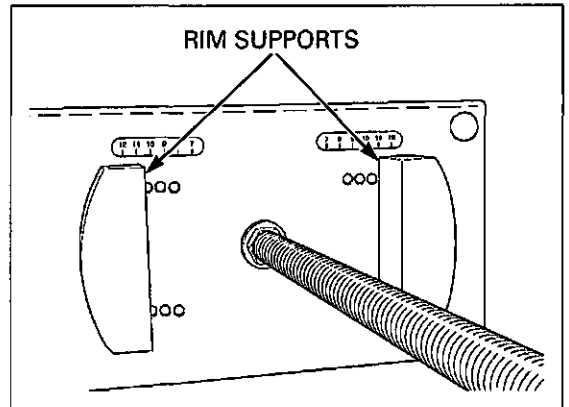
Lube the bead area of the tire with water, pressing down on the tire sidewall/bead area in several places to allow the water to run into and around the bead.

Place the wheel assembly over the center shaft and use the correct size cone to keep the wheel centered during operation.

Install the bottom hold down nut, bearing side down, and finger tighten it so the wheel can rotate freely during operation.

Install the breaker arm assembly over the center shaft and adjust the upper rim supports to fit the outside rim diameter.

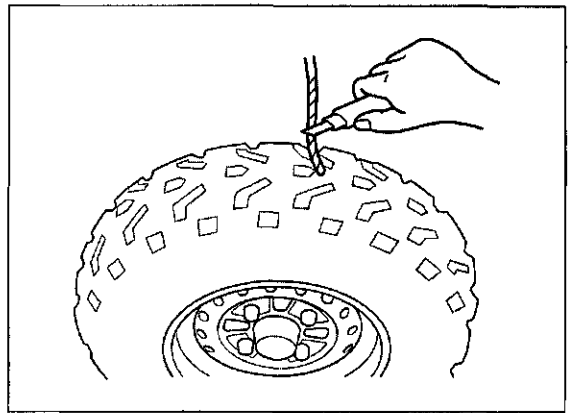
Install the top hold down nut and tighten it finger tight.



Trim the plug 6 mm (1/4 in) above the tire surface. Repeat the above procedure if the puncture is large. Do not use more than two plugs per injury.

Allow the repair to dry. Drying time will vary with air temperature. Refer to the tire repair kit manufacturer's recommendations.

Inflate the tire and test the seal by dabbing a small amount of cement around the plug. Escaping air will cause a bubble in the cement. If there is leakage, remove the tire (page 13-10) and apply a cold patch to the inside of the tire as described below.



If a plug has been inserted, trim it even with the inner tire surface.

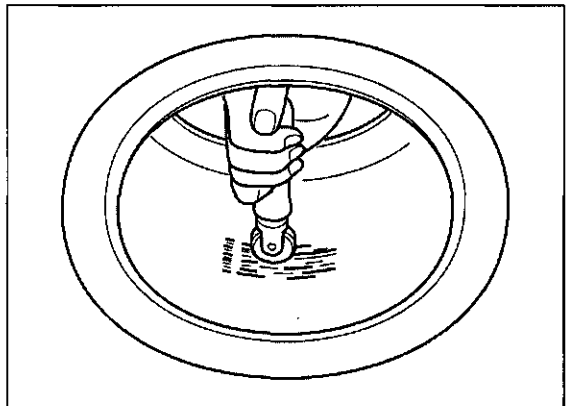
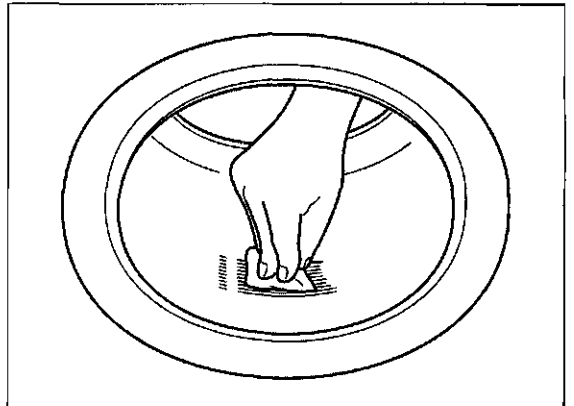
Temporarily place a rubber patch that is at least twice the size of the puncture over the injury. Make a mark around the patch, slightly larger than the patch itself.

Rough the area marked inside the tire with a tire buffer or a wire brush. Clean the rubber dust from the buffed area.

Apply cement over the area marked and allow it to dry until tacky.

Do not touch the cement with dirty or greasy hands. Remove the lining from the patch and center it over the injury.

Press the patch against the injury using a special roller.



**ASSEMBLY**

Install the tire onto the rim, where the rim shoulder width is the narrowest, to simplify installation.

Clean the rim bead seat and flanges.

Apply clean water to the rim flanges, bead seat and base.

Install the valve core in the valve stem. Install the tire with the arrow mark facing in the normal rotating direction.

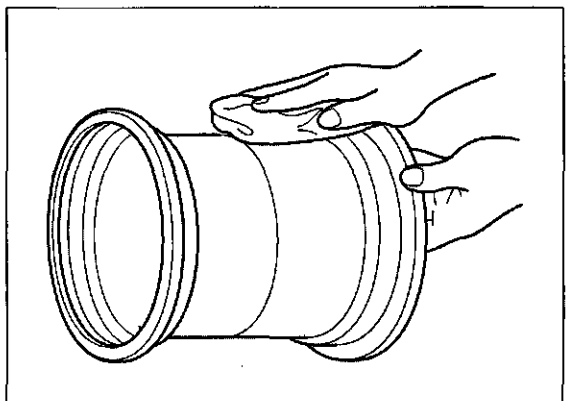
Inflate the tire to seat the tire bead.

Deflate the tire. Wait 1 hour and inflate the tire to the specified pressure.

**RECOMMENDED TIRE PRESSURE**

- Standard: 25 kPa (0.25 kgf/cm<sup>2</sup>, 3.6 psi)**
- Minimum: 22 kPa (0.22 kgf/cm<sup>2</sup>, 3.2 psi)**
- Maximum: 28 kPa (0.28 kgf/cm<sup>2</sup>, 4.0 psi)**
- With cargo: 25 kPa (0.25 kgf/cm<sup>2</sup>, 3.6 psi)**

Check for air leaks and install the valve cap.



*Use only water as a lubricant when removing or mounting tires. Soap or some mounting lubricants may leave a slippery residue which can cause the tire to shift on the rim and lose air pressure during riding.*

# WHEEL HUB AND KNUCKLE

## REMOVAL

Remove the front wheel (page 13-10).

*Support the caliper so that it does not hang from the brake hose. Do not twist or bend the brake hose.*

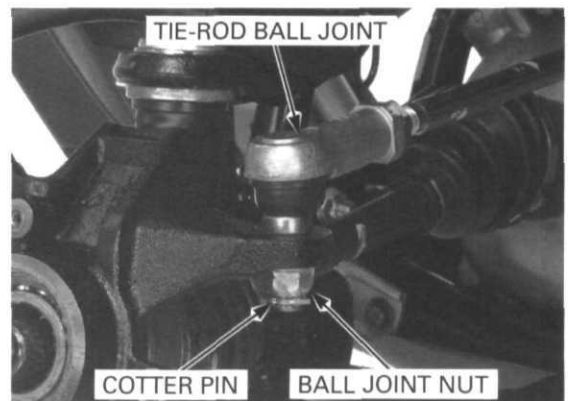
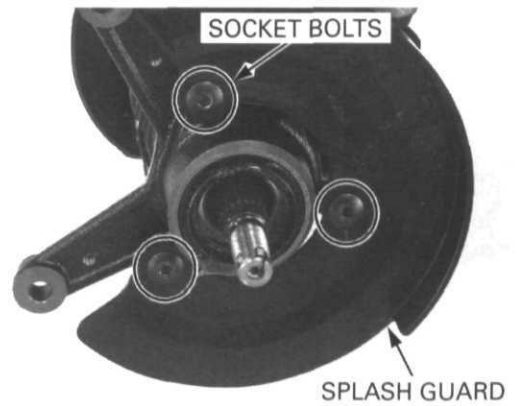
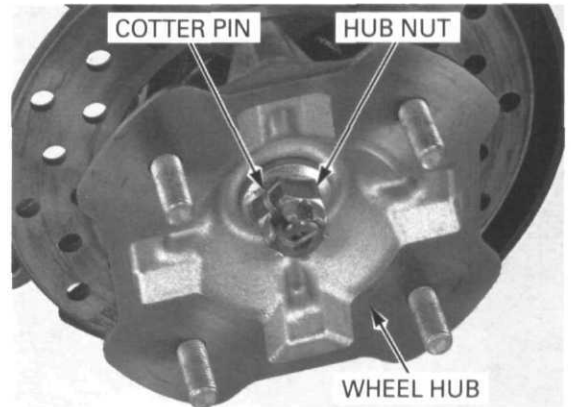
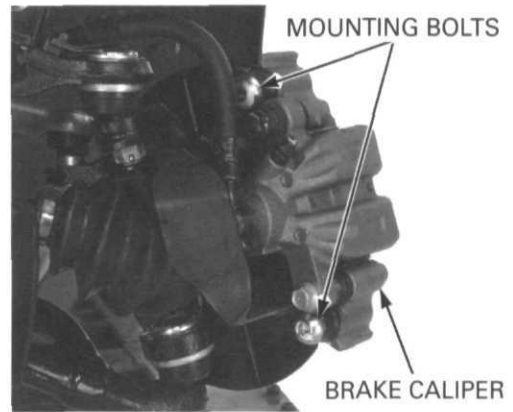
Remove the following:

- mounting bolts
- front brake caliper

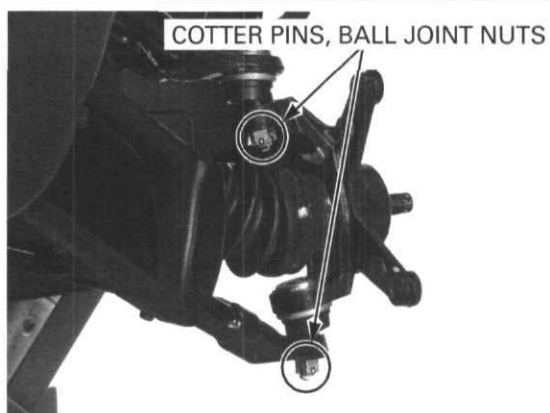
- cotter pin
- hub nut
- wheel hub

- socket bolts
- splash guard

Remove the cotter pin from the tie-rod ball joint stud.  
Remove the ball joint nut by holding the joint stud flat surfaces.

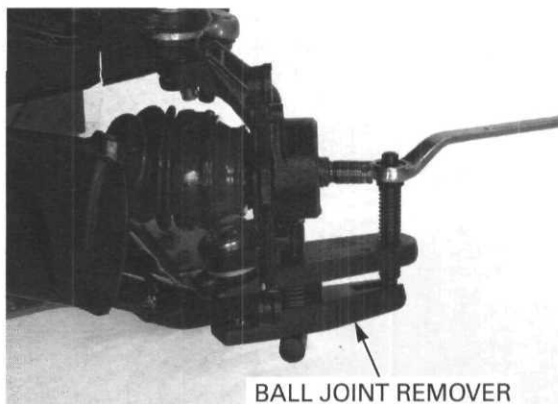


Remove the cotter pins from the ball joint studs. Loosen the ball joint nuts, but do not remove them yet.



Release the ball joints, using the special tool according to the following instructions.

**TOOL:**  
**Ball joint remover, 28 mm      07MAC-SL00201**

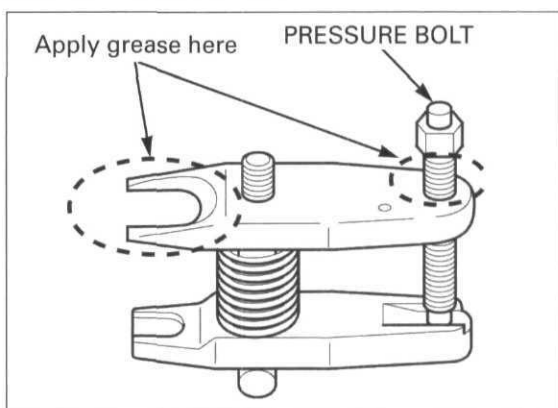


Apply grease to the ball joint remover at the point shown. This will ease installation of the tool and prevent damage to the pressure bolt threads.

Insert the jaws carefully, making sure that you do not damage the ball joint boot.

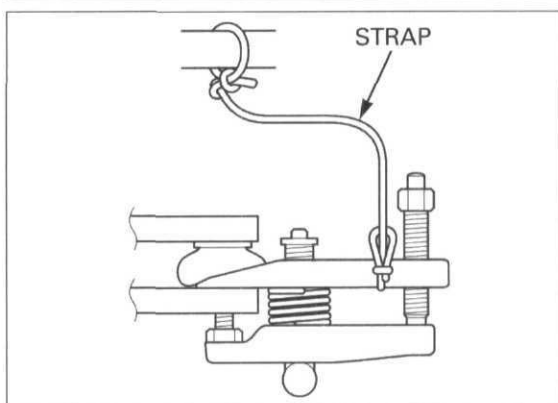
Adjust the jaw spacing by turning the pressure bolt.

*If necessary, apply penetrating type lubricant to loosen the ball joint.*



To prevent the tool from dropping, tie the strap on a neighboring solid part such as the lower arm, tie-rod, etc. before operation.

- Do not tie the strap on the brake hose, brake pipe, rubber boot, and other parts that can be damaged easily.



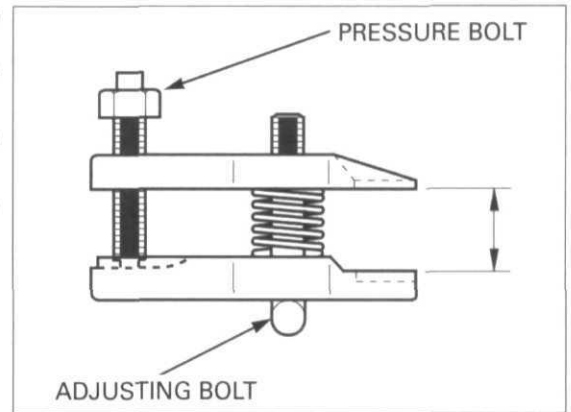


## FRONT WHEEL/SUSPENSION/STEERING

Once the tool is in place, turn the adjusting bolt as necessary to make the jaws parallel. Then hand-tighten the pressure bolt and recheck the jaws to make sure they are still parallel.

Tighten the pressure bolt with a wrench until the ball joint stud pops loose.

Remove the ball joint nuts and the knuckle from the upper and lower arms.

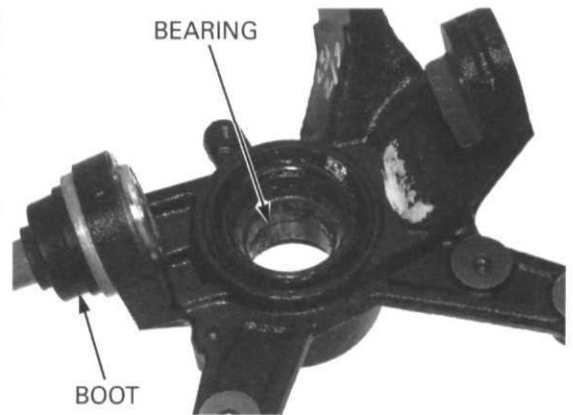


### INSPECTION

Turn the inner race of each bearing in the wheel hub (TM model) and knuckle (FM/FE models) with your finger. The bearings should turn smoothly and quietly. Also check that the bearing outer race fits tightly in the hub or knuckle.

Inspect the knuckle for damage or cracks.

Inspect the ball joint boot for tears or other damage by moving the ball joint stud. It should move freely and smoothly.

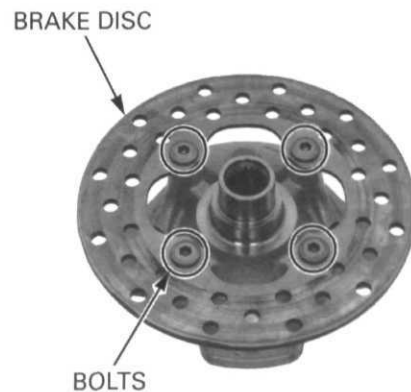


### BRAKE DISC REPLACEMENT

Remove the four socket bolts and brake disc from the wheel hub.

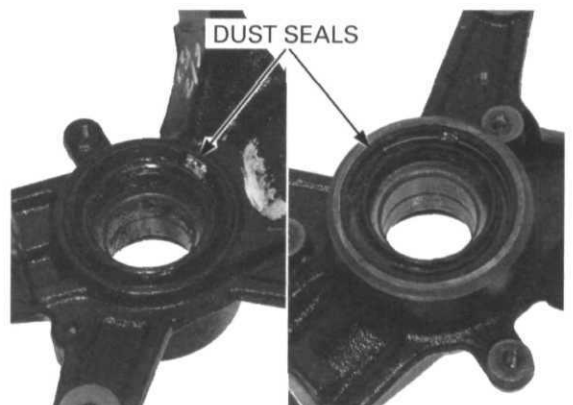
Install a new brake disc with new socket bolts and tighten the bolts.

**TORQUE: 42 N·m (4.3 kgf·m, 31 lbf·ft)**



### BEARING REPLACEMENT

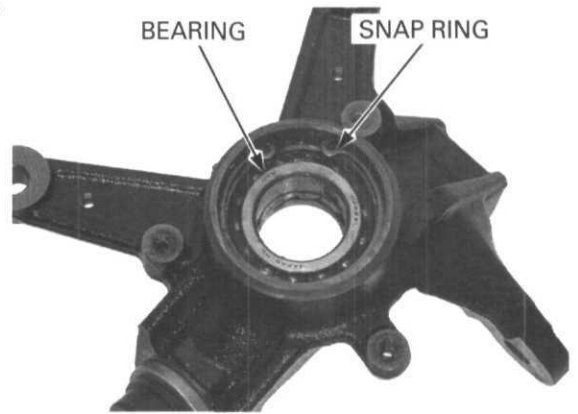
Remove the dust seals from the knuckle.



Remove the snap ring and drive the bearings out of the knuckle.

**TOOLS:**

<b>Driver</b>	<b>07749-0010000</b>
<b>Attachment, 42 x 47 mm</b>	<b>07746-0010300</b>
<b>Pilot, 30 mm</b>	<b>07746-0040700</b>

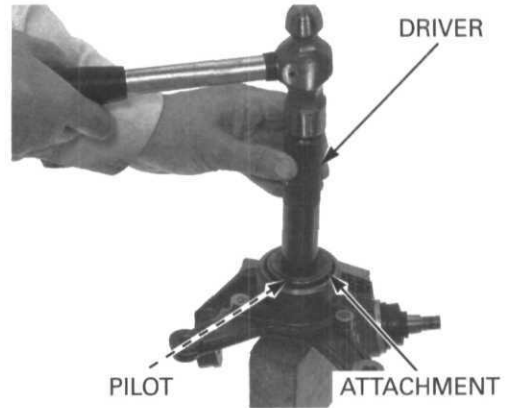


Pack the cavities of a new bearings with grease. Drive in the bearing squarely with the marked side facing up until they are fully seated.

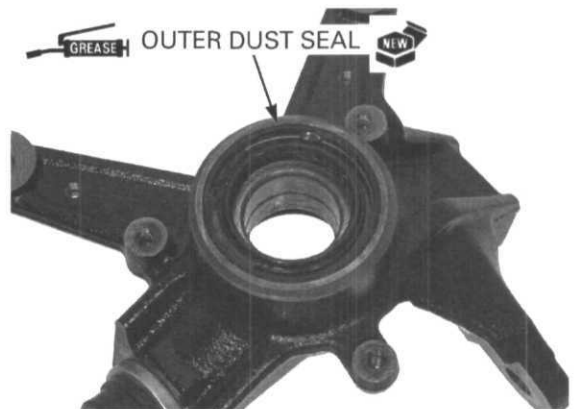
**TOOLS:**

<b>Driver</b>	<b>07749-0010000</b>
<b>Attachment, 52 x 55 mm</b>	<b>07746-0010400</b>
<b>Pilot, 30 mm</b>	<b>07746-0040700</b>

Install the snap ring into the knuckle groove with the chamfered side facing in.



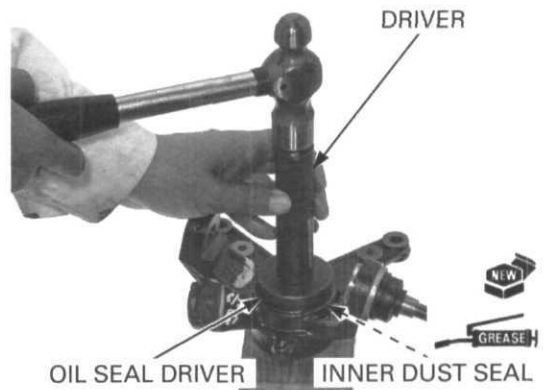
Apply grease to a new outer dust seal lip and install seal using the same tools until it is flush with the knuckle end.



Apply grease to the lips of a new inner dust seal and install seal until it is flush with the knuckle end, being careful not to damage the lip.

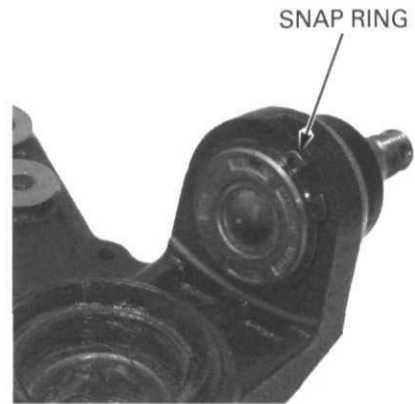
**TOOLS:**

<b>Driver</b>	<b>07749-0010000</b>
<b>Oil seal driver</b>	<b>07JAD-PH80101</b>



**BALL JOINT REPLACEMENT**

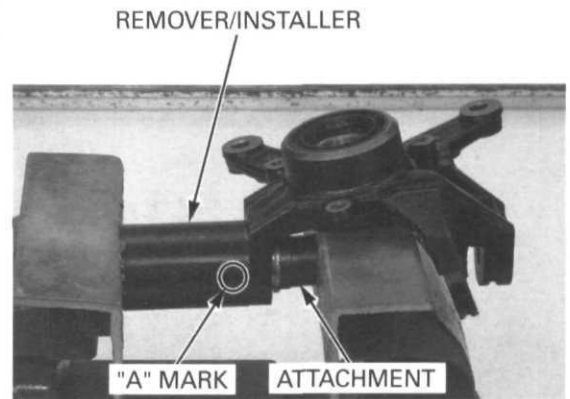
Remove the snap ring from the ball joint.



Set the knuckle and special tools with "A" mark side of the remover/installer facing to the ball joint in the vise as shown.  
Press the ball joint out of the knuckle.

**TOOLS:**

**Ball joint remover/installer**      07WMF-HN00100  
**Attachment, 28 x 30 mm**      07946-1870100



Set the knuckle and special tools with "B" mark side of the remover/installer facing to the ball joint in the vise as shown.  
Press the ball joint into the knuckle until it is fully seated.

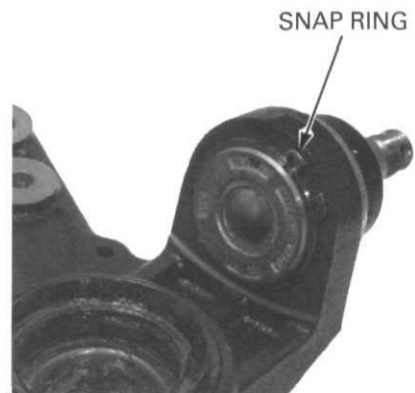
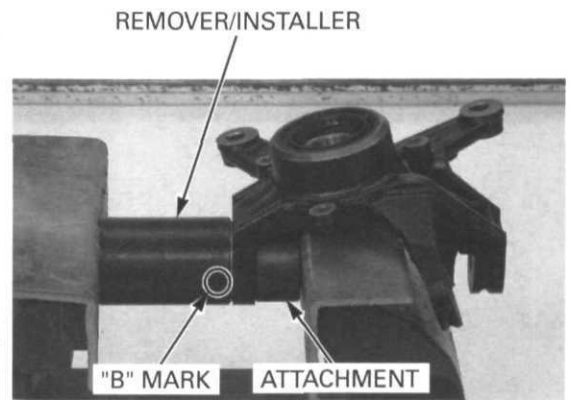
**TOOLS:**

**Ball joint remover/installer**      07WMF-HN00100  
**Attachment, 20 mm I.D.**      07746-0020400

**NOTICE**

*If you feel strong resistance when compressing the vise, stop. Reset the attachment of the tool so that the ball joint head can go into the hollow of the attachment and try again.*

Install the snap ring with the chamfered edge facing in.



**INSTALLATION**

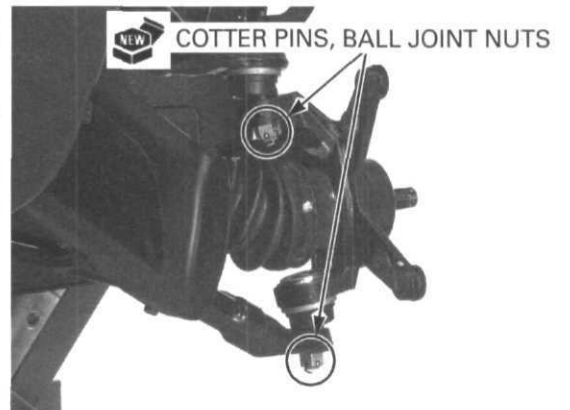
Install the knuckle onto the drive shaft (FM/FE models only), and lower and upper arms with the ball joint nuts.

Install the tie-rod ball joint into the knuckle with a new nut.

Tighten each arm ball joint nut to the specified torque and further tighten until its grooves align with the cotter pin hole.

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

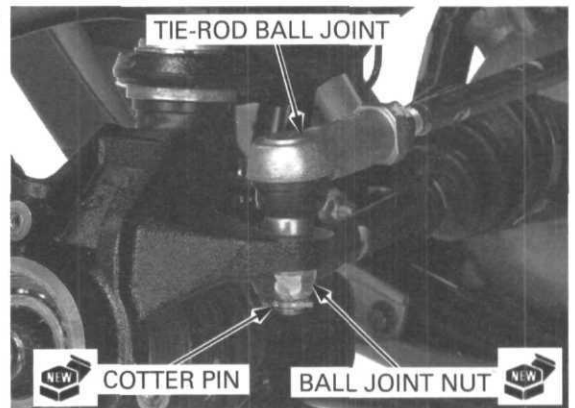
Install new cotter pins.



Tighten the tie-rod ball joint nut by holding the joint stud flat surfaces.

**TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)**

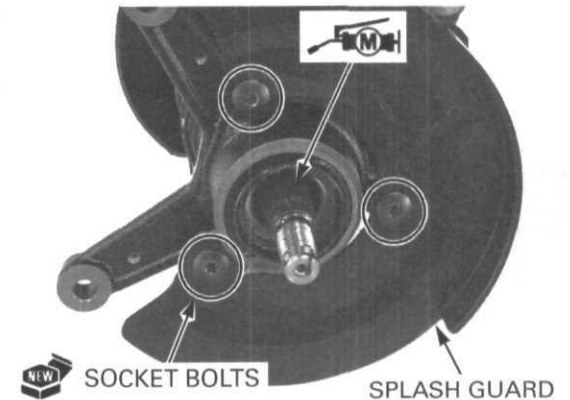
Install a new cotter pin.



Apply molybdenum disulfide grease to the drive shaft splines.

Install the splash guard with new bolts and tighten the bolts.

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

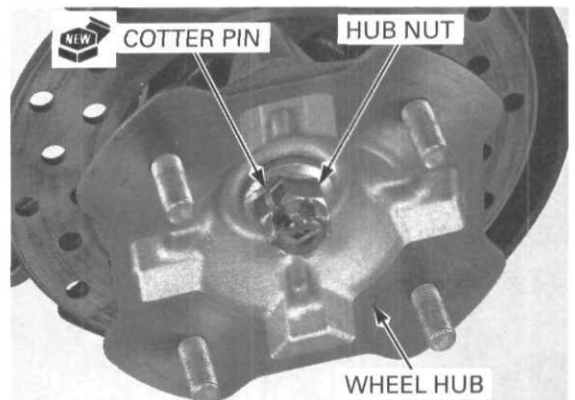


Install the wheel hub and hub nut.

Tighten the nut to the specified torque and further tighten until its grooves align with the cotter pin hole.

**TORQUE: 78 N·m (8.0 kgf·m, 58 lbf·ft)**

Install a new cotter pin.

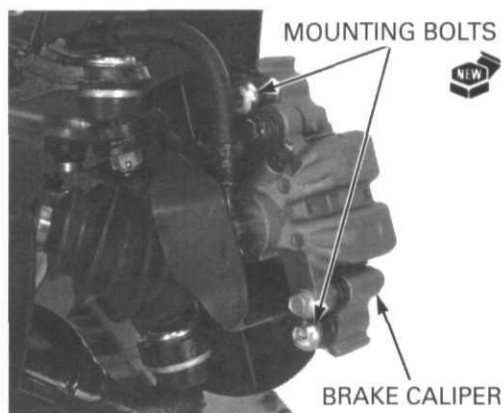


## FRONT WHEEL/SUSPENSION/STEERING

Install the front brake caliper with new mounting bolts and tighten the bolts.

**TORQUE: 44 N·m (4.5 kgf·m, 32 lbf·ft)**

Install the front wheel (page 13-10).



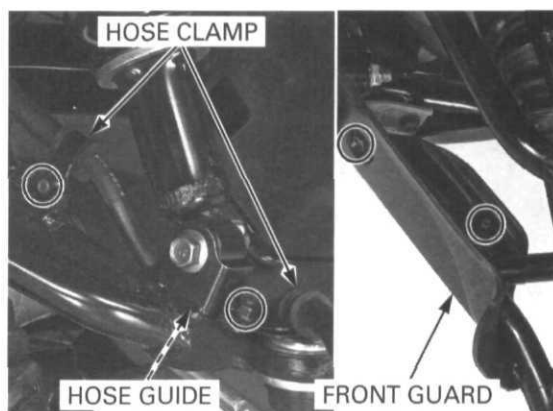
## SUSPENSION ARM

### REMOVAL

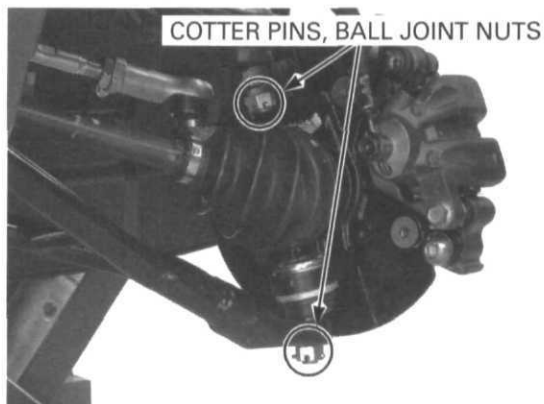
Remove the front carry pipe (page 3-8).  
Remove the front wheel (page 13-10).

Remove the two brake hose clamp bolts and the brake hose from the hose guide.

FM/FE only: Remove the two bolts and front guard from the lower arm.



Remove the cotter pins from the ball joint studs.  
Loosen the ball joint nuts, but do not remove them yet.



Release the ball joints, using the special tool according to the instructions described on page 13-15.

### TOOL:

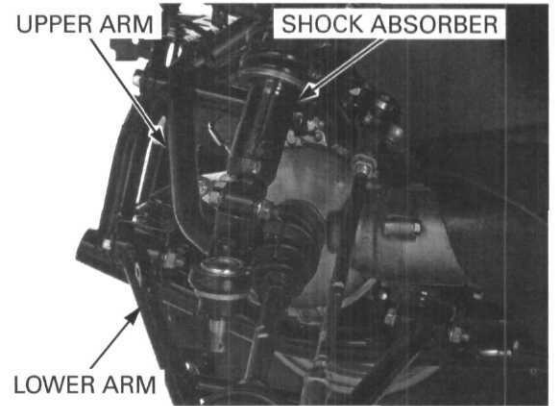
**Ball joint remover, 28 mm      07MAC-SL00201**

Support the wheel hub/knuckle assembly securely.

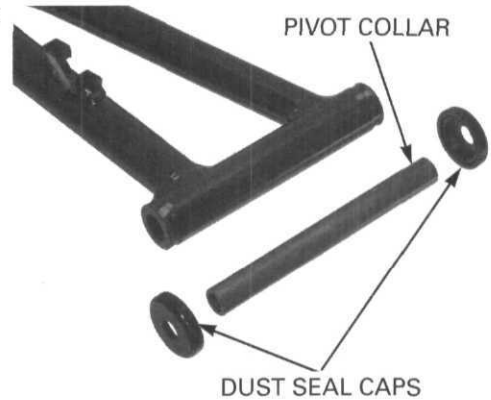


Remove the following:

- shock absorber lower mounting nut and bolt
- pivot nut, bolt and upper arm
- pivot nuts, bolts and lower arm

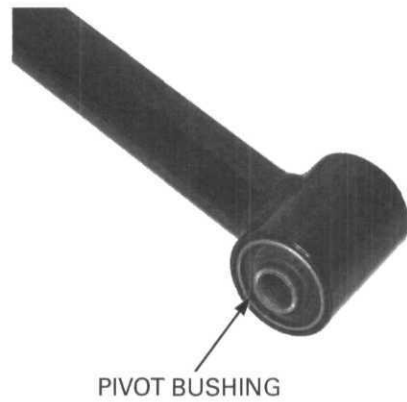


Remove the dust seal caps and pivot collar from the upper arm.

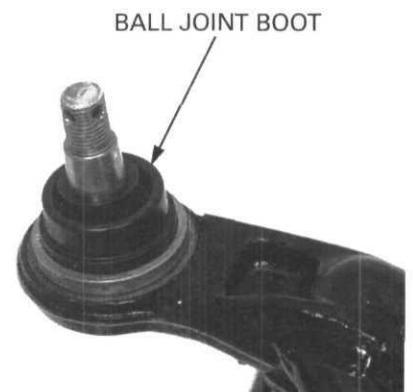


### INSPECTION

Check the pivot bushings for wear or damage.



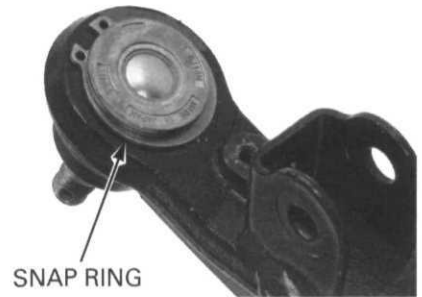
Inspect the ball joint boot for tears or other damage by moving the ball joint studs. It should move freely and smoothly.



## FRONT WHEEL/SUSPENSION/STEERING

### BALL JOINT REPLACEMENT

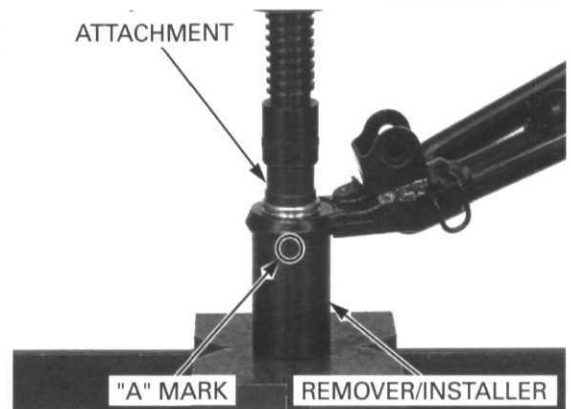
Remove the snap ring from the ball joint.



Set the upper arm and special tools with "A" mark side of the remover/installer facing to the ball joint in the hydraulic press as shown. Press the ball joint out of the upper arm.

**TOOLS:**

**Ball joint remover/installer** 07WMF-HN00100  
**Attachment, 28 x 30 mm** 07946-1870100



Set the upper arm and special tools with "B" mark side of the remover/installer facing to the ball joint in the hydraulic press as shown. Press the ball joint into the upper arm until it is fully seated.

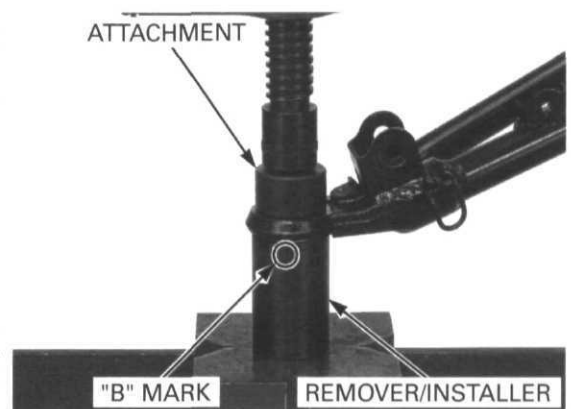
**TOOLS:**

**Ball joint remover/installer** 07WMF-HN00100  
**Attachment, 20 mm I.D.** 07746-0020400

**NOTICE**

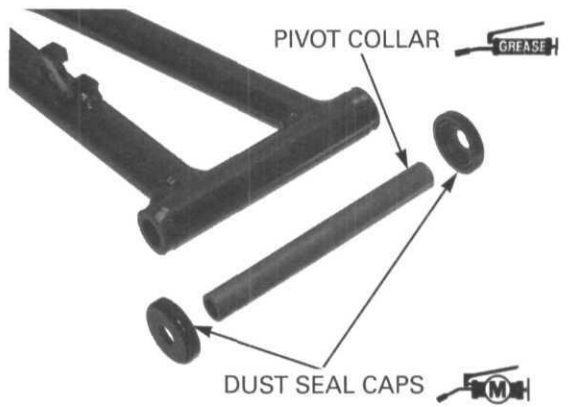
*If you feel strong resistance when lowering the press, stop. Reset the attachment of the tool so that the ball joint head can go into the hollow of the attachment and try again.*

Install the snap ring with the chamfered edge facing in.



**INSTALLATION**

Apply grease to the pivot collar outer surface and install the collar into the upper arm.  
Apply molybdenum disulfide grease to the dust seal lips and install the dust seal caps onto the upper arm.



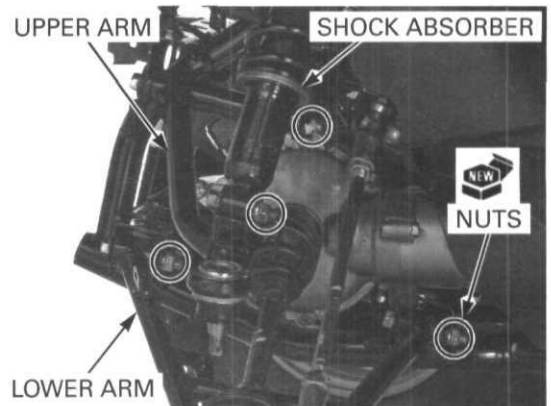
Install the upper arm into the frame with the pivot bolt and a new nut, and tighten the nut.

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

Install the shock absorber lower mount into the upper arm with the mounting bolt and a new nut, and tighten the nut.

**TORQUE: 44 N·m (4.5 kgf·m, 32 lbf·ft)**

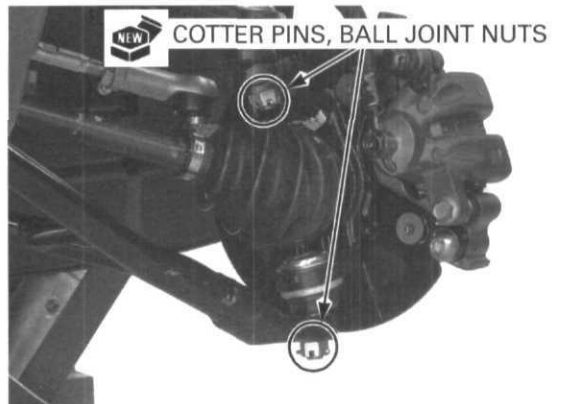
Install the lower arm into the frame with the pivot bolts and new nuts, and loosely tighten the nuts.



Install the wheel hub/knuckle assembly onto the upper and lower arms and install the ball joint nuts. Tighten each nut to the specified torque and further tighten until its grooves align with the cotter pin hole.

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

Install new cotter pins.



Install the brake hose into the hose guide and the hose clamp onto the upper arm, and tighten the bolts.

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

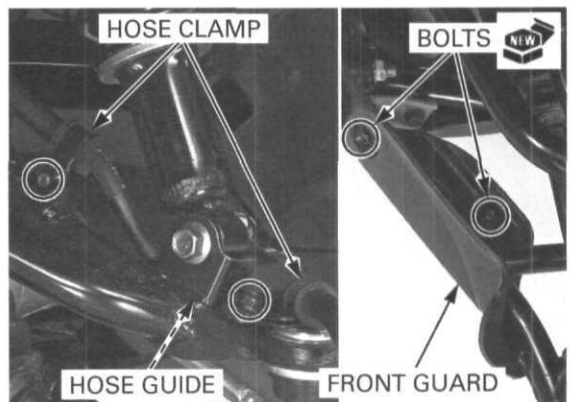
FM/FE only: Install the front guard onto the lower arm with new bolts, and tighten the bolts securely.

Install the front wheel (page 13-10).

Place the vehicle on level ground and tighten the lower arm pivot nuts.

**TORQUE: 44 N·m (4.5 kgf·m, 32 lbf·ft)**

Install the front carrier pipe (page 3-8).



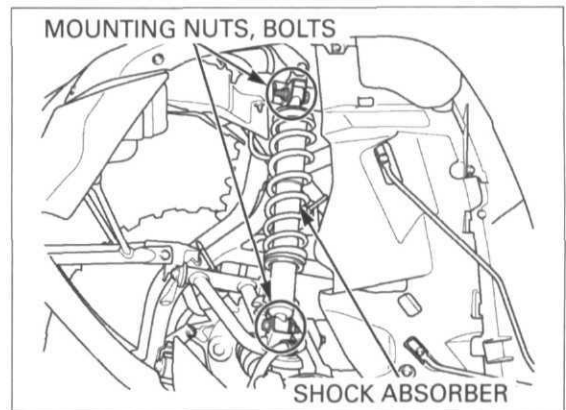


## FRONT SHOCK ABSORBER

### REMOVAL

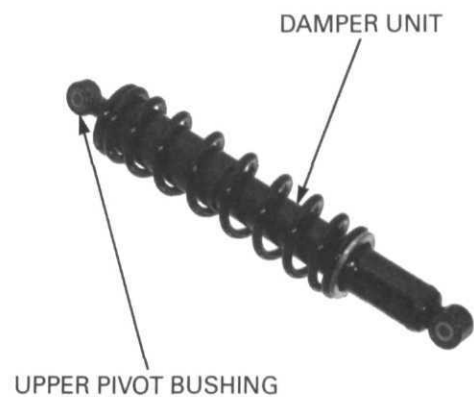
Support the vehicle with a support block to raise the front wheels off the ground.

Support the suspension arm or front wheel, and remove the mounting nuts, bolts and front shock absorber.



### INSPECTION

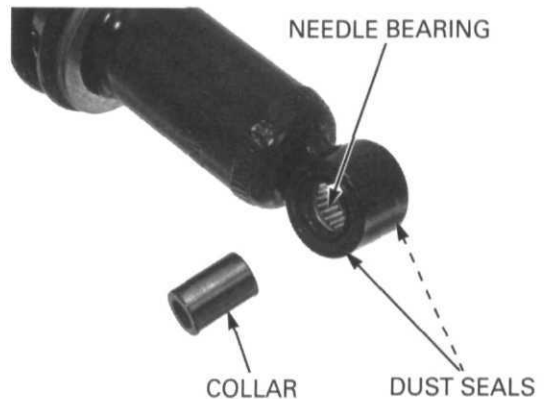
Check the upper pivot bushing for wear or damage. Check the damper unit for leakage or other damage. Replace the shock absorber assembly if necessary.



Remove the lower pivot collar. Check the lower pivot needle bearing for wear or damage.

### BEARING REPLACEMENT

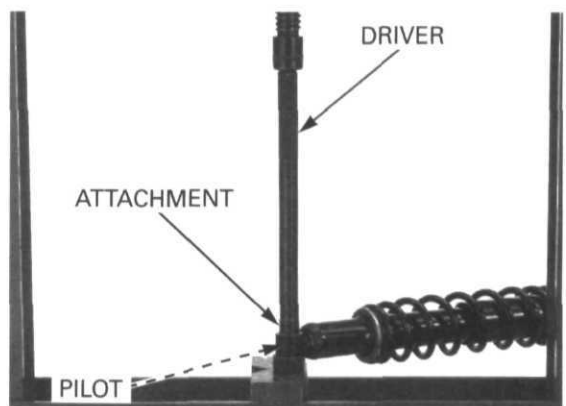
Remove the dust seals.



Press the needle bearing out of the lower pivot.

#### TOOLS:

Driver	07949-3710001
Attachment, 22 x 24 mm	07746-0010800
Pilot, 16 mm	07746-0041300

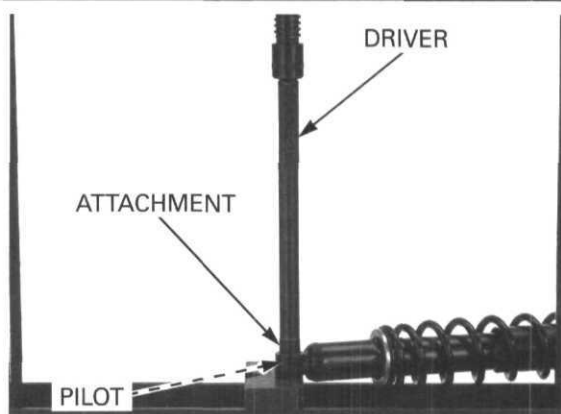


Press the bearing with the marking side facing up.

Apply grease to the needle rollers of a new bearing. Carefully press the needle bearing into the lower pivot until it is 5.4 – 5.5 mm (0.21 – 0.22 in) below the lower pivot surface.

### TOOLS:

<b>Driver</b>	<b>07949-3710001</b>
<b>Attachment, 22 x 24 mm</b>	<b>07746-0010800</b>
<b>Pilot, 16 mm</b>	<b>07746-0041300</b>



Apply grease to new dust seal lips and install the dust seals into the lower pivot until they are flush with the pivot surfaces.

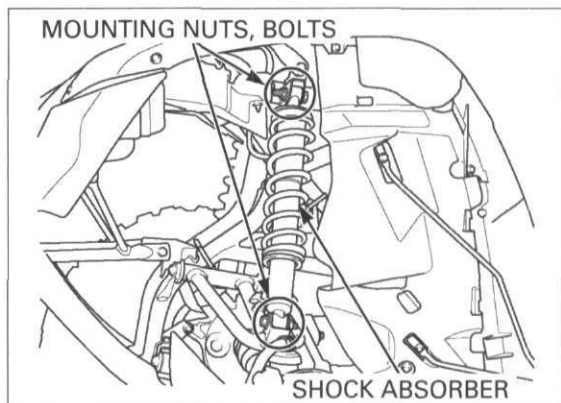
Install the pivot collar.



## INSTALLATION

Install the front shock absorber in the frame and the mounting bolts from the front side. Install new mounting nuts and tighten them.

**TORQUE: 44 N·m (4.5 kgf·m, 32 lbf·ft)**

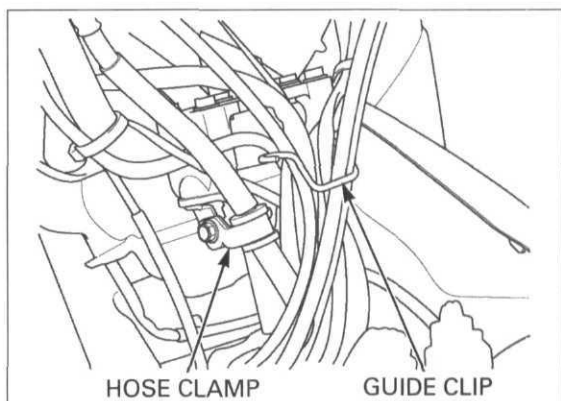


## STEERING SHAFT

### REMOVAL

Remove the following:

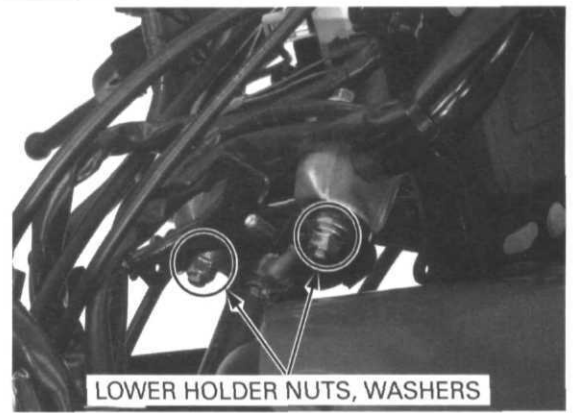
- inner fenders (page 3-7)
- front fender (page 3-9)
- assist headlight (page 21-4)
- bolt and brake hose clamp
- wire harnesses from the guide clip



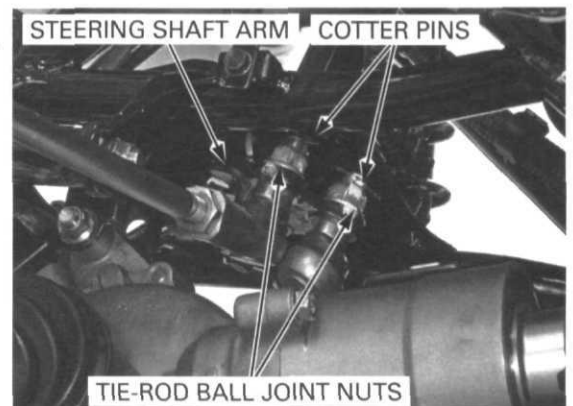
## FRONT WHEEL/SUSPENSION/STEERING

Keep the master cylinder reservoir upright to prevent air from entering the hydraulic system.

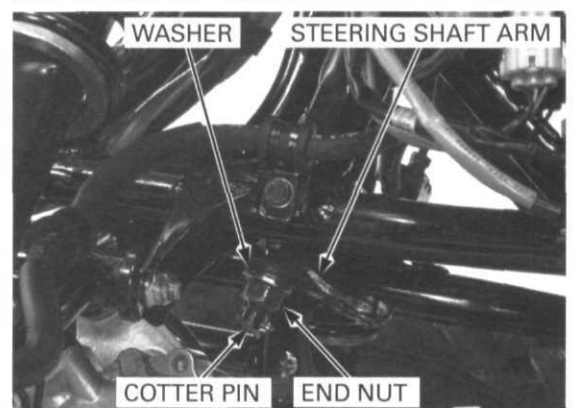
- handlebar lower holder nuts and washers
- handlebar assembly from the steering shaft



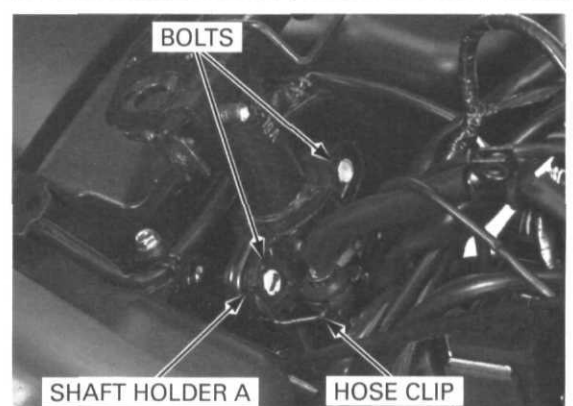
- cotter pins
- ball joint nuts by holding the joint stud flat surfaces
- tie-rods from the steering shaft arm



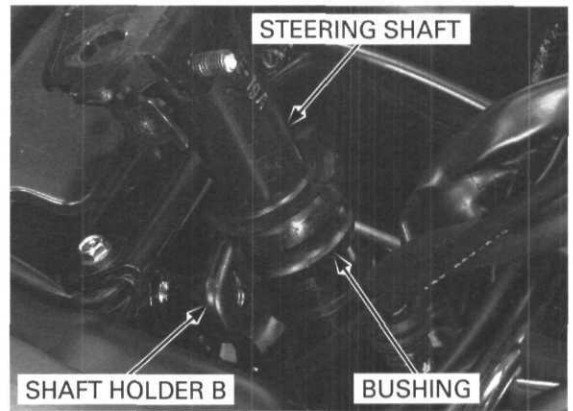
- cotter pin
- steering shaft end nut
- washer
- steering shaft arm



- brake hose from the hose clip
- two bolts
- steering shaft holder A



- steering shaft
- steering shaft bushing
- steering shaft holder B



### INSPECTION

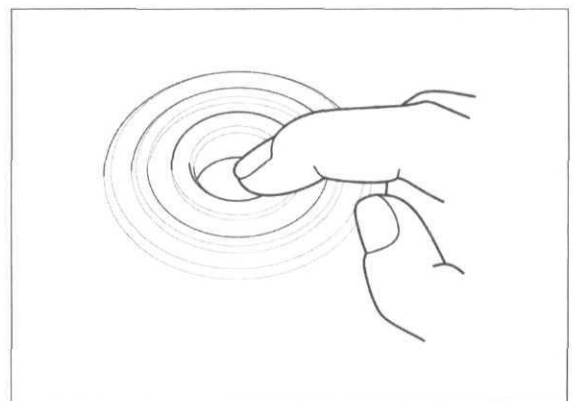
Check the steering shaft bushing for wear or damage.



Check the steering shaft for distortion or damage.



Turn the inner race of the steering shaft bearing with your finger.  
The bearing should turn smoothly and quietly. Also check that the bearing outer race fits tightly in the frame.

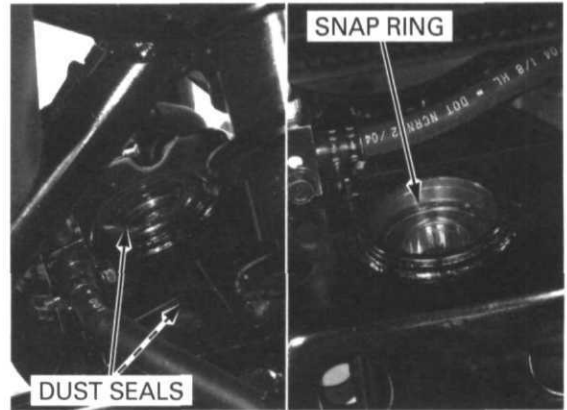


## FRONT WHEEL/SUSPENSION/STEERING

### BEARING REPLACEMENT

Remove the upper and lower dust seals.

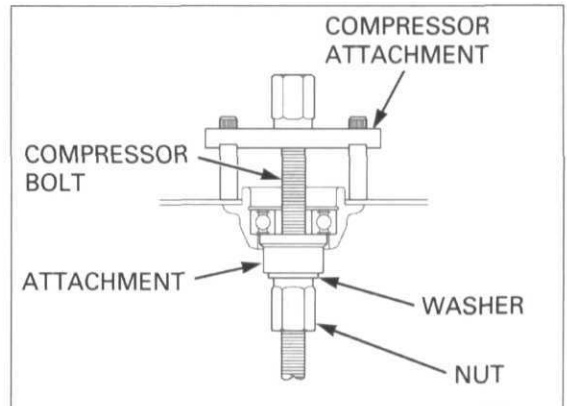
Remove the snap ring.



Remove the bearing from the frame using the special tools and a 10 mm washer

#### TOOLS:

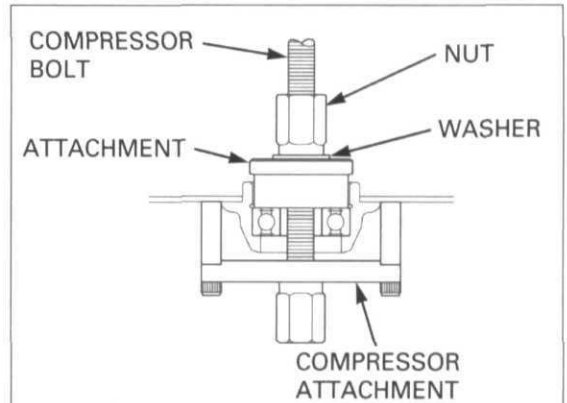
**Clutch compressor attachment** 07LAE-PX40100  
**Compressor bolt assembly** 07GAE-PG40200  
**Attachment, 32 x 35 mm** 07746-0010100



Draw a new bearing into the frame with the marked side facing up until it is fully seated, using the special tools and a 10 mm washer.

#### TOOLS:

**Clutch compressor attachment** 07LAE-PX40100  
**Compressor bolt assembly** 07GAE-PG40200  
**Attachment, 42 x 47 mm** 07746-0010300

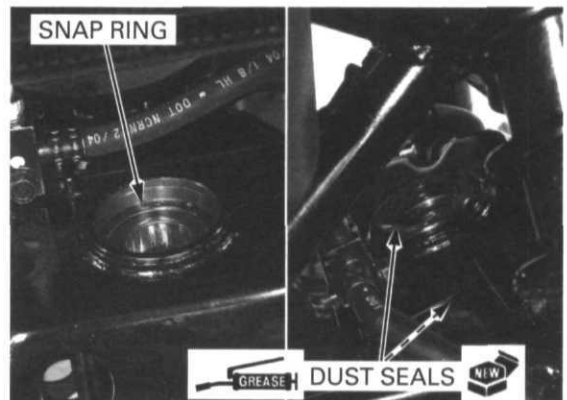


Install the snap ring into the frame groove properly with the chamfered edge facing up.

Apply grease to new dust seal lips.

Install the upper seal so that it is flush with the frame edge.

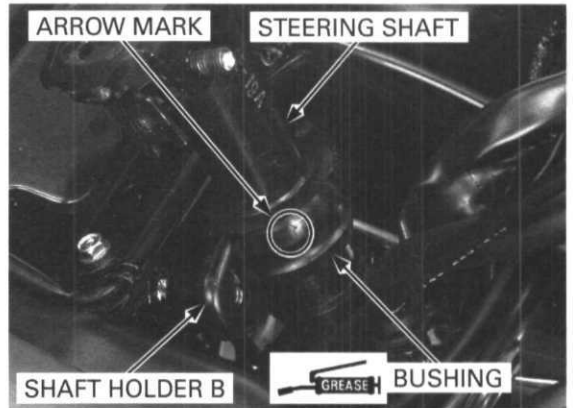
Install the lower seal so that it is fully seated onto the bearing.



**INSTALLATION**

Apply 2 – 3 g of grease to the shaft bushing inner surface.

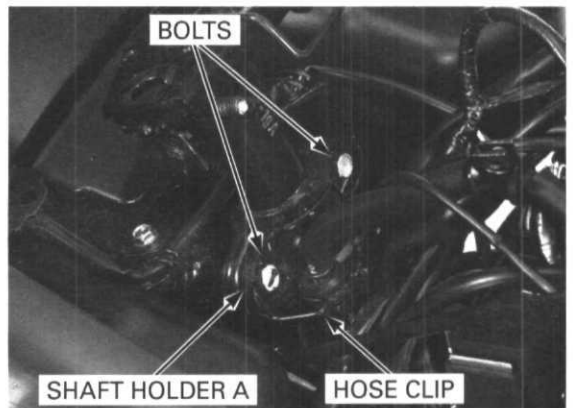
Install the shaft bushing onto the steering shaft with the arrow mark facing up.  
Install steering shaft holder B onto the frame.  
Install the steering shaft into the shaft bearing.



Install steering shaft holder A with the hose clip toward the right side.  
Tighten the holder bolts.

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

Install the brake hose grommet into the hose clip.

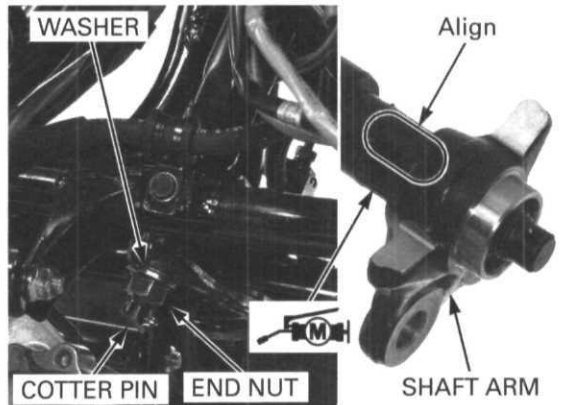


Apply molybdenum disulfide grease to the steering shaft spline.

Install the shaft arm over the steering shaft by aligning the wide tooth with the wide groove.  
Install the washer and a new end nut, and tighten the nut to the specified torque.

**TORQUE: 108 N·m (11.0 kgf·m, 80 lbf·ft)**

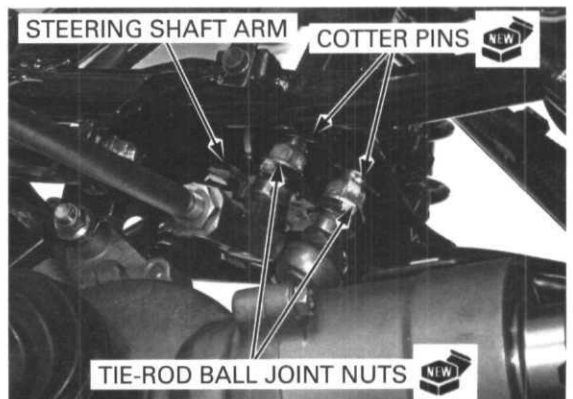
Install a new cotter pin.



Install the tie-rods into the steering shaft arm.  
Install new ball joint nuts and tighten them by holding the joint stud flat surfaces.

**TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)**

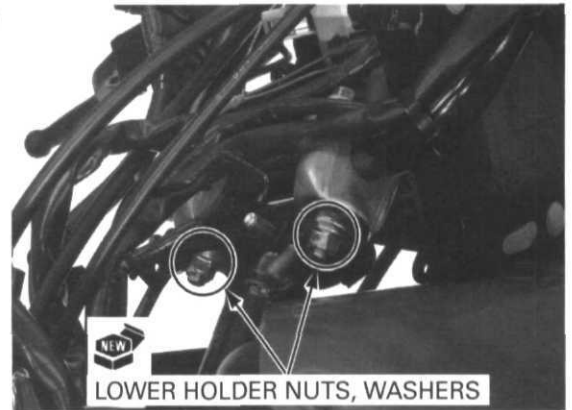
Install new cotter pins into the ball joint studs.



## FRONT WHEEL/SUSPENSION/STEERING

Install the handlebar assembly onto the steering shaft with the washers and new lower holder nuts. Tighten the nuts.

**TORQUE: 39 N·m (4.0 kgf·m, 29 lbf·ft)**

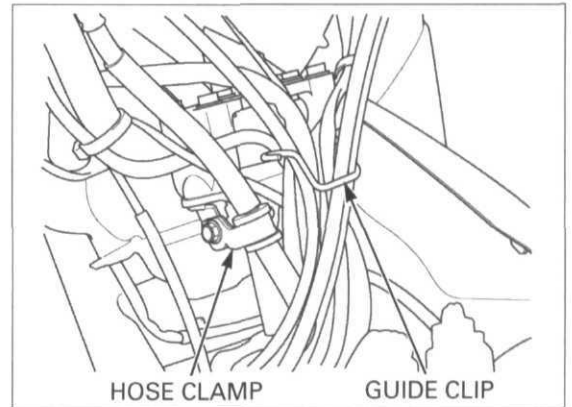


Install the wire harnesses in the wire clip. Install the brake hose clamp and tighten the bolt.

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

Install the following:

- assist headlight (page 21-4)
- front fender (page 3-9)
- inner fenders (page 3-7)



## TIE-ROD

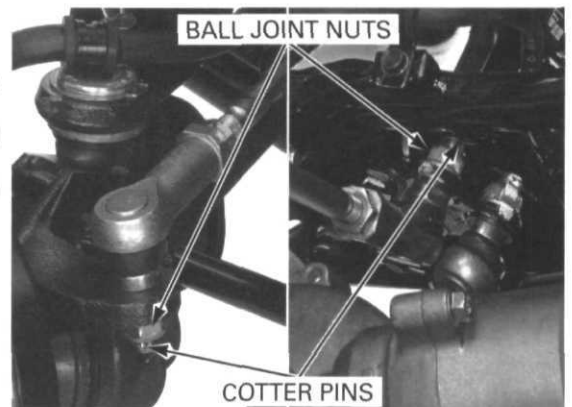
### REMOVAL

Remove the inner fender (page 3-7).  
Remove the front wheel (page 13-10).

Remove the cotter pins from the tie-rod ball joint studs.

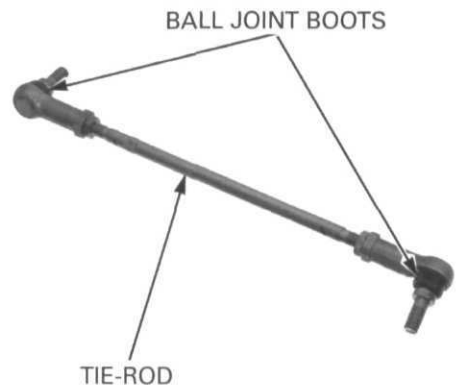
Remove the ball joint nuts by holding the joint stud flat surfaces.

Remove the tie-rod from the steering shaft arm and knuckle.



### INSPECTION

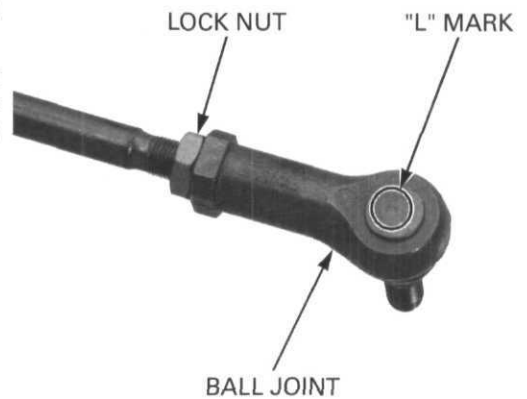
Inspect the tie-rod for distortion or damage.  
Inspect the ball joint boots for tears or other damage by moving the ball joint studs.  
They should move freely and smoothly.



**DISASSEMBLY/ASSEMBLY**

Loosen the lock nuts, and remove the ball joints and lock nuts from the tie-rod.

Install the gold colored nut and unmarked ball joint on the flat (wrench holding position) side of the tie-rod, and the silver nut and "L" marked ball joint on the opposite side.



Note the reference distances.

**REFERENCE DISTANCES:**

- TM model:** A: 5.75 mm (0.23 in)  
B: 5.75 mm (0.23 in)
- FM/FE model:** A: 8.5 mm (0.33 in)  
B: 8.5 mm (0.33 in)

A difference between distances A and B should be 3 mm (0.12 in) max.



*Tighten these nuts after installing the tie-rod and adjusting the toe.*

Temporarily tighten the lock nuts while the ball joint positions are 180° from each other.

Install the tie-rod onto the knuckle and steering shaft arm.  
Install new ball joint nuts and tighten them by holding the ball joint stud flat surfaces.

**TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)**

Install new cotter pins.

Install the front wheel (page 13-10).

Install the inner fender (page 3-7).

Adjust the toe (page 4-22).



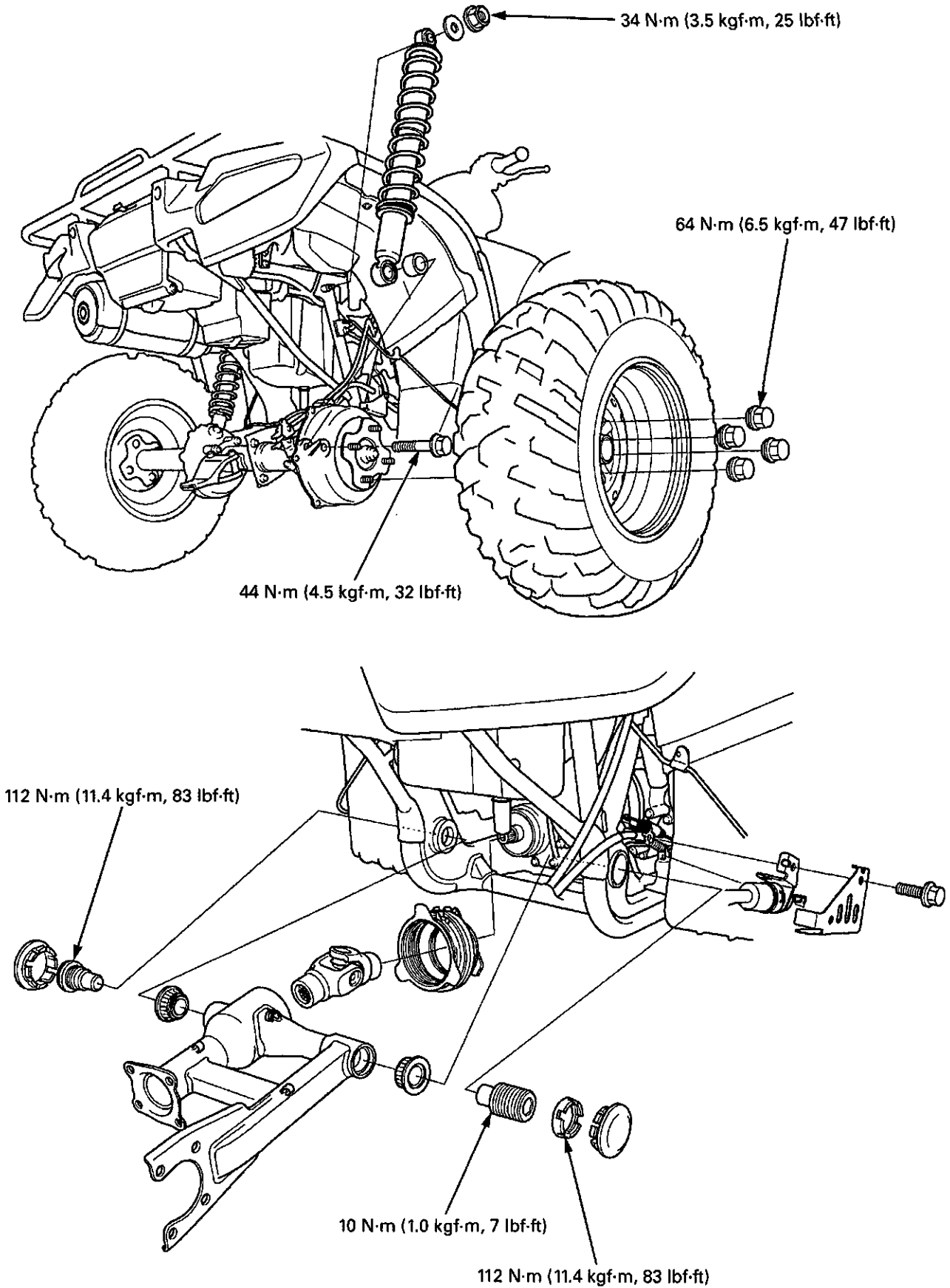


# 14. REAR WHEEL/SUSPENSION

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<b>SYSTEM COMPONENTS .....</b>	<b>14-2</b>	<b>REAR WHEEL.....</b>	<b>14-6</b>
<b>SERVICE INFORMATION .....</b>	<b>14-3</b>	<b>REAR SHOCK ABSORBER .....</b>	<b>14-6</b>
<b>TROUBLESHOOTING.....</b>	<b>14-5</b>	<b>SWINGARM .....</b>	<b>14-8</b>

# REAR WHEEL/SUSPENSION SYSTEM COMPONENTS



## SERVICE INFORMATION

### GENERAL

- This section covers service of the rear wheel, rear shock absorber and swingarm.
- Refer to page 13-11 for tire information.
- Refer to page 15-15 for brake system service.
- Refer to page 16-3 for rear driving mechanism service.
- A jack or other support is required to support the vehicle.
- Use genuine Honda replacement bolts and nuts for all suspension pivots and mounting points.
- When using the lock nut wrench, use a deflecting beam type torque wrench 20 inches long. The lock nut wrench increases the torque wrench's leverage, so the torque wrench reading will be less than the torque actually applied to the lock nut. The specification given is the actual torque applied to the lock nut, not the reading on the torque wrench. Do not overtighten the lock nut. The specification later in the text gives both actual and indicated.

### SPECIFICATIONS

Unit: mm (in)

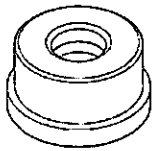
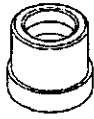
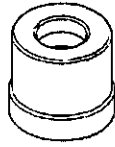
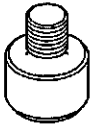
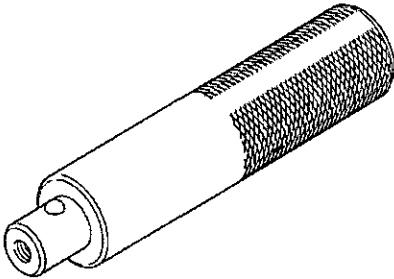
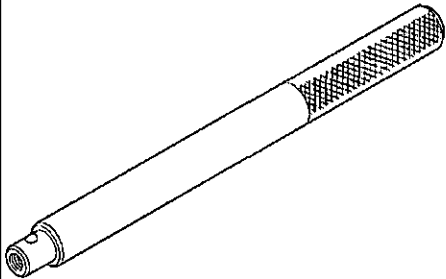
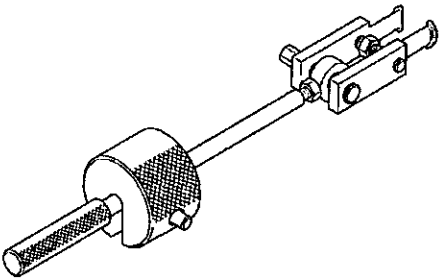
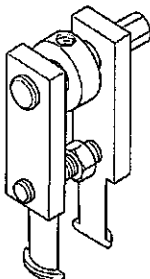
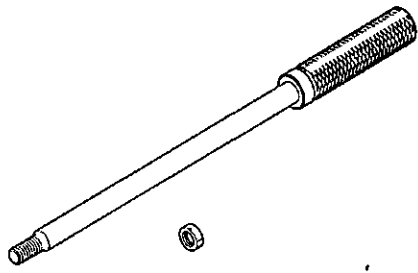
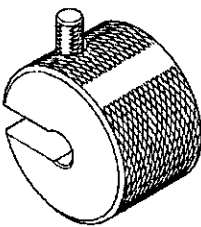
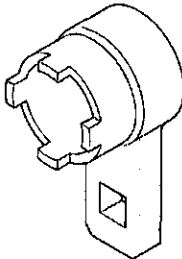
ITEM		STANDARD	SERVICE LIMIT
Minimum tire tread depth		-	4.0 (0.16)
Cold tire pressure	Standard	25 kPa (0.25 kgf/cm <sup>2</sup> , 3.6 psi)	-
	Minimum	22 kPa (0.22 kgf/cm <sup>2</sup> , 3.2 psi)	-
	Maximum	28 kPa (0.28 kgf/cm <sup>2</sup> , 4.0 psi)	-
	With cargo	25 kPa (0.25 kgf/cm <sup>2</sup> , 3.6 psi)	-

### TORQUE VALUES

Rear wheel nut	64 N·m (6.5 kgf·m, 47 lbf·ft)
Shock absorber upper mounting nut	34 N·m (3.5 kgf·m, 25 lbf·ft)
Shock absorber lower mounting bolt	44 N·m (4.5 kgf·m, 32 lbf·ft)
Swingarm left pivot bolt	112 N·m (11.4 kgf·m, 83 lbf·ft)
Swingarm right pivot bolt	10 N·m (1.0 kgf·m, 7 lbf·ft)
Swingarm right pivot lock nut	112 N·m (11.4 kgf·m, 83 lbf·ft)

# REAR WHEEL/SUSPENSION

## TOOLS

<p>Attachment, 37 x 40 mm 07746-0010200</p> 	<p>Attachment, 22 x 24 mm 07746-0010800</p> 	<p>Attachment, 28 x 30 mm 07946-1870100</p> 
<p>Pilot, 16 mm 07746-0041300</p> 	<p>Driver 07749-0010000</p> 	<p>Driver 07949-3710001</p> 
<p>Adjustable bearing remover set 07JAC-PH80000</p>  <p>Not available in U.S.A.</p>	<p>Remover attachment 07JAC-PH80100</p>  <p>or 07736-A01000B</p>	<p>Remover shaft assembly 07JAC-PH80200</p>  <p>or commercially available 3/8 x 16 thread slide hammer (U.S.A. only)</p>
<p>Bearing remover weight 07741-0010201</p>  <p>or commercially available 3/8 x 16 thread slide hammer (U.S.A. only)</p>	<p>Lock nut wrench 07908-4690003</p> 	

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**TROUBLESHOOTING****Rear wheel wobbling**

- Bent rim
- Worn or damaged rear axle bearings
- Faulty rear tire
- Axle fastener not tightened properly
- Faulty swingarm pivot bearings

**Rear wheel hard to turn**

- Faulty rear axle bearings
- Bent rear axle
- Rear brake drag

**Soft suspension**

- Weak shock absorber spring
- Oil leakage from damper unit

**Stiff suspension**

- Bent shock absorber damper rod
- Faulty rear suspension pivot bearing or bushing
- Damaged swingarm pivot bearing
- Improperly tightened swingarm pivot

**Rear suspension noise**

- Faulty rear shock absorber
- Loose rear suspension fasteners
- Worn rear suspension pivot bearing or bushing

## REAR WHEEL/SUSPENSION

### REAR WHEEL

#### REMOVAL

Loosen the wheel nuts.

Support the vehicle with a support block to raise the rear wheels off the ground.

Remove the wheel nuts and rear wheel.

Refer to page 13-11 for tire removal/installation and repair

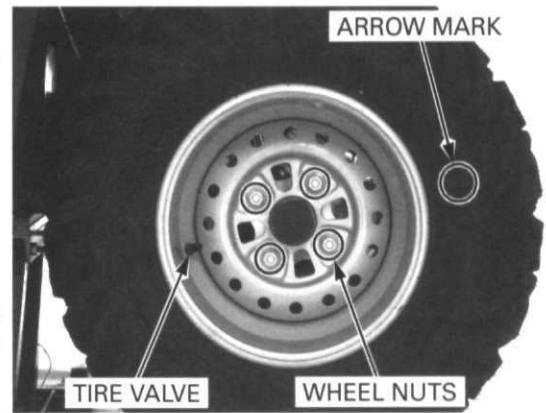
#### INSTALLATION

*Do not interchange the left and right wheels*

Install the rear wheel with the tire valve facing out and the arrow mark facing in the normal rotating direction.

Install the wheel nuts with the tapered side facing inward and tighten them.

**TORQUE: 64 N·m (6.5 kgf·m, 47 lbf·ft)**

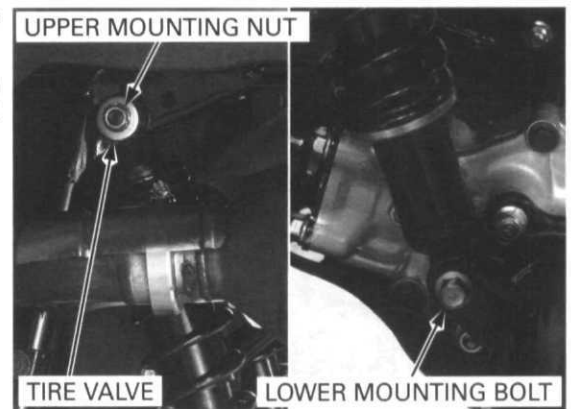


### REAR SHOCK ABSORBER

#### REMOVAL

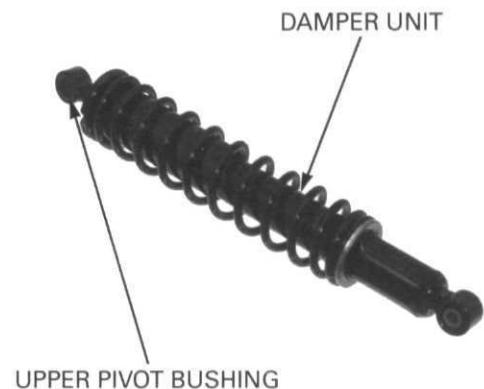
Support the vehicle with a support block to raise the rear wheels off the ground.

Support the swingarm and remove upper mounting nut, washer, lower mounting bolt and the rear shock absorber.



#### INSPECTION

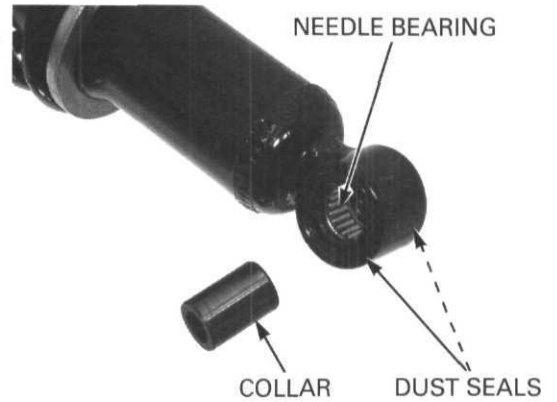
Check the upper pivot bushing for wear or damage. Check the damper unit for leakage or other damage. Replace the shock absorber assembly if necessary.



Remove the lower pivot collar.  
Check the lower pivot needle bearing for wear or damage.

**BEARING REPLACEMENT**

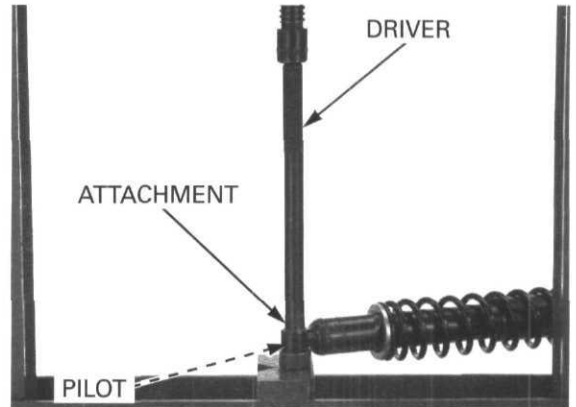
Remove the dust seals.



Press the needle bearing out of the lower pivot.

**TOOLS:**

- |                               |                      |
|-------------------------------|----------------------|
| <b>Driver</b>                 | <b>07949-3710001</b> |
| <b>Attachment, 22 x 24 mm</b> | <b>07746-0010800</b> |
| <b>Pilot, 16 mm</b>           | <b>07746-0041300</b> |

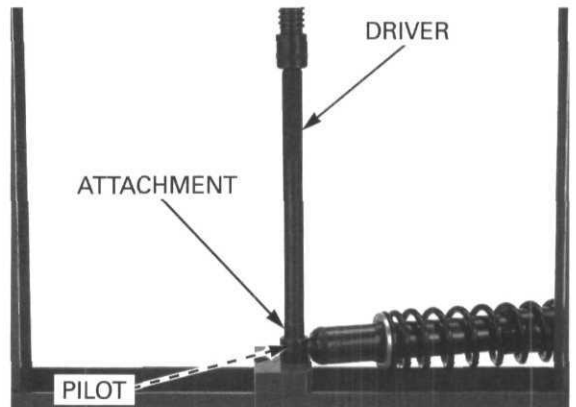


*Press the bearing with the marked side facing up.*

Apply grease to the needle rollers of a new bearing. Carefully press the needle bearing into the lower pivot until it is 5.4 – 5.5 mm (0.21 – 0.22 in) below the lower pivot surface.

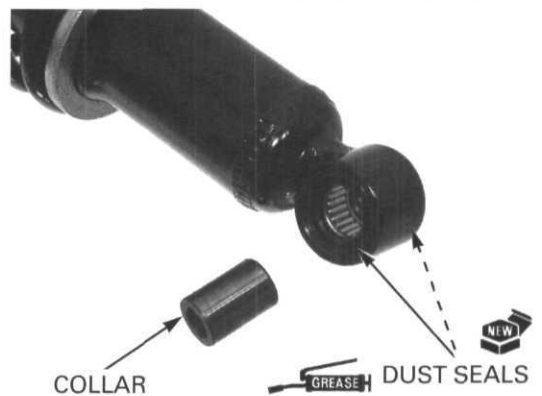
**TOOLS:**

- |                               |                      |
|-------------------------------|----------------------|
| <b>Driver</b>                 | <b>07949-3710001</b> |
| <b>Attachment, 22 x 24 mm</b> | <b>07746-0010800</b> |
| <b>Pilot, 16 mm</b>           | <b>07746-0041300</b> |



Apply grease to new dust seal lips and install the dust seals into the lower pivot until they are flush with the pivot surfaces.

Install the pivot collar.



## REAR WHEEL/SUSPENSION

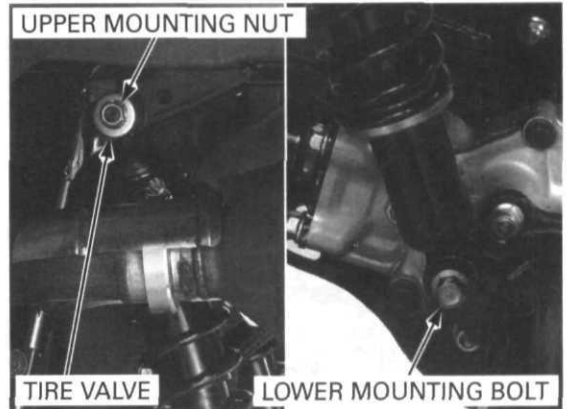
### INSTALLATION

Install the rear shock absorber, washer and upper mounting nut onto the mounting stud of the frame. Install the lower mounting bolt and tighten it.

**TORQUE: 44 N·m (4.5 kgf·m, 32 lbf·ft)**

Tighten the upper mounting nut.

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

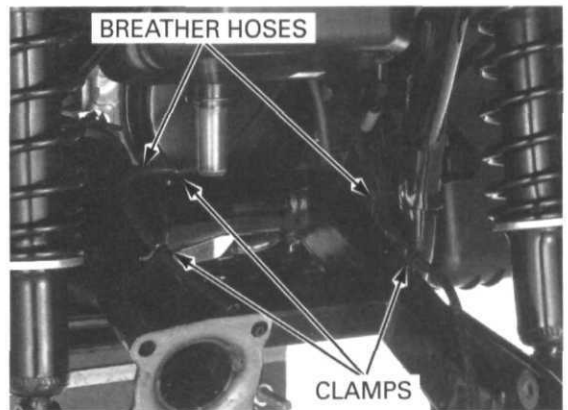


## SWINGARM

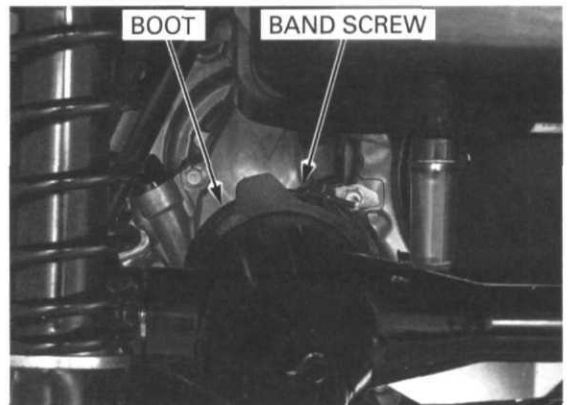
### REMOVAL

Remove the final drive assembly (page 17-10).

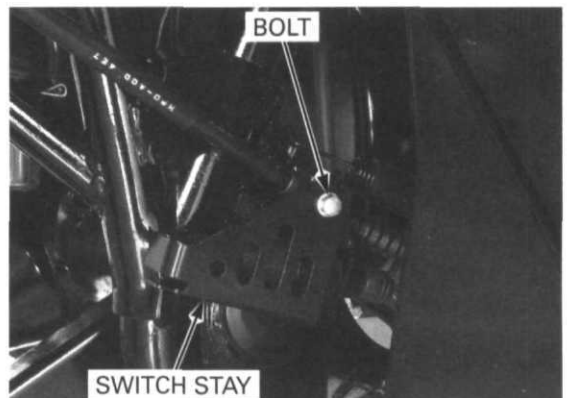
Remove the breather hoses from the clamps on the swingarm.



Loosen the boot band screw and remove the universal joint boot from the swingarm.

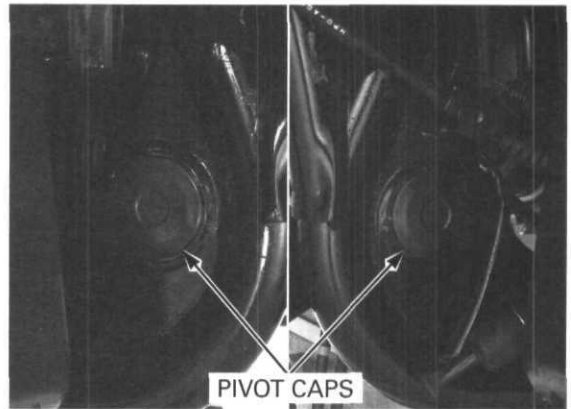


Remove the bolt and rear brake light switch stay with the switch.





Remove the left and right swingarm pivot caps.

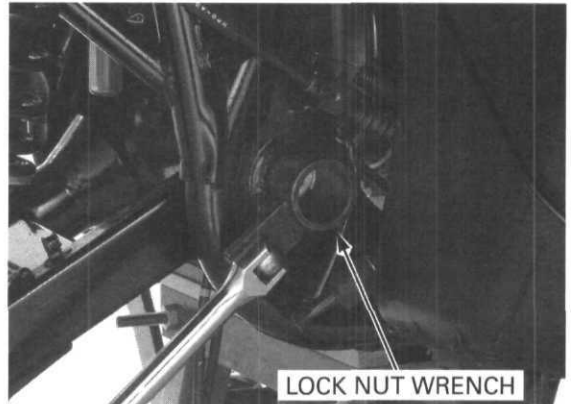


Loosen the right swingarm pivot lock nut using the special tool.

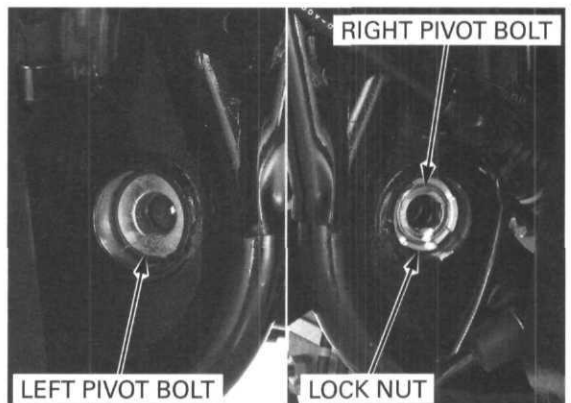
**TOOL:**

**Lock nut wrench**

**07908-4690003**

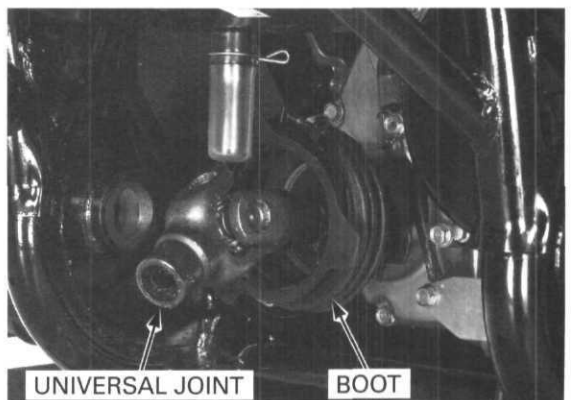


Remove the left and right swingarm pivot bolts, and the swingarm from the frame.



Remove the universal joint from the output shaft.

Check the universal joint boot for tears or other damage and replace it if necessary.



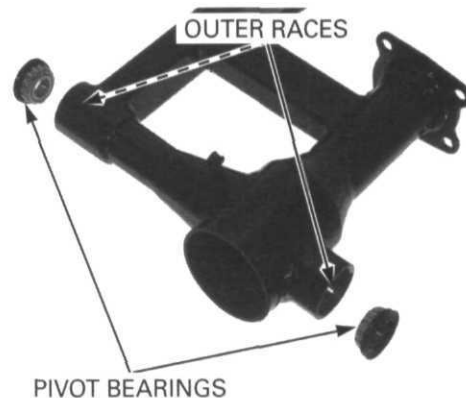
## REAR WHEEL/SUSPENSION

### INSPECTION

Remove the pivot bearings from the swingarm pivots.

*Both bearings, outer races and grease holders must be replaced as a set if any part is damaged or worn.*

Check the bearing rollers, dust seals and outer races for wear or damage.



### BEARING REPLACEMENT

Drive the grease holder into the swingarm using the special tools and remove it.

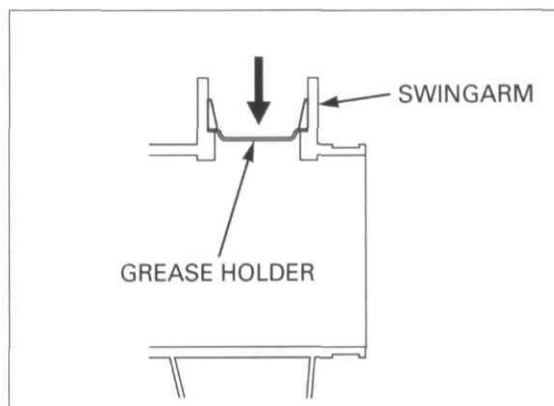
#### TOOLS:

**Driver**

07749-0010000

**Attachment, 28 x 30 mm**

07946-1870100



Remove the outer race from the swingarm using the special tools.

#### TOOLS:

**Adjustable bearing remover set** 07JAC-PH80000

– Remover attachment 07JAC-PH80100

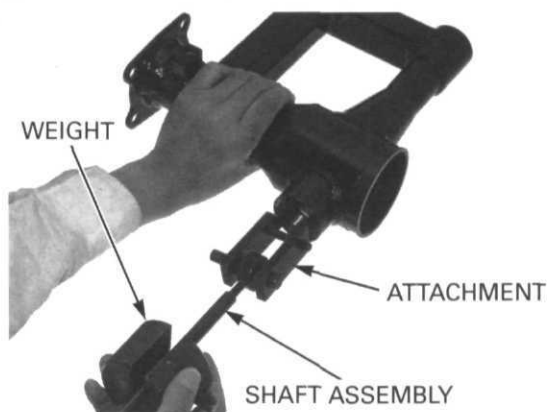
– Remover shaft assembly 07JAC-PH80200

**Bearing remover weight** 07741-0010201

#### U.S.A. TOOL:

**Adjustable bearing puller,**  
25 x 40 mm

07736-A01000B



Install the grease holder into the swingarm pivot. Drive in a new outer race until it is fully seated, using the special tools.

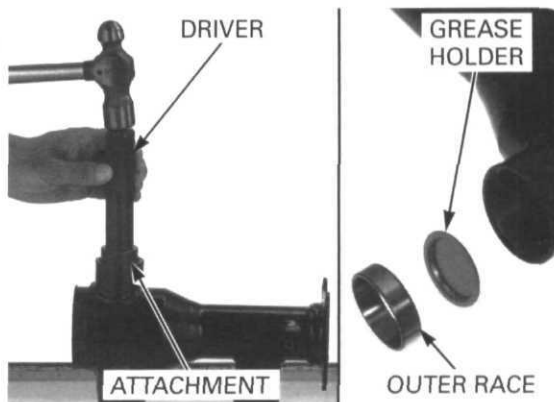
#### TOOLS:

**Driver**

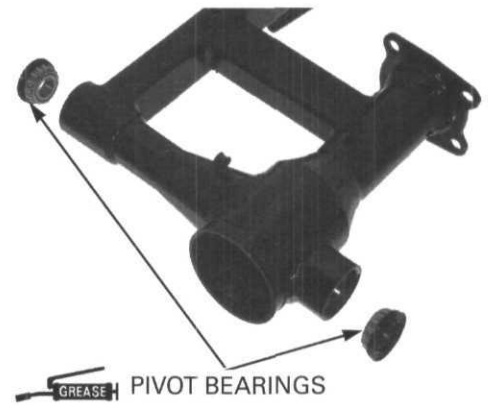
07949-3710001

**Attachment, 37 x 40 mm**

07746-0010200

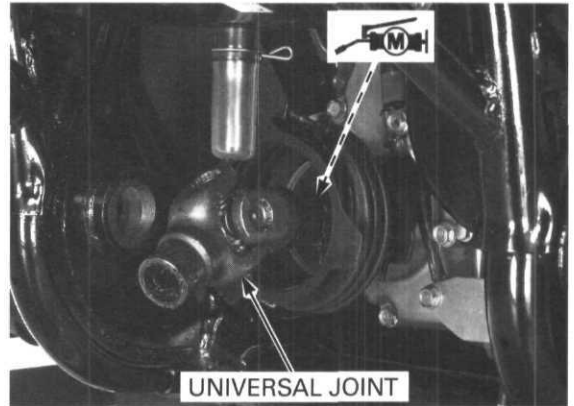


Apply grease to new bearing rollers and dust seal lips and install bearings into the swingarm pivots.



### INSTALLATION

Apply molybdenum disulfide grease to the output shaft splines and install the universal joint onto the output shaft.



Set the swingarm into the frame and install the left and right pivot bolts.

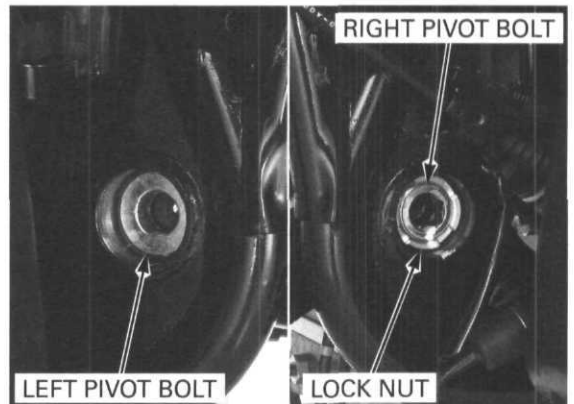
Tighten the left pivot bolt.

**TORQUE: 112 N·m (11.4 kgf·m, 83 lbf·ft)**

Tighten the right pivot bolt.

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

Move the swingarm up and down several times to seat the pivot bearings.  
Retighten the pivot bolts to the same torque.



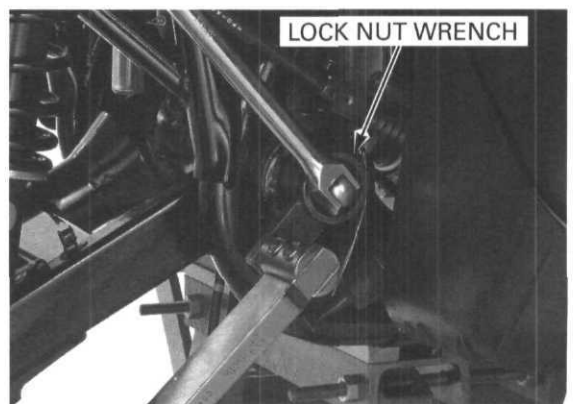
Tighten the right pivot lock nut while holding the pivot bolt.

**TOOL:**

**Lock nut wrench**

**07908-4690003**

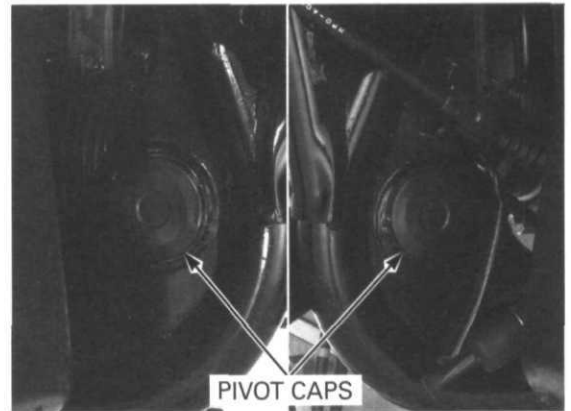
**TORQUE: Actual: 112 N·m (11.4 kgf·m, 83 lbf·ft)  
Indicated: 102 N·m (10.4 kgf·m, 74 lbf·ft)**



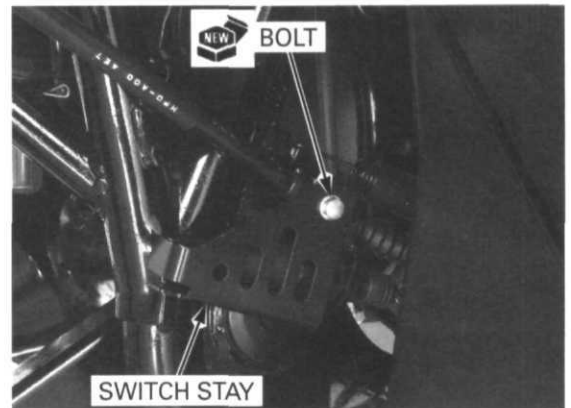
*Refer to torque wrench reading information on page 14-3 "Service Information".*

## REAR WHEEL/SUSPENSION

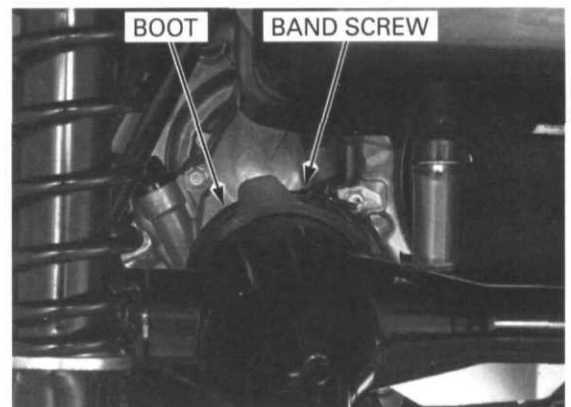
Install the left and right pivot caps.



Hook the rear brake light switch spring to the pedal and install the switch stay onto the frame with a new bolt.

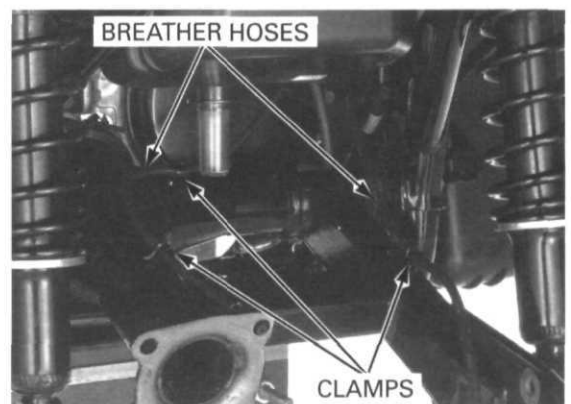


Install the joint boot over the swingarm securely. Position the screw of the boot band facing up as shown and tighten it.



Route the breather hoses properly (page 1-22) and secure them with the clamps.

Install the final drive assembly (page 17-23).



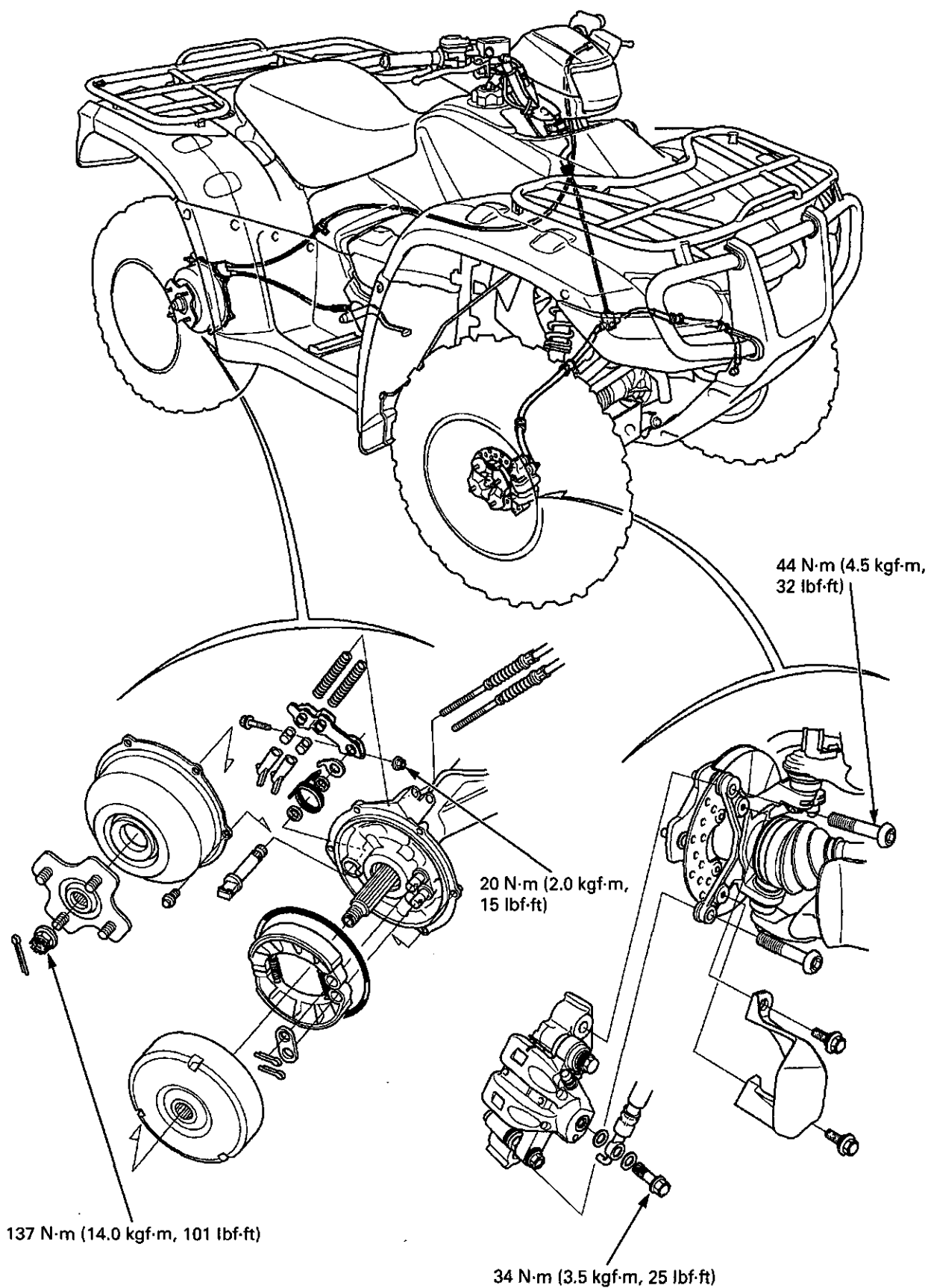
# 15. BRAKE SYSTEM

---

<b>SYSTEM COMPONENTS .....</b>	<b>15-2</b>	<b>BRAKE PAD/DISC.....</b>	<b>15-6</b>
<b>SERVICE INFORMATION .....</b>	<b>15-3</b>	<b>FRONT MASTER CYLINDER.....</b>	<b>15-8</b>
<b>TROUBLESHOOTING .....</b>	<b>15-4</b>	<b>FRONT BRAKE CALIPER.....</b>	<b>15-11</b>
<b>BRAKE FLUID REPLACEMENT/ AIR BLEEDING .....</b>	<b>15-5</b>	<b>REAR BRAKE DRUM/SHOES .....</b>	<b>15-15</b>
		<b>REAR BRAKE PEDAL.....</b>	<b>15-19</b>

# BRAKE SYSTEM

## SYSTEM COMPONENTS



## SERVICE INFORMATION

### GENERAL

#### ⚠ CAUTION

Frequent inhalation of brake pad or lining 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.
- A contaminated brake disc, pad, drum or shoe reduces stopping power. Discard contaminated pads or shoes, and clean a contaminated disc or drum with a high quality brake degreasing agent.
- Spilled brake fluid will severely damage the plastic parts and painted surfaces. It is also harmful to some rubber parts. Be careful whenever you remove the reservoir cap; make sure the reservoir is horizontal first.
- 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 4 brake fluid from a sealed container when servicing the system. Do not mix different types of fluid as they may not be compatible.
- Always check brake operation before riding the vehicle.

### SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Front brake	Recommended brake fluid	Honda DOT 4 brake fluid	–
	Disc thickness	3.8 – 4.2 (0.15 – 0.17)	3.0 (0.12)
	Disc runout	–	0.30 (0.012)
	Master cylinder I.D.	14.0 (0.55)	–
	Caliper cylinder I.D.	33.96 (1.3379)	–
Rear brake	Drum I.D.	180.0 (7.09)	181 (7.1)
	Shoe lining thickness	5.3 (0.21)	To index mark

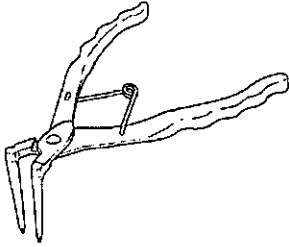
### TORQUE VALUES

Brake hose oil bolt	34 N·m (3.5 kgf·m, 25 lbf·ft)	
Front brake caliper bleed valve	5.4 N·m (0.54 kgf·m, 4.0 lbf·ft)	
Front master cylinder reservoir cap screw	2 N·m (0.2 kgf·m, 1.5 lbf·ft)	
Front brake light switch screw	1.2 N·m (0.12 kgf·m, 0.9 lbf·ft)	Apply locking agent to the threads.
Front brake lever pivot bolt	1 N·m (0.1 kgf·m, 0.7 lbf·ft)	
Front brake lever pivot nut	5.9 N·m (0.6 kgf·m, 4.4 lbf·ft)	
Front master cylinder holder bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	
Front brake caliper mounting bolt	44 N·m (4.5 kgf·m, 32 lbf·ft)	ALOC bolt: replace with a new one.
Caliper slide pin bolt	23 N·m (2.3 kgf·m, 17 lbf·ft)	
Brake joint pipe	17 N·m (1.7 kgf·m, 13 lbf·ft)	
Rear brake arm pinch bolt	20 N·m (2.0 kgf·m, 15 lbf·ft)	
Rear brake panel drain bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	

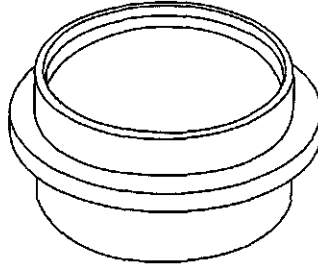
## BRAKE SYSTEM

### TOOLS

Snap ring pliers  
07914-SA50001



Oil seal driver  
07965-MC70100



## TROUBLESHOOTING

### FRONT DISC BRAKE

#### Brake lever soft or spongy

- Air in hydraulic system
- Leaking hydraulic system
- Contaminated brake pad/disc
- Worn caliper piston seal
- Worn master cylinder piston cups
- Worn brake pad/disc
- Contaminated caliper
- Contaminated master cylinder
- Caliper not sliding properly
- Low brake fluid level
- Clogged fluid passage
- Warped/deformed brake disc
- Sticking/worn caliper piston
- Sticking/worn master cylinder piston
- Bent brake lever

#### Brake lever hard

- Clogged/restricted brake system
- Sticking/worn caliper piston
- Sticking/worn master cylinder piston
- Caliper not sliding properly
- Bent brake lever

#### Brake drags

- Contaminated brake pad/disc
- Badly worn brake pad/disc
- Warped/deformed brake disc
- Caliper not sliding properly
- Clogged/restricted fluid passage
- Sticking caliper piston

### REAR DRUM BRAKE

#### Poor brake performance

- Brake not adjusted properly
- Worn or contaminated brake shoes
- Worn or contaminated brake drum
- Water in brake drum
- Incorrectly installed rear brake arm
- Worn rear brake cam

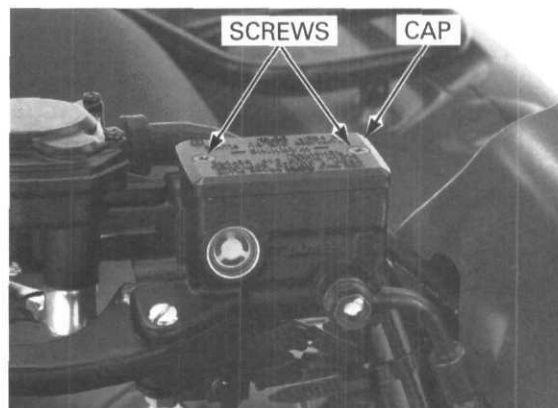


## BRAKE FLUID REPLACEMENT/AIR BLEEDING

### BRAKE FLUID DRAINING

Turn the handlebar to the left until the reservoir is level before removing the reservoir cap.

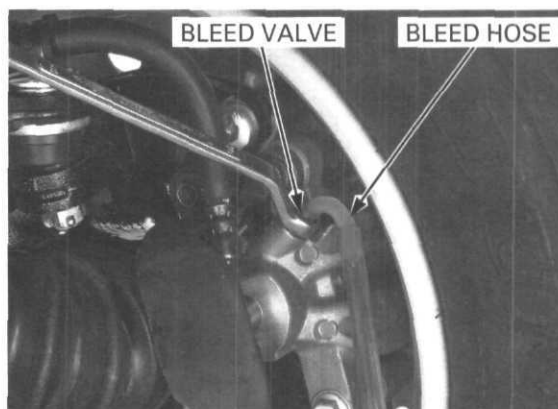
Remove the screws, reservoir cap, set plate and diaphragm.



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.

Perform above procedure for the other side bleed valve.



### BRAKE FLUID FILLING/BLEEDING

Close the front brake caliper bleed valve.

Fill the front master cylinder reservoir with DOT 4 brake fluid from a sealed container.

*Follow the manufacturer's operating instructions.*

Connect a commercially available brake bleeder to the bleed valve.

Operate the brake bleeder and loosen the bleed valve.

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

If an automatic refill system is not used, add fluid when the fluid level in the reservoir is low.

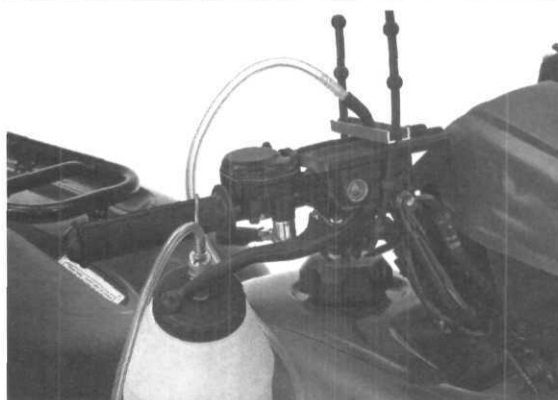
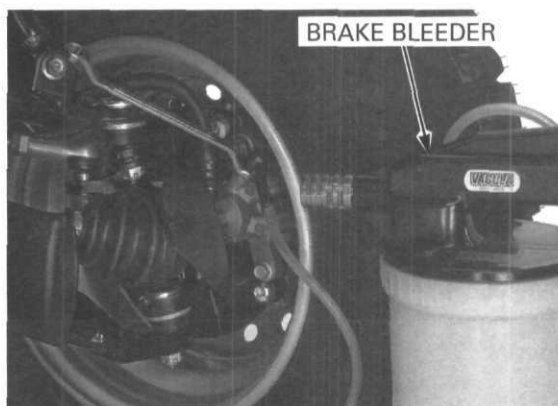
*If air enters the bleeder from around the bleed valve threads, seal the threads with teflon tape.*

Perform the bleeding procedure until the system is completely flushed/bled.

Tighten the bleed valve.

**TORQUE: 5.4 N·m (0.54 kgf·m, 4.0 lbf·ft)**

Perform air bleeding for the other side bleed valve.



## BRAKE SYSTEM

If the brake bleeder is not available, perform the following procedure:

Pump up the system pressure with the front brake lever until the lever resistance is felt.

Connect a bleed hose to the front brake caliper bleed valve and bleed the system as follows:

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

1. Squeeze the 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 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.

Tighten the bleed valve.

**TORQUE: 5.4 N·m (0.54 kgf·m, 4.0 lbf·ft)**

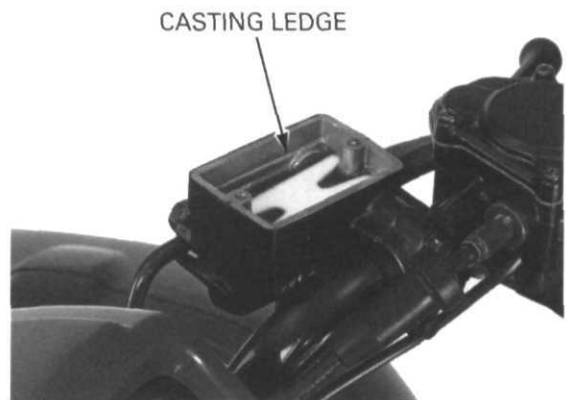
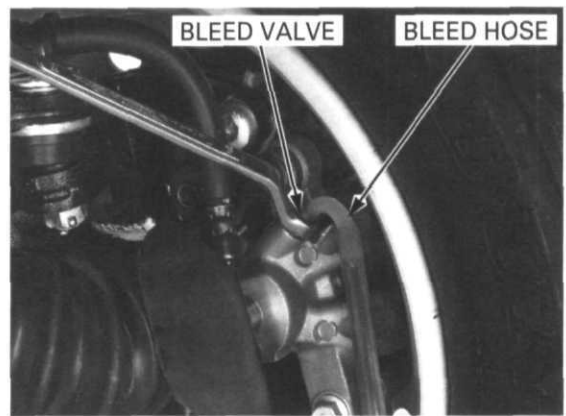
Perform air bleeding for the other side bleed valve.

After bleeding air, operate the front brake lever. If it still feels spongy, bleed the system again.

Fill the front master cylinder reservoir to the casting ledge with DOT 4 brake fluid from a sealed container.

Install the diaphragm, set plate and reservoir cap, and tighten the screws.

**TORQUE: 2 N·m (0.2 kgf·m, 1.5 lbf·ft)**



## BRAKE PAD/DISC

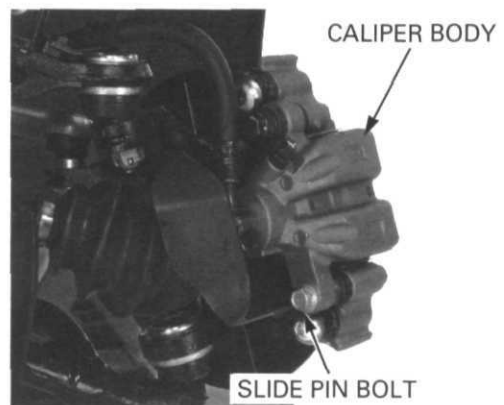
### BRAKE PAD REPLACEMENT

Remove the front wheel (page 13-10).

*Check the fluid level in the master cylinder reservoir as this operation causes the fluid level to rise.*

Push the caliper piston all the way in by pushing the caliper body against the disc to allow installation of new brake pads.

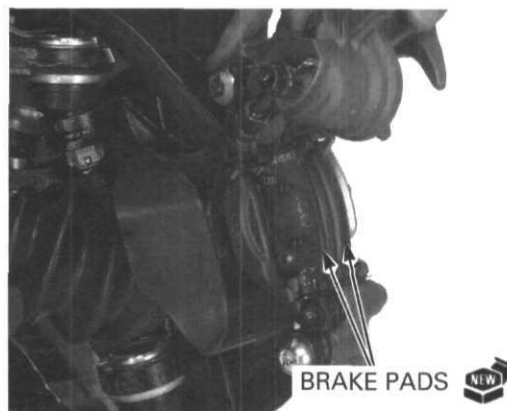
Remove the caliper pin bolt.



Pivot the caliper body up and remove the brake pads from the caliper bracket.

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

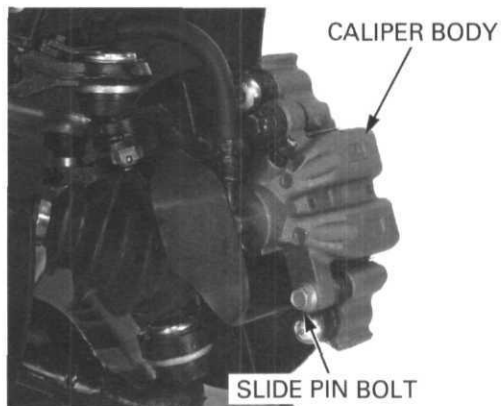
Install new brake pads into the caliper bracket properly as shown.



Lower the caliper body, install the caliper pin bolt and tighten it.

**TORQUE: 23 N·m (2.3 kgf·m, 17 lbf·ft)**

Squeeze the front brake lever to seat the caliper piston against the pad.



**BRAKE DISC INSPECTION**

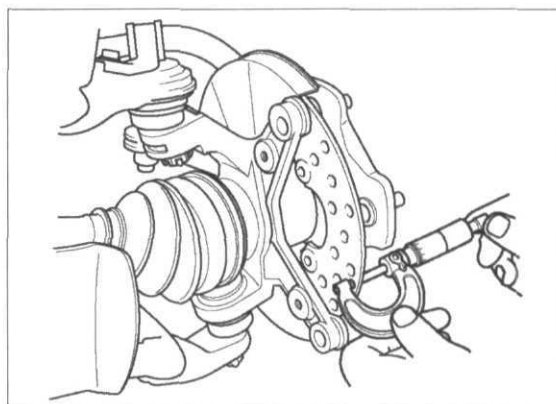
Remove the front wheel (page 13-10).

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 service limit.

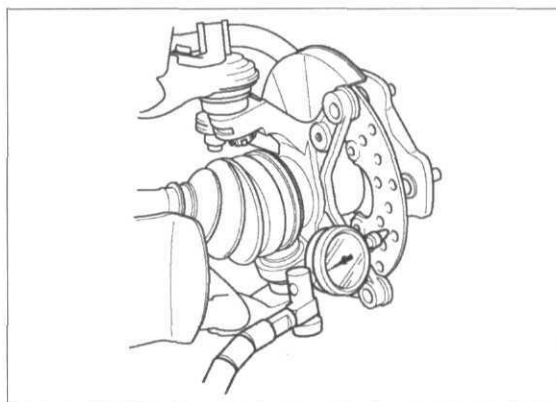


Check the brake disc for warpage.

**SERVICE LIMIT: 0.30 mm (0.012 in)**

Check the front wheel hub bearings or rear axle bearings for excessive play, if the warpage exceeds the service limit.

Replace the brake disc if the bearings are normal.

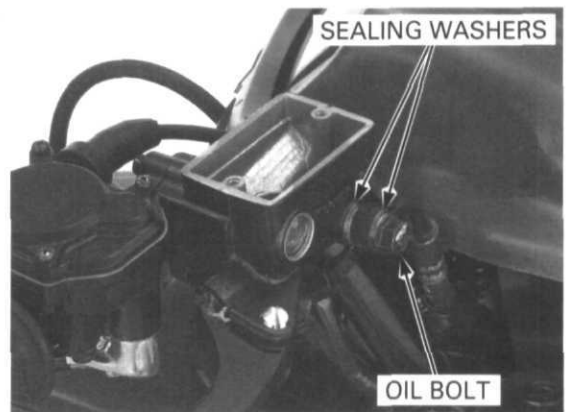


**FRONT MASTER CYLINDER**

**DISASSEMBLY**

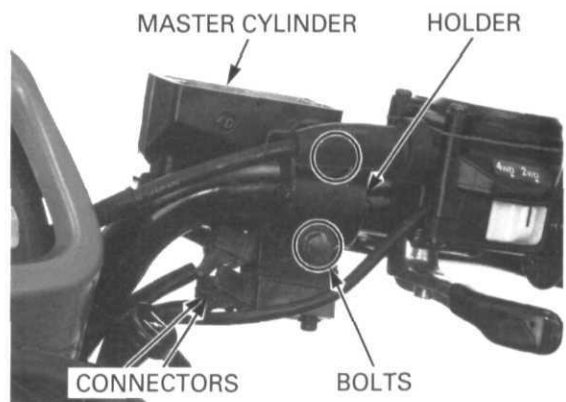
Drain the brake fluid from the front brake hydraulic system (page 15-5).

Disconnect the brake hose by removing the oil bolt and sealing washers.

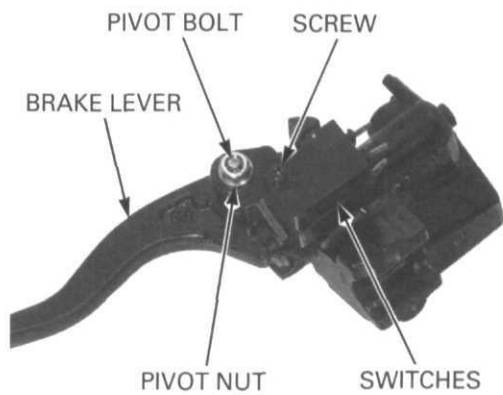


Disconnect the front brake switch connectors.

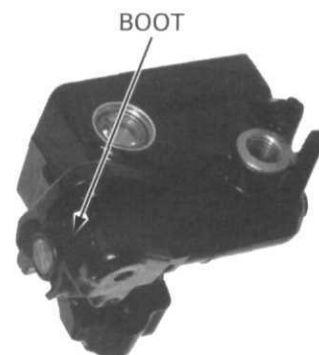
Remove the master cylinder holder bolts, holder and master cylinder.



Remove the pivot nut, bolt and brake lever.  
Remove the screw and brake switches.



Remove the boot from the master cylinder and master piston.

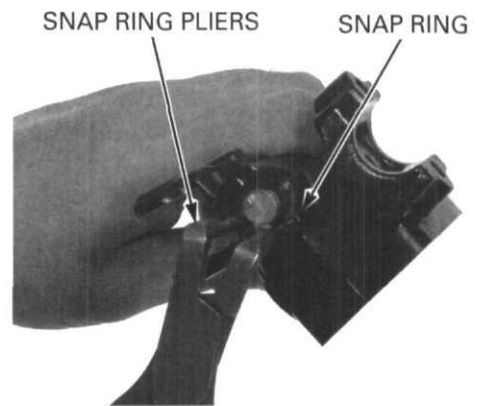


Remove the snap ring using the special tool.

**TOOL:**

**Snap ring pliers**

**07914-SA50001**



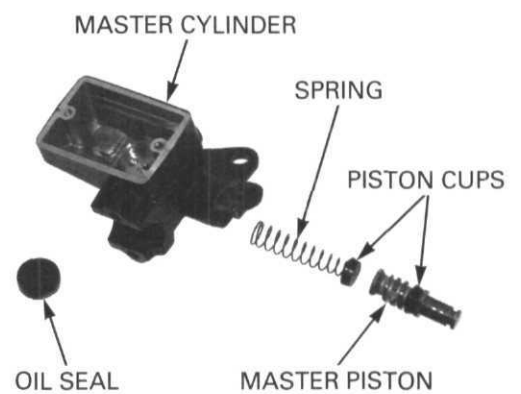
Remove the master piston and spring.  
Remove the oil seal

Clean the master cylinder, reservoir and master piston in clean brake fluid.

**INSPECTION**

Check the master cylinder and master piston for scoring, scratches or damage.

Check the piston cups and oil seal for wear, deterioration or damage.



**ASSEMBLY**

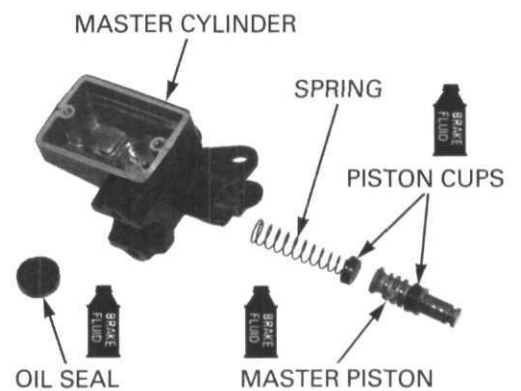
Coat the master piston, piston cups and oil seal with clean DOT 4 brake fluid.

Install the oil seal into the master cylinder.

Install the spring onto the piston end.

Install the spring and master piston into the master cylinder.

*Do not allow the piston cup lips to turn inside out.*

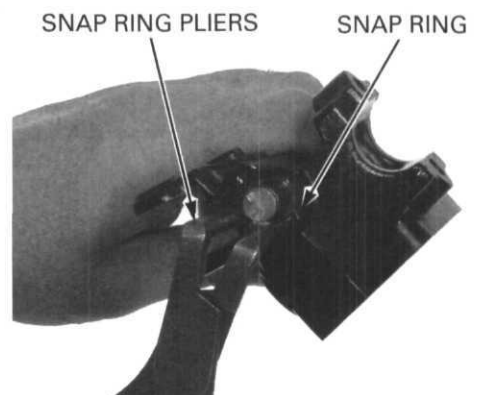


Install the snap ring into the groove in the master cylinder using the special tool.

**TOOL:**

**Snap ring pliers**

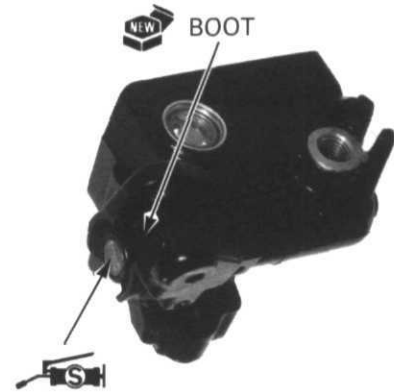
**07914-SA50001**



*Be certain the snap ring is firmly seated in the groove.*

## BRAKE SYSTEM

Install a new boot into the master cylinder and the groove in the piston.  
Apply silicone grease to the brake lever pivot-to-master piston contact area.



Apply silicone grease to the brake lever pivot bolt sliding surface.

Install the pivot bolt and tighten it.

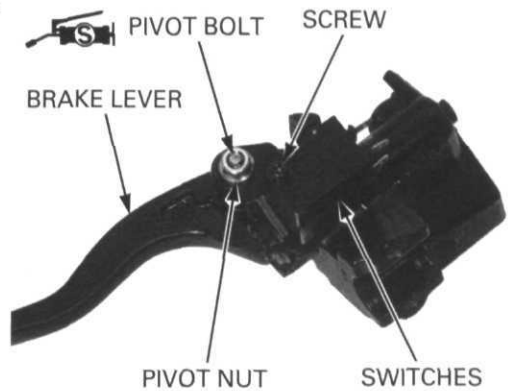
**TORQUE: 1 N·m (0.1 kgf·m, 0.7 lbf·ft)**

Install the pivot nut and tighten it.

**TORQUE: 5.9 N·m (0.6 kgf·m, 4.4 lbf·ft)**

Install the brake light switch and tighten the screw.

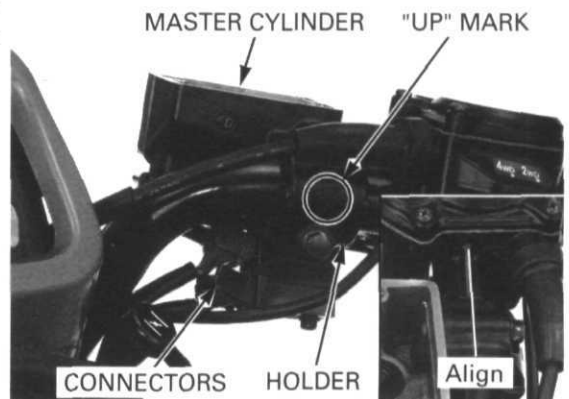
**TORQUE: 1.2 N·m (0.12 kgf·m, 0.9 lbf·ft)**



*Align the mating surface of the master cylinder and holder with the lug on the throttle housing.*

Install the front brake master cylinder and holder with the "UP" mark facing up. Tighten the upper bolt first, then tighten the lower bolt.

Connect the front brake light switch connectors.

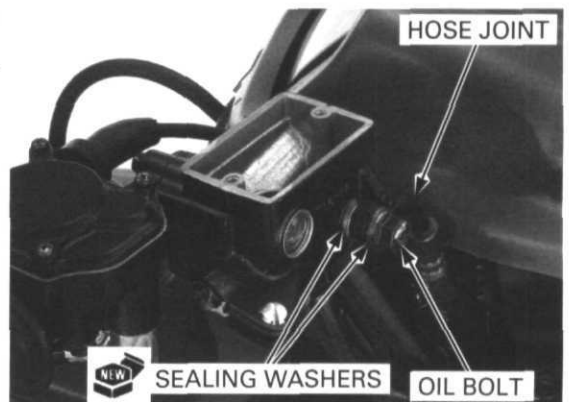


Rest the brake hose joint between the stoppers on the master cylinder.

Connect the brake hose with the oil bolt and new sealing washers, and tighten the oil bolt.

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

Fill and bleed the front brake hydraulic system (page 15-5).

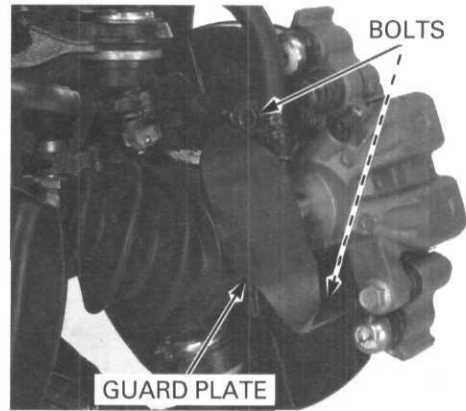


# FRONT BRAKE CALIPER

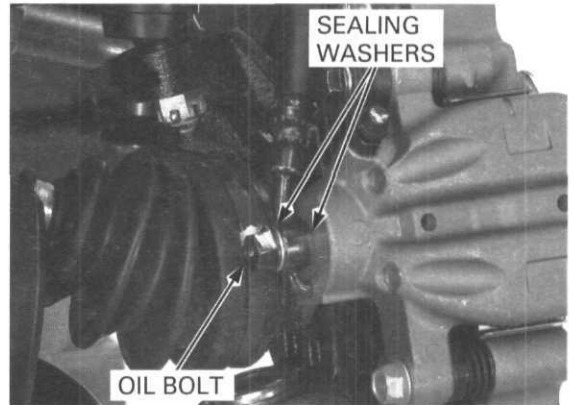
## DISASSEMBLY

Drain the brake fluid from the front brake hydraulic system (page 15-5).

Remove the two bolts and guard plate.

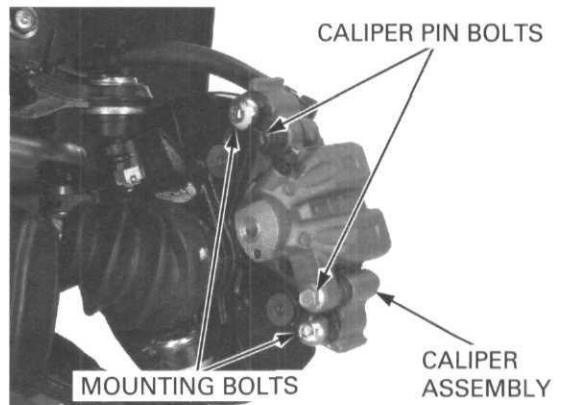


Disconnect the brake hose from the brake caliper by removing the oil bolt and sealing washer.



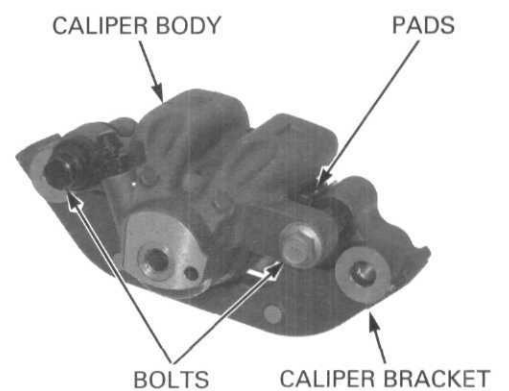
Loosen the two caliper pin bolts.

Remove the two mounting bolts and brake caliper assembly.



Remove the two caliper pin bolts and separate the caliper bracket from the caliper body.

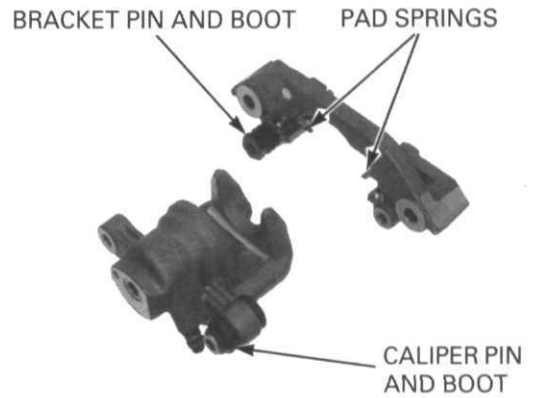
Remove the brake pads.



## BRAKE SYSTEM

Remove the bracket pin, boot and pad springs from the caliper bracket.

Remove the caliper pin and boot from the caliper body.

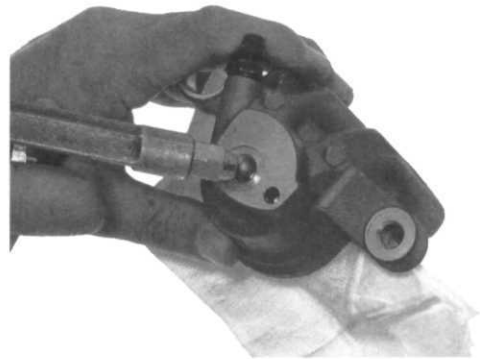


Place a shop towel over the piston.

*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 piston.

Remove the caliper piston boot.

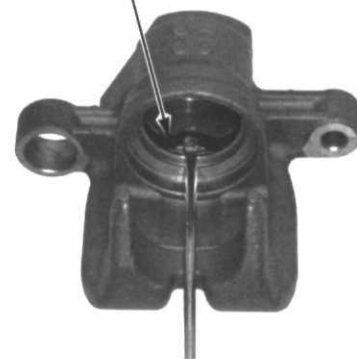


*Be careful not to damage the piston sliding surface.*

Push the piston seal in and lift it out.

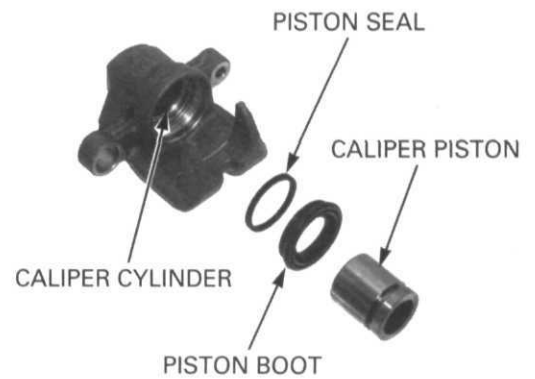
Clean the boot and seal grooves, caliper cylinder, and piston with clean brake fluid.

PISTON SEAL



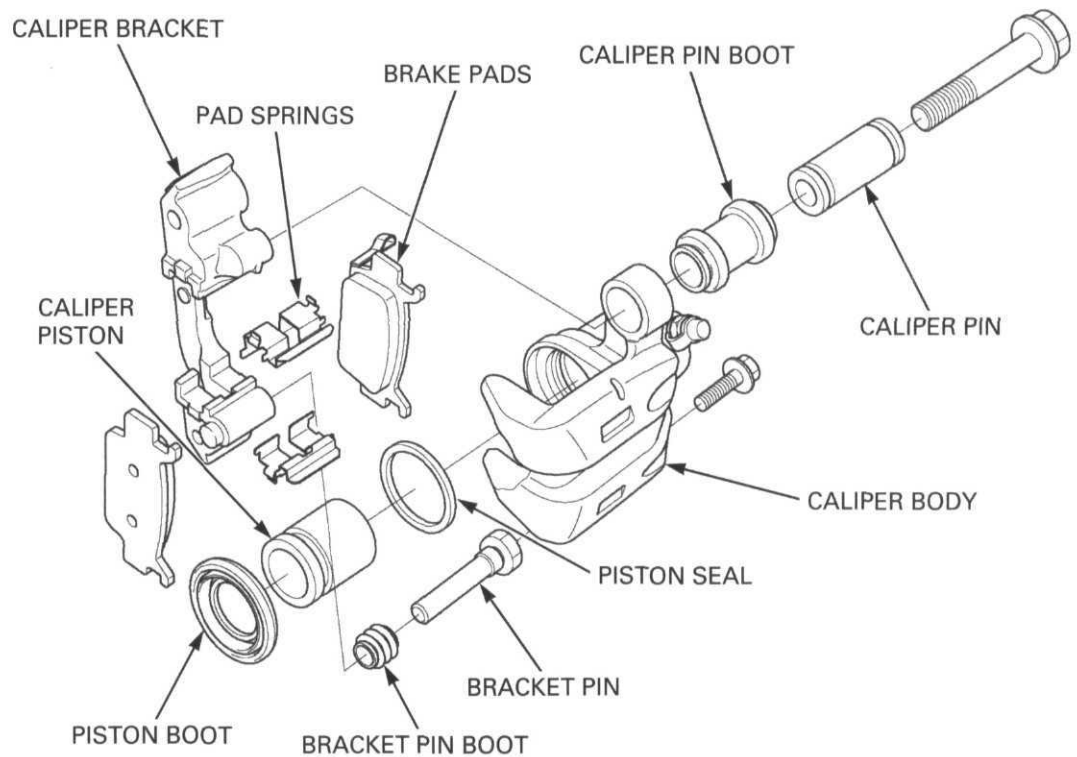
### INSPECTION

Check the caliper cylinder and piston for scoring, scratches or damage.





**ASSEMBLY**



Coat new piston seal with clean brake fluid and install it into the seal groove in the caliper cylinder.

Apply silicone grease to the inside of a new piston boot and install it into the caliper cylinder groove properly.

Coat the caliper piston with clean brake fluid and install them into the caliper cylinder with the open side toward the pads, and install the piston boot into the piston groove properly.

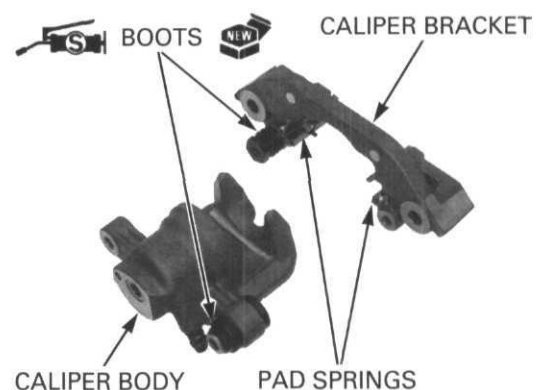


Install the pad springs onto the caliper body as shown.

Apply silicone grease to the insides of new pin boots.

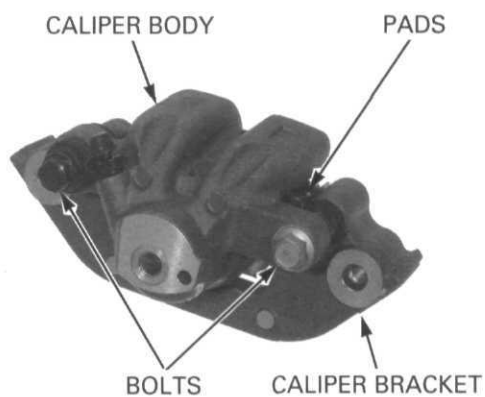
Install the caliper pin boot and pin into the caliper body.

Install the bracket pin boot and pin into the caliper bracket.



## BRAKE SYSTEM

Install the brake pads onto the caliper bracket.  
Install the caliper body onto the bracket.  
Loosely install the caliper pin bolts.

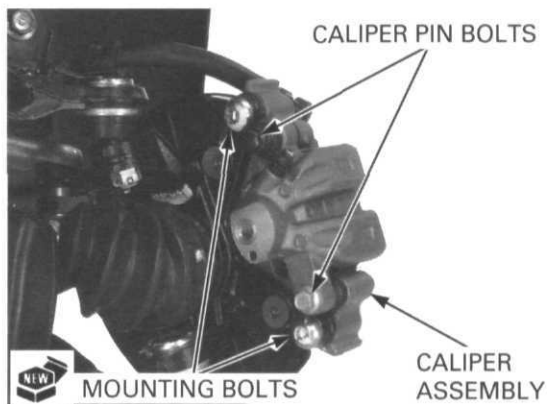


Install the brake caliper assembly onto the knuckle with new mounting bolts, and tighten the bolts.

**TORQUE: 44 N·m (4.5 kgf·m, 32 lbf·ft)**

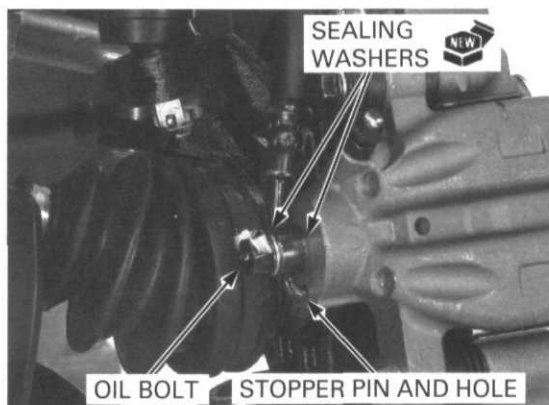
Tighten the caliper pin bolts.

**TORQUE: 23 N·m (2.3 kgf·m, 17 lbf·ft)**



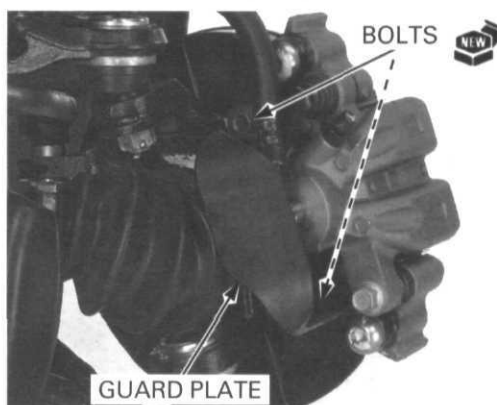
Connect the brake hose with the oil bolt and new sealing washers while inserting the stopper pin into the hole in the caliper body.  
Tighten the oil bolt.

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



Install the guard plate with new bolts and tighten the bolts securely.

Fill and bleed the front brake hydraulic system (page 15-5).



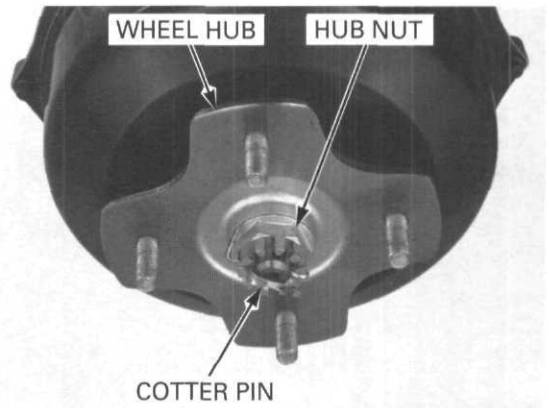
## REAR BRAKE DRUM/SHOES

### BRAKE DRUM REMOVAL

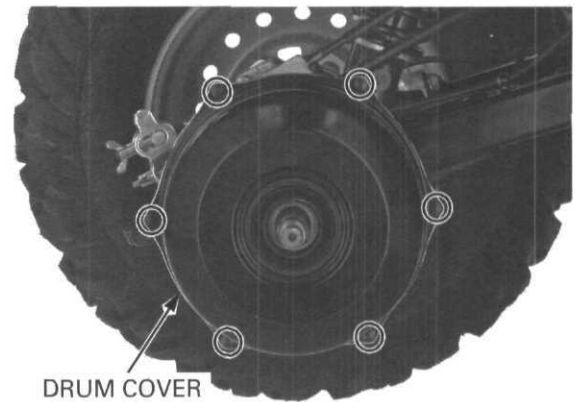
Remove the right rear wheel (page 14-6).

Remove the following:

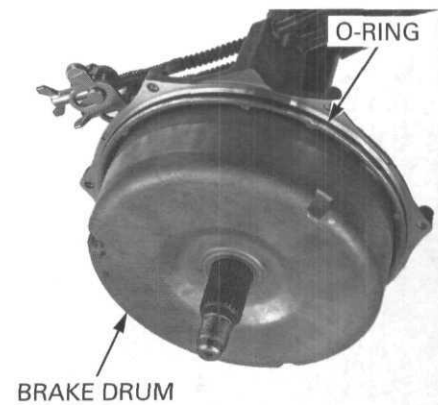
- cotter pin
- hub nut
- wheel hub



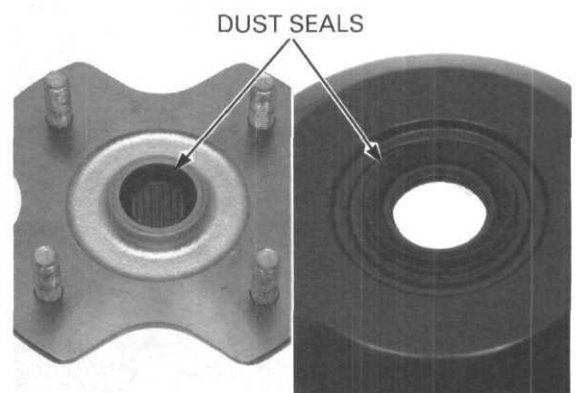
- cover bolts
- brake drum cover



- O-ring
- brake drum



- dust seals from the wheel hub and brake drum



# BRAKE SYSTEM

## INSPECTION

Measure the brake drum I.D.

**SERVICE LIMIT: 181.0 mm (7.1 in)**



## DISASSEMBLY

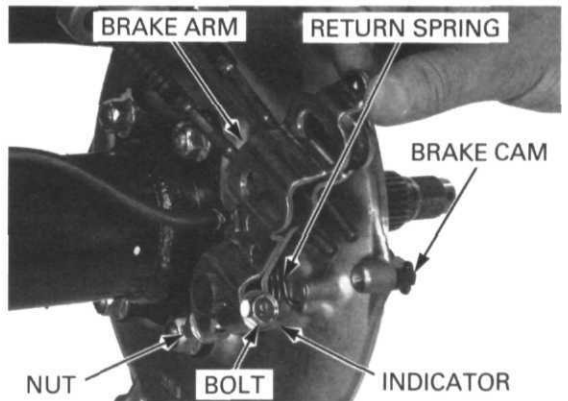
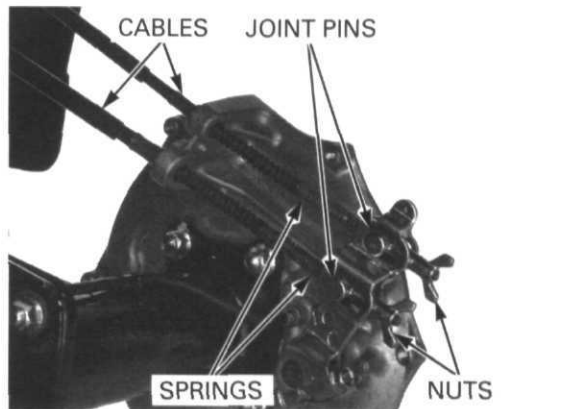
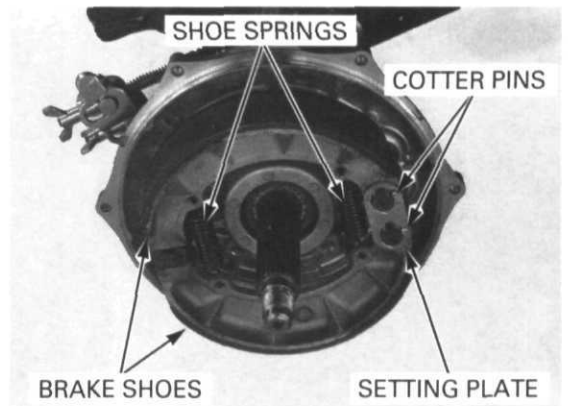
*Always replace the brake shoes in pairs.*

Remove the following:

- cotter pins
- setting plate
- brake shoes
- springs

- adjusting nuts
- joint pins
- springs
- brake cables

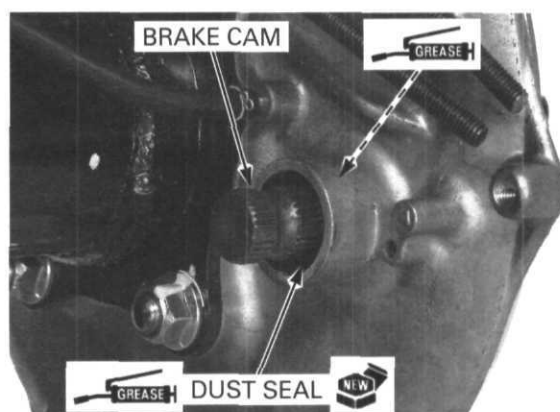
- nut and bolt
- brake arm
- wear indicator
- return spring
- brake cam
- felt seal
- dust seal



**ASSEMBLY**

Apply grease to the lips of a new brake cam dust seal and install it with the flat side facing toward the brake arm until it is fully seated.

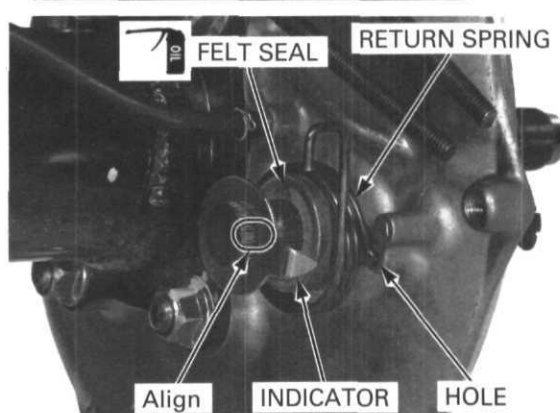
Apply grease to the brake cam spindle and install it.



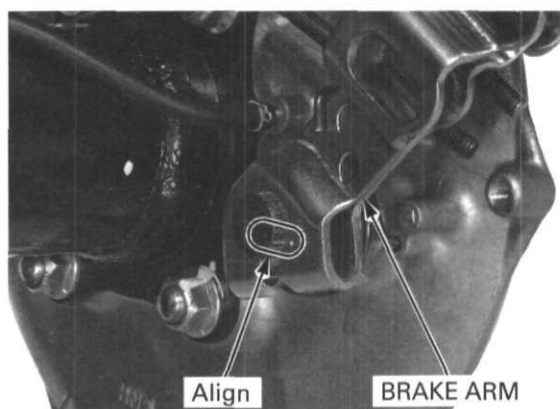
Apply engine oil to the felt seal and install it over the brake cam.

Install the return spring by aligning its end with the hole.

Install the wear indicator by aligning its wide teeth with the wide groove.



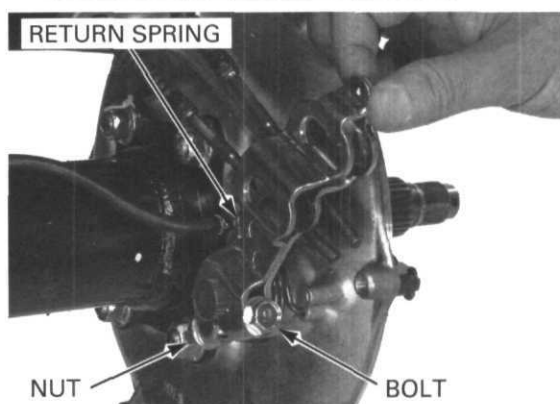
Install the brake arm by aligning the punch marks.



Install the pinch bolt from the punch mark side and the nut, and tighten it.

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

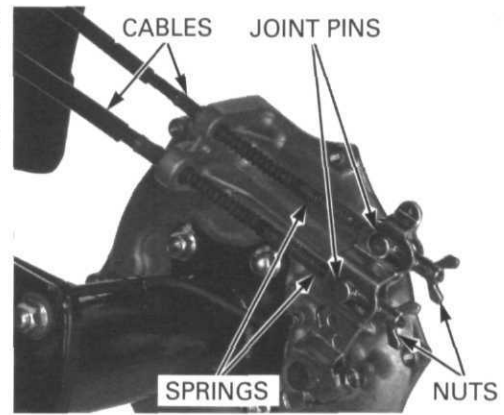
Hook the return spring end to the brake arm.



## BRAKE SYSTEM

Install the brake cables into the cable holders on the brake panel (upper holder for parking brake cable and lower holder for pedal brake cable).

Install the cable springs onto the cables and the joint pins into the brake arm. Connect the brake cables to the brake arm with the adjusting nuts.



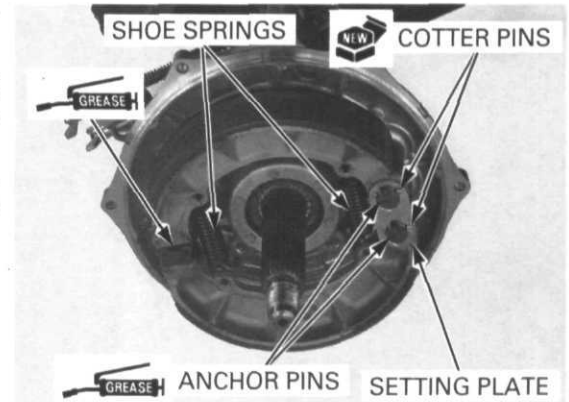
Apply grease to the anchor pins and brake cam sliding surfaces.

*Do not get grease onto the shoe linings.*

Assemble the brake shoes and springs so that the spring ends are facing outside as shown and install the assembly onto the brake panel.

*Install the cotter pins from the front side.*

Install the setting plate with the chamfered side facing toward the brake shoe and secure it with new cotter pins.



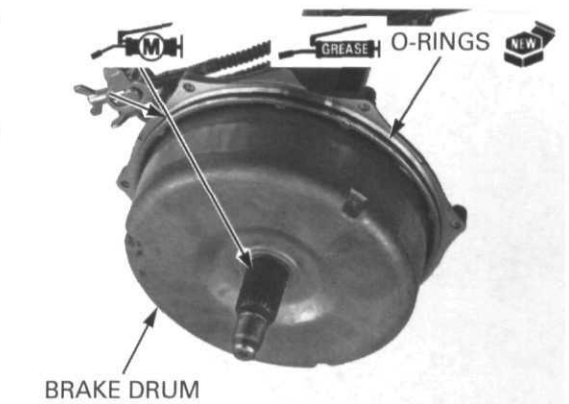
## BRAKE DRUM INSTALLATION

Apply molybdenum disulfide grease to the axle spline.

*Do not get grease to the brake drum and shoes.*

Install the brake drum onto the axle.

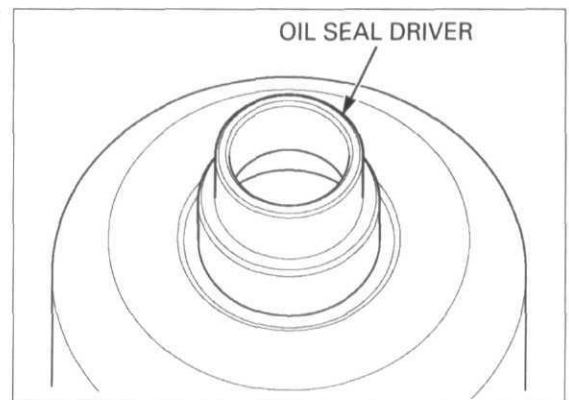
Coat a new O-ring with grease and install it into the groove in the brake panel.



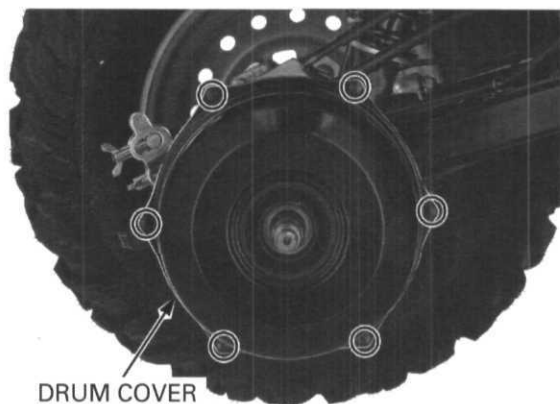
Apply grease to a new dust seal lips and install it into the drum cover using the special tool.

### TOOL:

Oil seal driver                      07965-MC70100

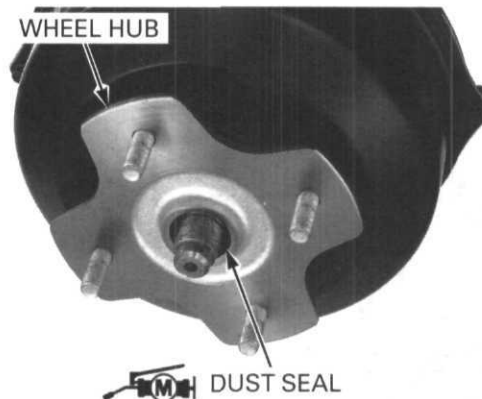


Install the drum cover and tighten the six bolts.



Apply molybdenum disulfide grease to a new dust seal lips and install it into the wheel hub with the flat side facing in until it is fully seated.

Install the wheel hub onto the axle.

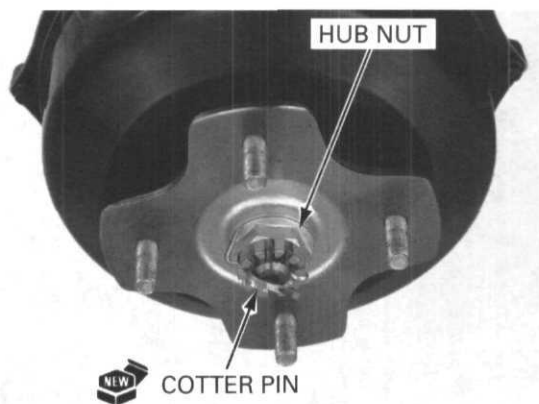


Install the hub nut and tighten it to the specified torque and further tighten until its grooves align with the cotter pin hole.

**TORQUE: 137 N·m (14 kgf·m, 101 lbf·ft)**

Install a new cotter pin.

Install the right rear wheel (page 14-6).  
Adjust the rear brake (page 4-18).



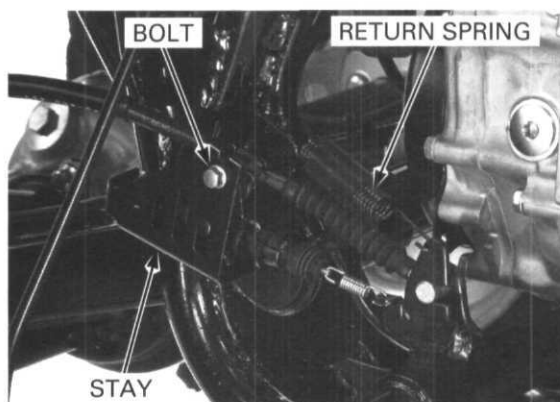
## REAR BRAKE PEDAL

### REMOVAL

Remove the right center mud guard (page 3-6).

Remove the following:

- bolt
- rear brake light switch stay with the switch
- return spring



## BRAKE SYSTEM

- cotter pin
- washer
- brake pedal
- brake cable

- dust seals

### INSTALLATION

Apply grease to new dust seal lips and install them with the flat side facing out.

Apply grease to the groove in the pivot shaft.

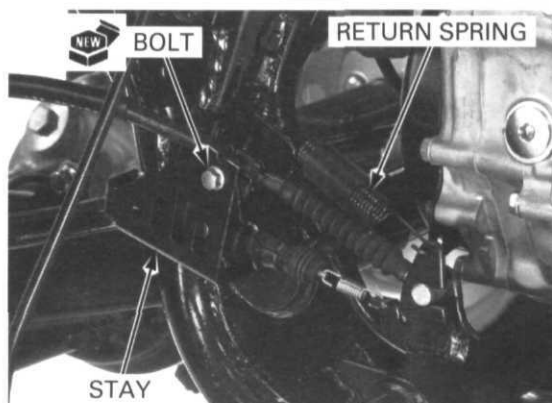
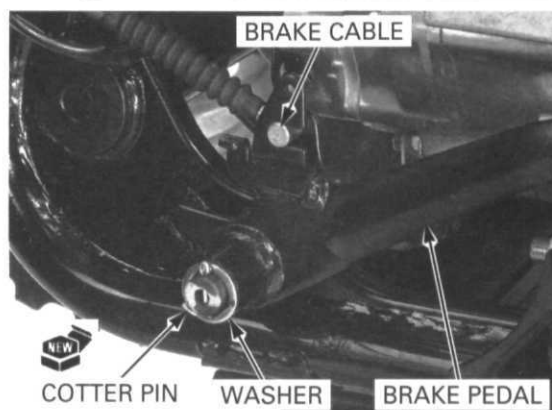
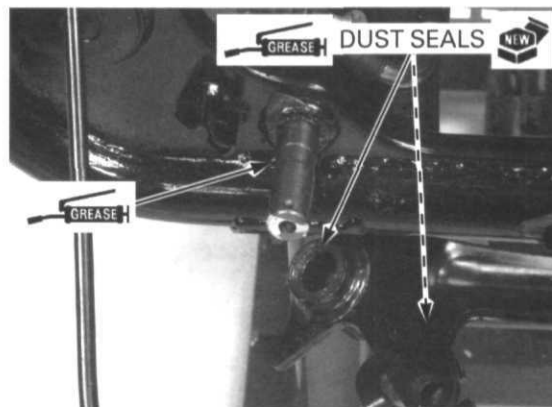
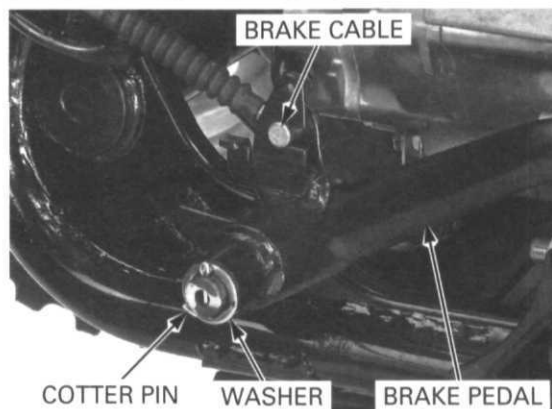
Connect the brake cable to the pedal and install the pedal onto the pivot shaft.

Install the washer and a new cotter pin.

Install the return spring as shown.

Hook the rear brake light switch spring to the pedal and install the switch stay onto the frame with a new bolt.

Install the right rear mud guard (page 3-6).





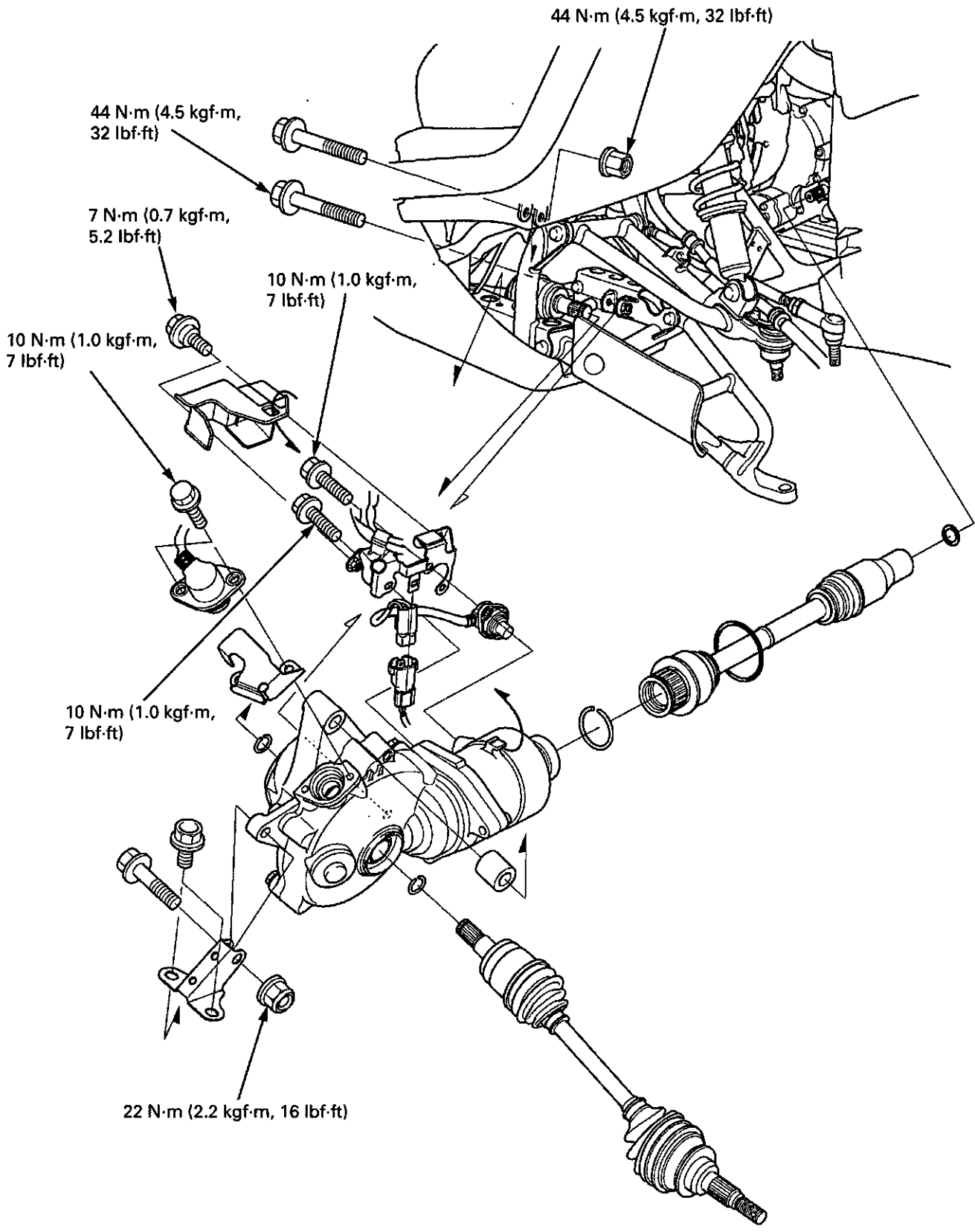
# 16. FRONT DRIVING MECHANISM (FM/FE models)

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<b>SYSTEM COMPONENTS .....</b>	<b>16-2</b>	<b>FRONT FINAL GEAR DISASSEMBLY/ INSPECTION .....</b>	<b>16-15</b>
<b>SERVICE INFORMATION .....</b>	<b>16-3</b>	<b>FRONT FINAL GEAR CASE BEARING REPLACEMENT .....</b>	<b>16-22</b>
<b>TROUBLESHOOTING .....</b>	<b>16-6</b>	<b>FRONT FINAL GEAR ASSEMBLY.....</b>	<b>16-25</b>
<b>FRONT DRIVE SHAFT .....</b>	<b>16-7</b>	<b>FRONT FINAL DRIVE INSTALLATION .....</b>	<b>16-30</b>
<b>FRONT FINAL DRIVE REMOVAL.....</b>	<b>16-12</b>		

**FRONT DRIVING MECHANISM (FM/FE models)**

**SYSTEM COMPONENTS**



## SERVICE INFORMATION

### GENERAL

- Perform the gear contact pattern and backlash inspection whenever you replace the bearings, gears or gear case. The extension lines from the gear engagement surfaces should intersect at one point.
- Protect the gear case with a shop towel or soft jaws while holding it in vise. Do not clamp it too tight as it could damage the gear case.
- When using the lock nut wrench, use a deflecting beam type torque wrench 20 inches long. The lock nut wrench increases the torque wrench's leverage, so the torque wrench reading will be less than the torque actually applied to the lock nut. The specification given is the actual torque applied to the lock nut, not the reading on the torque wrench. Do not overtighten the lock nut. The specification later in the text gives both actual and indicated.
- Replace the ring and pinion gears as a set.
- Replace the cam followers (12 pieces) as a set, and the cam followers, face cams and differential housing halves as an assembly if the face cam or differential housing is faulty.

### SPECIFICATIONS

Unit: mm (in)

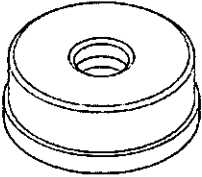
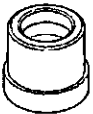

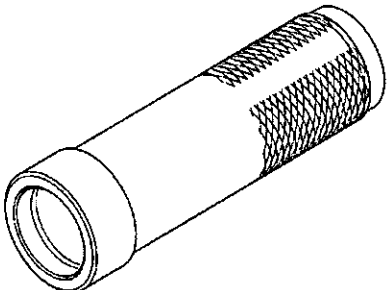
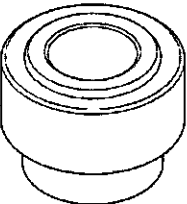

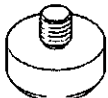
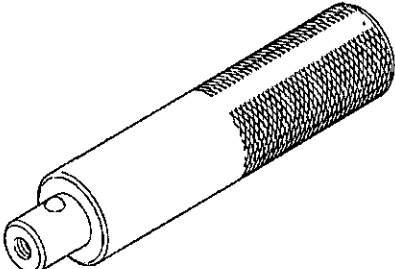
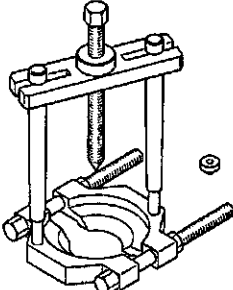
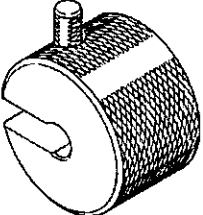
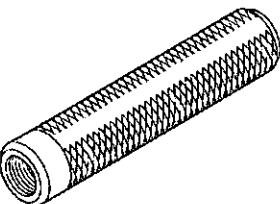
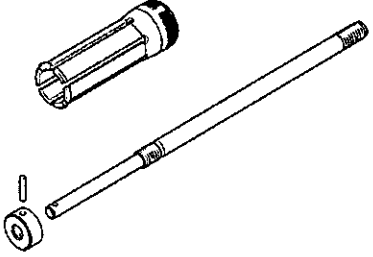
ITEM		STANDARD	SERVICE LIMIT
Front differential	Oil capacity	After draining	185 cm <sup>3</sup> (6.3 US oz, 6.5 Imp oz)
		After disassembly	230 cm <sup>3</sup> (7.8 US oz, 8.1 Imp oz)
	Recommended oil	Hypoid gear oil SAE # 80	-
	Gear backlash	0.05 - 0.25 (0.002 - 0.010)	0.4 (0.02)
	Backlash difference	-	0.2 (0.01)
	Slip torque	14 - 17 N·m (1.45 - 1.75 kgf·m, 10 - 13 lbf·ft)	12 N·m (1.2 kgf·m, 9 lbf·ft)
	Face cam-to-housing distance	3.3 - 3.7 (0.13 - 0.15)	3.3 (0.13)
	Differential ring gear depth	6.55 - 6.65 (0.258 - 0.262)	6.55 (0.258)
Cone spring free height	2.8 (0.11)	2.6 (0.10)	

### TORQUE VALUES

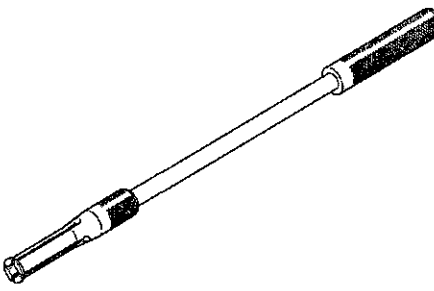
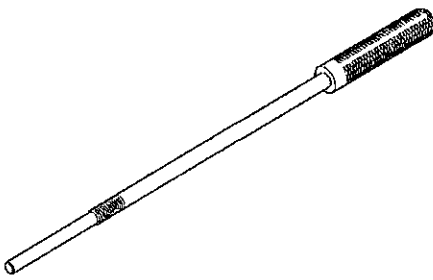
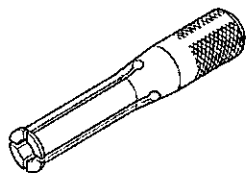
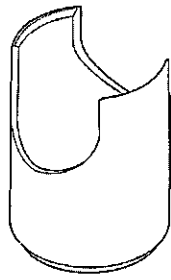
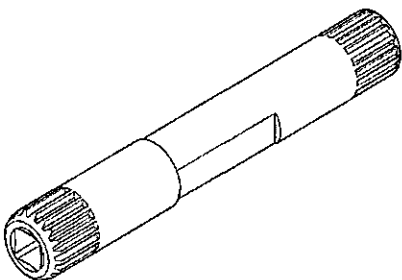
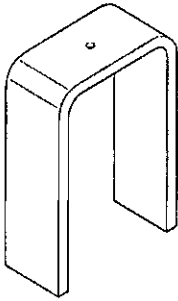
Differential ring gear bolt	49 N·m (5.0 kgf·m, 36 lbf·ft)	ALOC bolt: replace with a new one.
Front final gear case cover bolt (10 mm)	49 N·m (5.0 kgf·m, 36 lbf·ft)	Apply locking agent to the threads.
Front final gear case cover bolt (8 mm)	25 N·m (2.5 kgf·m, 18 lbf·ft)	
Front final clutch bolt	25 N·m (2.5 kgf·m, 18 lbf·ft)	ALOC bolt: replace with a new one.
Front final gear mounting bolt (10 mm)	44 N·m (4.5 kgf·m, 32 lbf·ft)	
Front final gear mounting nut (10 mm)	44 N·m (4.5 kgf·m, 32 lbf·ft)	Lock nut: replace with a new one.
Final gear mounting nut (8 mm)	22 N·m (2.2 kgf·m, 16 lbf·ft)	
Front vehicle speed sensor bolt	10 N·m (1.0 kgf·m, 7 lbf·ft)	
Rear vehicle speed sensor bolt	10 N·m (1.0 kgf·m, 7 lbf·ft)	
Clutch cover stay bolt	10 N·m (1.0 kgf·m, 7 lbf·ft)	
Front final clutch cover bolt	7 N·m (0.7 kgf·m, 5.2 lbf·ft)	

# FRONT DRIVING MECHANISM (FM/FE models)

## TOOLS

<p>Attachment, 52 x 55 mm 07746-0010400</p> 	<p>Attachment, 22 x 24 mm 07746-0010800</p> 	<p>Attachment, 20 mm I.D. 07746-0020400</p> 
<p>Driver, 40 mm I.D. 07746-0030100</p> 	<p>Attachment, 30 mm I.D. 07746-0030300</p> 	<p>Pilot, 15 mm 07746-0040300</p> 
<p>Pilot, 28 mm 07746-0041100</p> 	<p>Driver 07749-0010000</p> 	<p>Universal bearing puller 07631-0010000</p>  <p>or equivalent commercially available in U.S.A.</p>
<p>Remover weight 07741-0010201</p>  <p>or 07936-371020A or 07936-3710200 (U.S.A. only)</p>	<p>Remover handle 07936-3710100</p> 	<p>Bearing remover, 30 mm 07936-8890300</p> 

# FRONT DRIVING MECHANISM (FM/FE models)

<p>Bearing remover, 15 mm 07936-KC10500</p>  A long, thin metal tool with a textured grip at one end and a small cylindrical head at the other.	<p>Remover shaft, 15 mm 07936-KC10100</p>  A long, thin metal shaft with a textured grip at one end and a small cylindrical head at the other.	<p>Remover head, 15 mm 07936-KC10200</p>  A small, cylindrical metal head with a textured grip at one end and a small cylindrical head at the other.
<p>Bearing clip compressor, 25 mm 070ME-HN8A100</p>  A U-shaped metal tool with a curved top and a flat bottom.	<p>Differential inspection tool 07KMK-HC50101 or 07KMK-HC5010A (U.S.A. only)</p>  A cylindrical metal tool with a textured grip at one end and a small cylindrical head at the other.	<p>Press attachment 07LME-GE20100</p>  A U-shaped metal tool with a curved top and a flat bottom.

## **TROUBLESHOOTING**

### **Consistent noise during cruising**

- Oil level too low
- Foreign matter contaminating gear oil
- Worn or damaged bearing
- Worn or damaged ring gear and pinion gear
- Deformed ring gear or differential case
- Improper tooth contact between ring gear and pinion gear

### **Gear noises while running**

- Oil level too low
- Foreign matter contaminating gear oil
- Chipped or damaged gears
- Improper tooth contact between ring gear and pinion gear

### **Gear noises while coasting**

- Damaged or chipped gears

### **Abnormal noises when turning**

- Worn or damaged ring gear bearing
- Worn or damaged face cam and cam followers
- Worn or damaged differential housing grooves
- Worn cone spring or shim

### **Abnormal noises at start or during acceleration**

- Excessive backlash between ring gear and pinion gear
- Worn differential splines
- Loose fasteners
- Worn cone spring or shim

### **Oil leak**

- Oil level too high
- Clogged breather
- Damaged seals
- Loose case cover bolt

### **Overheating**

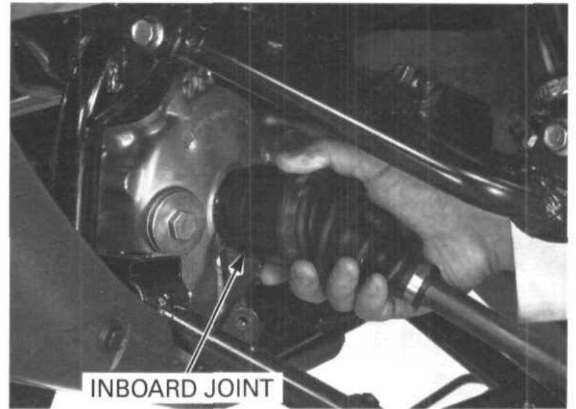
- Oil level too low
- Insufficient backlash between ring gear and pinion gear

## FRONT DRIVE SHAFT

### REMOVAL

*It is not necessary to remove the splash guard.* Remove the knuckle (page 13-14)

*To prevent damage to the differential oil seal, hold the inboard joint horizontal until the drive shaft is clear of the differential.* Hold the inboard joint of the drive shaft and tug firmly to force the stopper ring on the inboard joint end past the groove while prying with a screwdriver.



Remove the stopper ring from the inboard joint.

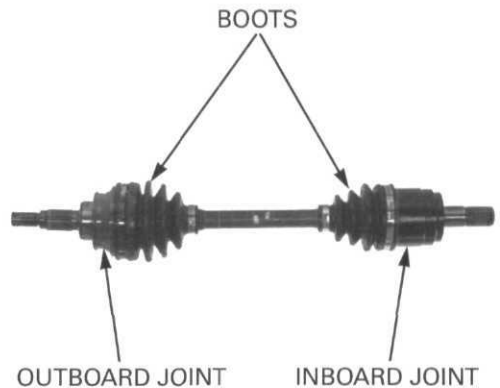


### DISASSEMBLY/INSPECTION

Check the boots for cuts or other damage. Check the drive shaft joints for excessive play or noise by moving the joints in a circular direction. If the outboard joint seems to be worn or damaged, the drive shaft must be replaced.

#### NOTE:

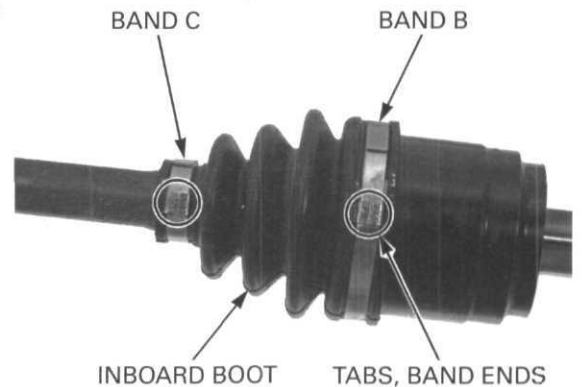
- To replace the outboard boot, first remove the inboard boot as described in following steps. Then remove bands and the outboard boot off the inboard end of the shaft.
- The outboard joint can not be disassembled.



*Replace the bands with new ones whenever removing them.*

Bend up the lock tabs and raise the band end to loosen the boot bands on the inboard side. Remove boot band B.

Remove the boot from the inboard joint.



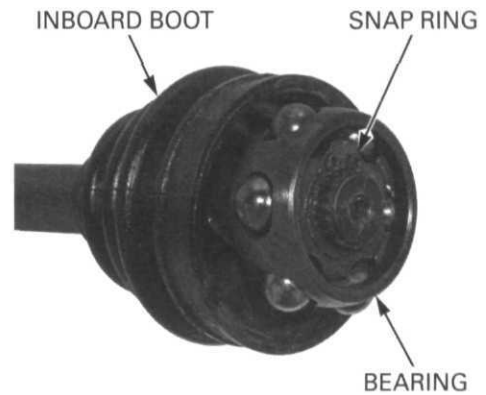
## FRONT DRIVING MECHANISM (FM/FE models)

Remove the following:

- stopper ring
- inboard joint



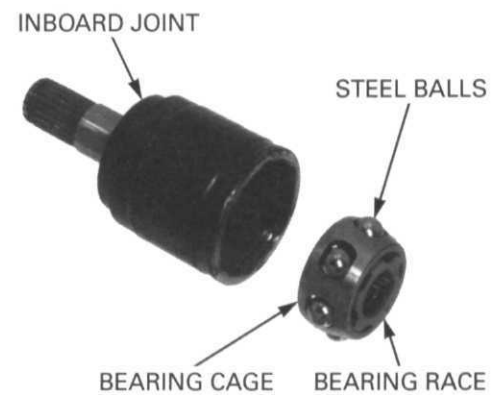
- snap ring
- bearing
- inboard boots
- boot band C



*Replace these components as an assembly.*

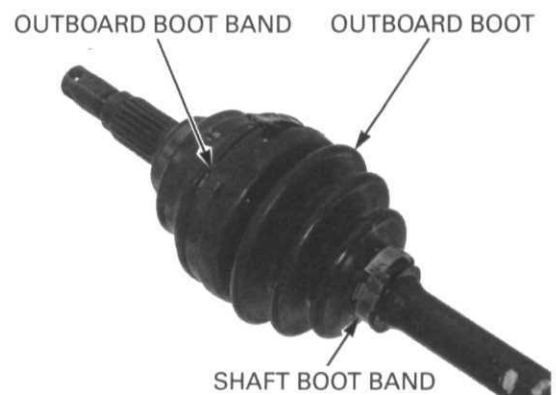
Check the following for wear or damage.

- bearing cage
- race
- steel balls
- inboard joint



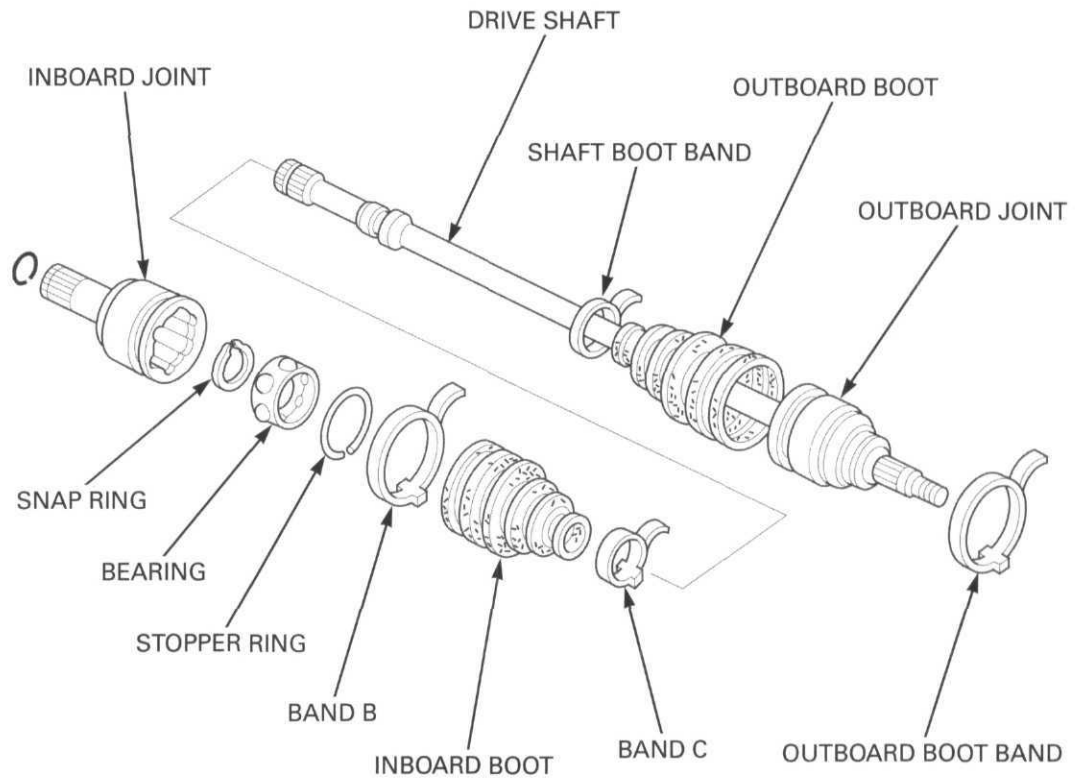
Remove the following:

- shaft boot band
- outboard boot band
- outboard boot

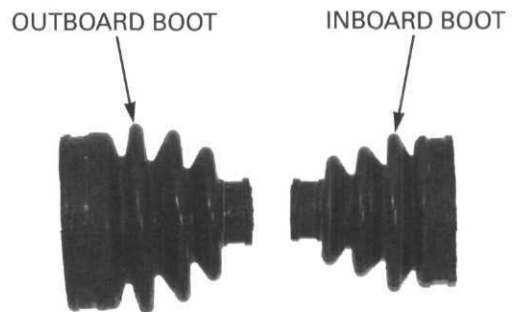




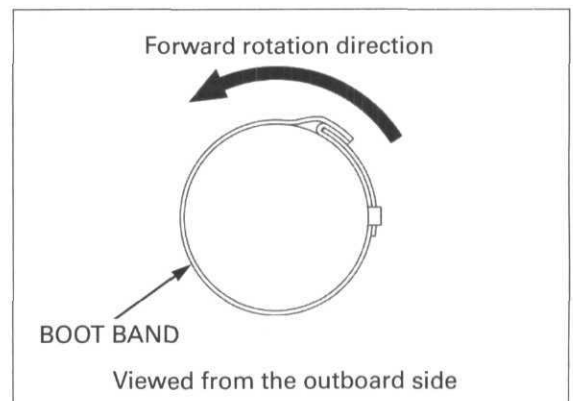
ASSEMBLY



The outboard boot is large and the inboard boot is small. Do not interchange them.



Note the installation direction of the boot bands.



## FRONT DRIVING MECHANISM (FM/FE models)

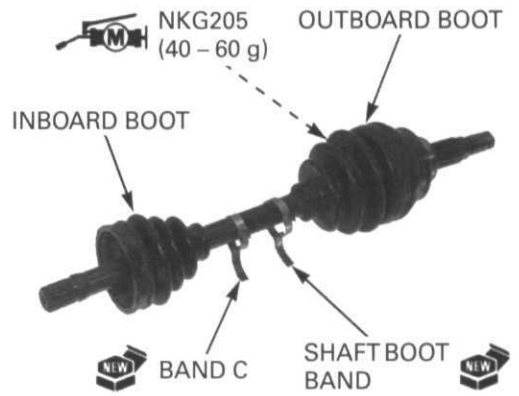
Pack the outboard joint with 40 – 60 g of specified grease.

**SPECIFIED GREASE: NKG205 (KYODO YUSHI)**

Install the following:

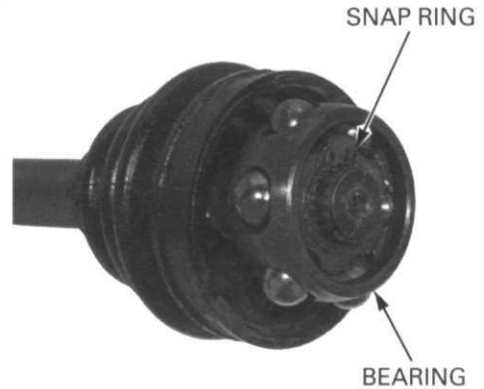
- outboard boot
- new shaft boot band
- new band C
- inboard boot

Do not tighten the bands at this time.



Install the bearing with the small O.D. facing to the drive shaft.

Install the snap ring with the chamfered side facing to the bearing.

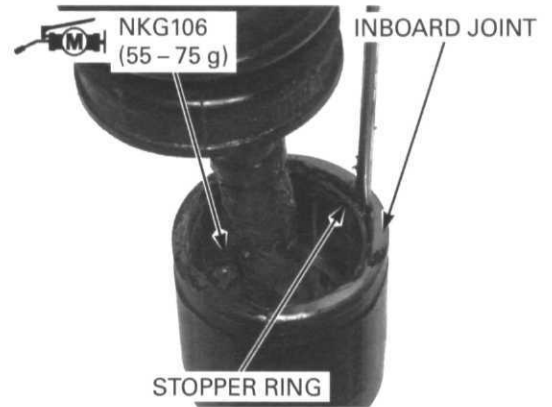


Pack the inboard joint with 55 – 75 g of specified grease.

**SPECIFIED GREASE: NKG106 (KYODO YUSHI)**

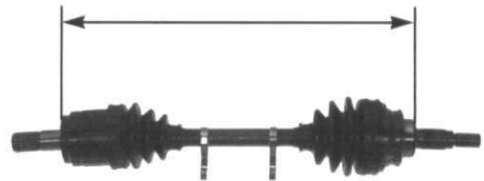
Install the inboard joint over the bearing.

Install the stopper ring into the groove in the inboard joint properly.



Adjust the length of the drive shaft to the figure given below.

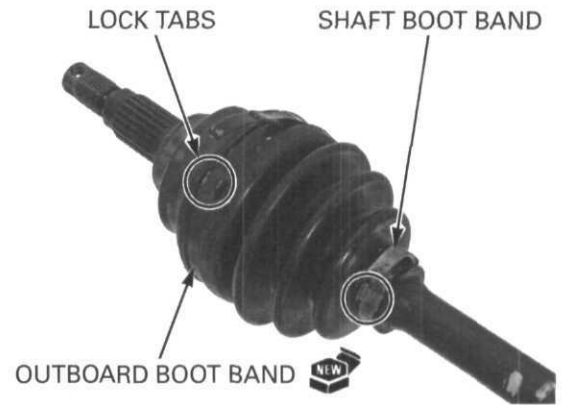
**DRIVE SHAFT LENGTH: Left: 363.2 mm (14.30 in)  
Right: 383.0 mm (15.08 in)**



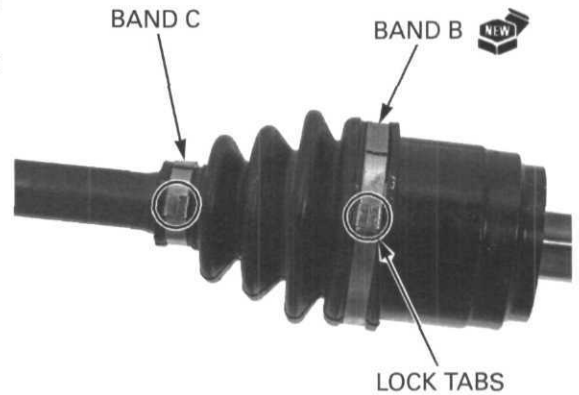
## FRONT DRIVING MECHANISM (FM/FE models)

See page 16-9 for band installation direction.

Install the shaft boot band and a new outboard boot band onto the outboard boot. Bend down the band end and secure it with the lock tabs. Tap the lock tabs with a plastic hammer.



Install band C and a new band B onto the inboard boot. Bend down the band end and secure it with the lock tabs. Tap the lock tabs with a plastic hammer.



### INSTALLATION

Install a new stopper ring into the groove in the inboard joint spline.

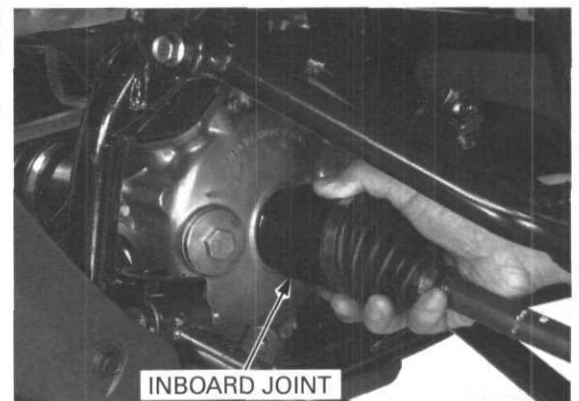


Be careful not to damage the oil seal in the differential gear case.

Install the drive shaft by holding the inboard joint until the stopper ring seats in the groove of the differential.

Make sure that the stopper ring is seated properly by pulling on the inboard joint lightly.

Install the knuckle (page 13-19)

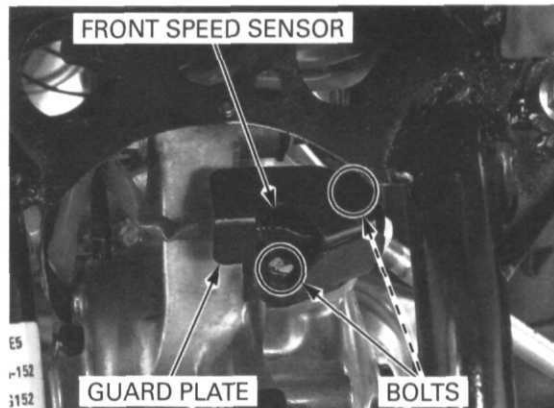


## FRONT FINAL DRIVE REMOVAL

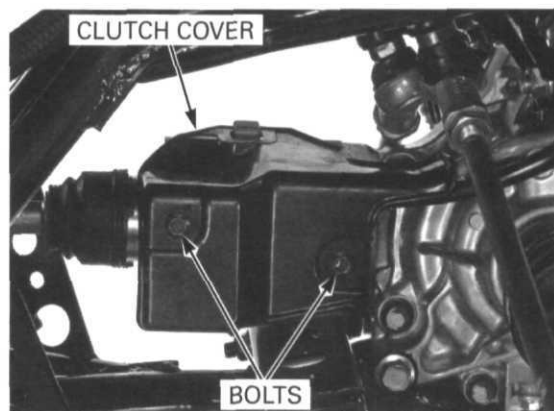
Drain the differential oil (page 4-15).

Remove the following:

- left side cover (page 3-5)
- both inner fenders (page 3-7)
- carry pipe guard (page 3-8)
- left drive shaft (page 16-7)
- two bolts, guard plate, front speed sensor and O-ring

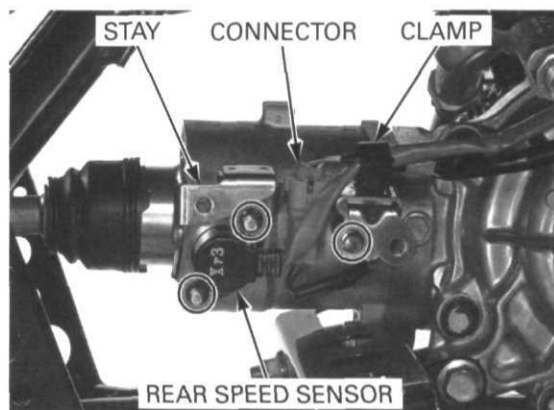


- two bolts and final clutch cover

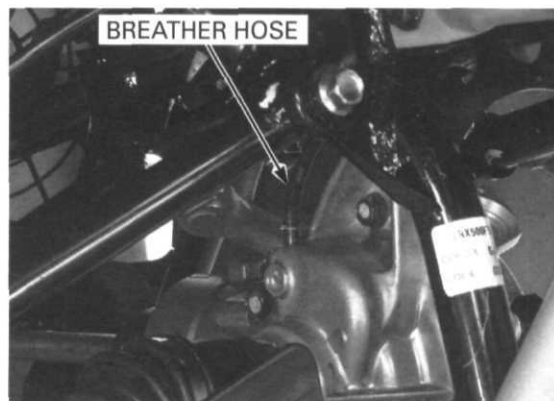


- rear speed sensor and front final clutch wires from the clamp
- three bolts, clutch cover stay, rear speed sensor and O-ring

Disconnect the front final clutch 2P connector.



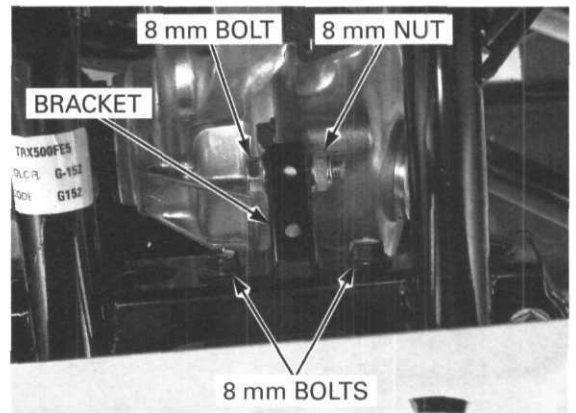
Disconnect the front final gear breather hose.



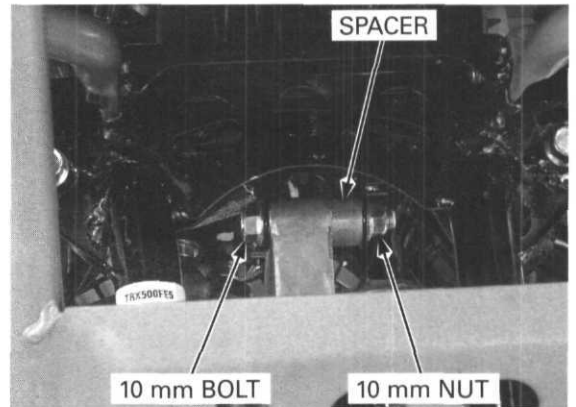
## FRONT DRIVING MECHANISM (FM/FE models)

Remove the following:

- 8 mm mounting nut and bolt
- two 8 mm bolts and mounting bracket

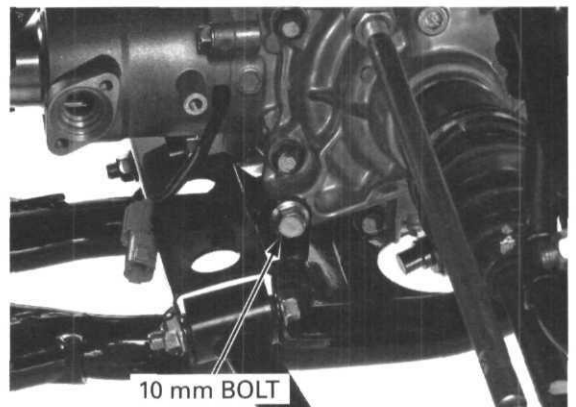


- 10 mm mounting nut, bolt and spacer



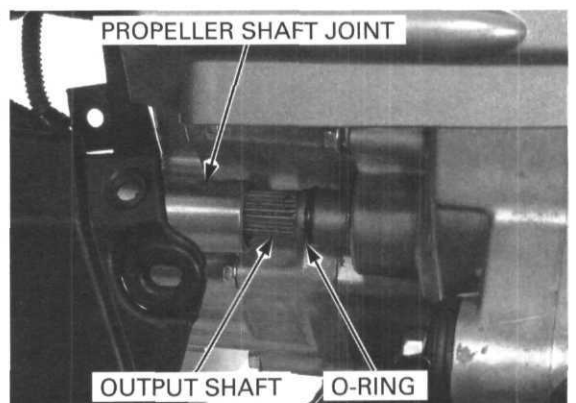
- 10 mm mounting bolt

Move the front final gear assembly forward.



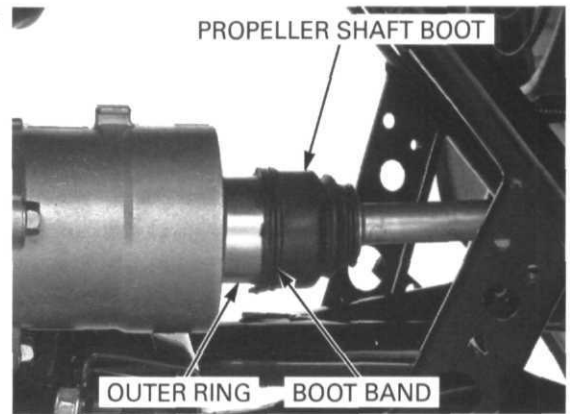
Pull the propeller shaft joint out of the output shaft of the engine.

Remove the O-ring from the output shaft.



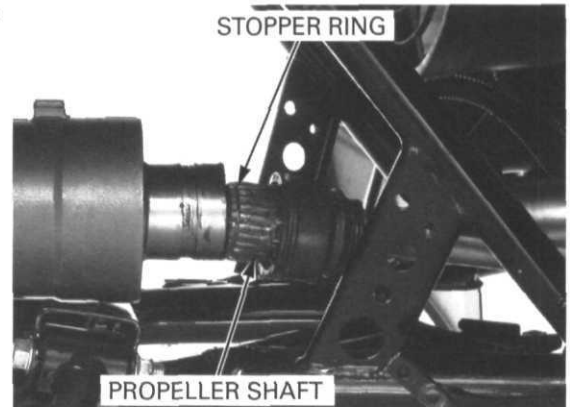
## FRONT DRIVING MECHANISM (FM/FE models)

Remove the boot band and propeller shaft boot from the outer ring of the front final clutch.



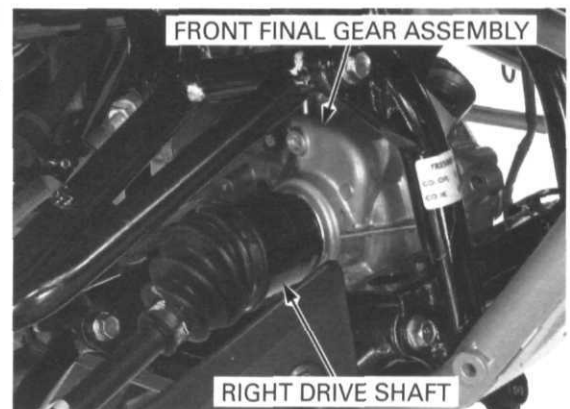
Pull the propeller shaft to force the stopper ring past the groove in the outer ring and remove it.

Remove the stopper ring from the propeller shaft.



Separate the right drive shaft from the front final gear.

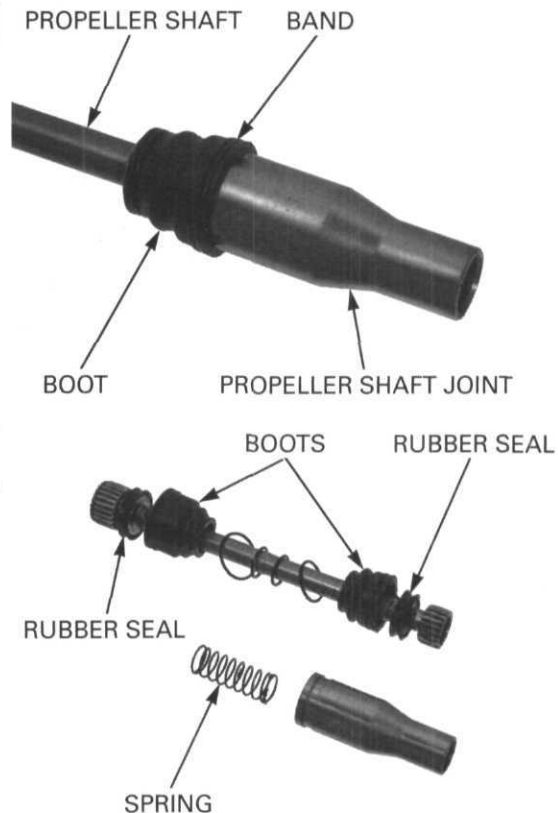
Remove the front final gear assembly from the frame.



## FRONT FINAL GEAR DISASSEMBLY/ INSPECTION

### PROPELLER SHAFT INSPECTION

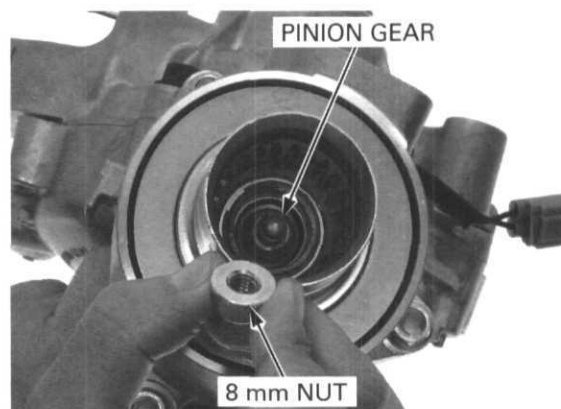
Remove the boot band and boot from the propeller shaft joint and remove the propeller shaft joint and spring.



Check the splines of the propeller shaft and joint for wear or damage.  
If they are damaged, check the splines of the output shaft and outer ring.  
Check the rubber seals for fatigue or damage.  
Check the boots for cuts, deterioration or damage.

### OPERATION CHECK

Install an 8 mm nut onto the pinion gear.



Turn the 8 mm nut and check the pinion gear turns smoothly and quietly without binding.

If the pinion gear does not turn smoothly or quietly, the pinion gear, ring gear and/or bearing may be damaged or faulty. They must be checked after disassembly; replace them if necessary.



## FRONT DRIVING MECHANISM (FM/FE models)

### BACKLASH INSPECTION

Hold the pinion gear with the special tools.

Set the final gear case into a jig or vise with soft jaws.

Install the differential inspection tool into the right side of the final gear.

#### TOOL:

Differential inspection tool    **07KMK-HC50101** or  
**07KMK-HC5010A**  
(U.S.A. only)

Set a horizontal type dial indicator on the ring gear through the filler hole.

Turn the ring gear back and forth to read backlash.

**STANDARD: 0.05 – 0.25 mm (0.002 – 0.010 in)**

**SERVICE LIMIT: 0.4 mm (0.02 in)**

Remove the dial indicator. Turn the ring gear 120° and measure backlash. Repeat this procedure once more.

Compare the difference of the three measurements.

**SERVICE LIMIT: 0.2 mm (0.01 in)**

If the difference in measurements exceeds the service limit, it indicates that the bearing is not installed squarely, or the case is deformed. Inspect the bearings and case.

If the backlash is excessive, replace the ring gear left side shim with a thinner one.

If the backlash is too small, replace the ring gear left side shim with a thicker one.

The backlash is changed by about 0.06 mm (0.002 in) when the thickness of the shim is changed by 0.10 mm (0.004 in).

#### NOTE:

- Twenty-three different thickness shims are available from the thinnest (0.50 mm thickness: A) shim to the thickest (1.60 mm thickness: W) in intervals of 0.05 mm.

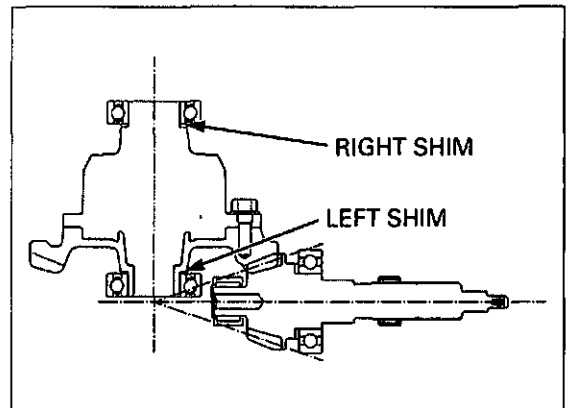
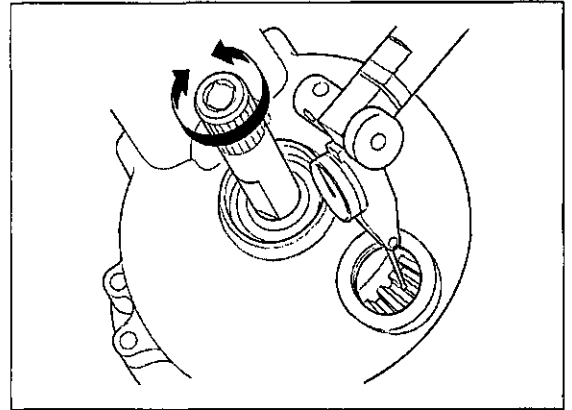
#### Ring gear shims:

**A: (thinnest): 0.50 mm (0.020 in)**

**K: (standard): 1.00 mm (0.039 in)**

**W: (thickest): 1.60 mm (0.063 in)**

Change the right side shim as follows: If the left shim was replaced with a 0.10 mm (0.004 in) **thicker** shim, replace the right shim with one that is 0.10 mm (0.004 in) **thinner**.

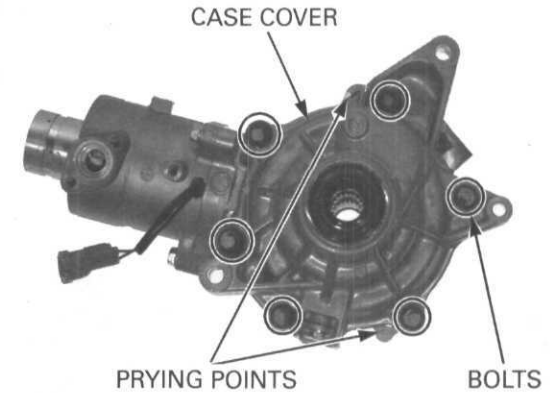




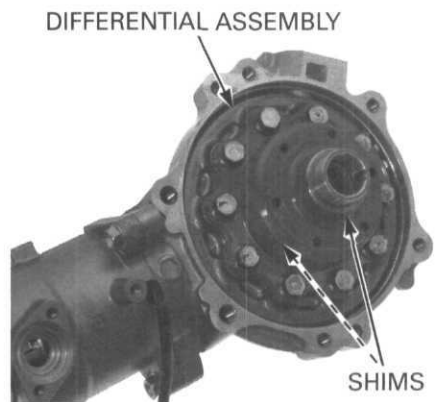
### DIFFERENTIAL REMOVAL

Loosen the six cover bolts in a crisscross pattern in several steps and remove them.

Pry the final gear case cover at the points as shown by using a screwdriver and remove it. Remove the case cover and O-ring.



Remove the differential assembly and shims.



### BEARING INSPECTION

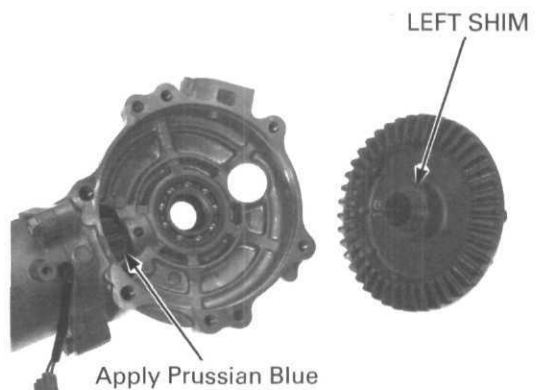
Turn the inner race of each bearing in the gear case and case cover with your finger. The bearings should turn smoothly and quietly. Also check that the bearing outer race fits tightly in the case or cover.



### GEAR TOOTH CONTACT PATTERN CHECK

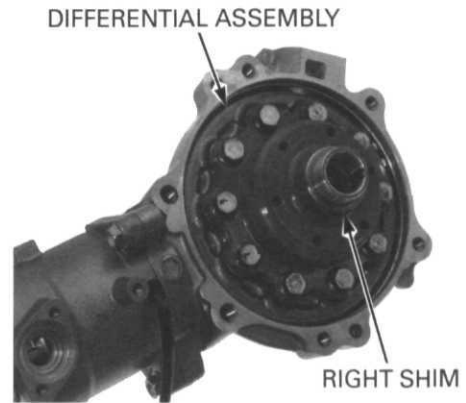
Apply thin coat of Prussian Blue to the pinion gear teeth for a tooth contact pattern check.

Install the ring gear shims onto the differential assembly.



## FRONT DRIVING MECHANISM (FM/FE models)

Install the differential assembly into the gear case.

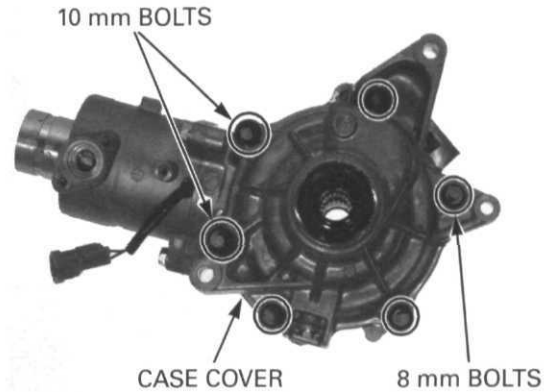


Install the case cover and tighten the bolts in several steps until the cover evenly touches the gear case.

*It is important to turn the pinion gear while tightening the bolts. If the ring gear shim is too thick, the gears will lock after only light tightening.*

Then, while rotating the pinion gear, tighten the bolts to the specified torque in a crisscross pattern in several steps.

**TORQUE: 10 mm bolt: 49 N·m (5.0 kgf·m, 36 lbf·ft)**  
**8 mm bolt: 25 N·m (2.5 kgf·m, 18 lbf·ft)**



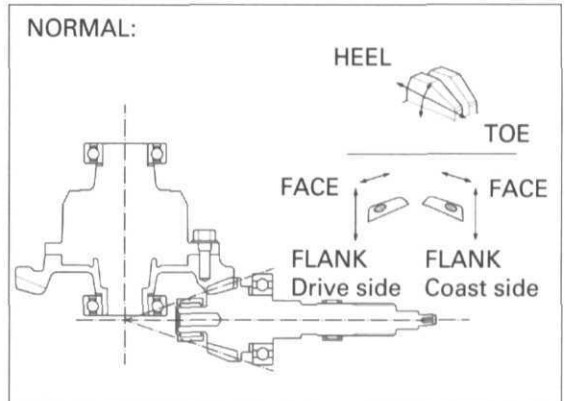
Rotate the ring gear several times in both directions of rotation.

Check the gear tooth contact pattern through the oil filler hole.

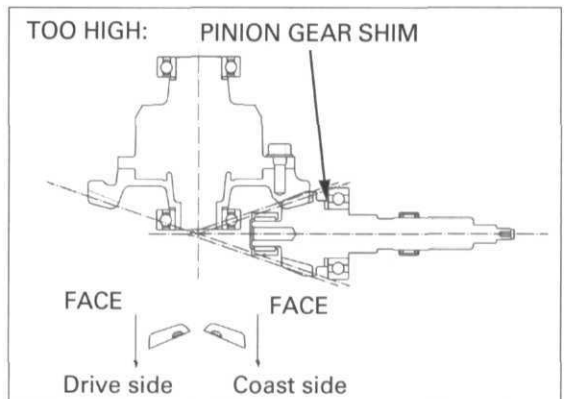
The pattern is indicated by the Prussian Blue applied to the pinion.

Contact is normal if the Prussian Blue is transferred to the approximate center of each tooth, but slightly to the heel side and to the flank side.

If the patterns are not correct, remove and change the pinion shim with one of an alternate thickness.



Replace the pinion shim with a thicker one if the contact pattern is too high, toward the face.



Replace the pinion shim with a thinner one if the contact pattern is too low, toward the flank.

The pattern will shift about 0.5 – 1.0 mm (0.02 – 0.04 in) when the thickness of the shim is changed by 0.12 mm (0.005 in).

**NOTE:**

- Fifteen different thickness shims are available from the thinnest (1.64 mm thickness: A) shim to the thickest (2.48 mm thickness: O) in intervals of 0.06 mm.

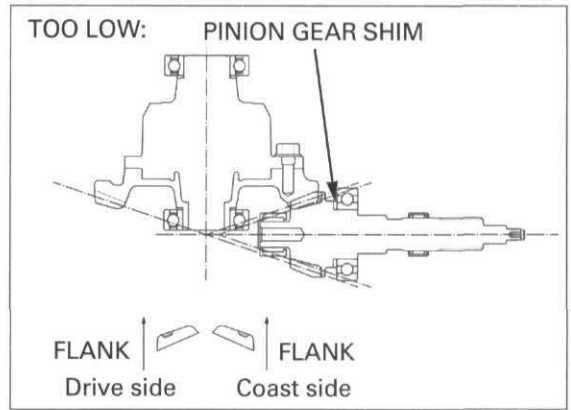
**Pinion gear shims:**

**A: (thinnest): 1.64 mm (0.065 in)**

**G: (standard): 2.00 mm (0.079 in)**

**O: (thickest): 2.48 mm (0.098 in)**

For pinion shim replacement, see page 16-22 and page 16-26.



### DIFFERENTIAL INSPECTION

Install the inspection tools into both sides of the differential.

**TOOL:**

**Differential inspection tool**      **07KMK-HC50101 or 07KMK-HC5010A (U.S.A. only)**

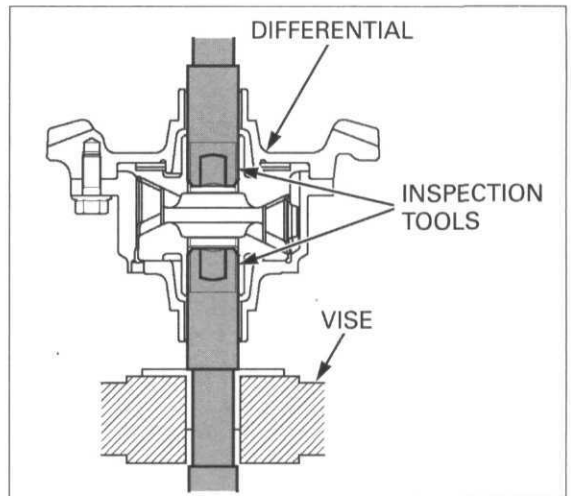
Hold the flat surface of the tool with a bench vise. Attach a torque wrench to the other tool and measure the limited slip torque.

**STANDARD:**

**14 – 17 N·m (1.45 – 1.75 kgf·m, 10 – 13 lbf·ft)**

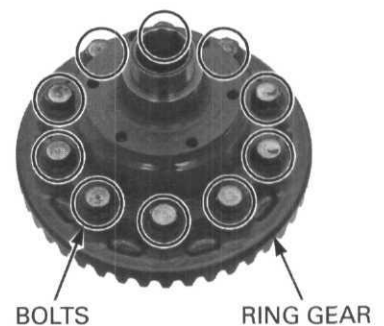
**SERVICE LIMIT: 12 N·m (1.2 kgf·m, 9 lbf·ft)**

If the slip torque is out of specification, disassemble the differential and perform the components inspection (page 16-20) since the differential may be faulty.



### DIFFERENTIAL DISASSEMBLY

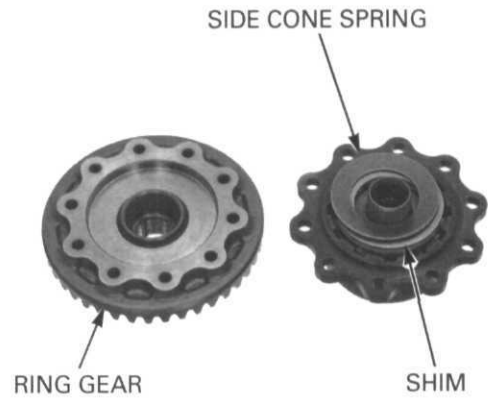
Remove the ten bolts, then place the differential assembly with the ring gear side up.



## FRONT DRIVING MECHANISM (FM/FE models)

Remove the following:

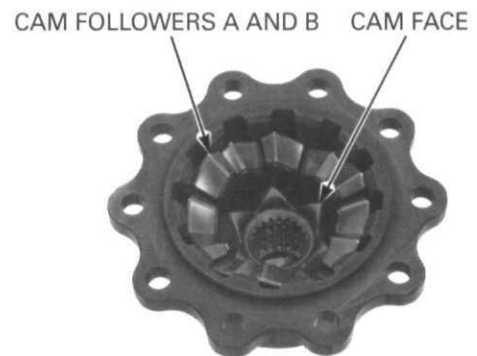
- ring gear
- cone spring
- shim



- face cam



- six cam followers A and six cam followers B
- face cam

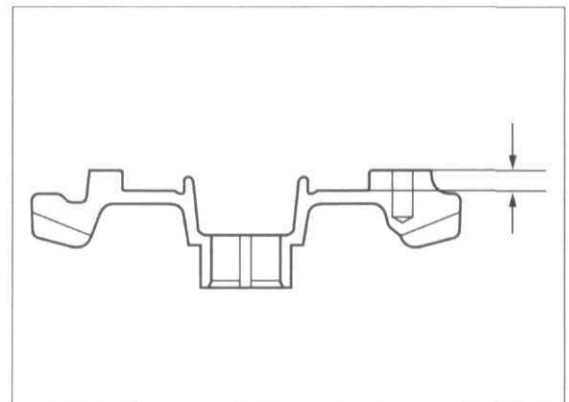


## DIFFERENTIAL COMPONENTS INSPECTION

### RING GEAR

Check the sliding surface of the ring gear for damage or discoloration. Measure the depth of the ring gear from the mating surface as shown.

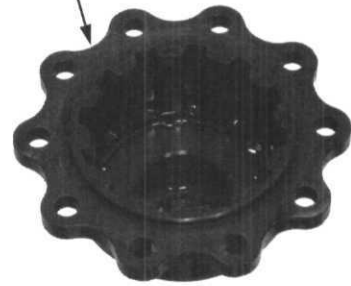
**SERVICE LIMIT: 6.55 mm (0.258 in)**



**DIFFERENTIAL HOUSING/FACE CAM/  
CAM FOLLOWER**

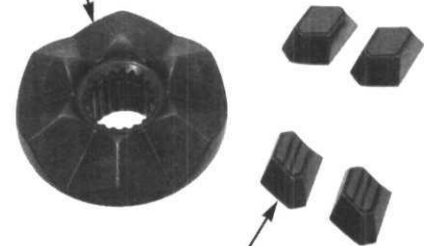
*If the differential housing or face cam are faulty, replace the differential as an assembly.* Check the sliding surface and grooves of the housing for damage or discoloration.

DIFFERENTIAL HOUSING



*Replace the cam followers as a set (12 pieces).* Check the shim, face cams and followers for damage.

CAM FACE



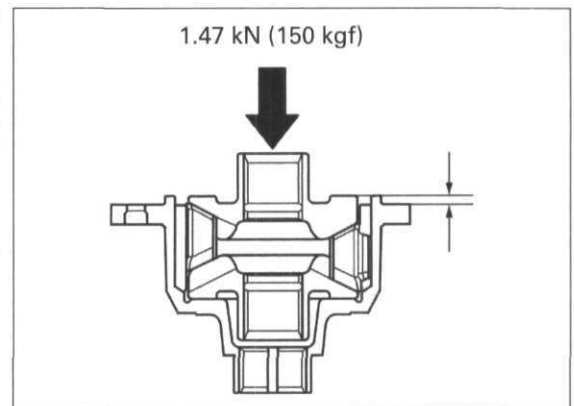
CAM FOLLOWERS

Temporarily assemble the differential housing, face cams and cam followers (page 16-27).

Measure the height of the face cam from the housing mating surface as shown while applying a load of 1.47 kN (150 kgf) to the face cam boss using a hydraulic press.

**SERVICE LIMIT: 3.3 mm (0.13 in)**

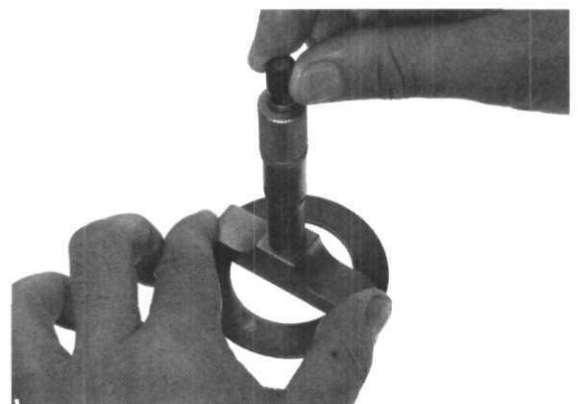
If the height is less than the limit, replace the differential as an assembly.



**SIDE CONE SPRING**

Check the spring for damage. Measure the height of the cone spring.

**SERVICE LIMIT: 2.6 mm (0.10 in)**

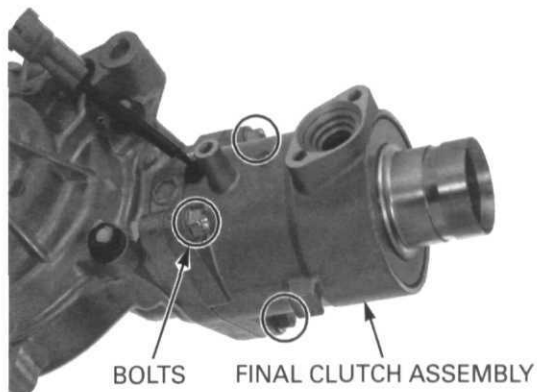


## FRONT DRIVING MECHANISM (FM/FE models)

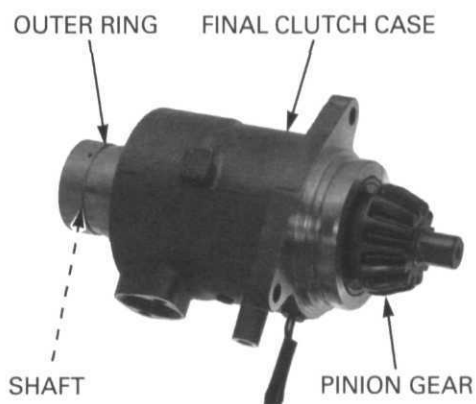
### PINION GEAR REMOVAL

Remove the three bolts and front final clutch assembly from the differential.

Remove the O-ring from the final clutch assembly.



Drive the pinion gear from the final clutch case by tapping its shaft from the outer ring side.



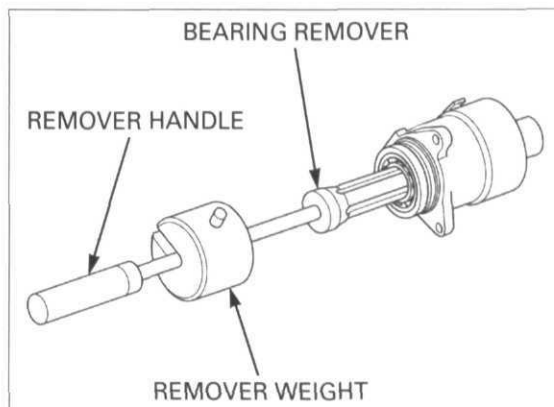
Heat the final clutch case to about 100°C (212°F).

Remove the pinion gear bearing from the final clutch case using the special tools.

#### TOOLS:

Bearing remover, 30 mm  
Remover handle  
Remover weight

07936-8890300  
07936-3710100  
07741-0010201 or  
07936-371020A or  
07936-3710200  
(U.S.A. only)

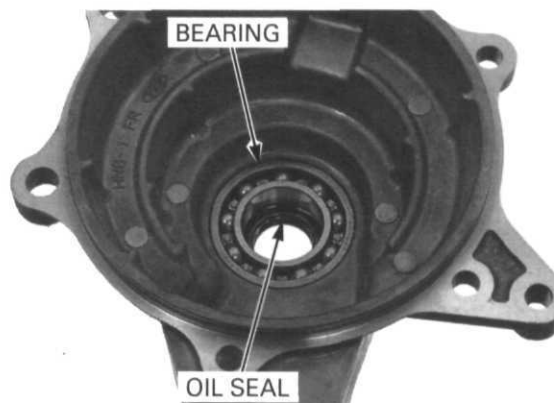


## FRONT FINAL GEAR CASE BEARING REPLACEMENT

### DIFFERENTIAL BEARING

Remove the oil seals from the final gear case and cover.

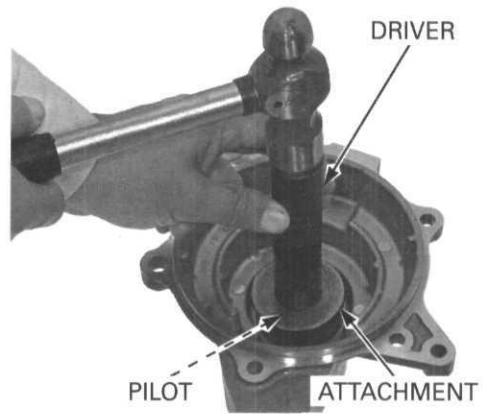
Drive the differential bearings out of the case and cover.



Drive the bearings into the final gear case and cover.

**TOOLS:**

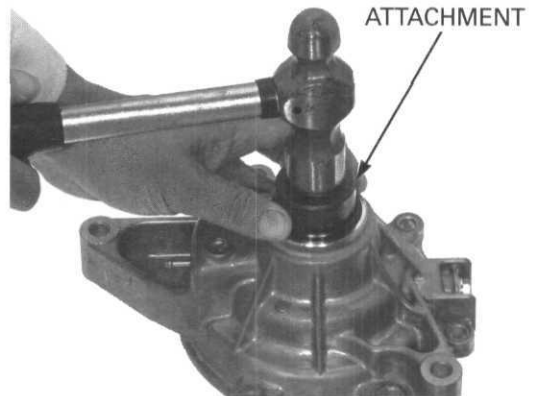
<b>Driver</b>	<b>07749-0010000</b>
<b>Attachment, 52 x 55 mm</b>	<b>07746-0010400</b>
<b>Pilot, 28 mm</b>	<b>07746-0041100</b>



Apply grease to new dust seal lips and install them into the case and cover.

**TOOL:**

<b>Attachment, 20 mm I.D.</b>	<b>07746-0020400</b>
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**PINION NEEDLE BEARING**

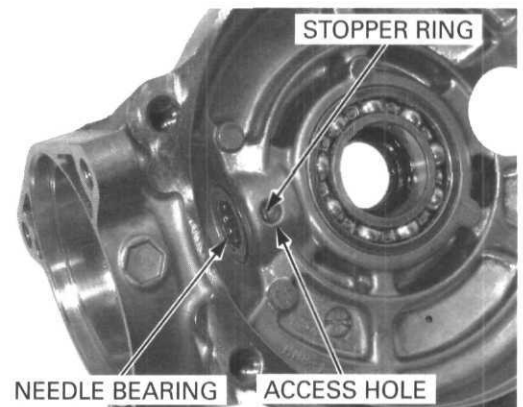
Remove the stopper ring by rotating it until its end appears in the access hole.  
 Bend up the end of the ring with a screwdriver.  
 Grasp the end of the ring with needle-nose pliers and pull the stopper ring out through the access hole.

Remove the oil filler cap.

Heat the gear case to about 80°C (176°F) and remove the needle bearing, using the special tools.

**TOOLS:**

<b>Bearing remover, 15 mm</b>	<b>07936-KC10500</b>
<b>– Remover shaft, 15 mm</b>	<b>07936-KC10100</b>
<b>– Bearing head, 15 mm</b>	<b>07936-KC10200</b>
<b>Remover weight</b>	<b>07741-0010201 or</b>
	<b>07936-371020A or</b>
	<b>07936-3710200</b>
	<b>(U.S.A. only)</b>



Remove the bearing cage and bearings from the inside of the pinion bearing to allow the special tool to grip the bearing.

## FRONT DRIVING MECHANISM (FM/FE models)

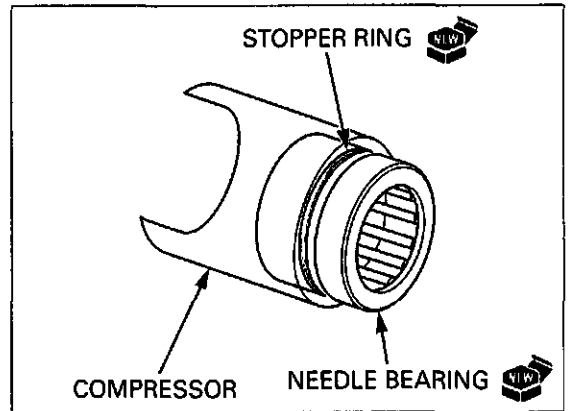
Install a new stopper ring into the groove in a new bearing.

*Make sure the stopper ring stays in the groove.*

Install a new bearing into the compressor until the bearing is flush with the end of the tool.

**TOOLS:**

**Bearing clip compressor**                    **070ME-HN8A100**



Place the driver, attachment and pilot on the top of the bearing and tape the driver to the compressor.

**TOOLS:**

**Driver**    **07749-0010000**

**Attachment, 22 x 24 mm**                    **07746-0010800**

**Pilot, 15 mm**                                    **07746-0040300**

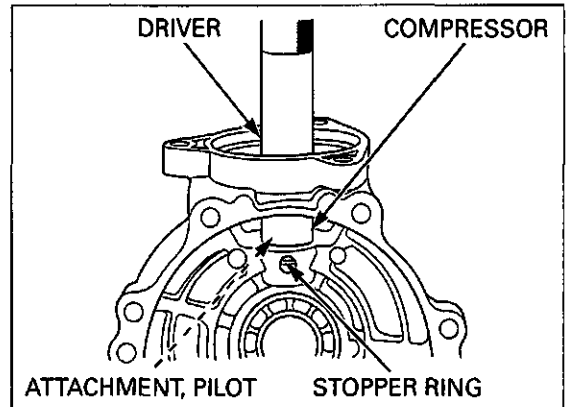
Place the bearing and tool assembly into a freezer for at least 30 minutes.

Heat the gear case to 80°C (176°F).

Remove the bearing and tool assembly from the freezer and drive the bearing into the gear case using the special tools.

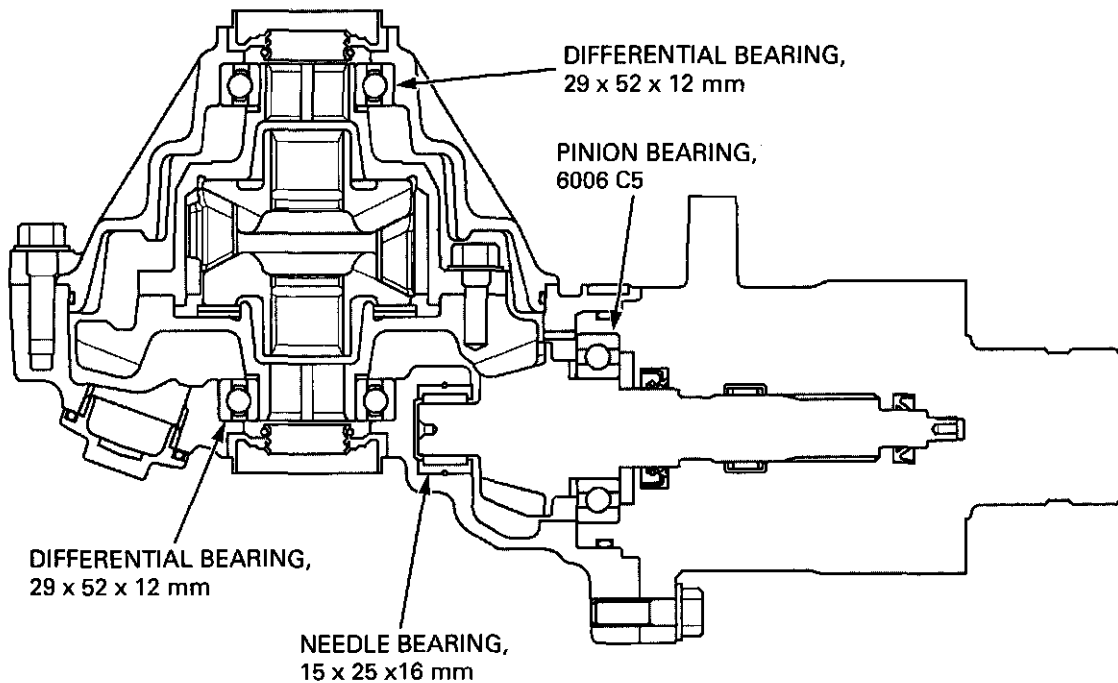
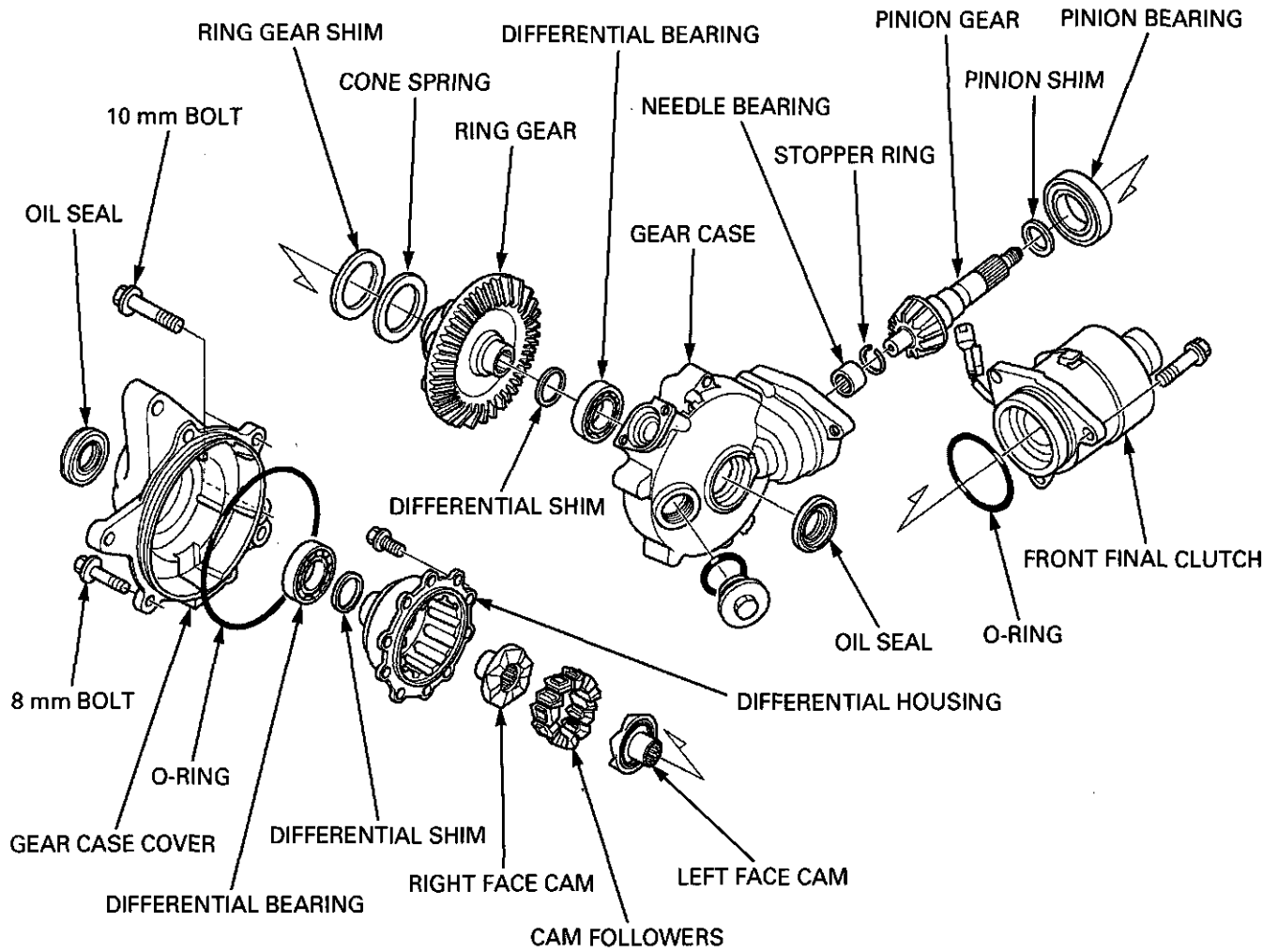
Only strike the driver once. If you strike it more than once, the ring may slip out of the groove. If this happens, remove the ring and bearing, and install a new ring.

Make sure the stopper ring is securely set in the groove of the gear case.





**FRONT FINAL GEAR ASSEMBLY**

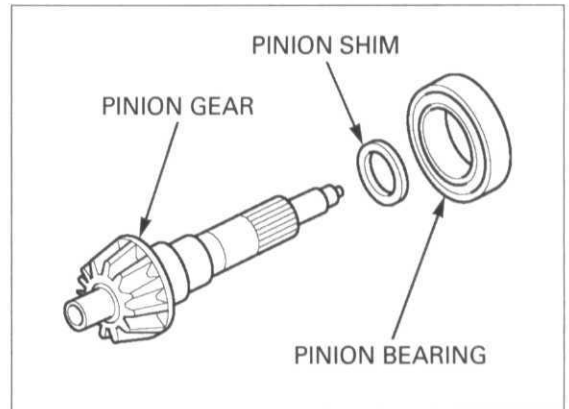


## PINION GEAR INSTALLATION

Install the shim and a new bearing onto the pinion gear.

**NOTE:**

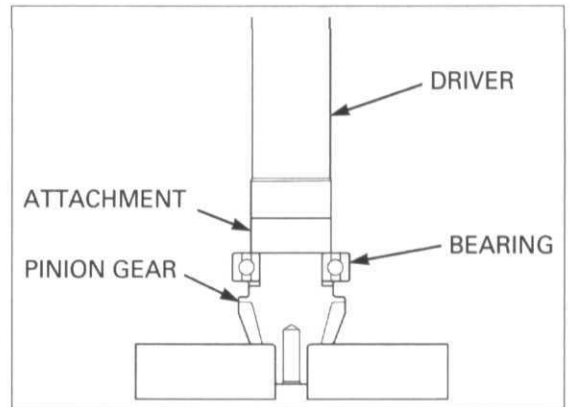
- When the gear set, differential bearing, differential housing and/or final gear case has been replaced, use a 2.00 mm (0.079 in) thick shim for initial reference.



Drive the pinion bearing onto the pinion gear.

**TOOL:**

- Driver, 40 mm I.D.** 07746-0030100
- Attachment, 30 mm I.D.** 07746-0030300

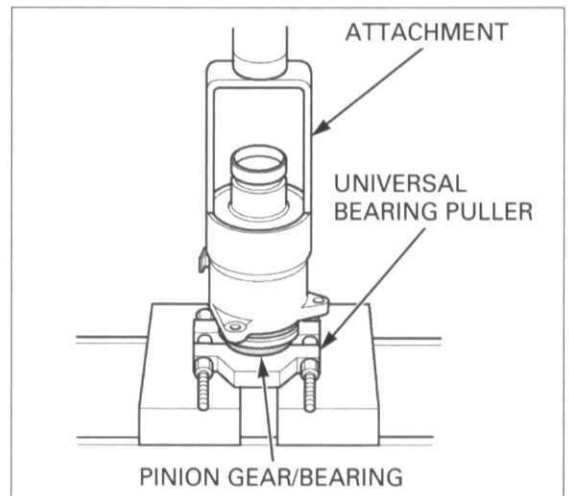


*Be careful not to damage the oil seal lips in the final clutch.*

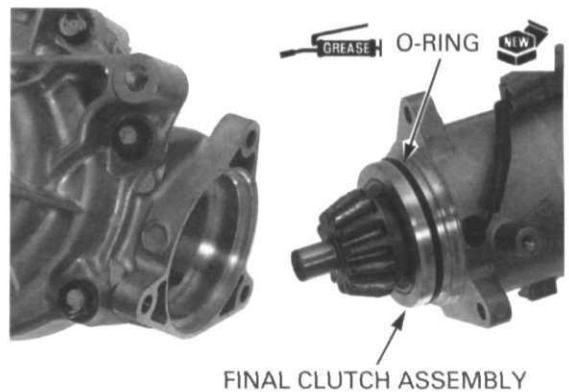
Press the pinion gear/bearing assembly into the front final clutch using the special tools.

**TOOL:**

- Press attachment** 07LME-GE20100
- Universal bearing puller** 07631-0010000

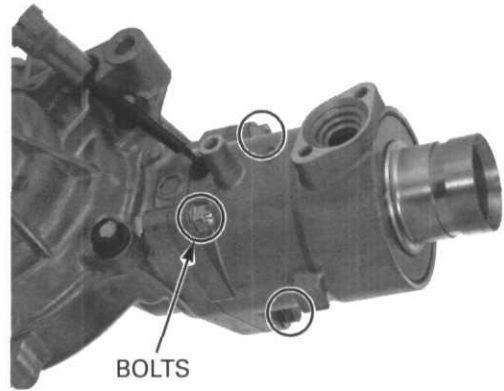


Coat a new O-ring with grease and install it into the groove in the front final clutch assembly.



Install the final clutch assembly onto the final gear.  
Install new bolts and tighten them.

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

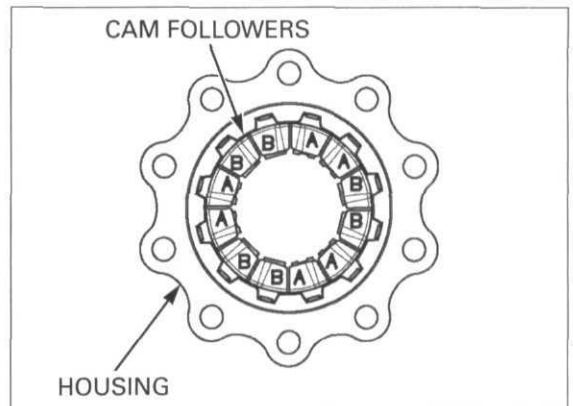


**DIFFERENTIAL ASSEMBLY**

*Keep dust and dirt out of the differential housing.*

Install the face cam into the differential housing.

Install six cam followers A (rib) and six followers B (flat) into the specified grooves in the housing by two and two as shown.



Install the face cam onto the cam followers.

Measure the depth of the ring gear (page 16-20) and the height of the housing-to-cam (page 16-21), and record them.

Calculate the shim thickness using the equation below. The correct shim is nearly this dimension.

$$A = B - C - 1.6 \text{ mm}$$

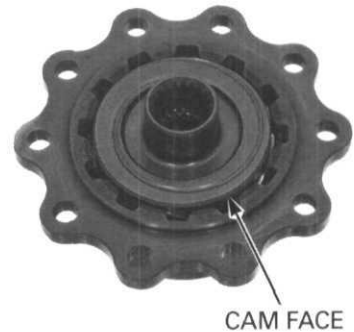
- A: New shim thickness
- B: Recorded ring gear depth
- C: Recorded cam height

Select the shim and install it onto the face cam.

**Differential shims:**

- A: 1.3 mm (0.051 in)
- B: 1.4 mm (0.055 in)
- C: 1.5 mm (0.059 in)
- D: 1.6 mm (0.063 in)
- E: 1.7 mm (0.067 in)
- F: 1.8 mm (0.071 in)
- G: 1.9 mm (0.075 in)

Install the cone spring with the concave side facing up (ring gear side).  
Install the ring gear.



CAM FACE  
SIDE CONE SPRING

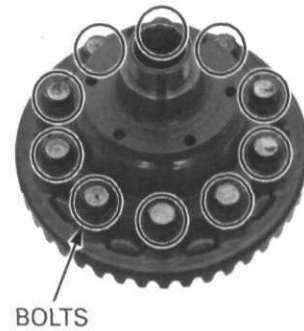


## FRONT DRIVING MECHANISM (FM/FE models)

Install new ring gear bolts and tighten them in a crisscross pattern in several steps.

**TORQUE: 49 N·m (5.0 kgf·m, 36 lbf·ft)**

Inspect the slip torque (page 16-19). If the slip torque is out of specification, perform the shim adjustment. Replace the differential assembly when the replacement shim is changed by 0.3 mm or more from the selected shim.

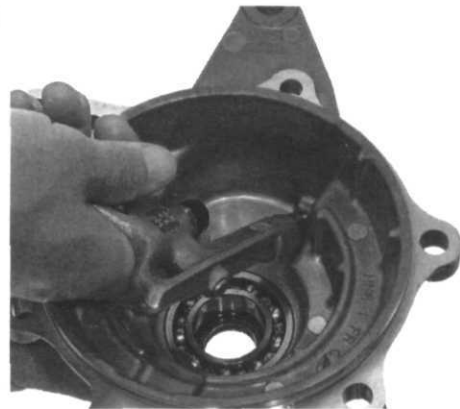


## FRONT FINAL GEAR CASE ASSEMBLY

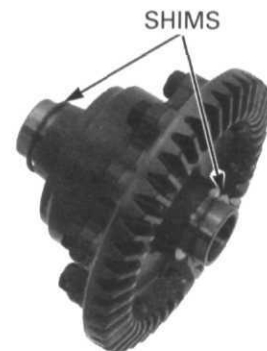
NOTE:

- When the gear set, bearing, differential housing and/or front final gear case has been replaced, check the tooth contact pattern (page 16-17) and gear backlash (page 16-16).

Blow compressed air through the breather hole in the front final case cover.



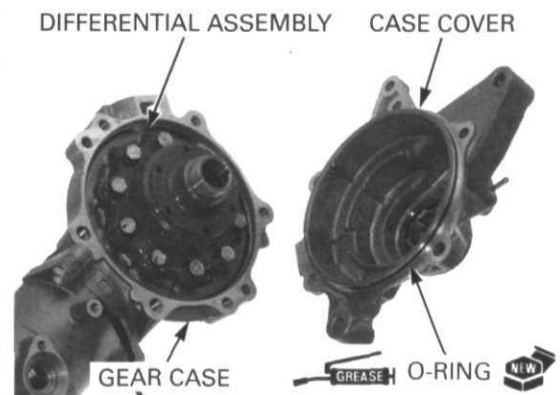
Install the proper ring gear shims onto the differential assembly.



Install the differential assembly into the front final gear case.

Coat a new O-ring with grease and install it into the gear case cover groove.

Install the cover over the gear case.



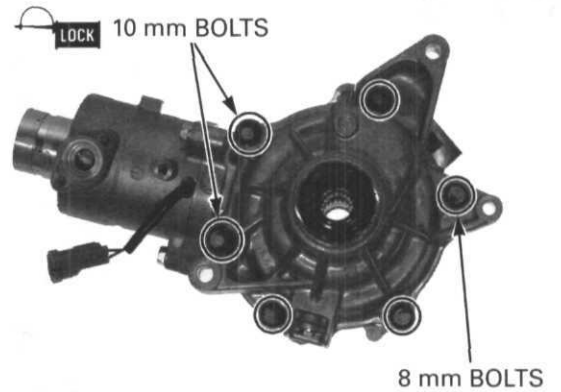
## FRONT DRIVING MECHANISM (FM/FE models)

*It is important to turn the pinion while tightening the bolts. If the ring gear shim is too thick, the gears will lock after only light tightening.*

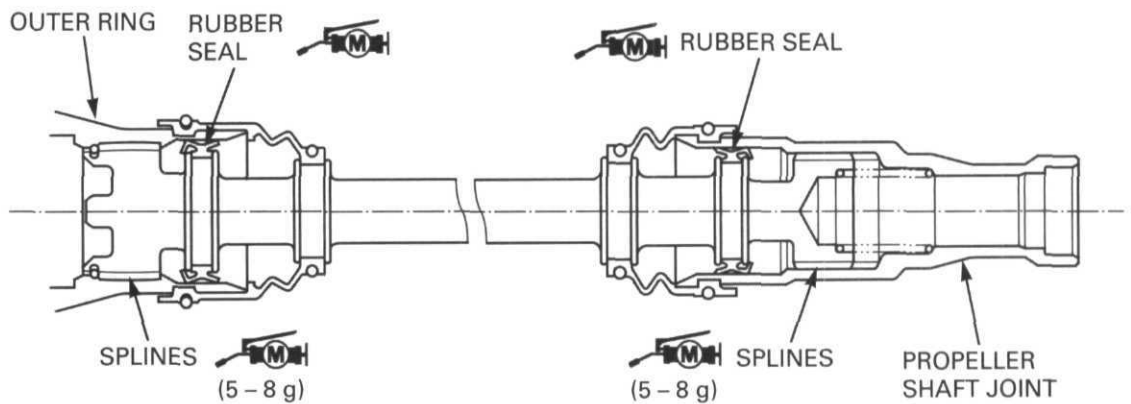
Apply locking agent to the threads of the two 10 mm bolts. Install the two 10 mm bolts and four 8 mm bolts, and tighten them several steps until the cover evenly touches the case. Then, while rotating the pinion gear, tighten the bolts to the specified torque in a crisscross pattern in several steps.

**TORQUE: 10 mm bolt: 49 N·m (5.0 kgf·m, 36 lbf·ft)**  
**8 mm bolt: 25 N·m (2.5 kgf·m, 18 lbf·ft)**

Make sure that the gear assembly rotates smoothly without binding.



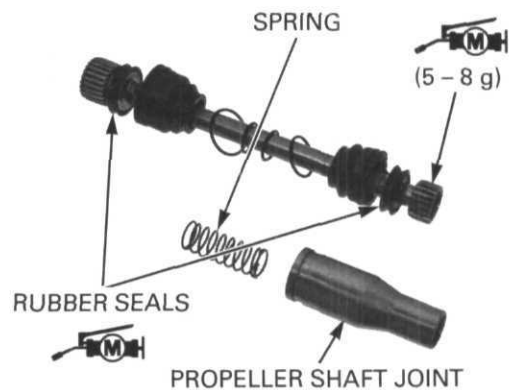
## PROPELLER SHAFT ASSEMBLY/INSTALLATION



Apply molybdenum disulfide grease to the rubber seals.

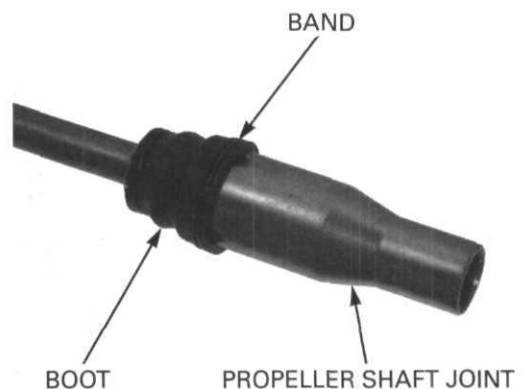
Apply 5-8 g of molybdenum disulfide grease to the propeller shaft joint splines.

Set the spring and propeller shaft joint onto the propeller shaft.



Install the boot over the propeller shaft joint while compressing the spring.

Install the boot band into the boot groove.

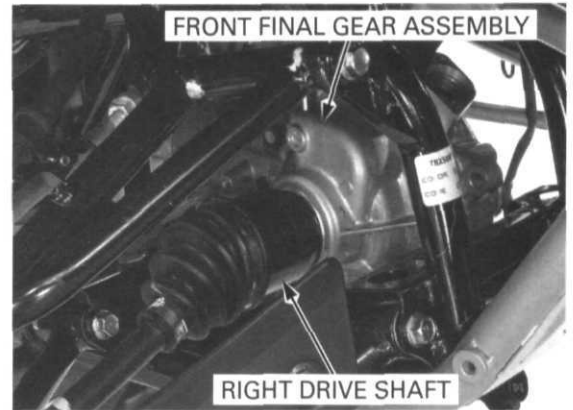


## FRONT DRIVING MECHANISM (FM/FE models)

### FRONT FINAL DRIVE INSTALLATION

Place the differential into the frame.

Install the right drive shaft onto the front final gear in the same manner as on page 16-11.

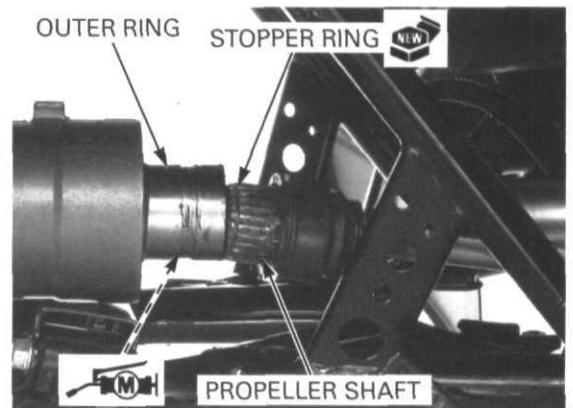


Install a new stopper ring into the groove in the propeller shaft.

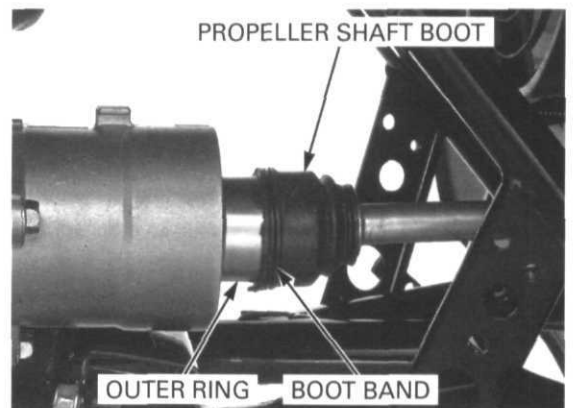
Apply 5 – 8 g of molybdenum disulfide grease to the front final clutch outer ring splines.

Install the propeller shaft assembly into the front final clutch outer ring until the stopper ring seats in the outer ring groove.

Make sure that the stopper ring is seated properly by pulling on the propeller shaft lightly.



Install the propeller shaft boot over the outer ring securely and the boot band into the boot groove.

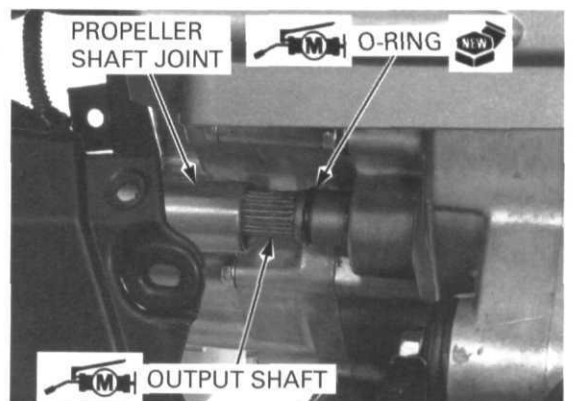


Coat a new O-ring with molybdenum disulfide grease and install it into the groove in the output shaft.

Apply molybdenum disulfide grease to the output shaft splines.

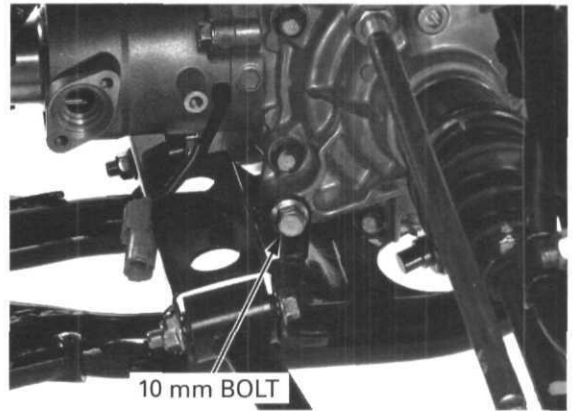
Move the front final gear assembly forward for maximum clearance between the propeller shaft joint and output shaft.

Install the propeller shaft joint over the output shaft.

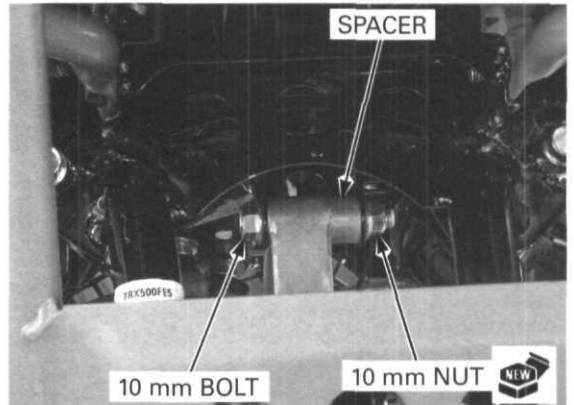


## FRONT DRIVING MECHANISM (FM/FE models)

Align the bolt holes in the differential and frame, and install the 10 mm mounting bolt.



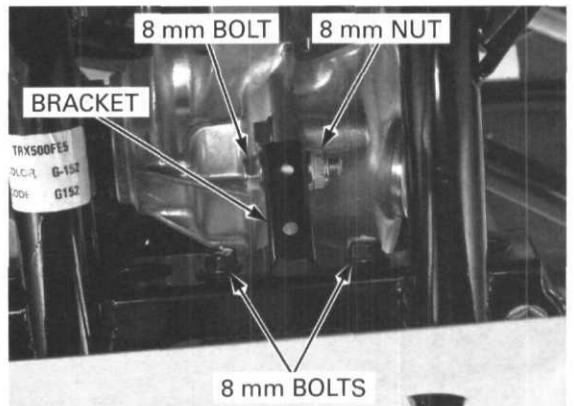
Install the spacer, 10 mm mounting bolt and a new 10 mm mounting nut.



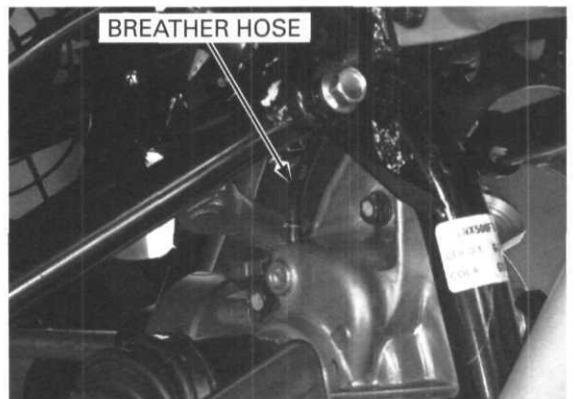
Install the mounting bracket, 8 mm bolts, 8 mm mounting bolt and nut.

Tighten the all mounting fasteners.

**TORQUE: 10 mm: 44 N·m (4.5 kgf·m, 32 lbf·ft)**  
**8 mm: 22 N·m (2.2 kgf·m, 16 lbf·ft)**

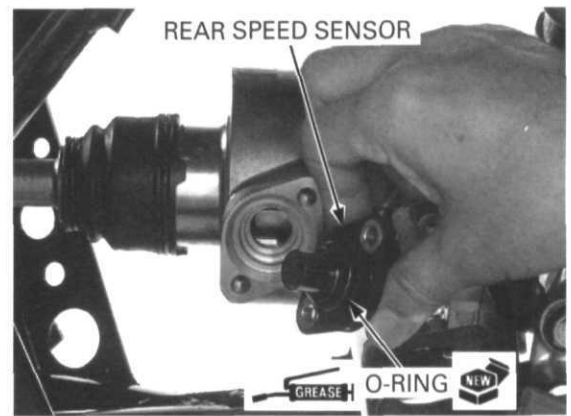


Connect the front final gear breather hose.



## FRONT DRIVING MECHANISM (FM/FE models)

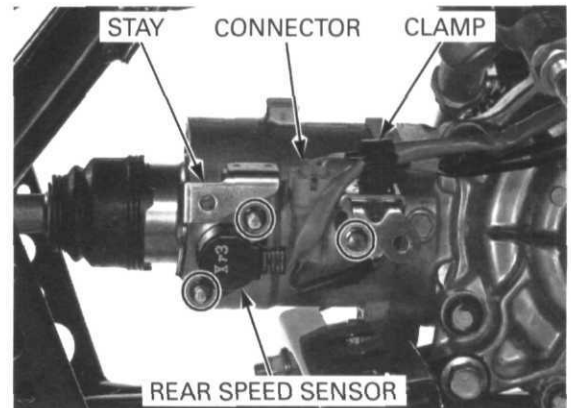
Coat a new O-ring with grease and install it onto the rear speed sensor.



Connect the front final clutch 2P connector and install it onto the clutch cover stay. Install the rear speed sensor, sensor cover stay and three bolts, and tighten the bolts.

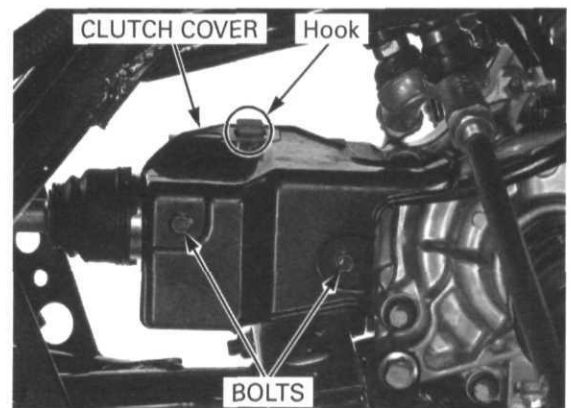
**TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)**

Clamp the rear speed sensor wire and front final clutch wire.

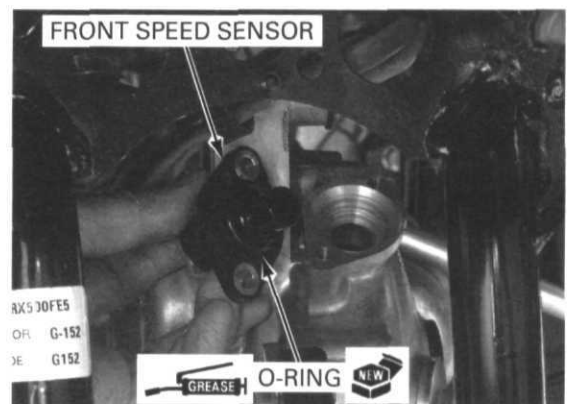


Install the final clutch cover while hooking it to the boss on the case, and install the two bolts and tighten them.

**TORQUE: 7 N·m (0.7 kgf·m, 5.2 lbf·ft)**



Coat a new O-ring with grease and install it onto the front speed sensor.





## FRONT DRIVING MECHANISM (FM/FE models)

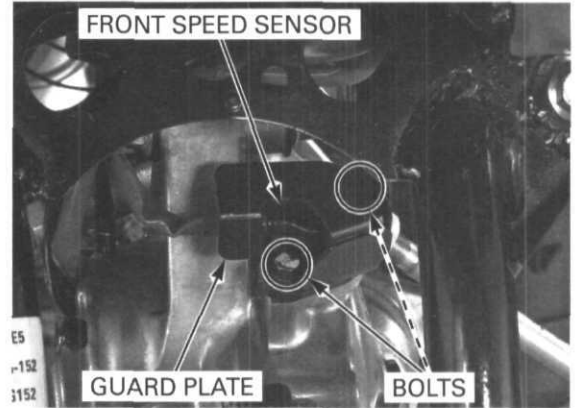
Install the front speed sensor, guard plate and two bolts, and tighten the bolts.

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

Install the following:

- left drive shaft (page 16-11)
- carry pipe guard (page 3-8)
- both inner fenders (page 3-7)
- left side cover (page 3-5)

Fill the differential with the recommended oil (page 4-15).

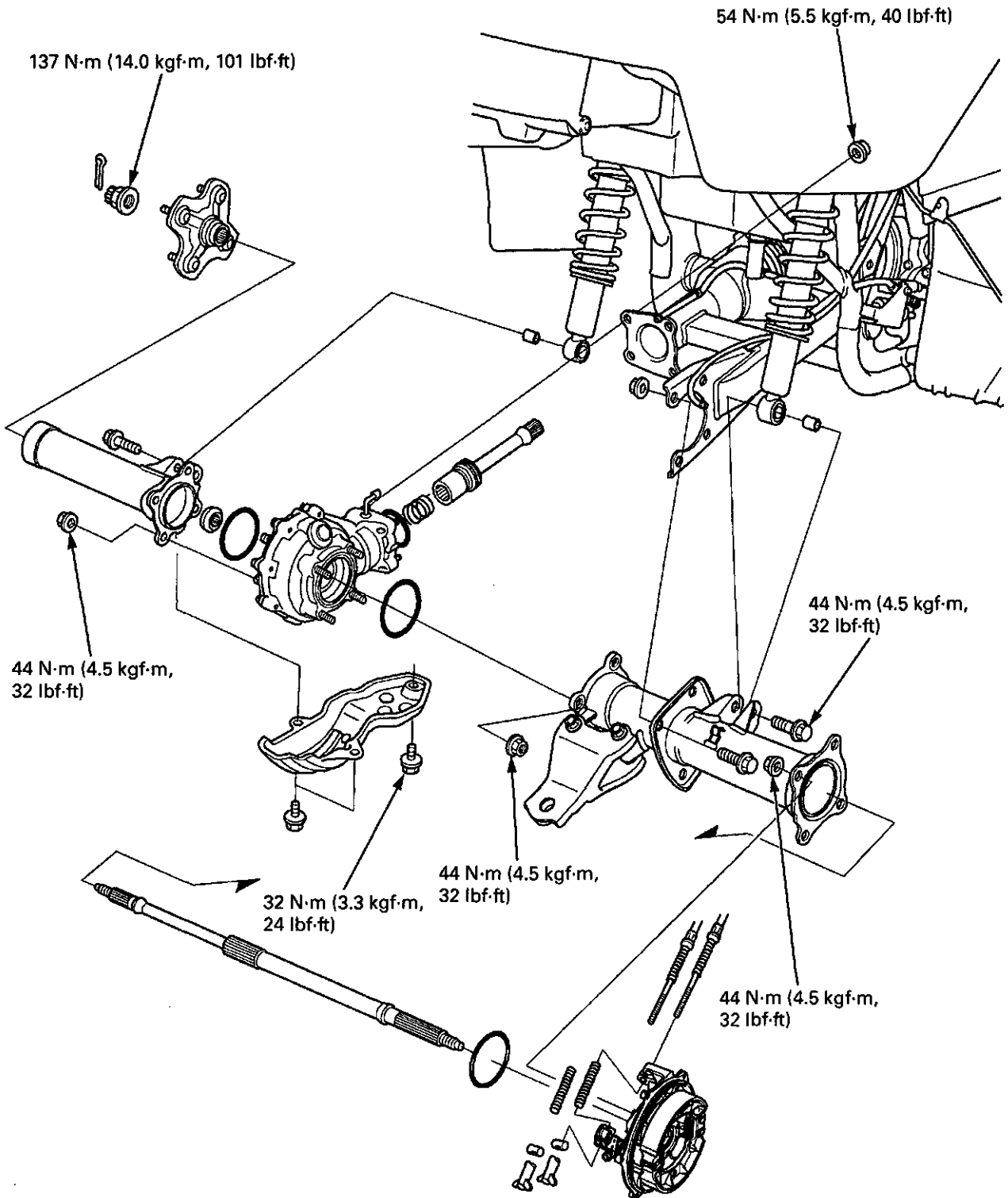


# 17. REAR DRIVING MECHANISM

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<b>SYSTEM COMPONENTS .....</b>	<b>17-2</b>	<b>REAR FINAL GEAR DISASSEMBLY/ INSPECTION .....</b>	<b>17-12</b>
<b>SERVICE INFORMATION .....</b>	<b>17-3</b>	<b>REAR FINAL GEAR CASE BEARING REPLACEMENT .....</b>	<b>17-17</b>
<b>TROUBLESHOOTING .....</b>	<b>17-6</b>	<b>REAR FINAL GEAR ASSEMBLY .....</b>	<b>17-20</b>
<b>REAR AXLE REMOVAL .....</b>	<b>17-7</b>	<b>REAR FINAL DRIVE INSTALLATION.....</b>	<b>17-23</b>
<b>REAR FINAL DRIVE REMOVAL .....</b>	<b>17-10</b>	<b>REAR AXLE INSTALLATION.....</b>	<b>17-25</b>

# REAR DRIVING MECHANISM SYSTEM COMPONENTS



## SERVICE INFORMATION

### GENERAL

- Perform the gear contact pattern and backlash inspection whenever you replace the bearings, gears or gear case. The extension lines from the gear engagement surfaces should intersect at one point.
- Protect the gear case with a shop towel or soft jaws while holding it in vise. Do not clamp it too tight as it could damage the gear case.
- When using the lock nut wrench, use a deflecting beam type torque wrench 20 inches long. The lock nut wrench increases the torque wrench's leverage, so the torque wrench reading will be less than the torque actually applied to the lock nut. The specification given is the actual torque applied to the lock nut, not the reading on the torque wrench. Do not overtighten the lock nut. The specification later in the text gives both actual and indicated.
- Replace the ring and pinion gears as a set.

### SPECIFICATIONS

Unit: mm (in)

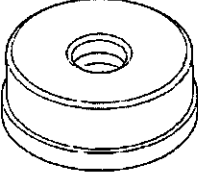
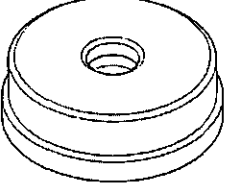
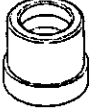
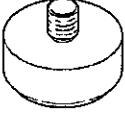
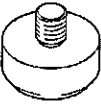

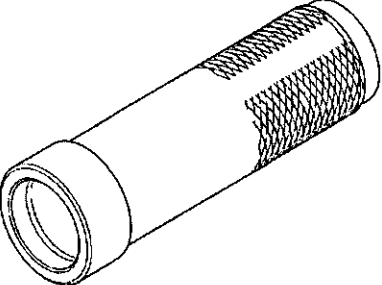
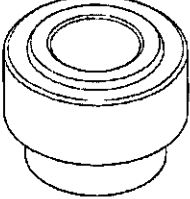
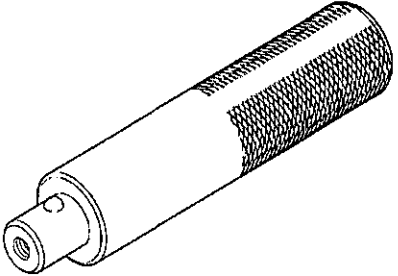
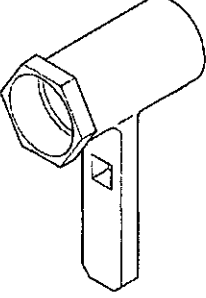
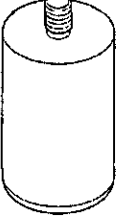
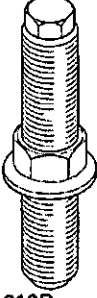
ITEM		STANDARD	SERVICE LIMIT
Axle runout		-	3.0 (0.12)
Rear final drive	Oil capacity	After draining	75 cm <sup>3</sup> (2.5 US oz, 2.6 Imp oz)
		After disassembly	100 cm <sup>3</sup> (3.4 US oz, 3.5 Imp oz)
	Recommended oil		Hypoid gear oil SAE # 80
	Gear backlash		0.05 - 0.25 (0.002 - 0.010)
	Backlash difference		-
	Ring gear-to-stop pin clearance		0.3 - 0.6 (0.01 - 0.02)

### TORQUE VALUES

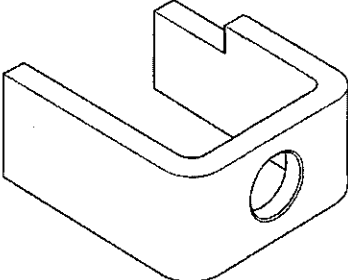
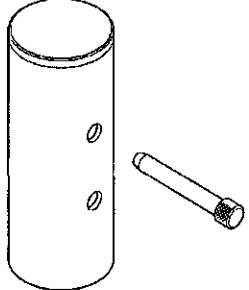
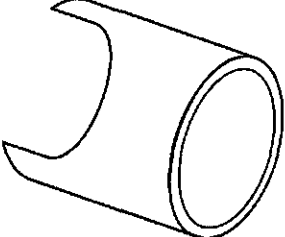
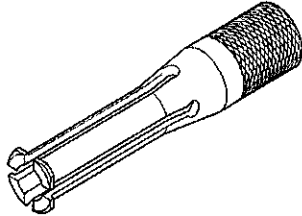
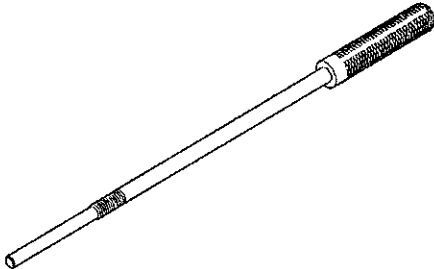
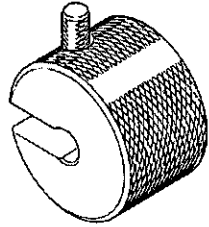
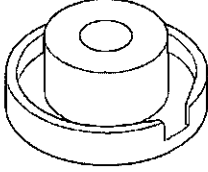
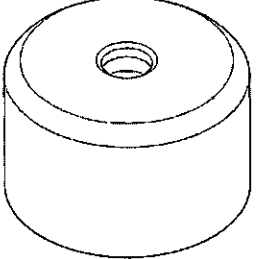
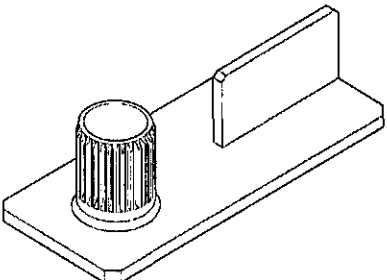
Rear final gear pinion bearing lock nut	98 N·m (10.0 kgf·m, 72 lbf·ft)	Lock nut: replace with a new one. Stake.
Rear final gear case cover bolt (10 mm)	49 N·m (5.0 kgf·m, 36 lbf·ft)	Apply locking agent to the threads.
Rear final gear case cover bolt (8 mm)	25 N·m (2.5 kgf·m, 18 lbf·ft)	
Rear final gear case mounting nut	54 N·m (5.5 kgf·m, 40 lbf·ft)	Lock nut: replace with a new one
Axle housing nut	44 N·m (4.5 kgf·m, 32 lbf·ft)	Lock nut: replace with a new one
Skid plate bolt	32 N·m (3.3 kgf·m, 24 lbf·ft)	
Rear brake panel nut	44 N·m (4.5 kgf·m, 32 lbf·ft)	Lock nut: replace with a new one
Rear wheel hub nut	137 N·m (14.0 kgf·m, 101 lbf·ft)	Castle nut: tighten to the specified torque and further tighten until its grooves align with the cotter pin hole.

# REAR DRIVING MECHANISM

## TOOLS

<p>Attachment, 52 x 55 mm 07746-0010400</p> 	<p>Attachment, 62 x 68 mm 07746-0010500</p> 	<p>Attachment, 22 x 24 mm 07746-0010800</p> 
<p>Pilot, 35 mm 07746-0040800</p> 	<p>Pilot, 28 mm 07746-0041100</p> 	<p>Pilot, 14 mm 07746-0041200</p> 
<p>Driver, 40 mm I.D. 07746-0030100</p> 	<p>Attachment, 30 mm I.D. 07746-0030300</p> 	<p>Driver 07749-0010000</p> 
<p>Lock nut wrench, 30 x 64 mm 07916-MB00002</p> 	<p>Pilot, 32 x 35 mm 07MAD-PR90200</p> 	<p>Puller shaft 07931-ME40000</p>  <p>or 07931-ME4010B and 07931-HB3020A (U.S.A. only)</p>

# REAR DRIVING MECHANISM

<p><b>Pinion puller base</b> 07HMC-MM80110</p>  <p>or 07HMC-MM8011A (U.S.A. only)</p>	<p><b>Oil seal driver</b> 07965-KE80200</p>  <p>or 07947-KA50100</p>	<p><b>Differential bearing clip compressor</b> 07YME-HN4010A</p> 
<p><b>Bearing remover, 14 mm</b> 07WMC-KFG0100</p> 	<p><b>Remover shaft, 15 mm</b> 07936-KC10100</p> 	<p><b>Remover weight</b> 07741-0010201</p>  <p>or 07936-371020A or 07936-3710200 (U.S.A. only)</p>
<p><b>Oil seal driver attachment</b> 07JAD-PH80101</p> 	<p><b>Driver attachment</b> 07LAD-PW50500</p> 	<p><b>Pinion holder</b> 07SMB-HM70200</p> 

### TROUBLESHOOTING

#### Excessive noise

- Worn or scored ring gear shaft and axle
- Worn or scored pinion and splines
- Worn pinion and ring gears
- Excessive backlash between pinion and ring gears
- Oil level too low

#### Wobble or vibration in vehicle

- Axle not tightened properly
- Bent axle

#### Oil leak

- Oil level too high
- Clogged breather
- Damaged seals
- Loose case cover bolt

## REAR AXLE REMOVAL

Remove the following:

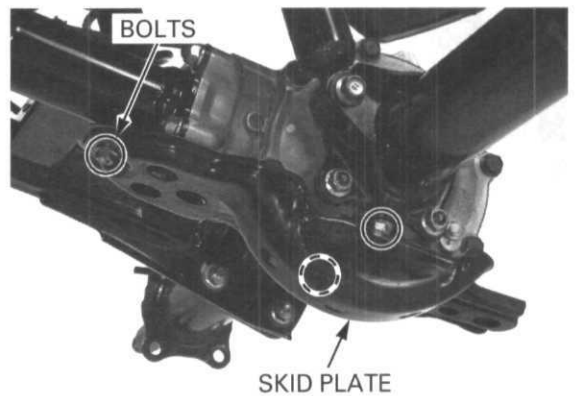
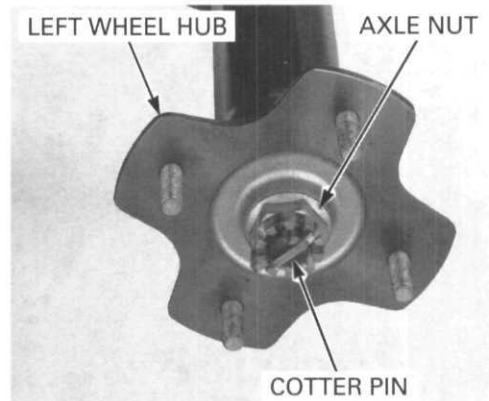
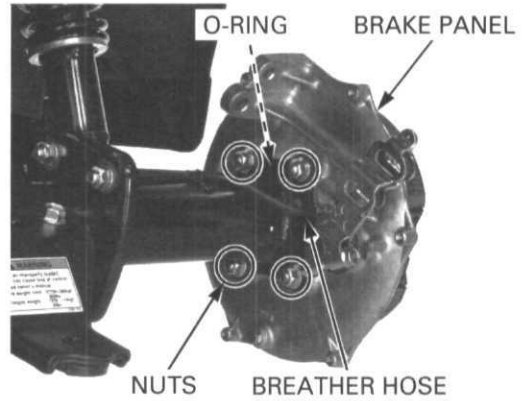
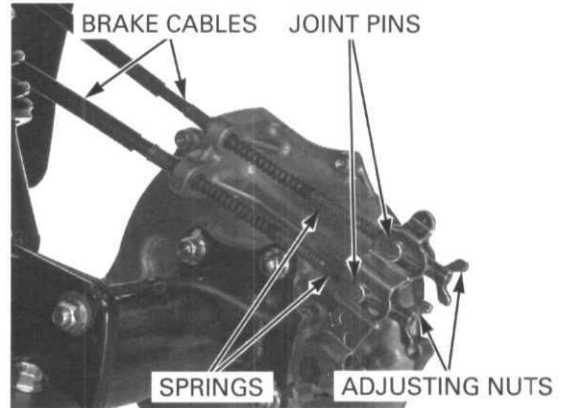
- rear wheels (page 14-6)
- rear brake drum (page 15-15)
- adjusting nuts
- joint pins
- springs
- brake cables

*Do not get grease onto the brake shoe linings.*

- breather hose
- four nuts
- brake panel assembly
- O-ring

- cotter pin
- hub nut
- left wheel hub

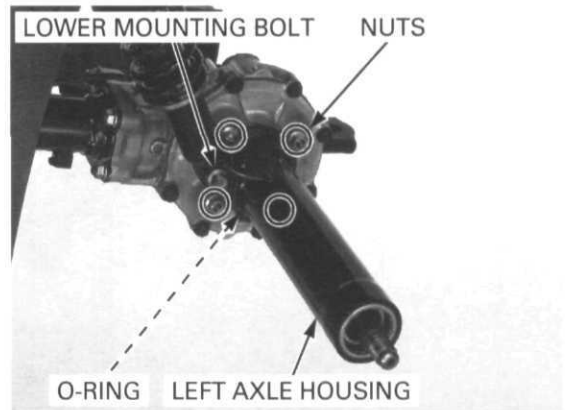
- three bolts
- skid plate



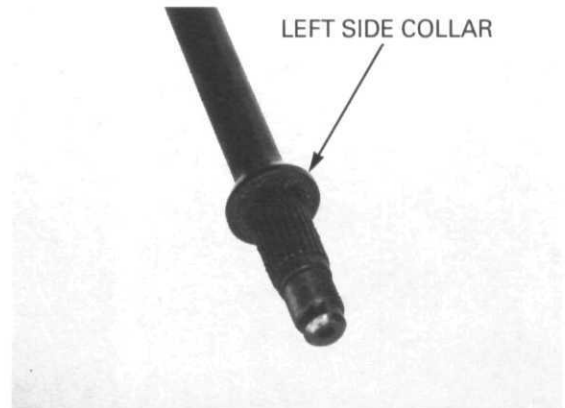


## REAR DRIVING MECHANISM

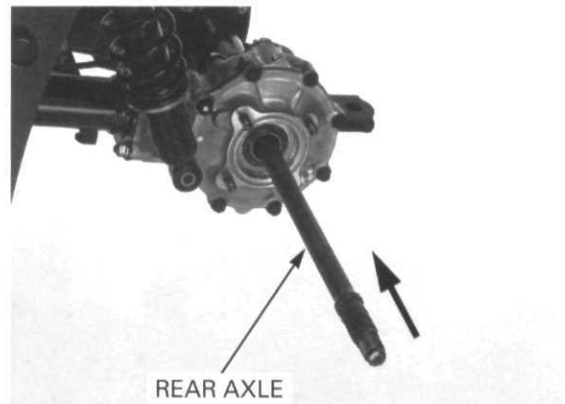
- left shock absorber lower mounting bolt
- four left axle housing nuts (discard them)
- left axle housing
- O-ring



- left side collar



Remove the rear axle by driving the axle from the left side using a rubber mallet.

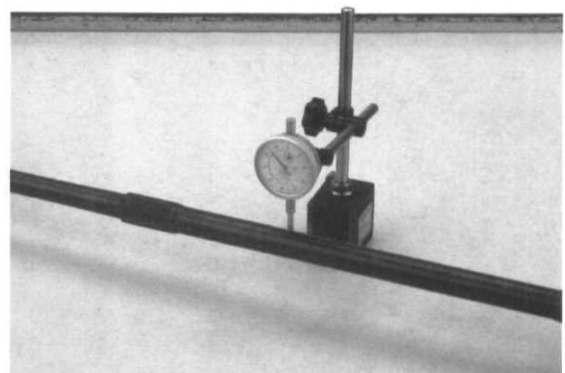


## INSPECTION

### REAR AXLE

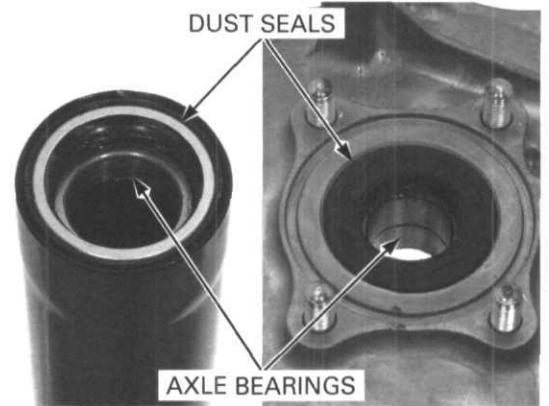
Set the axle in V-blocks and measure the axle runout with a dial indicator.  
Axle runout is 1/2 the total indicator reading.

**SERVICE LIMIT: 3.0 mm (0.12 in)**



## AXLE BEARING

Remove the dust seals from the axle housing and brake panel.  
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 housing or panel.



## BEARING REPLACEMENT

### AXLE HOUSING

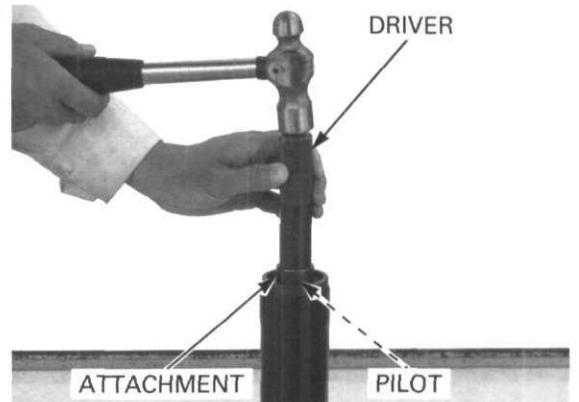
Remove the dust seal and drive the axle bearing out of the axle housing.



Drive the bearing into the axle housing with the sealed side facing down until it is 11.0 – 11.5 mm (0.43 – 0.45 in) below the housing edge.

### TOOLS:

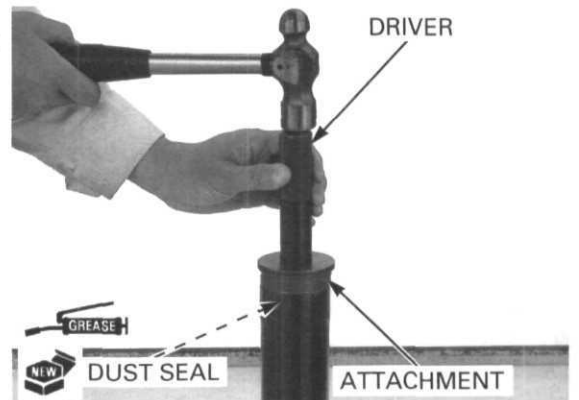
<b>Driver</b>	<b>07749-0010000</b>
<b>Attachment, 52 x 55 mm</b>	<b>07746-0010400</b>
<b>Pilot, 32 mm</b>	<b>07MAD-PR90200</b>



Apply grease to a new dust seal lips. Install the dust seal with the metal plate side facing up until it is flush with the housing end.

### TOOLS:

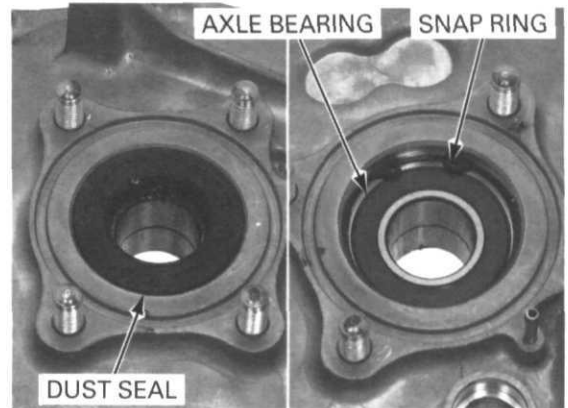
<b>Driver</b>	<b>07749-0010000</b>
<b>Attachment, 62 x 68 mm</b>	<b>07746-0010500</b>



## REAR DRIVING MECHANISM

### BRAKE PANEL

Remove the snap ring.  
Drive the axle bearings out of the brake panel.

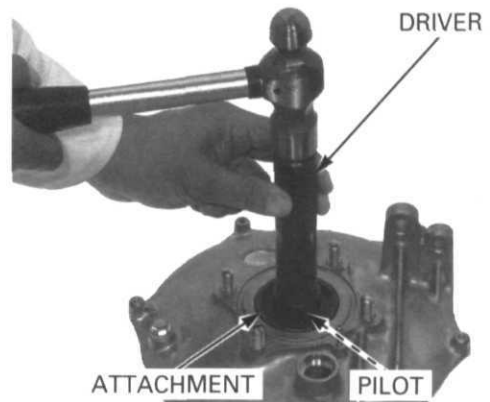


*Support the bearing housing section of the brake panel when installing.*

Drive the outer bearing (brake drum side) squarely with the sealed side facing down until it is fully seated, then the inner bearing with the sealed side facing up.

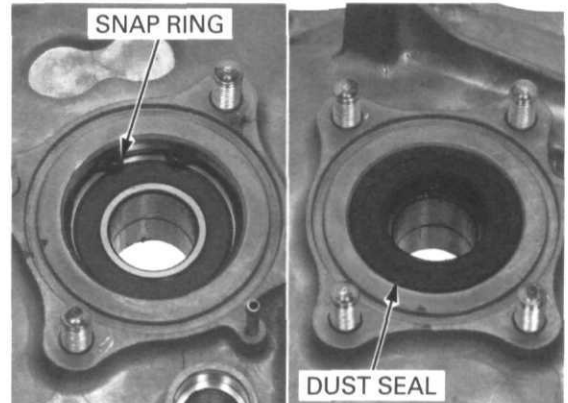
#### TOOLS:

<b>Driver</b>	<b>07749-0010000</b>
<b>Oil seal driver attachment</b>	<b>07JAD-PH80100</b>
<b>Pilot, 28 mm</b>	<b>07746-0041100</b>



Install the snap ring with the chamfered side facing to the bearing securely.

Apply grease to a new dust seal lips.  
Install the dust seal with the flat side facing up until it is flush with the brake panel.



## REAR FINAL DRIVE REMOVAL

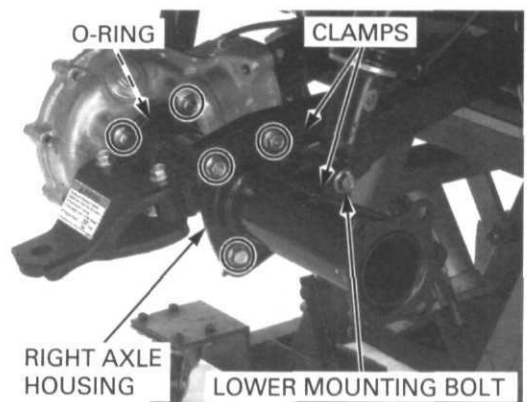
Drain the final gear case oil (page 4-14).  
Remove the rear axle (page 17-7).

Remove the brake panel breather hose from the clamps.

Support the swingarm and remove the right shock absorber lower mounting bolt.

Remove the eight nuts, four bolts and right axle housing.

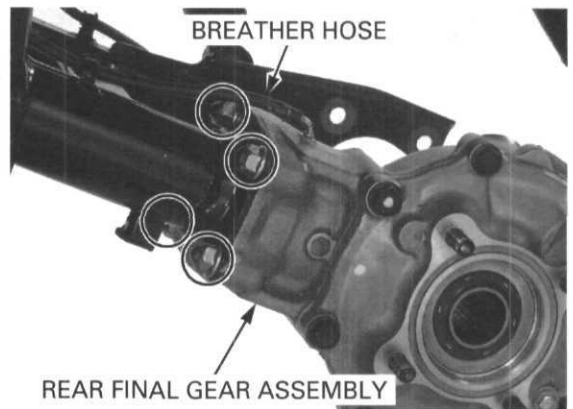
Remove the O-ring from the rear final gear case.



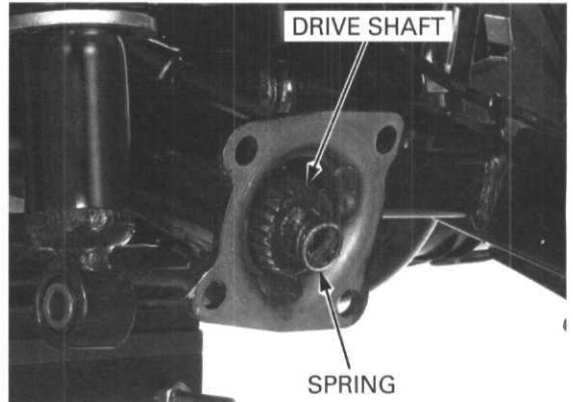
Disconnect the breather hose from the rear final gear case.

Remove the four nuts and rear final gear assembly from the swingarm.

Remove the O-ring from the rear final gear case.



Remove the spring and rear drive shaft from the swingarm.



### INSPECTION

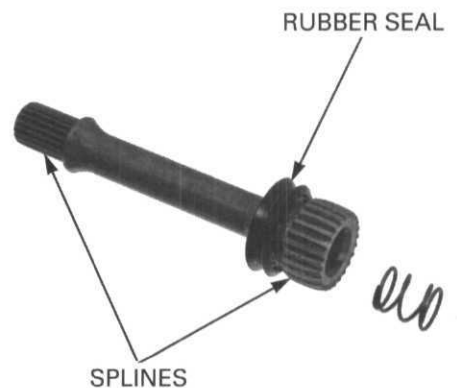
#### REAR DRIVE SHAFT

Check the rubber seal for wear, deterioration or damage.

Check the splines of the drive shaft for wear or damage.

If the splines are damaged, check the pinion and universal joint splines also.

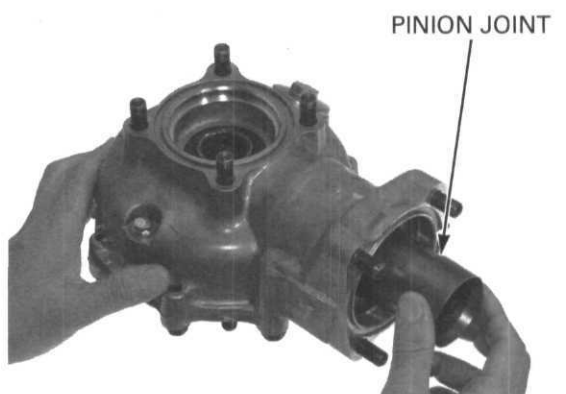
Refer to page 14-8 "Swingarm" for universal joint removal/installation.



#### REAR FINAL GEAR

Turn the pinion joint and check the pinion and ring gears turn smoothly and quietly without binding.

If the gears do not turn smoothly or quietly, the gears and/or bearing may be damaged or faulty. They must be checked after disassembly; replace them if necessary.



# REAR FINAL GEAR DISASSEMBLY/ INSPECTION

### BACKLASH INSPECTION

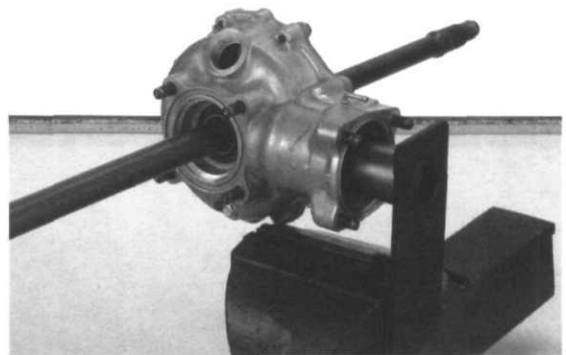
Remove the oil filler cap.

Install the special tool into the pinion joint, and set the rear final gear assembly and tool in a vise as shown.

#### TOOL:

**Pinion holder** **07SMB-HM70200**

Install the rear axle into the rear final gear assembly.



Set a horizontal type dial indicator on the ring gear through the oil filler hole. Turn the ring gear back and forth with the axle to read backlash.

**STANDARD: 0.05 – 0.25 mm (0.002 – 0.010 in)**

**SERVICE LIMIT: 0.4 mm (0.02 in)**

Remove the dial indicator. Turn the ring gear 120° and measure backlash. Repeat this procedure once more.

Compare the difference of the three measurements.

**SERVICE LIMIT: 0.2 mm (0.01 in)**

If the difference in measurements exceeds the service limit, it indicates that the bearing is not installed squarely, or the case is deformed. Inspect the bearings and case.

If the backlash is excessive, replace the ring gear right side shim with a thinner one.

If the backlash is too small, replace the ring gear right side shim with a thicker one.

Backlash changed by about 0.06 mm (0.002 in) when thickness of the shim is changed by 0.12 mm (0.005 in).

#### Ring gear shims:

**A: 1.82 mm (0.072 in)**      **F: 2.12 mm (0.083 in)**

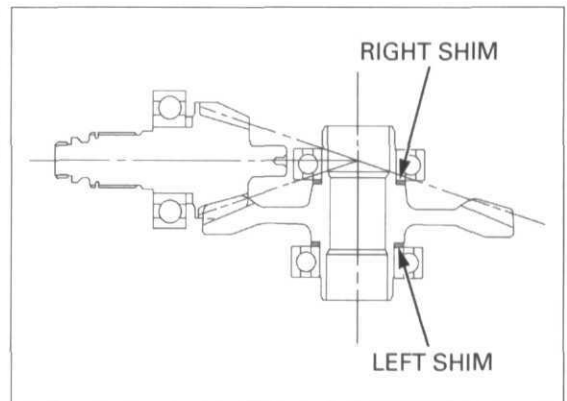
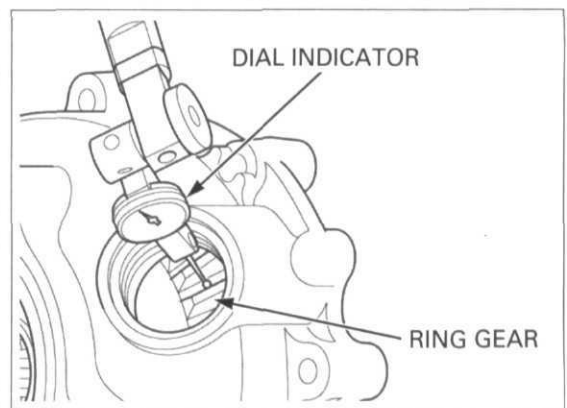
**B: 1.88 mm (0.074 in)**      **G: 2.18 mm (0.086 in)**

**C: 1.94 mm (0.076 in)**      **H: 2.24 mm (0.088 in)**

**D: 2.00 mm (0.079 in)**      **I: 2.30 mm (0.091 in)**

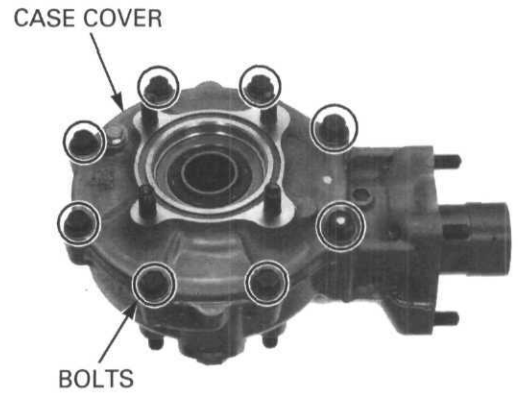
**E: 2.06 mm (0.081 in)**

Change the left side shim as follows: If the right shim was replaced with a 0.12 mm (0.005 in) **thicker** shim, replace the left shim with one that is 0.12 mm (0.005 in) **thinner**.



**REAR FINAL GEAR CASE  
DISASSEMBLY**

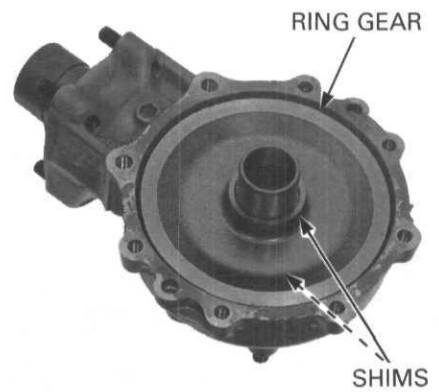
Loosen the eight cover bolts in a crisscross pattern in several steps and remove them.



Pry the case cover at the prying points using a screwdriver and remove it.



Remove the ring gear and shims.



**BEARING INSPECTION**

Turn the inner race of each bearing in the gear case and case cover with your finger. The bearings should turn smoothly and quietly. Also check that the bearing outer race fits tightly in the case or cover.

For ring gear bearing replacement, see page 17-17.



## REAR DRIVING MECHANISM

### GEAR TOOTH CONTACT PATTERN CHECK

*Keep dust and dirt out of the case and cover.*

Clean sealing material off the mating surfaces of the gear case and cover, being careful not to damage them.

Apply thin coat of Prussian Blue to the pinion gear teeth for a tooth contact pattern check.

Install the ring gear right shim onto the ring gear.

Install the ring gear with the shim into the gear case. Install the ring gear left shim onto the ring gear.

*It is important to turn the pinion gear while tightening the bolts. If the ring gear shim is too thick, the gears will lock after only light tightening.*

Install the case cover and tighten the bolts in several steps until the cover evenly touches the gear case. Then, while rotating the pinion gear, tighten the bolts to the specified torque in a crisscross pattern in several steps.

**TORQUE:** 10 mm bolt: 49 N·m (5.0 kgf·m, 36 lbf·ft)  
8 mm bolt: 25 N·m (2.5 kgf·m, 18 lbf·ft)

Remove the oil filler cap.

Rotate the ring gear several times in both directions of rotation.

Check the gear tooth contact pattern through the oil filler hole.

The pattern is indicated by the Prussian Blue applied to the pinion gear.

Contact is normal if the Prussian Blue is transferred to the approximate center of each tooth, but slightly to the heel side and to the flank side.

If the patterns are not correct, remove and change the pinion gear shim with one of an alternate thickness.

Apply Prussian Blue

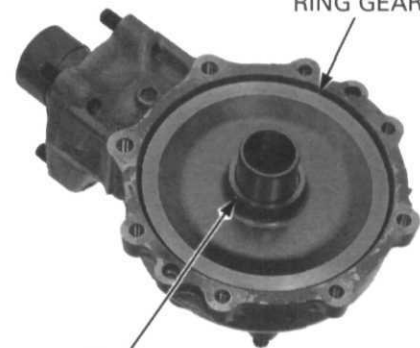


RING GEAR

RIGHT SHIM



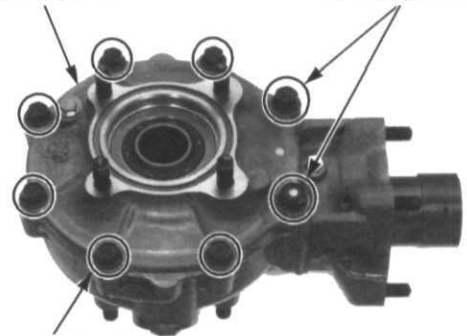
RING GEAR



LEFT SHIM

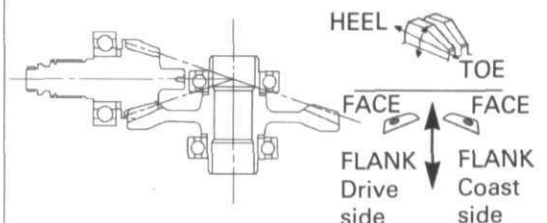
CASE COVER

10 mm BOLTS

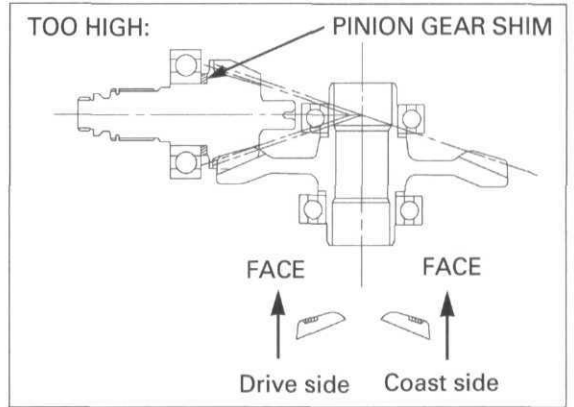


8 mm BOLTS

NORMAL:



Replace the pinion gear shim with a thicker one if the contact pattern is too high, toward the face.



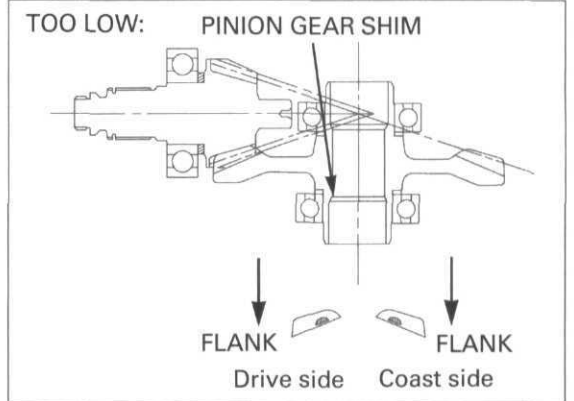
Replace the pinion gear shim with a thinner one if the contact pattern is too low, toward the flank.

The pattern will shift about 0.5 – 1.0 mm (0.02 – 0.04 in) when the thickness of the shim is changed by 0.12 mm (0.005 in).

**Pinion gear shims:**

- |                              |                              |
|------------------------------|------------------------------|
| <b>A: 1.64 mm (0.065 in)</b> | <b>F: 1.94 mm (0.076 in)</b> |
| <b>B: 1.70 mm (0.067 in)</b> | <b>G: 2.00 mm (0.079 in)</b> |
| <b>C: 1.76 mm (0.069 in)</b> | <b>H: 2.06 mm (0.081 in)</b> |
| <b>D: 1.82 mm (0.072 in)</b> | <b>I: 2.12 mm (0.083 in)</b> |
| <b>E: 1.88 mm (0.074 in)</b> | <b>J: 2.18 mm (0.086 in)</b> |

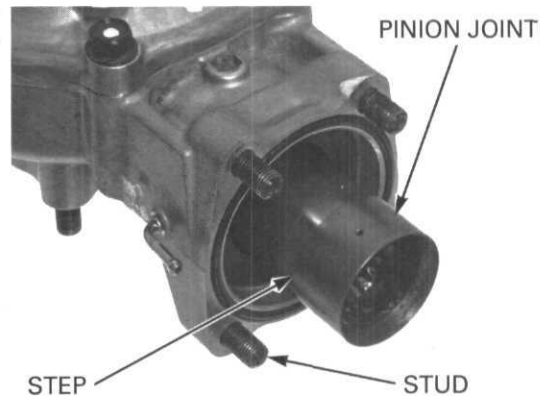
For pinion shim replacement, see page 17-16.



## PINION GEAR REMOVAL

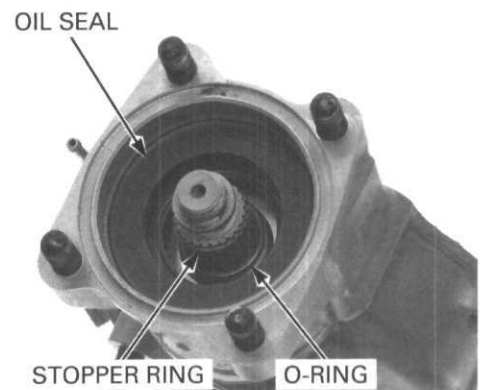
*Use a screwdriver to pry the pinion joint up by levering against one of the studs and the step in the joint. Rotate the joint in small steps as you pry the joint up.*

Remove the pinion joint from the pinion gear by pulling it to force the stopper ring at the pinion gear shaft end past the groove in the pinion joint.



Remove the oil seal from the gear case.

Remove the stopper ring and O-ring from the pinion gear shaft.





## REAR DRIVING MECHANISM

*Be careful that metal particles do not enter the bearing and the threads of the case are not damaged.*

Unstake the pinion bearing lock nut with a drill or grinder.

Remove the lock nut using the special tool.

**TOOL:**

Lock nut wrench, 30 x 64 mm 07916-MB00002

Install the special tools onto the pinion gear shaft and gear case.

**TOOLS:**

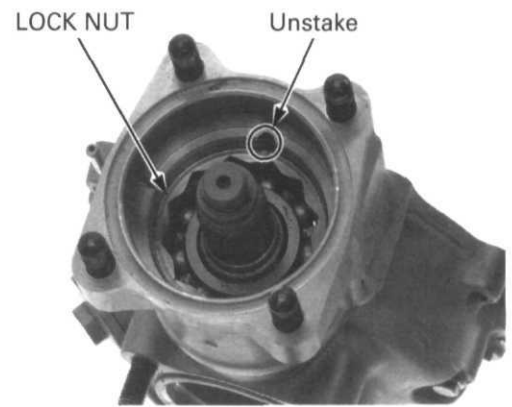
Puller shaft	07931-ME40000
Pinion puller base	07HMC-MM80110
or	
U.S.A. only:	
Puller shaft	07931-ME4010B
Special nut	07931-HB3020A
Pinion puller base	07HMC-MM8011A

Pull the pinion assembly out from the gear case.

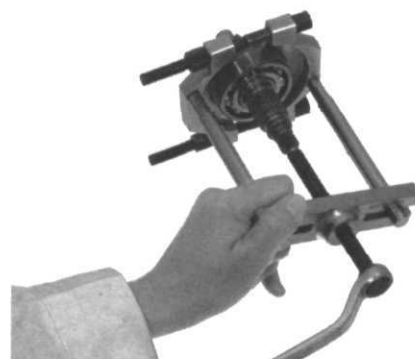
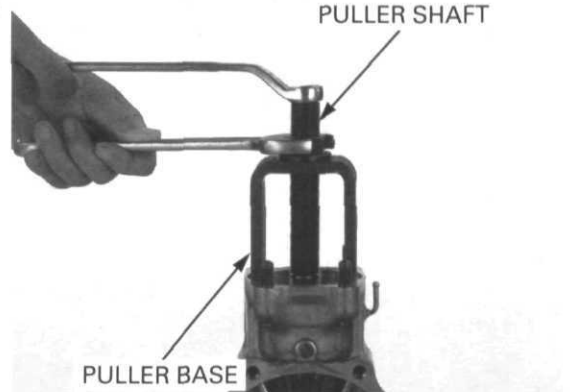
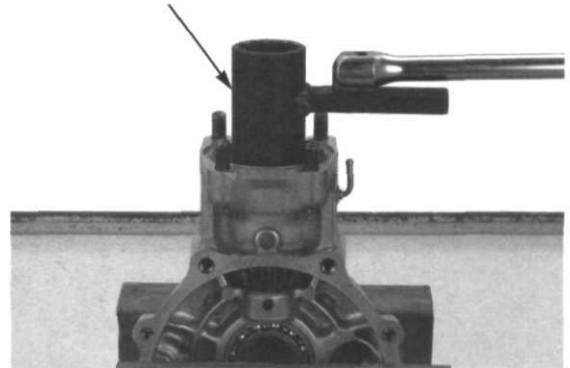
### PINION GEAR BEARING AND SHIM REPLACEMENT

Pull the pinion gear bearing from the shaft with a commercially available bearing puller.

Remove the pinion gear shim.



LOCK NUT WRENCH



## REAR DRIVING MECHANISM

Install the shim and bearing onto the pinion gear.

**NOTE:**

- When the gear set, ring gear bearing, and/or gear case has been replaced, use a 2.00 mm (0.79 in) thick shim for initial reference.



Drive the bearing with the marked side facing up.

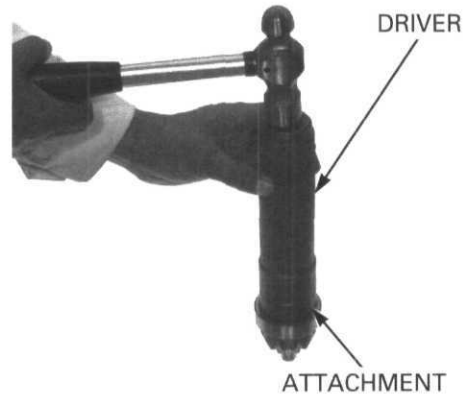
**TOOLS:**

**Driver, 40 mm I.D.**

**07746-0030100**

**Attachment, 30 mm I.D.**

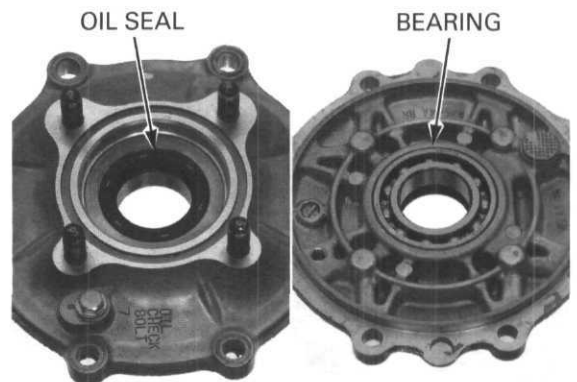
**07746-0030300**



## REAR FINAL GEAR CASE BEARING REPLACEMENT

### RING GEAR BEARING

Remove the oil seals from the gear case and cover.  
Drive the bearings out of the gear case and cover.



Drive new bearings into the gear case and cover.

**TOOLS:**

**Driver**

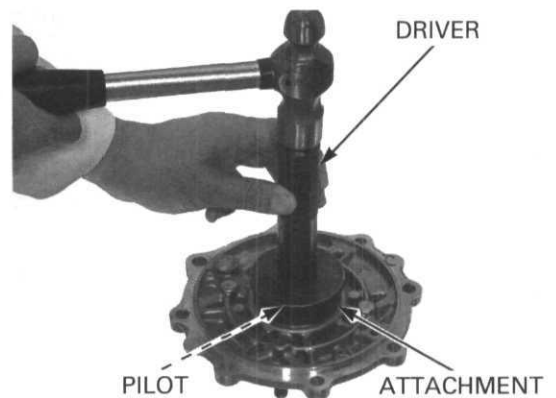
**07749-0010000**

**Attachment, 62 x 68 mm**

**07746-0010500**

**Pilot, 35 mm**

**07746-0040800**



## REAR DRIVING MECHANISM

Apply grease to new oil seal lips.  
Install each oil seal with the flat side facing out until it is flush with the case or cover.

**TOOLS:**

**Driver:** 07749-0010000

**Attachment, 52 x 55 mm** 07746-0010400



### PINION NEEDLE BEARING

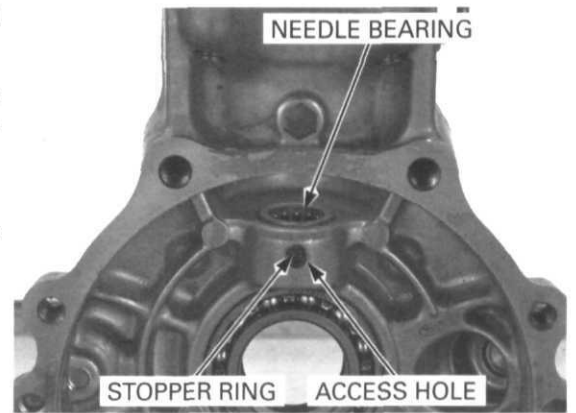
Remove the stopper ring by rotating it until its end appears in the access hole.  
Bend up the end of the ring with a screwdriver.  
Grasp the end of the ring with needle-nose pliers and pull the stopper ring out through the access hole.

Remove the oil filler cap.

Heat the gear case to 80°C (176°F) and remove the needle bearing by using the special tools.

**TOOLS:**

**Remover shaft, 15 mm** 07936-KC10100  
**Bearing remover, 15 mm** 07936-KC10200  
**Remover weight** 07741-0010201 or 07936-371020A or 07936-3710200 (U.S.A. only)



Remove the bearing cage and bearings from the inside of the pinion bearing to allow the special tool to grip the bearing.

Install a new stopper ring into the groove in a new bearing.

*Make sure the stopper ring stays in the groove.*

Install a new bearing into the compressor until the bearing is flush with the end of the tool.

**TOOLS:**

**Bearing clip compressor** 070ME-HN8A100

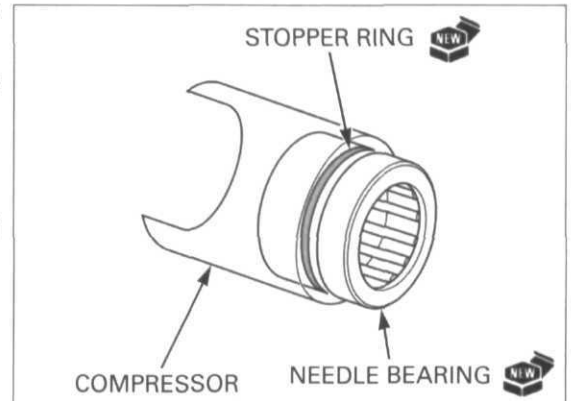
Place the driver, attachment and pilot on the top of the bearing and tape the driver to the compressor.

**TOOLS:**

**Driver** 07749-0010000  
**Attachment, 22 x 24 mm** 07746-0010800  
**Pilot, 15 mm** 07746-0040300

Place the bearing and tool assembly into a freezer for at least 30 minutes.

Heat the gear case to 80°C (176°F).



## REAR DRIVING MECHANISM

Place the driver, attachment and pilot on the top of the bearing and tape the driver to the compressor.

### TOOLS:

<b>Driver</b>	<b>07749-0010000</b>
<b>Attachment, 22 x 24 mm</b>	<b>07746-0010800</b>
<b>Pilot, 15 mm</b>	<b>07746-0040300</b>

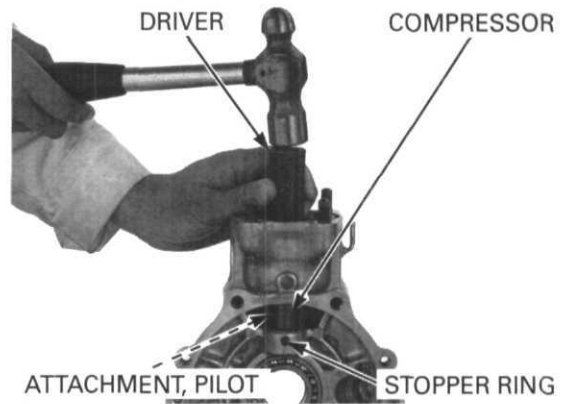
Place the bearing and tool assembly into a freezer for at least 30 minutes.

Heat the gear case to 80°C (176°F).

Remove the bearing and tool assembly from the freezer and drive the bearing into the gear case using the special tools.

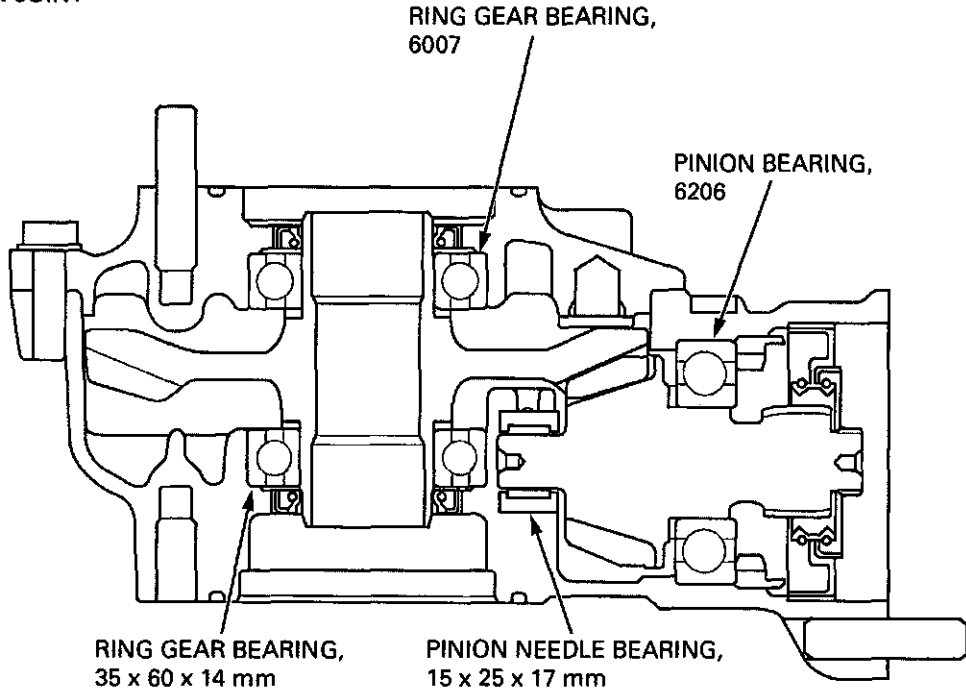
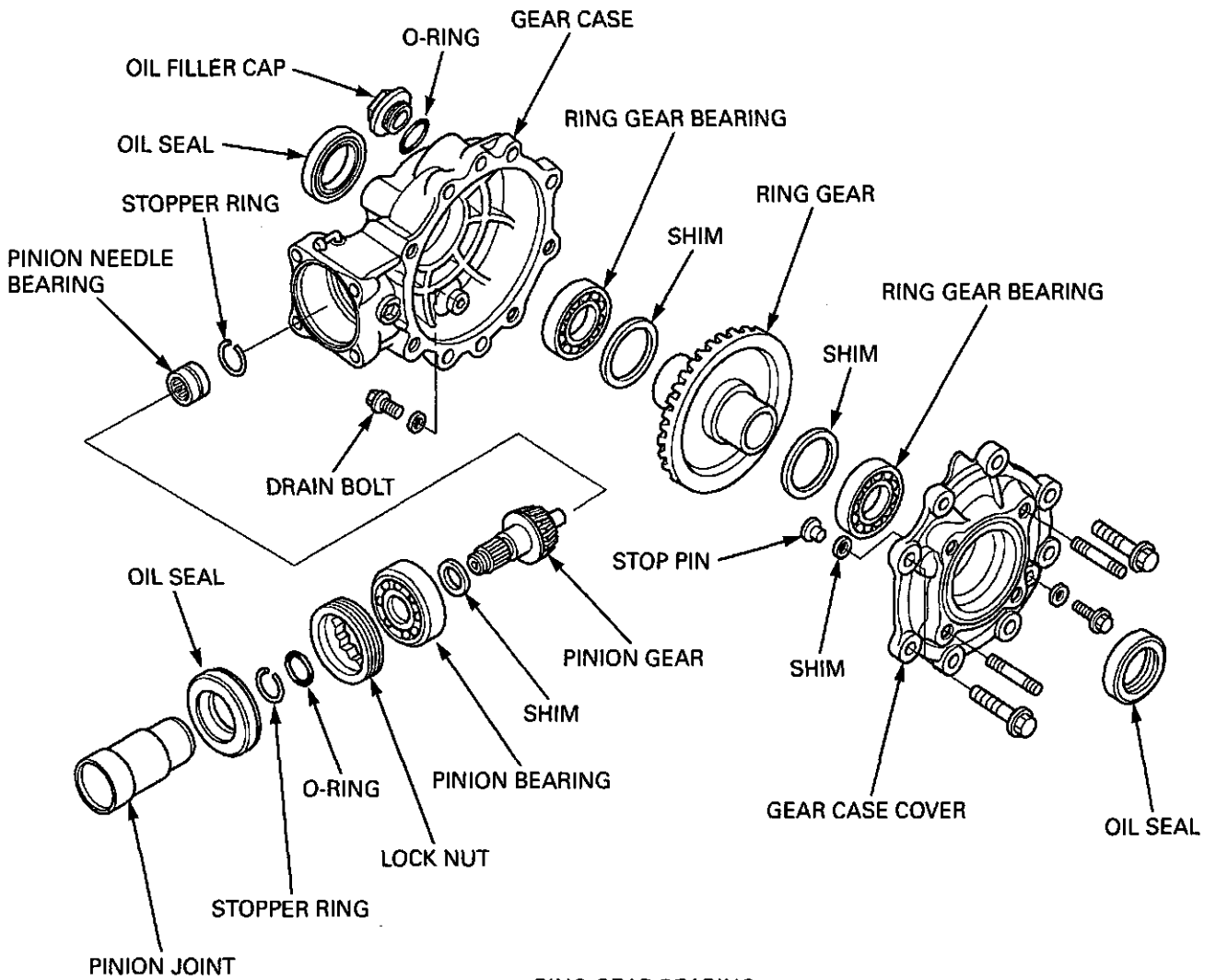
Only strike the driver once. If you strike it more than once, the ring may slip out of the groove. If this happens, remove the ring and bearing, and install a new ring.

Make sure the stopper ring is securely set in the groove of the gear case.



**REAR DRIVING MECHANISM**

**REAR FINAL GEAR ASSEMBLY**



**PINION GEAR INSTALLATION**

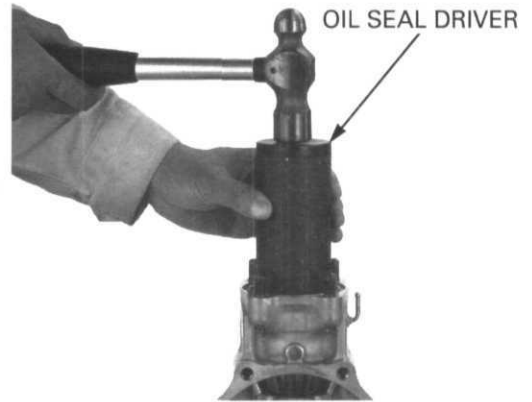
Drive the pinion gear assembly into the gear case.

**TOOL:**

**Oil seal driver** 07965-KE80200 or 07947-KA50100

**NOTE:**

- Keep the driver centered with the bearing outer race during installation.

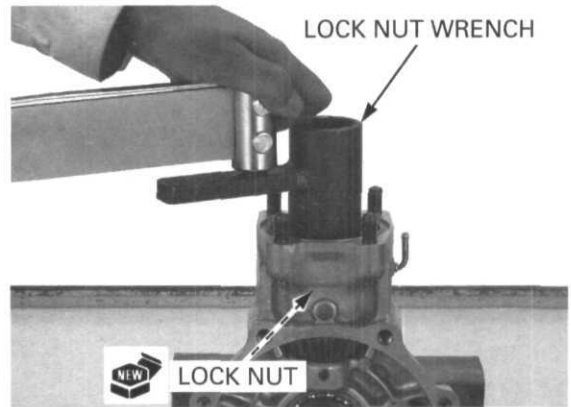


Install a new lock nut and tighten it.

**TOOL:**

**Lock nut wrench, 30 x 64 mm** 07916-MB00002

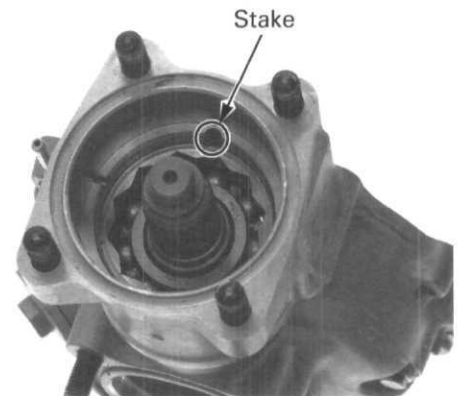
**TORQUE: Actual: 98 N·m (10.0 kgf·m, 72 lbf·ft)**  
**Indicated: 89 N·m (9.1 kgf·m, 66 lbf·ft)**



*Refer to torque wrench reading information on page 17-3 "Service Information."*

*Be careful not to damage the threads of the case.*

Stake the lock nut into the case groove.

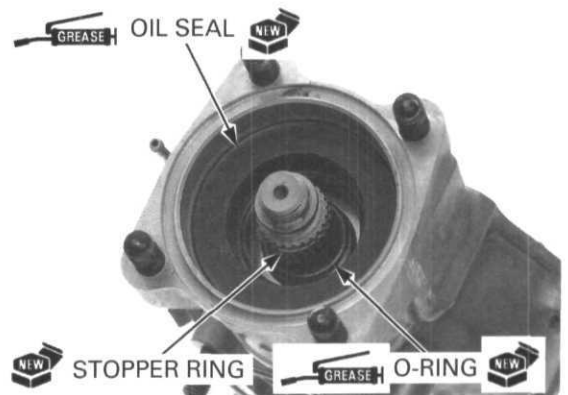


Coat a new O-ring with grease and install it onto the pinion gear shaft.  
 Install a new stopper ring into the pinion gear shaft groove.

Apply grease to a new oil seal lips and install it into the gear case until it is fully seated.

**TOOL:**

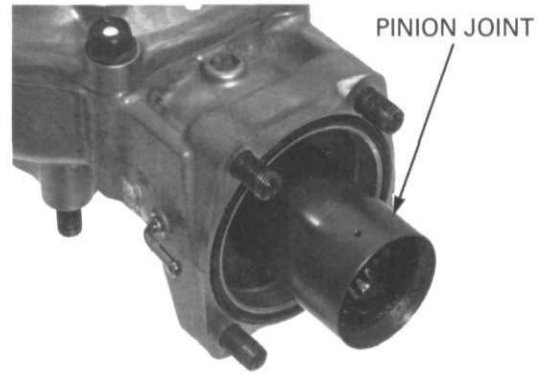
**Driver** 07749-0010000  
**Driver attachment** 07LAD-PW50500



## REAR DRIVING MECHANISM

*Be careful not to damage the oil seal lip.*

Install the pinion joint onto the pinion gear shaft by pushing it in until the stopper ring seats in the pinion joint groove.



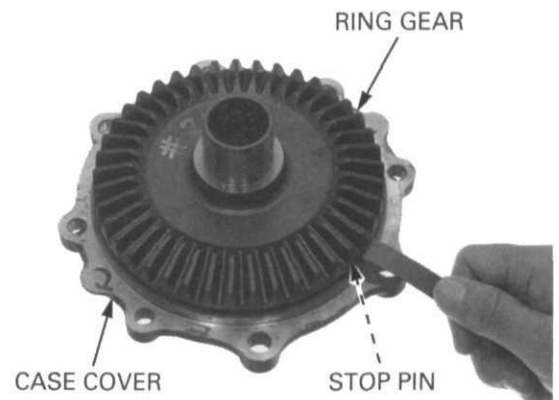
### RING GEAR CLEARANCE INSPECTION

Install the ring gear with the left shim into the case cover.

Measure the clearance between the ring gear and stop pin with a feeler gauge.

**CLEARANCE: 0.3 – 0.6 mm (0.01 – 0.02 in)**

Remove the ring gear.



If the clearance exceeds the standard value, heat the case cover to approximately 80°C (176°F) and remove the stop pin by tapping the cover.

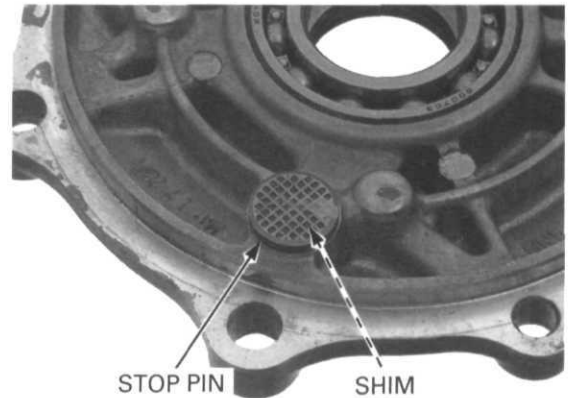
Install a stop pin shim to obtain the correct clearance.

**Stop pin shims:**

**A: 0.10 mm (0.004 in)**

**B: 0.15 mm (0.006 in)**

Install the shim and drive the stop pin into the case cover.



### FINAL GEAR CASE ASSEMBLY

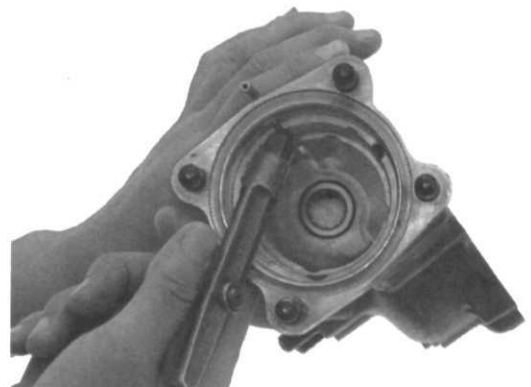
**NOTE:**

- When the gear set, bearing, and/or gear case has been replaced, check the tooth contact pattern (page 17-14) and gear backlash (page 17-12).

*Keep dust and dirt out of the case and cover.*

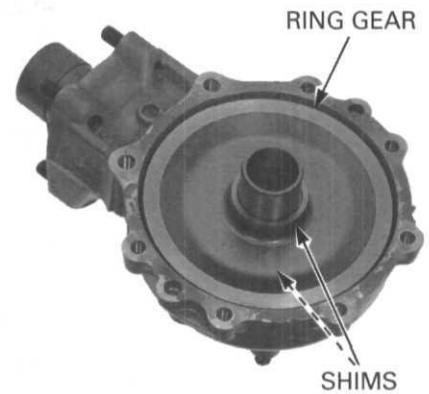
Clean the mating surface of the gear case and cover, being careful not to damage them.

Blow compressed air through the breather hole in the gear case.



## REAR DRIVING MECHANISM

Install the proper ring gear shims onto the ring gear and install them into the gear case.



Apply liquid sealant to the mating surface of the case cover.  
Install the cover onto the gear case.



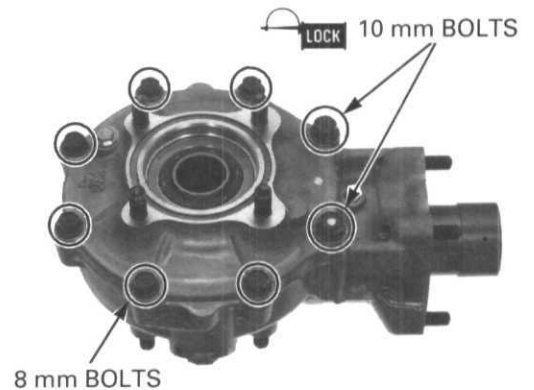
Apply locking agent to the threads of the two 10 mm bolts.

*It is important to turn the pinion while tightening the bolts. If the ring gear shim is too thick, the gears will lock after only light tightening.*

Install the bolts and tighten them several steps until the cover evenly touches the case. Then, while rotating the pinion gear, tighten the bolts to the specified torque in a crisscross pattern in several steps.

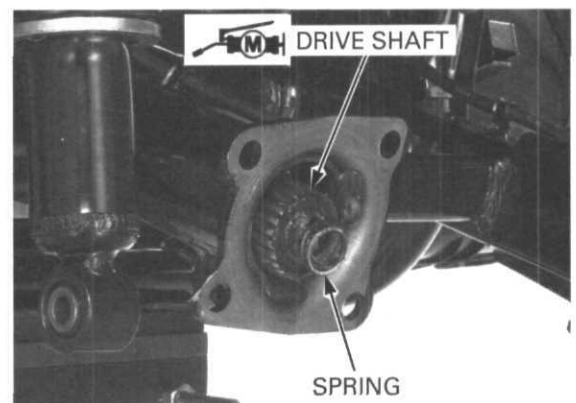
**TORQUE: 10 mm bolt: 49 N·m (5.0 kgf·m, 36 lbf·ft)**  
**8 mm bolt: 25 N·m (2.6 kgf·m, 19 lbf·ft)**

Make sure that the gear assembly rotates smoothly without binding.



## REAR FINAL DRIVE INSTALLATION

Apply molybdenum disulfide grease to the rear drive shaft splines and seal lips.  
Install the drive shaft into the swingarm, while aligning the splines of the drive shaft and universal joint.  
Install the spring into the drive shaft.

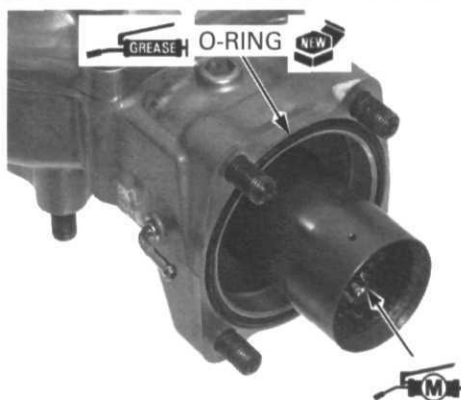




## REAR DRIVING MECHANISM

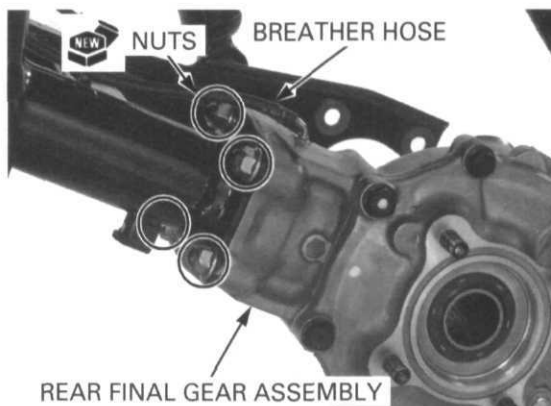
Coat a new O-ring with grease and install it into the rear final gear case groove.

Apply 5 – 8 g of molybdenum disulfide grease to the rear final gear pinion joint splines.

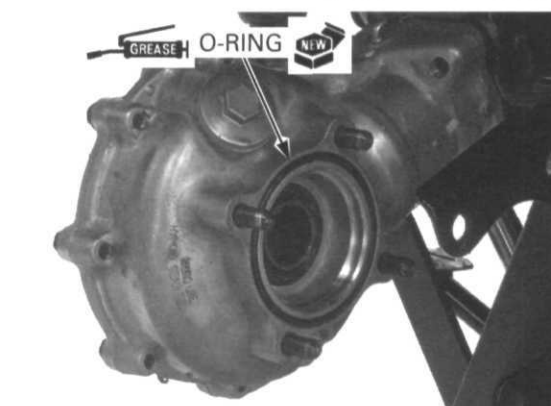


Install the rear final gear assembly onto the swingarm with four new nuts, and loosely tighten the nuts.

Connect the breather hose to the hose joint of the gear case.



Coat a new O-ring with grease and install it into the gear case groove.



*Insert the bolts from the right side.*

Install the right axle housing onto the gear case and swingarm with the four bolts and eight new nuts.

Tighten the four rear final gear case mounting nuts.

**TORQUE: 54 N·m (4.5 kgf·m, 40 lbf·ft)**

Tighten the eight axle housing mounting nuts.

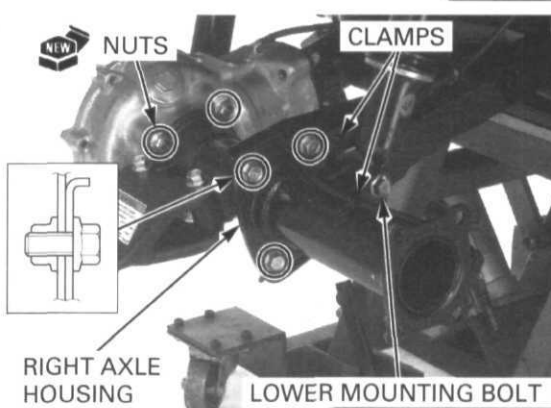
**TORQUE: 44 N·m (4.5 kgf·m, 32 lbf·ft)**

Install the right rear shock absorber into the axle housing and tighten the lower mounting bolt.

**TORQUE: 44 N·m (4.5 kgf·m, 32 lbf·ft)**

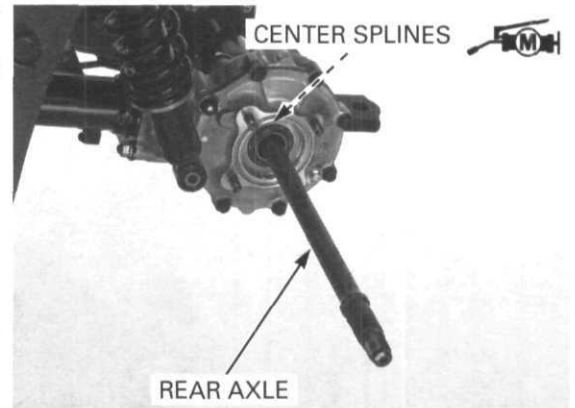
Install the rear brake panel breather hose into the clamps.

Install the rear axle (page 17-25).

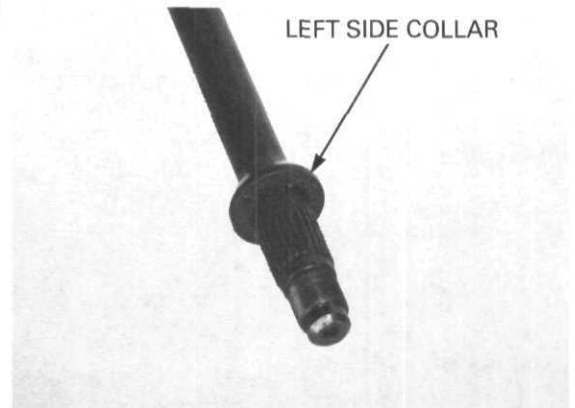


## REAR AXLE INSTALLATION

Apply molybdenum disulfide grease to the center spline of the axle.  
Install the axle into the final gear case from the right side until it is fully seated.



Install the side collar onto the axle with the tapered side facing inward.



Coat a new O-ring with grease and install it into the gear case groove.

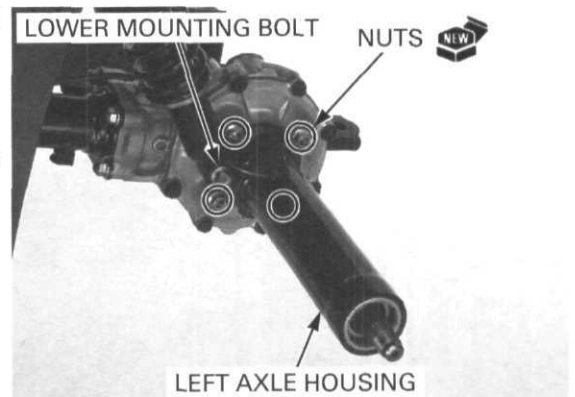


Install the left axle housing with the skid plate bolt hole facing down.  
Install four new housing nuts and tighten them.

**TORQUE: 44 N-m (4.5 kgf-m, 32 lbf-ft)**

Install the left rear shock absorber into the axle housing and tighten the lower mounting bolt.

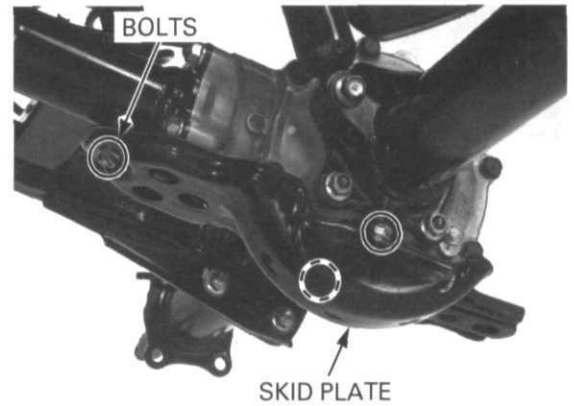
**TORQUE: 44 N-m (4.5 kgf-m, 32 lbf-ft)**



## REAR DRIVING MECHANISM

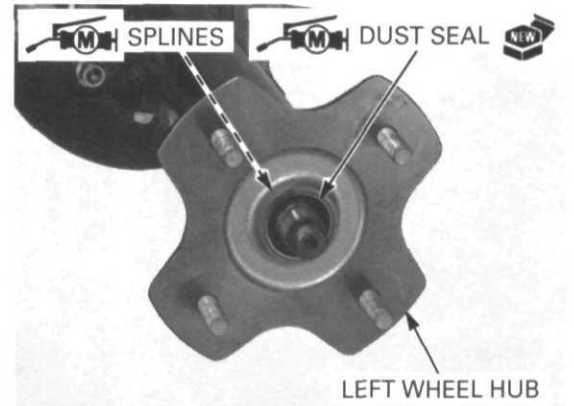
Install the skid plate and tighten the three bolts.

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



Apply molybdenum disulfide grease to the seal lips of a new hub dust seal and install it with the flat side facing in until it is fully seated.

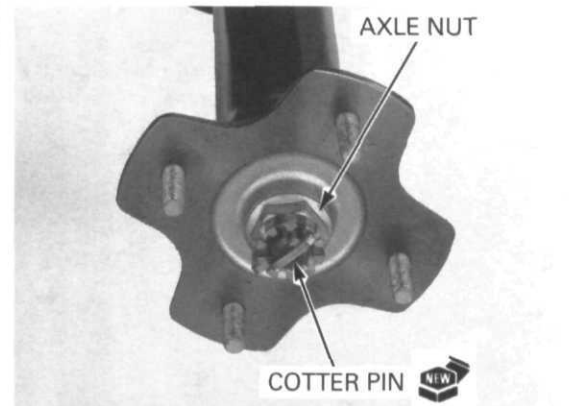
Install the left wheel hub onto the rear axle, being careful not to damage the dust seal lip.



Install the hub nut and tighten it to the specified torque and further tighten until its grooves align with the cotter pin hole.

**TORQUE: 137 N·m (14.0 kgf·m, 101 lbf·ft)**

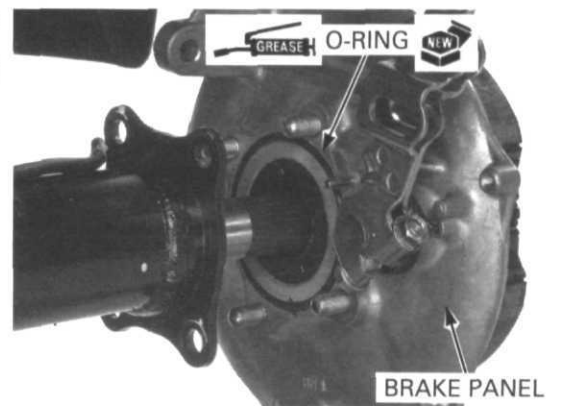
Install a new cotter pin.



*Do not get grease onto the brake shoe linings.*

Coat a new O-ring with grease and install it into the brake panel groove.

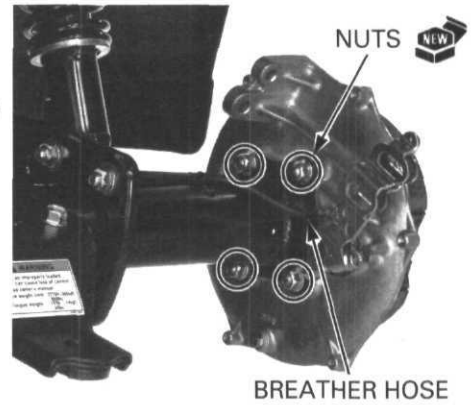
Install the brake panel assembly onto the axle and right axle housing.



Install new brake panel nuts and tighten them.

**TORQUE: 44 N·m (4.5 kgf·m, 32 lbf·ft)**

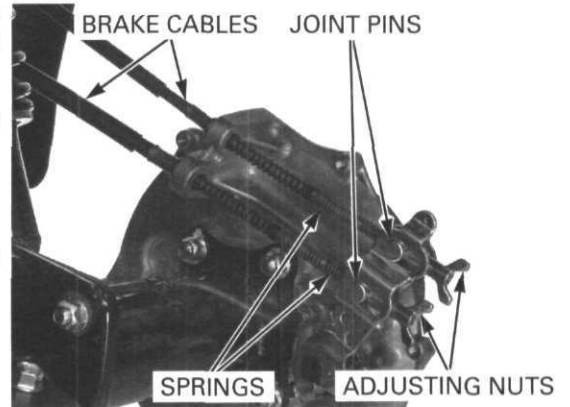
Connect the breather hose to the hose joint of the brake panel.



Install the brake cables into the cable holders on the brake panel (upper holder for lever brake cable and lower holder for pedal brake cable).  
Install the cable springs onto the cables.  
Connect the brake cables to the brake arm with the joint pins and adjusting nuts.

Install the rear brake drum (page 15-18).  
Install the rear wheels (page 14-6).

Fill the gear case with the recommended oil (page 4-14).



# 18. BATTERY/CHARGING SYSTEM

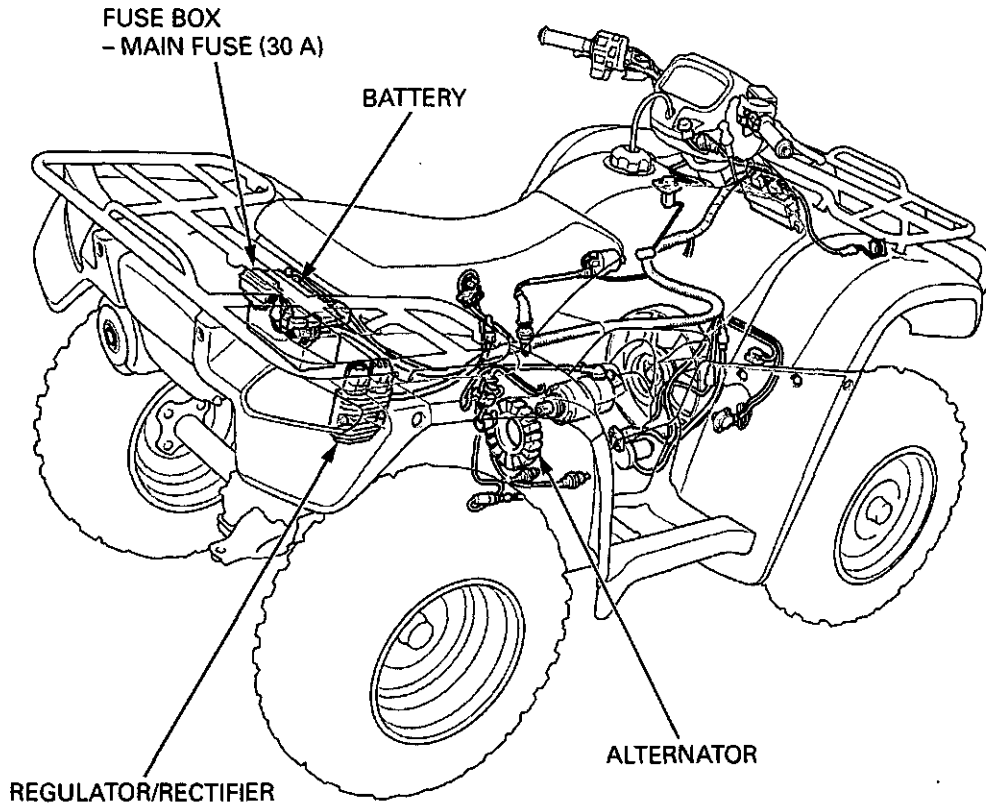
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COMPONENT LOCATION .....	18-2	BATTERY.....	18-5
SYSTEM DIAGRAM.....	18-2	CHARGING SYSTEM INSPECTION.....	18-7
SERVICE INFORMATION .....	18-3	ALTERNATOR CHARGING COIL .....	18-8
TROUBLESHOOTING .....	18-4	REGULATOR/RECTIFIER .....	18-8

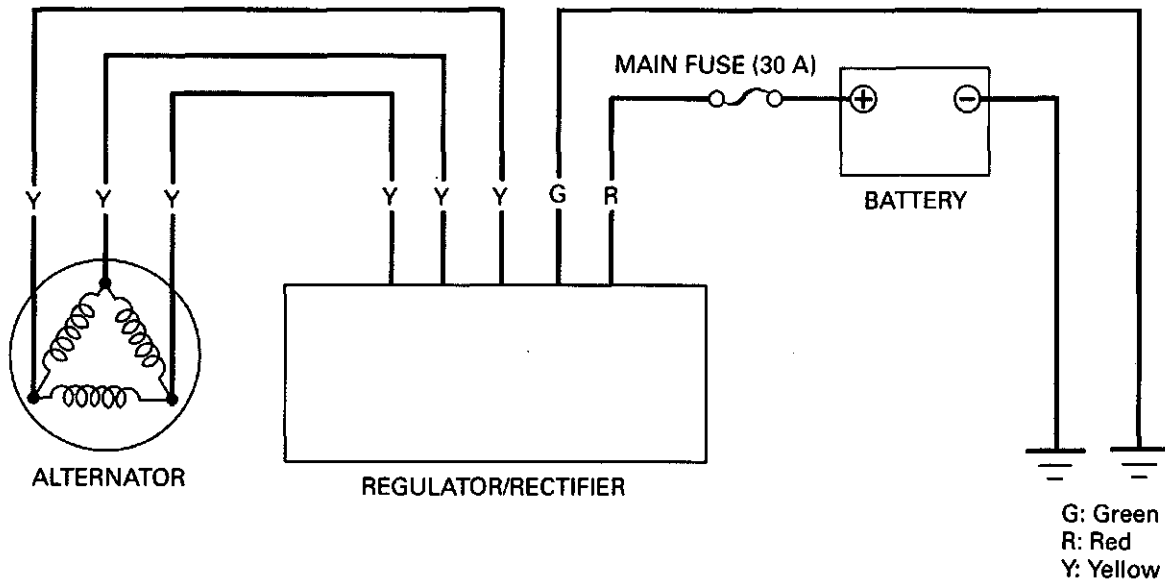
# BATTERY/CHARGING SYSTEM

## COMPONENT LOCATION

FE model shown:



## 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 a physician immediately. **KEEP OUT OF REACH OF CHILDREN.**
- 
- Always turn OFF the ignition switch before disconnecting any electrical component.
  - Some electrical components may be damaged if terminals or connectors are connected or disconnected while the ignition switch is ON and current is present.
  - For extended storage, remove the battery, give it a full charge, and store it in a cool, dry place.
  - For a battery remaining in a stored vehicle, disconnect the negative battery cable from the battery.
  - The battery sealing caps should not be removed. Attempting to remove the sealing caps from the cells may damage the battery.
  - The maintenance free (FM) 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 vehicle.
  - The battery will self-discharge when the vehicle is not in use. For this reason, charge the battery every two weeks to prevent sulfation from occurring.
  - Filling a new battery with electrolyte will produce some voltage, but in order to achieve its maximum performance, always charge the battery. Also, the battery life is lengthened when it is initially charged.
  - When checking the charging system, always follow the steps in the troubleshooting (page 18-4).
  - For alternator service, refer to page 11-7.

**BATTERY CHARGING**

- This model comes with a maintenance free (MF) battery. Remember the following about MF batteries.
  - Use only the electrolyte that comes with the battery.
  - Use all of the electrolyte.
  - Seal the battery properly.
  - Never open the seals again.
- 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 battery tester’s Operation Manual for the recommended battery testing procedures. The recommended battery tester puts a “load” on the battery so the actual battery condition of the load can be measured.

**RECOMMENDED BATTERY TESTER: BM-210-AH, BM-210, or BATTERY MATE or equivalent**

**SPECIFICATIONS**

ITEM		SPECIFICATIONS	
Battery	Capacity	12 V – 12 Ah	
	Current leakage	1 mA max.	
	Voltage (20°C/68°F)	Fully charged	13.0 – 13.2 V
		Needs charging	Below 12.3 V
	Charging current	Normal	1.4 A x 5 – 10 h
Quick		6.0 A x 1.0 h	
Alternator	Capacity	0.357 kW/5,000 rpm (min <sup>-1</sup> )	
	Charging coil resistance (20°C/68°F)	0.1 – 1.0 Ω	

### TROUBLESHOOTING

#### BATTERY IS DAMAGED OR WEAK

##### 1. Battery Inspection

Remove the battery (page 18-5).

Check the battery condition using the recommended battery tester.

**RECOMMENDED BATTERY TESTER: BM-210-AH, BM-210 or BATTERY MATE or equivalent**

*Is the battery in good condition?*

**NO** – Faulty battery.

**YES** – GO TO STEP 2.

##### 2. Battery Current Leakage Inspection

Install the battery (page 18-5).

Check the battery current leakage (Leak test: page 18-7).

**STANDARD: 1 mA max. (FM/FE models)**

**0.1 mA max. (TM model)**

*Is the current leakage below standard value?*

**NO** – GO TO STEP 3.

**YES** – GO TO STEP 4.

##### 3. Battery Current Leakage Inspection with Regulator/Rectifier Connector Disconnected

Disconnect the regulator/rectifier 3P black connector and recheck the battery current leakage.

*Is the current leakage below standard value?*

**NO** – • Shorted wire harness.  
• Faulty ignition switch.

**YES** – Faulty regulator/rectifier.

##### 4. Alternator Charging Coil Inspection

Check the alternator charging coil (page 18-8).

**STANDARD: 0.1 – 1.0  $\Omega$  (20°C/68°F)**

*Is the resistance within the specified range?*

**NO** – Faulty charging coil.

**YES** – GO TO STEP 5.

##### 5. Charging Voltage Inspection

Measure and record the battery voltage using a digital multimeter (page 18-5).

Start the engine.

Measure the charging voltage (page 18-8).

Compare the measurements to result of the following calculation.

**STANDARD: Measured Battery Voltage < Measured Charging Voltage < 15.5 V**

*Is the charging voltage within the specified range?*

**NO** – GO TO STEP 6.

**YES** – faulty battery

##### 6. Regulator/Rectifier Harness Inspection

Perform the regulator/rectifier wire harness inspection (page 18-8).

*Are the measurements correct?*

**NO** – • Open circuit in related wire.  
• Loose or poor contacts of related terminal.  
• Shorted wire harness.

**YES** – Faulty regulator/rectifier.



# BATTERY

## REMOVAL/INSTALLATION

Remove the seat (page 3-4).

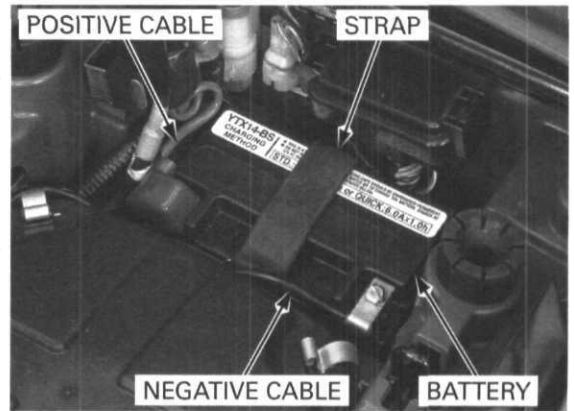
With the ignition switch to OFF, disconnect the negative (-) cable first, then disconnect the positive (+) cable.

Remove the strap from the front side retainer.  
Remove the battery.

Install the battery in the reverse order of removal.

After connecting the battery cables, coat the terminals with grease.

*Connect the positive (+) cable first, then connect the negative (-) cable.*

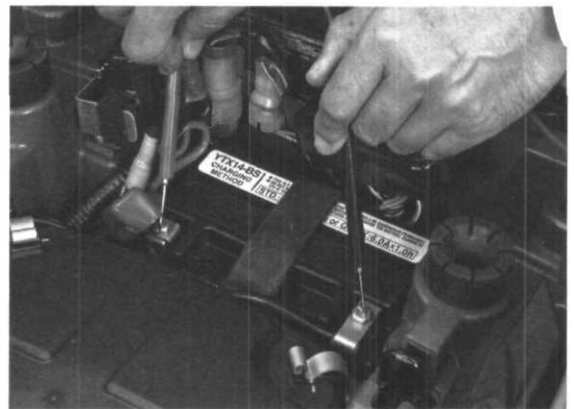


## VOLTAGE INSPECTION

Remove the seat (page 3-4).

Measure the battery voltage using a commercially available digital multimeter.

**VOLTAGE (20°C/68°F): Fully charged: 13.0 – 13.2 V**  
**Under charged: Below 12.3 V**



## BATTERY TESTING

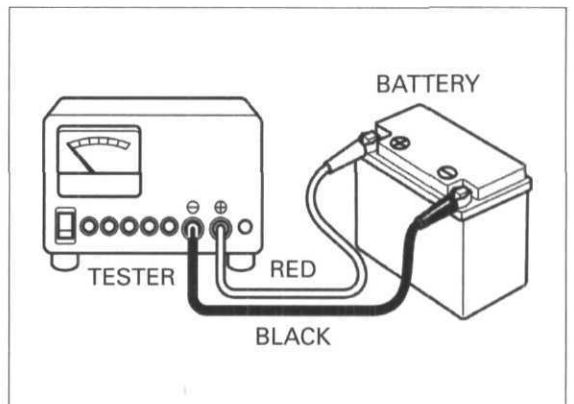
Remove the battery (page 18-5).

Securely connect the tester's positive (+) cable first, then connect the negative (-) cable.

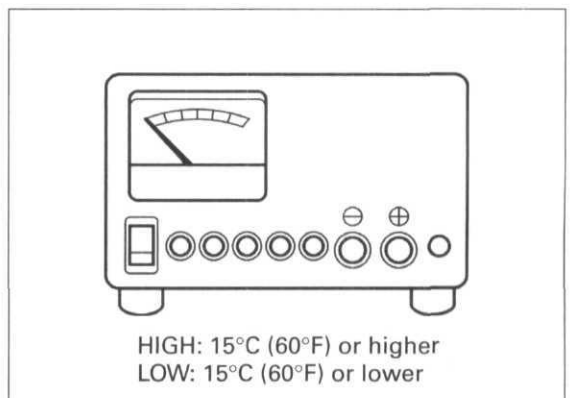
**TOOL:**

**Battery tester BM-210-AH, BM-210 or BATTERY MATE or equivalent**

*For accurate test results, be sure the tester's cables and clamps are in good working condition and that a secure connection can be made at the battery.*



Set the temperature switch to "HIGH" or "LOW" depending on the ambient temperature.



## BATTERY/CHARGING SYSTEM

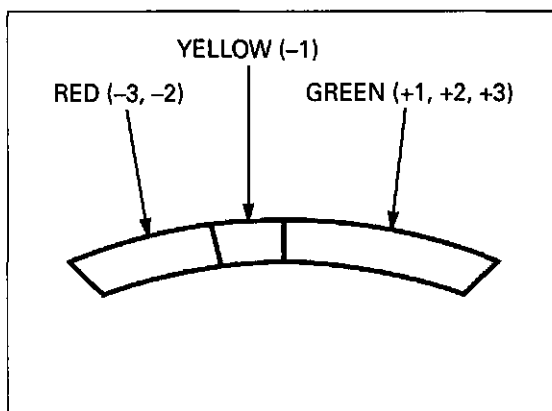
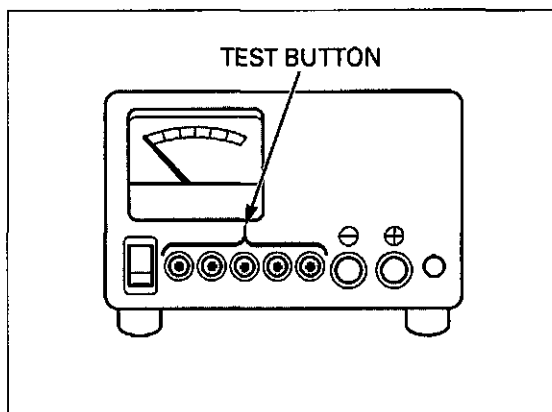
For the first check, DO NOT charge the battery before testing; test it in an "as is" condition.

Push in the appropriate test button for 3 seconds and read the condition of the battery on the meter.

### NOTICE

- To avoid damaging the tester, only test batteries with an amperage rating of less than 30 Ah.
- Tester damage can result from overheating when:
  - The test button is pushed in for more than 3 seconds.
  - The tester is used without being allowed to cool for at least 1 minute when testing more than one battery.
  - More than ten consecutive tests are performed without allowing at least a 30-minute cool-down period.

The result of a test on the meter scale is relative to the amp. hour rating of the battery. Any battery reading in the green zone is OK. Batteries should only be charged if they register in the YELLOW or RED zone.



## BATTERY CHARGING (U.S.A. only)

Remove the battery (page 18-5).

### NOTE:

- Make sure the area around the charger is well ventilated, clear of flammable materials, and free from heat, humidity, water and dust.
- Clean the battery terminals and position the battery as far away from the charger as the leads will permit.
- Do not place batteries below the charger – gases from the battery may corrode and damage the charger.
- Do not place batteries on top of the charger. Be sure the air vents are not blocked.

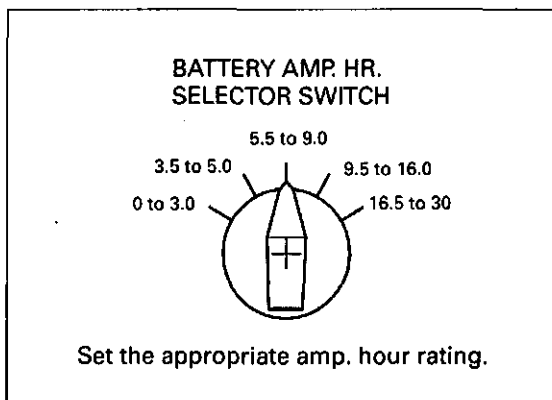
1. Turn the "POWER" switch to OFF.

### TOOL:

Christie battery charger MC1012/2 (U.S.A. only)

Turn power ON/OFF at the charger, not at the battery terminal.

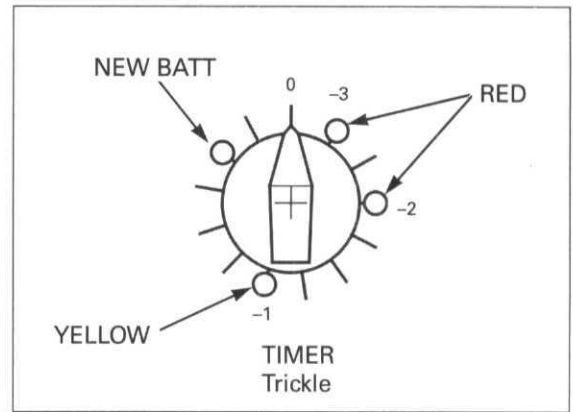
2. Set the "BATTERY AMP. HR. SELECTOR SWITCH" for the size of the battery being charged.



- Set the "TIMER" to the position indicated by the Honda Battery Tester; RED -3, RED -2 or YELLOW -1. If you are charging a new battery, set the switch to the NEW BATT position.
- Attach the clamps to the battery terminals: red to positive, black to negative.

*Connecting the cables with the POWER switch turned to ON can produce a spark which could ignite or explode the battery.*

Connect the battery cables only when the "POWER" switch is turned to OFF.



- Turn the "POWER" switch to ON.
- When the timer reaches the "Trickle" position, the charging cycle is complete. Turn the "POWER" switch to OFF and disconnect the clamps.
- Let the battery cool for at least 10 minutes or until gassing subsides after charging.
- Retest the battery using the Honda Battery Tester and recharge if necessary using the above steps.

*The charger will automatically switch to the "Trickle" mode after the set charging time has elapsed.*

## CHARGING SYSTEM INSPECTION

### CURRENT LEAKAGE TEST

Remove the seat (page 3-4).

Turn the ignition switch to OFF, and disconnect the negative (-) cable from the battery.

Connect the ammeter (+) probe to the negative (-) cable and the ammeter (-) probe to the battery (-) terminal.

With the ignition switch turned to OFF, check for current leakage.

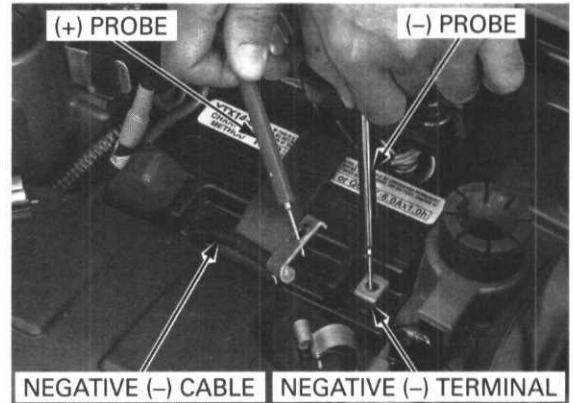
#### NOTE:

- When measuring current using a tester, set it to a high range, and then bring the range down to an appropriate level. Current flow higher than the range selected may blow out the fuse in the tester.
- While measuring current, do not turn the ignition switch to ON. A sudden surge of current may blow out the fuse in the tester.

**STANDARD: 1 mA max. (FM/FE models)  
0.1 mA max. (TM model)**

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.



## BATTERY/CHARGING SYSTEM

### CHARGING VOLTAGE INSPECTION

Be sure that the battery is in good condition before performing this test.

Start the engine and warm it up to the operating temperature; stop the engine.

Connect the multimeter between the positive and negative terminals of the battery.

#### NOTE:

- To prevent a short, make absolutely certain which are the positive and negative terminals or cable.

With the headlight on Hi beam, restart the engine. Measure the voltage on the multimeter when the engine runs at 5,000 rpm ( $\text{min}^{-1}$ ).

#### STANDARD:

Measured BV (page 18-5) < Measured CV < 15.5 V

BV = Battery voltage

CV = Charging voltage



## ALTERNATOR CHARGING COIL

### INSPECTION

Disconnect the alternator 5P natural connector.

Measure the resistance between the Yellow wire terminals of the alternator side connector.

**STANDARD: 0.1 – 1.0  $\Omega$  (20°C/68°F)**

Check for continuity between each Yellow wire terminal of the alternator side connector and ground. There should be no continuity.

Replace the alternator stator if resistance is out of specification, or if any wire has continuity to ground.

See page 11-7 for alternator stator replacement.



## REGULATOR/RECTIFIER

### WIRE HARNESS INSPECTION

Disconnect the regulator/rectifier 3P black and gray connectors.

Check the connectors for loose contacts or corroded terminals.

#### BATTERY LINE

Measure the voltage between the Red wire terminal and ground.

There should be battery voltage at all times.

#### GROUND LINE

Check the continuity between the Green wire terminal and ground.

There should be continuity at all times.

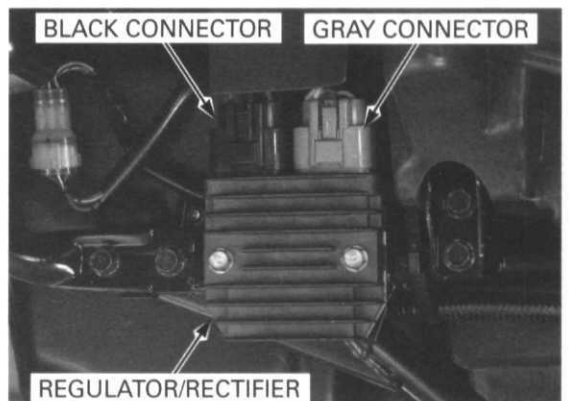
#### CHARGING COIL LINE

Measure the resistance between the Yellow wire terminals.

**STANDARD: 0.1 – 1.0  $\Omega$  (20°C/68°F)**

Check for continuity between each Yellow wire terminal and ground.

There should be no continuity.



# 19. IGNITION SYSTEM

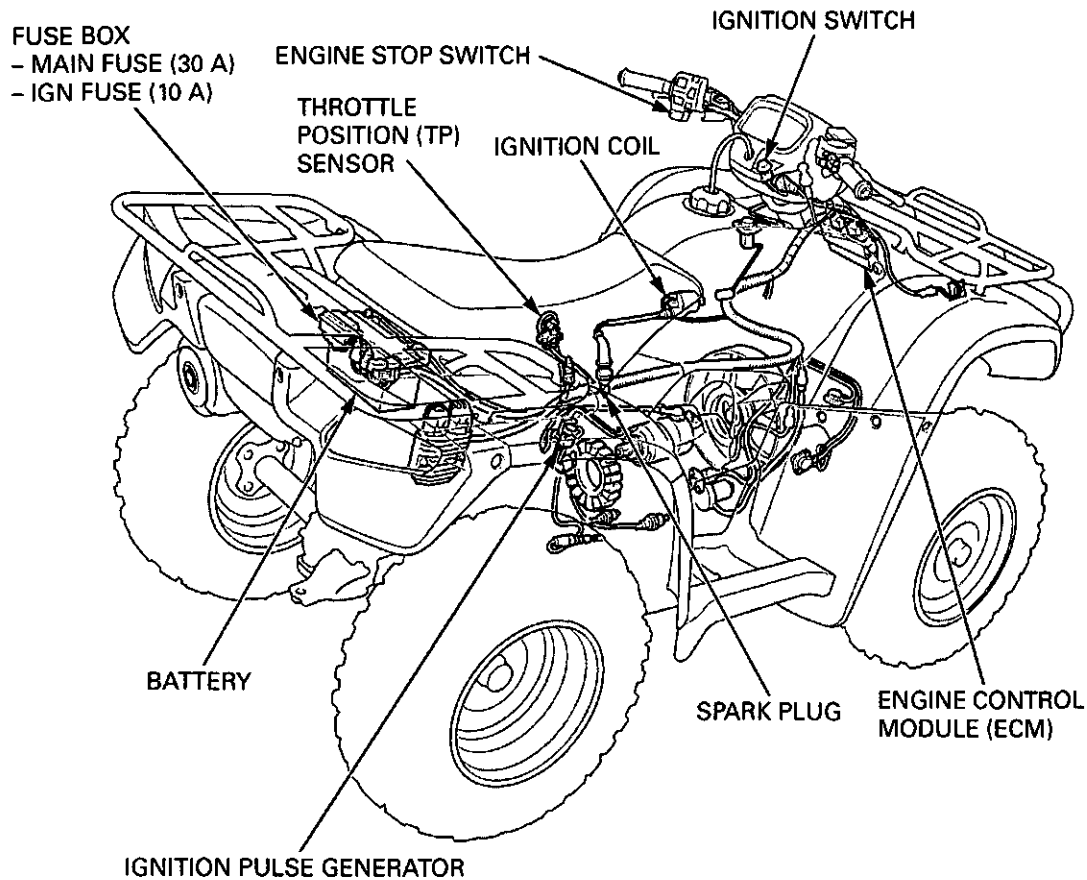
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<b>COMPONENT LOCATION</b> .....	<b>19-2</b>	<b>IGNITION SYSTEM INSPECTION</b> .....	<b>19-5</b>
<b>SYSTEM DIAGRAM</b> .....	<b>19-2</b>	<b>IGNITION COIL</b> .....	<b>19-7</b>
<b>SERVICE INFORMATION</b> .....	<b>19-3</b>	<b>IGNITION TIMING</b> .....	<b>19-7</b>
<b>TROUBLESHOOTING</b> .....	<b>19-4</b>		

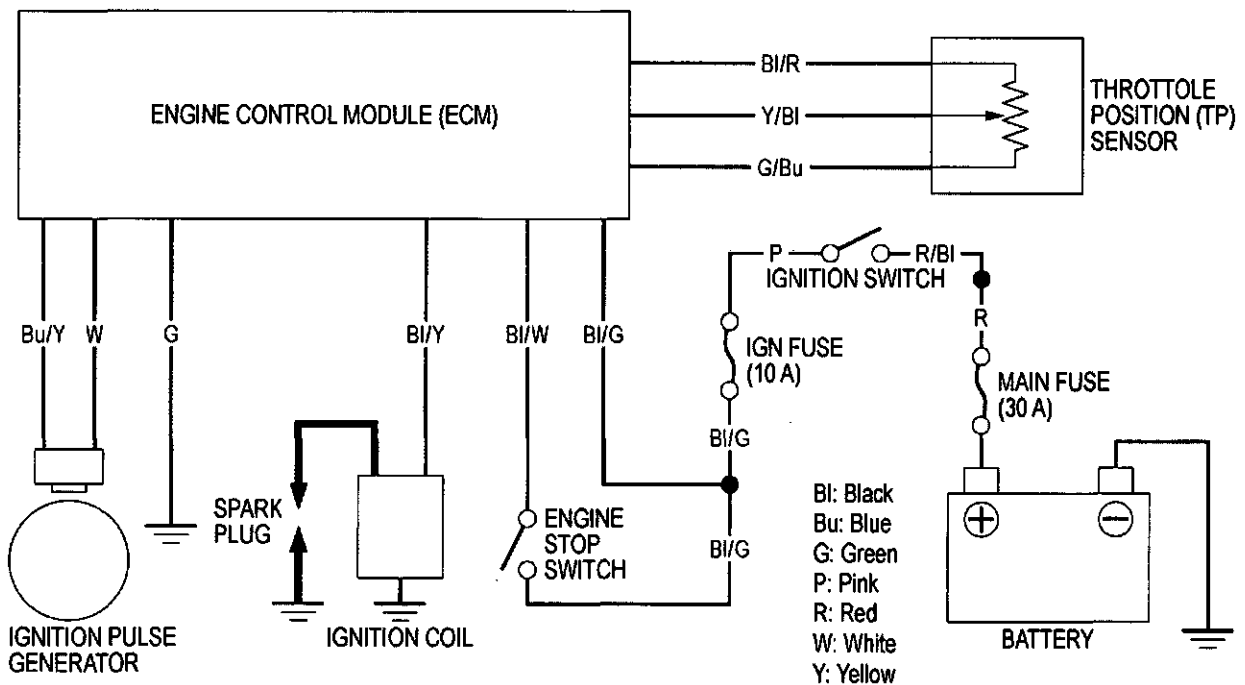
# IGNITION SYSTEM

## COMPONENT LOCATION

FE model shown:



## SYSTEM DIAGRAM



## SERVICE INFORMATION

### GENERAL

- Some electrical components may be damaged if terminals or connectors are connected or disconnected while the ignition switch is ON and current is present.
- When servicing the ignition system, always follow the checks in the troubleshooting on page 19-4.
- This vehicle's Ignition Control Module (ICM) is built into the ECM.
- The ignition timing cannot be adjusted since the ECM is factory preset.
- The ECM may be damaged if dropped. Also, if the connector is disconnected when current is flowing, the excessive voltage may damage the ECM. Always turn off the ignition switch before servicing.
- A faulty ignition system is often related to poor connections. Check those connections before proceeding.
- Use a spark plug of the correct heat range. Using spark plug with an incorrect heat range can damage the engine.
- For ignition switch inspection, see page 21-7.
- For engine stop switch inspection, see page 21-8.
- For ignition pulse generator (alternator stator) removal/installation, see page 11-7.

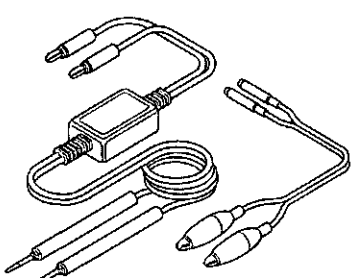
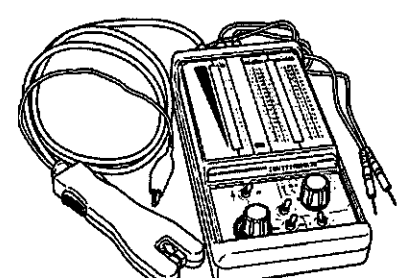
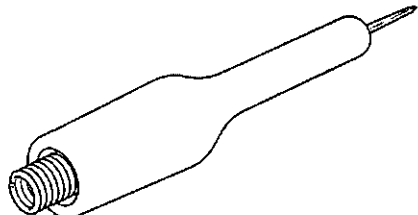
### SPECIFICATIONS

ITEM	SPECIFICATIONS
Spark plug	BKR5E-11 (NGK), K16PR-U11 (DENSO)
Spark plug gap	1.0 – 1.1 mm (0.039 – 0.043 in)
Ignition coil primary peak voltage	100 V minimum
Ignition pulse generator peak voltage	0.7 V minimum
Ignition timing ("F" mark)	10° BTDC at idle

### TORQUE

Timing hole cap 10 N·m (1.0 kgf·m, 7 lbf·ft)

### TOOL

<p>Peak voltage adapter 07HGJ-0020100</p>  <p>(not available in U.S.A.) with commercially available digital multimeter (impedance 10 M Ω/DCV minimum)</p>	<p>Ignition Mate Peak Voltage Tester MTP07-0286</p>  <p>(U.S.A. only)</p>	<p>Pin probe (Male) 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 connections
  - Water got into the spark plug cap (Leaking the ignition coil secondary voltage)

#### NO SPARK AT SPARK PLUG

UNUSUAL CONDITION		PROBABLE CAUSE (Check in numerical order)
Ignition coil primary voltage	Low peak voltage	<ol style="list-style-type: none"> <li>1. Incorrect peak voltage adapter connections. (System is normal if measured voltage is over the specifications with reverse connections.)</li> <li>2. The multimeter impedance is too low; below 10M <math>\Omega</math>/DCV.</li> <li>3. Cranking speed is too low. (Battery is undercharged.)</li> <li>4. 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>5. Poorly connected connectors or an open circuit in ignition system.</li> <li>6. Faulty gear position switch.</li> <li>7. An open circuit or loose connection in No. 6 related circuit.</li> <li>8. Faulty ignition coil.</li> <li>9. Faulty ECM. (When above No. 1 through 8 are normal.)</li> </ol>
	No peak voltage	<ol style="list-style-type: none"> <li>1. Incorrect peak voltage adapter 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. Faulty ignition switch or engine stop switch.</li> <li>4. Loose or poorly connected ECM connector.</li> <li>5. No voltage at the black/white wire of the ECM.</li> <li>6. Open circuit or poor connection in ground (green) wire of the ECM.</li> <li>7. Faulty gear position switch.</li> <li>8. An open circuit or loose connection in No. 7 related circuit (light green/red wire).</li> <li>9. Faulty peak voltage adapter.</li> <li>10. Faulty ignition pulse generator. (Measure peak voltage.)</li> <li>11. Faulty ECM. (When above No. 1 through 10 are normal.)</li> </ol>
	Peak voltage is normal, but no spark jumps at plug	<ol style="list-style-type: none"> <li>1. Faulty spark plug or leaking ignition coil secondary current ampere.</li> <li>2. Faulty ignition coil.</li> </ol>
Ignition pulse generator	Low peak voltage	<ol style="list-style-type: none"> <li>1. The multimeter impedance is too low; 10M <math>\Omega</math>/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 ignition pulse generator. (When above No. 1 through 3 are normal).</li> </ol>
	No peak voltage	<ol style="list-style-type: none"> <li>1. Faulty peak voltage adapter.</li> <li>2. Faulty ignition pulse generator.</li> </ol>



## IGNITION SYSTEM INSPECTION

**NOTE:**

- If no spark jumps at the plug, check all connections for loose or poor contact before measuring each peak voltage.
- Use recommended digital multimeter or a commercially available digital multimeter (impedance 10 MΩ/DCV minimum).
- The display value differs depending upon the internal impedance of the multimeter.

Connect the peak voltage adapter to the digital multimeter, or use the peak voltage tester.

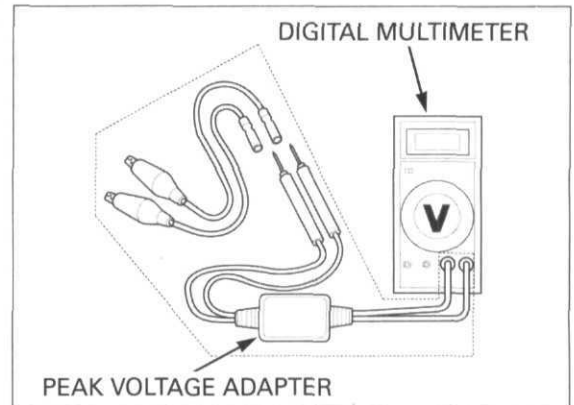
**TOOLS:**

**Peak voltage tester** MTP07-0286 (U.S.A. only) or

**Peak voltage adapter** 07HGJ-0020100

(not available in U.S.A.)

with commercially available digital multimeter (impedance 10MΩ/DCV minimum)



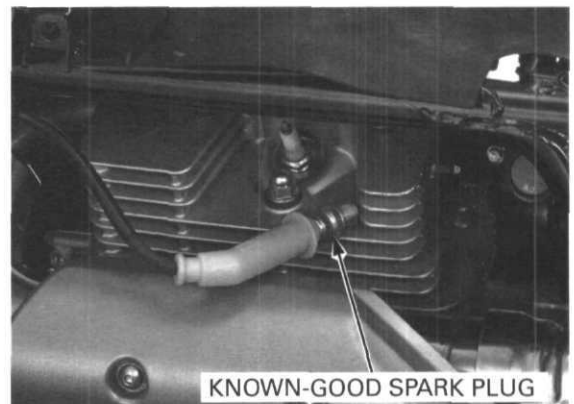
### IGNITION PRIMARY PEAK VOLTAGE

**NOTE:**

- Check all system connections before this inspection. Poor connected connectors can cause incorrect readings.
- Check the cylinder compression and check that the spark plug is installed correctly in the cylinder head.

Remove the fuel tank cover (page 3-5).

Disconnect the spark plug cap from the spark plug. Connect known-good spark plug to the spark plug cap and ground the spark plug to the cylinder head as done in a spark test.



With the connector connected, connect the peak voltage tester or adapter probes to the ignition coil primary terminal and body ground.

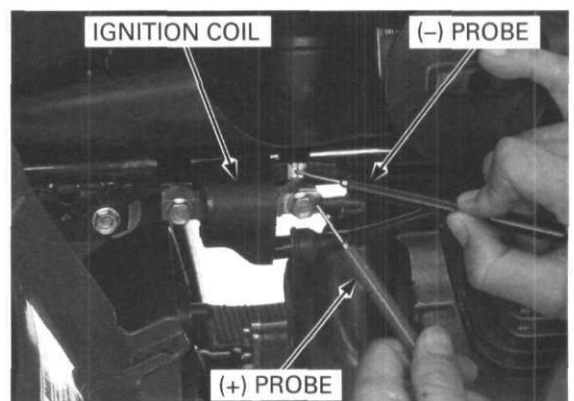
**CONNECTION: Black/yellow (-) – Body ground (+)**

Turn the ignition switch to ON with the engine stop switch at "O".

Crank the engine with the starter motor and read the ignition coil primary peak voltage.

**PEAK VOLTAGE: 100 V minimum**

If the peak voltage is lower than the standard value, follow the checks described in the troubleshooting on page 19-4.



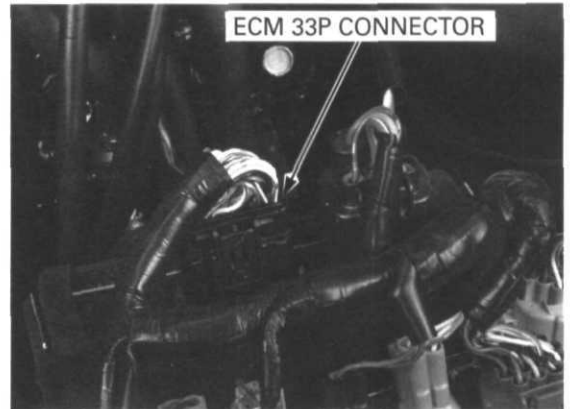
## IGNITION PULSE GENERATOR PEAK VOLTAGE

**NOTE:**

- Check that the cylinder compression is normal and the spark plug is installed correctly in the cylinder head.

Remove the front fender (page 3-9).

Disconnect the ECM 33P black connector.



Connect the peak voltage tester or adapter probes to the connector terminals of the wire harness side using the special tool.

**TOOL:**

**Pin probe (Male) 07ZAJ-RDJA110**

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

Turn the ignition switch to ON with the engine stop switch at "O".

Crank the engine with the starter motor and read the pulse generator peak voltage.

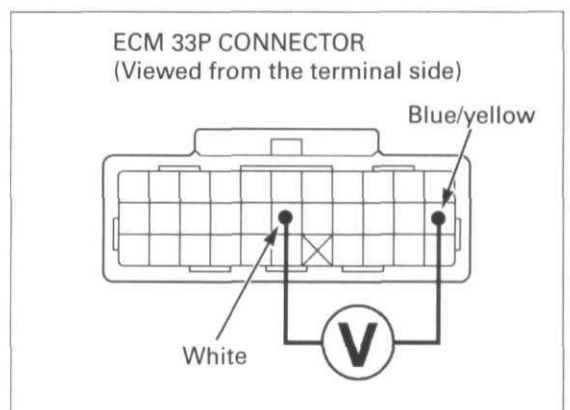
**PEAK VOLTAGE: 0.7 V minimum**

If the voltage measured at the ECM connector is abnormal, measure the peak voltage at the alternator connector.

Disconnect the alternator 5P connector and connect the peak voltage tester or adapter probes to the Blue/yellow and White wire terminals of the alternator side connector.

In the same manner as at the ECM connector, measure the peak voltage and compare it to the voltage measured at the ECM connector.

- If the peak voltage measured at the ICM connector is abnormal and the one measured at the alternator connector is normal, the Blue/yellow or White wire has an open or short circuit, or loose connections.
- If both peak voltages are abnormal, follow the checks described in the troubleshooting on page 19-4.  
See page 11-7 for alternator stator/ignition pulse generator assembly replacement.



## IGNITION COIL

### REPLACEMENT

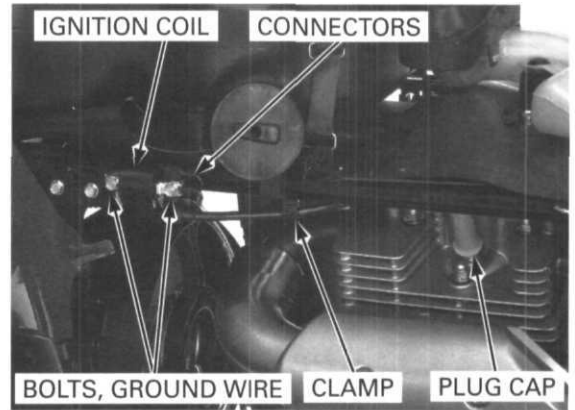
Remove the fuel tank cover (page 3-5).

Remove the spark plug cap from the plug and the spark plug wire from the clamp.

Disconnect the primary wire connectors from the ignition coil.

Remove the two bolts, ground wire and the ignition coil.

Install a new ignition coil in the reverse order of removal.



## IGNITION TIMING

Remove the recoil starter cover (page 3-4).

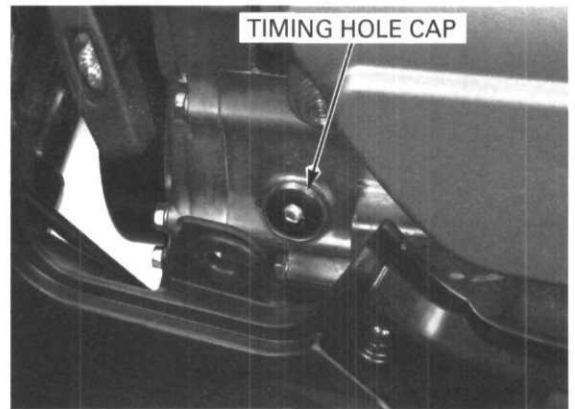
Start the engine and warm it up operating temperature.

Stop the engine and remove the timing hole cap.

Connect the timing light and tachometer.

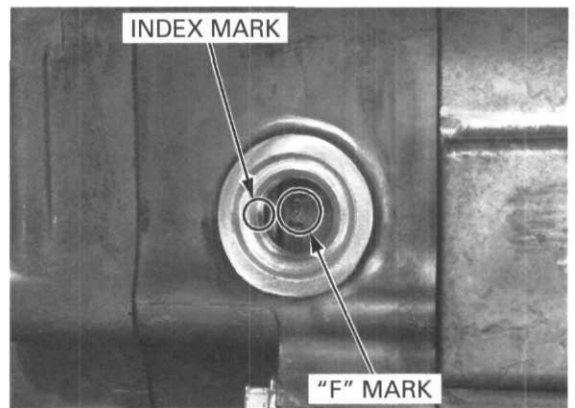
Start the engine, let it idle and check the ignition timing.

*Read the instructions for timing light and tachometer operation.*



The ignition timing is correct if the "F" mark on the flywheel aligns with the index mark on the rear crankcase cover at idle.

Increase the engine speed and make sure the "F" mark begins to move.

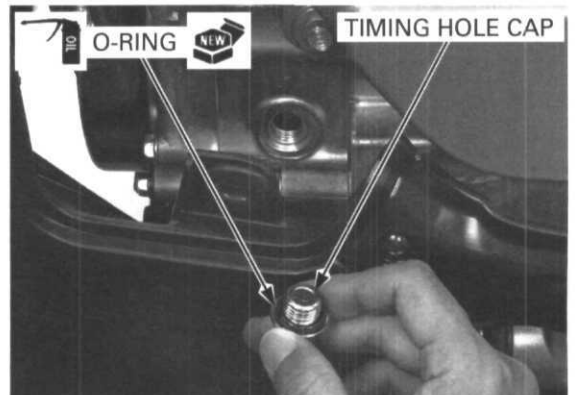


Coat a new O-ring with engine oil and install it onto the timing hole cap.

Install the timing hole cap and tighten it.

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

Install the recoil starter cover (page 3-4).



# 20. ELECTRIC STARTER

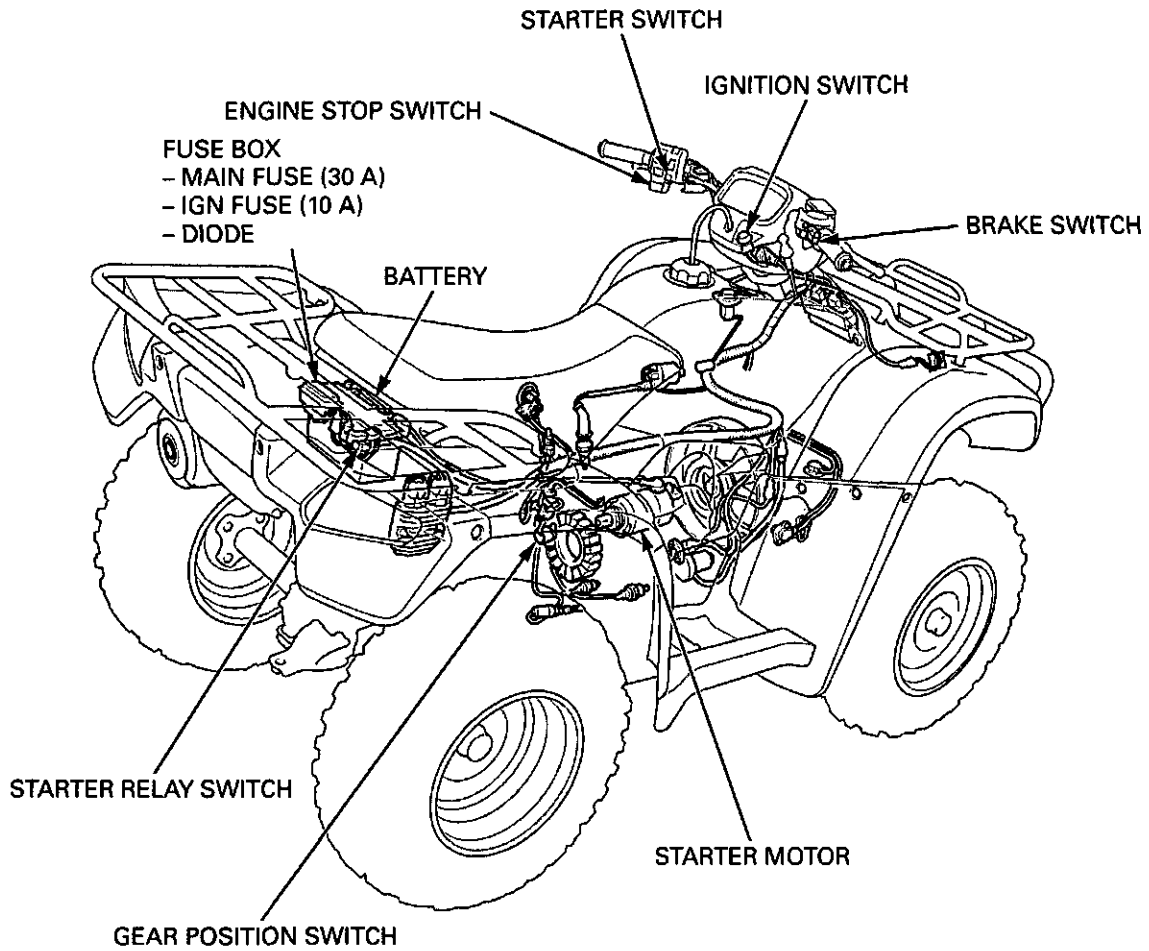
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COMPONENT LOCATION .....	20-2	STARTER MOTOR.....	20-6
SYSTEM DIAGRAM.....	20-2	STARTER RELAY SWITCH.....	20-12
SERVICE INFORMATION .....	20-3	DIODE.....	20-13
TROUBLESHOOTING.....	20-4		

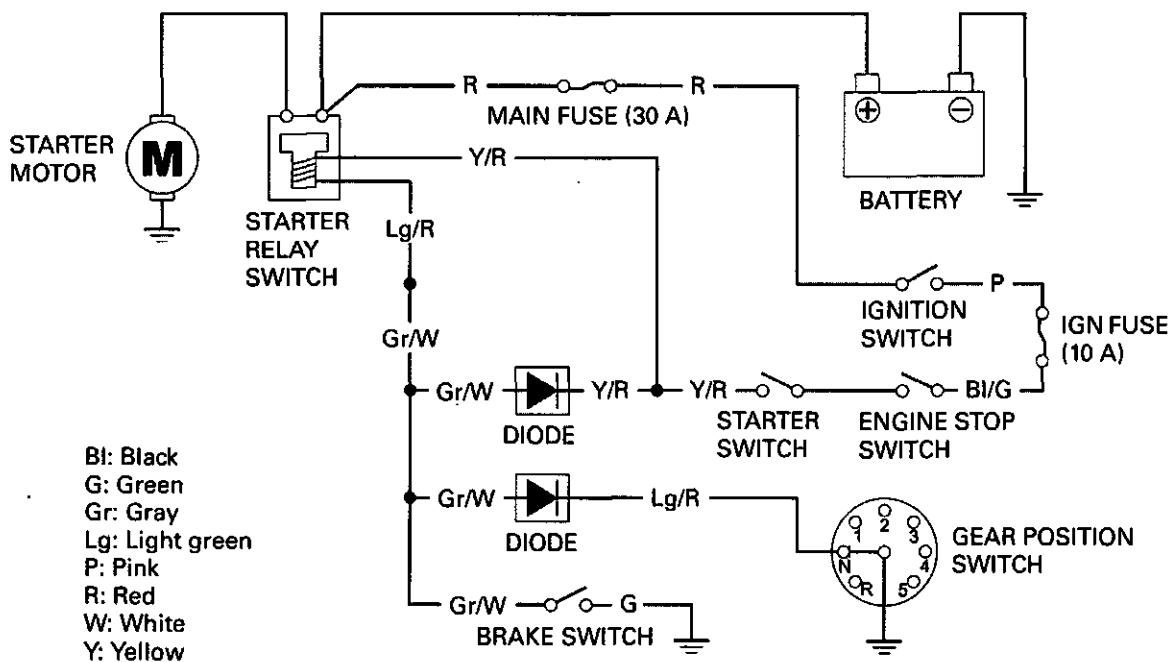
# ELECTRIC STARTER

## COMPONENT LOCATION

FE model shown:



## SYSTEM DIAGRAM



---

**SERVICE INFORMATION****GENERAL**

- Always turn the ignition switch to OFF before servicing the starter motor. The motor could suddenly start, causing serious injury.
- 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).
- A weak battery may be unable to turn the starter motor quickly enough, or supply adequate ignition current.
- If the current is kept flowing through the starter motor to turn it while the engine is not cranking over, the starter motor may be damaged.
- See page 11-10 for starter clutch servicing.
- See page 21-7 for ignition switch inspection and servicing.
- See page 21-8 for engine stop switch and starter switch inspection.
- See page 21-10 for front brake switch inspection.
- See page 21-10 for gear position switch inspection and servicing.

**SPECIFICATION**

Unit: mm (in)

<b>ITEM</b>	<b>STANDARD</b>	<b>SERVICE LIMIT</b>
Starter motor brush length	12.5 (0.49)	9.0 (0.35)

# TROUBLESHOOTING

### NOTE:

- The starter motor should operate when the transmission is in neutral or when the front brake lever is squeezed.
- Make sure the engine stop switch is turned to "O" before starting the engine. The starter motor does not operate with the engine stop switch turned to "R".

### Starter motor does not turn

#### 1. Fuse Inspection

Check for blown main fuse (30 A) or IGN fuse (10 A).

*Is the fuse blown?*

**YES** – Replace the fuse.

**NO** – GO TO STEP 2.

#### 2. Battery Inspection

Check that the battery is fully charged and in good condition.

*Is the battery in good condition?*

**YES** – GO TO STEP 3.

**NO** – Charge the battery (page 18-6).

#### 3. Starter Relay Switch Operation Inspection

Check the operation of the starter relay switch (page 20-12).

*Does the starter relay switch click?*

**YES** – GO TO STEP 4.

**NO** – GO TO STEP 5.

#### 4. Starter Motor Inspection

Turn the ignition switch to OFF.

Apply battery voltage to the starter motor directly.

*Does the starter motor turn?*

**YES** –

- Poorly connected starter motor cable.
- Faulty starter relay switch.

**NO** – Faulty starter motor (page 20-6).

#### 5. Relay Coil Ground Line Inspection

Turn the ignition switch to OFF.

Check the ground line of the starter relay switch (page 20-12).

*Is the ground line normal?*

**YES** – GO TO STEP 6.

**NO** –

- Faulty gear position switch.
- Faulty diode.
- Faulty front brake switch.
- Loose or poor contact of the related connector terminal.
- Open circuit in the wire harness.

#### 6. Relay Coil Power Input Line Inspection

Check the power input line of the starter relay switch (page 20-12).

*Is the power input line normal?*

**YES** – GO TO STEP 7.

**NO** –

- Faulty ignition switch.
- Faulty engine stop switch.
- Faulty starter switch.
- Loose or poor contact of the related connector terminal.
- Open circuit in the wire harness.

### 7. Starter Relay Switch Inspection

Check the function of the starter relay switch (page 20-12).

***Does the starter relay switch function properly?***

**YES** – Loose or poor contact of the starter relay switch connector terminal.

**NO** – Faulty starter relay switch.

#### **Starter motor turns engine slowly**

- Low battery voltage
- Poorly connected battery cable
- Poorly connected starter motor cable
- Faulty starter motor
- Poorly connected ground cable terminal

#### **Starter motor turns, but engine does not turn**

- Faulty starter clutch
- Damaged starter gear train

#### **Starter relay switch clicks, but engine does not turn over**

- Crankshaft does not turn due to engine problems

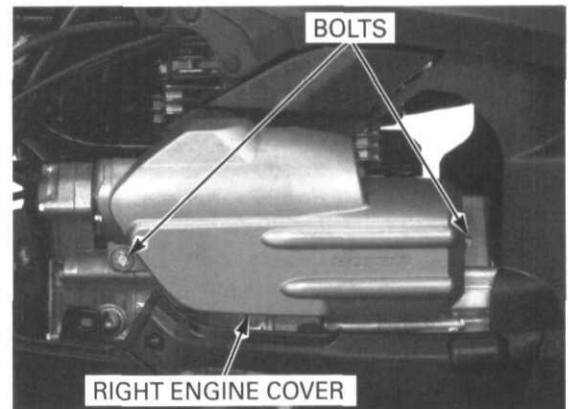


## ELECTRIC STARTER

### STARTER MOTOR

#### REMOVAL

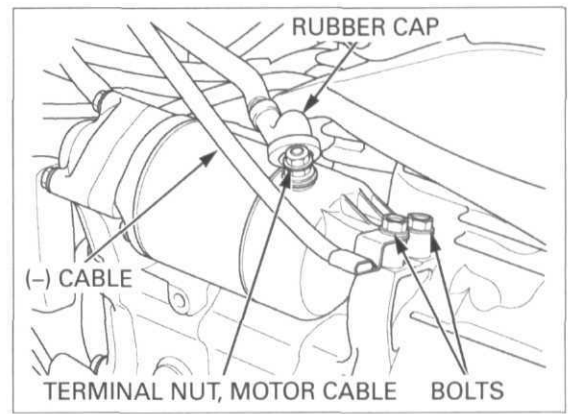
- Remove the seat (page 3-4).
- Remove the recoil starter cover (page 3-4).
- Disconnect the negative (-) cable from the battery.
- Remove the two bolts and right engine cover.



Slide the rubber cap off the starter motor cable terminal and remove the terminal nut and starter motor cable.

Remove the two mounting bolts, battery (-) cable and the starter motor from the crankcase.

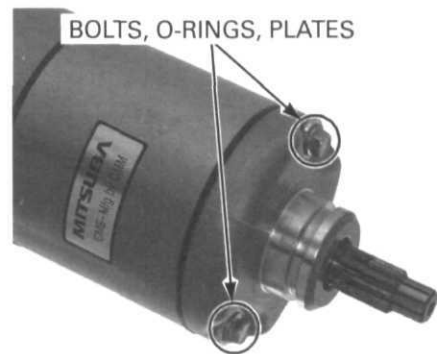
Remove the O-ring from the starter motor.



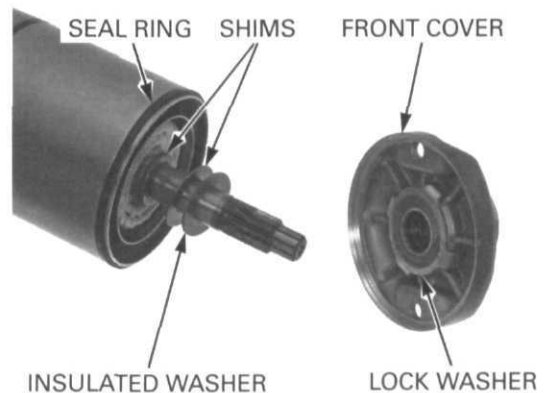
#### DISASSEMBLY/INSPECTION

Remove the following:

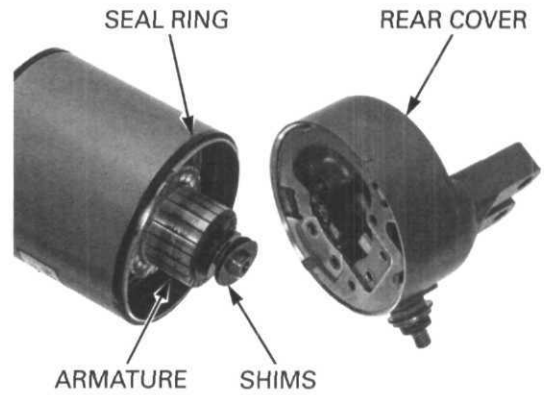
- motor case bolts
- O-rings
- setting plates



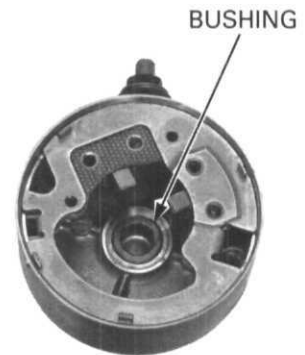
- Record the location and number of shims.
- front cover
  - lock washer
  - insulated washer
  - shims
  - seal ring



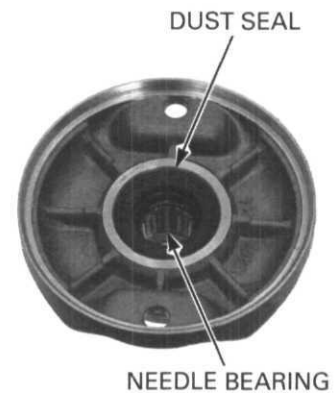
Record the location  
and number of  
shims.  
- rear cover  
- shims  
- seal ring  
- armature



Check the bushing in the rear cover for wear or damage.



Check the dust seal and needle bearing in the front cover for deterioration, wear or damage.



Check the commutator bars of the armature for discoloration.

**NOTE:**

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



# ELECTRIC STARTER

Check for continuity between pairs of commutator bars.  
There should be continuity.

CONTINUITY



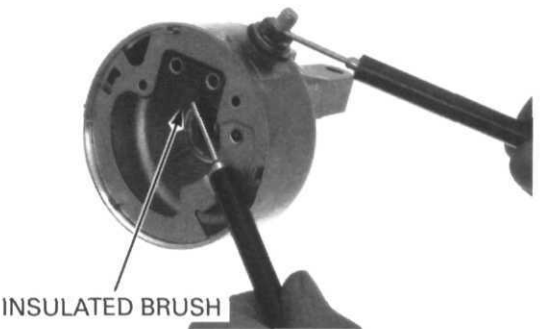
Check for continuity between each commutator bar and the armature shaft.  
There should be no continuity.

NO CONTINUITY



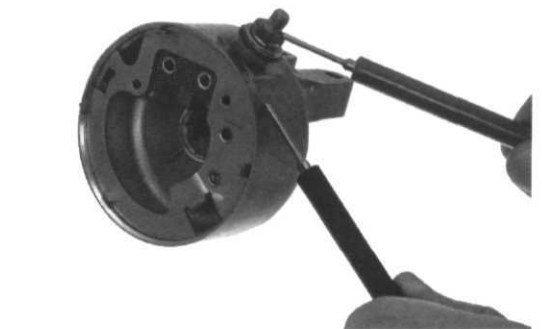
Check for continuity between the insulated brush and cable terminal.  
There should be continuity.

CONTINUITY



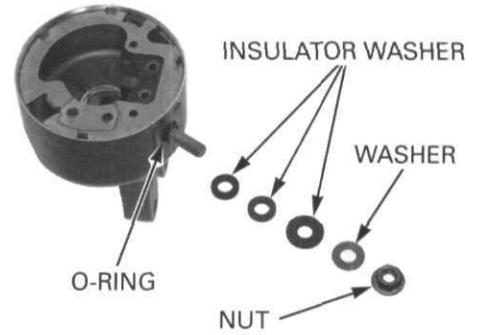
Check for continuity between the cable terminal and motor case.  
There should be no continuity.

NO CONTINUITY



Remove the following:

- nut
- washer
- insulator washers
- brush holder assembly
- O-ring



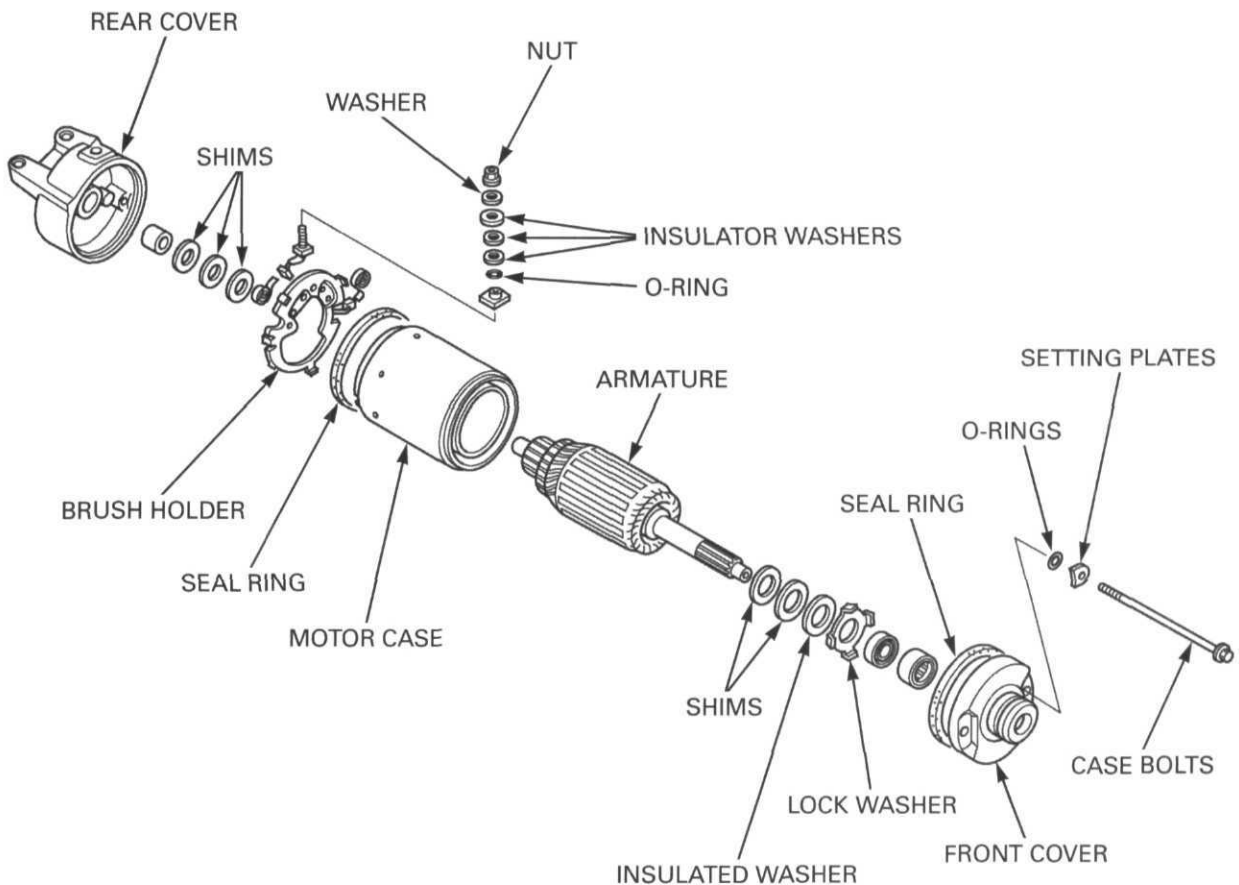
Remove the brushes from the brush holder.

Measure the brush length.

**SERVICE LIMIT: 9.0 mm (0.35 in)**

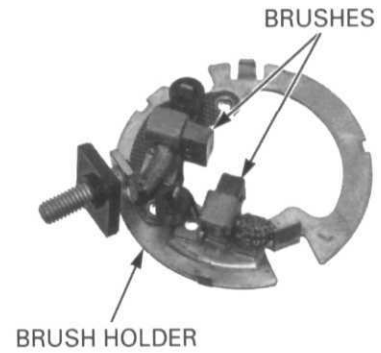


## ASSEMBLY



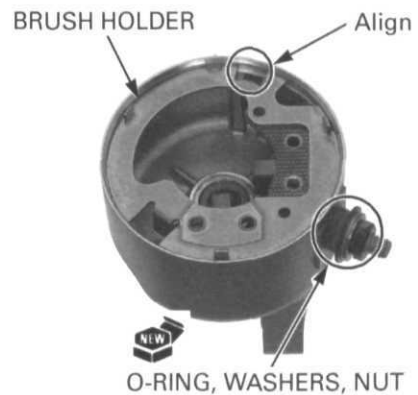
## ELECTRIC STARTER

Install the brushes into the brush holder.



Install the brush holder assembly into the rear cover by aligning the tab of the holder with the groove in the rear cover.

- Install the following:
- new O-ring
  - insulator washers
  - washer
  - nut

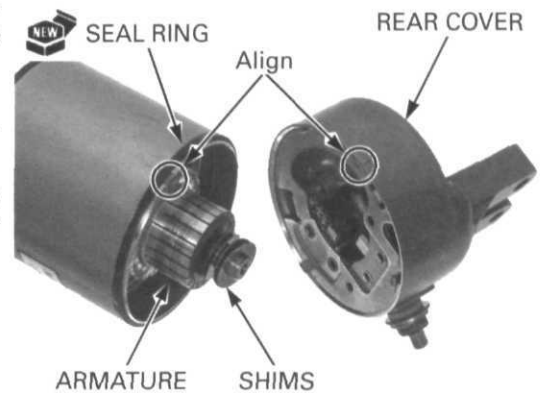


*The coil may be damaged if the magnet pulls the armature against the case.*

Install the armature into the motor case while holding the armature tightly to keep the magnet of the case from pulling the armature against it.

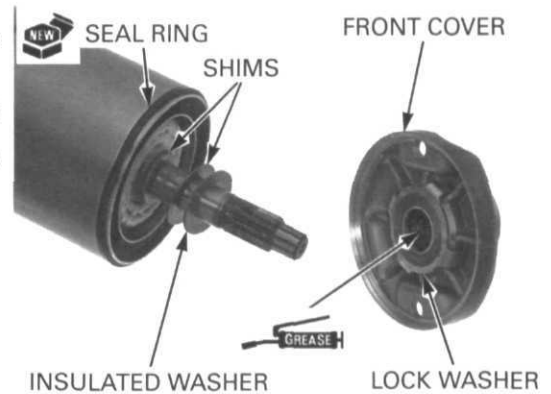
Install a new seal ring onto the motor case. Install the same number of shims in the same locations as noted during disassembly.

Install the rear cover while pushing in the brushes into the brush holder by aligning the brush holder tab with the motor case groove.

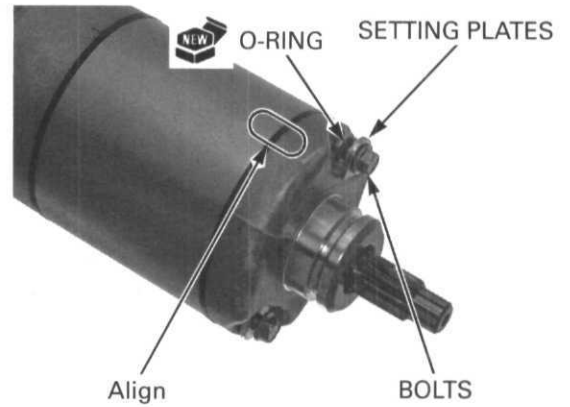


Install a new seal ring onto the motor case. Install the shims and insulated washer onto the armature shaft.

Apply grease to the dust seal lip and needle bearing in the front cover. Install the lock washer onto the front cover and the front cover over the motor case.

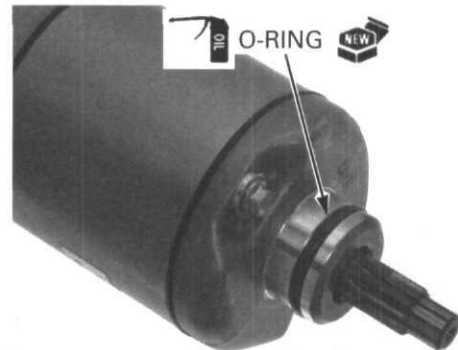


Align the index lines on the front cover and motor case.  
 Install the setting plates and new O-rings onto the motor case bolts.  
 Install the motor case bolts and tighten them.



## INSTALLATION

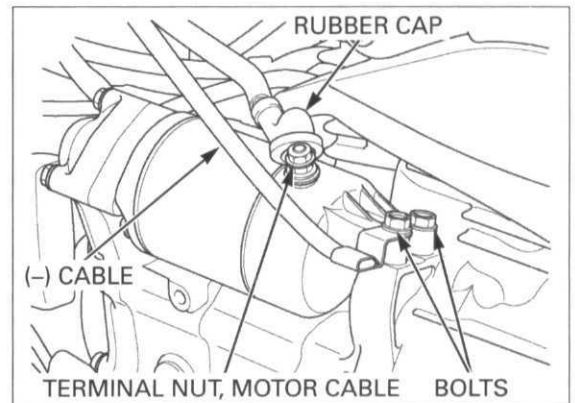
Coat a new O-ring with engine oil and install it into the starter motor groove.



Install the starter motor into the rear crankcase cover and onto the crankcase.  
 Install the mounting bolts with the battery (-) cable terminal and tighten them securely.

Install the starter motor cable and terminal nut, and tighten the nut.

Install the rubber cap over the cable terminal.

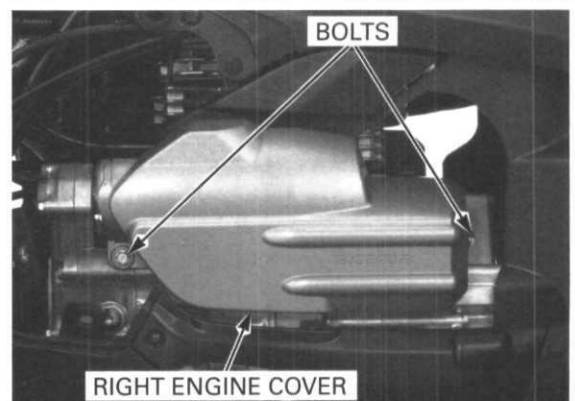


Install the right engine cover and tighten the two bolts.

Connect the negative (-) cable to the battery.

Install the recoil starter cover (page 3-4).

Install the seat (page 3-4).



# STARTER RELAY SWITCH

### OPERATION INSPECTION

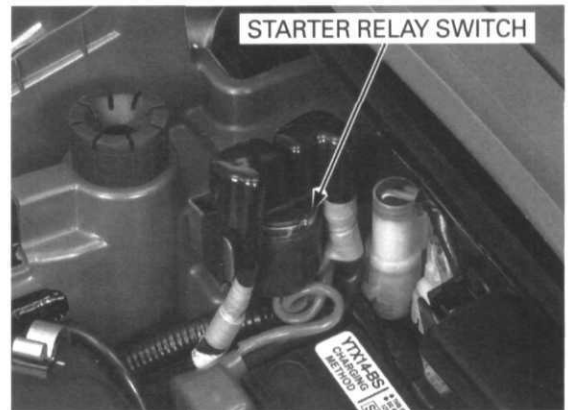
Remove the seat (page 3-4).

Shift the transmission into neutral.

Make sure the engine stop switch is turned to "O".  
Turn the ignition switch to ON and push the starter switch.

The coil is normal if the starter relay switch clicks.

If you don't hear the switch "CLICK", inspect the relay switch circuit



### CIRCUIT INSPECTION

Remove the rear fender lid (page 3-10).

Disconnect the starter relay switch 2P connector.

#### GROUND LINE

Check for continuity between the Gray/white wire terminal of the wire harness side connector and ground.

If there is continuity when the transmission is in neutral or when the front brake lever is squeezed, the ground circuit is normal.

#### POWER INPUT LINE

Make sure the engine stop switch is turned to "O" and turn the ignition switch to "ON".

Measure the voltage between the Yellow/red wire terminal (+) of the wire harness side connector and ground (-).

If the battery voltage appears only when the starter switch is pushed, the circuit is normal.



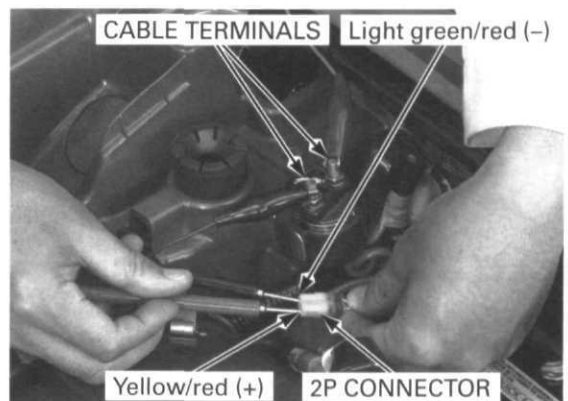
### FUNCTION INSPECTION

Remove the rear fender lid (page 3-10).

Disconnect the negative (-) cable from the battery.  
Disconnect the starter relay switch 2P connector.  
Remove the battery (+) cable and starter motor cable from the starter relay switch.

Connect the fully charged 12 V battery positive terminal to the Yellow/red wire terminal and negative terminal to the Light green/red wire terminal of the starter relay switch.

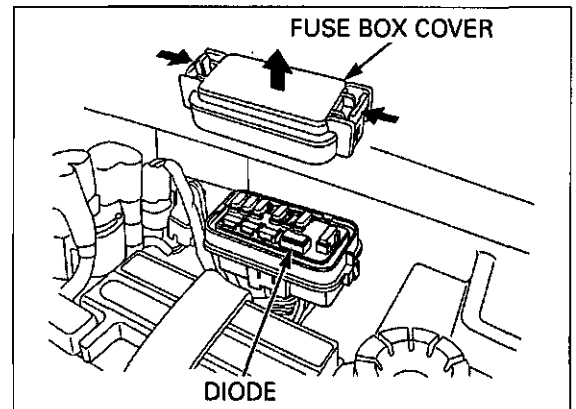
There should be continuity between the cable terminals while the battery is connected, and no continuity when the battery is disconnected.



**DIODE****INSPECTION**

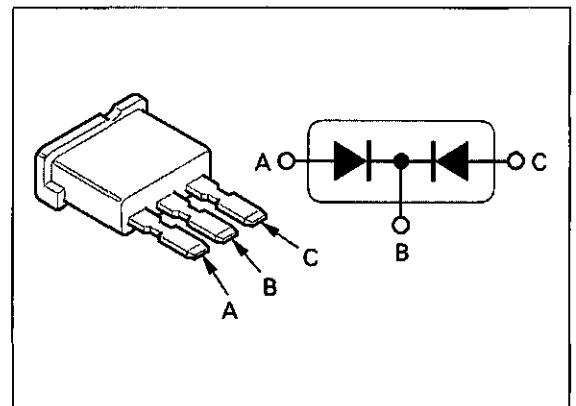
Remove the seat (page 3-4).

Remove fuse box cover and the diode.



Check for continuity between the diode terminals.  
When there is continuity, a small resistance value will register.

If there is continuity in one direction, the diode is normal.





# 21. LIGHTS/METERS/SWITCHES

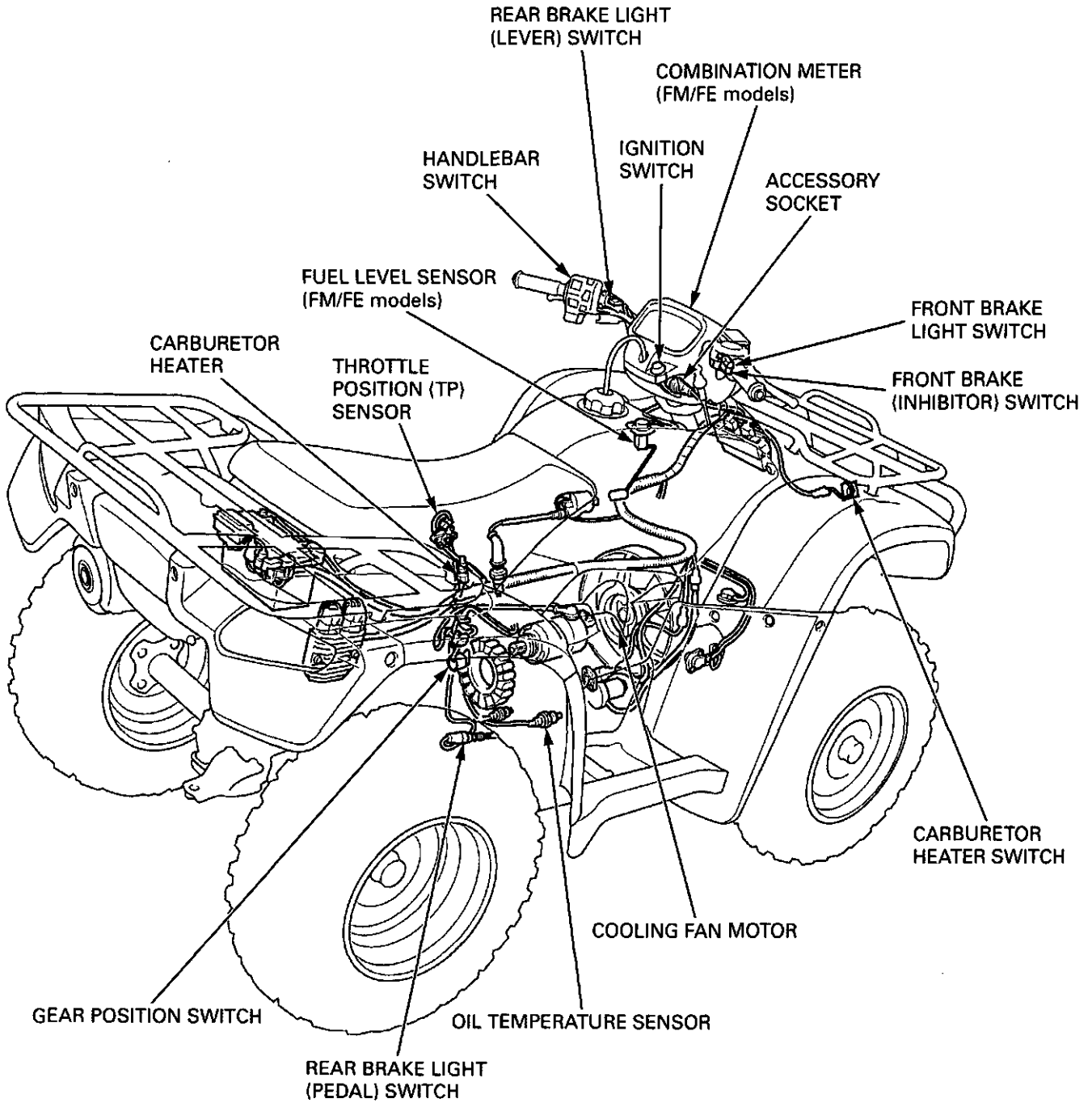
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COMPONENT LOCATION .....	21-2	FRONT BRAKE SWITCH.....	21-10
SERVICE INFORMATION .....	21-3	GEAR POSITION SWITCH.....	21-10
ASSIST HEADLIGHT (Except A/CM type TM model) .....	21-4	CARBURETOR HEATER/ CARBURETOR HEATER SWITCH.....	21-11
HEADLIGHT.....	21-5	COMBINATION METER (Except A/CM type TM model) .....	21-12
TAILLIGHT.....	21-5	FUEL GAUGE/FUEL LEVEL SENSOR (Except A/CM type TM model) .....	21-13
ACCESSORY SOCKET .....	21-6	OIL COOLING SYSTEM/ TEMPERATURE INDICATOR .....	21-15
IGNITION SWITCH.....	21-7	THROTTLE POSITION (TP) SENSOR .....	21-19
HANDLEBAR SWITCH.....	21-8	HORN (U type only) .....	21-21
BRAKE LIGHT SWITCH .....	21-9		

# LIGHTS/METERS/SWITCHES

## COMPONENT LOCATION

FE model shown:



## SERVICE INFORMATION

### GENERAL

- All plastic connectors have locking tabs that must be released before disconnecting, and must be aligned when reconnecting.
- A continuity check can usually be made without removing the part from the vehicle. Simply disconnect the connectors and connect a continuity tester to the terminals or connections.
- Check the battery condition before performing any inspection that requires proper battery voltage.
- The following color codes used are indicated throughout this section.

Bl: Black	G: Green	Lg: Light Green	R: Red
Br: Brown	Gr: Gray	O: Orange	W: White
Bu: Blue	Lb: Light Blue	P: Pink	Y: Yellow

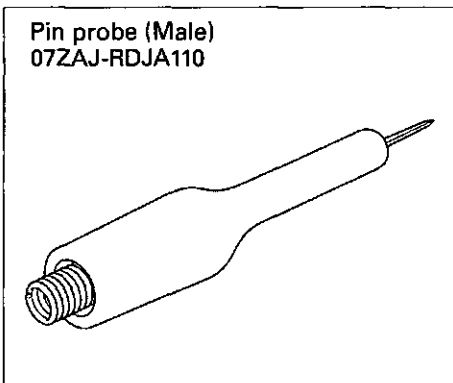
### SPECIFICATIONS

ITEM		SPECIFICATIONS	
Bulbs	Headlight (high/low beam)	12 V - 30/30 W x 2	
	Assist headlight	12 V - 45 W	
	Brake/taillight	12 V - 21/5 W x 2	
	Neutral indicator	12 V-1.7 W (A/CM type TM model) LED (Except A/CM type TM model)	
	Reverse indicator	12 V-1.7 W (A/CM type TM model) LED (Except A/CM type TM model)	
	Oil temperature indicator	12 V-1.7 W (A/CM type TM model) LED (Except A/CM type TM model)	
	4WD indicator (FM/FE only)	LED	
	Meter light	LED x 10 (Except A/CM type TM model)	
Fuse	Main fuse	TM/FM	30 A
		FE	30 A x 2
	Sub-fuse		15 A x 2, 10 A x 2

### TORQUE VALUES

Oil temperature sensor	18 N·m (1.8 kgf·m, 13 lbf·ft)
Assist headlight/meter bracket nut	25 N·m (2.5 kgf·m, 18 lbf·ft)
Throttle position sensor spacer screw	3.4 N·m (0.35 kgf·m, 2.5 lbf·ft)

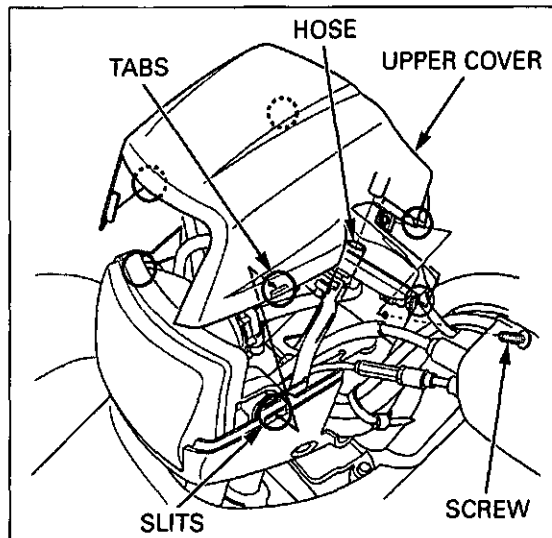
### TOOL



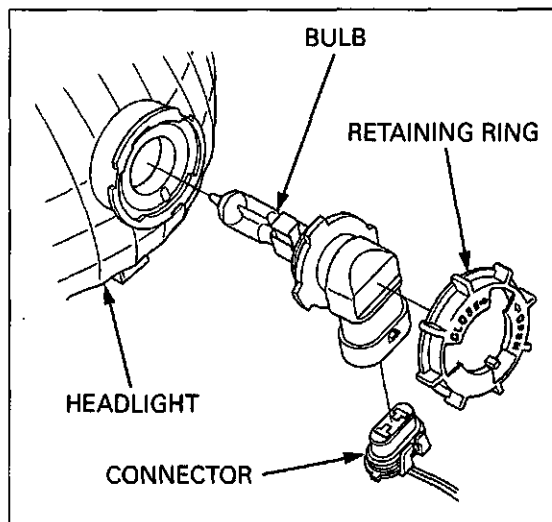
## ASSIST HEADLIGHT (Except A/CM type TM model)

### BULB REPLACEMENT

Remove the screw.  
Release the four tabs of the assist headlight upper cover from the slits in the front and lower covers.  
Disconnect the breather joint hose from the upper cover and remove the cover.



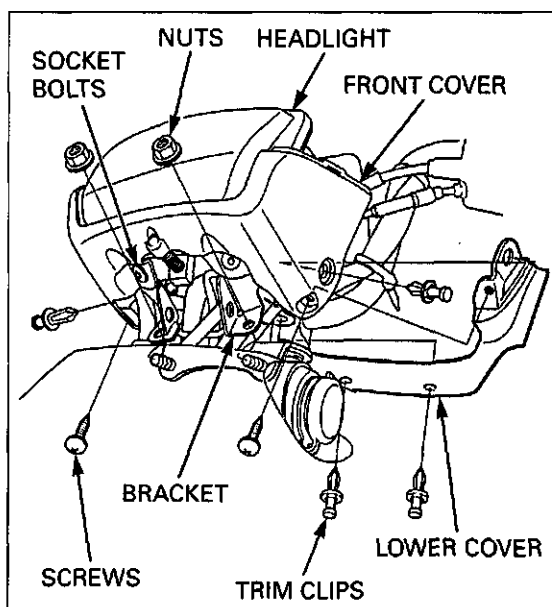
Disconnect the assist headlight connector.  
Remove the retaining ring by turning it counter-clockwise and remove the bulb from the headlight.  
Install a new bulb and removed parts in the reverse order of removal.



### REMOVAL/INSTALLATION

Remove the assist headlight bulb (page 21-4).  
Remove the two tapping screws, trim clips and the headlight lower cover from the bracket.  
Remove the two trim clips, 8 mm nuts and the assist headlight/meter bracket from the steering shaft.  
Remove the two socket bolts and assist headlight/front cover from the bracket.  
Install the headlight/front cover and removed parts in the reverse order of removal.

**TORQUE: 8 mm nut: 25 N·m (2.5 kgf·m, 18 lbf·ft)**



# HEADLIGHT

## BULB REPLACEMENT

Remove the screw and headlight cover cap by releasing the tabs from the slits in the headlight case.

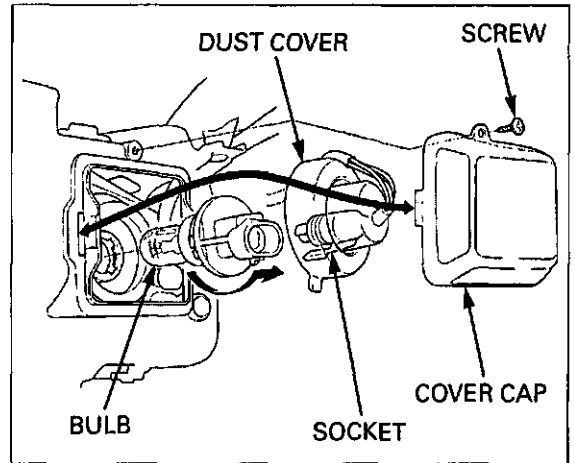
Remove the dust cover.

Remove the bulb socket by turning it counterclockwise.

Disconnect the bulb connector and replace the bulb with a new one.

Install a new bulb in the reverse order of removal.

*Align the socket tabs with the headlight grooves properly.*



## REMOVAL/INSTALLATION

Remove the headlight bulb socket (page 21-5).

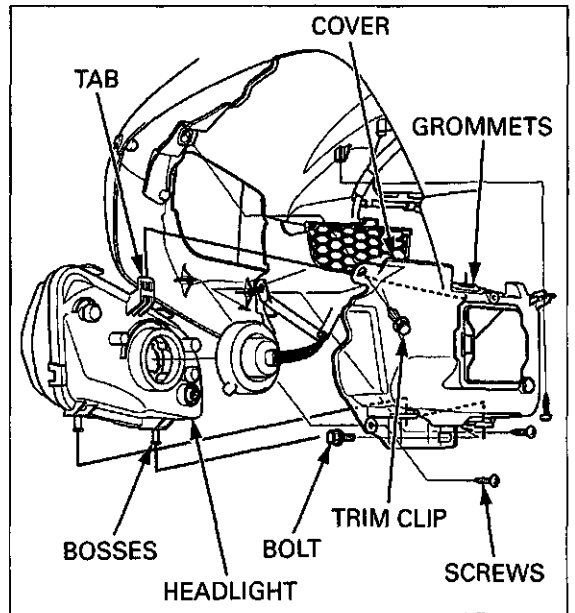
Remove the trim clip, three tapping screws, bolt and the headlight assembly from the front fender.

Remove the headlight cover by releasing the grommets from the tab and two bosses.

Install the headlight in the reverse order of removal.

**NOTE:**

- The headlight beam can be adjusted vertically by removing the access plug and turning the headlight beam adjusting screw.



# TAILLIGHT

## BULB REPLACEMENT

Remove the screw and taillight cover cap.

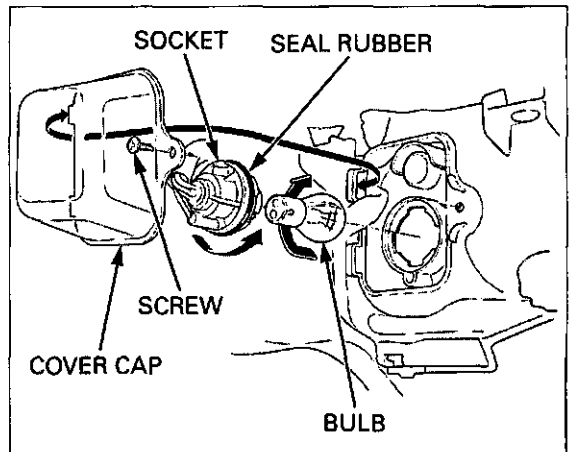
Turn the bulb socket counterclockwise and remove it from the taillight.

Turn the taillight bulb counterclockwise while pushing it in and remove it from the socket.

Make sure that the seal rubber on the connector is installed in position and is in good condition.

Install a new taillight bulb in the reverse order of removal.

*Align the socket tabs with the taillight grooves properly.*



## LIGHTS/METERS/SWITCHES

### REMOVAL/INSTALLATION

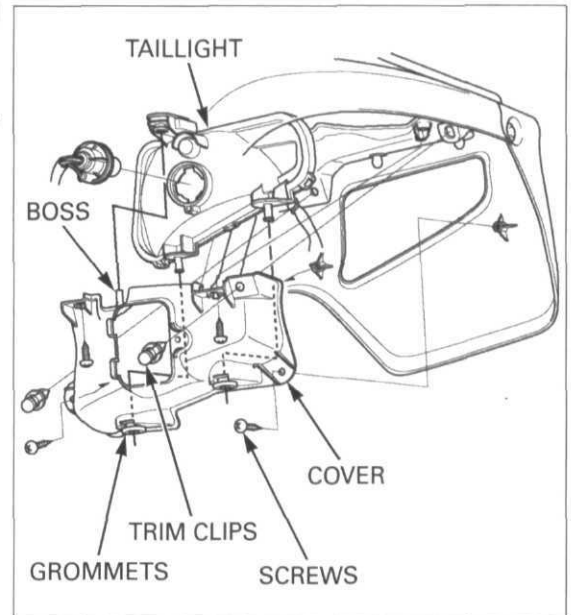
Remove the two trim clips, four tapping screws and the taillight assembly from the rear fender.

Remove the taillight bulb (page 21-5).

Remove the taillight cover from the taillight by releasing the three boss and grommets.

Install the taillight in the reverse order of removal.

*Align the bosses  
and grommets  
properly.*



## ACCESSORY SOCKET

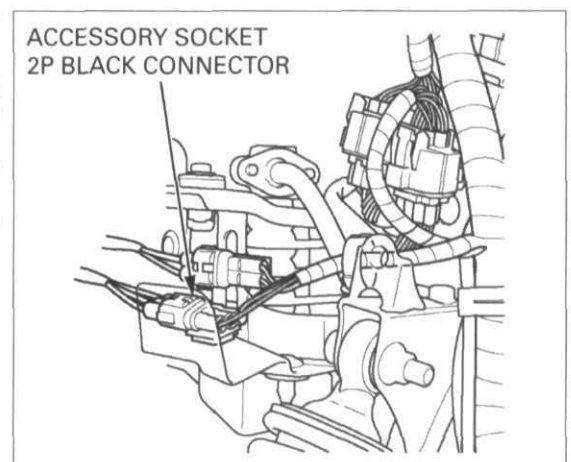
### INSPECTION

Remove the accessory socket 2P black connector from the frame and disconnect it.

Measure the voltage between the White/black (+) and Green (-) wire terminals of the wire harness side connector.

There should be battery voltage with the ignition switch turned to ON.

If there is no voltage, check for brown ACC fuse (10 A) and an open circuit in the wire harness.

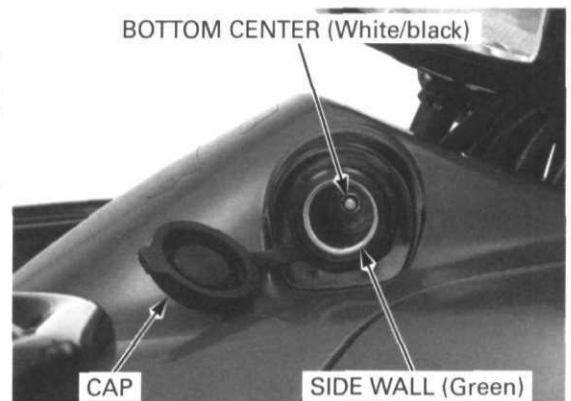


Remove the accessory socket cap.

Check for continuity between the White/black wire terminal of the socket side 2P connector and bottom center terminal of the socket, and between the Green wire terminal and side wall terminal.

There should be continuity.

If there is no continuity, replace the accessory socket.



**REPLACEMENT**

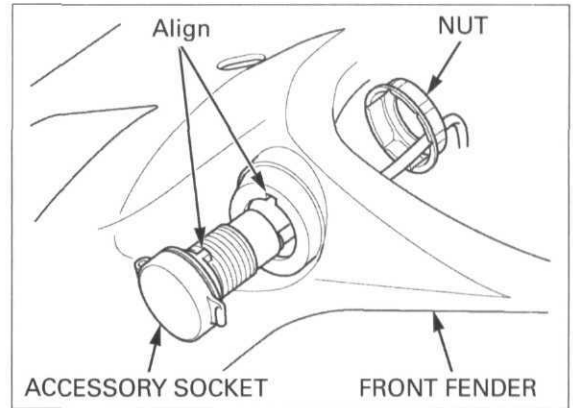
Disconnect the accessory socket 2P connector (page 21-6)  
 Remove the fuel tank cover (page 3-5)

Release the accessory socket wire from the wire clip on the front fender

Loosen the nut and remove the accessory socket from the front fender.

Install a new accessory socket by aligning the lug with the groove in the front fender.  
 Install the nut and tighten it securely.

Clamp the accessory socket wire on the front fender (page 1-22), and connect the 2P black connector.



**IGNITION SWITCH**

**INSPECTION**

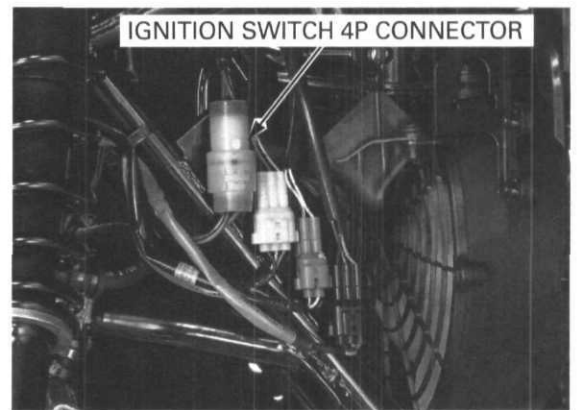
Remove the left inner fender (page 3-8).

Remove the ignition switch 4P connector from the frame and disconnect it.

Check for continuity between the switch side connector terminals in each switch position.

Continuity should exist between the color coded wires as follows:

Color Position	Red/black	Pink	Red	Black
	ON	○—○		○—○
OFF				



**REPLACEMENT**

Remove the front fender (page 3-9).

Remove the assist headlight covers (page 21-4).

Disconnect the ignition switch 4P connector (page 21-7).

Remove the wire band.

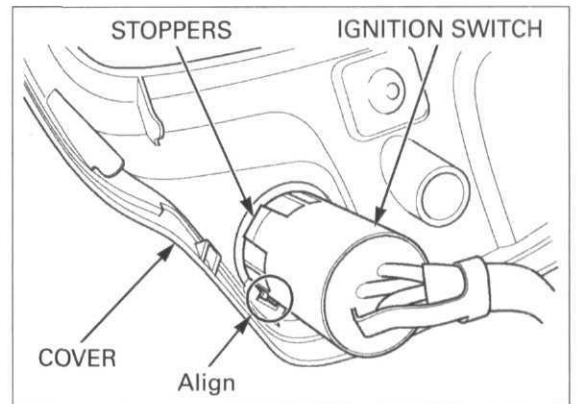
Release the ignition switch wire from the guide clip on the steering shaft holder.

Remove the ignition switch from the assist headlight upper cover by pushing in the two stoppers.

Install a new ignition switch by aligning the locating tab with the cover groove.

Install the removed parts in the reverse order of removal.

*Route the ignition switch wire properly (page 1-22).*

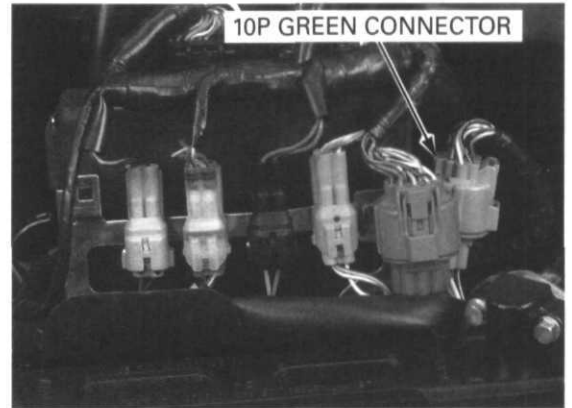


# HANDLEBAR SWITCH

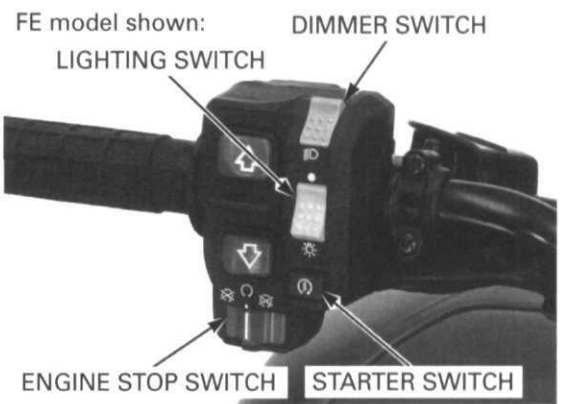
## INSPECTION

Remove the front fender (page 3-9).

Remove the handlebar switch 10P green connector from the frame and disconnect it.



Check for continuity between the switch side connector terminals in each switch position. Continuity should exist between the color coded wires as follows:



### LIGHTING SWITCH/DIMMER SWITCH

Color \ Position	Black/brown	Brown	●
●			
☀	○	○	○

Color \ Position	●	White	Blue/black
☀	○		○
(N)	○	○	○
☀	○	○	

### ENGINE STOP SWITCH/STARTER SWITCH

Color \ Position	Black/green	Black/white
⊗	○	○
○		
⊗	○	○

Color \ Position	Black/white	Yellow/red
FREE		
PUSH	○	○



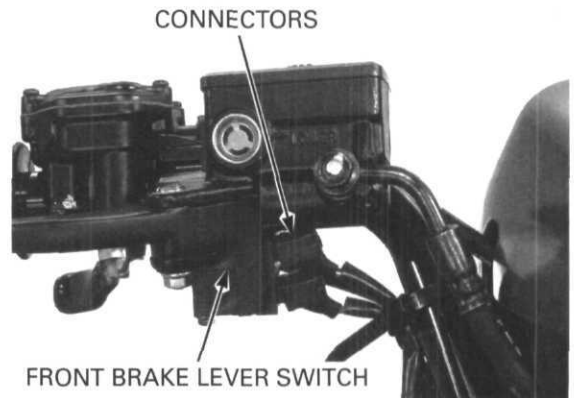
## BRAKE LIGHT SWITCH

### FRONT BRAKE LEVER

*The upper switch is the front brake light switch.*

Disconnect the front brake lever switch connectors and check for continuity between the switch terminals.

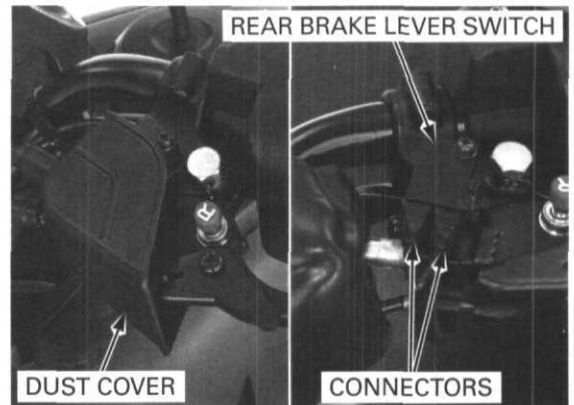
There should be continuity with the front brake lever squeezed and no continuity with the lever released.



### REAR BRAKE LEVER

Slide the dust cover from the brake lever bracket. Disconnect the rear brake lever switch connectors and check for continuity between the switch terminals.

There should be continuity with the rear brake lever squeezed and no continuity with the lever released.



### REAR BRAKE PEDAL

Remove the seat (page 3-4).  
Remove the recoil starter cover (page 3-4).

Disconnect the rear brake pedal switch 2P yellow connector and check for continuity between the switch side connector terminals.

There should be continuity with the rear brake pedal depressed and no continuity with the pedal released.



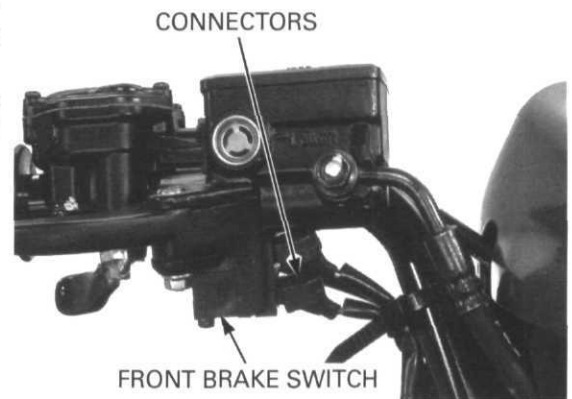
## FRONT BRAKE SWITCH

### INSPECTION

*The lower switch is the front brake (inhibitor) switch.*

Disconnect the front brake (inhibitor) switch connectors and check for continuity between the switch terminals.

There should be continuity with the front brake lever squeezed and no continuity with the lever released.



## GEAR POSITION SWITCH

### INSPECTION

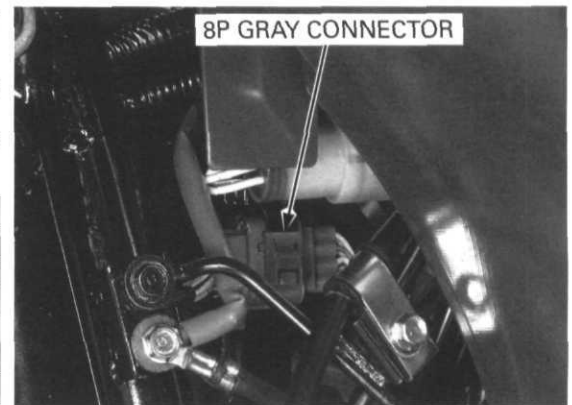
Remove the gear position switch 8P gray connector from the frame and disconnect it.

*If the transmission will not shift with the gearshift switches, use the manual gearshift lever located with the tool kit under the seat.*

Check for continuity between each terminal of the switch side connector and ground.

There should be continuity in each gear position as follows:

Gear position	Wire color
Reverse	Gray
Neutral	Light green/red
1st	White/green
2nd	White/red
3rd	Green
4th	Yellow
5th	Light blue/white



### REPLACEMENT

Remove the rear crankcase cover (page 12-8).

Remove the bolt and clamp plate.

Remove the wire grommet from the crankcase cover.

Remove the retaining bolt and the gear position switch.

Apply locking agent to the retaining bolt threads.

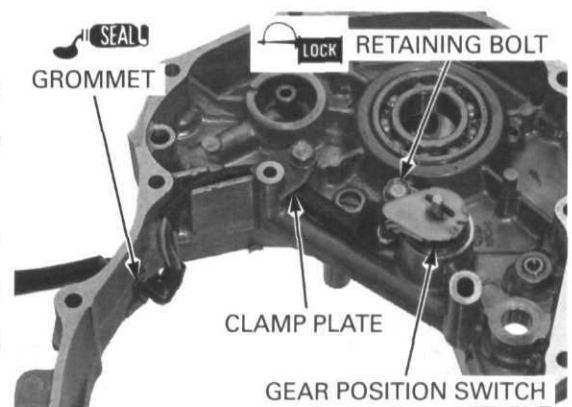
Install a new gear position switch into the crankcase cover and tighten the bolt.

Apply liquid sealant to the grommet seating surface.

Route the wire as shown and install the grommet into the crankcase cover groove securely.

Install the clamp plate and tighten the bolt.

Install the rear crankcase cover (page 12-30).

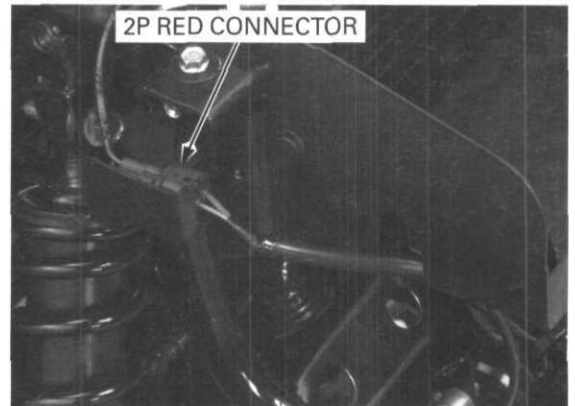


## CARBURETOR HEATER/CARBURETOR HEATER SWITCH

### SYSTEM INSPECTION

Remove the carburetor heater switch 2P red connector from the frame under the front fender and disconnect it.

Connect the wire harness side connector terminals with a jumper wire.

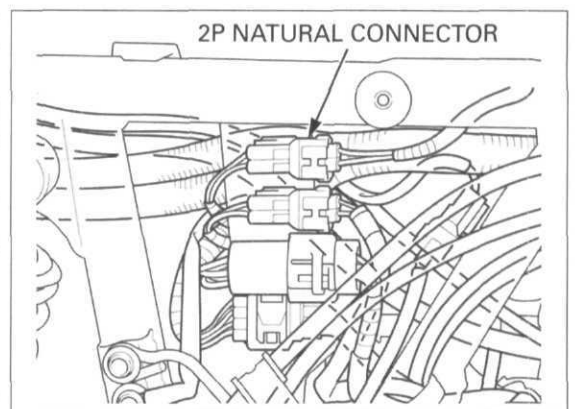


Remove the carburetor heater 2P natural connector from the frame under the rear fender and disconnect it.

Measure the voltage between the Brown (+) and Green (-) wire terminals of the wire harness side connector.

There should be battery voltage with the ignition switch turned to ON.

If there is no voltage, check for an open circuit in the wire harness.



### CARBURETOR HEATER INSPECTION

Remove the carburetor heater 2P connector from the frame under the rear fender and disconnect it.

Measure the resistance between the heater side connector terminals.

**STANDARD: 13 – 15  $\Omega$  (at 20°C/68°F)**

If the resistance is out of above range, replace the carburetor heater.

Refer to pages 6-10 and 6-12 for carburetor heater replacement.

### CARBURETOR HEATER SWITCH INSPECTION

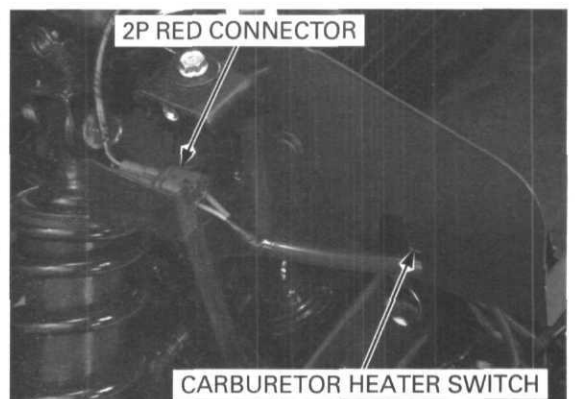
Remove the carburetor heater switch 2P red connector from the frame under the front fender and disconnect it.

Check for continuity between the switch side connector terminals.

**Above 20°C (68°F): No continuity**

**Below 7°C (45°F): Continuity**

If the test result is abnormal, replace the carburetor heater switch.



## COMBINATION METER (Except A/CM type TM model)

### POWER/GROUND LINE INSPECTION

Remove the front fender (page 3-9).

Remove the combination meter 14P gray connector from the frame and disconnect it.

Check the following at the wire harness side connector.

### POWER INPUT LINE

Measure the voltage between the Black/brown wire terminal (+) and ground (-).

There should be battery voltage with the ignition switch turned to ON.

If there is no voltage, check for an open circuit in the wire harness.

### BACK-UP VOLTAGE LINE

Measure the voltage between the Red/black wire terminal (+) and ground (-).

There should be battery voltage at all times.

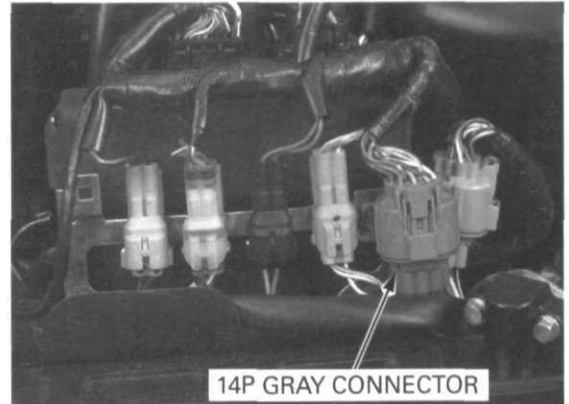
If there is no voltage, check for an open circuit in the wire harness.

### GROUND LINE

Check for continuity between the Green wire terminal and ground.

There should be continuity at all times.

If there is no voltage, check for an open circuit in the wire harness.



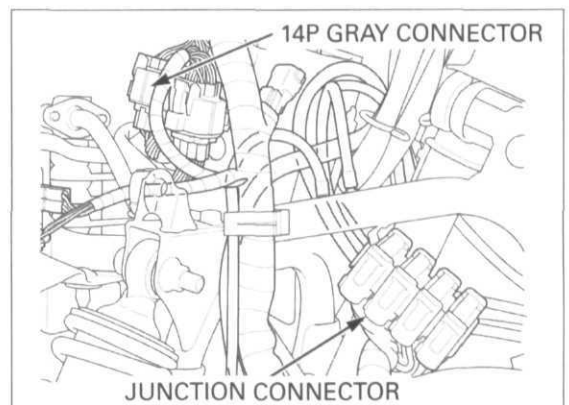
### SPEEDOMETER INSPECTION

Check that the hour meter and odometer/trip meter function properly.

- If they do not function, perform the power/ground line inspection (page 21-12).
- If they function, check the rear vehicle speed sensor (VSS) (page 23-7).

If the VSS is OK, remove the front fender (page 3-9) and check the Pink/green wire for continuity between the combination meter 14P gray connector and rear VSS 3P yellow connector.

- If there is continuity, replace the combination meter.
- If there is no continuity, repair an open circuit in the wire harness.



### REPLACEMENT

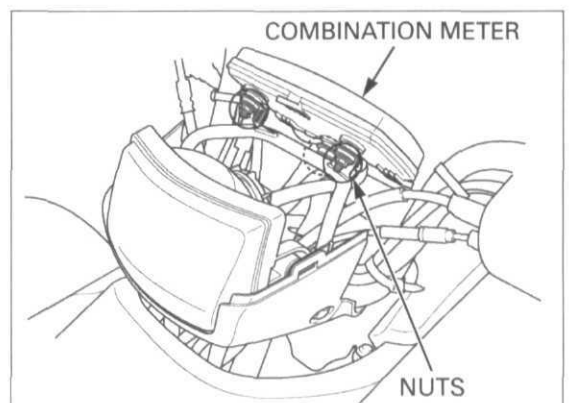
Disconnect the combination meter 14P gray connector (page 21-12).

Remove the assist headlight upper cover (page 21-4).

Remove the three nuts and the combination meter from the bracket.

Install the combination meter in the reverse order of removal.

*Route the meter wire properly (page 1-22).*



## FUEL GAUGE/FUEL LEVEL SENSOR (Except A/CM type TM model)

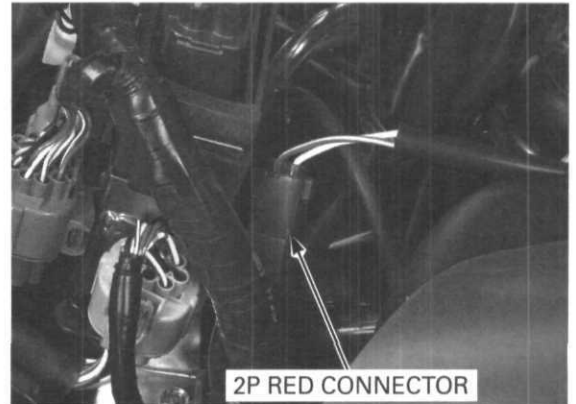
### SYSTEM INSPECTION

Check that the speedometer and indicators function properly.

- If they do not function, check the power/ground line (page 21-12).
- If they function, check as follows:

Remove the front fender (page 3-9).

Disconnect the fuel level sensor 2P red connector.



Turn the ignition switch to ON and check the fuel gauge.

All segments should blink.

Turn the ignition switch to OFF.

Connect the wire harness side connector terminals with a jumper wire.

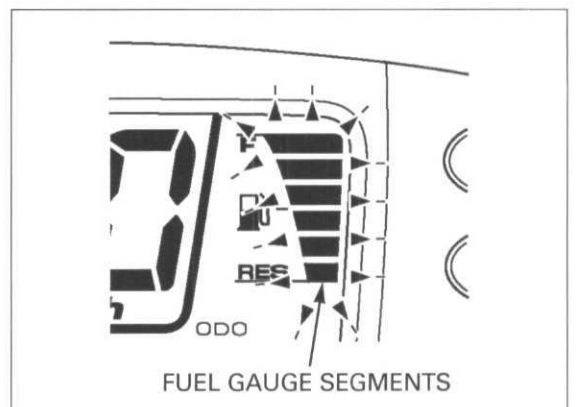
Turn the ignition switch to ON and check the fuel gauge.

All segments should blink.

If the fuel gauge does not function properly, replace the combination meter (page 21-12).

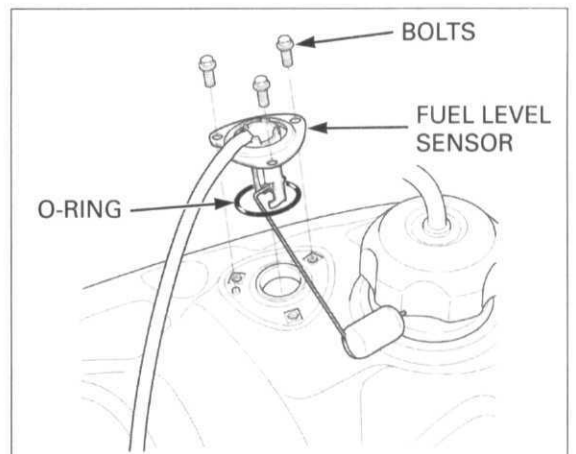
Turn the ignition switch to OFF.

Connect the fuel level sensor 2P red connector.

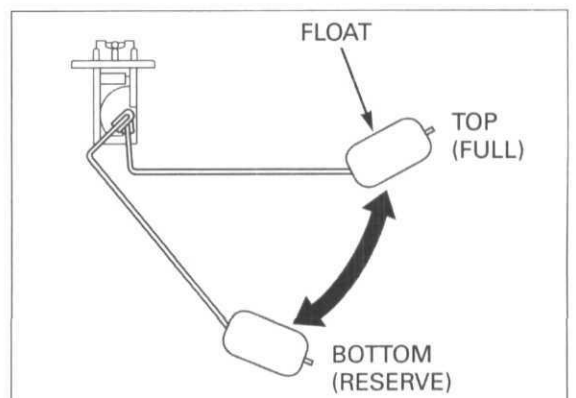


Remove the fuel tank cover (page 3-5).

Remove the three bolts, fuel level sensor and O-ring from the fuel tank.

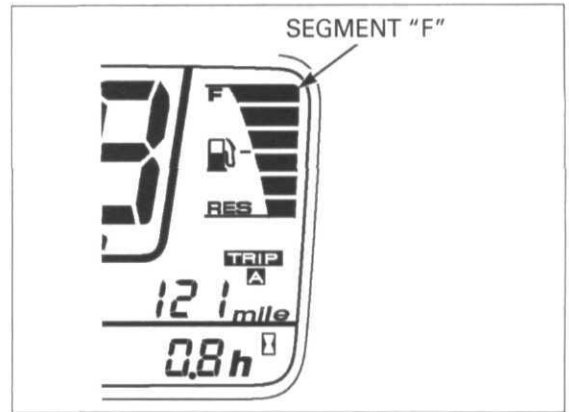


With the fuel level sensor float at the top (FULL) position, turn the ignition switch to ON and check the fuel gauge.



## LIGHTS/METERS/SWITCHES

All segments up to segment "F" should come on.  
Turn the ignition switch to OFF.



Move the float to the bottom (RESERVE) position, turn the ignition switch to ON and check the fuel gauge.

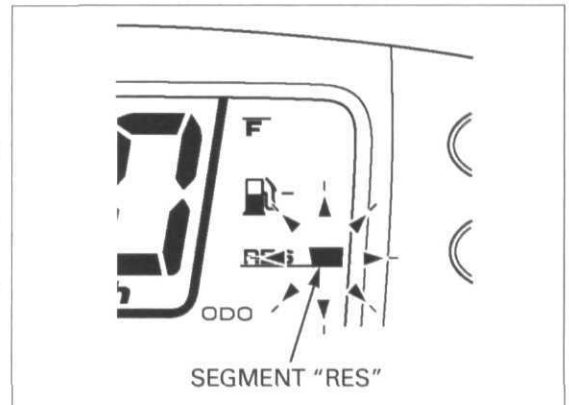
Segment "RES" should blink.

If the fuel gauge does not function properly, check the fuel level sensor (page 21-14).

If the fuel level sensor is OK, replace the combination meter.

If all segments blink during inspection, replace the combination meter.

Turn the ignition switch to OFF.

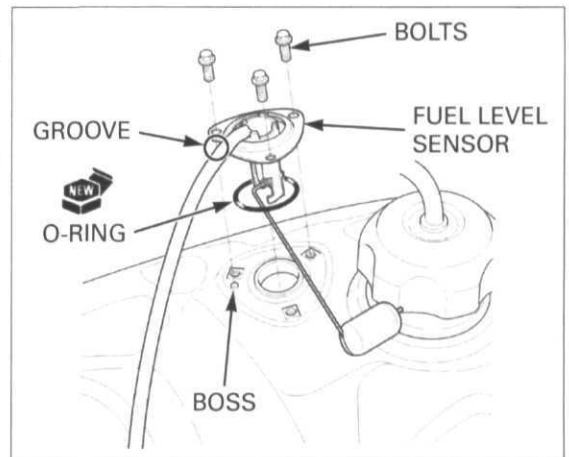


Install a new O-ring onto the fuel tank.

Install the fuel level sensor into the fuel tank while aligning the groove with the boss on the fuel tank.

Install and tighten the bolts securely.

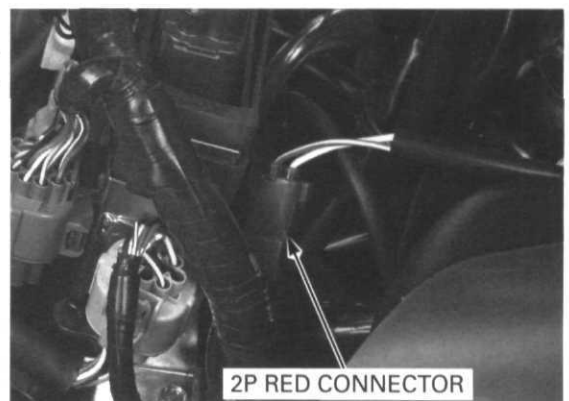
Install the removed parts in the reverse order of removal.



### FUEL LEVEL SENSOR INSPECTION

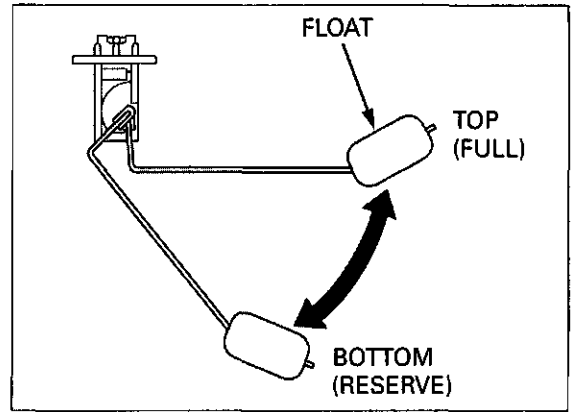
Remove the fuel level sensor (page 21-13).

Disconnect the fuel level sensor 2P red connector and connect the ohmmeter to the sensor side connector terminals.



Measure the fuel level sensor resistance with the float at the top (FULL) and bottom (RESERVE) positions.

FLOAT POSITION	RESISTANCE (20°C/68°F)
TOP (FULL)	5 - 7 Ω
BOTTOM (RESERVE)	204 - 210 Ω



## OIL COOLING SYSTEM/TEMPERATURE INDICATOR

### INSPECTION

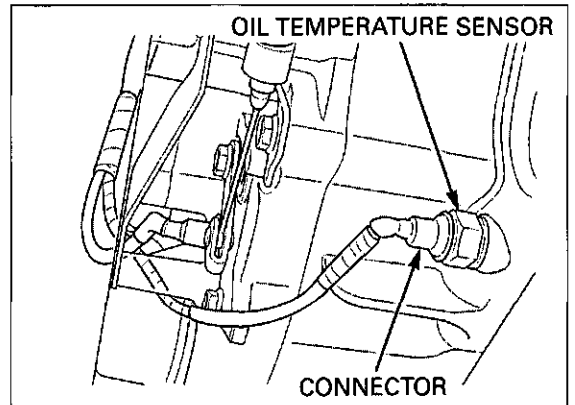
**NOTE:**

- The oil temperature indicator should come on for a few seconds when the ignition switch is turned to ON, then it should go off.

Check that the neutral indicator or reverse indicator function properly.

- If they do not function, perform the power/ground line inspection (page 21-12).
- If they function, check the following.

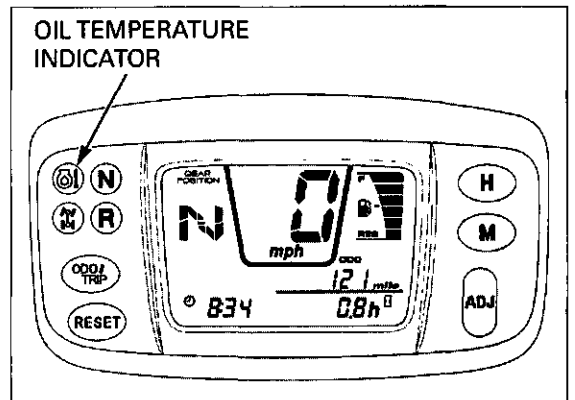
Disconnect the connector from the oil temperature sensor and ground it with a jumper wire.



Turn the ignition switch to ON and check the cooling fan motor and oil temperature indicator.

The motor should start and indicator should come on when the jumper wire is connected, and the motor should not start and indicator should not come on when the jumper wire is disconnected.

- If the system is normal, check the oil temperature sensor (page 21-18).
- If it is abnormal, check as follows.



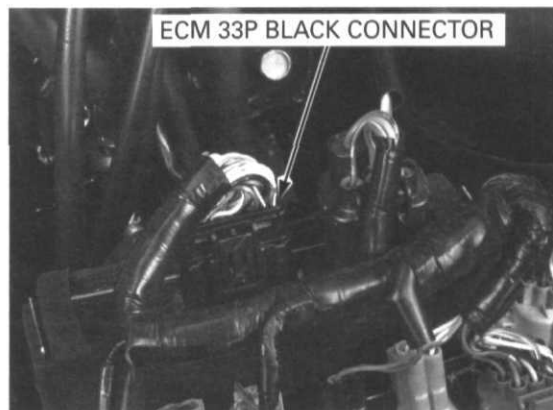
## LIGHTS/METERS/SWITCHES

### Fan motor does not start and oil temperature indicator does not come on

Remove the front fender (page 3-9).

Turn the ignition switch to OFF.

Disconnect the 33P black connector from the ECM.



Check the Yellow/green wire for continuity between the 33P connector and oil temperature sensor connector using the special tool.

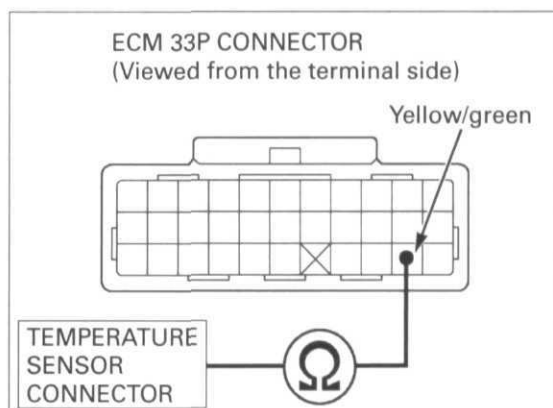
#### TOOL:

**Pin probe (Male)**

**07ZAJ-RDJA110**

There should be continuity.

- If there is no continuity, repair open circuit in the Yellow/green wire.
- If there is continuity, replace the ECM.



### Fan motor does not stop and oil temperature indicator does not go off

Disconnect the 33P black connector from the ECM (page 21-16).

Check for continuity between the oil temperature sensor connector terminal and ground.

There should be no continuity.

- If there is continuity, repair short circuit in the Yellow/green wire between the 33P connector and oil temperature sensor connector.
- If there is no continuity, replace the ECM.

### Fan motor does not start

Remove the front fender (page 3-9).

Turn the ignition switch to OFF.

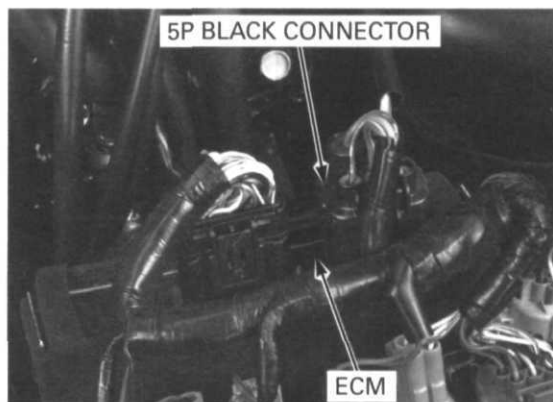
Disconnect the 5P black connector from the ECM.

Ground the Green/black wire terminal of the wire harness side connector with a jumper wire.

Turn the ignition switch to ON and check the fan motor.

If the motor starts, check the for continuity between the Green wire terminal of the wire harness side connector and ground.

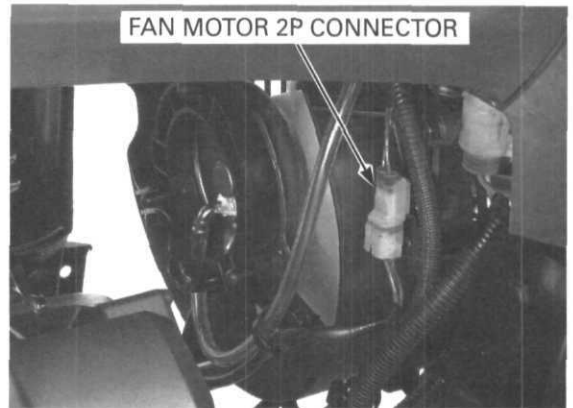
- If there is continuity, replace the ECM.
- If there is no continuity, repair open circuit in the Green wire.





If the motor does not start, remove the right engine air guide (page 3-12).  
 Disconnect the fan motor 2P connector.  
 Measure the voltage between the wire harness side connector Blue wire terminal (+) and ground (-).  
 There should be battery voltage with the ignition switch turned to ON.

- If there is no voltage, check for open circuit in the Blue wire.
- If there is voltage, check the Green/black wire for continuity between the fan motor 2P connector and ECM 5P connector.
- If there is continuity, replace the ECM.
- If there is no continuity, repair open circuit in the Green/black wire.



**Fan motor does not stop**

Disconnect the 5P black connector from the ECM (page 21-16).

Turn the ignition switch to ON and check the fan motor.

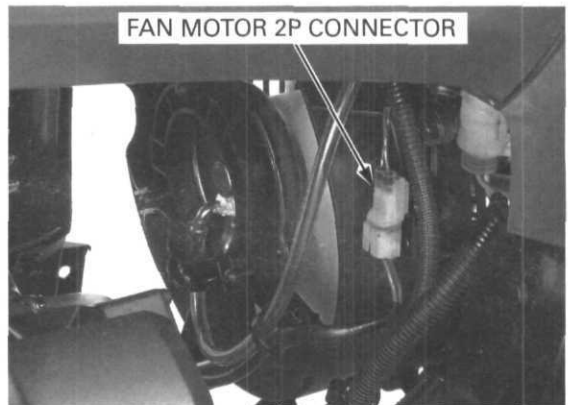
If the fan motor does not start, replace the ECM.

If the fan motor starts, remove the right engine air guide (page 3-12).

Turn the ignition switch to OFF.

Disconnect the fan motor 2P connector.

Check for short circuit in the Green/black wire between the fan motor 2P connector and ECM 5P connector.



**Oil temperature indicator does not come on**

Disconnect the 33P black connector from the ECM (page 21-16).

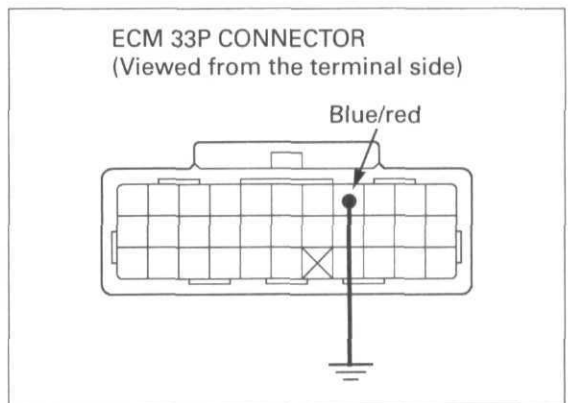
Ground the Blue/red wire terminal of the wire harness side connector using a jumper wire and special tool.

**TOOL:**

**Pin probe (Male) 07ZAJ-RDJA110**

Turn the ignition switch to ON and check the oil temperature indicator.

If the indicator comes on, replace the ECM.

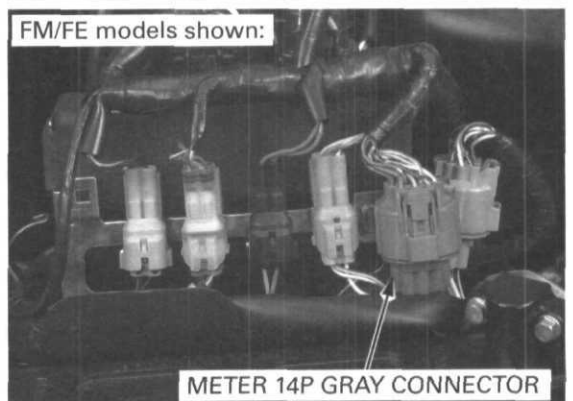


*FM/FE models:* If the indicator does not come on, turn the ignition switch to OFF and disconnect the meter 14P gray connector.

Check for an open circuit in the Blue/red wire between the meter connector and ECM connector.  
 If the wire is OK, replace the combination meter.

*TM model:* If the indicator does not come on, turn the ignition switch to OFF and disconnect the indicator 6P connector.

Check for open circuit in the Blue/red wire between the indicator connector and ECM connector.  
 If the wire is OK, check the oil temperature indicator bulb and socket.



## LIGHTS/METERS/SWITCHES

### Oil temperature indicator does not go off

Disconnect the 33P black connector from the ECM (page 21-16).

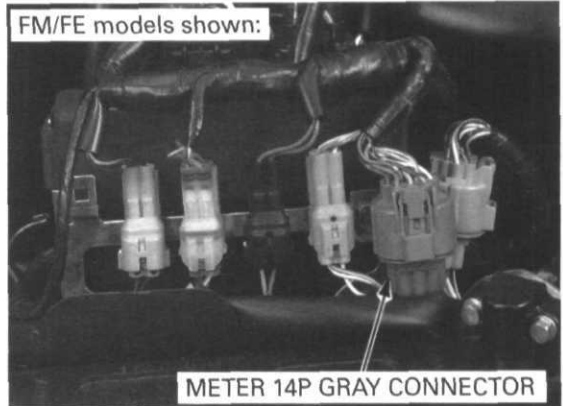
Turn the ignition switch to ON and check the oil temperature indicator.

If the indicator does not come on, replace the ECM.

*FM/FE models:* If the indicator comes on, turn the ignition switch to OFF and disconnect the meter 14P gray connector. Check for short circuit in the Blue/red wire between the meter connector and ECM connector. If the wire is OK, replace the combination meter.

*TM model:* If the indicator comes on, turn the ignition switch to OFF and disconnect the indicator 6P connector. Check for short circuit in the Blue/red wire between the indicator connector and ECM connector. If the wire is OK, check the oil temperature indicator bulb socket.

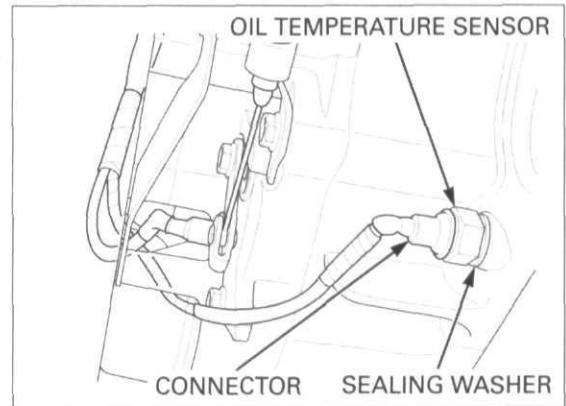
FM/FE models shown:



### OIL TEMPERATURE SENSOR INSPECTION

Drain the engine oil (page 4-12).

Disconnect the connector and remove the oil temperature sensor and sealing washer.



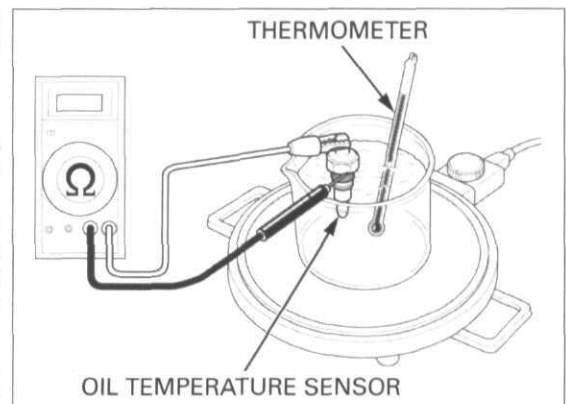
Suspend the temperature sensor in a pan of engine oil on an electric heating element and measure the resistance through the sensor as the oil heats up.

#### NOTE:

- Soak the temperature sensor in oil up to its threads with at least 40 mm (1.57 in) from the bottom of the pan to the bottom of the sensor.
- Keep the temperature constant for 3 minutes before testing. A sudden change of temperature will result in incorrect readings. Do not let the thermometer and temperature sensor touch the pan.

<b>Temperature</b>	<b>150°C (302°F)</b>	<b>170°C (338°F)</b>
<b>Resistance</b>	<b>306 – 340 Ω</b>	<b>209 – 231 Ω</b>

Replace the oil temperature sensor if it is out of specifications by more than 10% at any temperature listed.

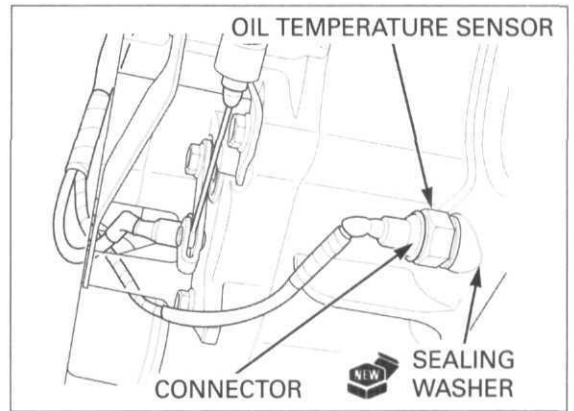


Install the oil temperature sensor with a new sealing washer and tighten it.

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

Connect the temperature sensor connector.

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

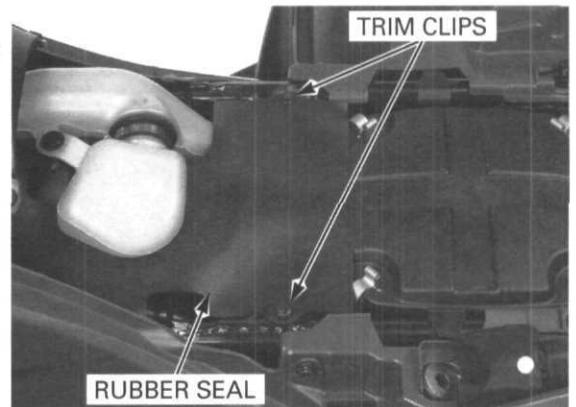


## THROTTLE POSITION (TP) SENSOR

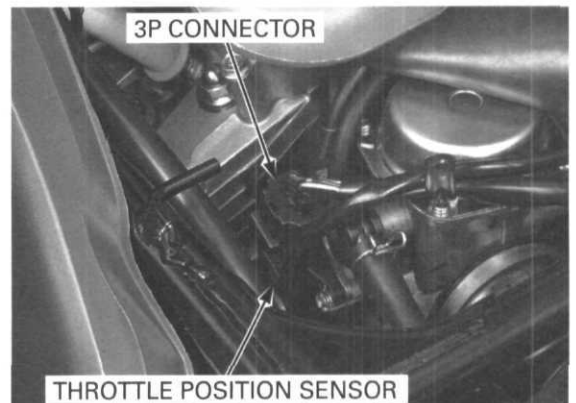
### INSPECTION

Remove the seat (page 3-4).

Remove the two trim clips and turn over the rubber seal.



Disconnect the 3P connector from the TP sensor.



### SENSOR RESISTANCE

Measure the resistance between the Black/red and Green/blue terminal of the TP sensor.

**STANDARD: 4 – 6 kΩ (20°C/68°F)**

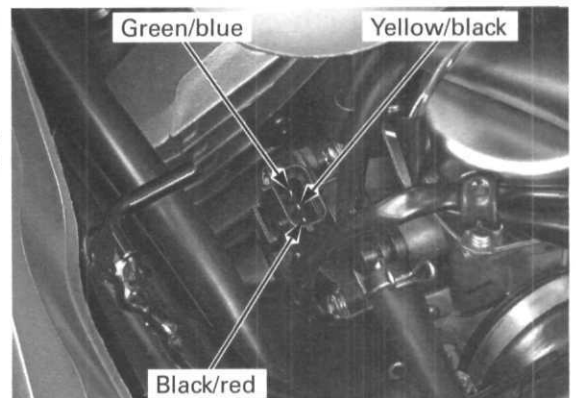
Check that the resistance between the Yellow/black and Green/blue terminals varies with the throttle position while operating the throttle lever.

**From fully closed position to fully open position:**

Resistance increases

**From fully open position to fully closed position:**

Resistance decreases



## LIGHTS/METERS/SWITCHES

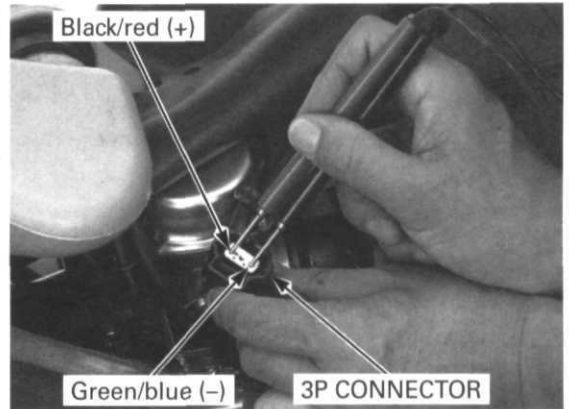
### INPUT VOLTAGE

Turn the ignition switch to ON and measure the input voltage between the Black/red (+) and Green/blue (-) terminal of the wire harness side connector.

**STANDARD: 4.7 – 5.3 V**

If the input voltage is out of specification, check for open or short circuit in the Black/red and Green/blue wires between the throttle position sensor and ECM.

If the wires are OK, replace the ECM.

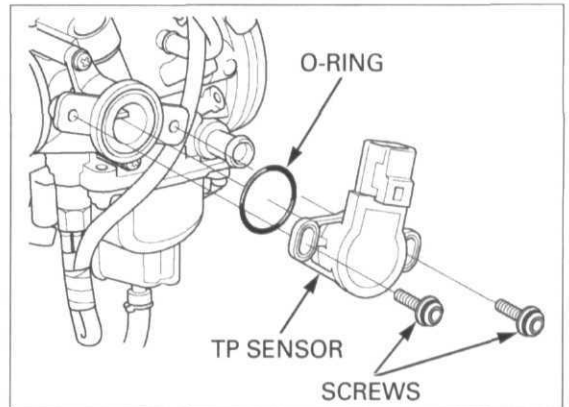


### REPLACEMENT

Remove the fuel tank cover (page 3-5).

Disconnect the TP sensor connector (page 21-19).

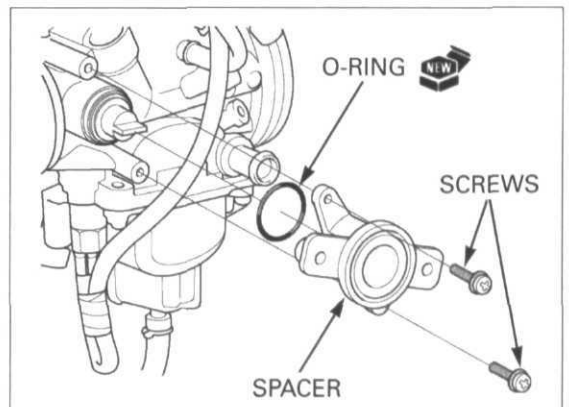
Remove the two sensor screws, TP sensor and O-ring.



Remove the two screws, spacer and O-ring.

Install a new O-ring onto the carburetor body. Install the spacer and tighten the two screws.

**TORQUE: 3.4 N·m (0.35 kgf·m, 2.5 lbf·ft)**

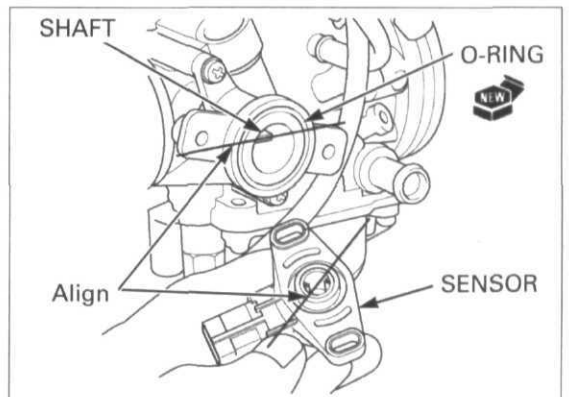


Install a new O-ring into the spacer groove.

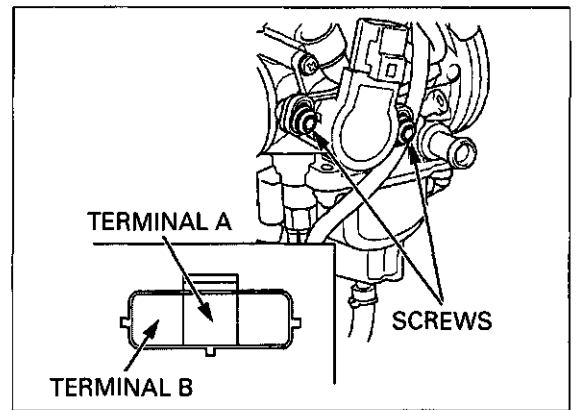
*Improper installation can cause damage to the throttle position sensor.*

Install a new TP sensor by aligning the sensor tabs with the flat end of the throttle shaft as shown.

Loosely install new break-off screws.



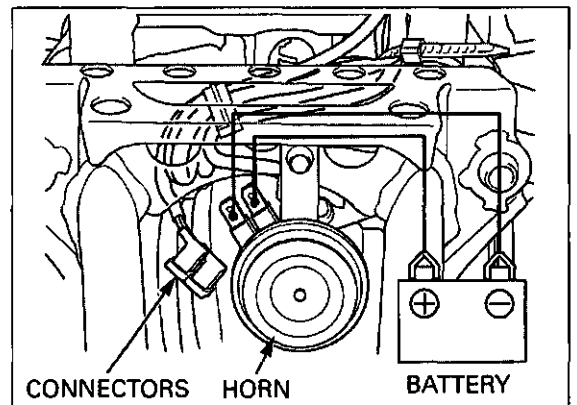
Adjust the TP sensor position so that the resistance between terminals A and B is 490 – 510  $\Omega$ .  
Tighten the screws until their screw heads break off.  
Connect the TP sensor connector.  
Install the removed parts in the reverse order of removal.



## HORN (U type only)

### INSPECTION

Disconnect the wire connectors from the horn.  
Connect a 12 V battery to the horn terminals.  
The horn is normal if it sounds when the 12 V battery is connected across the horn terminals.



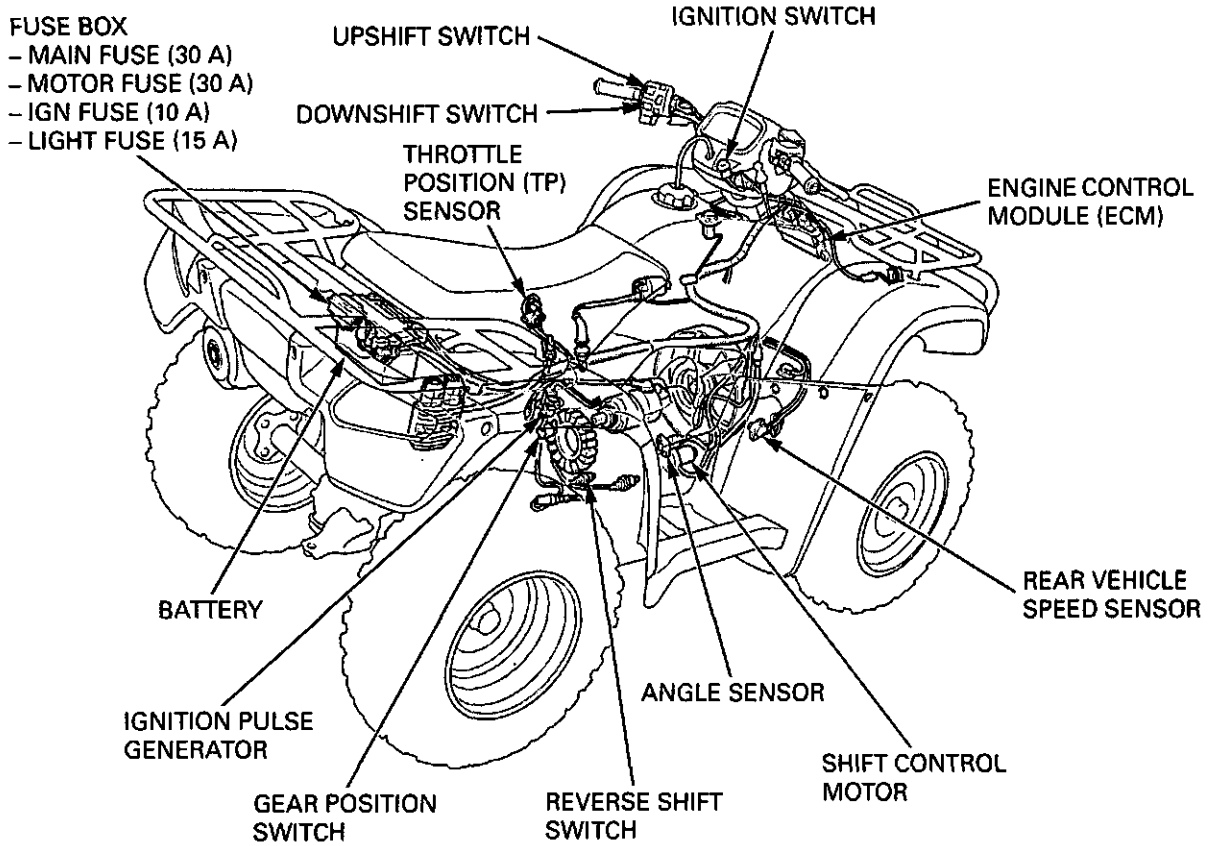
# **22. ELECTRIC SHIFT PROGRAM (ESP: FE model)**

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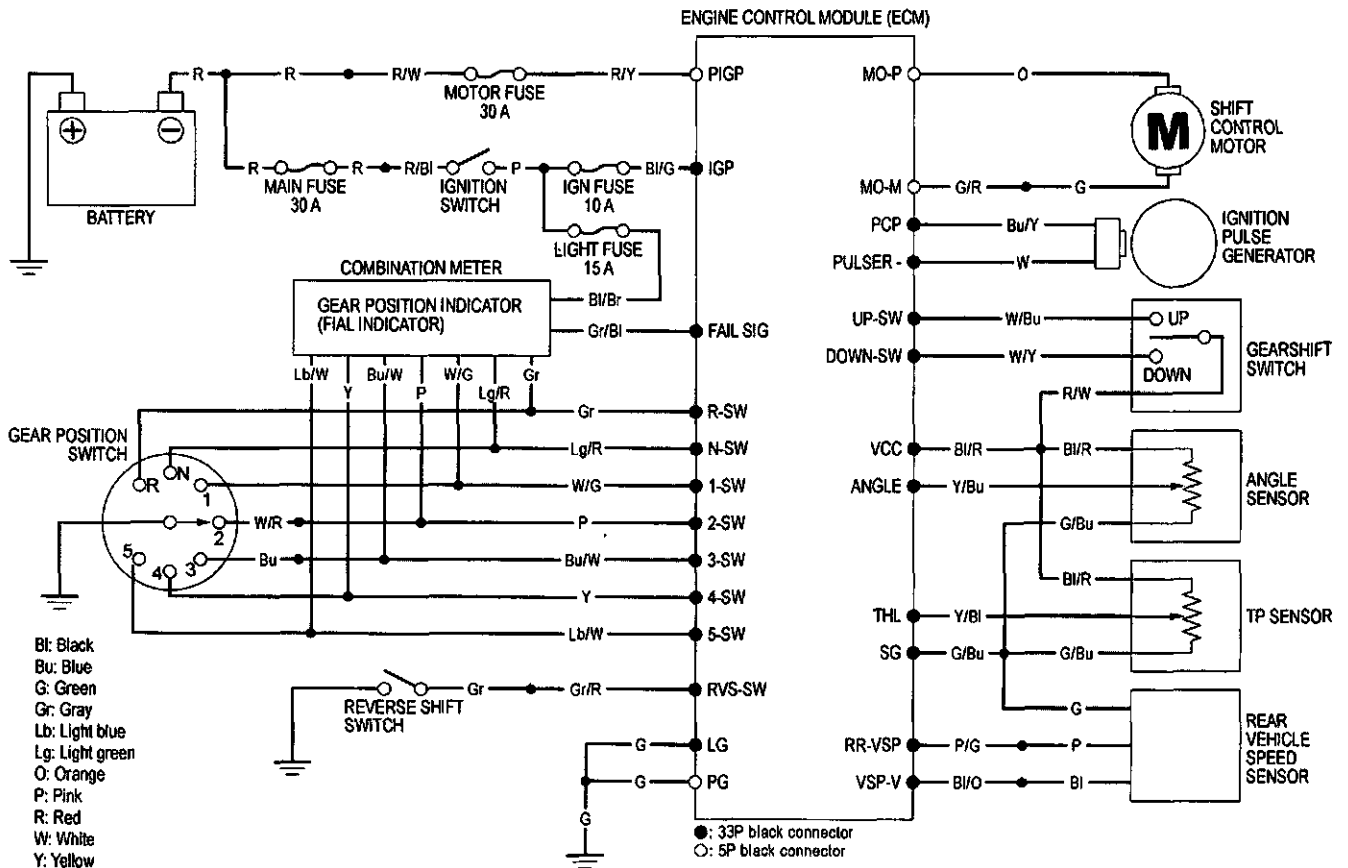
<b>COMPONENT LOCATION.....</b>	<b>22-2</b>	<b>ANGLE SENSOR.....</b>	<b>22-18</b>
<b>SYSTEM DIAGRAM.....</b>	<b>22-2</b>	<b>CONTROL MOTOR AND REDUCTION GEARS.....</b>	<b>22-19</b>
<b>SERVICE INFORMATION .....</b>	<b>22-3</b>	<b>GEARSHIFT SWITCH.....</b>	<b>22-21</b>
<b>BEFORE TROUBLESHOOTING .....</b>	<b>22-4</b>	<b>REVERSE SHIFT SWITCH .....</b>	<b>22-22</b>
<b>DIAGNOSTIC TROUBLESHOOTING .....</b>	<b>22-6</b>		

# ELECTRIC SHIFT PROGRAM (ESP/FE model)

## COMPONENT LOCATION



## SYSTEM DIAGRAM



## SERVICE INFORMATION

### GENERAL

- When checking the Electric Shift Program (ESP) system, always follow the steps in the troubleshooting flowchart (page 22-6).
- The ESP parts can be serviced with the engine installed in the frame.
- This vehicle's ESP control unit is built into the engine control module (ECM).
- 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 off the ignition switch before disconnecting or connecting the connectors.
- Use a digital tester for ESP system inspection.
- See page 21-10 for gear position switch inspection.
- See page 23-7 for rear vehicle speed sensor inspection.

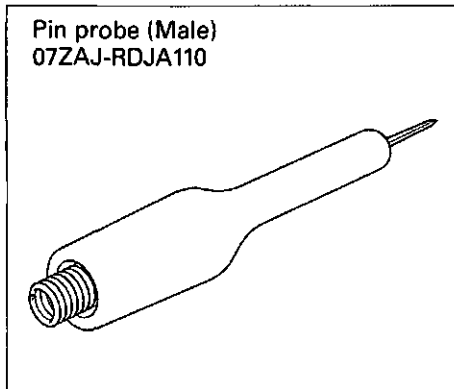
### TORQUE VALUES

Angle sensor bolt  
Reverse shift switch

6 N·m (0.6 kgf·m, 4.4 lbf·ft)  
13 N·m (1.3 kgf·m, 10 lbf·ft)

Apply locking agent to the threads.

### TOOL





# BEFORE TROUBLESHOOTING

## SELF DIAGNOSIS FUNCTION

When the engine control module (ECM) detects a system abnormality, it has a built-in self-diagnostic function that stops the Electric Shift (ES) system or resets the system entirely (just as when the ignition switch is turned from OFF to ON). If the ECM detects an ES system failure, it stops the ES system function and records a problem code. The ES system will not operate, even after the ignition switch is turned to OFF.

To reset the ES system, turn the ignition switch from ON to OFF and back to ON again. However, if the ECM still detects a problem, it will continue to deactivate the ES system function. When this occurs, the gear position indicator will blink a certain number of times to indicate the appropriate problem code.

The ECM is able to record the system failures and outputs these as problem codes that are shown on the indicator (i. e., the "N" blinks a designated number of times).

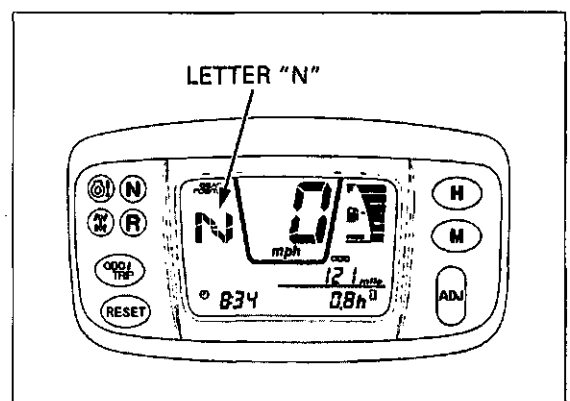
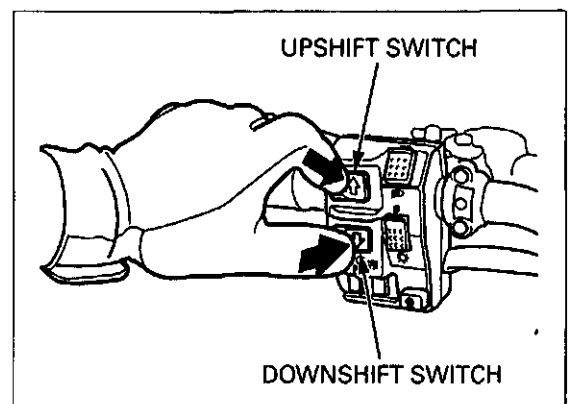
## RETRIEVAL/ERASURE OF PROBLEM CODES

When the operator detects an abnormality, check the following before proceeding with the diagnosis:

1. Check the battery voltage (minimum spec. 12.4 V) and any blown fuses.
2. Turn the ignition switch to ON. If the gear position indicator blinks, record the number of blinks, since this indicates the type of failure. Then troubleshoot the indicated failure. Refer to the table on page 22-5 for appropriate problem code.

If no ES system failure occurs (the indicator does not blink), perform the following:

1. Make sure the gear position indicator blinked codes to the user. Check the problem code as described below:
  - Turn the ignition switch to OFF.
  - Place the transmission in neutral.
  - Apply the parking brake so the vehicle does not move.
  - Push both Upshift switch and Downshift switch.
  - While pushing both switches, turn the ignition switch to ON.



- Before letter "N" appears on the gear position indicator (within about 2 seconds), release both the shift switches, then push them again for more than 3 seconds. The indicator "N" starts blinking to indicate the problem code.

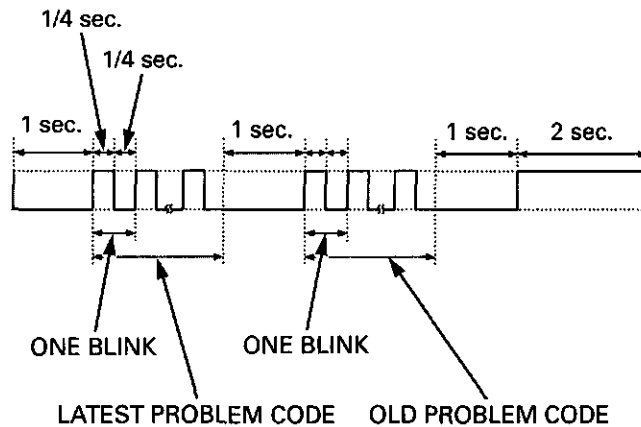
If the switches are not released and pushed within 2 seconds, the code number will not appear.

2. If the code number could not be checked (the indicator did not blink), repeat step 1.
3. If a failure is still not indicated (i. e., the "N" does not blink), the problem is as follows:
  - Electric shift (ES) system does not operate (page 22-6) and/or
  - Faulty gear position indicator (e. g., does not indicate the problem, keeps indicating the same gear position, indicates a different gear position than what the transmission is in) (page 22-6)

4. After performing the above troubleshooting steps and repairing the problem, erase the problem codes from the ECM as follows:
  - Turn the ignition switch to OFF.
  - Place the transmission in neutral.
  - Apply the parking brake so the vehicle does not move.
  - Push both the Upshift and Downshift switches.
  - While pushing both switches, turn the ignition switch to ON.  
 Before letter "N" appears on the gear position indicator (within about 2 seconds), release both the shift switches, then push them again more than 3 seconds.  
 If the switches are not released and pushed within 2 seconds, the code number will not appear.
  - While the indicator is showing the problem code (i. e., the "N" is blinking with the transmission in neutral), push both the Upshift and Downshift switches to erase the problem codes from the ECM.
  - Turn the ignition switch to OFF.

**PROBLEM CODE**

**PROBLEM CODE BLINKING PATTERN**



**PROBLEM CODE TABLE**

Gear position indicator blinks	Check part and system	Refer to page
0	No problem	-
1	ECM (writing and recording circuit)	22-8
2	ES shift switch system (up and down)	22-8
3	Angle sensor system	22-9
4	Gear position switch system	22-11
5	ECM motor driver circuit	22-12
6	ECM fail-safe relay circuit	22-14
7	ECM voltage convert circuit	22-14
8	Angle sensor system	22-9
9	Angle sensor system	22-9
10	Ignition pulse generator system	22-14
11	Rear vehicle speed sensor system (vehicle speed)	22-15
12	Gear position switch system	22-11
13	Throttle position (TP) sensor system	22-15

## DIAGNOSTIC TROUBLESHOOTING

Inspect the following before diagnosing the system.

- Make sure the battery is fully charged and in good condition
- Make sure the clutch is adjusted properly
- Blown main (30 A), motor (30 A) or ING fuse (10 A)

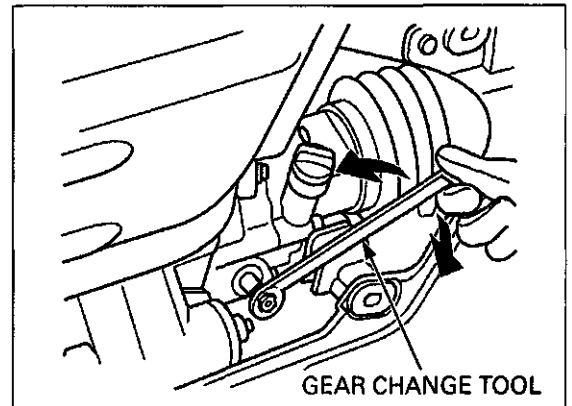
### Electric Shift Does Not Operate

#### 1. Gearshift Linkage Inspection

Turn the ignition switch to ON.  
Shift the gear manually using the gear change tool.

#### *Can the gears be changed manually?*

- NO** - Faulty transmission (page 10-5) or gear-shift linkage (page 12-7).  
**YES** - GO TO STEP 2.



#### 2. Gear Position Indicator Inspection

Check gear position indicator.

#### *Does the gear position indicator show the correct gear position when the gear change tool is moved?*

- NO** - Troubleshoot the gear position switch system (page 22-11)  
**YES** - Troubleshoot the ES switch system (page 22-8)

### Gear Position Indicator Problem (No problem code indication, same gear indication or wrong gear indication)

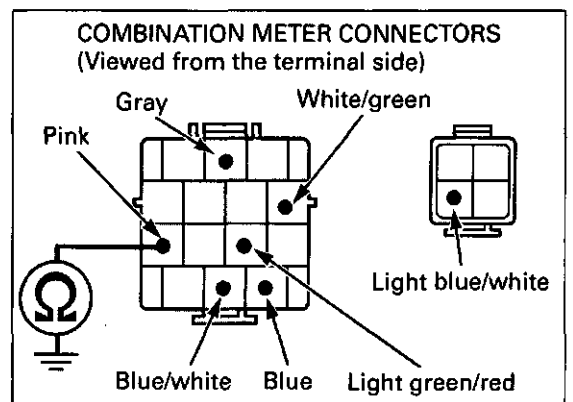
#### 1. Gear Position Switch Inspection at Combination Meter

Remove the front fender (page 3-9).  
Disconnect the combination meter 14P gray and 4P green connectors.  
Check for continuity between each terminal of the wire harness side connector and ground. There should be continuity in each gear position as follows:

- Reverse:** Gray  
**Neutral:** Light green/red  
**1st:** White/green  
**2nd:** Pink  
**3rd:** Blue/white  
**4th:** Blue  
**5th:** Light blue/white

#### *Is there continuity?*

- NO** - GO TO STEP 2.  
**YES** - GO TO STEP 3.



**2. Gear Position Switch Inspection**

Check the gear position switch (page 21-10).

*Is the gear position switch normal?*

**NO** - Replace the gear position switch (page 21-10).

**YES** - Repair open circuit in the wire harness.

**3. Signal Line Open Circuit Inspection**

Disconnect the ECM 33P black connector. Check Gray/black wire for continuity between the ECM connector and the combination meter connector terminals using the special tool.

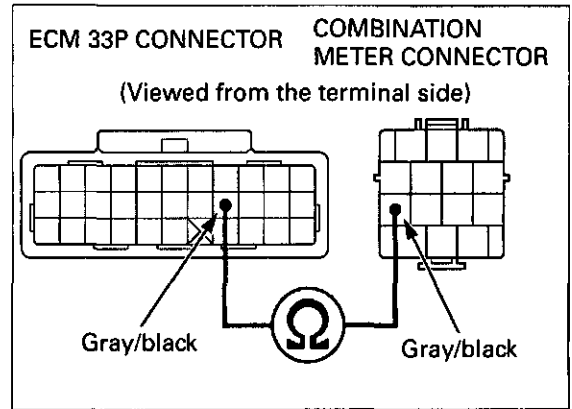
**TOOL:**

**Pin probe (Male)                      07ZAJ-RDJA110**

*Is there continuity?*

**NO** - Repair open circuit in the Gray/black wire.

**YES** - GO TO STEP 4.



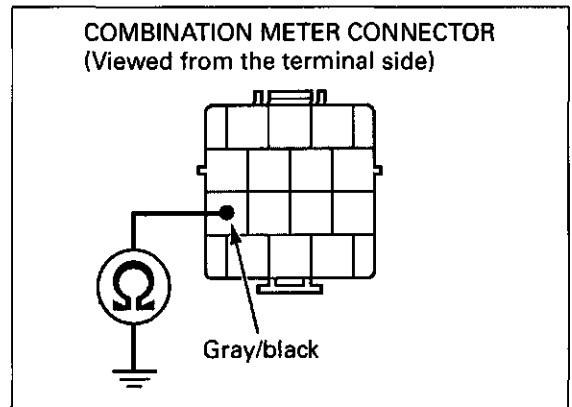
**4. Signal Line Short Circuit Inspection**

Check for continuity between Gray/black wire terminal of the wire harness side meter connector and body ground.

*Is there continuity?*

**NO** - Repair short circuit in the Gray/black wire.

**YES** - GO TO STEP 5.



**5. Failure Reproduction With a Known-good Combination meter**

Replace the combination meter with known-good one (page 21-12). Turn the ignition switch to ON and check the gear position indicator operation.

*Does the gear position indicator operate normally?*

**NO** - Replace the ECM with a new one.

**YES** - Replace the combination meter with a new one.

## ELECTRIC SHIFT PROGRAM (ESP/FE model)

### Problem Code 1: ECM (writing and recording circuit)

#### 1. ECM Inspection

Erase the problem codes from the ECM (page 22-4).  
Check the ES system failure (the gear position indicator blinks) when turning the ignition switch from OFF to ON.

**Does the gear position indicator blink?**

- NO** - No problem (temporary failure).  
**YES** - Replace the ECM with a new one and troubleshoot again.

### Problem Code 2: ES Switch System (Up and Down)

#### 1. ECM and Gearshift Switch Connection Inspection

Remove the front fender (page 3-9).  
Check the connections of the ECM and handlebar switch connectors.

**Are all connections OK?**

- NO** - Connect the ECM and/or handlebar switch connector securely.  
**YES** - GO TO STEP 2.

#### 2. Gearshift Switch Inspection at ECM Connector

Disconnect the ECM 33P black connector (page 19-6).  
Check for continuity between the following terminals of the wire harness side connector while pushing the gearshift switch using the special tool.

**TOOL:**

Pin probe (Male)                      07ZAJ-RDJA110

**With the upshift switch pushed:**

Black/red - White/blue

**With the downshift switch pushed:**

Black/red - White/yellow

**Is there continuity?**

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

#### 3. Gearshift Switch Inspection at Handlebar Switch Connector

Disconnect the left handlebar switch connector (page 21-8).  
Check for continuity between the following terminals of the switch side connector while pushing the gearshift switch.

**With the upshift switch pushed:**

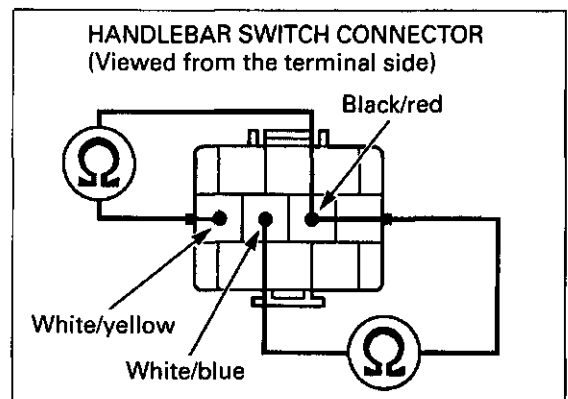
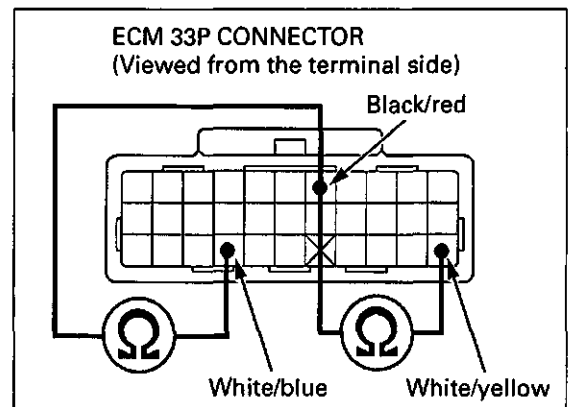
Black/red - White/blue

**With the downshift switch pushed:**

Black/red - White/yellow

**Is there continuity?**

- NO** - Replace the left handlebar switch.  
**YES** -  
• Loose or poor contact of the handlebar switch connector.  
• Open circuit in the Black/red, White/blue, and/or White/yellow wire.



**4. ECM Inspection**

Connect the handlebar switch and ECM connectors.

Check the ES system failure (the gear position indicator blinks) when turning the ignition switch from OFF to ON.

**Does the gear position indicator blink?**

**NO** – No problem (temporary failure).

**YES** – Replace the ECM with a new one and troubleshoot again.

**Problem Code 3, 8, 9: Angle Sensor System**

**1. ECM and Angle Sensor Connection Inspection**

Remove the right inner fender (page 3-7).

Remove the front fender (page 3-9).

Check the connections of the ECM and angle sensor connectors.

**Are all connections good?**

**NO** – Connect the ECM and/or angle sensor connector securely.

**YES** – GO TO STEP 2.

**2. Angle Sensor Inspection 1 at ECM Connector**

Disconnect the throttle position sensor 3P connector (page 21-19).

Disconnect the ECM 33P black connector.

Measure the resistance between the Black/red and Green/blue wire terminals of the wire harness side connector using the special tool.

**TOOL:**

**Pin probe (Male) 07ZAJ-RDJA110**

**STANDARD: 4 – 6 k $\Omega$  (20°C/ 68°F)**

**Is the resistance within the specified range?**

**NO** – GO TO STEP 4.

**YES** – GO TO STEP 3.

**3. Angle Sensor Inspection 2 at ECM Connector**

Check that the resistance between the Yellow/blue and Green/blue terminals of the wire harness side connector varies while shifting the gear manually using the gear change tool.

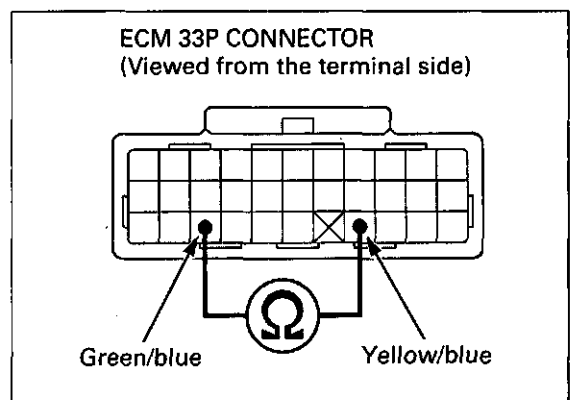
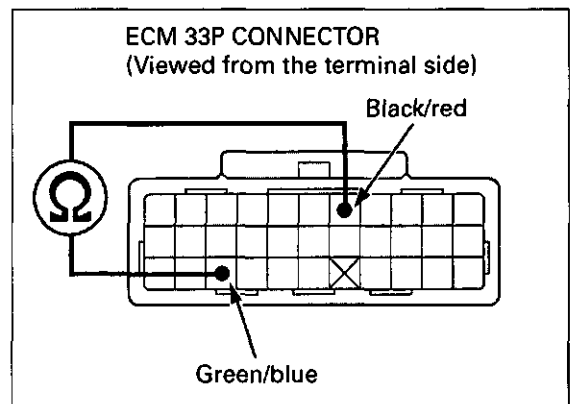
**From neutral to 5th gear: Resistance increase**

**From 5th gear to neutral: Resistance decreases**

**Does the resistance vary properly?**

**NO** – GO TO STEP 7.

**YES** – GO TO STEP 9.



## ELECTRIC SHIFT PROGRAM (ESP/FE model)

### 4. Angle Sensor Inspection 1

Measure the resistance between the Black/red and Green/blue terminals of the sensor connector (page 22-18).

**STANDARD: 4k – 6k $\Omega$  (20°C/ 68°F)**

*Is the resistance within the specified range?*

**NO** – Replace the angle sensor.

**YES** – GO TO STEP 5.

### 5. Angle Sensor Power Input Line Inspection

Connect the ECM connector.  
Check the angle sensor input voltage (page 22-18).

*Is there 4.7 – 5.3 V?*

**NO** – Repair open or short circuit in the Black/red wire.

**YES** – GO TO STEP 6.

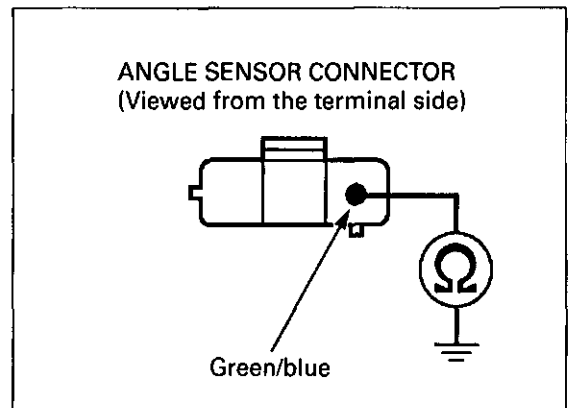
### 6. Angle Sensor Ground Line Short Circuit Inspection

Turn the ignition switch to OFF.  
Check for continuity between the Green/blue wire terminal of the wire harness side sensor connector and ground.

*Is there continuity?*

**NO** – Check the angle sensor connector for loose or corroded terminal.

**YES** – Repair short circuit in the Green/blue wire.



### 7. Angle Sensor Inspection 2

Check that the resistance between the Yellow/blue and Green/blue terminals of the sensor connector varies with the gear position (page 22-18).

**From neutral to 5th gear: Resistance increase**  
**From 5th gear to neutral: Resistance decreases**

*Does the resistance vary properly?*

**NO** – Replace the angle sensor.

**YES** – GO TO STEP 8.

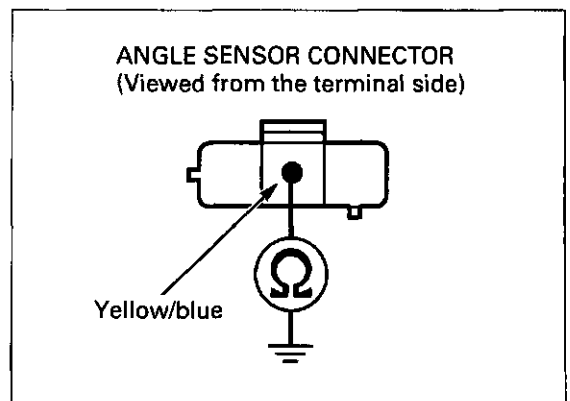
### 8. Angle Sensor Signal Line Short Circuit Inspection

Check for continuity between the Yellow/blue wire terminal of the wire harness side sensor connector and ground.

*Is there continuity?*

**NO** – Repair open circuit in the Yellow/blue wire.

**YES** – Repair short circuit in the Yellow/blue wire.



**9. ECM Inspection**

Connect the ECM connector.  
Check the ES system failure (the gear position indicator blinks) when turning the ignition switch from OFF to ON.

**Does the gear position indicator blink?**

- NO** – No problem (temporary failure).
- YES** – Replace the ECM with a known-good one and troubleshoot again.

**Problem Codes 4 or 12: Gear Position Switch System**

**1. ECM and Gear Position Switch Connection Inspection**

Remove the front fender (page 3-9)  
Check the connections of the ECM and gear position switch connectors.

**Are all connections good?**

- NO** – Connect the ECM and/or gear position switch connector securely.
- YES** – GO TO STEP 2.

**2. Gear Position Switch Inspection at ECM**

Disconnect the ECM 33P black connector.  
Check for continuity between each terminal of the wire harness side connector and ground. There should be continuity in each gear position as follows:

- Reverse:** Gray
- Neutral:** Light green/red
- 1st:** White/green
- 2nd:** Pink
- 3rd:** Blue/white
- 4th:** Yellow
- 5th:** Light blue/white

**Is there continuity?**

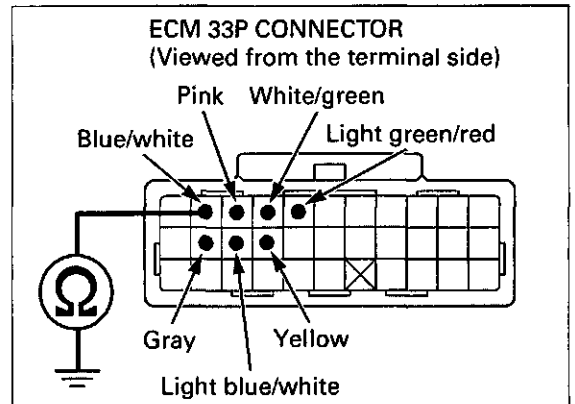
- NO** – GO TO STEP 3.
- YES** – GO TO STEP 4.

**3. Gear Position Switch Inspection**

Check the gear position switch (page 21-10).

**Is the gear position switch normal?**

- NO** – Replace the gear position switch (page 21-10).
- YES** – Repair open circuit in the wire harness.





## ELECTRIC SHIFT PROGRAM (ESP/FE model)

### 4. ECM Inspection

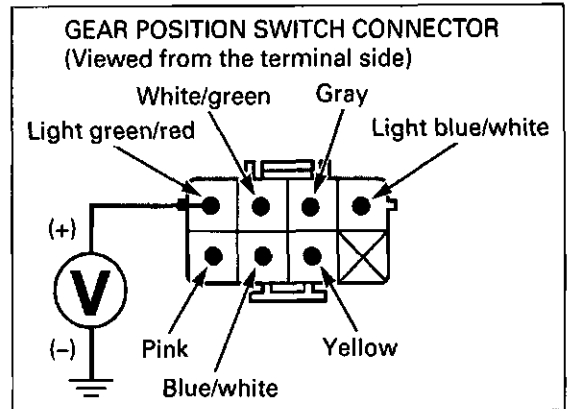
Connect the ECM connector.  
Disconnect the gear position switch 8P gray connector.  
Turn the ignition switch to ON.  
Measure the voltage between each terminal (+) of the wire harness side 8P connector and ground (-).

**STANDARD: 5 V**

*Is the voltage about 5 V?*

**NO** - Replace the ECM unit with a new one and troubleshoot again.

**YES** - GO TO STEP 5.



### 5. ES System Failure Checking

Check the ES system failure (the gear position indicator blinks) when turning the ignition switch from OFF to ON.

*Does the gear position indicator blink?*

**NO** - No problem (temporary failure).

**YES** - Replace the ECM with a new one and troubleshoot again.

### Problem Code 5: ECM Motor Driver Circuit

#### 1. ECM and Motor Connection Inspection

Remove the right inner fender (page 3-7).  
Remove the front fender (page 3-9).  
Check the connections of the ECM and motor connectors.

*Are all connections good?*

**NO** - Connect the ECM and/or control motor connector securely.

**YES** - GO TO STEP 2.

#### 2. ECM Motor Power Input Line Inspection

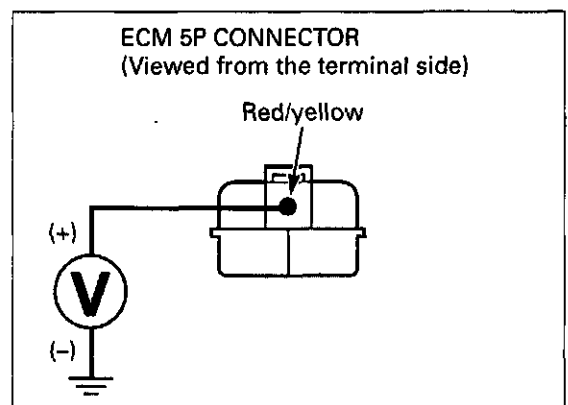
Disconnect the ECM 5P black connector.  
Measure the voltage between the Red/yellow wire terminal (+) of the wire harness side connector and ground (-).

*Is there battery voltage?*

**NO** -

- Check for loose or poor contact of related circuits.
- Check for blown MOTOR fuse (30 A)
- Check for open circuit in the Red/yellow, Red/white and/or Red wire

**YES** - GO TO STEP 3.



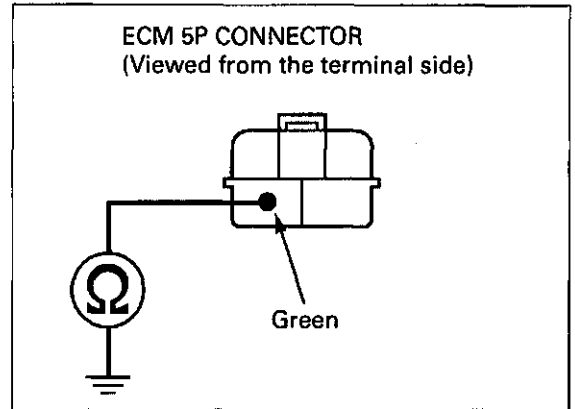
**3. ECM Power Ground Line Inspection**

Check for continuity between the Green wire terminal of the wire harness side connector and body ground.

**Is there continuity?**

**NO** - • Check for loose or poor contact of ground terminal  
 • Check for open circuit in the Green wire

**YES** - GO TO STEP 4.



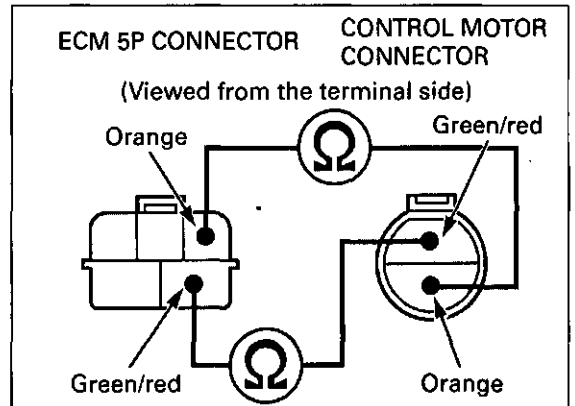
**4. ECM to Motor Harness Inspection**

Disconnect the control motor 2P connector. Check the Orange and Green/red wires for continuity between the ECM 5P connector and motor connector.

**Is there continuity?**

**NO** - Repair open circuit in the Orange and/or Green/blue wire

**YES** - GO TO STEP 5.



**5. Control Motor Inspection**

Connect a fully charged 12 V battery to the motor 2P connector terminals.

**Does the motor turn?**

**NO** - Faulty motor

**YES** - GO TO STEP 6.

**6. ES System Failure Checking**

Connect the ECM and motor connectors. Check the ES system failure (the gear position indicator blinks) when turning the ignition switch from OFF to ON.

**Does the gear position indicator blink?**

**NO** - No problem (temporary failure).

**YES** - Replace the ECM with a known-good one and troubleshoot again.

## ELECTRIC SHIFT PROGRAM (ESP/FE model)

---

### Problem Code 6: ECM Fail-Safe Circuit or Problem Code 7: ECM Voltage Convert Circuit

#### 1. ES System Failure Checking

Check the ES system failure (the gear position indicator blinks) when turning the ignition switch from OFF to ON.

**Does the gear position indicator blink?**

**NO** – No problem (temporary failure).

**YES** – GO TO STEP 2.

#### 2. Problem Code Check

Check the number of blinks (problem code number).

**Does the gear position indicator blink other than 6 or 7 times?**

**NO** – Replace the ECM with a known-good one and troubleshoot again.

**YES** – Troubleshoot the problem code.

### Problem Code 10: Ignition Pulse Generator System

#### 1. ECM and Ignition Pulse Generator Connection Inspection

Remove the front fender (page 3-9).  
Check the connection of the ECM and alternator connectors.

**Are all connections good?**

**NO** – Connect the ECM and/or alternator connector securely.

**YES** – GO TO STEP 2.

#### 2. Ignition Pulse Generator Inspection at ECM

Check the ignition pulse generator peak voltage at the ECM (page 19-6).

**Is the peak voltage 0.7 V or more?**

**NO** – GO TO STEP 3.

**YES** – GO TO STEP 4.

#### 3. Ignition Pulse Generator Inspection at Alternator

Check the ignition pulse generator peak voltage at the alternator (page 19-6).

**Is the peak voltage 0.7 V or more?**

**NO** – Replace the ignition pulse generator (alternator stator).

**YES** – Check for open or short circuit in the Blue/yellow wire and/or White wire.

#### 4. ES System Failure Checking

Check the number of gear position indicator blinks while driving in 1st gear over 6 km/h (4 mi/h) for more than 6 seconds.

**Does the gear position indicator blink?**

**NO** – No problem (temporary failure).

**YES** – Replace the ECM with a known-good one and troubleshoot again.

## Problem Code 11: Vehicle Speed Sensor System

### 1. Speedometer Inspection

Check the speedometer during low speed driving.

**Is the speedometer showing the correct vehicle speed?**

**NO** – Check the combination meter (page 21-12).

**YES** – GO TO STEP 2.

### 2. ECM and Rear Vehicle Speed Sensor (VSS) Connection Inspection

Remove the front fender (page 3-9).  
Check the connection of the ECM and the rear VSS connectors.

**Are all connections good?**

**NO** – Connect the ECM and/or rear VSS connector securely.

**YES** – GO TO STEP 3.

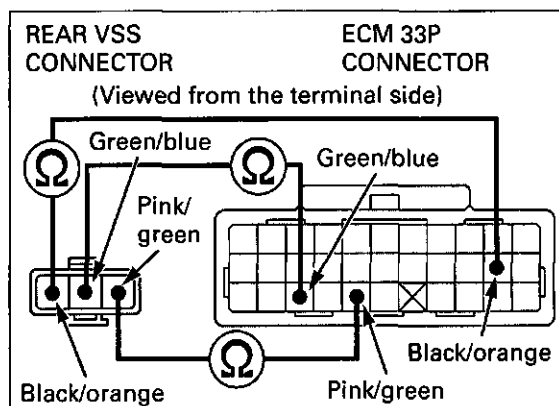
### 3. Rear VSS Line Open Circuit Inspection

Turn the ignition switch OFF.  
Disconnect the ECM 33P black connector and rear VSS 3P yellow connector.  
Check for Black/orange, Pink/green and Green/blue wires for continuity between the ECM and rear VSS connectors.

**Is there continuity?**

**NO** – Repair open circuit in the Black/orange, Pink/green and/or Green/blue wire

**YES** – GO TO STEP 4.



### 4. ES System Failure Checking

Check the number of gear position indicator blinks while driving in 1st gear over 6 km/h (4 mi/h) for more than 6 seconds.

**Does the gear position indicator blink?**

**NO** – No problem (temporary failure).

**YES** – Replace the ECM with a known-good one and troubleshoot again.

## Problem Code 13: Throttle Position (TP) Sensor System

### 1. ECM and TP Sensor Connection Inspection

Remove the seat (page 3-4)  
Remove the front fender (page 3-9)  
Check the connections of the ECM and TP sensor connectors.

**Are all connections good?**

**NO** – Connect the ECM and/or TP sensor connector securely.

**YES** – GO TO STEP 2.

## ELECTRIC SHIFT PROGRAM (ESP/FE model)

### 2. TP Sensor Inspection 1 at ECM Connector

Disconnect the angle sensor 3P connector (page 22-18).

Disconnect the ECM 33P black connector.

Measure the resistance between the Black/red and Green/blue wire terminals of the wire harness side connector using the special tool.

**TOOL:**

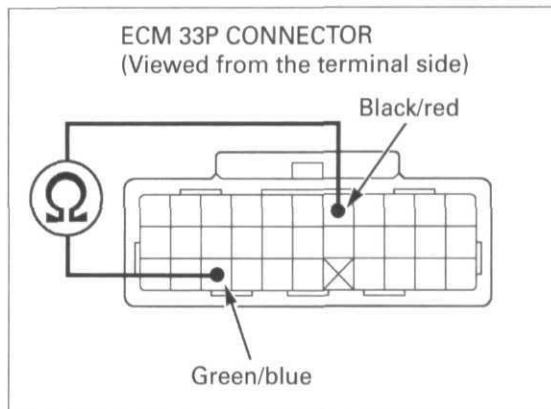
Pin probe (Male) 07ZAJ-RDJA110

**STANDARD:** 4 – 6 k $\Omega$  (20°C/ 68°F)

*Is the resistance within the specified range?*

**NO** – GO TO STEP 4.

**YES** – GO TO STEP 3.



### 3. TP Sensor Inspection 2 at ECM Connector

Check that the resistance between the Yellow/black and Green/blue terminals of the wire harness side connector varies while operating the throttle lever.

**From fully closed position to fully open position:**

**Resistance increases**

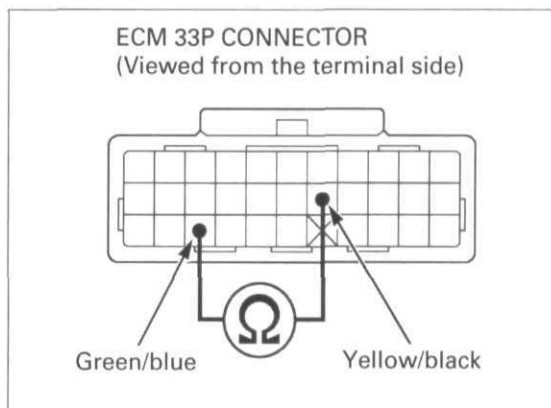
**From fully open position to fully closed position:**

**Resistance decreases**

*Does the resistance vary properly?*

**NO** – GO TO STEP 7.

**YES** – GO TO STEP 9.



### 4. TP Sensor Resistance Inspection 1

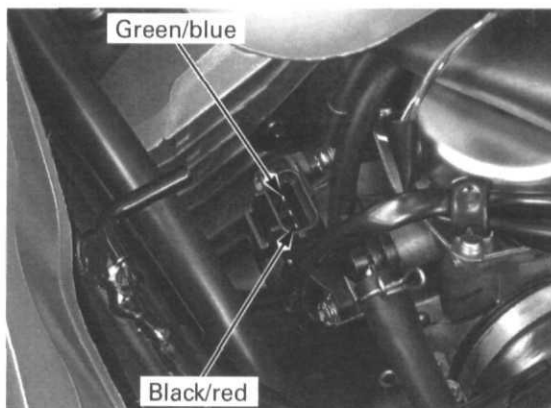
Disconnect the TP sensor connector.

Measure the resistance between the Black/red and Green/blue terminal of the TP sensor.

*Is the resistance within 4 – 6 k $\Omega$  (20°C/68°F)?*

**NO** – Faulty TP sensor.

**YES** – GO TO STEP 5.



### 5. TP Sensor Input Voltage Inspection

Connect the ECM 33P connector.

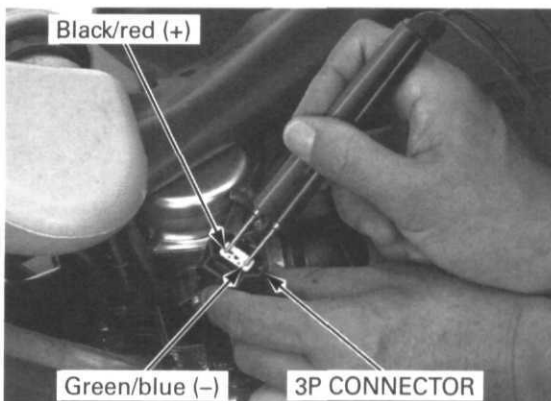
Turn the ignition switch to "ON".

Measure the input voltage between the Black/red (+) and Green/blue (-) terminal of the wire harness side TP sensor connector.

*Is there 4.7 – 5.3 V?*

**NO** – Repair open or short circuit in the Black/red wire.

**YES** – GO TO STEP 6.

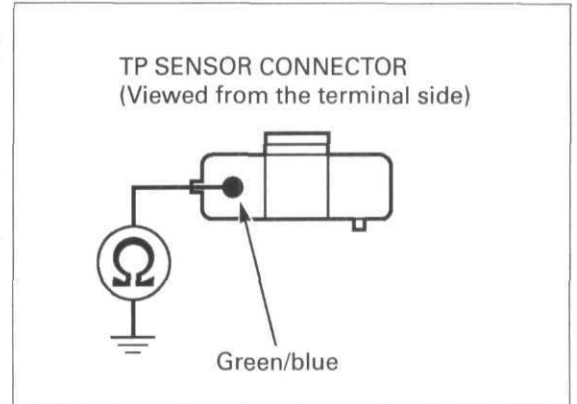


**6. TP Sensor Ground Line Short Circuit Inspection**

Turn the ignition switch to OFF.  
Check for continuity between the Green/blue wire terminal of the wire harness side sensor connector and ground.

**Is there continuity?**

- NO** – Check the TP sensor connector for loose or corroded terminal.
- YES** – Repair short circuit in the Green/blue wire.



**7. TP Sensor Resistance Inspection 2**

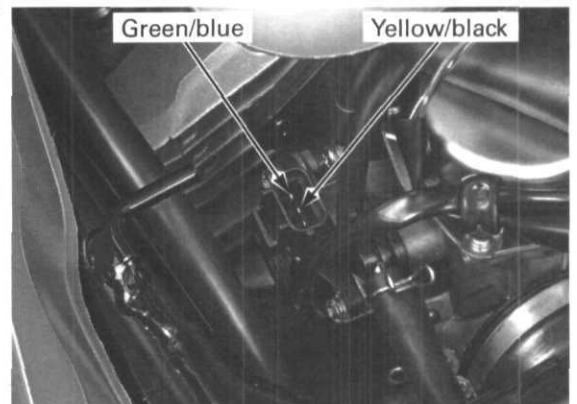
Check that the resistance between the Yellow/black and Green/blue terminals varies with the throttle position while operating the throttle lever.

**From fully closed position to fully open position:  
Resistance increases**

**From fully open position to fully closed position:  
Resistance decreases**

**Does the resistance vary properly?**

- NO** – Replace the angle sensor.
- YES** – GO TO STEP 8.

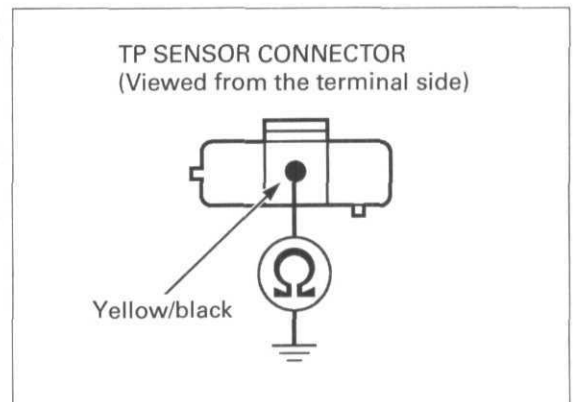


**8. TP Sensor Signal Line Short Circuit Inspection**

Check for continuity between the Yellow/black wire terminal of the wire harness side sensor connector and ground.

**Is there continuity?**

- NO** – Repair open circuit in the Yellow/black wire.
- YES** – Repair short circuit in the Yellow/black wire.



**9. ECM Inspection**

Connect the ECM 33P connector.  
Check the ES system failure (the gear position indicator blinks) when turning the ignition switch from OFF to ON.

**Does the gear position indicator blink?**

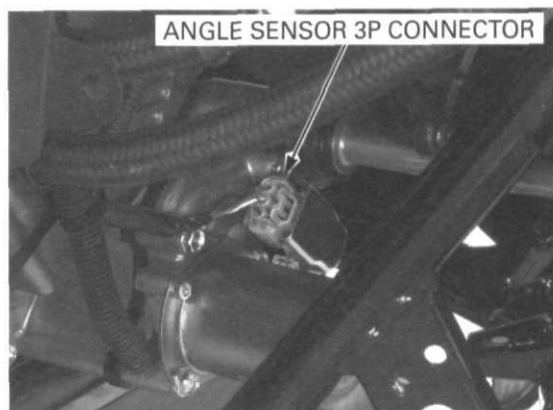
- NO** – No problem (temporary failure).
- YES** – Replace the ECM with a known-good one and troubleshoot again.

## ANGLE SENSOR

### INSPECTION

Remove the right inner fender (page 3-7).

Disconnect the angle sensor 3P connector.



### SENSOR RESISTANCE

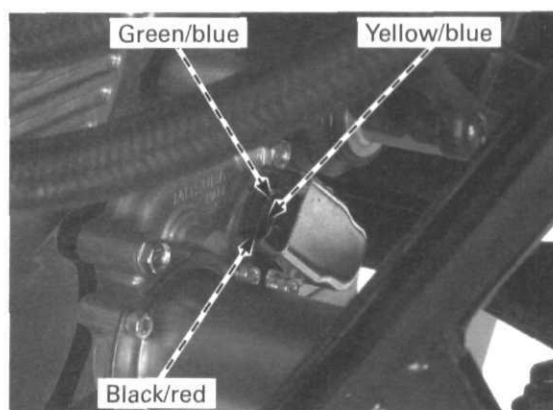
Measure the resistance between the Black/red and Green/blue terminal of the angle sensor.

**STANDARD: 4 – 6 k $\Omega$  (20°C/68°F)**

Check that the resistance between the Yellow/blue and Green/blue terminals varies with the gear position while shifting the gear manually using the gear change tool.

**From neutral to 5th gear: Resistance increase**

**From 5th gear to neutral: Resistance decreases**



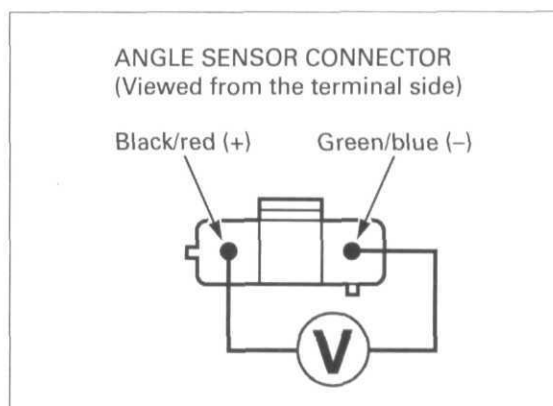
### INPUT VOLTAGE

Turn the ignition switch to ON and measure the input voltage between the Black/red (+) and Green/blue (-) terminal of the wire harness side connector.

**STANDARD: 4.7 – 5.3 V**

If the input voltage is out of specification, check for open or short circuit in the Black/red and Green/blue wires between the angle sensor and ECM.

If the wires are OK, replace the ECM.



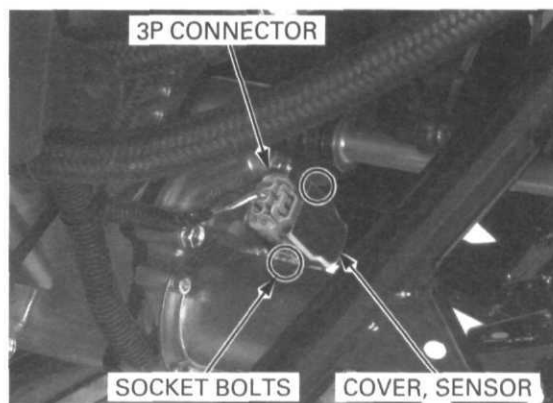
### REMOVAL

Remove the right inner fender (page 3-7).

Disconnect the angle sensor 3P connector.

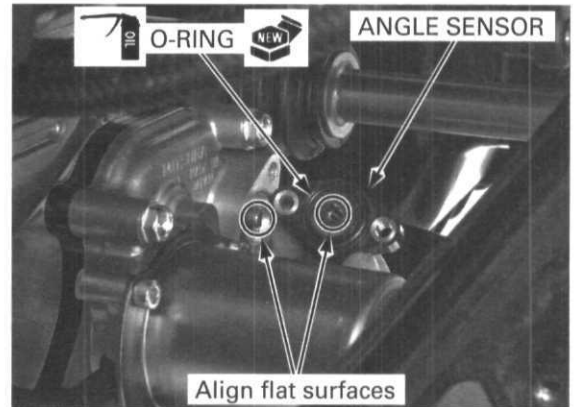
Remove the two socket bolts, sensor cover and angle sensor.

Remove the O-ring.



## INSTALLATION

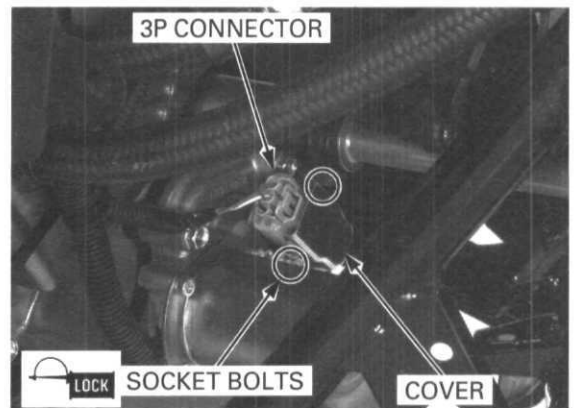
Coat a new O-ring with engine oil and install it into the sensor groove.  
Carefully install the angle sensor by aligning the flat surfaces of the sensor shaft hole and gearshift spindle end.



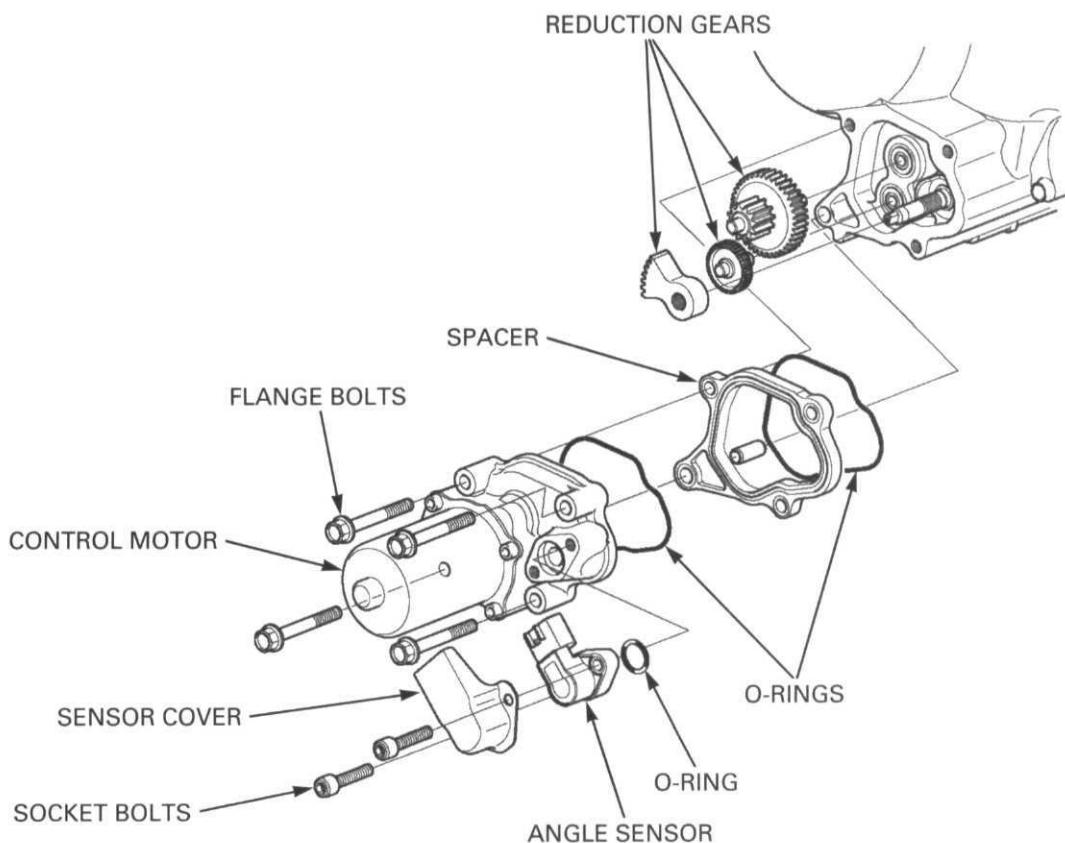
Apply locking agent to the socket bolt threads  
Install the sensor cover and socket bolts and tighten the bolts.

**TORQUE: 6 N·m (0.6 kgf·m, 4.4 lbf·ft)**

Connect the angle sensor 3P connector.  
Install the right inner fender (page 3-7).



## CONTROL MOTOR AND REDUCTION GEARS





## ELECTRIC SHIFT PROGRAM (ESP/FE model)

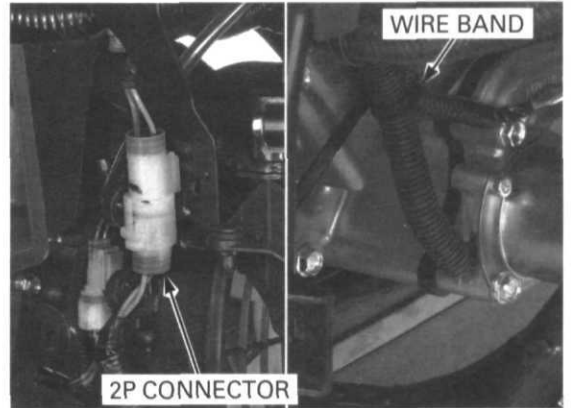
### REMOVAL

Replace the control motor as an assembly.

Remove the angle sensor (page 22-18)

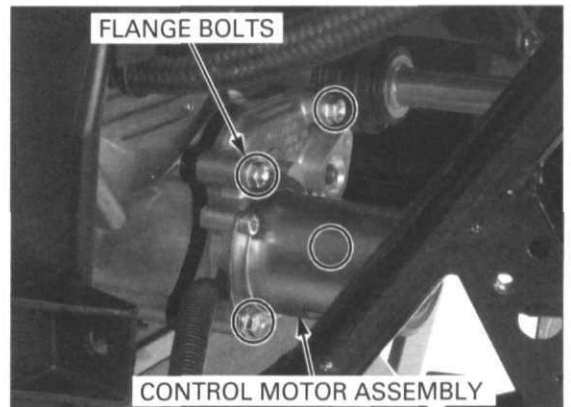
Remove the control motor 2P connector from the frame and disconnect it.

Remove the wire band from the control motor and angle sensor wires.



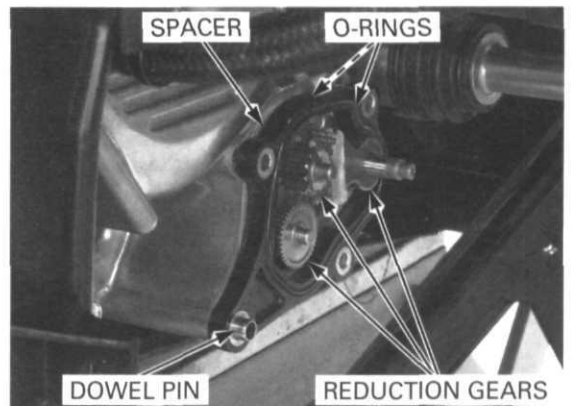
Remove the following:

- four flange bolts
- control motor assembly



- O-ring
- spacer
- O-ring
- dowel pin
- reduction gears

Check the gear teeth for wear or damage.



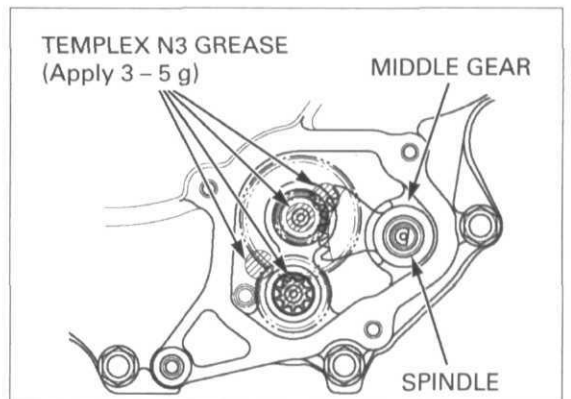
### INSTALLATION

Thoroughly clean the gears and journals.

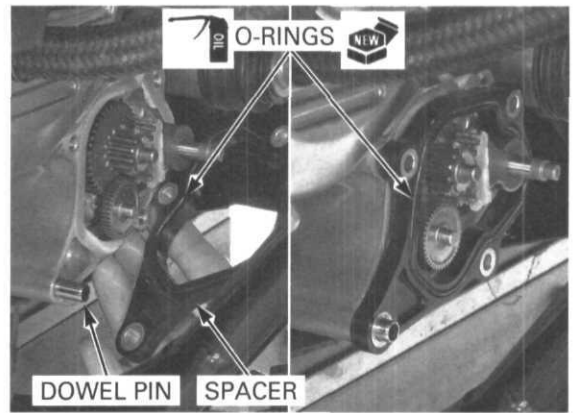
Apply 3 – 5 g of specified grease to the gear journals (both sides of the upper and lower gears) and gear teeth as shown.

**SPECIFIED GREASE: Templex N3 grease (ESSO)**

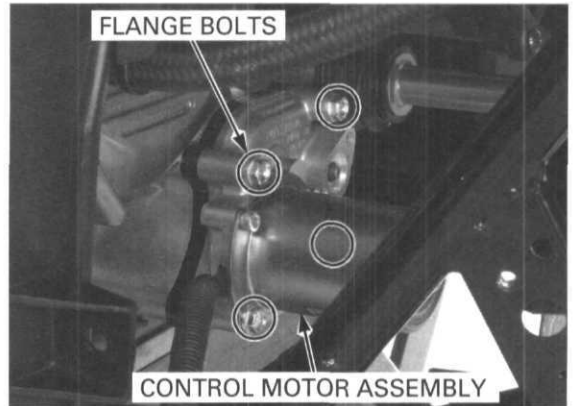
Install the upper and lower gears into the crankcase cover, and the middle gear by aligning its wide groove (indicated by punch mark) with the wide tooth on the gearshift spindle.



Install the dowel pin into the front crankcase cover.  
Coat new O-rings with engine oil and install them into the spacer grooves.  
Install the spacer onto the front crankcase cover.

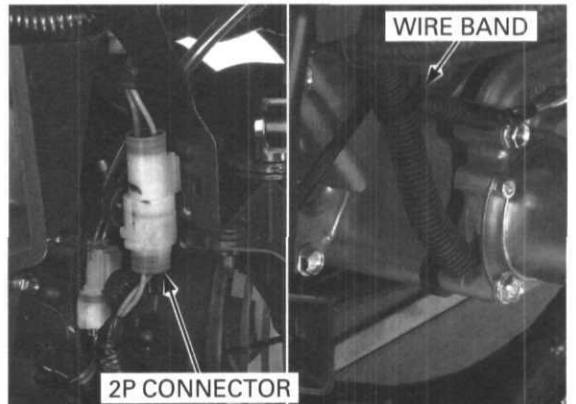


Install the control motor assembly and tighten the four flange bolts.



Connect the control motor 2P connector and install it onto the frame.  
Install the wire band.

Install the angle sensor (page 22-19).

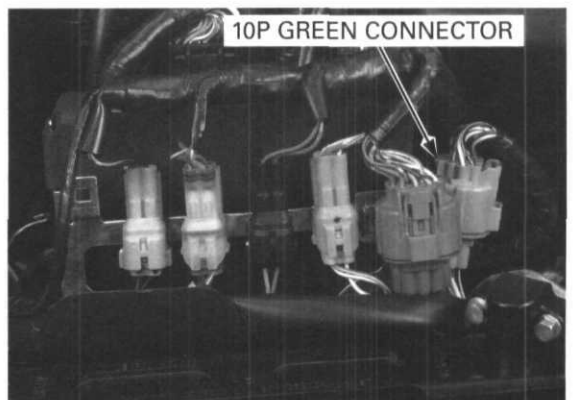


## GEARSHIFT SWITCH

### SYSTEM INSPECTION

Remove the front fender (page 3-9).

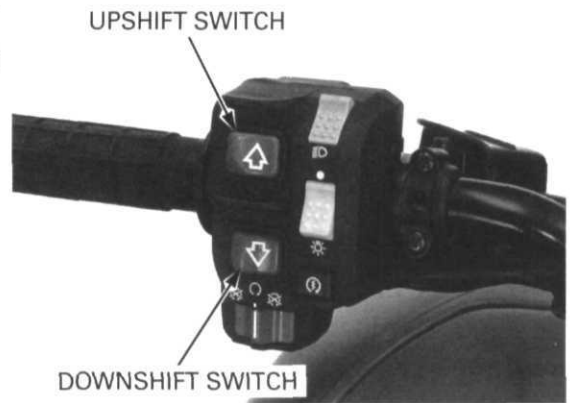
Remove the handlebar switch 10P green connector from the frame and disconnect it.



## ELECTRIC SHIFT PROGRAM (ESP/FE model)

Check for continuity between the switch side connector terminals with each switch pushed. Continuity should exist between the color coded wires as follows:

Switch Position	Color		
	White/red	White/blue	White/yellow
UPSHIFT pushed	○	○	
DOWNSHIFT pushed	○		○



### INPUT VOLTAGE

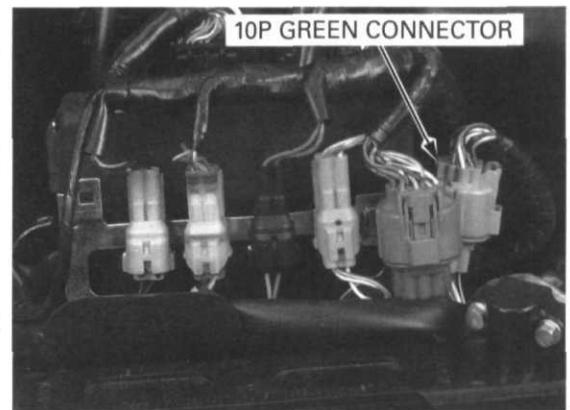
Remove the front fender (page 3-9).

Remove the handlebar switch 10P green connector from the frame and disconnect it. Turn the ignition switch to ON.

Measure the input voltage between the Black/red wire terminal (+) of the harness side connector and ground (-).

**STANDARD: 4.7 – 5.3 V**

If the input voltage is abnormal, or if there is no input voltage, check for an open or short circuit in the wire harness, or loose or poor connections in the wire harness.



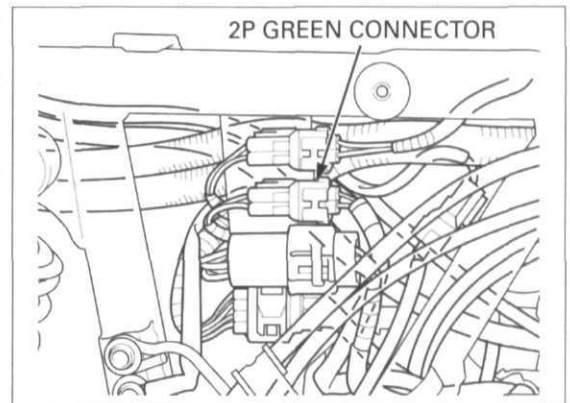
## REVERSE SHIFT SWITCH

### INSPECTION

Remove the engine sub-wire harness 2P green connector from the frame and disconnect it.

Check for continuity between the Gray wire terminal of the engine side connector and ground.

There should be continuity with the reverse selector lever operated and no continuity with the lever released.



### REMOVAL/INSTALLATION

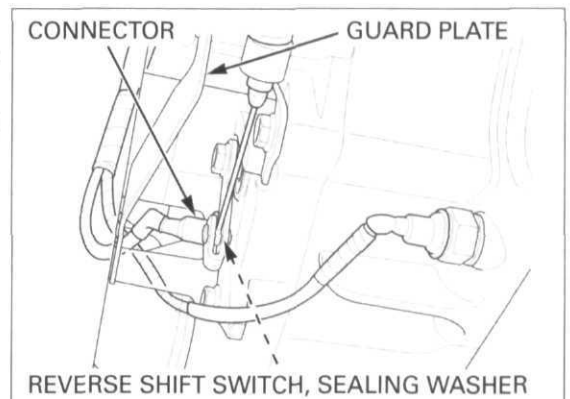
Remove the two bolts and guard plate.

Disconnect the switch connector and remove the reverse shift switch and sealing washer.

Install the reverse shift switch with a new sealing washer and tighten it.

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

Connect the switch connector securely.



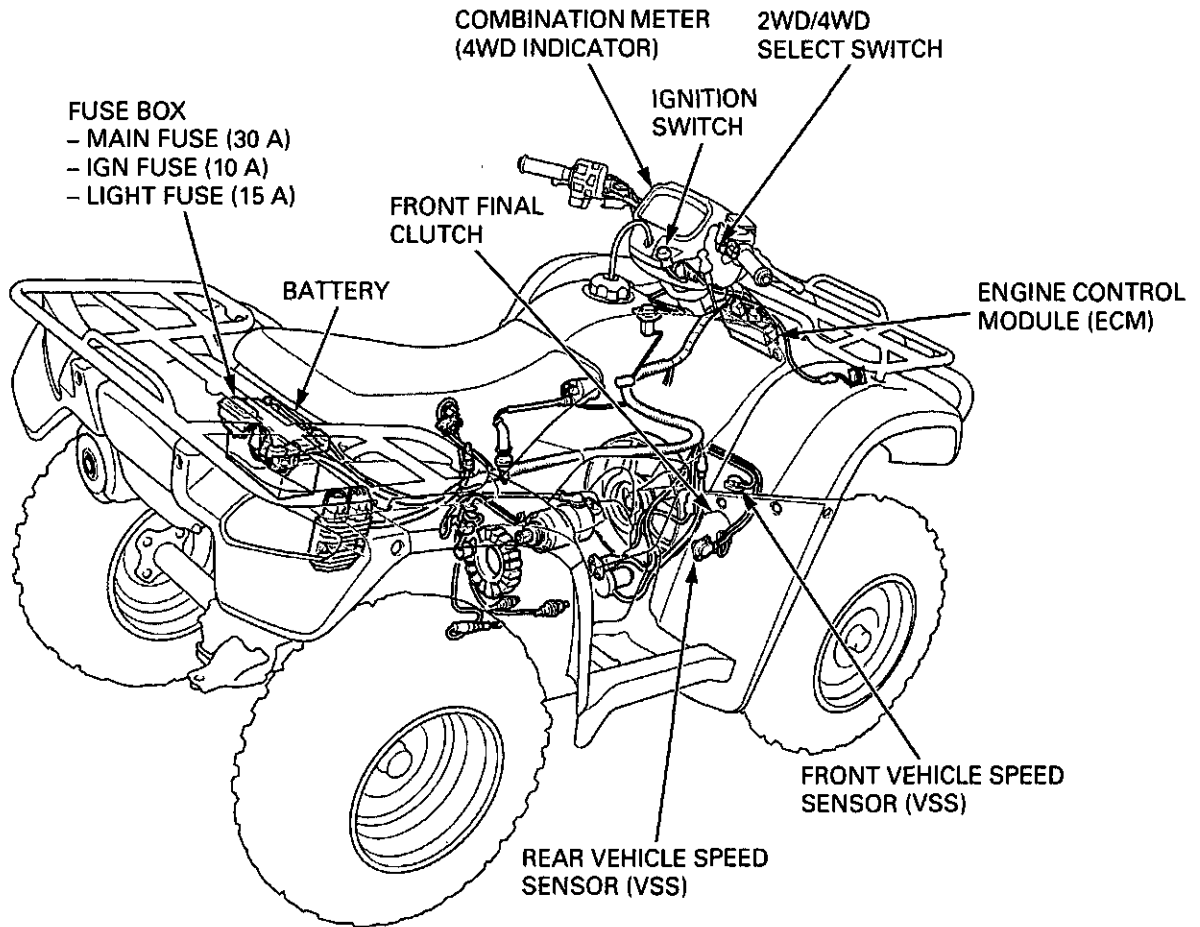
# **23. SELECTABLE 4WD SYSTEM (FM/FE models)**

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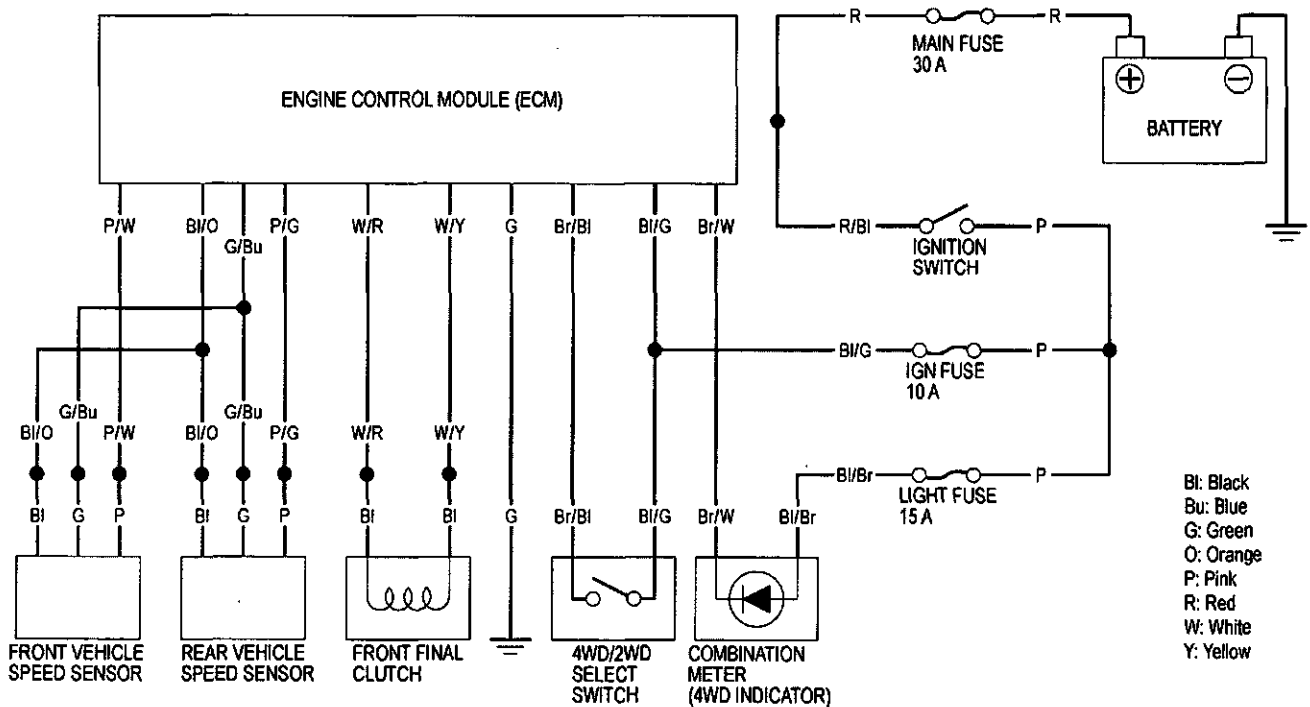
<b>COMPONENT LOCATION.....</b>	<b>23-2</b>	<b>TROUBLESHOOTING CHART.....</b>	<b>23-3</b>
<b>SYSTEM DIAGRAM.....</b>	<b>23-2</b>	<b>TROUBLESHOOTING.....</b>	<b>23-4</b>
<b>SERVICE INFORMATION .....</b>	<b>23-3</b>		

# SELECTABLE 4WD SYSTEM (FM/FE models)

## COMPONENT LOCATION



## SYSTEM DIAGRAM

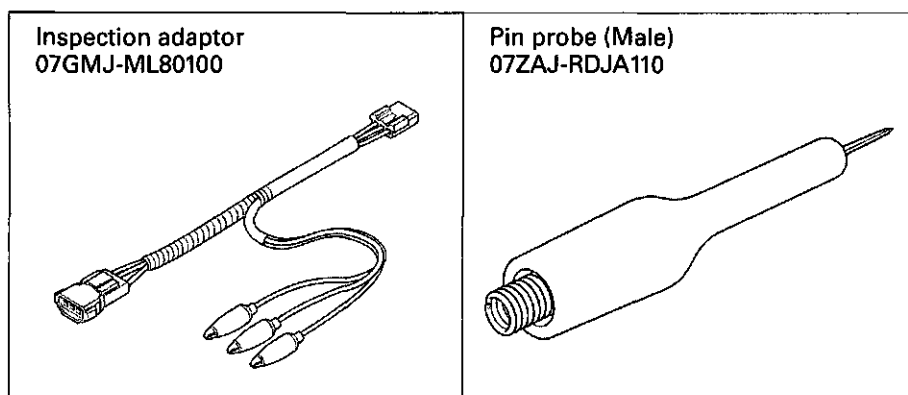


## SERVICE INFORMATION

### GENERAL

- The drive mode (2WD or 4WD) can be changed electrically by operating the front final clutch with the 2WD/4WD select switch.
- When checking the selectable 4WD system, always follow the steps in the troubleshooting (page 23-4).
- Refer to page 16-3 for front final clutch information.
- A faulty selectable 4WD system is often related to poorly connected or corroded connections. Check those connections before proceeding.
- Refer to page 16-12 and page 16-32 for vehicle speed sensor removal/installation.

### TOOL



## TROUBLESHOOTING CHART

4WD indicator blinks	Check part and system	Refer to page
2	Front vehicle speed sensor (VSS)	23-5
3	Rear vehicle speed sensor (VSS)	23-7
4	System voltage	23-9
5	Front final clutch system	23-9

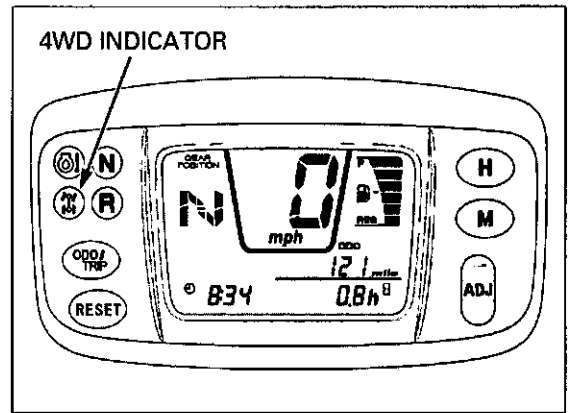
**TROUBLESHOOTING**

**SELF-DIAGNOSTIC FUNCTION**

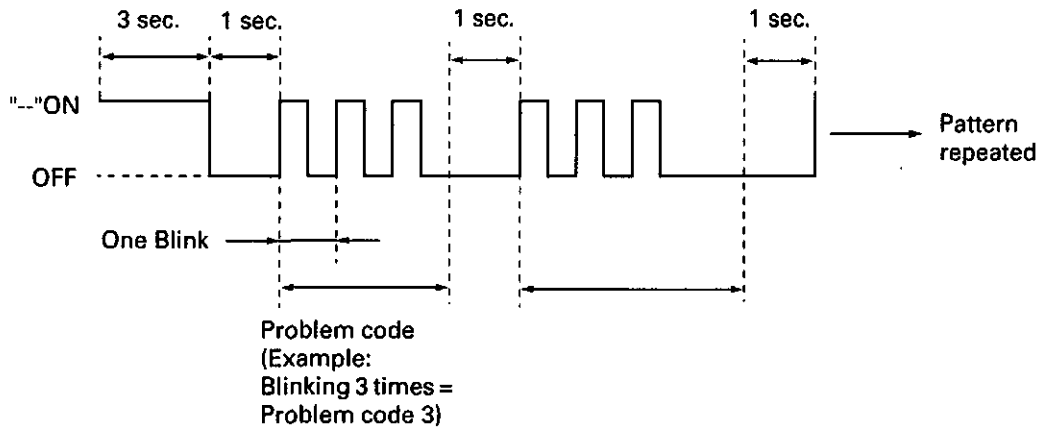
When the integrated engine control module (ECM) detects a problem in the system, the 4WD indicator shows the problem code.

The 4WD indicator denotes the problem codes by blinking from two to five times when the ignition switch is turned from OFF to ON.

If no 4WD system failure occurs (the indicator does not blink), perform same procedure as the Electric Shift (ES) system (page 22-4).



**PROBLEM CODE BLINKING PATTERN:**



**PROBLEM CODE 2: FRONT VEHICLE SPEED SENSOR (VSS)**

**NOTE:**

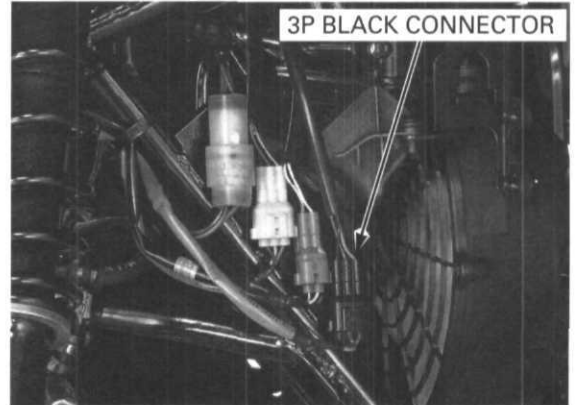
- Before troubleshooting, check that the tire pressure and tire size are correct.

**1. Front VSS Connector Inspection**

Remove the left inner fender (page 3-8).  
Turn the ignition switch to OFF.  
Disconnect the front VSS 3P black connector.  
Check the connector for loose contacts or corroded terminals.

*Is the connector in good condition?*

- NO** – Loose or poorly connected front VSS 3P connector.
- YES** – GO TO STEP 2.



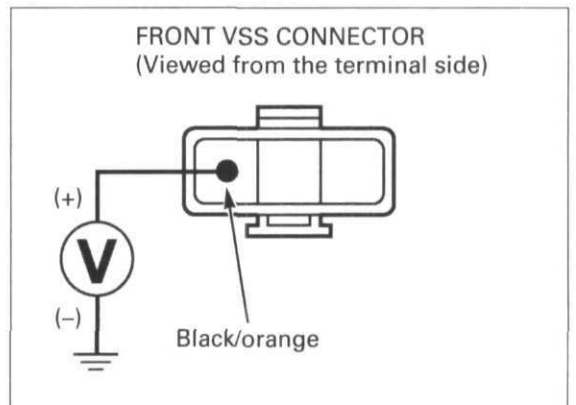
**2. Front VSS Input Line Inspection**

Turn the ignition switch to ON.  
Measure the voltage between the wire harness side front VSS 3P black connector terminal and ground.

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

*Is the voltage more than 10 V?*

- NO** – Open or short circuit in the Black/orange wire.
- YES** – GO TO STEP 3.



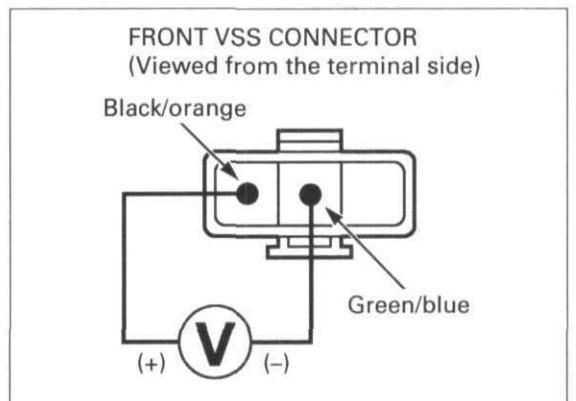
**3. Front VSS Ground Line Inspection**

Measure the voltage between the wire harness side front VSS 3P black connector terminals.

**Connection: Black/orange (+) – Green/blue (-)**

*Is the voltage more than 10 V?*

- NO** – Open circuit in the Green/blue wire.
- YES** – GO TO STEP 4.





## SELECTABLE 4WD SYSTEM (FM/FE models)

### 4. Front VSS Output Line Inspection

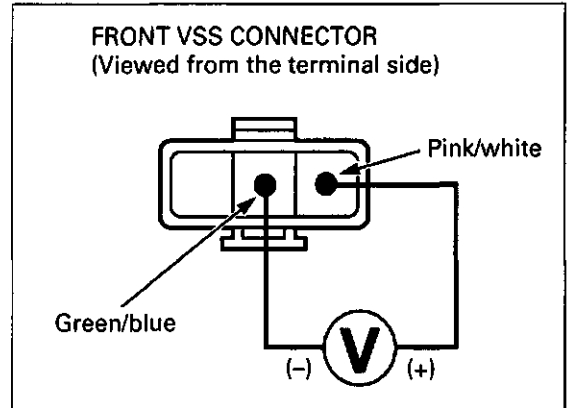
Measure the voltage between the wire harness side front VSS 3P black connector terminals.

**Connection: Pink/white (+) – Green/blue (-)**

**Is the voltage approximately 5 V?**

**NO** – Open or short circuit in the Pink/white wire.

**YES** – GO TO STEP 5.



### 5. Front VSS Inspection

Turn the ignition switch to OFF.  
Connect the inspection adaptor to the front VSS 3P black connectors.

**TOOL:**

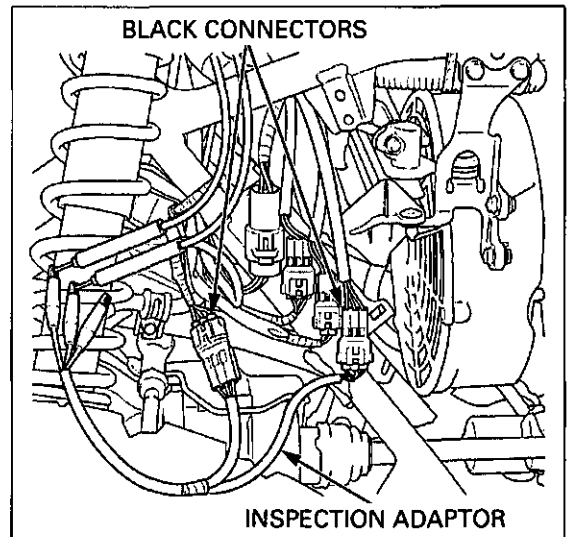
**Inspection adaptor 07GMJ-ML80100**

Shift the transmission in neutral.  
Raise the wheels off the ground and support the vehicle securely with a hoist or equivalent.  
Turn the ignition switch to ON.  
Measure the voltage between the Red clip (+) and White clip (-) while slowly turning the front wheels by hand.

**Is there 0 to 5 V pulse voltage?**

**NO** – Faulty front VSS.

**YES** – GO TO STEP 6.



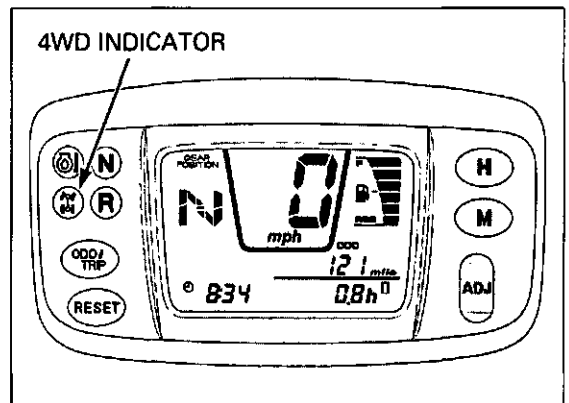
### 6. Failure Reproduction

Turn the ignition switch to OFF.  
Connect the front VSS 3P black connector and install the left inner fender (page 3-8).  
Turn the 2WD/4WD select switch to "4WD".  
Test-drive the vehicle above 4 mph for more than 5 seconds and check that the 4WD indicator blinks.

**Does the 4WD indicator blink 5 times?**

**NO** – No problem (Temporary failure).

**YES** – Faulty ECM.



## PROBLEM CODE 3: REAR VEHICLE SPEED SENSOR (VSS)

**NOTE:**

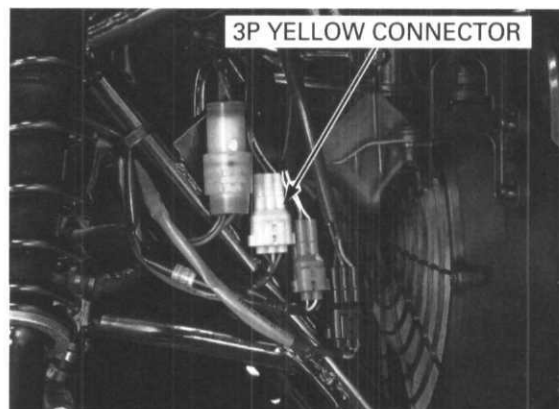
- Before troubleshooting, check that the tire pressure and tire size are correct.

### 1. Rear VSS Connector Inspection

Remove the left inner fender (page 3-8).  
Turn the ignition switch to OFF.  
Disconnect the rear VSS 3P yellow connector.  
Check the connector for loose contacts or corroded terminals.

**Is the connector in good condition?**

- NO** – Loose or poorly connected rear VSS 3P connector.
- YES** – GO TO STEP 2.



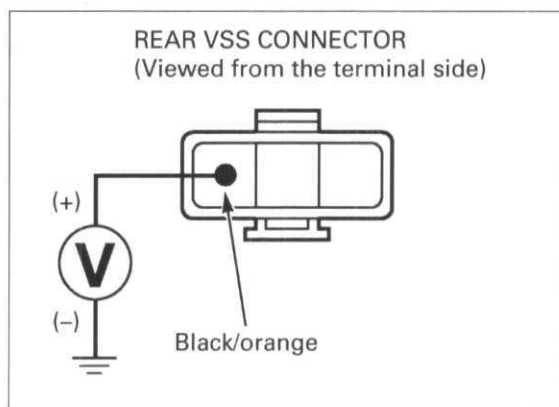
### 2. Rear VSS Input Line Inspection

Turn the ignition switch to ON.  
Measure the voltage between the wire harness side rear VSS 3P yellow connector terminal and ground.

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

**Is the voltage more than 10 V?**

- NO** – Open or short circuit in the Black/orange wire.
- YES** – GO TO STEP 3.



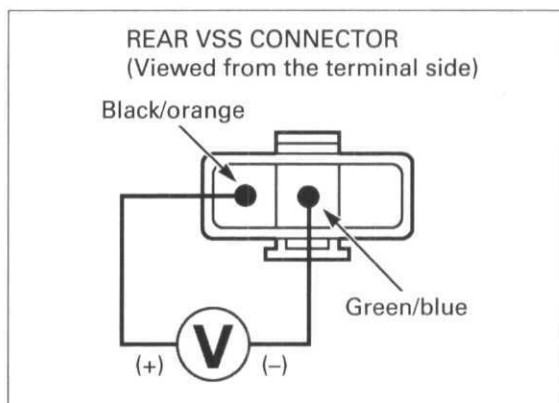
### 3. Rear VSS Ground Line Inspection

Measure the voltage between the wire harness side rear VSS 3P yellow connector terminals.

**Connection: Black/orange (+) – Green/blue (-)**

**Is the voltage more than 10 V?**

- NO** – Open circuit in the Green/blue wire.
- YES** – GO TO STEP 4.



## SELECTABLE 4WD SYSTEM (FM/FE models)

### 4. Rear VSS Output Line Inspection

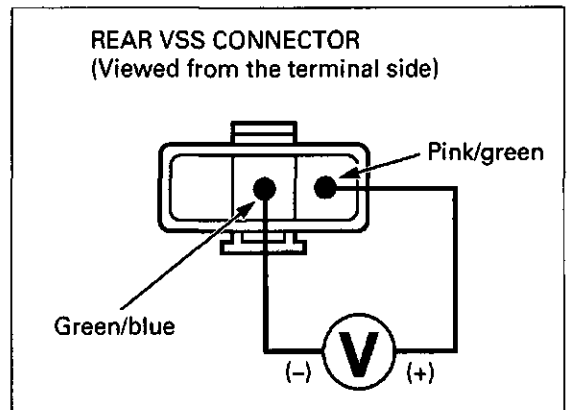
Measure the voltage between the wire harness side rear VSS 3P yellow connector terminals.

**Connection: Pink/green (+) – Green/blue (-)**

**Is the voltage approximately 5 V?**

**NO** – Open or short circuit in the Pink/green wire.

**YES** – GO TO STEP 5.



### 5. Rear VSS Inspection

Turn the ignition switch to OFF.

Connect the inspection adaptor to the rear VSS 3P yellow connectors.

**TOOL:**

**Inspection adaptor 07GMJ-ML80100**

Shift the transmission in neutral.

Raise the wheels off the ground and support the vehicle securely with a hoist or equivalent.

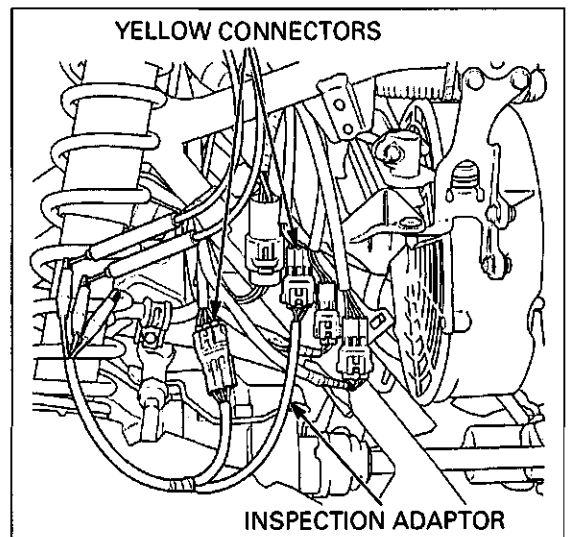
Turn the ignition switch to ON.

Measure the voltage between the Red clip (+) and White clip (-) while slowly turning the rear wheels by hand.

**Is there 0 to 5 V pulse voltage?**

**NO** – Faulty rear VSS.

**YES** – GO TO STEP 6.



### 6. Failure Reproduction

Turn the ignition switch to OFF.

Connect the rear VSS 3P yellow connector and install the left inner fender (page 3-8).

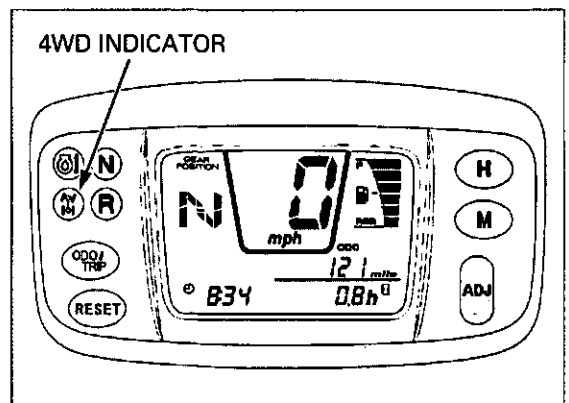
Turn the 2WD/4WD select switch to 4WD.

Test-drive the vehicle above 4 mph for more than 5 seconds and check that the 4WD indicator blinks.

**Does the 4WD indicator blink 5 times?**

**NO** – No problem (Temporary failure).

**YES** – Faulty ECM.



**PROBLEM CODE 4: SYSTEM VOLTAGE**

**NOTE:**

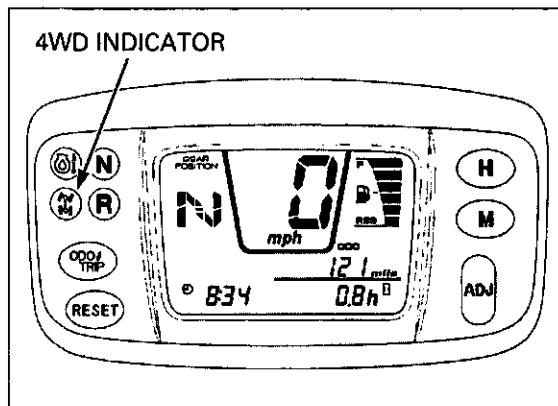
- Before starting the troubleshooting, check for the following:
  - battery condition (page 18-5)
  - engine idle speed (page 4-13)

**1. Failure Reproduction**

Turn the ignition switch to ON.  
30 seconds after turning the ignition switch ON, check that the 4WD indicator blinks.

**Does the 4WD indicator blink 4 times?**

- NO** - Check the charging system (page 18-7).
- YES** - GO TO STEP 2.



**2. ECM Power Input Line Inspection**

Turn the ignition switch to OFF.  
Remove the front fender (page 3-9).  
Disconnect the ECM 33P black connector.  
Turn the ignition switch to ON.  
Measure the voltage between the wire harness side connector terminal and ground using the special tool.

**TOOL:**

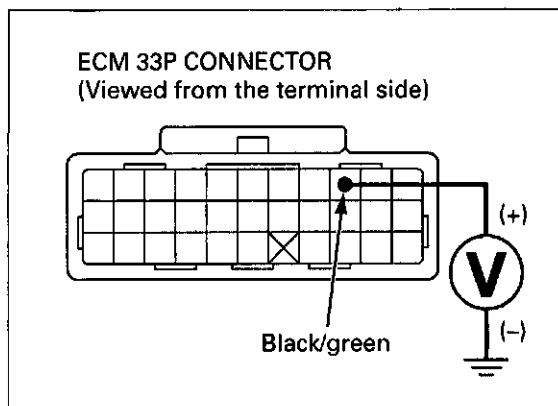
Pin probe (Male) 07ZAJ-RDJA110

**Connection:** Black/green (+) - Ground (-)

**Standard:** 11 - 16 V (20°C/68°F)

**Is the voltage within the standard value?**

- NO** -
  - Open circuit in wire harness between the battery-to-fuse box and fuse box-to-ECM.
  - Undercharged battery.
- YES** - Recheck for poor contact or loose connection in the wire harness. If they are OK, replace the ECM with a new one.



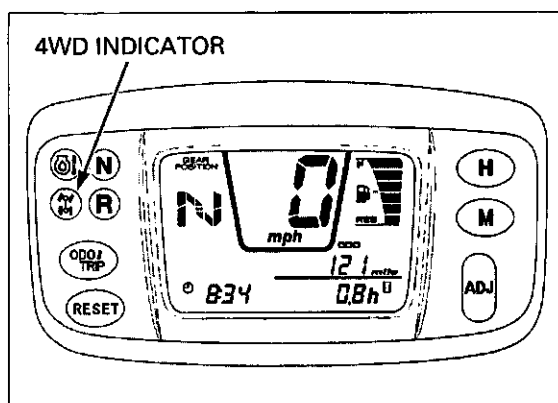
**PROBLEM CODE 5: FRONT FINAL CLUTCH SYSTEM**

**1. Failure Reproduction**

Turn the ignition switch to OFF then ON and the 2WD/4WD select switch to 4WD, and check that the 4WD indicator blinks.

**Does the 4WD indicator blink 5 times?**

- NO** - No problem (Temporary failure).
- YES** - GO TO STEP 2.



## SELECTABLE 4WD SYSTEM (FM/FE models)

### 2. Front Final Clutch Line Open Circuit Inspection

Remove the front fender (page 3-9).  
Remove the final clutch cover (page 16-12).  
Turn the ignition switch to OFF.  
Disconnect the ECM 33P black connector and front final clutch 2P green connector.  
Check the White/red and White/yellow wires for continuity between the ECM 33P black and front final clutch 2P green connector terminals using the special tool.

**TOOL:**

**Pin probe (Male) 07ZAJ-RDJA110**

*Is there continuity?*

**NO** - • Open circuit in the White/red wire.  
• Open circuit in the White/yellow wire.

**YES** - GO TO STEP 3.

### 3. Front Final Clutch Line Short Circuit Inspection

Check the White/red and White/yellow wires for continuity between the wire harness side clutch 2P connector terminals and ground.

*Is there continuity?*

**YES** - • Short circuit in the White/red wire.  
• Short circuit in the White/yellow wire.

**NO** - GO TO STEP 4.

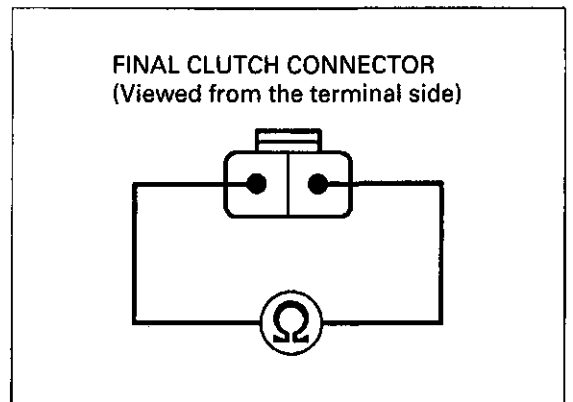
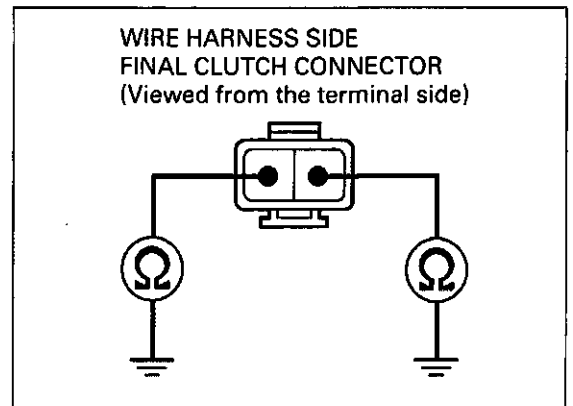
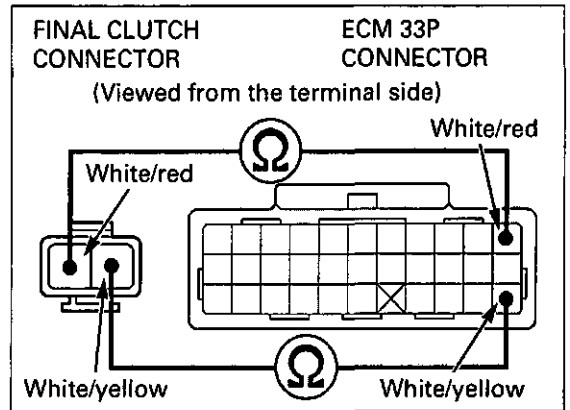
### 4. Front Final Clutch Inspection

Measure the resistance between the final clutch side 2P connector terminals.

*Is the resistance within 5.1 – 5.8  $\Omega$  (20°C/68°F)?*

**NO** - Faulty front final clutch.

**YES** - Faulty ECM.



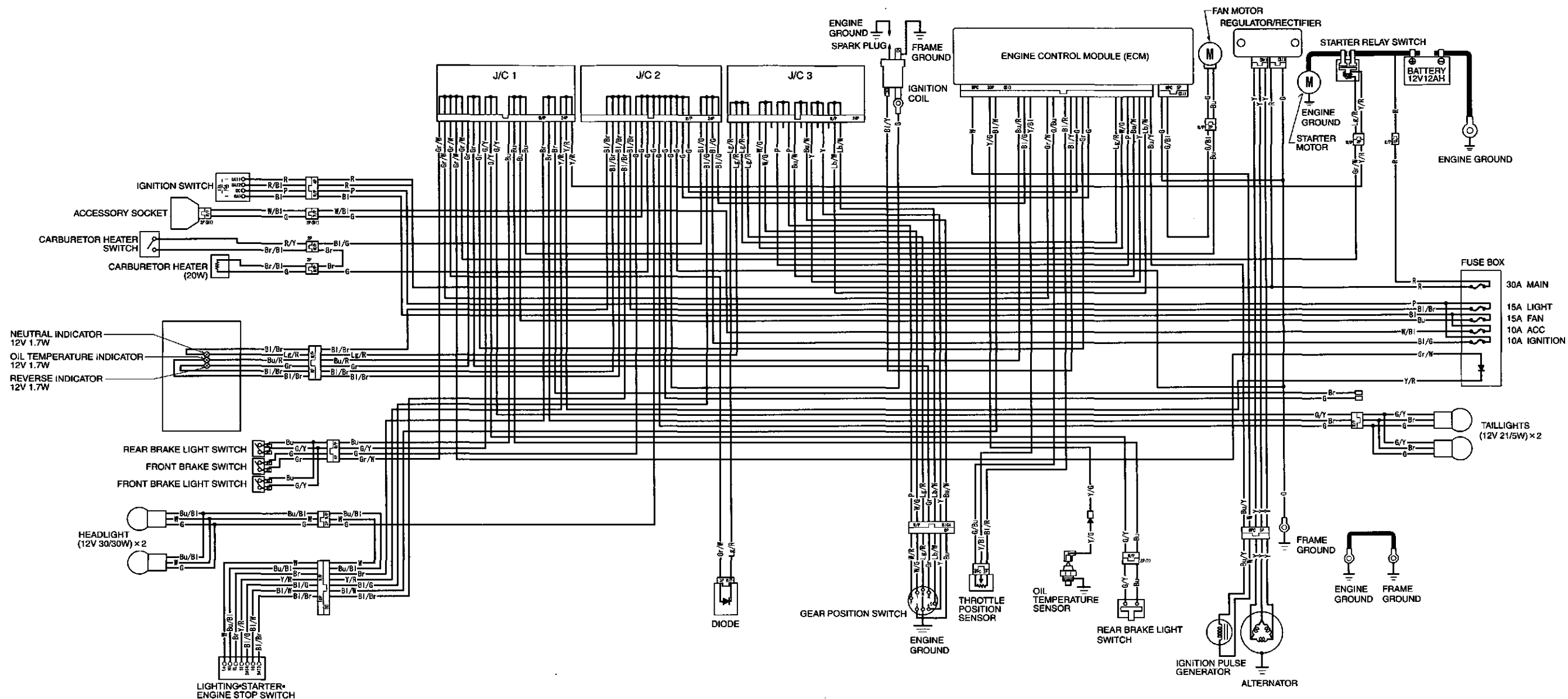
# 24. WIRING DIAGRAMS

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A/CM-TYPE TM MODEL .....	24-3	FM MODEL.....	24-5
U-TYPE TM MODEL.....	24-4	FE MODEL.....	24-6



A/CM-TYPE TM MODEL



SWITCH CONTINUITY

		IGNITION SWITCH			
		BAT2	DC	BAT1	BAT
ON		○	○	○	○
OFF					
	COLOR	R/BI	P	R	BI

		LIGHTING SWITCH		
		BAT3	TL	(HL)
ON		○	○	○
OFF				
	COLOR	BI	Br	

		DIMMER SWITCH		
		(HL)	Lo	Hi
Lo		○	○	
(N)		○	○	○
Hi		○		
	COLOR	W	Bu/BI	

		ENGINE STOP SWITCH	
		BAT4	IG
OFF			
RUN		○	
OFF			
	COLOR	BI/G	BI/W

		STARTER SWITCH	
		IG	ST
FREE			
PUSH		○	
	COLOR	BI/W	Y/R

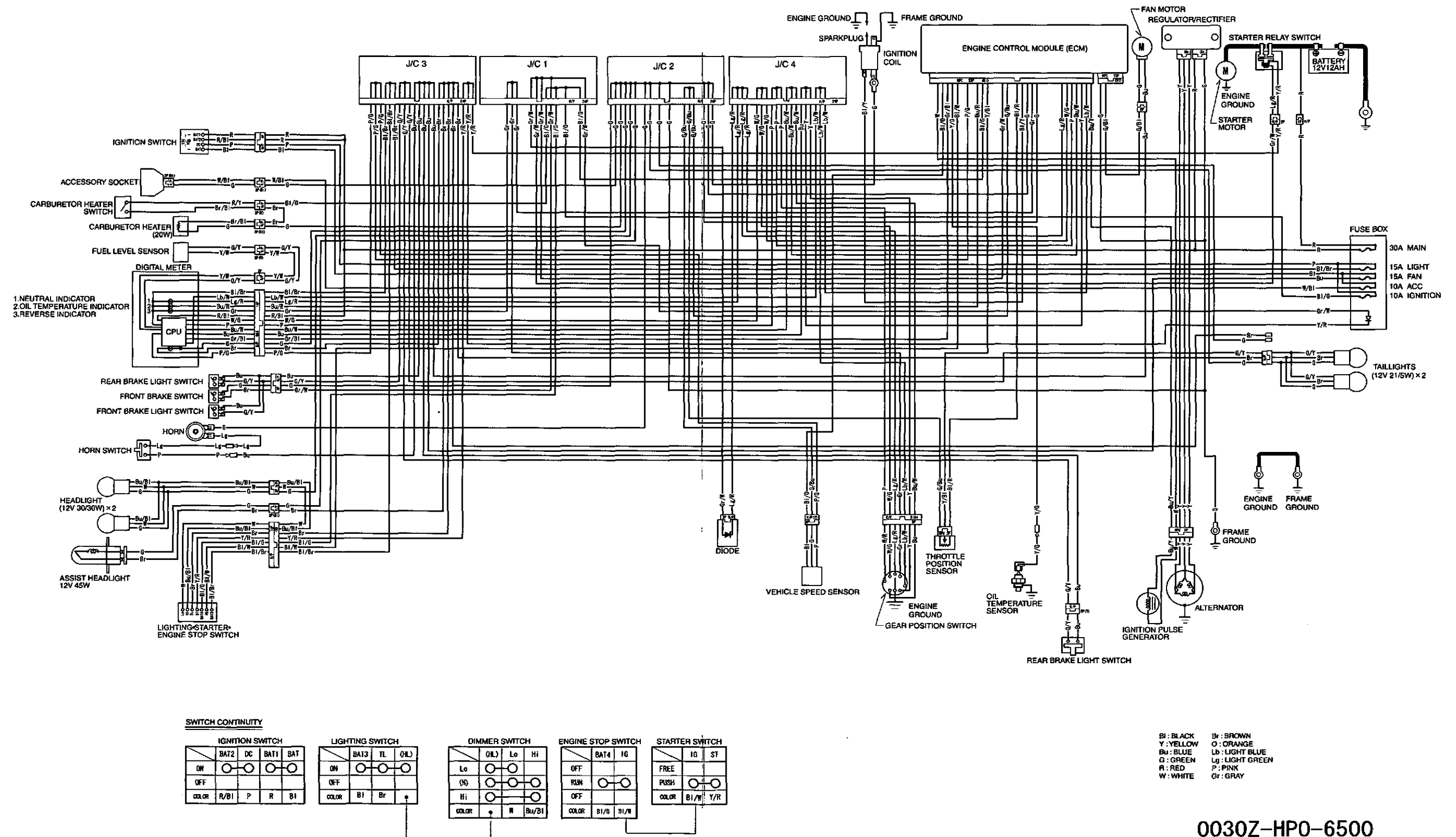
- BI: BLACK      Br: BROWN
- Y: YELLOW     O: ORANGE
- Bu: BLUE      Lb: LIGHT BLUE
- G: GREEN      Lg: LIGHT GREEN
- R: RED        P: PINK
- W: WHITE      Gr: GRAY

0030Z-HP0-6700



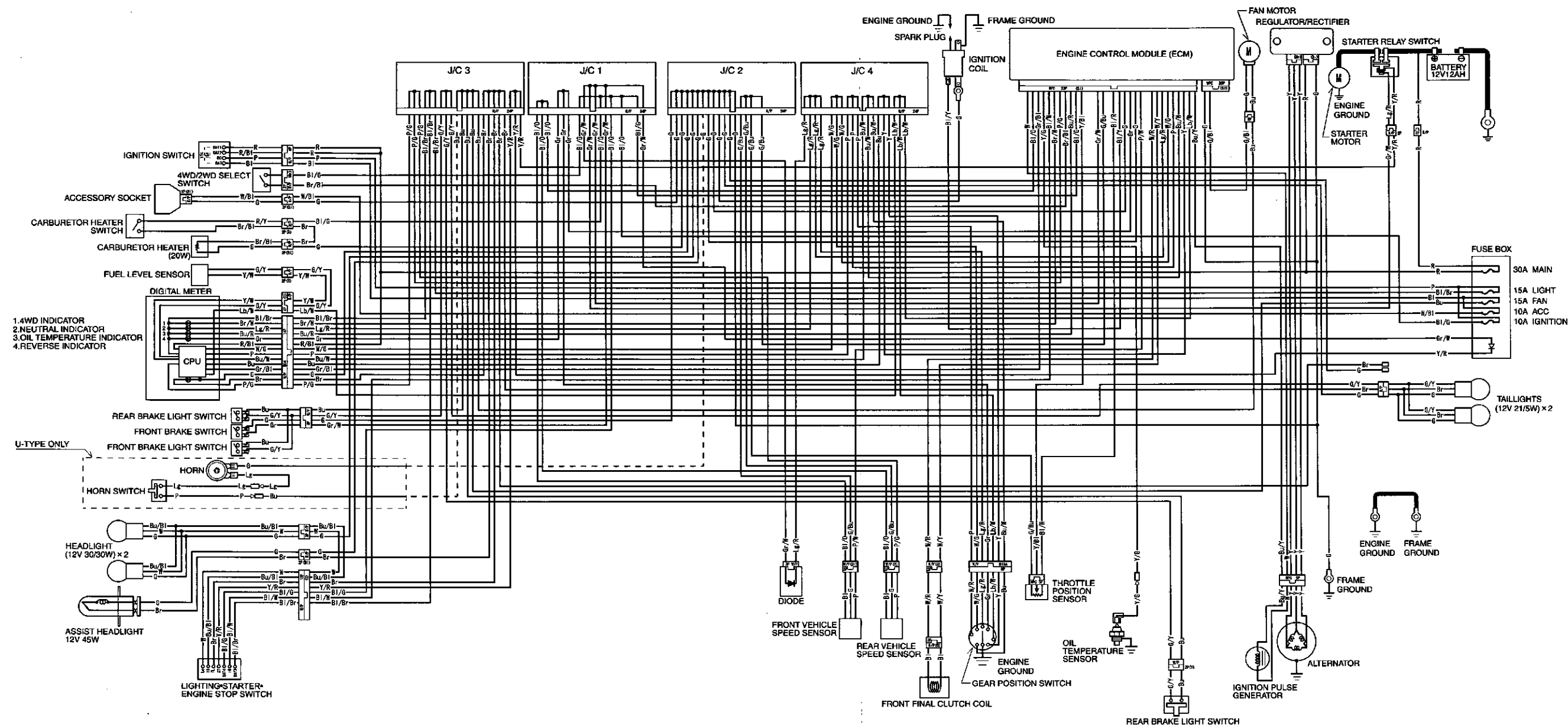
# WIRING DIAGRAMS

## U-TYPE TM MODEL



0030Z-HP0-6500

FM MODEL



- 1. 4WD INDICATOR
- 2. NEUTRAL INDICATOR
- 3. OIL TEMPERATURE INDICATOR
- 4. REVERSE INDICATOR

U-TYPE ONLY

SWITCH CONTINUITY

		IGNITION SWITCH			
		BAT2	DC	BAT1	BAT
ON		○	○	○	○
OFF		○	○	○	○
	COLOR	R/B1	P	R	B1

		LIGHTING SWITCH		
		BAT3	TL	(HL)
ON		○	○	○
OFF		○	○	○
	COLOR	B1	Br	

		DIMMER SWITCH		
		(HL)	Lo	HI
Lo		○	○	○
(H)		○	○	○
Hi		○	○	○
	COLOR	W	Bu/B1	

		ENGINE STOP SWITCH	
		BAT4	IG
OFF		○	○
REN		○	○
OFF		○	○
	COLOR	B1/G	B1/W

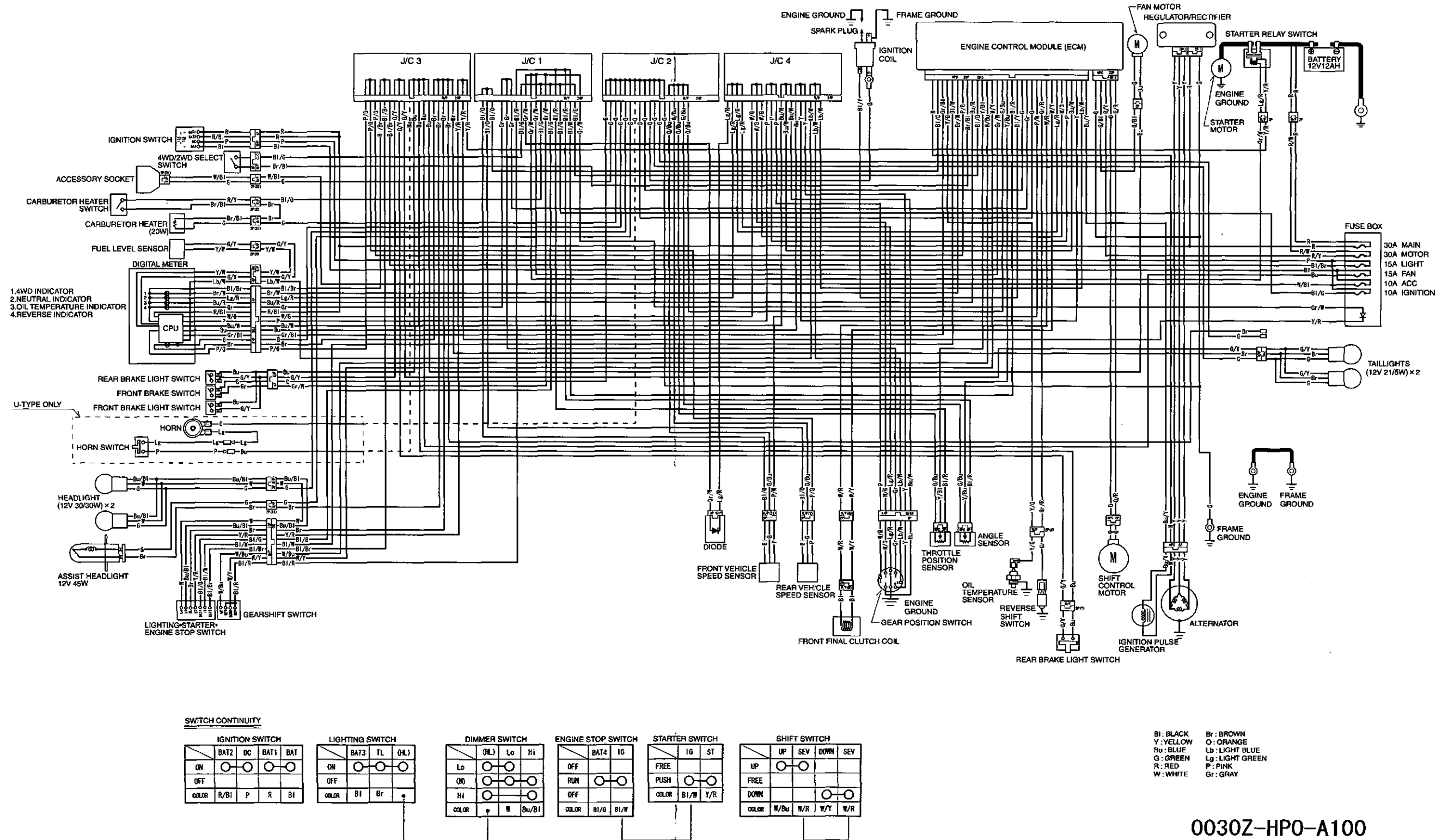
		STARTER SWITCH	
		IG	ST
FREE		○	○
PUSH		○	○
	COLOR	B1/W	Y/R

- B1: BLACK
- Y: YELLOW
- Bu: BLUE
- G: GREEN
- R: RED
- W: WHITE
- Br: BROWN
- O: ORANGE
- Lb: LIGHT BLUE
- Lg: LIGHT GREEN
- P: PINK
- Gr: GRAY

0030Z-HP0-A000  
0030Z-HP0-U000

**WIRING DIAGRAMS**

**FE MODEL**



0030Z-HPO-A100  
 0030Z-HPO-U100

# 25. TROUBLESHOOTING

---

**ENGINE DOES NOT START OR IS HARD TO START ..... 25-2**

**ENGINE LACKS POWER ..... 25-3**

**POOR PERFORMANCE AT LOW AND IDLE SPEED .....25-5**

**POOR PERFORMANCE AT HIGH SPEED ....25-6**

**POOR HANDLING.....25-6**

# ENGINE DOES NOT START OR IS HARD TO START

### 1. Fuel Flow Inspection

Check fuel flow to the carburetor.

*Is fuel reaching the carburetor?*

- NO** - • Clogged fuel line and strainer  
• Clogged fuel valve  
• Clogged fuel tank breather hose

**YES** - GO TO STEP 2.

### 2. Spark Plug Inspection

Remove and inspect the spark plug.

*Is the spark plug wet with fuel?*

- YES** - • Flooded carburetor  
• Throttle valve open  
• Dirty air cleaner  
• Improperly adjusted pilot screw  
• Starting enrichment (SE) valve stuck open or damaged

**NO** - GO TO STEP 3.

### 3. Spark Test

Perform the spark test.

*Is the spark quality good?*

- NO** - • Faulty spark plug  
• Fouled spark plug  
• Loose or disconnected ignition system wires  
• Broken or shorted spark plug wire  
• Faulty ignition coil  
• Faulty ignition pulse generator  
• Faulty engine stop switch  
• Faulty ignition switch  
• Faulty ignition control module (ICM)

**YES** - GO TO STEP 4.

### 4. Engine Start Condition

Start the engine by following the normal procedure.

*Does the engine start but stop?*

- YES** - • Improper choke operation  
• Incorrectly adjusted carburetor  
• Leaking carburetor insulator  
• Improper ignition timing (Faulty ECM or ignition pulse generator)  
• Contaminated fuel

**NO** - GO TO STEP 5.

### 5. Cylinder Compression Inspection

Test the cylinder compression.

*Is the compression as specified?*

- NO** - • Valve clearance too small  
• Valve stuck open  
• Worn cylinder and piston rings  
• Damaged cylinder head gasket  
• Seized valve  
• Improper valve timing

---

## ENGINE LACKS POWER

### 1. Drive Train Inspection

Raise wheel off the ground and spin by hand.

**Does the wheel spin freely?**

- NO** - • Brake dragging  
• Worn or damaged knuckle, hub or axle bearing

**YES** - GO TO STEP 2.

### 2. Tire Pressure Inspection

Check the tire pressure.

**Are the tire pressures correct?**

- NO** - • Faulty tire valve  
• Punctured tire

**YES** - GO TO STEP 3.

### 3. Clutch Inspection

Accelerate rapidly low to second.

**Does the engine speed change?**

- NO** - • Clutch slipping  
• Worn clutch discs/plates  
• Warped clutch discs/plates  
• Weak clutch spring  
• Additive in engine oil

**YES** - GO TO STEP 4.

### 4. Engine Performance Inspection

Accelerate lightly.

**Does the engine speed increase?**

- NO** - • Fuel/air mixture too rich or lean  
• Clogged air cleaner  
• Restricted fuel flow  
• Clogged muffler  
• Restricted fuel tank breather hose

**YES** - GO TO STEP 5.

### 5. Ignition Timing Inspection

Check the ignition timing.

**Is the ignition timing as specified?**

- NO** - • Faulty engine control module (ECM)  
• Faulty ignition pulse generator

**YES** - GO TO STEP 6.

### 6. Cylinder Compression Inspection

Test the cylinder compression.

**Is the compression as specified?**

- NO** - • Valve clearance too small  
• Valve stuck open  
• Worn cylinder and piston rings  
• Damaged cylinder head gasket  
• Seized valve  
• Improper valve timing

**YES** - GO TO STEP 7.

## TROUBLESHOOTING

---

### 7. Carburetor Inspection

Check the carburetor for clogging.

***Are the carburetor passages clear?***

**NO** – Carburetor not serviced frequently enough

**YES** – GO TO STEP 8.

### 8. Spark Plug Inspection

Remove and inspect the spark plug.

***Is the spark plug in good condition?***

**NO** – • Plugs not serviced frequently enough  
• Incorrect spark plug used

**YES** – GO TO STEP 9.

### 9. Engine Oil Inspection

Check the oil level and condition.

***Is the engine oil at the correct level and in good condition?***

**NO** – • Oil level too high  
• Oil level too low  
• Contaminated oil

**YES** – GO TO STEP 10.

### 10. Valve Train Lubrication Inspection

Remove the cylinder head cover and inspect lubrication.

***Is the valve train properly lubricated?***

**NO** – • Clogged oil passage  
• Clogged oil orifice

**YES** – GO TO STEP 11.

### 11. Engine Knocking Inspection

Accelerate or run at high speed.

***Is the engine knocking?***

**YES** – • Worn piston and cylinder  
• Use of poor quality fuel  
• Excessive carbon build-up in combustion chamber  
• Ignition timing too advanced (Faulty ECM)  
• Lean fuel mixture

---

## POOR PERFORMANCE AT LOW AND IDLE SPEED

### 1. Carburetor Pilot Screw Adjustment Inspection

Check carburetor pilot screw adjustment.

*Is the pilot screw properly adjusted?*

**NO** – Adjust the carburetor pilot screw (page 6-19)

**YES** – GO TO STEP 2.

### 2. Carburetor Insulator Inspection

Check for leaking carburetor insulator.

*Is the carburetor insulator leaking?*

**YES** –

- Loose carburetor insulator bands
- Damaged carburetor insulator
- Faulty carburetor insulator O-ring

**NO** – GO TO STEP 3.

### 3. Spark Test

Perform the spark test.

*Is the spark quality good?*

**NO** –

- Faulty spark plug
- Fouled spark plug
- Loose or disconnected ignition system wires
- Broken or shorted spark plug wire
- Faulty ignition coil
- Faulty ignition pulse generator
- Faulty engine stop switch
- Faulty ignition switch
- Faulty engine control module (ECM)

**YES** – GO TO STEP 4.

### 4. Ignition Timing Inspection

Check the ignition timing.

*Is the ignition timing as specified?*

**NO** –

- Faulty engine control module (ECM)
- Faulty ignition pulse generator



## TROUBLESHOOTING

---

### POOR PERFORMANCE AT HIGH SPEED

#### 1. Fuel Flow Inspection

Disconnect the fuel hose and check fuel flow to carburetor.

*Does fuel flow freely?*

- NO** – • Restricted fuel hose  
• Restricted fuel tank breather hose  
• Faulty fuel valve  
• Clogged fuel strainer

**YES** – GO TO STEP 2.

#### 2. Carburetor Inspection

Check the carburetor for clogging.

*Are the carburetor passages clear?*

**NO** – Carburetor not serviced frequently enough

**YES** – GO TO STEP 3.

#### 3. Valve Timing Inspection

Check the valve timing.

*Is the valve timing correct?*

**NO** – Camshaft not installed properly

**YES** – GO TO STEP 4.

#### 4. Ignition Timing Inspection

Check the ignition timing.

*Is the ignition timing as specified?*

- NO** – • Faulty engine control module (ECM)  
• Faulty ignition pulse generator

**YES** – GO TO STEP 5.

#### 5. Valve Spring Inspection

Check the valve springs.

*Is the valve spring free length as specified?*

**NO** – Faulty valve spring

### POOR HANDLING

#### Steering is heavy

- Steering shaft end nut or holder too tight
- Damaged steering shaft bushing
- Damaged steering shaft bearing

#### Either wheel is wobbling

- Excessive knuckle, hub or axle bearing play
- Bent rim
- Improperly installed wheel hub
- Excessively worn swingarm pivot bearings
- Bent frame

#### The vehicle pulls to one side

- Tire air pressure incorrect
- Faulty shock absorber
- Bent tie-rod
- Incorrect tie-rod adjustment
- Bent swingarm
- Bent frame
- Improper wheel alignment

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