

2005-2012



SERVICE MANUAL

TRX500FA

FourTrax Foreman Rubicon™

TRX500FGA

FourTrax Foreman Rubicon™
GPScape™

TRX500FPA

FourTrax Foreman Rubicon™
GPScape™ Power Steering

A Few Words About Safety

Service Information

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

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

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

For Your Customer's Safety

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

For Your Safety

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

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

Important Safety Precautions

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

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

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

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

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

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

▲ WARNING

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

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

▲ WARNING

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

Follow the procedures and precautions in this manual carefully.

HOW TO USE THIS MANUAL

This service manual describes the service procedures for the TRX500FA/FGA/FPA.

Follow the Maintenance Schedule (Section 3) 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 3 apply to the whole vehicle. Section 2 illustrates procedures for removal/installation of components that may be required to perform service described in the following sections. Sections 4 through 24 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 don't know the source of the trouble, go to section 26 Troubleshooting.

Your safety, and the safety of others, is very important. To help you make informed decisions we have provided safety messages and other information throughout this manual. Of course, it is not practical or possible to warn you about all the hazards associated with servicing this vehicle. You must use your own good judgement. You will find important safety information in a variety of forms including:

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

These signal words mean:

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

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

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

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












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

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SYMBOLS

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

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

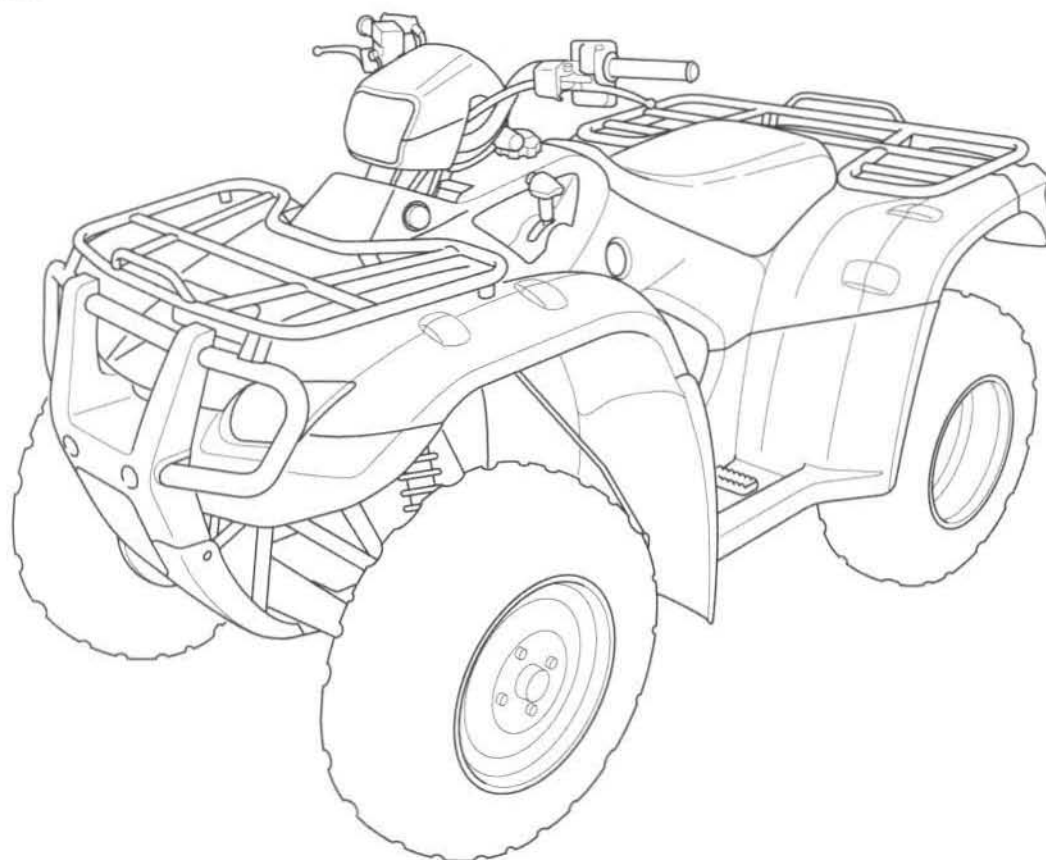
1. Use genuine Honda or Honda-recommended parts and lubricants or their equivalents. Parts that don't meet Honda's design specifications may cause damage to the vehicle.
2. Use the special tools designed for this product to avoid damage and incorrect assembly.
3. Use only metric tools when servicing 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 show in the Cable and Harness Routing (page 1-24).

MODEL IDENTIFICATION

This manual covers 3 types of TRX500 models:

- FA – 4WD/Automotic transmission
- FGA – 4WD/Automotic transmission/GPScape
- FPA – 4WD/Automotic transmission/GPScape/EPS

'05, '06 shown:



ABBREVIATION

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

Abbrev. term	Full term
ECU	Electronic Control Unit
EPS	Electric Power Steering
ESP	Electric Shift Program
DLC	Data Link Connector
ECM	Engine Control Module
CKP sensor	Crankshaft Position sensor
VS sensor	Vehicle Speed sensor
HDS	Honda Diagnostic System
DTC	Diagnostic Trouble Code
SCS connector	Service Check Short connector

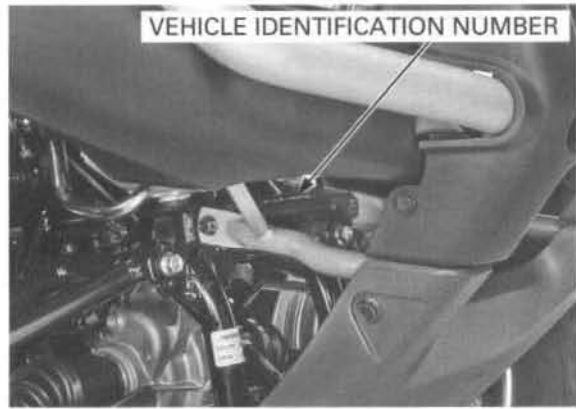
DESTINATION CODE

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, U.K., Sweden

GENERAL INFORMATION

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

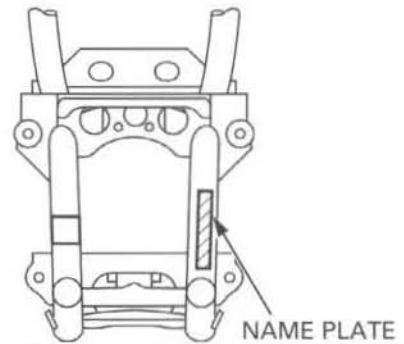


The engine serial number is stamped on the right side of the crankcase.



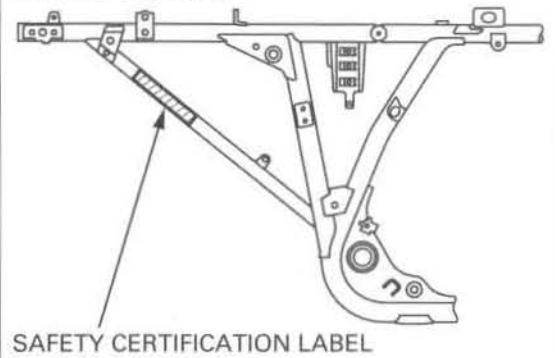
The name plate is attached on the front frame pipe (U type only).

U type only:



The vehicle safety certification label is attached on the right side of the frame (U.S.A. and Canada).

U.S.A. and Canada:

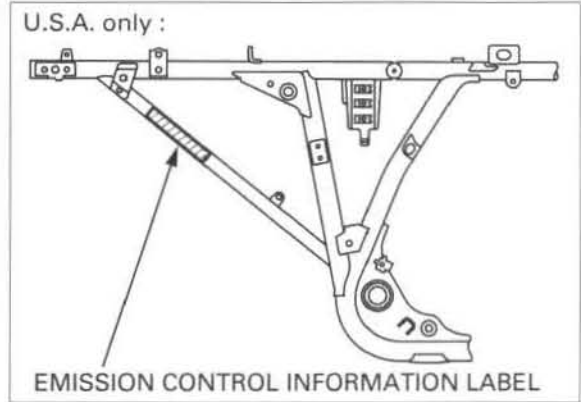


The carburetor identification number is stamped on the left side of the carburetor body.



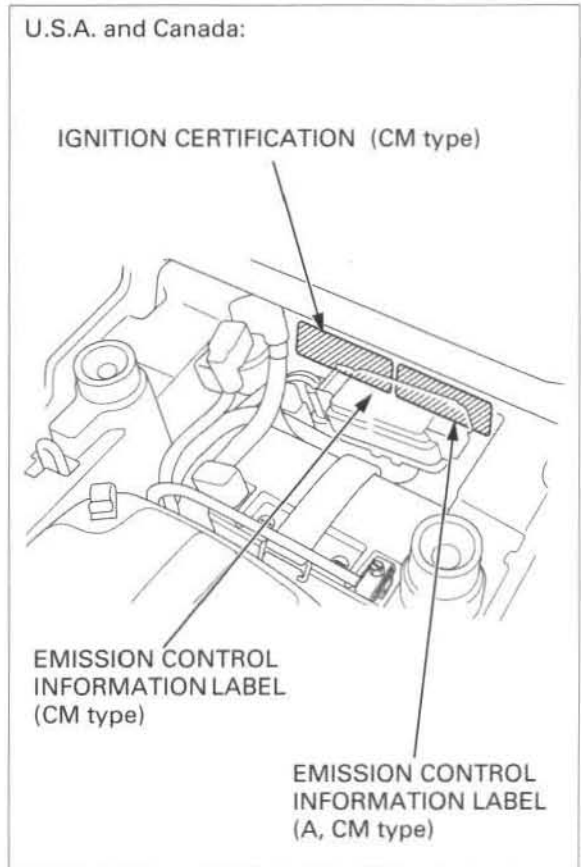
'05 - '07:

The vehicle emission control information label is attached on the right side of the frame (U.S.A. only).



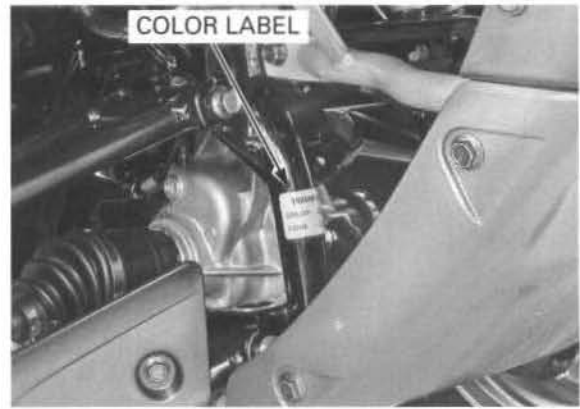
After '07:

The vehicle emission control information label is attached on the rear fender near the battery.



GENERAL INFORMATION

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



GENERAL SPECIFICATIONS

ITEM		SPECIFICATIONS	
DIMENSIONS	Overall length	2,108 mm (83.0 in)	
	Overall width	1,188 mm (46.8 in)	
	Overall height	1,179 mm (46.4 in)	
	Wheelbase	1,286 mm (50.6 in)	
	Front tread	917 mm (36.1 in)	
	Rear tread	925 mm (36.4 in)	
	Seat height	861 mm (33.9 in)	
	Footpeg height	340 mm (13.4 in)	
	Ground clearance	190 mm (7.5 in)	
	Curb weight	Except EPS EPS 287 kg (633 lbs) 294 kg (648 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 (Leading-trailing)	
	Caster angle	2°	
	Trail length	8 mm (0.3 in)	
	Camber angle	0°	
	Fuel tank capacity	'05 - '07 After '07	15.8 liters (4.17 US gal, 3.48 Imp gal) 15.0 liters (3.96 US gal, 3.30 Imp gal)
Fuel tank reserve capacity	'05 - '07 After '07	3.3 liters (0.87 US gal, 0.73 Imp gal) 2.5 liters (0.66 US gal, 0.55 Imp gal)	
ENGINE	Cylinder arrangement	Single cylinder, longitudinally installed	
	Bore and stroke	92.0 x 75.0 mm (3.62 x 2.95 in)	
	Displacement	499 cm ³ (30.4 cu-in)	
	Compression ratio	9.2 : 1	
	Valve train	OHV	
	Intake valve	opens at 1 mm (0.04 in) lift closes at 1 mm (0.04 in) lift	13° BTDC 35° ABDC
	Exhaust valve	opens at 1 mm (0.04 in) lift closes at 1 mm (0.04 in) lift	45° BBDC 5° ATDC
	Lubrication system	Forced pressure (dry sump)	
	Oil pump type	Trochoid	
	Cooling system	Liquid cooled	
	Air filtration	Oiled urethane foam	
Engine dry weight	62.9 kg (138.7 lbs)		
CARBURETOR	Carburetor type	Constant Velocity (VE type)	
	Throttle bore	36 mm (1.4 in)	

GENERAL INFORMATION

ITEM		SPECIFICATIONS
DRIVE TRAIN	Clutch system Transmission Primary reduction Secondary reduction Final reduction Front Rear Automatic transmission ratio Sub-transmission Drive ratio Low Reverse Gearshift pattern	Centrifugal, wet HONDAMATIC (automatic; non-stage speed) with sub-transmission (constant mesh) 1.045 (70/67) 2.000 (40/20) 3.231 (42/13) 3.154 (41/13) 0.93—3.47 1.583 (38/24) 2.500 (45/18) 3.222 (29/18 x 28/14) D - N - R - L (Sub-transmission) D: 3-mode; Automatic 2-pattern (D1/D2) and Manual (ESP; 5-speeds) L: 2-mode; Automatic and manual (ESP: 5-speeds) R: 1-mode (fixed low ratio)
ELECTRICAL	Ignition system Starting system Charging system Regulator/rectifier Lighting system	DC-CDI (Direct current-Capacitor discharge ignition) Electric starter motor and emergency recoil starter Triple phase output alternator FET shorted, triple phase full wave rectifica- tion Battery

LUBRICATION SYSTEM SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Engine oil capacity	After draining	4.4 liters (4.7 US qt, 3.9 Imp qt)	-
	After draining/filter change	4.6 liters (4.9 US qt, 4.0 Imp qt)	-
	After disassembly	5.2 liters (5.5 US qt, 4.6 Imp qt)	-
Recommended engine oil		Pro Honda GN4 4-stroke oil or equivalent motor oil API service classification: SG or Higher JASO T 903 standard: MA Viscosity: SAE 10W-30	-
Oil pressure 80°C (176°F)	At 1,400 rpm (min ⁻¹)	Above 150 kPa (1.5 kgf/cm ² , 22 psi)	-
	At 5,000 rpm (min ⁻¹)	Above 800 kPa (8.2 kgf/cm ² , 116 psi)	-
Oil pump rotor	Tip clearance	0.15 (0.006)	0.20 (0.008)
	Body clearance	0.12 - 0.22 (0.005 - 0.009)	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	A, CM type	VE6AE
	U type	VE6AF
Main jet		# 162
Slow jet		# 45
Pilot screw opening		See page 5-19
Float level		15.9 mm (0.63 in)
Idle speed		1,400 ± 100 rpm (min ⁻¹)
Throttle lever freeplay		3 - 8 mm (1/8 - 5/16 in)

COOLING SYSTEM SPECIFICATIONS

ITEM		SPECIFICATIONS
Coolant capacity	Radiator and engine	1.7 liters (1.8 US qt, 1.5 Imp qt)
	Reserve tank	0.40 liter (0.42 US qt, 0.35 Imp qt)
Radiator cap relief pressure		108 - 137 kPa (1.1 - 1.4 Kgf/cm ² , 16 - 20 psi)
Thermostat	Begin to open	80 - 84°C (176 - 183°F)
	Fully open	95°C (203°F)
	Valve lift	8 mm (0.3 in) minimum
Recommended antifreeze		Pro Honda HP Coolant or an equivalent high quality ethylene glycol antifreeze containing silicate-free corrosion inhibitors
Standard coolant concentration		1:1 mixture with soft water

GENERAL INFORMATION

CYLINDER HEAD/VALVE/CAMSHAFT SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Cylinder compression at 450 rpm (min^{-1})		608 – 902 kPa (6.2 – 9.2 kgf/cm^2 , 88 – 131 psi)	–
Valve clearance		IN	0.15 (0.006)
		EX	0.23 (0.009)
Valve, valve guide	Valve stem O.D.	IN	5.475 – 5.490 (0.2156 – 0.2161)
		EX	5.455 – 5.470 (0.2148 – 0.2154)
	Valve guide I.D.	IN/EX	5.500 – 5.512 (0.2165 – 0.2170)
	Stem-to-guide clearance	IN	0.010 – 0.037 (0.0004 – 0.0015)
		EX	0.030 – 0.057 (0.0012 – 0.0022)
	Valve guide projection above cylinder head	IN	15.8 – 16.2 (0.62 – 0.64)
EX		18.8 – 19.2 (0.74 – 0.76)	
Valve spring	Free length	Inner	38.82 (1.528)
		Outer	51.17 (2.015)
	Valve seat width	IN/EX	1.0 – 1.1 (0.039 – 0.043)
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	33.9602 – 34.1202 (1.33701 – 1.34331)
		EX	34.1959 – 34.3559 (1.34629 – 1.35259)
	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 – 3.6224)	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)	91.90 (3.618)	
	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/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)	0.01 (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)	

CENTRIFUGAL CLUTCH SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Clutch	Drum I.D.	150.0 – 150.2 (5.906 – 5.913)	150.4 (5.92)
	Weight lining thickness	3.0 (0.12)	2.0 (0.08)
	Clutch spring height	3.72 (0.146)	3.6 (0.14)
	Clutch weight spring free length	23.2 (0.91)	24.1 (0.95)
Clutch drum boss I.D.		29.000 – 29.020 (1.1417 – 1.1425)	29.05 (1.144)
Crankshaft O.D. at clutch drum		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)	51.705 (2.0356)

SUB-TRANSMISSION/GEARSHIFT LINKAGE SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Shift fork	I.D.	11.000 – 11.021 (0.4331 – 0.4339)	11.04 (0.435)
	Claw thickness	4.93 – 5.00 (0.194 – 0.197)	4.5 (0.18)
	Shaft O.D.	10.966 – 10.984 (0.4317 – 0.4324)	10.96 (0.431)
Transmission	Gear I.D.	D., R., L.	28.020 – 28.041 (1.1031 – 1.1040)
		Reverse idle	14.000 – 14.018 (0.5512 – 0.5519)
	Gear bushing O.D.	D./R.	27.979 – 28.000 (1.1015 – 1.1024)
		L.	27.984 – 28.005 (1.1017 – 1.1026)
	Gear-to-bushing clearance	D., R.	0.020 – 0.062 (0.0008 – 0.0024)
		L.	0.015 – 0.057 (0.0006 – 0.0022)
	Gear bushing I.D.	D./R.	25.000 – 25.013 (0.9843 – 0.9848)
	Reverse idle shaft O.D.		13.966 – 13.984 (0.5498 – 0.5506)
	Reverse idle gear-to-shaft clearance		0.016 – 0.052 (0.0006 – 0.0020)

CRANKSHAFT/AUTOMATIC TRANSMISSION SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Crankshaft	Runout	–	0.15 (0.006)
	Big end side clearance	0.05 – 0.65 (0.002 – 0.026)	0.8 (0.03)
	Big end radial clearance	0.006 – 0.018 (0.0002 – 0.0007)	0.05 (0.002)

GENERAL INFORMATION

FRONT WHEEL/SUSPENSION/STEERING SPECIFICATIONS

ITEM			STANDARD	SERVICE LIMIT
Minimum tire tread depth			-	4.0 mm (0.16 in)
Cold tire pressure	'05 - '07	Standard	25 kPa (0.25 kgf/cm ² , 3.6 psi)	-
		Minimum	22 kPa (0.22 kgf/cm ² , 3.2 psi)	-
		Maximum	28 kPa (0.28 kgf/cm ² , 4.0 psi)	-
		With cargo	25 kPa (0.25 kgf/cm ² , 3.6 psi)	-
	After '07 Except EPS		25 kPa (0.25 kgf/cm ² , 3.6 psi)	-
EPS only After '08	Front		32.5 kPa (0.325 kgf/cm ² , 4.7 psi)	
	Rear		25 kPa (0.25 kgf/cm ² , 3.6 psi)	
Tie-rod distance between the ball joints			387 mm (15.2 in)	-
Toe			Toe-out: 30 ± 15 mm (1 - 3/16 ± 9/16 in)	-
Suspension spring pre-load adjuster standard position (CM type only)			Position 2	-

REAR WHEEL/SUSPENSION SPECIFICATIONS

ITEM			STANDARD	SERVICE LIMIT
Minimum tire tread depth			-	4.0 mm (0.16 in)
Cold tire pressure	'05 - '07	Standard	25 kPa (0.25 kgf/cm ² , 3.6 psi)	-
		Minimum	22 kPa (0.22 kgf/cm ² , 3.2 psi)	-
		Maximum	28 kPa (0.28 kgf/cm ² , 4.0 psi)	-
		With cargo	25 kPa (0.25 kgf/cm ² , 3.6 psi)	-
	After '07		25 kPa (0.25 kgf/cm ² , 3.6 psi)	-
Suspension spring pre-load adjuster standard position (CM type and U.S.A. after '08)			Position 2	-

BRAKE SYSTEM SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Front brake	Recommended brake fluid	DOT 4 brake fluid	-
	Master cylinder I.D.	14.000 - 14.043 (0.5512 - 0.5529)	14.055 (0.5533)
	Master cylinder O.D.	13.957 - 13.984 (0.5495 - 0.5506)	13.945 (0.5490)
	Caliper cylinder I.D.	33.96 - 34.01 (1.337 - 1.339)	34.02 (1.3394)
	Caliper cylinder piston O.D.	33.878 - 33.928 (1.3338 - 1.3357)	33.87 (1.3335)
	Brake disc thickness	3.8 - 4.2 (0.15 - 0.17)	3.5 (0.14)
	Brake disc runout	-	0.10 (0.004)
Rear brake	Drum I.D.	180.0 - 180.2 (7.086 - 7.095)	181 (7.1)
	Lining thickness	5.3 - 5.32 (0.209 - 0.217)	To index mark
	Rear (parking) brake lever freeplay	15 - 20 (9/16 - 13/16)	-
	Rear brake pedal freeplay	15 - 20 (9/16 - 13/16)	-

FRONT DRIVING MECHANISM SPECIFICATIONS

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Front differential	Oil capacity	After draining	185 cm ³ (6.3 US oz, 6.5 Imp oz)	-
		After disassembly	230 cm ³ (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 (0.15)
	Differential ring gear depth		6.55 - 6.65 (0.258 - 0.262)	6.6 (0.26)
Cone spring 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 ³ (2.5 US oz, 2.6 Imp oz)	-
		After disassembly	100 cm ³ (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		12V - 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		0.361 kW/5,000 rpm (min ⁻¹)
	Charging coil resistance (20° C/68° F)		0.1 - 1.0 Ω

IGNITION SYSTEM SPECIFICATIONS

ITEM		SPECIFICATIONS
Spark plug	Standard	IJR7A9 (NGK), VX22BC (DENSO)
	For cold climate (below 5° C/41° F)	IJR6A9 (NGK), VX20BC (DENSO)
Spark plug gap		0.8 - 0.9 mm (0.03 - 0.04 in)
Ignition coil primary peak voltage		100 V minimum
Ignition pulse generator peak voltage		0.7 V minimum
Ignition timing ("F" mark)		15° 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)

GENERAL INFORMATION**LIGHTS/METERS/SWITCHES SPECIFICATIONS**

ITEM		SPECIFICATIONS	
Bulb	Headlight (high/low beam)	12V - 30/30 W x 2	
	Assist headlight	12V - 45 W	
	Brake/taillight	'05, '06	12V - 21/5 W x 2
		After '06	LED
	Neutral indicator	LED	
	Reverse indicator	LED	
	Coolant/oil temperature indicator	LED	
	4WD indicator	LED	
EPS indicator (EPS model only)	LED		
Fuse	Main fuse	30 A	
	Transmission control motor	30 A	
	Sub-fuse	15 A x 2, 10 A x 2	
	EPS fuse (EPS model only)	40 A	

STANDARD TORQUE VALUES

FASTENER TYPE	TORQUE		FASTENER TYPE	TORQUE	
	N·m (kgf·m, lbf·ft)			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 head)	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/screw: 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 aligns with the cotter pin hole.
7. Special bolt: replace with a new one.
8. Stake.
9. Apply sealant to the threads.

ENGINE

MAINTENANCE

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Spark plug	1	12	22 (2.2, 16)	
Valve adjusting screw lock nut	4	6	17 (1.7, 13)	
Timing hole cap	1	14	10 (1.0, 7)	
Engine oil drain bolt (crankcase and oil tank)	2	12	25 (2.5, 18)	
Engine oil filter center bolt	1	20	18 (1.8, 13)	

LUBRICATION SYSTEM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Oil gallery sealing bolt (front crankcase cover)	2	10	34 (3.5, 25)	

FUEL SYSTEM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Carburetor insulator band screw	2	5	4 (0.4, 2.9)	

CYLINDER HEAD/VALVE/CAMSHAFT

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Cylinder head cover cap nut	4	10	53 (5.4, 39)	NOTE 2

GENERAL INFORMATION

CENTRIFUGAL CLUTCH

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Centrifugal clutch lock nut	1	20	118 (12.0, 87)	NOTE 2, 5, 8
Oil feed pipe setting cap	1	20	18 (1.8, 13)	
Oil gallery sealing bolt (inside of front crankcase cover)	1	10	10 (1.0, 7)	NOTE 1

ALTERNATOR/STARTER CLUTCH

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Starter clutch outer 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	3	6	10 (1.0, 7)	
Ignition pulse generator bolt	2	5	6 (0.6, 4.3)	NOTE 1

SUB-TRANSMISSION/GEARSHIFT LINKAGE

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Gearshift drum center bolt	1	8	27 (2.8, 20)	NOTE 1
Gearshift drum stopper arm pivot bolt	1	6	12 (1.2, 9)	NOTE 1

CRANKSHAFT/AUTOMATIC TRANSMISSION

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Primary driven gear bolt	4	6	17 (1.7, 12)	NOTE 2
Oil pump driven sprocket bolt	1	6	12 (1.2, 9)	NOTE 1

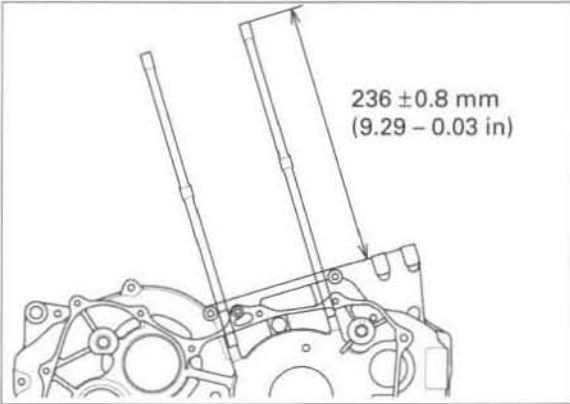
LIGHTS/METERS/SWITCHES

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Engine coolant temperature (ECT) sensor	1	PT 1/8	10 (1.0, 7)	NOTE 9
Meter assembly studs (on back of meter)	3	6	10 (1.0, 7)	NOTE 9
Engine oil temperature (EOT) sensor	1	12	18 (1.8, 13)	

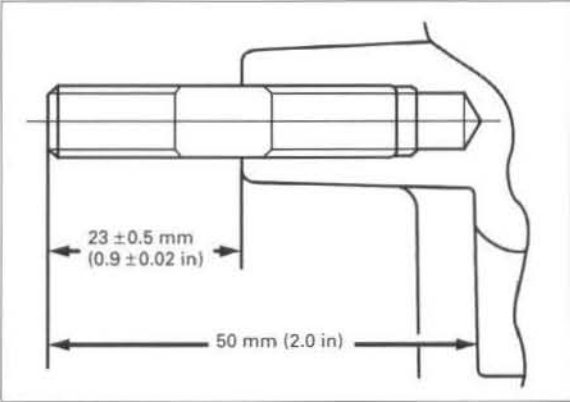
HONDAMATIC

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Angle sensor bolt	2	5	6 (0.6, 4.3)	NOTE 1

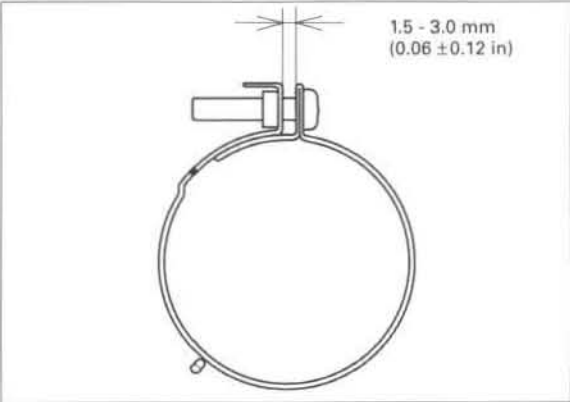
Cylinder stud bolt



Exhaust pipe stud bolt



Insulator band



GENERAL INFORMATION

FRAME

FRAME/BODY PANELS/EXHAUST SYSTEM

ITEM	Q'TY	THREAD	TORQUE	REMARKS
		DIA. (mm)	N·m (kgf·m, lbf·ft)	
Front carrier/carry pipe bolt	8	8	37 (3.8, 27)	
Gearshift lever knob screw	2	5	2 (0.2, 1.4)	
Rear carrier bolt	8	8	37 (3.8, 27)	
Muffler band bolt	2	8	23 (2.3, 17)	
Front exhaust pipe cover band screw	2	5	3.2 (0.3, 2.4)	
Rear exhaust pipe cover end band screw	2	5	5.4 (0.6, 4.0)	
Rear exhaust pipe cover center band screw	1	5	5.4 (0.6, 4.0)	
Muffler cover screw	2	5	3.2 (0.3, 2.4)	
Footpeg bracket nut	4	8	32 (3.3, 24)	

MAINTENANCE

ITEM	Q'TY	THREAD	TORQUE	REMARKS
		DIA. (mm)	N·m (kgf·m, lbf·ft)	
Front differential oil filler cap	1	30	12 (1.2, 9)	
Front differential oil drain 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 check bolt	1	8	12 (1.2, 9)	
Rear final gear case oil drain bolt	1	8	12 (1.2, 9)	
Tie-rod lock nut (Steering shaft side is left handed thread)	4	12	54 (5.5, 40)	
Spark arrester bolt	3	6	12 (1.2, 9)	

FUEL SYSTEM

ITEM	Q'TY	THREAD	TORQUE	REMARKS
		DIA. (mm)	N·m (kgf·m, lbf·ft)	
Starting enrichment (SE) valve nut	1	14	2.3 (0.2, 1.7)	
Throttle drum cover screw	1	4	1.5 (0.2, 1.1)	

ENGINE REMOVAL/INSTALLATION

ITEM	Q'TY	THREAD	TORQUE	REMARKS
		DIA. (mm)	N·m (kgf·m, lbf·ft)	
Left lower engine hanger bracket bolt	2	8	32 (3.3, 24)	
Lower engine hanger nut (left and right)	2	10	54 (5.5, 40)	
Upper engine hanger bracket nut (frame side)	1	10	54 (5.5, 40)	
Upper engine hanger bracket bolt (engine side)	2	8	32 (3.3, 24)	

SUB-TRANSMISSION/GEARSHIFT LINKAGE

ITEM	Q'TY	THREAD	TORQUE	REMARKS
		DIA. (mm)	N·m (kgf·m, lbf·ft)	
Gearshift lever box cover bolt	2	6	5 (0.5, 3.6)	
Gearshift lever linkage arm pivot bolt	1	8	27 (2.8, 20)	NOTE 1
Gearshift lever linkage tie-rod lock bolt	4	6	10 (1.0, 7)	

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
Front wheel nut	8	10	64 (6.5, 47)		
Front wheel hub nut	2	16	78 (8.0, 58)		NOTE 6
Shock absorber mounting nut	4	10	44 (4.5, 33)		NOTE 5
Upper arm pivot nut	2	10	34 (3.5, 25)		NOTE 5
Lower arm pivot nut	4	10	44 (4.5, 33)		NOTE 5
Upper and lower arm ball joint nut	4	12	29 (3.0, 21)		NOTE 6
Brake hose clamp bolt	4	6	12 (1.2, 9)		
Tie-rod ball joint nut	4	12	54 (5.5, 40)		NOTE 5
Assist headlight case mounting nut	2	8	25 (2.6, 19)		
Steering shaft end nut	1	14	108 (11.0, 80)		NOTE 5
Steering shaft holder bolt	2	8	32 (3.3, 24)		
EPS unit output shaft nut (EPS model)	1	14	108 (11.0, 80)		NOTE 5
EPS unit mounting bolt (EPS model)	2	8	22 (2.2, 16)		
EPS unit mounting nut (EPS model)	2	8	22 (2.2, 16)		
EPS unit steering shaft flange bolt (EPS model)	1	10	60 (6.1, 44)		NOTE 4
EPS unit flange bolt (EPS model)	2	8	20 (2.0, 15)		

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 flange nut	2	10	34 (3.5, 25)		
Shock absorber lower mounting flange bolt	2	10	44 (4.5, 33)		
Swingarm pivot bolt (left)	1	30	112 (11.4, 82)		
Swingarm pivot bolt (right)	1	30	10 (1.0, 7)		('05 - '06)
	1	30	3.9 (0.4, 0.9)		(After '06)
Swingarm right pivot lock nut	1	30	112 (11.4, 82)		

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 bleed valve	2	8	5.4 (0.6, 4.0)		
Front master cylinder reservoir cap screw	2	4	2 (0.2, 1.4)		
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 brake switch screw	1	4	1.2 (0.1, 0.9)		NOTE 1
Front master cylinder holder bolt	2	6	12 (1.2, 9)		
Front brake caliper mounting bolt	4	10	44 (4.5, 33)		NOTE 4
Front brake disc plate bolt	8	8	42 (4.3, 31)		NOTE 4
Front brake caliper slide pin bolt	4	8	23 (2.3, 17)		
Splash guard bolt	4	6	11 (1.1, 8)		NOTE 4
Rear brake arm pinch bolt	1	8	20 (2.0, 14)		
Rear wheel hub nut	2	20	137 (14.0, 101)		NOTE 6
Rear brake panel drain bolt	1	8	12 (1.2, 9)		
Brake pipe joint (green surface)	2	10	17 (1.7, 13)		
Brake pipe joint (black surface)	2	10	14 (1.4, 10)		

GENERAL INFORMATION

FRONT DRIVING MECHANISM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Differential ring gear bolt	10	8	49 (5.0, 36)	NOTE 1, 7
Differential case cover bolt	2	10	49 (5.0, 36)	NOTE 1
	2	10	46.5 (4.7, 34)	NOTE 1
	6	8	25 (2.6, 19)	
Differential case mounting bolt (10 mm)	1	10	44 (4.5, 33)	
Differential case mounting bracket bolt (8 mm)	2	8	22 (2.2, 16)	
Differential case mounting nut (10 mm)	1	10	44 (4.5, 33)	NOTE 5
Differential case mounting nut (8 mm)	1	8	22 (2.2, 16)	
Final drive clutch assembly mounting bolt	3	8	25 (2.6, 19)	NOTE 4
Front vehicle speed sensor cover bolt	2	6	10 (1.0, 7)	
Clutch cover stay bolt	3	6	10 (1.0, 7)	
Clutch cover bolt	2	6	7 (0.7, 5.1)	

REAR DRIVING MECHANISM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Final gear case pinion bearing lock nut	1	64	98 (10.0, 72)	NOTE 5, 8
Final gear case cover bolt	2	10	49 (5.0, 36)	NOTE 1
	6	8	25 (2.6, 19)	
Final gear case mounting nut	4	10	54 (5.5, 40)	NOTE 5
Left and right axle housing nut	12	10	44 (4.5, 33)	NOTE 5
Skid plate bolt	3	8	32 (3.3, 24)	
Rear brake panel nut	4	10	44 (4.5, 33)	NOTE 5

LUBRICATION & SEAL POINTS

ENGINE

LOCATION	MATERIAL	REMARKS
Camshaft cam lobes Rocker arm shaft sliding surface Valve stem (valve guide sliding surface) Piston pin outer surface Starter driven gear needle bearing Starter reduction gear shaft journal Starter reduction gear teeth Reverse idle gear shaft Sub-transmission gear sliding surfaces and gear bushings Starter motor shaft spline Control motor shaft spline	Molybdenum disulfide solution (a mixture of 1/2 engine oil and 1/2 molybdenum disulfide grease)	
Rocker arm followers and adjusting screw tips Cam chain Cam followers whole surface Cylinder head cap nut threads and seating surfaces Connecting rod small end inner surface Piston outer surface and piston pin hole Piston rings Cylinder bore Centrifugal clutch drum crankshaft contacting surface Centrifugal clutch drive plate sprag clutch whole surface Centrifugal clutch drive plate sprag clutch contacting surface Centrifugal clutch lock nut threads and seating surface Automatic transmission control motor reduction gear teeth, driven gear teeth and shaft Recoil starter driven pulley bolt threads and seating surface Starter sprag clutch whole surface Sub-transmission gear teeth Sub-transmission mainshaft and countershaft journals Shift fork shaft Shift drum guide grooves Primary driven gear bolt threads and seating surface Primary driven gear bolt threads Recoil starter driven pulley oil seal lips Each bearing rotating area Each O-ring whole surface Each oil seal lip	Engine oil	
Recoil starter drive pulley shaft Recoil starter drive pulley ratchet pivot pin Starter motor dust seal lips and needle bearing	Multi-purpose grease	
Oil gallery separate plate bolt threads (inside of oil tank) Ignition pulse generator bolt threads Starter clutch bolt threads Oil gallery sealing bolt threads (inside of front crankcase cover) Gearshift spindle stopper plate bolt threads Gearshift drum stopper arm pivot bolt threads Gearshift drum center bolt threads Oil pump driven sprocket bolt threads Cam chain tensioner pivot bolt threads Angle sensor bolt threads	Locking agent	

GENERAL INFORMATION

LOCATION	MATERIAL	REMARKS
Engine coolant temperature (ECT) sensor threads Oil tank mating surfaces Alternator/ignition pulse generator wire grommet seating groove Front crankcase cover mating surface Rear crankcase cover mating surface Crankcase mating surface	Liquid sealant	Do not apply to the sensor head.

FRAME

LOCATION	MATERIAL	REMARKS
Steering shaft bushing inner surface Front shock absorber lower bearing ('05, '06) Front shock absorber lower dust seal lips Rear shock absorber lower bearing ('05, '06) Rear shock absorber lower dust seal lips	Urea based multi-purpose grease with extreme pressure (example: EXCELITE EP2 manufactured by KYODO YUSHI, Japan, Shell stamina EP2) or equivalent	Apply 2 – 3 g
Sub - transmission tie -rod, A sliding surface Sub - transmission tie -rod, B sliding surface Steering shaft bushing inner surface Rear brake pedal pivot Gearshift lever box pivot sliding surface	Multi-purpose grease (Shell Alvania EP2 or equivalent)	Apply 2 – 3 g
Throttle cable ends (lever side) Throttle cable adjuster threads (lever side) Throttle lever pivot and dust seal lips Rear (parking) brake lever pivot Parking lock arm pivot (screw) Steering shaft dust seal lips Steering shaft end nut threads Knuckle outer dust seal lips Knuckle inner dust seal lips (inner and side lips) Rear brake cam dust seal lips Rear brake cam sliding surface Rear brake anchor pin-to-brake shoe contact area Rear brake cam-to-brake shoe contact area Rear brake drum cover dust seal lips (inner and side lips) Rear brake pedal pivot dust seal lips Rear brake cable (pedal and lever) ends Rear brake panel O-ring Rear brake panel dust seal lips Front differential case oil seal lips and O-rings Left rear axle housing dust seal lips and O-ring (final gear case) Rear final gear case oil seal lips (ring gear and pinion joint) and O-ring (pinion gear, filler cap and swingarm) Front wheel hub dust seal lips Rear wheel hub dust seal lips Gearshift lever linkage arm pivot bolt groove Gearshift lever linkage ball joints	Multi purpose grease (NLGI #2)	Fill up 2.5 – 3 g per each seal Apply 0.2 – 0.3 g Apply 0.2 – 0.3 g Apply 0.2 – 0.3 g
Swingarm pivot bearing ('05, '06) Swingarm pivot dust seal lips ('05, '06) Swingarm pivot bearing grease holder ('05, '06)	Lithium based grease (Shell 6459) or equivalent	

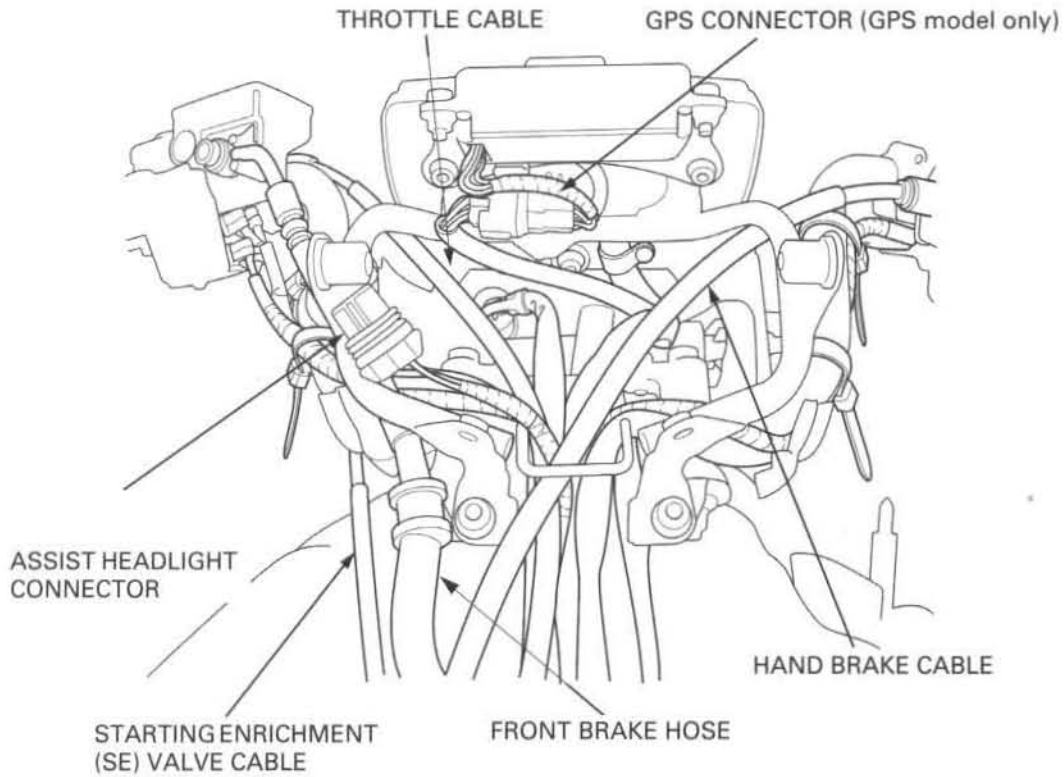
GENERAL INFORMATION

LOCATION	MATERIAL	REMARKS	
Swingarm pivot bearing (After '06)	Molybdenum disulfide grease	Apply 3 g minimum	
Swingarm pivot dust seal lips (After '06)		Apply 3 g minimum	
Swingarm pivot bearing grease holder (After '06)		EPS model only	
Steering shaft spline		Fill up 5 – 8 g per each spline	
EPS unit output shaft spline		Fill up 5 – 8 g per spline	
Front propeller shaft seal outer surfaces (2 places)			
Front propeller shaft splines (pinion joint and output shaft joint)			
Front differential pinion gear spline (pinion joint)			
Output shaft splines and O-ring (output shaft joint)			
Front drive shaft inboard joint inside ('05, '06)		Fill up 55 – 75 g per each joint	
(After '06)		Fill up 40 – 60 g per each joint	
Front drive shaft outboard joint inside ('05, '06)		Fill up 40 – 60 g per each joint	
(After '06)		Fill up 35 – 55 g per each joint	
Universal joint splines (output shaft and final drive shaft)			
Rear axle splines			
Upper arm dust seal lips			
Upper arm pivot collar-to-pivot bushing contact area			
Rear final drive shaft seal outer surface			
Rear final drive shaft splines (pinion joint)		Fill up 5 – 8 g	
Gearshift lever box sliding area			
Gearshift lever knob push button sliding surface			
Gearshift lever lock pin rod sliding area			
Rear brake cam felt seal	Engine oil		
Master piston boot	Silicone grease	EPS model only	
Front brake lever-to-master piston contacting area			
Front brake lever pivot bolt-to-brake lever pivot contact area			
Front brake caliper pin boot inner surface			
Front brake caliper dust seal			
EPS motor O-ring			
Throttle cable outer inside			Cable lubricant
Choke cable outer inside			
Rear brake cable (pedal and lever) outer inside			
Master cylinder piston, cups and oil seal	DOT4 brake fluid		
Front brake caliper piston seal			
Front brake caliper piston			
Handlebar grip rubber inside	Honda bond A or Honda Hand Grip Cement (U.S.A. only) or equivalent		
Air cleaner case-to-connecting hose (carburetor and air intake duct) mating surface			
Rear final gear case cover mating surface	Sealant		
Cooling fan motor shaft nut threads	Locking agent		
Front brake switch screw threads			
Differential ring gear bolt threads			
Differential case cover bolt threads			
Final gear case cover bolt threads (10 mm bolt)			
Gearshift lever linkage arm pivot bolt threads			
Sub-transmission pivot bolt			
Air cleaner element	Pro-Honda form filter oil or equivalent	Apply 17 – 23 g	
EPS motor worm gear splines	NIHON GREASE WR-S	EPS model only Apply 0.5 g	

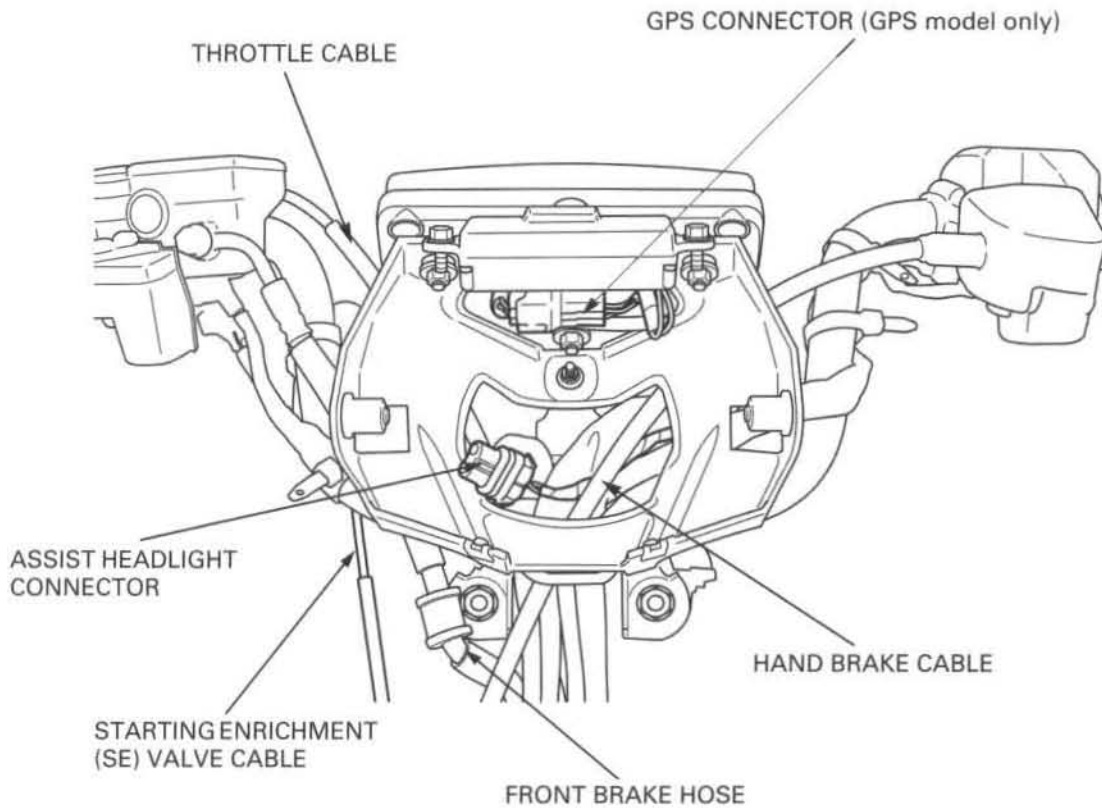
GENERAL INFORMATION

CABLE & HARNESS ROUTING

'05, '06:



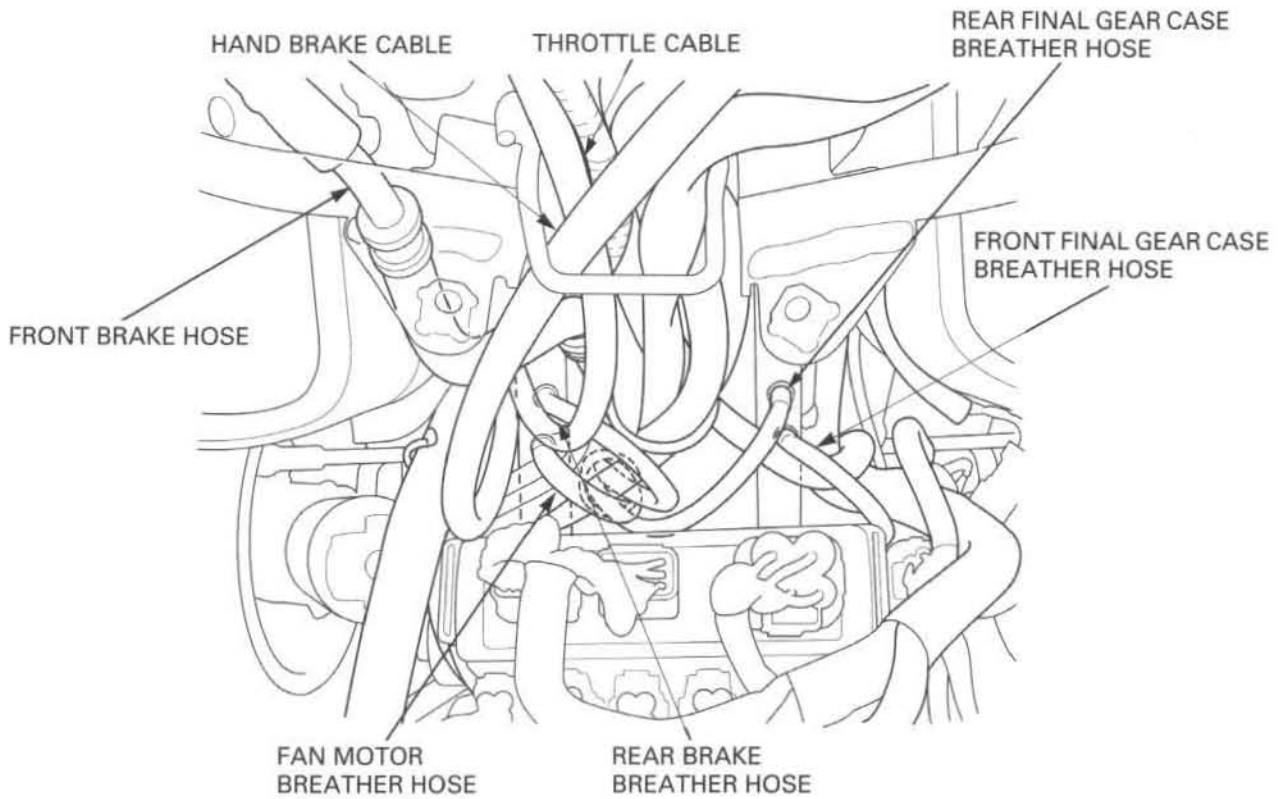
After '06:



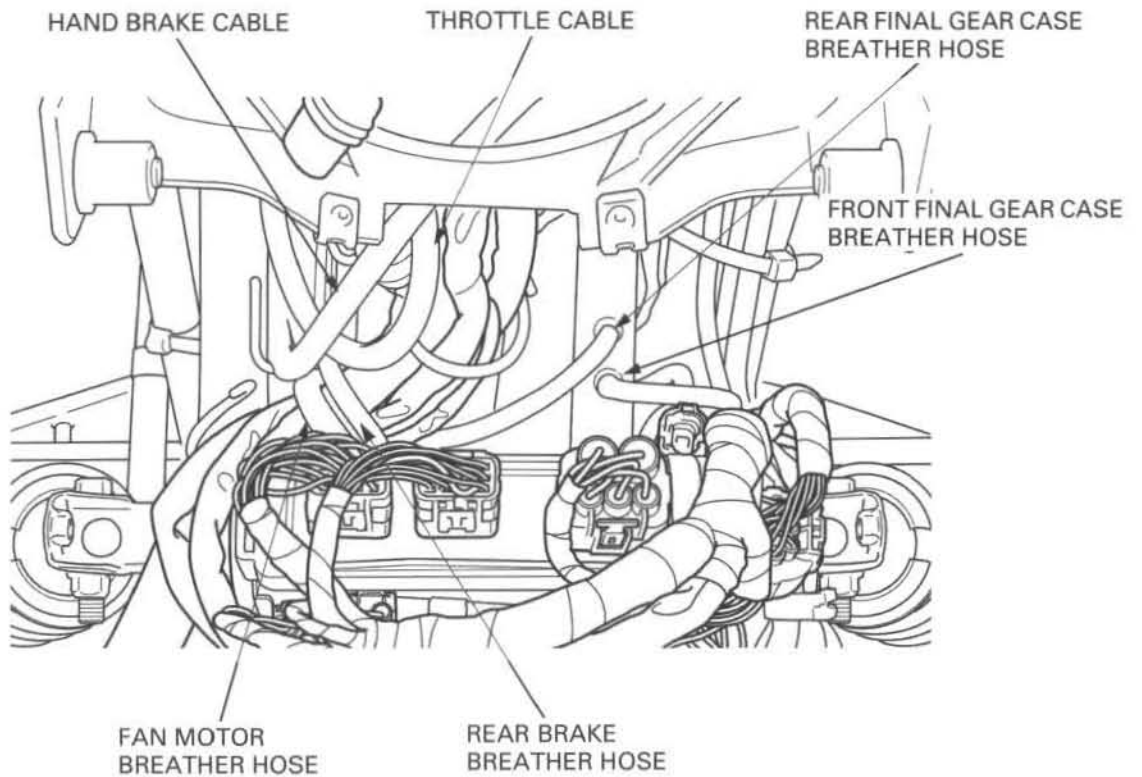
NOTE:

EPS model only: If the cables and harness around handlebar were replaced or removed/installed, perform the Torque Sensor Initialization (page 25-13).

'05, '06:



After '06:

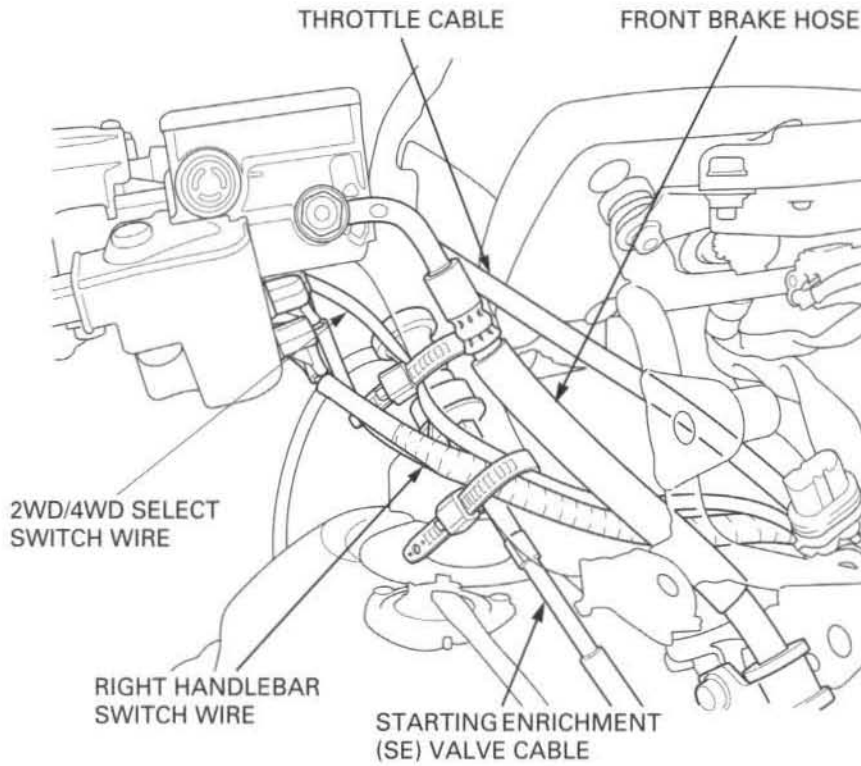


NOTE:

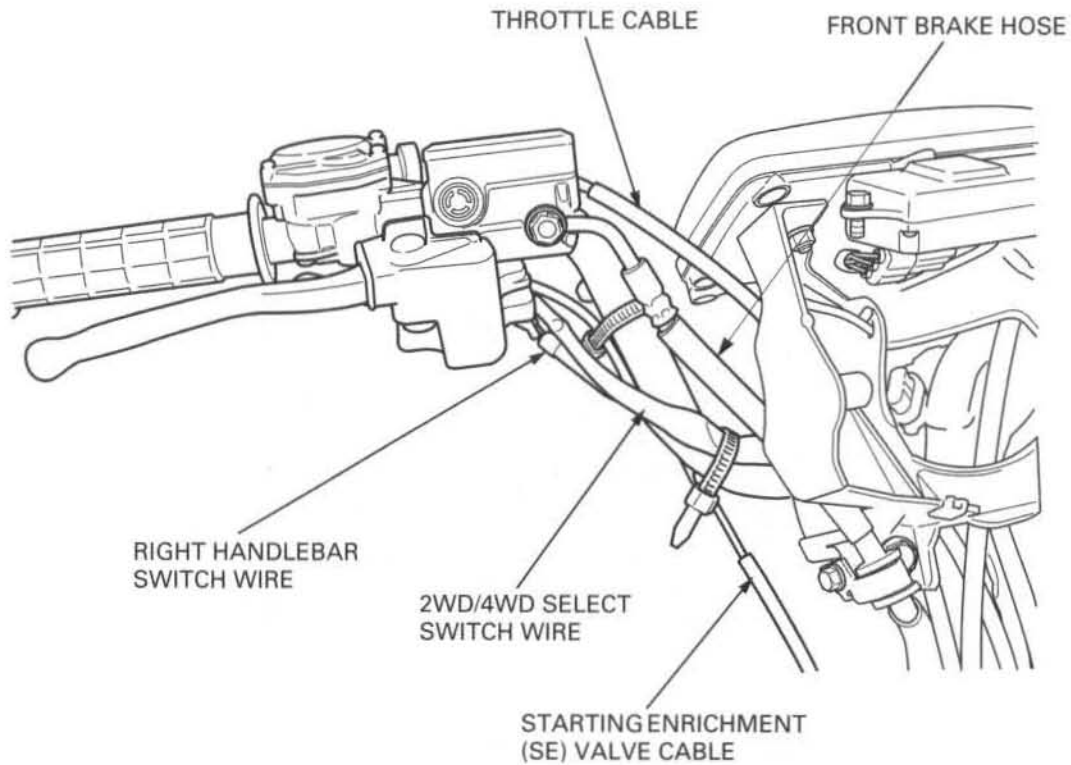
EPS model only: If the cables and harness around handlebar were replaced or removed/installed, perform the Torque Sensor Initialization (page 25-13).

GENERAL INFORMATION

'05, '06:



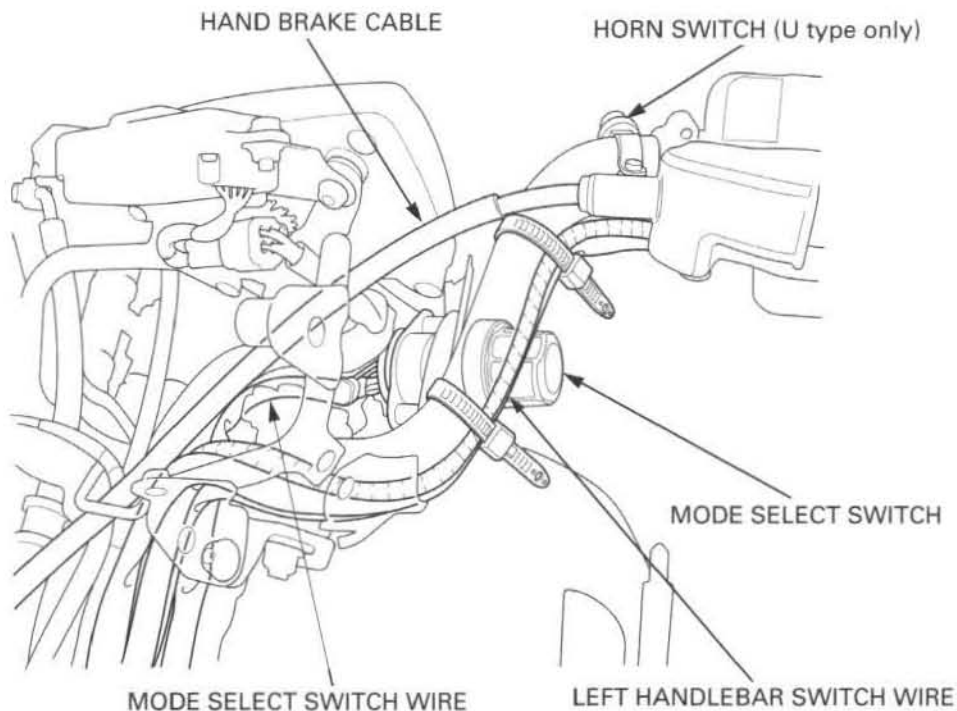
After '06:



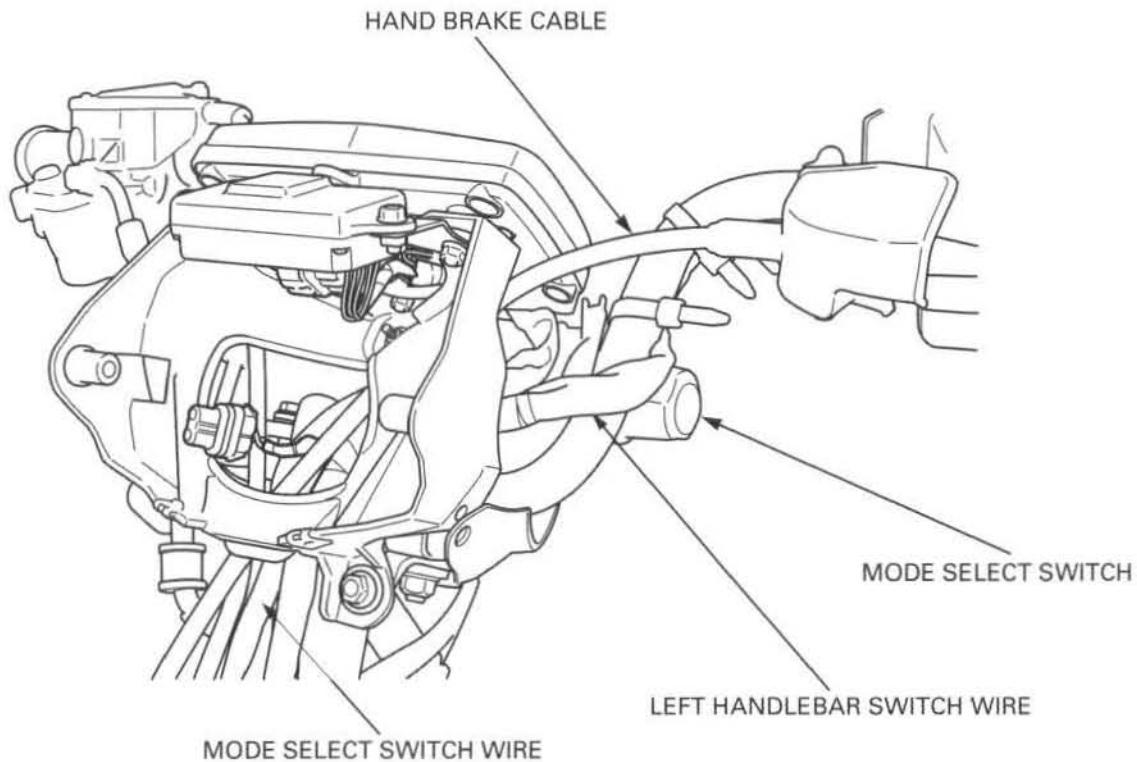
NOTE:

EPS model only: If the cables and harness around handlebar were replaced or removed/installed, perform the Torque Sensor Initialization (page 25-13).

'05, '06:



After '06:

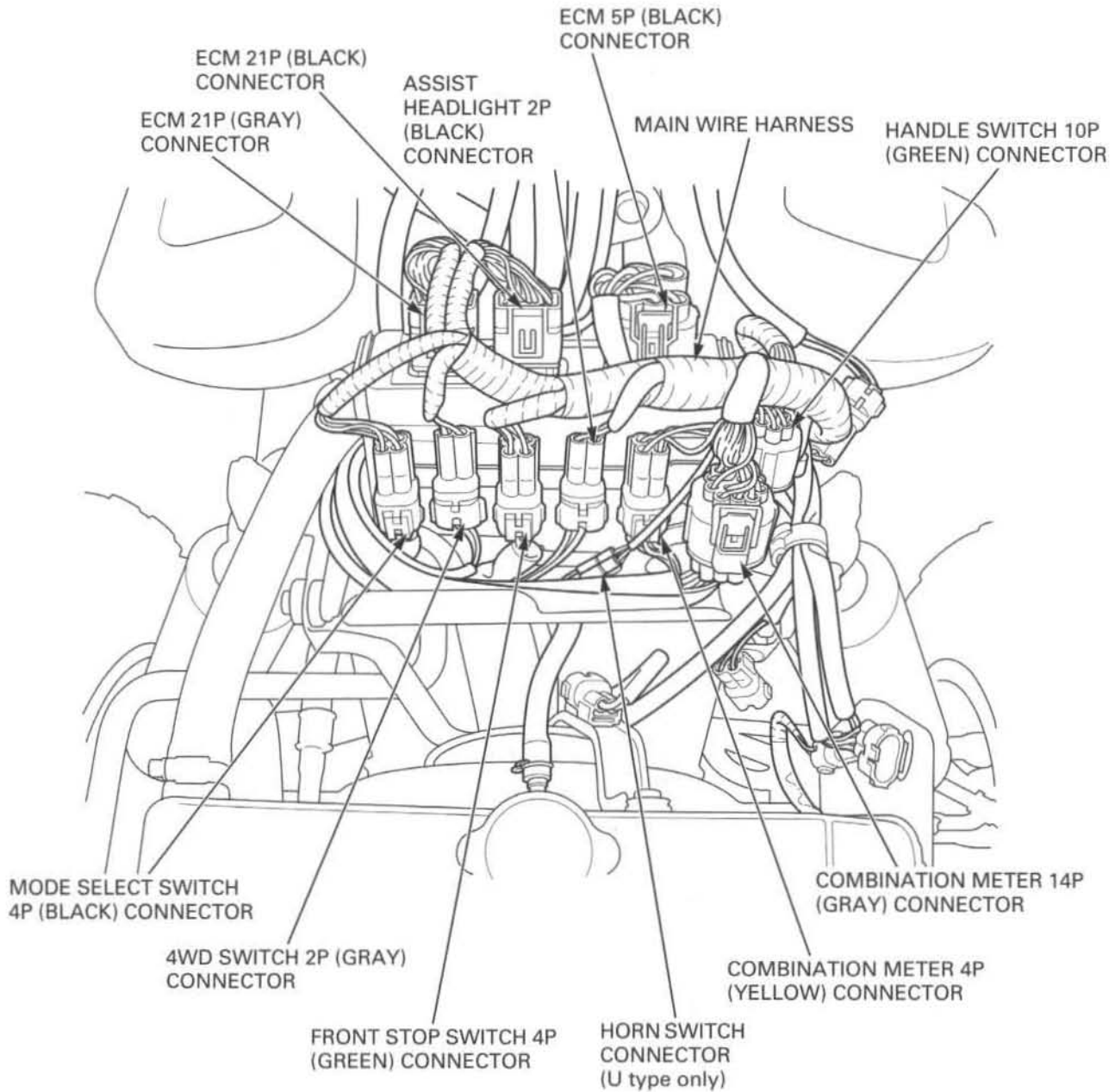


NOTE:

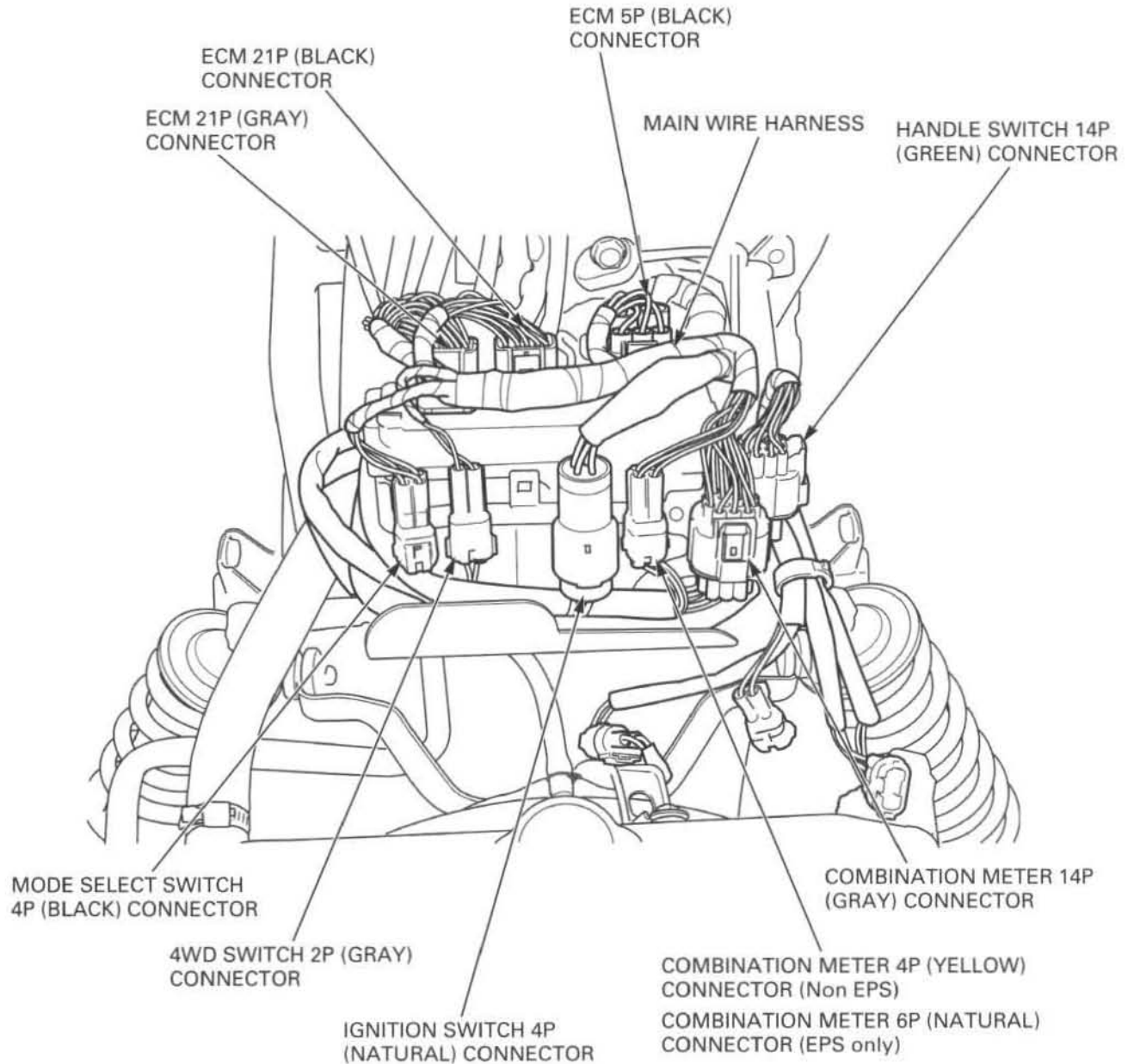
EPS model only: If the cables and harness around handlebar were replaced or removed/installed, perform the Torque Sensor Initialization (page 25-13).

GENERAL INFORMATION

'05, '06:

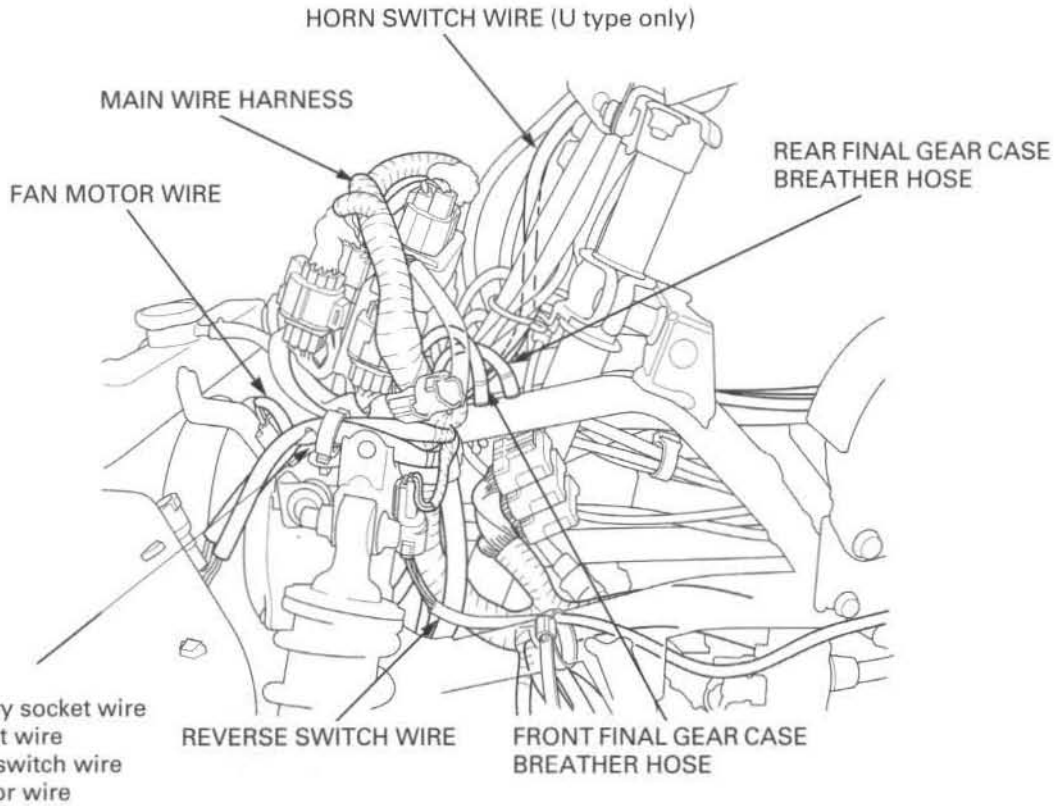


After '06:

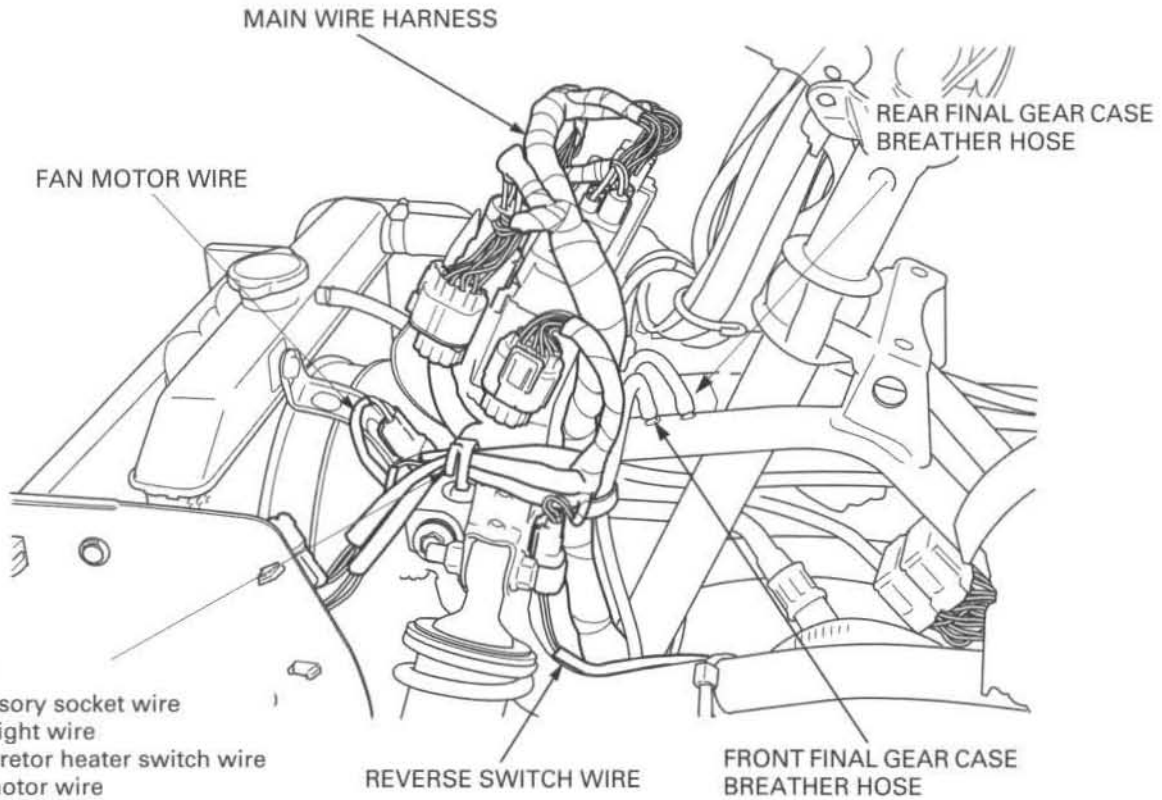


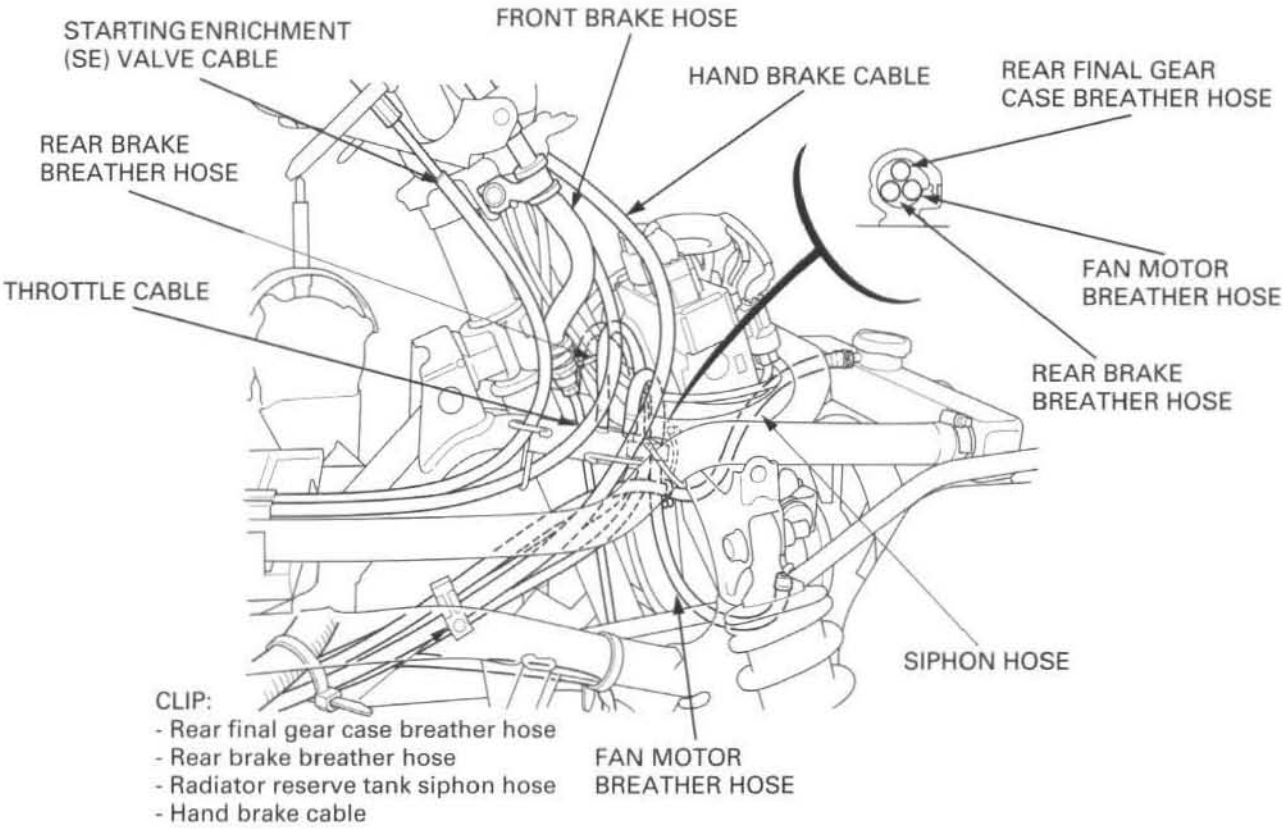
GENERAL INFORMATION

'05, '06:



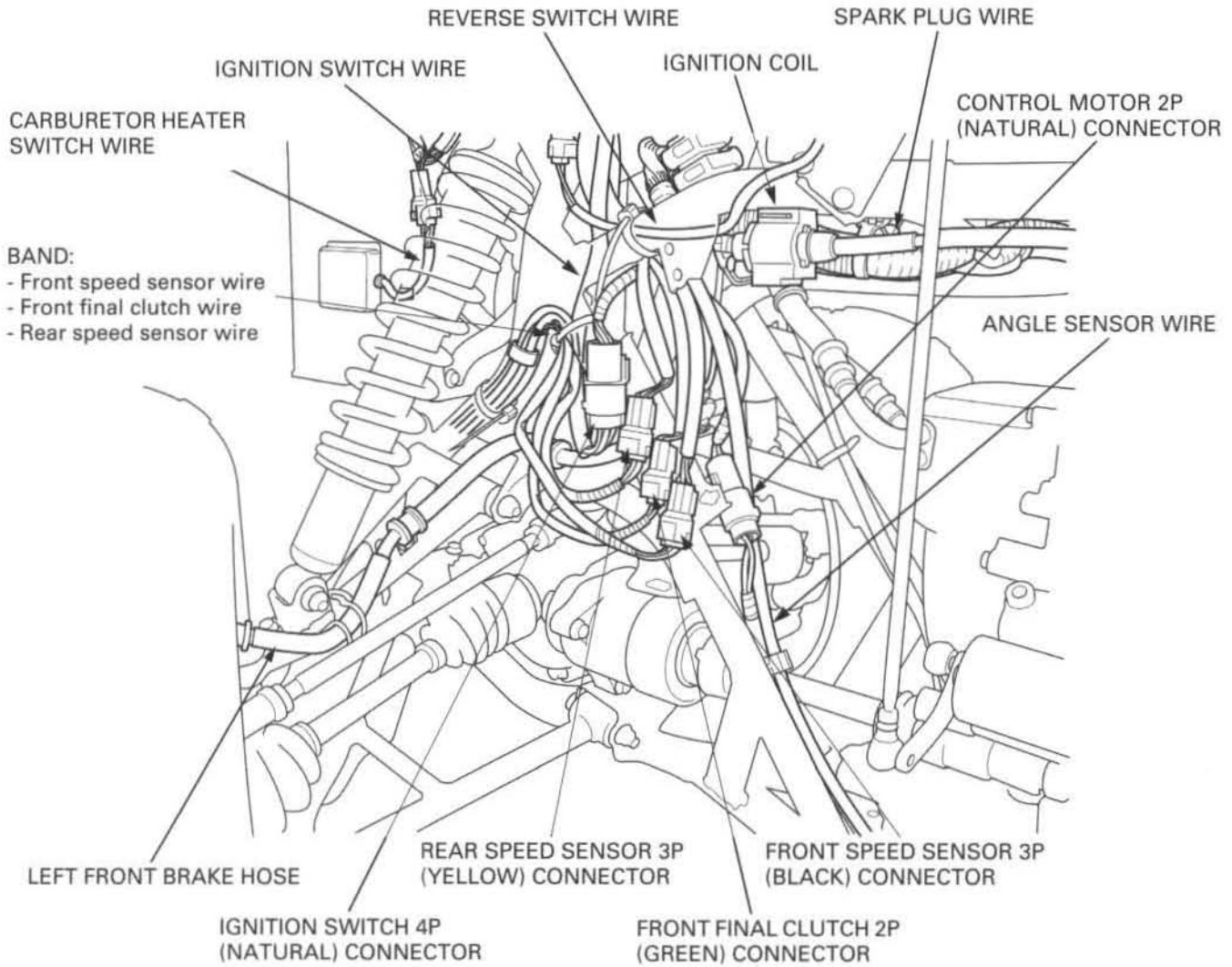
After '06:



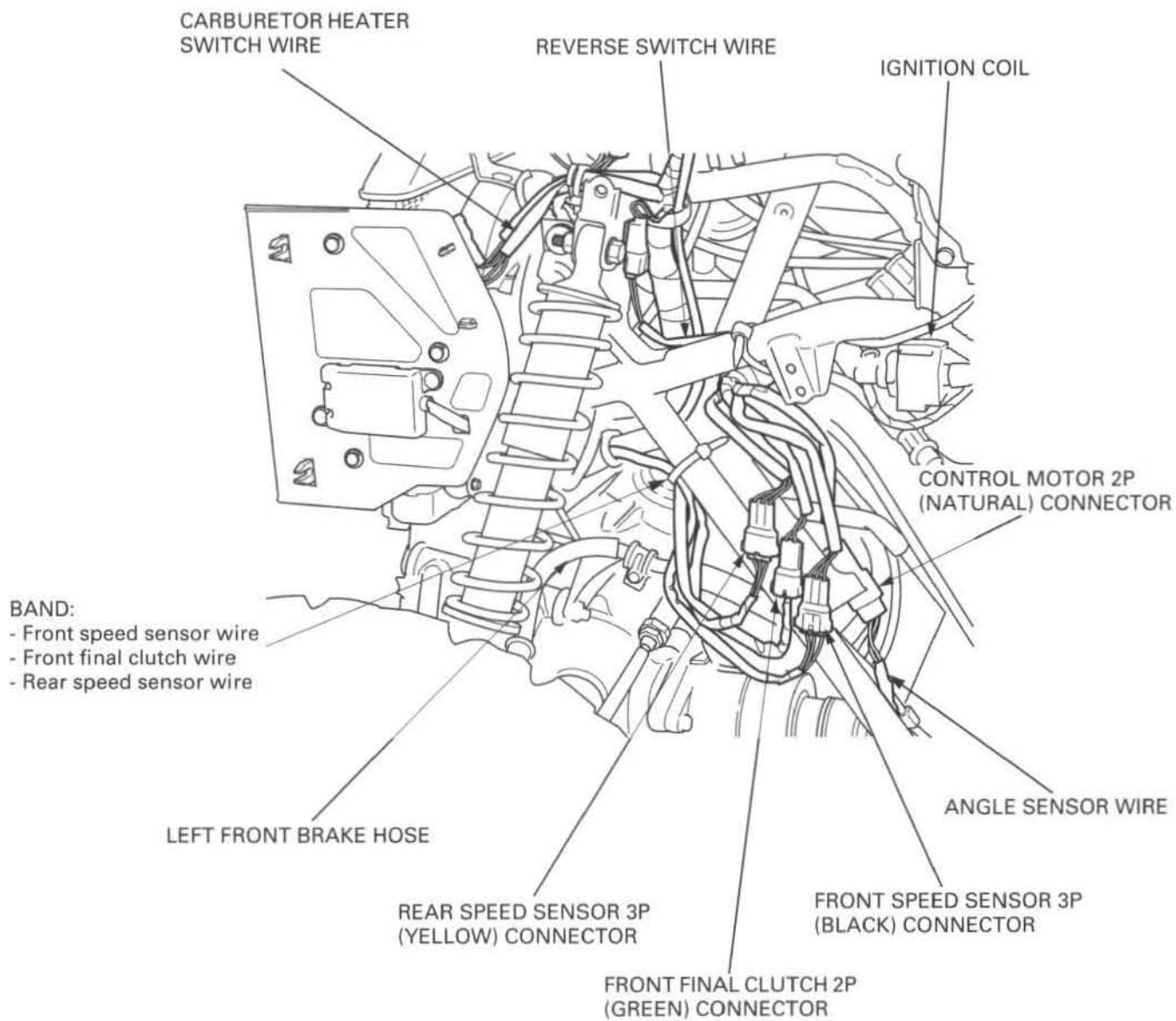


GENERAL INFORMATION

'05, '06 (A type shown):

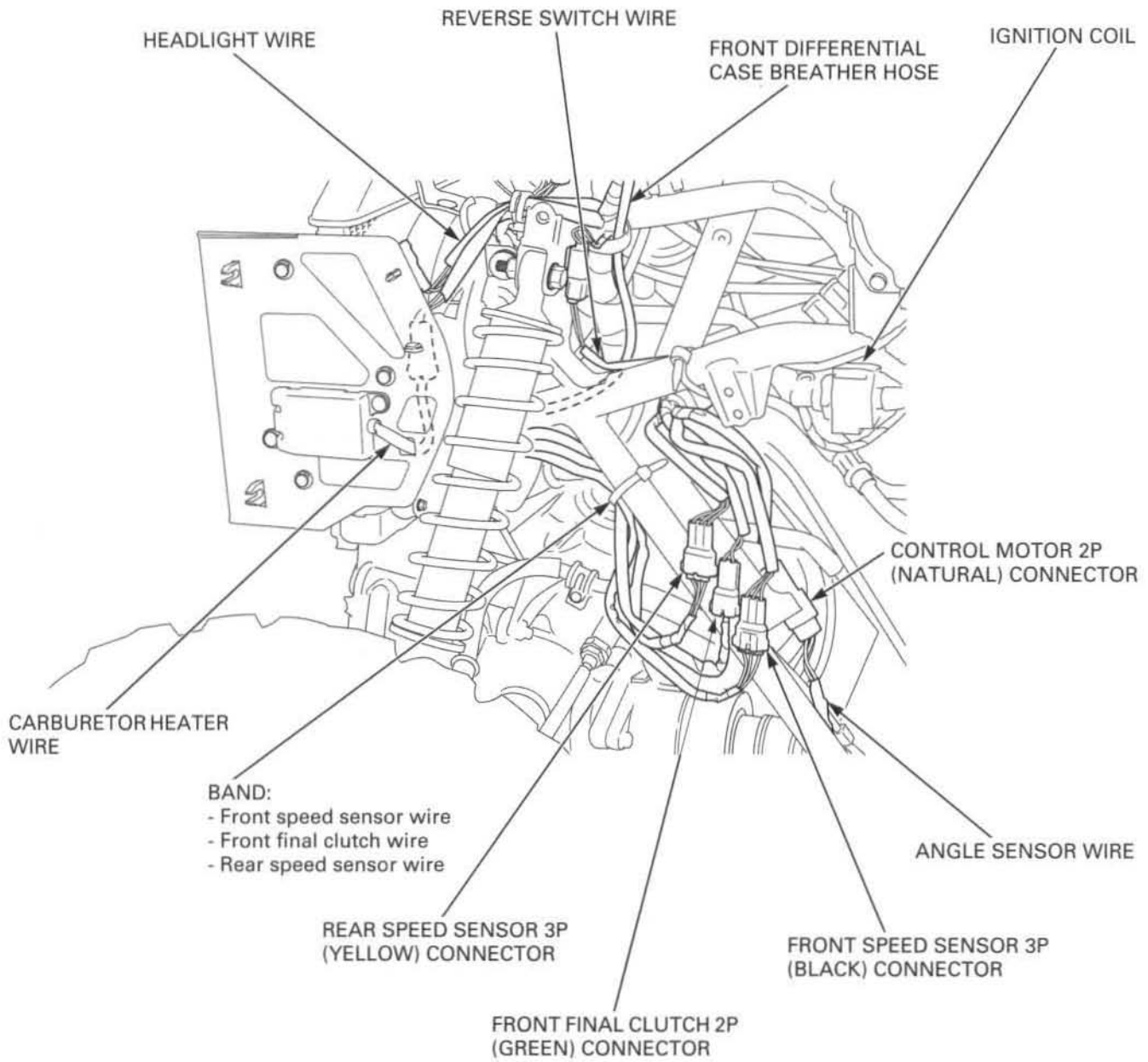


'07:

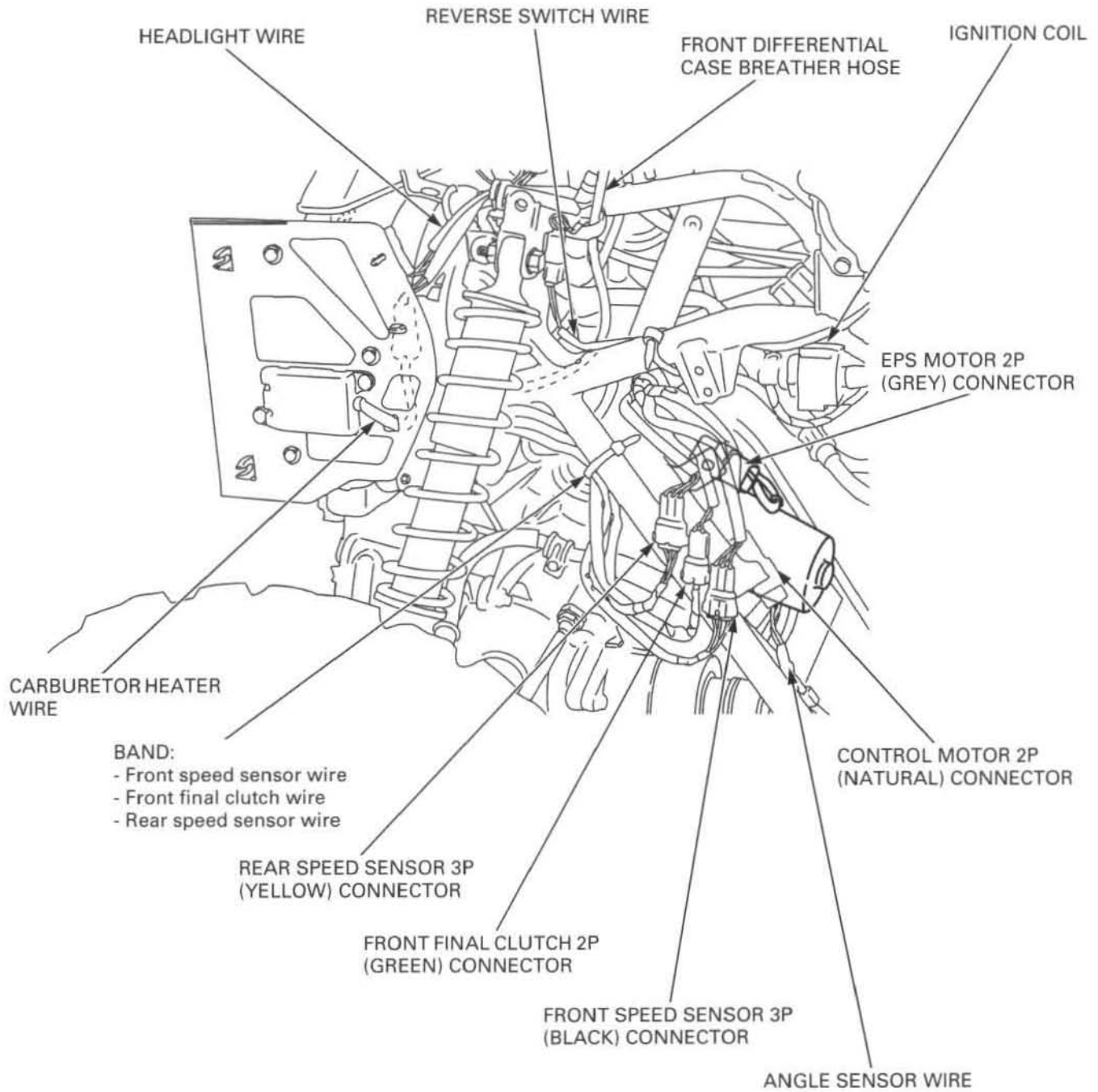


GENERAL INFORMATION

After '07:

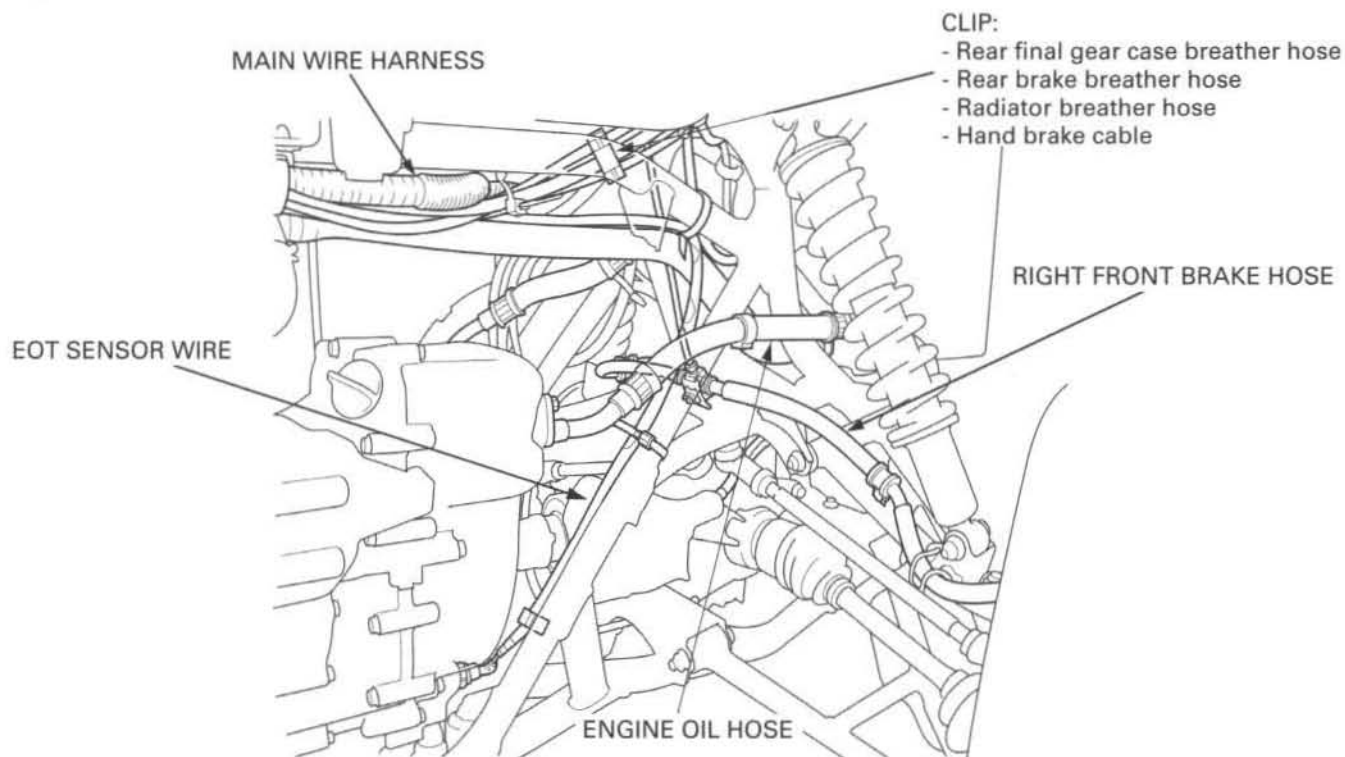


After '08 EPS only:

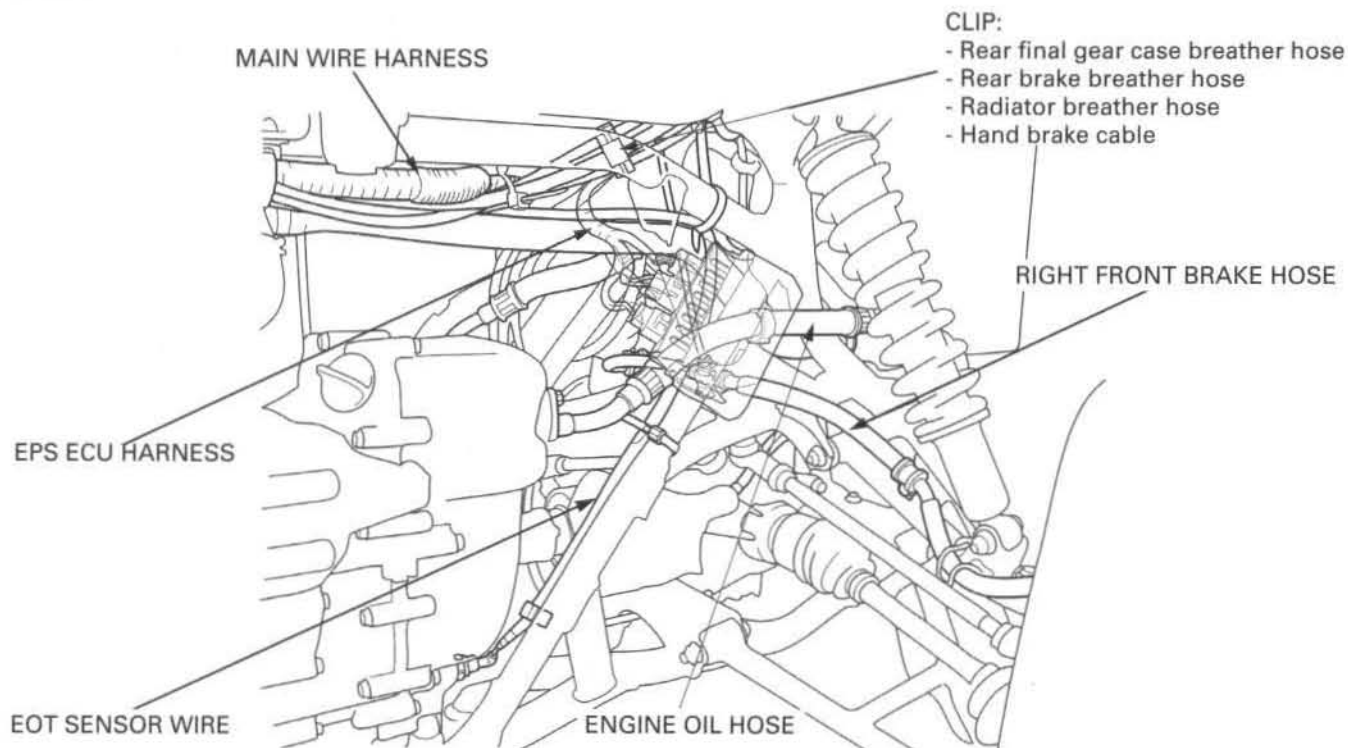


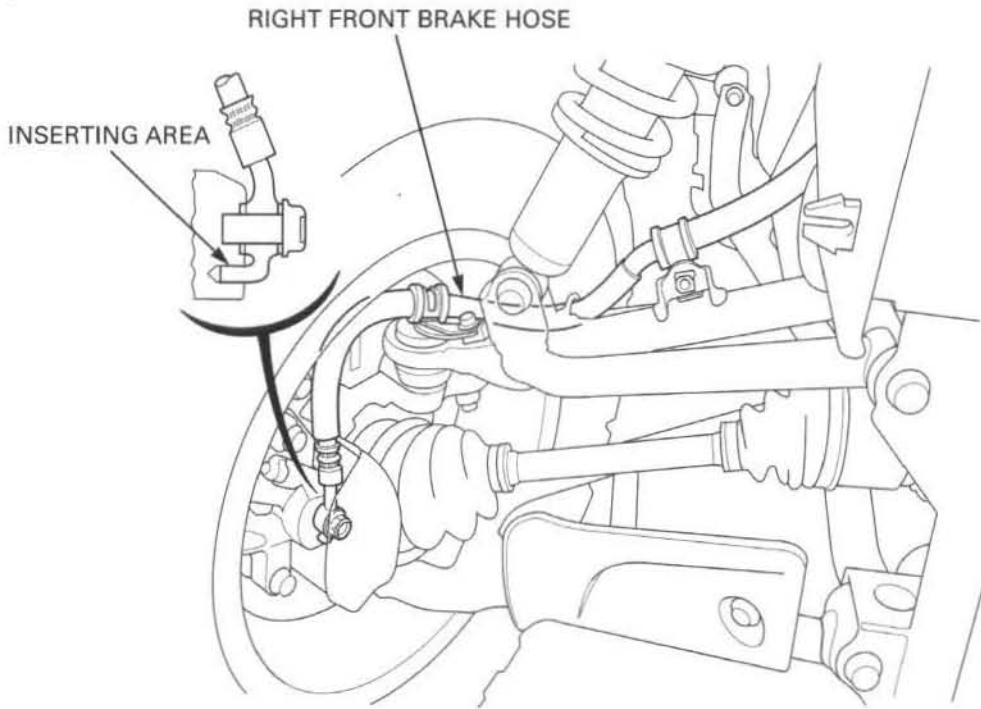
GENERAL INFORMATION

Except EPS:

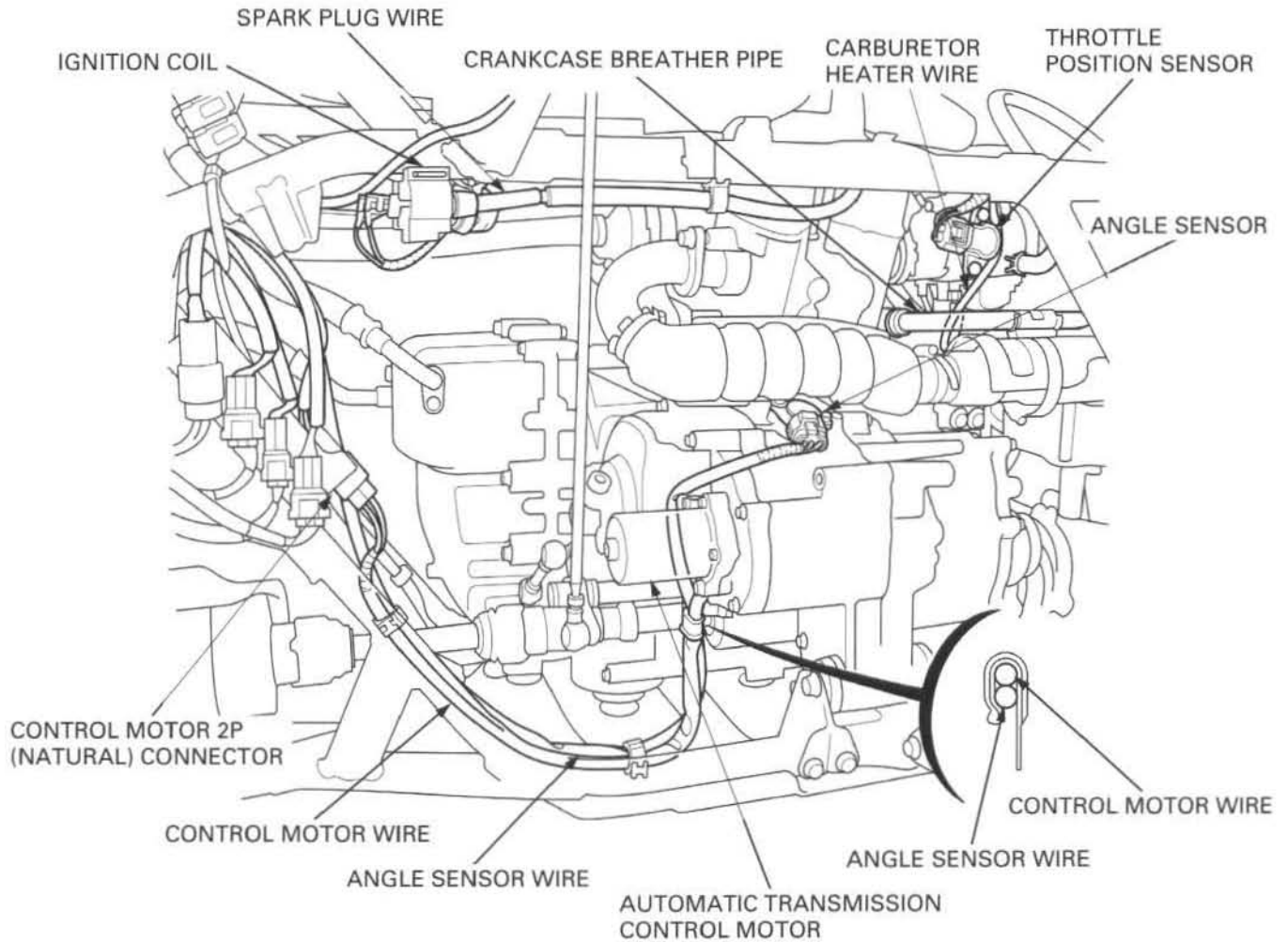


EPS only:



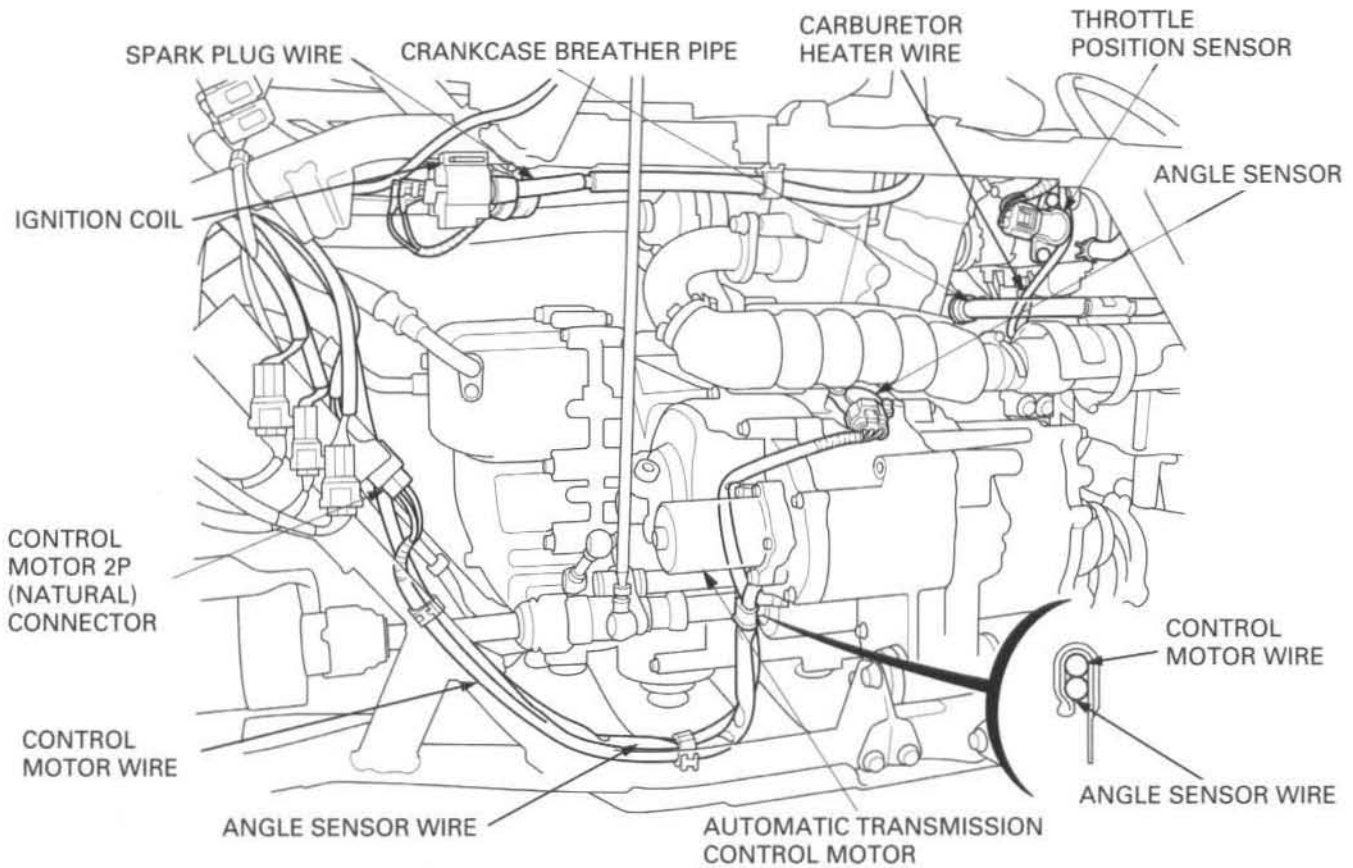


'05, '06:

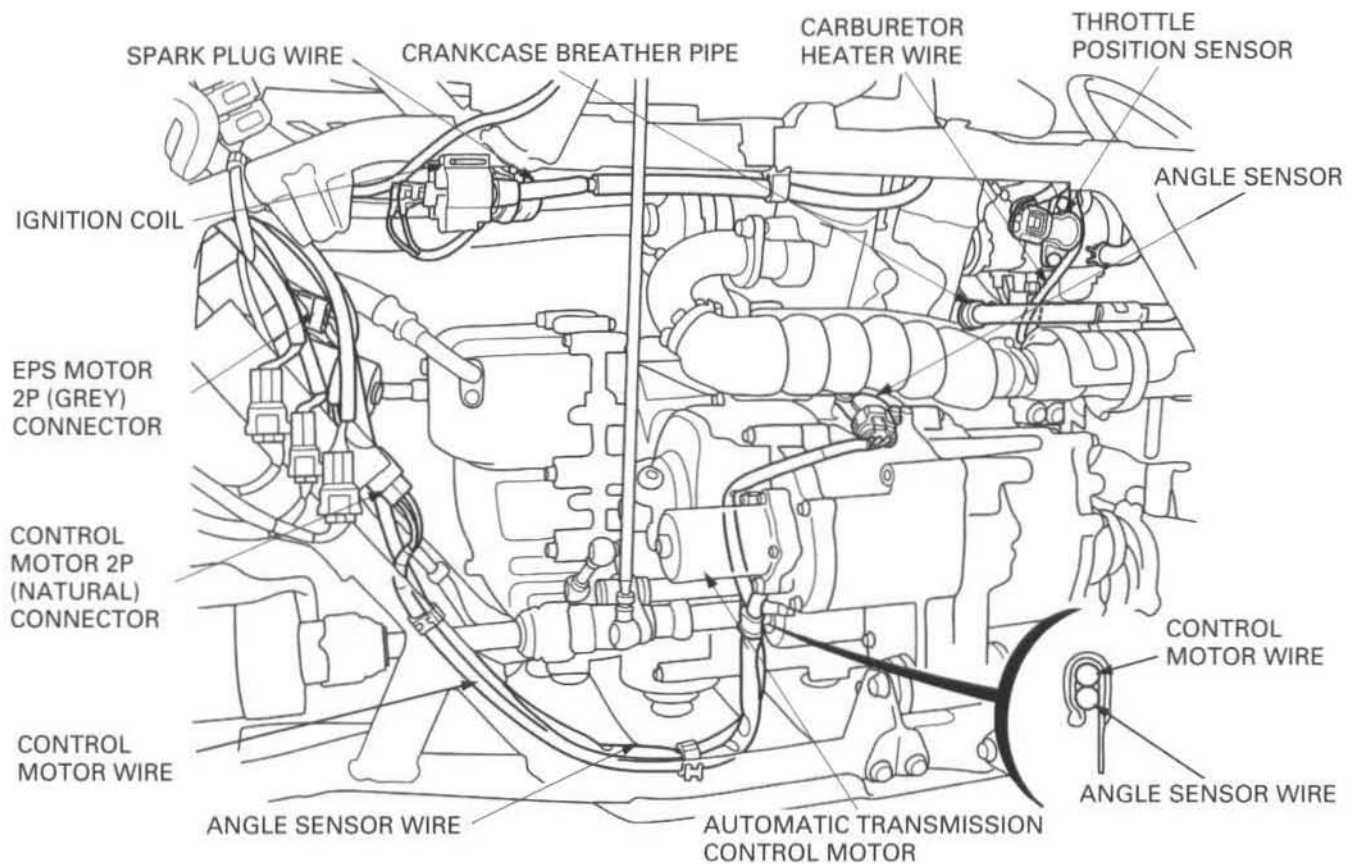


GENERAL INFORMATION

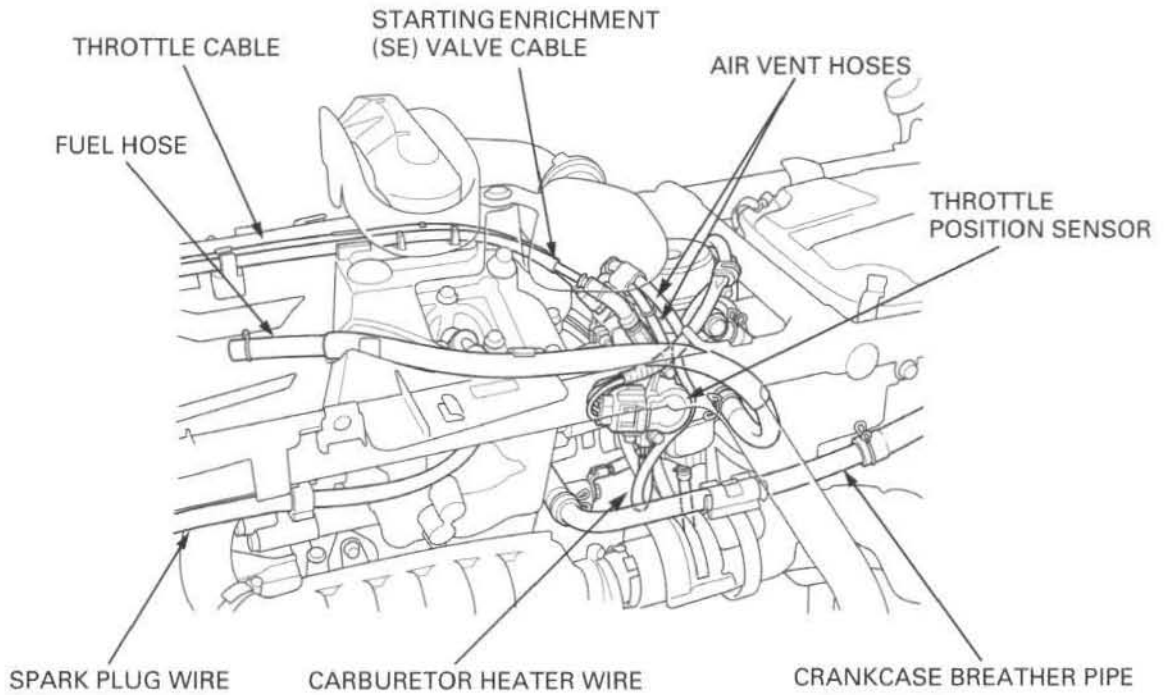
After '06 except EPS:



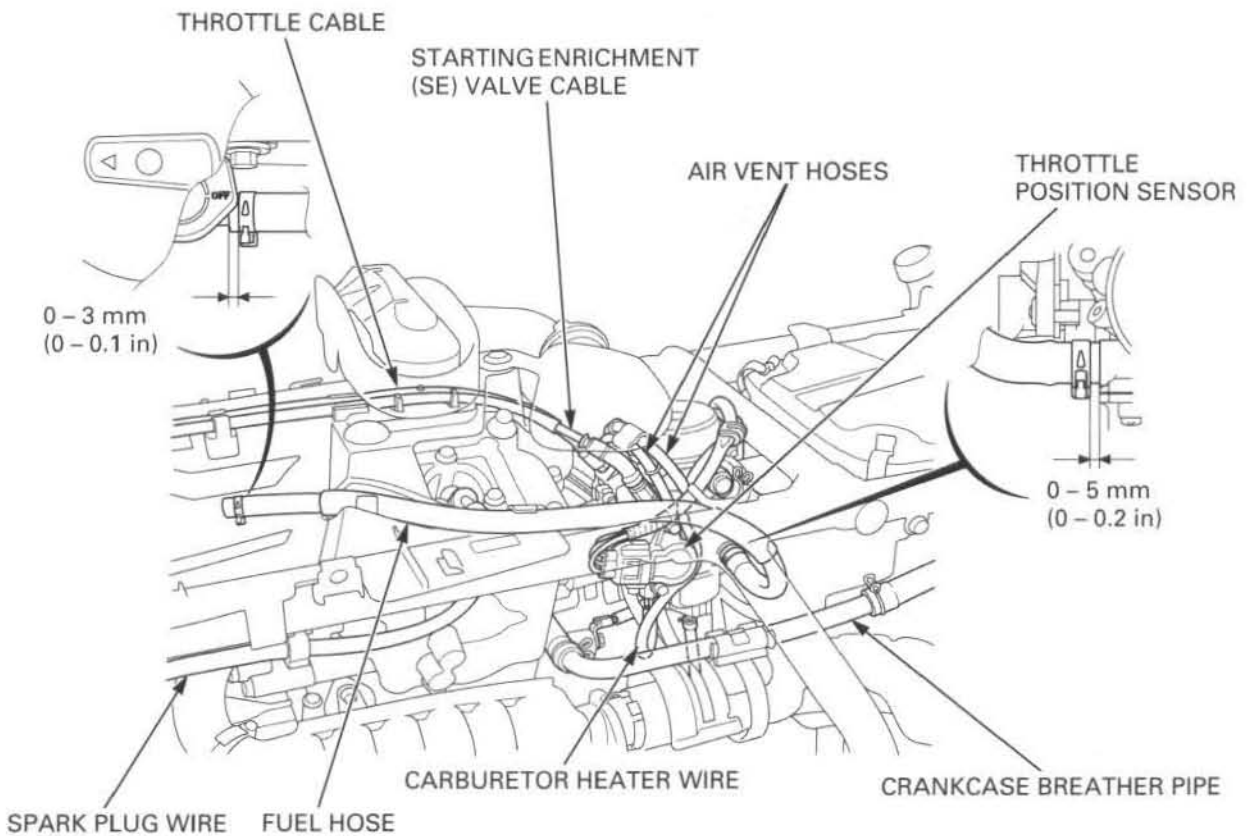
After '09 EPS:



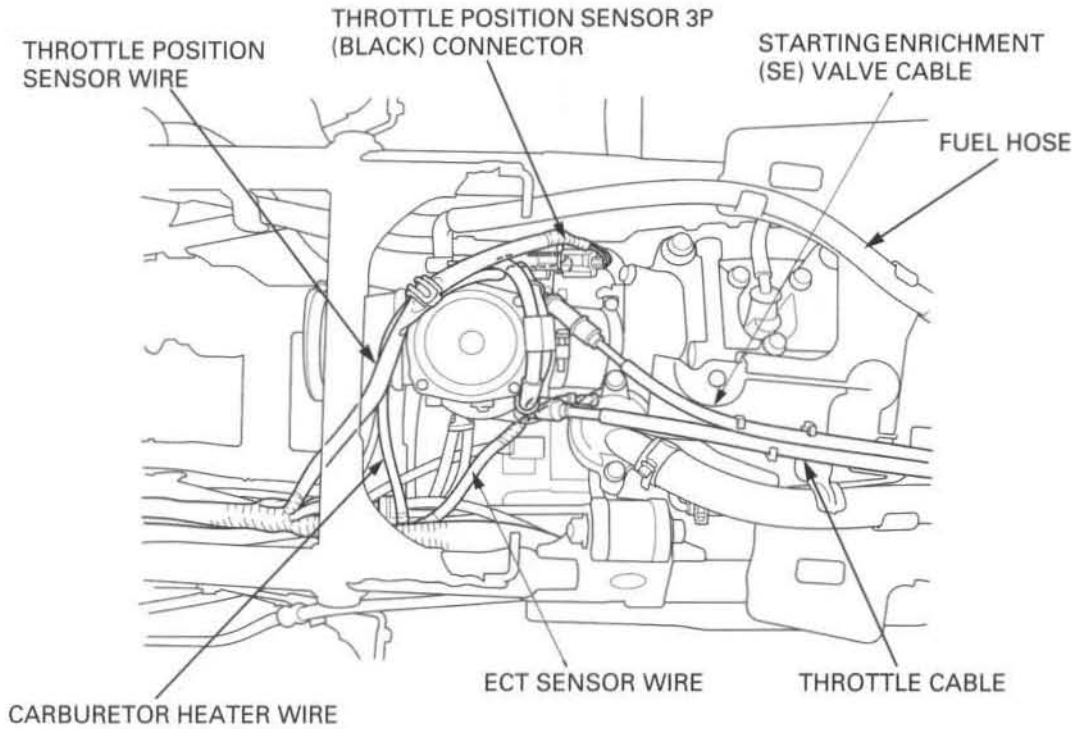
'05 - '07:



After '07:



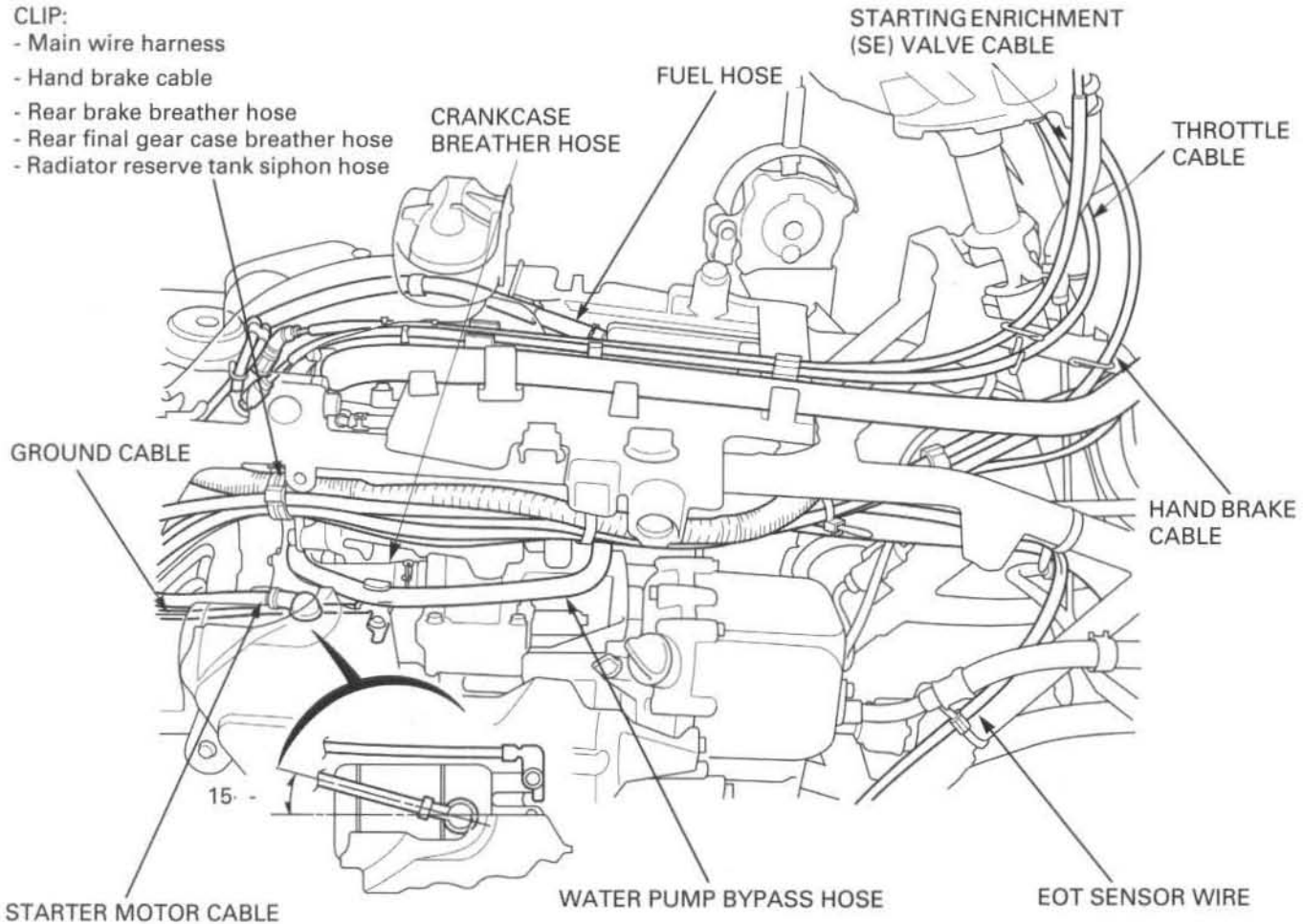
GENERAL INFORMATION



Except EPS:

CLIP:

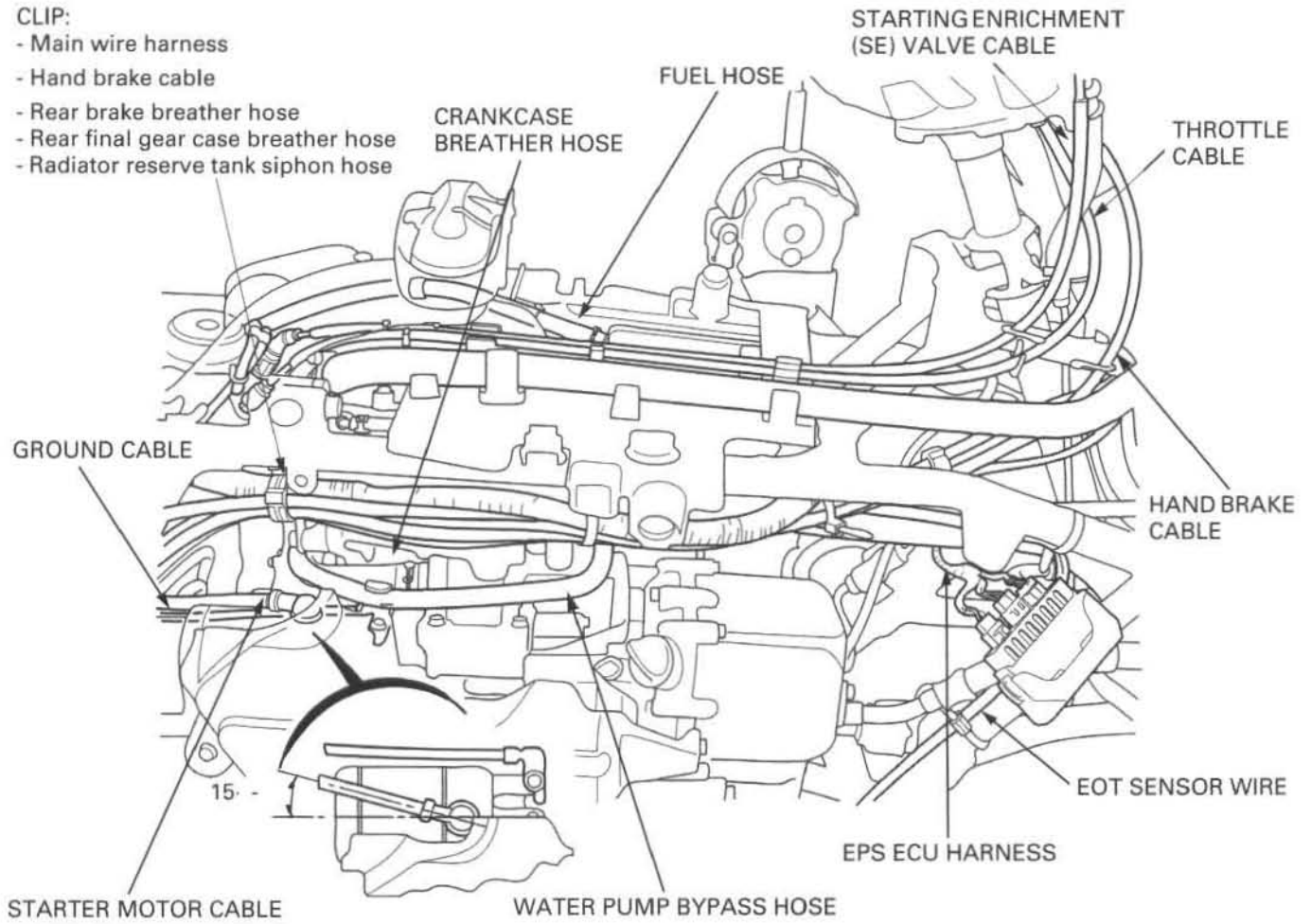
- Main wire harness
- Hand brake cable
- Rear brake breather hose
- Rear final gear case breather hose
- Radiator reserve tank siphon hose



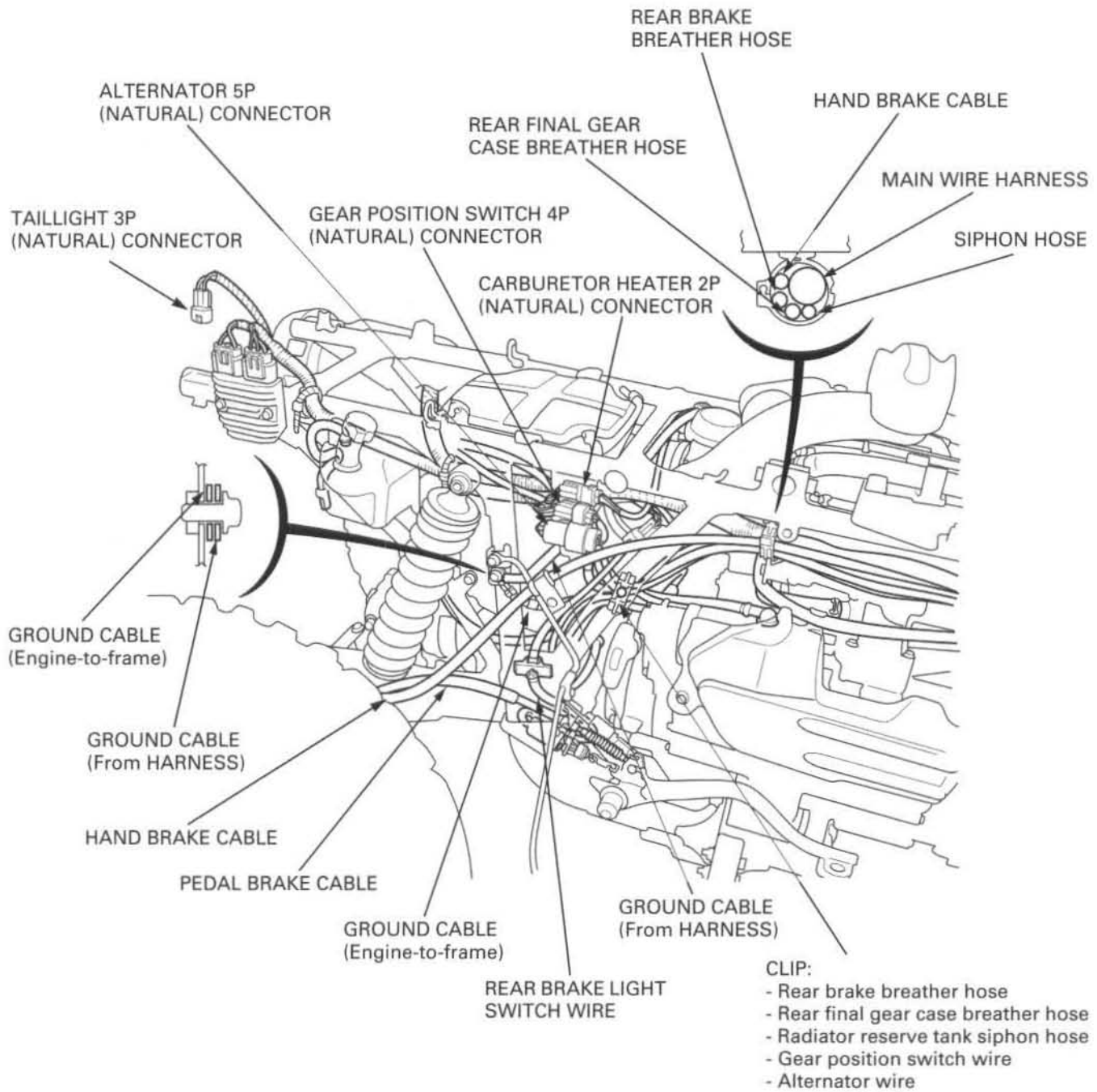
EPS only:

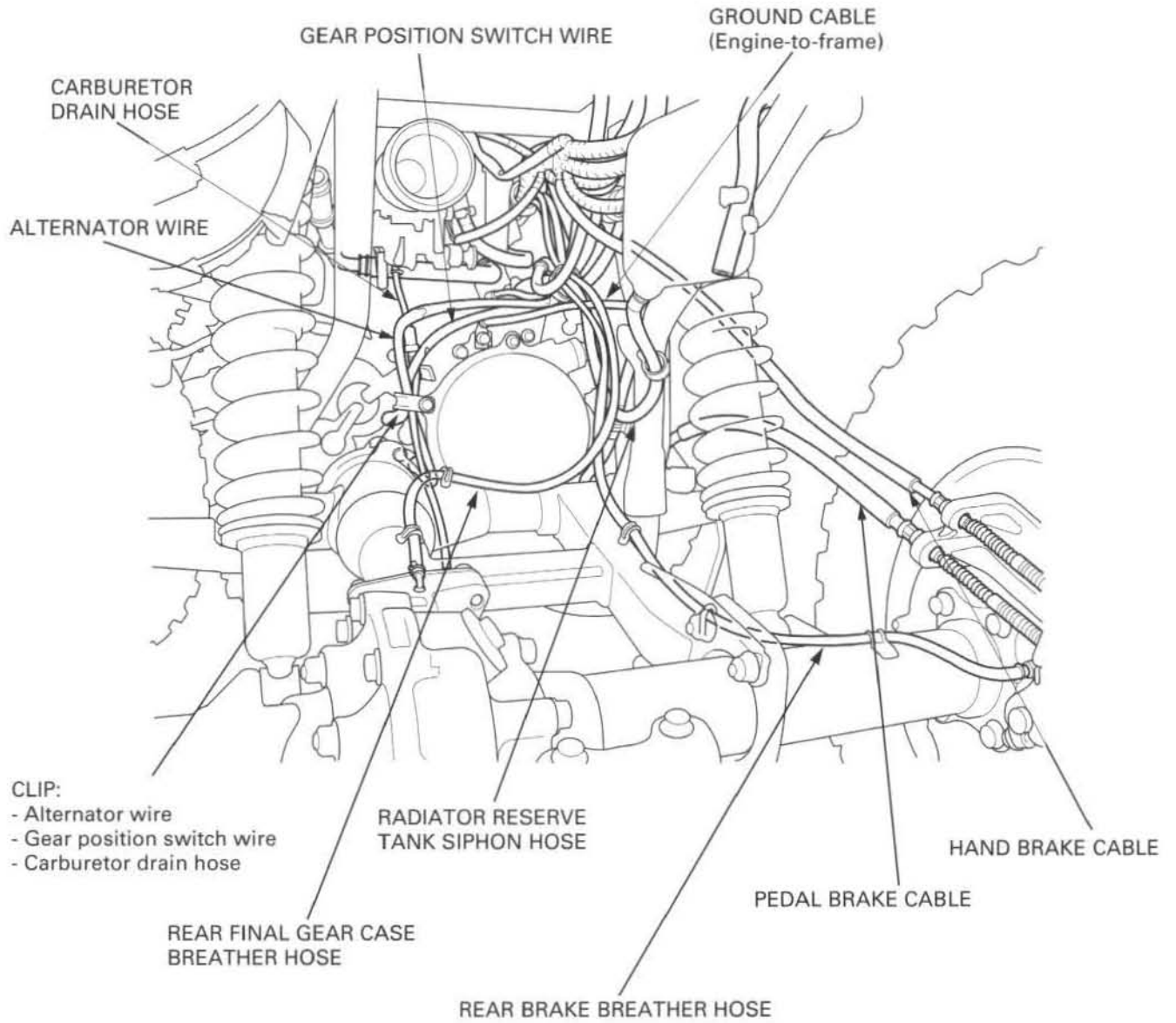
CLIP:

- Main wire harness
- Hand brake cable
- Rear brake breather hose
- Rear final gear case breather hose
- Radiator reserve tank siphon hose



GENERAL INFORMATION





GENERAL INFORMATION

'05 - '07 (Except U type):

CLIPS:

- Front speed sensor wire
- Front final clutch wire
- Rear speed sensor wire
- Front final gear case breather hose

FRONT FINAL GEAR
CASE BREATHER HOSE

BRAKE HOSE

BAND:

- Front speed sensor wire
- Front final clutch wire
- Rear speed sensor wire

RIGHT FRONT BRAKE HOSE

LEFT FRONT BRAKE HOSE

'05 - '07 (U type):

CLIPS:

- Horn wire
- Front speed sensor wire
- Front final clutch wire
- Rear speed sensor wire
- Front final gear case breather hose

FRONT FINAL GEAR
CASE BREATHER HOSE

BRAKE HOSE

BAND:

- Front speed sensor wire
- Front final clutch wire
- Rear speed sensor wire
- Horn wire

HORN

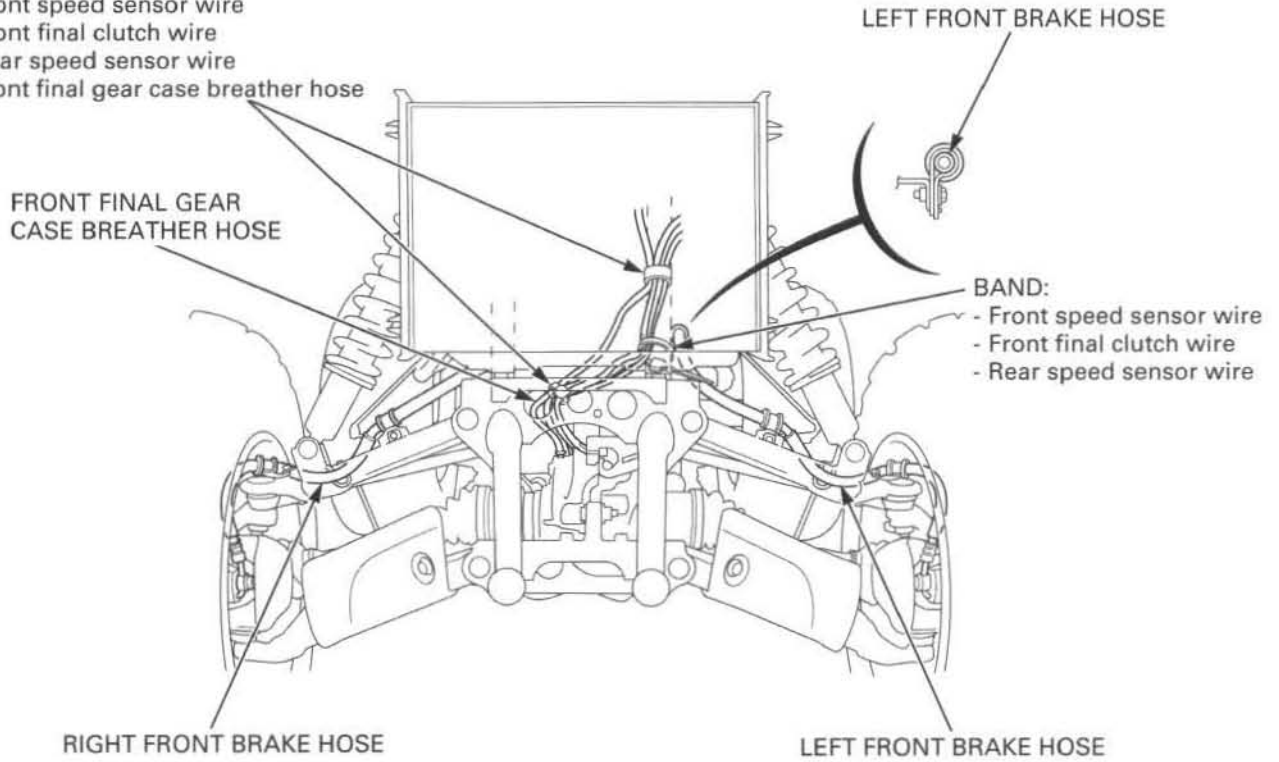
RIGHT FRONT BRAKE HOSE

LEFT FRONT BRAKE HOSE

After '07 (Except U type):

CLIPS:

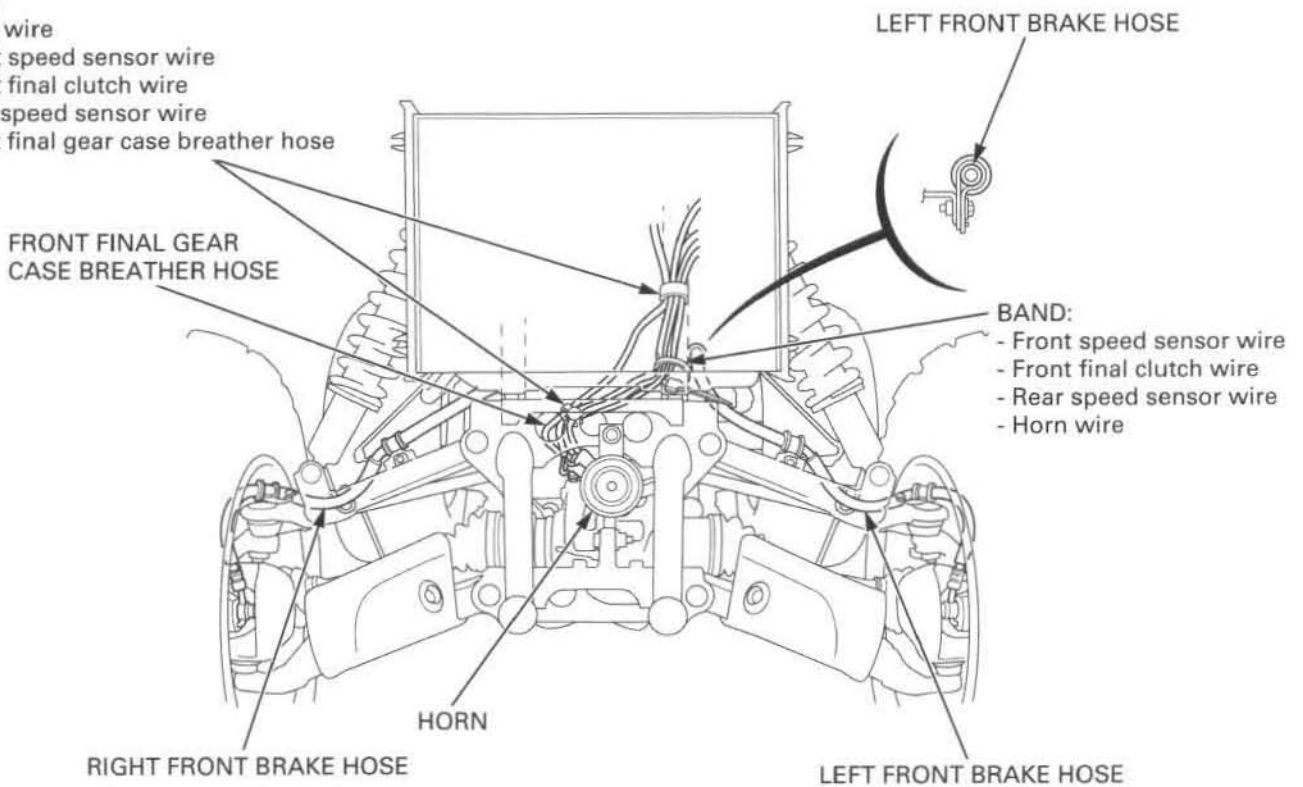
- Front speed sensor wire
- Front final clutch wire
- Rear speed sensor wire
- Front final gear case breather hose



After '07 (U type):

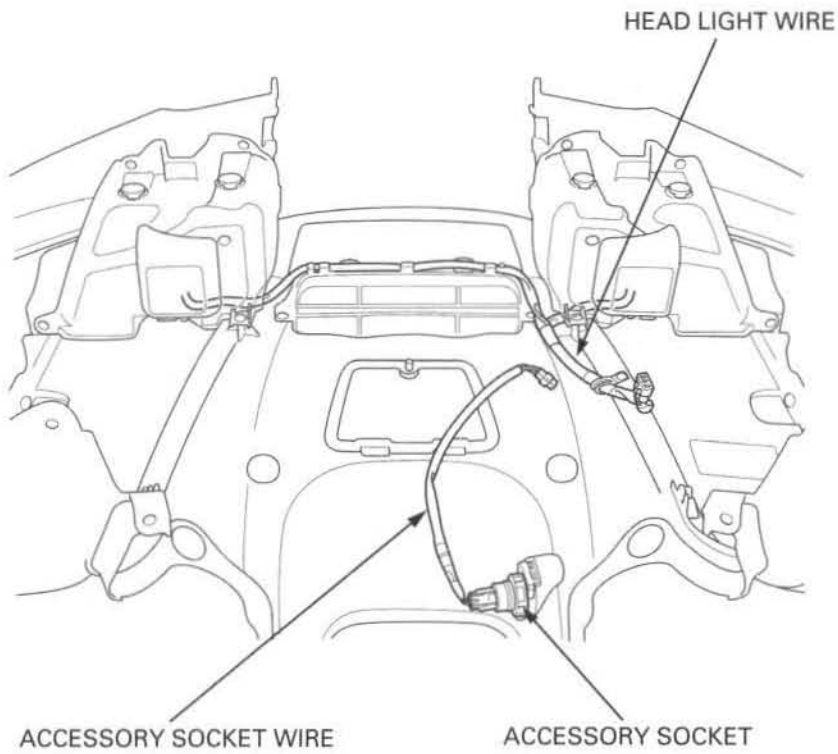
CLIPS:

- Horn wire
- Front speed sensor wire
- Front final clutch wire
- Rear speed sensor wire
- Front final gear case breather hose



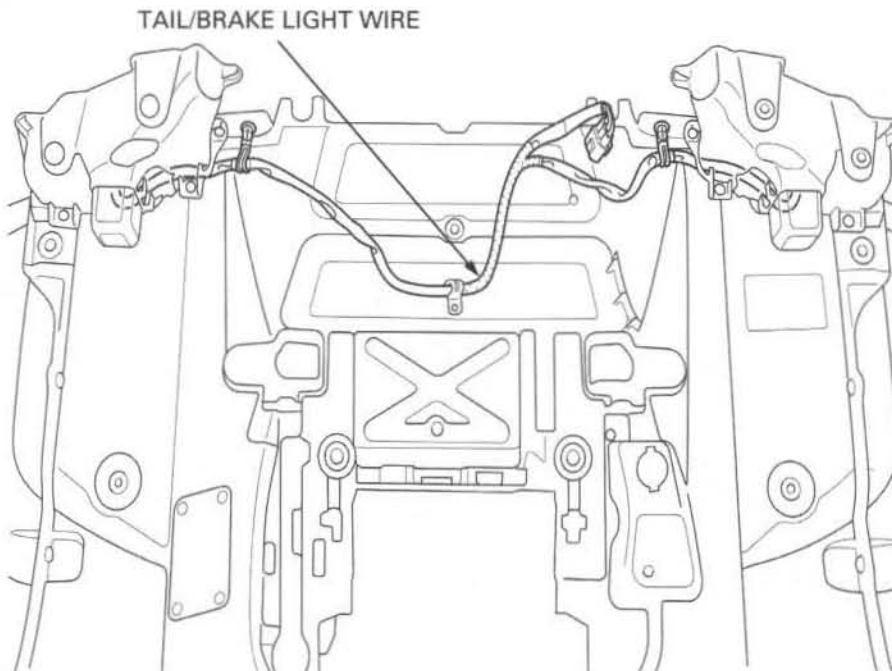
GENERAL INFORMATION

Reverse side of the front fender:

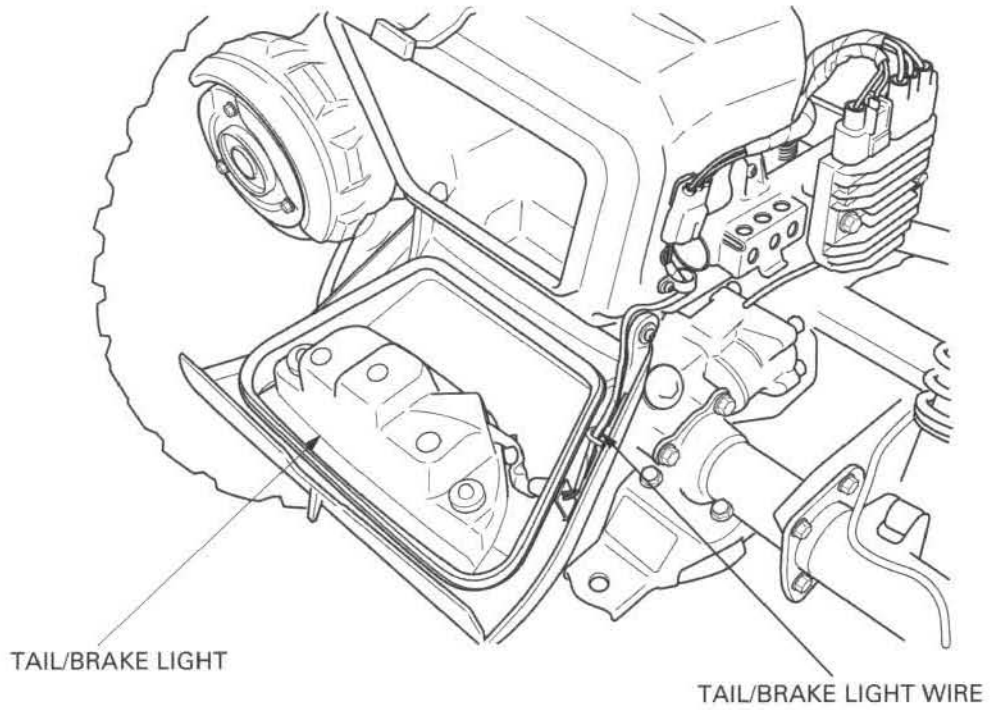


'05, '06:

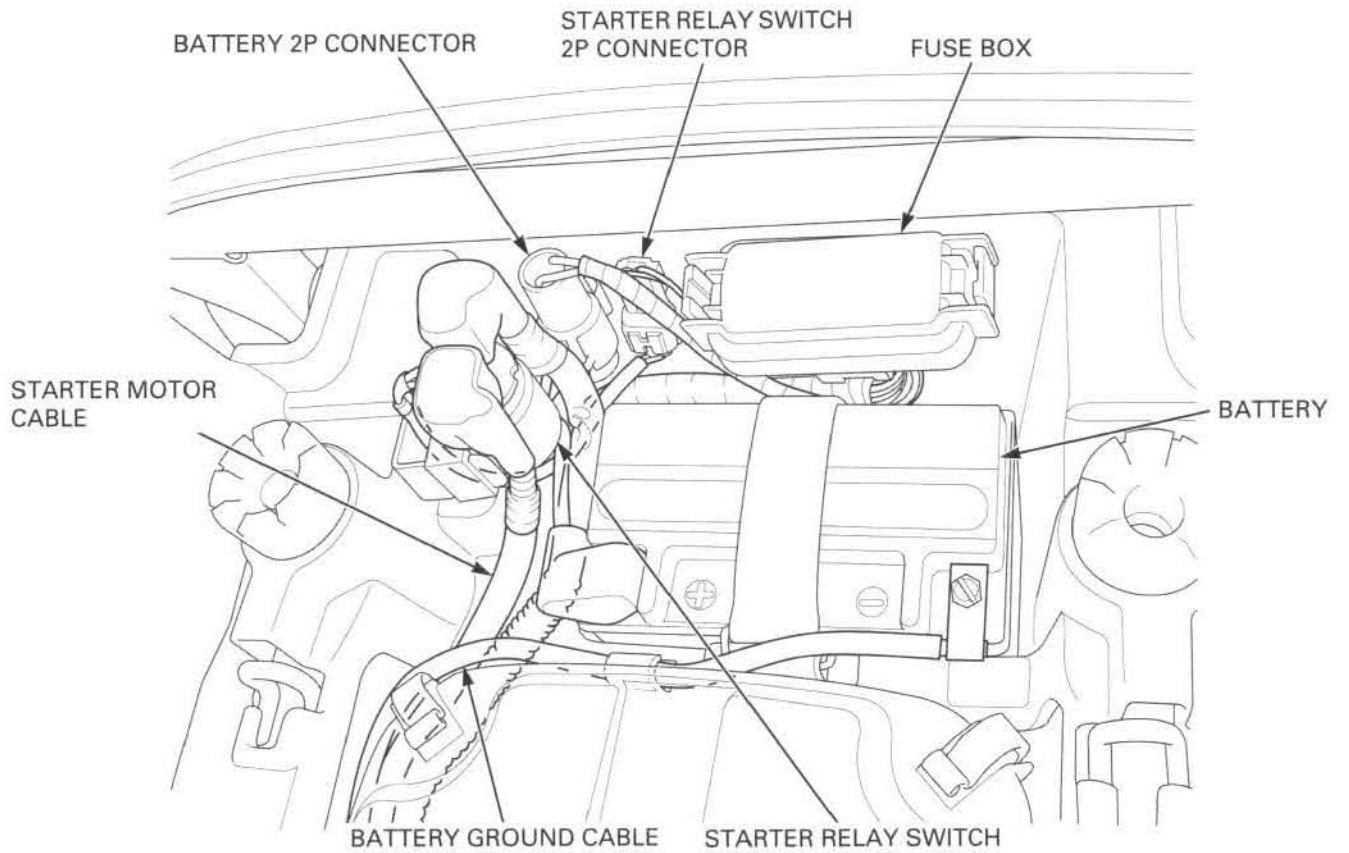
Reverse side of the rear fender:



After '06:

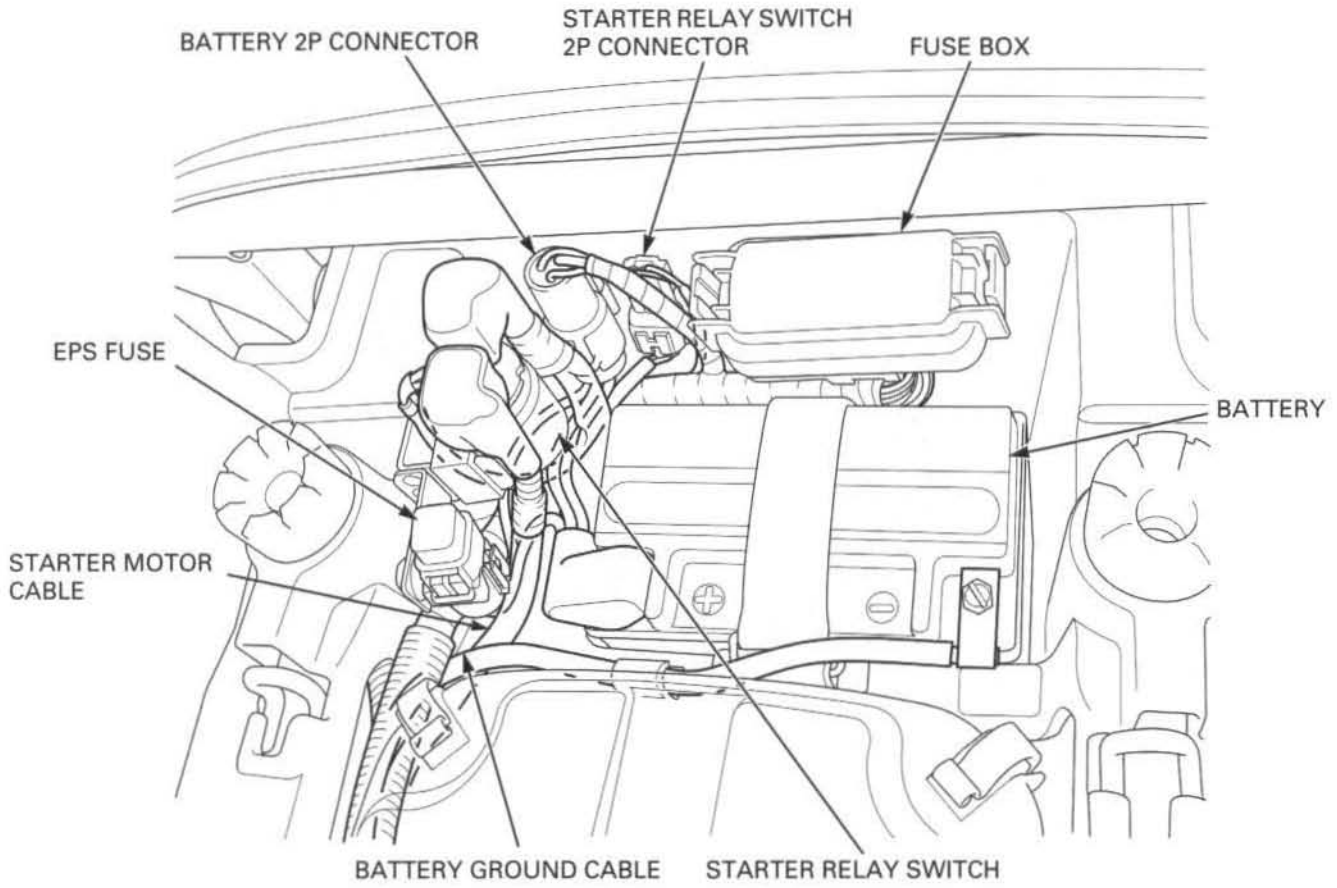


Except EPS:



GENERAL INFORMATION

EPS only:



EMISSION CONTROL SYSTEMS

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

SOURCE OF EMISSIONS

The combustion process produces carbon monoxide, oxide 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.

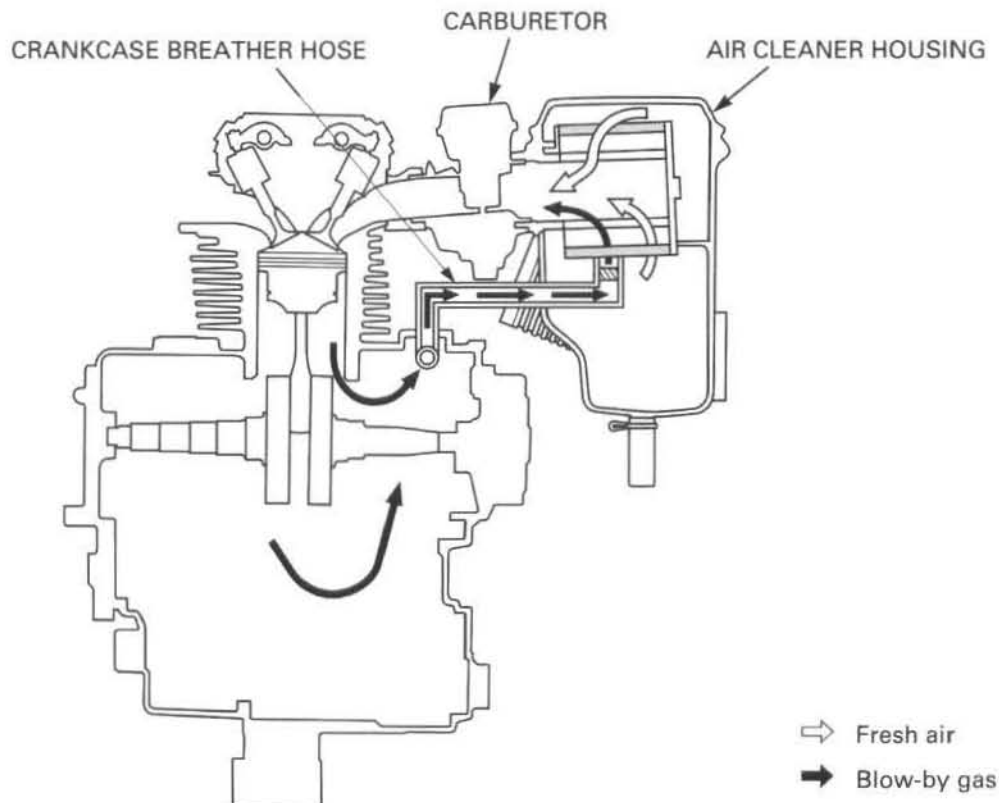
Honda Motor Co., Ltd. utilizes various systems to reduce carbon monoxide, oxides of nitrogen, and hydrocarbon.

EXHAUST EMISSION CONTROL SYSTEM

The exhaust emission control system is composed of a lean 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.



GENERAL INFORMATION

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.

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: law 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.

FUEL PERMEATION EMISSION CONTROL SYSTEM (After '07)

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

REBUILT ENGINE

When you rebuild the 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, the vehicle 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. FRAME/BODY PANELS/EXHAUST SYSTEM

SERVICE INFORMATION	2-2	INNER COVER	2-7
TROUBLESHOOTING	2-2	FRONT MUD GUARD	2-8
BODY PANEL LOCATIONS	2-3	INNER FENDER	2-9
TRIM CLIP	2-4	FRONT CARRIER	2-9
SEAT	2-4	FRONT CARRY PIPE	2-10
RECOIL STARTER COVER	2-4	FRONT FENDER	2-11
ENGINE GUARD	2-5	REAR CARRIER	2-11
GEARSHIFT LEVER KNOB	2-5	REAR FENDER	2-12
SIDE COVER	2-5	TOOL BOX	2-13
FUEL TANK COVER	2-6	OUTER FENDER	2-13
CENTER MUD GUARD	2-7	EXHAUST SYSTEM	2-15

SERVICE INFORMATION

GENERAL

- This section covers removal and installation of the body panels and exhaust system.
- Serious burns may result if the exhaust system is not allowed to cool before components are removed or serviced.
- When installing the exhaust system, loosely install all of the exhaust pipe fasteners. Always tighten the exhaust clamps first, then tighten the mounting fasteners. If you tighten the mounting fasteners first, the exhaust pipe may not seat properly.
- Always replace the gaskets after removing the exhaust system.
- Always inspect the exhaust system for leaks after installation.

TORQUE VALUES

Front carrier/carry pipe bolt	37 N·m (3.8 kgf·m, 27 lbf·ft)
Gearshift lever knob screw	2 N·m (0.2 kgf·m, 1.4 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)
Front exhaust pipe cover band screw	3.2 N·m (0.3 kgf·m, 2.4 lbf·ft)
Rear exhaust pipe cover end band screw	5.4 N·m (0.6 kgf·m, 4.0 lbf·ft)
Rear exhaust pipe cover center band screw	5.4 N·m (0.6 kgf·m, 4.0 lbf·ft)
Muffler cover screw	3.2 N·m (0.3 kgf·m, 2.4 lbf·ft)

TROUBLESHOOTING

Excessive exhaust noise

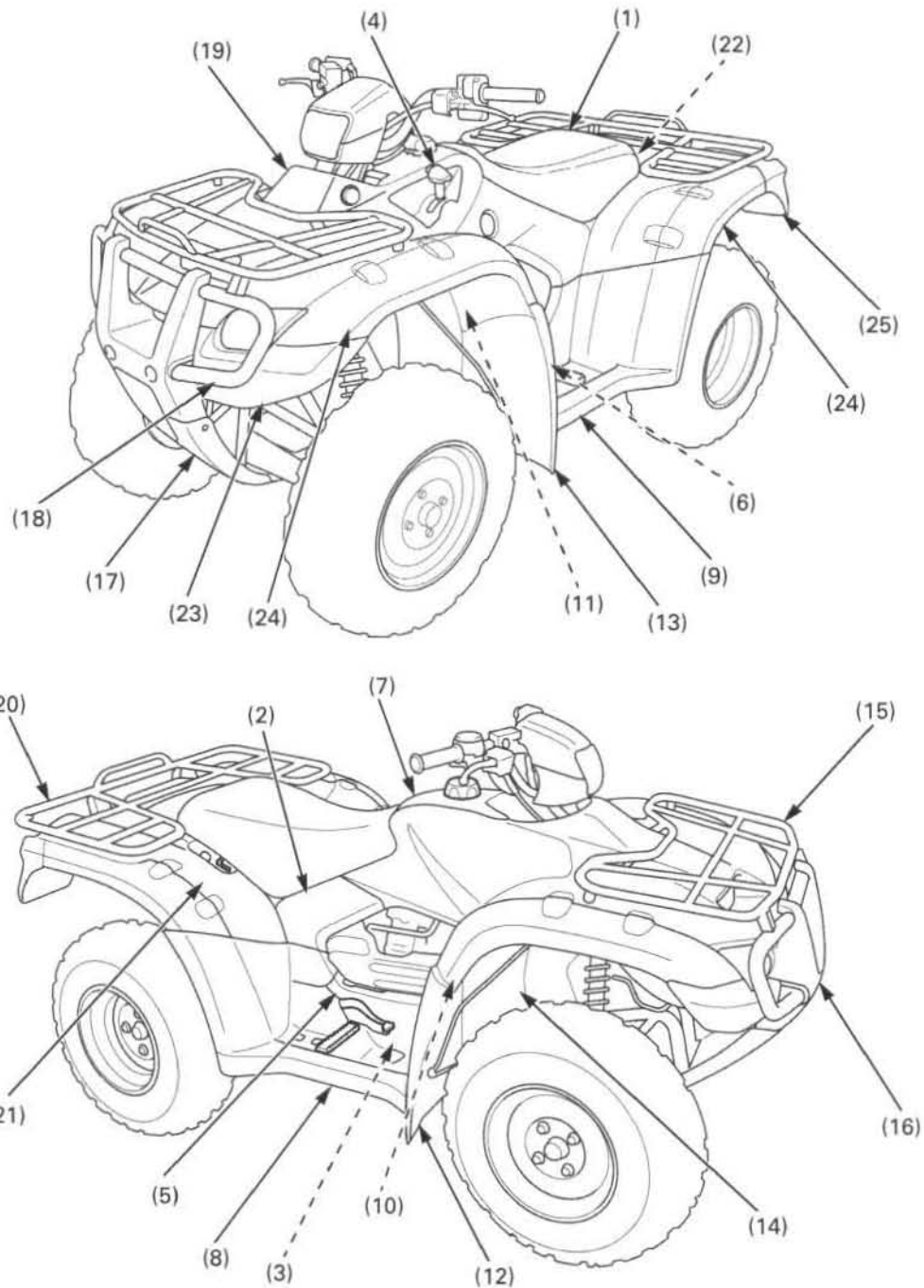
- Broken exhaust system
- Exhaust gas leak

Poor performance

- Deformed exhaust system
- Exhaust gas leak
- Clogged muffler

BODY PANEL LOCATIONS

'05, '06 shown:



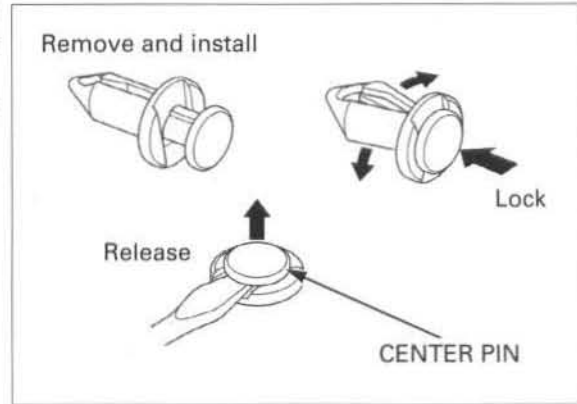
- | | |
|---------------------------------------|--|
| (1) Seat (page 2-4) | (14) Inner Fender (page 2-9) |
| (2) Recoil Starter Cover (page 2-4) | (15) Front Carrier (page 2-9) |
| (3) Engine Guard (page 2-5) | (16) Carry Pipe Guard (page 2-10) |
| (4) Gearshift Lever Knob (page 2-5) | (17) Front Skid Plate (page 2-10) |
| (5) Right Side Cover (page 2-5) | (18) Carry Pipe (page 2-10) |
| (6) Left Side Cover (page 2-6) | (19) Front Fender (page 2-11) |
| (7) Fuel Tank Cover (page 2-6) | (20) Rear Carrier (page 2-11) |
| (8) Right Center Mud Guard (page 2-7) | (21) Rear Fender (page 2-12) |
| (9) Left Center Mud Guard (page 2-7) | (22) Tool Box (page 2-13) |
| (10) Right Inner Cover (page 2-7) | (23) Headlight Grille (page 2-13) |
| (11) Left Inner Cover (page 2-8) | (24) Outer Fender (page 2-13) |
| (12) Right Front Mud Guard (page 2-8) | (25) Tail Light Grille: '05, '06 only (page 2-14) |
| (13) Left Front Mud Guard (page 2-8) | (25) Rear Corner Outer Fender: After '06 (page 2-14) |

TRIM CLIP

Release by pulling the center pin up using a snap ring pliers or flat blade screwdriver and remove the trim clip.

When installing the trim clip, carefully align the clip hole to avoid damaging the clip.

Install the clip and lock it by pushing the center pin securely.

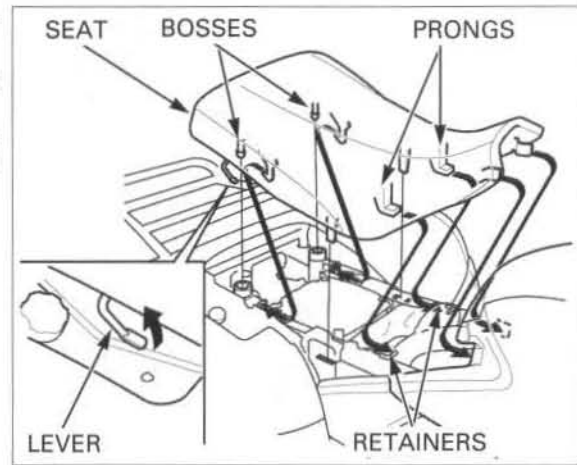


SEAT

Unlock the seat by turning the release lever upward. Pull the seat back and remove it.

Install the seat by inserting the prongs into the seat retainer on the frame.

Push the seat forward and align the mounting bosses with the mounting rubbers, then press down to lock it.

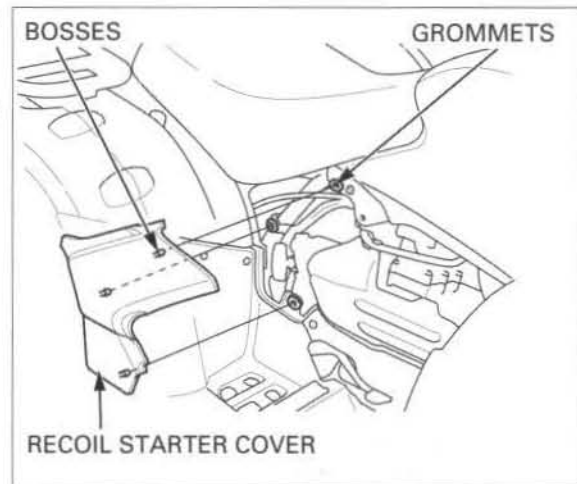


RECOIL STARTER COVER

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

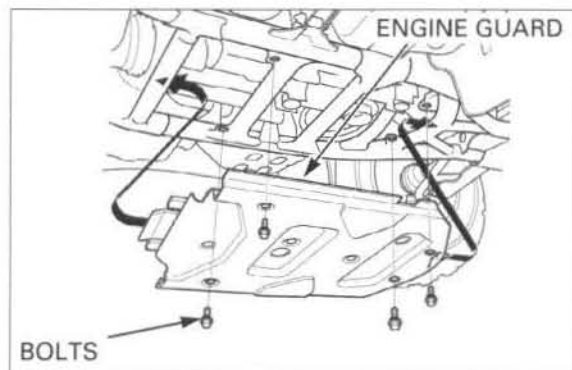
Be careful not to dislodge the grommets in the frame.

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



ENGINE GUARD

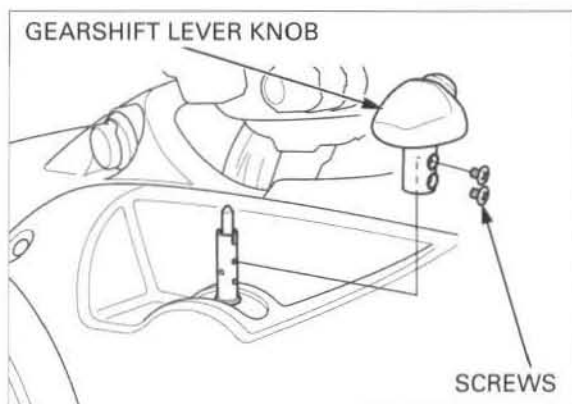
Remove the four bolts and engine guard.
Installation is in the reverse order of removal.



GEARSHIFT LEVER KNOB

Remove the two screws and gearshift lever knob.
Installation is in the reverse order of removal.

TORQUE: Knob screw: 2 N·m (0.2 kgf·m, 1.4 lbf·ft)

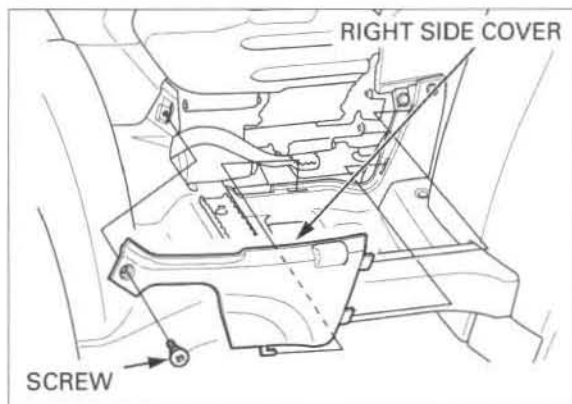


SIDE COVER

RIGHT SIDE COVER

Remove the screw and right side cover by releasing the hook from the right mud guard.

Installation is in the reverse order of removal.

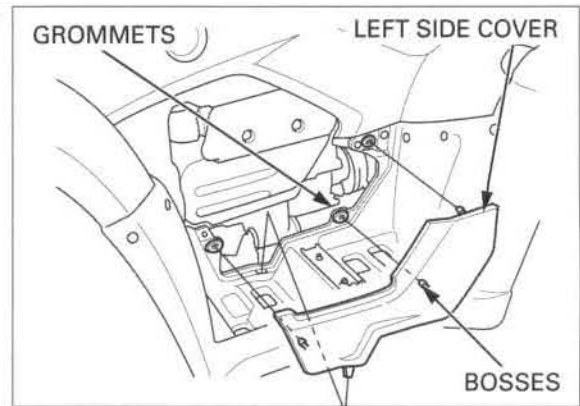


FRAME/BODY PANELS/EXHAUST SYSTEM

LEFT SIDE COVER

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

Installation is in the reverse order of removal.



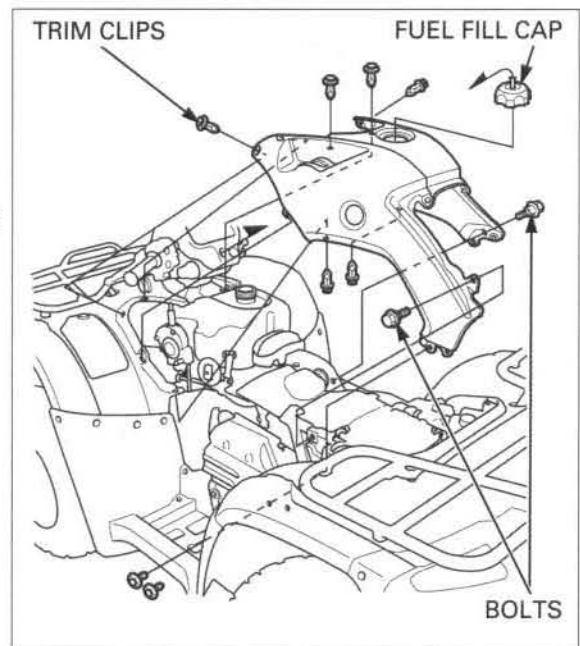
FUEL TANK COVER

REMOVAL/INSTALLATION

Remove the following:

- seat (page 2-4)
- recoil starter cover (page 2-4)
- gearshift lever knob (page 2-5)
- left side cover (page 2-6)
- fuel fill cap
- eight trim clips
- fuel tank cover assembly (release two tabs of cover by sliding the cover forward)

Installation is in the reverse order of removal.



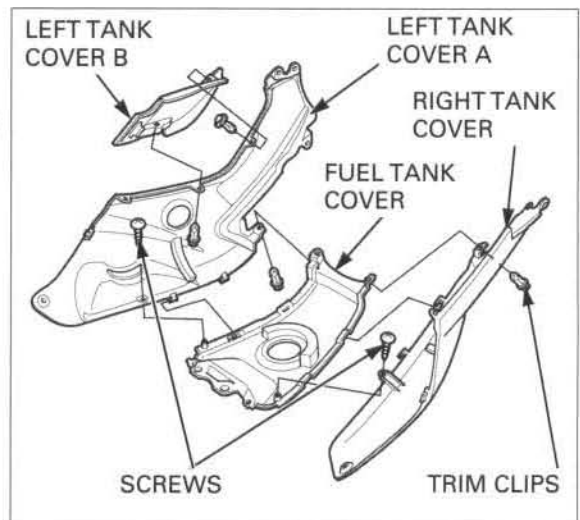
DISASSEMBLY/ASSEMBLY

Remove the following:

- two screws
- four trim clips

Separate the fuel tank cover, right tank cover, left tank cover A and left tank cover B.

Installation is in the reverse order of removal.



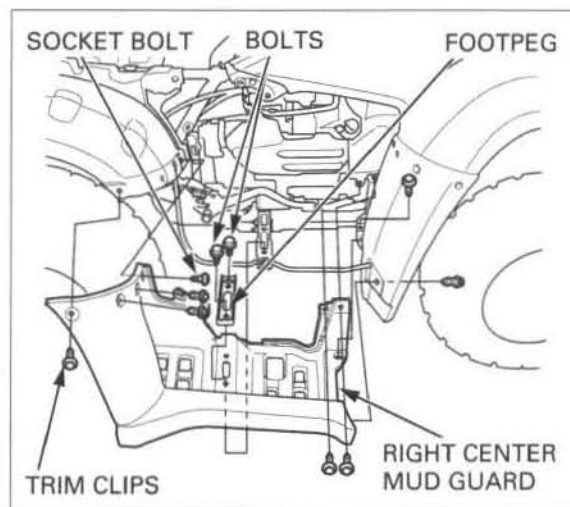
CENTER MUD GUARD

RIGHT CENTER MUD GUARD

Remove the following:

- recoil starter cover (page 2-4)
- right side cover (page 2-5)
- two bolts and footpeg
- socket bolt
- seven trim clips
- right center mud guard

Installation is in the reverse order of removal.

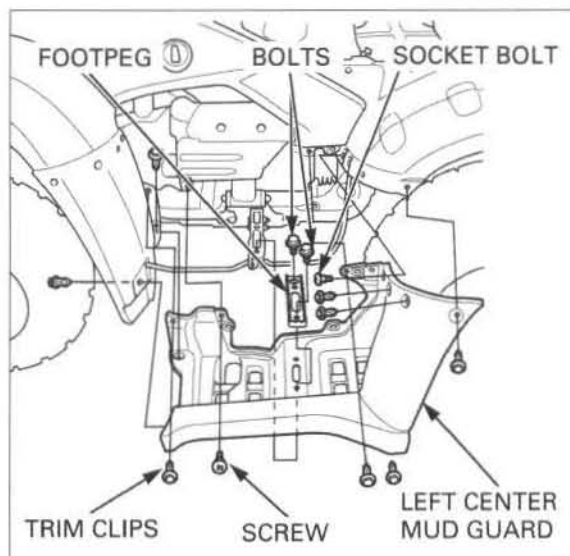


LEFT CENTER MUD GUARD

Remove the following:

- left side cover (page 2-6)
- two bolts and footpeg
- screw
- socket bolt
- eight trim clips
- left center mud guard

Installation is in the reverse order of removal.



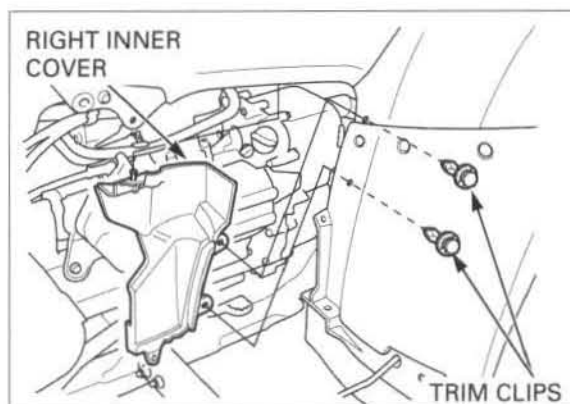
INNER COVER

RIGHT INNER COVER

Remove the right center mud guard (page 2-7).

Remove the two trim clips and right inner cover.

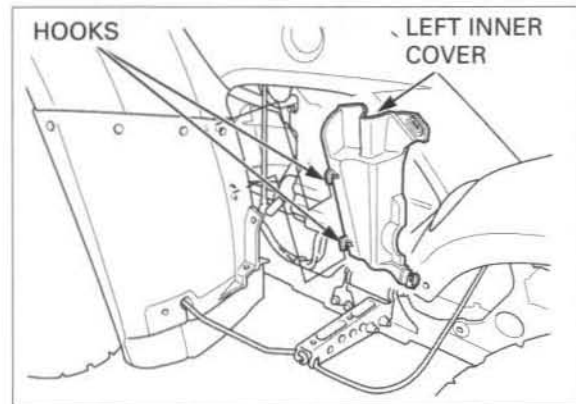
Installation is in the reverse order of removal.



FRAME/BODY PANELS/EXHAUST SYSTEM

LEFT INNER COVER

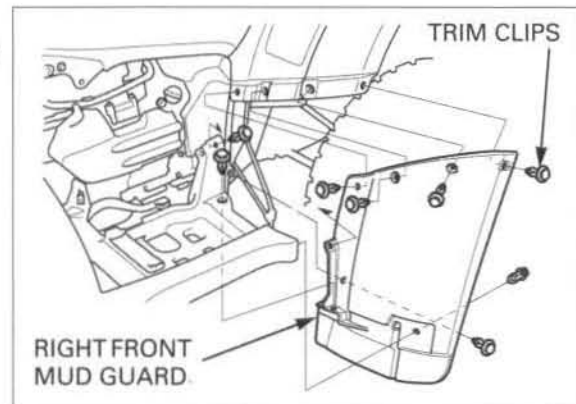
Remove the left center mud guard (page 2-7).
Remove the left inner cover by releasing the hooks.
Installation is in the reverse order of removal.



FRONT MUD GUARD

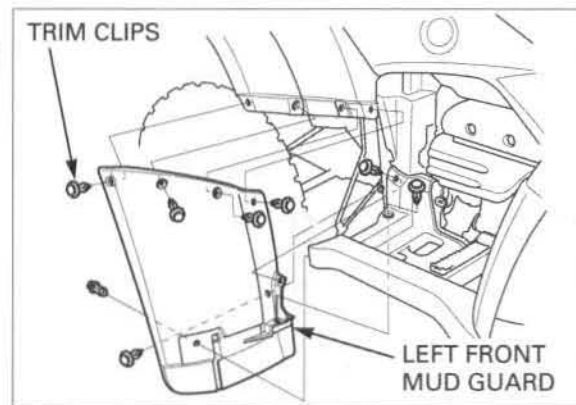
RIGHT FRONT MUD GUARD

Remove the right side cover (page 2-5).
Remove the nine trim clips and right front mud guard.
Installation is in the reverse order of removal.



LEFT FRONT MUD GUARD

Remove the left side cover (page 2-6).
Remove the eight trim clips and left front mud guard.
Installation is in the reverse order of removal.



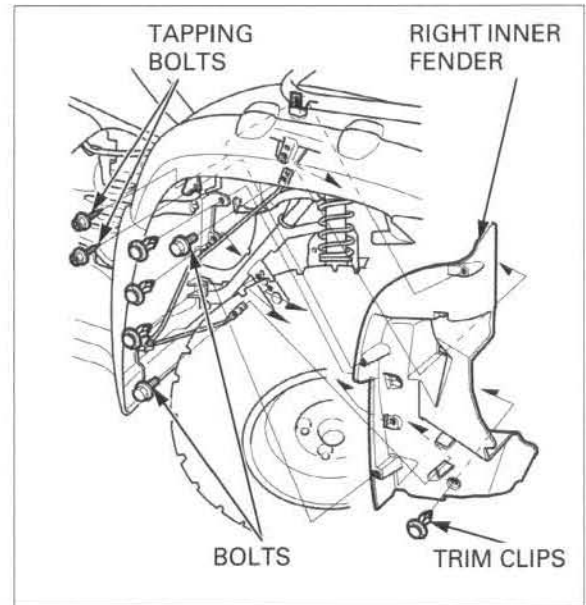
INNER FENDER

RIGHT INNER FENDER

Remove the following:

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

Installation is in the reverse order of removal.

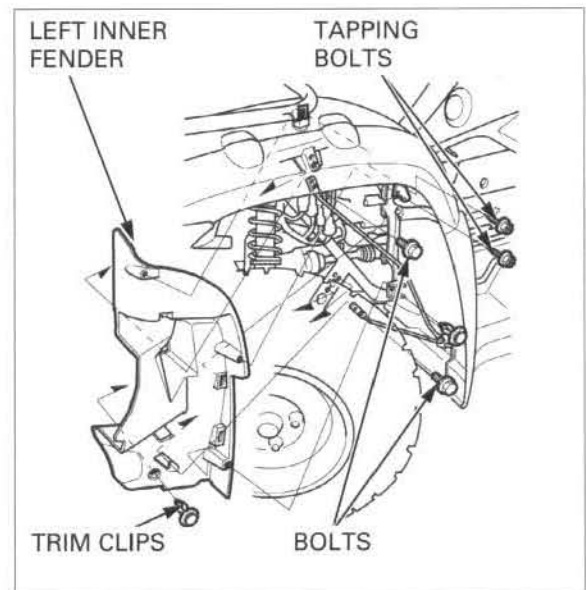


LEFT INNER FENDER

Remove the following:

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

Installation is in the reverse order of removal.



FRONT CARRIER

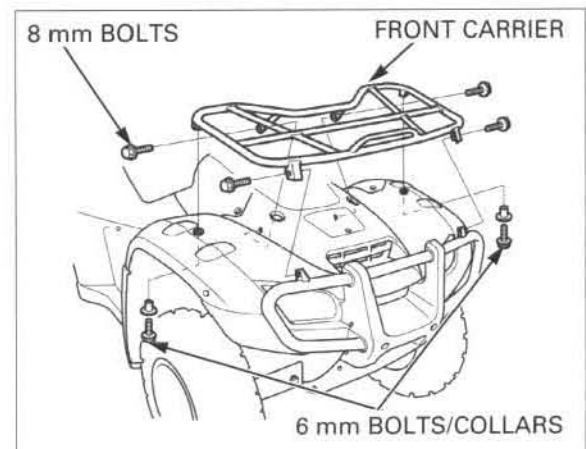
Remove the following:

- two 6 mm bolts and two collars
- four 8 mm bolts
- front carrier

Be careful not to scratch the front fender.

Installation is in the reverse order of removal.

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



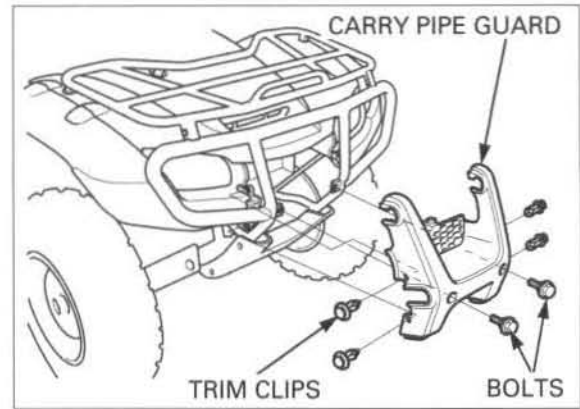
FRONT CARRY PIPE

CARRY PIPE GUARD

Remove the following:

- two bolts
- four trim clip
- carry pipe guard

Installation is in the reverse order of removal.

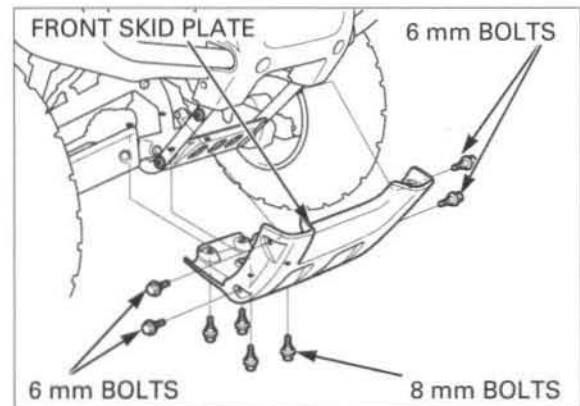


FRONT SKID PLATE

Remove the following:

- four 6 mm bolts
- four 8 mm bolts
- front skid plate

Installation is in the reverse order of removal.



CARRY PIPE

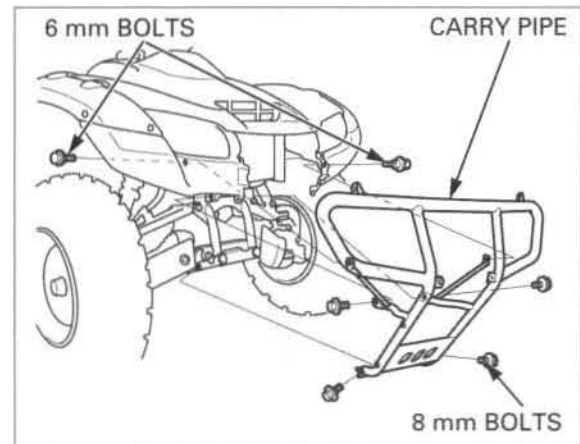
Remove the following:

- front carrier (page 2-9)
- carry pipe guard (page 2-10)
- front skid plate (page 2-10)
- two 6 mm bolts
- four 8 mm bolts
- carry pipe

Be careful not to damage the front fender

Installation is in the reverse order of removal.

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

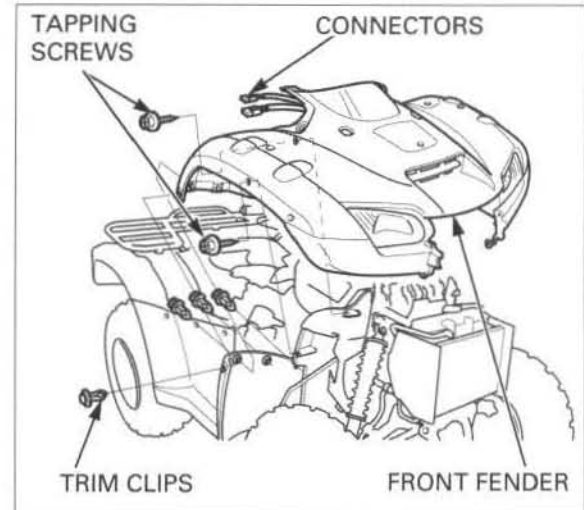


FRONT FENDER

Remove the following:

- fuel tank cover (page 2-6)
- carry pipe (page 2-10)
- eight trim clips
- four tapping bolts
- headlight connector
- accessory socket connector
- front fender

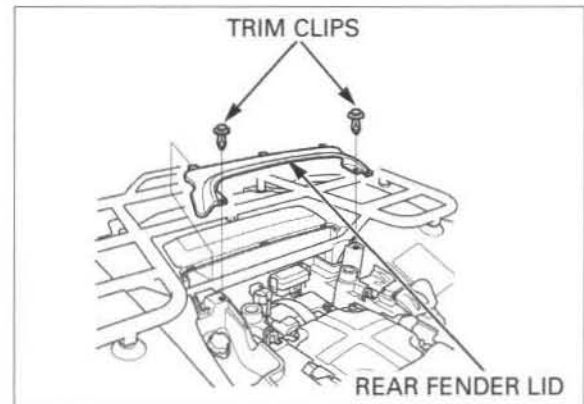
Installation is in the reverse order of removal.



REAR CARRIER

Remove the seat (page 2-4).

Remove the two trim clips and rear fender lid.



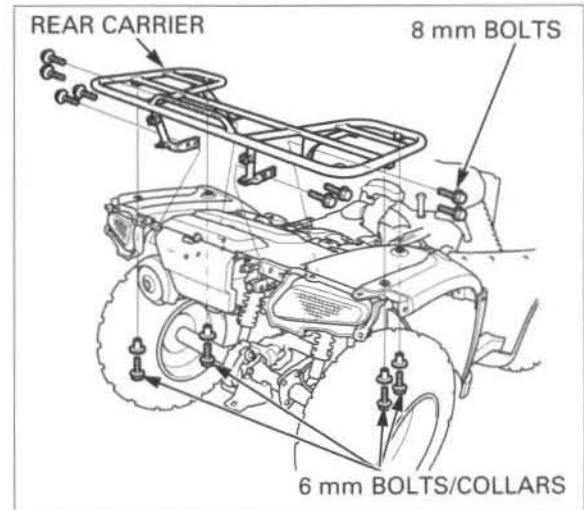
'05, '06 model
shown:

Remove the following:

- fuel tank cover (page 2-6)
- tail light grilles (page 2-14) or
- rear corner outer fender (page 2-14)
- four 6 mm bolts and four collars
- eight 8 mm bolts
- rear carrier

Installation is in the reverse order of removal.

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



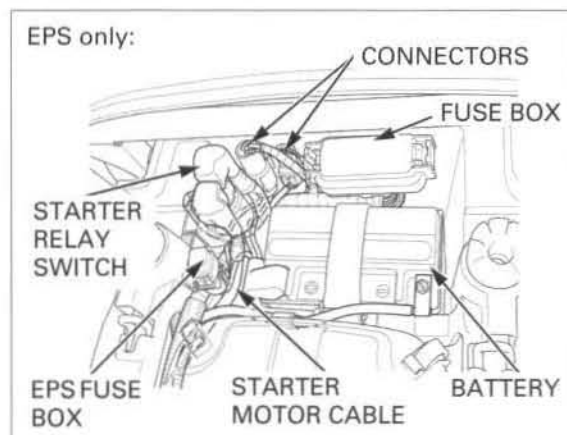
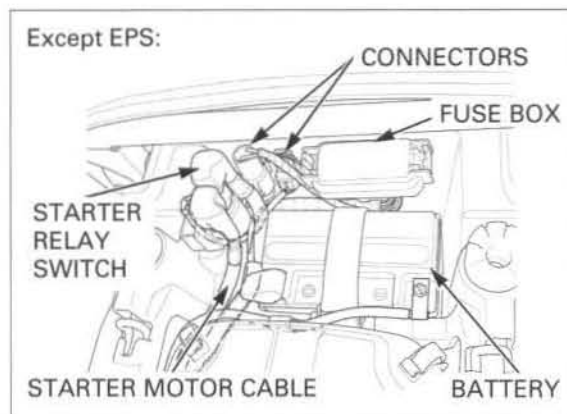
REAR FENDER

Remove the battery (page 19-6)

Disconnect the starter motor cable from the starter relay by removing the terminal nut and washer.

Remove the following from the battery box:

- fuse box
- 2P connectors
- starter relay switch
- EPS fuse box



'05, '06 model
shown:

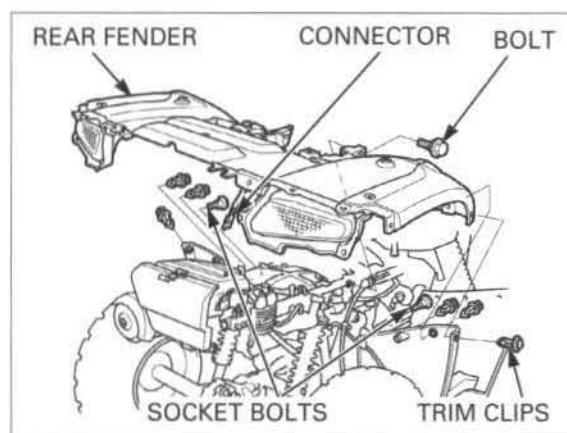
Remove the following:

- fuel tank cover (page 2-6)
- rear carrier (page 2-11)
- bolt
- two socket bolts
- six trim clips
- tail light connector ('05, '06 only)

Remove the starter motor and battery (-) cables out of the rear fender and remove the rear fender.

Installation is in the reverse order of removal.

Route the wires and cables properly (page 1-24).

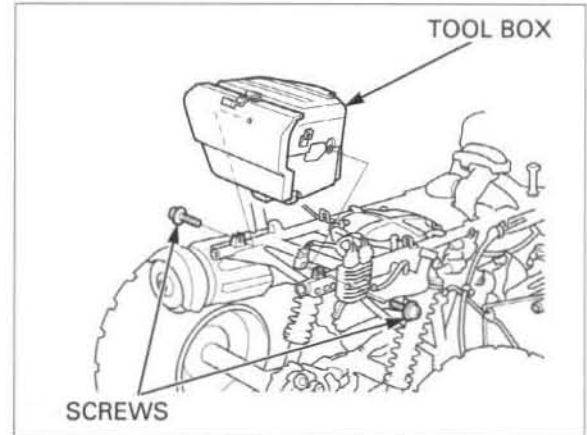


TOOL BOX

Remove the rear fender (page 2-12).

'05, '06 model Remove the two screws and the tool box.

shown: Installation is in the reverse order of removal.



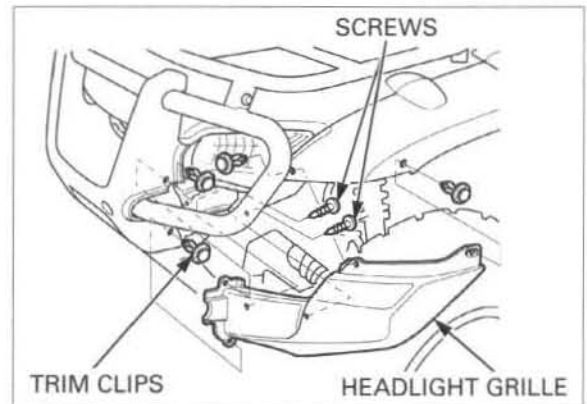
OUTER FENDER

HEADLIGHT GRILLE

Remove the following:

- two screws
- four trim clips
- headlight grille

Installation is in the reverse order of removal.

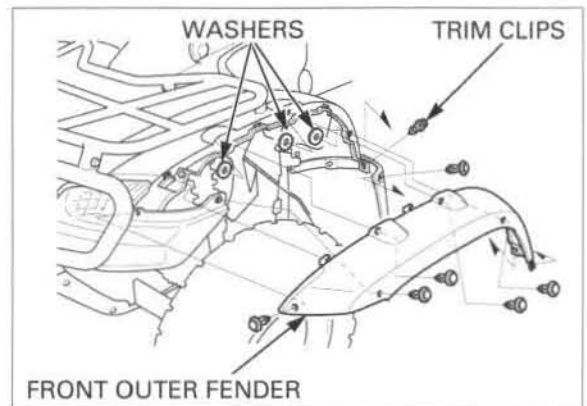


FRONT OUTER FENDER

Remove the following:

- seven trim clips
- three washers
- front outer fender

Installation is in the reverse order of removal.



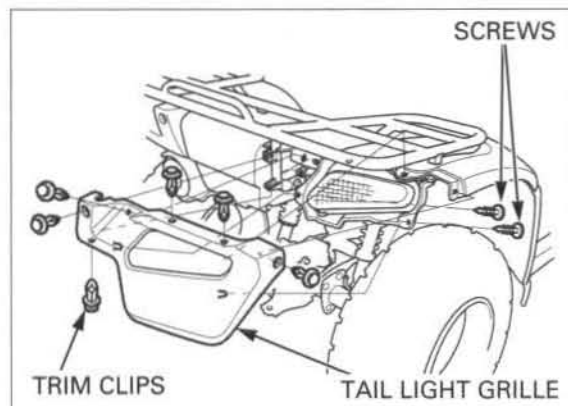
FRAME/BODY PANELS/EXHAUST SYSTEM

TAIL LIGHT GRILLE ('05, '06)

Remove the following:

- two screws
- six trim clips
- tail light grille

Installation is in the reverse order of removal.

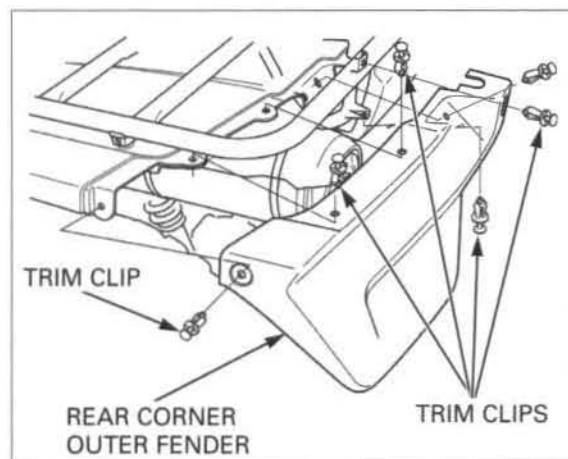


REAR CORNER OUTER FENDER (After '06)

Remove the following:

- six trim clips
- rear corner outer fender

Install the rear corner outer fender in the reverse order of removal.

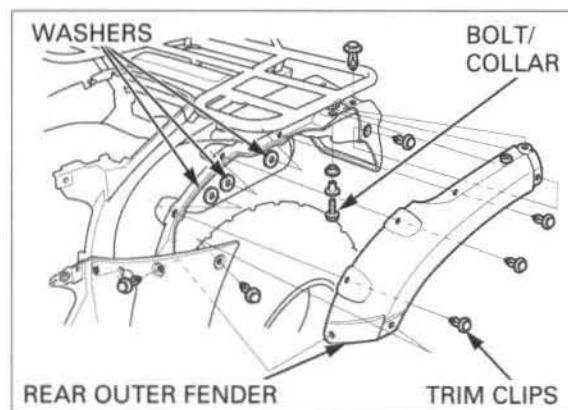


REAR OUTER FENDER

Remove the following:

- bolt and collar
- seven trim clips
- three washers
- rear outer fender

Installation is in the reverse order of removal.



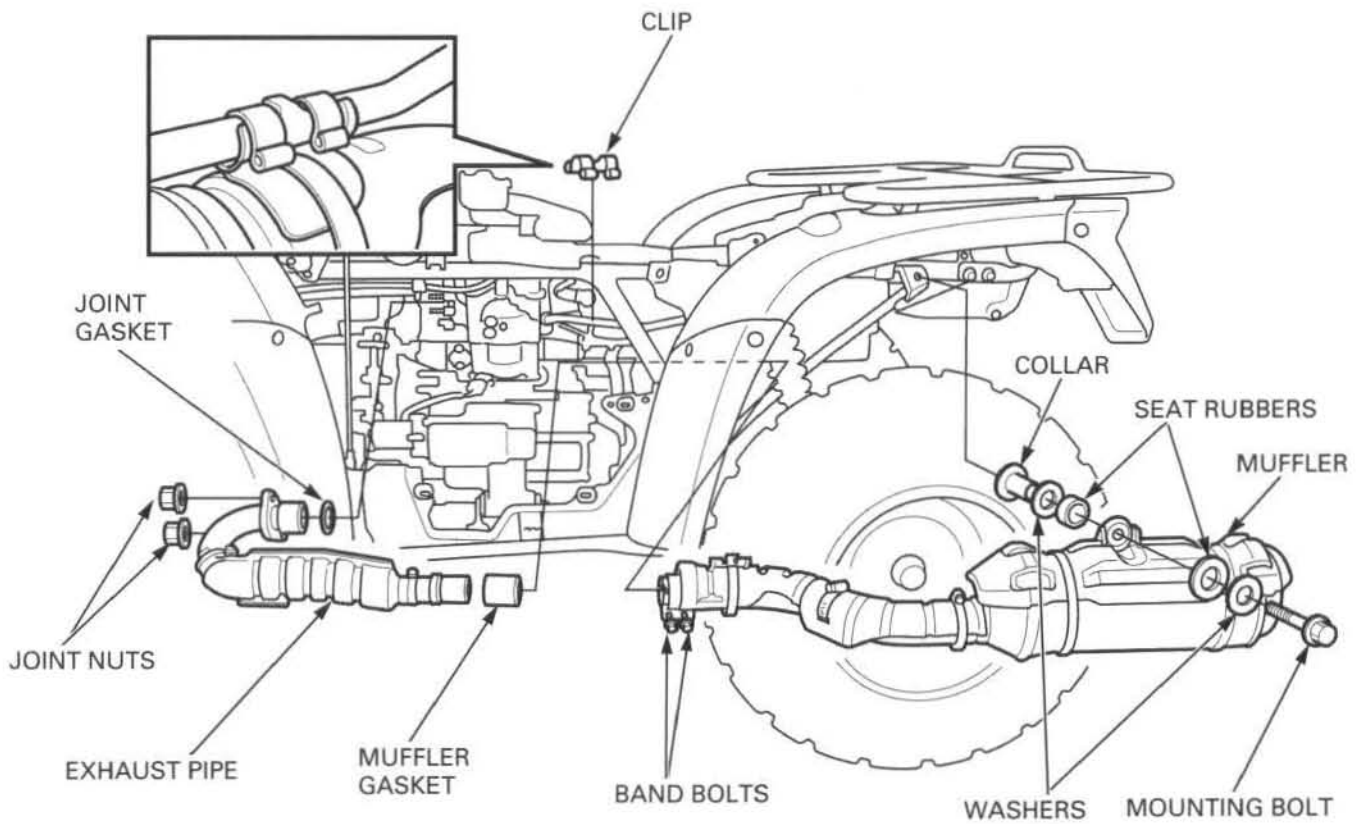
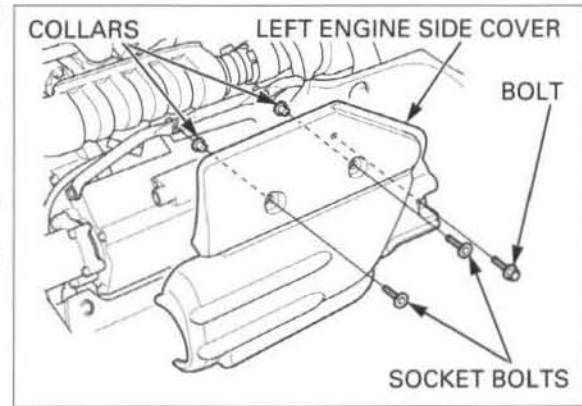
EXHAUST SYSTEM

REMOVAL

Remove the three bolt, socket bolts, collars and left engine side cover.

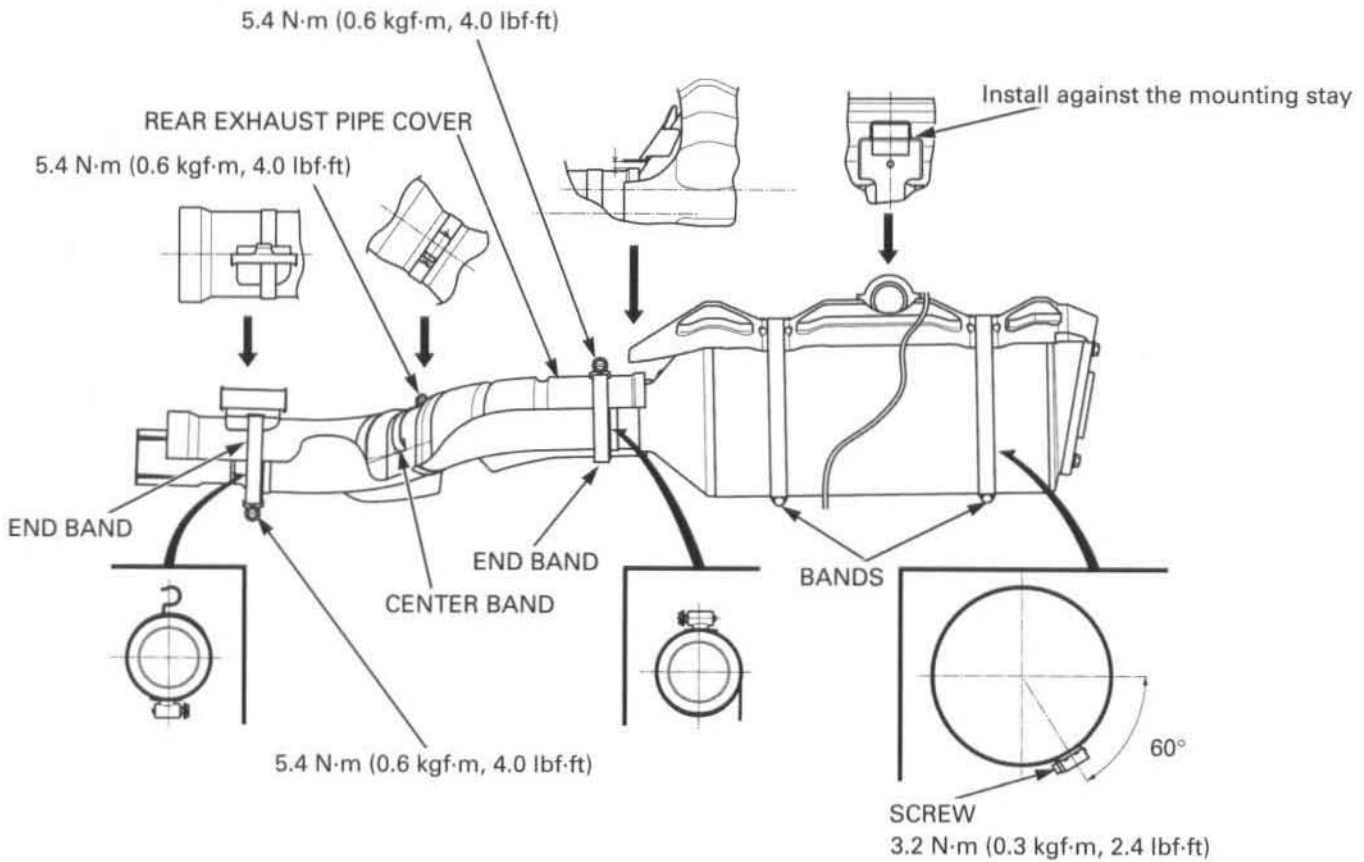
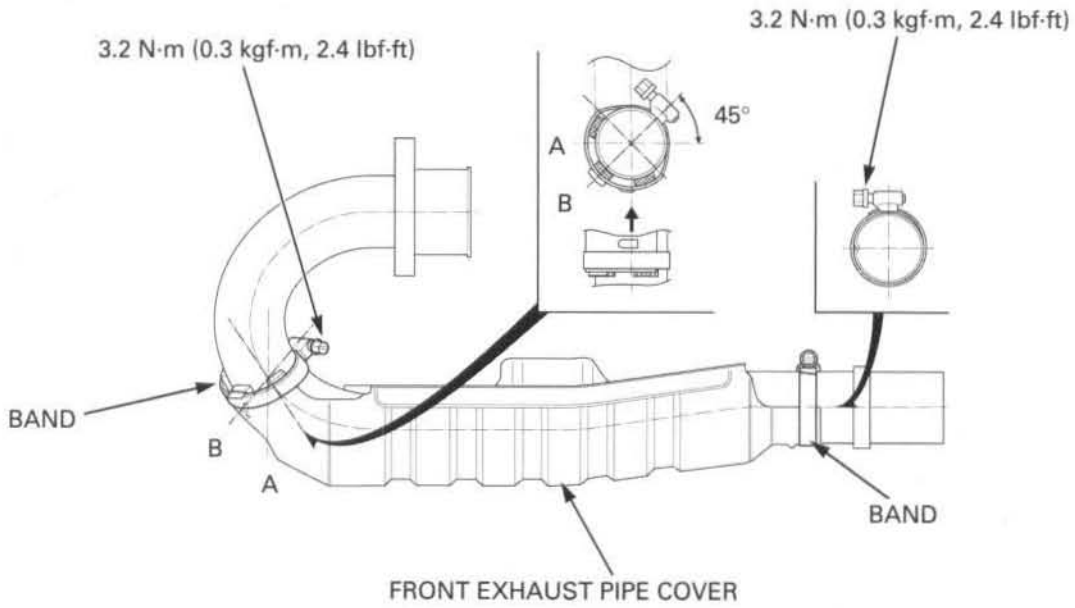
Loosen the muffler band bolts.
Remove the joint nuts and pull the exhaust pipe forward gradually to disconnect it from the muffler.
Remove the joint gasket and muffler gasket.

Release the crankcase breather pipe clips from the stay on the muffler.
Remove the mounting bolt, washers, seat rubbers and collar then remove the muffler from the frame.

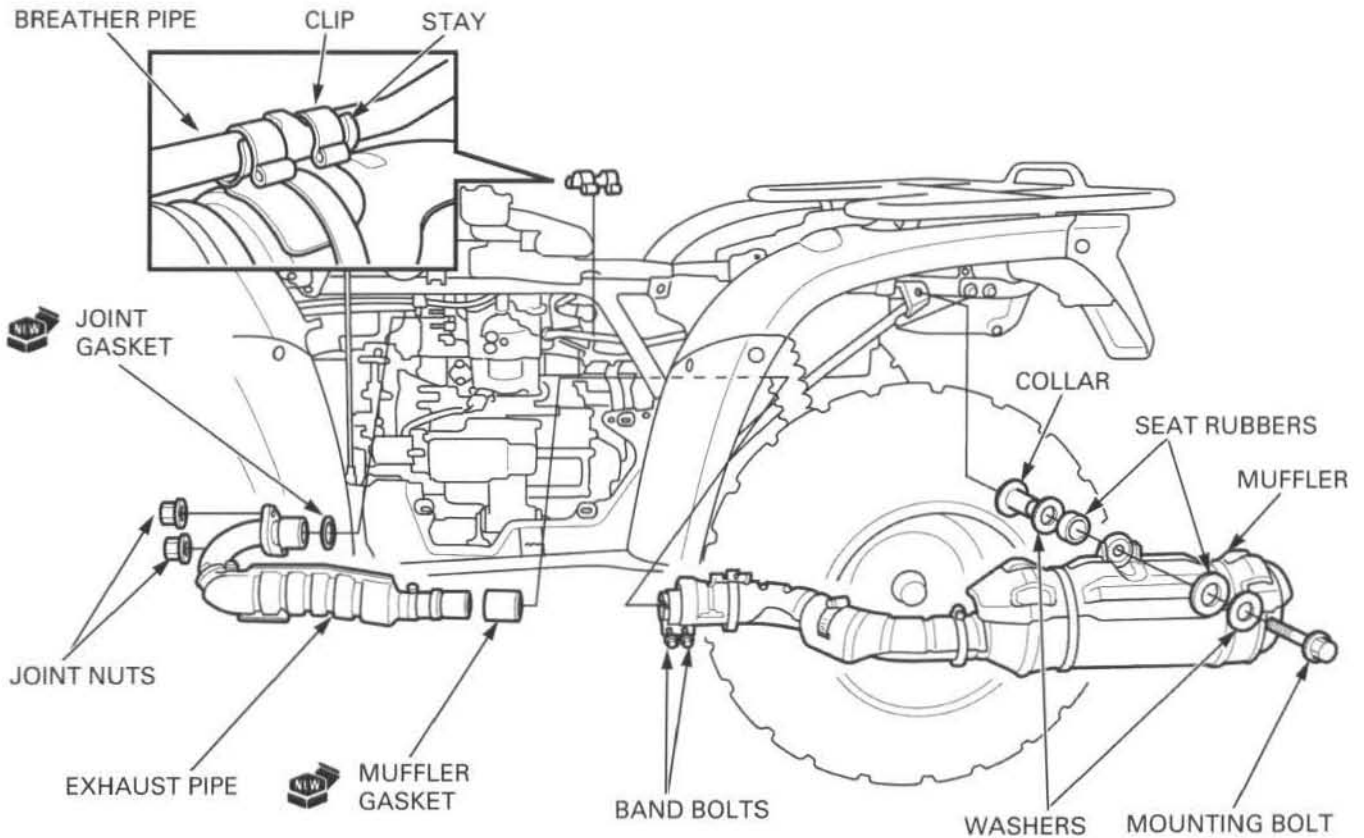


FRAME/BODY PANELS/EXHAUST SYSTEM

DISASSEMBLY/ASSEMBLY



INSTALLATION



Install the new joint gasket and muffler gasket.

Install the muffler and exhaust pipe in the reverse order of removal by loosely tightening all fasteners.

Tighten the joint nuts first, then tighten the mounting bolt and band bolts.

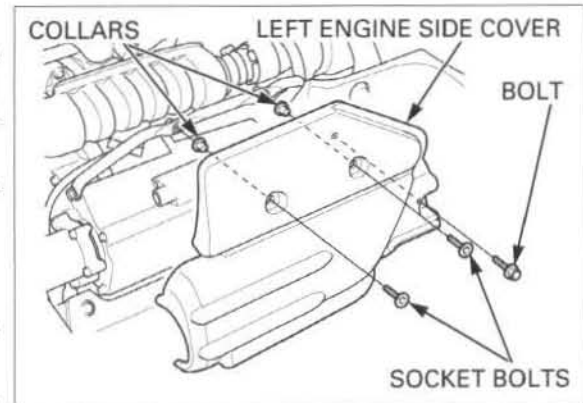
Set the breather pipe onto the stay and install the clip.

TORQUE:

Muffler band bolt: 23 N·m (2.3 kgf·m, 17 lbf·ft)

After installation, inspect the exhaust system for leaks.

Install the left engine cover and collars by tightening the bolt and socket bolts.



MEMO



SERVICE INFORMATION	3-2	REAR FINAL GEAR CASE OIL AND DIFFERENTIAL OIL	3-18
MAINTENANCE SCHEDULE	3-4	BRAKE FLUID	3-20
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SERVICE INFORMATION

GENERAL

- Place the vehicle on a level ground before starting any work.
- The exhaust contains poisonous carbon monoxide gas that may cause loss of consciousness and may lead to death. Run the engine in an open area or with an exhaust evacuation system in an enclosed area.

SPECIFICATIONS

ITEM		SPECIFICATIONS	
Throttle lever freeplay		3 – 8 mm (1/8 – 5/16 in)	
Spark plug	Standard	IJR7A9 (NGK), VX22BC (DENSO)	
	For cold climate (below 5° C/41° F)	IJR6A9 (NGK), VX20BC (DENSO)	
Spark plug gap		0.8 – 0.9 mm (0.03 – 0.04 in)	
Valve clearance	IN	0.15 mm (0.006 in)	
	EX	0.23 mm (0.009 in)	
Recommended engine oil		Pro Honda GN4 4-stroke oil or equivalent motor oil API service classification: SG or higher JASO T 903 standard: MA Viscosity: SAE 10W-30	
Engine oil capacity	After draining	4.4 liters (4.7 US qt, 3.9 Imp qt)	
	After draining/filter change	4.6 liters (4.9 US qt, 4.0 Imp qt)	
	After disassembly	5.2 liters (5.5 US qt, 4.6 Imp qt)	
Engine idle speed		1,400 ± 100 rpm (min ⁻¹)	
Recommended final gear case oil		Hypoid gear oil SAE #80	
Front differential oil capacity	At draining	185 cm ³ (6.3 US oz, 6.5 Imp oz)	
	At disassembly	230 cm ³ (7.8 US oz, 8.1 Imp oz)	
Recommended differential oil		Hypoid gear oil SAE #80	
Rear final gear oil capacity	At draining	75 cm ³ (2.5 US oz, 2.6 Imp oz)	
	At disassembly	100 cm ³ (3.4 US oz, 3.5 Imp oz)	
Recommended brake fluid		DOT 4 brake fluid	
Rear (parking) brake lever freeplay		15 – 20 mm (9/16 – 13/16 in)	
Rear brake pedal freeplay		15 – 20 mm (9/16 – 13/16 in)	
Cold tire pressure ('05 – '07)	Front	Standard	25 kPa (0.25 kgf/cm ² , 3.6 psi)
		Minimum	22 kPa (0.22 kgf/cm ² , 3.2 psi)
		Maximum	28 kPa (0.28 kgf/cm ² , 4.0 psi)
		With cargo	25 kPa (0.25 kgf/cm ² , 3.6 psi)
	Rear	Standard	25 kPa (0.25 kgf/cm ² , 3.6 psi)
		Minimum	22 kPa (0.22 kgf/cm ² , 3.2 psi)
		Maximum	28 kPa (0.28 kgf/cm ² , 4.0 psi)
		With cargo	25 kPa (0.25 kgf/cm ² , 3.6 psi)
Cold tire pressure (After '07 except EPS)	Front	25 kPa (0.25 kgf/cm ² , 3.6 psi)	
	Rear	25 kPa (0.25 kgf/cm ² , 3.6 psi)	
Cold tire pressure (EPS only)	Front	32.5 kPa (0.33 kgf/cm ² , 4.7 psi)	
	Rear	25 kPa (0.25 kgf/cm ² , 3.6 psi)	
Tire size	Front	AT25 x 8-12 ★ ★	
	Rear	AT25 x 10-12 ★ ★	
Tire brand	Front	KT 181 (DUNLOP)	
	Rear	KT 185 (DUNLOP)	
Minimum tire tread depth (Front/Rear)		4.0 mm (0.16 in)	
Toe		Toe-out: 30 ± 15 mm (1 - 3/16 ± 9/16 in)	

TORQUE VALUES

Spark plug	22 N·m (2.2 kgf·m, 16 lbf·ft)
Valve adjusting screw lock nut	17 N·m (1.7 kgf·m, 13 lbf·ft)
Timing hole cap	10 N·m (1.0 kgf·m, 7 lbf·ft)
Engine oil drain bolt (crankcase and oil tank)	25 N·m (2.5 kgf·m, 18 lbf·ft)
Engine oil filter center bolt	18 N·m (1.8 kgf·m, 13 lbf·ft)
Front differential oil filler cap	12 N·m (1.2 kgf·m, 9 lbf·ft)
Front differential oil drain bolt	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)
Tie-rod lock nut	54 N·m (5.5 kgf·m, 40 lbf·ft)
Spark arrester bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)
Front master cylinder reservoir cap screw	2 N·m (0.2 kgf·m, 1.4 lbf·ft)

Steering shaft side is left handed thread

MAINTENANCE

MAINTENANCE SCHEDULE

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

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

ITEMS	FREQUENCY	WHICHEVER COMES FIRST ↓	↔	INITIAL MAINTENANCE	REGULAR MAINTENANCE INTERVAL		REFER TO PAGE
				mi	600	1,200	
				km	1,000	2,000	
				HOURS	100	200	
* FUEL LINE					I		3-5
* THROTTLE OPERATION					I		3-5
* CARBURETOR CHOKE					I		3-6
AIR CLEANER		NOTE 1			C	C	3-6
AIR CLEANER HOUSING DRAIN HOSE		NOTE 2			I	I	3-8
SPARK PLUG					I	I	3-9
* VALVE CLEARANCE				I	I	I	3-10
ENGINE OIL		'05		R	R	R	3-12
		After '05	INITIAL = 100 mi (150 km), 20 operating hours or 1 month: R REGULAR = every 600 mi (1,000 km), 100 operating hours or 12 months: R				
ENGINE OIL FILTER				R	R	R	3-15
* ENGINE IDLE SPEED				I	I	I	3-15
RADIATOR COOLANT		NOTE 3			I	I	3-16
* COOLING SYSTEM		NOTE 2			I	I	3-16
DRIVE SHAFT BOOTS					I	I	3-17
REAR FINAL GEAR CASE OIL AND DIFFERENTIAL OIL					(R: Every 2 years)	I	3-18
* BRAKE FLUID		NOTE 3			I	I	3-20
* BRAKE SHOES WEAR		NOTE 1				I	3-21
* BRAKE PADS WEAR		NOTE 1, 2				I	3-21
* BRAKE LIGHT SWITCH				I	I	I	3-21
BRAKE SYSTEM				I	I	I	3-22
SKID PLATE, ENGINE GUARD					I	I	3-23
* SUSPENSION					I	I	3-23
* SPARK ARRESTER					C	C	3-24
* NUTS, BOLTS, FASTENERS				I		I	3-25
** WHEELS/TIRES				I	I	I	3-25
** TIE-ROD AND JOINT BOOTS		After '07		I	I	I	3-25
** STEERING SHAFT HOLDER BEARING						I	3-26
** STEERING SYSTEM						I	3-26

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

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

NOTES:

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

FUEL LINE

- Remove the seat (page 2-4).
- Remove the fuel tank cover (page 2-6).
- Turn over the rubber seat.
- Check the fuel line for deterioration, damage or leakage.
- Replace the fuel line if necessary.



THROTTLE OPERATION

- Check for any deterioration or damage to the throttle cable. Check the throttle lever for smooth operation.
- Check 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.

For cable lubrication: Disconnect the throttle cable at its upper end. Thoroughly lubricate the cable and its pivot point with a commercially available cable lubricant or a light weight oil.

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 freeplay and the throttle cable connection.

Measure the throttle lever freeplay at the tip of the throttle lever.

THROTTLE LEVER FREEPLAY:

3 – 8 mm (1/8 – 5/16 in)

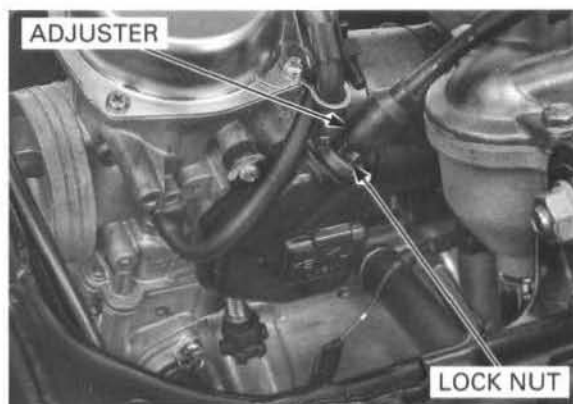
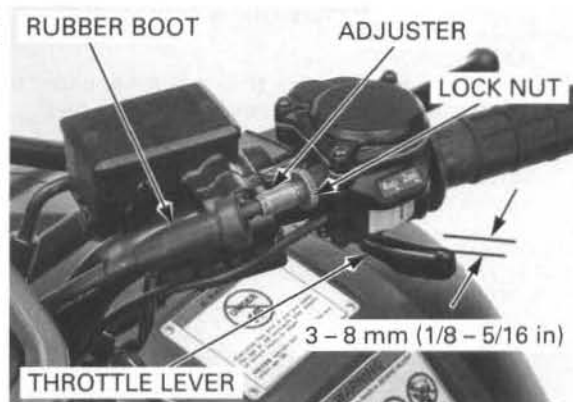
Throttle lever freeplay can be adjusted at either end of the throttle cable. Minor adjustments are made with the upper adjuster.

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

Major adjustments are made with the lower adjuster.

Remove the seat (page 2-4). Slide the rubber boot off the adjuster. Loosen the lock nut, turn the adjuster as required and tighten the lock nut.

Recheck the throttle operation and install the seat (page 2-4).

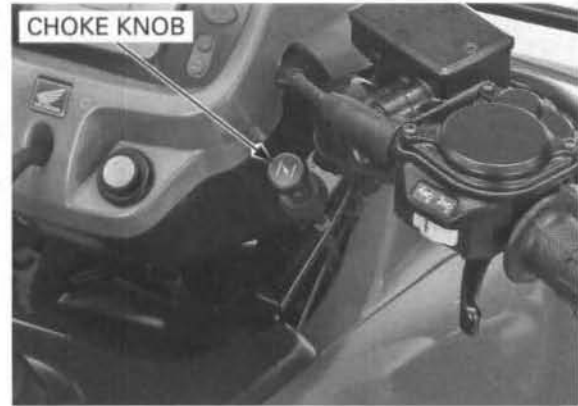


MAINTENANCE

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 is pulled up.

Check for smooth choke knob operation and lubricate the choke cable if required. Check the choke cable for fraying, kinking or other damage.

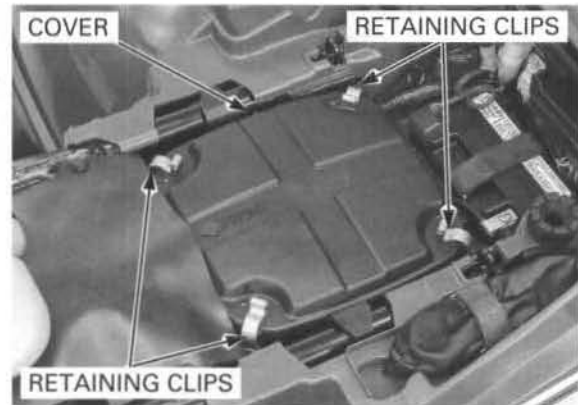


AIR CLEANER

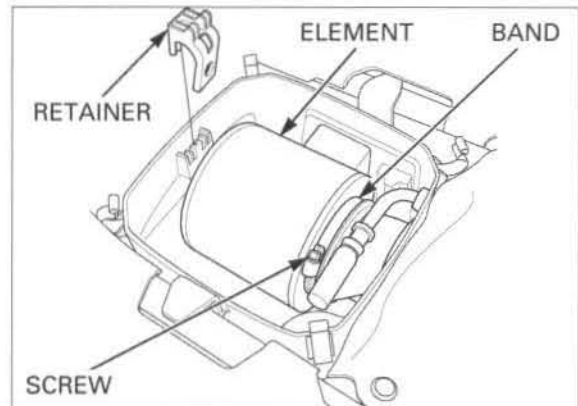
Remove the seat (page 2-4).

If the vehicle is used in dusty areas, sand or snow, more frequent inspections are required.

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

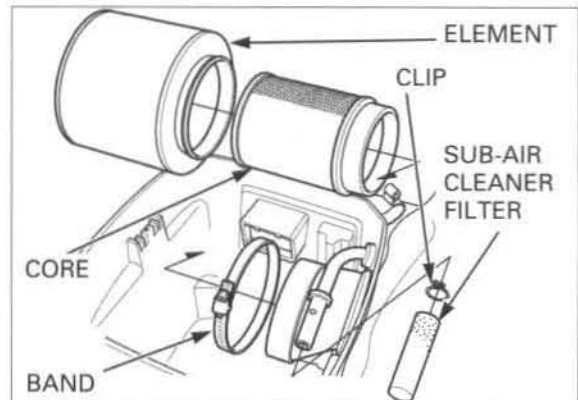


Remove the air cleaner element retainer. Loosen the air cleaner element band screw. Remove the air cleaner element assembly from the housing.



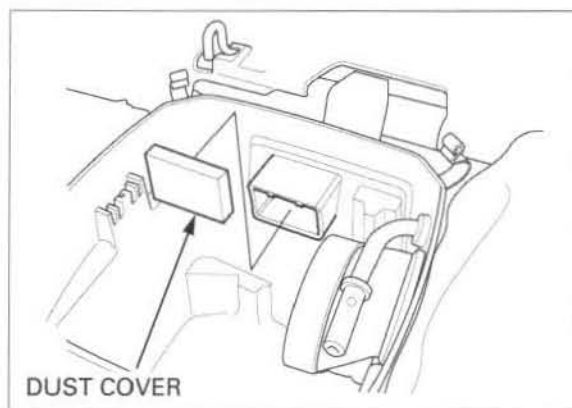
Remove the air cleaner element band and element core from the element.

Remove the clip and sub-air cleaner filter.



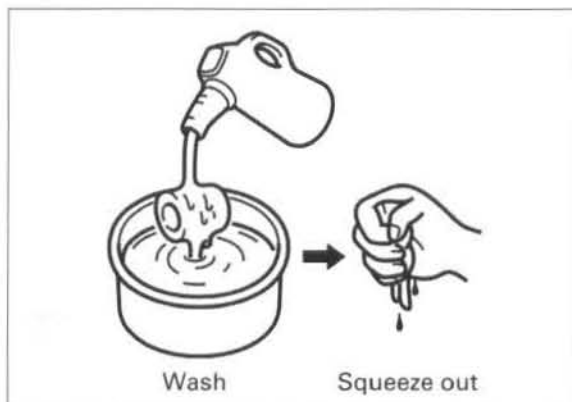
Remove the dust cover and clean it with compressed air if it is dirty.

Install the dust cover in position.



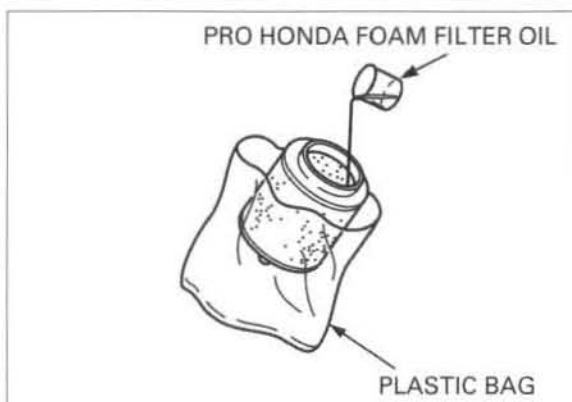
Wash the element and filter in non-flammable or high flash point solvent.

Squeeze out the solvent thoroughly, and allow the element and filter to dry.



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.

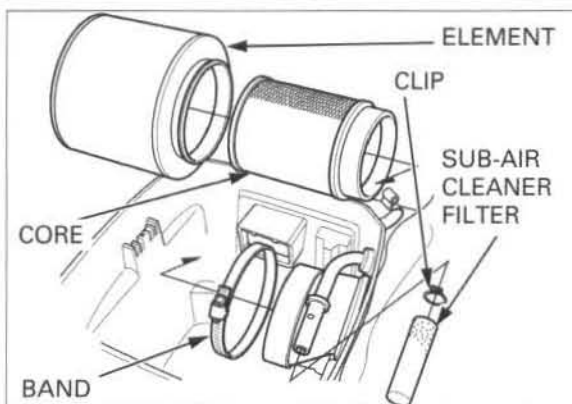


Install the clip and sub-air cleaner filter.

Install the element core into the air cleaner element properly.

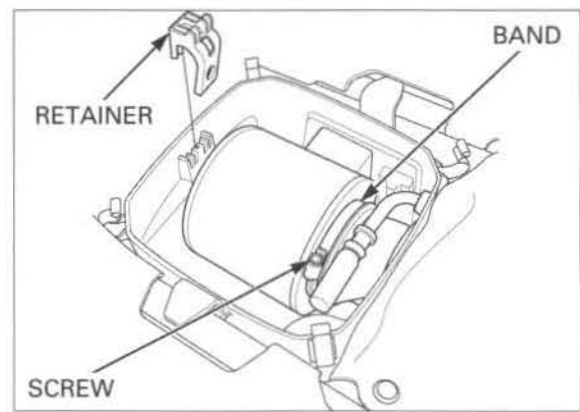
Install the element band onto the air cleaner element and the element assembly over the connecting hose.

Failure to properly tighten the band screw will allow the air cleaner element to fall off and engine damage could result.



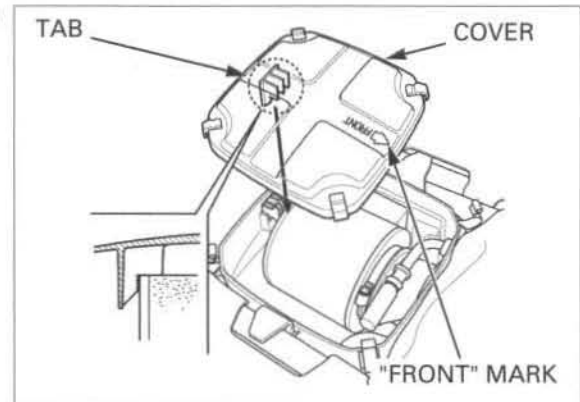
MAINTENANCE

Tighten the air cleaner element band screw.
Install the air cleaner element retainer.



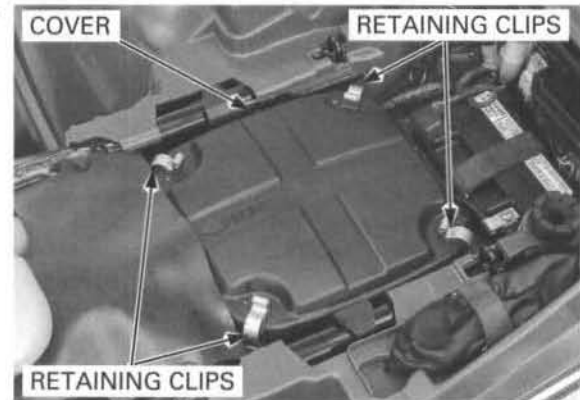
The "FRONT" mark of the cover should be faced to forward.

Install the air cleaner housing cover while aligning its tab with the air cleaner element end.



Secure the air cleaner housing cover with the retaining clips.

Install the seat (page 2-4).

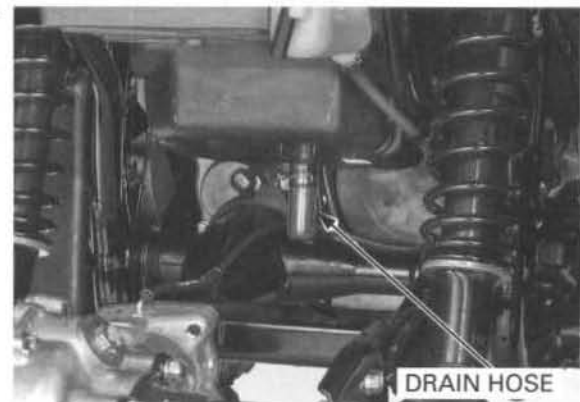


AIR CLEANER HOUSING DRAIN HOSE

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

If the vehicle is used in very wet or muddy conditions, more frequent inspections are required.

Install the drain hose.



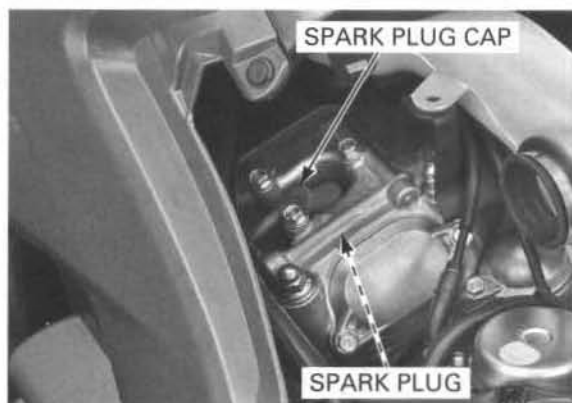
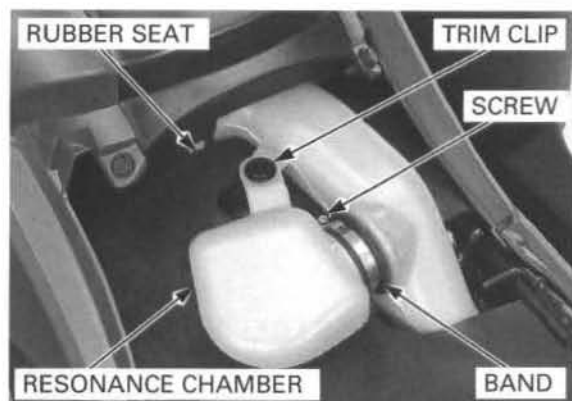
SPARK PLUG

REMOVAL

Remove the seat (page 2-4).

Loosen the band screw and remove the trim clip and resonance chamber.

Roll up the rubber seat.



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

Disconnect the spark plug cap and clean around the spark plug base with compressed air.

Remove the spark plug and inspect or replace as described in the maintenance schedule (page 3-4).

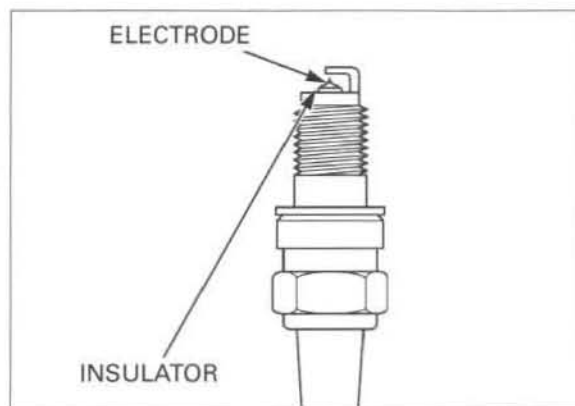
INSPECTION

Check the following and replace if necessary (recommended spark plug: page 3-2)

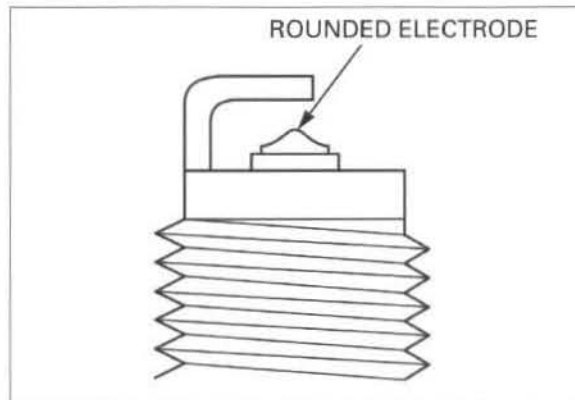
- Insulator for damage
- Electrodes for wear
- Burning condition, coloration

This motorcycle's spark plug has an iridium center electrode. Replace the spark plug if the electrode is contaminated.

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



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



Always use specified spark plugs on this motorcycle.

SPECIFIED SPARK PLUG:

Standard: IJR7A9 (NGK), VX22BC (DENSO)

For cold climate (below 5° C/41° F):

IJR6A9 (NGK), VX20BC (DENSO)

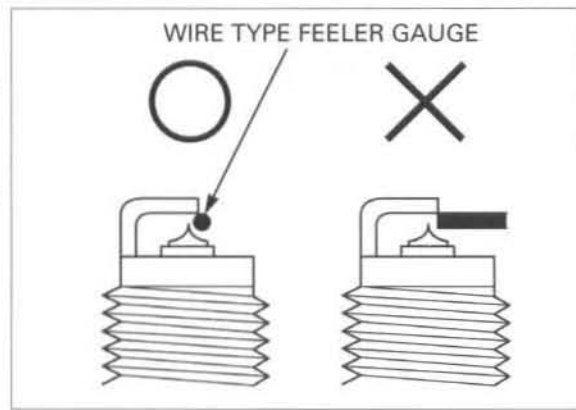
MAINTENANCE

To prevent damaging the iridium center electrode, use a wire type feeler gauge to check the spark plug gap. Do not adjust the spark plug gap. If the gap is out of specification, replace it with a new one.

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

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

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



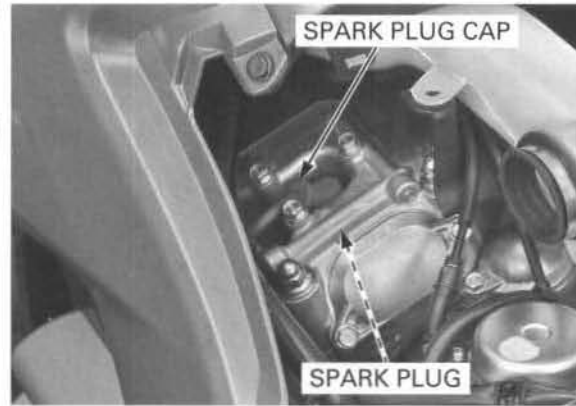
INSTALLATION

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

Install 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)

Install the removed parts in the reverse order of removal.



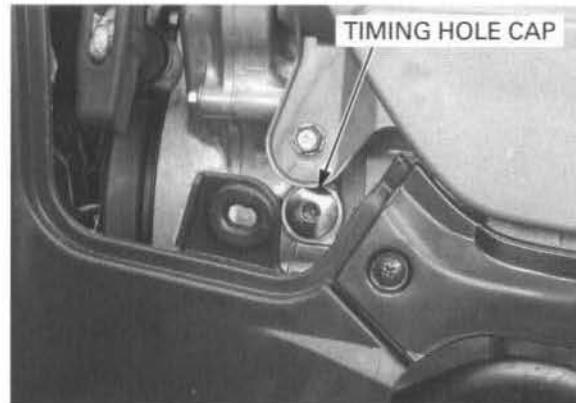
VALVE CLEARANCE

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

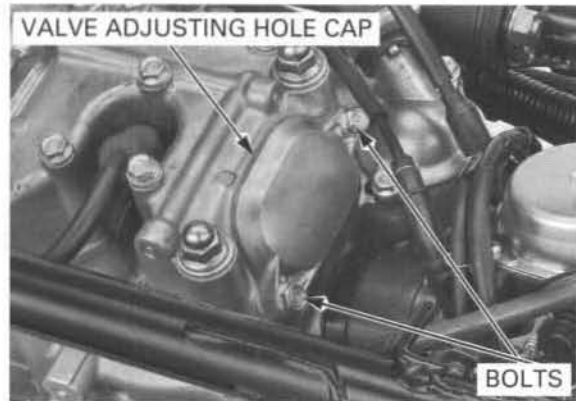
Remove recoil starter cover (page 2-4).

Remove the fuel tank heat guard (page 8-6).

Remove the timing hole cap.



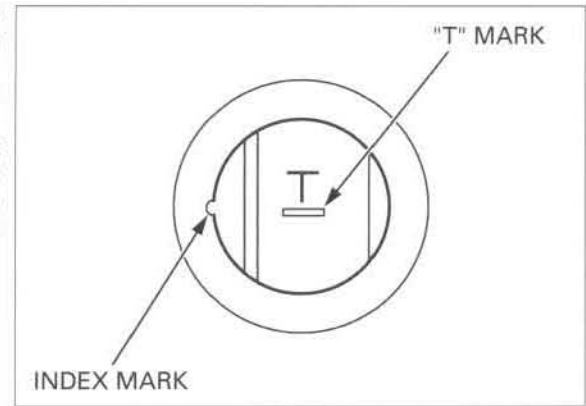
Remove the bolts, intake and exhaust valve adjusting hole caps.



Rotate the crankshaft using the recoil starter knob and align the "T" mark on the flywheel with the index mark on the alternator 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 the rocker arm. If there is no slack, it is because the piston is moving through the exhaust stroke to TDC. Rotate the crankshaft one full turn and match up the "T" mark again.



When checking the clearance, slide the feeler gauge from the center toward the outside.

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

VALVE CLEARANCES:

IN: 0.15 mm (0.006 in)

EX: 0.23 mm (0.009 in)

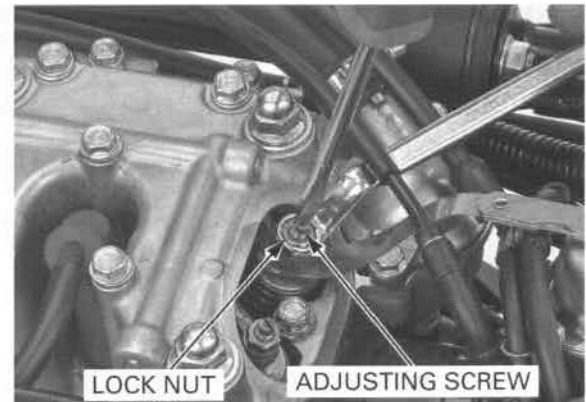


Adjust by loosening the lock nut and turning the adjusting screw until there is a slight drag on the feeler gauge.

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

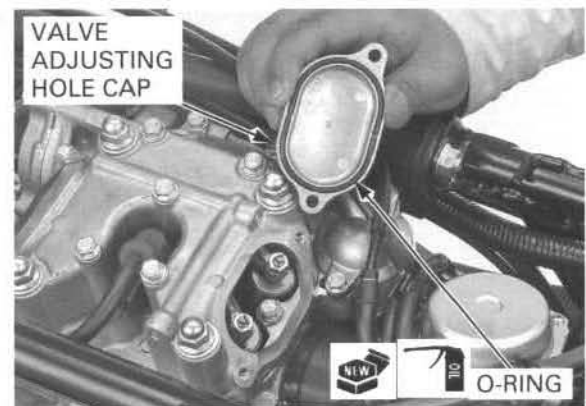
TORQUE: 17 N·m (1.7 kgf·m, 13 lbf·ft)

After tightening the lock nut, recheck the valve clearance.



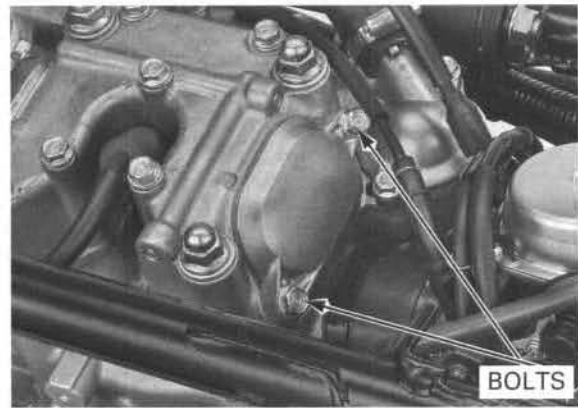
Coat new O-rings with engine oil and install them into the grooves in the tappet adjusting hole caps.

install the tappet adjusting hole caps.



MAINTENANCE

Install and tighten the bolts to the specified torque.



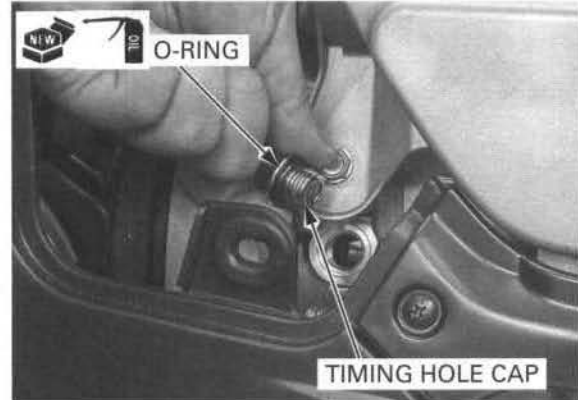
Coat a new O-ring with engine oil and install it onto the timing hole cap.

Install the timing hole cap and tighten it to the specified torque.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

Install the fuel tank heat guard (page 8-6).

Install the recoil starter cover (page 2-4).



ENGINE OIL

LEVEL CHECK

- Check the oil level after starting the engine and allowing the oil to circulate through the engine thoroughly. It is especially important on a dry sump engine, due to the comparatively large volume of oil.
- Do not snap the throttle while idling or the oil level reading will be inaccurate.
- Before checking the oil level, remove the dipstick and wipe it clean, insert the dipstick without screwing it in, then remove the dipstick and check the oil level at the tip mark.

Place the vehicle on a 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).

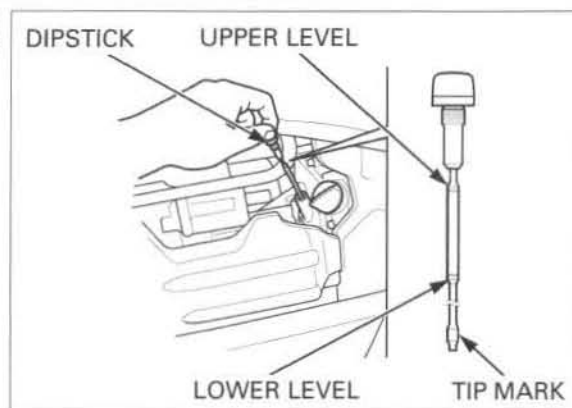
Stop the engine and wait 2 - 3 minutes.

Remove the dipstick and wipe it clean.

Check the oil level by inserting the dipstick into the oil tank without screwing it in.



The oil tank 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, remove the oil filler cap and add the recommended engine oil up to the upper level mark.

RECOMMENDED ENGINE OIL:

Pro Honda GN4 4-stroke oil or equivalent motor oil

API service classification: SG or higher

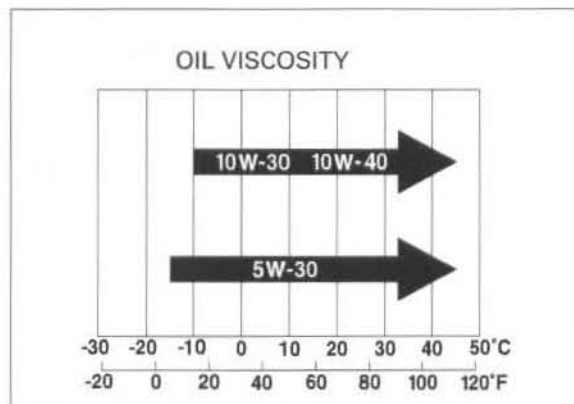
JASO T 903 standard: MA

Viscosity: SAE 10W-30



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 and dipstick.



Oil level check when engine is running

NOTE:

- The oil pump adjusts the oil level so that the oil tank is always kept at the proper level. If this check shows otherwise, some portion of the lubrication system is not working properly.
- Do not check the oil level immediately after the engine has been operated at high speeds. Make sure that vehicle is on firm level ground while idling. Allow the engine to idle for few minutes to stabilize the oil levels.

The oil level is correct if the oil is above the stepped end line of the dipstick.

OIL CHANGE

NOTE:

- Pour the engine oil after replacing the oil filter (page 3-15).
- Change the oil with the engine warm to assure complete and rapid draining.

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

Remove the oil drain bolt and drain the engine oil.

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

TORQUE: 25 N·m (2.5 kgf·m, 18 lbf·ft)



Pour the recommended engine oil (page 3-13) into the oil tank up to the upper level mark on the dipstick.

ENGINE OIL CAPACITY:

- 4.4 liters (4.7 US qt, 3.9 Imp qt) after draining
- 4.6 liters (4.9 US qt, 4.0 Imp qt) after draining/filter change
- 5.2 liters (5.5 US qt, 4.6 Imp qt) after disassembly

Install the oil filler cap.

Check the oil level (page 3-12).

After oil change, be sure to reset the maintenance indicator (See Owner's manual)

Make sure there are no oil leakage.



ENGINE OIL FILTER

Drain the engine oil (page 3-14).

Remove the engine guard (page 2-5).

Remove the oil filter center bolt, cover, spring, washer and oil filter.

Remove the O-rings from the oil filter cover and center bolt.

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

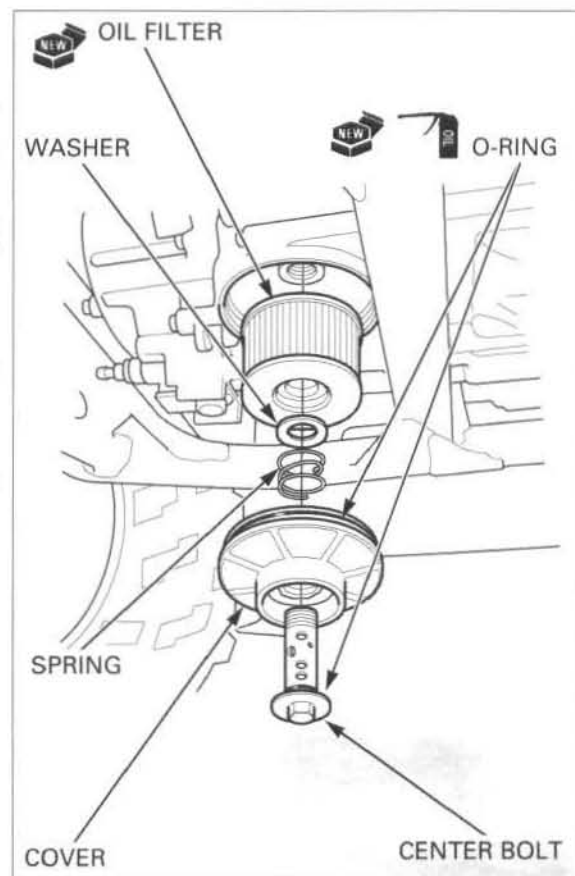
Install a new oil filter.

Install the washer, spring, cover and center bolt.

Tighten the center bolt while holding the oil filter cover by hand.

TORQUE: 18 N·m (1.8 kgf·m, 13 lbf·ft)

Fill the oil tank with the recommended engine oil (page 3-14).



ENGINE IDLE SPEED

- Inspect and adjust 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.

Connect a tachometer.

Warm up the engine, shift the transmission into neutral and place the vehicle on a level surface.

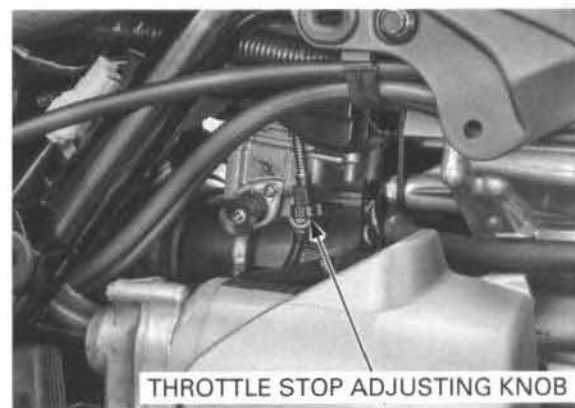
Check the idle speed.

IDLE SPEED: 1,400 ± 100 rpm (min⁻¹)

If the adjustment is necessary, remove the recoil starter cover (page 2-4).

Adjust the idle speed by turning the throttle stop adjusting knob as required.

Remove the tachometer and install the removed parts.



RADIATOR COOLANT

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

If the level is low, remove the reserve tank cap, and fill the tank to the "UPPER" level line with a 1:1 mixture of distilled water and antifreeze (coolant preparation: page 6-5).

RECOMMENDED ANTIFREEZE:

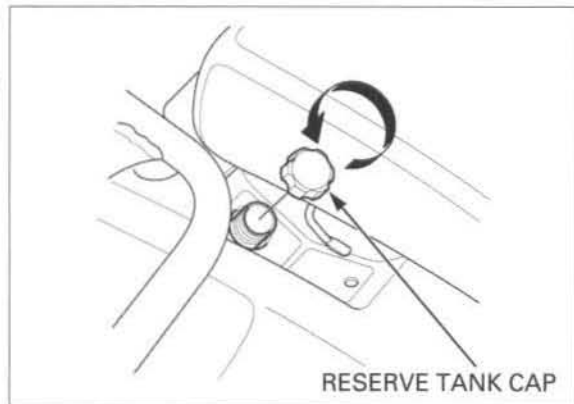
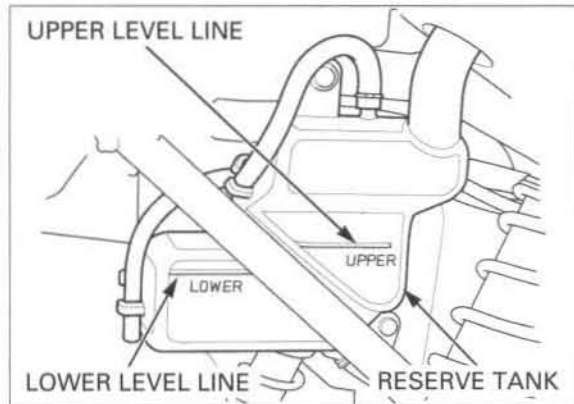
Pro Honda HP coolant or an equivalent high quality ethylene glycol antifreeze containing silicate-free corrosion inhibitors

NOTICE

Using coolant with silicate corrosion inhibitors may cause premature wear of water pump seals or blockage of radiator passages. Using tap water may cause engine damage.

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

If reserve tank becomes completely empty, there is a possibility of air getting into the cooling system. Be sure to remove all air from the cooling system (page 6-6).



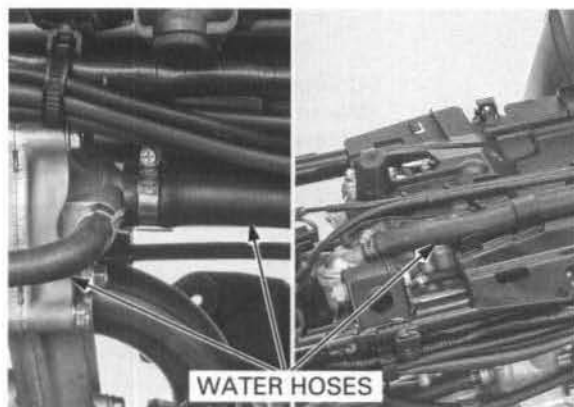
COOLING SYSTEM

Remove the front fender (page 2-11).

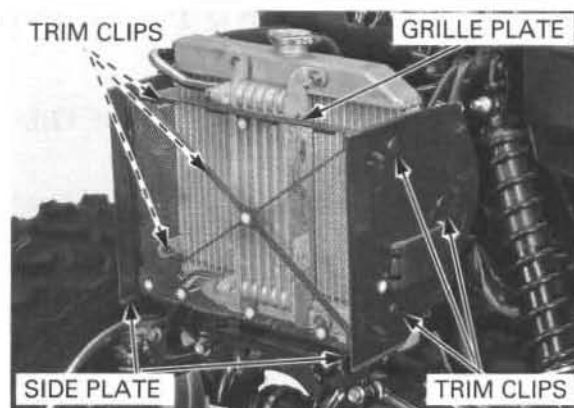
Check for any coolant leakage from the water pump, water hoses (radiator and by-pass hoses) and hose joints.

Check the water hoses for cracks or deterioration and replace if necessary.

Check that all hose clamps are tight.



Remove the trim clips, radiator side plates and radiator grille plate.



Check the radiator 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 or low pressure water. Replace the radiator if the air flow is restricted over more than 20% of the radiating surface.

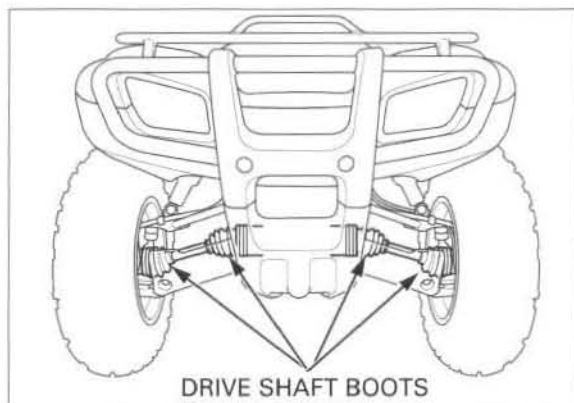
Installation is in the reverse order of removal. Install the front fender (page 2-11).



DRIVE SHAFT BOOTS

Check the drive shaft boots for cuts or other damage.

If the boot is damaged, replace it (page 17-7).



MAINTENANCE

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 sealing washer, check that the oil flows out of the check bolt hole.

Check for leakage if there is no oil flow.



Remove the oil filler cap and pour the oil slowly through the filler hole until the 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 to the specified torque.

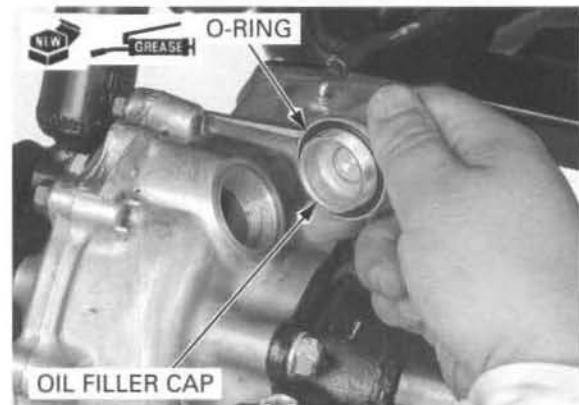
TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)



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

Install the oil filler cap and tighten it to the specified torque.

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.

Tighten the drain bolt to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Fill the final gear case with the recommended oil (page 3-18).

OIL CAPACITY:

75 cm³ (2.5 US oz, 2.6 Imp oz) at draining

100 cm³ (3.4 US oz, 3.5 Imp oz) at disassembly

Install the oil filler cap with a new O-ring (page 3-18).

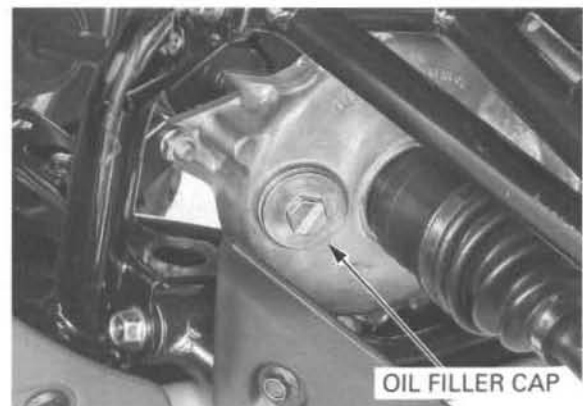


DIFFERENTIAL OIL

LEVEL CHECK

Place the vehicle on a level surface.

Remove the oil filler cap.



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.

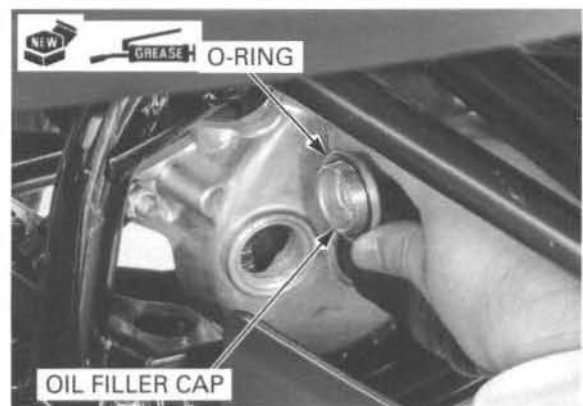
Pour the oil through the filler hole until it reaches the lower edge of the hole.

RECOMMENDED OIL: Hypoid gear oil SAE #80

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

Install the oil filler cap and tighten it to the specified torque.

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.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

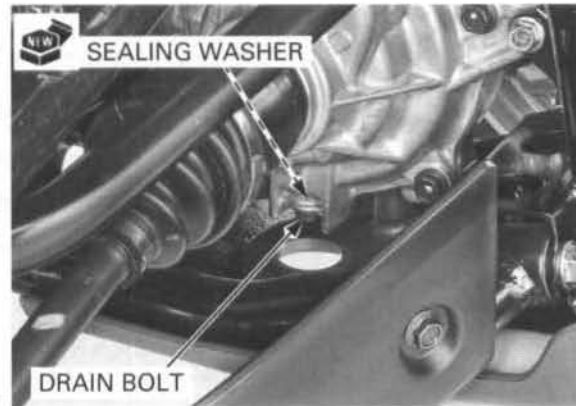
Fill the differential case with the recommended oil (page 3-19).

OIL CAPACITY:

185 cm³ (6.3 US oz, 6.5 Imp oz) at draining

230 cm³ (7.8 US oz, 8.1 Imp oz) at disassembly

Install the oil filler cap with a new O-ring (page 3-19).



BRAKE FLUID

- Do not mix different types of fluid, as they are not compatible with each other.
- Do not allow foreign material to enter the system when filling the reservoir.

NOTICE

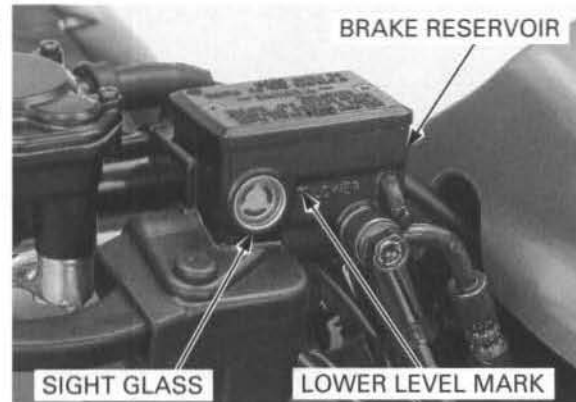
Spilled fluid can damage painted, plastic or rubber parts. Place a rag over these parts whenever the system is serviced.

FRONT BRAKE

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

If the level is near the "LOWER" level mark, check the brake pads wear (page 3-21).

Check the brake system for leakage (page 3-22).



If they are OK and the fluid level is near the "LOWER" level mark, remove the screws, 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.

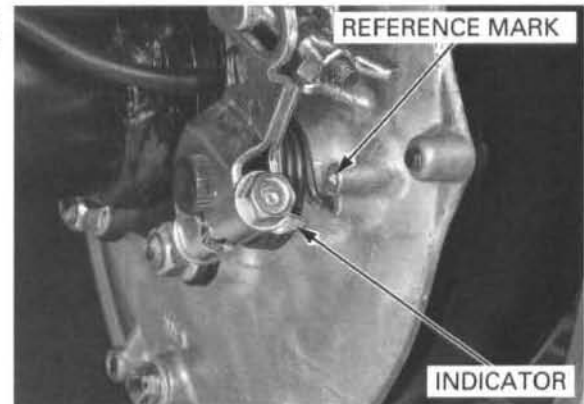
TORQUE: 2 N·m (0.2 kgf·m, 1.4 lbf·ft)



BRAKE SHOES WEAR

INSPECTION

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

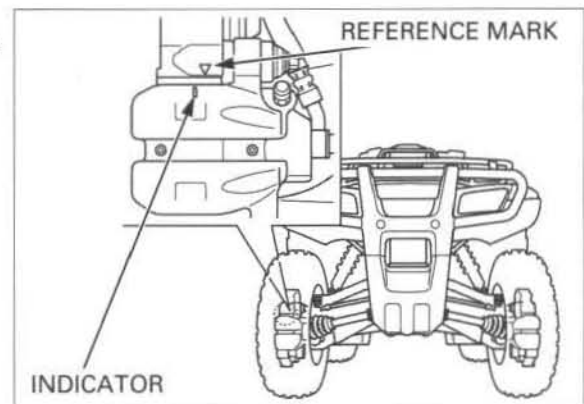


BRAKE PADS WEAR

INSPECTION

Check the brake pads for wear. Replace the brake pads if the indicator aligns with reference mark.

Refer to page 16-13 for brake pads replacement.



BRAKE LIGHT SWITCH

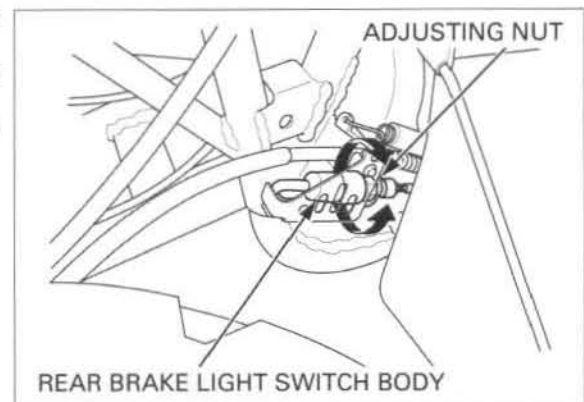
INSPECTION

- Adjust the rear brake light switch after adjusting the brake pedal freeplay.
- The front brake light switch can not be adjusted.

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

Inspect the brake hoses, pipes and fittings for deterioration, cracks and signs of leakage. Tighten any loose fittings.



BRAKE HOSE

Replace hoses and fittings as required.



BRAKE HOSE

REAR BRAKE

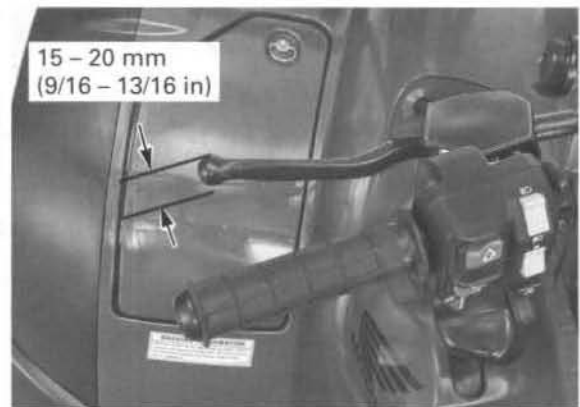
BRAKE LEVER

Check the 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 cables at the brake lever or pedal ends. Thoroughly lubricate the cables and their pivot points with commercially available cable lubricant.

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

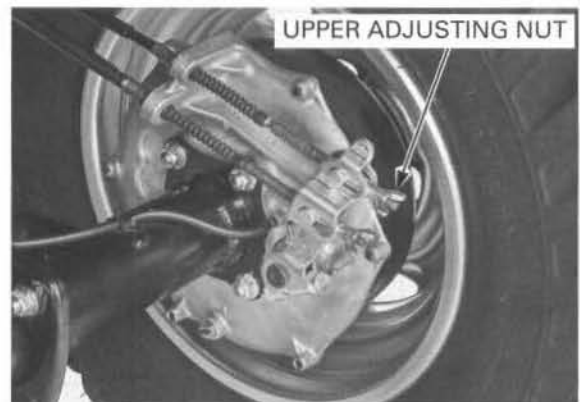
FREEPLAY: 15 – 20 mm (9/16 – 13/16 in)



15 – 20 mm
(9/16 – 13/16 in)

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

Adjustments should be made with the upper adjusting nut at the rear brake arm.



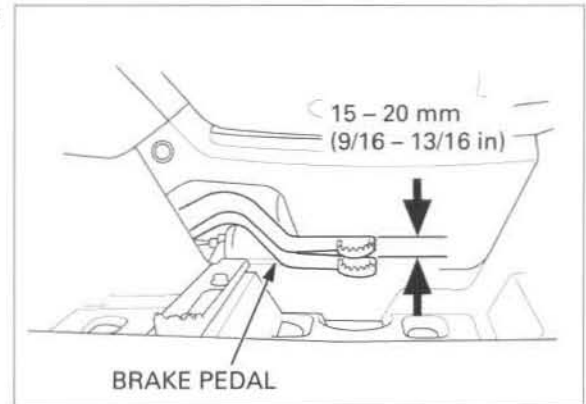
UPPER ADJUSTING NUT

BRAKE PEDAL

Measure the brake pedal freeplay at the end of the brake pedal and adjust as required.

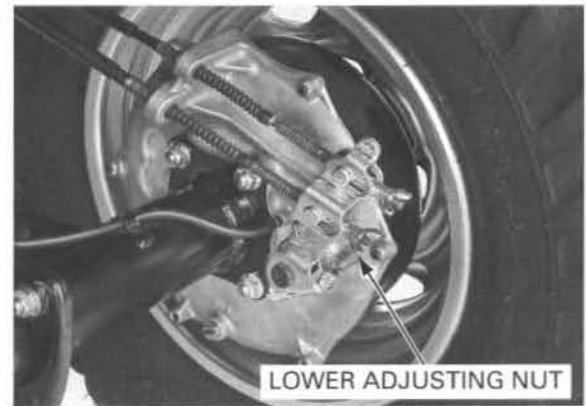
BRAKEPEDAL FREEPLAY:

15 – 20 mm (9/16 – 13/16 in)



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

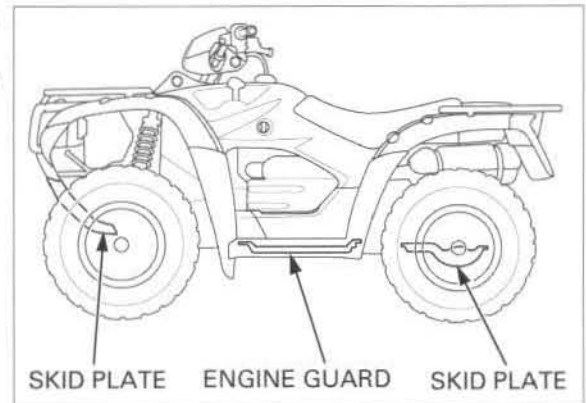
Adjust the rear brake pedal freeplay by turning the lower adjusting nut at the rear brake arm.



SKID PLATE, ENGINE GUARD

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

Tighten any loose fasteners. Replace the skid plates and engine guard as required.



SUSPENSION

FRONT SUSPENSION INSPECTION

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.



MAINTENANCE

REAR SUSPENSION INSPECTION

Replace damaged components which cannot be repaired.

Tighten all nuts and bolts.

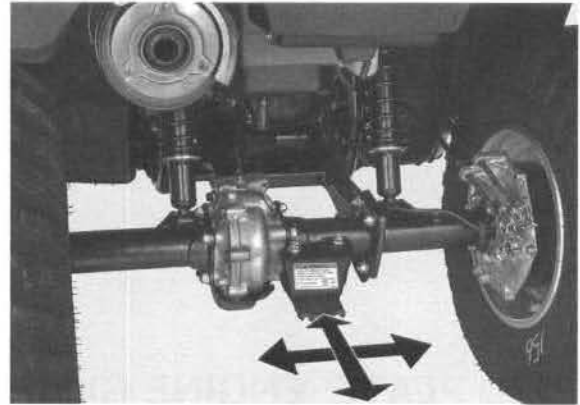


SWINGARM BEARINGS INSPECTION

Raise the rear wheels off the ground by placing a jack or block under the engine.

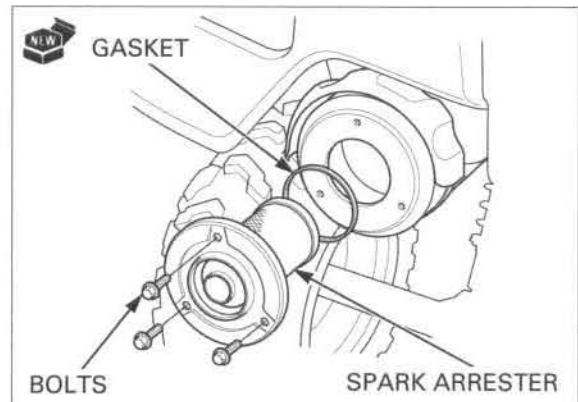
Check for worn swingarm pivot bearings by grabbing the rear axle housings and attempting to move the swingarm side to side.

Replace the pivot bearings if any looseness is noted (page 15-9).



SPARK ARRESTER

Remove the three bolts and the spark arrester with the gasket.

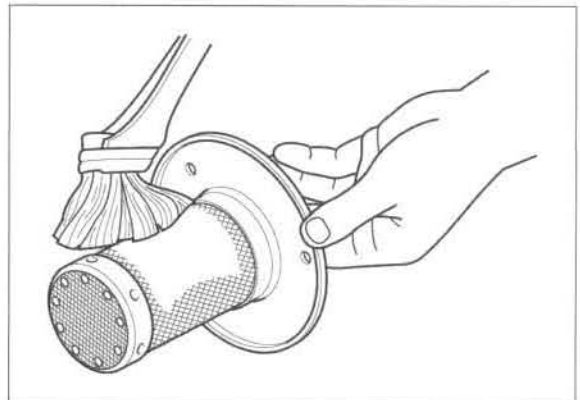


Use a brush to remove carbon deposits from the screen mesh, being careful not to damage the screen mesh.

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 1-15).

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 the tire pressure gauge.

RECOMMENDED TIRE PRESSURE ('05 - '07):

Front: Standard: 25 kPa (0.25 kgf/cm², 3.6 psi)
 Minimum: 22 kPa (0.22 kgf/cm², 3.2 psi)
 Maximum: 28 kPa (0.28 kgf/cm², 4.0 psi)
 With cargo: 25 kPa (0.25 kgf/cm², 3.6 psi)
Rear: Standard: 25 kPa (0.25 kgf/cm², 3.6 psi)
 Minimum: 22 kPa (0.22 kgf/cm², 3.2 psi)
 Maximum: 28 kPa (0.28 kgf/cm², 4.0 psi)
 With cargo: 25 kPa (0.25 kgf/cm², 3.6 psi)

RECOMMENDED TIRE PRESSURE

(After '07 except EPS):

Front: 25 kPa (0.25 kgf/cm², 3.6 psi)
Rear: 25 kPa (0.25 kgf/cm², 3.6 psi)

RECOMMENDED TIRE PRESSURE (EPS only):

Front: 32.5 kPa (0.33 kgf/cm², 4.7 psi)
Rear: 25 kPa (0.25 kgf/cm², 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 limit.

MINIMUM TREAD DEPTH (Front/rear):

4.0 mm (0.16 in)

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



TIE-ROD AND JOINT BOOTS (After '07)

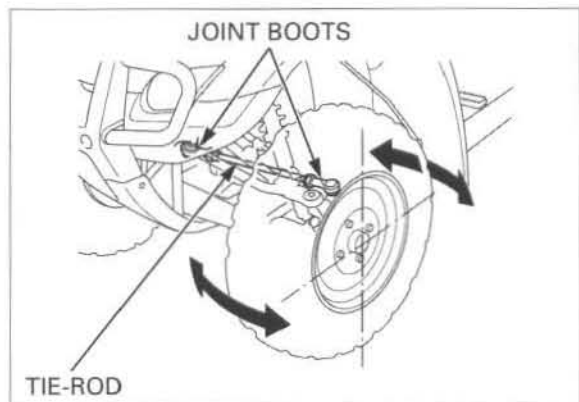
Check the tie-rod joint nuts for looseness.

Check the ball joint boots of the tie-rod for tears or other damage.

Check for looseness of the tie-rod ball joints or bearings by grabbing each front wheel side to side with the wheels on the ground.

If any looseness is noted, inspect the following.

- Tie-rod (page 14-42)
- Hub or knuckle bearing (page 14-23)



MAINTENANCE

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.

Check that the handlebar moves freely from side to side.

If the handlebar moves unevenly, binds, or has horizontal movement, inspect the steering shaft holder bushing and bearing (page 14-28).

EPS model only:

Remove the floor jack or other safety support tool. Compare the required steering force with the engine running and with the engine stopped. If the required steering force is the same, check the EPS system (page 25-8).

If the handlebar moves unevenly, binds, or has horizontal or vertical movement, inspect the steering shaft holder bushing and bearing (page 14-28).

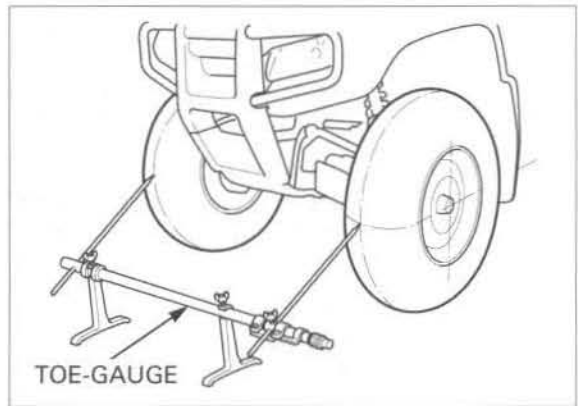


STEERING SYSTEM

Place the vehicle on a 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.

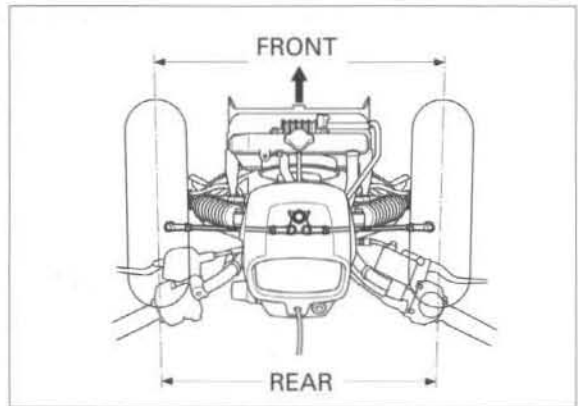


Slowly move the vehicle back until the wheels have turned 180° so the marks on the tires are aligned with the gauge height on the rear side.

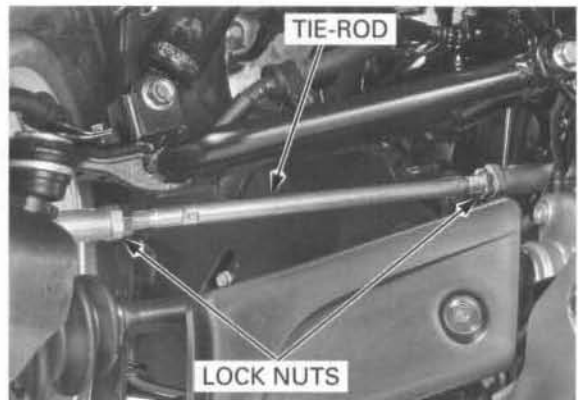
Measure the toe on the rear part of the tires at the same points with no load on the vehicle.

Toe-out: 30 ± 15 mm ($1 - 3/16 \pm 9/16$ in)

- 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.

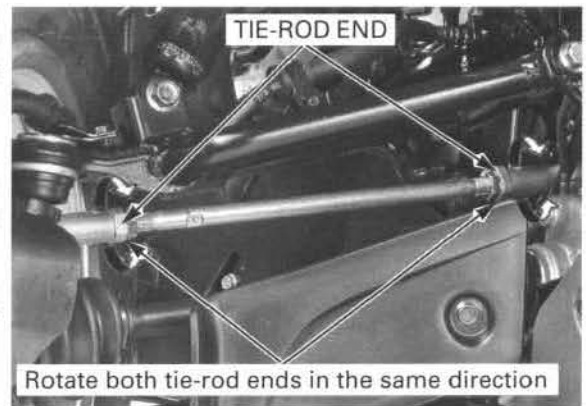


'05 - '06: After adjusting each tie-rod, rotate both ball joints in the same direction with the tie-rod axis until they stop against the ball joint stud. Hold them in that position and tighten the tie-rod lock nuts.

TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)

After 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.

Raise the wheel off the ground and check the hub, knuckle bearings, and tie-rod ball joints for excessive play or abnormal noise.

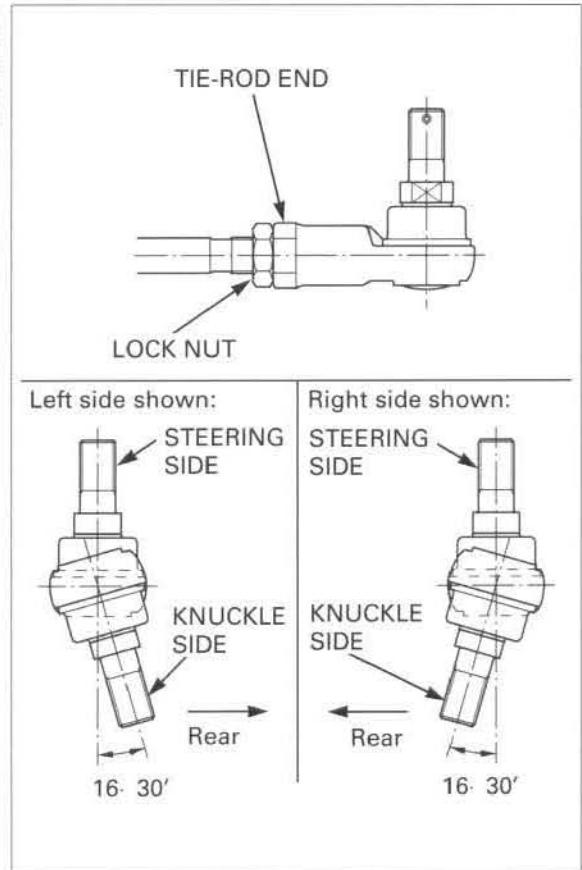


After '06: Using a 22 mm wrench, hold the tie-rod ends so that the relative angle of both tie-rods may turn into 16 degrees 30 minutes. Then, using a suitable torque wrench, tighten the tie-rod lock nuts, making sure not to force the tie-rod ends against the ball joint studs.

TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)

After tightening the lock nuts, rotate the tie-rods to make sure the ball joints have operate properly and have an equal range of movement.

Raise the wheel off the ground and check the hub, knuckle bearings or tie-rod ball joints for excessive play or abnormal noise.



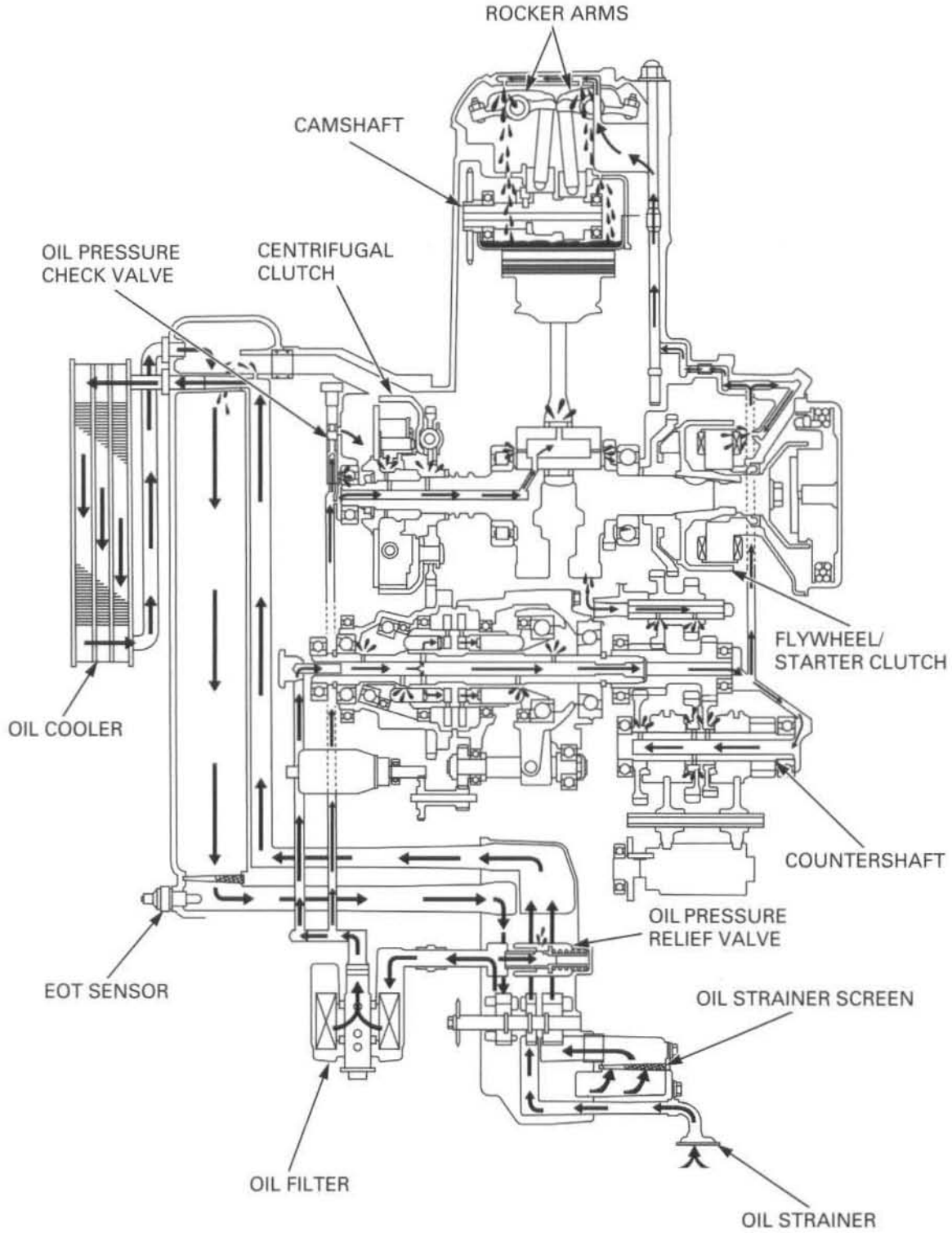
MEMO



4. LUBRICATION SYSTEM

LUBRICATION SYSTEM DIAGRAM	4-2	OIL COOLER	4-7
SERVICE INFORMATION	4-3	OIL STRAINER	4-8
TROUBLESHOOTING	4-5	OIL PUMP	4-12
OIL PRESSURE CHECK	4-6		

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 and oil cooler.
- For oil level check, oil change and filter replacement, refer to page 3-12.
- The service procedures in this section can be performed with the engine oil drained.
- 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 oil pump, oil cooler and/or oil hoses have been installed, check that there are no oil leaks and that oil pressure is correct.

SPECIFICATIONS

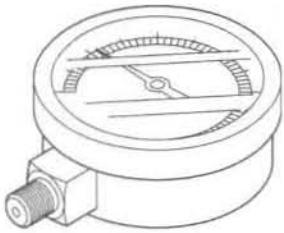
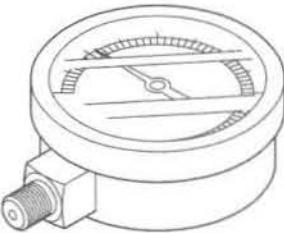



ITEM		STANDARD	Unit: mm (in)
			SERVICE LIMIT
Engine oil capacity	After draining	4.4 liters (4.7 US qt, 3.9 Imp qt)	–
	After draining/filter change	4.6 liters (4.9 US qt, 4.0 Imp qt)	–
	After disassembly	5.2 liters (5.5 US qt, 4.6 Imp qt)	–
Recommended engine oil		Pro Honda GN4 4-stroke oil or equivalent motor oil API service classification: SG or Higher JASO T 903 standard: MA Viscosity: SAE 10W-30	–
Oil pressure 80° C (176° F)	At 1,400 rpm (min ⁻¹)	Above 150 kPa (1.5 kgf/cm ² , 22 psi)	–
	At 5,000 rpm (min ⁻¹)	Above 800 kPa (8.2 kgf/cm ² , 116 psi)	–
Oil pump rotor	Tip clearance	0.15 (0.006)	0.20 (0.008)
	Body clearance	0.12 – 0.22 (0.005 – 0.009)	0.25 (0.010)
	Side clearance	0.02 – 0.09 (0.001 – 0.004)	0.11 (0.004)

TORQUE VALUES

Oil gallery sealing bolt (front crankcase cover)	34 N·m (3.5 kgf·m, 25 lbf·ft)
Engine oil temperature (EOT) sensor	18 N·m (1.8 kgf·m, 13 lbf·ft)

LUBRICATION SYSTEM

TOOLS

<p>Oil pressure gauge 07YAJ-0010100</p>  <p>Not available in U.S.A.</p>	<p>Oil pressure gauge 07YAJ-0010300</p>  <p>Not available in U.S.A.</p>	<p>Pressure gauge hose 07FPJ-7520100</p>  <p>Not available in U.S.A.</p>
<p>Pressure gauge attachment 07KPJ-VD60100</p>  <p>or 07KPJ-VD6010A (U.S.A. only)</p>	<p>Oil pressure gauge, 0 – 160 psi 07ZMJ-HN2A100</p>  <p>U.S.A. only</p>	

TROUBLESHOOTING

Oil level too low – high oil consumption

- Oil consumption
- External oil leak
- Worn piston rings or incorrect piston ring installation
- Worn cylinder
- Worn valve guides or stem seals
- Oil pump worn or damaged

Low oil pressure

- Oil level low
- Oil pressure relief valve wear
- Clogged oil strainer or filter
- Faulty oil pump
- Internal oil leak
- Incorrect oil being used

No oil pressure

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

High oil pressure

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

Oil contamination

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

Oil emulsification

- Blown cylinder head gasket
- Entry of water

LUBRICATION SYSTEM

OIL PRESSURE CHECK

PRESSURE INSPECTION

Check the oil level and add the recommended oil if necessary (page 3-12). Also, check the engine and oil line for external oil leak before checking the oil pressure.

Clean around the sealing bolt with compressed air before removing the bolt, and be sure that no dirt is allowed to enter the oil gallery.

Remove the oil gallery sealing bolt and washer on the left side of the front crankcase cover.

Connect an oil pressure gauge attachment and gauge to the oil gallery hole.

TOOLS:

Oil pressure gauge (for 1,400 rpm (min ⁻¹))	07YAJ-0010100
Oil pressure gauge (for 5,000 rpm (min ⁻¹))	07YAJ-0010300
Pressure gauge hose	07FPJ-7520100
Pressure gauge attachment	07KPJ-VD60100

U.S.A. only:

Oil pressure gauge, 0 – 160 psi	07ZMJ-HN2A100
Adapter, 10 x 1.25 mm	07KPJ-VD6010A

Start the engine and check the oil pressure at each engine rpm (min⁻¹).

OIL PRESSURE (80° C/176° F):

Above 150 kPa (1.5 kgf/cm², 22 psi)
at 1,400 rpm (min⁻¹)

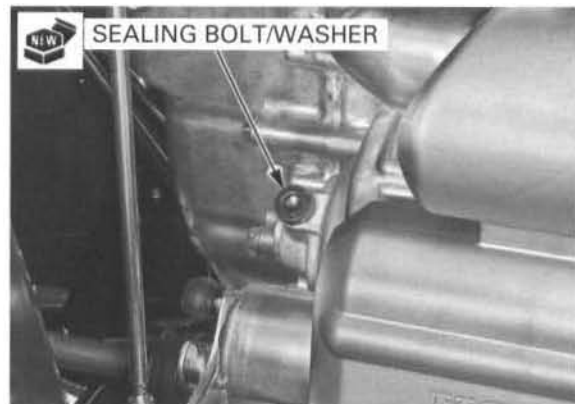
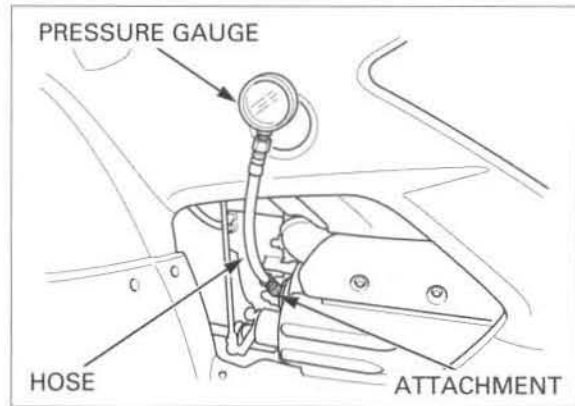
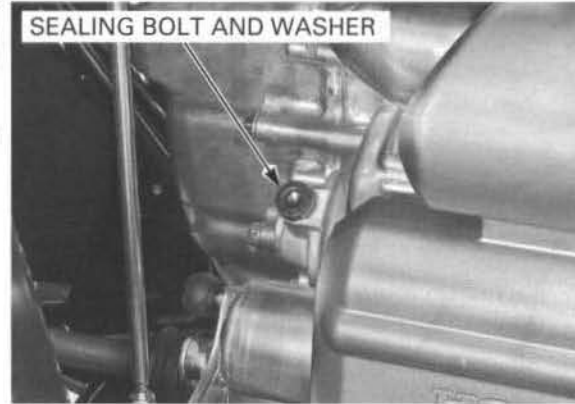
Above 800 kPa (8.2 kgf/cm², 116 psi)
at 5,000 rpm (min⁻¹)

Stop the engine.

If the pressure is abnormal, check the pressure check valve in the front crankcase cover (page 4-7). If it is OK, inspect the lubrication system.

Clean the sealing bolt threads and install it with a new sealing washer.

TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)



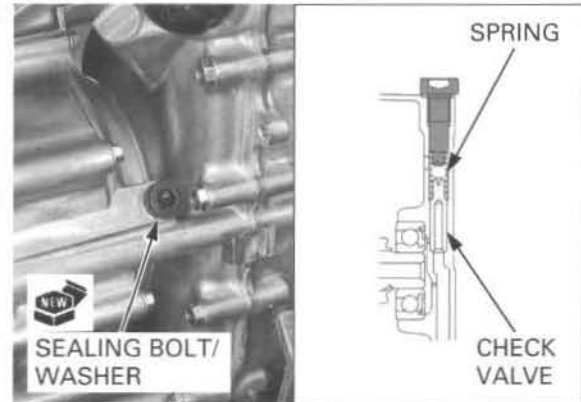
CHECK VALVE INSPECTION

Remove the oil gallery sealing bolt and washer on the right side of the front crankcase cover.

Remove the valve spring and check valve. Check the valve for wear, sticking or other damage. Check the spring for fatigue or damage.

Install the check valve and spring. Clean the sealing bolt threads and install it with a new sealing washer.

TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)

**OIL COOLER****INSPECTION**

Remove the radiator grille plate (page 3-16).

Check the oil cooler pipe joints and seams for leaks. 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 or low pressure water.

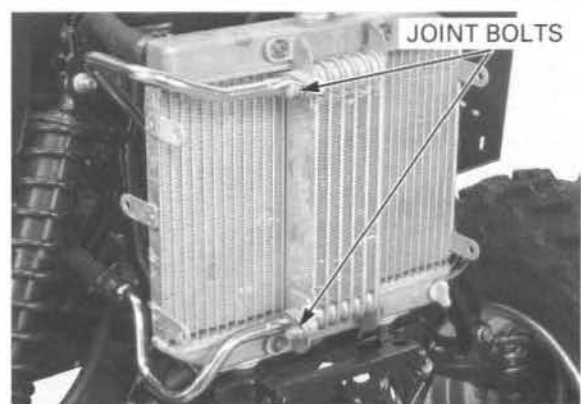
**REMOVAL**

Remove the front fender (page 2-11).

Remove the six clips and the radiator grille.

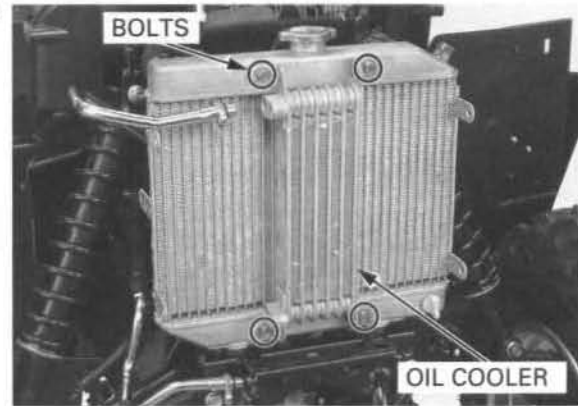


Remove the oil cooler pipe joint bolts and joints from the oil cooler. Remove the O-rings.



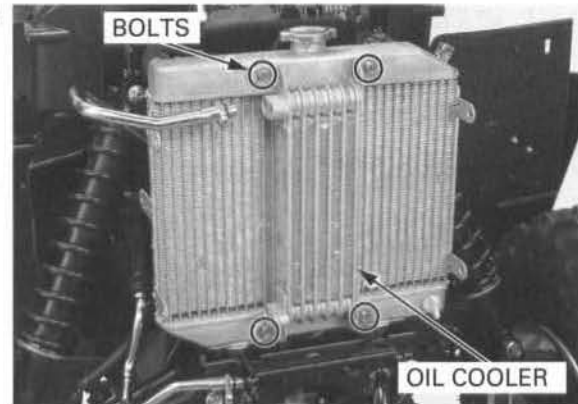
LUBRICATION SYSTEM

Remove the four bolts and the oil cooler from the radiator.



INSTALLATION

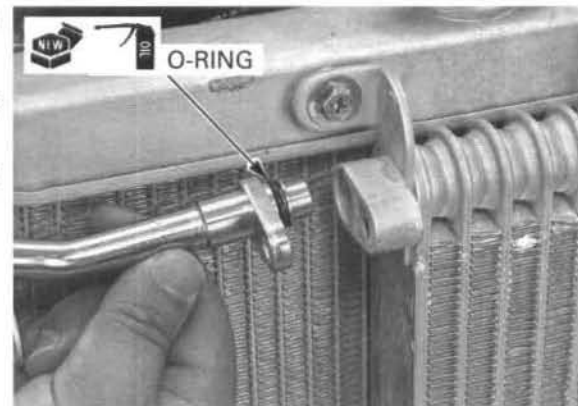
Install the oil cooler onto the radiator and tighten the four bolts securely.



Coat new O-rings with engine oil and install them onto the oil cooler pipe joints.
Install the pipe joints onto the oil cooler.

Install the removed parts in the reverse order of removal.

- Check the oil level and add the recommended engine oil if the level is low (page 3-12).



OIL STRAINER

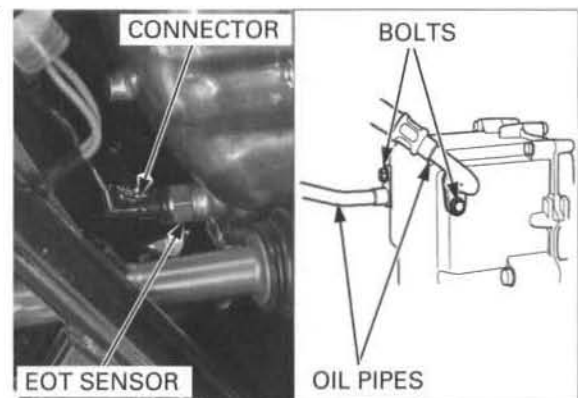
CLEANING

FOR FEED PUMP:

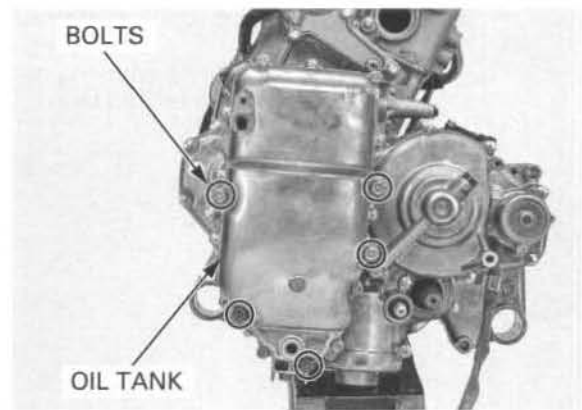
Remove the front mud guard (page 2-8) and inner fender (page 2-9).

Disconnect the engine oil temperature (EOT) sensor connector and remove the EOT sensor.

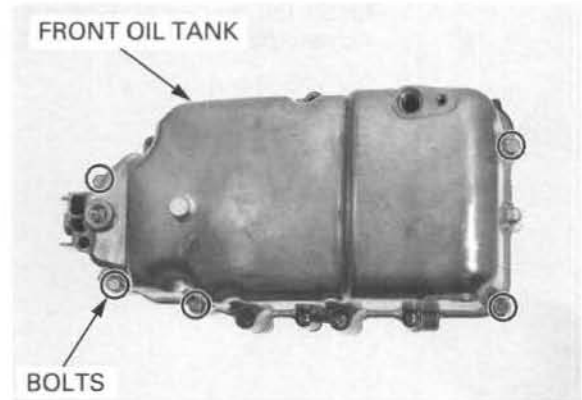
Remove the bolts and oil pipes from the oil tank.



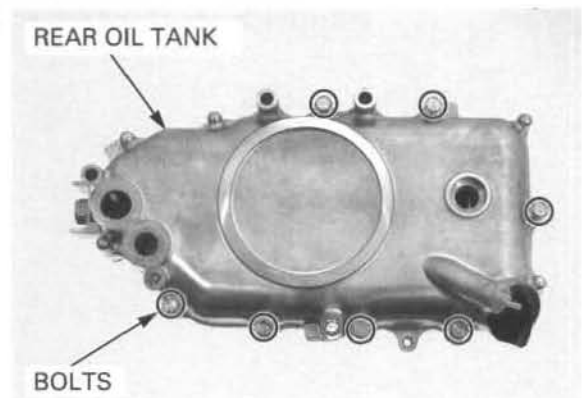
Remove the five bolts and oil tank.
Remove the O-rings and collar.



Remove the five bolts from the front oil tank.



Remove the seven bolts and remove the rear oil tank from the front oil tank.



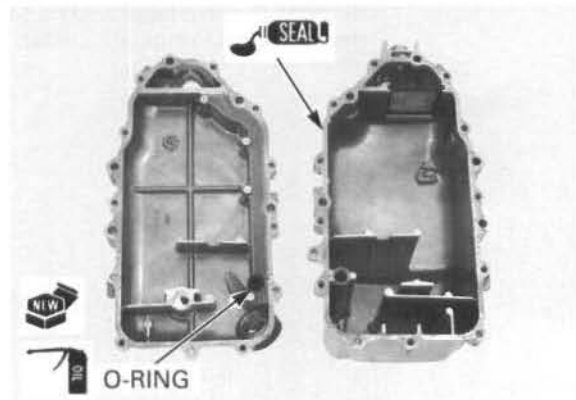
Remove the oil strainer screen from the front oil tank.
Clean the strainer screen thoroughly and reinstall it.



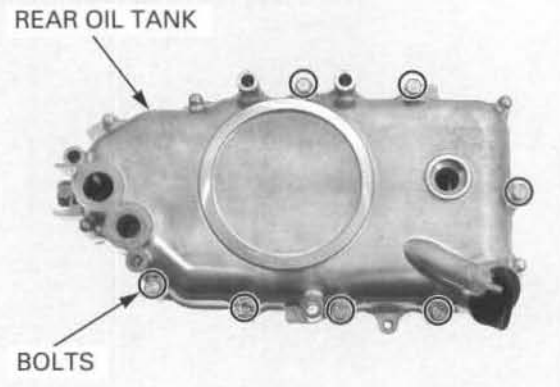
LUBRICATION SYSTEM

Apply sealant to the mating surface of the front oil tank.

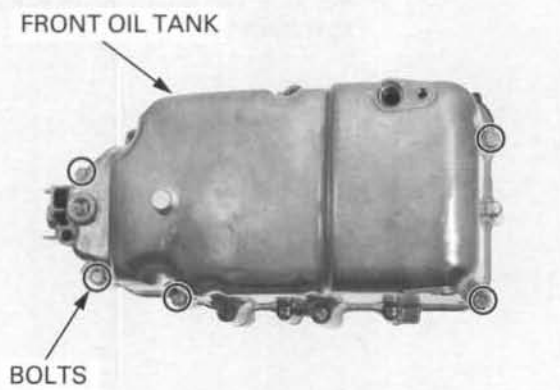
Coat a new O-ring with engine oil and install it onto the plate on the rear oil tank.



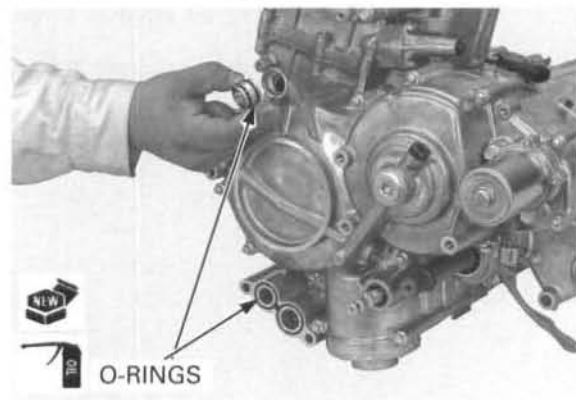
Install the rear oil tank onto the front oil tank, and tighten the seven bolts securely.



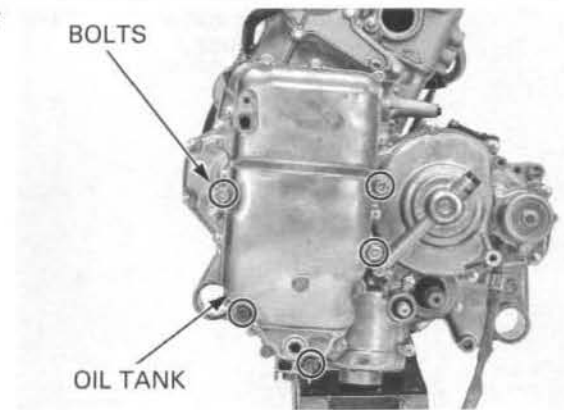
Install the five bolts and tighten them securely.



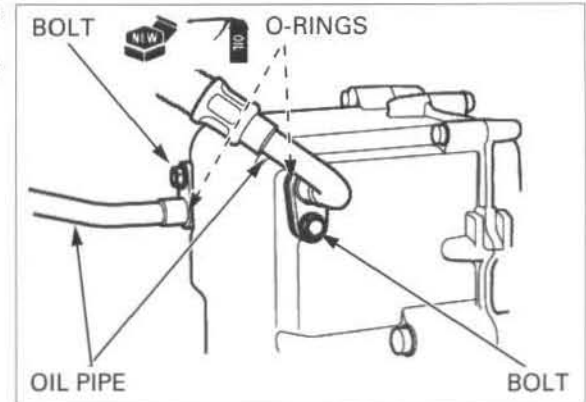
Install the joint collar into the front crankcase cover. Coat new O-rings with oil and install them onto the collar and into the crankcase cover groove.



Install the oil tank onto the front crankcase cover and tighten the five bolts securely.



Coat new O-rings with oil and install them onto the oil pipes. Install the oil pipes into the oil tank and tighten the bolts securely.

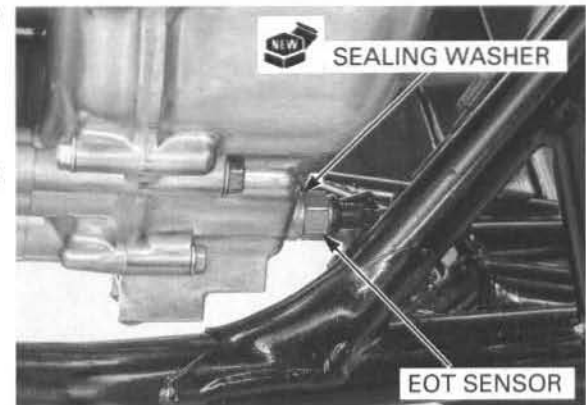


Install the engine oil temperature (EOT) sensor with a new sealing washer and tighten it.

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

Connect the EOT sensor connector.

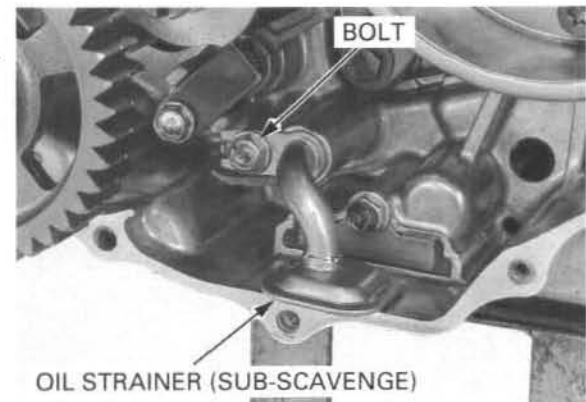
Install the inner fender (page 2-9) and front mud guard (page 2-8).



FOR SCAVENGE PUMPS:

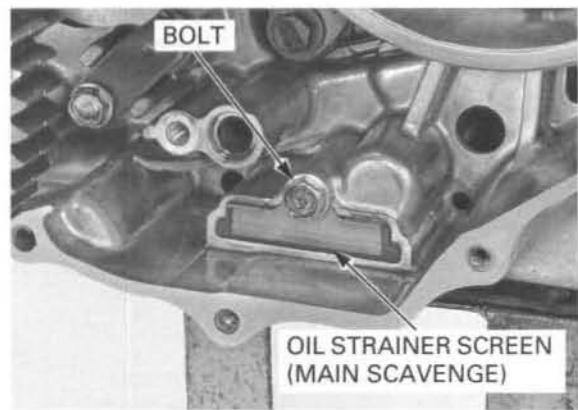
Remove the rear crankcase cover (page 12-6).

Remove the bolt and oil strainer for the sub-scavenge pump.



LUBRICATION SYSTEM

Remove the bolt and oil strainer screen for the main scavenge pump.



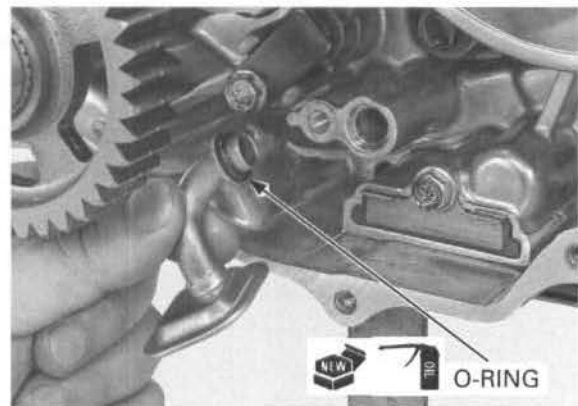
Clean the oil strainer and screen thoroughly.

Install the oil strainer screen and tighten the bolt securely.



Coat a new O-ring with oil and install it onto the oil strainer.

Install the oil strainer and tighten the bolt securely.

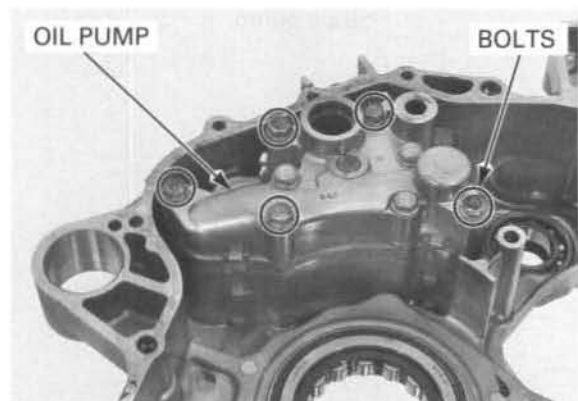


OIL PUMP

REMOVAL

Separate the crankcases (page 13-8).

Remove the five bolts (gold) and oil pump from the front crankcase.

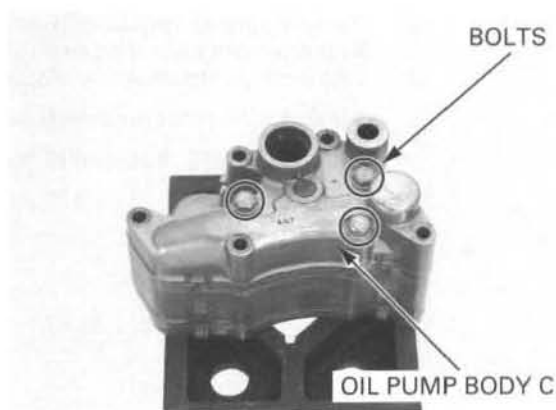


Remove the O-rings.

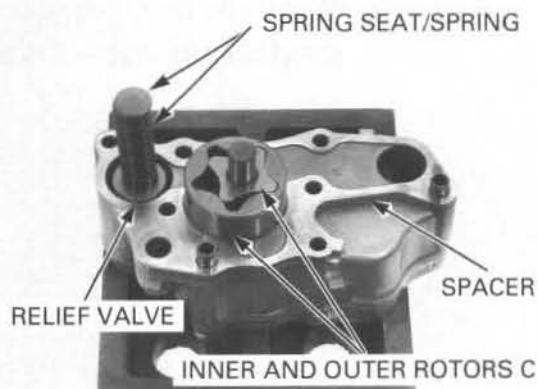


DISASSEMBLY

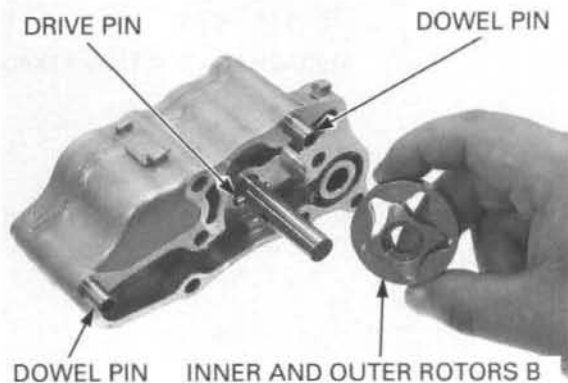
Remove the three bolts and oil pump body C.
Oil pump body C may pop out by the spring force.



Remove the spring seat, spring and relief valve.
 Check the valve for wear, sticking or other damage.
 Check the spring for fatigue or damage.
 Remove outer, inner rotors C and drive pin.
 Remove the oil pump spacer.



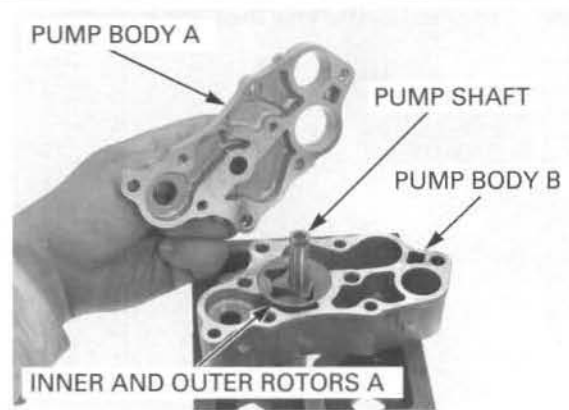
Remove outer, inner rotors B and drive pin.
 Remove the dowel pins.



LUBRICATION SYSTEM

Separate oil pump bodies A and B.
Remove the outer, inner rotors A, drive pin and pump shaft.

Clean the all disassembled parts thoroughly.

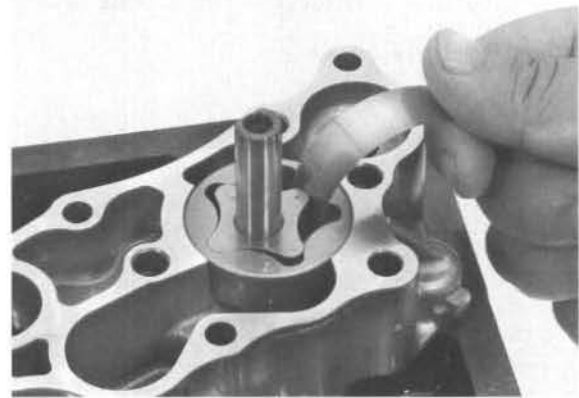


INSPECTION

Temporarily assemble each inner rotor, outer rotor and drive pin onto the pump shaft, and install them into each pump body individually.

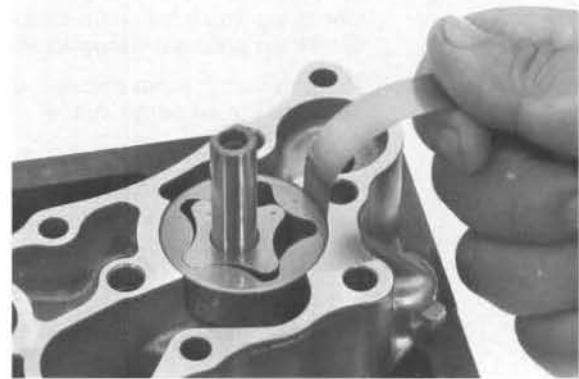
Measure the rotor tip clearance.

SERVICE LIMIT: 0.20 mm (0.008 in)



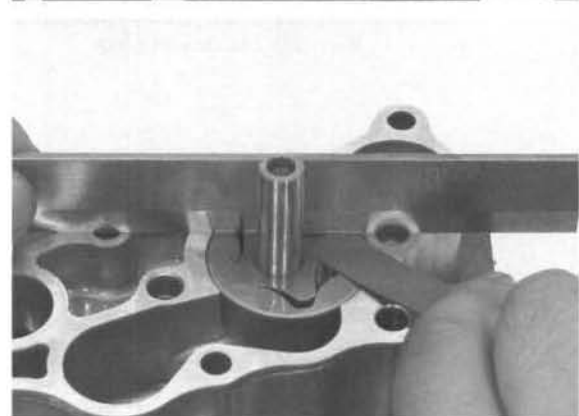
Measure the pump body clearance.

SERVICE LIMIT: 0.25 mm (0.010 in)



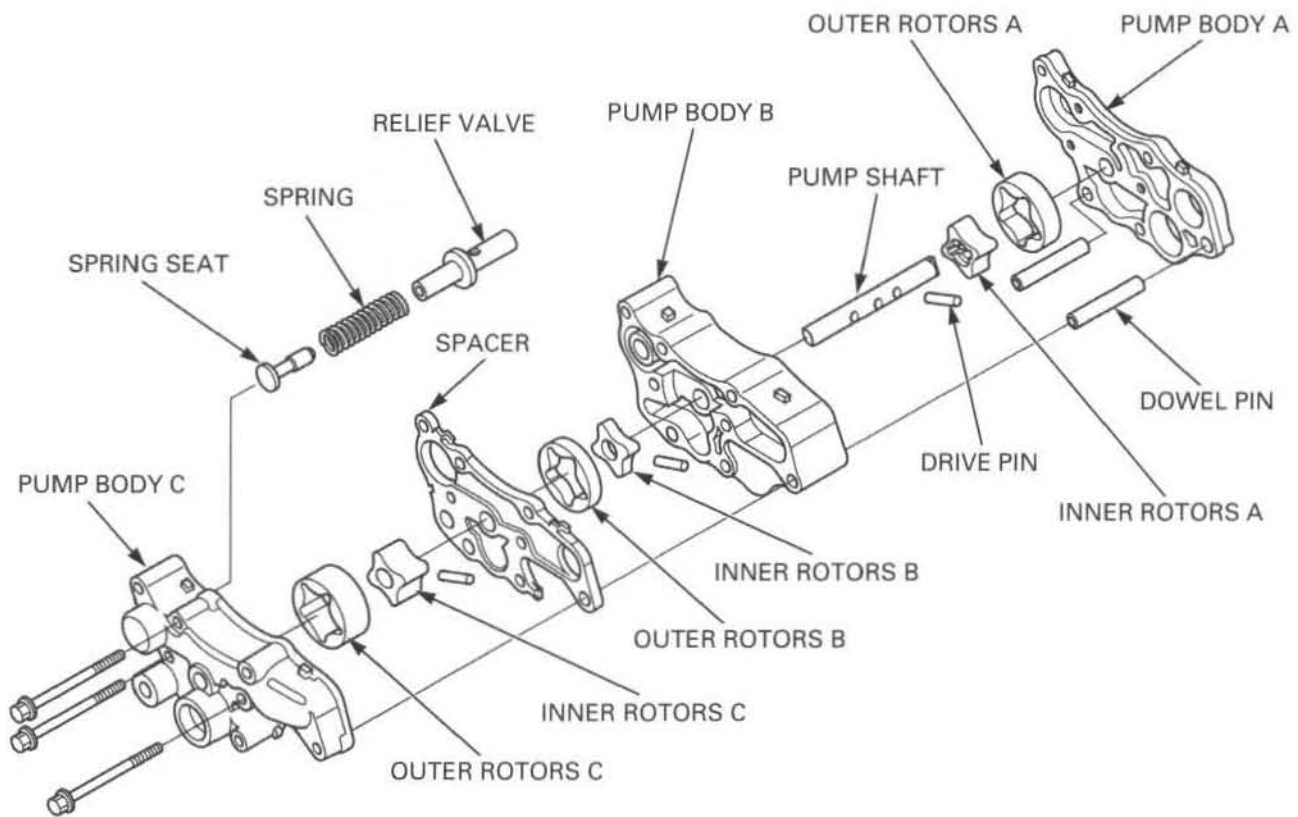
Measure the pump side clearance.

SERVICE LIMIT: 0.11 mm (0.004 in)

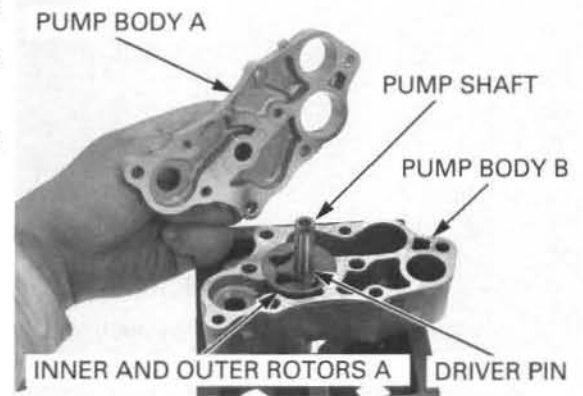


ASSEMBLY

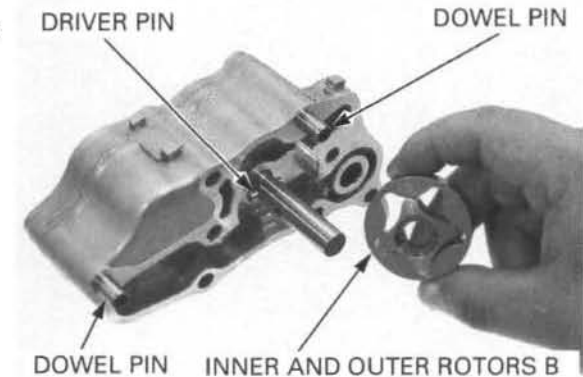
Dip all parts in clean engine oil.



Install the pump shaft into pump body A with the threaded hole end facing toward pump body A. Install inner rotor A onto the shaft with the drive pin grooves facing out. Install outer rotor A. Install the drive pin into the pump shaft hole and set the drive pin in the inner rotor grooves. Install pump body B.



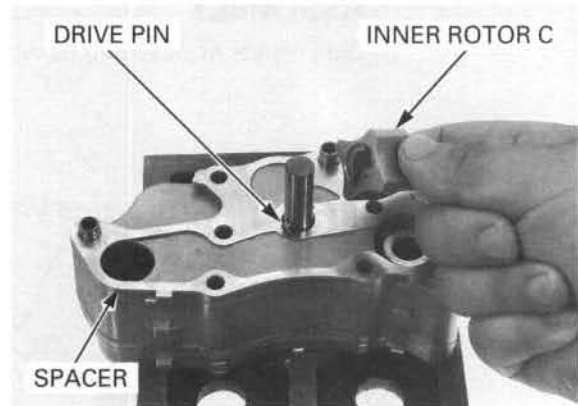
Install the two dowel pins. Install the drive pin and inner rotor B, aligning the pin grooves with the drive pin. Install outer rotor B.



LUBRICATION SYSTEM

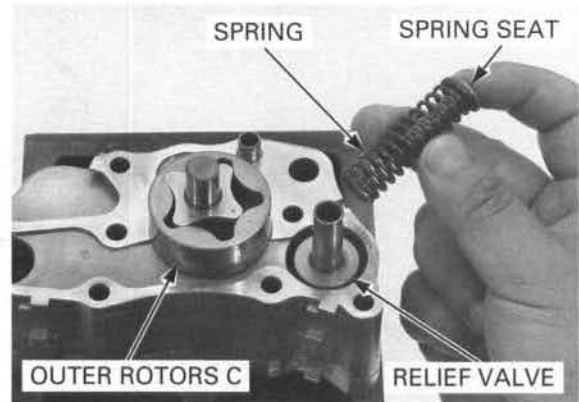
Install the pump spacer.

Install the drive pin and inner rotor C, aligning the pin grooves with the drive pin.

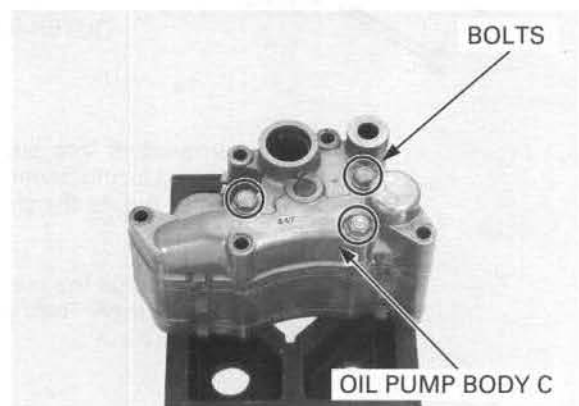


Install outer rotor C.

Install the relief valve, spring and spring seat.



Install the pump body C and tighten the three bolts.



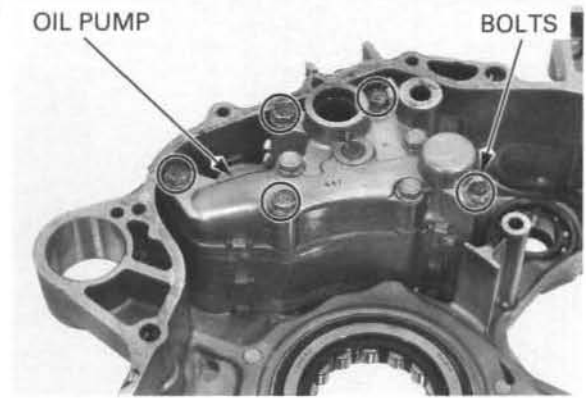
INSTALLATION

Coat new O-rings with oil and install it into the grooves in the front crankcase.



Install the oil pump onto the front crankcase and tighten the five bolts securely.

Assemble the crankcases (page 13-16).

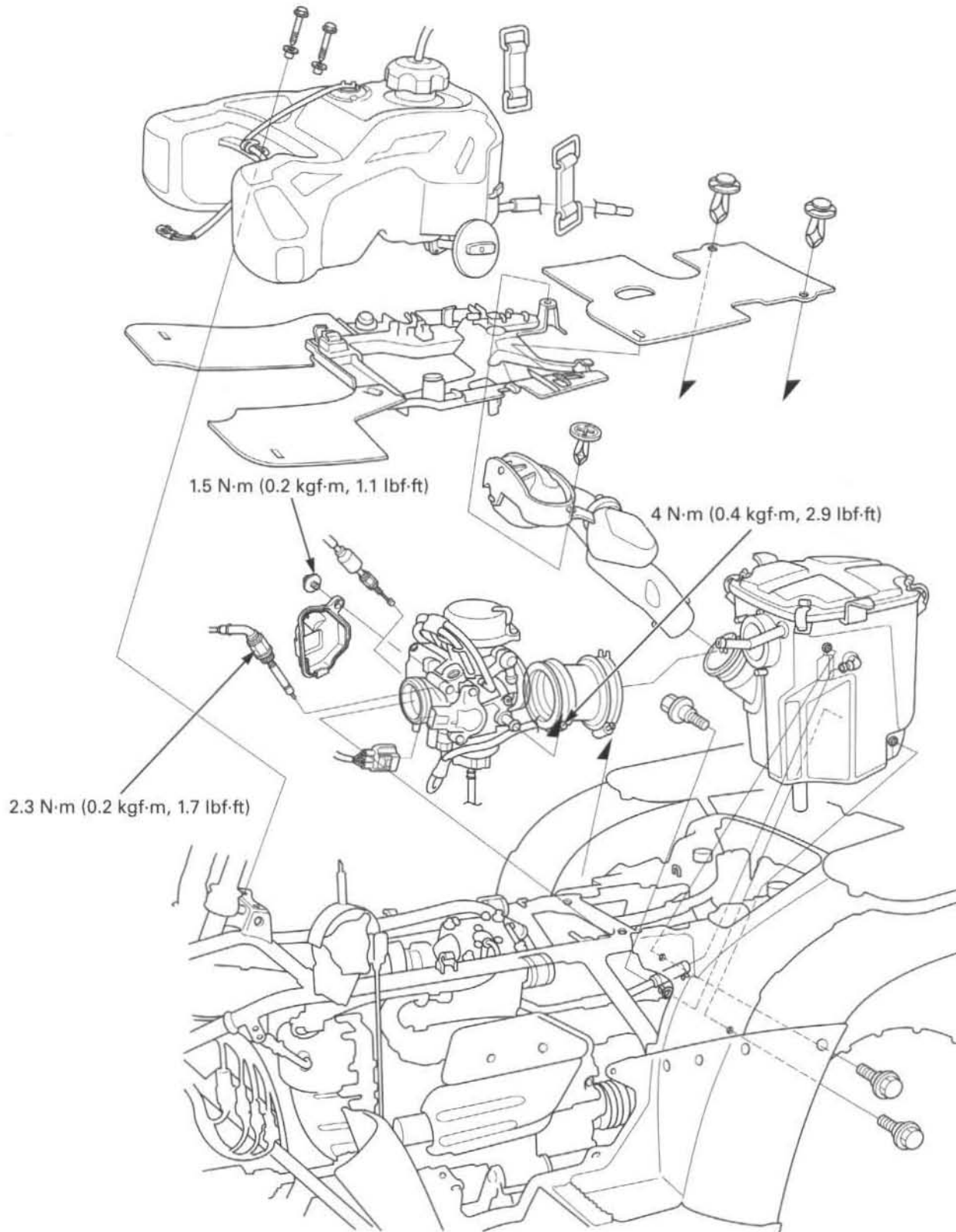


MEMO



SYSTEM COMPONENTS	5-2	CARBURETOR ASSEMBLY	5-13
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TROUBLESHOOTING	5-4	PILOT SCREW ADJUSTMENT	5-19
AIR CLEANER HOUSING	5-5	HIGH ALTITUDE ADJUSTMENT (except U type).....	5-20
CARBURETOR REMOVAL.....	5-6	FUEL TANK.....	5-21
CARBURETOR DISASSEMBLY/ INSPECTION	5-8		

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 location of the O-rings. Replace them with new ones on reassembly.
- If the throttle cable was disconnected, perform the initial setting (page 24-6) after all carburetor adjustments have been completed.
- 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 drive-ability.
- See page 22-11 for carburetor heater inspection.
- See page 24-40 for throttle position sensor inspection and replacement.

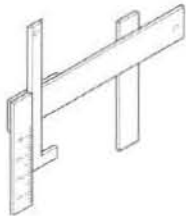

SPECIFICATIONS

ITEM		SPECIFICATIONS
Carburetor identification number	A, CM type	VE6AE
	U type	VE6AF
Main jet		# 162
Slow jet		# 45
Pilot screw opening		See page 5-19
Float level		15.9 mm (0.63 in)
Idle speed		1,400 ± 100 rpm (min ⁻¹)
Throttle lever freeplay		3 – 8 mm (1/8 – 5/16 in)

TORQUE VALUES

Carburetor insulator band screw	4 N·m (0.4 kgf·m, 2.9 lbf·ft)
Starter enrichment (SE) valve nut	2.3 N·m (0.2 kgf·m, 1.7 lbf·ft)
Throttle drum cover screw	1.5 N·m (0.2 kgf·m, 1.1 lbf·ft)

TOOL

<p>Carburetor float level gauge 07401-0010000</p> 	<p>Pilot screw wrench 07KMA-MN90101</p>  <p>or 07KMA-MN9A100 (U.S.A. only)</p>
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FUEL SYSTEM

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
 - Misadjusted fuel level
- 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 – (page 20-4))

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 (ON)
- Clogged air jets
- Faulty float valve
- Float level too high
- Dirty air cleaner
- Clogged slow circuit
- Clogged SE valve circuit
- 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
- Restricted fuel tank breather hose
- Dirty air cleaner
- Misadjusted pilot screw
- Faulty ignition system (page 20-4)

Afterburn when engine braking is used

- Lean mixture in slow circuit
- Faulty ignition system (page 20-4)

Backfiring or misfiring during acceleration

- Lean mixture
- Faulty ignition system (page 20-4)

Poor performance (drive-ability) and poor fuel economy

- Clogged fuel system
- Faulty ignition system (page 20-4)

AIR CLEANER HOUSING

REMOVAL/INSTALLATION

Remove the following:

- fuel tank cover (page 2-6)
- two trim clips



Release the breather pipe clip from the stay on the muffler. Disconnect the crankcase breather pipe from the air cleaner housing.



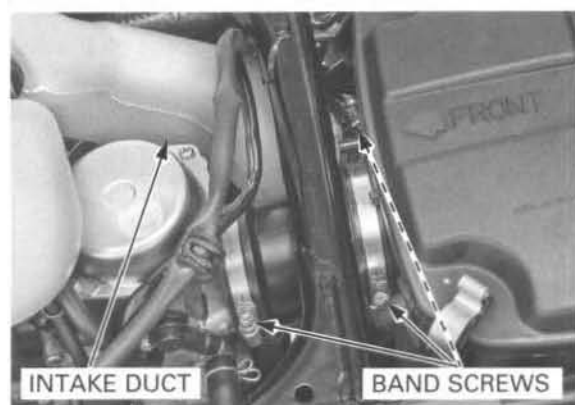
Disconnect the air cleaner hose from the carburetor hose joint.



Loosen the band screw and remove the air intake duct from the air cleaner housing.

Be careful not to damage the connecting hose.

Loosen the air cleaner connecting hose band screws.



FUEL SYSTEM

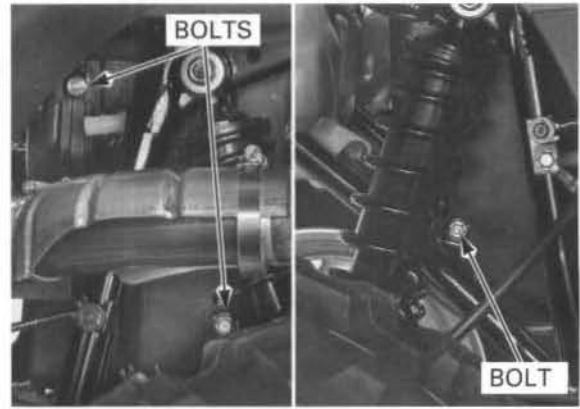
Remove the bolts.

Remove the air cleaner housing from the frame.

Install the air cleaner housing and connecting hose, and align the groove in the connecting hose with the lug on the air cleaner housing.

Install the air intake duct, aligning guide on the duct with the seat retainer.

Install the removed parts in the reverse order of removal.



CARBURETOR REMOVAL

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

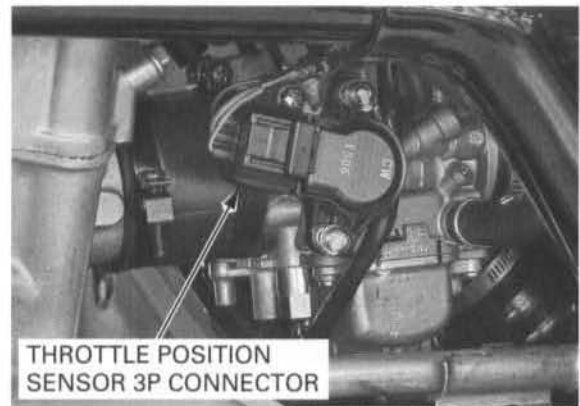
Release the carburetor heater wire from the wire clip and disconnect the heater 2P connector.

Remove the carburetor drain hose from the clamp.



Do not loosen the throttle position sensor attaching screws unless the throttle position sensor requires replacement.

Disconnect the throttle position sensor 3P connector.

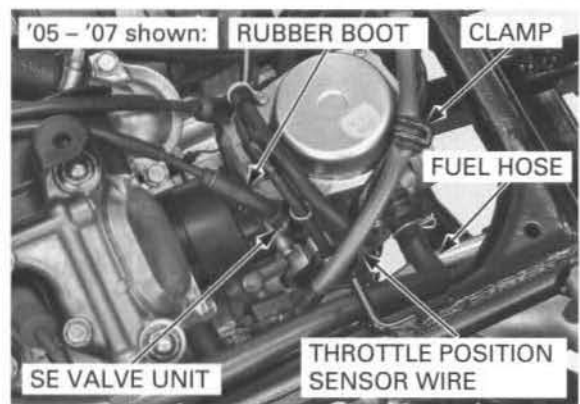


Remove the throttle position sensor wire from the clamp.

Slide the rubber cap off the starting enrichment (SE) valve nut.

Loosen the SE valve nut and remove the SE valve from the carburetor.

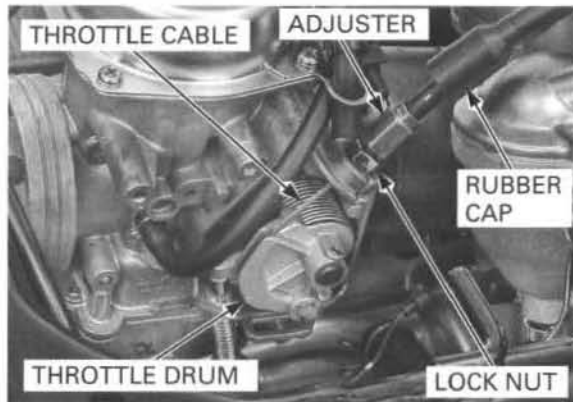
Turn the fuel valve OFF and disconnect the fuel hose from the carburetor.



Remove the screw and throttle drum cover.



Slide the rubber cap off the throttle cable adjuster. Loosen the throttle cable lock nut and remove the adjuster from the carburetor body, and disconnect the cable from the throttle drum.



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



CARBURETOR DISASSEMBLY/ INSPECTION

STARTING ENRICHMENT (SE) VALVE INSPECTION

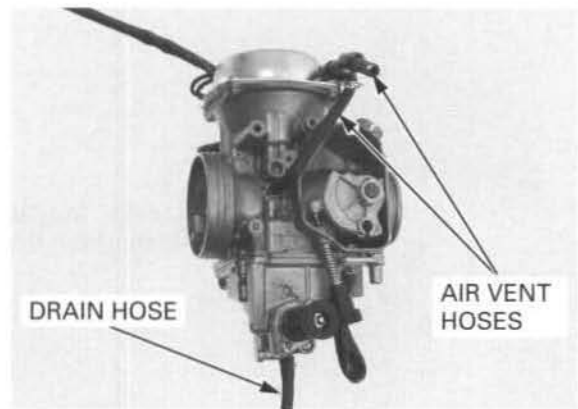
Check the SE valve face for scores, scratches or wear.
Check the SE valve seat at the tip of the valve for stepped wear.
Check the seal ring for wear or damage.



HOSES

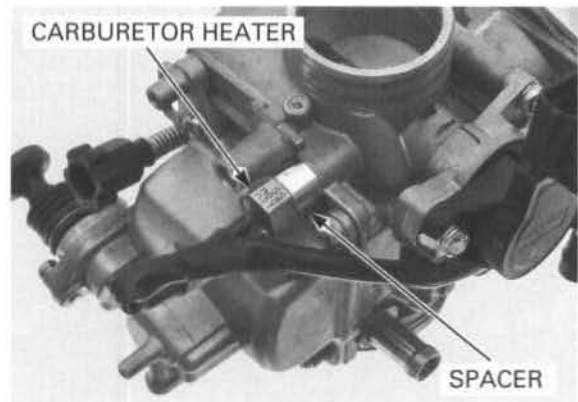
Remove the following:

- air vent hoses
- drain hose



CARBURETOR HEATER

Remove the carburetor heater and spacer.



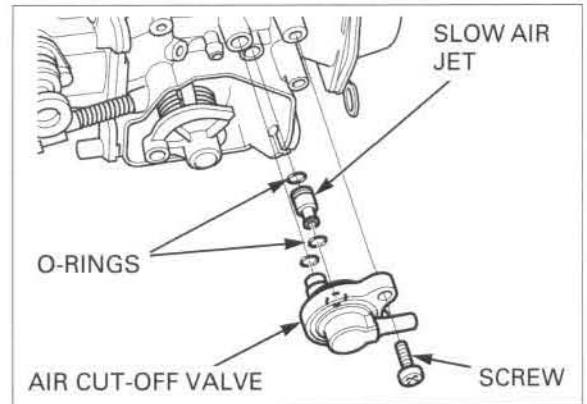
AIR CUT-OFF VALVE (U type only)

Remove the screw and the air cut-off valve from the carburetor body.

Remove the slow air jet and three O-rings.

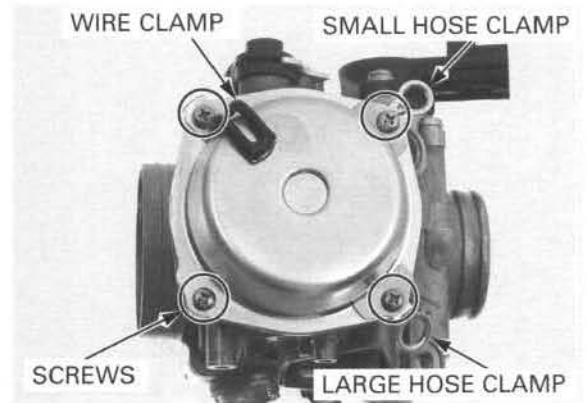
Check the air cut-off valve and jet for damage.

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

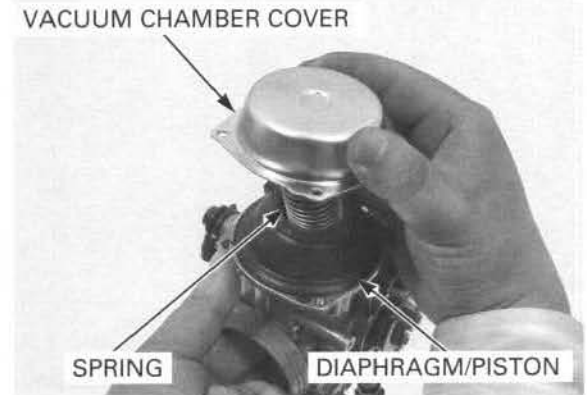


VACUUM CHAMBER

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

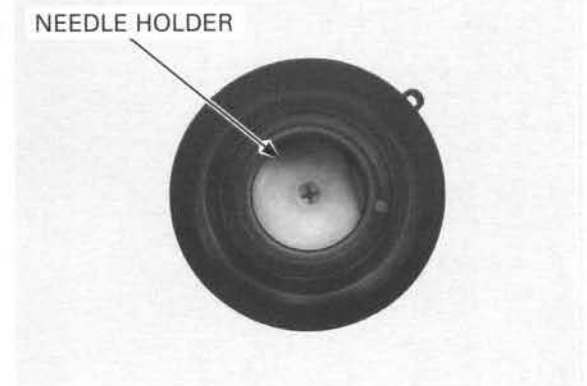


Remove the vacuum chamber cover, compression spring and diaphragm/vacuum piston from the carburetor body.



Be careful not to damage the diaphragm.

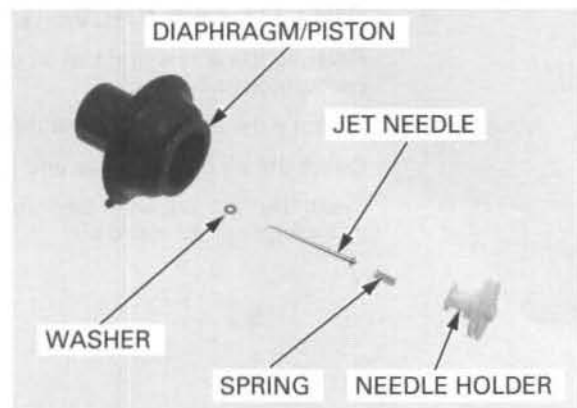
Turn the needle holder counterclockwise by using a screwdriver while pressing it in and release the holder flange from the vacuum piston. Remove the needle holder, spring, jet needle and washer.



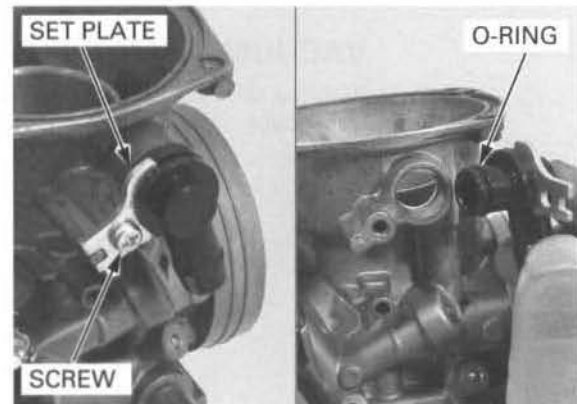
FUEL SYSTEM

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.

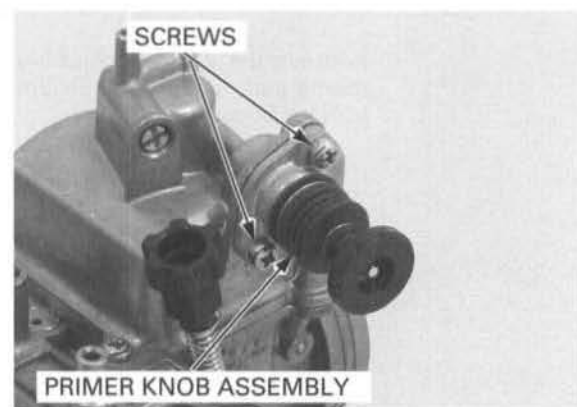


Remove the screw, set plate, air joint and O-ring.

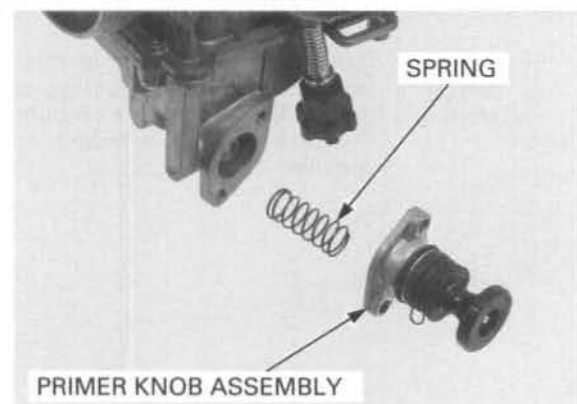


PRIMER KNOB

Remove the two screws while holding the primer knob body.



Remove the primer knob assembly and spring.

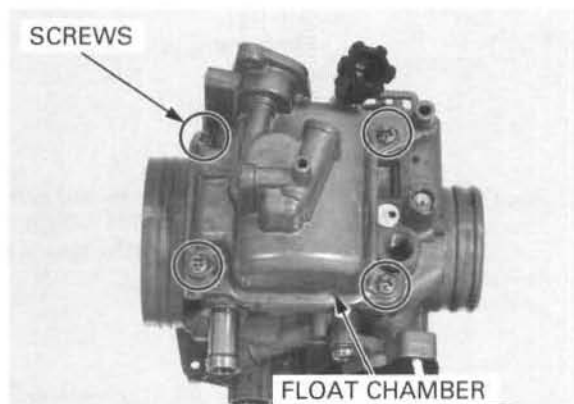


Check the diaphragm for holes, deterioration or damage.

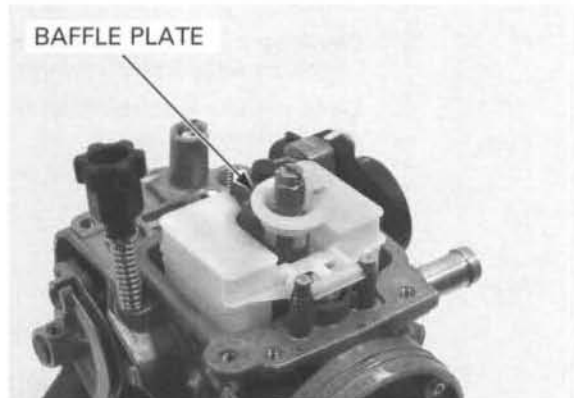


FLOAT CHAMBER

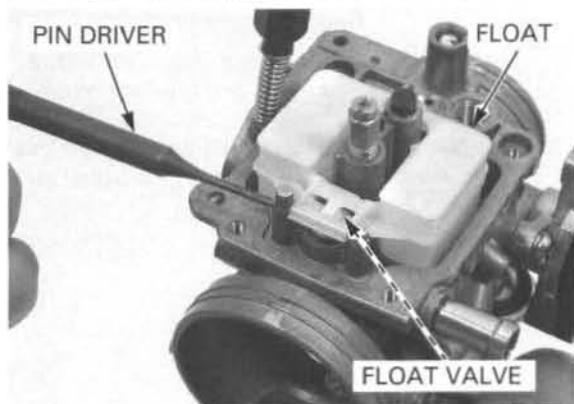
Remove the four screws and the float chamber.



Remove the baffle plate.

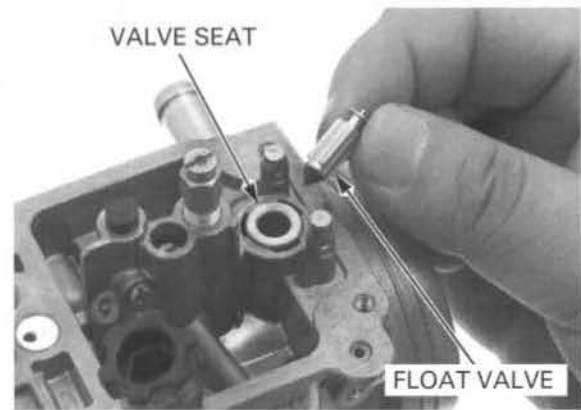


Drive out the float pin from the throttle stop screw side using a pin driver.
 Remove the float and float valve.
 Check the float for damage or fuel in the float.



FUEL SYSTEM

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.



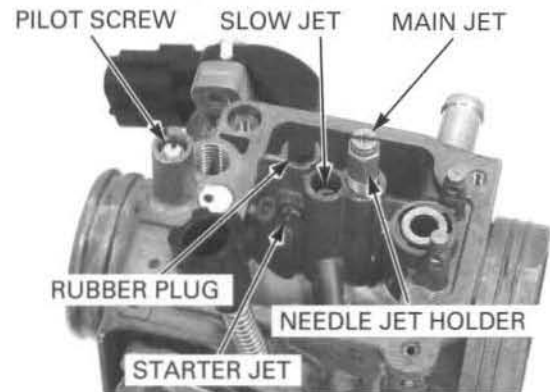
Handle the jets with care. They can easily be scored or scratched.

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.

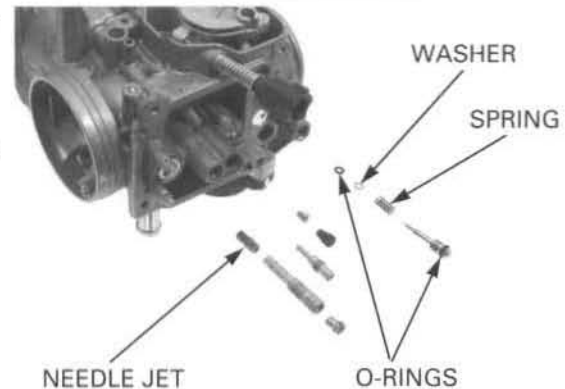
Turn the pilot screw in and carefully count the number of turns until it seats lightly. Make a note of this to use as a reference when reinstalling the pilot screw.



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

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:

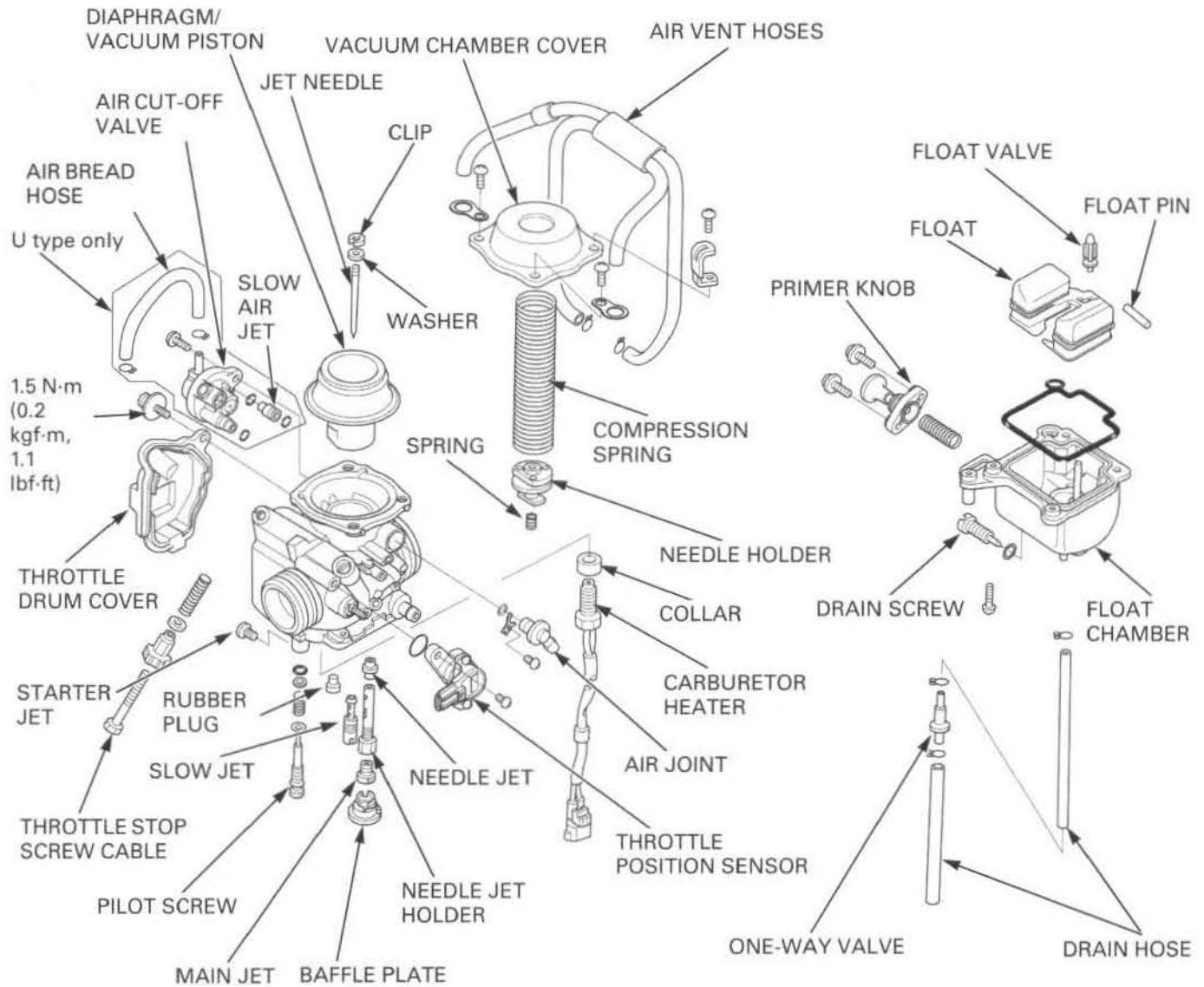
- diaphragm/vacuum piston
- all jets and pilot screw

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

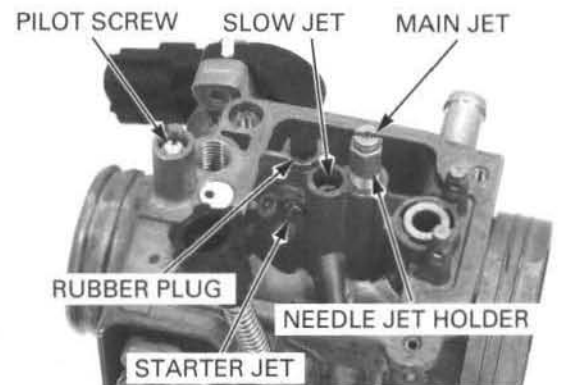
Damage to the pilot screw seat will occur if the pilot screw is tightened against the seat.

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

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.

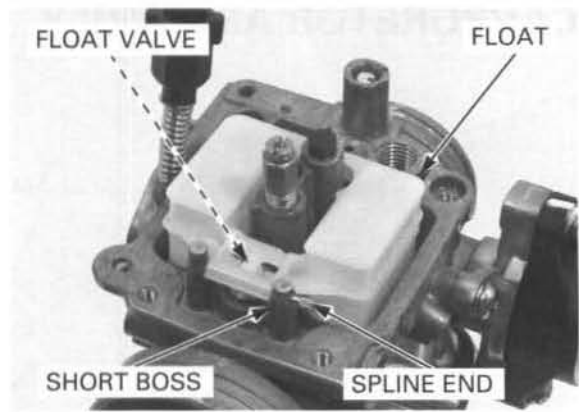
Install the following:

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



FUEL SYSTEM

Hang the float valve onto the float arm lip. Install the float valve and float, and insert the float pin so that the spline end rests in the short boss (spline hole) side as shown. Drive the float pin using the pin driver until its end is flush with the boss.



FLOAT LEVEL INSPECTION

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

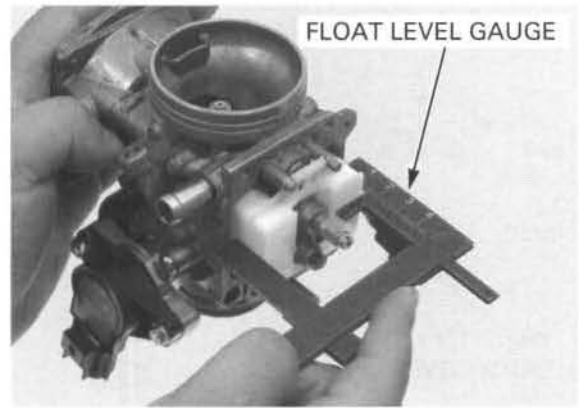
Set the float level gauge so that it is perpendicular to the float chamber face at the highest point of the float.

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

TOOL:

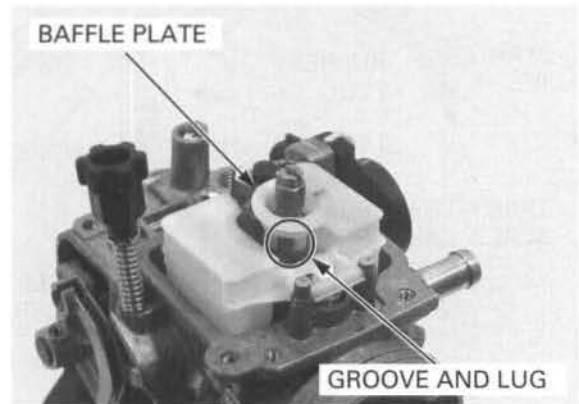
Carburetor float level gauge 07401-0010000

FLOAT LEVEL: 15.9 mm (0.63 in)

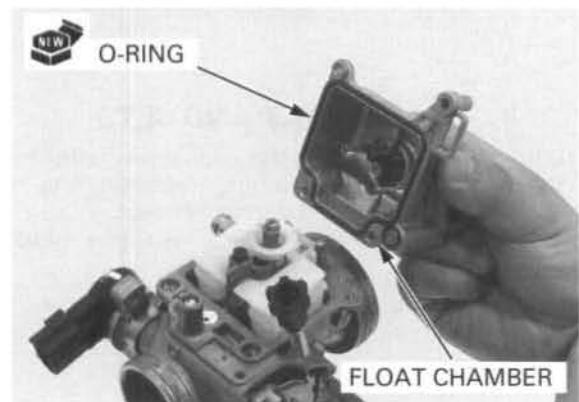


The float cannot be adjusted. Replace the float assembly if the float level is out of specification.

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

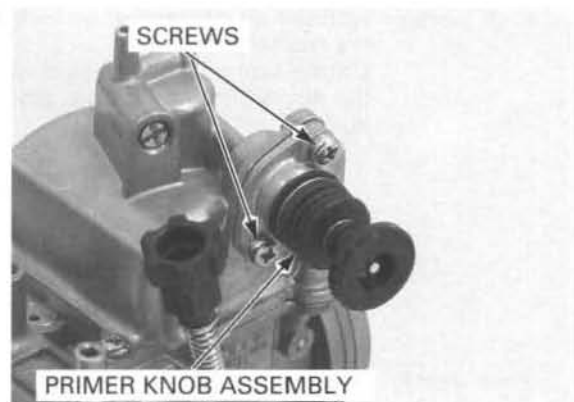


Install a new O-ring into the float chamber groove properly. Install the float chamber and tighten the four screws.



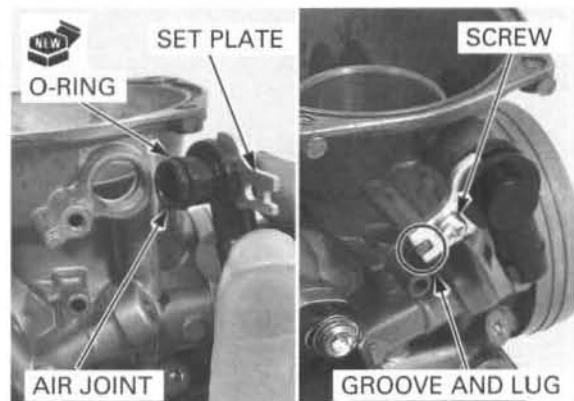
PRIMER KNOB

Install the spring primer knob assembly, and tighten the two screws securely.



VACUUM CHAMBER

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



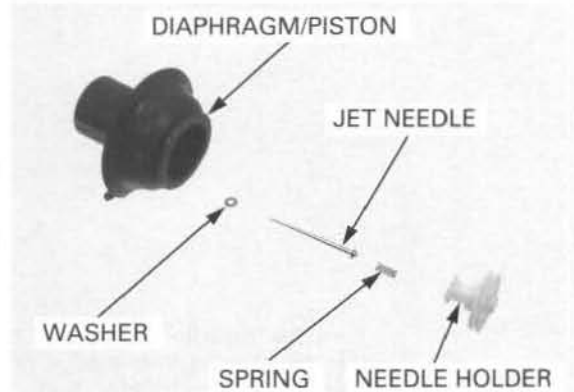
Install the needle clip onto the jet needle.

'05: **STANDARD CLIP POSITION: 2nd groove from top**

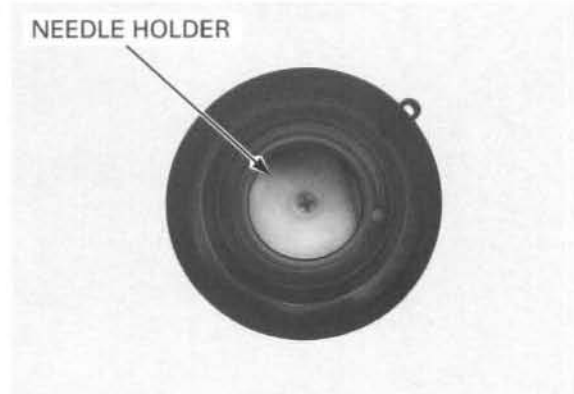
After '05: After '05 model can not adjust the needle clip position.

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 90 degrees clockwise while pressing it until it locks.

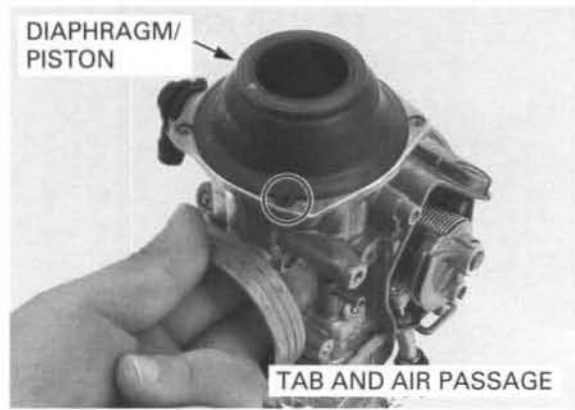


FUEL SYSTEM

Be careful not to damage the jet needle.

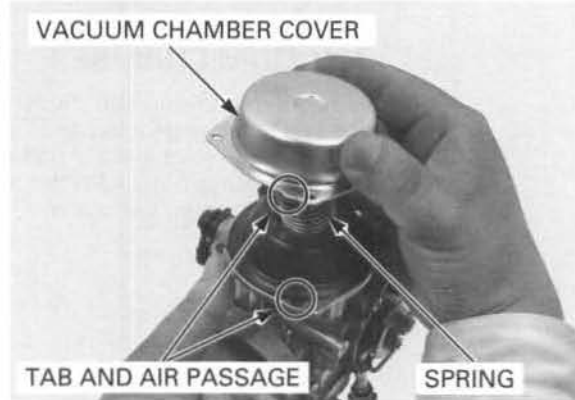
Install the diaphragm/vacuum piston into the carburetor body by aligning the tab of the diaphragm with the air passage, then insert the jet needle into the needle jet.

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

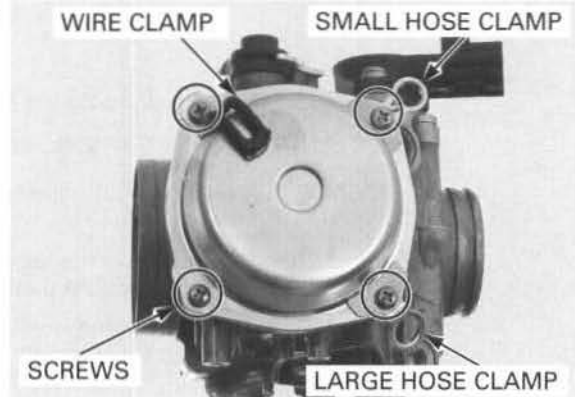


Be careful not to pinch the diaphragm under the chamber cover, and to keep the spring straight when compressing the spring.

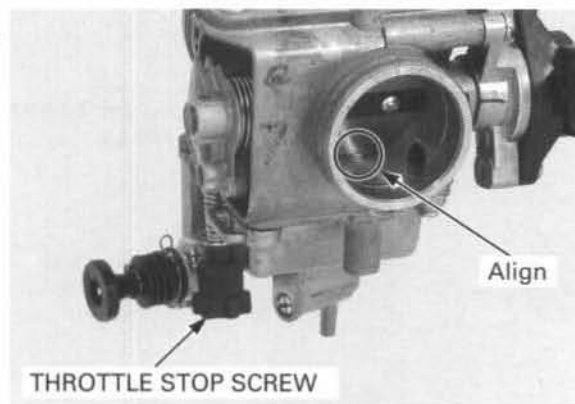
Install the compression spring and vacuum chamber cover while lifting the piston in place. Align the tab of the cover with the air passage and secure the cover with at least two screws before releasing the vacuum piston.



Install the wire and hose clamps as shown, and tighten the four screw securely.



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.



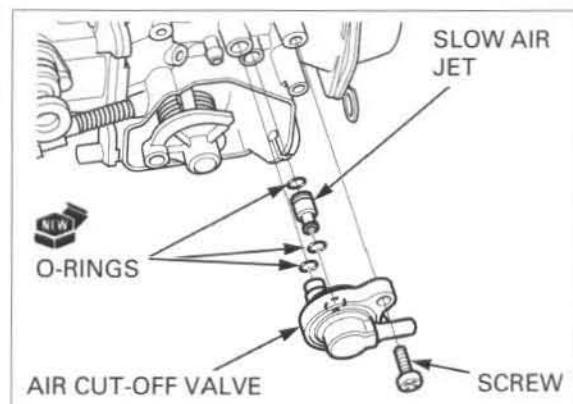
AIR CUT-OFF VALVE (U type only)

Install a new O-rings onto the slow air jet and air cut-off valve.

Install the air jet with its small end facing the air cut-off valve.

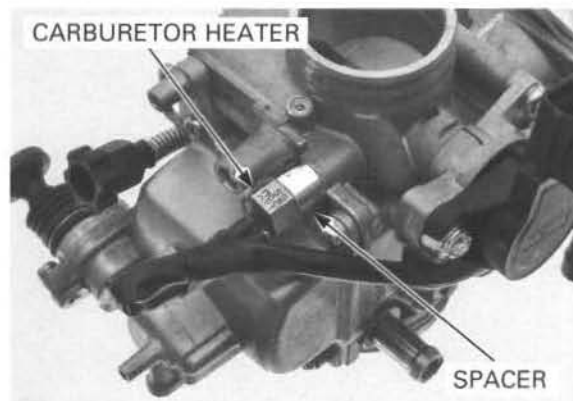
Install the slow air jet and air cut-off valve onto the carburetor body

Install and tighten the screw.



CARBURETOR HEATER

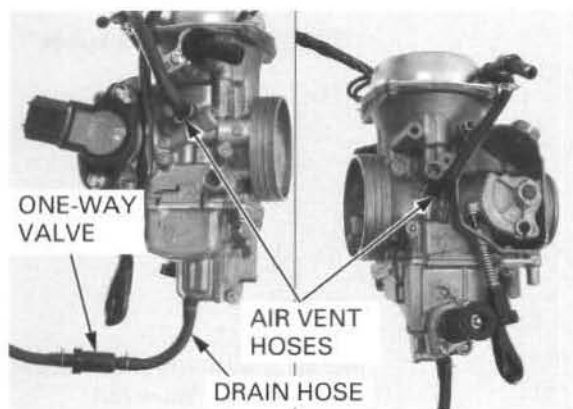
Install the collar and carburetor heater with the stepped side of the collar facing the carburetor and tighten carburetor heater.



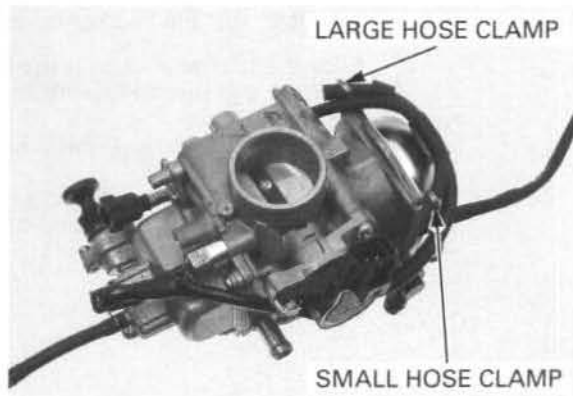
HOSES

Connect the carburetor drain hose so that the "UP" mark on the one-way valve is facing toward the carburetor.

Connect the air vent hoses.



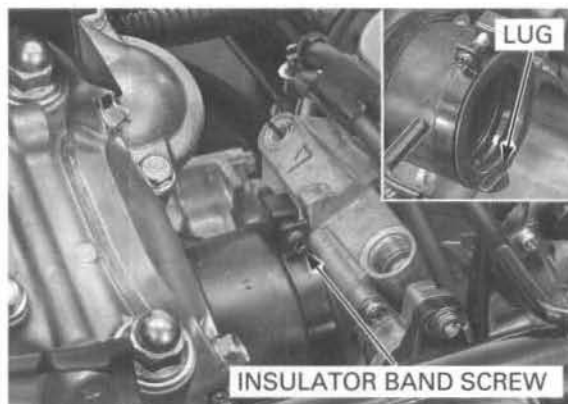
Route the air vent hoses into the hose clamps as shown.



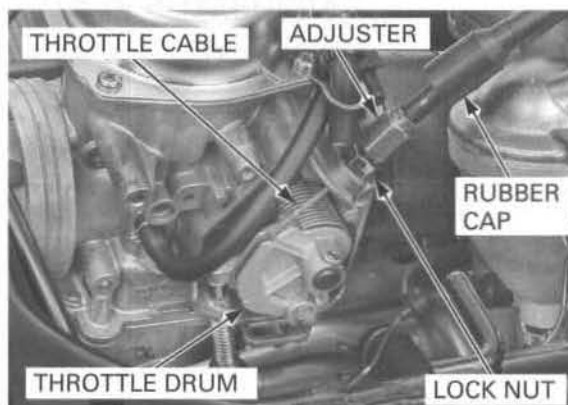
CARBURETOR INSTALLATION

Install the carburetor into the insulator, rest the carburetor rib against the insulator lug and tighten the band screw.

TORQUE: 4 N·m (0.4 kgf·m, 2.9 lbf·ft)



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



Install the throttle drum cover and tighten the screw.

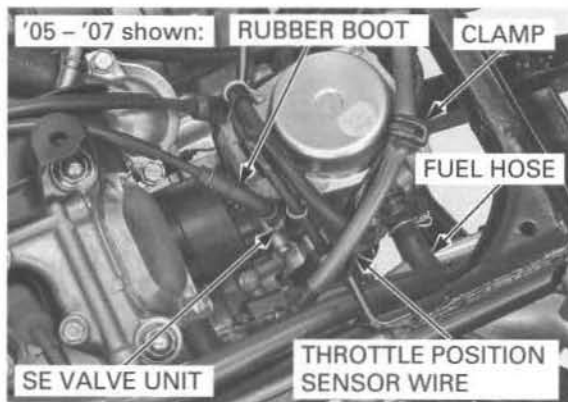
TORQUE: 1.5 N·m (0.2 kgf·m, 1.1 lbf·ft)



Install the starting enrichment (SE) valve and tighten the SE valve nut.

TORQUE: 2.3 N·m (0.2 kgf·m, 1.7 lbf·ft)

Slide the rubber boot over the SE valve nut. Connect the throttle position sensor connector to the sensor. Clamp the throttle position sensor wire onto the carburetor. Connect the fuel hose to the carburetor. Turn the fuel valve ON and check that there is no fuel leak.



Route the carburetor heater wire and carburetor drain hose properly (page 1-24).

Connect the carburetor heater connector.

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

Perform the following inspections and adjustments:

- engine idle speed (page 3-15)
- throttle operation (page 3-5)
- pilot screw if it was replaced (page 5-19)

Perform the initial setting (page 24-6) after all carburetor adjustments have been completed.



CARBURETOR HEATER
2P CONNECTOR

PILOT SCREW ADJUSTMENT

IDLE DROP PROCEDURE

- 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 (min^{-1}) or smaller that will accurately indicate a 50 rpm (min^{-1}) change.

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

1. Remove the recoil starter cover (page 2-4). 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

07KMA-MN90101 or
07KMA-MN9A100
(U.S.A. only)

INITIAL OPENING: A,CM type: 2 turns out
U type: 1-3/4 turns out

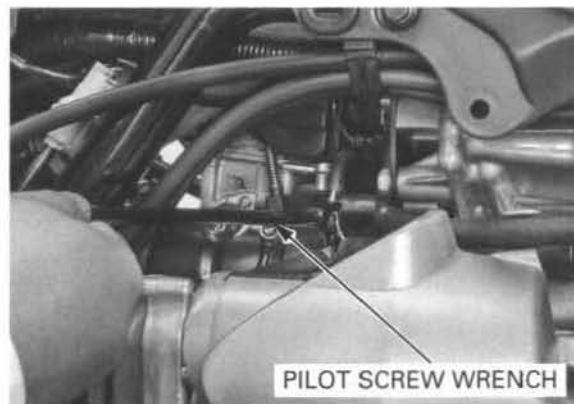
2. Warm up the engine to operating temperature. Stop and go riding for 10 minutes is sufficient.
3. Stop the engine and connect a tachometer according to the tachometer manufacturer's instructions.
4. Start the engine and adjust the idle speed with the throttle stop screw.

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

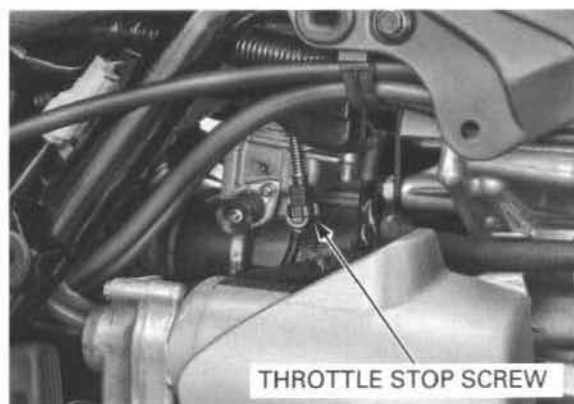
5. Turn the pilot screw in or out slowly to obtain the highest engine speed.
6. Lightly open the throttle 2-3 times, then adjust the idle speed with the throttle stop screw.
7. Turn the pilot screw in gradually until the engine speed drops by 100 rpm (min^{-1}).
8. Turn the pilot screw out to the final opening.

FINAL OPENING: 3/4 turn out from the position obtained step #7

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



PILOT SCREW WRENCH



THROTTLE STOP SCREW

HIGH ALTITUDE ADJUSTMENT (except U type)

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 5-6) 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 and replace it with a new one if necessary.

Install the float chamber and the carburetor.

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

TOOL:

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

HIGH ALTITUDE PILOT SCREW OPENING:

1/4 turn in from initial opening

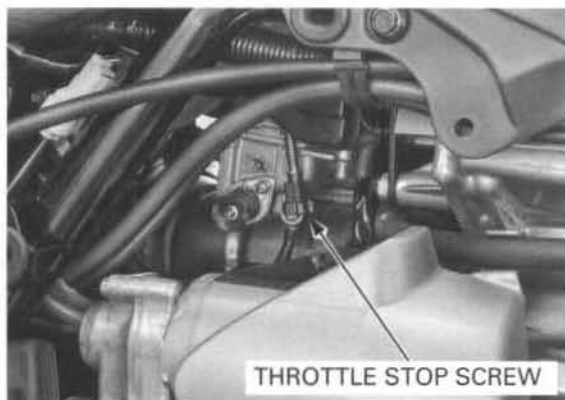
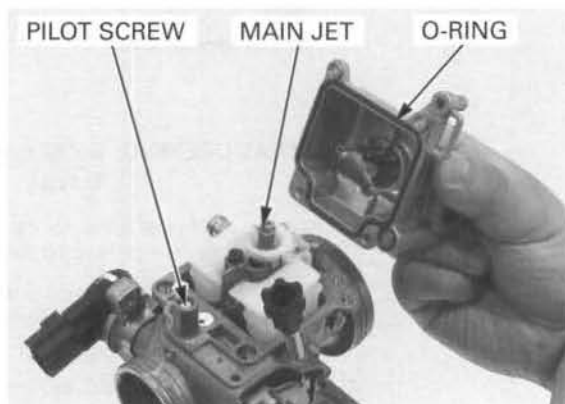
Start the engine and warm it up.

Adjust the idle speed at high altitude with the throttle stop screw to ensure proper high altitude operation.

IDLE SPEED: 1,400 ± 100 rpm (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 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

TOOL:

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

LOW ALTITUDE PILOT SCREW OPENING:

1/4 turn out from the high altitude setting

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

IDLE SPEED: 1,400 ± 100 rpm (min⁻¹)

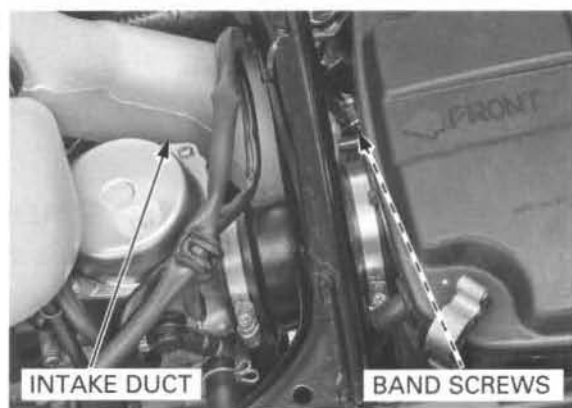
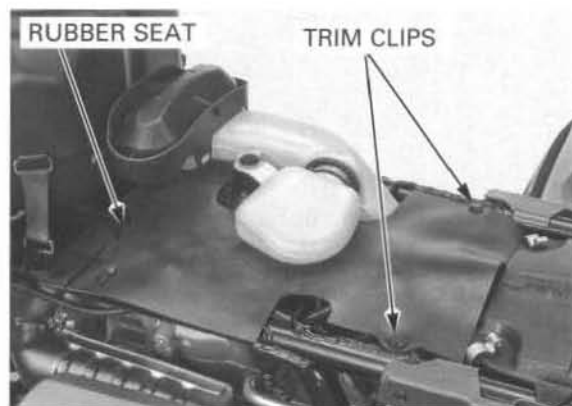
FUEL TANK

REMOVAL/INSTALLATION

Remove the fuel tank cover (page 2-6).

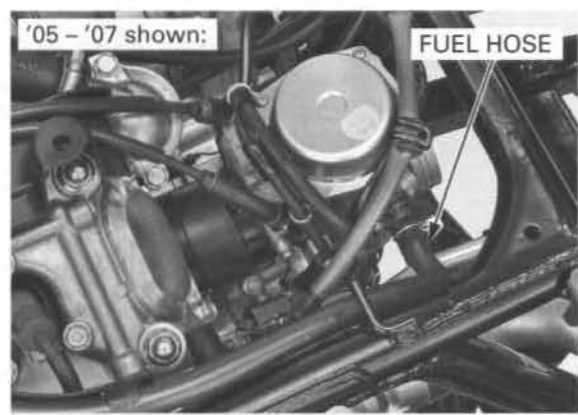
Remove the trim clips and rubber seat.

Loosen the band screw and remove the air intake duct from the air cleaner housing.

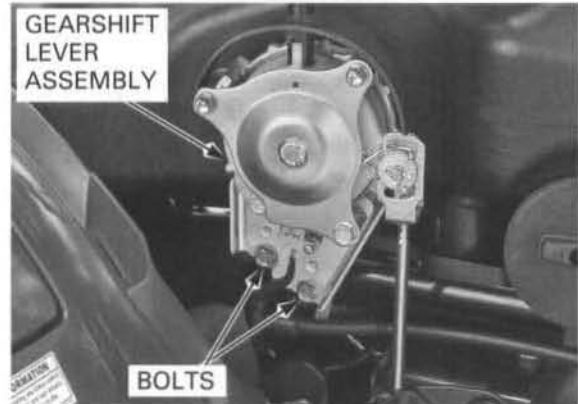


FUEL SYSTEM

Turn the fuel valve OFF and disconnect the fuel hose from the carburetor.



Remove the two bolts and gearshift lever assembly.



Unhook the two holder bands from the fuel tank, and remove the two bolts. Slide the tank to the backward and disconnect the fuel level sensor 2P (Red) connector. Remove the fuel tank.



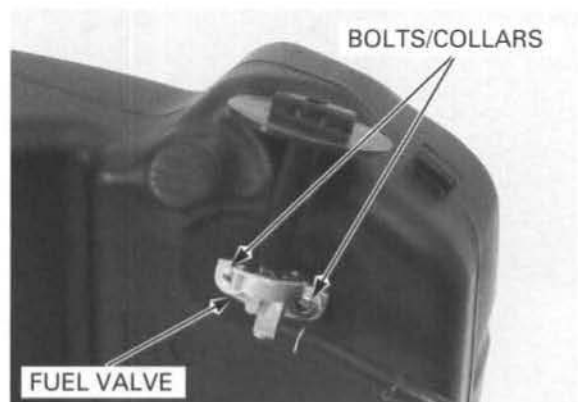
Install the fuel tank in the reverse order of removal.

- After connecting the fuel hose, turn the fuel valve ON and check that there is no fuel leak.

FUEL STRAINER SCREEN CLEANING

Remove the fuel tank (page 5-21).

Drain the gasoline into an approved fuel container. Turn fuel valve OFF and remove the two mounting bolts, collars and the fuel valve.



Remove the O-ring.

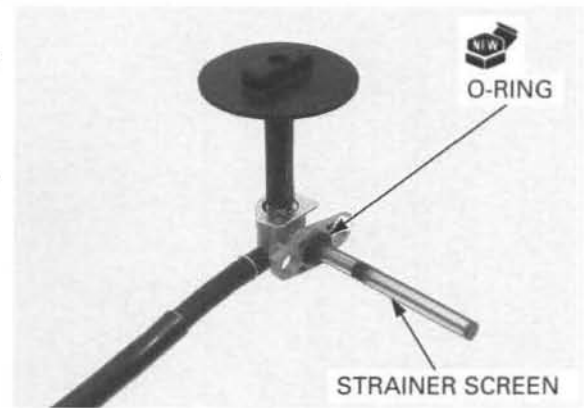
Clean the fuel strainer screen with non-flammable or high flash point solvent.

Dry the strainer screen thoroughly.

Install a new O-ring onto the fuel valve.

Install the fuel valve into the fuel tank with the two collars and bolts, and tighten the bolts securely.

Install the fuel tank (page 5-21).



MEMO

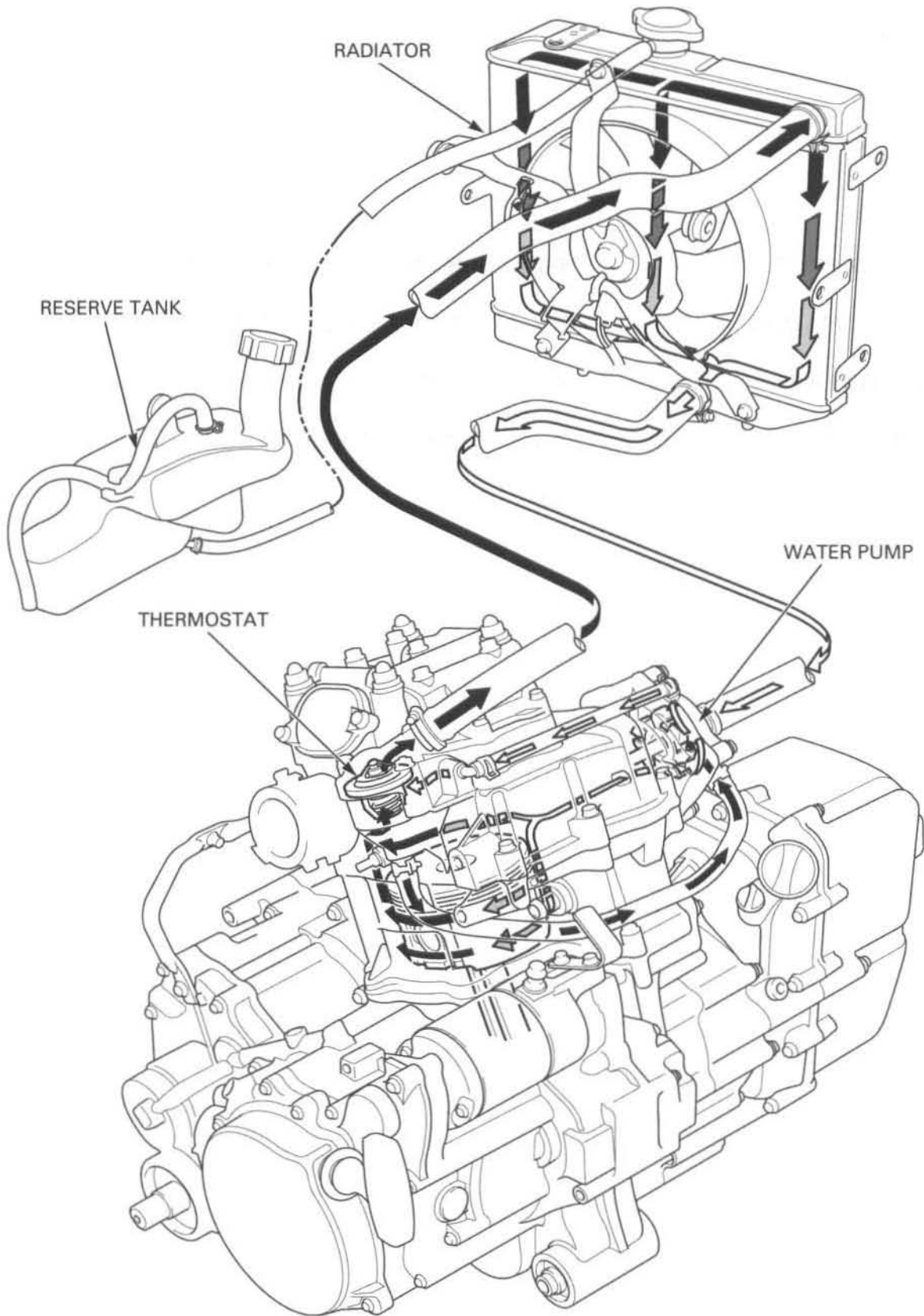


6. COOLING SYSTEM

SYSTEM FLOW PATTERN	6-2	RADIATOR RESERVE TANK	6-7
SERVICE INFORMATION	6-3	RADIATOR/COOLING FAN	6-7
TROUBLESHOOTING	6-3	THERMOSTAT	6-10
SYSTEM TESTING	6-4	WATER PUMP	6-12
COOLANT REPLACEMENT	6-5		

COOLING SYSTEM

SYSTEM FLOW PATTERN



SERVICE INFORMATION

GENERAL

⚠ WARNING

Removing the radiator cap while the engine is hot can allow the coolant to spray out, seriously scalding you. Always let the engine and radiator cool down before removing the radiator cap.

NOTICE

Using coolant with silicate inhibitors may cause premature wear of water pump seals or blockage of radiator passage. Using tap water may cause engine damage.

- If any coolant gets in your eyes, rinse them with water and consult a doctor immediately.
- If any coolant is swallowed, induce vomiting, gargle and consult a physician immediately.
- If any coolant gets on your skin or clothes, rinse thoroughly with plenty of water.
- Add coolant to the system at the reserve tank. Do not remove the radiator cap except to refill or drain the system.
- All cooling system service can be done with the engine in the frame.
- Avoid spilling coolant on painted surfaces.
- After servicing the system, check for leaks with a cooling system tester.
- Refer to 22-21 for engine coolant temperature sensor information.

SPECIFICATIONS

ITEM		SPECIFICATIONS
Coolant capacity	Radiator and engine	1.7 liters (1.8 US qt, 1.5 Imp qt)
	Reserve tank	0.40 liter (0.42 US qt, 0.35 Imp qt)
Radiator cap relief pressure		108 – 137 kPa (1.1 – 1.4 Kg/cm ² , 16 – 20 psi)
Thermostat	Begin to open	80 – 84° C (176 – 183° F)
	Fully open	95° C (203° F)
	Valve lift	8 mm (0.3 in) minimum
Recommended antifreeze		Pro Honda HP Coolant or an equivalent high quality ethylene glycol antifreeze containing silicate-free corrosion inhibitors
Standard coolant concentration		1:1 mixture with soft water

TROUBLESHOOTING

Engine temperature too high

- Thermostat stuck closed
- Faulty radiator cap
- Insufficient coolant
- Passage blocked in radiator, hoses or water jacket
- Air in system
- Faulty cooling fan motor
- Faulty water pump
- Faulty temperature indicator drive circuit (page 22-17)
- Faulty fan motor drive circuit (page 22-17)

Coolant leaks

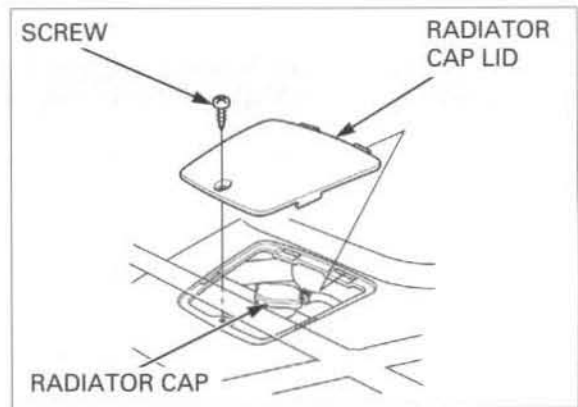
- Faulty water pump mechanical seal
- Deteriorated O-rings
- Faulty radiator cap
- Damaged or deteriorated cylinder head gasket
- Loose hose connection or clamp
- Damaged or deteriorated hoses

COOLING SYSTEM

SYSTEM TESTING

Remove the screw and radiator cap lid from the front fender.

Remove the radiator cap.

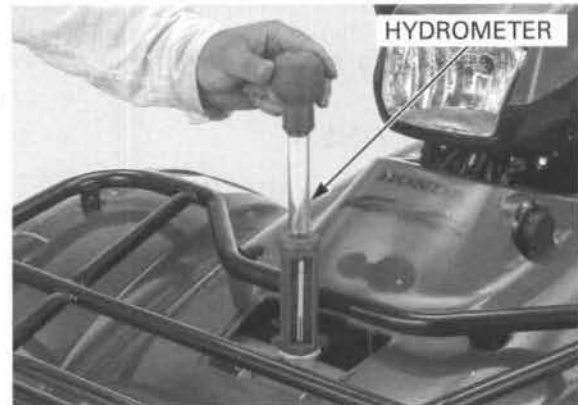


COOLANT (HYDROMETER TEST)

Test the coolant gravity using a hydrometer.

STANDARD COOLANT CONCENTRATION: 1:1

Look for contamination and replace the coolant if necessary.



		Coolant temperature °C (°F)										
		0 (32)	5 (41)	10 (50)	15 (59)	20 (68)	25 (77)	30 (86)	35 (95)	40 (104)	45 (113)	50 (122)
Coolant ratio%	5	1.009	1.009	1.008	1.008	1.007	1.006	1.005	1.003	1.001	0.999	0.997
	10	1.018	1.017	1.017	1.016	1.015	1.014	1.013	1.011	1.009	1.007	1.005
	15	1.028	1.027	1.026	1.025	1.024	1.022	1.020	1.018	1.016	1.014	1.012
	20	1.036	1.035	1.034	1.033	1.031	1.029	1.027	1.025	1.023	1.021	1.019
	25	1.045	1.044	1.043	1.042	1.040	1.038	1.036	1.034	1.031	1.028	1.025
	30	1.053	1.052	1.051	1.049	1.047	1.045	1.043	1.041	1.038	1.035	1.032
	35	1.063	1.062	1.060	1.058	1.056	1.054	1.052	1.049	1.046	1.043	1.040
	40	1.072	1.070	1.068	1.066	1.064	1.062	1.059	1.056	1.053	1.050	1.047
	45	1.080	1.078	1.076	1.074	1.072	1.069	1.066	1.063	1.060	1.057	1.054
	50	1.086	1.084	1.082	1.080	1.077	1.074	1.071	1.068	1.065	1.062	1.059
	55	1.095	1.093	1.091	1.088	1.085	1.082	1.079	1.076	1.073	1.070	1.067
60	1.100	1.098	1.095	1.092	1.089	1.086	1.083	1.080	1.077	1.074	1.071	

RADIATOR CAP/SYSTEM PRESSURE INSPECTION

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

Pressure test the radiator cap using the tester. Replace the radiator cap if it does not hold pressure, or if relief pressure is too high or too low. It must hold specified pressure for at least 6 seconds.

RADIATOR CAP RELIEF PRESSURE:

108 – 137 kPa (1.1 – 1.4 kgf/cm², 16 – 20 psi)

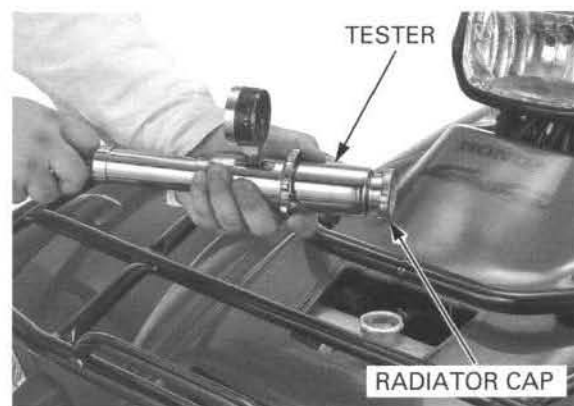
Pressure the radiator, engine and hoses using the tester, and check for leaks.

NOTICE

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

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

Remove the tester and install the radiator cap. Install the radiator cap lid and tighten the screw.



COOLANT REPLACEMENT

PREPARATION

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

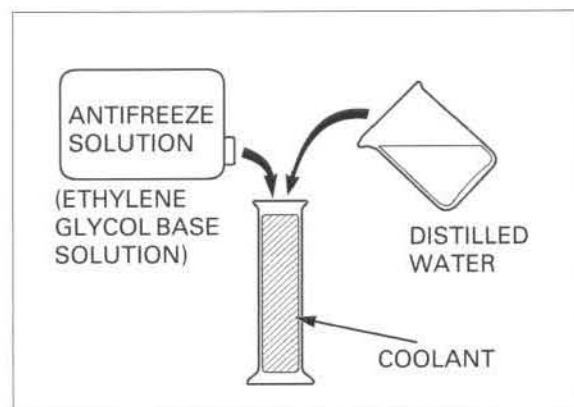
Mix only distilled water with the recommended anti-freeze.

RECOMMENDED ANTIFREEZE:

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

RECOMMENDED MIXTURE:

1:1 (Distilled water and recommended antifreeze)



COOLING SYSTEM

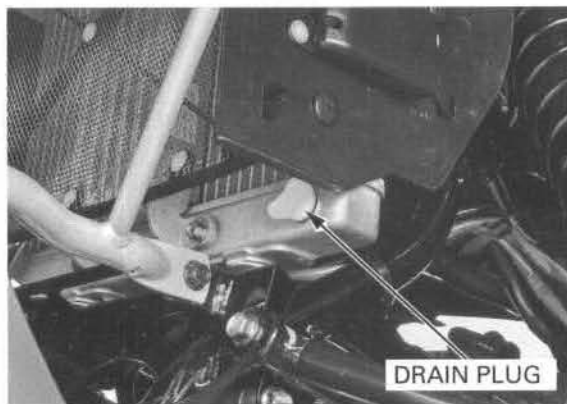
REPLACEMENT/AIR BLEEDING

- When filling the system with a coolant, place the vehicle on a flat, level surface.

Remove the radiator cap (page 6-4).

Remove the drain plug and drain the coolant from the radiator.

Install the drain plug with a new seal rubber.

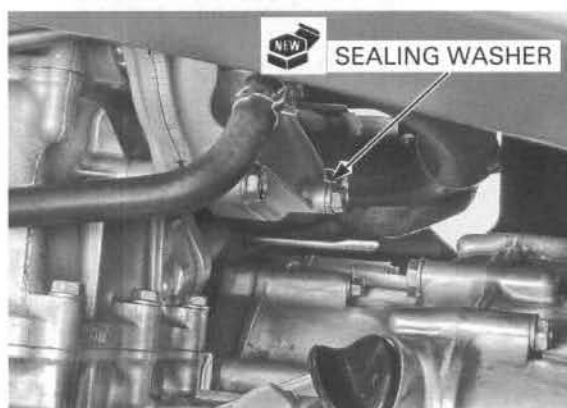


Remove the fuel tank cover (page 2-6).

Remove the drain bolt and drain the coolant from the engine.

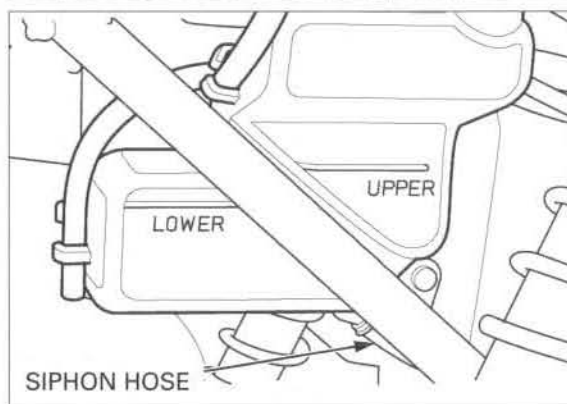
Install the drain bolt with a new sealing washer.

Install the fuel tank cover (page 2-6).



Disconnect the siphon hose and drain the coolant from the radiator reserve tank.

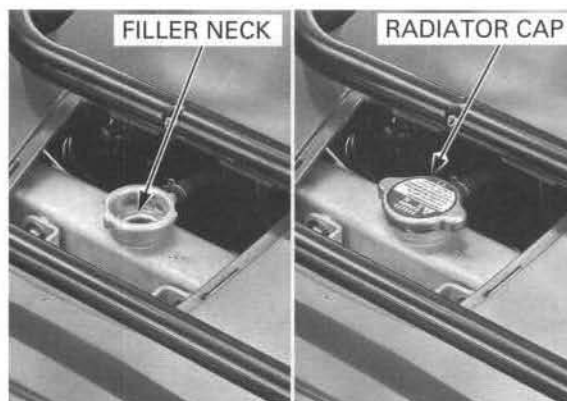
Connect the siphon hose to the reserve tank.



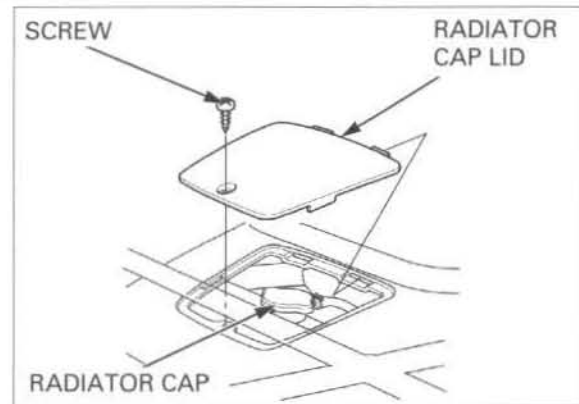
Fill the system with recommended coolant up to the filler neck with the motorcycle on its side stand.

Bleed air from the system as follows:

1. Shift the transmission into neutral.
Start the engine and let it idle for 2 - 3 minutes.
2. Snap the throttle 3 - 4 times to bleed air from the system.
3. Stop the engine and add coolant up to the filler neck.
4. Install the radiator cap.

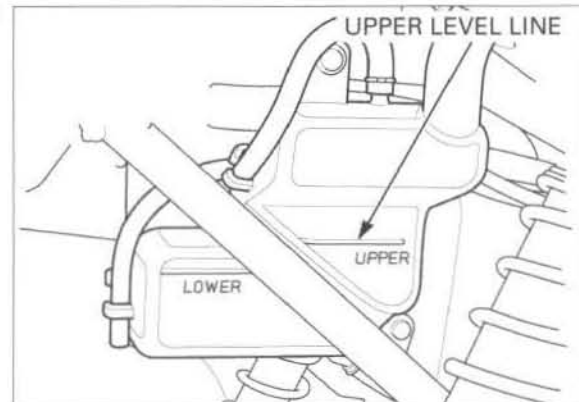


Install the radiator cap lid and tighten the screw.



Fill the reserve tank to the upper level line with the vehicle on a flat, level surface.

Install the reserve tank cap.

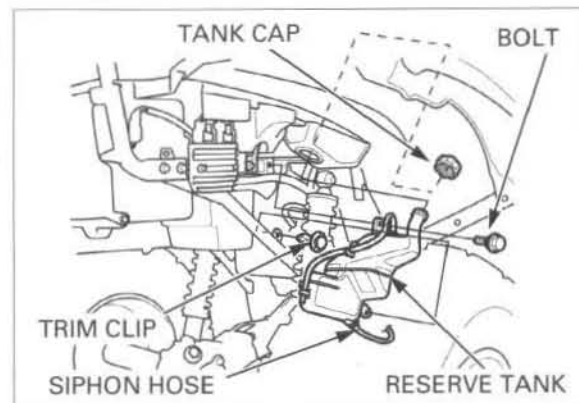


RADIATOR RESERVE TANK

REMOVAL/INSTALLATION

Remove the reserve tank cap.
Remove the trim clip, mounting bolt and reserve tank.
Disconnect the siphon hose from the reserve tank and drain the coolant.

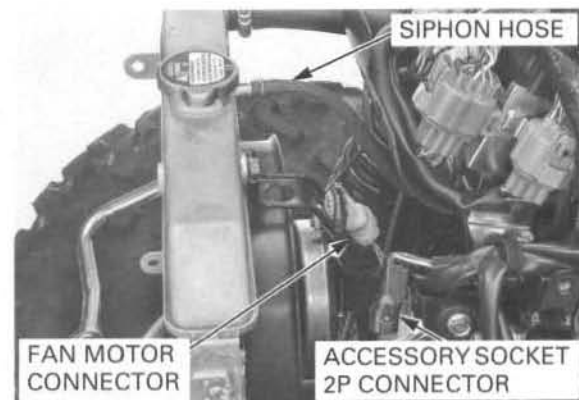
Install the reserve tank in the reverse order of removal.
Fill the reserve tank to the upper level line.



RADIATOR/COOLING FAN

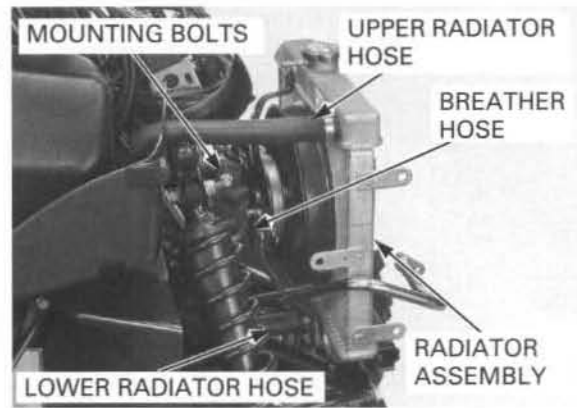
RADIATOR REMOVAL

Remove the oil cooler (page 4-7).
Drain the coolant from the radiator (page 6-5).
Disconnect the fan motor 2P connector.
Remove the accessory socket 2P connector from the stay of the fan shroud.
Disconnect the siphon hose from the radiator.



COOLING SYSTEM

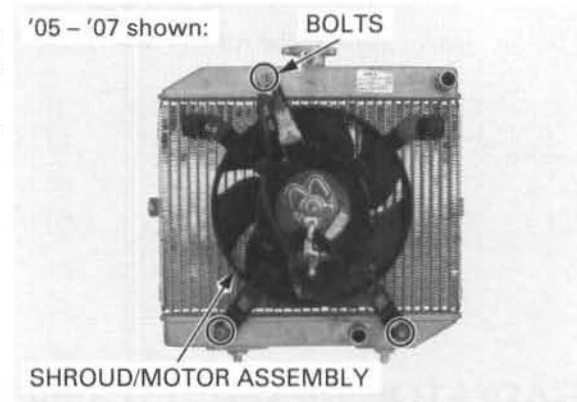
Disconnect the fan motor breather hose.
Disconnect the upper and lower radiator hoses.
Remove the two mounting bolts and radiator assembly from the frame.



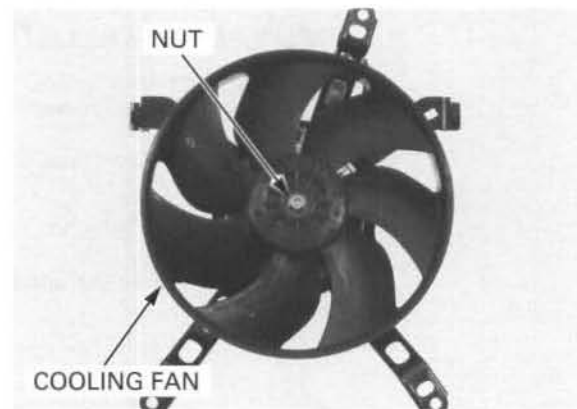
COOLING FAN DISASSEMBLY

Remove the radiator.
Free the fan motor wire and breather hose from the clamp, and disconnect the breather hose from the motor.

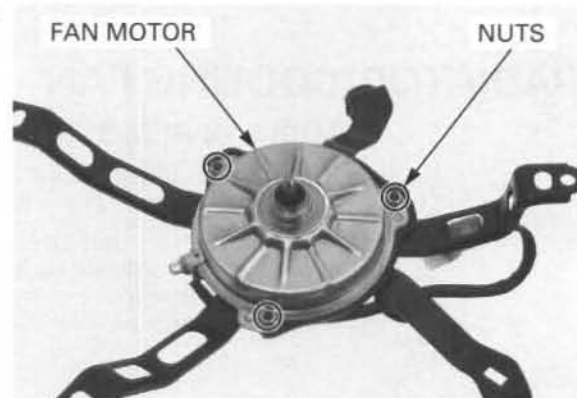
Remove the three bolts and fan shroud/motor assembly from the radiator.



Remove the nut and cooling fan from the motor.

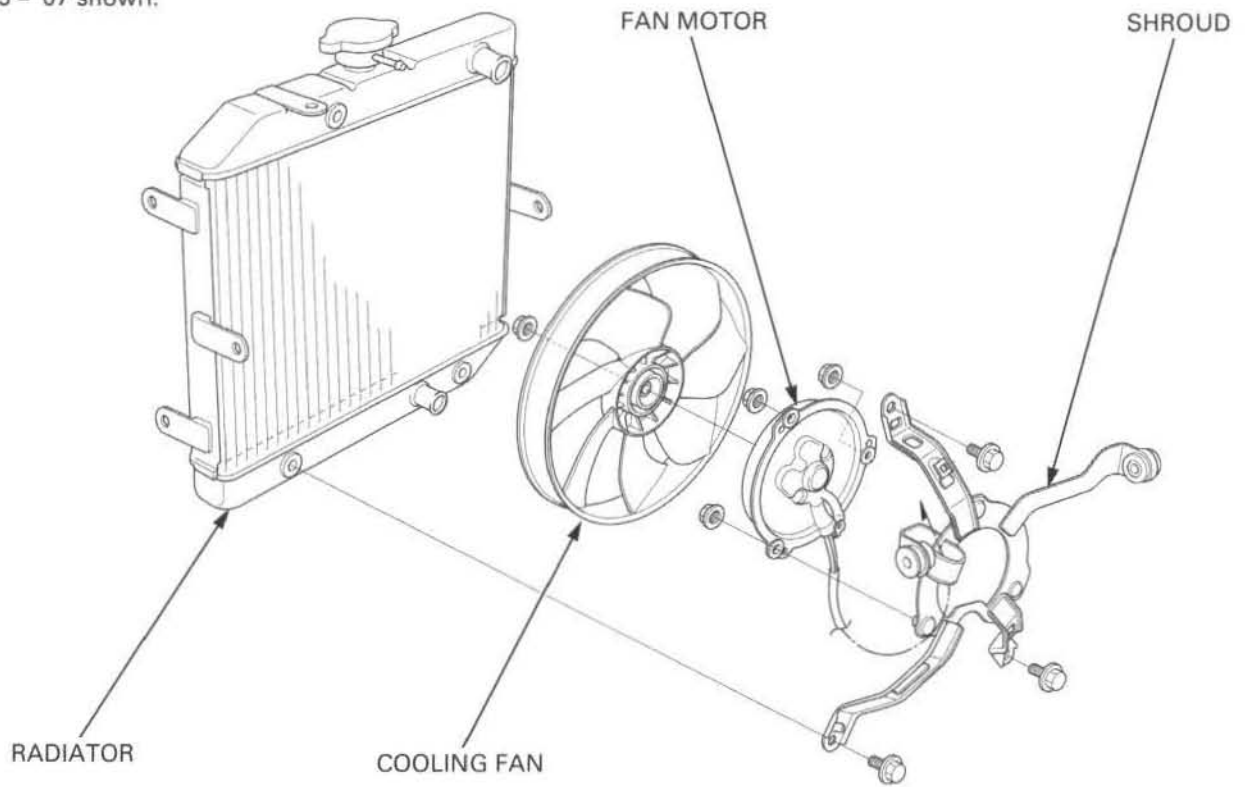


Remove the three nuts and the fan motor from the shroud.

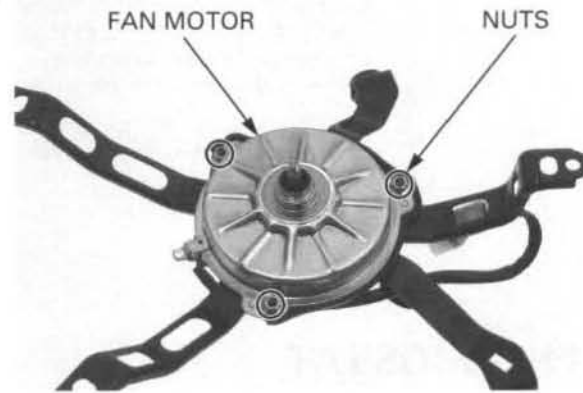


COOLING FAN ASSEMBLY

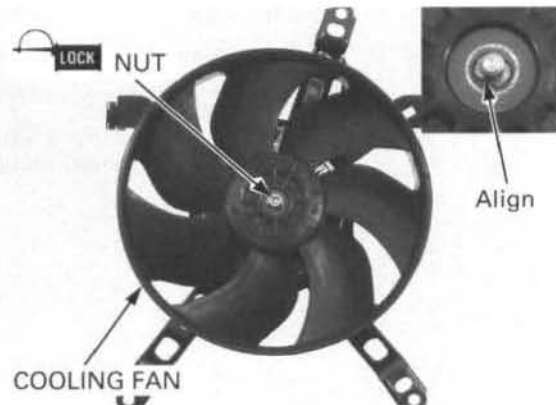
'05 - '07 shown:



Install the fan motor onto the shroud and tighten the three nuts securely.

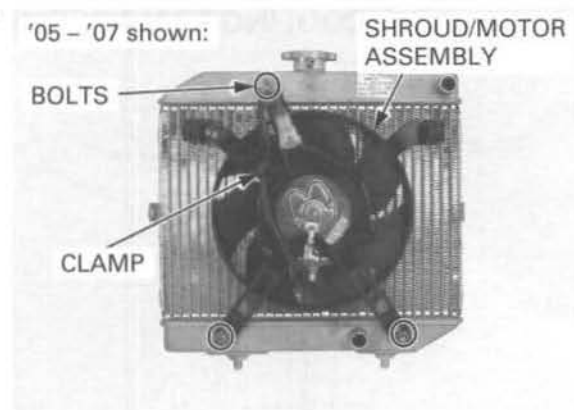


Install the cooling fan onto the motor shaft, aligning the flat surfaces. Apply locking agent to the motor shaft threads. Install and tighten the nut.



COOLING SYSTEM

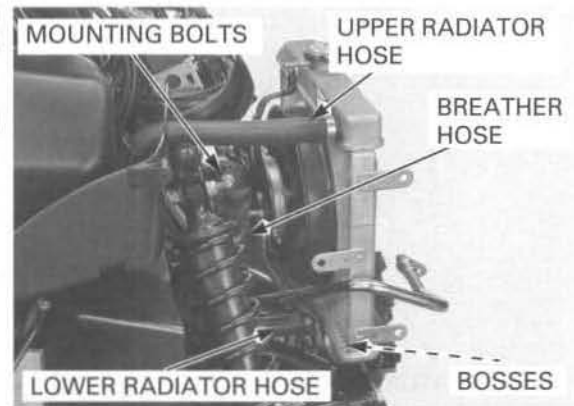
Install the fan shroud/motor assembly onto the radiator and tighten the three bolts.
Clamp the fan motor wire.



RADIATOR INSTALLATION

Install the radiator/cooling fan assembly, aligning the lower mounting bosses with the holes in the frame.

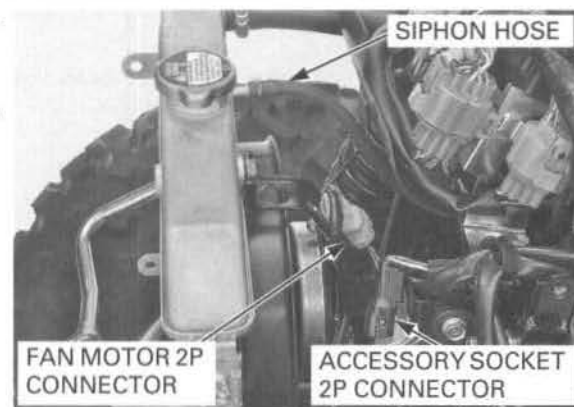
Install and tighten the two mounting bolts.
Connect the upper and lower radiator hoses, and tighten the hose band screws.
Connect the fan motor breather hose.



Route the fan motor wire and breather hose properly (page 1-24).

Connect the fan motor 2P connector.
Install the accessory socket 2P connector onto the stay of the fan motor shroud.
Connect the siphon hose to the radiator.

Install the oil cooler (page 4-7).
Fill and bleed the cooling system (page 6-5).



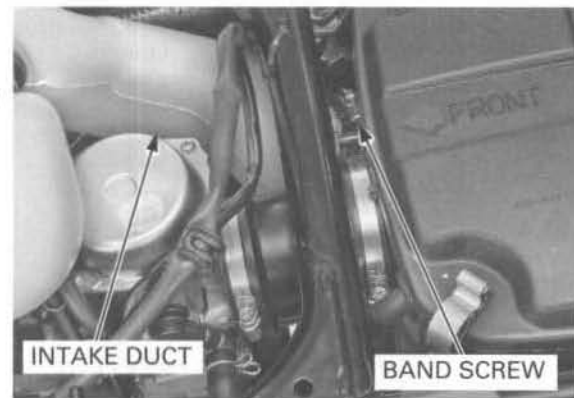
THERMOSTAT

REMOVAL

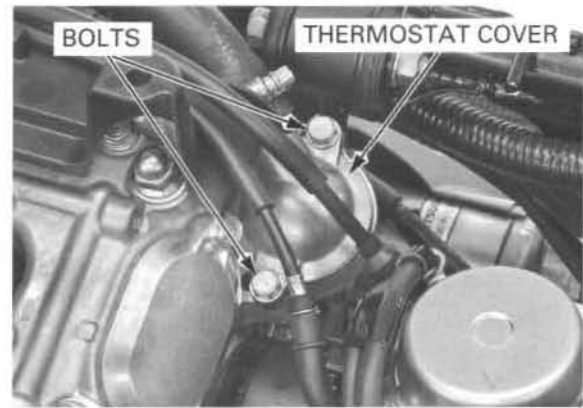
Drain the coolant from the engine (page 6-5).

Remove the fuel tank cover (page 2-6).

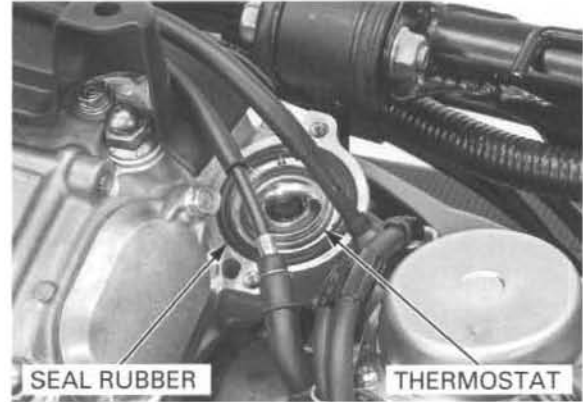
Loosen the band screw and remove the air intake duct from the air cleaner housing.



Remove the two bolts and thermostat cover.



Remove the thermostat from the cylinder head.
Remove the seal rubber from the thermostat.



INSPECTION

Visually inspect the thermostat for damage.
Make sure the rubber seal on the thermostat is in good condition.
Replace the thermostat if the valve stays open at room temperature or the rubber seal is damaged.

Keep flammable materials away from the electric heating element.

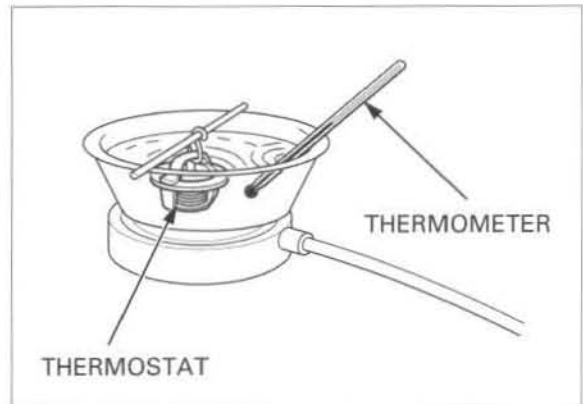
Do not let the thermometer or thermostat touch the pan, or you will get false readings.

Heat the water with an electric heating element to operating temperature for 5 minutes.
Suspend the thermostat in heated water to check its operation.

THERMOSTAT BEGINS TO OPEN:
80 – 84° C (176 – 183° F)

VALVE LIFT:
8 mm (0.3 in) minimum at 95° C (203° F)

Replace the thermostat if the valve responds at temperature other than those specified.



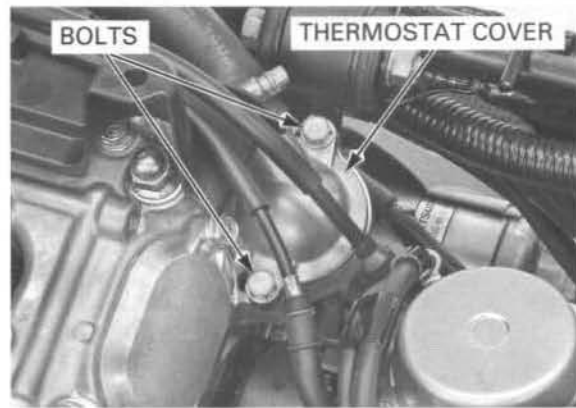
INSTALLATION

Install the thermostat into the cylinder head by aligning the boss of the thermostat with the stopper in the cylinder head.



COOLING SYSTEM

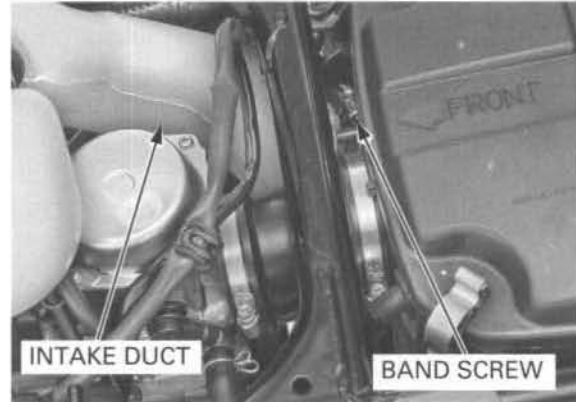
Install the thermostat cover and tighten the two bolts.



Install the air intake duct and tighten the band screw.

Install the fuel tank cover (page 2-6).

Fill and bleed the cooling system (page 6-5).

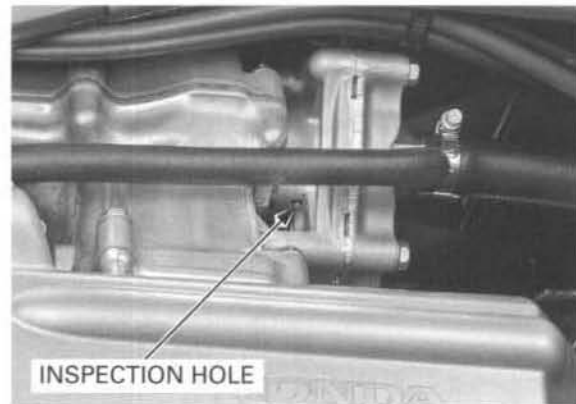


WATER PUMP

MECHANICAL SEAL INSPECTION

Check the inspection hole for signs of coolant leakage.

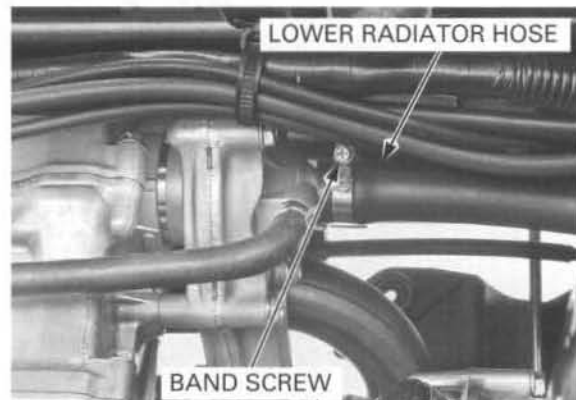
If there is leakage, the water pump mechanical seal is defective, and the water pump assembly should be replaced.



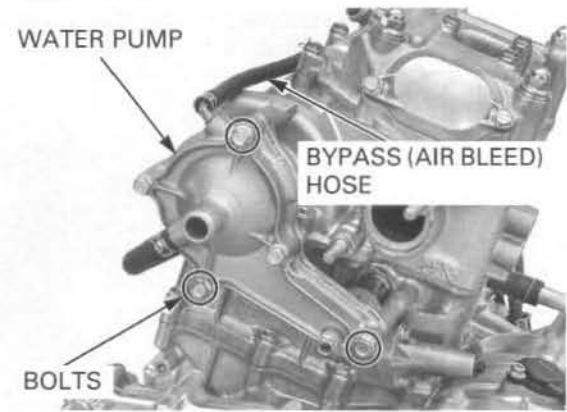
REMOVAL

Drain the coolant from the engine (page 6-5).

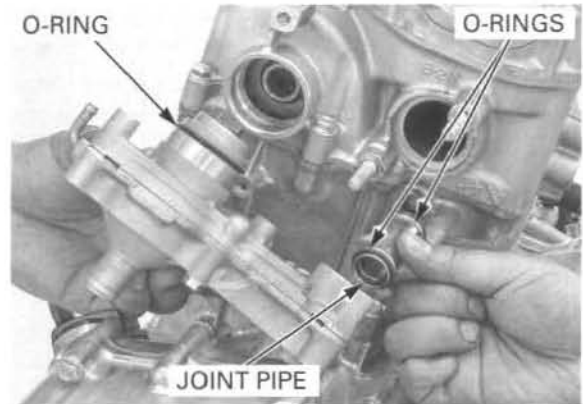
Loosen the band screw and disconnect the lower radiator hose from the water pump.



Disconnect the bypass hoses from the water pump.
Remove the three bolts and water pump.



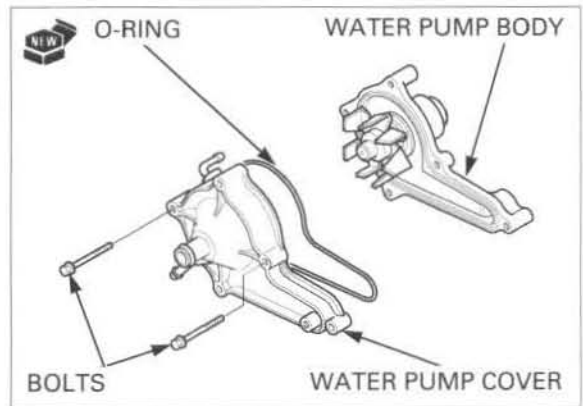
Remove the water joint pipe and O-rings.



DISASSEMBLY/ASSEMBLY

Remove the two bolts and separate the water pump cover and water pump body.
Remove the O-ring.

Install a new O-ring and assemble the water pump cover and water pump body.
Install and tighten the two bolts.



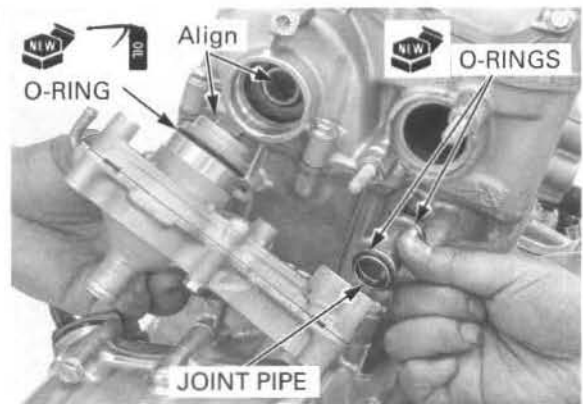
INSTALLATION

Do not apply oil to the O-rings.

Install a new O-ring onto the pump side of the water joint pipe.
Install a new O-ring onto the engine side of the water joint pipe.

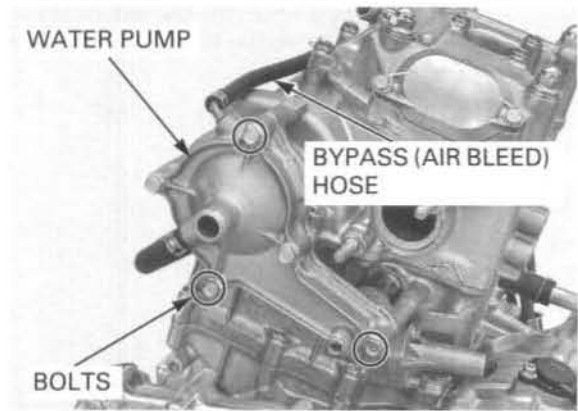
Coat a new O-ring with oil and install it onto the water pump.

Install the water pump onto the engine while aligning the flat end of the pump shaft with the slot in the camshaft.



COOLING SYSTEM

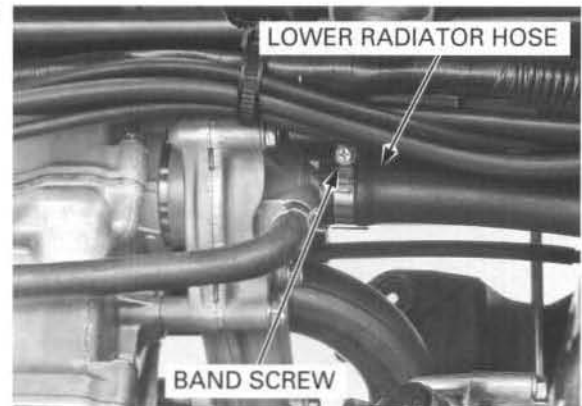
Install the three bolts and tighten them securely.
Connect the bypass hoses to the water pump.



Connect the lower radiator hose to the water pump and tighten the band screw securely.

Install the fuel tank cover (page 2-6).

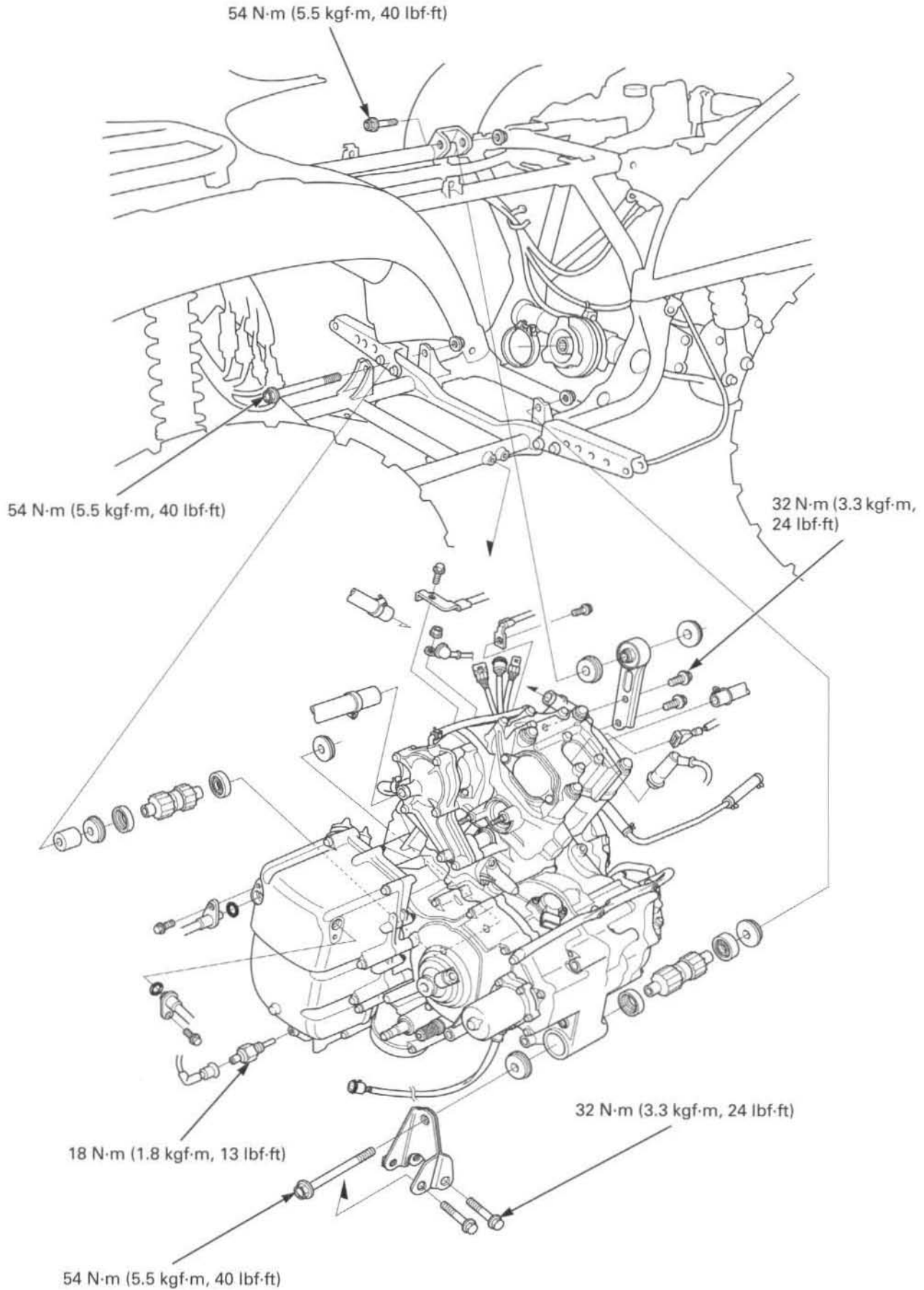
Fill and bleed the cooling system (page 6-5).



7. ENGINE REMOVAL/INSTALLATION

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

SYSTEM COMPONENTS



SERVICE INFORMATION

GENERAL

- When removing/installing the engine, tape the frame around the engine beforehand to protect the frame.
- The following components require engine removal for service:
 - sub-transmission (page 12-12)
 - crankshaft and automatic transmission (page 13-8)

SPECIFICATIONS

ITEM		SPECIFICATIONS
Engine dry weight		62.9 kg (138.7 lbs)
Engine oil capacity	After draining	4.4 liters (4.7 US qt, 3.9 Imp qt)
	After draining/filter change	4.6 liters (4.9 US qt, 4.0 Imp qt)
	After disassembly	5.2 liters (5.5 US qt, 4.6 Imp qt)

TORQUE VALUES

Left lower engine hanger bracket bolt		32 N·m (3.3 kgf·m, 24 lbf·ft)	
Lower engine hanger nut	(left and right)	54 N·m (5.5 kgf·m, 40 lbf·ft)	
Upper engine hanger bracket bolt	(frame side)	54 N·m (5.5 kgf·m, 40 lbf·ft)	
Upper engine hanger bracket nut	(engine side)	32 N·m (3.3 kgf·m, 24 lbf·ft)	
Engine oil temperature (EOT) sensor		18 N·m (1.8 kgf·m, 13 lbf·ft)	
Gearshift lever linkage arm pivot bolt		27 N·m (2.8 kgf·m, 20 lbf·ft)	Apply locking agent to the threads
Differential case mounting bolt	(10 mm)	44 N·m (4.5 kgf·m, 33 lbf·ft)	
Differential case mounting bracket bolt	(8 mm)	22 N·m (2.2 kgf·m, 16 lbf·ft)	
Differential case mounting nut	(10 mm)	44 N·m (4.5 kgf·m, 33 lbf·ft)	Lock nut: replace with a new one
Differential case mounting nut	(8 mm)	22 N·m (2.2 kgf·m, 16 lbf·ft)	

ENGINE REMOVAL/INSTALLATION

ENGINE REMOVAL

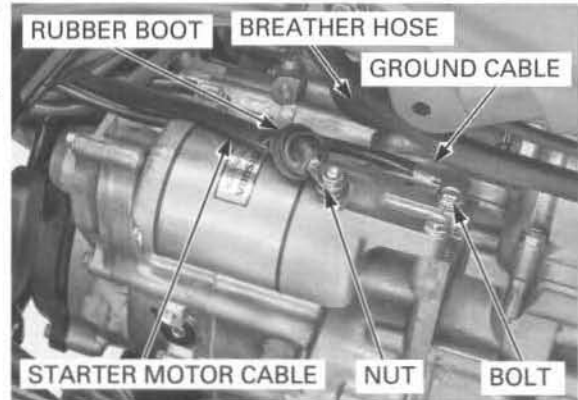
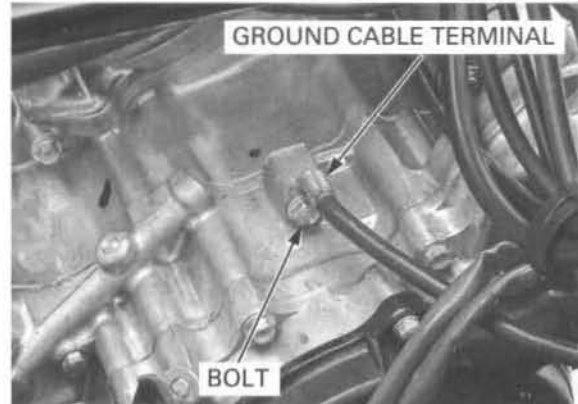
Drain the engine oil (page 3-14).
Drain the coolant from the engine (page 6-5).

Remove the following:

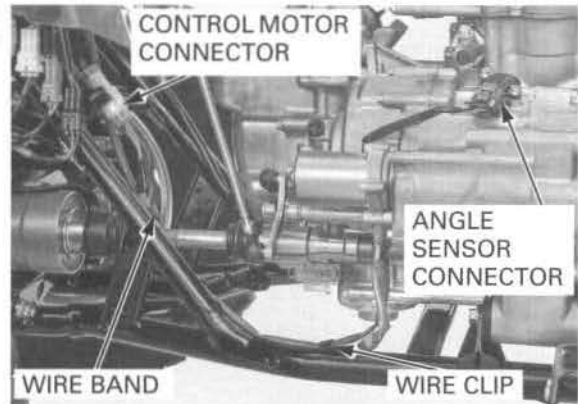
- left and right center mud guards (page 2-7)
- left and right front mud guards (page 2-8)
- right and left inner fender (page 2-9)
- exhaust system (page 2-15)
- carburetor (page 5-6)
- heat guard (page 8-6)
- bolt and ground cable terminal

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

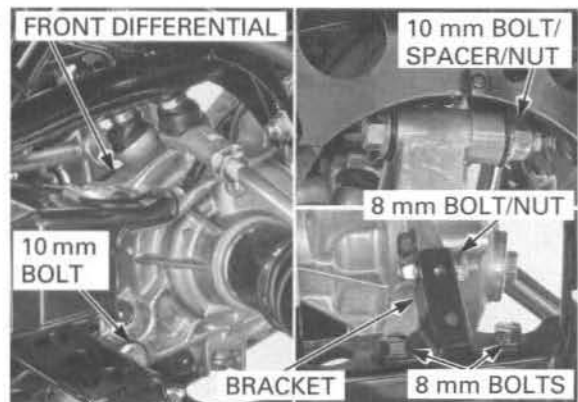
Remove the bolt and ground cable.
Disconnect the crankcase breather hose from the cylinder.



Free the control motor and angle sensor wires from the wire band and clip, and disconnect their connectors.



Remove the front differential mounting bolts, nuts and bracket.
Move the front differential forward.

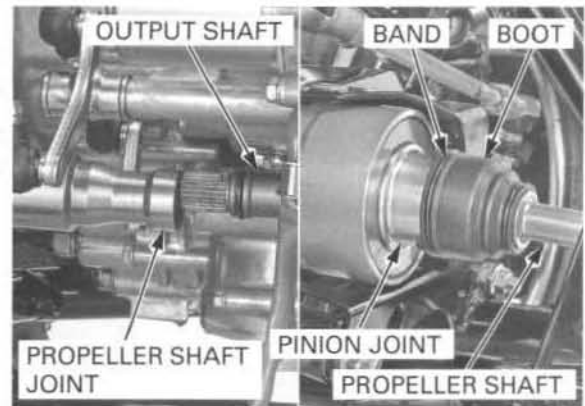


ENGINE REMOVAL/INSTALLATION

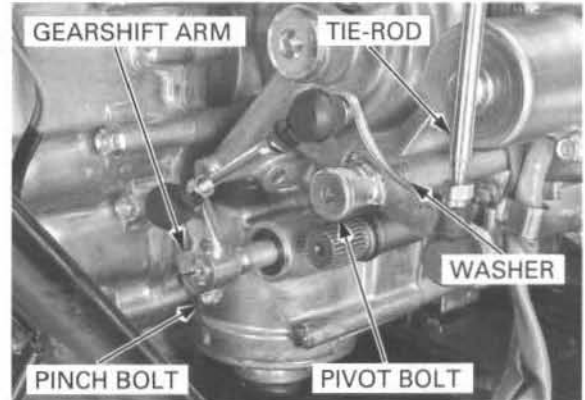
Pull the propeller shaft joint out of the output shaft.

Remove the boot band from the dust boot and release the dust boot off the pinion joint of the front differential.

Pull the propeller shaft to force the stopper ring at the propeller shaft end past the groove in the pinion joint and remove the propeller shaft.



Make sure that the sub-transmission is into neutral. Remove the pivot bolt, washer, pinch bolt and the gearshift arm from the gearshift spindle. Pivot the tie-rod out of the way.



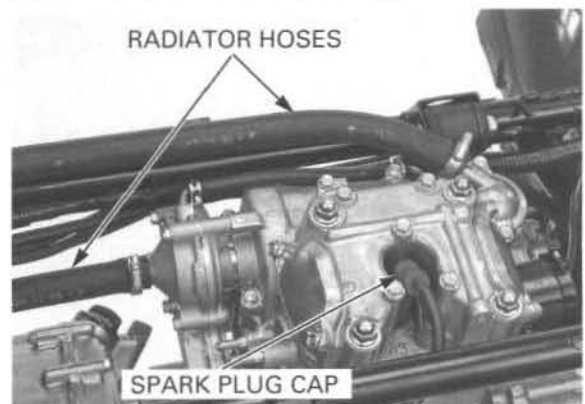
Remove the following from the stays and disconnect them:

- alternator/ignition pulse generator connector
- gear position switch connector

Free the wires from the wire clip.

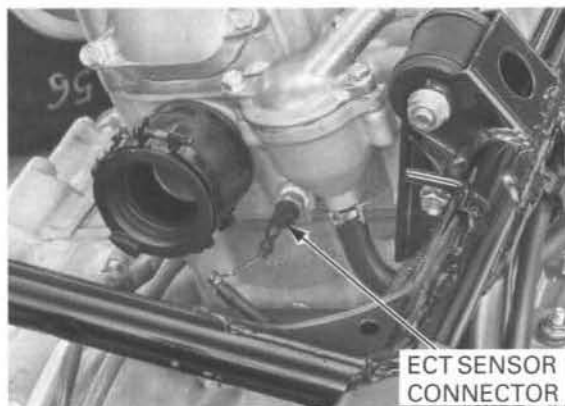


Remove the spark plug cap from the plug. Loosen the band screws and disconnect the upper and lower radiator hoses from the thermostat cover and water pump.

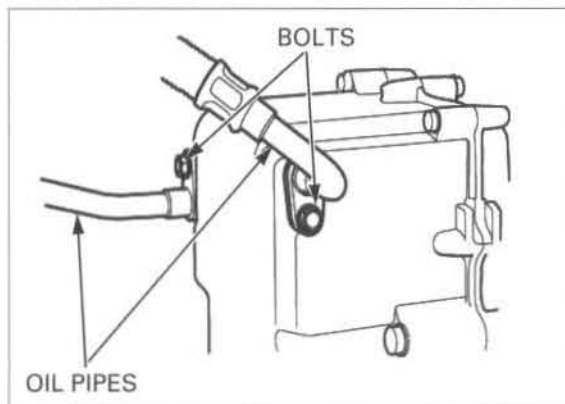


ENGINE REMOVAL/INSTALLATION

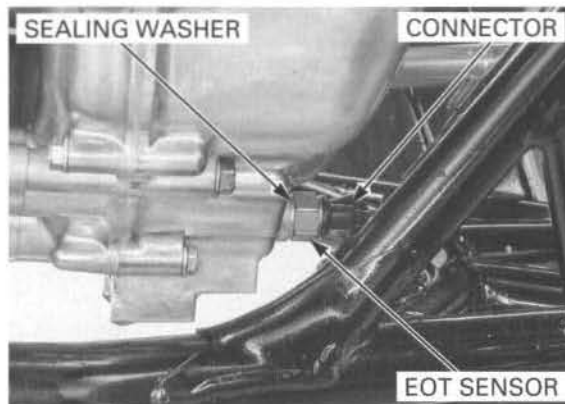
Disconnect the engine coolant temperature (ECT) sensor connector.



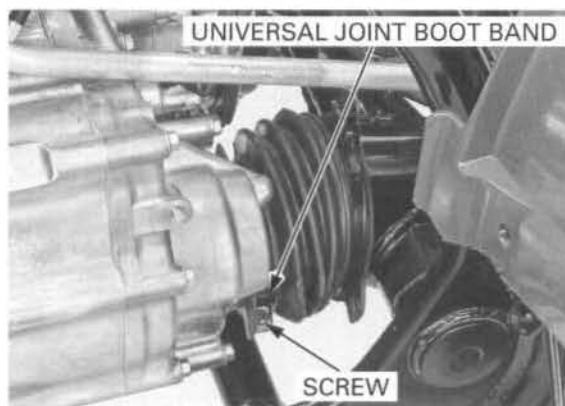
Remove the bolts and oil pipes from the oil tank.



Disconnect the engine oil temperature (EOT) sensor connector and remove the EOT sensor and sealing washer.

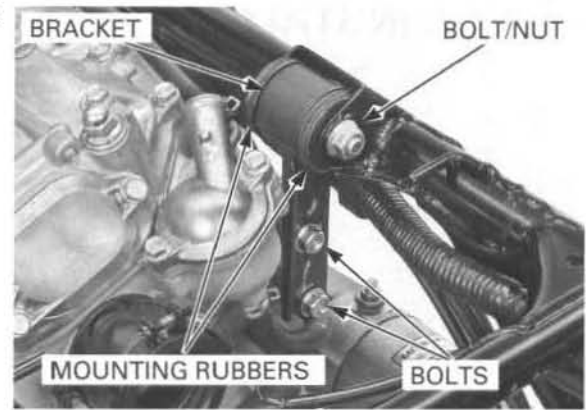


Remove the screw and universal joint boot band. Remove the boot from the engine.



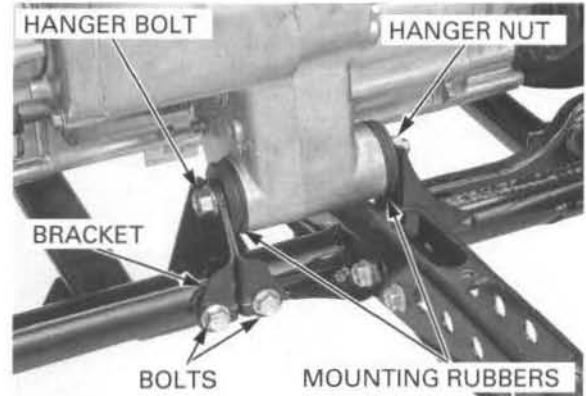
ENGINE REMOVAL/INSTALLATION

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



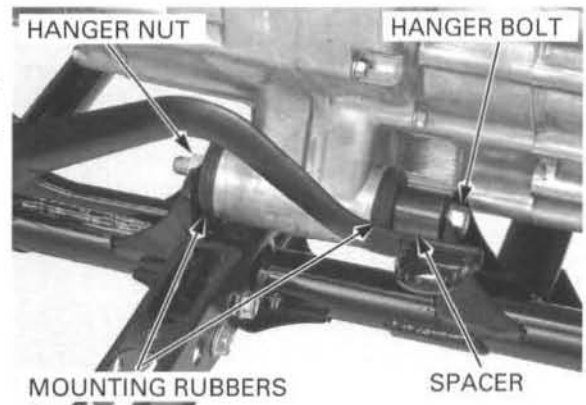
Remove the following:

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

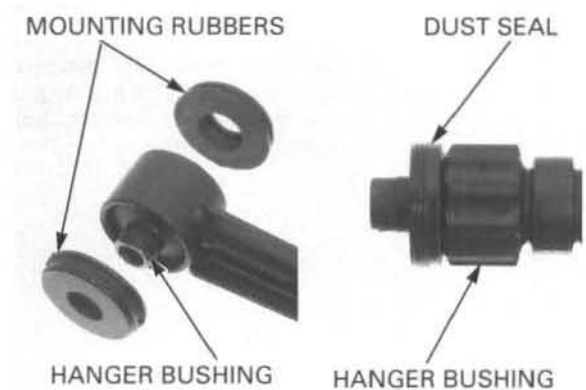


- right lower engine hanger nut and bolt
- spacer and mounting rubbers

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

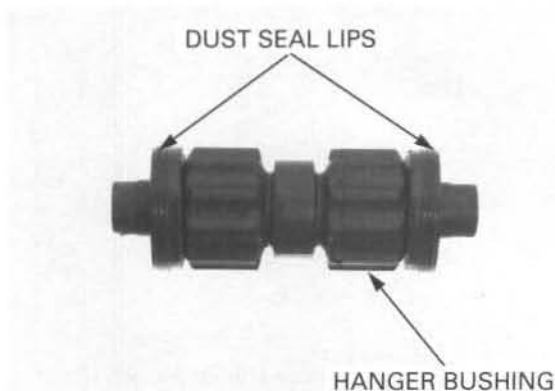


Remove the engine hanger bushings and dust seals. Check the mounting rubbers, hanger bushings and dust seals for wear or damage.

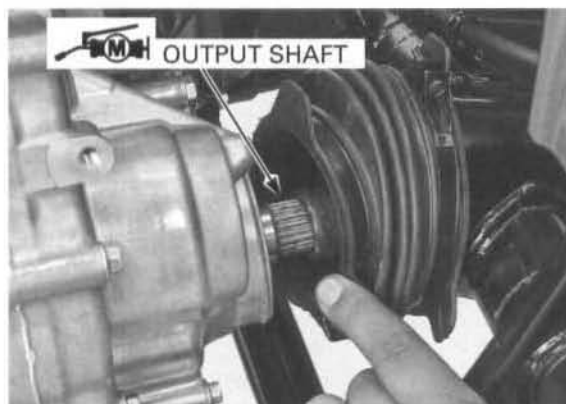


ENGINE INSTALLATION

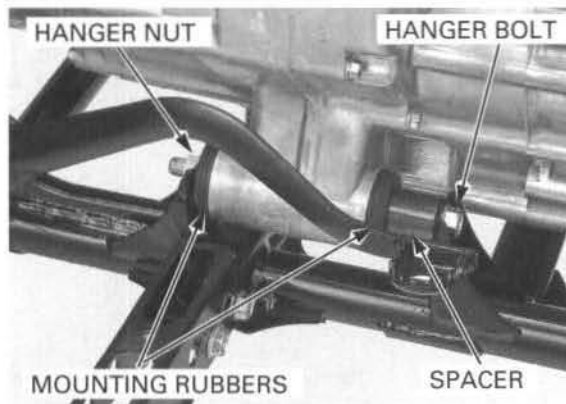
Install the lower hanger bushings into the engine lower mounts.
Install the dust seals with the lip side facing out.



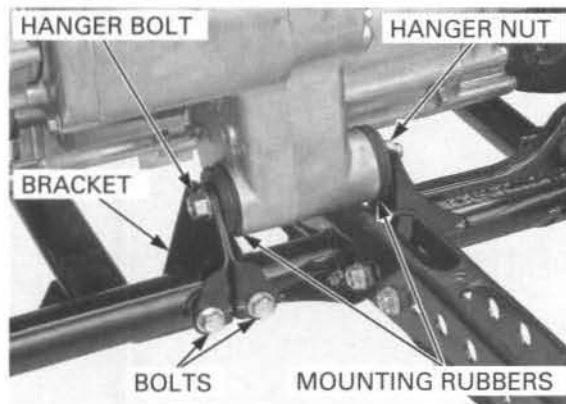
Apply molybdenum disulfide grease to the output shaft splines.
Install the engine in the frame from the left side.
Engage the output shaft with the universal joint.



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



ENGINE REMOVAL/INSTALLATION

Install the mounting rubbers on the upper hanger bushing with the large I.D. side facing in.
Install the upper engine hanger bracket and bolts.

After installing all the mounting fasteners and seat them, tighten the fasteners in order as follows.

Tighten the left and right lower engine hanger nuts.

TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)

Tighten the left lower hanger bracket bolts.

TORQUE: 32 N·m (3.3 kgf·m, 24 lbf·ft)

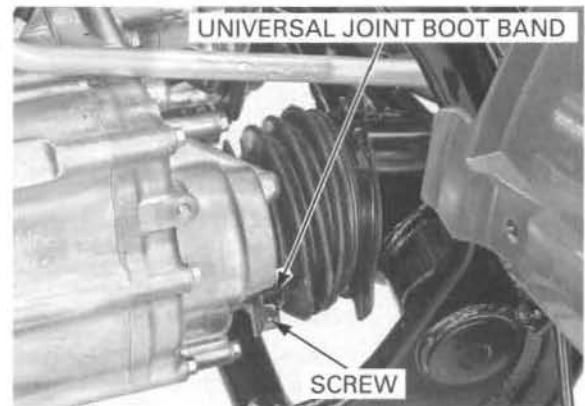
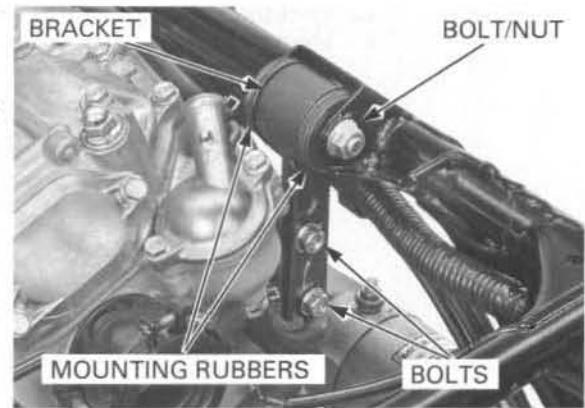
Tighten the engine side upper hanger bolts.

TORQUE: 32 N·m (3.3 kgf·m, 24 lbf·ft)

Tighten the frame side upper hanger nut.

TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)

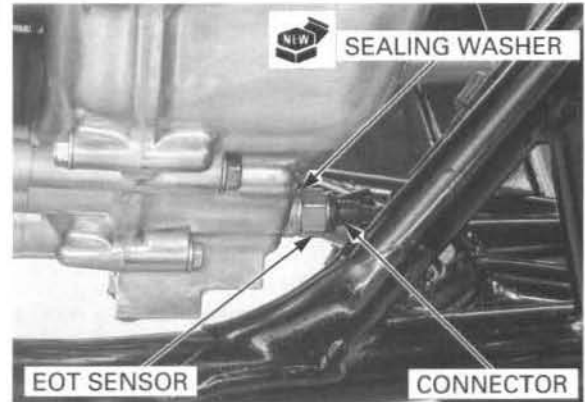
Install the universal joint boot onto the engine.
Install the boot band and tighten the screw securely.



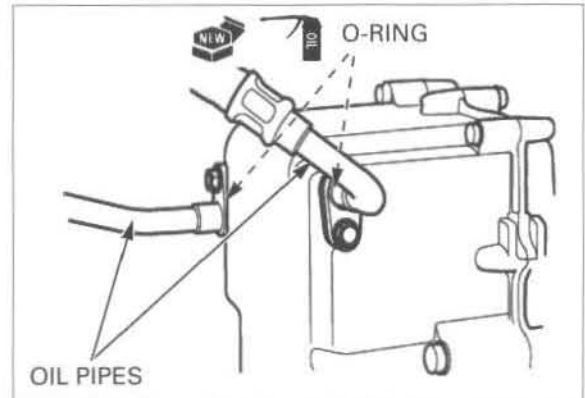
Install the engine oil temperature (EOT) sensor with a new sealing washer and tighten it.

TORQUE: 18 N·m (1.8 kgf·m, 13 lbf·ft)

Connect the EOT sensor connector.

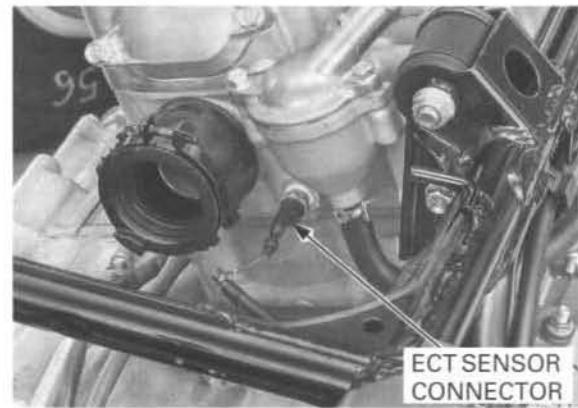


Coat new O-rings with oil and install them onto the oil pipes.
Install the oil pipes into the oil tank and tighten the bolts securely.

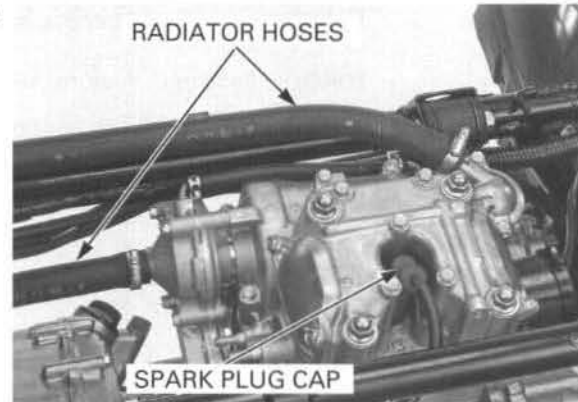


ENGINE REMOVAL/INSTALLATION

Connect the engine coolant temperature (ECT) sensor connector.



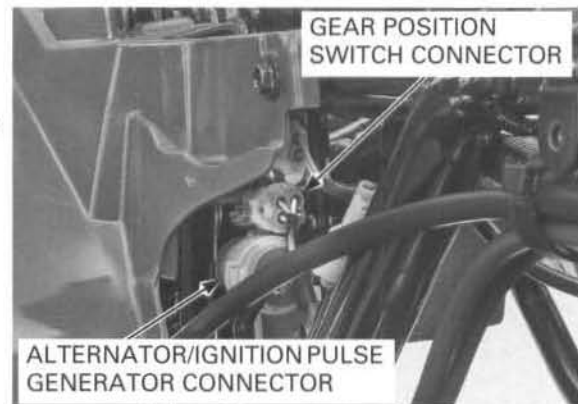
Connect the upper and lower radiator hose to the thermostat cover and water pump. Tighten the hose band screws securely. Install the spark plug cap onto the plug.



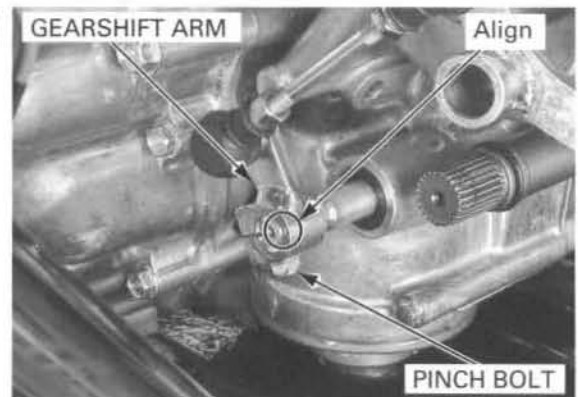
Connect the following:

- alternator/ignition pulse generator connector
- gear position switch connector

Install the connectors onto the stays and clamp the wires and hoses properly (page 1-24).

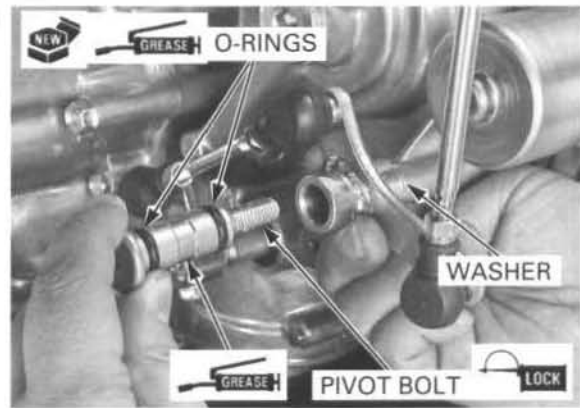


Install the gearshift arm onto the gearshift spindle, aligning the groove in the arm with the wide tooth on the spindle. Install and tighten the pinch bolt.



Coat new O-rings with grease and install it onto the pivot bolt.
 Apply locking agent to the pivot bolt threads.
 Apply grease to the pivot bolt groove and install the washer, linkage lever and pivot bolt.
 Tighten the pivot bolt.

TORQUE: 27 N·m (2.8 kgf·m, 20 lbf·ft)

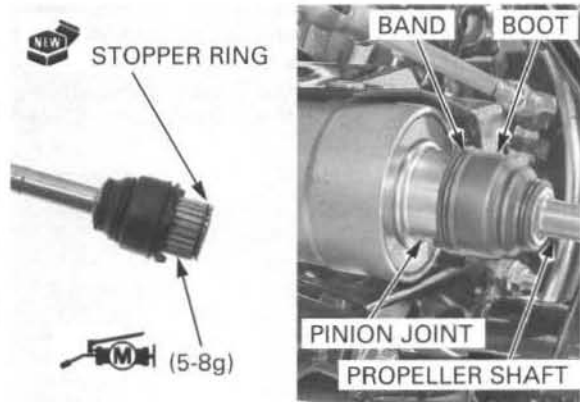


Place the boot band over the propeller shaft.
 Install a new stopper ring into the groove in the propeller shaft.

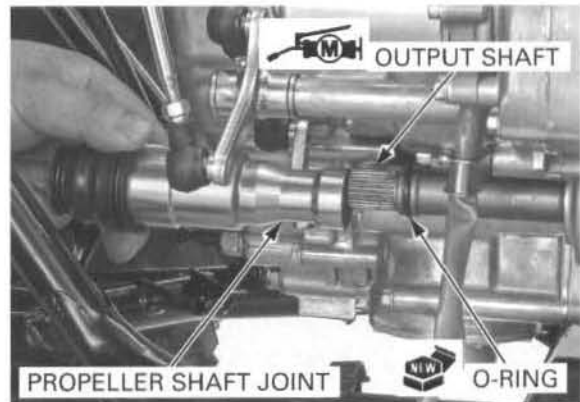
Apply 5–8 g of molybdenum disulfide grease to the pinion joint splines of the front differential.
 Install the propeller shaft into the pinion joint, aligning the joint and shaft splines until the stopper ring seats in the groove.

Make sure that the stopper ring is seated properly by pulling on the propeller shaft lightly.

Install the boot over the pinion joint securely and the boot bands into the boot groove.



Install a new O-ring onto the output shaft groove.
 Apply molybdenum disulfide grease to the output shaft splines.
 Install the propeller shaft joint over the output shaft, aligning the output shaft and joint splines.

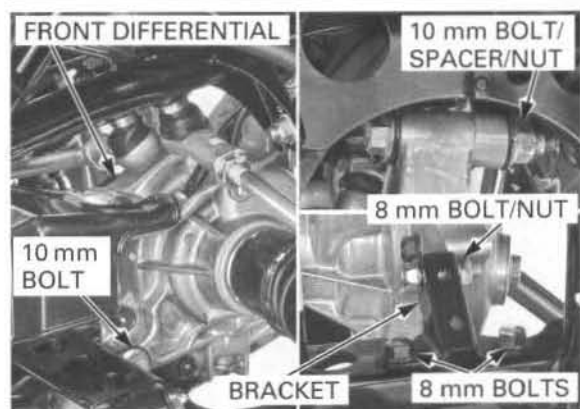


Move the front differential forward, align the mounting points and install the spacer (upper side; between the right side of the differential and frame), 10 mm bolts and a new nut.
 Install the mounting bracket, 8 mm bolts and nut.
 Tighten the 10 mm bolt and nut.

TORQUE: 44 N·m (4.5 kgf·m, 33 lbf·ft)

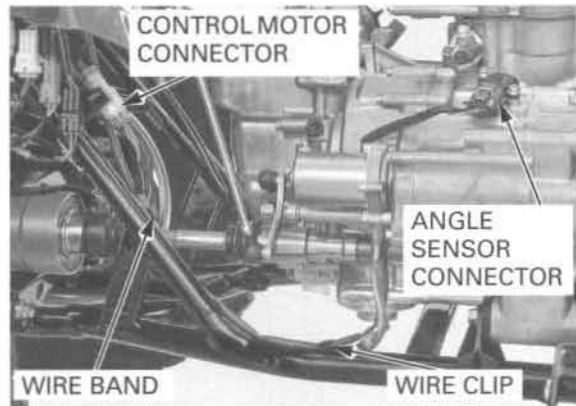
Tighten the 8 mm bolts and nut.

TORQUE: 22 N·m (2.2 kgf·m, 16 lbf·ft)

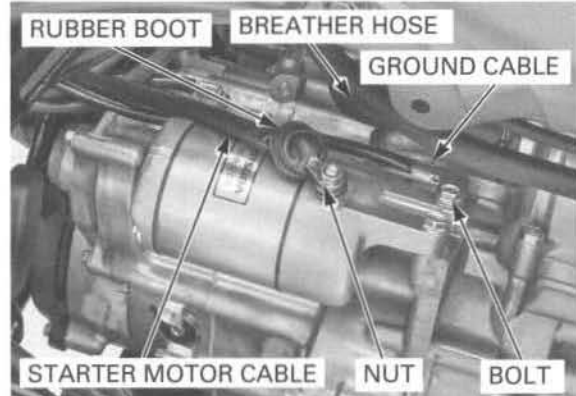


ENGINE REMOVAL/INSTALLATION

Connect the angle sensor and control motor connectors, and secure their wires with the wire clip and band.



Connect the crankcase breather hose to cylinder. Install the starter motor cable onto the terminal and tighten the nut. Install the ground cable and tighten the bolt. Install the rubber cap over the terminal properly.



Install the ground cable terminal onto the engine and tighten the bolt.

Adjust the tie-rod length of the gearshift lever linkage (page 12-18).

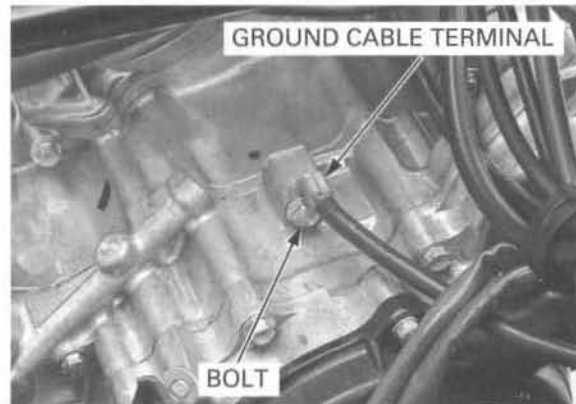
Install the following:

- heat guard (page 8-6)
- carburetor (page 5-18)
- exhaust system (page 5-6)
- right and left inner fender (page 2-9)
- right and left front mud guards (page 2-8)
- right and left center mud guards (page 2-7)

Fill the oil tank with recommended engine oil (page 3-14).

Fill and bleed the cooling system (page 6-5).

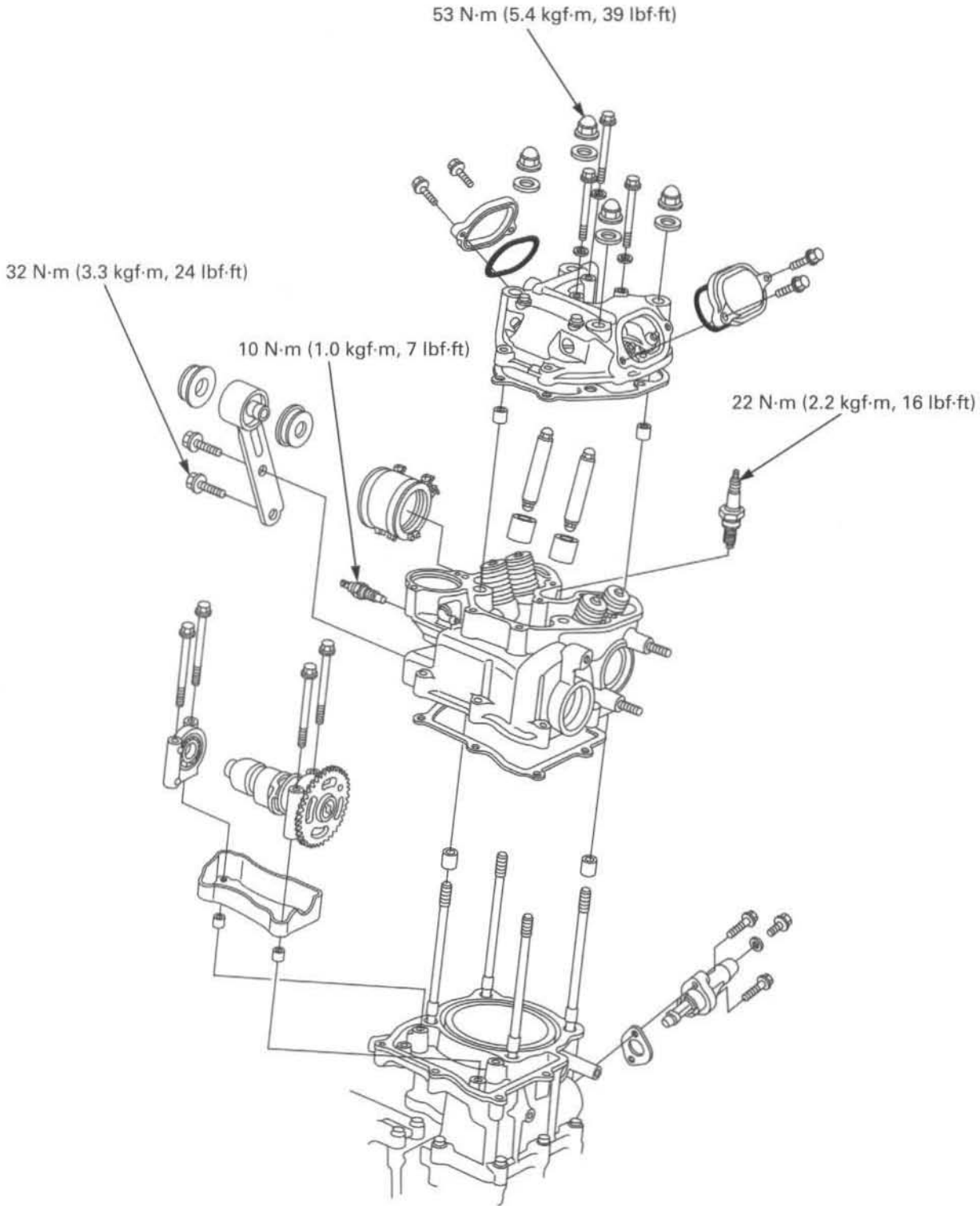
Check the engine oil level (page 3-12).



8. CYLINDER HEAD/VALVE/CAMSHAFT

SYSTEM COMPONENTS	8-2	VALVE GUIDE REPLACEMENT	8-12
SERVICE INFORMATION	8-3	VALVE SEAT INSPECTION/ REFACING	8-13
TROUBLESHOOTING	8-5	CAMSHAFT REMOVAL	8-15
CYLINDER COMPRESSION	8-6	CAMSHAFT INSTALLATION	8-17
CYLINDER HEAD COVER REMOVAL/ DISASSEMBLY	8-6	CYLINDER HEAD ASSEMBLY	8-19
CYLINDER HEAD REMOVAL	8-8	CYLINDER HEAD INSTALLATION	8-20
CYLINDER HEAD DISASSEMBLY	8-9	CYLINDER HEAD COVER ASSEMBLY/ INSTALLATION	8-22

**CYLINDER HEAD/VALVE/CAMSHAFT
SYSTEM COMPONENTS**



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, valve and camshaft lubricating oil is fed through oil passages in the cylinder head and head cover. Clean the oil passages before assembling cylinder head and head cover.
- Be careful not to damage the mating surfaces when removing the cylinder head cover and cylinder head.

SPECIFICATIONS

Unit: mm (in)

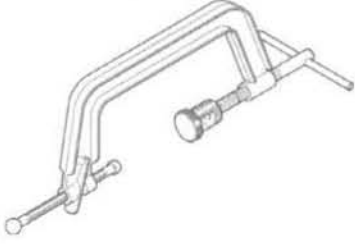




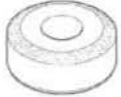


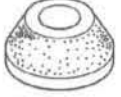


ITEM		STANDARD	SERVICE LIMIT
Cylinder compression at 450 rpm (min ⁻¹)		608 – 902 kPa (6.2 – 9.2 kgf/cm ² , 88 – 131 psi)	–
Valve clearance		IN 0.15 (0.006) EX 0.23 (0.009)	–
Valve, valve guide	Valve stem O.D.	IN 5.475 – 5.490 (0.2156 – 0.2161)	5.45 (0.215)
		EX 5.455 – 5.470 (0.2148 – 0.2154)	5.43 (0.214)
	Valve guide I.D.	IN/EX 5.500 – 5.512 (0.2165 – 0.2170)	5.53 (0.218)
	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 guide projection above cylinder head	IN 15.8 – 16.2 (0.62 – 0.64)	–
EX 18.8 – 19.2 (0.74 – 0.76)		–	
Valve seat width	IN/EX 1.0 – 1.1 (0.039 – 0.043)	1.4 (0.06)	
	Valve spring	Free length	Inner 38.82 (1.528) Outer 51.17 (2.015)
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 33.9602 – 34.1202 (1.33701 – 1.34331)	33.790 (1.3303)
		EX 34.1959 – 34.3559 (1.34629 – 1.35259)	33.946 (1.3365)
	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 cover cap nut		53 N·m (5.4 kgf·m, 39 lbf·ft)	Apply oil to the threads and seating surface
Upper engine hanger bracket nut	(frame side)	54 N·m (5.5 kgf·m, 40 lbf·ft)	
Upper engine hanger bracket bolt	(engine side)	32 N·m (3.3 kgf·m, 24 lbf·ft)	
Engine coolant temperature (ECT) sensor		10 N·m (1.0 kgf·m, 7 lbf·ft)	Apply sealant to the threads
Spark plug		22 N·m (2.2 kgf·m, 16 lbf·ft)	

CYLINDER HEAD/VALVE/CAMSHAFT

TOOLS

<p>Valve spring compressor 07757-0010000</p> 	<p>Valve guide driver, 5.5 mm 07742-0010100</p> 	<p>Valve guide reamer, 5.5 mm 07984-2000001</p>  <p>or 07984-200000D (U.S.A. only)</p>
<p>Cutter holder, 5.5 mm 07781-0010101</p>  <p>or equivalent commercially available in U.S.A.</p>	<p>Flat cutter, 36 mm (IN 32°) 07780-0013500</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>Seat cutter, 35 mm (IN 45°) 07780-0010400</p>  <p>or equivalent commercially available in U.S.A.</p>	<p>Seat cutter, 33 mm (EX 45°) 07780-0010800</p>  <p>or equivalent commercially available in U.S.A.</p>	<p>Interior cutter, 34 mm (IN 60°) 07780-0014700</p>  <p>or equivalent commercially available in U.S.A.</p>
<p>Interior cutter, 30 mm (EX 60°) 07780-0014000</p>  <p>or equivalent commercially available in U.S.A.</p>	<p>Cam chain tensioner stopper 07NMG-MY90101</p>  <p>or 07ZMG-MCAA400 (U.S.A. only)</p>	

TROUBLESHOOTING

- Engine top-end problems usually affect engine performance. These 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 9-5).

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

- Valves:
 - Incorrect valve adjustment
 - Burned or bent valve
 - Incorrect valve timing
 - Broken valve spring
 - Uneven valve seating
 - Valve stuck open
- Cylinder head:
 - Leaking or damaged cylinder head gasket
 - Loose spark plug
 - Warped or cracked cylinder head
- Cylinder/piston problem (page 9-5)

Compression too high, overheating or knocking

- 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 9-5)

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 9-5)

Rough idle

- Low cylinder compression

CYLINDER COMPRESSION

Warm up the engine to normal operating temperature.

Stop the engine, disconnect the spark plug cap and remove the spark plug (page 3-9).

Install the compression gauge into the spark plug hole.

Shift the transmission in neutral.

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

COMPRESSION PRESSURE:

608 – 902 kPa (6.2 – 9.2 kgf/cm², 88 – 131 psi) at 450 rpm (min⁻¹)

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

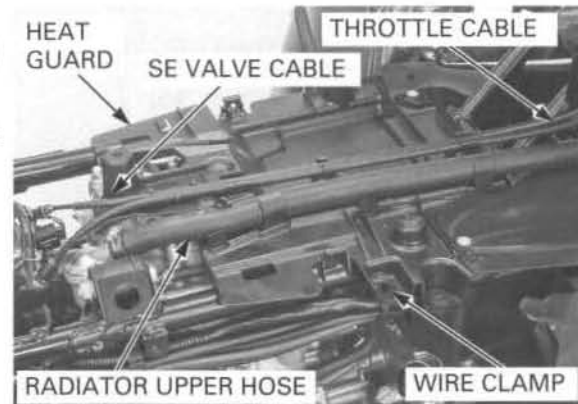
REMOVAL

Remove the fuel tank (page 5-21).

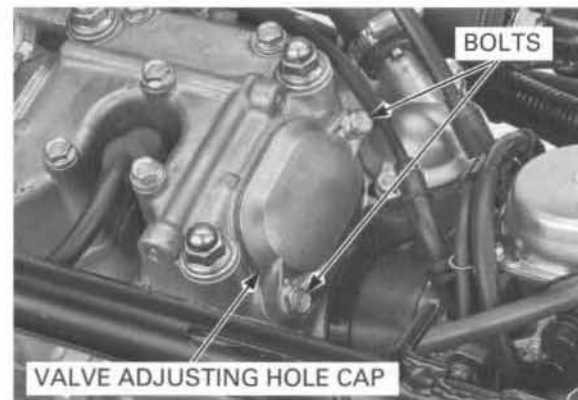
Release the radiator upper hose, SE valve cable and throttle cable.

Remove the fuel tank heat guard.

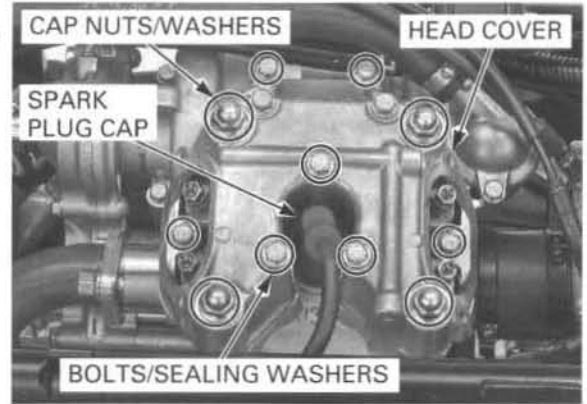
Remove the wire clamp from the fuel tank heat guard.



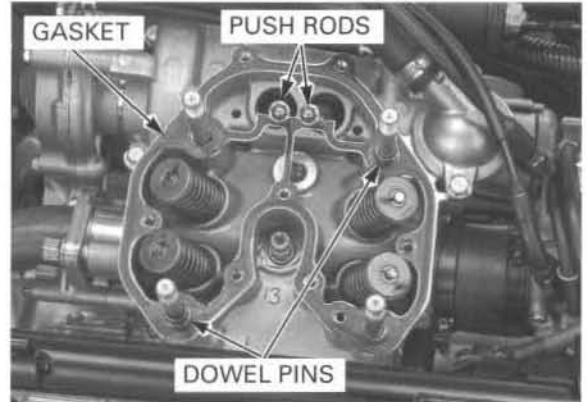
Remove the four bolts and valve adjusting hole caps.



Remove the spark plug cap.
Remove the seven bolts, three sealing washers, four cap nuts, washers and the cylinder head cover.

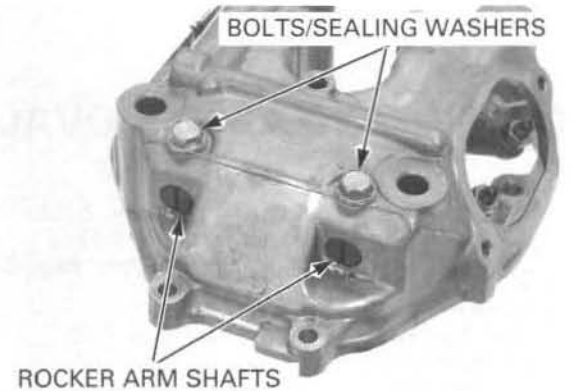


Mark the push rods so that they can be placed back in their original locations. Remove the push rods, gasket and dowel pins.

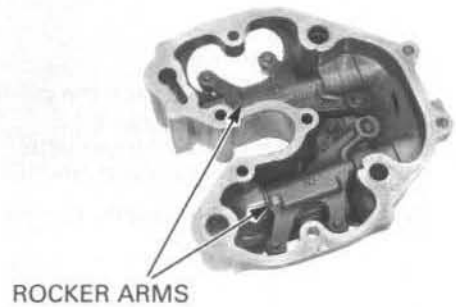


DISASSEMBLY

Remove the two setting bolts and sealing washers.
Push the rocker arm shaft with the small screwdriver through the bolt hole until the O-ring on the shaft is removed from the cylinder head cover.



Remove the rocker arm shafts and rocker arms from the cylinder head cover.



CYLINDER HEAD/VALVE/CAMSHAFT

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 passages.

Measure each rocker arm shaft O.D.

SERVICE LIMITS: 11.92 mm (0.469 in)

Measure each rocker arm I.D.

SERVICE LIMITS: 12.05 mm (0.474 in)

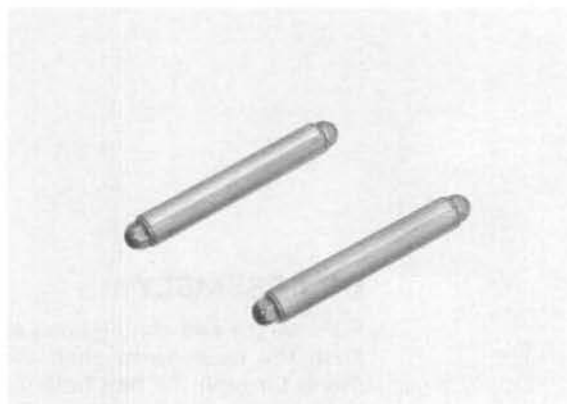
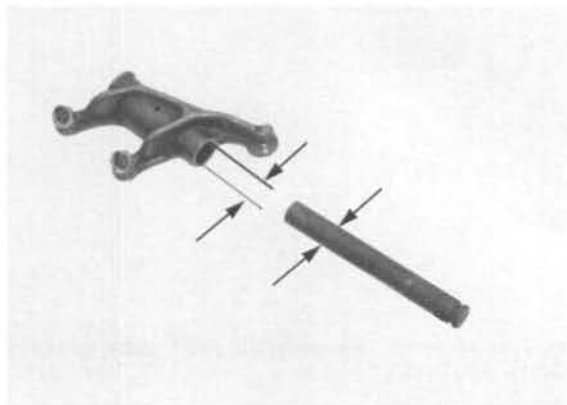
Subtract each rocker arm shaft O.D. from the corresponding rocker arm I.D. to obtain the rocker arm-to-shaft clearance.

SERVICE LIMITS: 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.



CYLINDER HEAD REMOVAL

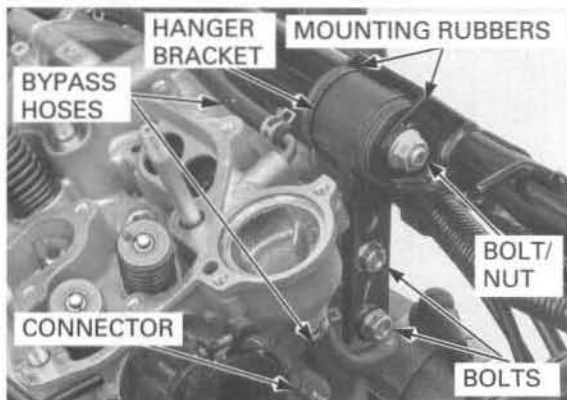
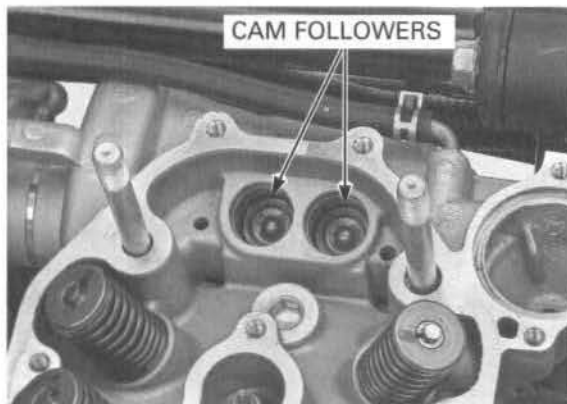
Remove the following:

- exhaust pipe (page 2-15)
- carburetor (page 5-6)
- cylinder head cover (page 8-6)
- cam followers
- thermostat (page 6-10)

The cam followers can be removed without removing the exhaust pipe and carburetor.

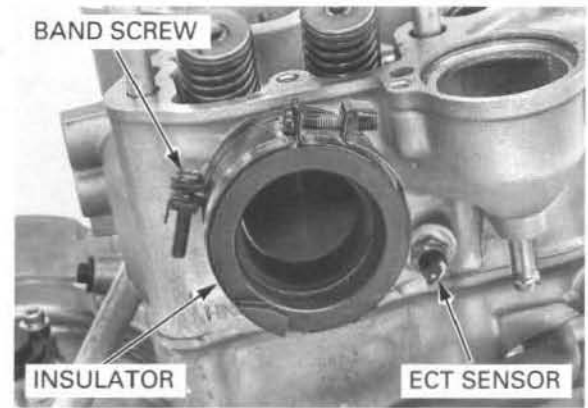
- bypass hoses from the cylinder head
- water pump (page 6-12)
- upper engine hanger bolts
- hanger bracket and mounting rubbers

Disconnect the engine coolant temperature sensor connector.

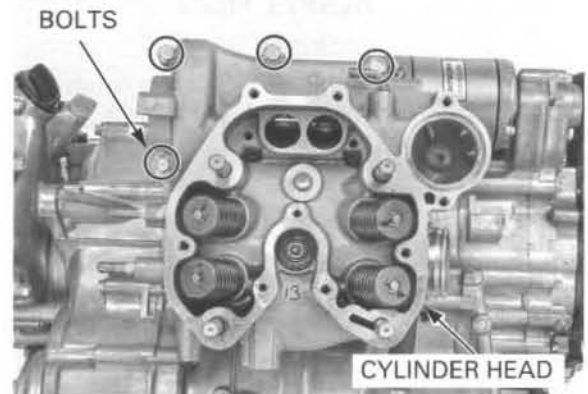


Remove the spark plug.

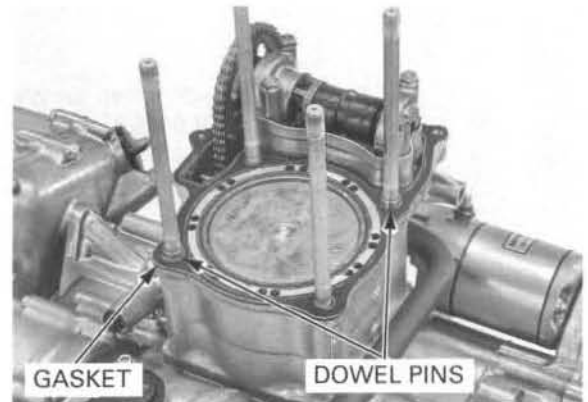
Loosen the band screw and remove the carburetor insulator if necessary.
Remove the engine coolant temperature (ECT) sensor if necessary.



Do not strike the cylinder head too hard. Remove the four bolts and the cylinder head.



Remove the gasket and dowel pins.

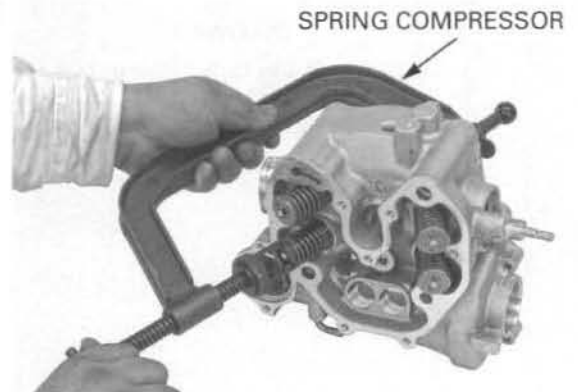


CYLINDER HEAD DISASSEMBLY

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

Remove the valve spring cotters using the valve spring compressor.

TOOL:
Valve spring compressor 07757-0010000

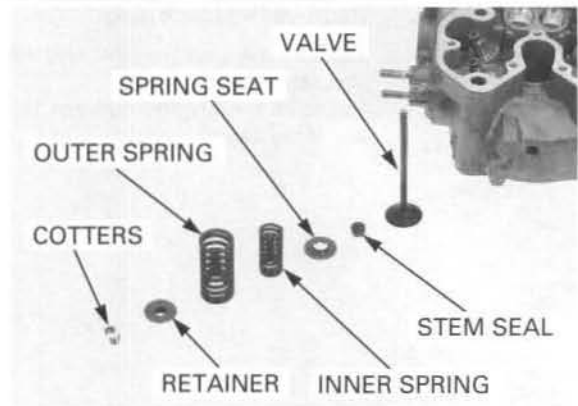


CYLINDER HEAD/VALVE/CAMSHAFT

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

Remove the following:

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

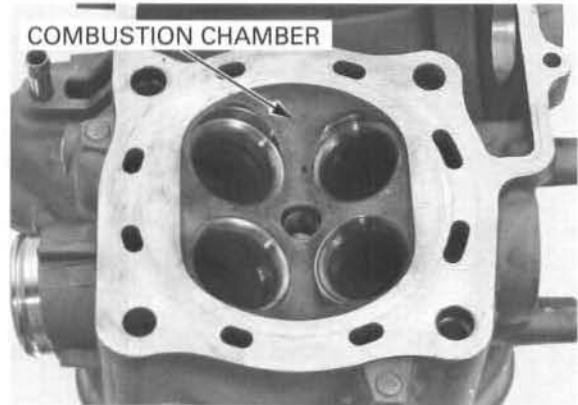


INSPECTION

CYLINDER HEAD

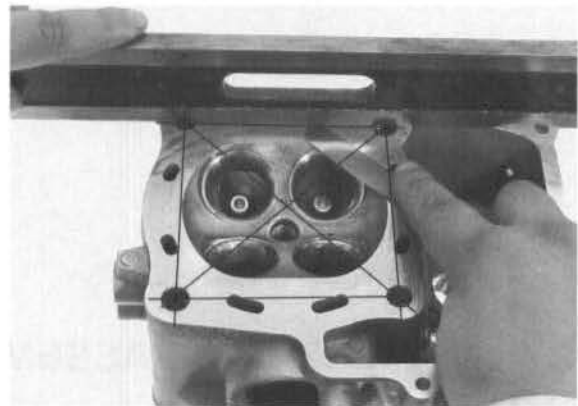
Remove the carbon deposits from the combustion chamber, being careful not to damage the gasket surface.

Check the spark plug hole and valve areas for cracks.



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

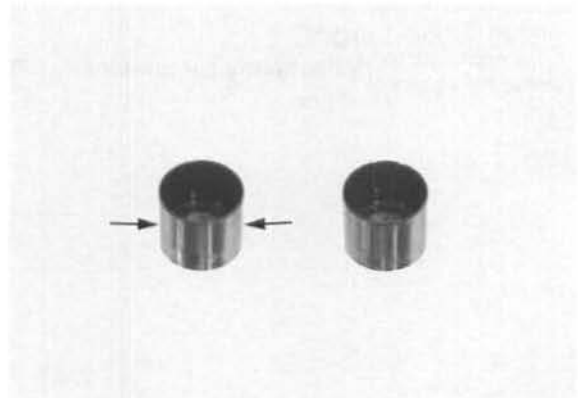
SERVICE LIMIT: 0.10 mm (0.004 in)



CAM FOLLOWER

Check the cam follower and follower bore in the cylinder head for scoring, scratches or damage. Measure each follower O.D.

SERVICE LIMIT: 22.46 mm (0.884 in)

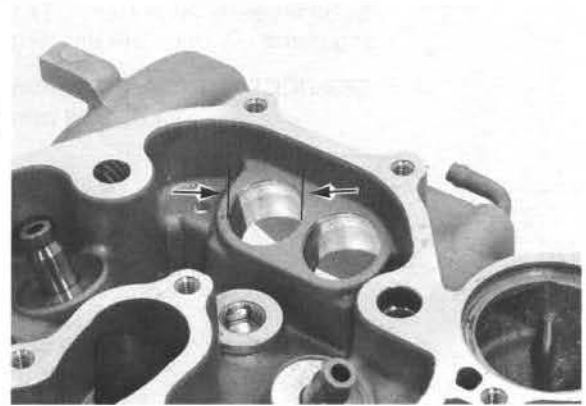


Measure each follower bore I.D.

SERVICE LIMIT: 22.54 mm (0.887 in)

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

SERVICE LIMIT: 0.07 mm (0.003 in)

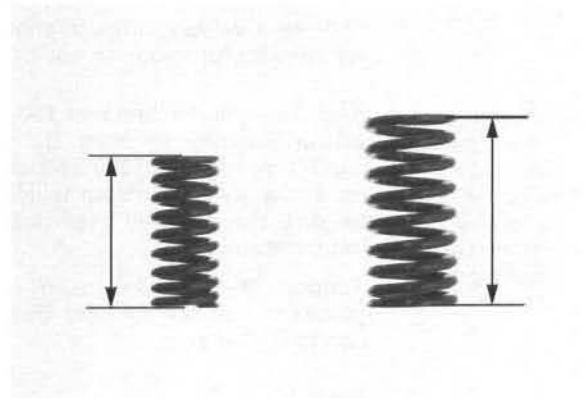


VALVE SPRING

Measure the valve spring free length.

SERVICE LIMITS: Inner: 37.8 mm (1.49 in)

Outer: 49.0 mm (1.93 in)



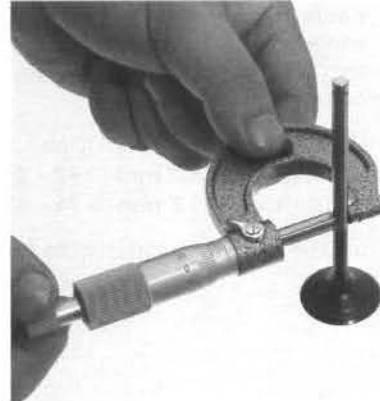
VALVE/VALVE GUIDE

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: 5.45 mm (0.215 in)

EX: 5.43 mm (0.214 in)



Always rotate the reamer clockwise.

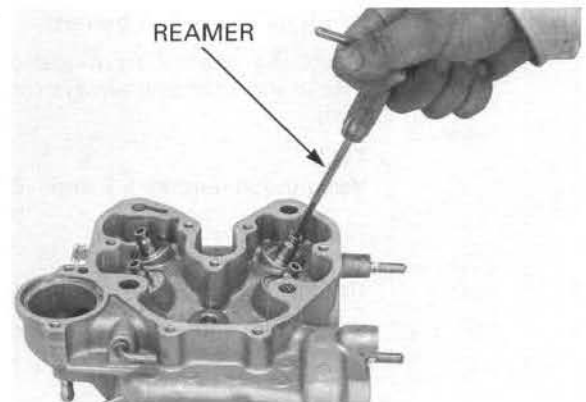
Ream the valve guide to remove any carbon build-up before measuring the guide.

TOOL:

Valve guide reamer, 5.5 mm 07984-2000001 or 07984-200000D (U.S.A. only)

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

SERVICE LIMITS: IN/EX: 5.53 mm (0.218 in)



CYLINDER HEAD/VALVE/CAMSHAFT

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)

Inspect and reface the valve seats whenever the valve guides are replaced (page 8-14).

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

Be sure to wear heavy gloves to avoid burns when handling the heated cylinder head. Using a torch to heat the cylinder head may cause warpage.

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.

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

TOOL:

Valve guide driver, 5.5 mm 07742-0010100

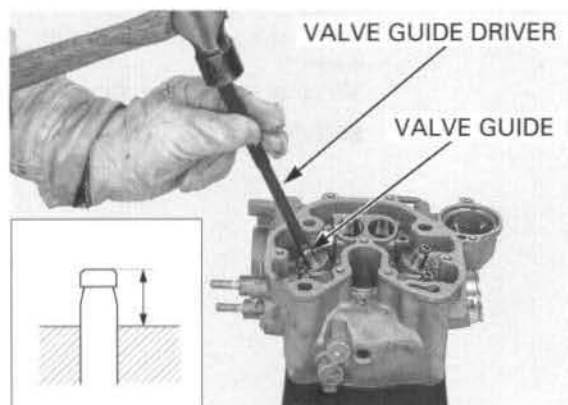
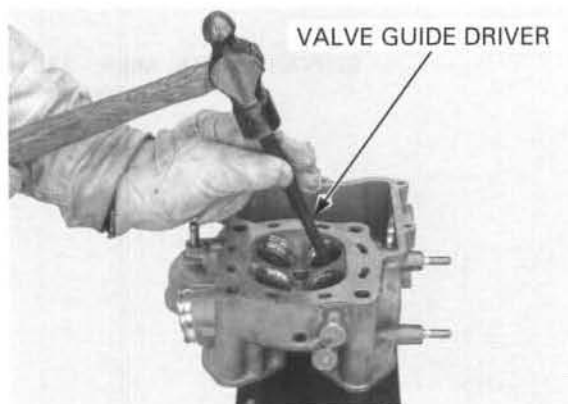
While the cylinder head is still heated, drive new valve guides in the cylinder head from the rocker arm side using the same tool until the exposed height is specified value.

VALVE GUIDE PROJECTION:

IN: 15.8 – 16.2 mm (0.62 – 0.64 in)

EX: 18.8 – 19.2 mm (0.74 – 0.76 in)

Let the cylinder head cool to room temperature.



Take care not to tilt or lean the reamer in the guide while reaming.

Ream the new valve guides.

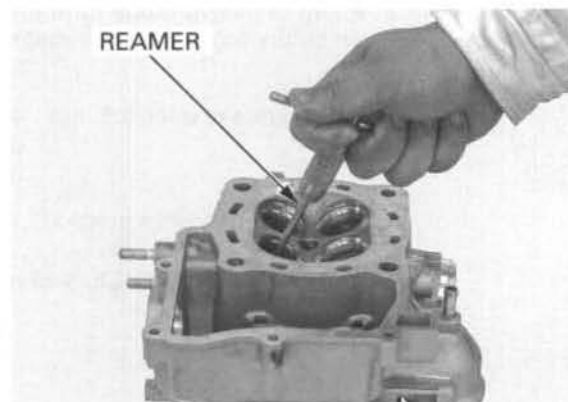
Insert the reamer from the combustion chamber side of the head and always rotate the reamer clockwise.

TOOL:

Valve guide reamer, 5.5 mm 07984-2000001 or 07984-200000D (U.S.A. only)

Use cutting oil on the reamer during this operation.

Clean the cylinder head thoroughly to remove any metal particles after reaming and reface the valve seat (page 8-14).



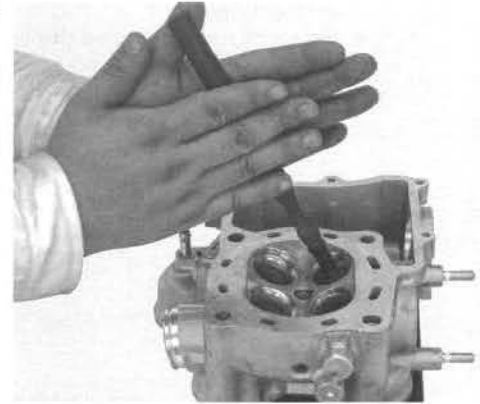
VALVE SEAT INSPECTION/REFACING

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.

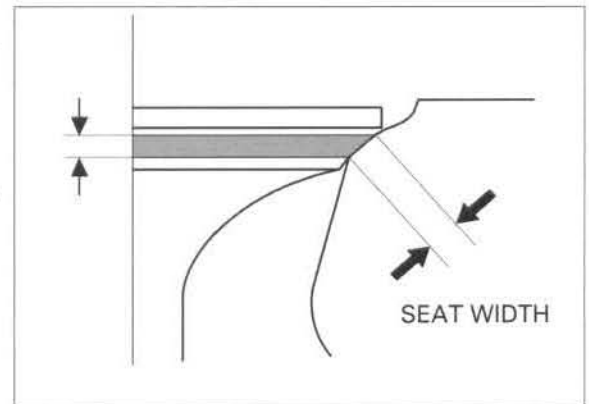


The valve cannot be ground. If the valve face is burned or badly worn or if it contacts the seat unevenly, replace the valve.

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.

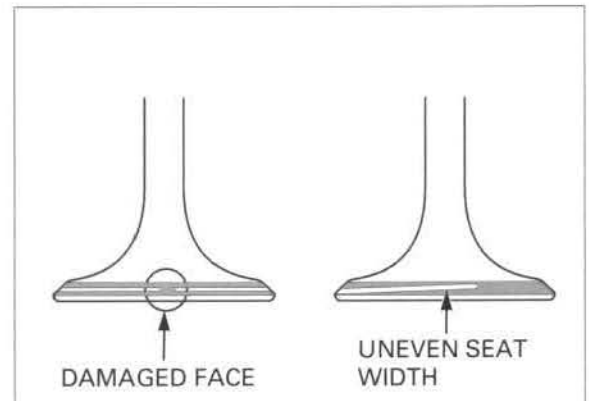
STANDARD: 1.0 – 1.1 mm (0.039 – 0.043 in)
SERVICE LIMIT: 1.4 mm (0.06 in)

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

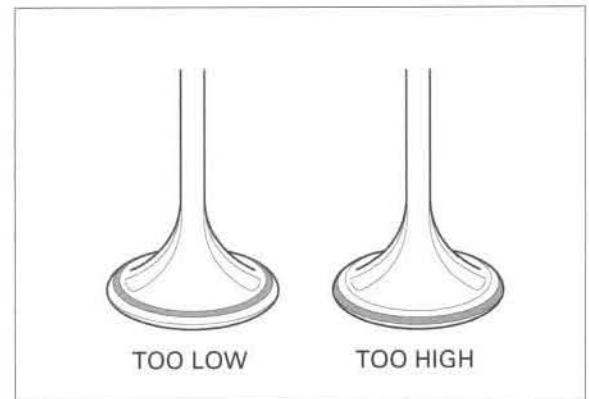


Inspect the valve seat face for:

- Uneven seat width:
 - Replace the valve and reface the valve seat.
- Damaged face:
 - Replace the valve and reface the valve seat.



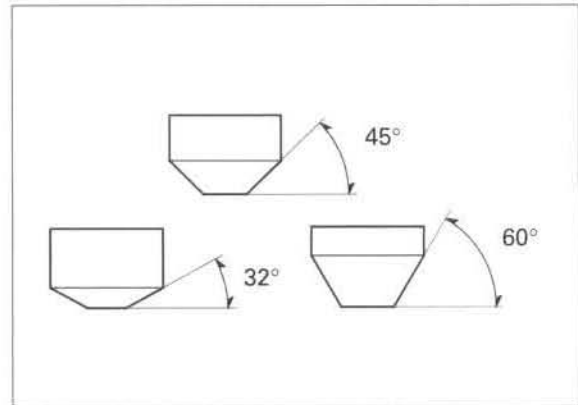
- Contact area (too high or too low)
 - Reface the valve seat.



REFACING

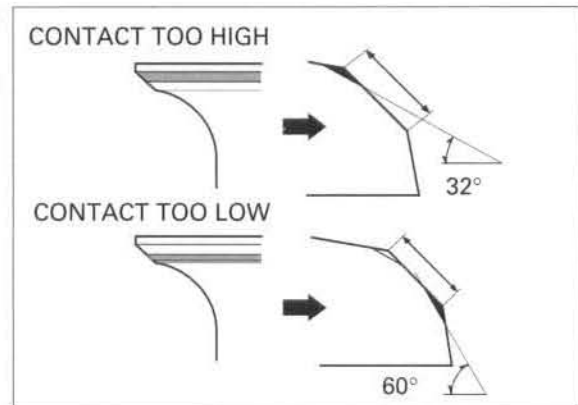
NOTE:

- Follow the refacer manufacturer's operating instructions.
- Be careful not to grind the seat more than necessary.



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

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

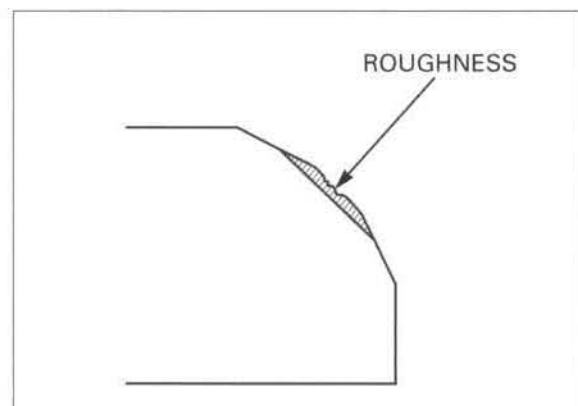


Using a 45° seat cutter, remove any roughness or irregularities from the seat.

TOOLS:

- Valve seat cutter, 35 mm (IN) 07780-0010400
- Valve seat cutter, 33 mm (EX) 07780-0010800
- Cutter holder, 5.5 mm 07781-0010101

or equivalent commercially available in U.S.A.

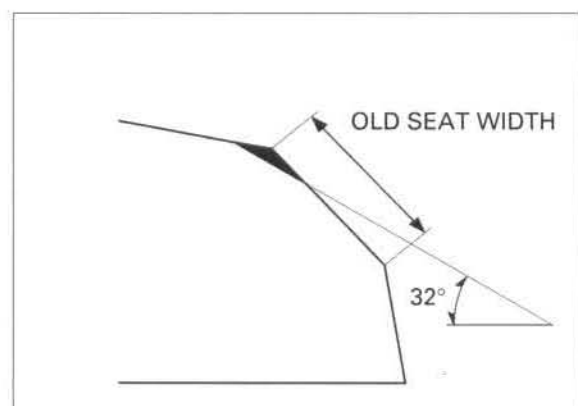


Using a 32° flat cutter, remove 1/4 of the existing valve seat material.

TOOLS:

- Flat cutter, 36 mm (IN) 07780-0013500
- Flat cutter, 33 mm (EX) 07780-0012900
- Cutter holder, 5.5 mm 07781-0010101

or equivalent commercially available in U.S.A.

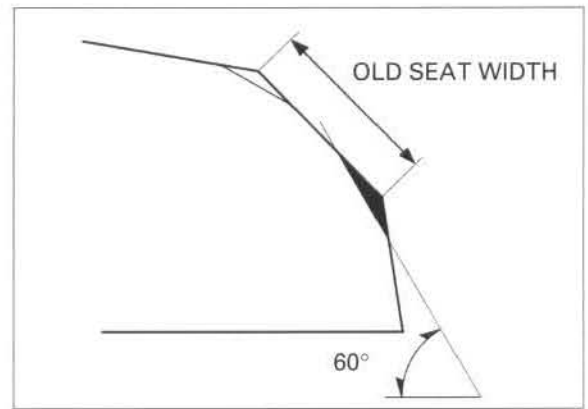


Using a 60° interior cutter, remove 1/4 of the existing valve seat material.

TOOLS:

Interior cutter, 34 mm (IN) 07780-0014700
 Interior cutter, 30 mm (EX) 07780-0014000
 Cutter holder, 5.5 mm 07781-0010101

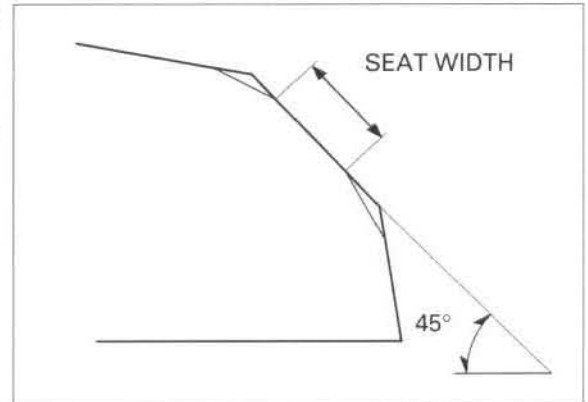
or equivalent commercially available in U.S.A.



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

VALVE SEAT WIDTH: 1.0 – 1.1 mm (0.039 – 0.043 in)

Make sure that all pitting and irregularities are removed.

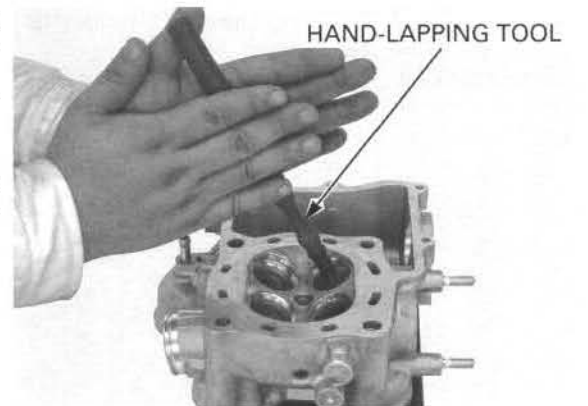


Excessive lapping pressure may deform or damage the seat.

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



CAMSHAFT REMOVAL

Remove the cylinder head (page 8-8).

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

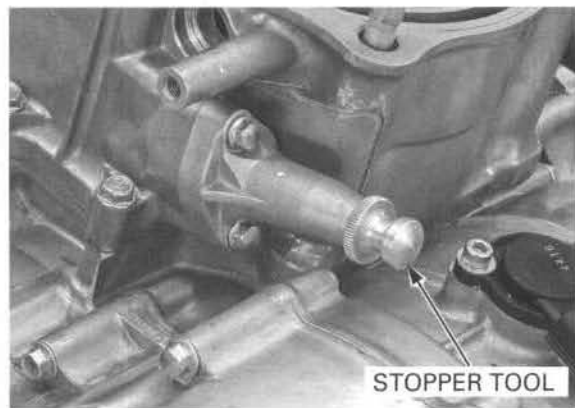


CYLINDER HEAD/VALVE/CAMSHAFT

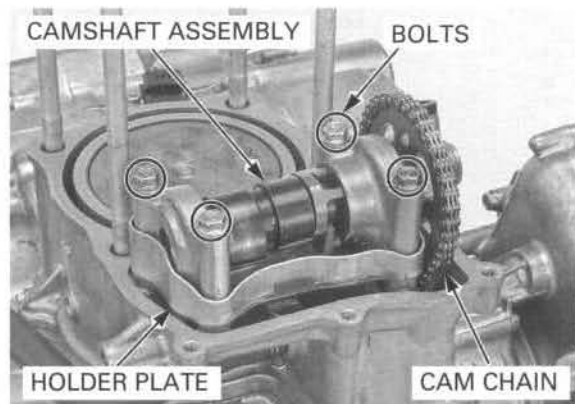
Turn the cam chain tensioner lifter shaft clockwise fully and secure it with a stopper tool.

TOOL:

Cam chain tensioner stopper 07NMG-MY90101 or
07ZMG-MCAA400
(U.S.A. only)

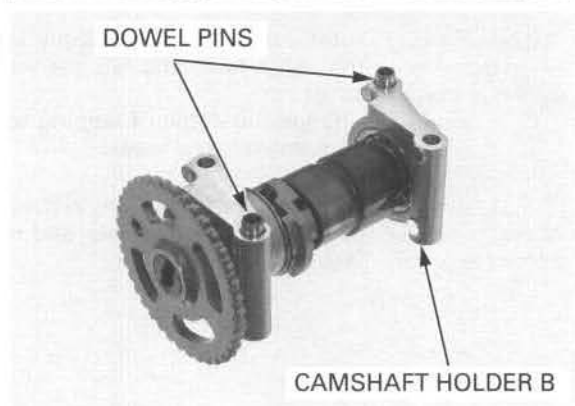


Remove the four camshaft holder bolts.
Raise the camshaft holder plate so that the dowel pins fitted in the camshaft holders are removed from the cylinder.
Remove the cam chain from the cam sprocket, and suspend the cam chain with a piece of wire to prevent it from falling into the crankcase.
Remove the camshaft assembly and holder plate.



Do not forcibly remove the dowel pins from the camshaft holders.

Remove the dowel pins from the camshaft holders.
Remove camshaft holder B from the camshaft assembly.



INSPECTION

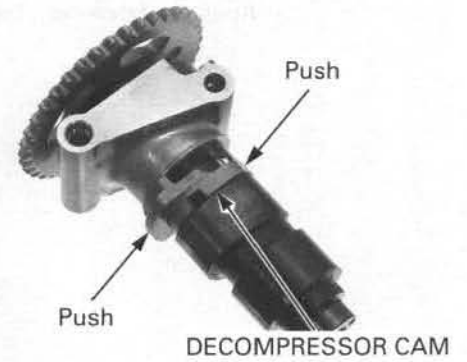
Check the cam surfaces for scoring, scratches or evidence of insufficient lubrication.
Check the sprocket teeth for wear or damage.
Measure each cam lobe height.

SERVICE LIMITS: IN: 33.790 mm (1.3303 in)
EX: 33.946 mm (1.3365 in)



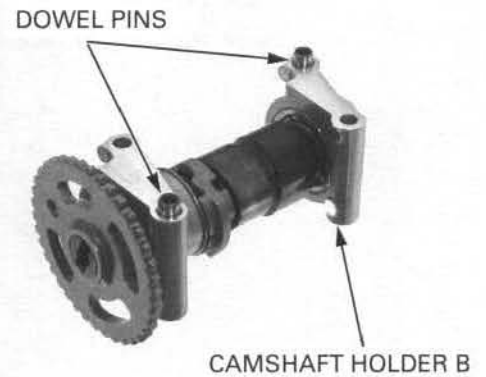
Turn the camshaft holder to check the bearing. The bearing should turn smoothly and quietly. Replace the camshaft assembly if the bearing does not turn smoothly and quietly.

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 of the exhaust cam lobe. As you press on other side, the decompressor cam lobe extend below the base of the exhaust cam lobe.

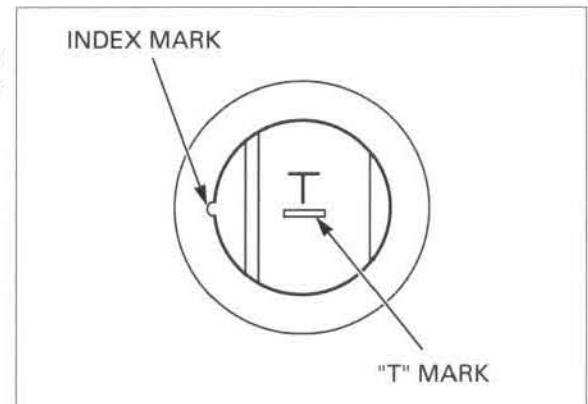


CAMSHAFT INSTALLATION

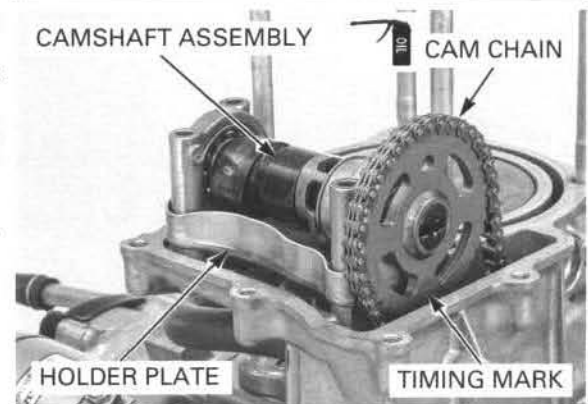
Install camshaft holder B onto the camshaft assembly. Install the dowel pins if they were removed.



Remove the timing hole cap (page 3-10). Rotate the crankshaft using the recoil starter knob and align the "T" mark on the flywheel with the index mark on the rear crankcase cover.

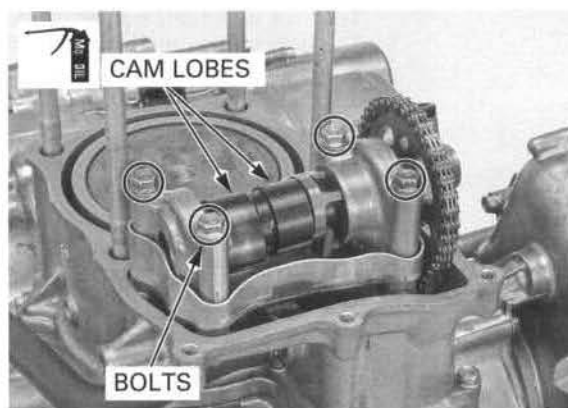


Lubricate the camshaft bearings and cam chain with oil. Install the camshaft holder plate onto the camshaft holders. Align the timing mark (index line) on the cam sprocket with the cylinder top surface, and install the cam chain onto the cam sprocket. Locate the dowel pins into the holes in the cylinder. Make sure that the timing mark lines up with the cylinder top surface.



CYLINDER HEAD/VALVE/CAMSHAFT

Install and tighten the four camshaft holder bolts.
Apply molybdenum oil solution to the cam lobes.

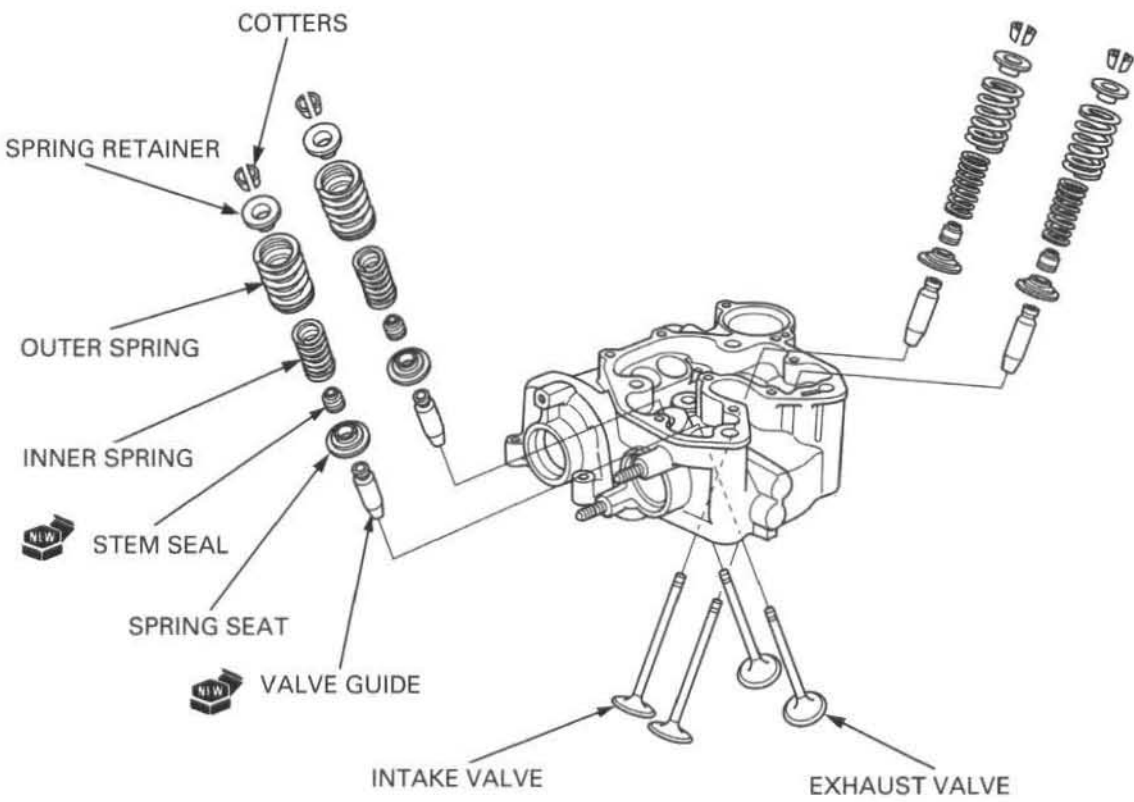


Remove the stopper tool from the cam chain tensioner lifter and install the sealing bolt with a new sealing washer.

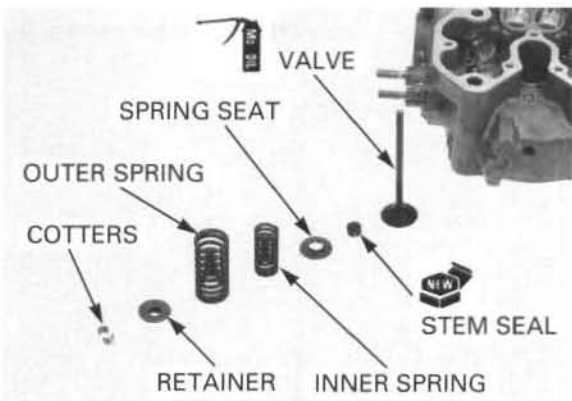
Install the cylinder head (page 8-20).



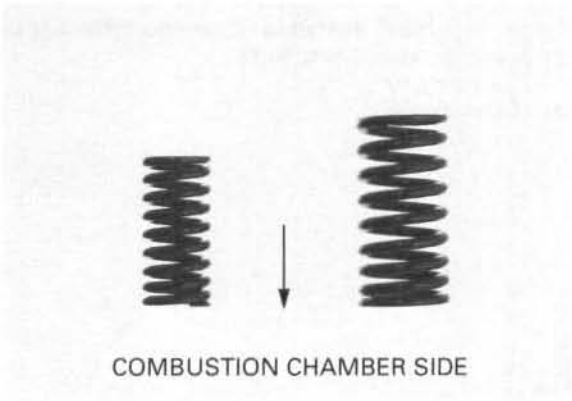
CYLINDER HEAD ASSEMBLY



Blow through the oil passage (stud bolt hole) in the cylinder head with compressed air.
 Install the valve spring seats.
 Install 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 damage to the stem seal.



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



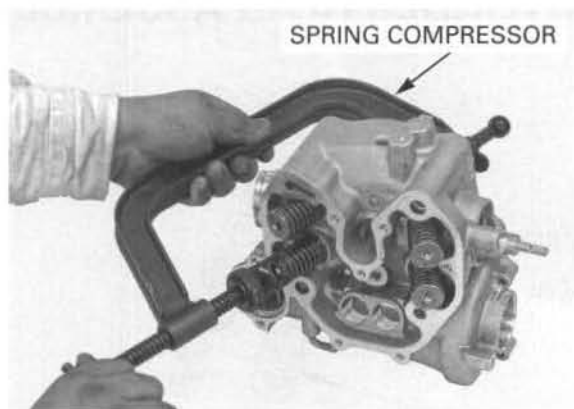
CYLINDER HEAD/VALVE/CAMSHAFT

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

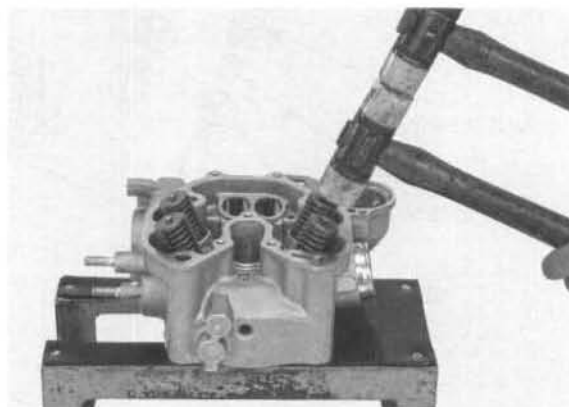
Install the valve spring cotters using the valve spring compressor.

TOOL:

Valve spring compressor 07757-0010000



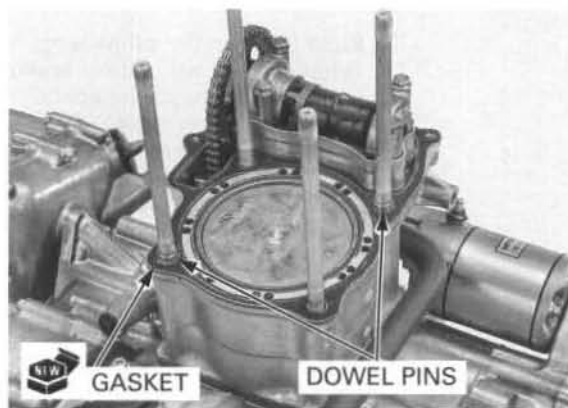
Support the cylinder head so that the valve heads will not contact anything that cause damage. Tap the valve stems gently with two plastic hammers as shown to seat the cotters firmly.



CYLINDER HEAD INSTALLATION

Clean the mating surface of the cylinder and head.

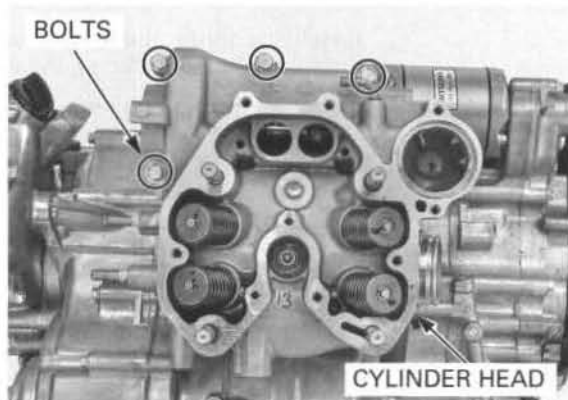
Install the dowel pins and a new gasket.



Install the cylinder head.

Tighten the cylinder head bolts after installing the cylinder head cover.

Install and temporarily tighten the four cylinder head bolts.



If the ECT sensor was removed, apply sealant to the ECT sensor threads. Do not apply sealant to the sensor head.

Install and tighten the ECT sensor.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

If the carburetor insulator was removed, install it, aligning its groove with the lug on the cylinder head.

Install and tighten the spark plug.

TORQUE: 22 N·m (2.2 kgf·m, 16 lbf·ft)

Connect the ECT sensor connector.

Install the mounting rubbers on the upper engine hanger bushing with the large I.D. side facing in. Install the upper engine hanger bracket and bolts. Tighten the engine side hanger bolts.

TORQUE: 32 N·m (3.3 kgf·m, 24 lbf·ft)

Tighten the upper engine hanger nut.

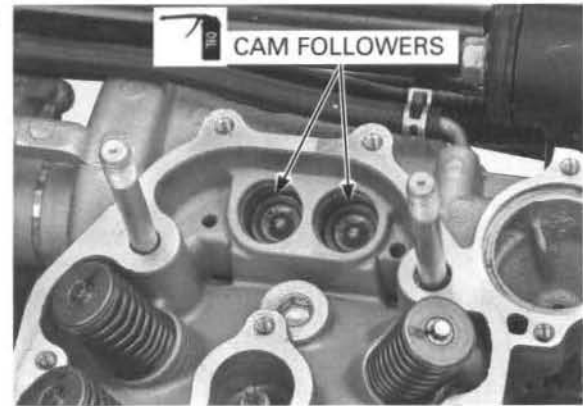
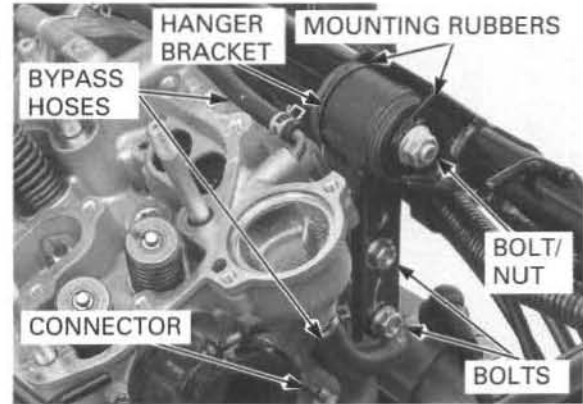
TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)

Connect the bypass hoses to the cylinder head.

Coat the cam followers with oil and install them into the cylinder head.

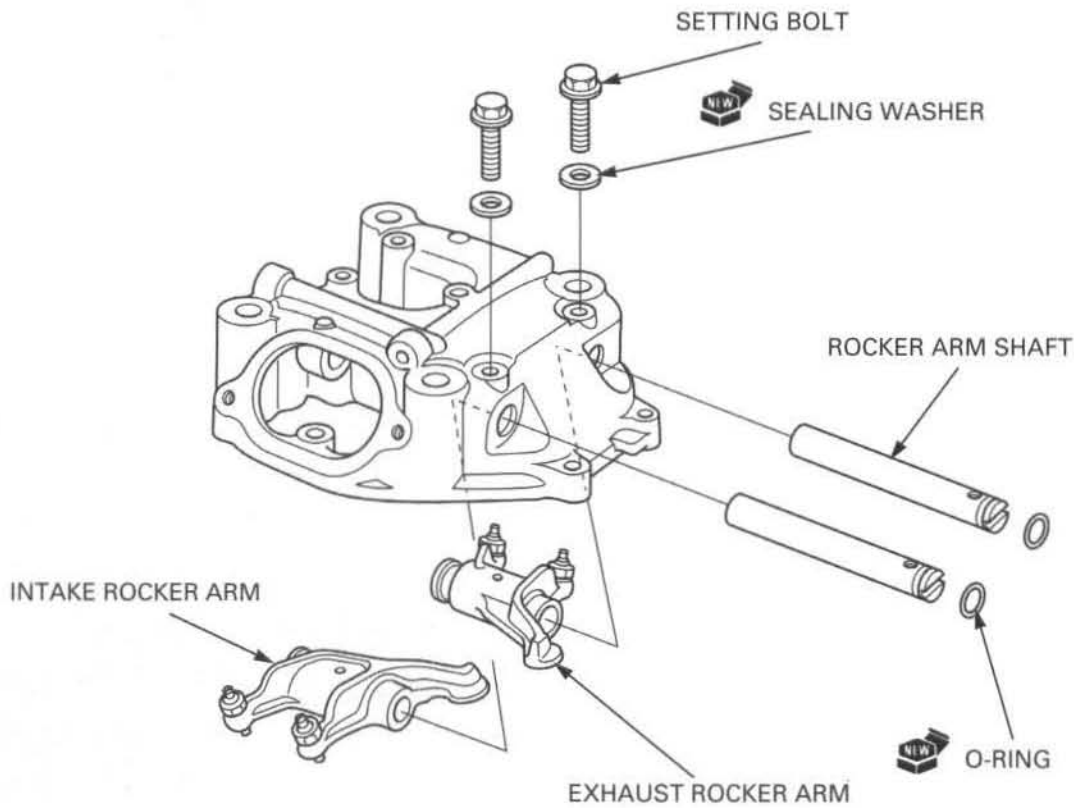
Install the following:

- water pump (page 6-12)
- cylinder head cover (page 8-22)
- thermostat (page 6-10)
- carburetor (page 5-18)
- exhaust pipe (page 2-15)

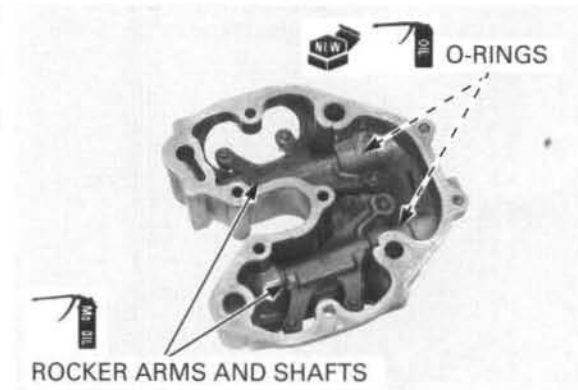


CYLINDER HEAD COVER ASSEMBLY/ INSTALLATION

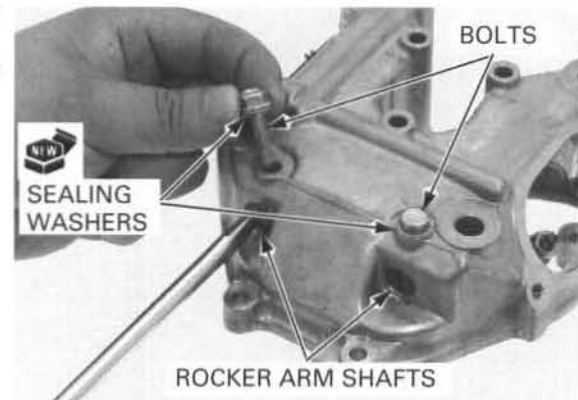
ASSEMBLY



Coat new O-rings with oil and install them onto the rocker arm shaft grooves.
Apply molybdenum oil solution to the rocker arm shaft sliding surface.
Install the rocker arms and shafts into the cylinder head cover.

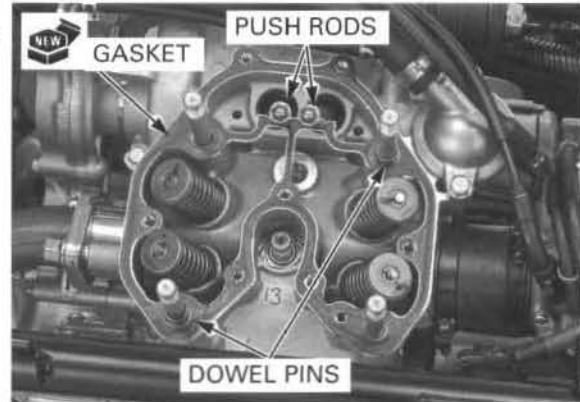


Align the bolt holes in the cylinder head cover and rocker arm shaft by turning the shaft.
Install the setting bolts with new sealing washers and tighten the bolt securely.



INSTALLATION

Install the dowel pins and a new gasket. Install the push rods into the cam followers rest them into the gasket grooves as shown.



Installing head cover incorrectly will result in severe engine damage. Do not tighten the cap nuts when the rocker arms are not aligned with the push rod ends.

Install the cylinder head cover while holding the rocker arms lightly and align the rocker arm followers with the push rod ends.

Be sure to seat the rocker arm followers on the push rods properly by turning the crankshaft slowly with the recoil starter.

Apply oil to the cap nut threads and seating surfaces.

Install the four washers, cap nuts, three new sealing washers and seven bolts.

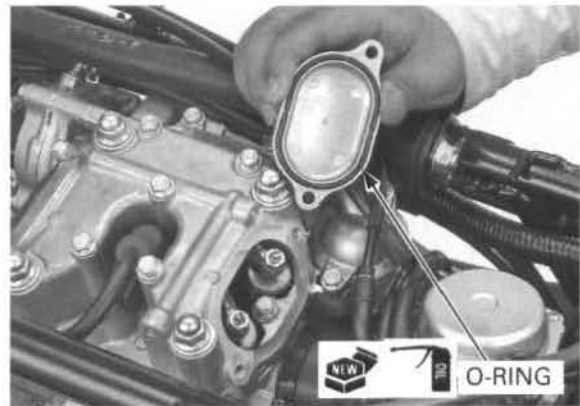
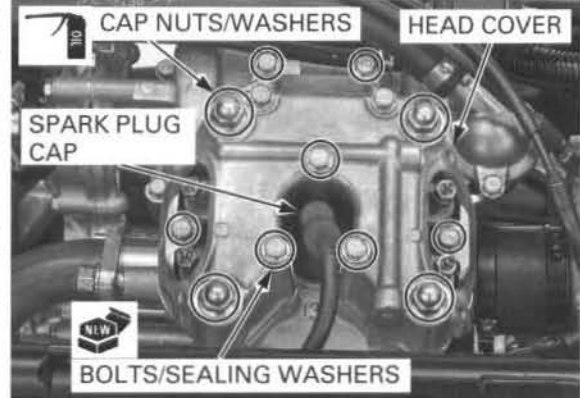
Tighten the nuts and bolts in a crisscross pattern in 2 or 3 steps.

TORQUE: Cap nut: 53 N-m (5.4 kgf-m, 39 lbf-ft)

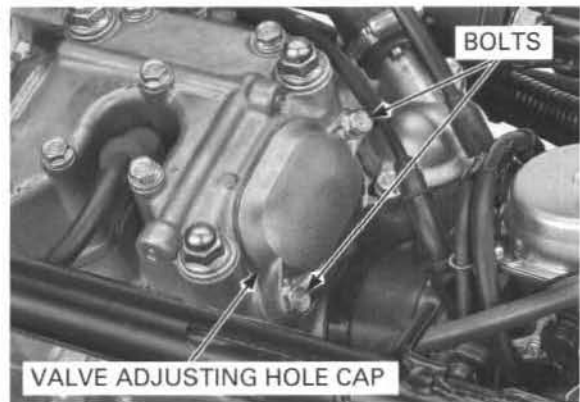
Install the spark plug cap.

If the cylinder and/or cylinder head were serviced, tighten the four cylinder bolts and four cylinder head bolts.

Coat new O-rings with oil and install them into the grooves in the valve adjusting hole caps.

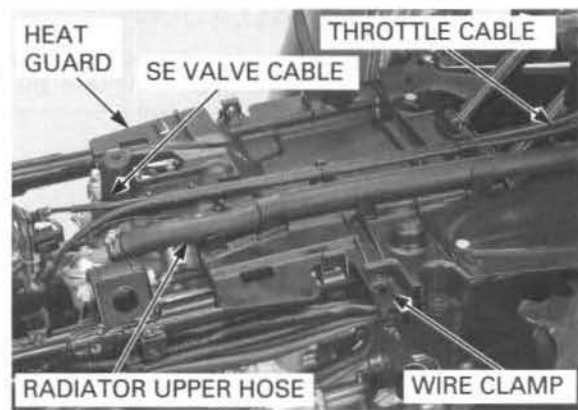


Install the valve adjusting hole caps and tighten the bolts.



CYLINDER HEAD/VALVE/CAMSHAFT

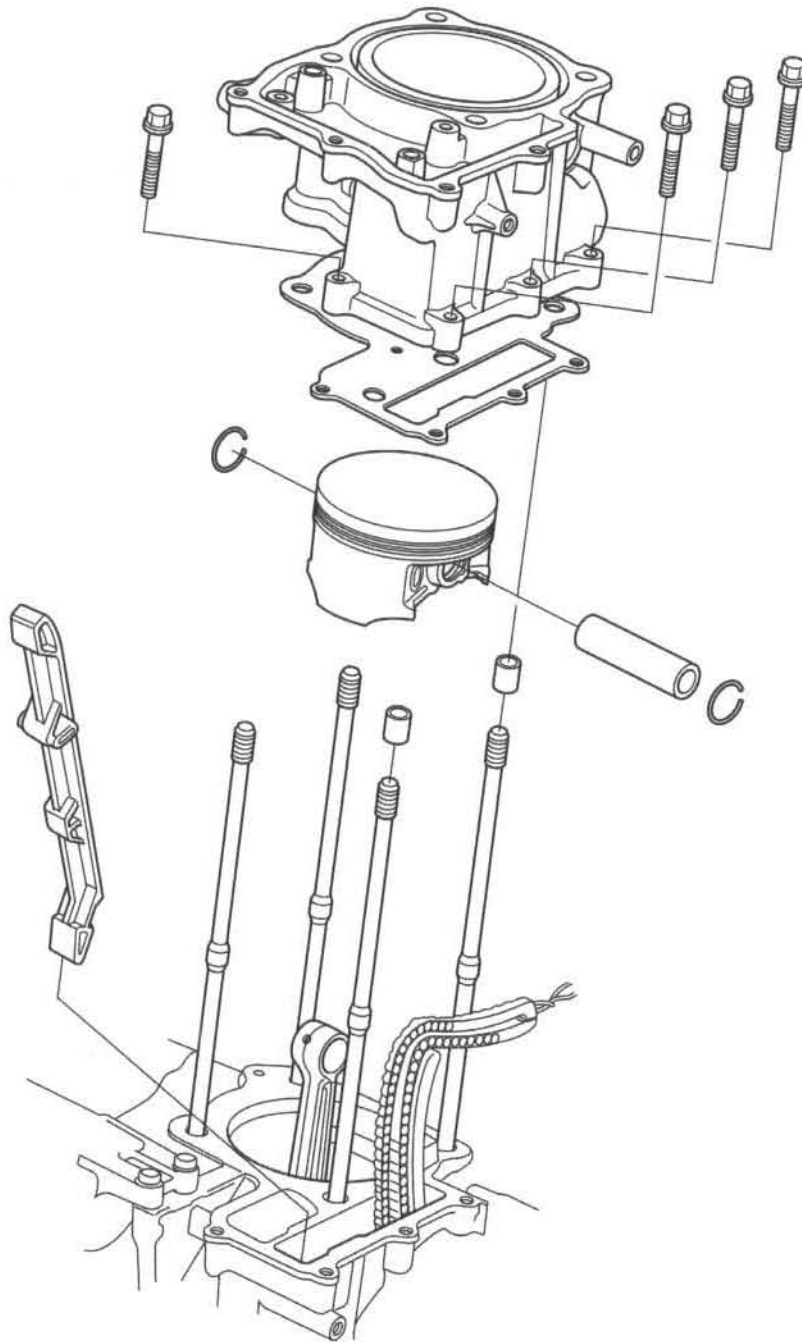
Install the wire clamp to the fuel tank heat guard.
Install the fuel tank heat guard.
Install the upper radiator hose, choke and throttle cables onto the fuel tank heat guard properly.
Install the fuel tank (page 5-21).



9. CYLINDER/PISTON

SYSTEM COMPONENTS	9-2	CYLINDER/PISTON REMOVAL	9-5
SERVICE INFORMATION	9-3	CYLINDER/PISTON INSTALLATION.....	9-9
TROUBLESHOOTING	9-4		

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.
- Rocker arm and valve lubricating oil is fed through the oil passage in the cylinder. Clean the oil passage before installing the cylinder.
- When disassembling, mark and store the disassembled parts to ensure that they are reinstalled in their original locations.

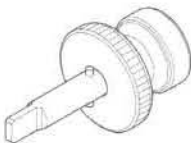
SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT	
Cylinder	I.D.	92.000 – 92.010 (3.6220 – 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)	91.90 (3.618)	
	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/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)	0.01 (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)	

TOOLS

Cam chain tensioner stopper
07NMG-MY90101



or 07ZMG-MCAA400 (U.S.A. only)

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 built-up on piston head or combustion chamber

Excessive smoke

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

Abnormal noise

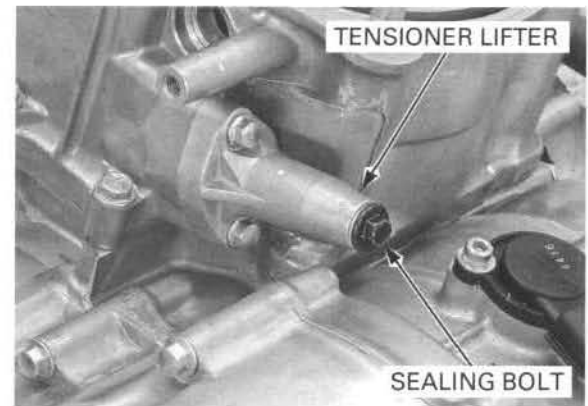
- Worn piston pin or piston pin bore
- Worn connecting rod small end
- Worn cylinder, piston or piston rings

CYLINDER/PISTON REMOVAL

CYLINDER REMOVAL

Remove the cylinder head (page 8-8).

Remove the cam chain tensioner lifter sealing bolt.

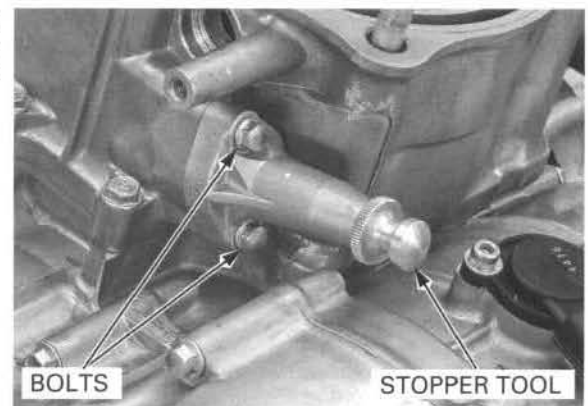


Turn the tensioner shaft clockwise with the stopper tool to retract the tensioner, then insert the stopper fully to hold the tensioner in the fully retracted position.

TOOL:

Cam chain tensioner stopper 07NMG-MY90101 or
07ZMG-MCAA400
(U.S.A. only)

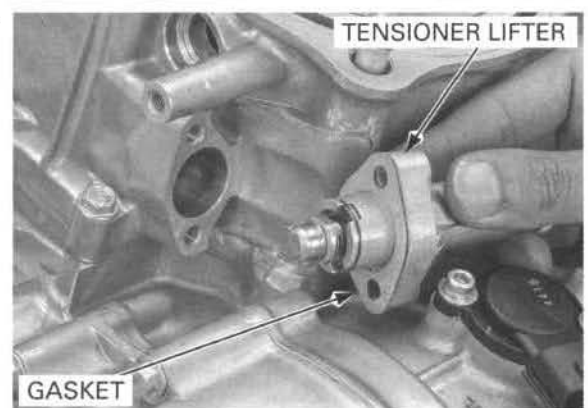
Remove the two bolts.



Remove the cam chain tensioner lifter from the cylinder.

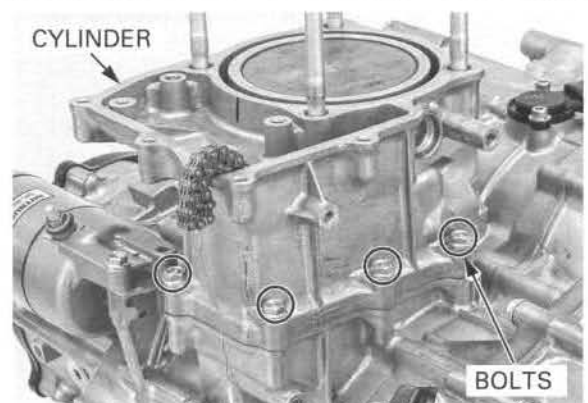
Remove the gasket.

Remove the camshaft (page 8-15).



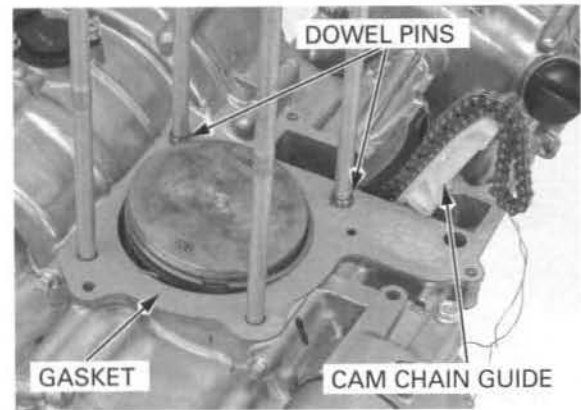
Do not strike the cylinder too hard and do not damage the mating surface with a screwdriver.

Remove the four bolts and cylinder.



CYLINDER/PISTON

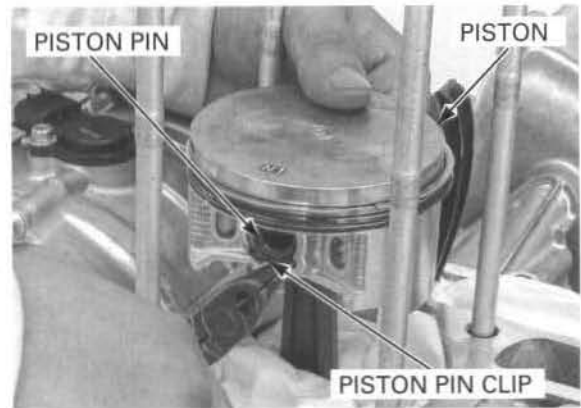
Remove the gasket and dowel pins.
Remove the cam chain guide.



PISTON REMOVAL

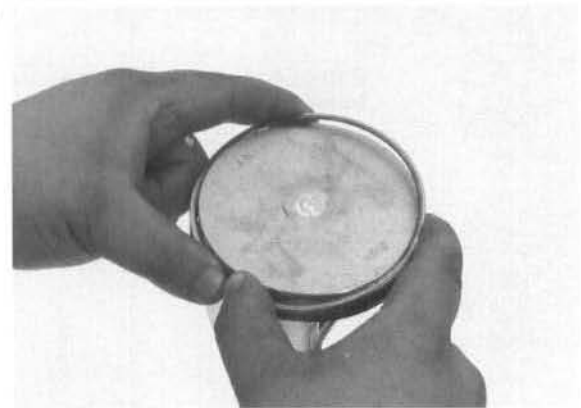
Place a clean shop towel over the crankcase to prevent the clip from falling into the crankcase.

Remove the piston pin clips with the pliers. Push the piston pin out of the piston and connecting rod, and remove the piston.

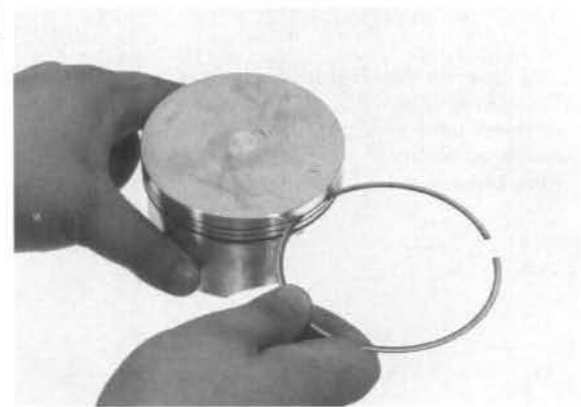


Do not damage the piston ring by spreading the ends too far.

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



Clean carbon deposits from the ring grooves with a ring that will be discarded. Never use a wire brush; it will scratch the groove.



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 9-4 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 LIMITS: Taper: 0.10 mm (0.004 in)
Out-of-round: 0.10 mm (0.004 in)

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

The 0.25 mm (0.010 in) and 0.50 mm (0.020 in) oversize pistons are available.

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

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

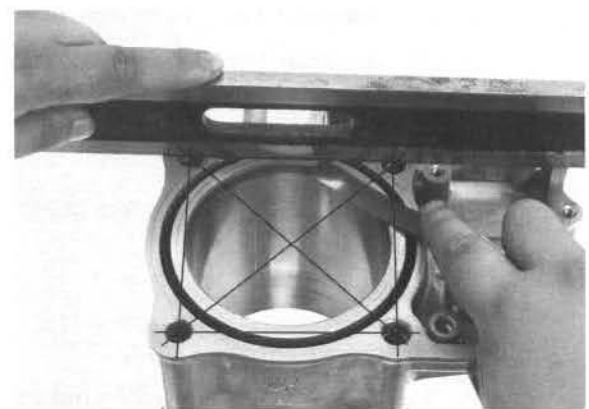
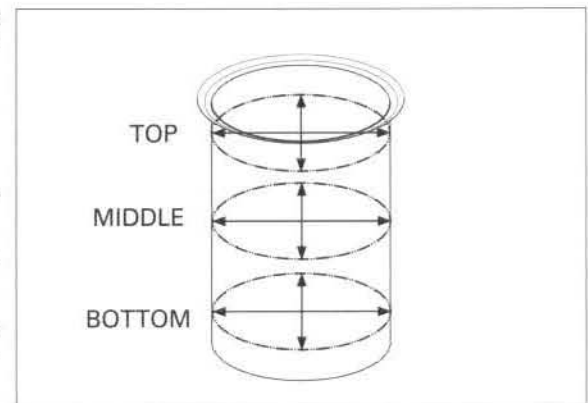
SERVICE LIMIT: 0.10 mm (0.004 in)

PISTON/PISTON RING

Inspect the piston rings for movement by rotating the rings. The rings should be able to move in their grooves without catching.

Push the ring until the outer surface of the piston ring is nearly flush with the piston and measure the ring-to-ring groove clearance.

SERVICE LIMITS: Top/Second: 0.09 mm (0.004 in)



CYLINDER/PISTON

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

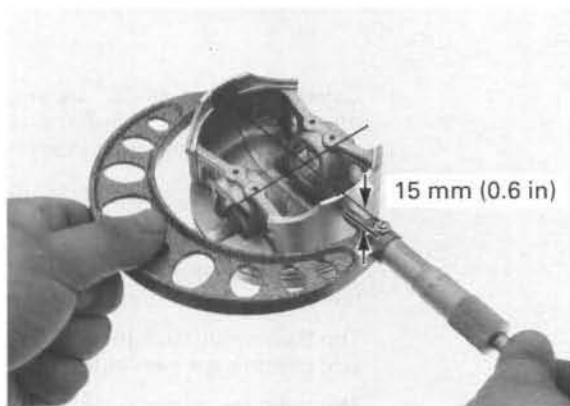
SERVICE LIMITS: Top: 0.5 mm (0.02 in)
Second: 0.6 mm (0.02 in)



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

SERVICE LIMIT: 91.90 mm (3.618 in)

Compare this measurement against the maximum cylinder I.D. measurement and calculate the piston-to-cylinder clearance (page 9-7).



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

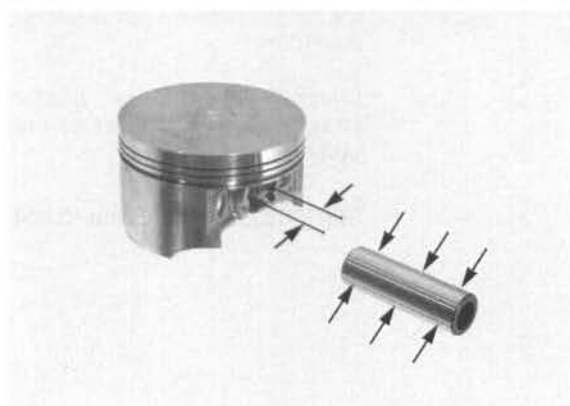
SERVICE LIMIT: 20.04 mm (0.789 in)

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)



CONNECTING ROD

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/PISTON INSTALLATION

PISTON RING INSTALLATION

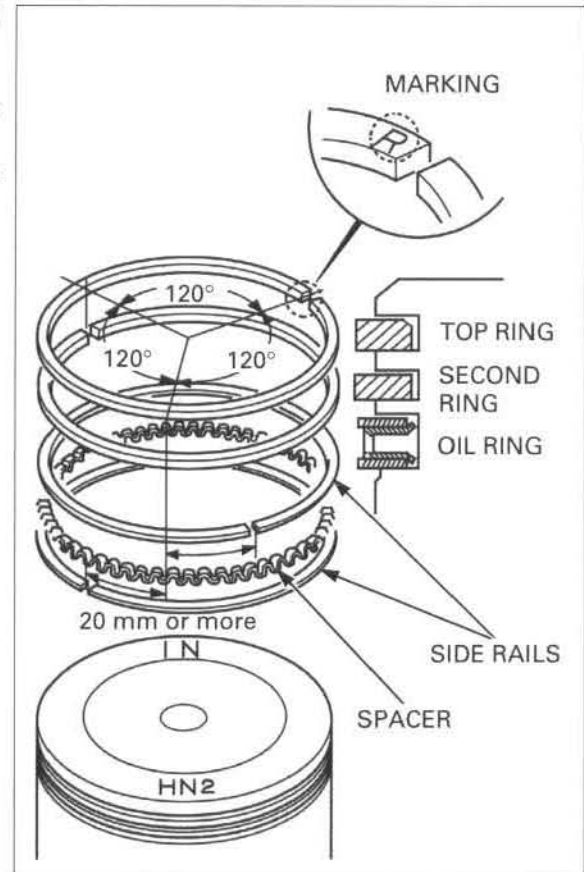
Be careful not to damage the piston and rings.

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

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

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 piston pin clip from falling into the crankcase.

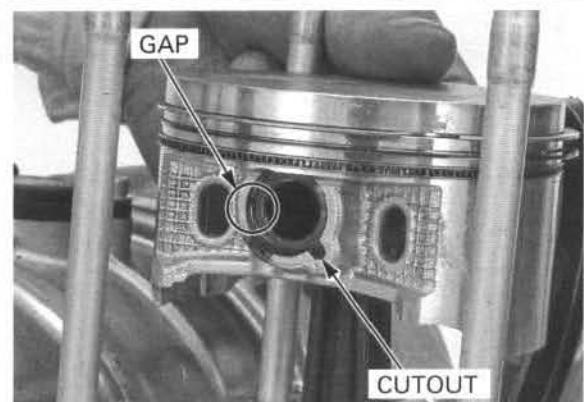
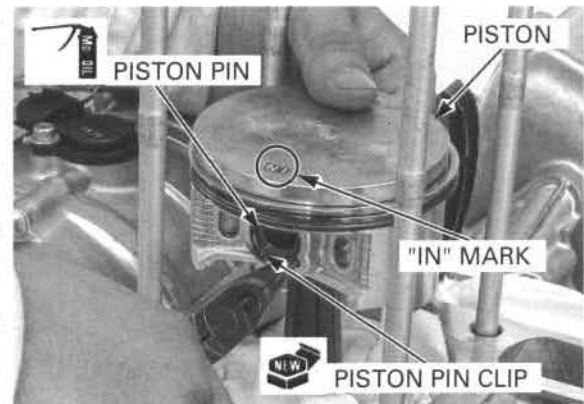
Apply molybdenum oil solution to the piston pin outer surface.

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

Make sure that the piston pin clips are seated securely and piston pin clip end does not align with the piston cutout.

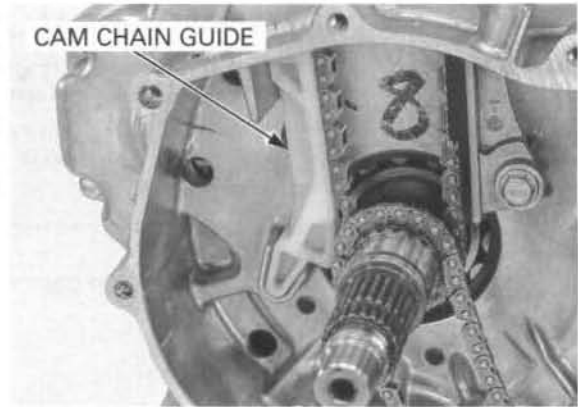


CYLINDER INSTALLATION

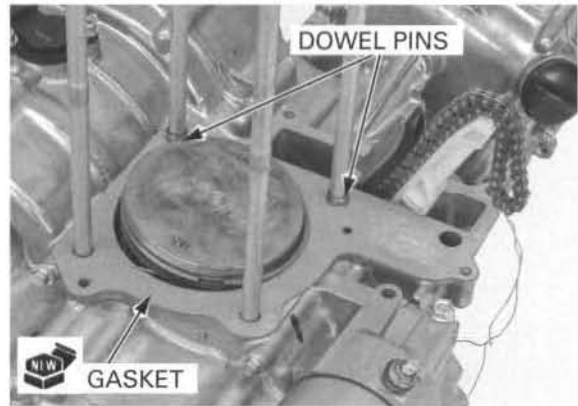
Clean the gasket surfaces of the cylinder and crankcase thoroughly, being careful not to damage them, and being careful not to allow gasket material into the crankcase.

Blow through the oil passage (stud bolt hole) in the cylinder with compressed air.

Install the cam chain guide into the crankcase so that its end rests in the groove properly as shown.



Install the dowel pins and a new gasket.

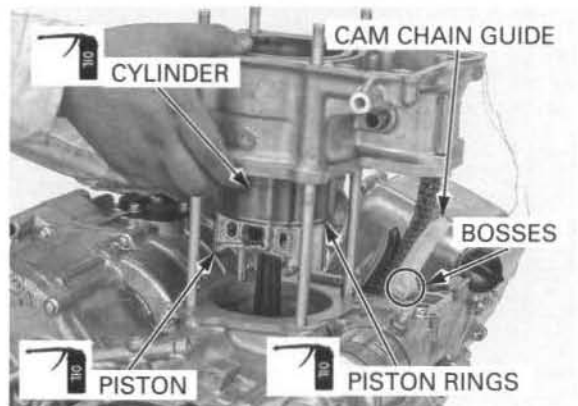


Apply engine oil to the cylinder wall, piston outer surface and piston rings.

Be careful not to damage the piston rings and cylinder wall.

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

Align the cam chain guide bosses with the grooves in the cylinder properly to seat the cylinder onto the crankcase.



Tighten the cylinder bolts after installing the cylinder head cover.

Make sure that the cylinder is touched to the crankcase evenly. Install and temporarily tighten the four cylinder bolts

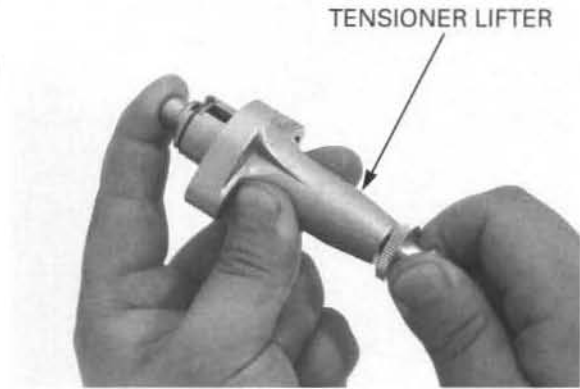


Remove the sealing bolt and washer from the cam chain tensioner lifter.

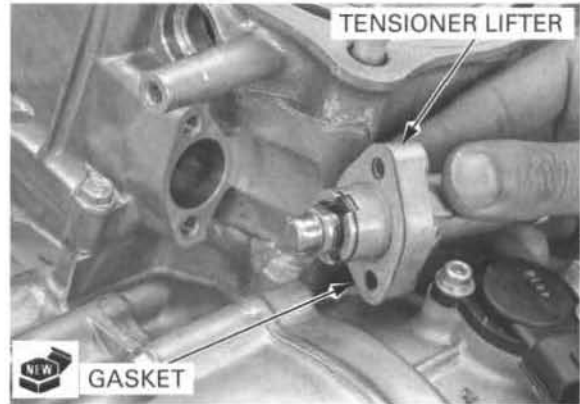
Turn the cam chain tensioner lifter shaft clockwise fully to retract the tensioner lifter and secure it with a stopper tool.

TOOL:

Cam chain tensioner stopper 07NMG-MY90101 or 07ZMG-MCAA400 (U.S.A. only)



Install the cam chain tensioner lifter into the cylinder with a new gasket.

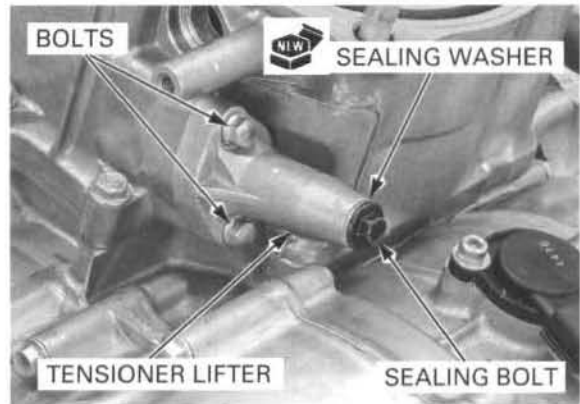


Install the camshaft (page 8-17).

Install and tighten the two bolts.

Remove the stopper tool and install the sealing bolt with a new sealing washer.

Install the cylinder head (page 8-20).



MEMO

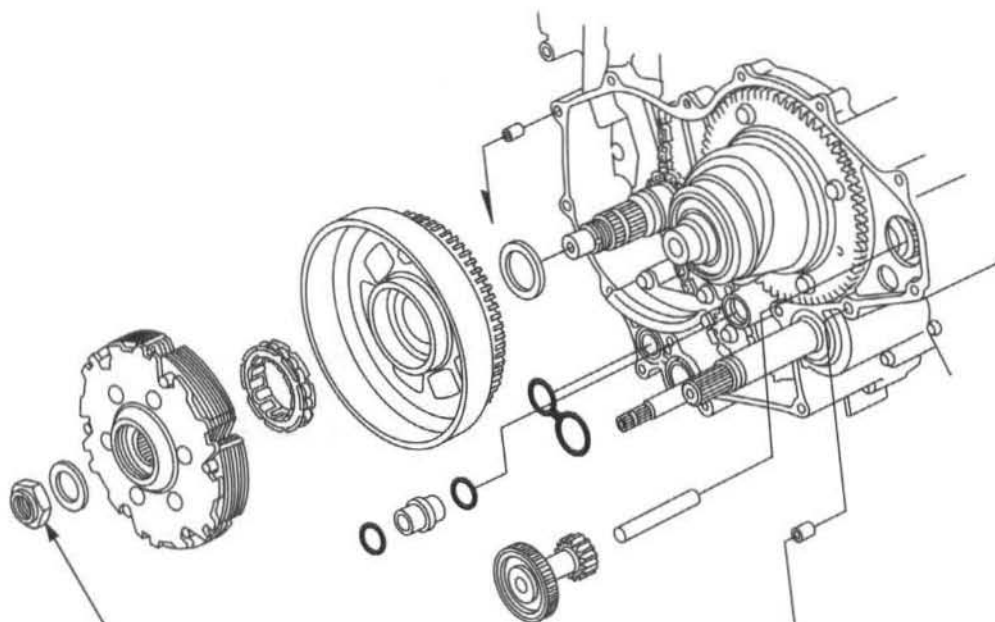


10. CENTRIFUGAL CLUTCH

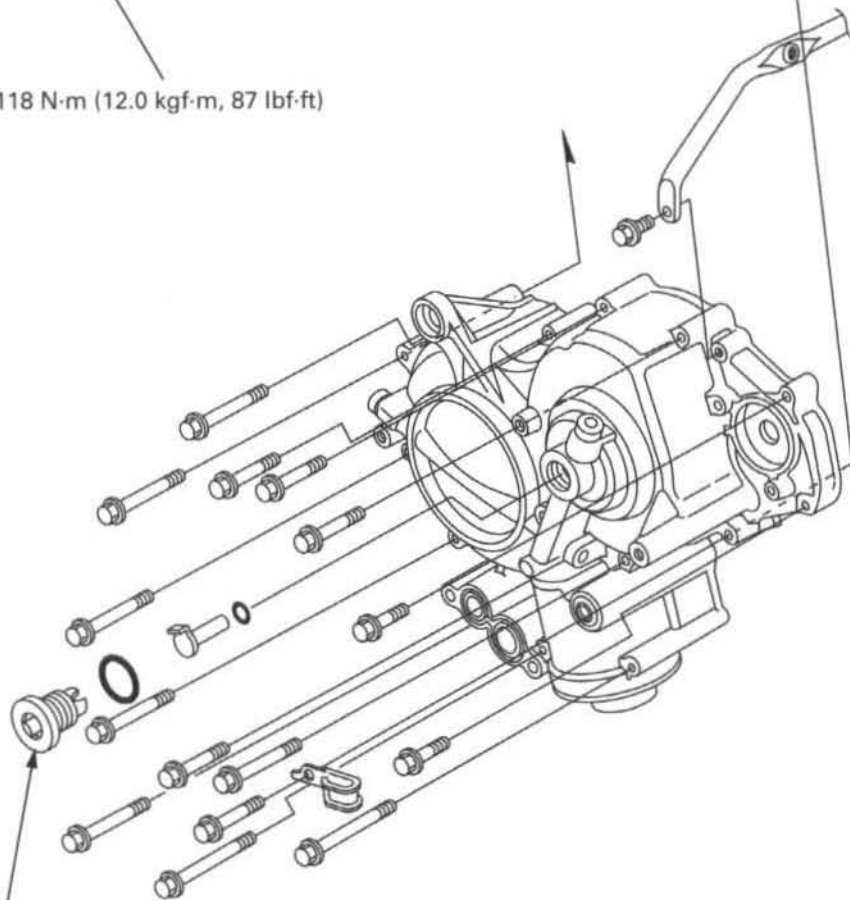
COMPONENT LOCATION	10-2	FRONT CRANKCASE COVER	10-5
SERVICE INFORMATION	10-3	CENTRIFUGAL CLUTCH	10-9
TROUBLESHOOTING	10-4		

CENTRIFUGAL CLUTCH

COMPONENT LOCATION



118 N·m (12.0 kgf·m, 87 lbf·ft)



18 N·m (1.8 kgf·m, 13 lbf·ft)

SERVICE INFORMATION

GENERAL

- This section covers service of the centrifugal clutch and change clutch. These parts can be serviced with the engine installed in the frame.
- The automatic transmission unit and engine lubricating oil from the filter is fed through the oil passages in the front crankcase cover.
- The clutch will not engage properly if the engine oil contains additives such as molybdenum disulfide. Oils with a molybdenum disulfide additive tend to reduce clutch friction.
- Engine oil viscosity and level and the use of oil additives have an effect on clutch disengagement. Oil additives of any kind are not recommended. When the clutch does not disengage or the vehicle creeps with the clutch disengaged, inspect the engine oil viscosity and level before servicing the clutch system.

SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Clutch	Drum I.D.	150.0 – 150.2 (5.906 – 5.913)	150.4 (5.92)
	Weight lining thickness	3.0 (0.12)	2.0 (0.08)
	Clutch spring height	3.72 (0.146)	3.6 (0.14)
	Clutch weight spring free length	23.2 (0.91)	24.1 (0.95)
Clutch drum boss I.D.		29.000 – 29.020 (1.1417 – 1.1425)	29.05 (1.144)
Crankshaft O.D. at clutch drum		28.959 – 28.980 (1.1401 – 1.1409)	28.93 (1.139)

TORQUE VALUES

Centrifugal clutch lock nut

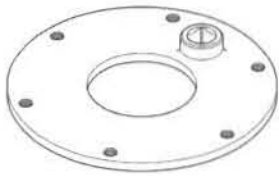

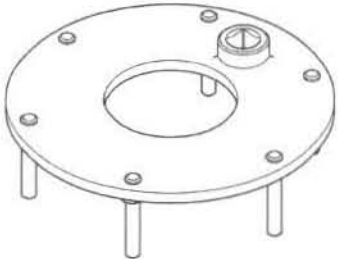

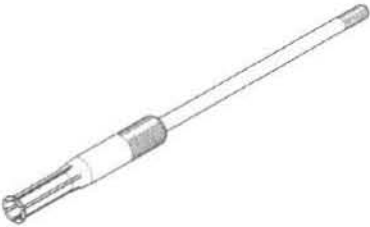
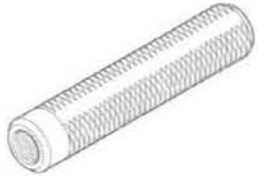
118 N·m (12.0 kgf·m, 87 lbf·ft)

Lock nut: Replace with a new one
Apply oil to the threads and seating surface
Stake

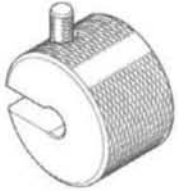
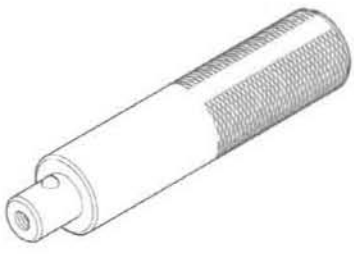



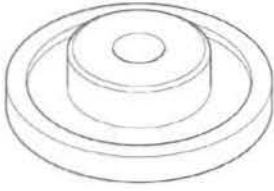
Oil feed pipe setting cap

18 N·m (1.8 kgf·m, 13 lbf·ft)

TOOLS

Clutch holder plate 07ZMB-HN20100  Not available in U.S.A.	Clutch holder pin 07ZMB-HN20200  Not available in U.S.A.	Clutch holder set 07ZMB-HN20000  or 07ZMB-HN2A100 (U.S.A. only)
Outside screw puller, 40 x 1.5 mm 07ZMC-HN20100  or 07ZMC-HN2A100 (U.S.A. only)	Bearing remover, 17 mm 07936-3710300 	Remover handle 07936-3710100 

CENTRIFUGAL CLUTCH

<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>Pilot, 22 mm 07746-0041000</p> 	<p>Hub bearing driver 07HAD-SG00100</p> 

TROUBLESHOOTING

Clutch slips when accelerating

- Worn clutch weight linings
- Worn clutch drum
- Improper oil additive used

The vehicle creeps with clutch disengaged

- Weak clutch weight springs

FRONT CRANKCASE COVER

REMOVAL

Remove the following:

- front mud guards (page 2-8)
- inner fenders (page 2-9)
- gearshift linkage (page 7-5)
- oil tank (page 4-8)

Remove the bolt, socket bolt, collar and left engine side cover.

Remove the two bolts and left engine side cover stay.

Remove the setting cap and oil feed pipe from the front crankcase cover.

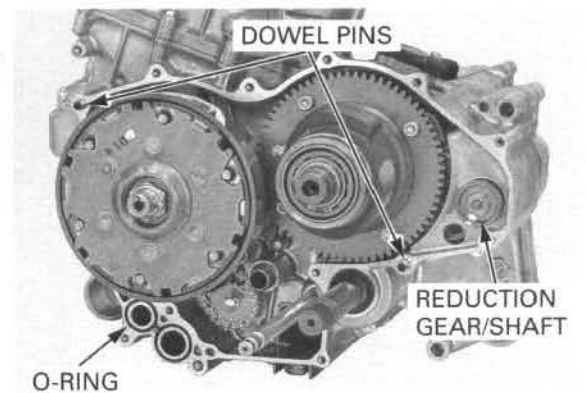
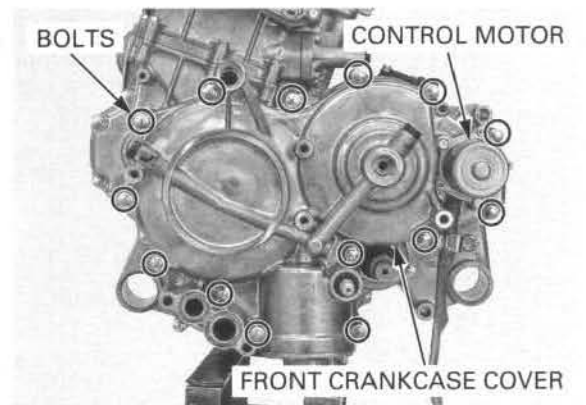
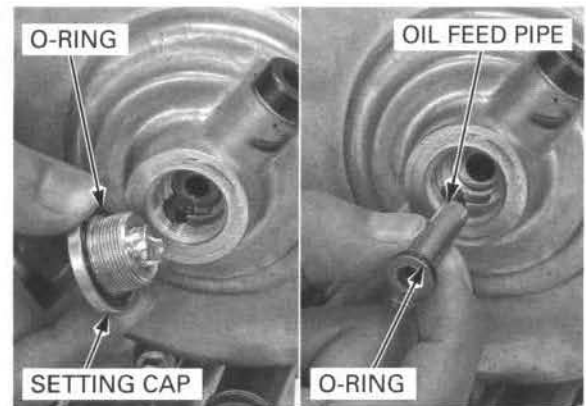
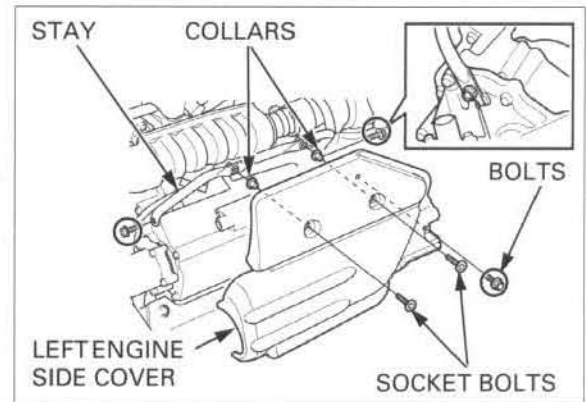
Remove the O-rings from the setting cap and feed pipe.

Remove the fourteen crankcase cover bolts.
Remove the two bolts and control motor from the front crankcase cover.

Remove the front crankcase cover.

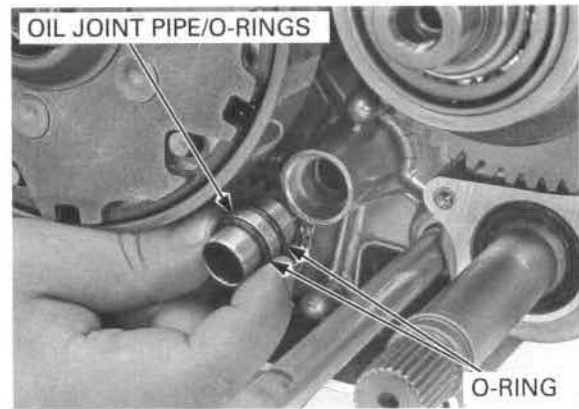
Remove the dowel pins and O-ring.

Remove the control motor reduction gear and shaft if necessary.



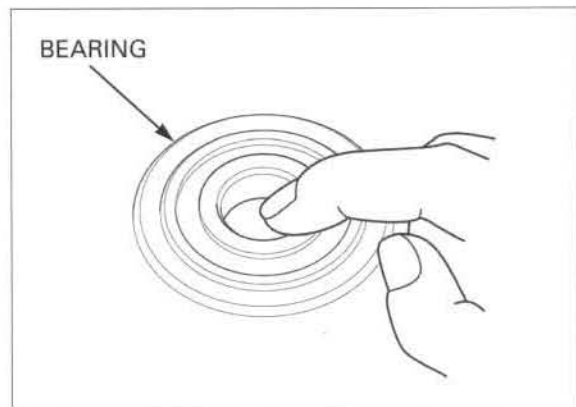
CENTRIFUGAL CLUTCH

Remove the oil joint pipe and O-rings.



BEARING INSPECTION/ REPLACEMENT

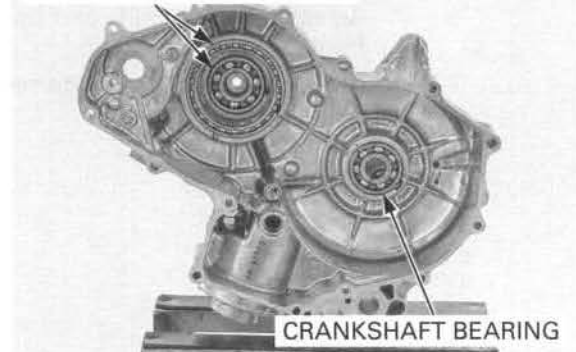
Turn the inner race of each bearing with your finger. The bearing should turn smoothly and quietly.



Also check that the outer race of the bearing fits tightly in the front crankcase cover.

Replace the bearing if the inner race does not turn smoothly, quietly, or if the outer race fits loosely in the front crankcase cover.

TRANSMISSION BEARINGS

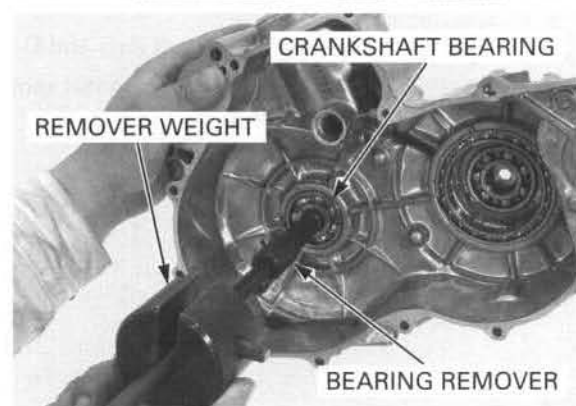


Remove the crankshaft bearing using special tools.

TOOLS:

Bearing remover, 17 mm
Remover handle
Remover weight

07936-3710300
07936-3710100
07741-0010201 or
07936-371020A or
07936-3710200
(U.S.A. only)



Drive a new crankshaft bearing in with the sealed side facing down, using the special tools.

TOOLS:

Driver 07749-0010000
Attachment, 42 x 47 mm 07746-0010300
Pilot, 17 mm 07746-0040400

Be sure to wear heavy gloves to avoid burns when handling the heated cover.

Heat the front crankcase cover with a heat gun or a hot plate and remove the automatic transmission unit bearings from the cover.

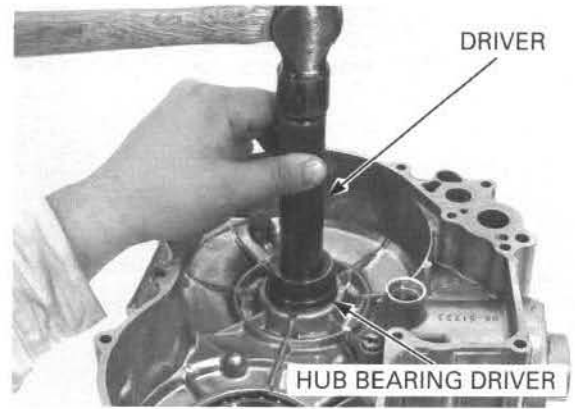
Drive new transmission bearings in using the special tools.

TOOLS:

Inner bearing:
Driver 07749-0010000
Attachment, 42 x 47 mm 07746-0010300
Pilot, 22 mm 07746-0041000

Outer bearing:

Driver 07749-0010000
Hub bearing driver 07HAD-SG00100



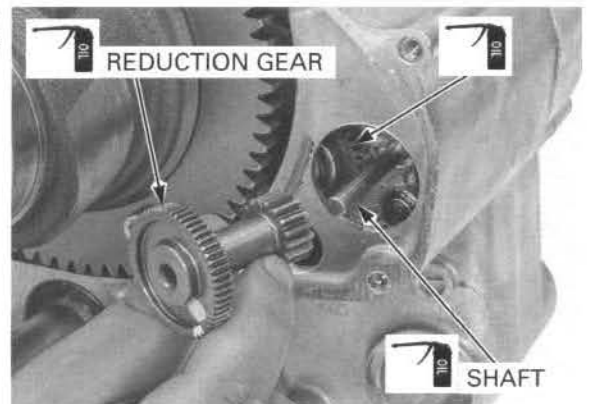
INSTALLATION

Blow through the oil passages in the front crankcase cover with compressed air.

Remove the gearshift spindle oil seal.
 Apply engine oil to a new oil seal lip and install it.



Apply engine oil to the control motor driven gear teeth, reduction gear teeth and shaft. Install the shaft and reduction gear if they were removed.

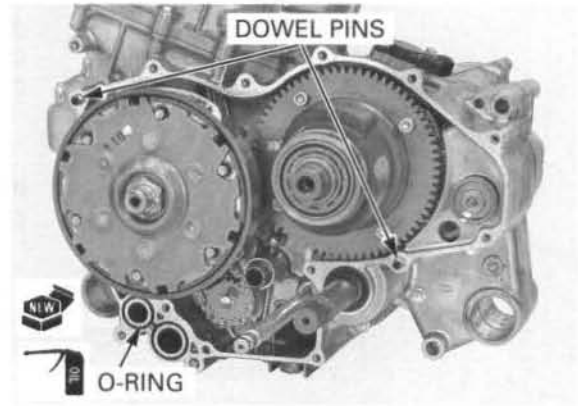


CENTRIFUGAL CLUTCH

Coat new O-rings with oil and install them onto the oil joint pipe.
Install the oil joint pipe into the crankcase.

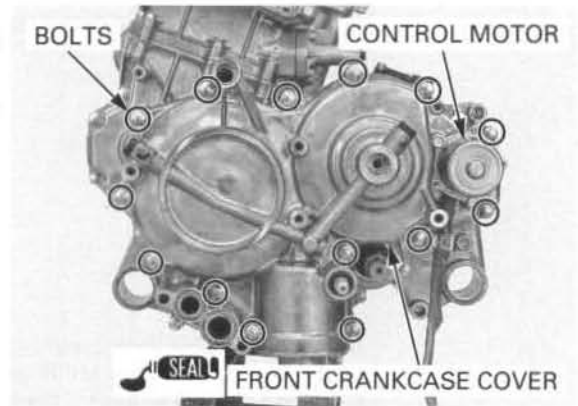


Coat a new O-ring with engine oil and install it into the crankcase groove.
Install the dowel pins.

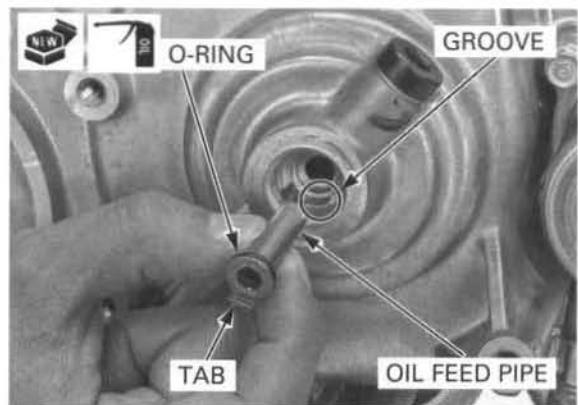


Clean the crankcase and cover mating surfaces.
Apply liquid sealant to the mating surface of the front crankcase cover.

Install the front crankcase cover and tighten the fourteen bolts in a crisscross pattern in 2 or 3 steps.
Install the control motor (page 24-43).

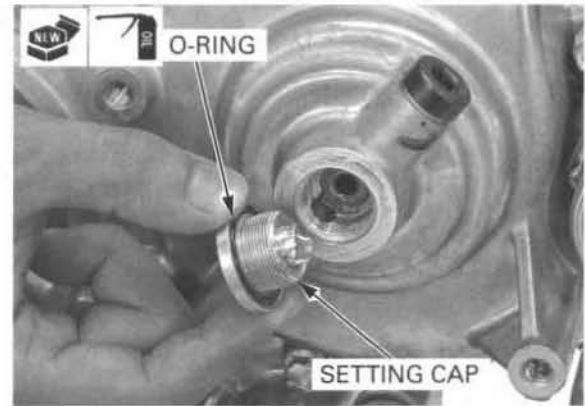


Coat a new O-ring with engine oil and install it onto the oil feed pipe.
Install the oil feed pipe into the front crankcase cover, aligning the tab with the groove in the cover.



Coat a new O-ring with oil and install it onto the oil feed pipe setting cap.
Install and tighten the setting cap.

TORQUE: 18 N·m (1.8 kgf·m, 13 lbf·ft)



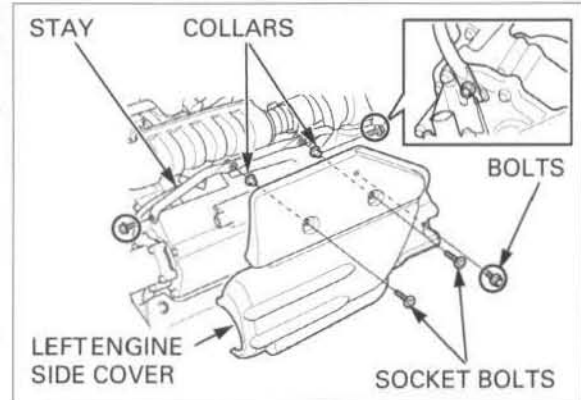
Install the left engine side cover stay by aligning the locating tab with the groove in the rear crankcase cover, and tighten the two bolts.

Install the left engine side cover and collars then tighten the bolt and socket bolts.

Install the following:

- oil tank (page 4-8)
- gearshift linkage (page 7-10)
- inner fenders (page 2-9)
- front mud guards (page 2-8)

Adjust the tie-rod length of the gearshift lever linkage (page 12-18).



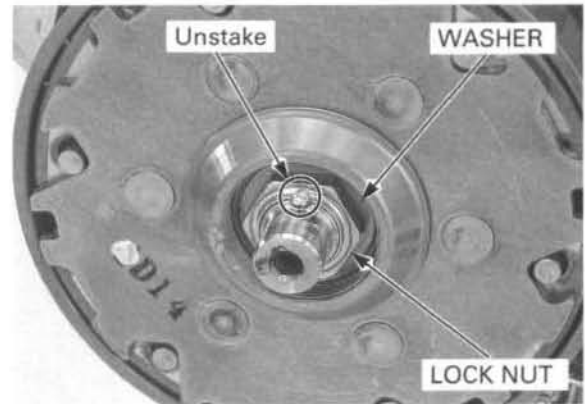
CENTRIFUGAL CLUTCH

DISASSEMBLY

Remove the front crankcase cover (page 10-2).

Be careful not to damage the crankshaft threads.

Unstake the centrifugal clutch lock nut.



Install the special tools by aligning the pins with the grooves in the drive plate.
Hold the drive plate and loosen the lock nut

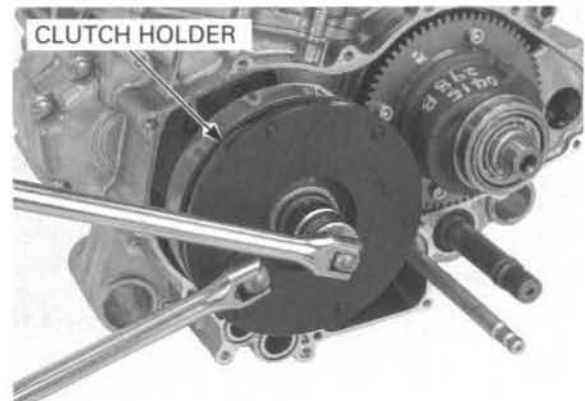
TOOLS:

Clutch holder set

07ZMB-HN20000 or
07ZMB-HN2A100
(U.S.A. only)
07ZMB-HN20100
07ZMB-HN20200

- clutch holder plate
- clutch holder pin

Remove the lock nut and washer.



CENTRIFUGAL CLUTCH

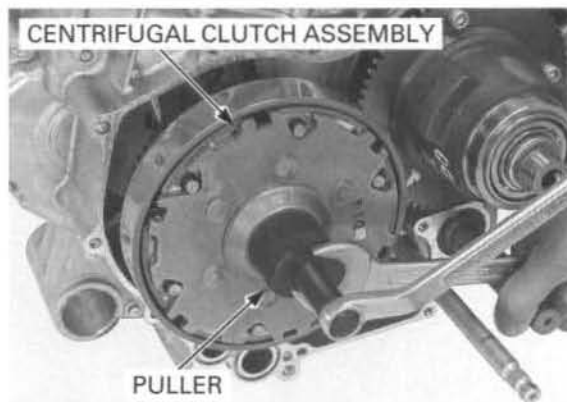
Remove the centrifugal clutch assembly using the special tool.

TOOL:

Outside screw puller,
40 x 1.5 mm

07ZMC-HN20100 or
07ZMC-HN2A100
(U.S.A. only)

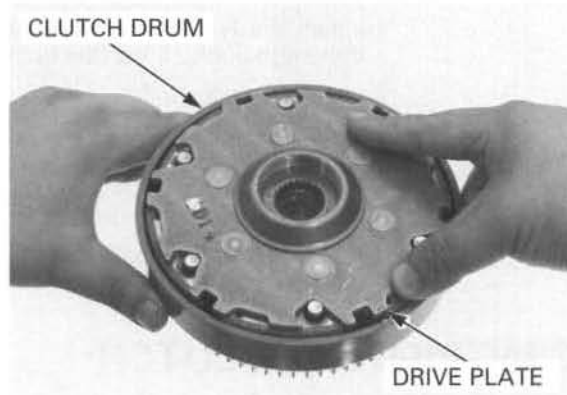
Remove the washer.



INSPECTION

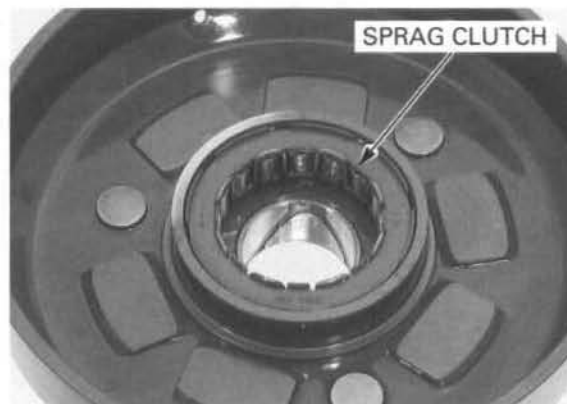
ONE-WAY CLUTCH

Hold the clutch drum and turn the drive plate. The drive plate should turn counterclockwise smoothly and should not turn clockwise. Remove the drive plate assembly from the clutch drum by turning it counterclockwise.



CLUTCH DRUM

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



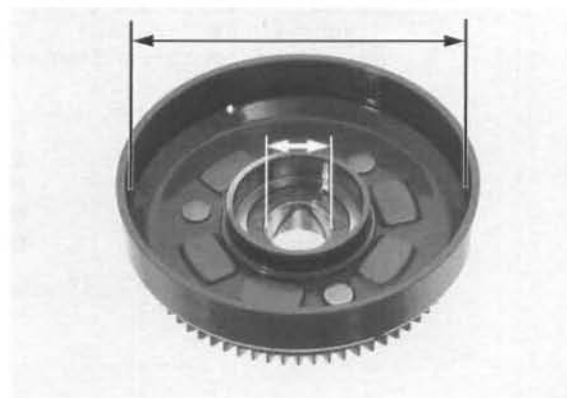
Remove the sprag clutch from the clutch outer. Check the clutch lining and sprag clutch contacting surfaces for abnormal wear or damage.

Measure the clutch drum I.D.

SERVICE LIMIT: 150.4 mm (5.92 in)

Check the crankshaft sliding surface of the clutch drum boss for scratches or abnormal wear. Measure the clutch drum boss I.D.

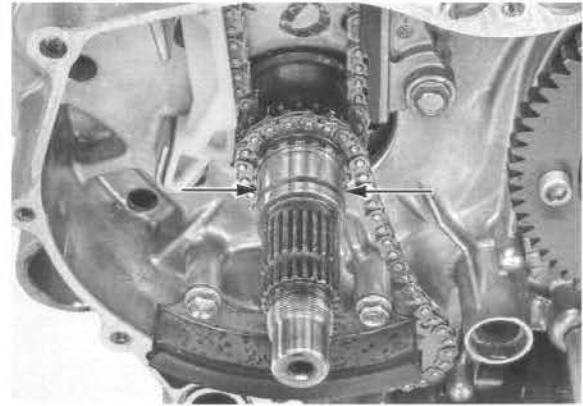
SERVICE LIMIT: 29.05 mm (1.144 in)



CRANKSHAFT

Check the clutch drum sliding surface of the crankshaft for scratches or abnormal wear.
Measure the crankshaft O.D.

SERVICE LIMIT: 28.93 mm (1.139 in)



DRIVE PLATE ASSEMBLY

Replace the clutch weights as a set.

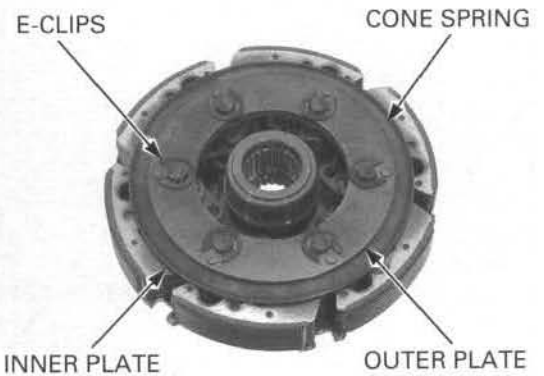
Measure the clutch lining thickness of the weight.

SERVICE LIMIT: 2.0 mm (0.08 in)



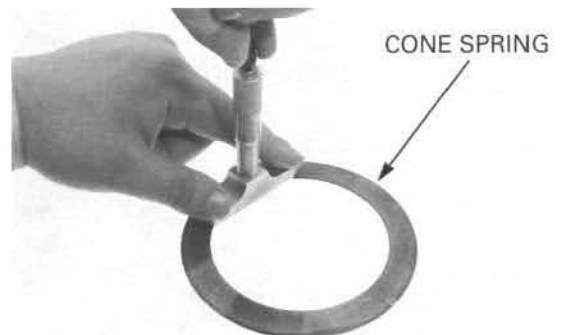
Check the sprag clutch contacting surface of the drive plate boss for abnormal wear or damage.

Compress the clutch cone spring and remove the E-clips.
Remove the outer plate, cone spring and inner plate.



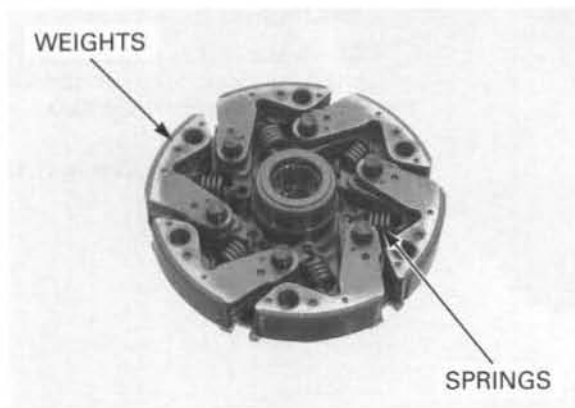
Measure the height of the clutch cone spring.

SERVICE LIMIT: 3.6 mm (0.14 in)



CENTRIFUGAL CLUTCH

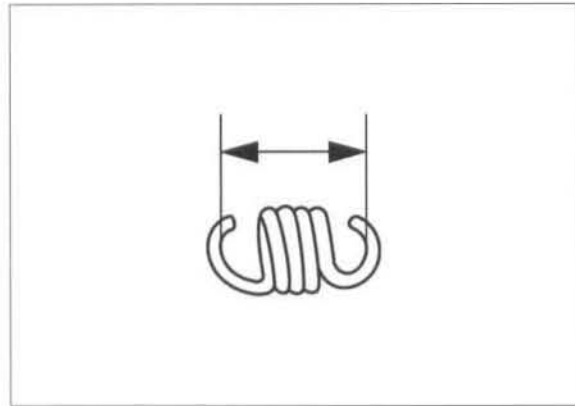
Remove the clutch weights and springs from the drive plate.



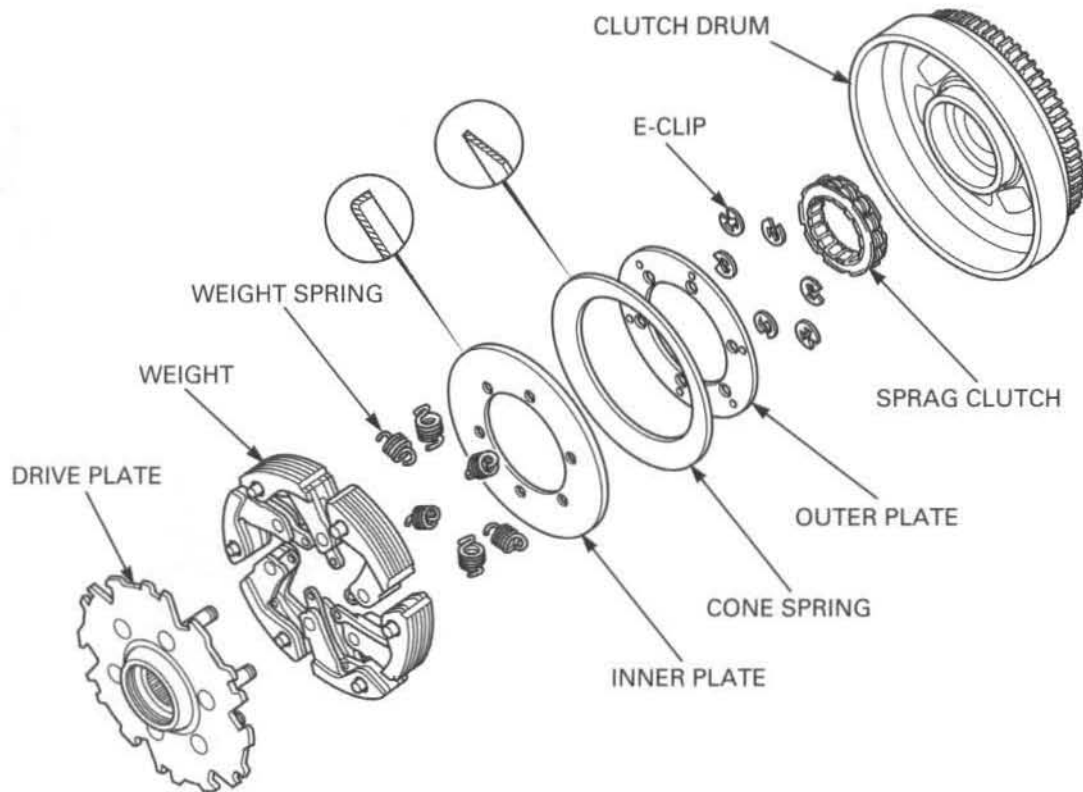
Replace the clutch weight springs as a set.

Measure the clutch weight spring free length.

SERVICE LIMIT: 24.1 mm (0.95 in)



ASSEMBLY



Install with the spring's open ends facing in.

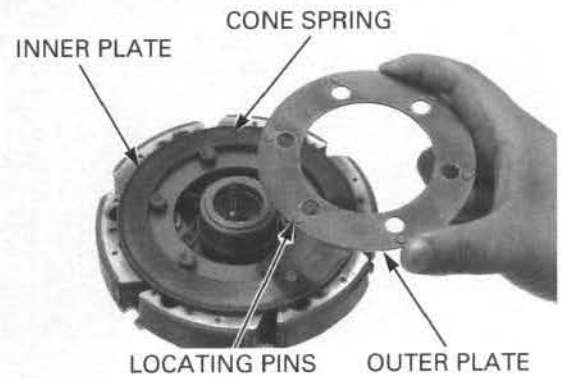
Install the clutch weights and springs onto the drive plate as shown.

WEIGHTS



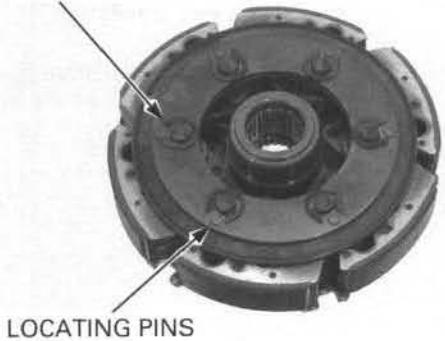
Install the following:

- inner plate with dished side facing up
- clutch spring with concaved side facing down
- outer plate with locating pins facing up

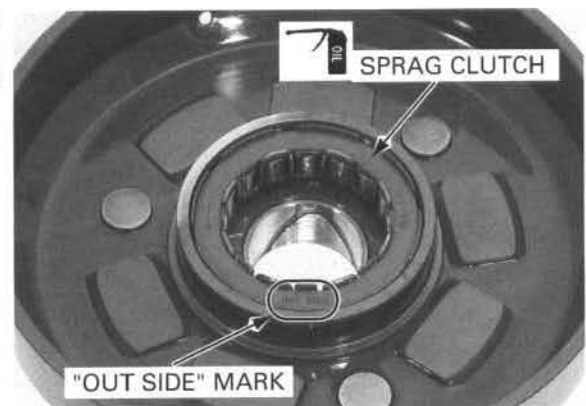


Install the E-clips into the pin grooves of the drive plate with their gaps facing towards the locating pins while compressing the cone spring with pliers.

E-CLIPS

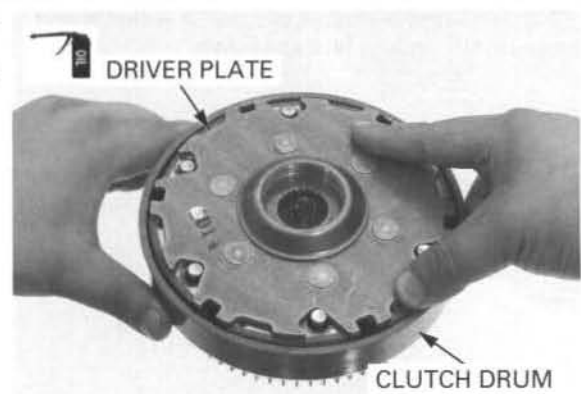


Apply oil to the sprag clutch whole surface and the sprag clutch contacting surface of the clutch drum. Install the sprag clutch into the clutch drum with the "OUT SIDE" mark facing up.



CENTRIFUGAL CLUTCH

Apply engine oil to the sprag clutch contacting surface of the drive plate boss.
Install the drive plate assembly into the clutch drum while turning it counterclockwise.

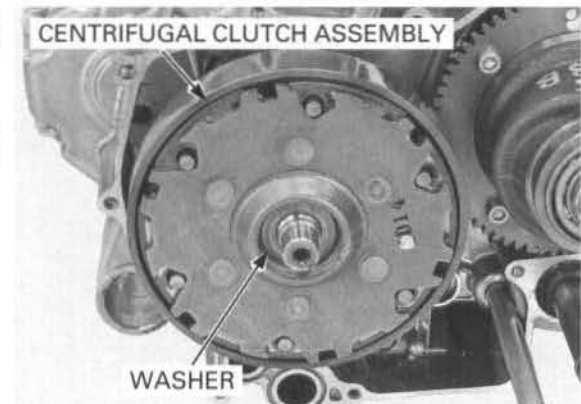


Install the washer onto the crankshaft.

Apply engine oil to the clutch drum sliding surface of the crankshaft.



Install the centrifugal clutch assembly onto the crankshaft while aligning the splines of the drive plate boss and crankshaft.



Keep the clutch drum and drive plate as an assembly.

Engage the primary drive gear of the clutch drum with the driven gear of the automatic transmission unit.

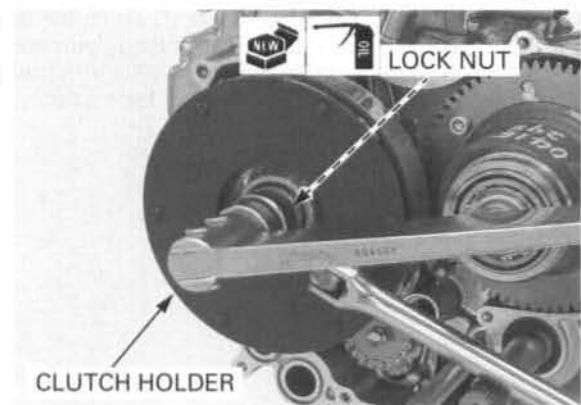
Install the washer.

Apply engine oil to the threads and seating surface of a new clutch lock nut and install it.
Install the special tools by aligning the pins with the grooves in the drive plate.
Hold the drive plate and tighten the lock nut

TOOLS:

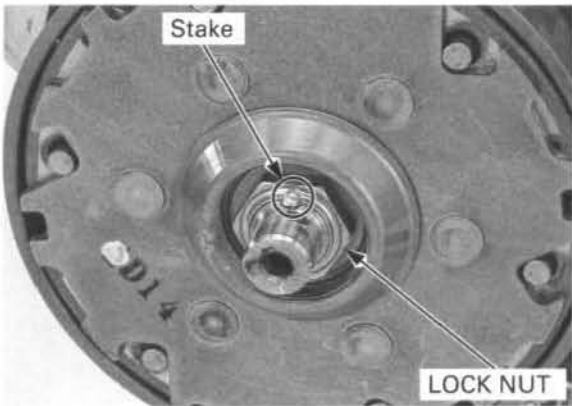
Clutch holder set	07ZMB-HN20000 or 07ZMB-HN2A100 (U.S.A. only)
- clutch holder plate	07ZMB-HN20100
- clutch holder pin	07ZMB-HN20200

TORQUE: 118 N·m (12.0 kgf·m, 87 lbf·ft)

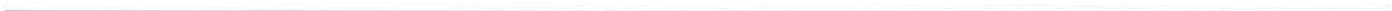


Be careful not to damage the crankshaft threads.

Stake the clutch lock nut into the crankshaft groove.
Install the front crankcase cover (page 10-7).



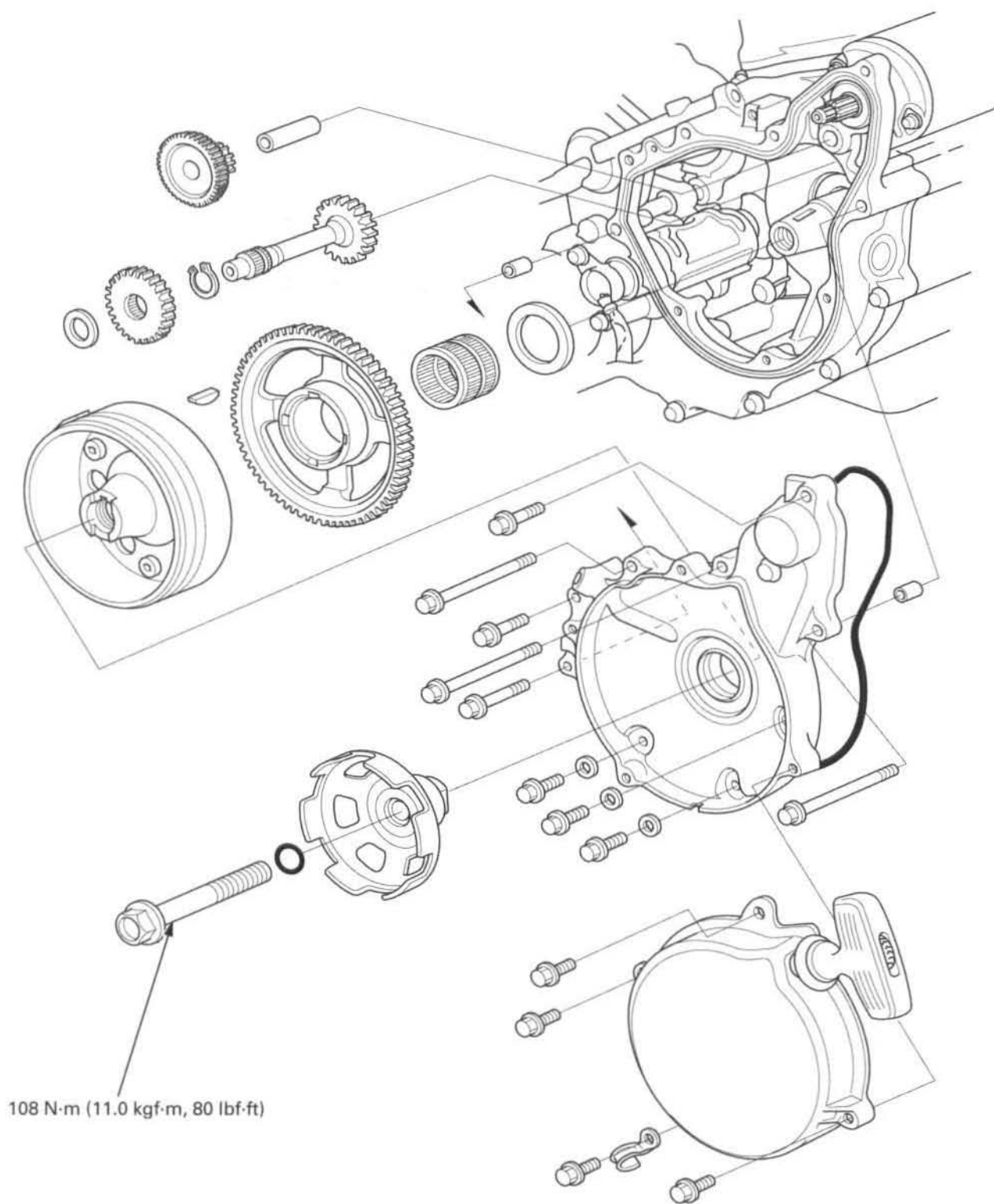
MEMO



11. ALTERNATOR/STARTER CLUTCH

SYSTEM COMPONENTS	11-2	RECOIL STARTER.....	11-5
SERVICE INFORMATION	11-3	ALTERNATOR STATOR	11-8
TROUBLESHOOTING	11-4	FLYWHEEL/STARTER CLUTCH	11-12

ALTERNATOR/STARTER CLUTCH SYSTEM COMPONENTS



SERVICE INFORMATION

GENERAL

- This section covers service of the recoil starter, alternator stator and flywheel/starter clutch. These parts can be serviced with the engine installed in the frame.
- Starter clutch lubricating oil is fed through the oil passage in the alternator cover. Clean the oil passage before installing the alternator cover.
- Be careful not to damage the mating surfaces of the alternator and crankcase covers when servicing.
- Refer to 19-8 for alternator stator inspection.
- Refer to 21-6 for starter motor servicing.

SPECIFICATIONS

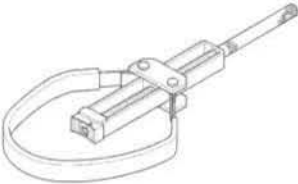
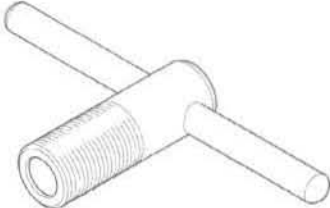
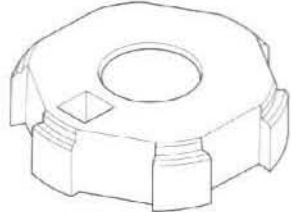
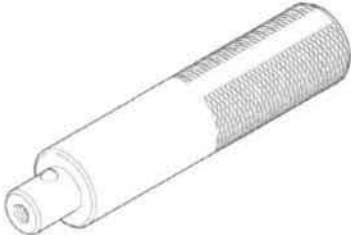


Unit: mm (in)

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

TORQUE VALUES

Starter clutch outer bolt	30 N·m (3.1 kgf·m, 22 lbf·ft)	Apply locking agent to the threads Apply engine oil to the threads and seating surface
Recoil starter driven pulley bolt	108 N·m (11.0 kgf·m, 80 lbf·ft)	
Alternator stator bolt	10 N·m (1.0 kgf·m, 7 lbf·ft)	Apply locking agent to the threads
Ignition pulse generator bolt	6 N·m (0.6 kgf·m, 4.3 lbf·ft)	

TOOLS

<p>Flywheel holder 07725-0040001</p>  <p>or equivalent commercially available in U.S.A.</p>	<p>Flywheel puller 07933-3950000</p> 	<p>Recoil pulley holder 07SMB-HM70100</p> 
<p>Driver 07749-0010000</p> 	<p>Attachment, 24 x 26 mm 07746-0010700</p> 	<p>Pilot, 10 mm 07746-0040100</p> 

ALTERNATOR/STARTER CLUTCH

Remover weight
07741-0010201



or 07936-3710200
or 07936-371020A (U.S.A. only)

Bearing remover shaft, 10 mm
07936-GE00100



Bearing remover head, 10 mm
07936-GE00200



TROUBLESHOOTING

Starter motor turns, but engine does not turn

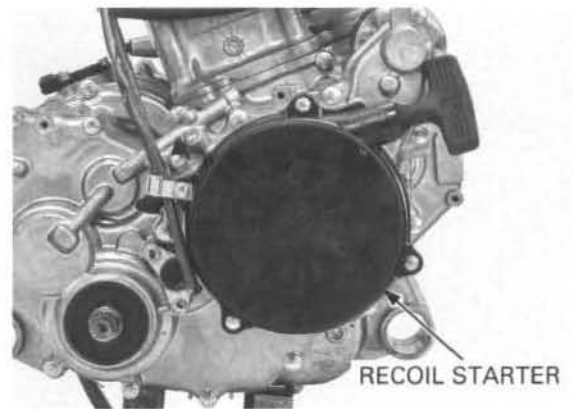
- Faulty starter clutch
- Damaged reduction gear or shaft

RECOIL STARTER

REMOVAL

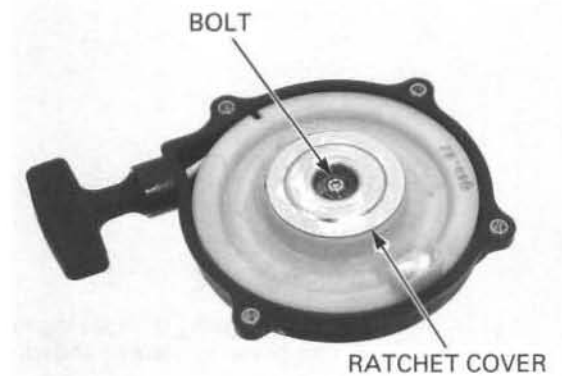
Remove the air cleaner housing (page 5-5).

Remove the four mounting bolts and the recoil starter assembly.

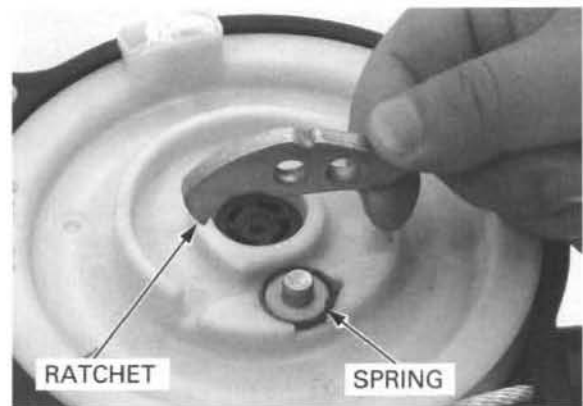


DISASSEMBLY

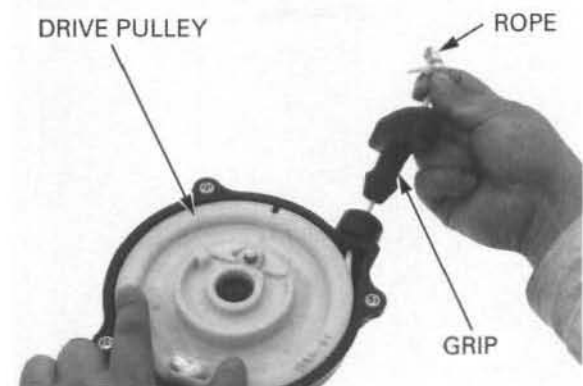
Remove the bolt and ratchet cover.



Remove the ratchet and spring.



Untie the starter rope and remove the starter grip. Release the starter rope slowly.

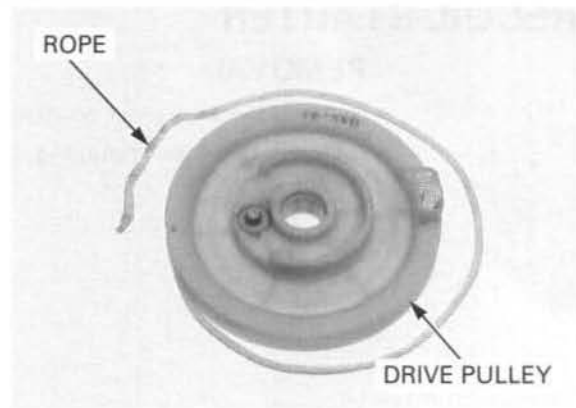


Remove the starter drive pulley.

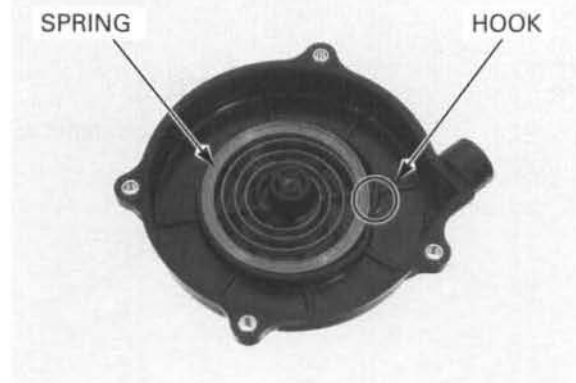
Wear eye protection and use care when removing the drive pulley and starter spring. The spring can pop out of the housing if care is not used.

ALTERNATOR/STARTER CLUTCH

Remove the starter rope from the drive pulley.
Check the starter rope for wear or damage.

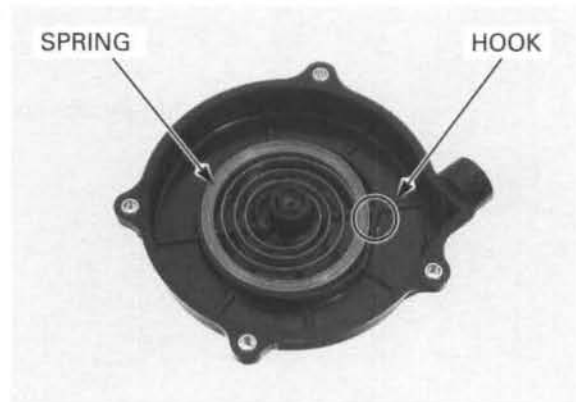


Check the recoil starter spring and replace it with a new one if it is damaged or broken.

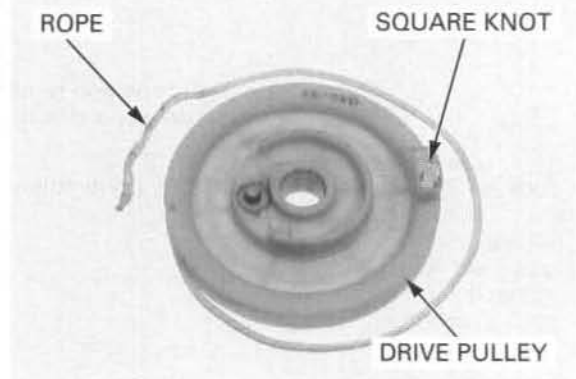


ASSEMBLY

Install the spring by hooking the outer end onto the starter housing hook as shown.

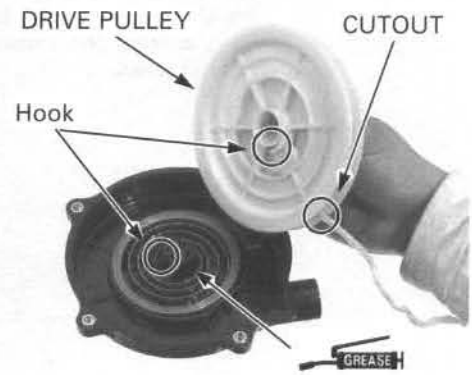


Install the starter rope into the drive pulley and tie the rope end in a square knot.
Wrap the rope around the drive pulley in a counter-clockwise direction as viewed from the ratchet side as shown.

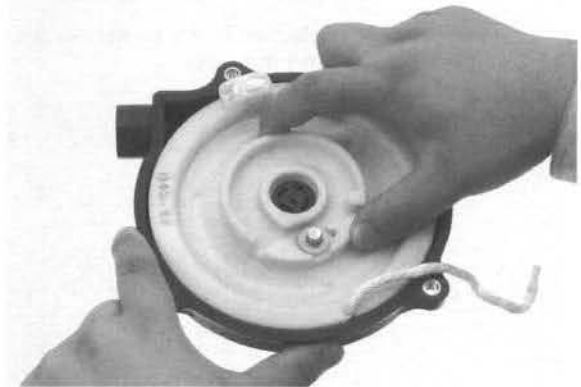


ALTERNATOR/STARTER CLUTCH

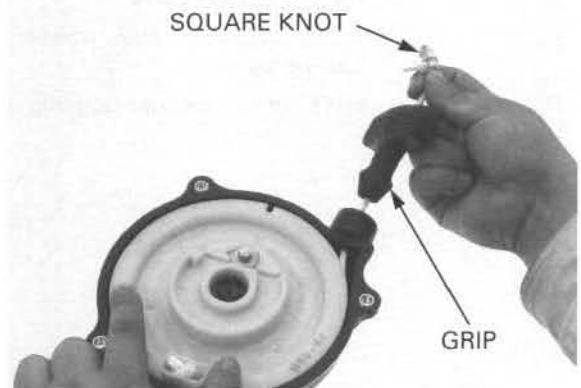
Apply grease to the drive pulley shaft.
Set the starter rope into the pulley cutout and install the pulley while hooking the spring inner end onto the pulley hook.



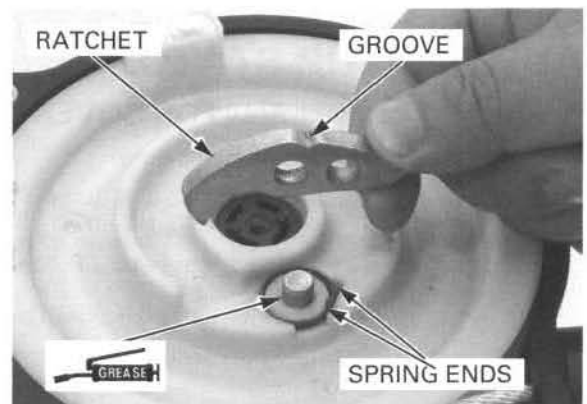
Preload the starter spring by turning the pulley 2-1/2 turns counterclockwise.



Route the starter rope end through the starter housing and grip holes while the pulley remains held in place.
Tie the starter rope end in a square knot.

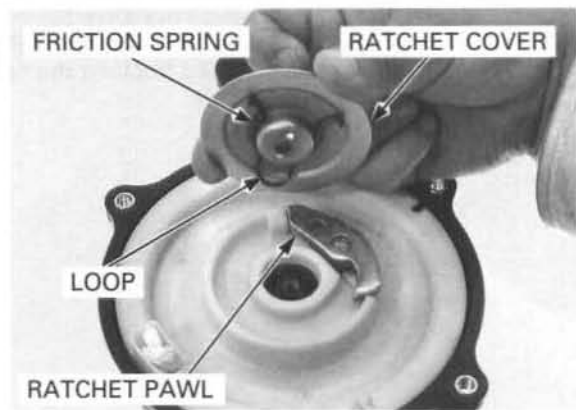


Install the ratchet return spring onto the drive pulley, inserting the end into the hole in the pulley.
Apply grease to the starter ratchet pivot pin on the drive pulley.
Install the starter ratchet onto the pivot pin while hooking the spring end onto the ratchet groove.



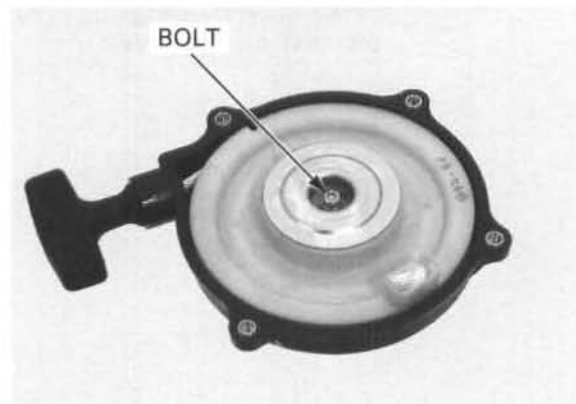
ALTERNATOR/STARTER CLUTCH

Install the friction spring onto the ratchet cover. Install the ratchet cover, aligning the flats on the boss so that the friction spring loop is against the ratchet pawl.



Install and tighten the bolt.

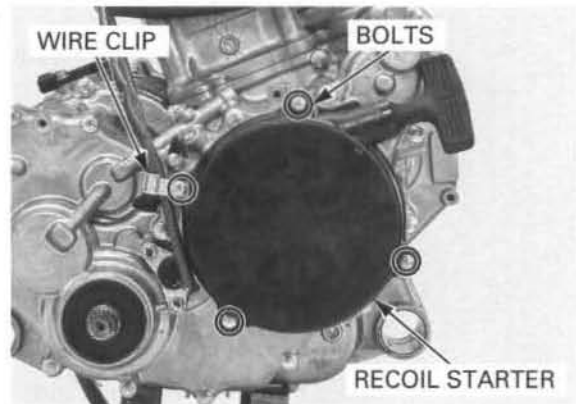
Check that the recoil starter for smooth operation by pulling the grip.



INSTALLATION

Install the recoil starter assembly and tighten the four bolts.

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



ALTERNATOR STATOR

ALTERNATOR COVER REMOVAL

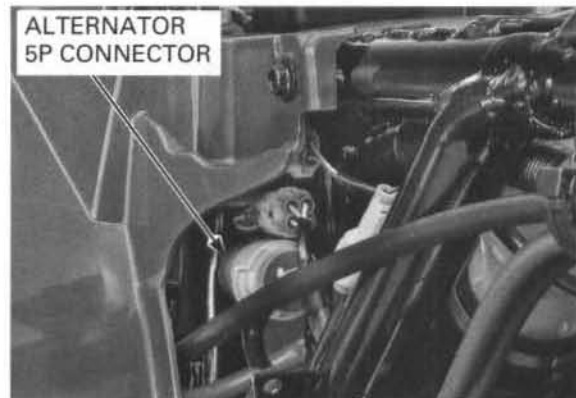
Remove the following:

- air cleaner housing (page 5-5).
- swingarm (page 15-9).

Remove the alternator 5P connector from the stay and disconnect it.

Free the alternator wire from the clip.

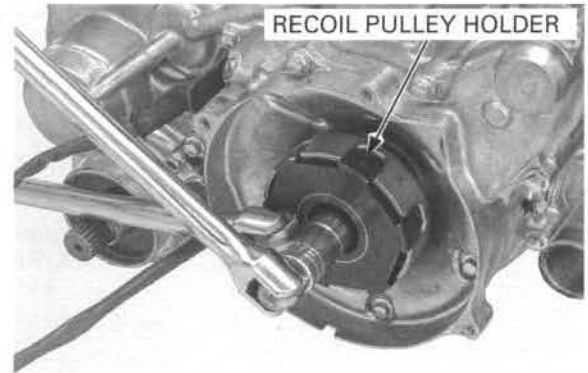
Remove the recoil starter (page 11-5).



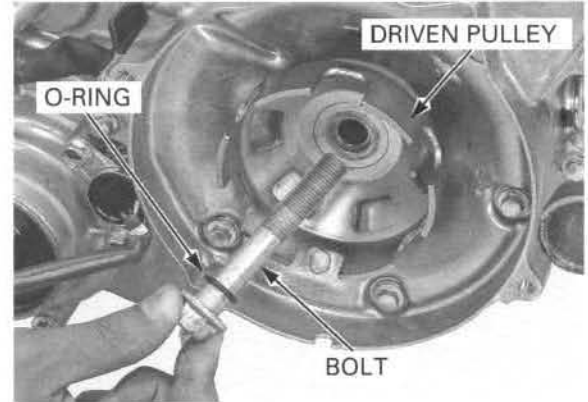
ALTERNATOR/STARTER CLUTCH

Hold the recoil starter driven pulley using the special tool and loosen the bolt.

TOOL:
Recoil pulley holder 07SMB-HM70100

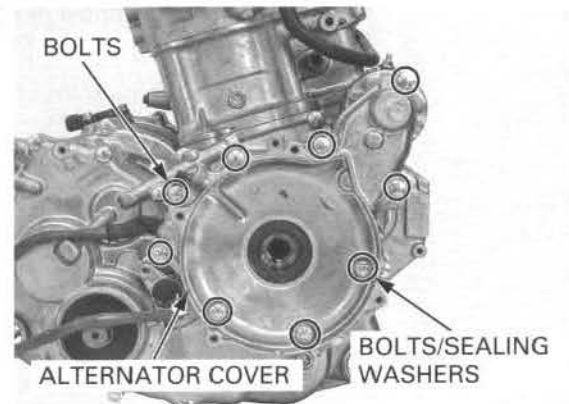


Remove the bolt, O-ring and the driven pulley.



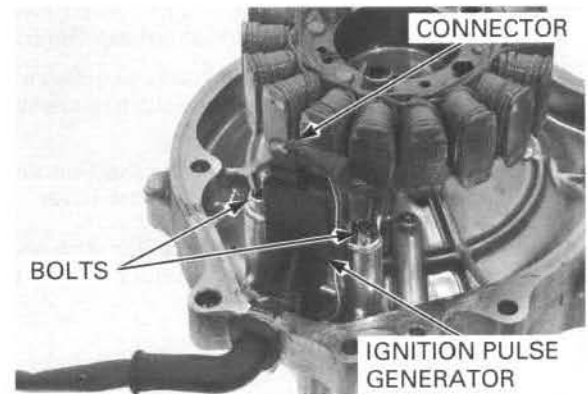
The cover (stator) is magnetically attracted to the flywheel, be careful during removal.

Remove the nine bolts, three sealing washer and alternator cover.
Remove the dowel pins and O-ring.



IGNITION PULSE GENERATOR/ STATOR REMOVAL/INSTALLATION

Disconnect the ignition pulse generator connector.
Remove the two bolts and ignition pulse generator.



ALTERNATOR/STARTER CLUTCH

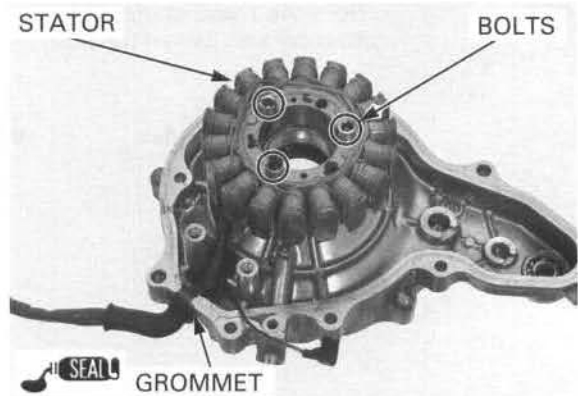
Remove the wire grommet from the alternator cover groove.

Remove the three bolts and alternator stator.

Install the alternator stator onto the cover and tighten the three bolts.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

Apply sealant to the wire grommet seating groove and install the grommet into the cover groove properly.

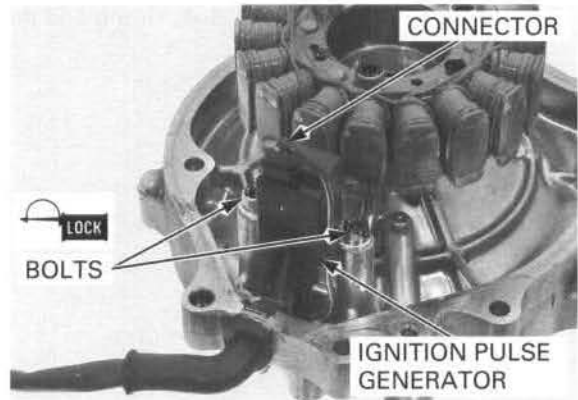


Apply locking agent to the ignition pulse generator bolt threads.

Install the ignition pulse generator and tighten the two bolts.

TORQUE: 6 N·m (0.6 kgf·m, 4.3 lbf·ft)

Connect the ignition pulse generator connector.

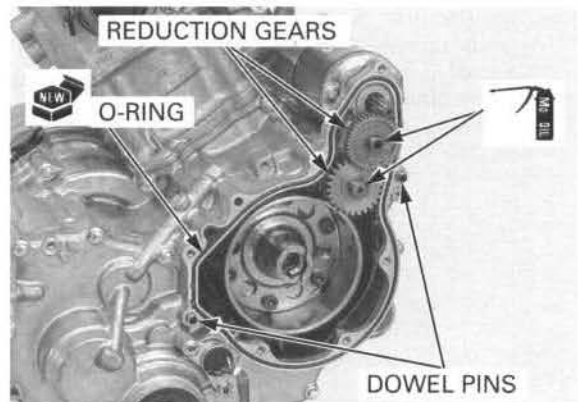


ALTERNATOR COVER INSTALLATION

Install the dowel pins and a new O-ring.

Check that the starter reduction gears are installed in position.

Apply molybdenum oil solution to the starter reduction shaft journals.



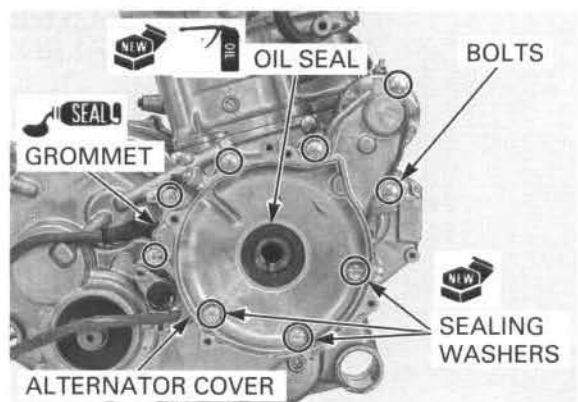
Blow through the oil passage in the alternator cover with compressed air.

Apply sealant to the wire grommet seating surface and install the alternator cover.

Install the nine bolts with three new sealing washers and tighten the bolts in a crisscross pattern in 2 or 3 steps.

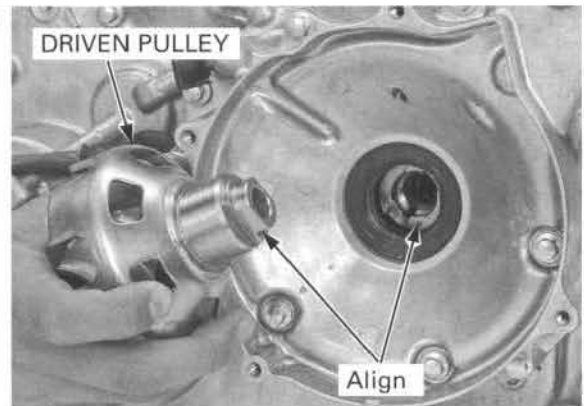
- The location for the bolt with sealing washer is marked "△" on the cover.

Coat a new oil seal lips with oil and install it into the alternator cover until it is fully seated.



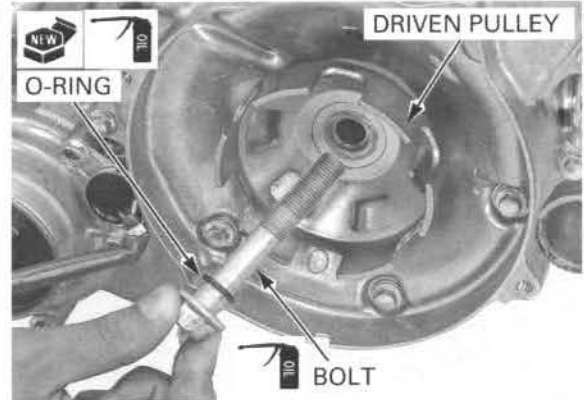
The cover (stator) is magnetically attracted to the flywheel, be careful not to get anything caught between these parts when installing.

Install the starter driven pulley aligning the bosses with the grooves in the crankshaft.



Coat a new O-ring with oil and install it onto the driven pulley bolt.

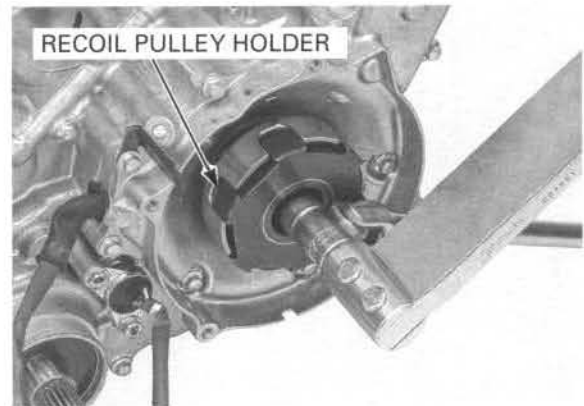
Apply oil to the driven pulley bolt threads and seating surface, and install the bolt.



Hold the starter 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)



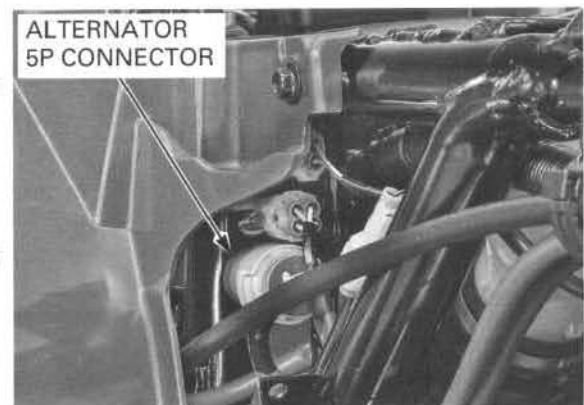
Install the recoil starter (page 11-5).

Route the wires and hoses properly (page 1-24).
Connect the alternator 5P connector and install it onto the stay.

Install the following:

- swingarm (page 15-9)
- air cleaner housing (page 5-5)

Check the oil level and add the recommended oil if necessary (page 3-12).



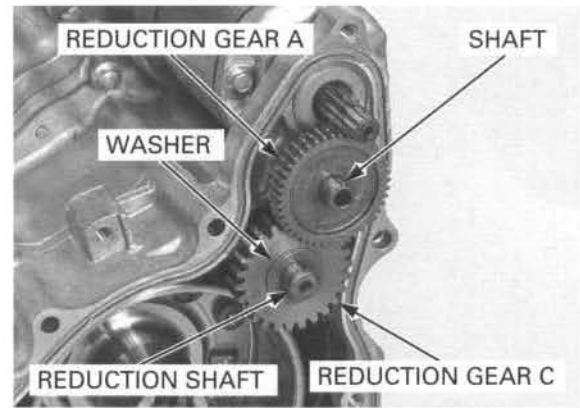
ALTERNATOR/STARTER CLUTCH

FLYWHEEL/STARTER CLUTCH

REMOVAL

Remove the following:

- alternator cover (page 11-8)
- starter reduction gear A and shaft
- washer and starter reduction gear C
- starter reduction shaft

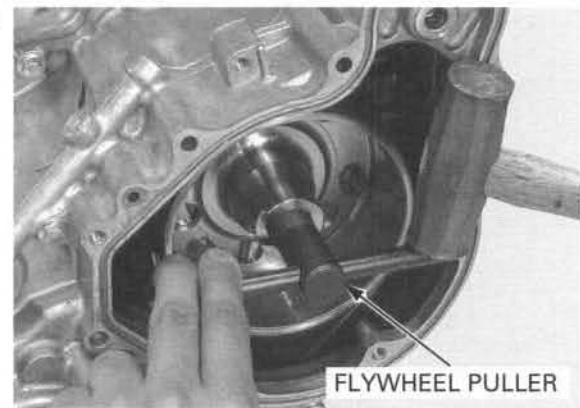


Remove the flywheel and starter driven gear using the special tool.

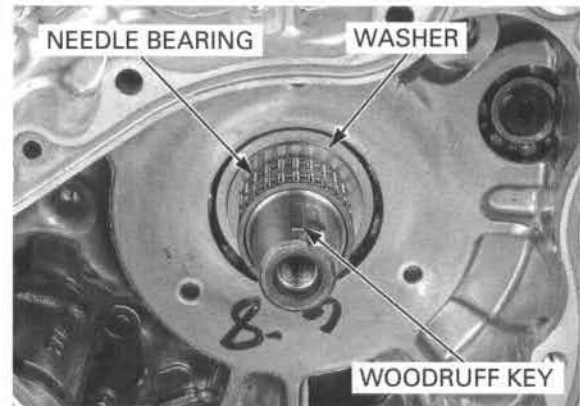
TOOL:

Flywheel puller

07933-3950000



Remove the needle bearing, washer and woodruff key.



STARTER CLUTCH DISASSEMBLY/ INSPECTION

Make sure that the starter driven gear turns clockwise smoothly and does not turn counterclockwise.

Remove the driven gear while turning it clockwise.



ALTERNATOR/STARTER CLUTCH

Hold the flywheel with the special tool and remove the starter clutch bolts.

TOOL:

Flywheel holder

07725-0040001 or equivalent commercially available in U.S.A.

Remove the starter clutch assembly from the flywheel.

Remove the sprag clutch from the starter clutch outer.

Check the starter clutch outer and sprag clutch for abnormal wear or damage.

Check the starter driven gear teeth and needle bearing for wear or damage.

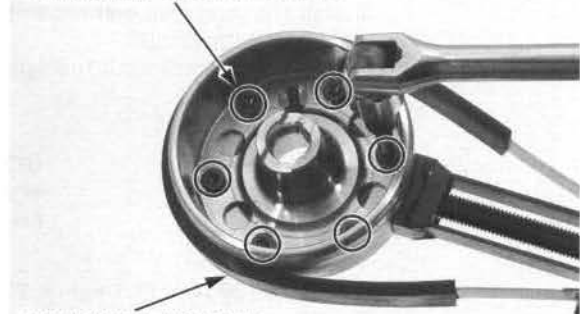
Measure the starter driven gear boss O.D.

SERVICE LIMIT: 51.705 mm (2.0356 in)

STARTER CLUTCH ASSEMBLY

Lubricate the sprag clutch with oil and install it into the starter clutch outer with the flange side facing the flywheel side.

STARTER CLUTCH BOLTS



FLYWHEEL HOLDER

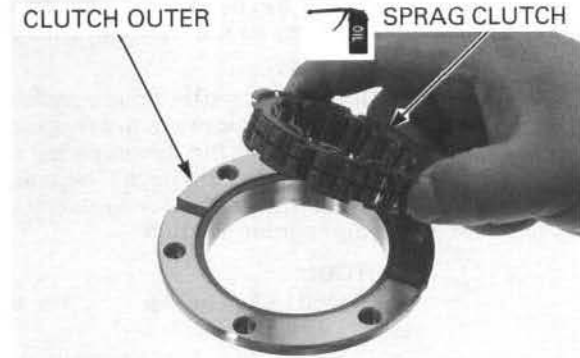
CLUTCH OUTER



SPRAG CLUTCH



CLUTCH OUTER



SPRAG CLUTCH

ALTERNATOR/STARTER CLUTCH

Apply locking agent to the starter clutch bolt threads.
Install the starter clutch assembly onto the flywheel and install the bolts.
Hold the flywheel with the special tool and tighten the bolts.

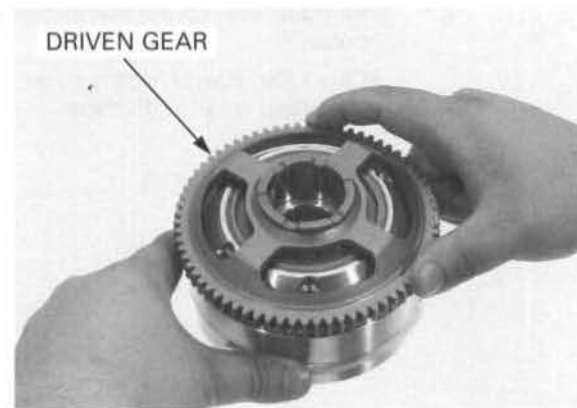
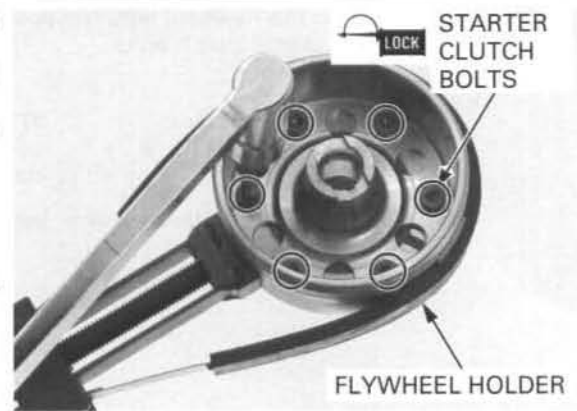
TOOL:

Flywheel holder

07725-0040001 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.

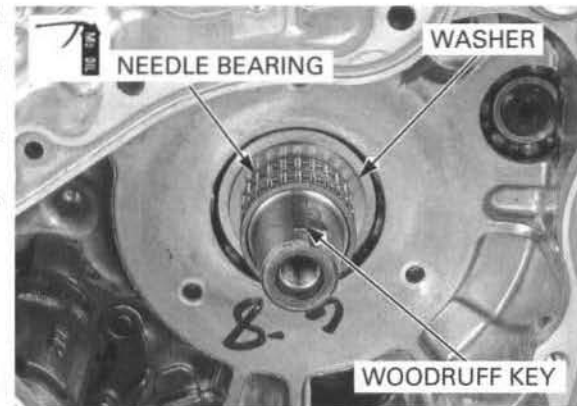


INSTALLATION

Lubricate the needle bearing with molybdenum oil solution.
Install the washer and needle bearing onto the crankshaft.

Clean any oil from the tapered portions of the crankshaft and flywheel.

Install the woodruff key into the crankshaft key groove.



Install the flywheel/starter driven gear, aligning the key way in the flywheel with the key on the crankshaft.

Install the starter driven pulley aligning the bosses with the grooves in the crankshaft.
Apply oil to the driven pulley bolt threads and seating surface, and install the bolt.
Hold the starter 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)



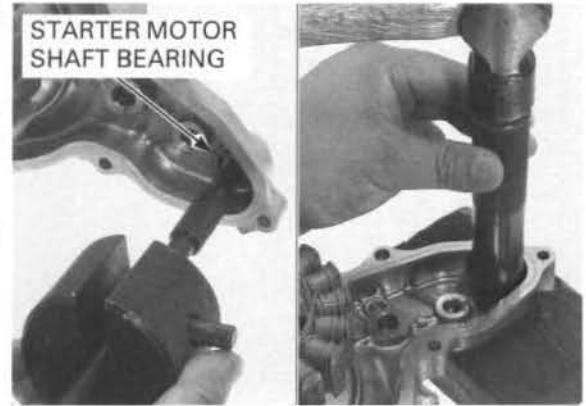
Loosen the starter driven pulley bolt, and remove the pulley holder, bolt and pulley.

Check the starter motor shaft bearing. Replace the bearing if the inner race does not turn smoothly, quietly, or if the outer race fits loosely in the alternator cover.

To replace the bearing:
Heat the alternator cover and remove the bearing using the special tools.

TOOLS:

Bearing remover shaft, 10 mm	07936-GE00100
Bearing remover head, 10 mm	07936-GE00200
Remover weight	07741-0010201 or 07936-371020A or 07936-3710200 (U.S.A. only)



Be sure to press the bearing in evenly and flush with the surface. Drive a new bearing in the cover using the special tools.

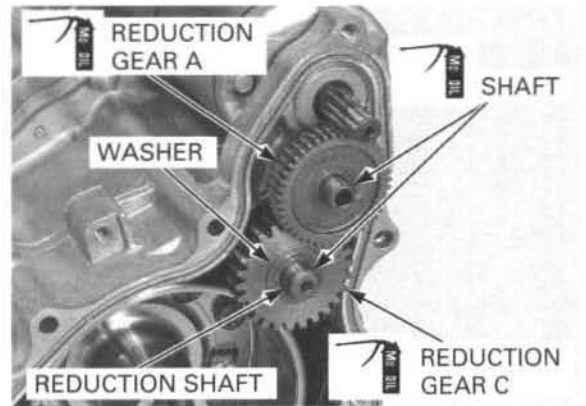
TOOLS:

Driver	07749-0010000
Attachment, 24 x 26 mm	07746-0010700
Pilot, 10 mm	07746-0040100

Apply molybdenum oil solution to the reduction gear teeth, shaft journals and gear A shaft.

Install the following:

- starter reduction shaft
- starter reduction gear C and washer
- starter reduction gear A and shaft
- alternator cover (page 11-10)



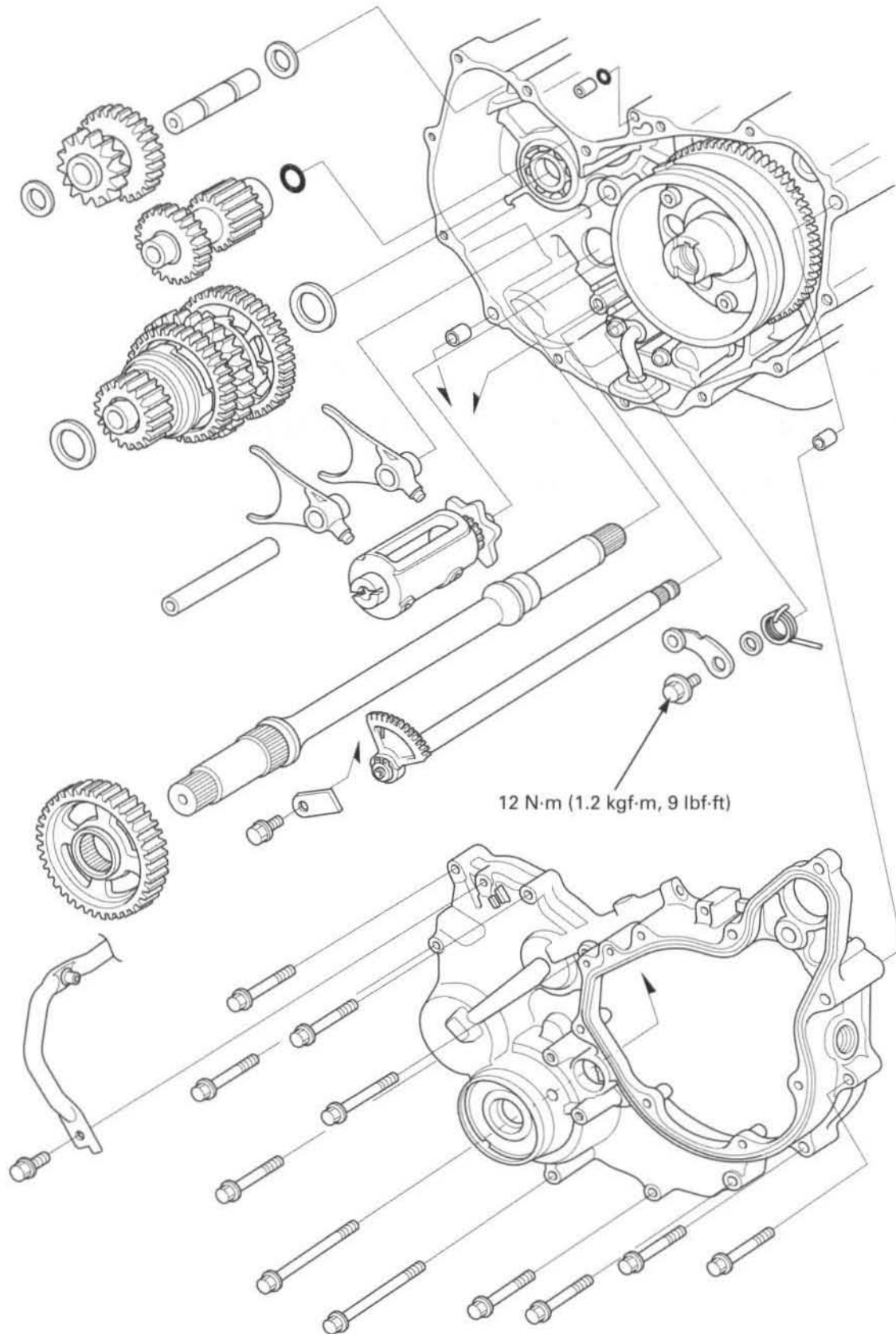
MEMO



12. SUB-TRANSMISSION/GEARSHIFT LINKAGE

SYSTEM COMPONENTS	12-2	GEARSHIFT LINKAGE	12-8
SERVICE INFORMATION	12-3	SUB-TRANSMISSION	12-12
TROUBLESHOOTING	12-5	GEARSHIFT LEVER LINKAGE	12-15
REAR CRANKCASE COVER	12-6		

SYSTEM COMPONENTS



SERVICE INFORMATION

GENERAL

- This section covers service of the gearshift lever linkage and sub-transmission. The shift lever linkage can be serviced with the engine installed in the frame. To service sub-transmission, the engine must be removed from the frame.
- cylinder head and sub-transmission lubricating oil is fed through the oil passage in the rear crankcase cover. Clean the oil passage before installing the rear crankcase cover.

SPECIFICATIONS

Unit: mm (in)


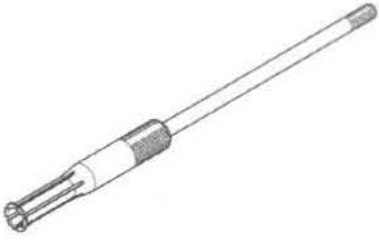
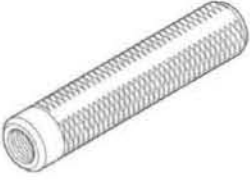

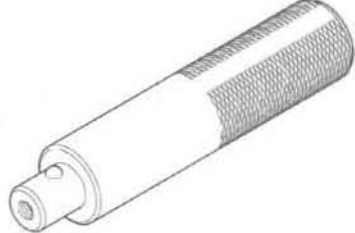


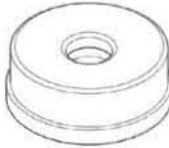


ITEM		STANDARD	SERVICE LIMIT
Shift fork	I.D.	11.000 – 11.021 (0.4331 – 0.4339)	11.04 (0.435)
	Claw thickness	4.93 – 5.00 (0.194 – 0.197)	4.5 (0.18)
	Shaft O.D.	10.966 – 10.984 (0.4317 – 0.4324)	10.96 (0.431)
Transmission	Gear I.D.	D., R., L.	28.020 – 28.041 (1.1031 – 1.1040)
		Reverse idle	14.000 – 14.018 (0.5512 – 0.5519)
	Gear bushing O.D.	D./R.	27.979 – 28.000 (1.1015 – 1.1024)
		L.	27.984 – 28.005 (1.1017 – 1.1026)
	Gear-to-bushing clearance	D., R.	0.020 – 0.062 (0.0008 – 0.0024)
		L.	0.015 – 0.057 (0.0006 – 0.0022)
	Gear bushing I.D.	D./R.	25.000 – 25.013 (0.9843 – 0.9848)
	Reverse idle shaft O.D.		13.966 – 13.984 (0.5498 – 0.5506)
Reverse idle gear-to-shaft clearance		0.016 – 0.052 (0.0006 – 0.0020)	

TORQUE VALUES

Gearshift lever box cover bolt	5 N·m (0.5 kgf·m, 3.6 lbf·ft)	
Gearshift lever linkage arm pivot bolt	27 N·m (2.8 kgf·m, 20 lbf·ft)	Apply locking agent to the threads
Gearshift lever linkage tie-rod lock nut	10 N·m (1.0 kgf·m, 7 lbf·ft)	
Gearshift drum center bolt	27 N·m (2.8 kgf·m, 20 lbf·ft)	Apply locking agent to the threads
Gearshift drum stopper arm pivot bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	Apply locking agent to the threads

SUB-TRANSMISSION/GEARSHIFT LINKAGE

TOOLS

<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 or 07936-371020A (U.S.A. only) or 07936-3710200</p> 	<p>Driver 07749-0010000</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>Pilot, 17 mm 07746-0040400</p> 
<p>Pilot, 25 mm 07746-0040600</p> 		

TROUBLESHOOTING

Hard to shift

- Bent shift forks
- Bent shift fork shaft
- Bent shift fork shaft
- Damaged shift drum cam grooves
- Improperly adjusted tie-rod length of gearshift lever linkage
- Bent tie-rod of gearshift lever linkage
- Improperly installed gearshift spindle and drum

Transmission jumps out of gear

- Worn gear dogs
- Worn gear shifter groove
- Bent shift fork shaft
- Broken shift drum stopper arm
- Weak or broken stopper arm spring
- Damaged shift drum center plate

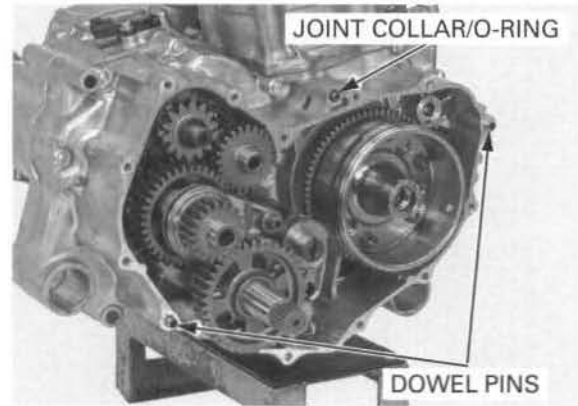
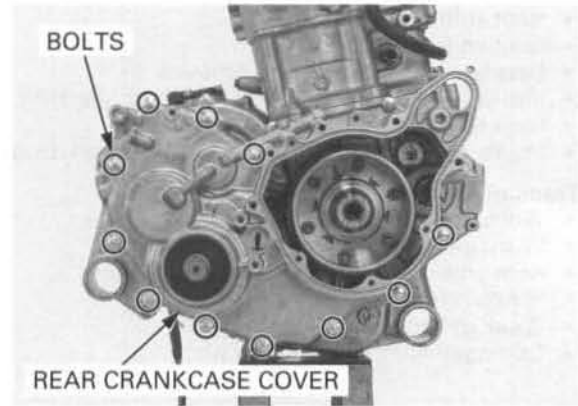
REAR CRANKCASE COVER

REMOVAL

Remove the following:

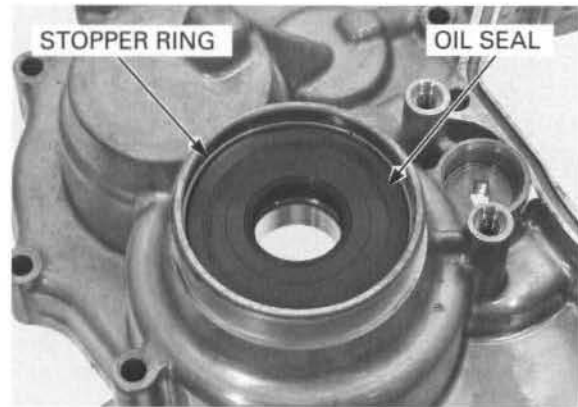
- engine from the frame (page 7-4)
- alternator cover (page 11-8)
- starter reduction gears and shafts (page 11-12)
- starter motor (page 21-6)
- vehicle speed sensor (page 23-11)
- gear position switch (page 24-39)
- engine side cover stay (page 10-5)
- eleven bolts and rear crankcase cover

- dowel pins
- oil joint collar and O-ring

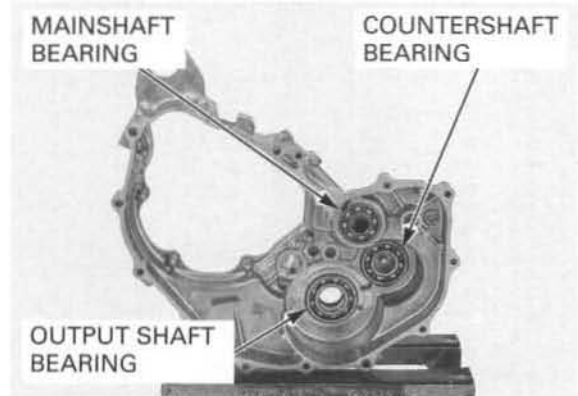


BEARING REPLACEMENT

Remove the stopper ring and output shaft oil seal.



Drive the output shaft bearing out of the cover.



SUB-TRANSMISSION/GEARSHIFT LINKAGE

Remove the mainshaft and countershaft bearings using the special tools.

TOOLS:

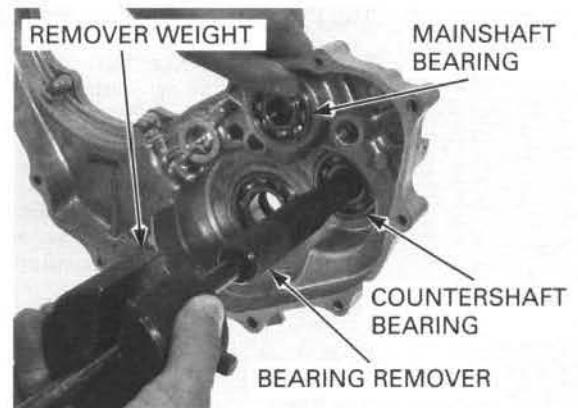
Mainshaft bearing:

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

Countershaft bearing:

Mainshaft bearing:

Bearing remover, 20 mm	07936-3710600
Remover handle	07936-3710100
Remover weight	07741-0010201 or 07936-371020A or 07936-3710200 (U.S.A. only)



Drive new mainshaft and countershaft bearings in with the sealed side facing down, using the special tools.

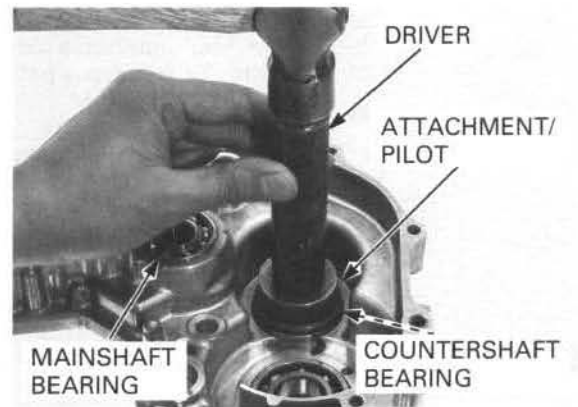
TOOLS:

Mainshaft bearing:

Driver	07749-0010000
Attachment, 37 x 40 mm	07746-0010200
Pilot, 17 mm	07746-0040400

Countershaft bearing:

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



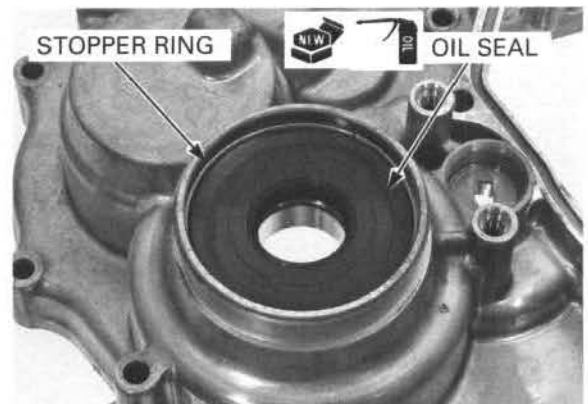
Drive a new output shaft bearing in with the markings facing up, using the special tools.

TOOLS:

Mainshaft bearing:

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

Apply oil to a new output shaft oil seal lip.
Drive the oil seal until the stopper ring groove in the cover is visible.
Install the stopper ring.

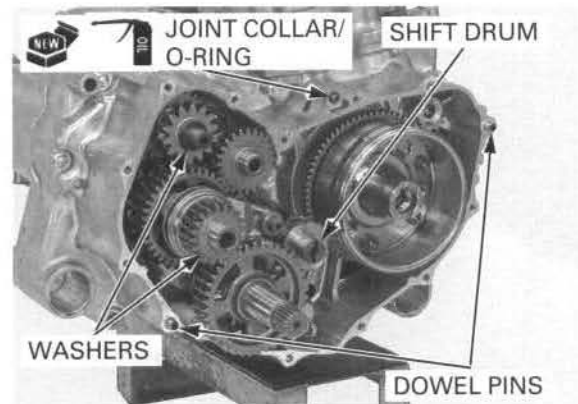


SUB-TRANSMISSION/GEARSHIFT LINKAGE

INSTALLATION

Install the oil joint collar.
Coat a new O-ring with oil and install it onto the joint collar.
Install the dowel pins.

Make sure that the washers are installed on the countershaft and reverse idle shaft, and the shift drum position is neutral as shown (gear position switch pin groove is in positioned lengthwise).



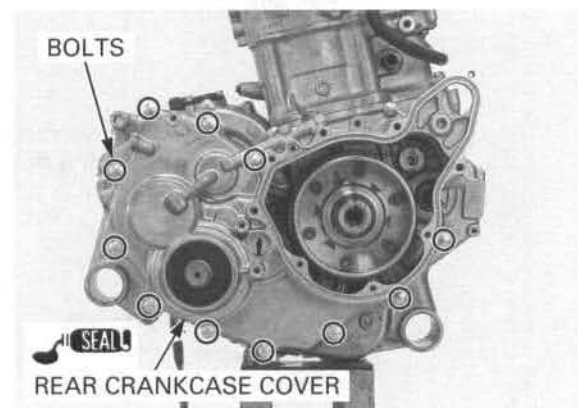
Blow through the oil passages in the rear crankcase cover with compressed air.
Clean the crankcase and cover mating surfaces.

Apply liquid sealant to the mating surface of the rear crankcase cover.

Install the rear crankcase cover and tighten the eleven bolts in a crisscross pattern in 2 or 3 steps.

Install the following:

- engine side cover stay (page 10-9)
- gear position switch (page 24-39)
- vehicle speed sensor (page 23-11)
- starter motor (page 21-6)
- starter reduction gears and shafts (page 11-12)
- alternator cover (page 11-10)
- engine in the frame (page 7-8)

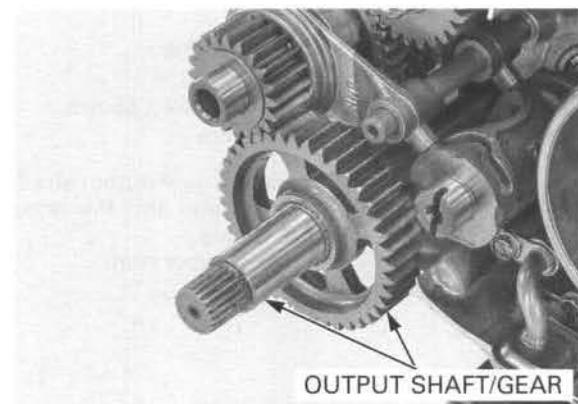


GEARSHIFT LINKAGE

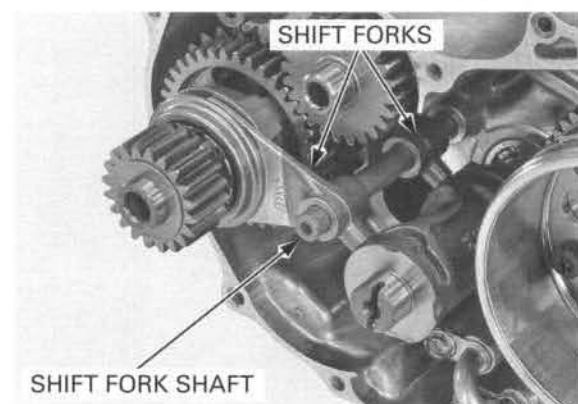
REMOVAL

Remove the following:

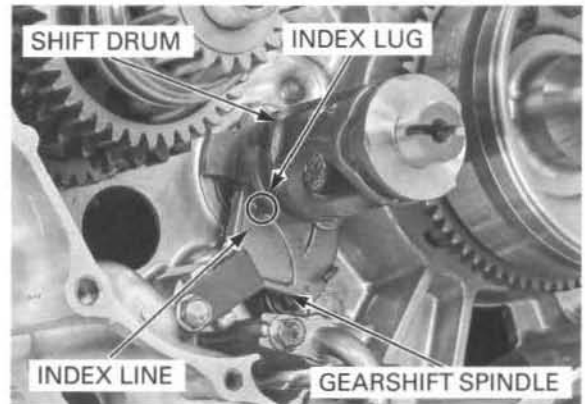
- rear crankcase cover (page 12-6).
- output shaft and driven gear from the crankcase.



- shift fork shaft
- shift forks

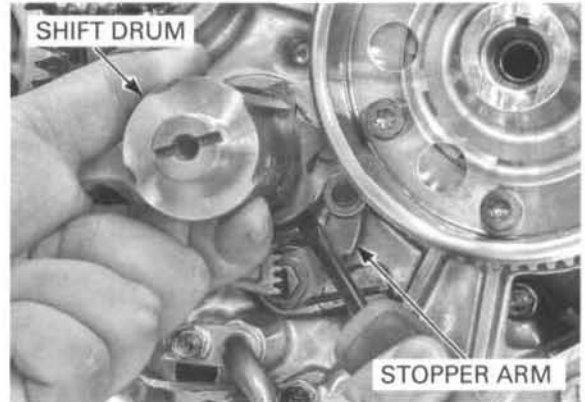


Align the index lug of the shift drum with the index line on the gearshift spindle.

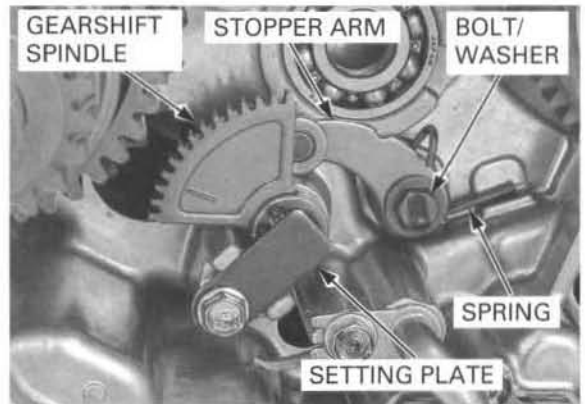


Remove the following:

- shift drum while lowering the stopper arm with a screwdriver



- bolt and setting plate
- gearshift spindle
- pivot bolt, stopper arm, washer and spring



INSPECTION

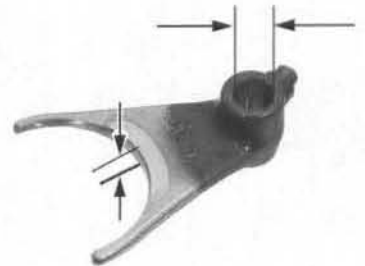
Check the shift fork guide pins for abnormal wear or damage.

Measure the shift fork I.D.

SERVICE LIMIT: 11.04 mm (0.435 in)

Measure the shift fork claw thickness.

SERVICE LIMIT: 4.5 mm (0.18 in)



SUB-TRANSMISSION/GEARSHIFT LINKAGE

Measure the shift fork shaft O.D.

SERVICE LIMIT: 10.96 mm (0.431 in)

Check the shift drum guide grooves for abnormal wear or damage.

Check the shift drum center plate and shifter gear for abnormal wear or damage.

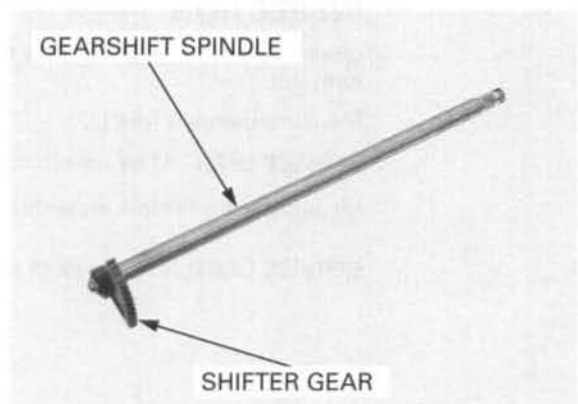
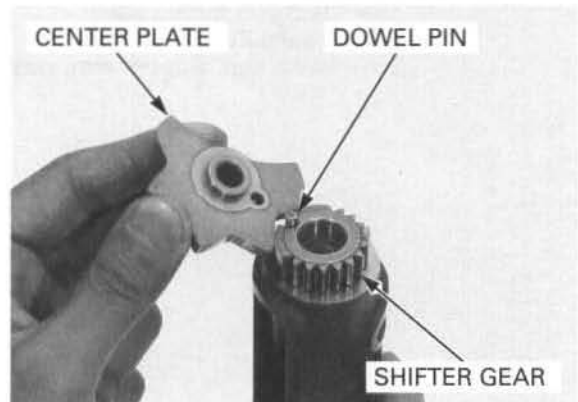
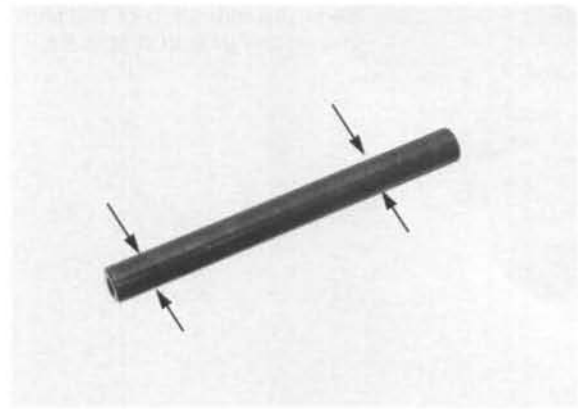
Remove the bolt, center plate, shifter gear and dowel pin if necessary.

Install the dowel pin, drum shifter gear and center plate.

Apply locking agent to the drum center bolt threads. Install and tighten the bolt.

TORQUE: 27 N·m (2.8 kgf·m, 20 lbf·ft)

Check the gearshift spindle for bending or damage. Check the spindle shifter gear for abnormal wear or damage.



INSTALLATION

Apply locking agent to the stopper arm pivot bolt threads.

Install the return spring as shown.

Install the washer, stopper arm and pivot bolt, and tighten the bolt.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Insert the gearshift spindle into the crankcase.

Apply locking agent to the setting plate bolt threads.

Install the setting plate and tighten the bolt.

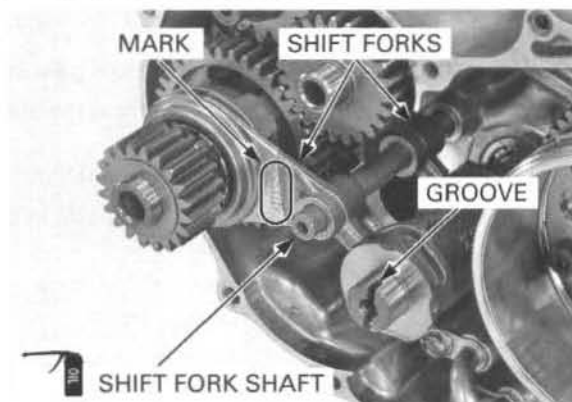
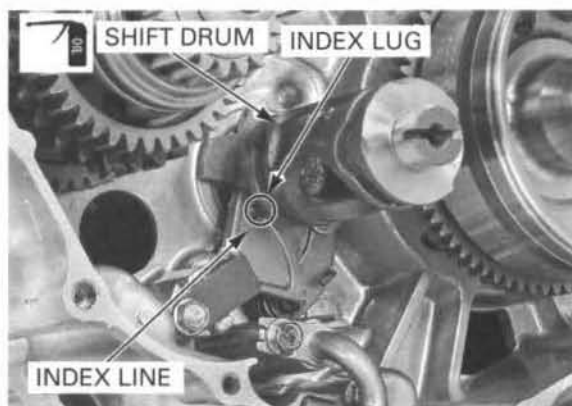
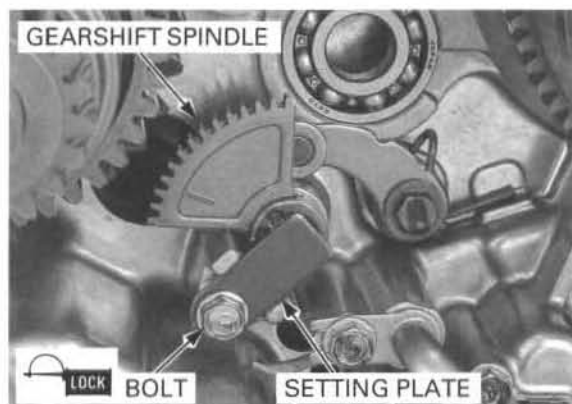
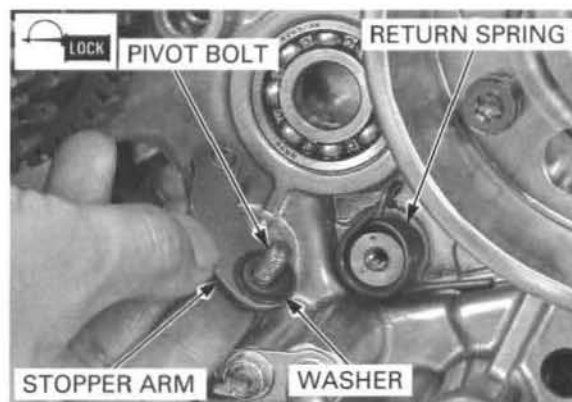
Apply oil to the shift drum guide grooves.

Lower the stopper arm and install the shift drum by aligning the index lug of the shift drum with the index line on the gearshift spindle.

Turn the shift drum clockwise and set it in neutral position so that its groove position is lengthwise as shown.

Install the shift forks into the gear shifter grooves and shift drum guide grooves with the marks facing out.

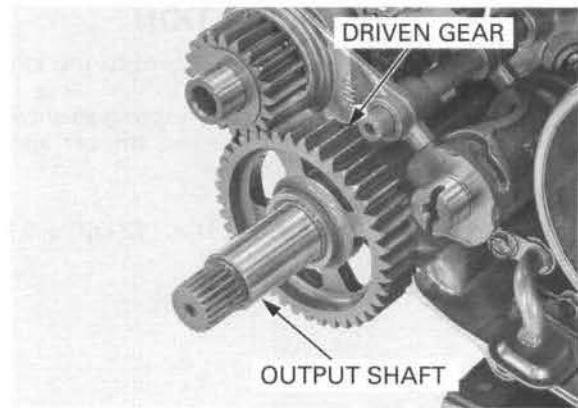
Coat the shift fork shaft with oil and insert it into the shift forks and crankcase.



SUB-TRANSMISSION/GEARSHIFT LINKAGE

Install the output shaft into the crankcase and the output driven gear onto the shaft with the large raised side facing out.

Install the rear crankcase cover (page 12-6).



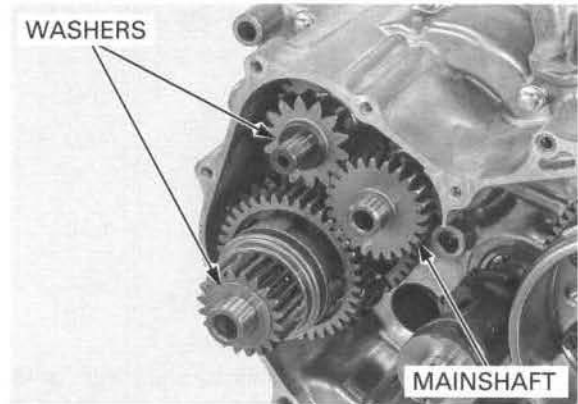
SUB-TRANSMISSION

DISASSEMBLY

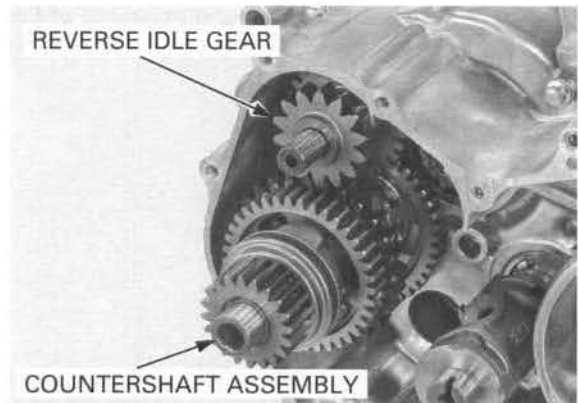
Remove the shift fork shaft and shift forks (page 12-8).

Remove the washers from the countershaft and reverse idle shaft.

Pull out the mainshaft from the automatic transmission unit.



Remove the countershaft assembly and reverse idle gear as a set.

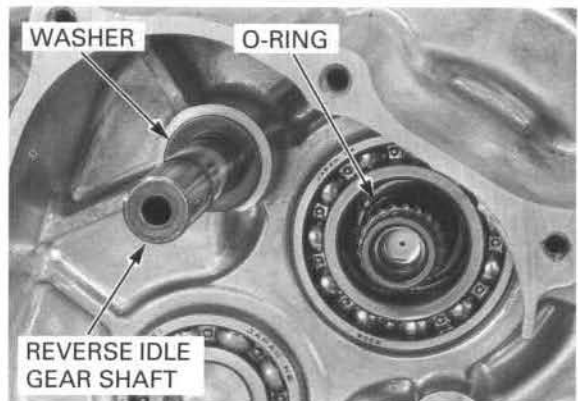


Remove the reverse idle gear shaft and washer.

Remove the O-ring from the automatic transmission unit.

Disassemble the countershaft.

Clean all disassemble parts in solvent thoroughly.



INSPECTION

COUNTERSHAFT

Check the gear dogs and teeth for abnormal wear or damage.

Measure the gear I.D.

SERVICE LIMIT: D., R., L.: 28.07 mm (1.105 in)

Check the gear bushings for scratches or damage.

Measure the gear bushing O.D.

SERVICE LIMIT: D./R./L.: 27.93 mm (1.100 in)

Calculate the gear-to-bushing clearance.

SERVICE LIMIT: D., R., L.: 0.10 mm (0.004 in)

Measure the gear bushing I.D.

SERVICE LIMIT: D./R.: 25.04 mm (0.986 in)

Check the countershaft for abnormal wear or damage.

Check the gear shifter for smooth operation.
Check the shifter groove and gear dogs for abnormal wear or damage.

REVERSE IDLE GEAR

Check the reverse idle gear and shaft for abnormal wear or damage.

Measure the gear I.D.

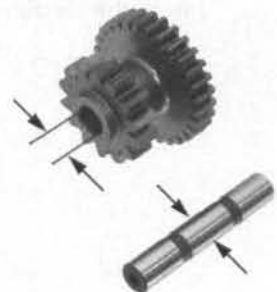
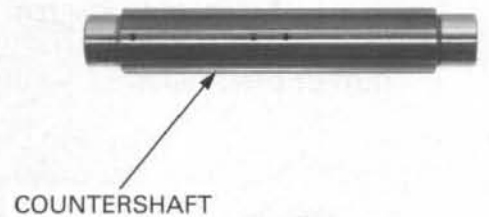
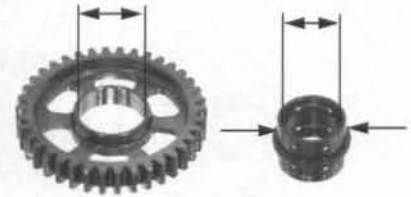
SERVICE LIMIT: 14.04 mm (0.553 in)

Measure the shaft O.D.

SERVICE LIMIT: 13.93 mm (0.548 in)

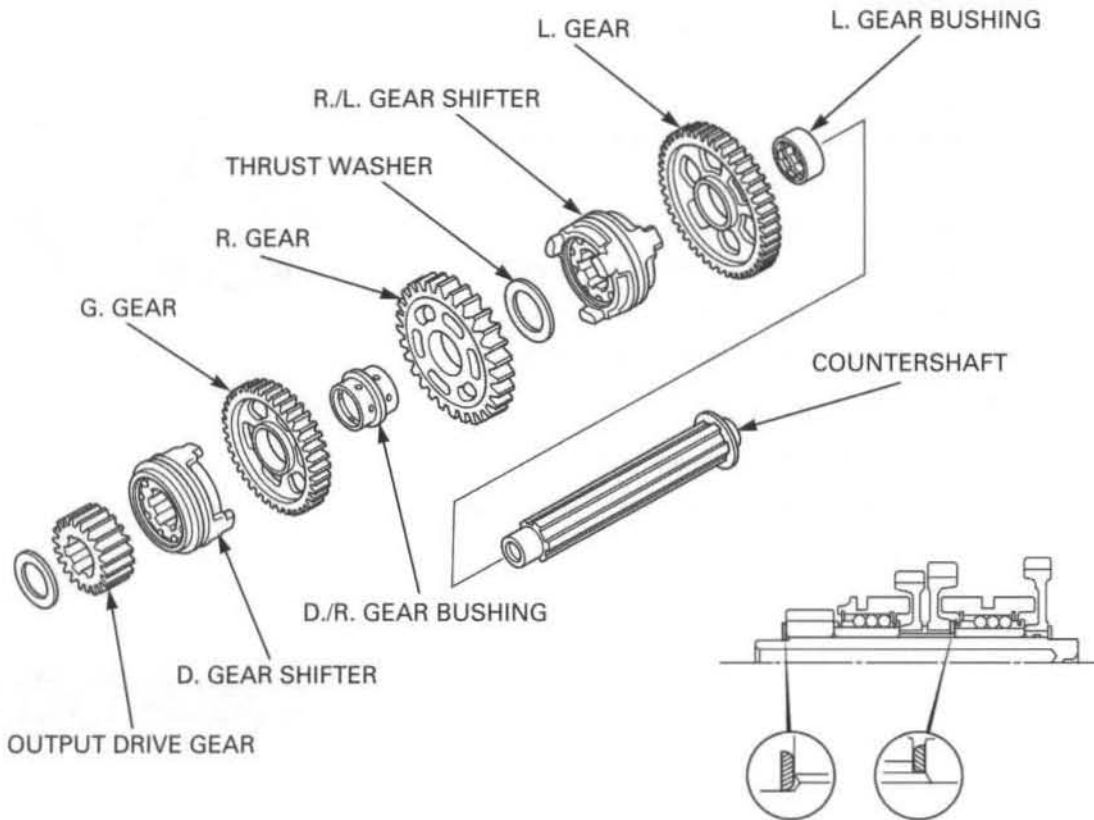
Calculate the gear-to-shaft clearance.

SERVICE LIMIT: 0.10 mm (0.004 in)



SUB-TRANSMISSION/GEARSHIFT LINKAGE

ASSEMBLY



Apply molybdenum oil solution to the gear sliding surface, shifter grooves and bushings.

Assemble the countershaft.

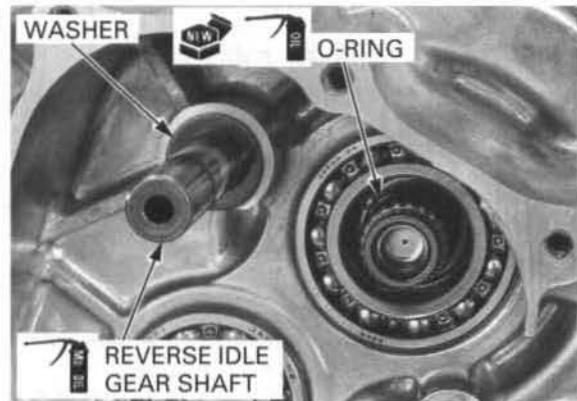
Do not forget to install the washer onto the crankcase end of the shaft.

COUNTERSHAFT ASSEMBLY

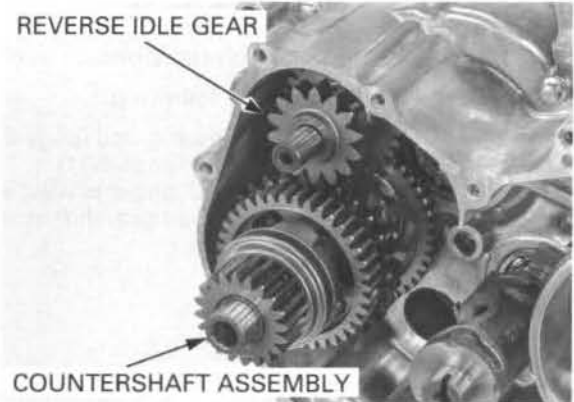


Coat a new O-ring with oil and install it into the groove in the automatic transmission unit.

Coat the reverse idle gear shaft with molybdenum oil solution and install it into the crankcase. Install the washer onto the reverse idle gear shaft.



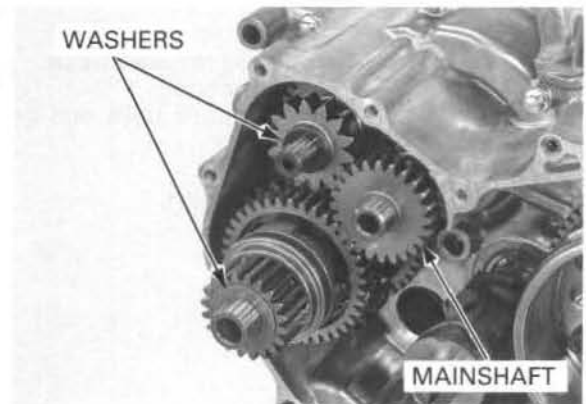
Install the countershaft assembly and reverse idle gear as a set.



Install the mainshaft onto the automatic transmission unit and into the crankcase.

Install the washers onto the reverse idle gear shaft and countershaft.

Install the shift forks and shaft (page 12-8).

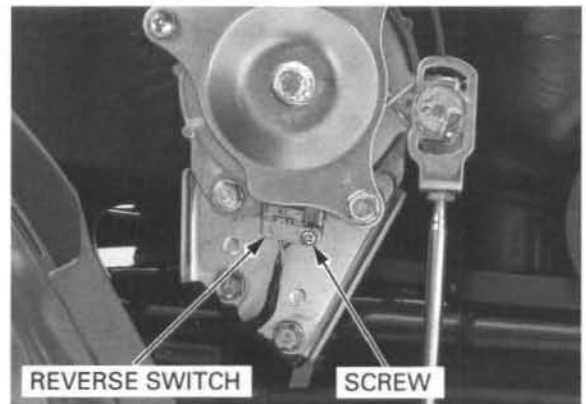


GEARSHIFT LEVER LINKAGE

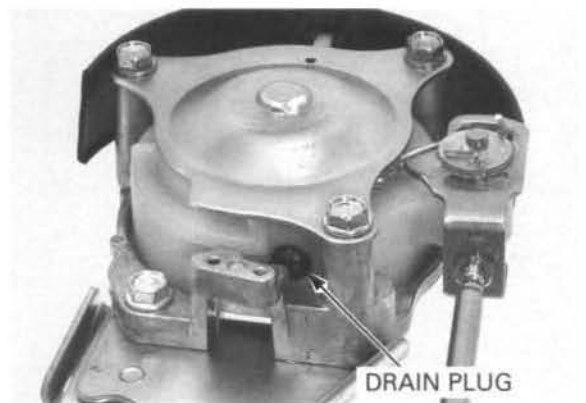
GEARSHIFT LEVER BOX DRAINING

Remove the fuel tank cover (page 2-6).

Remove the screw and reverse switch.



Check if there is water in the shift lever box. Remove the drain plug and drain the box if necessary.



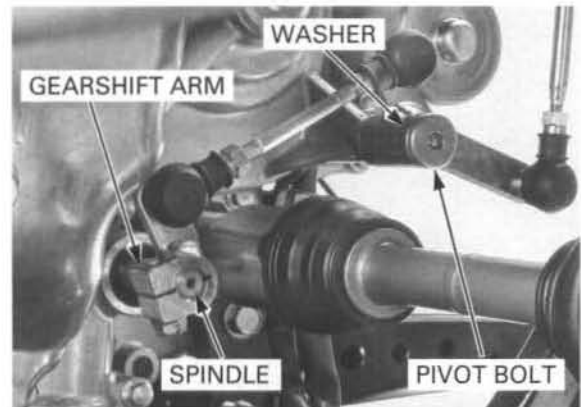
SUB-TRANSMISSION/GEARSHIFT LINKAGE

DISASSEMBLY

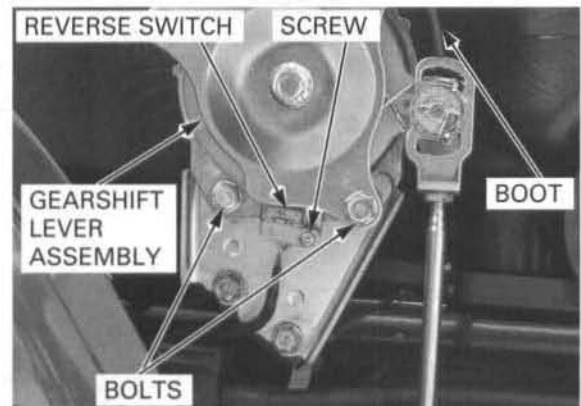
Shift the sub-transmission into neutral.

Remove the following:

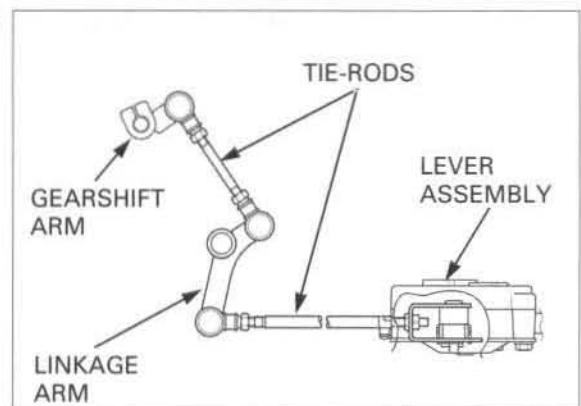
- left front mud guard (page 2-8)
- front fender (page 2-11)
- pivot bolt, O-ring and washer
- pinch bolt and gearshift arm from the spindle



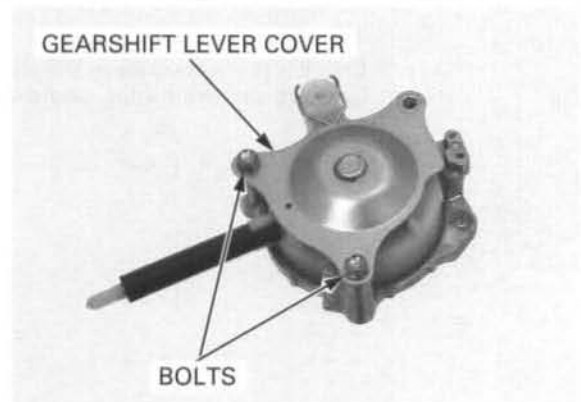
- screw and reverse switch
- shift lever boot
- two mounting bolts and gearshift lever assembly.



Loosen the lock nuts and remove the tie-rods from the gearshift arm, linkage arm and lever assembly.



Remove the two bolts and gearshift lever cover.

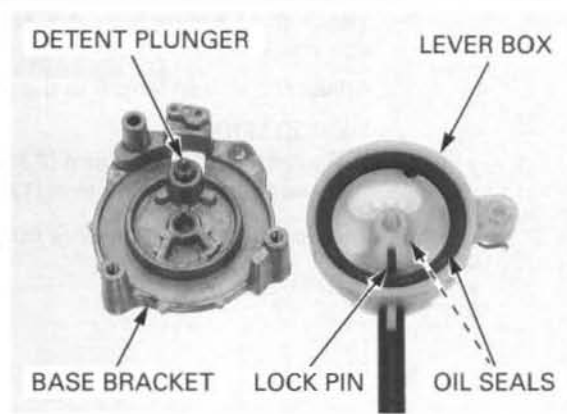


Remove the shift lever box from the base bracket.

Check that the detent plunger moves smoothly.
Check the plunger sliding surface of the shift lever box for abnormal wear or damage.

Check the oil seals in the shift lever box for wear, deterioration or damage.

Remove the detent plunger and spring.
Check the plunger, spring and lock pin for wear or damage.



ASSEMBLY

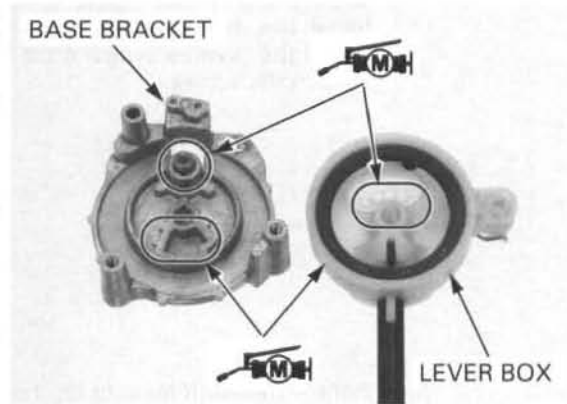
Apply molybdenum disulfide grease to the plunger, lock pin sliding area, lever box pivot and both mating surfaces of lever box, and dust seal lips.

Assemble the base bracket, gearshift lever box, return spring and cover, and tighten the two bolts.

TORQUE: 5 N·m (0.5 kgf·m, 3.6 lbf·ft)

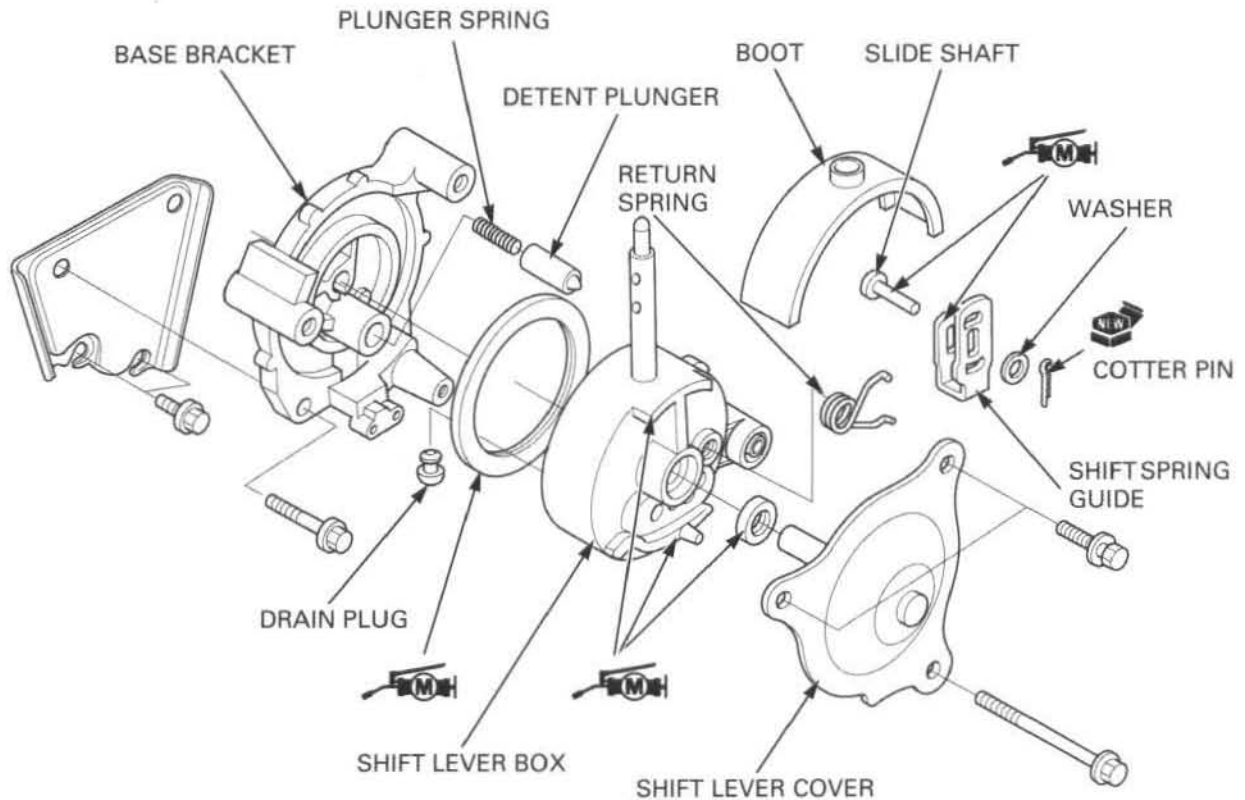
Apply molybdenum disulfide grease to the slide shaft pivot.

Install the spring guide onto the lever box by aligning its guide holes with the spring ends



Secure the cotter pin after adjusting the tie-rod length (page 12-18).

Install the slide shaft from the base bracket side, and the washer and cotter pin.



SUB-TRANSMISSION/GEARSHIFT LINKAGE

Install the tie-rods into the gearshift arm, linkage arm and lever assembly.

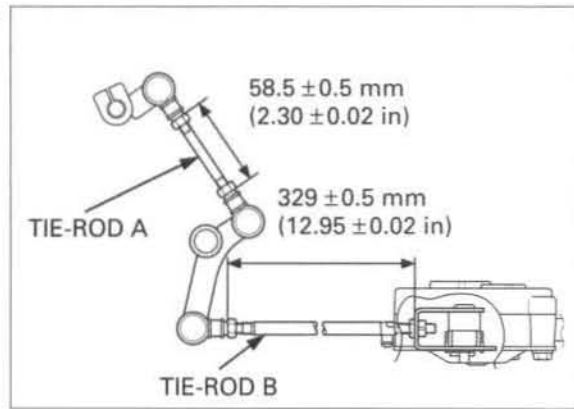
Adjust the tie-rod length to the specified value.

TIE-ROD LENGTH:

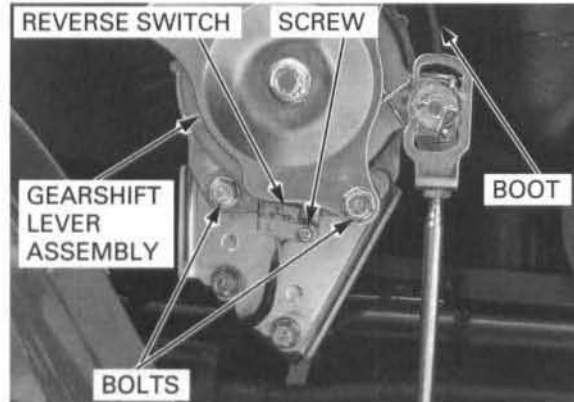
Tie-rod A: 58.5 ± 0.5 mm (2.30 ± 0.02 in)

Tie-rod B: 329.0 ± 0.5 mm (12.95 ± 0.02 in)

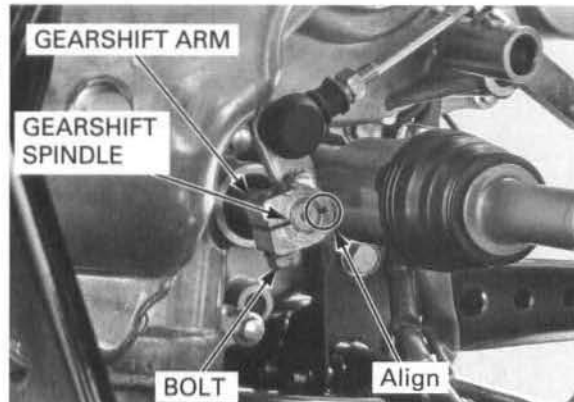
Temporarily tighten the lock nuts.



Install the gearshift lever assembly onto the frame and tighten the two bolts.
Install the shift lever boot.
Install the reverse switch onto the base bracket and tighten the screw.

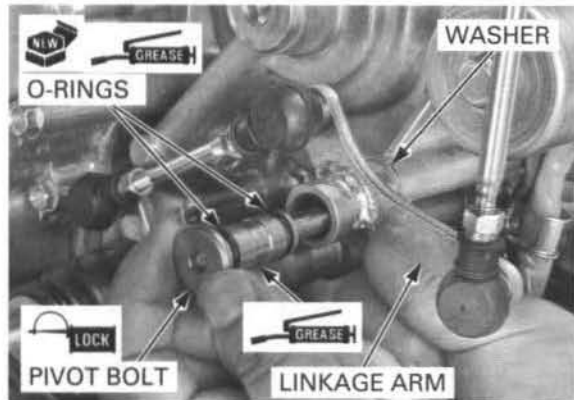


Put the gearshift lever in the neutral position.
Install the gearshift arm onto the gearshift spindle by aligning the groove in the arm with the wide tooth on the spindle.
Install and tighten the pinch bolt.



Coat a new O-rings with grease and install them onto the pivot bolt.
Apply locking agent to the pivot bolt threads.
Apply grease to the pivot bolt groove and install the washer, linkage arm and pivot bolt.
Tighten the pivot bolt.

TORQUE: 27 N·m (2.8 kgf·m, 20 lbf·ft)



SUB-TRANSMISSION/GEARSHIFT LINKAGE

Remove the cotter pin and washer. Be sure to center the slide shaft of the spring guide slot when the gear position is in neutral.

If it is not centered, loosen the lock nuts on the tie-rod B and adjust the slide shaft position by turning the tie-rod B.

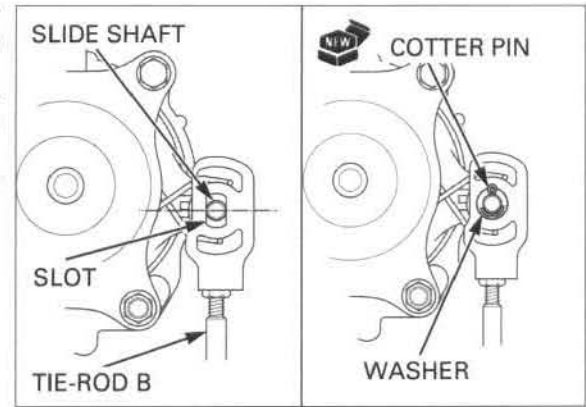
Install the washer and secure the slide shaft with a new cotter pin.

Tighten all the tie-rod lock nuts.

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

Install the following:

- front fender (page 2-11)
- left front mud guard (page 2-8)



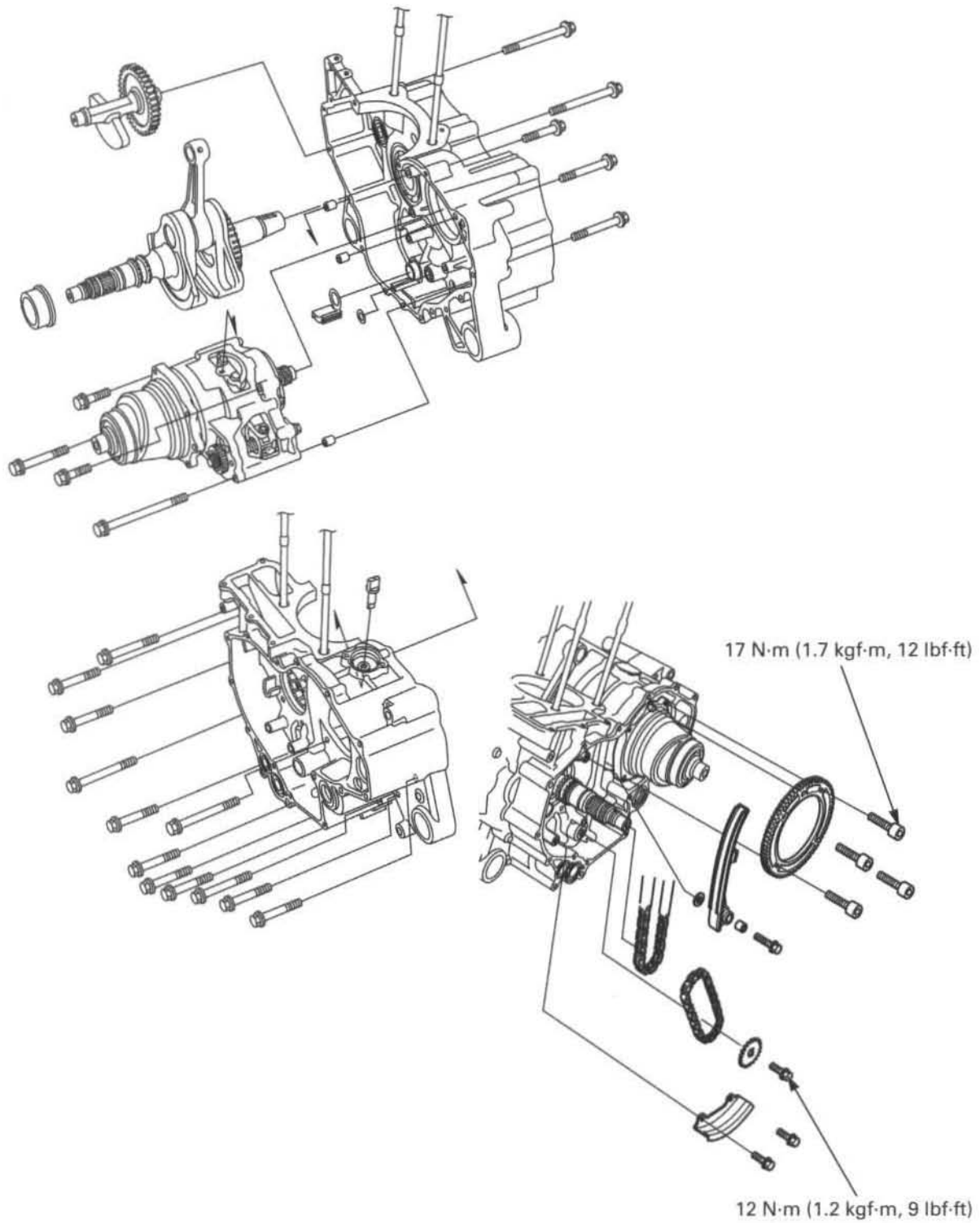
MEMO



13. CRANKSHAFT/AUTOMATIC TRANSMISSION

SYSTEM COMPONENTS	13-2	AUTOMATIC TRANSMISSION UNIT AND CRANKSHAFT	13-10
SERVICE INFORMATION	13-3	CRANKCASE BEARING REPLACEMENT	13-13
TROUBLESHOOTING	13-6	CRANKCASE ASSEMBLY	13-16
CRANKCASE SEPARATION	13-8		

SYSTEM COMPONENTS



SERVICE INFORMATION

GENERAL

- The crankcase halves must be separated to service the crankshaft and automatic transmission (mainshaft). To service these parts, the engine must be removed from the frame (page 7-4).
- For electrical system of the Hondamatic (page 24-2).
- The engine oil is used for automatic transmission oil. For lubrication system service (page 4-2).
- Be careful not to damage the crankcase mating surfaces when servicing.
- Cylinder head section lubricating oil is fed through the oil passage in the crankcase. Clean the oil passages before assembling the crankcase halves
- Do not disassemble the automatic transmission unit. Replace the automatic transmission unit as an assembly when it is faulty.

SPECIFICATIONS

Unit: mm (in)


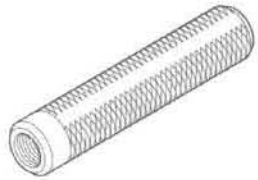
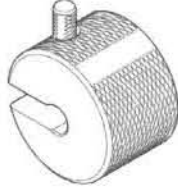
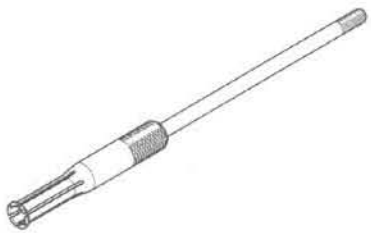
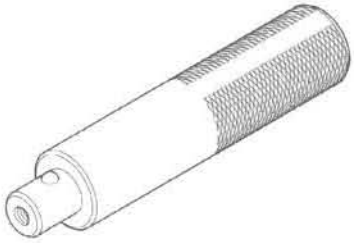


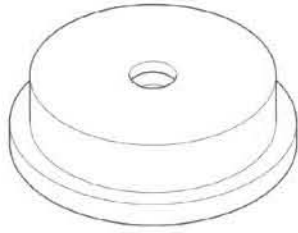



ITEM		STANDARD	SERVICE LIMIT
Crankshaft	Runout	-	0.15 (0.006)
	Big end side clearance	0.05 – 0.65 (0.002 – 0.026)	0.8 (0.03)
	Big end radial clearance	0.006 – 0.018 (0.0002 – 0.0007)	0.05 (0.002)

TORQUE VALUES



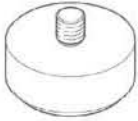




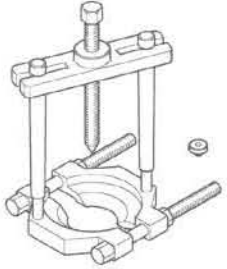
Primary driven gear bolt	17 N·m (1.7 kgf·m, 12 lbf·ft)	Apply engine oil to the threads and seating surface
Oil pump driven sprocket bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	Apply locking agent to the threads

CRANKSHAFT/AUTOMATIC TRANSMISSION

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>Bearing remover, 20 mm 07936-3710600</p> 	<p>Driver 07749-0010000</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, 78 x 90 mm 07GAD-SD40101</p> 
<p>Pilot, 17 mm 07746-0040400</p> 	<p>Pilot, 20 mm 07746-0040500</p> 	<p>Pilot, 25 mm 07746-0040600</p> 

CRANKSHAFT/AUTOMATIC TRANSMISSION

<p>Pilot, 30 mm 07746-0040700</p> 	<p>Pilot, 32 mm 07MAD-PR90200</p> 	<p>Pilot, 40 mm 07746-0040900</p> 
<p>Assembly collar 07965-VM00100</p> 	<p>Thread shaft 07965-VM00200</p>  <p>or Puller shaft (07931-ME4010B) and Special nut (07931-HB3020A) (U.S.A. only)</p>	<p>Thread adapter 07965-VM00300</p>  <p>or 07931-KF00200 (U.S.A. only)</p>
<p>Gear holder, 2.5 07724-0010100</p>  <p>or 07724-001A100 (U.S.A. only)</p>	<p>Universal bearing puller 07631-0010000</p>  <p>or equivalent commercially avail- able in U.S.A.</p>	

TROUBLESHOOTING

- Before starting this diagnostic troubleshooting, make sure that the gear position indicator is not blinking "--" (Electrical system of the Hondamatic is normal) and all the engine maintenance items have been performed and are within specifications.

Faulty drive performance of the vehicle

1. Oil level inspection

Check the oil level (page 3-12).

Is the oil level correct?

NO – Fill the crankcase with recommended oil (page 3-12)

YES – GO TO STEP 2.

2. Oil pressure test

If poor performance occurs only at vehicle maximum speed with ESP selected, angle sensor malfunction is the likely cause. Perform sensor inspection (page 24-41).

Check the engine oil pressure (page 4-6).

Is the oil pressure correct?

NO – Faulty lubrication system (page 4-5)

YES – GO TO STEP 3.

3. Centrifugal clutch inspection 1

Test-drive the vehicle to check the engine speed and vehicle speed condition.

Does vehicle engine speed rise, but vehicle speed does not rise?

YES – GO TO STEP 4.

NO – GO TO STEP 5.

4. Centrifugal clutch inspection 2

Check the centrifugal clutch (page 10-9).

Is the centrifugal clutch normal condition?

NO – Correct the faulty part

YES – Faulty automatic transmission

5. Automatic transmission bearing inspection

Remove the front crankcase cover (page 10-5), and check the automatic transmission bearing condition.

Is the bearing normal condition?

NO – Faulty transmission bearing

YES – GO TO STEP 6.

6. Sub-transmission inspection

Check the sub-transmission (page 12-12).

Is the sub-transmission normal condition?

NO – Faulty sub-transmission

YES – Faulty automatic transmission

Vehicle does not move**1. Oil level inspection**

Check the oil level (page 3-12).

Is the oil level correct?

NO – Fill the crankcase with recommended oil (page 3-12)

YES – GO TO STEP 2.

2. Oil pressure test

Check the engine oil pressure (page 4-6).

Is the oil pressure correct?

NO – Faulty lubrication system (page 4-5)

YES – GO TO STEP 3.

3. Sub-transmission inspection 1

Start the engine.

Check the engine operation by operating the throttle with the sub-transmission in each D and R range.

Does the engine speed rise in any ranges?

NO – GO TO STEP 5.

YES – GO TO STEP 4.

4. Centrifugal clutch inspection

Check the centrifugal clutch (page 10-9).

Is the centrifugal clutch normal condition?

NO – Correct the faulty part

YES – GO TO STEP 7.

5. Sub-transmission inspection 2

Check the operating condition in each sub-transmission range.

Does the engine speed rise and stop both ranges?

YES – GO TO STEP 6.

NO – Faulty sub-transmission

6. Automatic transmission bearing inspection

Remove the front crankcase cover (page 10-5), and check the automatic transmission bearing condition.

Is the bearing normal condition?

NO – Faulty transmission bearing

YES – GO TO STEP 7.

7. Sub-transmission inspection

Check the sub-transmission (page 12-12).

Is the sub-transmission normal condition?

NO – Faulty sub-transmission

YES – Faulty automatic transmission

Excessive engine noise

- Oil level too low
- Worn or damaged connecting rod bearing
- Worn crankshaft main journal bearing
- Worn connecting rod small end
- Worn balancer bearing
- Worn, seized or chipped transmission gear
- Worn transmission bearings

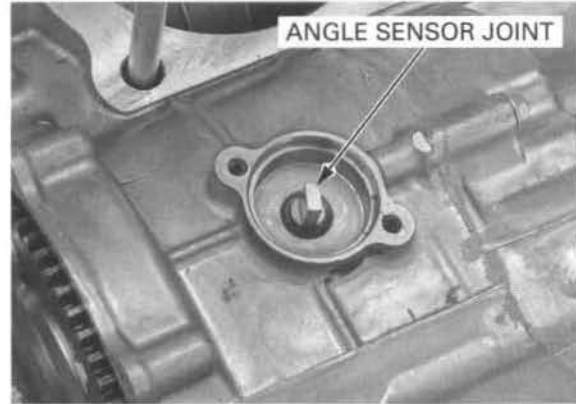
Abnormal vibration

- Improper balancer timing

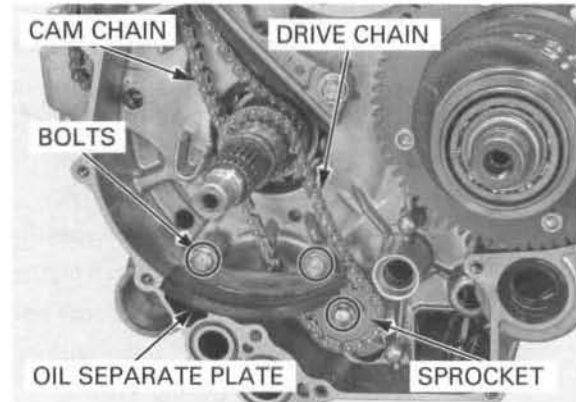
CRANKCASE SEPARATION

Remove the following:

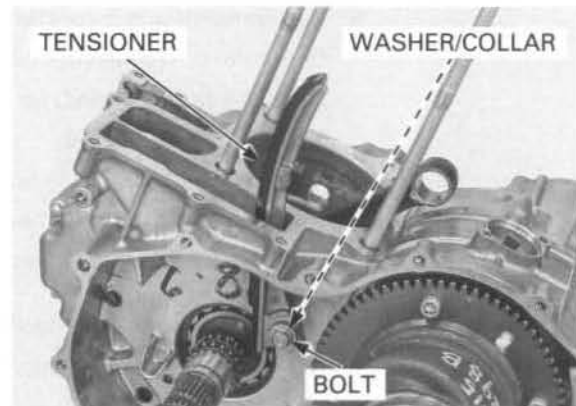
- engine (page 7-4)
- cylinder head and camshaft (page 8-8)
- cylinder and piston (page 9-5)
- centrifugal clutch (page 10-9)
- flywheel and starter clutch (page 11-12)
- sub-transmission and shift linkage (page 12-12)
- angle sensor (page 24-41)
- angle sensor joint



- two bolts and oil separate plate
- sprocket bolt
- oil pump driven sprocket and drive chain
- cam chain



- pivot bolt and cam chain tensioner
- washer and collar



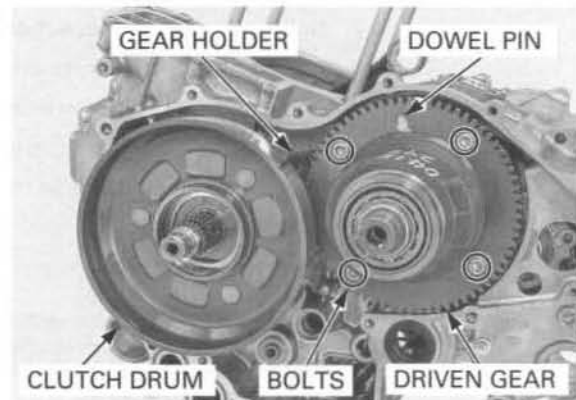
Temporarily install the clutch drum onto the crankshaft and the gear holder as shown. Loosen the four driven gear socket bolts and remove them.

TOOL:

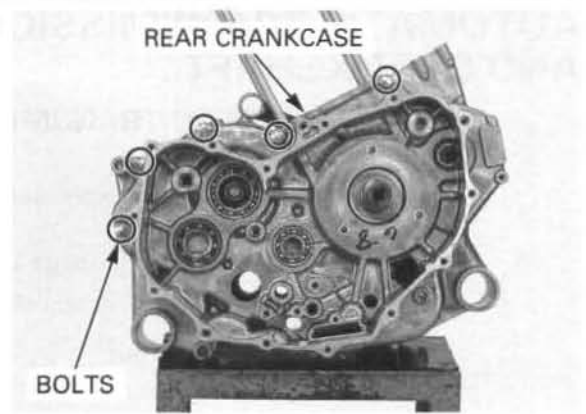
Gear holder, 2.5

**07724-0010100 or
07724-001A100
(U.S.A. only)**

Remove the clutch drum and the primary driven gear from the automatic transmission unit. Remove the dowel pin.

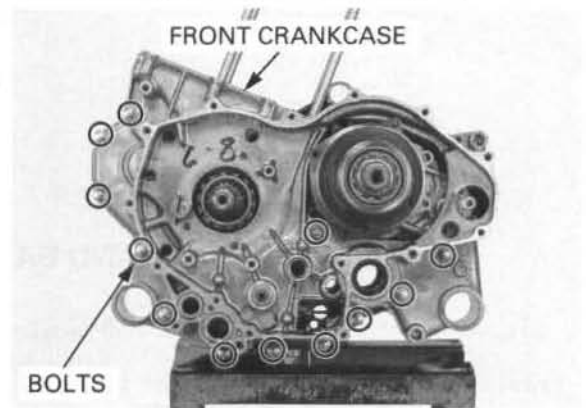


Loosen the five rear crankcase bolts in a crisscross pattern in several steps and remove them.



Loosen the twelve front crankcase bolts in a crisscross pattern in several steps and remove them.

Place the crankcase assembly with the rear crankcase down.



Be careful not to interfere the front crankcase with the automatic transmission unit.

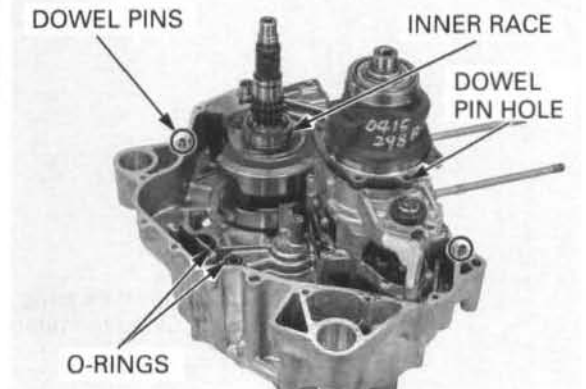
Do not pry the crankcase apart with a screwdriver.

The dowel pin hole in the automatic transmission unit face to the left.

Remove the front crankcase from the rear crankcase while tapping them at several locations with a soft hammer.

Remove the following:

- front crankshaft bearing inner race
- two dowel pins
- two O-rings.



AUTOMATIC TRANSMISSION UNIT AND CRANKSHAFT

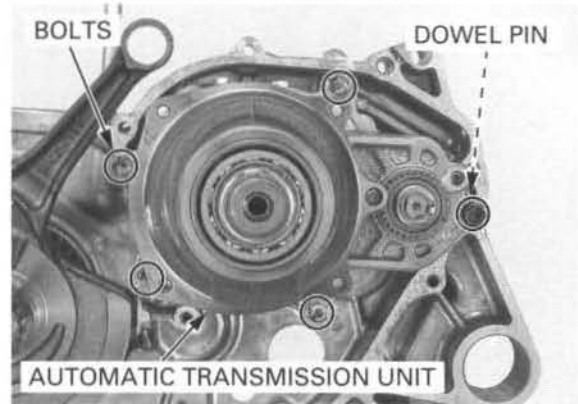
AUTOMATIC TRANSMISSION UNIT REMOVAL

- Do not disassemble the automatic transmission unit.

Separate the crankcase (page 13-8).

Remove the five mounting bolts and the automatic transmission unit.

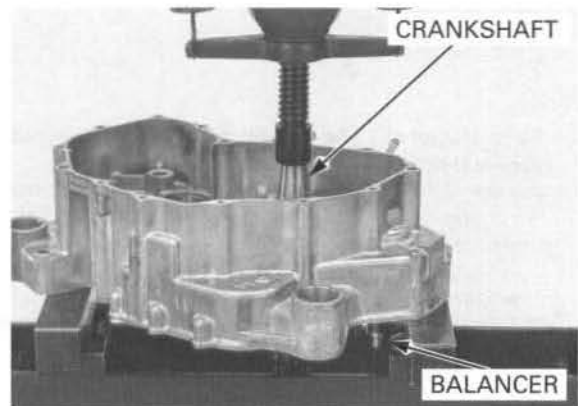
Remove the dowel pin.



CRANKSHAFT AND BALANCER REMOVAL

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.



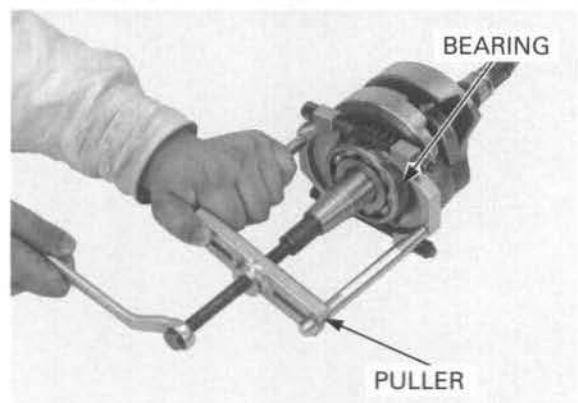
If the rear crankshaft bearing is left on the crankshaft, remove it using the bearing puller with a suitable protector.

TOOL:

Universal bearing puller

07631-0010000 or equivalent commercially available in U.S.A.

- Always replace the rear crankshaft bearing with a new one when the crankshaft is removed.

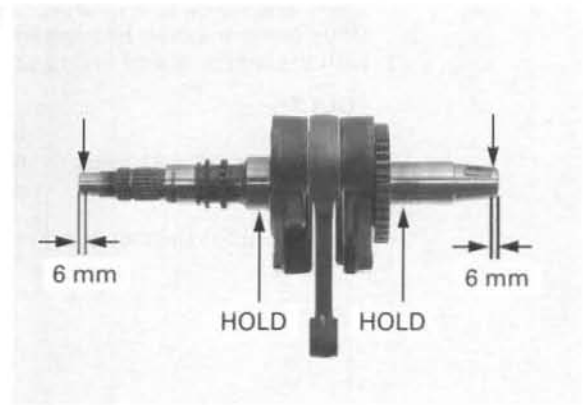


INSPECTION

CRANKSHAFT

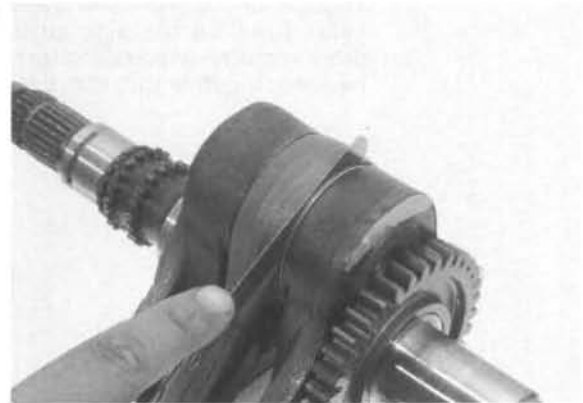
Set the crankshaft as shown and measure the runout using a dial indicator.

SERVICE LIMIT: 0.15 mm (0.006 in)



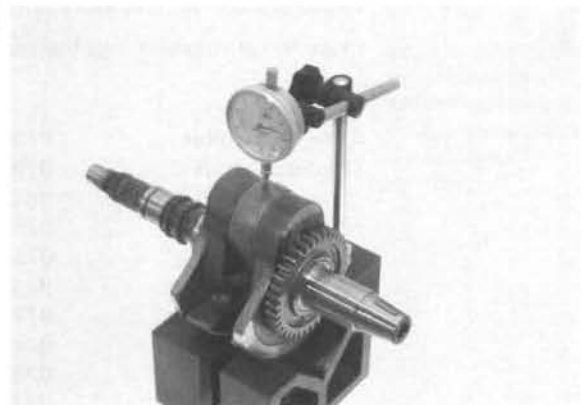
Measure the side clearance between the connecting rod big end and crank weight with a feeler gauge.

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)



BALANCER

Check the balancer gear for wear or damage.



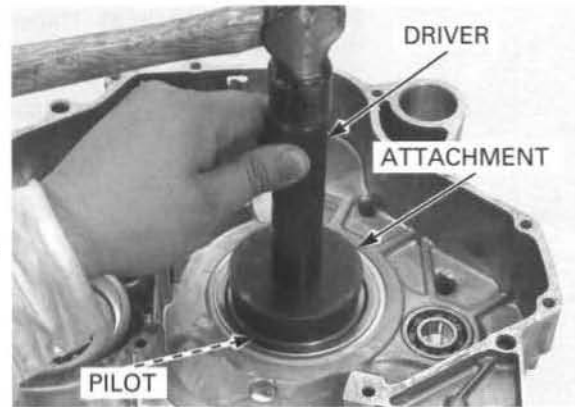
CRANKSHAFT AND BALANCER INSTALLATION

Apply engine oil to a new rear crankshaft bearing. Drive the crankshaft bearing into the rear crankcase with the marking side facing up.

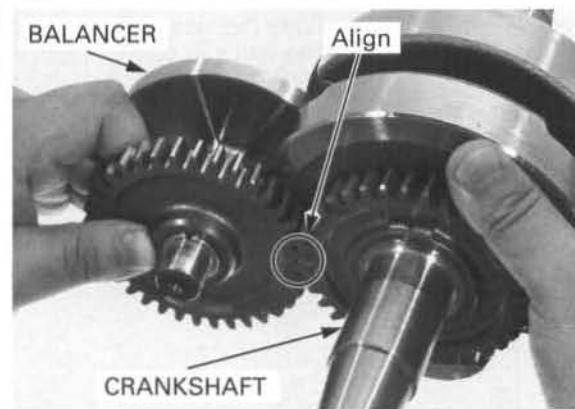
TOOLS:

Driver	07749-0010000
Attachment, 78 x 90 mm	07GAD-SD40101
Pilot, 32 mm	07MAD-PR90200

For front crankshaft bearing replacement, see page 13-13.



Engage the balancer and crankshaft by aligning the index lines on the side surfaces of the balancer drive and driven gears and install the crankshaft and balancer together into the rear crankcase.



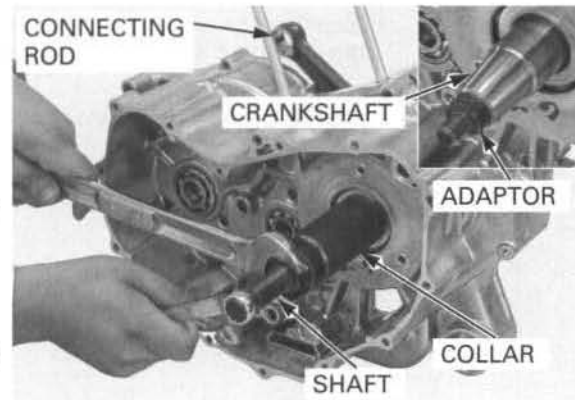
Assemble the special tools onto the crankshaft.

Draw the crankshaft into the bearing inner race.

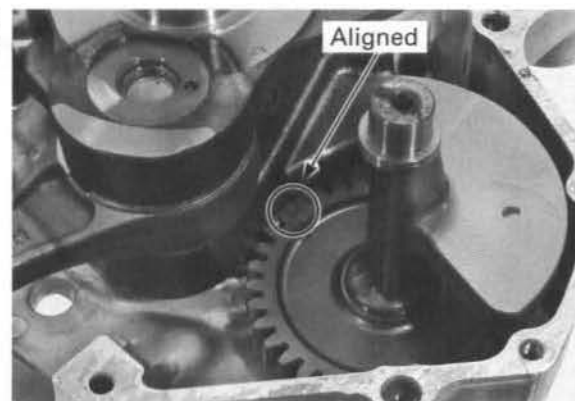
Be careful not to let the connecting rod press against the crankcase mating surface while drawing.

TOOLS:

Assembly collar	07965-VM00100
Threaded shaft	07965-VM00200
	not available in U.S.A. or 07931-ME4010B and 07931-HB3020A (U.S.A. only)
Threaded adaptor	07965-VM00300
	not available in U.S.A. or 07931-KF00200 (U.S.A. only)



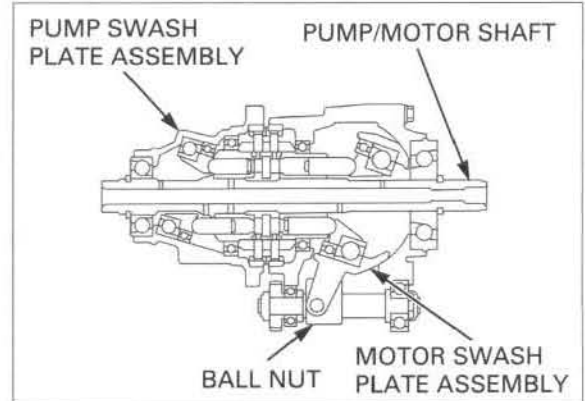
After installing the crankshaft in, make sure that the index lines on the crank weight and balancer driven gear are aligned.



AUTOMATIC TRANSMISSION UNIT INSTALLATION

Before installing the automatic transmission unit, check the following components for smooth operation.

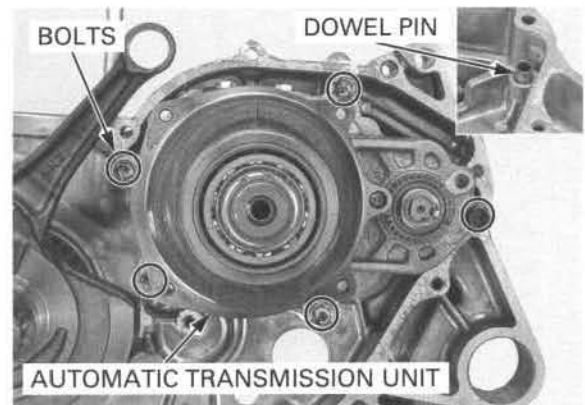
- rotation of the pump swash plate assembly
- rotation of the pump/motor shaft
- movement of the motor swash plate assembly and ball nut



Install the dowel pin into the rear crankcase.

Install the automatic transmission unit and tighten the five mounting bolts.

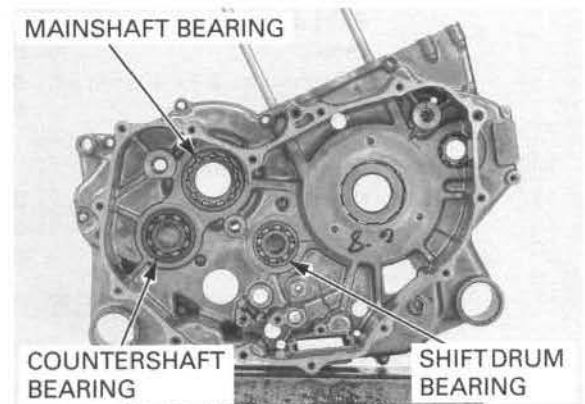
Assemble the crankcase halves (page 13-16).



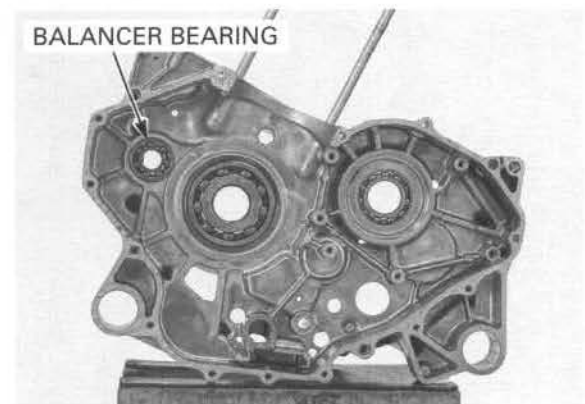
CRANKCASE BEARING REPLACEMENT

REAR CRANKCASE

Drive the mainshaft bearing out of the rear crankcase.



Drive the balancer bearing out of the rear crankcase.



CRANKSHAFT/AUTOMATIC TRANSMISSION

Remove the shift drum and countershaft bearings with the special tools.

TOOLS:

Shift drum bearing:
Bearing remover, 17 mm 07936-3710300
Remover handle 07936-3710100
Remover weight 07741-0010201 or
07936-371020 or
07936-371020A
(U.S.A. only)

Countershaft 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)

Apply engine oil to new bearings.
Drive the following bearings in with the marking side facing up using the special tools.

TOOLS:

Mainshaft bearing:
Driver 07749-0010000
Attachment, 52 x 55 mm 07746-0010400
Pilot, 30 mm 07746-0040700

Countershaft bearing:
Driver 07749-0010000
Attachment, 42 x 47 mm 07746-0010300
Pilot, 20 mm 07746-0040500

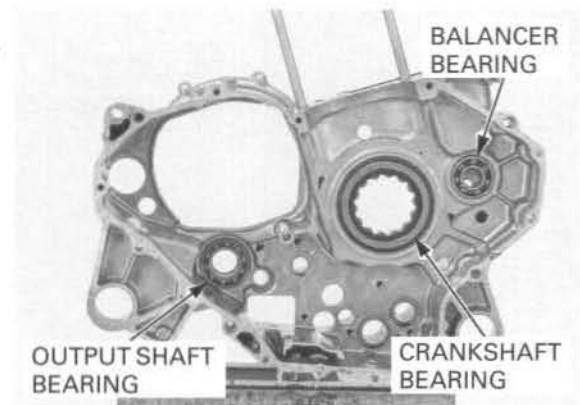
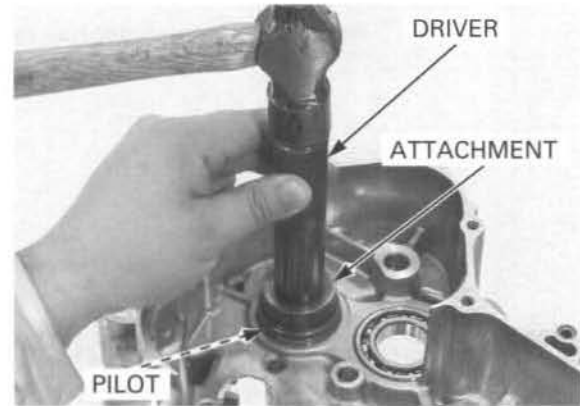
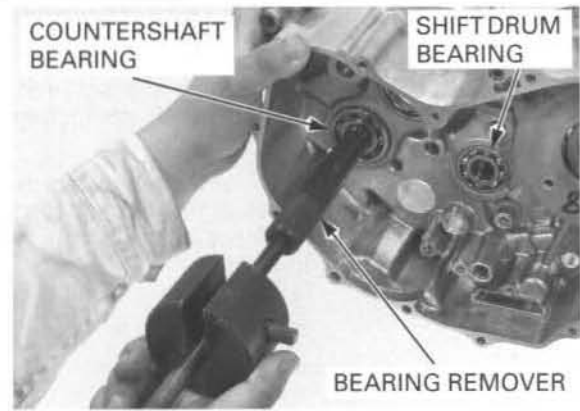
Shift drum bearing:
Driver 07749-0010000
Attachment, 37 x 40 mm 07746-0010200
Pilot, 17 mm 07746-0040400

Balancer bearing:
Driver 07749-0010000
Attachment, 37 x 40 mm 07746-0010200
Pilot, 17 mm 07746-0040400

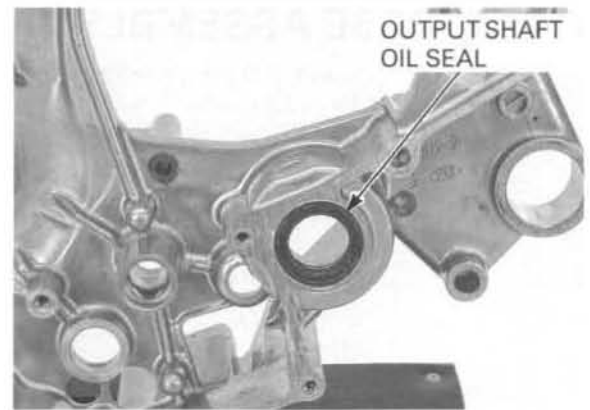
FRONT CRANKCASE

Remove the oil pump (page 4-12).

Drive output shaft and crankshaft bearings out of the front crankcase.



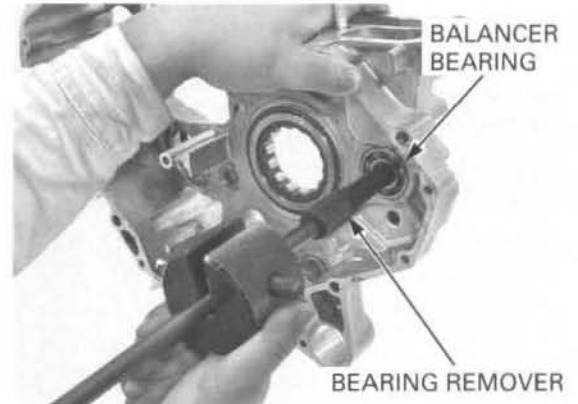
Remove the output shaft oil seal.



Remove the balancer bearing with the special tools.

TOOLS:

Balancer bearing:
 Bearing remover, 17 mm 07936-3710300
 Remover handle 07936-3710100
 Remover weight 07741-0010201 or
 07936-371020A or
 07936-3710200



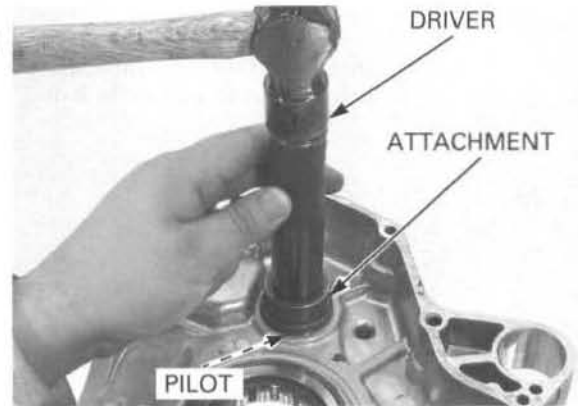
Apply engine oil to new bearings.
 Drive the following bearings in with the marking side facing up using the special tools.

TOOLS:

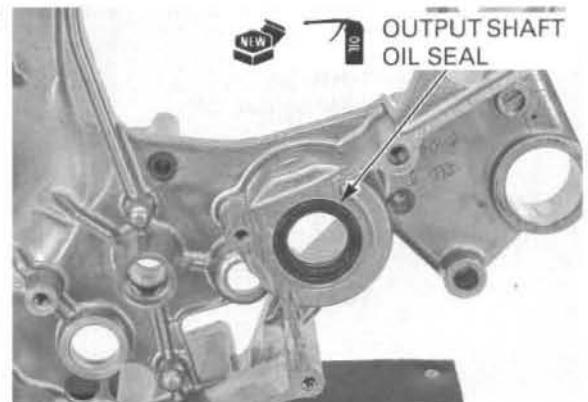
Crankshaft bearing:
 Driver 07749-0010000
 Attachment, 78 x 90 mm 07GAD-SD40101
 Pilot, 40 mm 07746-0040900

Balancer bearing:
 Driver 07749-0010000
 Attachment, 37 x 40 mm 07746-0010200
 Pilot, 17 mm 07746-0040400

Output shaft bearing:
 Driver 07749-0010000
 Attachment, 42 x 47 mm 07746-0010300
 Pilot, 25 mm 07746-0040600



Apply engine oil to a new output shaft oil seal lips and install it until it is flush with the crankcase.
 Install the oil pump (page 4-12).



CRANKCASE ASSEMBLY

Clean the front and rear crankcase mating surfaces thoroughly, being careful not to damage them. Blow through the oil passage in the rear crankcase with compressed air.

Install the bearing inner race onto the crankshaft with the flange side facing in. Apply engine oil to new O-rings and install them into the grooves in the rear crankcase.

Apply liquid sealant to the mating surface of the crankcase. Install the two dowel pins.

Be careful not to interfere the front crankcase with the automatic transmission unit.

Install the front crankcase over the rear crankcase.

Install the twelve front crankcase bolts and tighten them in a crisscross pattern in 2 or 3 steps.

Install the five rear crankcase bolts and tighten them in a crisscross pattern in 2 or 3 steps.

Install the dowel pin and primary driven gear. Apply engine oil to the driven gear bolt threads and seating surface, and install them.

Temporarily install the clutch drum and the gear holder.

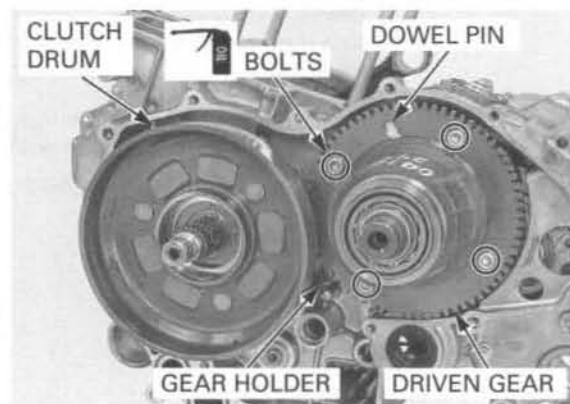
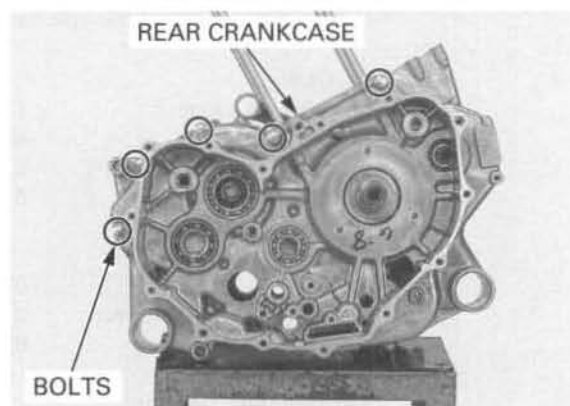
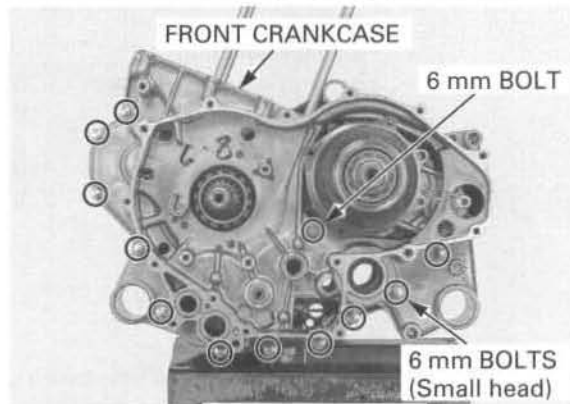
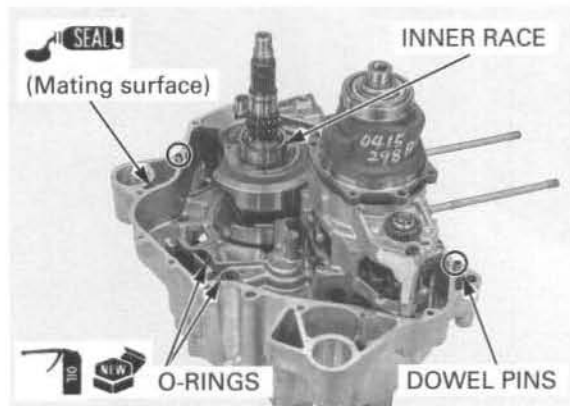
TOOL:

Gear holder, 2.5

**07724-0010100 or
07724-001A100
(U.S.A. only)**

Tighten the four driven gear bolts in a crisscross pattern in 2 or 3 steps.

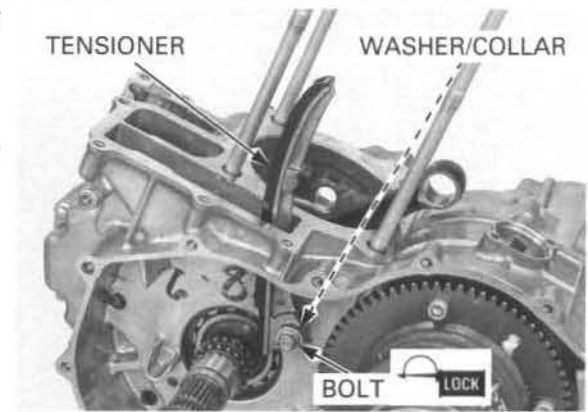
TORQUE: 17 N·m (1.7 kgf·m, 12 lbf·ft)



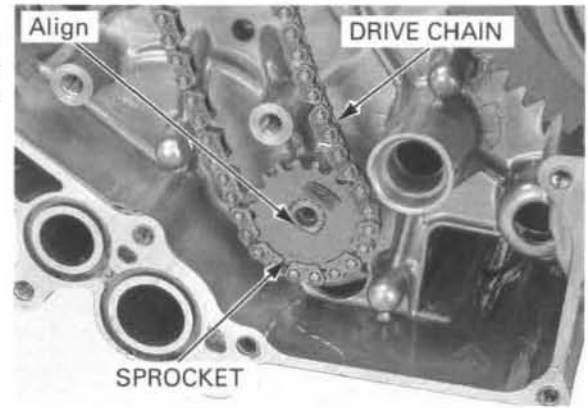
Apply locking agent to the cam chain tensioner pivot bolt threads.

Install the following:

- pivot collar (into the tensioner pivot)
- cam chain tensioner with bolt and washer (between the tensioner and crankcase)



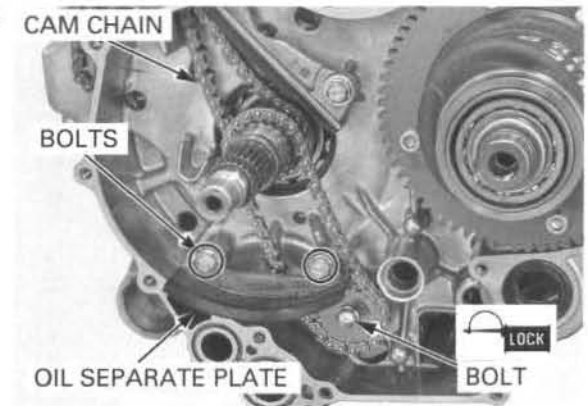
- cam chain
- oil pump drive chain and driven sprocket (with the rolled edge of the sprocket facing to the crankcase, and by aligning the flats of the sprocket and pump shaft)



- driven sprocket bolt (apply locking agent to the threads)

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

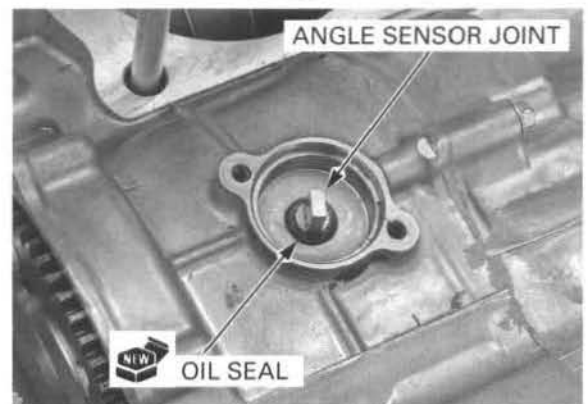
- oil separate plate with two bolts



- new oil seal (do not apply oil)
- angle sensor joint

Install the removed parts:

- angle sensor (page 24-41)
- centrifugal clutch (page 10-12)
- sub-transmission and shift linkage (page 12-12)
- flywheel and starter clutch (page 11-12)
- cylinder and piston (page 9-9)
- cylinder head and camshaft (page 8-17)
- oil tank (page 4-8)
- engine (page 7-8)



MEMO

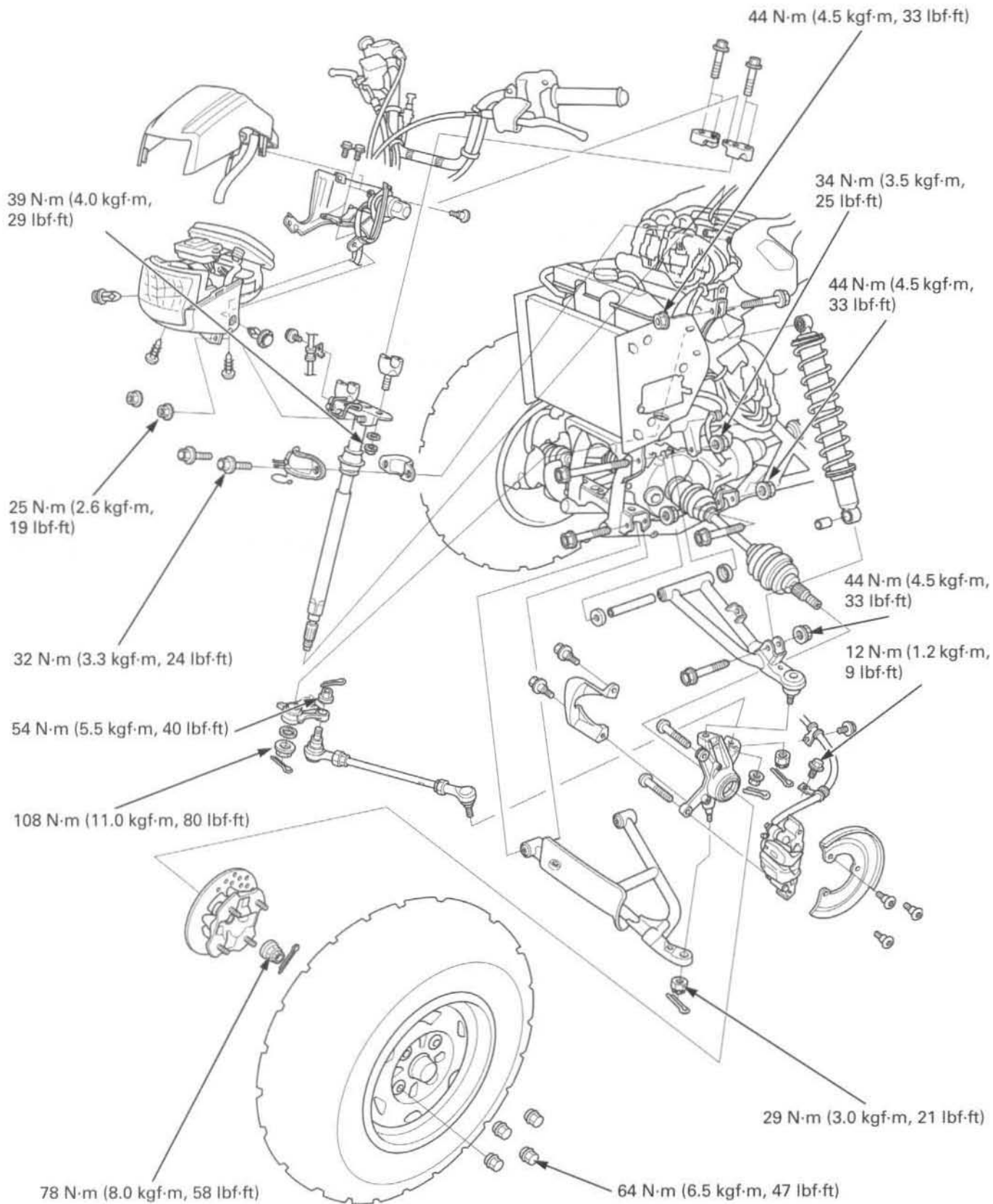


14. FRONT WHEEL/SUSPENSION/STEERING

SYSTEM COMPONENTS	14-2	FRONT WHEEL HUB	14-18
SERVICE INFORMATION	14-4	SUSPENSION ARM.....	14-20
TROUBLESHOOTING	14-6	STEERING SHAFT (Except EPS model)	14-28
HANDLEBAR	14-7	STEERING SHAFT/EPS UNIT (EPS model).....	14-34
THROTTLE HOUSING	14-13	TIE-ROD	14-42
FRONT WHEEL	14-14	FRONT SHOCK ABSORBER	14-44
TIRES	14-15		

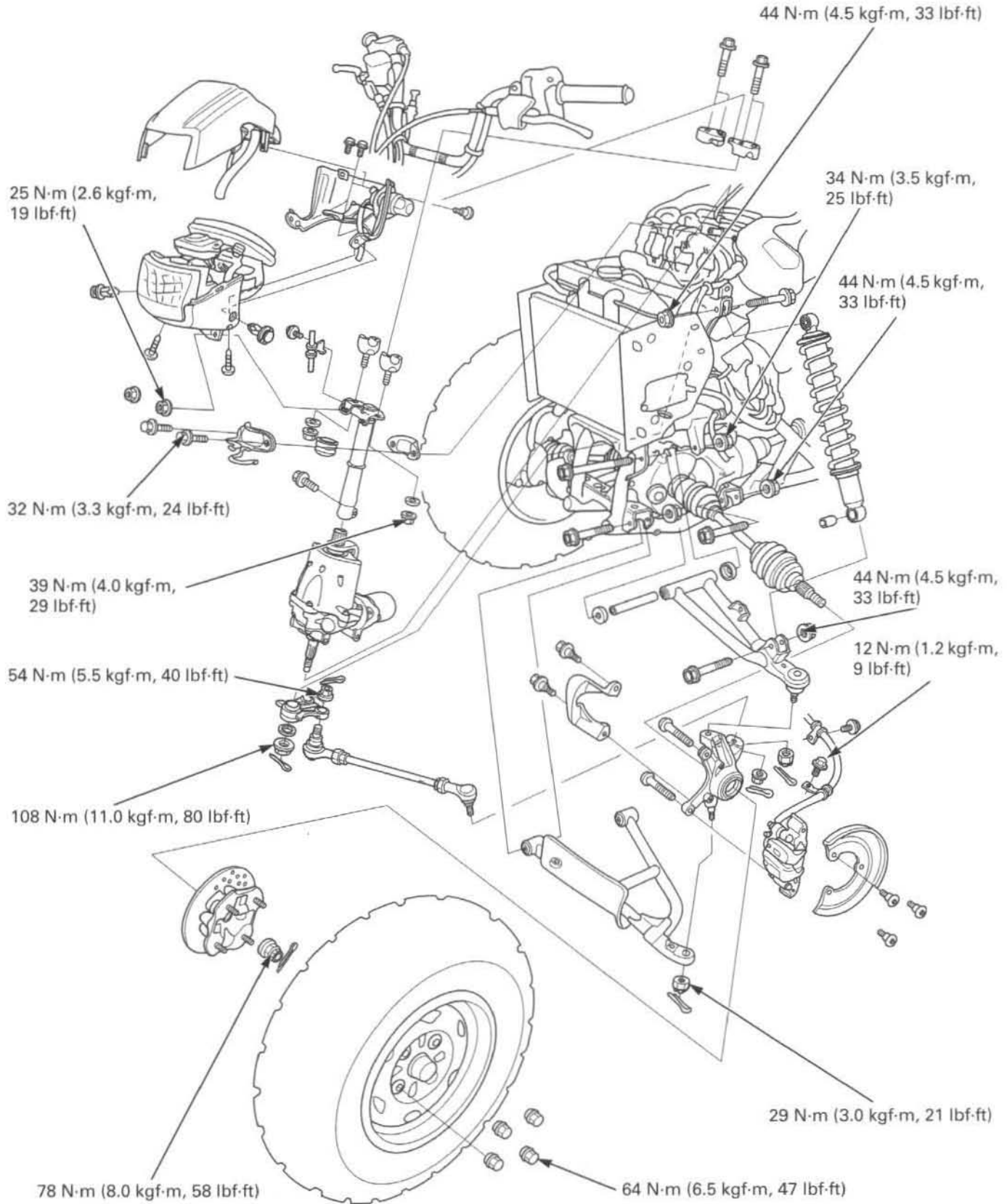
SYSTEM COMPONENTS

Except EPS model:



FRONT WHEEL/SUSPENSION/STEERING

EPS model:



FRONT WHEEL/SUSPENSION/STEERING

SERVICE INFORMATION

GENERAL

- 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 3-26).
- Do not twist or bend the brake hose and pipe when serving.
- Use genuine Honda replacement bolts and nuts for all suspension pivots and mounting points.
- Refer to 16-3 for brake system information.
- Refer to 22-10 for handlebar switch inspection.
- For electric power steering (EPS) service (page 25-8).
- EPS model only: Perform the Torque Sensor Initialization when you service the following components (page 25-13).

MAINTENANCE LOCATION	REPLACEMENT	REMOVAL/INSTALLATION
Cables and harness around handlebar	INITIALIZE	INITIALIZE
Handlebar	INITIALIZE	INITIALIZE
Steering shaft and steering shaft bushing	INITIALIZE	INITIALIZE
Steering shaft arm and end nut	INITIALIZE	INITIALIZE
EPS unit	INITIALIZE	INITIALIZE
EPS ECU	INITIALIZE	NO NEED

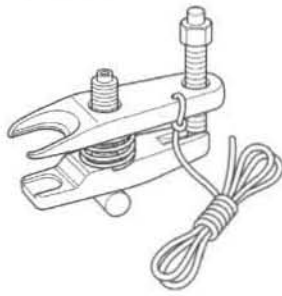


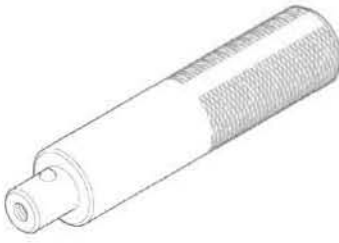








SPECIFICATIONS

ITEM			STANDARD	SERVICE LIMIT
Minimum tire tread depth			-	4.0 mm (0.16 in)
Cold tire pressure	'05 - '07	Standard	25 kPa (0.25 kgf/cm ² , 3.6 psi)	-
		Minimum	22 kPa (0.22 kgf/cm ² , 3.2 psi)	-
		Maximum	28 kPa (0.28 kgf/cm ² , 4.0 psi)	-
		With cargo	25 kPa (0.25 kgf/cm ² , 3.6 psi)	-
	After '07 except EPS		25 kPa (0.25 kgf/cm ² , 3.6 psi)	-
	EPS only		32.5 kPa (0.33 kgf/cm ² , 4.7 psi)	-
Tie-rod distance between the ball joints			387 mm (15.2 in)	-
Toe			Toe-out: 30 ± 15 mm (1 - 3/16 ± 9/16 in)	-
Suspension spring pre-load adjuster standard position (CM type and A type after '08 only)			Position 2	-

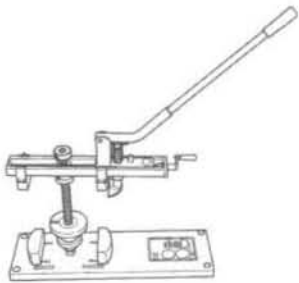
TORQUE VALUES

Handlebar lower holder nut	39 N·m (4.0 kgf·m, 29 lbf·ft)	Lock nut: replace with a new one
Front wheel nut	64 N·m (6.5 kgf·m, 47 lbf·ft)	
Front wheel hub nut	78 N·m (8.0 kgf·m, 58 lbf·ft)	Castle nut
Front brake disc plate bolt	42 N·m (4.3 kgf·m, 31 lbf·ft)	ALOC bolt: replace with a new one
Shock absorber mounting nut	44 N·m (4.5 kgf·m, 33 lbf·ft)	Lock nut: replace with a new one
Upper arm pivot nut	34 N·m (3.5 kgf·m, 25 lbf·ft)	Lock nut: replace with a new one
Lower arm pivot nut	44 N·m (4.5 kgf·m, 33 lbf·ft)	Lock nut: replace with a new one
Upper and lower arm ball joint nut	29 N·m (3.0 kgf·m, 21 lbf·ft)	Castle nut
Brake hose clamp bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	
Tie-rod ball joint nut	54 N·m (5.5 kgf·m, 40 lbf·ft)	Lock nut: replace with a new one
Assist headlight case mounting nut	25 N·m (2.6 kgf·m, 19 lbf·ft)	
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 master cylinder holder bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	
EPS unit output shaft nut (EPS model)	108 N·m (11.0 kgf·m, 80 lbf·ft)	Lock nut: replace with a new one.
EPS unit mounting bolt (EPS model)	22 N·m (2.2 kgf·m, 16 lbf·ft)	
EPS unit mounting nut (EPS model)	22 N·m (2.2 kgf·m, 16 lbf·ft)	
EPS unit steering shaft flange bolt (EPS model)	60 N·m (6.1 kgf·m, 44 lbf·ft)	ALOC bolt: replace with a new one.
EPS motor flange bolt (EPS model)	20 N·m (2.0 kgf·m, 15 lbf·ft)	

TOOLS

<p>Ball joint remover, 28 mm 07MAC-SL00201</p>  <p>07MAC-SL0A202(U.S.A.only) or 07MAC-SL00200 and 07MAC-SL0A300 (U.S.A.only)</p>	<p>Ball joint remover/installer 07WMF-HN00100</p> 	<p>Oil seal driver 07JAD-PH80101</p> 
<p>Driver 07749-0010000</p> 	<p>Attachment, 28 x 30 mm 07946-1870100</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, 15 mm I.D. 07746-0020200</p> 
<p>Pilot, 30 mm 07746-0040700</p> 	<p>Pilot, 22 mm 07746-0041000</p> 	<p>Pilot, 16 mm 07746-0041300</p> 

ATV Bead Buster
KLS379024



(U.S.A. only)

TROUBLESHOOTING

Hard steering

- Steering shaft holder too tight
- Damaged steering shaft bearing/bushing
- Insufficient tire pressure
- EPS does not assist the steering force (EPS model only)

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
- Weak shock absorber

Front wheel wobbling

- Bent rim
- Worn or damaged knuckle bearing
- Faulty tire
- Wheel hub nut not tightened properly

Soft suspension

- Weak shock absorber spring
- Faulty shock absorber damper

Hard 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:

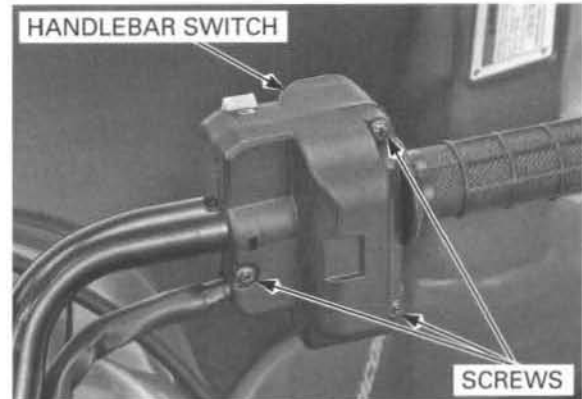
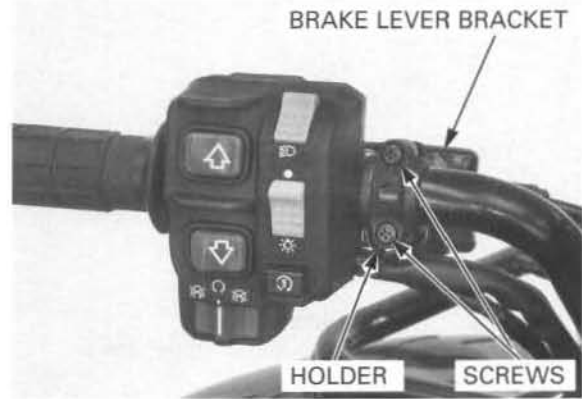
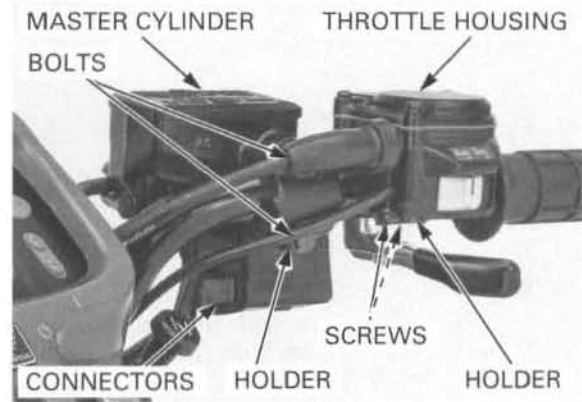
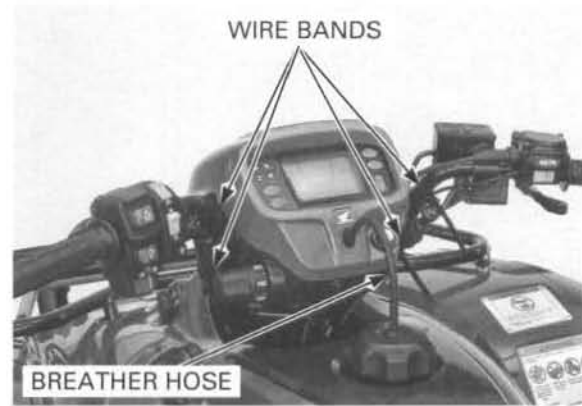
- four wire bands
- breather hose

- two screws
- throttle housing holder
- throttle housing
- brake light switch connectors
- two bolts
- master cylinder holder
- front brake master cylinder

Keep the brake master cylinder upright to prevent air from entering the hydraulic system.

- two screws
- bracket holder
- rear (parking) brake lever bracket

- three screws
- handlebar switch

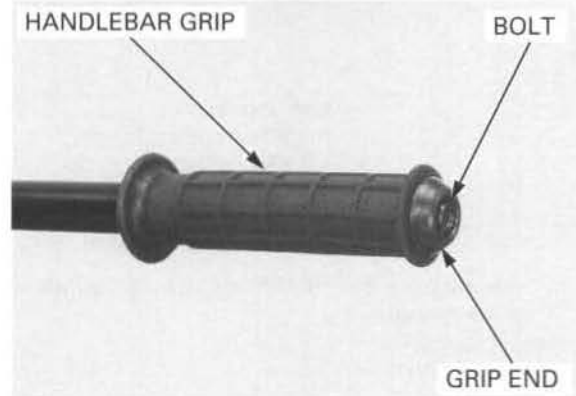


FRONT WHEEL/SUSPENSION/STEERING

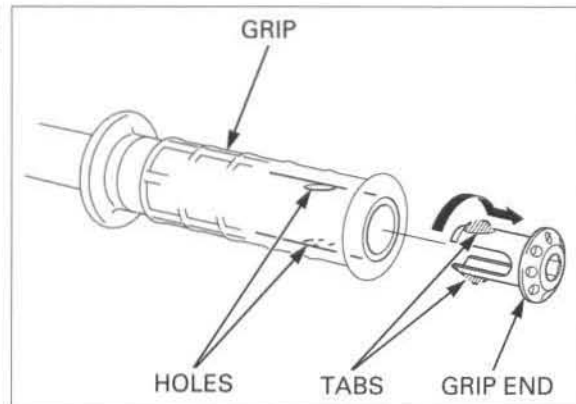
- nut
- choke knob



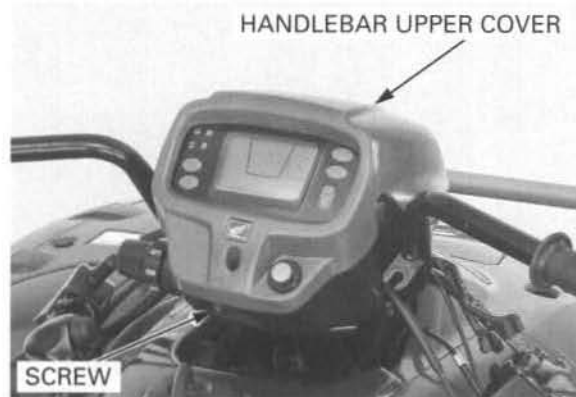
- '05 - '07:
- bolts
 - grip ends
 - handlebar grips



- After '07:
- grip ends (turn the grip end to release the setting tabs from the holes in the handlebar and pry it using a screwdriver)
 - handlebar grips



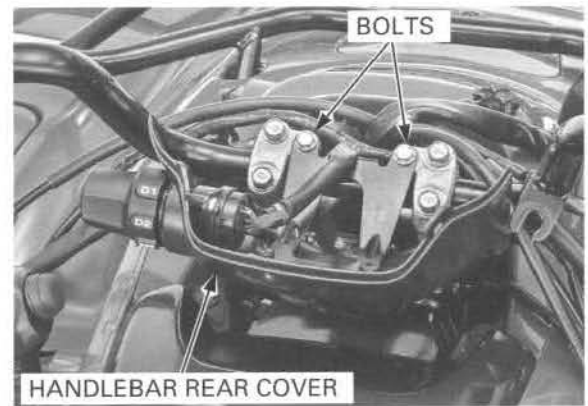
- screw
- handlebar upper cover



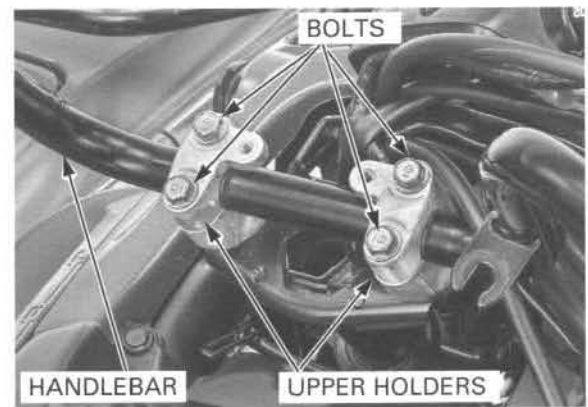
- two nuts
- handlebar front cover



- two bolts
- handlebar rear cover

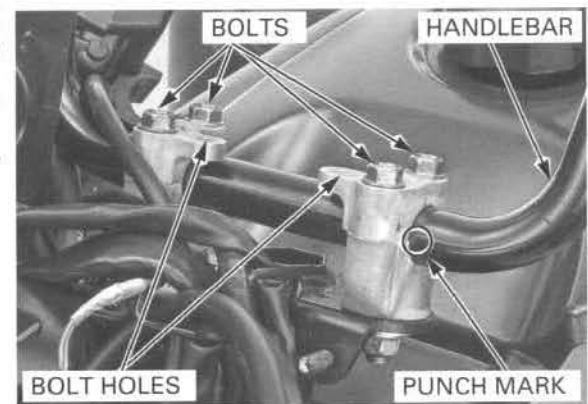


- four bolts
- handlebar upper holders
- handlebar



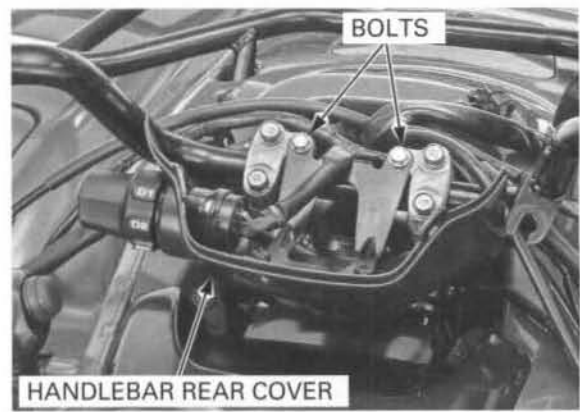
INSTALLATION

Place the handlebar onto the lower holders and align the punch mark on the handlebar with the top of the lower holder. Install the upper holders with the bolt holes facing forward. Install the four bolts and tighten the front bolts first, then tighten the rear bolts.



FRONT WHEEL/SUSPENSION/STEERING

Install the handlebar rear cover and tighten the two bolts.



Install the handlebar front cover and tighten the two nuts.



Install the handlebar upper cover and tighten the screw.



FRONT WHEEL/SUSPENSION/STEERING

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.

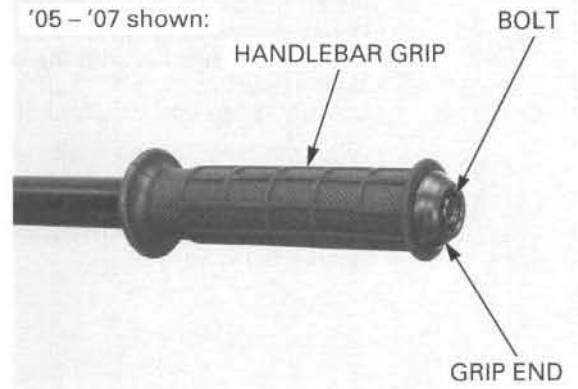
Allow the adhesive to dry for an hour before using.

Wait 3—5 minutes and install the grip. Rotate the grip for even application of the adhesive.

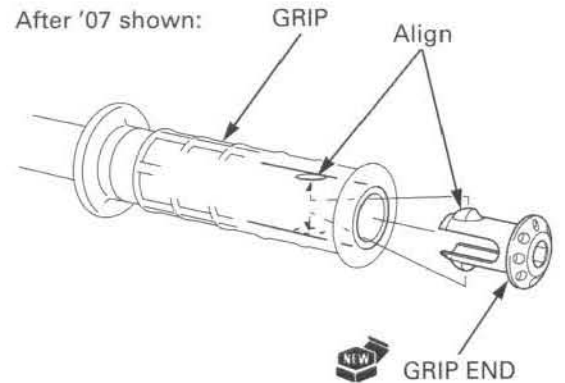
'05 - '07: Install the grip ends and tighten the bolts.

After '07: Install new grip ends by aligning their tabs with the holes in the handlebar.

'05 - '07 shown:



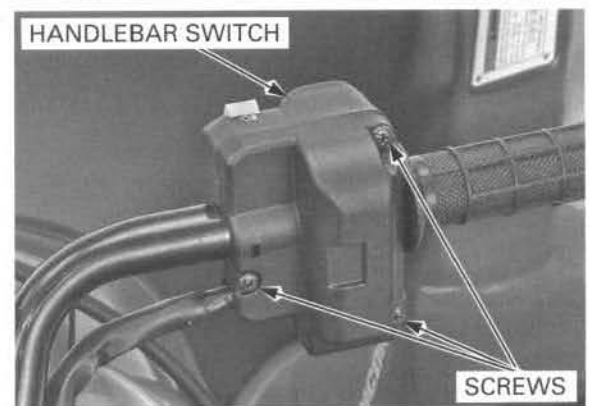
After '07 shown:



Install the choke knob and tighten the nut.



Install the handlebar switch and loosely tighten the three screws.



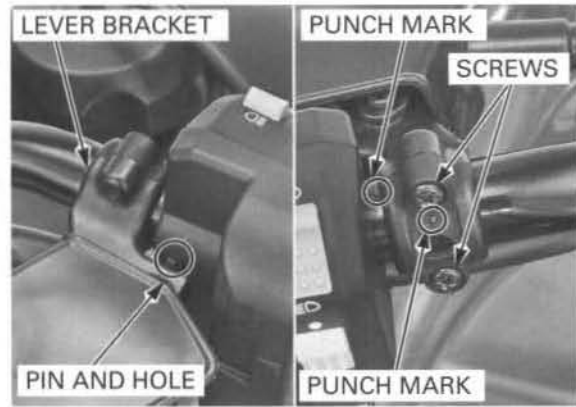
FRONT WHEEL/SUSPENSION/STEERING

Install the brake lever bracket and holder with the punch mark facing up by aligning the locating pin on the lever bracket with the hole in the handlebar switch housing.

Loosely tighten the bracket holder screws.

Align the edge of the brake lever bracket with the punch mark on the handlebar, and tighten the upper bracket screw first, then tighten the lower screw.

Tighten the upper handlebar switch screw first, then tighten the lower screws.

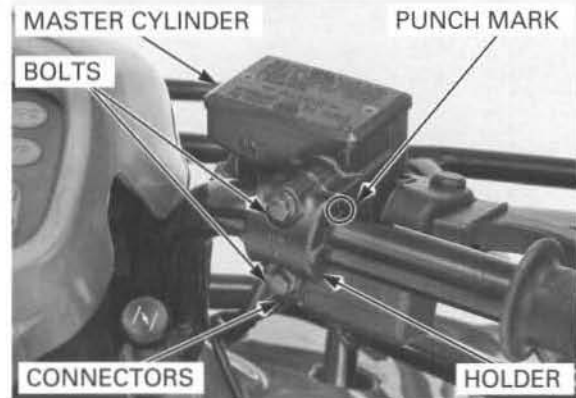


Install the front brake master cylinder and holder with the "UP" mark facing up.

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.

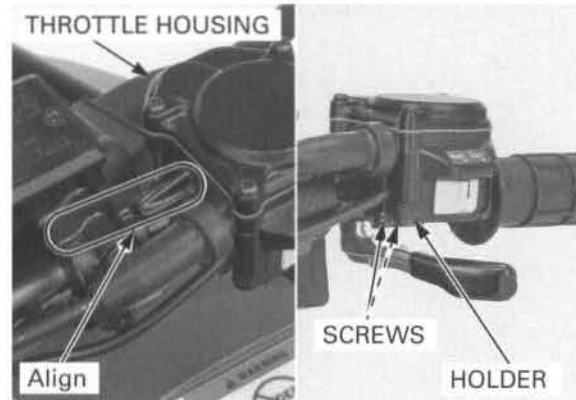
TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Connect the brake light switch connectors.



Install the throttle housing and holder against the master cylinder.

Align the lug on the throttle housing with the mating surface of the master cylinder and holder, and tighten the front screw first, then tighten the rear screw.



Install the breather hose.

Install the four wire bands as shown.

EPS only: Perform the Torque Sensor Initialization (page 25-13).



THROTTLE HOUSING

DISASSEMBLY

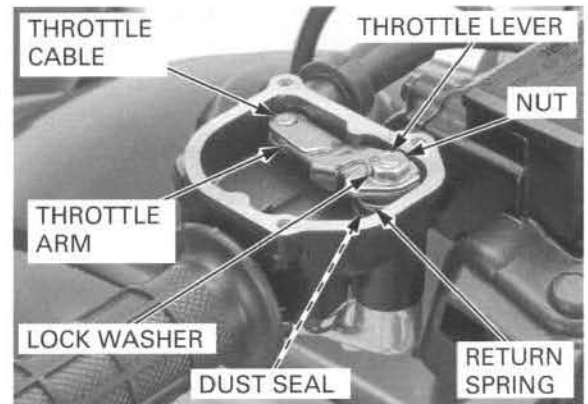
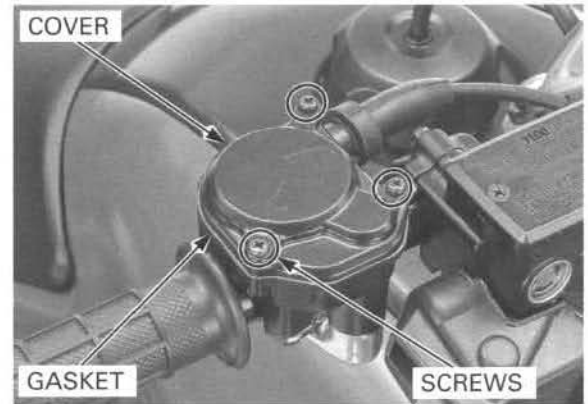
Remove the following:

- 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 pivot nut, lock washer, throttle arm, return spring, throttle lever and 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 throttle housing until it is fully seated.

Apply grease to the throttle lever pivot.

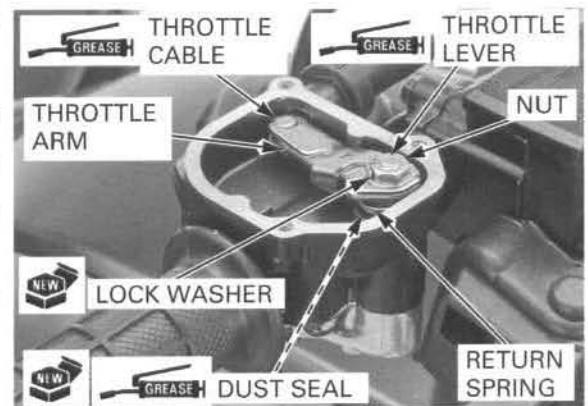
Apply grease to the throttle cable end and connect the cable to the throttle arm.

Install the washer onto the throttle lever and insert the lever into the throttle housing.

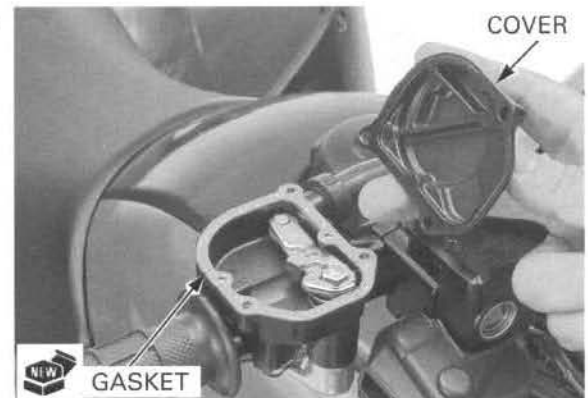
Install the throttle arm with the return spring over the throttle lever pivot by aligning the flat surfaces.

Install a new lock washer and the pivot nut.

Tighten the pivot nut and bend up the lock washer tab against the nut.



Install the throttle housing cover with a new gasket.

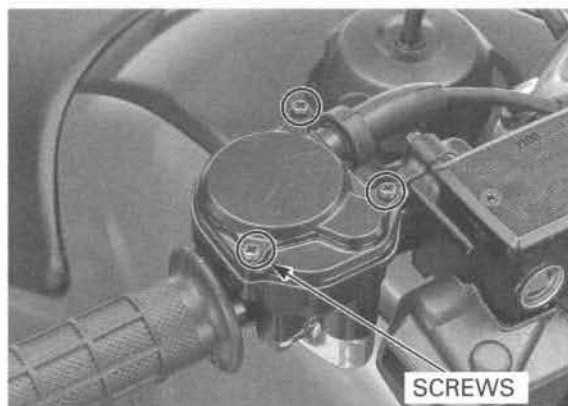


FRONT WHEEL/SUSPENSION/STEERING

Install and tighten the three screws.

Adjust the throttle lever freeplay (page 3-5).

If the throttle cable was replaced, perform the initial setting (page 24-6) after adjustment the freeplay.

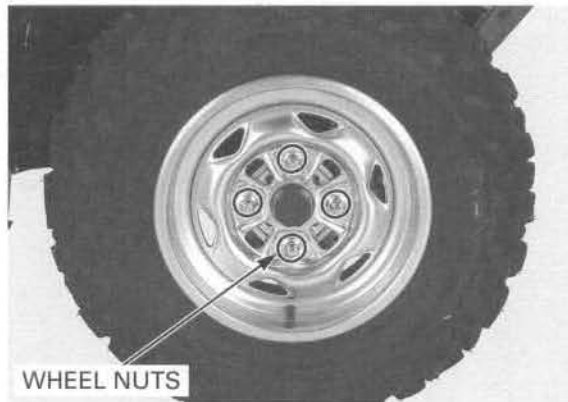


FRONT WHEEL

REMOVAL

Loosen the wheel nuts.

Place the support block under the frame to raise the front wheel off the ground.
Remove the nuts and wheel.



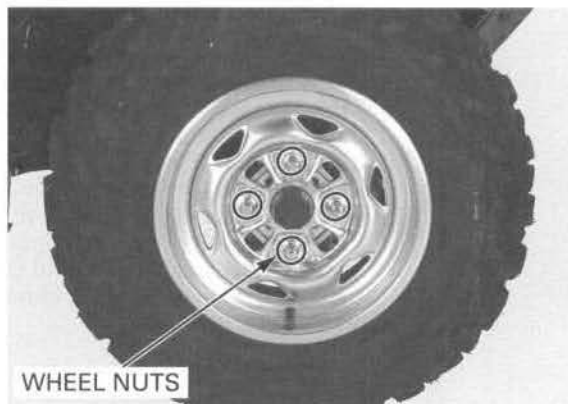
INSTALLATION

*Do not interchange
the left and right
tires.*

Install the wheel with the arrow mark facing in the normal rotating direction.

Install the wheel nuts and tighten them.

TORQUE: 64 N·m (6.5 kgf·m, 47 lbf·ft)



TIRES

REMOVAL (U.S.A. only)

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.

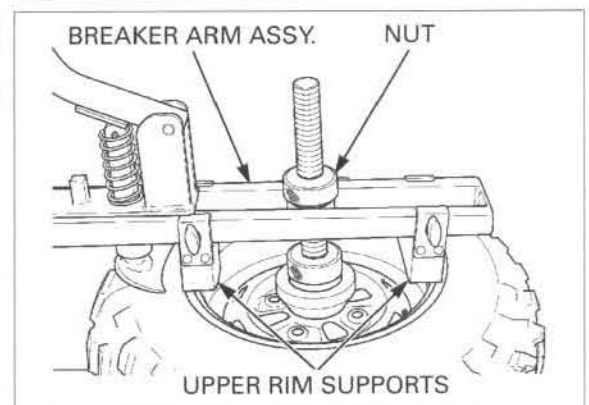
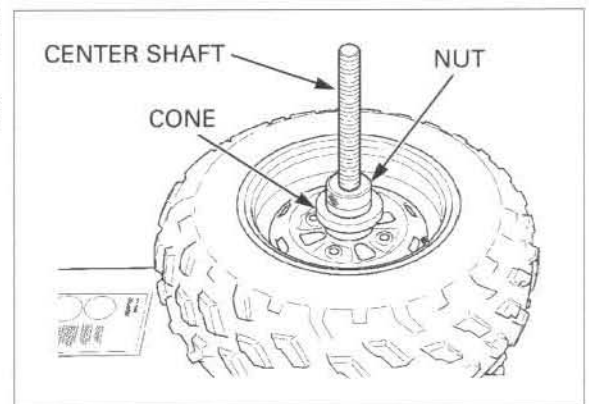
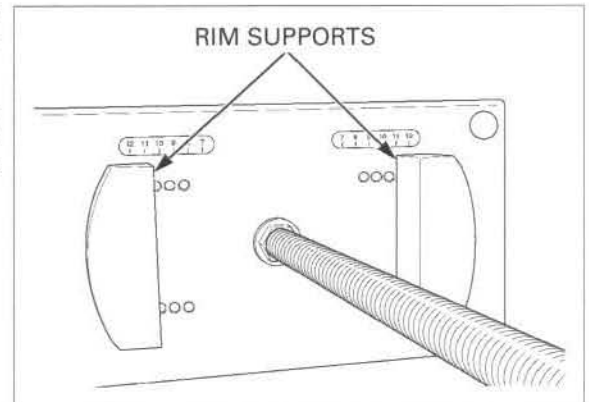
Lube the bead area of the tire with water, pressing down on the tire sidewall/bead area in several places to allow the water to run into and around the bead.

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.

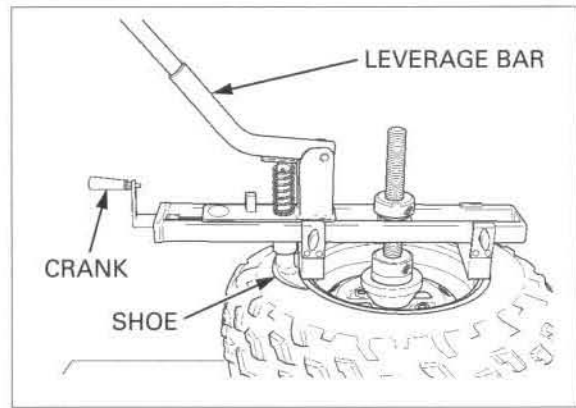
Install the top hold down nut and tighten it finger tight.



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.

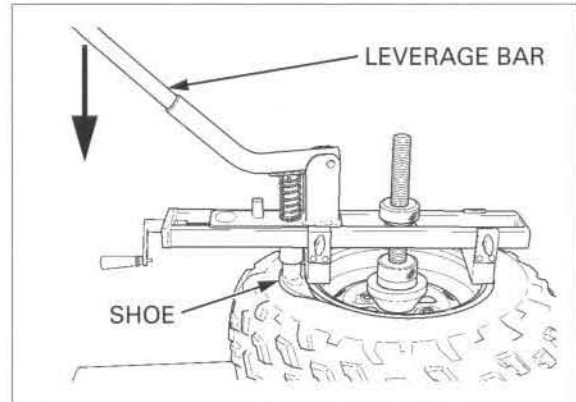
Pull the leverage bar down so the breaker shoe is just below the rim lip. Turn the crank to fully push the breaker shoe between the tire bead and rim. Once the shoe contacts the rim, back the crank out two turns to allow the shoe to clear the rim's bead lock.



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.

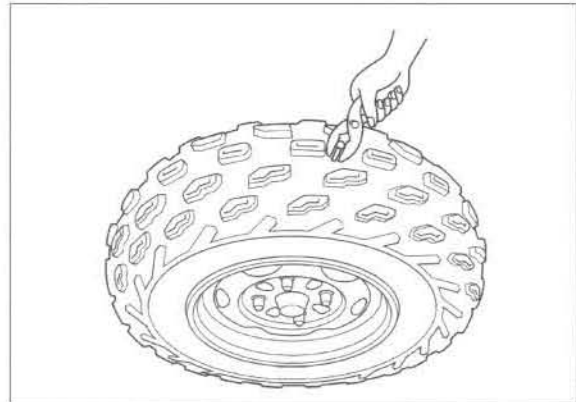
Chalk mark the punctured area and remove the puncturing objects.

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.

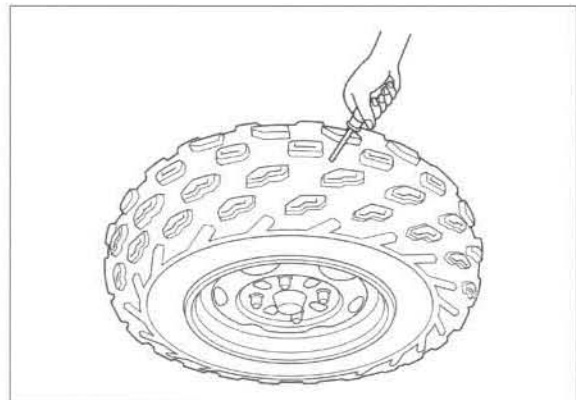
Do not let the cement dry.

Insert and center a rubber plug through the eye of the inserting needle.

Apply cement to the rubber plug.

Push the inserting needle with the plug into the injury until the plug is slightly above the tire.

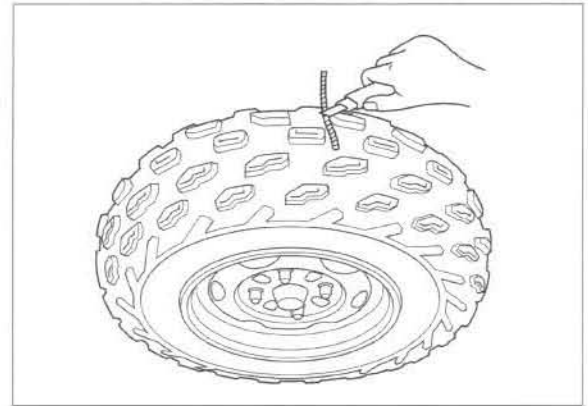
Twist the needle and remove it from the tire; the plug will stay in the tire.



Be careful not to push the plug all the way into the tire to prevent it from falling inside.

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.

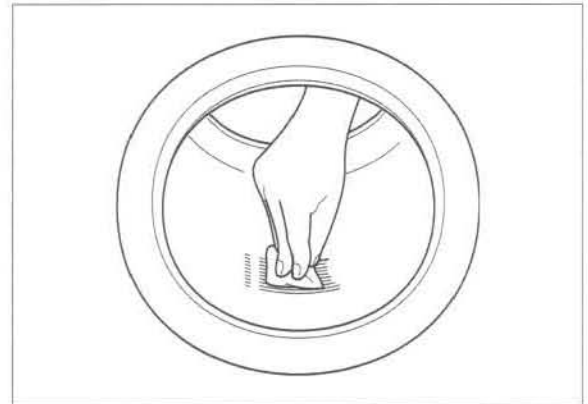


Inflate the tire and test the seal by dabbing a small amount of cement around the plug. Escaping air will cause a bubble in the cement. If there is leakage, remove the tire (page 14-15) and apply a cold patch to the inside of the tire as described.

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.

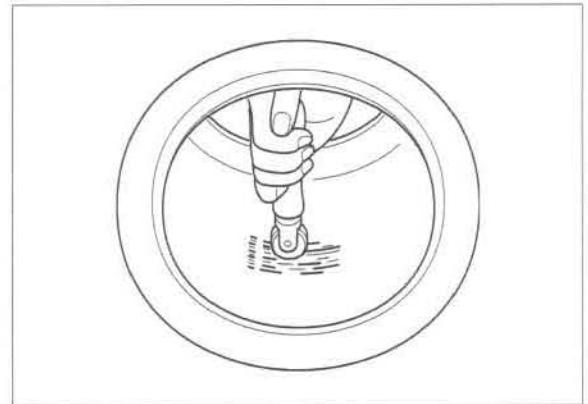
Rough the area marked inside the tire with a tire buffer or a wire brush. Clean the rubber dust from the buffed area.



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 over the injury.

Press the patch against the injury using a special roller.



FRONT WHEEL/SUSPENSION/STEERING

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.

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.

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 ('05 - '07):

Front:	Standard:	25 kPa (0.25 kgf/cm ² , 3.6 psi)
	Minimum:	22 kPa (0.22 kgf/cm ² , 3.2 psi)
	Maximum:	28 kPa (0.28 kgf/cm ² , 4.0 psi)
	With cargo:	25 kPa (0.25 kgf/cm ² , 3.6 psi)
Rear:	Standard:	25 kPa (0.25 kgf/cm ² , 3.6 psi)
	Minimum:	22 kPa (0.22 kgf/cm ² , 3.2 psi)
	Maximum:	28 kPa (0.28 kgf/cm ² , 4.0 psi)
	With cargo:	25 kPa (0.25 kgf/cm ² , 3.6 psi)

RECOMMENDED TIRE PRESSURE

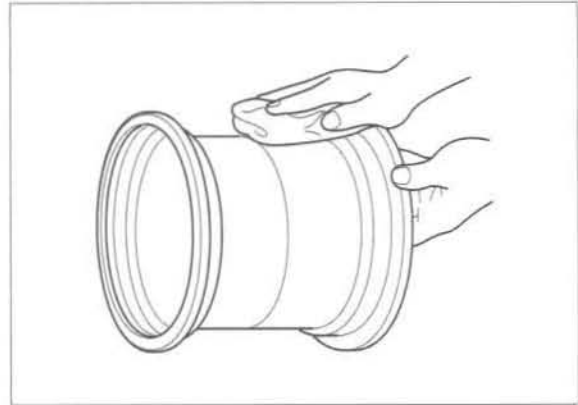
(After '07 except EPS):

Front:	25 kPa (0.25 kgf/cm ² , 3.6 psi)
Rear:	25 kPa (0.25 kgf/cm ² , 3.6 psi)

RECOMMENDED TIRE PRESSURE (EPS only):

Front:	32.5 kPa (0.33 kgf/cm ² , 4.7 psi)
Rear:	25 kPa (0.25 kgf/cm ² , 3.6 psi)

Check for air leaks and install the valve cap.



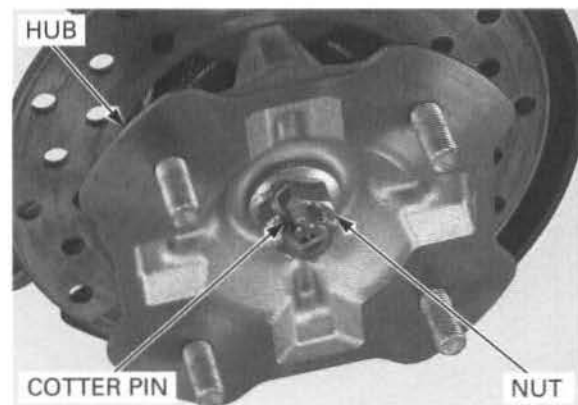
FRONT WHEEL HUB

REMOVAL

Remove the front wheel (page 14-14).

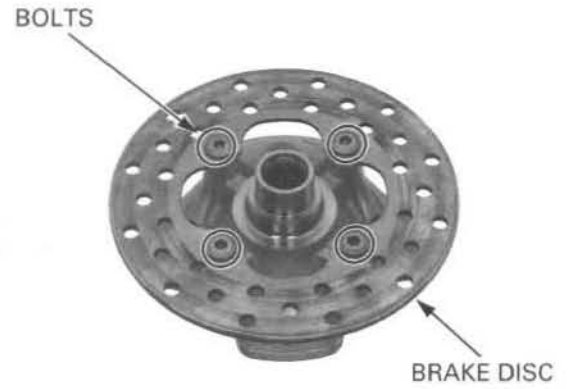
Remove the front brake caliper (page 16-14).

Remove the cotter pin, nut and front wheel hub.

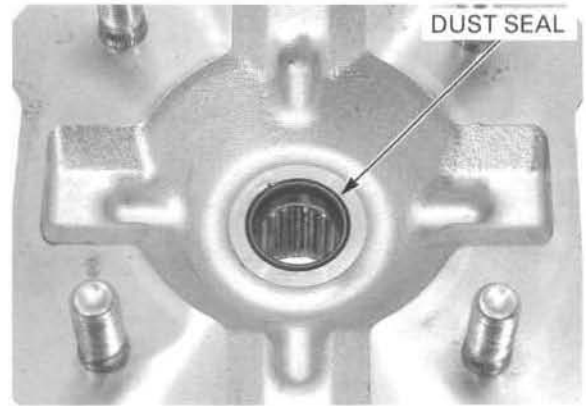


DISASSEMBLY

Remove the bolts and brake disc.

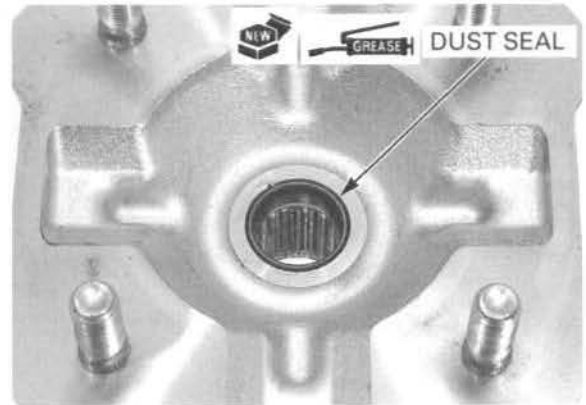


Remove the dust seal.



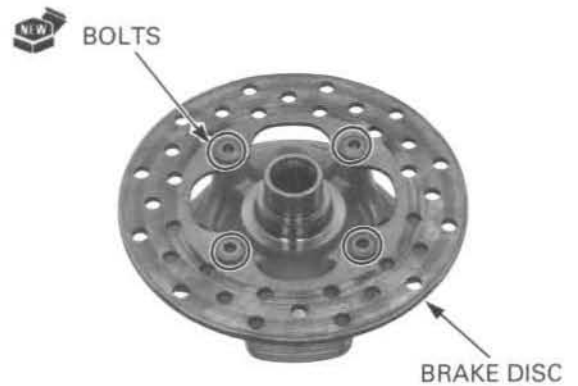
ASSEMBLY

Apply grease to a new dust seal lip and install it to the hub.



Install the brake disc and tighten the new disc plate bolts to the specified torque.

TORQUE: 42 N·m (4.3 kgf·m, 31 lbf·ft)



FRONT WHEEL/SUSPENSION/STEERING

INSTALLATION

Install the wheel hub and hub nut onto the knuckle.

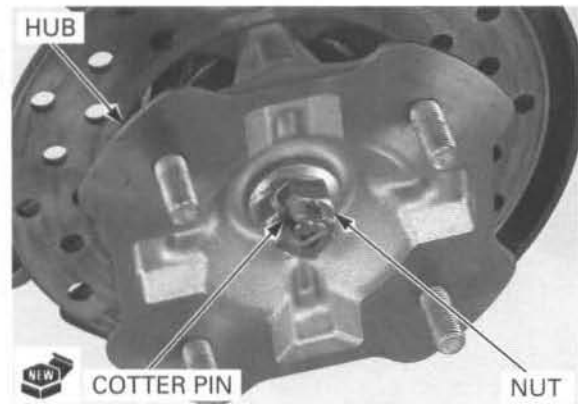
Tighten the hub nut to the specified torque and further tighten it until its grooves align with the cotter pin hole.

TORQUE: 78 N-m (8.0 kgf-m, 58 lbf-ft)

Install a new cotter pin.

Install the front brake caliper (page 16-14).

Install the front wheel (page 14-14).

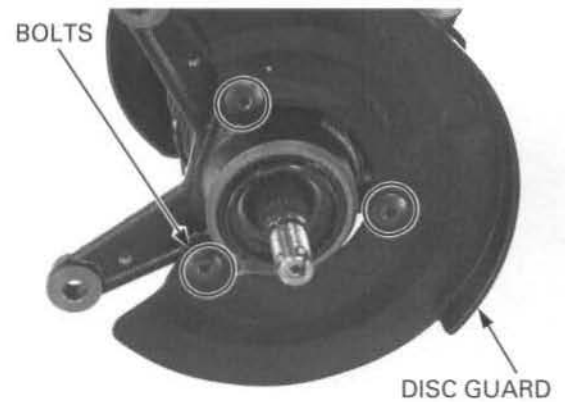


SUSPENSION ARM

REMOVAL

Remove the wheel hub (page 14-18).

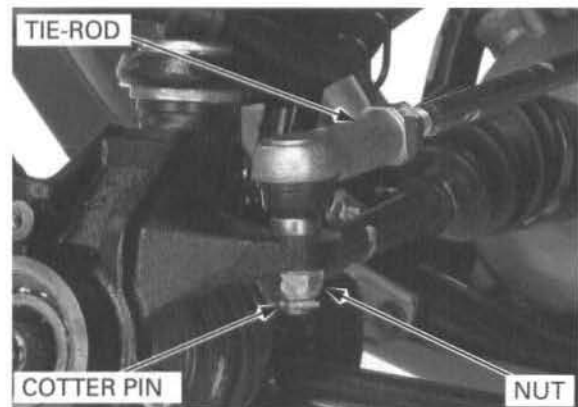
Remove the brake disc guard bolts and brake disc guard.



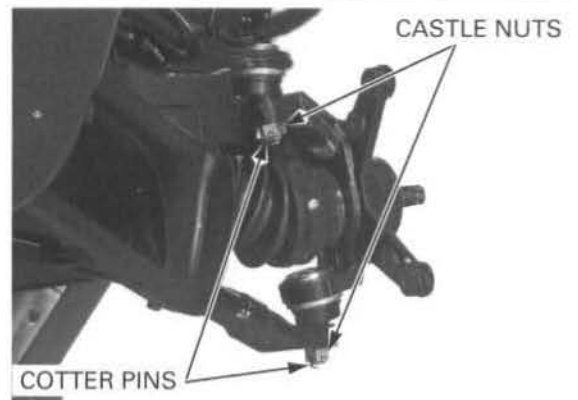
Remove the cotter pin.

Remove the tie-rod ball joint nut while holding the joint stud flats with an open end wrench.

Remove the tie-rod from the knuckle.



Remove the cotter pins and loosen the ball joint castle 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
 07MAC-SL0A202
 (U.S.A. only) or
 07MAC-SL00200 and
 07MAC-SL0A300
 (U.S.A. only)

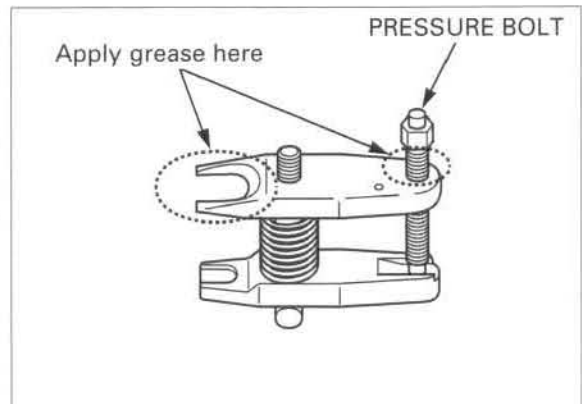


Apply grease to the ball joint remover at the point shown. This will ease installation of the tool and prevent damage to the pressure bolt threads.

Insert the jaws carefully, making sure that you do not damage the ball joint boot.

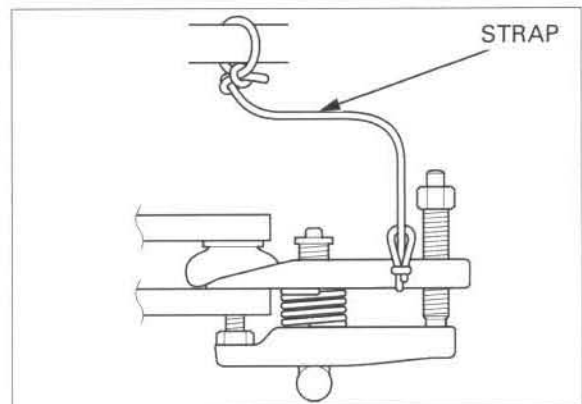
Adjust the jaw spacing by turning the pressure bolt.

If necessary, apply penetrating type lubricant to loosen the ball joint.



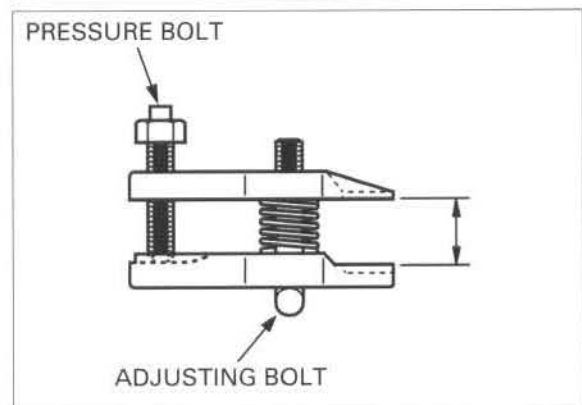
To prevent the tool from dropping, tie the strap on a neighboring solid part such as the lower arm, tie-rod, etc. before operation.

- Do not tie the strap on the brake hose, brake pipe, rubber boot, and other parts that can be damaged easily.



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.

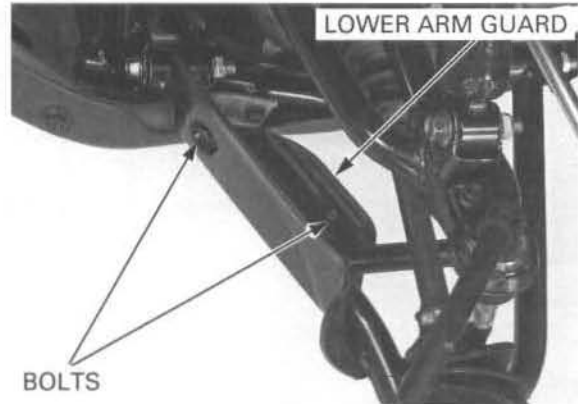


FRONT WHEEL/SUSPENSION/STEERING

Remove the two brake hose clamp bolts.

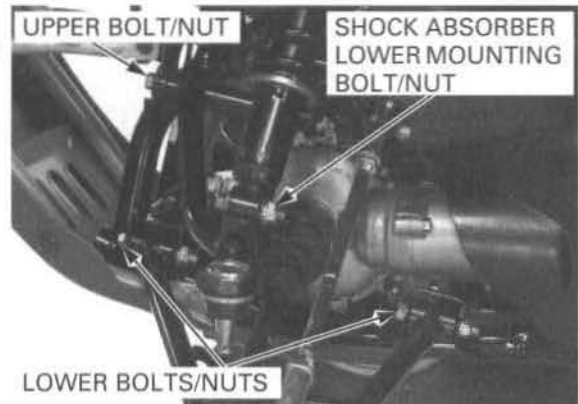


Remove the bolts and lower arm guard if necessary.



Remove the following:

- front shock absorber lower mounting nut and bolt
- pivot nut, bolt and upper arm
- pivot nuts, bolts and lower arm

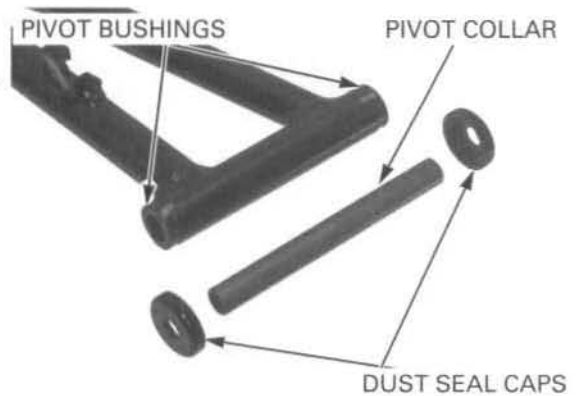


INSPECTION

UPPER/LOWER ARM

Remove the dust seal caps and pivot collar from the upper arm.

Check the pivot bushings of the upper arm for wear or damage.



Inspect the ball joint boot for tears or other damage by moving the ball joint stud. It should move freely and smoothly.

BALL JOINT BOOT



Check the pivot bushings of the lower arm for wear or damage.



PIVOT BUSHING

KNUCKLE

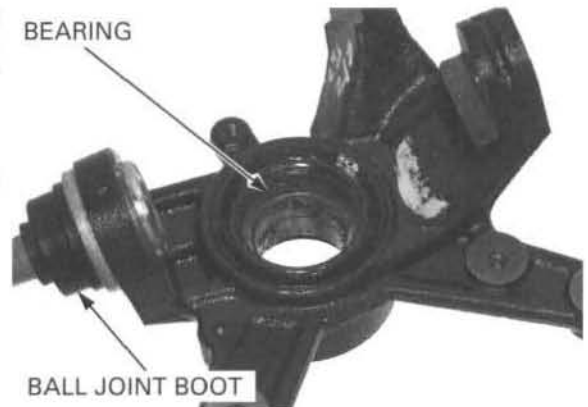
Turn the inner race of the bearing in the knuckle with your finger. The bearing should turn smoothly and quietly. Also check that the bearing outer race fits tightly in the knuckle.

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.

For ball joint replacement, see page 14-23.

BEARING



BALL JOINT BOOT

BALL JOINT REPLACEMENT

UPPER ARM

Remove the snap ring from the ball joint.

SNAP RING



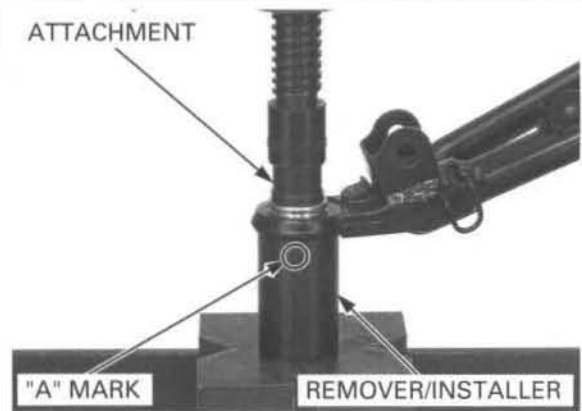
FRONT WHEEL/SUSPENSION/STEERING

Set the upper arm and special tools with "A" mark side of the remover/installer facing to the ball joint 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



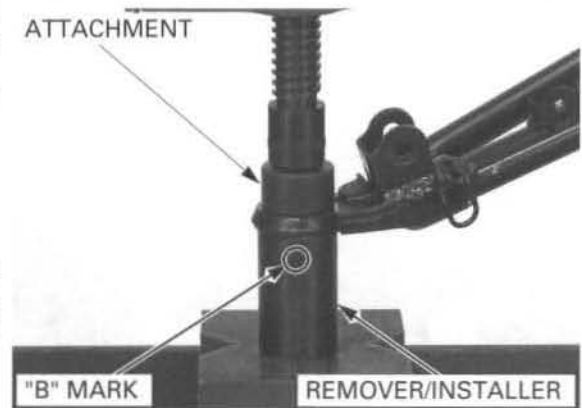
Set the upper arm and special tools with "B" mark side of the remover/installer facing to the ball joint as shown.

Press the ball joint into the upper arm until it is fully seated.

TOOLS:

Ball joint remover/installer 07WMF-HN00100
Attachment, 15 mm I.D. 07746-0020200

- 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.

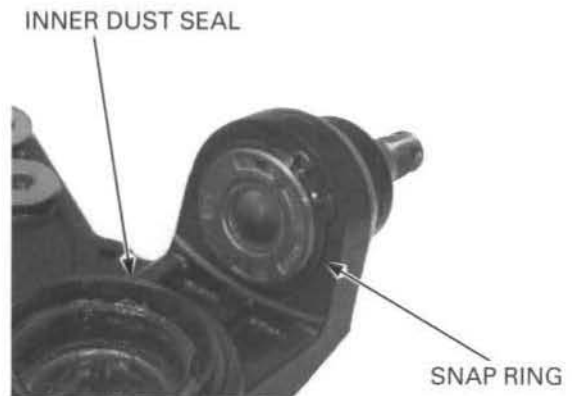


Install the snap ring with the chamfered edge facing in.



KNUCKLE

Remove the snap ring and the inner dust seal.

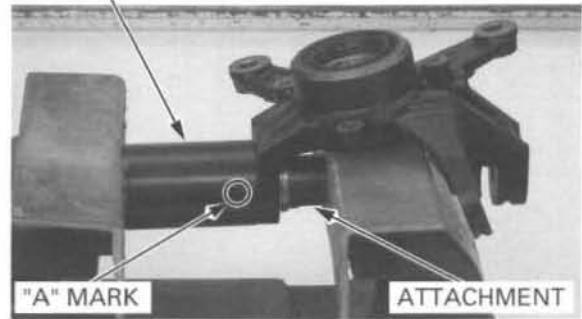


Set the knuckle and special tools with "A" mark side of the remover/installer facing to the ball joint, in a vise as shown.
Press the ball joint out of the knuckle.

TOOLS:

Ball joint remover/installer 07WMF-HN00100
Attachment, 28 x 30 mm 07946-1870100

REMOVER/INSTALLER

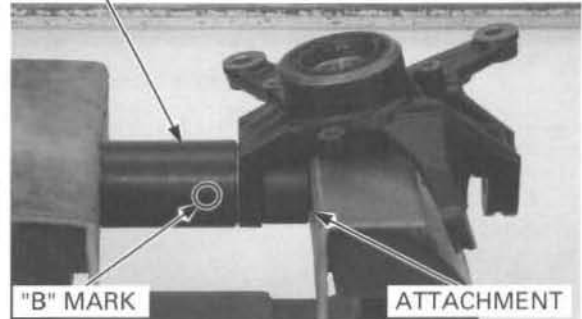


Set the knuckle and special tools with "B" mark side of the remover/installer facing to the ball joint in a vise as shown.
Press the ball joint into the knuckle until it is fully seated.

TOOLS:

Ball joint remover/installer 07WMF-HN00100
Attachment, 15 mm I.D. 07746-0020200

REMOVER/INSTALLER



- 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.

Install a new inner dust seal (page 14-25).

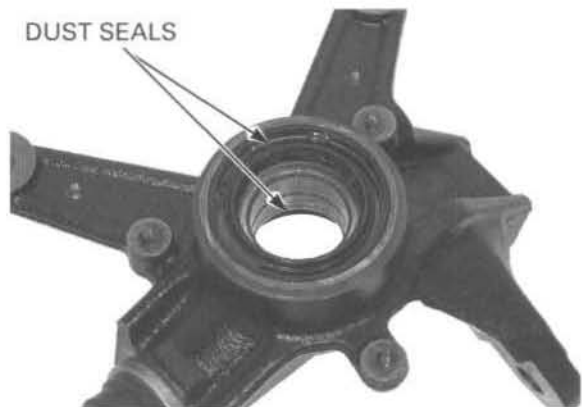
NEW GREASE INNER DUST SEAL



KNUCKLE BEARING REPLACEMENT

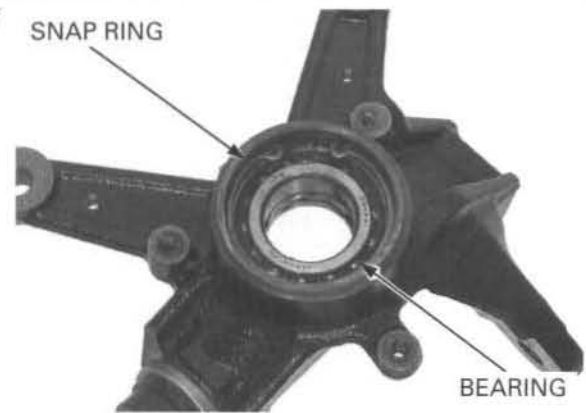
Remove the dust seals from the knuckle.

DUST SEALS



FRONT WHEEL/SUSPENSION/STEERING

Remove the snap ring and drive the bearing out of the knuckle.

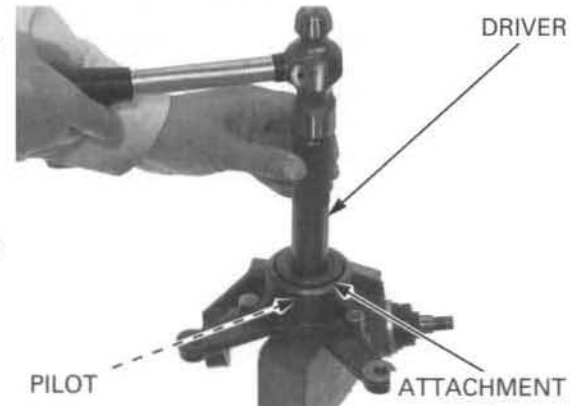


Pack the cavities of a new bearing with grease. Drive in the bearing squarely with the marked side facing up until it is fully seated.

TOOLS:

Driver	07749-0010000
Attachment, 52 x 55 mm	07746-0010400
Pilot, 30 mm	07746-0040700

Install the snap ring into the knuckle groove with the chamfered edge facing



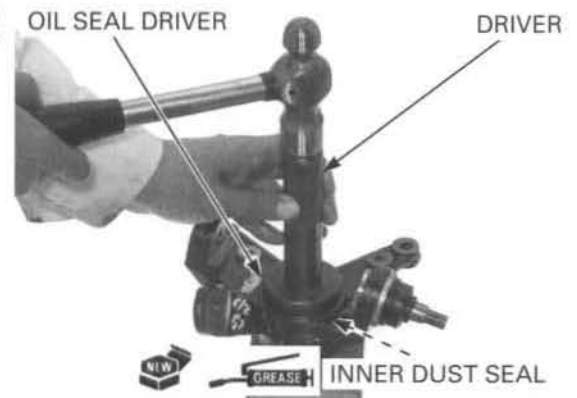
Apply grease to a new outer dust seal lip and install it using the same tools until it is flush with the knuckle end.



Apply 2.5 – 3 g of grease to a new inner dust seal lip and install it until it is fully seated, being careful not to damage the lips.

TOOLS:

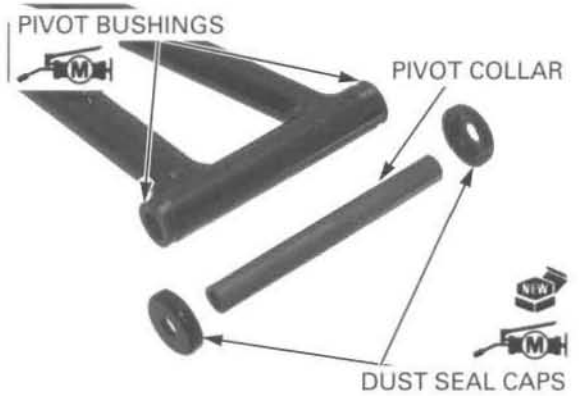
Driver	07749-0010000
Oil seal driver	07JAD-PH80101



INSTALLATION

Apply molybdenum disulfide grease to the pivot bushing contact area of the pivot collar and install it into the upper arm.

Apply molybdenum disulfide grease to the new dust seal cap lips and install them onto the upper arm.



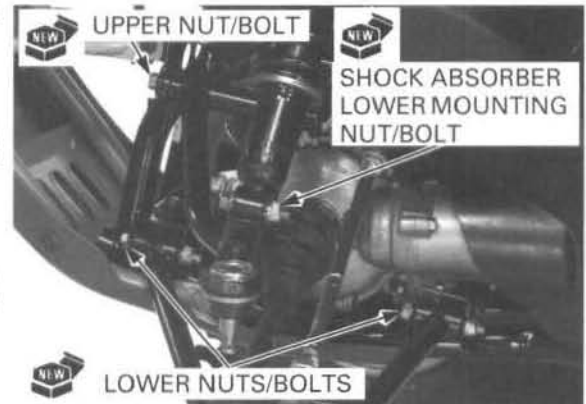
Install the upper arm into the frame with the pivot bolt and a new nut, and tighten the nut.

TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)

Connect the shock absorber to the upper arm with the lower mounting bolt and a new nut, and tighten the nut.

TORQUE: 44 N·m (4.5 kgf·m, 33 lbf·ft)

Install the lower arm into the frame with the two pivot bolts and the new nuts, and loosely tighten the nuts.



Install the brake hose clamps and tighten the brake hose clamp bolts.

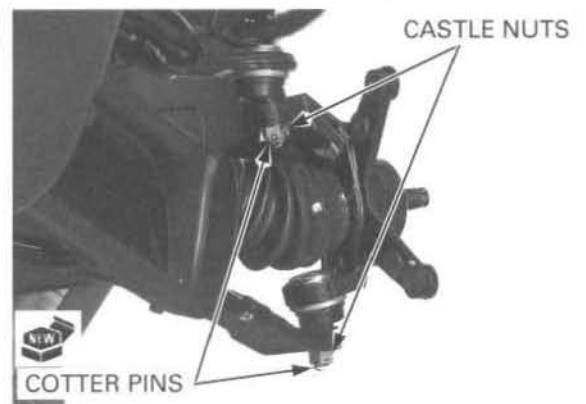
TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)



Tighten the ball joint castle nuts to the specified torque and further tighten until their grooves align with the cotter pin holes.

TORQUE: 29 N·m (3.0 kgf·m, 21 lbf·ft)

Install the new cotter pins.

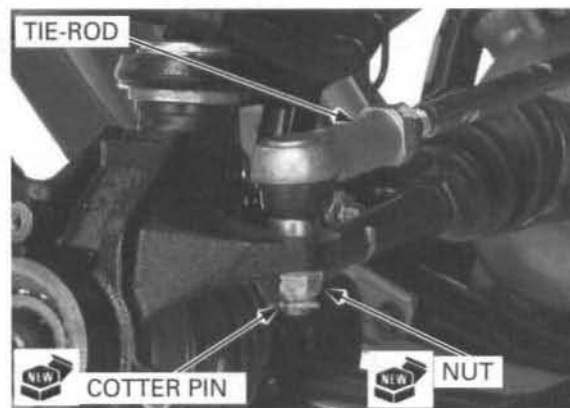


FRONT WHEEL/SUSPENSION/STEERING

Install the tie-rod ball joint onto the knuckle with a new nut, and tighten the nut while holding the joint stud flats with an open end wrench

TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)

Install a new cotter pin.



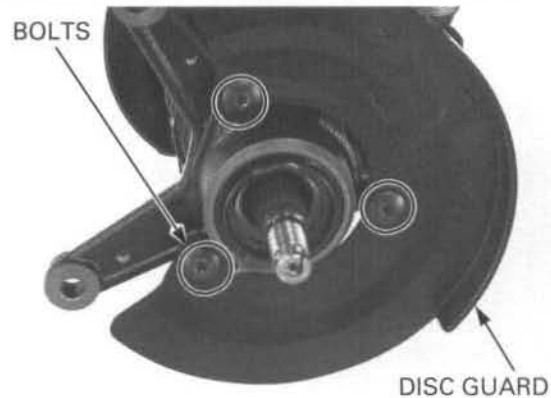
Install the brake disc guard and tighten the brake disc guard bolts.

Install the wheel hub (page 14-18).

Install the front wheel (page 14-14), then place the vehicle on level ground.

Tighten the lower arm pivot nuts to the specified torque.

TORQUE: 44 N·m (4.5 kgf·m, 33 lbf·ft)



STEERING SHAFT (Except EPS model)

REMOVAL

Remove the screw and handlebar upper cover.

- inner fenders (page 2-9)
- front fender (page 2-11)
- screw and handlebar upper cover

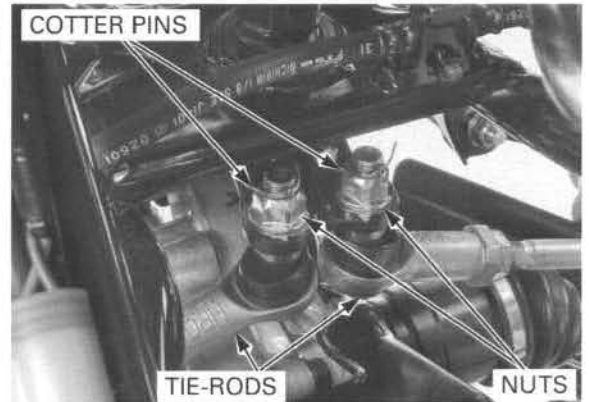
- nuts
- handlebar front cover



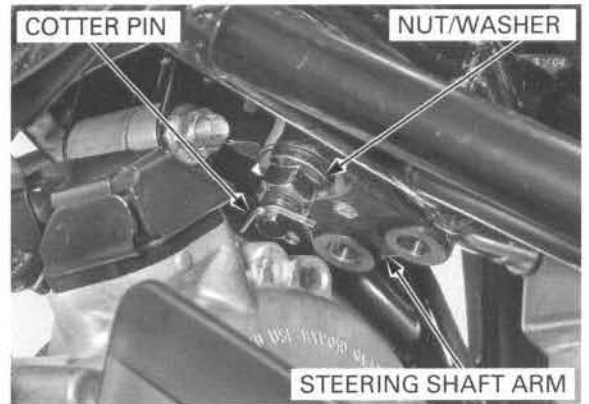
- handlebar lower holder nuts and washers
 - handlebar assembly from the steering shaft
- Keep the master cylinder reservoir upright.*



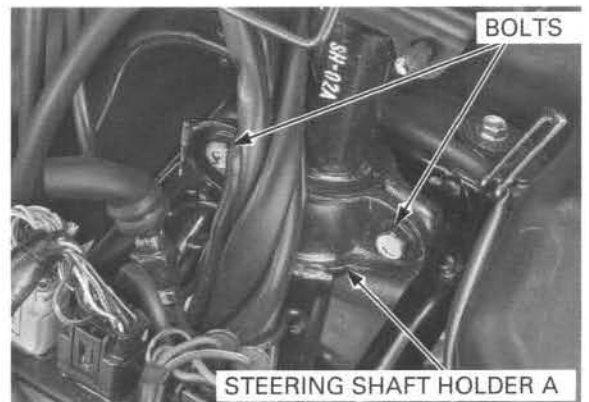
Remove the cotter pins.
Remove the tie-rod ball joint nuts while holding the joint stud flats with an open end wrench.
Remove the tie-rods from the steering shaft arm.



Remove the cotter pin, steering shaft end nut, washer and steering shaft arm.

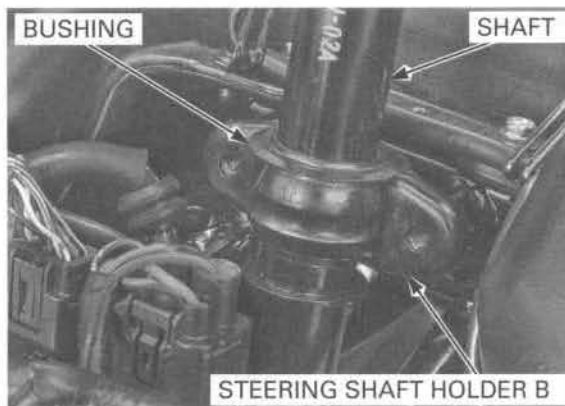


Remove the two bolts and steering shaft holder A.



FRONT WHEEL/SUSPENSION/STEERING

Remove the steering shaft.
Remove the steering shaft bushing, holder B and shaft.

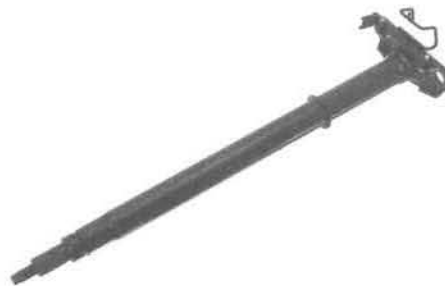


INSPECTION

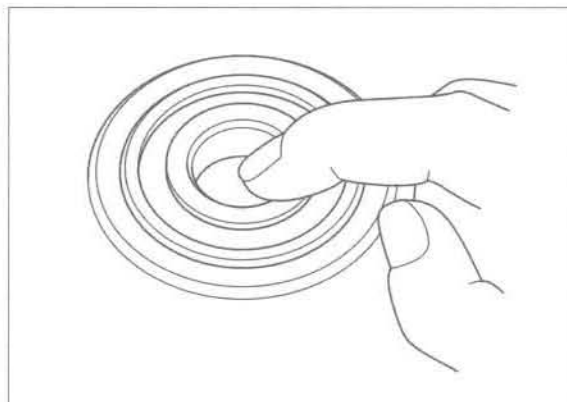
Check the steering shaft bushing for wear or damage.



Check the steering shaft for distortion or damage.

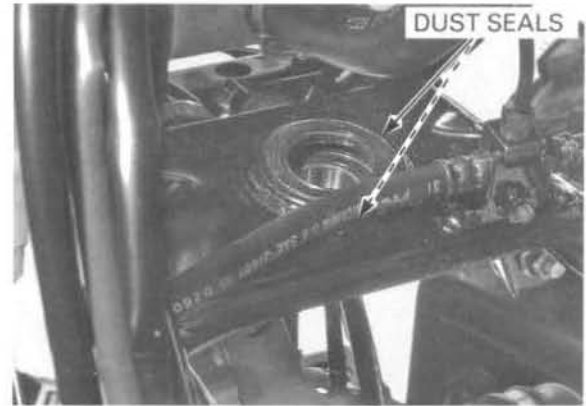


Turn the inner race of the steering shaft bearing with your finger. The bearing should turn smoothly and quietly. Also check that the bearing outer race fits tightly in the frame.



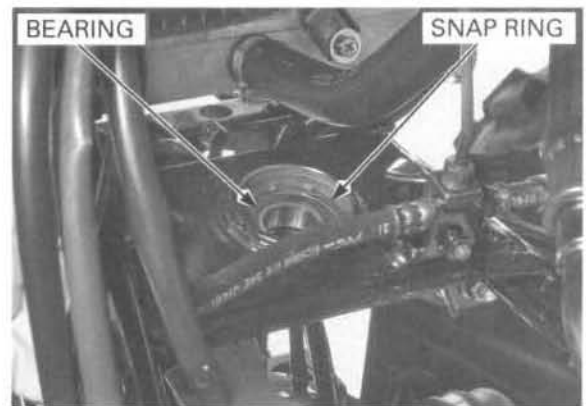
BEARING REPLACEMENT

Remove the upper and lower dust seals.



Remove the snap ring.

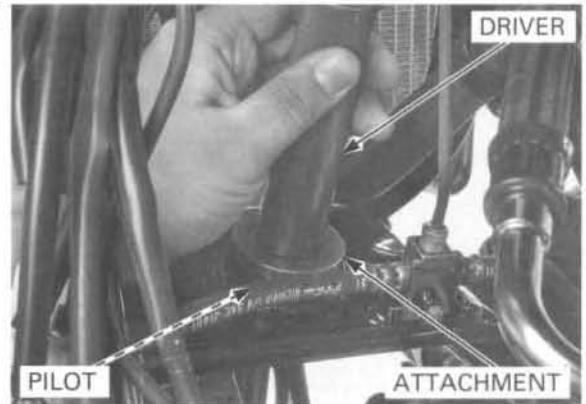
Drive the steering shaft bearing out of the frame.



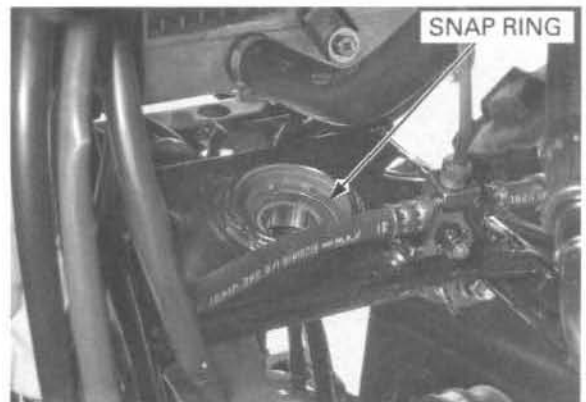
Drive in a new bearing squarely with the marked side facing up until it is fully seated.

TOOLS:

- | | |
|-------------------------------|----------------------|
| Driver | 07749-001000 |
| Attachment, 42 x 47 mm | 07746-0010300 |
| Pilot, 22 mm | 07746-0041000 |



Install the snap ring into the groove properly with the chamfered edge facing up.



FRONT WHEEL/SUSPENSION/STEERING

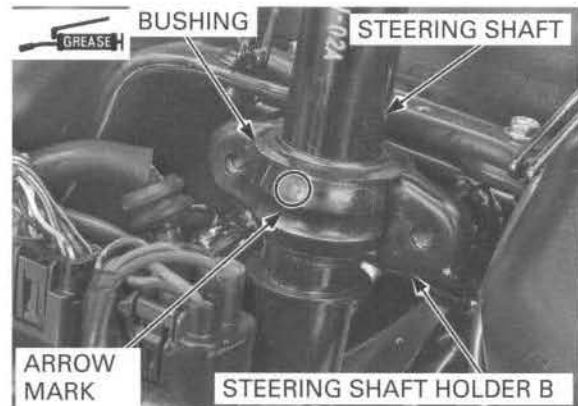
Coat new dust seal lips with grease and install them (the upper seal is flush with the frame edge and the lower seal is fully seated onto the bearing).



INSTALLATION

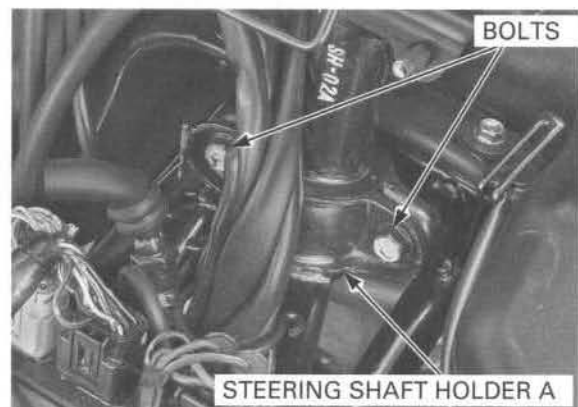
Apply 2 – 3 g of grease to the shaft bushing inner surface.

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.
Install and tighten the two bolts.

TORQUE: 32 N·m (3.3 kgf·m, 24 lbf·ft)

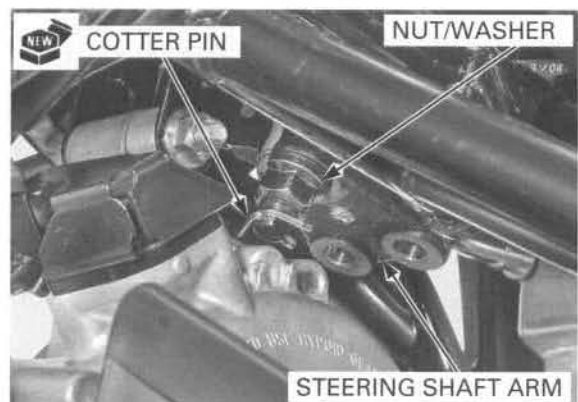


Apply molybdenum disulfide grease to the steering shaft spline.

Install the shaft arm over the steering shaft by aligning the wide tooth with the wide groove.
Install the washer and steering shaft end nut, and tighten the nut.

TORQUE: 108 N·m (11.0 kgf·m, 80 lbf·ft)

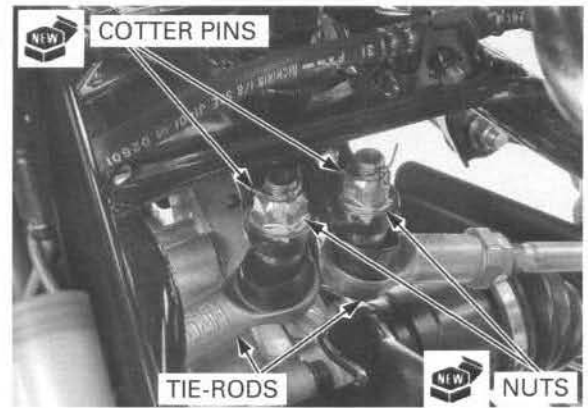
Install a new cotter pin.



Install the tie-rods into the steering shaft arm.
Install the new nuts and tighten them by holding the ball joint stud flats with an open end wrench.

TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)

Install new cotter pins.



Install the handlebar assembly onto the steering shaft with the washers and new lower holder nuts, and tighten the nuts.

TORQUE: 39 N·m (4.0 kgf·m, 29 lbf·ft)



Install the meter/assist headlight assembly onto the steering shaft and tighten the two nuts.

TORQUE: 25 N·m (2.6 kgf·m, 19 lbf·ft)



Install the handlebar upper cover and tighten the screw.

Install the front fender (page 2-11).
Install the inner fenders (page 2-9).



STEERING SHAFT/EPS UNIT (EPS model)

REMOVAL

Remove the following:

- front fender (page 2-11)
- assist headlight (page 22-4)

Disconnect the torque sensor 3P connector. Disconnect the EPS motor 2P connector and remove the harness-side female connector from the frame. Remove the control motor 2P connector from the frame and position it to allow room for EPS unit removal.

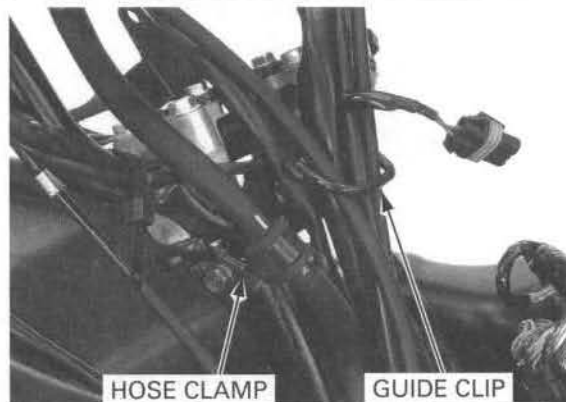
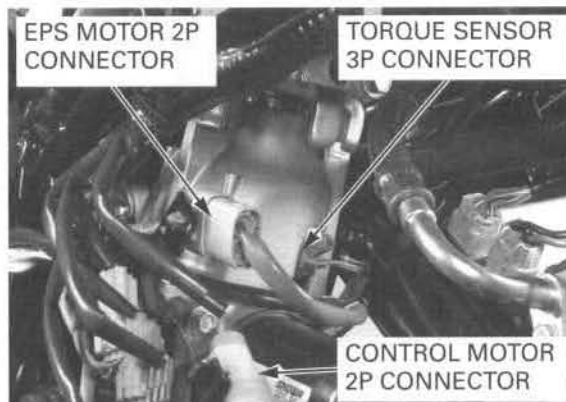
Remove the following:

- bolt and brake hose clamp.
- cable and wire harnesses from the guide clip

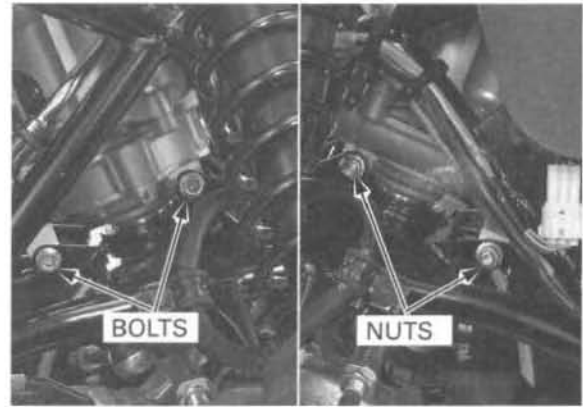
Keep the master cylinder reservoir upright to prevent air from entering the hydraulic system.

- 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

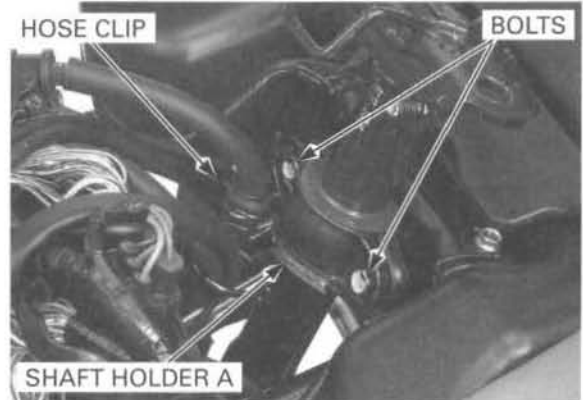


Loosen mounting bolts and nuts.



Remove the following:

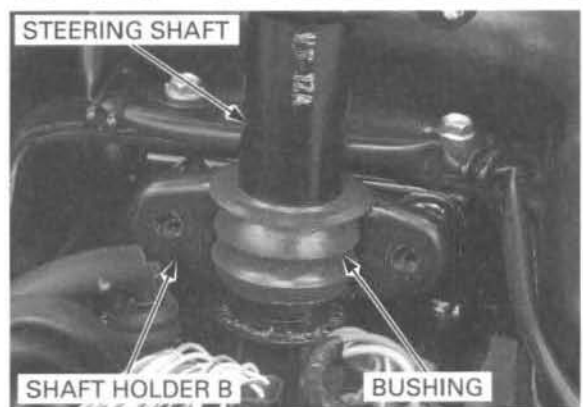
- brake hose from the hose clip
- two bolts
- steering shaft holder A



- steering shaft bolt

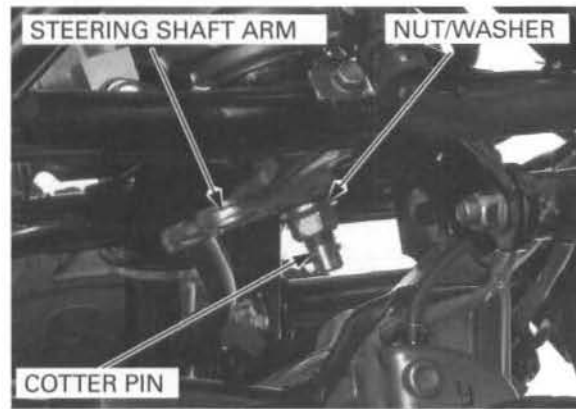


- steering shaft
- steering shaft bushing
- steering shaft holder B

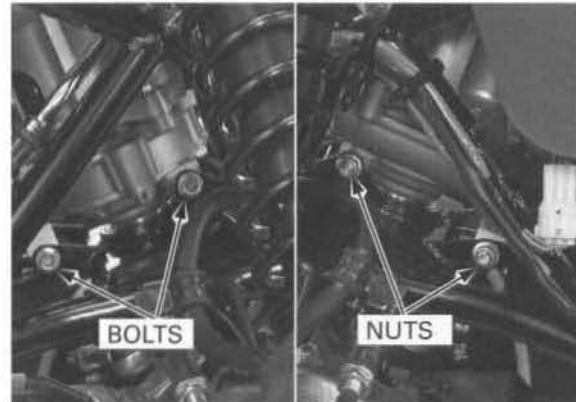


FRONT WHEEL/SUSPENSION/STEERING

- cotter pin
- nut
- washer
- steering shaft arm



- mounting bolts and nuts



Remove the EPS unit from the frame to left side.



INSPECTION

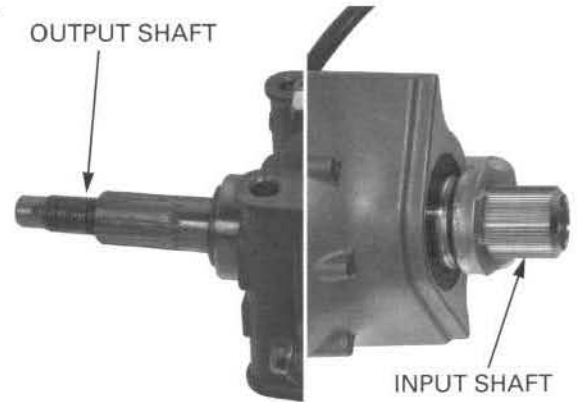
Check the steering shaft bushing for wear or damage.



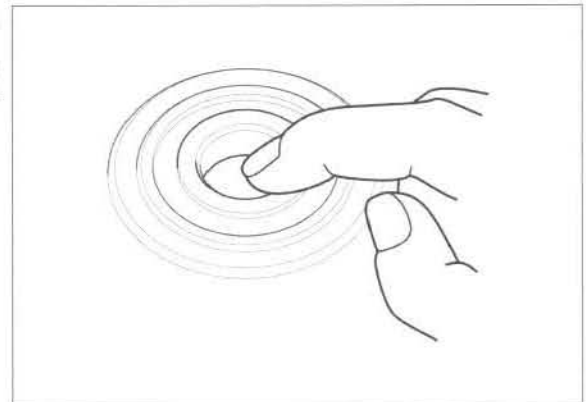
Check the steering shaft for distortion or damage.



Check the EPS unit input shaft and output shaft for wear or damage.



Turn the inner race of the output shaft bearing with your finger. The bearing should turn smoothly and quietly. Also check that the bearing outer race fits tightly in the frame.



EPS MOTOR

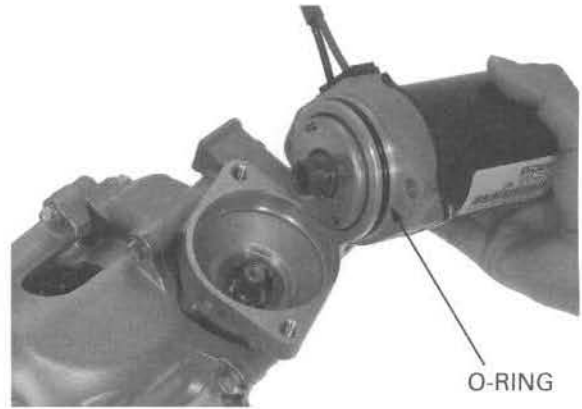
REMOVAL

Remove the bolts and EPS motor.



FRONT WHEEL/SUSPENSION/STEERING

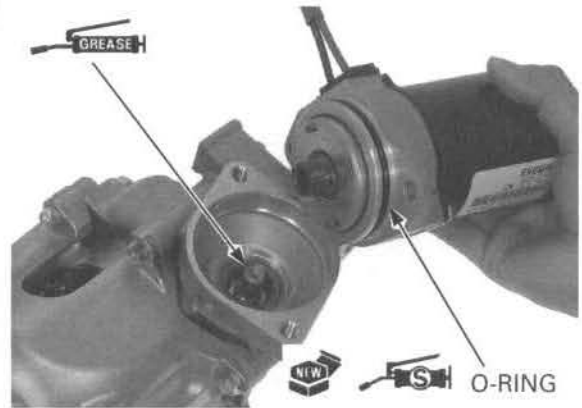
Remove the O-ring from the EPS motor.



INSTALLATION

Pack the worm gear splines with 0.5 g of specified grease (page 1-24).

Coat a new O-ring with silicone grease and install it.
Install the EPS motor onto the EPS unit.



Install the bolts and tighten them.

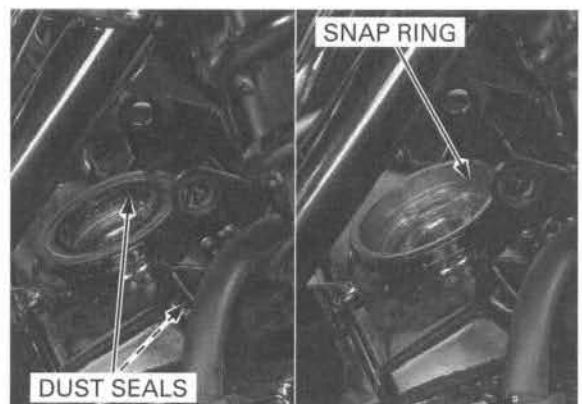
TORQUE: 20 N·m (2.0 kgf·m, 15 lbf·ft)



BEARING REPLACEMENT

Remove the upper and lower dust seals.

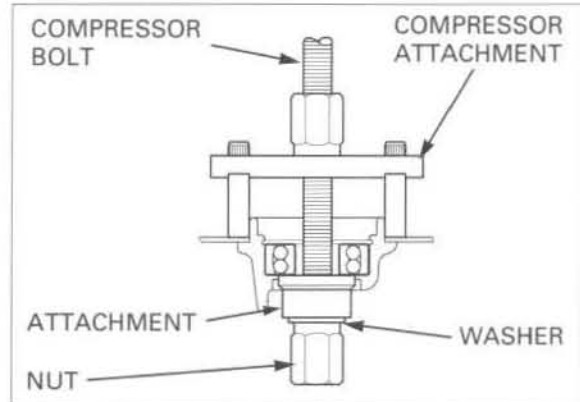
Remove the snap ring.



Remove the bearing from the frame using the special tools and a 10 mm washer as shown.

TOOLS:

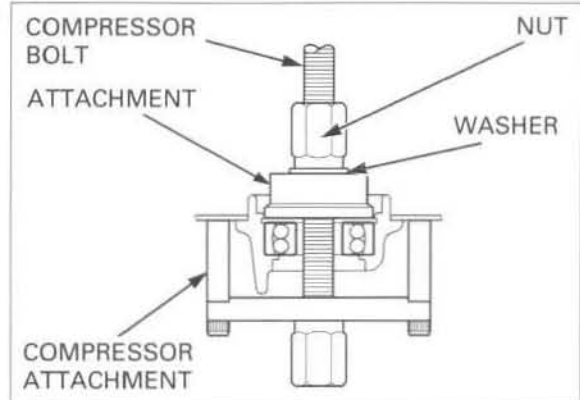
- Clutch compressor attachment** 07LAE-PX40100
- Compressor bolt assembly** 07GAE-PG40200
- Attachment, 32 x 35 mm** 07746-0010100



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 as shown.

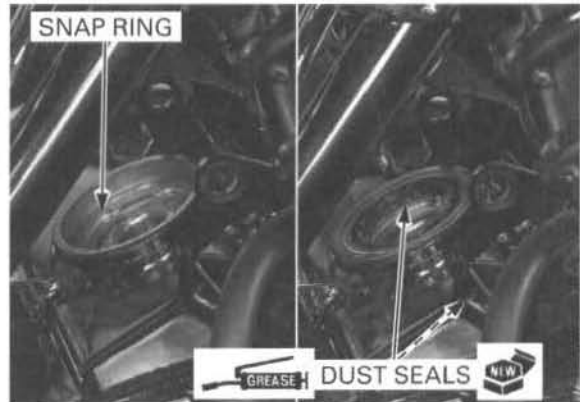
TOOLS:

- 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 down.

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.

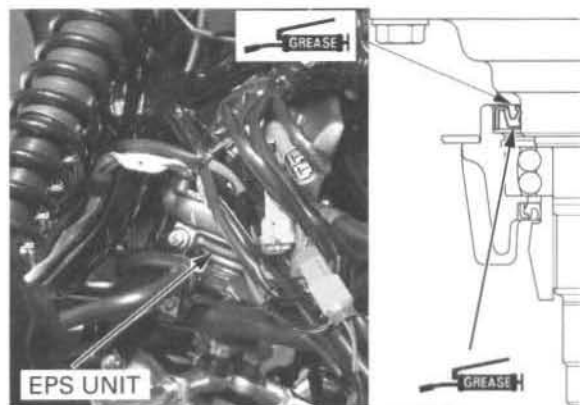


INSTALLATION

Inspect dust seal lips for deformation when you install the EPS unit.

Apply grease to the tip of dust seal lip and EPS unit chamfer as shown.

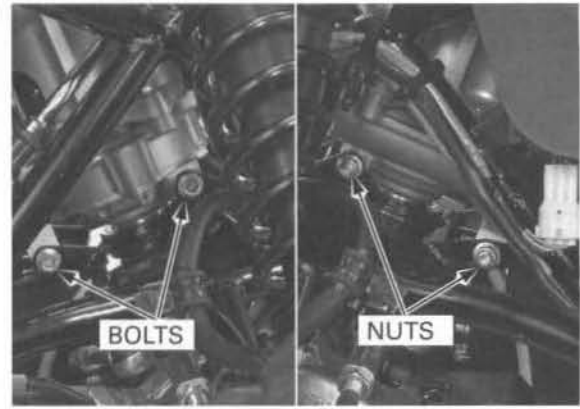
Install the EPS unit onto the frame from left side.



FRONT WHEEL/SUSPENSION/STEERING

Do not tighten the mounting bolts and nuts yet.

Loosely install the EPS unit mounting bolts and nuts.

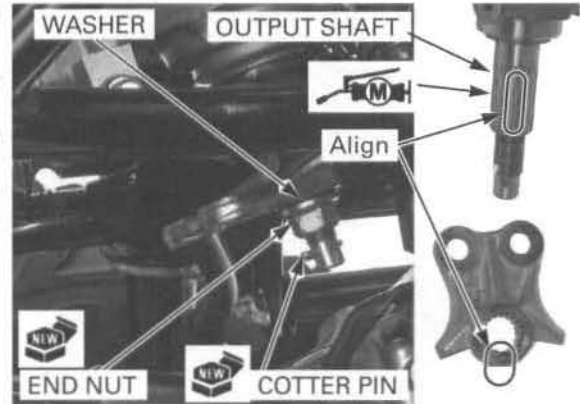


Apply molybdenum disulfide grease to the output shaft spline.

Install the shaft arm over the output 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.

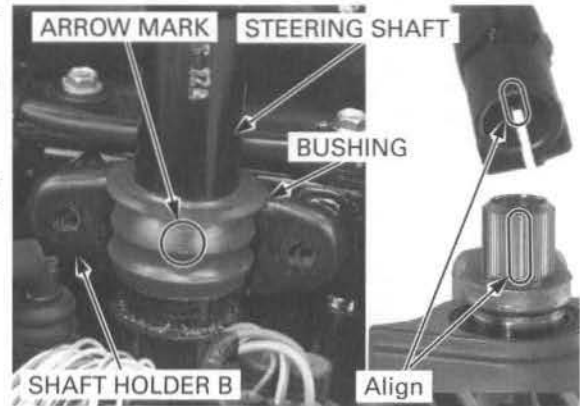


Apply 2 – 3 g of grease to the shaft bushing inner surface.

Install the shaft bushing onto the steering shaft with the arrow mark facing up. Install steering shaft holder B onto the frame.

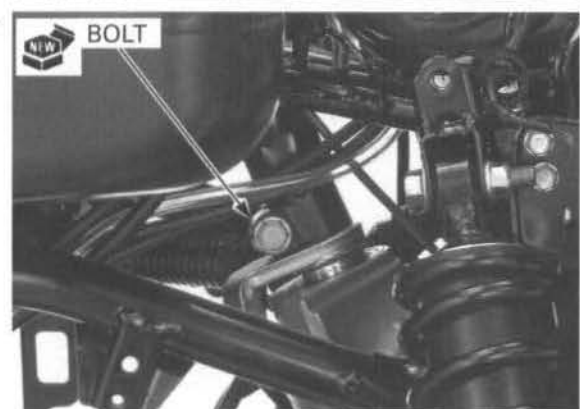
Make sure the steering shaft is fully seated onto the input shaft of EPS unit.

Install the steering shaft onto the input shaft of the EPS unit by aligning the wide tooth with the wide groove.



Install and tighten the new flange bolt to the specified torque.

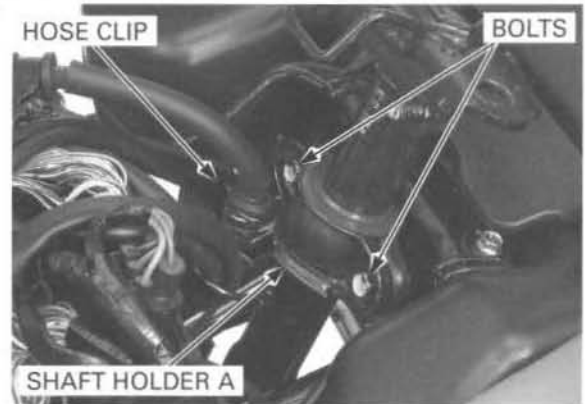
TORQUE: 60 N·m (6.1 kgf·m, 44 lbf·ft)



Install steering shaft holder A with the hose clip toward the right side.
Tighten the holder bolts to the specified torque.

TORQUE: 32 N·m (3.3 kgf·m, 24 lbf·ft)

Install the brake hose grommet into the hose clip.

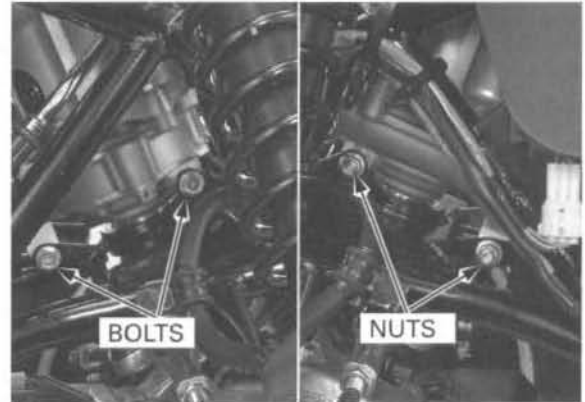


Tighten the EPS unit mounting bolts and nuts alternately to the specified torque.

TORQUE:

BOLTS: 22 N·m (2.2 kgf·m, 16 lbf·ft)

NUTS: 22 N·m (2.2 kgf·m, 16 lbf·ft)



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.



Install the handlebar assembly onto the steering shaft with the washers and new lower holder nuts.
Tighten the nuts to specified torque.

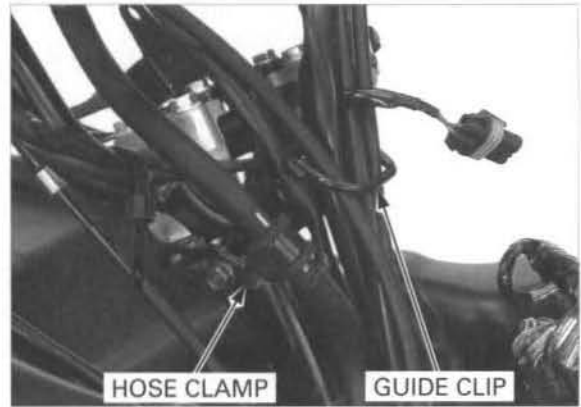
TORQUE: 39 N·m (4.0 kgf·m, 29 lbf·ft)



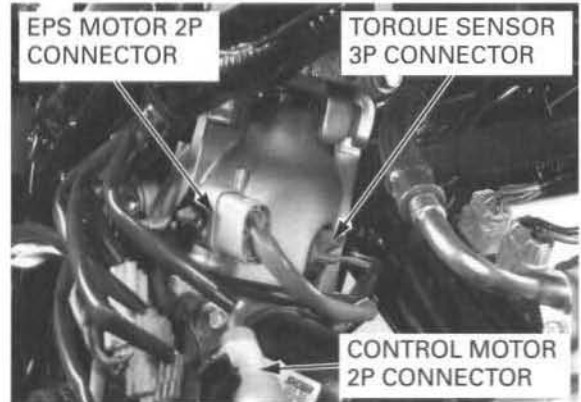
FRONT WHEEL/SUSPENSION/STEERING

Install the cable and 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)



Connect the torque sensor 3P connector.
Connect the EPS motor 2P connector and secure the connector from the frame.
Secure the control motor 2P connector to the frame.
Connect the EPS motor 2P connector.



Install the following:

- front fender (page 2-11)
- assist headlight (page 22-4)

Refer to information for the torque sensor initialization chart (page 25-13).

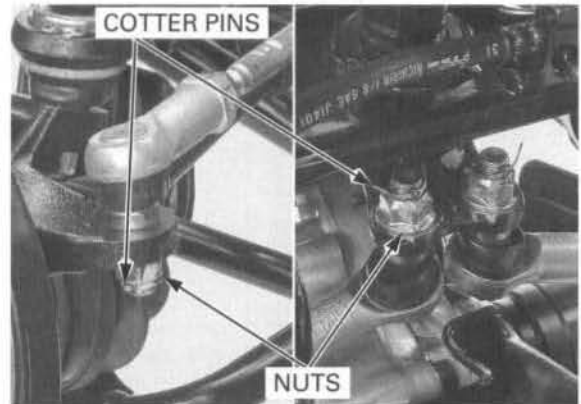
Perform the Torque Sensor Initialization (page 25-13).

TIE-ROD

REMOVAL

Remove the inner fenders (page 2-9).
Remove the front wheel (page 14-14).

Remove the cotter pins.
Remove the tie-rod ball joint nuts while holding the joint stud flats with an open end wrench.
Remove the tie-rod from the knuckle and steering shaft.



INSPECTION

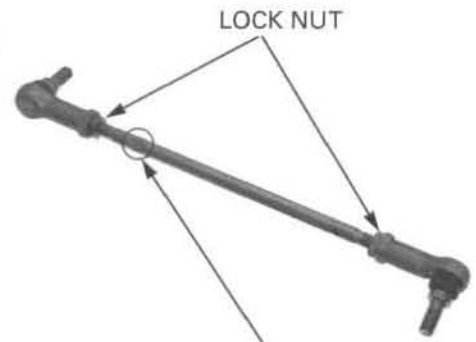
Inspect the tie-rod for distortion or damage.
Inspect the ball joint boots for tears or other damage by moving the ball joint studs.
They should move freely and smoothly.

Replace the ball joints if necessary.



**BALL JOINT DISASSEMBLY/
ASSEMBLY**

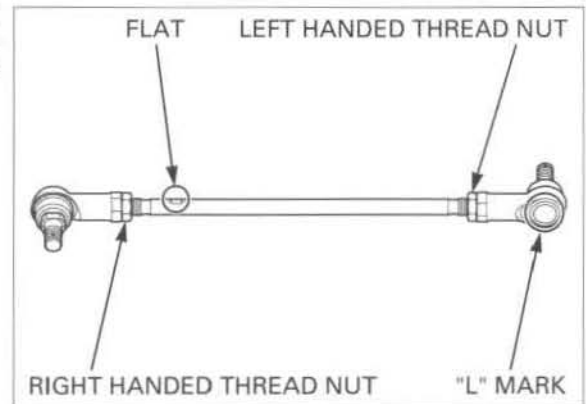
Loosen the lock nuts and remove the ball joints and lock nuts from the tie-rod.



'05 - '06: Install the unmarked ball joint and gold colored nut on the flat side of the tie-rod, and the "L" marked ball joint and silver nut (left handed thread) on the opposite side.



After '06: Install the right-hand threads nut and unmarked ball joint on the flat (wrench holding area for toe adjustment) side of the tie-rod, and the left-hand threads nut and "L" marked ball joint on the opposite side.



The ball joint positions are 180° ('05, '06/'16-'30' (After '06) from each other. Tighten these nuts after installing the tie-rod.

Hand-tighten the lock nuts and measure the distance between the lock nut and thread end.

TIE- ROD DISTANCE: 387 mm (15.2 in)

The difference between distances A and B should be 3 mm (0.12 in) or less.

Install the tie-rod onto the knuckle and steering arm, and adjust the toe (page 3-26).



FRONT WHEEL/SUSPENSION/STEERING

INSTALLATION

Install the tie-rods into the steering shaft arm and knuckle.

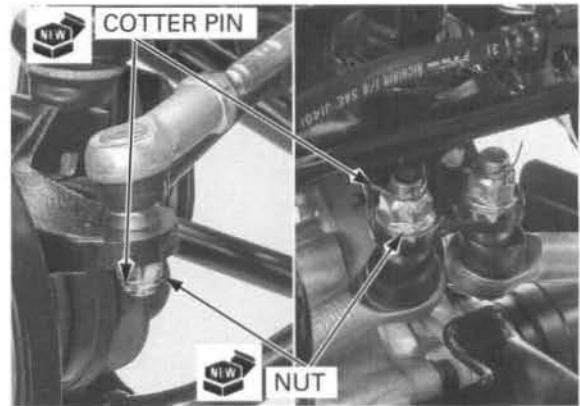
Install new nuts and tighten them by holding the ball joint stud flats with an open end wrench.

TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)

Install new cotter pins.

Install the front wheel (page 14-14)

Install the inner fenders (page 2-9)

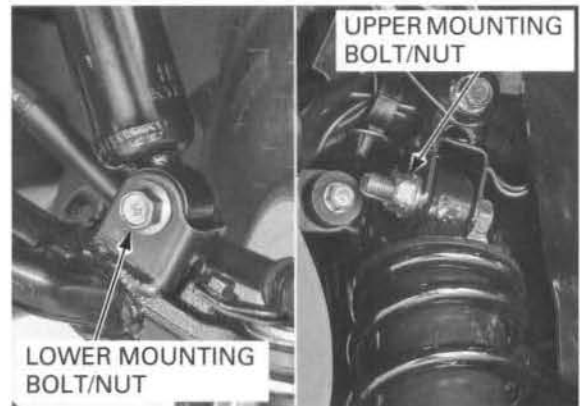


FRONT SHOCK ABSORBER

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 upper and lower mounting nuts, bolts and 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.

UPPER PIVOT BUSHING

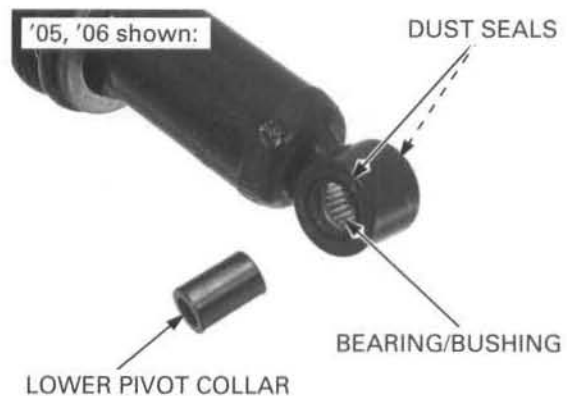


Remove the lower pivot collar.

Remove the dust seals.

'05, '06: Check the lower pivot bearing for wear or damage.

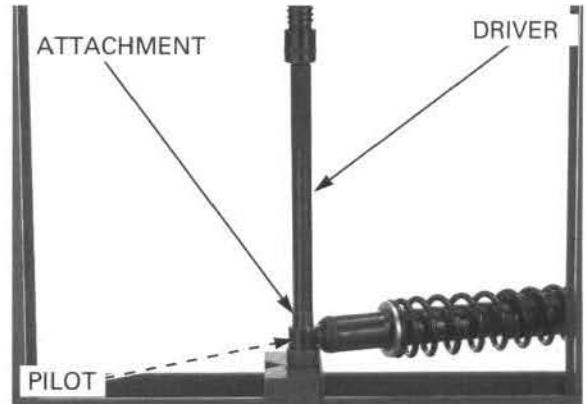
After '06: Check the lower pivot bushing for wear or damage.



BEARING REPLACEMENT ('05, '06)

Press the needle bearing out of the lower pivot using the special tools.

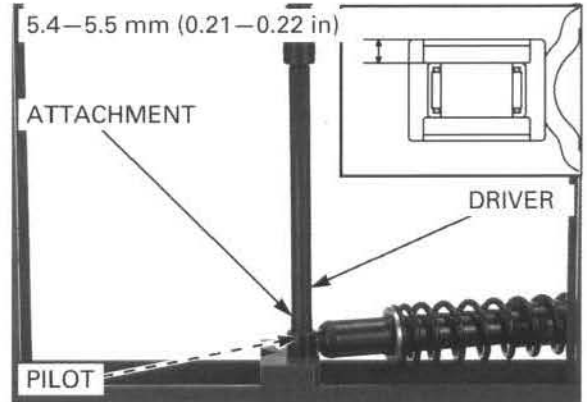
- TOOLS:**
Driver 07749-0010000
Attachment, 22 x 24 mm 07746-0010800
Pilot, 16 mm 07746-0041300



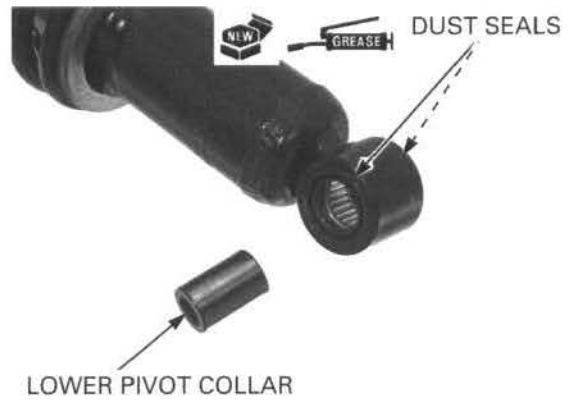
Press in the bearing with the marking side facing up.

Apply grease to the needle rollers of a new bearing. Carefully press the needle bearing in the lower pivot until the depth from the lower pivot outer surface is 5.4–5.5 mm (0.21–0.22 in), using the special tools.

- TOOLS:**
Driver 07749-0010000
Attachment, 22 x 24 mm 07746-0010800
Pilot, 16 mm 07746-0041300



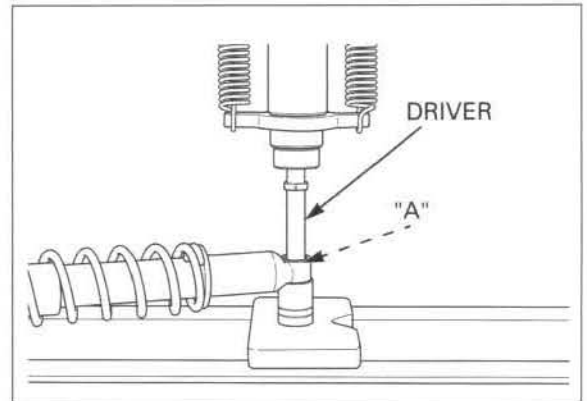
Apply grease to the new dust seal lips and install them into the lower pivot. Install the lower pivot collar.



BUSHING REPLACEMENT (After '06)

Press the bushing out of the lower pivot using side "A" of the special tool.

- TOOLS:**
Bushing driver, 16 mm 07AMD-HP0A100



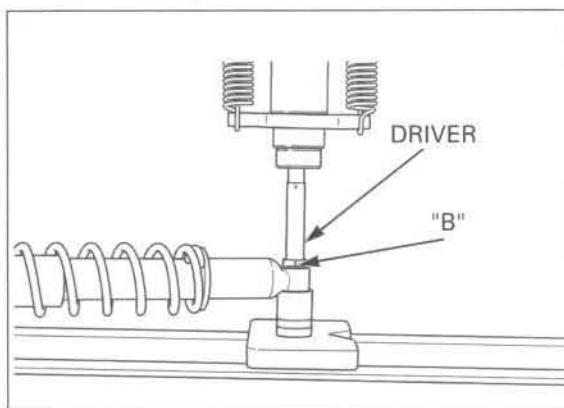
FRONT WHEEL/SUSPENSION/STEERING

Carefully press the bushing into the lower pivot until the tool bottoms, using side "B" of the special tool.

TOOLS:

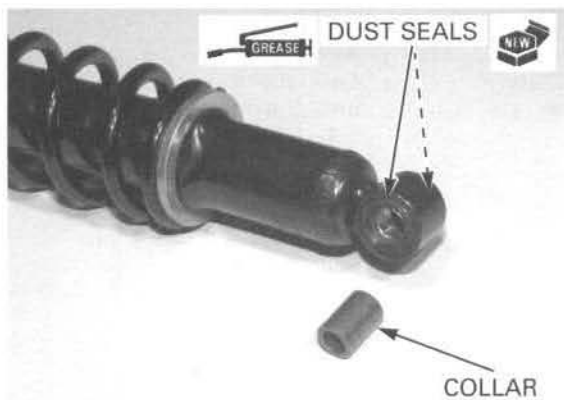
Bushing driver, 16 mm

07AMD-HP0A100



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.

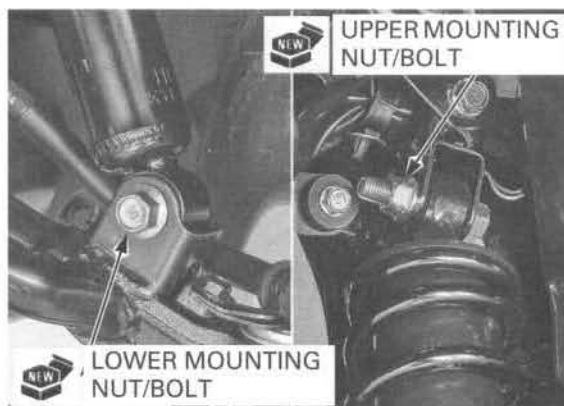


INSTALLATION

Install the front shock absorber in the frame and insert the upper and lower mounting bolts from the front side.

Install and tighten the new mounting nuts.

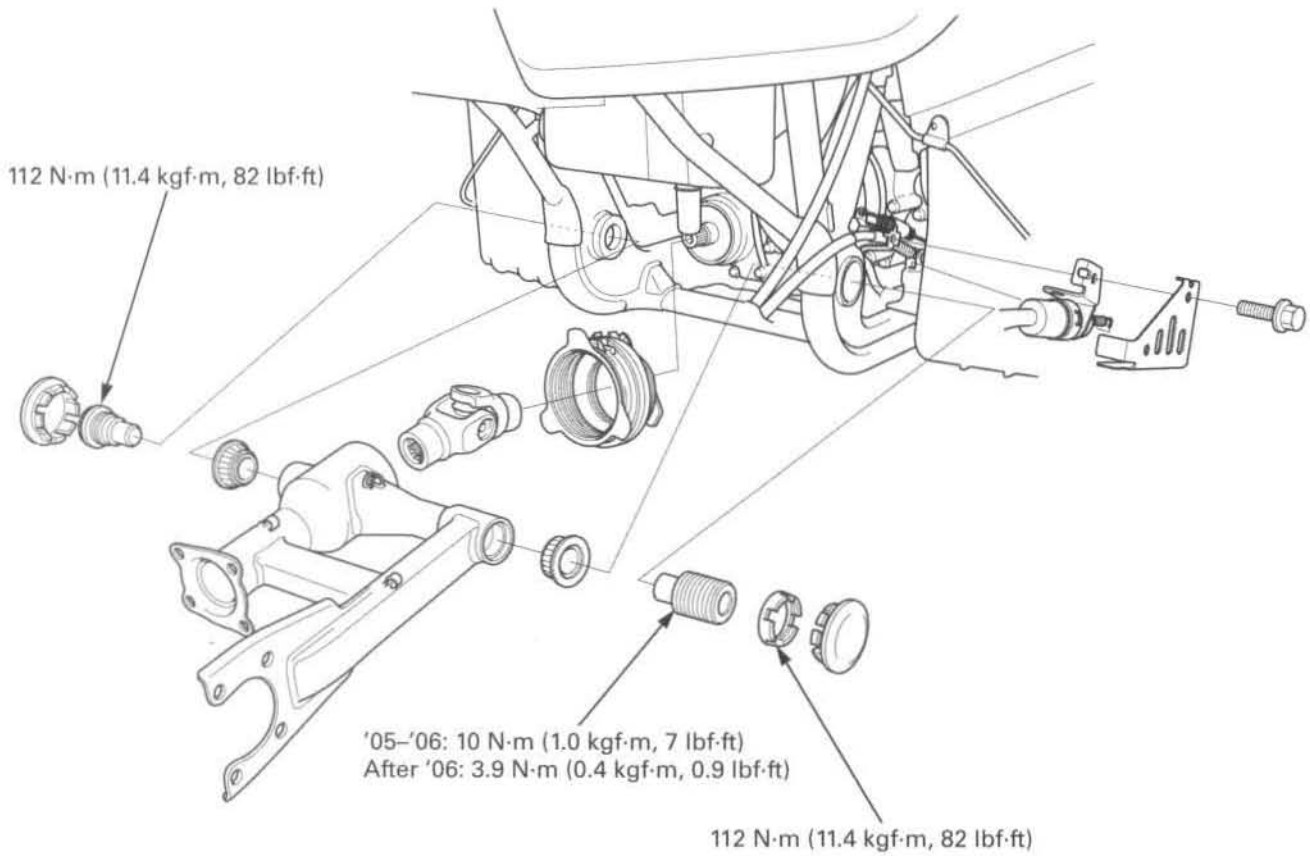
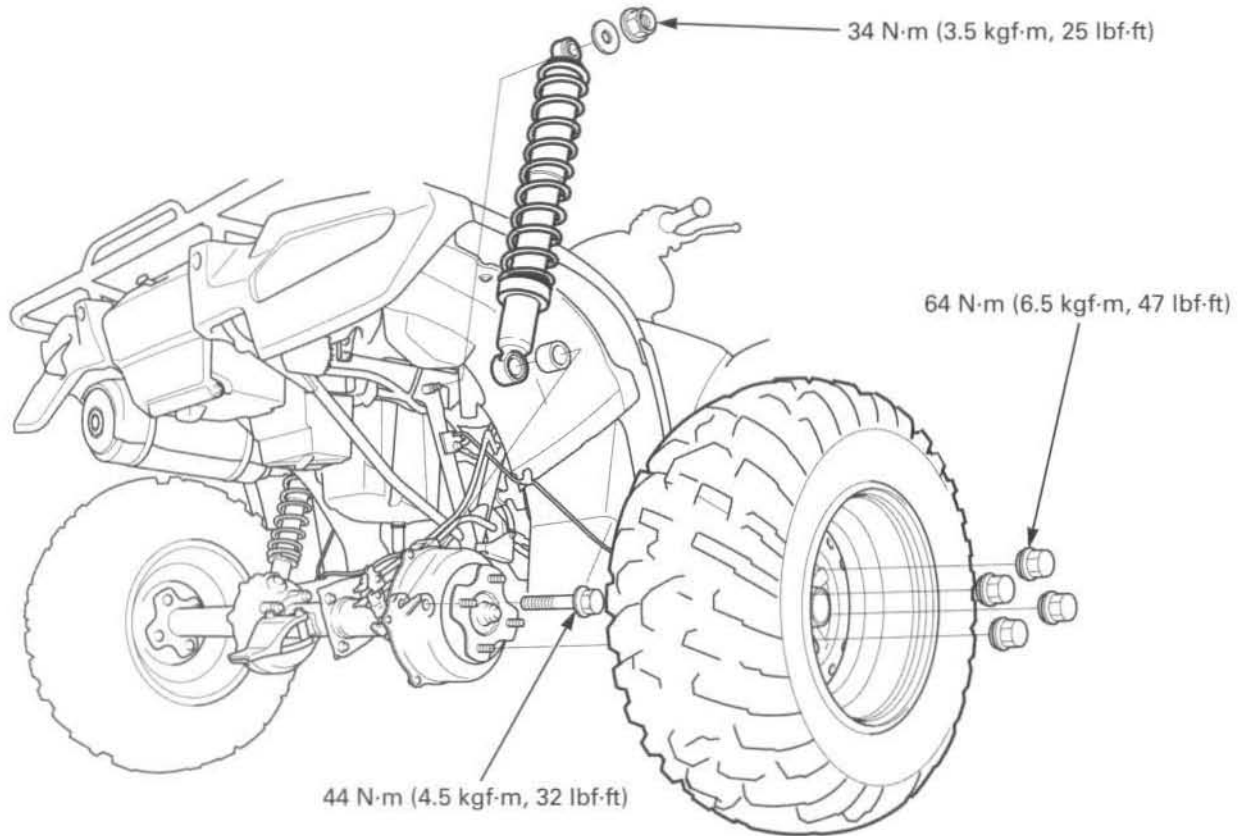
TORQUE: 44 N·m (4.5 kgf·m, 33 lbf·ft)



15. REAR WHEEL/SUSPENSION

SYSTEM COMPONENTS	15-2	REAR WHEEL.....	15-6
SERVICE INFORMATION	15-3	REAR SHOCK ABSORBER	15-6
TROUBLESHOOTING	15-5	SWINGARM.....	15-9

**REAR WHEEL/SUSPENSION
SYSTEM COMPONENTS**



SERVICE INFORMATION

GENERAL

- This section covers service of the rear wheel and rear suspension.
- For tire information, refer to 14-15.
- For brake system service, refer to 16-3.
- For rear driving mechanism service, refer to 18-3.
- 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

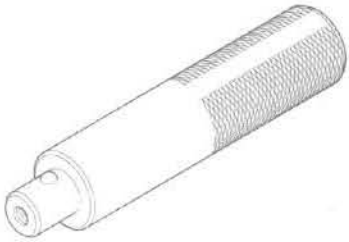



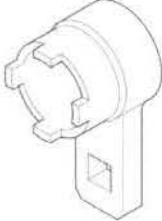
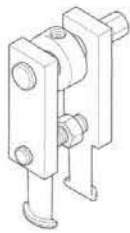

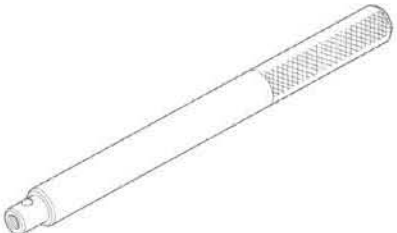
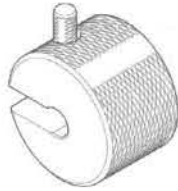
ITEM			STANDARD	SERVICE LIMIT
Minimum tire tread depth			-	4.0 mm (0.16 in)
Cold tire pressure	'05 - '07	Standard	25 kPa (0.25 kgf/cm ² , 3.6 psi)	-
		Minimum	22 kPa (0.22 kgf/cm ² , 3.2 psi)	-
		Maximum	28 kPa (0.28 kgf/cm ² , 4.0 psi)	-
		With cargo	25 kPa (0.25 kgf/cm ² , 3.6 psi)	-
	After '07		25 kPa (0.25 kgf/cm ² , 3.6 psi)	-
Suspension spring pre-load adjuster standard position (CM type and A type after '08)			Position 2	-

TORQUE VALUES

Rear wheel nut		64 N·m (6.5 kgf·m, 47 lbf·ft)
Shock absorber upper mounting flange nut		34 N·m (3.5 kgf·m, 25 lbf·ft)
Shock absorber lower mounting flange bolt		44 N·m (4.5 kgf·m, 33 lbf·ft)
Swingarm pivot bolt	(Left)	112 N·m (11.4 kgf·m, 82 lbf·ft)
	(Right)	10 N·m (1.0 kgf·m, 7 lbf·ft)
	(Right)	3.9 N·m (0.4 kgf·m, 0.9 lbf·ft)
Swingarm right pivot lock nut	'05 - '06	112 N·m (11.4 kgf·m, 82 lbf·ft)
	After '06	

REAR WHEEL/SUSPENSION

TOOLS

<p>Driver 07749-0010000</p> 	<p>Attachment, 37 x 40 mm 07746-0010200</p> 	<p>Attachment, 22 x 24 mm 07746-0010800</p> 
<p>Pilot, 16 mm 07746-0041300</p> 	<p>Lock nut wrench 07908-4690003</p> 	<p>Adjustable bearing remover, 20 x 40 mm 07JAC-PH80100</p>  <p>or 07736-A01000B or 07736-A01000A(U.S.A. only) with commercially available 3/8" x 16 slide hammer</p>
<p>Adjustable bearing remover shaft 07JAC-PH80200</p> 	<p>Driver shaft 07949-3710001</p> 	<p>Remover weight 07741-0010201</p> 

TROUBLESHOOTING

Rear wheel wobbling

- Bent rim
- Faulty tire
- Wheel hub nut not tightened properly
- Faulty bearings

Steers to one side or does not track straight

- Unequal tire pressure
- Bent swingarm or frame
- Weak shock absorber

Soft suspension

- Weak shock absorber spring
- Faulty shock absorber damper

Hard suspension

- Bent shock absorber damper rod
- Faulty suspension bushings or bearings

Rear suspension noise

- Loose rear suspension fasteners
- Damaged suspension components

REAR WHEEL/SUSPENSION

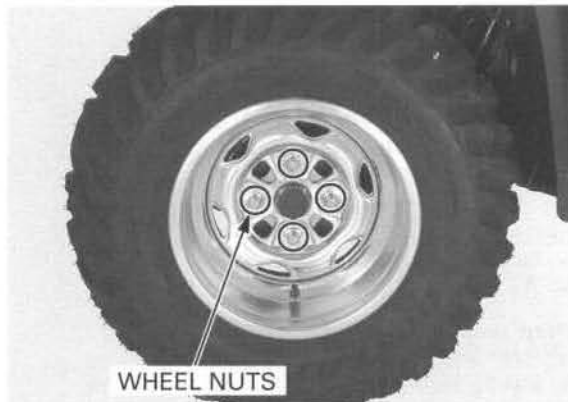
REAR WHEEL

REMOVAL

Loosen the wheel nuts.

Support the vehicle with a support block to raise the rear wheels off the ground.
Remove the nuts and wheel.

For tire removal/installation and repair, refer to page 14-15.



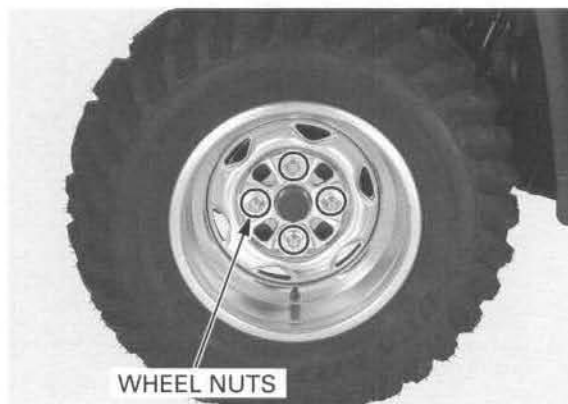
INSTALLATION

Do not interchange the left and right tires.

Install the wheel with the arrow mark facing in the normal rotating direction.

Install the wheel nuts and tighten them.

TORQUE: 64 N·m (6.5 kgf·m, 47 lbf·ft)

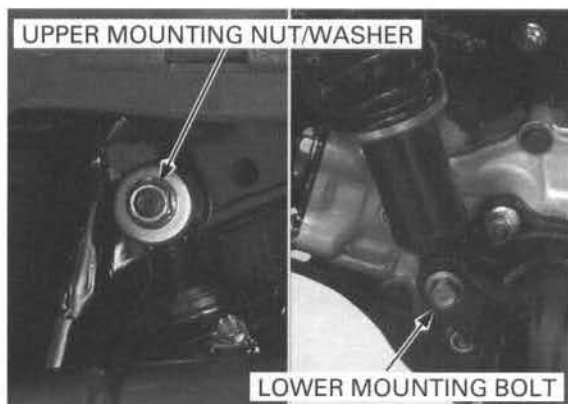


REAR SHOCK ABSORBER

REMOVAL

Support the vehicle with a support block to raise the rear wheels off the ground.

Support the swingarm and remove the mounting nut, washer, bolt and the 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.

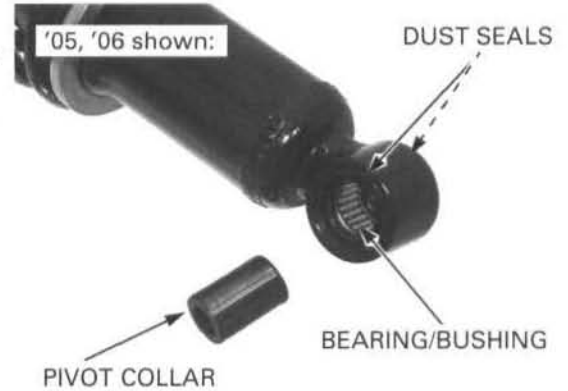
UPPER PIVOT BUSHING



Remove the lower pivot collar.

'05, '06: Check the lower pivot bearing and lower pivot collar for wear or damage.

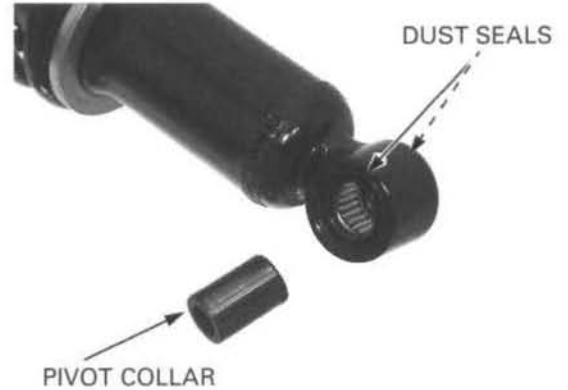
After '06: Check the lower pivot bushing for wear or damage.



BEARING REPLACEMENT ('05, '06)

Remove the lower pivot collar.

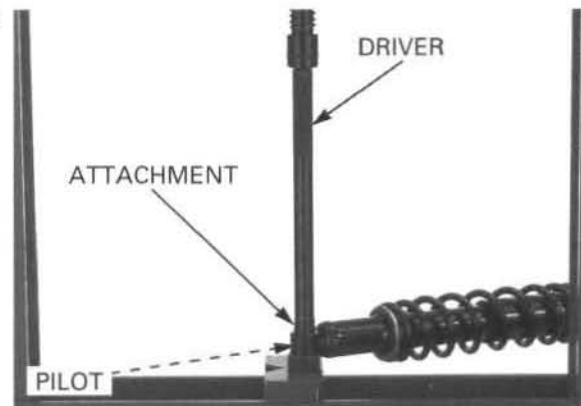
Remove the dust seals.



Press the needle bearing out of the lower pivot using the special tools.

TOOLS:

- | | |
|------------------------|---------------|
| Driver shaft | 07949-3710001 |
| Attachment, 22 x 24 mm | 07746-0010800 |
| Pilot, 16 mm | 07746-0041300 |

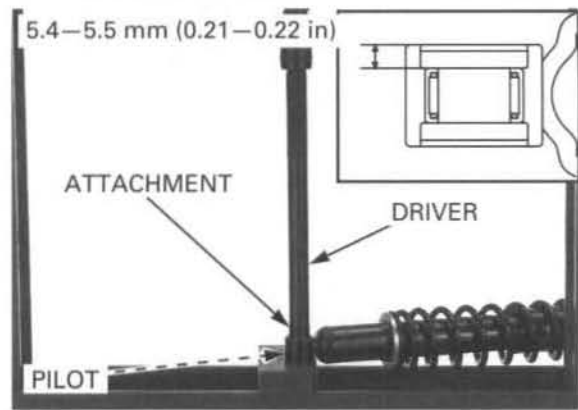


REAR WHEEL/SUSPENSION

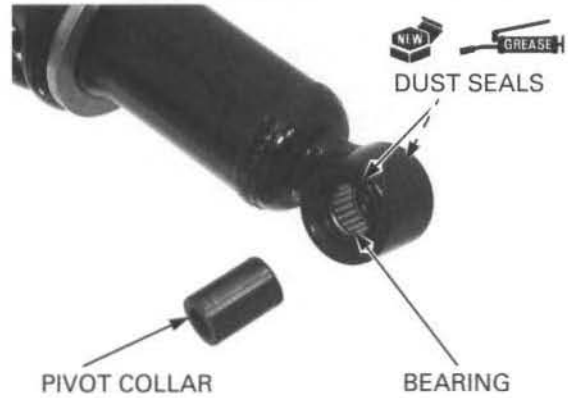
Apply grease to the needle rollers of a new bearing. Carefully press the needle bearing in the lower pivot until the depth from the lower pivot outer surface is 5.4-5.5 mm (0.21-0.22 in), using the special tools.

TOOLS:

Driver shaft	07949-3710001
Attachment, 22 x 24 mm	07746-0010800
Pilot, 16 mm	07746-0041300



Apply grease to new dust seal lips and install them into the lower pivot. Install the lower pivot collar.

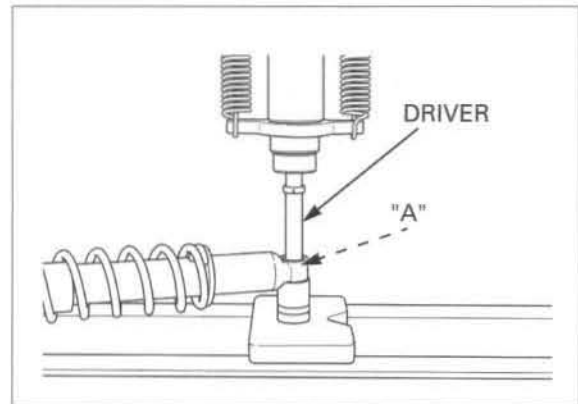


BUSHING REPLACEMENT (After '06)

Press the bushing out of the lower pivot using side "A" of the special tool.

TOOLS:

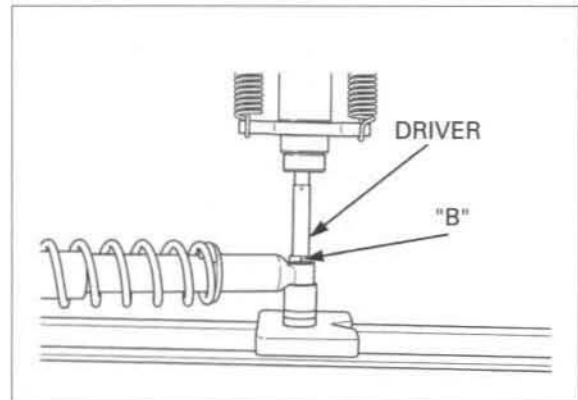
Bushing driver, 16 mm	07AMD-HP0A100
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Carefully press the bushing into the lower pivot until the tool bottoms, using side "B" of the special tool.

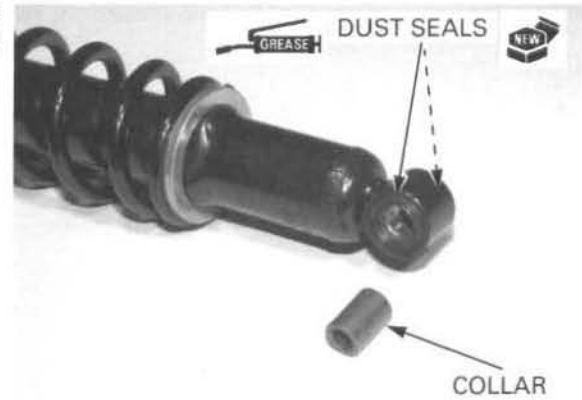
TOOLS:

Bushing driver, 16 mm	07AMD-HP0A100
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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.



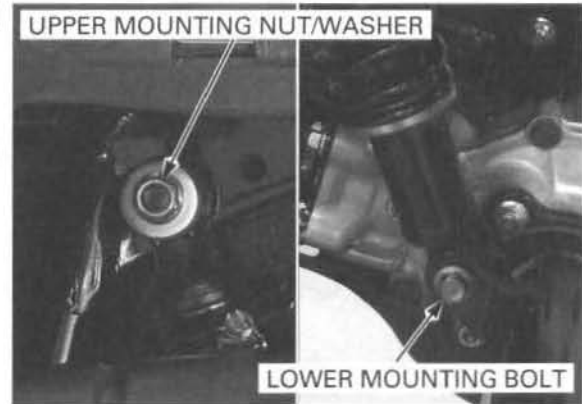
INSTALLATION

Install the rear shock absorber onto upper mounting stud of the frame.
Install the lower mounting bolt and tighten it.

TORQUE: 44 N·m (4.5 kgf·m, 33 lbf·ft)

Install the washer and upper mounting nut and tighten the nut.

TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)

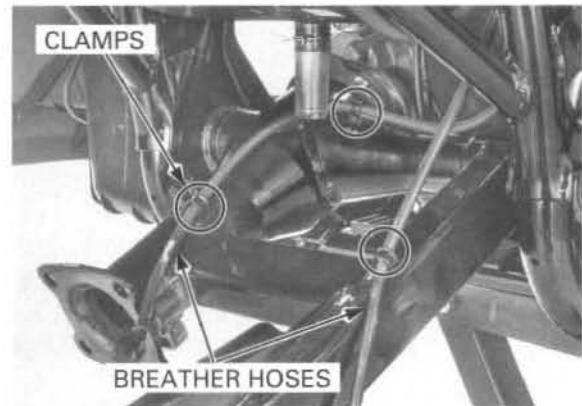


SWINGARM

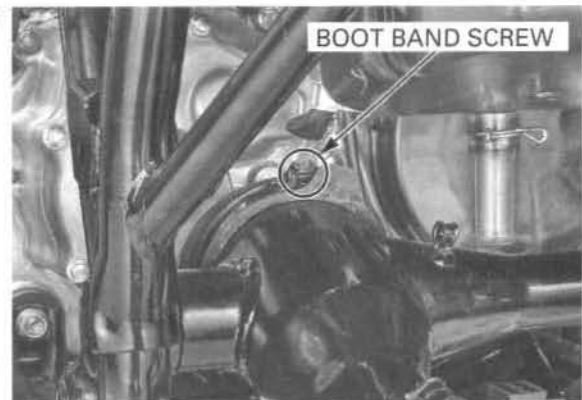
REMOVAL

Remove the final drive assembly (page 18-9).

Remove the breather hoses from the clamps on the swingarm.

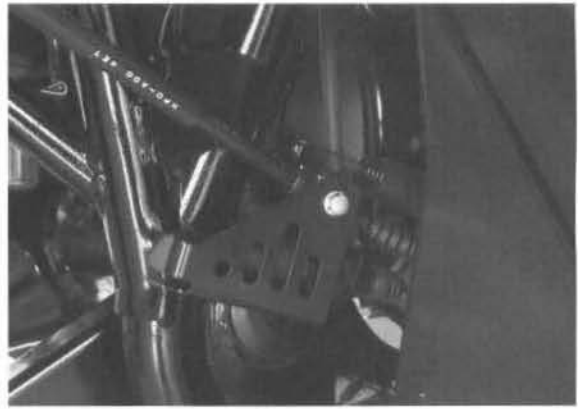


Remove the band screw and universal joint boot band.

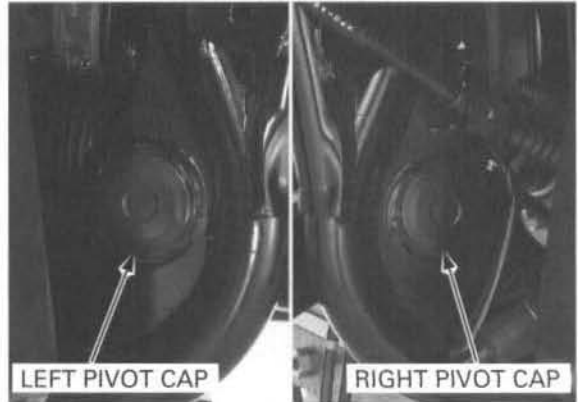


REAR WHEEL/SUSPENSION

Remove the bolt, brake light switch guard and brake light switch.



Remove the left and right swingarm pivot caps.

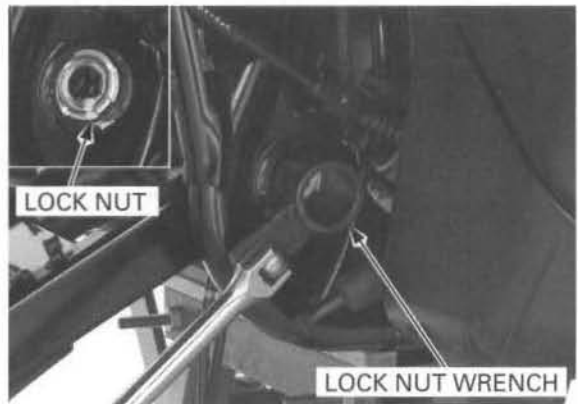


Remove the right pivot lock nut using the special tool.

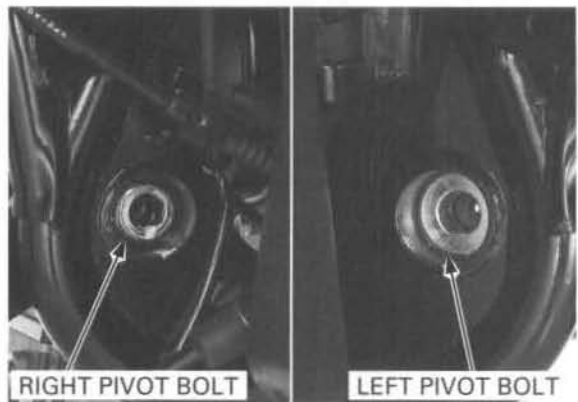
TOOL:

Lock nut wrench

07908-4690003

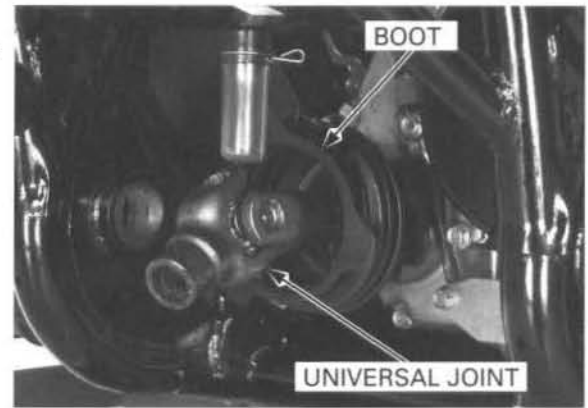


Remove the left and right pivot bolts.
Remove the universal joint boot from the swingarm,
then remove the swingarm from the frame.



Remove the universal joint.

Check the joint boot for tears or other damage and replace it if necessary.

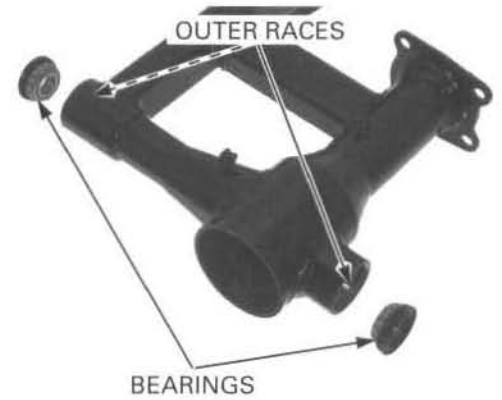


INSPECTION

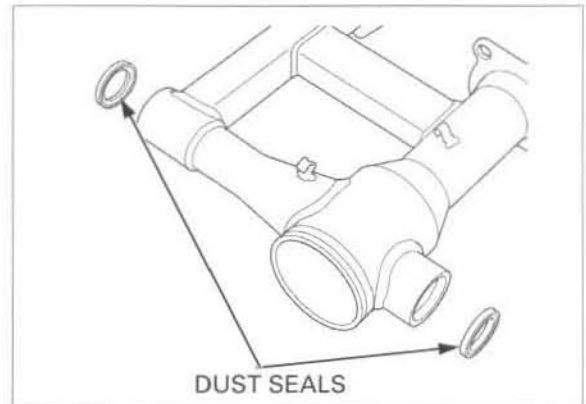
'05 - '06: Remove the pivot bearings from the swingarm pivots.

Both bearings, outer races and grease holders must be replaced as a set if any part is damaged or worn.

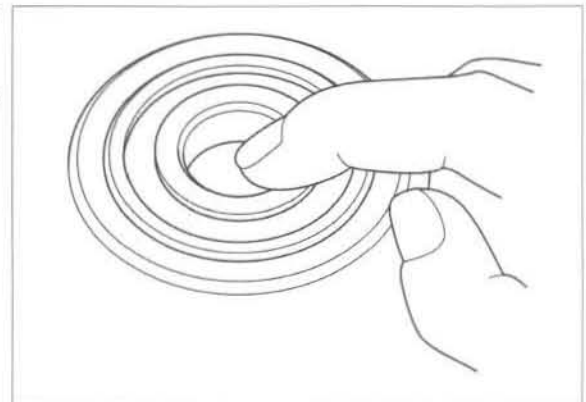
Check the bearing rollers, dust seals and outer races for wear or damage.



After '06: Remove the dust seals from the swingarm. Check the dust seals for wear or damage.



After '06: Turn the inner race of each pivot bearing with your finger. The bearing should turn smoothly and quietly. Also check that the outer race of the bearing fits tightly in the swingarm pivot. Replace it if necessary.

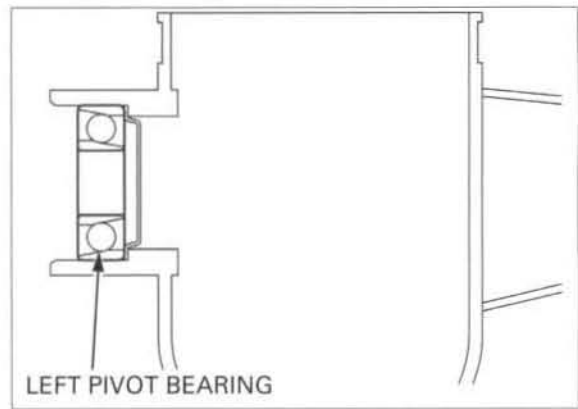


REAR WHEEL/SUSPENSION

After '06: Remove the swingarm pivot bearing using the special tools.

TOOLS:

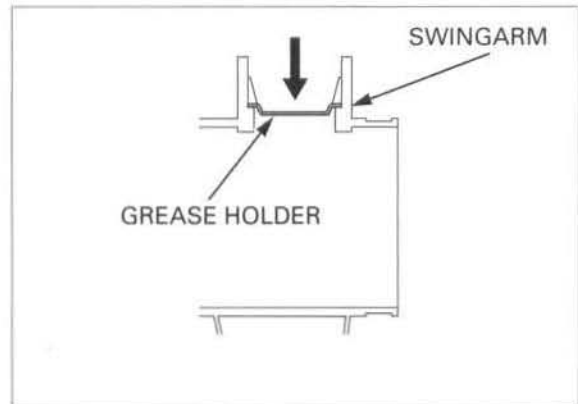
Remover handle	07936-3710100
Bearing remover, 17mm	07936-3710300
Remover weight	07741-0010201



Drive the grease holder into the swingarm to remove it.

TOOLS:

Driver	07749-0010000
Attachment, 22 x 24 mm	07746-0010800



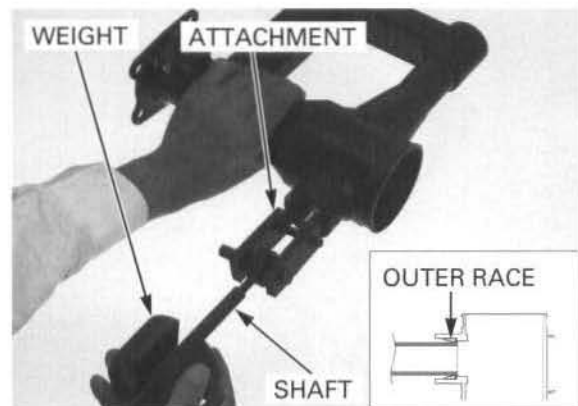
Remove the outer race from the swingarm using the special tools.

TOOLS:

Adjustable bearing remover, 20 x 40 mm	07JAC-PH80100
Adjustable bearing remover shaft	07JAC-PH80200
Remover weight	07741-0010201

U.S.A. only:

Adjustable bearing puller, 24 x 40 mm	07736-A01000B or 07736-A01000A
3/8" x 16 Slide hammer	Commercially available



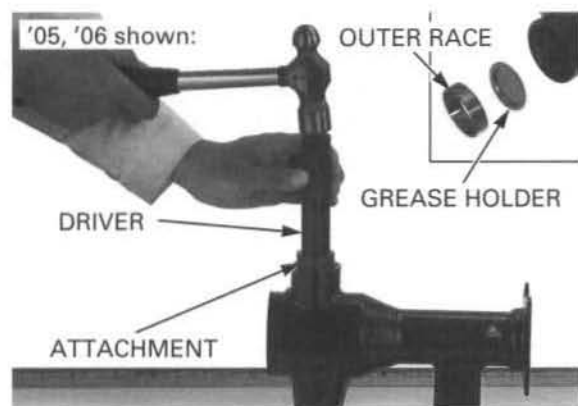
Install a new grease holder into the swingarm pivot.

'05, '06: Drive a new outer race into the swingarm pivot until it is fully seated, using the special tools.

After '06: Drive a new bearing into the swingarm pivot until it is fully seated, using the special tools.

TOOLS:

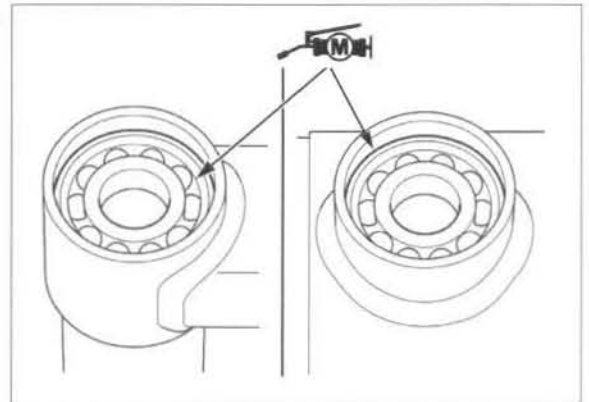
Driver	07749-0010000
Attachment, 37 x 40 mm	07746-0010200



'05 - '06: Apply lithium based grease (Shell 6459) to new bearing rollers and dust seal lips and install the bearings into the swingarm pivots.



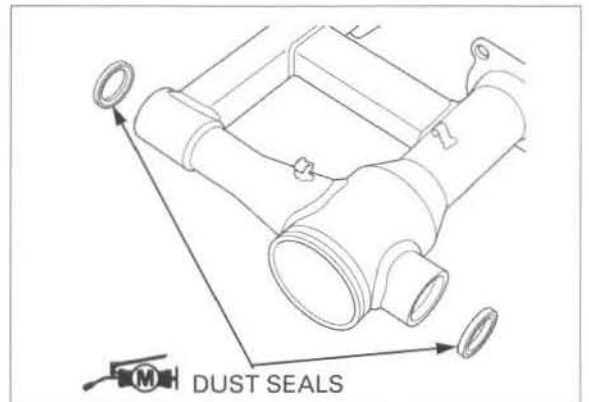
After '06: Pack the grease holders and bearing cavities with 3 g of molybdenum disulfide grease.



After '06: Apply molybdenum disulfide grease to the dust seal lips, and install the dust seals in the swingarm using the special tools.

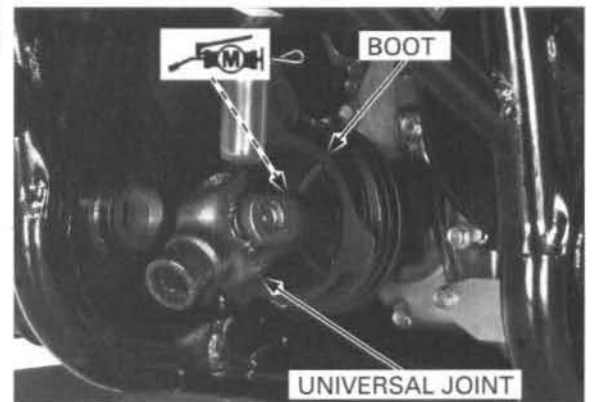
TOOLS:

Driver	07749-0010000
Attachment, 37 x 40 mm	07746-0010200



INSTALLATION

Apply molybdenum disulfide grease to the output shaft spline and install the universal joint onto the output shaft.



REAR WHEEL/SUSPENSION

Set the swingarm into the frame and install the left and right pivot bolts.
Install the universal joint boot onto the swingarm.
Tighten the left pivot bolt.

TORQUE: 112 N·m (11.4 kgf·m, 82 lbf·ft)

Tighten the right pivot bolt.

TORQUE: '05 - '06: 10 N·m (1.0 kgf·m, 7 lbf·ft)
After '06: 3.9 N·m (0.4 kgf·m, 0.9 lbf·ft)

Move the swingarm up and down several times to seat the pivot bearings.
Retighten the pivot bolts to the same torques.

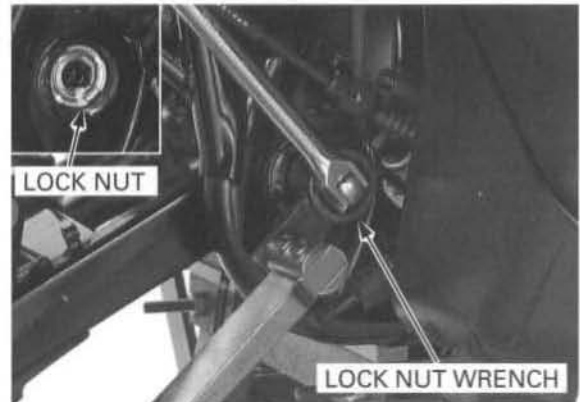
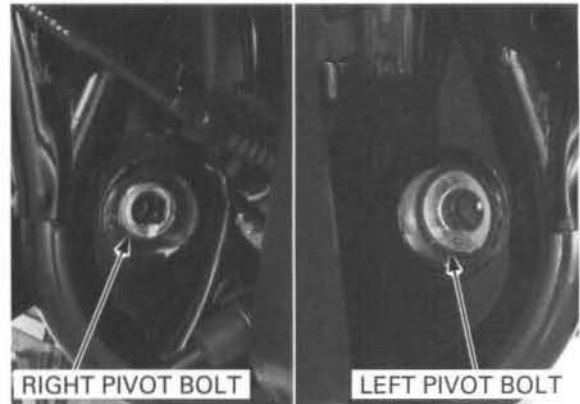
Tighten the right pivot lock nut using the special tool, while holding the pivot bolt.

TOOL:

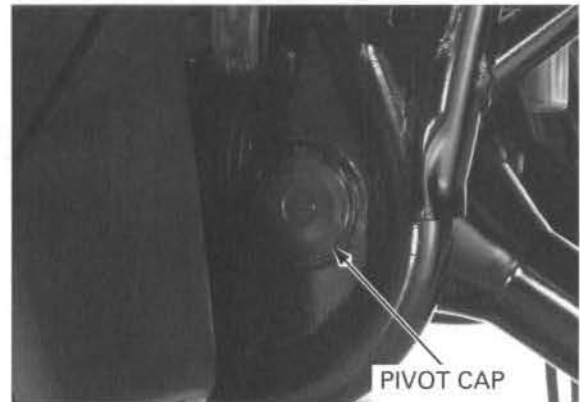
Lock nut wrench **07908-4690003**

TORQUE: Actual: 112 N·m (11.4 kgf·m, 82 lbf·ft)
Indicated: 102 N·m (10.4 kgf·m, 75 lbf·ft)

Refer to torque wrench reading information on page 15-3 "Service Information".



Install the left and right pivot caps securely.

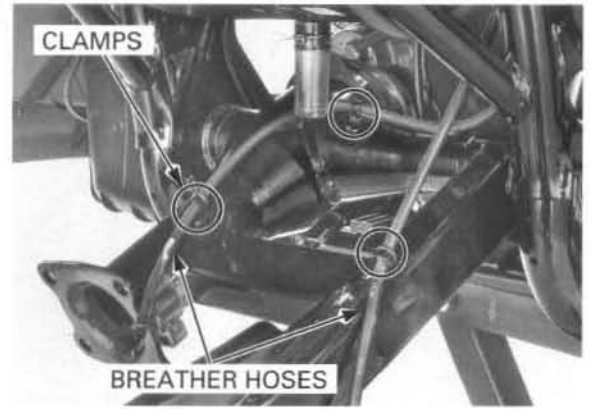


Install the universal joint boot band and screw so that the screw is positioned top and facing left side.
Tighten the band screw.



Route the breather hoses properly (page 1-24) and secure them with the clamps.

Install the final drive assembly (page 18-21).



MEMO

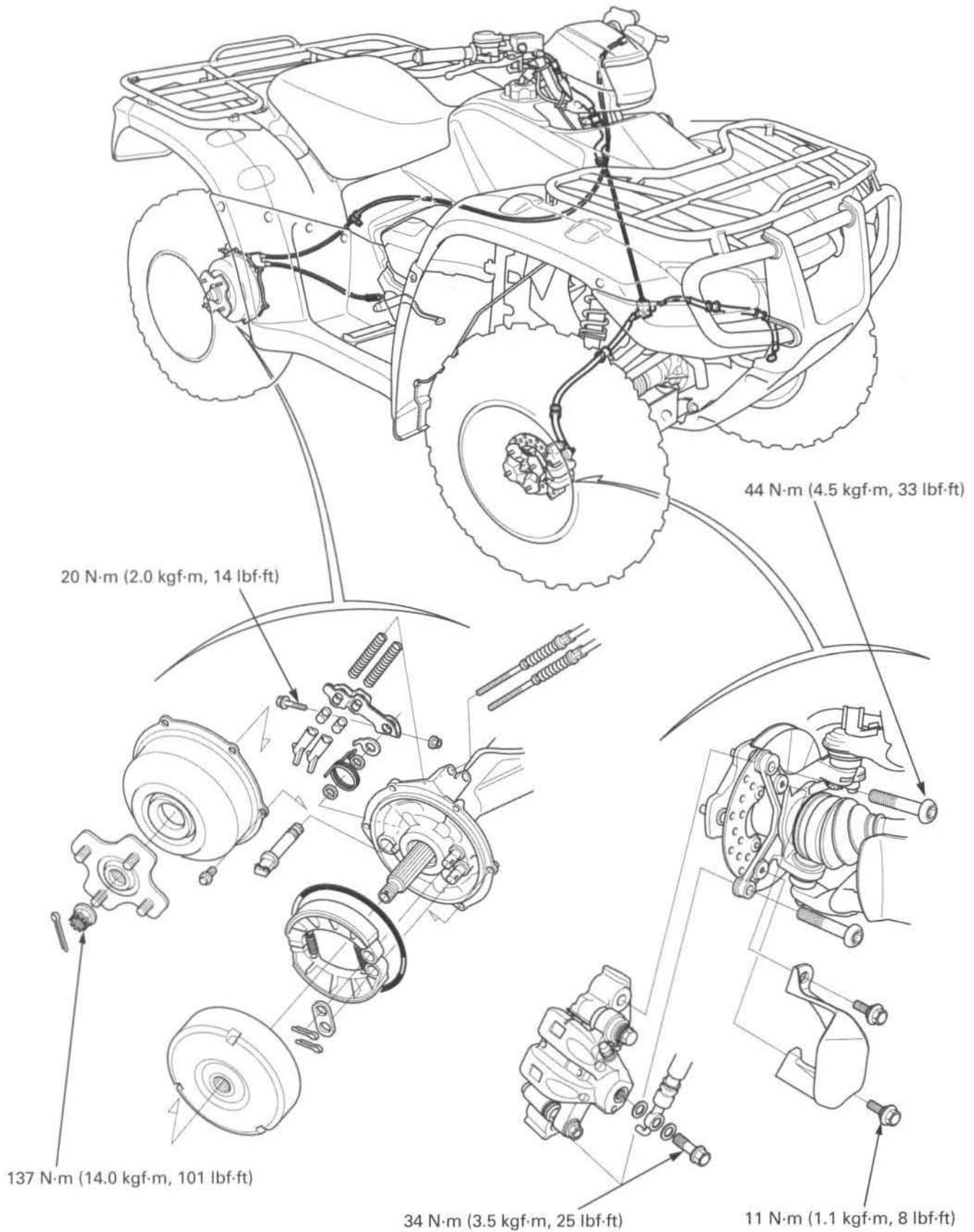


16. BRAKE SYSTEM

COMPONENT LOCATION	16-2	FRONT MASTER CYLINDER.....	16-8
SERVICE INFORMATION	16-3	BRAKE PAD/DISC	16-13
TROUBLESHOOTING	16-5	FRONT BRAKE CALIPER.....	16-14
BRAKE FLUID REPLACEMENT/ AIR BLEEDING	16-6	REAR BRAKE	16-19
		BRAKE PEDAL	16-27

BRAKE SYSTEM

COMPONENT LOCATION



SERVICE INFORMATION

GENERAL

⚠ CAUTION

- Frequent inhalation of brake lining or pad dust, regardless of material composition could be hazardous to your health.
- Avoid breathing dust particles.
 - Never use an air hose or brush to clean brake assemblies. Use an OSHA-approved vacuum cleaner.

NOTICE

Spilled brake fluid will severely damage 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.

- A contaminated brake lining, drum, disc or pad reduces stopping power. Discard contaminated linings or pads, and clean a contaminated drum or disc with a high quality brake degreasing agent.
- Check the brake system by applying the brake lever after the air bleeding.
- Never allow contaminants (dirt, water, etc.) to get into an open reservoir.
- Once the hydraulic system has been opened, or if the brake feels spongy, the system must be bled.
- Always use fresh DOT 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)

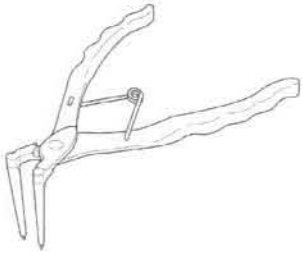
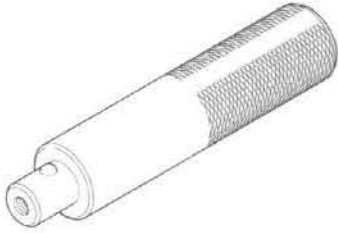
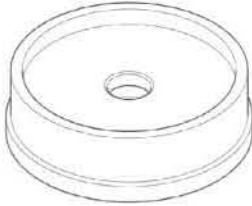

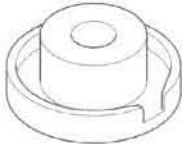
	ITEM	STANDARD	SERVICE LIMIT
Front brake	Recommended brake fluid	DOT 4 brake fluid	–
	Master cylinder I.D.	14.000 – 14.043 (0.5512 – 0.5529)	14.055 (0.5533)
	Master cylinder O.D.	13.957 – 13.984 (0.5495 – 0.5506)	13.945 (0.5490)
	Caliper cylinder I.D.	33.96 – 34.01 (1.337 – 1.339)	34.02 (1.3394)
	Caliper cylinder piston O.D.	33.878 – 33.928 (1.3338 – 1.3357)	33.87 (1.3335)
	Brake disc thickness	3.8 – 4.2 (0.15 – 0.17)	3.5 (0.14)
	Brake disc runout	–	0.10 (0.004)
Rear brake	Drum I.D.	180.0 - 180.2 (7.086 – 7.095)	181 (7.1)
	Lining thickness	5.3 – 5.32 (0.209 – 0.217)	To index mark
	Rear (parking) brake lever freeplay	15 – 20 (9/16 – 13/16)	–
	Rear brake pedal freeplay	15 – 20 (9/16 – 13/16)	–

TORQUE VALUES

Brake hose oil bolt	34 N·m (3.5 kgf·m, 25 lbf·ft)	
Front master cylinder reservoir cap screw	2 N·m (0.2 kgf·m, 1.4 lbf·ft)	
Front brake lever pivot bolt	1.0 N·m (0.1 kgf·m, 0.7 lbf·ft)	
Front brake lever pivot nut	5.9 N·m (0.6 kgf·m, 4.4 lbf·ft)	
Front brake switch screw	1.2 N·m (0.1 kgf·m, 0.9 lbf·ft)	Apply locking agent to the threads
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, 33 lbf·ft)	ALOC bolt: replace with a new one
Front brake caliper slide pin bolt	23 N·m (2.3 kgf·m, 17 lbf·ft)	
Splash guard	11 N·m (1.1 kgf·m, 8 lbf·ft)	
Rear brake arm pinch bolt	20 N·m (2.0 kgf·m, 14 lbf·ft)	
Rear wheel hub nut	137 N·m (14.0 kgf·m, 101 lbf·ft)	Castle nut
Front brake bleed valve	5.4 N·m (0.6 kgf·m, 4.0 lbf·ft)	
Brake pipe joint (green surface)	17 N·m (1.7 kgf·m, 13 lbf·ft)	
Brake pipe joint (black surface)	14 N·m (1.4 kgf·m, 10 lbf·ft)	

BRAKE SYSTEM

TOOLS

<p>Snap ring pliers 07914-SA50001</p> 	<p>Driver 07749-0010000</p> 	<p>Attachment, 78 x 80 mm 07NAD-PX40100</p> 
<p>Pilot, 28 mm 07746-0041100</p> 	<p>Oil seal driver attachment 07JAD-PH80101</p> 	

TROUBLESHOOTING

Poor brake performance

- Air in hydraulic system
- Leaking hydraulic system
- Contaminated brake pad/disk
- Worn caliper piston seal
- Worn master cylinder piston cups
- Worn brake pad/disc
- Contaminated caliper
- Low brake fluid level
- Clogged fluid passage
- Warped/deformed brake disc
- Sticking/worn master piston
- Sticking/worn caliper piston
- Contaminated master cylinder
- Improperly adjusted brake
- Worn brake shoe/drum
- Contaminated brake shoe/drum
- Warped/deformed brake drum
- Bent brake lever/pedal

Front brake lever hard

- Clogged/restricted hydraulic system
- Sticking/worn caliper piston
- Clogged fluid passage
- Worn caliper piston seal
- Sticking/worn master piston
- Bent brake lever/pedal

Brake drags

- Contaminated brake pad/disc
- Contaminated brake shoe/drum
- Clogged/restricted hydraulic system
- Warped/deformed brake disc
- Badly worn brake shoe/drum
- Warped/deformed brake drum
- Clogged/restricted fluid passage
- Sticking/worn caliper piston
- Sticking/worn master piston

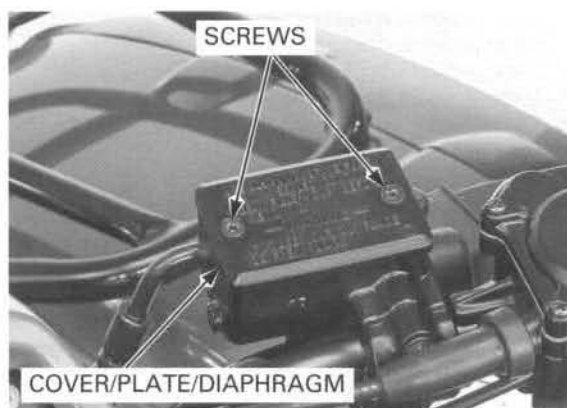
BRAKE SYSTEM

BRAKE FLUID REPLACEMENT/AIR BLEEDING

- Do not allow foreign material to enter the system when filling the reservoir.
- Use only Honda DOT 4 brake fluid from a sealed container.
- Do not mix different types of fluid. They are not compatible.

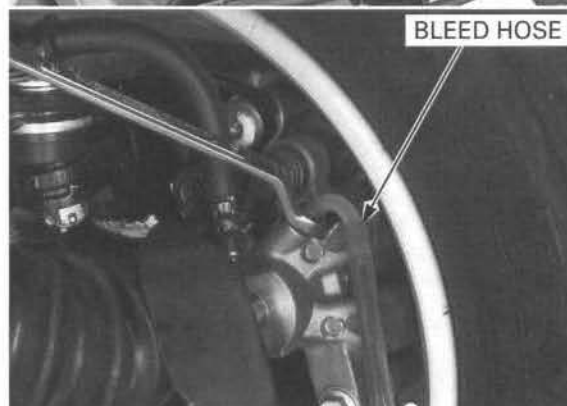
BRAKE FLUID DRAINING

With the fluid reservoir parallel to the ground, remove the reservoir cover, diaphragm plate and diaphragm.



Connect a bleed hose to the bleed valve.

Loosen the bleed valve and pump the brake lever. Stop pumping the lever when no more fluid flows out of the bleed valve.



BRAKE FLUID FILLING

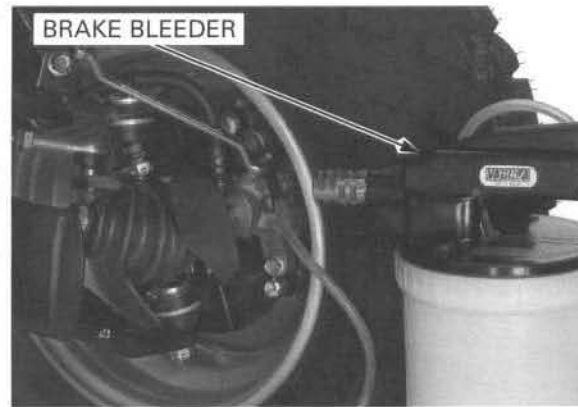
Fill the reservoir with DOT 4 brake fluid from a sealed container.



Connect a commercially available brake bleeder to the bleed valve.

Pump the brake bleeder and loosen the bleed valve, adding fluid when the fluid level in the master cylinder reservoir is low.

- Check the fluid level often while bleeding the brakes to prevent air from being pumped into the system.
- When using a brake bleeding tool, follow the manufacturer's operating instructions.



Repeat the above procedures until air bubbles do not appear in the plastic hose.

- If air is entering the bleeder from around the bleed valve threads, seal the threads with Teflon tape.
- If a brake bleeder is not available, fill the master cylinder and operate the brake lever to fill the system.

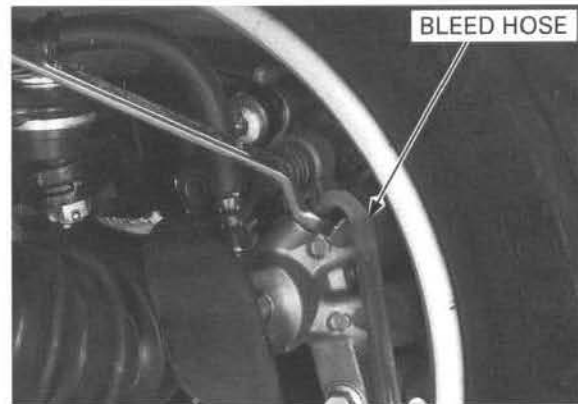
Close the bleed valve.

Next, perform the available BLEEDING procedure (see below).



BRAKE BLEEDING

Connect a clear bleed hose to the bleed valve. Pump up the system pressure with the lever until there are no air bubbles in the fluid flowing out of the master cylinder and lever resistance is felt.



Do not release the brake lever until the bleed valve has been closed.

1. Squeeze the brake lever, open the bleed valve 1/2 turn and then close the valve.
2. Release the brake lever until the bleed valve has been closed.

Repeat steps 1 and 2 until bubbles cease to appear in the fluid coming out of the bleed valve.

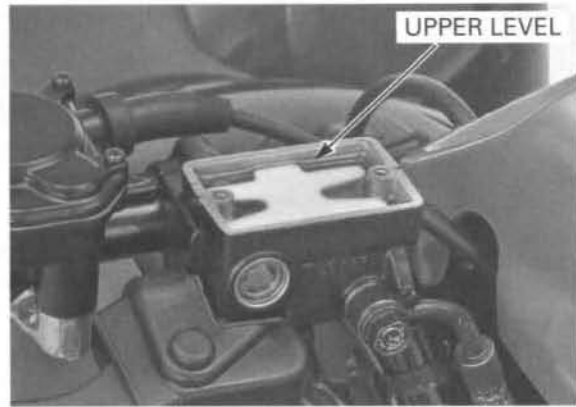
Tighten the bleed valve to the specified torque.

TORQUE: 5.4 N·m (0.6 kgf·m, 4.0 lbf·ft)



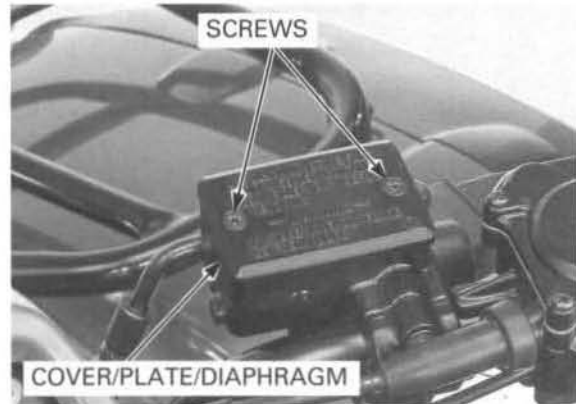
BRAKE SYSTEM

Fill the fluid reservoir with DOT 4 brake fluid to the upper level.



Reinstall the diaphragm, diaphragm plate and reservoir cover, and tighten the screws.

TORQUE: 2 N·m (0.2 kgf·m, 1.4 lbf·ft)



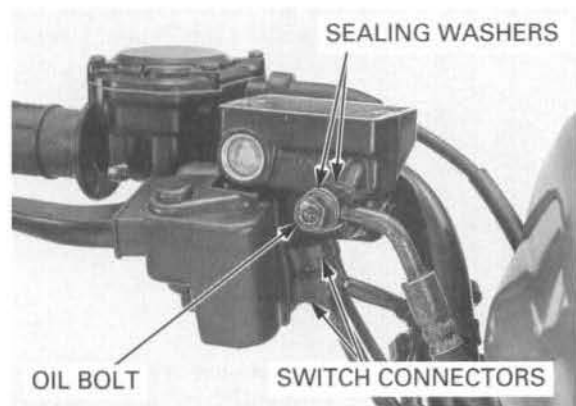
FRONT MASTER CYLINDER

REMOVAL

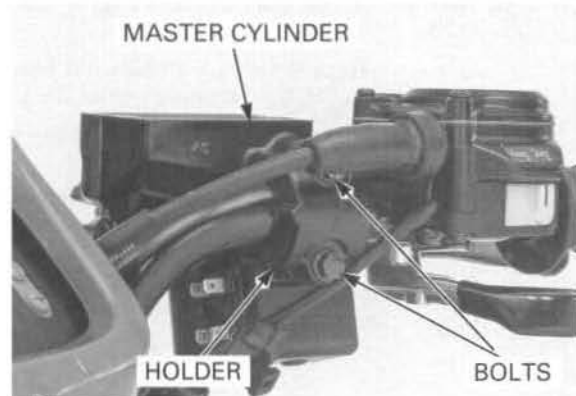
Avoid spilling fluid on painted, plastic, or rubber parts. Place a rag over these parts whenever the system is serviced.

Remove the reservoir cover, diaphragm plate, diaphragm and float, and soak up the brake fluid from the reservoir (page 16-6).

Disconnect the brake switch connectors. Disconnect the brake hose from the master cylinder by removing the oil bolt and two sealing washers. Fix the brake hose to prevent the fluid from flowing out.



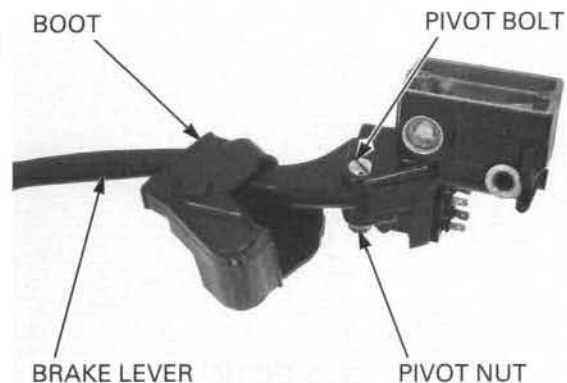
Remove the bolts from the master cylinder holder and remove the master cylinder.



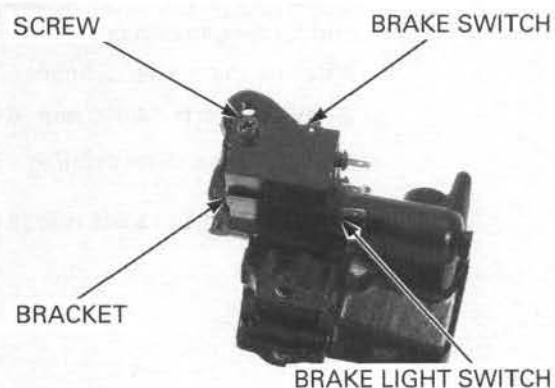
DISASSEMBLY

Remove the brake lever boot.

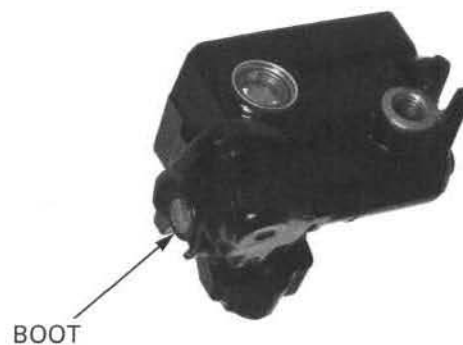
Remove the front brake lever nut, pivot bolt and brake lever.



Remove the screw, brake switch, bracket and brake light switch.



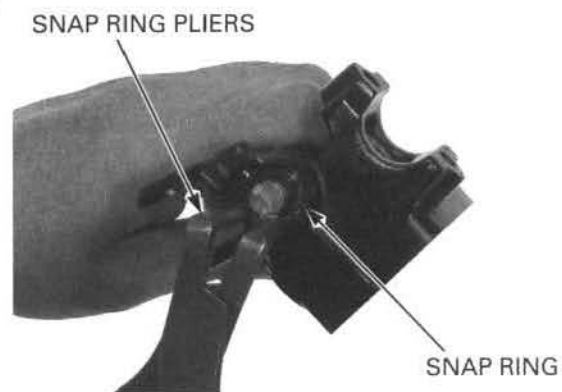
Remove the master piston boot.



Remove the snap ring from the master cylinder using the special tool.

TOOL:
Snap ring pliers

07914-SA50001



BRAKE SYSTEM

Remove the master piston, primary cup, spring and oil seal.



INSPECTION

Check the piston boot, primary cup and secondary cup for fatigue or damage.

Measure the master cylinder I.D.

SERVICE LIMIT: 14.055 mm (0.5533 in)

Measure the master cylinder piston O.D.

SERVICE LIMIT: 13.945 mm (0.5490 in)



ASSEMBLY

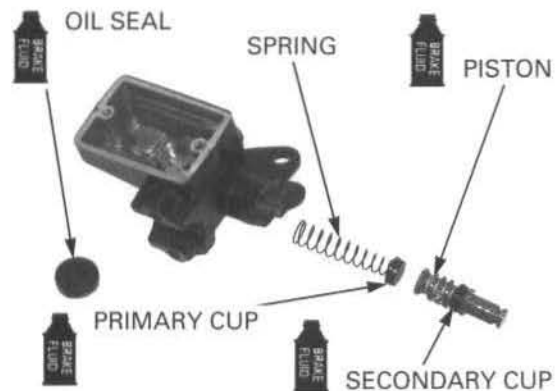
- Keep the piston, cups, spring, snap ring and boot as a set; do not substitute individual parts.

Coat all parts with clean brake fluid before assembly.

When installing the cups, do not allow the lips to turn inside out.

Install the secondary cup into the master piston groove.

Install the primary cup onto the tip of the spring. Install the spring/primary cup and master piston into the master cylinder. Install the oil seal.

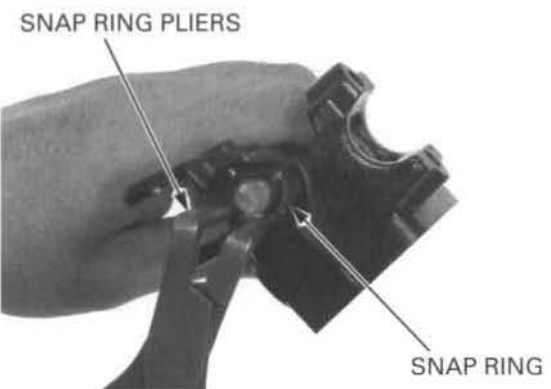


Make sure the snap ring is firmly seated in the groove.

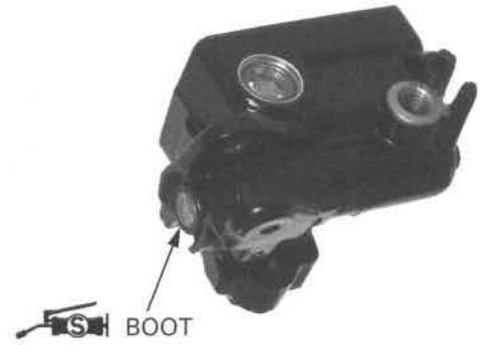
Install the snap ring using the special tool.

TOOL:
Snap ring pliers

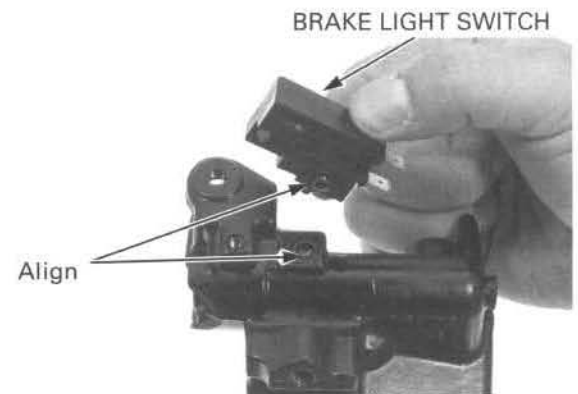
07914-SA50001



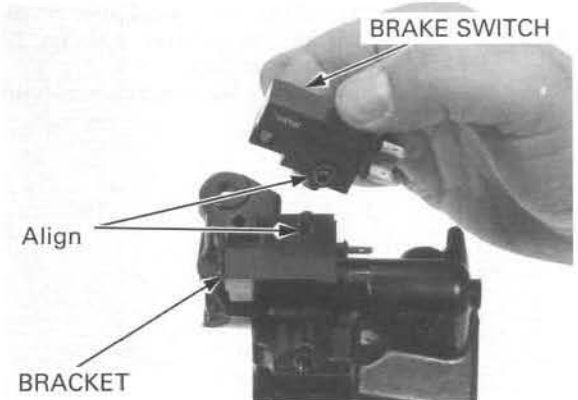
Fill the master piston boot with silicone grease.
Install the boot.



Install the brake light switch by aligning the hole of the master cylinder and boss of the brake light switch.



Install the bracket onto the brake light switch.
Install the brake light switch by aligning the hole of the bracket and boss of the brake switch



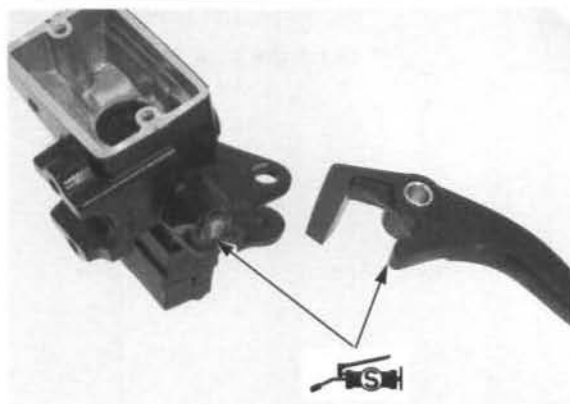
Apply locking agent to the threads of the screw.
Install and tighten the screw to the specified torque.



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

BRAKE SYSTEM

Apply silicone grease to the brake lever contact area of the master cylinder piston.



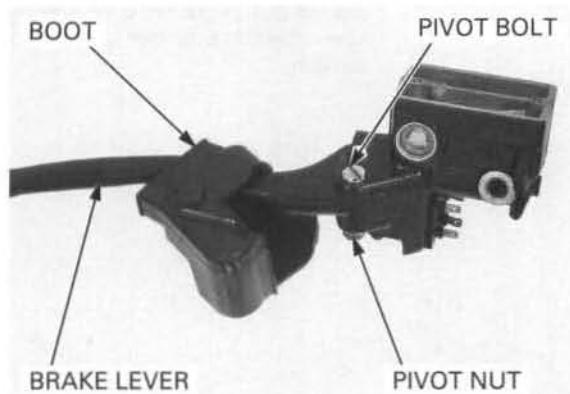
Apply silicone grease to the brake lever contact area of the pivot bolt.
Install the brake lever.
Install and tighten the brake lever pivot bolt to the specified torque.

TORQUE: 1.0 N·m (0.1 kgf·m, 0.7 lbf·ft)

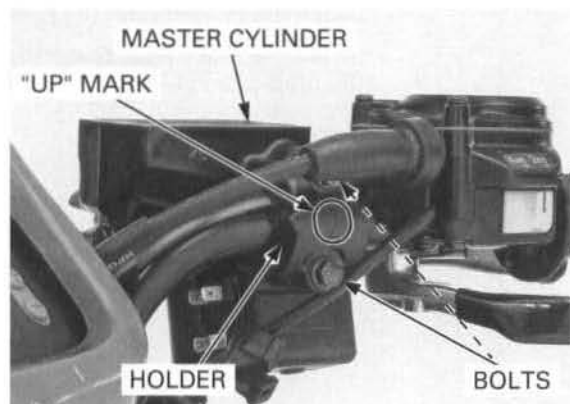
Hold the pivot bolt and tighten the pivot nut to the specified torque.

TORQUE: 5.9 N·m (0.6 kgf·m, 4.4 lbf·ft)

Install the brake lever boot.

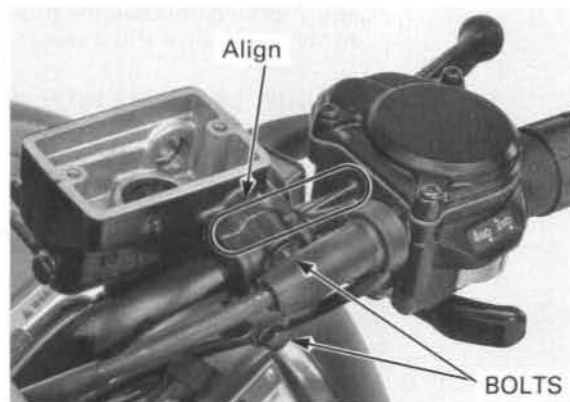


Place the master cylinder on the handlebar.
Install the master cylinder holder with the "UP" mark facing up.
Install the bolts but do not tighten yet.



Align the mating surface of the master cylinder holder with the throttle housing boss as shown.
Tighten the upper bolt first, then tighten the lower bolt.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)



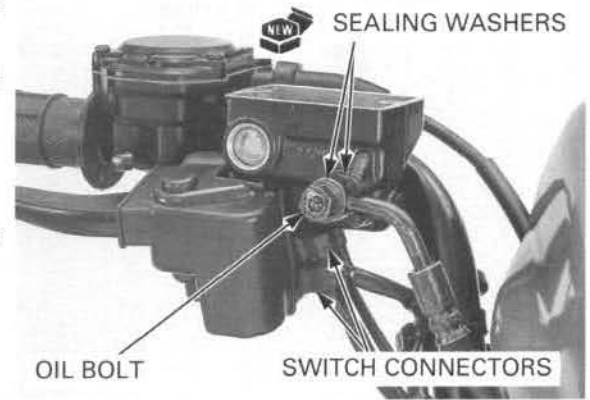
Install the brake hose between the stoppers with the new sealing washers.

Install and tighten the brake hose oil bolt to the specified torque.

TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)

Connect the brake switch connectors.

Fill the fluid reservoir with DOT 4 brake fluid to the upper level and bleed the brake system (page 16-6).



BRAKE PAD/DISC

BRAKE PAD REPLACEMENT

- A contaminated brake disc or pad reduces stopping power. Discard contaminated pads and clean a contaminated disc with a high quality brake degreasing agent.
- Be careful that the master cylinder does not overflow when the caliper pistons are compressed.
- Brake fluid can cause damage to painted, plastic or rubber parts.

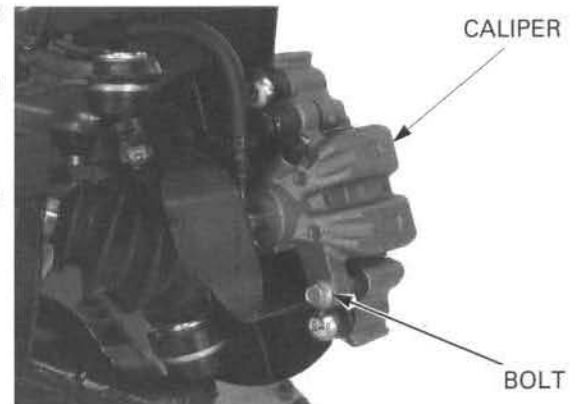
Always replace the brake pads in pairs to assure even disc pressure.

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

Remove the front wheel (page 14-14).

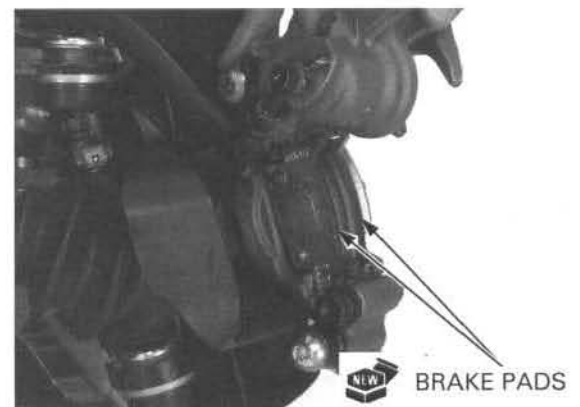
Do not bend the brake hose severely.

Remove the brake caliper slide pin bolt and lift the caliper.



Remove the brake pads.

Install the new pads in the caliper.



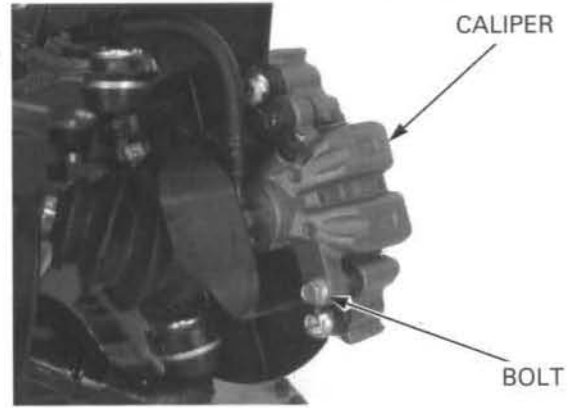
BRAKE SYSTEM

Put back the caliper.

Install and tighten the brake caliper slide pin bolt to the specified torque.

TORQUE: 23 N·m (2.3 kgf·m, 17 lbf·ft)

Install the front wheel (page 14-14).



BRAKE DISC INSPECTION

Remove the front wheel (page 14-14).

Visually inspect the brake disc for damage or cracks.

Measure the brake disc thickness at several points.

SERVICE LIMIT: 3.0 mm (0.12 in)

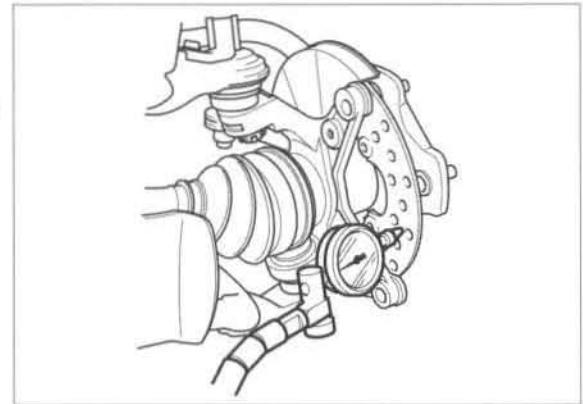
Replace the brake disc if the smallest measurement is less than the service limit (page 14-18).



Check the brake disc for warpage.

SERVICE LIMIT: 0.30 mm (0.012 in)

Check the front wheel hub bearings for excessive play, if the warpage exceeds the service limit.
Replace the brake disc if the bearings are normal.



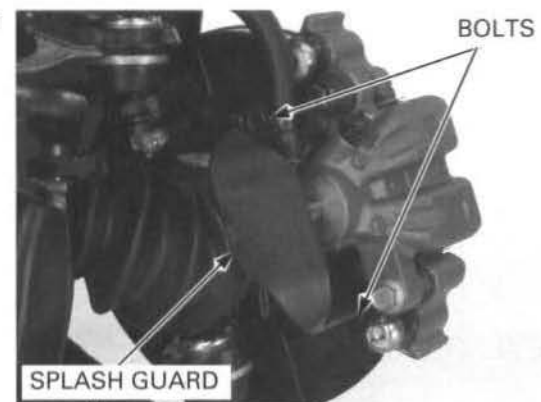
FRONT BRAKE CALIPER

REMOVAL

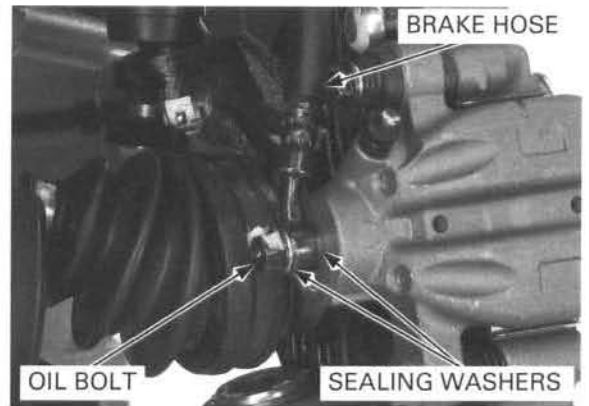
Raise the front wheel off the ground by placing a block or safety stand under the engine.

Drain the front brake hydraulic system (page 16-6).
Remove the front wheel (page 14-14).

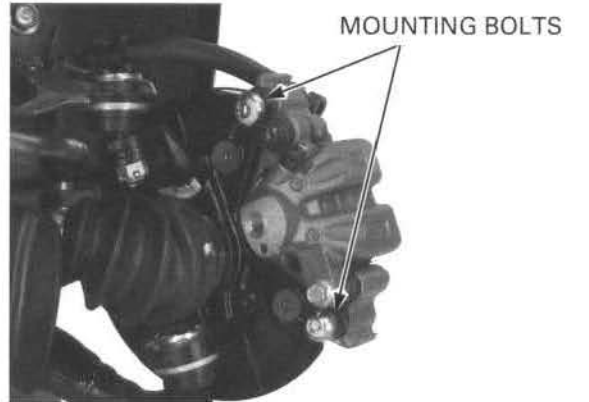
Remove the bolts and splash guard.



Remove the oil bolt, sealing washers and brake hose from the brake caliper.

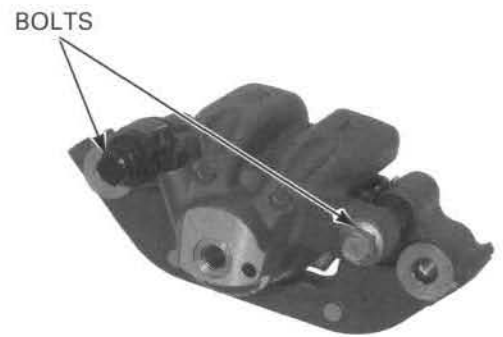


Remove the mounting bolts and brake caliper.

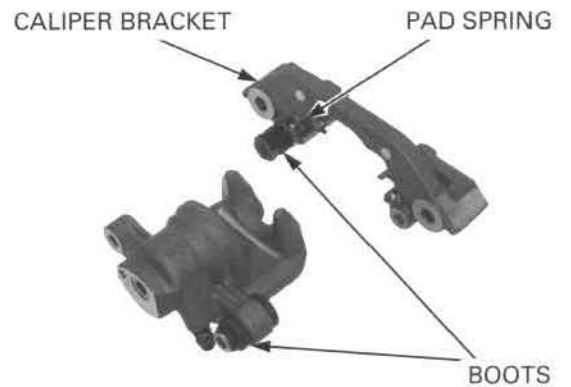


DISASSEMBLY

Remove the brake caliper slide pin bolts.



Remove the caliper bracket, pad spring and boots. Remove the pad spring.



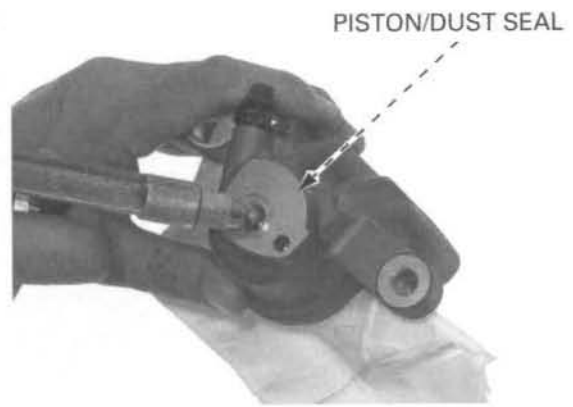
BRAKE SYSTEM

If necessary, lightly apply compressed air to the caliper fluid inlet to get the piston and dust seal out.

Place a shop rag under the caliper to cushion the piston when it is expelled.

Do not bring the air nozzle too close to the inlet or the pistons may be forced out with excessive force that could cause injury.

Use the air in short spurts.



Be careful not to damage the piston sliding surface. Push the piston seal in and lift it out.

Clean the seal grooves, caliper piston and caliper piston sliding surfaces with clean brake fluid.



INSPECTION

Check the caliper cylinder and piston for scoring, scratches or damage.

Measure the caliper cylinder I.D.

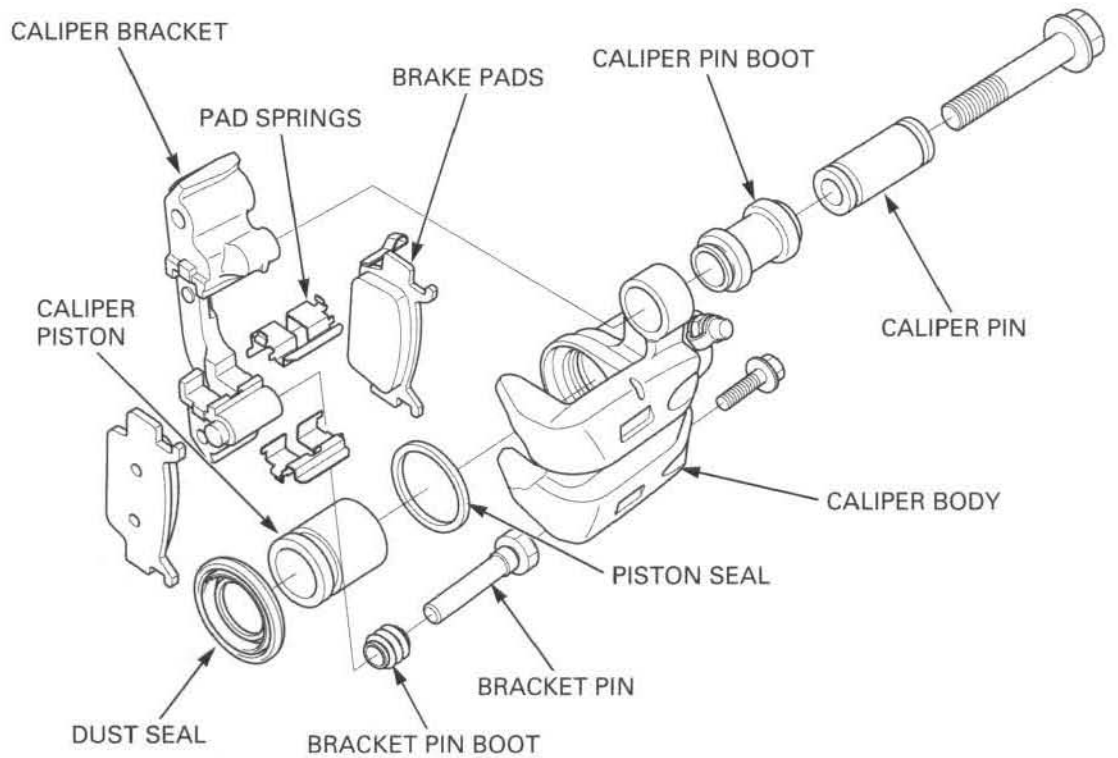
SERVICE LIMIT: 34.020 mm (1.3394 in)

Measure the caliper piston O.D.

SERVICE LIMIT: 33.870 mm (1.3335 in)



ASSEMBLY



Replace the dust seal and piston seal with a new one.

Be sure that each part is free from dust or dirt before reassembly.

Coat a new piston seal with clean brake fluid.

Coat a new dust seal with silicone grease.

Install the piston seal and dust seal into the groove of the caliper body.

Coat the caliper piston with clean brake fluid and install it into the caliper cylinder with its closed ends facing the caliper.



Note the installation direction of the pad spring.

Install the pad spring onto the caliper bracket.

Replace the caliper and bracket pin boots if they are worn, deteriorated or damaged.

Apply silicone grease to the boots inner surface. Install the boots and caliper bracket.



BRAKE SYSTEM

Install and tighten the brake caliper slide pin bolts to the specified torque.

TORQUE: 23 N·m (2.3 kgf·m, 17 lbf·ft)

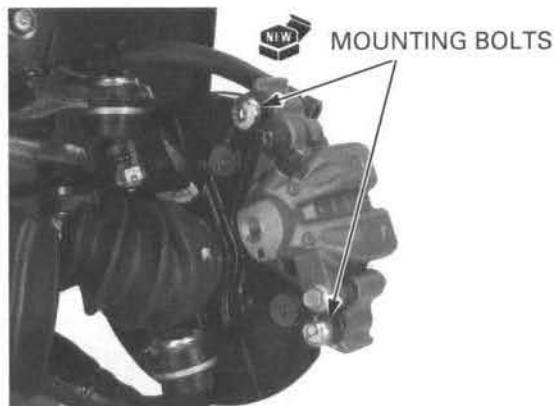
BOLTS



INSTALLATION

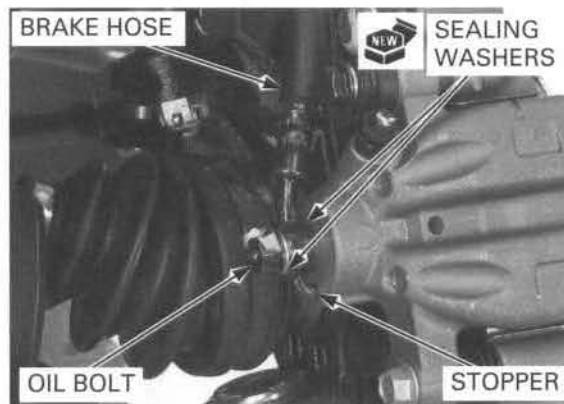
Install the brake caliper and new mounting bolts. Tighten the mounting bolts to the specified torque.

TORQUE: 44 N·m (4.5 kgf·m, 33 lbf·ft)



Install the brake hose eyelet to the caliper body with new sealing washers and oil bolts. Push the brake hose eyelet to the stopper on the caliper, then tighten the oil bolts to the specified torque.

TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)

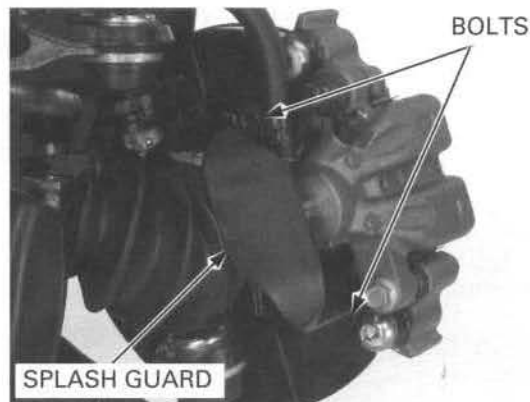


Install the brake splash guard and tighten the bolts.

TORQUE: 11 N·m (1.1 kgf·m, 8 lbf·ft)

Install the front wheel (page 14-14).

Fill and bleed the hydraulic system (page 16-6).



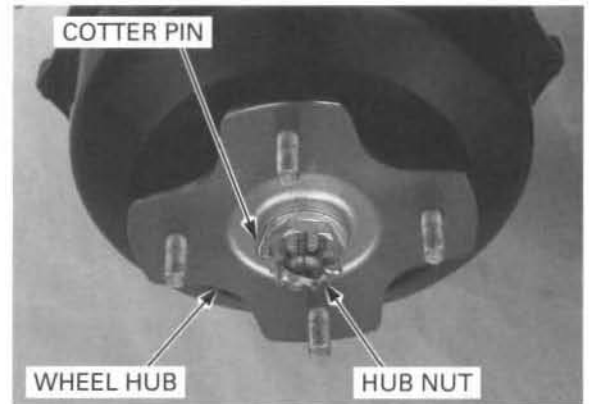
REAR BRAKE

BRAKE DRUM REMOVAL

Remove the rear wheel (page 15-6).

Remove the cotter pin.

Remove the right rear hub nut and wheel hub.

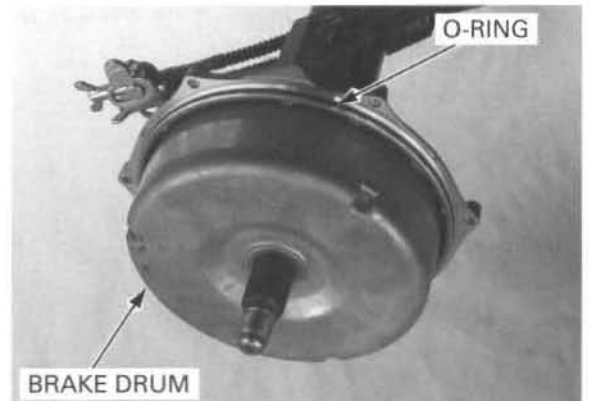


Remove the bolts and brake drum cover.



Remove the brake drum cover O-ring.

Remove the brake drum.



INSPECTION

Measure the brake drum I.D.

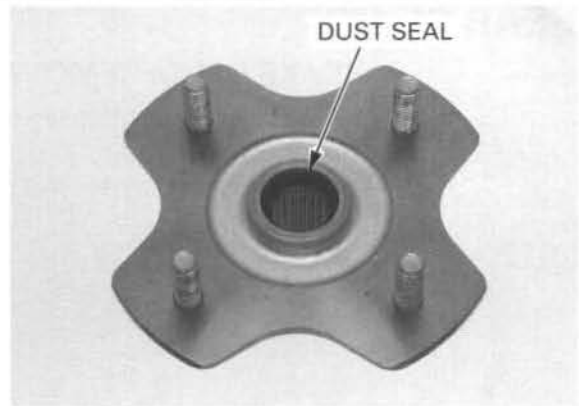
SERVICE LIMIT: 181 mm (7.1 in)

Inspect the brake drum for scoring, cracks and out of roundness.



BRAKE SYSTEM

Check the wheel hub dust seal for wear or damage.



Check the brake drum cover dust seal for wear or damage.
Drive it out of the drum cover if necessary.



DUST SEAL REPLACEMENT

Remove the dust seal from the wheel hub.

Apply grease to a new seal lips and install it into the wheel hub with the flat side facing in until it is fully seated.

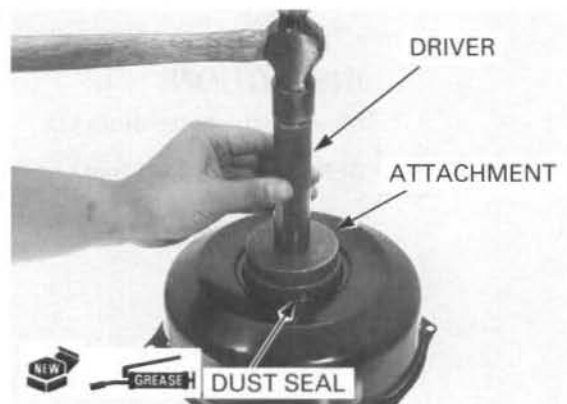


Install a new dust seal into the drum cover using the special tool as shown.

TOOL:

Driver 07749-0010000
Attachment, 78 x 80 mm 07NAD-PX40100

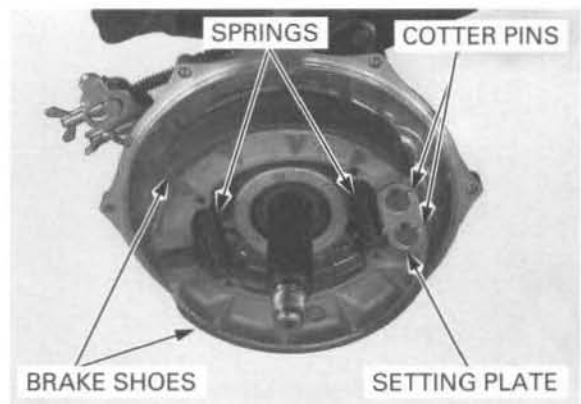
Fill up with grease to the brake drum cover dust seal lip.



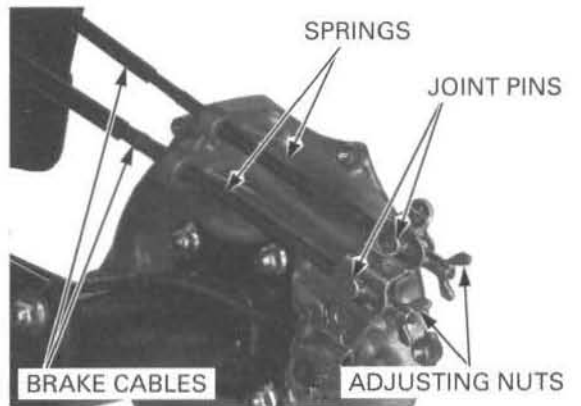
BRAKE PANEL DISASSEMBLY

Mark the brake shoes to indicate their original positions before removing them.

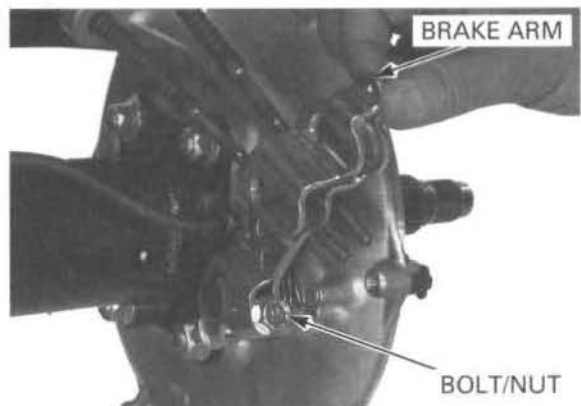
Remove the cotter pins, setting plate, brake shoes and shoe springs.



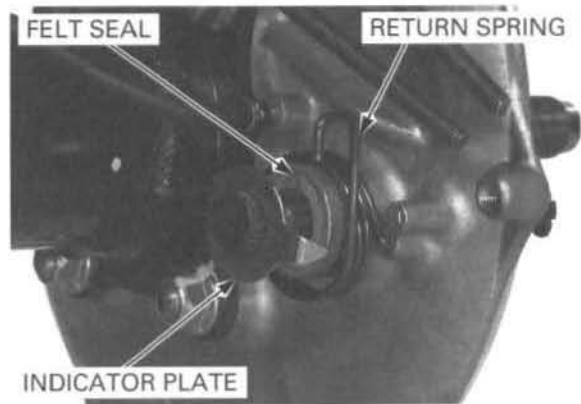
Remove the adjusting nuts, brake cables, springs and joint pins from the brake arm.



Remove the brake arm pinch bolt/nut and brake arm.



Remove the indicator plate, return spring and felt seal.

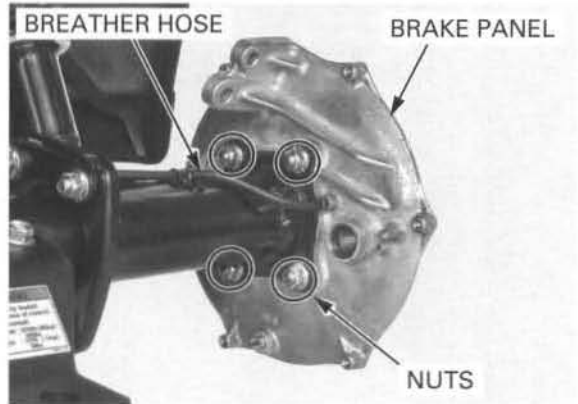


BRAKE SYSTEM

Remove the brake cam.



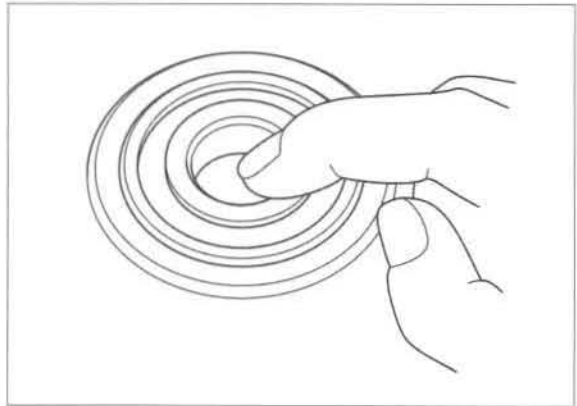
Disconnect the breather hose from the brake panel.
Remove the brake panel nuts and discard them.
Remove the brake panel.
Remove the O-ring from the brake panel groove.



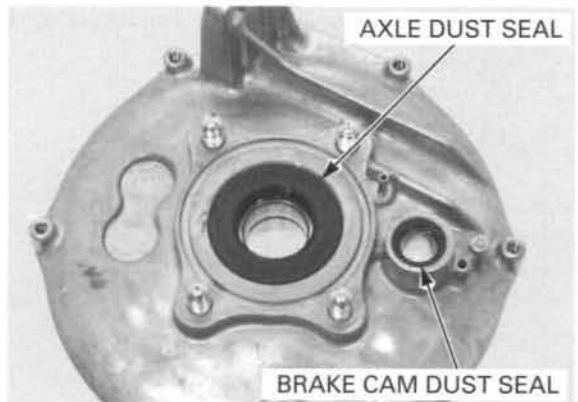
BRAKE PANEL BEARING REPLACEMENT

Turn the inner race of the bearing with your finger.
The bearing should turn smoothly and quietly.
Also check that the outer race of the bearing fits tightly in the brake panel.
Replace it if necessary.

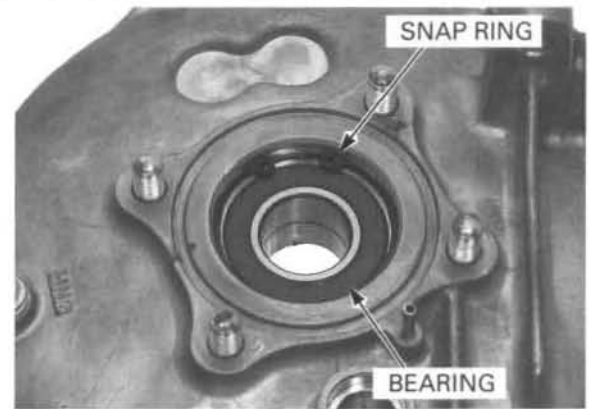
Check the dust seal for wear or damage.



Remove the axle dust seal and brake cam dust seal.



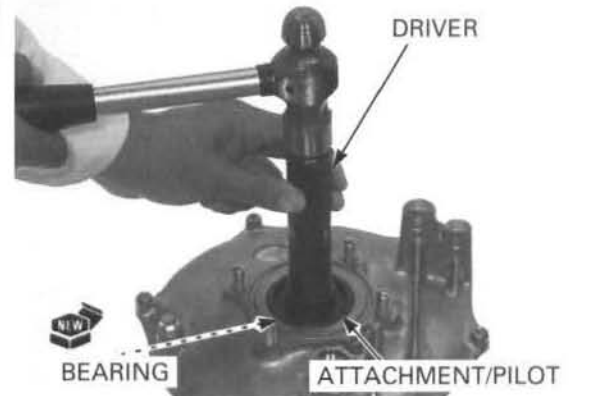
Remove the snap ring.
Drive the bearing out of the brake panel.



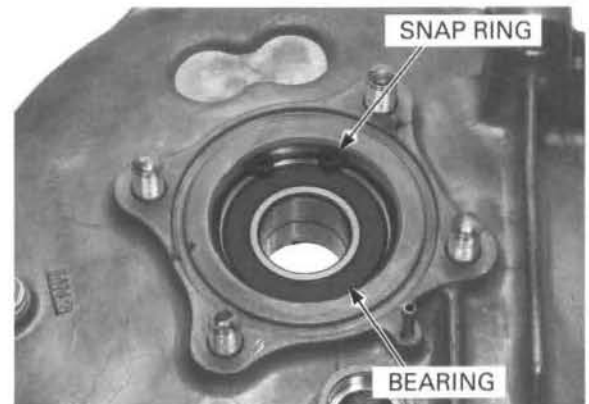
Drive a new bearing into the brake panel with its sealed side facing out (facing the axle housing) using the special tools as shown.

TOOLS:

- | | |
|----------------------------|---------------|
| Driver | 07749-0010000 |
| Oil seal driver attachment | 07JAD-PH80101 |
| Pilot, 28 mm | 07746-0041100 |

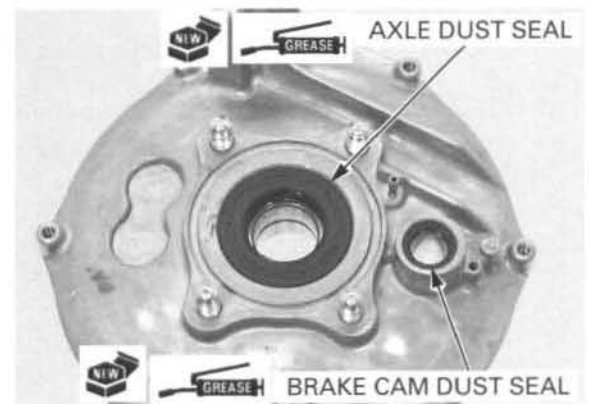


Install the snap ring into the groove.



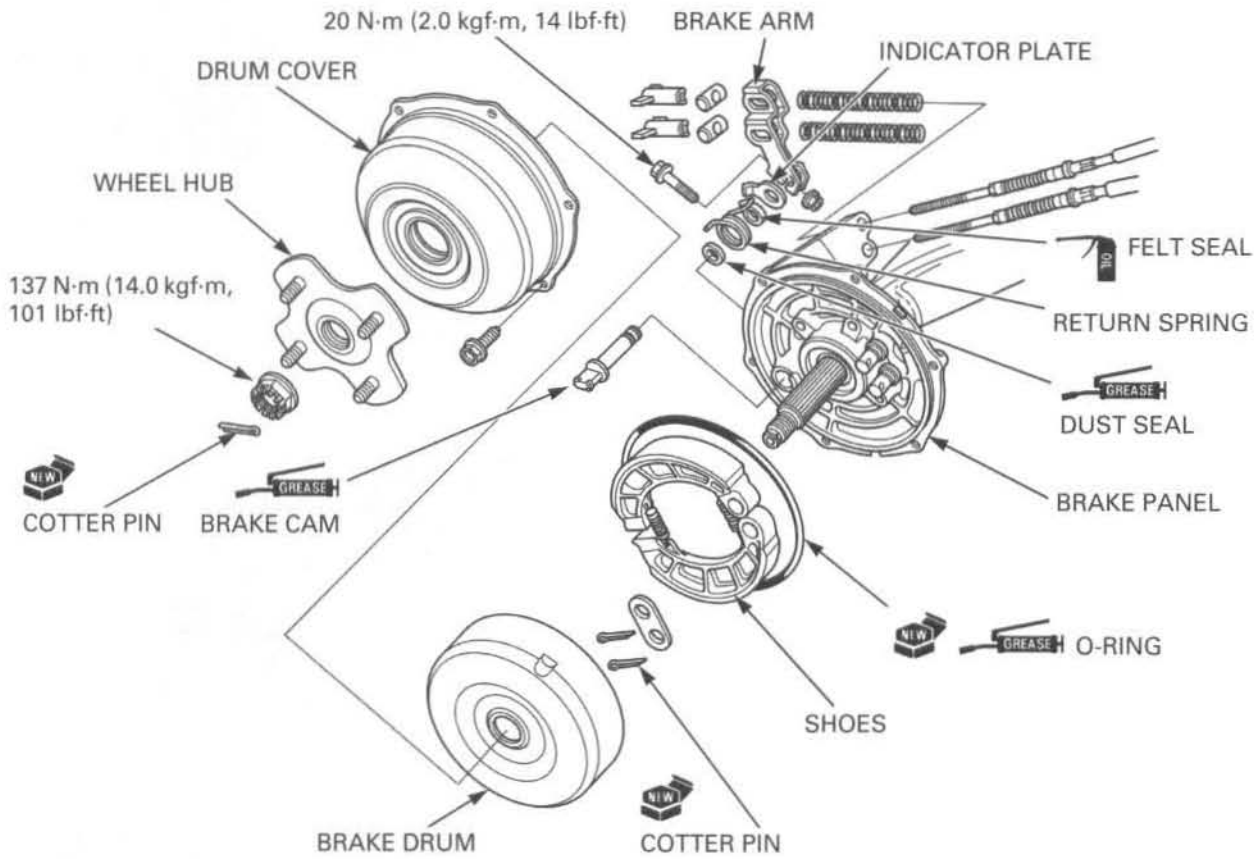
Pack a new dust seal lips with grease.
Install the dust seal into the brake panel until it flush with the brake panel.

Apply grease to the new brake cam dust seal lips.
Install the dust seal until it is seated.



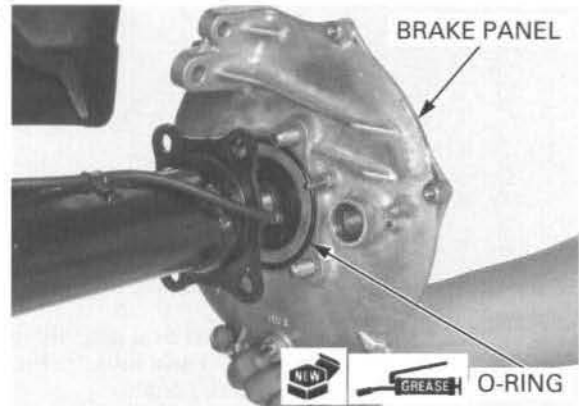
BRAKE SYSTEM

BRAKE PANEL ASSEMBLY



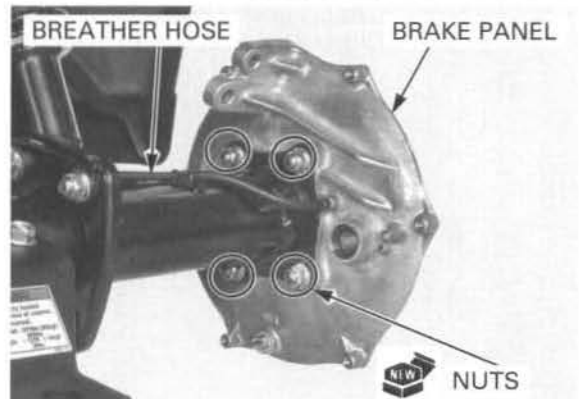
Coat a new O-ring with grease and install it in the brake panel groove.

Install the brake panel onto the axle housing.

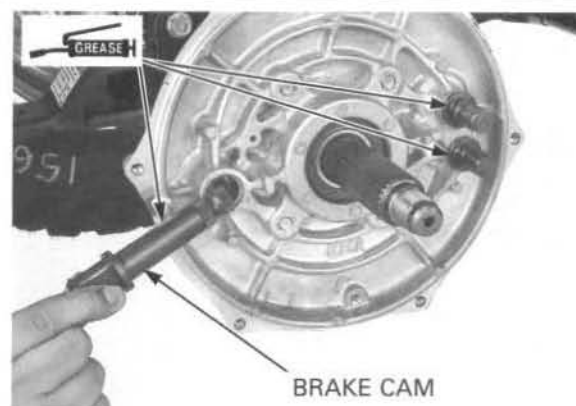


Do not reuse the nuts.

Install and tighten the new nuts.
Connect the breather hose to the brake panel.

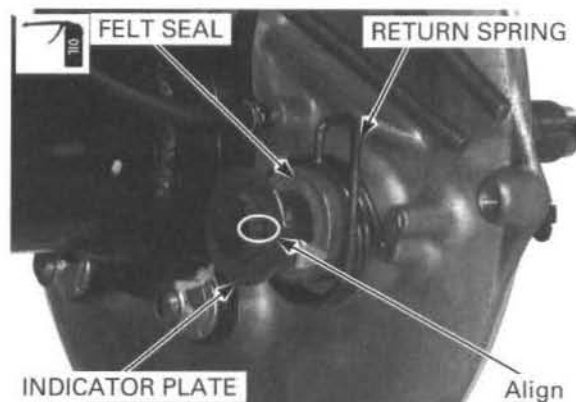


Apply 0.2 – 0.3 g of grease to the brake cam sliding surface and anchor pin contacting area of the brake shoes.
Install the brake cam into the brake panel.



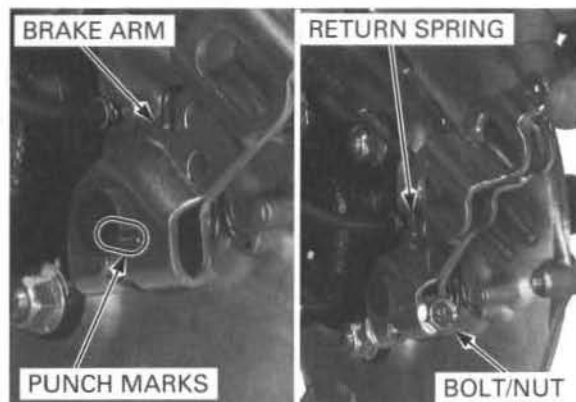
Apply engine oil to the felt seal and install it.
Install the return spring.

Install the indicator plate aligning the wide tooth on the plate with the wide groove on the brake cam.

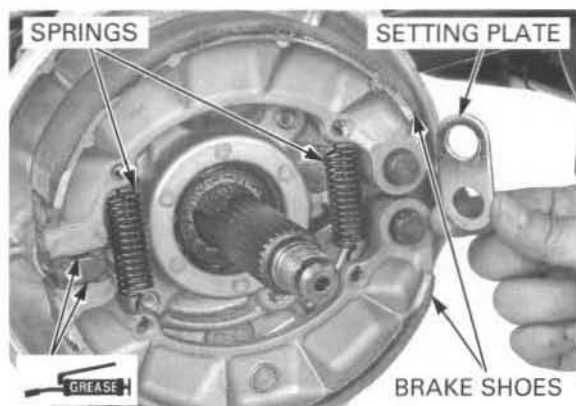


Install the brake arm, aligning the punch marks on the brake arm and cam.
Hook the return spring end onto the brake arm.
Tighten the brake arm pinch bolt/nut to the specified torque.

TORQUE: 20 N·m (2.0 kgf·m, 14 lbf·ft)

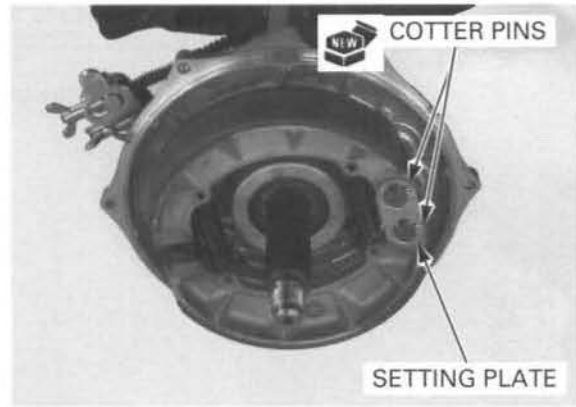


Apply 0.2 – 0.3 g of grease to the brake cam contacting area of the brake shoes.
Install the brake shoes in their original positions with the spring as shown.
Install the anchor pin setting plate with its chamfered side (rolled edge side) facing in.

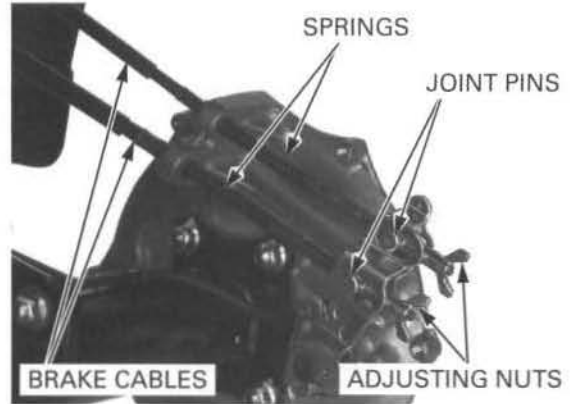


BRAKE SYSTEM

Install the new cotter pins and secure the setting plate as shown.



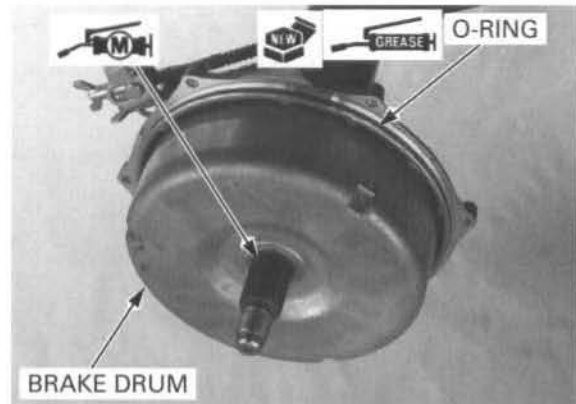
Install the joint pins into the brake arm, then install the brake cables and springs. Install the adjusting nuts.



BRAKE DRUM INSTALLATION

Apply molybdenum disulfide grease to the axle splines and install the brake drum.

Apply grease to a new O-ring and install it onto the brake panel groove.

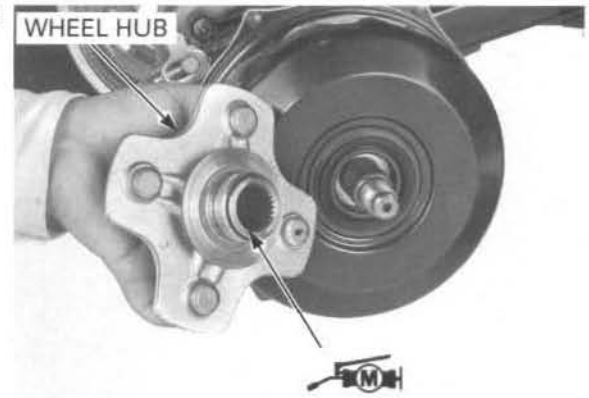


Install the brake drum cover and tighten the bolts.



Apply molybdenum disulfide grease to the axle splines.

Install wheel hub onto the rear axle.



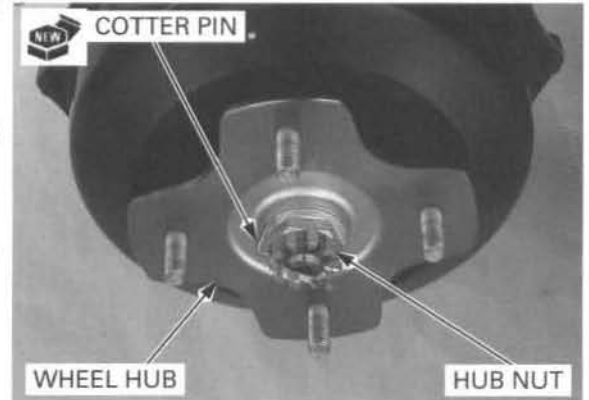
Install the hub nut and tighten it to the specified torque.

TORQUE: 137 N·m (14.0 kgf·m, 101 lbf·ft)

Further tighten the hub nut until its grooves align with the cotter pin hole in the axle shaft. Install a new cotter pin and secure the hub nut.

Install the rear wheel (page 15-6).

Adjust the rear brake lever and pedal freeplay (page 3-22).



BRAKE PEDAL

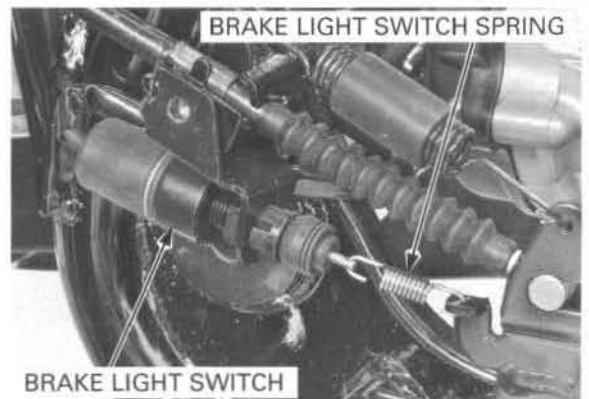
REMOVAL

Remove the brake cables from the brake arm (page 16-21).

Remove the bolt and brake light switch guard.

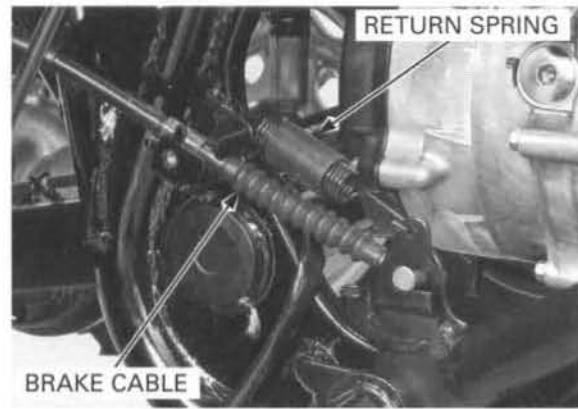


Unhook the brake light switch spring and remove the brake light switch.



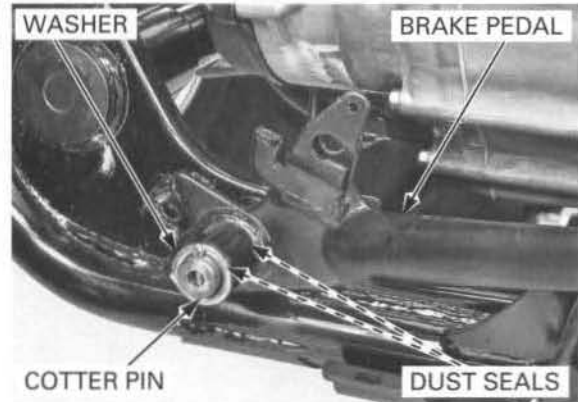
BRAKE SYSTEM

Disconnect the brake cable.
Unhook the brake pedal return spring.



Remove the cotter pin and washer from the pedal pivot shaft, then remove the brake pedal from the shaft.

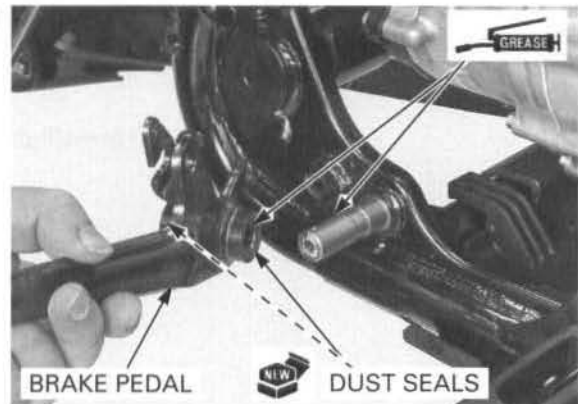
Remove the dust seals.



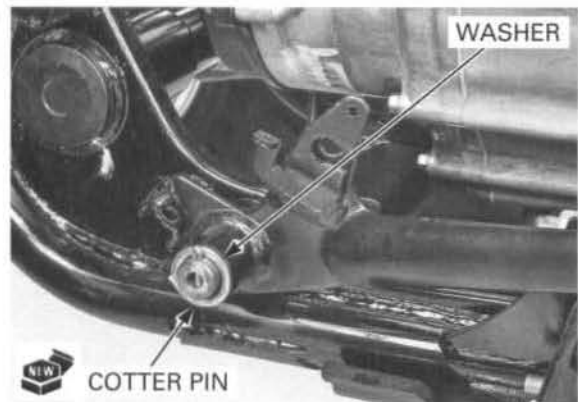
INSTALLATION

Apply grease to the brake pedal pivot shaft sliding surface and dust seal lips.

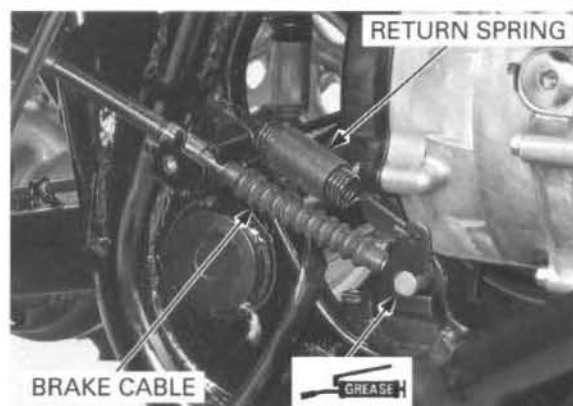
Install the brake pedal onto the pivot shaft.



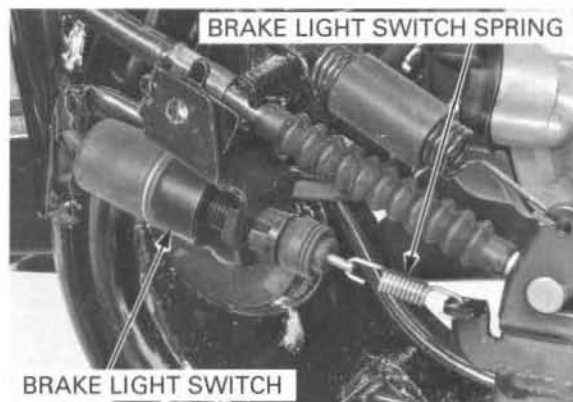
Install the washer and secure the brake pedal with a new cotter pin.



Apply grease to the brake cable end.
Install and connect the brake cable.
Hook the return spring.



Install the brake light switch.
Hook the brake light switch spring.



Install the brake light switch guard and tighten the bolt.

Adjust the rear brake (page 3-23).



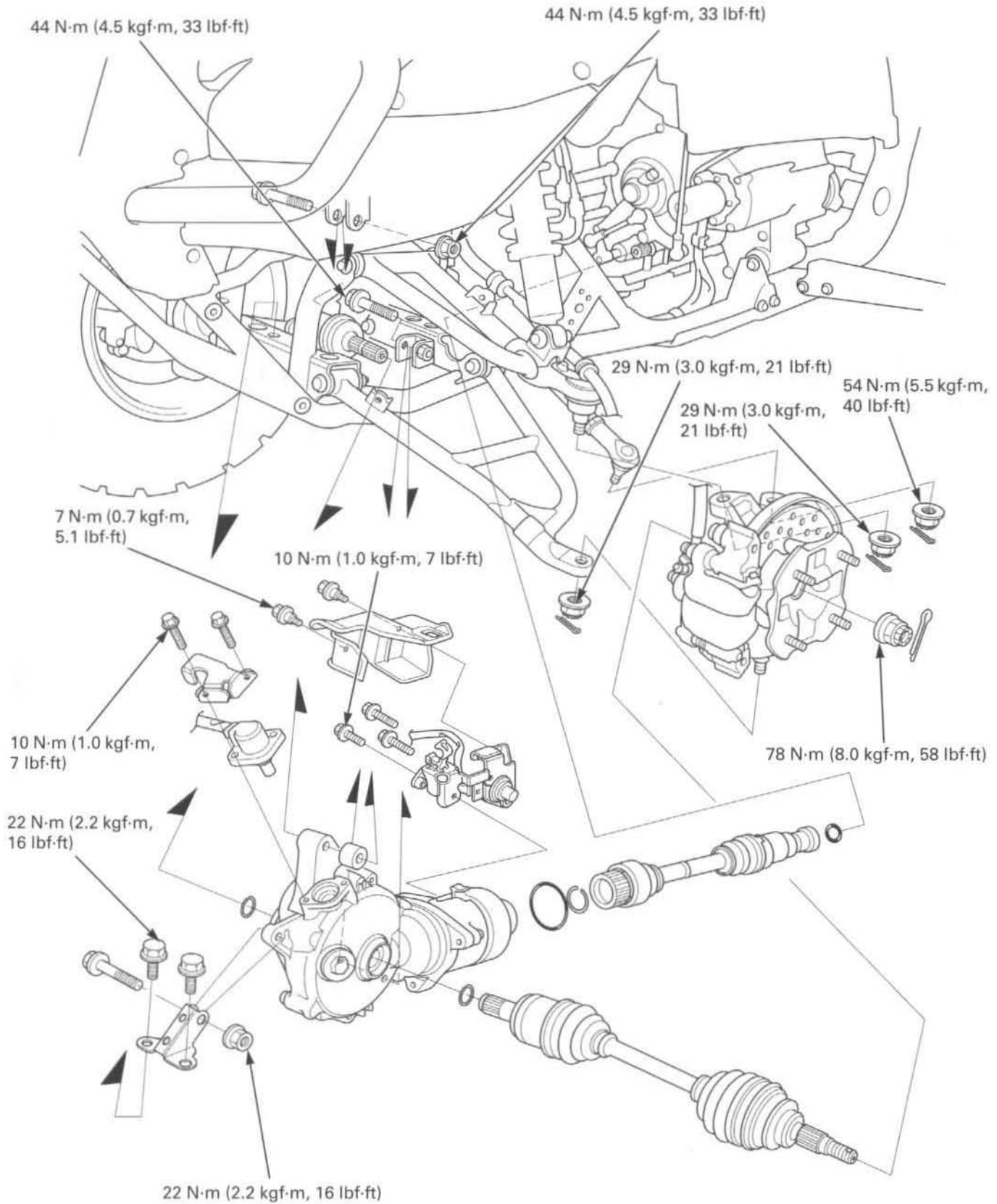
MEMO



17. FRONT DRIVING MECHANISM

SYSTEM COMPONENTS	17-2	DIFFERENTIAL DISASSEMBLY/ INSPECTION	17-17
SERVICE INFORMATION	17-3	CASE BEARING REPLACEMENT	17-24
TROUBLESHOOTING	17-6	DIFFERENTIAL ASSEMBLY	17-27
FRONT DRIVE SHAFT	17-7	DIFFERENTIAL INSTALLATION	17-32
DIFFERENTIAL REMOVAL	17-14		

FRONT 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.
- Replace the ring and pinion gears as a set.
- Replace the cam followers (12 pieces) as a set, and the cam followers, face cams, differential housing and cap as an assembly if the face cam, differential housing or cap is faulty.

SPECIFICATIONS

Unit: mm (in)

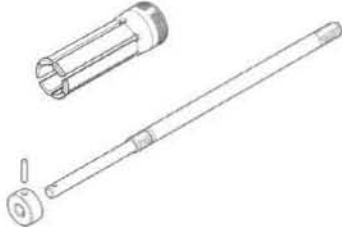
ITEM		STANDARD	SERVICE LIMIT
Front differential	Oil capacity	After draining	185 cm ³ (6.3 US oz, 6.5 Imp oz)
		After disassembly	230 cm ³ (7.8 US oz, 8.1 Imp oz)
	Recommended oil	Hypoid gear oil SAE #80	-
	Gear backlash	0.05 - 0.25 (0.002 - 0.010)	0.4 (0.02)
	Backlash difference	-	0.2 (0.01)
	Slip torque	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)	6.6 (0.26)
	Cone spring height	2.8 (0.11)	2.6 (0.10)

TORQUE VALUES

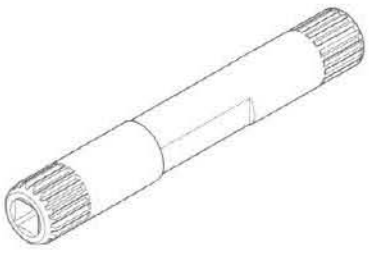
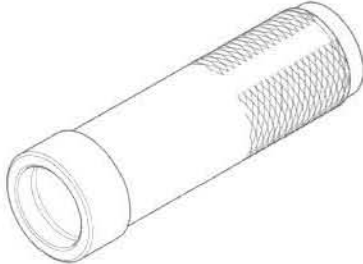

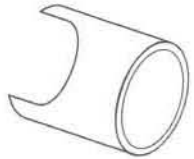
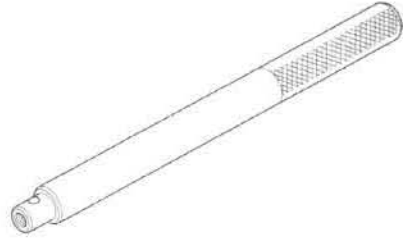
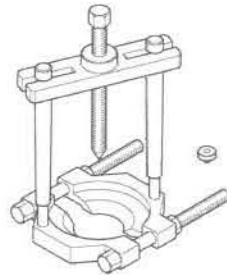

Upper and lower arm ball joint nut		29 N·m (3.0 kgf·m, 21 lbf·ft)	Castle nut
Front wheel hub nut		78 N·m (8.0 kgf·m, 58 lbf·ft)	Castle nut
Differential ring gear bolt		49 N·m (5.0 kgf·m, 36 lbf·ft)	Special bolt: replace with a new one Apply locking agent to the threads
Differential case cover 10 mm bolt	('05 - '07)	49 N·m (5.0 kgf·m, 36 lbf·ft)	Apply locking agent to the threads
	(After '07)	46.5 N·m (4.7 kgf·m, 34 lbf·ft)	Apply locking agent to the threads
Differential case cover 8 mm bolt		25 N·m (2.6 kgf·m, 19 lbf·ft)	
Differential case mounting bolt	(10 mm)	44 N·m (4.5 kgf·m, 33 lbf·ft)	
Differential case mounting bracket bolt	(8 mm)	22 N·m (2.2 kgf·m, 16 lbf·ft)	
Differential case mounting nut	(10 mm)	44 N·m (4.5 kgf·m, 33 lbf·ft)	Lock nut: replace with a new one
Differential case mounting nut	(8 mm)	22 N·m (2.2 kgf·m, 16 lbf·ft)	
Final drive clutch assembly mounting bolt		25 N·m (2.6 kgf·m, 19 lbf·ft)	ALOC bolt: replace with a new one
Front vehicle speed sensor cover 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)	
Clutch cover bolt		7 N·m (0.7 kgf·m, 5.1 lbf·ft)	
Splash guard bolt		11 N·m (1.1 kgf·m, 8 lbf·ft)	ALOC bolt: replace with a new one
Tie-rod ball joint nut		54 N·m (5.5 kgf·m, 40 lbf·ft)	Lock nut: replace with a new one
Front wheel hub nut		78 N·m (8.0 kgf·m, 58 lbf·ft)	Castle nut

FRONT DRIVING MECHANISM

TOOLS

<p>Driver 07749-0010000</p> 	<p>Attachment, 22 x 24 mm 07746-0010800</p> 	<p>Attachment, 52 x 55 mm 07746-0010400</p> 
<p>Attachment, 20 mm I.D. 07746-0020400</p> 	<p>Pilot, 15 mm 07746-0040300</p> 	<p>Pilot, 28 mm 07746-0041100</p> 
<p>Bearing remover head, 15 mm 07936-KC10200</p> 	<p>Remover shaft 07936-KC10100</p> 	<p>Remover weight 07741-0010201</p>  <p>or 07936-3710200 or 07936-371020A (U.S.A. only)</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>Bearing remover head, 30 mm 07936-8890300</p> 	<p>Remover handle 07936-3710100</p> 

FRONT DRIVING MECHANISM

<p>Differential inspection tool 07KMK-HC50101</p>  <p>or 07KMK-HC5010A (U.S.A. only)</p>	<p>Driver, 40 mm I.D. 07746-0030100</p> 	<p>Attachment, 30 mm I.D. 07746-0030300</p> 
<p>Differential bearing clip compressor 07YME-HN4010A (U.S.A. only)</p> 	<p>Driver shaft 07949-3710001</p> 	<p>Universal bearing puller 07631-0010000</p> 
<p>Press attachment 07LME-GE20100</p> 		

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 noise while coasting

- Chipped or damaged gears

Abnormal noises when turning

- Worn or damaged ring gear bearing
- Worn or damaged face cams 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

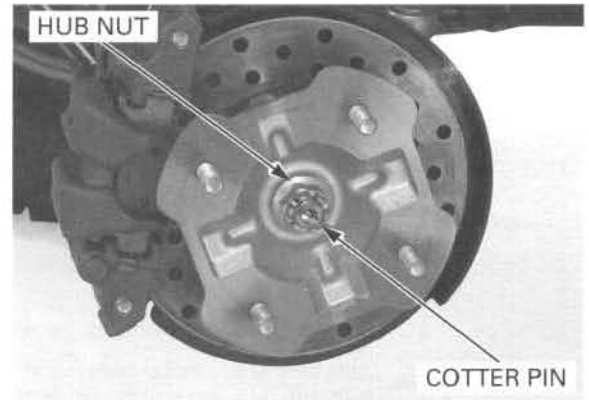
Overheating

- Oil level too low
- Insufficient backlash between ring gear and pinion gear

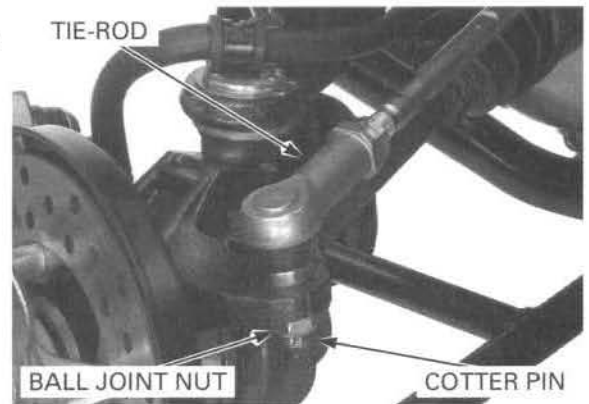
FRONT DRIVE SHAFT

REMOVAL

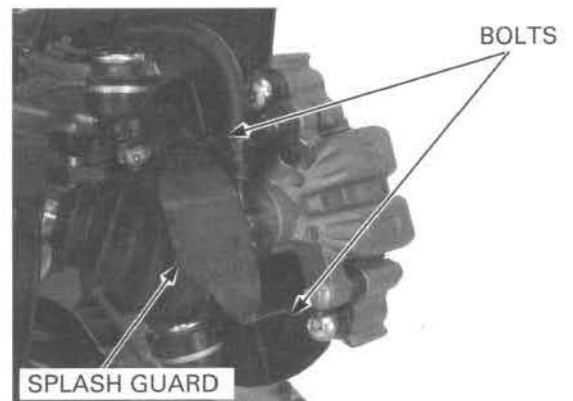
Remove the front wheel (page 14-14).
Remove the cotter pin and loosen the hub nut.



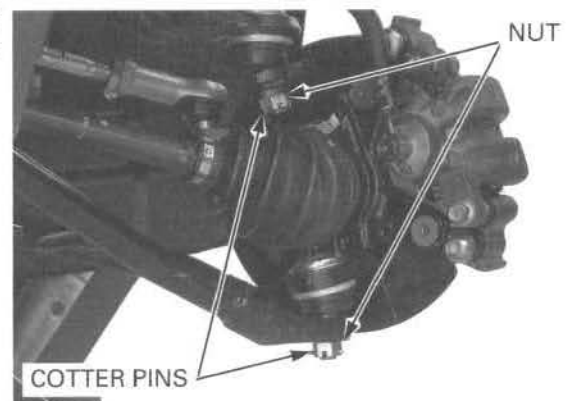
Remove the cotter pin.
Remove the tie-rod ball joint nut while holding the joint stud flats with an open end wrench.
Remove the tie-rod from the knuckle.



Remove the two bolts and splash guard.



Remove the cotter pins and loosen the castle nuts of the suspension arm ball joints, but do not remove them yet.



FRONT DRIVING MECHANISM

Separate the ball joints, using the special tool according to the instructions (page 14-21).

TOOL:

Ball joint remover, 28 mm

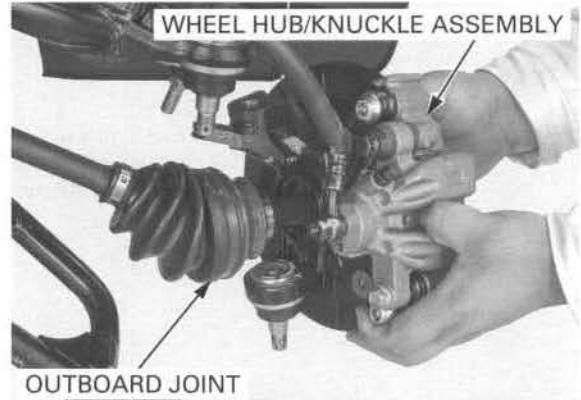
07MAC-SL00201
07MAC-SL0A202
(U.S.A. only) or
07MAC-SL00200 and
07MAC-SL0A300
(U.S.A. only)



Do not get grease onto the shoe linings.

Remove the axle nut and the wheel hub/knuckle.

Remove the castle nuts, and separate the wheel hub/knuckle assembly from the suspension arms and drive shaft outboard joint.



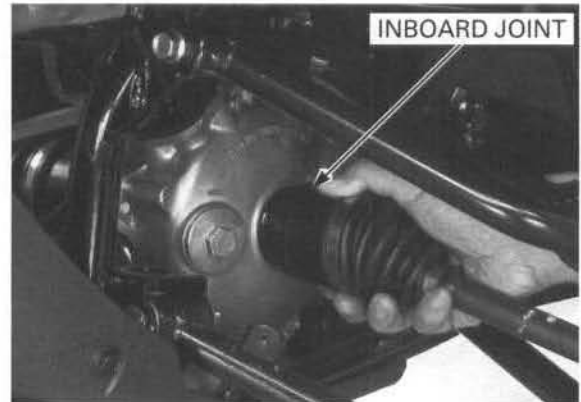
Do not twist the brake hose.

Support the wheel hub/knuckle assembly so that it does not hang from the brake hose.

To prevent damage 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 in the drive shaft end past the groove while prying with a screwdriver.

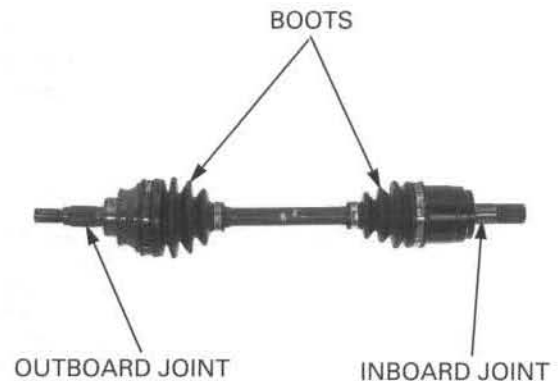
Remove the stopper ring from the inboard joint.



DISASSEMBLY/INSPECTION

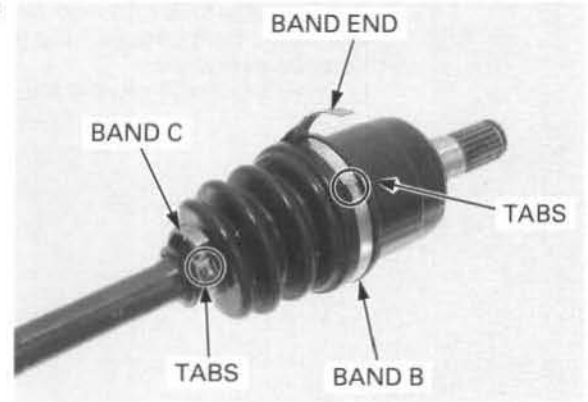
Check the boots for cuts or other damage. Check the drive shaft joints for excessive play or noise by moving the joints in a circular direction. If the outboard joint seems to be worn or damaged, the drive shaft must be replaced.

- To replace the outboard boot, first remove the inboard boot as described in the following steps. Then remove the bands and outboard boot from the inboard end of the shaft.
- The outboard joint cannot be disassembled.



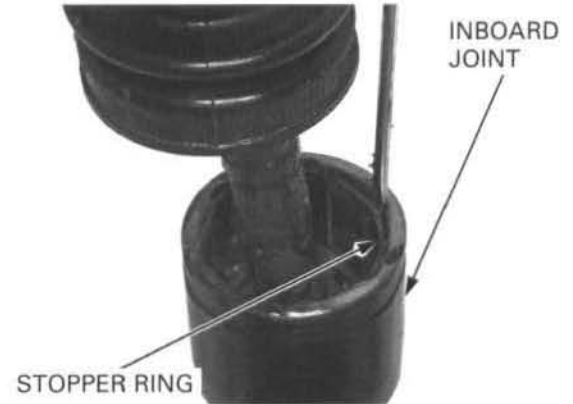
FRONT DRIVING MECHANISM

Replace the bands with new ones whenever removing them. Bend up the lock tabs and raise the band ends to loosen the boot bands on the inboard side. Remove the boot band B. Remove the boot from the inboard joint.

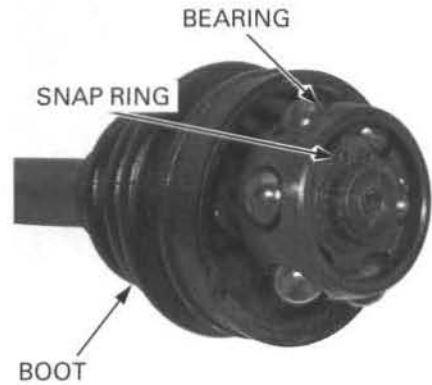


Remove the following:

- stopper ring
- inboard joint

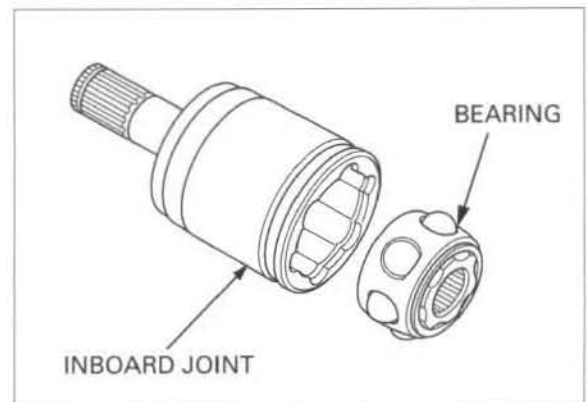


- snap ring
- bearing
- inboard boot
- boot band C



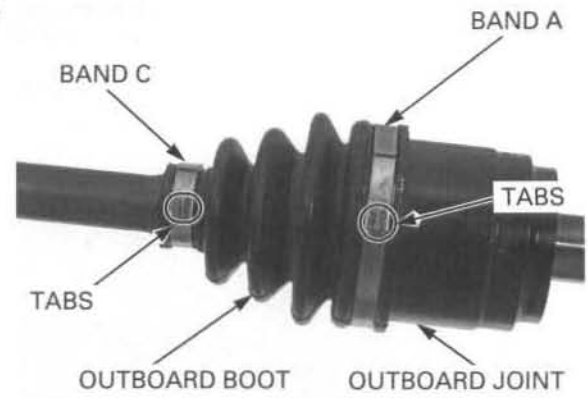
Replace the components as an assembly. Check the following for wear or damage:

- bearing cage
- race
- steel balls
- inboard joint

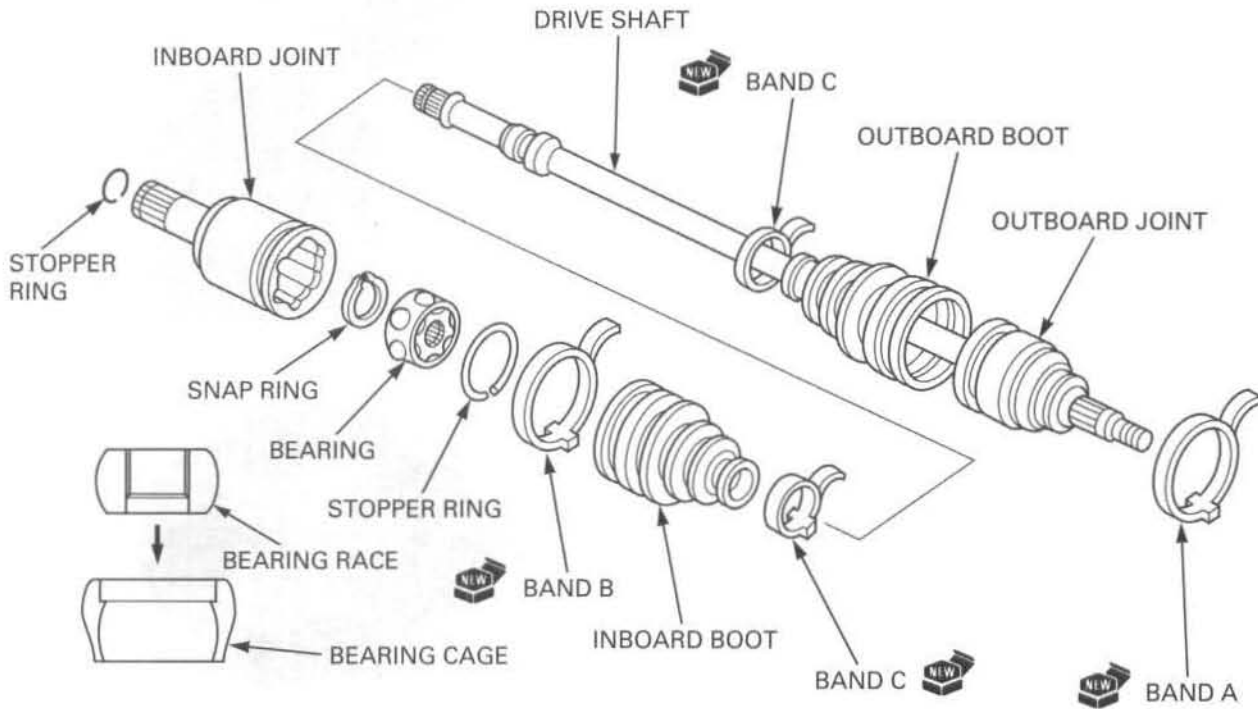


FRONT DRIVING MECHANISM

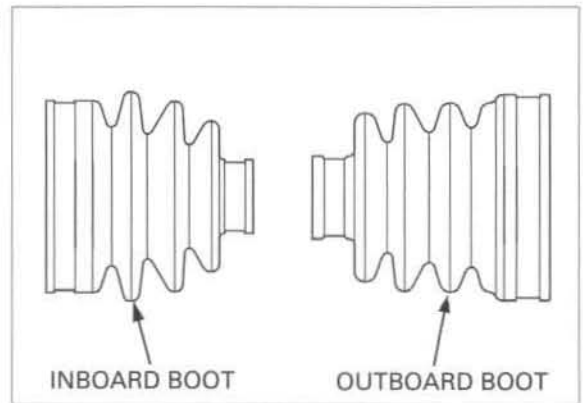
Bend up the lock tabs and raise the band ends to loosen the boot bands on the outboard side.
Remove boot band A.
Remove the boot from the outboard joint.



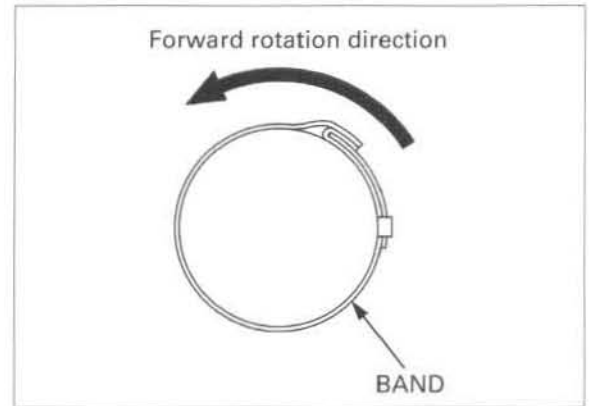
ASSEMBLY



The outboard boots is larger than the inboard boots.



Note the installation direction of the boot bands.

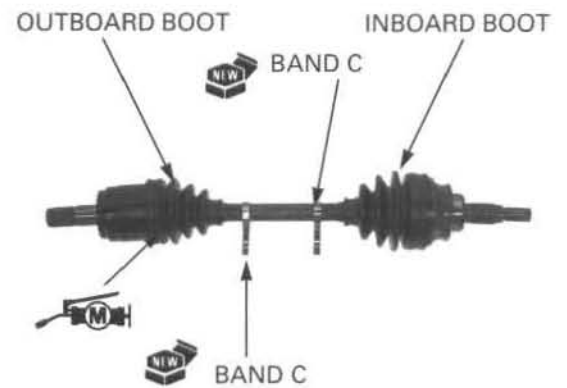


Pack the outboard joint with 40 – 60 g ('05 – '06)/35 – 55 g (After '06) of molybdenum disulfide grease.

Install the following:

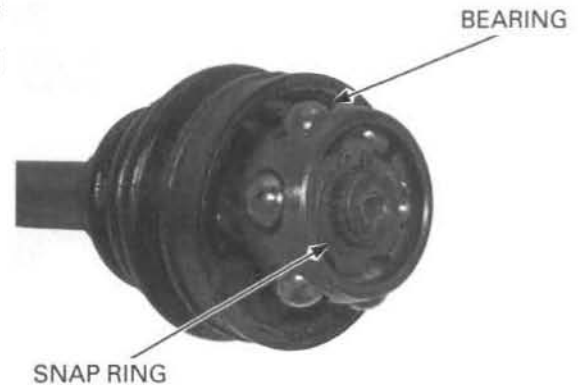
- outboard boot
- new boot band C
- inboard boot

Do not tighten the bands at this time.



Install the bearing with the small O.D. facing the drive shaft.

Install the snap ring with the chamfered side facing the bearing.



Pack the inboard joint with 55 – 75 g ('05 – '06)/40 – 60 g (After '06) of molybdenum disulfide grease.

Install the inboard joint over the bearing.

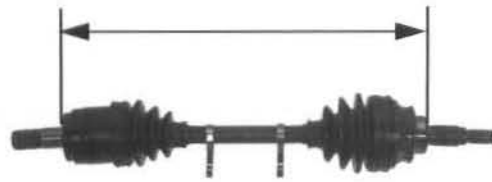
Install the stopper ring into the groove in the inboard joint properly.



FRONT DRIVING MECHANISM

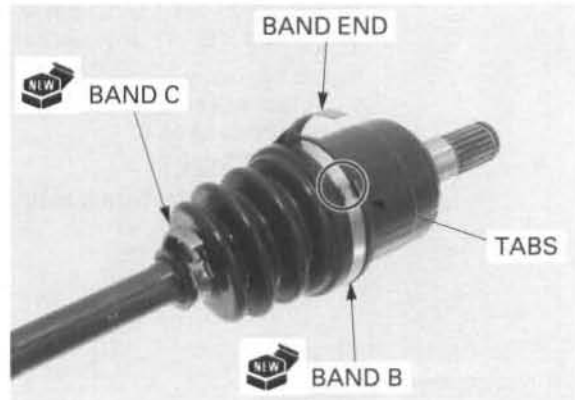
Adjust the length of the drive shaft to the figure given below.

DRIVE SHAFT LENGTH: Left: 363.2 mm (14.30 in)
Right: 383 mm (15.08 in)

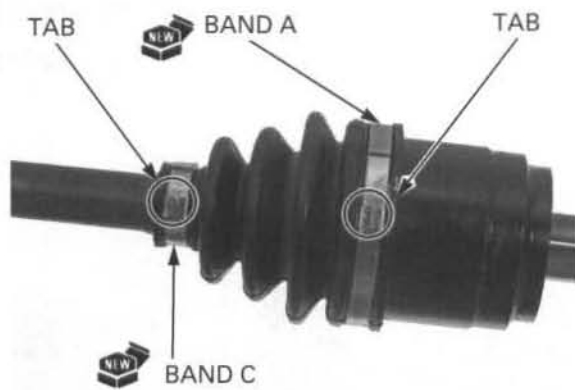


See page 17-11 for band installation direction.

Install a new boot band C and a new boot band B onto the inboard joint boot. Bend down the band end and secure it with the lock tabs. Tap the lock tabs with a plastic hammer.



Install a new boot band C and a new outboard boot band onto the outboard joint. Bend down the band end and secure it with the lock tabs. Tap the lock tabs with a plastic hammer.



INSTALLATION

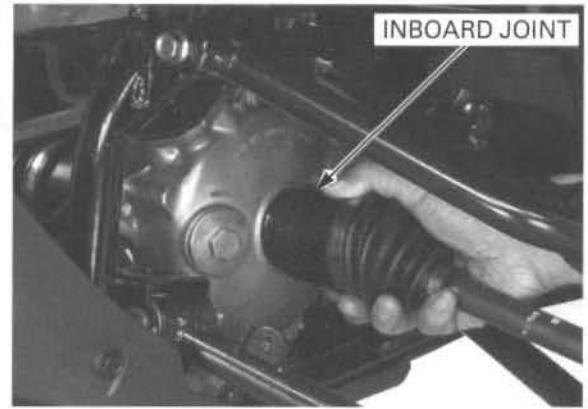
Install a new stopper ring into the groove in the inboard joint splines.



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 out the inboard joint lightly.



Do not get grease onto the shoe linings.

Install the wheel hub/knuckle assembly over the drive shaft and onto the suspension arms. Install hub nut, and temporarily tighten the nut.

Install and tighten each joint nut to the specified torque and further tighten until its grooves align with the cotter pin holes.

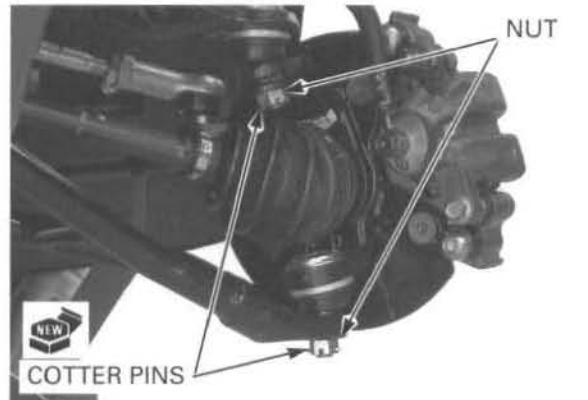


Do not get grease onto the shoe linings.

Install and tighten each 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)

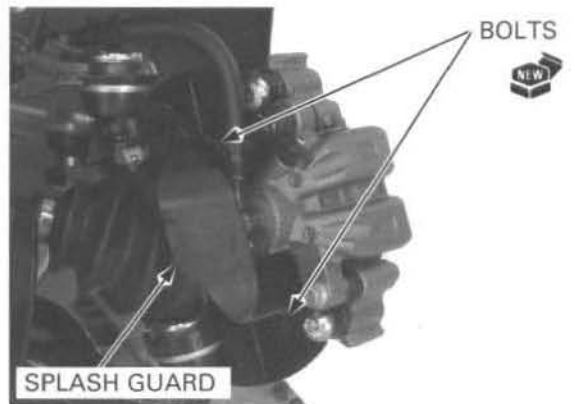
Install new cotter pins.



Install the splash guard and new bolts.

Tighten the splash guard bolts to the specified torque.

TORQUE: 11 N·m (1.1 kgf·m, 8 lbf·ft)

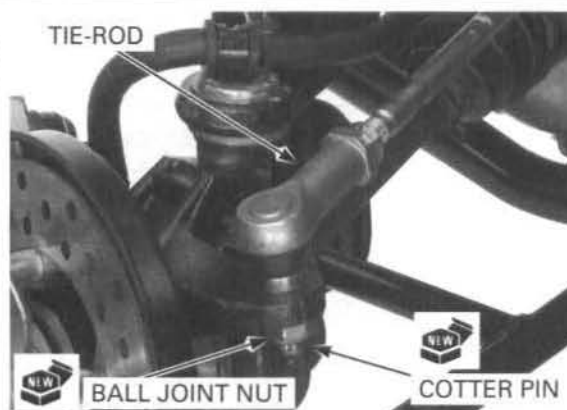


FRONT DRIVING MECHANISM

Install the tie-rod onto the knuckle.
Install a new tie-rod ball joint nut and tighten it by holding the ball joint stud flats with an open end wrench.

TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)

Install a new cotter pin.

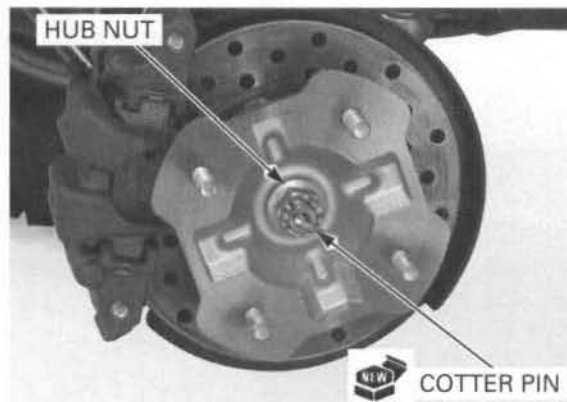


Tighten the hub nut to the specified torque and further tighten until its grooves align with the cotter pin hole.

TORQUE: 78 N·m (8.0 kgf·m, 58 lbf·ft)

Install a new cotter pin.

Install the front wheel (page 14-14).



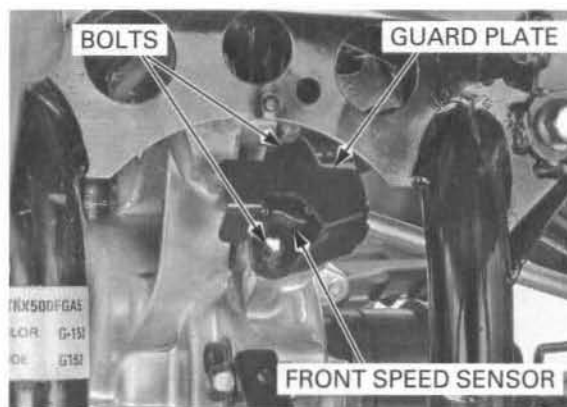
DIFFERENTIAL REMOVAL

Drain the differential oil (page 3-18).

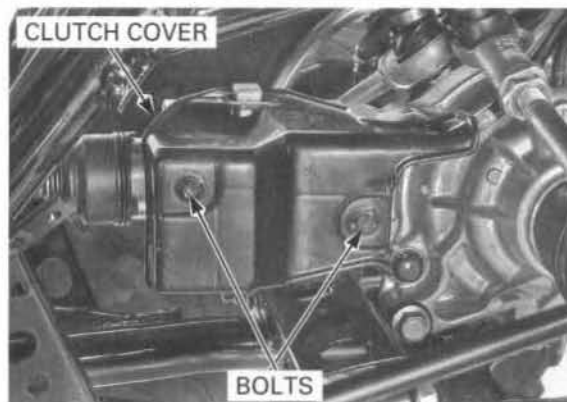
Remove the following:

- front fender/inner fender (page 2-11)
- left drive shaft (page 17-7)

Remove the two bolts, guard plate and front vehicle speed sensor.

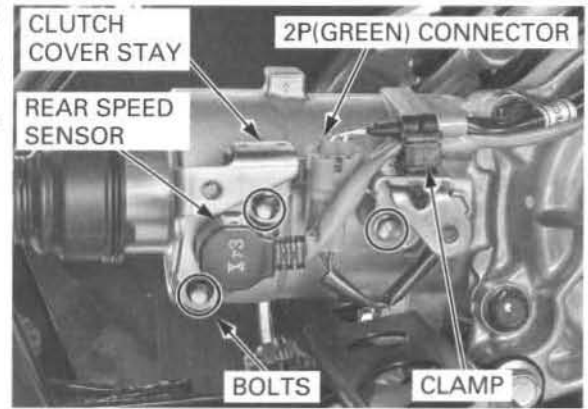


Remove the two bolts and clutch cover.

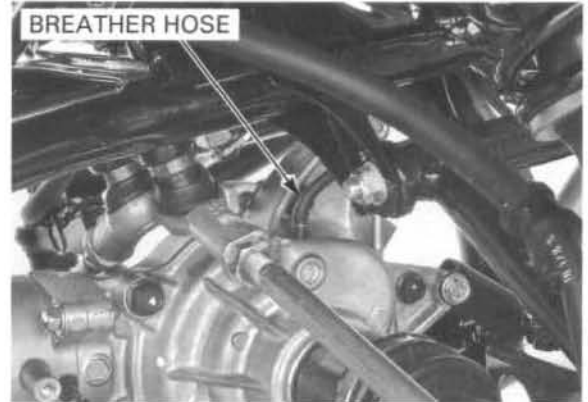


FRONT DRIVING MECHANISM

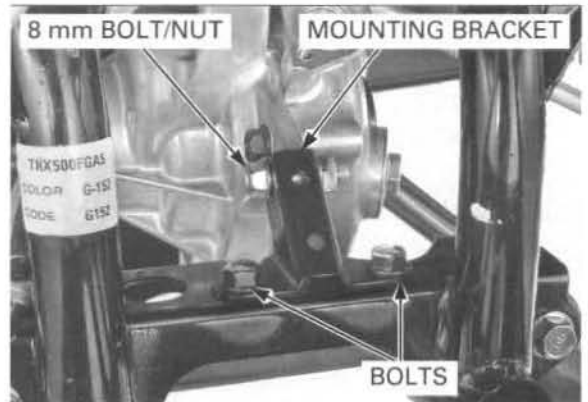
Remove the rear vehicle speed sensor wire and front final clutch wire from the clamp.
Remove the three bolts, front clutch cover stay and rear vehicle speed sensor.
Disconnect the front final clutch 2P (Green) connector.



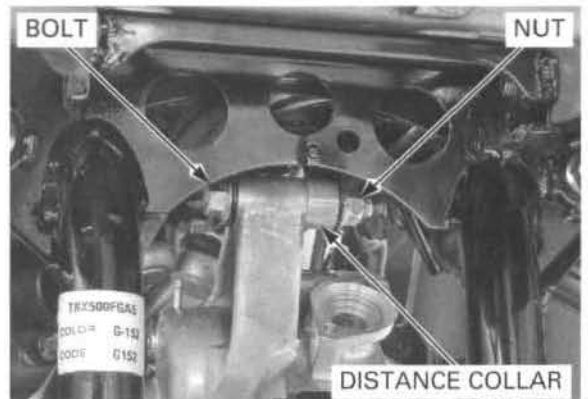
Disconnect the front differential case breather hose.



Remove the differential case mounting 8 mm bolt and nut.
Remove the bolts and differential case mounting bracket.

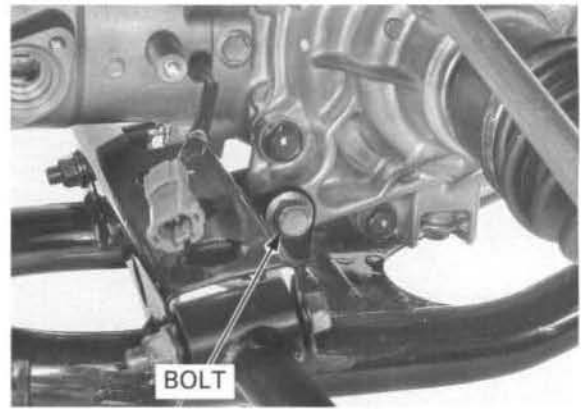


Remove the differential case upper mounting bolt/nut and distance collar.



FRONT DRIVING MECHANISM

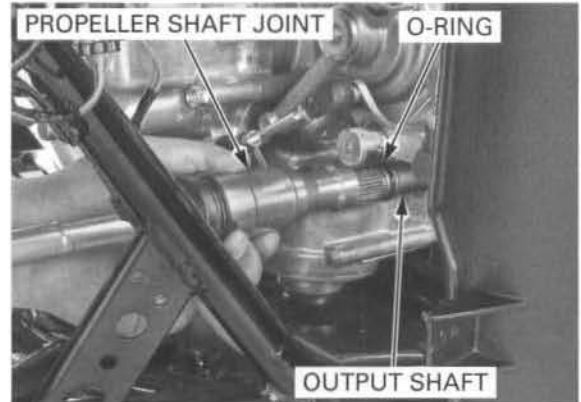
Remove the differential case lower mounting bolt.



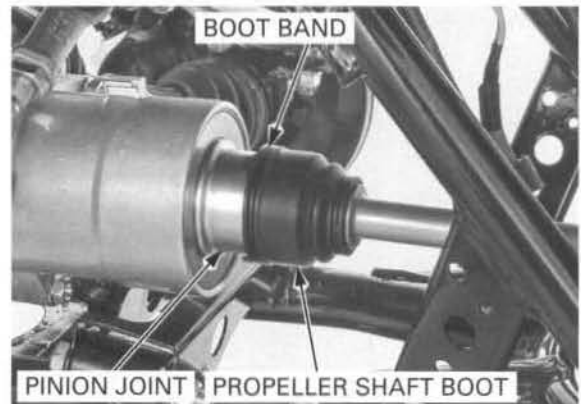
Move the differential forward for maximum clearance between the propeller shaft joint and engine.

Pull the propeller shaft joint out of the output shaft of the engine.

Remove the O-ring.

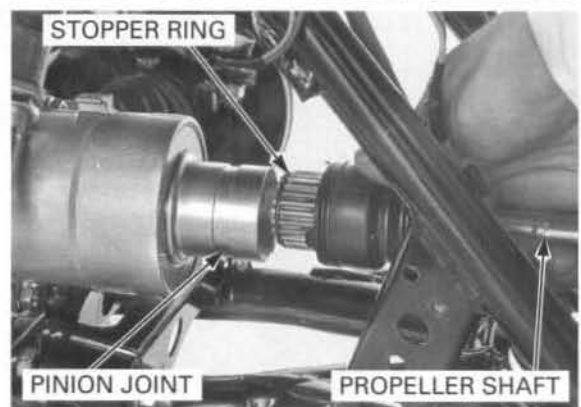


Remove the boot band and propeller shaft boot from the pinion joint.

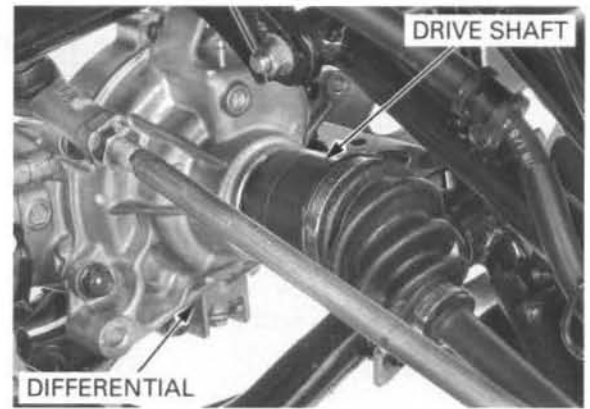


Pull the propeller shaft to force the stopper ring past the groove in the pinion joint and remove the propeller shaft.

Remove the stopper ring from the propeller shaft end.



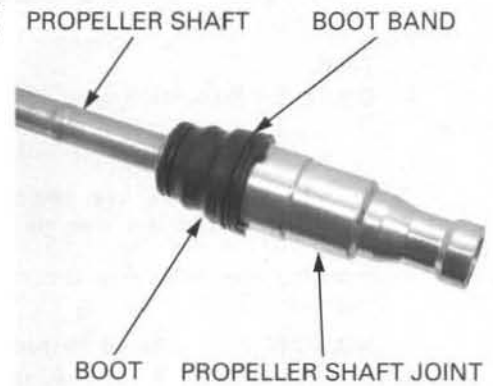
Separate the other drive shaft from the differential.
Remove the differential assembly from the frame.



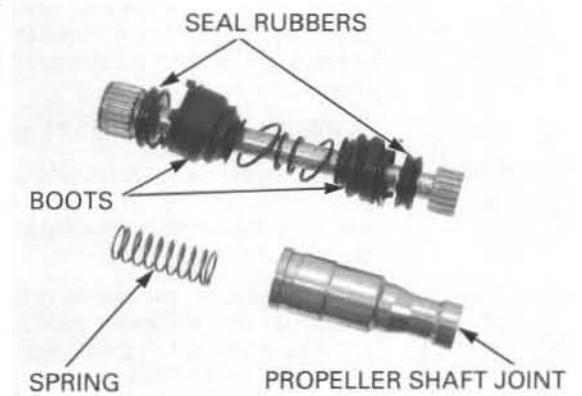
DIFFERENTIAL DISASSEMBLY/ INSPECTION

PROPELLER SHAFT INSPECTION

Remove the boot band and boot from the propeller shaft joint, and remove the propeller shaft joint and spring.

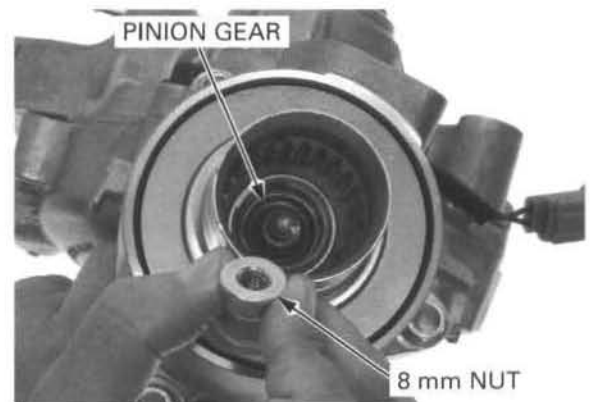


Check the splines of the propeller shaft and joint for wear or damage.
If damaged, check the output shaft and the pinion joint also.
Check the seal rubbers for fatigue or damage.
Check the boots for cuts, deterioration or damage.



OPERATION CHECK

Install a 8 mm nut onto the pinion gear.



FRONT DRIVING MECHANISM

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 or bearing may be damaged or faulty. They must be checked after disassembly; replace them if necessary.



BACKLASH INSPECTION

Hold the pinion gear with the 8 mm nut. Set the differential case into a jig or vise with soft jaws.

Install the differential inspection tool into the right side of the differential.

TOOL:

Differential inspection tool 07KMK-HC50101 or
07KMK-HC5010A
(U.S.A. only)

Remove the oil filler cap and set a horizontal type dial indicator on the ring gear through the filler hole.

Turn the ring gear back and forth to measure the 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).

- Twenty-three different thickness shims are available from the thinnest (0.50 mm) shim to the thickest (1.60 mm) shim in increments of 0.05 mm.

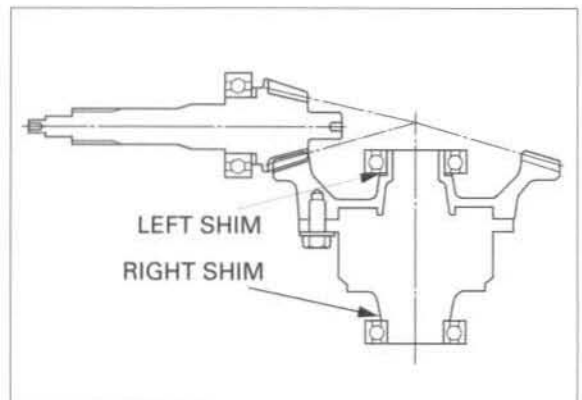
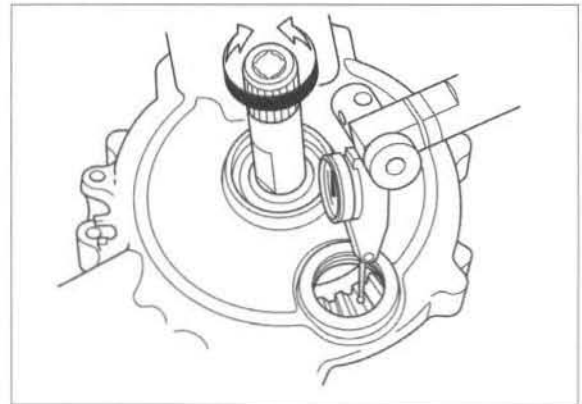
Ring gear shims:

A: (thinnest): 0.50 mm (0.020 in)

K: (standard): 1.00 mm (0.039 in)

W: (thickest): 1.60 mm (0.063 in)

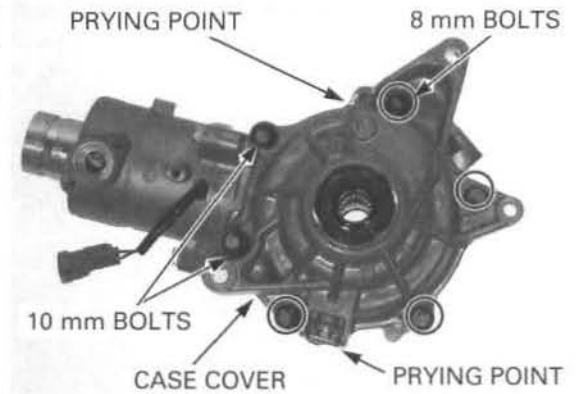
Change the right side shim an equal thickness and opposite amount of what the left side shim was changed; If the left shim was replaced with a 0.10 mm (0.004 in) thicker shim, replace the right shim with one that is 0.10 mm (0.004 in) thinner.



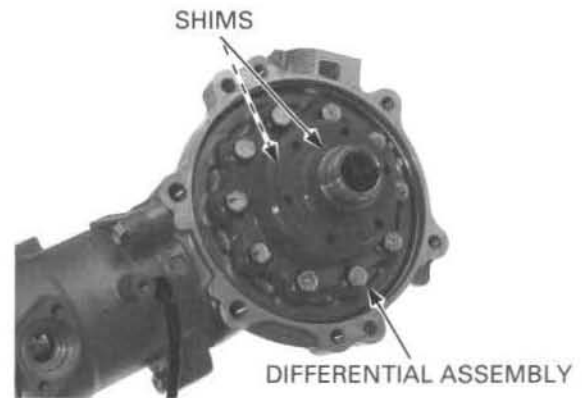
DIFFERENTIAL CASE DISASSEMBLY

Loosen the two 10 mm cover bolts and four 8 mm cover bolts in a crisscross pattern in several steps and remove them.

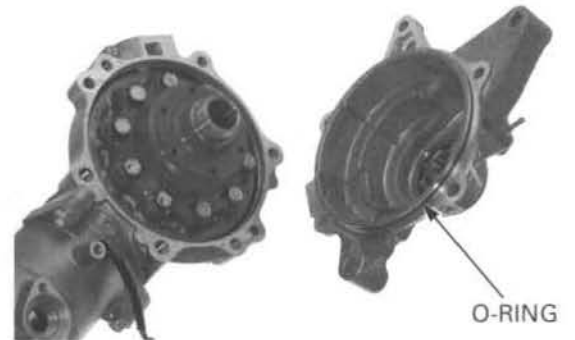
Pry the case cover at the points as shown by using a screwdriver and remove the cover.



Remove the differential assembly and shims.



Remove the O-ring.



BEARING INSPECTION

Turn the inner race of each bearing in the gear case and 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.



FRONT 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 differential 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 left ring gear shim onto the differential assembly.

Install the differential assembly into the gear case.

Install the right shim onto the differential assembly.

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:

'05 - '07: 49 N·m (5.0 kgf·m, 36 lbf·ft)

After '07: 46.5 N·m (4.7 kgf·m, 34 lbf·ft)

8 mm bolt: 25 N·m (2.6 kgf·m, 19 lbf·ft)

Remove the oil filler cap.

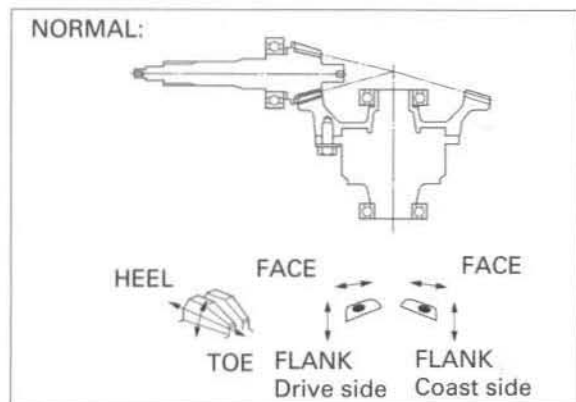
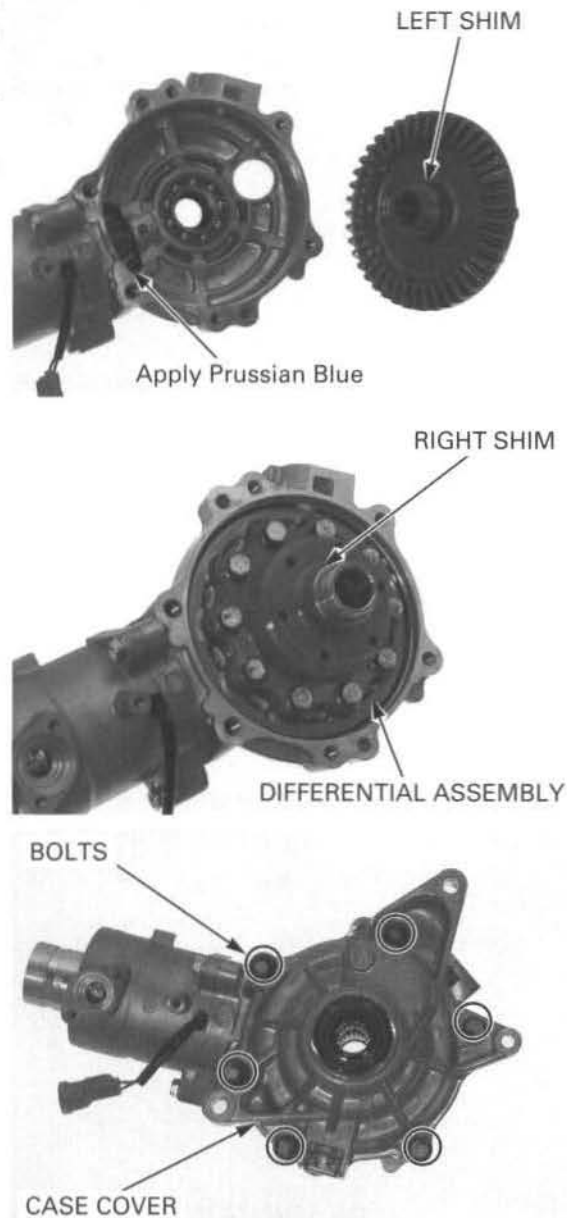
Rotate the ring gear several times in both directions of rotation.

Check the gear tooth contact pattern through the oil filler hole.

The pattern is indicated by the Prussian Blue applied to the pinion.

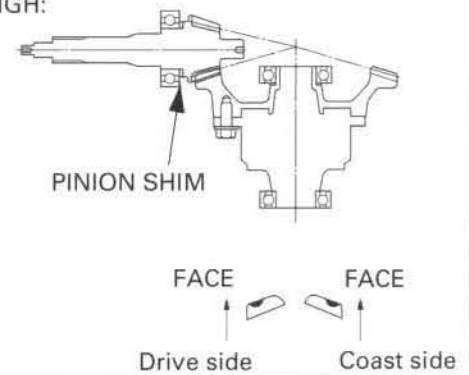
Contact is normal if the Prussian Blue is transferred to the approximate center of each tooth, but slightly to the heel side and to the flank side.

If the patterns are not correct, remove and change the pinion shim with one of an alternate thickness.



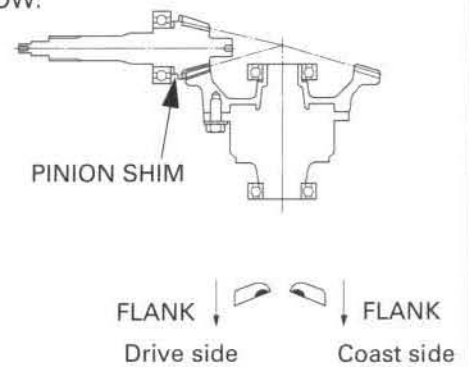
Replace the pinion shim with a thicker one if the contact pattern is too high, toward the face.

TOO HIGH:



Replace the pinion shim with a thinner one if the contact pattern is too low, toward the flank.

TOO LOW:



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).

Pinion gear shims:

- A: (thinnest): 1.64 mm (0.064 in)**
- G: (standard): 2.00 mm (0.079 in)**
- O: (thickest): 2.48 mm (0.098 in)**

Fifteen different thickness shims are available from the thinnest (1.64 mm) shim to the thickest (2.48 mm) shim in increments of 0.06 mm.

See page 17-28 for pinion shim replacement.

DIFFERENTIAL INSPECTION

Install the inspection tools into both sides of the differential.

TOOL:

Slip torque inspection tool **07KMK-HC50101 or 07KMK-HC5010A (U.S.A. only)**

Hold the flat surface of the tool with a vise.

Attach a torque wrench to the other tool and measure the limited slip torque.

STANDARD:

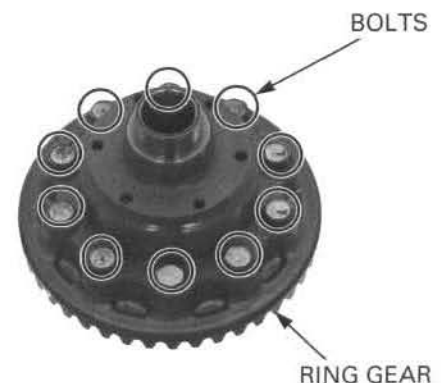
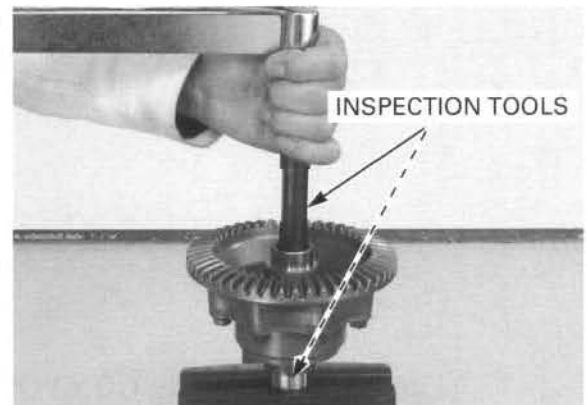
14 – 17 N·m (1.45 – 1.75 kgf·m, 10 – 13 lbf·ft)

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 17-22) since the differential may be faulty.

DIFFERENTIAL DISASSEMBLY

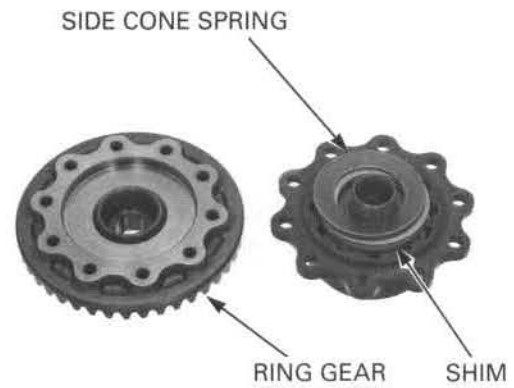
Remove the ten bolts, then place the differential assembly with the ring gear side up.



FRONT DRIVING MECHANISM

Remove the following:

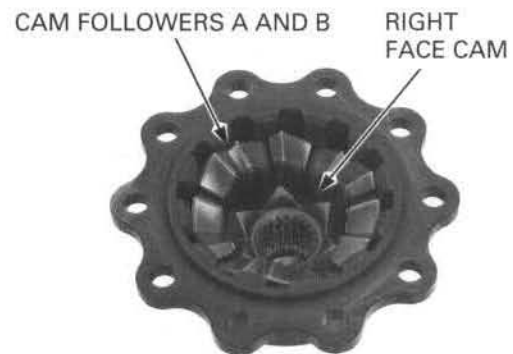
- ring gear
- side cone spring
- shim



- left face cam



- six cam followers A and six cam followers B
- right face cam



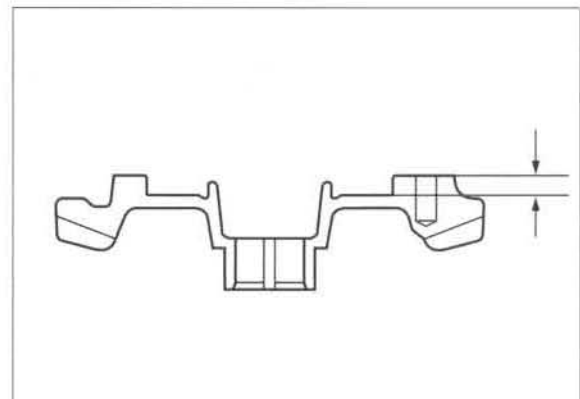
DIFFERENTIAL COMPONENTS INSPECTION

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: 6.6 mm (0.26 in)



DIFFERENTIAL HOUSING/FACE CAM/CAM FOLLOWERS

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.

FACE CAM



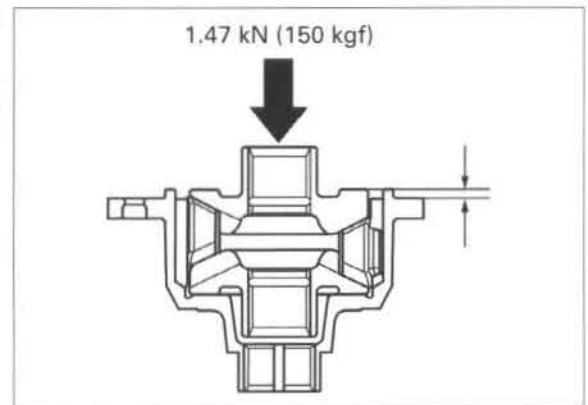
CAM FOLLOWERS

Temporarily assemble the differential housing, face cams and cam followers (page 17-29).

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 smaller than the service limit, replace the differential as an assembly.



SIDE CONE SPRING

Check the cone spring for damage.

Measure the height of the cone spring.

SERVICE LIMIT: 2.6 mm (0.10 in)

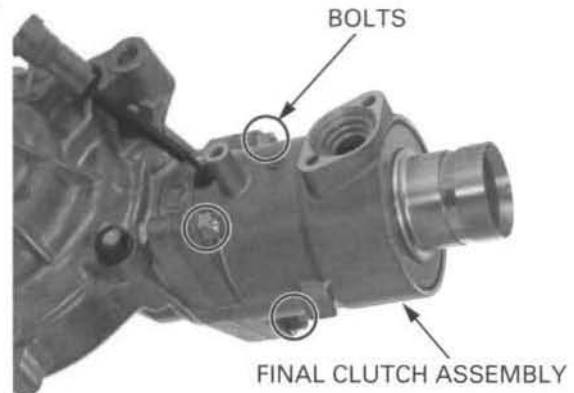


FRONT DRIVING MECHANISM

PINION GEAR REMOVAL

Remove the three bolts and front final clutch assembly from the differential.

Remove the O-ring from the final clutch assembly.



Press the pinion gear out of the final clutch assembly using the special tools.

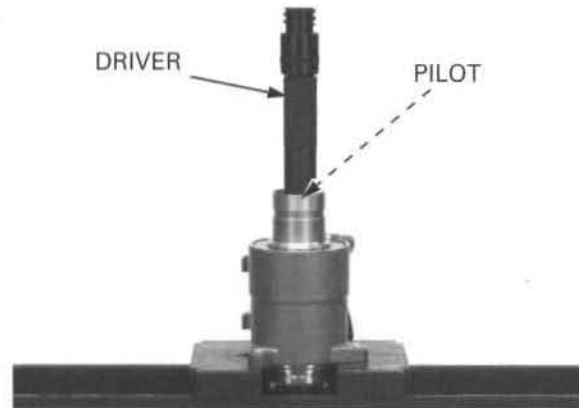
TOOLS:

Driver

07749-0010000

Pilot, 15 mm

07746-0040300



Be sure to wear heavy gloves to avoid burns when handling the heated final clutch. Using a torch to heat the final clutch may damage the clutch.

Heat the final clutch to about 100°C (212°F).

Remove the pinion gear bearing from the final clutch using the special tools.

TOOLS:

Bearing remover, 30 mm

07936-8890300

Remover handle

07936-3710100

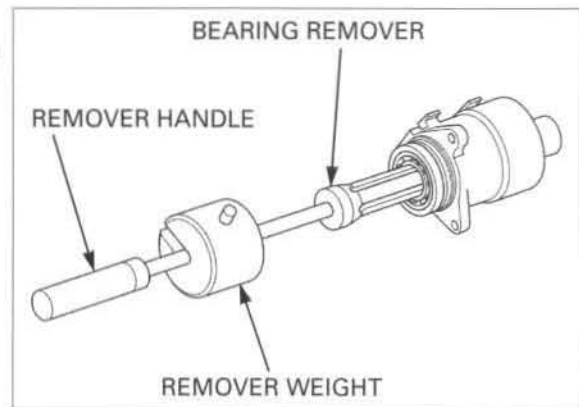
Remover weight

07741-0010201 or

07936-3710200 or

07936-371020A

(U.S.A. only)

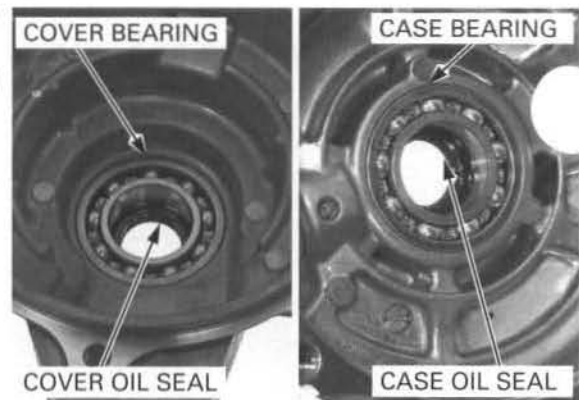


CASE BEARING REPLACEMENT

DIFFERENTIAL BEARING

Remove the oil seals from the differential case and cover.

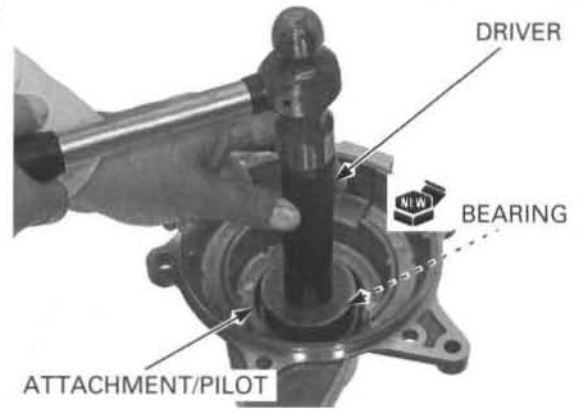
Drive the differential bearing out of the case and cover.



Drive new bearings into the differential case and cover.

TOOLS:

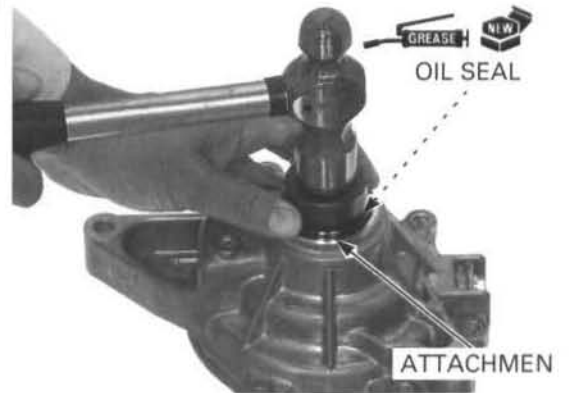
Driver	07749-0010000
Attachment, 52 x 55 mm	07746-0010400
Pilot, 28 mm	07746-0041100



Apply grease to new oil seal lips and install them into the differential case and cover.

TOOL:

Attachment, 20 mm I.D.	07746-0020400
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PINION NEEDLE BEARING

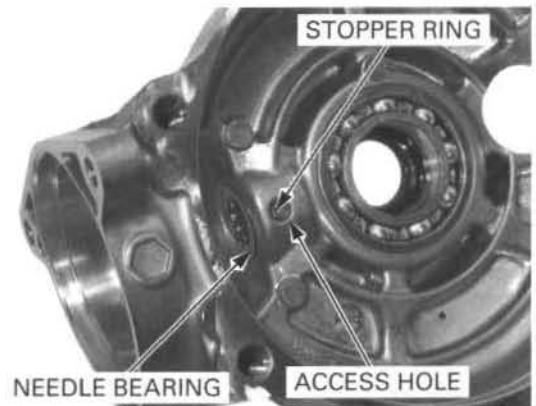
Rotate the stopper ring until the end of the stopper ring appears in the access hole.
Strike gently near the end of the ring with a punch to bent the end upward.
Grasp the end of the ring with needle-nosed pliers and pull the stopper ring out through the access hole.

Heat the gear case to about 80°C (176°F) and remove the needle bearing by using the special tools.

Be sure to wear heavy gloves to avoid burns when handling the heated gear case. Using a torch to heat the gear case may cause warpage.

TOOLS:

Remover head, 15 mm	07936-KC10200
Bearing remover shaft	07936-KC10100
Remover weight	07741-0010201 or
	07936-3710200 or
	07936-371020A
	(U.S.A. only)



Install a new stopper ring into the groove in a new bearing.



FRONT DRIVING MECHANISM

Install the bearing into the compressor until it is flush with the end of the tool.

TOOL:

Bearing compressor clip **07YME-HN4010A**
(U.S.A. only)

Place the driver, attachment and pilot on the top of the bearing and tape the driver to the compressor.

TOOLS:

Driver shaft **07949-3710001**

Attachment, 22 x 24 mm **07746-0010800**

Pilot, 15 mm **07746-0040300**

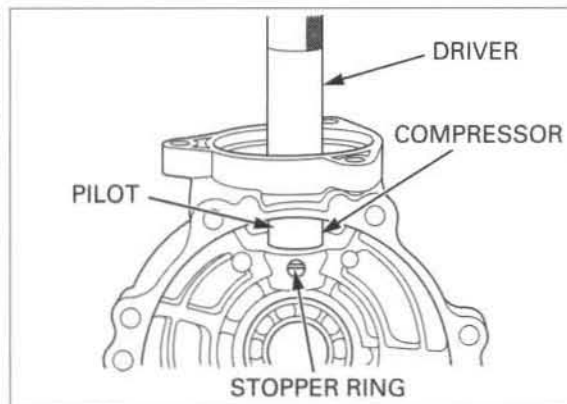
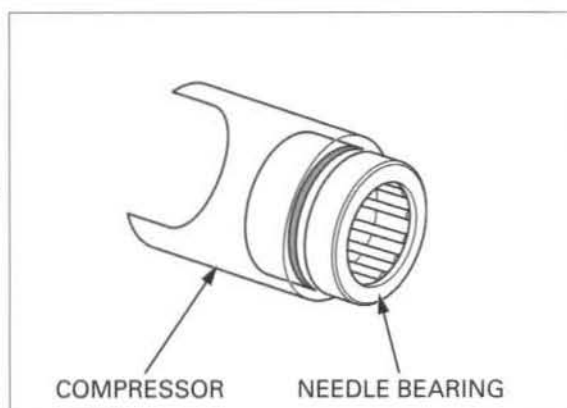
Place the bearing and tool assembly into a freezer for at least 30 minutes.

Heat the gear case to 80° C (176° F).


Take out the bearing and tool assembly from the freezer and drive the bearing into the gear case using the special tools.

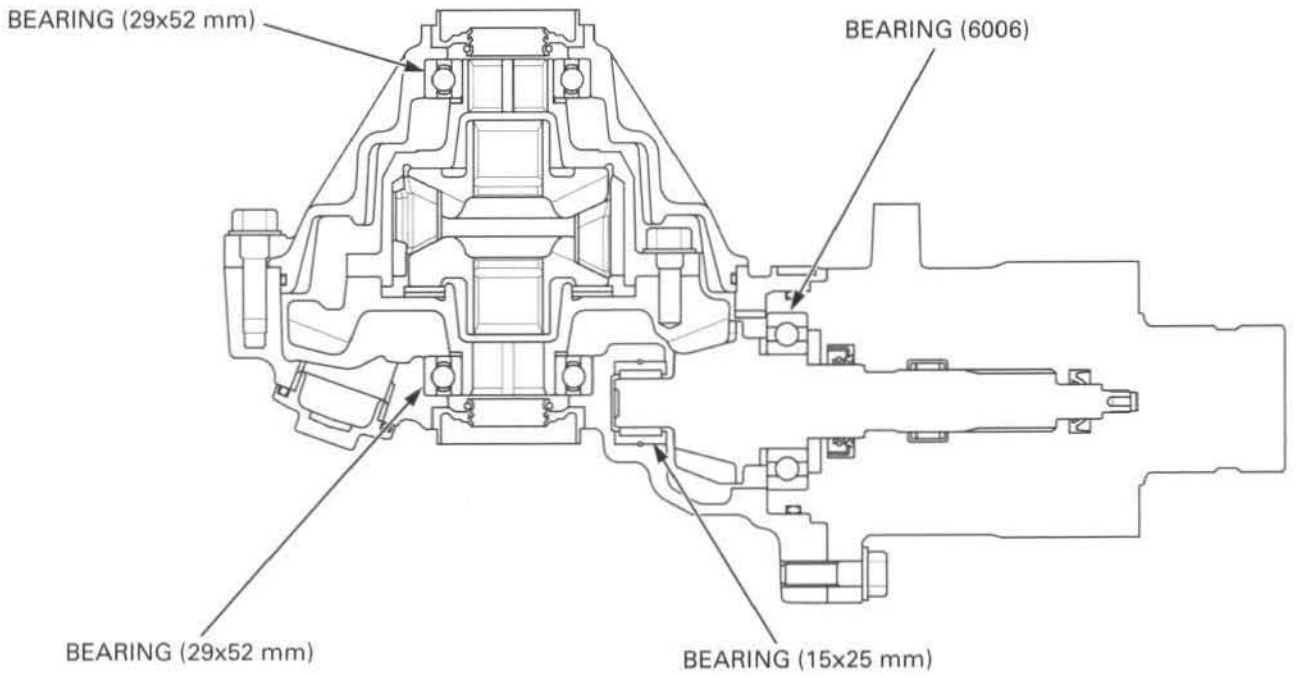
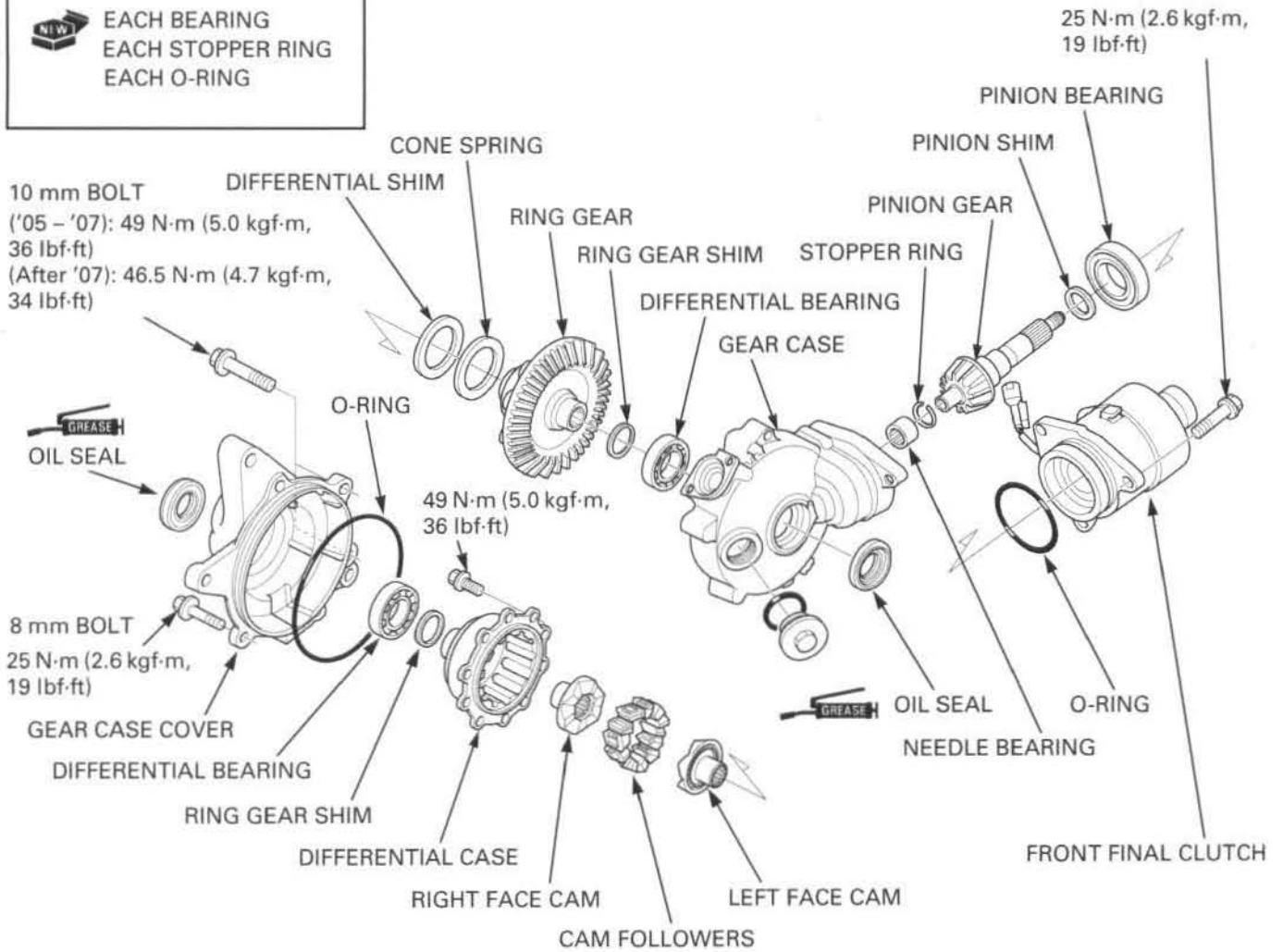
Only strike the driver once. If you strike it more than once, the ring may slip out of the groove. If this happens, remove the ring and bearing, and install a new ring.

Make sure that the stopper ring is securely set in the groove of the gear case.



DIFFERENTIAL ASSEMBLY

 EACH BEARING
EACH STOPPER RING
EACH O-RING

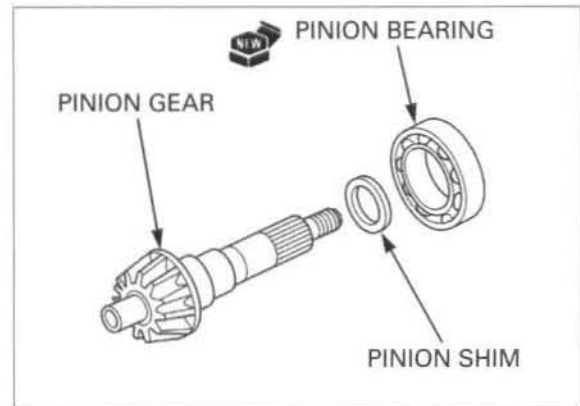


FRONT DRIVING MECHANISM

PINION GEAR INSTALLATION

When the gear set, differential bearing, differential housing and/or gear case has been replaced, use a 2.00 mm (0.079 in) thick shim for initial reference.

Install the shim and new bearing onto the pinion gear.



Press the pinion bearing onto the pinion gear.

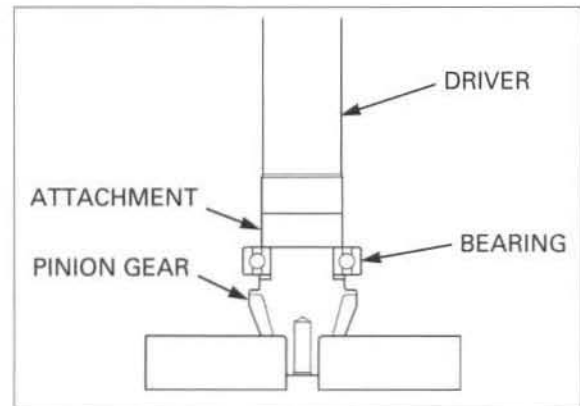
TOOLS:

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.

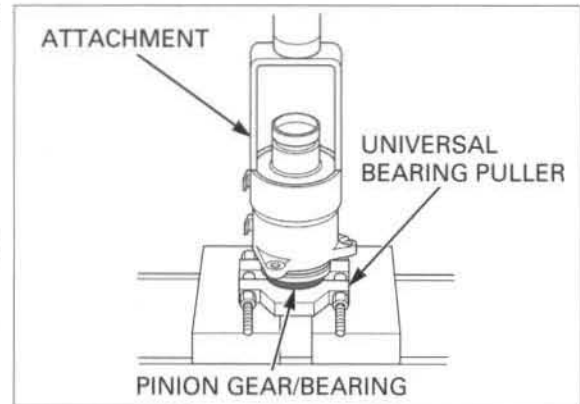
TOOLS:

Universal bearing puller

07631-0010000

Press attachment

07LME-GE20100



Be sure to wear heavy gloves to avoid burns when handling the heated final clutch case.

U.S.A. only:

Heat the final clutch case to about 100° C (212° F).

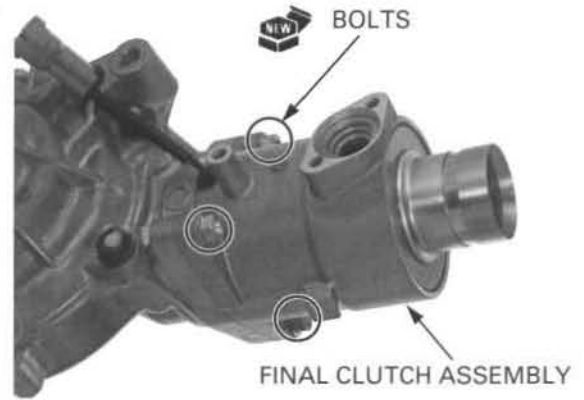
Drop the pinion gear assembly into the heated final clutch case.

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 differential.
Install and tighten the new three bolts.

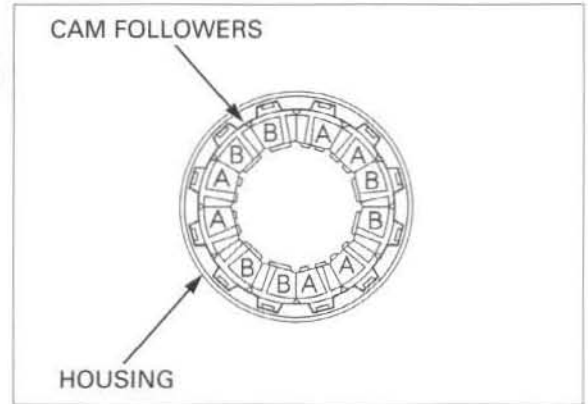
TORQUE: 25 N·m (2.6 kgf·m, 19 lbf·ft)



DIFFERENTIAL ASSEMBLY

Keep dust and dirt out of the differential housing.

Install the face cam into the differential housing.
Install the six cam followers A (rib) and six cam 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 17-22) and the height of the housing-to-cam (page 17-23), 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 face cam height

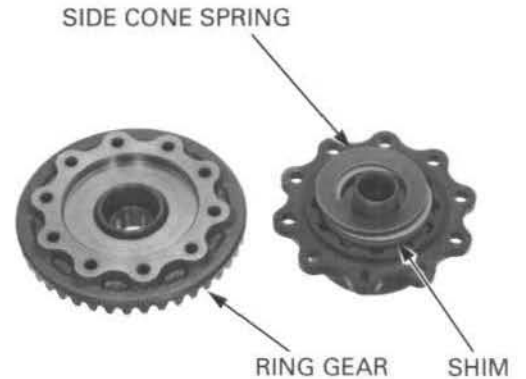


Select the shim and install it onto the face cam.

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 concaved side facing up (ring gear side).
Install the ring gear.



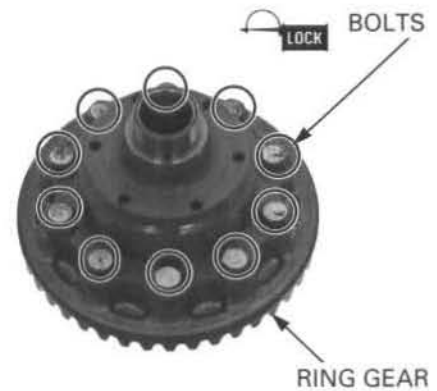
FRONT DRIVING MECHANISM

Apply locking agent to the threads of the new ring gear bolts.

Install the 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 17-21). 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 (page 17-29).



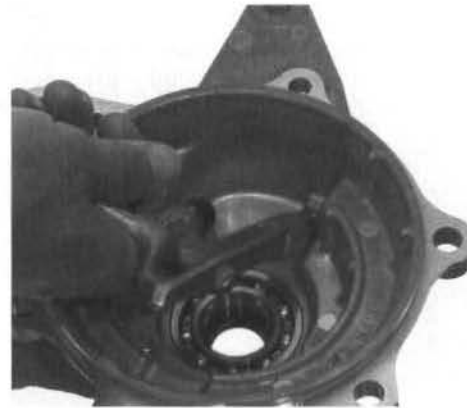
DIFFERENTIAL CASE ASSEMBLY

- When the gear set, bearing, differential housing and/or gear case has been replaced, check the tooth contact pattern (page 17-20) and gear backlash (page 17-18).

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.

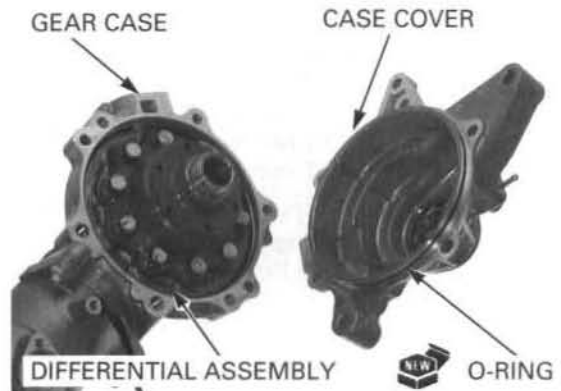
Blow compressed air through the breather hole in the case cover.



Install the proper ring gear shims onto the differential assembly and install the assembly into the gear case.



Install the case cover over 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.

Apply locking agent to the threads of the two 10 mm bolts. Install the bolts and tighten them 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:

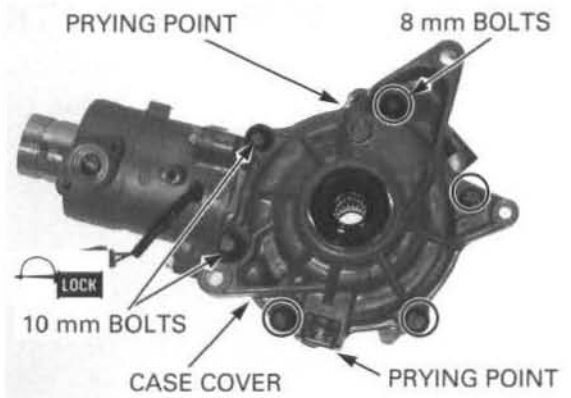
10 mm bolt:

'05 - '07: 49 N·m (5.0 kgf·m, 36 lbf·ft)

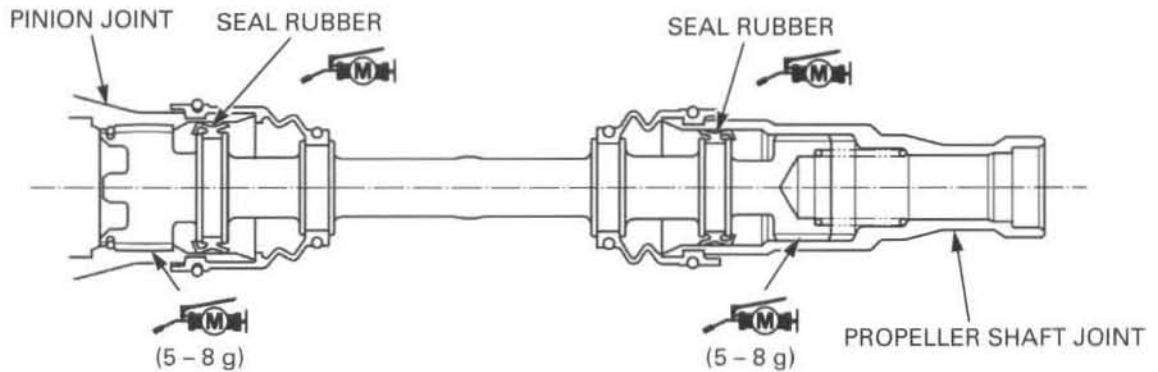
After '07: 46.5 N·m (4.7 kgf·m, 34 lbf·ft)

8 mm bolt: 25 N·m (2.6 kgf·m, 19 lbf·ft)

Make sure that the gear assembly rotates smoothly without binding.



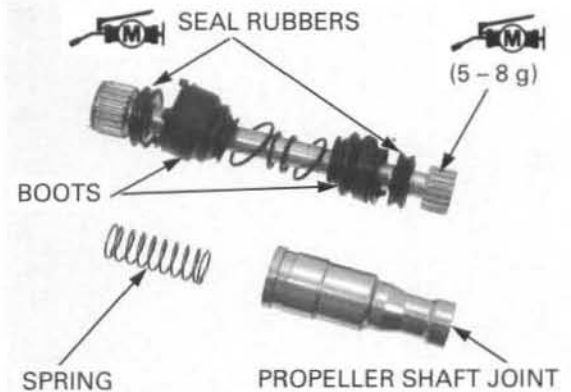
PROPELLER SHAFT ASSEMBLY



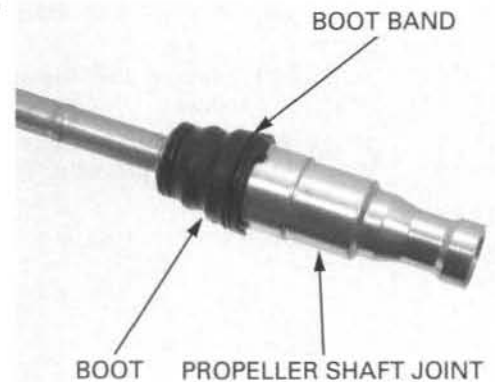
Apply molybdenum disulfide grease to the seal rubbers.

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.



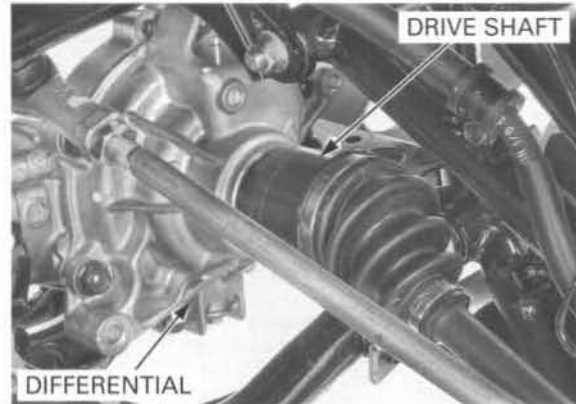
Install the boot over the propeller shaft joint while compressing the spring. Install the boot band into the boot groove.



DIFFERENTIAL INSTALLATION

Place the differential into the frame.

Install the right drive shaft onto the differential in the same manner as on (page 17-12).

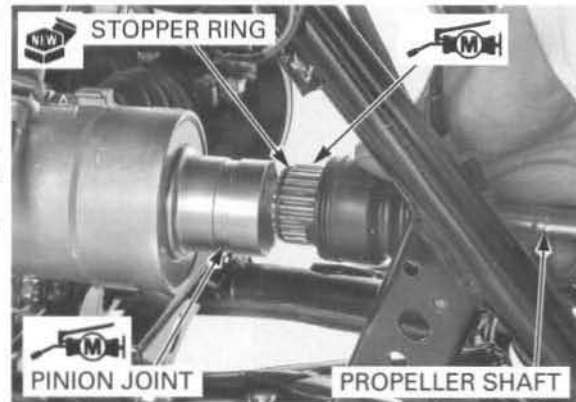


Install a new stopper ring into the groove in the propeller shaft.

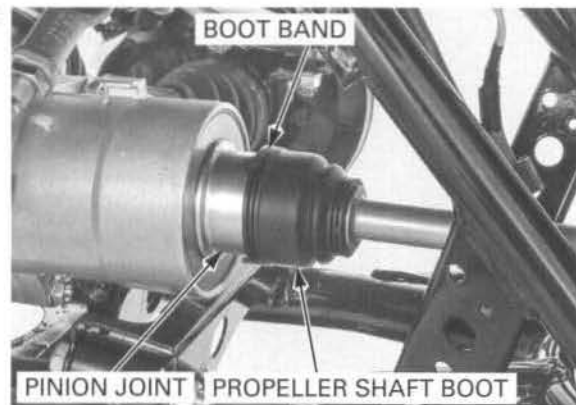
Apply 5 – 8 g of molybdenum disulfide grease to the propeller shaft joint and pinion joint splines.

Install the propeller shaft assembly into the differential until the stopper ring seats in the pinion joint groove.

Make sure that the stopper ring is seated properly by pulling on the pinion joint lightly.



Install the propeller shaft boot over the pinion joint securely and the boot band into the boot groove.

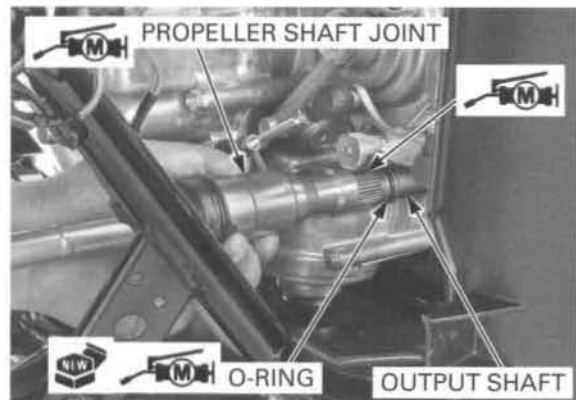


Coat a new O-ring with molybdenum disulfide grease and install it into the groove in the output shaft.

Apply molybdenum disulfide grease to the propeller shaft joint splines.

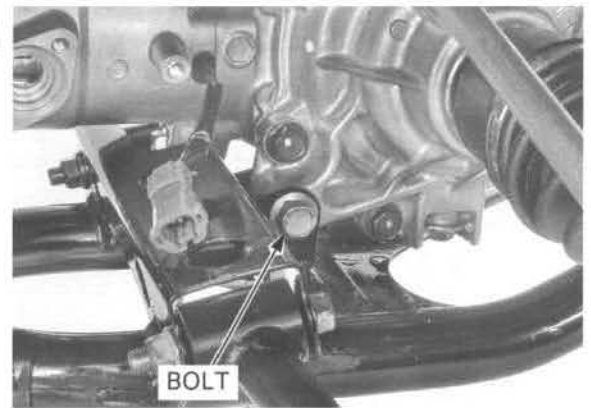
Move the differential forward for maximum clearance between the propeller shaft joint and output shaft.

Install the propeller shaft joint over the output shaft.

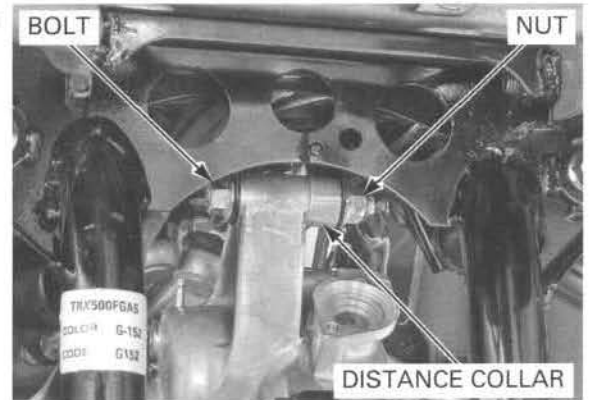


FRONT DRIVING MECHANISM

Align the bolt holes in the differential and frame, and install the lower mounting 10 mm mounting bolt.



Install the distance collar, 10 mm upper mounting bolt and nut.



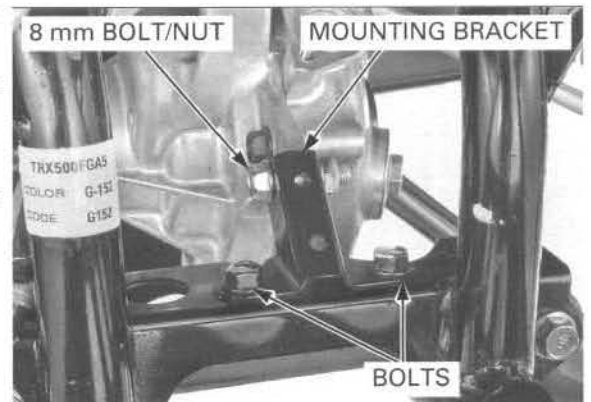
Install the mounting bracket, 8 mm bolts, 8 mm mounting bolt and nut.

First tighten the differential case mounting bracket bolts to the specified torque.

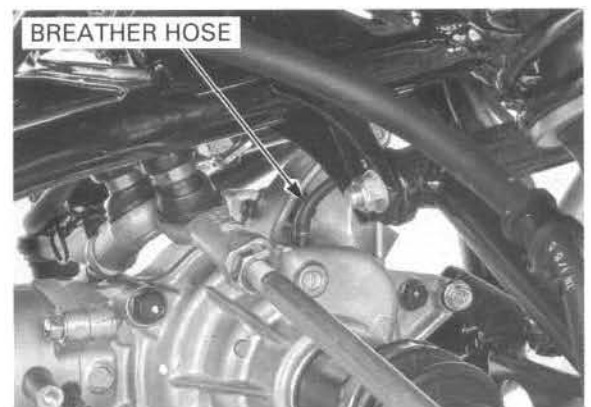
TORQUE: 22 N·m (2.2 kgf·m, 16 lbf·ft)

Tighten the differential case mounting bolt and nuts to the specified torque.

TORQUE: 10 mm: 44 N·m (4.5 kgf·m, 33 lbf·ft)
8 mm: 22 N·m (2.2 kgf·m, 16 lbf·ft)



Connect the front differential case breather hose.

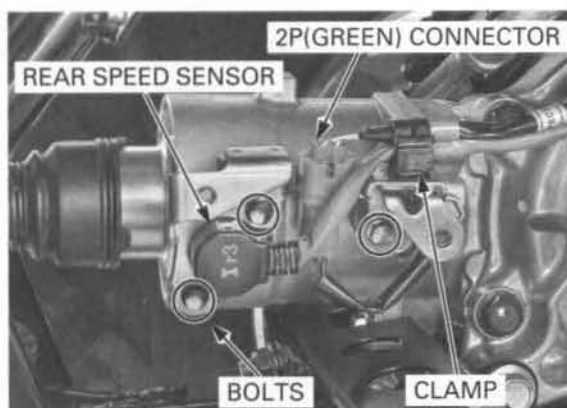


FRONT DRIVING MECHANISM

Connect the front final clutch 2P (Green) connector and install it onto the clutch cover stay.
Install the rear speed sensor, clutch cover stay and three bolts, and tighten the bolts to the specified torque.

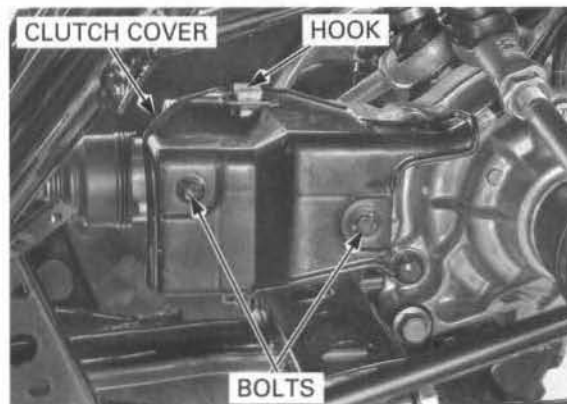
TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

Clamp the rear speed sensor wire and front final clutch wire.



Install the clutch cover while hooking it on the boss on the case, and install and tighten the two bolts to the specified torque.

TORQUE: 7 N·m (0.7 kgf·m, 5.1 lbf·ft)



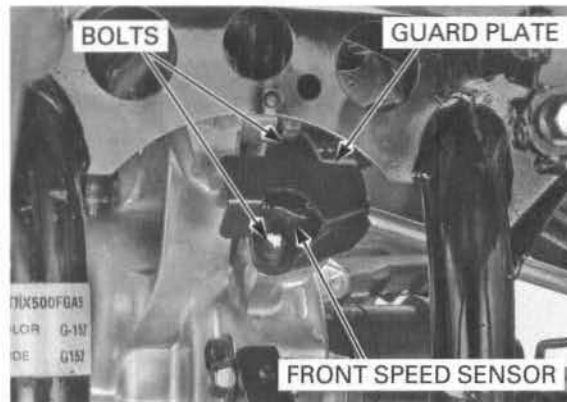
Install the front speed sensor, guard plate and two bolts, and tighten the bolts.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

Install the following:

- front fender/inner fender (page 2-11)
- left drive shaft (page 17-7)

Fill the differential with the recommended oil (page 3-19).



18. REAR DRIVING MECHANISM

SYSTEM COMPONENTS	18-2	FINAL DRIVE DISASSEMBLY/ INSPECTION	18-10
SERVICE INFORMATION	18-3	FINAL GEAR CASE BEARING REPLACEMENT	18-16
TROUBLESHOOTING	18-6	FINAL DRIVE ASSEMBLY	18-18
REAR AXLE REMOVAL	18-7	FINAL DRIVE INSTALLATION	18-21
FINAL DRIVE REMOVAL	18-9	REAR AXLE INSTALLATION	18-23

REAR DRIVING MECHANISM SYSTEM COMPONENTS

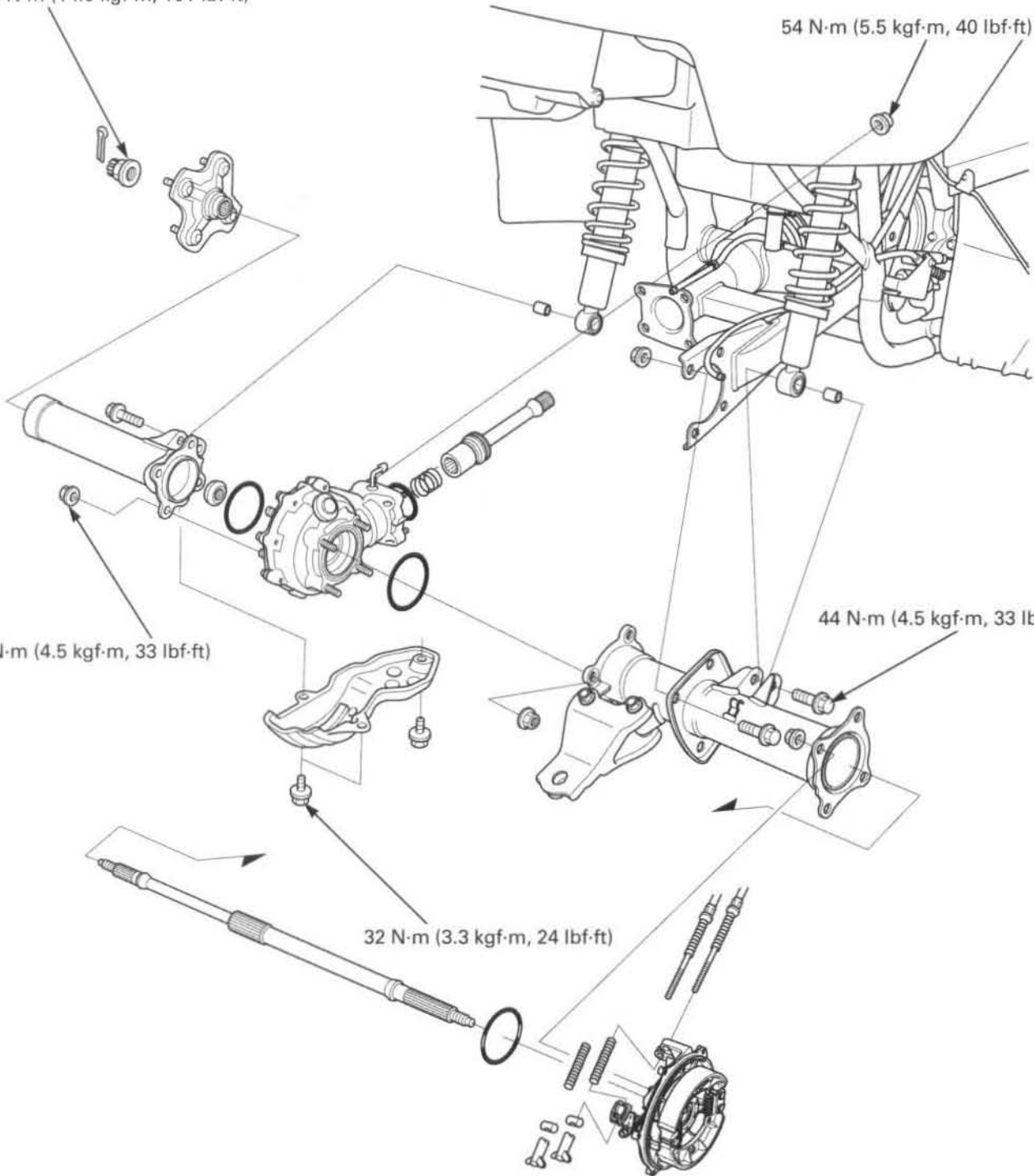
137 N·m (14.0 kgf·m, 101 lbf·ft)

54 N·m (5.5 kgf·m, 40 lbf·ft)

44 N·m (4.5 kgf·m, 33 lbf·ft)

44 N·m (4.5 kgf·m, 33 lbf·ft)

32 N·m (3.3 kgf·m, 24 lbf·ft)



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

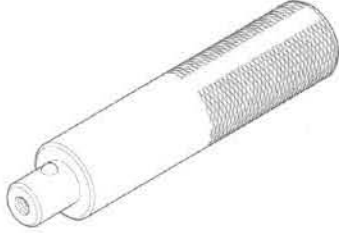
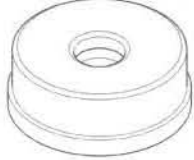
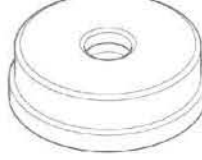





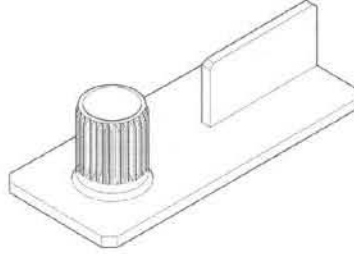
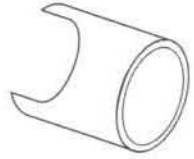

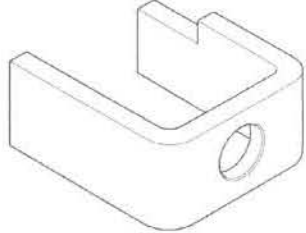
ITEM			STANDARD	Unit: mm (in)
				SERVICE LIMIT
Axle runout			-	3.0 (0.12)
Rear final drive	Oil capacity	After draining	75 cm ³ (2.5 US oz, 2.6 Imp oz)	-
		After disassembly	100 cm ³ (3.4 US oz, 3.5 Imp oz)	-
	Recommended oil		Hypoid gear oil SAE #80	-
	Gear backlash		0.05 - 0.25 (0.002 - 0.010)	0.4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

TORQUE VALUES

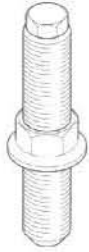
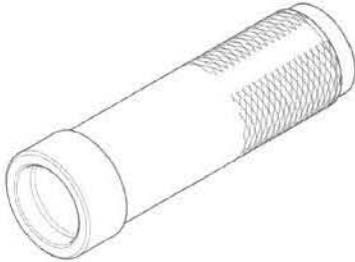

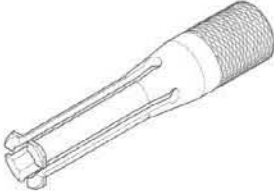

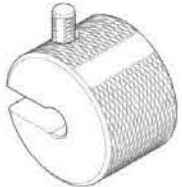

Final gear case pinion bearing lock nut	98 N·m (10.0 kgf·m, 72 lbf·ft)	Lock nut: replace with a new one/Stroke Apply locking agent to the threads.
Final gear case cover bolt, 10 mm	49 N·m (5.0 kgf·m, 36 lbf·ft)	
Final gear case cover bolt, 8 mm	25 N·m (2.6 kgf·m, 19 lbf·ft)	
Final gear case mounting nut	54 N·m (5.5 kgf·m, 40 lbf·ft)	Lock nut: replace with a new one
Left and right axle housing nut	44 N·m (4.5 kgf·m, 33 lbf·ft)	Lock nut: replace with a new one
Skid plate bolt	32 N·m (3.3 kgf·m, 24 lbf·ft)	
Rear wheel hub nut	137 N·m (14.0 kgf·m, 101 lbf·ft)	Castle nut
Rear brake panel nut	44 N·m (4.5 kgf·m, 33 lbf·ft)	Lock nut: replace with a new one
Shock absorber lower mounting flange bolt	44 N·m (4.5 kgf·m, 33 lbf·ft)	

REAR DRIVING MECHANISM

TOOLS

<p>Driver 07749-0010000</p> 	<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, 32 mm 07MAD-PR90200</p> 	<p>Pilot, 35 mm 07746-0040800</p> 
<p>Driver attachment 07LAD-PW50500</p> 	<p>Pilot, 14 mm 07746-0041200</p> 	<p>Pinion holder 07SMB-HM70200</p> 
<p>Differential bearing compressor clip 07YME-HN4010A (U.S.A. only)</p> 	<p>Lock nut wrench, 30 x 64 mm 07916-MB00002</p> 	<p>Pinion puller base 07HMC-MM80110 or 07HMC-MM8011A (U.S.A. only)</p> 

REAR DRIVING MECHANISM

<p>Puller shaft 07931-ME40000</p>  <p>or 07931-ME4010B and Special nut 07931-HB3020A (U.S.A. only)</p>	<p>Driver, 40 mm I.D. 07746-0030100</p> 	<p>Attachment, 30 mm I.D. 07746-0030300</p> 
<p>Bearing remover head, 14 mm 07WMC-KFG0100</p> 	<p>Remover shaft 07936-KC10100</p> 	<p>Remover weight 07741-0010201</p>  <p>or 07936-3710200 or 07936-371020A (U.S.A. only)</p>
<p>Oil seal driver 07965-KE80200</p>  <p>or 07947-KA50100 (U.S.A. only)</p>		

REAR DRIVING MECHANISM

TROUBLESHOOTING

Excessive noise

- Worn or damaged bearing
- Worn or scored splines
- Worn or damaged drive shaft, propeller shaft or universal joint
- 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

REAR AXLE REMOVAL

Remove the following:

- rear wheels (page 15-6)
- rear brake drum (page 16-19)
- breather hose
- adjusting nuts
- joint pins
- springs
- brake cables
- four nuts (discard them)

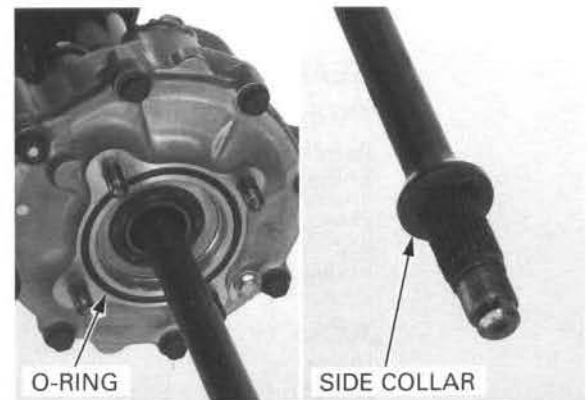
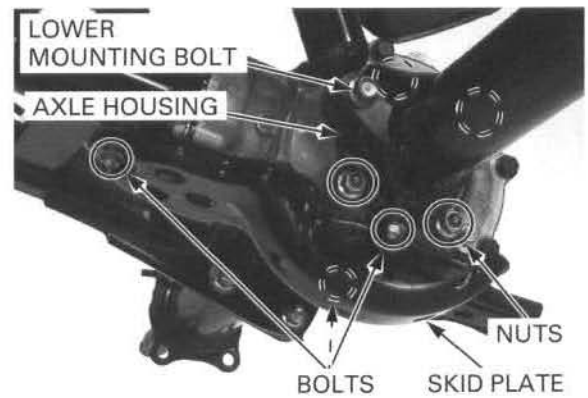
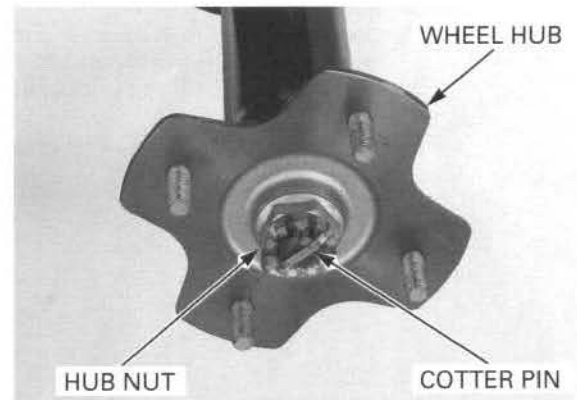
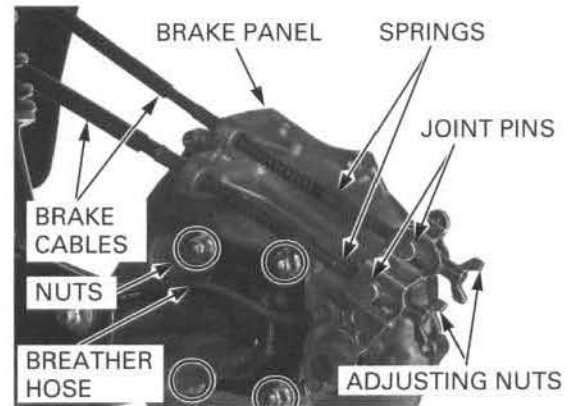
Do not get grease on the shoe linings.

- brake panel assembly
- O-ring

- cotter pin
- hub nut
- left wheel hub

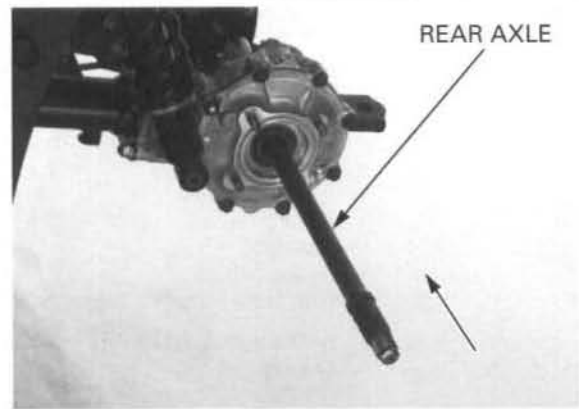
- three bolts and skid plate
- left shock absorber lower mounting bolt
- four nuts and left axle housing

- O-ring
- left side collar



REAR DRIVING MECHANISM

Remove the rear axle by driving the axle from the left side using a rubber mallet.

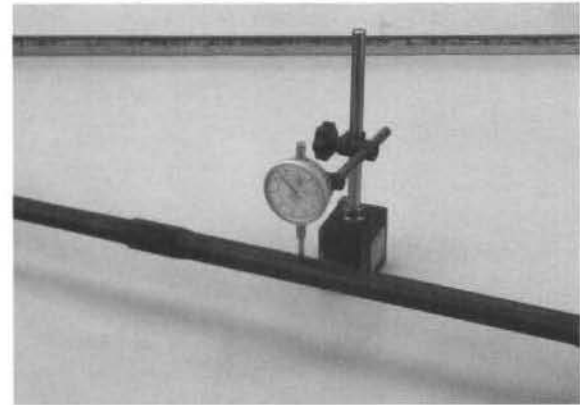


INSPECTION

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.

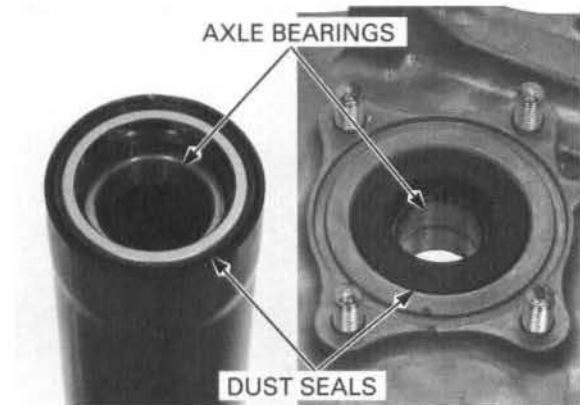
SERVICE LIMIT: 3.0 mm (0.12 in)



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

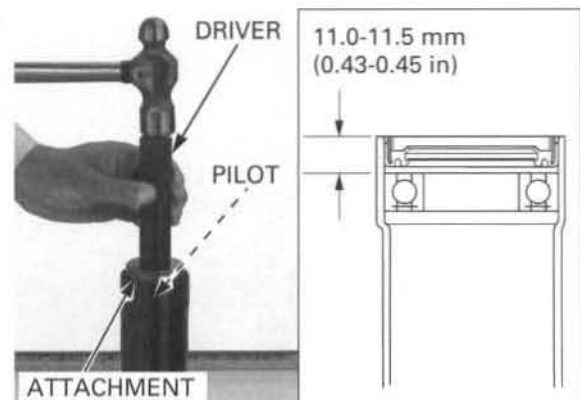
AXLE HOUSING

Remove the dust seal and drive the axle bearing out of the axle housing.

Press the bearing into the axle housing with the sealed side facing down until the depth from the housing edge is 11.0–11.5 mm (0.43–0.45 in).

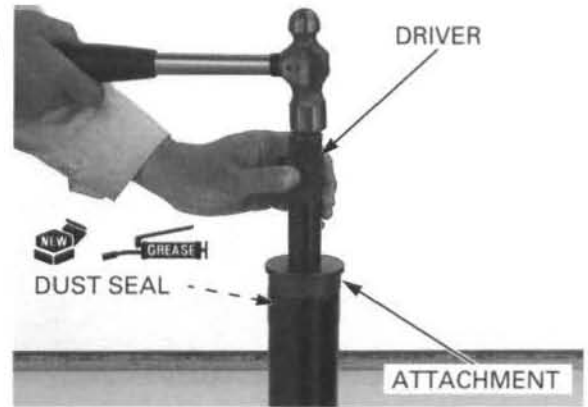
TOOLS:

Driver	07749-0010000
Attachment, 52 x 55 mm	07746-0010400
Pilot, 32 mm	07MAD-PR90200



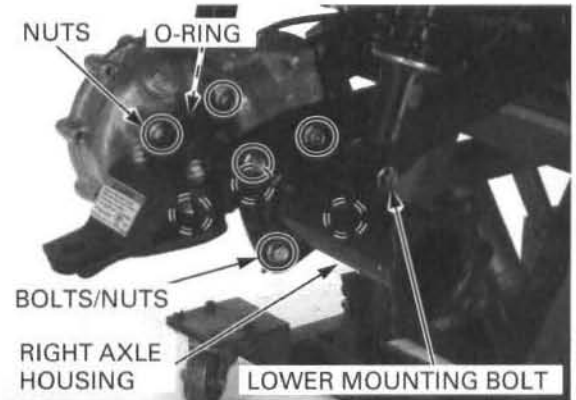
Apply grease to a new dust seal lips.
Install the dust seal with the metal plate side facing up until it is flush with the housing end.

TOOLS:
Driver 07749-0010000
Attachment, 62 x 68 mm 07746-0010500

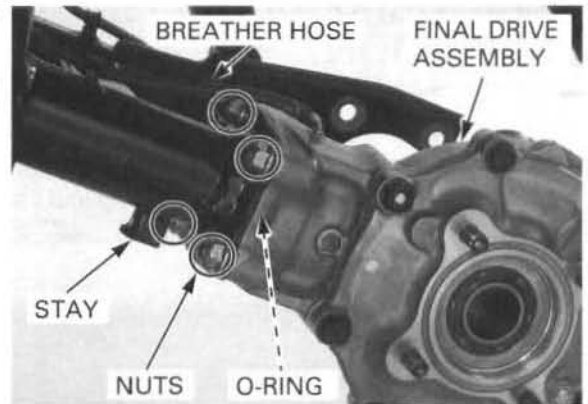


FINAL DRIVE REMOVAL

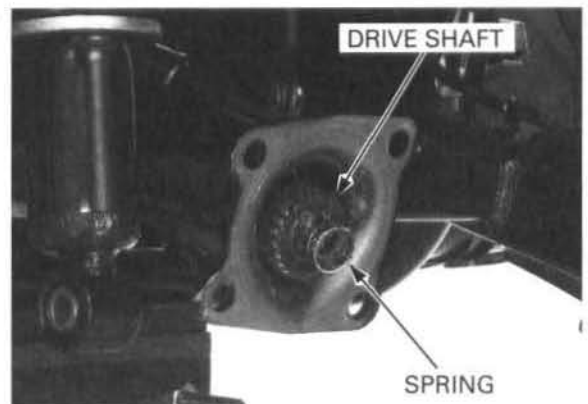
Remove the rear axle (page 18-7).
 Drain the final gear case oil (page 3-18).
 Support the swingarm and remove the right shock absorber lower mounting bolt.
 Remove the eight nuts, four bolts and right axle housing.
 Remove the O-ring from the final drive gear case.



Disconnect the breather hose from the final drive gear case.
 Remove the four nuts, skid plate stay and final drive assembly from the swingarm.
 Remove the O-ring from the final drive gear case.



Remove the spring and drive shaft from the swingarm.



REAR DRIVING MECHANISM

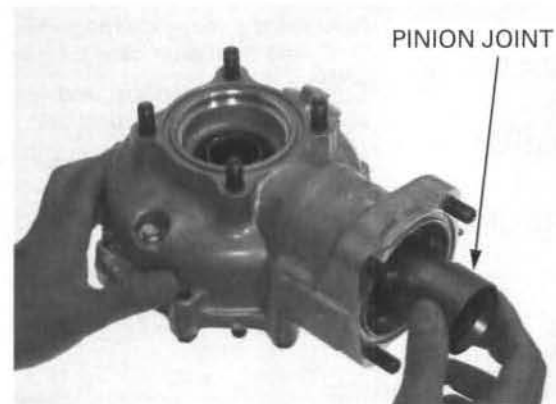
INSPECTION

Check the seal rubber for wear 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.

To remove the universal joint, remove the swing-arm (page 15-9).

Turn the pinion joint and check that 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 faulty parts/ assemblies as required.



FINAL DRIVE DISASSEMBLY/ INSPECTION

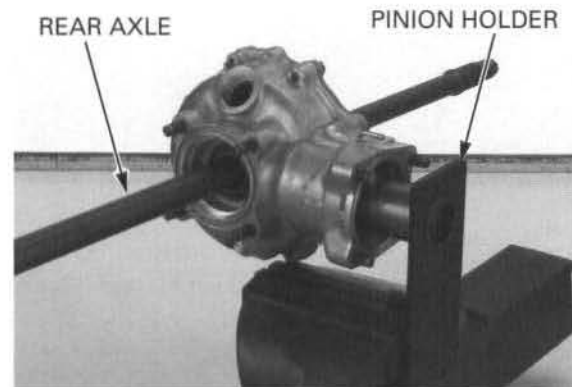
BACKLASH INSPECTION

Remove the oil filler cap.
Install the special tool into the pinion joint, and set the final drive assembly and tool in a vise as shown.

TOOL:

Pinion holder **07SMB-HM70200**

Install the rear axle into the final drive 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: (thinnest): 1.82 mm (0.072 in)

D: (standard): 2.00 mm (0.079 in)

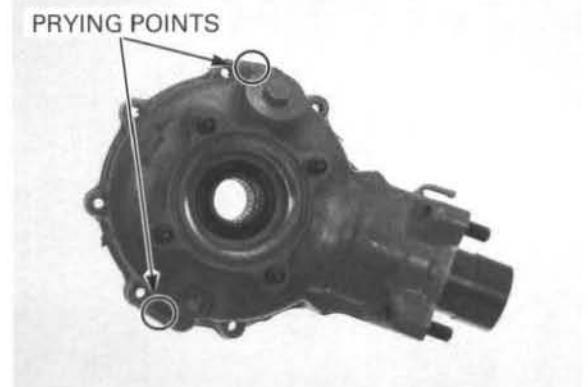
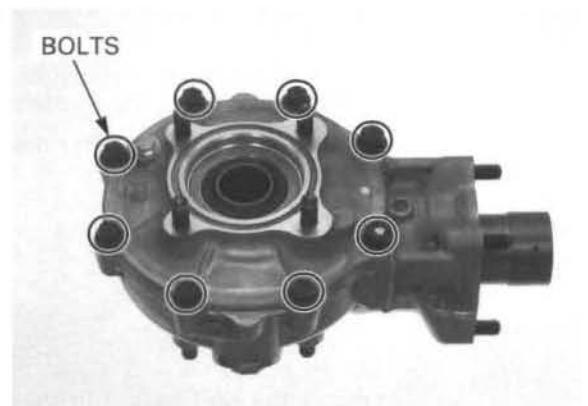
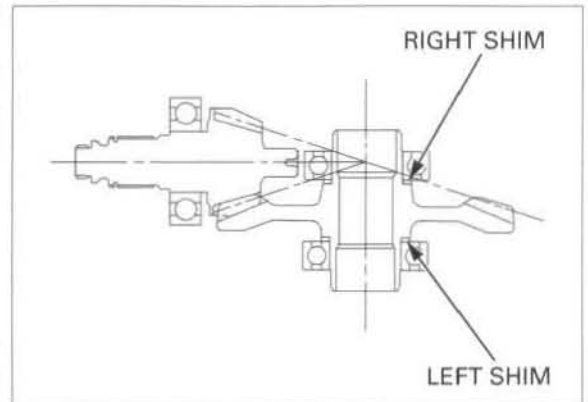
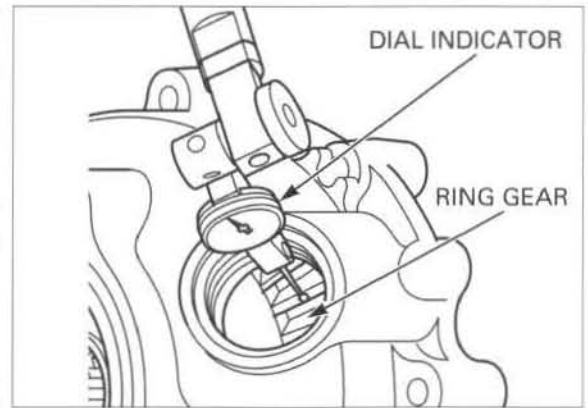
I: (thickest): 2.30 mm (0.091 in)

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**.

FINAL GEAR CASE DISASSEMBLY

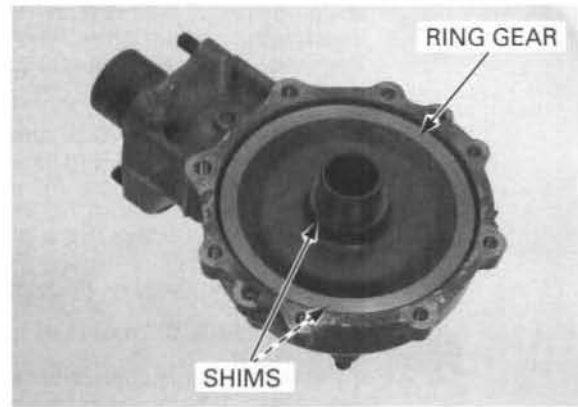
Loosen the eight cover bolts in a crisscross pattern in 2 or 3 steps and remove them.

Pry the cover at the prying points using a screwdriver and remove the case cover.



REAR DRIVING MECHANISM

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 18-12.



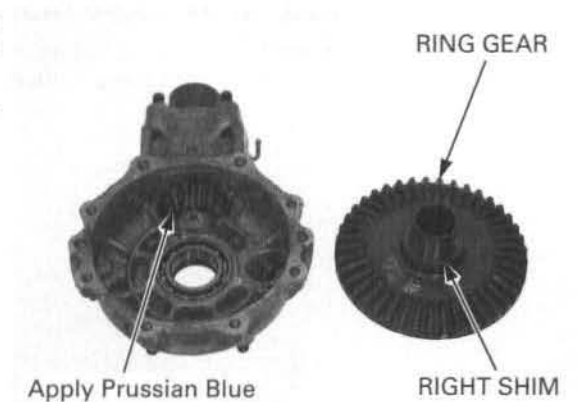
GEAR TOOTH CONTACT PATTERN CHECK

Keep dust and dirt out of the case and cover.

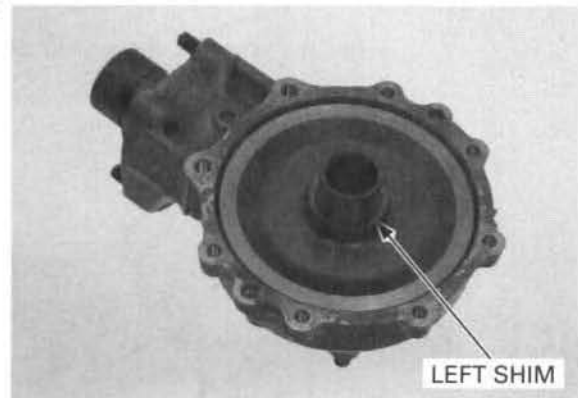
Clean sealing material off the mating surfaces of the gear case and cover, being careful not to damage them.

Apply thin coat of Prussian Blue to the pinion gear teeth for a tooth contact pattern check.

Install the ring gear shims onto the ring gear.



Install the ring gear with the shims into the gear case.

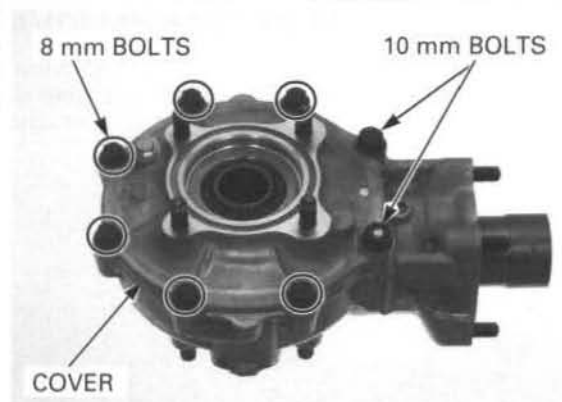


REAR DRIVING MECHANISM

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.

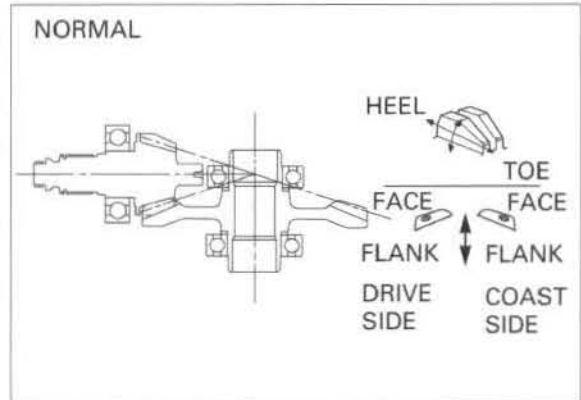
Install the case cover and tighten the bolts in several steps until the cover evenly touches the gear case. Then, while rotating the pinion gear, tighten the bolts to the specified torque in a crisscross pattern in several steps.

TORQUE: 10 mm bolt: 49 N·m (5.0 kgf·m, 36 lbf·ft)
8 mm bolt: 25 N·m (2.6 kgf·m, 19 lbf·ft)

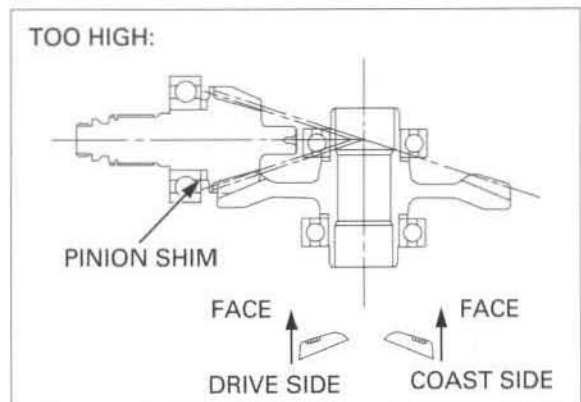


Remove the oil filler cap. Rotate the ring gear several times in both directions of rotation. Check the gear tooth contact pattern through the oil filler hole. The pattern is indicated by the Prussian Blue applied to the pinion. Contact is normal if the Prussian Blue is transferred to the approximate 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 a suitable one.



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).

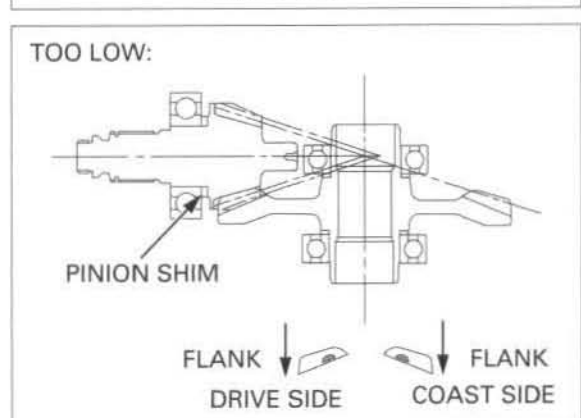
Ring gear shims:

A: (thinnest): 1.64 mm (0.064 in)

D: (standard): 2.00 mm (0.079 in)

I: (thickest): 2.18 mm (0.086 in)

For pinion shim replacement, see page 18-15.



REAR DRIVING MECHANISM

PINION GEAR REMOVAL

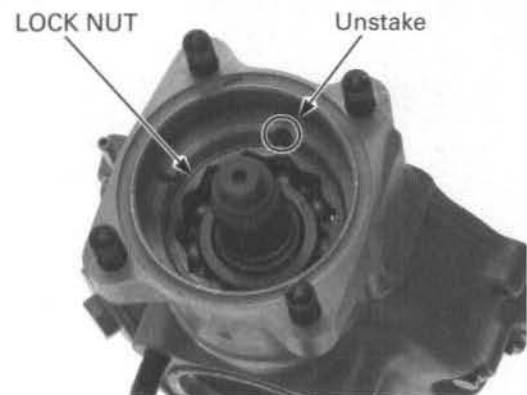
Remove the pinion joint from the pinion gear by pulling it to force the stopper ring at the pinion gear shaft end past the groove in the pinion joint.



Remove the oil seal from the gear case.



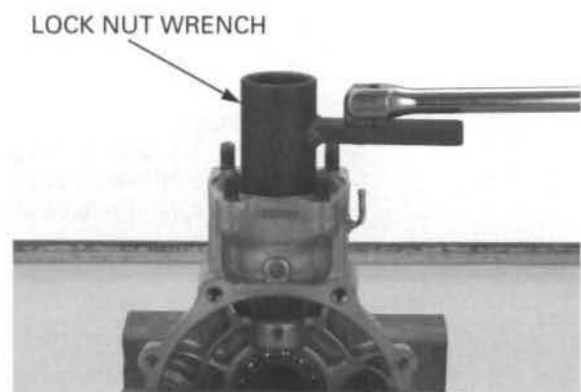
Be careful that metal particles do not enter the bearing and the threads of the case are not damaged. Unstake the pinion gear bearing lock nut with a drill or grinder.



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:

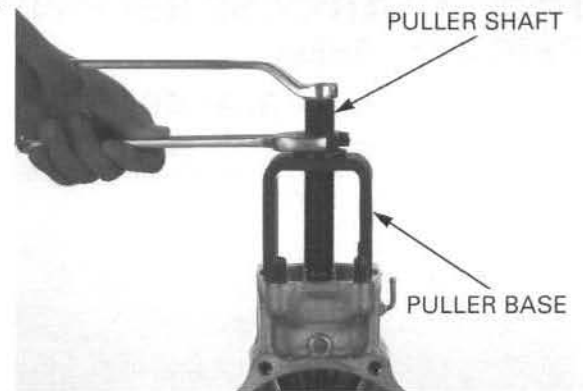
Pinion puller base

07HMC-MM80110 or
07HMC-MM8011A
(U.S.A. only)

Puller shaft

07931-ME40000 or
07931-ME4010B and
07931-HB3020A
(U.S.A. only)

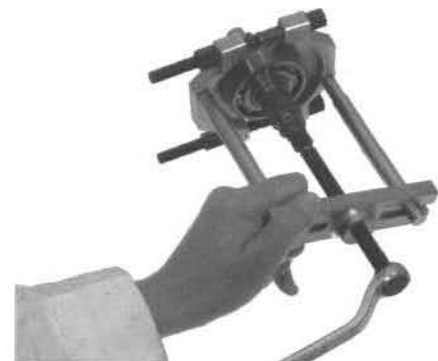
Pull the pinion gear assembly out of the gear case.



PINION GEAR BEARING/SHIM REPLACEMENT

Pull the pinion gear bearing from the shaft with a commercially available bearing puller.

Remove the pinion gear shim.



Install the shim and bearing onto the pinion gear.

- 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 marking side facing up.

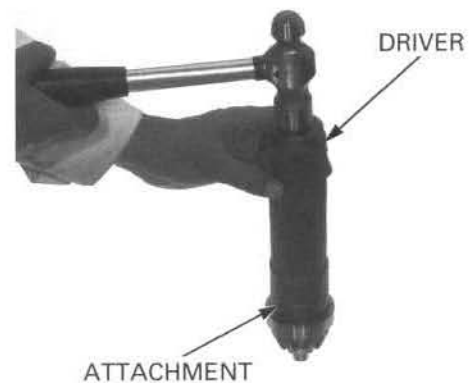
TOOLS:

Driver, 40 mm I.D.

07746-0030100

Attachment, 30 mm I.D.

07746-0030300

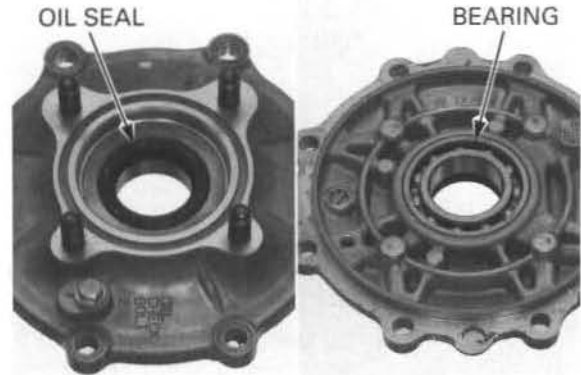


REAR DRIVING MECHANISM

FINAL GEAR CASE BEARING REPLACEMENT

RING GEAR BEARING

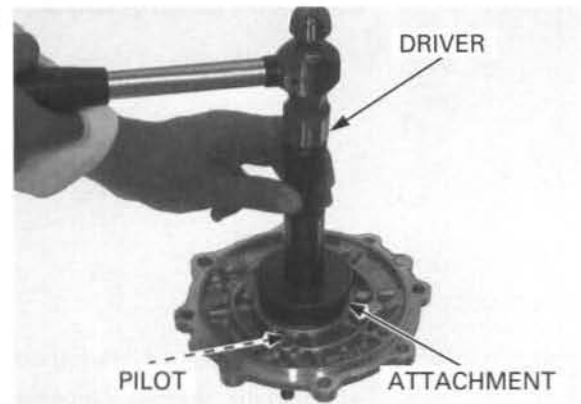
Remove the oil seals from the case and cover.
Drive the bearings out of the case and cover.



Drive new bearings in the case and cover using the special tools.

TOOLS:

Driver	07749-0010000
Attachment, 62 x 68 mm	07746-0010500
Pilot, 35 mm	07746-0040800



Apply grease to new oil seal lips.
Drive the oil seals in the case and cover using the special tools, until they are flush with the case and cover.

TOOLS:

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



PINION NEEDLE BEARING

Remove the stopper ring by rotating it until the end of the stopper ring appears in the access hole. Strike gently near the end of the ring with a punch to bent the end upward. Grasp the end of the ring with needle-nosed pliers and pull the stopper ring out through the access hole.

Be sure to wear heavy gloves to avoid burns when handling the heated gear case. Using a torch to heat the gear case may cause warpage.

Heat the gear case to 80°C (176°F) and remove the needle bearing by using the special tool.

TOOLS:

- Bearing remover head, 14 mm** 07WMC-KFG0100
- Remover shaft** 07936-KC10100
- Remover weight** 07741-0010201
- 07936-3710200 or 07936-371020A (U.S.A. only)

Install the stopper ring into the groove using special tool.

TOOLS:

- Differential bearing compressor clip** 07YME-HN4010A (U.S.A. only)

Heat the gear case to 80°C (176°F) and freeze the pinion bearing on ice or in a freezer.

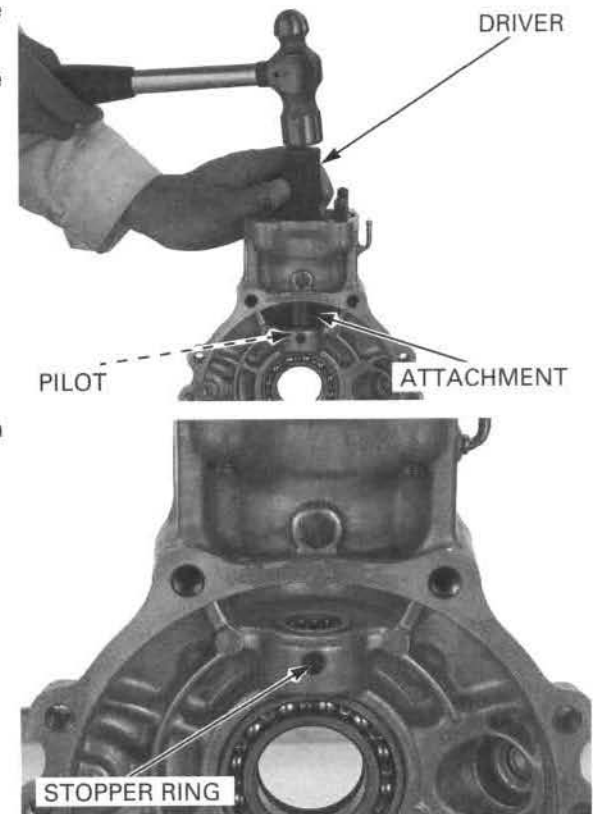
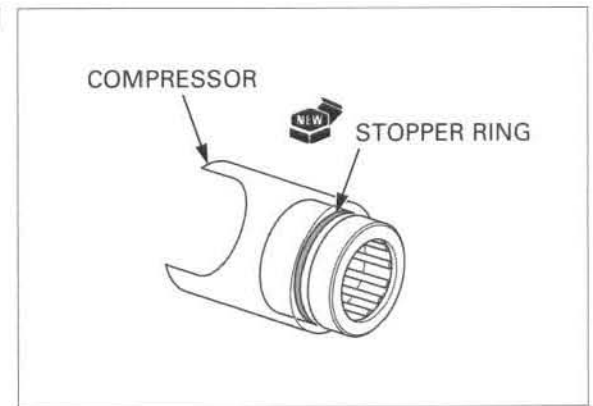
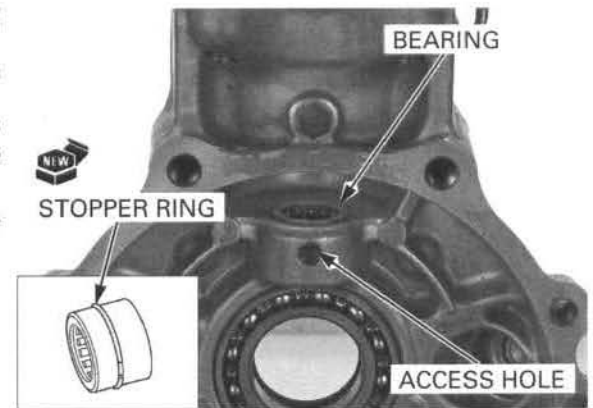
Using tape, attach the Differential Bearing Clip Compressor to the driver attachment.

Drive the pinion bearing into the gear case using the special tools.

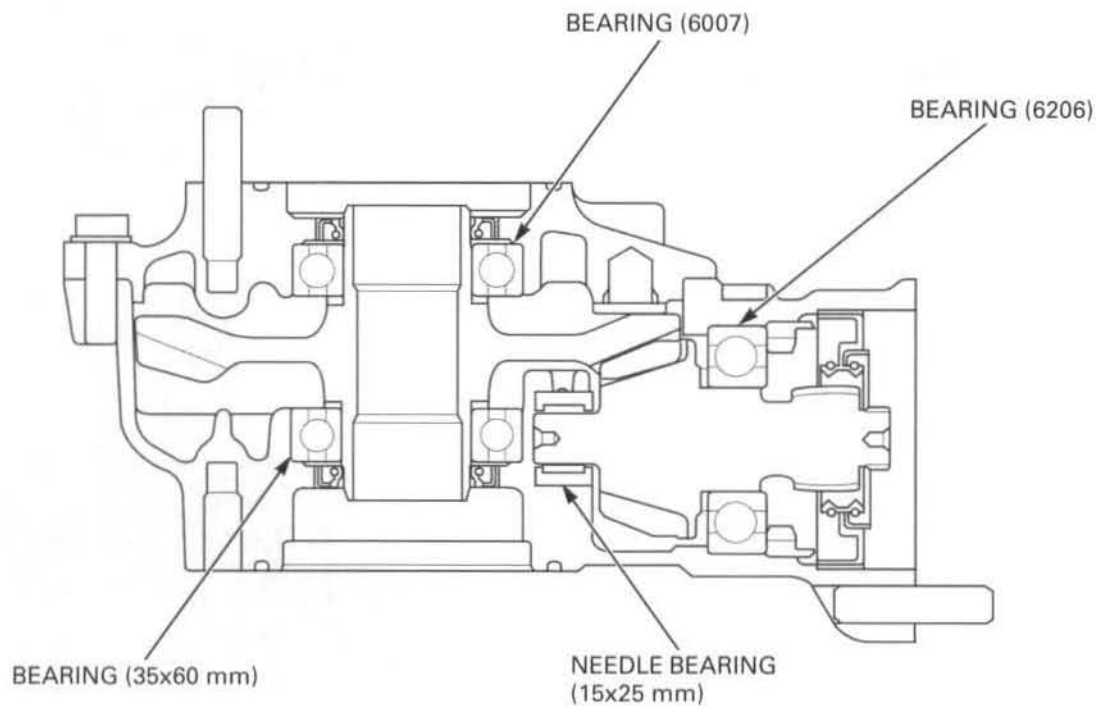
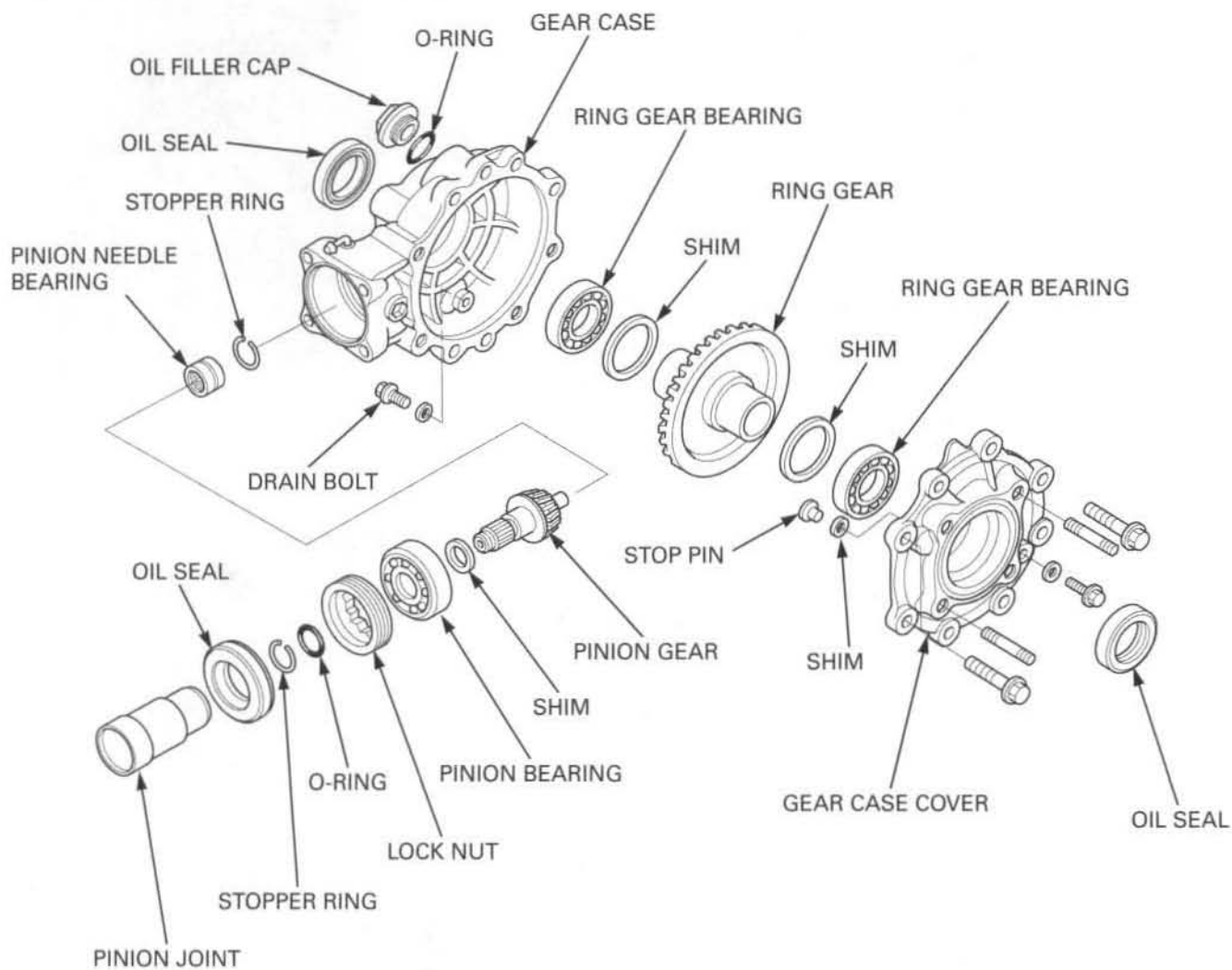
TOOLS:

- Driver** 07749-0010000
- Attachment, 22 x 24 mm** 07746-0010800
- Pilot, 14 mm** 07746-0041200

Make sure that the stopper ring is securely set in groove of gear case.



FINAL DRIVE ASSEMBLY



PINION GEAR INSTALLATION

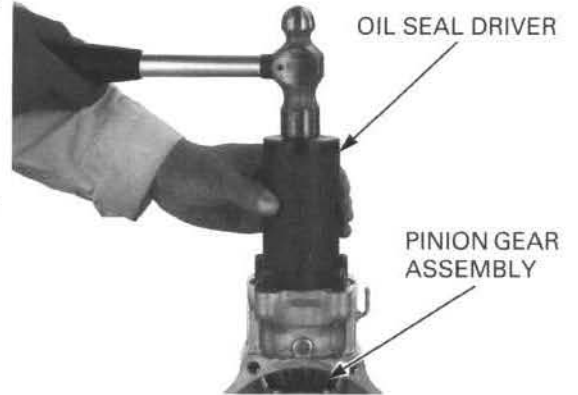
Drive the pinion gear assembly into the gear case using the special tool.

TOOL:

Oil seal driver

07965-KE80200 or
07947-KA50100
(U.S.A. only)

- Keep the driver centered with the bearing outer race during installation.



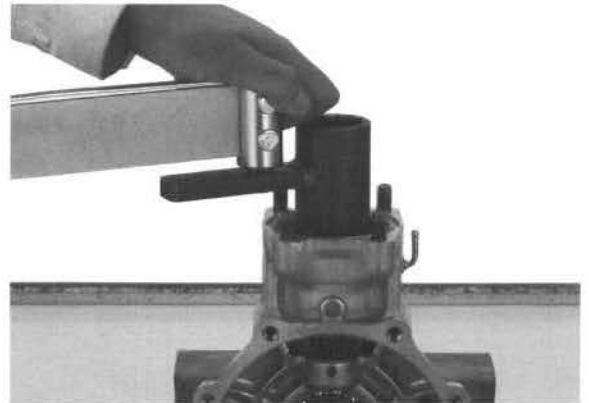
Refer to torque wrench reading information on page 18-3 "Service Information".

Install a new lock nut and tighten it using the special tool.

TOOL:

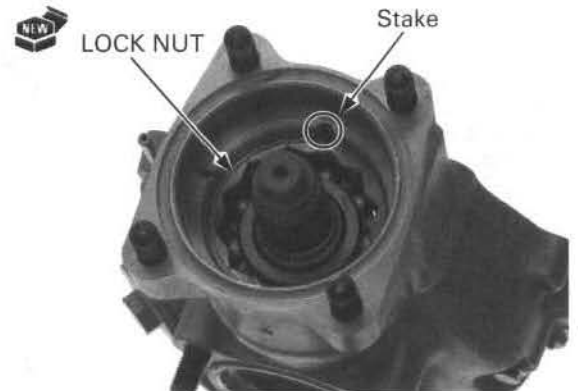
Lock nut wrench, 30 x 64 mm 07916-MB00002

TORQUE: Actual: 98 N·m (10.0 kgf·m, 72 lbf·ft)
Indicated: 89 N·m (9.1 kgf·m, 66 lbf·ft)



Be careful not to damage the threads of the case.

Stake the lock nut into the case groove.



Apply grease to a new oil seal lips and install it into the gear case until it is fully seated, using the special tools.

TOOLS:

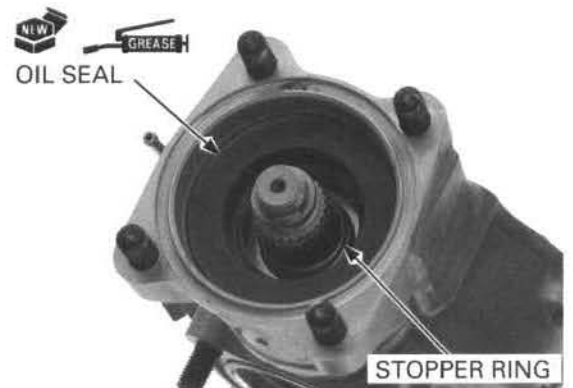
Driver

07749-0010000

Driver attachment

07LAD-PW50500

Make sure that the stopper ring is installed in the pinion gear shaft groove.



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 groove in the joint.

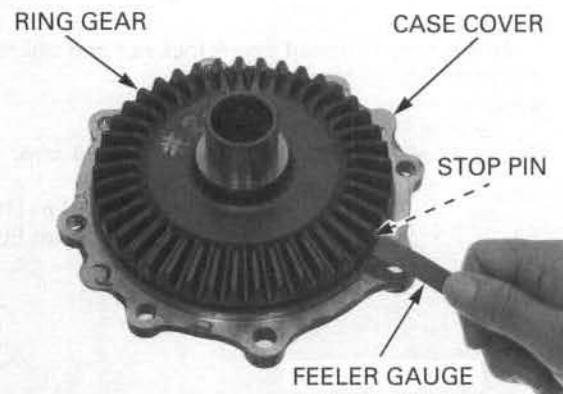


RING GEAR CLEARANCE INSPECTION

Install the ring gear with the 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.

Be sure to wear heavy gloves to avoid burns when handling the heated gear case. Using a torch to heat the gear case may cause warpage.

If the clearance is without the standard value, heat the case cover to approximately 80°C (176°F) and remove the stop pin by tapping the cover.

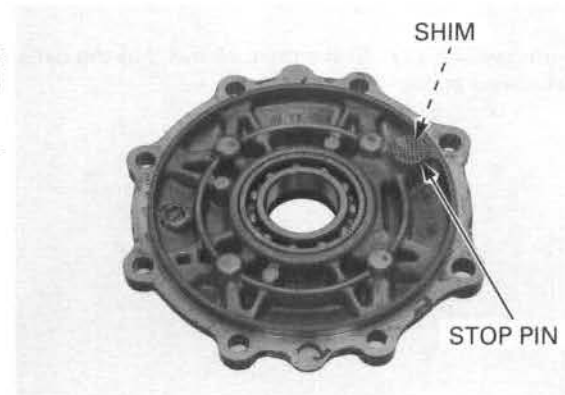
Install a stop pin shim to obtain the correct clearance.

Stop pin shims:

A: 0.10 mm (0.004 in)

B: 0.15 mm (0.006 in)

Drive the stop pin into the case cover.



FINAL GEAR CASE ASSEMBLY

- When the gear set, bearing, and/or gear case has been replaced, check the tooth contact pattern (page 18-12) and gear backlash (page 18-10).

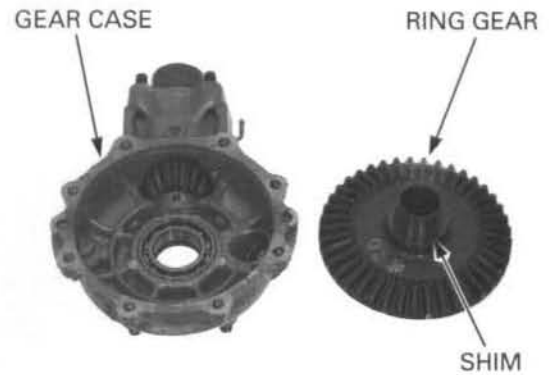
Keep dust and dirt out of the case and cover.

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.



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.



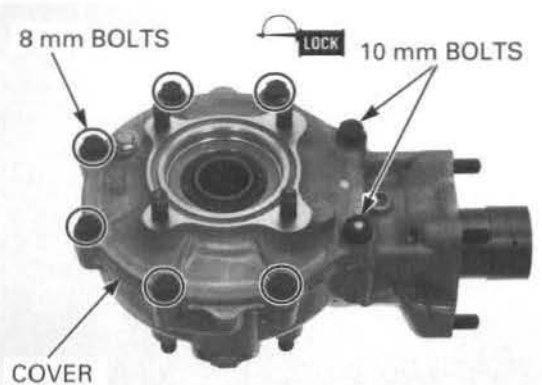
Apply locking agent to the threads of the two 10 mm bolts.

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 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 (2.6 kgf·m, 19 lbf·ft)

Check that the gear assembly turns smoothly without binding.



FINAL DRIVE INSTALLATION

Apply 5–8 g of molybdenum disulfide grease to the drive shaft splines.

Insert 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

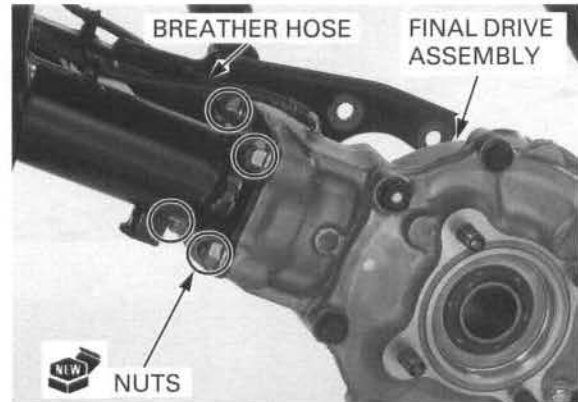
Clean the mating surfaces of the gear case.

Coat a new O-ring with grease and install it into the groove in the gear case.

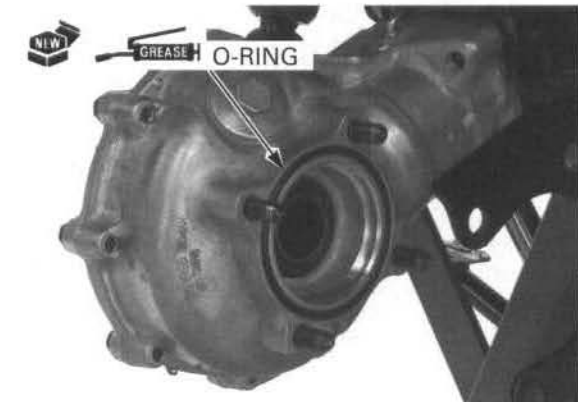


Install the final drive assembly onto the swingarm. Install four new nuts, and loosely tighten the nuts.

Connect the breather hose to the hose joint of the gear case.



Coat a new O-ring with grease and install it into the groove in the gear case.



Install the right axle housing onto the gear case and swingarm with the four bolts and eight new nuts.

Tighten the four final drive assembly mounting nuts

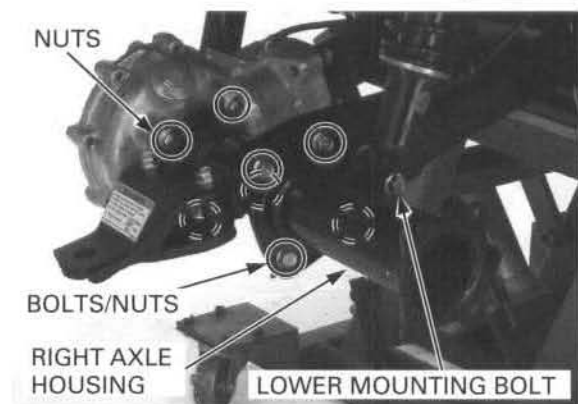
TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)

Tighten the four axle housing mounting nuts.

TORQUE: 44 N·m (4.5 kgf·m, 33 lbf·ft)

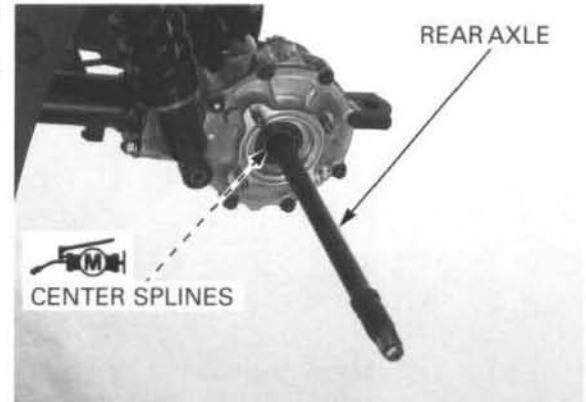
Install the right rear shock absorber into the axle housing and tighten the lower mounting bolt.

TORQUE: 44 N·m (4.5 kgf·m, 33 lbf·ft)



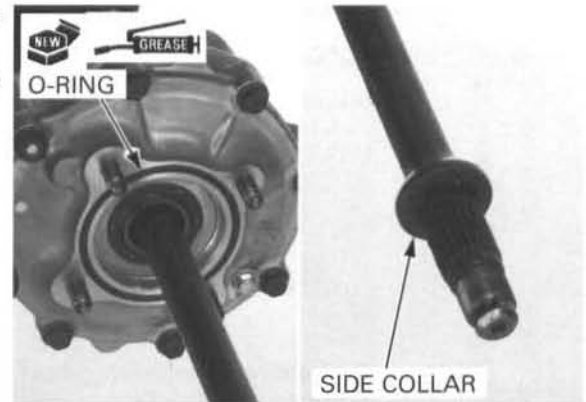
REAR AXLE INSTALLATION

Apply molybdenum disulfide grease to the center splines of the axle.
Install the axle into the final drive gear case from right side until it is fully seated.



Coat a new O-ring with grease and install it into the groove in the gear case.

Install the side collar onto the rear axle with the tapered side facing inward.

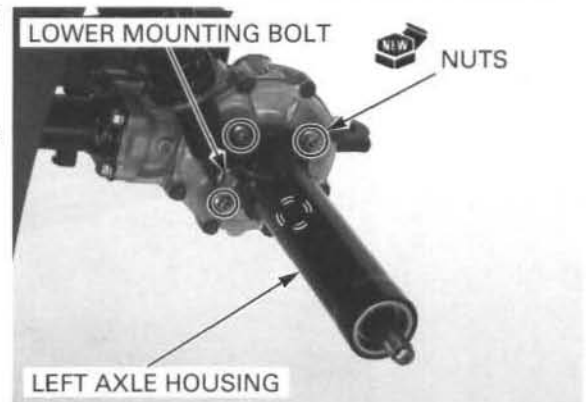


Install the left axle housing with four new nuts, and tighten the nuts.

TORQUE: 44 N·m (4.5 kgf·m, 33 lbf·ft)

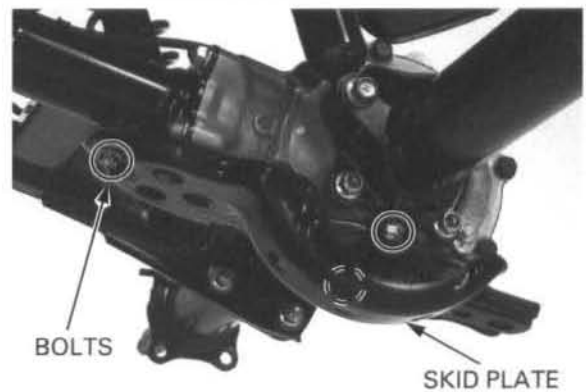
Install the left rear shock absorber into the axle housing and tighten the lower mounting bolt.

TORQUE: 44 N·m (4.5 kgf·m, 33 lbf·ft)



Install the skid plate and tighten the three bolts.

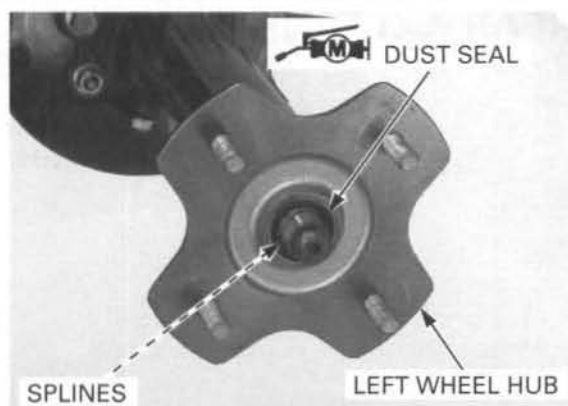
TORQUE: 32 N·m (3.3 kgf·m, 24 lbf·ft)



REAR DRIVING MECHANISM

Apply molybdenum disulfide grease to a new hub dust seal lip and install it into the left wheel hub until it is fully seated.

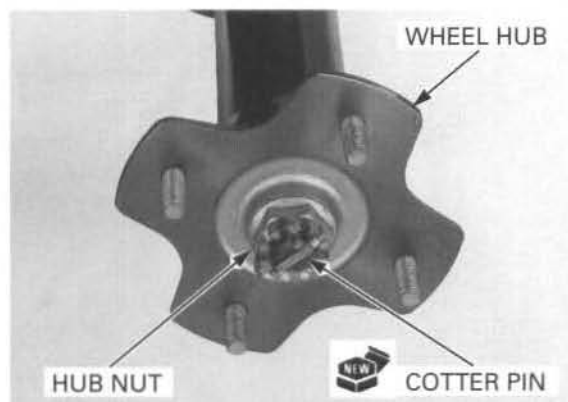
Install the wheel hub to the left splines.



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)

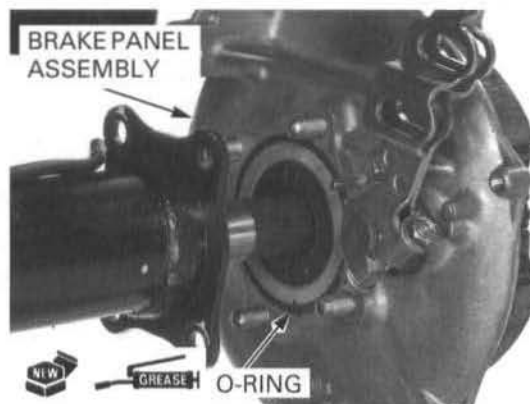
Install a new cotter pin.



Coat a new O-ring with grease and install it into the brake panel groove.

Do not get grease on the brake shoe linings.

Install the brake panel assembly onto the axle.



Install new brake panel nuts and tighten them.

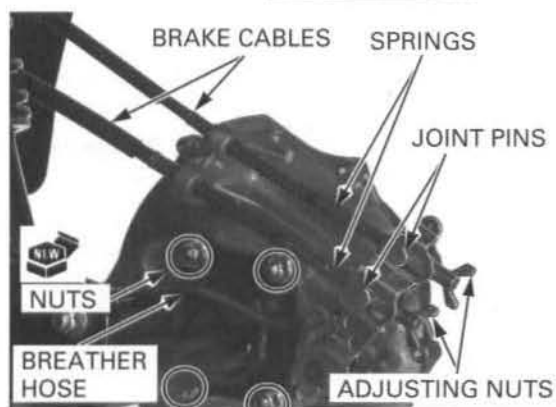
TORQUE: 44 N·m (4.5 kgf·m, 33 lbf·ft)

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 16-26).

Fill the gear case with the recommended oil (page 3-18).

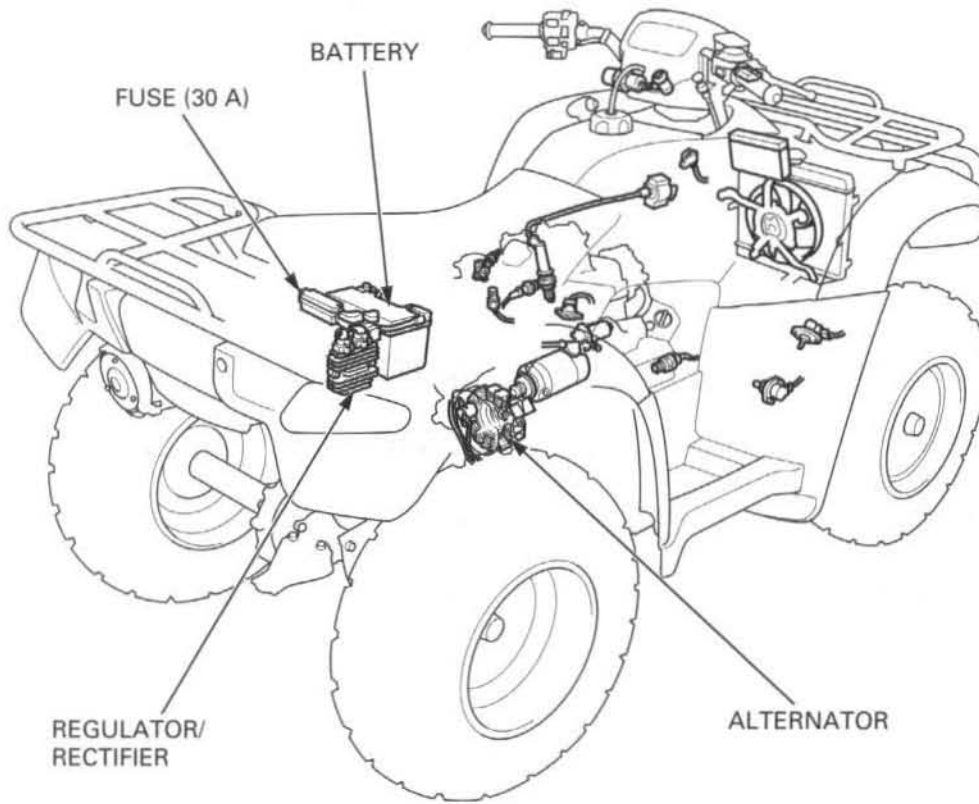


19. BATTERY/CHARGING SYSTEM

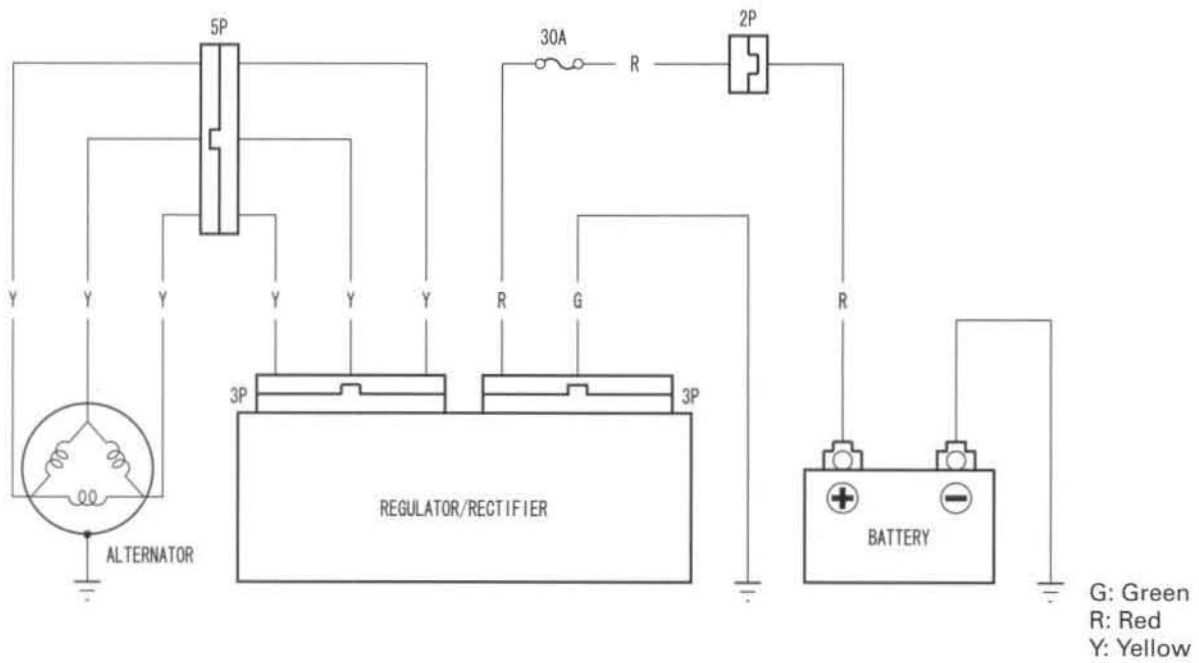
COMPONENT LOCATION	19-2	BATTERY	19-6
SYSTEM DIAGRAM	19-2	CHARGING SYSTEM INSPECTION	19-7
SERVICE INFORMATION	19-3	ALTERNATOR CHARGING COIL	19-8
TROUBLESHOOTING	19-5	REGULATOR/RECTIFIER	19-8

BATTERY/CHARGING SYSTEM

COMPONENT LOCATION



SYSTEM DIAGRAM



SERVICE INFORMATION

GENERAL

⚠ WARNING

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

NOTICE

- Always turn the ignition switch to OFF before disconnecting any electrical component.
- Some electrical components may be damaged if terminals or connectors are connected or disconnected while the ignition switch is ON and current is present.
- For extended storage, remove the battery, give it a full charge, and store it in a cool, dry space.
- For a battery remaining in a stored vehicle, disconnect the negative battery cable from the battery.
- The maintenance free battery must be replaced when it reaches the end of its service life.
- The battery can be damaged if overcharged or undercharged, or if left to discharge for 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 19-5).
- 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.
- 11-2 for alternator removal/installation.

BATTERY TESTING

Refer to the instruction of the Operation Manual for the recommended battery tester. The recommended battery tester puts a "load" on the battery so the actual battery condition of the load can be measured.

Recommended battery tester: Micro 404XL (U.S.A. only), BM-210 or equivalent

SPECIFICATIONS

ITEM		SPECIFICATIONS	
Battery	Capacity	12V – 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	0.361 kW/5,000 rpm (min ⁻¹)	
	Charging coil resistance (20° C/68° F)	0.1 – 1.0 Ω	

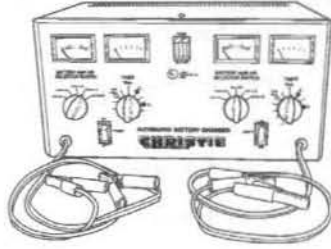
BATTERY/CHARGING SYSTEM

TOOLS

Motorcycle battery analyzer
Micro 404XL (U.S.A. only)



Christie battery charger
MC1012/2T (U.S.A. only)



TROUBLESHOOTING

BATTERY IS DAMAGED OR WEAK

1. Battery Test

Remove the battery (page 19-6).

Check the battery condition using the recommended battery tester.

RECOMMENDED BATTERY TESTER: Micro 404XL (U.S.A. only), BM-210 or equivalent

Is the battery in good condition?

No – Faulty battery

YES – GO TO STEP 2.

2. Current Leakage Test

Install the battery (page 19-6).

Check the battery current leakage test (Leak test: page 19-7).

Is the current leakage below 1 mA?

YES – GO TO STEP 4.

NO – GO TO STEP 3.

3. Current Leakage Test With Regulator/Rectifier Connector Disconnected

Disconnect the regulator/rectifier connector and recheck the battery current leakage.

Is the current leakage below 1 mA?

YES – Faulty regulator/rectifier

NO –

- Shorted wire harness
- Faulty ignition switch

4. Charging Voltage Inspection

Measure and record the battery voltage using a digital multimeter (page 19-6).

Start the engine.

Measure the charging voltage (page 19-7).

Compare the measurements to the results of the following calculation.

STANDARD: Measured BV < Measured CV < 15.5 V

- BV = Battery voltage
- CV = Charging voltage

Is the measured charging voltage within the standard voltage?

YES – Faulty battery

NO – GO TO STEP 5.

5. Alternator Charging Coil Inspection

Check the alternator charging coil (page 19-8).

Is the alternator charging coil resistance within 0.1 – 1.0Ω (20°C/68°F)?

YES – GO TO STEP 6.

NO – Faulty charging coil

6. Regulator/Rectifier System Inspection

Check the voltage and resistance at the regulator/rectifier connector (page 19-8).

Are the measurements correct?

YES – Faulty regulator/rectifier

NO –

- Open circuit in related wire
- Loose or poor contacts of related terminal
- Shorted wire harness

BATTERY/CHARGING SYSTEM

BATTERY

REMOVAL/INSTALLATION

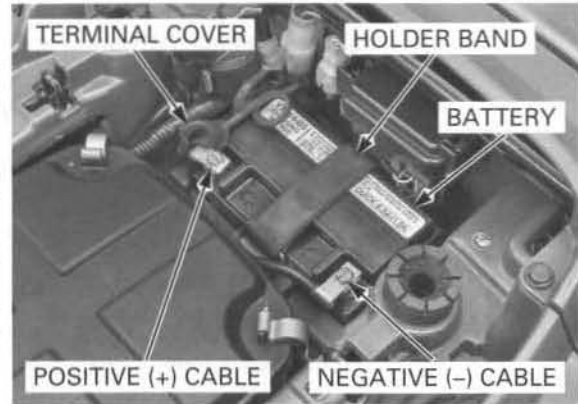
Remove the seat (page 2-4).
Remove the battery holder band.
With the ignition switch OFF, disconnect the negative (-) cable first, then disconnect the positive (+) cable by removing each terminal bolt.
Remove the battery.

Connect the positive terminal first and then the negative cable.

Install the battery in the reverse order of removal with the proper wiring as shown.

After installing the battery, coat the terminals with clean dielectric grease.

Install the terminal cover to the position terminal securely.

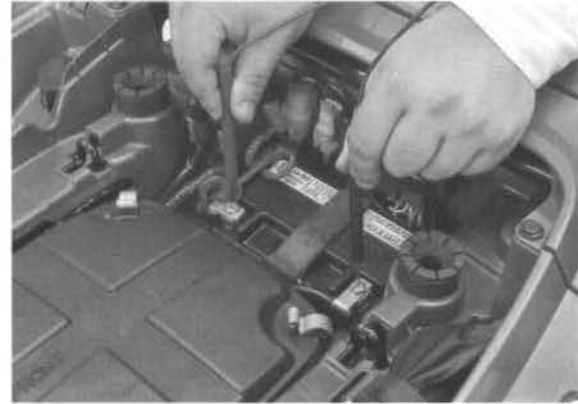


VOLTAGE INSPECTION

Remove the seat (page 2-4).
Measure the battery voltage using a commercially available digital multimeter.

VOLTAGE:

Fully charged: 13.0 – 13.2V
Under charged: Below 12.3V



BATTERY TESTING

Remove the battery (page 19-6).
Refer to the instructions that are appropriate to the battery testing equipment available to you.

TOOL:

Battery tester Micro 404XL (U.S.A. only),
BM-210 or equivalent

BATTERY CHARGING (U.S.A. only)

Remove the battery (page 19-6).
Refer to the instructions that are appropriate to the battery charging equipment available to you.

TOOL:

Christie battery charger MC1012/2T (U.S.A. only)

CHARGING SYSTEM INSPECTION

CURRENT LEAKAGE INSPECTION

Remove the seat (page 2-4).

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.

- 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 ON. A sudden surge of current may blow out the fuse in the tester.

SPECIFIED CURRENT LEAKAGE: 1 mA maximum

If current leakage exceeds the specified value, a shorted circuit is likely.

Locate the short by disconnecting connections one by one and measuring the current.

CHARGING VOLTAGE INSPECTION

Remove the seat (page 2-4).

Be sure the battery is in good condition before performing this test.

Warm up the engine to normal operating temperature.

Connect the multimeter between the battery positive (+) and negative (-) terminals.

NOTE:

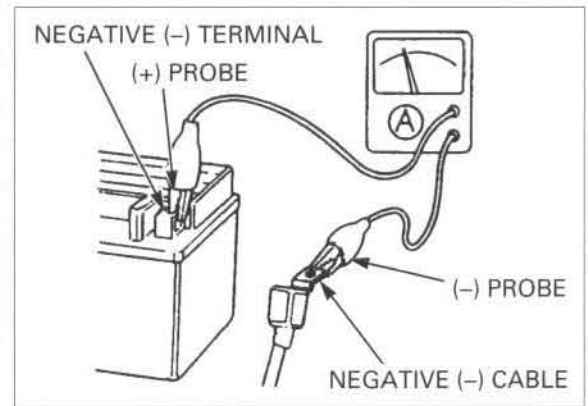
- To prevent a short, make absolutely certain which are the positive (+) and negative (-) terminals or cables.
- Do not disconnect the battery or any cable in the charging system without first switching off the ignition switch. Failure to follow this precaution can damage the tester or electrical components.

With the headlights on, and measure the voltage on the multimeter when the engine runs at 5,000 rpm (min^{-1}).

STANDARD:

Measured BV < Measured CV < 15.5 V

- BV = Battery voltage (page 19-6)
- CV = Charging voltage



ALTERNATOR CHARGING COIL

INSPECTION

Remove the recoil starter cover (page 2-4).

Disconnect the alternator 5P (Natural) connector. Check the connector for loose contacts or corroded terminals.



Measure the resistance between the Yellow wire terminals of the alternator side connector.

STANDARD: 0.1 – 1.0 Ω (at 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.

Refer to page 11-8 for alternator stator replacement.

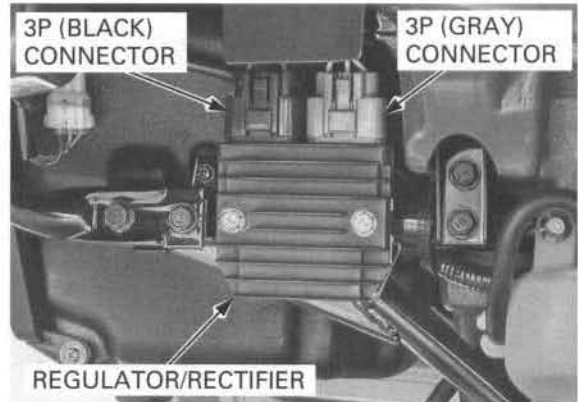


REGULATOR/RECTIFIER

WIRE HARNESS INSPECTION

Disconnect the regulator/rectifier 3P (Black) connector and 3P (Gray) connector.

Check the connectors for loose contacts or corroded terminals.



BATTERY LINE

Measure the voltage between the Red wire terminal of 3P (Black) connector and ground. There should be battery voltage at all times.

GROUND LINE

Check the continuity between the Green wire terminal of 3P (Black) connector and ground. There should be continuity at all times.

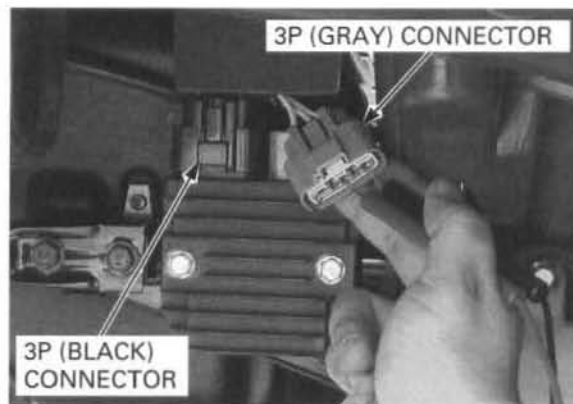
CHARGING COIL LINE

Measure the resistance between the Yellow wire terminals of 3P (GRAY) connector.

STANDARD: 0.1 – 1.0 Ω (at 20° C/68° F)

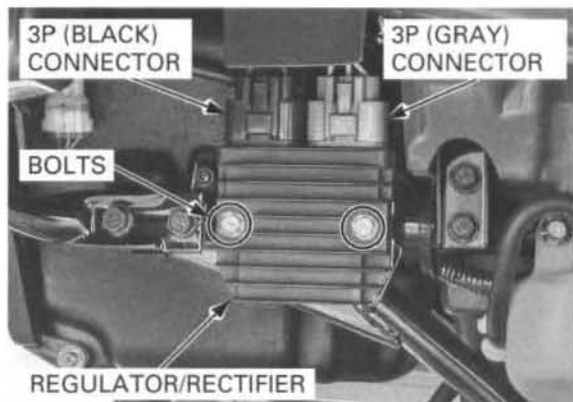
Check for continuity between each Yellow wire terminal and ground.

There should be no continuity.

**REMOVAL/INSTALLATION**

Disconnect the regulator/rectifier 3P (Black) connector and 3P (Gray) connector.

Remove the regulator/rectifier mounting bolts.



MEMO

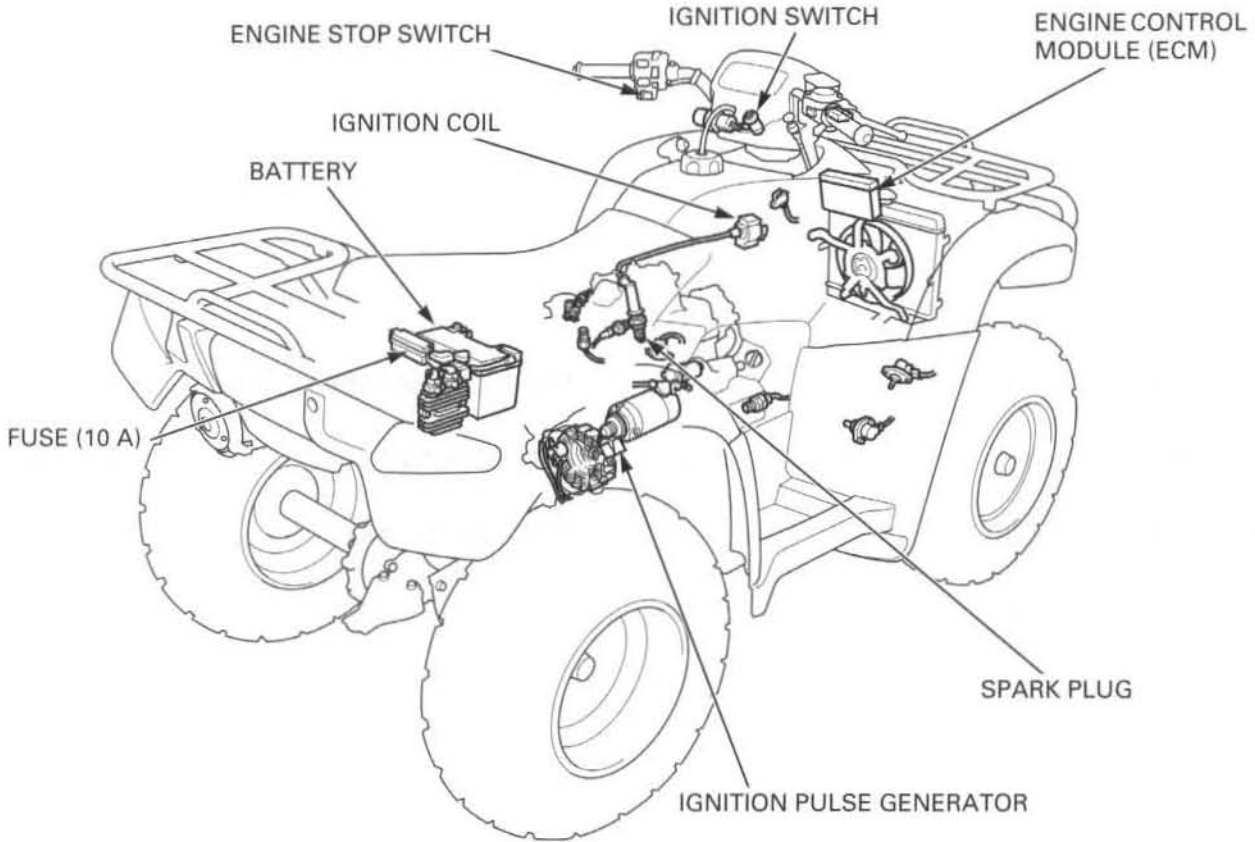


20. IGNITION SYSTEM

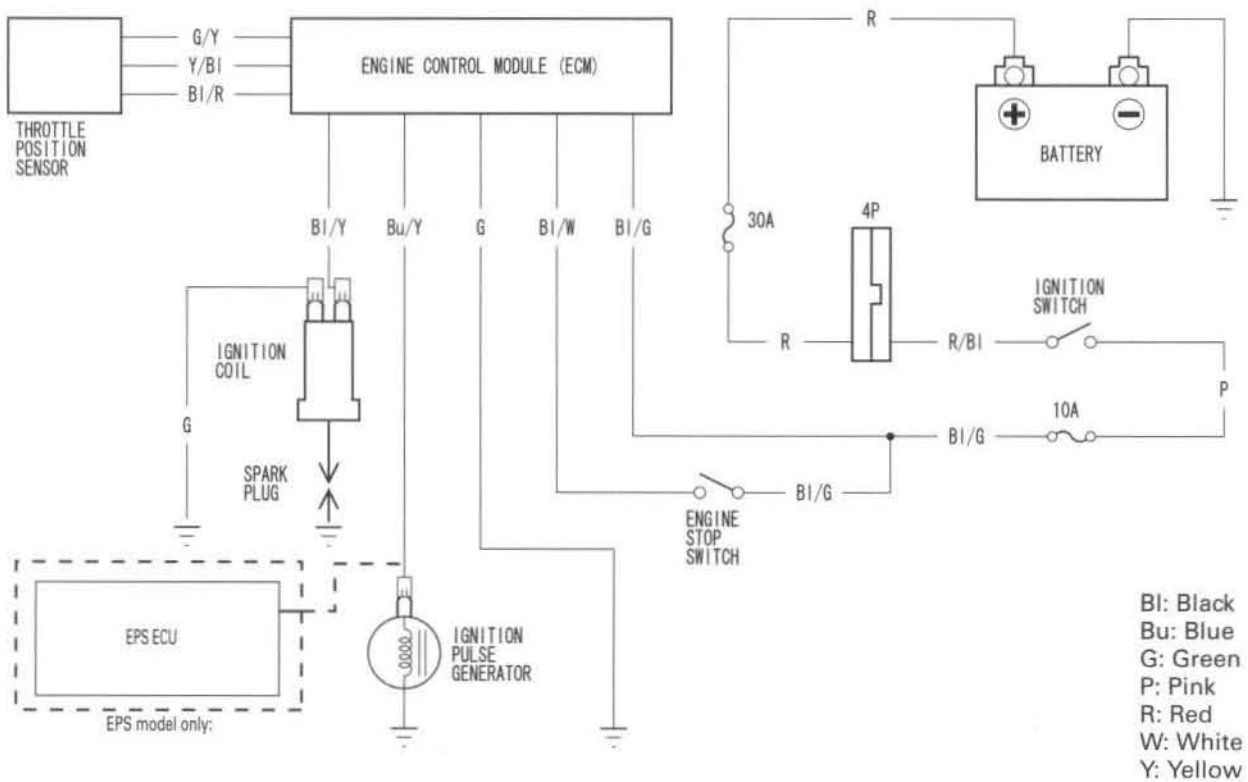
COMPONENT LOCATION	20-2	IGNITION SYSTEM INSPECTION.....	20-5
SYSTEM DIAGRAM.....	20-2	IGNITION COIL	20-7
SERVICE INFORMATION	20-3	IGNITION TIMING	20-8
TROUBLESHOOTING	20-4		

IGNITION SYSTEM

COMPONENT LOCATION



SYSTEM DIAGRAM



SERVICE INFORMATION

GENERAL

- Some electrical components may be damaged if terminals or connectors are connected or disconnected while the ignition switch is ON and current is present.
- When servicing the ignition system, always follow the steps in the troubleshooting table on page 20-4.
- This vehicle's Ignition Control Module (ICM) is built in the engine control module (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.
- Make sure the battery is adequately charged. Using the starter motor with a weak battery results in a slower engine cranking speed as well as no spark at the spark plug.
- This vehicle's spark plug is equipped with iridium type electrode. Do not use any spark plug other than specified.
- 11-8 for ignition pulse generator removal/installation.
- See page 22-9 for ignition switch servicing.
- See page 22-10 for engine stop switch inspection.
- See page 22-22 for reverse switch servicing.
- See page 24-37 for gear position switch servicing.

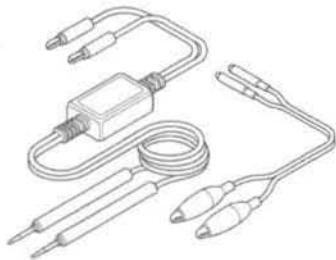
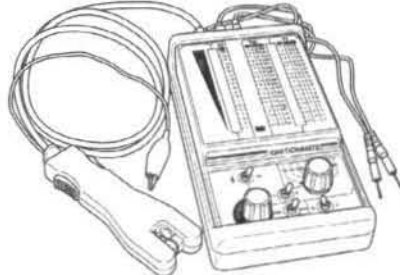
SPECIFICATION

ITEM		SPECIFICATIONS
Spark plug	Standard	IJR7A9 (NGK), VX22BC (DENSO)
	For cold climate (below 5° C/41° F)	IJR6A9 (NGK), VX20BC (DENSO)
Spark plug gap		0.8 – 0.9 mm (0.03 – 0.04 in)
Ignition coil primary peak voltage		100 V minimum
Ignition pulse generator peak voltage		0.7 V minimum
Ignition timing ("F" mark)		15° BTDC at idle

TORQUE VALUES

Timing hole cap 10 N·m (1.0 kgf·m, 7 lbf·ft)

TOOLS

<p>Peak voltage adapter 07HGJ-0020100</p>  <p>(not available in U.S.A.) with commercially available digital multimeter (impedance 10 MΩ/DCV minimum)</p>	<p>Ignition Mate peak voltage tester MTP07-0286</p>  <p>(U.S.A. only)</p>
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IGNITION SYSTEM

TROUBLESHOOTING

- Inspect the following before diagnosing the system:
 - Faulty spark plug
 - Loose spark plug cap or spark plug wire connection
 - Water got into the spark plug cap (leaking the ignition coil secondary voltage)
- If the engine speed will not rise above 2,200 rpm (min^{-1}) with the gearshift lever in "R" position, inspect the following:
 - Gearshift lever linkage adjustment (page 12-15)
 - Reverse switch (page 22-22)
 - Gear position switch (page 24-37)
- If the engine speed will not rise above 1,750 rpm (min^{-1}) with the front brake lever released and the gearshift lever in "D" or "L" position, inspect the brake switch (page 22-25) and its installation condition.

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"> 1. Incorrect peak voltage adapter connections. (System is normal if measured voltage is over the specifications with reverse connections.) 2. The multimeter impedance is too low. 3. Cranking speed is too slow (Battery is under charged). 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.) 5. Poorly connected connectors or an open circuit in the ignition system. 6. Faulty ignition coil. 7. Faulty engine control module (ECM) (when above No.1 through 6 are normal).
	No peak voltage.	<ol style="list-style-type: none"> 1. Incorrect peak voltage adaptor connections. (System is normal if measured voltage is over the specifications with reverse connections.) 2. Battery is undercharged. (Large voltage drop when the engine is started.) 3. Faulty ignition switch or engine stop switch. 4. Loose or poorly connected ECM connectors. 5. No voltage at the Black/white (power source) wire of the ECM. 6. Open circuit or poor connection in the Green (ground) wire of the ECM. 7. Faulty peak voltage adaptor. 8. Faulty ignition pulse generator (Measure peak voltage) 9. Faulty ECM (when above No. 1 through 8 are normal).
	Peak voltage is normal, but no spark jumps at the plug.	<ol style="list-style-type: none"> 1. Faulty spark plug or leaking ignition coil secondary current. 2. Faulty ignition coil.
Ignition pulse generator	Low peak voltage.	<ol style="list-style-type: none"> 1. The multimeter impedance is too low; below 10 MΩ DCV. 2. Cranking speed is too slow (Battery is under charged). 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.) 4. Faulty ignition pulse generator (when above No. 1 through 3 are normal).
	No peak voltage.	<ol style="list-style-type: none"> 1. Faulty peak voltage adaptor. 2. Faulty ignition pulse generator.

IGNITION SYSTEM INSPECTION

- If there is no spark at the plug, check all connections for loose or poor contact before measuring the peak voltage.
- Use the recommended digital multimeter or a commercially available digital multimeter with an impedance of 10 M Ω /DCV minimum.
- The display value differs depending upon the internal impedance of the multimeter.

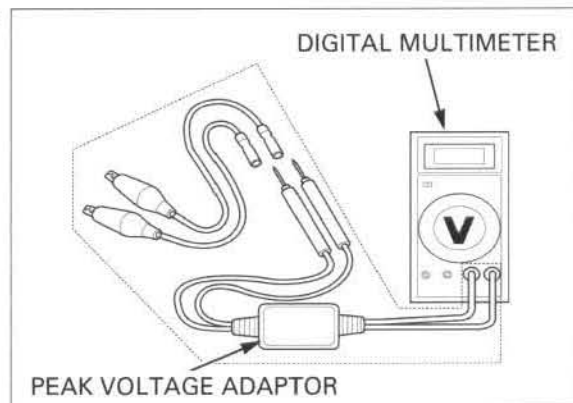
Use the peak voltage tester or connect the peak voltage adaptor to the digital multimeter.

TOOLS:

IgnitionMate peak voltage tester MTP07-0286
(U.S.A. only) or

Peak voltage adaptor 07HGJ-0020100
(not available in U.S.A.)

with commercially available digital multimeter
(impedance 10 M Ω /DCV minimum)



IGNITION COIL 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.

Disconnect the spark plug cap from the spark plug (page 3-9).

Connect a 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 adaptor probes to the ignition coil primary terminal and body ground.

CONNECTION: Black/yellow (-) – Body ground (+)

Turn the ignition switch to ON and the engine stop switch to the RUN.

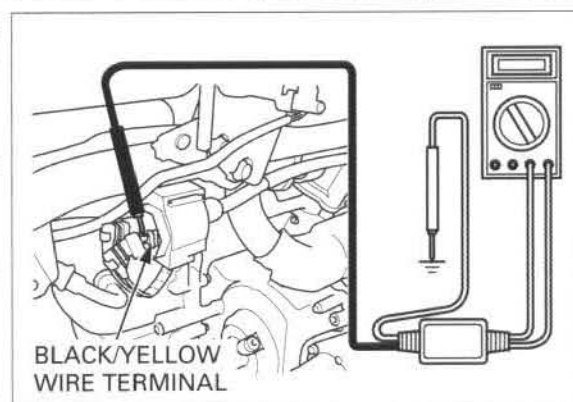
Shift the transmission into neutral.

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 chart on page 20-4.

Avoid touching the spark plug or tester probes to prevent electric shock.



IGNITION SYSTEM

IGNITION PULSE GENERATOR PEAK VOLTAGE

NOTE:

- Check that the cylinder compression is normal and the spark plug is installed correctly in the cylinder head.

Seal the ECM connector with tape to prevent dirt and oil from entering the connector after disconnecting the 21P (Black) connector.

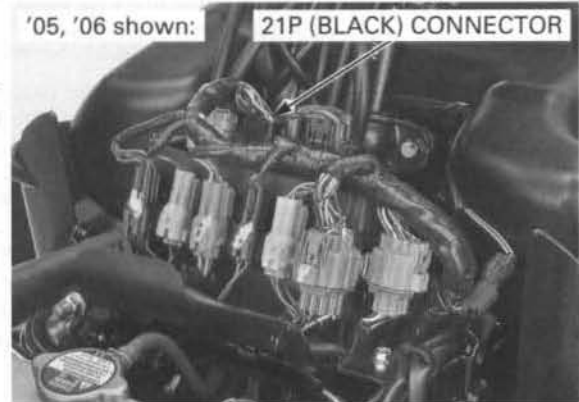
Disconnect the 21P (Black) ECM connector.

NOTE:

- When reconnecting the ECM 21P (Black) connector, check that there is no dirt and oil in the connector.

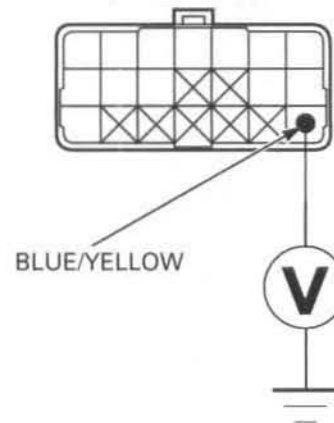
*Except EPS model:
Be careful not to bend the connector terminals.*

Connect the peak voltage tester or adaptor probes to the ECM 21P (Black) connector Blue/yellow terminal of the wire harness side and ground.



Except EPS model:

ECM CONNECTOR (Viewed from the terminal side)



EPS model: Disconnect the 21P (Grey) EPS ECU connector.

Connect the peak voltage tester or adaptor probes to the EPS ECU 21P (Grey) connector Blue/yellow terminal of the wire harness side and ground.

CONNECTION: Blue/yellow (+) – Body ground (-)

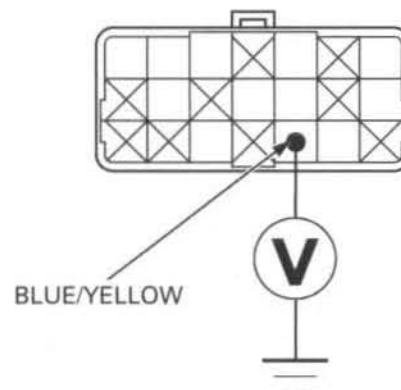
Shift the transmission into neutral.
Turn the ignition switch to ON.
Crank the engine with the starter motor and read the ignition pulse generator peak voltage.

PEAK VOLTAGE: 0.7 V minimum

If the voltage measured at the ECM 21P (Black) connector is abnormal, measure the peak voltage at the alternator connector.

EPS model:

EPS ECU CONNECTOR (Viewed from the terminal side)



Remove the recoil starter cover (page 2-4).

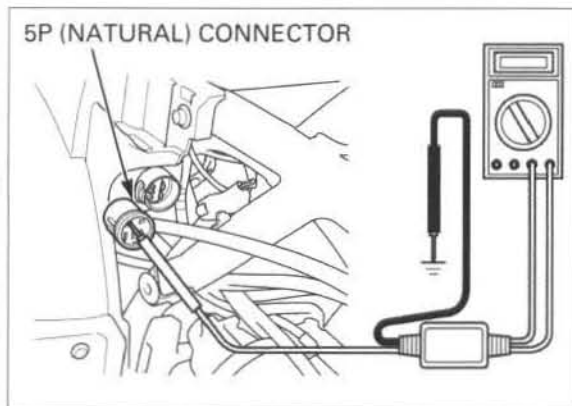
Disconnect the alternator 5P (Natural) connector and connect the peak voltage tester or adaptor probes to the Blue/yellow terminal of the alternator side connector and ground.

In the same manner as at the ECM connector, measure the peak voltage and compare it to the voltage measured at the ECM connector.

- If the peak voltage measured at the ECM connector is abnormal and the one measured at the alternator connector is normal, the Blue/yellow wire has an open or short circuit, or loose connection.
- If both peak voltages are abnormal, follow the checks described below.
 - Check the ignition pulse generator.
 - Check the stator.

11-8 for ignition pulse generator replacement.

5P (NATURAL) CONNECTOR



IGNITION COIL

REMOVAL/INSTALLATION

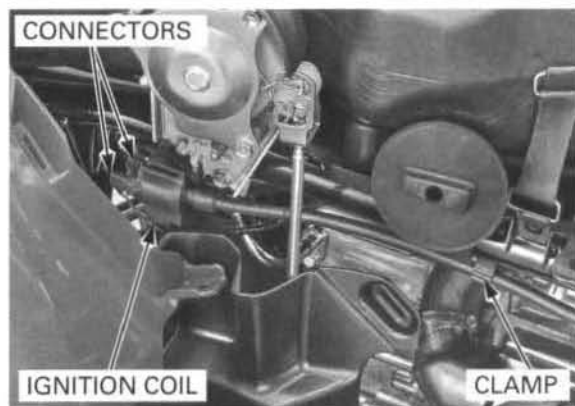
Remove the fuel tank (page 2-6).

Disconnect the plug cap from the plug.



Release the spark plug wire from the wire clamp. Disconnect the ignition coil connectors. Remove the ignition coil.

Installation is in the reverse order of removal.



IGNITION SYSTEM

IGNITION TIMING

Remove the recoil starter cover (page 2-4).

Start the engine and warm it up to operating temperature.

Stop the engine and remove the timing hole cap from the rear crankcase cover.

Connect the timing light and tachometer.

Start the engine, let it idle (1,400 rpm (min^{-1})) and check the ignition timing.

The ignition timing is correct if the "F" mark on the flywheel aligns with the index mark on the rear crankcase cover at idle.

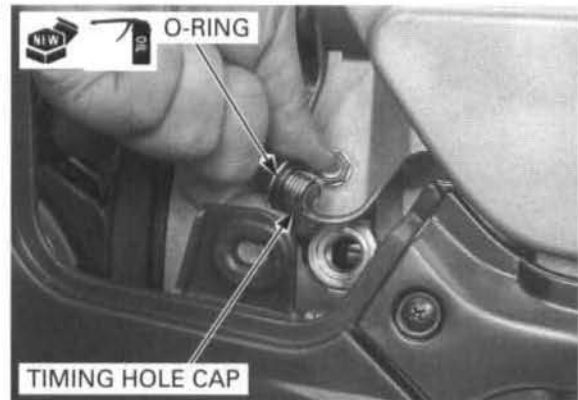
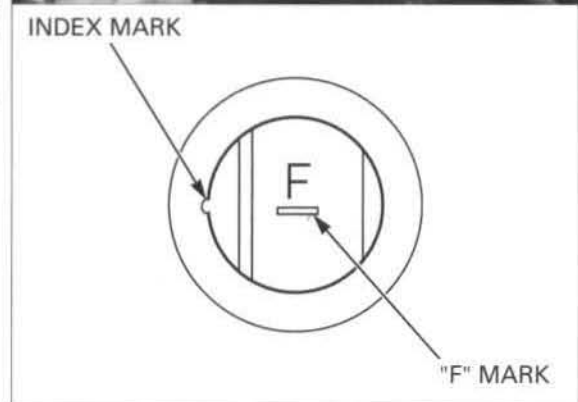
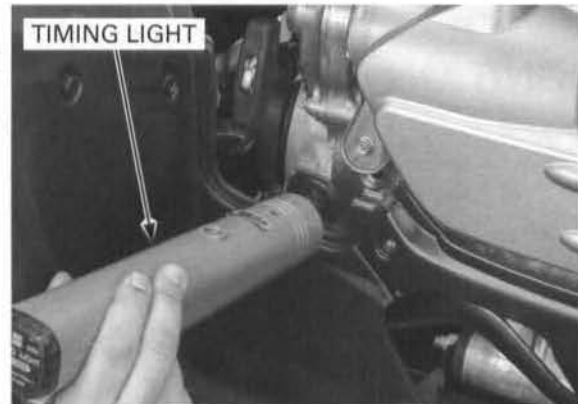
Increase the engine speed and make sure the "F" mark begins to move.

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

Install the timing hole cap and tighten it to the specified torque.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

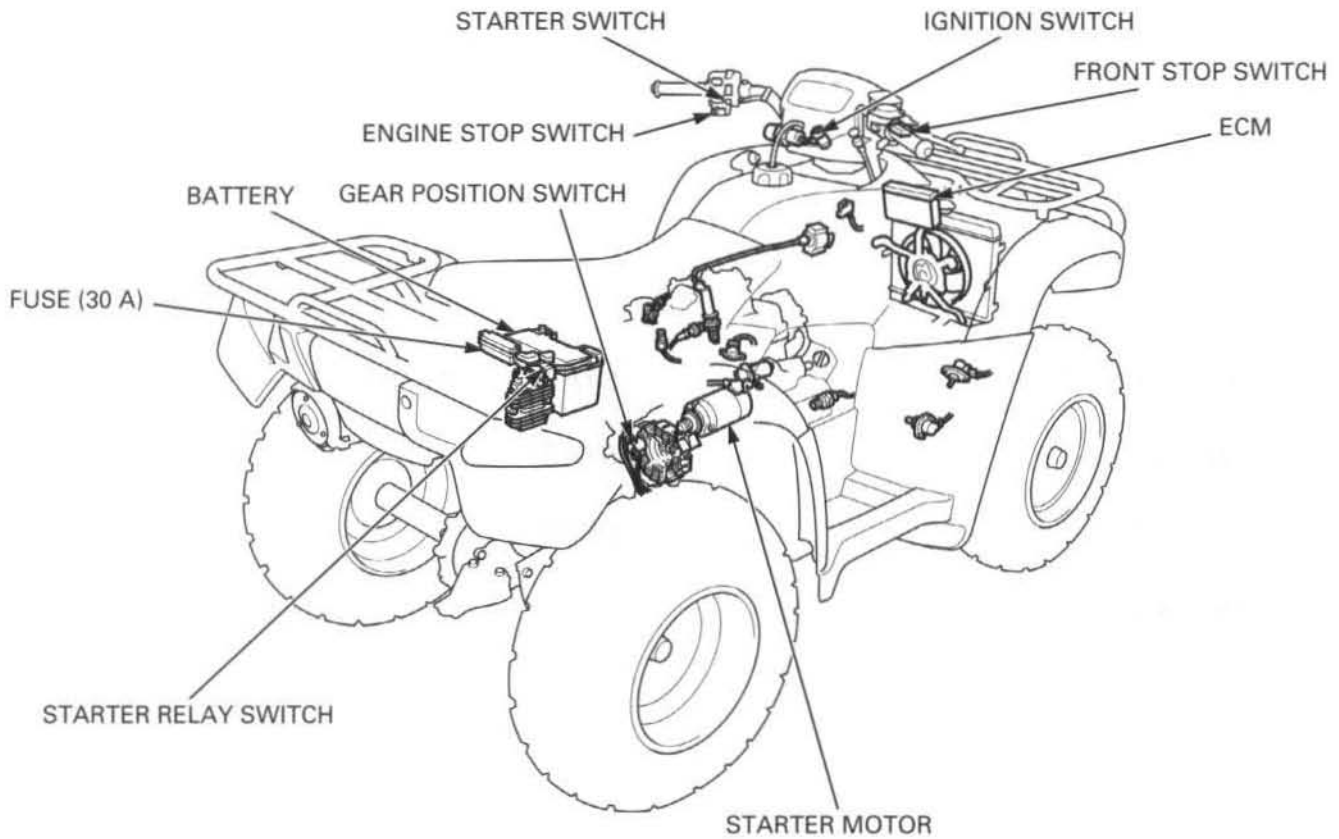
Install the recoil starter cover (page 2-4).



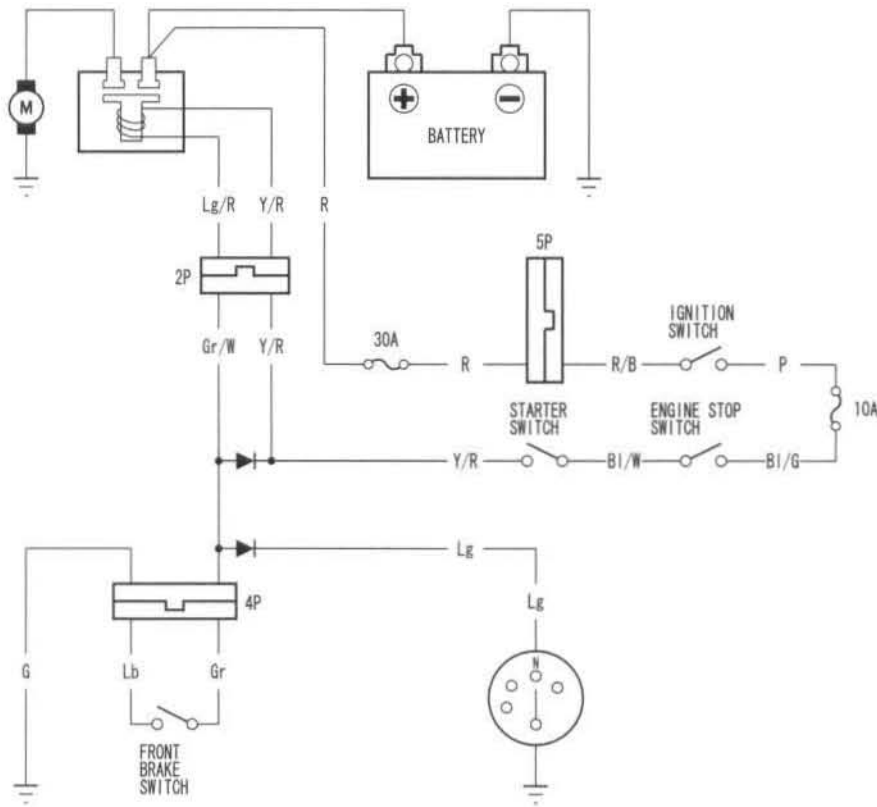
21. ELECTRIC STARTER

COMPONENT LOCATION	21-2	STARTER MOTOR	21-6
SYSTEM DIAGRAM	21-2	STARTER RELAY SWITCH	21-12
SERVICE INFORMATION	21-3	DIODE	21-13
TROUBLESHOOTING	21-4		

COMPONENT LOCATION



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 21-4).
- A weak battery may be unable to turn the starter motor quickly enough, or supply adequate ignition current.
- If the current is kept flowing through the starter motor to turn it while the engine is not cranking over, the starter motor may be damaged.
- 11-12 for starter clutch servicing.
- See page 22-9 for ignition switch information.
- See page 22-10 for engine stop switch and starter switch inspection.
- See page 22-26 for front brake switch inspection.
- See page 24-37 for gear position switch information.

SPECIFICATIONS

Unit: mm (in)

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

TROUBLESHOOTING

- The starter motor should operate when the transmission is in neutral or when the transmission is in drive and the front brake lever is squeezed.
- Make sure the engine stop switch is turned to RUN before starting the engine. The starter motor does not operate with the engine stop switch turned to OFF.

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 19-6).

3. Starter Relay Switch Operation Inspection

Check the operation of the starter relay switch (page 21-12).

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 (page 21-12).

NO – Faulty starter motor (page 21-6).

5. Relay Coil Ground Line Inspection

Turn the ignition switch to OFF.

Check the ground line of the starter relay switch (page 21-12).

Is the ground line normal?

NO –

- Faulty neutral switch (page 24-37).
- Faulty diode (page 21-13).
- Faulty front brake switch (page 22-26).
- Loose or poor contact of the related connector terminal.
- Open circuit in the wire harness.

YES – GO TO STEP 6.

6. Relay Coil Power Input Line Inspection

Check the power input line of the starter relay switch (page 21-12).

Is the power input line normal?

NO –

- Faulty ignition switch (page 22-9).
- Faulty engine stop switch (page 22-10).
- Faulty starter switch (page 22-10).
- Loose or poor contact of the related connector terminal.
- Open circuit in the wire harness.

YES – GO TO STEP 7.

7. Starter Relay Switch Inspection

Check the function of the starter relay switch (page 21-12).

Is the starter relay switch function properly?

NO – Faulty starter relay switch.

YES – Loose or poor contact of the starter relay switch connector terminal.

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

STARTER MOTOR

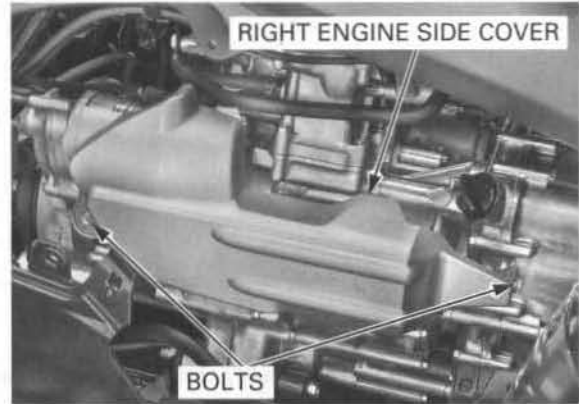
REMOVAL

Remove the following:

- seat (page 2-4)
- recoil starter cover (page 2-4)

With the ignition switch OFF, remove the negative (-) cable from the battery.

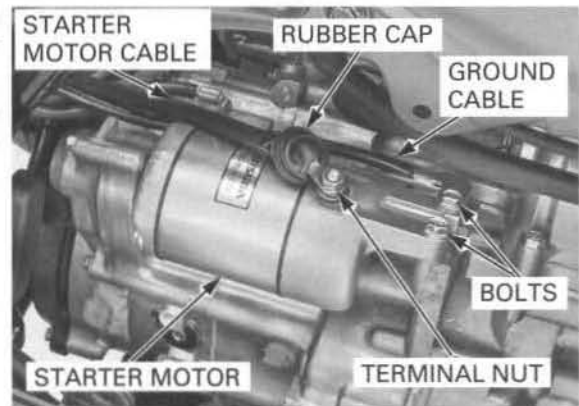
Remove the two bolts and right engine side cover.



Slide the rubber cap off the starter motor terminal and remove the terminal nut and starter motor cable.

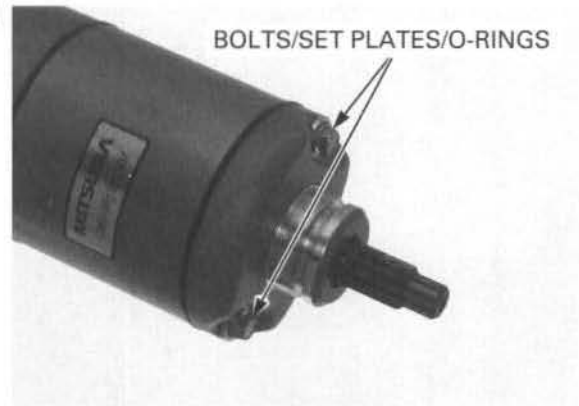
Remove the two mounting bolts and ground cable, and the starter motor from the rear crankcase cover.

Remove the O-ring from the starter motor.



DISASSEMBLY/INSPECTION

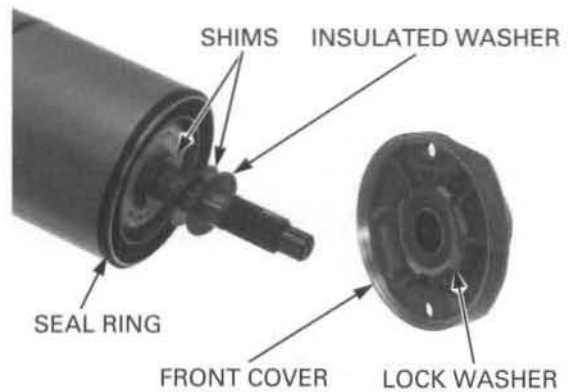
Remove the starter motor case bolts, set plates and O-rings.



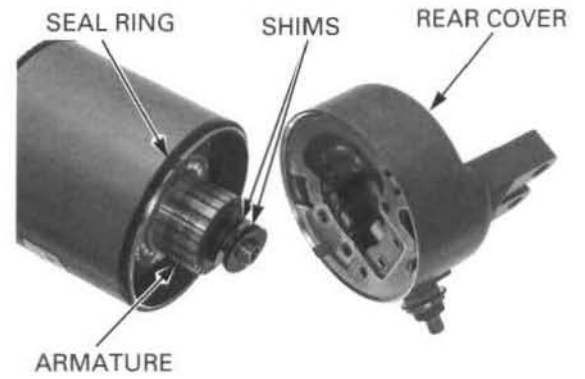
Record the location and number of shims.

Remove the following:

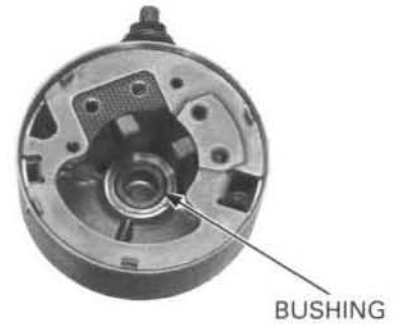
- front cover
- lock washer
- insulated washer
- shims
- seal ring



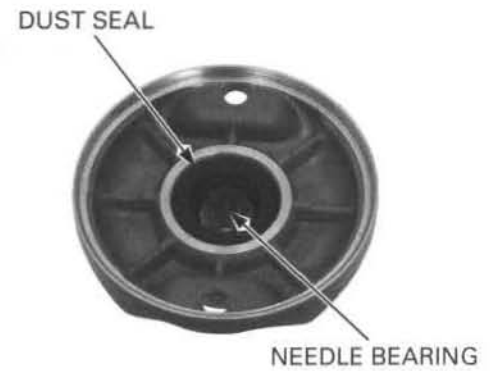
- rear cover
- shims
- seal ring
- armature



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.

- 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.

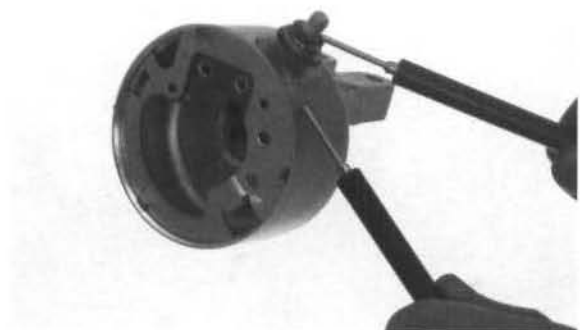
INSULATED BRUSH

Continuity



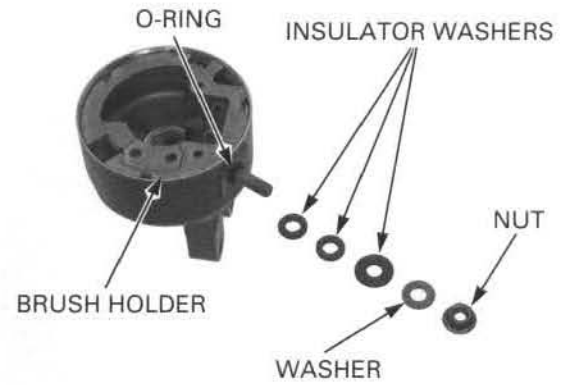
Check for continuity between the cable terminal and motor case.
There should be no continuity.

No continuity



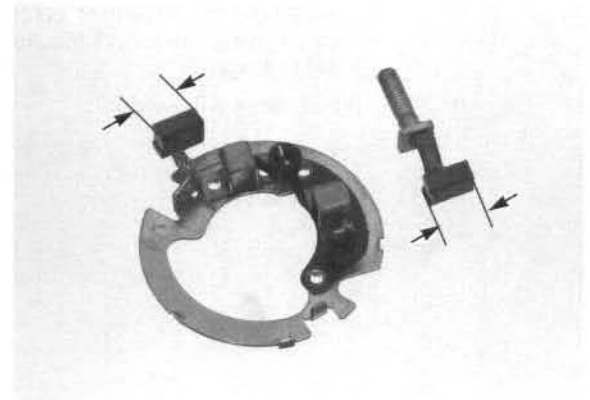
Remove the following:

- nut
- washer
- insulator washers
- brush holder assembly
- O-ring
- insulator

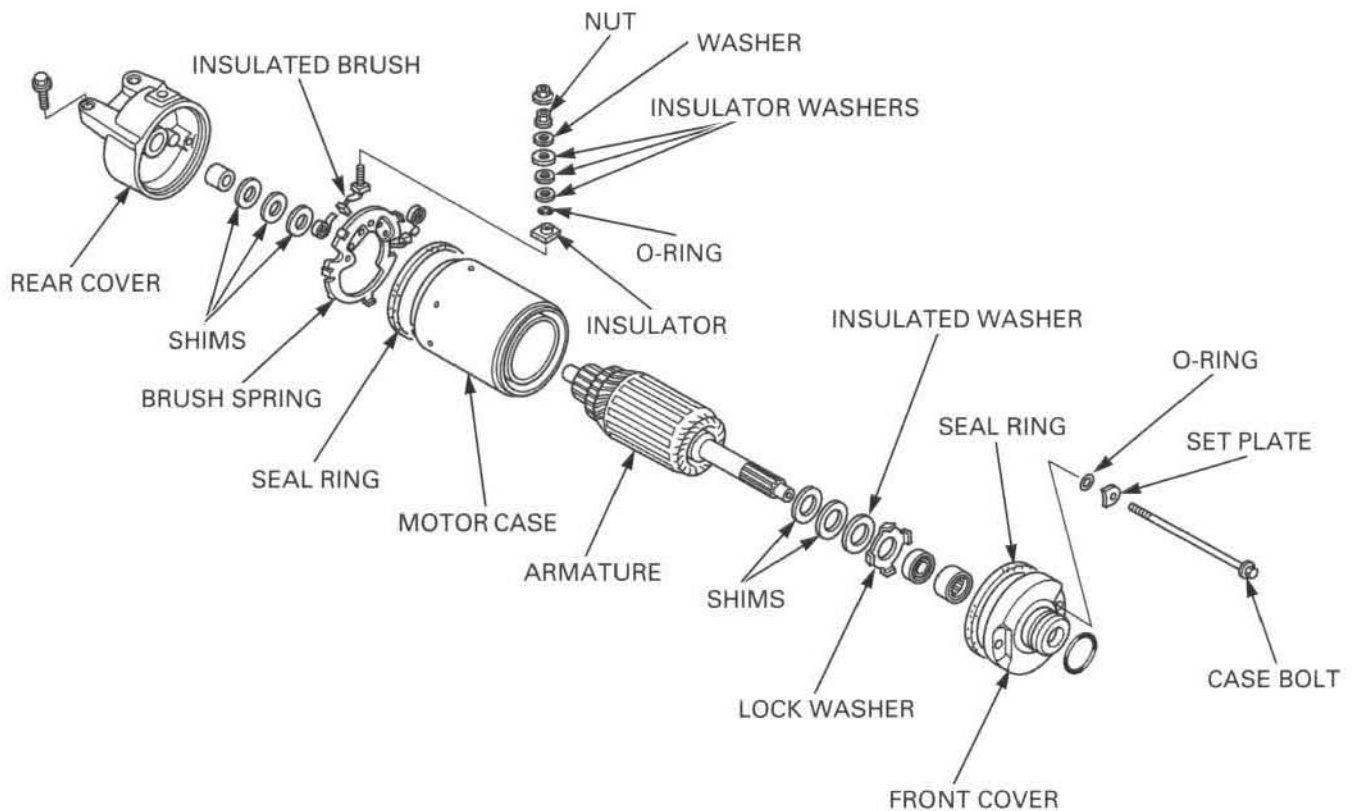


Remove the brushes from the brush holder.
Measure the brush length.

SERVICE LIMIT: 9.0 mm (0.35 in)

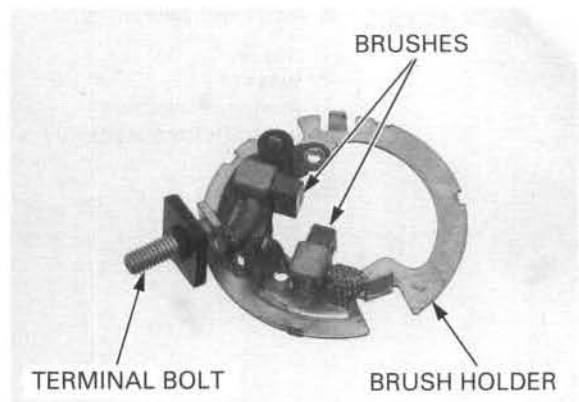


ASSEMBLY



ELECTRIC STARTER

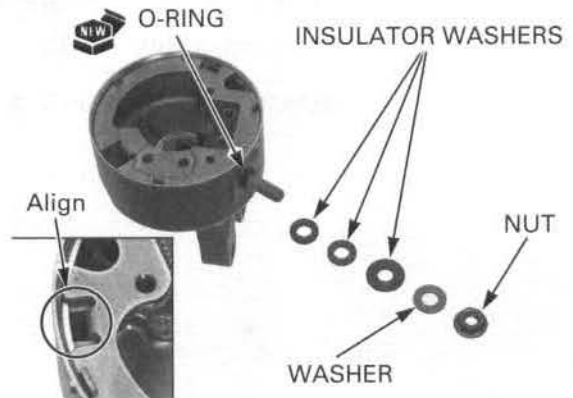
Install the brushes into the brush holder.
Install the insulator onto the terminal bolt.



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

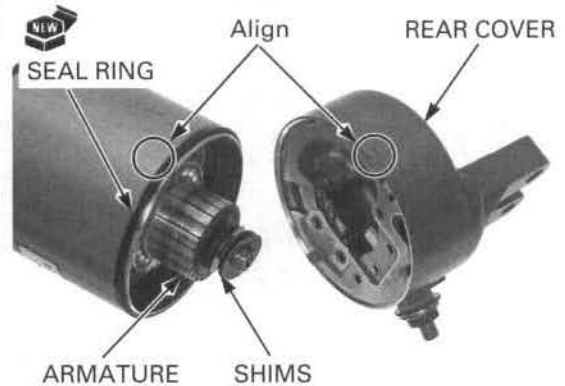


The coil may be damaged if the magnet pulls the armature against the case.

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.

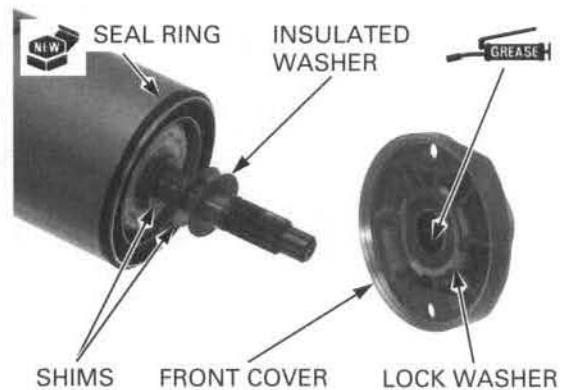
Install a new seal ring onto the motor case.
Install the same number of shims in the same locations as noted during disassembly.

Install the rear cover while pushing the brushes into the brush holder and aligning the brush holder tab with the motor case groove (aligning the index lines).

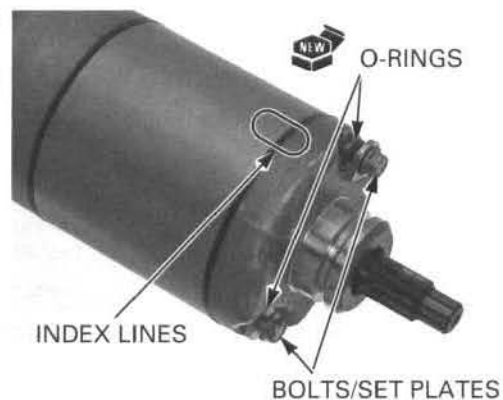


Install a new seal ring onto the motor case.
Install the shims and insulated washer onto the armature shaft.

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 onto the motor case.



Align the index lines on the front cover and motor case.
 Install the set plates and new O-rings onto the motor case bolts.
 Install the motor case bolts and tighten them.



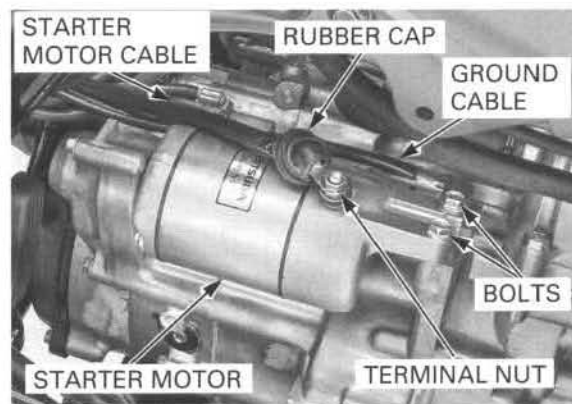
INSTALLATION

Coat a new O-ring with engine oil and install it into the starter motor groove.
 Apply molybdenum oil solution to the starter motor shaft splines.

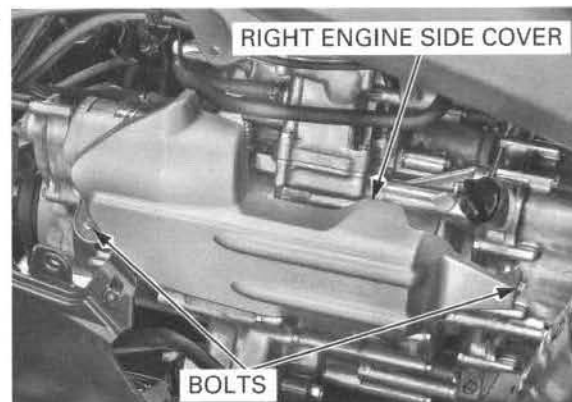


Set the water pump bypass hose properly (page 1-24).

Install the starter motor into the rear crankcase cover with the two mounting bolts and ground cable, and tighten the mounting bolts.
 Install the starter motor cable and nut onto the motor terminal and tighten the nut securely.
 Install the rubber cap over the starter motor terminal properly.



Install the right engine side cover and tighten the two bolts.
 Connect the battery negative (-) cable.
 Install the following:
 - recoil starter cover (page 2-4)
 - seat (page 2-4)



STARTER RELAY SWITCH

REMOVAL/INSTALLATION

Remove the seat (page 2-4).

Slide the rubber caps off the starter relay switch terminals.

Remove the nuts, battery positive (+) cable and starter motor cable from the starter relay switch.

Remove the starter relay switch from the stay.

Installation is in the reverse order of removal.



INSPECTION

Remove the seat (page 2-4).

Shift the sub-transmission into neutral.

Turn the ignition switch 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 using the procedure below.

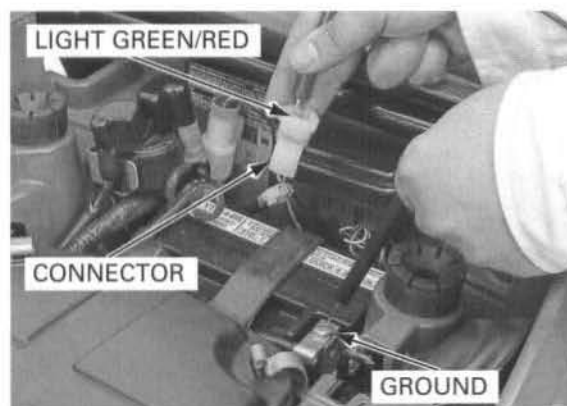
Disconnect the starter relay 2P (white) connector.



GROUND LINE

Check for continuity between the Light green/red wire terminal of the harness side connector and ground.

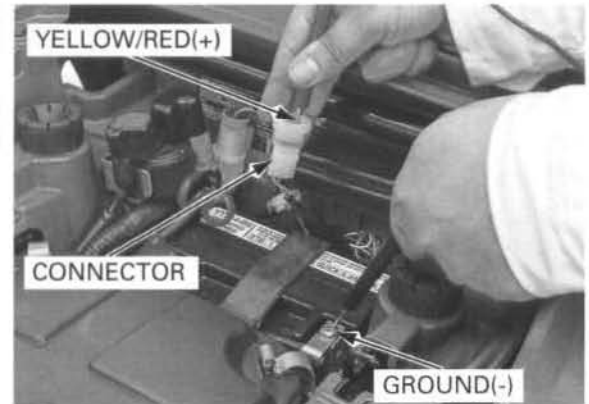
If there is continuity when the sub-transmission is in neutral or when the front brake lever is squeezed and the sub-transmission is in any gear except neutral, the ground circuit is normal. (There is a slight resistance due to the diode.)



STARTER RELAY VOLTAGE

Measure the voltage between the Yellow/red wire terminal (+) of the harness side 2P connector and ground (-).

If the battery voltage appears only when the starter switch is pushed with the ignition switch ON, the circuit is normal.

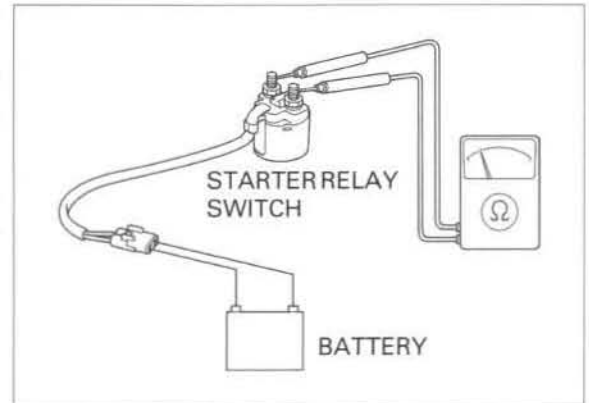


OPERATION CHECK

Disconnect battery positive (+) 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 relay switch side 2P connector.

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



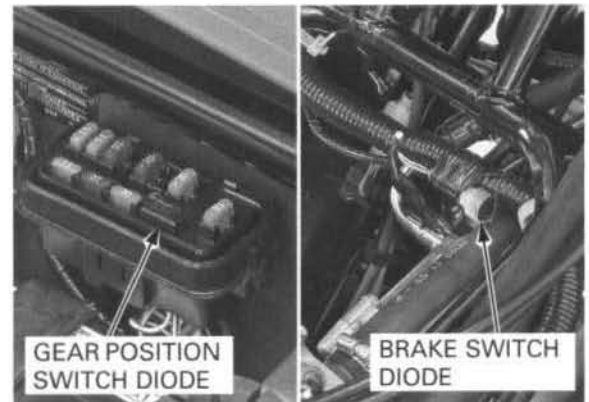
DIODE

INSPECTION

Remove the following:

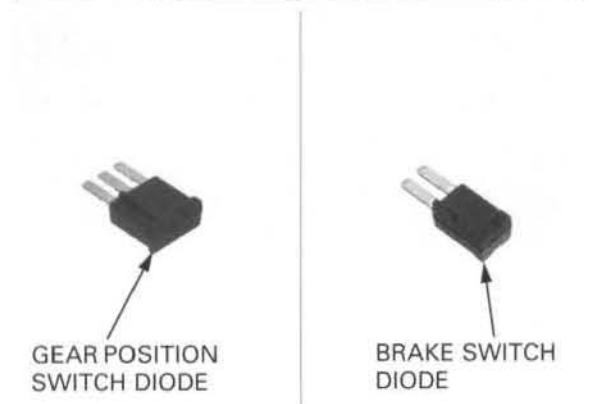
- seat (page 2-4)
- fuel tank heat guard (page 8-6)

Remove the gear position (neutral) switch diode and brake switch diode from the wire harness.



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.



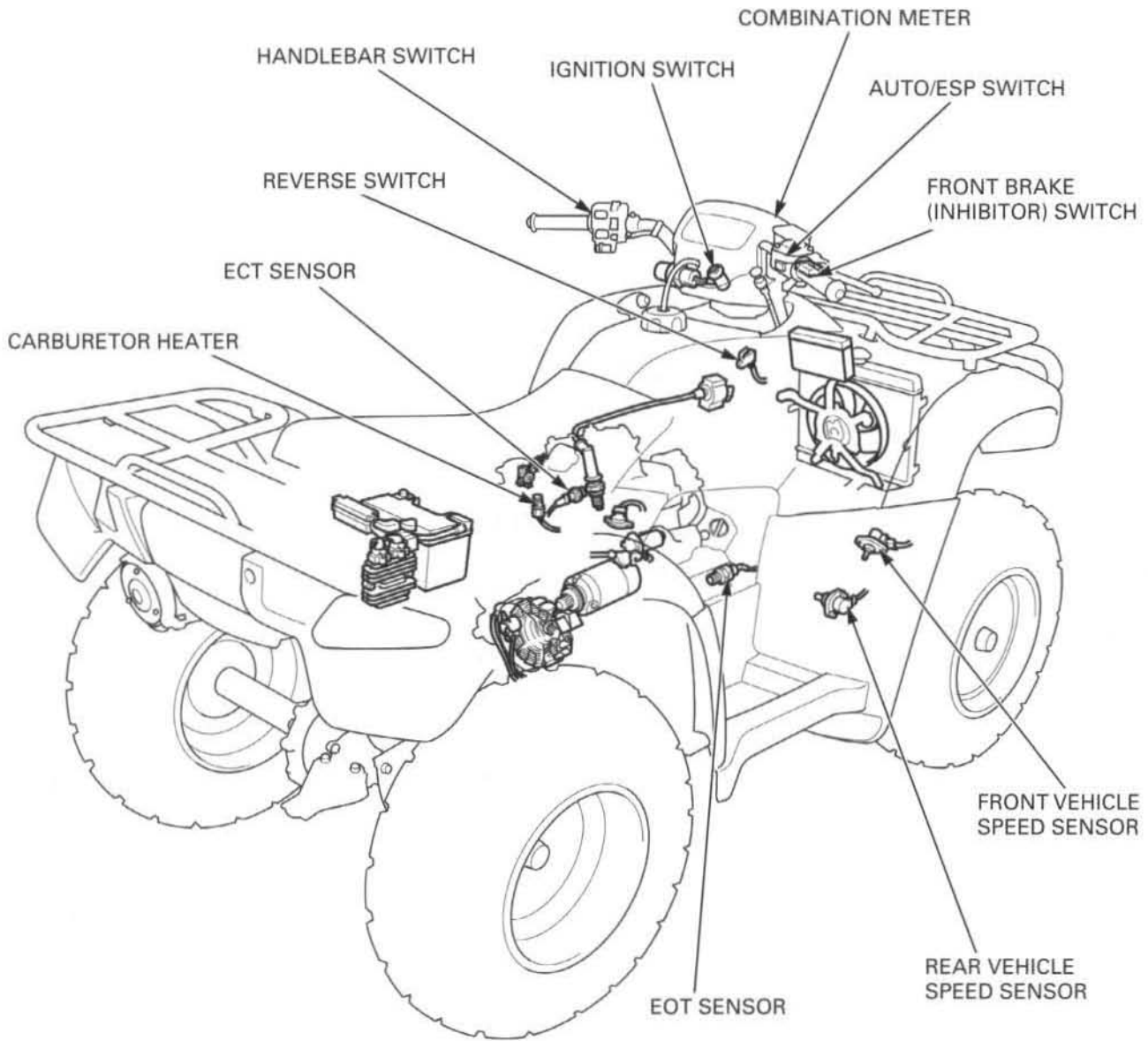
MEMO



22. LIGHTS/METERS/SWITCHES

COMPONENT LOCATION	22-2	FUEL GAUGE/ FUEL LEVEL SENSOR	22-15
SERVICE INFORMATION	22-3	TEMPERATURE INDICATOR	22-17
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COMBINATION METER/REAR VEHICLE SPEED SENSOR (VSS)	22-13		

COMPONENT LOCATION



SERVICE INFORMATION

GENERAL

- A continuity test can be made with the switches installed on the vehicle.
- All plastic connectors have locking tabs that must be released before disconnecting, and must be aligned when reconnecting.
- Check the battery condition before performing any inspection that requires proper battery voltage.
- The following color codes are used throughout this section.

Bu: Blue	G: Green	Lg: Light Green	R: Red
Bl: Black	Gr: Gray	O: Orange	W: White
Br: Brown	Lb: Light Blue	P: Pink	Y: Yellow

SPECIFICATIONS

ITEM		SPECIFICATIONS	
Bulb	Headlight (high/low beam)	12V - 30/30 W x 2	
	Assist headlight	12V - 45 W	
	Brake/taillight	'05, '06	12V - 21/5 W x 2
		After '06	LED
	Neutral indicator	LED	
	Reverse indicator	LED	
	Coolant/oil temperature indicator	LED	
	4WD indicator	LED	
EPS indicator (EPS model only)	LED		
Fuse	Main fuse	30 A	
	Transmission control motor	30 A	
	Sub-fuse	15 A x 2, 10 A x 2	
	EPS fuse (EPS model only)	40 A x 1	

TORQUE VALUES

Engine oil temperature (EOT) sensor	18 N·m (1.8 kgf·m, 13 lbf·ft)
Engine coolant temperature (ECT) sensor	10 N·m (1.0 kgf·m, 7 lbf·ft)
Assist headlight case mounting nut	25 N·m (2.6 kgf·m, 19 lbf·ft)

Apply sealant to the threads

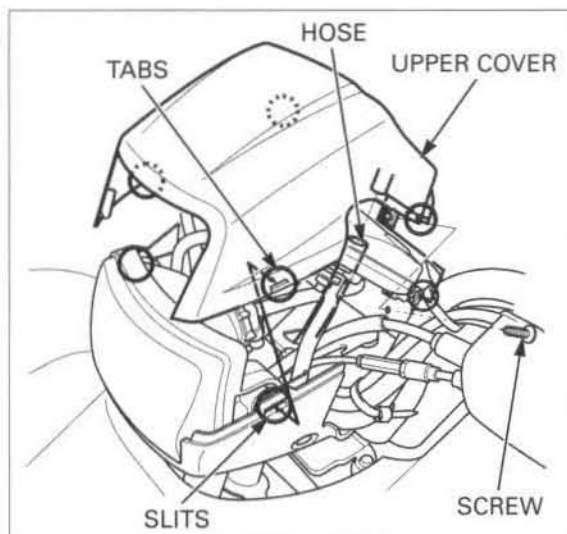
TOOL



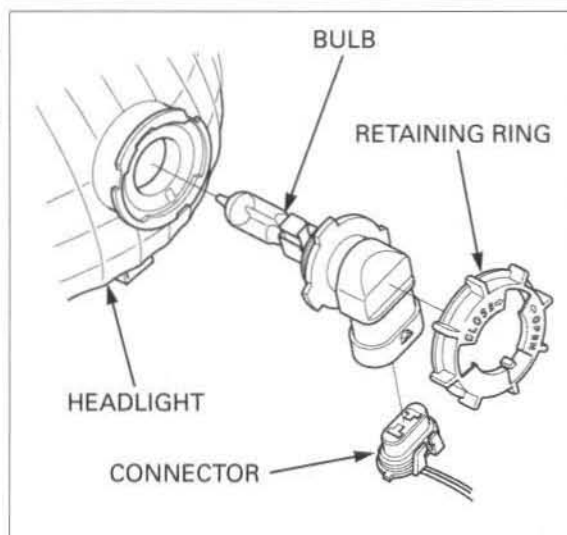
ASSIST HEADLIGHT

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.



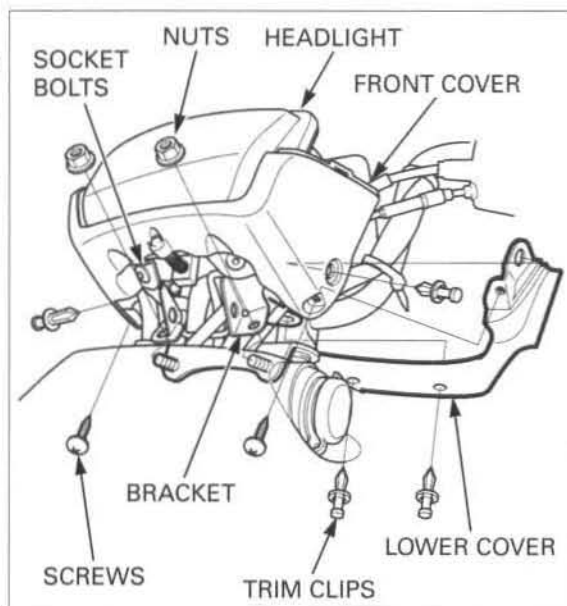
Disconnect the assist headlight connector. Remove the retaining ring by turning it counter-clockwise and remove the bulb from the headlight. Install a new bulb and removed parts in the reverse order of removal.



REMOVAL/INSTALLATION

Remove the assist headlight bulb (page 22-4).
Remove the two trim clips, 8 mm nuts and the assist headlight/meter bracket from the steering shaft.
Remove the two tapping screws, trim clips and the headlight lower cover from the bracket.
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 (2.6 kgf·m, 19 lbf·ft)

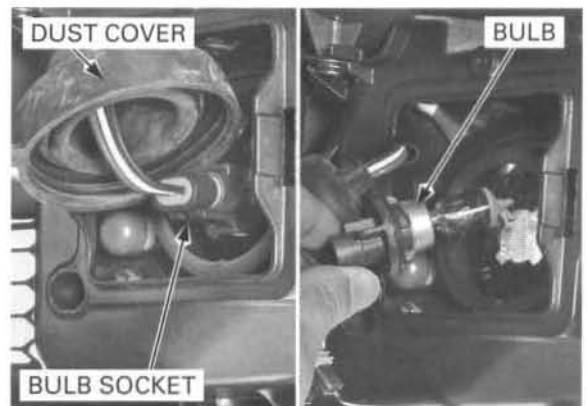


HEADLIGHT**BULB REPLACEMENT**

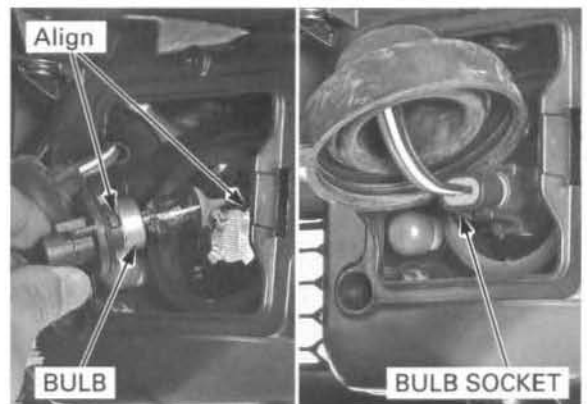
Remove the screw and headlight case cover cap.



Remove the dust cover.
Remove the bulb socket and bulb.



Install a new bulb in the case, aligning the bulb tab with the case groove.
Install the bulb socket.



Install the dust cover with its tab facing left under side.



LIGHTS/METERS/SWITCHES

Install the headlight cover cap while aligning its tab with the headlight cover groove as shown.



Install and tighten the headlight case cover cap screw.



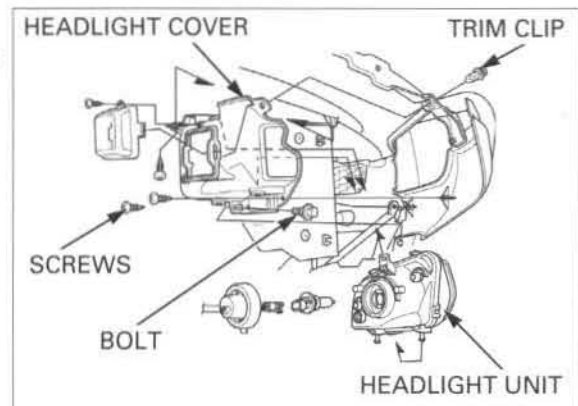
REMOVAL/INSTALLATION

Remove the front side outer fender (page 2-13).

Remove the screws, trim clip, bolt and headlight cover/unit assembly.

Remove the headlight unit from the cover.

Installation is in the reverse order of removal.



TAIL/BRAKE LIGHT ('05, '06)

BULB REPLACEMENT

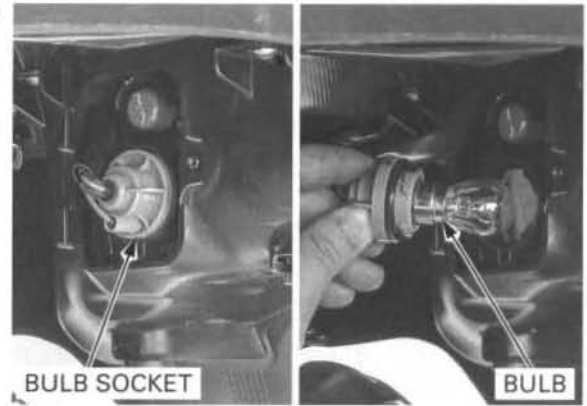
Remove the screw and taillight cover cap.



Turn the bulb socket counterclockwise and remove it.
 Turn the taillight bulb counterclockwise while pushing it in, then remove the bulb from the socket.

Align the cover cap tabs with the grooves in the cover properly.

Install a new taillight bulb in the reverse order of removal.



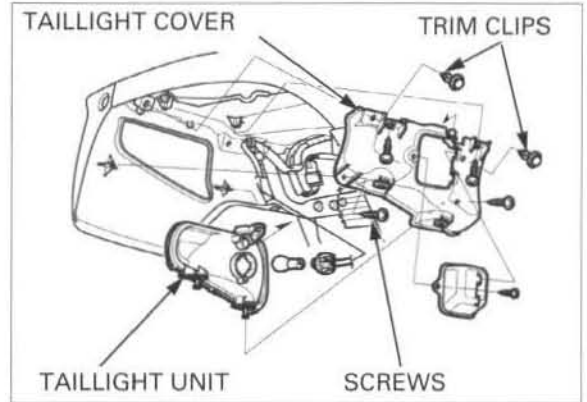
REMOVAL/INSTALLATION

Remove the taillight bulb socket (page 22-6).

Remove the trim clips, screws and taillight cover.
 Remove the taillight unit from the cover.

Align the bosses and grommets properly.

Install the taillight in the reverse order of removal.



TAIL/BRAKE LIGHT (After '06)

REMOVAL/INSTALLATION

Open the storage box.

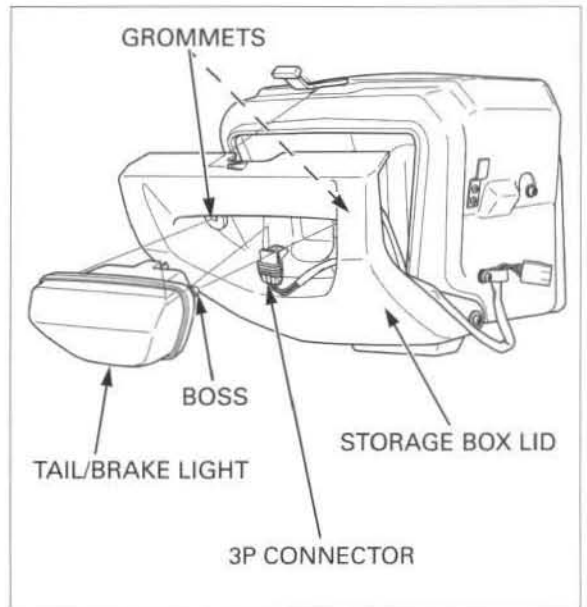
Push the tail/brake light assembly out of the storage box lid.

Disconnect the 3P black connector.

Replace the tail/brake light unit as an assembly.

Align the bosses and grommets properly.

Install the tail/brake light in the reverse order of removal.



ACCESSORY SOCKET

INSPECTION

Remove the front fender (page 2-11).

Remove the accessory socket 2P (Black) connector from the frame.

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 fuse (10 A) and an open circuit in the wire harness.

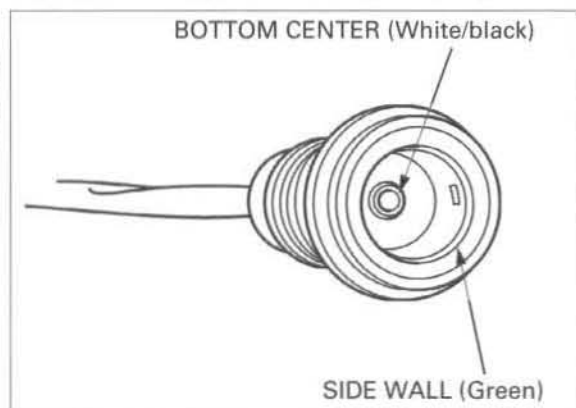


Remove the accessory socket cap.

Check for continuity between the White/black wire terminal of the socket side 2P (Natural) 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

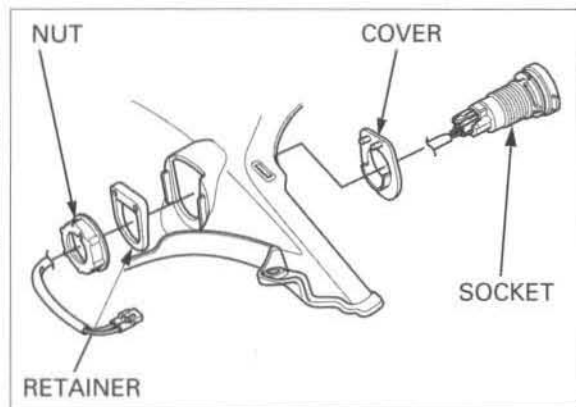
Remove the front fender (page 2-11).

Loosen the nut and remove the accessory socket from the front fender.

Install the retainer by aligning the holes with the cover tabs, then install a new accessory socket and tighten the nut securely.

Route the accessory socket wire properly (page 1-24).

Install the removed parts in the reverse order of removal.



IGNITION SWITCH

INSPECTION

Remove the front fender (page 2-11).

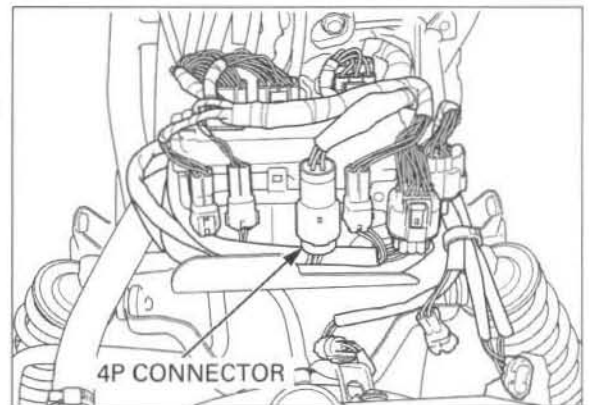
'05, '06: Remove the ignition switch 4P connector from the frame and disconnect it.



After '06: Disconnect the ignition switch 4P connector.

Check for continuity between the switch side connector terminals in each switch position. Continuity should exist between the color coded wires as follows:

		IGNITION SWITCH			
		BAT2	DC	BAT1	BAT
ON		○	○	○	○
OFF					
CORD COLOR		R/BI	P	R	BI

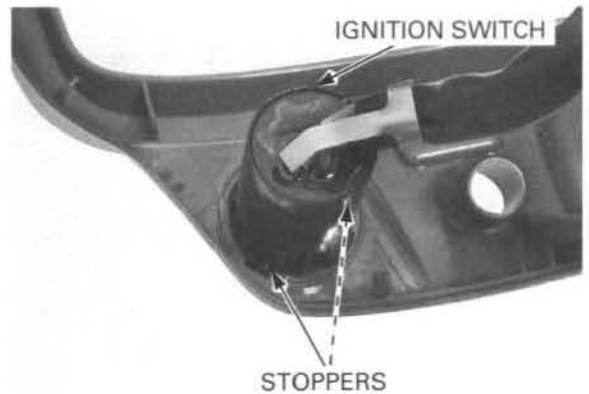


REMOVAL/INSTALLATION

Remove the following:

- front fender (page 2-11)
- combination meter (page 22-14)

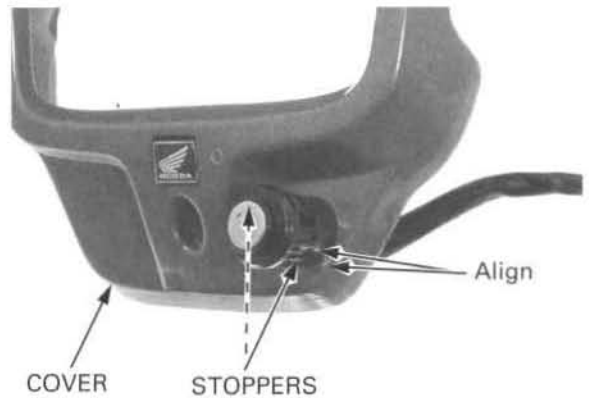
Remove the ignition switch from the handlebar cover by pushing in the two stoppers.



Install the ignition switch by aligning the locating tab with the cover groove.

Route the ignition switch wire properly (page 1-24).

Install the removed parts in the reverse order of removal.



HANDLEBAR SWITCH

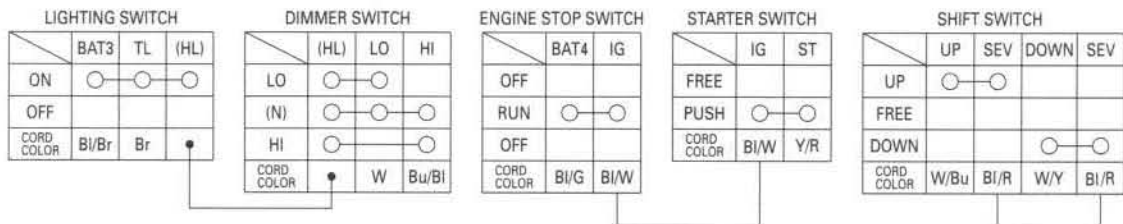
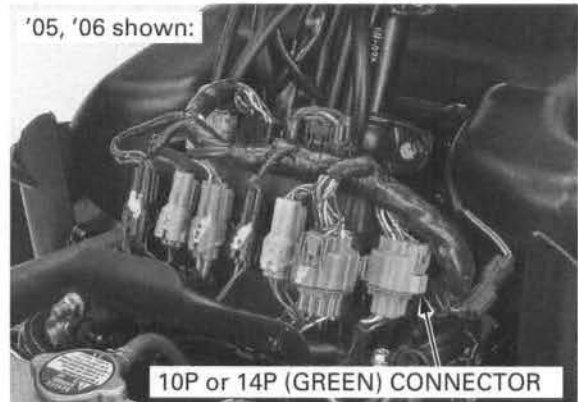
INSPECTION

Remove the front fender (page 2-11).

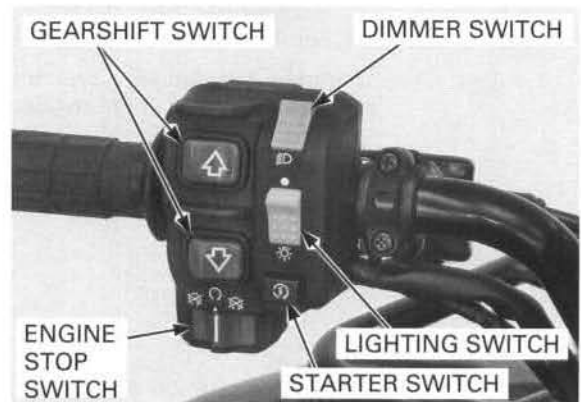
'05, '06: Remove the handlebar switch 10P (Green) connector from the frame and disconnect it.

After '06: Remove the handlebar switch 14P (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 shown below:



See page 24-38 for gearshift switch inspection.



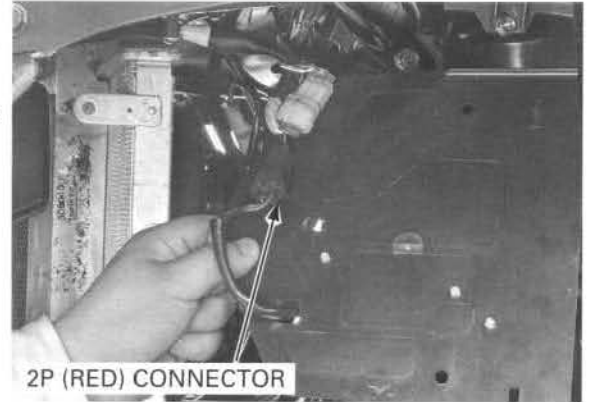
CARBURETOR HEATER

INSPECTION

Remove the front fender (page 2-11).

Remove the carburetor heater switch 2P (RED) connector from the holder and disconnect it.

Connect the wire harness side connector terminals with a jumper wire.



2P (RED) CONNECTOR

Remove the recoil starter cover (page 2-4).

Disconnect the carburetor heater 2P (Natural) connector.

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.

Measure the resistance between the heater side connector terminals.

STANDARD: 13 – 15 Ω (at 20° C/68° F)

If the resistance is out of above range, replace the carburetor heater.

REMOVAL/INSTALLATION

Disconnect the carburetor heater 2P (Natural) connector.

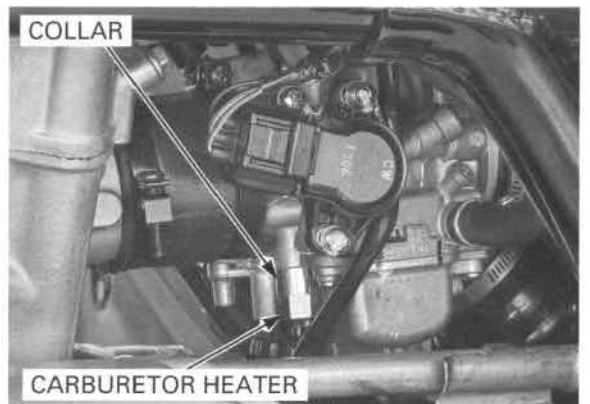
Remove the carburetor heater and collar.

Install the collar and a new carburetor heater with the stepped side of the collar facing the carburetor and tighten the carburetor heater.

Route the heater wire properly (page 1-24) and connect the carburetor heater 2P (Natural) connector.



2P (NATURAL) CONNECTOR



COLLAR

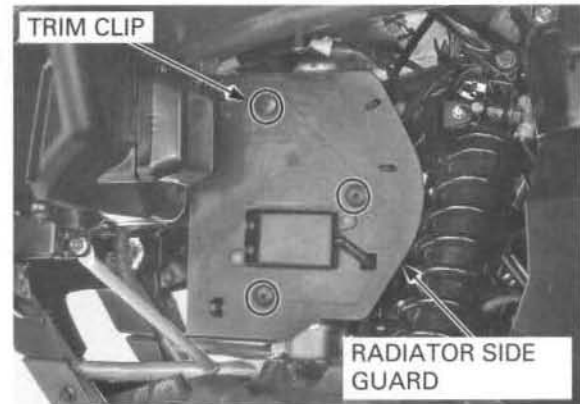
CARBURETOR HEATER

CARBURETOR HEATER SWITCH

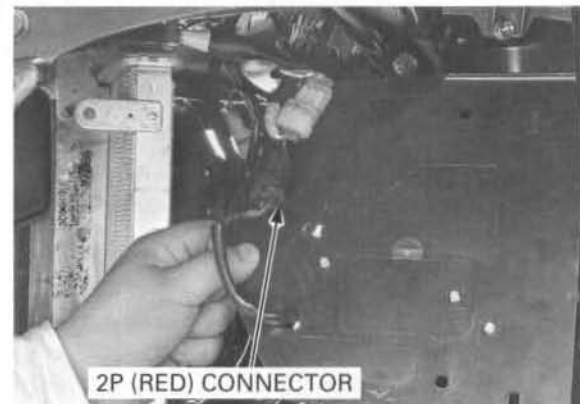
INSPECTION

Remove the front fender (page 2-11).

Remove the trim clips and radiator grille side guard.

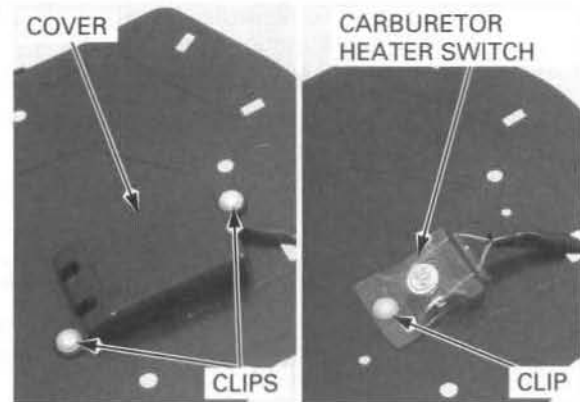


Disconnect the carburetor heater switch 2P (Red) connector.



Remove the clips and carburetor heater switch cover.

Remove the clip and carburetor heater switch.



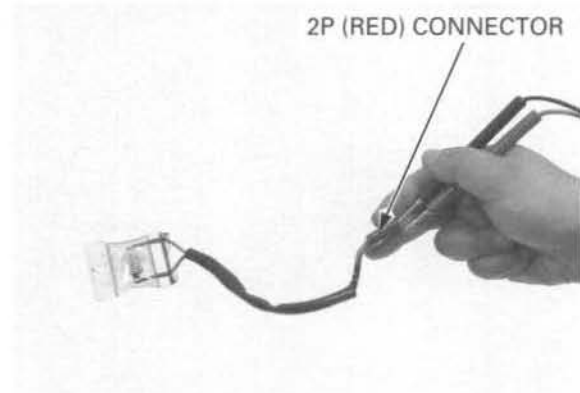
Check for continuity between the switch side connector terminals of the carburetor heater switch 2P (Red) connector.

Above 20° C (68° F): No continuity

Below 7° C (45° F): Continuity

If the test result is abnormal, replace the carburetor heater switch.

Installation is in the reverse order of removal



COMBINATION METER/REAR VEHICLE SPEED SENSOR (VSS)

POWER/GROUND LINE INSPECTION

Remove the front fender (page 2-11).

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 regardless of the ignition switch position.

If there is no voltage, check for an open circuit in the wire harness.

SPEEDOMETER/REAR VSS

Check that the hour meter and odometer/trip meter function properly.

- If they do not function, check the power/ground line (page 22-13).
- If they function properly, check as follows:

Remove the front fender (page 2-11).

Remove the rear VSS 3P (Yellow) connector from the holder and disconnect it.

Measure the voltage between the Black/orange (+) and Green/blue (-) wire terminals of the wire harness side connector.

There should be 10 V or more with the ignition switch turned to ON.

If there is no voltage, check for an open circuit in the wire harness.

Connect the inspection adaptor to the rear VSS 3P (Yellow) connector.

TOOL:

Inspection adaptor **07GMJ-ML80100**

Shift the transmission into neutral.

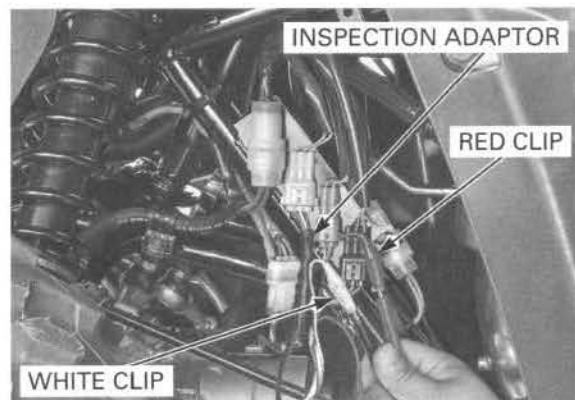
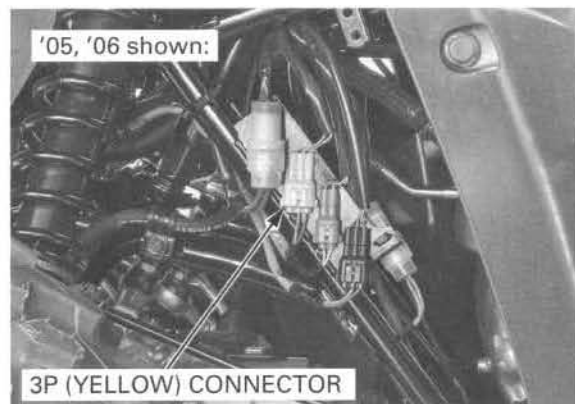
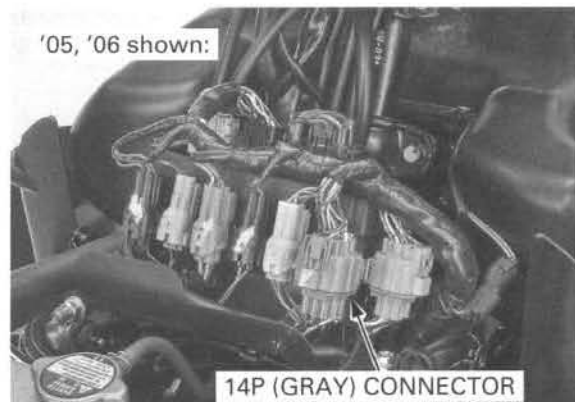
Raise the wheels off the ground and support the vehicle securely with a hoist or equivalent.

Turn the ignition switch to ON.

Measure the voltage between the Red clip (+) and White clip (-) while slowly turning the rear wheels by hand.

There should be 0 to 5 V pulse voltage.

- If the pulse voltage does not appear, replace the rear VSS (page 23-11).



LIGHTS/METERS/SWITCHES

- If the pulse voltage appears, check as follows:

Remove the combination meter 14P (Gray) connector from the frame and disconnect it.

Check for an open or short circuit in the Pink/green wire between the rear VSS 3P (Yellow) connector and combination meter 14P (Gray) connector.

If the Pink/green wire is OK, replace the combination meter.

COMBINATION METER REMOVAL/ INSTALLATION

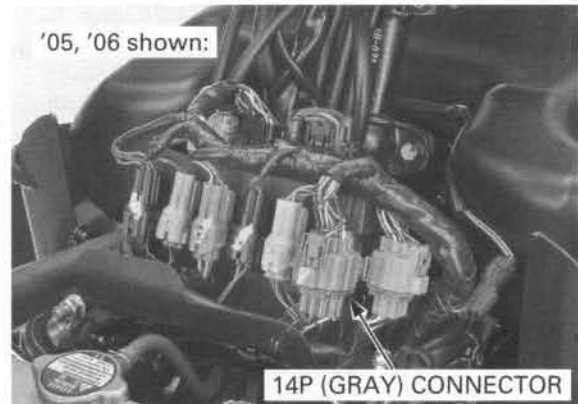
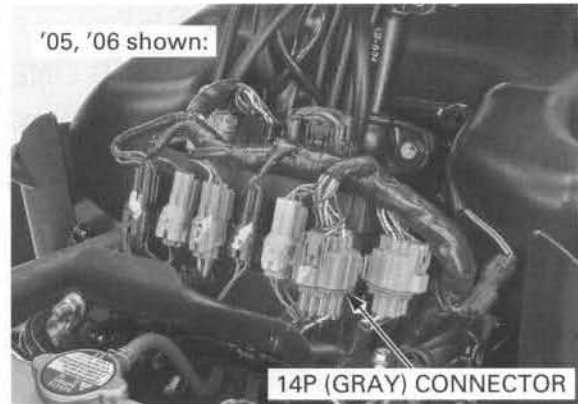
Remove the front fender (page 2-11).

Remove the combination meter 14P (Gray) connector from the frame and disconnect it.

Release the meter wire from the wire clip on the steering shaft holder.

Remove the screw and handlebar upper cover.

Remove the nuts and handlebar front cover.

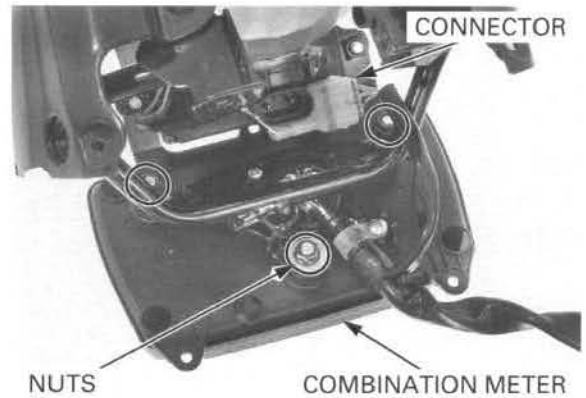


Disconnect the GPS receiver 6P connector (GPS model only).

Remove the three nuts and combination meter bracket.

Route the accessory socket wire properly (page 1-24).

Installation is in the reverse order of removal.



FUEL GAUGE/FUEL LEVEL SENSOR

SYSTEM INSPECTION

Check that the speedometer and indicators function properly.

- If they do not function, check the power/ground line.
- If they function, check the as follows:

Remove the left inner fender (page 2-9).

Turn the ignition switch to OFF and disconnect the fuel level sensor 2P connector.



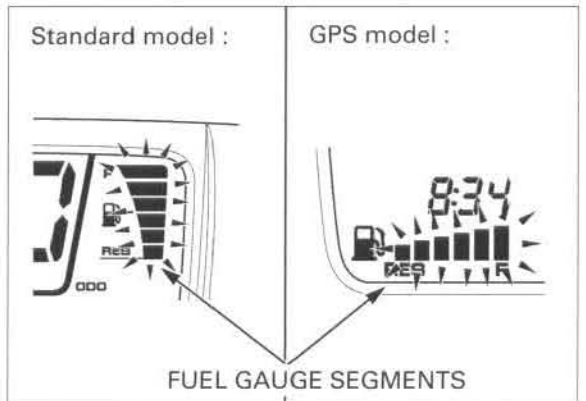
Turn the ignition switch to OFF.

Connect the meter side connector terminals with a jumper wire.

Turn the ignition switch to ON and check the fuel gauge.

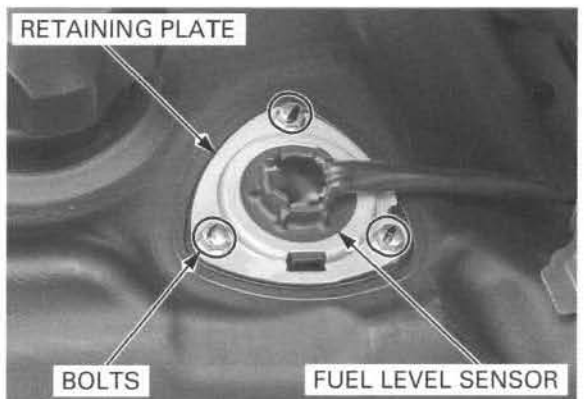
All segments are turned on.

If the fuel gauge does not function properly, replace the combination meter.



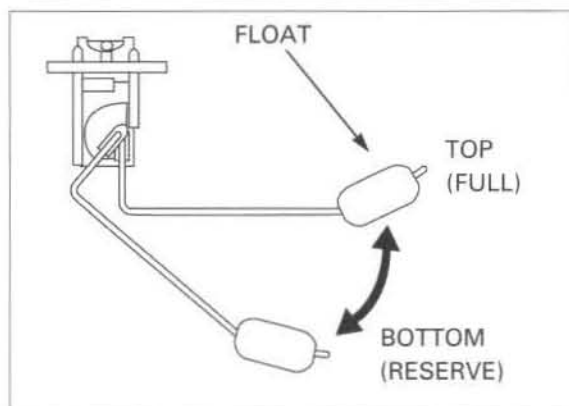
Remove the fuel tank cover/side (page 2-6).

Remove the three bolts, retaining plate and fuel level sensor from the fuel tank.

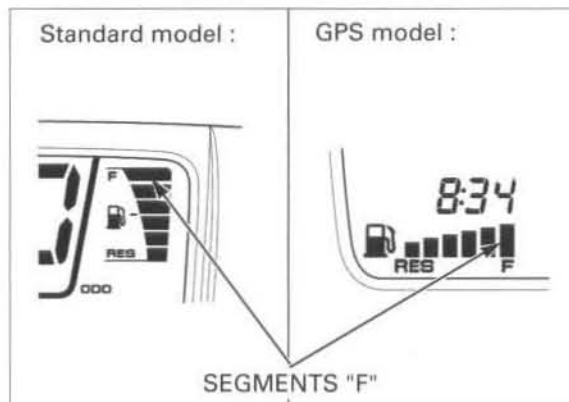


LIGHTS/METERS/SWITCHES

With the fuel level sensor float at the top "FULL" position, turn the ignition switch to ON and check the fuel gauge.



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.

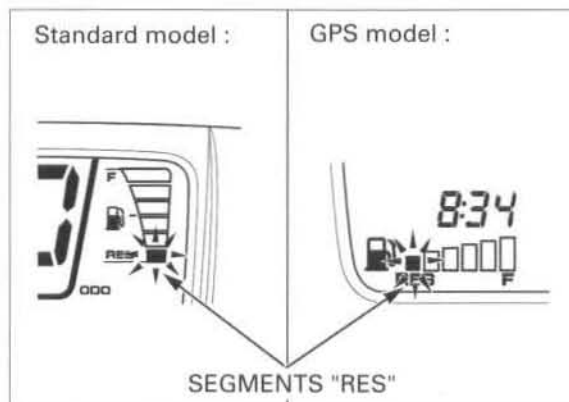
Segment "RES" should blink.

If the fuel gauge does not function properly, check the fuel level sensor (page 22-17).

If the fuel level sensor is OK, replace the combination meter.

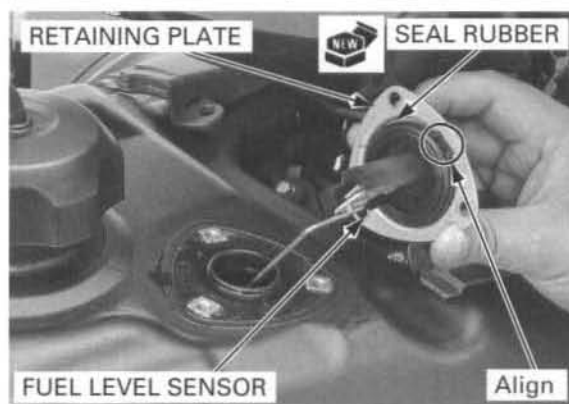
If all segments blink during inspection, replace the combination meter.

Turn the ignition switch to OFF.



Install a new seal rubber onto the fuel level sensor.

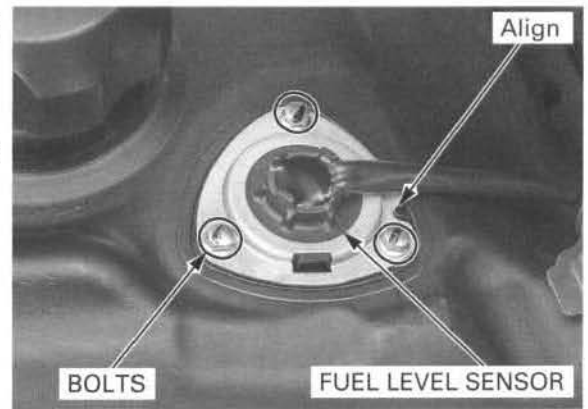
Install the retaining plate onto the sensor by aligning the tab with the groove.



Install the sensor into the fuel tank while aligning the groove in the plate with the boss on the fuel tank.

Install and tighten the bolts.

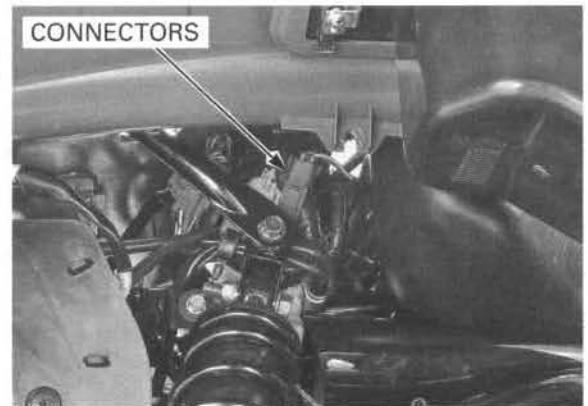
Install the removed parts in the reverse order of removal.



FUEL LEVEL SENSOR INSPECTION

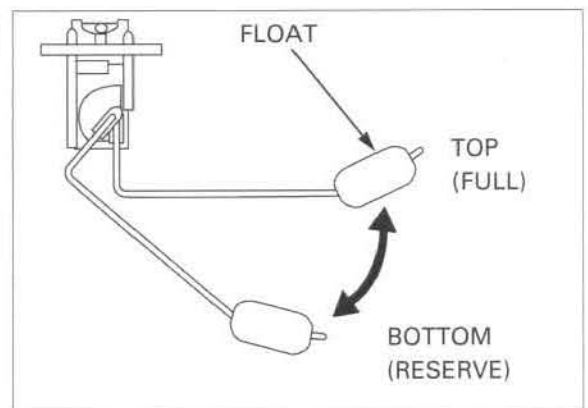
Remove the fuel level sensor (page 22-15).

Disconnect the fuel level sensor 2P 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" position.

FLOAT POSITION	Resistance (20° C/68° F)
TOP "FULL"	5 – 7 Ω
BOTTOM "RESERVE"	204 – 210 Ω



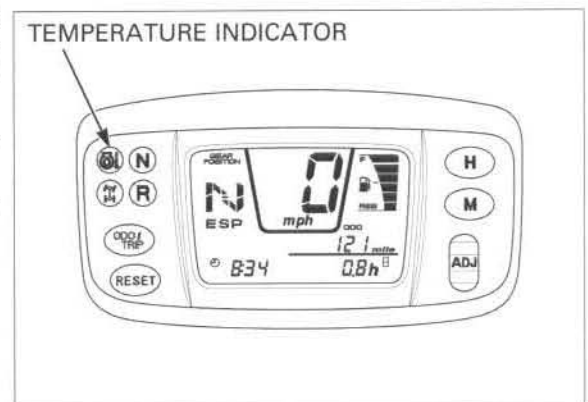
TEMPERATURE INDICATOR

SYSTEM INSPECTION

- The oil/coolant temperature indicator should come on for a few seconds when the ignition switch is turned ON and the indicator should extinguish shortly.

Check that the neutral indicator or reverse indicator function properly.

- If they do not function, perform the power/ground line inspection (page 22-13).
- If they function, check the following.



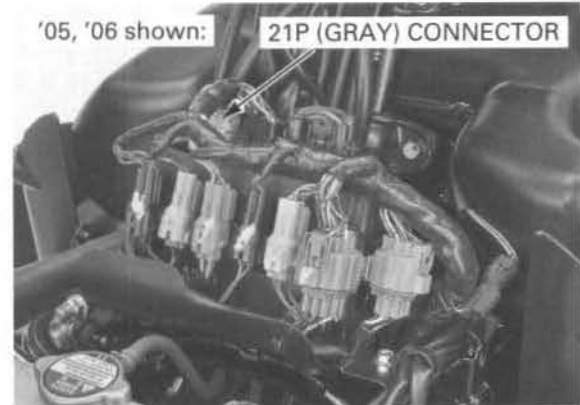
LIGHTS/METERS/SWITCHES

Temperature indicator does not come on when the ignition switch is turned ON

Disconnect the engine control module (ECM) 21P (Gray) and ECM 21P (Black) connectors and short the Blue/red and Green wire terminals with a jumper wire.

Turn the ignition switch ON and check the temperature indicator.

- If the indicator does not come, check for open circuit in Blue/red and Green wire. If the wires are normal, the combination meter is faulty.



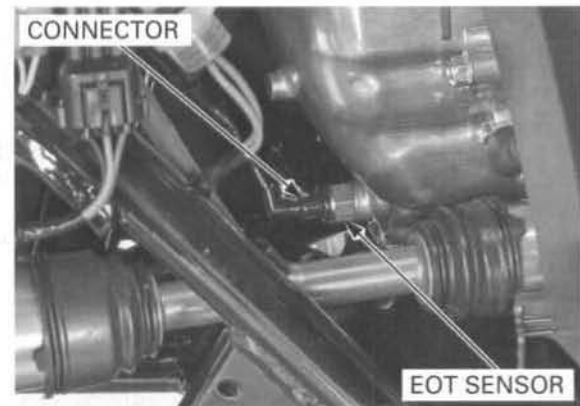
Temperature indicator does not go off when the fan motor stops

Remove the following:

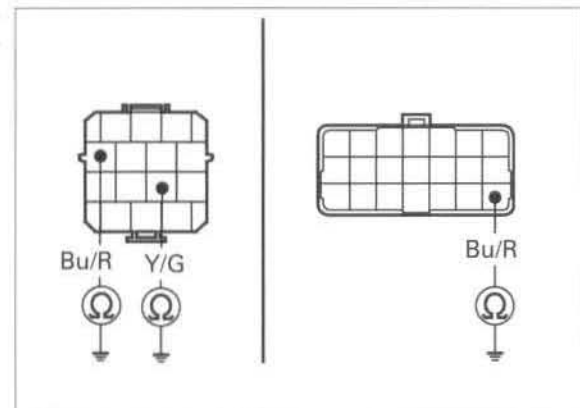
- recoil starter cover (page 2-4)
- fuel tank cover (page 2-6)
- air intake duct (page 6-10)

Disconnect the connector from the engine coolant temperature (ECT) sensor and check the temperature indicator with the ignition switch ON.

- If the indicator goes off, check the ECT sensor (page 22-20).



- If the indicator does not go off, disconnect the engine control module (ECM) 21P (Black) connector and meter 14P (Gray) connector, and check for short circuit in related wires as shown.



Temperature indicator stays on and the fan motor does not stop

Remove the following:

- recoil starter cover (page 2-4)
- fuel tank cover (page 2-6)
- air intake duct (page 6-10)

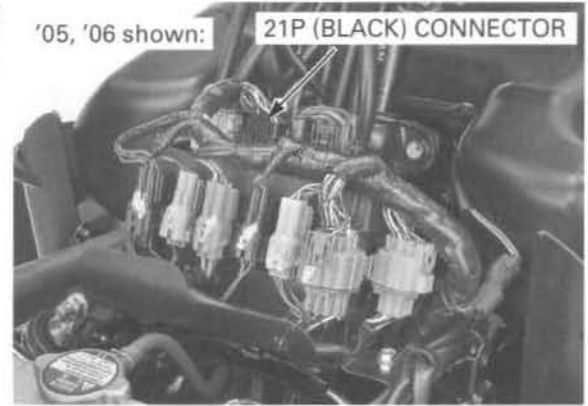
Disconnect the engine coolant temperature (ECT) sensor connector and check the fan motor with the ignition switch ON.

If the motor stops, check the ECT sensor (page 22-21).

Check the cooling system (page 6-3) before performing this inspection if the abnormality is found when the engine is hot.

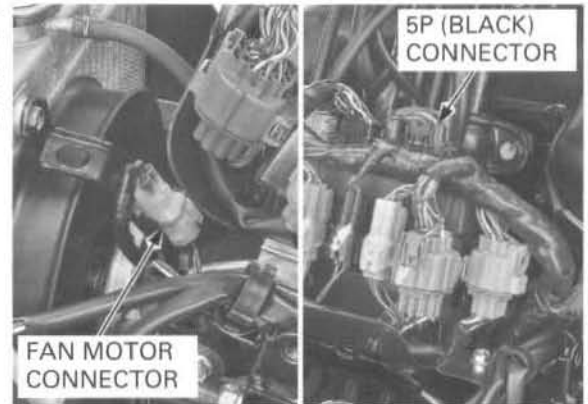


If the motor does not stop, disconnect the engine control module (ECM) 21P connector and check for short circuit in Black/blue wire between the ECM and engine coolant temperature (ECT) sensor.



Fan motor does not stop when the temperature indicator goes off

Remove the right front mud guard and right inner fender (page 2-9), and disconnect the fan motor 2P (Natural) connector and engine control module (ECM) 5P (Black) connector. Check for short circuit in Green/black wire between the ECM and fan motor.



Fan motor does not start

Remove the following:

- recoil starter cover (page 2-4)
- fuel tank cover (page 2-6)
- air intake duct (page 6-10)

Disconnect the engine coolant temperature (ECT) sensor connector and ground the connector terminal (Black/blue) with a jumper wire.

Turn the ignition switch ON and check the fan motor.

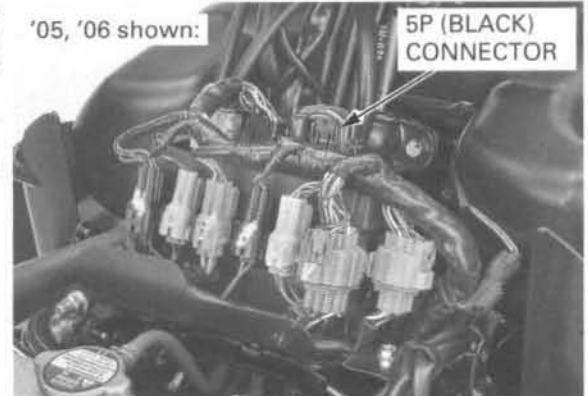
If the motor starts, check the ECT sensor (page 22-21).



If the motor does not start, disconnect the engine control module (ECM) 5P (Black) connector and ground the connector terminal (Green/black) with a jumper wire.

Turn the ignition switch ON and check the fan motor.

If the motor starts, check for open circuit in Black/blue wire between the ECT sensor and ECM.



LIGHTS/METERS/SWITCHES

If the motor does not start, remove the right front mud guard and right inner fender (page 2-9), and disconnect the fan motor 2P connector. Measure the voltage between the harness side Blue wire terminal (+) and ground (-).

There should be battery voltage with the ignition switch ON.

- If there is no voltage, check for open circuit in Blue wire.
- If there is voltage, check for open circuit in Green/black wire between the ECM and fan motor. If it is OK, the fan motor is faulty.



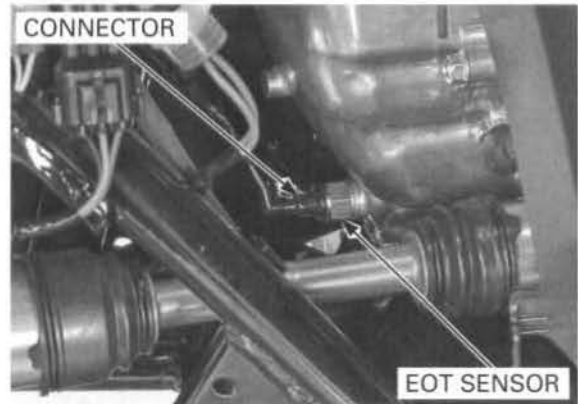
ENGINE OIL TEMPERATURE (EOT) SENSOR

INSPECTION

Remove the following:

- right front mud guard (page 2-8)
- right inner fender (page 2-9)

Disconnect the connector and remove the engine oil temperature (EOT) sensor.

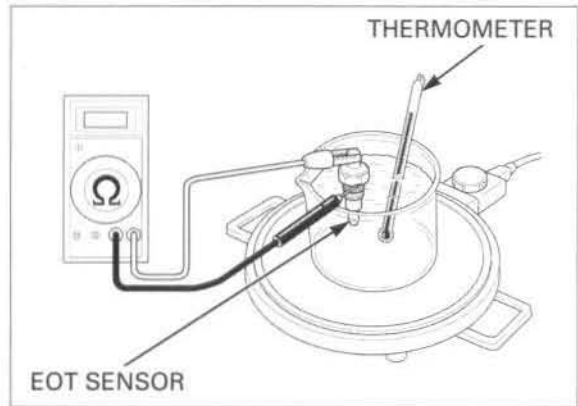


Suspend the EOT sensor in a pan of engine oil on an electric heating element and measure the resistance through the sensor as the oil heats up.

NOTE:

- Soak the EOT 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 or EOT sensor touch the pan.

Temperature	150° C (302° F)	170° C (338° F)
Resistance	306 – 340 Ω	209 – 231 Ω



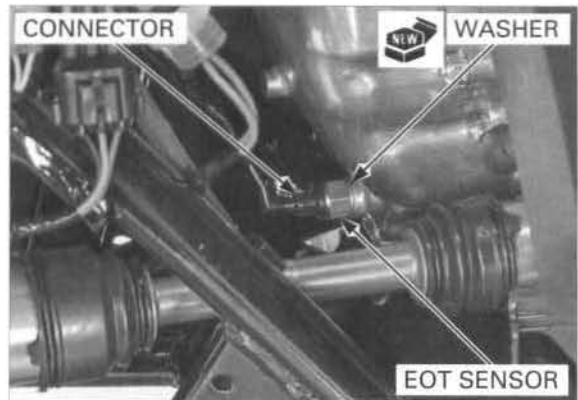
Replace the EOT sensor if it is out of specifications by more than 10% at any temperature listed.

Install the EOT sensor with a new sealing washer and tighten it.

TORQUE: 18 N·m (1.8 kgf·m, 13 lbf·ft)

Connect the EOT sensor connector.

Install the removed parts in the reverse order of removal.



ENGINE COOLANT TEMPERATURE (ECT) SENSOR

INSPECTION

Drain the coolant from the engine (page 6-5).
Remove the air intake duct (page 6-10).

Disconnect the connector and remove the engine coolant temperature (ECT) sensor.



Suspend the ECT sensor in a pan of coolant (1:1 mixture) on an electric heating element and measure the resistance through the sensor as the coolant heats up.

- Soak the ECT sensor in coolant up to its threads with at least 40 mm (1.57 in) from the bottom of the pan to the bottom of the ECT sensor.
- Keep the temperature constant for 3 minutes before testing. A sudden change of temperature will result in incorrect readings. Do not let the thermometer or ECT sensor touch the pan.

Temperature	80° C (176° F)	120° C (248° F)
Resistance	47 – 57 Ω	14 – 18 Ω

Replace the ECT sensor if it is out of specifications by more than 10% at any temperature listed.

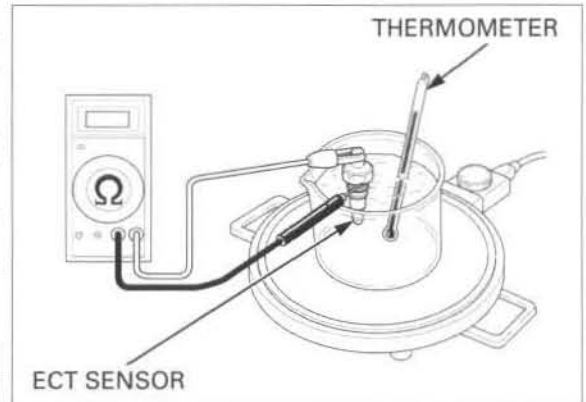
Apply sealant to the ECT sensor threads. Do not apply to the sensor head.
Install and tighten the ECT sensor.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

Connect the ECT sensor connector.

Install the air intake duct (page 6-12).

Fill and bleed the cooling system (page 6-5).



REVERSE SWITCH

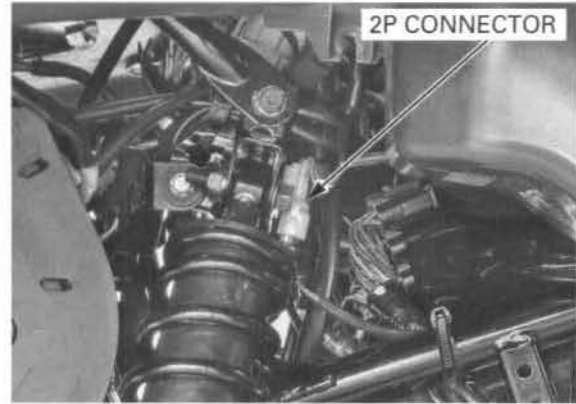
INSPECTION

Remove the following:

- fuel tank cover (page 2-6)
- left inner fender (page 2-9)

Disconnect the reverse switch 2P connector.
Check for continuity between the switch side connector terminals.

There should be continuity with the gearshift lever in reverse position and no continuity with it in except reverse.



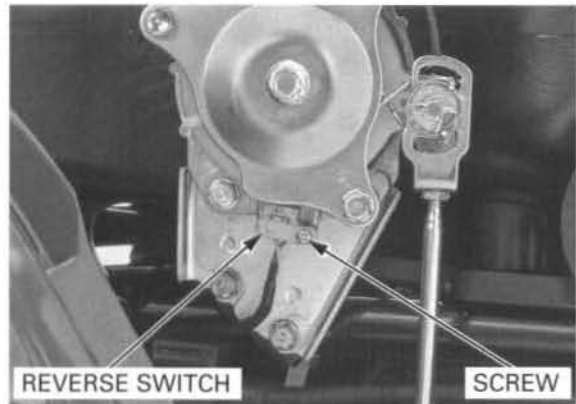
REPLACEMENT

Remove the screw and the reverse switch.

Install a new reverse switch by aligning the locating pin with the hole in the gearshift box base.

Route the switch wire properly (page 1-24) and connect the 2P connector.

Install the removed parts in the reverse order of removal.



GPS RECEIVER (GPS model only)

INSPECTION

The GPS receiver continuously calculates latitude and longitude when the ignition switch is in the ON position as a result, the start-up time of the position fix after the ignition switch is turned to ON varies depending on when the ignition switch was turned to OFF position. There are three different start-up times as follows:

Hot start

When turning the ignition switch ON within 2 hours from turning OFF the position fix will complete in about 25 seconds.

Warm start

When turning the ignition switch ON over 2 hours from turning OFF, the position fix will complete in about 2 minutes.

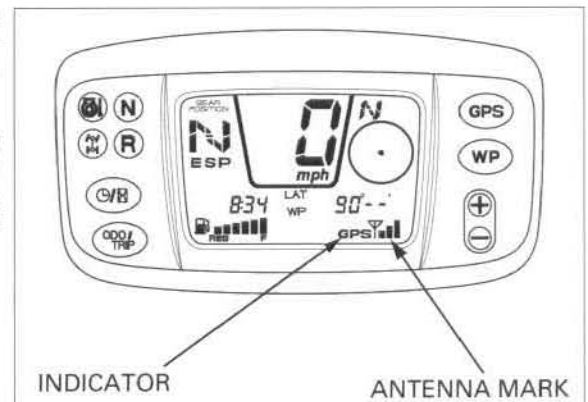
Cold start

The position fix will complete within about 8 minutes after the following situations;

- When turning the ignition switch ON over 1 month after turning OFF.
- When transporting the vehicle with the ignition switch OFF for over, 100 km (60 mi).
- When the battery is disconnected.

If the GPS indicator is blinking and the antenna mark and all segments do not indicate at all, perform the following troubleshooting "GPS INDICATOR BLINKS" (page 22-23).

If the GPS start-up time is taking too long every time the ignition switch is turned ON despite a hot start condition (Refer to System start-up; page 22-24). Troubleshoot "GPS START-UP TIME IS TAKING LONG".



GPS INDICATOR BLINKS (COMMUNICATION ERROR)

1. GPS RECEIVER CONNECTOR CHECK

Remove the combination meter assembly (page 22-14).

Check for a loose connection or poor contact of the GPS receiver connector.

Connect the GPS receiver 6P (Natural) connector, and turn the ignition switch ON.

After 8 minutes, recheck the GPS indicator.

Is the GPS indicator still blinking?

YES – GO TO STEP 2.

NO – No problem (Temporary failure)



2. GPS RECEIVER INPUT VOLTAGE INSPECTION

Disconnect the GPS receiver 6P (Natural) connector.
Turn the ignition switch ON.
Measure the voltage at the meter side connector terminal and ground.

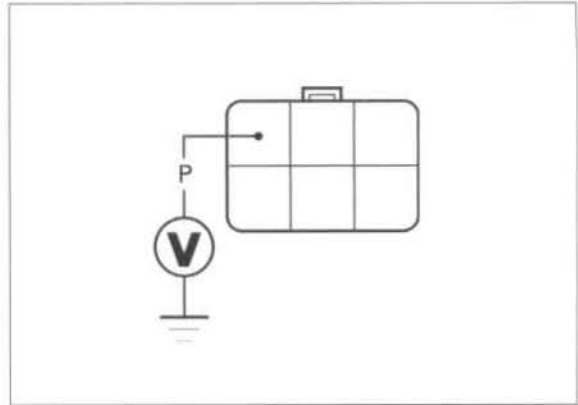
Connection: Pink (+) – Ground (-)

Is there about 5 V?

YES – GO TO STEP 3.

NO –

- Open or short circuit on the Pink wire
- Inspect the combination meter (page 22-13)



3. GPS RECEIVER GROUND LINE INSPECTION

Turn the ignition switch OFF.
Check for continuity between the meter side connector terminal and ground.

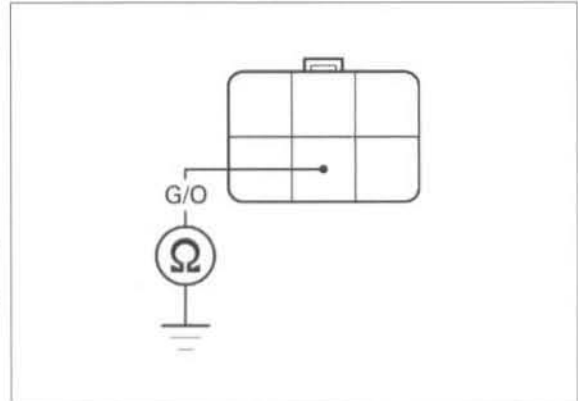
Connection: Green/orange – Ground

Is there continuity?

YES – GO TO STEP 4.

NO –

- Open circuit on the Green/orange wire
- Inspect the combination meter (page 22-13)



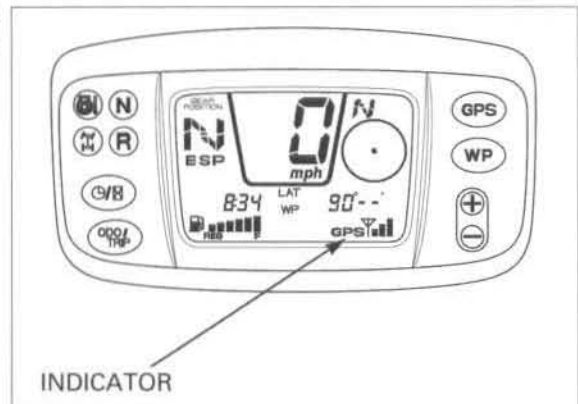
4. GPS RECEIVER REPLACEMENT

Replace the receiver with a known good one and recheck the GPS indicator after 5 minutes when turning the ignition switch ON.

Is the GPS indicator still blinking?

YES – Faulty combination meter

NO – Faulty original GPS receiver



GPS START-UP TIME IS TAKING LONG

1. GPS SYSTEM RESET

Disconnect and reconnect the battery negative (-) cable.
Turn the ignition switch ON and wait until GPS system start-up, then turn the ignition switch OFF and ON.

Does the GPS start-up within 30 seconds?

YES – No problem (Temporary failure)

NO – GO TO STEP 2.

2. GPS RECEIVER BACKUP VOLTAGE INSPECTION

Turn the ignition switch OFF.
 Remove the combination meter assembly (page 22-14).
 Disconnect the GPS receiver 6P (Natural) connector.
 Measure the voltage at the meter side connector terminal and ground.

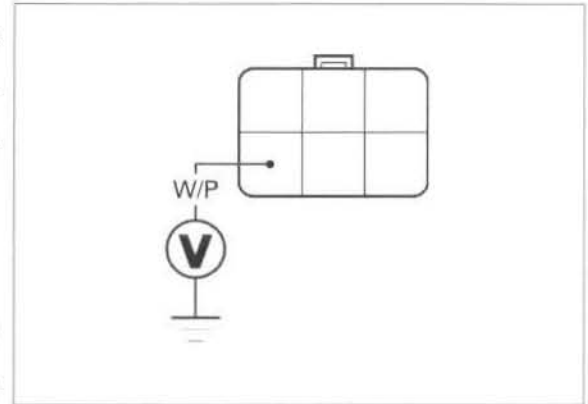
Connection: White/pink (+) – Ground (-)

Is there about 5 V?

YES – Faulty GPS receiver

NO –

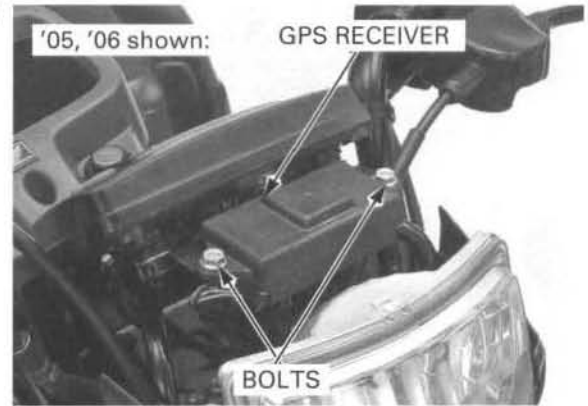
- Open or short circuit on the White/pink wire
- Inspect the combination meter (page 22-13)



REMOVAL/INSTALLATION

Remove the combination meter assembly and remove the meter bracket (page 22-14).

Remove the bolts and lift the GPS receiver.



Disconnect the GPS 6P connector and remove the GPS receiver.

Installation is in the reverse order of removal.



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.

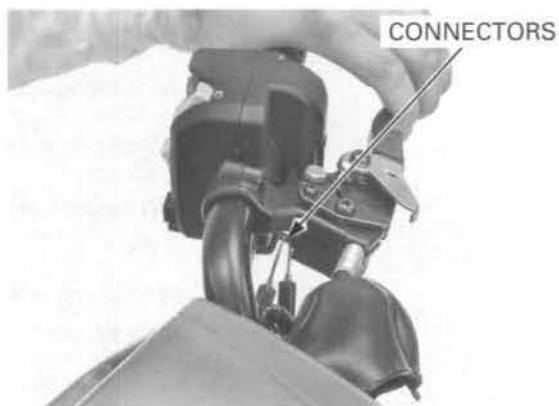
BRAKE SWITCH CONNECTORS



REAR BRAKE LEVER

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 recoil starter cover (page 2-4).

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.

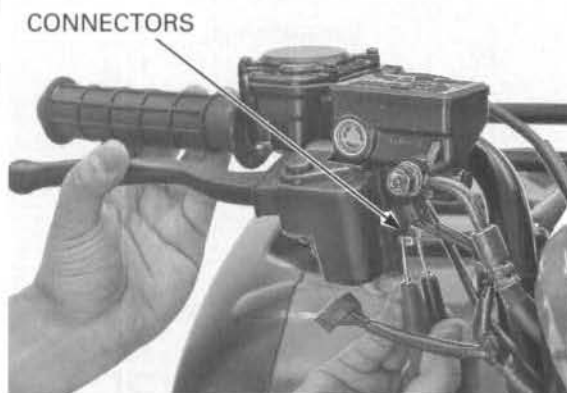


FRONT BRAKE SWITCH

The lower switch is the front brake (inhibitor) switch.

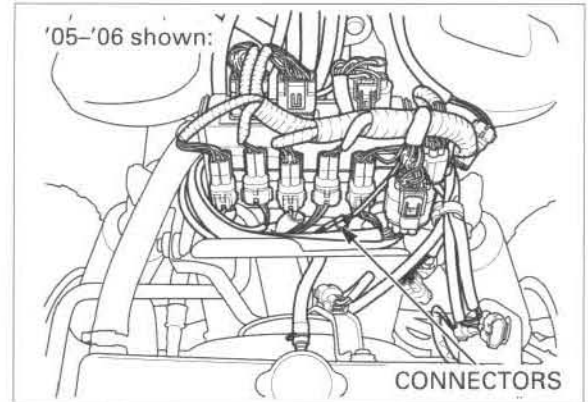
Disconnect the front brake switch connectors and check for continuity between the switch terminals.

There should be continuity with the front brake lever squeezed and no continuity with the lever released.



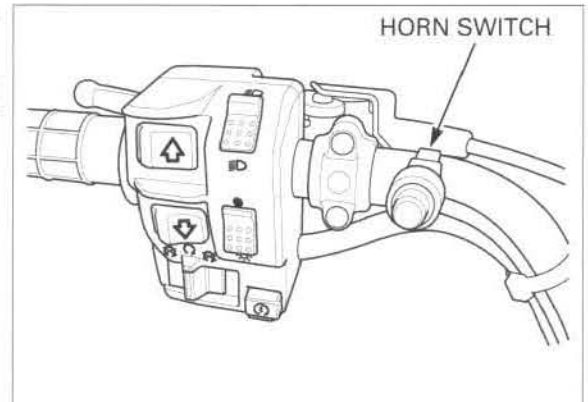
HORN SWITCH (U type only)

Disconnect the horn switch wire connectors.



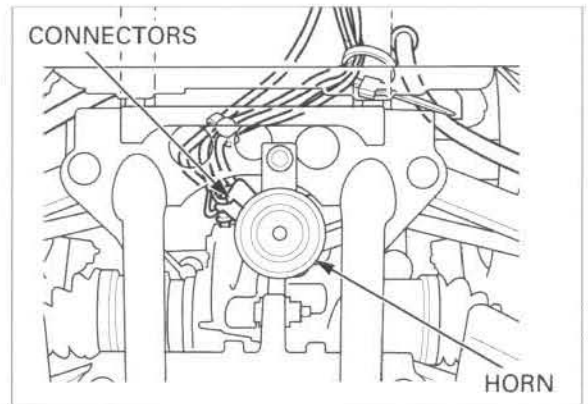
Check the continuity between the connector terminals.

There should be continuity when the horn switch is pushed, and be no continuity when the switch is released.

**HORN (U type only)**

Disconnect the wire connectors from the horn.
Connect a 12V battery to the horn terminals.

The horn is normal if it sounds when the 12V battery is connected across the horn terminals.



MEMO

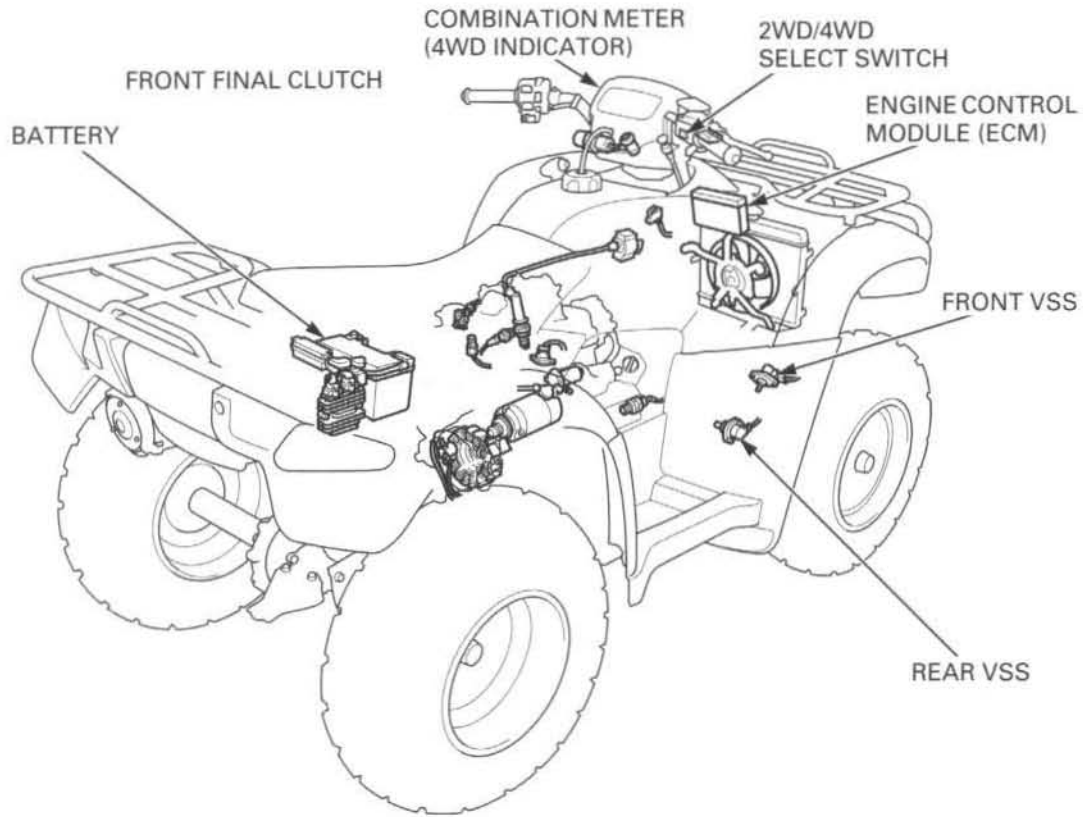


23. SELECTABLE 4WD SYSTEM

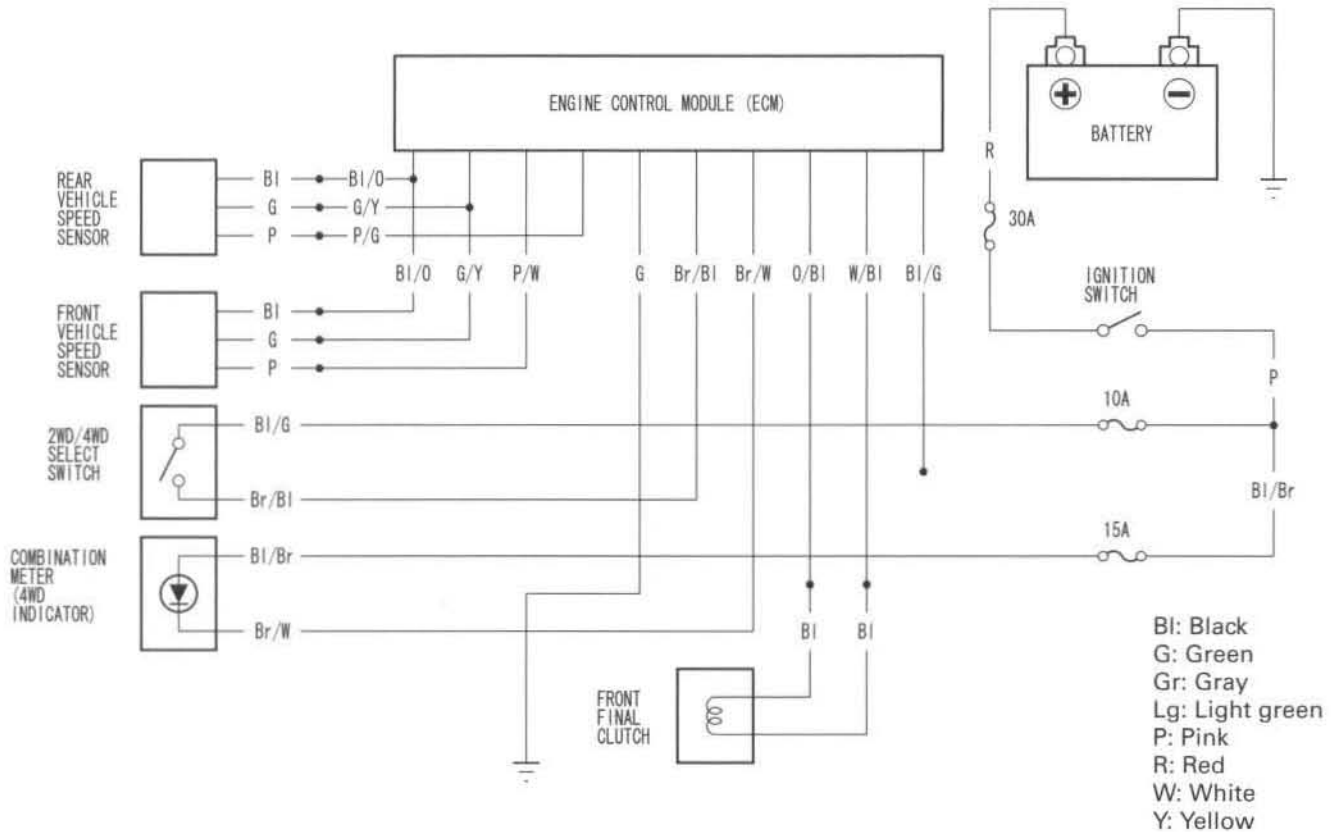
COMPONENT LOCATION	23-2	PROBLEM CODE INDEX	23-4
SYSTEM DIAGRAM	23-2	TROUBLESHOOTING	23-5
SERVICE INFORMATION	23-3	REAR VEHICLE SPEED SENSOR (VSS)	23-11
BEFORE STARTING TROUBLESHOOTING	23-4		

SELECTABLE 4WD SYSTEM

COMPONENT LOCATION



SYSTEM DIAGRAM



SERVICE INFORMATION

GENERAL

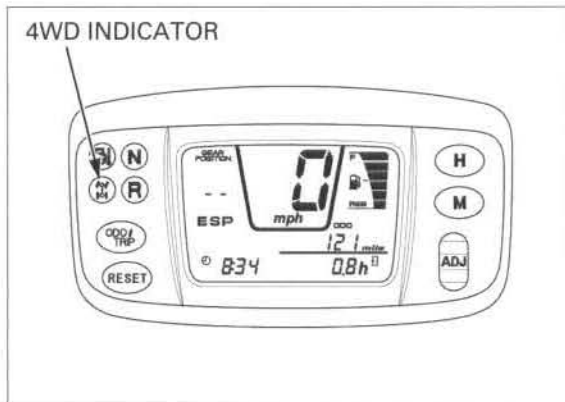
- The drive mode (2WD or 4WD) is changed electrically by operating the front final clutch with the 2WD/4WD select switch.
- When checking the selectable 4WD system, always follow the steps in the troubleshooting (page 23-5).
- See page 17-3, for front final clutch information.
- A faulty selectable 4WD system is often related to poorly connected or corroded connections. Check those connections before proceeding.
- Refer to page 24-9 for problem code retrieval and erasure procedure.
- Refer to page 17-14 for front VSS removal/installation.

BEFORE STARTING TROUBLESHOOTING

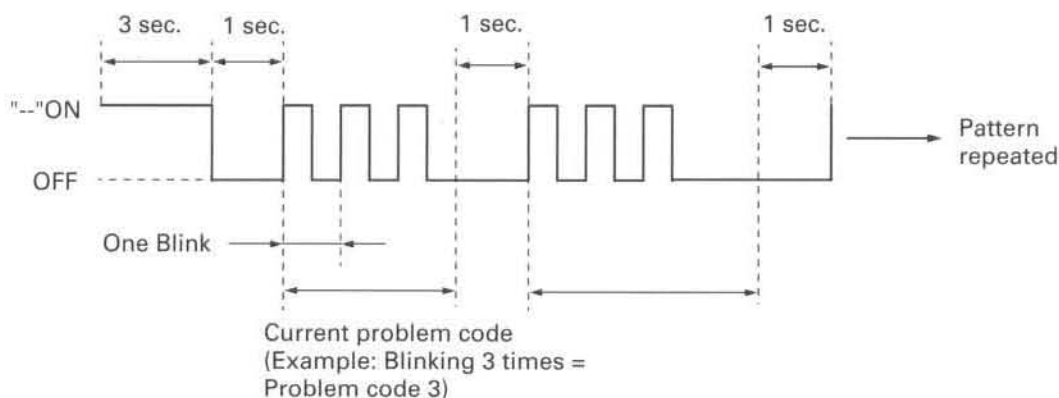
SELF-DIAGNOSTIC FUNCTION

The engine control module (ECM) that controls the Selectable 4WD system has a self-diagnostic function to constantly monitor the system. The ECM checks the condition of the Selectable 4WD system by detecting the signals from each sensor and device when the ignition switch is ON and during driving. When the ECM detects a problem in the system, the ECM overrides the 4WD selector switch, puts the machine into 2WD, and 4WD cannot be used.

- When the ECM detects a problem, it indicates the problem by blinking the 4WD indicator. Note how many times the indicator blinks, determine the detection item (page 23-4) and perform the troubleshooting (page 23-5).
- Only one current problem code will be indicated even if two or more problems occur.
- Once the ECM detects a problem, it stores the problem code in the erasable memory. It can be indicated as freeze code by retrieval of problem code (Retrieval and erasure procedure are the same as the Hondamatic ones, refer to page 24-9).
- The selectable 4WD function can be reset by turning the ignition switch OFF and ON, but the 4WD selector stops functioning when the ECM detects the problem again.
- After performing troubleshooting, erase the problem code(s) and test-drive the vehicle to be sure that the problem(s) has/have been repaired.



PROBLEM CODE BLINKING PATTERN:



PROBLEM CODE INDEX

Problem code	Detection item	Refer to
2	Front vehicle speed sensor (VSS) circuit (no signal)	23-5
3	Rear vehicle speed sensor (VSS) circuit (no signal)	23-7
4	System voltage (out of specified value)	23-9
5	Front final clutch system circuit malfunction	23-9

TROUBLESHOOTING

PROBLEM CODE 2: FRONT VEHICLE SPEED SENSOR (VSS)

- Before troubleshooting, check that the tire pressure and tire size are correct.

1. Front VSS Connector Inspection

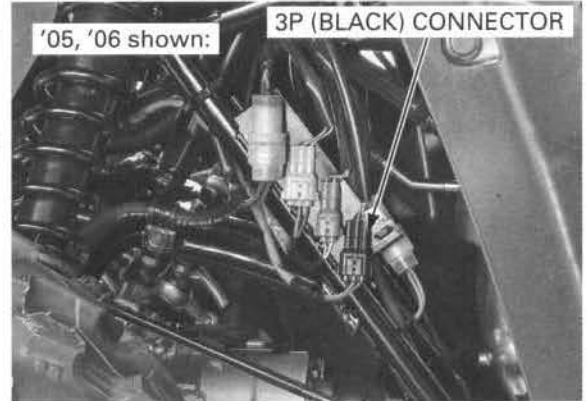
Turn the ignition switch OFF.

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 ON.

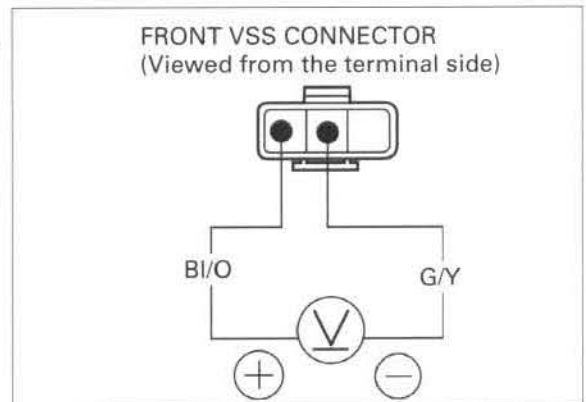
Measure the voltage between the wire harness side front VSS 3P (Black) connector terminals.

Connection: Black/orange (+) – Green/yellow (-)

Does the battery voltage exist?

NO – Open or short circuit in the Black/orange wire or Green/yellow wire.

YES – GO TO STEP 3.



3. Front VSS Line Inspection

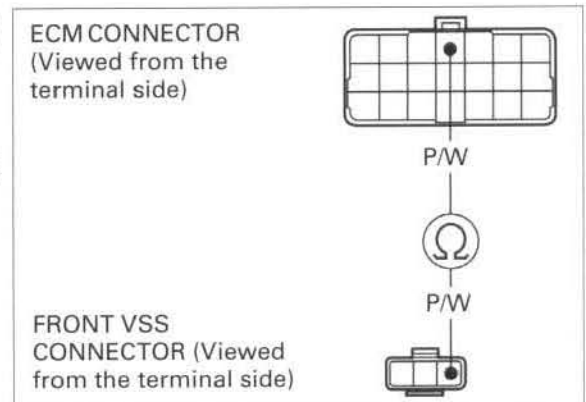
Be careful not to bend the connector terminals.

Check the Pink/white wire for continuity between the ECM 21P (Gray) and front VSS 3P (Black) connector terminals.

Is there continuity?

NO – Open circuit in the Pink/white wire between the ECM connector and front VSS connector.

YES – GO TO STEP 4.



SELECTABLE 4WD SYSTEM

4. Front VSS Line Short Circuit Inspection

Be careful not to bend the connector terminals.

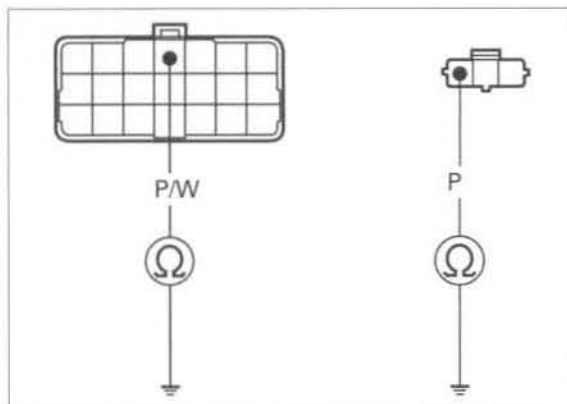
Check the Pink/white wire for continuity between the ECM 21P (Gray) connector terminal and ground.

Check the Pink wire for continuity between the front VSS 3P side (Black) connector terminal and ground.

Is there continuity?

- YES** -
- Short circuit in the Pink/white wire between the ECM connector and front VSS connector.
 - Short circuit in the Pink wire at the front VSS.

NO - GO TO STEP 5.



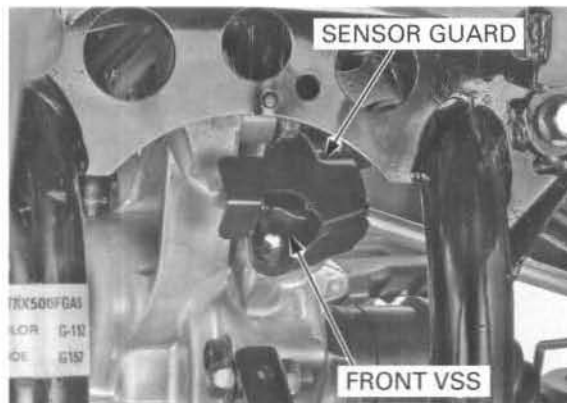
5. Front VSS Mechanical Inspection

Check the rear VSS for correct installation. Remove the front VSS (page 17-14), and check for any object on the sensor tip or ring gear surface, also check for damage on the sensor tip.

Is it installed correctly?

- NO** - Clean the front VSS and ring gear, correctly install the front VSS, or replace the front VSS.

YES - GO TO STEP 6.



6. Failure Reproduction

Interchange the front VSS 3P (Black) and rear VSS 3P (Yellow) connector.

Turn the ignition switch OFF then ON.

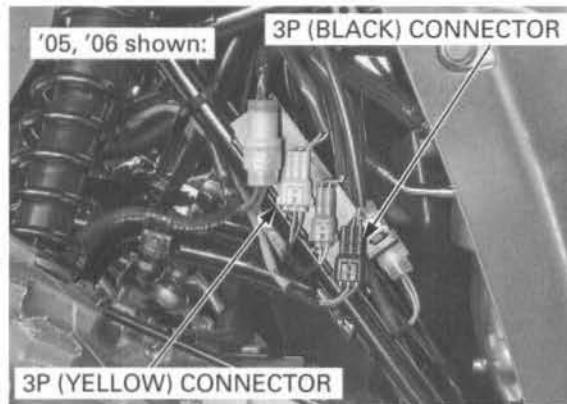
Turn the 2WD/4WD select switch to 4WD.

Test-drive the vehicle above 4 mph for more than 30 seconds and check that the 4WD indicator blinks.

Does the 4WD indicator blink?

- NO** -
- Check for poor contact or loose connection in wire harness.
 - No problem (Temporary failure).

- YES** -
- If the indicator blinks 2 times, recheck for poor contact or loose connection in wire harness. If they are OK, replace the ECM.
 - If the indicator blinks 3 times, replace the front VSS.



PROBLEM CODE 3: REAR VEHICLE SPEED SENSOR (VSS)

- Before troubleshooting, check that the tire pressure and tire size are correct.

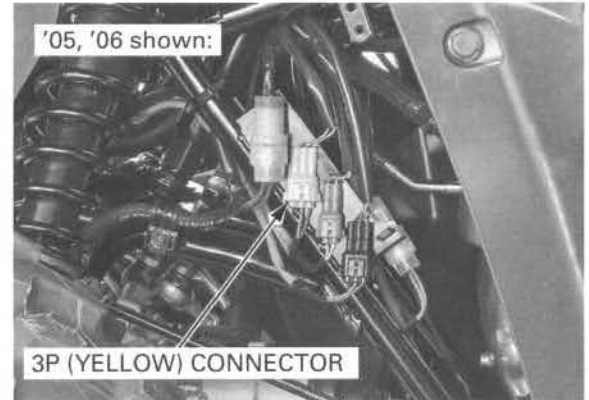
1. Rear VSS Connector Inspection

Turn the ignition switch 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

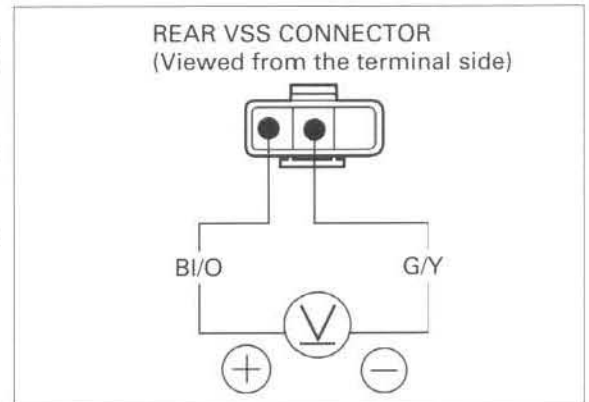
Turn the ignition switch ON.

Measure the voltage between the wire harness side rear VSS 3P (Yellow) connector terminal and ground.

Connection: Black/orange (+) – Green/yellow (-)

Does the battery voltage exist?

- NO** - Open or short circuit in the Black/orange wire or Green/yellow wire.
- YES** - GO TO STEP 3.



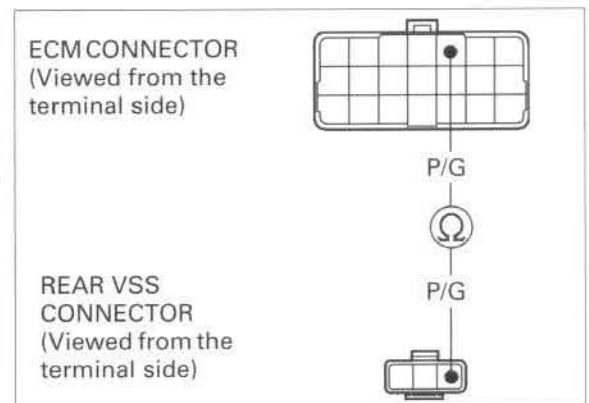
3. Rear VSS Line Inspection

Be careful not to bend the connector terminals.

Check the Pink/green wire for continuity between the ECM 21 P (Gray) and rear VSS 3P (Yellow) connector terminals.

Is there continuity?

- NO** - Open circuit in the Pink/green wire between the ECM connector and rear VSS connector.
- YES** - GO TO STEP 4.



SELECTABLE 4WD SYSTEM

4. Rear VSS Line Short Circuit Inspection

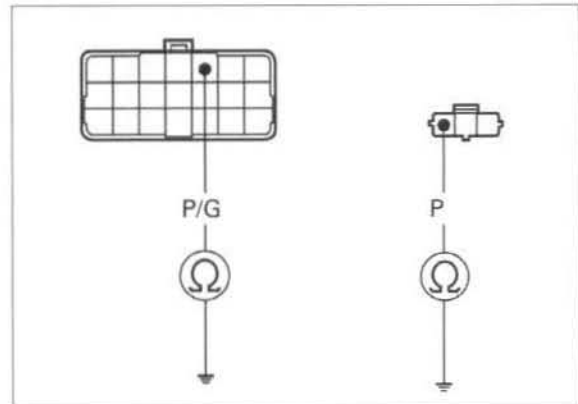
Be careful not to bend the connector terminals.

Check the Pink/green wire for continuity between the ECM 21P (Gray) connector terminal and ground.
Check the Pink wire for continuity between the rear VSS side 3P (Yellow) connector terminal and ground.

Is there continuity?

- YES** -
- Short circuit in the Pink/green wire between the ECM connector and rear VSS connector.
 - Short circuit in the Pink wire at the rear VSS.

NO - GO TO STEP 5.



5. Rear VSS Mechanical Inspection

Check the rear VSS for correct installation.
Remove the rear VSS (page 23-11), and check for any object on the sensor tip or ring gear surface, also check for damage on the sensor tip.

Is it installed correctly?

- NO** - Clean the rear VSS and ring gear, correctly install the rear VSS, or replace the rear VSS.

YES - GO TO STEP 6.

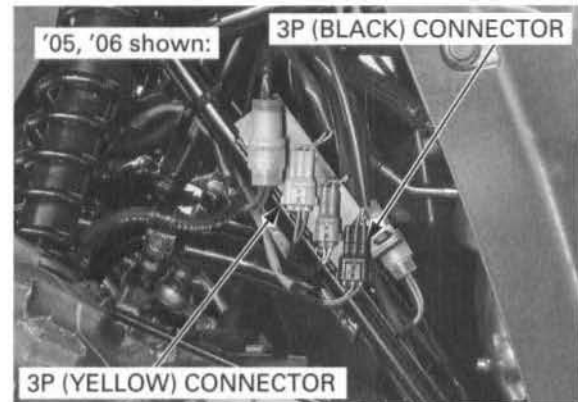


6. Failure Reproduction

Interchange the front VSS 3P (Black) and rear VSS 3P (Yellow) connector.
Turn the ignition switch OFF then ON.
Turn the 2WD/4WD select switch to 4WD.
Test-drive the vehicle above 4 mph for more than 30 seconds and check that the 4WD indicator blinks.

Does the 4WD indicator blink?

- NO** -
- Check for poor contact or loose connection in wire harness.
 - No problem (Temporary failure).
- YES** -
- If the indicator blinks 3 times, recheck for poor contact or loose connection in wire harness. If they are OK, replace the ECM.
 - If the indicator blinks 2 times, replace the rear VSS.



PROBLEM CODE 4: SYSTEM VOLTAGE

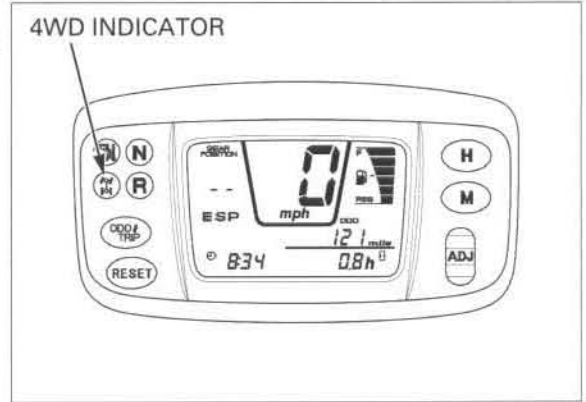
- Before starting the troubleshooting, check for the following:
 - battery condition (page 19-6)
 - engine idle speed (page 3-15)

1. Failure Reproduction

Turn the ignition switch ON.
After 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 19-7).
YES – GO TO STEP 2.



2. ECM Power Input Line Inspection

Be careful not to bend the connector terminals.

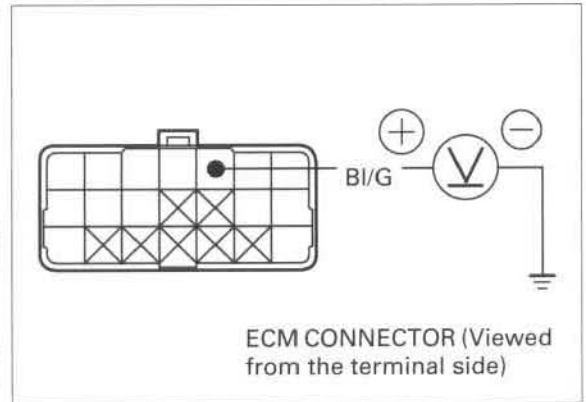
Turn the ignition switch ON.
Measure the voltage between the wire harness side connector terminal and ground.

Connection: Black/green (+) – Ground (–)

Standard: 11 – 16 V (20° C/68° F)

Is the voltage within the standard value?

- NO** – • Open or short 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 wire harness. If they are OK, replace the ECM with a new one.



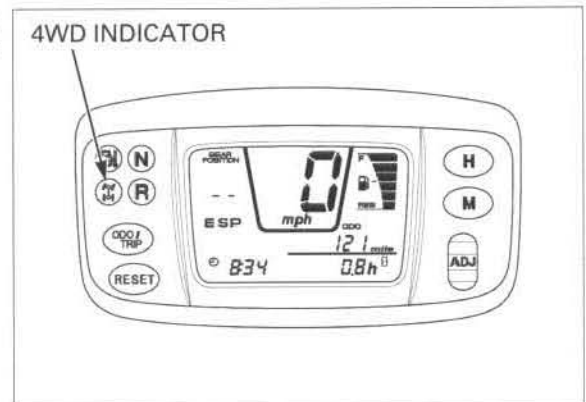
PROBLEM CODE 5: FRONT FINAL CLUTCH SYSTEM

1. Failure Reproduction

Turn the ignition switch 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

2. Front Final Clutch Line Open Circuit Inspection

Be careful not to bend the connector terminals.

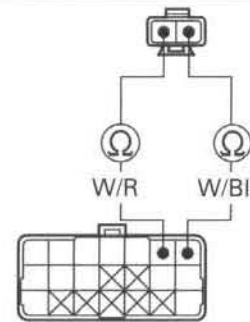
Check the White/red and White/black wires for continuity between the ECM 21P (Black) and front final clutch 2P (Green) connector terminals.

Is there continuity?

NO – • Open circuit in the White/red wire.
• Open circuit in White/black wire.

YES – GO TO STEP 3.

FINAL CLUTCH CONNECTOR (Viewed from the terminal side)



ECM CONNECTOR (Viewed from the terminal side)

3. Front Final Clutch Line Short Circuit Inspection

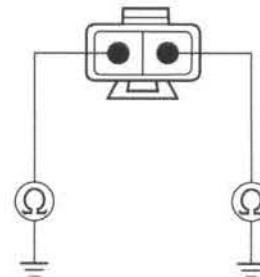
Check the White/red and White/black wires for continuity between the wire harness side clutch 2P (Green) connector terminals and ground.

Is there continuity?

YES – • Short circuit in the White/red wire.
• Short circuit in White/black wire.

NO – GO TO STEP 4.

WIRE HARNESS SIDE FINAL CLUTCH CONNECTOR (Viewed from the terminal side)



4. Front Final Clutch Inspection

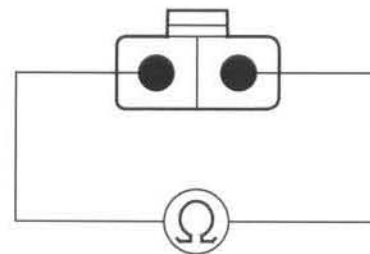
Measure the resistance between the final clutch side 2P (Green) connector terminals.

Is the resistance within 5.1 – 5.8 Ω (20°C/68°F)?

NO – Faulty front final clutch.

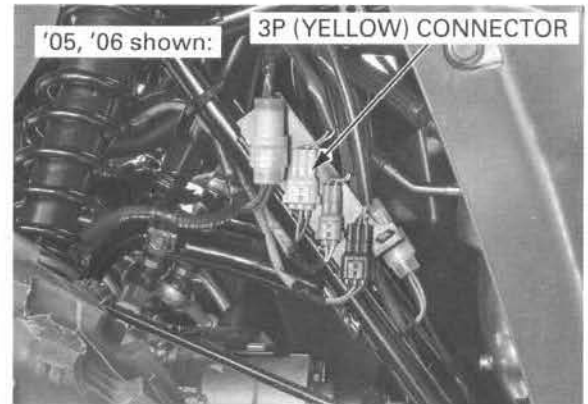
YES – Faulty ECM.

FINAL CLUTCH CONNECTOR (Viewed from the terminal side)

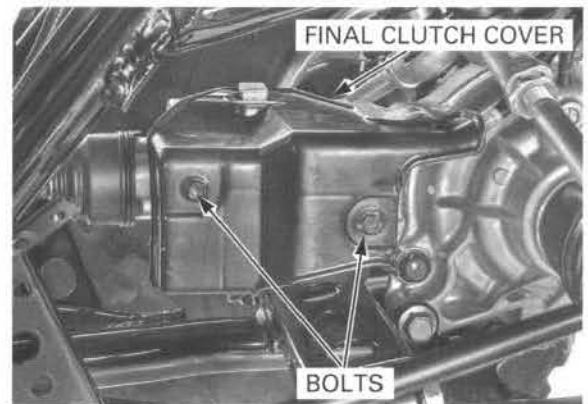


REAR VEHICLE SPEED SENSOR (VSS)**REMOVAL**

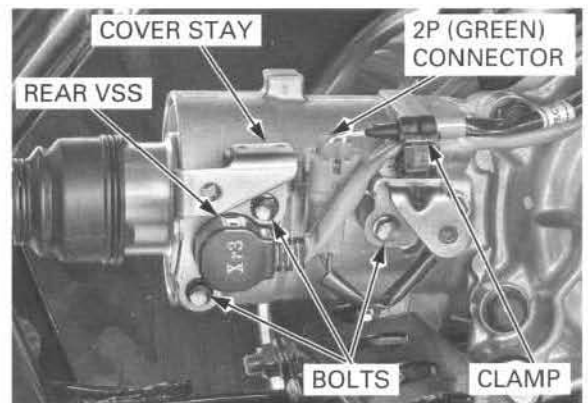
Disconnect the rear VSS 3P (Yellow) connector.



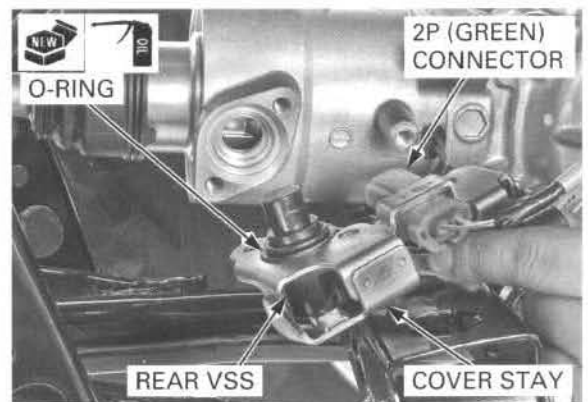
Remove the two bolts and front final clutch cover.



Remove the three front final clutch cover stay mounting bolts and stay.
Release the rear VSS wire from the wire clamp.
Remove the front final clutch 2P (Green) connector.

**INSTALLATION**

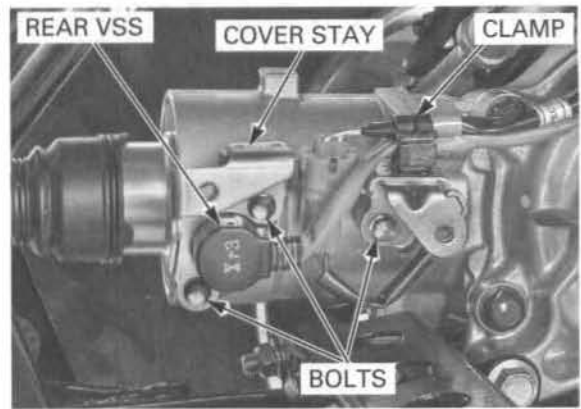
Install the front final clutch 2P (Green) connector.
Apply engine oil to a new O-ring and install it onto the rear VSS.
Route the rear VSS wire into the front final clutch cover stay and install the VSS.



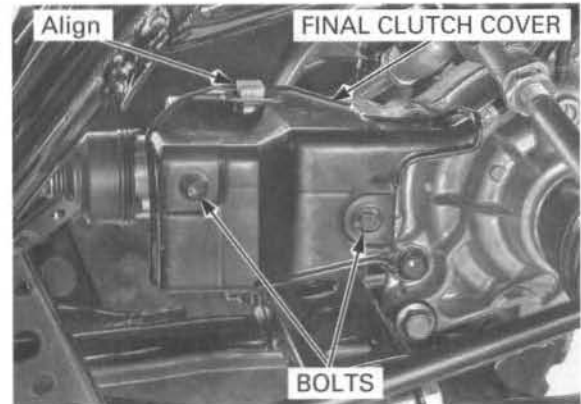
SELECTABLE 4WD SYSTEM

Install the front final clutch cover stay onto the clutch housing, then install and tighten the three mounting bolts.

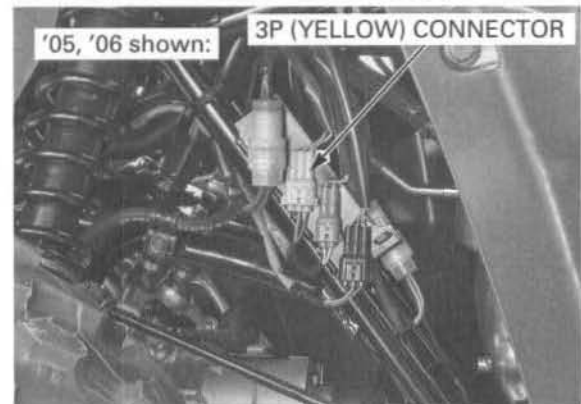
Clamp the rear VSS wire with the wire clamp.



Install the front final clutch cover onto the housing while aligning its hole with the boss on the housing. Install and tighten the two bolts.



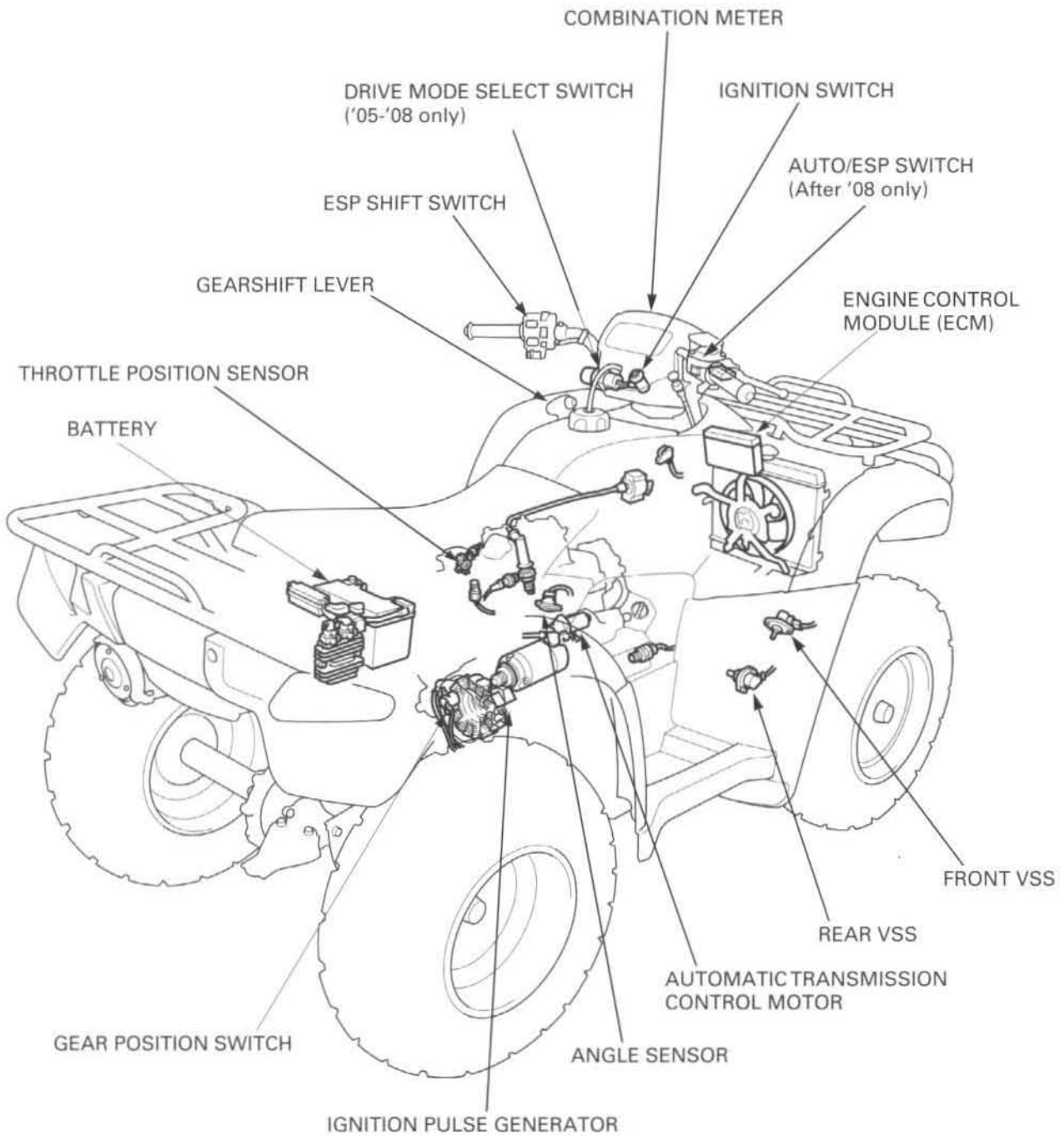
Connect the rear VSS 3P (Yellow) connector.



24. HONDAMATIC

COMPONENT LOCATION	24-2	GEAR POSITION SWITCH	24-37
SERVICE INFORMATION	24-3	ESP SHIFT SWITCH.....	24-38
CONNECTOR LOCATION.....	24-4	MODE SELECT SWITCH ('05-'08 only).....	24-39
CIRCUIT DIAGRAM.....	24-5	THROTTLE POSITION (TP) SENSOR	24-40
INITIAL SETTING PROCEDURE	24-6	ANGLE SENSOR	24-41
BEFORE STARTING TROUBLESHOOTING	24-8	CONTROL MOTOR.....	24-43
PROBLEM CODE INDEX.....	24-11	ENGINE CONTROL MODULE (ECM)	24-44
TROUBLESHOOTING	24-11		

COMPONENT LOCATION



SERVICE INFORMATION

GENERAL

- This section covers service of the electrical system of the Hondamatic. The automatic transmission unit of the Hondamatic is mounted inside the crankcase. Removal/installation of the automatic transmission is accomplished by separating the crankcase (page 13-8). Refer to page 13-6 if drive performance failure is caused by the mechanical system.
- Do not disassemble the automatic transmission unit. Replace the automatic transmission unit as an assembly when it is faulty.
- Read "Before Starting Troubleshooting" carefully, and inspect and troubleshoot the Hondamatic system according to the Troubleshooting. Observe each step of the procedures one by one. Note the problem code and related system before starting diagnosis and troubleshooting.
- When the Engine Control Module (ECM) detects a problem with the Hondamatic system, it stops the automatic transmission function and the gear position indicator blinks "--".
- After performing troubleshooting (including initial setting; 24-6), erase the problem code(s) and test-drive the vehicle to be sure that the problem(s) has/have been removed.
- The ECM may be damaged if dropped. Also, if a connector is disconnected when current is flowing, the excessive voltage may damage the ECM. Always turn OFF the ignition switch before servicing.
- The following color codes used are indicated throughout this section.

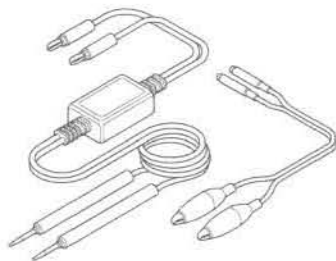
Bu: Blue	G: Green	Lg: Light Green	R: Red
Bl: Black	Gr: Gray	O: Orange	W: White
Br: Brown	Lb: Light Blue	P: Pink	Y: Yellow

TORQUE VALUES

Throttle position (TP) sensor	3.4 N·m (0.3 kgf·m, 2.5 lbf·ft)
Angle sensor mounting bolt	6 N·m (0.6 kgf·m, 4.3 lbf·ft)

TOOL

Peak voltage adapter
07HGJ-0020100



(not available in U.S.A.) with commercially available digital multi-tester (impedance 10 M Ω DCV minimum)

CONNECTOR LOCATION

Refer to page 2-3 for the parts that must be removed for serviced.

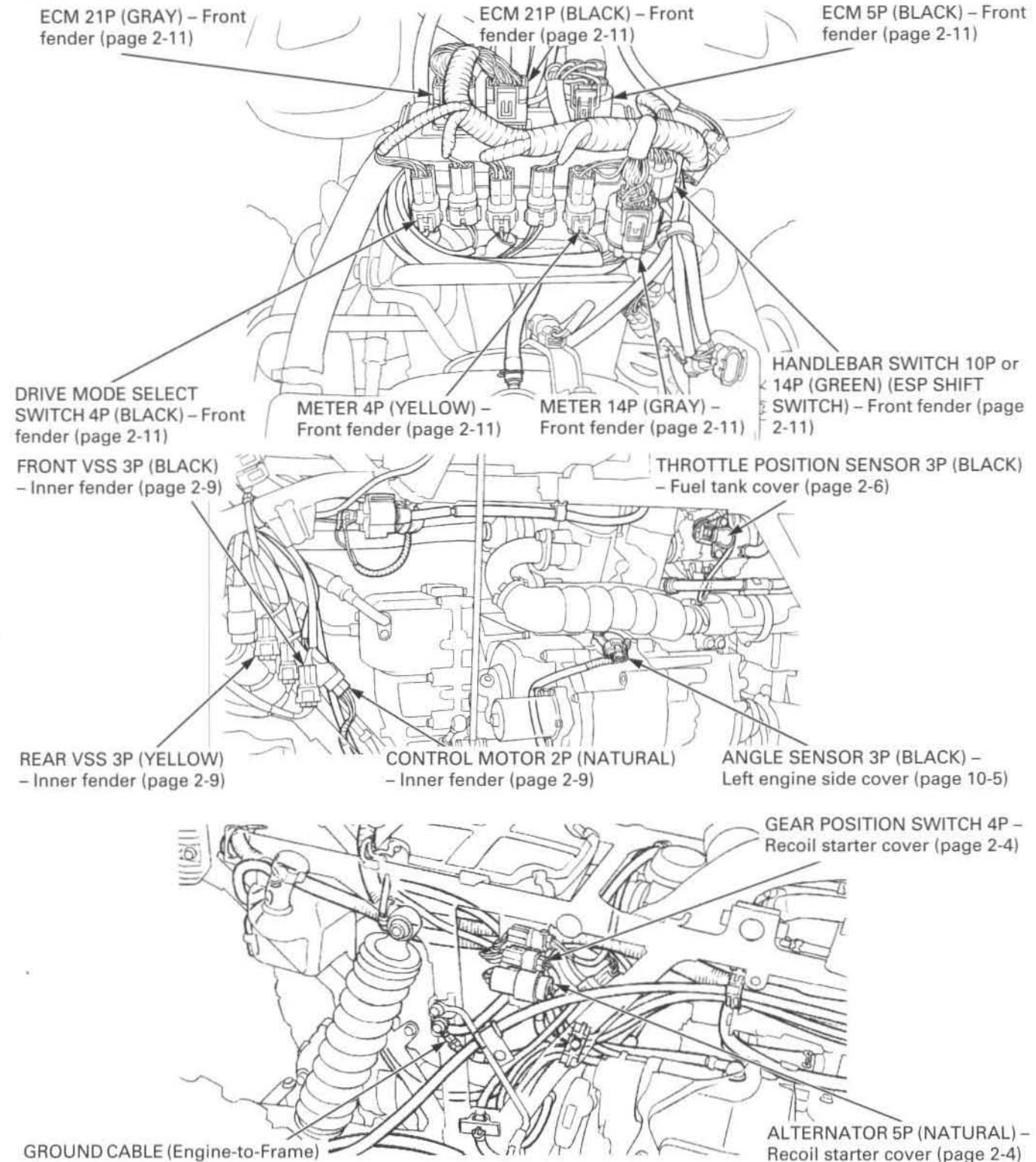
For exam-
ple:

Front VSS 3P

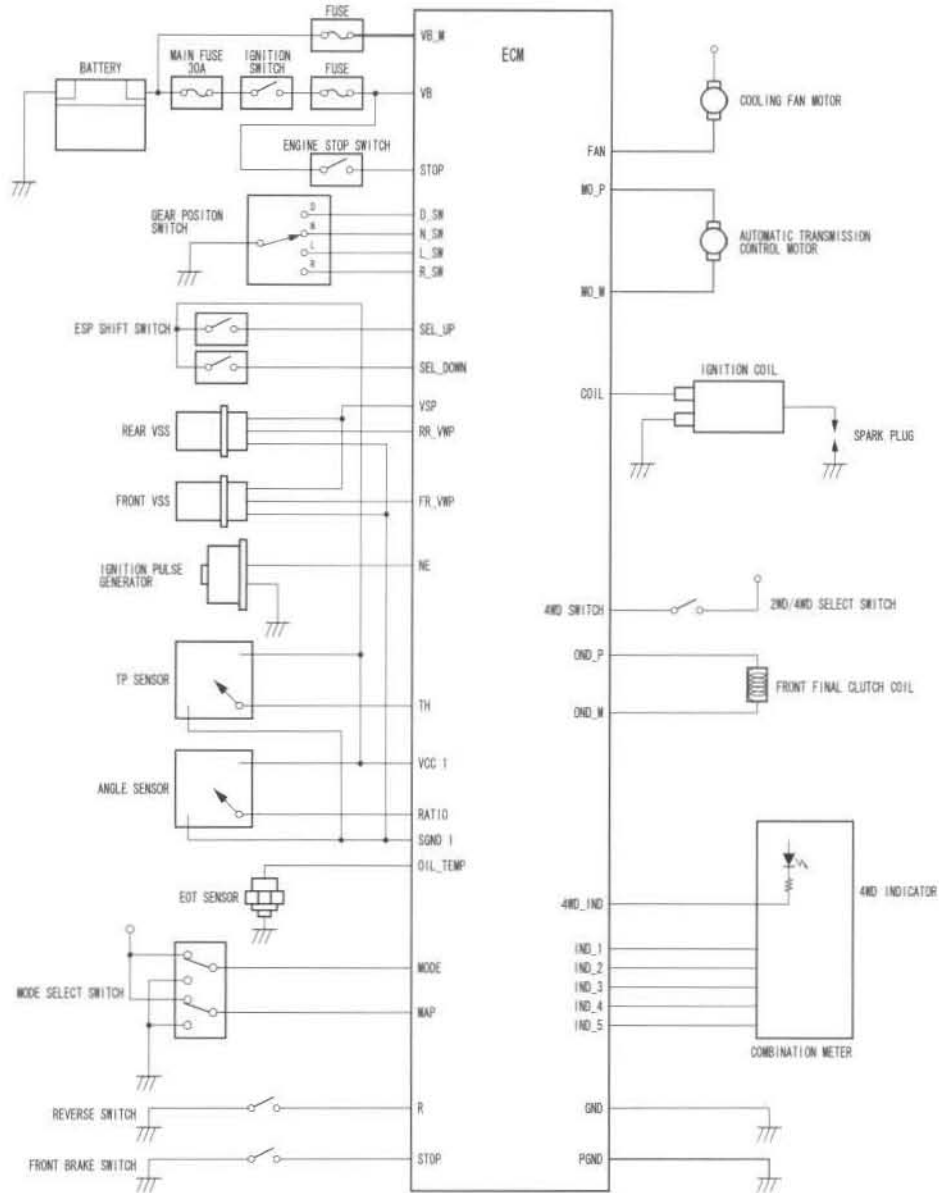
-Inner fender

← Electrical component
← The parts that must be removed for service

'05, '06 shown:



CIRCUIT DIAGRAM

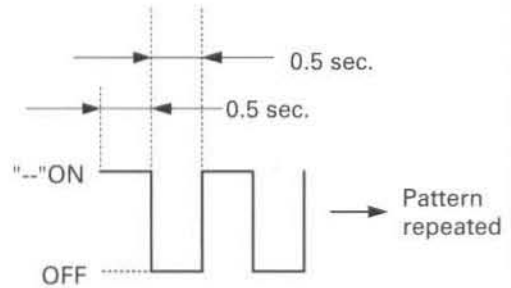


VB	Battery voltage	VCC 1	Voltage center channel 1	4WD SWITCH	4WD switch
VB_M	Main battery voltage	RATIO	Ratio voltage	OND_P	Final clutch power (+)
D_SW	Drive switch	SGND 1	Sensor ground 1	OND_M	Final clutch power (-)
L_SW	Low switch	OIL_TEMP	Oil temperature	4WD_IND	4WD indicator
N_SW	Neutral switch	MODE	Mode signal	GND	Ground
R_SW	Reverse switch	MAP	Map signal	PGND	Power ground
SEL_UP	Selector up	R	Reverse signal	IND_1	Indicator 1
SEL_DOWN	Selector down	STOP	Stop signal	IND_2	Indicator 2
VSP	Vehicle speed sensor voltage	FAN	Fan motor	IND_3	Indicator 3
FR_VWP	Front VSS pulse voltage	MO_P	Motor power (+)	IND_4	Indicator 4
RR_VWP	Rear VSS pulse voltage	MO_M	Motor power (-)	IND_5	Indicator 5
NE	Number of engine revolution	COIL	Ignition coil		
TH	TP sensor voltage	STOP	Engine stop switch		

INITIAL SETTING PROCEDURE

- After removal/installation or replacement of any of the following parts, perform the initial setting below.
 - ECM
 - TP sensor
 - Angle sensor
 - Carburetor*
 - Throttle cable
- * Only if the TP sensor or throttle cable are disconnected from the carburetor.
- The gear position indicator blinks in Indicator mode 2 when the initial setting was not made properly. Repeat the procedure from the step 2.

INDICATOR MODE 2 BLINK DURATION:

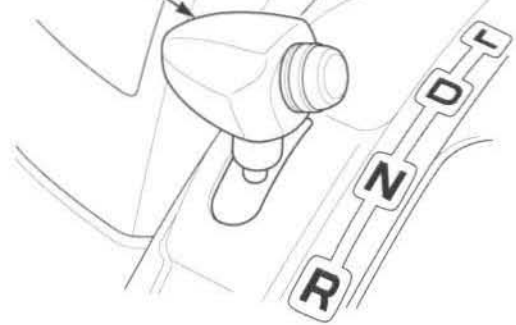


INITIAL SETTING

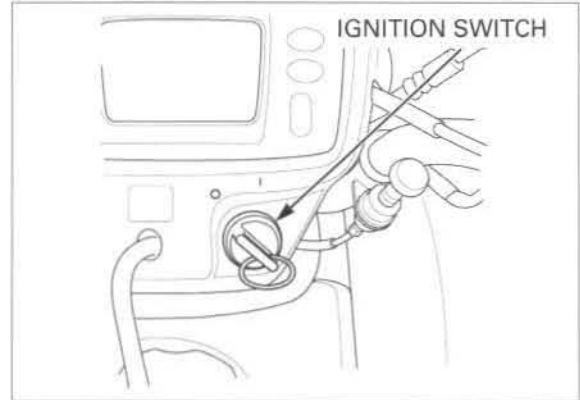
Make sure to check the oil level before executing the Initial Setting procedure.

1. Start the engine and let it idle about 30 seconds with the sub-transmission in the neutral.
 2. Move the gearshift lever to the D position and check that the gear position indicator shows "D".
 3. Ride slowly forward for about 5 feet.
 4. Move the gearshift lever back to the N position and check that the gear position indicator shows "N".
5. Turn the ignition switch OFF.

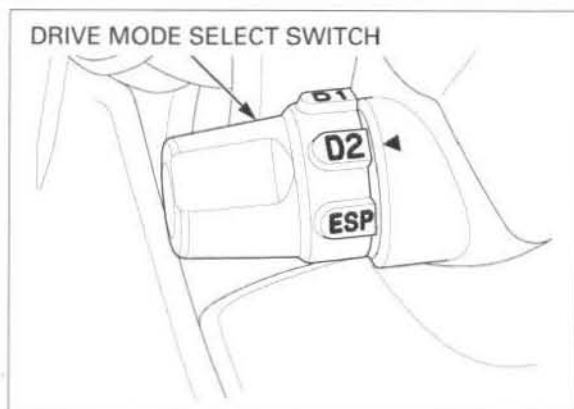
GEARSHIFT LEVER



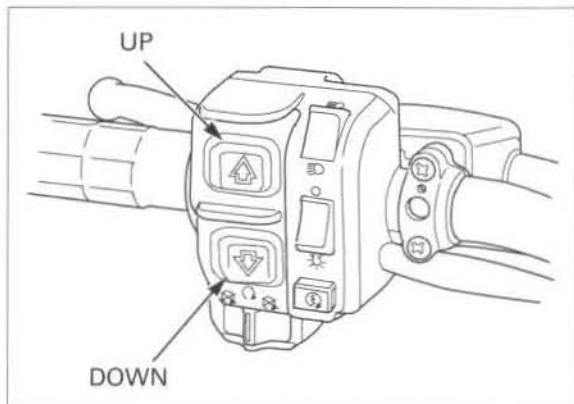
IGNITION SWITCH



- On '05-'08 models only, move the drive mode select switch to D1 or D2.



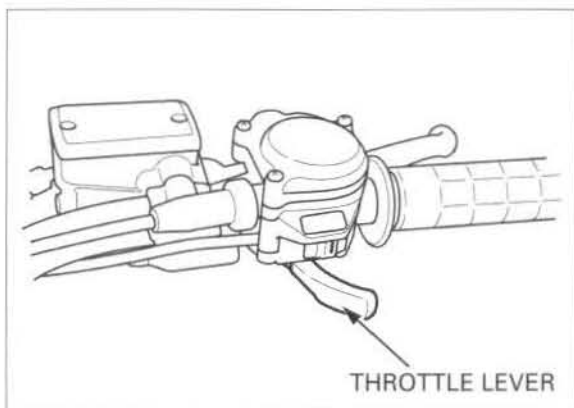
- Turn the ignition switch ON while pushing both the UP and DOWN shift switches (ESP shift switches) simultaneously (Do not release the shift switches yet).
Wait a moment and check that the "N" blinks at the gear position indicator.



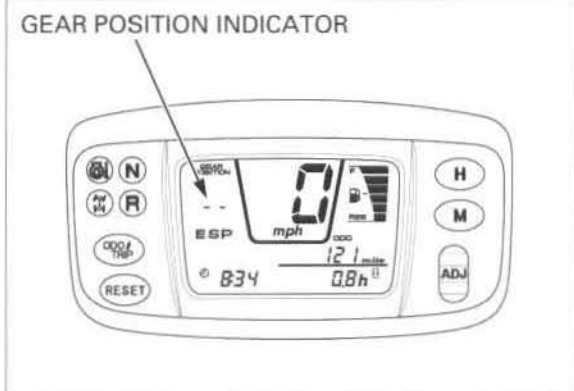
- Immediately release both the UP and DOWN shift switches, then push and release the shift switches in the order of UP, DOWN and UP (Do not hold onto the switch).

If the gear position indicator shows the constant display of "N" or the control motor did not cycle, turn the ignition switch OFF and repeat the procedure from step 7.

- A constant "--" should be displayed on the gear position indicator.
 - Listen for the control motor operation sound (the control motor should function at this time to adjust the angle sensor).
- Within 5 seconds of the display of "--" and while the control motor is operating, move the throttle lever from the fully closed position to the fully opened position, and then move it to the fully closed position again.



- When the initial setting is complete, the indication on the gear position indicator changes from the constant display of "--" to the constant display of "N."



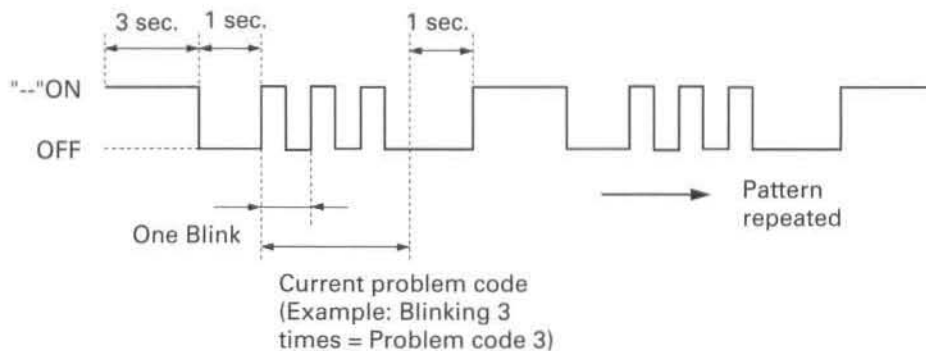
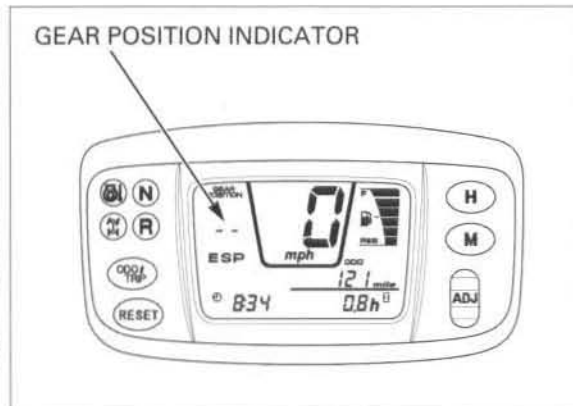
BEFORE STARTING TROUBLESHOOTING

SELF-DIAGNOSTIC FUNCTION

OUTLINE

The engine control module (ECM) that controls the Hondamatic system has a self-diagnostic function to constantly monitor the system. The ECM checks the condition of the Hondamatic system by detecting the signals from each sensor, switch and control motor when the ignition switch is ON and during driving.

- When the ECM detects a problem, it indicates the problem by blinking "--" at the gear position indicator.
Note how many times indicator blinking, determine the detection item (page 24-11) and perform the troubleshooting (page 24-12).
- Only one current problem code will be indicated even if two or more problems occur.
- Once the ECM detects a problem, it stores the problem code in the erasable memory. It can be indicated as freeze code by retrieval of problem code (page 24-9).
- The shift function can be reset by turning the ignition switch OFF and ON, but the shift control stops when the ECM detects the problem again.
- After performing troubleshooting (including initial setting; 24-6), erase the problem code(s) and test-drive the vehicle to be sure that the problem(s) has/have been repaired.



FAIL-SAFE FUNCTION

The ECM also has the fail-safe function to secure the vehicle function.

When a problem occurs and the ECM detects the problem in the Hondamatic system, the ECM stops the automatic transmission shifting function and control defaults to fail-safe mode so that the vehicle can be still driven.

RETRIEVAL/ERASURE OF PROBLEM CODE

NOTE:

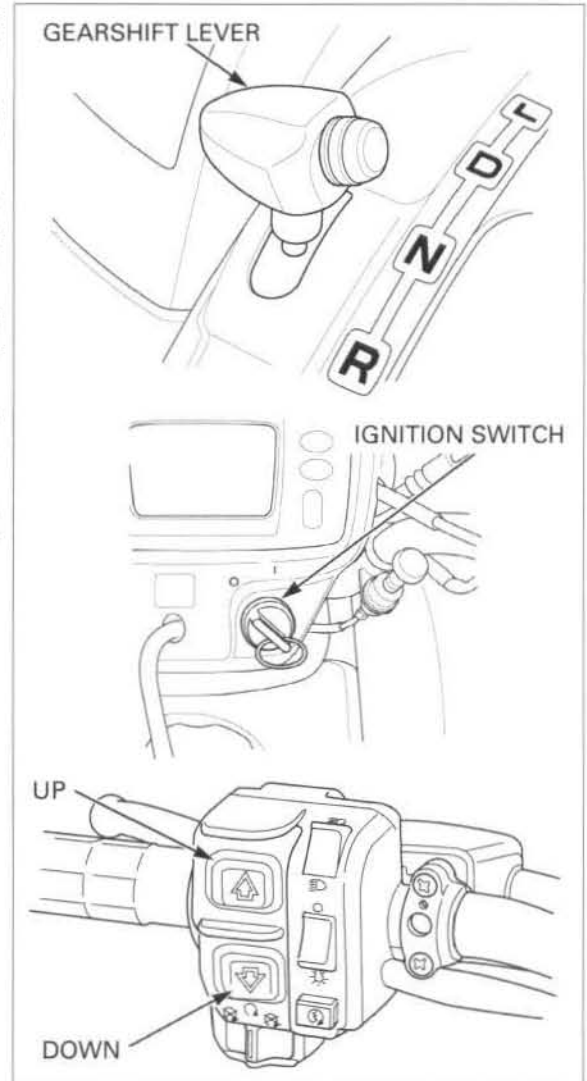
- The ECM stores up to two problem codes and displays the latest problem code first, and then the earlier code alternately. When the two problem codes are displayed, perform troubleshooting starting with the latest code (i.e, the code indicated first).

RETRIEVAL:

- Put the gearshift lever in the neutral position (be sure that the neutral indicator comes on) and turn the ignition switch OFF (vehicle at a stop).
- Turn the ignition switch ON while pushing the UP and DOWN shift switches (ESP shift switches) simultaneously.
- Release the UP and DOWN shift switches immediately, then push the UP and DOWN shift switches simultaneously again for 2 seconds or more.
- The problem code is displayed by a number of blinks "--" on the gear position indicator (page 24-8).

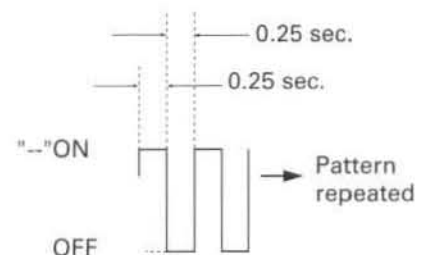
If "N" stays on the gear position indicator, the retrieval process was not correctly performed. Repeat the procedures from step 1.

- Note how many times indicator blinking, determine the detection item (page 24-11) and perform the troubleshooting (page 24-12).

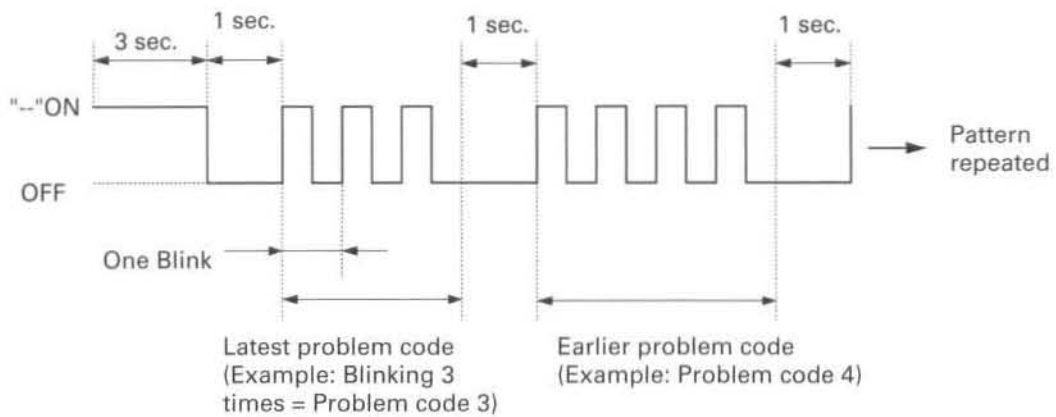


If the gear position indicator blinks (in mode 1), indicating a system failure before retrieving the problem code, and the problem cannot be retrieved by repeating the retrieval procedures, perform the diagnostic troubleshooting of Problem code 3 or 7.

INDICATOR MODE 1 BLINK DURATION

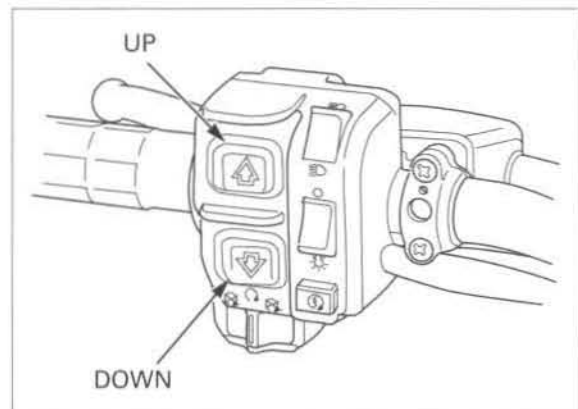


PROBLEM CODE BLINK DURATION, (Indicating a problem code):

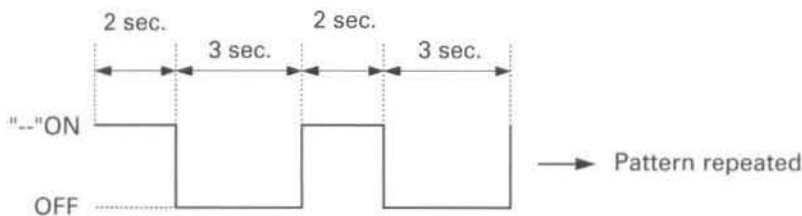


ERASURE:

1. Push the UP and DOWN shift switches simultaneously for 3 seconds or more while the problem code is being displayed (i.e., "--" blinking on the gear position indicator).
2. When the erasure is completed, the blinking pattern changes to the erasure confirmation blink.
3. Turn the ignition switch OFF.



ERASURE CONFIRMATION BLINK DURATION (Indicating erasure of problem code):



PROBLEM CODE INDEX

Problem code	Detection item	Refer to
1	Ignition pulse generator no signal	24-11
2	Rear VSS no signal	24-14
3	Gear position (D, L, N, R) circuit multiple ON position (Short)	24-16
4	TP sensor output voltage is out of specified value	24-18
5	Angle sensor system (Control motor lock)	24-20
6	Angle sensor output voltage is out of specified value	24-25
7	ESP shift (Up and down) switch circuit malfunction	24-27
8	EEPROM malfunction (Writing/Readout circuit)	24-29
9	Voltage converter circuit malfunction	24-30
10	Fail-safe relay circuit malfunction	24-30
11	Control motor driver circuit malfunction	24-30
12	CPU (Central Processing Unit) malfunction	24-30
13	Mode select (D1, D2 and ESP) switch circuit malfunction	24-32
Problem code can not be retrievable (Same circuit as of code 3 or 7)		24-34
Problem can not be detected by ECM (Faulty gear position or drive mode indication)		24-34

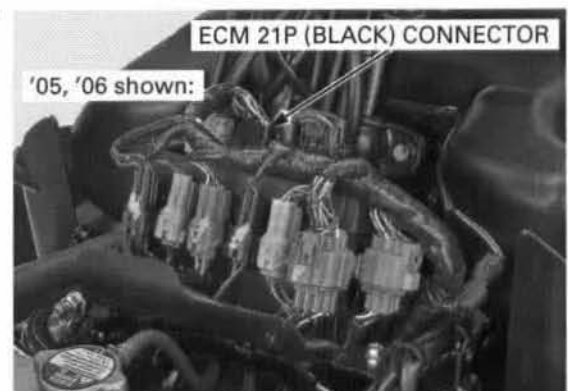
TROUBLESHOOTING

- The connector location as shown on page 24-4.
- Perform inspection with the ignition switch turned OFF, unless otherwise specified.
- Check the following **before** starting troubleshooting.
 - Battery voltage (12.3V or more)
 - Fuses
 - Relevant connectors/components for water or loose contact
- After troubleshooting, erase the problem code and test-drive the vehicle to be sure that the system is normal.
- When connecting the ECM connector, be careful not to enter the dust and dirt into the connector inside.

PROBLEM CODE 1: IGNITION PULSE GENERATOR SYSTEM

1. Ignition Pulse Generator Connection Inspection

Check for loose or poor contact on the ECM 21P (Black) connector.



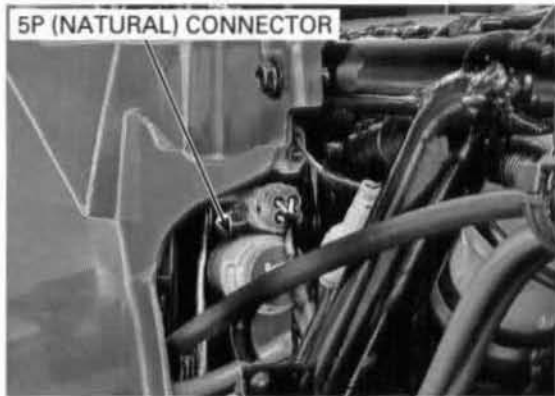
FA/FGA models only: Check for loose or poor contact on the alternator 5P (Natural) connector.

Is there normal condition?

NO - Loose or poor contact on the ECM 21P (Black) connector and the alternator 5P (Natural) connector

YES - GO TO STEP 2.

5P (NATURAL) CONNECTOR



FPA model only: Check for loose or poor contact on the EPS ECU 21P (Gray) A connector.

Is there normal condition?

NO - Loose or poor contact on the ECM 21P (Black) connector and the EPS ECU 21P (Gray) A connector

YES - GO TO STEP 2.

EPS ECU 21P (GRAY) CONNECTOR



2. Ground Cable Connection Inspection

Check for loose or poor contact on the ground cable.

Is the connection normal?

NO - Loose or poor contact on the ground cable

YES - GO TO STEP 3.



GROUND CABLE

3. Ignition Pulse Generator Line Inspection/(ECM) Short Circuit Inspection

FA/FGA models only:

Turn the ignition switch OFF.

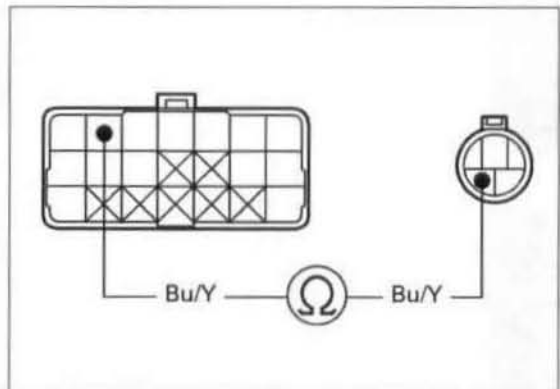
Disconnect the ECM 21P (Black) connector and the alternator 5P (Natural) connector.

Check for continuity at the Blue/yellow wire between the main harness side connectors.

Is there continuity?

NO - Open in wire between the ECM and ignition pulse generator

YES - GO TO STEP 4.



FPA model only:

Disconnect the ECM 21P (Black) and EPS ECU 21P (Gray) A connectors.

Check for Violet/white wire continuity between the wire harness side of the EPS ECU 21P (Gray) A connector and the ECM 33P (Black) connector.

TOOL:

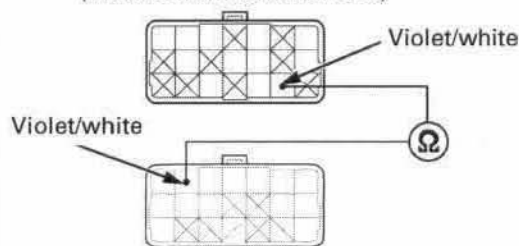
Pin probe (Male) 07ZAJ-RDJA110

Is there continuity?

NO – Open in wire between the ECM and ignition pulse generator

YES – GO TO STEP 4.

EPS ECU 21P (GRAY) A CONNECTOR
(Viewed from terminal side)



ECM 21P BLACK CONNECTOR
(Viewed from terminal side)

4. Ignition Pulse Generator Peak Voltage Inspection/line (ECM) Short Circuit Inspection

FA/FGA models only:

Inspect the ignition pulse generator peak voltage (page 20-5).

Connection: Blue/yellow (+) – Ground (–)

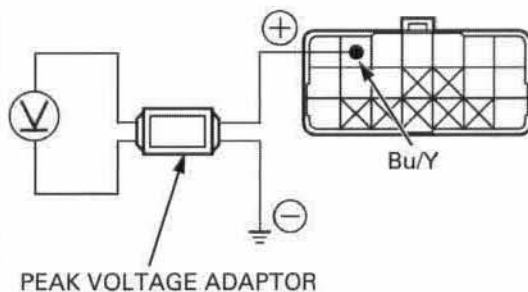
Standard: 0.7 V minimum

Is the voltage as specified?

NO – Inspect the ignition pulse generator (page 11-9)

YES – GO TO STEP 5.

ECM 21P (BLACK) CONNECTOR
(Viewed from the terminal side)



PEAK VOLTAGE ADAPTOR

FPA model only:

Check for Violet/white wire continuity between the wire harness side of the EPS ECU 21P (Gray) connector and body ground.

TOOL:

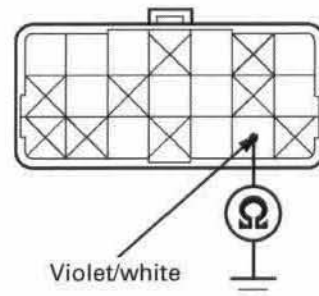
Pin probe (Male) 07ZAJ-RDJA110

Is there continuity?

NO – Short circuit in the Violet/white wire

YES – GO TO STEP 5.

EPS ECU 21P (GRAY) A CONNECTOR
(Viewed from terminal side)



5. System Failure Reproduction

Connect all connectors.

Test-ride the vehicle under the following conditions:

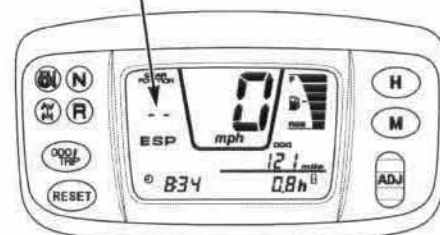
- Gearshift lever in D range
- **FA/FGA models only:** Mode select switch at ESP/1st
- **FPA model only:** Auto/ESP switch at ESP
- Driving for 2 seconds or more at over 3 mph of vehicle speed

Is problem code 1 blink indicated?

NO – • No problem (Temporary failure)
• Erase the problem code (page 24-9)

YES – Faulty ECM. After replacement, perform initial setting procedure (page 24-6).

GEAR POSITION INDICATOR



PROBLEM CODE 2: VEHICLE SPEED SENSOR (VSS) SYSTEM

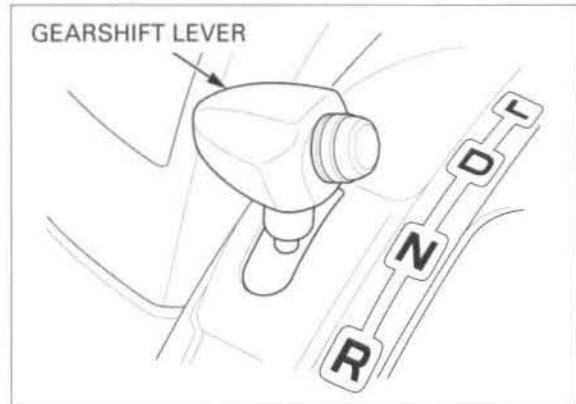
1. Mechanical System Inspection

Test-ride the vehicle with the gearshift lever in D range.

Is it possible to ride?

- NO** - • Check the automatic transmission mechanical system (page 13-6)
 • Check the centrifugal clutch (page 10-9)

YES - GO TO STEP 2.



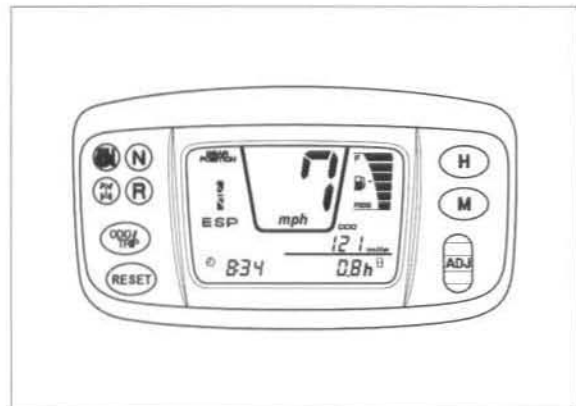
2. Speedometer Indication Inspection

Check the indication of the speedometer when driving at a low speed.

Is the indication accurate?

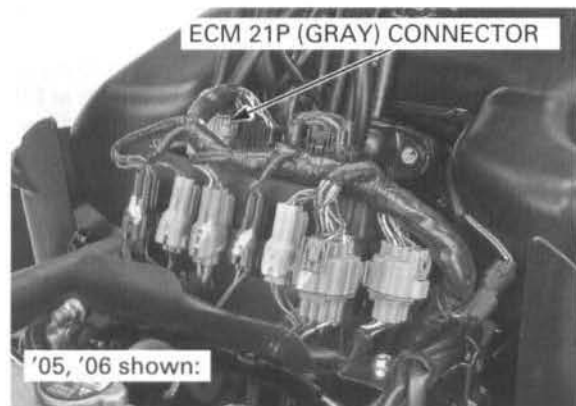
- NO** - Perform the troubleshooting of meter/speed sensor (page 22-13)

YES - GO TO STEP 3.



3. VSS Connection Inspection

Check for loose or poor contact on the ECM 21P (Gray) connector.

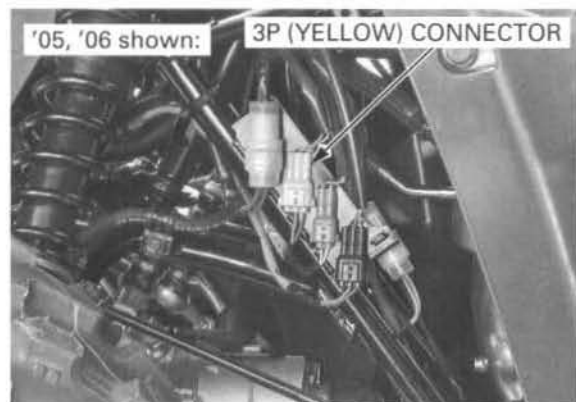


Check for loose or poor contact on the rear VSS 3P (Yellow) connector.

Is the connection normal?

- NO** - Loose or poor contact on the ECM 21P (Gray) connector and the rear VSS 3P (Yellow) connector

YES - GO TO STEP 4.



4. Rear VSS Input Line Inspection

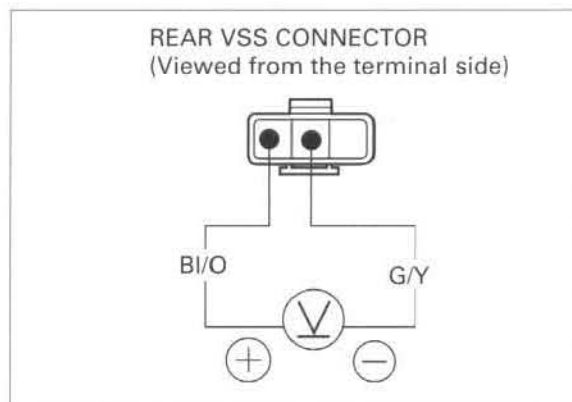
Turn the ignition switch ON.
Measure the voltage between the wire harness side rear VSS 3P (Yellow) connector terminal and ground.

Connection: Black/orange (+) – Green/yellow (-)

Does the battery voltage exist?

NO – Open or short circuit in the Black/orange wire or Green/yellow wire

YES – GO TO STEP 5.



5. Rear VSS Line Inspection

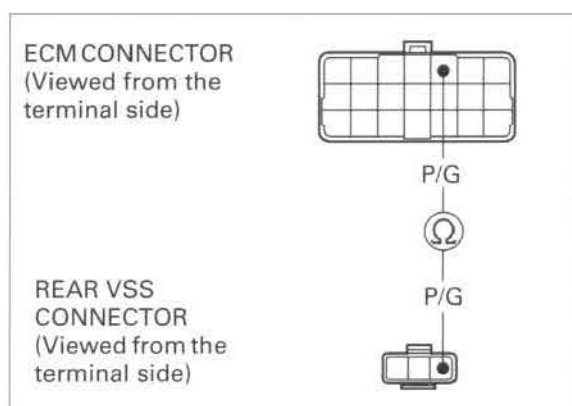
Be careful not to bend the connector terminals.

Check the Pink/green wire for continuity between the ECM 21 P (Gray) and rear VSS 3P (Yellow) connector terminals.

Is there continuity?

NO – Open circuit in the Pink/green wire between the ECM connector and rear VSS connector

YES – GO TO STEP 6.



6. Rear VSS Line Short Circuit Inspection

Be careful not to bend the connector terminals.

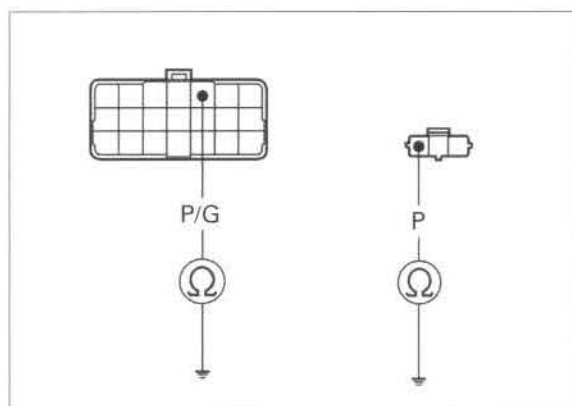
Check the Pink/green wire for continuity between the ECM 21P (Gray) connector terminal and ground.

Check the Pink wire for continuity between the rear VSS side 3P (Yellow) connector terminal and ground.

Is there continuity?

YES – • Short circuit in the Pink/green wire between the ECM connector and rear VSS connector
• Short circuit in the Pink wire at the rear VSS

NO – GO TO STEP 7.



7. Rear VSS Mechanical Inspection

Check the rear VSS for correct installation.
Remove the rear VSS (page 23-11), and check for any object on the sensor tip or ring gear surface, also check for damage on the sensor tip.

Is it installed certainly?

NO – Clean the rear VSS and ring gear, correctly install the rear VSS, or replace the rear VSS

YES – GO TO STEP 8.



8. System Failure Reproduction

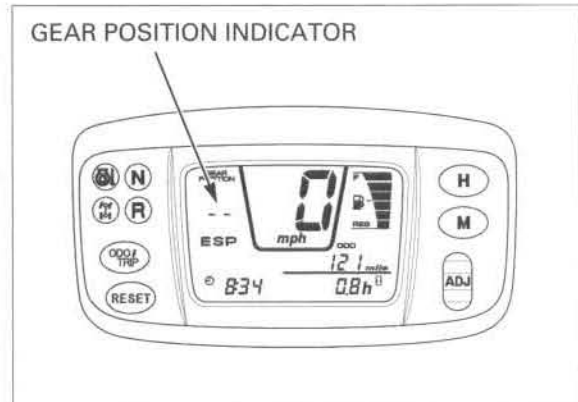
Connect all connectors.

Test-drive the vehicle under the following conditions:

- Gearshift lever in D range
- Mode select switch at ESP/1st
- Driving for 2 seconds or more at over 7 mph of vehicle speed

Is problem code 2 indicated?

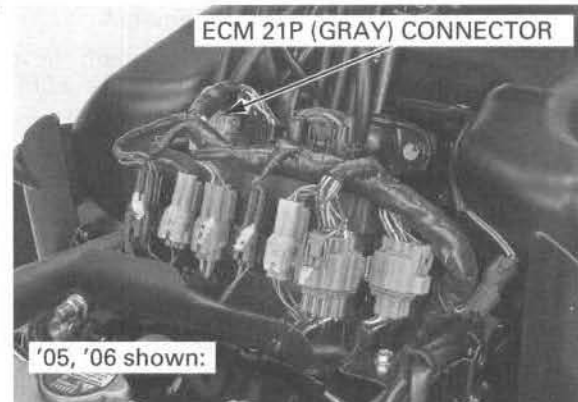
- NO** - • No problem (Temporary failure)
• Erase the problem code (page 24-9)
- YES** - Faulty ECM - After replacement, perform initial setting procedure (page 24-6)



PROBLEM CODE 3: GEAR POSITION SWITCH SYSTEM

1. Gear Position Switch Connection Inspection

Check for loose or poor contact on the ECM 21P (Gray) connector.



Check for loose or poor contact on the junction box.

Is the connection normal?

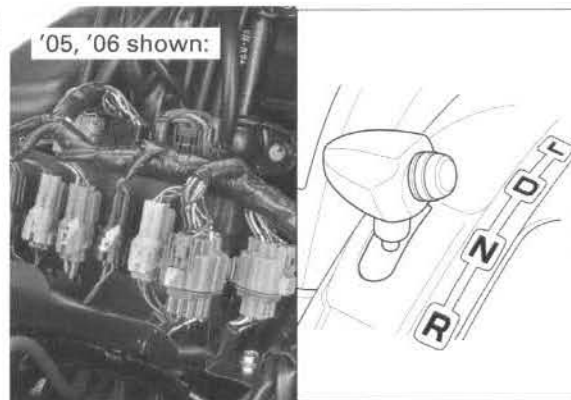
- NO** - Loose or poor contact on the ECM 21P (Gray) connector and the junction box
- YES** - GO TO STEP 2.



2. Gear Position Switch Line Inspection 1

Check for continuity between each gear position switch wire terminal of the ECM connector and ground.

WIRE COLOR GEAR POSITION	W	Lb/W	Lg/R	Gr	GND
LOW	1	2	3	4	
DRIVE	5	6	7	8	
NEUTRAL	9	10	11	12	
REVERSE	13	14	15	16	



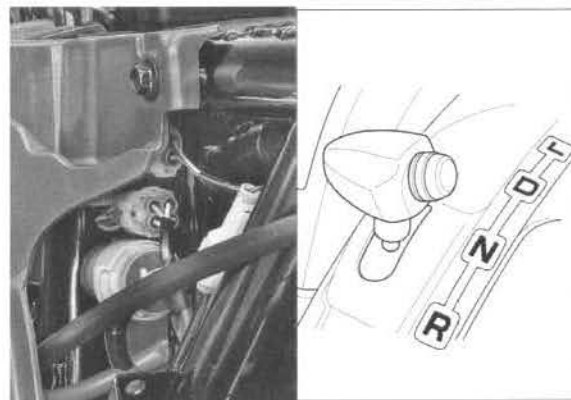
Is there normal continuity?

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

3. Gear Position Switch Line Inspection 2

Check for continuity between each terminal of the switch side 4P connector and ground.

WIRE COLOR GEAR POSITION	W	Lb/W	Lg/R	Gr	GND
LOW	1	2	3	4	
DRIVE	5	6	7	8	
NEUTRAL	9	10	11	12	
REVERSE	13	14	15	16	



Is there normal continuity?

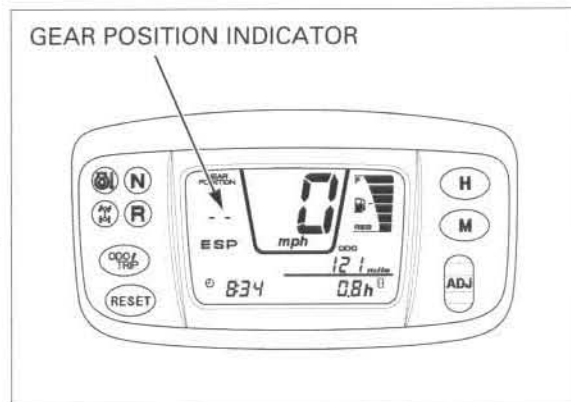
- NO –
 - Faulty gear position switch
 - Open or short circuit in engine sub-harness
- YES –
 - Open or short circuit in wire between the ECM and junction box connector
 - Open or short circuit in wire between the junction box and switch 4P connector

4. System Failure Reproduction

Connect all connectors.
Turn the ignition switch ON.
Check the gear position indicator.

Is problem code 3 indicated?

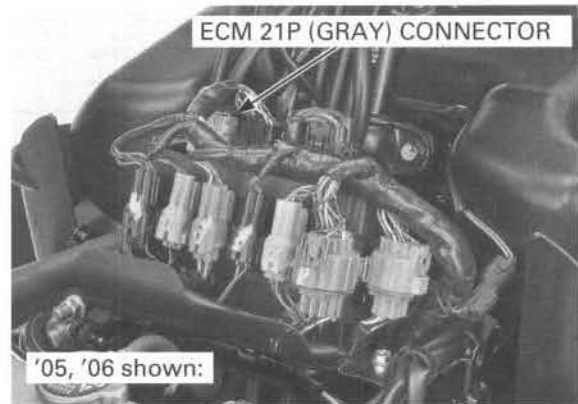
- NO –
 - No problem (Temporary failure)
 - Erase the problem code
- YES – Faulty ECM – After replacement, perform initial setting procedure



PROBLEM CODE 4: THROTTLE POSITION (TP) SENSOR SYSTEM

1. TP Sensor Connection Inspection

Check for loose or poor contact on the ECM 21P (Gray) connector.



Check for loose or poor contact on the TP sensor 3P (Black) connector.

Is there normal condition?

NO - Loose or poor contact on the ECM 21P (Gray) connector and the TP sensor 3P (Black) connector

YES - GO TO STEP 2.



2. TP Sensor Resistance Inspection 1

Measure the resistance at the TP sensor terminals of the sensor side.

Connection: Black/red (+) – Green/yellow (-)

Is the resistance within 4.0 – 6.0 kΩ (20°C/68°F)?

NO - Faulty TP sensor, perform initial setting procedure after replacement (page 24-6)

YES - GO TO STEP 3.



3. TP Sensor Resistance Inspection 2

Check that the resistance at the sensor terminals varies with the throttle position while operating the throttle lever.

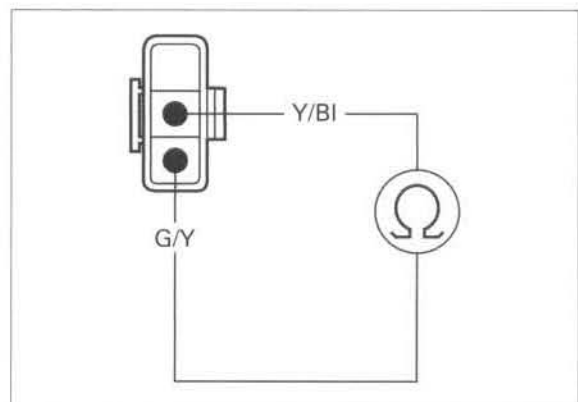
Connection: Yellow/black (+) – Green/yellow (-)

Standard: Fully close to Fully open
0.5 to 4.0 – 6.0 kΩ (20°C/60°F)

Is there normal condition and standard resistance?

NO - GO TO STEP 4.

YES - GO TO STEP 5.

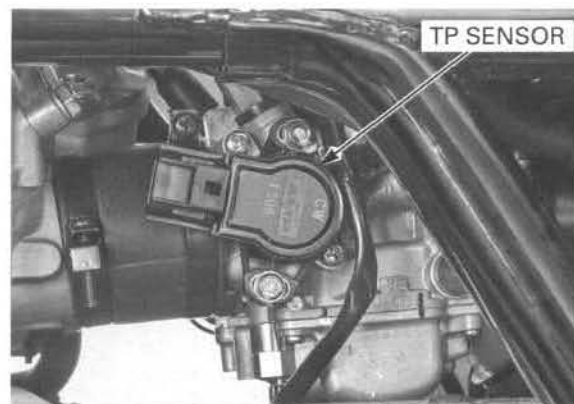


4. TP Sensor Installation Condition

Check installation condition of the TP sensor (page 24-40).

Is it installed certainly?

- NO** - Install properly or replace the faulty part
- YES** - Faulty TP sensor - After replacement, perform initial setting procedure



5. TP Sensor Input Voltage Inspection

Turn the ignition switch ON.
Measure the voltage between the wire harness side connector terminal.

Connection: Black/red (+) - Green/yellow (-)

Is the voltage within 4.7 - 5.3 V?

- NO** - GO TO STEP 6.
- YES** - GO TO STEP 7.



6. TP Sensor Line Inspection 1

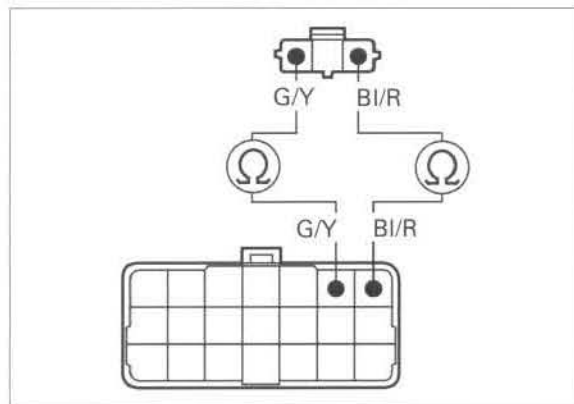
Turn the ignition switch OFF.

Disconnect the ECM 21P (Gray) connector and the TP sensor 3P (Black) connector.

Check for continuity at the Black/red wire and Green/yellow wire between the ECM connector and sensor connector.

Is there continuity?

- NO** - Open in wire between the ECM and TP sensor
- YES** - Faulty ECM - After replacement, perform initial setting procedure (page 24-6)



7. TP Sensor Line Inspection 2

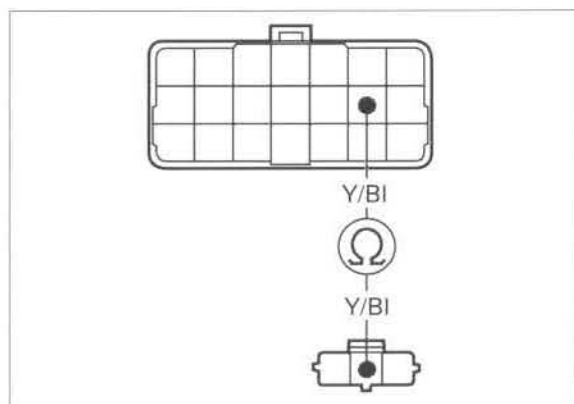
Turn the ignition switch OFF.

Disconnect the ECM 21P (Gray) connector and the TP sensor 3P (Black) connector.

Check for continuity on the Yellow/black wire between the ECM connector and sensor connector.

Is there continuity?

- NO** - Open in wire between the ECM and TP sensor
- YES** - GO TO STEP 8.



8. System Failure Reproduction

Connect all connectors.

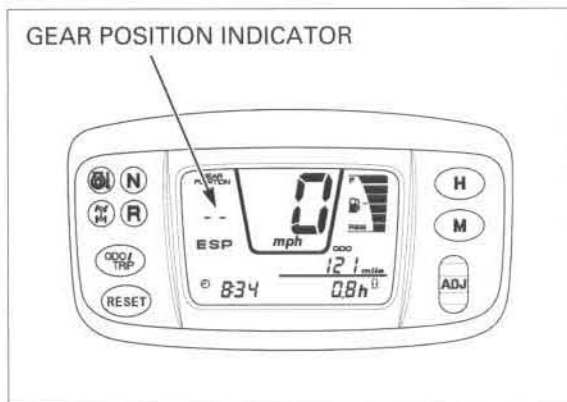
Turn the ignition switch ON.

Check the gear position indicator.

Is problem code 4 indicated?

- NO** - • No problem (Temporary failure)
 • Erase the problem code (page 24-9)

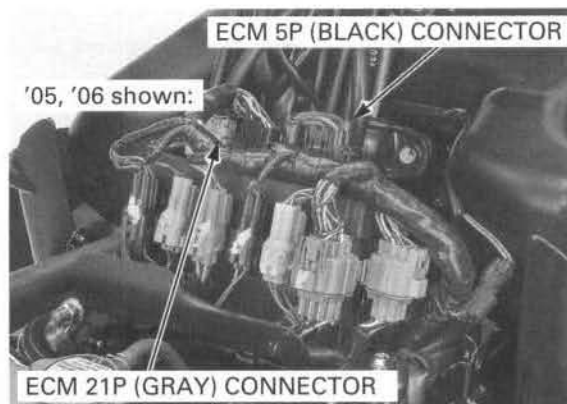
- YES** - Faulty ECM - After replacement, perform initial setting procedure (page 24-6)



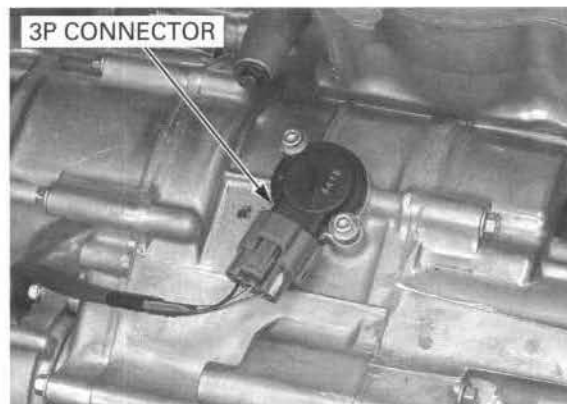
PROBLEM CODE 5: ANGLE SENSOR SYSTEM (MOTOR LOCK)

1. Angle Sensor Connection Inspection

Check for loose or poor contact on the ECM 21P (Gray) and 5P (Black) connectors.



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

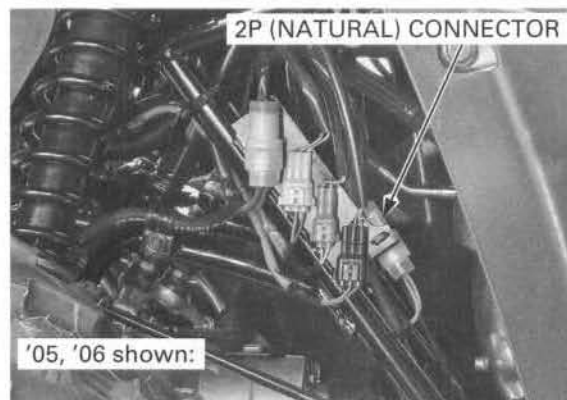


Check for loose or poor contact on the control motor 2P (Natural) connector.

Is the connection normal?

- NO** - Loose or poor contact on the ECM connectors, the angle sensor 3P (Black) connector and the control motor 2P (Natural) connector

- YES** - GO TO STEP 2.



2. Initial Setting Procedure

Perform initial setting procedure (page 24-6).

Is initial setting procedure completed?

NO – GO TO STEP 4.

YES – GO TO STEP 3.

3. ESP Shift Switch Operation Inspection

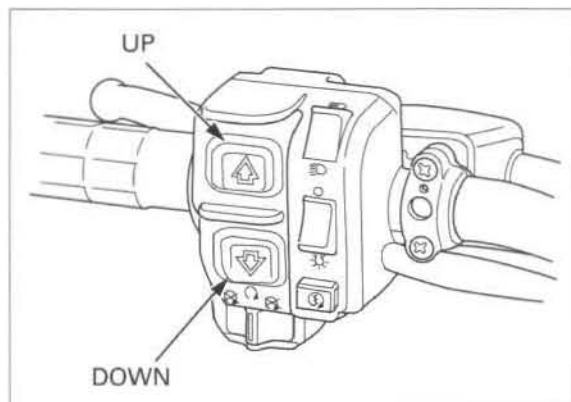
With the engine running, put the gearshift lever in the D range and the mode select switch ESP, and operate the shift switches to shift to each speed range 1st through 5th.

Is it possible to operate?

NO – GO TO STEP 4.

YES –

- No problem (Temporary failure)
- Erase the failure code (page 24-9)



4. Control Motor Power Input Line Inspection

Turn the ignition switch OFF.

Disconnect the ECM 5P (Black) connector.

Measure the voltage between the wire harness side connector terminal.

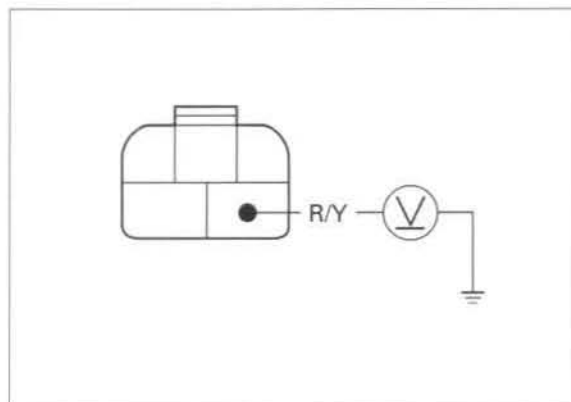
Connection: Red/yellow (+) – Ground (-)

Does the battery voltage exist?

NO –

- Blown control motor fuse (30A).
- Open in wire between the ECM and the battery

YES – GO TO STEP 5.



5. Control Motor Ground Line Inspection

Turn the ignition switch OFF.

Disconnect the ECM 5P (Black) connector.

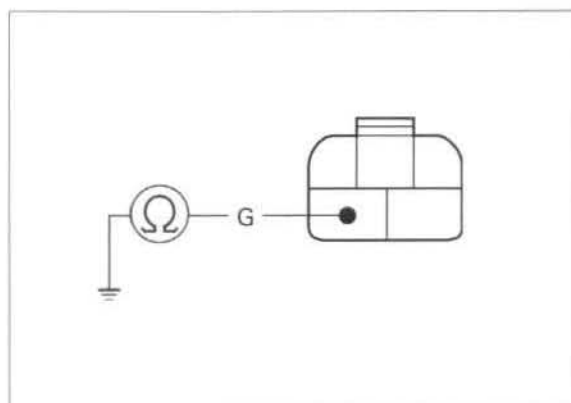
Check for continuity between the wire harness side connector terminal.

Connection: Green (+) – Ground (-)

Is there continuity?

NO – Open in wire between the ECM and ground

YES – GO TO STEP 6.



6. Control Motor Line Inspection

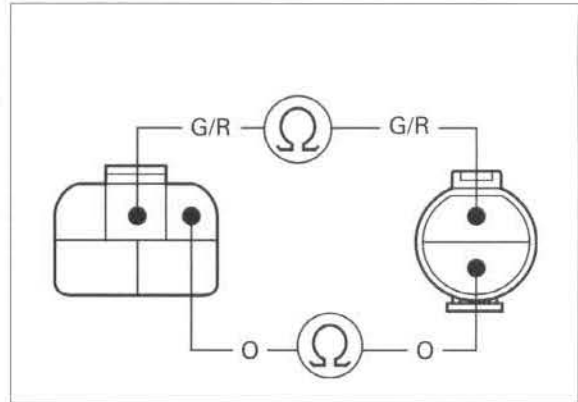
Disconnect the ECM 5P (Black) connector and the control motor 2P (Natural) connector.

Check for continuity on the Green/red wire and the Orange wire between the ECM connector and main harness side motor connector.

Is there continuity?

NO - Open in wire between the ECM and the control motor

YES - GO TO STEP 7.



7. Control Motor Circuit Inspection

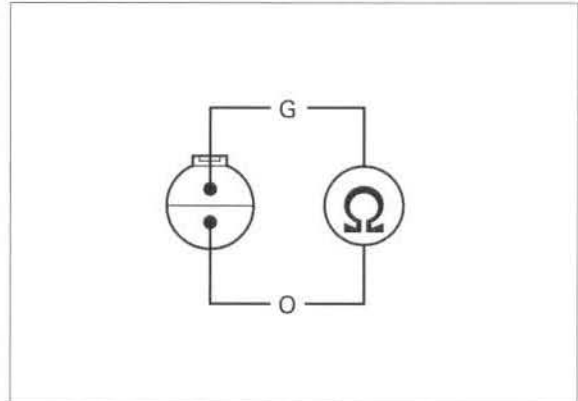
Disconnect the control motor 2P (Natural) connector.

Check for continuity between the motor side connector terminals.

Is there continuity?

NO - Faulty control motor

YES - GO TO STEP 8.



8. Control Motor Inspection

Be extremely careful not to distort or apply any force to the grommet or water may enter the control motor.

Remove the control motor from the crankcase (page 24-43).

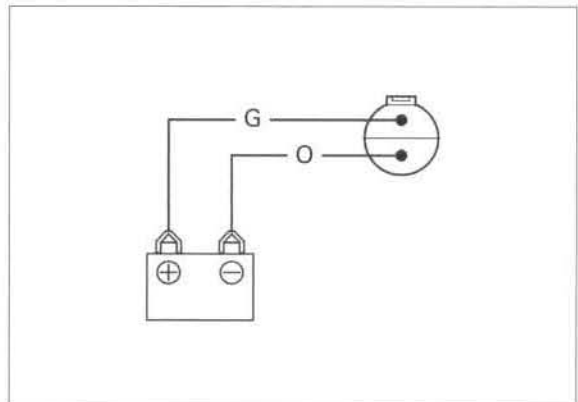
Do not use a thin wire because a large amount of current flows.

Connect the battery directly to the control motor side connector terminal and check whether the control motor rotates.

Does the control motor rotate?

NO - Faulty control motor

YES - GO TO STEP 9.

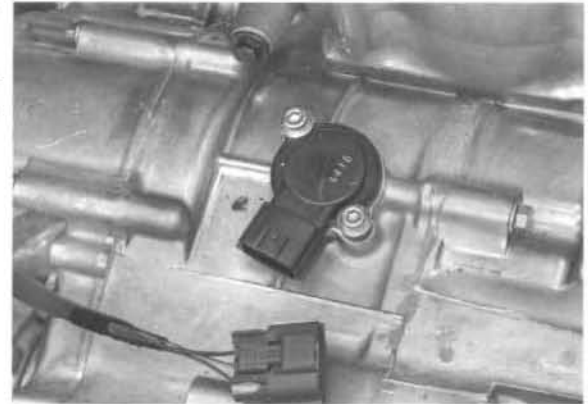


9. Automatic Transmission Operation Inspection

Disconnect the angle sensor 3P (Black) connector.

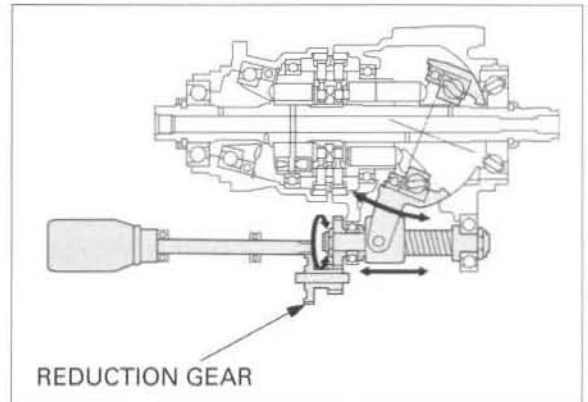
Measure the resistance at the angle sensor connector with the sensor installed in the crankcase.

Connection: Yellow/blue (+) – Green/yellow (-)



Check angle sensor resistance and turn the reduction gear in the direction as follows:

- 0.8 kΩ or below (locked at lower side): Turn counterclockwise
- 1.2 kΩ or more (locked at high side): Turn clockwise



Remove the control motor (page 24-43).

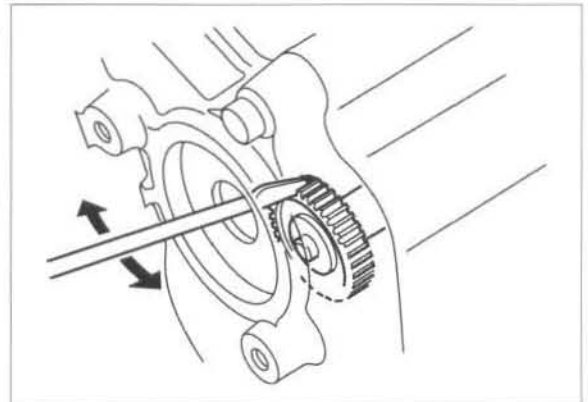
If the ball nut locks up, try to rotate the motor shaft joint in the crankcase to move the ball nut.

- The ball nut of the automatic transmission unit can strike the shaft end and lock up. This is just a temporary symptom. In this case, be sure that the motor shaft joint turns smoothly after releasing it and recheck the indicator blinking after erasing the problem code.

Is it possible to turn freely?

YES – GO TO STEP 10.

NO – Faulty automatic transmission unit



10. Angle Sensor Resistance Inspection 1

Turn the ignition switch OFF.

Disconnect the ECM 21P (Gray) connector.

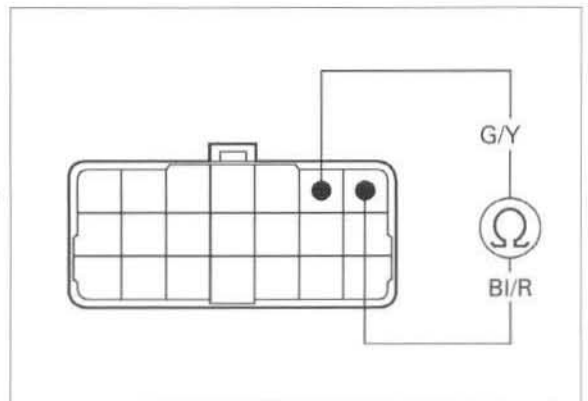
Measure the angle sensor resistance at the ECM 21P (Gray) connector (page 24-41).

Connection: Black/red (+) – Green/yellow (-)

Is the resistance within 1.6 – 2.4 kΩ (20°C/68°F)?

NO – GO TO STEP 11.

YES – GO TO STEP 12.



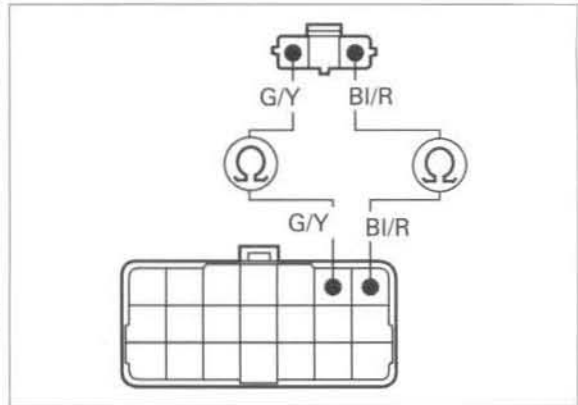
11. Angle Sensor Line Inspection 1

Disconnect the ECM 21P (Gray) connector and the angle sensor 3P (Black) connector.

Check for continuity on the Black/red wire and the Green/yellow wire between the ECM connector and main harness side angle sensor connector.

Is there continuity?

- NO** - Open in wire between the ECM and the angle sensor
- YES** - Faulty angle sensor - After replacement, perform initial setting procedure (page 24-6)



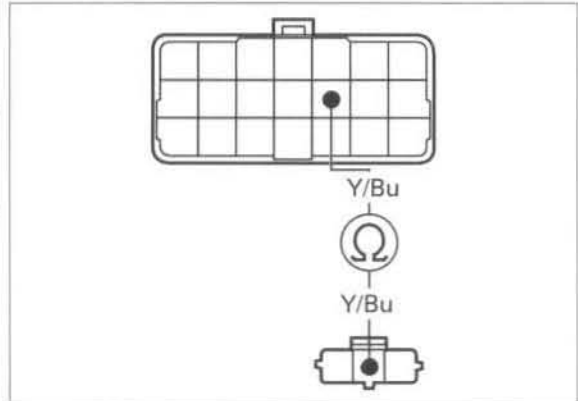
12. Angle Sensor Line Inspection 2

Disconnect the ECM 21P (Gray) connector and the angle sensor 3P (Black) connector.

Check for continuity on the Yellow/blue wire between the ECM connector and main harness side angle sensor connector.

Is there continuity?

- NO** - Open in wire between the ECM and the angle sensor
- YES** - GO TO STEP 13.



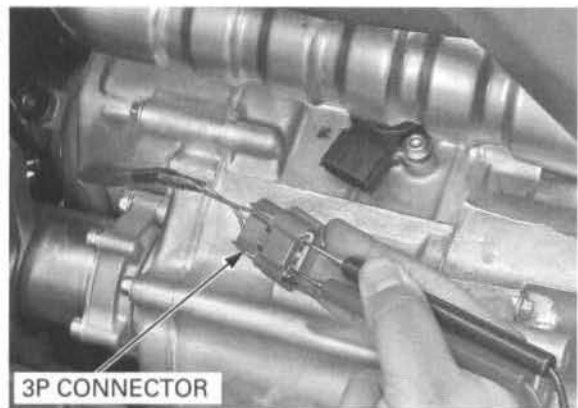
13. Angle Sensor Input Voltage Inspection

Turn the ignition switch ON.
Measure the voltage between the wire harness side connector terminal.

Connection: Black/red (+) - Green/yellow (-)

Is the voltage within 4.7 - 5.3 V?

- NO** - Faulty ECM - After replacement, perform initial setting procedure (page 24-6)
- YES** - GO TO STEP 14.



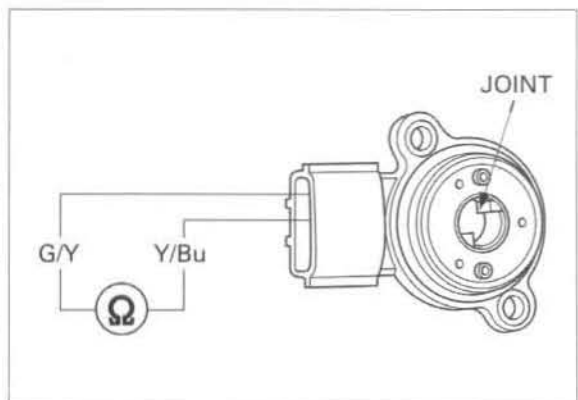
14. Angle Sensor Resistance Inspection 2

Remove the angle sensor (page 24-42).
Check that the resistance at the angle sensor terminal varies while turning the sensor joint.

Connection: Yellow/blue (+) - Green/yellow (-)
Standard: 0 to 1.6 - 2.4 kΩ (20° C/60° F)

Is there normal condition and standard resistance?

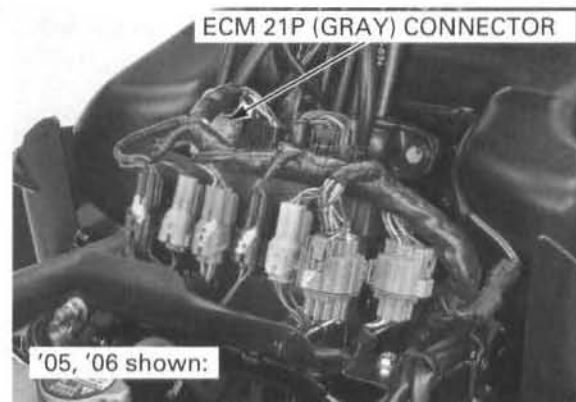
- NO** - Faulty angle sensor - After replacement, perform initial setting procedure.
- YES** - Faulty ECM - After replacement, perform initial setting procedure.



PROBLEM CODE 6: ANGLE SENSOR SYSTEM (AUTOMATIC TRANSMISSION SWASH PLATE ANGLE)

1. Angle Sensor Connection Inspection

Check for loose or poor contact on the ECM 21P (Gray) connector.



Check for loose or poor contact on the angle sensor 3P (Black) connector.

Is there normal condition?

NO – Loose or poor contact on the ECM connector and the angle sensor connector

YES – GO TO STEP 2.



2. Angle Sensor Resistance Inspection 1

Turn the ignition switch OFF.

Disconnect the ECM 21P (Gray) connector.

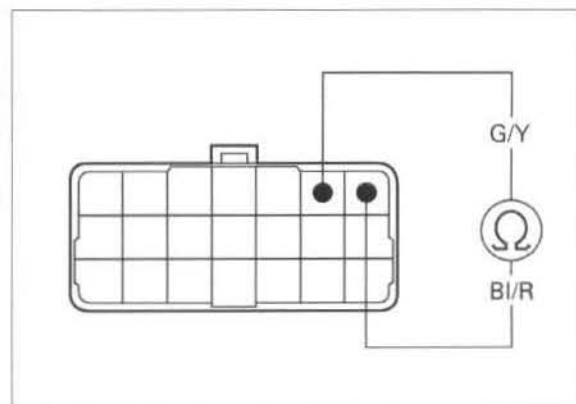
Measure the angle sensor resistance at the ECM 21P (Gray) connector.

Connection: Black/red (+) – Green/yellow(-)

Is the resistance within 1.6 – 2.4 k Ω (20°C/68°F)?

NO – GO TO STEP 3.

YES – GO TO STEP 4.



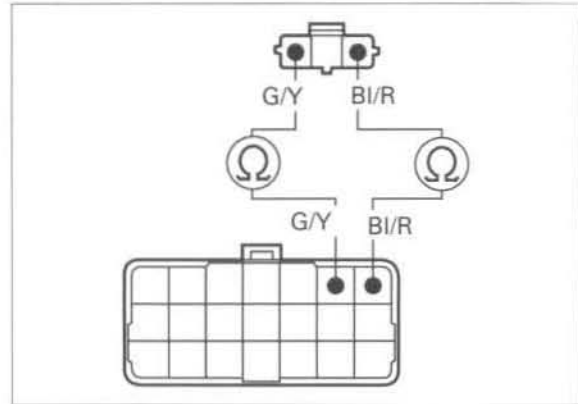
3. Angle Sensor Line Inspection 1

Disconnect the ECM 21P (Gray) connector and the angle sensor 3P (Black) connector.

Check for continuity on the Black/Red wire and the Green/Yellow wire between the ECM connector and main harness side angle sensor connector.

Is there continuity?

- NO** - Open circuit in wire between the ECM and angle sensor
- YES** - Faulty angle sensor - After replacement, perform initial setting procedure (page 24-6)



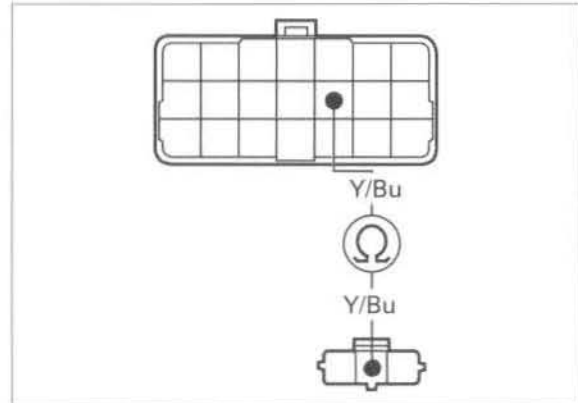
4. Angle Sensor Line Inspection 2

Disconnect the ECM 21P (Gray) connector and the angle sensor 3P (Black) connector.

Check for continuity on the Yellow/blue wire between the ECM connector and main harness side angle sensor connector.

Is there continuity?

- NO** - Open in wire between the ECM and angle sensor
- YES** - GO TO STEP 5.



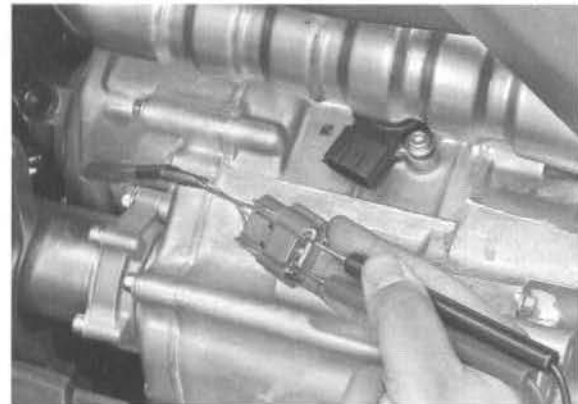
5. Angle Sensor Input Voltage Inspection

Measure the voltage between the wire harness side connector terminal.

Connection: Black/red (+) - Green/yellow (-)

Is the voltage within 4.7 - 5.3 V?

- NO** - Faulty ECM - After replacement, perform initial setting procedure (page 24-6)
- YES** - GO TO STEP 6.

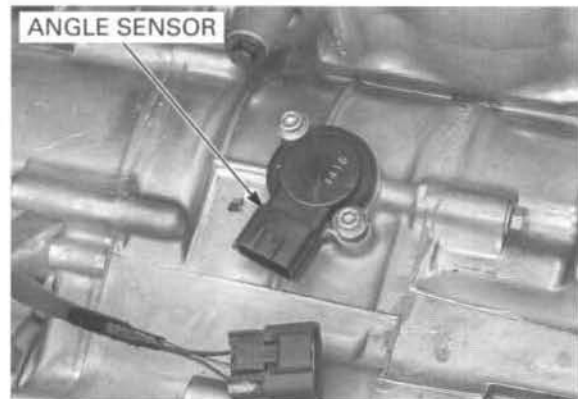


6. Angle Sensor Installation Condition

Check installation condition of the angle sensor (page 24-41).

Is it installed correctly?

- NO** - Install properly (page 24-42) or replace the faulty part
- YES** - GO TO STEP 7.



7. Angle Sensor Resistance Inspection 2

Remove the angle sensor (page 24-41).

Check that the resistance at the angle sensor terminal varies while turning the sensor joint.

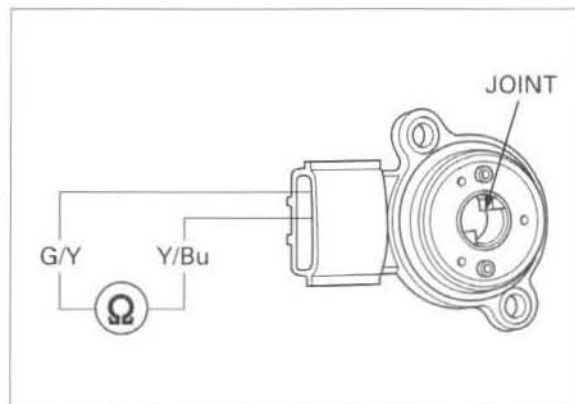
Connection: Yellow/blue (+) – Green/yellow (-)

Standard: 0 to 1.6 – 2.4 kΩ (20° C/60° F)

Is there normal condition and standard resistance?

No – Faulty angle sensor – After replacement, perform initial setting procedure (page 24-6)

YES – GO TO STEP 8.



8. System Failure Reproduction

Install the angle sensor and connect all connectors.

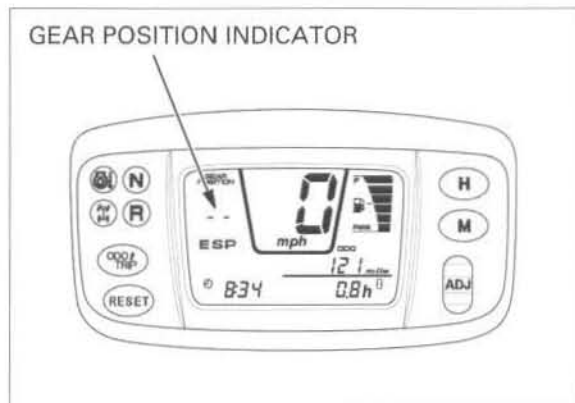
Turn the ignition switch ON.

Check the gear position indicator.

Is the problem code blink indicated?

NO – • No problem (Temporary failure)
• Erase the failure code (page 24-9)

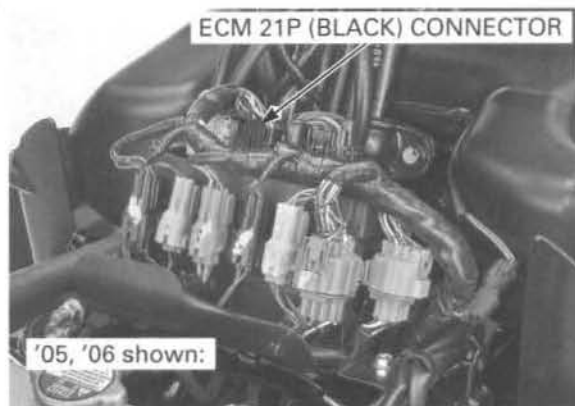
YES – Faulty ECM – After replacement, perform initial setting procedure.



PROBLEM CODE 7: ESP SHIFT SWITCH SYSTEM

1. ESP Shift Switch Connection Inspection

Check for loose or poor contact on the ECM 21P (Black) connector.



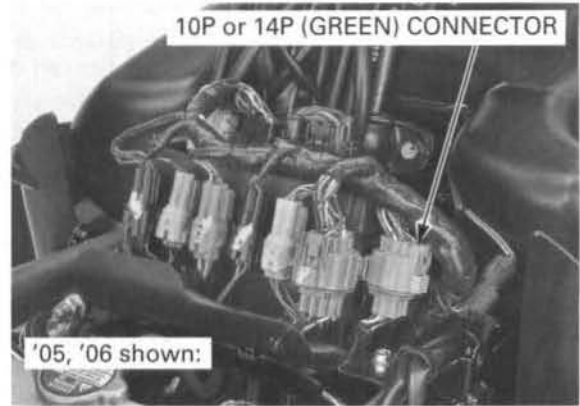
'05, '06: Check for loose or poor contact on the handlebar switch 10P (Green) connector.

After '06: Check for loose or poor contact on the handlebar switch 14P (Green) connector.

Is the connection normal?

NO - Loose or poor contact on the ECM 21P (Black) connector and the handlebar switch 10P (Green) connector

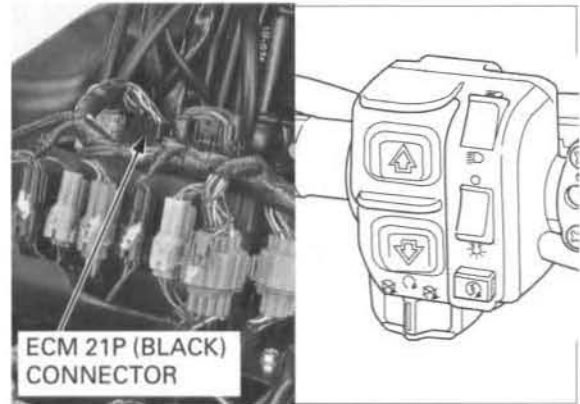
YES - GO TO STEP 2.



2. ESP Shift Switch Line Inspection (ECM side)

Check for continuity at the ECM 21P (Black) connector terminals in each shift switch position (page 24-38).

Color Position	White/ blue	Black/ red	white/ yellow	Black/ red
Up	○ — ○			
Free				
Down			○ — ○	



Is there normal continuity?

No - GO TO STEP 3.

YES - GO TO STEP 5.

3. ESP Shift Switch Condition Inspection

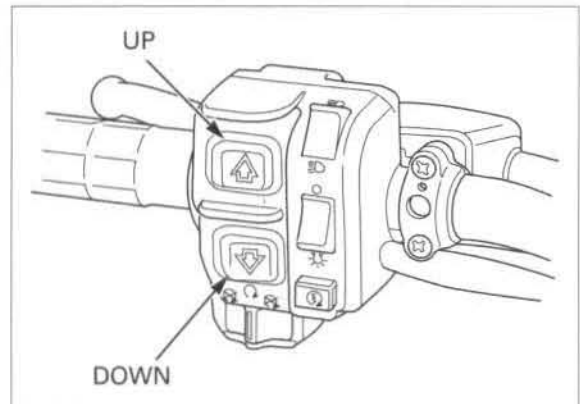
Remove the handlebar switch (page 14-7).

Check for water, mud and other foreign material inside the switch.

Is the condition normal?

NO - Clean inside the switch

YES - GO TO STEP 4.

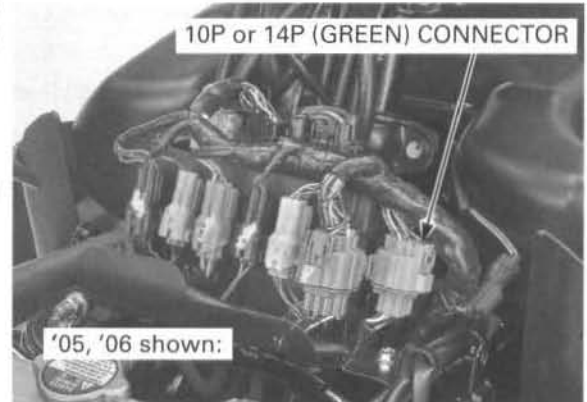


4. ESP Shift Switch Inspection (Handlebar switch side)

- '05, '06: Check for continuity at the switch side 10P (Green) connector in the same manner as the STEP 2 (page 24-28).
- After '06: Check for continuity at the switch side 14P (Green) connector in the same manner as the STEP 2 (page 24-28).

Is there normal continuity?

- No** - Faulty handlebar switch (shift switch)
- YES** - Open or short circuit in wire between the ECM and the shift switch

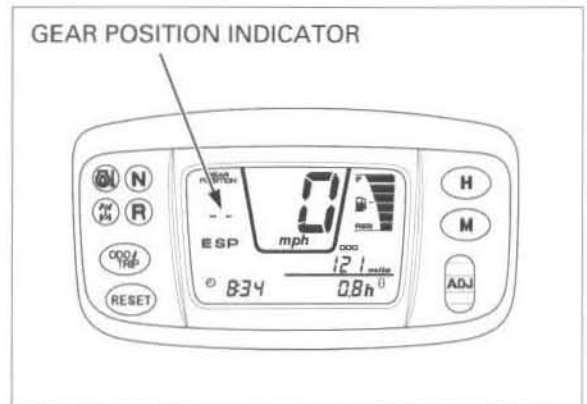


5. System Failure Reproduction

- Connect all connectors.
- Turn the ignition switch ON.
- Check the gear position indicator.

Is problem code 7 indicated?

- NO** -
 - No problem (Temporary failure)
 - Erase the failure code
- YES** - Faulty ECM - After replacement, perform initial setting procedure.



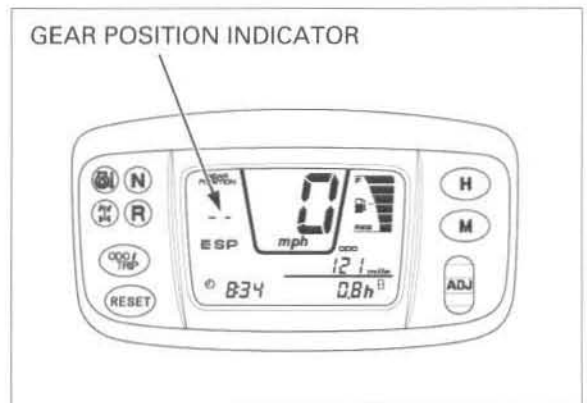
PROBLEM CODE 8: ECM EEPROM (WRITING/READOUT CIRCUIT)

1. Initial Setting Procedure

- Perform initial setting procedure (page 24-6).
- Turn the ignition switch OFF and ON.
- Check the gear position indicator.

Is the problem code blink indicated?

- NO** -
 - No problem (Temporary failure)
 - Erase the failure code
- YES** - Faulty ECM - After replacement, perform initial setting procedure.



PROBLEM CODE 9, 10, 12: ECM VOLTAGE CONVERTER CIRCUIT, ECM FAIL-SAFE RELAY CIRCUIT, ECM CPU

1. System Failure Reproduction

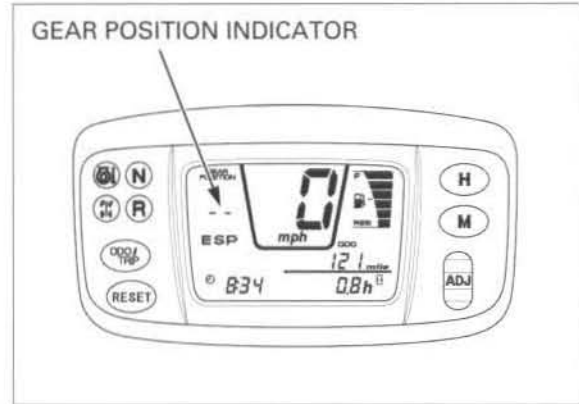
Turn the ignition switch OFF and ON.

Check the gear position indicator.

Is a problem code indicated?

- NO** - • No problem (Temporary failure)
 • Erase the failure code (page 24-9)

YES - GO TO STEP 2.



2. Retrieval of Problem Code

Retrieve the problem code again and check (page 24-9).

Is a problem code indicated?

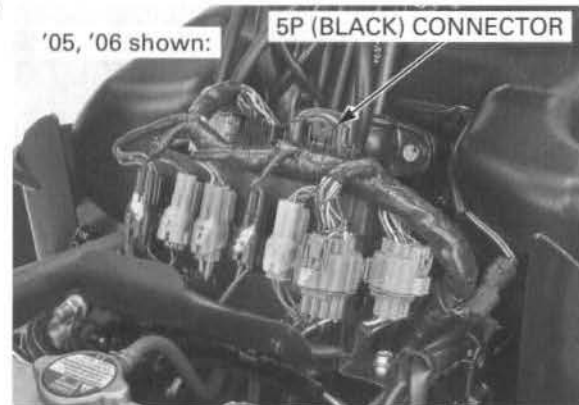
- NO** - Perform the necessary diagnostic troubleshooting of the output problem code

YES - Faulty ECM - After replacement, perform initial setting procedure (page 24-6)

PROBLEM CODE 11: ECM MOTOR DRIVER CIRCUIT

1. ECM/Control Motor Connection Inspection

Check for loose or poor contact on the ECM 5P (Black) connector.

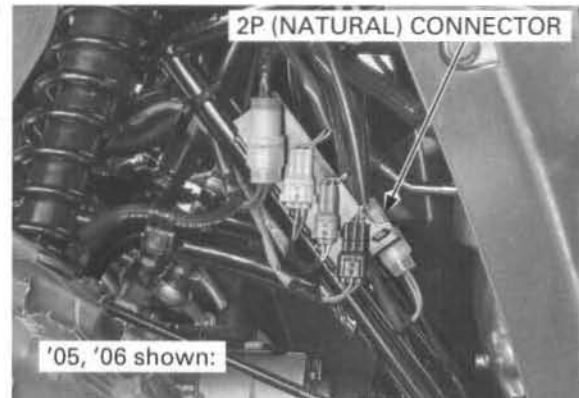


Check for loose or poor contact on the control motor 2P (Natural) connector.

Is the connection normal?

- NO** - Loose or poor contact on the ECM connector and the control motor connector

YES - GO TO STEP 2.



2. Control Motor Power Input Line Inspection

Turn the ignition switch OFF.

Disconnect the ECM 5P (Black) connector.

Turn the ignition switch ON.

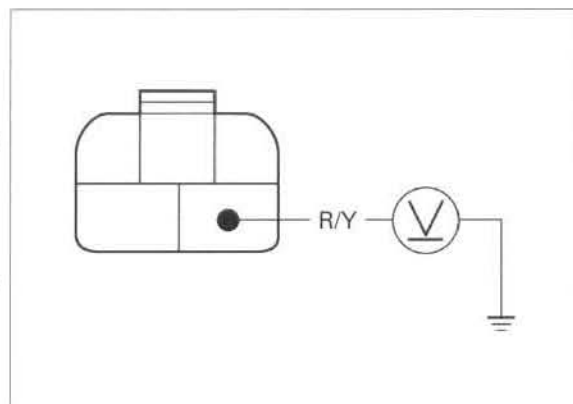
Measure the voltage between the wire harness side connector terminal and ground.

Connection: Red/yellow (+) – Ground (-)

Is the voltage 11V or above?

NO – Open in wire between the ECM and the battery

YES – GO TO STEP 3.



3. Control Motor Ground Line Inspection

Disconnect the ECM 5P (Black) connector.

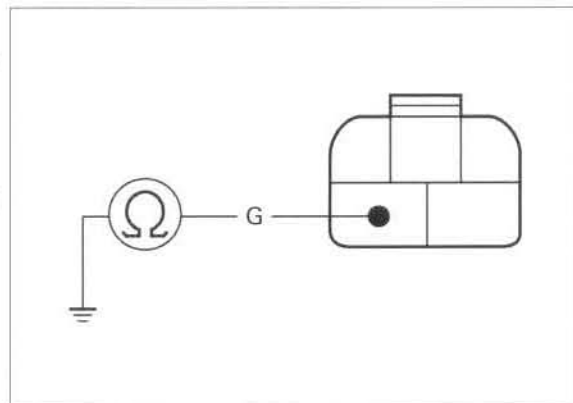
Check for continuity between the wire harness side connector terminal and ground.

Connection: Green (+) – Ground (-)

Is there continuity?

NO – Open in wire between the ECM and ground

YES – GO TO STEP 4.



4. Control Motor Line Inspection

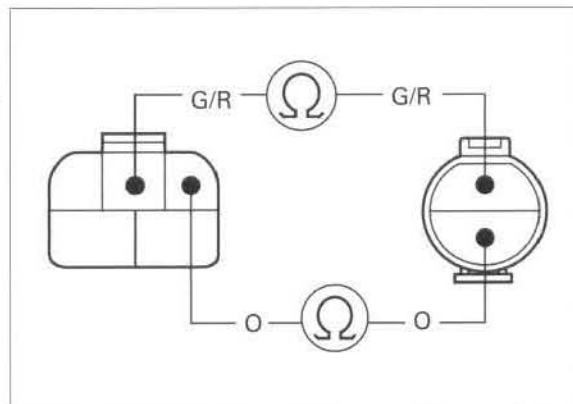
Disconnect the ECM 5P (Black) connector and the control motor 2P (Natural) connector.

Check for continuity on the Green/red wire and the Orange wire between the ECM connector and main harness side motor connector.

Is there continuity?

NO – Open circuit in wire between the ECM and control motor

YES – GO TO STEP 5.



5. Control Motor Circuit Inspection

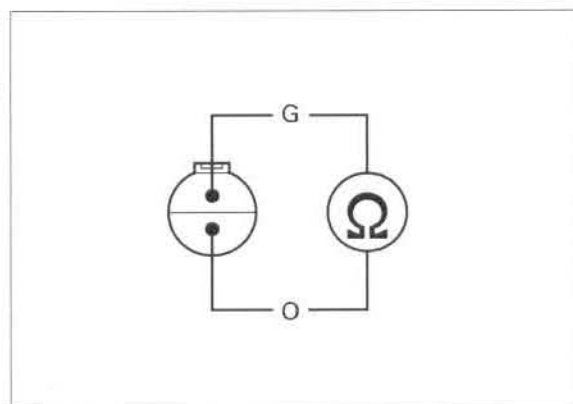
Disconnect the control motor 2P (Natural) connector.

Check for continuity between the motor side connector terminals.

Is there continuity?

NO – Faulty control motor

YES – GO TO STEP 6.



6. System Failure Reproduction

Connect all connectors.

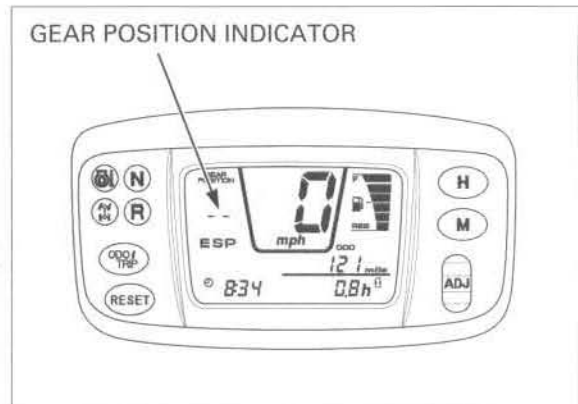
Turn the ignition switch ON.

Check the gear position indicator.

Is problem code 12 indicated?

- NO** – • No problem (Temporary failure)
• Erase the failure code (page 24-9)

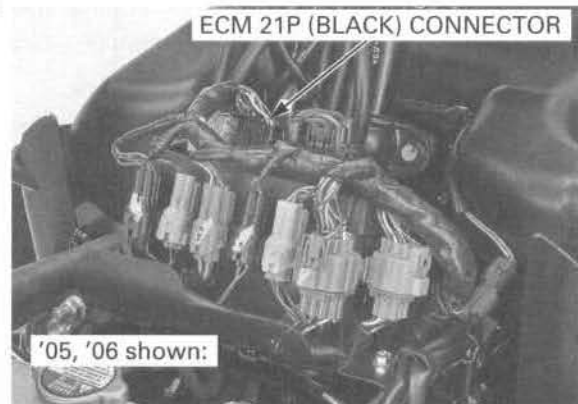
- YES** – Faulty ECM – After replacement, perform initial setting procedure (page 24-6)



PROBLEM CODE 13: MODE SELECT SWITCH SYSTEM (D1, D2 AND ESP)

1. Mode Select Switch Connection Inspection

Check for loose or poor contact on the ECM 21P (Black) connector.

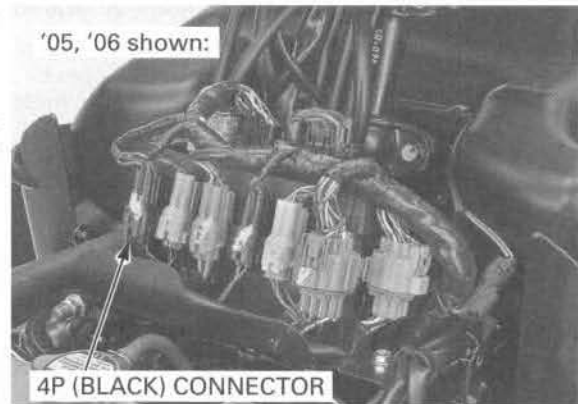


Check for loose or poor contact on the mode select switch 4P (Black) connector.

Is the connection normal?

- NO** – Loose or poor contact on the ECM connector and the mode select switch connector

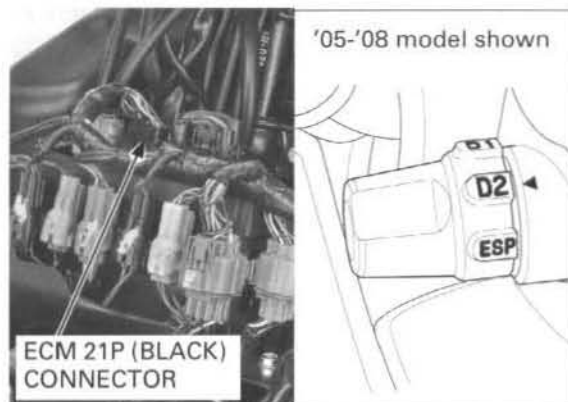
- YES** – GO TO STEP 2.



2. Mode Select Switch Line Inspection

Turn the ignition switch OFF.
 Disconnect the ECM 21P (Black) connector
 Check for continuity ECM 21P (Black) connector terminals of the wire harness side with the mode select switch in each mode position.

Color Position	Orange	Blue/ orange	Black/ green	Green
D1	○	○	○	
D2		○	○	
ESP	○		○	
		○		○



Is there normal continuity?

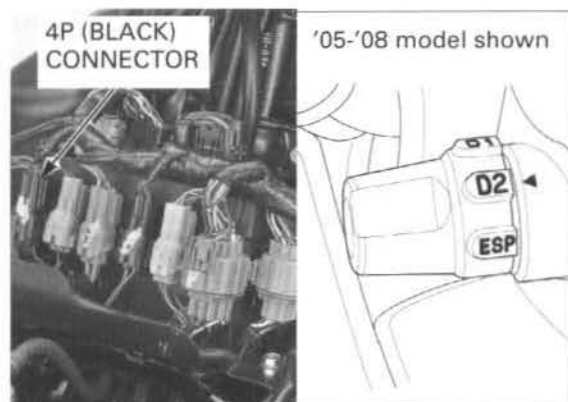
NO – GO TO STEP 3.

YES – GO TO STEP 4.

3. Mode select Switch Inspection (Handlebar switch side)

Disconnect the 4P (Black) connector.
 Check for continuity at the mode select switch side 4P (Black) connector in the same manner as the STEP 2 (page 24-33).

Color Position	Orange	Blue/ black	Black/ green	Green
D1	○	○	○	
D2		○	○	
ESP	○		○	
		○		○



Is there normal continuity?

NO – Faulty mode select switch

YES – Open or short circuit in wire between the ECM and the mode select switch

4. System Failure Reproduction

Connect all connectors.

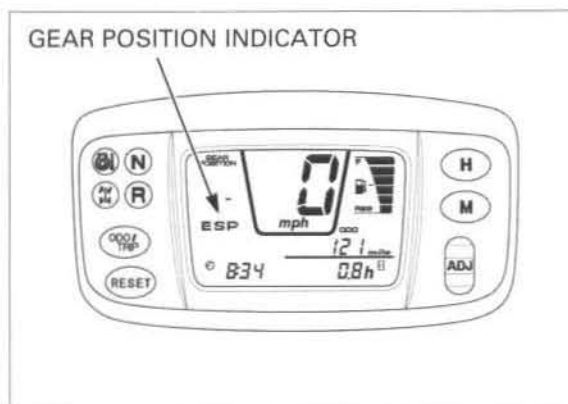
Turn the ignition switch ON.

Check the gear position indicator.

Is problem code 13 indicated?

NO – • No problem (Temporary failure)
 • Erase the failure code (page 24-9)

YES – Faulty ECM – After replacement, perform initial setting procedure (page 24-6)



PROBLEM INDICATED (MODE 1), BUT NO CODE IS RETRIEVABLE

Gear position indicator blinks indicating a problem, but the problem code is not displayed by the retrieval procedure:

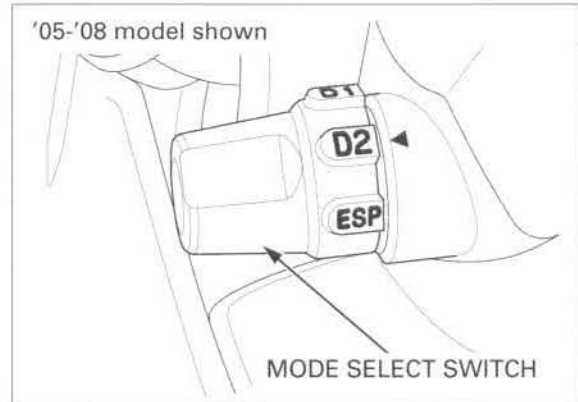
1. Automatic Transmission Inspection

Check the automatic transmission shift performance.

Note the position of the mode select switch at the time the automatic transmission does not shift.

"D1" or "D2"—Perform troubleshooting of problem code 3 (gear position switch system) (page 24-16).

"ESP" – GO TO STEP 2.



2. System Failure Reproduction

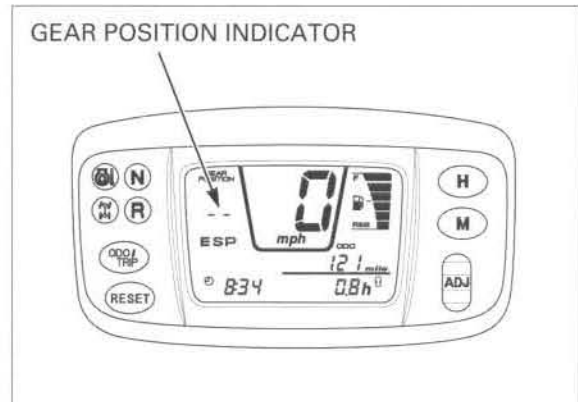
Turn the ignition switch ON.

Check the gear position indicator.

Is there the gear position (D, L, N, R) indication?

NO – Perform troubleshooting of problem code 3 (gear position switch system) (page 24-16)

YES – Perform troubleshooting of problem code 7 (ESP shift switch system) (page 24-27)



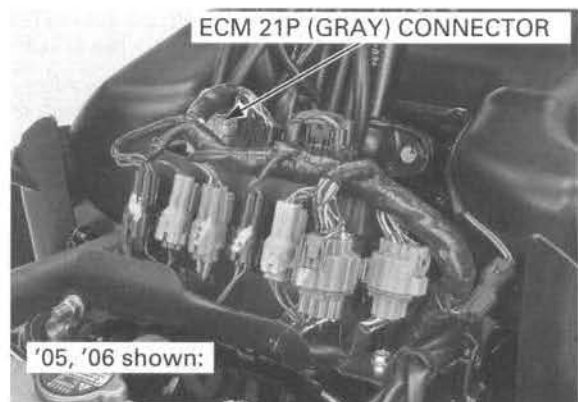
PROBLEM NOT DETECTED BY ECM

Gear position indicator does not blink to notify a problem and the problem and the problem code is not recorded: Faulty gear position indicator and/or drive mode indicator (No indication/Stuck indication/Incorrect indication)

- See page 22-13 for the meter function problems (except for the gear position indicator and drive mode indicator).

1. Meter Connection Inspection

Check for loose or poor contact on the ECM 21P (Gray) connector.



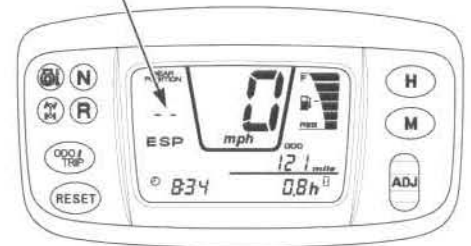
Check for loose or poor contact on the combination meter 14P (Gray) connector, gear position switch 4P (Natural) connector and mode select switch 4P (Black) connector.

Is the INDICATOR MODE 1 blink indicated?

NO - Loose or poor contact on the ECM connector, combination meter connector, the gear position switch connector and the mode select switch connector

YES - GO TO STEP 2.

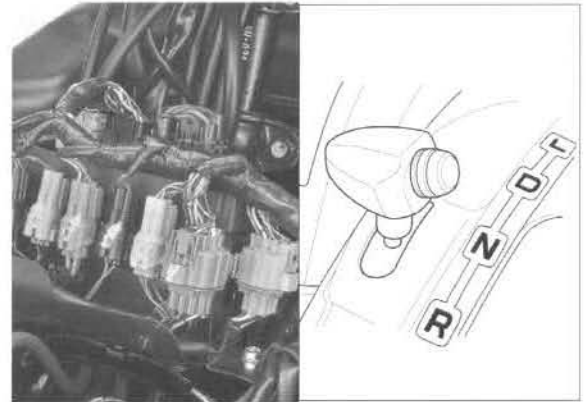
GEAR POSITION INDICATOR



2. Gear Position Switch Line Inspection 1

Check for continuity between each gear position switch wire terminal of the ECM connector and ground.

GEAR POSITION	WIRE COLOR				
	W	Lb/W	Lg/R	Gr	GND
LOW	1	2	3	4	
DRIVE	5	6	7	8	
NEUTRAL	9	10	11	12	
REVERSE	13	14	15	16	



Is there normal continuity?

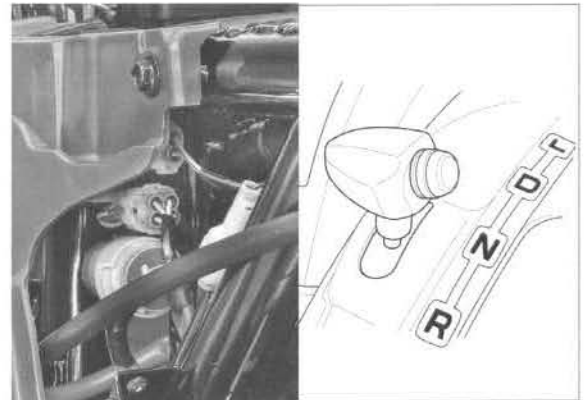
NO - GO TO STEP 3.

YES - GO TO STEP 4.

3. Gear Position Switch Line Inspection 2

Check for continuity between each terminal of the switch side 4P connector and ground.

GEAR POSITION	WIRE COLOR				
	W	Lb/W	Lg/R	Gr	GND
LOW	1	2	3	4	
DRIVE	5	6	7	8	
NEUTRAL	9	10	11	12	
REVERSE	13	14	15	16	



Is there normal continuity?

NO -

- Faulty gear position switch
- Open or short circuit in engine sub-harness

YES -

- Open or short circuit in wire between the ECM and junction box connector.
- Open or short circuit in wire between the junction box and switch 4P connector.

4. Mode Select Switch Line Inspection

Turn the ignition switch OFF.
 Disconnect the ECM 21P (Black) connector
 Check for continuity ECM 21P (Black) connector
 terminals of the wire harness side with the mode
 select switch in each mode position.

Color Position	Orange	Blue/ black	Black/ green	Green
D1	○	○	○	
D2		○	○	
ESP	○		○	
		○		○

Is there normal continuity?

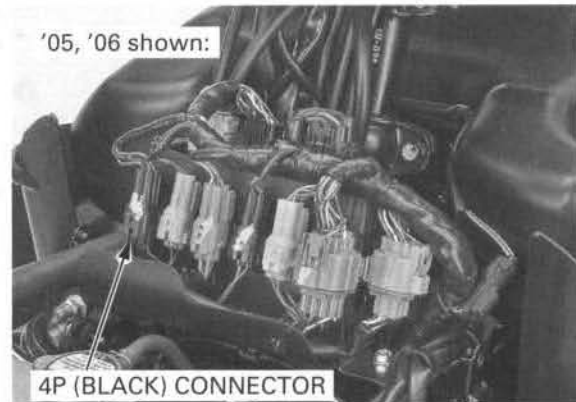
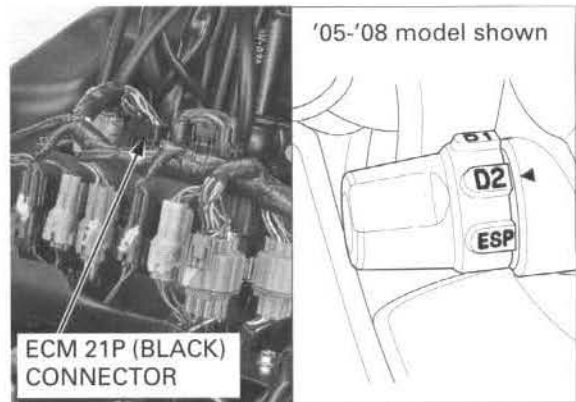
- NO** – Replace the mode select switch
- YES** – GO TO STEP 4.

5. Mode Select Switch Line Inspection (Handlebar switch side)

Check for continuity at the switch side 4P (Black) connector in the same manner as the STEP 4 (page 24-36).

Is there continuity?

- NO** – Faulty mode select switch
- YES** – Open or short circuit in wire between the ECM and the mode select switch



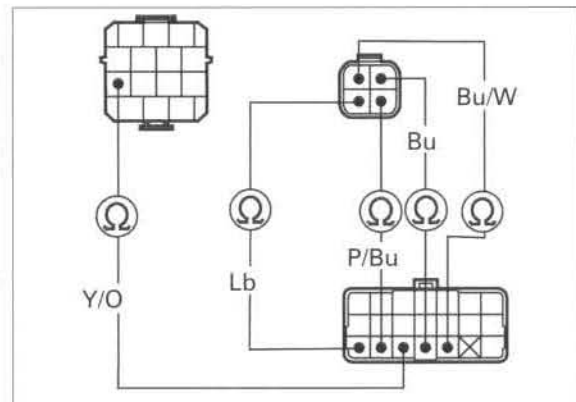
6. Meter Line Inspection

Turn the ignition switch OFF.
 Disconnect the ECM 21P (Gray) connector, combination meter 4P (Yellow) connector and the combination meter 14P (Gray) connector.

Check for continuity on each wire between the ECM connector and main harness side meter connector in the same wire color terminals.

Is there continuity?

- NO** – Open in wire between the ECM and combination meter
- YES** – GO TO STEP 7.



7. Meter Line Short Circuit Inspection

Connect the ECM 21P (Gray) connector.

Put the gear shift lever in the D range and the mode select switch at ESP.

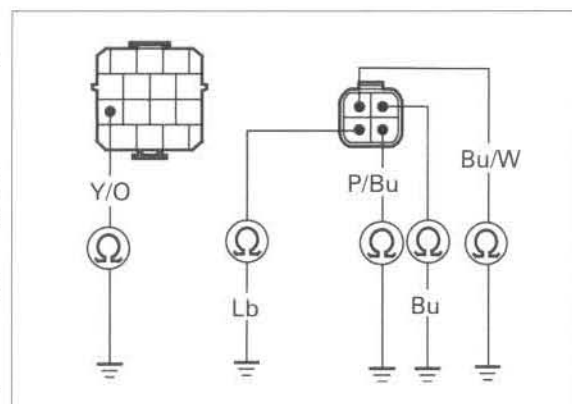
Turn the ignition switch ON.

Check for continuity between each of the wire terminals of main harness side combination meter 4P (Yellow) and 14P (Gray) connector and the frame ground.

Is there continuity at the Blue wire and Light blue wire only?

NO - Faulty combination meter

YES - Faulty ECM - After replacement, perform initial setting procedure (page 24-6)



GEAR POSITION SWITCH

INSPECTION

Turn the ignition switch OFF.

Disconnect the ECM 21P (Gray) connector.

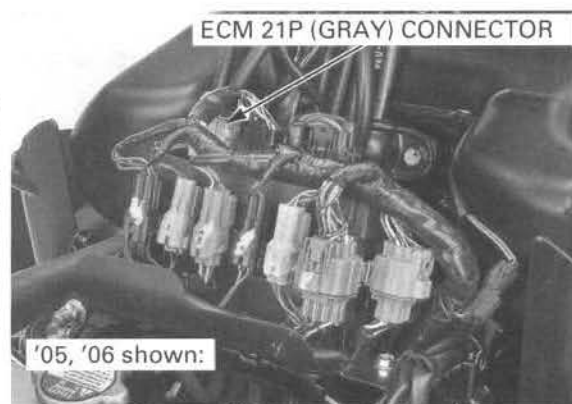
Check for continuity between each gear position switch wire terminal of the ECM connector and ground.

There should be continuity only at the terminals that correspond to the gear positions shown below, and there should be no continuity at the other terminals. You must test each of four wires in each gear position. Therefore, you need to make 16 tests, between each gear position switch wire terminal and ground.

GEAR POSITION	WIRE COLOR				
	W	Lb/W	Lg/R	Gr	GND
LOW	1	2	3	4	
DRIVE	5	6	7	8	
NEUTRAL	9	10	11	12	
REVERSE	13	14	15	16	

If the continuity is abnormal, disconnect the gear position switch 4P (Natural) connector, and check for continuity between each terminal of the switch side 4P connector and ground in the same manner as the previous step.

- If the continuity at the ECM is abnormal and continuity at the 4P connector is normal, check for open or short circuit, or loose or poor connector contact.
- If the both continuities are abnormal, replace the gear position switch.



REPLACEMENT

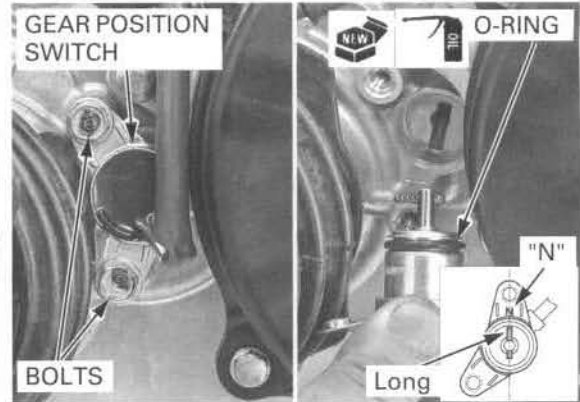
Shift the sub-transmission into neutral.
 Remove the two bolts and gear position switch from the crankcase cover.
 Remove the O-ring.

Coat a new O-ring with engine oil and install it onto a new gear position switch.

Align the long end of the switch pin with the "N" mark.

Install the gear position switch by aligning the switch pin with the slot in the crankcase cover being careful not to damage the switch pin.

Install the bolts and tighten them.



ESP SHIFT SWITCH

- The automatic transmission can shift and the meter indicates the shift position (1 through 5) with the following conditions:
 - Mode select switch at ESP (Electric Shift Program)
 - Gearshift lever (Sub-transmission) in D range
 - Engine is running

INSPECTION

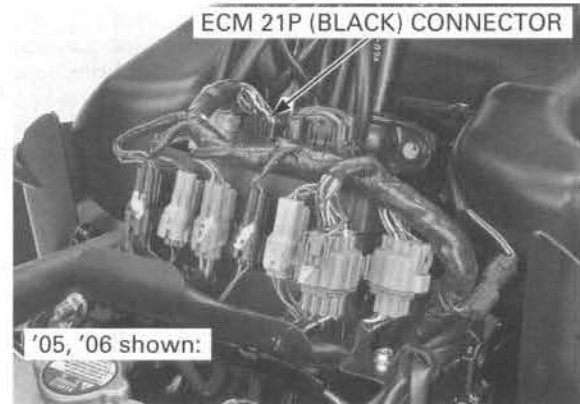
Turn the ignition switch OFF.

Disconnect the ECM 21P (Black) connector.

Check for continuity between the ECM connector terminals in each switch position.

Continuity should exist between the color coded wires as follows:

Color Position	White/ blue	Black/ red	white/ yellow	Black/ red
Up	○ — ○			
Free				
Down			○ — ○	

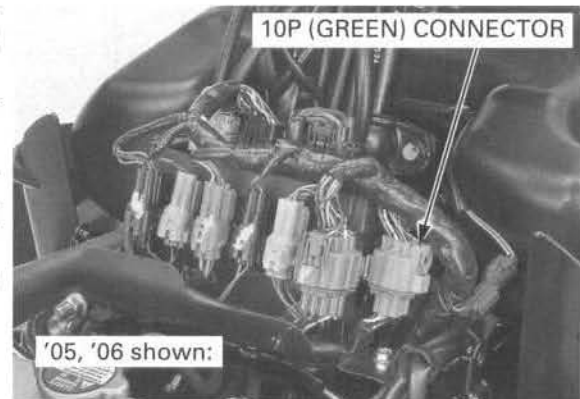


'05, '06: If the continuity is abnormal, remove the handlebar switch 10P (Green) connector from the frame and disconnect it.

After '06: If the continuity is abnormal, remove the handlebar switch 14P (Green) connector from the frame and disconnect it.

Perform the inspection at the 10P (Green) connector in the same manner as the previous step.

- If the continuity at the ECM is abnormal and continuity at the 10P (Green) connector is normal, check for an open or short circuit, or loose or poor connector contact.
- If the both continuities are abnormal, replace the handlebar switch (shift switch) (page 14-7).



MODE SELECT SWITCH ('05-'08 only)

INSPECTION

Turn the ignition switch OFF.

Disconnect the ECM 21P (Black) connector.

Check for continuity between the ECM connector terminals in each switch position.

Continuity should exist between the color coded wires as follows:

Color Position	Orange	Blue/ black	Black/ green	Green
D1	○	○	○	
D2		○	○	
	○			○
ESP	○		○	
		○		○

If the continuity is abnormal, disconnect the mode select switch 4P (Black) connector, and perform the inspection at the 4P (Black) connector in the same manner as the previous step.

- If the continuity at the ECM is abnormal and continuity at the 4P connector is normal, check for an open or short circuit, or loose or poor connector contact.
- If the both continuities are abnormal, replace the mode select switch.

REPLACEMENT

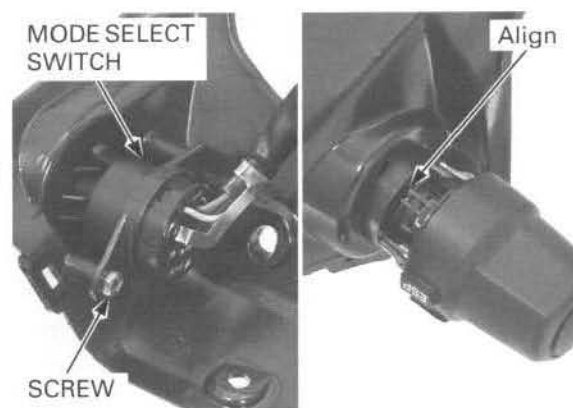
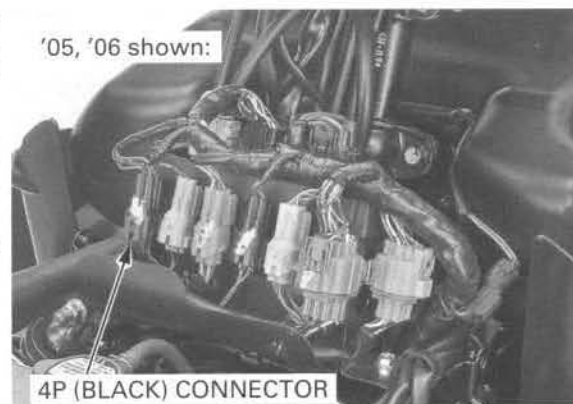
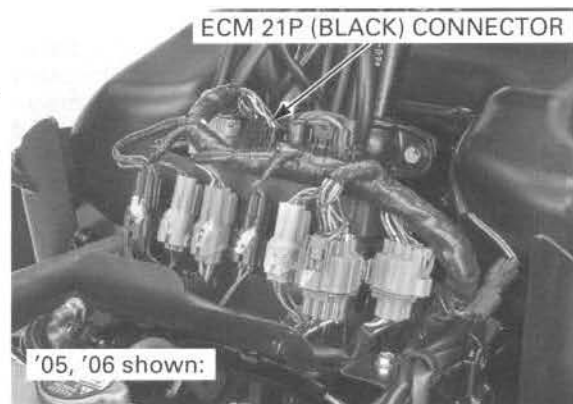
Remove the handlebar cover (page 14-7).

Remove the screw.

Remove the mode select switch from the cover while pushing in the stoppers.

Install the new switch by aligning the locating tab with the groove in the cover.

Install and tighten the screw.



THROTTLE POSITION (TP) SENSOR

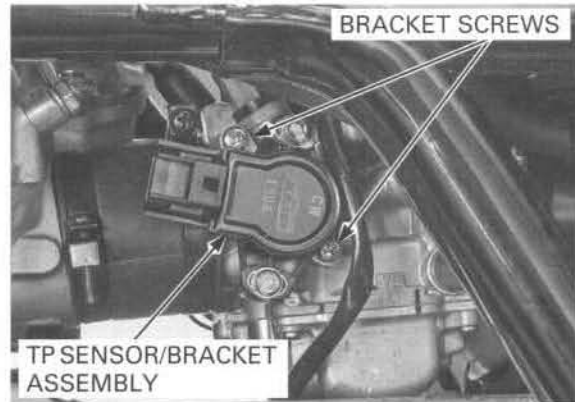
REMOVAL/INSTALLATION

NOTE:

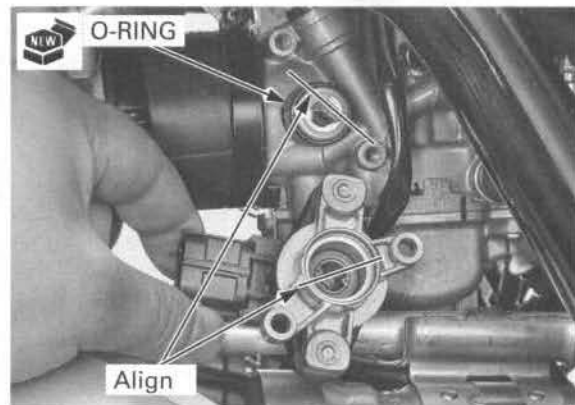
- Do not loosen the throttle position sensor attaching shear bolts unless the throttle position sensor requires replacement. It may cause the sensor to move out of position. For sensor replacement, see page 24-40.

Remove the fuel tank cover (page 2-6).

Disconnect the throttle position sensor connector. Remove the two sensor bracket screws, and TP sensor and bracket as an assembly.



Install a new O-ring onto the carburetor body.



Improper installation can cause damage to the TP sensor.

Install a new TP sensor assembly by aligning the tabs of the sensor with the flat of the shaft as shown.

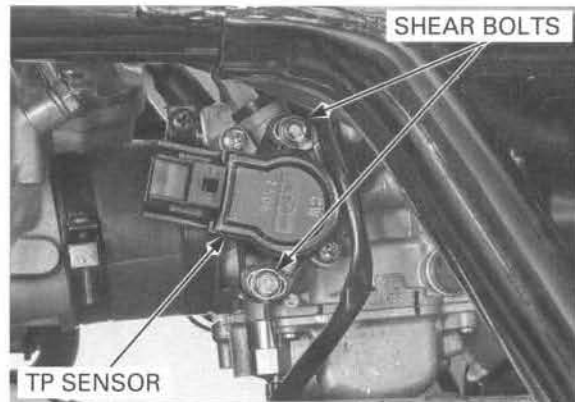
Install the screws and tighten them. Connect the sensor 3P connector.

Install the removed parts in the reverse order of removal.

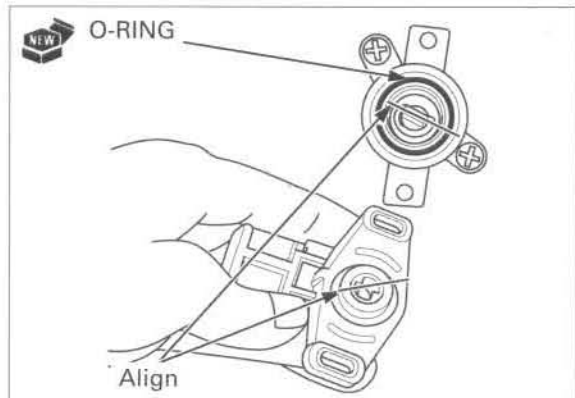
REPLACEMENT

Remove the fuel tank cover (page 2-6).

Remove the two sensor shear bolts and TP sensor.



Install a new O-ring onto the sensor bracket groove.



Improper installation can cause damage to the TP sensor.

Install the TP sensor by aligning the tabs of the sensor with the flat of the shaft as shown.

Loosely install the new shear bolts.

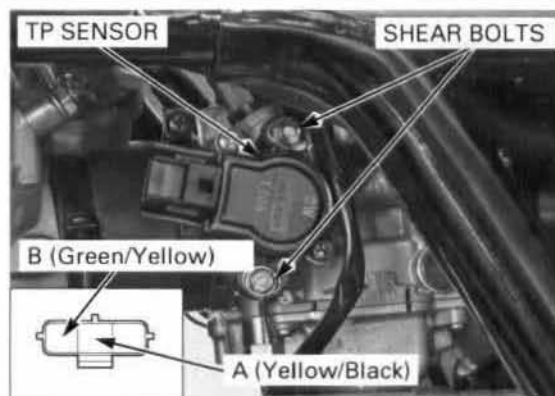
Check the engine idle speed and adjust it if necessary (page 3-15).

Adjust the TP sensor position so that the resistance between terminals A and B is 580 – 620 Ω , and tighten the shear bolts until the bolt heads break off.

Connect the TP sensor connector.

Perform the initial setting procedure (page 24-6).

Install the removed parts in the reverse order of removal.



ANGLE SENSOR

INSPECTION

SENSOR RESISTANCE

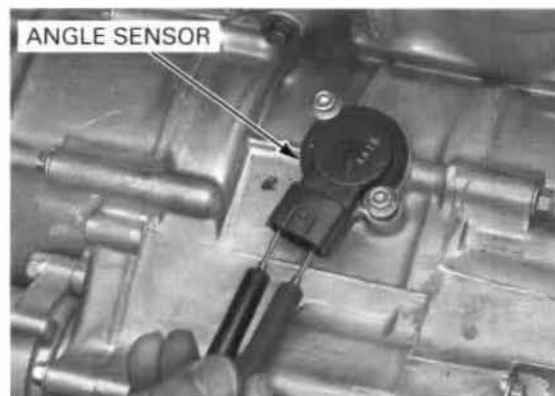
Turn the ignition switch OFF.

Disconnect the angle sensor 3P connector.

Measure the resistance at the angle sensor 3P connector.

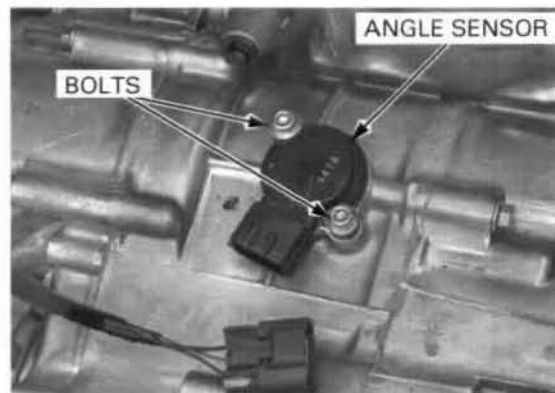
Connection: Black/red (+) – Green/yellow (-)

Standard: 1.6 – 2.4 k Ω (20° C/68° F)



Clean around the sensor base with compressed air before removing the angle sensor.

Remove the two socket bolts and angle sensor/bracket assembly.

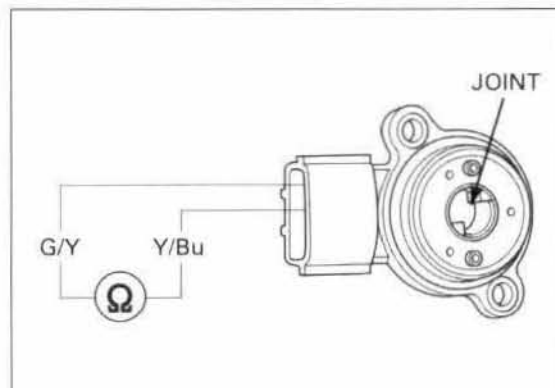


Check that the resistance at the angle sensor terminal varies while turning the sensor joint.

The resistance should change smoothly as follows.

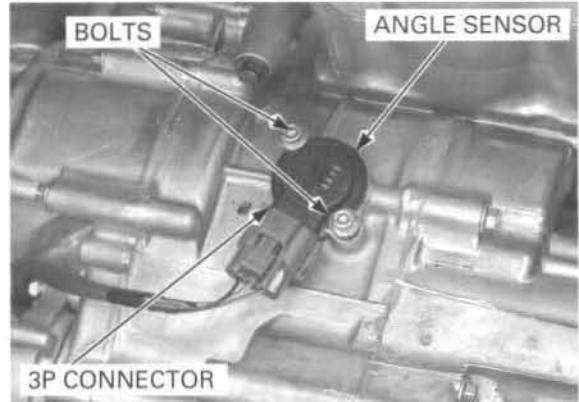
Connection: Yellow/blue (+) – Green/yellow (-)

Standard: 0 to 1.6 – 2.4 k Ω (20° C/60° F)



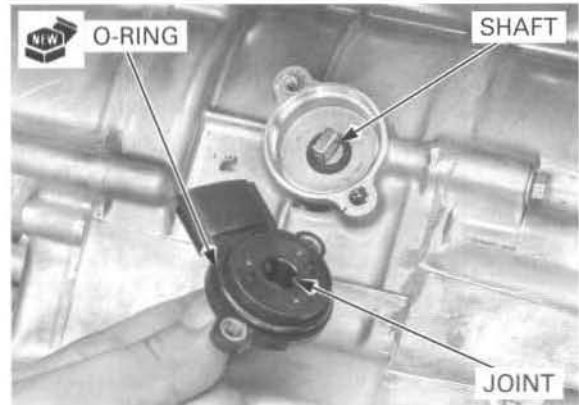
REPLACEMENT

Remove the left engine side cover (page 10-5).
 Clean around the sensor base with compressed air before removing the angle sensor.
 Disconnect the sensor 3P connector.
 Remove the two bolts, washers and angle sensor from the crankcase.



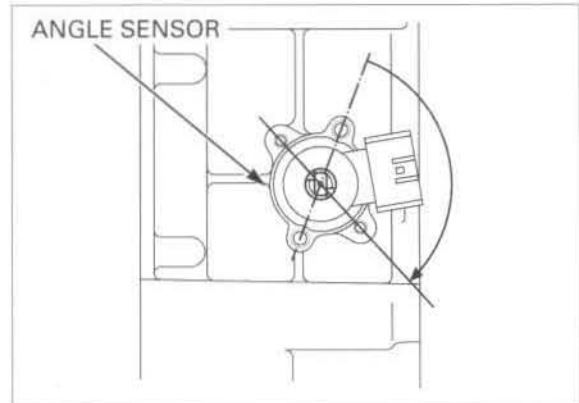
Install a new O-ring onto a new angle sensor.
 Clean the sensor shaft, sensor joint and crankcase base cavity, and be sure that no foreign material is allowed.
 Align the tabs of the sensor with the flat of the sensor joint and set the angle sensor onto the crankcase in the position as shown.

Never allow foreign materials (dust, water, oil etc.) to get into the clearance between the sensor shaft and sensor joint.



SENSOR PRELOAD

Turn the sensor clockwise to align the bolt holes in the sensor bracket with the bolt holes in crankcase.

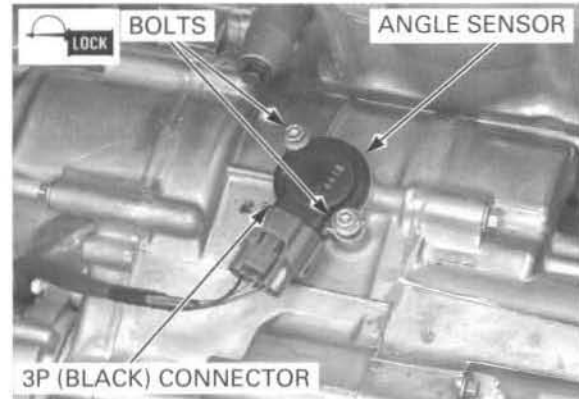


Apply locking agent to the threads of the sensor bolts.
 Install the washers and bolts, then tighten them.

TORQUE: 6 N·m (0.6 kgf·m, 4.3 lbf·ft)

Connect the sensor 3P (Black) connector.
Perform the initial setting procedure if the angle sensor is replaced (page 24-6).

Install the removed parts in the reverse order of removal.

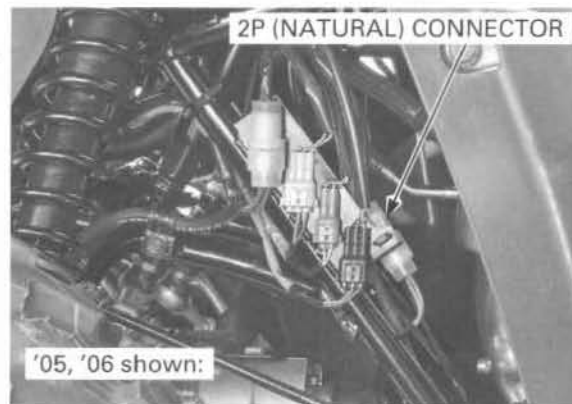


CONTROL MOTOR

REMOVAL/INSTALLATION

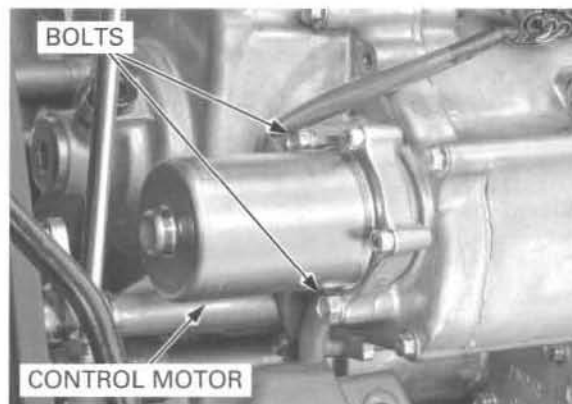
Remove the inner fender (page 2-9).

Disconnect the control motor 2P (Natural) connector.



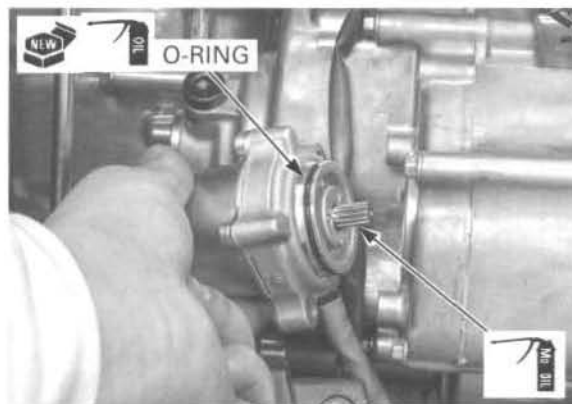
Remove the left engine side cover (page 10-5).

Remove the two mounting bolts and control motor.

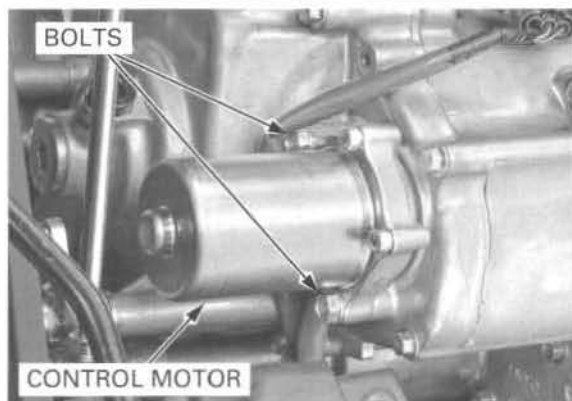


Coat a new O-ring with engine oil and install it into the control motor groove.

Apply molybdenum oil solution to the motor shaft splines and install the control motor into the front crankcase cover by aligning the bolt holes.



Install the mounting bolts and tighten them.

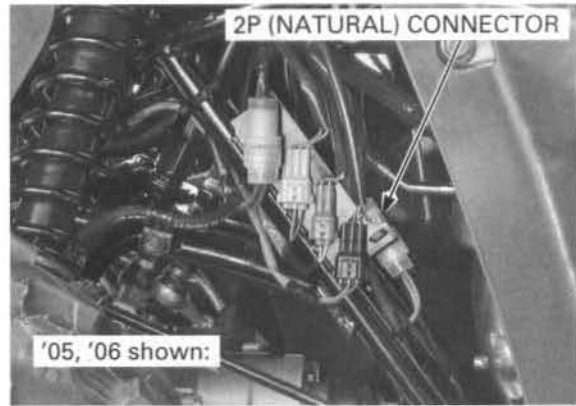


HONDAMATIC

Do not forget to secure the wires with the clamp.

Route the motor and angle sensor wires properly (page 1-24) and connect the motor 2P (Natural) connector.

Install the removed parts in the reverse order of removal.



ENGINE CONTROL MODULE (ECM)

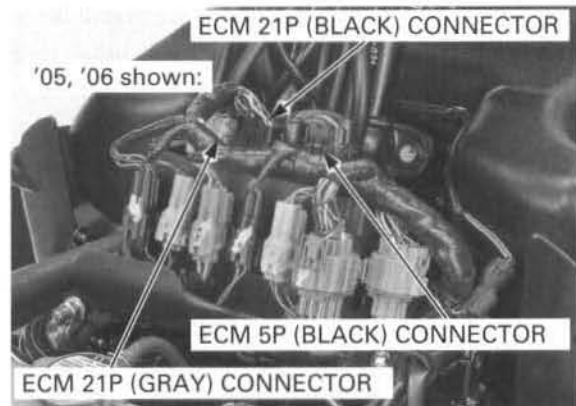
REMOVAL/INSTALLATION

Remove the front fender (page 2-11).

Disconnect the ECM 21P (Black), 21P (Gray) and 5P (Black) connectors.

Remove the ECM/holder from the stay.

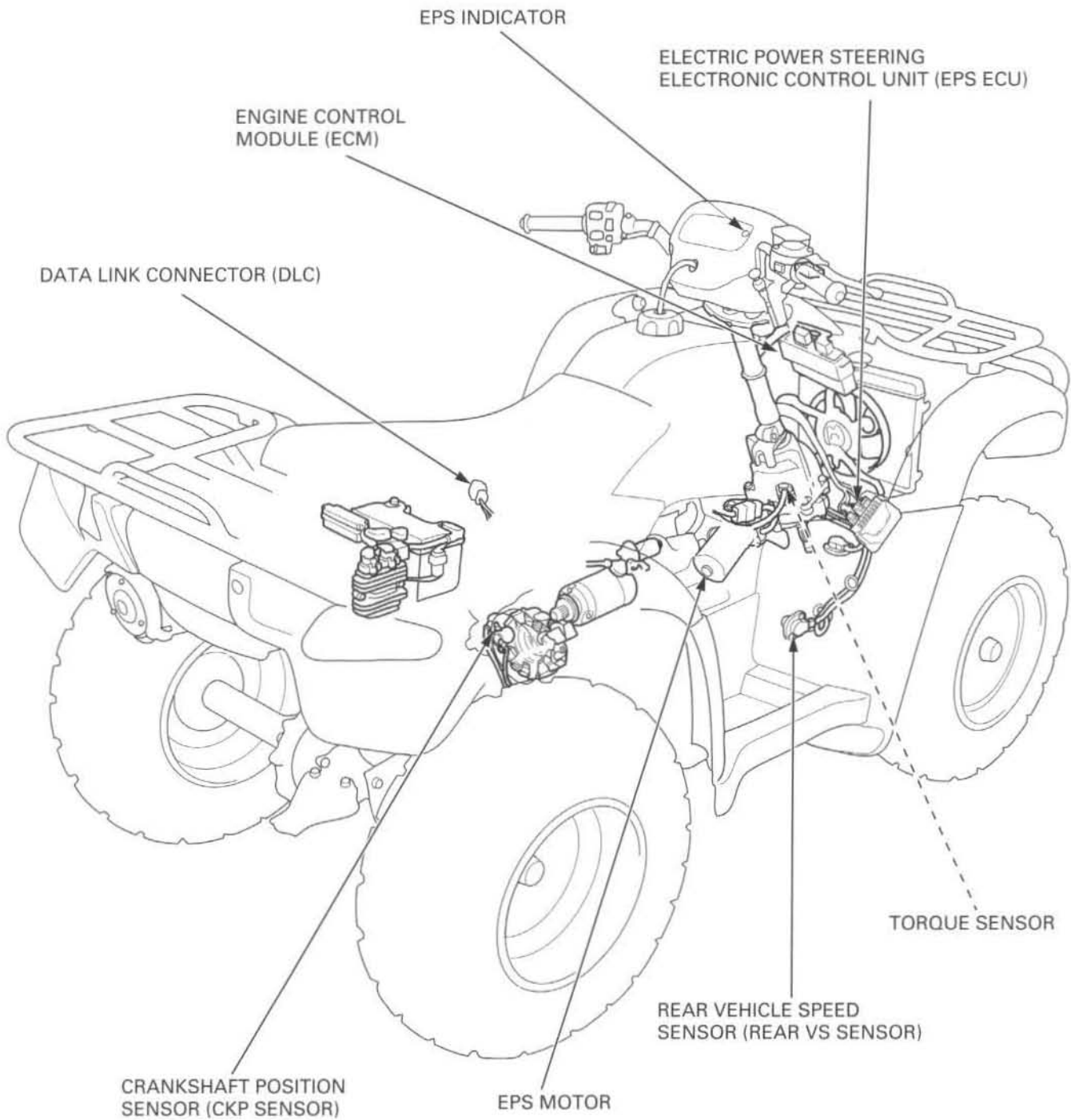
Installation is in the reverse order of removal.



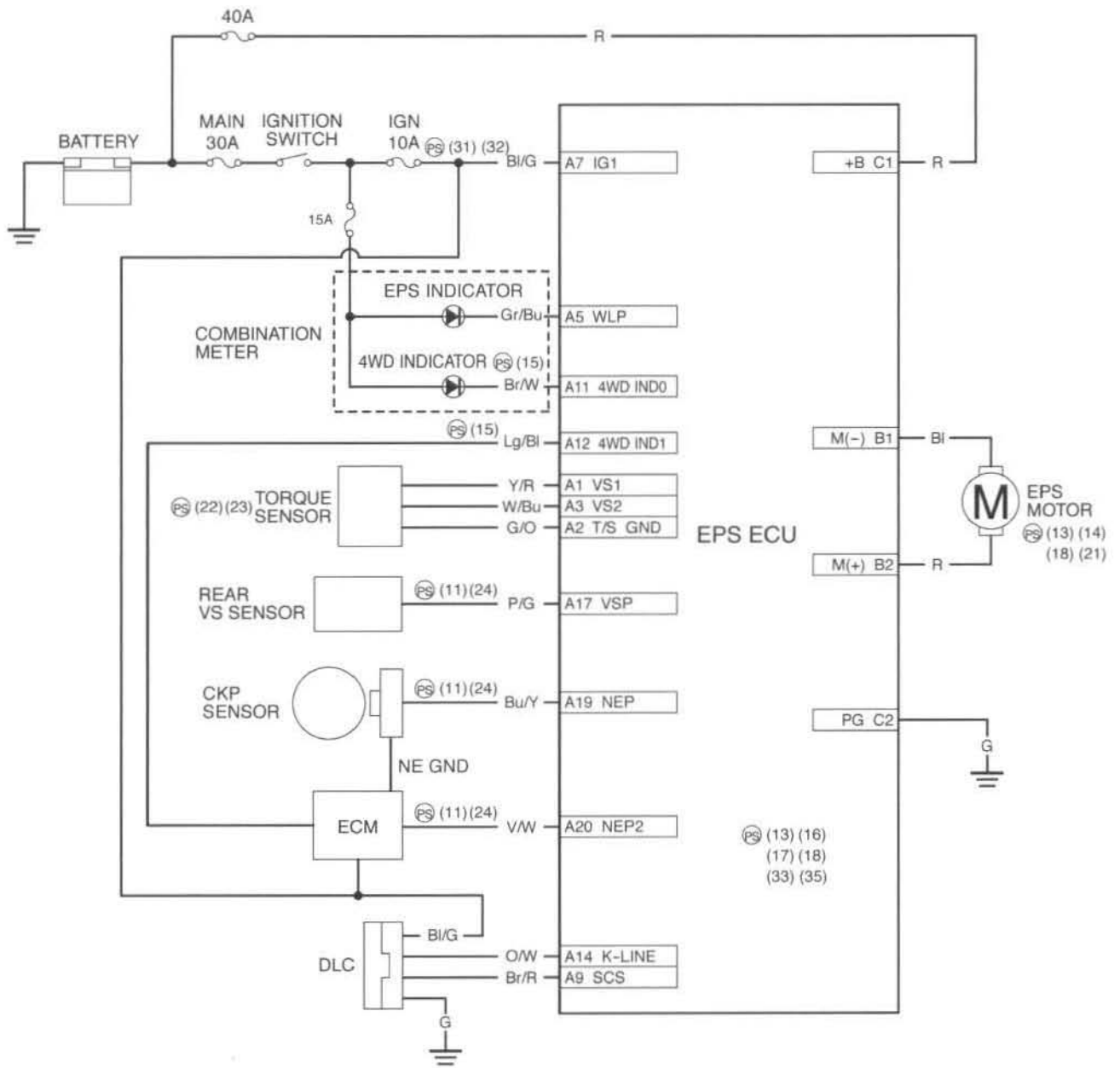
25. ELECTRIC POWER STEERING (EPS)

COMPONENT LOCATION	25-2	TROUBLESHOOTING INDEX	25-15
SYSTEM DIAGRAM	25-3	SYMPTOM TROUBLESHOOTING INDEX	25-17
EPS CONNECTOR LOCATION	25-4	DTC TROUBLESHOOTING	25-18
SERVICE INFORMATION	25-7	SYMPTOM TROUBLESHOOTING	25-34
GENERAL TROUBLESHOOTING INFORMATION	25-8	EPS ECU REPLACEMENT	25-37

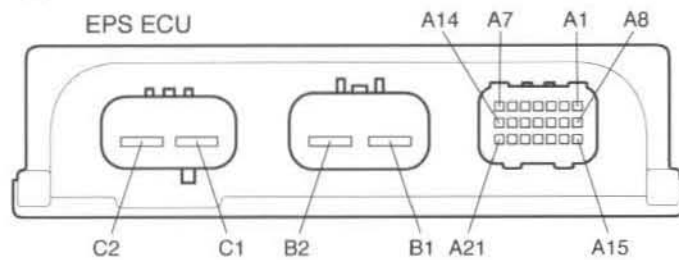
COMPONENT LOCATION



SYSTEM DIAGRAM



- | | |
|------------------|------------|
| Bl : BLACK | Br : BROWN |
| Y : YELLOW | O : ORANGE |
| Bu : BLUE | R : RED |
| G : GREEN | P : PINK |
| W : WHITE | Gr : GRAY |
| Lg : LIGHT GREEN | V : VIOLET |

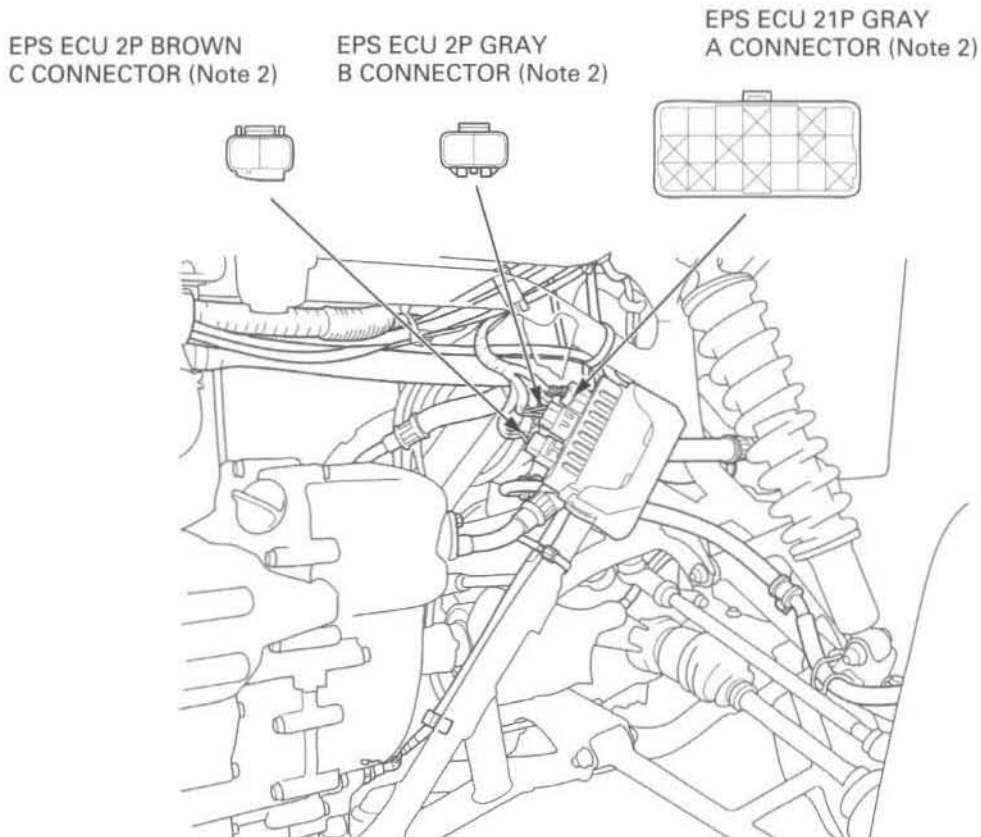
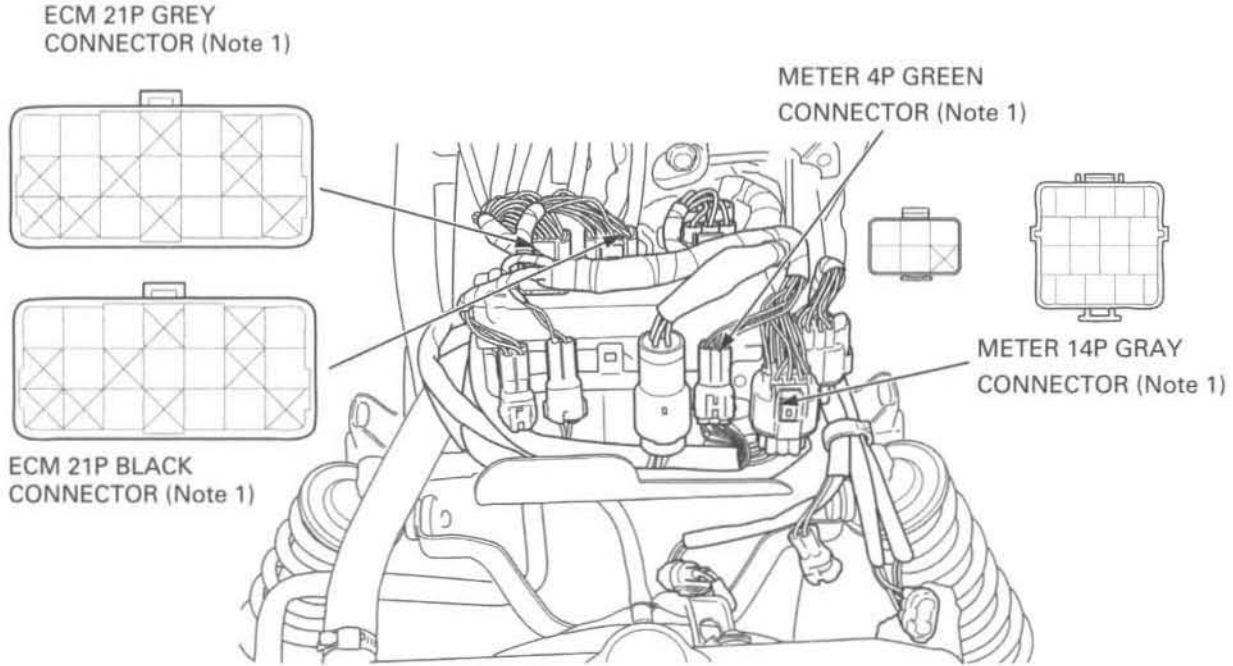


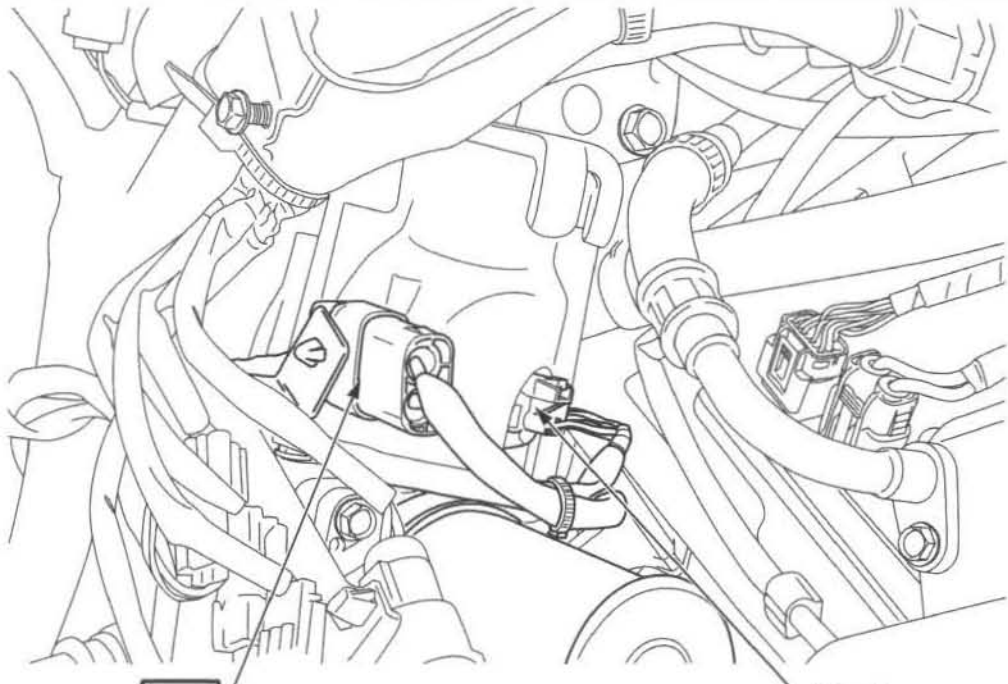
ELECTRIC POWER STEERING (EPS)

EPS CONNECTOR LOCATION

FRONT CONNECTOR LOCATIONS

- Note 1: Remove the front fender.
- Note 2: Remove the right inner fender.
- Note 3: Remove the left inner fender.



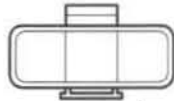


EPS MOTOR 2P
CONNECTOR (Note 3)



TORQUE SENSOR 3P
CONNECTOR (Note 3)

REAR VS SENSOR 3P YELLOW
CONNECTOR (Note 3)



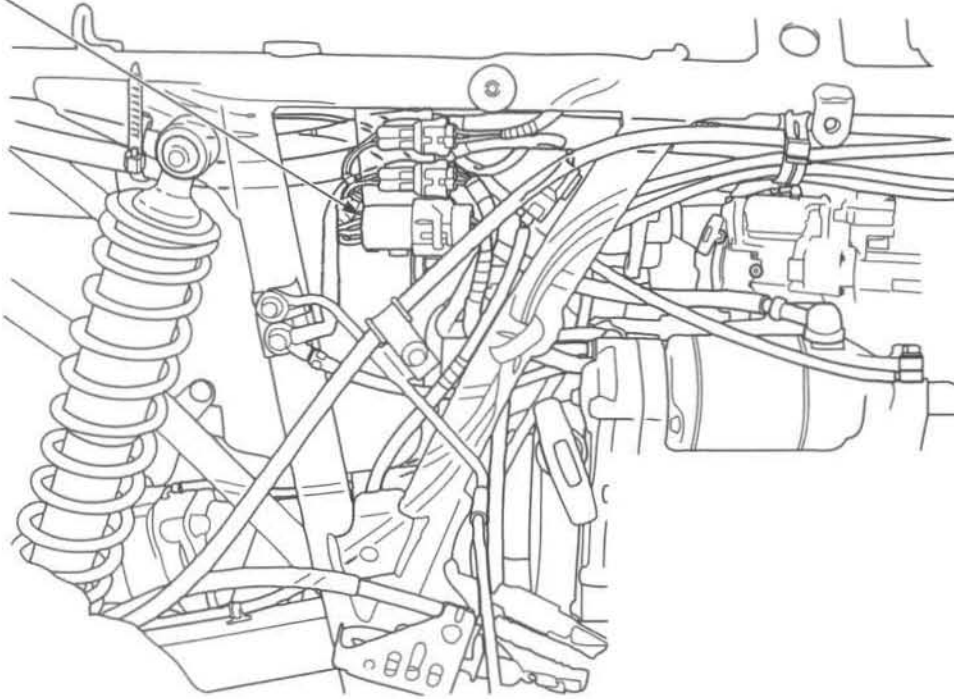
ELECTRIC POWER STEERING (EPS)

MIDDLE/REAR CONNECTOR LOCATIONS

Note 1: Behind the rear fender



ALTERNATOR 5P NATURAL
CONNECTOR (Note 1)



SERVICE INFORMATION

GENERAL

- This section covers the diagnosis and service for electric parts of Electric Power Steering (EPS) system. To service the EPS unit refer to steering shaft service procedure (page 13-34).
- Before disconnecting any connector of the EPS system, always turn the ignition switch OFF and disconnect the negative cable from the battery.
- The following color codes are indicated throughout this section.

Bl: Black
Br: Brown
Bu: Blue

G: Green
Gr: Gray
Lb: Light blue

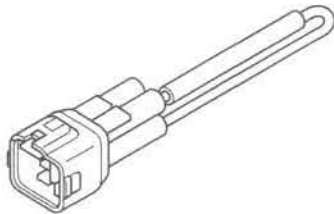
Lg: Light green
O: Orange
P: Pink

Pu: Purple
R: Red
W: White

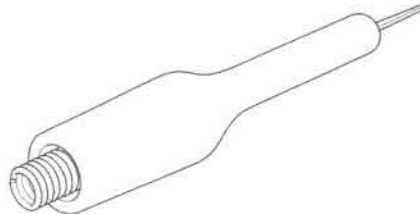
Y: Yellow
V: Violet

TOOLS

SCS connector
070PZ-ZY30100



Pin probe (Male)
07ZAJ-RDJA110



GENERAL TROUBLESHOOTING INFORMATION

EPS INDICATOR

Under normal conditions, the EPS indicator comes on when the ignition switch is turned to ON position, then goes off after the engine is started. This indicates that the LED and its circuit are operating correctly.

If there is any trouble in the system after the engine is started, the EPS indicator will stay on. (When DTC 22 (NO WRITING THE TORQUE SENSOR NEUTRAL POSITION) is detected by the control unit the EPS indicator will blink.)

When the EPS indicator light comes on, the control unit memorizes the DTC. The control unit will stop the EPS system after the engine starts again, but it keeps the EPS indicator on.

When DTC 23 (TORQUE SENSOR PROBLEM) is stored in the control unit, the EPS indicator will stay on until the DTC is erased.

When a problem is detected and the EPS indicator comes on, there are cases when the indicator stays on until the ignition switch is turned OFF, and cases when the indicator goes off automatically when the system returns to normal.

DIAGNOSTIC TROUBLE CODE (DTC)

The DTCs are memorized in the EEPROM (nonvolatile memory) therefore the memorized DTCs cannot be erased by disconnecting the battery. Perform the specified procedures to clear DTCs (page 25-11).

SELF DIAGNOSIS (DTC)

Self-diagnosis can be classified into three categories:

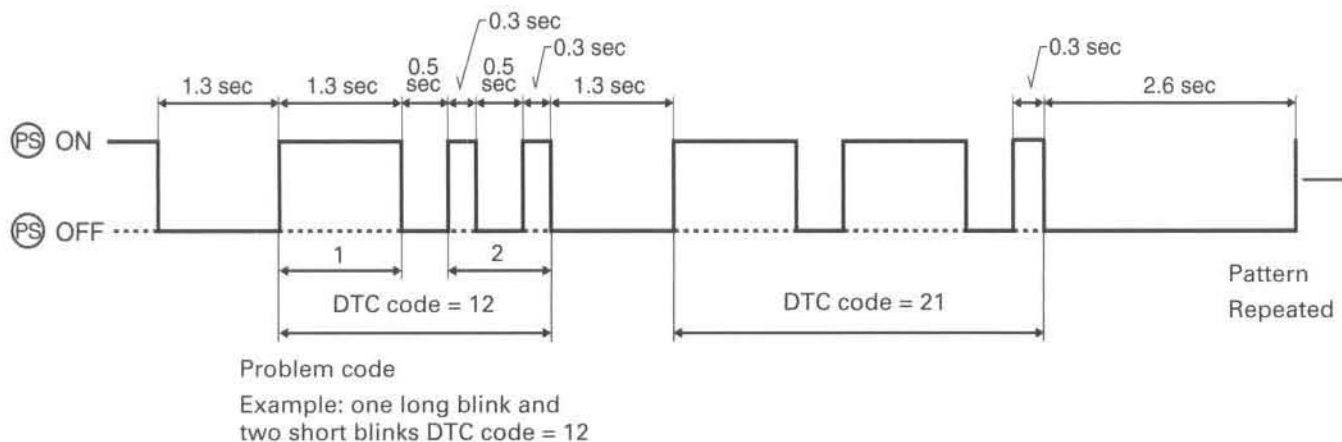
- Initial diagnosis: performed right after the engine starts and until the EPS indicator goes off.
- Regular diagnosis: performed right after the initial diagnosis until the ignition switch is turned OFF.
- Revest: The EPS indicator turns on when the DTC is set. The EPS indicator will turn off after the vehicle has recovered from the fail-safe condition, but the DTC will be stored in the EPS ECU. There was a temporary problem, but the system is now fully operational.

The EPS ECU performs the following functions when a problem is detected by self-diagnosis:

1. Turns on the EPS indicator.
2. Memorizes the DTC.
3. Stops power assist and manual steering operation begins or reduce the steering assist power.

EPS INDICATOR BLINK PATTERN

- If the HDS pocket tester is not available, DTC can be read from the EPS ECU memory by the EPS indicator blink pattern.
- The number of EPS indicator blinks is the equivalent to the main code of the DTC (the sub code cannot be displayed by the EPS indicator).
- When the EPS ECU stores more than one DTC, the EPS indicator will indicate them by blinking in the order from the lower number to highest number.



RESTRICTION ON POWER ASSIST OPERATION

Repeated extreme steering force, such as turning the handlebar continuously back-and-forth with the vehicle stopped, causes an increase of power consumption in the EPS motor. The increase of electric current causes the motor to heat up. Because this heat adversely affects the system, the control unit monitors the electric current of the motor. When the control unit detects heat build-up in the motor, it reduces the electric current to the motor gradually to protect the system (motor and EPS ECU), this restricts the power assist operation. The EPS indicator does not come on during this function. When steering torque is not applied to the handlebar, or when the ignition is turned off, and the system cools, the control unit will restore the power assist gradually until it's fully restored.

TORQUE SENSOR NEUTRAL POSITION (INITIALIZE THE TORQUE SENSOR)

The EPS ECU stores the torque sensor neutral position in the EEPROM. The torque sensor must be initialized whenever the EPS unit, the motor, the EPS ECU, etc is serviced (page 25-13).

Perform the Torque Sensor Initialization when you service the following contents (page 25-13).

MAINTENANCE LOCATION	REPLACEMENT	REMOVAL/ INSTALLATION
Cables and harness around handlebar	INITIALIZE	INITIALIZE
Handlebar	INITIALIZE	INITIALIZE
Steering shaft and steering shaft bushing	INITIALIZE	INITIALIZE
Steering shaft arm and end nut	INITIALIZE	INITIALIZE
EPS unit	INITIALIZE	INITIALIZE
EPS ECU	INITIALIZE	NO NEED

NOTE:

The torque sensor neutral position is not effected when erasing the DTCs.

HOW TO TROUBLESHOOT EPS DTC

1. Question the customer about the conditions when the problem occurred, and try to reproduce the same conditions for troubleshooting. Find out when the EPS indicator came on, such as during EPS control, after EPS control, when the vehicle was at a certain speed, etc.
2. When the EPS indicator does not come on during the test-drive, but troubleshooting is done based on the DTC, check for loose connectors, poor terminal contact, etc., in the affected circuit before you start troubleshooting.
3. After troubleshooting, erase the DTC and test-drive the vehicle. Be sure the EPS indicator does not come on.

ELECTRIC POWER STEERING (EPS)

DTC READOUT

NOTE:

Perform this procedure using fully charged battery. The EPS indicator will stay lit and the ECU will abort the process if you use a low or dead battery.

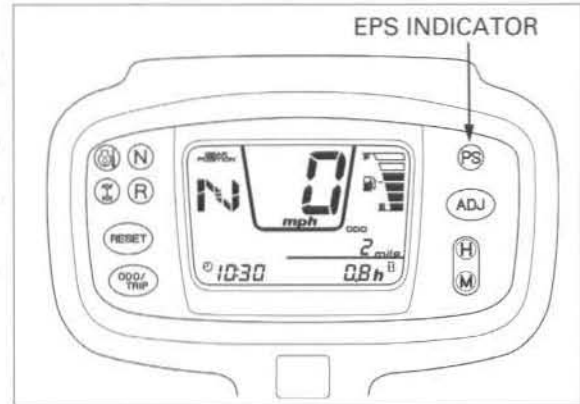
Start the engine and check the DTC.

- When the ignition switch is turned to ON, the EPS indicator will stay on until engine start, then go off.

If the DTC stays on or blinks, connect the HDS Pocket Tester to the DLC.

Read the DTC, freeze data and follow the troubleshooting index (page 25-15).

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



Reading the DTC with HDS

Turn the ignition switch to OFF.

Remove the seat (page 2-4).

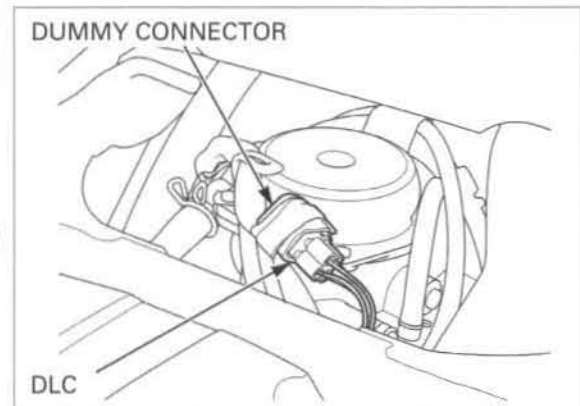
Remove the insulator rubber.

Remove the dummy connector.

Connect the HDS Pocket Tester to the DLC.

Make sure the engine stop switch is turned to "O", turn the ignition switch to ON, check the DTC and freeze data.

Refer to the troubleshooting index (page 25-15).



Reading DTC with the EPS indicator

Turn the ignition switch to OFF.

Remove the seat (page 2-4).

Remove the insulator rubber.

Remove the dummy connector and short the DLC terminals using the special tool.

TOOL:

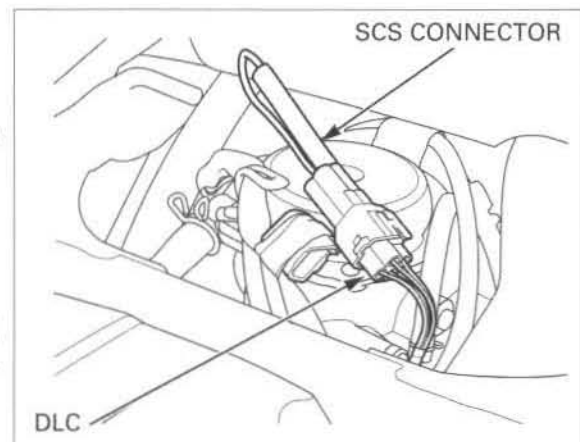
SCS connector 070PZ-ZY30100

CONNECTION: Brown/red – Green

Make sure the engine stop switch is turned to "O", turn the ignition switch to ON, read and note the EPS indicator blinks, and refer to the troubleshooting index (page 25-15).

NOTE:

If the EPS ECU has any DTC in its memory, the EPS indicator will start blinking.



ERASING DTC**NOTE:**

Perform this procedure using fully charged battery. The EPS indicator will stay lit and the ECU will abort the process if you use a low or dead battery.

How to erase the DTC with HDS

Connect the HDS Pocket Tester to the DLC.

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

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

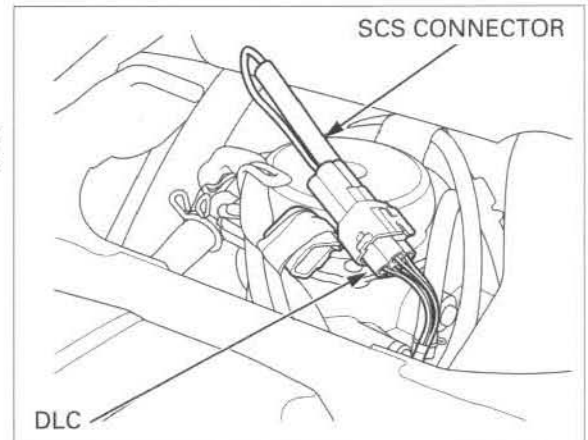
How to erase the DTC with DLC

1. Remove the seat (page 2-4).
2. Remove the insulator rubber.
3. Turn the ignition switch to OFF.
4. Remove the dummy connector and short the Brown/red and Green wire terminals of the DLC using the special tool.

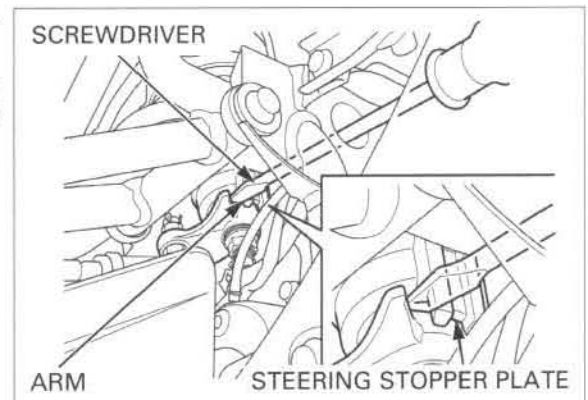
TOOL:

SCS connector 070PZ-ZY30100

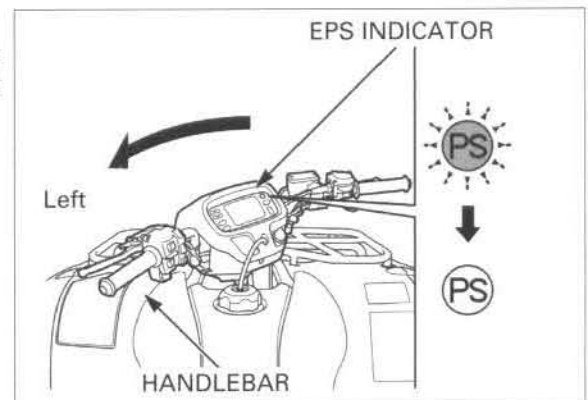
CONNECTION: Brown/red – Green



5. Raise the front wheels off the ground and support the ATV with a jack or work stand.
6. Place a 6 mm screwdriver between the steering shaft arm and the steering stopper plate as shown.

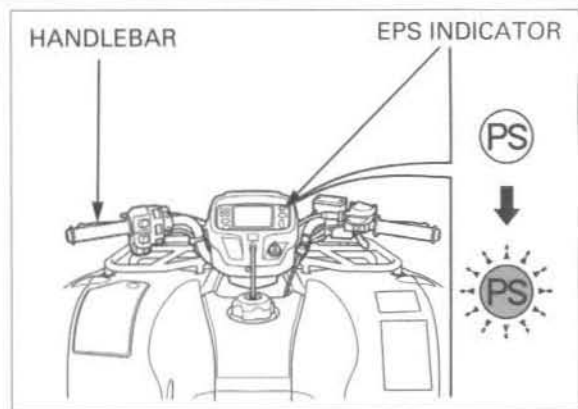


7. Fully turn the handlebar to the left and hold it.
8. Make sure the engine stop switch is turned to "O" and turn the ignition switch to ON. The EPS indicator lights and it goes off after 4 seconds.

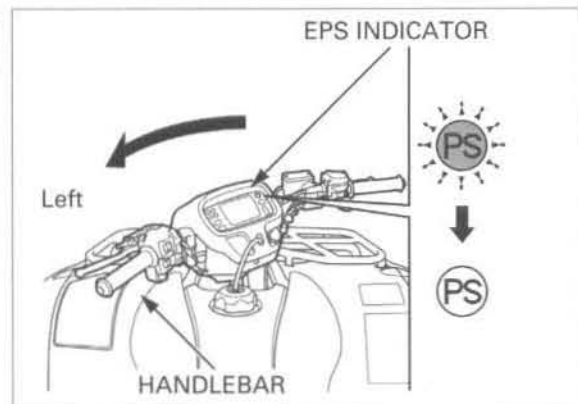


ELECTRIC POWER STEERING (EPS)

9. Within 4 seconds after the EPS indicator goes off, release the handlebar. The EPS indicator comes on again 4 seconds after releasing the handlebar.



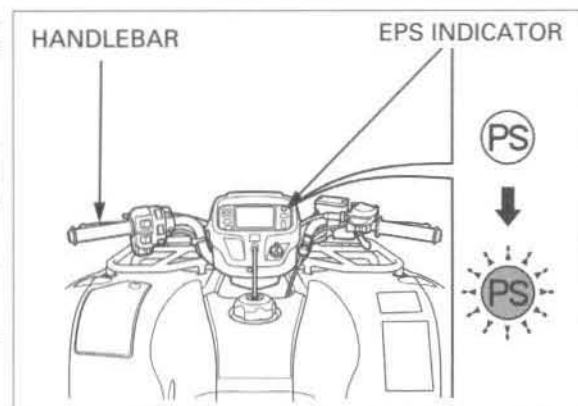
10. Within 4 seconds after the EPS indicator comes on, fully turn the handlebar to the left and hold it. The EPS indicator goes off 4 seconds after holding the handlebar.



11. Within 4 seconds after the EPS indicator goes off, release the handlebar. The EPS indicator blinks twice 4 seconds after releasing the handlebar.

NOTE:

- If the EPS indicator does not blink twice, an error was made in the procedure and the DTC was not erased. Turn the ignition switch OFF, and repeat the operation from step 3.
12. Turn the ignition switch OFF after the EPS indicator blinks twice.
13. Remove the special tool from the DLC and connect the DLC to the dummy connector.
14. Install the following
- insulator rubber
 - seat (page 2-4)



INITIALIZING THE TORQUE SENSOR

NOTE:

Perform this procedure using a fully charged battery. The EPS indicator will stay lit and the ECU will abort the process if you use a low or dead battery.

How to Initialize the Torque Sensor with HDS

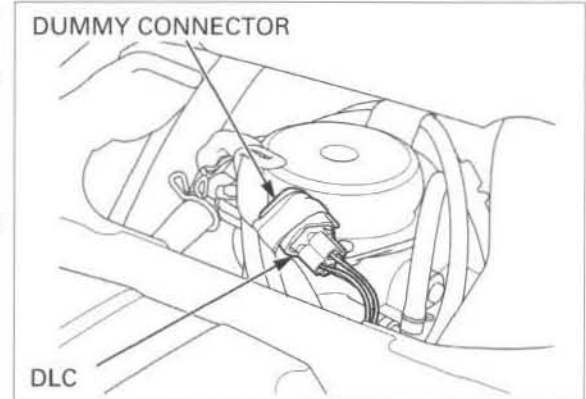
1. Raise the front wheels off the ground and support the ATV with a jack or work stand.
2. Remove the dummy connector and connect the HDS Pocket Tester to the DLC.

Turn the ignition switch to ON.

Turn the handlebar straight ahead.

Initialize the Torque Sensor with the HDS while the engine is stopped.

- Follow the instructions on the HDS display.



How to Initialize the Torque Sensor with DLC

NOTE:

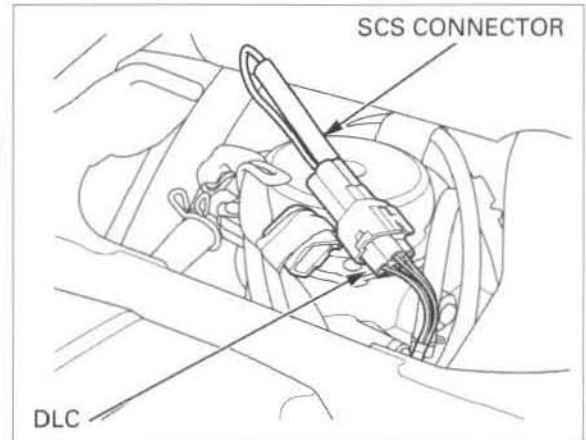
The DTC will be erased when initializing the torque sensor.

1. Remove the seat (page 2-4).
2. Remove the insulator rubber.
3. Turn the ignition switch to OFF.
4. Remove the dummy connector and short the Brown/red and Green wire terminals of the DLC using the special tool.

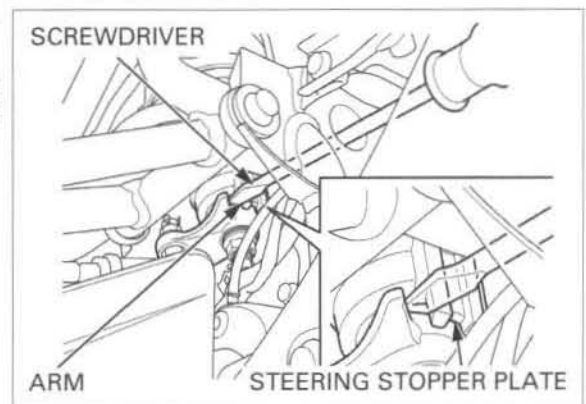
TOOL:

SCS connector **070PZ-ZY30100**

CONNECTION: Brown/red – Green

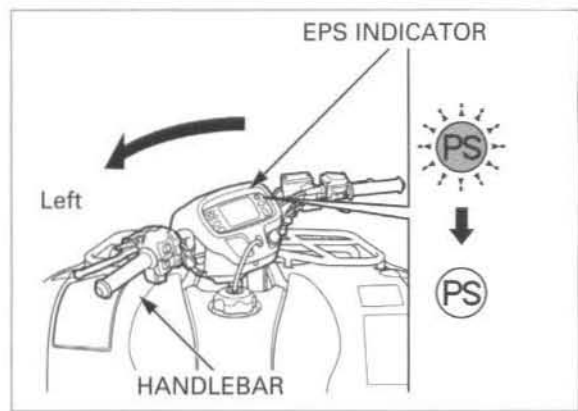


5. Raise the front wheels off the ground and support the ATV with a jack or work stand.
6. Place a 6 mm screwdriver between the steering shaft arm and the steering stopper plate as shown.

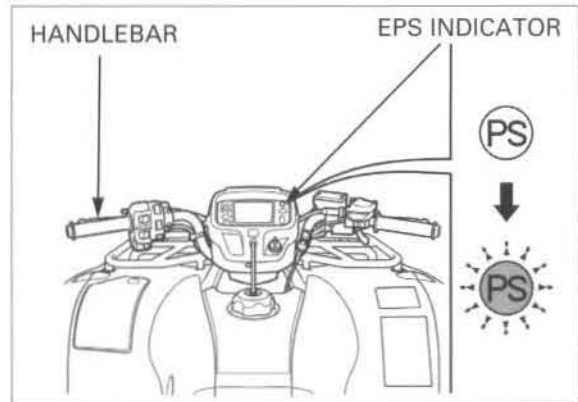


ELECTRIC POWER STEERING (EPS)

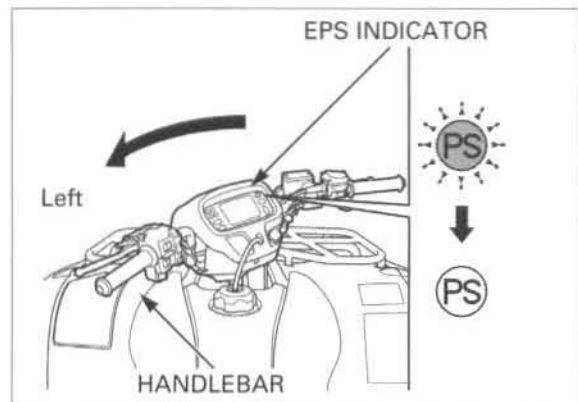
7. Fully turn the handlebar to the left and hold it.
8. Make sure the engine stop switch is turned to "O" and turn the ignition switch to ON. The EPS indicator lights and it goes off after 4 seconds.



9. Within 4 seconds after the EPS indicator goes off, release the handlebar. The EPS indicator comes on again 4 seconds after releasing the handlebar.



10. Within 4 seconds after the EPS indicator comes on, fully turn the handlebar to the left and hold it. The EPS indicator goes off 4 seconds after holding the handlebar.



The torque sensor is initialized of this time.

11. Within 4 seconds after the EPS indicator goes off, return the handlebar within 1 second to straight ahead and release the handlebar. The EPS indicator blinks twice 4 seconds after releasing the handlebar then EPS indicator blinks three times 5 seconds after blinking the EPS indicator.

NOTE:

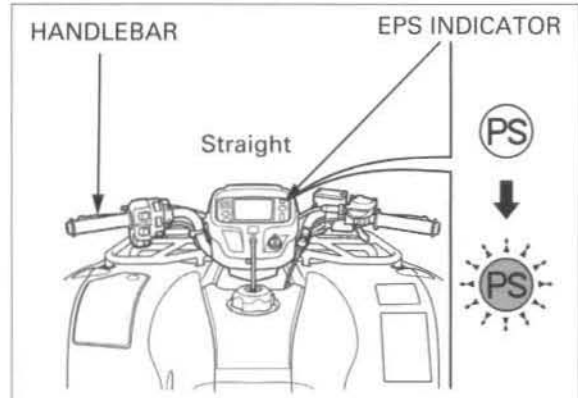
- If the EPS indicator does not blink twice, an error was made in the procedure and the torque sensor was not initialized. Turn the ignition switch OFF, and repeat the operation from step 3.

12. Turn the ignition switch OFF after the EPS indicator blinks three times.

13. Remove the special tool from the DLC and connect the DLC to the dummy connector.

14. Install the following

- insulator rubber
- seat (page 2-4)



TROUBLESHOOTING INDEX

DEFINITIONS

Latch: The EPS indicator turns on and stays on whenever the ignition switch is in the ON position, or until the DTC is erased.

Reset: The EPS indicator turns on when the DTC is set. The EPS indicator will not turn on after the ignition switch is cycled from ON to OFF, but the DTC will be stored in the EPS ECU.

Revest: The EPS indicator turns on when the DTC is set. The EPS indicator will turn off after vehicle has recovered from the fail-safe condition, but the DTC will be stored in the EPS ECU. There was a temporary problem, but the system is now fully operational.

Initial diagnosis: Performed right after the engine starts and until the EPS indicator goes OFF.

Regular diagnosis: Performed right after the initial diagnosis until the ignition switch is turned OFF.

DTC	Function Failure	Symptom/Fail-safe function	Latch/ Reset/ Revest	Refer to
11-01	Excessive change of the vehicle speed signal (Regular diagnosis)	Indicator ON/Substitution control of the engine RPM	Revest	25-18
11-02	Comparison between the vehicle speed and the engine speed signal (Regular diagnosis)	Indicator ON/Substitution control of the engine RPM	Revest	25-20
13-01	EPS ECU internal circuit (Lower FET stuck ON) (Initial diagnosis)	Indicator ON/Halt steering assist immediately	Reset	25-20
13-02	EPS ECU internal circuit (Upper FET stuck ON) (Initial diagnosis)	Indicator ON/Halt steering assist immediately	Reset	25-21
13-03	EPS ECU internal circuit (FET stuck ON <over current>) (Regular diagnosis)	Indicator ON/Halt steering assist immediately	Reset	25-21
13-04	EPS ECU internal circuit (FET stuck ON (VM<Voltage Motor>)) (Regular diagnosis)	Indicator ON/Halt steering assist immediately	Reset	25-21
13-05	EPS ECU internal circuit (FET stuck ON (over current<accumulated>)) (Regular diagnosis)	Indicator ON/Halt steering assist immediately	Reset	25-21
14-01	EPS ECU internal circuit (Power relay stuck ON) (Initial diagnosis)	Indicator ON/Halt steering assist immediately	Reset	25-21
14-02	EPS ECU internal circuit (Fail-safe relay 1 stuck ON) (Initial diagnosis)	Indicator ON/Halt steering assist immediately	Reset	25-21
14-03	EPS ECU internal circuit (Fail-safe relay 2 stuck ON) (Initial diagnosis)	Indicator ON/Halt steering assist immediately	Reset	25-21
14-04	EPS ECU internal circuit (Power relay stuck open) (Regular diagnosis)	Indicator ON/Halt steering assist immediately	Reset	25-22
15-01	4WD selectable system blinking communication line (Regular diagnosis)	4WD indicator blink (EPS indicator will not come ON)/2WD assist power stabilized	Revest	25-22
15-02	4WD selectable system communication line voltage (Regular diagnosis)	Indicator ON/2WD assist power stabilized or EPS operation is normally	Revest	25-23
16-01	EPS ECU internal circuit (Direction determine logic circuit) (Regular diagnosis)	Indicator ON/Halt steering assist immediately	Reset	25-26
16-02	EPS ECU internal circuit (INH output circuit) (Initial diagnosis)	Indicator ON/Halt steering assist immediately	Reset	25-26
17-01	EPS ECU internal circuit (Voltage raise transformation circuit) (Initial diagnosis)	Indicator ON/Halt steering assist immediately	Reset	25-26
17-02	EPS ECU internal circuit (Voltage raise transformation circuit) (Regular diagnosis)	Indicator ON/Halt steering assist under the Specified condition	Revest	25-26
18-01	EPS ECU internal circuit (Current sensor) (Initial diagnosis)	Indicator ON/Halt steering assist immediately	Reset	25-26

ELECTRIC POWER STEERING (EPS)

DTC	Function Failure	Symptom/Fail-safe function	Latch/ Reset/ Revest	Refer to
18-02	EPS ECU internal circuit (Current sensor off set) (Regular diagnosis)	Indicator ON/Halt steering assist immediately	Reset	25-26
18-03	EPS ECU internal circuit (Current sensor stuck low) (Initial diagnosis)	Indicator ON/Halt steering assist immediately	Reset	25-27
18-04	EPS ECU internal circuit (Current sensor stuck low) (Regular diagnosis)	Indicator ON/Halt steering assist immediately	Reset	25-28
18-05	EPS ECU internal circuit (Motor current deflection) (Regular diagnosis)	Indicator ON/Halt steering assist immediately	Reset	25-26
18-06	EPS ECU internal circuit (IM2) (Regular diagnosis)	Indicator ON/Halt steering assist immediately	Reset	25-26
21-01	Abnormal motor terminal voltage (Initial diagnosis)	Indicator ON/Halt steering assist immediately	Reset	25-28
21-02	Abnormal motor terminal voltage (Regular diagnosis)	Indicator ON/Halt steering assist immediately	Reset	25-28
21-03	Open in the motor harness (Regular diagnosis)	Indicator ON/Halt steering assist immediately	Reset	25-28
22-01	Failure to initialize the torque sensor (Initial diagnosis)	Indicator blink (DTC will not store in the EPS ECU)/Halt steering assist until the torque sensor is initialized	Latch	25-28
23-01	Low/high voltage for the torque sensor (VT1 and VT2) (Regular diagnosis)	Indicator ON/Halt steering assist until the DTC is erased	Latch	25-29
23-02	Torque sensor (VT3 Differential-amplification Function) (Regular diagnosis)	Indicator ON/Halt steering assist until the DTC is erased	Latch	25-31
23-03	Torque sensor (VT1, VT2 rapid change) (Regular diagnosis)	Indicator ON/Halt steering assist until the DTC is erased	Latch	25-31
23-04	Torque sensor (Temperature sensor) (Regular diagnosis)	Indicator ON/Halt steering assist immediately	Reset	25-31
23-05	Torque sensor (Sensor Coil) (Regular diagnosis)	Indicator ON/Halt steering assist until the DTC is erased	Latch	25-31
24-01	Engine speed signal (Regular diagnosis)	Indicator ON/Halt steering assist under the Specified condition	Revest	25-32
31-01	Low/high IG1-terminal voltage (Initial diagnosis)	Indicator ON/Halt steering assist under the Specified condition	Revest	25-32
31-02	Low/high IG1-terminal voltage (Regular diagnosis)	Indicator ON/Halt steering assist under the Specified condition	Revest	25-32
32-01	Low/high VBU voltage (Regular diagnosis)	Indicator ON/Halt steering assist under the Specified condition	Revest	25-33
33-02	EPS ECU internal circuit (EEPROM) (Regular diagnosis)	Indicator ON/Halt steering assist immediately	Reset	25-26
35-01	EPS ECU internal circuit (CPU) (Initial diagnosis)	Indicator ON/Halt steering assist immediately	Reset	25-26
35-02	EPS ECU internal circuit (CPU communication) (Initial diagnosis)	Indicator ON/Halt steering assist immediately	Reset	25-26
35-03	EPS ECU internal circuit (CPU communication) (Regular diagnosis)	Indicator ON/Halt steering assist under the Specified condition	Revest	25-26

SYMPTOM TROUBLESHOOTING INDEX

Symptom	Symptom/Fail-safe function	Refer to
EPS indicator does not come on	Symptom Troubleshooting	25-34
EPS indicator does not go off, and no DTCs are stored	Symptom Troubleshooting	25-35

DTC TROUBLESHOOTING

Refer to the EPS connector location (page 25-4) to disconnect each connector in the troubleshooting.

DTC 11-01: EXCESSIVE CHANGE OF THE VEHICLE SPEED SIGNAL (REGULAR DIAGNOSIS)

NOTE:

- Before starting the troubleshooting, check the connectors for loose contacts or corroded terminals, and recheck the DTC.
- Even though the system is operating normally, the EPS indicator will come on when the ECU detects conditions of DTC 11-01, DTC 11-02 and / or 22-1.

1. Rear VS Sensor Signal Inspection

Check for operation of the speedometer.

Does the speedometer operate normally?

NO – Perform the speedometer inspection (page 22-8)

YES – GO TO STEP 2.

2. Rear VS Sensor Signal line Open Circuit Inspection

Remove the following:

- front fender (page 2-11)
- left inner fender (page 2-9)

Disconnect the EPS ECU 21P gray A connector and rear VS sensor 3P yellow connector. Check for continuity between the Pink/green wire harness side of the EPS ECU 21P gray A connector and rear VS sensor 3P yellow connector.

TOOL:

Pin probe (Male) 07ZAJ-RDJA110

Is there continuity?

NO – Open circuit in the Pink/green wire

YES – GO TO STEP 3.

3. Rear VS Sensor Signal line short Circuit Inspection

Check for Pink/green wire continuity between the wire harness side of the EPS ECU 21P gray A connector and body ground.

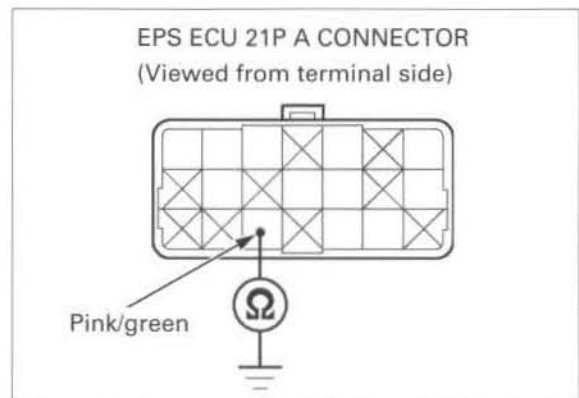
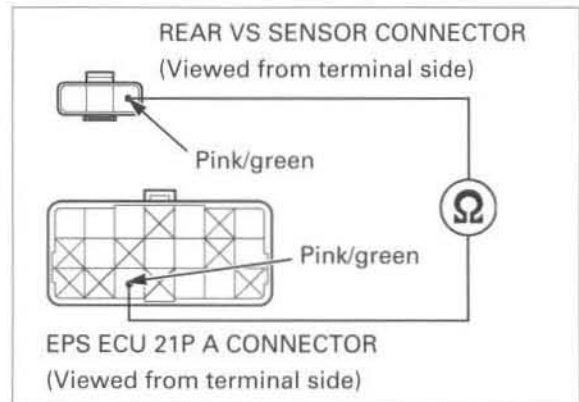
TOOL:

Pin probe (Male) 07ZAJ-RDJA110

Is there continuity?

YES – Short circuit in the Pink/green wire

NO – GO TO STEP 4.



4. CKP Sensor line Open Circuit Inspection

Disconnect the alternator 5P connector.
Check for Blue/yellow wire continuity between the wire harness side of the EPS ECU 21P gray A connector and the alternator 5P connector.

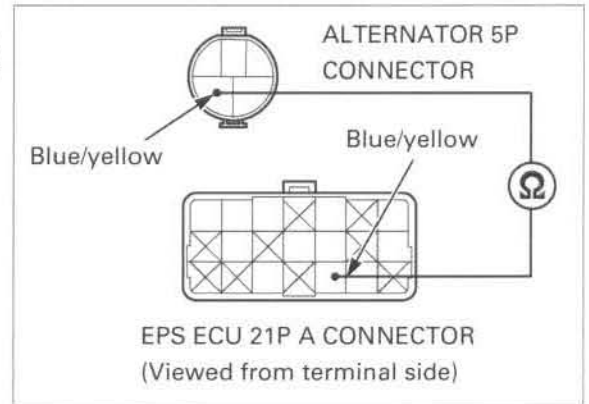
TOOL:

Pin probe (Male) 07ZAJ-RDJA 110

Is there continuity?

NO - Open circuit in the Blue/yellow wire

YES - GO TO STEP 5.



5. CKP Sensor line short Circuit Inspection

Check for Blue/yellow wire continuity between the wire harness side of the EPS ECU 21P gray A connector and body ground.

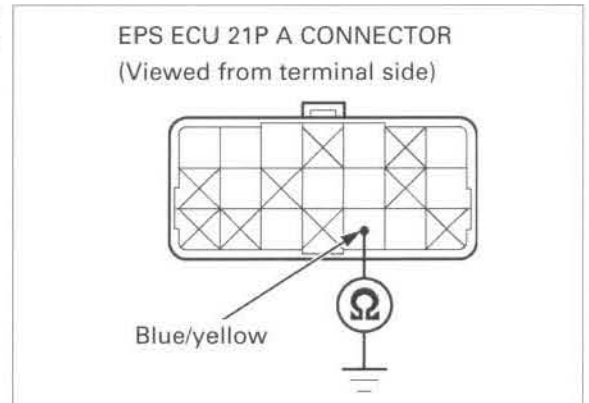
TOOL:

Pin probe (Male) 07ZAJ-RDJA 110

Is there continuity?

YES - Short circuit in the Blue/yellow wire

NO - GO TO STEP 6.



6. CKP Sensor line (ECM) Open Circuit Inspection

Disconnect the ECM 33P black connector.
Check for Violet/white wire continuity between the wire harness side of the EPS ECU 21P gray A connector and the ECM 33P black connector.

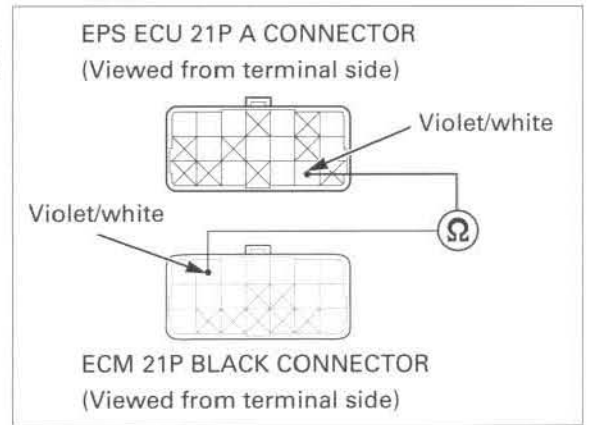
TOOL:

Pin probe (Male) 07ZAJ-RDJA 110

Is there continuity?

NO - Open circuit in the Violet/white wire

YES - GO TO STEP 7.



7. CKP Sensor line (ECM) Short Circuit Inspection

Check for Violet/white wire continuity between the wire harness side of the EPS ECU 21P gray A connector and body ground.

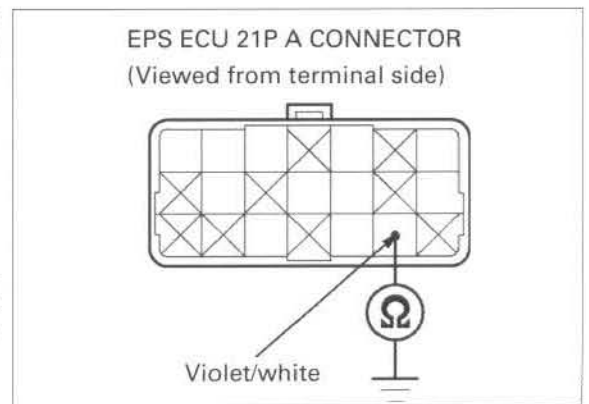
TOOL:

Pin probe (Male) 07ZAJ-RDJA 110

Is there continuity?

YES - Short circuit in the Violet/white wire

NO - Recheck for poor contact or loose connection in the wire harness. If they are OK, replace the EPS ECU with a new one (page 25-37).



DTC 11-02: COMPARISON BETWEEN THE VEHICLE SPEED AND THE ENGINE SPEED SIGNAL (REGULAR DIAGNOSIS)

Refer to DTC 11-01: EXCESSIVE CHANGE OF THE VEHICLE SPEED SIGNAL TROUBLESHOOTING (page 25-18)

DTC 13-01: EPS ECU INTERNAL CIRCUIT (LOWER FET STUCK ON) (INITIAL DIAGNOSIS)

NOTE:

- Before starting the troubleshooting, check the connectors for loose contacts or corroded terminals, and recheck the DTC.

1. EPS ECU system inspection

1. Erase the DTC with HDS or DLC (page 25-11).
2. Start the engine.
3. Fully turn the handlebar to the left or right and hold it 10 seconds.
4. Check the EPS indicator.

Does the EPS indicator come on?

NO – System is normal at this time

YES – GO TO STEP 2.

2. Motor Line Short Circuit Inspection

Remove the front fender (page 2-11).

Disconnect the EPS ECU 2P gray B connector. Check for continuity between the Black and Red wire harness side of the EPS ECU 2P gray B connector and body ground.

Connection:

Black (+) – Body ground (-)

Red (+) – Body ground (-)

Is there continuity?

YES – GO TO STEP 3.

NO – GO TO STEP 4.

3. Motor Short Circuit Inspection

Remove the right inner fender (page 2-9).

Disconnect the motor 2P connector. Check for continuity between the motor terminal side and body ground.

Connection:

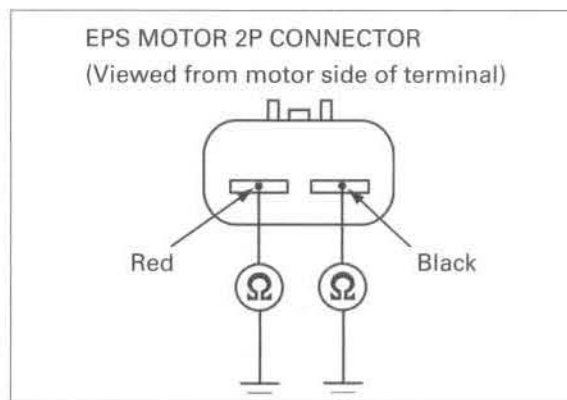
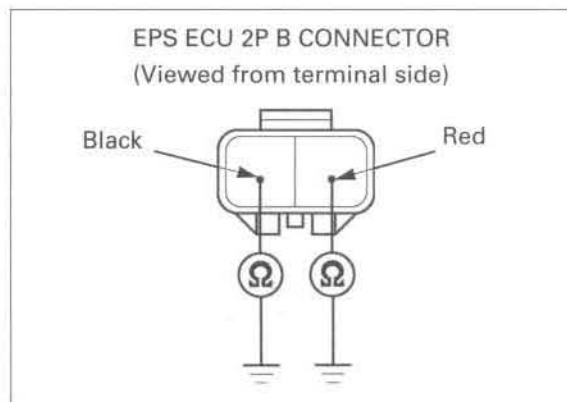
Black (+) – Body ground (-)

Red (+) – Body ground (-)

Is there continuity?

NO – Short circuit in the motor wire harness

YES – Replace the motor with a new one (page 13-38)



4. Motor Line Short Circuit Inspection

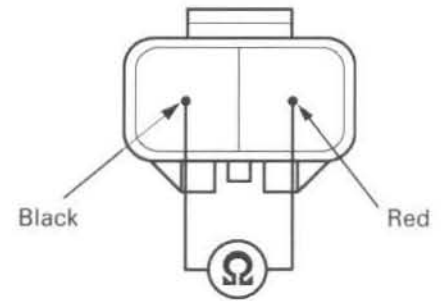
Disconnect the motor 2P connector
Check for continuity between the EPS ECU 2P gray B connector.

Connection: Red (+) – Black (-)

Is there continuity?

- YES** – Short circuit in the motor Red and Black wire between the EPS ECU and motor
- NO** – Recheck for poor contact or loose connection in the wire harness. If they are OK, replace the EPS ECU with a new one (page 25-37).

EPS ECU 2P B CONNECTOR
(Viewed from terminal side)



DTC 13-02: EPS ECU INTERNAL CIRCUIT (UPPER FET STUCK ON) (INITIAL DIAGNOSIS)

Refer to EPS ECU INTERNAL CIRCUIT (LOWER FET STUCK ON) troubleshooting (page 25-20)

DTC 13-03: EPS ECU INTERNAL CIRCUIT (FET STUCK ON <OVER CURRENT>) (REGULAR DIAGNOSIS)

Refer to EPS ECU INTERNAL CIRCUIT (LOWER FET STUCK ON) troubleshooting (page 25-20)

DTC 13-04: EPS ECU INTERNAL CIRCUIT (FET STUCK ON (VM<VOLTAGE MOTOR>) (REGULAR DIAGNOSIS)

Refer to EPS ECU INTERNAL CIRCUIT (LOWER FET STUCK ON) TROUBLESHOOTING (page 25-20)

DTC 13-05: EPS ECU INTERNAL CIRCUIT (FET STUCK ON (OVER CURRENT<ACCUMULATED>) (REGULAR DIAGNOSIS)

Refer to EPS ECU INTERNAL CIRCUIT (LOWER FET STUCK ON) TROUBLESHOOTING (page 25-20)

DTC 14-01: EPS ECU INTERNAL CIRCUIT (POWER RELAY STUCK ON) (INITIAL DIAGNOSIS)

Refer to EPS ECU INTERNAL CIRCUIT (LOWER FET STUCK ON) TROUBLESHOOTING (page 25-20)

DTC 14-02: EPS ECU INTERNAL CIRCUIT (FAIL-SAFE RELAY 1 STUCK ON) (INITIAL DIAGNOSIS)

Refer to EPS ECU INTERNAL CIRCUIT (LOWER FET STUCK ON) TROUBLESHOOTING (page 25-20)

DTC 14-03: EPS ECU INTERNAL CIRCUIT (FAIL-SAFE RELAY 2 STUCK ON) (INITIAL DIAGNOSIS)

Refer to EPS ECU INTERNAL CIRCUIT (LOWER FET STUCK ON) TROUBLESHOOTING (page 25-20)

DTC 14-04: EPS ECU INTERNAL CIRCUIT (POWER RELAY STUCK OPEN) (REGULAR DIAGNOSIS)

Refer to EPS ECU INTERNAL CIRCUIT (LOWER FET STUCK ON) TROUBLESHOOTING (page 25-20)

DTC 15-01: 4WD SELECTABLE SYSTEM BLINKING COMMUNICATION LINE (REGULAR DIAGNOSIS)

NOTE:

- Before starting the troubleshooting, check the connectors for loose contacts or corroded terminals, and recheck the DTC.
- When this problem occurs, there are some of problem of selectable 4WD system.
- Question the customer about the conditions when the problem occurred, and try to reproduce the same conditions for troubleshooting. Find out when the 4WD indicator came on, such as during 4WD to 2WD selecting, 2WD to 4WD selecting, at what speed, etc.

1. EPS ECU system inspection

1. Erase the DTC with HDS or DLC (page 25-11).
2. Perform the test ride.
3. Check the 4WD indicator.

Does the 4WD indicator blinking?

NO – System is normal at this time

YES – Perform the troubleshooting for selectable 4WD system. Erase the DTC for EPS after repair of the selectable 4WD system.

DTC 15-02: 4WD SELECTABLE SYSTEM COMMUNICATION LINE VOLTAGE (REGULAR DIAGNOSIS)

NOTE:

- Before starting the troubleshooting, check the connectors for loose contacts or corroded terminals, and recheck the DTC.
- Question the customer about the conditions when the problem occurred, and try to reproduce the same conditions for troubleshooting. Find out when the 4WD indicator came on, such as during 4WD to 2WD selecting, 2WD to 4WD selecting, at what speed, etc.

1. Combination Meter Inspection

Check that the combination meter functions properly.

Does the combination function properly?

NO – Perform the combination meter inspection (page 22-8).

YES – GO TO STEP 2.

2. EPS ECU system inspection

1. Erase the DTC with HDS or DLC (page 25-11).
2. Start the engine.
3. Check the EPS indicator.

Does the indicator come on?

NO – System is normal at this time

YES – GO TO STEP 3.

3. 4WD indicator Inspection

1. Turn the ignition switch ON.
2. Start engine.
3. 2WD/4WD select switch to 4WD, and check that the 4WD indicator.

Does the 4WD indicator come on?

YES – GO TO STEP 4.

NO – GO TO STEP 5.

4. 4WD IND0 Line Open Circuit Inspection

Remove the front fender (page 2-11)

Disconnect the EPS ECU 21P gray A connector. With the ignition switch turned to ON, measure the voltage between the Brown/white wire terminal of the wire harness side of the EPS ECU 21P gray A connector and body ground.

Connection: Brown/white (+) – Body ground (-)

TOOL:

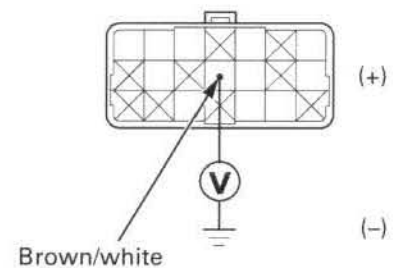
Pin probe (Male) 07ZAJ-RDJA110

Is there above 5V?

YES – Recheck for poor contact or loose connection in the wire harness. If they are OK, replace the EPS ECU with a new one (page 25-37).

NO – GO TO STEP 5.

EPS ECU 21P A CONNECTOR
(Viewed from terminal side)



ELECTRIC POWER STEERING (EPS)

5. 4WD IND0 Line Short Circuit Inspection

Check for Brown/white continuity between the wire harness side of the EPS ECU 21P gray A connector and body ground.

Connection: Brown/white (+) – Body ground (-)

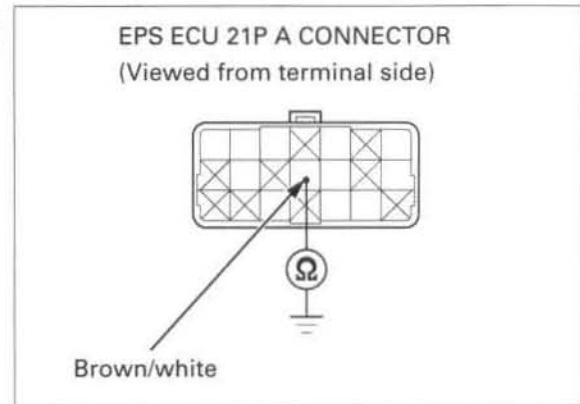
TOOL:

Pin probe (Male) 07ZAJ-RDJA110

Is there continuity?

YES – GO TO STEP 6.

NO – GO TO STEP 7.



6. 4WD IND0 (Combination Meter) Line Short Circuit Inspection.

Disconnect the combination meter 14P gray connector.

Check for Brown/white wire continuity between the meter harness side of 14P gray connector and body ground.

Connection: Brown/white (+) – Body ground (-)

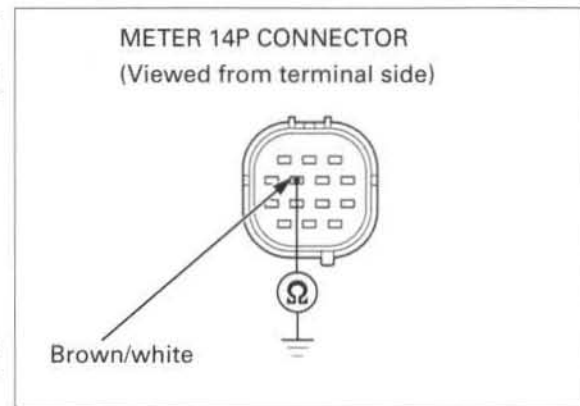
TOOL:

Pin probe (Male) 07ZAJ-RDJA110

Is there continuity?

YES – Replace the combination meter with a new one (meter short circuit) (page 22-13).

NO – Short circuit in the Brown/white wire between the combination meter and EPS ECU.



7. 4WD IND1 Line Short Circuit Inspection

Check for Light green/black continuity between the wire harness side of the EPS ECU 21P gray A connector and body ground.

Connection:

Light green/black (+) – Body ground (-)

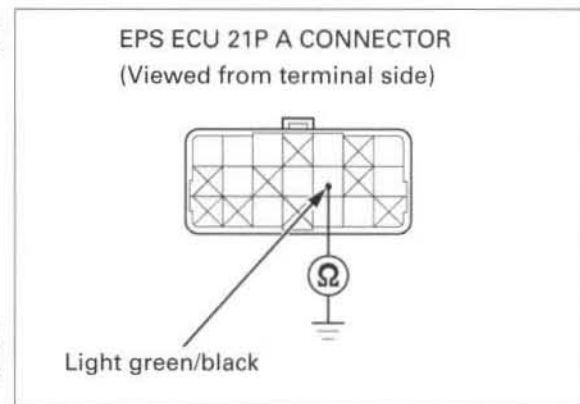
TOOL:

Pin probe (Male) 07ZAJ-RDJA110

Is there continuity?

NO – Recheck for poor contact or loose connection in the wire harness. If they are OK, replace the EPS ECU with a new one (page 25-37).

YES – GO TO STEP 8.



8. ECM (4WD IND1) Short Circuit Inspection

Disconnect the ECM 33P black connector.
Check for continuity between the wire harness side connector terminal and body ground.

Connection:

Light green/black (+) – Body ground (-)

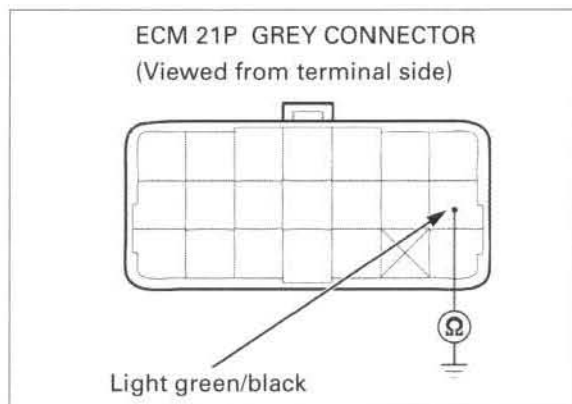
TOOL:

Pin probe (Male) 07ZAJ-RDJA110

Is there continuity?

NO – Recheck for poor contact or loose connection in the wire harness. If they are OK, replace the ECM with a new one (page 24-44).

YES – Short circuit in the Light green/black wire.



EPS ECU INTERNAL CIRCUIT

NOTE:

- Before starting the troubleshooting, check the connectors for loose contacts or corroded terminals, and recheck the DTC.

Perform the troubleshooting according to the DTC in the following table.

16-01	EPS ECU internal circuit (Direction determine logic circuit) (Regular diagnosis)
16-02	EPS ECU internal circuit (INH output circuit) (Initial diagnosis)
17-01	EPS ECU internal circuit (Voltage raise transformation circuit) (Initial diagnosis)
17-02	EPS ECU internal circuit (Voltage raise transformation circuit) (Regular diagnosis)
18-01	EPS ECU internal circuit (Current sensor) (Initial diagnosis)
18-02	EPS ECU internal circuit (Current sensor off set) (Regular diagnosis)
18-05	EPS ECU internal circuit (Motor current deflection) (Regular diagnosis)
18-06	EPS ECU internal circuit (IM2) (Regular diagnosis)
33-02	EPS ECU internal circuit (EEPROM) (Regular diagnosis)
35-01	EPS ECU internal circuit (CPU) (Initial diagnosis)
35-02	EPS ECU internal circuit (CPU communication) (Initial diagnosis)
35-03	EPS ECU internal circuit (CPU communication) (Regular diagnosis)

1. EPS ECU system inspection

1. Erase the DTC with HDS or DLC (page 25-11).
2. Start the engine.
3. Fully turn the handlebar to the left or right and hold it 10 seconds.
4. Check the EPS indicator.

Does the EPS indicator come on?

NO – System is normal at this time

YES – GO TO STEP 2.

2. DTC inspection

1. Check the DTC with HDS or DLC (page 25-10).
Is DTC 16-01, 16-02, 17-01, 17-02, 18-01, 18-02, 18-05, 18-06, 33-01, 35-01, 35-02 or 35-03 indicated?

NO – Perform the troubleshooting for the indicated DTC.

YES – Replace the EPS ECU with a new one (page 25-37).

DTC 18-03: EPS ECU INTERNAL CIRCUIT (CURRENT SENSOR STUCK LOW) (INITIAL DIAGNOSIS)

NOTE:

- Before starting the troubleshooting, check the connectors for loose contacts or corroded terminals, and recheck the DTC.

1. EPS ECU system inspection

1. Erase the DTC with HDS or DLC (page 25-11).
2. Start the engine.
3. Fully turn the handlebar to the left or right and hold it 10 seconds.
4. Check the EPS indicator.

Does the EPS indicator come on?

- NO** – System is normal at this time
YES – GO TO STEP 2.

2. Motor Line Open Circuit Inspection

Remove the front fender (page 2-11).

Disconnect the EPS ECU 2P gray B connector. Check for continuity between the Black and Red wire harness side of the EPS ECU 2P gray B connector.

Connection: Black (+) – Red (-)

Is there continuity?

- YES** – Recheck for poor contact or loose connection in the wire harness. If they are OK, replace the EPS ECU with a new one (page 25-37).

NO – GO TO STEP 3.

3. Motor Open Circuit Inspection

Remove the right inner fender (page 2-9)

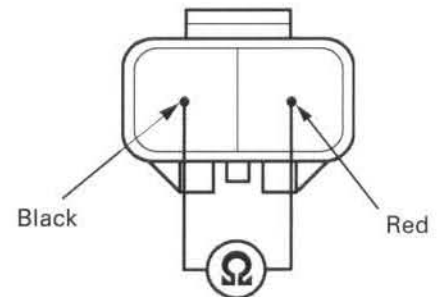
Disconnect the motor 2P connector. Check for continuity between the motor terminal side.

Connection: Black (+) – Red (-)

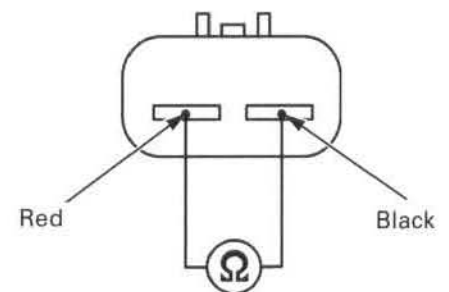
Is there continuity?

- YES** – Open circuit in the motor wire between the EPS ECU and motor.
- NO** – Replace the motor with a new one (page 13-38).

EPS ECU 2P B CONNECTOR
(Viewed from terminal side)



EPS MOTOR 2P CONNECTOR
(Viewed from motor side of terminal)



DTC 18-04: EPS ECU INTERNAL CIRCUIT (CURRENT SENSOR STUCK LOW) (REGULAR DIAGNOSIS)

Refer to EPS ECU INTERNAL CIRCUIT (CURRENT SENSOR STUCK LOW) (INITIAL DIAGNOSIS) troubleshooting (page 25-27)

DTC 21-01: ABNORMAL MOTOR TERMINAL VOLTAGE (INITIAL DIAGNOSIS)

Refer to EPS ECU INTERNAL CIRCUIT (CURRENT SENSOR LOW STUCK) (INITIAL DIAGNOSIS) troubleshooting (page 25-27)

DTC 21-02: ABNORMAL MOTOR TERMINAL VOLTAGE (REGULAR DIAGNOSIS)

Refer to EPS ECU INTERNAL CIRCUIT (CURRENT SENSOR LOW STUCK) (INITIAL DIAGNOSIS) troubleshooting (page 25-27)

DTC 21-03: OPEN IN THE MOTOR HARNESS (REGULAR DIAGNOSIS)

Refer to EPS ECU INTERNAL CIRCUIT (CURRENT SENSOR LOW STUCK) (INITIAL DIAGNOSIS) troubleshooting (page 25-27)

DTC 22-01: FAILURE TO INITIALIZE THE TORQUE SENSOR (INITIAL DIAGNOSIS)

NOTE:

- The EPS ECU stores the torque sensor neutral position in the EEPROM. The torque sensor must be initialized whenever the EPS unit, the motor, the EPS ECU, etc is serviced (page 25-13).
- Refer to the torque sensor neutral position information for detail of initialization parts (page 25-9).
- DTC will not store in the EPS ECU.
- The torque sensor neutral position is not effected when erasing the DTCs.

1. Initializing The Torque Sensor

Perform the Torque Sensor Initializing procedure (page 25-13).

Does the EPS indicator come on?

- NO** – System is normal at this time
- YES** – Check the DTC and perform the troubleshooting

DTC 23-01: LOW/HIGH VOLTAGE FOR THE TORQUE SENSOR (VT1 AND VT2) (REGULAR DIAGNOSIS)

NOTE:

- Before starting the troubleshooting, check the connectors for loose contacts or corroded terminals, and recheck the DTC.

1. EPS ECU system inspection

1. Erase the DTC with HDS or DLC (page 25-11).
2. Start the engine.
3. Fully turn the handlebar to the left or right and hold it 10 seconds.
4. Check the EPS indicator.

Does the EPS indicator come on?

NO – System is normal at this time.

YES – GO TO STEP 2.

2. Torque Sensor Line Short Circuit Inspection

Remove the front fender (page 2-11).

Disconnect the EPS ECU 21P gray A connector. Check for resistance between wire harness side of the EPS ECU 21P gray A connector.

Connection:

Yellow/red(+) – **Green/orange (-)**

Yellow/red(+) – **White/blue (-)**

White/blue (+) – **Green/orange (-)**

TOOL:

Pin probe (Male) **07ZAJ-RDJA110**

Is the resistance less than 10 Ω (at 20°C/68°F)?

YES – GO TO STEP 3.

NO – GO TO STEP 4.

3. Torque Sensor Coil Short Circuit Inspection

Remove the right inner fender (page 2-9).

Disconnect the torque sensor 3P connector. Check for resistance between the sensor side of the torque sensor 3P connector.

Connection:

A Terminal (+) – **B Terminal (-)**

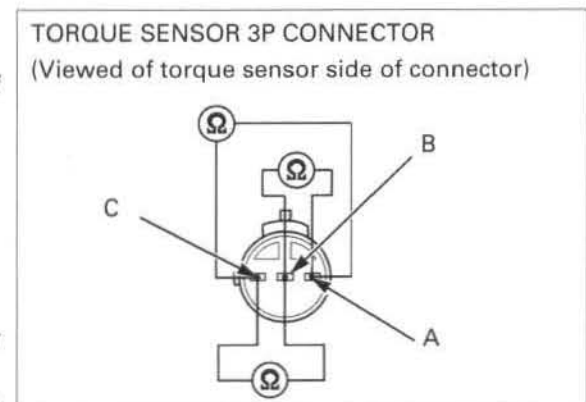
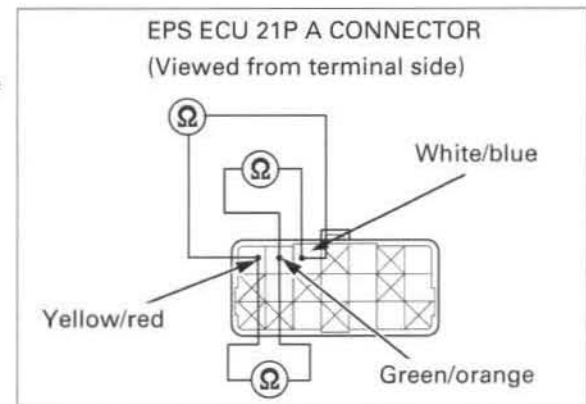
A Terminal (+) – **C Terminal (-)**

B Terminal (+) – **C Terminal (-)**

Is the resistance less than 10 Ω (at 20°C/68°F)?

YES – Replace the EPS unit (Torque sensor coil short circuit) (page 13-34)

NO – Short circuit in the torque sensor line between the EPS ECU and torque sensor.



ELECTRIC POWER STEERING (EPS)

4. Torque Sensor Line And Body Ground Short Circuit Inspection

Check for continuity between wire harness side of the EPS ECU 21P gray A connector and body ground.

Connection:

Yellow/red (+) – Body ground (-)

White/blue (+) – Body ground (-)

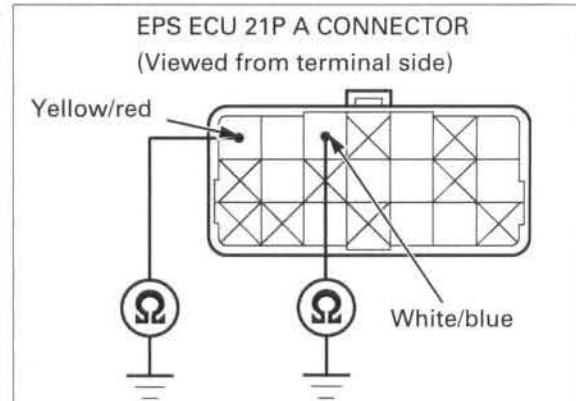
TOOL:

Pin probe (Male) 07ZAJ-RDJA110

Is there continuity?

YES – GO TO STEP 5.

NO – GO TO STEP 6.



5. Torque Sensor Coil Short Circuit Inspection

Disconnect the torque sensor 3P connector. Check for continuity between the A and C terminals of the torque sensor side 3P connector and body ground.

Connection:

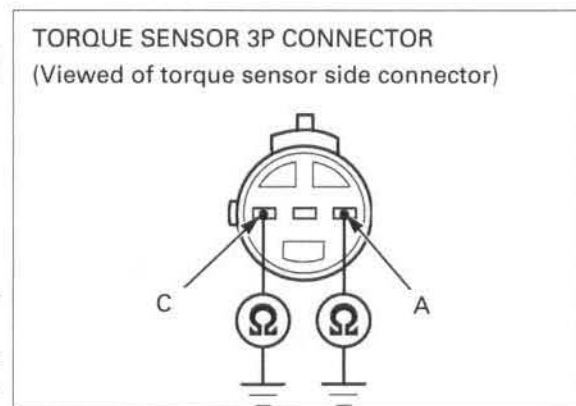
A Terminal (+) – Body ground (-)

C Terminal (+) – Body ground (-)

Is there continuity?

YES – Replace the EPS unit (Torque sensor coil short circuit) (page 13-34).

NO – Short circuit in the torque sensor line between the EPS ECU and torque sensor.



6. Torque Sensor Line Open Circuit Inspection

Disconnect the torque sensor 3P connector. Check for continuity between the EPS ECU 21P gray A connector and torque sensor 3P connector terminals.

Connection:

Yellow/red (+) – Yellow/red (-)

White/blue (+) – White/blue (-)

Green/orange (+) – Green/orange (-)

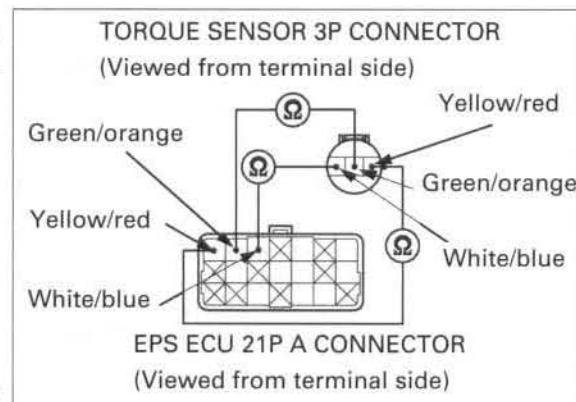
TOOL:

Pin probe (Male) 07ZAJ-RDJA110

Is there continuity?

NO – Open circuit in the torque sensor wire between the EPS ECU and torque sensor.

YES – GO TO STEP 7.



7. Torque Sensor Open Circuit Inspection

Disconnect the torque sensor 3P connector.
Check for resistance between the torque sensor side 3P connector terminals.

Connection:

A Terminal (+) – B Terminal (-)

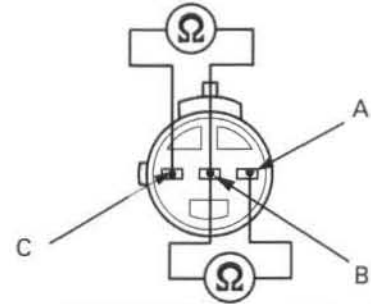
B Terminal (+) – C Terminal (-)

Is the resistance within 10 – 40 Ω (at 20°C/68°F) ?

YES – Recheck for poor contact or loose connection in the wire harness. If they are OK, replace the EPS ECU with a new one (page 25-37).

NO – Replace the EPS unit (Torque sensor coil short circuit) (page 13-34).

TORQUE SENSOR 3P CONNECTOR
(Viewed of torque sensor side connector)



DTC 23-02: TORQUE SENSOR (VT3 DIFFERENTIAL AMPLIFICATION FUNCTION) (REGULAR DIAGNOSIS)

NOTE:

- Before starting the troubleshooting, check the connectors for loose contacts or corroded terminals, and recheck the DTC.

1. EPS ECU system inspection

1. Erase the DTC with HDS or DLC (page 25-11).
2. Start the engine.
3. Fully turn the handlebar to the left or right and hold it 10 seconds.
4. Check the EPS indicator.

Does the EPS indicator come on?

NO – System is normally in this time

YES – GO TO STEP 2.

2. DTC inspection

1. Check the DTC with HDS or DLC (page 25-10).

Is DTC 23-2 indicated?

NO – Perform the troubleshooting for the indicated DTC.

YES – Replace the EPS ECU with a new one (page 25-37).

DTC 23-03: TORQUE SENSOR (VT1, VT2 RAPID CHANGE) (REGULAR DIAGNOSIS)

Refer to LOW/HIGH VOLTAGE FOR THE TORQUE SENSOR (VT1 AND VT2) TROUBLESHOOTING (page 25-29).

DTC 23-04: TORQUE SENSOR (TEMPERATURE SENSOR) (REGULAR DIAGNOSIS)

Refer to LOW/HIGH VOLTAGE FOR THE TORQUE SENSOR (VT1 AND VT2) TROUBLESHOOTING (page 25-29).

DTC 23-05: TORQUE SENSOR (SENSOR COIL) (REGULAR DIAGNOSIS)

Refer to LOW/HIGH VOLTAGE FOR THE TORQUE SENSOR (VT1 AND VT2) TROUBLESHOOTING (page 25-29).

DTC 24-01: ENGINE SPEED SIGNAL (REGULAR DIAGNOSIS)

Refer to DTC 11-01: EXCESSIVE CHANGE OF THE VEHICLE SPEED SIGNAL TROUBLESHOOTING (page 25-18)

DTC 31-01: LOW/HIGH IG1-TERMINAL VOLTAGE (INITIAL DIAGNOSIS)

NOTE:

Before starting the troubleshooting check the following items:

- check the connectors for loose contacts or corroded terminals, and recheck the DTC.
- check for a blown 10A IGN fuse.
- battery condition (must use a fully charged battery)

1. IG1 Line Open Circuit inspection

Remove the front fender (page 2-11).

Disconnect the EPS ECU 21P gray A connector. With the ignition switch turned to ON, measure the voltage between the Black/green wire terminal of the wire harness side of the EPS ECU 21P gray A connector and body ground.

Connection: Black/green(+) – **Body ground (-)**

TOOL:

Pin probe (Male) 07ZAJ-RDJA110

Is there battery voltage?

NO – Open circuit in the Black/green wire between 10A IGN fuse and EPS ECU 21P gray A connector.

YES – GO TO STEP 2.

2. Battery Inspection

Perform the BATTERY/CHARGING SYSTEM troubleshooting (page 19-5).

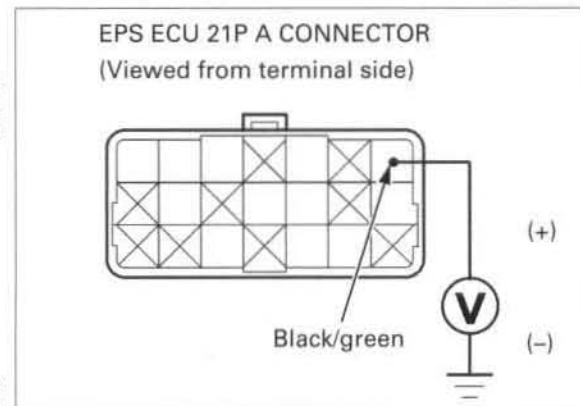
Is the BATTERY/CHARGING SYSTEM in good condition?

YES – Recheck for poor contact or loose connection in the wire harness. If they are OK, replace the EPS ECU with a new one (page 25-37).

NO – Repair the BATTERY/CHARGING SYSTEM

DTC 31-02: LOW/HIGH IG1-TERMINAL VOLTAGE (REGULAR DIAGNOSIS)

Refer to DTC 31-01: LOW/HIGH IG1-TERMINAL VOLTAGE (INITIAL DIAGNOSIS) TROUBLESHOOTING (page 25-32)



**DTC 32-01: LOW/HIGH VBU VOLTAGE
(REGULAR DIAGNOSIS)****NOTE:**

Before starting the troubleshooting check the following items

- check the connectors for loose contacts or corroded terminals, and recheck the DTC.
- check for a blown 40A and 10A IGN fuses.
- battery condition (must use a fully charged battery)

1. EPS ECU +B Line Open Circuit Inspection

Remove the front fender (page 2-11).

Disconnect the EPS ECU 2P C brown connector. With the ignition switch turned to ON, measure the voltage between the Red wire terminal of the wire harness side of the EPS ECU 2P C brown connector and body ground.

Connection: Red(+) – Body ground (-)

Is there battery voltage?

NO – Open circuit in the Red wire between 40A fuse and EPS ECU 2P C brown connector

YES – GO TO STEP 2.

2. Battery Inspection

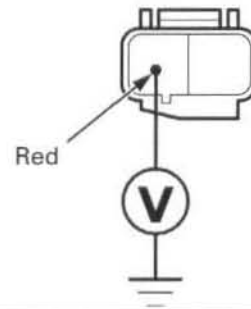
Perform the BATTERY/CHARGING SYSTEM troubleshooting (page 19-5).

Is the BATTERY/CHARGING SYSTEM in good condition?

YES – Recheck for poor contact or loose connection in the wire harness. If they are OK, replace the EPS ECU with a new one (page 25-37).

NO – Repair the BATTERY/CHARGING SYSTEM

EPS ECU 2P C CONNECTOR
(Viewed from terminal side)



SYMPTOM TROUBLESHOOTING

EPS INDICATOR DOES NOT COME ON

NOTE:

- Before starting the troubleshooting, check the connectors for loose contacts or corroded terminals.

1. Combination Meter Inspection

Check that the combination meter functions properly.

Does the combination function properly?

NO – Perform the combination meter inspection (page 22-15).

YES – GO TO STEP 2.

2. Indicator Line Short Circuit inspection

Remove the front fender (page 2-11).

Disconnect the EPS ECU 21P gray A connector. Turn the ignition switch to ON.

Does the indicator come on?

YES – Recheck for poor contact or loose connection in the wire harness. If they are OK, replace the EPS ECU with a new one (page 25-37).

NO – GO TO STEP 3.

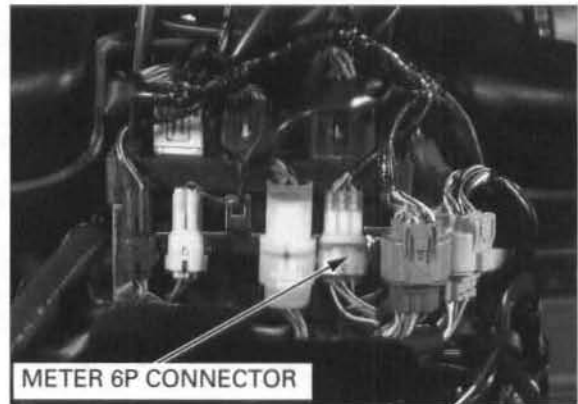
3. EPS Indicator Inspection

Turn the ignition switch to OFF. Disconnect the combination meter 6P natural connector. Turn the ignition switch to ON.

Does the indicator come on?

NO – Recheck for poor contact or loose connection in the wire harness. If they are OK, replace the combination meter with a new one (page 22-14).

YES – Short circuit in the Gray/blue wire between the combination meter and EPS ECU.



EPS INDICATOR DOES NOT GO OFF, AND NO DTCs ARE STORED

NOTE:

Before starting the troubleshooting check the following items

- check the connectors for loose contacts or corroded terminals, and recheck the DTC.
- check for a blown 40A and 10A IGN fuses.
- battery condition (must use a fully charged battery)

1. Fuse Inspection

Check the 40A and 10A IGN fuses.

Is the fuse OK?

YES - Replace the fuse and recheck. If the fuse is blown, check for a short to body ground in this fuse circuit.

NO - GO TO STEP 2.

2. DTC Inspection

Check the DTC with HDS or DLC (page 25-10).

Are there any DTCs?

YES - Troubleshoot the indicated DTC.

NO - GO TO STEP 3.

3. Indicator Line Short Circuit inspection

Remove the front fender (page 2-11).

Disconnect the EPS ECU 21P gray A connector. Ground the Gray/blue wire terminal of the wire harness side of the EPS ECU 21P gray A connector and with a jumper wire.

TOOL:

Pin probe (Male) 07ZAJ-RDJA110

Turn the ignition switch to ON.

Does the indicator go off?

YES - Check for poor contact or loose connection in the wire harness. If they are OK, replace the EPS ECU with a new one (page 25-37).

NO - GO TO STEP 4.

4. EPS Indicator Inspection

Turn the ignition switch to OFF.

Disconnect the combination meter 4P green connector.

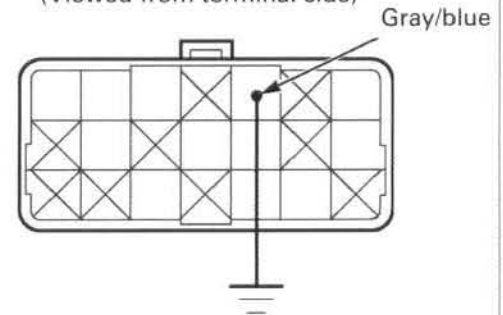
Ground the Gray/blue terminal of the combination meter 4P green connector and body ground.

Does the indicator go off?

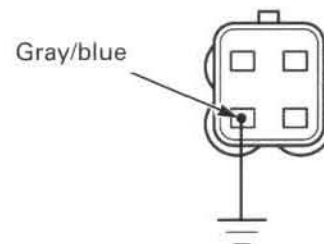
YES - GO TO STEP 5.

NO - GO TO STEP 6.

EPS ECU 21P A CONNECTOR
(Viewed from terminal side)



METER 4P CONNECTOR
(Viewed of meter side connector)



ELECTRIC POWER STEERING (EPS)

5. SCS Line Short Circuit Inspection

Turn the ignition switch to OFF.
Disconnect the EPS ECU 21P gray A connector.
Check for the continuity between the Brown/red wire terminal of the wire harness side and body ground.

Connection: Brown/red(+) – Body ground (-)

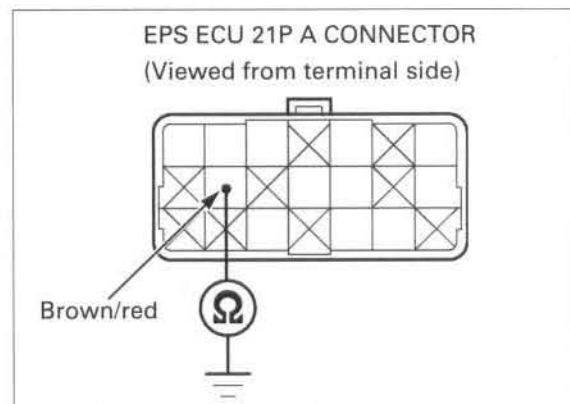
TOOL:

Pin probe (Male) 07ZAJ-RDJA110

Is there continuity?

YES – Short circuit in the Brown/red wire between the EPS ECU 21P gray A connector and DLC.

NO – GO TO STEP 6.



6. IG1 Line Open Circuit inspection

Disconnect the EPS ECU 21P gray A connector.
With the ignition switch turned to ON, measure the voltage between the Black/green wire terminal of the wire harness side of the EPS ECU 21P gray A connector and body ground.

Connection: Black/green(+) – Body ground (-)

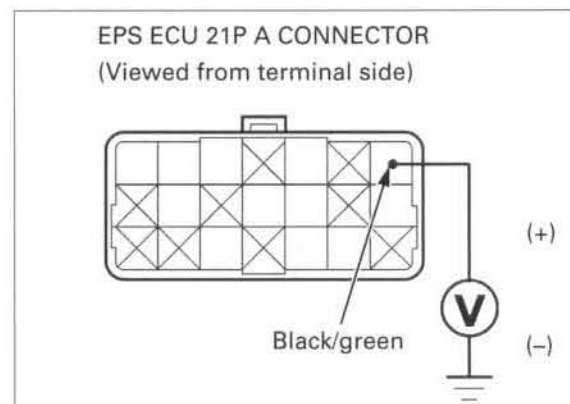
TOOL:

Pin probe (Male) 07ZAJ-RDJA110

Is there battered voltage?

NO – Open circuit in the Black/green wire between 10A IGN fuse and EPS ECU 21P gray A connector

YES – GO TO STEP 7.



7. EPS ECU +B Line Open Circuit Inspection

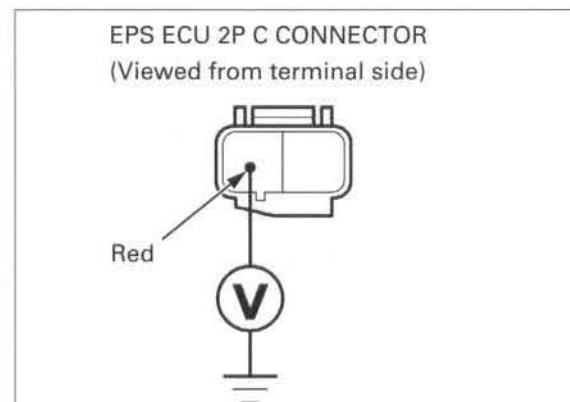
Disconnect the EPS ECU 2P C brown connector.
With the ignition switch turned to ON, measure the voltage between the Red wire terminal of the wire harness side of the EPS ECU 2P C brown connector and body ground.

Connection: Red(+) – Body ground (-)

Is there battery voltage?

NO – Open circuit in the Red wire between 40A fuse and EPS ECU 2P C brown connector

YES – GO TO STEP 8.



8. EPS ECU PG Line Open Circuit Inspection

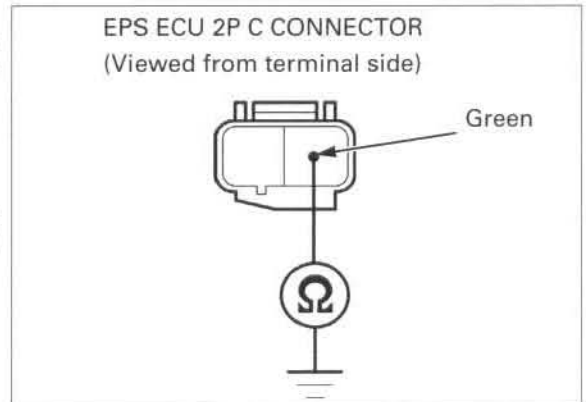
Disconnect the EPS ECU 2P C brown connector. Check the continuity of the wire harness side of the EPS ECU 2P C brown connector and body ground.

Connection: Green(+) – Body ground (-)

Is there continuity?

NO – Open circuit in the Green wire between EPS ECU 2P C brown connector and body ground.

YES – GO TO STEP 9.



9. Battery Inspection

Perform the BATTERY/CHARGING SYSTEM troubleshooting (page 19-5).

Is the BATTERY/CHARGING SYSTEM in good condition?

YES – Recheck for poor contact or loose connection in the wire harness. If they are OK, replace the EPS ECU with a new one (page 25-37).

NO – Repair the BATTERY/CHARGING SYSTEM

EPS ECU REPLACEMENT

REMOVAL/INSTALLATION

Remove the front fender (page 2-11).

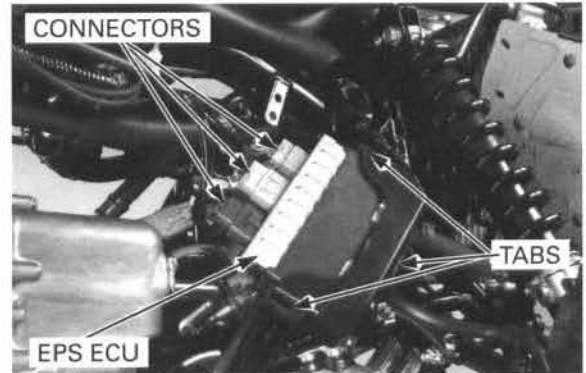
Disconnect the EPS ECU 21P gray A, 2P gray B and 2P brown C connectors.

Release the three tabs of the holder cover.

Remove the EPS ECU from the stays on the ECU holder.

Install the EPS ECU in the reverse order of removal.

Perform the Torque Sensor Initialization (page 25-13).



MEMO



MEMO



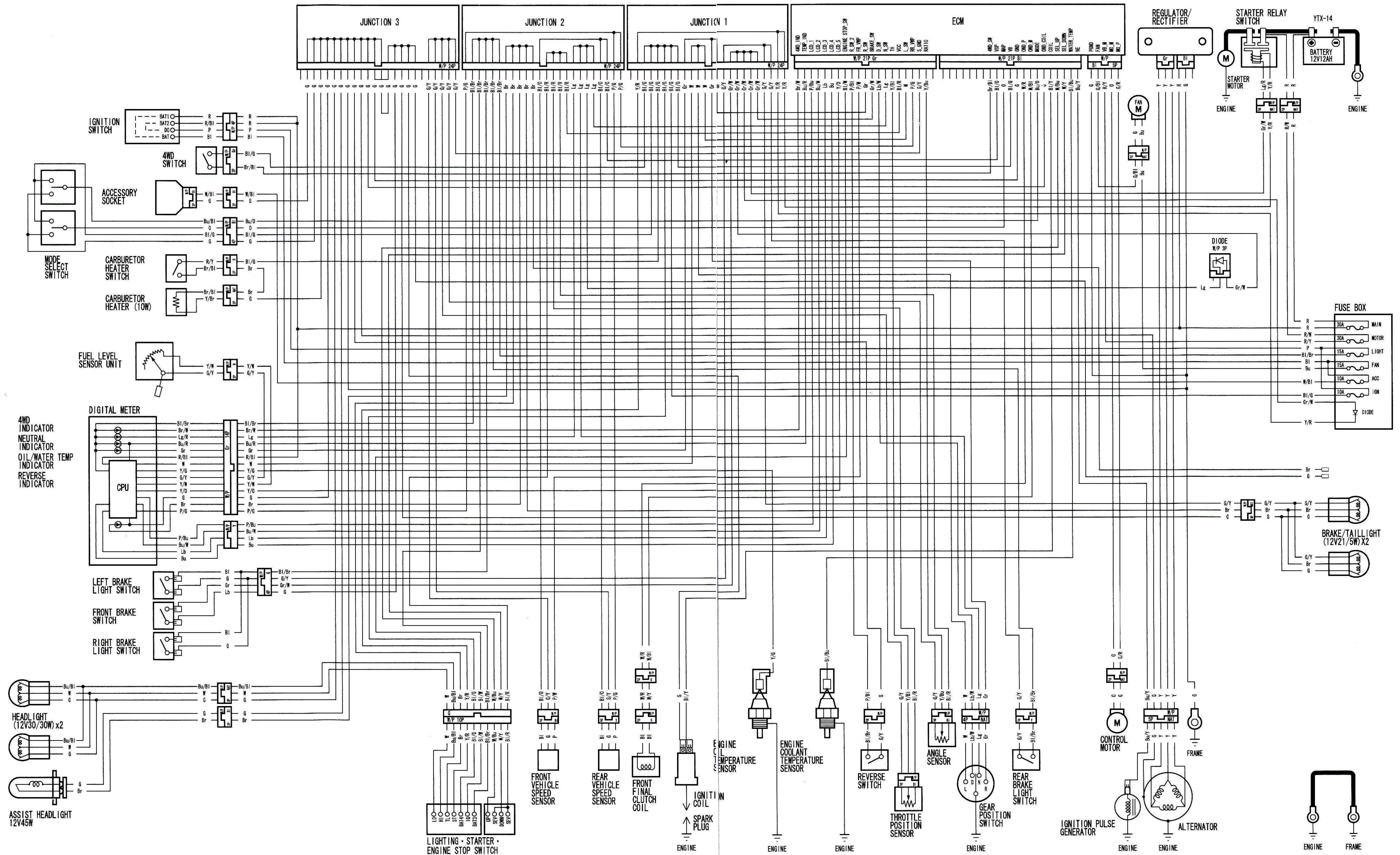
MEMO



26. WIRING DIAGRAMS

'05-'06 FA model (A, CM type).....	26-3	'06-'08 FGA model (A, CM type)	26-8
'05-'06 FA model (U type)	26-4	After '08 FA model (A type)	26-9
'05-'06 FGA model	26-5	After '08 FA model (U type)	26-10
'06-'08 FA model (A, CM type)	26-6	After '08 FGA model (CM type)	26-11
'06-'08 FA model (U type)	26-7	After '08 FPA model (A, CM type)	26-12

'05-'06 FA model (A, CM type)



CONNECTION TABLE

IGNITION SWITCH				LIGHTING SWITCH			DIMMER SWITCH				ENGINE STOP SWITCH		STARTER SWITCH			SHIFT SWITCH						
ON	BAT2	DC	BAT1	BAT	ON	BAT3	TL	(HL)	LO	(HL)	LO	HI	OF	BAT4	IG	ST	UP	UP	SEV	DOWN	SEV	
OFF	○	○	○	○	ON	○	○	○	LO	○	○	○	OF	○	○	FREE	○	○	○	○	○	
COLOR	R/BI	P	R	BI	COLOR	BI/Br	Br	•	LO	○	○	○	OF	○	○	COLOR	BI/W	Y/R	FREE	○	○	
									HI	○	○	○	OF	○	○	COLOR	W/Bu	BI/R	W/Y	BI/R	○	
									COLOR	•	W	Bu/BI	OF	○	○							

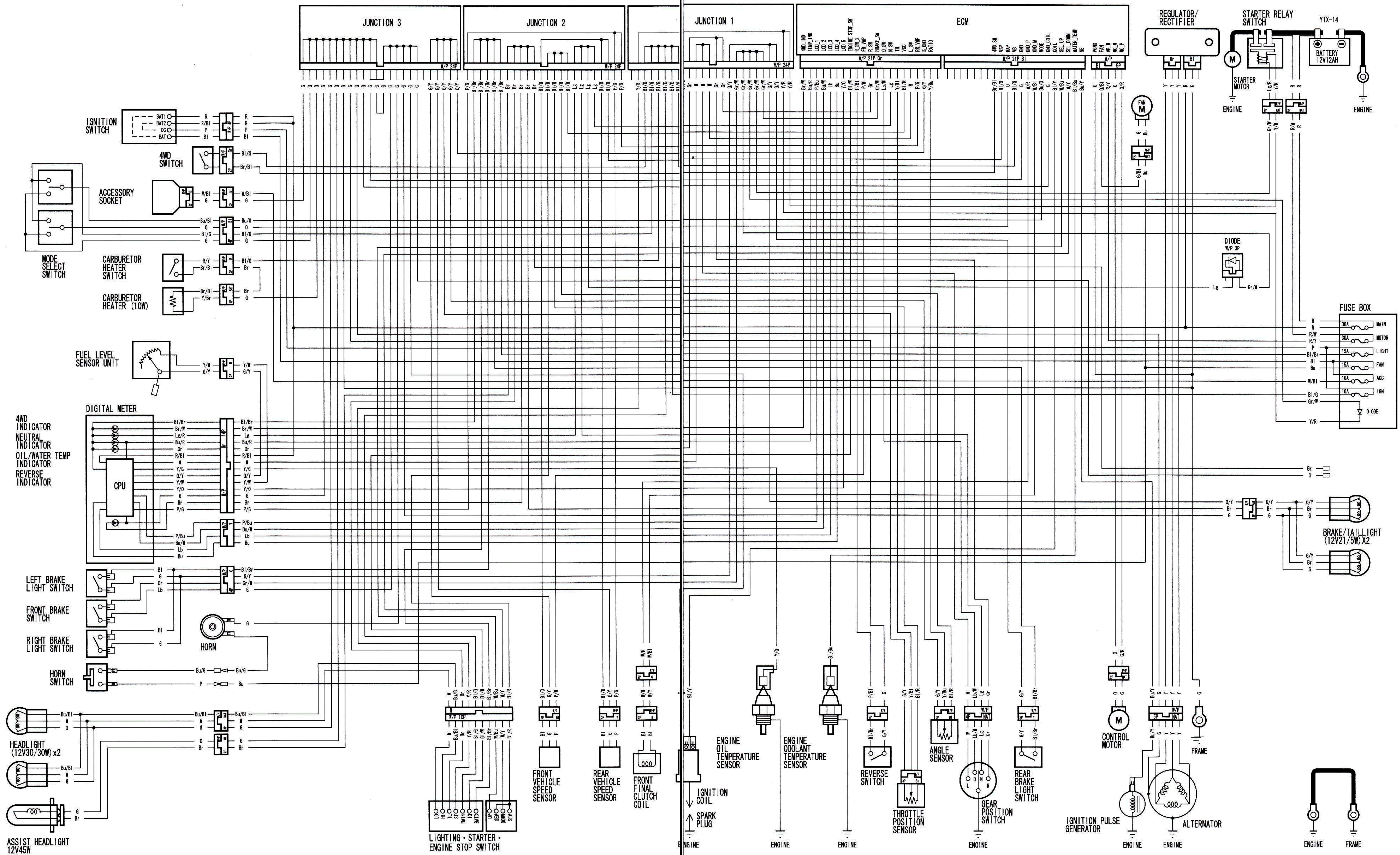
BI	BLACK	Br	BROWN
Y	YELLOW	O	ORANGE
Bu	BLUE	Lb	LIGHT BLUE
G	GREEN	Lg	LIGHT GREEN
R	RED	P	PINK
W	WHITE	Gr	GRAY

COLOR COMB : GROUND/MARKING

0030Z-HN2-A210

WIRING DIAGRAMS

'05-'06 FA model (U type)



CONNECTION TABLE

IGNITION SWITCH			
	BAT2	DC	BAT1
ON	○	○	○
OFF	○	○	○
COLOR	R/BI	P	R BI

LIGHTING SWITCH		
	BAT3	TL (HL)
ON	○	○
OFF	○	○
COLOR	BI/Br	Br

DIMMER SWITCH		
	(HL)	LO
LO (N)	○	○
HI	○	○
COLOR	W	BI/BI

ENGINE STOP SWITCH	
	BAT4
OFF	○
RUN	○
OFF	○
COLOR	BI/G BI/W

STARTER SWITCH	
	IG
FREE	○
PUSH	○
COLOR	BI/W Y/R

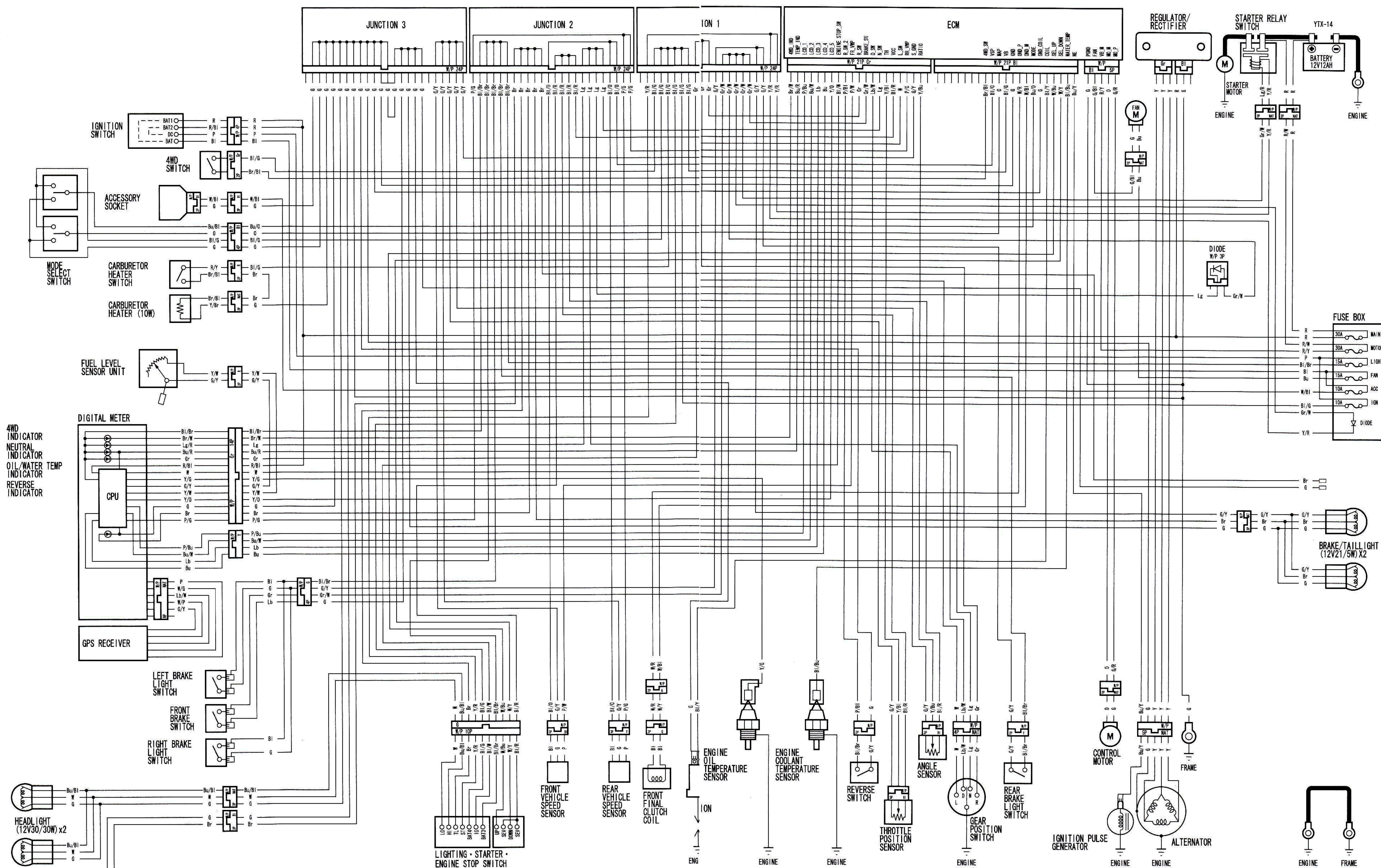
SHIFT SWITCH			
	UP	SEV	DOWN
UP	○	○	
FREE	○	○	
DOWN			○
COLOR	W/Bu	BI/R	W/Y BI/R

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

COLOR COMB : GROUND/MARKING

0030Z-HN2-U110

'05-'06 FGA model



CONNECTION TABLE

IGNITION SWITCH				LIGHTING SWITCH			DIMMER SWITCH				LINE STOP SWITCH				STARTER SWITCH			SHIFT SWITCH				
	BAT2	DC	BAT1	BAT	BAT3	TL	(HL)	(HL)	LO	HI	BAT4	IG	IG	ST	UP	SEV	DOWN	SEV	UP	SEV	DOWN	SEV
ON	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
OFF	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
COLOR	R/BI	P	R	BI	BI	Br	Br	W	W	W	Bu/E	R	BI/W	Y/R	W/Bu	BI/R	W/Y	BI/R	W/Y	BI/R	W/Y	BI/R

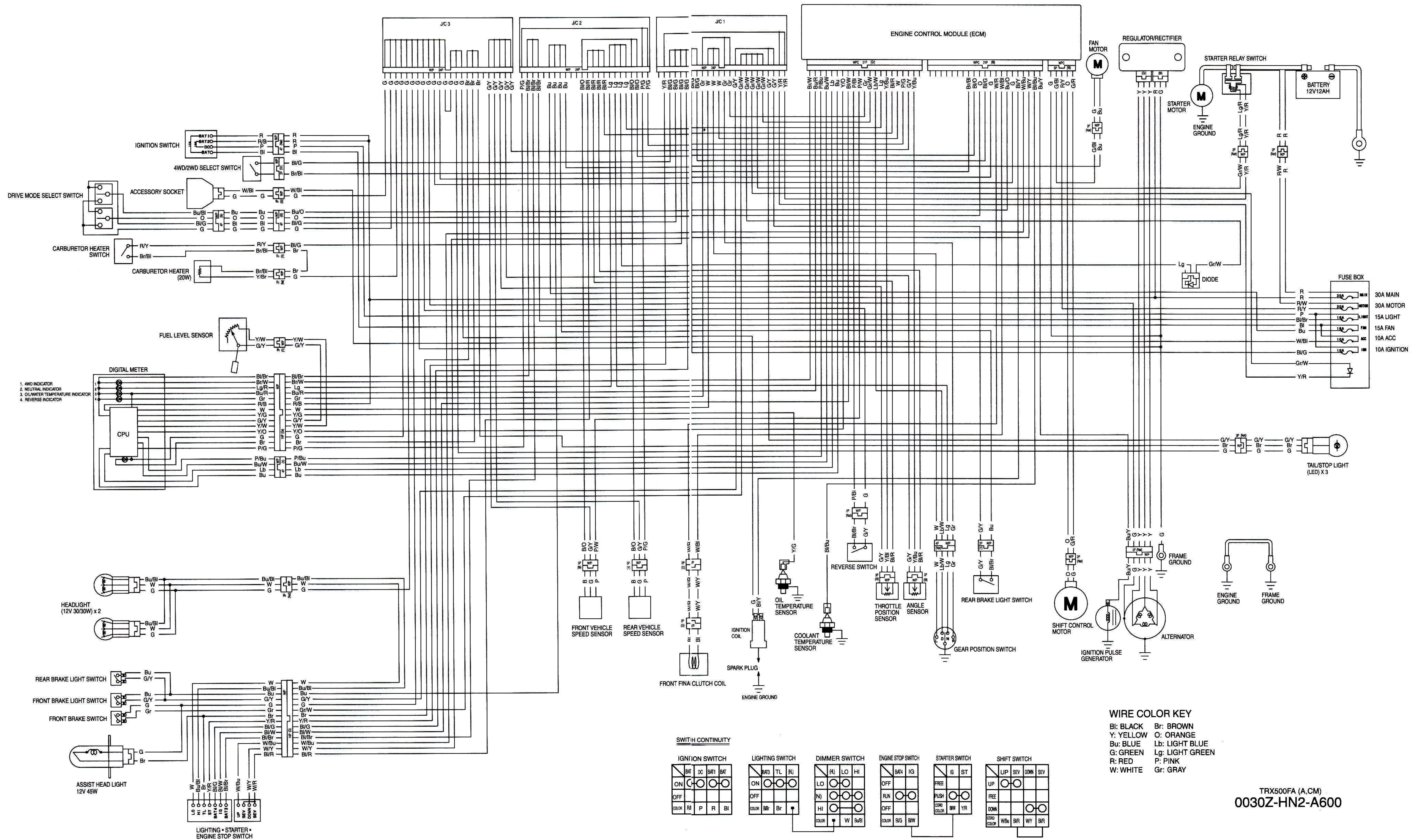
BI	BLACK	Br	BROWN
Y	YELLOW	O	ORANGE
Bu	BLUE	Lb	LIGHT BLUE
G	GREEN	Lg	LIGHT GREEN
R	RED	P	PINK
W	WHITE	Gr	GRAY

COLOR COMB : GROUND/MARKING

0030Z-HN2-A310

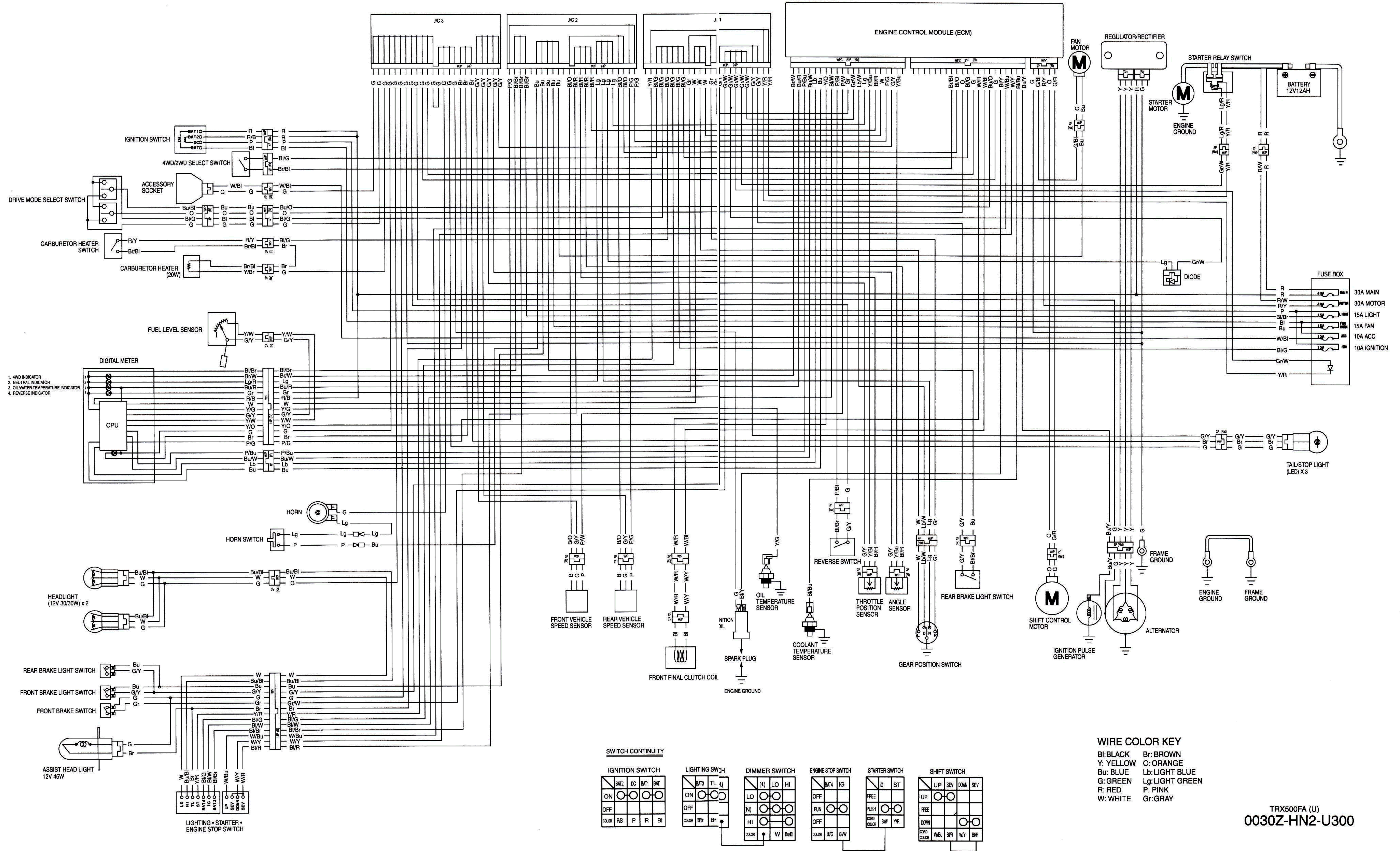
WIRING DIAGRAMS

'06-'08 FA model (A, CM type)



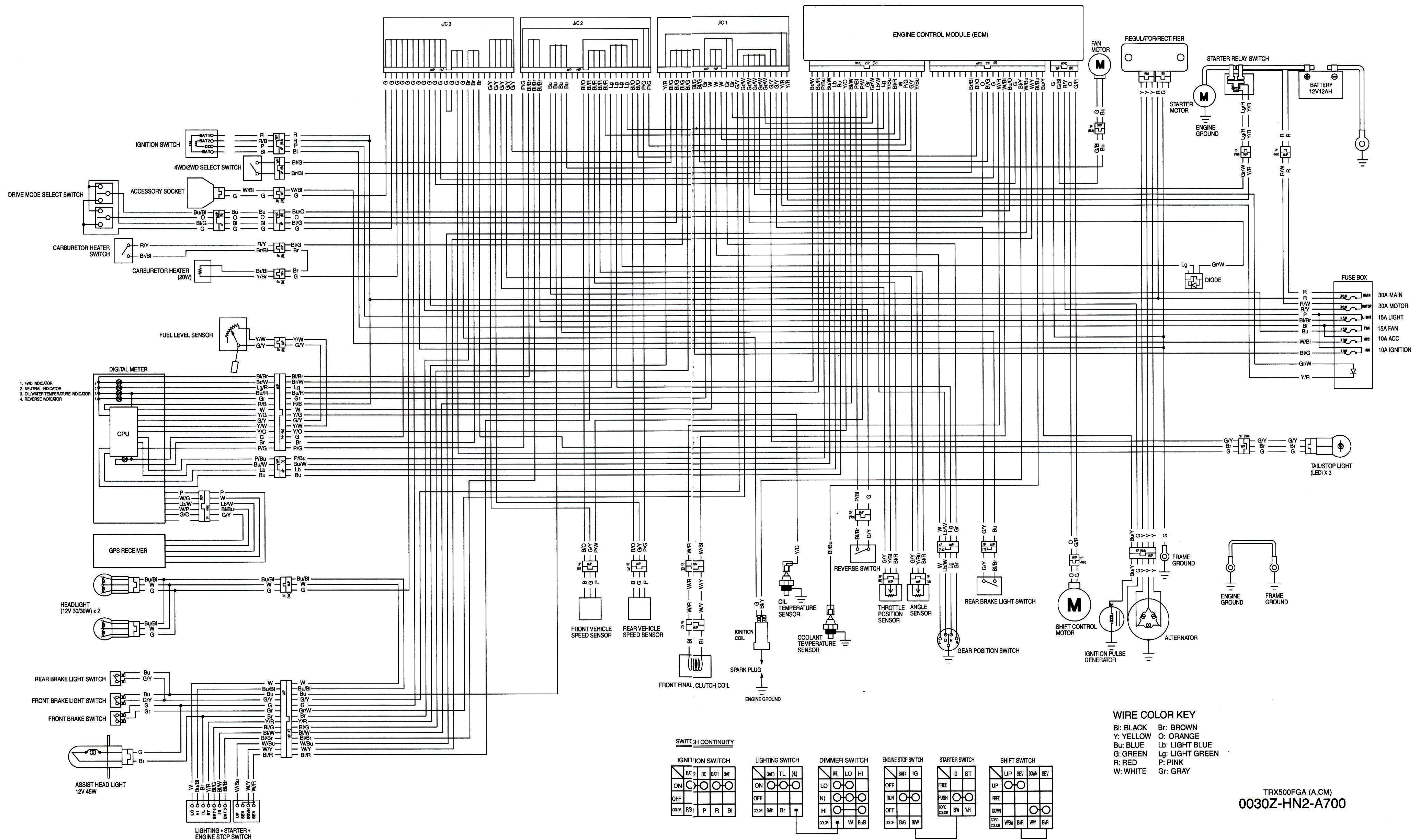
TRX500FA (A,CM)
0030Z-HN2-A600

'06-'08 FA model (U type)



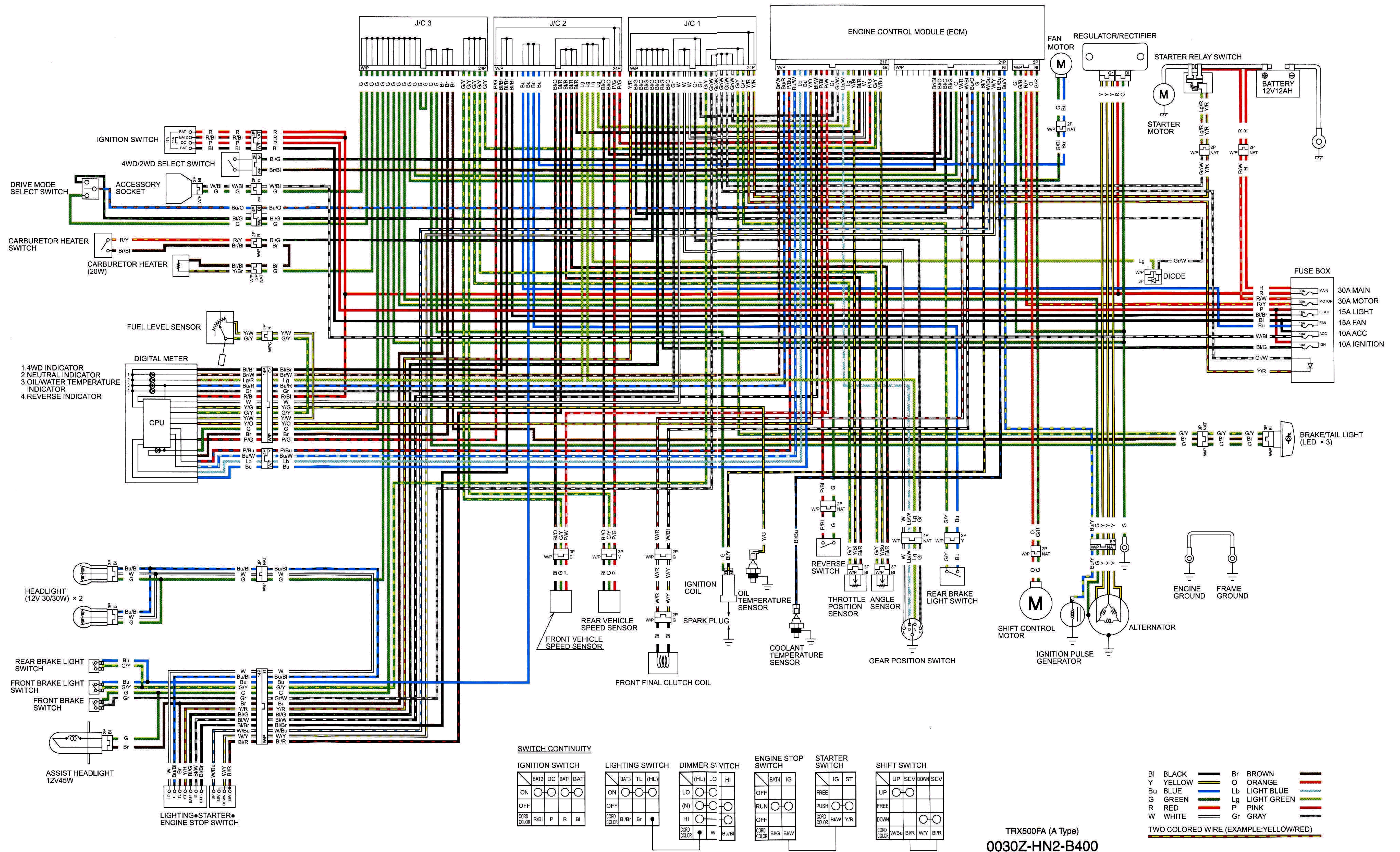
WIRING DIAGRAMS

'06-'08 FGA model (A, CM type)



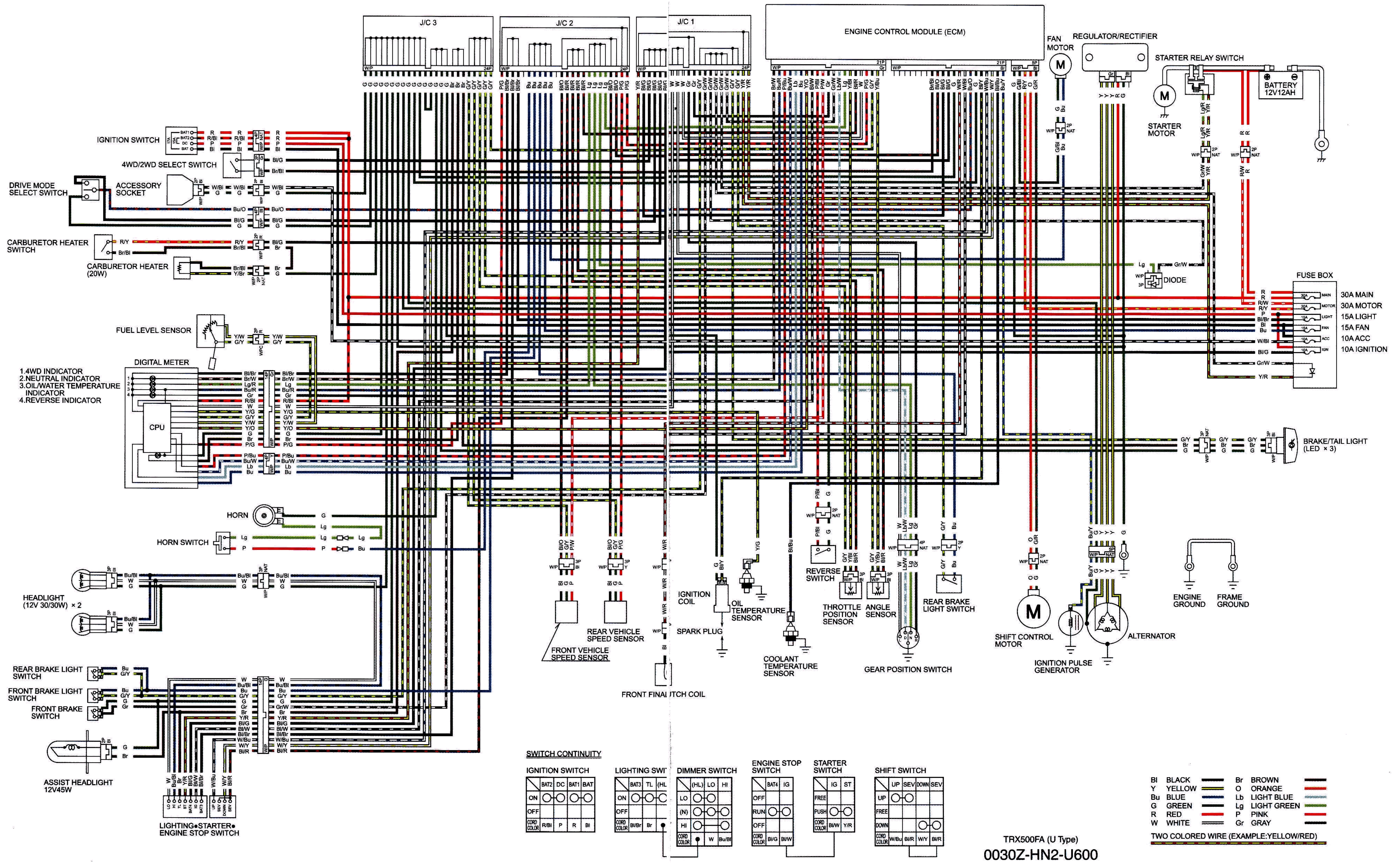
TRX500FGA (A,CM)
 0030Z-HN2-A700

After '08 FA model (A type)

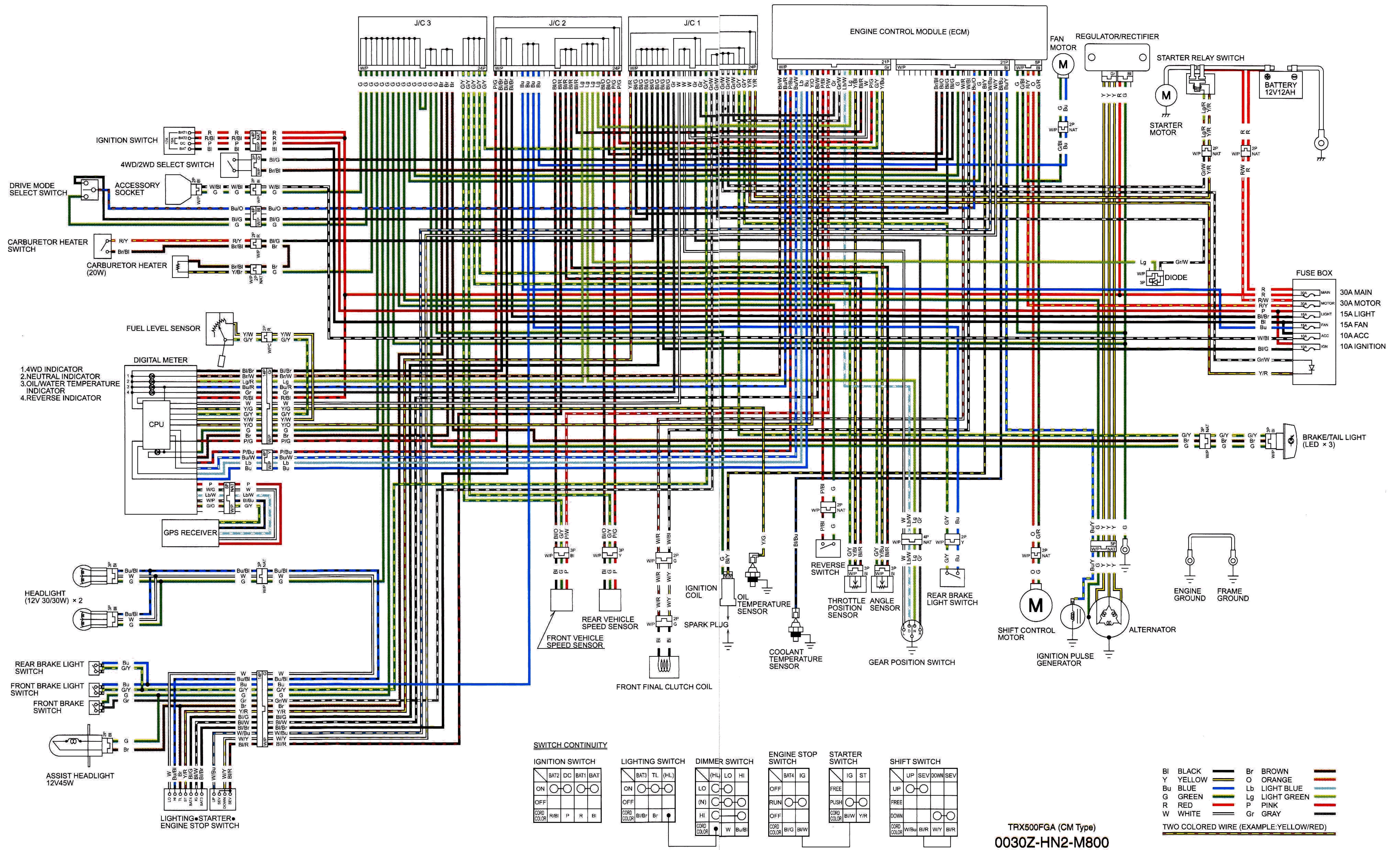


WIRING DIAGRAMS

After '08 FA model (U type)

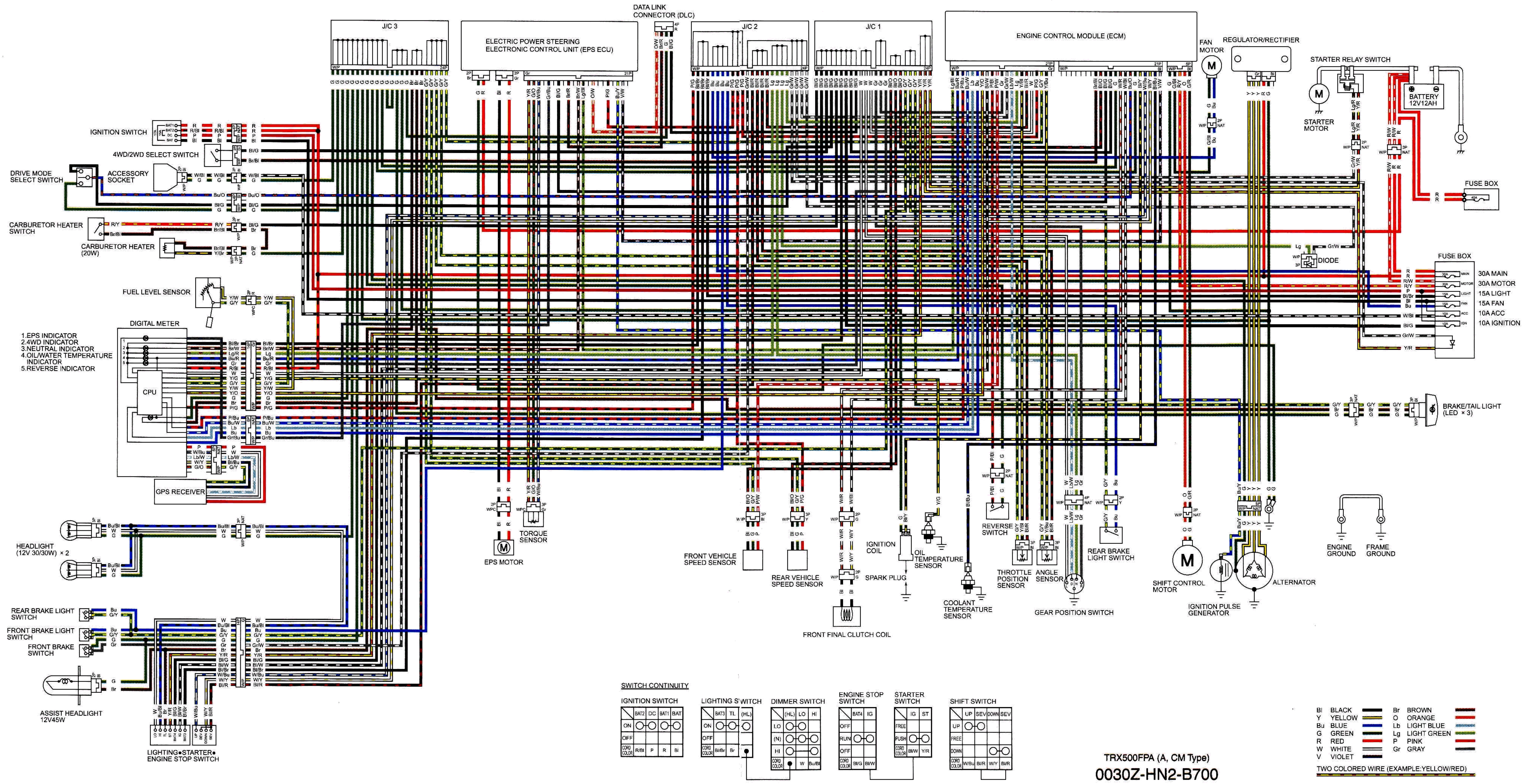


After '08 FGA model (CM type)



WIRING DIAGRAMS

After '08 FPA model (A, CM type)



MEMO



27. TROUBLESHOOTING

ENGINE DOES NOT START OR
IS HARD TO START 27-2

ENGINE LACKS POWER 27-3

POOR PERFORMANCE
AT LOW AND IDLE SPEED 27-5

POOR PERFORMANCE
AT HIGH SPEED 27-6

POOR HANDLING 27-6

ENGINE DOES NOT START OR IS HARD TO START

1. Fuel Line Inspection

Check fuel flow to carburetor.

Does fuel reach carburetor?

- NO** – • Clogged fuel line or strainer
• Faulty fuel valve
• Clogged fuel tank breather hose

YES – GO TO STEP 2.

2. Spark Plug Inspection

Remove and inspect spark plug.

Is the spark plug wet?

- 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 spark test.

Is there weak or no spark?

- YES** – • 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)

NO – GO TO STEP 4.

4. Engine Starting Condition

Start engine by following normal procedure.

Does the engine start then stop?

- Yes** – • Improper SE valve 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

Test cylinder compression.

Is the compression low?

- YES** – • 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 wheel bearing
• Damaged differential or final drive bearing
• Faulty differential or final drive

YES – GO TO STEP 2.

2. Tire Pressure Inspection

Check tire pressure.

Are the tire pressures low?

- YES** – • Faulty tire valve
• Punctured tire

NO – GO TO STEP 3.

3. Engine Condition 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 4.

4. Engine Condition Inspection

Accelerate or run at high speed.

Is there knocking?

- YES** – • Worn piston and cylinder
• Use of poor quality fuel
• Excessive carbon build-up in combustion chamber
• Ignition timing too advance (Faulty ECM)
• Lean fuel mixture

NO – GO TO STEP 5.

5. Ignition Timing Inspection

Check the ignition timing.

Is the ignition timing correct?

- NO** – • Faulty engine control module (ECM)
• Faulty ignition pulse generator

YES – GO TO STEP 6.

6. Spark Plug Inspection

Remove and inspect spark plug.

Is the spark plug fouled or discolored?

- YES** – • Plug not serviced frequently enough
• Incorrect spark plug used

NO – GO TO STEP 7.

TROUBLESHOOTING

7. Cylinder Compression Inspection

Test cylinder compression.

Is the compression low?

- YES** – • Valve clearance too small
• Valve stuck open
• Worn cylinder and piston rings
• Damaged cylinder head gasket
• Seized valve
• Improper valve timing

NO – GO TO STEP 8.

8. Carburetor Inspection

Check carburetor for clogging.

Is the carburetor clogged?

YES – Carburetor not serviced frequently enough

NO – GO TO STEP 9.

9. Engine Oil Inspection

Check oil level and condition.

Is there correct level and good condition?

- NO** – • Oil level too high
• Oil level too low
• Contaminated oil

YES – GO TO STEP 10.

10. Lubrication Inspection

Remove cylinder head cover and inspect lubrication.

Is the valve train lubricated properly?

- NO** – • Clogged oil passage
• Clogged oil orifice

YES – GO TO STEP 11.

11. Over Heating Inspection

check for engine over heating.

Is the engine over heating?

- NO** – • Coolant level too low
• Fan motor not working (Faulty ECM)
• Thermostat stuck closed
• Excessive carbon build up in combustion chamber
• Use of poor quality fuel
• Lean fuel mixture
• Wrong type of fuel

YES – Faulty automatic transmission system

POOR PERFORMANCE AT LOW AND IDLE SPEED**1. Pilot Screw Inspection**

Check carburetor pilot screw adjustment.

Is the adjustment correct?

NO – See page 5-19

YES – GO TO STEP 2.

2. Intake Air Leak Inspection

Check for leaking carburetor insulator.

Is there leaking?

YES – • Loose carburetor insulator bands
• Damaged insulator

NO – GO TO STEP 3.

3. Spark Test

Perform spark test.

Is there weak or intermittent spark?

YES – • 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)

NO – GO TO STEP 4.

4. Ignition Timing Inspection

Check the ignition timing.

Is the ignition timing correct?

NO – • Faulty engine control module (ECM)
• Faulty ignition pulse generator

YES – Faulty automatic transmission system

POOR PERFORMANCE AT HIGH SPEED

1. Fuel Line Inspection

Disconnect fuel line at carburetor.

Does fuel flow freely?

- NO** –
- Clogged fuel line
 - Clogged fuel tank breather hose
 - Faulty fuel valve
 - Clogged fuel strainer

YES – GO TO STEP 2.

2. Carburetor Inspection

Check carburetor for clogging.

Is the carburetor clogged?

YES – Carburetor not serviced frequently enough

NO – GO TO STEP 3.

3. Valve Timing Inspection

Check valve timing.

Is the valve timing correct?

NO – Camshaft not installed properly

YES – GO TO STEP 4.

4. Ignition Timing Inspection

Check ignition timing.

Is the ignition timing correct?

- NO** –
- Faulty engine control module (ECM)
 - Faulty ignition pulse generator

YES – GO TO STEP 5.

5. Valve Spring Inspection

Check valve springs.

Are the valve springs weak?

YES – Faulty valve spring

NO – Faulty automatic transmission system

POOR HANDLING

Steering is heavy

- Steering shaft nut or holder too tight
- Damaged steering shaft bushing
- Damaged steering shaft bearing
- EPS does not assist the steering force (EPS model only)

Any wheel is wobbling

- Excessive wheel bearing play
- Bent rim
- Improperly installed wheel hub
- Loose suspension arm
- Bent frame

Vehicle pulls to one side

- Tire air pressure incorrect
- Faulty shock absorber
- Bent tie-rod
- Incorrect tie-rod adjustment
- Bent frame
- Improper wheel alignment

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