

2003



SERVICE MANUAL

TRX650FA

RINCON™

A Few Words About Safety

Service Information

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

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

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

For Your Customer's Safety

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

For Your Safety

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

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

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 TRX650FA.

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 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 27 Troubleshooting.

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

You must use your own good judgement.

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

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

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

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

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

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

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

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












Honda Motor Co., Ltd.
SERVICE PUBLICATION OFFICE

CONTENTS

	GENERAL INFORMATION	1
	FRAME/BODY PANELS/EXHAUST SYSTEM	2
	MAINTENANCE	3
ENGINE	LUBRICATION SYSTEM	4
	FUEL SYSTEM	5
	COOLING SYSTEM	6
	ENGINE REMOVAL/INSTALLATION	7
	CYLINDER HEAD/VALVE/CAMSHAFT	8
	CYLINDER/PISTON	9
	ALTERNATOR/STARTER CLUTCH	10
	SUB-TRANSMISSION/GEARSHIFT LINKAGE	11
	AUTOMATIC TRANSMISSION	12
	CRANKCASE/CRANKSHAFT/BALANCER	13
CHASSIS	FRONT WHEEL/SUSPENSION/STEERING	14
	REAR WHEEL/SUSPENSION	15
	BRAKE SYSTEM	16
	FRONT DRIVING MECHANISM	17
	REAR DRIVING MECHANISM	18
ELECTRICAL	BATTERY/CHARGING SYSTEM	19
	IGNITION SYSTEM	20
	ELECTRIC STARTER	21
	LIGHTS/METERS/SWITCHES	22
	SELECTABLE 4WD SYSTEM	23
	AUTOMATIC TRANSMISSION SYSTEM	24
	WIRING DIAGRAM	25
	TECHNICAL FEATURE	26
	TROUBLESHOOTING	27
	INDEX	28

SYMBOLS

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

	Replace the part(s) with new one(s) before assembly.
	Use the recommended engine oil, unless otherwise specified.
	Use molybdenum oil solution (mixture of the engine oil and molybdenum grease in a ratio of 1:1)
	Use multi-purpose grease (lithium based multi-purpose grease NLGI #2 or equivalent).
	Use molybdenum disulfide grease (containing more than 3% molybdenum disulfide, 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
	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
	Use silicone grease.
	Apply a locking agent. Use a medium strength locking agent unless otherwise specified.
	Apply sealant.
	Use DOT 4 brake fluid. Use the recommended brake fluid unless otherwise specified.
	Use fork or suspension fluid.

1. GENERAL INFORMATION

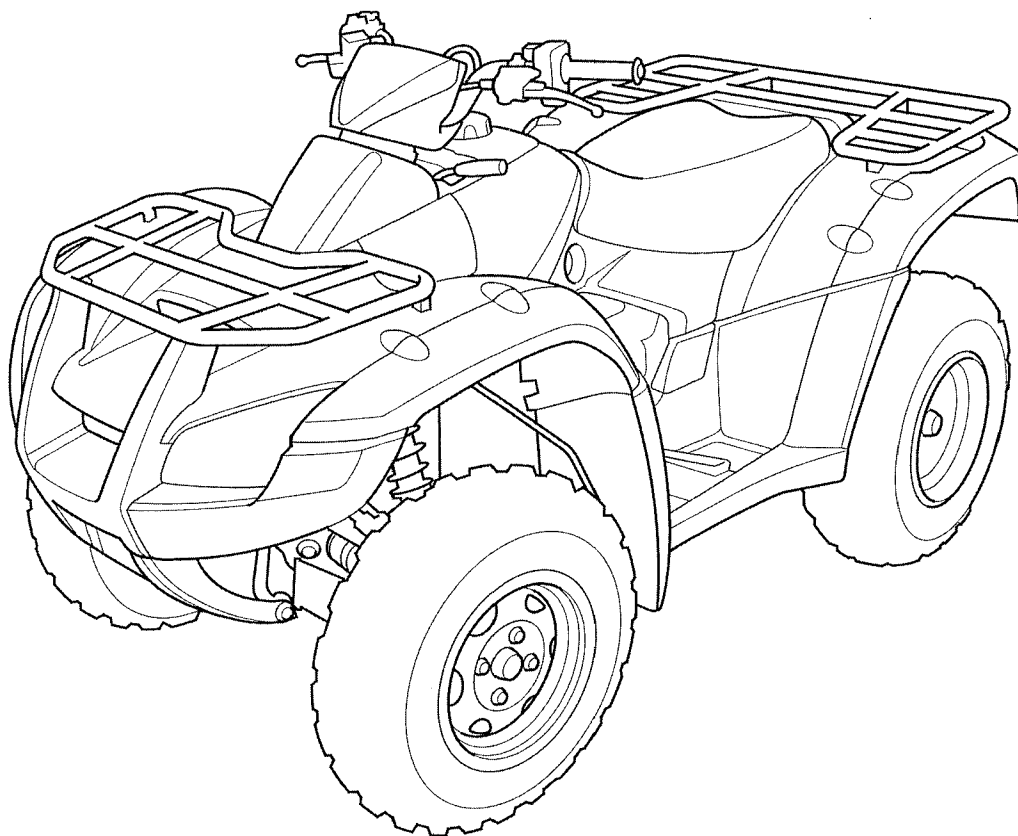
SERVICE RULES	1-2	BRAKE SYSTEM SPECIFICATIONS	1-10
MODEL IDENTIFICATION	1-2	FRONT DRIVING MECHANISM SPECIFICATIONS	1-10
GENERAL SPECIFICATIONS	1-5	REAR DRIVING MECHANISM SPECIFICATIONS	1-10
LUBRICATION SYSTEM SPECIFICATIONS .	1-7	BATTERY/CHARGING SYSTEM SPECIFICATIONS	1-10
FUEL SYSTEM SPECIFICATIONS	1-7	IGNITION SYSTEM SPECIFICATIONS	1-11
COOLING SYSTEM SPECIFICATIONS	1-7	ELECTRIC STARTER SPECIFICATIONS	1-11
CYLINDER HEAD/VALVE/CAMSHAFT SPECIFICATIONS	1-8	LIGHTS/METERS/SWITCHES SPECIFICATIONS	1-11
CYLINDER/PISTON SPECIFICATIONS	1-8	STANDARD TORQUE VALUES	1-12
ALTERNATOR/STARTER CLUTCH SPECIFICATIONS	1-8	ENGINE & FRAME TORQUE VALUES	1-12
SUB-TRANSMISSION/GEARSHIFT LINKAGE SPECIFICATIONS	1-9	TOOLS	1-16
AUTOMATIC TRANSMISSION SPECIFICA- TIONS	1-9	LUBRICATION & SEAL POINTS	1-18
CRANKCASE/CRANKSHAFT/BALANCER SPECIFICATIONS	1-9	CABLE & HARNESS ROUTING	1-21
FRONT WHEEL/SUSPENSION/STEERING SPECIFICATIONS	1-9	EMISSION CONTROL SYSTEMS	1-35
REAR WHEEL/SUSPENSION SPECIFICATIONS	1-9	EMISSION CONTROL INFORMATION LABEL (U.S.A. only)	1-36

GENERAL INFORMATION

SERVICE RULES

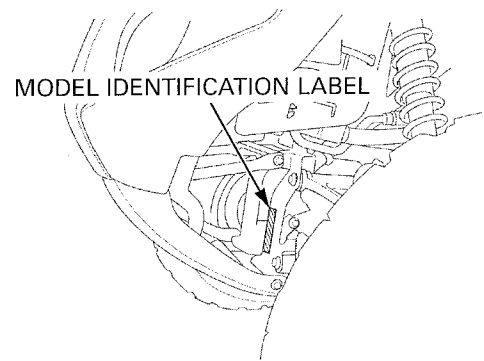
1. Use genuine Honda or Honda-recommended parts and lubricants or their equivalents. Parts that do not meet Honda's design specifications may cause damage to the motorcycle.
2. Use the special tools designed for this product to avoid damage and incorrect assembly.
3. Use only metric tools when servicing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

MODEL IDENTIFICATION

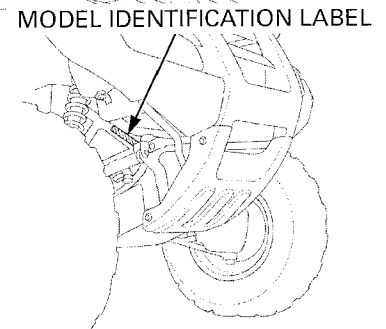


The model identification label is located on the frame down tube.

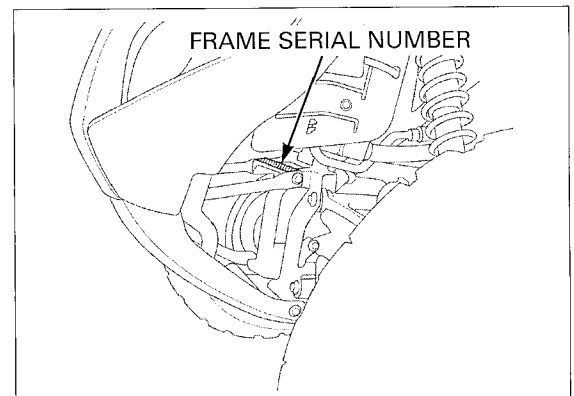
U.S.A.:



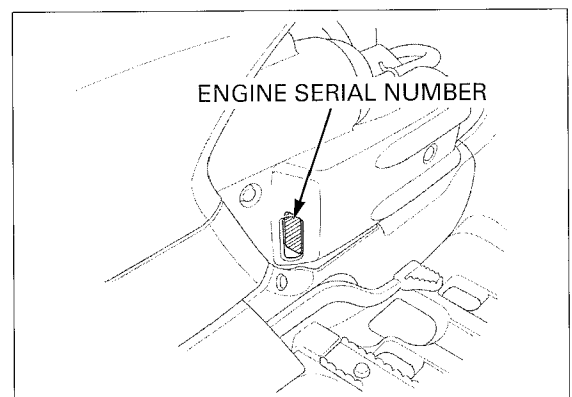
Canada:



The frame serial number is stamped on the front side of the frame.

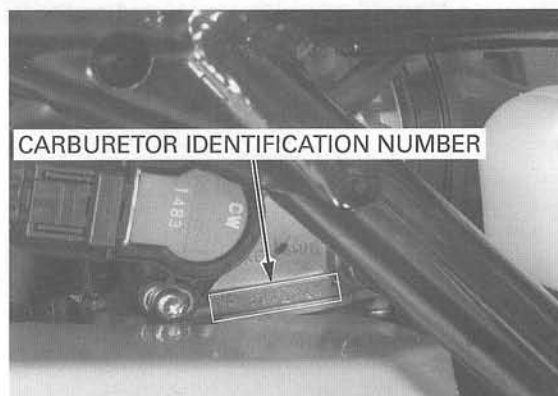


The engine serial number is stamped on the right side of the crankcase.

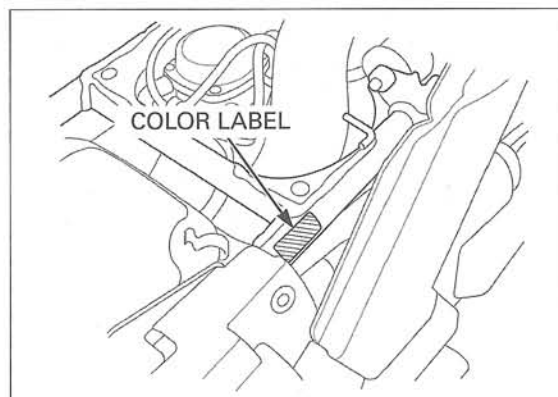


GENERAL INFORMATION

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



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



GENERAL SPECIFICATIONS

ITEM		SPECIFICATIONS
DIMENSIONS	Overall length	2,125 mm (83.7 in)
	Overall width	1,171 mm (46.1 in)
	Overall height	1,207 mm (47.5 in)
	Wheelbase	1,289 mm (50.7 in)
	Front tread	915 mm (36.0 in)
	Rear tread	945 mm (37.2 in)
	Seat height	875 mm (34.4 in)
	Footpeg height	341 mm (13.4 in)
	Ground clearance	254 mm (10.0 in)
	Dry weight	273 kg (600 lbs)
	Curb weight	286 kg (631 lbs)
	Maximum weight capacity	220 kg (485 lbs)
FRAME	Frame type	Double cradle
	Front suspension	Double wish-bone
	Front wheel travel	175 mm (6.9 in)
	Front damper	Double tube
	Rear suspension	Double wish-bone
	Rear wheel travel	203 mm (8.0 in)
	Rear damper	Single tube
	Front tire size	AT25 x 8R12
	Rear tire size	AT25 x 10R12
	Front rim size	12 x 6.0 AT ★ ★
	Rear rim size	12 x 7.5 AT ★ ★
	Front tire brand	H-TRAK UR101 (OHTSU)
	Rear tire brand	H-TRAK UR301 (OHTSU)
	Front brake	Hydraulic drum brake (Dual leading)
	Rear brake	Hydraulic/mechanical disc brake
	Caster angle	1.6°
	Trail length	2.1 mm (0.08 in)
	Camber angle	0°
ENGINE	Fuel tank capacity	17 liters (4.5 US gal, 3.7 Imp gal)
	Fuel tank reserve capacity	3.1 liters (0.82 US gal, 0.68 Imp gal)
	Cylinder arrangement	Single cylinder, longitudinally installed
	Bore and stroke	100 x 82.6 mm (3.9 x 3.25 in)
	Displacement	649 cm ³ (39.6 cu-in)
	Compression ratio	9.2 : 1
	Valve train	OHV
	Intake valve opens at 1 mm (0.04 in) lift	8° BTDC
	Intake valve closes at 1 mm (0.04 in) lift	35 ABDC
	Exhaust valve opens at 1 mm (0.04 in) lift	40° BBDC
	Exhaust valve closes at 1 mm (0.04 in) lift	5° ATDC
	Lubrication system	Forced pressure (dry sump)
	Oil pump type	Trochoid
CARBURETOR	Cooling system	Liquid cooled
	Air filtration	Oiled urethane foam
	Engine dry weight	59.8 kg (131.8 lbs)
	Carburetor type	Constant Vacuum (VE type)
	Throttle bore	40 mm (1.6 in)

GENERAL INFORMATION

ITEM			SPECIFICATIONS
DRIVE TRAIN	Transmission		Automatic (Torque converter + 3-speed drive system and reverse)
	Shift clutch (1st, 2nd and 3rd clutches)		Multi-plate, wet (hydraulic clutch with electric controlled)
	Primary reduction		1.333 (64/48)
	Secondary reduction	Forward	2.000 (38/19)
		Reverse	2.375 (38/16)
	Final reduction	Front	3.230 (42/13)
		Rear	3.153 (41/13)
	Transmission ratio	1st	2.053 (39/19)
		2nd	1.375 (33/24)
		3rd	0.933 (28/30)
		Reverse	2.138 (39/19 x 25/24)
	Gearshift pattern	Sub-transmission	D - N - R
D (Drive)		2-mode: 3-speed Automatic and Manual (ESP; 3 speeds)	
R (Reverse)		1-mode (fixed low ratio)	
ELECTRICAL	Ignition system		DC-CDI
	Starting system		Electric starter motor and emergency recoil starter
	Charging system		Triple phase output alternator
	Regulator/rectifier		FET shorted, triple phase full wave rectification
	Lighting system		Battery

LUBRICATION SYSTEM SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Engine oil capacity	After draining	2.8 liters (3.0 US qt, 2.5 Imp qt)	—
	After draining/filter change	2.9 liters (3.1 US qt, 2.6 Imp qt)	—
	After disassembly	4.1 liters (4.3 US qt, 3.6 Imp qt)	—
Recommended engine oil		Pro Honda GN4 or HP4 (without molybdenum additives) 4-stroke oil (USA & Canada), or Honda 4-stroke oil (Canada only), or an equivalent motorcycle oil API service classification: SG or Higher except oils labeled as energy conserving on the circular API service label JASO T 903 standard: MA Viscosity: SAE 10W-40, 5W-30	—
Oil pressure at 5,000 rpm/80°C (176°F)		785 kPa (8.0 kgf/cm ² , 114 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	VE89A
Main jet	# 152
Slow jet	# 50
Pilot screw opening	See page 5-20
Float level	15.9 mm (0.63 in)
Idle speed	1,400 ± 100 rpm
Throttle grip free play	3 – 8 mm (1/8 – 5/16 in)

COOLING SYSTEM SPECIFICATIONS

ITEM		SPECIFICATIONS
Coolant capacity	Radiator and engine	2.0 liters (2.1 US qt, 1.8 Imp qt)
	Reserve tank	0.46 liter (0.49 US qt, 0.40 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
	Fully open	95°C
	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 distilled water

GENERAL INFORMATION

CYLINDER HEAD/VALVE/CAMSHAFT SPECIFICATIONS

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Cylinder compression at 390 rpm			510 kPa (5.2 kgf/cm ² , 74 psi)	—
Valve clearance		IN	0.15 (0.006)	—
		EX	0.33 (0.013)	—
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	14.8 – 15.2 (0.58 – 0.60)	—
		EX	17.3 – 17.7 (0.68 – 0.70)	—
Valve spring	Free length	IN/EX	1.0 – 1.1 (0.039 – 0.043)	1.4 (0.06)
		Inner	37.20 (1.465)	36.3 (1.43)
		Outer	44.20 (1.740)	43.1 (1.70)
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	34.9501 – 35.1101 (1.37599 – 1.38228)	34.775 (1.3691)
		EX	35.3258 – 35.4858 (1.39078 – 1.39708)	35.068 (1.3806)
	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			—	0.05 (0.002)

CYLINDER/PISTON SPECIFICATIONS

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Cylinder	I.D.		100.000 – 100.015 (3.9370 – 3.9376)	100.05 (3.939)
	Out-of-round		–	0.05 (0.002)
	Taper		–	0.05 (0.002)
	Warpage		–	0.05 (0.002)
Piston, piston pin, piston ring	Piston O.D. at 15 (0.6) from bottom		99.960 – 99.990 (3.9354 – 3.9366)	99.86 (3.931)
	Piston pin hole I.D.		23.002 – 23.008 (0.9056 – 0.9058)	23.03 (0.907)
	Piston pin O.D.		22.994 – 23.000 (0.9053 – 0.9055)	22.98 (0.905)
	Piston-to-piston pin clearance		0.002 – 0.014 (0.0001 – 0.0006)	0.04 (0.002)
	Piston ring end gap	Top	0.25 – 0.35 (0.010 – 0.014)	0.5 (0.02)
		Second	0.40 – 0.55 (0.016 – 0.022)	0.7 (0.03)
		Oil (side rail)	0.20 – 0.70 (0.008 – 0.028)	0.9 (0.04)
	Piston ring-to-ring groove clearance	Top	0.045 – 0.080 (0.0018 – 0.0031)	0.095 (0.0037)
		Second	0.025 – 0.060 (0.0010 – 0.0024)	0.075 (0.0030)
Cylinder-to-piston clearance			0.010 – 0.055 (0.0004 – 0.0022)	0.19 (0.007)
Connecting rod small end I.D.			23.030 – 23.050 (0.9067 – 0.9075)	23.06 (0.908)
Connecting rod-to-piston pin clearance			0.030 – 0.056 (0.0012 – 0.0022)	0.08 (0.003)

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)	51.61 (2.032)
Torque limiter slip torque	53 – 84 N·m (5.4 – 8.6 kgf·m, 39 – 62 lbf·ft)	—

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)
Reverse idle gear	Collar I.D.	13.000 – 13.034 (0.5118 – 0.5131)	13.05 (0.514)
	Shaft O.D.	12.966 – 12.984 (0.5105 – 0.5112)	12.93 (0.509)
	Collar-to-shaft clearance	–	0.10 (0.004)

AUTOMATIC TRANSMISSION SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Oil pressure at 5,000 rpm	Line	785 kPa (8.0 kgf/cm ² , 114 psi)	–
	1st, 2nd and 3rd clutch	785 kPa (8.0 kgf/cm ² , 114 psi)	–
Shift clutch (1st, 2nd and 3rd)	Initial clearance	0.7 – 0.9 (0.03 – 0.04)	–
	Disc thickness	1.88 – 2.00 (0.074 – 0.079)	worn out lining
	Plate thickness	1.95 – 2.05 (0.077 – 0.081)	discoloration
	Return spring free length	33.8 (1.33)	31.8 (1.25)

CRANKCASE/CRANKSHAFT/BALANCER SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Crankshaft	Runout	–	0.05 (0.002)
	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)

FRONT WHEEL/SUSPENSION/STEERING SPECIFICATIONS

ITEM		STANDARD	SERVICE LIMIT
Minimum tire tread depth		–	4 mm (0.16 in)
Cold tire pressure	Standard	30 kPa (0.30 kgf/cm ² , 4.4 psi)	–
	Minimum	26 kPa (0.26 kgf/cm ² , 3.8 psi)	–
	Maximum	34 kPa (0.34 kgf/cm ² , 5.0 psi)	–
	With cargo	30 kPa (0.30 kgf/cm ² , 4.4 psi)	–
Tie-rod distance between the ball joints		388 ± 1 mm (15.3 ± 0.4 in)	–
Toe		Toe-out: 10.9 ± 15 mm (7/16 ± 9/16 in)	–

REAR WHEEL/SUSPENSION SPECIFICATIONS

ITEM		STANDARD	SERVICE LIMIT
Minimum tire tread depth		–	4 mm (0.16 in)
Cold tire pressure	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)	–

GENERAL INFORMATION

BRAKE SYSTEM SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Recommended brake fluid		DOT 4 brake fluid	—
Front brake	Drum I.D.	160.0 – 160.3 (6.30 – 6.31)	161 (6.34)
	Shoe lining thickness	4.0 (0.16)	1.0 (0.04)
	Brake panel warpage	—	0.4 (0.02)
	Waterproof seal lip length	22 (0.9)	20 (0.8)
	Master cylinder I.D.	14.000 – 14.043 (0.5512 – 0.5529)	14.055 (0.5533)
	Master piston O.D.	13.957 – 13.984 (0.5495 – 0.5506)	13.945 (0.5490)
	Wheel cylinder I.D.	19.050 – 19.102 (0.7500 – 0.7520)	19.12 (0.753)
Rear brake	Wheel cylinder piston O.D.	18.997 – 19.030 (0.7479 – 0.7492)	18.81 (0.741)
	Brake disc thickness	7.5 (0.30)	6 (0.2)
	Brake disc runout	—	0.5 (0.02)
	Master cylinder I.D.	15.870 – 15.913 (0.6248 – 0.6265)	15.925 (0.6270)
	Master piston O.D.	15.827 – 15.854 (0.6231 – 0.6242)	15.815 (0.6226)
	Caliper cylinder I.D.	30.230 – 30.280 (1.1902 – 1.1921)	30.29 (1.193)
Caliper piston O.D.		30.165 – 30.198 (1.1876 – 1.1889)	30.14 (1.187)

FRONT DRIVING MECHANISM SPECIFICATIONS

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Front differential	Oil capacity	At draining	175 cm ³ (5.9 US oz, 6.2 Imp oz)	—
		At disassembly	220 cm ³ (7.4 US oz, 7.7 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 (0.2579 – 0.2618)	6.55 (0.2579)
	Cone spring height		2.8 (0.11)	2.6 (0.10)

REAR DRIVING MECHANISM SPECIFICATIONS

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Final drive	Oil capacity	At draining	78 cm ³ (2.6 US oz, 2.7 Imp oz)	—
		At disassembly	90 cm ³ (3.0 US oz, 3.2 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 (YTX14-BS)	Capacity	12V – 12 Ah
	Current leakage	1 mA max.
	Voltage (20°C/68°F)	Fully charged
		13.0 – 13.2 V
	Charging current	Needs charging
		Below 12.3 V
Alternator	Capacity	1.4 A/5 – 10 h
		6.0 A/1.0 h
	Charging coil resistance (20°C/68°F)	360 kW/5,000 rpm
		0.1 – 1.0 Ω

IGNITION SYSTEM SPECIFICATIONS

ITEM		SPECIFICATIONS
Spark plug	Standard	IFR5L11 (NGK) VK16PRZ11 (DENSO)
	For extended high speed riding	IFR6L11 (NGK) VK20PRZ11 (DENSO)
Spark plug gap		1.0 – 1.1 mm (0.039 – 0.043 in)
Ignition coil peak voltage		100 V minimum
Ignition pulse generator peak voltage		0.7 V minimum
Ignition timing ("F" mark)		13° BTDC at idle

ELECTRIC STARTER SPECIFICATIONS

Unit: mm (in)

ITEM	STANDARD	SERVICE LIMIT
Starter motor brush length	12.0 – 13.0 (0.47 – 0.51)	6.5 (0.26)

LIGHTS/METERS/SWITCHES SPECIFICATIONS

ITEM		SPECIFICATIONS
Bulb	Headlight	12V-40/40 W x 2
	Brake/taillight	12V-21/5 W x 2
	Neutral indicator	LED
	Reverse indicator	LED
	4WD indicator	LED
	Coolant/oil temperature indicator	LED
	Meter light	LED x 12
Fuse	Main	30 A x 2
	Sub-fuse	20 A, 10 A x 3

GENERAL INFORMATION

STANDARD TORQUE VALUES

FASTENER TYPE	TORQUE FASTENER TYPE	N·m (kgf·m, lbf·ft)	TORQUE N·m (kgf·m, lbf·ft)
5 mm bolt and nut	5 (0.5, 3.6)	5 mm screw	4 (0.4, 2.9)
6 mm bolt and nut	10 (1.0, 7)	6 mm screw	9 (0.9, 6.5)
8 mm bolt and nut	22 (2.2, 16)	6 mm flange bolt (8 mm head; small 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	14	18 (1.8, 13)	
Valve adjusting screw lock nut	4	6	17 (1.7, 12)	
Timing hole cap	1	14	10 (1.0, 7)	
Engine oil drain bolt	1	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 pump driven sprocket bolt	1	6	12 (1.2, 9)	NOTE 1

FUEL SYSTEM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Carburetor insulator band screw	2	5	—	page 5-19
Starter enrichment (SE) valve nut	1	—	3 (0.3, 2.2)	

COOLING SYSTEM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Water pump impeller	4	7	12 (1.2, 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	54 (5.5, 40)	NOTE 2

GENERAL INFORMATION

CYLINDER/PISTON

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Cylinder stud bolt	4	10	–	page 9-7

ALTERNATOR/STARTER CLUTCH

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Starter clutch bolt	6	8	30 (3.1, 22)	NOTE 1
Recoil starter driven pulley bolt	1	12	108 (11.0, 80)	NOTE 2
Alternator stator bolt	3	6	10 (1.0, 7)	
Ignition pulse generator bolt	2	5	6 (0.6, 4.3)	NOTE 1

AUTOMATIC TRANSMISSION

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Primary driven gear lock nut	1	16	108 (11.0, 80)	NOTE 5, 8
Stator shaft inner collar stopper pin	1	10	14 (1.4, 10)	NOTE 1
Torque converter lock nut	1	20	118 (12.0, 87)	NOTE 2, 5, 8
Oil feed pipe setting cap	1	24	21 (2.1, 15)	

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
Oil temperature sensor	1	12	18 (1.8, 13)	

GENERAL INFORMATION

FRAME

FRAME/BODY PANELS/EXHAUST SYSTEM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Front carrier and carry pipe bolt	8	8	37 (3.8, 27)	
Rear carrier bolt	6	8	37 (3.8, 27)	
Muffler band bolt	2	8	23 (2.3, 17)	
Front exhaust pipe cover band screw	3	5	3 (0.3, 2.2)	
Rear exhaust pipe cover band screw	3	5	6 (0.6, 4.3)	
Muffler cover screw	2	5	3 (0.3, 2.2)	
Footpeg bracket nut	4	8	32 (3.3, 24)	

MAINTENANCE

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Front differential oil filler cap	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 drain bolt	1	8	12 (1.2, 9)	
Front master cylinder reservoir cap screw	2	4	2 (0.2, 1.4)	
Tie-rod lock nut	4	12	54 (5.5, 40)	

FUEL SYSTEM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Starting enrichment (SE) valve nut	1	14	2 (0.2, 1.4)	
Throttle drum cover screw	1	4	2 (0.2, 1.4)	

ENGINE REMOVAL/INSTALLATION

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Lower engine hanger nut (left and right)	2	10	54 (5.5, 40)	

SUB-TRANSMISSION/GEARSHIFT LINKAGE

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Gear selector lever pivot nut	1	12	9 (0.9, 6.5)	
Gear selector arm pinch bolt	2	6	16 (1.6, 12)	
Gear selector cable lock nut	1	14	26 (2.7, 20)	

FRONT WHEEL/SUSPENSION/STEERING

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
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, 22)	NOTE 6
Tie-rod ball joint nut	4	12	54 (5.5, 40)	NOTE 5
Steering shaft end nut	1	14	108 (11.0, 80)	
Steering shaft holder bolt	2	8	32 (3.3, 24)	

REAR WHEEL/SUSPENSION

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Rear wheel nut	8	10	64 (6.5, 47)	
Rear wheel hub nut	2	20	137 (14.0, 101)	NOTE 6
Upper arm pivot nut (frame side)	4	10	34 (3.5, 25)	NOTE 5
Upper arm pivot nut (knuckle side)	2	12	54 (5.5, 40)	NOTE 5
Lower arm pivot nut	4	10	34 (3.5, 25)	NOTE 5

BRAKE SYSTEM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Brake hose oil bolt	5	10	34 (3.5, 25)	
Wheel cylinder bleed valve	2	8	6 (0.6, 4.3)	
Front brake lever pivot bolt	1	6	1 (0.1, 0.7)	
Front brake lever pivot nut	1	6	6 (0.6, 4.3)	
Front master cylinder holder bolt	2	6	12 (1.2, 9)	
Wheel cylinder bolt	4	6	8 (0.8, 5.8)	
Wheel cylinder nut	4	8	17 (1.7, 12)	
Wheel cylinder oil pipe joint nut	4	10	17 (1.7, 12)	
Front brake panel bolt	8	8	29 (3.0, 22)	NOTE 7
Rear brake caliper bleed valve	1	8	6 (0.6, 4.3)	
Rear brake reservoir hose joint screw	1	4	2 (0.2, 1.4)	NOTE 1
Rear brake caliper parking nut	1	10	27 (2.8, 20)	
Rear brake caliper bracket pin bolt	1	8	32 (3.3, 24)	
Rear brake caliper pin retaining bolt	1	8	23 (2.3, 17)	
Rear brake caliper mounting bolt	2	8	30 (3.1, 22)	NOTE 4
Rear brake disc bolt	5	6	20 (2.0, 14)	NOTE 4

FRONT DRIVING MECHANISM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Differential ring gear bolt	8	8	49 (5.0, 36)	NOTE 7
Differential case cover bolt	2	10	49 (5.0, 36)	NOTE 1
	4	8	25 (2.6, 19)	
Differential final clutch bolt	3	8	25 (2.6, 19)	
Differential mounting bolt	1	10	44 (4.5, 33)	
Differential mounting nut	1	10	44 (4.5, 33)	NOTE 5
	1	8	22 (2.2, 16)	
Front vehicle speed sensor bolt	2	6	10 (1.0, 7)	
Rear vehicle speed sensor bolt	2	6	10 (1.0, 7)	
Speed sensor cover stay bolt	1	6	10 (1.0, 7)	
Rear vehicle speed sensor 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
Pinion joint nut	1	16	108 (11.0, 80)	NOTE 1
Final gear case cover bolt	2	10	49 (5.0, 36)	NOTE 1
	4	8	25 (2.6, 19)	
Final gear case mounting nut (main frame)	2	10	34 (3.5, 25)	NOTE 5
Final gear case mounting nut (sub-frame)	2	10	39 (4.0, 29)	NOTE 5
Sub-frame joint nut	4	10	34 (3.5, 25)	

GENERAL INFORMATION

TOOLS

NOTE:

1. Alternative tool
2. Equivalent commercially available in U.S.A.
3. Not available in U.S.A.
4. Newly designed tool

DESCRIPTION	TOOL NUMBER	REMARKS	REF. SEC.
Bearing clip compressor, 25 mm	070ME-HN80100	NOTE 4	17
Bearing clip compressor, 28 mm	070ME-HN80200	NOTE 4	18
Torque limiter attachment D	070MJ-HN80100	NOTE 4	10
Carburetor float level gauge	07401-0010000		5
Pressure gauge set	07406-0020005	NOTE 1: 07YAJ-0010300 and 07406-0020201 NOTE 2	4, 12
Universal bearing puller	07631-0010000		17
Lock nut wrench, 20 x 24 mm	07716-0020100		16
Flywheel holder	07725-0040000	NOTE 2	10
Rotor puller	07733-0020001		10
Remover weight	07741-0010201	NOTE 1: 07936-371020A or 07936-3710200 (U.S.A. only)	6, 10, 11, 12, 13, 14, 17, 18
Valve guide driver, 5.5 m	07742-0010100		8
Attachment, 37 x 40 mm	07746-0010200		11, 13
Attachment, 42 x 47 mm	07746-0010300		10, 12, 13, 14
Attachment, 52 x 55 mm	07746-0010400		13, 14, 17, 18
Attachment, 62 x 68 mm	07746-0010500		13, 18
Attachment, 24 x 26 mm	07746-0010700		10
Attachment, 22 x 24 mm	07746-0010800		14, 17
Attachment, 20 mm I.D.	07746-0020400		13, 17
Attachment, 20 mm I.D.	07746-0020400	NOTE 1: 07746-0020300 or 07746-00202	14
Driver, 40 mm I.D.	07746-0030100		17, 18
Attachment, 25 mm I.D.	07746-0030200		18
Attachment, 30 mm I.D.	07746-0030300		17
Attachment, 35 mm I.D.	07746-0030400		18
Pilot, 10 mm	07746-0040100		10, 12
Pilot, 15 mm	07746-0040300		17
Pilot, 17 mm	07746-0040400		11, 12, 13
Pilot, 20 mm	07746-0040500		13
Pilot, 25 mm	07746-0040600		11, 12, 17
Pilot, 30 mm	07746-0040700		10, 14, 18
Pilot, 35 mm	07746-0040800		13
Pilot, 40 mm	07746-0040900		13
Pilot, 22 mm	07746-0041000		14
Pilot, 28 mm	07746-0041100		13
Pilot, 16 mm	07746-0041300		16
Driver	07749-0010000		10, 11, 12, 13, 14, 15, 17, 18
Valve spring compressor	07757-0010000		8
Valve seat cutters		NOTE 2	8
– seat cutter, 35 mm (IN/EX 45°)	07780-0010400		
– flat cutter, 35 mm (EX32°)	07780-0012300		
– flat cutter, 38.5 mm (IN 32°)	07780-0012400		
– interior cutter, 34 mm (IN/EX 60°)	07780-0014700		
Cutter holder, 5.5 mm	07781-0010101		8
Pilot screw wrench	07908-4730002		5
Snap ring pliers	07914-SA50001		16
Lock nut wrench, 30 x 64 mm	07916-MB00002		17, 18
Threaded adapter	07931-KF00200		13

GENERAL INFORMATION

DESCRIPTION	TOOL NUMBER	REMARKS	REF. SEC.
Puller shaft	07931-ME40000	NOTE 1: 07931-ME4010B and 07931-HB3020A (U.S.A. only)	13, 18
Puller, 35 x 1.0 mm	07933-HA80000	NOTE 1: 07933-HB3000A (U.S.A. only)	12
Bearing remover handle	07936-3710100		11, 12, 13, 17, 18
Bearing remover, 17 mm	07936-3710300		11, 12, 13, 18
Bearing remover, 20 mm	07936-3710600		13
Bearing remover, 30 mm	07936-8890200		17
Bearing remover head, 10 mm	07936-GE00200	NOTE 1: 07936-GE00A00 (U.S.A. only)	10
Bearing remover shaft	07936-GE00100	NOTE 1: 07936-GE00A00 (U.S.A. only)	10
Bearing remover head, 15 mm	07936-KC10200	NOTE 1: 07936-KC10500	6, 17
Bearing remover shaft	07936-KC10100	NOTE 1: 07936-KC10500	6, 17
Mechanical seal driver attachment	07945-4150400	NOTE 1: 07965-415000A (U.S.A. only)	6
Attachment, 28 x 30 mm	07946-1870100		11, 14
Fork seal driver body	07947-KA50100		15
Driver	07949-3710001		14
Oil seal driver	07965-KE80200	NOTE 3	18
Assembly collar	07965-VM00100		13
Assembly shaft	07965-VM00200		13
Threaded adaptor	07965-VM00300		13
Valve guide reamer, 5.5 mm	07984-2000001	NOTE 1: 07984-200000D (U.S.A. only)	8
Assembly collar spacer	07AMF-HN8A100	NOTE 4	13
Attachment, 78 x 90 mm	07GAD-SD40101		13
Compressor bolt assembly	07GAE-PG40200	NOTE 1: 07GAE-PG4020A (U.S.A. only)	12, 14
Inspection adaptor	07GMJ-ML80100		23, 24
Peak voltage adaptor	07HGJ-0020100	NOTE 1: IgnitionMate Peak voltage tester (U.S.A. only)	20
Pinion puller base	07HMC-MM80110	NOTE 1: 07HMC-MM8011A (U.S.A. only)	18
Spherical bearing driver	07HMF-HC00100	NOTE 3	15
Adjustable bearing remover set	07JAC-PH80000		14
Oil seal driver	07JAD-PH80101		14, 15
Differential inspection tool	07KMK-HC50101	NOTE 1: 07KMK-HC5010A (U.S.A. only)	17
Driver attachment	07LAD-PW50500		18
Oil seal driver	07LAD-SM40100		15
Clutch compressor attachment	07LAE-PX40100		12, 14
Press attachment	07LME-GE20100		17
Ball joint remover, 28 mm	07MAC-SL002000		14, 17
Recoil pulley holder	07SMB-HM70100		10
Pinion holder	07SMB-HM70200		18
Ball joint remover/installer	07WMF-HN00100		13, 14
Puller attachment	07YMC-GCS0100	NOTE 3/NOTE 1: 07949-3710001, 07746-0010700 and 07746-0040400	18
Torque limiter attachment B	07YMJ-MCF0200		10
Tensioner B	07ZMG-MCAA400		8
Compression tester	EEPV303A		8
Adaptor	MT26J200		8
Cooling system adaptor	OTCJ33984A		6
Cooling system pressure tester	SVTS4AH		6

GENERAL INFORMATION

LUBRICATION & SEAL POINTS

ENGINE

LOCATION	MATERIAL	REMARKS
Water pump impeller shaft sliding surface Camshaft cam lobes Rocker arm shaft sliding surfaces Valve stems (valve sliding surface) Piston pin outer surface Starter driven gear bearing Starter reduction gear shaft splines Starter reduction gear teeth Starter motor shaft splines	Molybdenum disulfide solution (a mixture of engine oil and molybdenum disulfide grease in a ratio of 1:1)	
Oil strainer rubber seal Rocker arm followers and adjusting screw tips Cam chain Cam followers (entire 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 Starter sprag clutch (entire surface) Recoil starter driven pulley bolt threads and seating surface Shift fork shaft Shift drum guide groove Transmission gear teeth and sliding surfaces Mainshaft, countershaft and output shaft journals Primary driven gear lock nut threads and seating surface Torque converter sprag clutch and bearings Torque converter lock nut threads and seating surface Oil feed pipes (entire surface) Each bearing rotating area Each O-ring Each oil seal lips	Engine oil	
Recoil starter driven pulley oil seal lips Recoil starter drive pulley pivot	Multi purpose grease	
Recoil starter center bolt Ignition pulse generator bolt threads Starter clutch bolt threads Shift drum stopper arm pivot bolt threads Oil pump driven sprocket bolt threads Cam chain tensioner pivot bolt threads Stator shaft inner collar stopper pin threads	Locking agent	
Alternator wire grommet seating surface Front crankcase cover mating surface Crankcase mating surface Engine coolant temperature (ECT) sensor threads	Sealant	

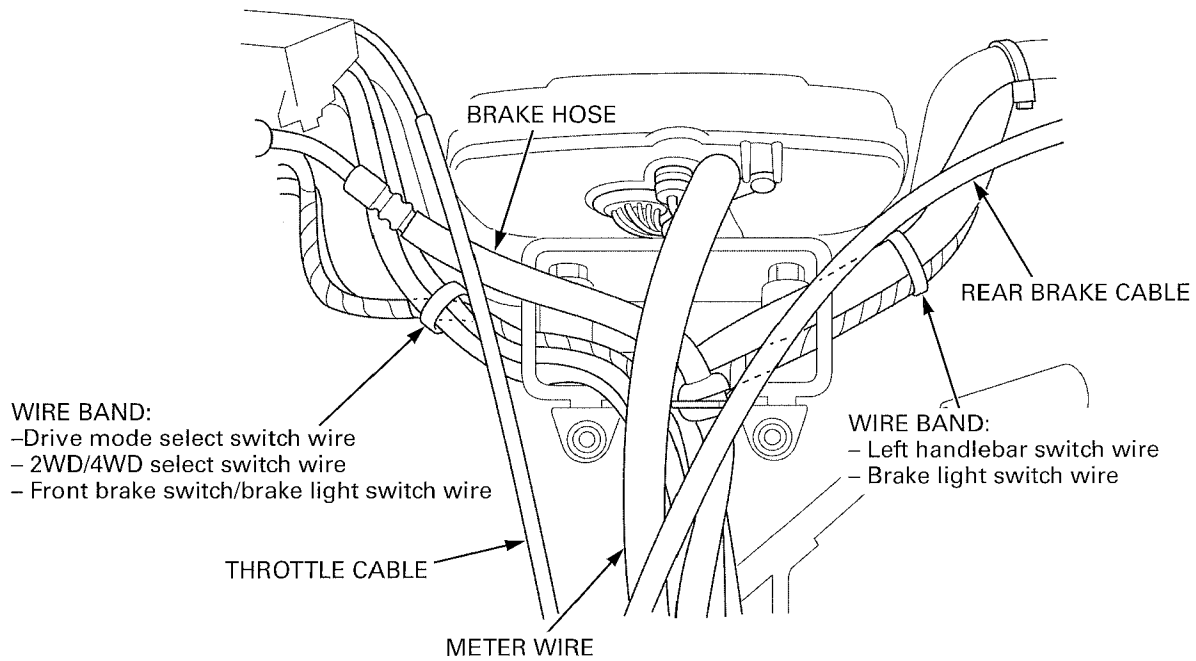
FRAME

LOCATION	MATERIAL	REMARKS
Throttle cable ends Throttle cable adjuster threads Throttle lever pivot and dust seal lips Rear brake lever pivot Parking lock arm pivot (screw) Steering shaft bushing inner surface Steering shaft dust seal lips Front knuckle outer dust seal lips Front knuckle inner dust seal lips Front upper arm pivot bushings Front upper arm pivot dust seal lips Front shock absorber lower bearing (upper arm) Front shock absorber lower pivot dust seal lips (upper arm) Rear knuckle dust seal lips Rear upper arm pivot bearings (frame side) Rear upper arm pivot bushings (knuckle) Rear lower arm pivot bushings Rear suspension arm pivot dust seal lips Rear brake pedal pivot Rear brake pedal pivot dust seal lips Rear brake cable ends Differential oil seal lips (2 places; drive shafts) Differential O-rings (3 places) Differential final clutch inside (dust seals and bearing) Vehicle speed sensor O-rings Final gear case oil seal lips (4 places) Final gear case O-rings (3 places) Gear selector lever pivot Gear selector lever gate grooves	Multi purpose grease (NLGI #2)	Apply 2 – 3 g Fill up 2.5 – 3 g Fill up 2.5 – 3 g per each seal Fill up 3 g per each bearing
Front brake drum water-proof seal lips	Multi purpose grease (NLGI #3)	
Steering shaft splines Rear suspension arm pivot bolt head and O-rings (knuckle side) Front propeller shaft seal outer surfaces (2 places) Output shaft joint splines (front propeller shaft side) Output shaft joint splines (engine side) Differential pinion joint splines Front drive shaft splines (wheel side) Rear propeller shaft seal outer surface Final gear case pinion joint splines (rear propeller shaft side) Universal joint bearing Universal joint splines (both sides) Rear drive shaft splines (each end)	Molybdenum disulfide grease	Fill up 5 – 8 g Fill up 5 – 8 g Fill up 5 – 8 g
Rear shock absorber pivot bushings (upper and lower) Rear shock absorber pivot dust seal lips	Molybdenum disulfide paste	
Front drive shaft inboard joint inside Front drive shaft outboard joint inside	NKG708 (KYODO YUSHI)	Fill up 55 – 75 g per each joint Fill up 50 – 70 g per each joint
Rear drive shaft inboard joint inside	NKG205 (KYODO YUSHI)	Fill up 60 – 80 g per each joint
Rear drive shaft outboard joint inside	NKG106 (KYODO YUSHI)	Fill up 45 – 65 g per each joint

GENERAL INFORMATION

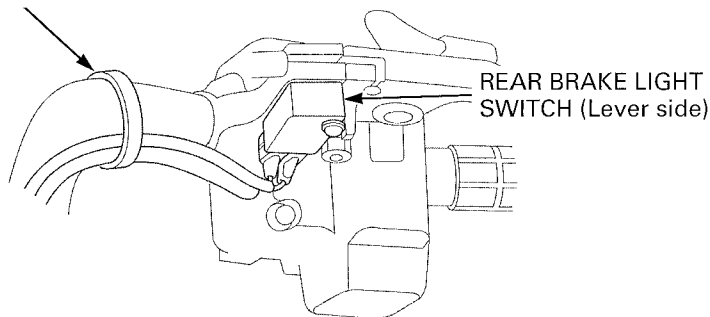
LOCATION	MATERIAL	REMARKS
Front brake lever-to-master piston contacting area Front brake lever pivot bolt Wheel cylinder adjuster screw threads and adjusting nut spindle outer surface Wheel cylinder body boot and piston boot grooves Front brake panel shoe metal contacting areas Wheel cylinder adjuster and piston grooves (shoe contacting grooves) Rear brake caliper slide pin boot grooves and boots inside	Silicone grease	
Throttle cable outer inside Choke cable outer inside Rear brake cable inside	Cable lubricant	
Brake master cylinder piston and cups Wheel cylinder piston and cup Brake caliper piston and piston seals	DOT4 brake fluid	
Handlebar grip rubber inside Air cleaner housing-to-connecting tube (carburetor and intake duct) mating areas	Honda bond A or Honda Hand Grip Cement (U.S.A. only) or equivalent	
Wheel cylinder-to-brake panel mating surface	Sealant	
Cooling fan motor shaft threads	Locking agent	

CABLE & HARNESS ROUTING

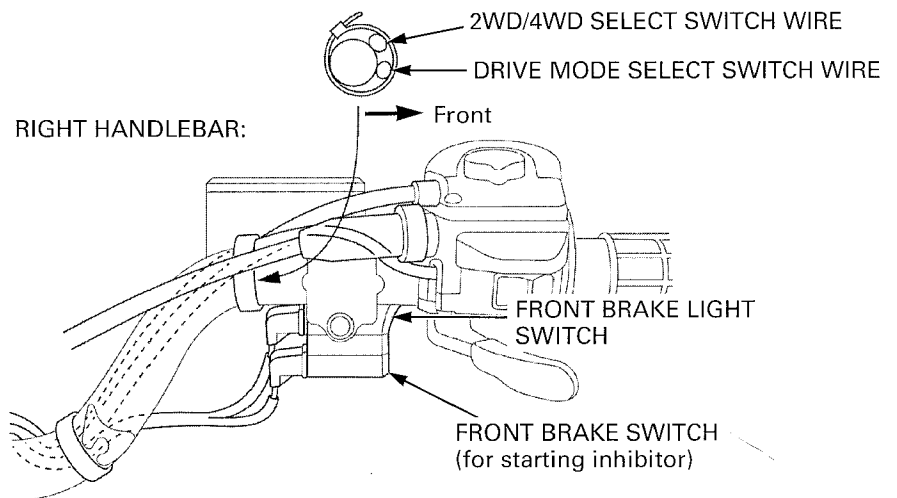


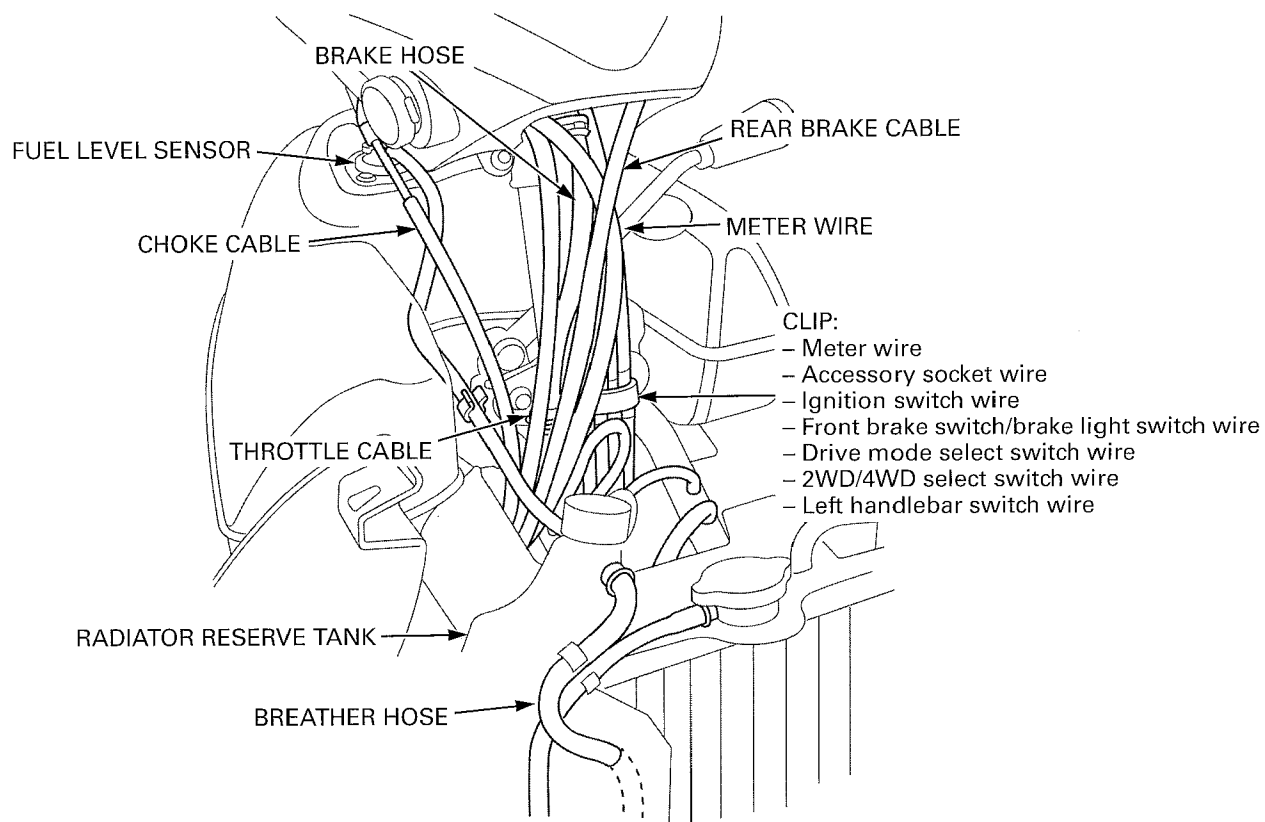
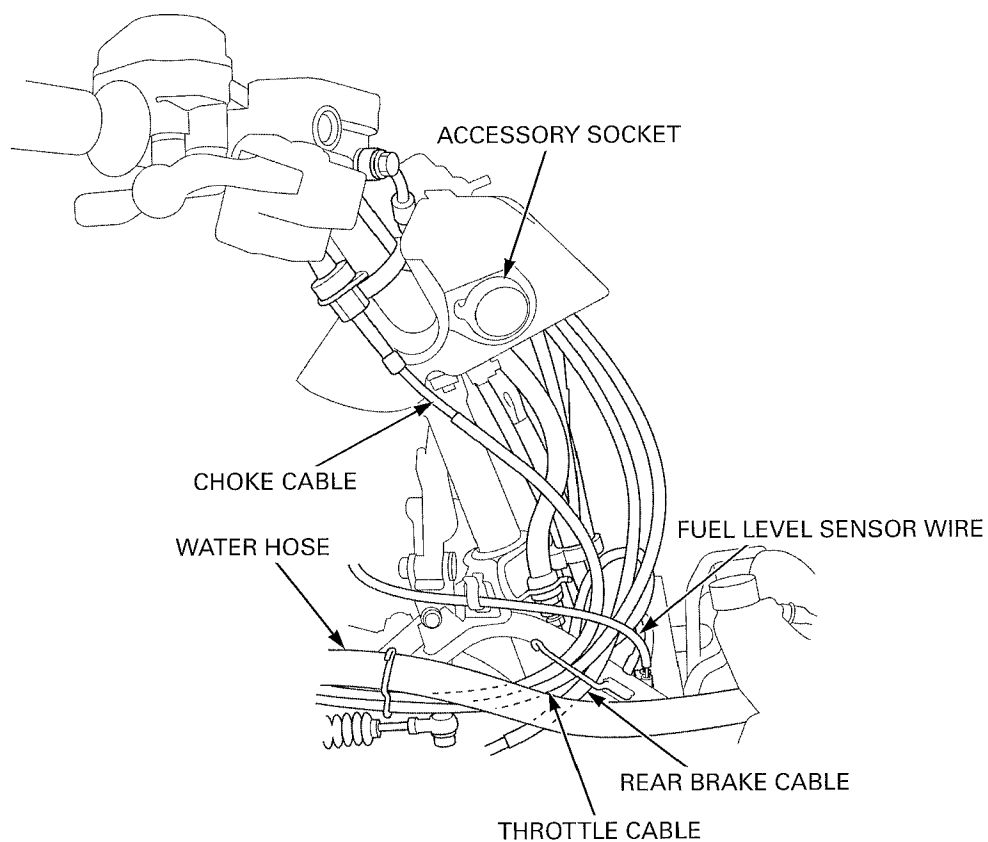
- WIRE BAND:**
- Left handlebar switch wire
 - Brake light switch wire

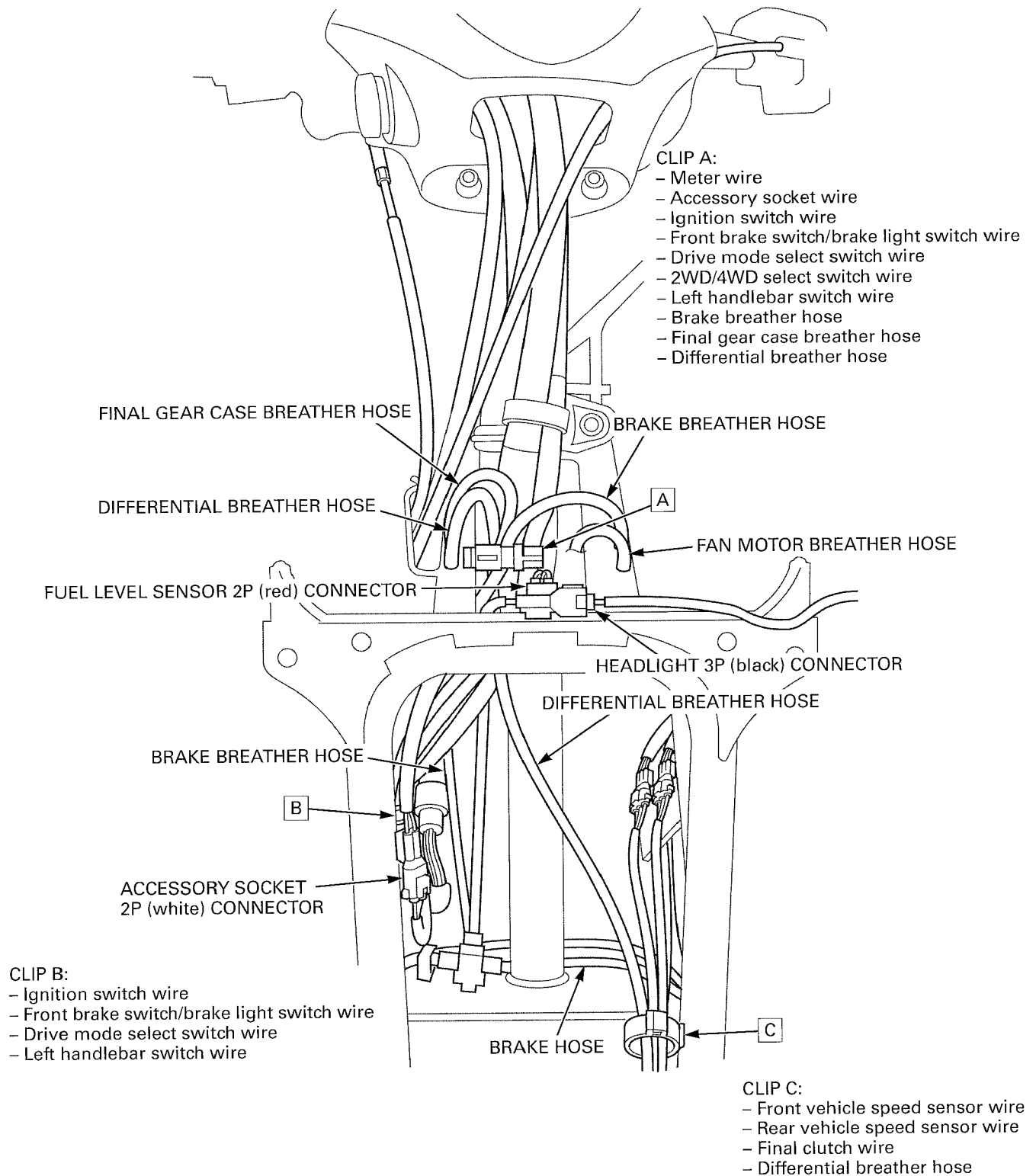
LEFT HANDLEBAR:



RIGHT HANDLEBAR:



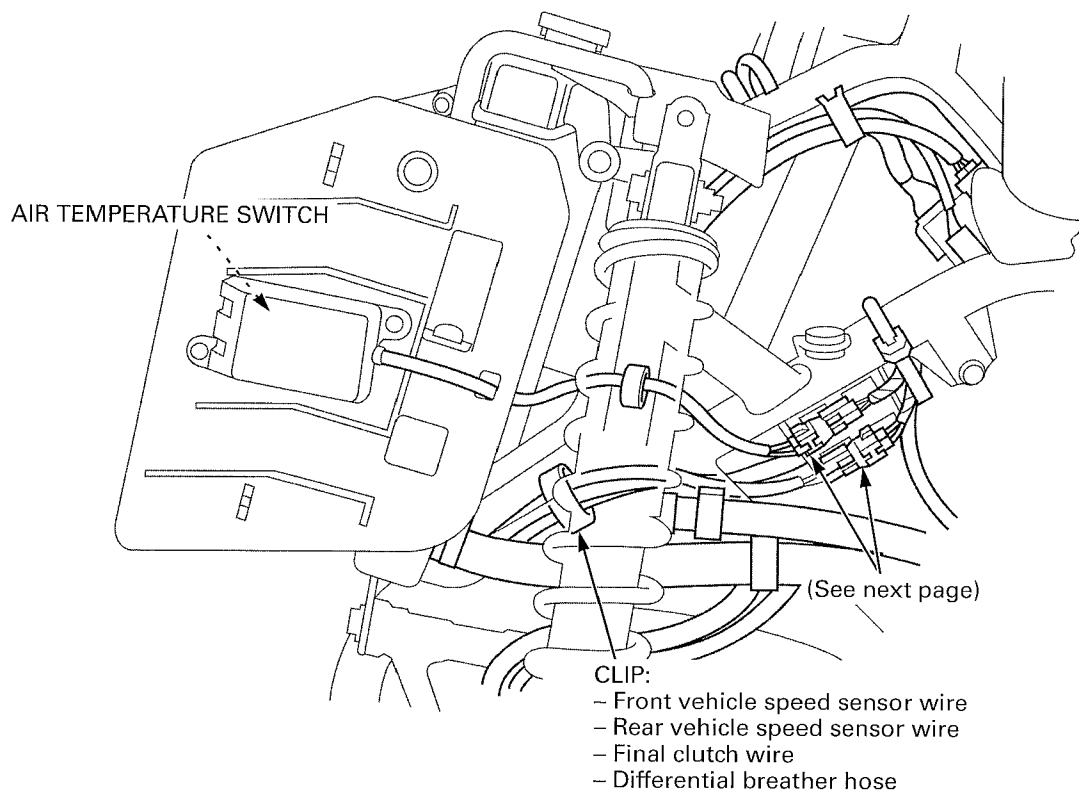
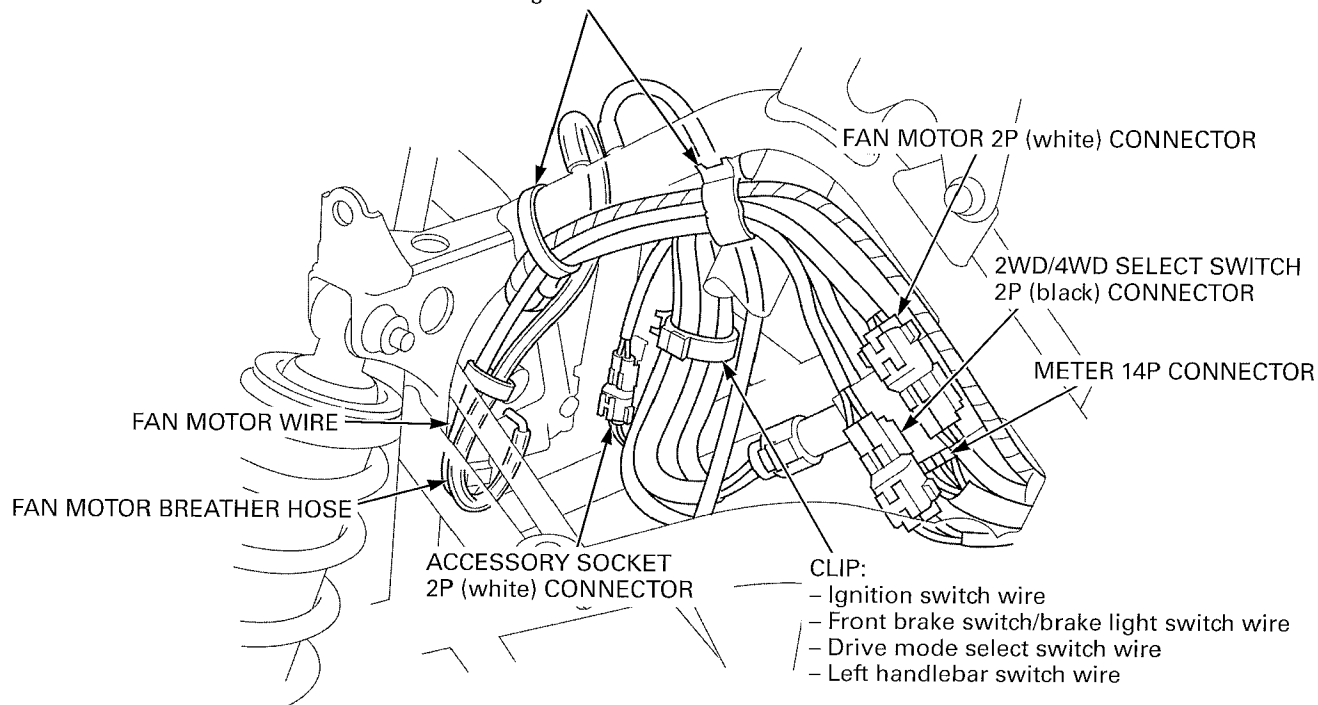


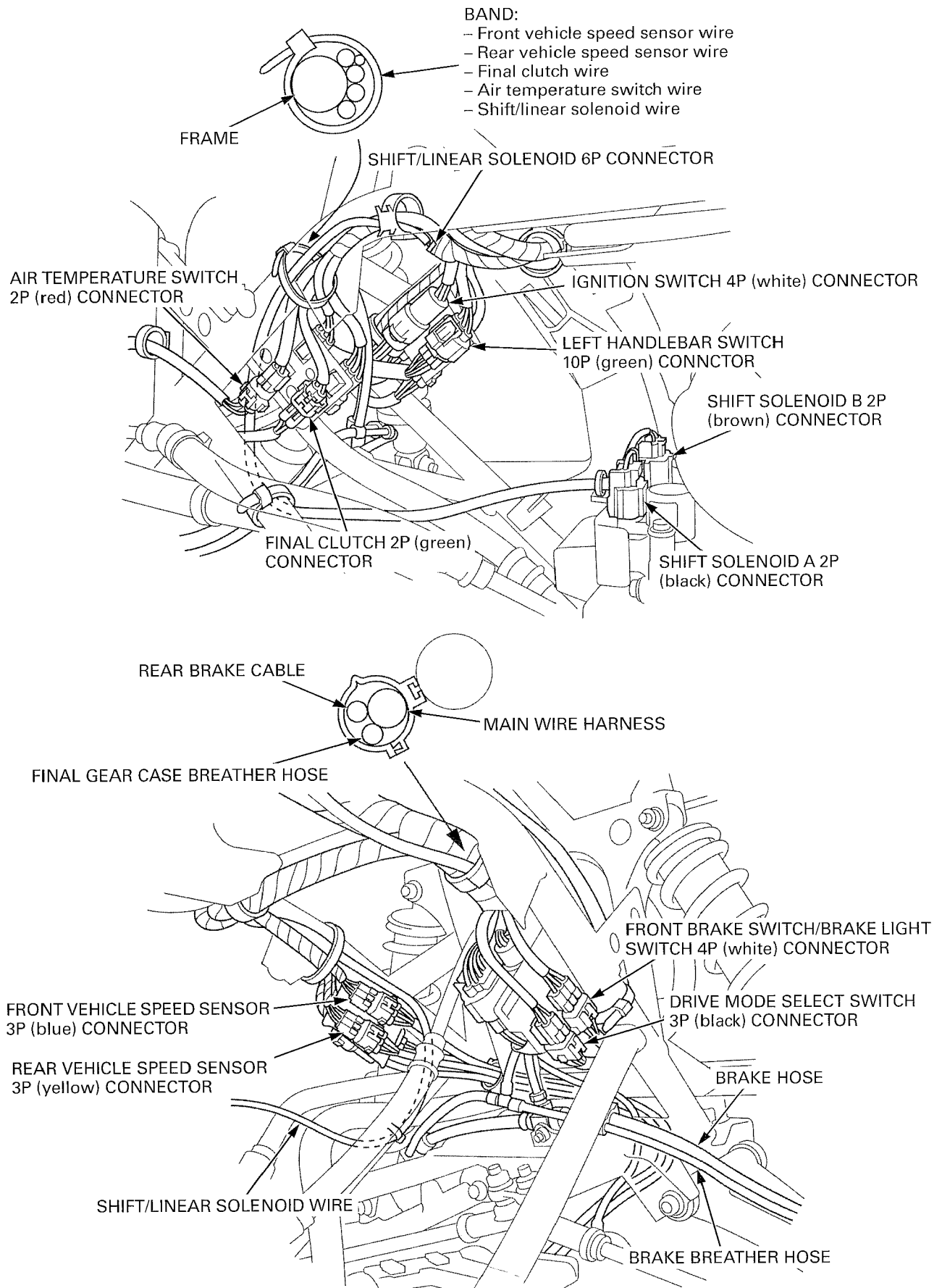


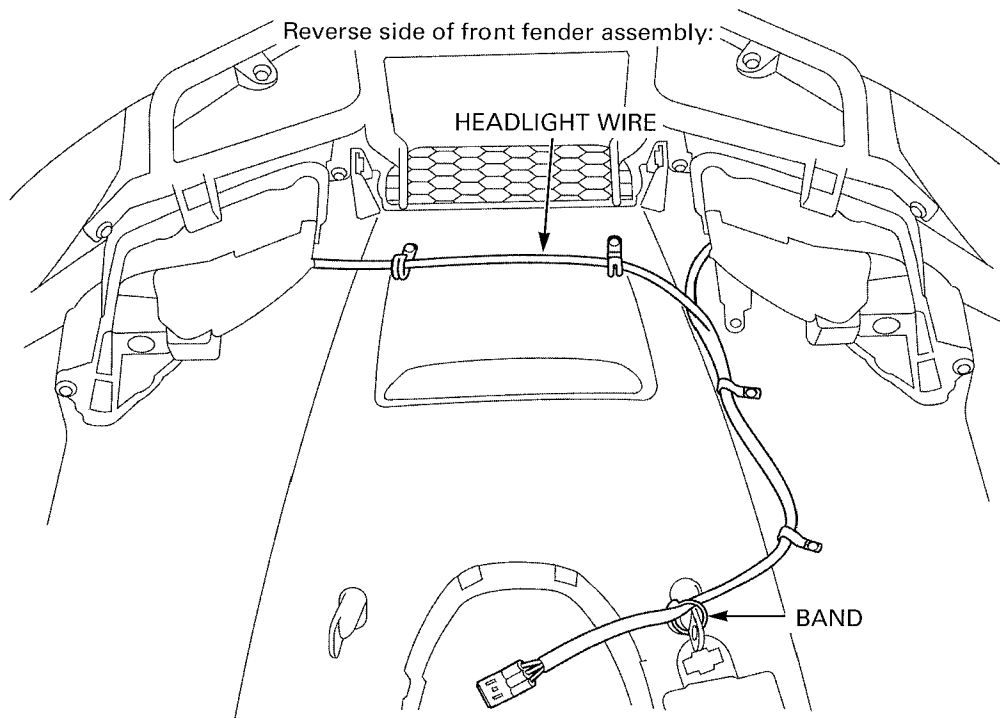
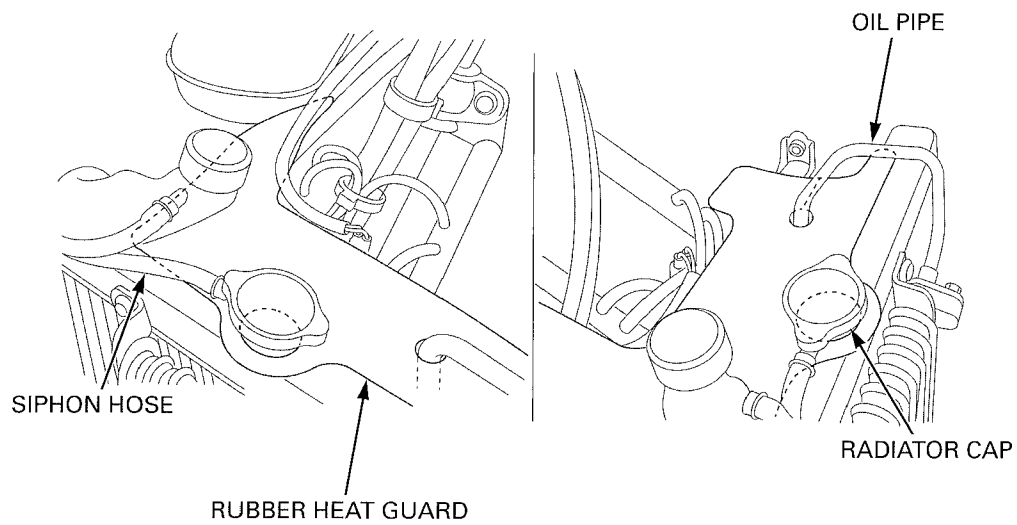
GENERAL INFORMATION

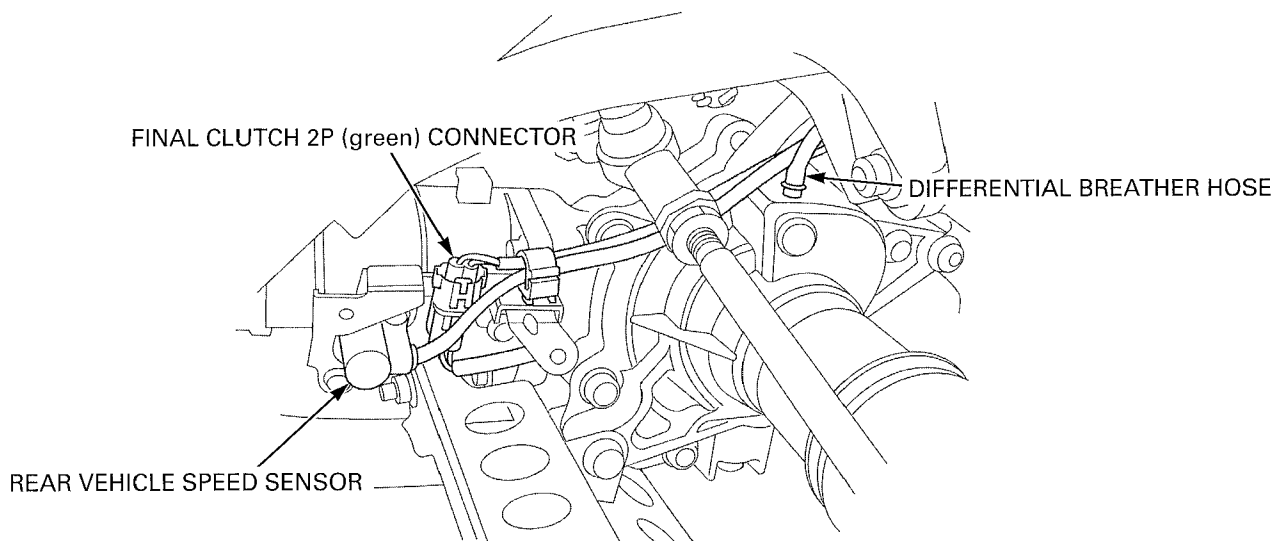
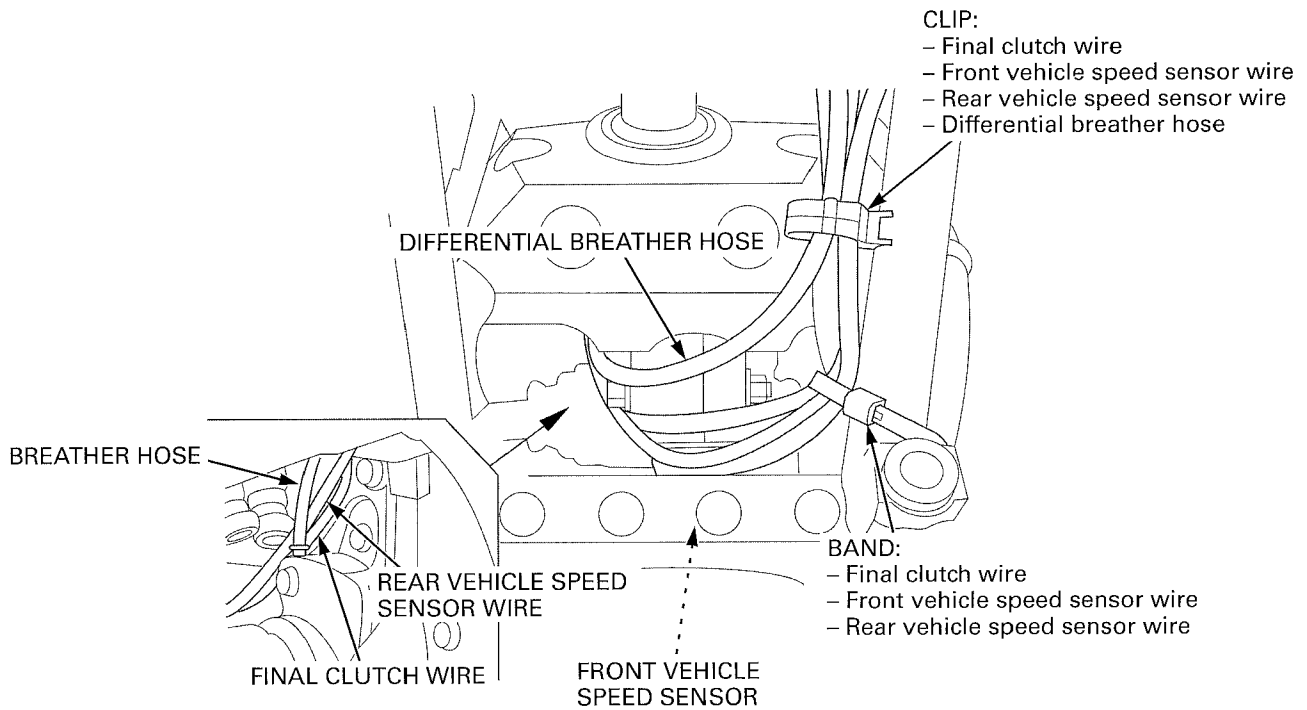
WIRE BAND and CLIP:

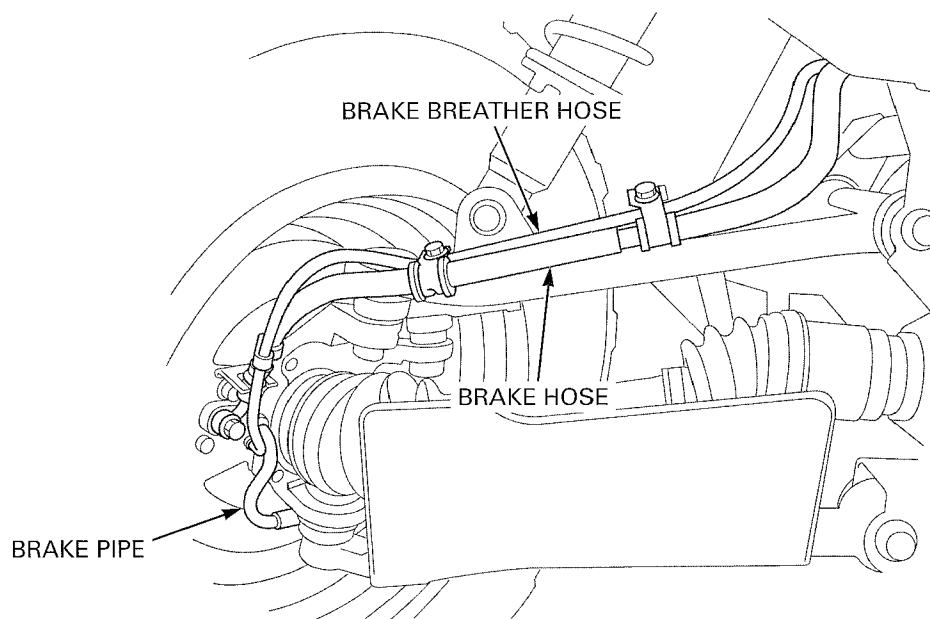
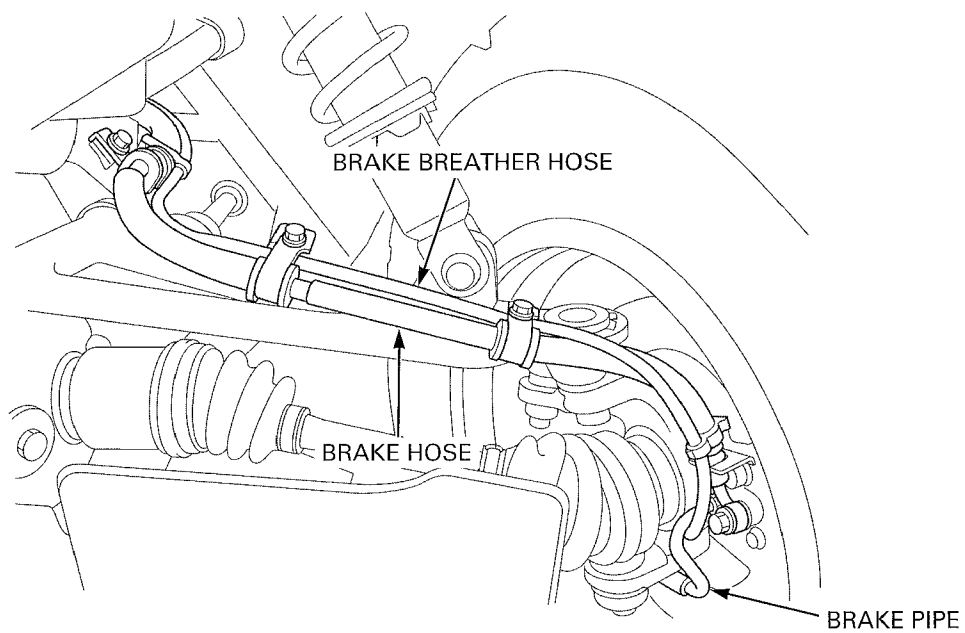
- Meter wire
- 2WD/4WD select switch wire
- Fan motor wire
- Headlight wire

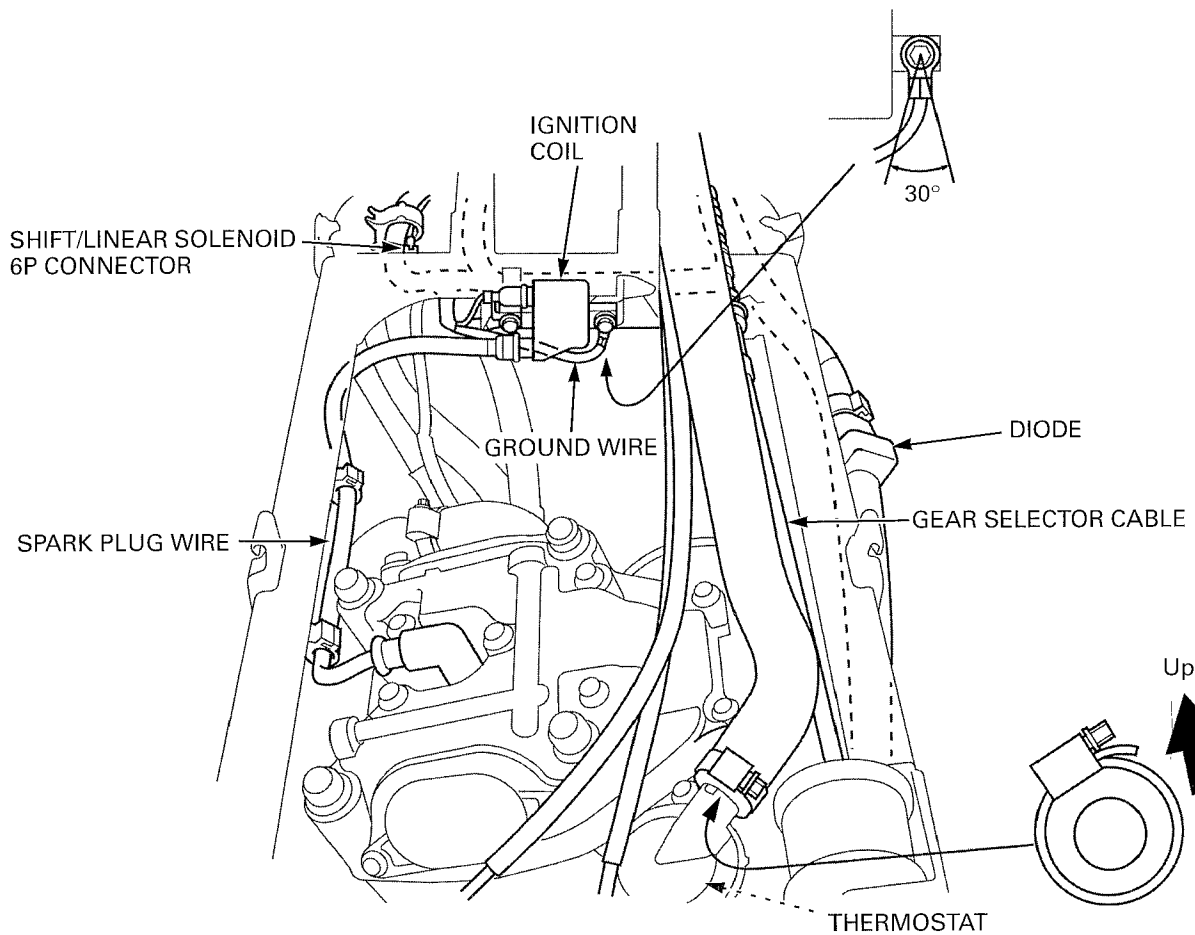
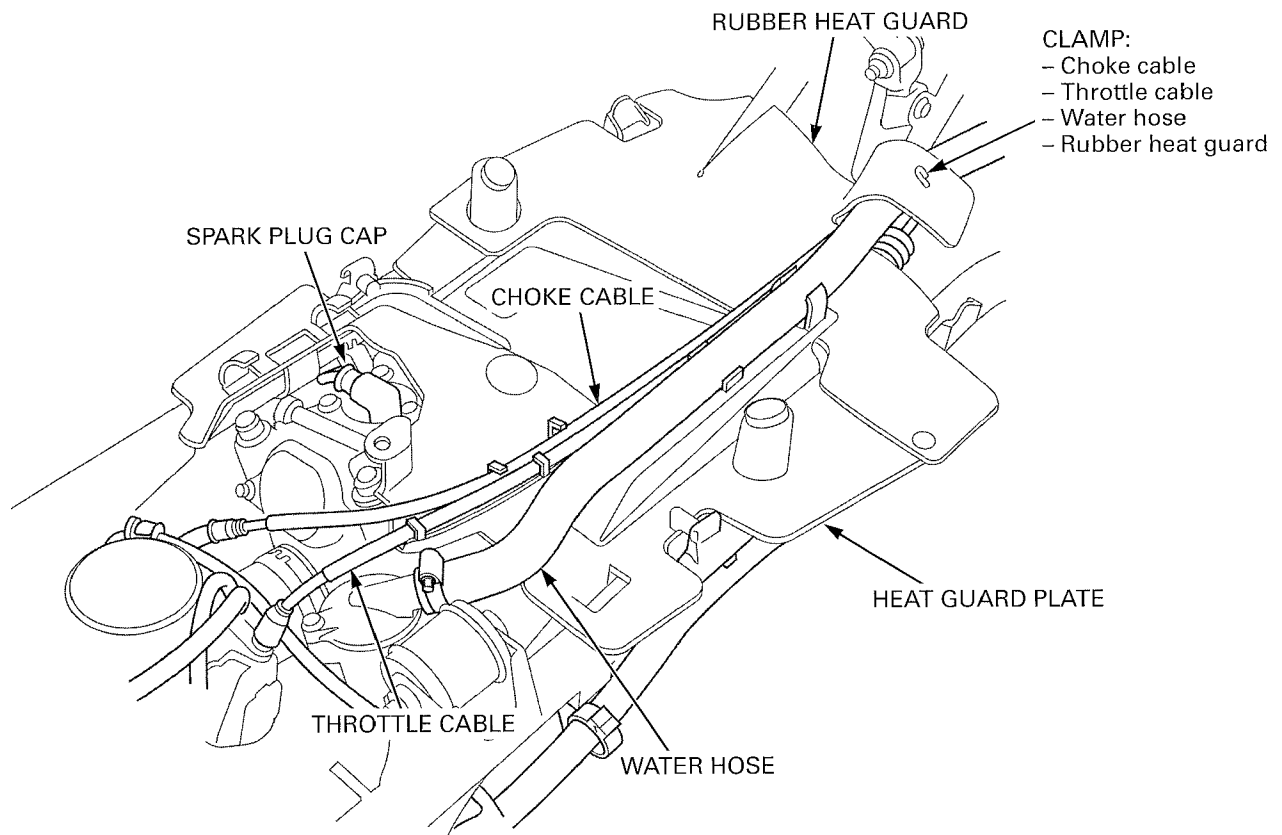


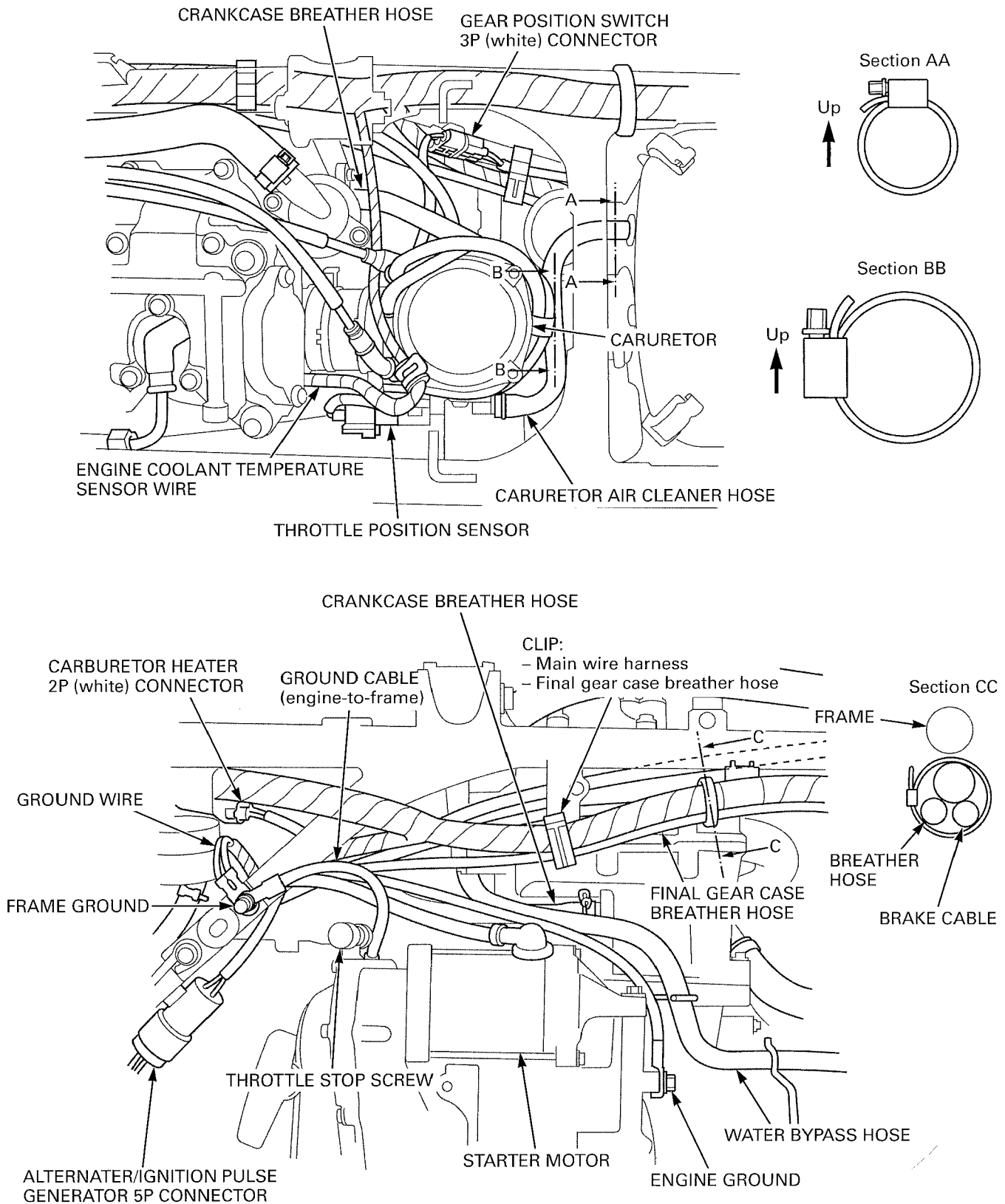


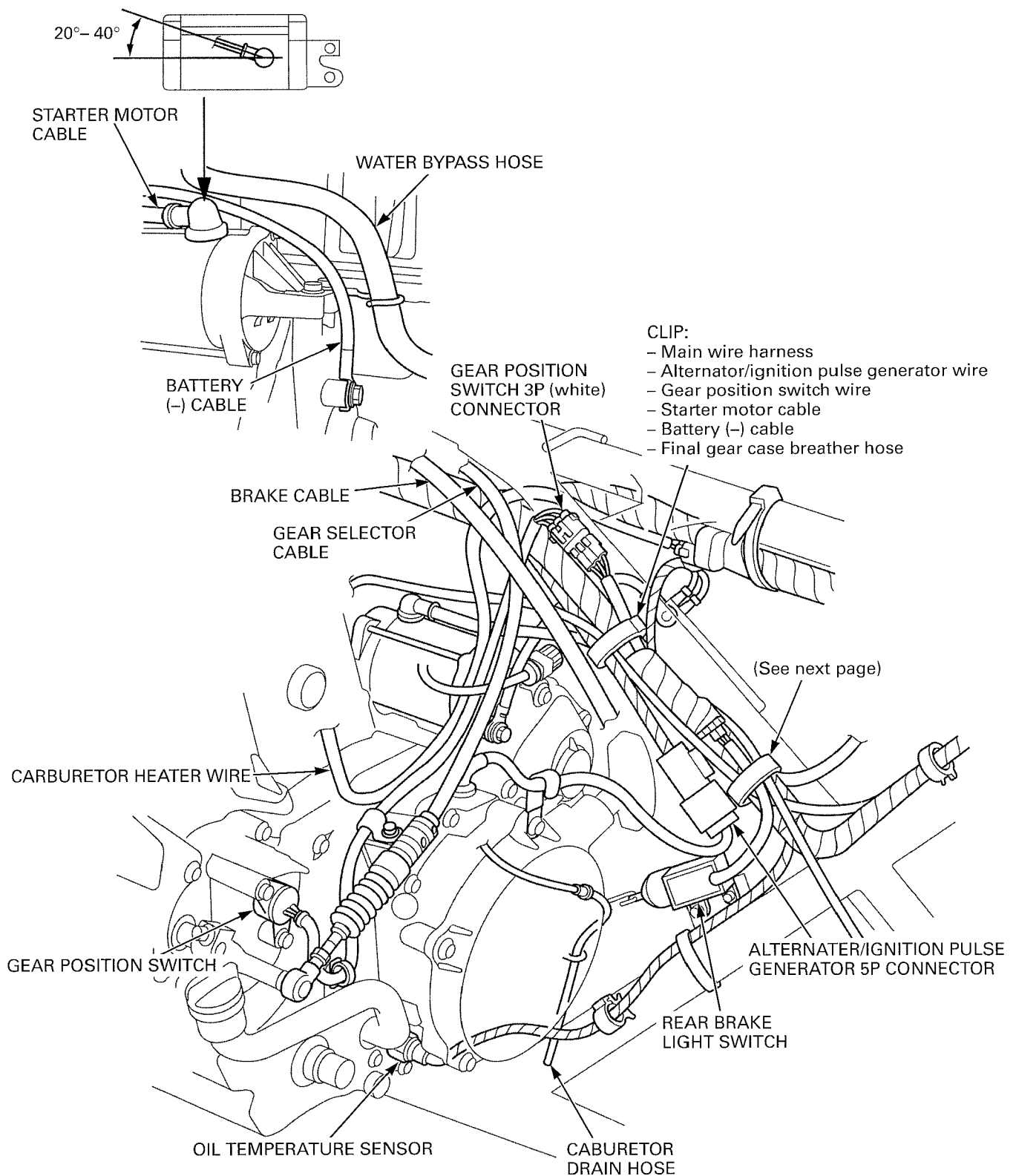




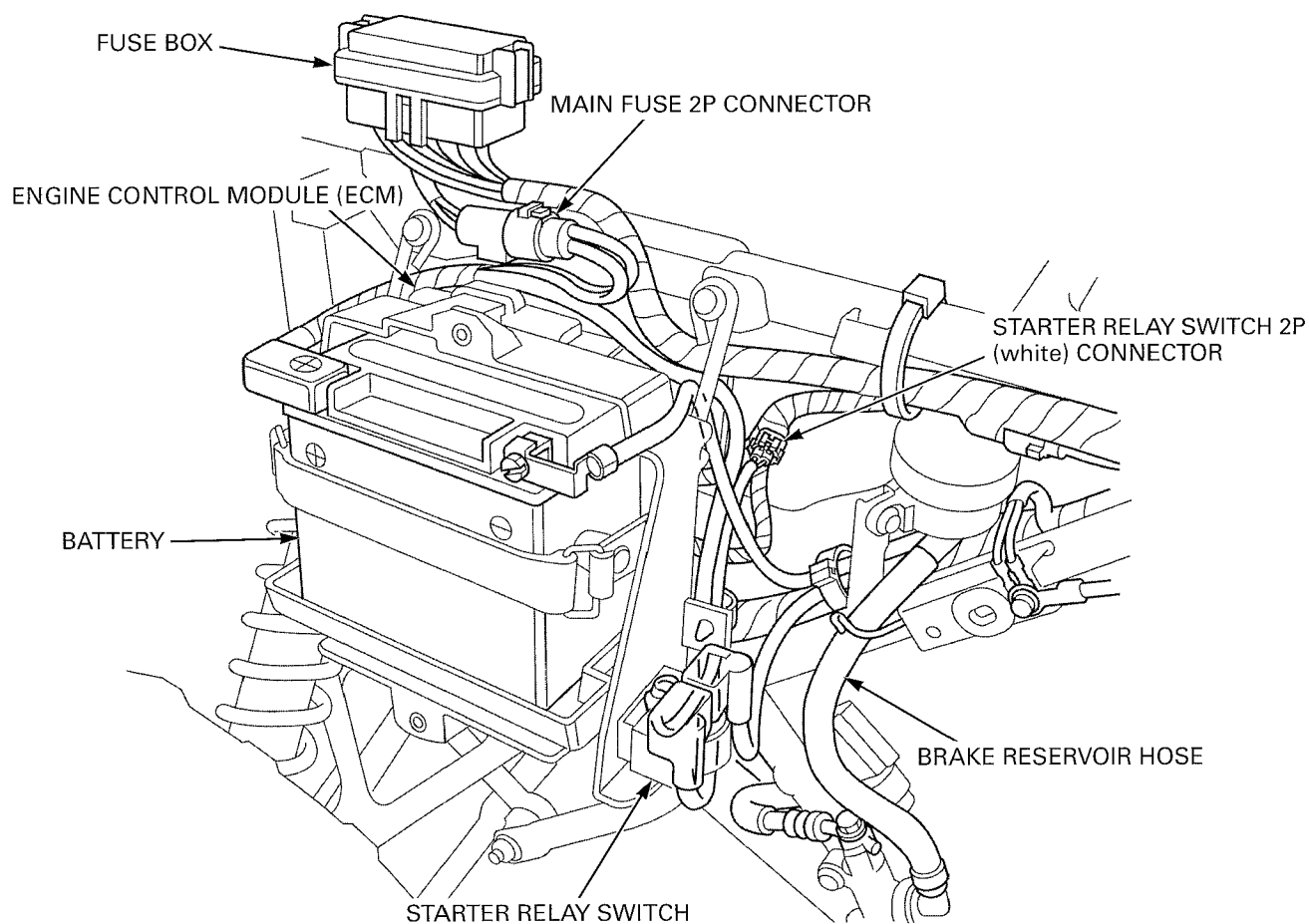
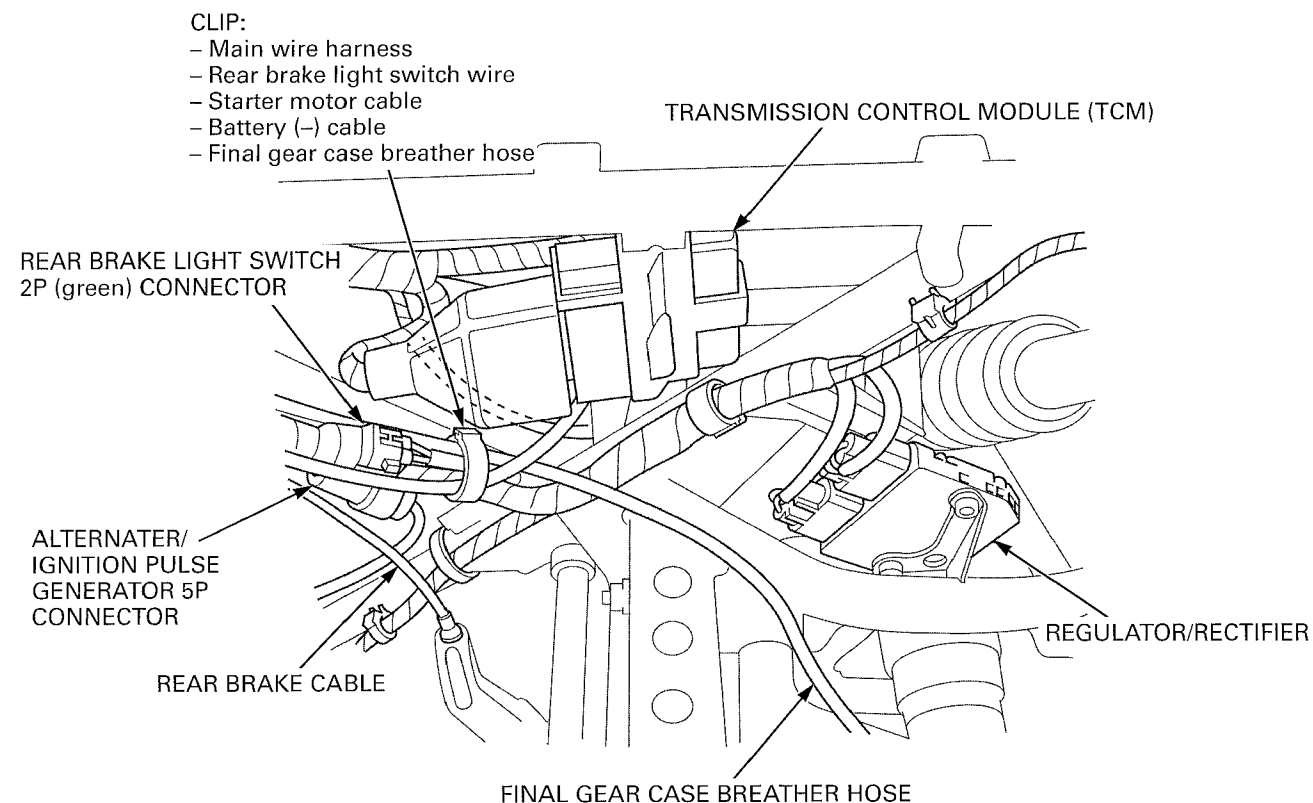


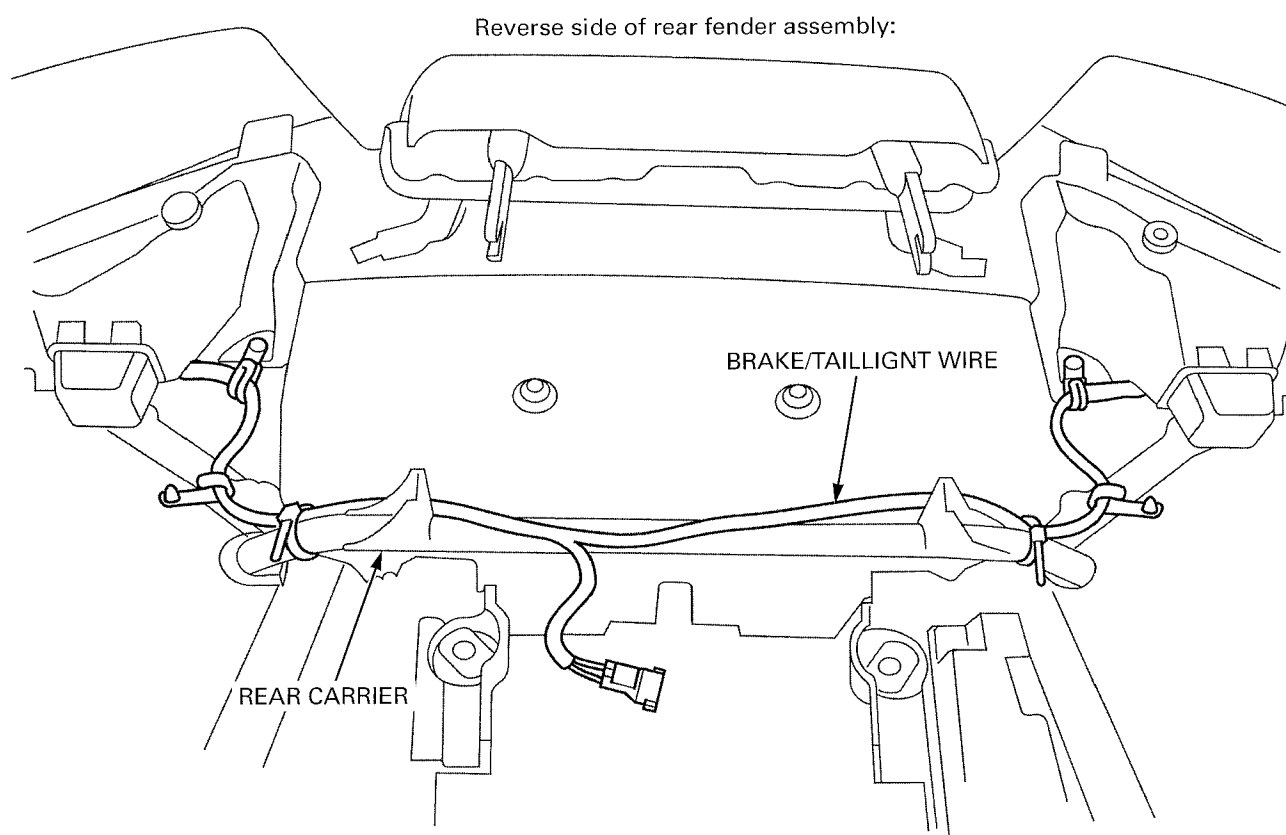
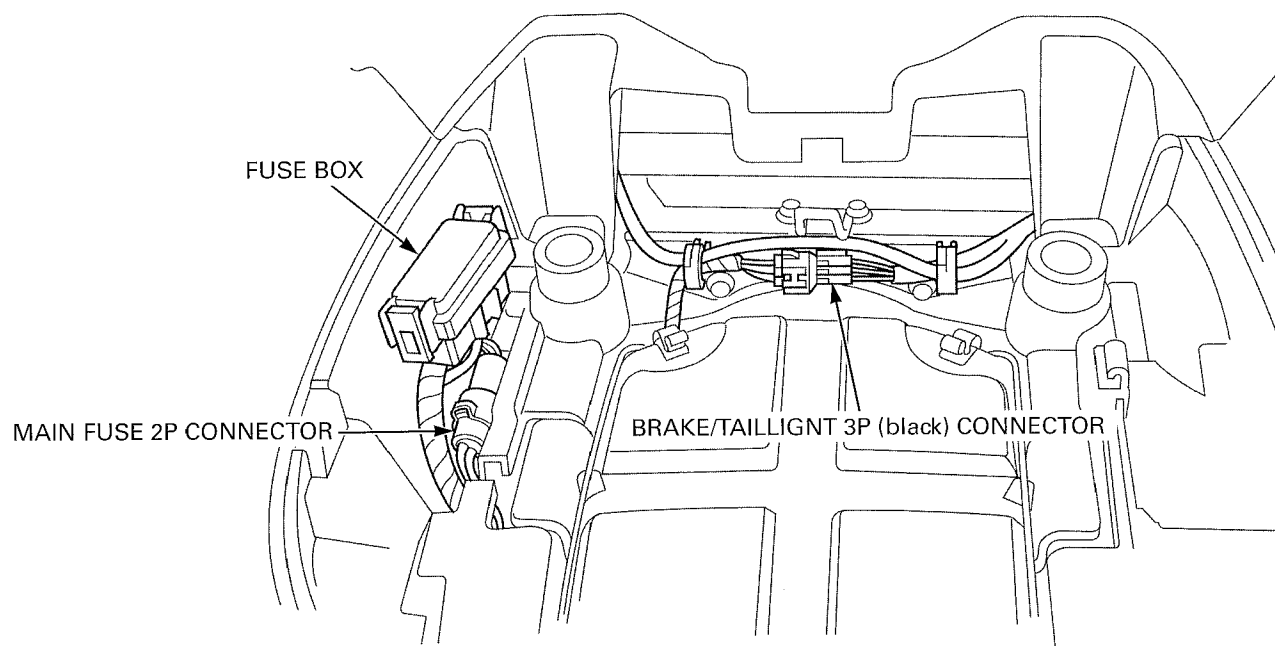


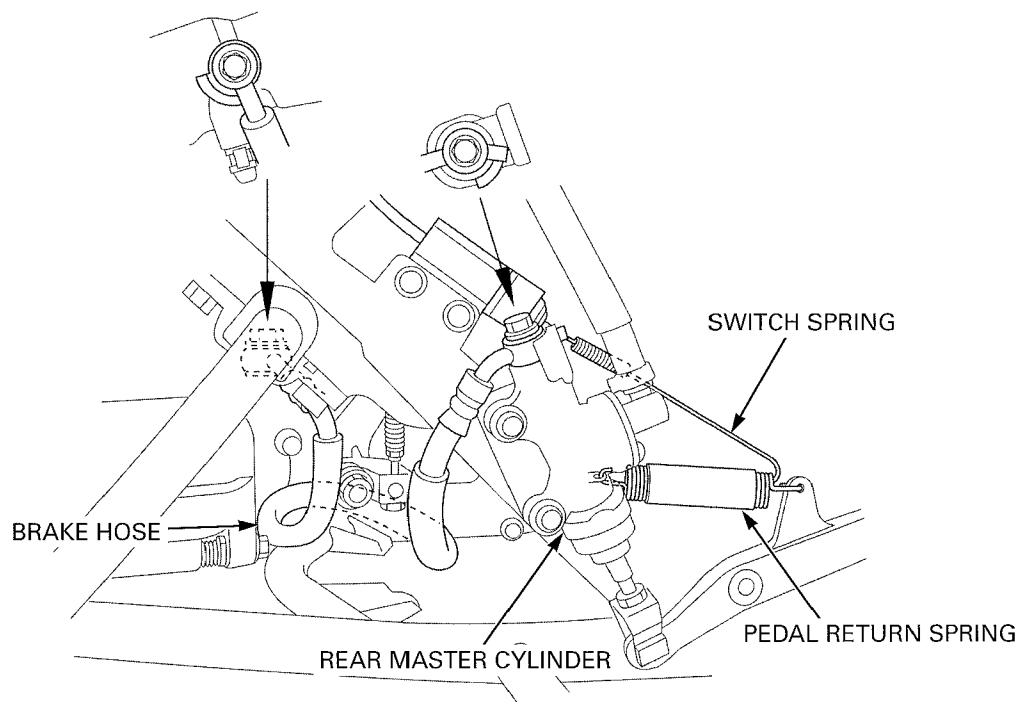
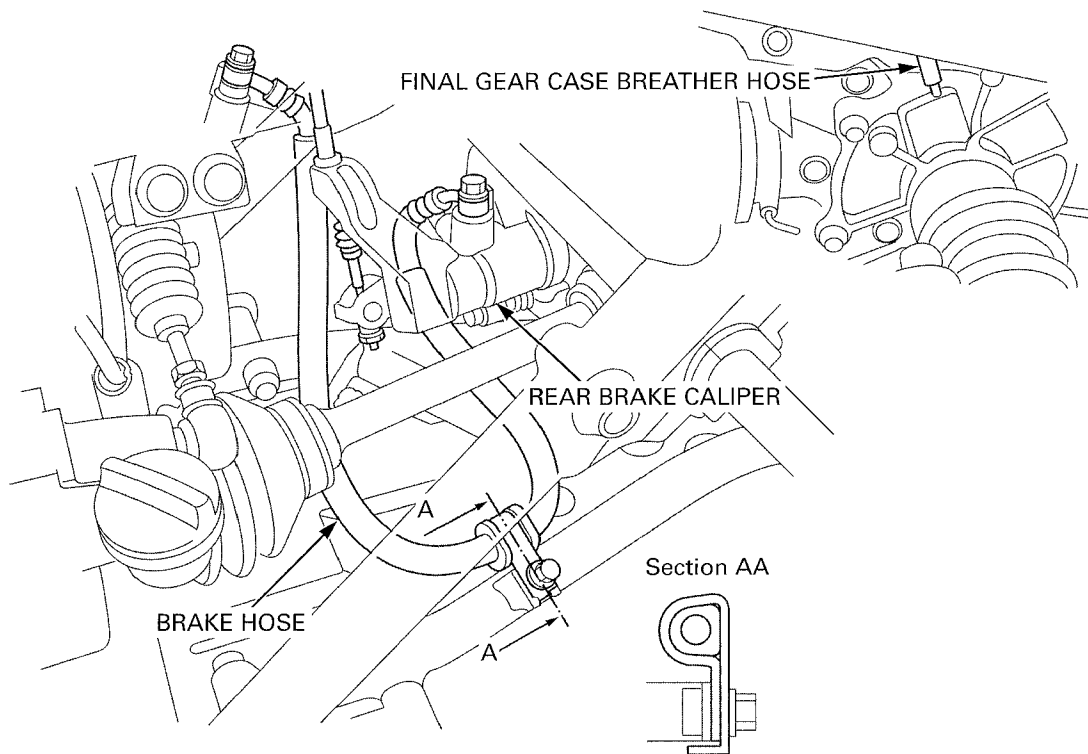




GENERAL INFORMATION







EMISSION CONTROL SYSTEMS

The California Air Resources Board (CARB) requires manufacturers to certify that their ATVs comply with applicable exhaust emissions standards during their useful life, when operated and maintained according to the instructions provided.

SOURCE OF EMISSIONS

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

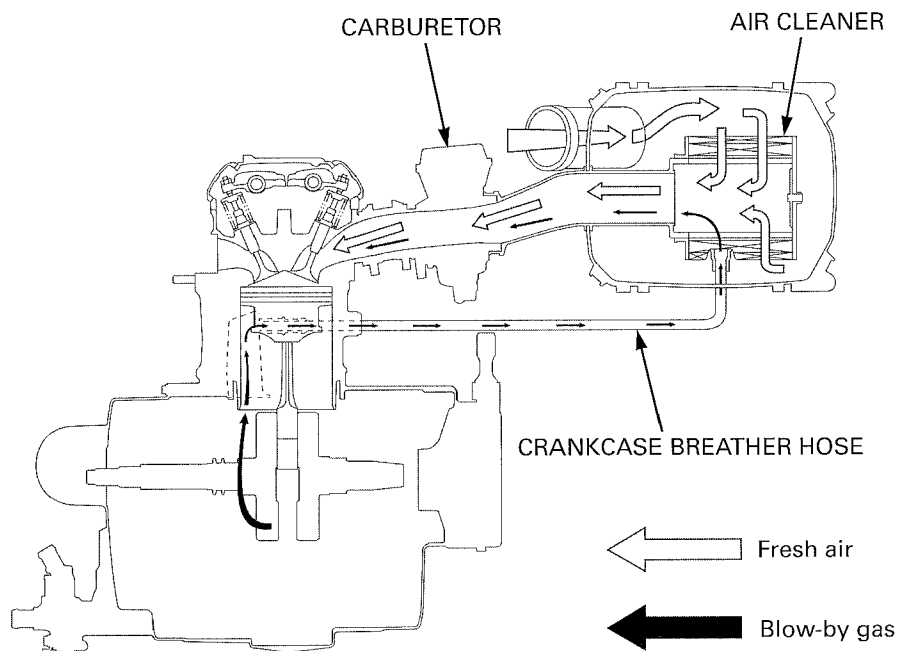
Honda Motor Co., Ltd. utilizes lean carburetor settings as well as other systems, to reduce carbon monoxide and hydrocarbons.

EXHAUST EMISSION CONTROL SYSTEM

The exhaust emission control system is composed of a lean carburetor setting, and no adjustments should be made except idle speed adjustment with the throttle stop screw. The exhaust emission control system is separate from the crankcase emission control systems.

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.



NOISE EMISSION CONTROL SYSTEM

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

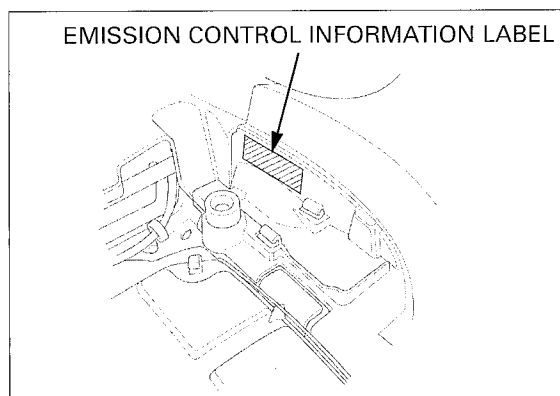
AMONG THOSE ACTS PRESUMED TO CONSTITUTE TAMPERING ARE THE ACTS LISTED BELOW:

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

GENERAL INFORMATION

EMISSION CONTROL INFORMATION LABEL (U.S.A. only)

The Vehicle Emission Control Information Label is attached on the left side of the rear fender under the seat.



2. FRAME/BODY PANELS/EXHAUST SYSTEM

SERVICE INFORMATION	2-2	FRONT CARRY PIPE	2-10
TROUBLESHOOTING	2-2	FRONT CARRIER	2-11
BODY PANEL LOCATIONS	2-3	FRONT FENDER.....	2-11
SEAT.....	2-4	MUFFLER PROTECTOR.....	2-12
RIGHT SIDE COVER.....	2-4	REAR CARRIER/MUD GUARD	2-13
STEERING COVER.....	2-5	REAR FENDER	2-14
FUEL TANK COVER.....	2-5	OUTER FENDER	2-15
FUEL TANK SIDE COVER.....	2-6	ENGINE GUARD	2-16
CENTER MUD GUARD	2-7	ENGINE SIDE COVER.....	2-17
FRONT MUD GUARD	2-8	METER COVER	2-18
INNER FENDER.....	2-9	EXHAUST SYSTEM.....	2-19
FRONT GRILLE.....	2-10		

SERVICE INFORMATION

GENERAL

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

TORQUE VALUES

Front carrier and carry pipe bolt	37 N·m (3.8 kgf·m, 27 lbf·ft)
Rear carrier bolt	37 N·m (3.8 kgf·m, 27 lbf·ft)
Muffler band bolt	23 N·m (2.3 kgf·m, 17 lbf·ft)
Front exhaust pipe cover band screw	3 N·m (0.3 kgf·m, 2.2 lbf·ft)
Rear exhaust pipe cover band screw	6 N·m (0.6 kgf·m, 4.3 lbf·ft)
Muffler cover screw	3 N·m (0.3 kgf·m, 2.2 lbf·ft)
Footpeg bracket nut	32 N·m (3.3 kgf·m, 24 lbf·ft)

TROUBLESHOOTING

Excessive exhaust noise

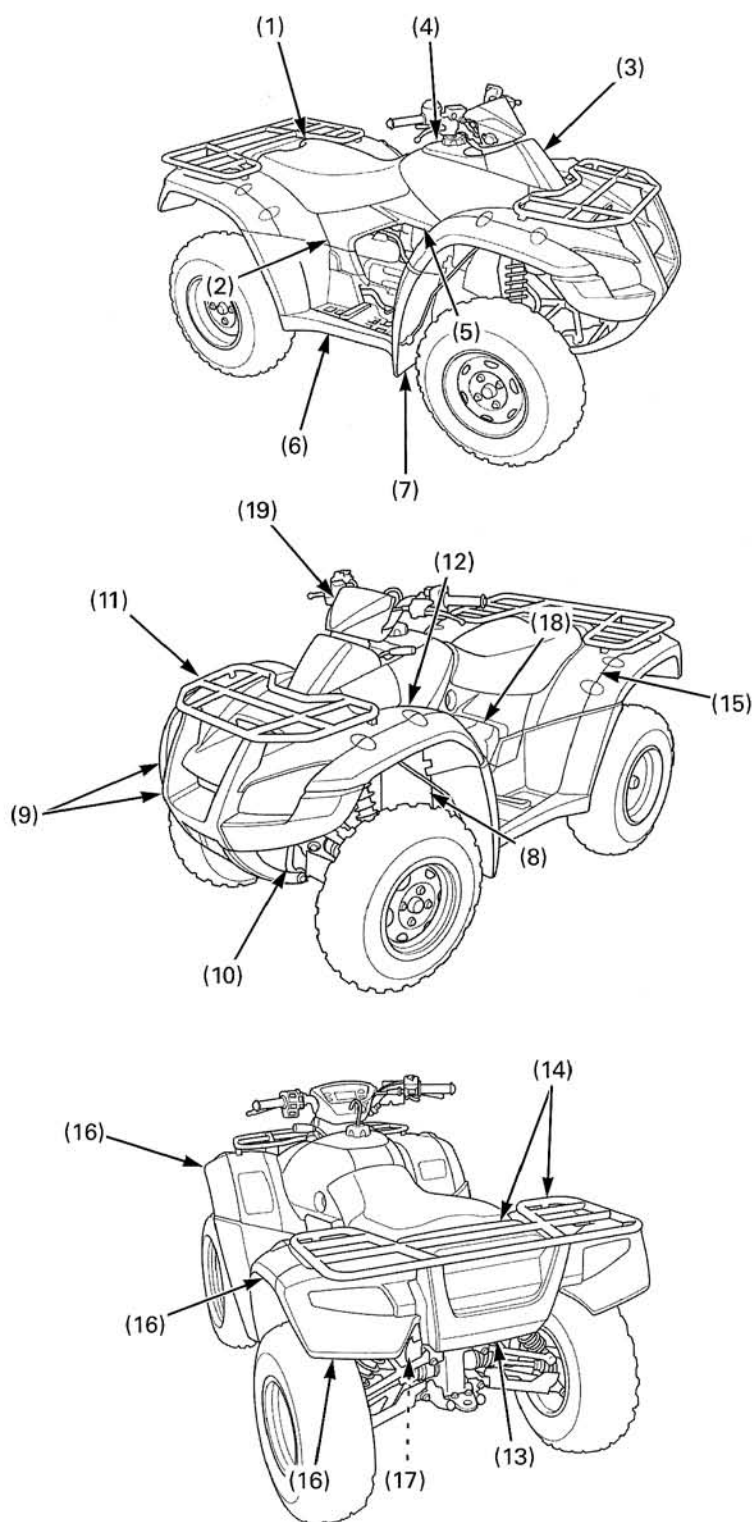
- Broken exhaust system
- Exhaust gas leak

Poor performance

- Deformed exhaust system
- Exhaust gas leak
- Clogged muffler

BODY PANEL LOCATIONS

- (1) Seat (page 2-4)
- (2) Right side cover (page 2-4)
- (3) Steering cover (page 2-5)
- (4) Fuel tank top/center cover (page 2-5)
- (5) Fuel tank side cover (page 2-6)
- (6) Center mud guard (page 2-7)
- (7) Front mud guard (page 2-8)
- (8) Inner fender (page 2-9)
- (9) Front grille (page 2-10)
- (10) Front carry pipe (page 2-10)
- (11) Front carrier (page 2-11)
- (12) Front fender (page 2-11)
- (13) Muffler protector (page 2-12)
- (14) Rear carrier/mud guard (page 2-13)
- (15) Rear fender (page 2-14)
- (16) Outer fender (page 2-15)
- (17) Engine guard (page 2-16)
- (18) Engine side cover (page 2-17)
- (19) Meter cover (page 2-18)

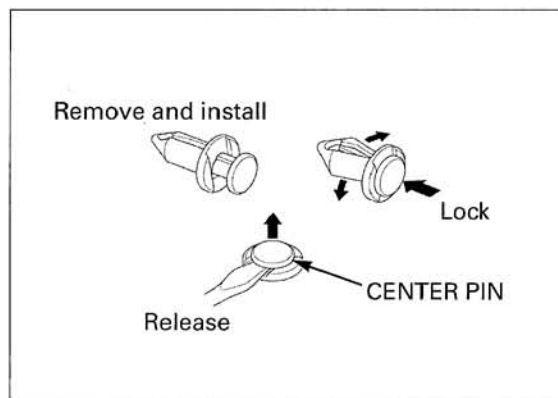


FRAME/BODY PANELS/EXHAUST SYSTEM

TRIM CLIP REMOVAL AND RETAINING PROCEDURE:

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

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



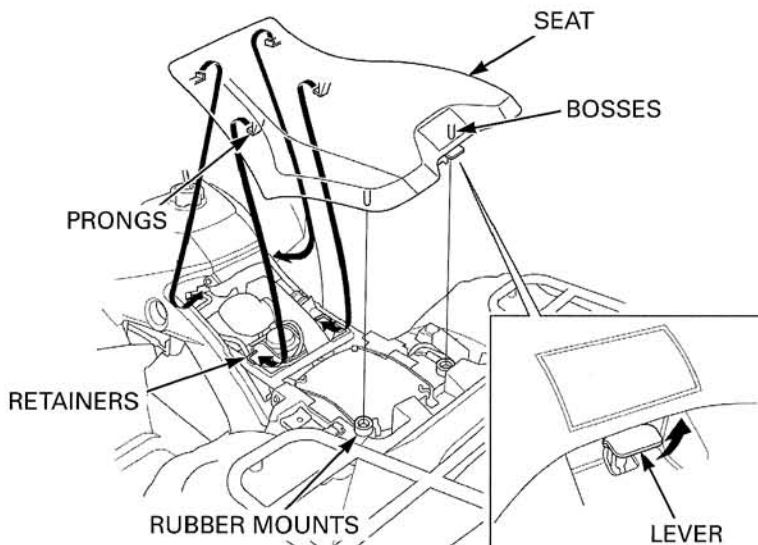
SEAT

REMOVAL

Unlock the seat by pulling the release lever up.
Pull the seat back and remove it.

INSTALLATION

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 rubber mounts, then press down to lock it.

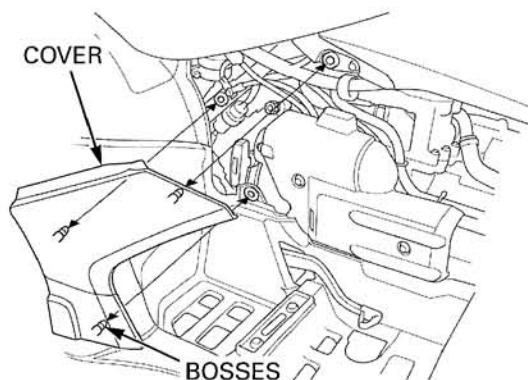


RIGHT SIDE COVER

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

Be careful not to dislodge the grommets.

Install the starter cover in the reverse order of removal.

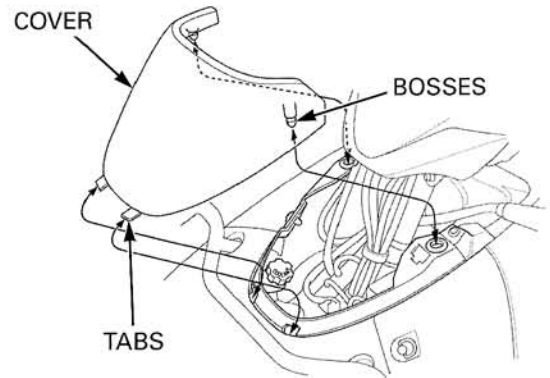


STEERING COVER

Release the two bosses from the grommets by pulling the rear portion of the cover up and release the two tabs to remove the steering cover.

Be careful not to dislodge the grommets.

Install the cover in the reverse order of removal.

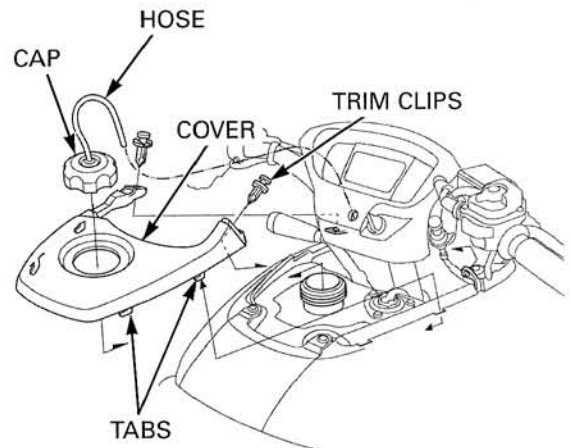


FUEL TANK COVER

Top Cover

Remove the following:

- steering cover (page 2-5)
- two trim clips
- breather hose and fuel fill cap
- fuel tank top cover (release the four tabs by sliding the cover forward)

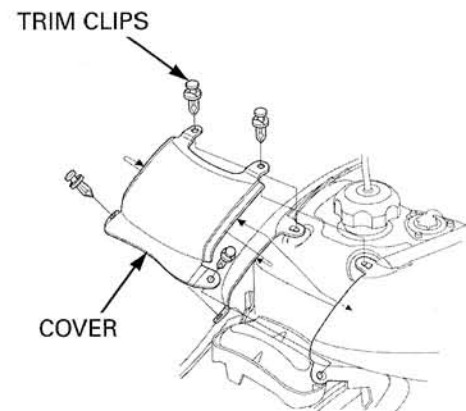


Center Cover

Remove the seat (page 2-4).

Release the four trim clips and remove the fuel tank center cover.

Installation is in the reverse order of removal.



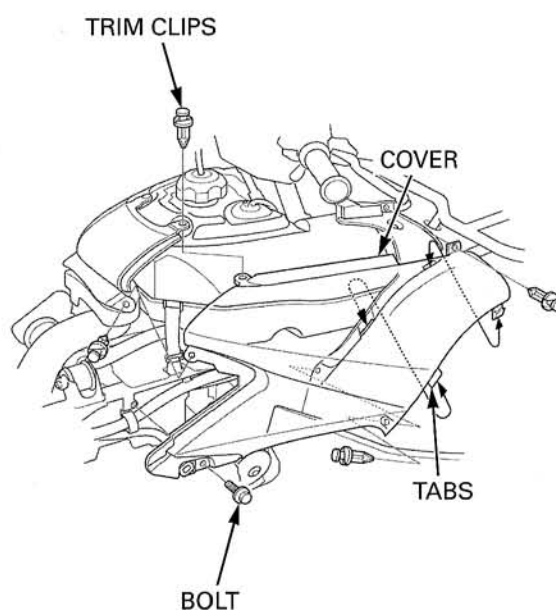
FUEL TANK SIDE COVER

Right side:

Remove the following:

- seat (page 2-4)
- right side cover (page 2-4)
- fuel tank top cover (page 2-5)
- setting bolt
- four trim clips
- fuel tank side cover (release the two tabs of the cover)

Installation is in the reverse order of removal.



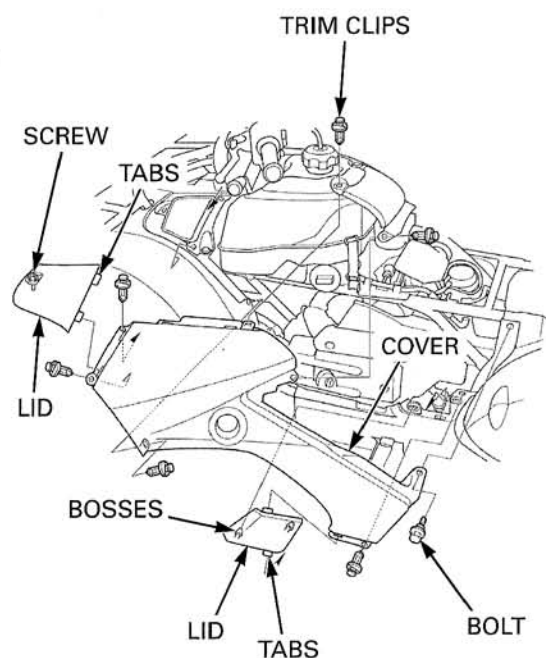
Left side:

Remove the following:

- seat (page 2-4)
- fuel tank top cover (page 2-5)
- compartment lid (by turning the quick screw counterclockwise and releasing the two tabs)
- oil filler lid (by releasing the two bosses and tabs)
- setting bolt
- six trim clips
- fuel tank side cover

Be careful not to dislodge the grommets when installing the filler lid.

Installation is in the reverse order of removal.



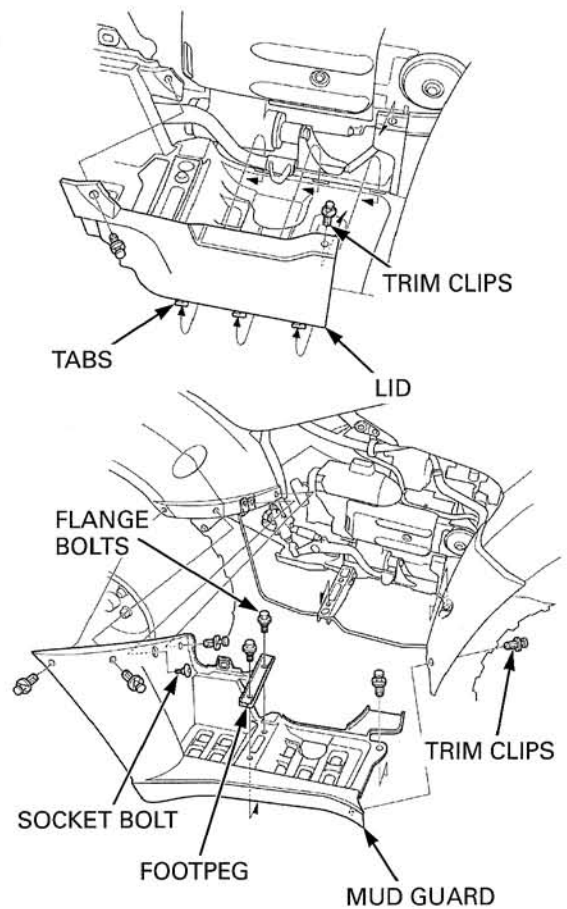
CENTER MUD GUARD

Right side:

Remove the following:

- right side cover (page 2-4)
- two trim clips and mud guard lid (by releasing the three tabs)
- five trim clips
- socket bolt
- two bolts and footpeg
- center mud guard

Installation is in the reverse order of removal.



FRAME/BODY PANELS/EXHAUST SYSTEM

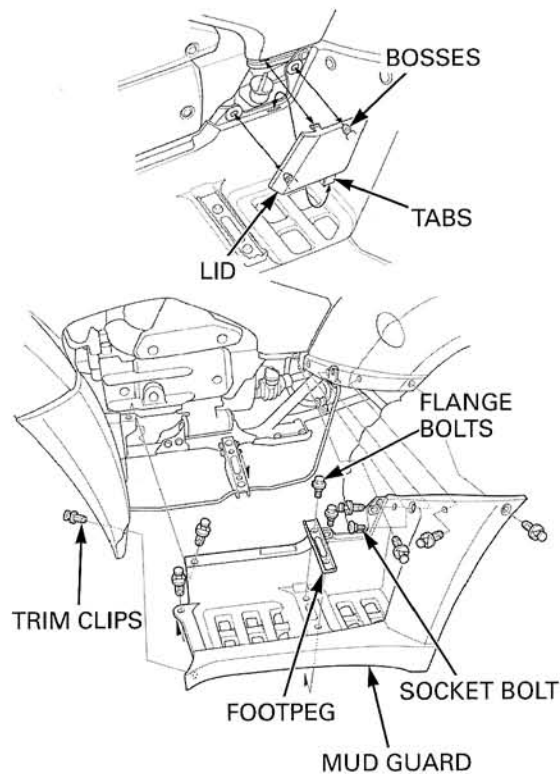
Left side:

Remove the following:

- oil filler lid (by releasing the two bosses and tabs)
- seven trim clips
- socket bolt
- two bolts and footpeg
- center mud guard

Be careful not to dislodge the grommets when installing the lid.

Installation is in the reverse order of removal.



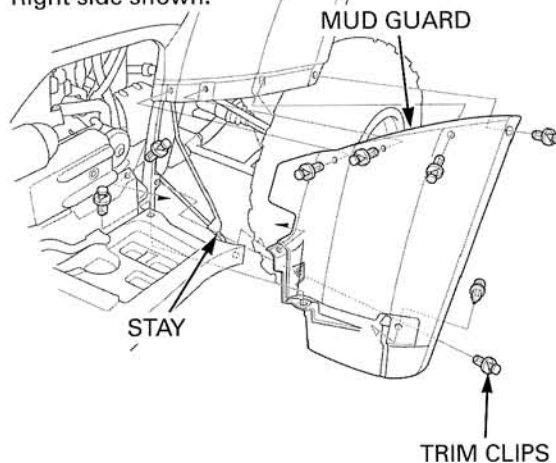
FRONT MUD GUARD

Remove the following:

- eight trim clips
- front mud guard (from the mud guard stay)

Installation is in the reverse order of removal.

Right side shown:



INNER FENDER

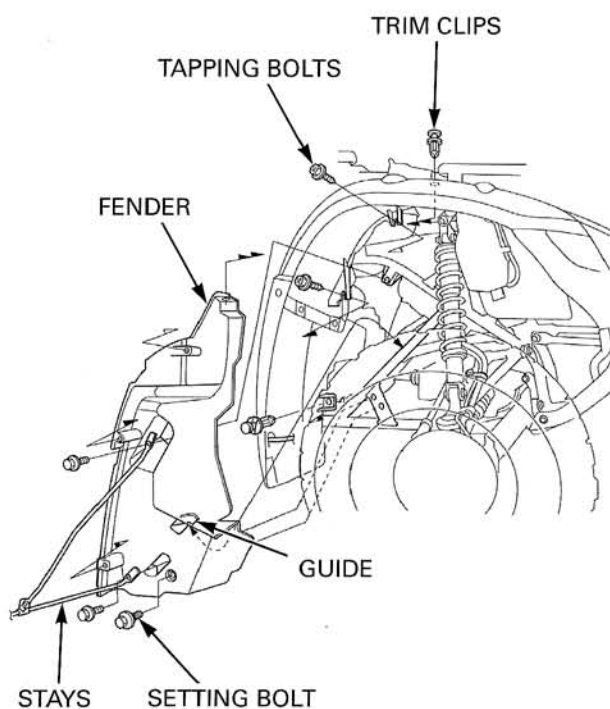
Right side:

Remove the following:

- three stay bolts
- two trim clips
- two tapping bolts
- setting bolt
- inner fender

*Hook the guide
over the frame
pipe.*

Installation is in the reverse order of removal.



Left side:

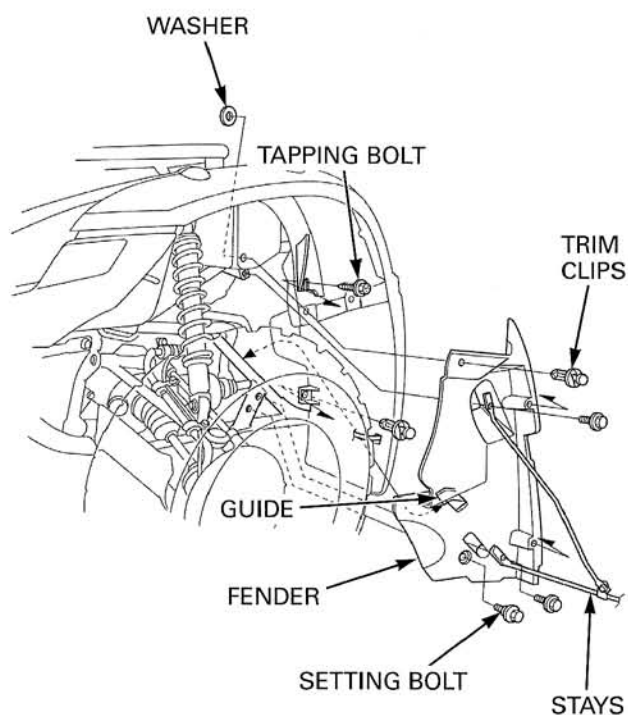
Remove the compartment lid (page 2-6).

Remove the following:

- three stay bolts
- two trim clips and setting washer (inside the storage compartment)
- tapping bolt
- setting bolt
- inner fender

*Hook the guide
over the frame
pipe.*

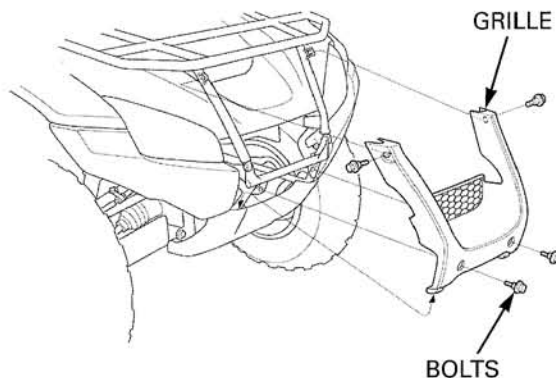
Installation is in the reverse order of removal.



FRONT GRILLE

Center Grille

Remove the four setting bolts and the center front grille.

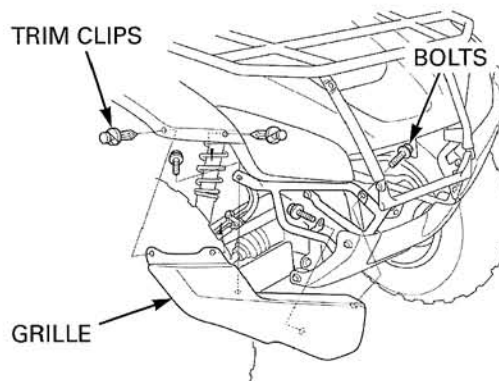


Side Grille

Remove the following:

- two trim clips
- three bolts
- side front grille

Installation is in the reverse order of removal.



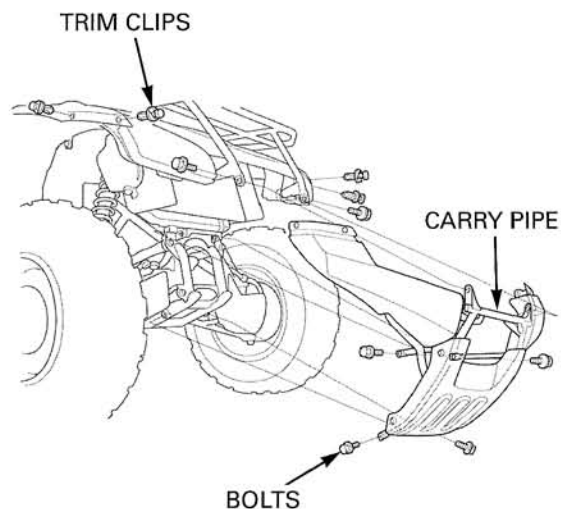
FRONT CARRY PIPE

Remove the following:

- center front grill (page 2-10)
- four trim clips
- six bolts
- carry pipe

Installation is in the reverse order of removal.

TORQUE: 37 N·m (3.8 kgf·m, 27 lbf·ft)



FRONT CARRIER

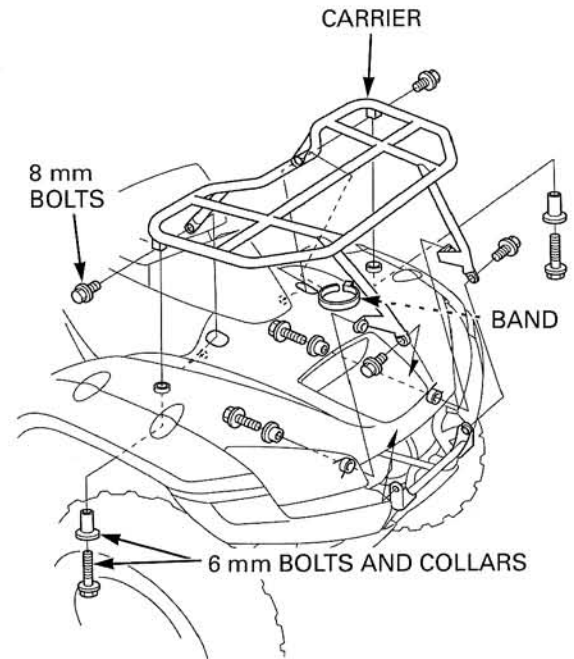
The front carrier and fender can be removed as an assembly for service. If removed, use the procedure described on page 2-12.

Remove the following:

- center front grille (page 2-10)
- wire band (that secured the headlight wire on the carrier pipe)
- two 6-mm bolts and collars (attached to fender)
- two 6-mm bolts and collars (attached to headlight case)
- four 8-mm bolts
- front carrier

Installation is in the reverse order of removal.

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



FRONT FENDER

The front carrier and fender can be removed as an assembly for service. If removed, use the procedure described on page 2-12.

Remove the following:

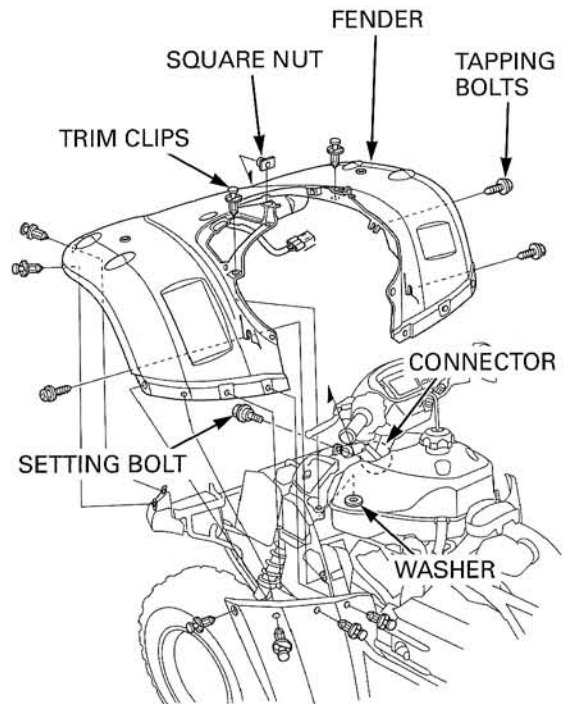
- fuel tank side covers (page 2-6).
- front carrier (page 2-11).

Remove the following connector and fasteners:

- headlight 3P (black) connector (from the frame and disconnect it)
- 14 trim clips and setting washer (inside the storage compartment)
- setting bolt and square nut
- three tapping bolt (loosen)

Remove the front fender while spreading the rear portion of it.

Installation is in the reverse order of removal.



Carrier/Fender Assembly Removal Procedure

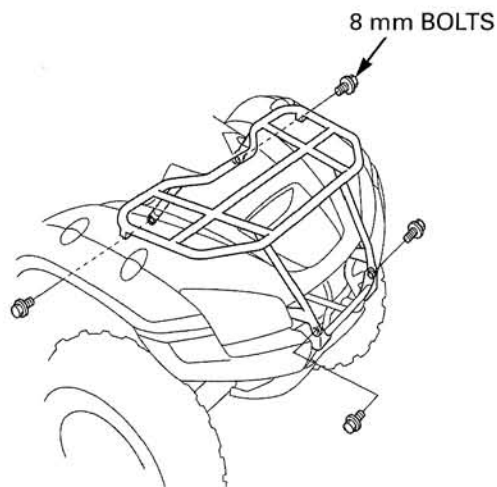
Remove the following:

- fuel tank side covers (page 2-6)
- center front grille (page 2-10)
- headlight connector and fender fasteners (see above; page 2-11)
- four 8-mm bolt (carrier mounting fasteners).

Remove the front carrier/fender assembly while spreading the rear portion of the fender.

Installation is in the reverse order of removal.

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

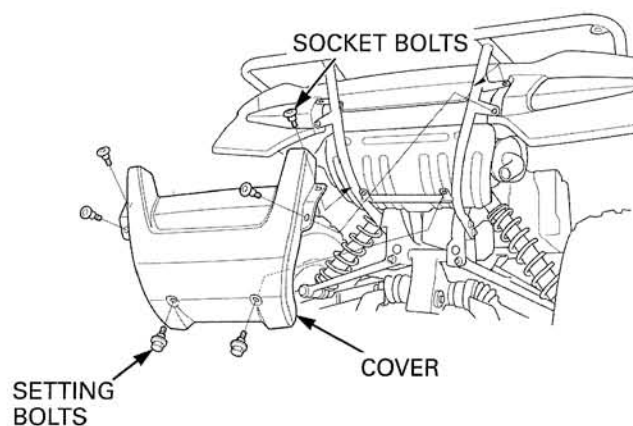


MUFFLER PROTECTOR

Remove the following:

- two setting bolts
- four socket bolts
- muffler protector

Installation is in the reverse order of removal.



REAR CARRIER/MUD GUARD

The rear carrier and rear side body panels can be removed as an assembly for service. If removed, use the procedure described on page 2-15.

Remove the following:

- seat (page 2-4)
- rear corner outer fenders (page 2-16)

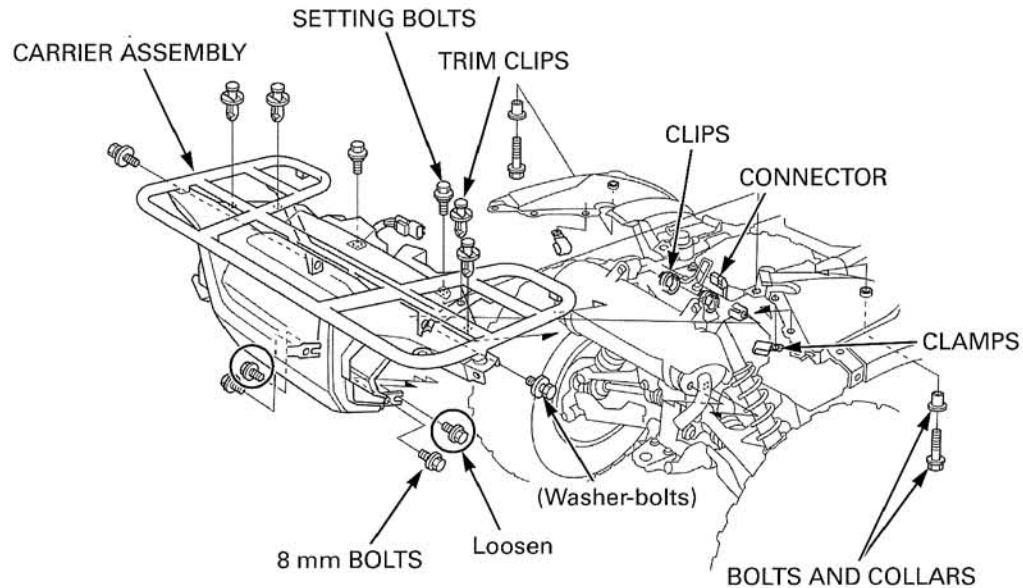
Disconnect the brake/taillight 3P (black) connector. Release the wires from the clips and remove the 3P connector from the frame.

Remove the following:

- four trim clips and wire clamps
- two setting bolts
- two bolts and collars

Only loosen the two lower inner bolts.

- four 8-mm bolts (two flange bolts and two washer-bolts)
- rear carrier assembly

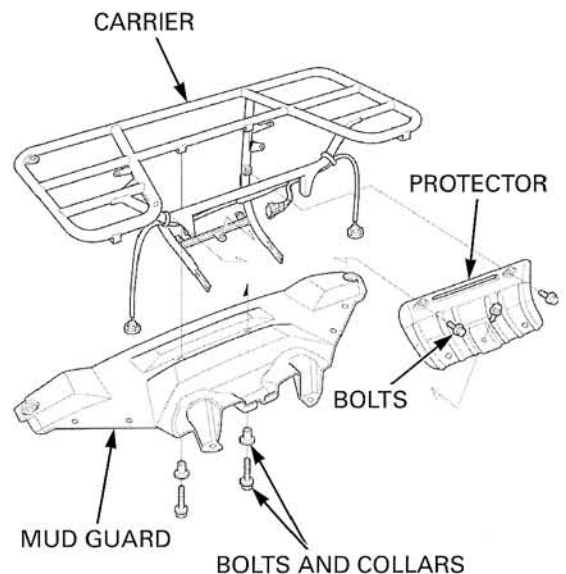


- muffler protector (page 2-12)
- two bolts, collars and rear mud guard
- three bolts and muffler protector
- wire bands and wire harness

Secure the wires with the bands properly (page 1-21).

Installation is in the reverse order of removal.

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



REAR FENDER

The rear carrier and rear side body panels can be removed as an assembly for service. If removed, use the procedure described on page 2-15.

Remove the seat (page 2-4).

Right side:

Remove the following:

- right side cover (page 2-4)
- fuse box (by releasing the tab from the reverse side of the fender)
- 2P (white) connector
- two setting bolts
- bolt and collar (front side)
- bolt, collar and setting rubbers (rear side)
- socket bolt
- seven trim clips, setting washer and wire clamp
- right rear fender

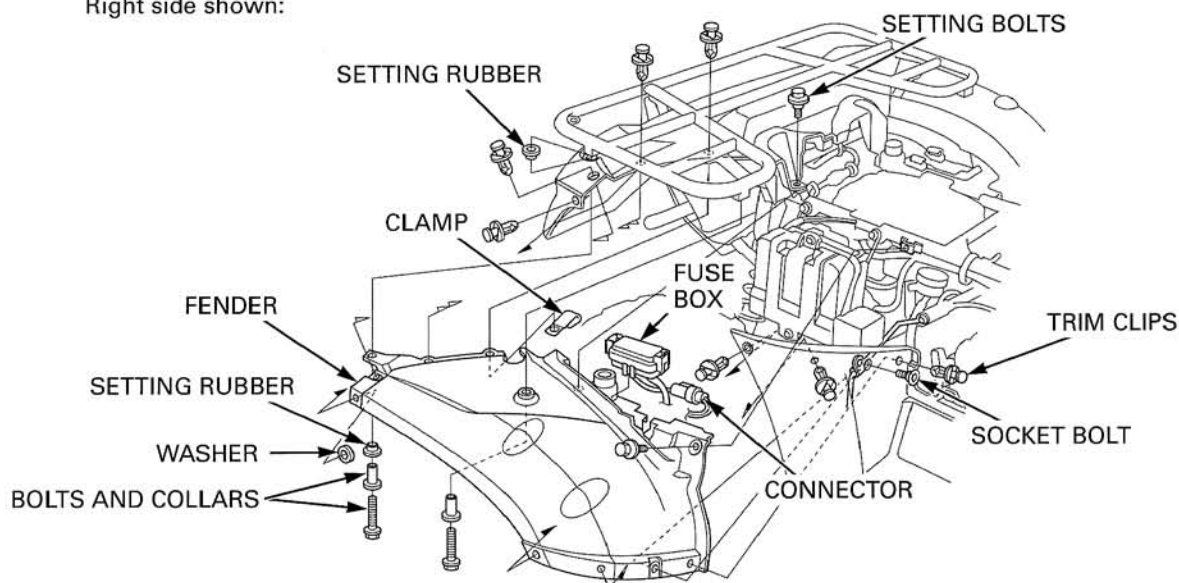
Left side:

Remove the following:

- oil filler lid (page 2-8)
- setting bolt (attached with the fuel tank side cover)
- bolt and collar (front side)
- bolt, collar and setting rubbers (rear side)
- socket bolt
- eight trim clips, setting washer and wire clamp
- left rear fender

Installation is in the reverse order of removal.

Right side shown:



Carrier/Fender Assembly Removal Procedure

Remove the following:

- seat (page 2-4)
- recoil stator cover (page 2-4)
- oil filler lid (page 2-8)

Disconnect the brake/taillight 3P (black) connector. Release the wires from the clips and remove the 3P connector from the frame.

Remove the following:

- fuse box (by releasing the tab from reverse side of the fender)
- 2P (white) connector
- three setting bolts
- two socket bolts
- 15 trim clips

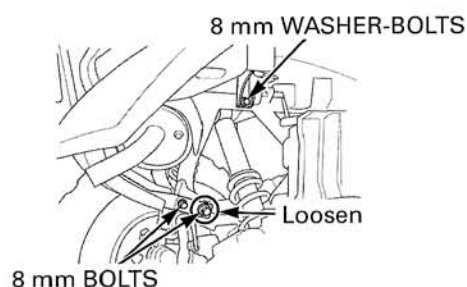
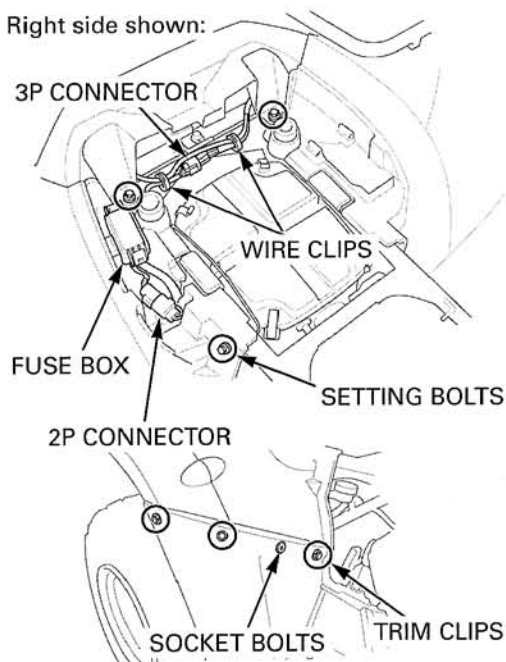
Only loosen the two lower inner bolts.

- four 8-mm bolts (carrier mounting bolts)
- rear carrier/fender assembly

Installation is in the reverse order of removal.

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

Right side shown:



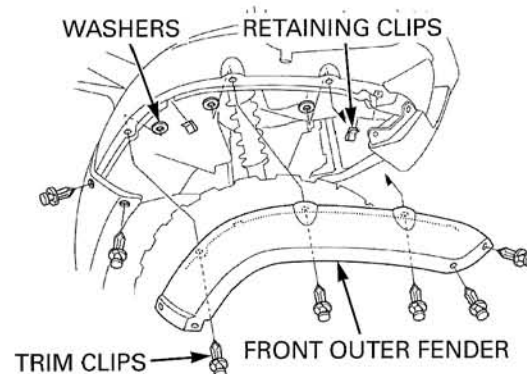
OUTER FENDER

Front Outer Fender

Remove the following:

- retaining clips
- seven trim clips and three setting washers
- front outer fender

Installation is in the reverse order of removal.

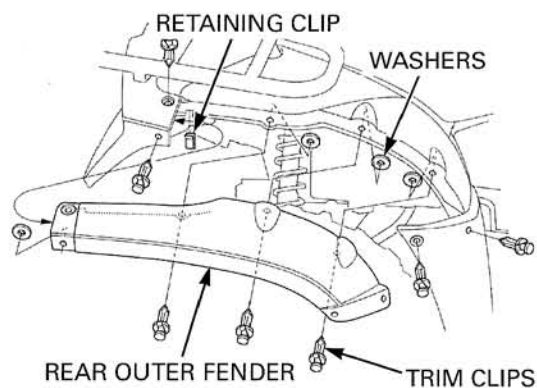


Rear Outer Fender

Remove the following:

- retaining clip
- seven trim clips and four setting washers
- rear outer fender

Installation is in the reverse order of removal.

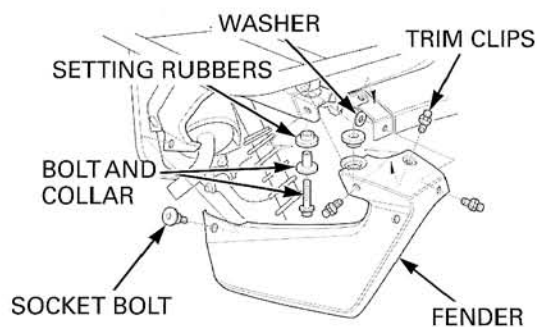


Rear Corner Outer Fender

Remove the following:

- taillight assembly (page 22-5)
- three trim clips and setting washer
- socket bolt
- bolt, collar and setting rubbers
- corner outer fender

Installation is in the reverse order of removal.



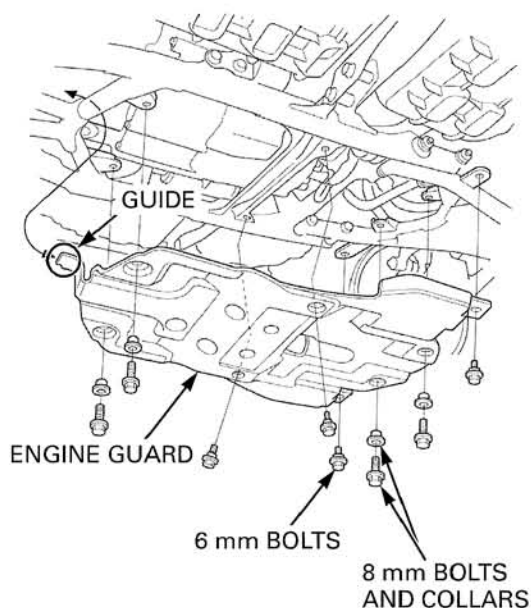
ENGINE GUARD

Remove the following:

- four 8-mm bolts and collars
- four 6-mm bolts
- engine guard

*Hook the guide
over the frame
pipe.*

Installation is in the reverse order of removal.



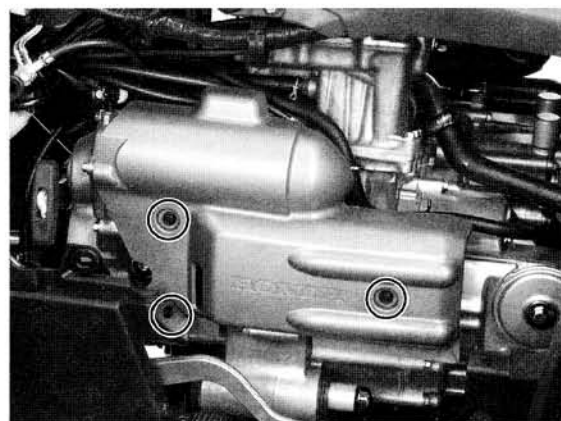
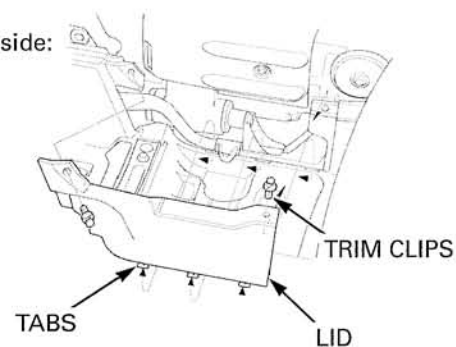
ENGINE SIDE COVER

Right side only: Remove the two trim clips and the mud guard lid by releasing the three tabs.

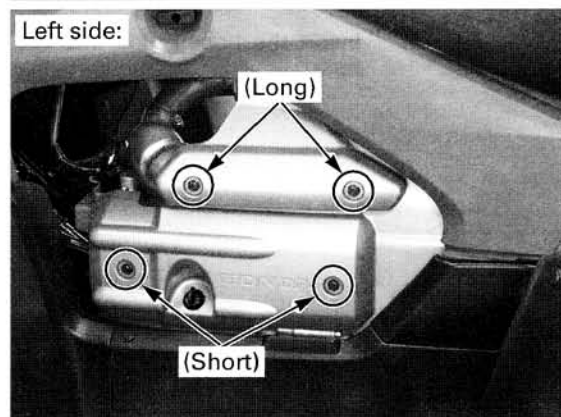
Remove the bolts and the engine side cover.

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

Right side:

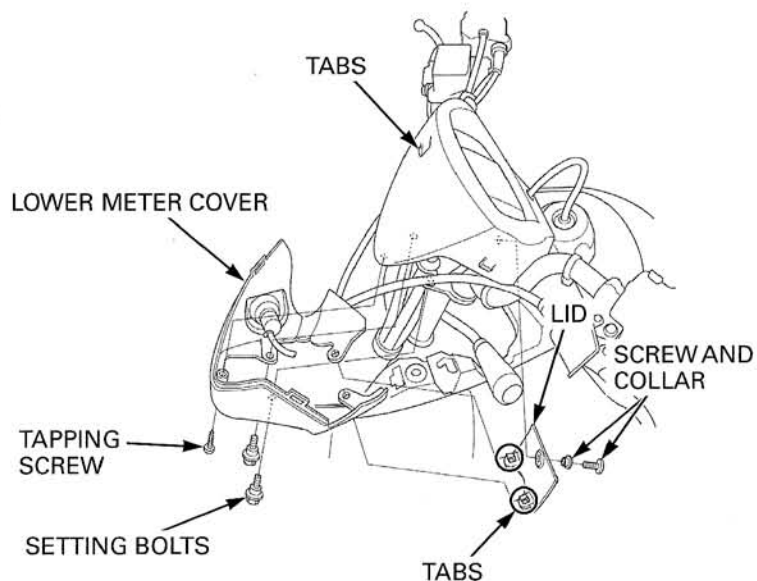


Left side:

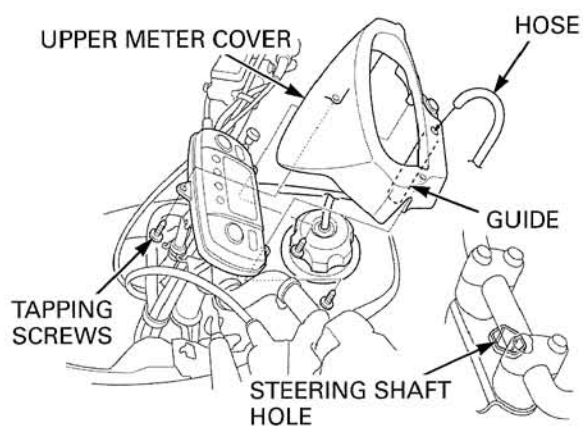


METER COVER

- If the lower meter cover will be replaced, remove the accessory socket (page 22-5).
- Remove the following:
- screw and collar (rear side)
 - cover lid (release tabs)
 - two setting bolts
 - tapping screw (front side)
 - lower meter cover (release tabs on the upper meter cover)



- If the upper meter cover will be replaced, remove the ignition switch (page 22-6).
- breather hose
 - three tapping screws
 - upper meter cover
- Installation is in the reverse order of removal.
- Insert the hose guide into the steering shaft hole.



EXHAUST SYSTEM

REMOVAL

Remove the left engine side cover (page 2-17).

EXHAUST PIPE

Remove the left side cover (page 2-6).

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.

MUFFLER

Remove the rear carrier assembly (page 2-13).

Loosen the muffler band bolts.

Remove the mounting nuts and bolts, and the muffler.

Remove the joint gasket.

INSTALLATION

Install new joint gasket and muffler gasket.

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

When tightening, adjust the clearance between the exhaust pipe and cover stay as shown so they do not interfere.

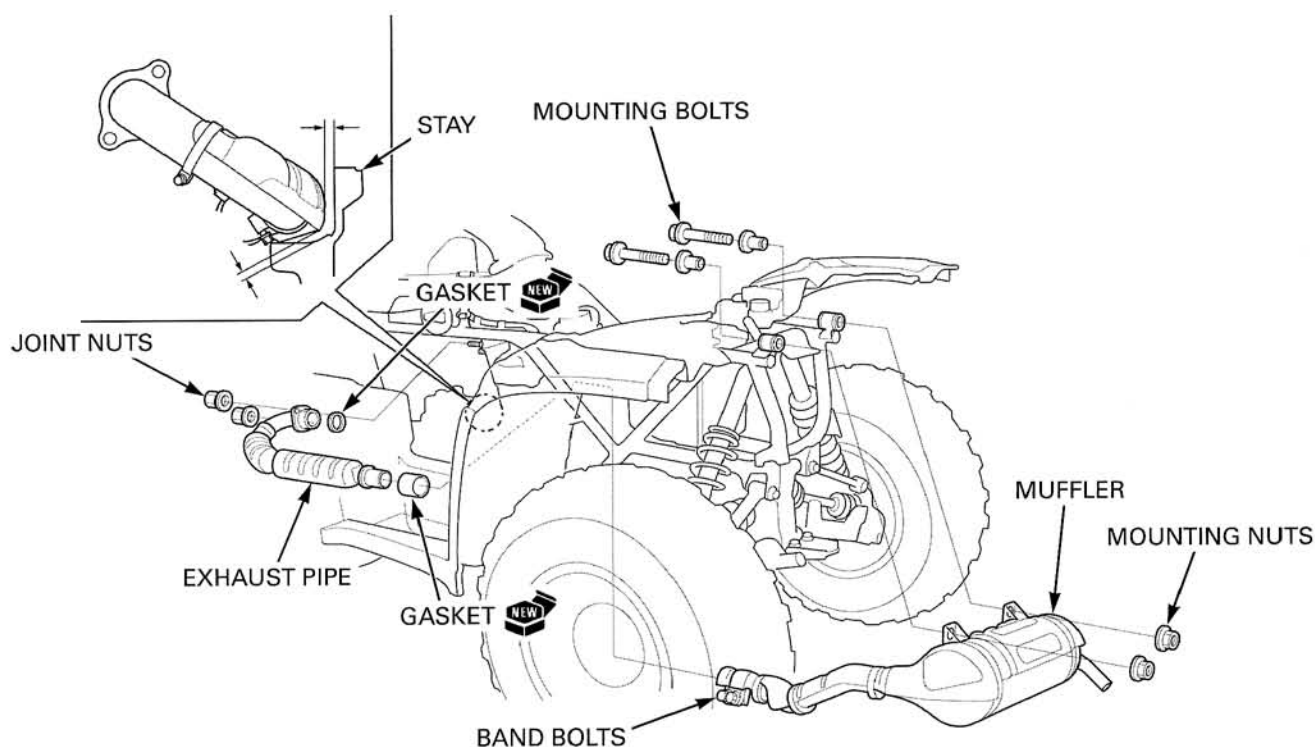
Tighten the joint nuts first, then tighten the mounting nuts and the band bolts.

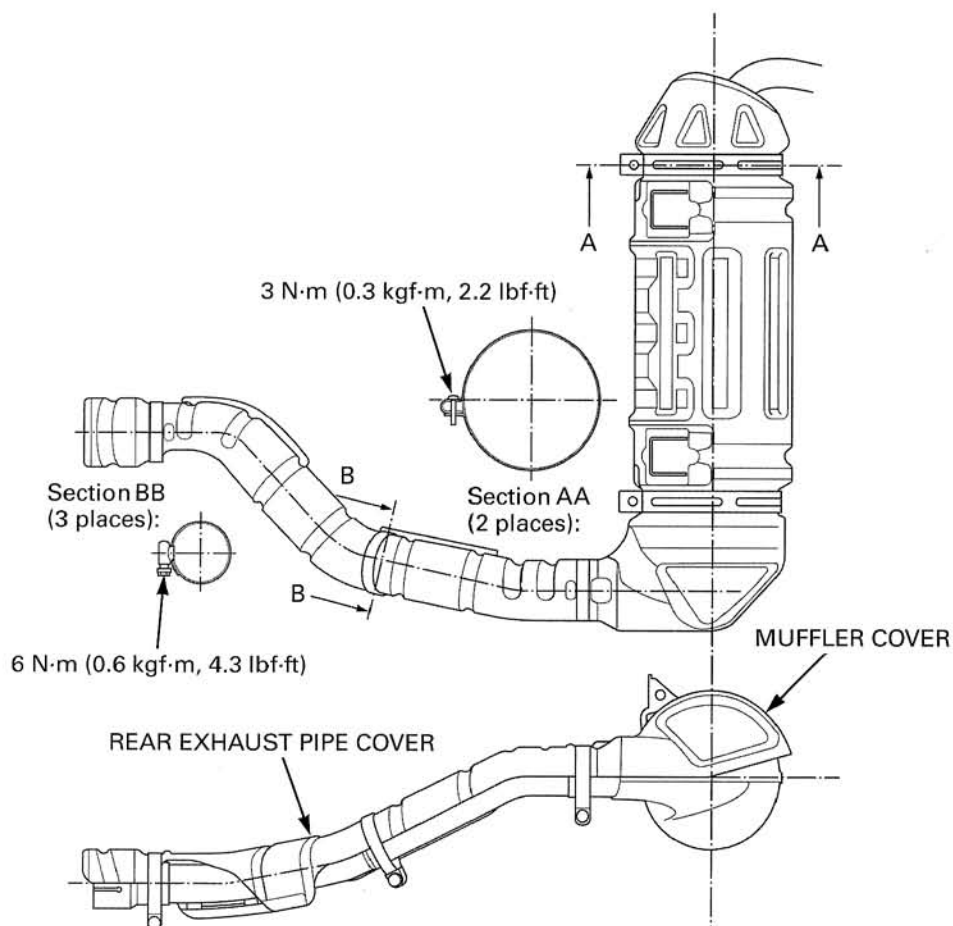
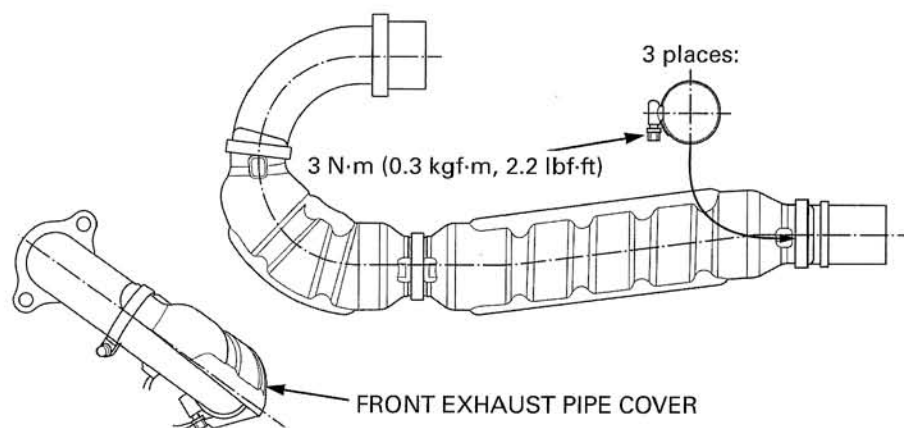
TORQUE:

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

After installation, inspect the exhaust system for leaks.

Install the removed covers in the reverse order of removal.





SERVICE INFORMATION	3-2	DRIVE SHAFT BOOTS	3-14
MAINTENANCE SCHEDULE	3-3	REAR FINAL GEAR CASE OIL AND DIFFERENTIAL OIL	3-15
FUEL LINE	3-4	BRAKE FLUID	3-17
THROTTLE OPERATION	3-4	BRAKE SHOES WEAR	3-18
CARBURETOR CHOKE	3-5	BRAKE PADS WEAR	3-18
AIR CLEANER	3-5	BRAKE SYSTEM	3-19
AIR CLEANER HOUSING DRAIN HOSE	3-7	SKID PLATE, ENGINE GUARD	3-20
SPARK PLUG	3-7	SUSPENSION	3-21
VALVE CLEARANCE	3-8	SPARK ARRESTER	3-21
ENGINE OIL	3-10	NUTS, BOLTS, FASTENERS	3-22
ENGINE OIL FILTER	3-12	WHEELS/TIRES	3-22
ENGINE IDLE SPEED	3-12	STEERING SHAFT HOLDER BEARING	3-22
RADIATOR COOLANT	3-13	STEERING SYSTEM	3-22
COOLING SYSTEM	3-13		

MAINTENANCE

SERVICE INFORMATION

GENERAL

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

SPECIFICATIONS

ITEM			SPECIFICATIONS
Throttle lever free play			3 – 8 mm (1/8 – 5/16 in)
Spark plug	Standard		IFR5L11 (NGK), VK16PRZ11 (DENSO)
	For cold climate (below 5°/41F°)		IFR6L11 (NGK), VK20PRZ11 (DENSO)
Spark plug gap			1.0– 1.1 mm (0.039 – 0.043 in)
Valve clearance	IN		0.15 mm (0.006 in)
	EX		0.33 mm (0.013 in)
Recommended engine oil			Pro Honda GN4 or HP4 (without molybdenum additives) 4-stroke oil (U.S.A. and Canada), or Honda 4-stroke oil (Canada only), or an equivalent motorcycle oil API service classification SG or Higher except oils labeled as energy conserving on the circular API service label JASO T 903 standard: MA Viscosity: SAE 10W-40, 5W-30
Engine oil capacity	After draining		2.8 liter (3.0 US qt, 2.5 Imp qt)
	After draining/filter change		2.9 liter (3.1 US qt, 2.6 Imp qt)
	After disassembly		4.1 liter (4.3 US qt, 3.6 Imp qt)
Engine idle speed			1,400 ± 100 rpm
Recommended final gear case oil			Hypoid gear oil SAE #80
Final gear case oil capacity	At draining		78 cm ³ (2.6 US oz, 2.7 Imp oz)
	At disassembly		90 cm ³ (3.0 US oz, 3.2 Imp oz)
Recommended differential oil			Hypoid gear oil SAE #80
Differential oil capacity	At draining		175 cm ³ (5.9 US oz, 6.2 Imp oz)
	At disassembly		220 cm ³ (7.4 US oz, 7.7 Imp oz)
Recommended brake fluid			DOT 4 brake fluid
Front brake shoe lining thickness			Standard: 4.0 mm (0.16 in)/Service limit: 2.0 mm (0.08 in)
Front brake lever free play			25 – 30 mm (1 – 1-3/16 in)
Rear (parking) brake lever free play			25 – 30 mm (1 – 1-3/16 in)
Cold tire pressure	Front	Standard	30 kPa (0.30 kgf/cm ² , 4.4 psi)
		Minimum	26 kPa (0.26 kgf/cm ² , 3.8 psi)
		Maximum	34 kPa (0.34 kgf/cm ² , 5.0 psi)
		With cargo	30 kPa (0.30 kgf/cm ² , 4.4 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)
Tire size	Front		AT25 x 8-12
	Rear		AT25 x 10-12
Tire brand	Front		OHTSU
	Rear		OHTSU
Minimum tire tread depth (Front/Rear)			4.0 mm (0.16 in)
Toe			Toe-out: 10.9 ± 15 mm (7/16 ± 9/16 in)

TORQUE VALUES

Spark plug	18 N·m (1.8 kgf·m, 13 lbf·ft)
Valve adjusting screw lock-nut	17 N·m (1.7 kgf·m, 12 lbf·ft)
Timing hole cap	10 N·m (1.0 kgf·m, 7 lbf·ft)
Engine oil drain-bolt	25 N·m (2.5 kgf·m, 18 lbf·ft)
Engine oil filter center bolt	18 N·m (1.8 kgf·m, 13 lbf·ft)
Final gear case oil filler cap	12 N·m (1.2 kgf·m, 9 lbf·ft)
Final gear case oil drain-bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)
Differential oil filler cap	12 N·m (1.2 kgf·m, 9 lbf·ft)
Differential 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)

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.

FREQUENCY			WHICHEVER COMES FIRST ↓	↗	INITIAL MAINTEN- NANCE	REGULAR MAINTENANCE INTERVAL		REFER TO PAGE		
ITEMS						mi	100		600	1,200
						km	150		1,000	2,000
						HOURS	20		100	200
EMISSION RELATED ITEMS	*	FUEL LINE					I	3-4		
	*	THROTTLE OPERATION					I	3-4		
	*	CARBURETOR CHOKE					I	3-5		
		AIR CLEANER	NOTE 1			C	C	3-5		
		AIR CLEANER HOUSING DRAIN HOSE	NOTE 2			I	I	3-7		
		SPARK PLUG					I	3-7		
	*	VALVE CLEARANCE			I	I	I	3-8		
		ENGINE OIL			R	R	R	3-10		
		ENGINE OIL FILTER			R	R	R	3-12		
	*	ENGINE IDLE SPEED			I	I	I	3-12		
		RADIATOR COOLANT	NOTE 3			I	I	3-13		
	*	COOLING SYSTEM	NOTE 2			I	I	3-13		
NON-EMISSION RELATED ITEMS		DRIVE SHAFT BOOTS				I	I	3-14		
		REAR FINAL GEAR CASE OIL AND DIFFERENTIAL OIL				(R: Every 2 years)	I	3-15		
	*	BRAKE FLUID	NOTE 3			I	I	3-17		
	*	BRAKE SHOES WEAR	NOTE 1				I	3-18		
	*	BRAKE PADS WEAR	NOTE 1, 2				I	3-18		
		BRAKE SYSTEM			I	I	I	3-19		
		SKID PLATE, ENGINE GUARD				I	I	3-20		
	*	SUSPENSION				I	I	3-21		
	*	SPARK ARRESTER				C	C	3-21		
	*	NUTS, BOLTS, FASTENERS			I		I	3-22		
	**	WHEELS/TIRES			I	I	I	3-22		
	**	STEERING SHAFT HOLDER BEARING					I	3-22		
**	STEERING SYSTEM					I	3-22			

* 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:

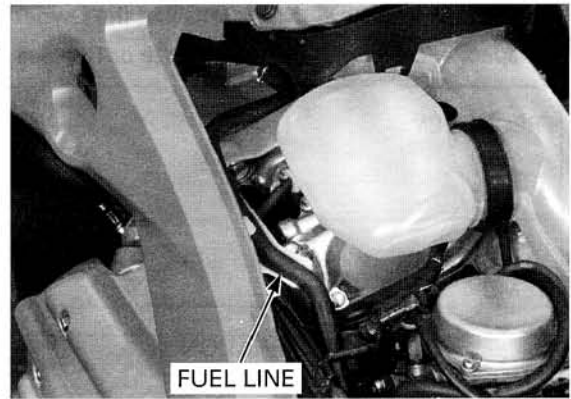
1. Service more frequently when riding in dusty areas, sand or snow.
2. Service more frequency after riding in very wet or muddy conditions.
3. Replace every 2 years. Replacement requires mechanical skill.

FUEL LINE

Remove the seat (page 2-4).

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 that 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 (page 14-8).

Reusing an abnormally bent or kinked throttle cable can prevent proper throttle slide operation and may lead to a loss of throttle control while riding.

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

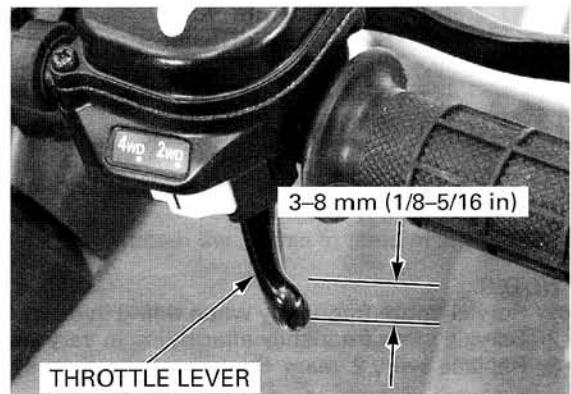
With the engine idling, turn the handlebar all the way to the right and left to ensure that the idle speed does not change. If idle speed increases, check the throttle lever free play and the throttle cable connection.

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

THROTTLE LEVER FREE PLAY:

3 – 8 mm (1/8 – 5/16 mm)

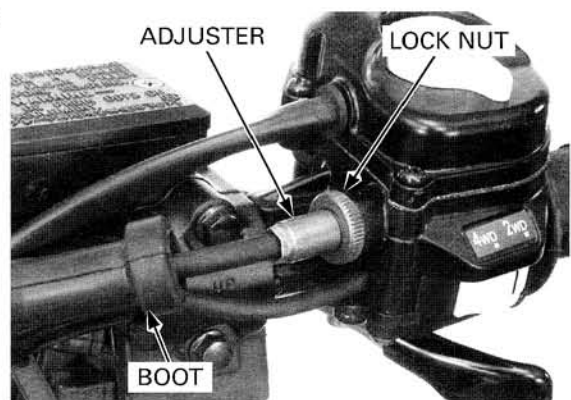
Throttle lever free play can be adjusted at either end of the throttle cable.



Minor adjustments are made with the upper adjuster.

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

Install the rubber boot securely.



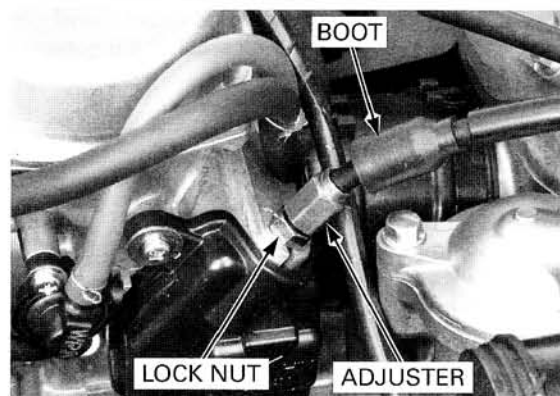
Major adjustments are made with the lower adjuster.

Remove the seat (page 2-4).

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

Install the rubber boot securely.

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



CARBURETOR CHOKE

This model's choke system uses a fuel enriching circuit controlled by a starting enrichment (SE) valve. The SE valve opens the enriching circuit via a cable when the choke knob on the handlebar is pulled up.

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

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



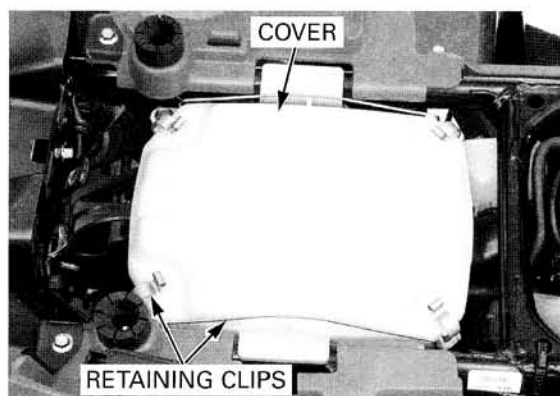
AIR CLEANER

Remove the seat (page 2-4).

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

NOTE:

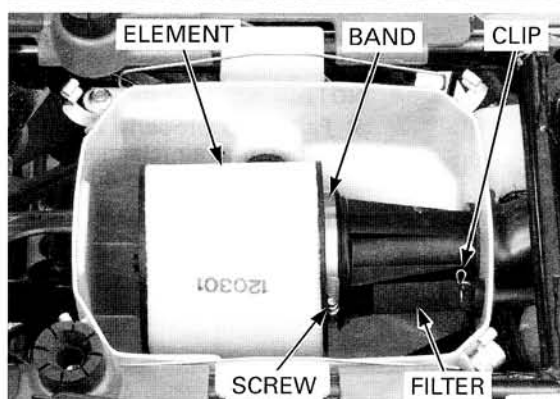
- If the vehicle is used in dusty areas, sand or snow, more frequent inspections are required.



Loosen the air cleaner element band screw.

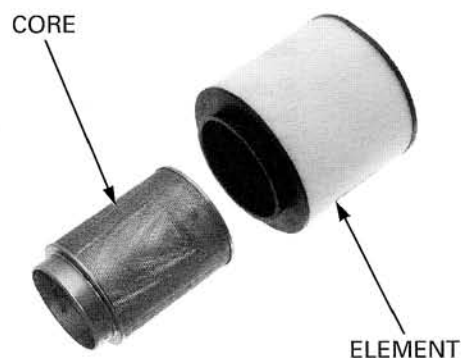
Remove the air cleaner element assembly from the housing.

Remove the clip and sub-air cleaner filter from the air cleaner hose joint.



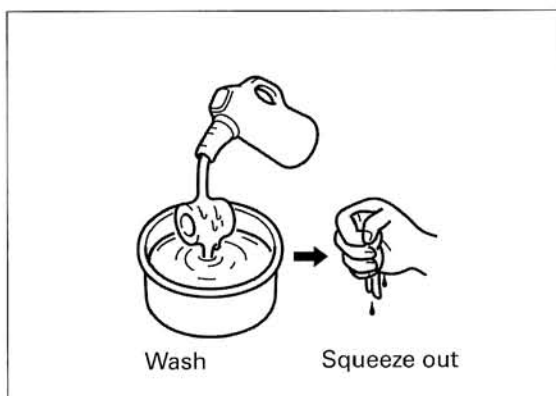
MAINTENANCE

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



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.

Install the sub-air cleaner filter onto the air cleaner hose joint and secure it with the clip.



Apply approximately 20 g (0.7 oz) of Pro Honda Form Filter Oil or equivalent oil from the inside of the element.
Place the element into a plastic bag and spread the oil evenly by hand.



Install the element core into the air cleaner element properly.

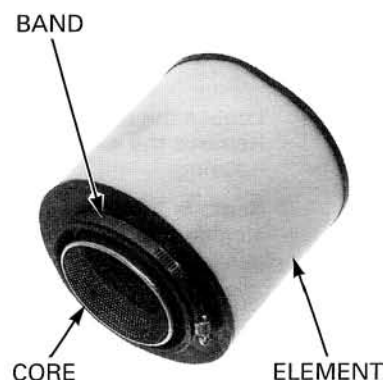
Install the element band onto the air cleaner element and the element assembly over the connecting tube flange of the housing securely.
Tighten the band screw.

NOTE:

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

Install the air cleaner element housing cover and secure it with the retaining clips.

Install the seat (page 2-4).



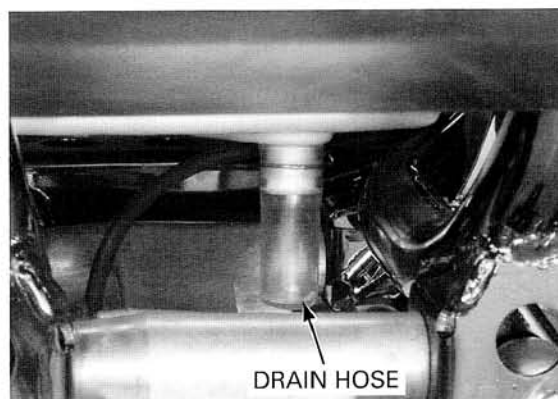
AIR CLEANER HOUSING DRAIN HOSE

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

Install the drain hose securely.

NOTE:

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

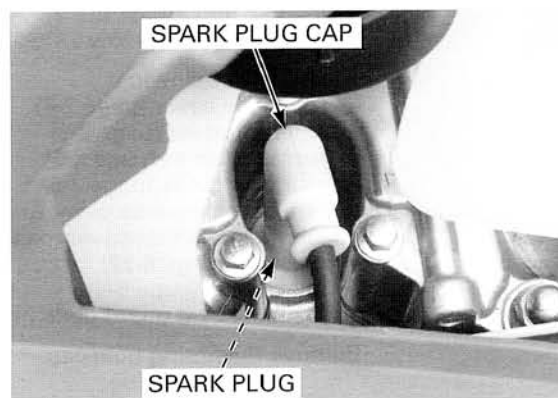


SPARK PLUG

Remove the seat (page 2-4).

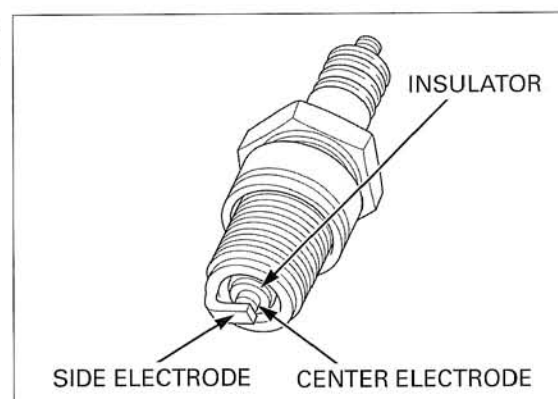
Disconnect the spark plug cap and clean around the spark plug base with compressed air.

Remove the spark plug.



This vehicle's spark plug is equipped with an iridium type center electrode. Do not clean the electrodes.

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



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

Always use the specified spark plug on this vehicle.

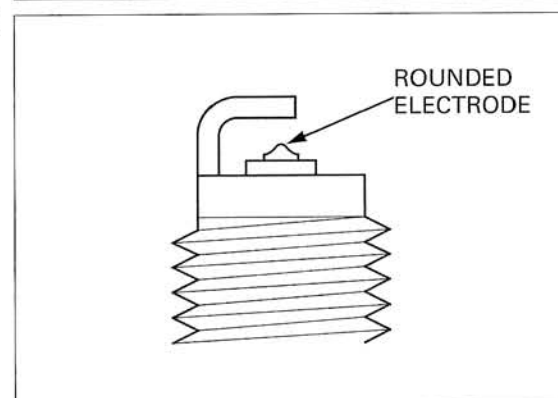
SPECIFIED SPARK PLUG:

Standard:

IFR5L11 (NGK), VK16PRZ11 (DENSO)

For extended high speed riding

IFR6L11 (NGK), VK20PRZ11 (DENSO)



MAINTENANCE

To prevent damaging the iridium coating of the 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 with a new one.

Measure the spark plug gap between the center and side electrodes with a wire-type feeler gauge.

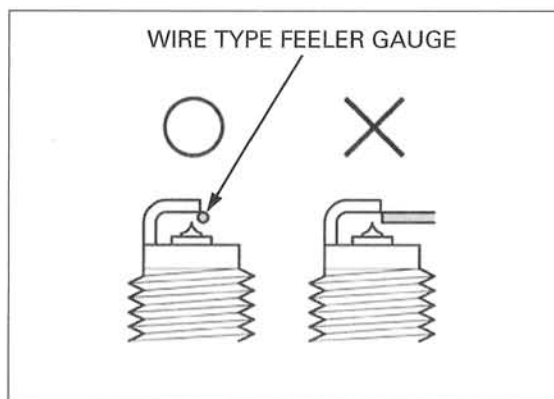
Make sure the 1.20 mm (0.047 in) wire-type feeler gauge cannot be inserted into the gap. If the gauge can be inserted into the gap, replace the plug with a new one.

Screw the spark plug into the cylinder head by hand to prevent cross-threading.

Tighten the spark plug.

TORQUE: 18 N·m (1.8 kgf·m, 13 lbf·ft)

Install the removed parts in the reverse order of removal.



VALVE CLEARANCE

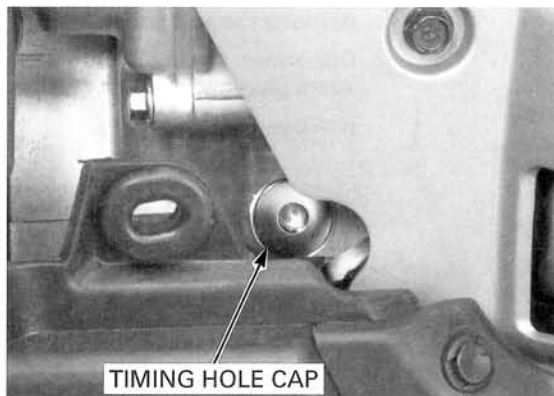
NOTE:

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

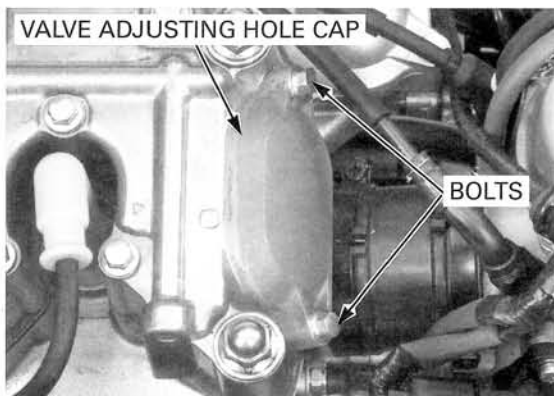
Remove the following:

- right side cover (page 2-4)
- steering cover (page 2-5)
- fuel tank cover (page 2-5)
- rear tank cover (page 2-5)
- right fuel tank side cover (page 2-6)
- left fuel tank side cover (page 2-6)
- fuel tank (page 5-22)
- intake duct (page 5-5)
- fuel tank heat guard plate (page 5-23)

Remove the timing hole cap.



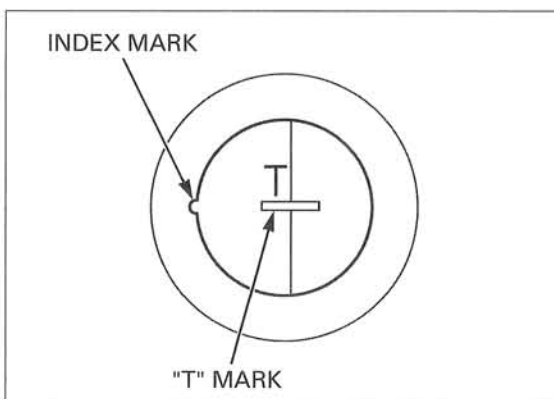
Remove the four bolts, intake and exhaust valve adjusting hole caps.



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

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

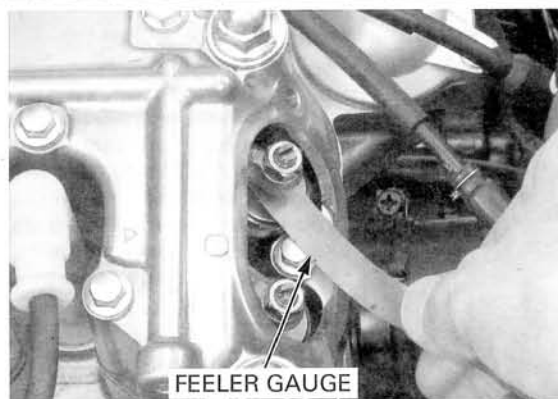
This position can be obtained by confirming that there is slack in the rocker arm. If there is no slack, it is because the piston is moving through the exhaust stroke to TDC. Rotate the crankshaft one full turn and match up the "T" mark again.



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: 0.33 mm (0.013 in)

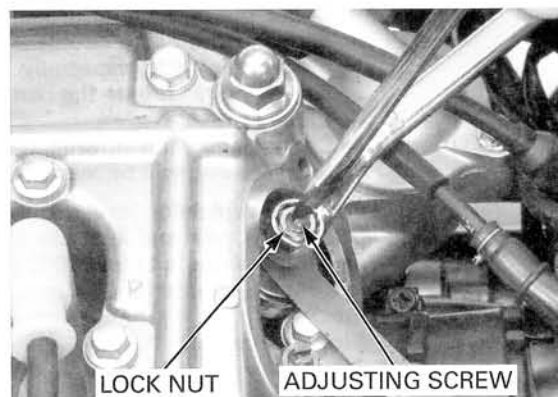


Adjust by loosening the lock nut and turning the adjusting screw until there is a slight drag on the feeler gauge.

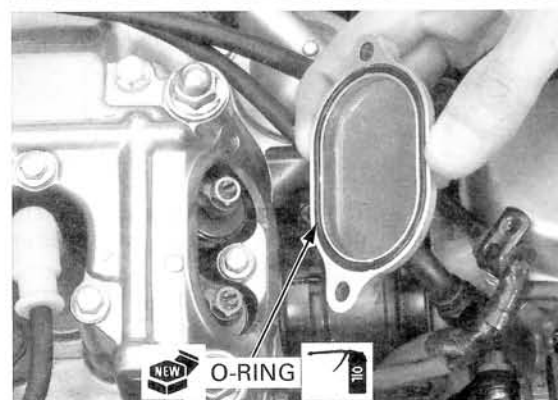
Hold the adjusting screw and tighten the lock nut.

TORQUE: 17 N·m (1.7 kgf·m, 12 lbf·ft)

After tightening the lock nut, recheck the valve clearance.



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 securely.



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

Install the timing hole cap and tighten it.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

Install the removed parts in the reverse order of removal.



MAINTENANCE

ENGINE OIL

⚠ 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.

LEVEL CHECK

NOTE:

- 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.

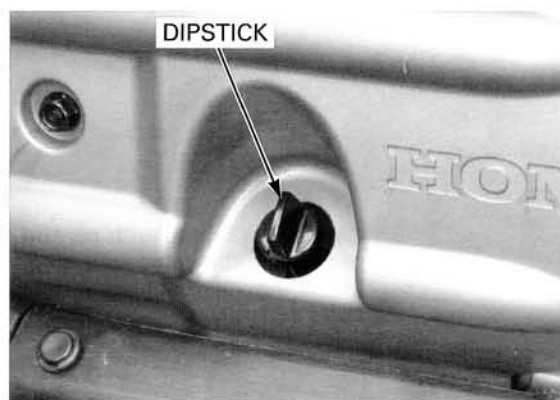
Place the vehicle on level ground.

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

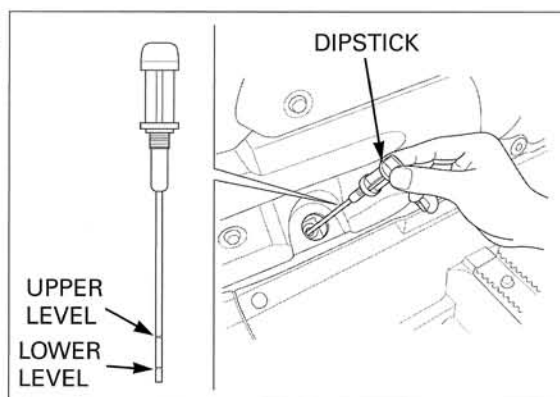
Stop the engine.

After a few minutes, remove the dipstick and wipe it clean.

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



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



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

RECOMMENDED ENGINE OIL:

Pro Honda GN4 or HP4 (without molybdenum additives) 4-stroke oil (U.S.A. and Canada), or Honda 4-stroke oil (Canada only), or an equivalent motorcycle oil

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

JASO T 903 standard: MA

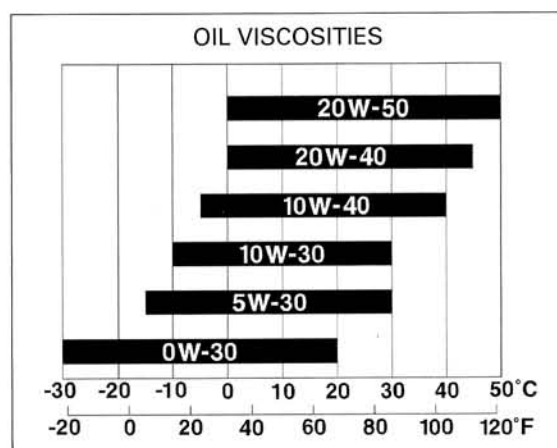
Viscosity: SAE 10W-40, 5W-30



NOTE:

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

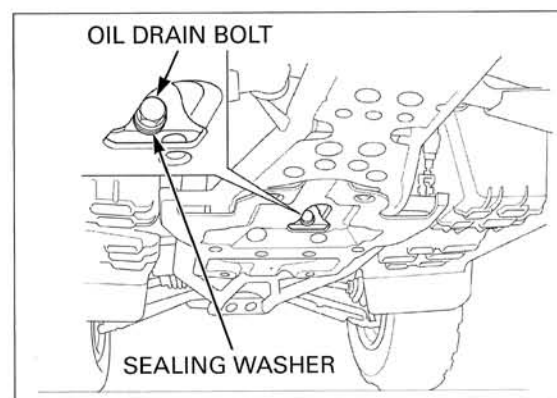
Reinstall the oil filler cap, oil filler cap cover and dipstick.


OIL CHANGE
NOTE:

- Pour the engine oil after replacing the oil filter (page 3-12).
- Change the oil with the engine warm to assure complete and rapid draining.

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

Remove the oil drain bolt and drain the engine oil.

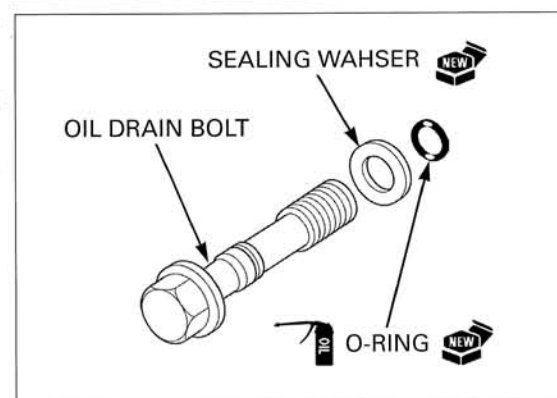


Remove the O-ring and sealing washer from the drain bolt.

Install a new sealing washer onto the drain bolt. Coat a new O-ring with oil and install it into the groove in the drain bolt.

After draining the oil completely, install the drain bolt and tighten it.

TORQUE: 25 N·m (2.5 kgf·m, 18 lbf·ft)



MAINTENANCE

Be careful not to spill the oil out of the filler neck.

Pour the recommended oil (page 3-10) into the engine to the upper level mark on the dipstick.

ENGINE OIL CAPACITY:

2.8 liters (3.0 US qt, 2.5 Imp qt) after draining

2.9 liters (3.1 US qt, 2.6 Imp qt) after draining/filter change

4.1 liters (4.3 US qt, 3.6 Imp qt) after disassembly

Install the oil filler cap.

Check the oil level (page 3-10).

Make sure there are no oil leaks.



ENGINE OIL FILTER

Drain the engine oil (page 3-11).

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 oil and install them into the grooves in the oil filter cover and center bolt.

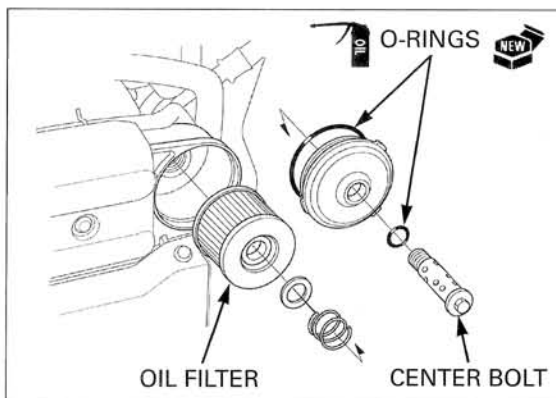
Install a new oil filter.

Reinstall the washer, spring, cover and center bolt.

Tighten the center bolt.

TORQUE: 18 N·m (1.8 kgf·m, 13 lbf·ft)

Fill the engine with the recommended oil (page 3-11)



ENGINE IDLE SPEED

NOTE:

- 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.

Remove the right side cover (page 2-4).

Connect a tachometer.

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

Check the idle speed and adjust by turning the throttle stop screw as required.

IDLE SPEED: 1,400 ± 100 rpm

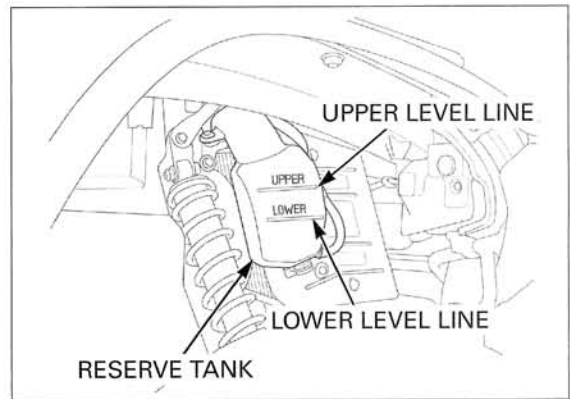
Remove the tachometer.

Install the right side cover (page 2-4).



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 steering cover (page 2-5) and reserve tank cap, and fill the tank up to the "UPPER" level line with a 1:1 mixture of distilled water and antifreeze (coolant preparation: page 6-6).

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 the reserve tank becomes completely empty, there is a possibility of air getting into the cooling system. Be sure to remove any air from the cooling system (page 6-7).

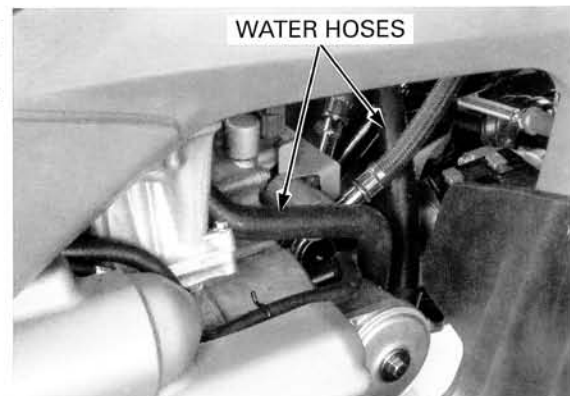


COOLING SYSTEM

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

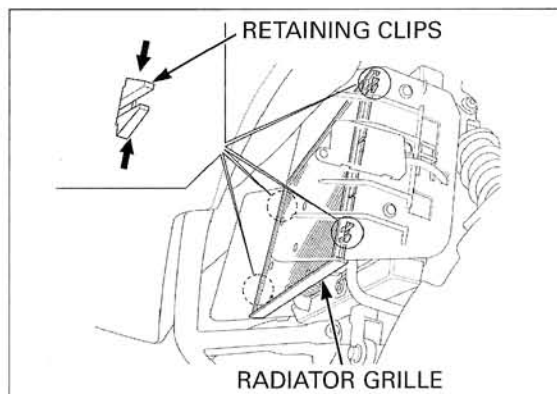
Check the water hoses for cracks or deterioration and replace if necessary.

Check that all hose clamps are tight.



MAINTENANCE

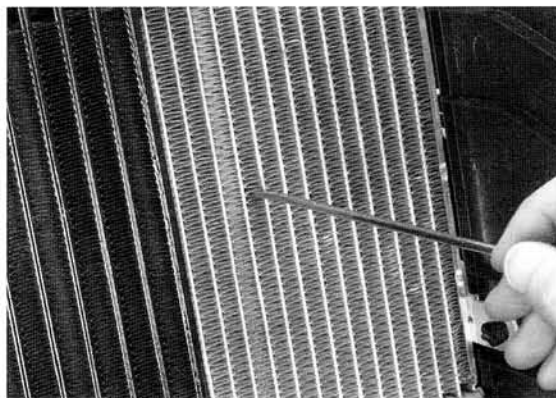
Remove the radiator grille by releasing the four retaining clips.



Check the radiator air passage for clogs or damage.

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

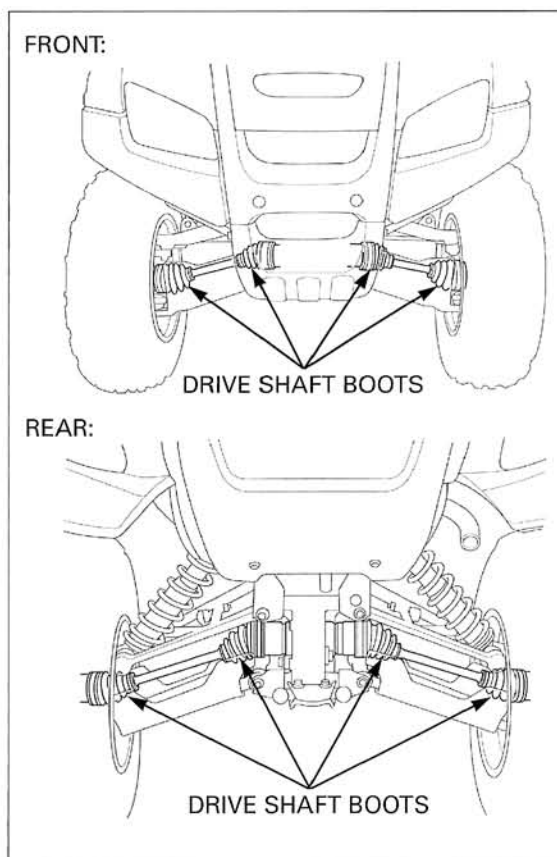
Install the radiator grille.



DRIVE SHAFT BOOTS

Check the drive shaft boots for cuts or other damage.

If a boot is damaged, replace it (page 17-5 and page 18-5).



REAR FINAL GEAR CASE OIL AND DIFFERENTIAL OIL

FINAL GEAR CASE OIL

LEVEL CHECK

Place the vehicle on a level surface.

Remove the oil filler cap.



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

Check for leaks if the oil level is low.

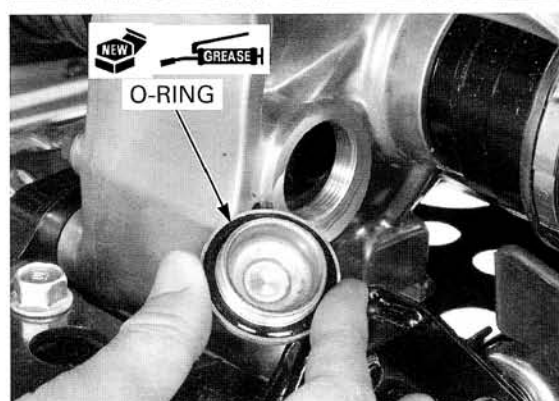
Pour the oil through the filler hole until it reaches the lower edge of the hole.

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.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)



OIL CHANGE

Place the vehicle on a level surface.

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

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

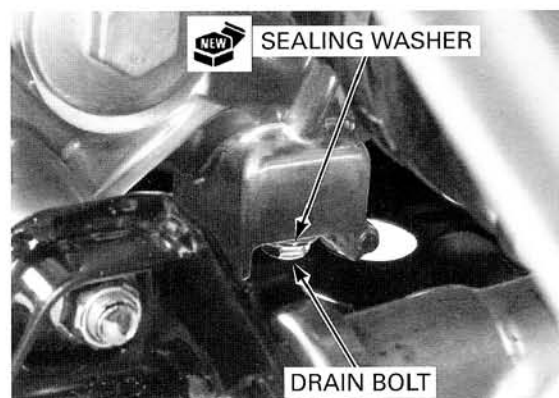
TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Fill the final gear case with the recommended oil (page 3-15).

OIL CAPACITY:

78 cm³ (2.6 US oz, 2.7 Imp oz) at draining

90 cm³ (3.0 US oz, 3.2 Imp oz) at disassembly



DIFFERENTIAL OIL

LEVEL CHECK

Place the vehicle on a level surface.

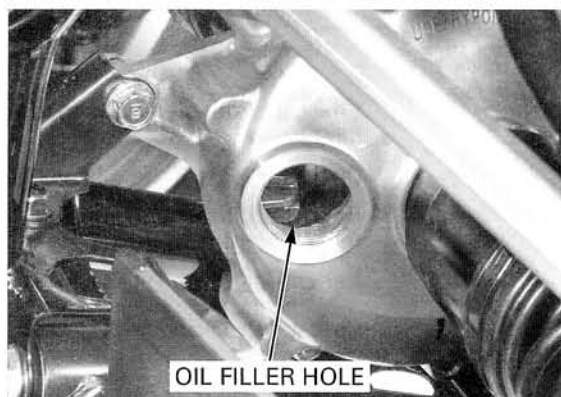
Remove the oil filler cap.



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.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)



OIL CHANGE

Place the vehicle on a level surface.

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

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

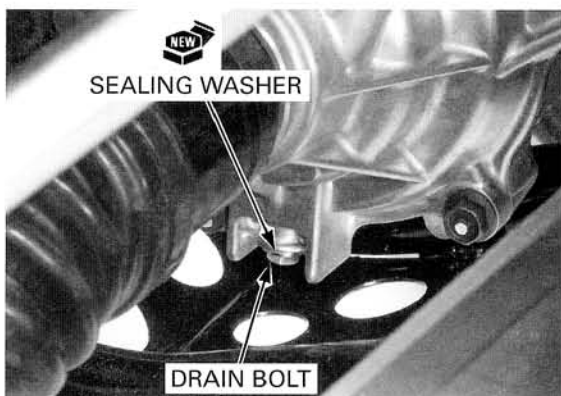
TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Fill the differential case with the recommended oil (page 3-16).

OIL CAPACITY:

175 cm³ (5.9 US oz, 6.2 Imp oz) at draining

220 cm³ (7.4 US oz, 7.7 Imp oz) at disassembly



BRAKE FLUID

NOTICE

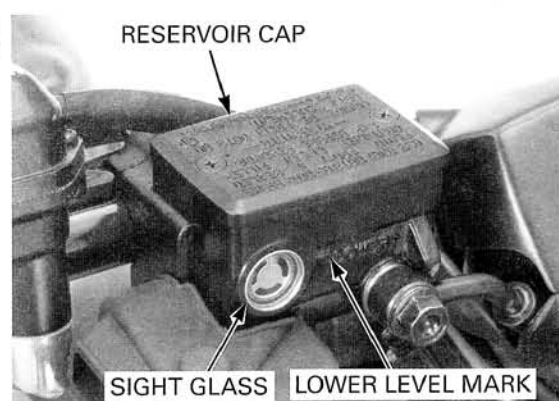
- Do not mix different types of fluid, as they may not be compatible with each other.
- Do not allow foreign material to enter the system when filling the reservoir.
- Avoid spilling fluid on painted, plastic or rubber parts. Place a rag over these parts whenever the system is serviced.

NOTE:

- When the fluid level is low, check the brake shoes or pads for wear (page 3-18). A low fluid level may be due to worn brake shoes or pads. If the brake shoes or pads are worn, the caliper piston is pushed out, and this causes a low reservoir level. If the brake shoes or pads are not worn and the fluid level is low, check entire system for leaks (page 3-19).

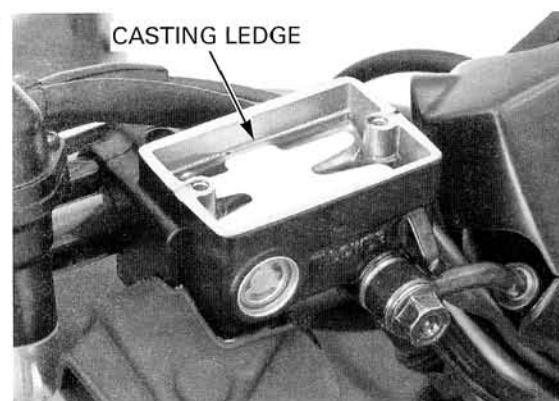
FRONT BRAKE

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



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

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



REAR BRAKE

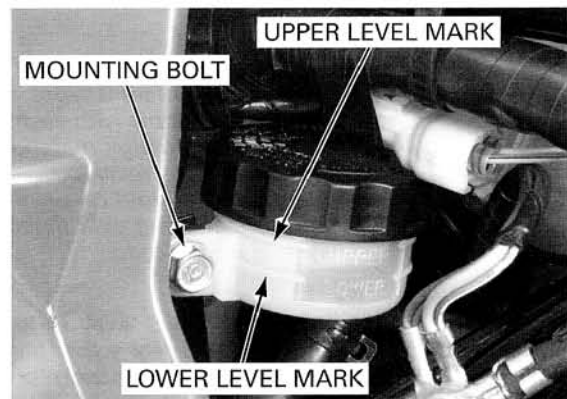
Place the vehicle on a level surface.

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

Check the fluid level in the rear brake reservoir. If the level is near the "LOWER" level line, remove the reservoir mounting bolt, reservoir cap, set plate and diaphragm and fill the reservoir with DOT 4 brake fluid from a sealed container to the "UPPER" level line.

Install the diaphragm, set plate, reservoir cap and mounting bolt, and tighten the bolt.

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



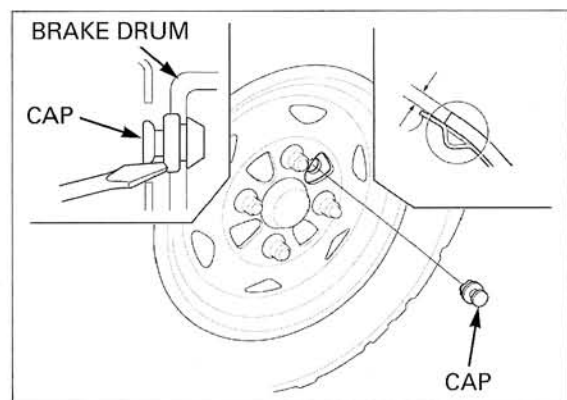
BRAKE SHOES WEAR

Remove the inspection hole cap and inspect the lining thickness.

SERVICE LIMIT: 2.0 mm (0.08 in)

NOTE:

- If either lining on one wheel is worn beyond the limit, both brake shoes for that wheel must be replaced.



BRAKE PADS WEAR

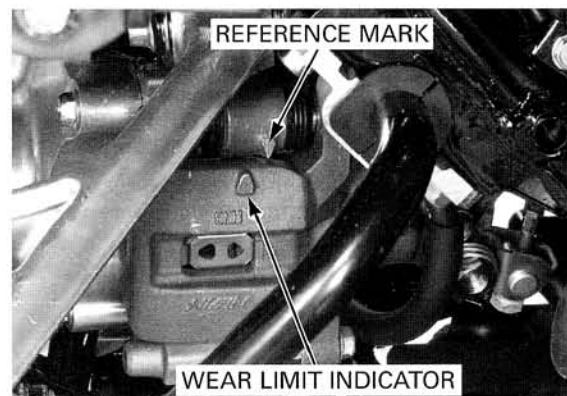
Check the brake pads for wear.

Replace the brake pads if the wear limit indicator mark on the caliper aligns with the reference mark on the caliper bracket when the rear brake is applied.

Refer to page 16-9 for brake pad replacement.

NOTE:

- The rear brake has audible brake wear indicator. When the brake pads need replacing, the rear brake will screech while applying the rear brake.



BRAKE SYSTEM

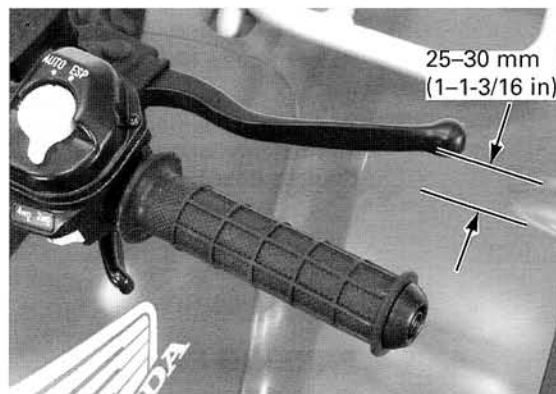
FRONT BRAKE

Measure the free play (distance the brake lever moves before the brake starts to take hold) at the end of the brake lever.

FREE PLAY: 25 – 30 mm (1 – 1-3/16 in)

If the free play is excessive and the brake shoe linings are not worn beyond the service limit, adjust the brake shoe lining-to-drum clearance.

Raise the front wheel off the ground by placing a support block under the vehicle.



Be careful not to damage the wheel while adjusting.

Remove the inspection hole cap and line up the cap hole with one of the brake shoe adjusters and turn the adjuster up with a screwdriver until the shoes lock, then back off three stops.

Spin the wheel manually to make sure the brake does not drag.

Line up the inspection hole with the second adjuster and repeat the procedure. Adjust both wheels.

NOTE:

- There are two adjusters on each front wheel. Adjust all four adjusters.

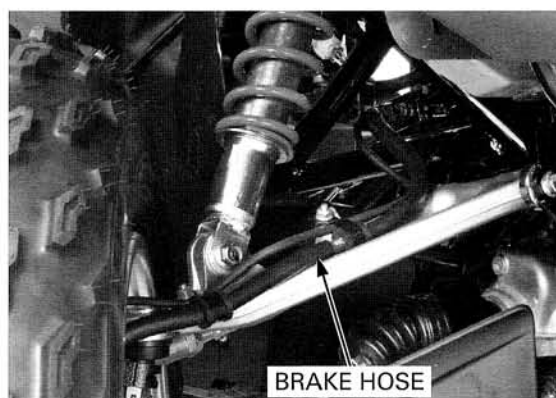
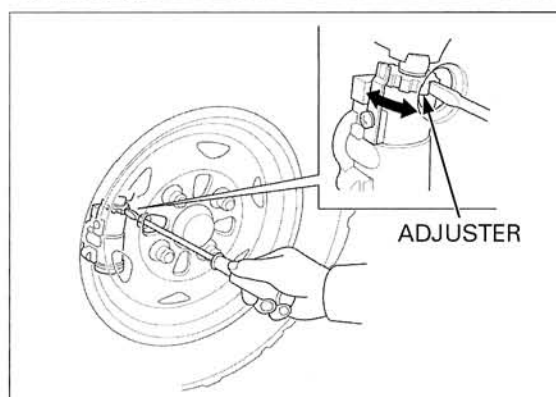
Recheck the brake lever free play. If the free play is still excessive after adjusting the brake shoe lining clearance, there is probably air in the brake system and it must be bled (page 16-7).

After checking, install the inspection hole cap securely in the drum while pushing the cap with a screwdriver.

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

Tighten any loose fittings.

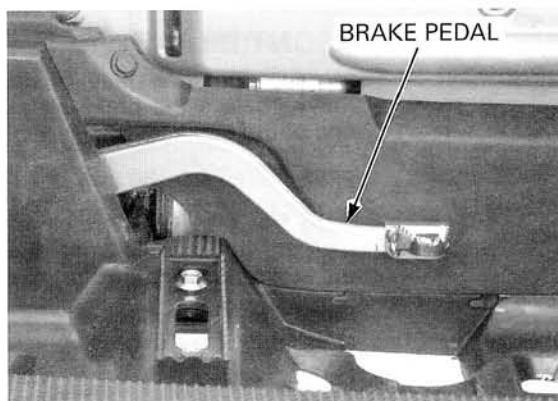
Replace hoses, pipes and fittings as required.



REAR BRAKE

Firmly apply the brake pedal and check that no air has entered the system. If the brake pedal feels soft or spongy when operated, bleed the system. Refer to page 16-8 for air bleeding procedures.

Inspect the brake hoses and fittings for deterioration, cracks, damage or signs of leakage. Tighten any loose fittings. Replace hoses, pipes and fittings as required.



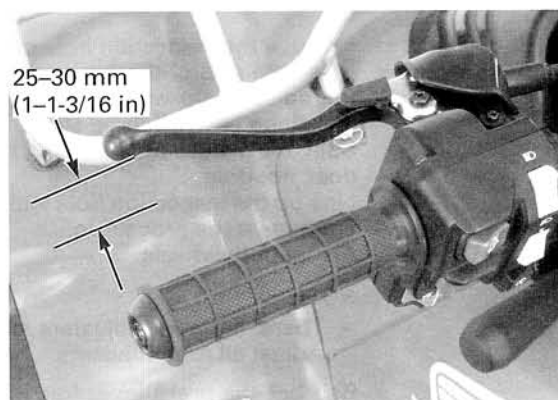
PARKING BRAKE

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

For cable lubrication: Disconnect the brake cable at the brake lever. Thoroughly lubricate the cable and its pivot point with a commercially available cable lubricant or a lightweight oil.

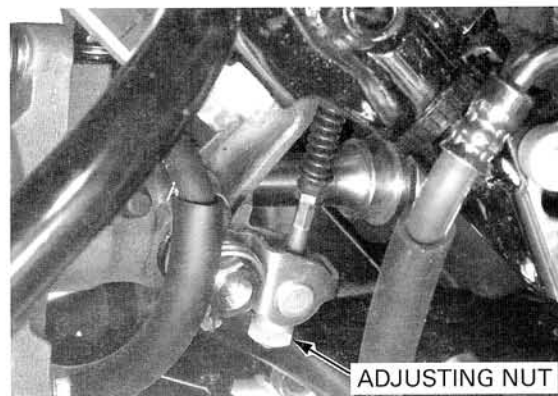
Measure the parking brake lever free play at the end of the lever.

FREE PLAY: 25 – 30 mm (1 – 1-3/16 in)



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

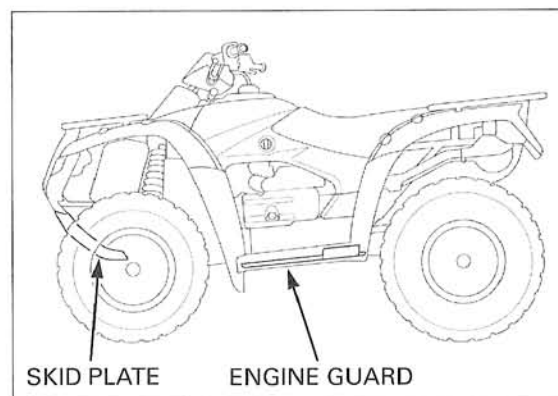
Adjust the parking brake lever free play by turning the adjusting nut at the brake arm.



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

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

Check the action of the front and rear shock absorbers by compressing them several times.
Check the entire shock absorber assembly for signs of leaks, damage or loose fasteners.
Replace damaged components which cannot be repaired.
Tighten all nuts and bolts.

FRONT:

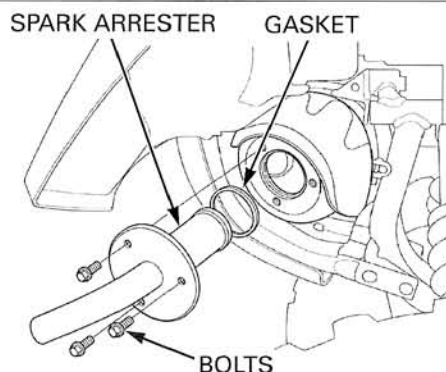


REAR:



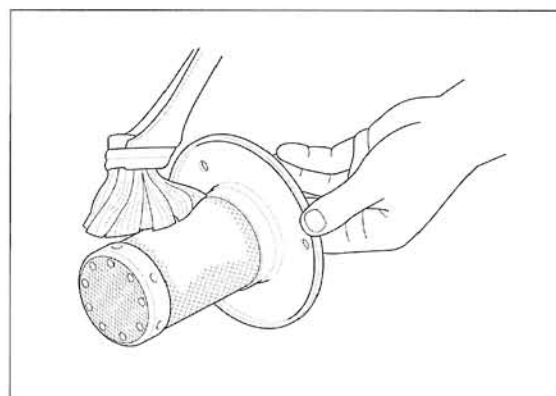
SPARK ARRESTER

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 bolts securely.



MAINTENANCE

NUTS, BOLTS, FASTENERS

Check that all chassis nuts and bolts are tightened to their correct torque values (page 1-14).
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:

Front: Standard: 30 kPa (0.30 kg/cm², 4.4 psi)
Minimum: 26 kPa (0.26 kg/cm², 3.8 psi)
Maximum: 34 kPa (0.34 kg/cm², 5.0 psi)
With cargo: 30 kPa (0.30 kg/cm², 4.4 psi)
Rear: Standard: 25 kPa (0.25 kg/cm², 3.6 psi)
Minimum: 22 kPa (0.22 kg/cm², 3.2 psi)
Maximum: 28 kPa (0.28 kg/cm², 4.0 psi)
With cargo: 25 kPa (0.25 kg/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.



STEERING SHAFT HOLDER BEARING

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

Check that the handlebar moves freely from side to side.

If the handlebar moves unevenly, binds, or has horizontal movement, inspect the steering shaft holder bushing and bearing (page 14-23).

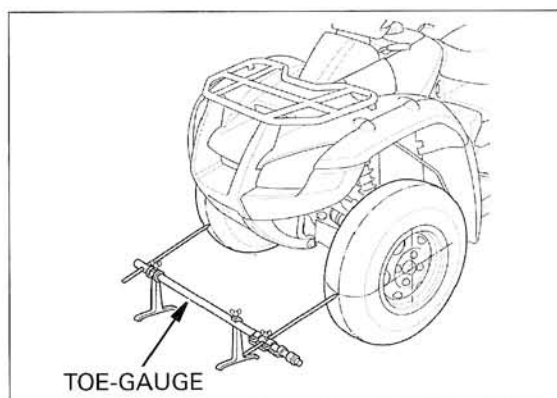


STEERING SYSTEM

Place the vehicle on level ground with the front wheels facing straight ahead.

Mark the centers of the tires with chalk to indicate the axle center height.

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



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: 9 ± 15 mm ($0.4 \pm 9/16$ in)

NOTE:

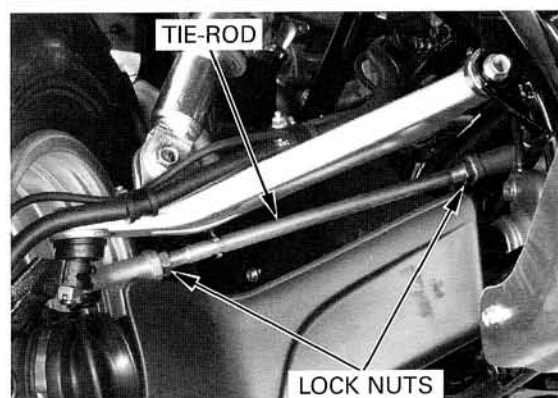
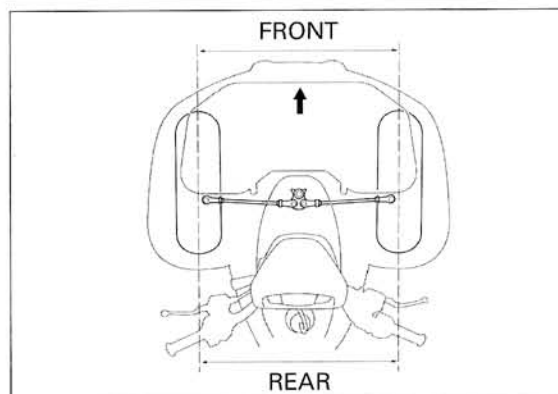
- Toe-out means the front measurement is greater than the rear measurement.

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

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

TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)

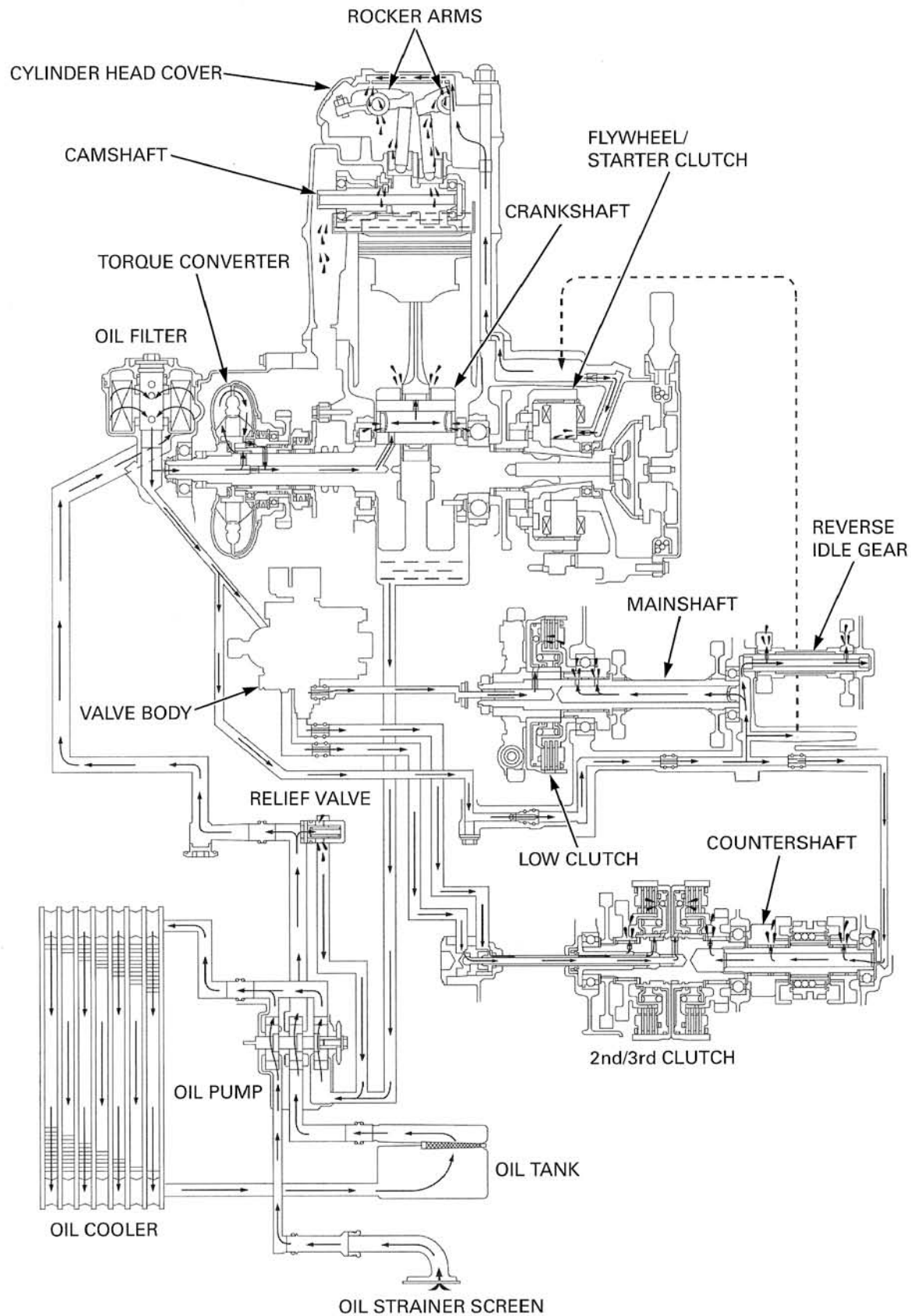
After tightening the lock nuts, make sure the ball joints operate properly by rotating the tie-rods, to make sure both ball joints have equal play.



4. LUBRICATION SYSTEM

LUBRICATION SYSTEM DIAGRAM	4-2	OIL PRESSURE CHECK	4-5
SERVICE INFORMATION	4-3	OIL PUMP	4-5
TROUBLE SHOOTING	4-4	OIL COOLER	4-12

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 3-10.
- 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 for oil leaks.

SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Engine oil capacity	After draining	2.8 liters (3.0 US qt, 2.5 Imp qt)	—
	After draining/filter change	2.9 liters (3.1 US qt, 2.6 Imp qt)	—
	After disassembly	4.1 liters (4.3 US qt, 3.6 Imp qt)	—
Recommended engine oil		Pro Honda GN4 or HP4 (without molybdenum additives) 4-stroke oil (U.S.A. and Canada), or Honda 4-stroke oil (Canada only), or an equivalent motorcycle oil API service classification SG or Higher except oils labeled as energy conserving on the circular API service label JASO T 903 standard: MA Viscosity: SAE 10W-40, 5W-30	—
Oil pressure at 5,000 rpm/80°C (176°F)		785 kPa (8.0 kgf/cm ² , 114 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 pump drive sprocket bolt 12 N·m (1.2 kgf-m, 9 lbf-ft) Apply locking agent to the threads.

TOOLS

Pressure gauge set 07406-0020005 or 07YAJ-0010300 and 07406-0020201
or equivalent commercially available in U.S.A.

TROUBLE SHOOTING

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
- Leaky coolant passage
- Water entry

OIL PRESSURE CHECK

Check the oil level and add the recommended oil if necessary (page 3-10). Also, check the engine and oil line for external oil leak before checking the oil pressure.

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

NOTE:

- Clean around the sealing bolt with compressed air before removing the bolt, and be sure that no dirt enters the oil gallery.

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

TOOLS:

Pressure gauge set 07406-0020005 or
Pressure gauge 07YAJ-0010300 and
Pressure gauge hose 07406-0020201
 or equivalent commercially available in U.S.A.

Start the engine and check the oil pressure.

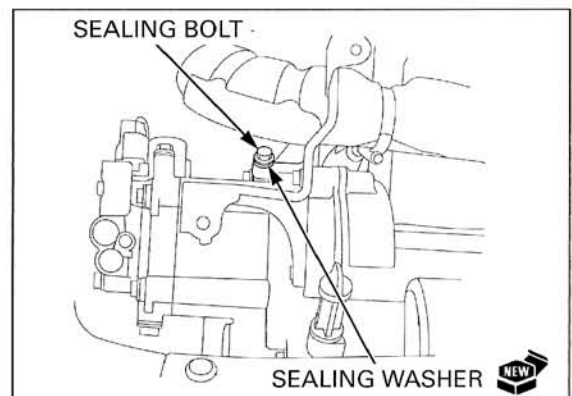
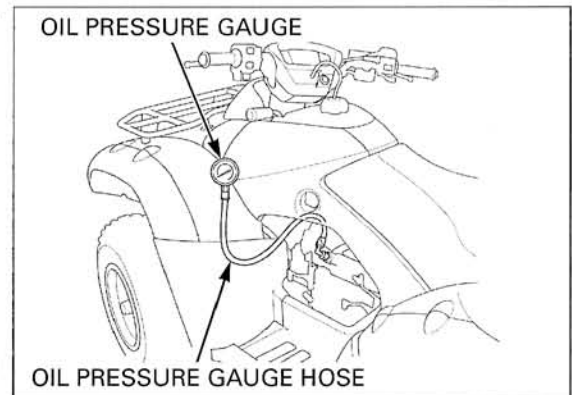
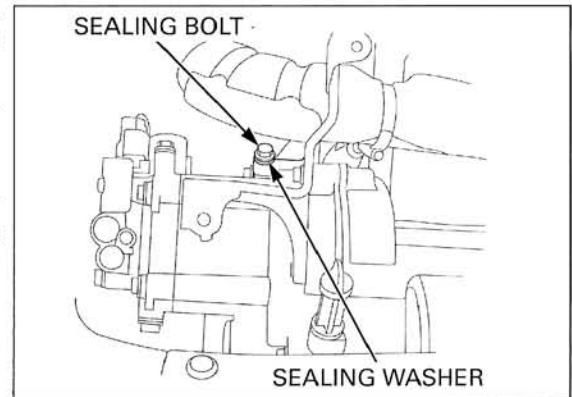
OIL PRESSURE (80°C/176°F):

785 kPa (8.0 kgf/cm², 114 psi) at 5,000 rpm

Stop the engine and remove the oil pressure gauge and hose.

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

Start the engine and make sure there are no oil leaks.

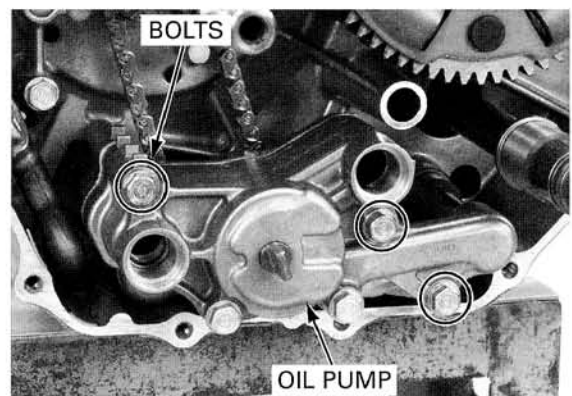


OIL PUMP

REMOVAL

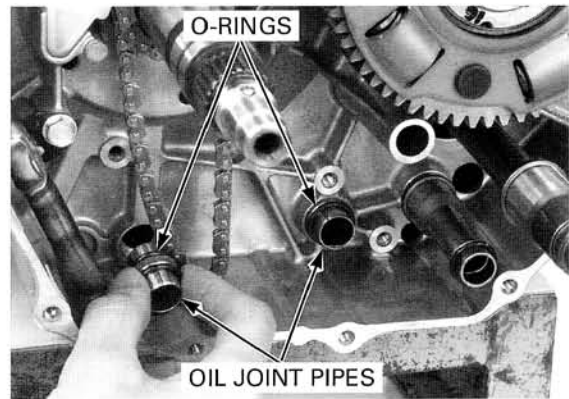
Remove the torque converter (page 12-24).

Remove the three mounting bolts and the oil pump from the crankcase.

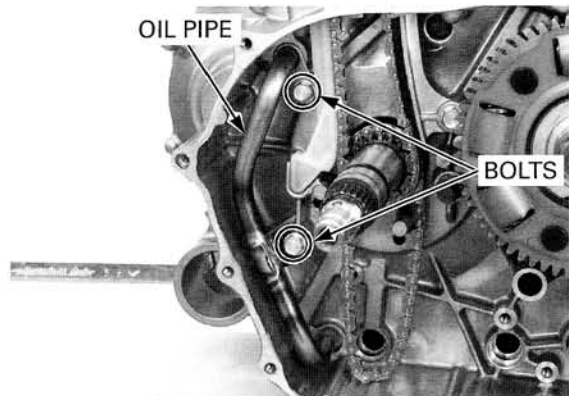


LUBRICATION SYSTEM

Remove the two oil joint pipes from the crankcase.
Remove the four O-rings from the oil joint pipes.

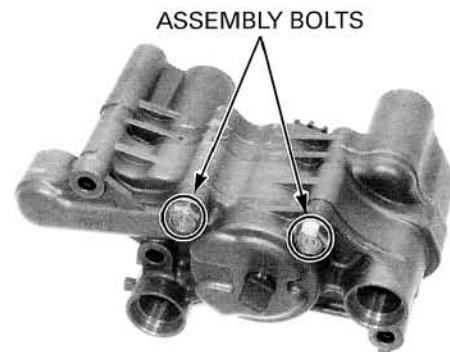


Remove the two bolts and oil pipe from the crankcase.



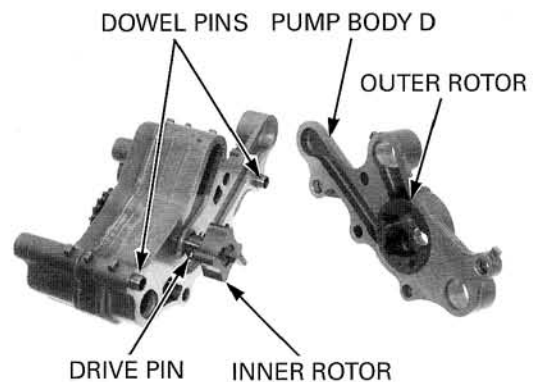
DISASSEMBLY

Remove the following:
- two oil pump assembly bolts

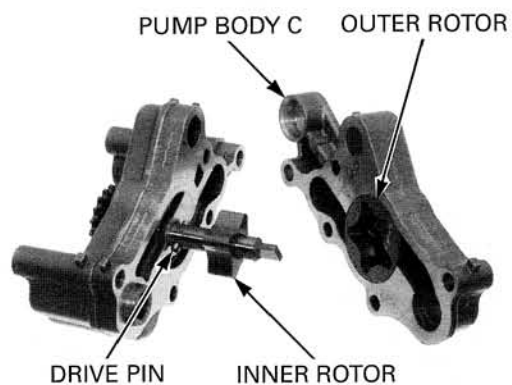


Mark the rotors
so they can be
reinstalled in their
original locations.

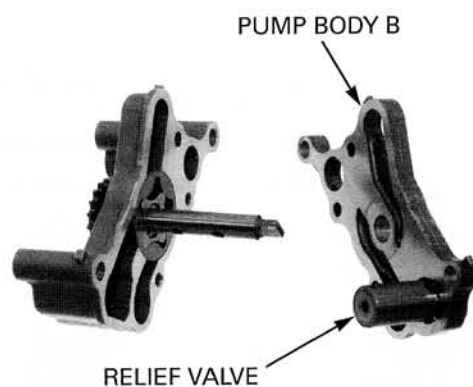
- oil pump body D
- outer rotor
- inner rotor
- drive pin
- two dowel pins



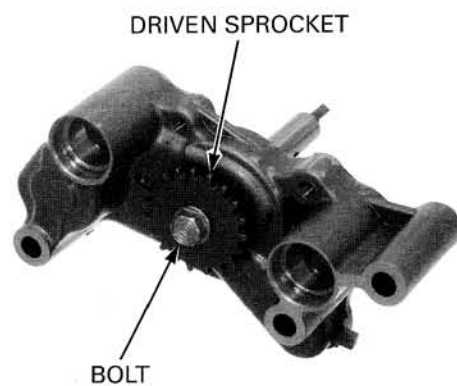
- oil pump body C
- outer rotor
- inner rotor
- drive pin



- oil pump body B
- pressure relief valve

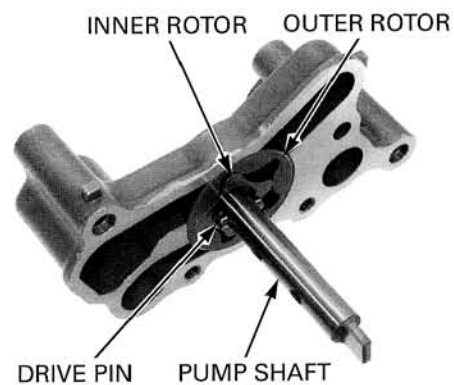


- bolt
- oil pump driven sprocket



- oil pump shaft
- drive pin
- outer rotor
- inner rotor

Clean all the disassembled parts thoroughly.



INSPECTION

Remove the O-ring from the pressure relief valve.

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



Temporarily assemble each inner rotor, outer rotor and drive pin on 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.

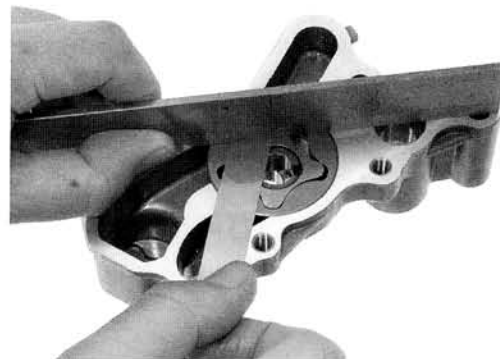
SERVICE LIMIT: 0.25 mm (0.010 in)



Remove the oil pump shaft and drive pin.

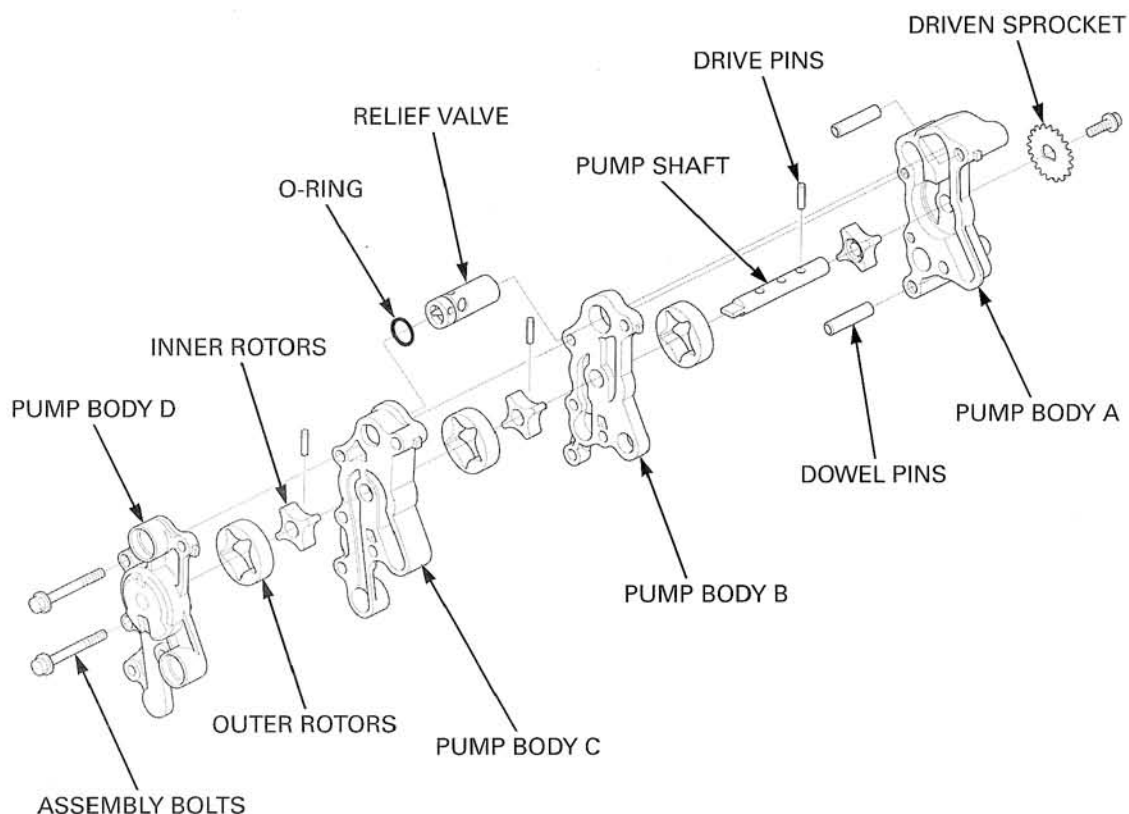
Measure the oil pump side clearance.

SERVICE LIMIT: 0.11 mm (0.004 in)

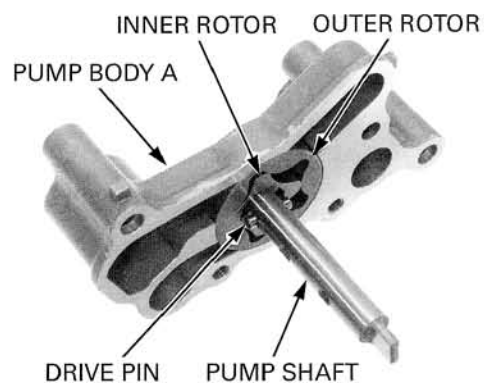


ASSEMBLY

Dip all parts in clean engine oil.

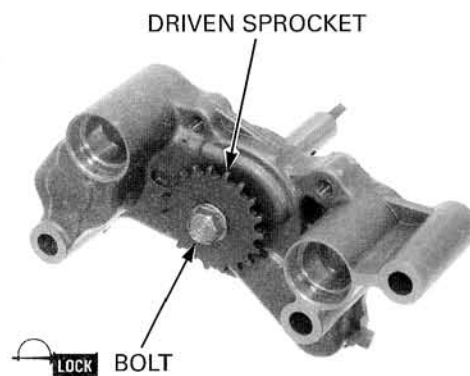


Install the outer and inner rotors into oil pump body A. Insert the drive pin onto the pump shaft. Install the pump shaft into the inner rotor and pump body A, aligning the drive pin with the inner rotor grooves.



Install the oil pump driven sprocket onto the pump shaft, aligning the flats. Apply locking agent to the driven sprocket bolt threads. Install and tighten the driven sprocket bolt.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

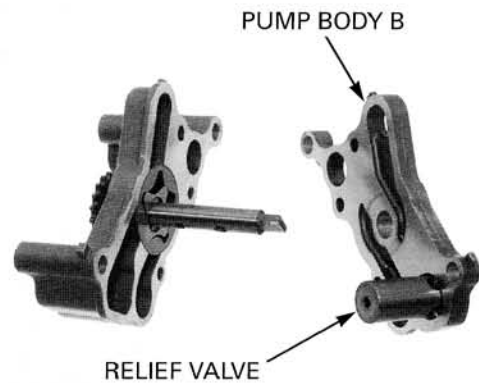


LUBRICATION SYSTEM

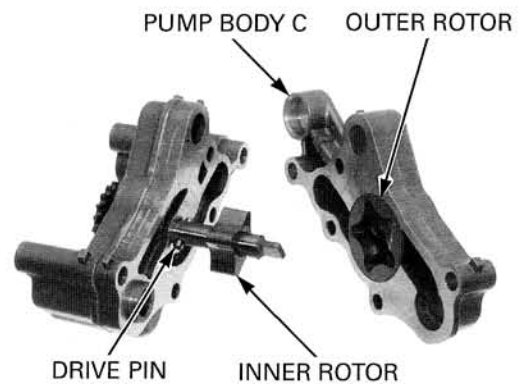
Coat a new O-ring with oil and install it into the relief valve groove.



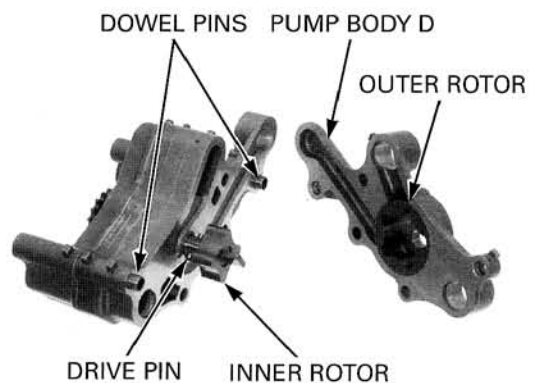
Install the pressure relief valve into oil pump body B.
Install oil pump body B onto pump body A.



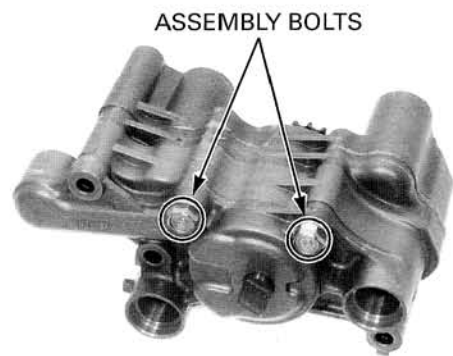
Insert the drive pin into the pump shaft.
Install the inner rotor onto the pump shaft, aligning its grooves with the drive pin.
Install the outer rotor into oil pump body C.
Install pump body C onto pump body B.



Install the dowel pins into pump bodies C, B and A.
Insert the drive pin into the pump shaft.
Install the inner rotor onto the pump shaft, aligning its grooves with the drive pin.
Install the outer rotor into oil pump body D.
Install pump body D onto pump body C.

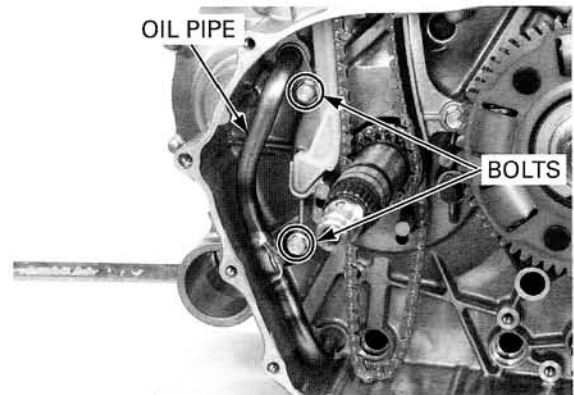


Install and tighten the two oil pump assembly bolts.

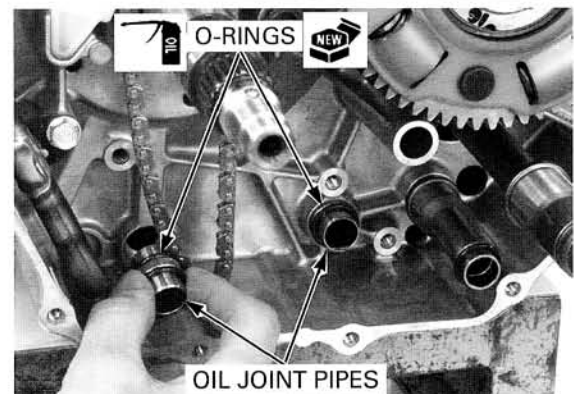


INSTALLATION

Install the oil pipe onto the crankcase and tighten the two bolts securely.

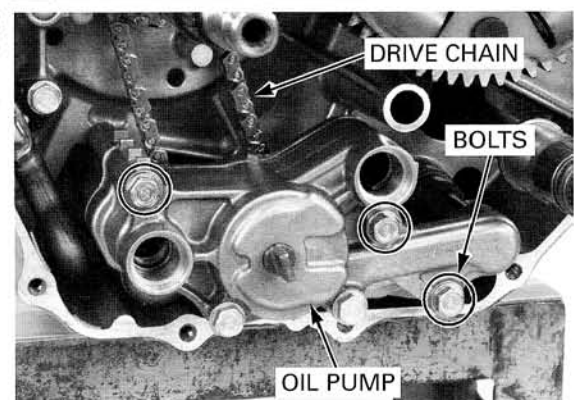


Coat new O-rings with oil and install them onto the oil joint pipes.
Install the oil joint pipes into the crankcase.



Install the oil pump drive chain onto the driven sprocket of the oil pump, and install the oil pump onto the crankcase.
Install the three mounting bolts and tighten them securely.

Install the torque converter (page 12-37).

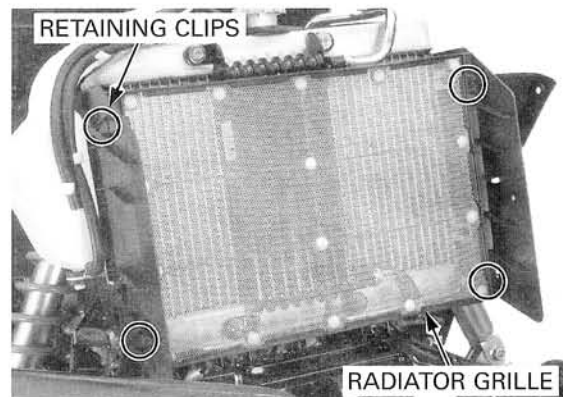


OIL COOLER

REMOVAL

Remove the front fender (page 2-11).

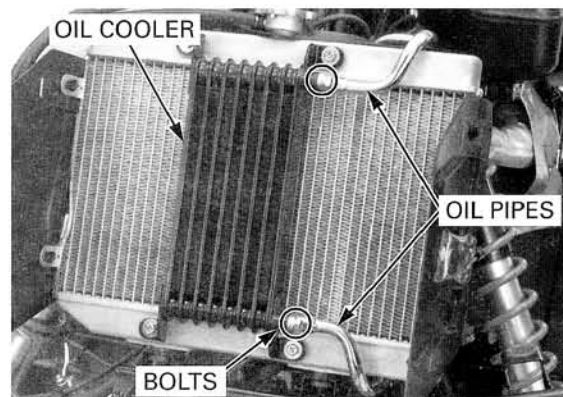
Remove the radiator grille by releasing the four retaining clips.



Check the oil cooler hose joints and seams for leaks. Check the oil cooler air passage for clogging or damage.

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

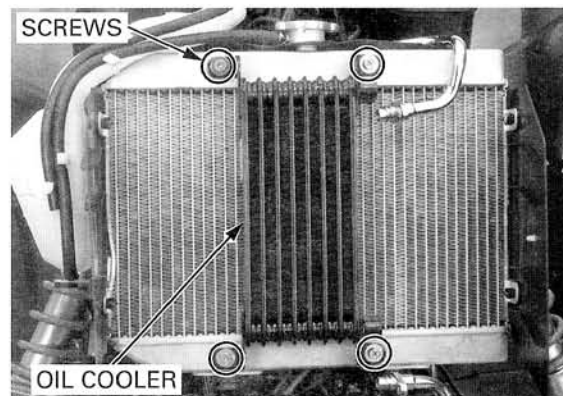
Remove the bolts and oil pipes from the oil cooler. Remove the O-rings from the oil pipes.



Remove the four mounting screws and oil cooler from the radiator.

INSTALLATION

Install the oil cooler onto the radiator and tighten the mounting screws securely.

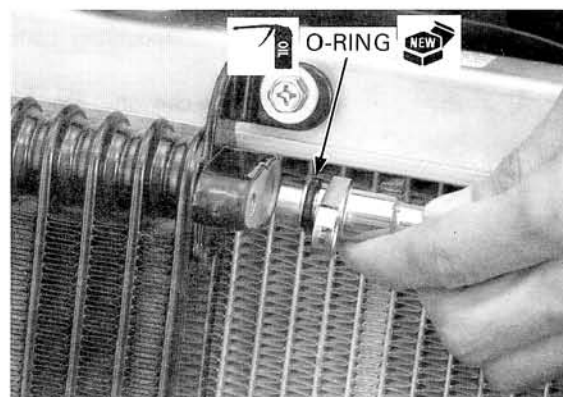


Coat new O-rings with oil and install them onto the oil pipes.

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

Install the removed parts in the reverse order of removal.

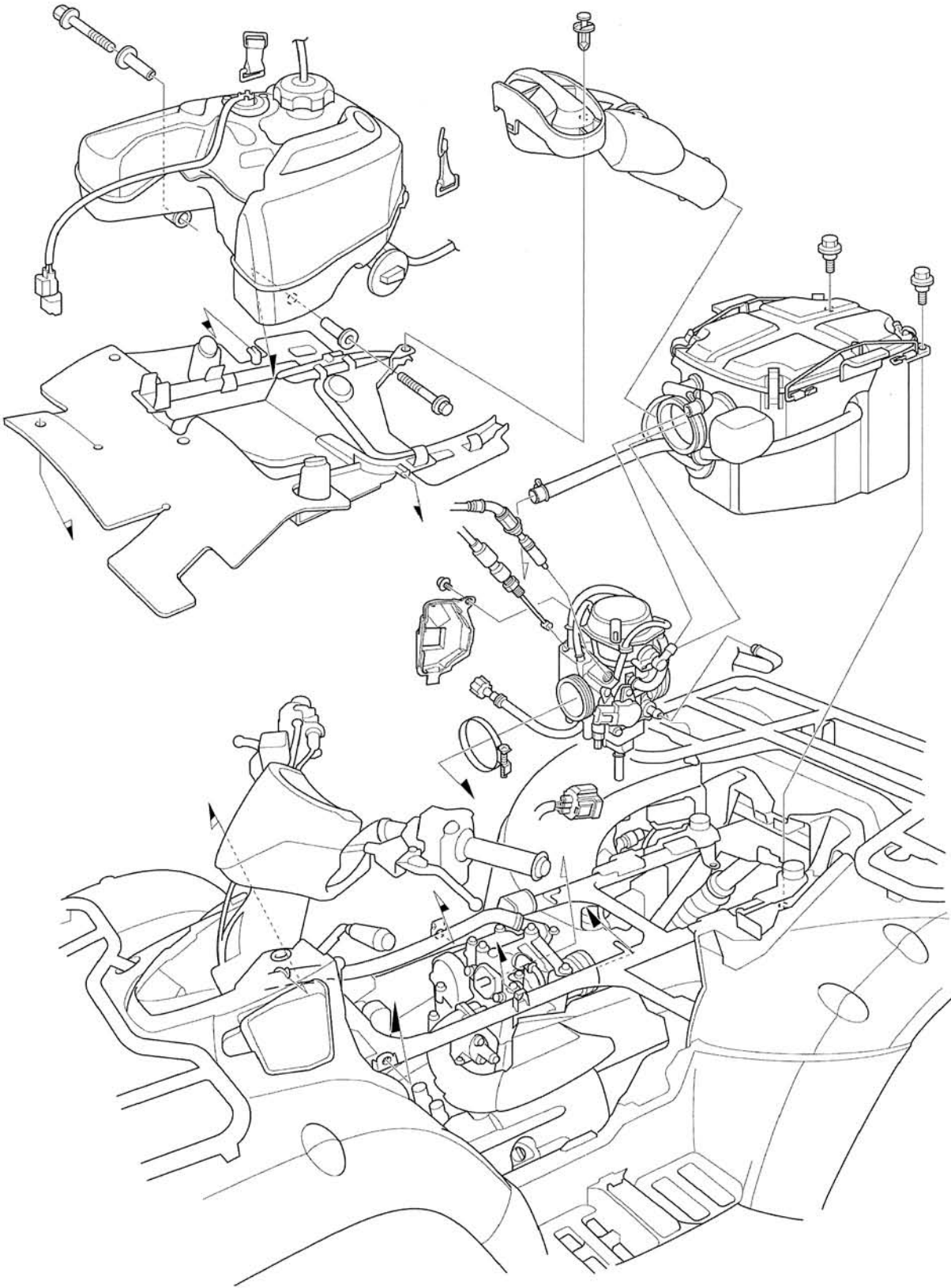
Check the oil level and add the recommended oil if the level is low (page 3-10).



SYSTEM COMPONENTS	5-2	CARBURETOR ASSEMBLY.....	5-13
SERVICE INFORMATION	5-3	CARBURETOR INSTALLATION	5-19
TROUBLESHOOTING	5-4	PILOT SCREW ADJUSTMENT.....	5-20
AIR CLEANER HOUSING	5-5	HIGH ALTITUDE ADJUSTMENT	5-21
CARBURETOR REMOVAL.....	5-6	FUEL TANK.....	5-22
CARBURETOR DISASSEMBLY/ INSPECTION	5-7		

FUEL SYSTEM

SYSTEM COMPONENTS



SERVICE INFORMATION

GENERAL

- Work in a well ventilated area. Smoking or allowing flames or sparks in the work area or where gasoline is stored can cause a fire or explosion.
- Bending or twisting the control cable will impair smooth operation and could cause the cable to stick or bind, resulting in loss of vehicle control.
- Before removing the carburetor, place an approved fuel container under the drain tube, 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 24-10) 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 driveability.
- See page 22-8 for carburetor heater inspection.
- See page 24-42 for throttle position sensor inspection and replacement.

SPECIFICATIONS

ITEM	SPECIFICATIONS
Carburetor identification number	VE89A
Main jet	# 152
Slow jet	# 50
Pilot screw opening	See page 5-20
Float level	15.9 mm (0.63 in)
Idle speed	1,400±100 rpm
Throttle grip free play	3 – 8 mm (1/8 – 5/16 in)

TORQUE VALUE

Starter enrichment (SE) valve nut 3 N·m (0.3 kgf·m, 2.2 lbf·ft)

TOOLS

Carburetor float level gauge 07401-0010000
Pilot screw wrench 07908-4730002

TROUBLESHOOTING

Engine cranks but won't start

- No fuel in tank
- No fuel to carburetor
 - Clogged fuel strainer
 - Clogged fuel line
 - Clogged fuel tank breather hose
- Too much fuel getting to the engine
 - Clogged air cleaner
 - Flooded carburetor
- Intake air leak
- Contaminated/deteriorated fuel
 - Clogged jets
- Clogged starting enrichment (SE) valve circuit
- Improper choke operation
- Improper throttle operation
- No spark at plug (faulty ignition system – page 20-5)

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 throttle valve

Rich mixture

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

Engine stalls, hard to start, rough idling

- Restricted fuel line
- Fuel mixture too lean/rich
- Contaminated/deteriorated fuel
 - Clogged jets
- Intake air leak
- Misadjusted idle speed
- Restricted fuel tank breather hose
- Dirty air cleaner
- Misadjusted pilot screw
- Faulty ignition system (page 20-5)

Afterburn when engine braking is used

- Lean mixture in slow circuit
- Faulty ignition system (page 20-5)

Backfiring or misfiring during acceleration

- Lean mixture
- Faulty ignition system (page 20-5)

Poor performance (driveability) and poor fuel economy

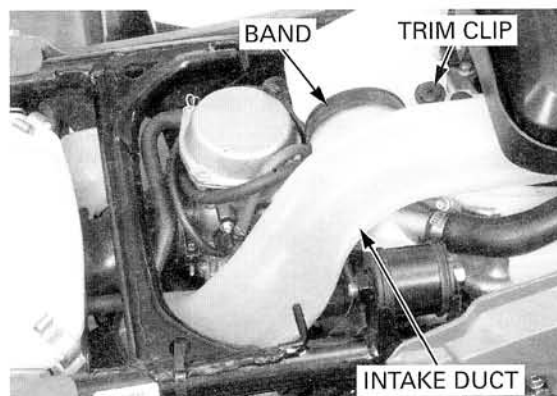
- Clogged fuel system
- Faulty ignition system (page 20-5)

AIR CLEANER HOUSING

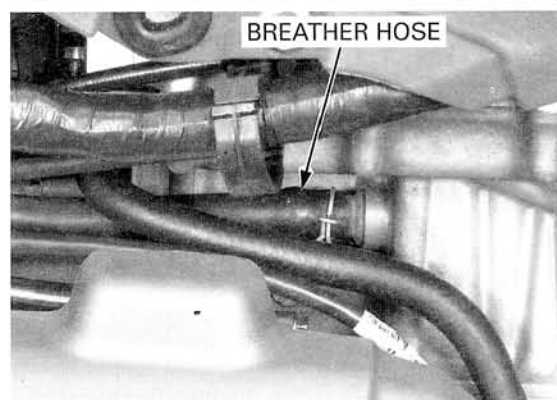
REMOVAL/INSTALLATION

Remove the seat (page 2-4).
 Remove the right side cover (page 2-4).
 Remove the fuel tank rear cover (page 2-5).

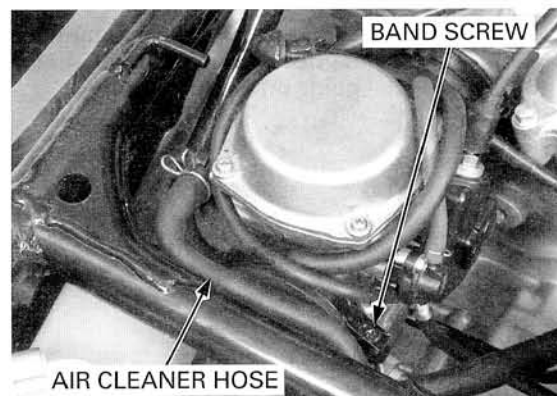
Remove the trim clip, loosen the band screw and remove the intake duct from the air cleaner housing.



Disconnect the crankcase breather hose from the cylinder.



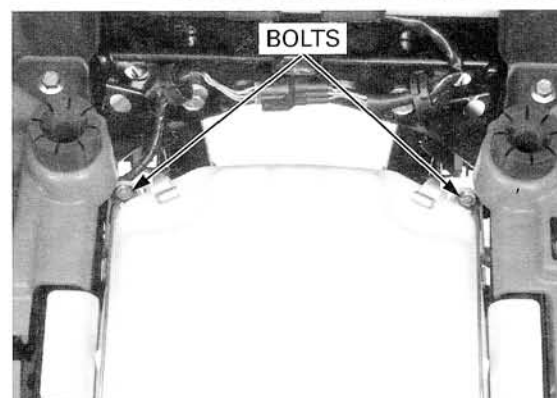
Disconnect the air cleaner hose from the carburetor.
 Loosen the air cleaner connecting hose band screw.



Be careful not to damage the air cleaner connecting hose.

Remove the two bolts and the air cleaner housing from the frame.

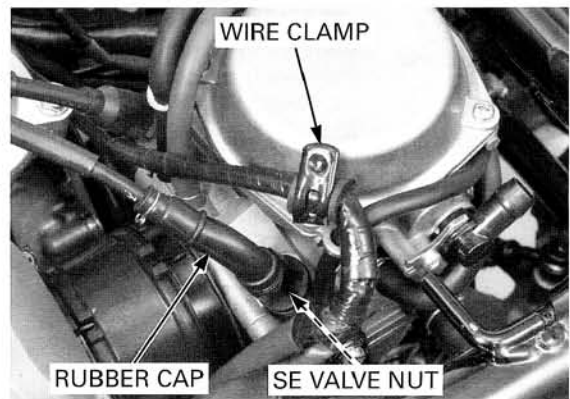
Installation is in the reverse order of removal.



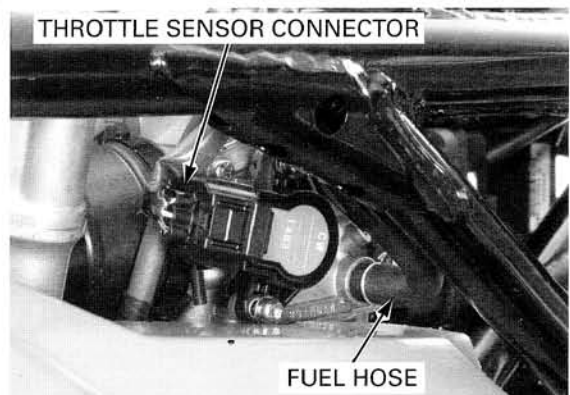
CARBURETOR REMOVAL

Remove the air cleaner housing (page 5-5).
Remove the left fuel tank side cover (page 2-6).

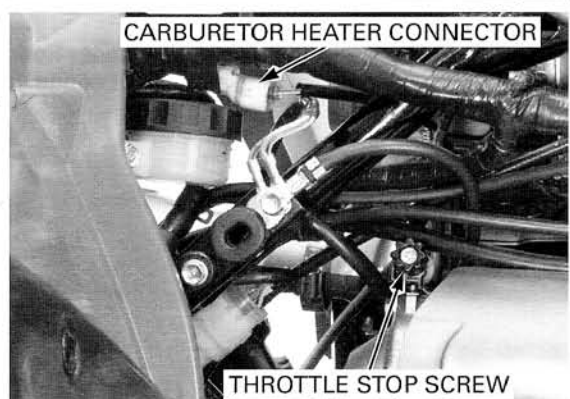
Remove the throttle position sensor/thermosensor wire from the clamp.
Slide the rubber cap off the starting enrichment (SE) valve nut.
Loosen the SE valve nut and remove the SE valve from the carburetor.



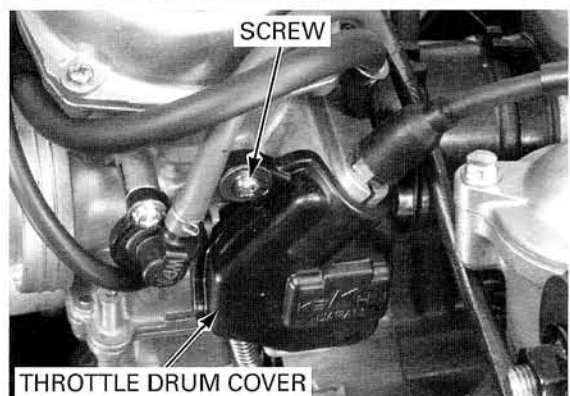
Turn the fuel valve to "OFF" and disconnect the fuel hose from the carburetor.
Disconnect the throttle sensor 3P connector.



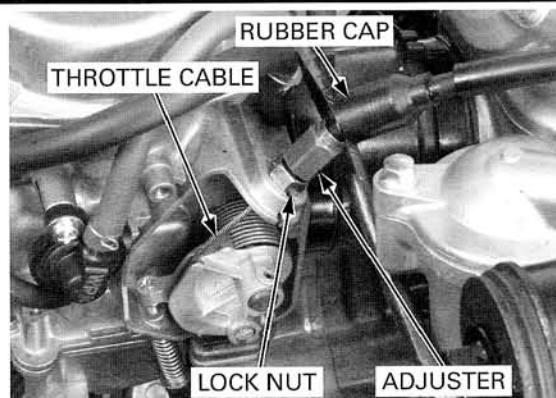
Remove the throttle stop screw cable from the cable clip.
Disconnect the carburetor heater 2P connector.
Remove the carburetor drain hose from the hose guide on the recoil starter.



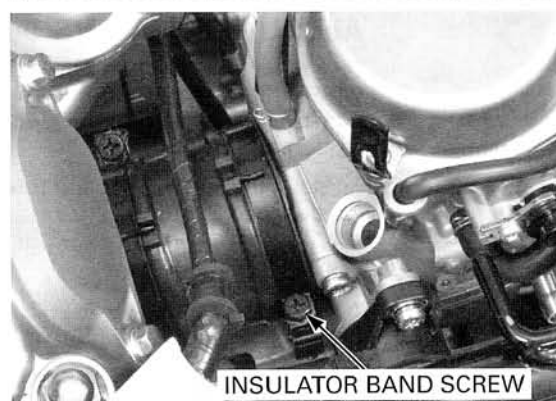
Remove the screw and throttle drum cover.



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

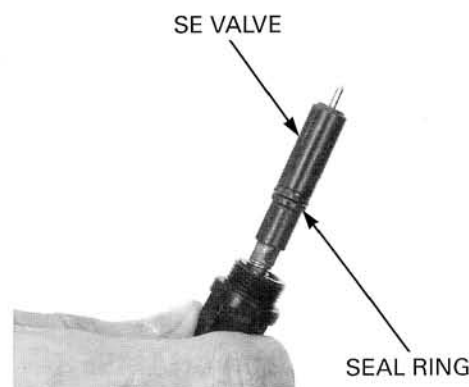


Loosen the carburetor insulator band screw and remove the carburetor from the insulator.



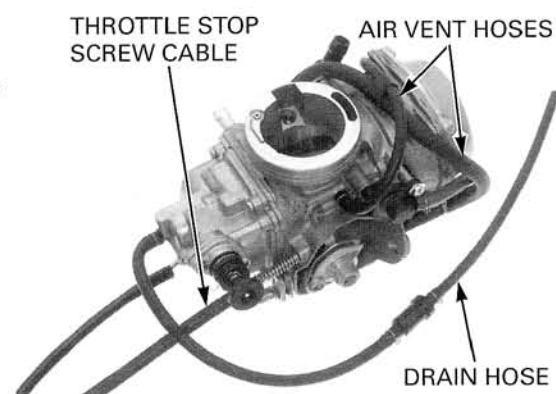
CARBURETOR DISASSEMBLY/ INSPECTION

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 deterioration, wear or damage.



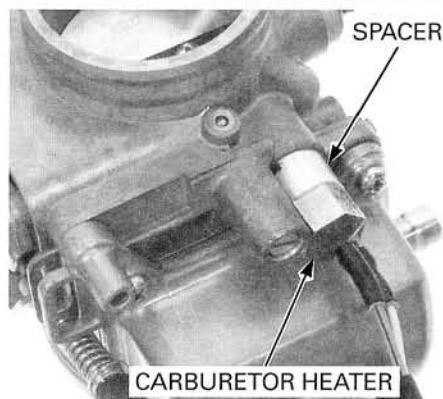
Remove the following:

- throttle position sensor (page 24-42)
- air vent hoses
- drain hose
- throttle stop screw cable, spring and washer if necessary



FUEL SYSTEM

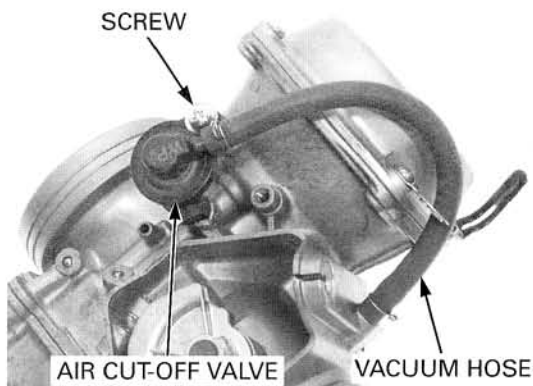
Remove the carburetor heater and spacer.



AIR CUT-OFF VALVE

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

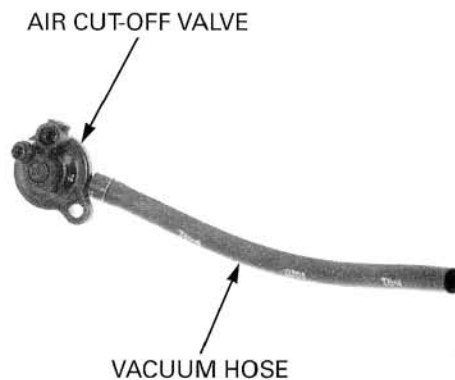
Remove the slow air jet and three O-rings.



Check the air cut-off valve and jet for damage. Clean the air jet with cleaning solvent and blow open with compressed air.

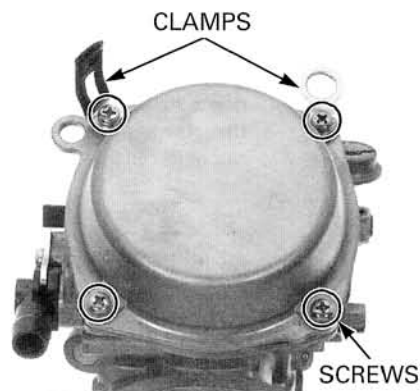
Apply vacuum to the vacuum hose.

The vacuum should be maintained. Air should not flow through the valve ports when vacuum is applied, and should flow when there is no vacuum.

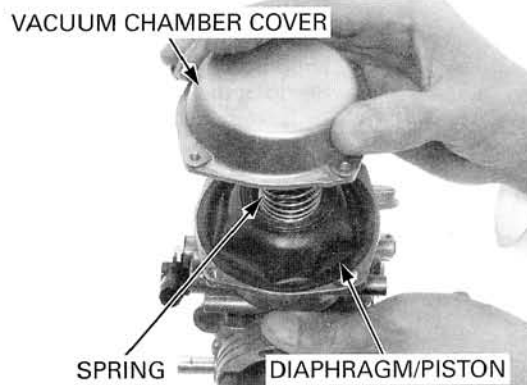


VACUUM CHAMBER

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

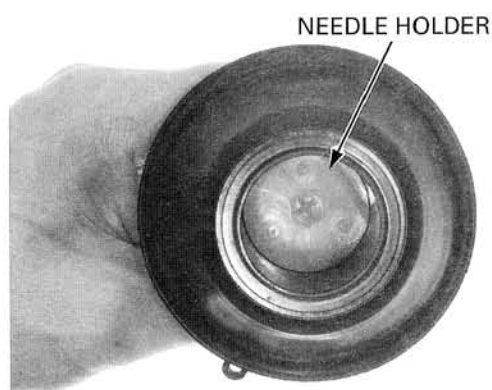


Remove the vacuum chamber cover, compression spring and diaphragm/vacuum piston from the carburetor body.



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 spring set plate, needle holder, spring, jet needle, shim and washer.

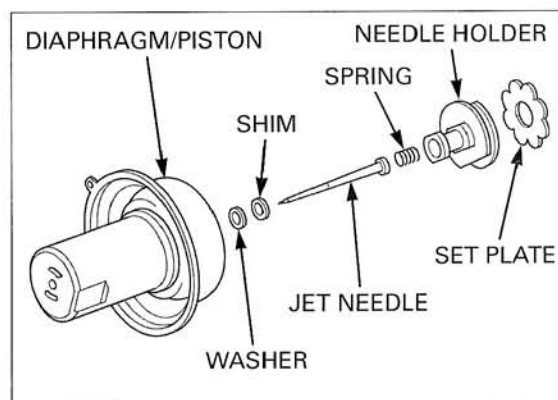


Check the jet needle for stepped wear.
Check the vacuum piston for wear or damage.

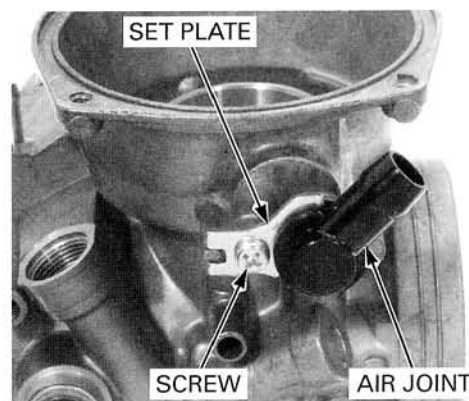
The vacuum chamber will not operate correctly if the diaphragm is damaged in any way, even with just a pin hole.

Check the diaphragm for holes, deterioration or damage.

Check the vacuum piston for smooth operation up and down in the carburetor body.



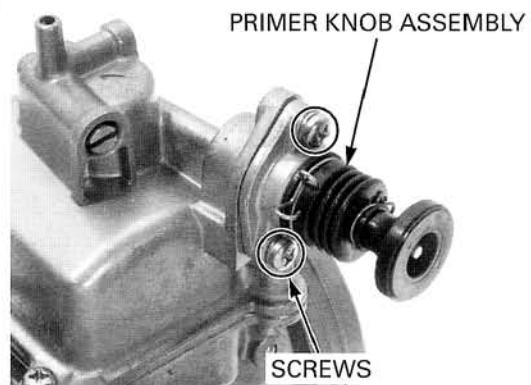
Remove the screw, set plate, air joint and O-ring.



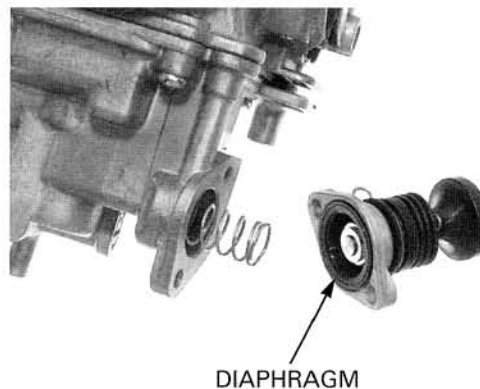
PRIMER KNOB

Remove the two screws while holding the primer knob body.

Remove the primer knob assembly and spring.



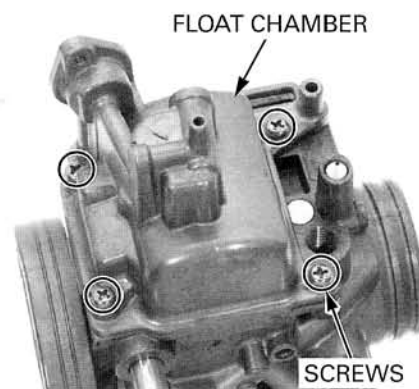
Check the diaphragm for holes, deterioration or damage.



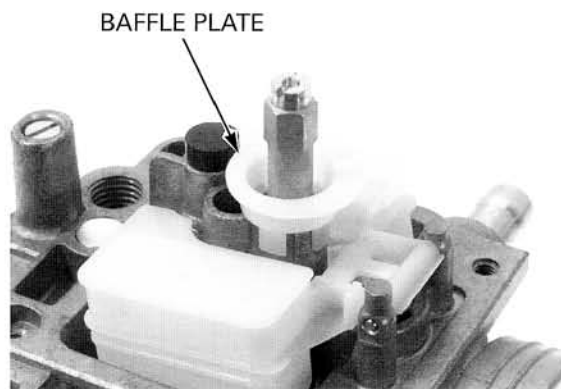
FLOAT AND JETS

Remove the four screws and the float chamber.

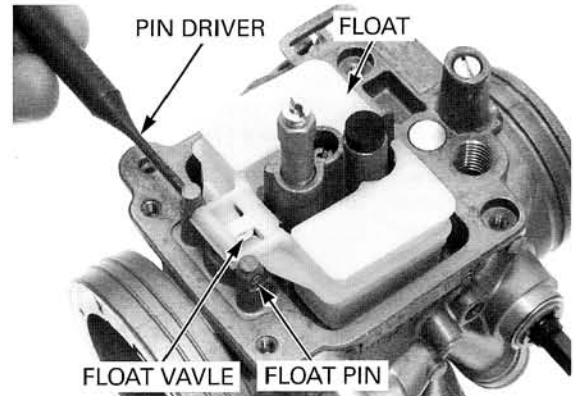
Remove the O-ring from the float chamber groove.



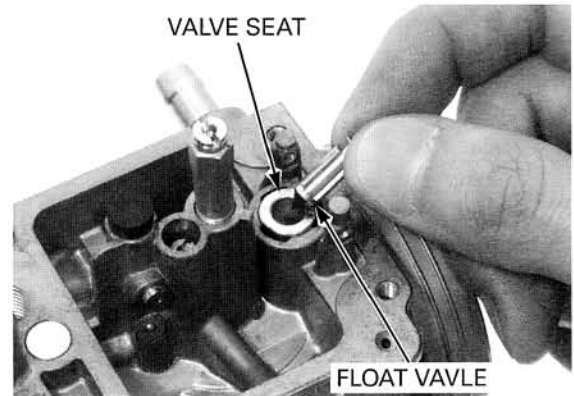
Remove the baffle plate.



Drive out the float pin from the throttle drum side using a pin driver.
Remove the float and float valve.
Inspect the float for deformation or damage.



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.

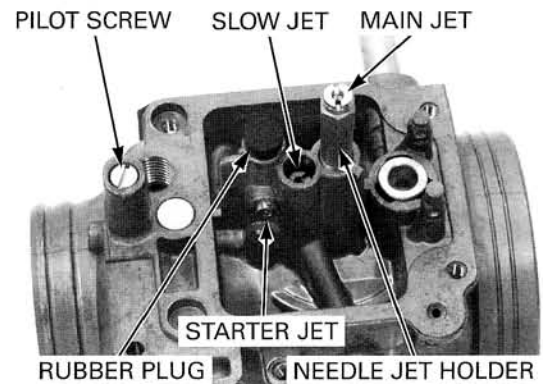
Remove the following:

- 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.

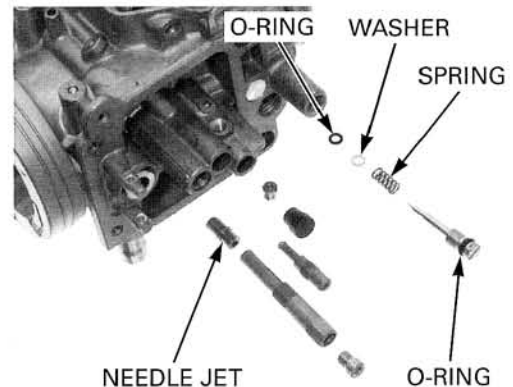
Turn the pilot screw in and carefully count the number of turn until it seats lightly. Make a note of this to use as a reference when reinstalling the pilot screw.

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



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

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



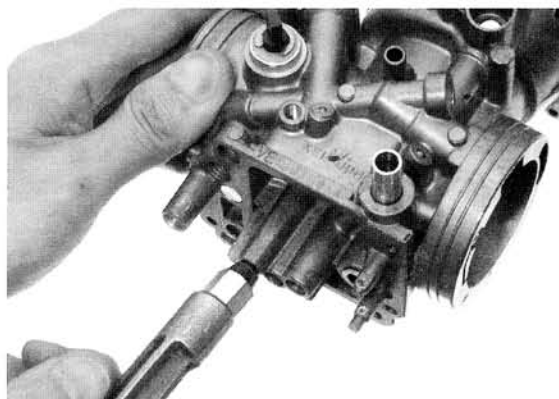
CARBURETOR BODY CLEANING

Remove the following:

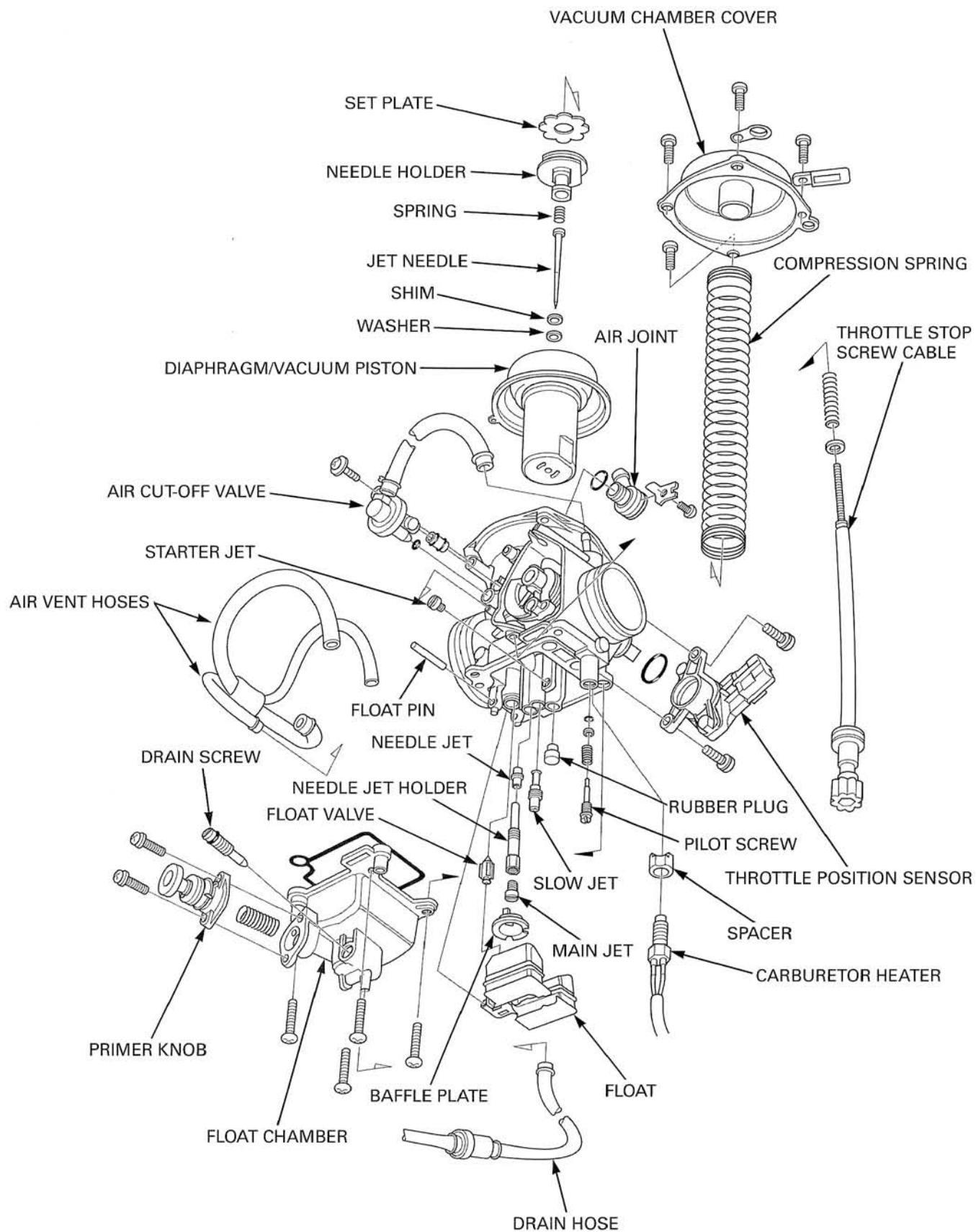
- air cut-off valve
- diaphragm/vacuum piston
- all jets and pilot screw

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

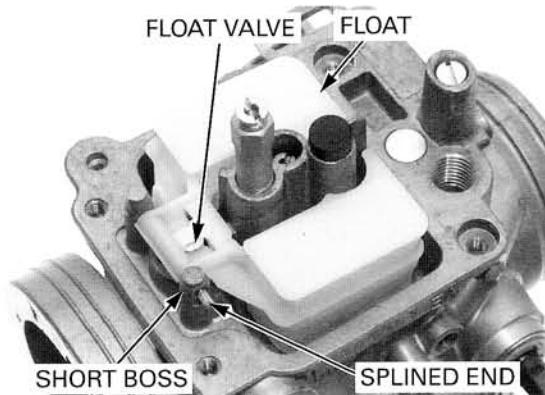
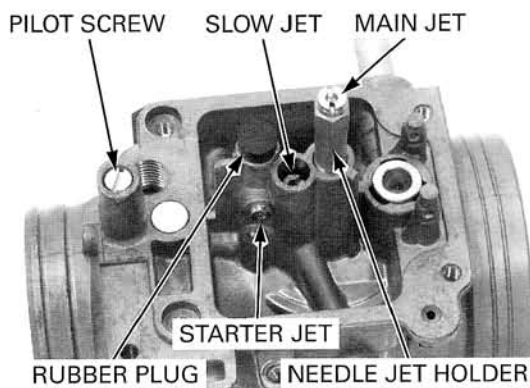
Install the pilot screw with the spring, washer and new O-rings, and return it to its original position as noted during removal. Perform the pilot screw adjustment if a new pilot screw is installed.

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

Install the following:

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

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



FLOAT LEVEL

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.

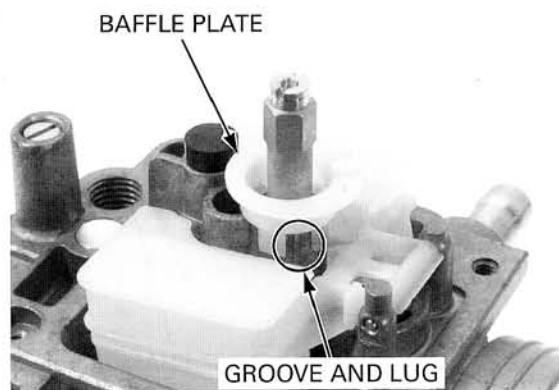
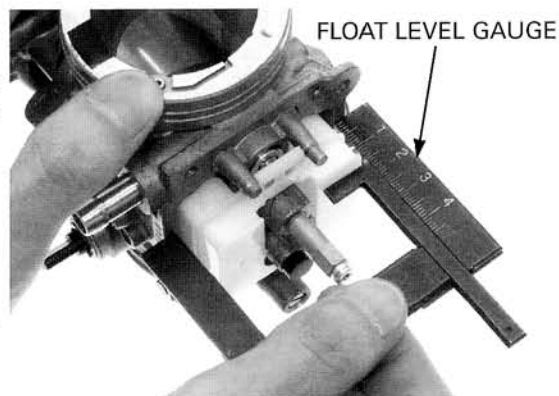
TOOL:

Carburetor float level gauge 07401-0010000

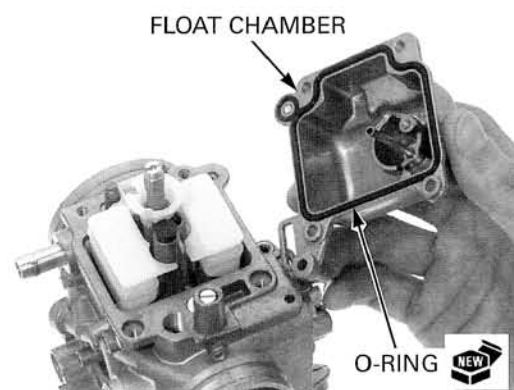
FLOAT LEVEL: 15.9 mm (0.63 in)

The float level 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.

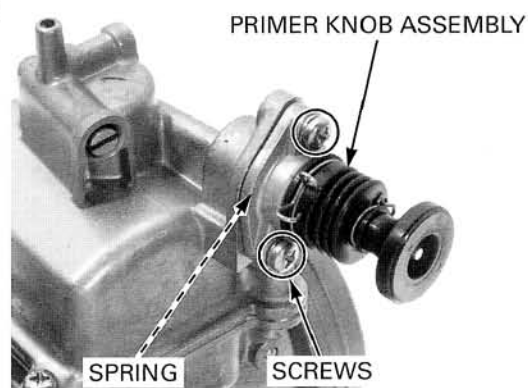


Install a new O-ring into the float chamber groove. Install the float chamber and tighten the four screws.



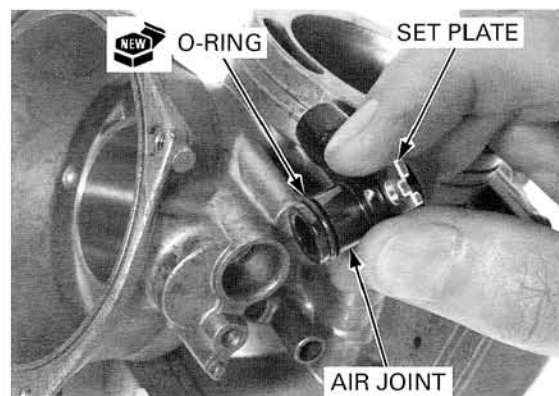
PRIMER KNOB

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

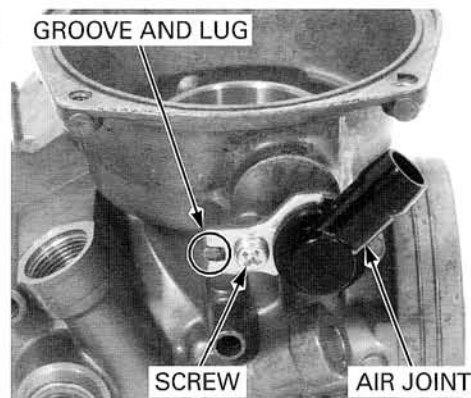


VACUUM CHAMBER

Install a new O-ring into the air joint groove. Install the set plate into the air joint groove.



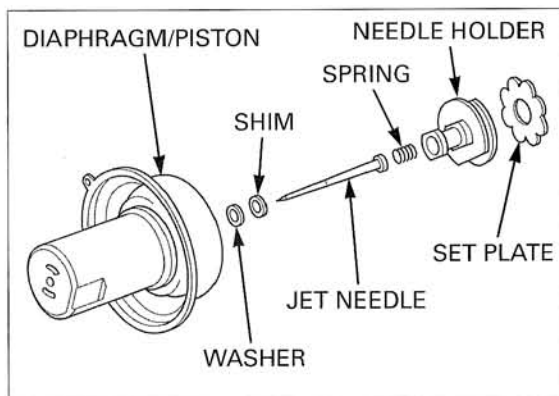
Install the air joint into the carburetor body, aligning the set plate groove with the lug on the carburetor body, and tighten the screw securely.



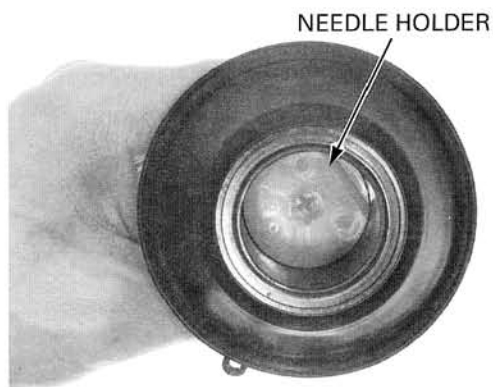
FUEL SYSTEM

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

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



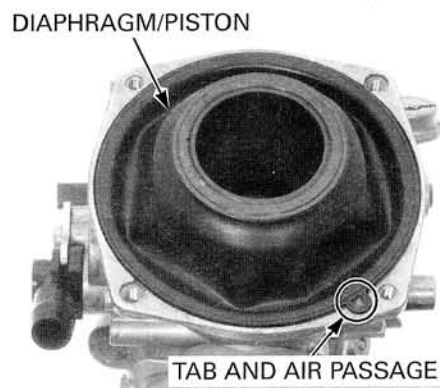
Turn the needle holder 90 degrees clockwise while pressing it until it locks.



Be careful not to damage the jet needle.

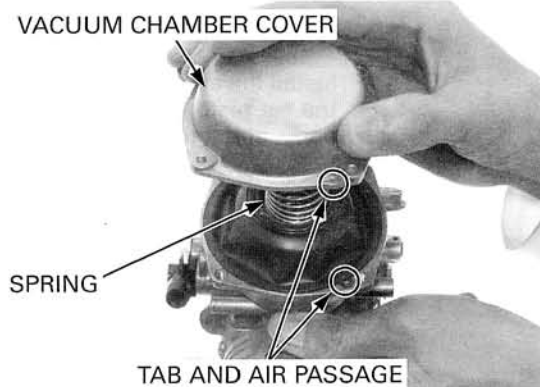
Install the diaphragm/vacuum piston into the carburetor body by aligning the tab of the diaphragm with the air passage, then insert the jet needle into the needle jet.

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

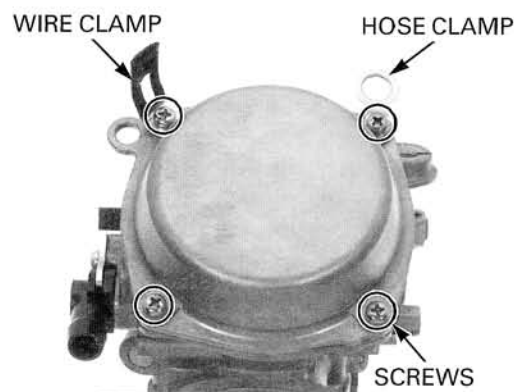


Be careful not to pinch the diaphragm under the chamber cover, and to keep the spring straight when compressing the spring.

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



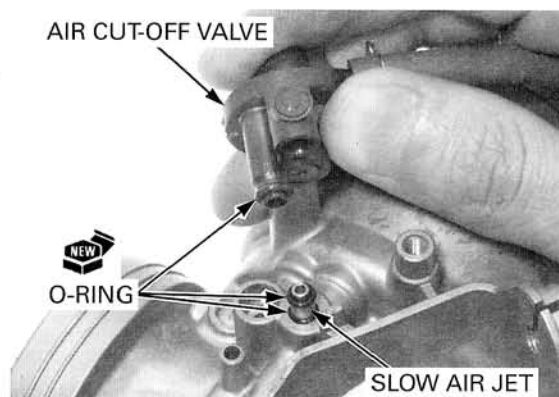
Install the wire and hose clamps as shown, and tighten the four screws.



AIR CUT-OFF VALVE

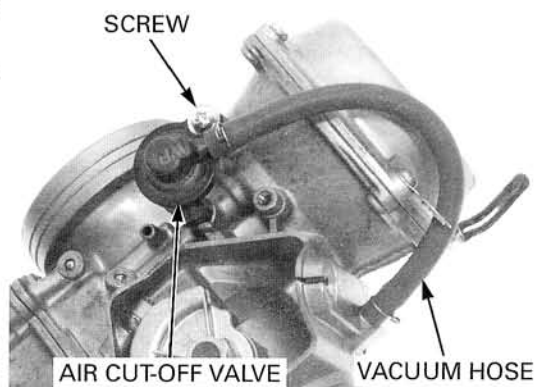
Install new O-rings onto the slow air jet and air cut-off valve.

Install the slow air jet into the carburetor body with the small end facing the air cut-off valve.



Install the air cut-off valve onto the carburetor body and tighten the screw securely.

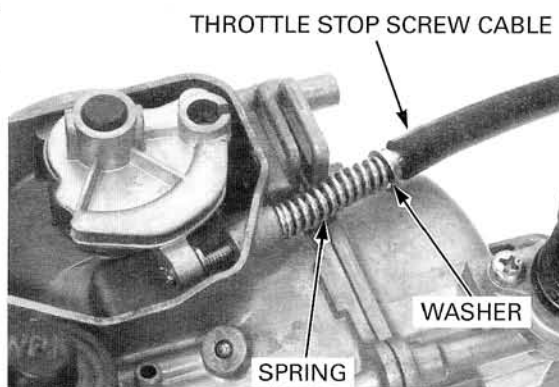
Connect the vacuum hose to the vacuum joint pipe of the carburetor body.



CARBURETOR HEATER, HOSES

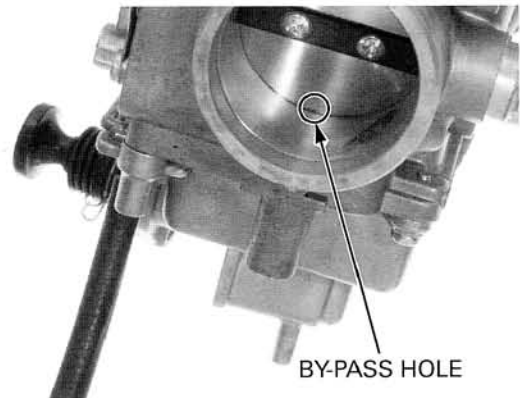
If the throttle stop screw cable was removed, install it as follows:

1. Install the washer and spring onto the throttle stop screw cable.
2. Install the throttle stop screw cable into the carburetor body by turning the screw knob.

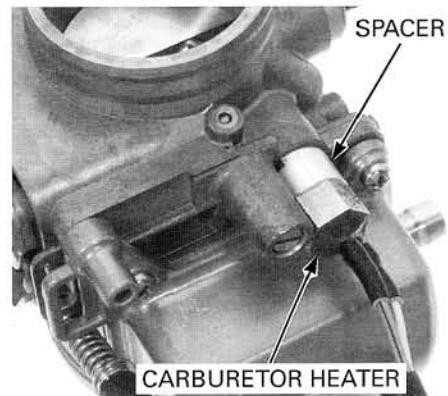


FUEL SYSTEM

3. Turn the throttle stop screw knob to align the butterfly throttle valve with the edge of the outside bypass hole in the carburetor body.

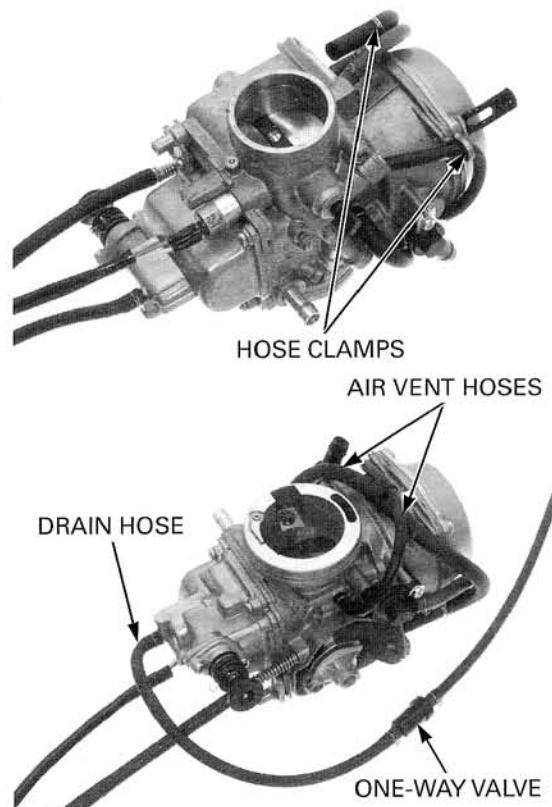


Install the collar and carburetor heater with the stepped side of the collar facing the carburetor and tighten the carburetor heater.



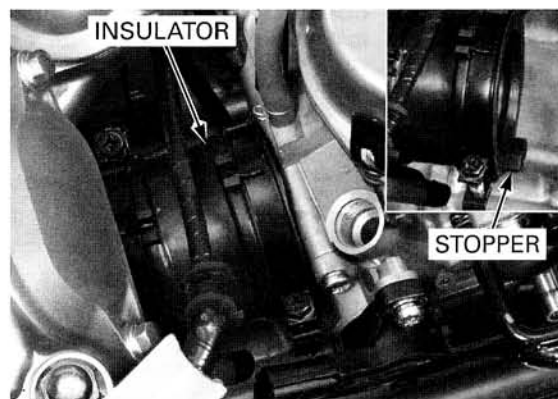
Connect the carburetor drain hose so that the "UP" mark on the one-way valve is facing toward the carburetor.
Connect the air vent hoses and route them into the hose clamp as shown.

Install the throttle position sensor (page 24-42).

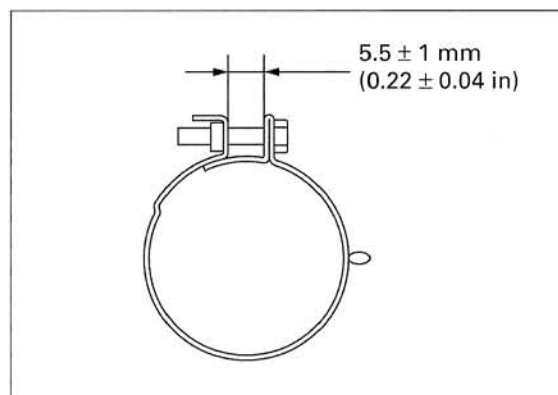


CARBURETOR INSTALLATION

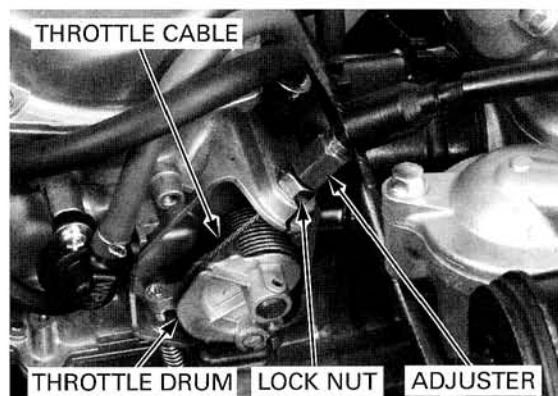
Install the carburetor into the insulator and rest the carburetor lug against the insulator stopper.



Tighten the insulator band screw so the distance between the band ends is 5.5 ± 1 mm (0.22 ± 0.04 in).



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.



FUEL SYSTEM

Route the carburetor drain hose and heater wire properly (page 1-21).

Install the carburetor drain hose into the hose guide on the recoil starter.
Connect the carburetor heater 2P connector.
Install the throttle stop screw cable into the cable clip.

Connect the throttle sensor 3P connector.
Connect the fuel hose to the carburetor.
Turn the fuel valve to "ON" and check that there is no fuel leak.

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

TORQUE: 3 N·m (0.3 kgf·m, 2.2 lbf·ft)

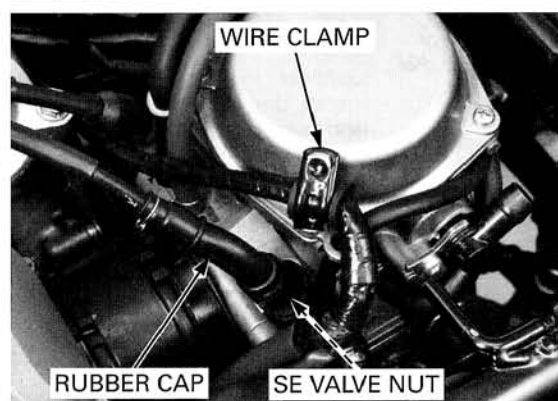
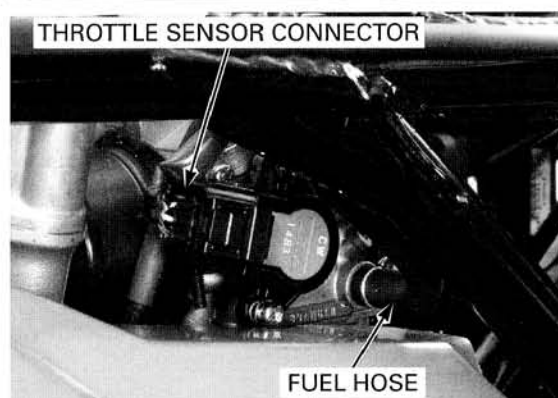
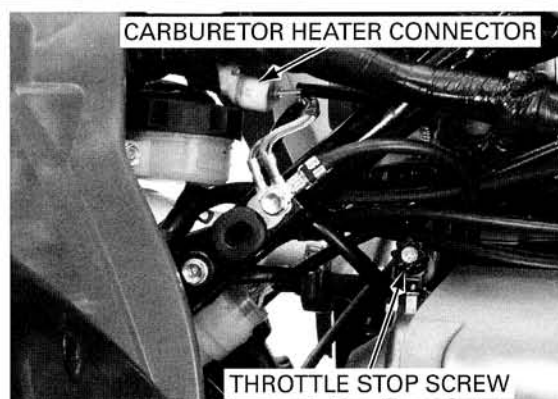
Slide the rubber boot over the SE valve nut.
Clamp the throttle position sensor/thermosensor wire onto the carburetor.

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

Perform the following inspections and adjustments:

- engine idle speed (page 3-12)
- throttle operation (page 3-4)
- pilot screw if it was replaced (page 5-20)

Perform the initial setting (page 24-10) after all carburetor adjustments have been completed.



PILOT SCREW ADJUSTMENT

IDLE DROP PROCEDURE

NOTE:

- The pilot screw is factory pre-set and no adjustment is necessary unless the pilot screw is replaced.
- Use a tachometer with graduations of 50 rpm or smaller that will accurately indicate a 50 rpm change.

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

1. Remove the right side cover (page 2-4). Turn the pilot screw clockwise until it seats lightly, then back it out the specification given. This is an initial setting prior to the final pilot screw adjustment.

INITIAL OPENING: 2-3/8 turns out

TOOL:

Pilot screw wrench 07908-4730002

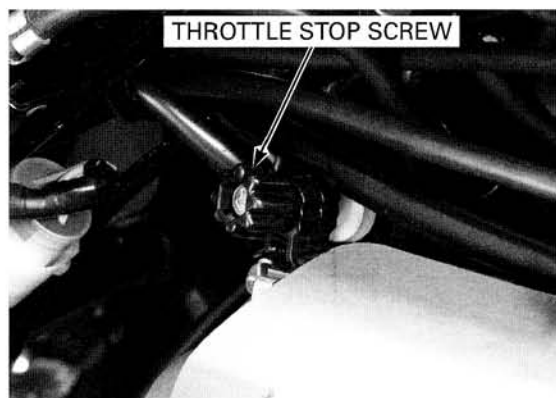
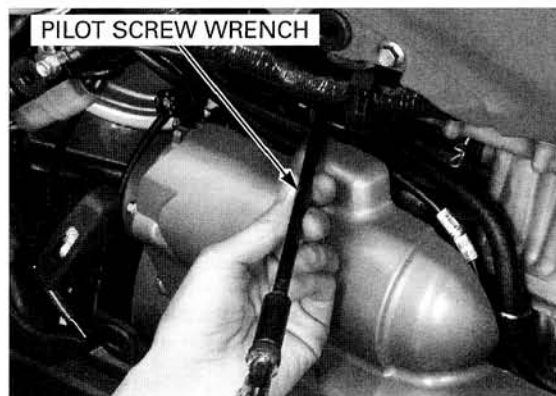
2. Warm up the engine to operating temperature. Stop and go driving for 10 minutes is sufficient.
3. Stop the engine and connect a tachometer according to the tachometer manufacturer's instructions.
4. Start the engine and adjust the idle speed with the throttle stop screw knob.

IDLE SPEED: 1,400 ± 100 rpm

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 knob.
7. Turn the pilot screw in gradually until the engine speed drops by 100 rpm.
8. Turn the pilot screw out to the final opening.

FINAL OPENING: 1 turns out from the position obtained in step #7

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



HIGH ALTITUDE ADJUSTMENT

	Below 5,000 ft (1,500 m)	Between 3,000 – 8,000 ft (1,000 – 2,500 m)
Pilotscrew opening	Factory preset	1/2 turn in from factory preset

The carburetor should be adjusted for high altitude riding (between 3,000 – 8,000 ft/1,000 – 2,500 m).

STANDARD SETTING: Below 5,000 ft (1,500 m)

HIGH ALTITUDE SETTING: Between 3,000 – 8,000 ft (1,000 – 2,500 m)

The high altitude carburetor adjustment is performed as follows:

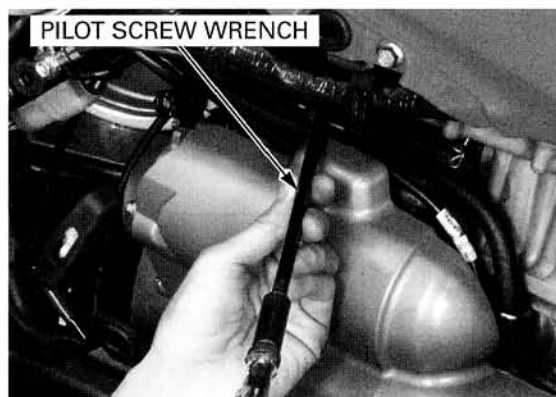
Screw in the pilot screw the specified number of turns from the factory preset position.

TOOL:

Pilot screw wrench 07908-4730002

HIGH ALTITUDE PILOT SCREW OPENING:

1/2 turn in from the factory preset position



FUEL SYSTEM

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

IDLE SPEED: $1,400 \pm 100$ rpm

Sustained operation below 5,000 ft (1,500 m) with the high altitude setting may cause engine overheating and engine damage. When riding below 5,000 ft (1,500 m), readjust the carburetor as follows:

Screw out the pilot screw the specified number of turns from the high altitude setting.

LOW ALTITUDE PILOT SCREW OPENING:

1/2 turn out from the high altitude setting

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

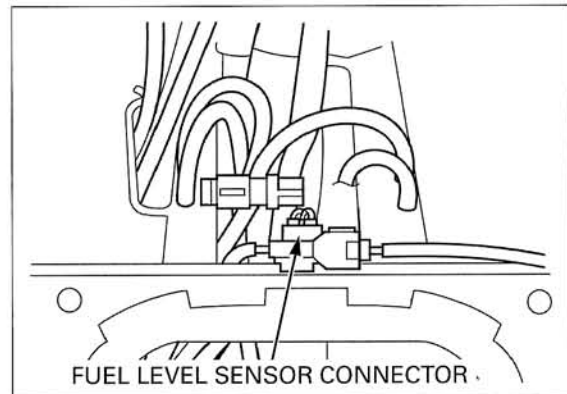


FUEL TANK

REMOVAL/INSTALLATION

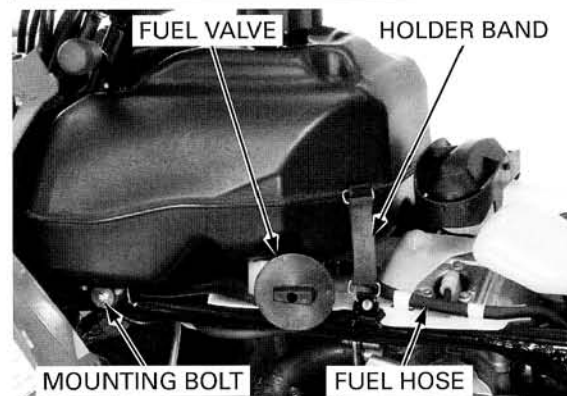
Remove both fuel tank side covers (page 2-6).

Disconnect the fuel level sensor 2P connector.



Remove the two fuel tank holder bands and mounting bolts.

Turn the fuel valve OFF, disconnect the fuel hose and remove the fuel tank.



Unhook the rubber heat guard from the clamp. Remove the rubber heat guard by releasing it from the heat guard plate bosses.

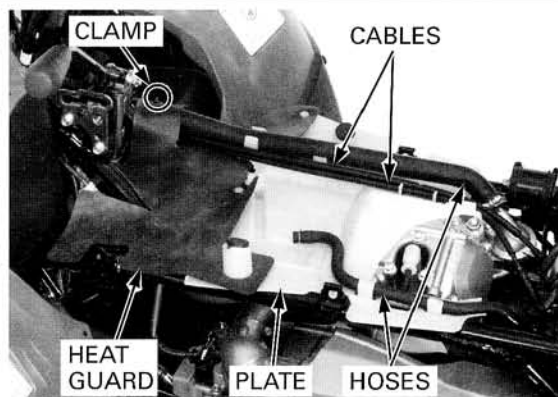
Remove the fuel hose, radiator hose, throttle cable and choke cable from the clamp on the heat guard plate.

Remove the heat guard plate from the frame by releasing the two bosses.

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

NOTE:

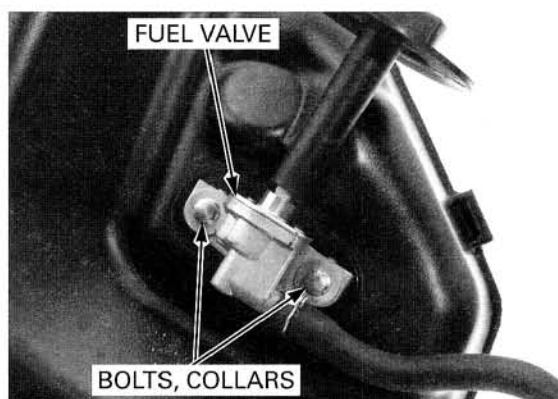
- After connecting the fuel hose, turn the fuel valve ON and check that there is no fuel leak.



FUEL STRAINER SCREEN CLEANING

Remove the fuel tank (page 5-22).

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



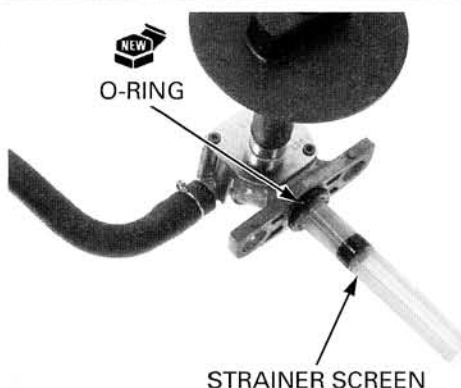
Remove the O-ring and fuel strainer screen. Clean the strainer screen with non-flammable or high flash point solvent. Dry the strainer screen thoroughly.

Install the strainer screen and a new O-ring onto the fuel valve.

Install the fuel valve onto the fuel tank.

Install the collars and mounting bolts, and tighten the bolts securely.

Install the fuel tank (page 5-22).

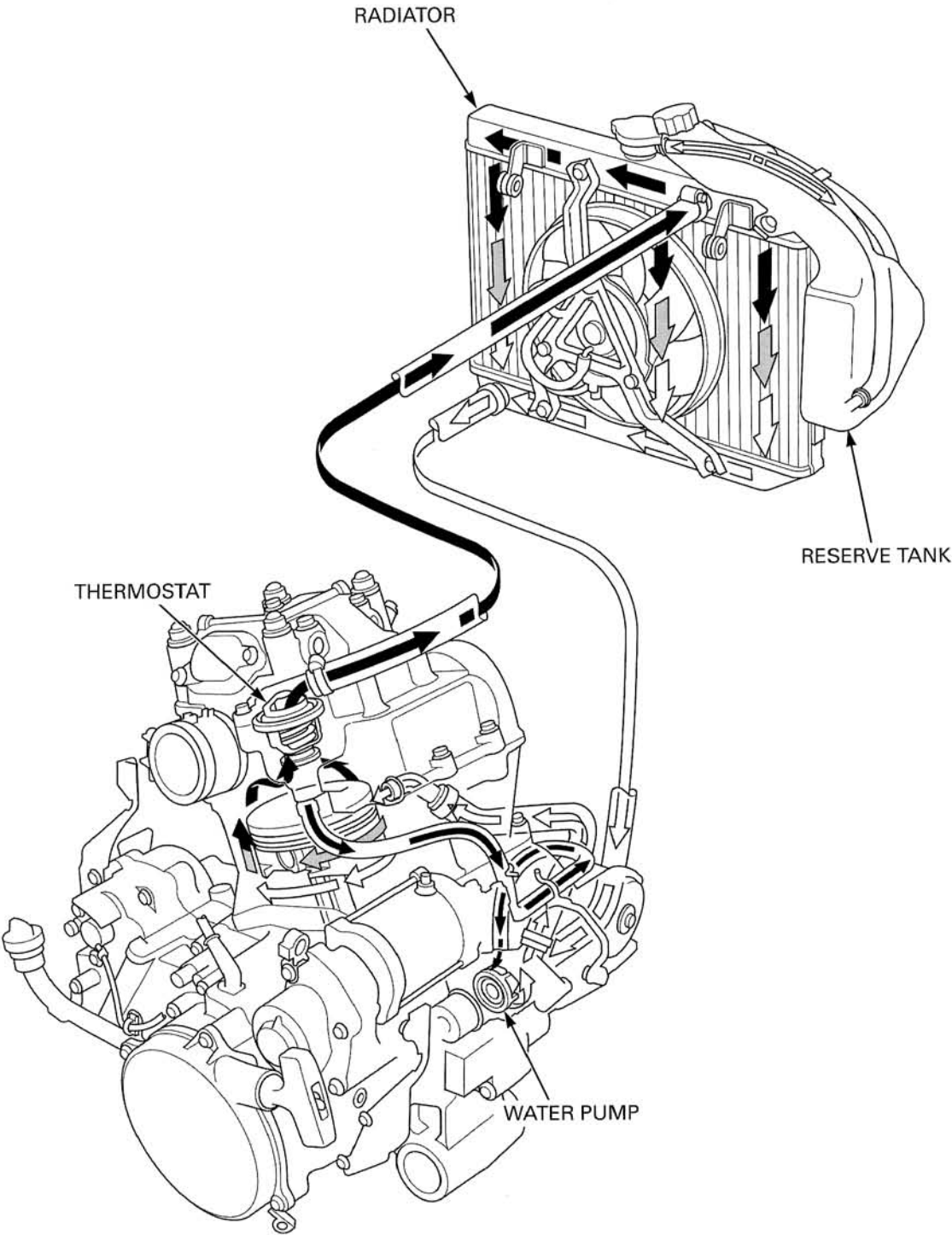


6. COOLING SYSTEM

SYSTEM FLOW PATTERN	6-2	THERMOSTAT	6-8
SERVICE INFORMATION	6-3	RADIATOR RESERVE TANK	6-10
TROUBLESHOOTING	6-4	RADIATOR/COOLING FAN	6-10
SYSTEM TESTING	6-5	WATER PUMP	6-14
COOLANT REPLACEMENT	6-6		

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.

⚠ CAUTION

Radiator coolant is toxic. Keep it away from eyes and mouth.

- If any coolant gets in your eyes, rinse them with water and consult a physician 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.

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.

- 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 page 22-14 for engine coolant temperature sensor information.

SPECIFICATIONS

ITEM		SPECIFICATIONS
Coolant capacity	Radiator and engine	2.0 liters (2.1 US qt, 1.8 Imp qt)
	Reserve tank	0.46 liter (0.49 US qt, 0.40 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
	Fully open	95°C
	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 distilled water

TORQUE VALUE

Water pump impeller 12 N·m (1.2 kgf·m, 9 lbf·ft)

TOOLS

Cooling system pressure tester	SVTS4AH
Cooling system adaptor	OTCJ33984A
Remover head, 15 mm	07936-KC10200 or 07936-KC10500
Bearing remover shaft	07936-KC10100 or 07936-KC10500
Remover weight	07741-0010201 or 07936-371020A or 07936-3710200 (U.S.A. only)
Mechanical seal driver attachment	07945-4150400 or 07965-415000A (U.S.A. only)

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 22-14)

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

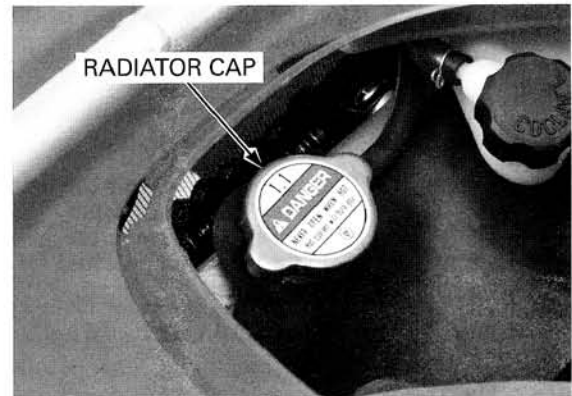
SYSTEM TESTING

COOLANT (HYDROMETER TEST)

Remove the steering cover (page 2-5).

Remove the radiator cap.

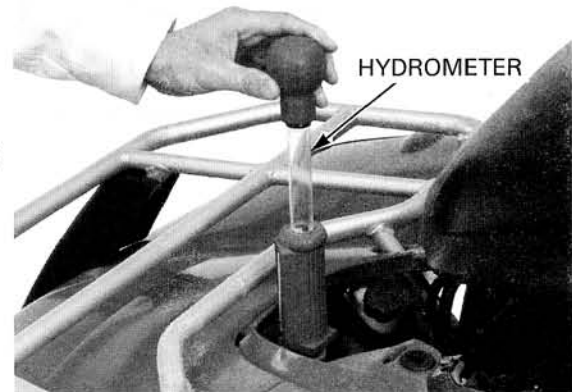
The engine must be cool before removing the radiator cap, or severe scalding may result.



Test the coolant gravity using a hydrometer.

STANDARD COOLANT CONCENTRATION:
1:1 (distilled water and the recommended antifreeze)

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	1.047	1.046	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

COOLING SYSTEM

RADIATOR CAP/SYSTEM PRESSURE INSPECTION

Remove the radiator cap (page 6-5).
Wet the sealing surfaces of the cap, then install the cap onto tester.

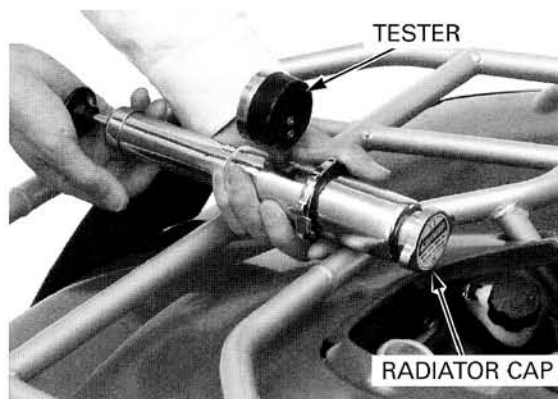
TOOLS:

Cooling system pressure tester	SVTS4AH
Cooling system adaptor	OTCJ33984A

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

RADIATOR CAP RELIEF PRESSURE:

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



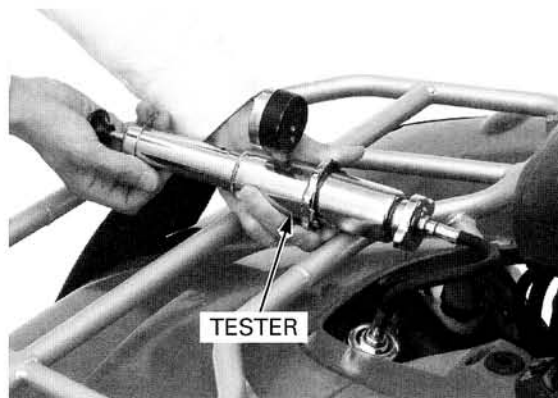
Excessive pressure can damage the cooling system components. Do not exceed 137 kPa (1.4 kgf/cm², 20 psi).

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

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

Remove the tester and install the radiator cap.

Install the steering cover (page 2-5).



COOLANT REPLACEMENT

PREPARATION

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.

NOTE:

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

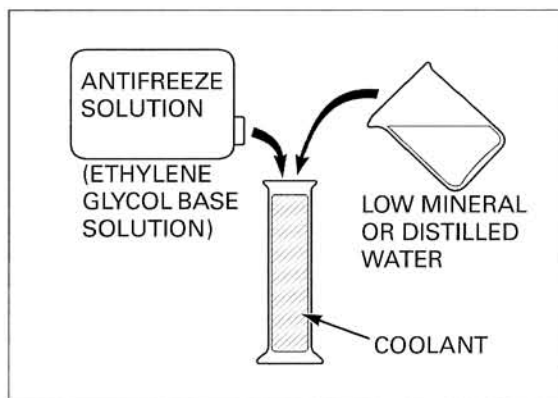
Mix only distilled, low mineral water with the recommended antifreeze.

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 the recommended antifreeze)



REPLACEMENT/AIR BLEEDING**NOTE:**

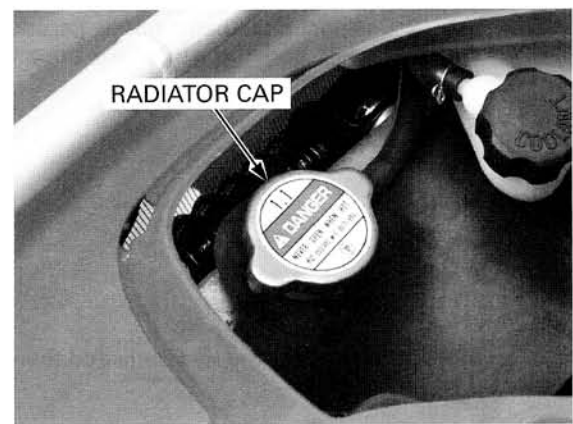
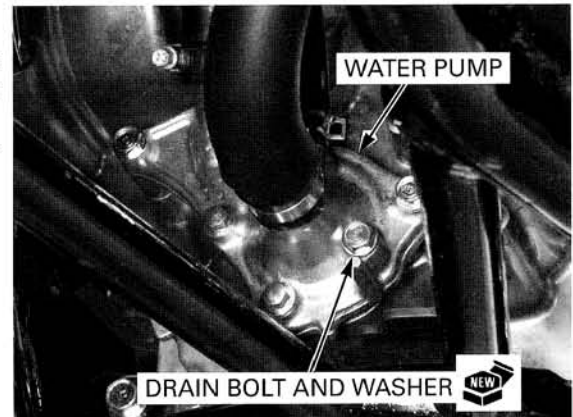
- When filling the system with a coolant, place the vehicle on a flat, level surface.

Remove the steering cover (page 2-5).

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

Drain the coolant from the system by removing the drain bolt and sealing washer on the water pump, and the radiator cap.

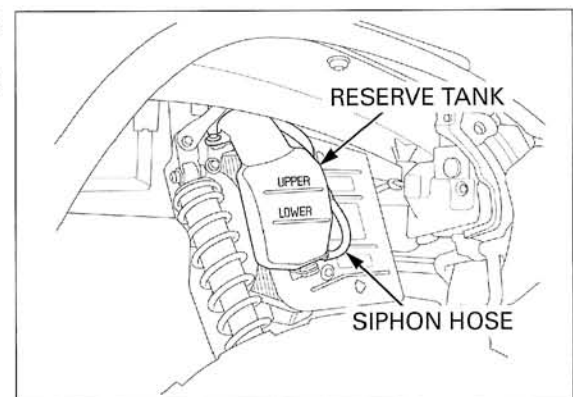
Reinstall the drain bolt with a new sealing washer securely.



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

Empty the coolant, remove the reserve tank cap and rinse the inside of the reserve tank with water.

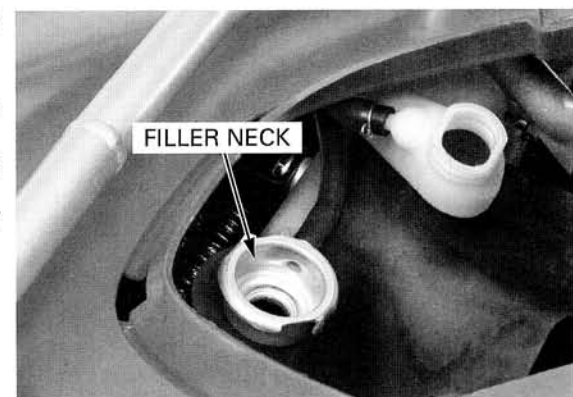
Reconnect the siphon hose.



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

Bleed air from the system as follows:

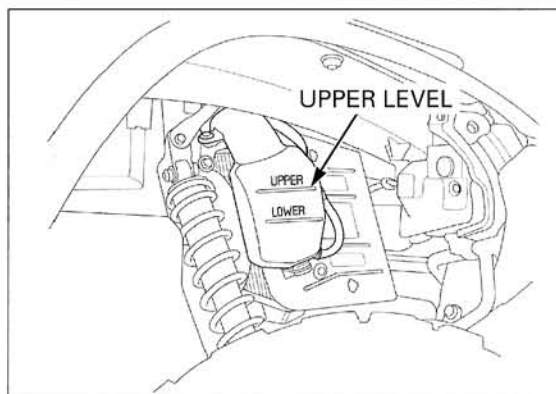
1. Shift the transmission into neutral. Start the engine and let it idle for 2 – 3 minutes.
2. Snap the throttle 3 – 4 times to bleed air from the system.
3. Stop the engine and add coolant up to the filler neck.
4. Install the radiator cap.



COOLING SYSTEM

Fill the reserve tank to the upper level line and install the tank cap.

Install the steering cover (page 2-5).



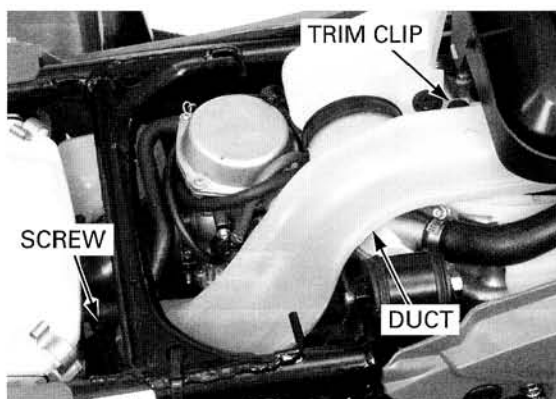
THERMOSTAT

REMOVAL

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

Remove the fuel tank covers (page 2-5).

Loosen the band screw. Remove the trim clip (page 2-4) and the air intake duct from the air cleaner housing.



Remove the two bolts and thermostat cover.



Remove the thermostat from the housing.



INSPECTION

Visually inspect the thermostat for damage.
Replace the thermostat if the valve stays open at room temperature.

Wear insulated gloves and adequate eye protection.

Keep flammable materials away from the electric heating element. Do not let the thermostat or thermometer touch the pan, or you will get a false reading.

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

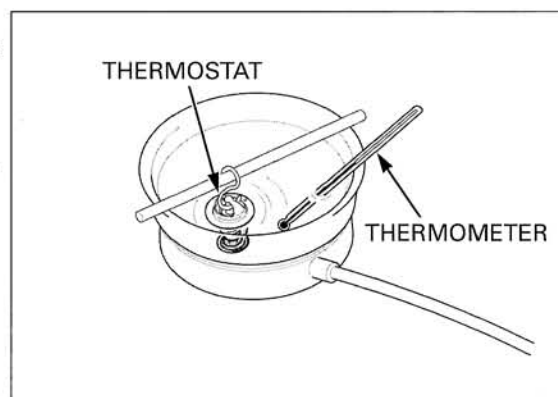
THERMOSTAT BEGIN TO OPEN:

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 opens at a temperature other than those specified.

**INSTALLATION**

Make sure the seal rubber on the thermostat is in good condition.
Install the thermostat into the housing, aligning the hole with the lug.



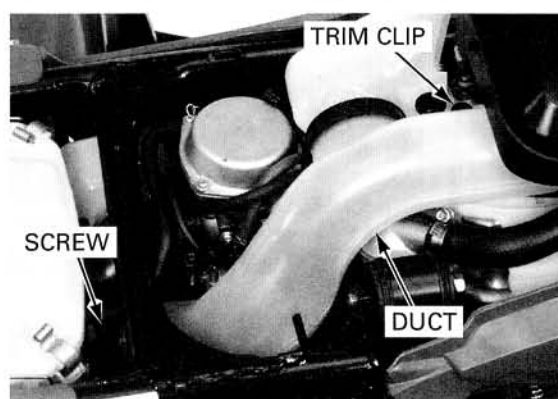
Install the thermostat and tighten the two bolts securely.



Insert the air intake duct against the connecting tube and secure it onto the heat guard with the trim clip. Tighten the band screw securely.

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

Install the fuel tank covers (page 2-5).



RADIATOR RESERVE TANK

REMOVAL/INSTALLATION

Remove the front fender (page 2-12).

Remove the breather hose from the grill cover.

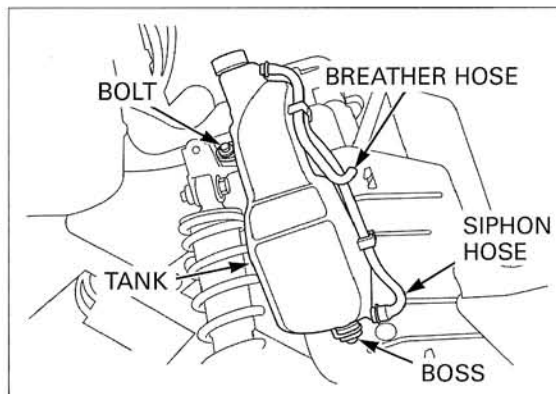
Remove the mounting bolt.

Release the boss on the tank bottom from the radiator and drain the coolant.

Disconnect the siphon hose to remove the reserve tank.

Install the reserve tank in the reverse order of removal.

Fill the reserve tank to the upper level line.



RADIATOR/COOLING FAN

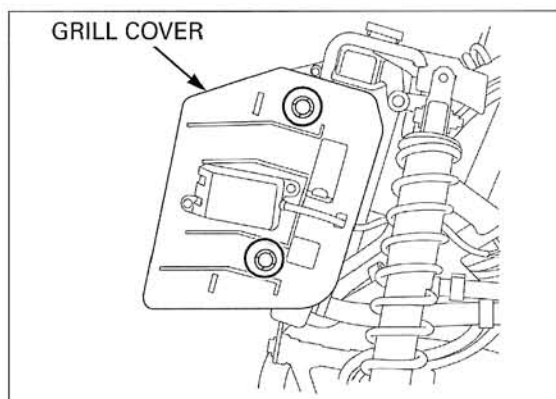
RADIATOR REMOVAL

Remove the following:

- oil cooler (page 4-12)
- radiator reserve tank (page 6-10)
- left inner fender (page 2-9)

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

Remove the two trim clips (page 2-4) and each grill cover.

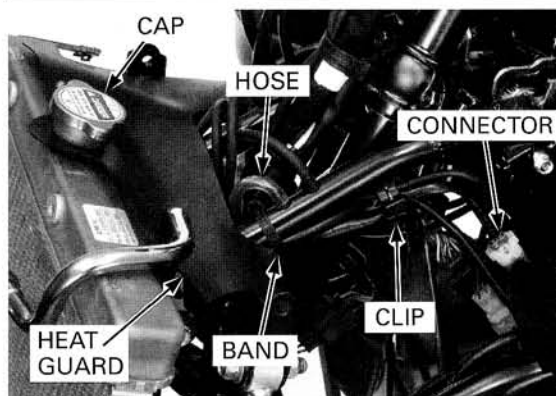


Disconnect the breather hose (pink) from the frame pipe.

Release the clip to free the fan motor wire and disconnect the motor 2P connector (white). Remove the wire band.

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

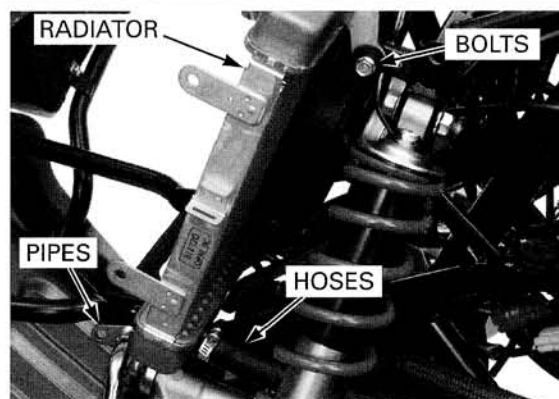
Remove the radiator cap and the rubber heat guard from the filler neck. Reinstall the radiator cap.



Disconnect the upper and lower water hoses.

Be careful not to damage the radiator fins with the oil pipe.

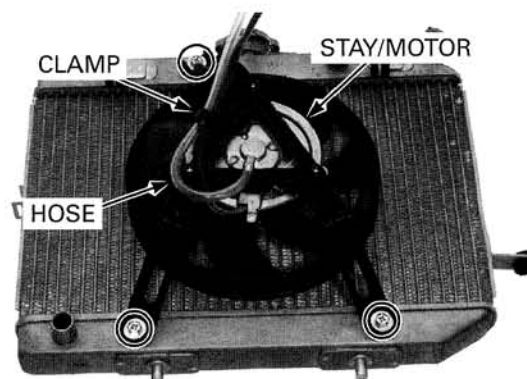
Remove the two mounting bolts. Release the mounting bosses on the radiator bottom from the frame and remove the radiator assembly while pulling the oil pipes aside.



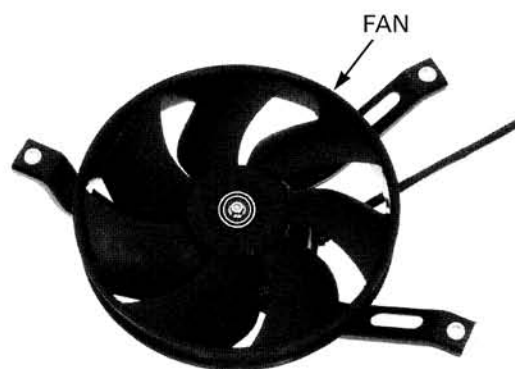
COOLING FAN DISASSEMBLY

Release the fan motor wire and breather hose from the clamp of the motor stay, and disconnect the breather hose.

Remove the three washer-bolts and stay/motor assembly from the radiator.



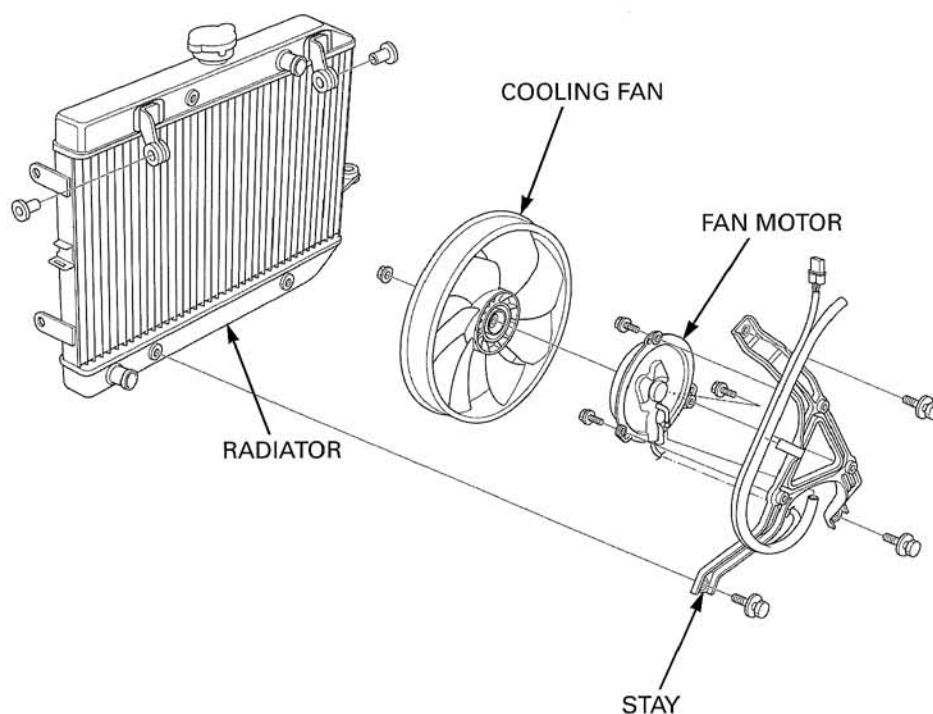
Remove the nut and cooling fan.



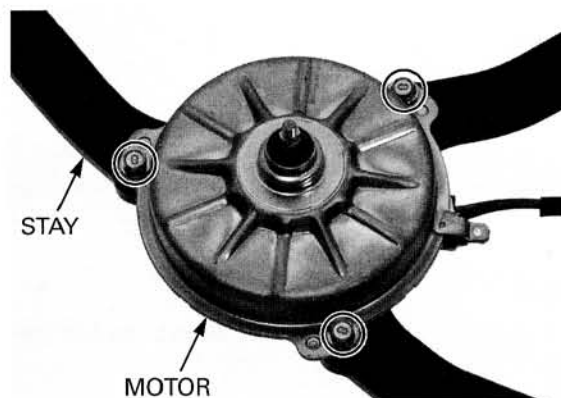
Remove the three bolts and fan motor.



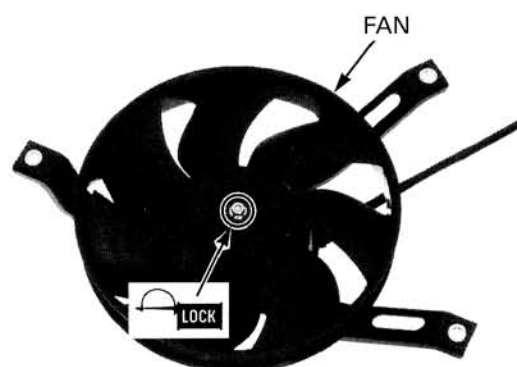
ASSEMBLY



Install the fan motor on the motor stay in the direction as shown and tighten the three bolts securely.

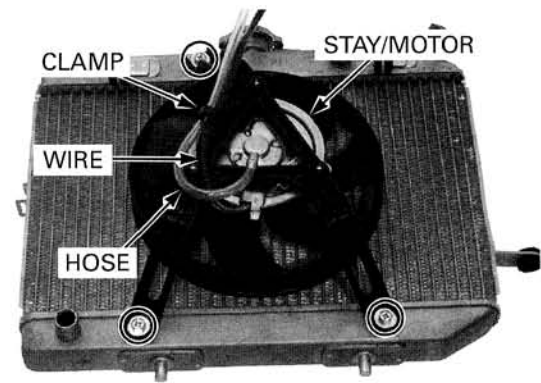


Install the cooling fan on the fan motor shaft, aligning the flat surfaces. Apply locking agent to the motor shaft threads. Install the nut and tighten it.



Install the stay/motor assembly onto the radiator and tighten the three washer-bolts securely.

Connect the breather hose to the motor breather joint. Route the fan motor wire and breather hose through the clamp.



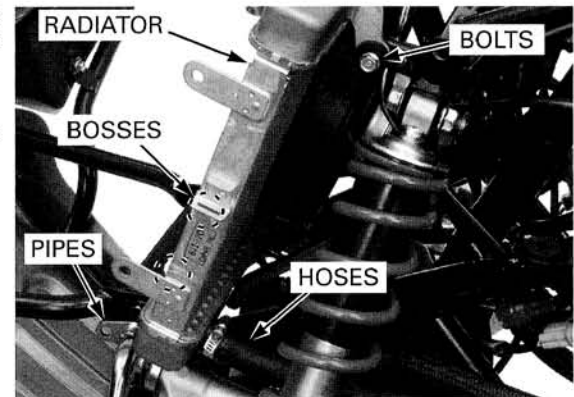
INSTALLATION

Be careful not to damage the radiator fins with the oil pipe.

Insert the bosses on the radiator bottom into the holes (mounting rubbers) in the frame to install the radiator assembly.

Install the mounting bolts and tighten them.

Connect the upper and lower water hoses, and tighten the hose clamps securely.



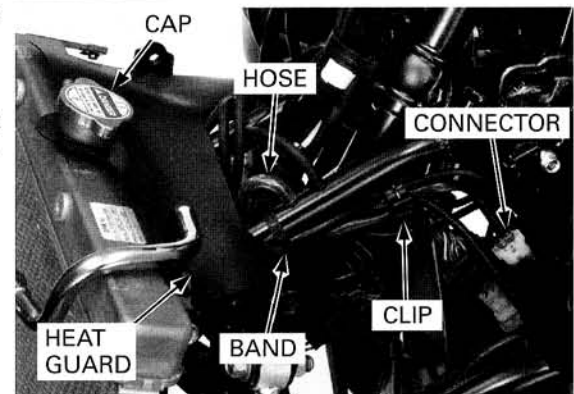
Route the wire and hose properly (page 1-21).

Connect the fan motor 2P connector and secure the wires with the clip. Install the wire band.

Connect the breather hose (pink) to the frame pipe.

Remove the radiator cap and install the rubber heat guard over the filler neck. Reinstall the radiator cap.

Set the rubber heat guard properly (page 1-21).



Install the left and right grill covers with the trim clips (page 2-4). For the left grill cover, align the tab with the groove in the radiator.

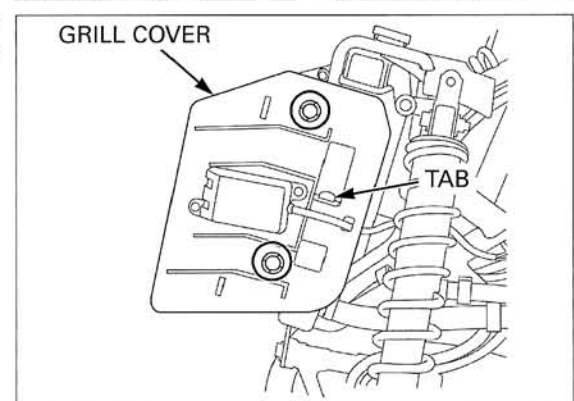
Install the following:

- oil cooler (page 4-12)
- radiator reserve tank (page 6-10)

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

After bleeding, install the following:

- left inner fender (page 2-9)
- front fender (page 2-12)

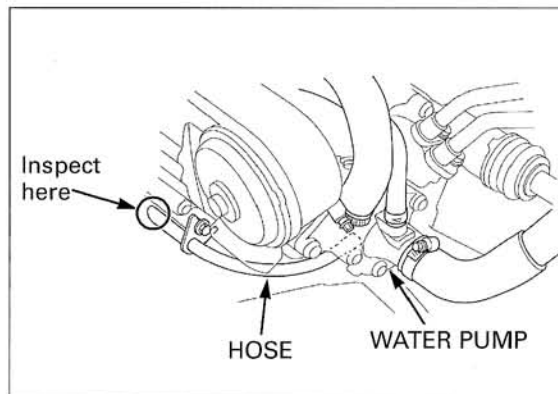


WATER PUMP

MECHANICAL SEAL INSPECTION

Remove the mud guard lid (page 2-7).

Check the drain hose for signs of coolant leakage. If there is leakage, the mechanical seal is defective, and the mechanical seal should be replaced.



REMOVAL

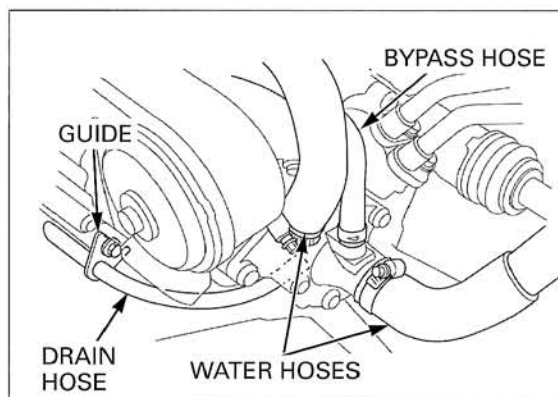
Remove the following:

- mud guard lid (page 2-7)
- right front mud guard (page 2-8)
- right inner fender (page 2-9)

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

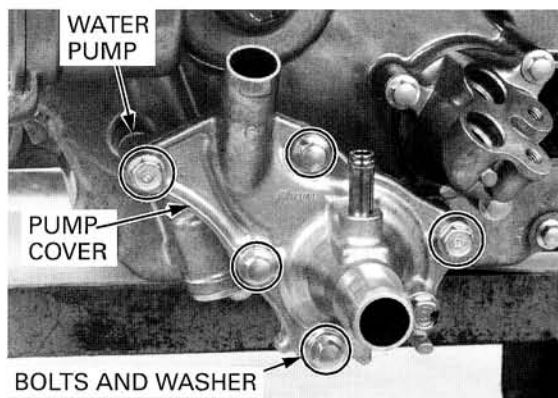
Remove the drain hose from the hose guide on the crankcase cover.

Disconnect the water hoses and bypass hose from the water pump.



Remove the following:

- two mounting bolts
- three cover bolts and sealing washer
- pump cover
- O-ring
- water pump
- O-ring

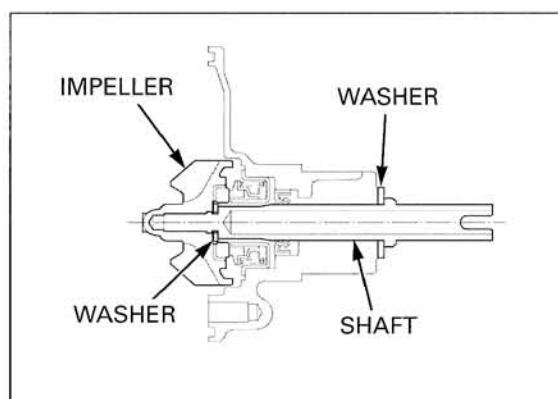


MECHANICAL SEAL REPLACEMENT

Loosen the impeller by turning it counterclockwise while holding the pump shaft slot.

Remove the following:

- impeller assembly
- washer
- pump shaft
- thrust washer



Remove the mechanical seal using the special tools.

TOOLS:

Remover head, 15 mm

Bearing remover shaft

Bearing remover, 15 mm

Remover weight

07936-KC10200

07936-KC10100 or

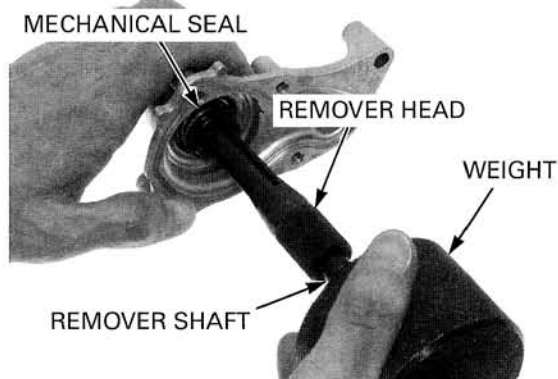
07936-KC10500

07741-0010201 or

07936-371020A or

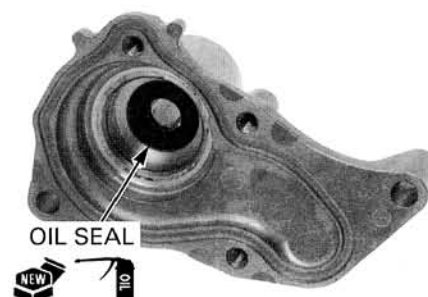
07936-3710200

(U.S.A. only)



Remove the oil seal.

Apply engine oil to a new oil seal lips. Install the oil seal with the flat side facing out until it is flush with the pump body edge.



Press a new mechanical seal in until it is seated.

TOOL:

Mechanical seal driver

attachment

Mechanical seal installer

07945-4150400 or

07965-415000A

(U.S.A. only)



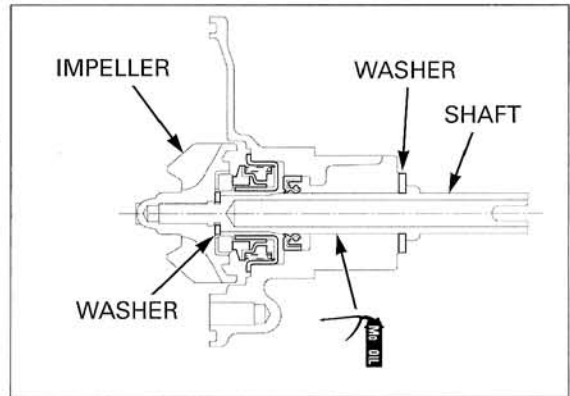
COOLING SYSTEM

Do not get oil on the pump shaft threads.

Install the thrust washer onto the pump shaft. Apply molybdenum disulfide solution to the sliding surface of the pump shaft and insert the shaft into the pump body.

Install the washer and impeller assembly, and tighten the impeller.

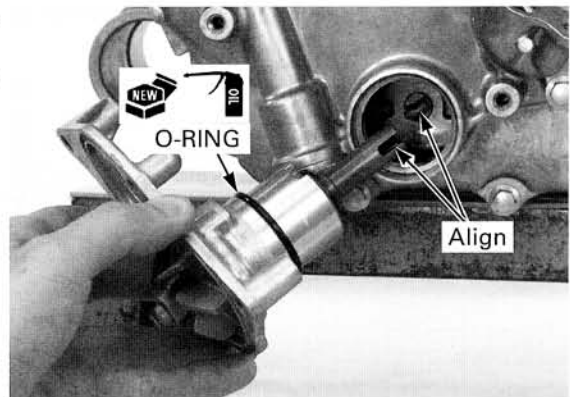
TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)



INSTALLATION

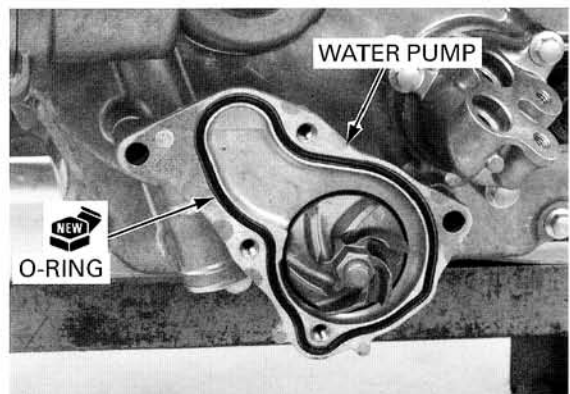
Coat a new O-ring with engine oil and install it on the stepped section of the pump body.

Install the water pump while turning the impeller to engage the pump shafts.



Align the mounting bolt holes in the pump body and crankcase cover, and be sure the water pump is fully seated.

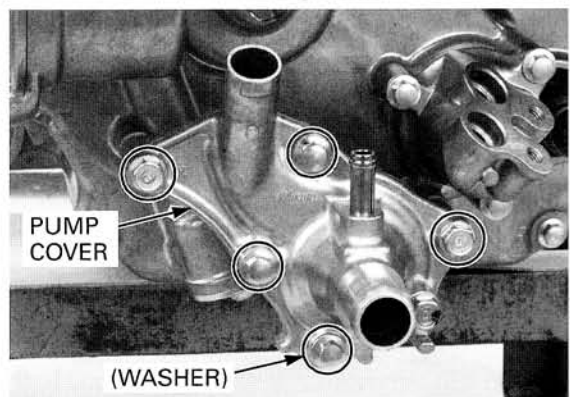
Install a new O-ring into the pump body groove.



Install the pump cover with the two mounting bolts.

Note the installation location of the sealing washer.

Install the three cover bolts with a new sealing washer as shown, and tighten all the bolts in a criss-cross pattern in several steps.



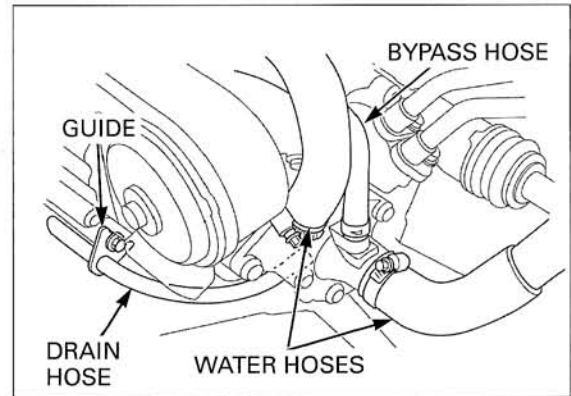
Connect the water hoses and bypass hose, and secure them with the hose clamps.

Insert the drain hose into the hose guide.

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

Install the following:

- inner fender (page 2-9)
- front mud guard (page 2-8)
- mud guard lid (page 2-7)



7. ENGINE REMOVAL/INSTALLATION

SYSTEM COMPONENTS 7-2

SERVICE INFORMATION 7-3

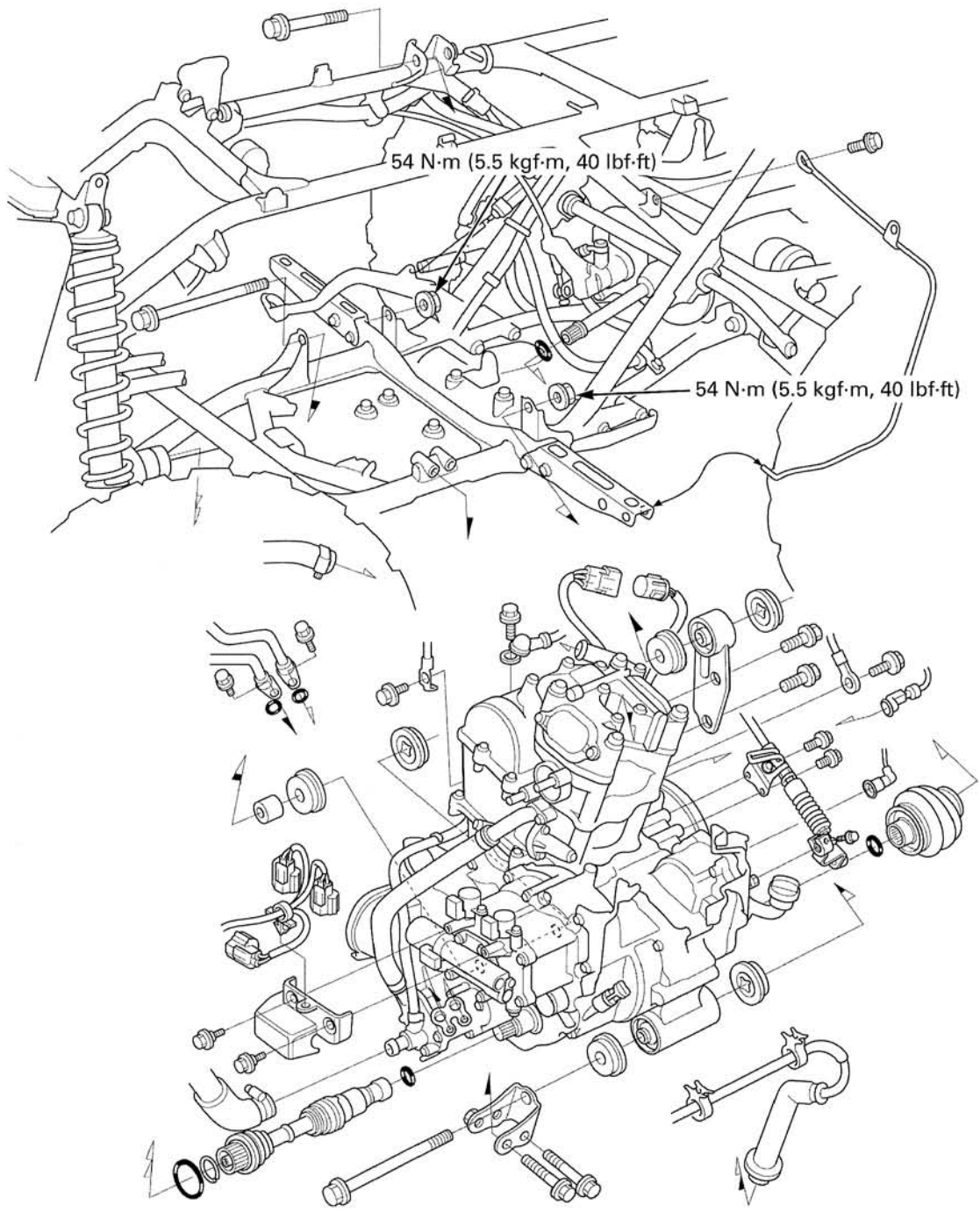
ENGINE REMOVAL7-4

ENGINE INSTALLATION.....7-7

7

ENGINE REMOVAL/INSTALLATION

SYSTEM COMPONENTS



SERVICE INFORMATION

GENERAL

- When removing/installing the engine, tape the frame around the engine beforehand for frame protection.
- The following components require engine removal for service:
 - mainshaft and 2nd/3rd shift clutch (countershaft) (page 12-26)
 - crankshaft/balancer (page 13-2)

SPCIFICATIONS

ITEM		SPECIFICATIONS
Engine dry weight		59.8 kg (131.8 lbs)
Engine oil capacity	After draining	2.8 liters (3.0 US qt, 2.5 Imp qt)
	After draining/filter change	2.9 liters (3.1 US qt, 2.6 Imp qt)
	After disassembly	3.5 liters (3.7 US qt, 3.1 Imp qt)
Coolant capacity (radiator and engine)		2.0 liters (2.1 US qt, 1.8 Imp qt)

TORQUE VALUES

Lower engine hanger nut (left and right)	54 N·m (5.5 kgf·m, 40 lbf·ft)
Differential mounting nut (10 mm)	44 N·m (4.5 kgf·m, 33 lbf·ft)
Differential mounting nut (8 mm)	22 N·m (2.2 kgf·m, 16 lbf·ft)
Gear selector arm pinch bolt	16 N·m (1.6 kgf·m, 12 lbf·ft)

ENGINE REMOVAL

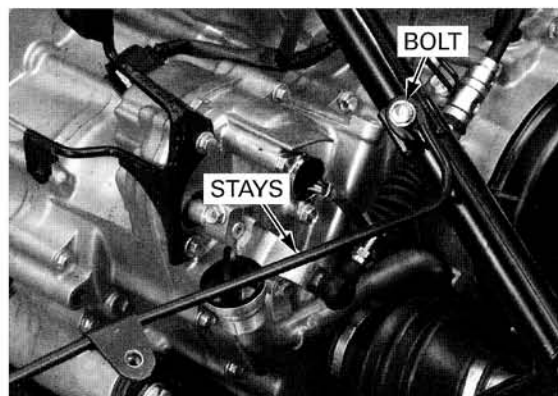
Drain the engine oil (page 3-11).

Drain the coolant (page 6-7).

Remove the following:

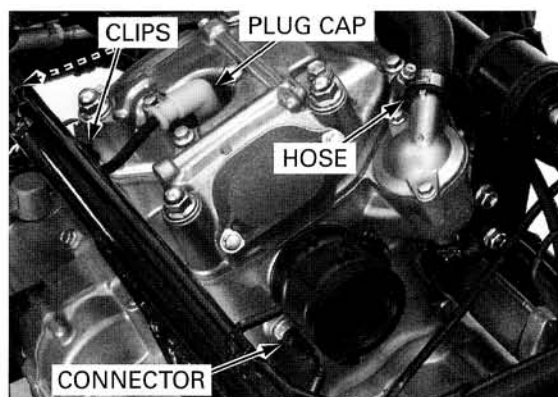
- front center grille (page 2-10)
- center mud guards (page 2-7)
- front mud guards (page 2-8)
- inner fenders (page 2-9)
- rear fender assembly (page 2-15)
- engine side covers (page 2-17)
- exhaust system (page 2-19)
- carburetor (page 5-6)
- heat guard plate (page 5-22)

Remove the bolt and the left mud guard stays from the footpeg bracket.

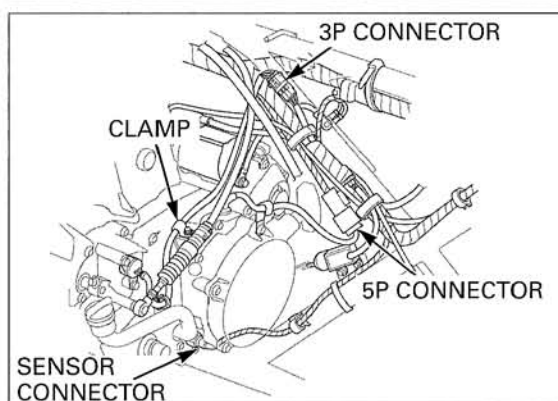


Disconnect the following:

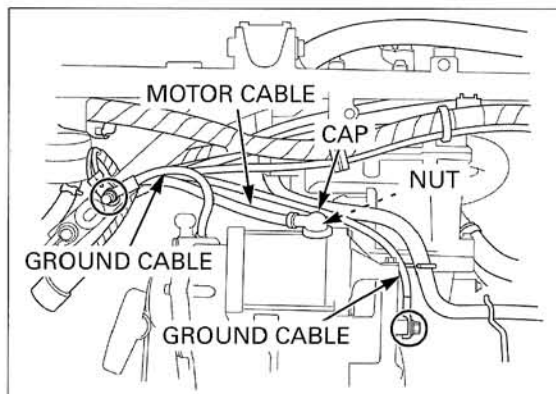
- engine coolant temperature (ECT) sensor connector
- spark plug cap (and remove the wire clips from the frame)
- water hose (from the thermostat housing)



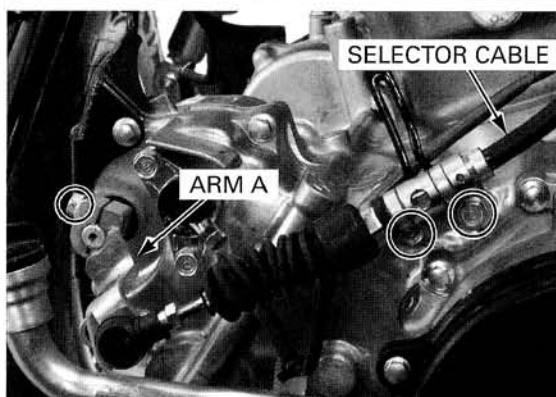
- alternator 5P connector
- gear position switch 3P connector (and release its wire from the clamp on the cable holder)
- oil temperature sensor connector



- starter motor cable (by sliding the rubber cap and removing the terminal nut)
- ground cables (by removing each bolt)



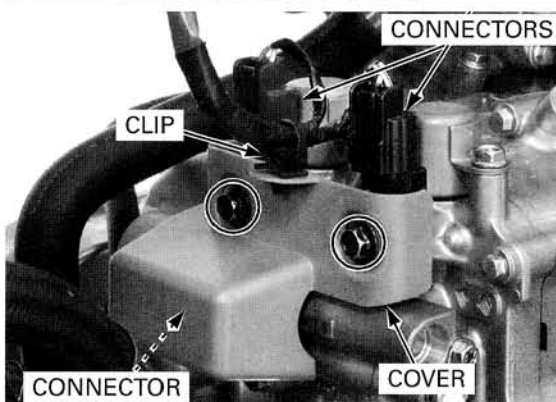
- gear selector cable (by removing the two cable holder bolts, and the pinch bolt and arm A)



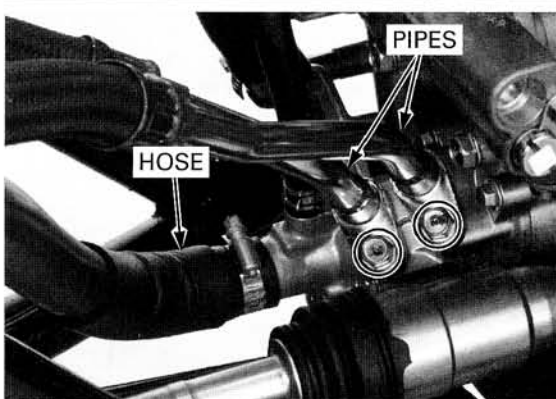
Reinstall the valve body cover after disconnecting the connectors to avoid damaging the solenoid valve.

Remove the wire clip. Remove the two set bolts and shift valve body cover, and disconnect the following:

- shift solenoid A and B 2P connectors
- linear solenoid 2P connector

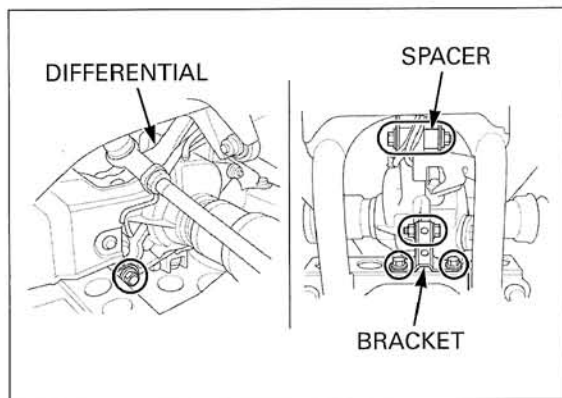


- oil pipes (by removing each joint bolt)
- water hose (from the water pump)



ENGINE REMOVAL/INSTALLATION

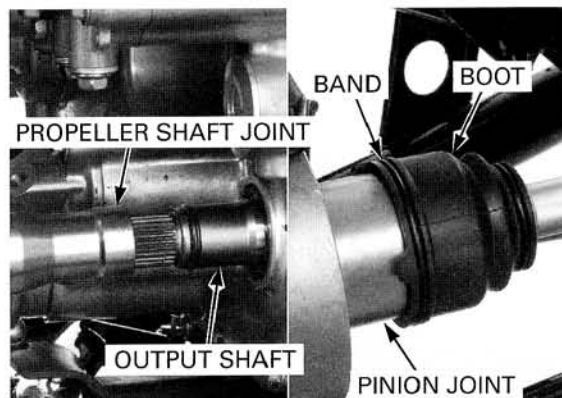
Remove the differential mounting fasteners, spacer and bracket.
Move the front differential forward to get the clearance for front propeller shaft removal.



Pull the propeller shaft joint out of the output shaft.

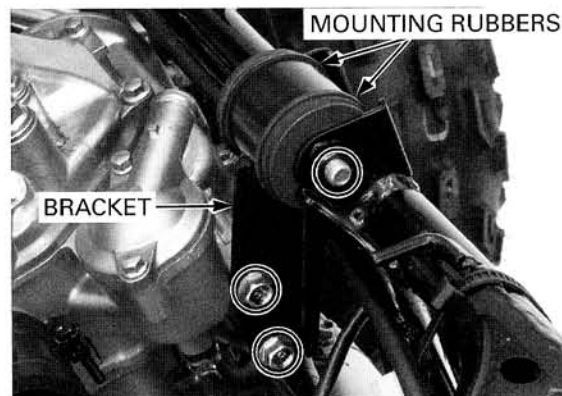
Remove the boot band from the dust boot and release the boot off the pinion joint of the differential.

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

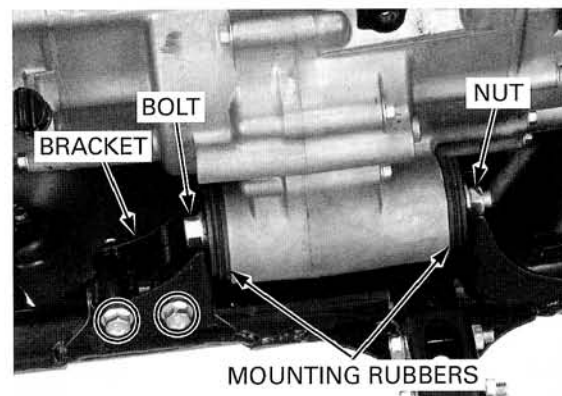


Remove the following mounting fasteners:

- upper engine hanger bolts
- hanger bracket
- mounting rubbers

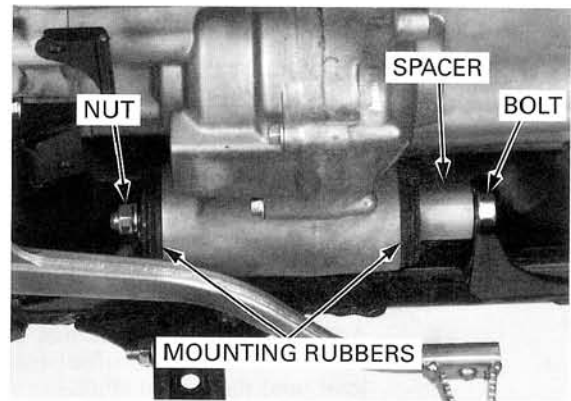


- Set suitable wooden blocks between the engine and lower frame pipe to support the engine for ease of bolt removal.
- left lower engine hanger nut and bolt
 - mounting rubbers
 - two bolts and hanger bracket



ENGINE REMOVAL/INSTALLATION

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



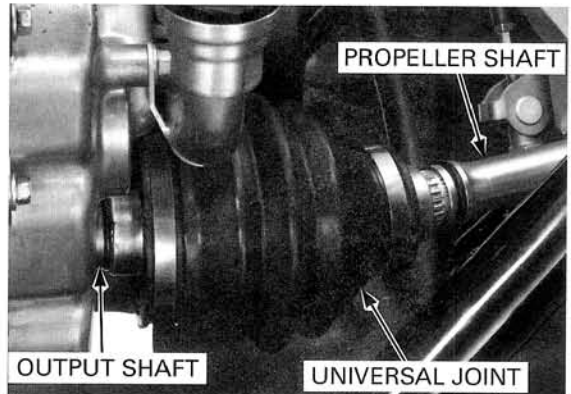
Move the engine forward and disconnect the output shaft from the rear propeller shaft. Remove the universal joint.

Hold the engine securely and take care not to damage the frame and engine

Remove the engine out of the frame toward the left side.

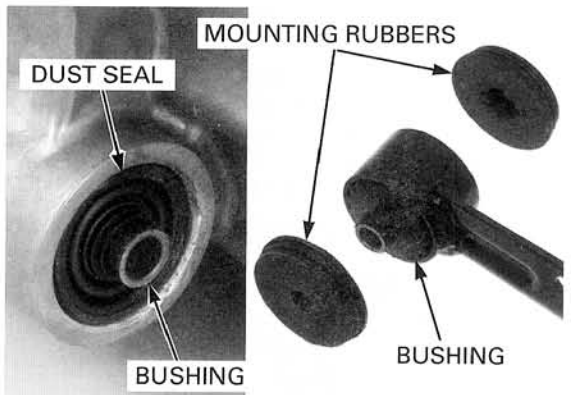
NOTICE

Do not hold or strike the solenoid valves on the shift valve body during engine removal. Holding the solenoid valve or excessive shock may damage the solenoid valve.



Remove the engine hanger bushings and dust seals.

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



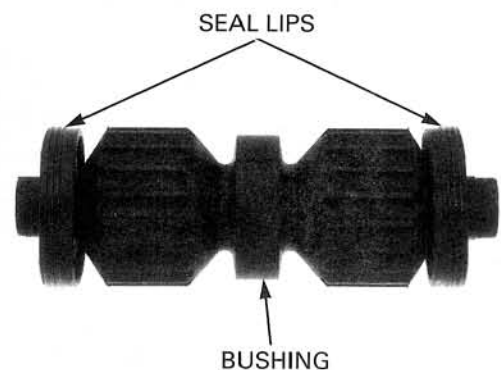
ENGINE INSTALLATION

NOTE:

- Before installing the engine, install the valve body cover onto the shift valve body to avoid damaging the solenoid valve (page 7-10).
- Route the wires, cables and hoses properly (page 1-21).

Install the lower hanger bushings into the engine lower mounts.

Install the dust seals with the lip side facing out.



ENGINE REMOVAL/INSTALLATION

Hold the engine securely and be careful not to damage the frame and engine

Place the engine in the frame from the left side and support it with suitable wooded blocks.

NOTICE

Do not hold or strike the solenoid valves on the shift valve body during engine removal. Holding the solenoid valve or excessive shock may damage the solenoid valve.

Coat new O-rings with molybdenum disulfide grease and install them into the grooves in the output shaft and rear propeller shaft.

Apply molybdenum disulfide grease to the universal joint splines (both sides) and install the universal joint onto the output shaft.

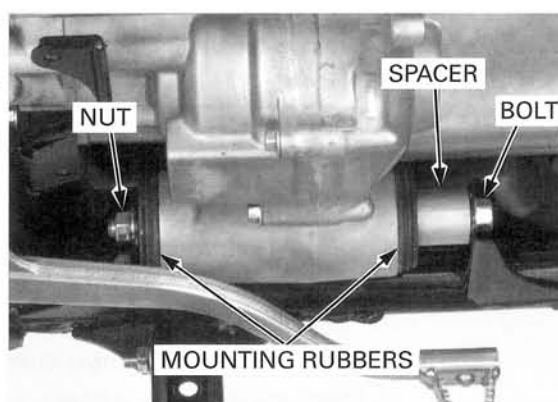
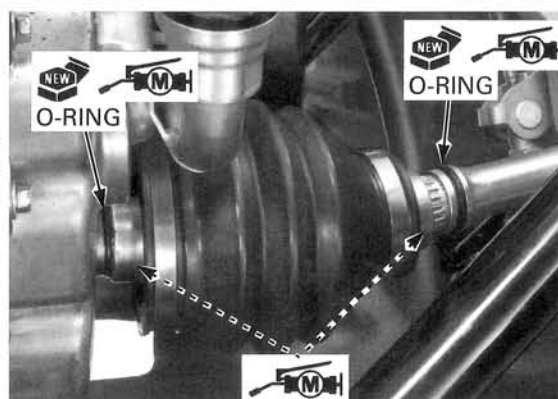
Carefully move the engine and engage the universal joint on the engine with the propeller shaft.

Be sure the universal joint is not disengaged.

Set the right lower mounting portion of the engine between the hanger stays on the frame.

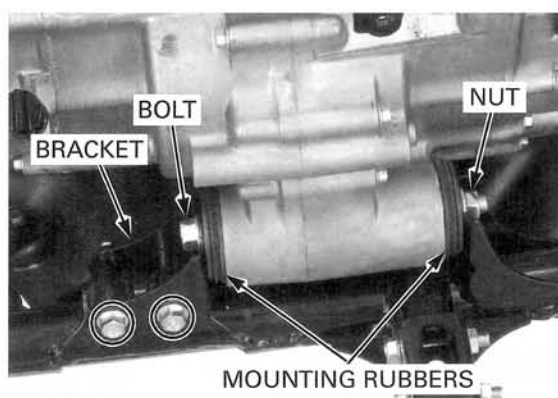
Install the mounting rubbers onto the right lower hanger bushing with the large I.D. side facing in. Install the spacer and the hanger bolt (from the front side) while aligning the bolt holes carefully.

Loosely install the hanger nut.



Install the mounting rubbers onto the left lower hanger bushing in the same manner as above. Install the hanger bracket and bolts, and the hanger bolt (from the front side) while aligning the bolt holes carefully.

Loosely install the hanger nut.



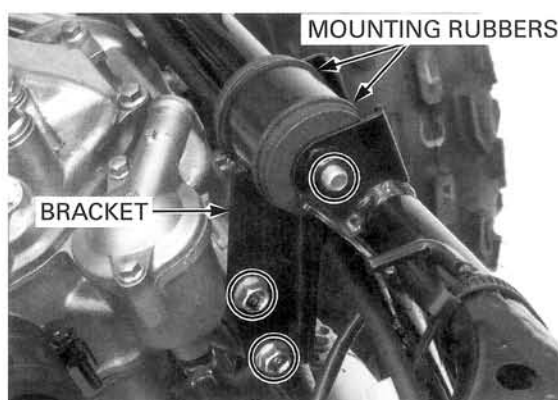
Install the mounting rubbers onto the upper hanger bushing in the same manner as above. Install the upper engine hanger bracket and the three bolts.

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

- left and right lower hanger nuts

TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)

- left lower engine hanger bracket bolts
- upper hanger bolts (engine side)
- upper hanger bolt (frame side)



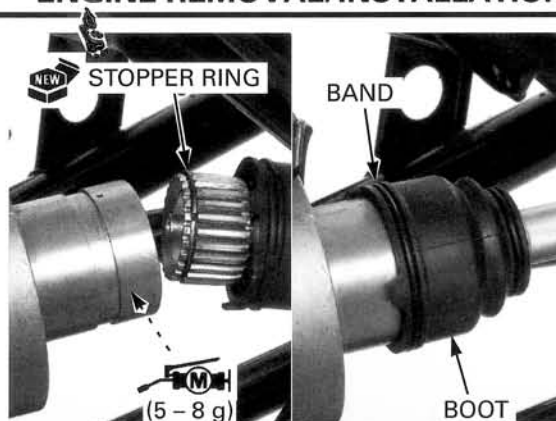
Install a new stopper ring into the groove on the propeller shaft end.

Apply 5 – 8 g of molybdenum disulfide grease to the pinion joint splines of the differential.
Place the boot band over the propeller shaft.

Install the propeller shaft into the pinion joint, aligning the joint and shaft splines until the stopper ring seats in the groove.

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

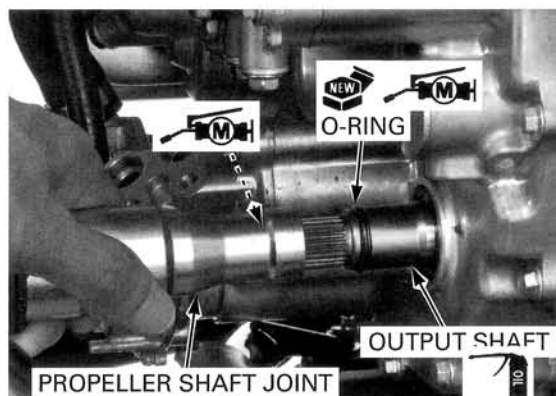
Install the boot over the pinion joint securely and the boot band into the boot groove.



Coat a new O-ring with molybdenum disulfide grease and install it in the output shaft groove.

Apply molybdenum disulfide grease to the propeller shaft joint splines.

Engage the propeller shaft joint over the output shaft, aligning the joint and shaft splines while moving the differential rearward.

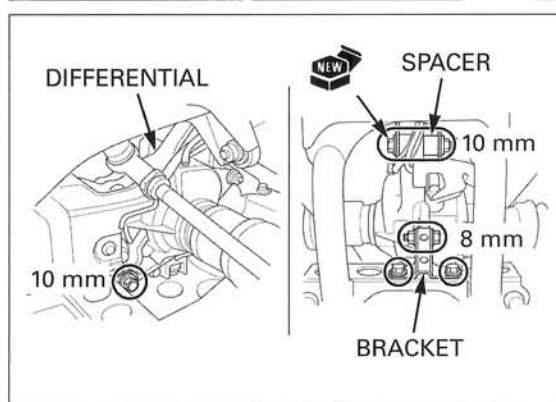


Upper side: Align the mounting points of the differential and frame, and install the spacer (between the left side of the differential and frame) and 10-mm bolt from the right side. Install a new 10-mm nut.

Lower side: Install the 10-mm bolt from the right side.

Front side: Install the mounting bracket, 8-mm bolts and nut.
Tighten the all the differential mounting fasteners.

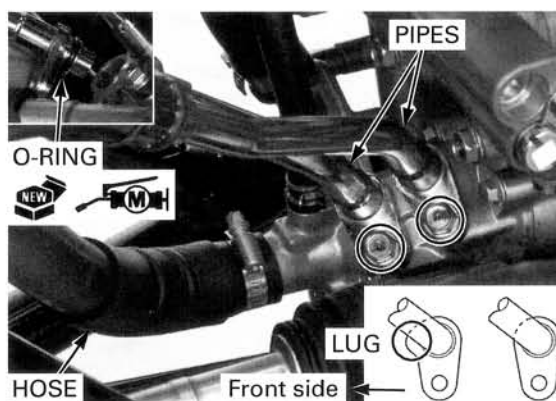
TORQUE: 10 mm nut: 44 N·m (4.5 kgf·m, 33 lbf·ft)
8 mm nut: 22 N·m (2.2 kgf·m, 16 lbf·ft)



Connect the following:

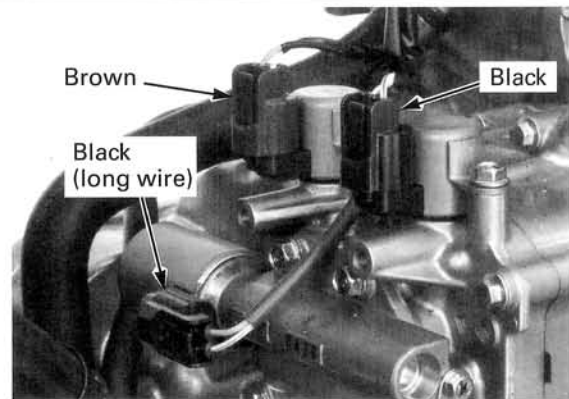
- water hose to the water pump (and secure it with the hose clamp)
- oil pipes with the joint bolts as shown

Coat new O-rings with engine oil and install them into each oil pipe grooves.

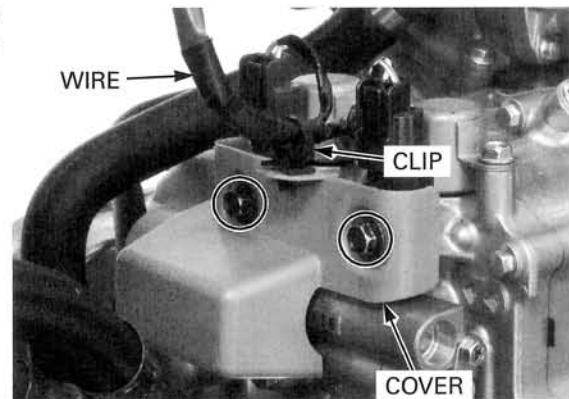


ENGINE REMOVAL/INSTALLATION

Remove the valve – linear and shift solenoid 2P connectors
body cover.



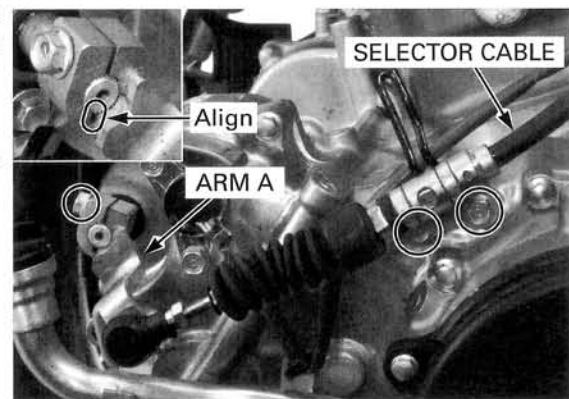
Install the valve body cover and tighten the two set bolts. Install the wire clip over the wire and into the cover.



Install the gear selector arm A by aligning the groove with the wide tooth of the spindle. Install the pinch bolt and tighten it.

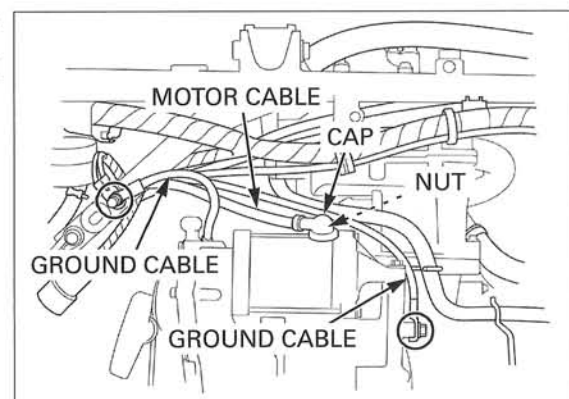
TORQUE: 16 N·m (1.6 kgf·m, 12 lbf·ft)

Secure the selector cable onto the engine with the two cable holder bolts.

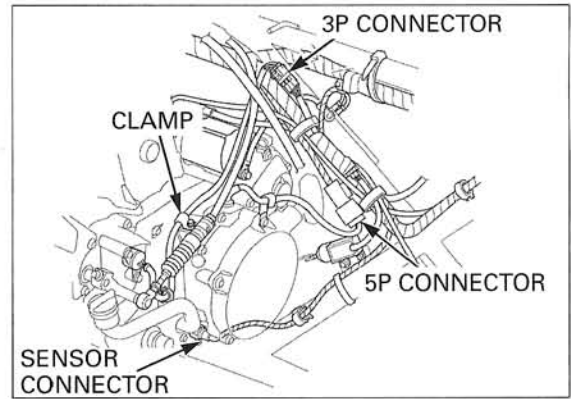


Connect the following:

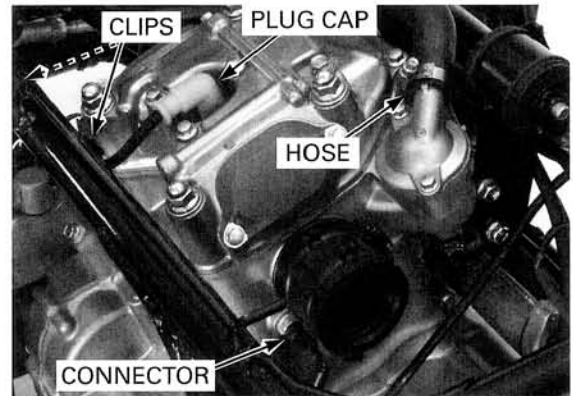
- ground cables to the engine with each attaching bolt
- starter motor cable with the terminal nut (and install the rubber cap over the terminal properly)



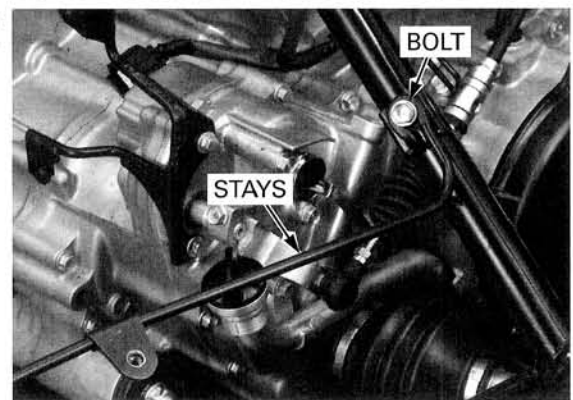
- oil temperature sensor connector
- gear position switch 3P connector (and secure its wire with the clamp on the cable holder)
- alternator 5P connector



- water hose
- ECT sensor connector
- spark plug cap (and install the wire clips onto the frame studs)



Hook the mud guard stays to the footpeg bracket and install the rear side stay on the frame with the washer-bolt.



Check the gear selector lever for smooth operation.

Install the following:

- heat guard plate and fuel tank (page 5-22)
- carburetor (page 5-19)
- exhaust system (page 2-19)
- engine side covers (page 2-17)
- rear fender assembly (page 2-15)
- inner fenders (page 2-9)
- front mud guards (page 2-8)
- center mud guards (page 2-7)
- front center grille (page 2-10)

Fill the engine with recommended oil (page 3-11).

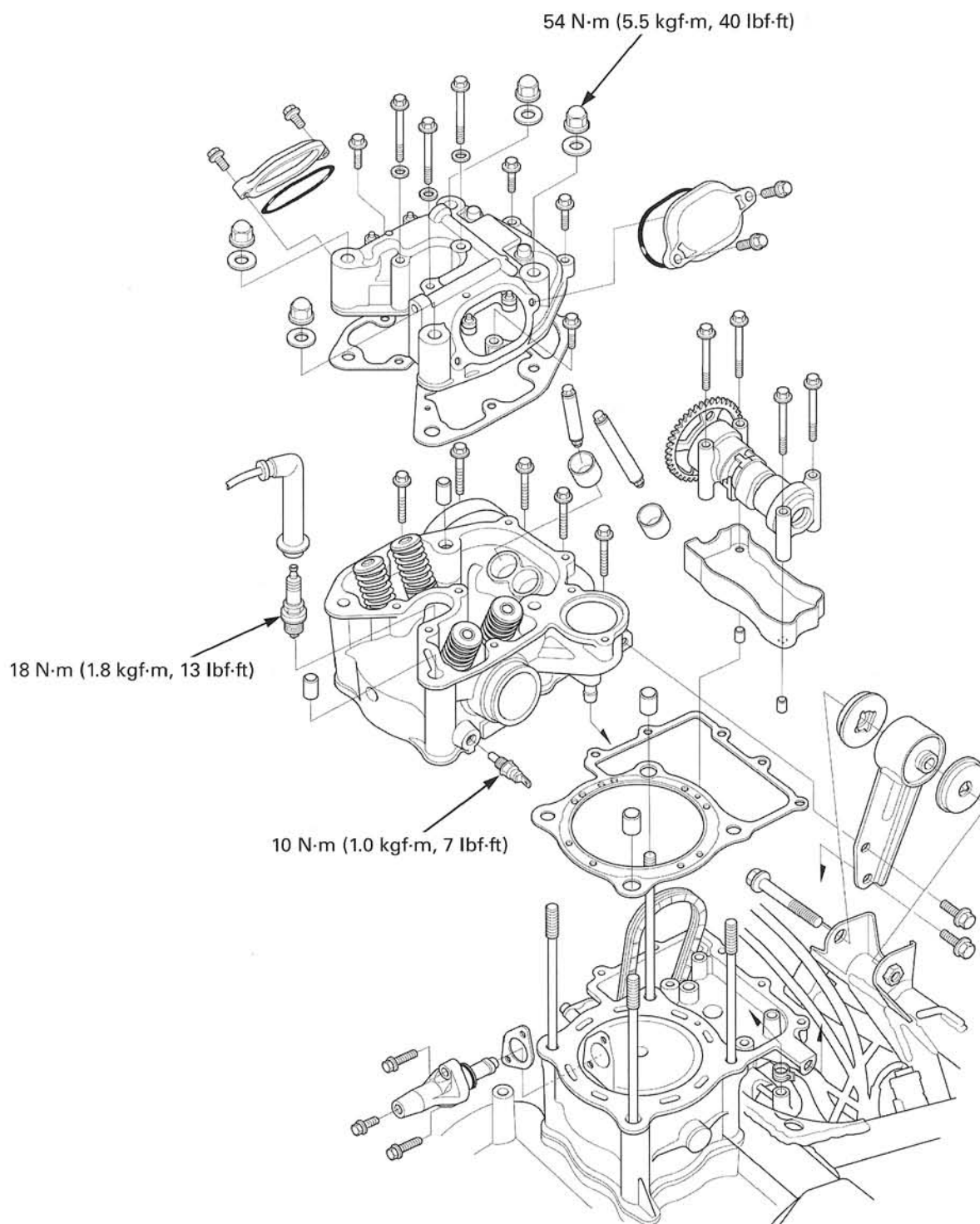
Fill and bleed the cooling system (page 6-6).

Check the engine oil level (page 3-10).

8. CYLINDER HEAD/VALVE/CAMSHAFT

SYSTEM COMPONENTS	8-2	VALVE GUIDE REPLACEMENT	8-11
SERVICE INFORMATION	8-3	VALVE SEAT INSPECTION/REFACING	8-12
TROUBLESHOOTING	8-4	CAMSHAFT REMOVAL	8-14
CYLINDER COMPRESSION	8-5	CAMSHAFT INSTALLATION	8-16
CYLINDER HEAD COVER REMOVAL/ DISASSEMBLY	8-5	CYLINDER HEAD ASSEMBLY	8-17
CYLINDER HEAD REMOVAL	8-8	CYLINDER HEAD INSTALLATION	8-18
CYLINDER HEAD DISASSEMBLY	8-9	CYLINDER HEAD COVER ASSEMBLY/ INSTALLATION	8-20

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 390 rpm			510 kPa (5.2 kgf/cm ² , 74 psi)	—
Valve clearance		IN	0.15 (0.006)	—
		EX	0.33 (0.013)	—
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	14.8 – 15.2 (0.58 – 0.60)	—
		EX	17.3 – 17.7 (0.68 – 0.70)	—
	Valve seat width	IN/EX	1.0 – 1.1 (0.039 – 0.043)	1.4 (0.06)
Valve spring	Free length	Inner	37.20 (1.465)	36.3 (1.43)
		Outer	44.20 (1.740)	43.1 (1.70)
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	34.9501 – 35.1101 (1.37599 – 1.38228)	34.775 (1.3691)
		EX	35.3258 – 35.4858 (1.39078 – 1.39708)	35.068 (1.3806)
	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 warp			—	0.05 (0.002)

TORQUE VALUE

Cylinder head cover cap nut	54 N·m (5.5 kgf·m, 40 lbf·ft)
Engine coolant temperature (ECT) sensor	10 N·m (1.0 kgf·m, 7 lbf·ft) Apply sealant to the threads.

TOOLS

Valve spring compressor	07757-0010000
Valve guide driver, 5.5 mm	07742-0010100
Valve guide reamer, 5.5 mm	07984-2000001 or 07984-200000D (U.S.A. only)
Valve seat cutters	or equivalent commercially available in U.S.A.
Seat cutter, 35 mm (IN/EX 45°)	07780-0010400
Flat cutter, 38.5 mm (IN 32°)	07780-0012400
Flat cutter, 35 mm (EX 32°)	07780-0012300
Interior cutter, 34 mm (IN/EX 60°)	07780-0014700
Cutter holder, 5.5 mm	07781-0010101
Tensioner holder B	07ZMG-MCAA400
Compression tester	EEP303A
Adaptor	MT26J200

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 9-2).

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 9-3)

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 9-3)

Excessive noise

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

Rough idle

- Low cylinder compression

CYLINDER COMPRESSION

Warm up the engine to normal operating temperature.

Stop the engine, disconnect the spark plug cap and remove the spark plug (page 3-7).

Install the compression gauge into the spark plug hole.

TOOLS:

Compression tester

EEPV303A

Adaptor

MT26J200

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:

510 kPa (5.2 kgf/cm², 74 psi) at 390 rpm

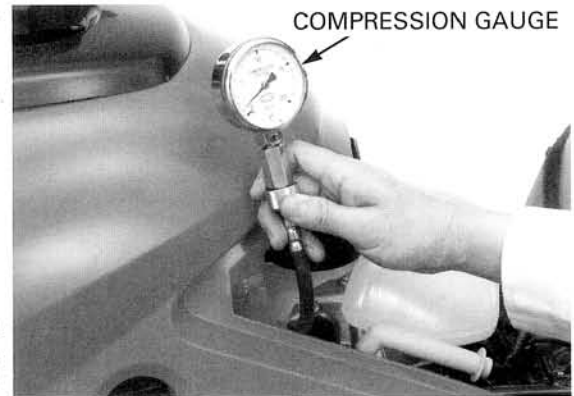
Check that there is no leakage at the gauge connection.

Low compression can be caused by:

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

High compression can be caused by:

- carbon deposits in combustion chamber or on piston head



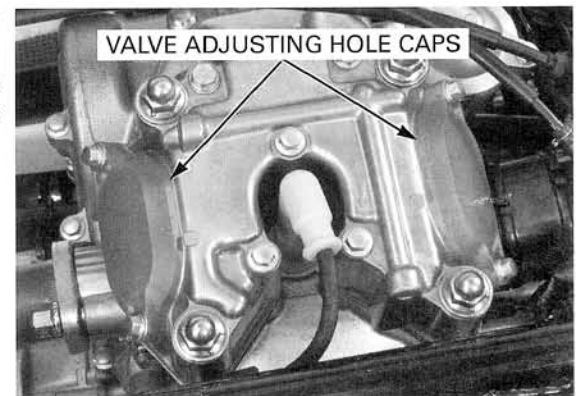
CYLINDER HEAD COVER REMOVAL/ DISASSEMBLY

REMOVAL

Remove the fuel tank and heat guard plate (page 5-22).

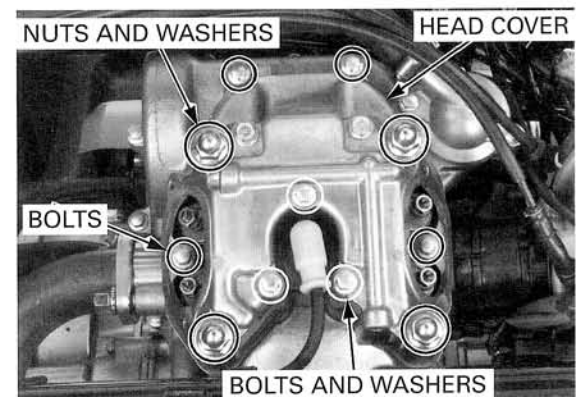
Remove the following and set the piston position to Top Dead Center on the compression stroke (page 3-8):

- timing hole cap
- four bolts and valve adjusting hole caps



Remove the following:

- spark plug cap
- seven bolts and three washers
- four cap nuts and washers
- cylinder head cover

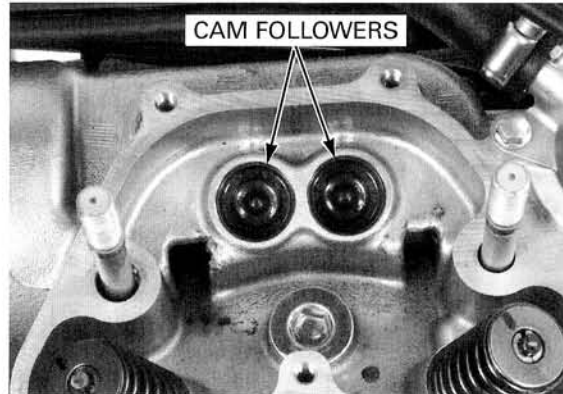
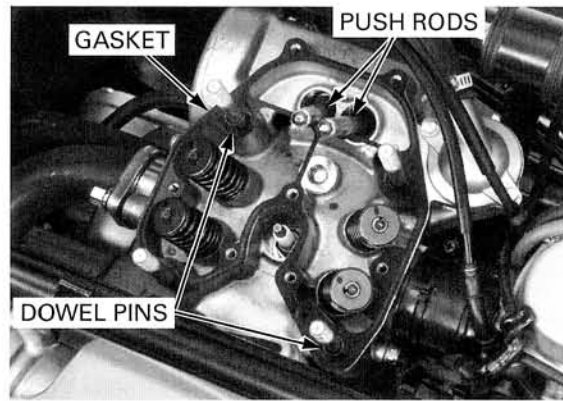


CYLINDER HEAD/VALVE/CAMSHAFT

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

- push rods
- gasket
- dowel pins

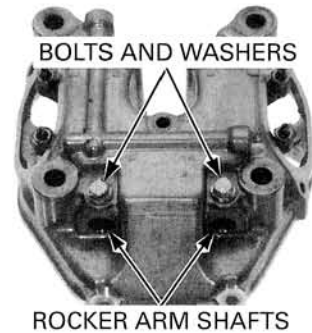
- cam followers



DISASSEMBLY

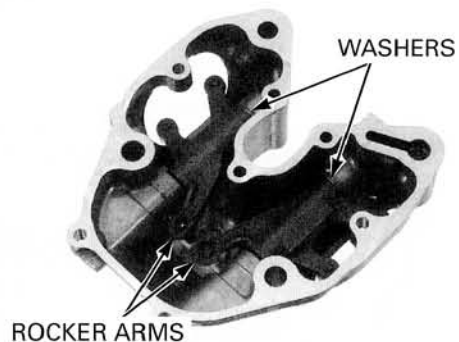
Remove the two bolts and sealing washers.

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



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

- Remove the following:
- rocker arm shafts
 - rocker arms
 - wave washers



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 LIMIT: 11.92 mm (0.469 in)

Measure each rocker arm I.D.

SERVICE LIMIT: 12.05 mm (0.474 in)

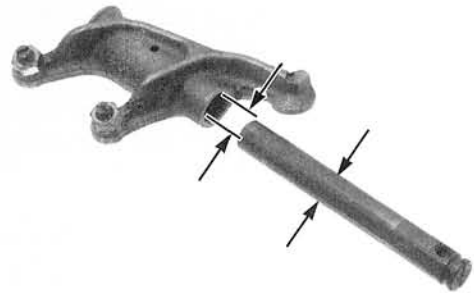
Subtract each rocker arm shaft O.D. from the corresponding rocker arm I.D. to obtain the rocker arm-to-shaft clearance.

SERVICE LIMIT: 0.08 mm (0.003 in)

PUSH ROD

Check the push rods for wear or damage.

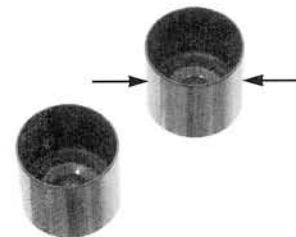
If the push rod is worn or damaged, check the cam follower and camshaft.

**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)

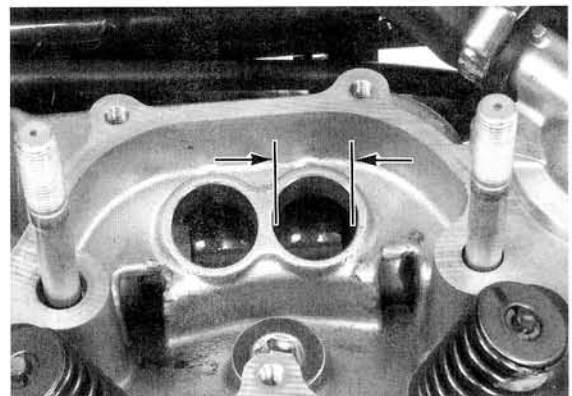


Measure each follower bore I.D.

SERVICE LIMIT: 22.54 mm (0.887 in)

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

SERVICE LIMIT: 0.07 mm (0.003 in)

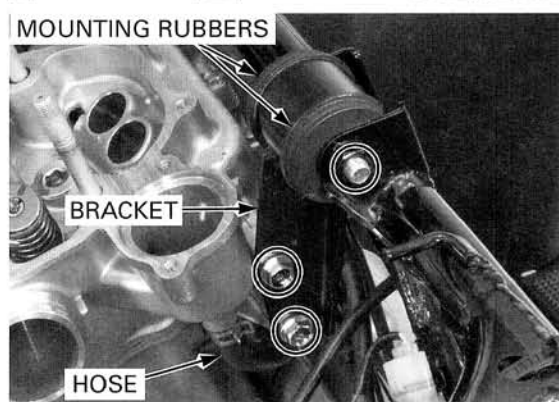
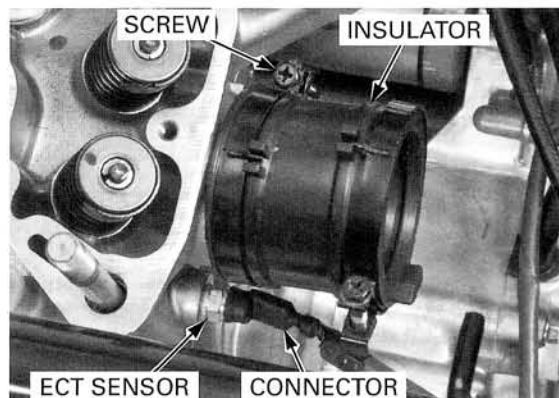


CYLINDER HEAD REMOVAL

Remove the following:

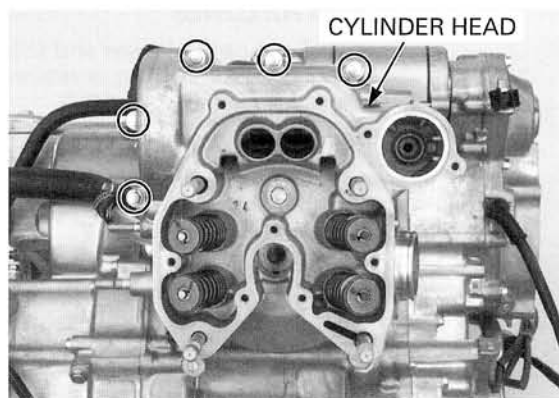
- thermostat (page 6-8)
- carburetor (page 5-6)
- exhaust pipe (page 2-19)
- cylinder head cover (page 8-5)
- spark plug
- carburetor insulator (loosen the band screw)
- connector and engine coolant temperature (ECT) sensor

- bypass hose from the cylinder head
- upper engine hanger bolts
- hanger bracket and mounting rubbers

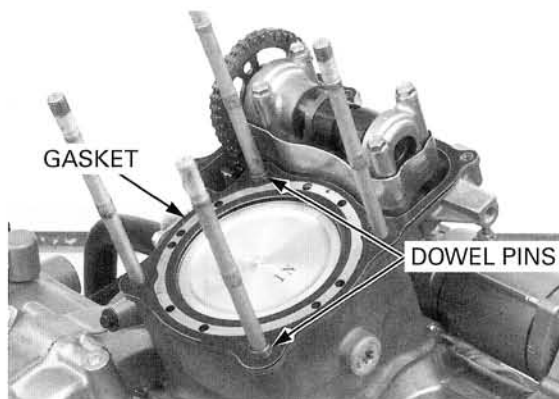


Do not strike the cylinder head too hard and do not damage the mating surface with a screwdriver.

- five bolts
- cylinder head



- gasket
- dowel pins

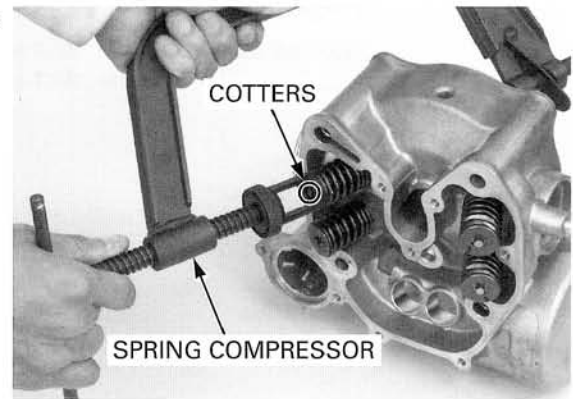


CYLINDER HEAD DISASSEMBLY

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

Remove the valve spring cotters using the valve spring compressor.

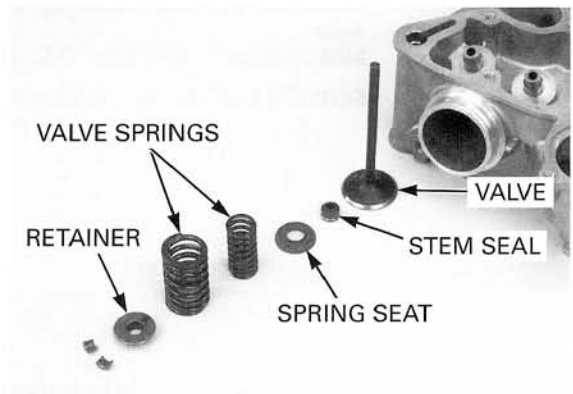
TOOL:
Valve spring compressor **07757-0010000**



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

Remove the following:

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

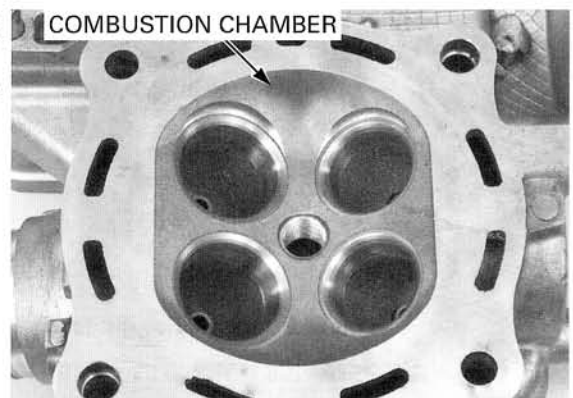


INSPECTION

CYLINDER HEAD

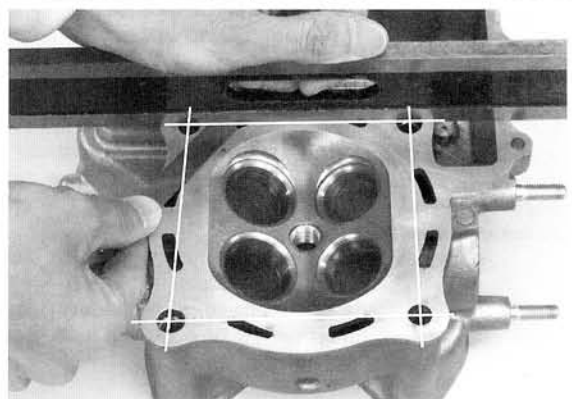
Be careful not to damage the gasket surface.

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: 0.05 mm (0.002 in)

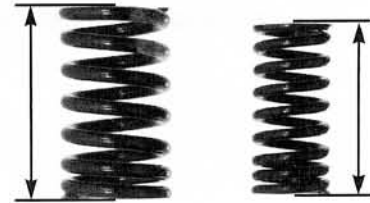


CYLINDER HEAD/VALVE/CAMSHAFT

VALVE SPRING

Measure the valve spring free length.

SERVICE LIMITS: Inner: 36.3 mm (1.43 in)
Outer: 43.1 mm (1.70 in)

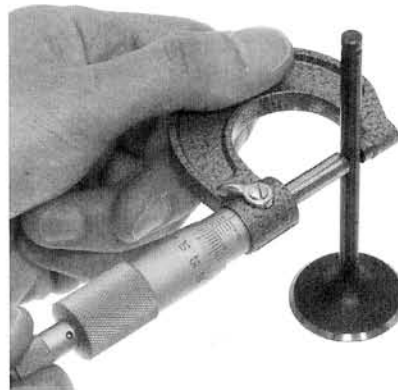


VALVE/VALVE GUIDE

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)

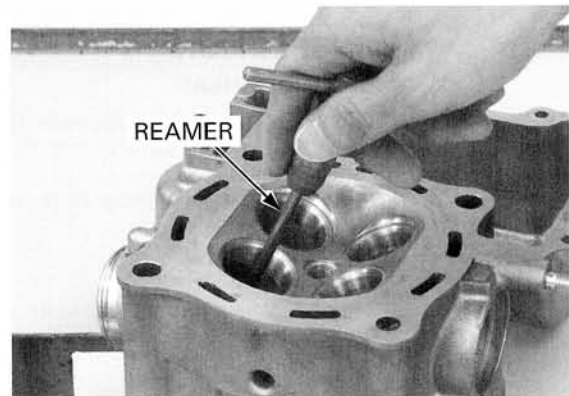


Ream the valve guide to remove any carbon build-up before measuring the guide.

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

TOOLS:

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

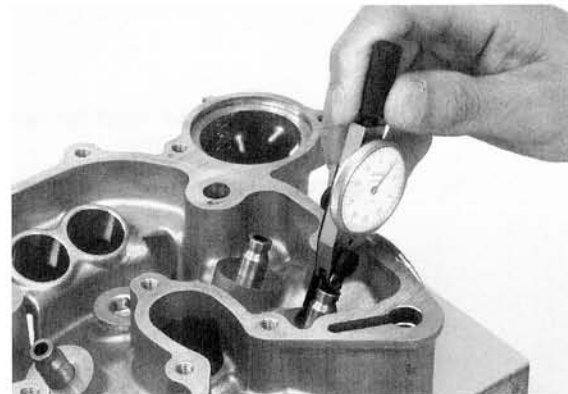


Measure each valve guide I.D. and record it.

SERVICE LIMIT: 5.53mm (0.218 in)

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

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



Inspect and reface the valve seats whenever the valve guides are replaced (page 8-12).

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

Mark new valve guides at the specified height indicated below, using a marker. Chill the new valve guides in a freezer for about an hour.

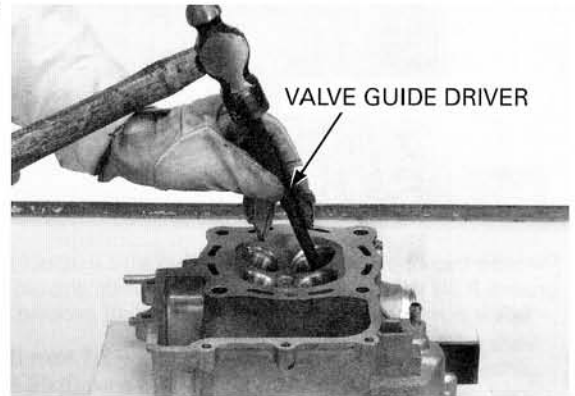
Be sure to wear heavy gloves to avoid burns when handling the heated cylinder head. Using a torch to heat the cylinder head may cause warpage.

Heat the cylinder head to 130°C–140°C (275°F–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 using the special tool.

TOOL:

Valve guide driver, 5.5 mm 07742-0010100



While the cylinder head is still heated, remove the new valve guides from the freezer and drive them into the cylinder head from the rocker arm side until the exposed height is at the specified value (at the mark).

TOOL:

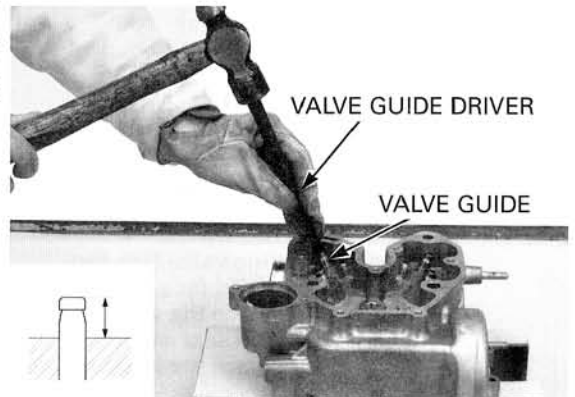
Valve guide driver, 5.5 mm 07742-0010100

VALVE GUIDE PROJECTION:

IN: 14.8 – 15.2 mm (0.58 – 0.60 in)

EX: 17.3 – 17.7 mm (0.68 – 0.70 in)

Let the cylinder head cool to room temperature.



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

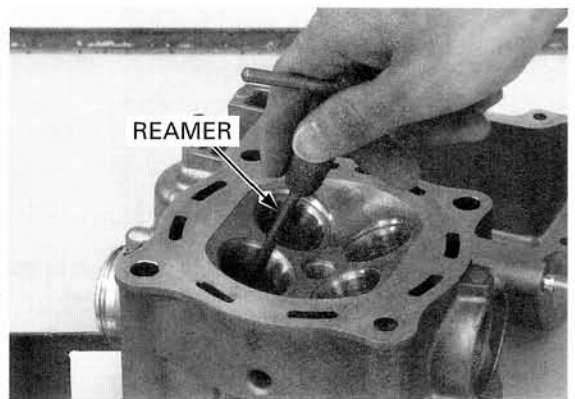
Ream the new valve guides.

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)

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



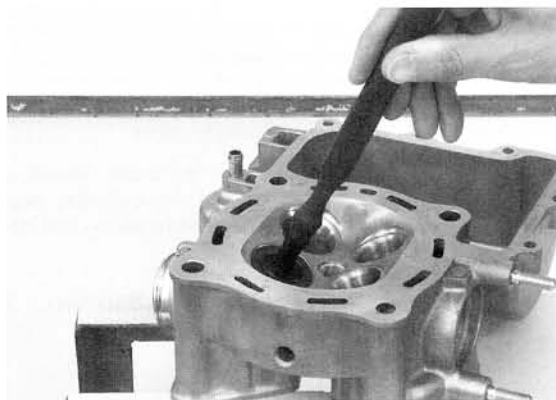
VALVE SEAT INSPECTION/REFACING

INSPECTION

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

Apply a light coat 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.



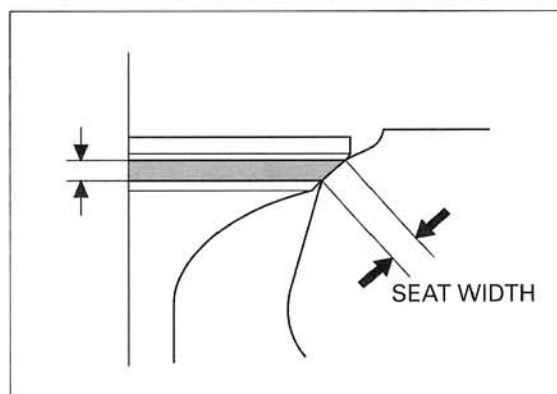
The valve cannot be ground. If the valve face is burned or badly worn or if it contacts the seat unevenly, replace the valve.

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)

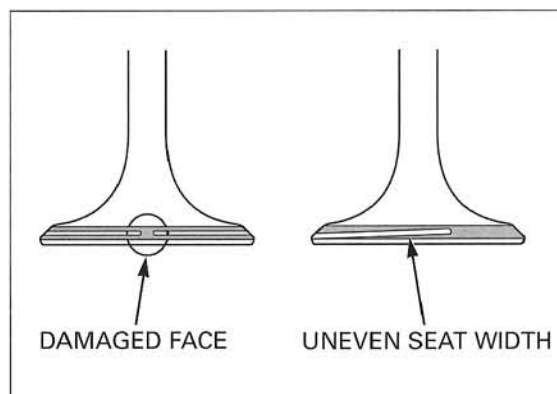
SERVICE LIMIT: 1.4 mm (0.06 in)

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

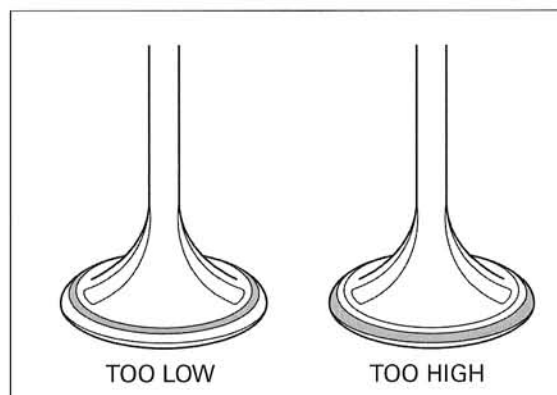


Inspect the valve face for:

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

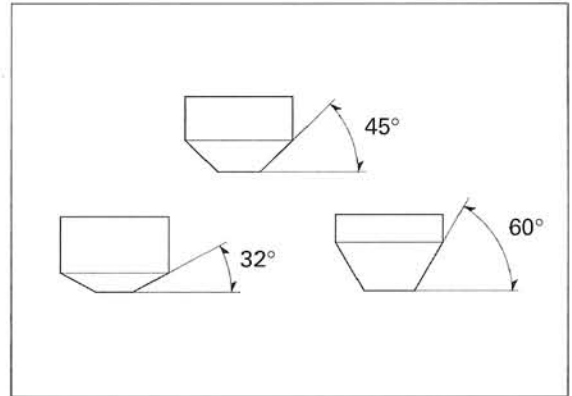


- Contact area (too high or too low)
 - Reface the valve seat.



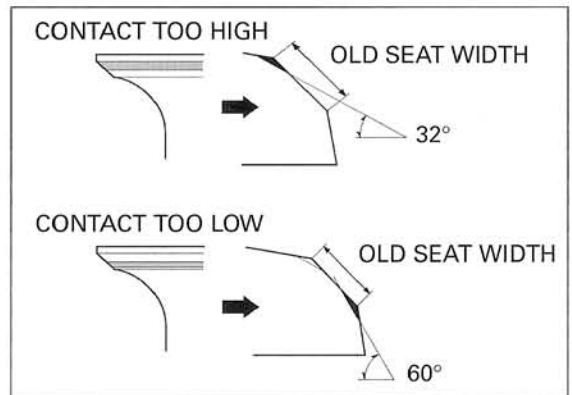
REFACING**NOTE:**

- 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.

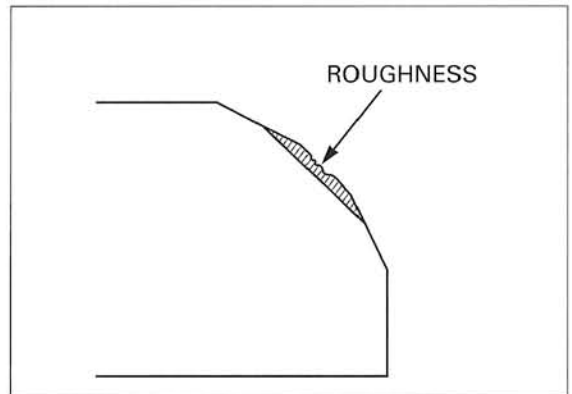


Using a 45° seat cutter, remove any roughness or irregularities from the seat.

TOOLS:

Seat cutter, 35 mm (IN/EX) 07780-0010400
Cutter holder, 5.5 mm 07781-0010101

or equivalent commercially available in U.S.A.

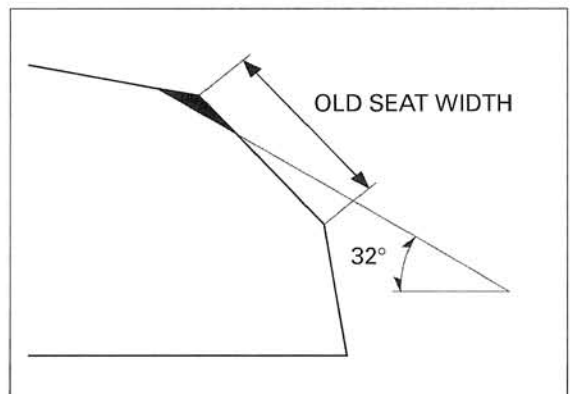


Using a 32° flat cutter, remove 1/4 of the existing valve seat material.

TOOLS:

Flat cutter, 38.5 mm (IN) 07780-0012400
Flat cutter, 35 mm (EX) 07780-0012300
Cutter holder, 5.5 mm 07781-0010101

or equivalent commercially available in U.S.A.



CYLINDER HEAD/VALVE/CAMSHAFT

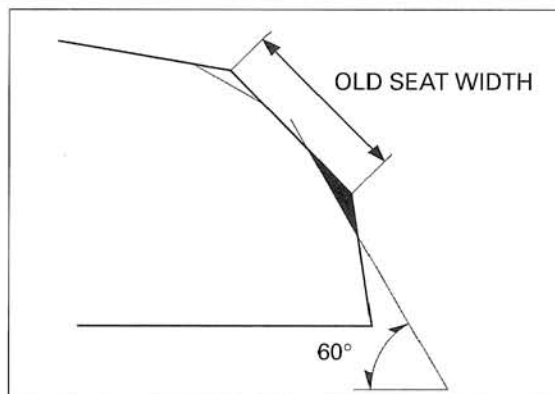
Using a 60° interior cutter, remove 1/4 of the existing valve seat material.

TOOLS:

Interior cutter, 34 mm (IN/EX) 07780-0014700

Cutter holder, 5.5 mm 07781-0010101

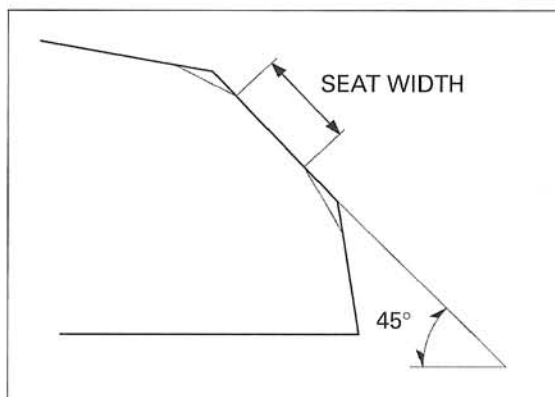
or equivalent commercially available in U.S.A.



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 all pitting and irregularities are removed.

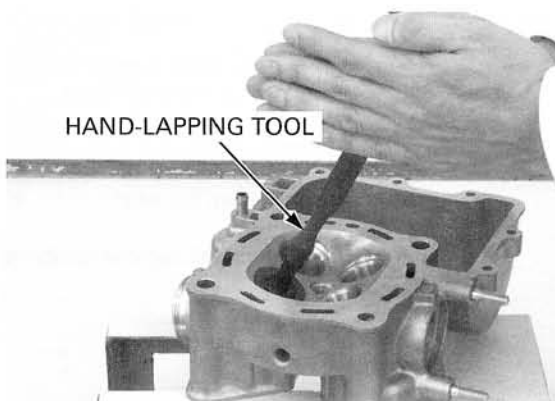


Excessive lapping pressure may deform or damage the seat. Do not allow lapping compound to enter the guides.

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

Change the angle of lapping tool frequently to prevent uneven seat wear.

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



CAMSHAFT REMOVAL

Remove the cylinder head (page 8-8).

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

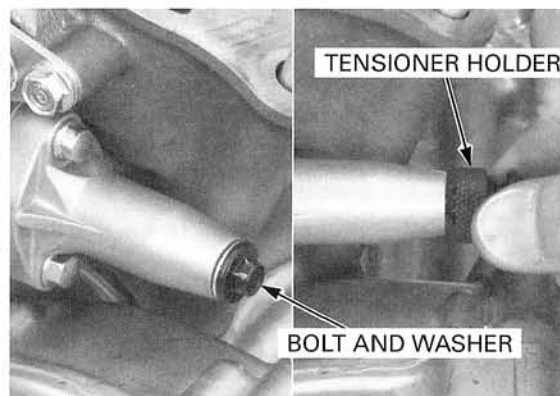
Install the special tool so its blade is into the tensioner lifter and the tabs are just above the slots in the lifter (there should be space between the bottom of tool and lifter body).

Then turn the tool clockwise until it stops turning and engage the tabs with the slots (the lifter shaft is fully secured with the special tool).

TOOL:

Tensioner holder B

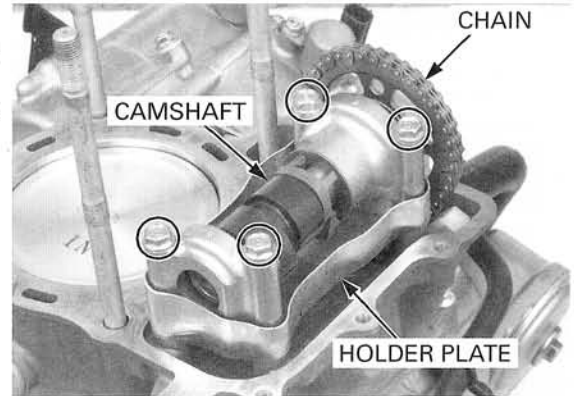
07ZMG-MCAA400



Remove the four camshaft holder bolts.

Suspend the cam chain with a piece of wire to prevent it from falling into the crankcase.

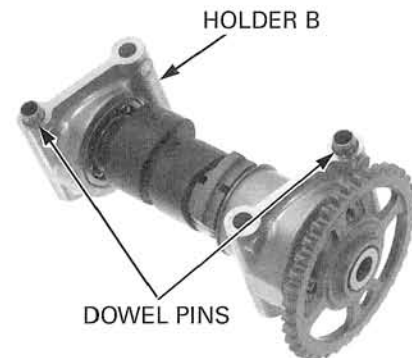
Raise the holder plate so the dowel pins fitted in the camshaft holders are removed off the cylinder. Release the cam chain from the cam sprocket to remove the camshaft assembly and holder plate.



Remove the camshaft holder B from the camshaft assembly.

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

Remove the dowel pins.



For cam chain tensioner lifter inspection, see page 9-7.

INSPECTION

Check the sprocket teeth for wear or damage.

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

Check the cam surfaces for scoring, scratches or evidence of insufficient lubrication.

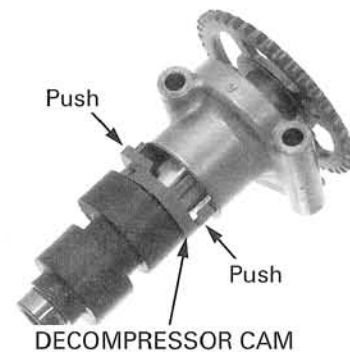
Measure each cam lobe height.

SERVICE LIMITS: IN: 34.775 mm (1.3691 in)
EX: 35.068 mm (1.3806 in)



Check the decompressor cam operation. Press on the decompressor cam as shown.

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

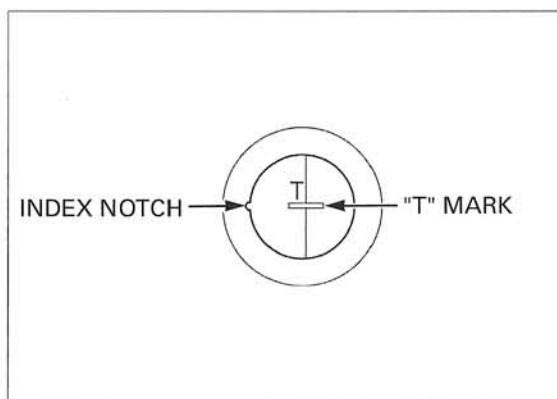


CAMSHAFT INSTALLATION

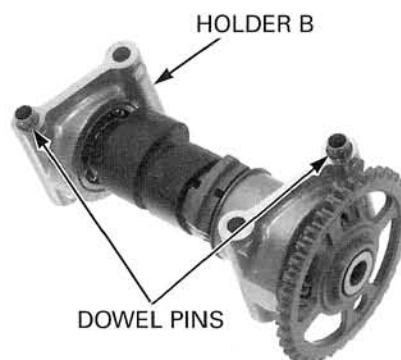
Carefully rotate the crankshaft while holding the cam chain to avoid jamming the cam chain against the timing sprocket of the crankshaft.

Turn the crankshaft clockwise using the recoil starter and align the "T" mark on the flywheel with the index notch in the crankcase cover.

Retract the tensioner lifter shaft and secure it with the stopper tool (page 8-14).



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



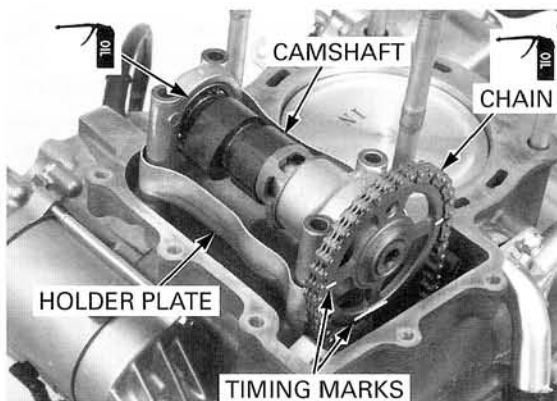
Before installing the camshaft, be sure the cylinder bolt (under the cam shaft) is tightened securely (page 9-9).

Lubricate the camshaft bearings and cam chain with engine oil.

Install the camshaft holder plate onto the camshaft holders, aligning the holes with the dowel pins.

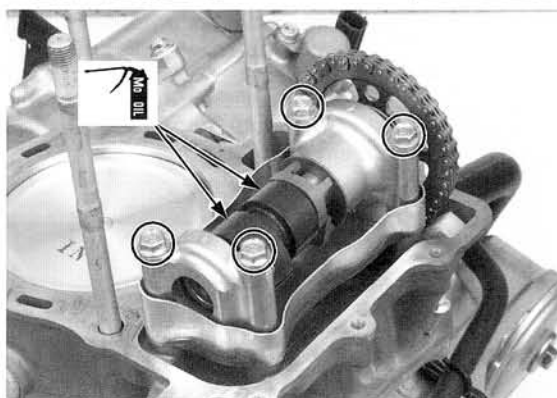
Place the camshaft assembly onto the cylinder and install the cam chain over the sprocket while aligning the timing marks (index lines) on the sprocket with the cylinder top surface and holder plate edge. Locate the dowel pins into the holes in the cylinder securely.

Be sure the timing marks lines up with the cylinder top surface and holder plate edge.



Install the four holder bolts and tighten them.

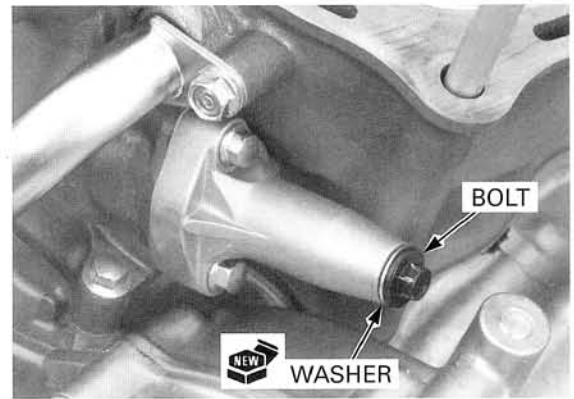
Apply molybdenum oil solution to the cam lobes.



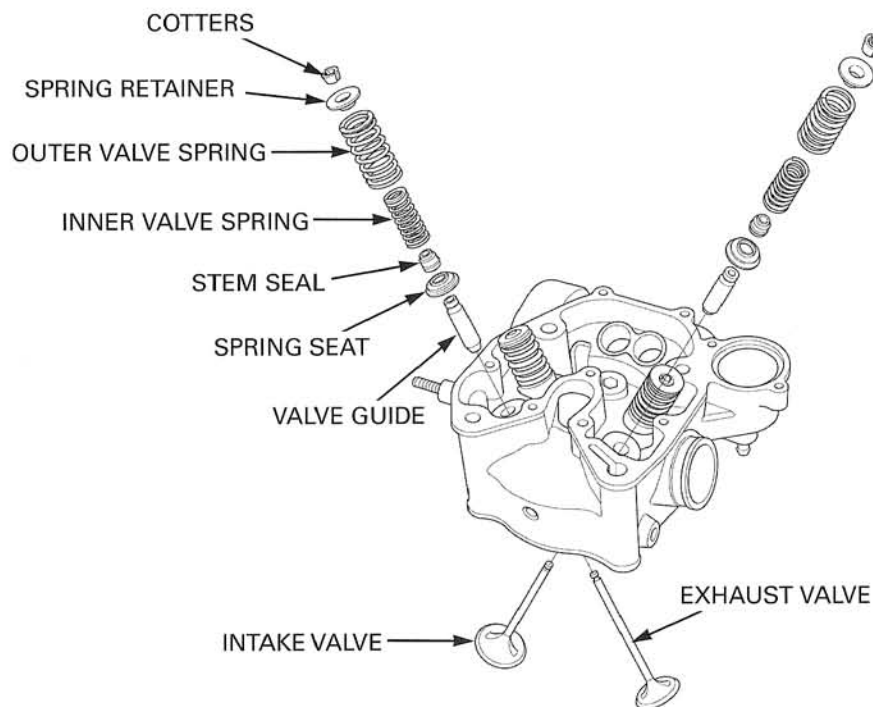
Make sure the timing mark on the sprocket aligns with the cylinder surface when the "T" mark is aligned with the index notch.

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

Install the cylinder head (page 8-18).



CYLINDER HEAD ASSEMBLY

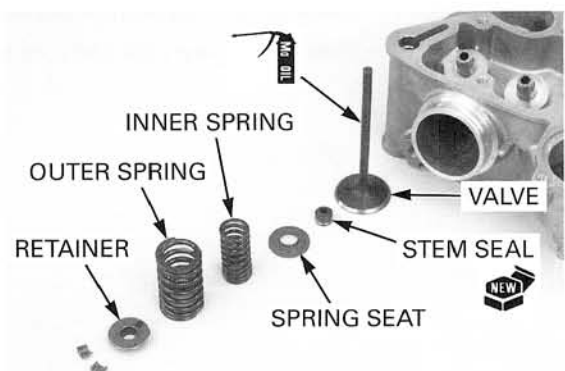


Blow through the oil passage (stud bolt hole) in the cylinder head with compressed air.

Install the valve spring seats and new stem seals.

Lubricate the valve stem sliding surface with molybdenum oil solution.

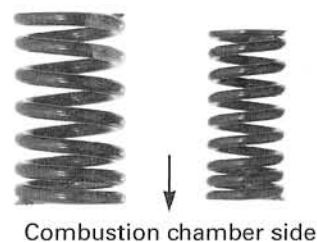
Insert the valve into the guide while turning it slowly to avoid damaging to the stem seal.



CYLINDER HEAD/VALVE/CAMSHAFT

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

Install the spring retainer.

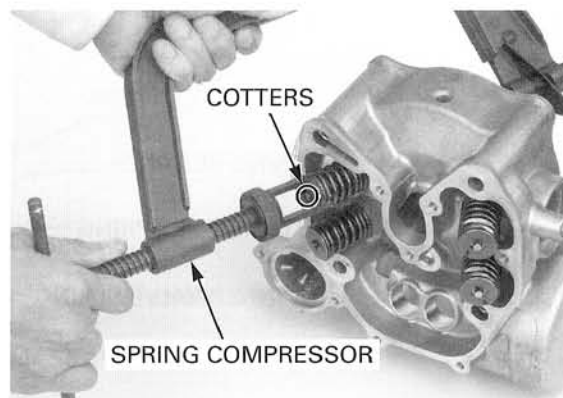


Grease the cotters to ease installation. To prevent loss of tension, do not compress the valve springs more than necessary.

Install the valve cotters using the valve spring compressor.

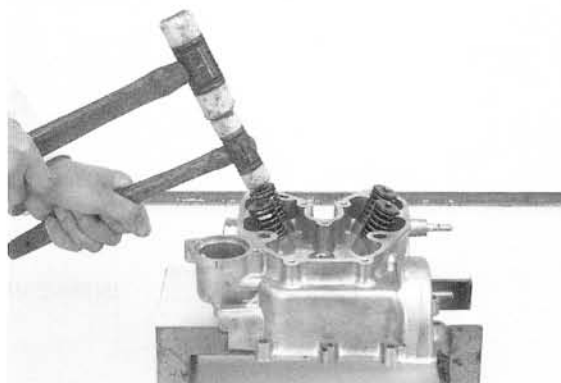
TOOL:

Valve spring compressor 07757-0010000



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

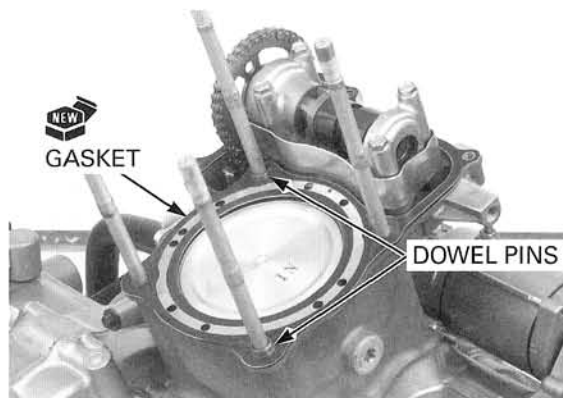
Tap the valve stems gently with two plastic hammers to seat the cotters firmly.



CYLINDER HEAD INSTALLATION

Clean the mating surface of the cylinder and head.

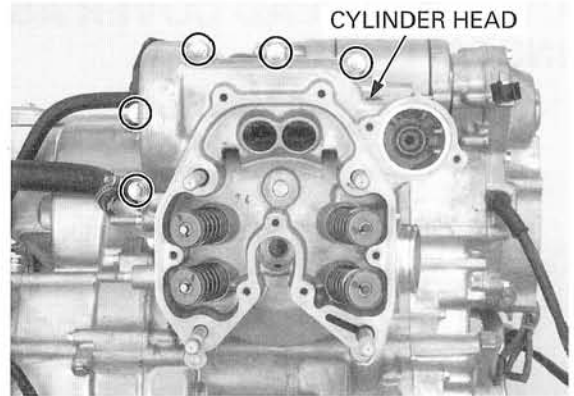
Install the dowel pins and a new gasket.



Install the cylinder head on the cylinder.

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

Install the five bolts and temporarily tighten them.

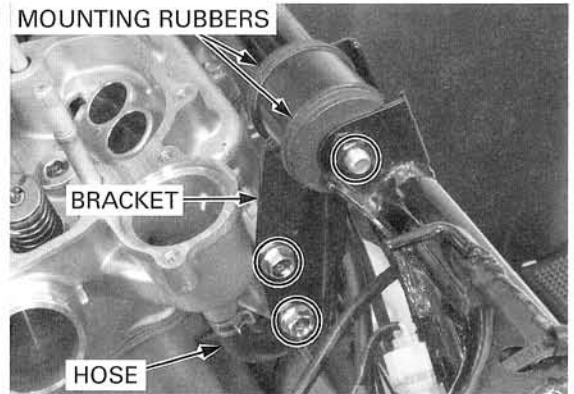


Install the mounting rubbers on the upper engine hanger bushing with the large I.D. side facing in. Install the upper engine hanger bracket and the three hanger bolts.

Tighten the hanger bolts after installing the cylinder head cover.

Temporarily tighten the three bolts.

Connect the bypass hose to the thermostat housing of the cylinder head.



Apply sealant to the ECT sensor threads. Do not apply sealant to the sensor head. Install the ECT sensor and tighten it.

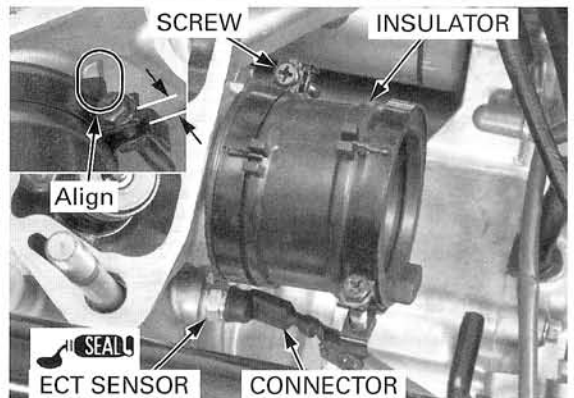
TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

Connect the sensor connector.

Install the carburetor insulator, aligning the groove with the lug on the cylinder head. Tighten the insulator band screw until the band ends clearance is 5.5 mm.

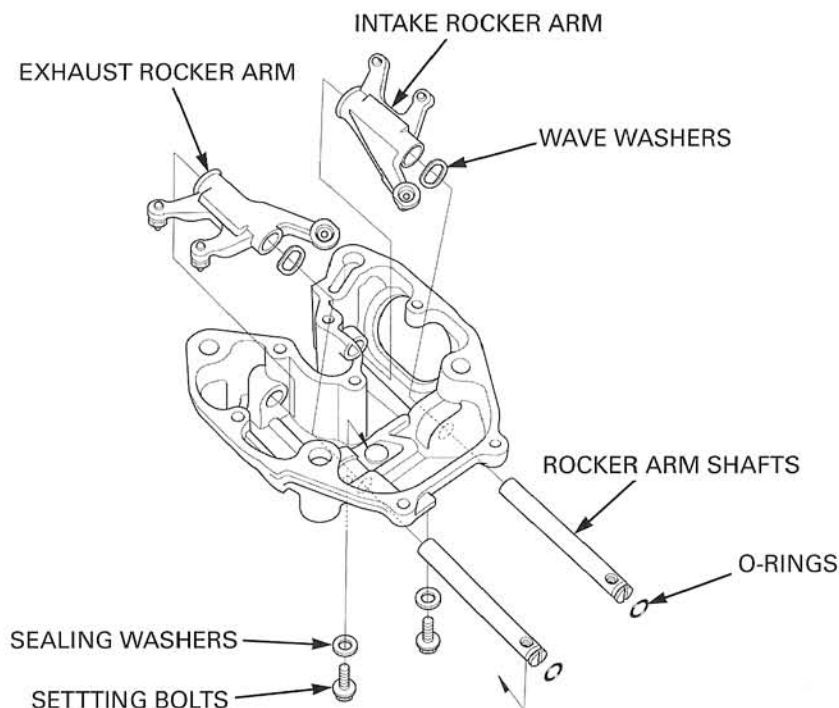
Install the following:

- spark plug (page 3-7)
- cylinder head cover (page 8-20)
- thermostat (page 6-9)
- carburetor (page 5-19)
- exhaust pipe (page 2-19)



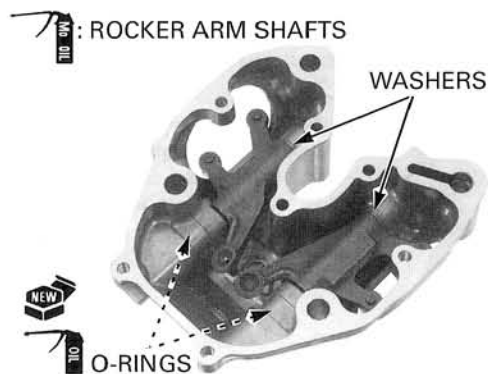
CYLINDER HEAD COVER ASSEMBLY/ INSTALLATION

ASSEMBLY

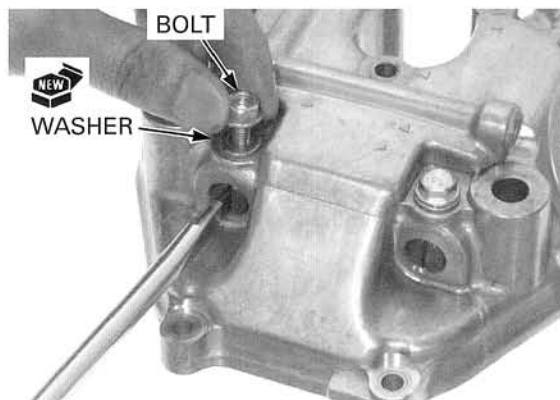


Coat new O-rings with engine oil and install them in each groove on the rocker arm shafts. Apply molybdenum oil solution to the rocker arm shaft sliding surface.

Install the rocker arms, wave washers (setting bolt side) and arm shafts.



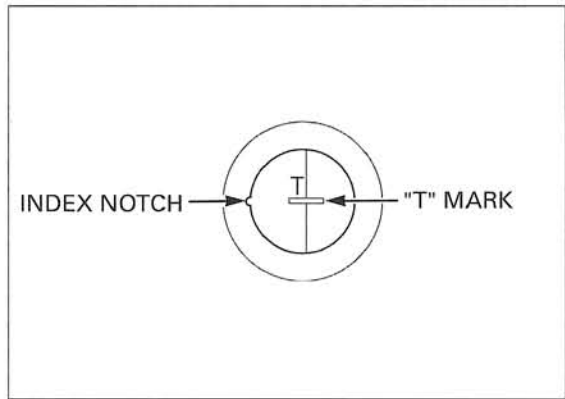
Align the bolt holes in the head cover and rocker arm shaft by turning the shaft. Install the setting bolts with new sealing washers and tighten the bolts securely.



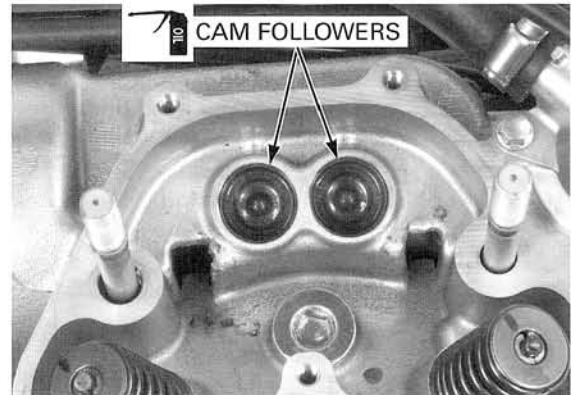
INSTALLATION

Turn the crankshaft using the recoil stater knob and align the "T" mark with the index notch, then check the cam lobes through the cam follower holes.

If the cam lobes face up, rotate the crankshaft one full turn and match up the "T" mark again so the cam lobes face down.

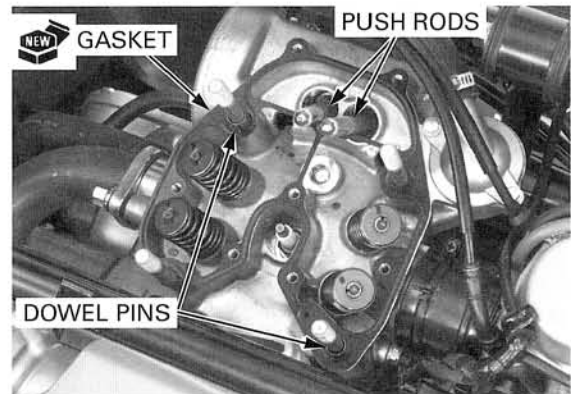


Coat the cam followers with engine oil and install them into the cylinder head.



Install the dowel pins and a new gasket.

Install the push rods in the cam followers and rest them on the gasket cutout as shown.

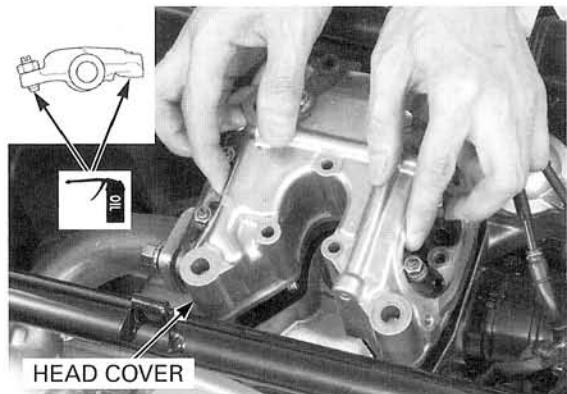


Apply engine oil to the rocker arm followers and adjusting screw tips.

Installing the head cover incorrectly will result in severe engine damage. Do not tighten the head cover fasteners when the rocker arm are not aligned with the push rod end.

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

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



CYLINDER HEAD/VALVE/CAMSHAFT

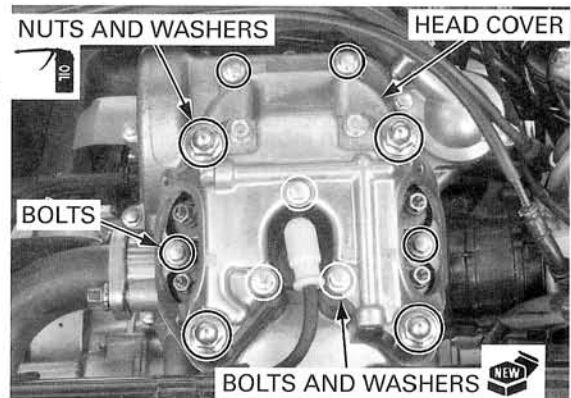
Apply engine oil to the cap nut threads and seating surfaces and install the following fasteners:

- four washers and cap nuts
- three new washers and seven bolts

Tighten the nuts and bolts in a crisscross pattern in several steps.

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

Install the spark plug cap.



If the cylinder and/or cylinder head were removed, tighten the following securely:

- three cylinder bolts
- five cylinder head bolts
- three upper engine hanger bolts

Install the following:

- valve adjusting hole caps and timing hole cap (page 3-9)
- heat guard plate and fuel tank (page 5-22)



9. CYLINDER/PISTON

SYSTEM COMPONENTS 9-2

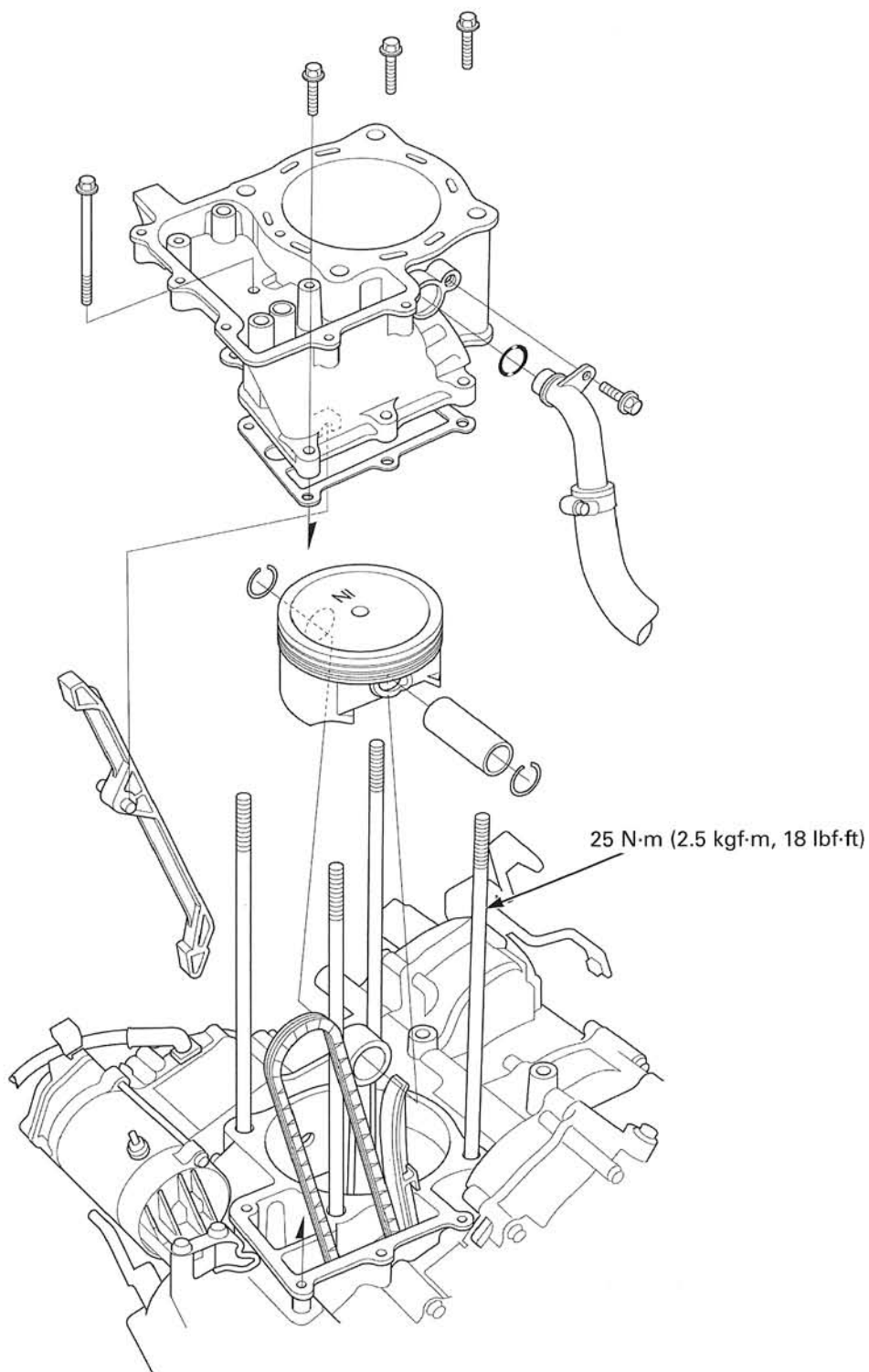
SERVICE INFORMATION 9-3

TROUBLESHOOTING 9-3

CYLINDER/PISTON REMOVAL9-4

CYLINDER/PISTON INSTALLATION9-8

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)

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Cylinder	I.D.		100.000 – 100.015 (3.9370 – 3.9376)	100.05 (3.939)
	Out-of-round		–	0.05 (0.002)
	Taper		–	0.05 (0.002)
	Warpage		–	0.05 (0.002)
Piston, piston pin, piston ring	Piston O.D. at 15 (0.6) from bottom		99.960 – 99.990 (3.9354 – 3.9366)	99.86 (3.931)
	Piston pin hole I.D.		23.002 – 23.008 (0.9056 – 0.9058)	23.03 (0.907)
	Piston pin O.D.		22.994 – 23.000 (0.9053 – 0.9055)	22.98 (0.905)
	Piston-to-piston pin clearance		0.002 – 0.014 (0.0001 – 0.0006)	0.04 (0.002)
	Piston ring end gap	Top	0.25 – 0.35 (0.010 – 0.014)	0.5 (0.02)
		Second	0.40 – 0.55 (0.016 – 0.022)	0.7 (0.03)
		Oil (side rail)	0.20 – 0.70 (0.008 – 0.028)	0.9 (0.04)
	Piston ring-to-ring groove clearance	Top	0.045 – 0.080 (0.0018 – 0.0031)	0.095 (0.0037)
		Second	0.025 – 0.060 (0.0010 – 0.0024)	0.075 (0.0030)
Cylinder-to-piston clearance			0.010 – 0.055 (0.0004 – 0.0022)	0.19 (0.007)
Connecting rod small end I.D.			23.030 – 23.050 (0.9067 – 0.9075)	23.06 (0.908)
Connecting rod-to-piston pin clearance			0.030 – 0.056 (0.0012 – 0.0022)	0.08 (0.003)

TORQUE VALUES

Cylinder stud bolt

See page 9-7

TROUBLESHOOTING

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

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

Compression too high, overheating or knocking

- Excessive carbon 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

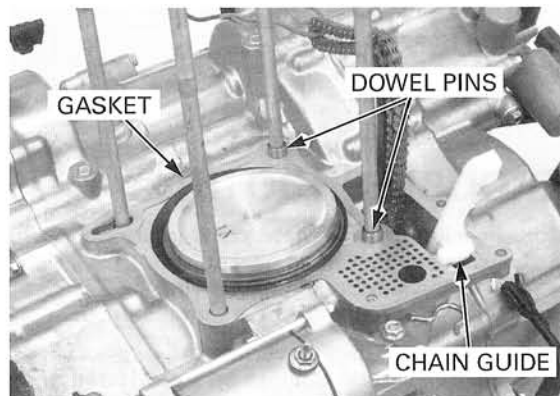
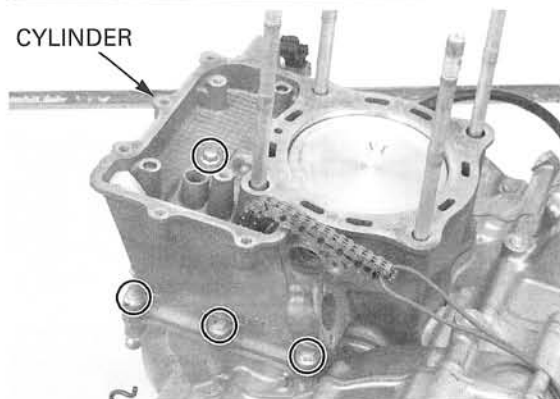
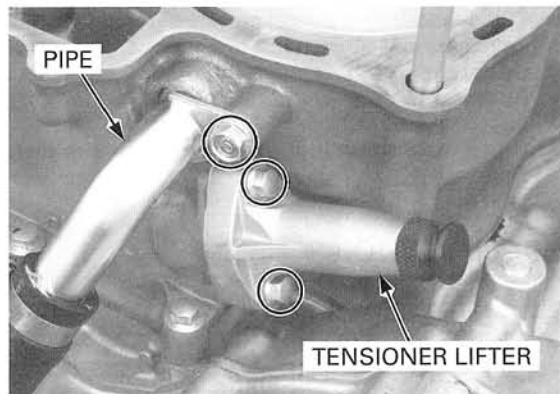
CYLINDER/PISTON REMOVAL

CYLINDER REMOVAL

Remove the camshaft (page 8-14).

Remove the following:

- two bolts and cam chain tensioner lifter
- gasket
- bolt and water pipe
- O-ring



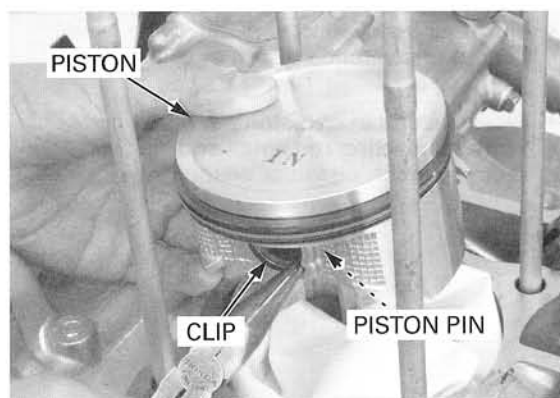
- four bolts
- cylinder
- cam chain guide
- gasket
- dowel pins

PISTON REMOVAL

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

Remove the piston pin clips with pliers.

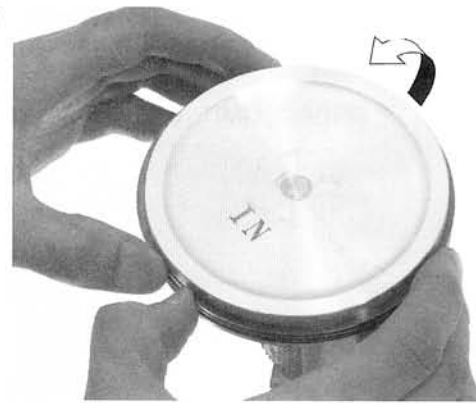
Push the piston pin out of the piston and connecting rod, and remove the piston.



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

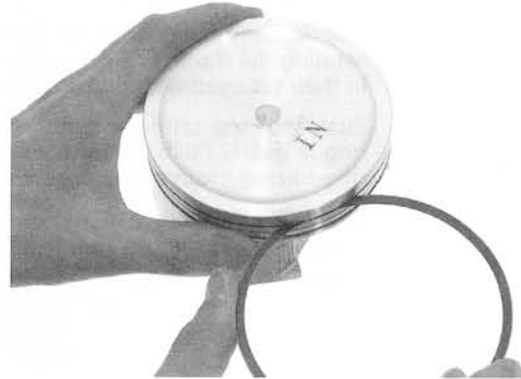
Do not damage the piston ring by spreading the end too far.

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



Never use a wire brush; it will scratch the groove.

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



INSPECTION

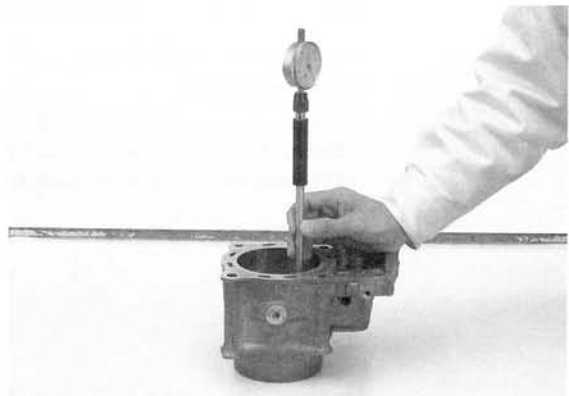
CYLINDER

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

SERVICE LIMIT: 100.05 mm (3.939 in)

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

SERVICE LIMIT: 0.19 mm (0.007 in)

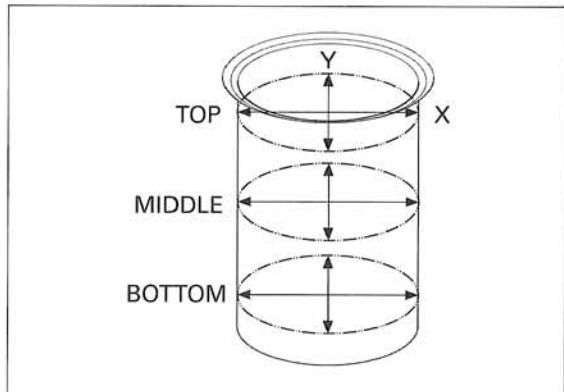


Calculate the cylinder taper and out-of-round at three levels in an X and Y axis. Take the maximum reading to determine the taper and out-of-round.

SERVICE LIMITS:

Taper: 0.05 mm (0.002 in)

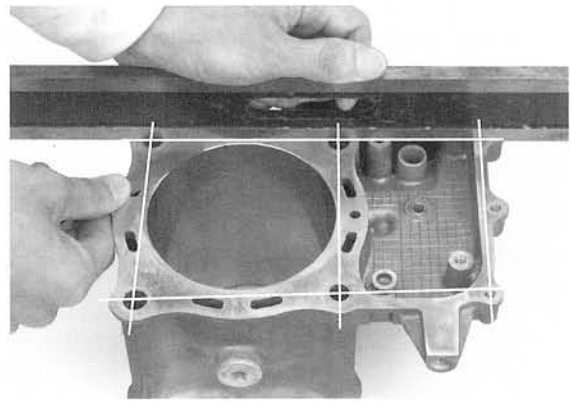
Out of round: 0.05 mm (0.002 in)



CYLINDER/PISTON

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

SERVICE LIMIT: 0.05 mm (0.002 in)



PISTON/PISTON RING

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

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

SERVICE LIMITS:

Top: 0.095 mm (0.0037 in)

Second: 0.075 mm (0.0030 in)



Insert the piston ring into the bottom of the cylinder squarely using the piston crown.

Measure the ring end gap.

SERVICE LIMITS:

Top: 0.5 mm (0.02 in)

Second: 0.7 mm (0.03 in)

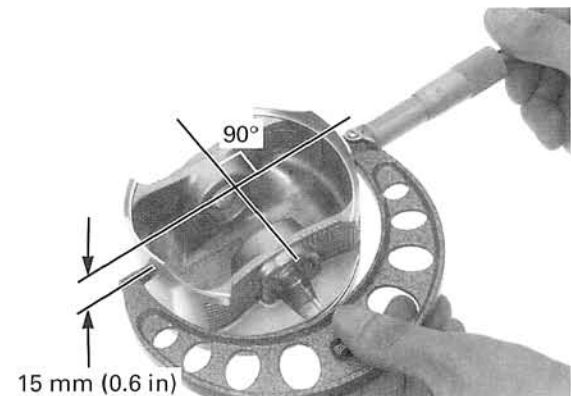
Oil (side rail): 0.9 mm (0.04 in)



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

SERVICE LIMIT: 99.86 mm (3.931 in)

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



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

SERVICE LIMIT: 23.03 mm (0.907 in)

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

SERVICE LIMIT: 22.98 mm (0.905 in)

Calculate the piston-to-piston pin clearance.

SERVICE LIMIT: 0.04 mm (0.002 in)



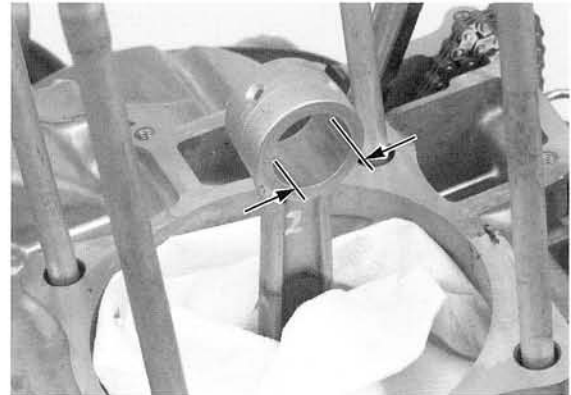
CONNECTING ROD

Measure the connecting rod small end I.D.

SERVICE LIMIT: 23.06 mm (0.908 in)

Calculate the connecting rod-to-piston pin clearance.

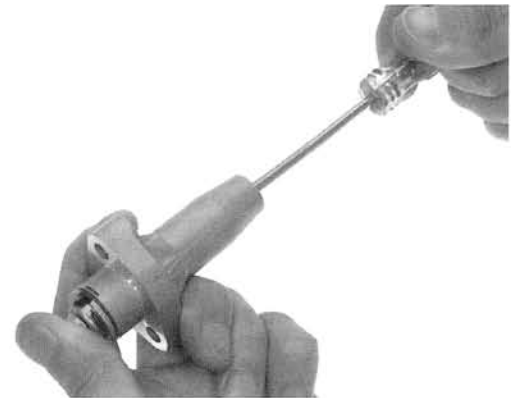
SERVICE LIMIT: 0.08 mm (0.003 in)



CAM CHAIN TENSIONER LIFTER

The lifter shaft should not go into the lifter body when it is pushed.

When the shaft (inside of the body) is turned clockwise with a screwdriver, the lifter shaft should be pulled into the lifter body. The shaft should spring out of the body as soon as the screwdriver is released.



CYLINDER STUD BOLT REPLACEMENT

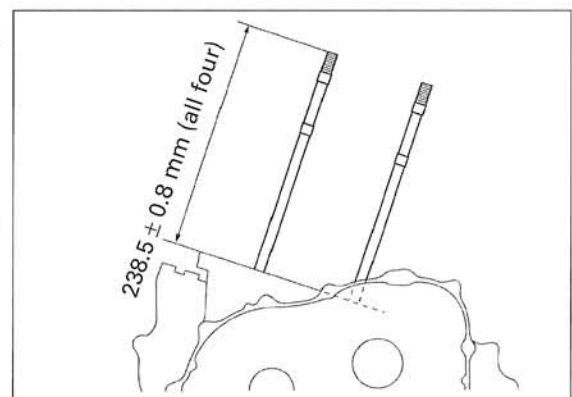
Thread two nuts onto the stud and tighten them together, and use a wrench on them to turn the stud bolt out.

Install a new stud bolt in the direction as shown.

- Front crankcase: 90033-HN8-0000 (Yellow mark on bolt head)
- Rear crankcase: 90032-HN8-0000 (No mark)

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

Adjust the height if necessary.



CYLINDER/PISTON INSTALLATION

PISTON RING INSTALLATION

Be careful not to damage the piston and rings.

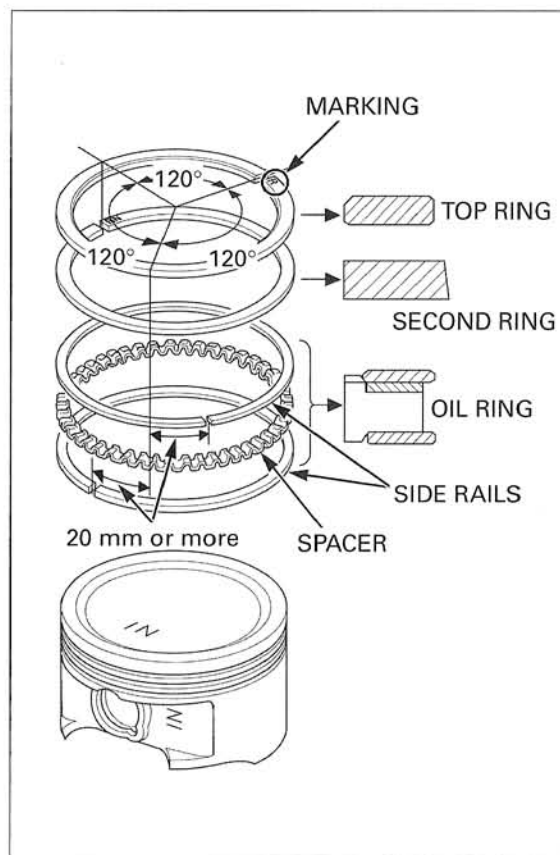
Carefully install the piston rings into the piston ring grooves with the markings facing up.

NOTE:

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

Stagger the piston ring end gaps 120° 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.

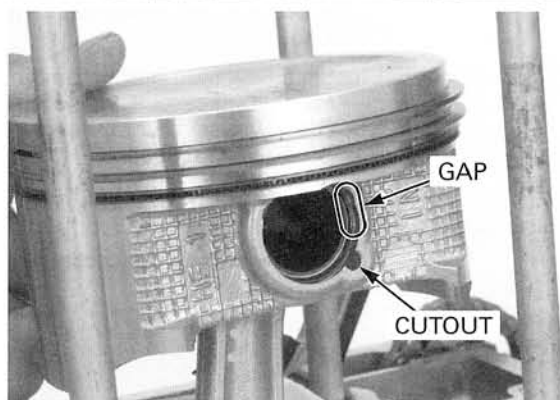
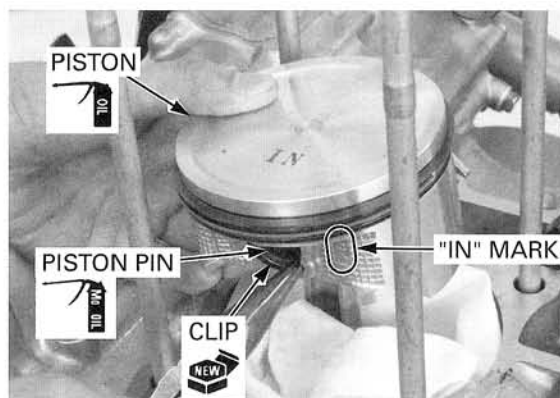
Apply engine oil to the piston pin hole and connecting rod inner surface.

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.

NOTE:

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

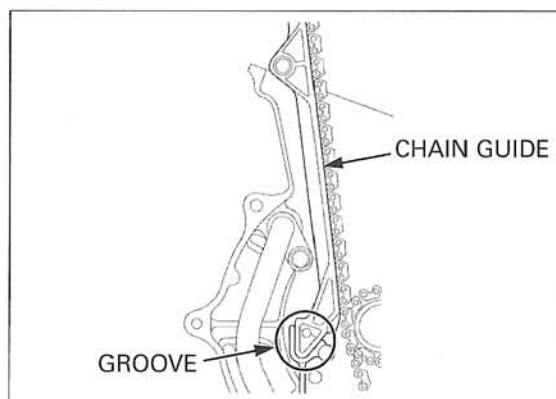


CYLINDER INSTALLATION

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

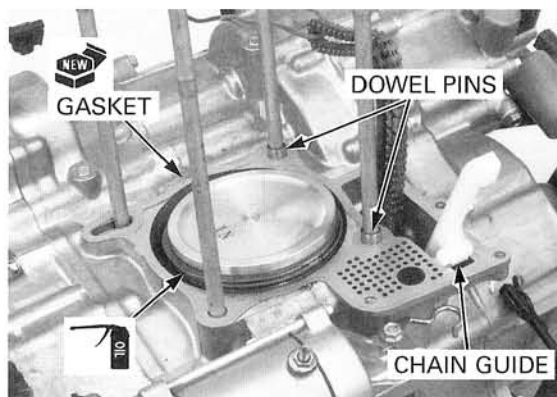
Blow through the oil passage (stud bolt hole) in the cylinder with compressed air.

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



Install the dowel pins and a new gasket.

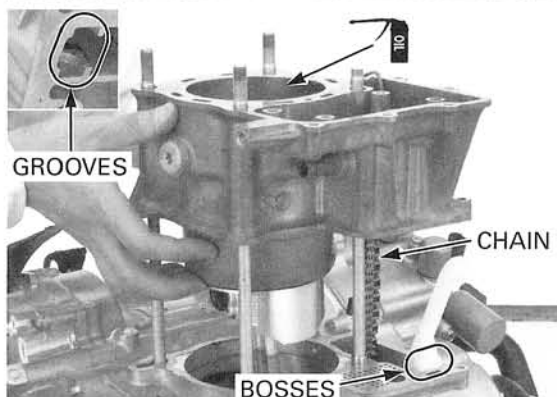
Apply engine oil to the cylinder wall, piston outer surface and piston rings.



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

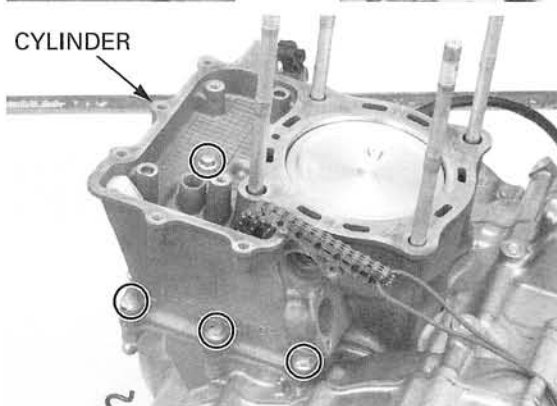
Route the cam chain through the cylinder and install the cylinder over the piston while compressing the piston rings with your fingers.

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



Tighten the three outside bolts again after installing the cylinder head cover.

Make sure that the cylinder touches the crankcase evenly. Install the four cylinder bolts and tighten them securely.

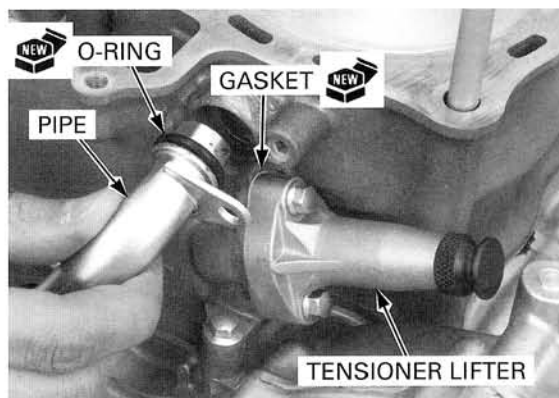


CYLINDER/PISTON

Coat a new O-ring with coolant and install it on the water pipe. Connect the water pipe and secure it with the bolt.

Install the cam chain tensioner lifter with a new gasket and tighten the two mounting bolts.

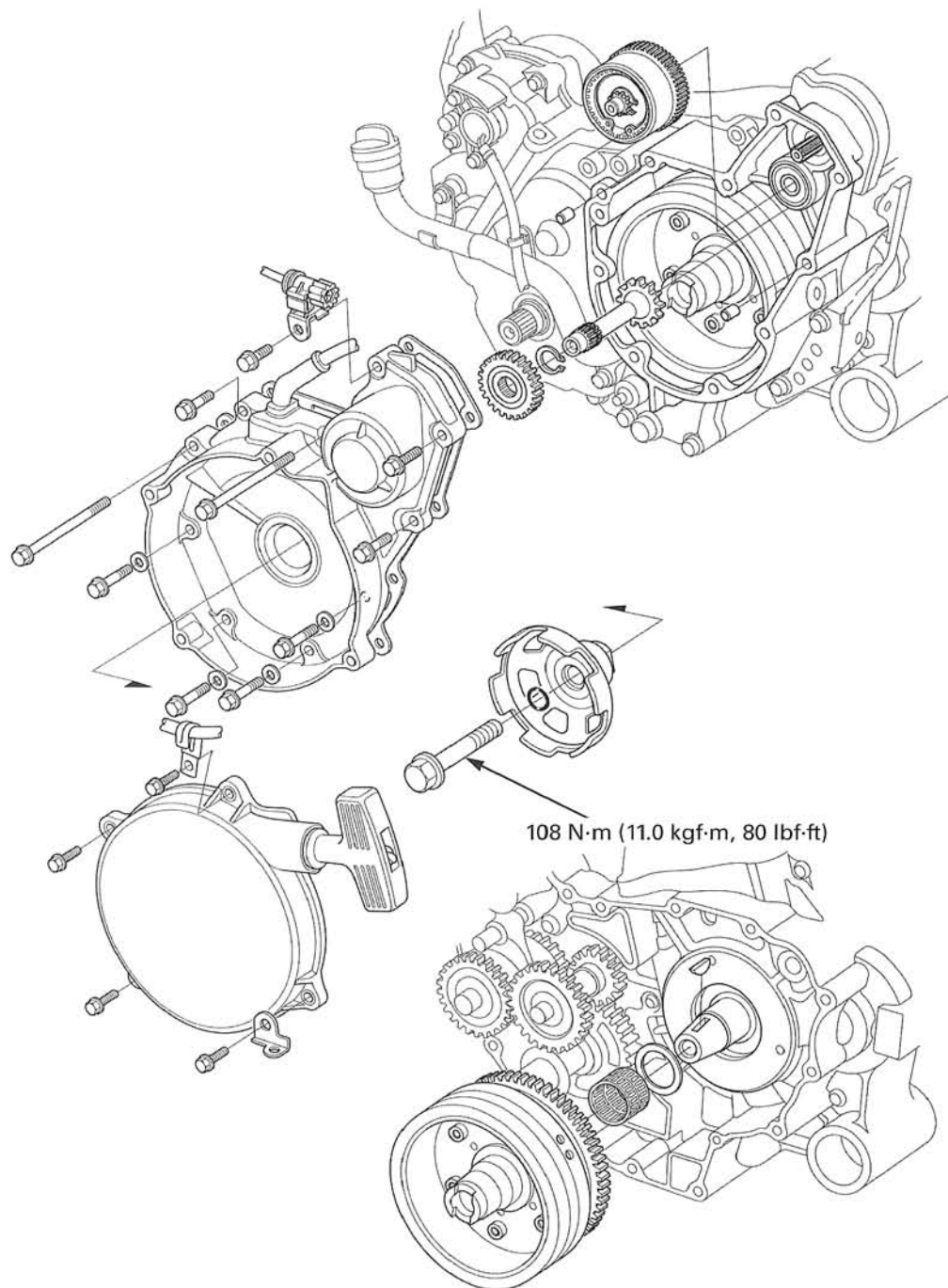
Install the cam shaft (page 8-16).



10. ALTERNATOR/STARTER CLUTCH

SYSTEM COMPONENTS	10-2	RECOIL STARTER.....	10-4
SERVICE INFORMATION	10-3	ALTERNATOR STATOR/STARTER REDUCTION GEARS	10-7
TROUBLESHOOTING	10-3	FLYWHEEL/STARTER CLUTCH.....	10-12

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.
- Crankshaft 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 page 11-5 for rear crankcase cover removal/installation
- Refer to page 19-2 for alternator stator inspection.
- Refer to page 21-2 for starter motor servicing.

SPECIFICATION

Unit: mm (in)

ITEM	STANDARD	SERVICE LIMIT
Starter driven gear boss O.D.	51.705 – 51.718 (2.0356 – 2.0361)	51.61 (2.032)
Torque limiter slip torque	53 – 84 N·m (5.4 – 8.6 kgf·m, 39 – 62 lbf·ft)	–

TORQUE VALUES

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

TOOLS

Driver	07749-0010000
Attachment, 24 x 26 mm	07746-0010700
Attachment, 42 x 47 mm	07746-0010300
Pilot, 10 mm	07746-0040100
Pilot, 30 mm	07746-0040700
Bearing remover head, 10 mm	07936-GE00200 or 07936-GE00A00 (U.S.A. only)
Bearing remover shaft, 10 mm	07936-GE00100 or 07936-GE00A00 (U.S.A. only)
Remover weight	07741-0010201 or 07936-371020A or 07936-3710200 (U.S.A. only)
Flywheel holder	07725-0040000 or equivalent commercially available in U.S.A.
Rotor puller	07733-0020001
Recoil pulley holder	07SMB-HM70100
Torque limiter attachment B	07YMJ-MCF0200
Torque limiter attachment D	070MJ-HN80100 (Newly designed tool)

TROUBLESHOOTING

Starter motor turns, but engine does not turn

- Faulty starter clutch
- Damaged reduction gears or torque limiter

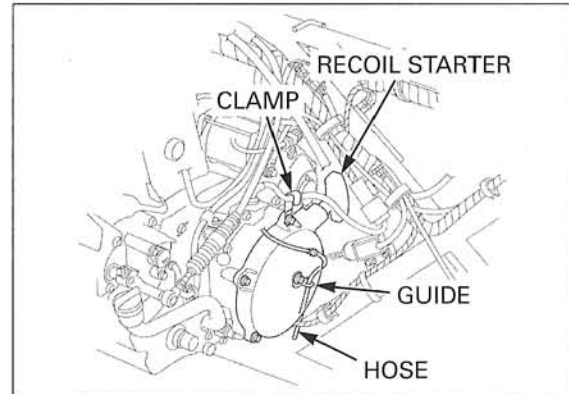
RECOIL STARTER

REMOVAL

Remove the right side cover (page 2-4).

Remove the following:

- carburetor drain hose (from the hose guide)
- four bolts, hose guide and clamp
- recoil starter assembly



STARTER ROPE REPLACEMENT

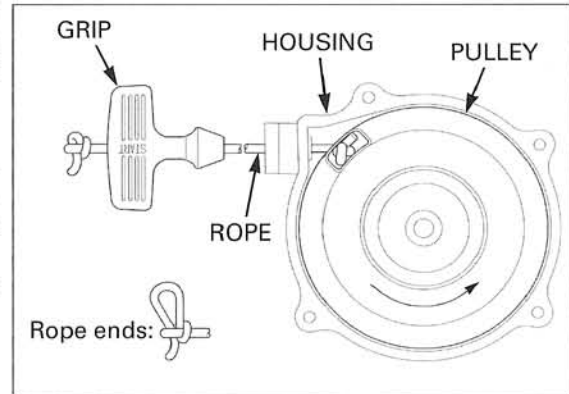
When the rope has broken or the pulley has rewound, align the rope holes by turning the pulley 5-1/2 turns counter-clockwise and hold it.

Pull the starter rope fully to align the rope holes in the drive pulley and housing, and secure the pulley with a vise pliers or equivalent tool to prevent the pulley from rewinding.

Untie the starter rope and remove the rope.

Insert a new starter rope through the pulley, housing and grip, and tie the rope ends in a square knot. Set the pulley side rope end into the cavity as shown.

Carefully release the pulley and check the recoil starter for smooth operation by pulling the grip.

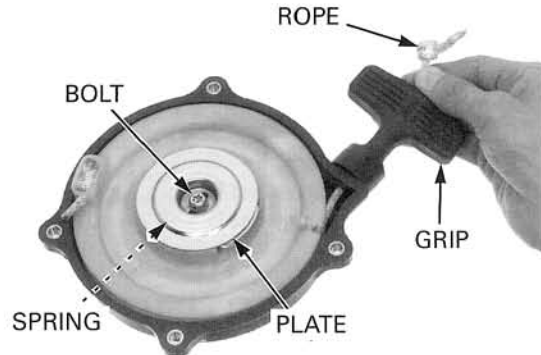


Replace the recoil starter as an assembly.

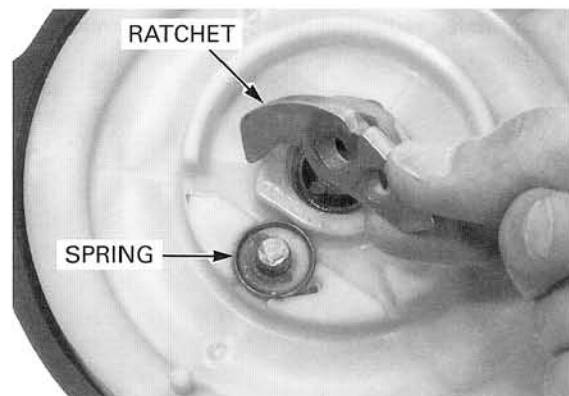
DISASSEMBLY

Untie the starter rope and remove the starter grip to release the starter rope slowly while holding the drive pulley.

Remove the center bolt (T30), and friction plate and spring.

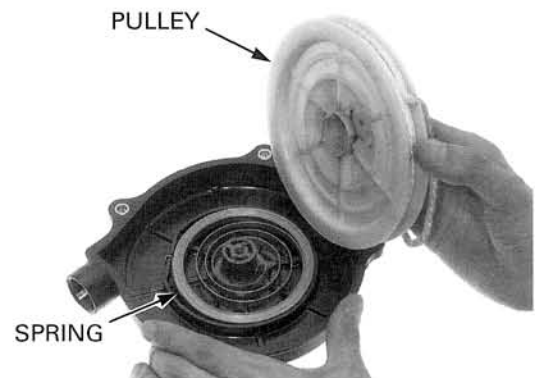


Remove the ratchet and spring.



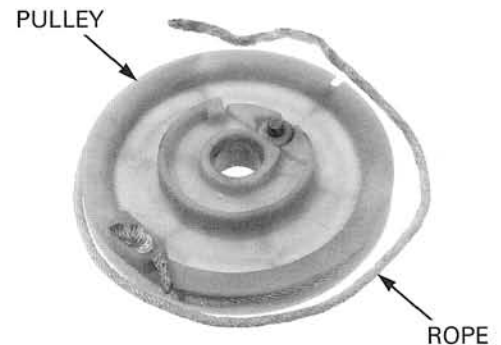
Wear eye protection and use care when removing the drive pulley and starter spring. The spring can pop out of the housing if care is not used.

Carefully remove the starter drive pulley.



Remove the starter rope from the drive pulley.

Check the starter rope for wear or damage.

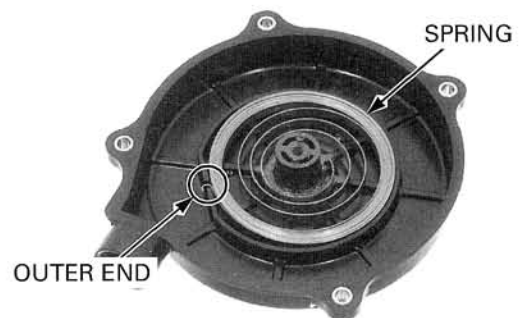


Check the recoil starter spring for damage or broken.

ASSEMBLY

Be sure to wear heavy gloves when installing the spring.

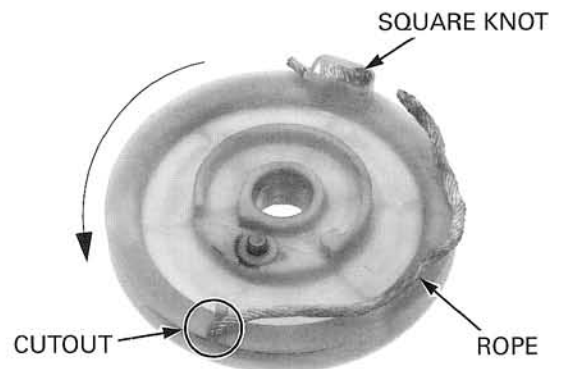
Install the starter spring by hooking the outer end onto the starter housing as shown.



Insert the starter rope into the drive pulley and tie the rope end in a square knot (page 10-4). Set the rope end into the cavity as shown.

Wrap the rope around the pulley in a counterclockwise direction as viewed from the ratchet side as shown.

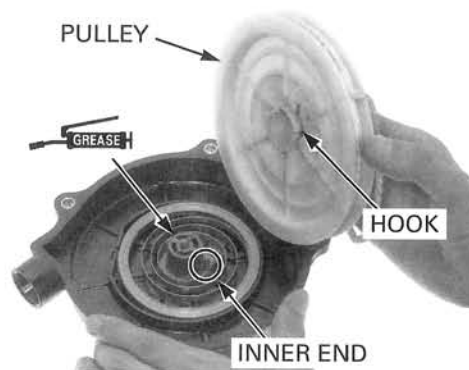
Set the rope into the pulley cutout.



ALTERNATOR/STARTER CLUTCH

Apply grease to the pulley pivot.

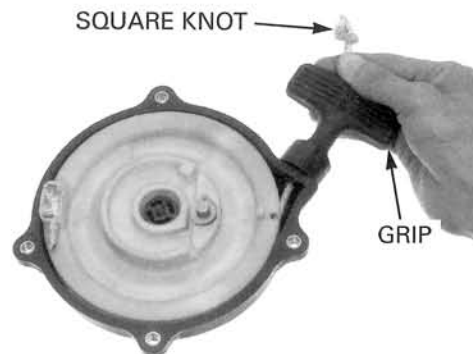
Install the pulley while hooking the inner end of the spring onto the pulley hook.



Preload the starter spring by turning the pulley 2 turns counterclockwise and hold it.

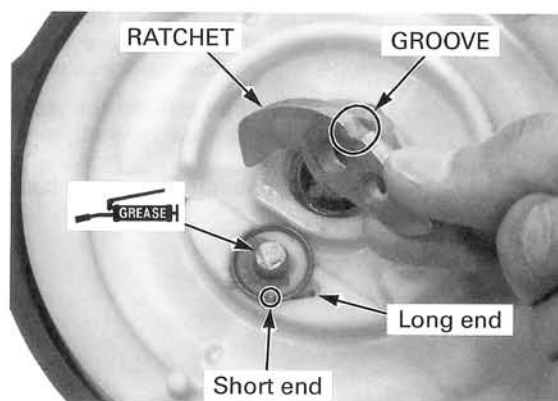


Route the rope end through the starter housing and starter grip holes while the pulley remains held in place. Tie the rope end in a square knot.



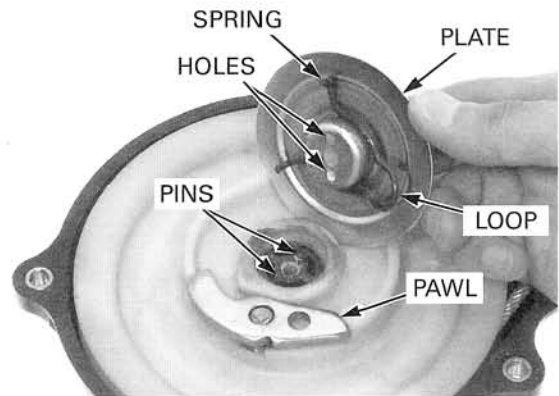
Install the ratchet return spring by inserting the long end into the hole in the pulley.

Apply grease to the ratchet pivot pin. Install the starter ratchet onto the pivot pin while setting the spring short end onto the ratchet groove properly.



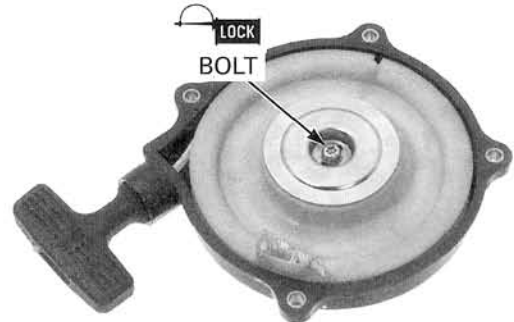
Install the friction spring onto the friction plate with the ends facing the pulley.

Install the friction plate, aligning the holes in the plate with the pins on the pivot boss so the friction spring loop is against the ratchet pawl.



Apply locking agent to the center bolt threads. Install the center bolt and tighten it.

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

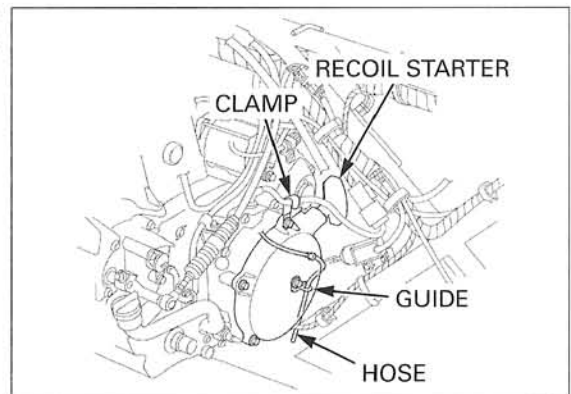


INSTALLATION

Install the recoil starter assembly with the four bolts, hose guide and clamp, and tighten the bolts in a crisscross pattern in several steps.

Secure the alternator wire with the clamp. Insert the carburetor drain hose into the guide.

Install the right side cover (page 2-4).



ALTERNATOR STATOR/STARTER REDUCTION GEARS

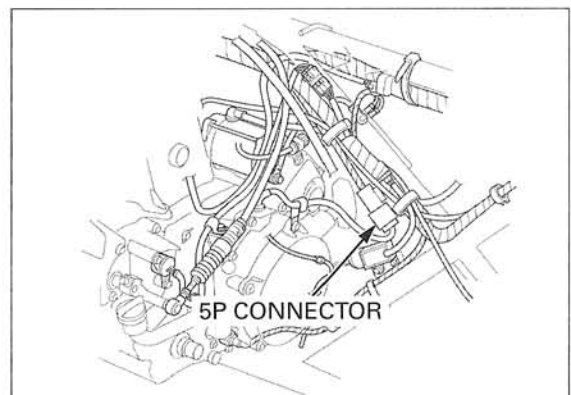
ALTERNATOR COVER REMOVAL

Remove the following:

- air cleaner housing (page 5-5)
- recoil starter (page 10-4)
- engine guard (page 2-16)

Drain the engine oil (page 3-11).

Disconnect the alternator 5P connector.



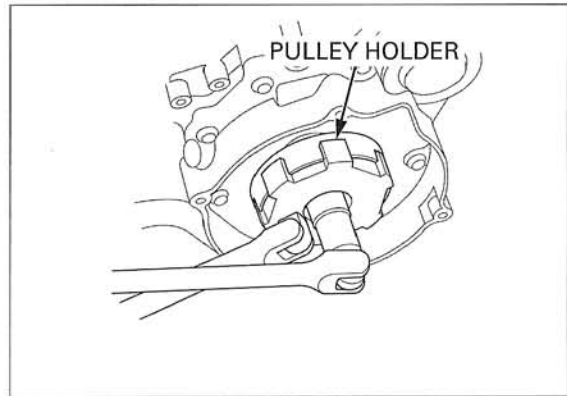
ALTERNATOR/STARTER CLUTCH

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

TOOL:

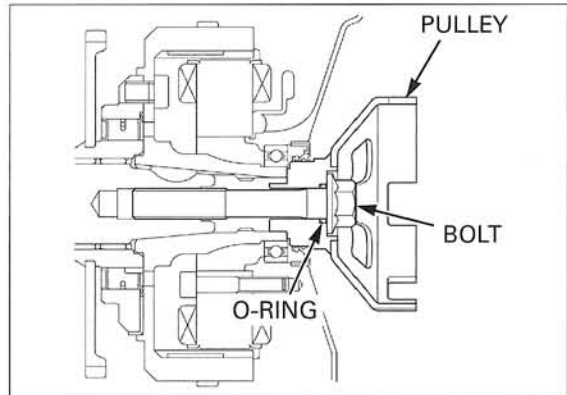
Recoil pulley holder

07SMB-HM70100



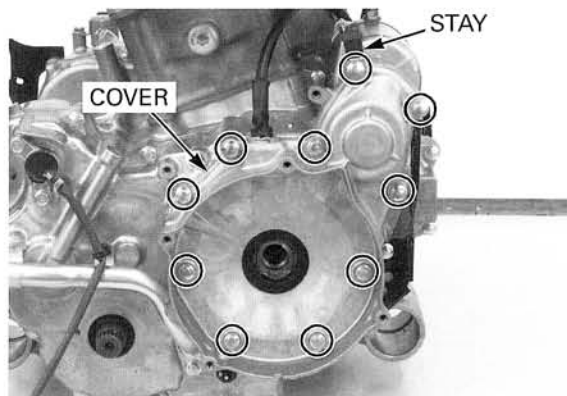
Remove the following:

- bolt and O-ring
- driven pulley

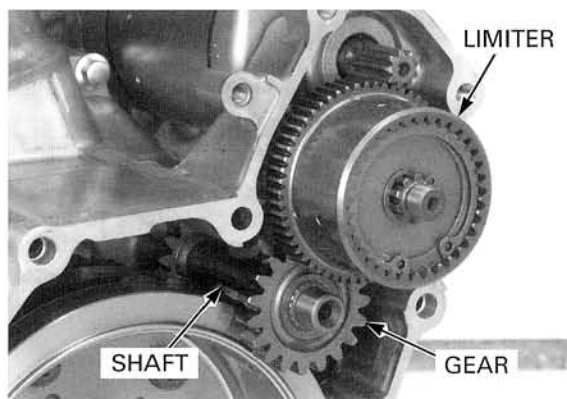


The cover (stator) is magnetically attracted to the fly-wheel, be careful during removal.

- ten bolts and four sealing washers
- clip stay
- alternator cover



- starter torque limiter
- reduction gear
- gear shaft

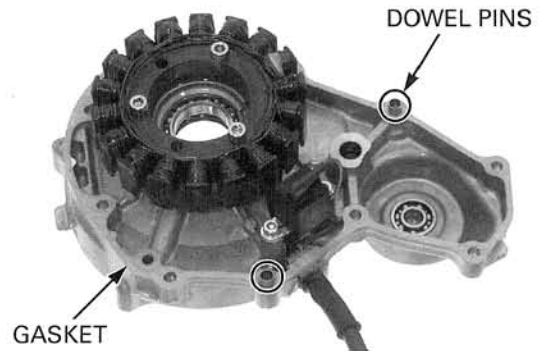


- dowel pins
- gasket

INSPECTION

Check the bearings in the alternator and rear crank-case covers.

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 covers.



Check the teeth of the reduction gears and torque limiter for abnormal wear or damage.



Hold the torque limiter in a vise with the special tool.

Replace the torque limiter as an assembly.

Check the slip torque with the special tool and a torque wrench.

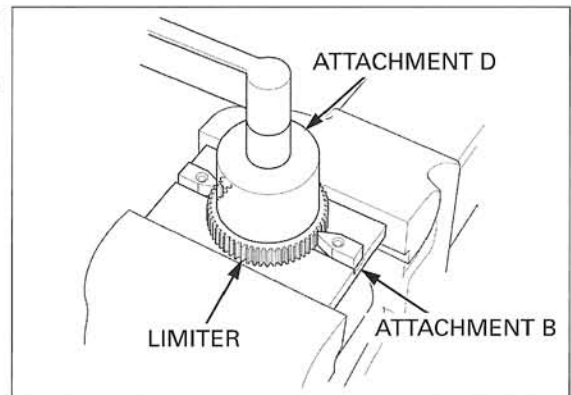
TOOLS:

Torque limiter attachment B 07YMJ-MCF0200

Torque limiter attachment D 070MJ-HN80100

STANDARD SLIP TORQUE:

53 – 84 N·m (5.4 – 8.6 kgf·m, 39 – 62 lbf·ft)



STATOR AND IGNITION PULSE GENERATOR REMOVAL/INSTALLATION

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

Release the wire grommet off the alternator cover. Remove the three bolts and alternator stator.

For bearing replacement, see page 10-10.

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

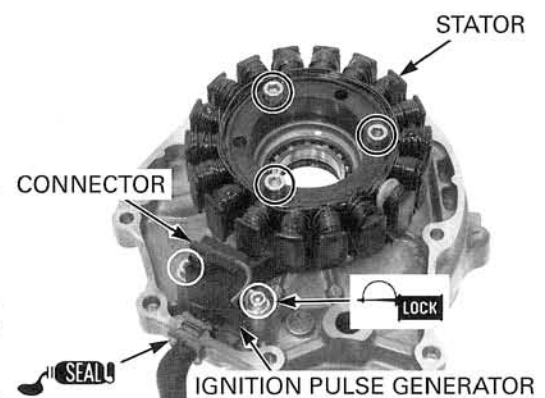
TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

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

Apply locking agent to the 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)



ALTERNATOR/STARTER CLUTCH

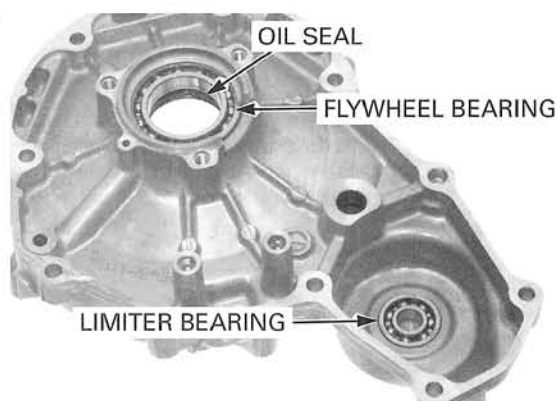
Connect the pulse generator connector.

BEARING REPLACEMENT

Remove the stator and ignition pulse generator (page 10-9).

Remove the driven pulley oil seal.

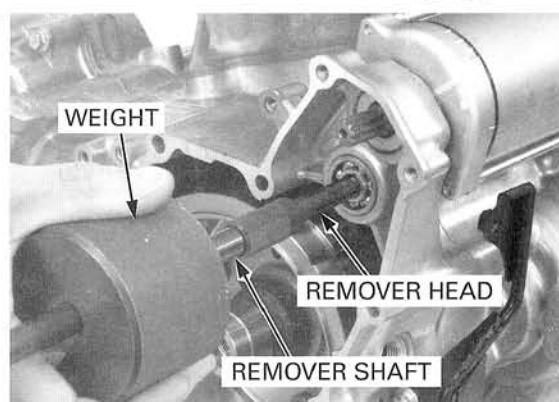
Drive the flywheel bearing out of the alternator cover.



Remove the torque limiter bearings in the alternator and rear crankcase covers, using the special tools.

TOOLS:

Bearing remover head, 10 mm	07936-GE00200
Remover shaft, 10 mm	07936-GE00100 or
Bearing remover, 10 mm	07936-GE00A00
	(U.S.A. only)
Remover weight	07741-0010201 or
	07936-371020A or
	07936-3710200
	(U.S.A. only)



Drive new bearings in with the marks facing up.

TOOLS:

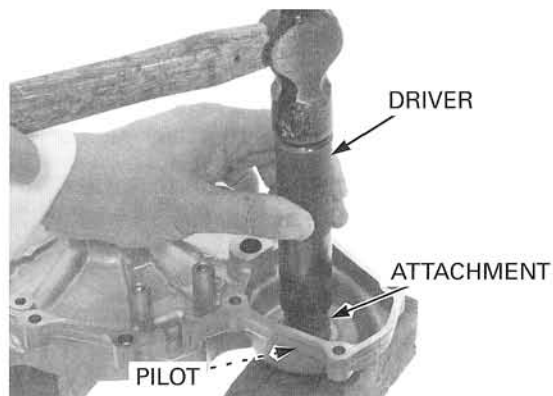
Torque limiter bearing:

Driver	07749-0010000
Attachment, 24 x 26 mm	07746-0010700
Pilot, 10 mm	07746-0040100

Flywheel bearing:

Driver	07749-0010000
Attachment, 42 x 47 mm	07746-0010300
Pilot, 30 mm	07746-0040700

Install the stator and ignition pulse generator (page 10-9).



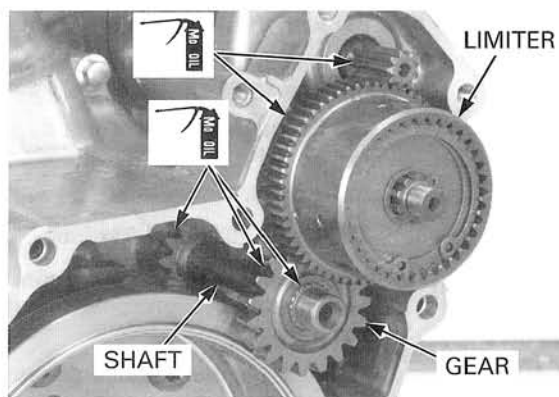
ALTERNATOR COVER INSTALLATION

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

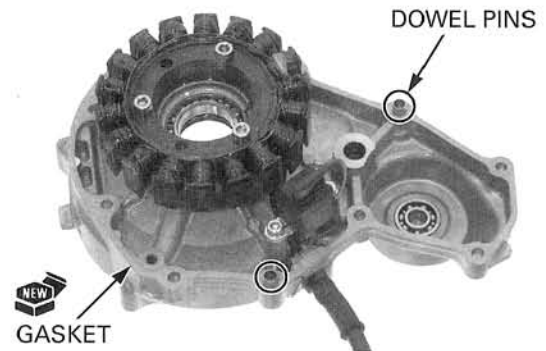
Clean the cover mating surfaces.

Apply molybdenum oil solution to the gear teeth and splines.

Install the reduction gear shaft into the crankcase and the reduction gear onto the gear shaft. Install the torque limiter.



Install the two dowel pins and a new gasket.



The cover (stator) is magnetically attracted to the fly-wheel, be careful not to get anything caught between these parts when installing.

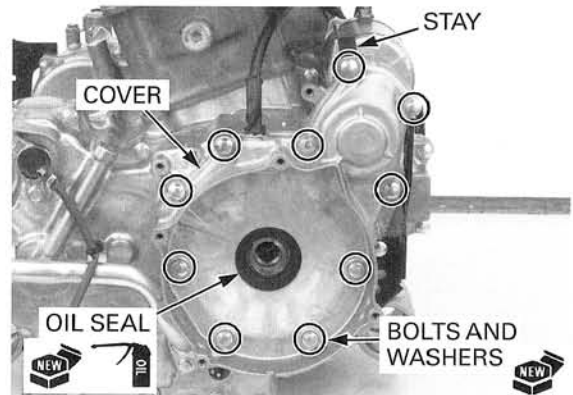
Carefully install the alternator cover.

Install the ten bolts with four new sealing washers and the clip stay, and tighten them in a crisscross pattern in several steps.

NOTE:

- The location for the bolt with sealing washer is marked Δ on the cover (inside of the recoil starter housing).

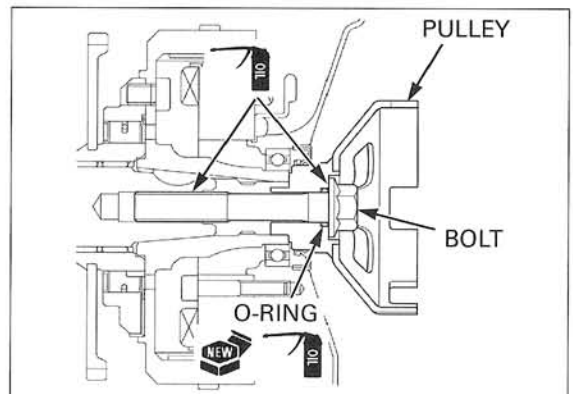
Apply engine oil to the lips of a new oil seal, and install it into the alternator cover until it is seated.



Install the starter driven pulley, aligning the bosses with the grooves in the crankshaft.

Coat a new O-ring with engine oil and install it onto the pulley bolt.

Apply engine oil to the pulley bolt threads and seating surface, and install the bolt.

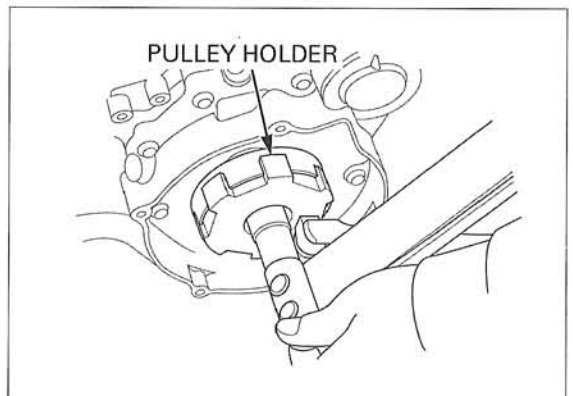


Hold the driven pulley using the special tool and tighten the bolt.

TOOL:

Recoil pulley holder 07SMB-HM70100

TORQUE: 108 N·m (11.0 kgf·m, 80 lbf·ft)



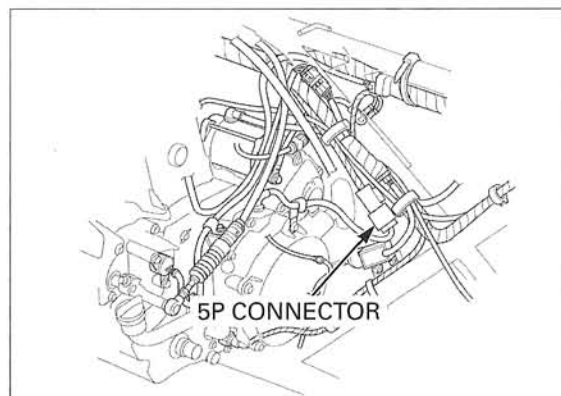
ALTERNATOR/STARTER CLUTCH

Route the wires properly (page 1-21). Connect the alternator 5P connector.

Install the following:

- recoil starter (page 10-7)
- air cleaner housing (page 5-5)
- engine guard (page 2-16)

Fill the engine with recommended oil (page 3-11).



FLYWHEEL/STARTER CLUTCH

REMOVAL

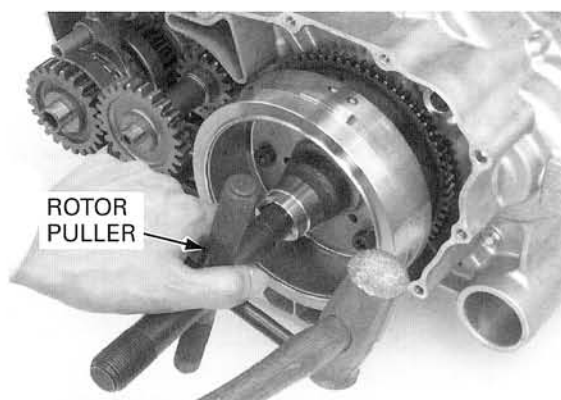
Remove the rear crankcase cover (page 11-5).

Remove the flywheel and starter driven gear using the special tool.

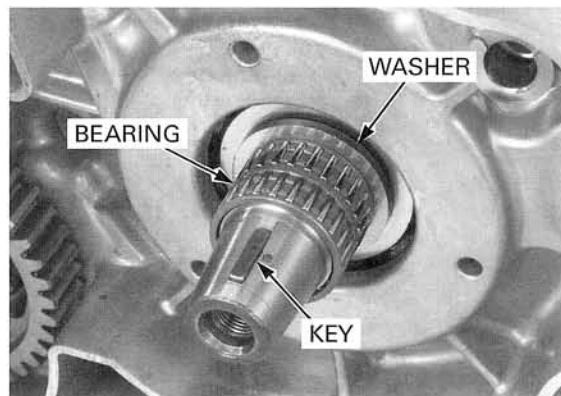
TOOL:

Rotor puller

07733-0020001



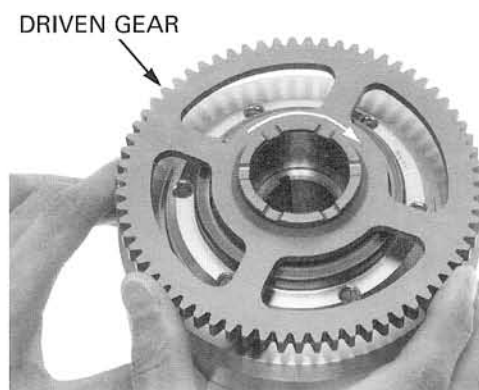
Remove the needle bearing and thrust washer, and the woodruff key.



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.



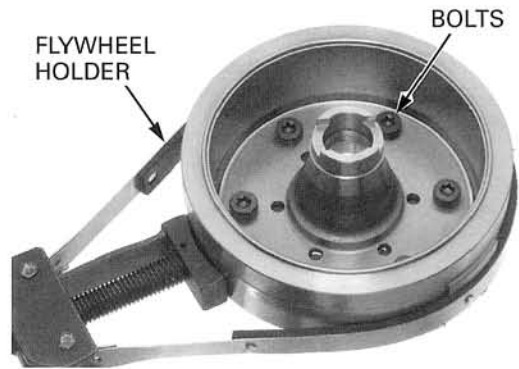
Hold the flywheel with the special tool and remove the starter clutch bolts (T40).

TOOL:

Flywheel holder

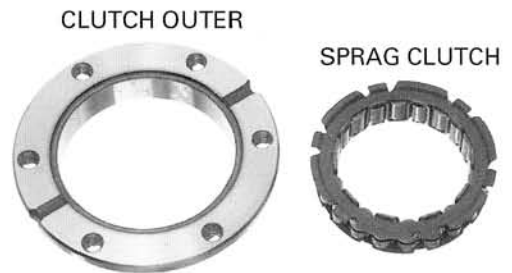
07725-0040000 or
equivalent commercially available in
U.S.A.

Remove the starter clutch assembly from the flywheel.



Remove the sprag clutch from the clutch outer.

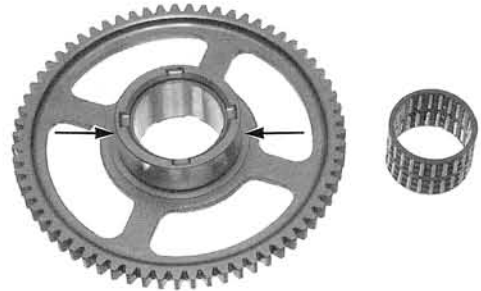
Check the clutch outer and sprag clutch for abnormal wear or damage.



Check the starter driven gear teeth and needle bearing for wear or damage.

Measure driven gear boss O.D.

SERVICE LIMIT: 51.61 mm (2.032 in)



STARTER CLUTCH ASSEMBLY

Lubricate the sprag clutch with engine oil and install it into the clutch outer with the flanged side facing the flywheel side.



ALTERNATOR/STARTER CLUTCH

Apply locking agent to the starter clutch bolt threads. Install the flywheel onto the clutch outer and the clutch bolts (T40).

Hold the flywheel with the special tool and tighten the bolts.

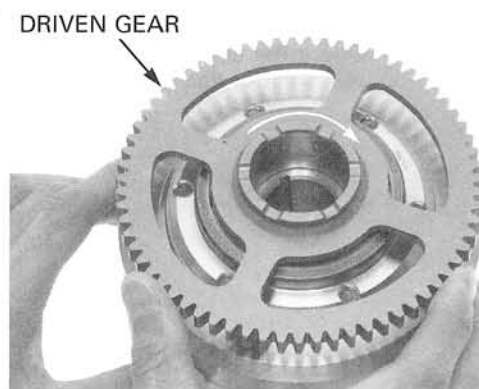
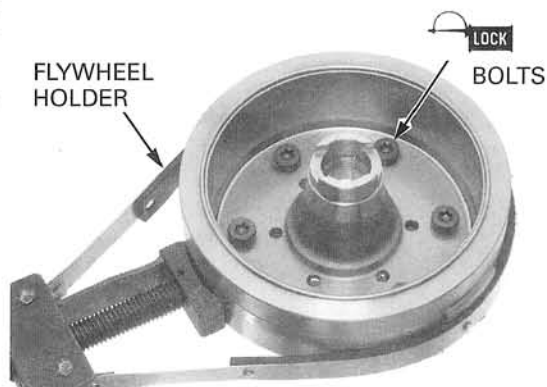
TOOL:

Flywheel holder

07725-0040000 or equivalent commercially available in U.S.A.

TORQUE: 30 N·m (3.1 kgf·m, 22 lbf·ft)

Install the starter driven gear while turning it clockwise.

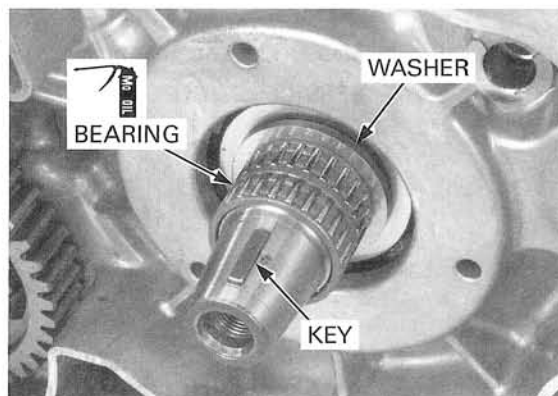


INSTALLATION

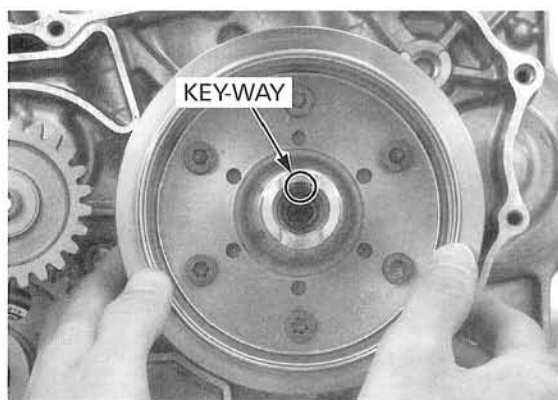
Lubricate the needle bearing with molybdenum oil solution. Install the washer and bearing onto the crankshaft.

Install the woodruff key into the key groove.

Clean any oil from the tapered portion of the crankshaft and flywheel thoroughly.



Install the flywheel/starter driven gear by aligning the key-way with the key on the crankshaft.



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

Install the starter driven pulley, aligning the bosses with the grooves in the crankshaft, and secure it with the bolt.

Hold the driven pulley using the special tool and tighten the bolt.

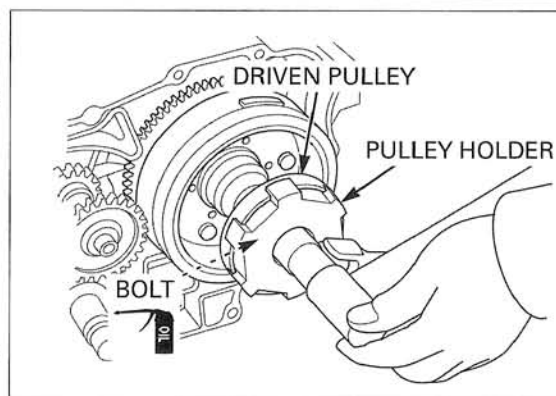
TOOL:

Recoil pulley holder 07SMB-HM70100

TORQUE: 108 N·m (11.0 kgf·m, 80 lbf·ft)

Loosen the pulley bolt, and remove the tool, bolt and driven pulley.

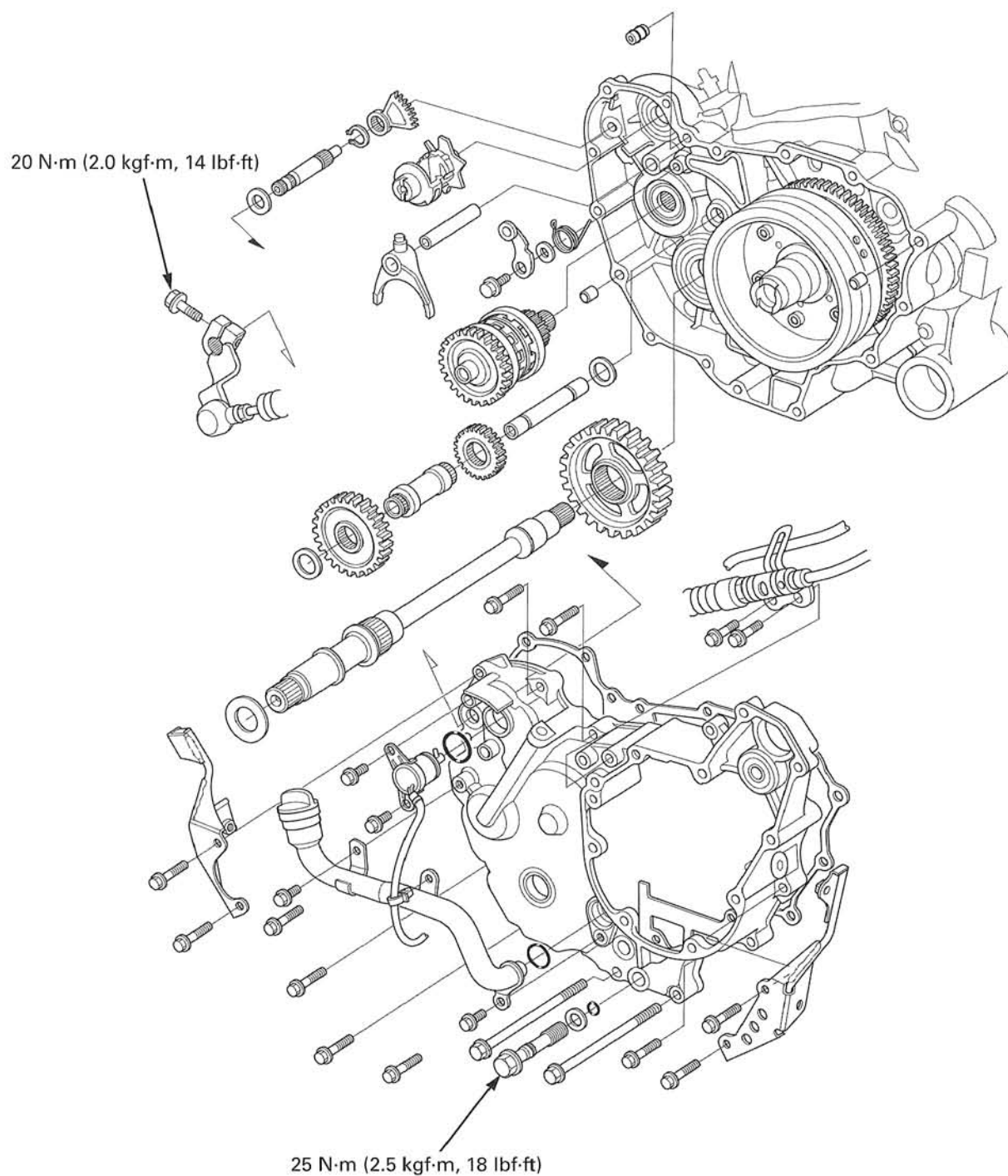
Install the rear crankcase cover (page 11-7).



11. SUB-TRANSMISSION/GEARSHIFT LINKAGE

SYSTEM COMPONENTS	11-2	REAR CRANKCASE COVER	11-5
SERVICE INFORMATION	11-3	SUB-TRANSMISSION	11-9
TROUBLESHOOTING	11-4	GEAR SELECTOR LEVER LINKAGE	11-14

SYSTEM COMPONENTS



SERVICE INFORMATION

GENERAL

- This section covers service of the sub-transmission and gearshift linkage (forward-reverse). These parts can be serviced with the engine installed in the frame.
- Sub-transmission lubricating oil is fed through the oil passage in the rear crankcase cover. Clean the oil passage before installing the crankcase cover.
- Be careful not to damage the crankcase and cover mating surfaces when servicing.
- For automatic transmission service, see ! and !.

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)
Reverse idle gear	Collar I.D.	13.000 – 13.034 (0.5118 – 0.5131)	13.05 (0.514)
	Shaft O.D.	12.966 – 12.984 (0.5105 – 0.5112)	12.93 (0.509)
	Collar-to-shaft clearance	–	0.10 (0.004)

TORQUE VALUES

Gear selector lever pivot nut	9 N·m (0.9 kgf·m, 6.5 lbf·ft)
Gear selector arm pinch bolt	16 N·m (1.6 kgf·m, 12 lbf·ft)
Gear selector cable lock nut	26 N·m (2.7 kgf·m, 20 lbf·ft)
Engine oil drain bolt	25 N·m (2.5 kgf·m, 18 lbf·ft)

TOOLS

Driver	07749-0010000
Attachment, 28 X 30 mm	07946-1870100
Attachment, 37 X 40 mm	07746-0010200
Pilot, 17 mm	07746-0040400
Pilot, 25 mm	07746-0040600
Bearing remover, 17 mm	07936-3710300
Bearing remover handle	07936-3710100
Bearing remover weight	07741-0010201 or 07936-371020A or 07936-3710200 (U.S.A. only)

TROUBLESHOOTING

NOTE:

- Be sure the gear position indicator is not blinking before checking the following !section 24.

Excessive shift shock or Abnormal noise when shifting sub-transmission (D-N-R)

1. Shift condition check

Check shift lever free play between the Neutral-Drive and Neutral-Reverse.

Is the free play the same for each gear?

NO – Faulty gearshift linkage (page 11-4).

YES – GO TO STEP 2.

2. Vehicle creep check

Start the engine.

Shift the sub-transmission in Drive position with the brake applied.

Wait several seconds. Release the brake and check the vehicle condition.

Does the vehicle creep?

YES – Perform the inspection "Vehicle creeps when idling" on page 12-6 while applying the brake as same manner as above.

NO – Adjust the selector cable (page 11-15).

Hard to shift

- Bent shift fork claw
- Bent shift fork shaft
- Damaged shift drum guide groove
- Damaged shift fork guide pin
- Damaged gearshift spindle and drum teeth
- Damaged selector lever linkage
- Improperly adjusted selector cable
- Improperly installed gearshift spindle and drum

Transmission jumps out of gear

- Worn gear and shifter 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:

- left front mud guard !
- inner fenders !
- front center grille !
- center mud guards!
- engine side covers!
- engine guard!
- starter motor !
- final drive/sub-frame assembly!

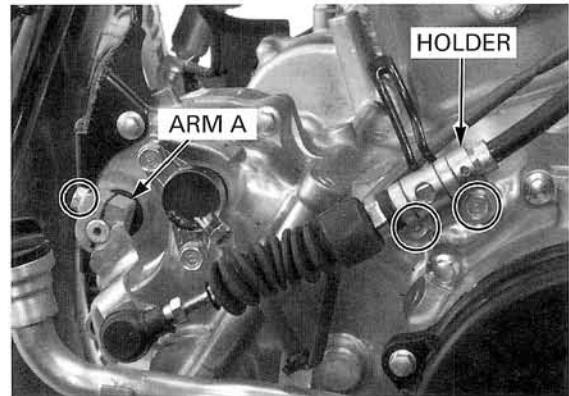
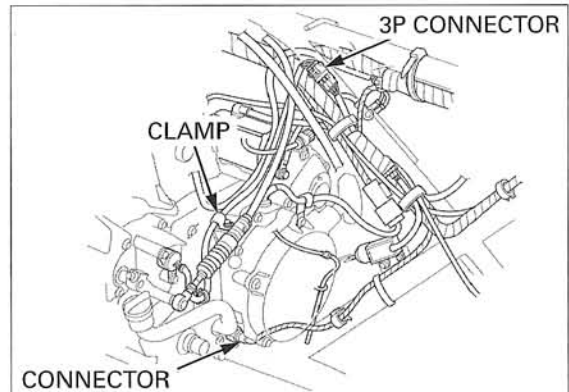
Disconnect the front propeller shaft from the output shaft (page 7-6).

Disconnect the oil temperature sensor connector and gear position switch 3P (white) connector. Release the wire from the clamp on the cable holder.

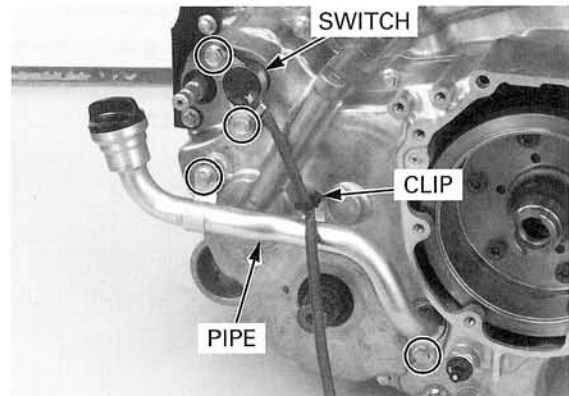
Shift the sub-transmission into neutral.

Remove the following:

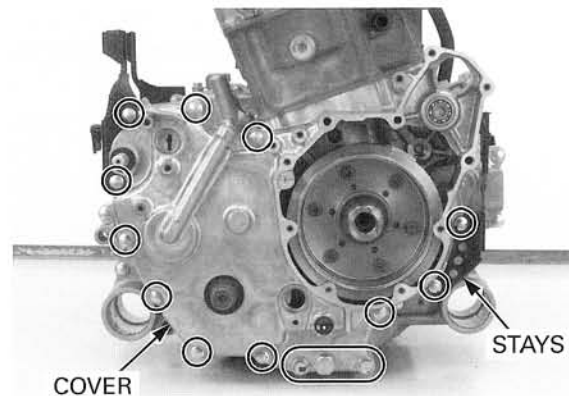
- two cable holder bolts
- pinch bolt
- selector arm A



- wire clip (from the oil filler pipe)
- two switch bolts
- gear position switch and O-ring (being careful not to damage the switch pin)
- alternator cover and reduction gears!
- starter motor!
- two pipe bolts
- oil filler pipe and O-ring

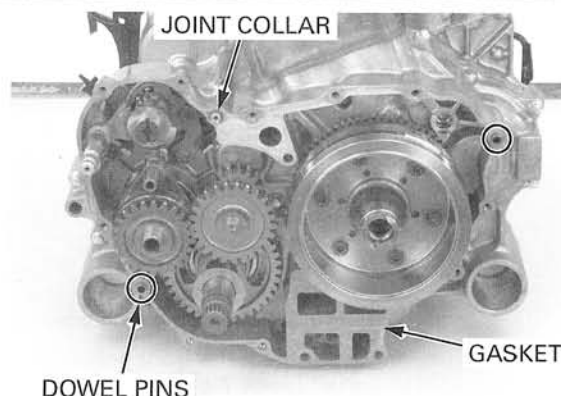


- two 8-mm bolts
- oil drain bolt, sealing washer and O-ring
- eleven 6-mm bolts
- side cover stays
- rear crankcase cover



SUB-TRANSMISSION/GEARSHIFT LINKAGE

- two dowel pins
- oil joint collar and O-rings
- gasket



BEARING REPLACEMENT

For replacement of the bearings in the crankcase, refer to !.

OUTPUT SHAFT BEARING

Remove the output shaft oil seal.

Press the needle bearing out of the crankcase cover.

TOOLS:

Driver	07749-0010000
Attachment, 28 x 30 mm	07946-1870100
Pilot, 25 mm	07746-0040600

Press in a new bearing until it is seated.

TOOLS:

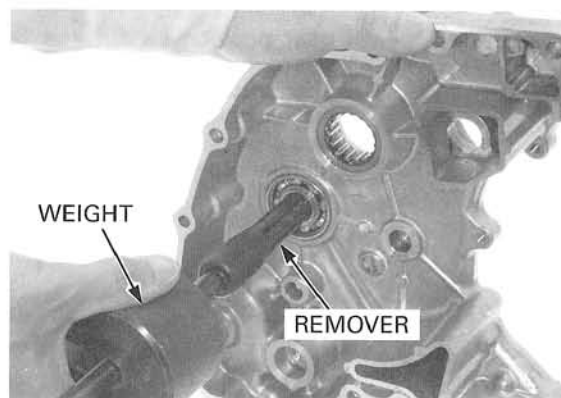
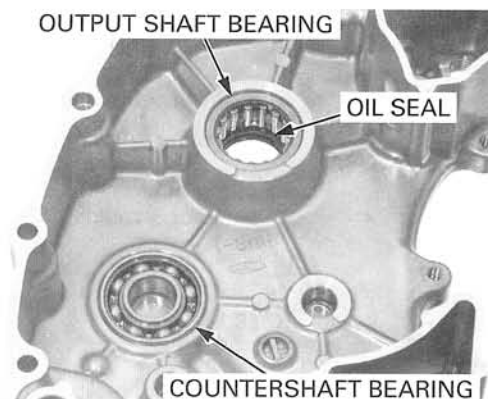
Driver	07749-0010000
Attachment, 37 x 40 mm	07746-0010200
Pilot, 25 mm	07746-0040600

COUNTERSHAFT BEARING

Remove the bearing using the special tools.

TOOLS:

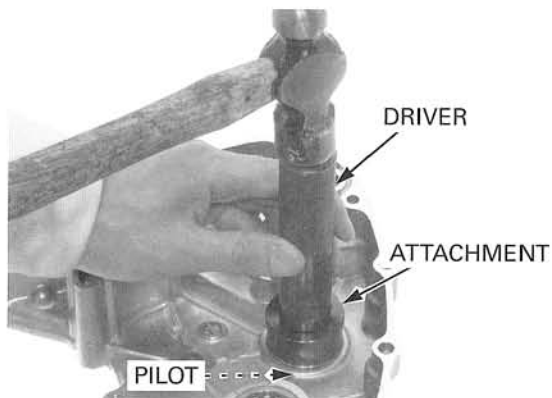
Bearing remover, 17 mm	07936-3710300
Remover handle	07936-3710100
Remover weight	07741-0010201 or 07936-371020A or 07936-3710200 (U.S.A. only)



Drive a new bearing in with the sealed side facing down.

TOOLS:

Driver	07749-0010000
Attachment, 37 x 40 mm	07746-0010200
Pilot, 17 mm	07746-0040400

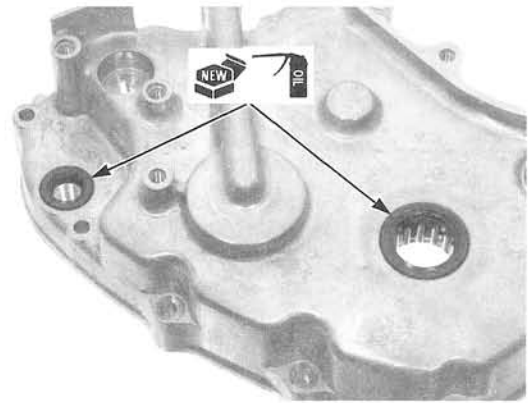


INSTALLATION

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

Clean the crankcase and cover mating surfaces.

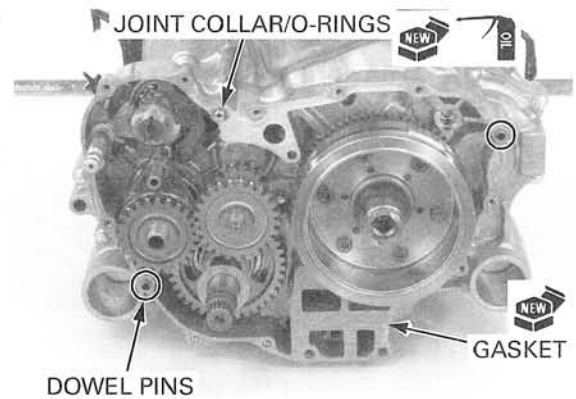
Apply engine oil to the lips of new oil seals, and install them into the crankcase cover until they are fully seated.



Coat new O-rings with engine oil and install them into the joint collar grooves. Install the oil joint collar into the crankcase.

Install the two dowel pins and a new gasket.

Make sure that the washers are installed on the output shaft, reverse idle shaft and gearshift spindle, and that the shift drum position is neutral as shown (switch pin groove is in positioned lengthwise).



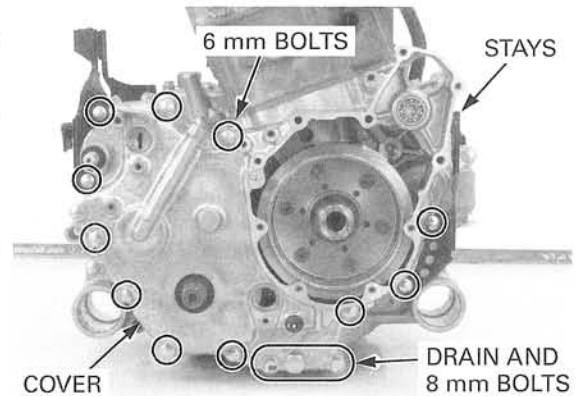
Install a new sealing washer onto the drain bolt. Coat a new O-ring with engine oil and install it into the drain bolt groove.

Install the rear crankcase cover with the following fasteners:

- eleven 6-mm bolts (with the side cover stays)
- two 8-mm bolts
- oil drain bolt

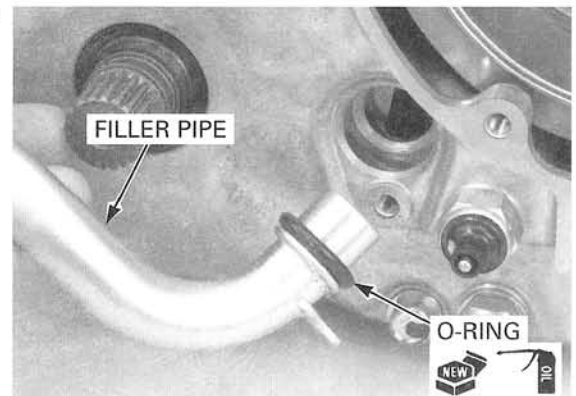
Tighten the bolts in a crisscross pattern in several steps.

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



Coat a new O-ring with engine oil and install it onto the oil filler pipe.

Install the filler pipe with the two bolts.



SUB-TRANSMISSION/GEARSHIFT LINKAGE

Coat a new O-ring with engine oil and install it into the groove in the gear position switch.

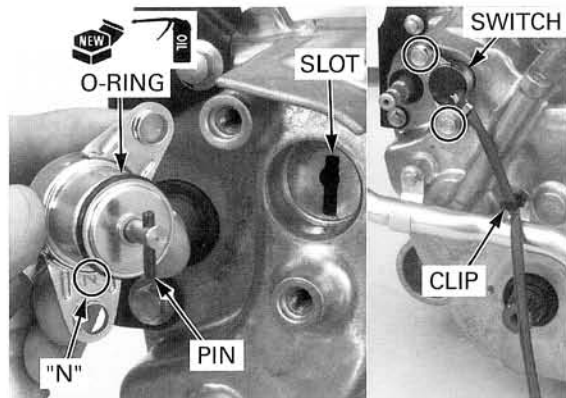
Be careful not to damage the switch pin during installation.

Align the long end of the switch pin with the "N" mark. Install the switch by aligning the switch pin with the slot in the crankcase cover. Install the bolts and tighten it.

Install the wire clip into the stay of the filler pipe.

Install the following:

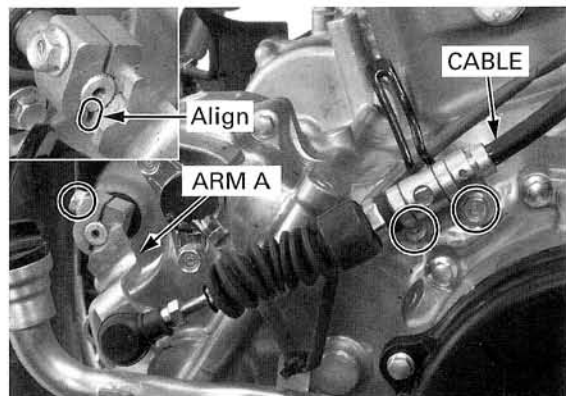
- alternator cover and reduction gears!
- starter motor!



Install the gear selector arm A by aligning the groove with the wide tooth of the spindle. Install the pinch bolt and tighten it.

TORQUE: 16 N·m (1.6 kgf·m, 12 lbf·ft)

Secure the selector cable onto the engine with the two cable holder bolts.



Route the wires properly !.

Connect the oil temperature sensor connector and gear position switch 3P (white) connector. Secure the wire with the clamp on the cable holder.

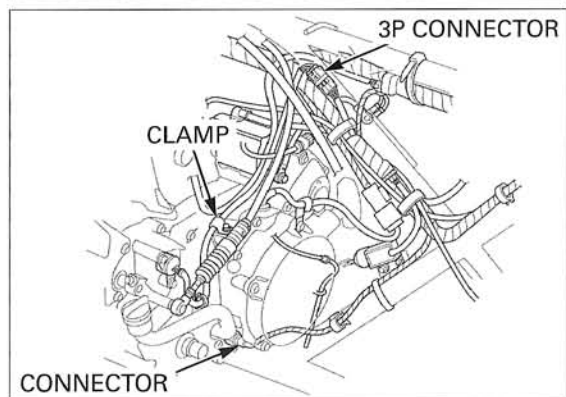
Adjust the gear selector cable if necessary (page 11-15).

Connect the front propeller shaft over the output shaft (page 7-9).

Install the following:

- final drive/sub-frame assembly!
- starter motor !
- engine guard!
- engine side covers!
- center mud guards!
- inner fenders !
- front mud guard !
- front center grille !

Fill the engine with recommended oil !.



SUB-TRANSMISSION

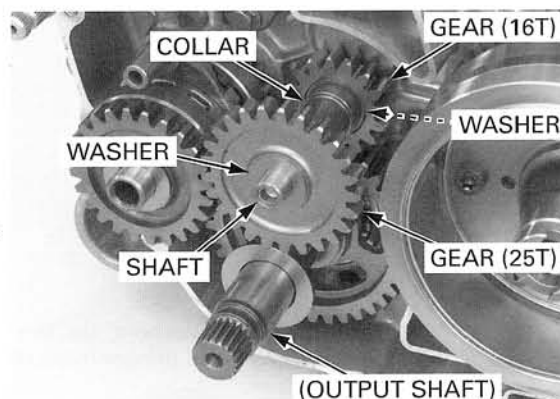
DISASSEMBLY

Remove the rear crankcase cover (page 11-5).

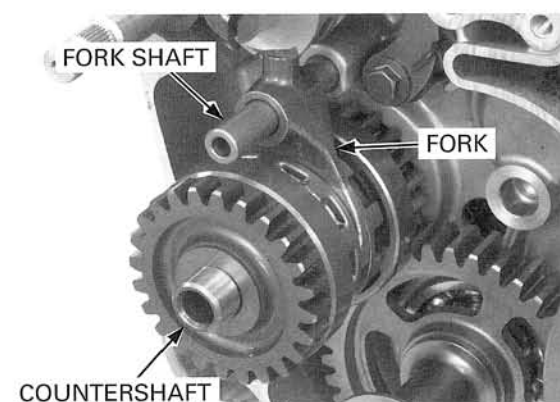
Remove the following:

- washer
- idle gear (25T)
- gear shaft and gear collar (inner and outer)
- washer
- idle gear (16T)

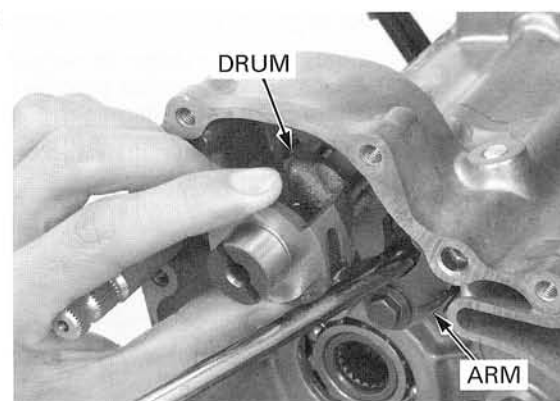
The output shaft can be removed at this time (page 11-10).



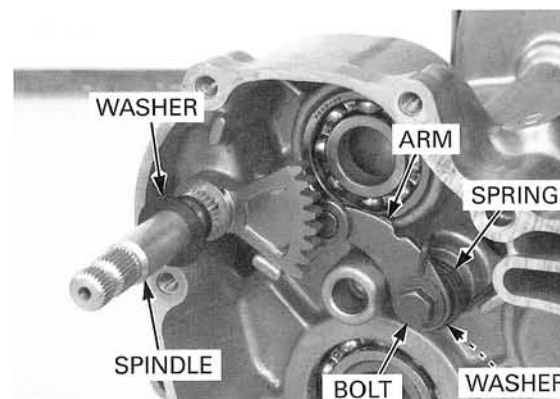
- shift fork shaft
- shift fork
- countershaft assembly



- shift drum (while lifting the stopper arm with a screwdriver)

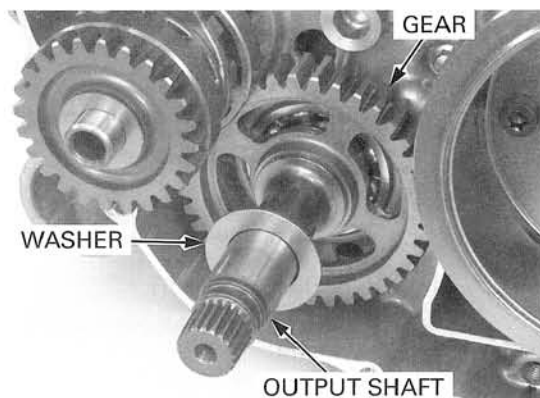


- washer
- gearshift spindle
- pivot bolt
- stopper arm
- washer
- return spring



SUB-TRANSMISSION/GEARSHIFT LINKAGE

- washer
- output shaft (while holding the driven gear)
- output driven gear



Remove the washers on the shaft ends with a screwdriver and disassemble the countershaft.



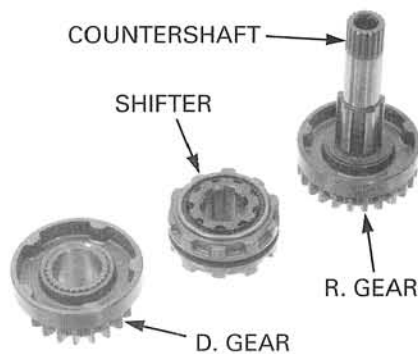
INSPECTION

COUNTERSHAFT

Check the gear dogs and teeth for abnormal wear or damage.

Check the gear shifter for smooth operation.
Check the gear shifter groove, dogs and splines for abnormal wear or damage.

Check the counter shaft and bearings for abnormal wear or damage.



OUTPUT SHAFT

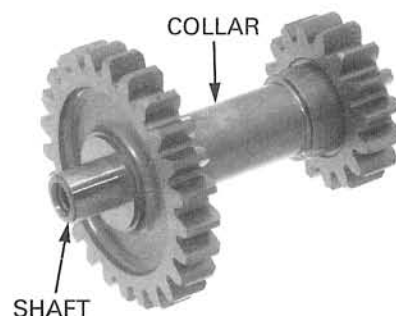
Check the gear teeth and splines for abnormal wear or damage.

Check the output shaft for abnormal wear or damage.



REVERSE IDLE GEAR

Check the gear teeth for abnormal wear or damage.
Check the splines of the gears and collar for abnormal wear or damage.



Check the gear shaft and collar for abnormal wear or damage.

Measure each end of the gear collar I.D.

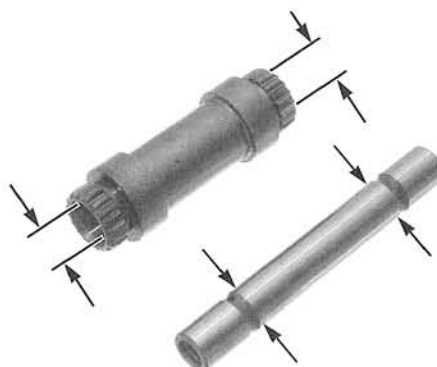
SERVICE LIMIT: 13.05 mm (0.514 in)

Measure the shaft O.D.

SERVICE LIMIT: 12.93 mm (0.509 in)

Calculate the collar-to-shaft clearance.

SERVICE LIMIT: 0.10 mm (0.004 in)



SHIFT FORK AND SHAFT

Check shift fork guide pin for abnormal wear or damage.

Measure each shift fork claw thickness.

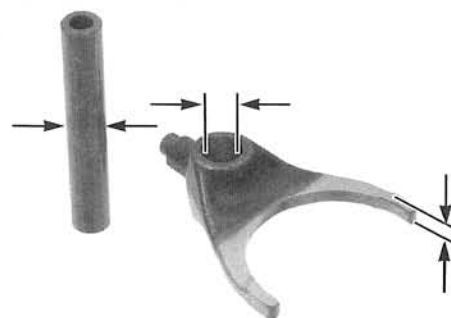
SERVICE LIMIT: 4.5 mm (0.18 in)

Measure the shift fork I.D.

SERVICE LIMIT: 11.04 mm (0.435 in)

Measure the shift fork shaft O.D.

SERVICE LIMIT: 10.96 mm (0.431 in)

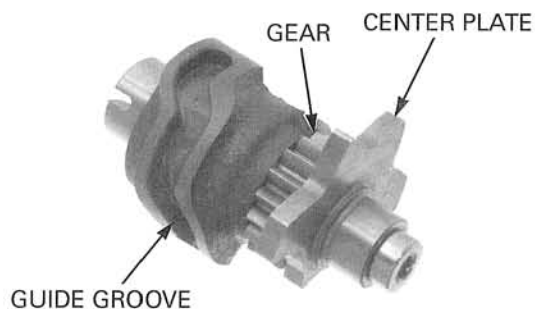


SHIFT DRUM

Replace the shift drum as an assembly.

Check the guide groove for abnormal wear or damage.

Check the drum center plate and shifter gear for abnormal wear or damage.



SUB-TRANSMISSION/GEARSHIFT LINKAGE

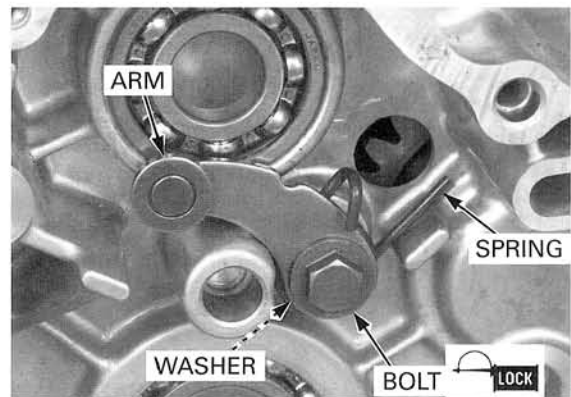
GEARSHIFT SPINDLE

Check the shifter gear and splines for abnormal wear or damage.



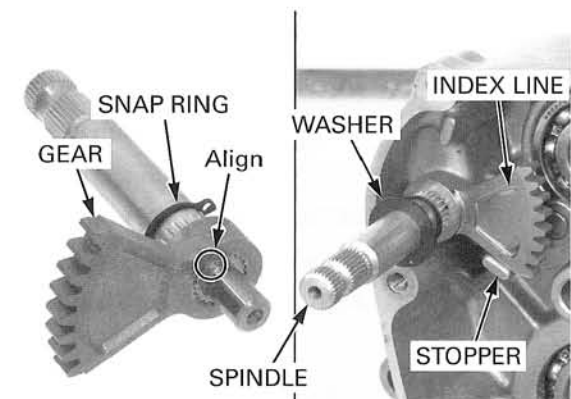
INSTALLATION

Apply locking agent to the pivot bolt threads. Install the spring, washer (between the crankcase and arm) and stopper arm with the bolt as shown and tighten the bolt.



Install the snap ring into the spindle groove with the chamfered edge facing the crankcase cover side. Install the shifter gear with the index line facing the snap ring, aligning the wide groove with the wide tooth.

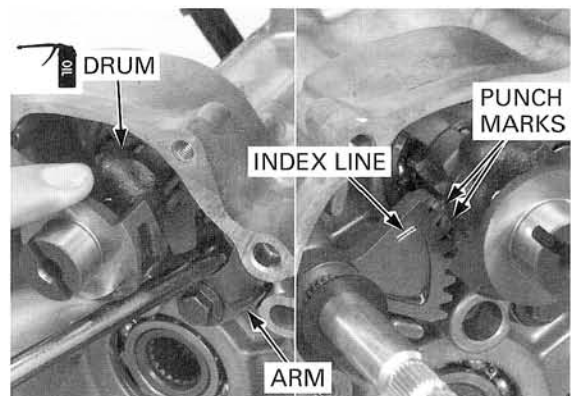
Install the gearshift spindle and rest it onto the stopper on the crankcase. Install the washer onto the spindle.



Apply engine oil to the shift drum guide groove.

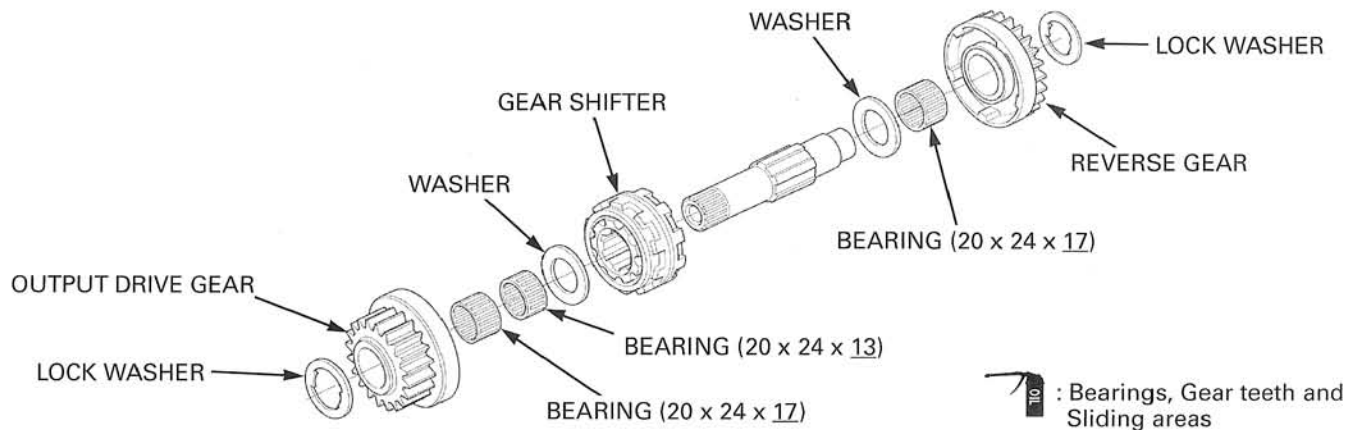
Lift the stopper arm and install the shift drum so the index line on the spindle shifter gear is aligned between the punch marks.

Turn the shift drum clockwise and set it in neutral position so its groove position is lengthwise.



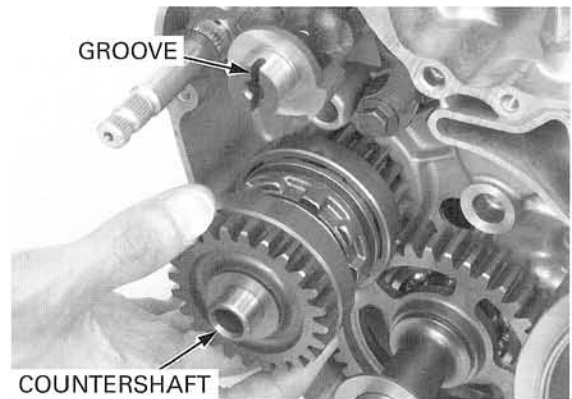
Apply engine oil to the bearings, gear teeth and sliding areas.

Assemble the countershaft.



The output shaft may be installed before installing the countershaft (page 11-13).

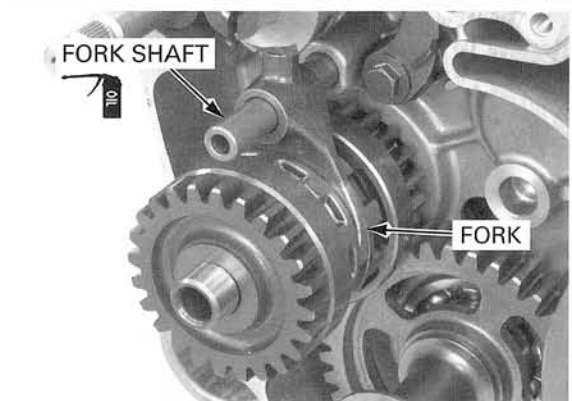
Install the countershaft assembly by engaging the splines.



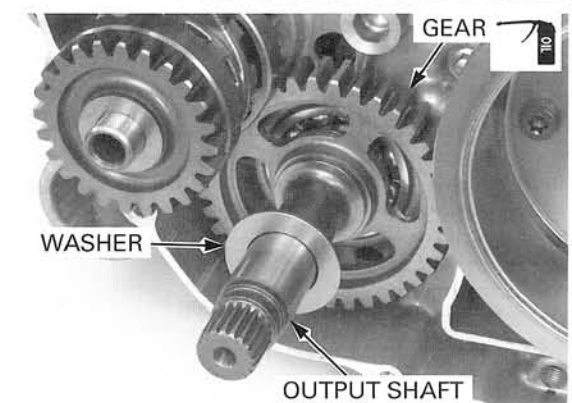
Apply engine oil to the fork shaft outer surface.

Before installation, be sure that the switch pin groove in the shift drum is lengthwise as shown above.

Install the shift fork into the gear shifter groove and drum guide groove. Insert the fork shaft through the fork and install it into the crankcase.



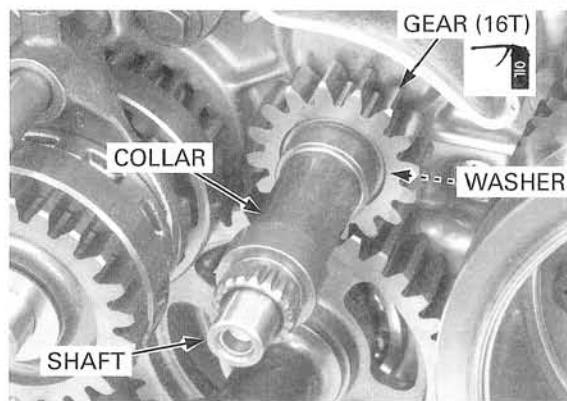
Apply engine oil to the gear teeth and set the output driven gear into the crankcase. Insert the output shaft through the driven gear and install it into the crankcase. Install the washer.



SUB-TRANSMISSION/GEARSHIFT LINKAGE

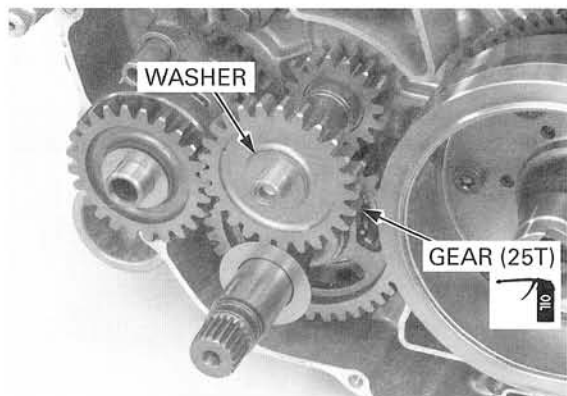
Install the gear shaft with the washer into the crankcase.

Install the idle gear (16T) onto the gear collar and install them onto the gear shaft.



Install the idle gear (25T) and washer.

Install the rear crankcase cover (page 11-5).



GEAR SELECTOR LEVER LINKAGE

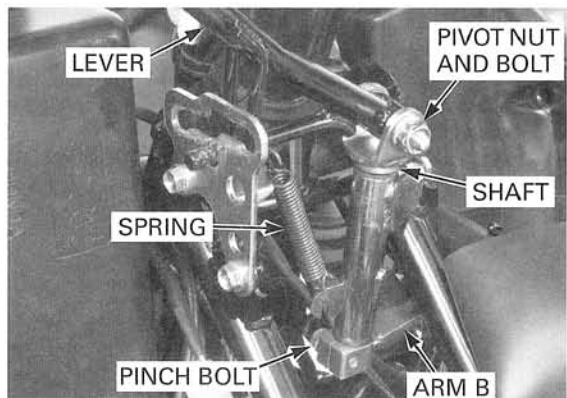
DISASSEMBLY

Remove the fuel tank !.

Loosen the pivot nut and remove the following:

- return spring
- pinch bolt
- selector arm B
- lever/shaft assembly (from the pivot pipe)

Remove the pivot nut and bolt to separate the selector lever from the pivot shaft.



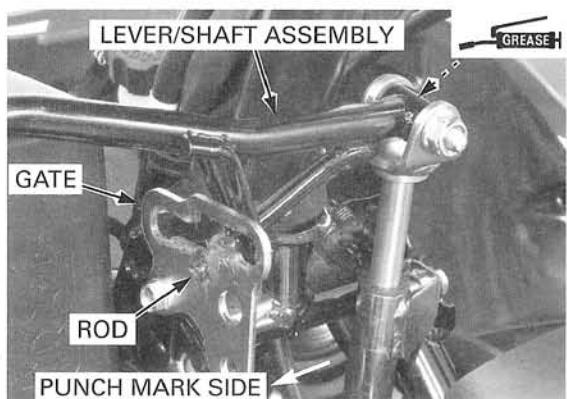
ASSEMBLY

Apply grease to the pivot bolt groove.

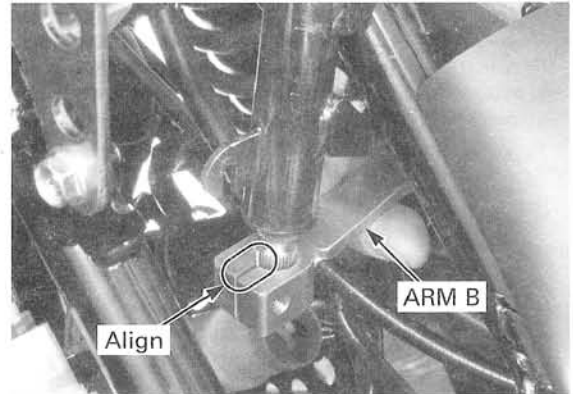
Install the selector lever into the pivot shaft with the pivot bolt and nut so the guide rod is facing toward the punch mark on the shaft bottom.

Before installing, mark the spline of the shaft at the same position with the punch mark to indicate the aligning point for installing the selector arm.

Install the lever/shaft assembly while setting the guide rod into the selector gate slot.



Install the arm B by aligning the slit with the mark (punch mark).

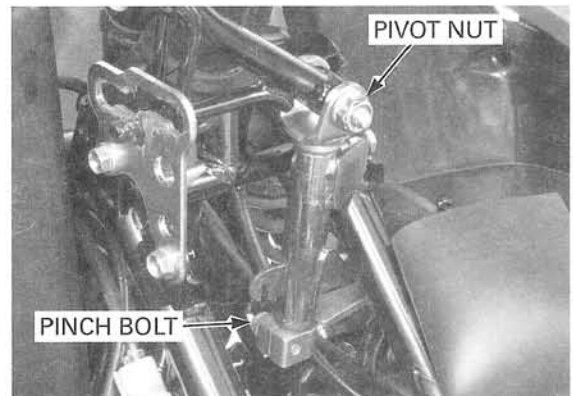


Install the pinch bolt and tighten it.

TORQUE: 16 N·m (1.6 kgf·m, 12 lbf·ft)

Tighten the pivot nut.

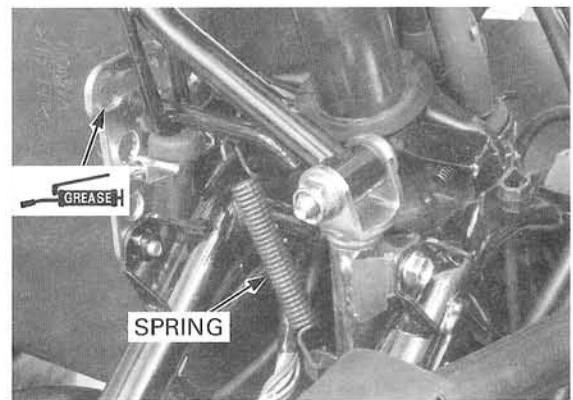
TORQUE: 9 N·m (0.9 kgf·m, 6.5 lbf·ft)



Install the return spring in the direction as shown.

Apply grease to the gate groove.

Check the selector lever for smooth operation.
Adjust the selector cable if necessary (page 11-15).

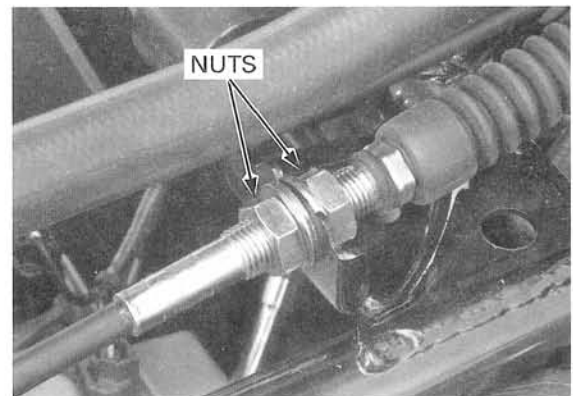


SELECTOR CABLE ADJUSTMENT

Remove the following:

- fuel tank and head guard plate !.
- left engine side cover !

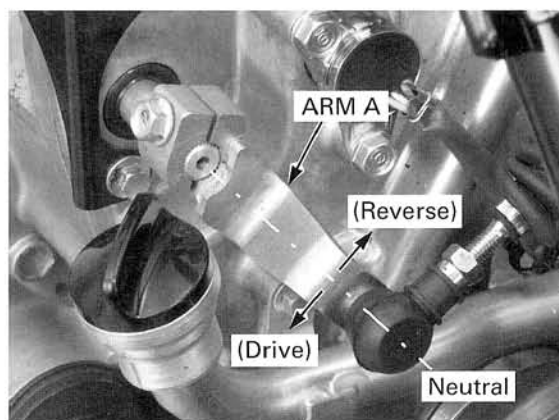
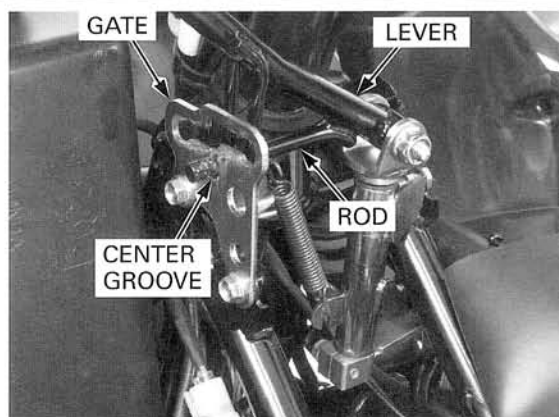
Loosen the cable lock nuts fully.



SUB-TRANSMISSION/GEARSHIFT LINKAGE

Turn the ignition switch ON and check that the neutral indicator comes on at this time.

Operate the selector lever several times and shift the sub-transmission into neutral. Make sure that the selector arm A stops at the center (neutral) position when setting the guide rod of the lever into the center (neutral) groove in the selector gate.



Turn one of the lock nuts until it touches the cable holder while holding the cable. Then, turn the other nut in the same manner.

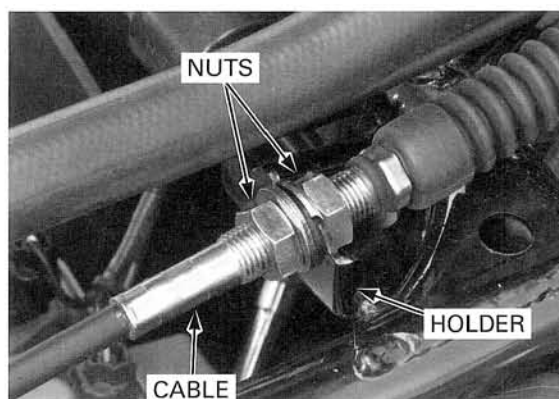
Be sure the nuts are seated on the cable holder and tighten them together to secure the cable.

TORQUE: 26 N·m (2.7 kgf·m, 20 lbf·ft)

Check that the selector lever operates properly.

Install the following:

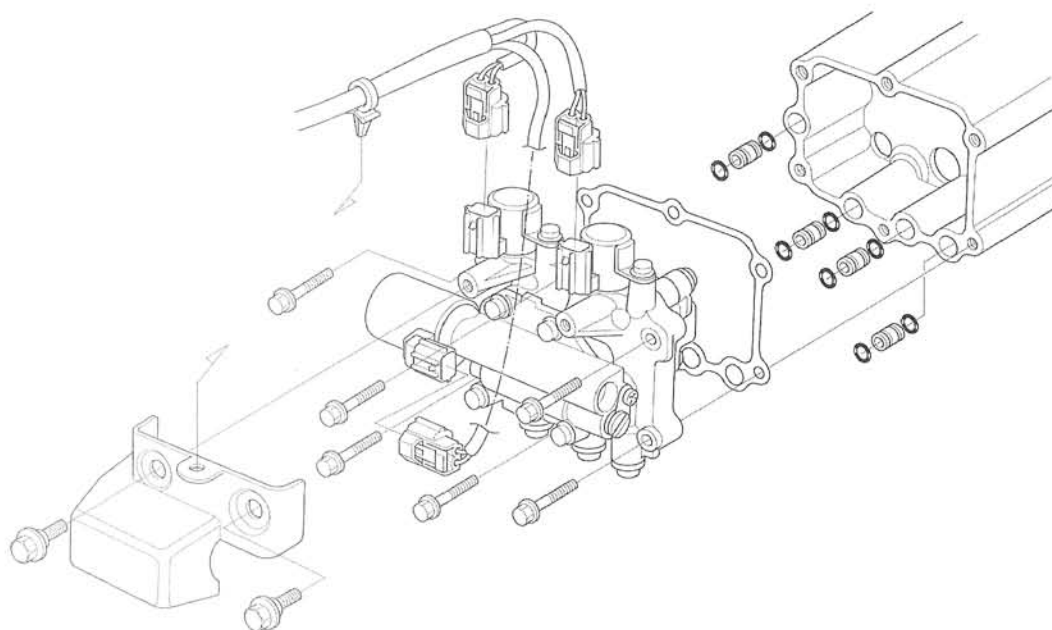
- left engine side cover !
- head guard plate and fuel tank !.

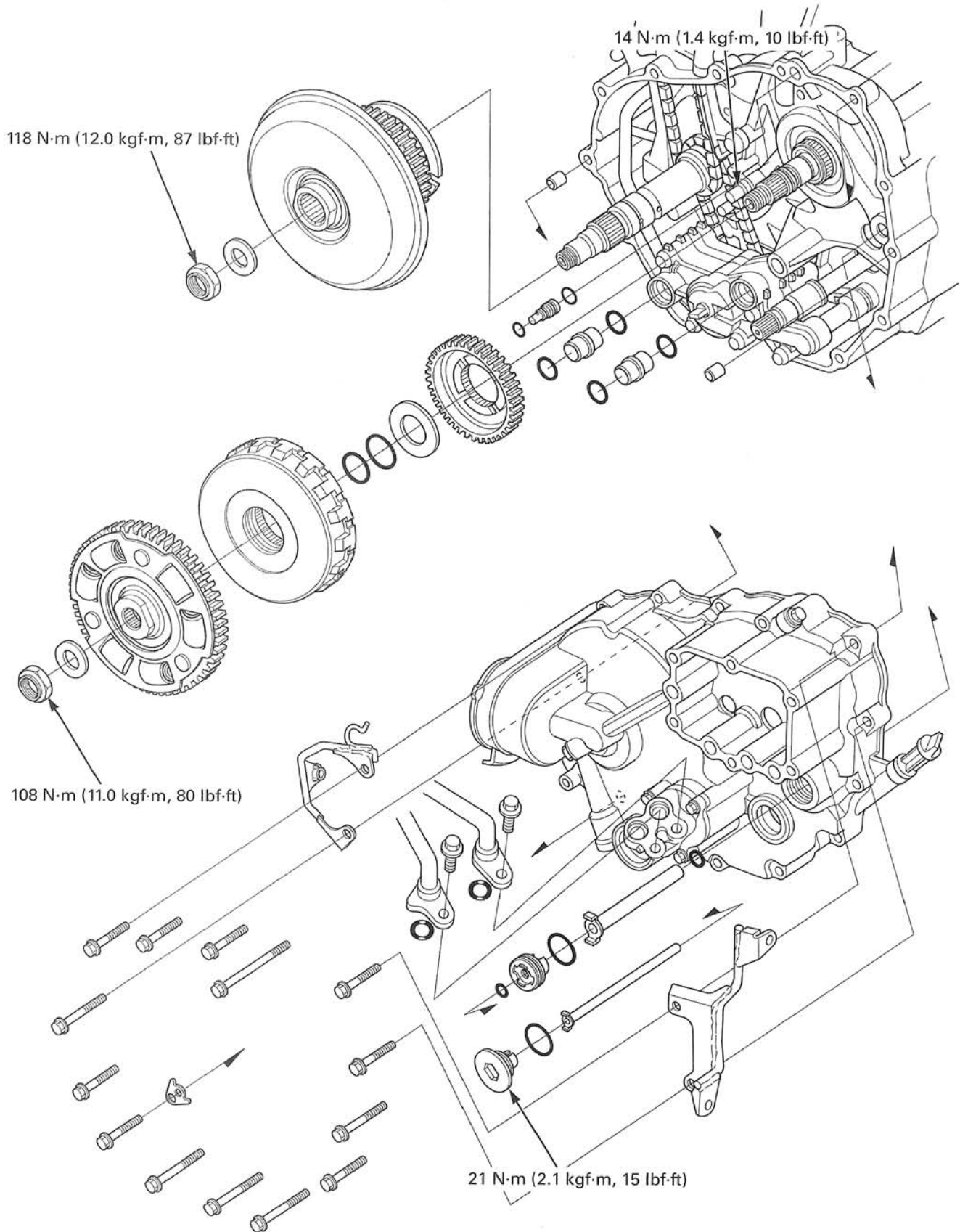


12. AUTOMATIC TRANSMISSION

SYSTEM COMPONENTS	12-2	FRONT CRANKCASE COVER	12-18
SERVICE INFORMATION	12-4	TORQUE CONVERTER REMOVAL	12-24
TROUBLESHOOTING	12-5	SHIFT CLUTCH/MAINSHAFT DISASSEMBLY	12-26
OIL PRESSURE CHECK	12-9	SHIFT CLUTCH/MAINSHAFT ASSEMBLY	12-31
SHIFT VALVE BODY	12-11	TORQUE CONVERTER INSTALLATION ...	12-37

AUTOMATIC TRANSMISSION SYSTEM COMPONENTS





SERVICE INFORMATION

GENERAL

- This section covers service of the automatic transmission components. The torque converter and 1st shift clutch can be serviced with the engine installed in the frame. To service the mainshaft and 2nd/3rd shift clutch (countershaft), the crankcase halves must be separated.
- Refer to page 13-2 for crankcase separation and assembly.
- Refer to page 26-2 "Technical Feature" for construction and function of each components in the automatic transmission.
- The engine oil is used for automatic transmission oil. For lubrication system service (oil pump and oil cooler), see page 4-2.
- Automatic transmission and lubricating oil is fed through the oil passage in the front crankcase cover. Clean the oil passages before installing the crankcase cover.
- Be careful not to damage the crankcase and cover mating surfaces when servicing.
- Replace the torque converter as an assembly, when it is faulty.
- For electrical system service of the automatic transmission, see page 24-2.
- For sub-transmission (Forward-Neutral-Reverse) service, see page 11-2.

SPECIFICATIONS

		Unit: mm (in)	
ITEM		STANDARD	SERVICE LIMIT
Oil pressure at 5,000 rpm	Line	785 kPa (8.0 kgf/cm ² , 114 psi)	—
	1st, 2nd and 3rd clutch	785 kPa (8.0 kgf/cm ² , 114 psi)	—
Shift clutch (1st, 2nd and 3rd)	Initial clearance	0.7 – 0.9 (0.03 – 0.04)	—
	Disc thickness	1.88– 2.00 (0.074 – 0.079)	worn out lining
	Plate thickness	1.95– 2.05 (0.077 – 0.081)	discoloration
	Return spring free length	33.8 (1.33)	31.8 (1.25)

TORQUE VALUES

Primary driven gear lock nut	108 N·m (11.0 kgf·m, 80 lbf·ft)	Lock nut: replace with a new one. Stake.
Stator shaft inner collar stopper pin	14 N·m (1.4 kgf·m, 10 lbf·ft)	Apply locking agent to the threads.
Torque converter lock nut	118 N·m (12.0 kgf·m, 87 lbf·ft)	Lock nut: replace with a new one. Apply engine oil to the threads and seating surface. Stake.
Oil feed pipe setting cap	21 N·m (2.1 kgf·m, 15 lbf·ft)	

TOOLS

Driver	07749-0010000
Attachment, 42 x 47 mm	07746-0010300
Pilot, 17 mm	07746-0040400
Pilot, 25 mm	07746-0040600
Bearing remover, 17 mm	07936-3710300
Bearing remover handle	07936-3710100
Bearing remover weight	07741-0010201 or 07936-371020A or 07936-3710200 (U.S.A. only)
Puller, 35 x 1.0 mm	07933-HA80000 or 07933-HB3000A (U.S.A. only)
Clutch compressor attachment	07LAE-PX40100 (2 required)
Compressor bolt assembly	07GAE-PG40200 or 07GAE-PG4020A (U.S.A. only)
Pressure gauge set	07406-0020005 or 07YAJ-0010300 and 07406-0020201 or equivalent commercially available in U.S.A.

TROUBLESHOOTING

NOTE:

- The engine control module (ECM) and transmission control module (TCM) monitors the condition of the automatic transmission system continuously. When they detect a problem, the TCM indicates the problem by blinking "--" in the gear position indicator display, and the shift control stops in a fail-safe mode (automatic transmission fixed in 2nd range and the vehicle creeps when idling). If so, the TCM stores the problem symptom as a problem code. Perform the transmission system troubleshooting (page 24-2).
- If the gear position indicator does not blink and the problem code is not recorded, measure the transmission oil pressure and diagnose according to the troubleshooting chart (page 12-10). However, inspect the each corresponding symptom as follows before checking the oil pressure.

STARTING CONTROL FAILURE

Vehicle does not start

1. Linear solenoid valve operation sound check

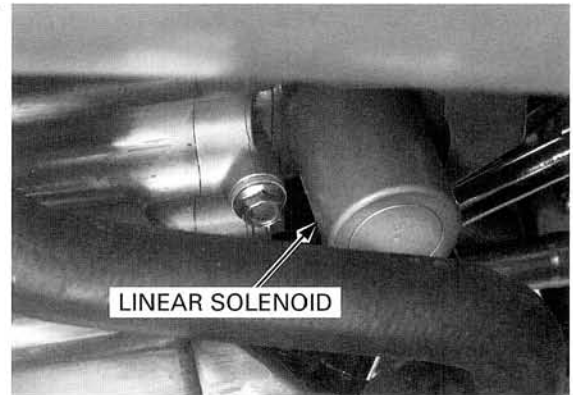
Put the gear selector lever in the Drive or Reverse position.

Check for a "click" sound from the linear solenoid valve when the ignition switch is ON.

Is there sound?

NO – GO TO STEP 2.

YES – GO TO STEP 3.



2. Linear solenoid valve operation check

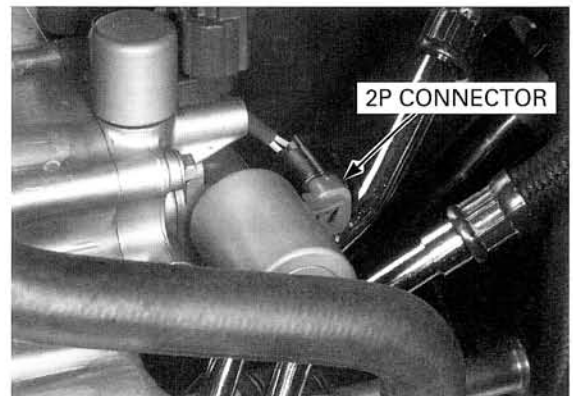
Remove the valve body cover (page 12-11). Disconnect the linear solenoid valve 2P (black) connector. Connect the 12V battery to the solenoid terminals.

It should operate (sounds) when the battery is connected.

Does the solenoid operate?

NO – Faulty linear solenoid valve.

YES – Test-drive the vehicle and check the gear position indicator (page 24-7).



3. Vehicle driving test

Start the vehicle with the mode select switch at ESP. Check the starting conditions with the transmission in the 2nd and 3rd ranges.

Does the vehicle start with the transmission in 2nd and 3rd?

YES – Faulty 1st shift clutch system (page 12-29)

NO – Hydraulic circuit malfunction is the likely cause. Check the oil pressure (page 12-9).

Excessive starting shock

1. Initial setting of the throttle position sensor

Perform the Initial Setting (page 24-10).
Test-drive the vehicle with the mode select switch at AUTO.

Is the vehicle starting condition normal (there is no starting shock)?

YES – Normal (incorrect Initial Setting)

NO – GO TO STEP 2.

2. Vehicle driving test

Start the vehicle with the mode select switch at ESP. Check for starting shock with the transmission in the 2nd and 3rd ranges.

Is there starting shock with the transmission in 2nd and 3rd?

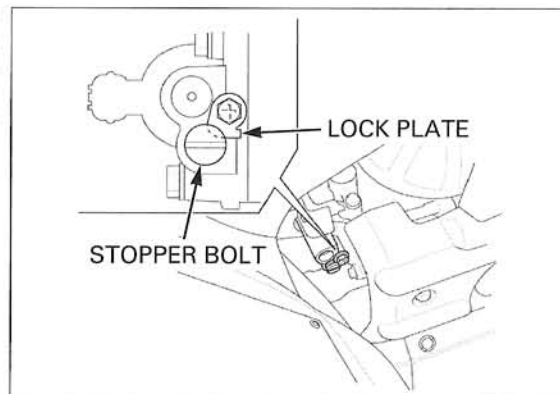
YES – Faulty 1st shift clutch system (page 12-29)

NO – Hydraulic circuit malfunction is the likely cause. Check the oil pressure (page 12-9).

Vehicle creeps (vehicle does not stop) when idling

NOTE:

- Be sure the emergency valve is not active, that the stopper bolt is secured with the lock plate as shown. If it is turned all the way in (active), the transmission will be fixed in 2nd range and the vehicle creeps when idling. For emergency valve information, see page 12-11.



1. Vehicle driving test

Start the engine and shift the sub-transmission in drive position with the mode select switch at ESP. Check the starting conditions (creep) with the transmission in the 2nd and 3rd ranges.

Does the vehicle creep with the transmission in 2nd and 3rd?

YES – Faulty 1st shift clutch system (page 12-29)

NO – Hydraulic circuit malfunction is the likely cause. Check the oil pressure (page 12-9).

Driving power falls off when starting (insufficient engine brake)

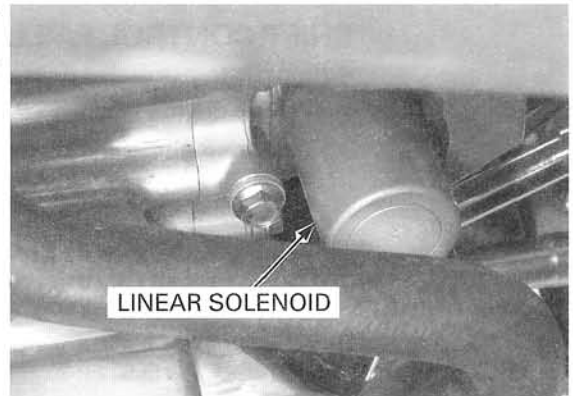
1. Linear solenoid valve operation sound check

Put the gear selector lever in the Drive or Reverse position.
Check for a "click" sound from the linear solenoid valve when the ignition switch is ON.

Is there sound?

NO – GO TO STEP 2.

YES – GO TO STEP 3.



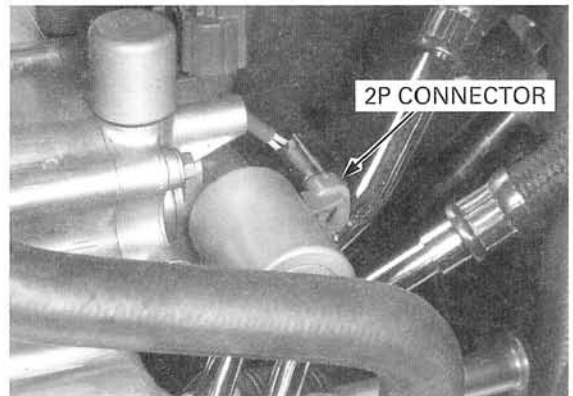
2. Linear solenoid valve operation check

Remove the valve body cover (page 12-11).
Disconnect the linear solenoid valve 2P (black) connector. Connect the 12V battery to the solenoid terminals.
It should operate when the battery is connected.

Does the solenoid operate?

NO – Faulty linear solenoid valve.

YES – Test-drive the vehicle and check the gear position indicator (page 24-7).



3. Vehicle driving test

Test-drive the vehicle with the mode select switch at ESP. Check for engine braking with the transmission in the 2nd and 3rd ranges.

Is there engine braking with the transmission in except the 1st?

YES – Faulty 1st shift clutch system (page 12-29)

NO – Hydraulic circuit malfunction is the likely cause. Check the oil pressure (page 12-9).

Engine stalls when starting

NOTE:

- Check the following after all carburetor adjustments have been completed (page 5-3).

1. Vehicle creep check

Start the engine.
Shift the sub-transmission in drive position with the brake applied.
Wait several seconds. Release the brake and check the vehicle condition.

Does the vehicle creep?

YES – Perform the inspection "Vehicle creeps when idling" on page 12-6 while applying the brake in the same manner as above.

- NO** – Hydraulic circuit malfunction is the likely cause. Check the oil pressure (page 12-9).

SHIFT CONTROL FAILURE

Automatic transmission does not shift

1. Vehicle driving test

Test-drive the vehicle with the mode select switch at ESP. Check that it shifts to each range.

Does the vehicle shift?

- YES** – Faulty throttle position sensor or vehicle speed sensor system. Check the installation condition of them (page 24-42 and 17-29).

NO – GO TO STEP 2.

2. Shift solenoid valve operation check

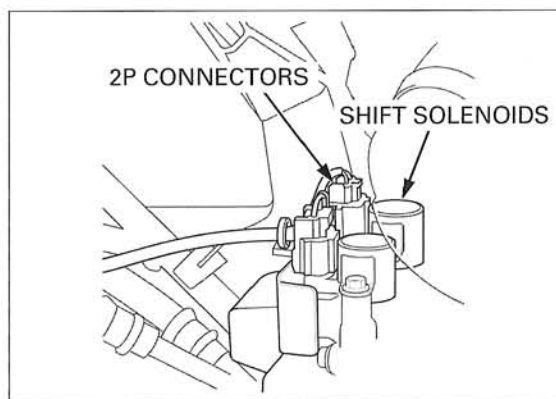
Disconnect the shift solenoid valve 2P connectors. Connect the 12V battery to each solenoid terminals.

It should operate (sounds) when the battery is connected.

Does the solenoid valves operate?

NO – Faulty shift solenoid valve A and/or B.

- YES** – Hydraulic circuit malfunction is likely cause. Check the oil pressure (page 12-9).



When shifting in the AUTO (automatic) mode, excessive shift shock, engine rpm rises or driving power falls off

1. Vehicle driving test

Test-drive the vehicle with the mode select switch at ESP. Check above symptoms when shifting with the ESP shift switch.

Are there repeated symptoms?

- YES** – Faulty throttle position sensor or vehicle speed sensor system. Check the installation condition of them (page 24-42 and 17-29).

NO – Hydraulic circuit malfunction is likely cause. Check the oil pressure (page 12-9).

OIL PRESSURE CHECK

NOTE:

- After checking each oil pressure, perform the inspection and cleaning according to the trouble-shooting chart (page 12-10).

Check the oil level and add the recommended oil if necessary (page 3-10). Also, check the engine and oil line for external oil leak before checking the oil pressure.

Be careful not touch the rotating wheels during inspection.

Support the vehicle using a hoist or equivalent and raise all the wheels off the ground.

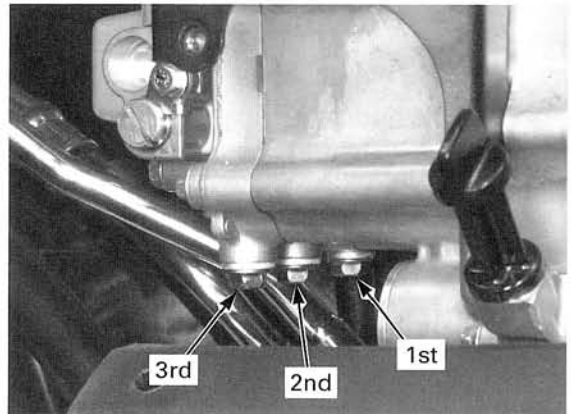
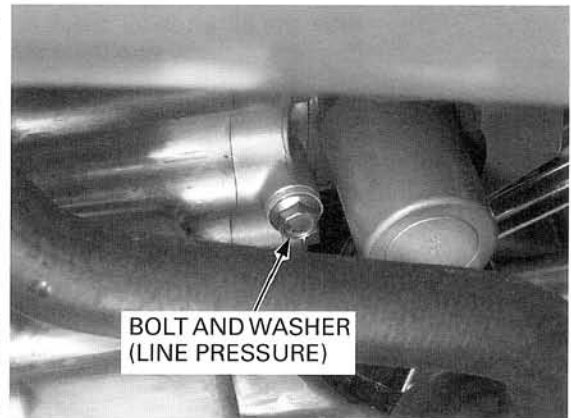
NOTE:

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

For line pressure: Remove the sealing bolt and washer on the right side of the shift valve body.

For 1st, 2nd and 3rd clutch pressure: Remove the following:
 – left engine side cover (page 2-17)
 – left front mud guard (page 2-8)

Remove the sealing bolts and washers on the bottom of the shift valve body.



Connect the oil pressure gauge and hose(s) to each inspection hole (hole threads; M8 x 1.25).

TOOLS:

Pressure gauge set 07406-0020005 or
Pressure gauge 07YAJ-0010300 and
Pressure gauge hose 07406-0020201
 or equivalent commercially available in U.S.A.

Support the vehicle using a hoist or equivalent and raise the front wheels off the ground.

Start the engine and check the oil pressure as follows.

For line pressure: Shift the sub-transmission into Neutral (set the selector lever in center position) and measure the oil pressure.

LINE OIL PRESSURE (80°C/176°F):

785 kPa (8.0 kgf/cm², 114 psi) at 5,000 rpm

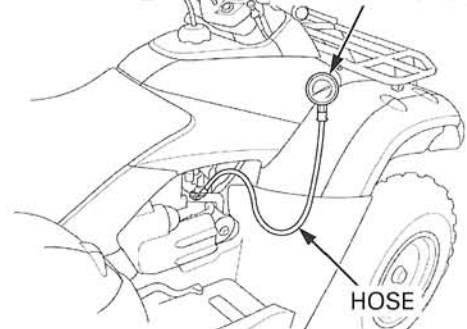
For 1st, 2nd and 3rd clutch pressure: Shift the sub-transmission in Drive position with the mode select switch at "ESP". Shift to the respective transmission position (1st, 2nd and 3rd) with the ESP shift switch and measure the each clutch oil pressure.

SHIFT CLUTCH OIL PRESSURE (80°C/176°F):

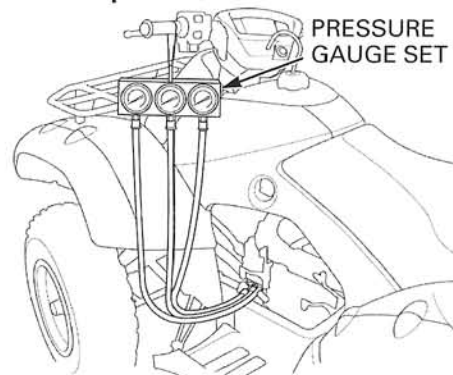
1st, 2nd, 3rd:
785 kPa (8.0 kgf/cm², 114 psi) at 5,000 rpm

Stop the engine.

Line pressure:



1st/2nd/3rd pressure:

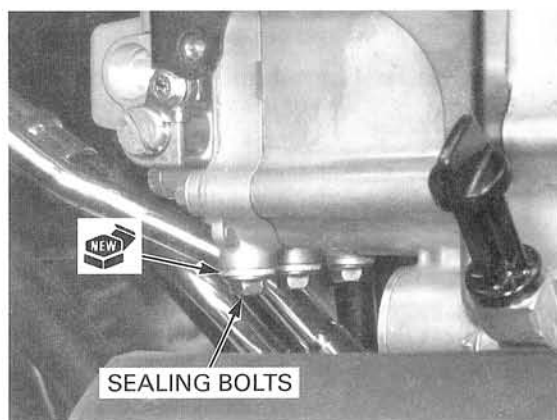
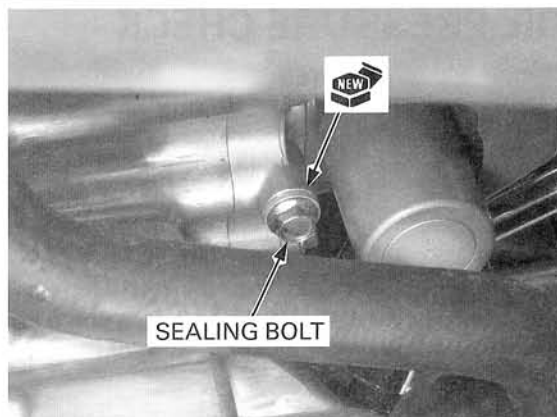


AUTOMATIC TRANSMISSION

Remove the pressure gauge and hose(s).

Install each sealing bolt with a new sealing washer and tighten the bolt(s).

After the oil pressure check is completed, start the engine and make sure there are no oil leaks.



TROUBLESHOOTING CHART OF HYDRAULIC CIRCUIT

PRESSURE CHECK SECTION		MEASUREMENT RESULT (■: Abnormal / Blank: Normal)										REFER TO PAGE
Line pressure											■	
1st clutch pressure				■			■	■	■	■	■	
2nd clutch pressure			■			■		■	■	■	■	
3rd clutch pressure		■				■	■			■	■	
PROBABLE FAULTY PART (applied to O)	Linear solenoid valve									0		12-12
	Emergency valve									0		
	1-2 shift valve			0	0							
	2-3 shift valve		0	0								
	Shift solenoid valve A			0	0							
	Shift solenoid valve B		0	0								
	2nd orifice control valve											
	3rd orifice control valve											
	Shift valve body					0	0	0	0			
	Orifice control valve body					0	0	0	0			
	1st clutch				0							12-29
	2nd clutch			0								
	3rd clutch		0									
	Feed pipe A				0							12-20
	Feed pipe B		0	0		0						
	Feed pipe C		0	0		0						
	Torque converter										0	12-25
	Oil pump										0	4-5
	Oil pipe setting collar		0	0	0						0	12-19
	Oil filter										0	3-12
	Oil strainer										0	13-5
	Oil level										0	3-10

For function of each component, refer to page 26-2.

OIL PRESSURE CHECK

NOTE:

- After checking each oil pressure, perform the inspection and cleaning according to the trouble-shooting chart (page 12-10).

Check the oil level and add the recommended oil if necessary (page 3-10). Also, check the engine and oil line for external oil leak before checking the oil pressure.

Be careful not touch the rotating wheels during inspection.

Support the vehicle using a hoist or equivalent and raise all the wheels off the ground.

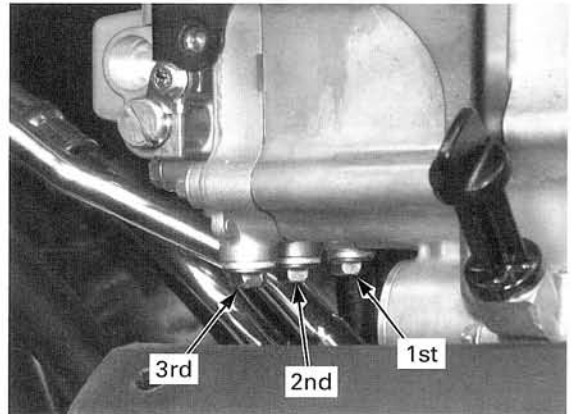
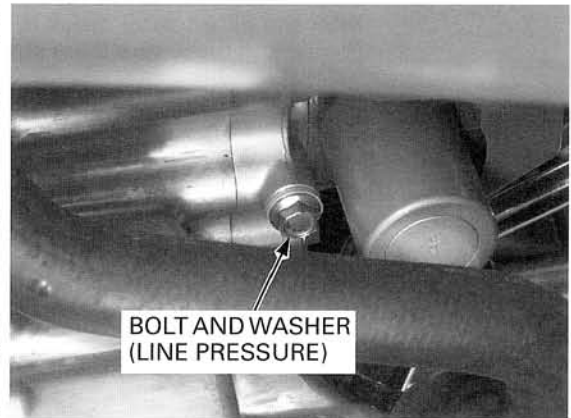
NOTE:

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

For line pressure: Remove the sealing bolt and washer on the right side of the shift valve body.

For 1st, 2nd and 3rd clutch pressure: Remove the following:
 – left engine side cover (page 2-17)
 – left front mud guard (page 2-8)

Remove the sealing bolts and washers on the bottom of the shift valve body.



Connect the oil pressure gauge and hose(s) to each inspection hole (hole threads; M8 x 1.25).

TOOLS:

Pressure gauge set **07406-0020005 or**
Pressure gauge **07YAJ-0010300 and**
Pressure gauge hose **07406-0020201**
or equivalent commercially available in U.S.A.

Support the vehicle using a hoist or equivalent and raise the front wheels off the ground.

Start the engine and check the oil pressure as follows.

For line pressure: Shift the sub-transmission into Neutral (set the selector lever in center position) and measure the oil pressure.

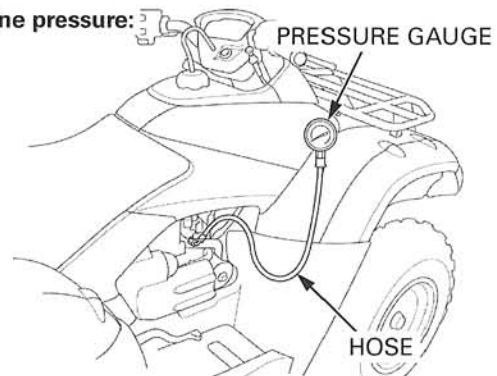
LINE OIL PRESSURE (80°C/176°F):
785 kPa (8.0 kgf/cm², 114 psi) at 5,000 rpm

For 1st, 2nd and 3rd clutch pressure: Shift the sub-transmission in Drive position with the mode select switch at "ESP". Shift to the respective transmission position (1st, 2nd and 3rd) with the ESP shift switch and measure the each clutch oil pressure.

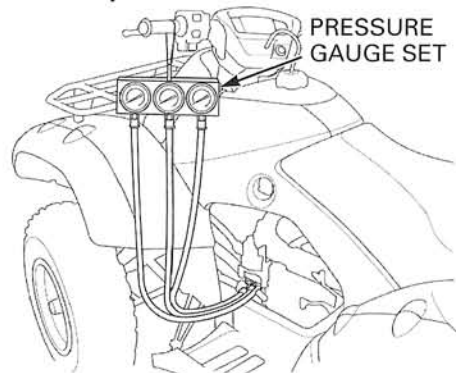
SHIFT CLUTCH OIL PRESSURE (80°C/176°F):
1st, 2nd, 3rd:
785 kPa (8.0 kgf/cm², 114 psi) at 5,000 rpm

Stop the engine.

Line pressure:



1st/2nd/3rd pressure:

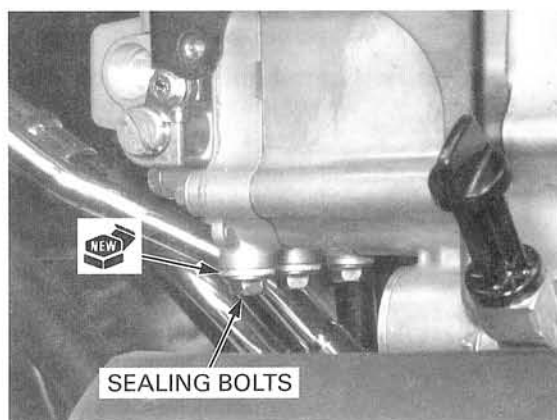
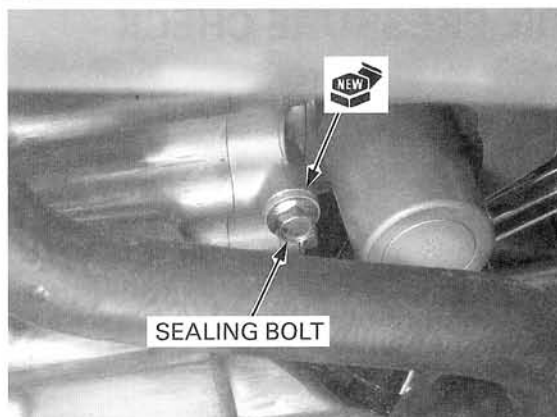


AUTOMATIC TRANSMISSION

Remove the pressure gauge and hose(s).

Install each sealing bolt with a new sealing washer and tighten the bolt(s).

After the oil pressure check is completed, start the engine and make sure there are no oil leaks.



TROUBLESHOOTING CHART OF HYDRAULIC CIRCUIT

PRESSURE CHECK SECTION		MEASUREMENT RESULT (■: Abnormal / Blank: Normal)										REFER TO PAGE
Line pressure											■	REFER TO PAGE
1st clutch pressure				■			■	■	■	■	■	
2nd clutch pressure				■		■		■	■	■	■	
3rd clutch pressure		■				■	■			■	■	
PROBABLE FAULTY PART (applied to O)	Linear solenoid valve									0		12-12
	Emergency valve									0		
	1-2 shift valve			O	O							
	2-3 shift valve		O	O								
	Shift solenoid valve A			O	O							
	Shift solenoid valve B		O	O								
	2nd orifice control valve											
	3rd orifice control valve											
	Shift valve body					O	O	O	O			
	Orifice control valve body					O	O	O	O			
	1st clutch				O							12-29
	2nd clutch			O								
	3rd clutch		O									
	Feed pipe A				O							12-20
	Feed pipe B		O	O		O						
	Feed pipe C		O	O		O						
	Torque converter										O	12-25
	Oil pump										O	4-5
	Oil pipe setting collar		O	O	O						O	12-19
	Oil filter										O	3-12
	Oil strainer										O	13-5
	Oil level										O	3-10

For function of each component, refer to page 26-2.

SHIFT VALVE BODY

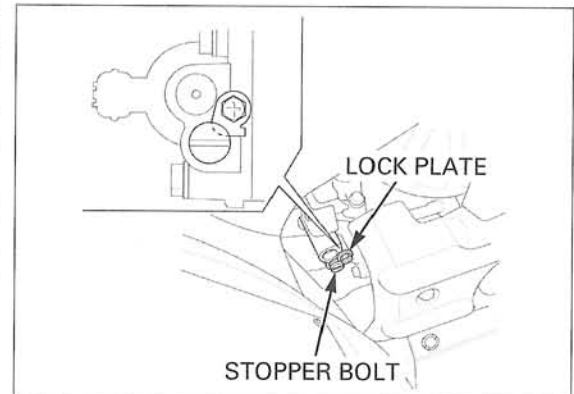
NOTICE

Do not drop or strike the solenoid valves when servicing. Excessive shock may damage the solenoid valve.

EMERGENCY VALVE FUNCTION

NOTE:

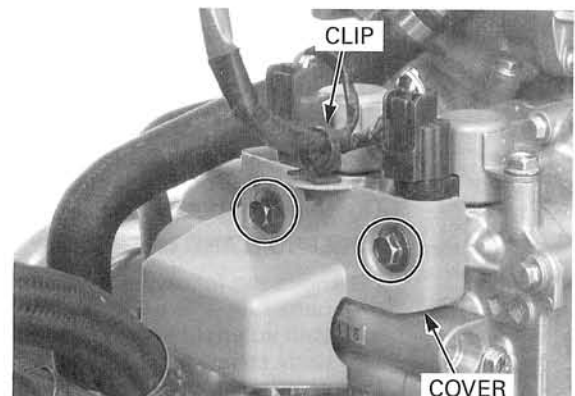
- The emergency valve is used when the hydraulic pressure is shut off by the faulty linear solenoid valve (stuck; mechanical lock), and the vehicle is hindered from running. Open the bypass oil circuit manually to supply hydraulic pressure (In this case, the transmission will be fixed in the 2nd range and the vehicle creeps during idling.)
- The stopper bolt that operates the emergency valve is secured with the lock plate. When trouble occurs, remove the lock plate and turn the stopper bolt all the way in to activate the emergency valve.



REMOVAL

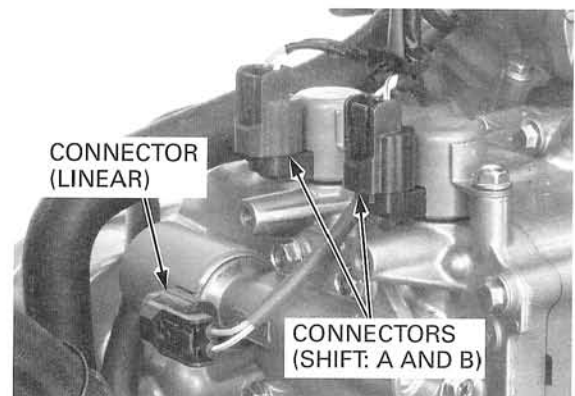
Remove the following:

- left engine side cover (page 2-17)
- left front mud guard (page 2-8)
- left inner fender (page 2-9)
- wire clip
- two setting bolts
- valve body cover



Clean around the valve body with compressed air to remove dust, dirt and foreign material.

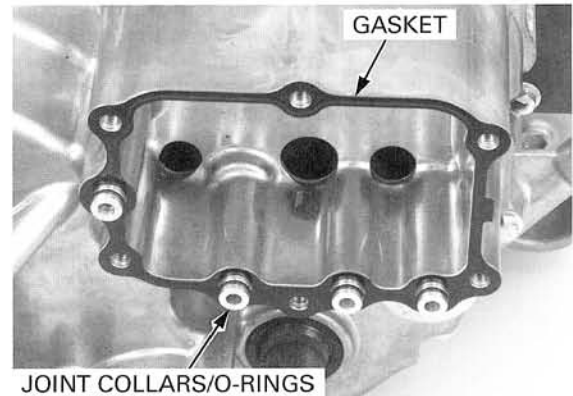
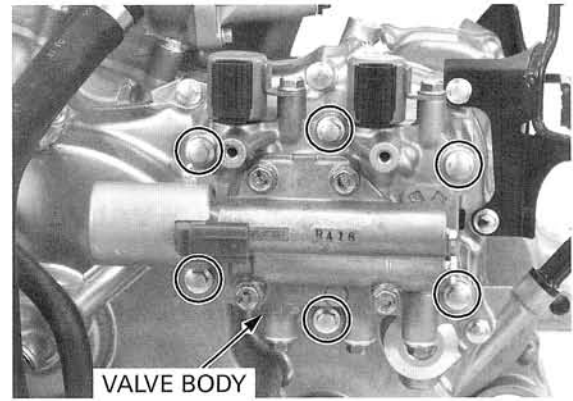
- solenoid valve 2P connectors



AUTOMATIC TRANSMISSION

If the valve body will be disassembled, loosen the six solenoid valve bolts and four sealing bolts (large head; gold). Place a shop towel under the valve body.

- six bolts (small head)
- shift valve body assembly
- gasket
- four oil joint collars
- O-rings



DISASSEMBLY/INSPECTION

NOTE:

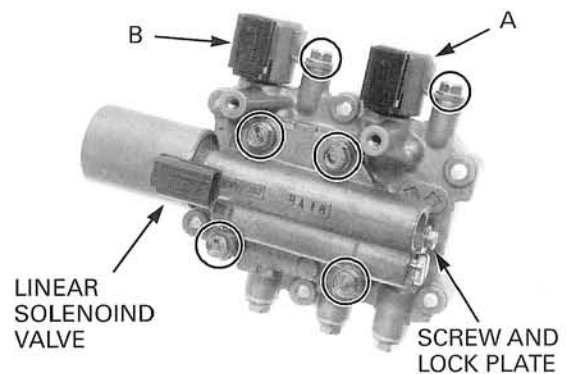
- Keep dust and dirt away from all the parts.
- Take care not to damage the mating surfaces of the valve bodies.

The emergency valve is built in the linear solenoid valve.

SOLENOID AND EMERGENCY VALVES

Remove the following from the valve body cover:

- bolts
- shift solenoid valve A and B (by pulling out of the body cover)
- screw and lock plate
- four bolts and linear solenoid valve assembly
- rubber seal (from the valve body)



Use a hand-operated air pump only.
Do not use a high pressure air source.

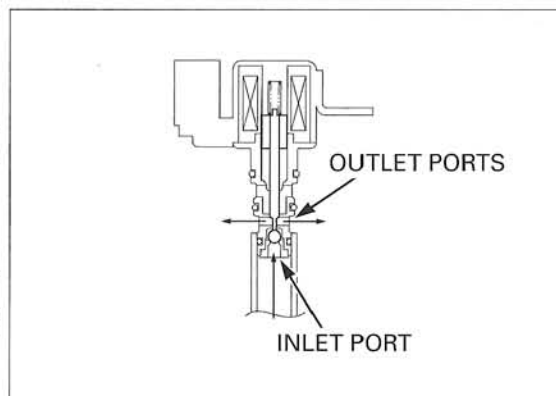
Be careful not to short the positive and negative terminals.

Connect a pressure pump to the input port (filter side) of the shift solenoid valve.

Connect the 12V battery to the solenoid valve terminals and check for air flow conditions (do not use a thin wire because a large amount of current flows).

- valve A: Yellow/black (+) - Green/white (-)
- valve B: Yellow/green (+) - Green (-)

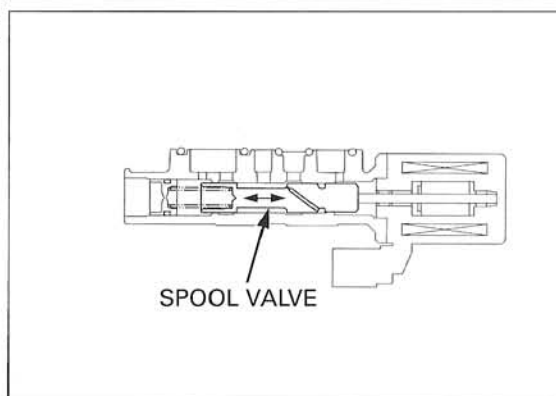
Air should not flow (the pressure should maintained) while the battery is connected, and should flow out of the output ports that goes to the shift valve when the battery is disconnected.



Be careful not to short the positive and negative terminals.

Connect the 12V battery positive terminal to the Yellow/red terminal and negative terminal to the Blue/red terminal of the linear solenoid valve 2P connector, and check the spool valve through the oil passages for operation.

The valve should move to away from the solenoid side when the battery is connected, and should return by spring force when the battery is disconnected.



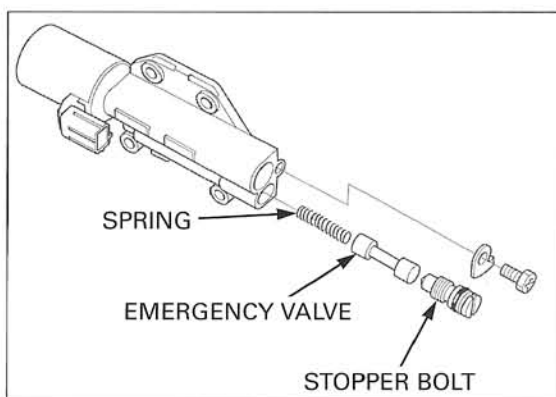
Remove the following from the linear solenoid assembly:

- valve stopper bolt
- emergency valve
- valve spring

Blow through all the oil passages thoroughly (including solenoid valves).

Wash all the parts with a high flash point or non-flammable solvent and blow dry them with compressed air to clean completely.

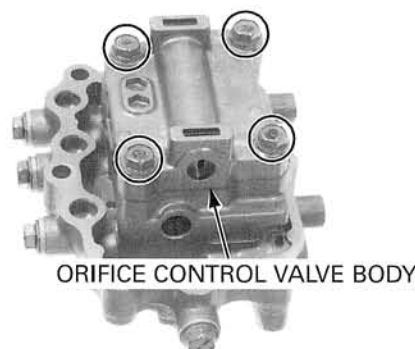
Check the emergency valve and valve bore for scoring, scratch or abnormal wear.



ORIFICE CONTROL AND SHIFT VALVES

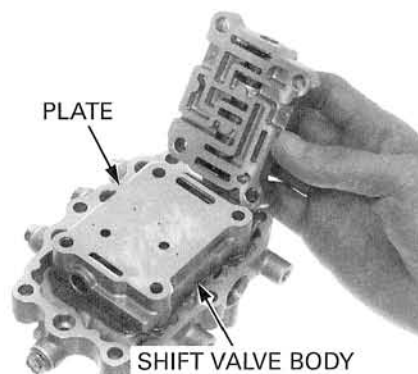
Remove the following:

- four bolts
- orifice control valve body

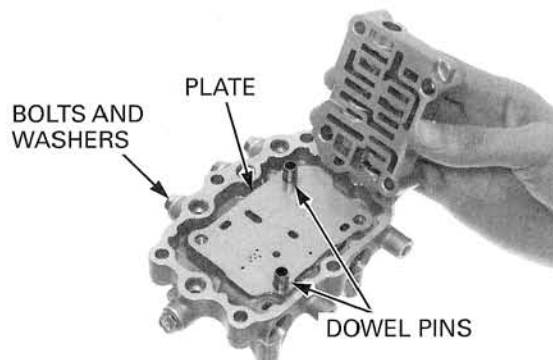


AUTOMATIC TRANSMISSION

- separator plate
- shift valve body

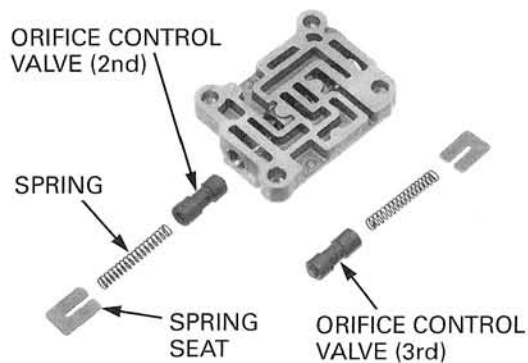


- separator plate
- two dowel pins
- four sealing bolts and washers



Remove the following from the orifice control valve body:

- spring seats
- valve springs
- orifice control valves (2nd and 3rd)



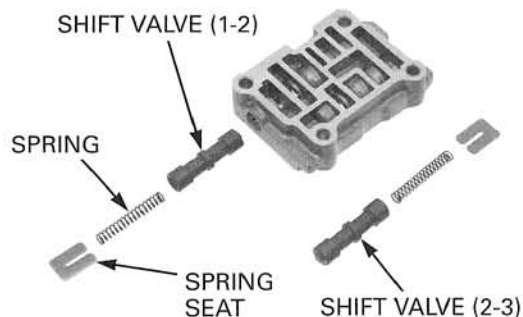
Remove the following from the shift valve body:

- spring seats
- valve springs
- shift valves (1-2 and 2-3)

Blow through all the oil passages thoroughly.

Wash all the parts with a high flash point or non-flammable solvent and blow dry them with compressed air to clean completely.

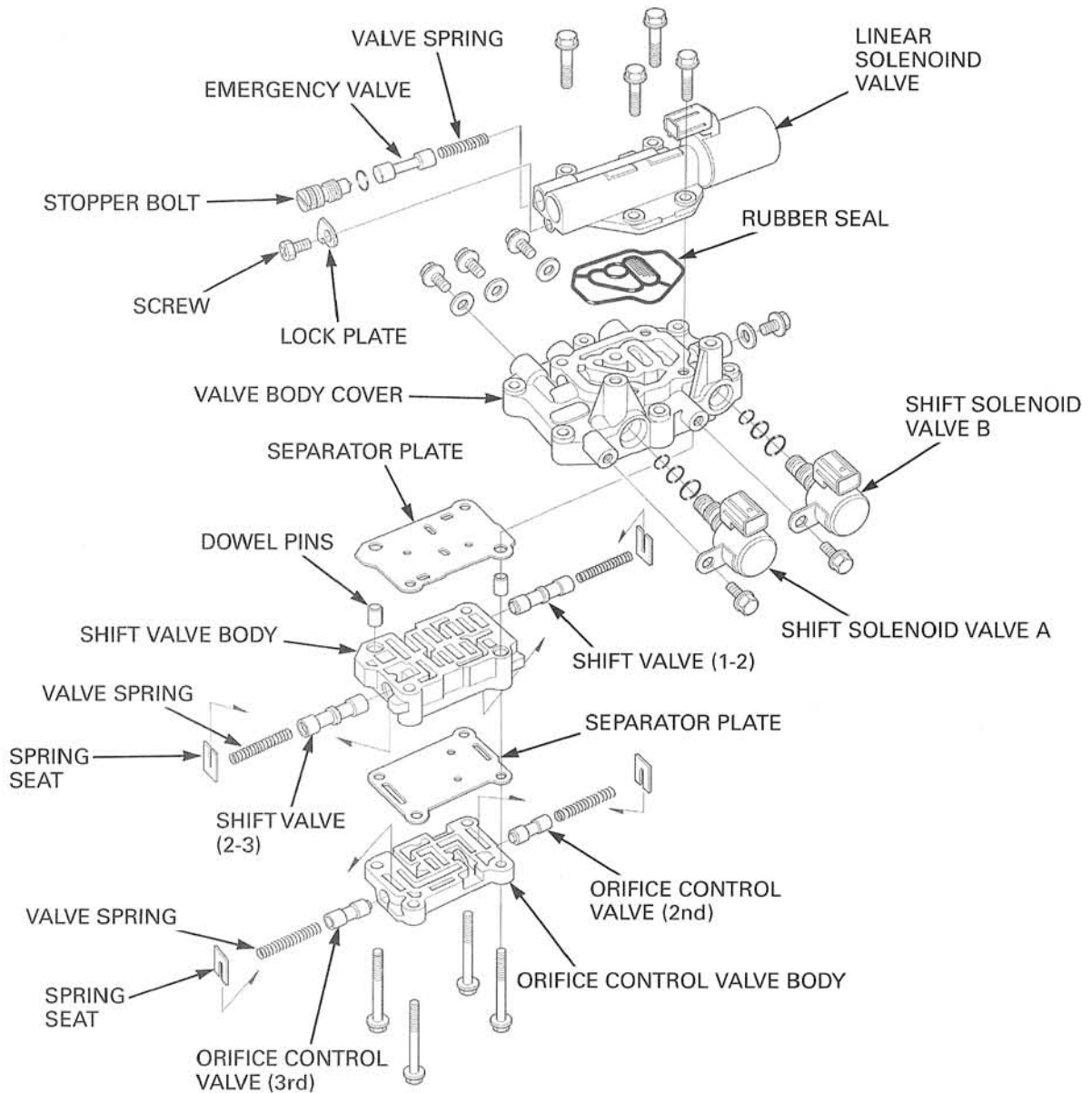
Check the spool valves (orifice control and shift valves) and valve bores for scoring, scratch or abnormal wear.



ASSEMBLY

NOTE:

- Before assembly, clean all the parts with compressed air. Make sure that there is no dust or lint on any parts.

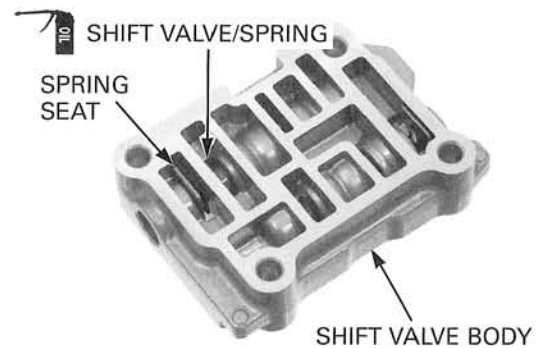


SHIFT AND ORIFICE CONTROL VALVES

Apply engine oil to the outer surface of the spool (shift and orifice control) valves.

Install the spring seats with the slit facing away from the orifice control valve body (page 12-15).

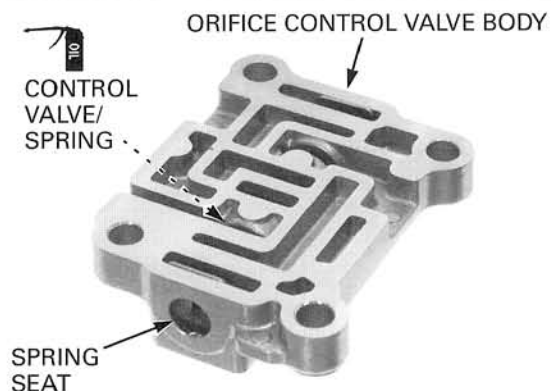
Insert each shift valve (1-2 and 2-3) and spring into the shift valve body and secure it with the spring seat.



AUTOMATIC TRANSMISSION

Install the spring seats with the slit facing away from the shift valve body (page 12-15).

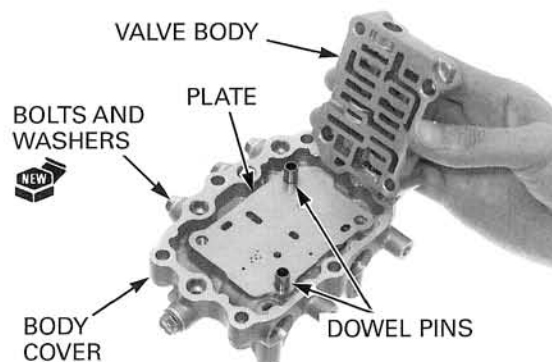
Insert each orifice control valve (2nd and 3rd) and spring into the shift valve body and secure it with the spring seat.



Install the four sealing bolts with new sealing washers.

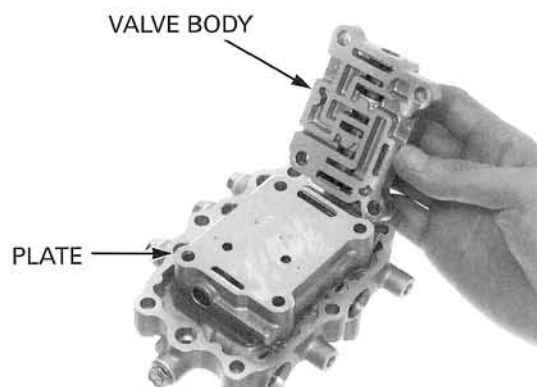
Install the following onto the valve body cover:

- dowel pins
- separator plate
- shift valve body



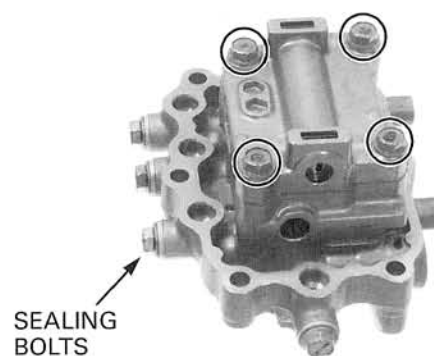
Install the following onto the shift valve body:

- separator plate
- orifice control valve body



Install the four valve body bolts and tighten them securely.

Tighten the four sealing bolts.



SOLENOID AND EMERGENCY VALVES

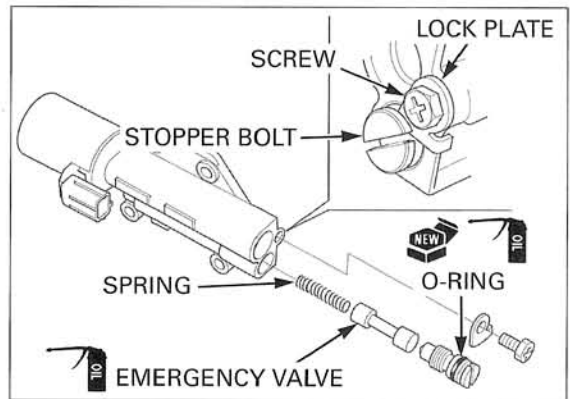
Coat a new O-ring with engine oil and install it into the stopper bolt groove.

Apply engine oil to the emergency valve.

Install the spring and emergency valve into the linear solenoid valve body with the concave head end portion of valve facing in.

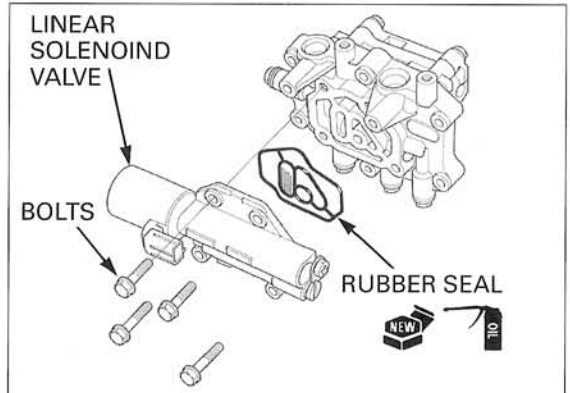
Install the valve stopper bolt and screw it in until the groove edge is aligned with the valve body surface.

Install the lock plate and screw as shown.



Coat a new rubber seal with engine oil and install it into the groove in the linear solenoid valve body.

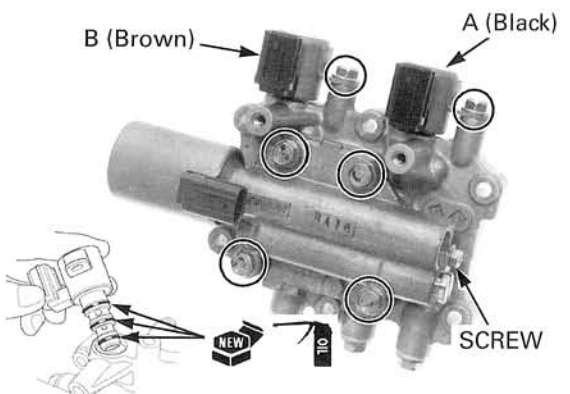
Install the linear solenoid valve assembly with the four bolts.



Coat new O-rings with engine oil and install them into the grooves in each shift solenoid valve.

Do not interchange A and B. Install the shift solenoid valve A and B with the bolts.

Tighten the six solenoid valve bolts and lock plate screw securely.

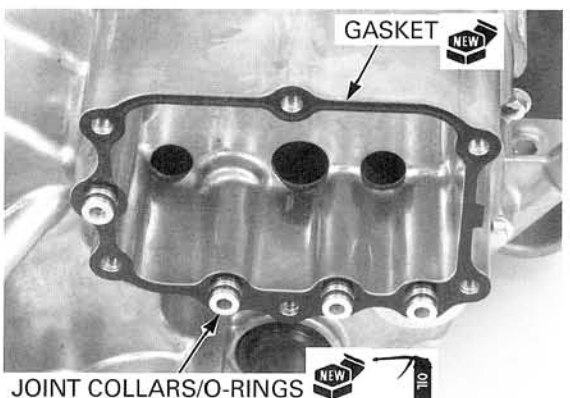


INSTALLATION

Clean the mating surface of the valve body assembly and front crankcase cover.

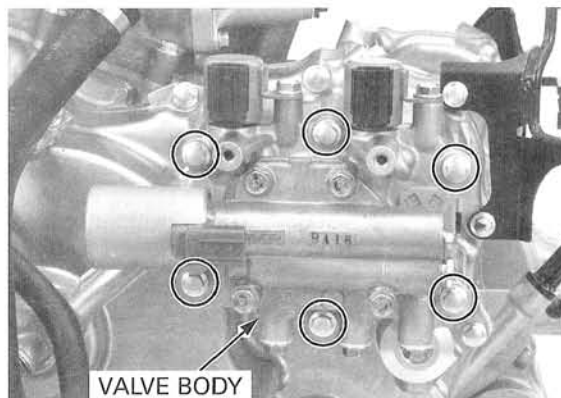
Coat new O-rings with engine oil and install them into the grooves in the oil joint collars.

Install the four joint collars and a new gasket.

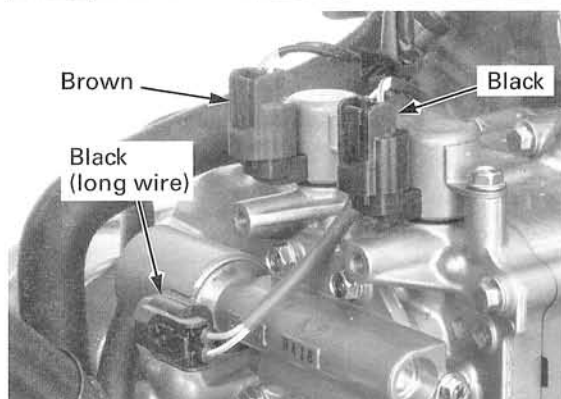


AUTOMATIC TRANSMISSION

Install the shift valve body assembly with the six bolts and tighten them securely.



Connect the solenoid valve 2P connectors.



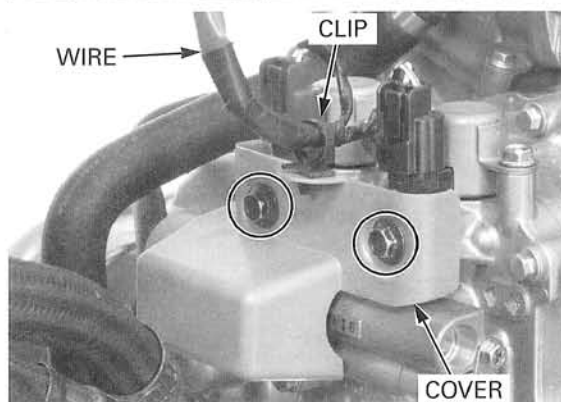
Install the valve body cover with the two setting bolts and tighten them.

Install the wire clip over the wire harness and into the body cover.

Perform the transmission oil pressure check, if necessary (page 12-9).

Install the following:

- inner fender (page 2-9)
- front mud guard (page 2-8)
- engine side cover (page 2-17)

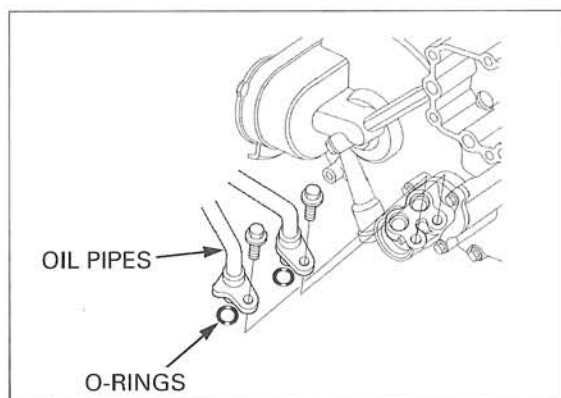


FRONT CRANKCASE COVER

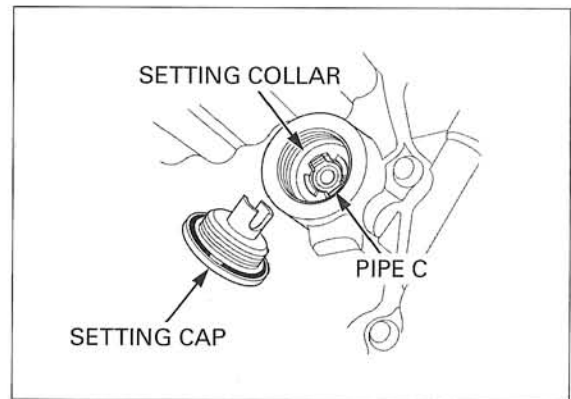
REMOVAL

Remove the following:

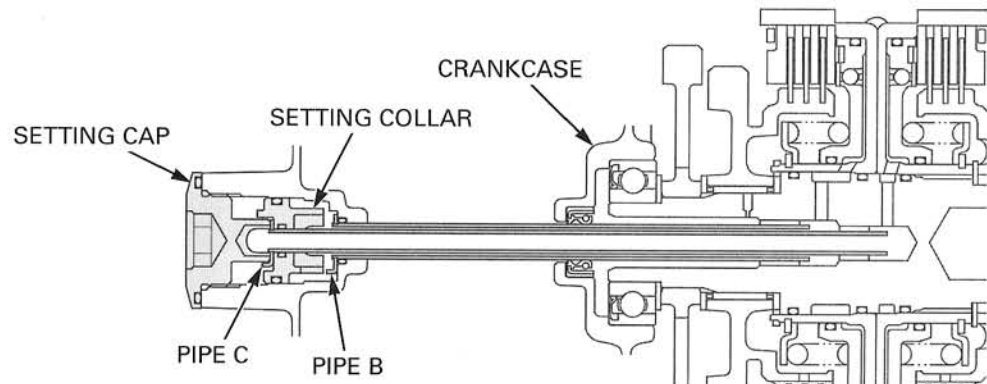
- front mud guards (page 2-8)
- inner fenders (page 2-9)
- front center grille (page 2-10)
- center mud guards (page 2-7)
- engine side covers (page 2-17)
- engine guard (page 2-16)
- front propeller shaft (page 7-6).
- water pump (page 6-14)
- shift valve body (page 12-11)
- oil pipes (by removing each joint bolt)
- O-rings



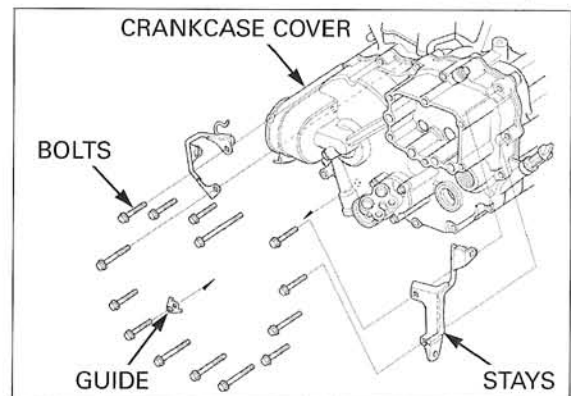
- pipe setting cap and O-ring
- oil feed pipe C
- pipe setting collar (by pulling it out with a needle nose pliers) and O-rings



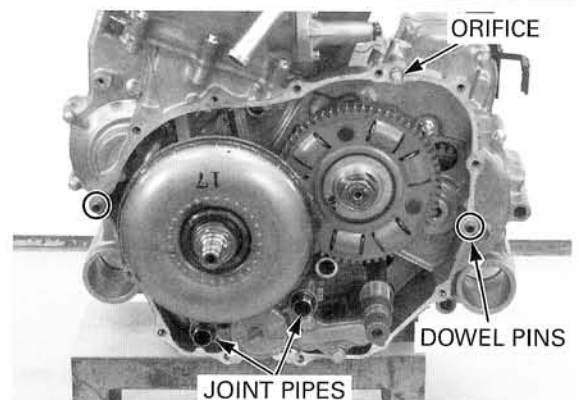
- oil feed pipe B and O-ring



- fourteen bolts
- side cover stays and hose guide
- front crankcase cover



- two oil joint pipes and O-rings
- oil orifice and O-rings
- two dowel pins



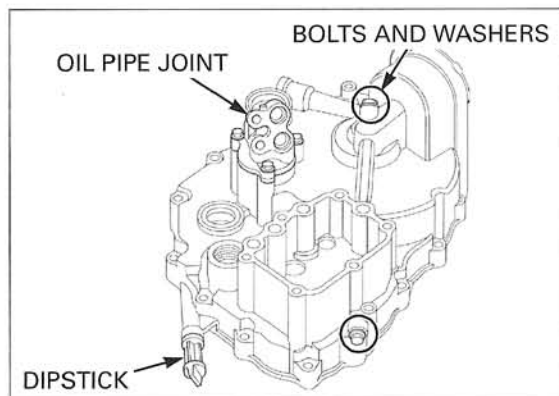
AUTOMATIC TRANSMISSION

CLEANING/INSPECTION

Remove the following:

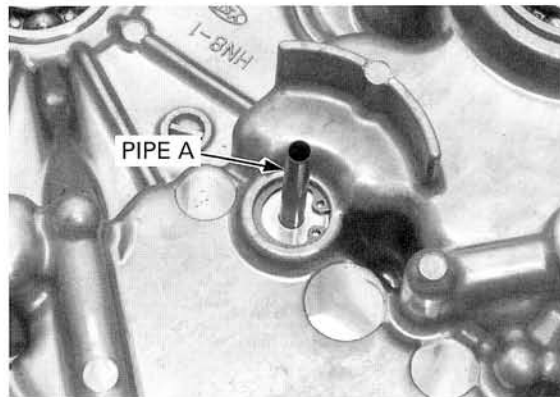
- oil filter (page 3-12)
- dipstick
- sealing bolts and washers
- three bolts and oil pipe joint

Wash the crankcase cover with solvent and blow through all the passages with compressed air to clean them thoroughly.



The feed pipes are supplying engine oil to each shift clutch; A: 1st, B: 2nd and C: 3rd.

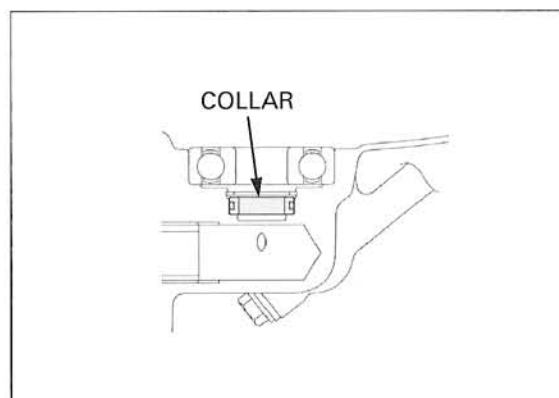
Check the feed pipe A, B and C for abnormal wear or damage.



The hydraulic oil in the torque converter is supplied through the crankshaft.

Check the crankshaft seal collar behind the bearing for abnormal wear or damage.

For replacement, see page 12-20.



BEARING REPLACEMENT

Remove the crankshaft bearing using the special tools.

TOOLS:

Bearing remover, 17 mm

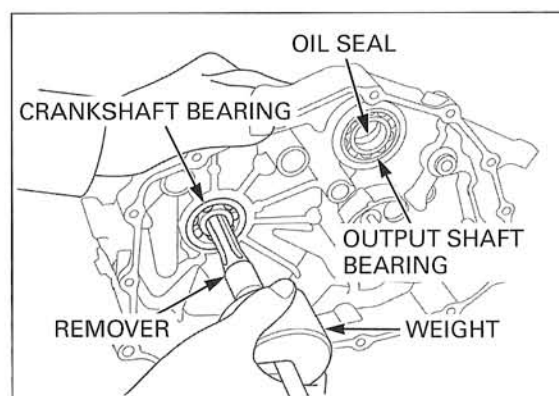
Remover handle

Remover weight

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

Remove the output shaft oil seal.

Drive the output shaft bearings out of the crankcase cover.

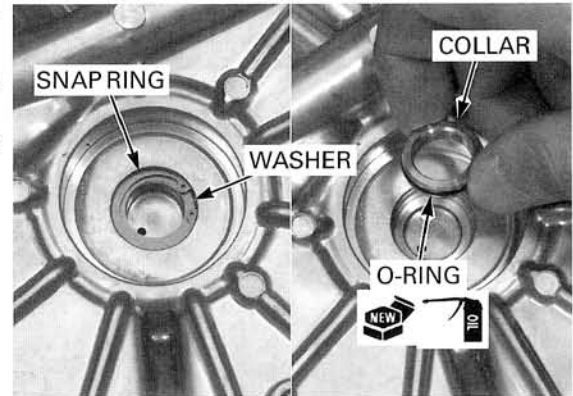


Remove the snap ring and washer, and the seal collar.

Coat a new O-ring with engine oil and install it into the groove in a new collar.

Be careful not to damage the inner surface of the collar.

Install the collar until it is seated. Install the washer and the snap ring into the cover groove properly.



Drive a new bearing in with the marked side facing up.

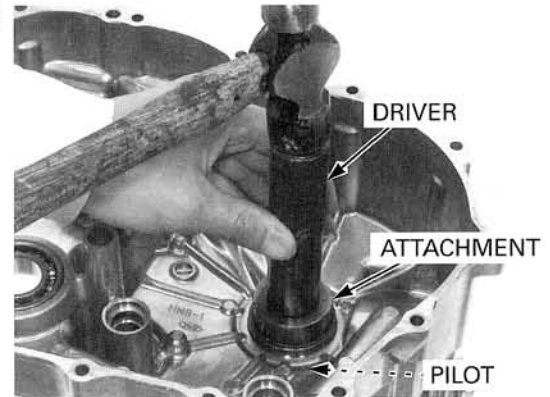
TOOLS:

Crankshaft bearing:

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

Output shaft bearing:

Driver	07749-0010000
Attachment, 42 x 47 mm	07746-0010300
Pilot, 25 mm	07746-0040600



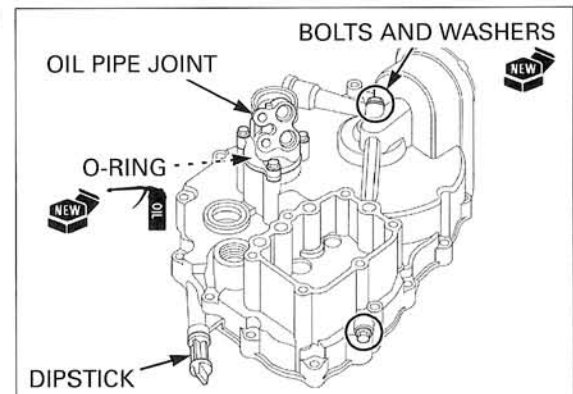
INSTALLATION

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

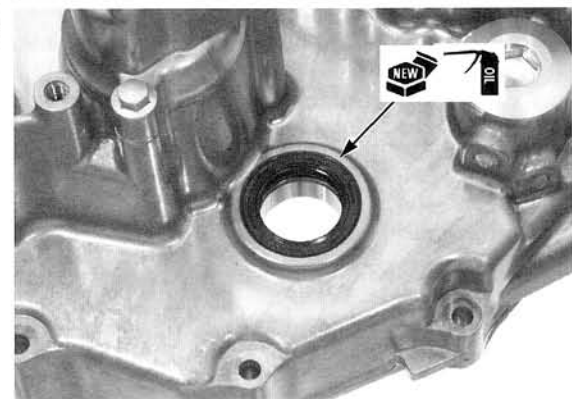
Clean the crankcase and cover mating surfaces.

Install the following if they were removed:

- sealing bolts with new washers
- oil pipe joint with a new O-ring
- dip stick
- oil filter (page 3-12)

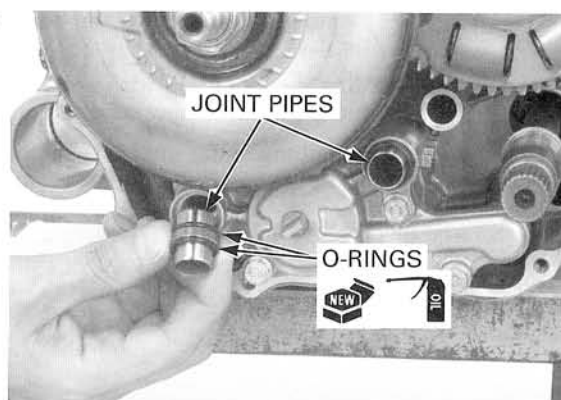


Apply engine oil to the lips of a new oil seal, and install it into the crankcase cover until it is fully seated.



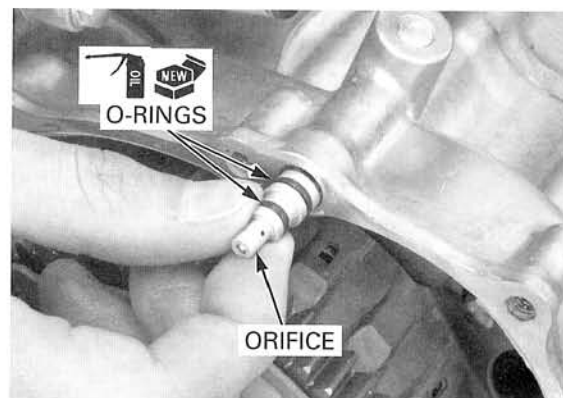
AUTOMATIC TRANSMISSION

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



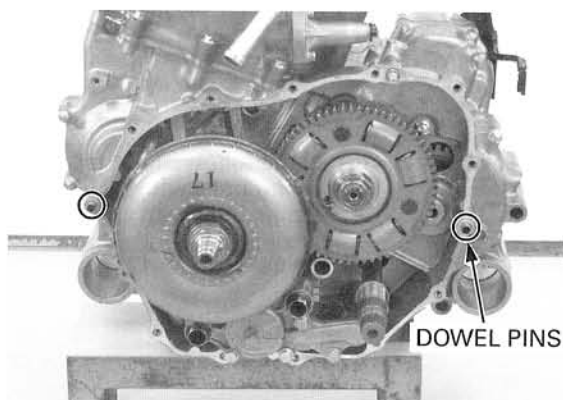
Blow the oil orifice with compressed air to clean the passage.

Coat new O-rings with engine oil and install them into the orifice groove.
Install the oil orifice with the stepped side facing out.



Install the two dowel pins.

Apply liquid sealant to the mating surface of the crankcase cover.

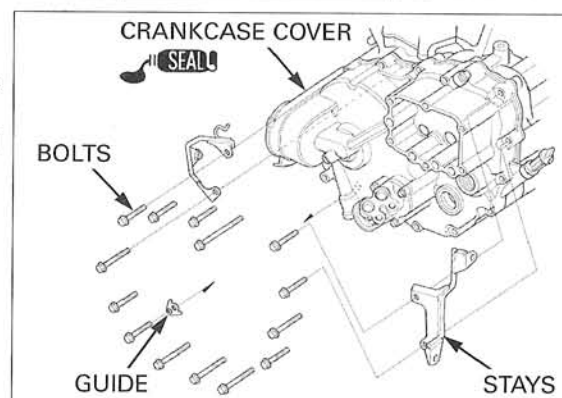


Install the following:

- front crankcase cover
- 14 bolts with the side cover stays and hose guide

Make sure the mating surfaces touch evenly, there should be no clearance between the cover and crankcase.

Tighten the bolts in a crisscross pattern in several steps securely.



Coat a new O-ring with engine oil and install it onto the flange of the feed pipe B.

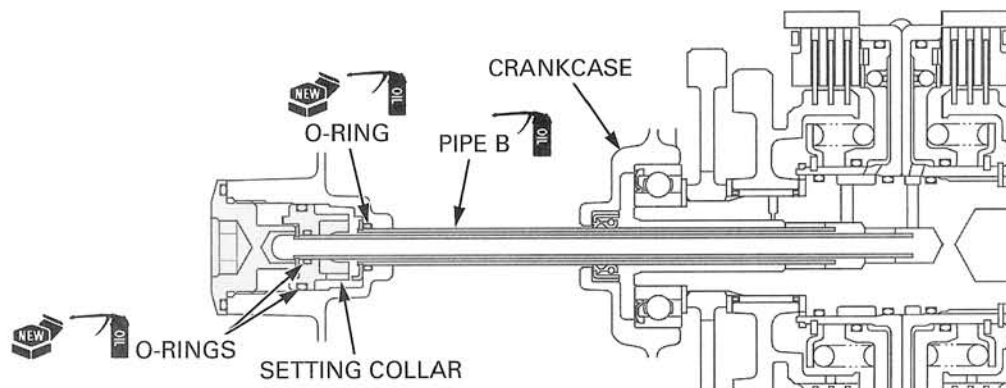
Apply engine oil to the outer surface of pipe B.

Align the flange tabs with the grooves in the cover.

Carefully insert pipe B into the crankcase cover while turning it slowly to avoid damaging the oil seal in the crankcase.

Coat new O-rings with engine oil and install them into the setting collar grooves.

Install the setting collar until it is seated.



Apply engine oil to the outer surface of feed pipe C.

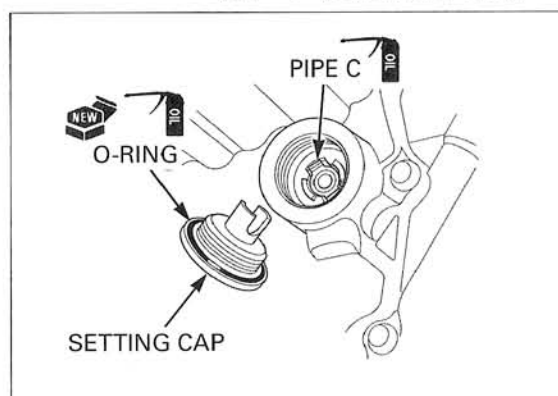
Align the flange tabs with the grooves in the collar.

Insert pipe C while turning it slowly to avoid damaging the O-ring in the setting collar.

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

Install the setting cap and tighten it.

TORQUE: 21 N·m (2.1 kgf·m, 15 lbf·ft)



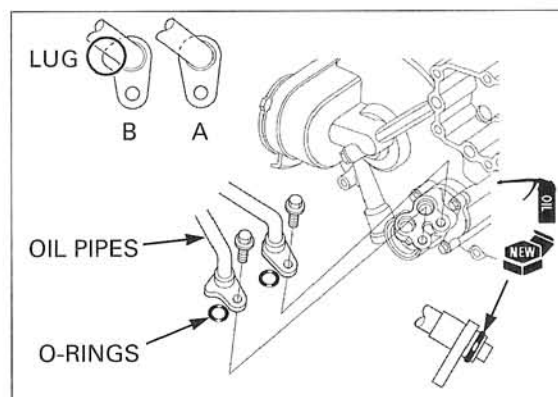
Coat new O-rings with engine oil and install them into the oil pipe grooves.

Connect the pipe B (flange lug) to the front side

Connect the oil pipes with the bolts and tighten them securely.

Install the following:

- shift valve body (page 12-17)
- water pump (page 6-16)
- front propeller shaft (page 7-9)
- engine side covers (page 2-17)
- center mud guards (page 2-7)
- front center grille (page 2-10)
- inner fenders (page 2-9)
- front mud guards (page 2-8)



TORQUE CONVERTER REMOVAL

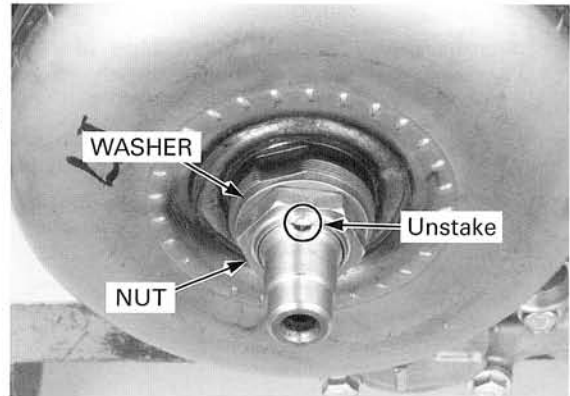
Remove the front crankcase cover (page 12-18).

Be careful not to damage the crankshaft threads.

Unstake the lock nut.

Loosen the lock nut while holding the converter boss with an open end wrench (width across flats: 32 mm).

Remove the lock nut and washer.



Remove the torque converter assembly using the special tools.

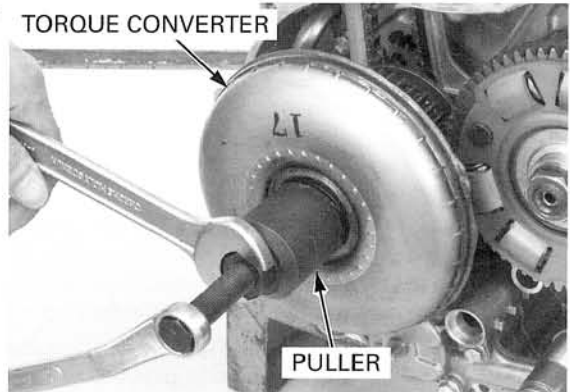
TOOL:

Puller, 35 x1.0 mm

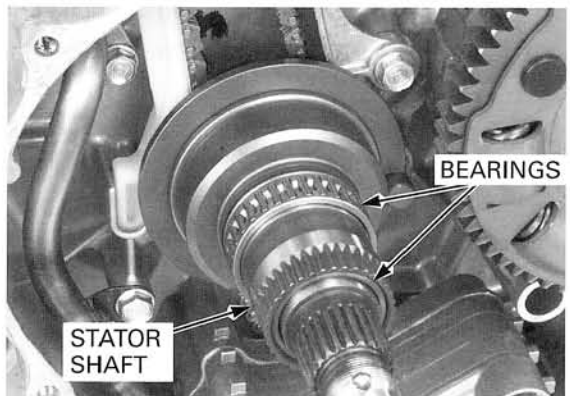
**07933-HA80000 or
07933-HB3000A
(U.S.A. only)**

Remove the following:

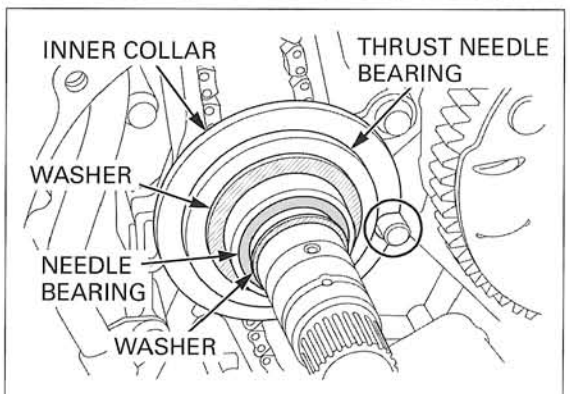
- torque converter assembly



- stator shaft (while turning it counterclockwise)
- needle bearings



- washers
- inner collar
- needle bearings



INSPECTION

NOTE:

- Replace the torque converter as an assembly (from converter to inner collar).

Check the primary drive gear teeth for abnormal wear or damage.

Hold the torque converter and turn the drive gear to check the one-way clutch in the torque converter. The gear should turn counterclockwise smoothly and should not turn clockwise.



Check the needle bearings for abnormal wear or damage.

Check the one-way clutch sprag in the stator shaft for abnormal wear, damage or irregular movement. Check the sprag contacting surface for abnormal wear or damage.

SPRAG



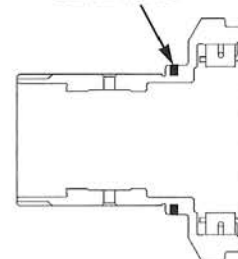
STATOR SHAFT



INNER COLLAR

Check the seal ring on the stator shaft for abnormal wear or damage.

SEAL RING



Assemble the stator shaft and inner collar.

Hold the inner collar and turn the stator shaft. The shaft should turn counterclockwise smoothly and should not turn clockwise.



SHIFT CLUTCH/MAINSHAFT DISASSEMBLY

NOTE:

- For 2nd/3rd shift clutch (countershaft) and mainshaft removal, refer to page 13-2.

1st SHIFT CLUTCH REMOVAL

Remove the torque converter (page 12-24).

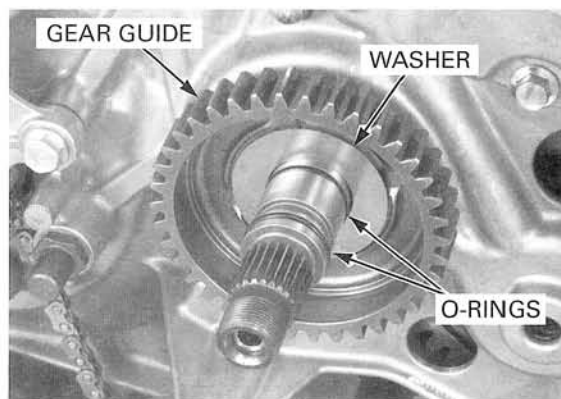
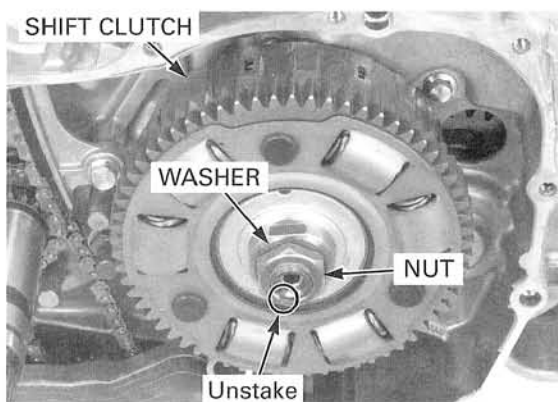
*Be careful not to
damage the
mainshaft threads.*

Unstake the lock nut.

Loosen the lock nut while holding the driven gear boss with an open end wrench (width across flats: 29 mm).

Remove the following:

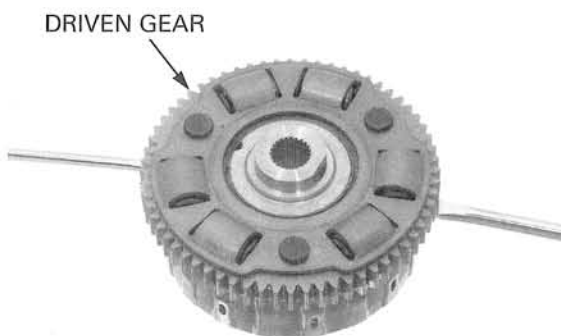
- lock nut
- washer
- 1st shift clutch assembly
- washer
- M1 gear guide
- O-rings



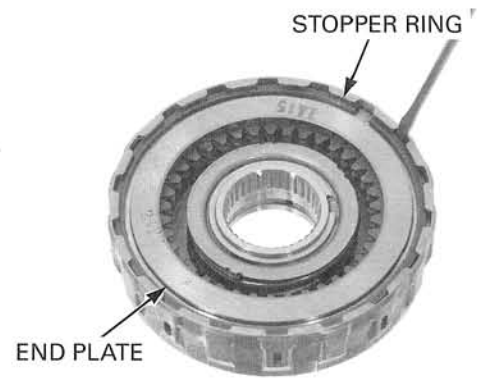
1st SHIFT CLUTCH DISASSEMBLY

Remove the following from the clutch drum:

- primary driven gear
- O-rings

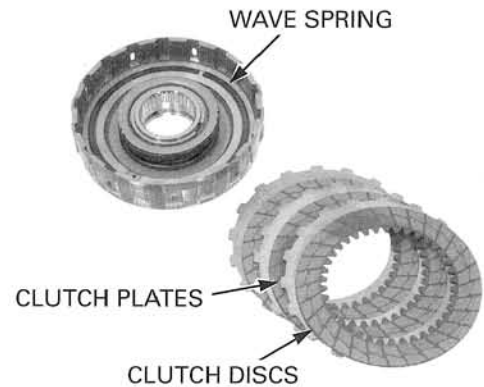


- stopper ring
- end plate



- three clutch discs and plates
- wave spring

Remove the return spring and clutch piston (page 12-28).

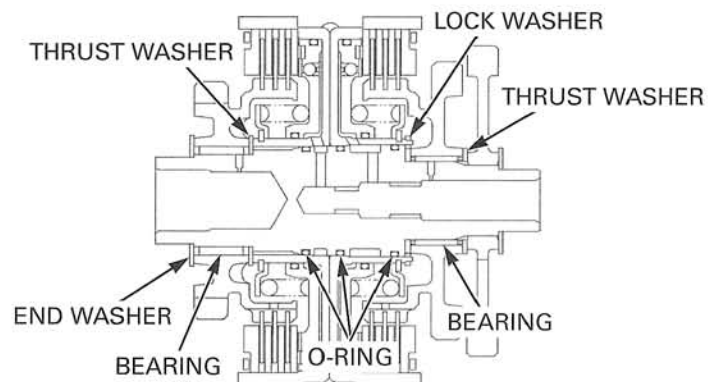
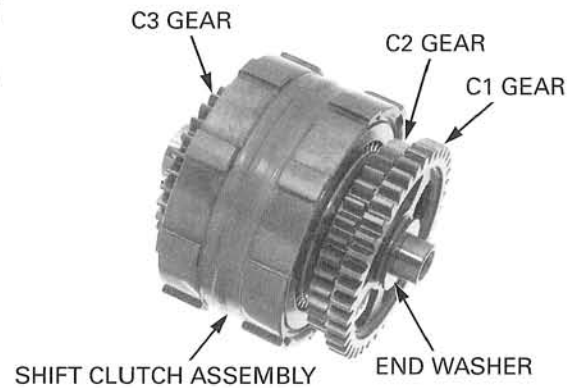


2nd/3rd SHIFT CLUTCH AND MAINSHAFT DISASSEMBLY

Remove the countershaft (2nd/3rd shift clutch) and mainshaft (page 13-5).

Remove the end washers with a screwdriver and disassemble the countershaft:

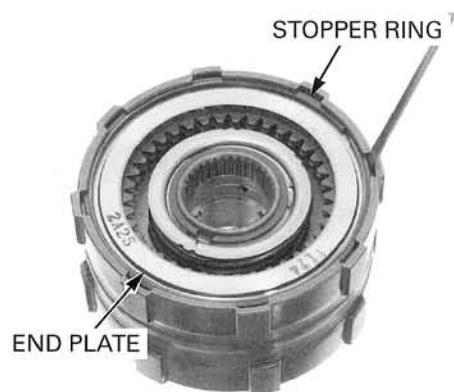
- C1 gear
- thrust washer
- C2 gear
- bearing
- lock washer
- C3 gear
- bearing
- thrust washer
- 2nd/3rd shift clutch assembly
- O-rings



AUTOMATIC TRANSMISSION

Remove the following from each clutch drum:

- stopper ring
- end plate



- three clutch discs and plates
- wave spring

Remove the return spring and clutch piston (page 12-28).



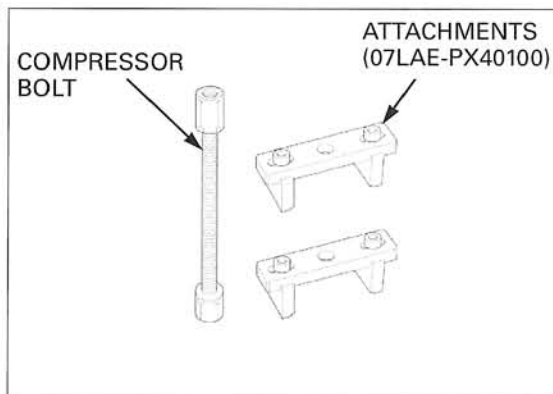
CLUTCH PISTON REMOVAL

Install the following special tools onto the shift clutch.

TOOLS:

Clutch compressor attachment 07LAE-PX40100
(2 required)

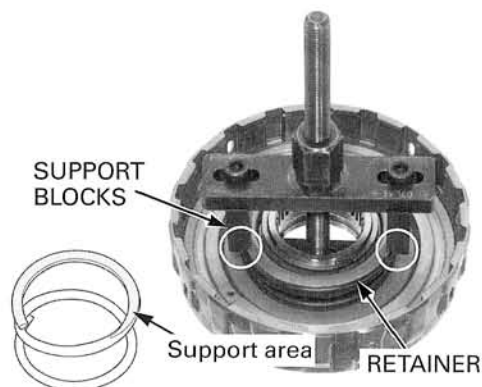
Compressor bolt assembly 07GAE-PG40200 or
07GAE-PG4020A
(U.S.A. only)



NOTE:

If either support block end of the special tool is set over an area of the spring retainer which is unsupported by the return spring, the retainer may be damaged.

- Be sure the special tool is adjusted to have full contact the stepped areas with the spring retainer.



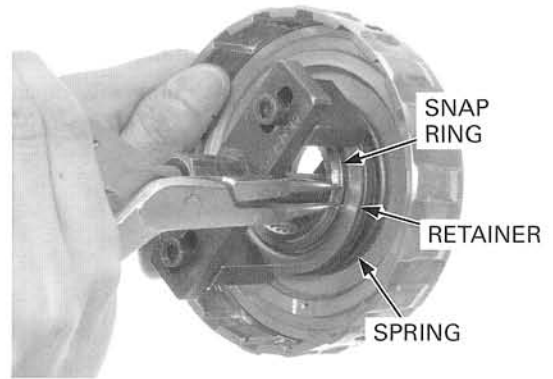
To prevent loss of spring tension, do not compress more than necessary.

Compress the return spring by tightening the nut.

Remove the snap ring from the boss.

Loosen the special tool and remove the following:

- snap ring
- spring retainer
- return spring



Wrap a shop towel around the clutch drum. Apply air pressure to the oil hole while closing the other holes with your finger to remove the clutch piston.

Remove the O-rings from the piston.

Clean all the parts of the shift clutch in solvent thoroughly and blow dry them with compressed air.



MAINSHAFT DISASSEMBLY

Remove the mainshaft (page 13-5).

Disassemble the mainshaft:

- M1 gear
- bearing
- washer
- M3 gear
- snap rings
- M2 gear



INSPECTION

MAINSHAFT

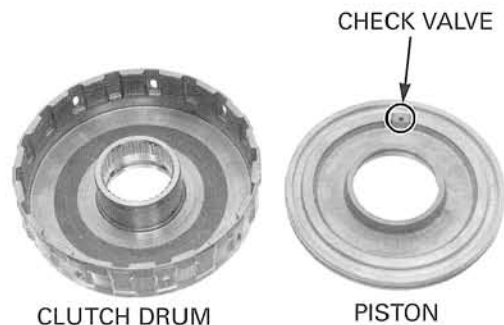
Check each gear tooth and bearing for abnormal wear or damage.

Check the oil holes in the mainshaft for clogs.

CLUTCH DRUM AND PISTON

Check the clutch drum for nicks, indentations or abnormal wear made by the clutch plates.

Check the oil holes in the drum boss and check valve in the piston for clogs.



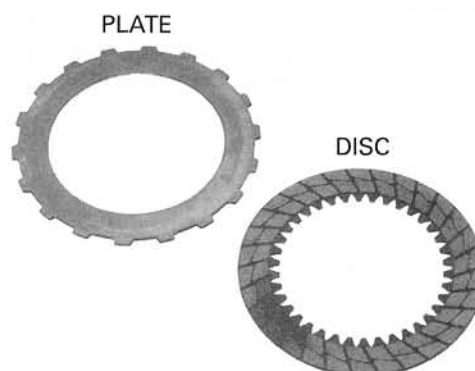
AUTOMATIC TRANSMISSION

CLUTCH DISC AND PLATE

Replace the clutch discs and plates as a set.

Check the linings of the clutch discs for wear (disc groove disappearance).

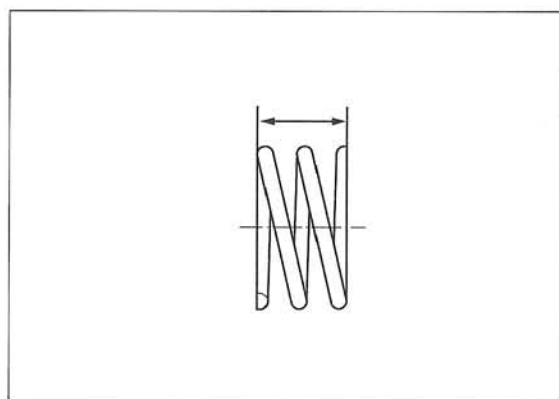
Check the clutch plates for discoloration.



CLUTCH RETURN SPRING

Measure the spring free length.

SERVICE LIMIT: 31.8 mm (1.25 in)



SHIFT CLUTCH/MAINSHAFT ASSEMBLY

MAINSHAFT ASSEMBLY

Blow through the oil passages in the mainshaft with compressed air.

Apply engine oil to the each gear teeth and bearing.

Install the snap ring and washer with the chamfered (rolled) edge facing away from the thrust load.

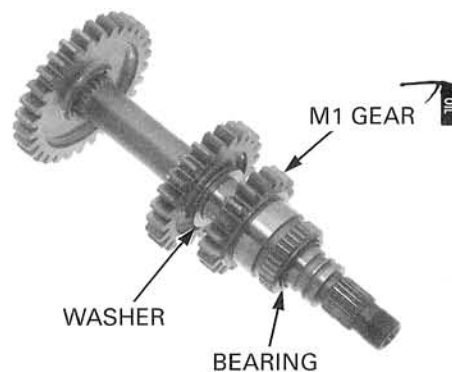
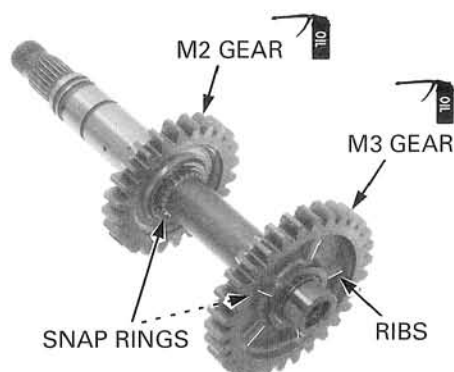
Install the following onto the mainshaft:

- M2 gear
- snap rings (so that its end gap aligns with the groove in the splines)
- M3 gear (with the ribs facing out)

- washer
- bearing
- M1 gear

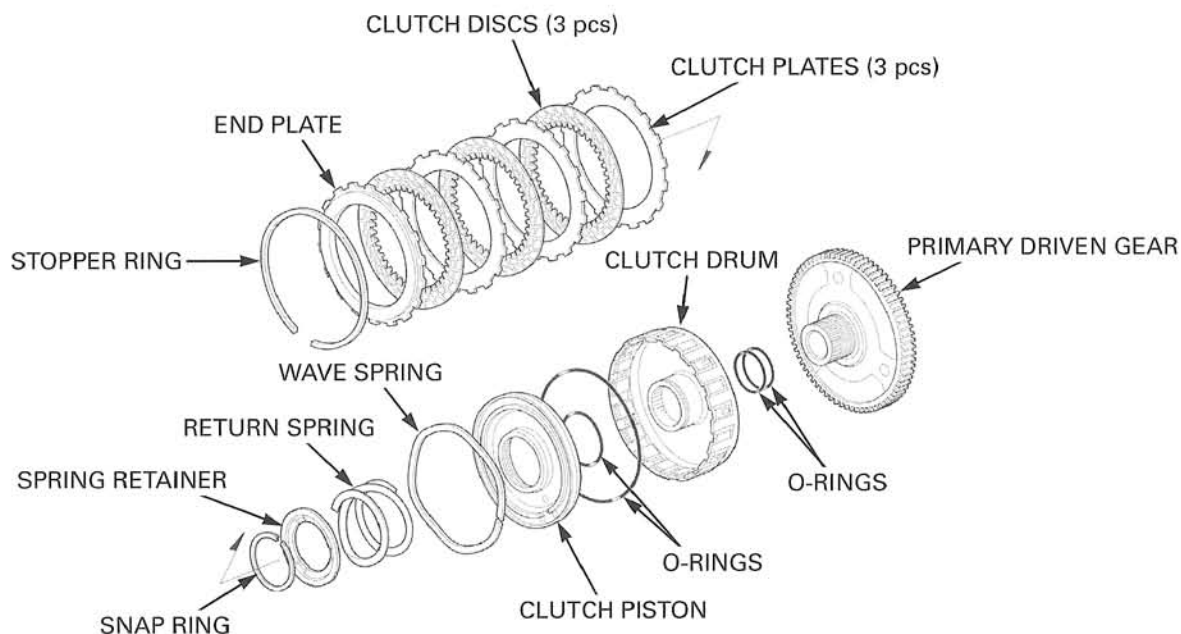
Make sure the snap rings are fully seated in the shaft grooves.

Install the mainshaft assembly with the countershaft (2/3 shift clutch) (page 13-8).



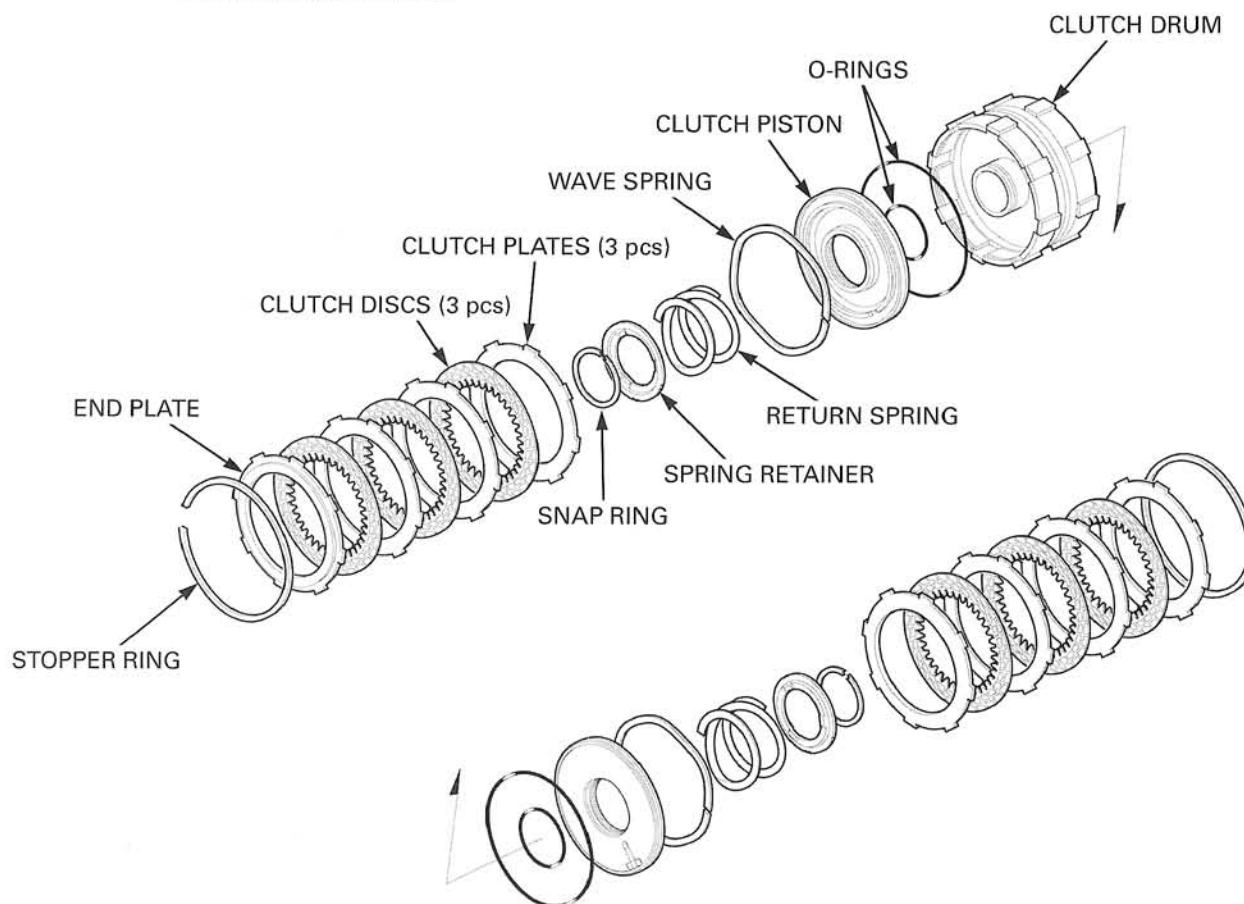
SHIFT CLUTCH ASSEMBLY

1st SHIFT CLUTCH



AUTOMATIC TRANSMISSION

2nd/3rd SHIFT CLUTCH

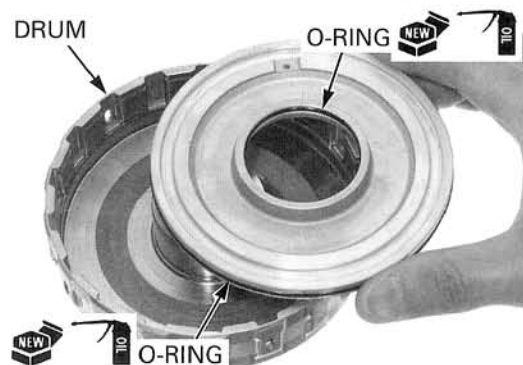


All shift clutches (1st, 2nd and 3rd) use the following procedure.

Clean the inner surface of the clutch drum thoroughly and blow through the oil holes in the drum boss and check valve in the piston.

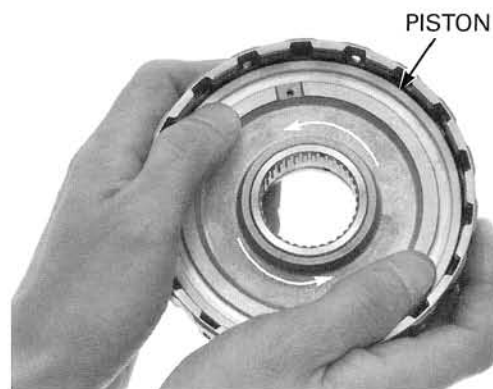
Apply engine oil to new O-rings and install them into the piston groove.

Place the clutch piston into the clutch drum in the direction shown.



Be careful not to pinch the O-rings with too much force.

Install the piston while turning it to ensure proper seating.



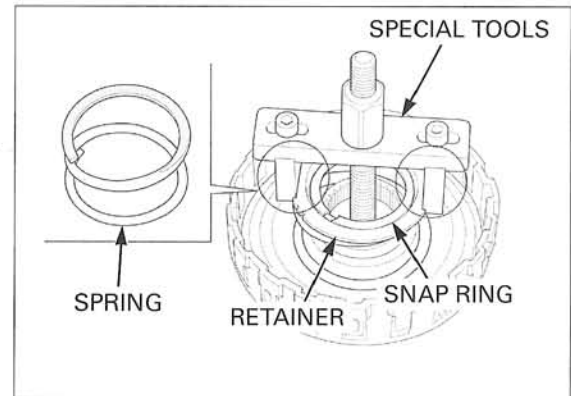
Place the following into the clutch drum.

- return spring
- spring retainer
- snap ring

Install the special tools while adjusting their position carefully (page 12-28).

To prevent loss of spring tension, do not compress more than necessary.

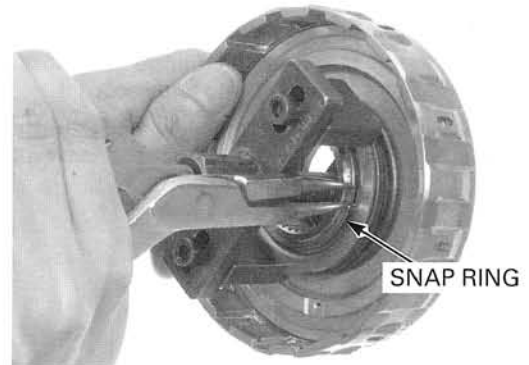
Compress the return spring by tightening the nut.



Align the end gap with the groove (3 places) in the spring retainer.

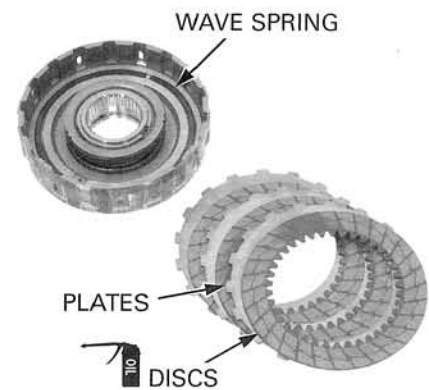
Install the snap ring into the groove in the drum boss properly.

Loosen the special tools and remove them.



Install the wave spring into the piston groove.

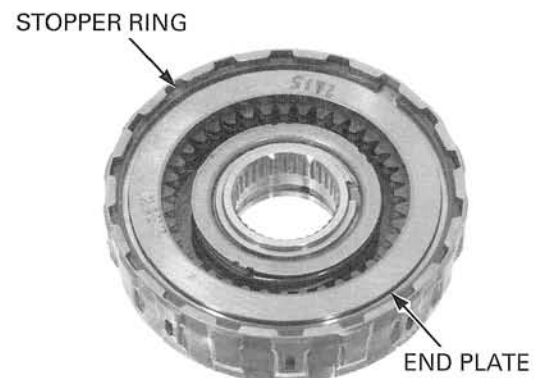
Coat the clutch discs with clean engine oil. Install the three clutch plates and discs alternately, starting with the plate.



Install the end plate with the stepped side facing out.

Install the stopper ring into the drum grooves properly.

Perform the initial clearance inspection (page 12-34).



AUTOMATIC TRANSMISSION

CLUTCH INITIAL CLEARANCE CHECK

Assemble the shift clutch.

Measure the clearance between the end plate and top disc.

Set a dial indicator on the end plate with the plate is lowered.

Lift the end plate up against the stopper ring and read the clearance, and record it.

Perform this inspection at the three points from 120° apart.

STANDARD: 0.7 – 0.9 mm (0.03 – 0.04 in)

If the clearance is not within the standard value, replace the end plate with a new one as follows.

Remove the stopper ring and end plate.

Measure the flange thickness of the end plate at several points and record it.

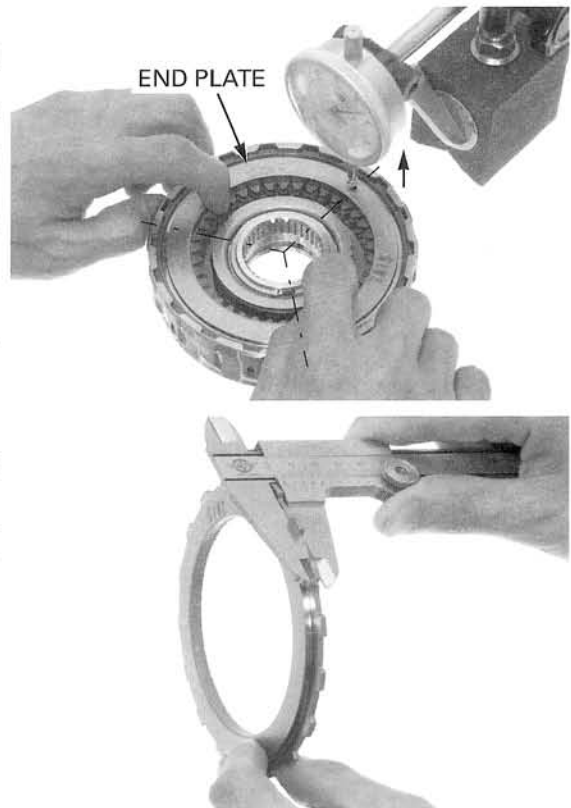
Calculate the new plate thickness using the equation below. Choose a new plate as close to this dimension as possible.

$$A = (B - 0.8) + C$$

A: New plate thickness

B: Recorded clearance

C: Old plate thickness



If the calculated dimension is over the thickest plate thickness, replace the clutch discs and plates as a set.

Select the end plate, and install it and the stopper ring drum grooves properly.

1st CLUTCH		2nd/3rd CLUTCH	
Mark	Thickness	Mark	Thickness
1	2.1 mm	1	2.3 mm
2	2.2 mm	2	2.6 mm
3	2.3 mm	3	2.9 mm
4	2.4 mm	4	3.2 mm
5	2.5 mm	5	3.5 mm
6	2.6 mm	11	2.15 mm
7	2.7 mm	12	2.45 mm
8	2.8 mm	13	2.75 mm
9	2.9 mm	14	3.05 mm
		15	3.35 mm
		16	3.65 mm

2nd/3rd shift clutch: Install the countershaft and transmission gears (page 12-35).

1st shift clutch: Install the primary drive gear (page 12-35).

COUNTERSHAFT ASSEMBLY (2nd/3rd Shift Clutch)

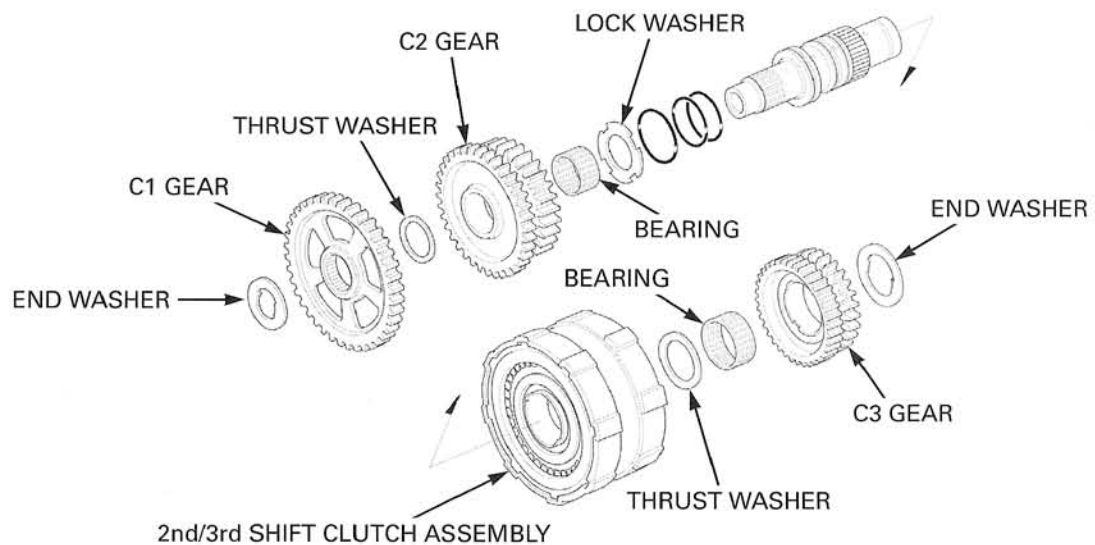
Blow through the oil passages in the countershaft with compressed air.

Coat new O-rings with engine oil and install them into the shaft grooves as shown. Install the countershaft into the shift clutch by aligning the splines.

Apply engine oil to the gear teeth and the bearings and assemble the countershaft.

NOTE:

- Install the washer with the chamfered (rolled) edge facing away from the thrust load.
- Align the lock washer groove with the tabs on the clutch drum boss.



Install the countershaft assembly with the mainshaft (page 13-8).

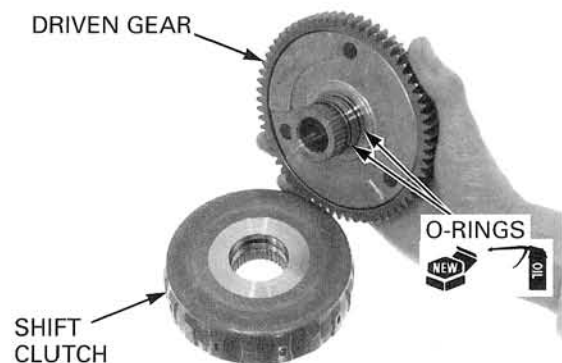
PRIMARY DRIVEN GEAR INSTALLATION (1st Shift Clutch)

Blow through the oil holes in the driven gear boss with compressed air.

Coat new O-rings with engine oil and install them into the boss grooves.

Install the primary driven gear into the shift clutch until it is fully seated.

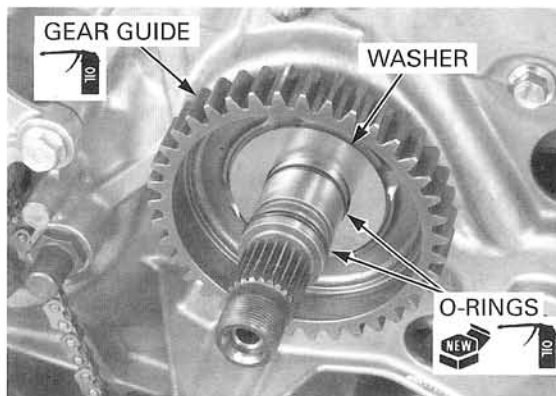
Install the 1st shift clutch assembly (page 12-36).



1st SHIFT CLUTCH INSTALLATION

Install the following:

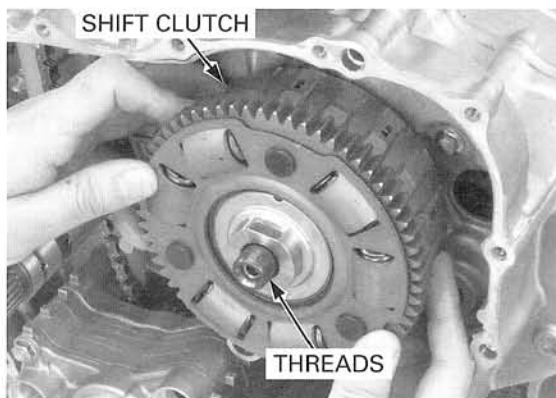
- M1 gear guide (apply engine oil to the gear teeth)
- washer
- new O-rings (apply engine oil)



Line up the tabs of the three clutch discs in the shift clutch.

Align the disc tabs with the gear guide teeth.

Carefully install the shift clutch assembly onto the mainshaft and onto the M1 gear guide until it is fully seated (the whole of the shaft threads are exposed).



Install the washer and a new lock nut.

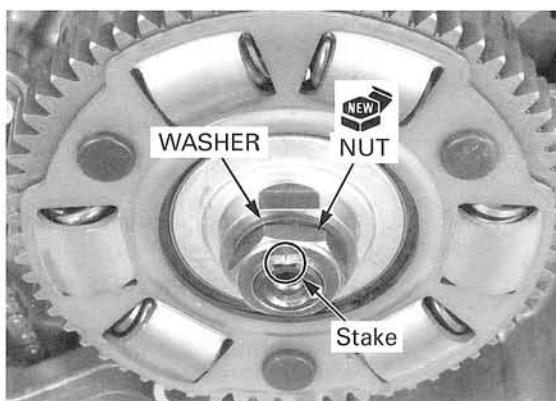
Tighten the lock nut while holding the driven gear boss with an open end wrench (width across flats: 29 mm).

TORQUE: 108 N·m (11.0 kgf·m, 80 lbf·ft)

Be careful not to damage the mainshaft threads.

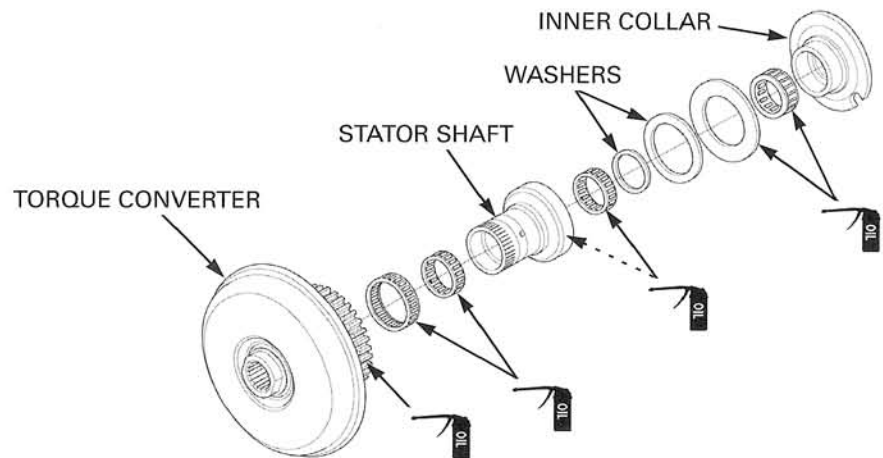
Stake the lock nut into the shaft groove.

Install the torque converter (page 12-37).



TORQUE CONVERTER INSTALLATION

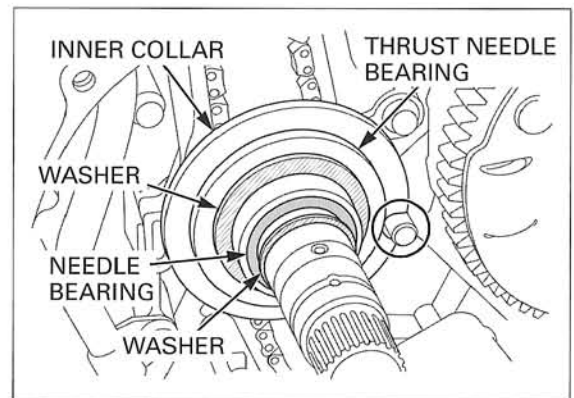
Apply engine oil to the bearings, gear teeth and clutch sprag.



Install the needle bearing into the inner collar.
Install the inner collar and onto the crankshaft by aligning the cutout with the stopper pin.

Install the thrust needle bearing onto the inner collar with the needle roller side facing in.

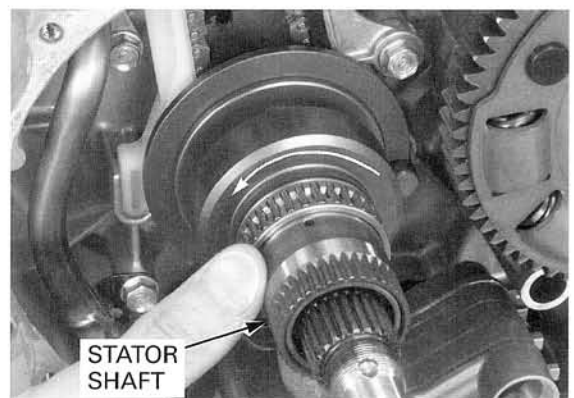
Install the washers.



Install the three bearings onto the stator shaft.



Install the stator shaft while turning it counterclockwise.

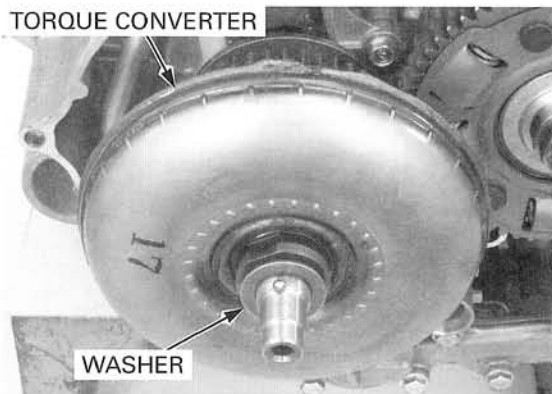


AUTOMATIC TRANSMISSION

Install the torque converter, aligning the splines carefully.

Install the washer.

TORQUE CONVERTER



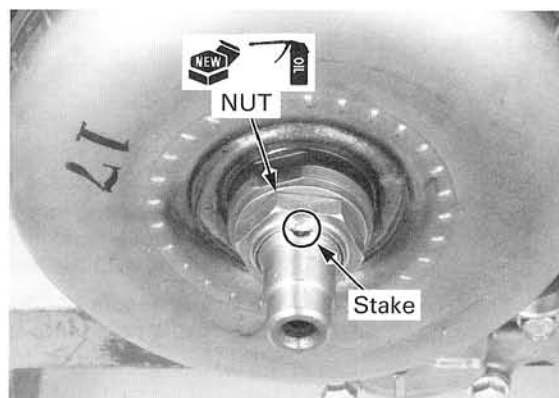
Apply engine oil to the threads of a new lock nut. Install the lock nut and tighten it while holding the converter boss with an open end wrench (width across flats: 32 mm).

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

Be careful not to damage the crankshaft threads.

Stake the lock nut into the crankshaft groove.

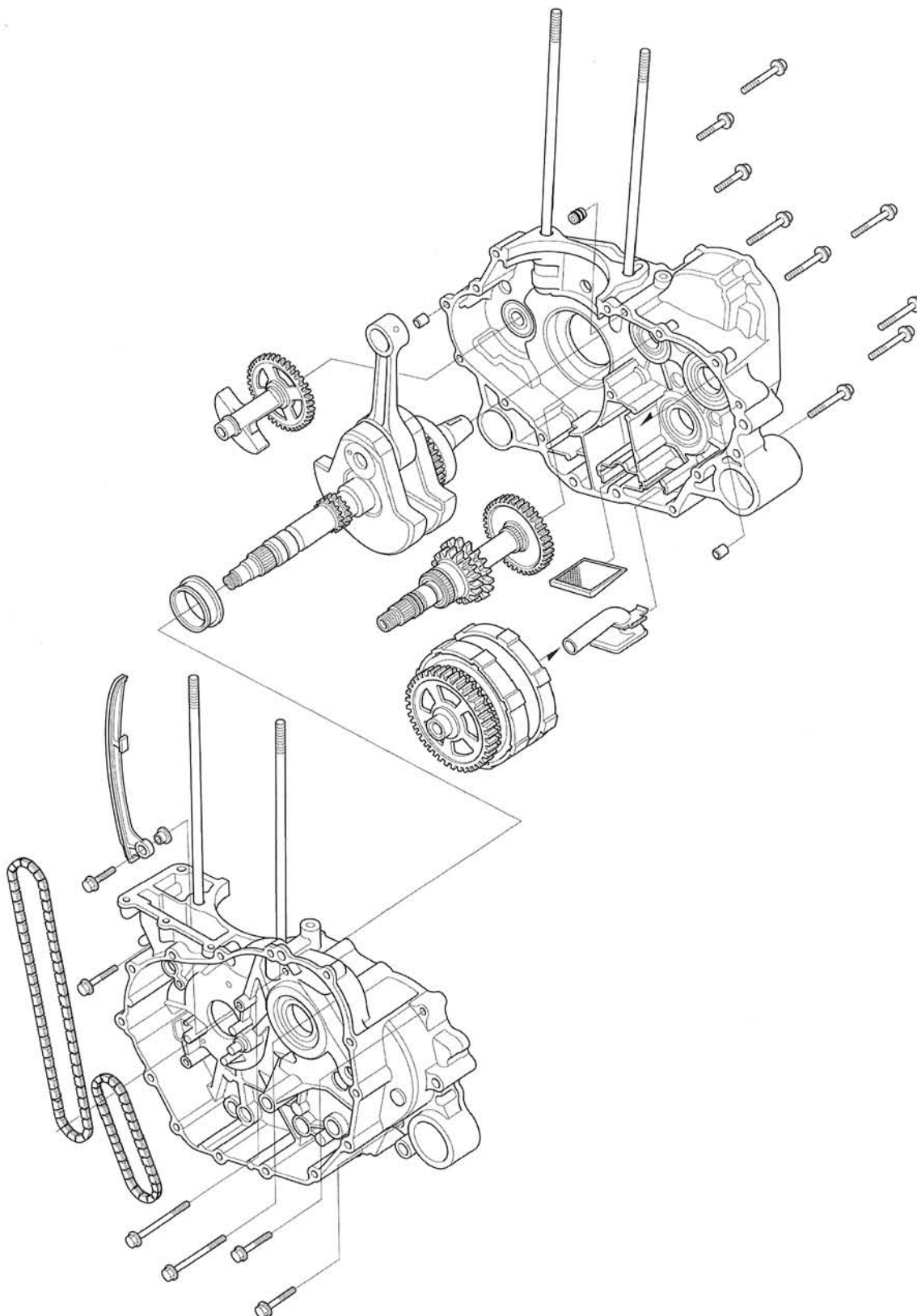
Install the front crankcase cover (page 12-21)



13. CRANKCASE/CRANKSHAFT/BALANCER

SYSTEM COMPONENTS	13-2	CRANKSHAFT	13-5
SERVICE INFORMATION	13-3	CRANKCASE BEARING REPLACEMENT	13-9
TROUBLESHOOTING	13-3	CRANKCASE ASSEMBLY	13-11
CRANKCASE SEPARATION	13-4		

SYSTEM COMPONENTS



SERVICE INFORMATION

GENERAL

- The crankcase halves must be separated to service the crankshaft and automatic transmission (mainshaft and 2nd/3rd shift clutch [countershaft]). To service these parts, the engine must be removed from the frame (page 7-2).
- Refer to page 12-2 for automatic transmission service.
- Be careful not to damage the crankcase mating surfaces when servicing.

SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Crankshaft	Runout	—	0.05 (0.002)
	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)

TOOLS

Driver	07749-0010000
Attachment, 37 X 40 mm	07746-0010200
Attachment, 42 X 47 mm	07746-0010300
Attachment, 52 X 55 mm	07746-0010400
Attachment, 62 X 68 mm	07746-0010500
Attachment, 78 x 90 mm	07GAD-SD40101
Attachment, 20 mm I.D.	07746-0020400
Pilot, 17 mm	07746-0040400
Pilot, 20 mm	07746-0040500
Pilot, 28 mm	07746-0041100
Pilot, 35 mm	07746-0040800
Pilot, 40 mm	07746-0040900
Bearing remover, 17 mm	07936-3710300
Bearing remover, 20 mm	07936-3710600
Bearing remover handle	07936-3710100
Bearing remover weight	07741-0010201 or 07936-371020A or 07936-3710200 (U.S.A. only)
Ball joint remover/installer	07WMF-HN00100
Assembly shaft	07965-VM00200
Threaded adaptor	07965-VM00300
U.S.A. only:	
Puller shaft	07931-ME4010B
Special nut	07931-HB3020A
Threaded adapter	07931-KF00200
Assembly collar	07965-VM00100
Assembly collar spacer	07AMF-HN8A100 (Newly designed tool)

TROUBLESHOOTING

Excessive engine noise

- 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

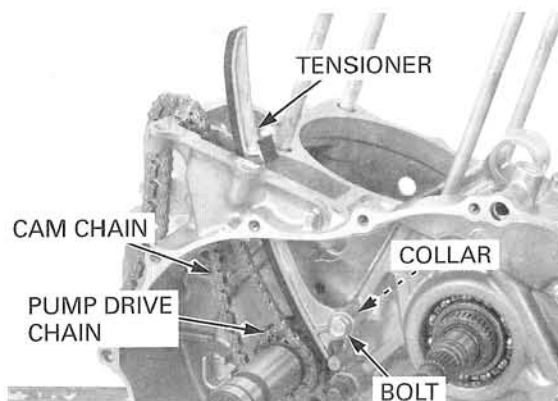
Abnormal vibration

- Improper balancer timing

CRANKCASE SEPARATION

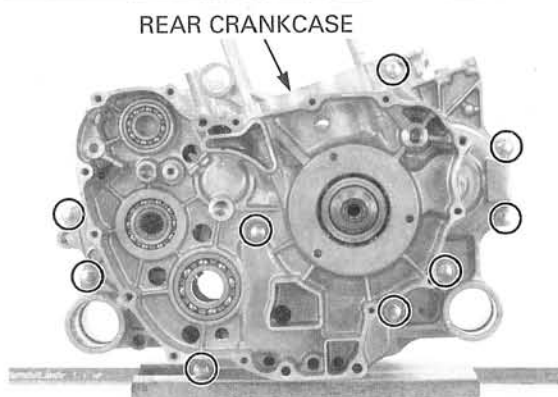
Remove the following:

- engine (page 7-2)
- cylinder and piston (page 9-4)
- sub-transmission/gearshift linkage (page 11-9)
- flywheel/starter clutch (page 10-12)
- torque converter and 1st shift clutch (page 12-24 and 12-26)
- oil pump (page 4-5)
- cam chain
- oil pump drive chain
- pivot bolt
- cam chain tensioner and collar



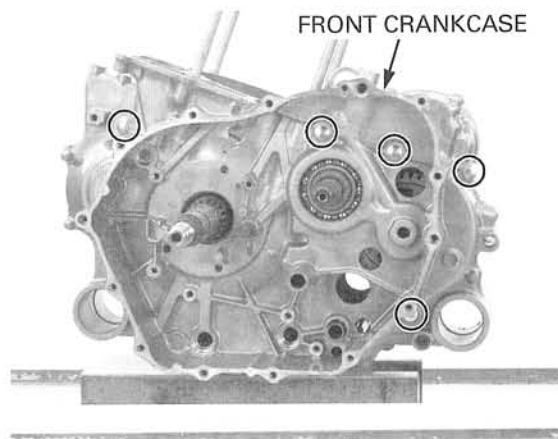
The crankcase bolts are loosened in a crisscross pattern in several steps.

- nine rear crankcase bolts



- five front crankcase bolts

Place the crankcase assembly with the rear crankcase down.

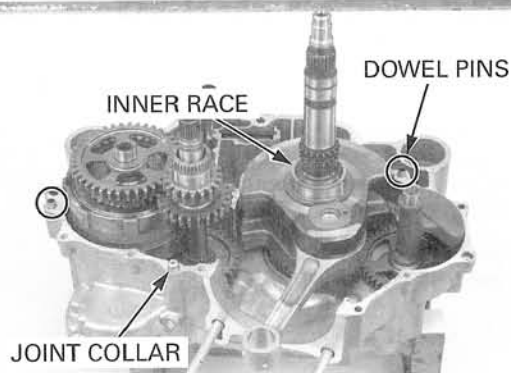


Do not pry the crankcase apart with a screwdriver.

Remove the front crankcase while tapping it at several locations with a soft hammer.

Remove the following:

- crankshaft bearing inner race
- two dowel pins
- oil joint collar and O-rings



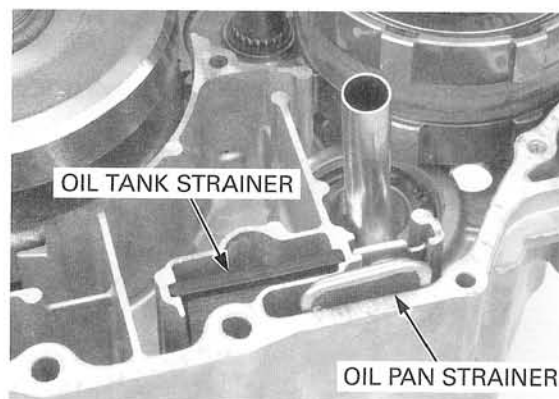
OIL STRAINER CLEANING

Remove the oil strainers.

Clean each strainer screen thoroughly.

Install the oil tank strainer with the thin edge facing the crankcase.

Install the strainers properly as shown.



CRANKSHAFT

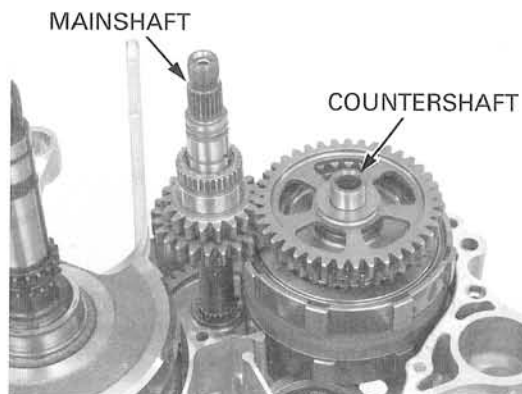
REMOVAL

Separate the crankcase (page 13-4).

Remove the following:

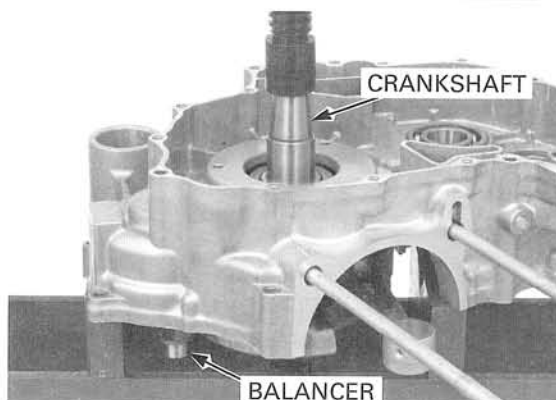
- oil strainers (page 13-5)
- mainshaft and countershaft

For automatic transmission service, see (page 12-27).



Be careful not to damage the crankcase mating surface and crankshaft assembly.

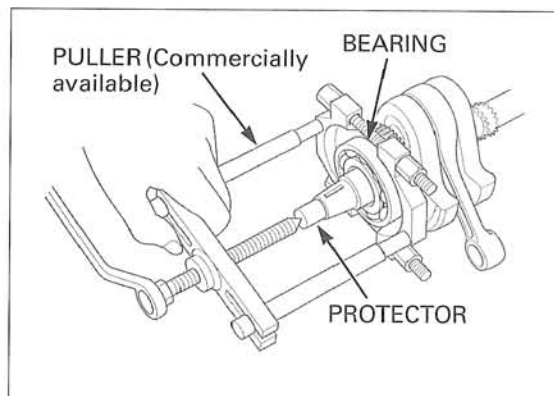
Remove the crankshaft and balancer from the rear crankcase using a hydraulic press. Be sure to hold the crankshaft and balancer while pressing them out of the crankcase.



Remove crankshaft bearing using a bearing puller with a suitable protector.

NOTE:

- Always replace the rear crankshaft bearing with a new one whenever the crankshaft is removed.



CRANKCASE/CRANKSHAFT/BALANCER

INSPECTION

Set the crankshaft in a stand or V-blocks and measure the runout using a dial indicator.

SERVICE LIMIT: 0.05 mm (0.002 in)



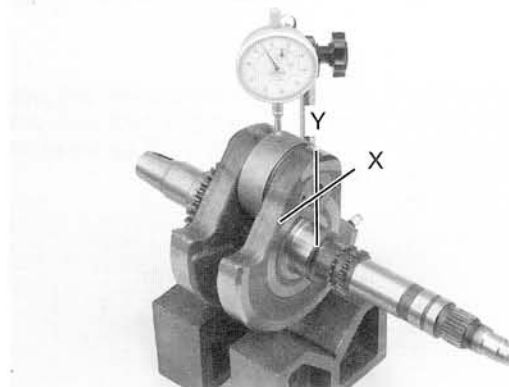
Measure the side clearance between the connecting rod big end and crank weight with a feeler gauge.

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)



Check the balancer gear for wear or damage.



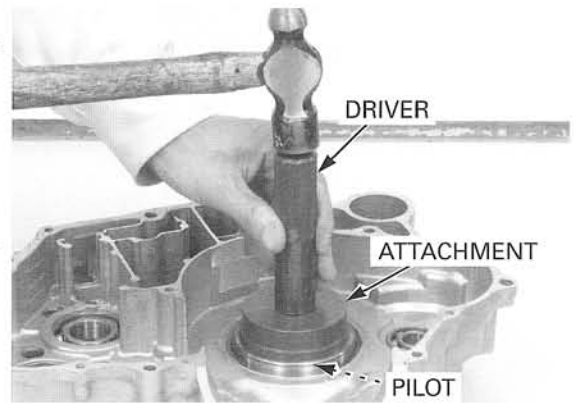
CRANKSHAFT AND BALANCER INSTALLATION

Apply engine oil to a new rear crankshaft bearing. Drive the crankshaft bearing into the rear crankcase with the marking side facing up.

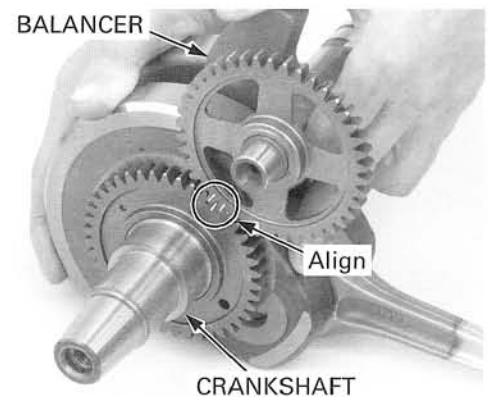
TOOLS:

Driver	07749-0010000
Attachment, 78 x 90 mm	07GAD-SD40101
Pilot, 40 mm	07746-0040900

For other bearing replacement in the crankcase halves, see page 13-9.



Engage the crankshaft and balancer by aligning the index lines on the sides of the balancer drive and driven gears as shown, and install them together into the rear crankcase.



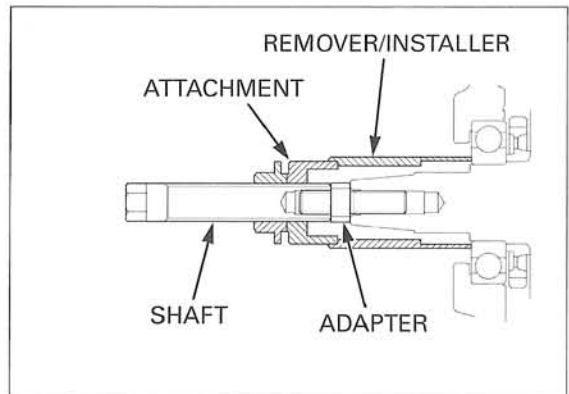
Assemble the special tools onto the crankshaft.

Be careful not to let the connecting rod press against the crankcase mating surface while drawing.

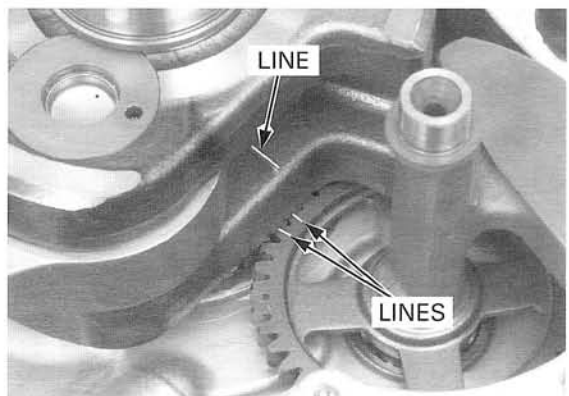
Draw the crankshaft into the bearing inner race by turning the assembly shaft while holding the shaft nut.

TOOLS:

Ball joint remover/installer	07WMF-HN00100
Attachment, 20 mm I.D.	07746-0020400
Assembly shaft	07965-VM00200
Threaded adapter	07965-VM00300
U.S.A. only:	
Puller shaft	07931-ME4010B
Special nut	07931-HB3020A
Threaded adapter	07931-KF00200
Assembly collar	07965-VM00100
Assembly collar spacer	07AMF-HN8A100



After installing the crankshaft in, make sure the index line on the crank weight is aligned between the index lines on the balancer driven gear.

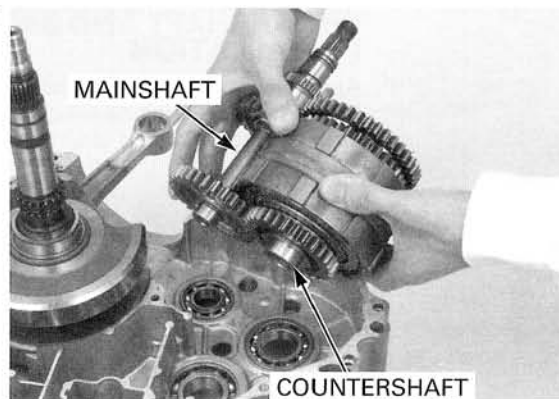


CRANKCASE/CRANKSHAFT/BALANCER

Install the mainshaft and countershaft assemblies as a set into the rear crankcase.

Install the oil strainers (page 13-5).

Assemble the crankcase halves (page 13-11).



CRANKCASE BEARING REPLACEMENT

REAR CRANKCASE

Remove the balancer, mainshaft and shift drum bearings with the special tools.

TOOLS:

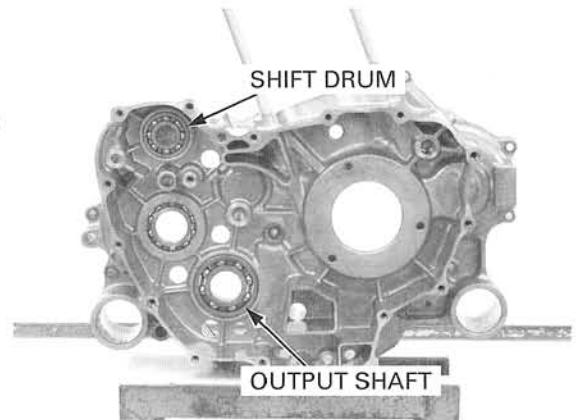
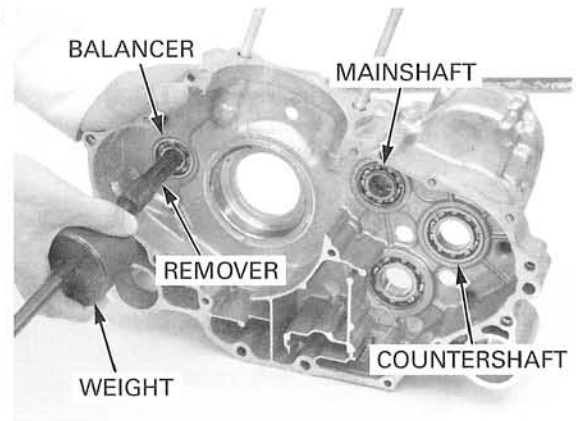
Balancer and Shift Drum Bearings:

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

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 the countershaft and output shaft bearings out of the rear crankcase.



Apply engine oil to new bearings.
Drive the bearings in with the marks facing up.

The mainshaft bearing is installed with the sealed side facing down.

TOOLS:

Mainshaft Bearing

Driver	07749-0010000
Attachment, 37 x 40 mm	07746-0010200
Pilot, 20 mm	07746-0040500

Countershaft Bearing

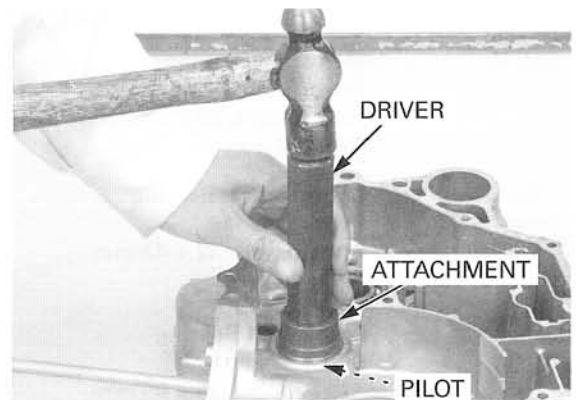
Driver	07749-0010000
Attachment, 52 x 55 mm	07746-0010400
Pilot, 28 mm	07746-0041100

Balancer and Shift Drum Bearing

Driver	07749-0010000
Attachment, 37 x 40 mm	07746-0010200
Pilot, 17 mm	07746-0040400

Output Shaft Bearing

Driver	07749-0010000
Attachment, 62 x 68 mm	07746-0010500
Pilot, 28 mm	07746-0041100



FRONT CRANKCASE

Remove the balancer and countershaft bearings with the special tools.

TOOLS:

Balancer Bearing:

Bearing remover, 17 mm

Remover handle

Remover weight

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

Countershaft Bearing:

Bearing remover, 20 mm

Remover handle

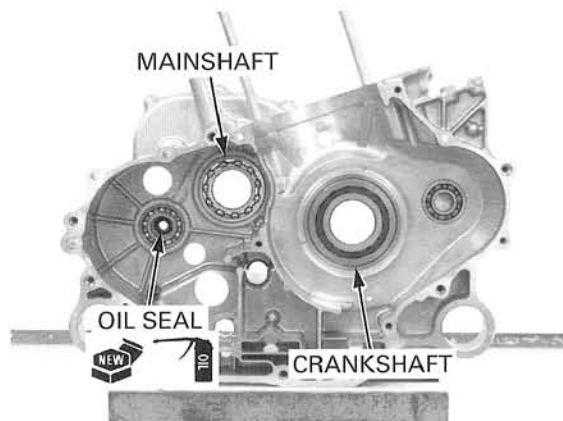
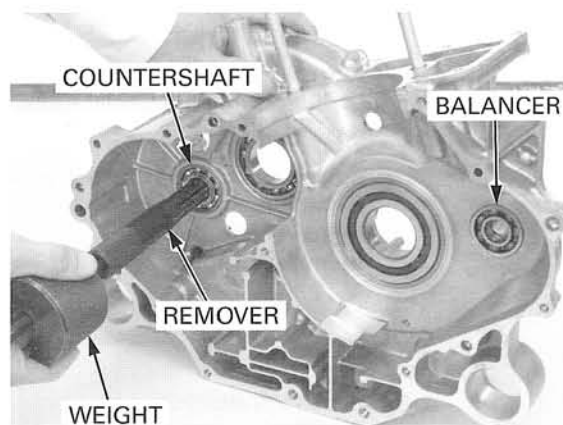
Remover weight

07936-3710600
07936-3710100
07741-0010201 or
07936-371020A or
07936-3710200
(U.S.A. only)

Remove the oil feed pipe oil seal.

Drive the mainshaft and crankshaft bearings out of the front crankcase.

Apply engine oil to the lips of a new feed pipe oil seal. Install the oil seal with the flat side facing the crankcase until it is fully seated.



Apply engine oil to new bearings.

Drive the bearings in with the marks facing up.

TOOLS:

Mainshaft Bearing

Driver

Attachment, 62 x 68 mm

Pilot, 35 mm

07749-0010000
07746-0010500
07746-0040800

Countershaft Bearing

Driver

Attachment, 42 x 47 mm

Pilot, 20 mm

07749-0010000
07746-0010300
07746-0040500

Crankshaft Bearing

Driver

Attachment, 78 x 90 mm

Pilot, 40 mm

07749-0010000
07GAD-SD40101
07746-0040900

Balancer Bearing

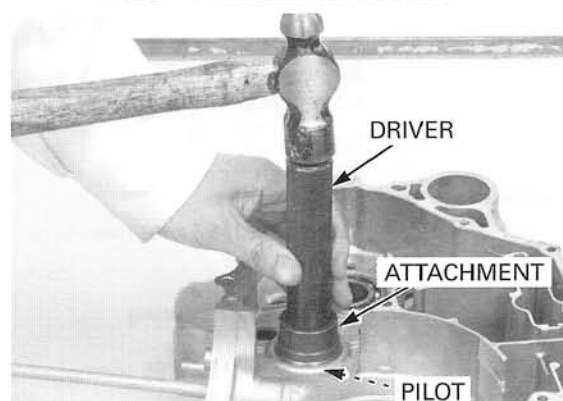
Driver

Attachment, 37 x 40 mm

Pilot, 17 mm

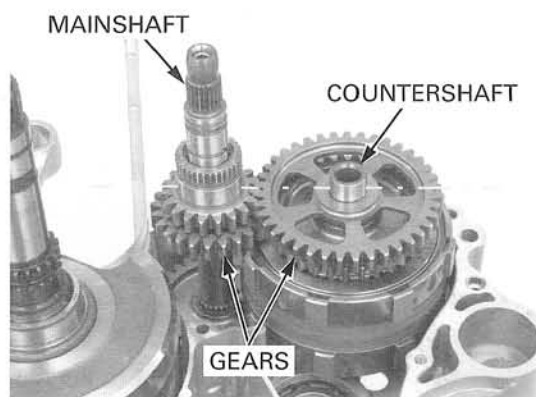
07749-0010000
07746-0010200
07746-0040400

The countershaft bearing is installed with the sealed side facing down.



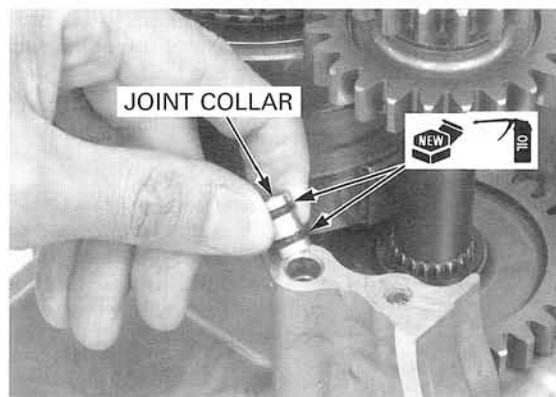
CRANKCASE ASSEMBLY

Before installing the front crankcase cover, make sure the gear side surfaces (C1 and M1 gears) of the countershaft and mainshaft are flush.



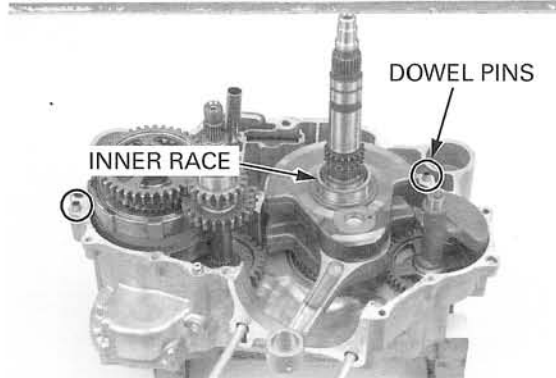
Clean the front and rear crankcase mating surfaces thoroughly, being careful not to damage them. Blow through the oil passages in the crankcases with compressed air.

Coat new O-rings with engine oil and install them into the joint collar grooves. Install the oil joint collar into the crankcase.



Install the two dowel pins.

Install the bearing inner race onto the crankshaft with the flange side facing in.



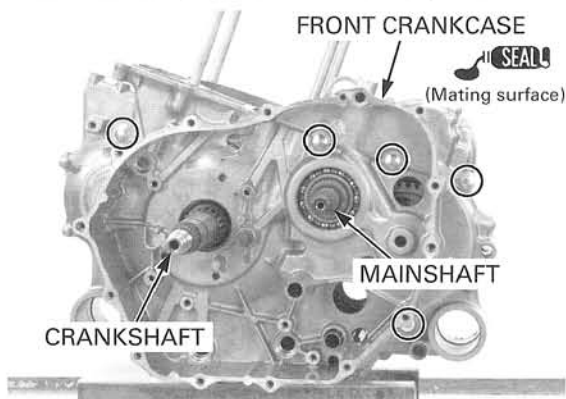
Apply liquid sealant to the mating surface of the front crankcase.

Make sure the mating surfaces evenly touch, that there is no clearance between the cases.

Install the front crankcase over the rear crankcase, aligning the oil strainer pipe with the pipe hole.

Install the five front crankcase bolts.

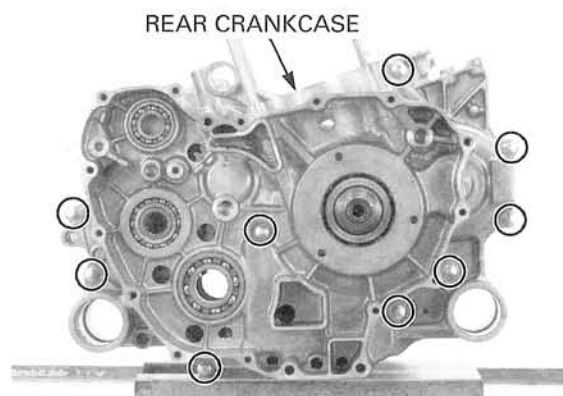
Check that the mainshaft and crankshaft turns smoothly and quietly.



CRANKCASE/CRANKSHAFT/BALANCER

Install the nine rear crankcase bolts.

Tighten all the crankcase bolts in a crisscross pattern in several steps.



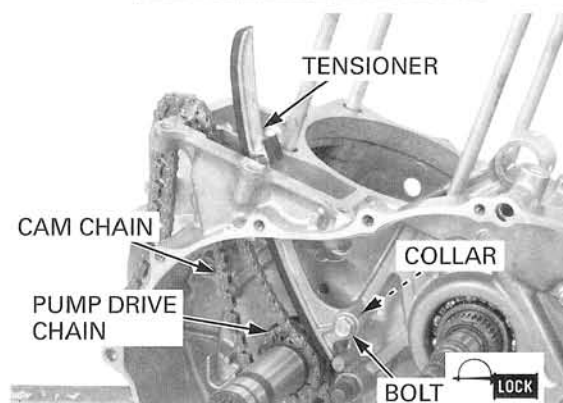
Apply locking agent to the threads of the tensioner pivot bolt.

Install the cam chain tensioner and pivot collar with the flange side of the collar facing to the crankcase, and tighten the bolt.

Install the oil pump drive and cam chains onto the crankshaft.

Install the following:

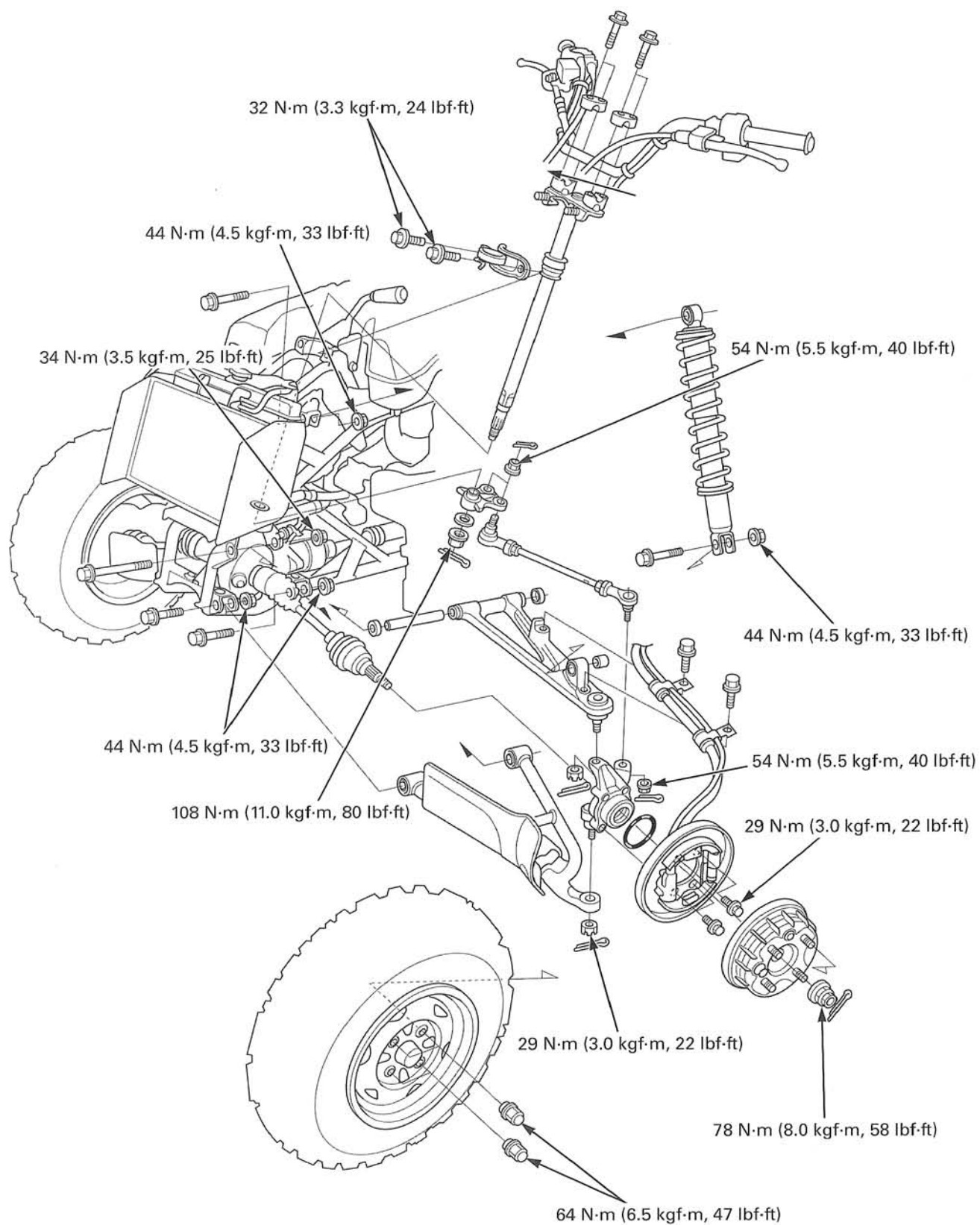
- oil pump (page 4-11)
- 1st shift clutch and torque converter (page 12-36)
- flywheel/starter clutch (page 10-14)
- sub-transmission/gearshift linkage (page 11-12)
- cylinder and piston (page 9-8)
- engine (page 7-7)



14. FRONT WHEEL/SUSPENSION/STEERING

SYSTEM COMPONENTS	14-2	TIRES.....	14-9
SERVICE INFORMATION	14-3	WHEEL HUB/KNUCKLE	14-13
TROUBLESHOOTING	14-4	FRONT SHOCK ABSORBER.....	14-17
HANDLEBAR	14-5	SUSPENSION ARM.....	14-18
THROTTLE HOUSING	14-8	STEERING SHAFT	14-23
FRONT WHEEL	14-9	TIE-ROD.....	14-29

FRONT WHEEL/SUSPENSION/STEERING SYSTEM COMPONENTS



SERVICE INFORMATION

GENERAL

- A contaminated brake drum or shoe reduces stopping power. Discard contaminated shoes and clean a contaminated drum with a high quality brake degreasing agent.
- A jack or other support is required to support the vehicle.
- Adjust toe whenever the tie-rod, knuckle or steering shaft are replaced or removed (page 3-22).
- 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 page 16-2 for brake system information.
- Refer to page 22-7 for handlebar switch inspection.

SPECIFICATIONS

ITEM		STANDARD	SERVICE LIMIT
Minimum tire tread depth		—	4 mm (0.16 in)
Cold tire pressure	Standard	30 kPa (0.30 kgf/cm ² , 4.4 psi)	—
	Minimum	26 kPa (0.26 kgf/cm ² , 3.8 psi)	—
	Maximum	34 kPa (0.34 kgf/cm ² , 5.0 psi)	—
	With cargo	30 kPa (0.30 kgf/cm ² , 4.4 psi)	—
Tie-rod distance between the ball joints		388 ± 1 mm (15.3 ± 0.4 in)	—
Toe		Toe-out: 10.9 ± 15 mm (7/16 ± 9/16 in)	—

TORQUE VALUES

Front master cylinder holder bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)
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.
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, 22 lbf·ft) *Castle nut.
Tie-rod ball joint nut	54 N·m (5.5 kgf·m, 40 lbf·ft) Lock nut: replace with a new one.
Steering shaft end nut	108 N·m (11.0 kgf·m, 80 lbf·ft)
Steering shaft holder bolt	32 N·m (3.3 kgf·m, 24 lbf·ft)
Front brake panel bolt	29 N·m (3.0 kgf·m, 22 lbf·ft) Special bolt: replace with a new one.

*Castle nut: tighten to the specified torque and further tighten until its groove aligns with the cotter pin hole.

TOOLS

Driver	07749-0010000
Attachment, 28 x 30 mm	07946-1870100
Attachment, 42 x 47 mm	07746-0010300
Attachment, 52 x 55 mm	07746-0010400
Attachment, 22 x 24 mm	07746-0010800
Attachment, 20 mm I.D.	07746-0020400 or 07746-0020300 or 07746-00202
Pilot, 16 mm	07746-0041300
Pilot, 30 mm	07746-0040700
Oil seal driver	07JAD-PH80101
Ball joint remover, 28 mm	07MAC-SL002000
Ball joint remover/installer	07WMF-HN00100
Clutch compressor attachment	07LAE-PX40100
Compressor bolt assembly	07GAE-PG40200 or 07GAE-PG4020A (U.S.A. only)

TROUBLESHOOTING

Hard steering

- Steering shaft holder too tight
- Damaged steering shaft bearing/bushing
- Insufficient tire pressure

Steers to 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

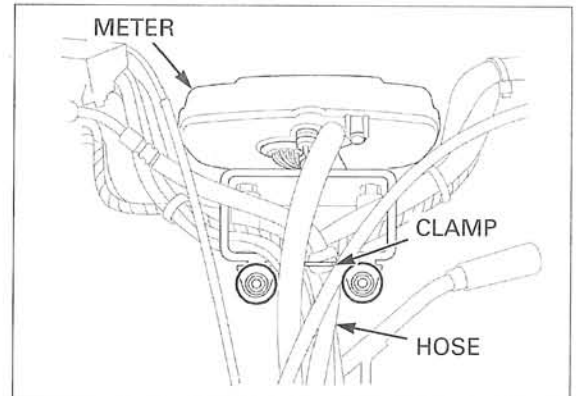
HANDLEBAR

REMOVAL

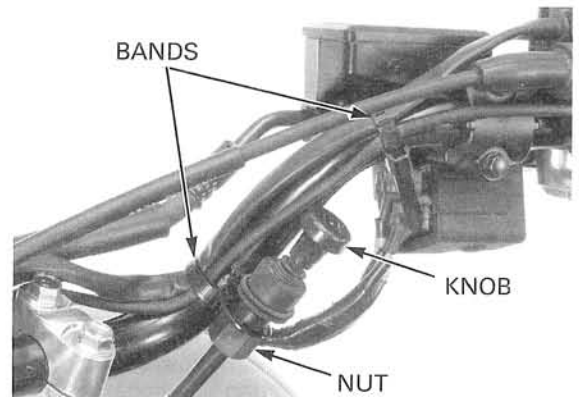
Remove the meter covers (page 2-18).

Remove the following:

- two nuts
- combination meter/stay assembly
- brake hose (from the hose clamp)

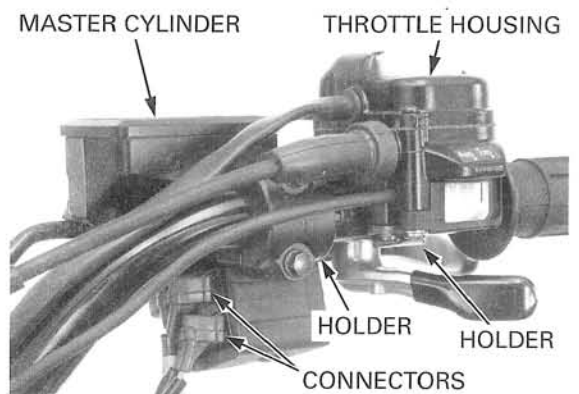


- four wire bands
- choke knob (by loosening the setting nut)

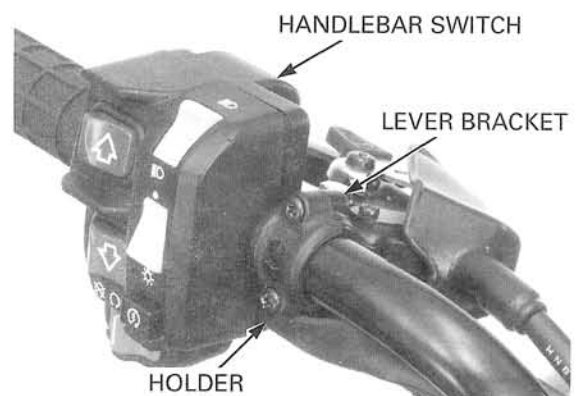


Keep the master cylinder upright to prevent air from entering the hydraulic system.

- two screws
- throttle housing holder
- throttle housing
- connectors
- two bolts
- master cylinder holder
- brake master cylinder

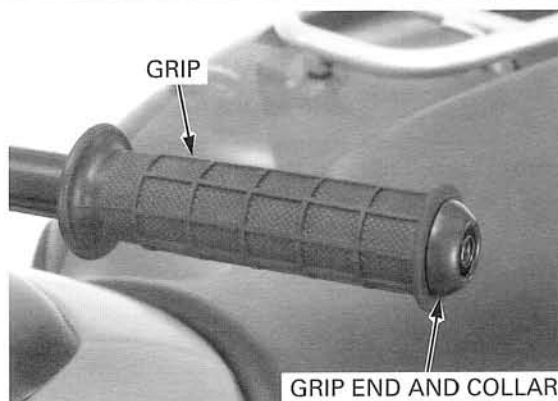


- two screws
- bracket holder
- rear brake lever bracket
- three screws
- handlebar switch



FRONT WHEEL/SUSPENSION/STEERING

- bolts
- grip ends and collars
- handlebar grips

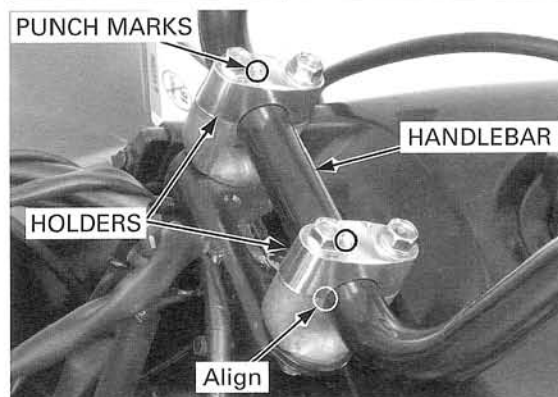


- four bolts
- upper holders
- handlebar

INSTALLATION

Align the punch mark on the handlebar with the punch mark on the top edge of the lower holder.

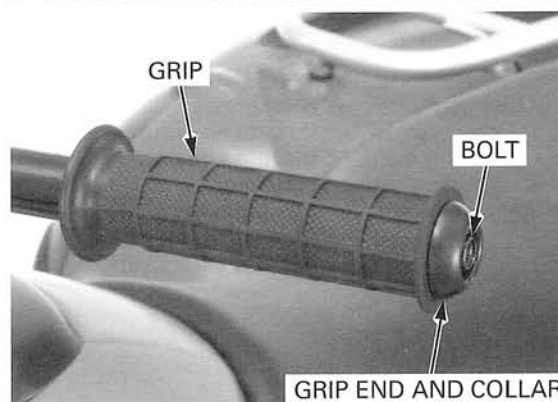
Install the handlebar and upper holders with the punch marks facing forward. Tighten the front bolts first, then tighten the rear bolts.



Apply Honda Bond A or equivalent to the inside surface of each handlebar grip and to the clean surfaces of the handlebar.

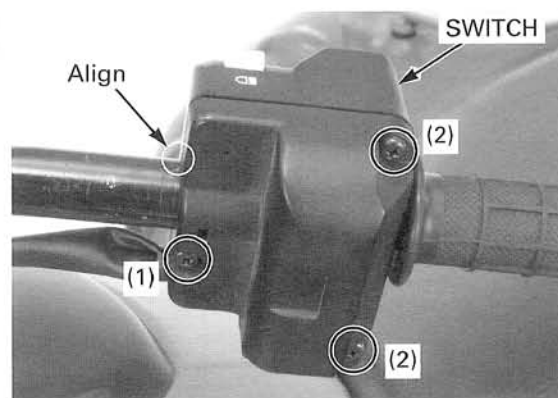
Wait 3-5 minutes and install the grips. Rotate the grips for even application of the adhesive.

Install the grip ends with the collars and tighten the bolts.



Align the seam of the switch with the punch mark on the handlebar.

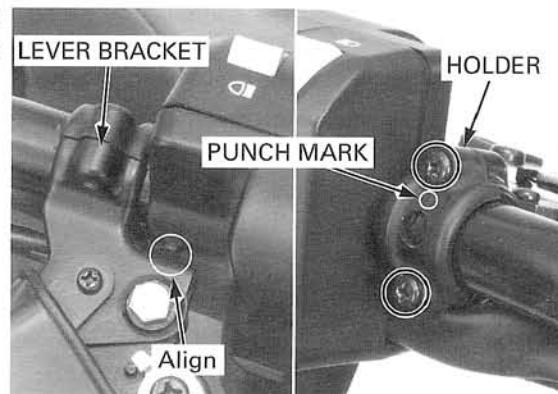
Install the left handlebar switch, and tighten the inside screw (1) first, then tighten the outside screws (2).



FRONT WHEEL/SUSPENSION/STEERING

Align the locating pin on the bracket with the hole in the switch housing.

Install the brake lever bracket and holder with the punch mark facing up. Tighten the upper screw first, then tighten the lower screw.

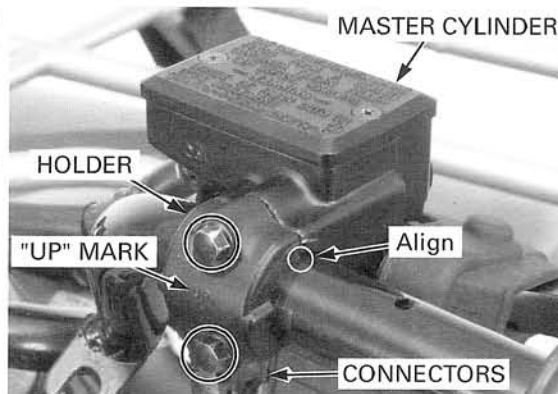


Align the edge of the master cylinder with the punch mark on the handlebar.

Install the brake master cylinder and holder with the "UP" mark facing up. Tighten the upper bolt first, then tighten the lower bolt.

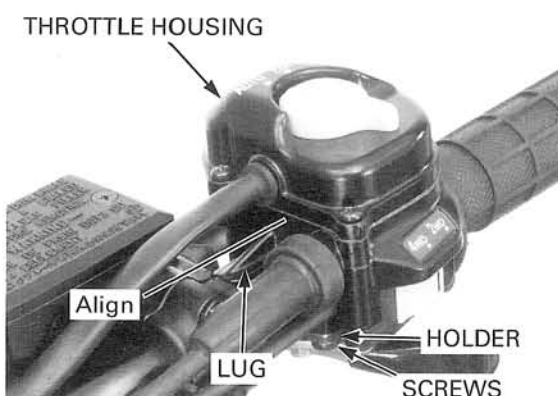
TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Connect the connectors to the brake and brake light switches.



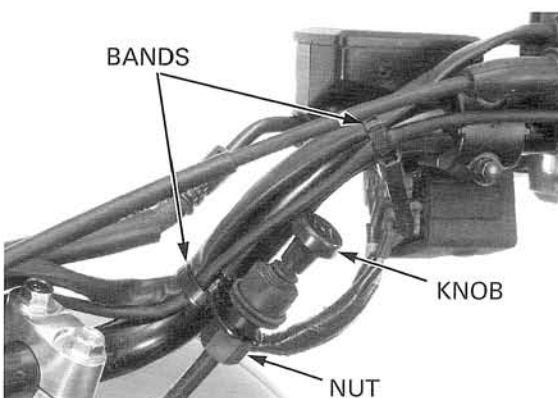
Align the lug on the throttle housing with the mating line of the master cylinder.

Install the throttle housing and holder against the master cylinder. Tighten the front screw first, then tighten the rear screw.



Install the choke knob into the stay, aligning the flat surfaces, and tighten the setting nut.

Secure the switch wires with the four wire bands.



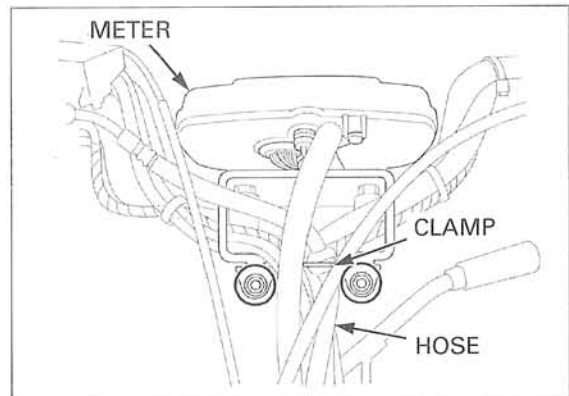
FRONT WHEEL/SUSPENSION/STEERING

Route the wires
and hose properly
(page 1-21).

Install the combination meter and tighten the two
nuts securely.

Install the brake hose into the clamp.

Install the meter covers (page 2-18).



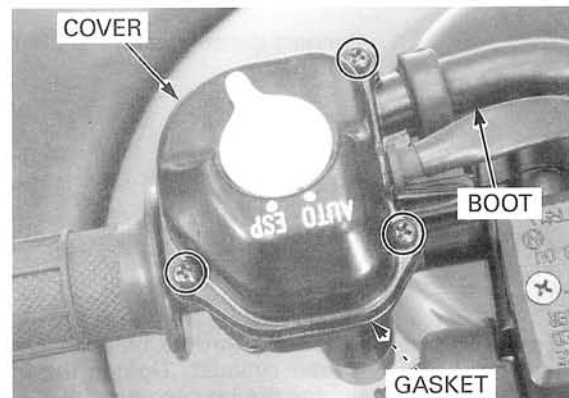
THROTTLE HOUSING

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 following:

- pivot nut and lock washer
- throttle lever and washer
- return spring
- throttle arm (by disconnecting the throttle cable)
- 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.

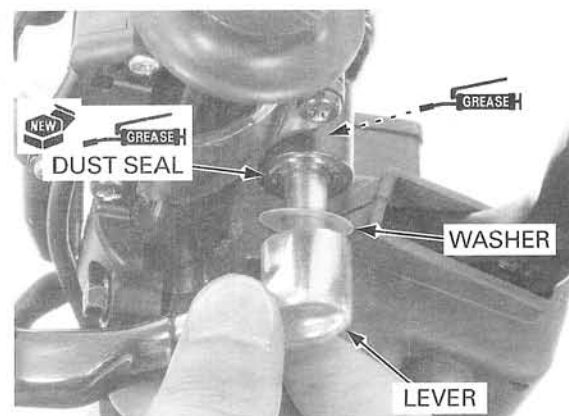
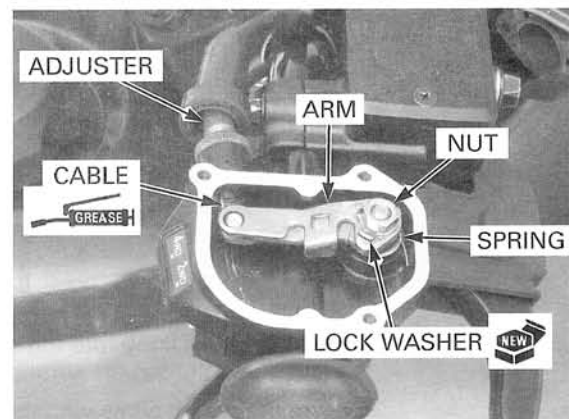
Apply grease to the throttle lever pivot in the housing and to the throttle cable end.

Connect the cable to the throttle arm.

Install the washer onto the throttle lever and insert the throttle lever into the throttle housing.

Install the throttle arm with the spring over the lever pivot by aligning the flat surfaces as shown.

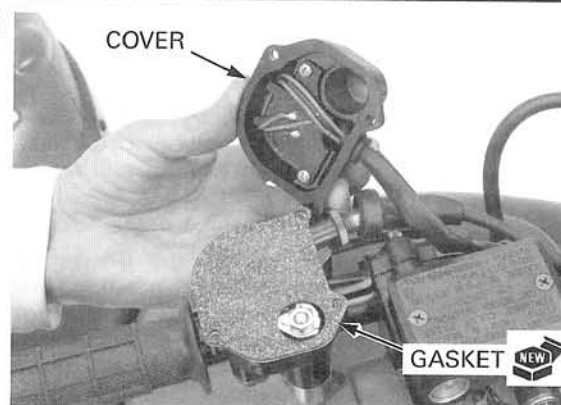
Install a new lock washer and the pivot nut, and tighten it. Bend up the washer tab against the nut.



Install the throttle housing cover with a new gasket and tighten the three screws.

If the throttle cable was replaced, perform the initial setting (page 24-10) after adjustment the free play.

Adjust the throttle lever free play (page 3-4).



FRONT WHEEL

REMOVAL

Loosen the wheel nuts.

Support the vehicle using a hoist or equivalent and raise the front wheels off the ground.

Remove the nuts and wheel.

INSTALLATION

NOTE:

- 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

NOTE:

- This service requires the Universal Bead Breaker (GN-AH-958-BB1).
- Remove and install the tire from the rim side opposite the valve stem.

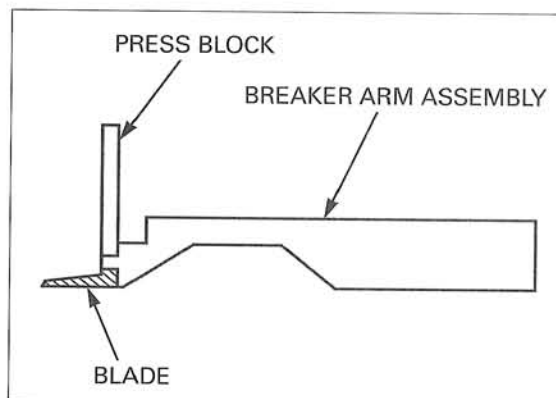
Remove the core from the valve stem.

Do not damage the bead seating area of the rim.

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.

Use of an improper size blade may result in damage to the rim, tire or blade.

Install the blade for 9/11" rims onto the breaker arm assembly. Slide a piece of 1-1/2" I.D. x 8" length rectangular tubing over the end of the breaker assembly.



FRONT WHEEL/SUSPENSION/STEERING

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.

Place the proper size adaptor onto the threaded shaft and then put the wheel over the threaded shaft and adaptor.

Lube the bead area with water, pressing down on the tire sidewall/bead area in several places to allow the water to run into and around the bead. Also lube the area where the breaker arm will contact the sidewall of the tire.

While holding the breaker arm assembly at an approximate 45° position, insert the blade of the breaker arm between the tire and rim. Push the breaker arm inward and downward until it is in the horizontal position with its press block in contact with the rim.

With the breaker arm in the horizontal position, place the breaker press head assembly over the breaker arm press block. Make sure the press head bolt is backed out all the way and use one of the two nylon buttons positioned on the press head against the inside edge of the rim.

Insert the thread shaft through the appropriate hole in the breaker press head assembly and then tighten the lever nut until both ends of the breaker press head assembly are in firm contact with the rim.

Tighten the press head bolt until the reference mark on the press block is aligned with the top edge of the press head.

If the rest of the bead cannot be pushed down into the center of the rim by hand, loosen the press head bolt and the lever nut.

Rotate the breaker arm assembly and breaker press head assembly 1/8 to 1/4 the circumference of the rim.

Tighten the lever nut and then tighten the press head bolt as described.

Repeat this procedure as necessary until the remainder of the bead can be pushed down into the center of the rim.

Assemble the Universal Bead Breaker on the other side of the wheel and break the bead following the same procedures.

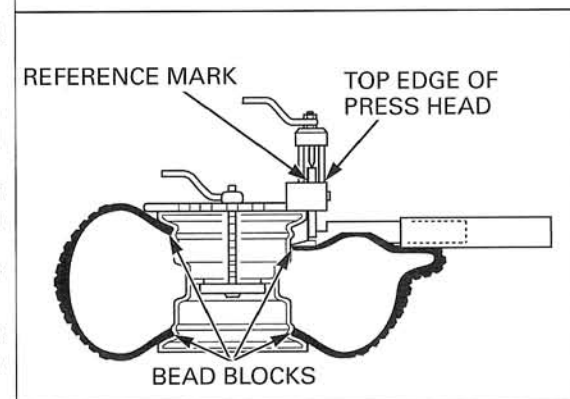
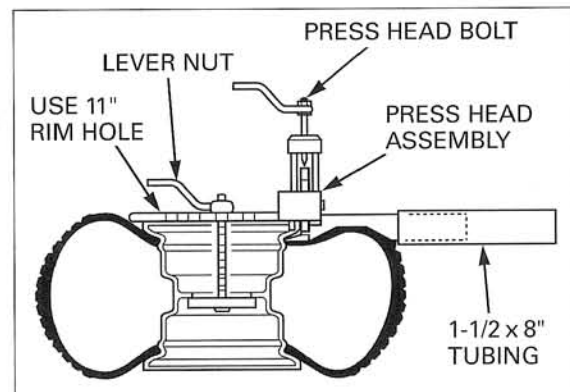
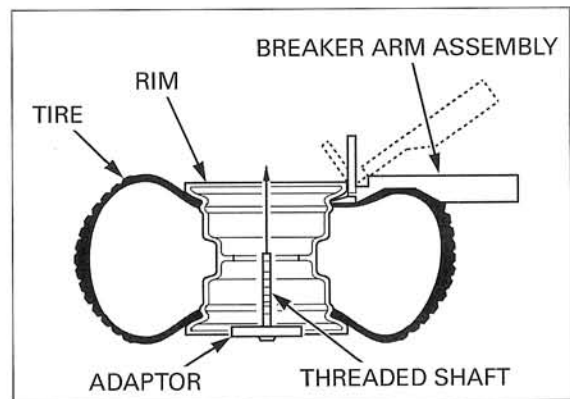
Remove the tire from the rim using a tire change machine or tire irons and rim protectors.

Remove the tire from the side of the rim that has the smallest shoulder area to simplify removal.

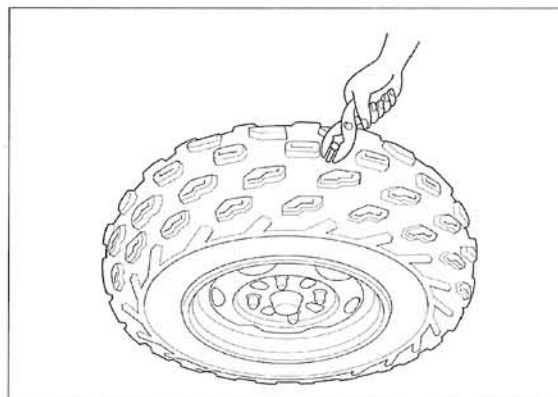
TIRE REPAIR

NOTE:

- Use the manufacture's instructions for the tire repair kit you are using. If your kit does not have instructions, use the procedures provided hear.



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 rubber plug.
Push the inserting needle with plug into the injury until the plug is slightly above the tire.

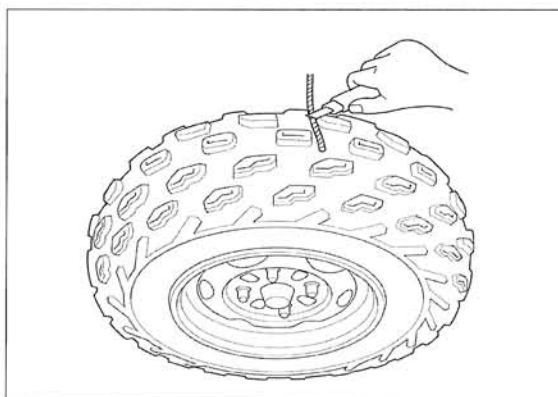


Be careful not to push the plug all the way into the tire to prevent from falling inside.

Twist the needle and remove it from the tire; the plug will stay in the tire.

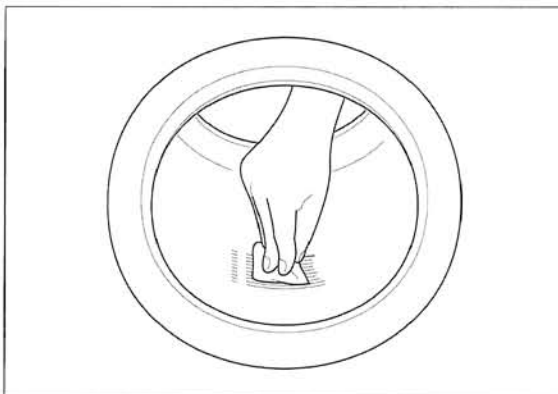
Trim the plug 6 mm (1/4 in) above the tire surface.
Repeat the above procedure if the puncture is large.
Do not use more than two plugs per injury.

Allow the repair to dry. Drying time will vary with air temperature. Refer to the tire repair kit manufacturer's recommendations.



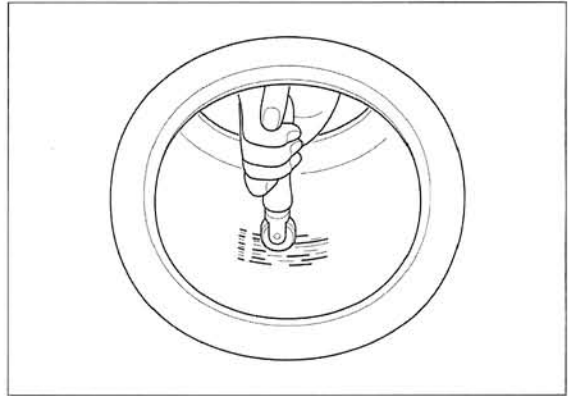
Inflate the tire and test the seal by dabbing a small amount of cement around the plug. Escaping air will cause a bubble in the cement. If there is leakage, remove the tire (page 14-9) and apply a cold patch to the inside of the tire as described.
If a plug has been inserted, trim it even with the inner 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.



FRONT WHEEL/SUSPENSION/STEERING

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.



ASSEMBLY

Install the tire onto the rim, where the rim shoulder width is the narrowest, to simplify installation.

Clean the rim bead seat and flanges.

Apply clean water to the rim flanges, bead seat and base.

Install the valve core in the valve stem.

Install the tire with the arrow mark facing in the normal rotating direction.

Inflate the tire to seat the tire bead.

Deflate the tire. Wait 1 hour and inflate the tire to the specified pressure.

RECOMMENDED TIRE PRESSURE:

FRONT:

Standard: 30 kPa (0.30 kgf/cm, 4.4 psi)

Minimum: 26 kPa (0.26 kgf/cm, 3.8 psi)

Maximum: 34 kPa (0.34 kgf/cm, 5.0 psi)

With cargo: 30 kPa (0.30 kgf/cm, 4.4 psi)

REAR:

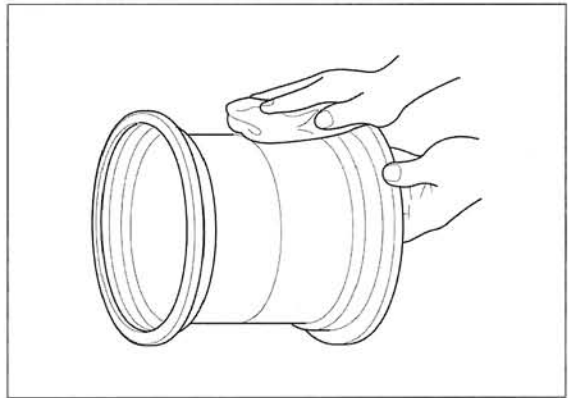
Standard: 25 kPa (0.25 kgf/cm, 3.6 psi)

Minimum: 22 kPa (0.22 kgf/cm, 3.2 psi)

Maximum: 28 kPa (0.28 kgf/cm, 4.0 psi)

With cargo: 25 kPa (0.25 kgf/cm, 3.6 psi)

Check for air leaks and install the valve cap.



Use only water as a lubricant when removing or mounting tires. Soap or some mounting lubricants may leave a slippery residue which can cause the tire to shift on the rim and lose air pressure during riding.

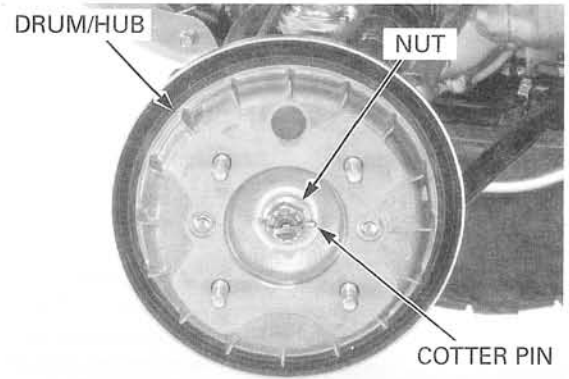
WHEEL HUB/KNUCKLE

REMOVAL

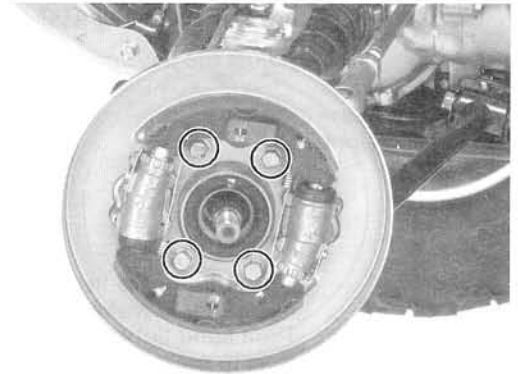
Do not get grease onto the brake shoes and drum, or stopping power will be reduced.

- Remove the following:
- front wheel (page 14-9)
 - cotter pin
 - hub nut
 - brake drum/wheel hub

For waterproof seal inspection, see page 16-23.

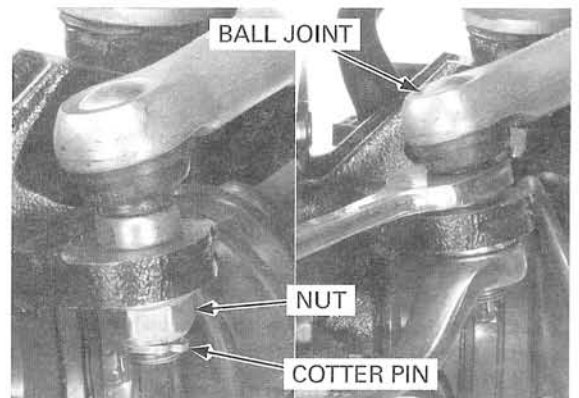


Loosen the four brake panel bolts.

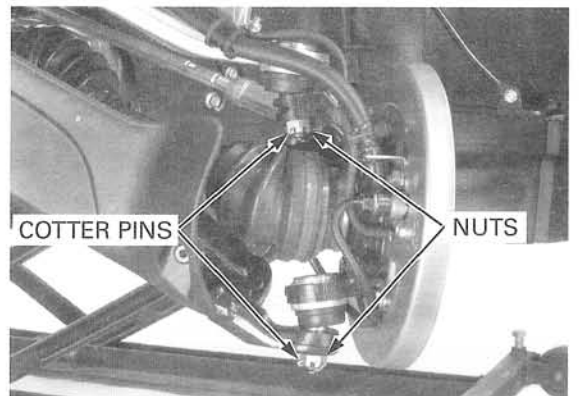


Remove the cotter pin.

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.



FRONT WHEEL/SUSPENSION/STEERING

Release the ball joints, using the special tool according to the following instructions.

TOOLS:

Ball joint remover, 28 mm 07MAC-SL00200



BALL JOINT REMOVER

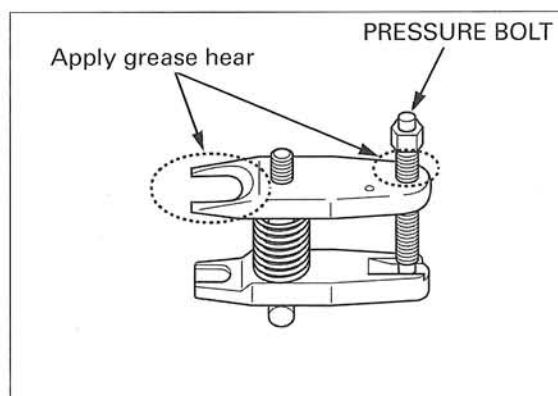
Apply grease to the ball joint remover at the point shown.

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.

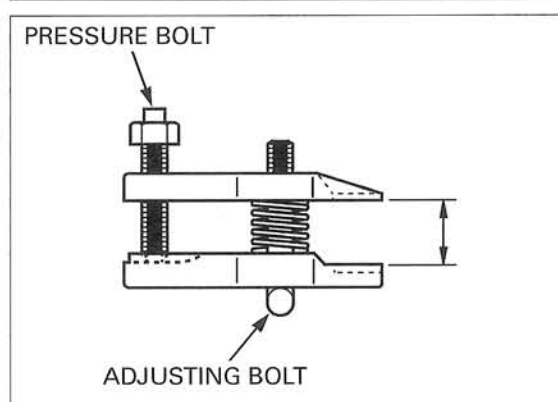
If necessary, apply penetrating type lubricant to loosen the ball joint.



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.

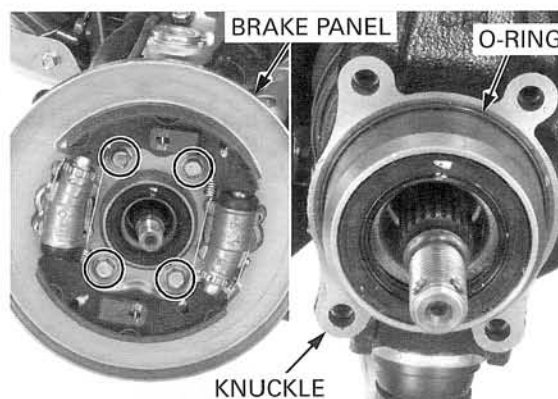
Tighten the pressure bolt with a wrench until the ball joint stud pops loose.



Do not hang the brake panel from the brake hose. Do not twist the brake hose.

Remove the four bolts and brake panel from the knuckle. Remove the O-ring from the knuckle.

Remove the castle nuts and the knuckle from the upper and lower arms.



INSPECTION

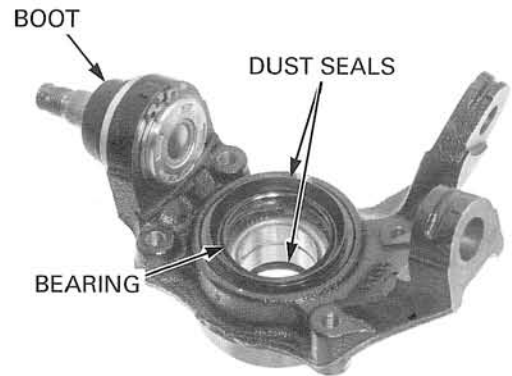
Remove the dust seals.

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.

For ball joint replacement, see page 14-21.

Inspect the ball joint boot for tears or other damage by moving the ball joint stud. It should move freely and smoothly.



BEARING REPLACEMENT

Remove the snap ring and drive the bearing out of the knuckle.

SNAP RING

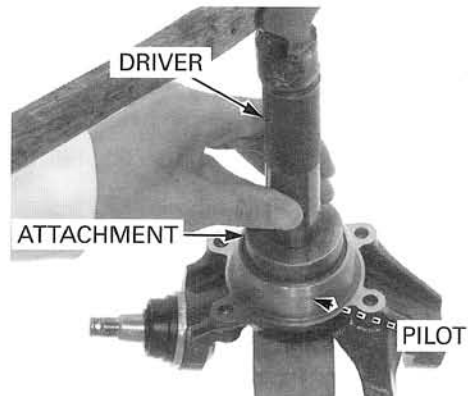


Pack the cavities of a new bearing with grease. Drive in the bearing squarely with the marked side facing up until it is fully seated.

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 in.



Coat the lips of a new outer dust seal with grease and install it using the same tools until it is flush with the knuckle end.



FRONT WHEEL/SUSPENSION/STEERING

Coat the lips of a new inner dust seal with grease and install it until it is fully seated, being careful not to damage the lip.

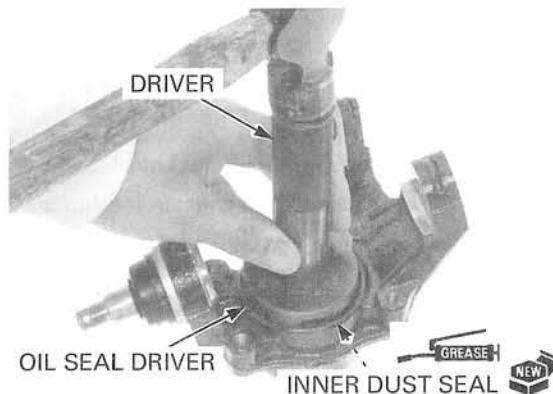
TOOLS:

Driver

07749-0010000

Oil seal driver

07JAD-PH80101

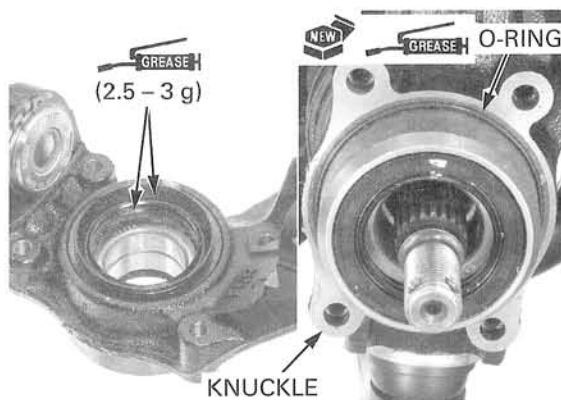


INSTALLATION

Pack the lip cavities of the inner dust seal with 2.5 – 3 g of grease.

Install the knuckle over the drive shaft, and onto the lower and upper arms. Install the castle nuts.

Coat a new O-ring with grease and install it onto the knuckle.



Install the brake panel with new bolts.

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, 22 lbf·ft)

Install new cotter pins.

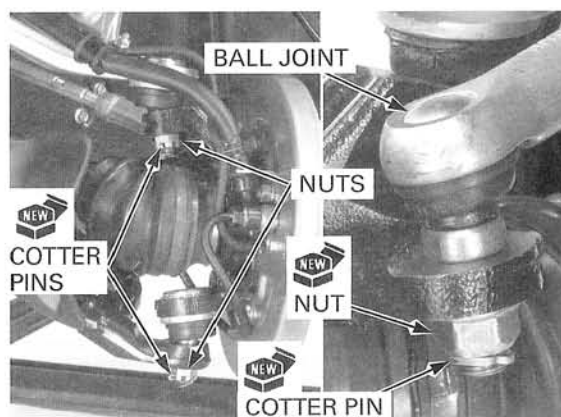
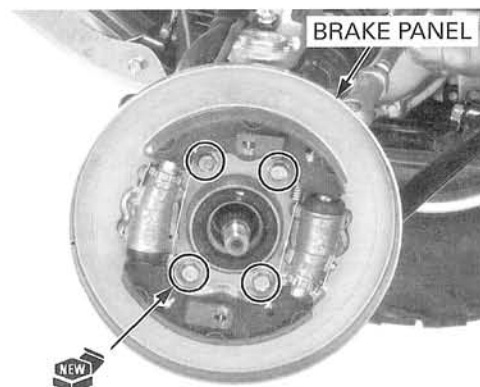
Install the tie-rod ball joint into the knuckle with a new nut, and tighten the nut while holding the joint stud flats with an open end wrench.

TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)

Install a new cotter pin.

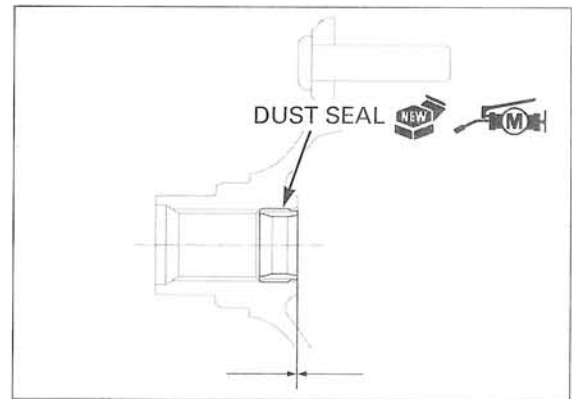
Tighten the four brake panel bolts.

TORQUE: 29 N·m (3.0 kgf·m, 22 lbf·ft)

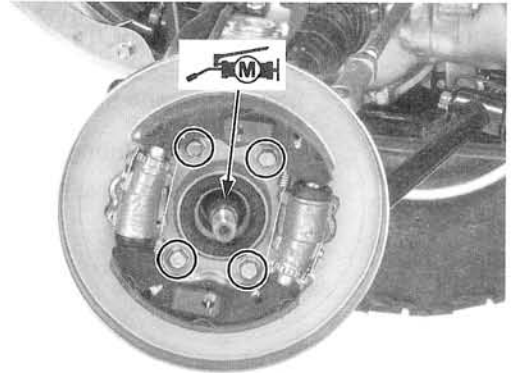


Install a new dust seal into the hub with the metal side facing out until it is flush with the hub surface.

Apply molybdenum disulfide grease to the dust seal.



Apply molybdenum disulfide grease to the drive shaft splines.

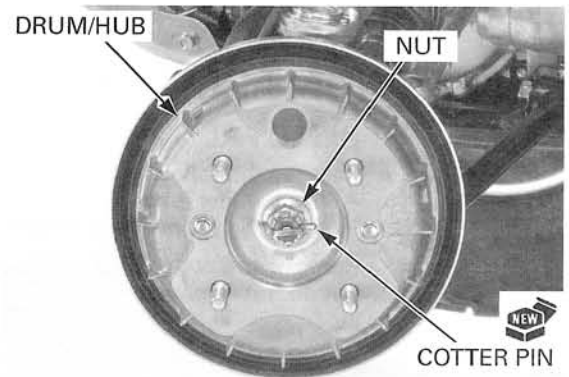


Install the brake drum/wheel hub.
Install the hub nut and tighten it to the specified torque and further tighten until its grooves align with the cotter pin hole.

TORQUE: 78 N·m (8.0 kgf·m, 58 lbf·ft)

Install a new cotter pin.

Install the wheel (page 14-9).

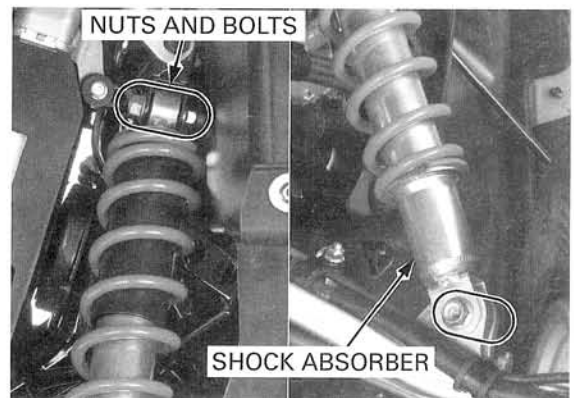


FRONT SHOCK ABSORBER

REMOVAL

Support the vehicle using a hoist or equivalent and raise the front wheel off the ground.

Support the lower arm. Remove the mounting nuts, bolts and shock absorber.



INSPECTION

Check the upper pivot bushing for wear or damage.
Check the damper unit for leaks or other damage.
Replace the shock absorber assembly if necessary.

For lower pivot bearing inspection and replacement, see page 14-18.

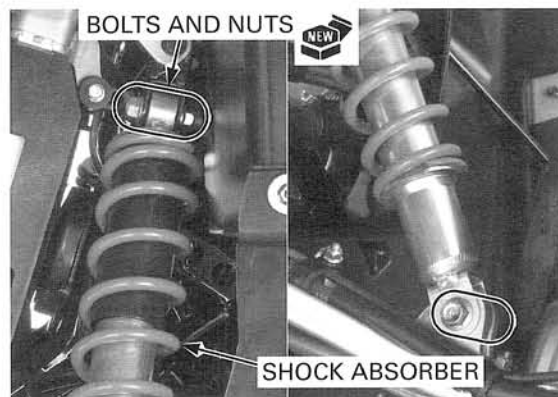


INSTALLATION

Install the shock absorber in the frame and over the upper arm, and insert the mounting bolts from the front side.

Install new mounting nuts and tighten them.

TORQUE: 44 N·m (4.5 kgf·m, 33 lbf·ft)



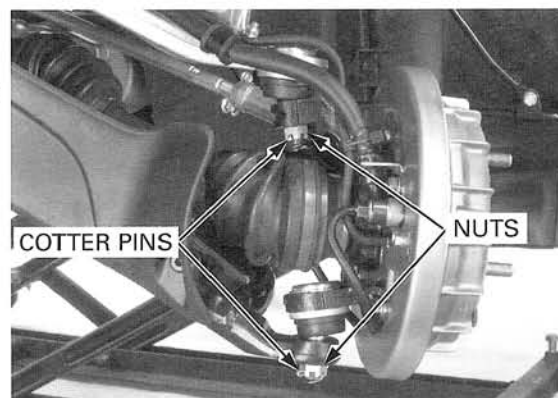
SUSPENSION ARM

REMOVAL

Remove the following:

- front wheel (page 14-9)
- front carry pipe (page 2-10)

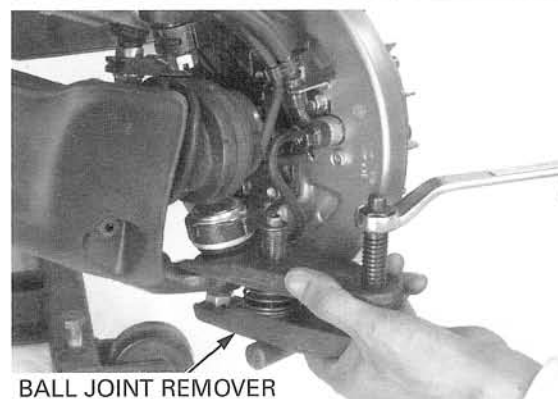
Remove the cotter pins and loosen the castle nuts, but do not remove them yet.



Release the ball joints, using the special tool according to the instructions described on page 14-14.

TOOLS:

Ball joint remover, 28 mm 07MAC-SL00200



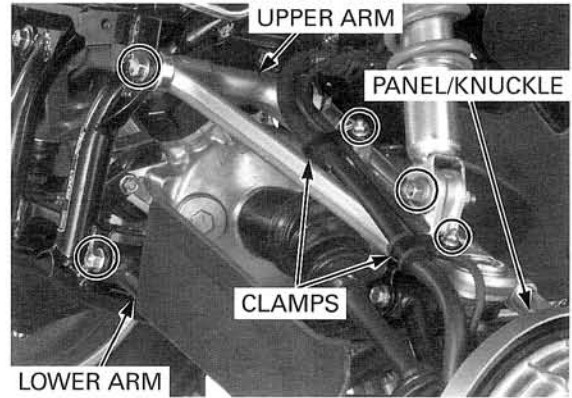
Do not hang the assembly from the brake hose. Do not twist the brake hose.

Remove the two brake hose clamp bolts.

Remove the castle nuts on the ball joints and support the brake panel/knuckle assembly.

Remove the following:

- shock absorber lower mounting nut and bolt
- pivot nut, bolt and upper arm
- pivot nuts, bolts and lower arm

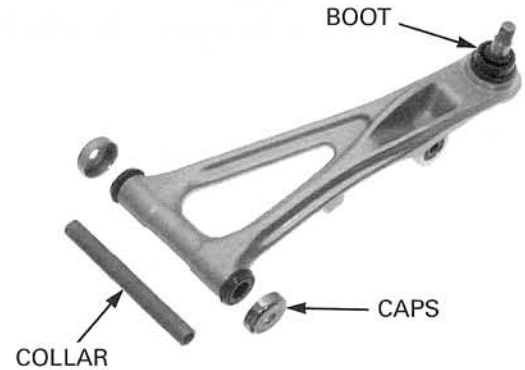


INSPECTION

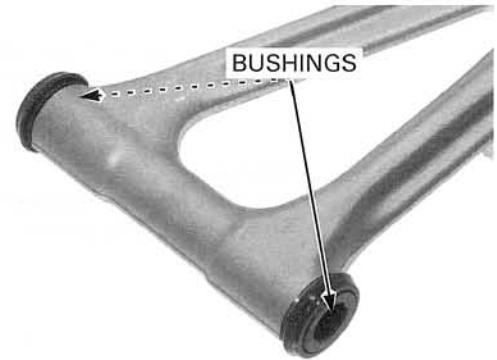
Remove the seal caps and pivot collar from the upper arm.

For ball joint replacement, see page 14-20.

Inspect the ball joint boot for tears or other damage by moving the ball joint stud. It should move freely and smoothly.



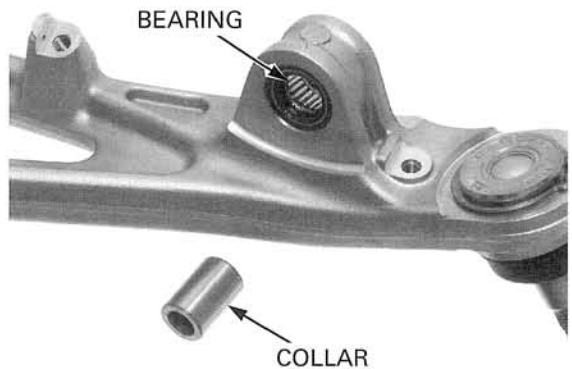
Check the pivot bushings in the upper arm for wear or damage.



Remove the shock absorber lower pivot collar.

For bearing replacement, see page 14-22.

Check the pivot bearing for wear or damage.

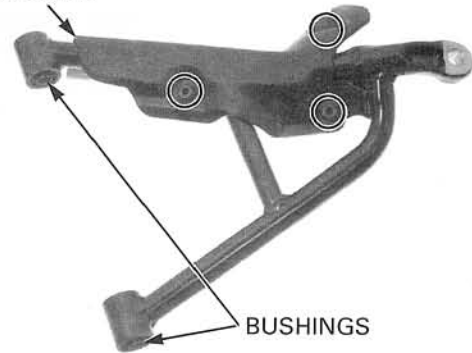


FRONT WHEEL/SUSPENSION/STEERING

Remove the three flange bolts and lower arm guard if necessary.

Check the pivot bushings in the lower arm for wear or damage.

ARM GUARD

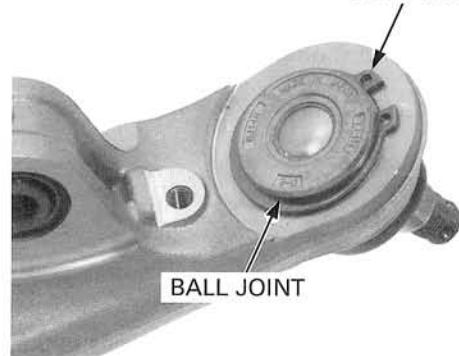


BALL JOINT REPLACEMENT

UPPER ARM

Remove the snap ring from the ball joint.

SNAP RING

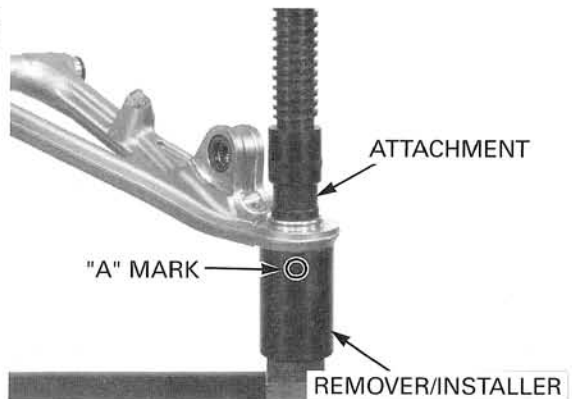


Set the upper arm and special tools with "A" mark side of the remover/installer facing to the ball joint as shown.

Press the ball joint out of the upper arm.

TOOLS:

Ball joint remover/installer 07WMF-HN00100
Attachment, 28 x 30 mm 07946-1870100

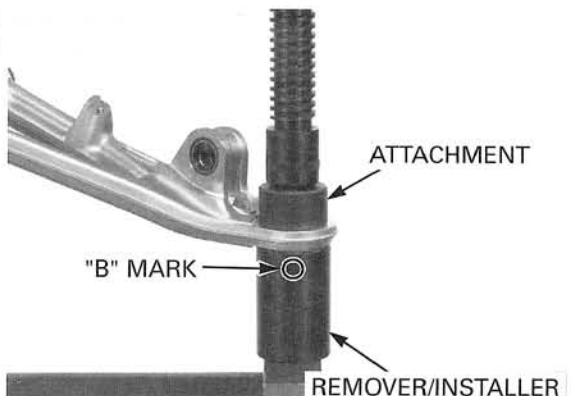


Set the upper arm and special tools with "B" mark side of the remover/installer facing to the ball joint as shown.

Press the ball joint into the upper arm until it is fully seated.

TOOLS:

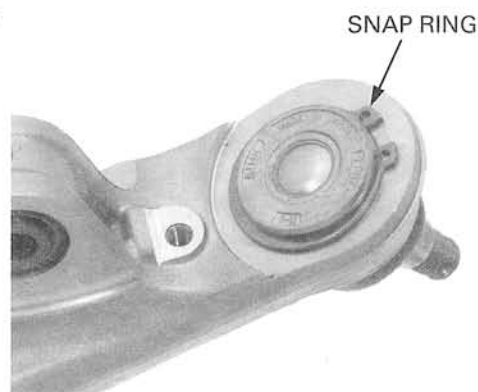
Ball joint remover/installer 07WMF-HN00100
Attachment, 20 mm I.D. 07746-0020400 or
Attachment, 17 mm I.D. 07746-0020300 or
Attachment, 15 mm I.D. 07746-0020200



NOTICE

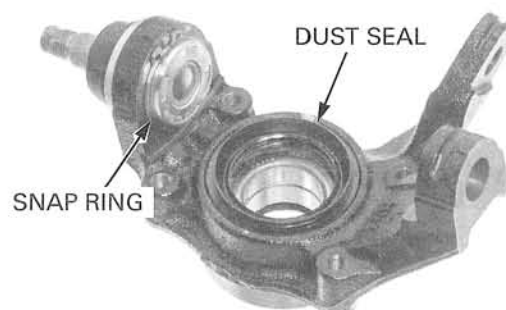
If you feel strong resistance when lowering the press, stop. Reset the attachment of the tool so the ball joint head can go into the hollow of the attachment and try again. Failure to reset the attachment will damage the ball joint and/or the upper arm.

Install the snap ring with the chamfered edge facing in.



KNUCKLE

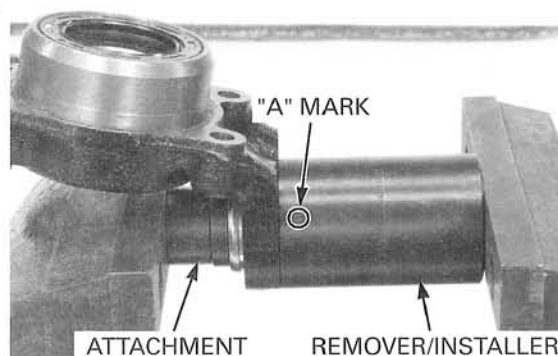
Remove the snap ring and the inner dust seal.



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:

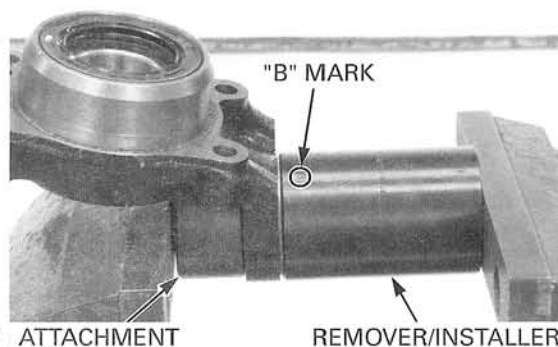
Ball joint remover/installer 07WMF-HN00100
Attachment, 28 x 30 mm 07946-1870100



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, 20 mm I.D. 07746-0020400 or
Attachment, 17 mm I.D. 07746-0020300 or
Attachment, 15 mm I.D. 07746-0020200



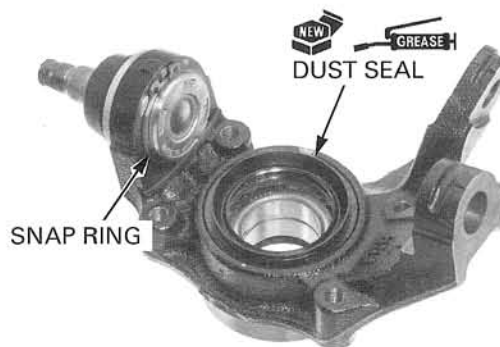
NOTICE

If you feel strong resistance when tightening the vise, stop. Reset the attachment of the tool so the ball joint head can go into the hollow of the attachment and try again. Failure to reset the attachment will damage the ball joint and/or the knuckle.

FRONT WHEEL/SUSPENSION/STEERING

Install the snap ring with the chamfered edge facing in.

Install a new inner dust seal (page 14-16).



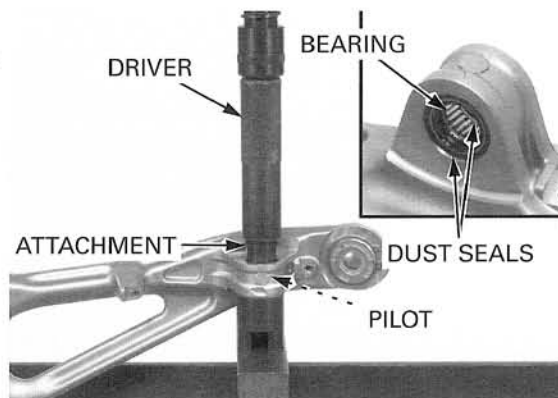
SHOCK ABSORBER LOWER PIVOT BEARING REPLACEMENT

Remove the dust seals.

Press the bearing out of the upper arm using the special tools.

TOOLS:

Driver	07749-0010000
Attachment, 22 x 24 mm	07746-0010800
Pilot, 16 mm	07746-0041300

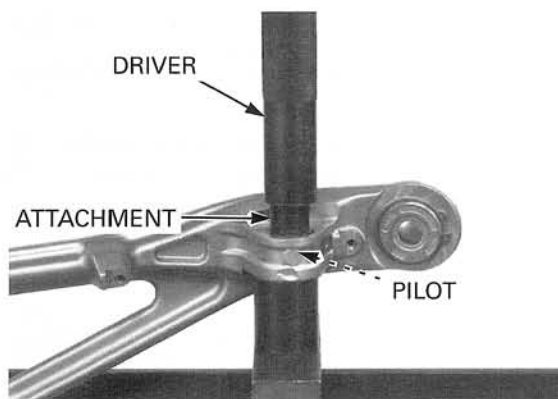


Press the bearing with the marked side facing up.

Carefully press in a new bearing until it is flush with the pivot edge (until the press stops).

TOOLS:

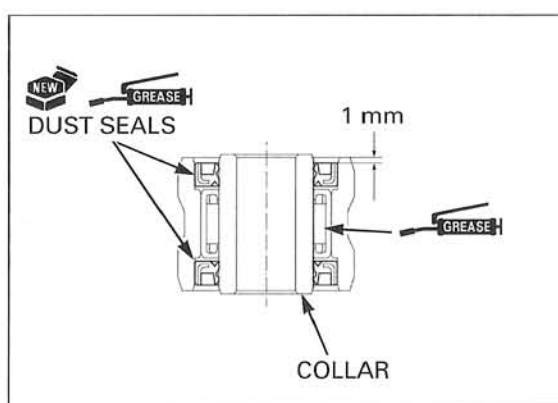
Driver	07749-0010000
Attachment, 22 x 24 mm	07746-0010800
Pilot, 16 mm	07746-0041300



Install new dust seals with the flat side facing in until the depth from the pivot outer surface is 1 mm (0.04 in).

Apply grease to the dust seal lips and the needle rollers of the bearing.

Install the pivot collar.

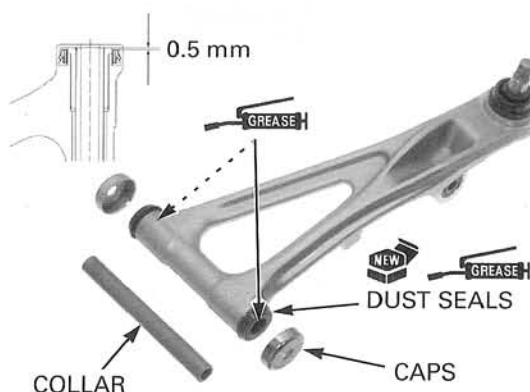


INSTALLATION

Install new dust seals with the lip side facing out until the depth from the bushing end is 0.5 mm (0.02 in).

Apply grease to the pivot bushings in the upper arm and install the pivot collar.

Apply grease to the seal lips and install the seal caps over the dust seals.



Insert all the bolts of the suspension components from the front side.

Install the upper arm into the frame with the pivot bolt and a new nut, and tighten it.

TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)

Connect the shock absorber to the upper arm with the mounting bolt and a new nut, and tighten it.

TORQUE: 44 N·m (4.5 kgf·m, 33 lbf·ft)

Install the lower arm into the frame with the two pivot bolts and new nuts, and loosely tighten them.

Install the brake panel/knuckle assembly onto the upper and lower arms and install the castle nuts. Tighten the 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, 22 lbf·ft)

Install new cotter pins.

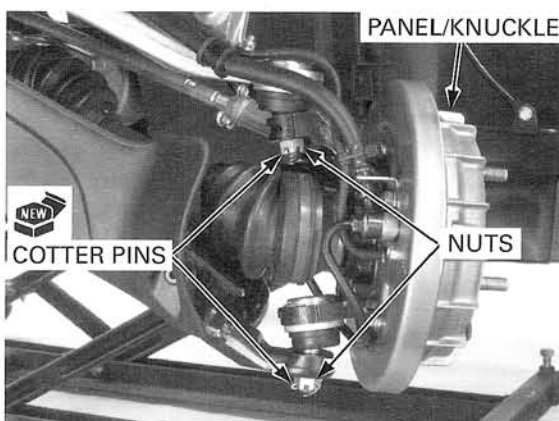
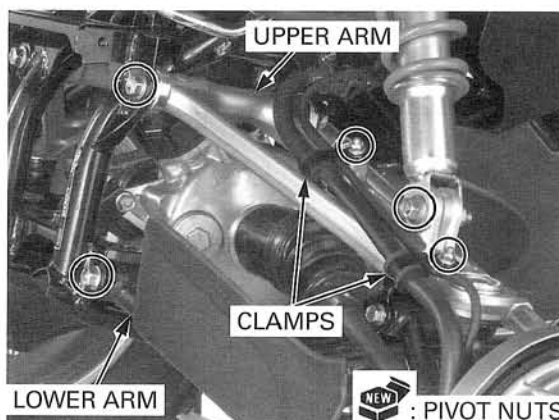
Install the brake hose clamps and tighten the bolts securely.

Install the front wheel (page 14-9), 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)

Install the carry pipe (page 2-10).

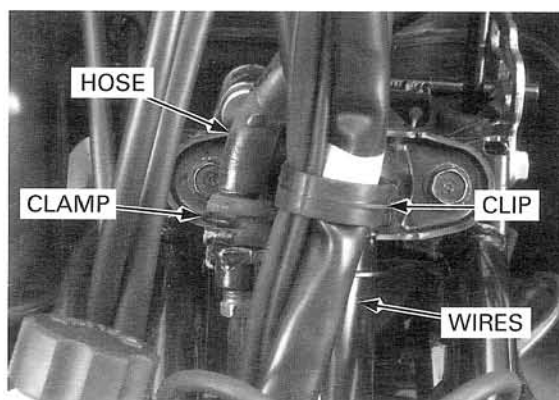


STEERING SHAFT

REMOVAL

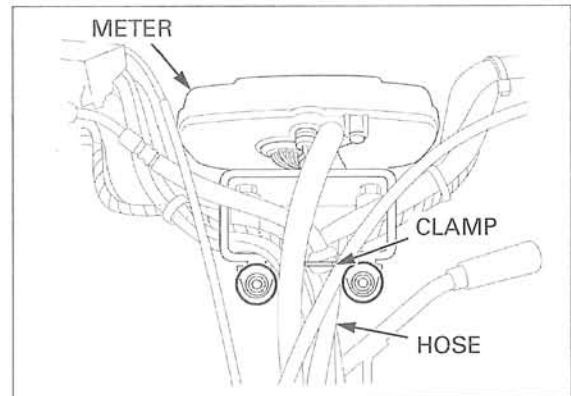
Remove the following:

- front wheels (page 14-9)
- inner fenders (page 2-9)
- front fender (page 2-12)
- meter covers (page 2-18)
- brake hose (from the clamp)
- wires (from the clip)



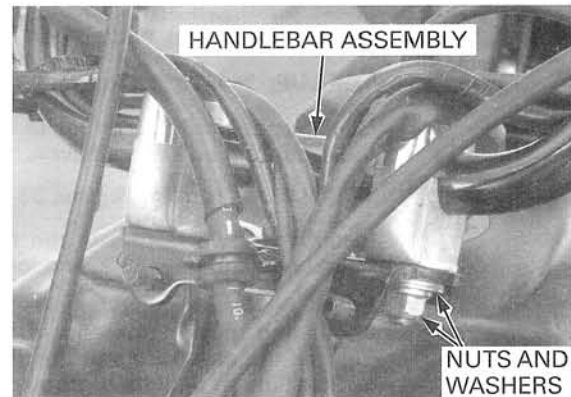
FRONT WHEEL/SUSPENSION/STEERING

- two nuts
- combination meter/stay assembly
- brake hose (from the hose clamp)

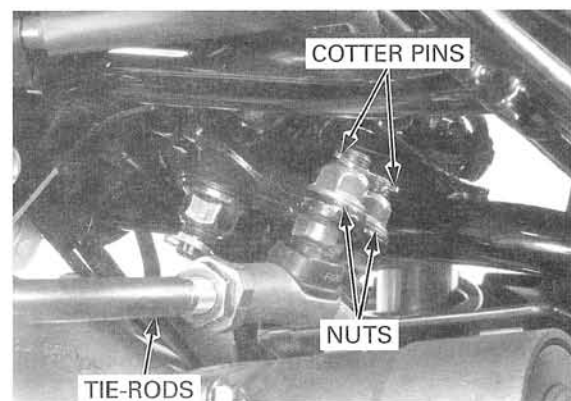


Keep the master cylinder reservoir upright.

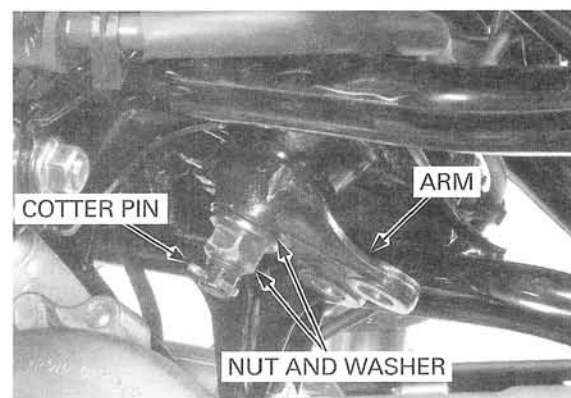
- handlebar lower holder nuts and washers
- handlebar assembly (from the steering shaft)



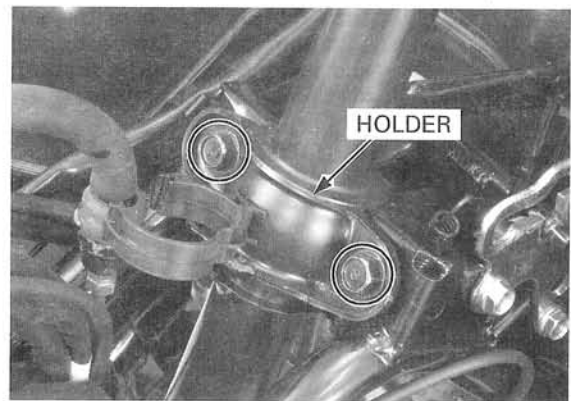
- cotter pins
- tie-rod ball joint nuts (while holding the joint stud flats with an open end wrench)
- tie-rods (from the steering shaft arm)



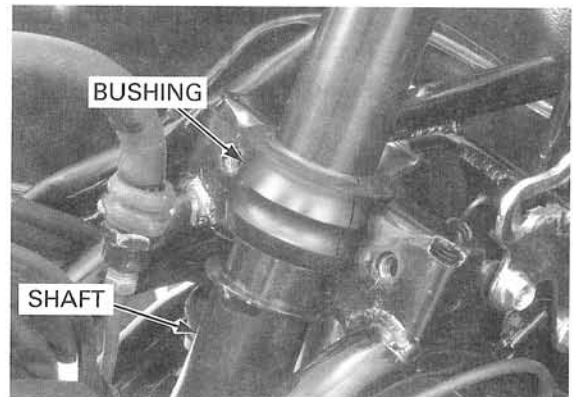
- cotter pin
- shaft end nut and washer
- shaft arm



- two holder bolts
- shaft holder



- steering shaft (from the shaft bearing)
- shaft bushing



INSPECTION

Check the steering shaft bushing for wear or damage.

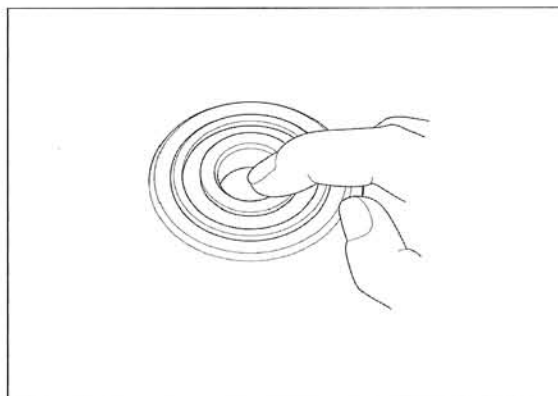


Check the steering shaft for distortion or damage.



FRONT WHEEL/SUSPENSION/STEERING

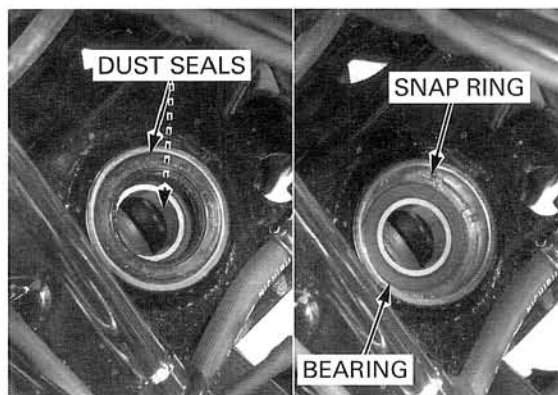
Turn the inner race of the steering shaft bearing with your finger. The bearing should turn smoothly and quietly. Also check that the bearing outer race fits tightly in the frame.



BEARING REPLACEMENT

Remove the upper and lower dust seals.

Remove the snap ring.

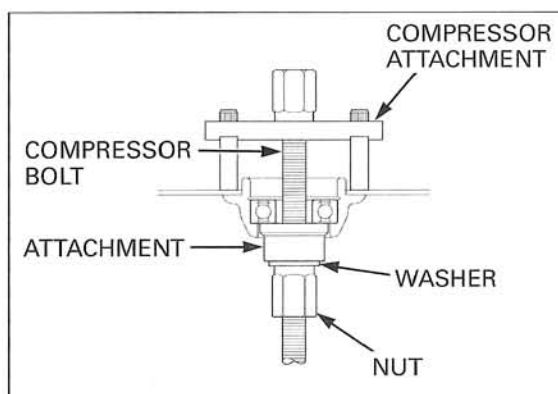


Assemble the special tools onto the steering shaft bearing.

Remove the bearing from the frame by tightening the nut.

TOOLS:

Clutch compressor attachment	07LAE-PX40100
Compressor bolt assembly	07GAE-PG40200 or 07GAE-PG4020A (U.S.A. only)
	07946-1870100
Attachment, 28 x 30 mm	Common hardware
10 mm washer	

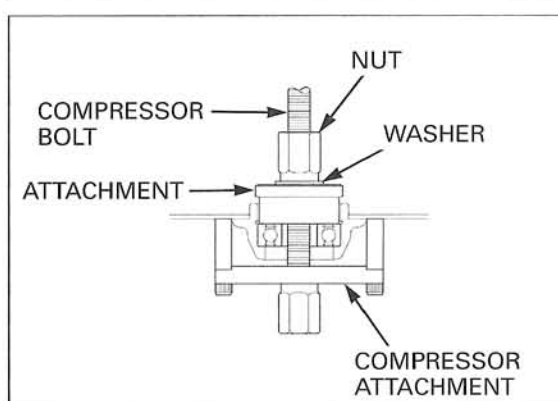


Draw a new bearing into the frame with the marked side facing up until it is fully seated.

TOOLS:

Clutch compressor attachment	07LAE-PX40100
Compressor bolt assembly	07GAE-PG40200 or 07GAE-PG4020A (U.S.A. only)
	07746-0010300
Attachment, 42 x 47 mm	Common hardware
10 mm washer	

Install the snap ring into the groove properly with the chamfered edge facing up.



The upper seal is flush with the frame edge and the lower seal is seated onto the bearing.

Coat new dust seal lips with grease and install them.



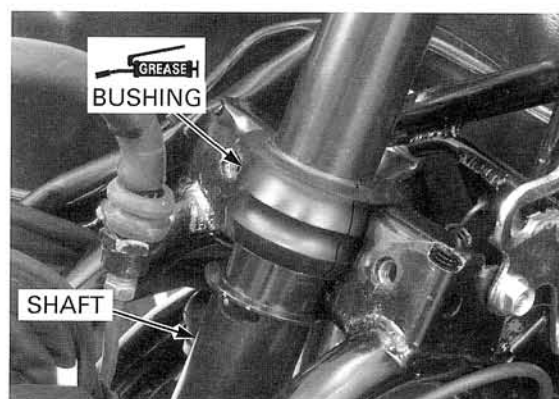
INSTALLATION

NOTE:

- Route the wires, hose and cables properly (page 1-21).

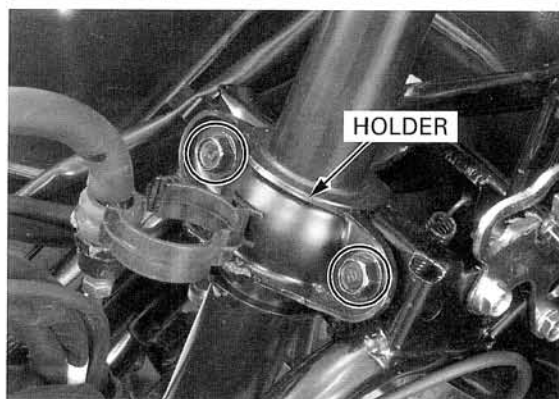
Apply grease to the shaft bushing inner surface. Install the shaft bushing onto the steering shaft with the flange side facing up.

Install the steering shaft into the shaft bearing.



Install the shaft holder with the hose clamp facing the right side and tighten the two bolts alternately.

TORQUE: 32 N·m (3.3 kgf·m, 24 lbf·ft)

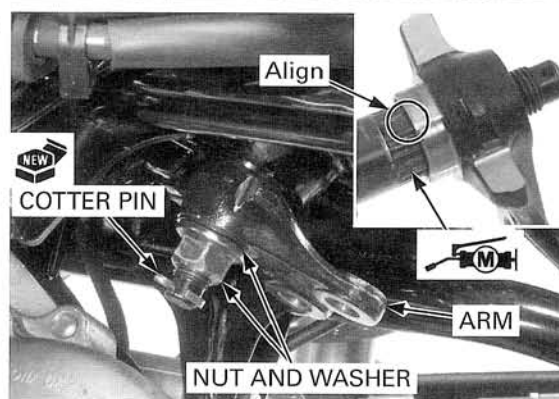


Apply molybdenum disulfide grease to the steering shaft splines.

Install the shaft arm over the steering shaft by aligning the wide tooth with the wide groove. Install the washer and end nut, and tighten it.

TORQUE: 108 N·m (11.0 kgf·m, 80 lbf·ft)

Install a new cotter pin.

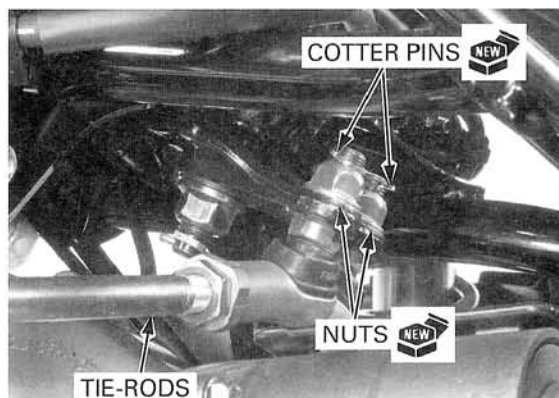


FRONT WHEEL/SUSPENSION/STEERING

Install the tie-rods into the steering shaft arm.
Install new joint nuts and tighten them by holding the ball joint stud flats with an open end wrench.

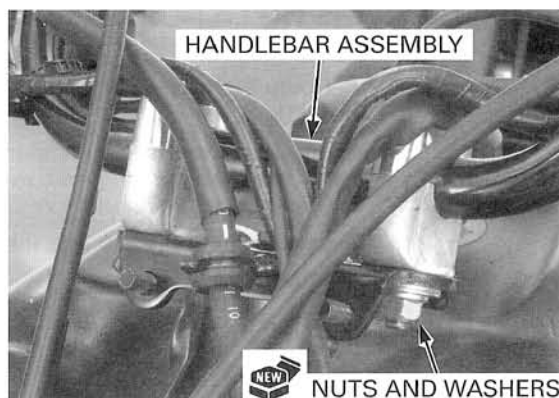
TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)

Install new cotter pins.



Install the handlebar assembly onto the steering shaft with the washers and new lower holder nuts. Tighten the nuts.

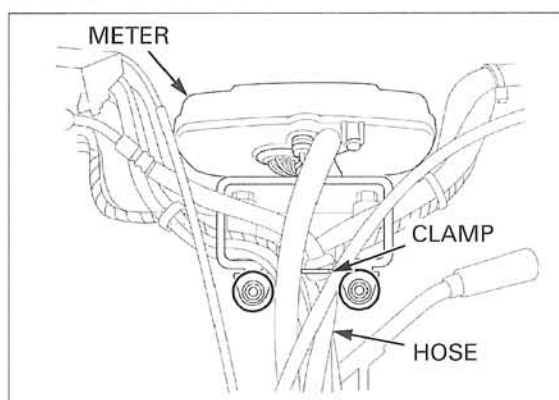
TORQUE: 39 N·m (4.0 kgf·m, 29 lbf·ft)



Route the wires and hose properly (page 1-21).

Install the combination meter and tighten the two nuts securely.

Install the brake hose into the clamps on the steering shaft and shaft holder (see below).

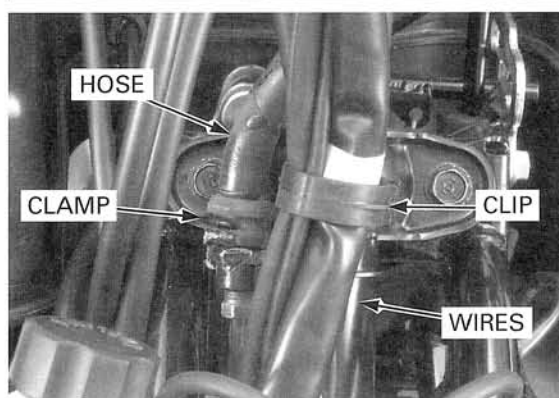


Make sure all the wires and hose are properly routed (page 1-21).

Secure the wires with the wire clip.

Install the following:

- meter covers (page 2-18)
- front fender (page 2-12)
- inner fenders (page 2-9)
- front wheels (page 14-9)



TIE-ROD

REMOVAL

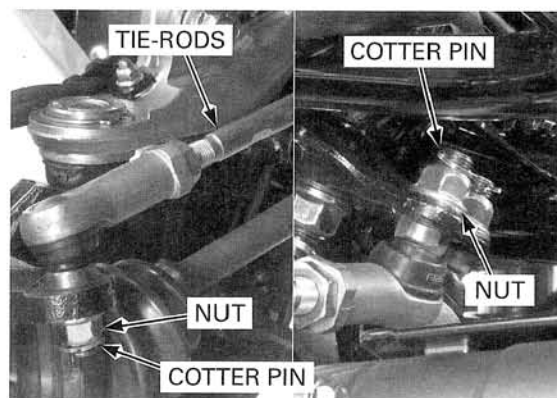
Remove the following:

- front wheel (page 14-9)
- inner fender (page 2-9)

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 arm.



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.

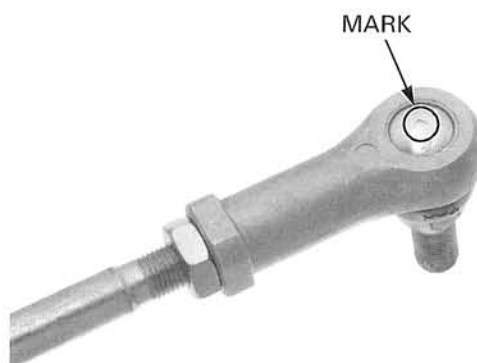
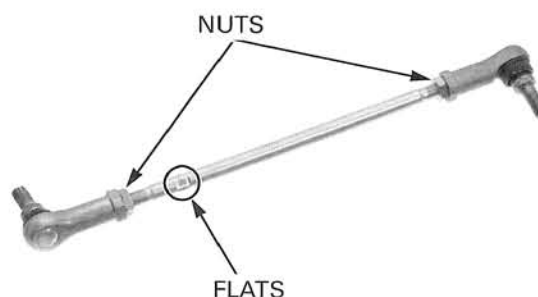
They should move freely and smoothly.

Replace the ball joint if necessary.

DISASSEMBLY/ASSEMBLY

Loosen the lock nuts and remove the ball joints and lock nuts from the tie-rod.

Install the unmarked ball joint and gold colored nut on the flat (wrench holding area) side of the tie-rod, and the "L" marked ball joint and silver nut on the opposite side.



The ball joint positions are 180° 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.

STANDARD DISTANCE: A/B: 8.5 mm (0.33 in)

The difference between distance A and B should be 3 mm (0.1 in) or less.



INSTALLATION

Install the tie-rod with the flat side of the rod toward the knuckle. Install new joint nuts and adjust the toe-out (page 3-22).

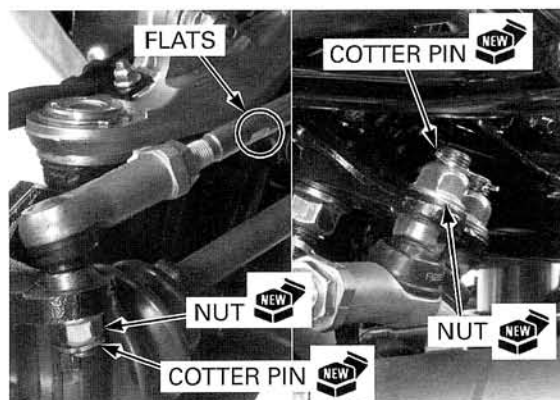
Tighten the joint nuts by holding the ball joint stud flats with an open end wrench.

TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)

Install new cotter pins.

Install the following:

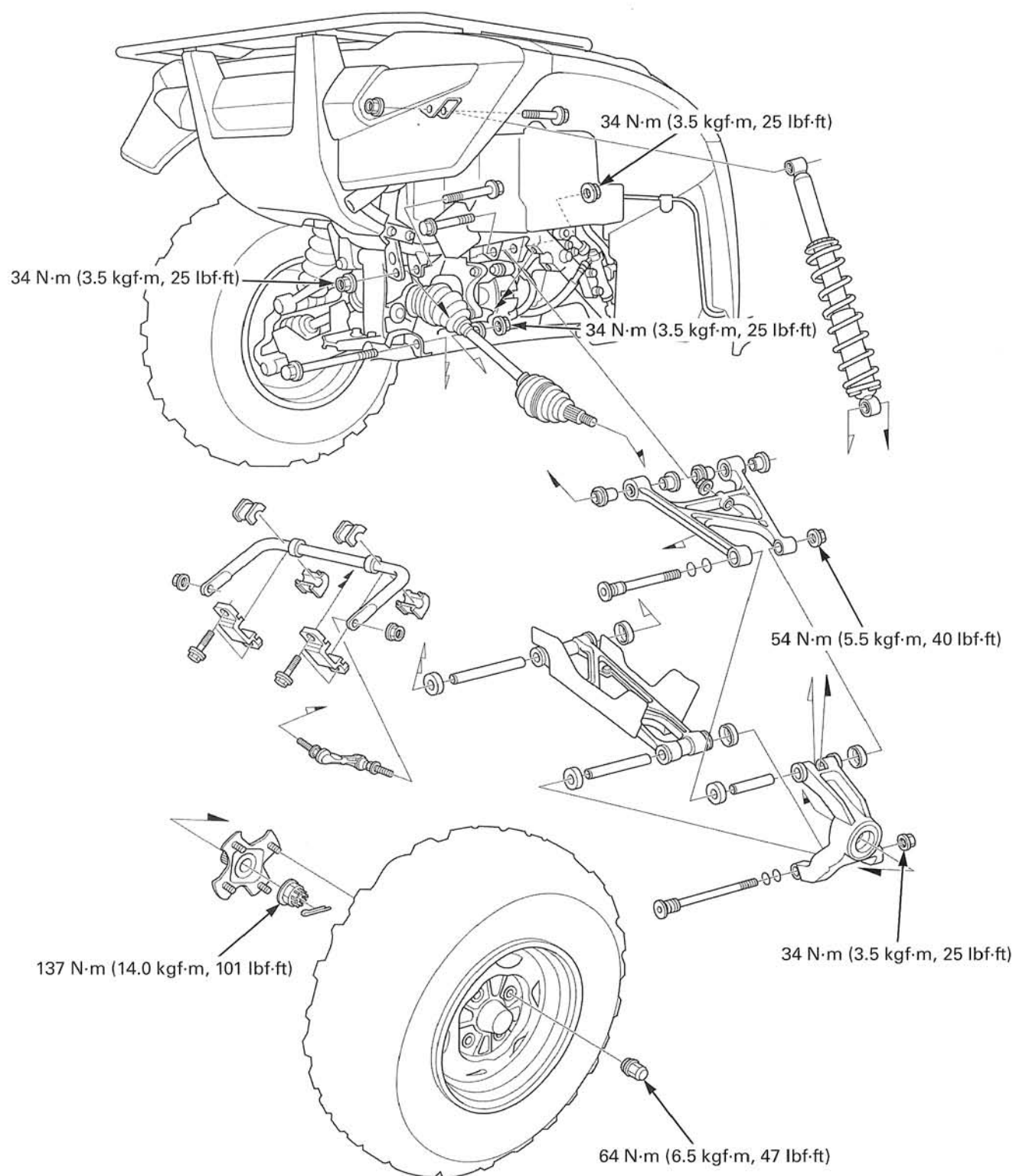
- inner fender (page 2-9)
- front wheel (page 14-9)



15. REAR WHEEL/SUSPENSION

SYSTEM COMPONENTS	15-2	REAR WHEEL	15-5
SERVICE INFORMATION	15-3	WHEEL HUB/KNUCKLE	15-5
TROUBLESHOOTING	15-4	REAR SHOCK ABSORBER/SUSPENSION ARM	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 page 14-9.
- For brake system service, refer to page 16-2.
- For rear driving mechanism service, refer to page 18-2.
- 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.

SPECIFICATIONS

ITEM		STANDARD	SERVICE LIMIT
Minimum tire tread depth		—	4 mm (0.16 in)
Cold tire pressure	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)	—

TORQUE VALUES

Rear wheel nut	64 N·m (6.5 kgf·m, 47 lbf·ft)
Rear wheel hub nut	137 N·m (14.0 kgf·m, 101 lbf·ft) *Castle nut.
Upper arm pivot nut (frame side)	34 N·m (3.5 kgf·m, 25 lbf·ft) Lock nut: replace with a new one.
Upper arm pivot nut (knuckle side)	54 N·m (5.5 kgf·m, 40 lbf·ft) Lock nut: replace with a new one.
Lower arm pivot nut	34 N·m (3.5 kgf·m, 25 lbf·ft) Lock nut: replace with a new one.

*Castle nut: Tighten to the specified torque then tighten to a position suitable for cotter pin hole alignment.

TOOLS

Driver	07749-0010000
Oil seal driver	07JAD-PH80101
Oil seal driver	07LAD-SM40100
Fork seal driver body	07947-KA50100
Spherical bearing driver	07HMF-HC00100 (not available in U.S.A., use a suitable collar)

TROUBLESHOOTING

Rear wheel wobbling

- Bent rim
- Worn or damaged knuckle bearing
- Faulty tire
- Wheel hub nut not tightened properly
- Loose rear suspension fasteners

Steers to one side or does not track straight

- Unequal tire pressure
- Bent suspension arm or frame
- Worn or damaged knuckle bearing
- Weak shock absorber

Soft suspension

- Weak shock absorber spring
- Faulty shock absorber damper

Hard suspension

- Bent shock absorber damper rod
- Improperly installed suspension arms
- Faulty suspension bushings or bearings

Rear suspension noise

- Loose rear suspension fasteners
- Damaged suspension components

REAR WHEEL

REMOVAL

Loosen the wheel nuts.

Support the vehicle using a hoist or equivalent and raise the rear wheels off the ground.

Remove the nuts and wheel.

For tire removal/installation and repair, refer to page 14-9.

INSTALLATION

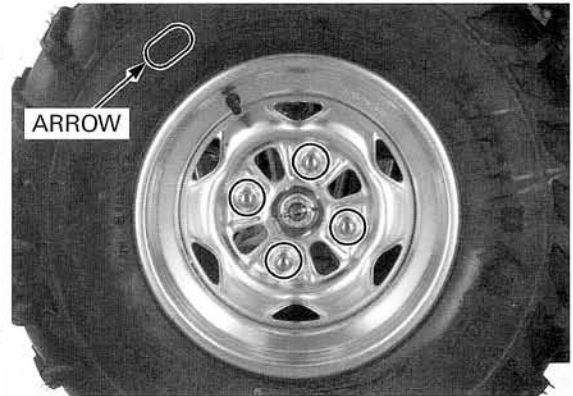
NOTE:

- 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)



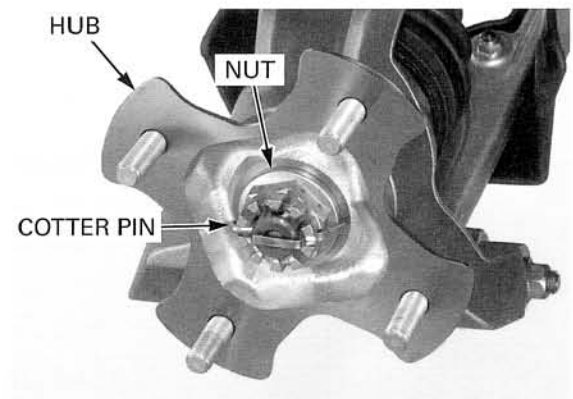
WHEEL HUB/KNUCKLE

REMOVAL

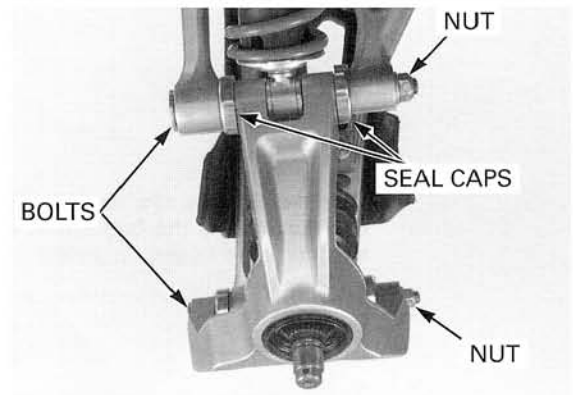
Remove the rear wheel (page 15-5).

Remove the following:

- cotter pin
- hub nut
- wheel hub

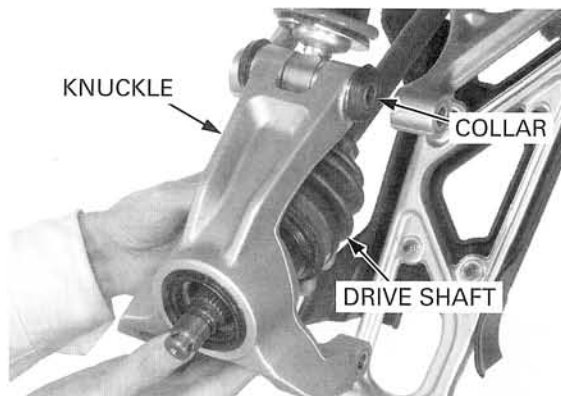


- lower arm pivot nut and bolt
- upper arm pivot nut and bolt
- seal caps (from the knuckle)



REAR WHEEL/SUSPENSION

- pivot collar (to disconnect the shock absorber)
- knuckle (from the drive shaft)



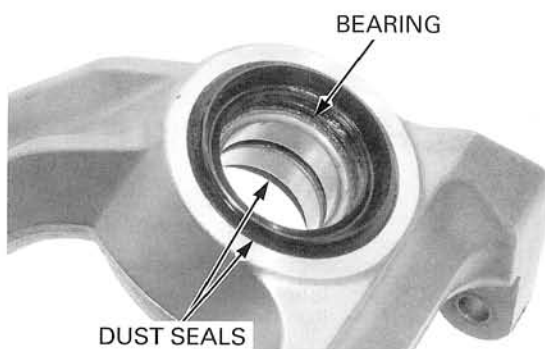
INSPECTION

Remove the dust seals.

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.

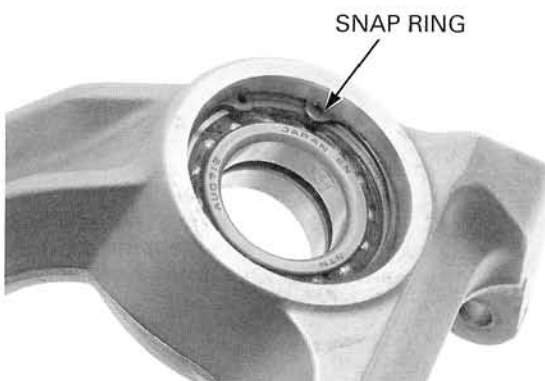
For suspension pivot inspection, see page 15-12.



BEARING REPLACEMENT

Remove the snap ring.

Press the bearing out of the knuckle using a suitable collar.



Pack the cavities of a new bearing with grease. Carefully press the bearing in the knuckle with the marking side facing up until it is fully seated.

TOOLS:

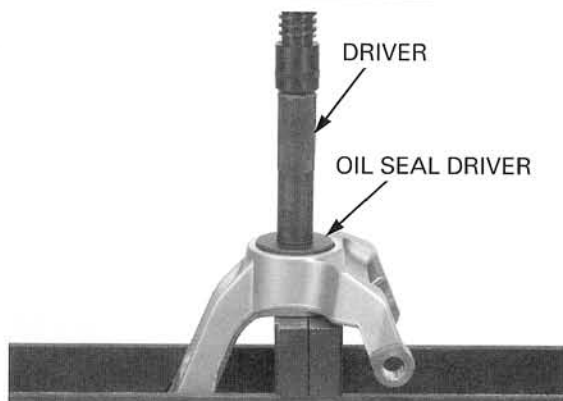
Driver

07749-0010000

Oil seal driver

07JAD-PH80101

Install the snap ring into the knuckle groove with the chamfered edge facing in.



When installing the dust seals, be careful not to damage the seal lip.

Coat the lips of new dust seals with grease and install them until they are flush with the knuckle surface. Install the outer seal first, then install the inner seal.

TOOLS:

OUTER SEAL:

Driver

07749-0010000

Oil seal driver

07LAD-SM40100

INNER SEAL:

Driver

07749-0010000

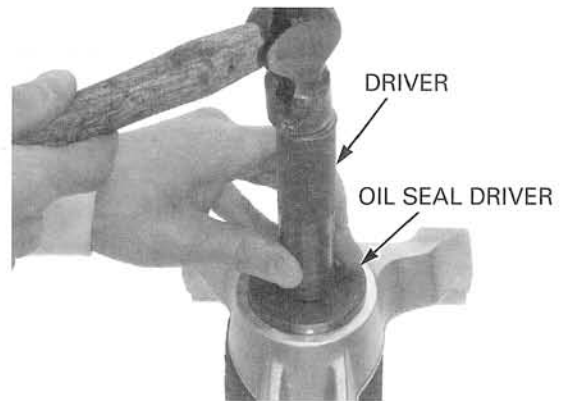
Oil seal driver

07LAD-SM40100

Fork seal driver body

07947-KA50100

Support the knuckle with the driver weight to avoid damaging the outer dust seal.



INSTALLATION

KNUCKLE

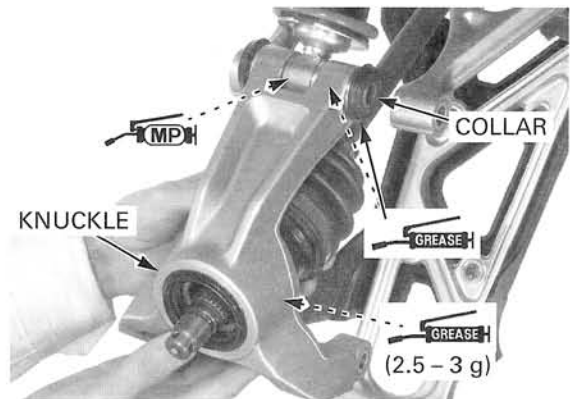
Apply grease to the pivot bushings and dust seal lips on the knuckle.

Apply molybdenum disulfide paste to the pivot bushing in the shock absorber.

Install the knuckle onto the shock absorber with the pivot collar.

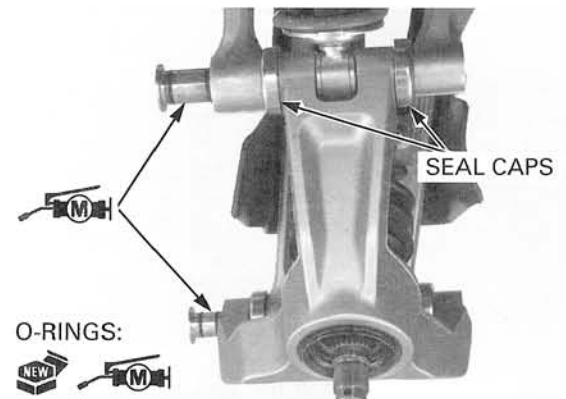
Pack the lip cavities of the inner dust seal with 2.5 – 3 g of grease and set the knuckle over the drive shaft.

Install the seal caps onto the dust seals on the knuckle.



Coat new O-rings with molybdenum disulfide grease and install them into the pivot bolt grooves. Apply molybdenum disulfide grease to each bolt head (between the O-rings).

Connect the upper and lower arms to the knuckle with the pivot bolts.

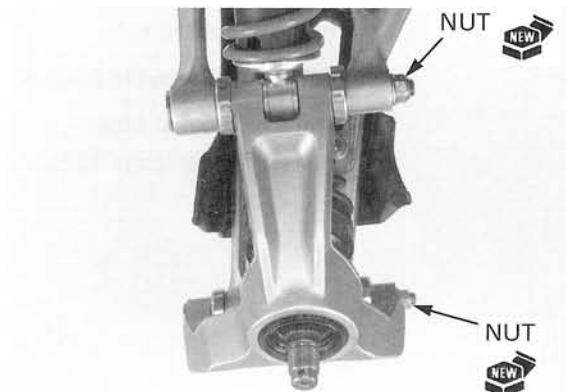


Install new nuts and tighten them.

TORQUE:

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

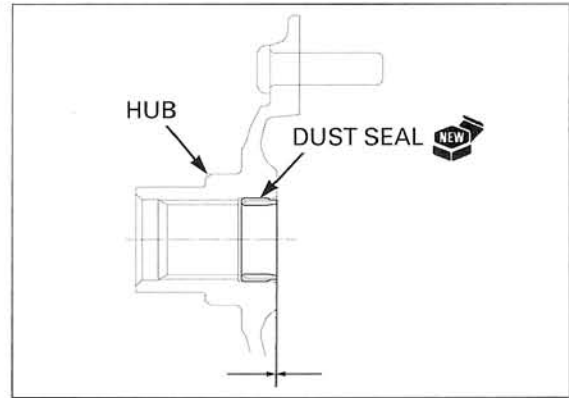
Lower arm: 34 N·m (3.5 kgf·m, 25 lbf·ft)



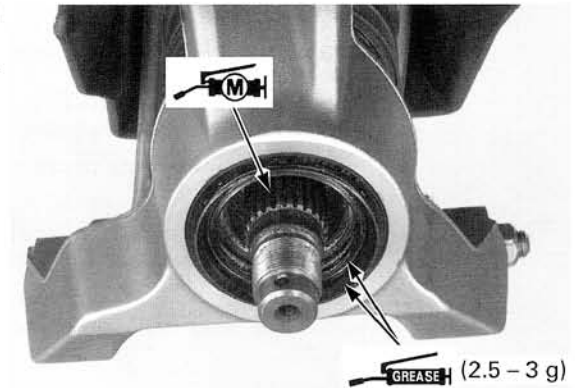
REAR WHEEL/SUSPENSION

WHEEL HUB

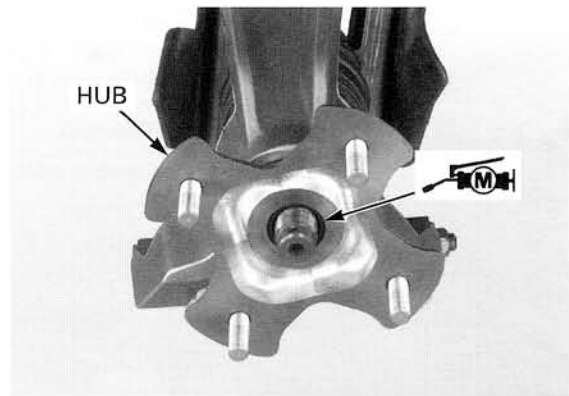
Install a new dust seal into the hub with the metal side facing out until it is flush with the hub surface.



Apply molybdenum disulfide grease to the drive shaft splines.
Pack the lip cavities of the outer dust seal with 2.5 – 3 g of grease.



Apply molybdenum disulfide grease to the dust seal and install the wheel hub.

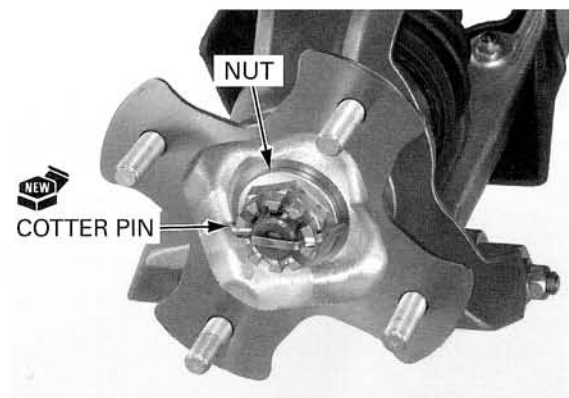


Install the hub nut and tighten it to the specified torque and further tighten until its grooves align with the cotter pin hole.

TORQUE: 137 N·m (14.0 kgf·m, 101 lbf·ft)

Install a new cotter pin.

Install the wheel (page 15-5).



REAR SHOCK ABSORBER/ SUSPENSION ARM

Remove the rear wheel (page 15-5).

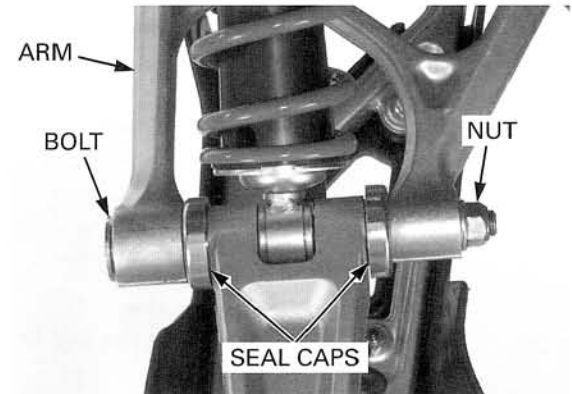
Support the knuckle with a support block.

SHOCK ABSORBER REMOVAL

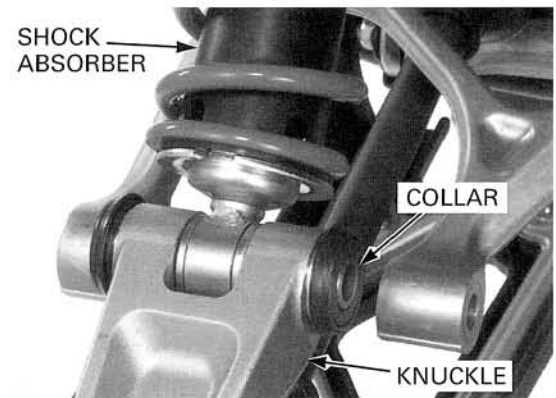
Remove the seat (page 2-4).

Remove the following:

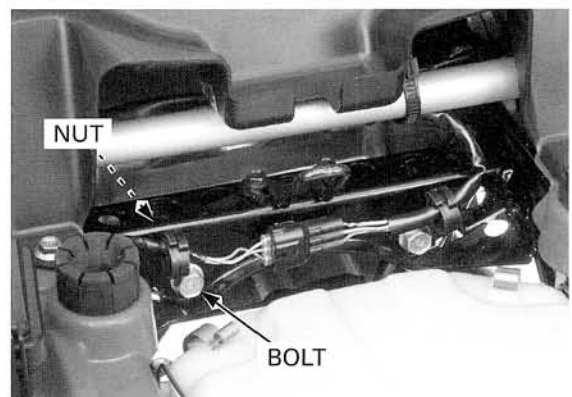
- upper arm pivot nut and bolt (to disconnect the upper arm)
- seal caps



- pivot collar (to disconnect the knuckle)



- mounting nut and bolt
- shock absorber



SUSPENSION ARM REMOVAL

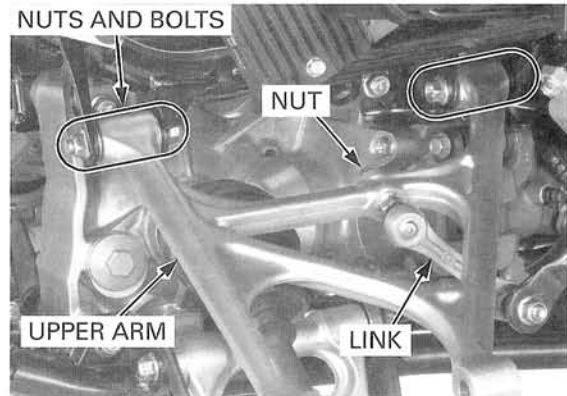
UPPER ARM

Remove the pivot collar (page 15-9).

Right upper arm: Remove the right side cover (page 2-4).
Left upper arm: Remove the oil filler lid (page 2-8).

Remove the following:

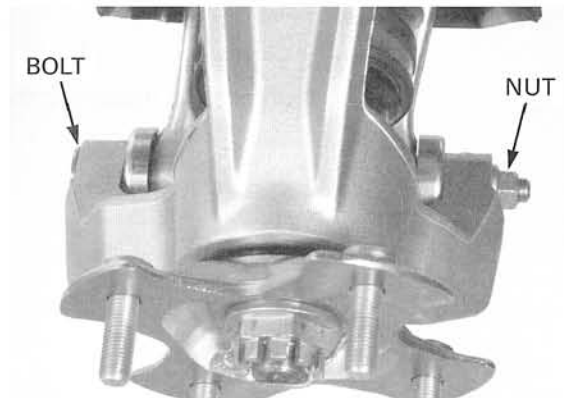
- stabilizer link nut (to disconnect the link)
- two pivot nuts and bolts
- upper arm



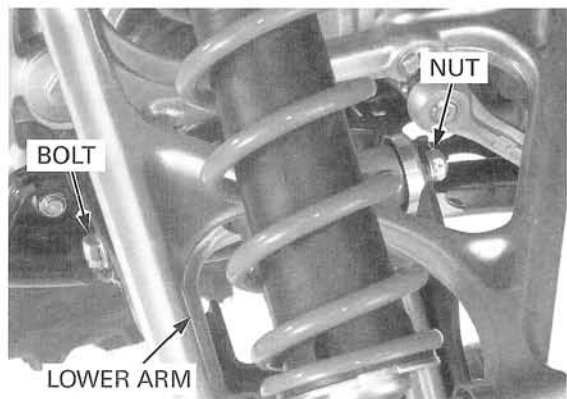
LOWER ARM

Remove the following:

- lower arm pivot nut and bolt (to disconnect the knuckle)



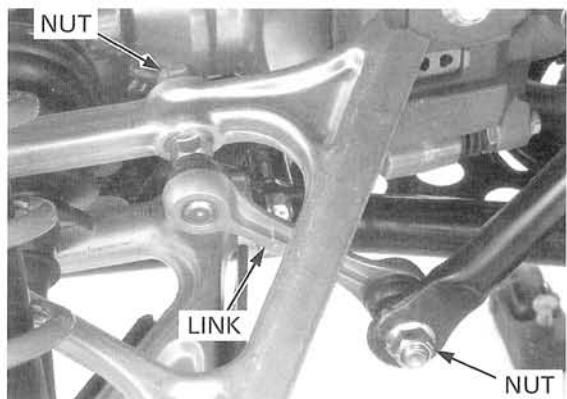
- lower arm pivot nut and bolt
- lower arm



STABILIZER ARM AND LINK

Remove the following:

- link nuts
- stabilizer links

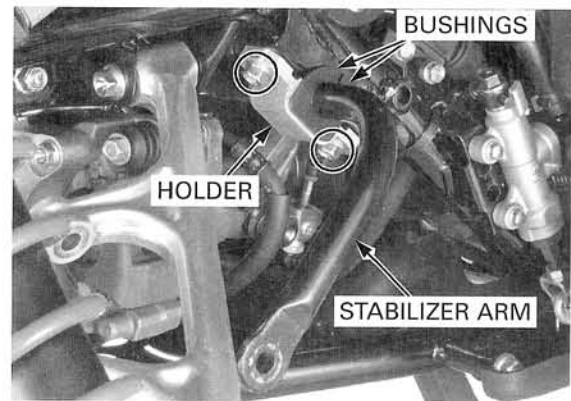


- four bolts and arm holders
- stabilizer arm
- stabilizer bushings

INSPECTION

SUSPENSION ARMS

Check the stabilizer bushings for wear or damage.
Check the stabilizer arm for distortion or damage.



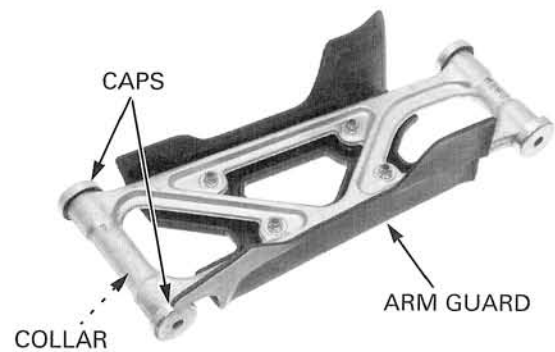
Inspect the ball joint boot of the link for tears or other damage.



Replace the nuts with new ones.

Remove the seal caps and pivot collars from the lower arm.
Remove the four nuts, bolts and arm guard if necessary.

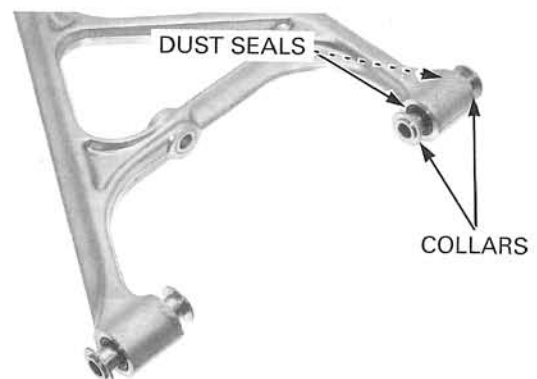
Check the pivot bushings for wear or damage.



Remove the pivot collars and the dust seals from the upper arm.

Check the pivot bearings for wear or damage.

For bearing replacement, see page 15-12.



REAR WHEEL/SUSPENSION

Check the pivot bushings in the knuckle for wear or damage.



SHOCK ABSORBER

Remove the upper pivot collar.

Check the pivot bushings for wear or damage.
Check the damper unit for leaks or other damage.



PIVOT BEARING REPLACEMENT

Clean any grease from the upper arm pivot thoroughly.

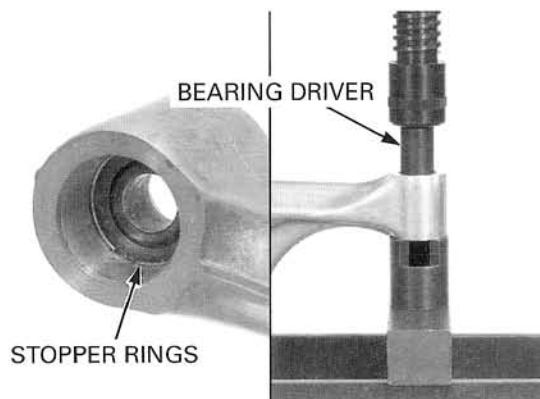
Remove the stopper rings from the pivot.

Press the bearing out of the upper arm using the special tool.

TOOL:

Spherical bearing driver

07HMF-HC00100
(not available in
U.S.A., use a suitable
collar)



Install a new stopper ring into the inner groove in the pivot securely.

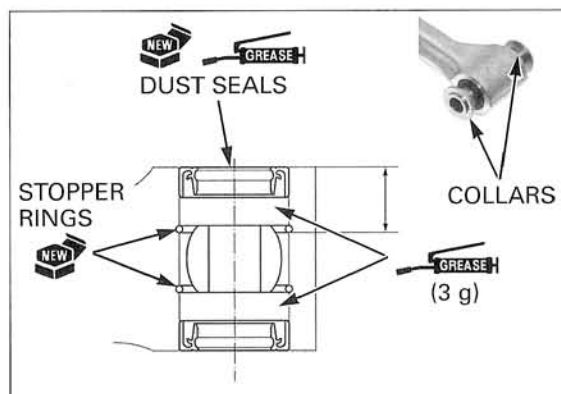
Carefully press in a new bearing until it contacts the stopper ring (the depth from the outer surface is 12.8 mm), using the same tool.

Install a new stopper ring.

Pack each pivot (between bearing and dust seals) with 3 g of grease.

Apply grease to the new dust seal lips and install them until they are flush with the outer surface.

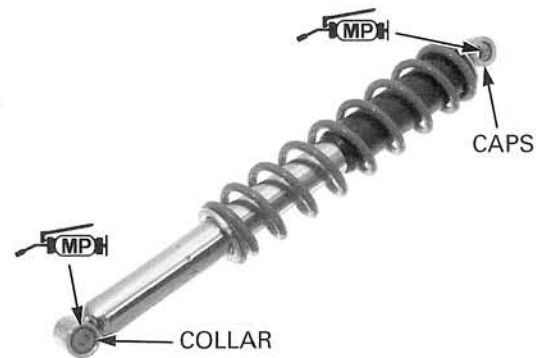
Install the pivot collars.



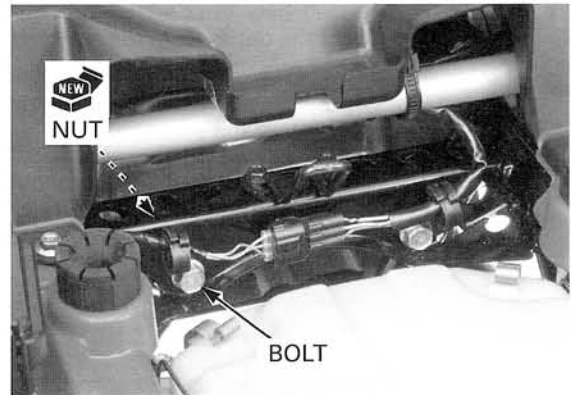
SHOCK ABSORBER INSTALLATION

Install new dust seals into the pivots with the lip side facing out until they are seated.
Apply molybdenum disulfide paste to the pivot bushings and dust seal lips.

Install the seal caps and pivot collar.

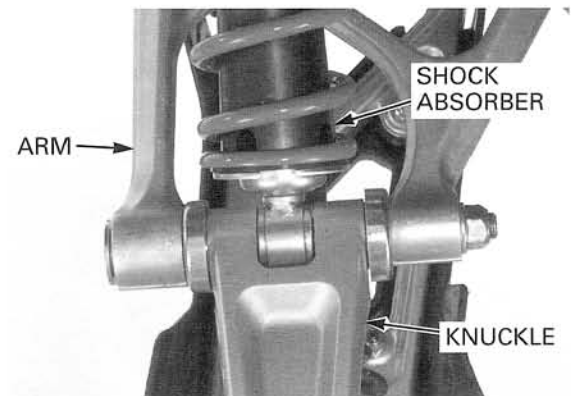


Install the shock absorber into the frame with the mounting bolt. Install a new nut.



Connect the shock absorber to the knuckle and upper arm (page 15-15).

Install the seat (page 2-4).

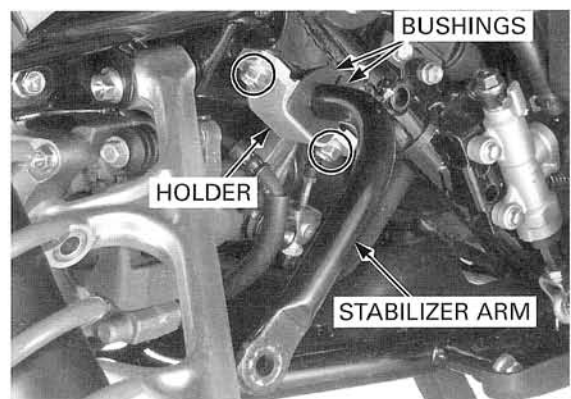


SUSPENSION ARM INSTALLATION

STABILIZER ARM AND LINK

Install the stabilizer arm and bushings with the arm holders so the rounded side of the bushings are toward the frame.

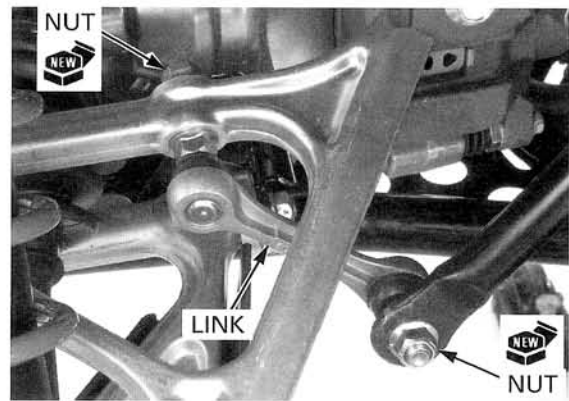
Tighten the four holder bolts alternately.



REAR WHEEL/SUSPENSION

Install with the short threads into the stabilizer arm.

Install the stabilizer links with new nuts and tighten them.

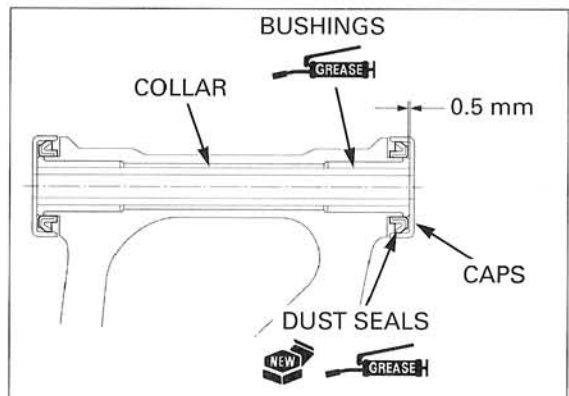


LOWER ARM

Install new dust seals with the lip side facing out until the depth from the bushing end is 0.5 mm (0.02 in).

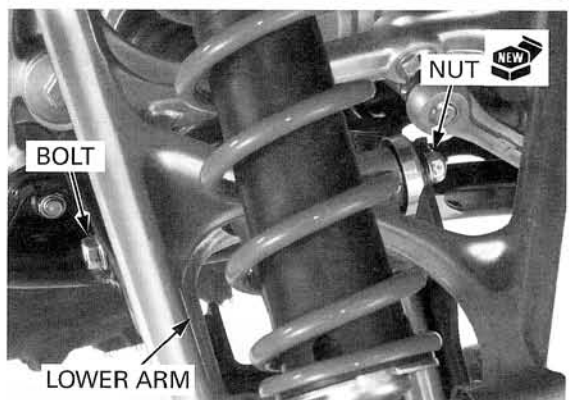
Apply grease to the pivot bushings in the lower arm and install the pivot collar.

Apply grease to the seal lips and install the seal caps over the dust seals securely.

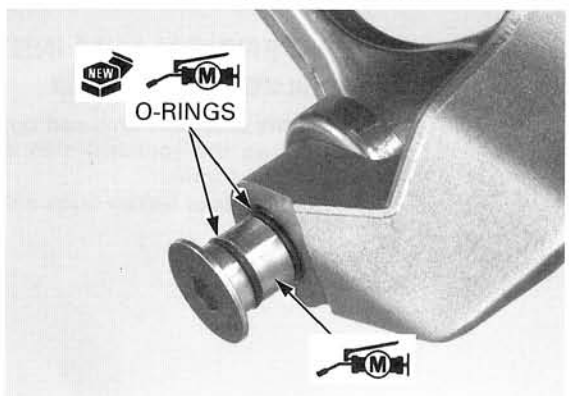


Install the lower arm into the frame. Align the bolt holes in the frame and arm, and insert the pivot bolt from the rear side.

Install a new pivot nut.

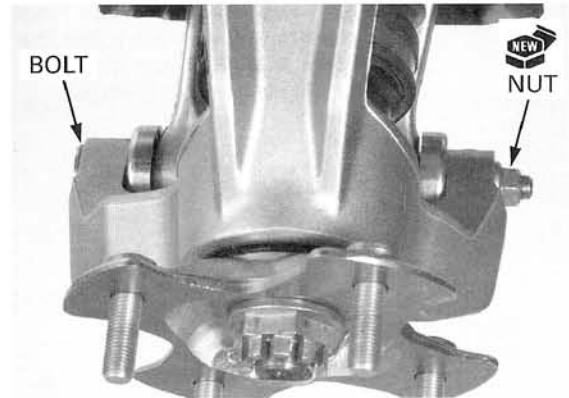


Coat new O-rings with molybdenum disulfide grease and install them into the pivot bolt groove. Apply molybdenum disulfide grease to the bolt head (between the O-rings) and insert the pivot bolt through the knuckle and lower arm.



Install a new pivot nut and tighten each pivot nut.

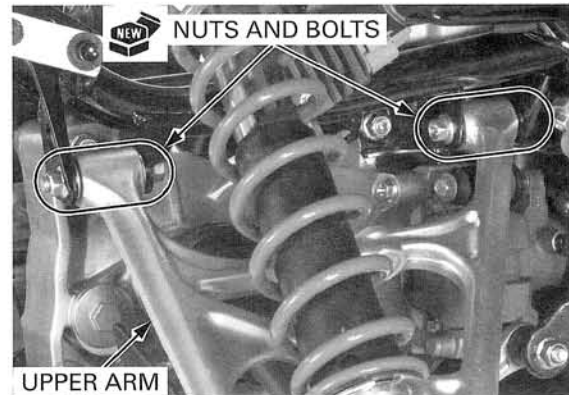
TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)



UPPER ARM

Insert the pivot bolts from the inside.

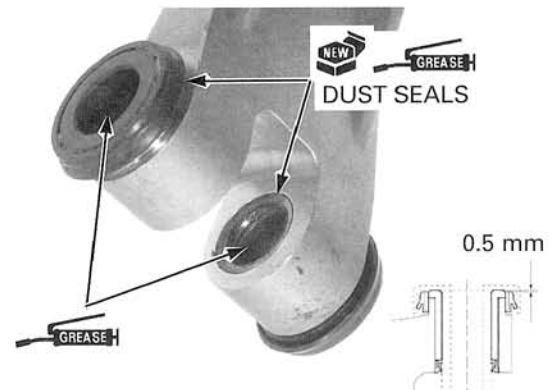
Install the upper arm into the frame with the pivot bolts and new nuts.



Install new inner dust seals into the knuckle pivots with the lip side facing the bushing until they are seated.

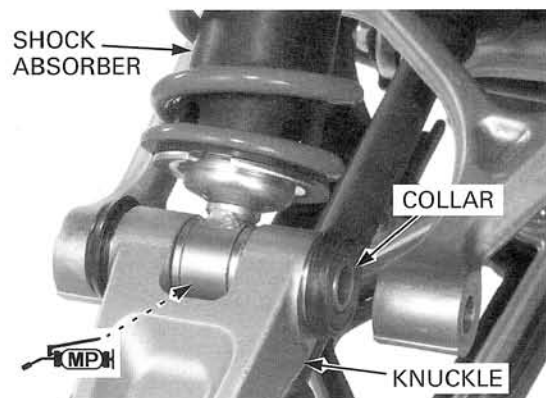
Install new outer dust seals with the lip side facing out until the depth from the bushing end is 0.5 mm (0.02 in).

Apply grease to the pivot bushings and dust seal lips.



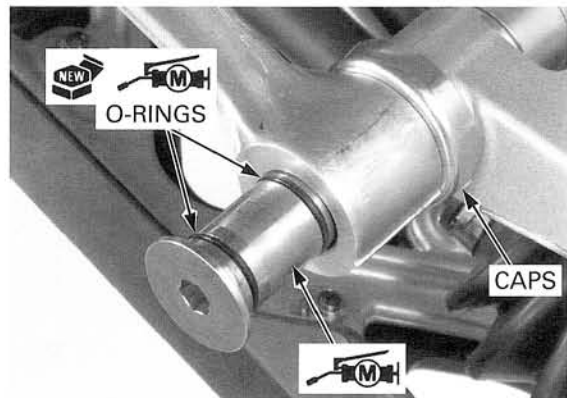
Apply molybdenum disulfide paste to the pivot bushing in the shock absorber.

Connect the knuckle to the shock absorber with the pivot collar and install the seal caps over the dust seals.



REAR WHEEL/SUSPENSION

Coat new O-rings with molybdenum disulfide grease and install them into the pivot bolt grooves. Apply molybdenum disulfide grease to the bolt head (between the O-rings).



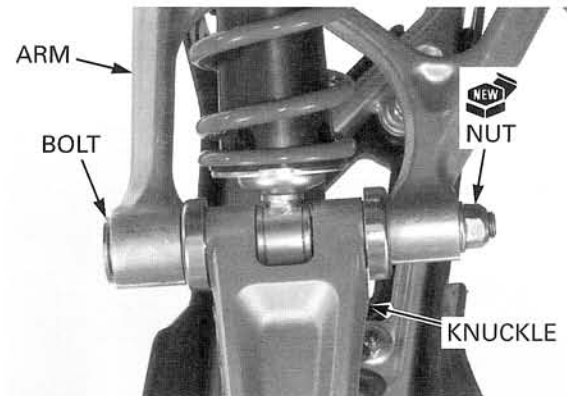
Connect the knuckle to the upper arm with the pivot bolt. Install a new pivot nut.

Tighten the each pivot nut.

TORQUE:

Frame side: 34 N·m (3.5 kgf·m, 25 lbf·ft)

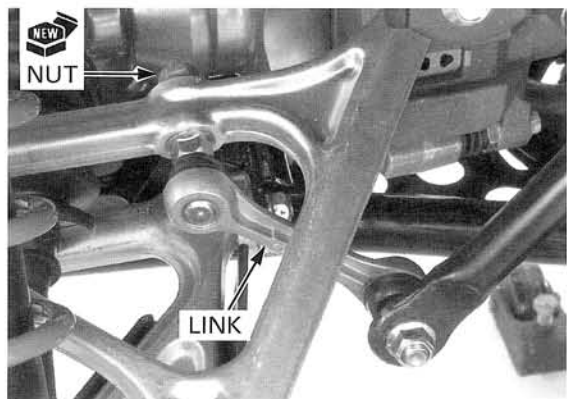
Knuckle side: 54 N·m (5.5 kgf·m, 40 lbf·ft)



Connect the stabilizer link with a new nut and tighten it.

Right side: Install the right side cover (page 2-4).

Left side: Install the oil filler lid (page 2-8).



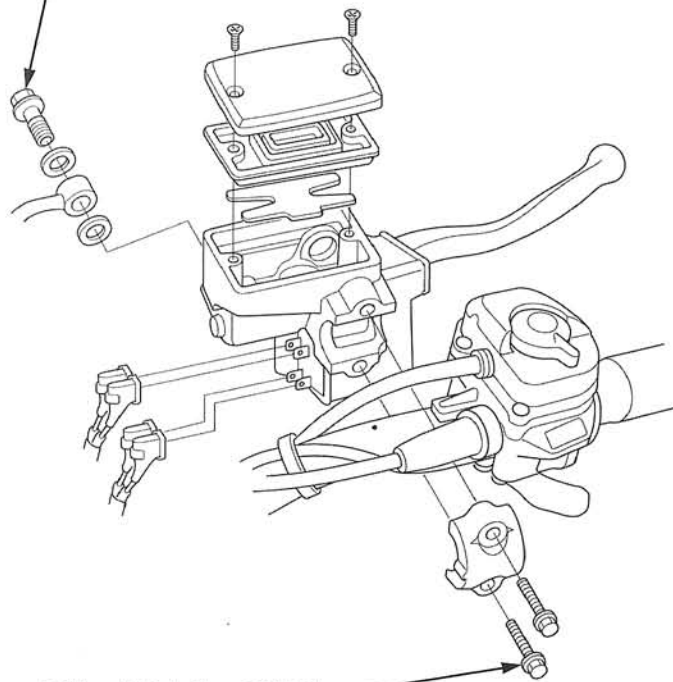
Install the rear wheel (page 15-5).

16. BRAKE SYSTEM

SYSTEM COMPONENTS	16-2	REAR BRAKE MASTER CYLINDER/BRAKE PEDAL	16-15
SERVICE INFORMATION	16-4	FRONT BRAKE SHOES/DRUM.....	16-21
TROUBLESHOOTING	16-5	FRONT WHEEL CYLINDER/BRAKE PANEL	16-24
BRAKE FLUID REPLACEMENT/ AIR BLEEDING	16-6	REAR BRAKE CALIPER.....	16-29
REAR BRAKE PAD/DISC	16-9	REAR BRAKE DISC	16-36
FRONT BRAKE MASTER CYLINDER	16-11		

SYSTEM COMPONENTS

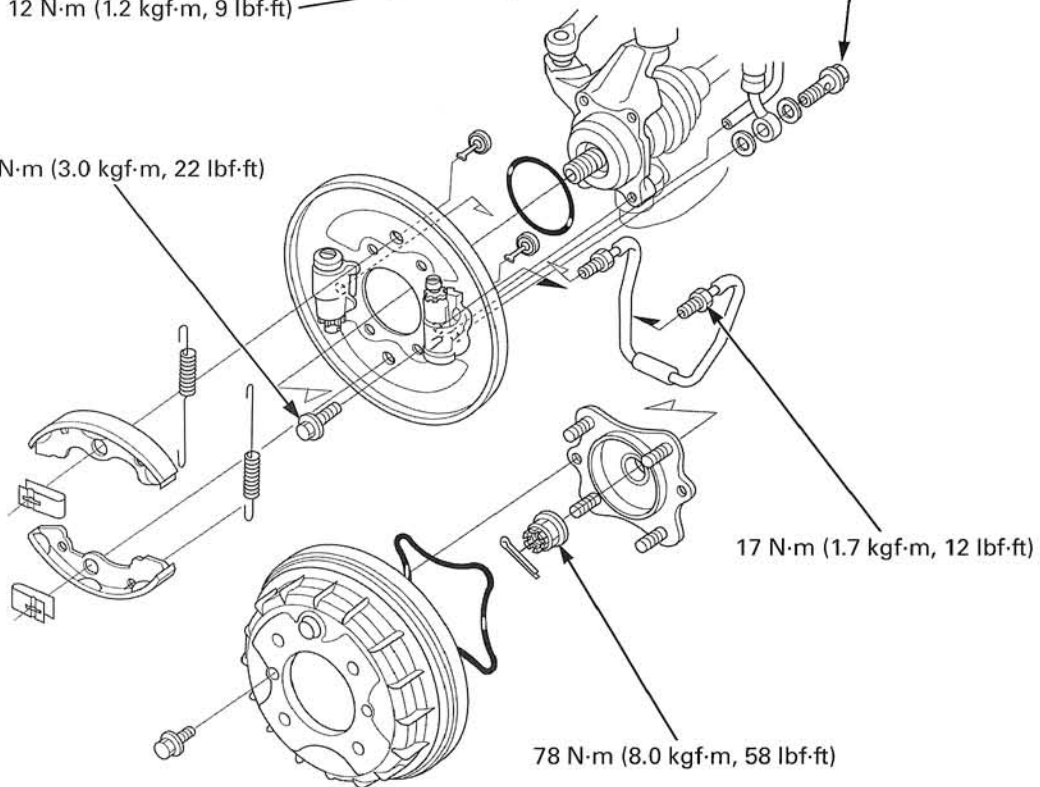
34 N·m (3.5 kgf·m, 25 lbf·ft)



12 N·m (1.2 kgf·m, 9 lbf·ft)

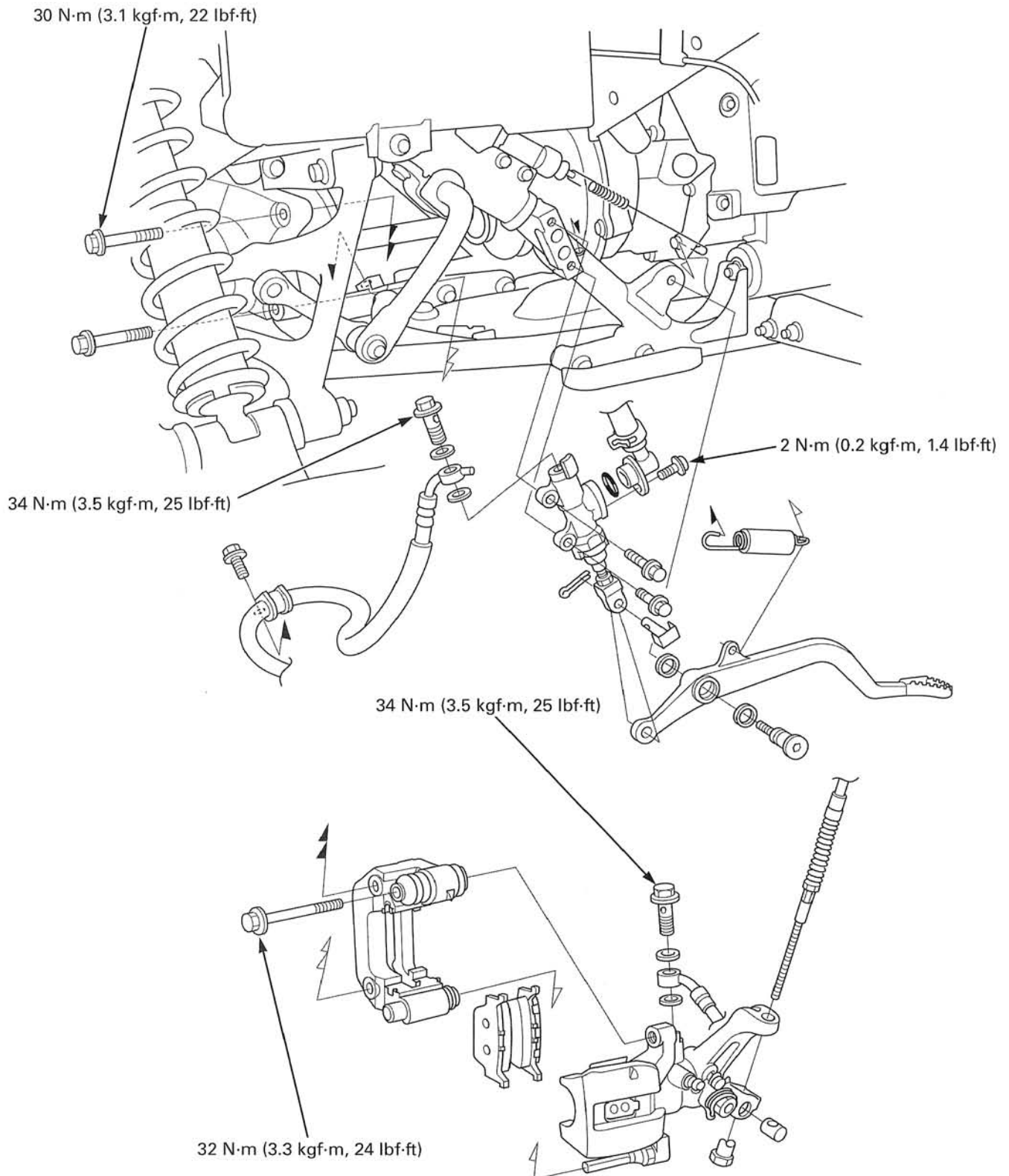
34 N·m (3.5 kgf·m, 25 lbf·ft)

29 N·m (3.0 kgf·m, 22 lbf·ft)



17 N·m (1.7 kgf·m, 12 lbf·ft)

78 N·m (8.0 kgf·m, 58 lbf·ft)



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.

- 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.
- Spilled brake fluid will severely damage the plastic parts and painted surfaces. It is also harmful to some rubber parts. Be careful whenever you remove the reservoir cap; make sure the reservoir is horizontal first.
- Never allow contaminants (dirt, water, etc.) to get into an open reservoir.
- Once the hydraulic system has been opened, or if the brake feels spongy, the system must be bled.
- Always use fresh DOT 3 or 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
Recommended brake fluid		DOT 4 brake fluid	—
Front brake	Drum I.D.	160.0 – 160.3 (6.30 – 6.31)	161 (6.34)
	Shoe lining thickness	4.0 (0.16)	1.0 (0.04)
	Brake panel warpage	—	0.4 (0.02)
	Waterproof seal lip length	22 (0.9)	20 (0.8)
	Master cylinder I.D.	14.000 – 14.043 (0.5512 – 0.5529)	14.055 (0.5533)
	Master piston O.D.	13.957 – 13.984 (0.5495 – 0.5506)	13.945 (0.5490)
	Wheel cylinder I.D.	19.050 – 19.102 (0.7500 – 0.7520)	19.12 (0.753)
	Wheel cylinder piston O.D.	18.997 – 19.030 (0.7479 – 0.7492)	18.81 (0.741)
Rear brake	Brake disc thickness	7.5 (0.30)	6 (0.2)
	Brake disc runout	—	0.5 (0.02)
	Master cylinder I.D.	15.870 – 15.913 (0.6248 – 0.6265)	15.925 (0.6270)
	Master piston O.D.	15.827 – 15.854 (0.6231 – 0.6242)	15.815 (0.6226)
	Caliper cylinder I.D.	30.230 – 30.280 (1.1902 – 1.1921)	30.29 (1.193)
	Caliper piston O.D.	30.148 – 30.198 (1.1869 – 1.1889)	30.14 (1.187)

TORQUE VALUES

Brake hose oil bolt	34 N·m (3.5 kgf·m, 25 lbf·ft)	
Wheel cylinder bleed valve	6 N·m (0.6 kgf·m, 4.3 lbf·ft)	
Brake lever pivot bolt	1 N·m (0.1 kgf·m, 0.7 lbf·ft)	
Brake lever pivot nut	6 N·m (0.6 kgf·m, 4.3 lbf·ft)	
Front master cylinder holder bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	
Rear brake reservoir hose joint screw	2 N·m (0.2 kgf·m, 1.4 lbf·ft)	Apply locking agent to the threads.
Wheel cylinder bolt	8 N·m (0.8 kgf·m, 5.8 lbf·ft)	
Wheel cylinder nut	17 N·m (1.7 kgf·m, 12 lbf·ft)	
Wheel cylinder oil pipe joint nut	17 N·m (1.7 kgf·m, 12 lbf·ft)	
Front brake panel bolt	29 N·m (3.0 kgf·m, 22 lbf·ft)	Special bolt; replace with a new one.
Front wheel hub nut	78 N·m (8.0 kgf·m, 58 lbf·ft)	Castle nut.
Rear brake caliper bleed valve	6 N·m (0.6 kgf·m, 4.3 lbf·ft)	
Rear brake caliper bracket pin bolt	32 N·m (3.3 kgf·m, 24 lbf·ft)	
Rear brake caliper pin retaining bolt	23 N·m (2.3 kgf·m, 17 lbf·ft)	
Rear brake caliper parking nut	27 N·m (2.8 kgf·m, 20 lbf·ft)	Apply locking agent to the threads.
Rear brake caliper mounting bolt	30 N·m (3.1 kgf·m, 22 lbf·ft)	ALOC bolt; replace with a new one.
Rear brake disc bolt	20 N·m (2.0 kgf·m, 14 lbf·ft)	ALOC bolt; replace with a new one.

TOOLS

Snap ring pliers	07914-SA50001 or 07914-3230001
Lock nut wrench, 20 x 24 mm	07716-00201001

TROUBLESHOOTING

FRONT DRUM BRAKE

Poor brake performance

- Improperly adjusted brake
- Air in hydraulic system
- Leaking hydraulic system
- Worn brake shoe/drum
- Contaminated brake shoe/drum
- Low brake fluid level
- Clogged fluid passage
- Warped/deformed brake drum
- Sticking/worn wheel cylinder piston
- Sticking/worn master piston
- Bent brake lever

Front brake lever hard

- Clogged/restricted hydraulic system
- Sticking/worn wheel cylinder piston
- Sticking/worn master piston
- Bent brake lever

Brake drags

- Contaminated brake shoe/drum
- Badly worn brake shoe/drum
- Warped/deformed brake drum
- Clogged/restricted fluid passage
- Sticking wheel cylinder piston

REAR DISC BRAKE

Rear brake pedal soft or spongy

- Air in hydraulic system
- Leaking hydraulic system
- Contaminated brake pad/disc
- Worn caliper piston seal
- Worn master cylinder piston cups
- Worn brake pad/disc
- Contaminated caliper
- Contaminated master cylinder
- Caliper not sliding properly
- Low brake fluid level
- Clogged fluid passage
- Warped/deformed brake disc
- Sticking/worn caliper piston
- Sticking/worn master piston
- Bent brake pedal

Rear brake pedal hard

- Clogged/restricted hydraulic system
- Sticking/worn caliper piston
- Sticking/worn master piston
- Caliper not sliding properly
- Bent brake pedal

Brake drags

- Contaminated brake pad/disc
- Badly worn brake pad/disc
- Warped/deformed brake disc
- Caliper not sliding properly
- Clogged/restricted fluid passage
- Sticking caliper piston
- Misaligned disc

BRAKE FLUID REPLACEMENT/AIR BLEEDING

NOTICE

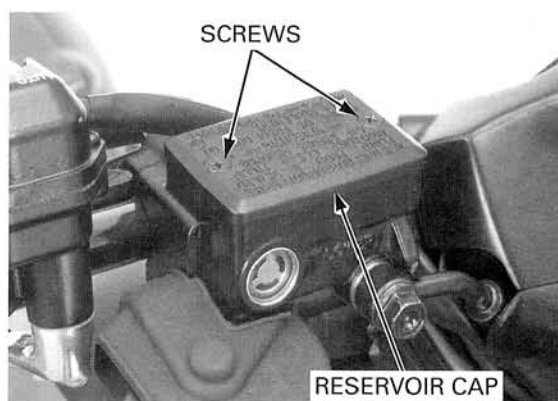
- Do not allow foreign material to enter the system when filling the reservoir. Foreign material can cause brake system failure.
- Avoid spilling fluid on painted, plastic, or rubber parts. Place a rag over these parts whenever the system is serviced. Brake fluid will damage these types of materials.
- Use only DOT 3 or DOT 4 brake fluid from a sealed container.
- Do not mix different types of fluid. They are not compatible. Mixed fluid types can cause brake system failure.

BRAKE FLUID DRAINING

FRONT BRAKE

Turn the handlebar to the left side so that the reservoir is level before removing the reservoir cap.

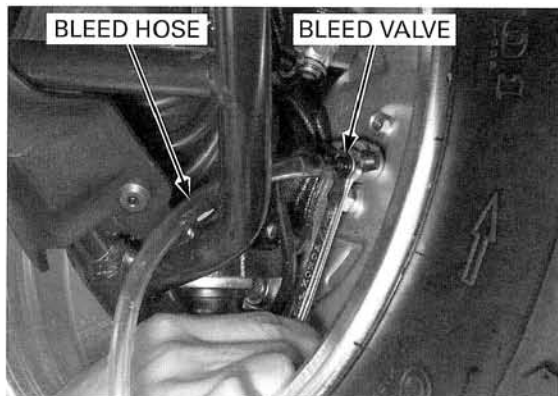
Remove the screws, reservoir cap, set plate and diaphragm from the front master cylinder.



Connect the bleed hose to the wheel cylinder bleed valve.

Loosen the bleed valve and pump the brake lever until no more fluid flows out of the bleed valve.

Perform above procedure for other side bleed valve.



REAR BRAKE

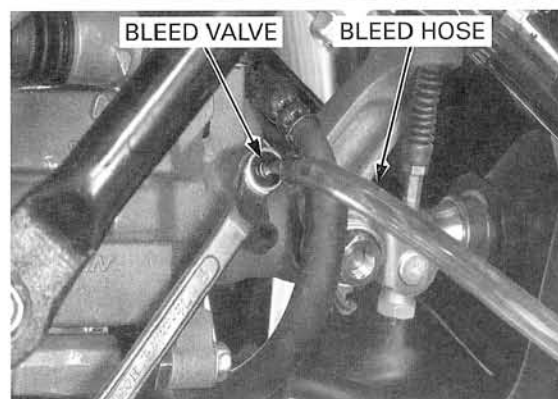
Remove the right side cover (page 2-4).

Remove the rear brake reservoir cap, set plate and diaphragm.



Connect the bleed hose to the rear brake caliper bleed valve.

Loosen the bleed valve and pump the brake lever until no more fluid flows out of the bleed valve.



BRAKE FLUID FILLING/BLEEDING

FRONT BRAKE

Close the wheel cylinder bleed valve.

Fill the front master cylinder reservoir with DOT 3 or DOT 4 brake fluid from a sealed container.

Connect a commercially available brake bleeder to the bleed valve.

Operate the brake bleeder and loosen the bleed valve.

If not using an automatic refill system, add brake fluid when the fluid level in the reservoir is low.

NOTE:

- Check the fluid level often while bleeding the brake to prevent air from being pumped into the system.
- When using a brake bleeding tool, follow the manufacturer's operating instructions.

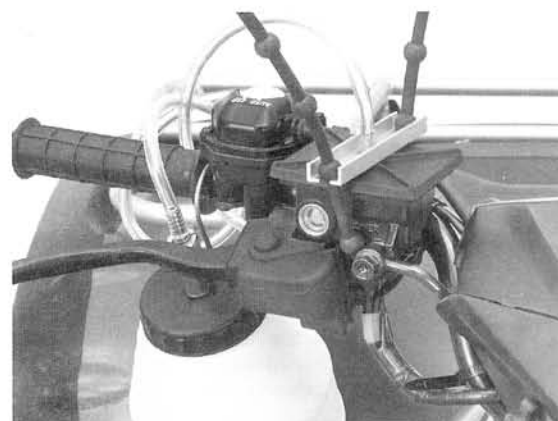
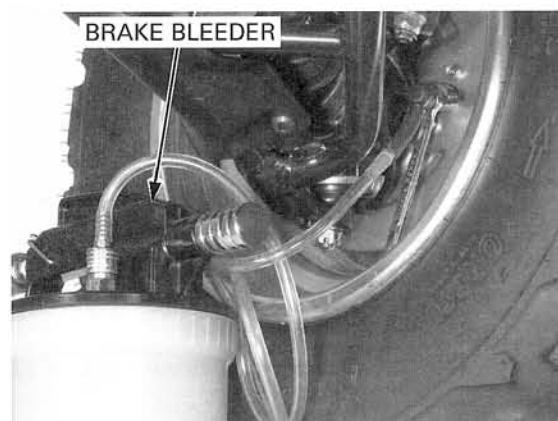
Perform the bleeding procedure until the system is completely flushed/bled.

NOTE:

- If air is entering the bleeder from around the bleed valve threads, seal the threads with teflon tape.

Close the bleed valve and perform air bleeding for the other side bleed valve.

Close the bleed valve and operate the brake lever. If it is still feels spongy, bleed the system again.



BRAKE SYSTEM

If a brake bleeder is not available, use the following procedure:

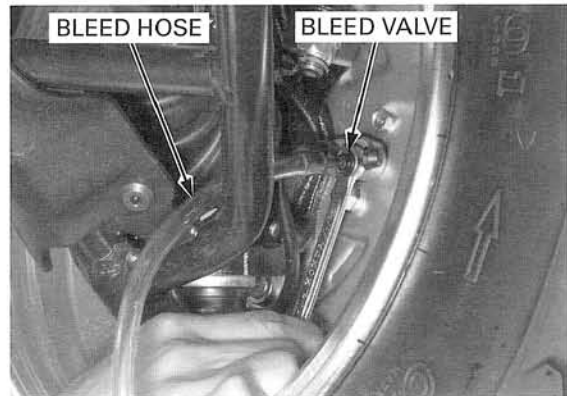
Pump up the system pressure with the brake lever until the lever resistance is felt.

Connect a plastic hose to the bleed valve and bleed the system as follows:

1. Squeeze the brake lever, open the bleed valve 1/4 turn and then close it.

NOTE:

- Do not release the brake lever until the bleed valve has been closed.
2. Release the brake lever slowly and wait several seconds after it reaches the end of its travel.



Repeat the steps 1 and 2 until air bubbles do not appear in the bleed hose.

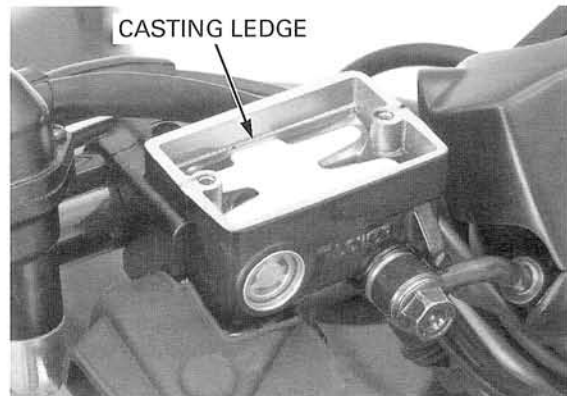
Tighten the bleed valve.

TORQUE: 6 N·m (0.6 kgf·m, 4.3 lbf·ft)

Perform air bleeding for the other side bleed valve.

Fill the reservoir to the casting ledge with DOT 3 or DOT 4 brake fluid from a sealed container.

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



REAR BRAKE

Close the caliper bleed valve.

Fill the rear brake reservoir with DOT 3 or DOT 4 brake fluid from a sealed container.

Connect a commercially available brake bleeder to the bleed valve.

Operate the brake bleeder and loosen the bleed valve.

If not using an automatic refill system, add brake fluid when the fluid level in the reservoir is low.

NOTE:

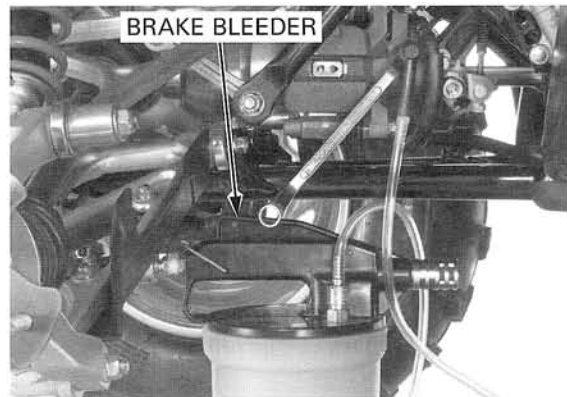
- Check the fluid level often while bleeding the brake to prevent air from being pumped into the system.
- When using a brake bleeding tool, follow the manufacturer's operating instructions.

Perform the bleeding procedure until the system is completely flushed/bled.

NOTE:

- If air is entering the bleeder from around the bleed valve threads, seal the threads with teflon tape.

Close the bleed valve and operate the brake pedal. If it is still feels spongy, bleed the system again.



If a brake bleeder is not available, use the following procedure:

Pump up the system pressure with the rear brake pedal until the pedal resistance is felt.

Connect a plastic hose to the bleed valve and bleed the system as follows:

1. Depress the rear brake pedal, open the bleed valve 1/4 turn and then close it.

NOTE:

- Do not release the brake pedal until the bleed valve has been closed.
2. Release the brake pedal slowly and wait several seconds after it reaches the end of its travel.

Repeat the steps 1 and 2 until air bubbles do not appear in the bleed hose.

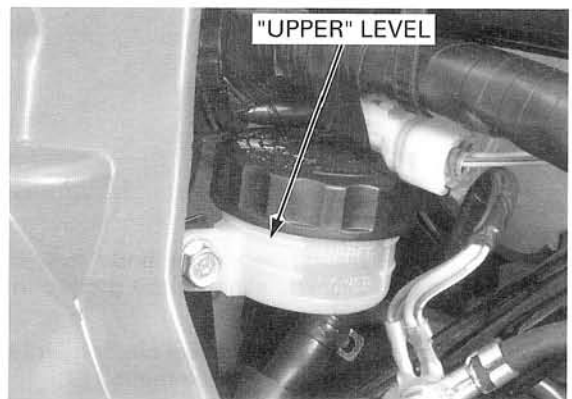
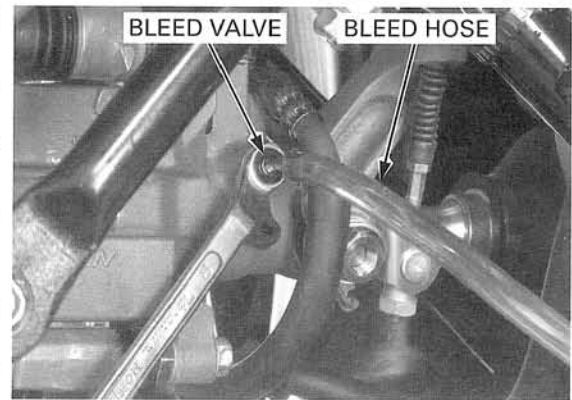
Tighten the bleed valve.

TORQUE: 6 N·m (0.6 kgf·m, 4.3 lbf·ft)

Fill the reservoir to the "UPPER" level with DOT 3 or DOT 4 brake fluid from a sealed container.

Install the diaphragm, set plate and reservoir cap.

Install the right side cover (page 2-4).



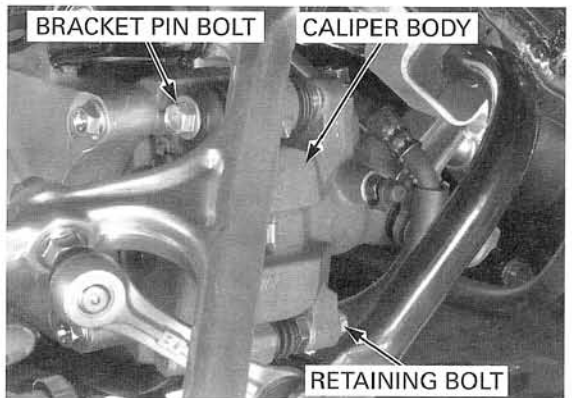
REAR BRAKE PAD/DISC

BRAKE PAD REPLACEMENT

Remove the right rear wheel (page 14-9).

Remove the bracket pin retaining bolt and bracket pin bolt.

Remove the caliper body from the caliper bracket.

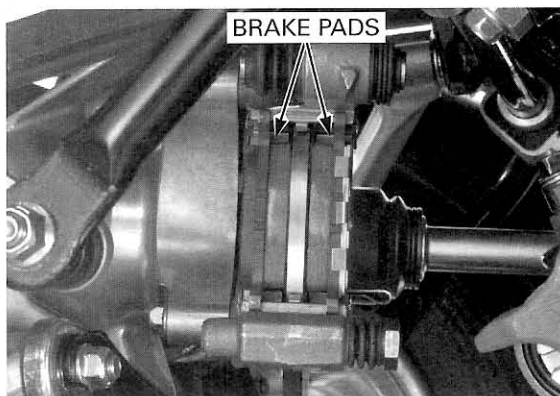


BRAKE SYSTEM

Always replace the brake pads in pairs to ensure even disc pressure.

Remove the brake pads from the caliper bracket.

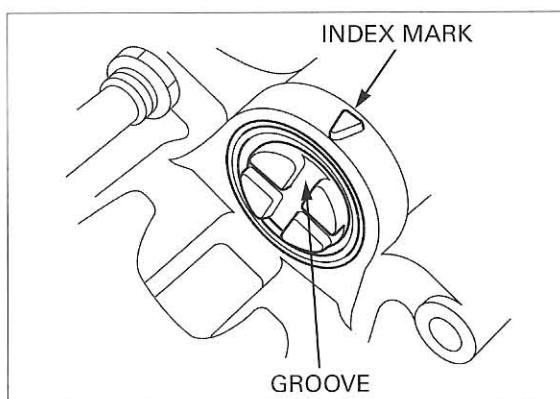
Install new pad onto the caliper bracket properly so that the pin on the pad is facing to the piston.



Rotate the caliper piston clockwise using the special tool or equivalent to retract it and align the piston groove with the index mark on the caliper body.

TOOL:

Lock nut wrench, 20 x 24 mm 07716-0020100



Install the caliper body over the pads and caliper bracket, aligning the groove in the piston with the pin on the pad.

Install the bracket pin bolt and bracket pin retaining bolt, and tighten them.

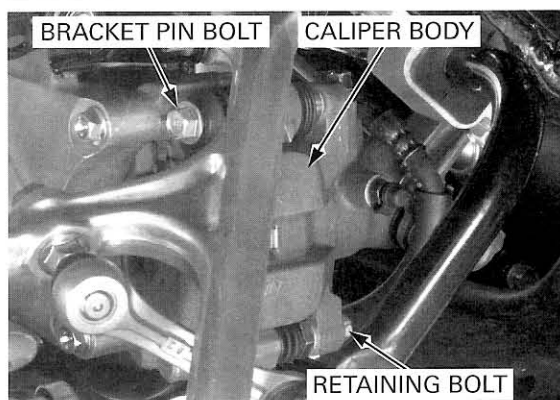
TORQUE:

bracket pin bolt: 32 N·m (3.3 kgf·m, 24 lbf·ft)

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

Install the right rear wheel (page 15-5).

Operate the brake pedal to seat the caliper piston against the pad.



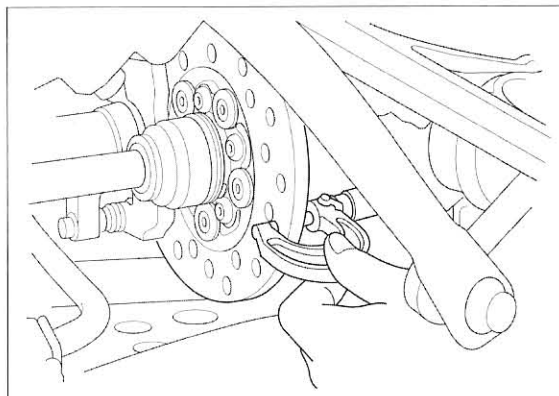
BRAKE DISC INSPECTION

Visually inspect the disc for damage or cracks.

Measure the brake disc thickness at several points.

SERVICE LIMIT: 6 mm (0.2 in)

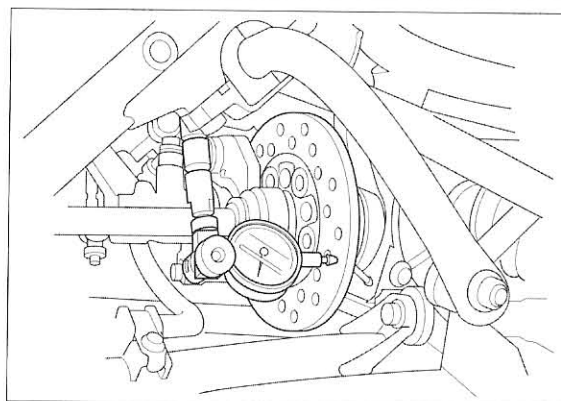
Replace the brake disc if the smallest measurement is less than the service limit.



Check the brake disc for warpage.

SERVICE LIMIT: 0.5 mm (0.02 in)

Replace the brake disc if the warpage exceeds the service limit.



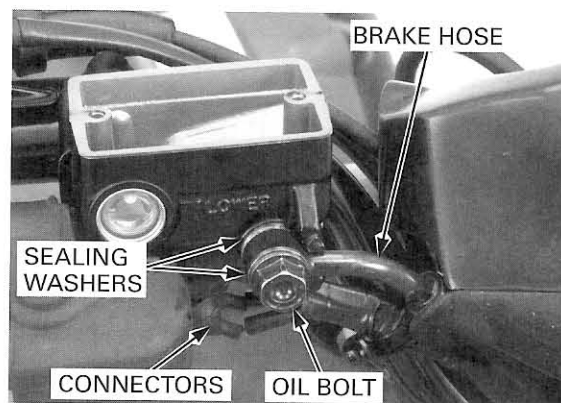
FRONT BRAKE MASTER CYLINDER

DISASSEMBLY

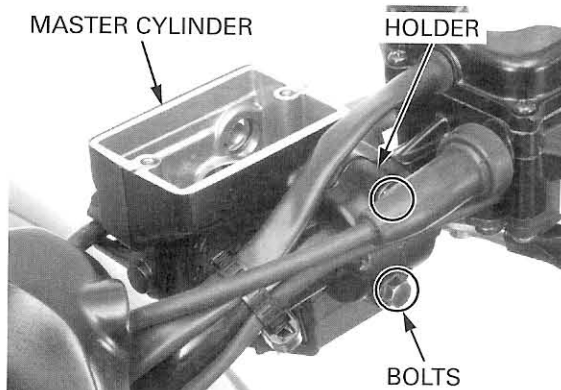
Drain the brake fluid from the front brake hydraulic system (page 16-6).

Disconnect the brake light switch connectors and brake switch connectors.

Disconnect the brake hose from the master cylinder by removing the oil bolt and sealing washers.

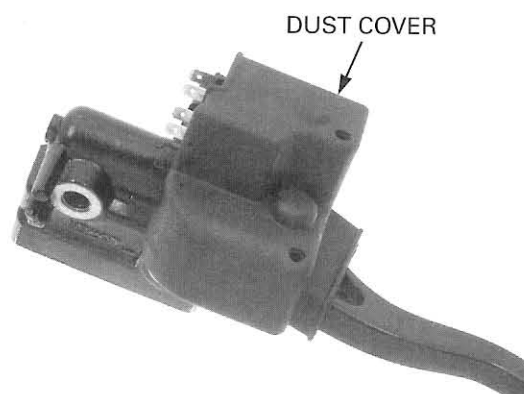


Remove the master cylinder holder bolts, holder and the master cylinder.



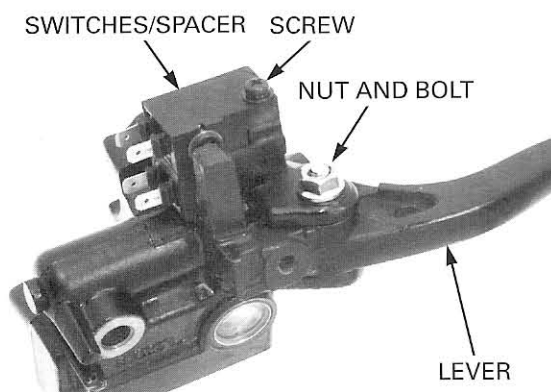
Remove the following:

- dust cover

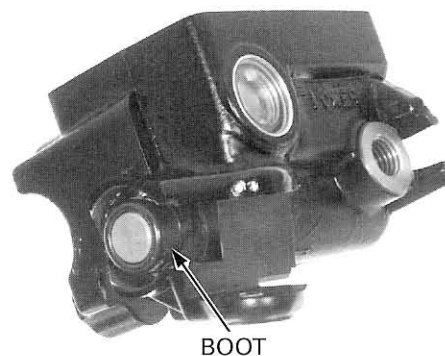


BRAKE SYSTEM

- screw
- brake light switch
- spacer
- brake switch
- brake lever pivot nut
- brake lever pivot bolt
- brake lever



- piston boot

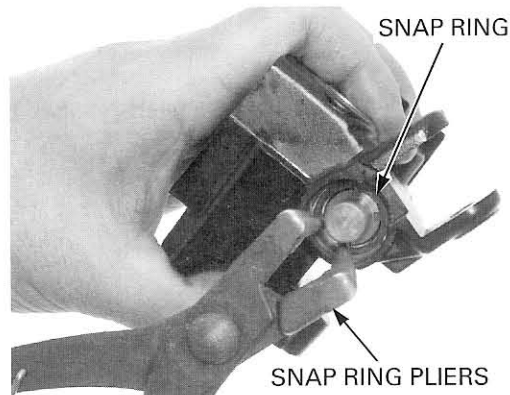


- snap ring using the special tool

TOOL:

Snap ring pliers

07914-SA50001 or
07914-3230001



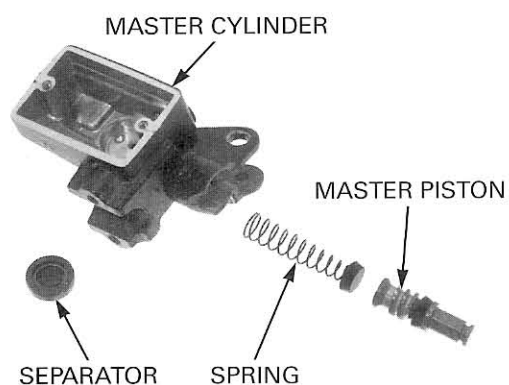
- master piston
- spring
- separator

Clean the master cylinder, reservoir and master piston in clean brake fluid.

INSPECTION

Check the piston cups, separator and boot for wear, deterioration or damage.

Check the spring for damage.



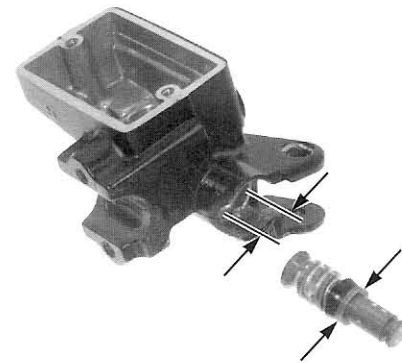
Check the master cylinder and piston for scoring, scratches or damage.

Measure the master cylinder I.D.

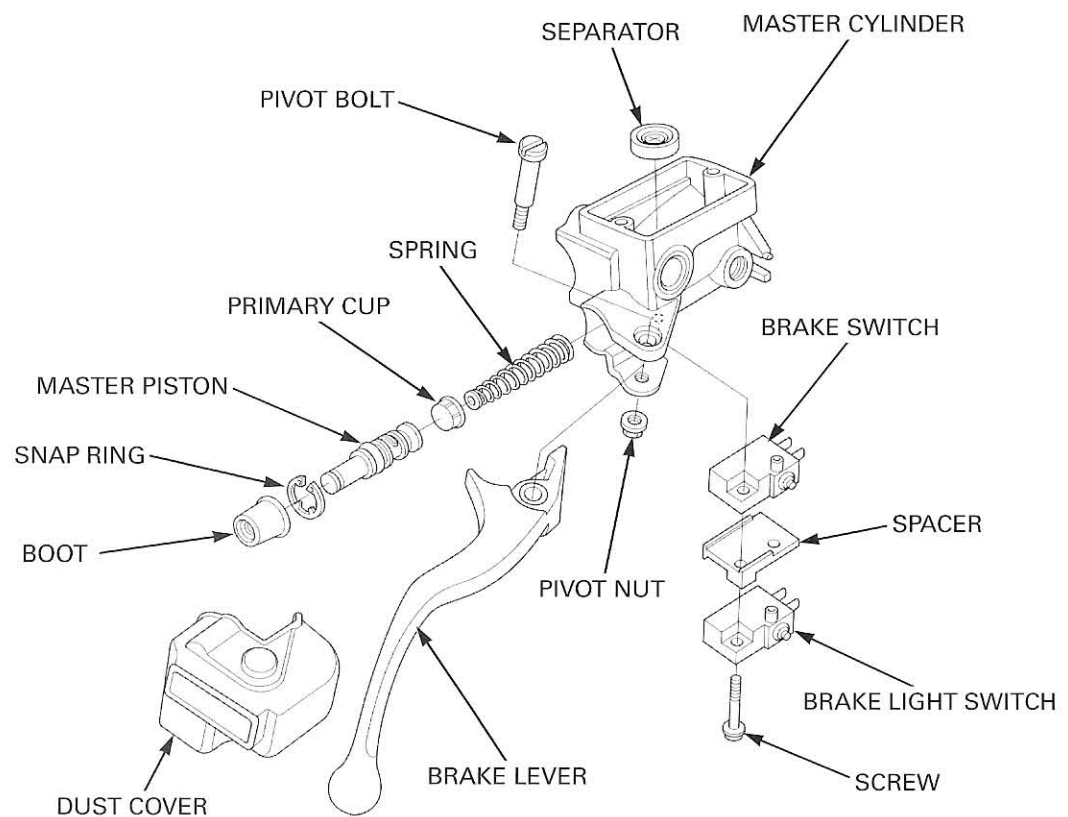
SERVICE LIMIT: 14.055 mm (0.5533 in)

Measure the master piston O.D.

SERVICE LIMIT: 13.945 mm (0.5490 in)



ASSEMBLY



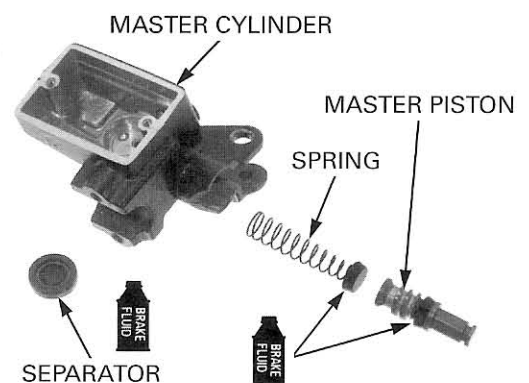
Coat the master piston, piston cups and separator with clean brake fluid.

Install the primary cup onto the spring.

Do not allow the piston cup lips to turn inside out.

Install the spring and master piston into the master cylinder.

Install the separator into the master cylinder.



BRAKE SYSTEM

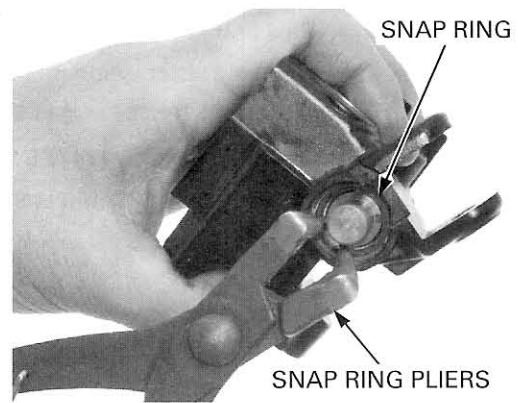
Make sure the snap ring is firmly seated in the groove.

Install the snap ring into the groove in the master cylinder, using the special tool.

TOOL:

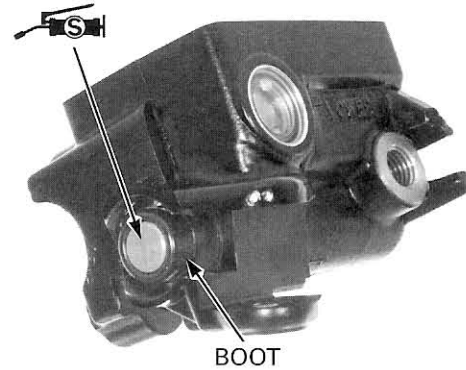
Snap ring pliers

**07914-SA50001 or
07914-3230001**



Install the boot into the master cylinder and the groove in the piston

Apply silicone grease to the brake lever-to-master piston contact area.



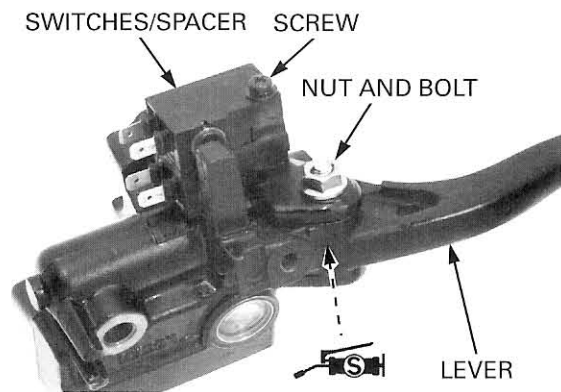
Apply silicone grease to the brake lever pivot.

Install the brake lever and pivot bolt.
Tighten the pivot bolt to the specified torque.

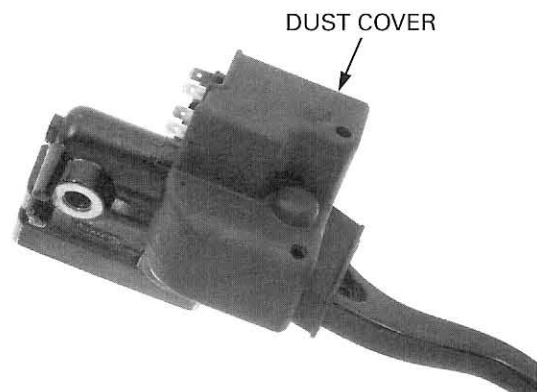
TORQUE: 1 N·m (0.1 kgf·m, 0.7 lbf·ft)

Install the pivot nut and tighten it to the specified torque.

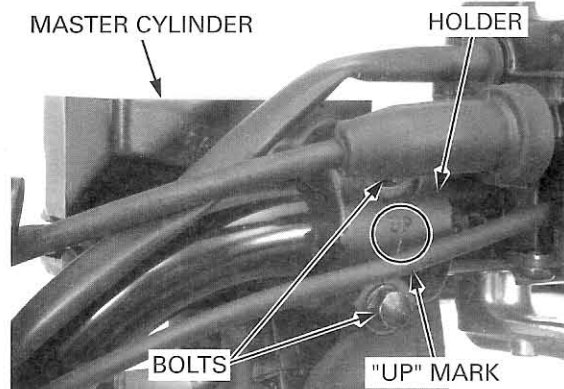
TORQUE: 6 N·m (0.6 kgf·m, 4.3 lbf·ft)



Install the dust cover.

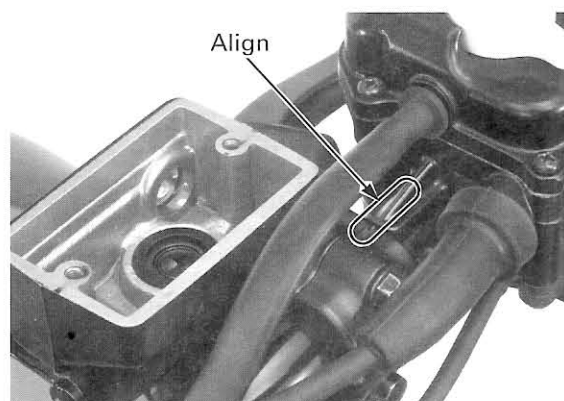


Install the master cylinder and holder with the "UP" mark facing up, and install the bolts.



Align the end of the master cylinder with the lug on the throttle housing, and tighten the upper bolt first, then tighten the lower bolt

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

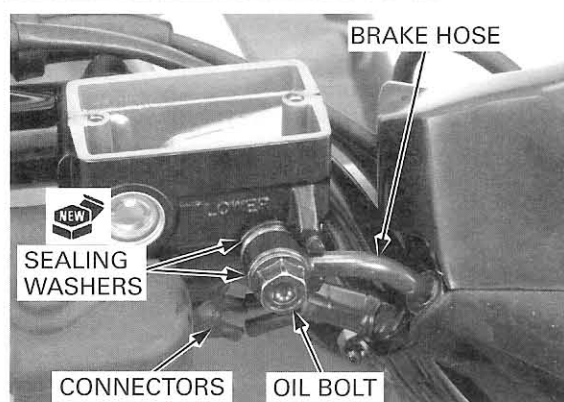


Connect the brake hose onto the master cylinder with the oil bolt and new sealing washers by aligning the joint pipe with the stopper groove. Tighten the oil bolt to the specified torque.

TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)

Connect the brake switch connectors and brake light switch connectors.

Fill and bleed the front brake hydraulic system (page 16-7).



REAR BRAKE MASTER CYLINDER/ BRAKE PEDAL

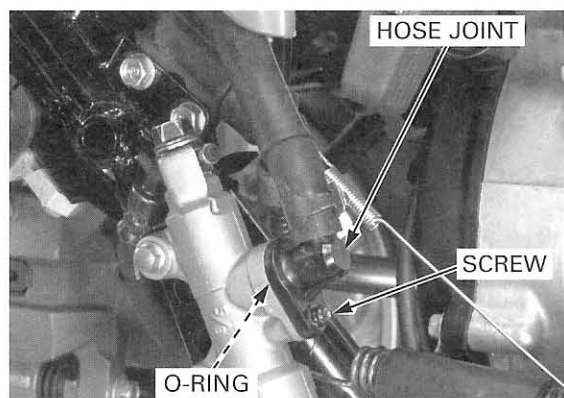
DISASSEMBLY

Drain the brake fluid from the rear brake hydraulic system (page 16-7).

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

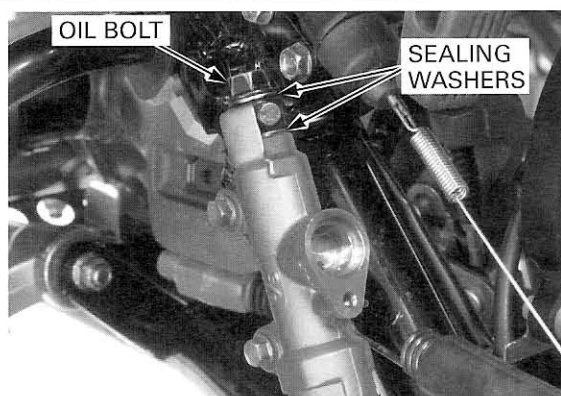
Remove the screw and reservoir hose joint from the master cylinder.

Remove the O-ring.

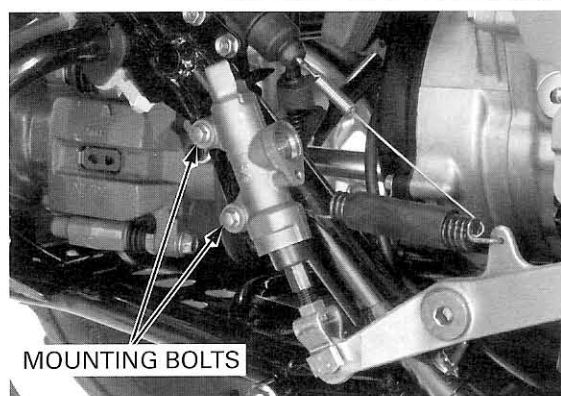


BRAKE SYSTEM

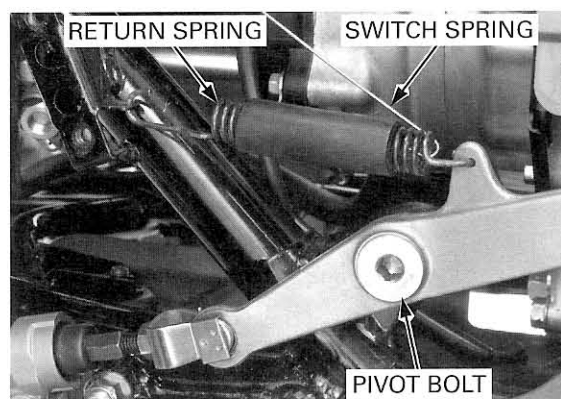
Disconnect the brake hose from the master cylinder by removing the oil bolt and sealing washers.



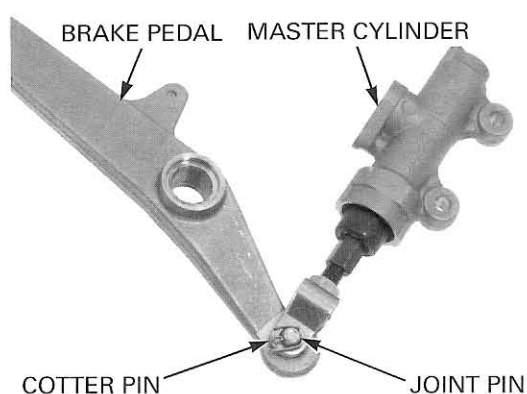
Remove the master cylinder mounting bolts while holding the brake pedal.



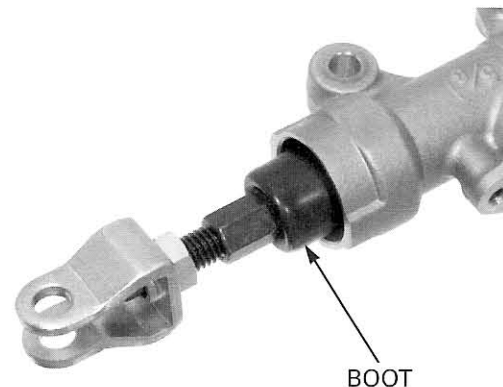
Remove the brake pedal pivot bolt and dust seals.
Unhook the brake switch spring from the return spring.
Unhook the return spring from the pedal and frame.



Separate the master cylinder from the brake pedal by removing the cotter pin and joint pin.



Remove the boot from the master cylinder.



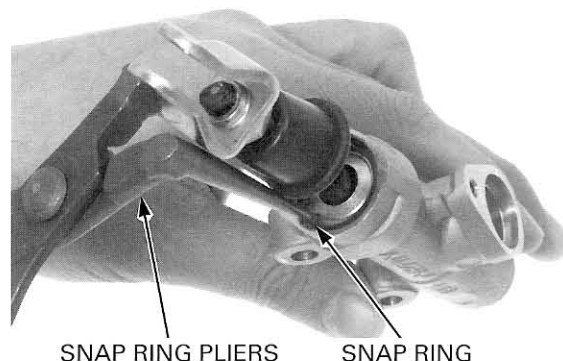
Remove the snap ring using the special tool.

TOOL:

Snap ring pliers

**07914-SA50001 or
07914-3230001**

Remove the push rod.



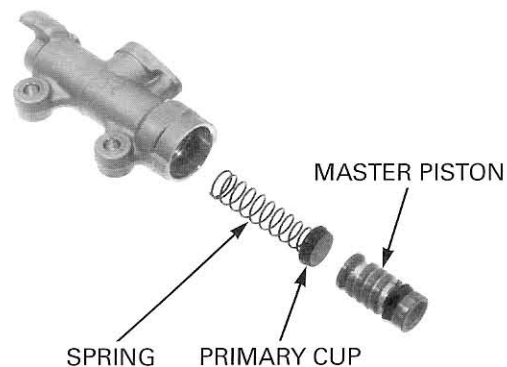
Remove the master piston, primary cup and spring.

Clean the master cylinder, spring and master piston in clean brake fluid.

INSPECTION

Check the piston cups and boot for wear, deterioration or damage.

Check the spring for damage.



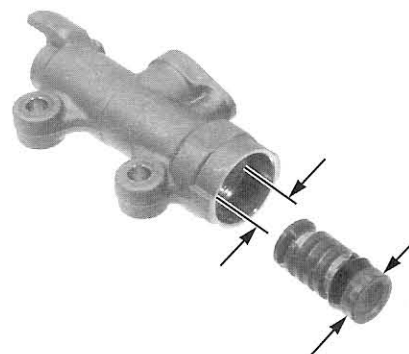
Check the master cylinder and piston for scoring, scratches or damage.

Measure the master cylinder I.D.

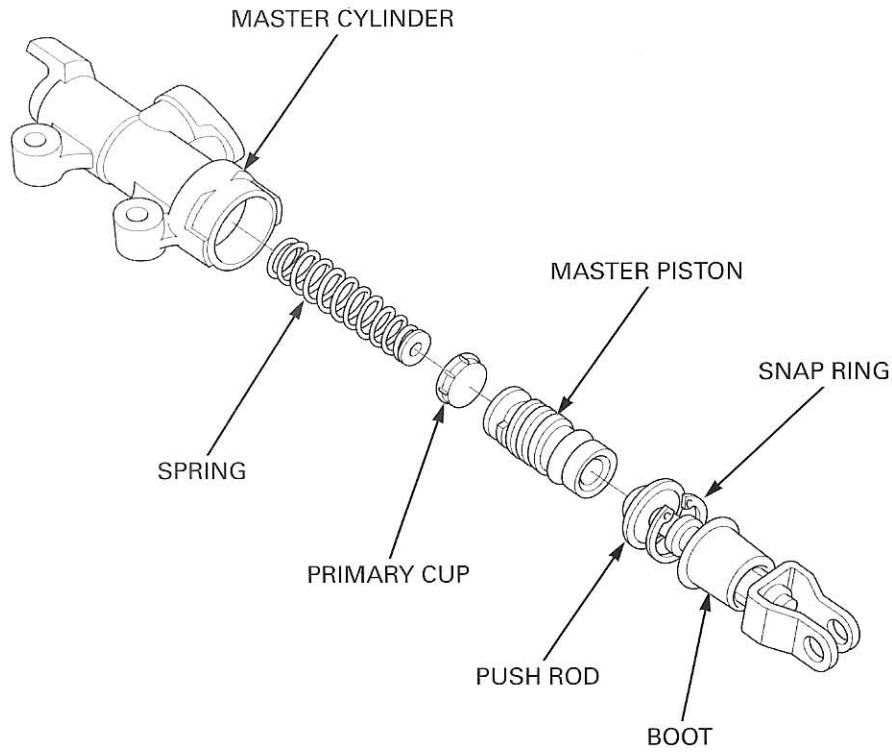
SERVICE LIMIT: 14.055 mm (0.5533 in)

Measure the master piston O.D.

SERVICE LIMIT: 13.945 mm (0.5490 in)



ASSEMBLY



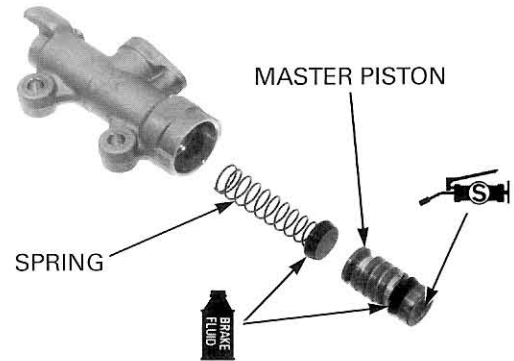
Coat the master piston and piston cups and with clean brake fluid.

Install the primary cup onto the spring.

Do not allow the piston cup lips to turn inside out.

Install the spring, primary cup and master piston into the master cylinder.

Apply silicone grease to the push rod contact area of the master piston.



Install the push rod into the master cylinder.

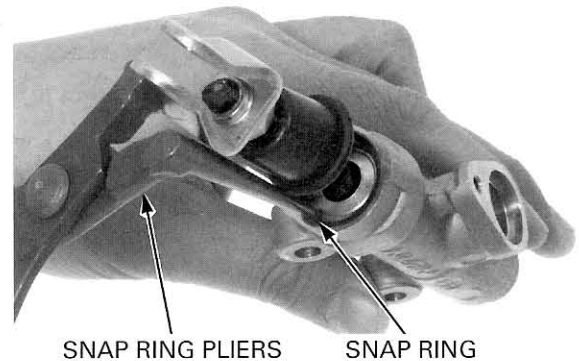
Be certain the snap ring is firmly seated in the groove.

Install the snap ring into the groove in the master cylinder using the special tool.

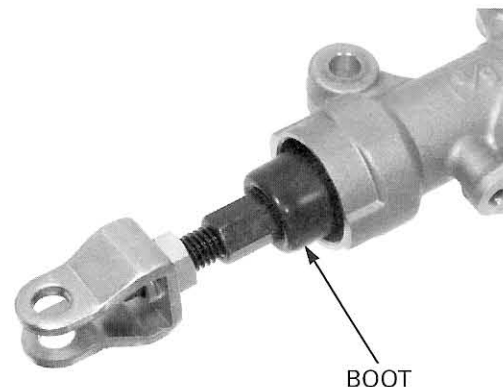
TOOL:

Snap ring pliers

07914-SA50001 or
07914-3230001

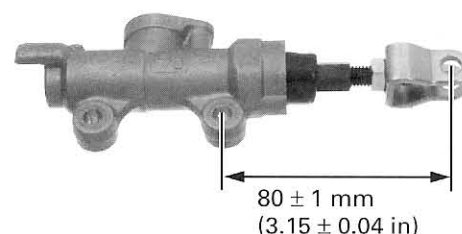


Install the boot into the master cylinder.

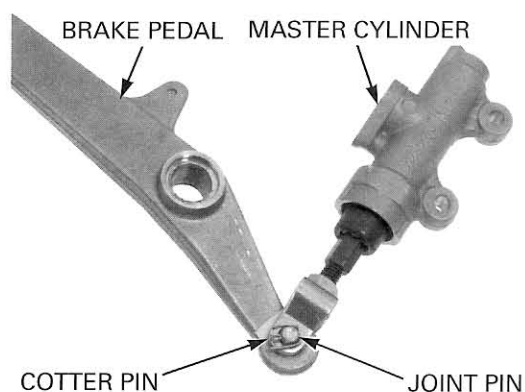


If the push rod joint is reinstalled, adjust the push rod length so that the distance between the centers of the master cylinder lower mounting bolt hole and joint pin hole is 80 ± 1 mm (3.15 ± 0.04 in). After adjustment, tighten the joint nut.

TORQUE: 18 N·m (1.8 kgf·m, 13 lbf·ft)



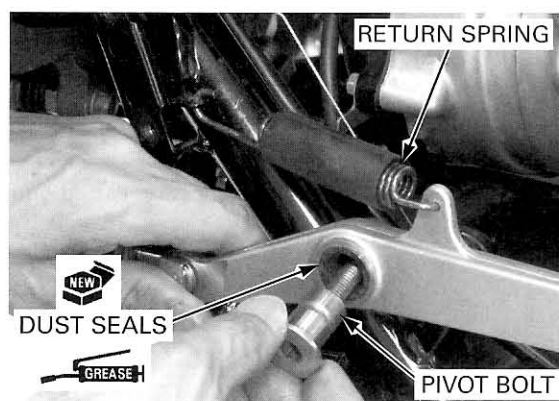
Connect the master cylinder to the brake pedal with the joint pin and a new cotter pin.



Apply grease to new dust seal lips.
Install the dust seals into the brake pedal.

Hook the return spring to the pedal and frame as shown.

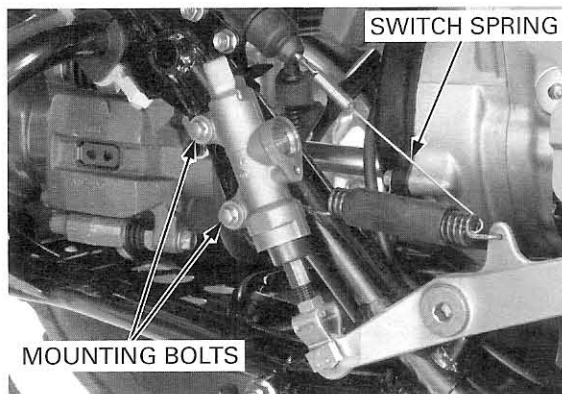
Install and tighten the brake pedal pivot bolt.



BRAKE SYSTEM

Connect the brake switch spring to the return spring.

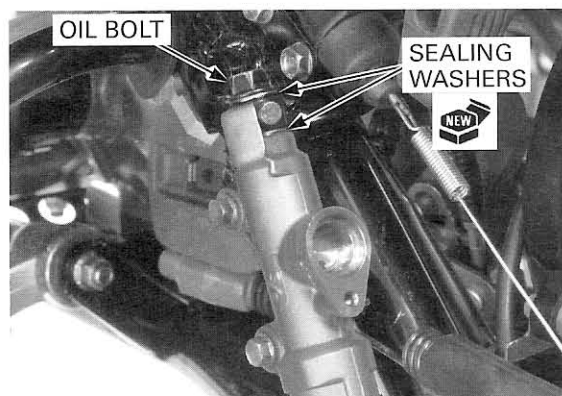
Install the master cylinder onto the frame and tighten the mounting bolts securely.



Connect the brake hose to the master cylinder with the oil bolt and new sealing washers.

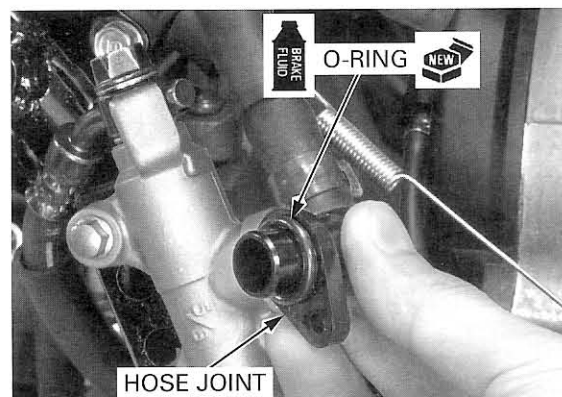
Rest the hose joint pin against the stopper and tighten the oil bolt.

TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)



Coat a new O-ring with brake fluid and install it into the master cylinder.

Install the reservoir hose joint onto the master cylinder.

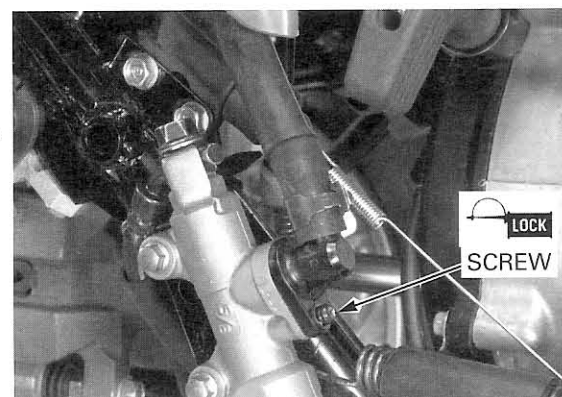


Apply locking agent to the hose joint screw threads. Install and tighten the hose joint screw.

TORQUE: 2 N·m (0.2 kgf·m, 1.4 lbf·ft)

Fill and bleed the rear brake hydraulic system (page 16-8).

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

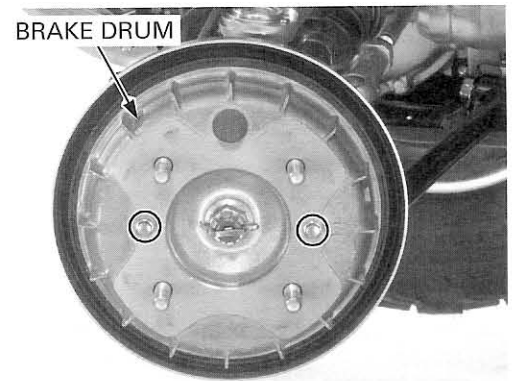


FRONT BRAKE SHOES/DRUM

BRAKE DRUM REMOVAL

Remove the front wheel (page 14-9).

Remove the two bolts and the brake drum.
Remove the O-ring from the brake drum.

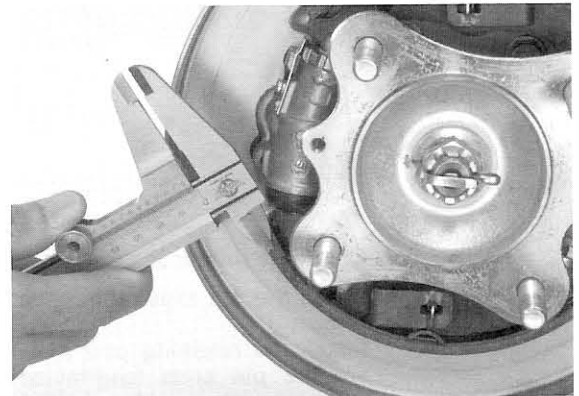


INSPECTION/REPLACEMENT

SHOE INSPECTION

Measure the lining thickness.

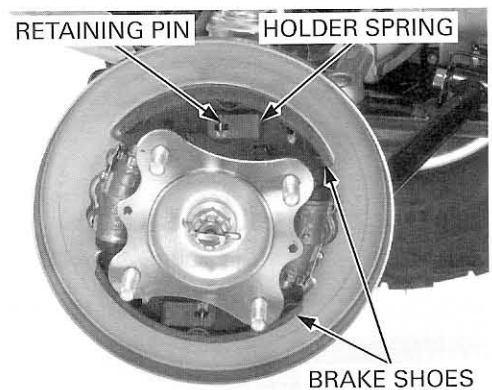
SERVICE LIMIT: 1.0 mm (0.04 in)



SHOE REPLACEMENT

Turn each retaining pin 90° while pressing the pin holder spring and remove the pins, pin caps/seal rubbers and holder springs.

Expand the shoes and remove the shoes and shoe springs from the wheel cylinders.

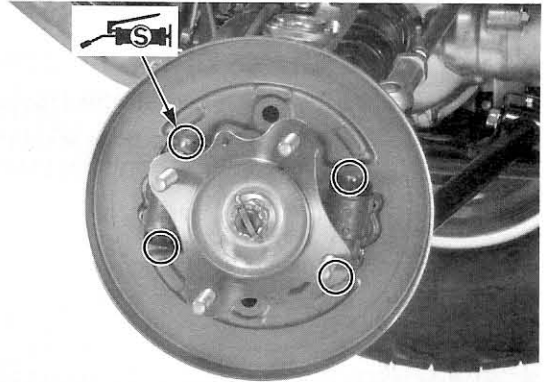


Coat the shoe metal contact areas of the brake panel with silicone grease (6 places).



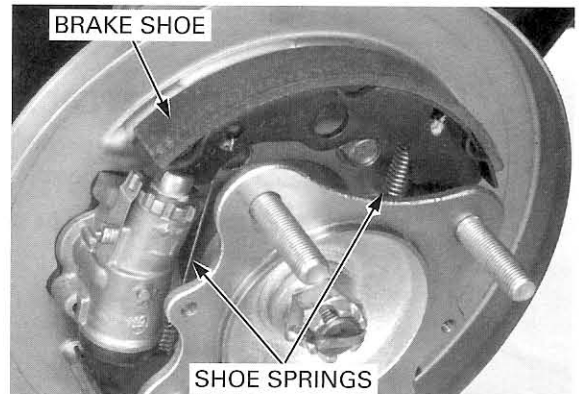
BRAKE SYSTEM

Apply silicone grease to the shoe contact grooves of the wheel cylinder (4 places).



Note the installation direction of the shoes and shoe spring.

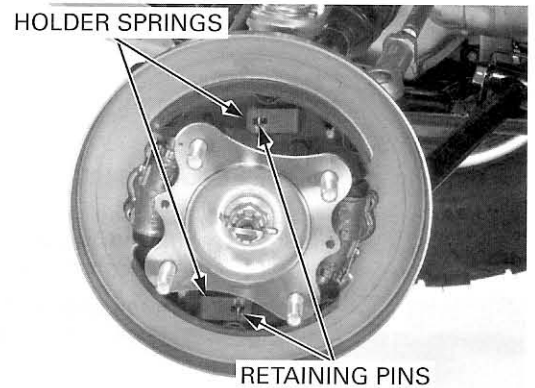
Install the shoe springs and new shoes onto the wheel cylinders as shown.



Check the rubber seals are in good condition.

Install the pin caps/rubber seals onto the retaining pins.

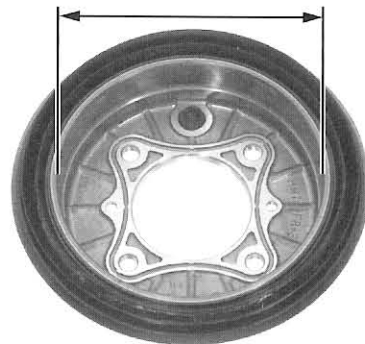
Install the retaining pins and holder springs, then set the pin ends lengthwise against the holder grooves while pressing the holder springs to secure the shoes.



DRUM INSPECTION

Measure the drum I.D.

SERVICE LIMIT: 161 mm (6.34 in)

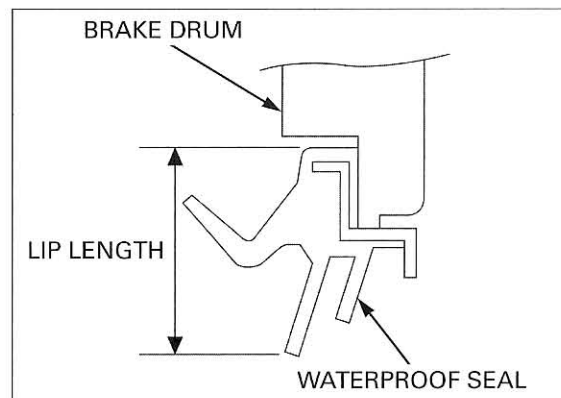


WATERPROOF SEAL INSPECTION

Check the waterproof seal for damage, fatigue or faulty installation.

Measure the seal lip length.

SERVICE LIMIT: 20 mm (0.8 in)



WATERPROOF SEAL REPLACEMENT

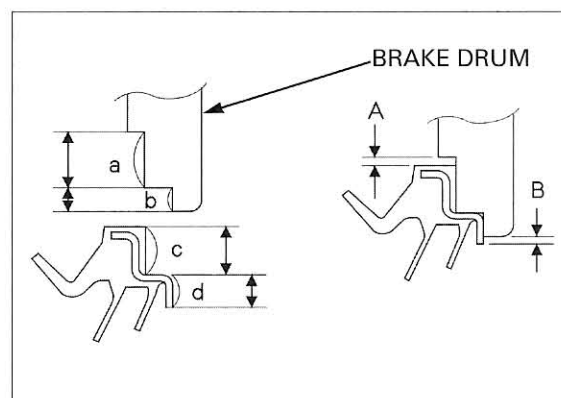
Remove the waterproof seal from the brake drum by prying open the seal edge.

Measure the drum and seal at points a, b, c and d as shown.

Calculate clearance A and B between the drum and seal.

$$A = a - c$$

$$B = d - b$$



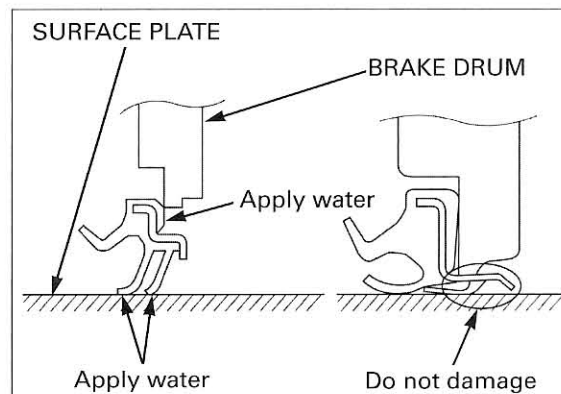
Apply water to a new waterproof seal edge.

Press the drum onto the seal evenly, so the lips will not be damaged. If the seal is damaged or mis-installed, remove it and try again with a new seal.

Place the waterproof seal on a clean surface plate, and press the brake drum into the waterproof seal, making sure that the clearances between the drum and seal will reach the calculated clearances.

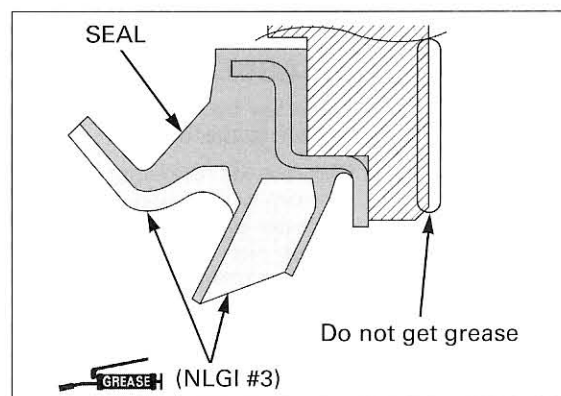
NOTE:

- When pressing the drum, place a steel plate (about 140 mm (5.5 in) diameter and more than 10 mm (0.4 in) in thickness) on the brake drum, or the brake drum will be warped or damaged.



Do not get grease onto the inner surface of the brake drum. Keep grease off the drum.

Dry the seal thoroughly and pack the lips cavities with 14 – 16 g (0.5 – 0.6 oz) of multi-purpose grease (NLGI #3) as shown.



BRAKE SYSTEM

BRAKE PANEL INSPECTION

Do not get grease on the shoe linings.

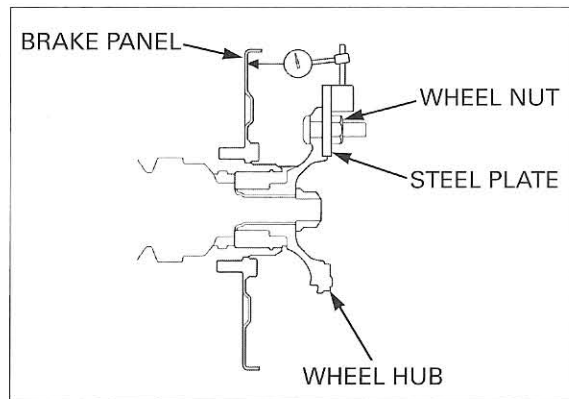
Clean any grease from the brake panel thoroughly. Check the brake panel at the waterproof seal lip contact area for abnormal scratches or wear.

Install a suitable steel plate onto the wheel hub and secure it with the wheel nut as shown.

Measure the brake panel on the points attached to the seal lip for warpage using a dial gauge.

SERVICE LIMIT: 0.4 mm (0.02 in)

See page 16-24 for brake panel replacement.

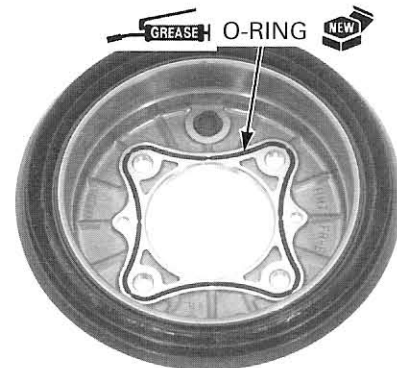


BRAKE DRUM INSTALLATION

Do not get grease on the brake drum and shoe linings.

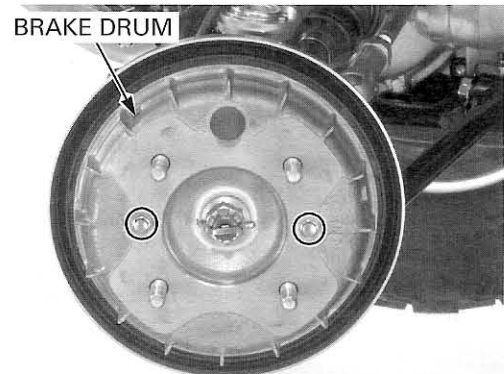
Coat a new O-ring with grease and install it into the brake drum groove.

Make sure that the waterproof seal is packed with the multi-purpose grease (NLGI #3).



Install the brake drum onto the hub and tighten the two bolts securely.

Install the front wheel (page 14-9).



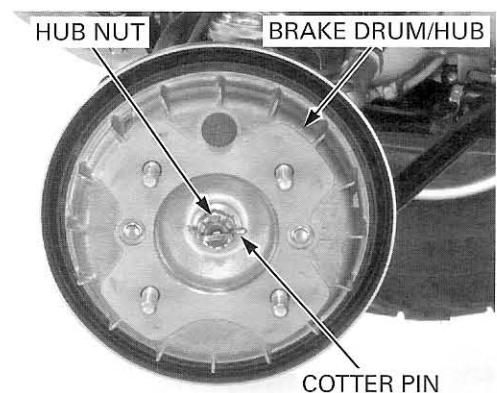
FRONT WHEEL CYLINDER/BRAKE PANEL

DISASSEMBLY

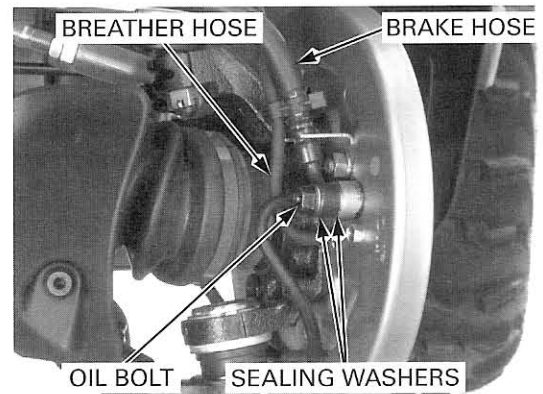
Drain the brake fluid from the front brake hydraulic system (page 16-6).

Remove the following:

- front wheel (page 14-9)
- cotter pin
- hub nut
- brake drum/wheel hub

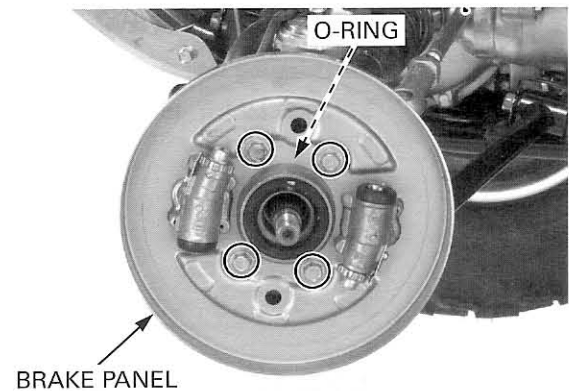


- brake shoes (page 16-21)
- oil bolt
- sealing washers
- brake hose
- breather hose

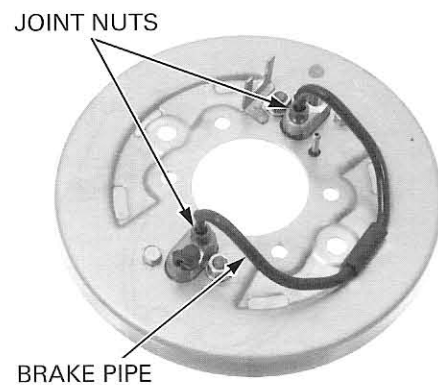


Do not reuse the brake panel bolts because their threads are specially dry-coated for waterproofing.

- four bolts (discard them)
- brake panel
- O-ring

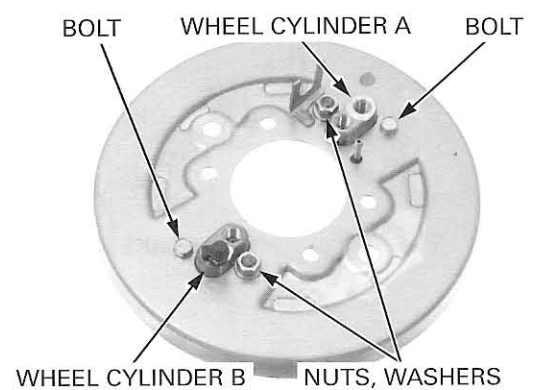


Loosen the joint nuts and remove the brake pipe.



Remove the nuts, washers, bolts and wheel cylinders A and B.

Clean any sealant material from the wheel cylinders, bolts and brake panel.



BRAKE SYSTEM

Remove the boot, piston, adjuster nut and adjuster screw from the cylinder.

INSPECTION

Check the piston cup and boot for wear, deterioration or damage.

Check the cylinder bore and piston for scoring, scratches or damage.

Check the adjuster for wear or damage.

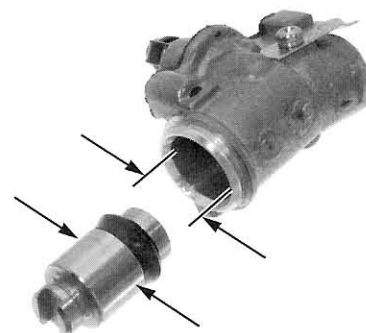
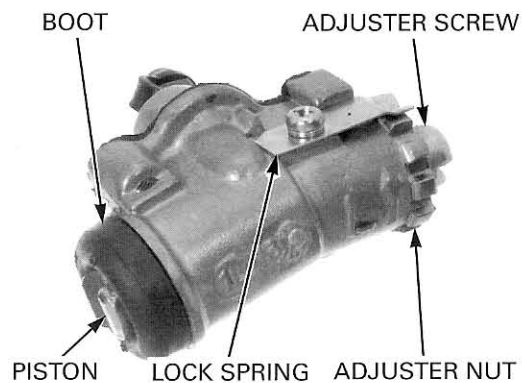
Check the lock spring for fatigue or damage.

Measure the wheel cylinder I.D.

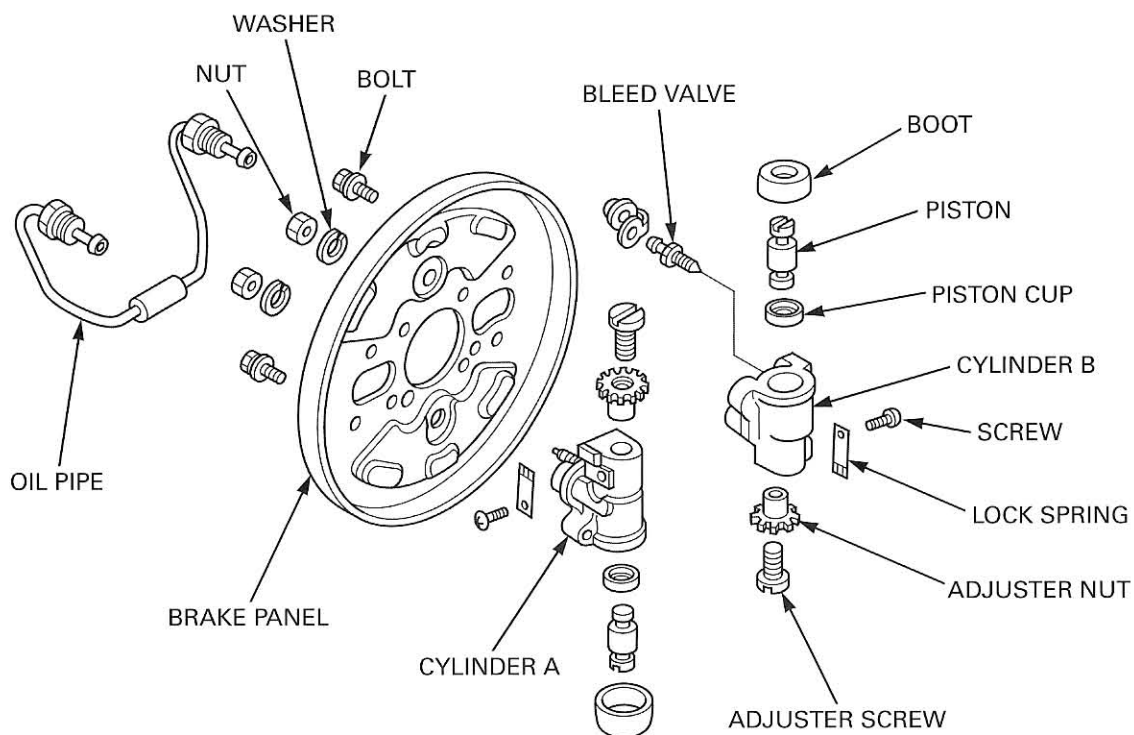
SERVICE LIMIT: 19.12 mm (0.753 in)

Measure the wheel cylinder piston O.D.

SERVICE LIMIT: 18.81 mm (0.741 in)



ASSEMBLY



Coat the piston and piston cups with clean brake fluid.

Do not allow the piston cup lip to turn inside out.

Install the piston into the wheel cylinder.

Apply silicone grease to the boot grooves in the piston and cylinder body.

Install the piston boot onto the cylinder and piston grooves properly.

Apply silicone grease to the adjuster screw threads and adjuster nut spindle outer surface.

Install the adjuster into the wheel cylinder.

Apply sealant to the mating surface of the cylinder body.

Install wheel cylinders A and B onto the brake panel.

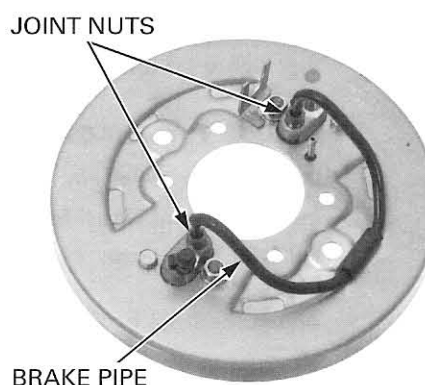
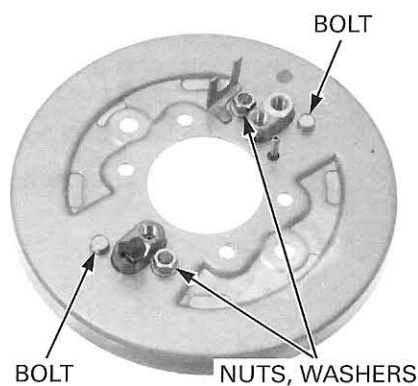
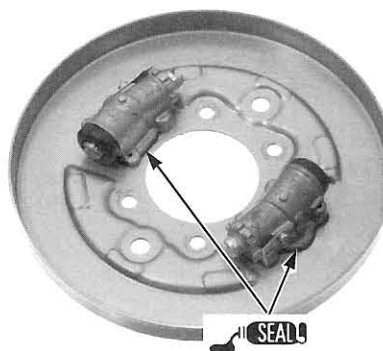
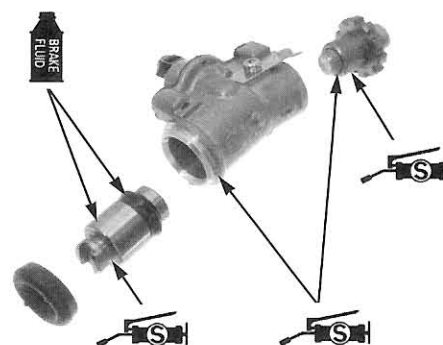
Install the bolts, washers and nuts, and tighten the bolts and nuts.

TORQUE: Bolt: 8 N·m (0.8 kgf·m, 5.8 lbf·ft)

Nut: 17 N·m (1.7 kgf·m, 12 lbf·ft)

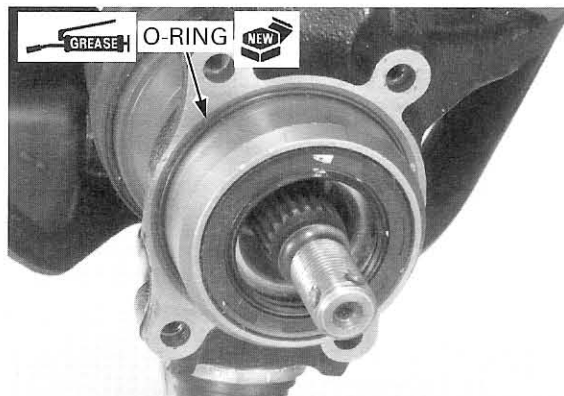
Install the brake pipe as shown and tighten the joint nuts.

TORQUE: 16 N·m (1.6 kgf·m, 12 lbf·ft)



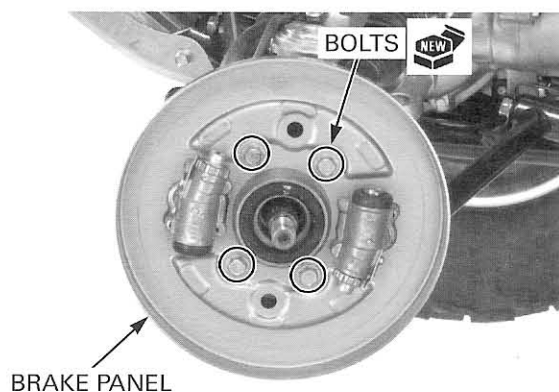
BRAKE SYSTEM

Coat a new O-ring with grease and install it onto the knuckle.



Install the brake panel and four new bolts, and tighten the bolts.

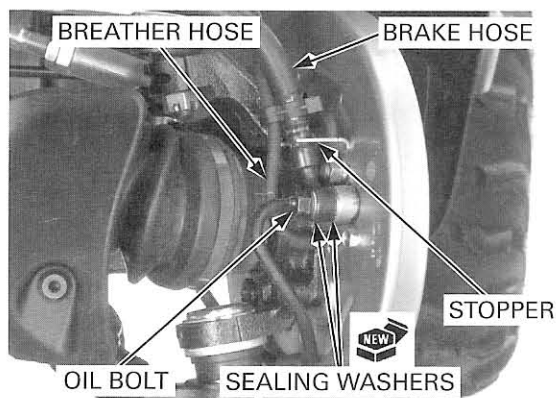
TORQUE: 29 N·m (3.0 kgf·m, 22 lbf·ft)



Connect the brake hose to the wheel cylinder with the oil bolt and new sealing washers by aligning the hose joint with the stopper groove. Tighten the oil bolt.

TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)

Connect the breather hose to the brake panel joint.



Install the brake drum/wheel hub and hub nut. Tighten the hub nut to the specified torque and further tighten it until its grooves align with the cotter pin hole.

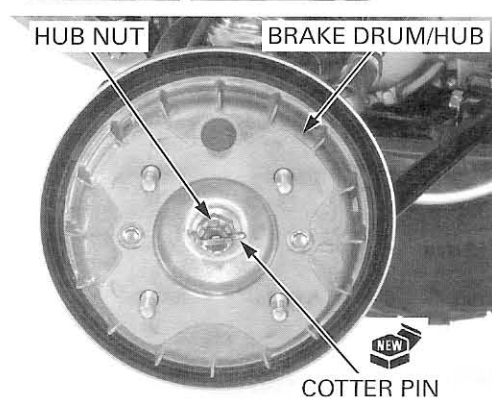
TORQUE: 78 N·m (8.0 kgf·m, 58 lbf·ft)

Install a new cotter pin.

Install the front wheel (page 14-9).

Fill and bleed the front brake hydraulic system (page 16-7).

Adjust the front brake (page 3-19).



REAR BRAKE CALIPER

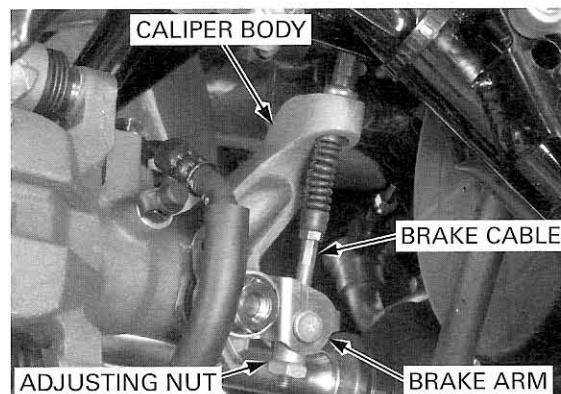
DISASSEMBLY

Remove the right rear wheel (page 14-9).

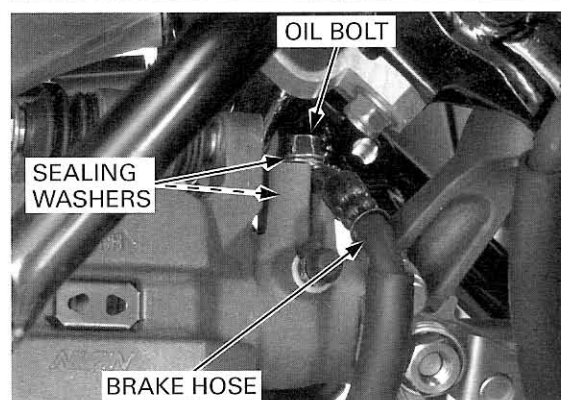
Drain the brake fluid from the rear brake hydraulic system (page 16-7).

Remove the rear brake adjusting nut and disconnect the brake cable from the brake arm.

Remove the brake cable from the caliper body.

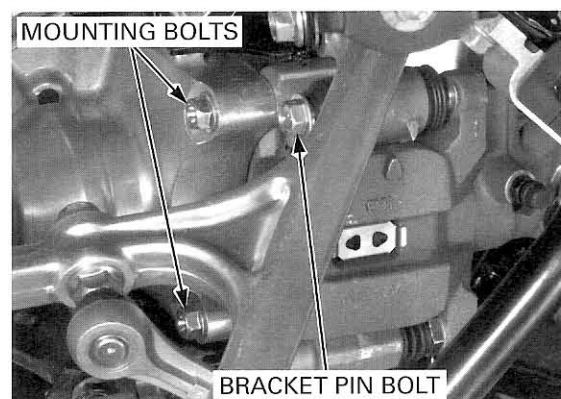


Disconnect the brake hose from the caliper body by removing the oil bolt and sealing washers.

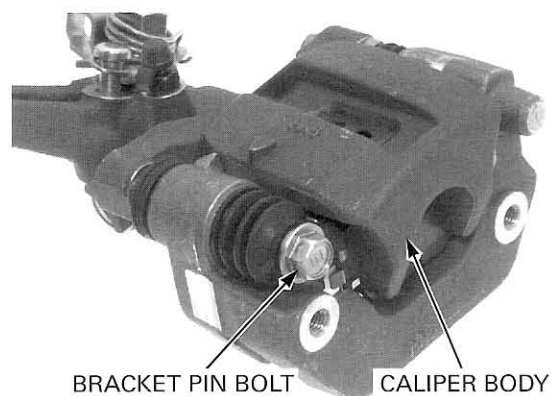


Loosen the bracket pin bolt.

Remove the two mounting bolts and the brake caliper from the frame.

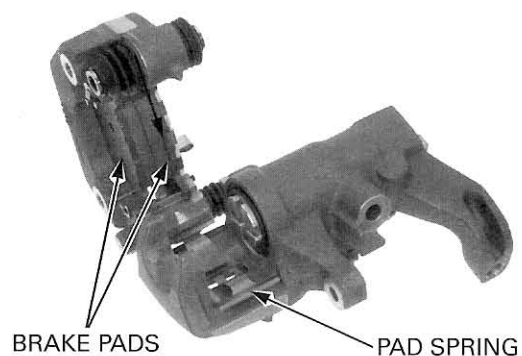


Remove the bracket pin bolt and pivot the caliper body.

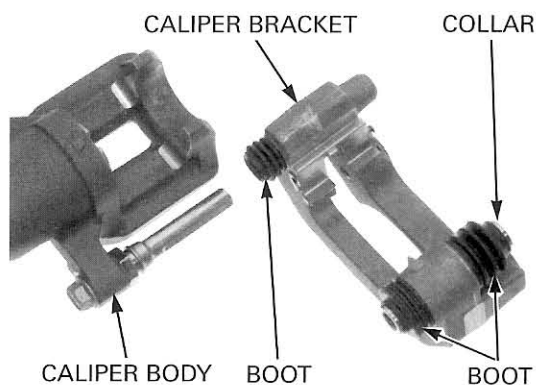


BRAKE SYSTEM

Remove the brake pads and pad spring.

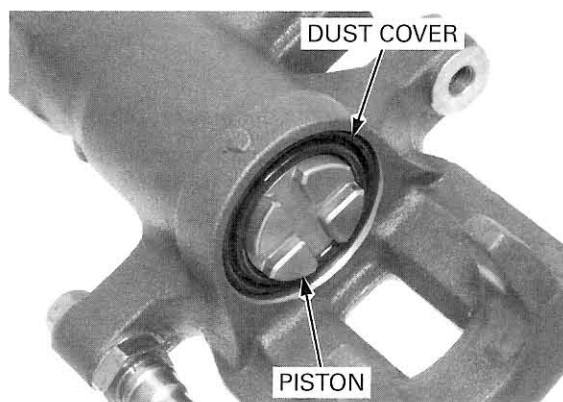


Separate the caliper body from the caliper bracket.
Remove the boots and collar from the caliper bracket.



Remove the caliper piston by turning it counter-clockwise.

Remove the piston dust cover.



*Be careful not to
damage the piston
sliding surface.*

Push the piston seal in and lift it out.

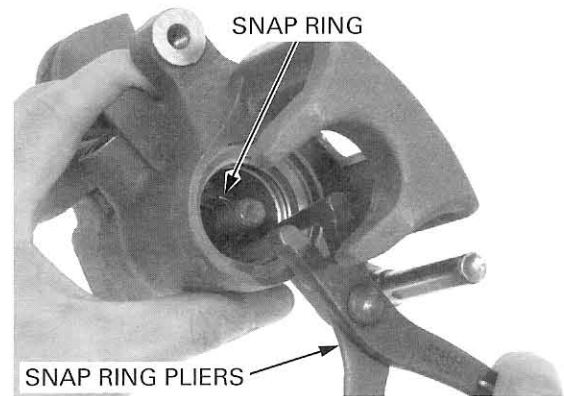


Remove the snap ring using the snap ring pliers.

TOOL:

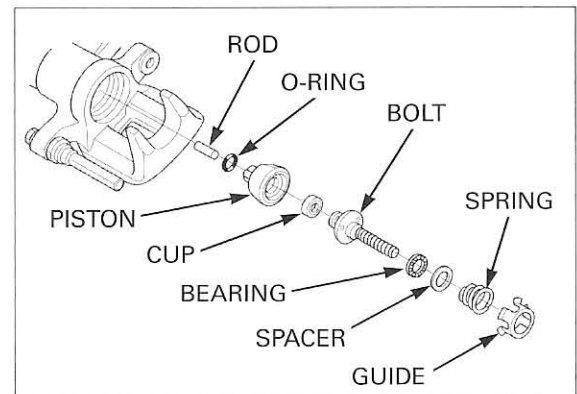
Snap ring pliers

07914-SA50001

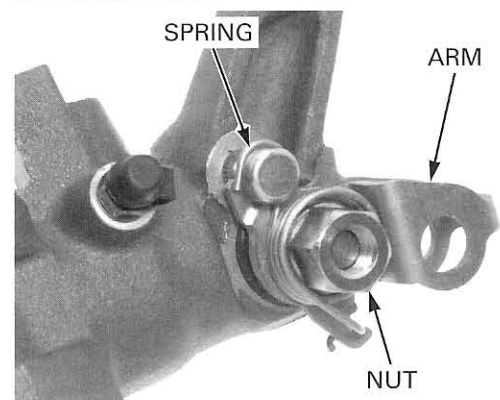


Remove the following:

- spring guide
- adjusting spring B
- spacer
- bearing A
- adjusting bolt
- cup
- sleeve piston
- rod
- O-ring

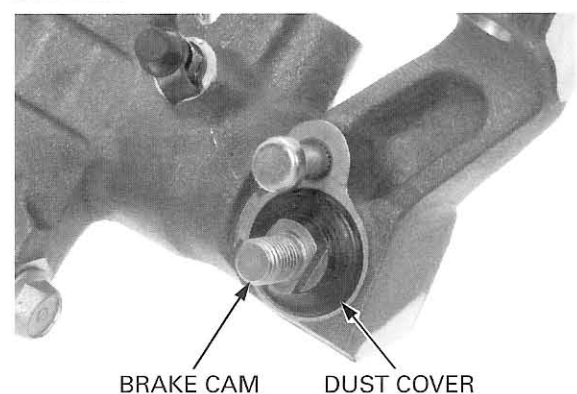


- return spring
- parking nut
- spring washer
- brake arm



- brake cam
- dust cover

Clean the disassembled parts in clean brake fluid.



BRAKE SYSTEM

INSPECTION

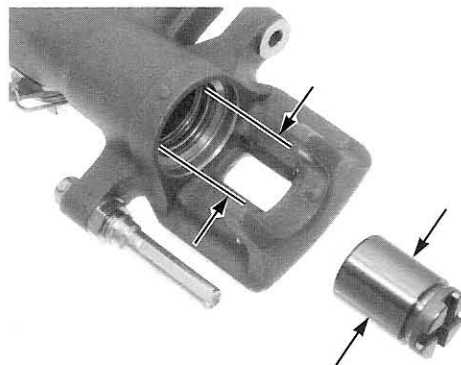
Check the caliper cylinder and piston for scoring or other damage.

Measure the caliper cylinder I.D.

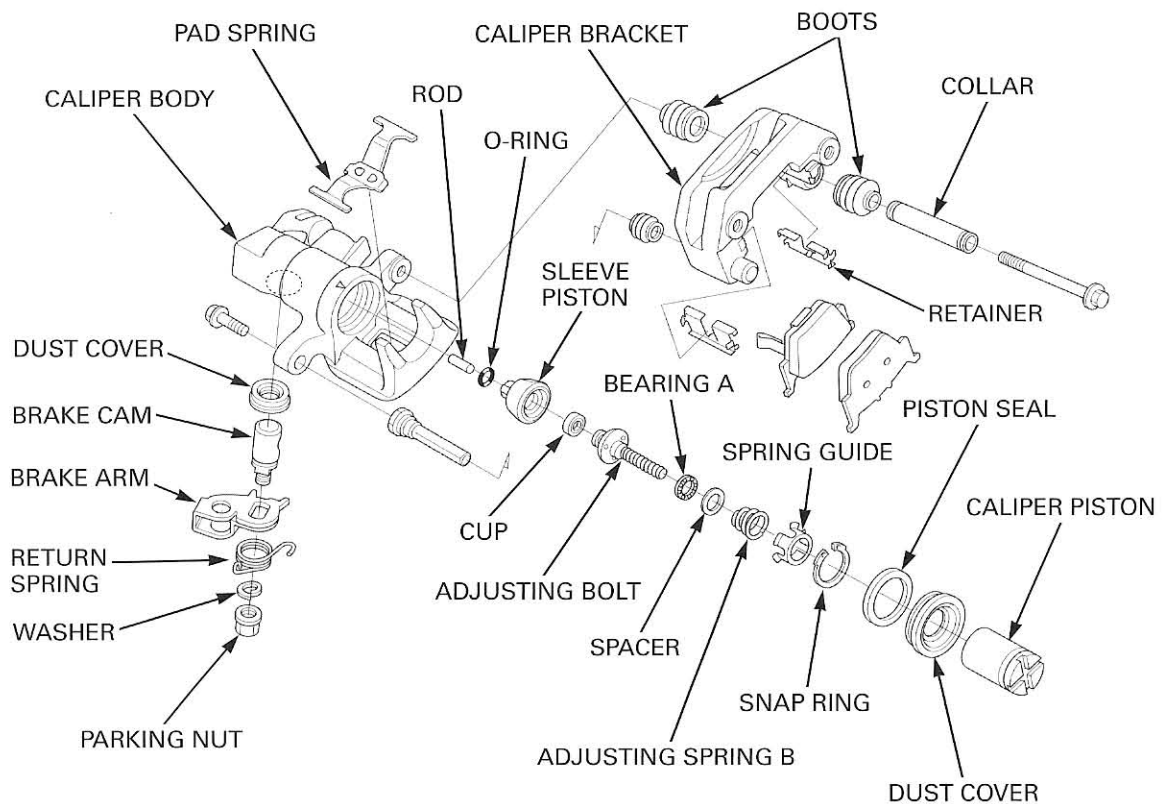
SERVICE LIMIT: 30.29 mm (1.193 in)

Measure the caliper piston O.D.

SERVICE LIMIT: 30.14 mm (1.187 in)

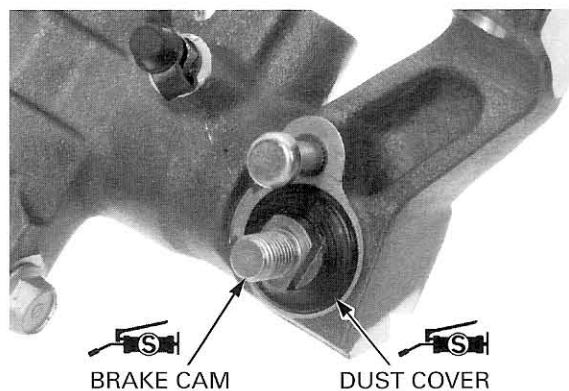


ASSEMBLY/INSTALLATION



Apply silicone grease to the dust cover lips and install it into the caliper body.

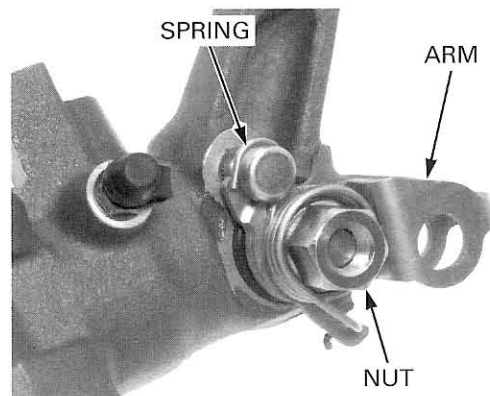
Apply silicone grease to the brake cam groove and install it into the caliper body with the groove facing the caliper cylinder.



Install the brake arm, washer and parking nut.
Tighten the parking nut.

TORQUE: 27 N·m (2.8 kgf·m, 20 lbf·ft)

Install the return spring as shown.



Coat a new O-ring with silicone grease and install it into the sleeve piston groove.

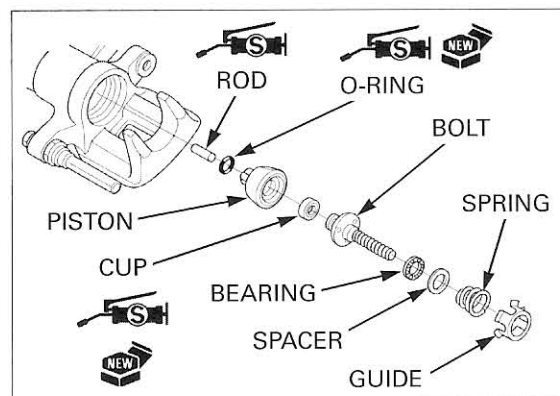
Coat a new cup with silicone grease and install it onto the adjusting bolt.

Install the adjusting bolt into the sleeve piston.

Coat the rod with silicone grease and install it into the sleeve piston.

Install the piston assembly in the caliper cylinder by aligning the pins of the piston with the holes in the caliper.

Install bearing A, spacer, adjusting spring B and spring guide onto the adjusting bolt.

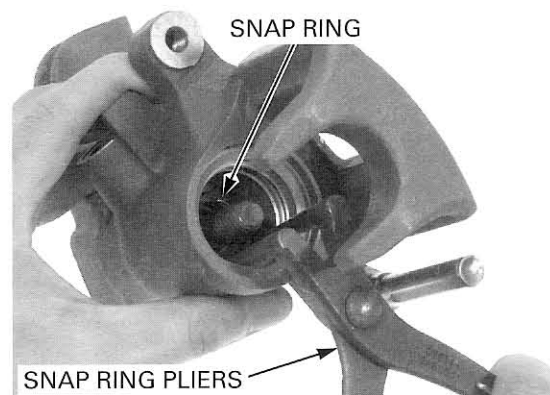


Install the snap ring using the snap ring pliers.

TOOL:

Snap ring pliers

07914-SA50001



Coat a new piston seal with clean brake fluid and install it into the seal groove in the caliper.

Coat the caliper piston with clean brake fluid.

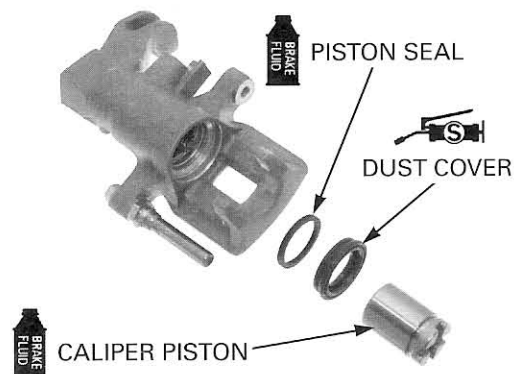
Apply silicone grease to the lips of a new dust cover.

Install the dust cover onto the caliper piston.

Install the dust cover into the groove in the caliper.

Install the caliper piston into the caliper cylinder and onto the adjusting bolt by turning it clockwise.

Install the dust cover into the groove in the caliper piston.

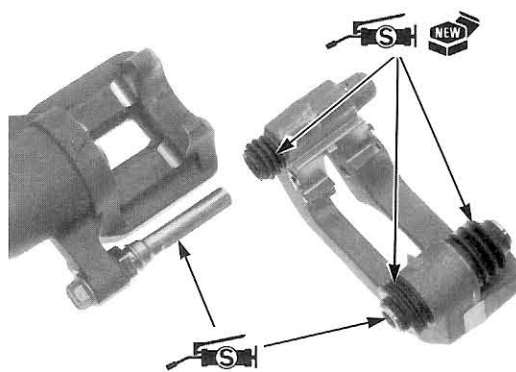


BRAKE SYSTEM

Apply silicone grease to the lips of new boots and install them into the caliper bracket.

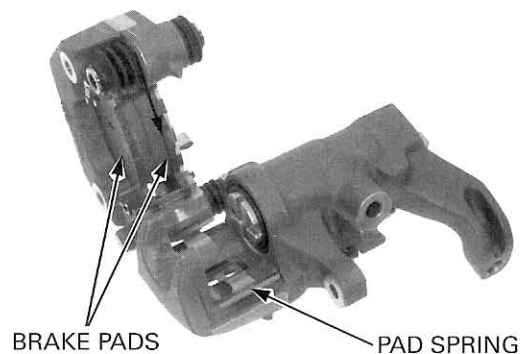
Coat the collar with silicone grease and install it into the caliper bracket.

Coat the caliper pin of the caliper body with silicone grease and install it into the caliper bracket.



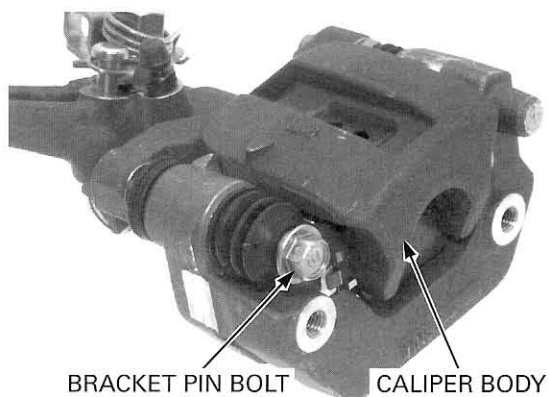
Install the pad spring in the caliper body as shown.

Install the brake pads onto the caliper bracket.



Pivot the caliper body over the pads and bracket.

Temporarily install the bracket pin bolt.

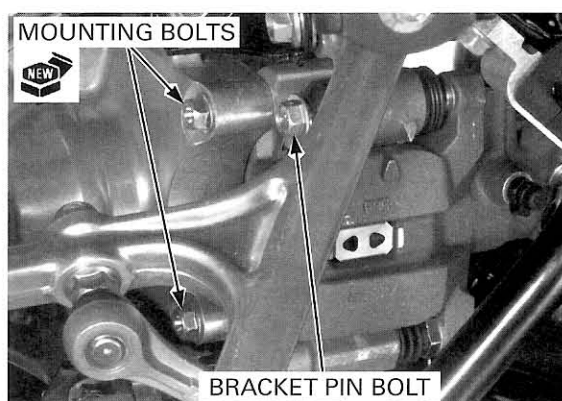


Install the brake caliper with new mounting bolts and tighten the bolts.

TORQUE: 30 N·m (3.1 kgf·m, 22 lbf·ft)

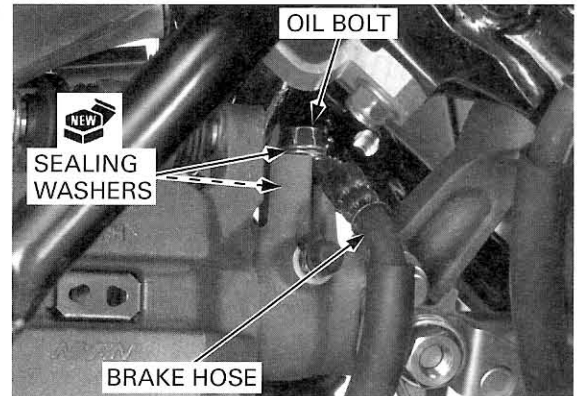
Tighten the bracket pin bolt.

TORQUE: 32 N·m (3.3 kgf·m, 24 lbf·ft)



Connect the brake hose to the brake caliper with the oil bolt and new sealing washers, and tighten the oil bolt.

TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)

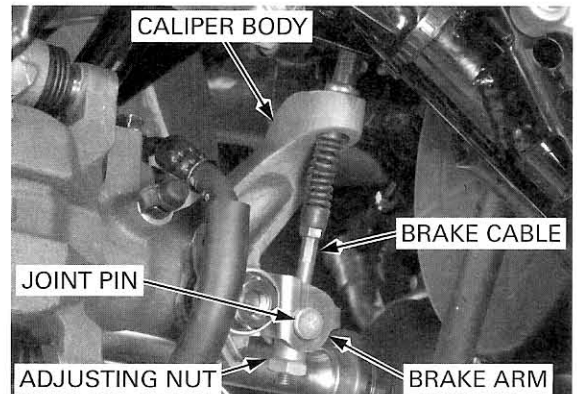


Install the rear brake cable into the caliper body and connect it to the brake arm with the joint pin. Install the rear brake adjusting nut.

Fill and bleed the rear brake hydraulic system (page 16-8).

Adjust the rear (parking) brake lever free play (page 3-20).

Install the right rear wheel (page 15-5).



REAR BRAKE DISC**REMOVAL**

Remove the following:

- oil filler lid
- right side cover (page 2-4)
- engine guard (page 2-16)
- both rear wheels (page 14-9)
- bolt and rear brake hose clamp
- two rear brake caliper mounting bolts
- two link nuts
- four rear upper arm bolts and nuts
- rear shock absorber upper mounting bolts.

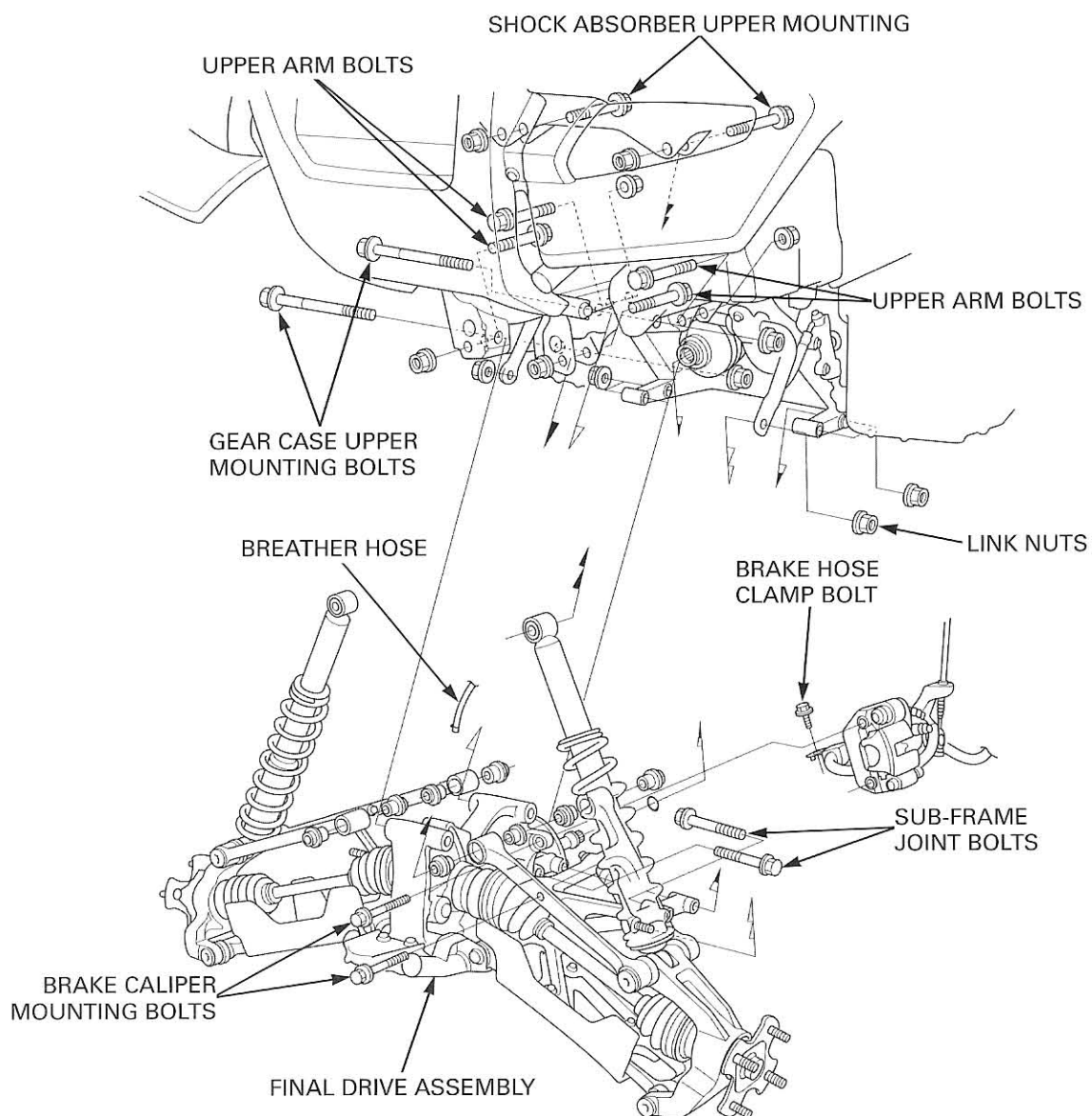
Lift the rear of the frame and place a jack or stand under the sub-frame at the final gear case.

Disconnect the breather hose from the final gear case.

Remove the following:

- four sub-frame joint nuts and bolts
- two final gear case upper mounting nuts and bolts

Remove the final drive assembly from the frame by moving it rearward.



Remove the following:

- boot band
- boot (off the pinion joint)
- propeller shaft
- spring

- five disc bolts
- brake disc

INSTALLATION

Install the brake disc with the stamp facing to the engine side. Install new disc bolts and tighten them in a crisscross pattern in several steps.

TORQUE: 20 N·m (2.0 kgf·m, 14 lbf·ft)

Apply 5 – 8 g of molybdenum disulfide grease to the pinion joint splines.

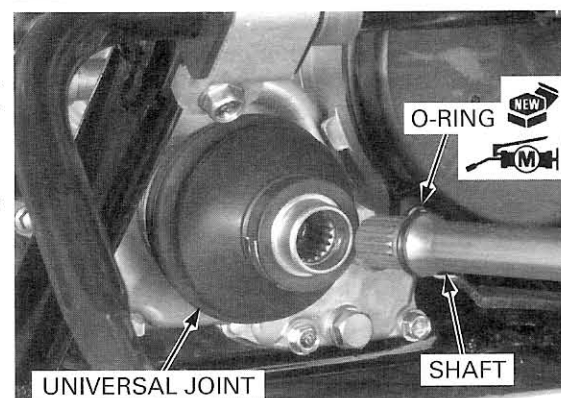
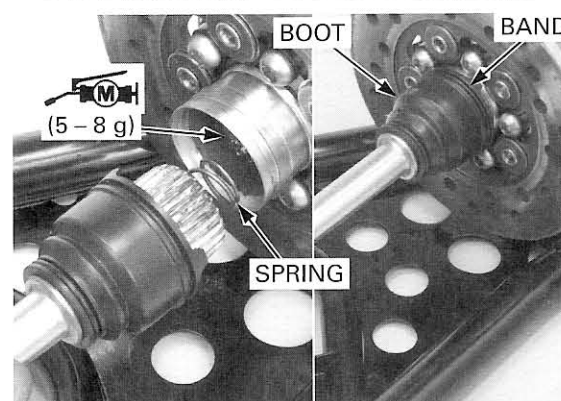
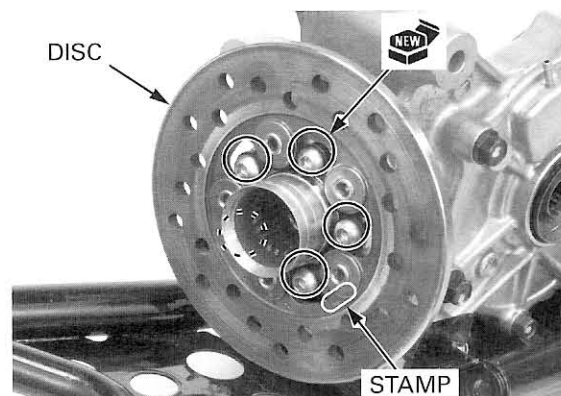
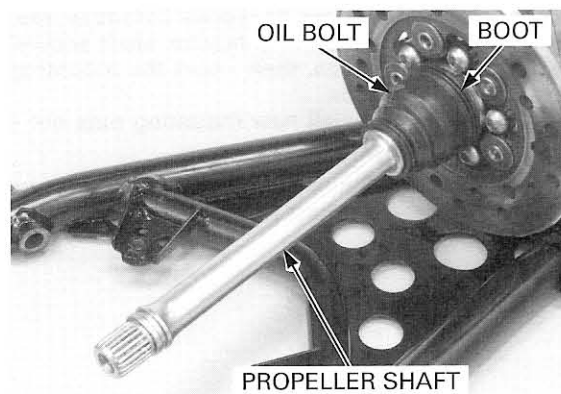
Install the spring into the propeller shaft. Set the propeller shaft into the pinion joint while compressing the spring, then install the boot over the pinion joint groove securely and secure it with the boot band.

Be sure the propeller shaft is installed properly by pulling on the shaft lightly.

Coat a new O-ring with molybdenum disulfide grease and install it into the propeller shaft groove.

Put the final drive assembly on a floor jack or other adjustable support and place the assembly under the main frame.

While adjusting the jack height, move the final drive assembly forward and connect the propeller shaft into the universal joint.



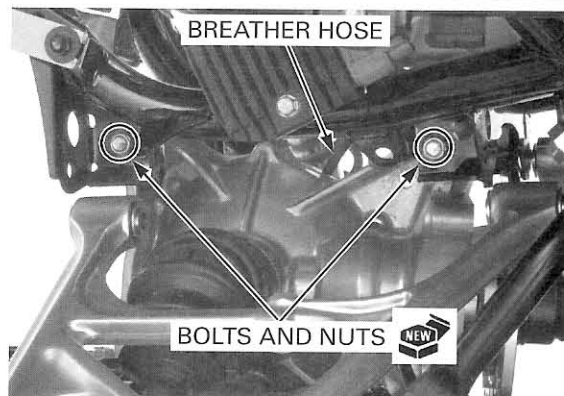
BRAKE SYSTEM

Be careful not to disconnect the propeller shaft and universal joint.

Set the final drive assembly into the main frame and seat the propeller shaft securely to align the bolt holes, then insert the mounting bolts from the left side.

Install new mounting nuts but do not tighten them yet.

Route the breather hoses properly (page 1-21) and connect them.



Insert the sub-frame joint bolt bolts from the inside. Install new joint nuts.

Tighten the four mounting nuts and joint nuts alternately.

TORQUE:

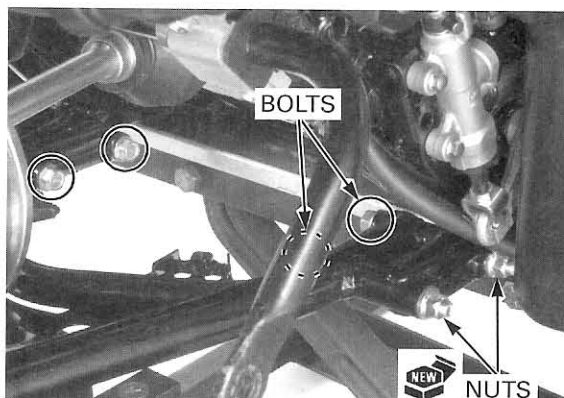
Joint nut: 34 N·m (3.5 kgf·m, 25 lbf·ft)

Mounting bolt (main frame):

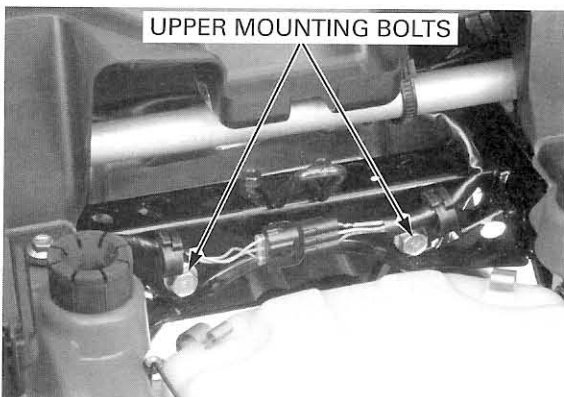
34 N·m (3.5 kgf·m, 25 lbf·ft)

Mounting bolt (sub-frame):

44 N·m (4.5 kgf·m, 33 lbf·ft)

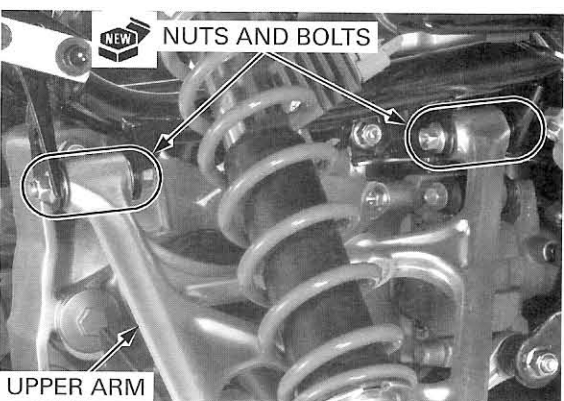


Install the rear shock absorber upper mounting bolts and nuts, and tighten them.

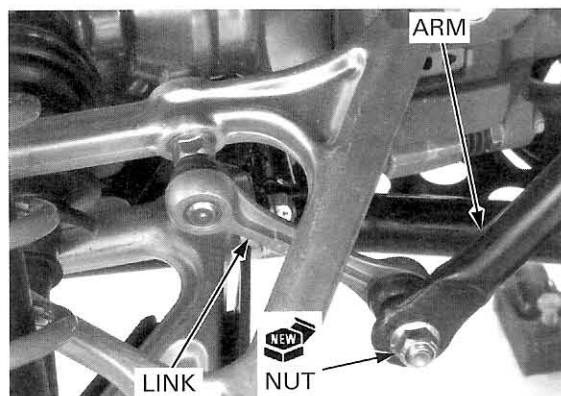


Insert the pivot bolts from the inside.

Install the upper arm into the frame with the pivot bolts and new nuts, and tighten the nuts.

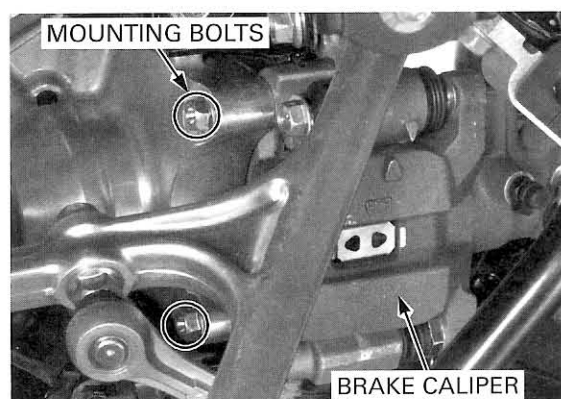


Connect the stabilizer links to the stabilizer arms with new nuts and tighten them.



Install the rear brake caliper onto the final gear case, and install and tighten the mounting bolts.

TORQUE: 30 N·m (3.1 kgf·m, 22 lbf·ft)

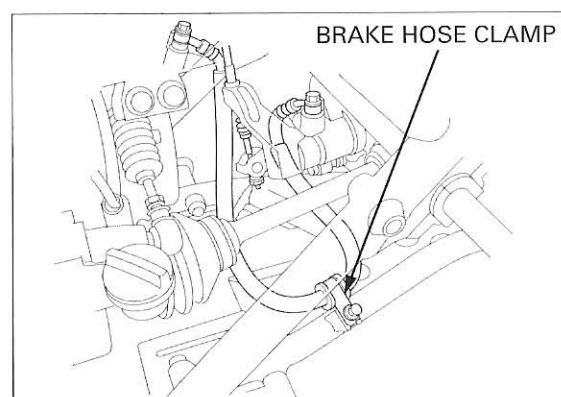


Align the shapes of the brake hose clamp and grommet properly.

Install the rear brake hose clamp onto the sub-frame and tighten the bolt securely.

Install the following:

- both rear wheels (page 15-5)
- engine guard (page 2-16)
- right side cover (page 2-4)
- oil filler lid

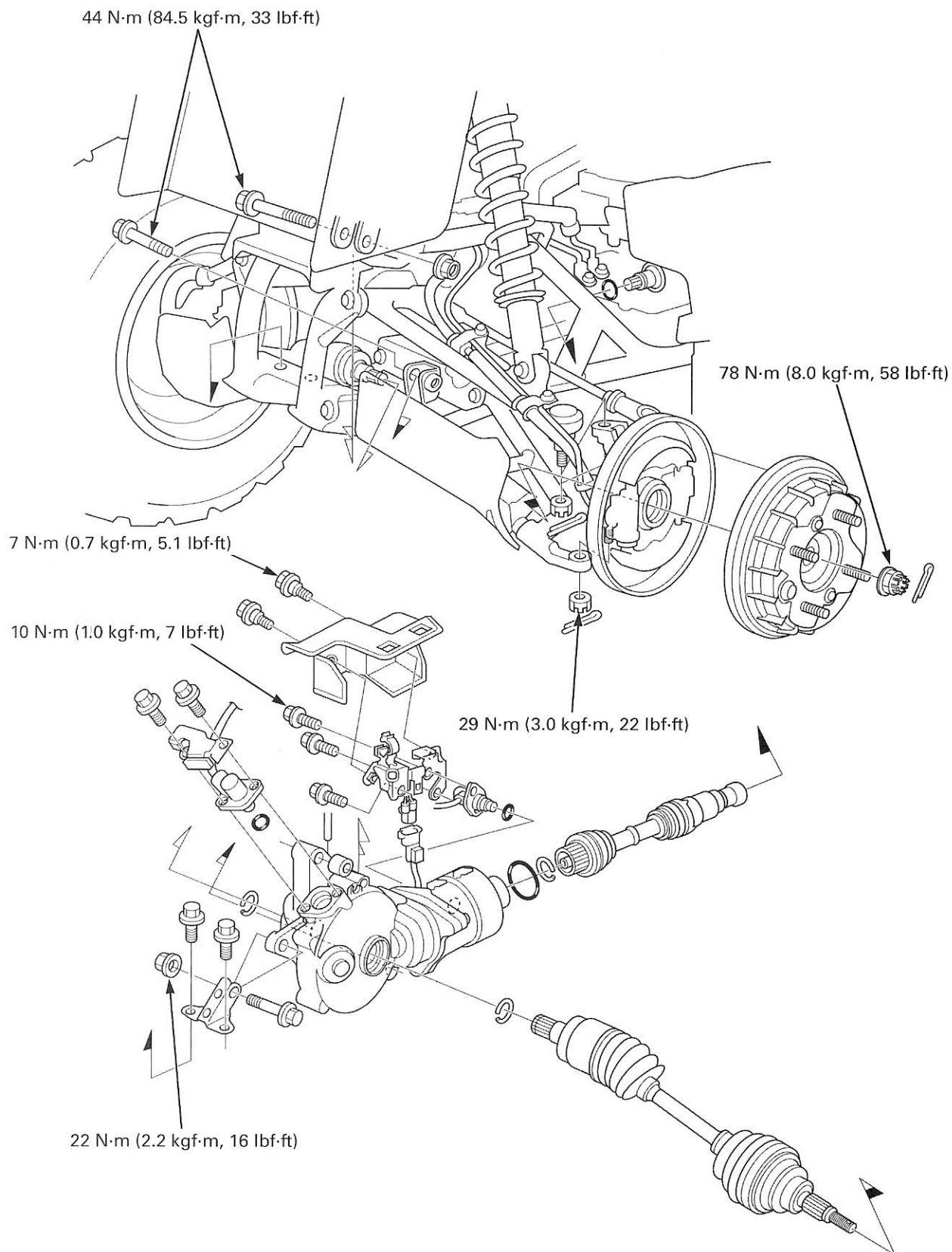


17. FRONT DRIVING MECHANISM

SYSTEM COMPONENTS	17-2	DIFFERENTIAL DISASSEMBLY/ INSPECTION	17-14
SERVICE INFORMATION	17-3	CASE BEARING REPLACEMENT.....	17-21
TROUBLESHOOTING.....	17-4	DIFFERENTIAL ASSEMBLY	17-24
FRONT DRIVE SHAFT	17-5	DIFFERENTIAL INSTALLATION.....	17-29
DIFFERENTIAL REMOVAL	17-11		

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	At draining	175 cm ³ (5.9 US oz, 6.2 Imp oz)	–
		At disassembly	220 cm ³ (7.4 US oz, 7.7 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 (0.2579 – 0.2618)	6.55 (0.2579)
	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, 22 lbf·ft)	Castle nut.
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.
Differential ring gear bolt	49 N·m (5.0 kgf·m, 36 lbf·ft)	Special bolt: replace with a new one.
Differential case cover 10-mm bolt	49 N·m (5.0 kgf·m, 36 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 final clutch bolt	25 N·m (2.6 kgf·m, 19 lbf·ft)	
Differential mounting bolt	44 N·m (4.5 kgf·m, 33 lbf·ft)	
Differential 10-mm mounting nut	44 N·m (4.5 kgf·m, 33 lbf·ft)	Lock nut: replace with a new one.
Differential 8-mm mounting nut	22 N·m (2.2 kgf·m, 16 lbf·ft)	
Front vehicle speed sensor bolt	10 N·m (1.0 kgf·m, 7 lbf·ft)	
Rear vehicle speed sensor bolt	10 N·m (1.0 kgf·m, 7 lbf·ft)	
Speed sensor cover stay bolt	10 N·m (1.0 kgf·m, 7 lbf·ft)	
Rear vehicle speed sensor cover bolt	7 N·m (0.7 kgf·m, 5.1 lbf·ft)	

FRONT DRIVING MECHANISM

TOOLS

Attachment, 52 x 55 mm	07746-0010400
Attachment, 22 x 24 mm	07746-0010800
Attachment, 20 mm I.D.	07746-0020400
Driver, 40 mm I.D.	07746-0030100
Attachment, 30 mm I.D.	07746-0030300
Pilot, 15 mm	07746-0040300
Pilot, 28 mm	07746-0041100
Driver	07749-0010000
Universal bearing puller	07631-0010000
Bearing remover, 30 mm	07936-8890200
Remover handle	07936-3710100
Remover weight	07936-371020A or 07936-3710200 (U.S.A. only)
Bearing remover head, 15 mm	07936-KC10200 or 07936-KC10500
Remover shaft	07936-KC10100 or 07936-KC10500
Driver	07949-3710001
Bearing clip compressor, 25 mm	07OME-HN8A200 (Newly designed tool)
Differential inspection tool	07KMK-HC50101 or 07KMK-HC5010A (U.S.A. only)
Press attachment	07LME-GE20100
Ball joint remover, 28 mm	07MAC-SL00200

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

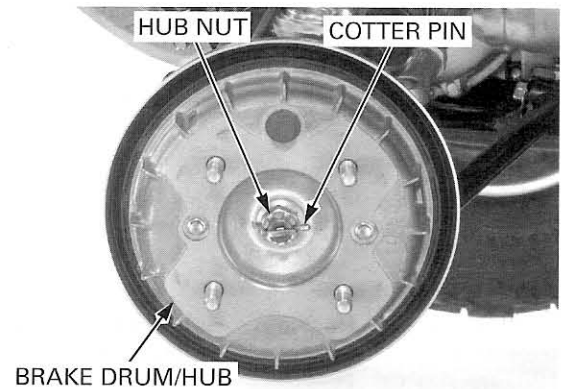
- Oil level too low
- Insufficient backlash between ring gear and pinion gear

FRONT DRIVE SHAFT

REMOVAL

Remove the front wheel (page 14-9).

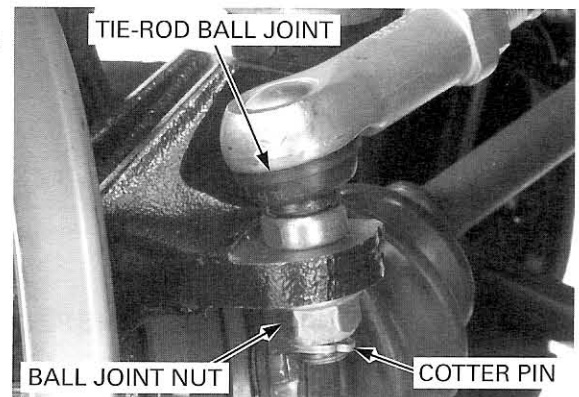
Remove the cotter pin and loosen the hub nut.



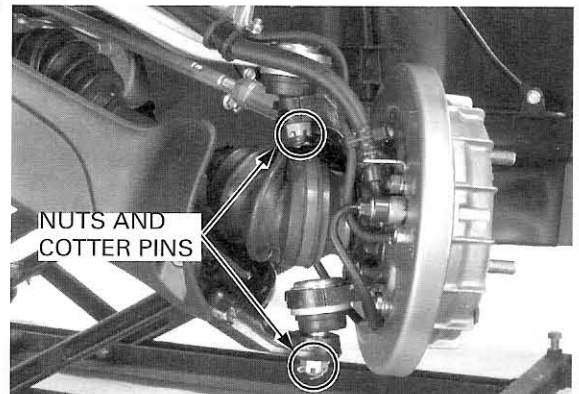
Remove the cotter pin.

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.



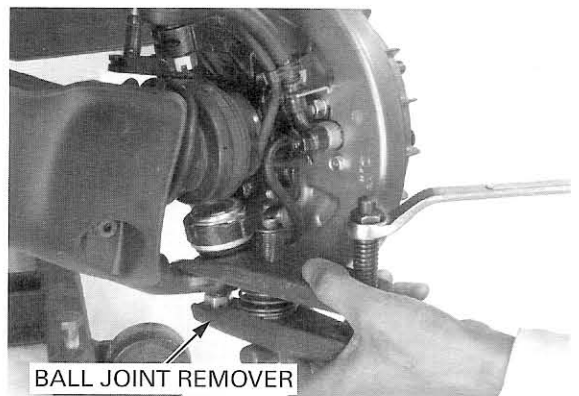
Remove the cotter pins and loosen the castle nuts of the suspension arm ball joints, but do not remove them yet.



Separate the ball joints, using the special tool according to the instructions on page 14-13.

TOOL:

Ball joint remover, 28 mm 07MAC-SL00200



FRONT DRIVING MECHANISM

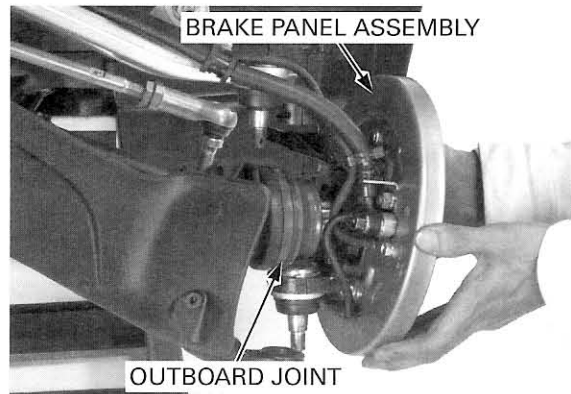
Do not get grease onto the shoe linings.

Remove the hub nut and the brake drum/hub.

Remove the castle nuts, and separate the brake panel assembly from the suspension arms and drive shaft outboard joint.

Do not twist the brake hose.

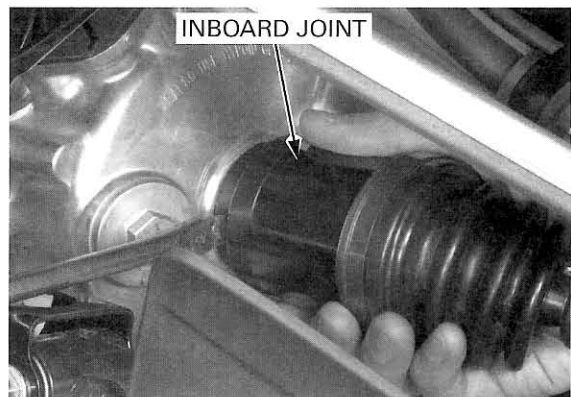
Support the brake panel assembly so that it does not hang from the brake hose.



To prevent damage to the differential oil seal, hold the inboard joint horizontal until the drive shaft is clear of the differential.

Hold the inboard joint of the drive shaft and tug firmly to force the stopper ring in the drive shaft end past the groove while prying with a screwdriver.

Remove the stopper ring from the inboard joint.

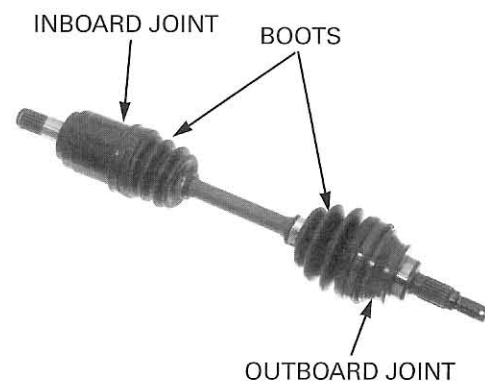


DISASSEMBLY/INSPECTION

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.

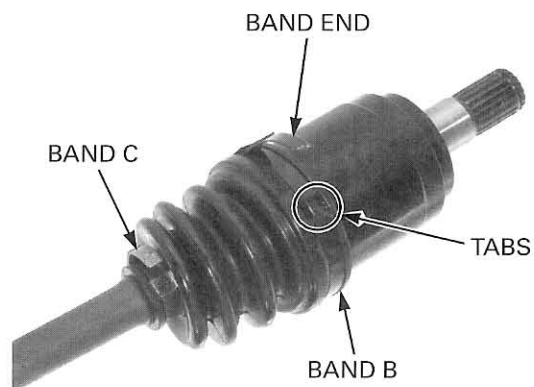
NOTE:

- 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.



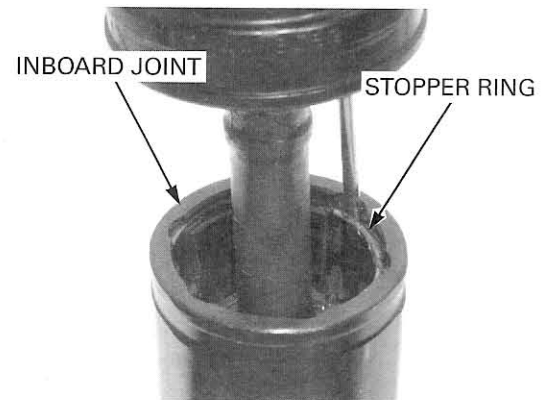
Replace the band with new ones whenever removing them.

Bend up the lock tabs and raise the band ends to loosen the boot bands on the inboard side. Remove boot band B. Remove the boot from the inboard joint.

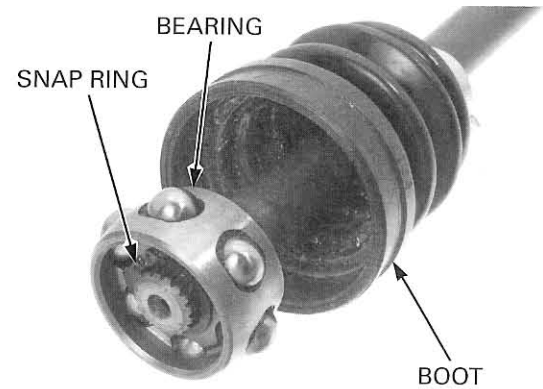


Remove the following:

- stopper ring
- inboard joint



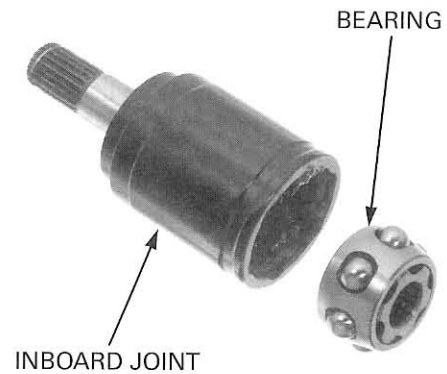
- snap ring
- bearing
- inboard boot
- boot band C



Replace the components as an assembly.

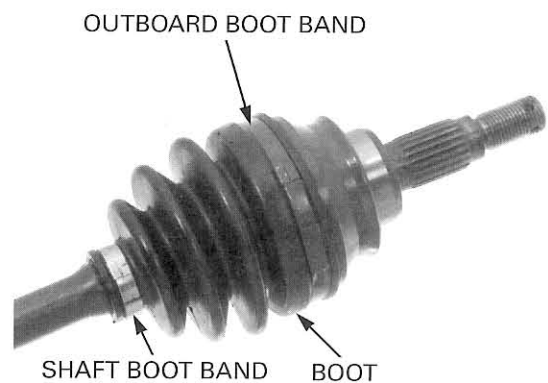
Check the following for wear or damage:

- bearing cage
- race
- steel balls
- inboard joint



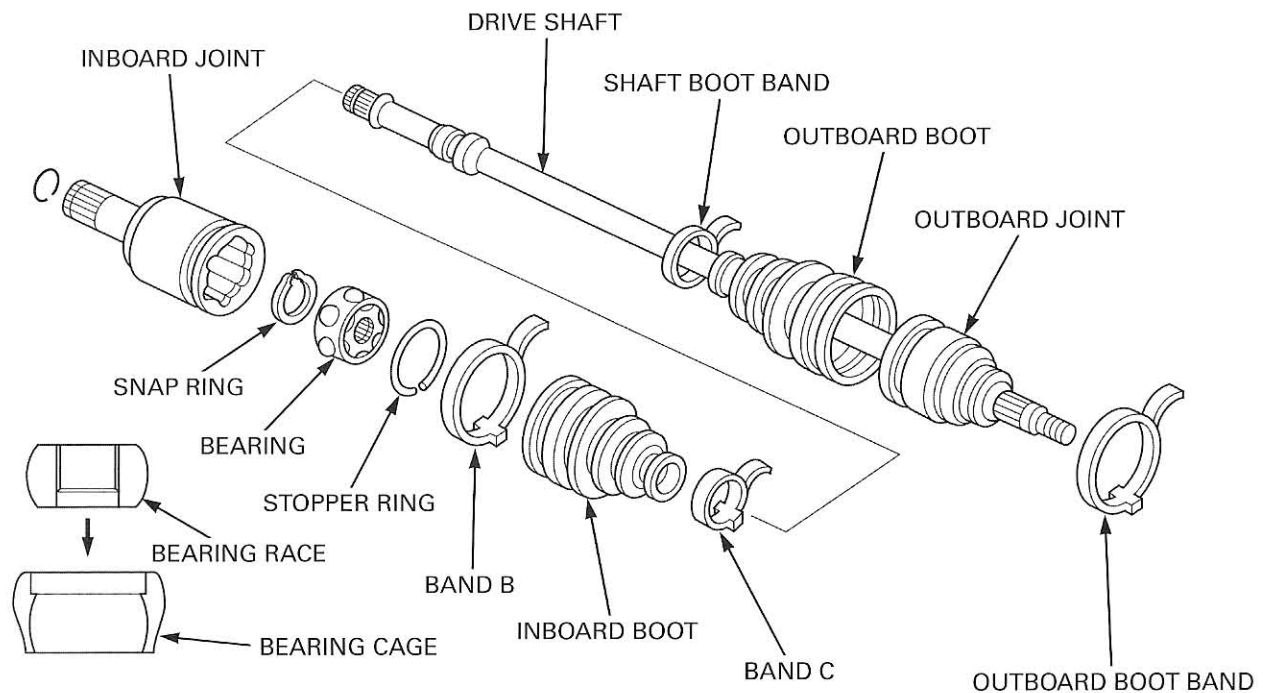
Remove the following:

- shaft boot band
- outboard boot band
- outboard boot

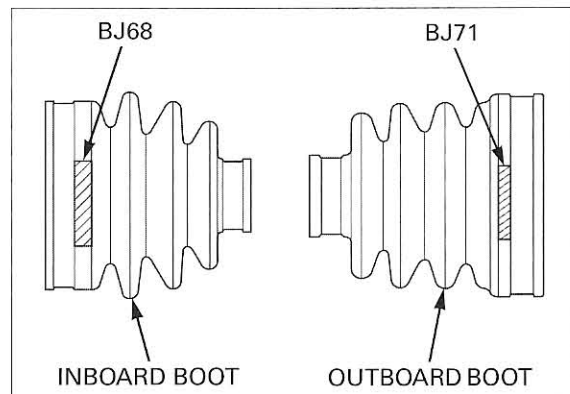


FRONT DRIVING MECHANISM

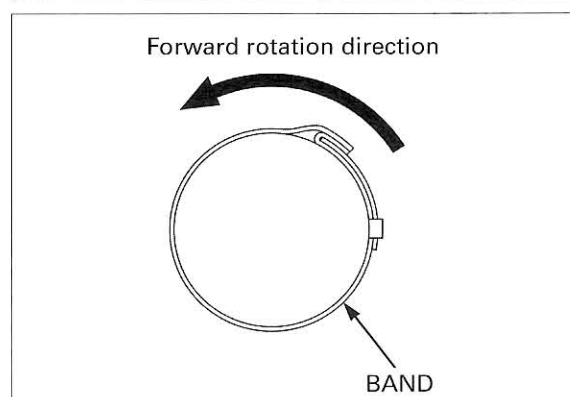
ASSEMBLY



Each boot has an identification mark; "BJ71" for the outboard and "BJ68" for inboard.



Note the installation direction of the boot bands.



FRONT DRIVING MECHANISM

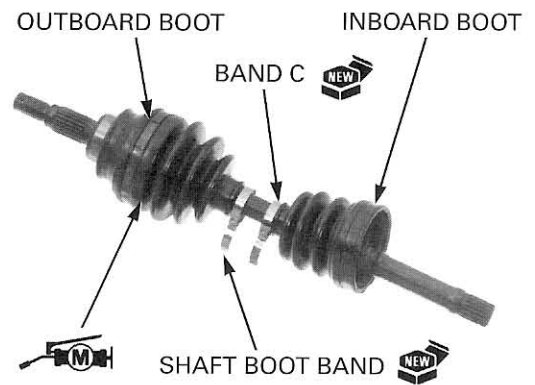
Pack the outboard joint with 55 – 75 g of specified grease.

Specified grease: NKG708 (KYODO YUSHI)

Install the following:

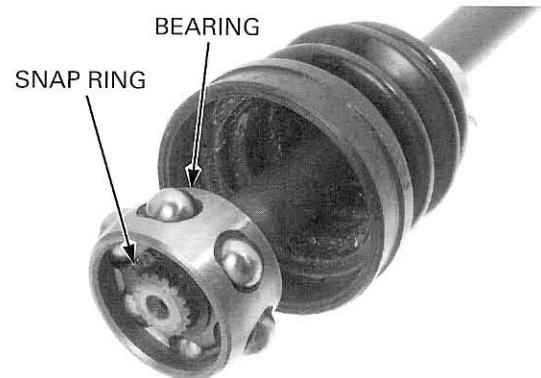
- outboard boot
- new shaft boot band
- new boot band C
- inboard boot

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.

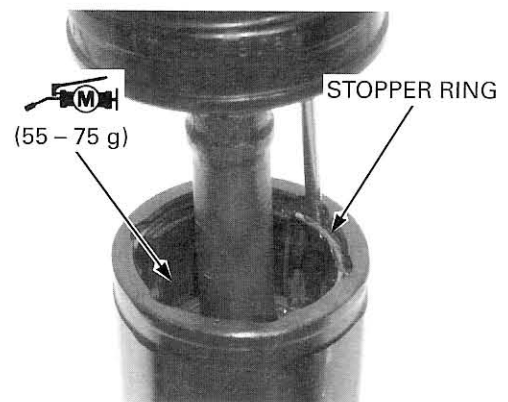


Pack the inboard joint with 55 – 75 g of specified grease.

Specified grease: NKG708 (KYODO YUSHI)

Install the inboard joint over the bearing.

Install the stopper ring into the groove in the inboard joint properly.

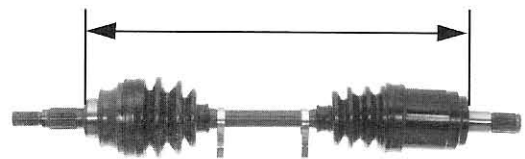


Adjust the length of the drive shaft to the figure given below.

DRIVE SHAFT LENGTH:

Left: 363.3 mm (14.30 in)

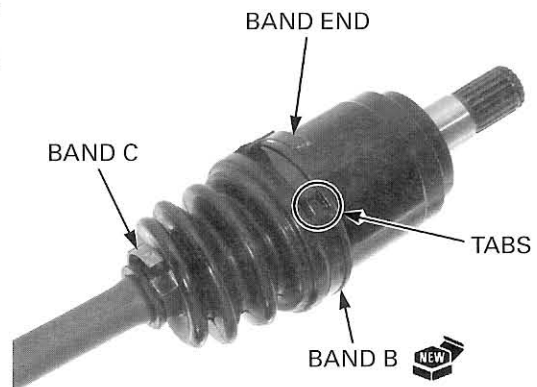
Right: 383.1 mm (115.08 in)



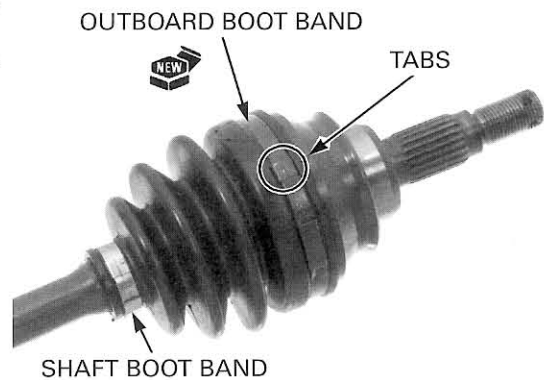
FRONT DRIVING MECHANISM

See page 17-8 for
band installation
direction.

Install 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.

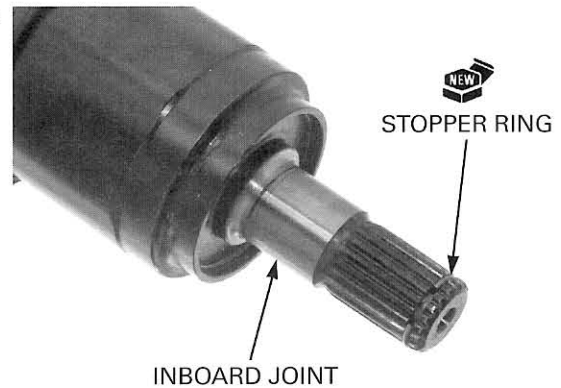


Install the shaft boot band and a new outboard boot band onto the outboard boot. Bend down the band end and secure it with the lock tabs. Tap the lock tabs with a plastic hammer.



INSTALLATION

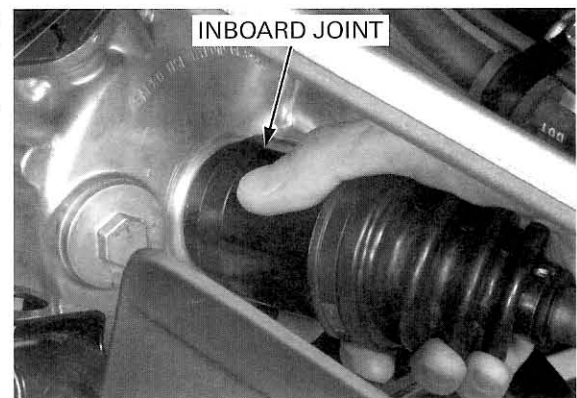
Install a new stopper ring into the groove in the inboard joint splines.



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 on the inboard joint lightly.



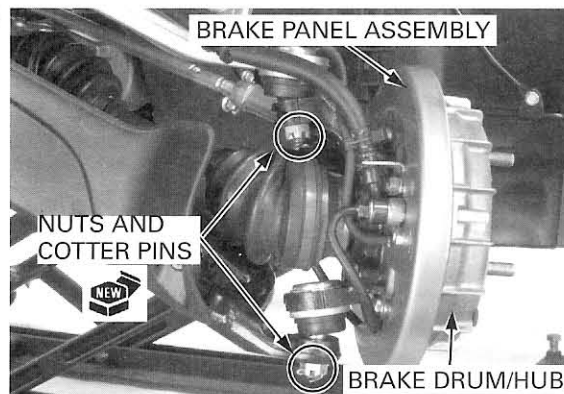
Do not get grease onto the shoe linings.

Install the brake panel assembly over the drive shaft and onto the suspension arms. Install the brake drum/hub and 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 hole.

TORQUE: 29 N·m (3.0 kgf·m, 22 lbf·ft)

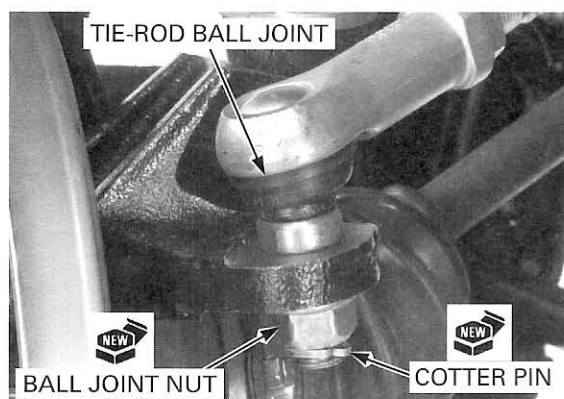
Install new cotter pins.



Install the tie-rod onto the knuckle. Install a new lock 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.

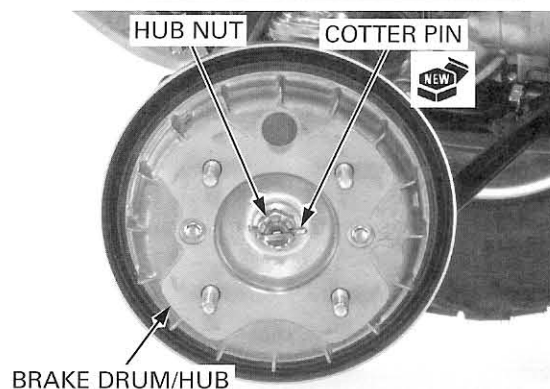


Tighten the hub nut to the specified torque and further tighten until its grooves align with the cotter pin hole.

TORQUE: 78 N·m (8.0 kgf·m, 58 lbf·ft)

Install a new cotter pin.

Install the front wheel (page 14-9).

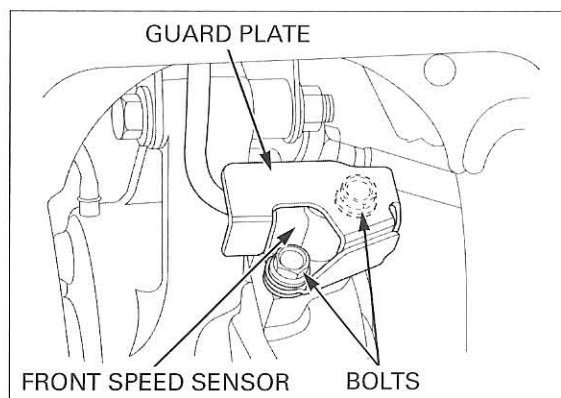


DIFFERENTIAL REMOVAL

Drain the differential oil (page 3-16).

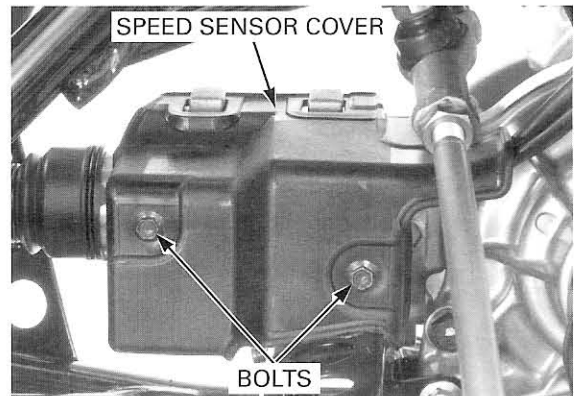
Remove the following:

- left front mud guard (page 2-8)
- both inner fenders (page 2-9)
- front grille (page 2-10)
- left drive shaft (page 17-5)
- two bolts, guard plate and front speed sensor

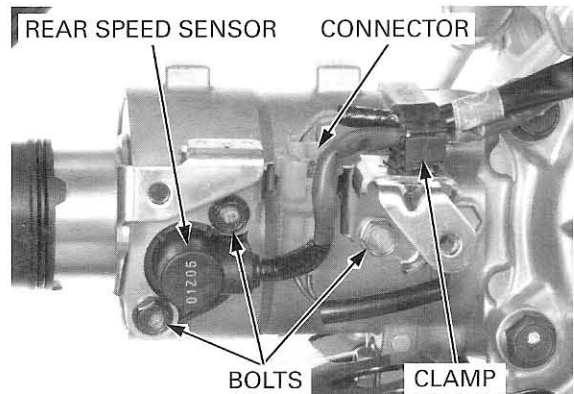


FRONT DRIVING MECHANISM

- two bolts and speed sensor cover

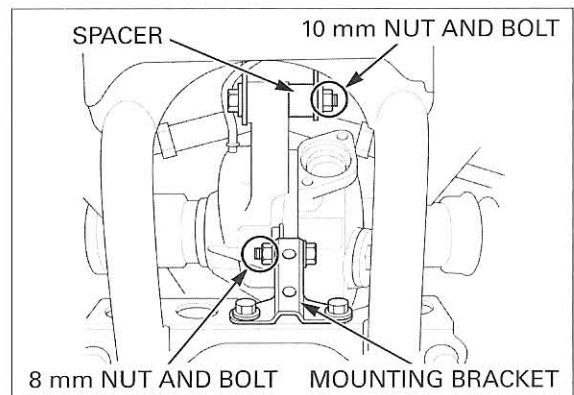


Remove the rear speed sensor wire and front final clutch wire from the clamp.
Remove the three bolts, sensor cover stay and rear speed sensor.
Disconnect the front final clutch 2P connector.

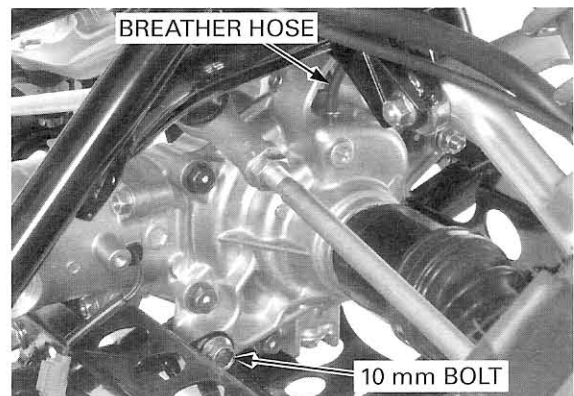


Remove the following:

- 8 mm mounting nut and bolt
- two 8 mm bolts and mounting bracket
- 10 mm mounting nut, bolt and spacer



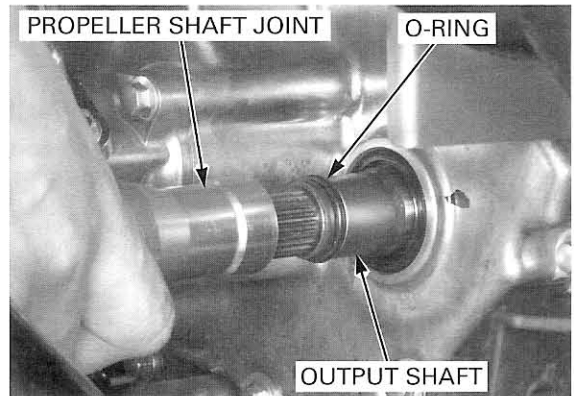
- breather tube
- 10 mm mounting bolt



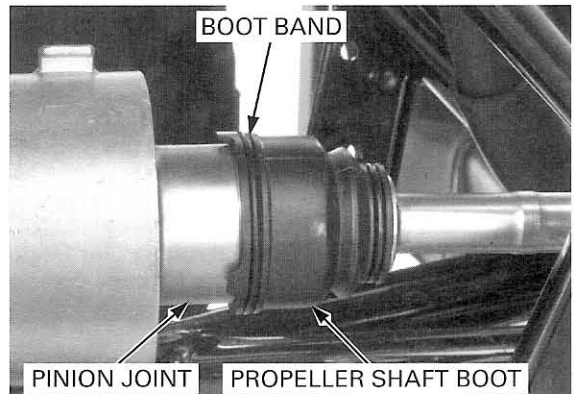
Move the differential forward for maximum clearance between the propeller shaft joint and engine.

Pull the propeller shaft joint out of the output shaft of the engine.

Remove the O-ring.

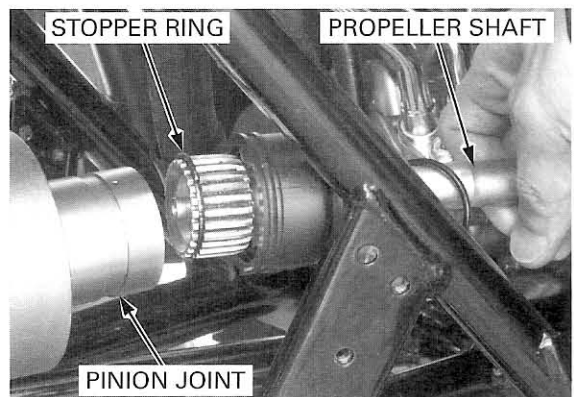


Remove the boot band and propeller shaft boot from the pinion joint.



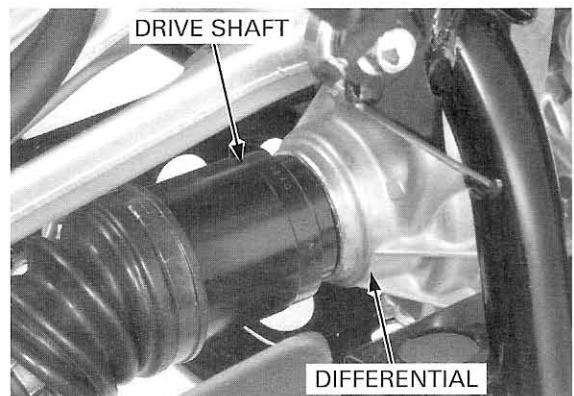
Pull the propeller shaft to force the stopper ring past the groove in the pinion joint and remove the propeller shaft.

Remove the stopper ring from the propeller shaft end.



Separate the other drive shaft from the differential as you remove it.

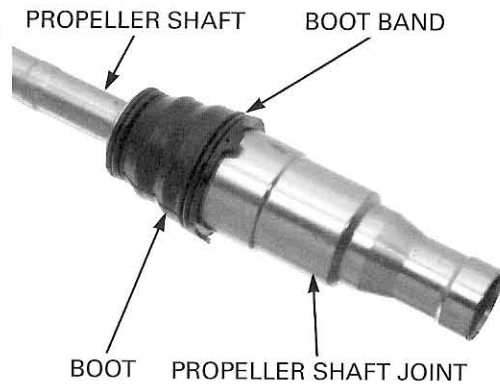
Remove the differential assembly from the frame.



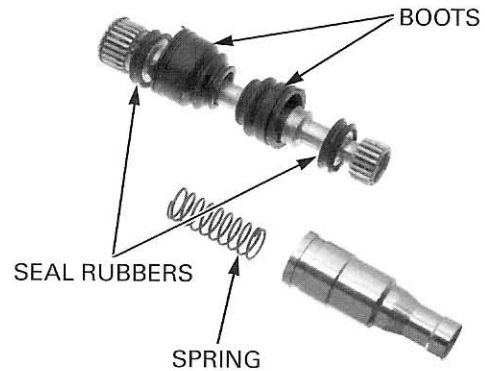
DIFFERENTIAL DISASSEMBLY/ INSPECTION

PROPELLER SHAFT INSPECTION

Remove the boot band and boot from the propeller shaft joint, and remove the propeller shaft joint and spring.

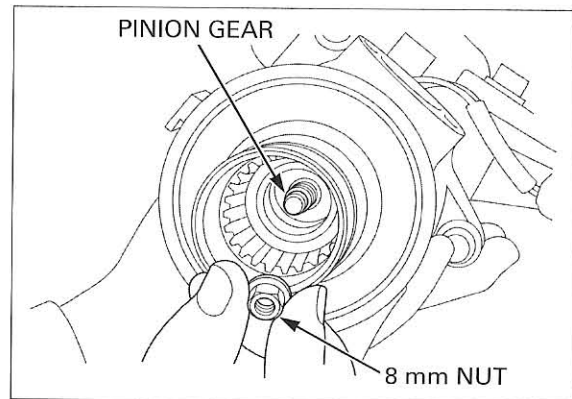


Check the splines of the propeller shaft and joint for wear or damage.
If damaged, check the output shaft and the pinion joint also.
Check the seal rubbers for fatigue or damage.
Check the boots for cuts, deterioration or damage.



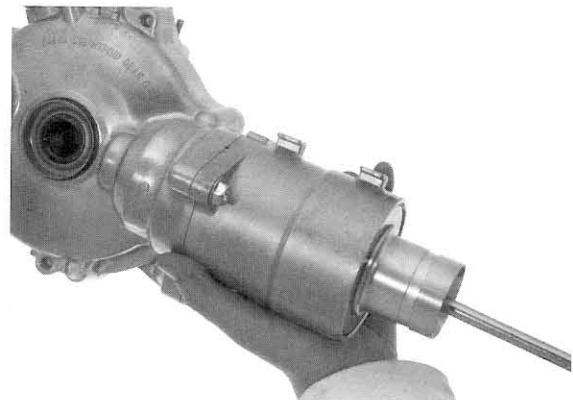
OPERATION CHECK

Install a 8 mm nut onto the pinion gear.



Turn the 8 mm nut and check the pinion gear turns smoothly and quietly without binding.

If the pinion gear does not turn smoothly or quietly, the pinion gear, ring gear and/or bearing may be damaged or faulty. They must be checked after disassembly; replace them if necessary.



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 read backlash.

STANDARD: 0.05 – 0.25 mm (0.002 – 0.010 in)

SERVICE LIMIT: 0.4 mm (0.02 in)

Remove the dial indicator. Turn the ring gear 120° and measure backlash. Repeat this procedure once more. Compare the difference of the three measurements.

SERVICE LIMIT: 0.2 mm (0.01 in)

If the difference in measurements exceeds the service limit, it indicates that the bearing is not installed squarely, or the case is deformed. Inspect the bearings and case.

If the backlash is excessive, replace the ring gear left side shim with a thinner one.

If the backlash is too small, replace the ring gear left side shim with a thicker one.

The backlash is changed by about 0.06 mm (0.002 in) when the thickness of the shim is changed by 0.10 mm (0.004 in).

NOTE:

- Twenty-three different thickness shims are available from the thinnest (0.50 mm) shim to the thickest (1.60 mm) shim in increments of 0.05 mm.

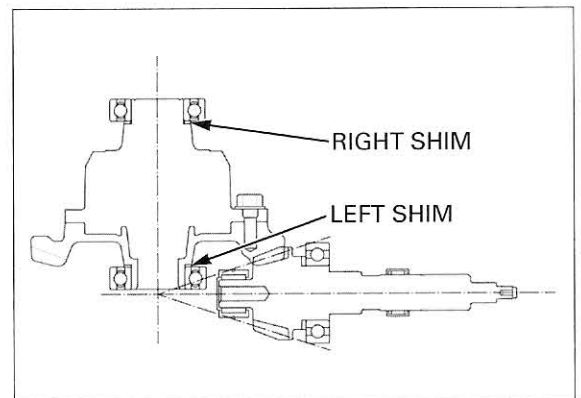
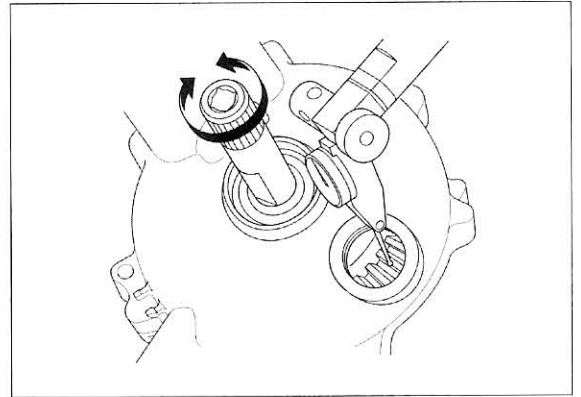
Ring gear shims:

A: (thinnest): 0.50 mm (0.020 in)

K: (standard): 1.00 mm (0.039 in)

W: (thickest): 1.60 mm (0.063 in)

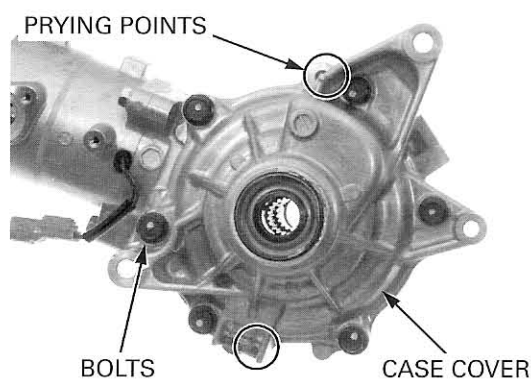
Change the right side shim an equal thickness and opposite amount of what the left side shim was changed; If the left shim was replaced with a 0.10 mm (0.004 in) thicker shim, replace the right shim with one that is 0.10 mm (0.004 in) thinner.



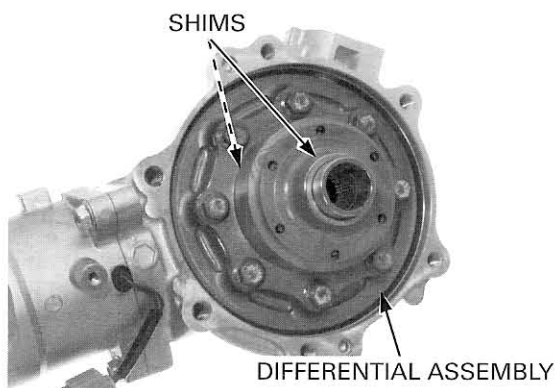
DIFFERENTIAL REMOVAL

Loosen the six 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.

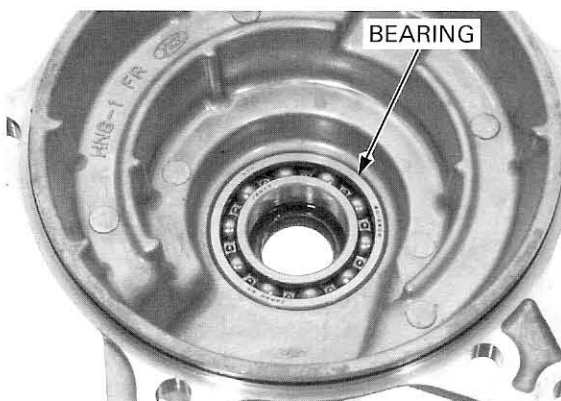


Remove the differential assembly and shims.



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.



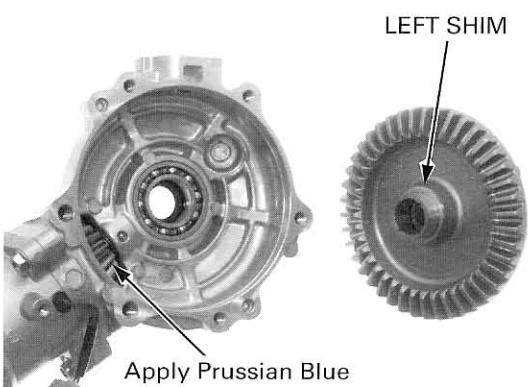
GEAR TOOTH CONTACT PATTERN CHECK

Keep dust and dirt out of the case and cover.

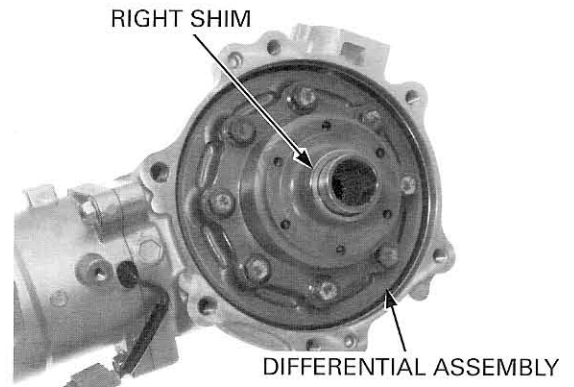
Clean sealing material off the mating surfaces of the differential case and cover, being careful not to damage them.

Apply thin coat of Prussian Blue to the pinion gear teeth for a tooth contact pattern check.

Install the ring gear shims onto the differential assembly.



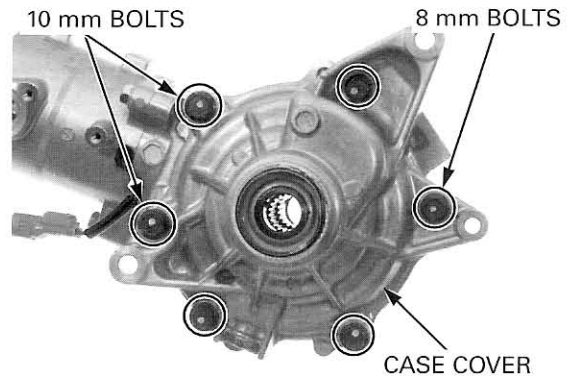
Install the differential assembly into the gear case.



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.

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.

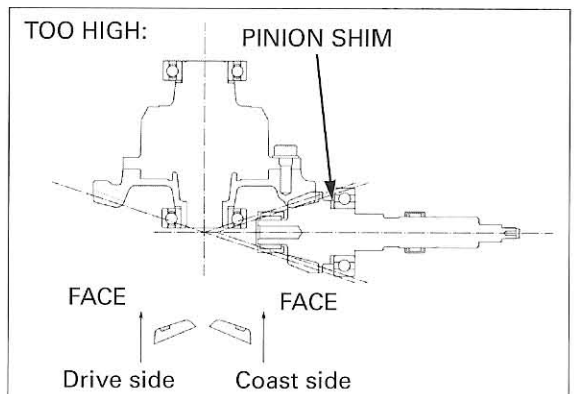
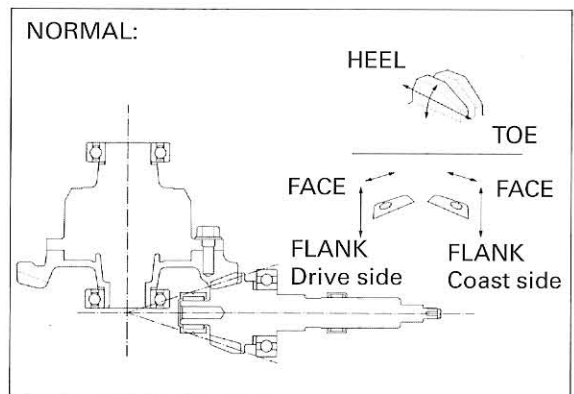
Check the gear tooth contact pattern through the oil filler hole.

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 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.



FRONT DRIVING MECHANISM

Replace the pinion shim with a thinner one if the contact pattern is too low, toward the flank.

The pattern will shift about 0.5 – 1.0 mm (0.02 – 0.04 in) when the thickness of the shim is changed by 0.12 mm (0.005).

NOTE:

- Fifteen different thickness shims are available from the thinnest (1.64 mm) shim to the thickest (2.18 mm) shim in intervals of 0.06 mm.

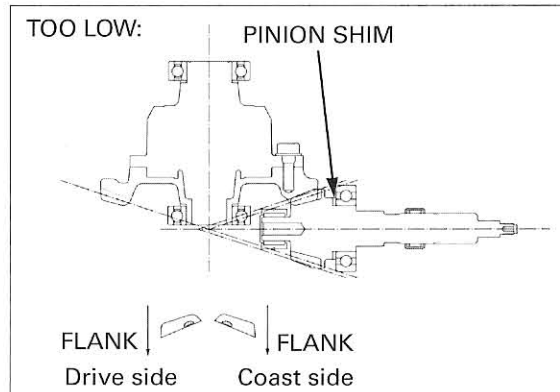
Ring gear shims:

A: (thinnest): 1.64 mm (0.064 in)

G: (standard): 2.00 mm (0.079 in)

J: (thickest): 2.18 mm (0.086 in)

See page 17-21 and page 17-25 for pinion shim replacement.



DIFFERENTIAL INSPECTION

Install the inspection tools into both sides of the differential.

TOOL:

Differential inspection tool 07KMK-HC50101 or 07KMK-HC5010A (U.S.A. only)

Hold the flat surface of the tool with a vise.

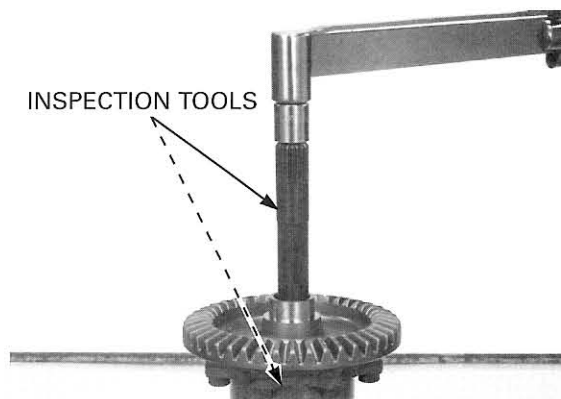
Attach a torque wrench to the other tool and measure the limited slip torque.

STANDARD:

14 – 17 N·m (14.5 – 17.5 kgf·m, 10 – 13 lbf·ft)

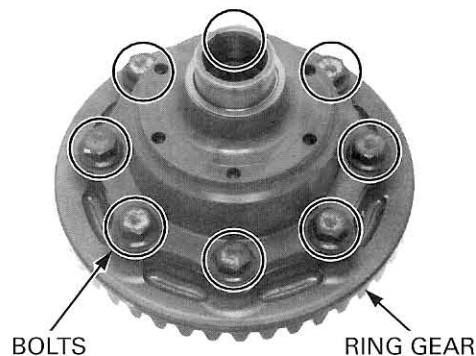
SERVICE LIMIT: 12 N·m (1.2 kgf·m, 9lbf·ft)

If the slip torque is out of specification, disassemble the differential and perform the components inspection (page 17-19) since the differential may be faulty.



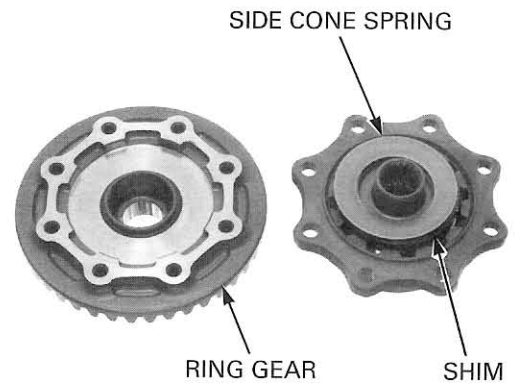
DIFFERENTIAL DISASSEMBLY

Remove the eight bolts, then place the differential assembly with the ring gear side up.



Remove the following:

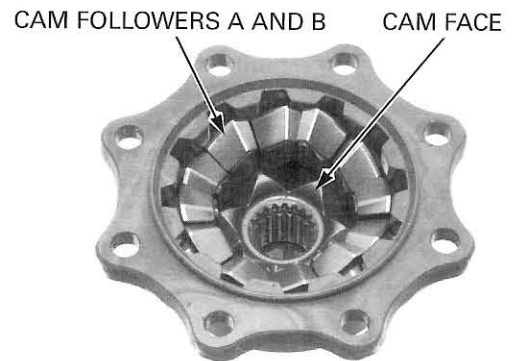
- ring gear
- side cone spring
- shim



- face cam



- six cam followers A and six cam followers B
- face cam



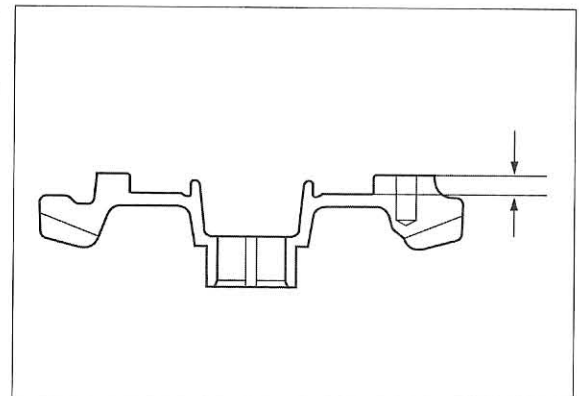
DIFFERENTIAL COMPONENTS INSPECTION

RING GEAR

Check the sliding surface of the ring gear for damage or discoloration.

Measure the depth of the ring gear from the mating surface as shown.

SERVICE LIMIT: 6.55 mm (0.2568 in)

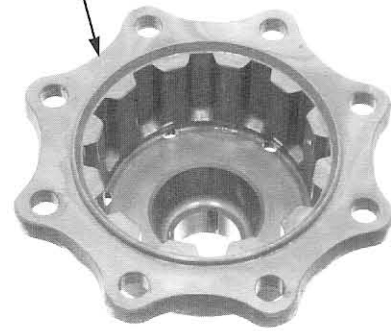


FRONT DRIVING MECHANISM

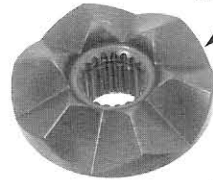
DIFFERENTIAL HOUSING/FACE CAM/CAM FOLLOWERS

Check the sliding surface and grooves of the housing for damage or discoloration.

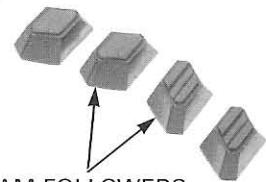
DIFFERENTIAL HOUSING



FACE CAM



CAM FOLLOWERS



Replace the cam followers as a set (12 pieces).

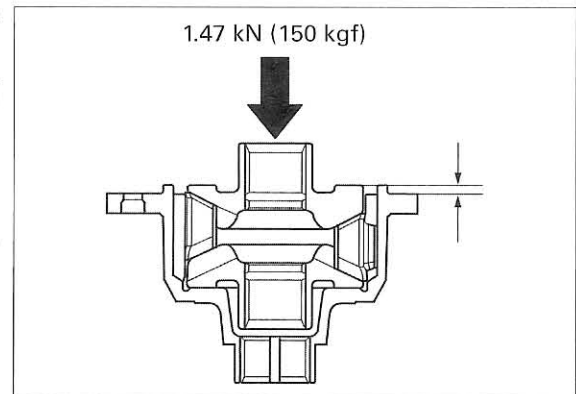
Check the shim, face cams and followers for damage.

Temporarily assemble the differential housing, face cams and cam followers (page 17-26).

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.

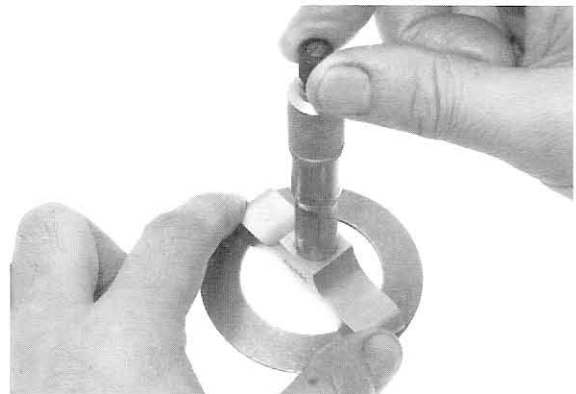


SIDE CONE SPRING

Check the cone spring for damage.

Measure the height of the cone spring.

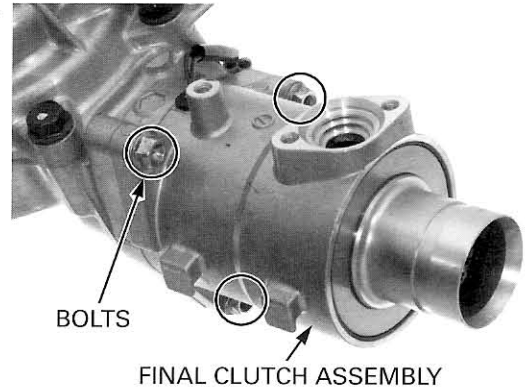
SERVICE LIMIT: 2.6 mm (0.10 in)



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.

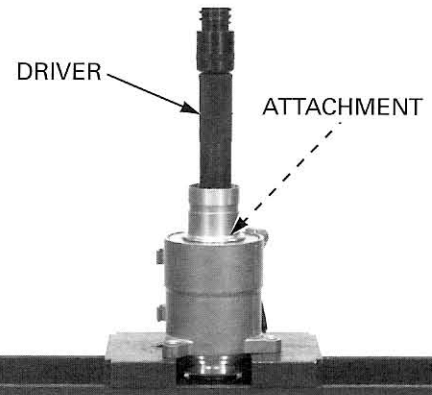
TOOLS:

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

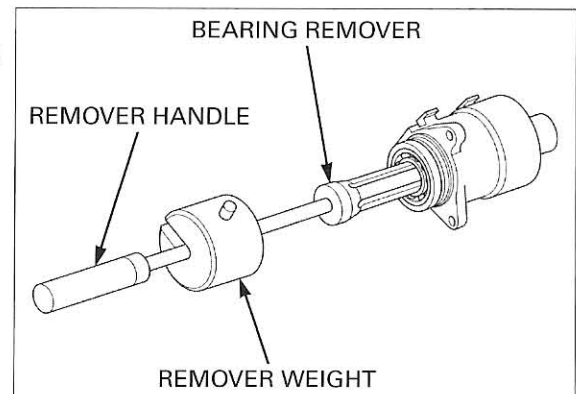
07936-8890200

Remover handle

07936-3710100

Remover weight

**07936-371020A or
07936-3710200**

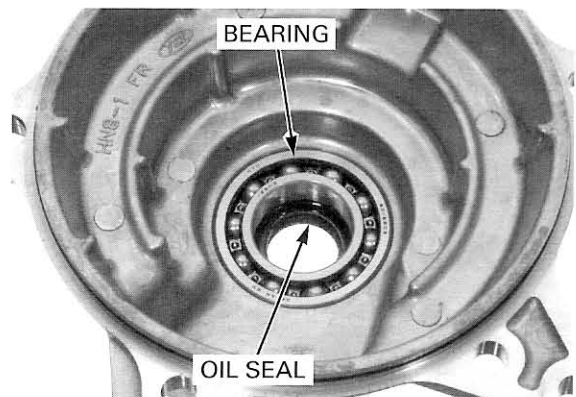


CASE BEARING REPLACEMENT

DIFFERENTIAL BEARING

Remove the oil seals from the differential case and cover.

Drive the differential bearing out of the case and cover.

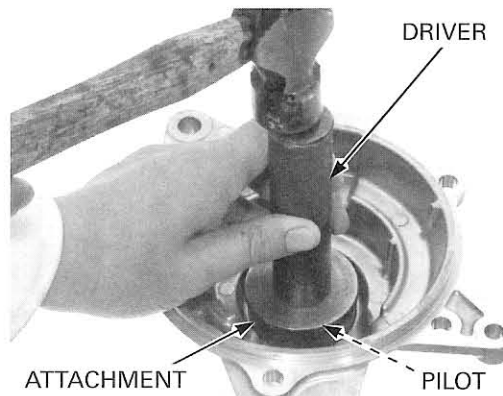


FRONT DRIVING MECHANISM

Drive new bearings into the differential case and cover.

TOOLS:

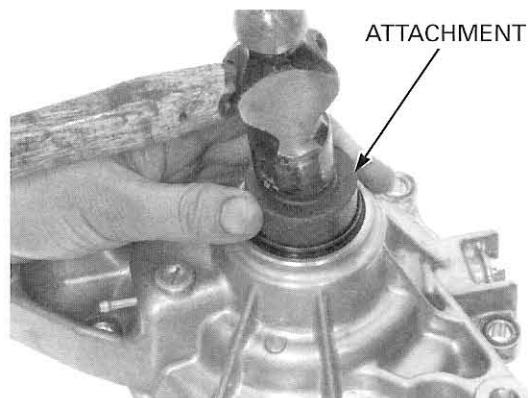
Driver	07749-0010000
Attachment, 52 x 55 mm	07746-0010400
Pilot, 28 mm	07746-0041100



Apply grease to new oil seal lips and install them into the differential case and cover.

TOOL:

Attachment, 20 mm I.D.	07746-0020400
-------------------------------	----------------------



PINION NEEDLE BEARING

Rotate the stopper ring until the end of the stopper ring appears in the access hole.

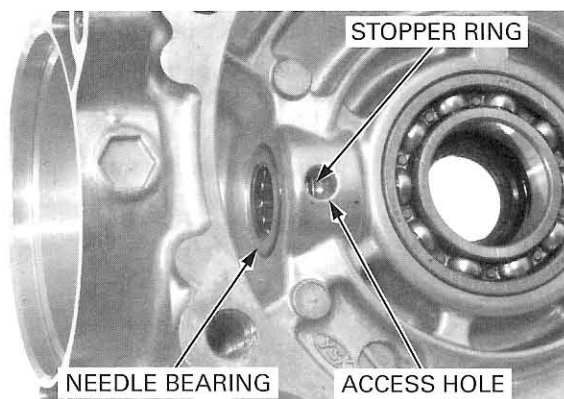
Strike gently near the end of the ring with a punch to bent the end upward.

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.

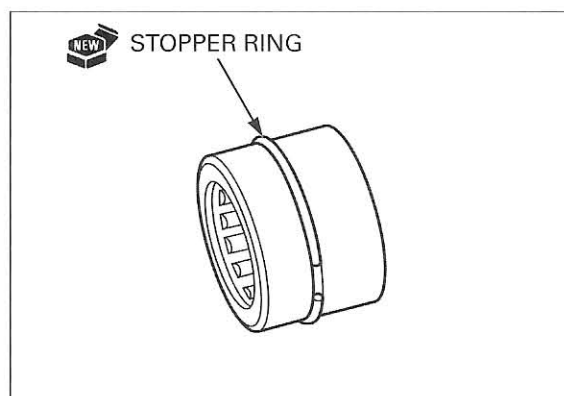
TOOLS:

Remover head, 15 mm	07936-KC10200
Bearing remover shaft	07936-KC10100 or
Bearing remover, 15 mm	07936-KC10500
Remover weight	07741-0010201 or
	07936-371020A or
	07936-3710200
	(U.S.A. only)



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.

Install a new stopper ring into the groove in a new bearing.



Install the bearing into the compressor until it is flush with the end of the tool.

TOOL:

Bearing clip compressor, 25 mm 07OME-HN8A200

Place the driver, attachment and pilot on the top of the bearing and tape the driver to the compressor.

TOOLS:

Driver 07949-3710001

Attachment, 22 x 24 mm 07746-0010800

Pilot, 15 mm 07746-0040300

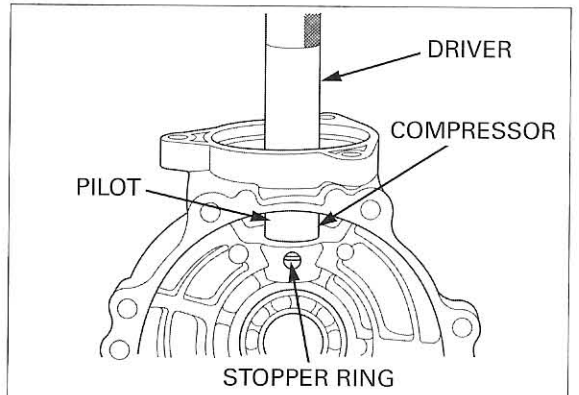
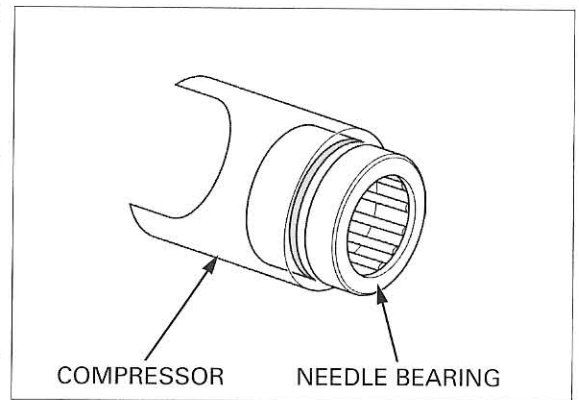
Place the bearing and tool assembly into a freezer for at least 30 minutes.

Heat the gear case to 80°C (176°F).

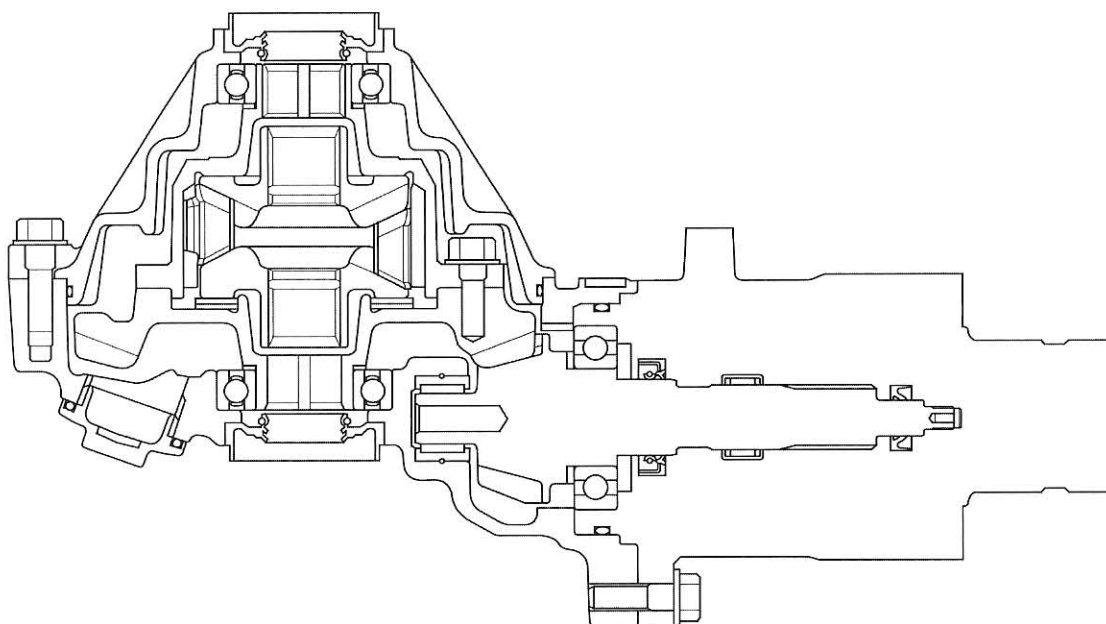
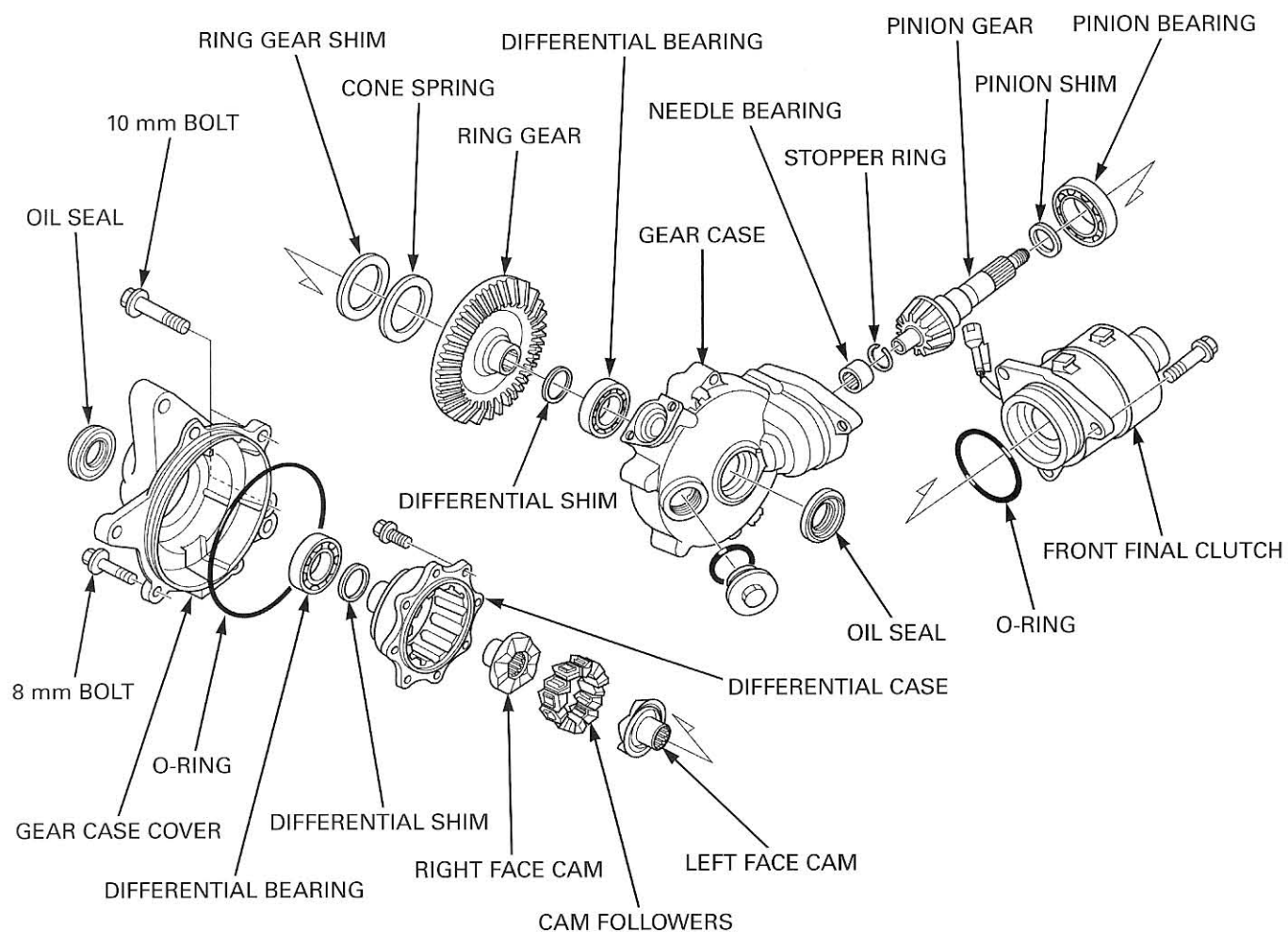
Remove the bearing and tool assembly from the freezer and drive the bearing into the gear case using the special tools.

Only strike the driver once. If you strike it more than once, the ring may slip out of the groove. If this happens, remove the ring and bearing, and install a new ring.

Make sure that the stopper ring is securely set in the groove of the gear case.



DIFFERENTIAL ASSEMBLY

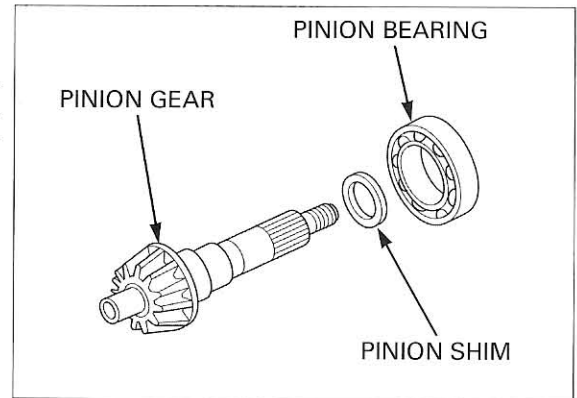


PINION GEAR INSTALLATION

Install the shim and bearing onto the pinion gear.

NOTE:

- 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.



Press the pinion bearing onto the pinion gear.

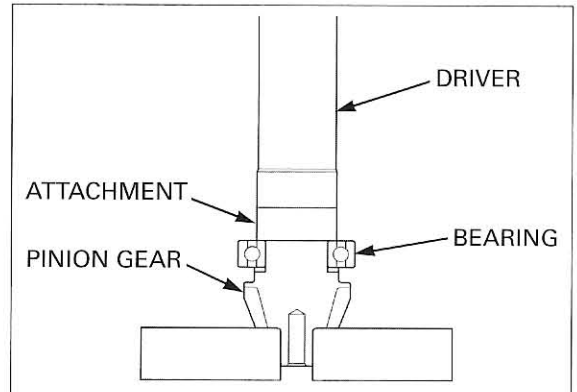
TOOLS:

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

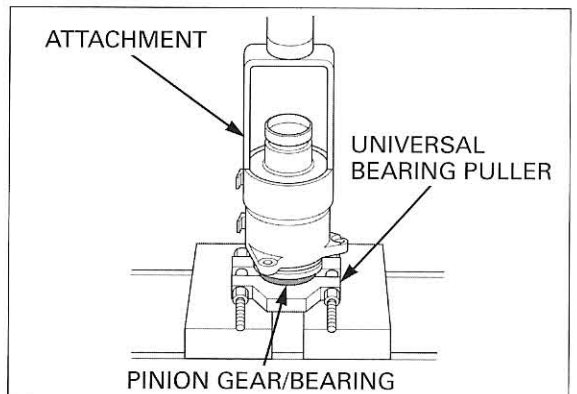
Press attachment

07LME-GE20100

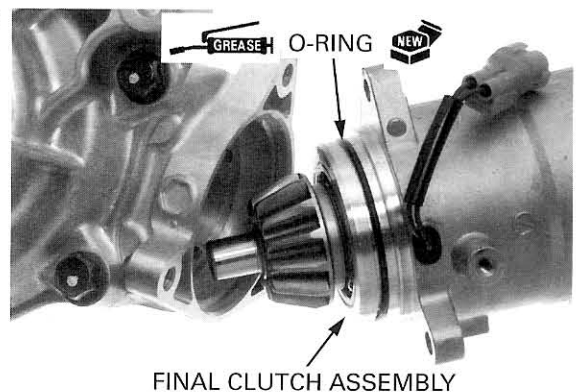
Be sure to wear heavy gloves to avoid burns when handling the heated final clutch case.

U.S.A. only:

Heat the final clutch case to about 100°C (212°F). Drop the pinion gear assembly into the warm final clutch case.



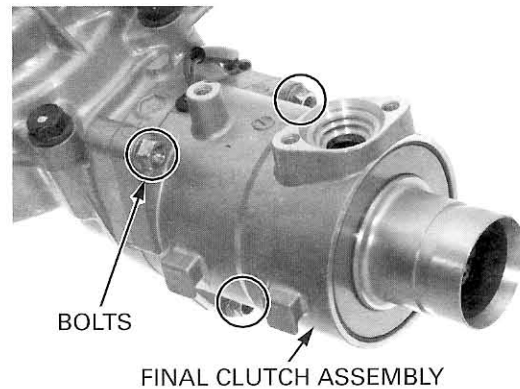
Coat a new O-ring with grease and install it into the groove in the front final clutch assembly.



FRONT DRIVING MECHANISM

Install the final clutch assembly onto the differential.
Install and tighten the three bolts.

TORQUE: 25 N·m (2.6 kgf·m, 19 lbf·ft)

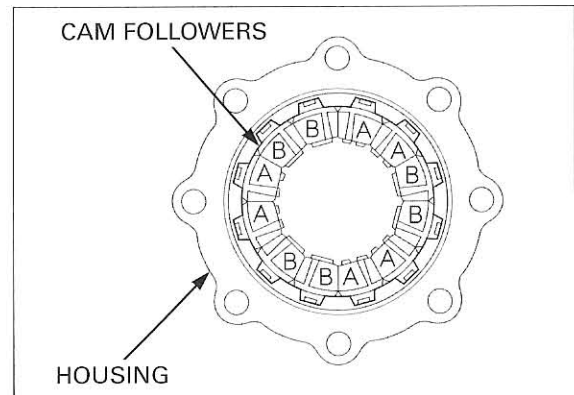


Keep dust and dirt out of the differential housing.

DIFFERENTIAL ASSEMBLY

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 17-19) and the height of the housing-to-cam (page 17-20), 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)

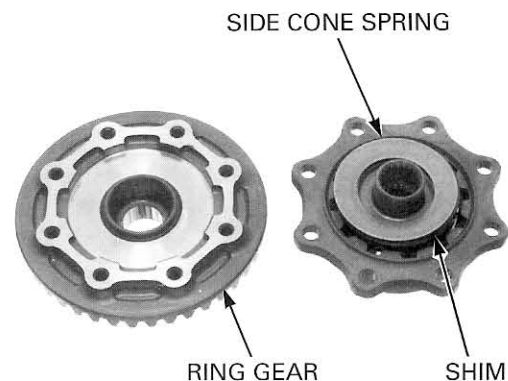
E: 1.7 mm (0.067 in)

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).

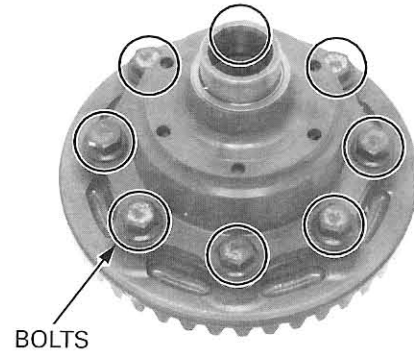
Install the ring gear.



Install new ring gear bolts and tighten them in a crisscross pattern in several steps.

TORQUE: 49 N·m (5.0 kgf·m, 36 lbf·ft)

Inspect the slip torque (page 17-18). 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 17-26).



DIFFERENTIAL CASE ASSEMBLY

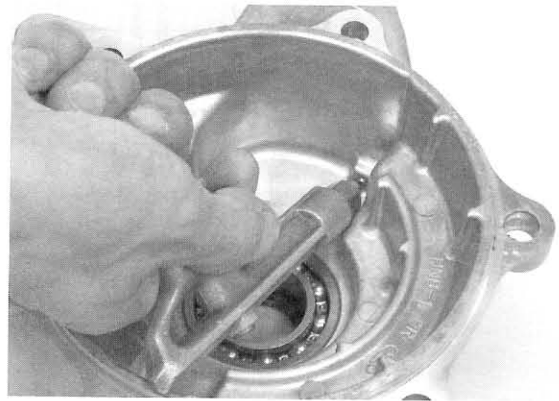
NOTE:

- When the gear set, bearing, differential housing and/or gear case has been replaced, check the tooth contact pattern (page 17-16) and gear backlash (page 17-15).

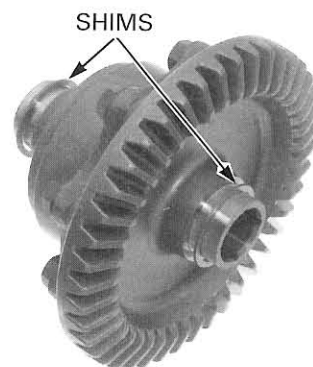
Keep dust and dirt out of the case and cover.

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.

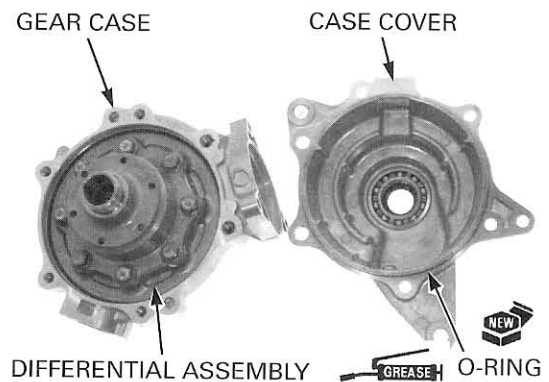


Install the proper ring gear shims onto the differential assembly and install the assembly into the gear case.



Coat a new O-ring with grease and install it into the gear case cover groove.

Install the case cover over the gear case.



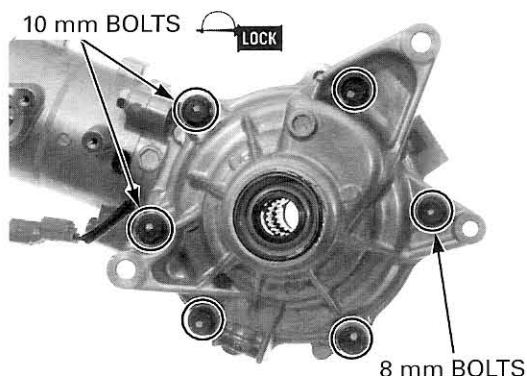
FRONT DRIVING MECHANISM

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.

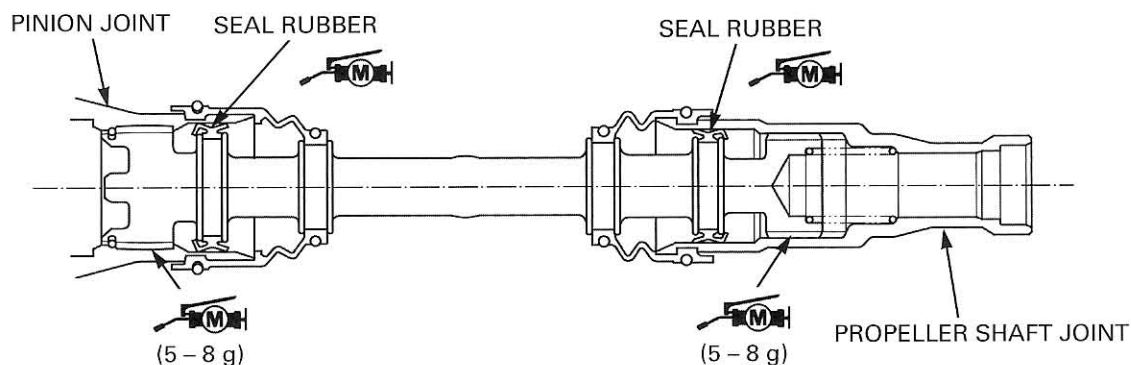
Apply locking agent to the threads of the two 10 mm bolts.
Install the bolts and tighten them in several steps until the cover evenly touches the gear case. Then, while rotating the pinion gear, tighten the bolts to the specified torque in a crisscross pattern in several steps.

TORQUE: 10 mm bolt: 49 N·m (5.0 kgf·m, 36 lbf·ft)
8 mm bolt: 25 N·m (2.6 kgf·m, 19 lbf·ft)

Make sure that the gear assembly rotates smoothly without binding.



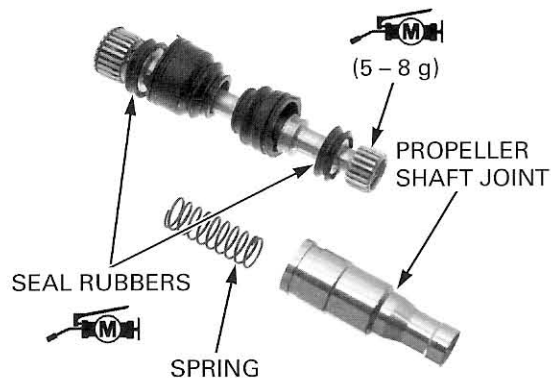
PROPELLER SHAFT ASSEMBLY



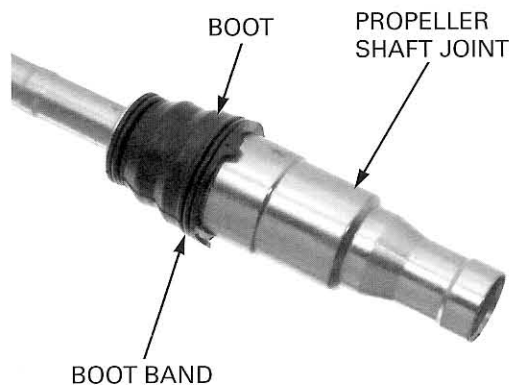
Apply molybdenum disulfide grease to the seal rubbers.

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.



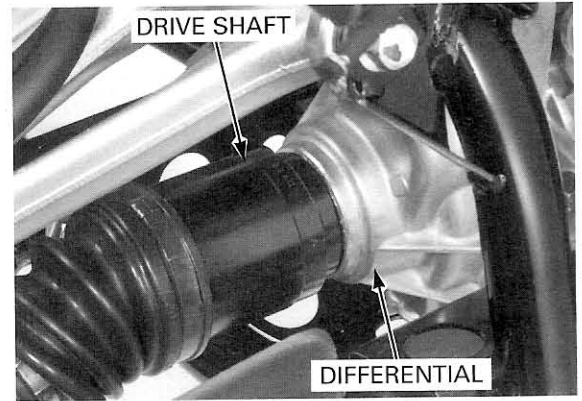
Install the boot over the propeller shaft joint while compressing the spring.
Install the boot band into the boot groove.



DIFFERENTIAL INSTALLATION

Place the differential into the frame.

Install the right drive shaft onto the differential in the same manner as on (page 17-10).

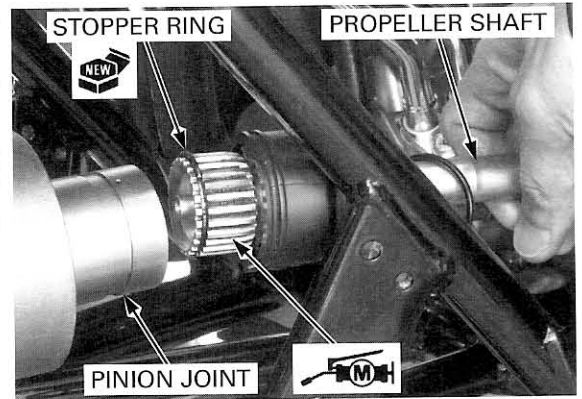


Install a new stopper ring into the groove in the propeller shaft.

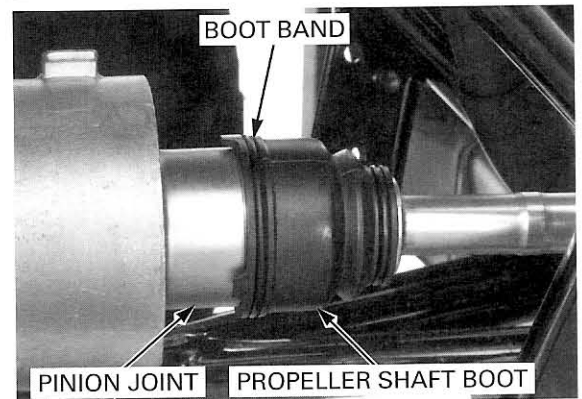
Apply 5 – 8 g of molybdenum disulfide grease to the propeller shaft joint splines.

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.

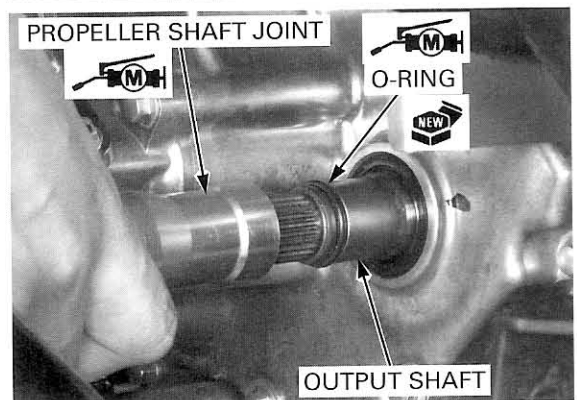


Coat a new O-ring with molybdenum disulfide grease and install it into the groove in the output shaft.

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.

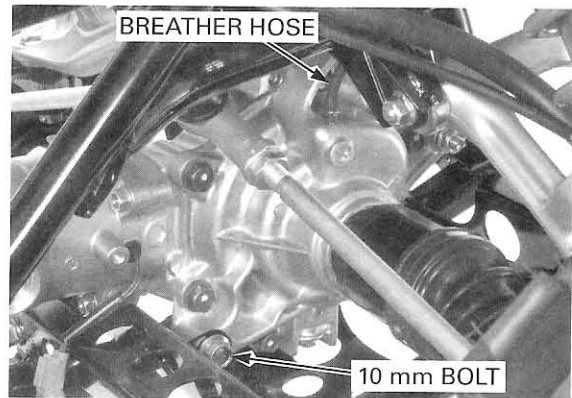
Install the propeller shaft joint over the output shaft.



FRONT DRIVING MECHANISM

Align the bolt holes in the differential and frame, and install the 10 mm mounting bolt.

Connect the breather hose.



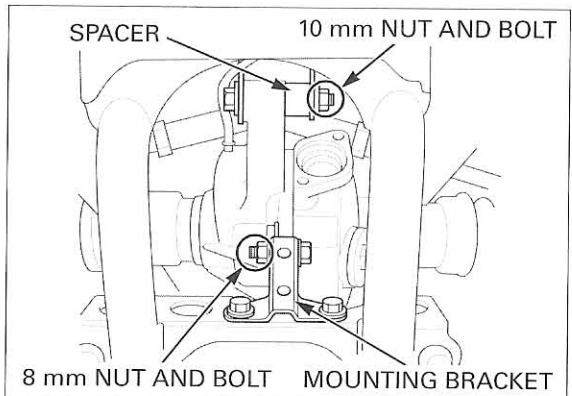
Install the spacer, 10 mm mounting bolt and nut.

Install the mounting bracket, 8 mm bolts, 8 mm mounting bolt and nut.

Tighten the all mounting fasteners.

TORQUE: 10 mm: 44 N·m (4.5 kgf·m, 33 lbf·ft)

8 mm: 22 N·m (2.2 kgf·m, 16 lbf·ft)

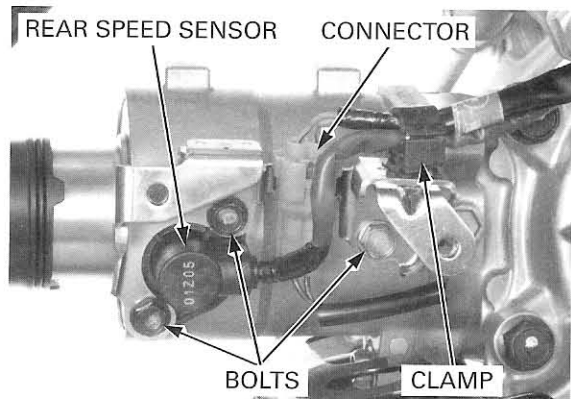


Connect the front final clutch 2P connector and install it onto the sensor cover stay.

Install the rear speed sensor, sensor cover stay and three bolts, and tighten the bolts.

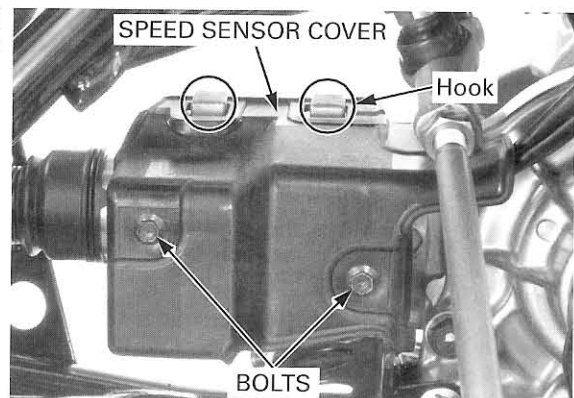
TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

Clamp the rear speed sensor wire and front final clutch wire.



Install the speed sensor cover while hooking it on the bosses on the case, and install and tighten the two bolts.

TORQUE: 7 N·m (0.7 kgf·m, 5.1 lbf·ft)



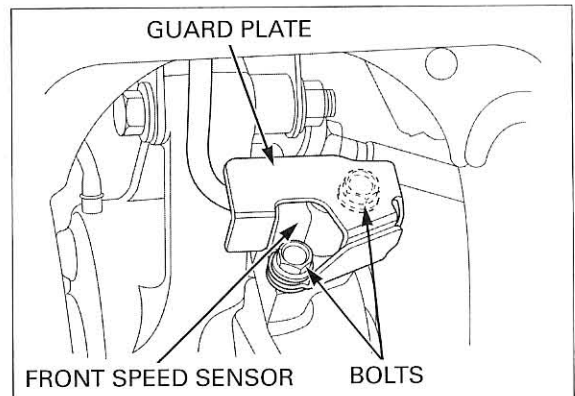
Install the front speed sensor, guard plate and two bolts, and tighten the bolts.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

Install the following:

- left drive shaft (page 17-10)
- front grille (page 2-10)
- inner fenders (page 2-9)
- left front mud guard (page 2-8)

Fill the differential with the recommended oil (page 3-16).

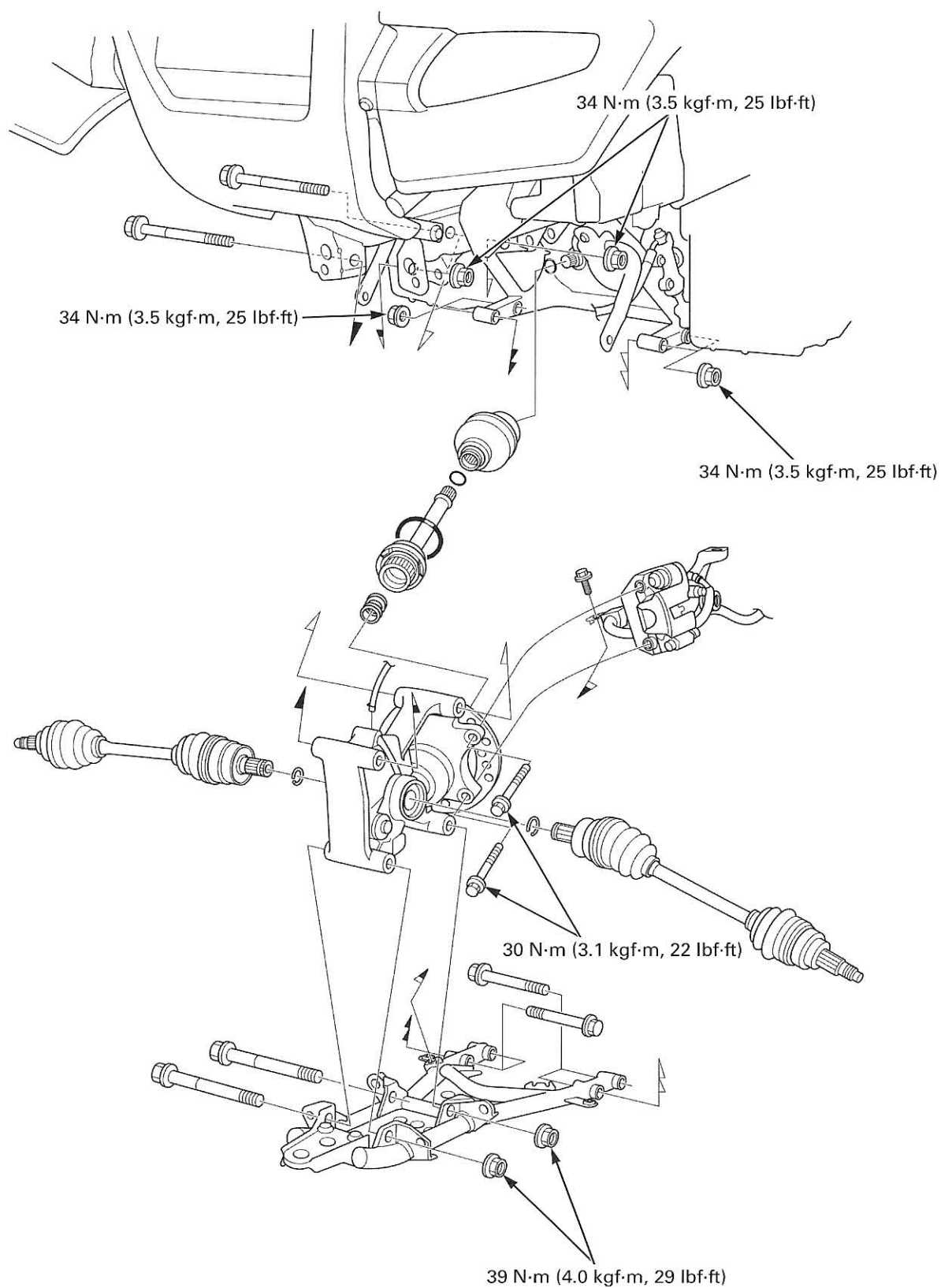


18. REAR DRIVING MECHANISM

SYSTEM COMPONENTS	18-2	FINAL DRIVE DISASSEMBLY/ INSPECTION	18-14
SERVICE INFORMATION	18-3	CASE BEARING REPLACEMENT.....	18-19
TROUBLESHOOTING	18-4	FINAL DRIVE ASSEMBLY	18-21
REAR DRIVE SHAFT	18-5	FINAL DRIVE INSTALLATION	18-24
FINAL DRIVE REMOVAL	18-11		

REAR DRIVING MECHANISM

SYSTEM COMPONENTS



SERVICE INFORMATION

GENERAL

- Perform the gear contact pattern and backlash inspection whenever you replace the bearings, gears or gear case. The extension lines from the gear engagement surfaces should intersect at one point.
- Protect the gear case with a shop towel or soft jaws while holding it in vise. Do not clamp it too tight as it could damage the gear case.
- When using the lock nut wrench, use a deflecting beam type torque wrench 20 inches long. The lock nut wrench increases the torque wrench's leverage, so the torque wrench reading will be less than the torque actually applied to the lock nut. The specification given is the actual torque applied to the lock nut, not the reading on the torque wrench. Do not overtighten the lock nut. The specification later in the text gives both actual and indicated.
- Replace the ring and pinion gears as a set.
- For bearing replacement in the knuckle, refer to page 15-6.

SPECIFICATIONS

			Unit: mm (in)	
ITEM			STANDARD	SERVICE LIMIT
Final drive	Oil capacity	At draining	78 cm ³ (2.6 US oz, 2.7 Imp oz)	–
		At disassembly	90 cm ³ (3.0 US oz, 3.2 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)	–

TOEQUE 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. Stake.
Pinion joint nut	108 N·m (11.0 kgf·m, 80 lbf·ft) Apply locking agent to the threads.
Final gear case cover bolt (10 mm)	49 N·m (5.0 kgf·m, 36 lbf·ft) Apply locking agent to the threads.
Final gear case cover bolt (8 mm)	25 N·m (2.6 kgf·m, 19 lbf·ft)
Final gear case mounting nut (main frame)	34 N·m (3.5 kgf·m, 25 lbf·ft) Lock nut: replace with a new one.
Final gear case mounting nut (sub-frame)	39 N·m (4.0 kgf·m, 29 lbf·ft) Lock nut: replace with a new one.
Sub-frame joint nut	34 N·m (3.5 kgf·m, 25 lbf·ft)
Rear brake disc bolt	20 N·m (2.0 kgf·m, 14 lbf·ft) ALOC bolt: replace with a new one.

TOOLS

Driver	07749-0010000
Attachment, 52 x 55 mm	07746-0010400
Attachment, 62 x 68 mm	07746-0010500
Pilot, 30 mm	07746-0040700
Driver, 40 mm I.D.	07746-0030100
Attachment, 25 mm I.D.	07746-0030200
Attachment, 35 mm I.D.	07746-0030400
Pinion holder	07SMB-HM70200
Lock nut wrench, 30 x 64 mm	07916-MB00002
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)
Bearing remover, 17 mm	07936-3710300
Bearing remover handle	07936-3710100
Bearing remover weight	07741-0010201 or 07936-371020A or 07936-3710200 (U.S.A. only)
Bearing clip compressor, 28 mm	070ME-HN80200 (Newly designed tool)
Puller attachment	07YMC-GCS0100 (not available in U.S.A.) or 07949-3710001, 07746-0010700 and 07746-0040400
Oil seal driver	07965-KE80200 (not available in U.S.A.)
Driver attachment	07LAD-PW50500

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 DRIVE SHAFT

REMOVAL

Remove the following:

- wheel hub (page 15-5)
- seat (page 2-4)

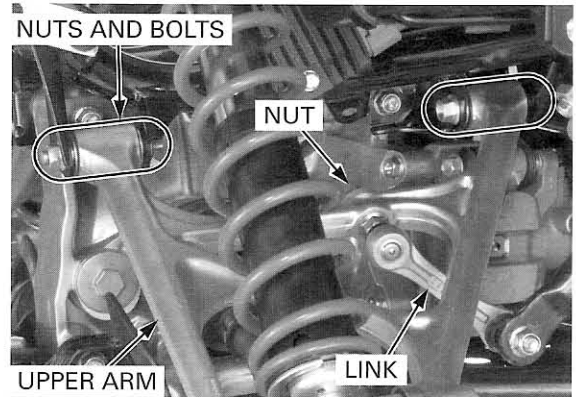
Right drive shaft: Remove the right side cover (page 2-4).

Left drive shaft: Remove the oil filler lid (page 2-8).

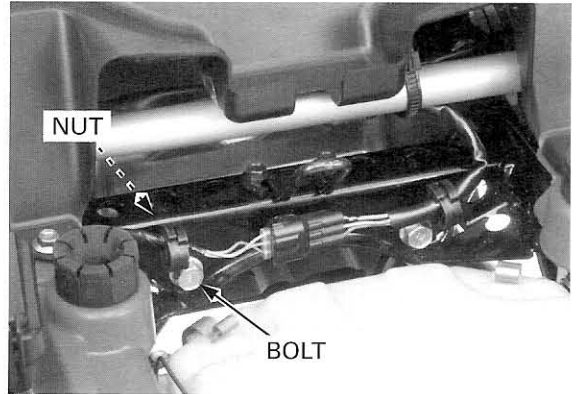
Support the lower arm with a support block.

Remove the following:

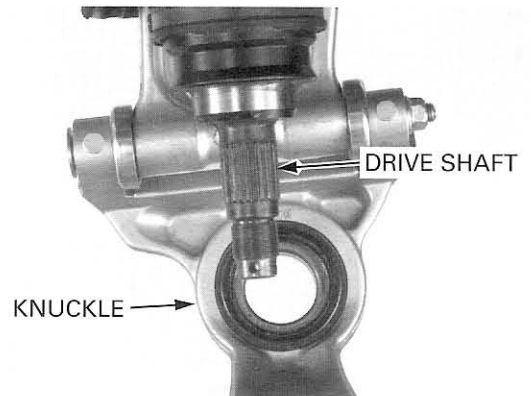
- stabilizer link nut (to disconnect the link)
- two upper arm pivot nuts and bolts



- shock absorber upper mounting nut and bolt



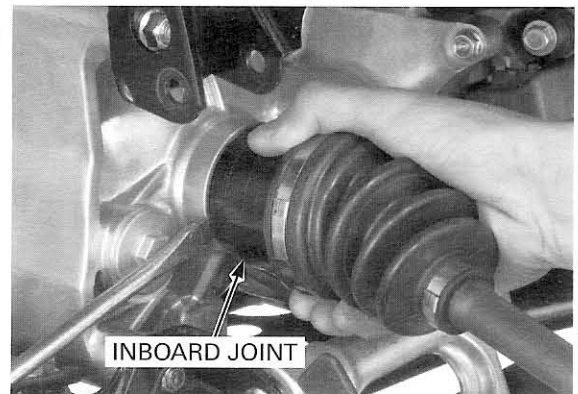
Remove the shock absorber and upper arm off the frame, and pivot the knuckle outward to release it from the drive shaft.



To prevent damage to the gear case oil seal, hold the inboard joint horizontal until the drive shaft is clear of the gear case.

Hold the inboard joint of the drive shaft and tug firmly to force the stopper ring at the drive shaft end past the groove while prying with a screwdriver.

Remove the stopper ring.



REAR DRIVING MECHANISM

DISASSEMBLY/INSPECTION

Check the boots for cuts or other damage.
Check the drive shaft joints for excessive play or noise by moving the joints in a circular direction.
If the outboard joint seems to be worn or damaged, the drive shaft must be replaced.

NOTE:

- To replace the outboard boot, first remove the inboard boot as described in the following steps. Then remove the bands and outboard boot from the inboard end of the shaft.
- The outboard joint cannot be disassembled.

Replace the band with new ones whenever removing them.

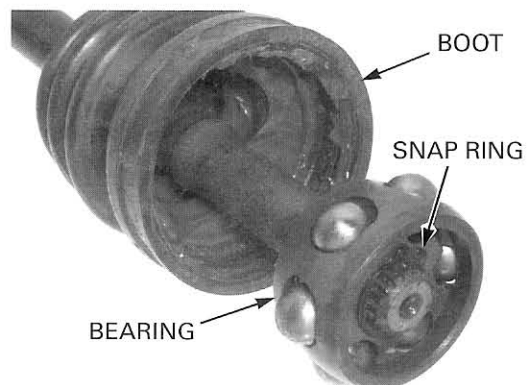
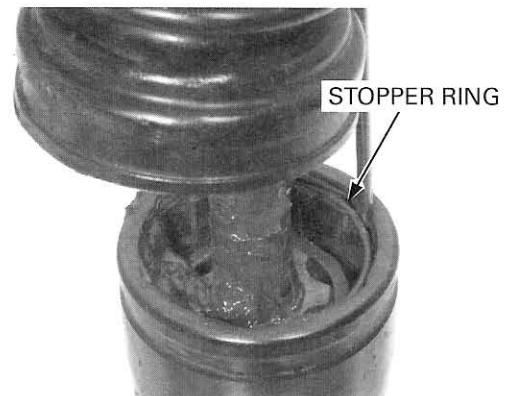
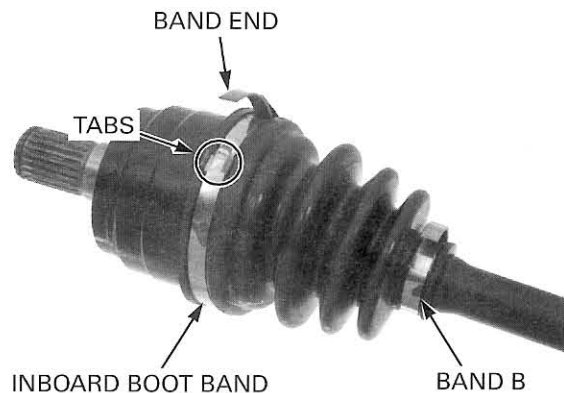
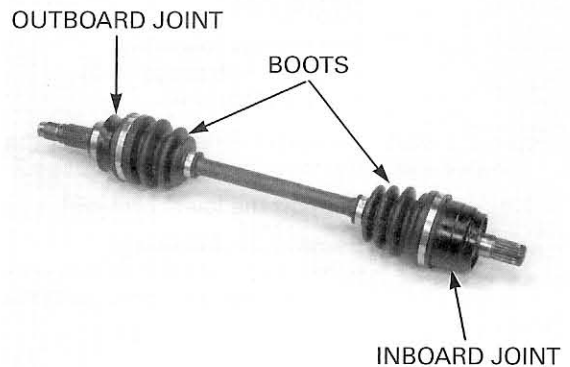
Bend up the lock tabs and raise the band ends to loosen the boot bands on the inboard side.
Remove the inboard boot band.

Remove the boot from the inboard joint.

Remove the following:

- stopper ring
- inboard joint

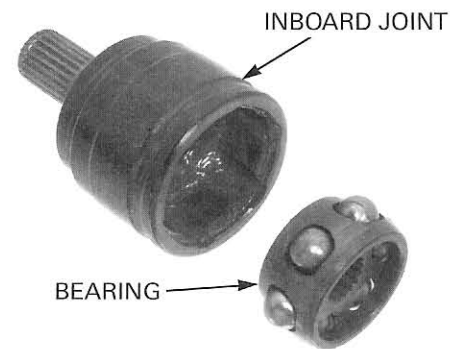
- snap ring
- bearing
- inboard boot
- boot band B



Replace their components as an assembly.

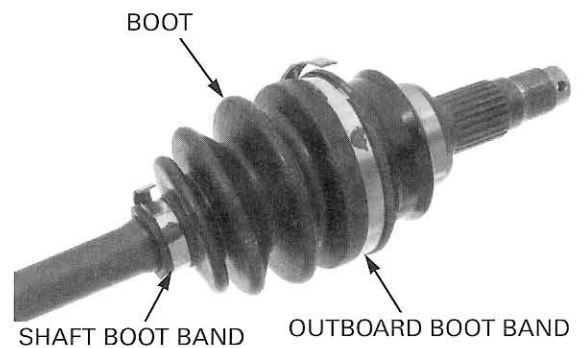
Check the following for wear or damage:

- bearing cage
- race
- steel balls
- inboard joint

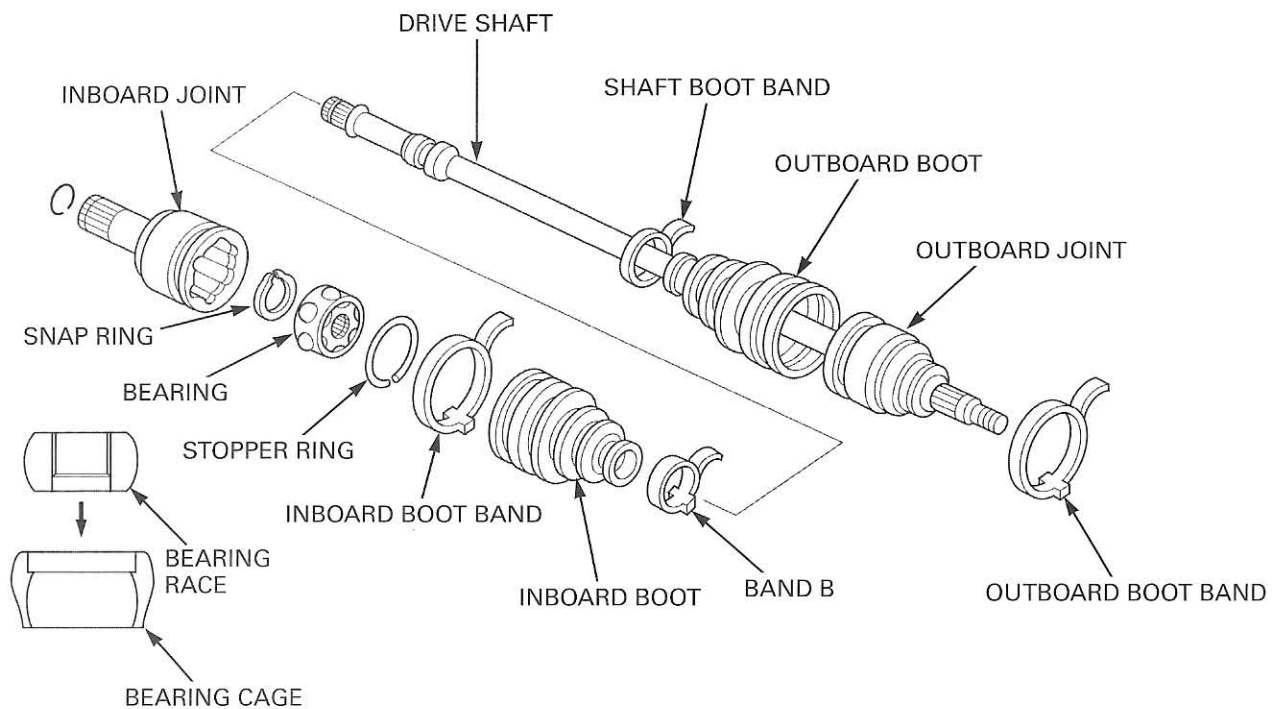


Remove the following:

- shaft boot band
- outboard boot band
- outboard boot

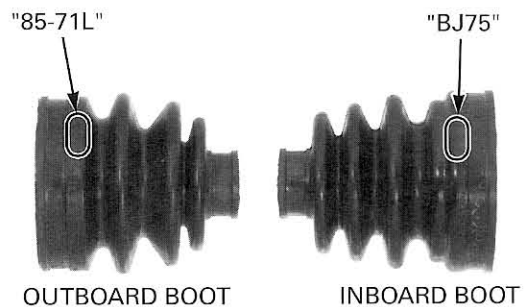


ASSEMBLY

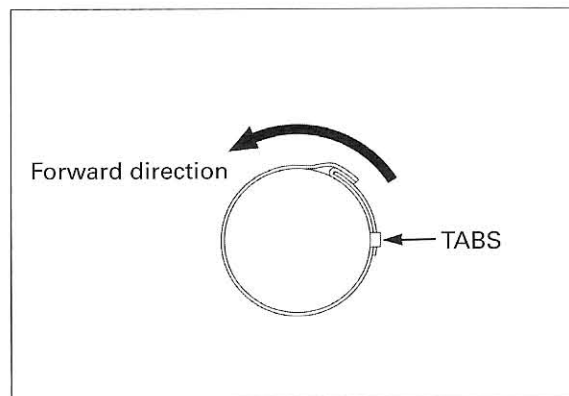


REAR DRIVING MECHANISM

Each boot has an identification mark; "85-71L" for the outboard and "BJ75" for inboard.



Note the installation direction of the boot bands.



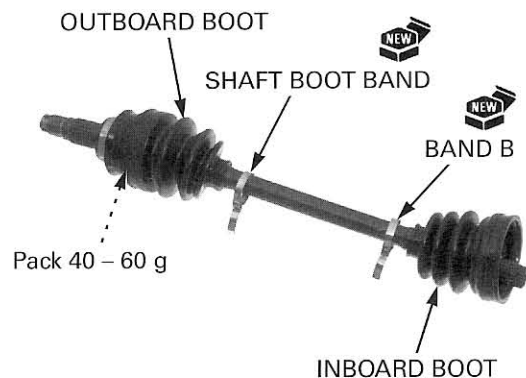
Pack the outboard joint with 45 – 65 g of specified grease.

Specified grease: NKG106 (KYODO YUSHI)

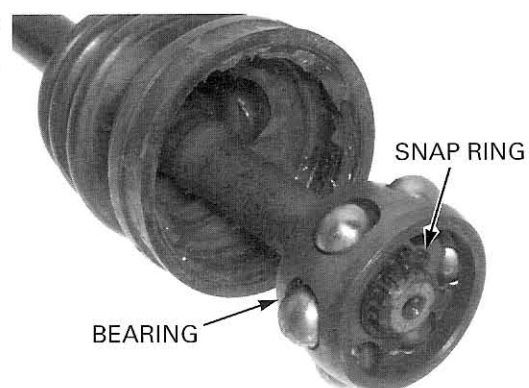
Install the following:

- outboard boot
- new shaft boot band
- new boot band B
- 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 to the bearing.

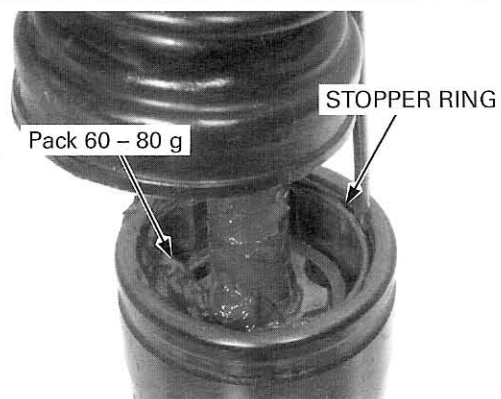


Pack the inboard joint with 60 – 80 g of specified grease.

Specified grease: NKG205 (KYODO YUSHI)

Install the inboard joint over the bearing.
Install the stopper ring into the groove in the inboard joint properly.

Install the inboard boot over the inboard joint securely.



Be sure the length of the drive shaft to the figure given below.

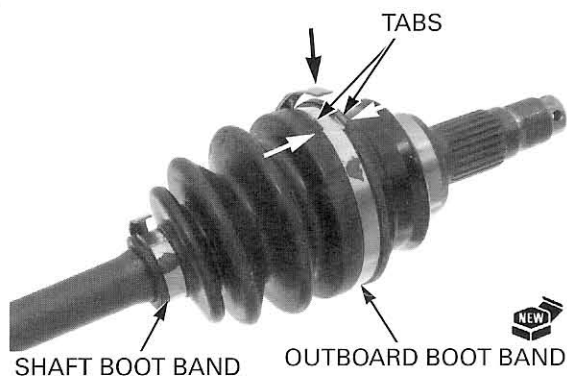
DRIVE SHAFT LENGTH: 425.2 mm (16.74 in)



See page 18-8 for
band installation
direction.

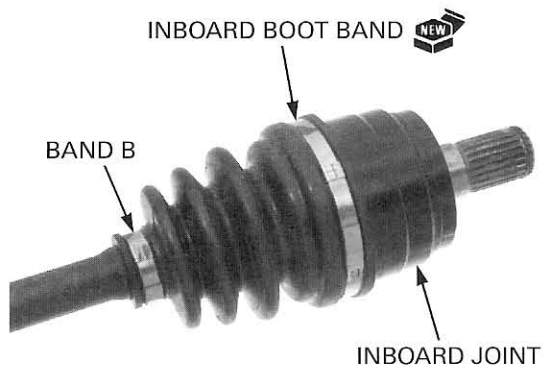
Install the shaft boot band and a new outboard boot band onto the outboard boot.

Bend down each band end and secure it with the lock tabs. Tap the lock tabs with a plastic hammer.



Install the boot band B and a new inboard boot band onto the inboard boot.

Bend down each band end and secure it with the lock tabs. Tap the lock tabs with a plastic hammer.



REAR DRIVING MECHANISM

INSTALLATION

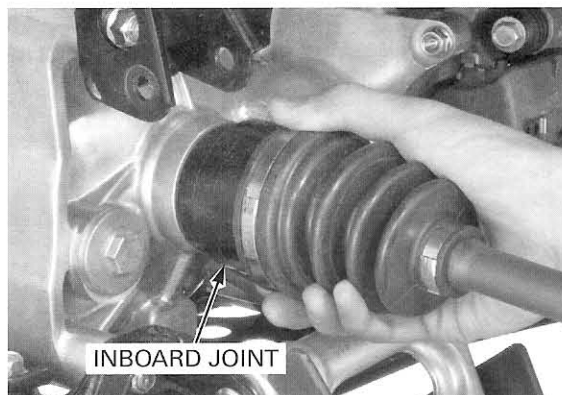
Install a new stopper ring into the groove in the inboard joint splines.



Be careful not to damage the oil seal in the gear case.

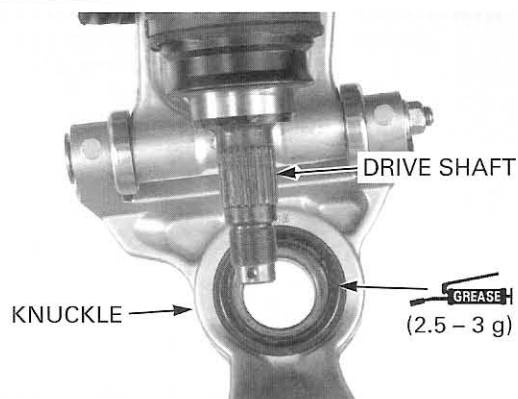
Install the drive shaft by holding the inboard joint until the stopper ring seats in the groove.

Make sure the stopper ring is seated properly by pulling on the inboard joint lightly.



Pack the lip cavities of the inner dust seal with 2.5 – 3 g of grease.

Set the upper arm and shock absorber into the frame properly to fit the knuckle over the drive shaft.

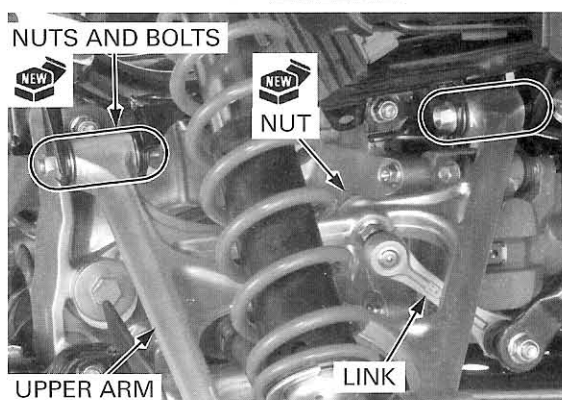


Insert the pivot bolts from the inside.

Install the upper arm pivot bolts and new nuts, and tighten them.

TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)

Connect the stabilizer link into the upper arm with a new nut and tighten it securely.



Install the shock absorber upper mounting bolt and a new nut, and tighten it securely.

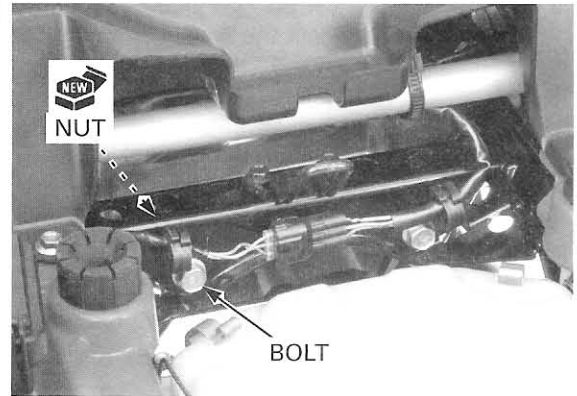
Install the following:

- wheel hub (page 15-8).

Right side: – right side cover (page 2-4)

Left side: – oil filler lid (page 2-8)

- seat (page 2-4).



FINAL DRIVE REMOVAL

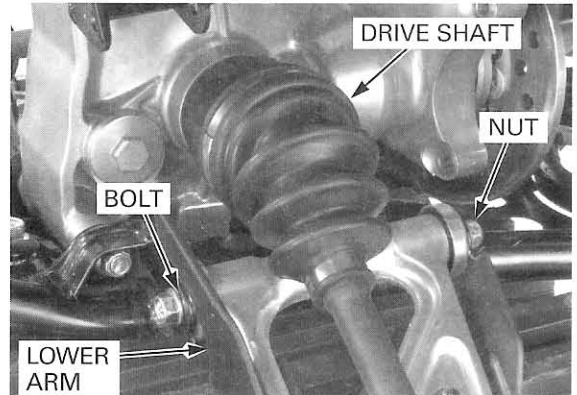
Drain the final gear case oil (page 3-15).

Remove the following:

- engine guard (page 2-16)
- rear brake caliper without disconnecting the brake hose (page 16-29)
- drive shafts (page 18-5)

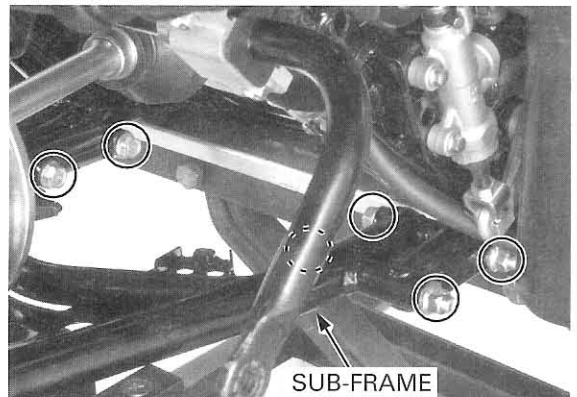
Remove the following from the frame:

- pivot nuts and bolts
- suspension arm/shock absorber assemblies

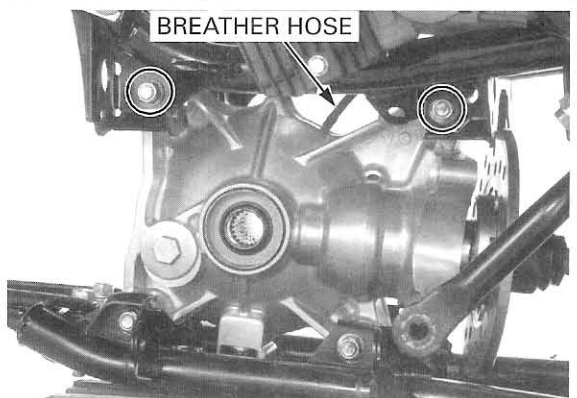


Place a floor jack or other adjustable support under the sub-frame.

- sub-frame joint nuts and bolts



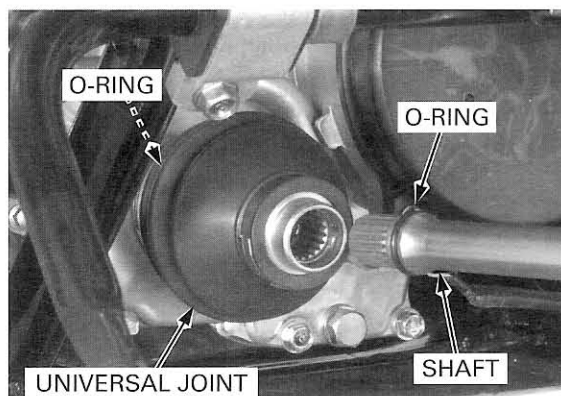
- breather hose
- upper mounting nuts and bolts



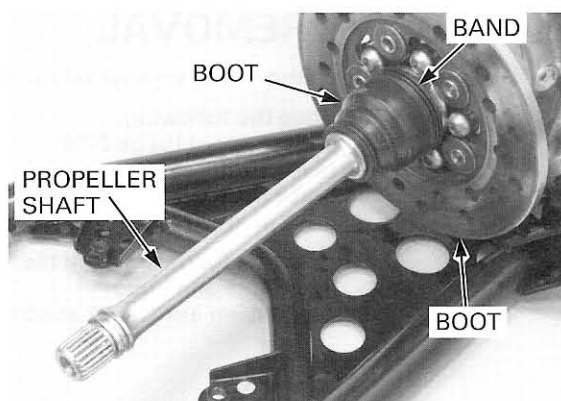
REAR DRIVING MECHANISM

Lower the jack slightly and move it rearward to disconnect the propeller shaft. Remove the final drive assembly out of the vehicle.

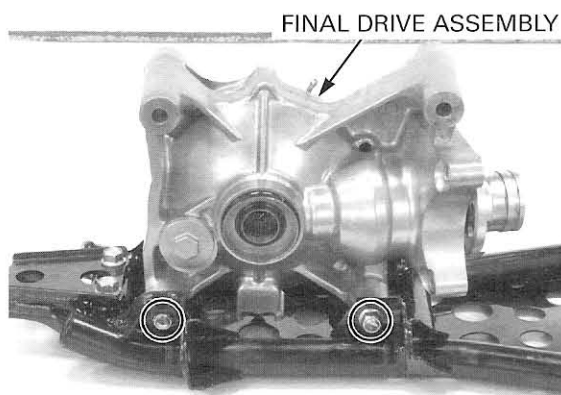
- universal joint
- O-rings (from the propeller shaft and output shaft of the engine)



- boot band
- joint boot (off the pinion joint)
- propeller shaft
- spring
- disc bolts
- brake disc



- mounting nuts and bolts
- final drive assembly

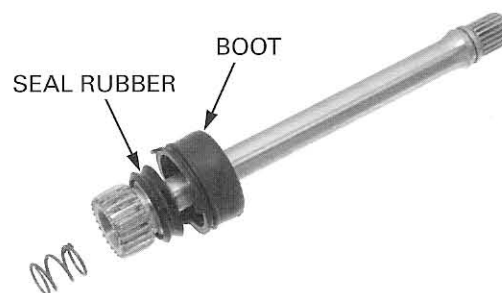


INSPECTION

PROPELLER SHAFT

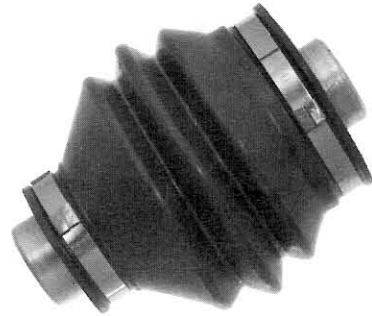
For boot and seal replacement, see page 18-25.

Check the splines for wear or damage.
If damaged, check the universal joint and output shaft also.
Check the seal rubber for fatigue or damage.
Check the boot for cuts or damage.



UNIVERSAL JOINT

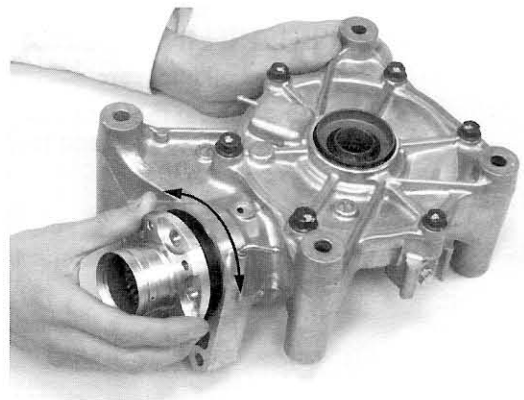
Check the boot for cuts or other damage.
Check that the joint moves smoothly without binding or noise.



FINAL DRIVE OPERATION

Turn the pinion joint and check that the gear turns 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.



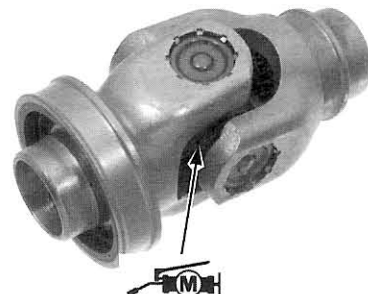
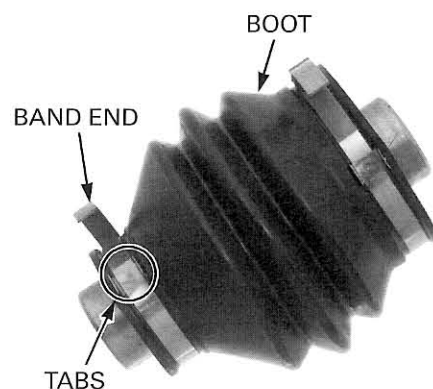
UNIVERSAL JOINT DISASSEMBLY/ASSEMBLY

Bend up the lock tabs and raise the band ends to loosen the boot bands.

Remove the joint boot.

Apply molybdenum disulfide grease to the joint bearing.

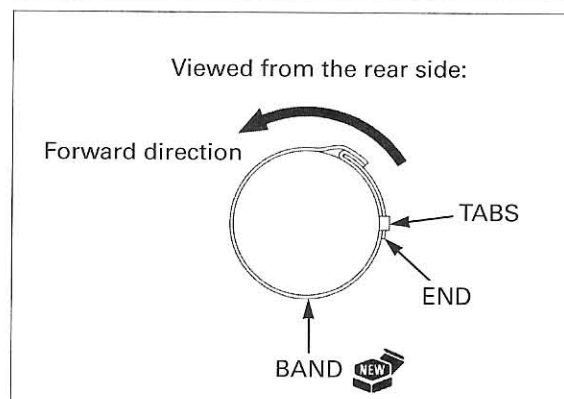
Install the boot and set it onto the universal joint properly.



REAR DRIVING MECHANISM

Install new boot bands so the band ends are facing opposite the forward direction.

Bend down each band end and secure it with the lock tabs. Tap the lock tabs with a plastic hammer.



FINAL DRIVE DISASSEMBLY/ INSPECTION

BACKLASH INSPECTION

Remove the oil filler cap.

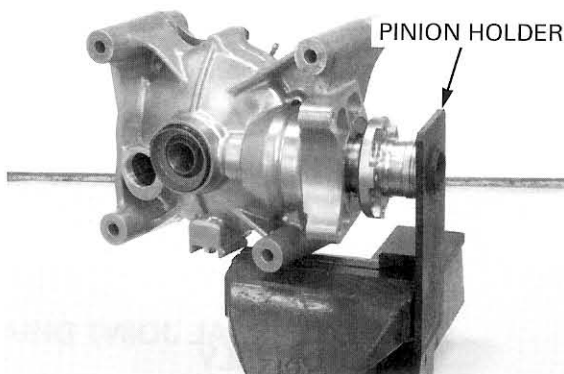
Install the special tool into the pinion joint, and set the final drive assembly and tool in a vise.

TOOL:

Pinion holder

07SMB-HM70200

Install the drive shaft into the final drive assembly and hold it.



Set a horizontal type dial indicator on the ring gear through the filler hole.

Turn the ring gear back and forth with the drive shaft to read backlash.

STANDARD: 0.05–0.25 mm (0.002–0.010 in)

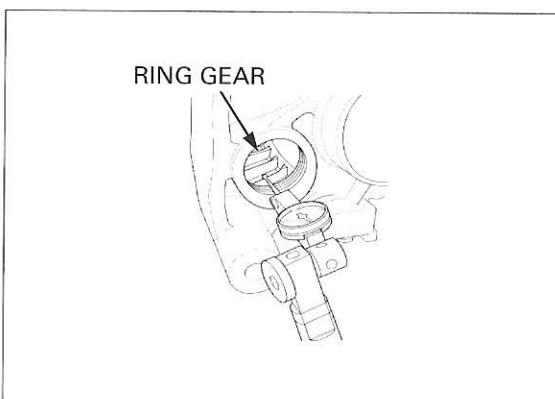
SERVICE LIMIT: 0.4 mm (0.02 in)

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.

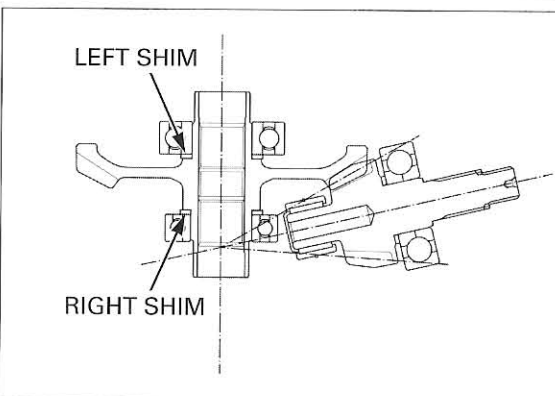
If the backlash is excessive, replace the ring gear right shim with a thinner one.

If the backlash is too small, replace the ring gear right shim with a thicker one.

Backlash is changed by about 0.06 mm (0.002 in) when thickness of the spacer is changed by 0.12 mm (0.005 in).

NOTE:

- Ten different shims (from A to J) are available in thickness increments of 0.06 mm (0.002 in).



Ring gear shims:

A: 1.64 mm (0.064 in)	F: 1.94 mm (0.076 in)
B: 1.70 mm (0.067 in)	G: 2.00 mm (0.079 in)
C: 1.76 mm (0.069 in)	H: 2.06 mm (0.081 in)
D: 1.82 mm (0.072 in)	I: 2.12 mm (0.083 in)
E: 1.88 mm (0.074 in)	J: 2.18 mm (0.086 in)

Change the left shim thickness in an opposite amount of what the right shim was changed; If the right shim was replaced with a 0.12 mm (0.005 in) thicker one, replace the left shim with a 0.12 mm (0.005 in) thinner one.

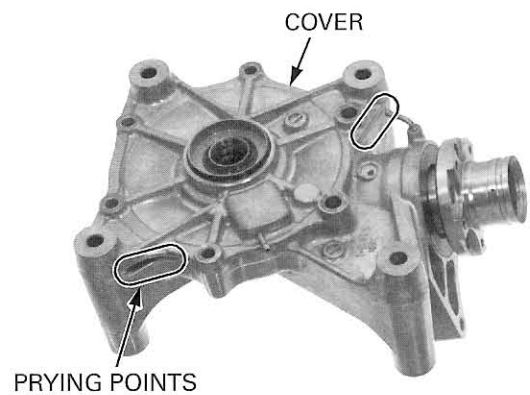
FINAL GEAR CASE DISASSEMBLY

Loosen the cover bolts in a crisscross pattern in several steps and remove them.



Pry the cover at the prying points using a screwdriver and remove the case cover.

Remove the O-ring.

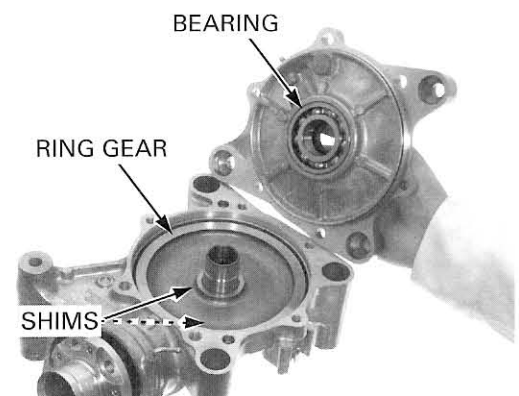


Remove the ring gear and shims.

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 and cover.

For ring gear bearing replacement, see page 18-19.



REAR DRIVING MECHANISM

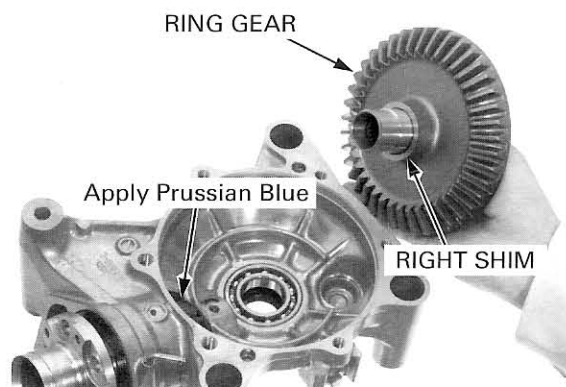
GEAR TOOTH CONTACT PATTERN CHECK

Keep dust and dirt out of the case and cover.

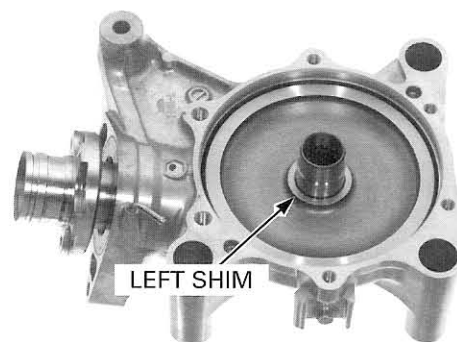
Clean the mating surfaces of the gear case and cover.

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.



Align the bolt holes and install the case cover.

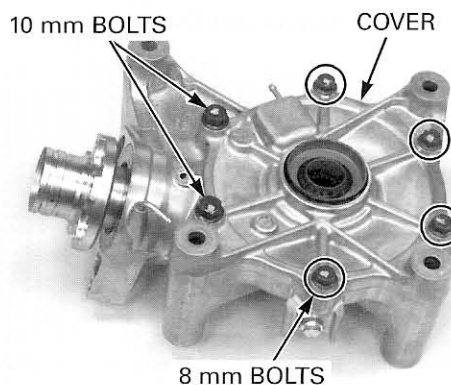
It is important to turn the pinion while tightening the bolts. If the ring gear shims is too thick, the gears will lock after only light tightening.

Install the cover 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: 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.

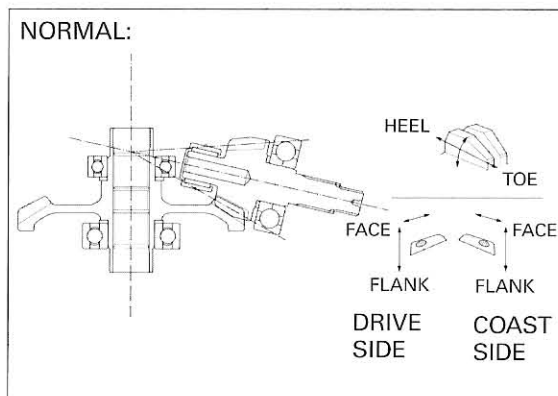
Rotate the ring gear several times in both directions of rotation.

Check the gear tooth contact pattern through the oil filler hole.

The pattern is indicated by the Prussian Blue applied to the pinion.

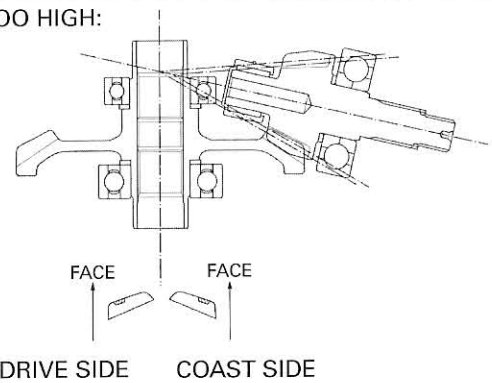
Contact is normal if the Prussian Blue is transferred to the approximate center of each tooth, but slightly to the heel side and to the flank side.

If the pattern 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.

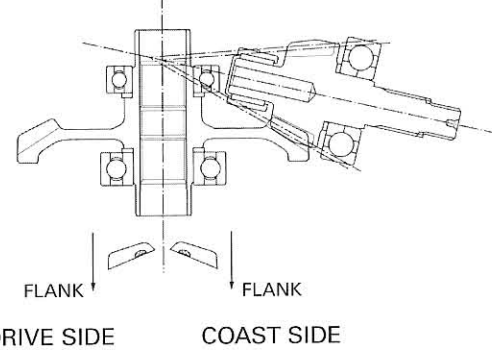
The pattern will shift about 0.5 – 1.0 mm (0.02 – 0.04 in) when the thickness of the shim is changed by 0.12 mm (0.005 in).

Pinion gear shims:

A: 1.82 mm (0.072 in)	F: 2.12 mm (0.083 in)
B: 1.88 mm (0.074 in)	G: 2.18 mm (0.086 in)
C: 1.94 mm (0.076 in)	
D: 2.00 mm (0.079 in)	
E: 2.06 mm (0.081 in)	

For pinion shim replacement, see page 18-18.

TOO LOW:



PINION GEAR REMOVAL

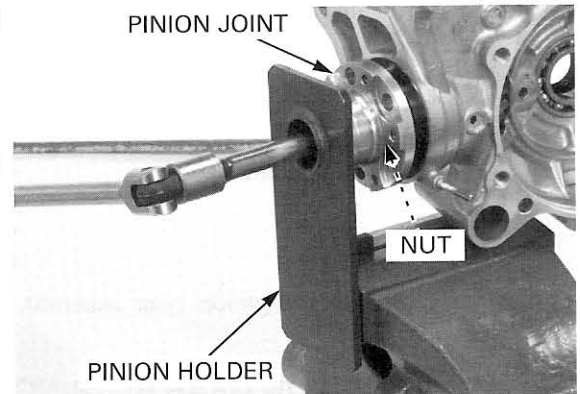
Install the special tool into the pinion joint, and set the final drive assembly and tool in a vise.

TOOL:

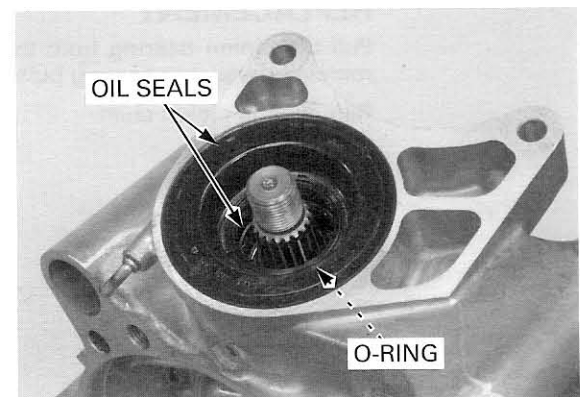
Pinion holder 07SMB-HM70200

Take care not to drop the final drive assembly from the vise.

Loosen the pinion joint nut, and remove the joint nut and pinion joint.



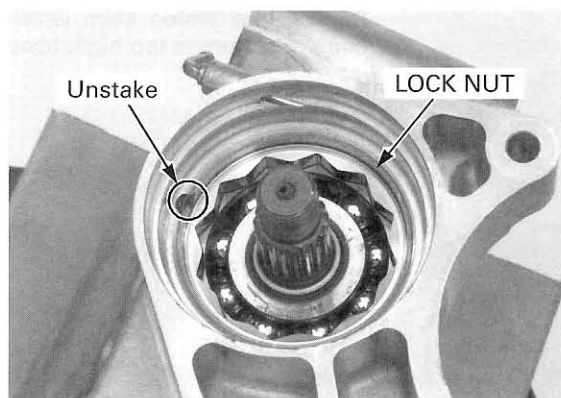
Remove the oil seals and O-ring.



REAR DRIVING MECHANISM

Be careful that metal particles do not enter the bearing and the threads of the case are not damaged.

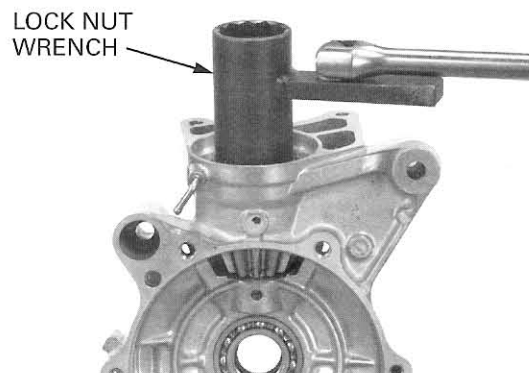
Unstake the pinion bearing lock nut with a drill or grinder.



Remove the lock nut using the special tool.

TOOL:

Lock nut wrench, 30 x 64 mm 07916-MB00002



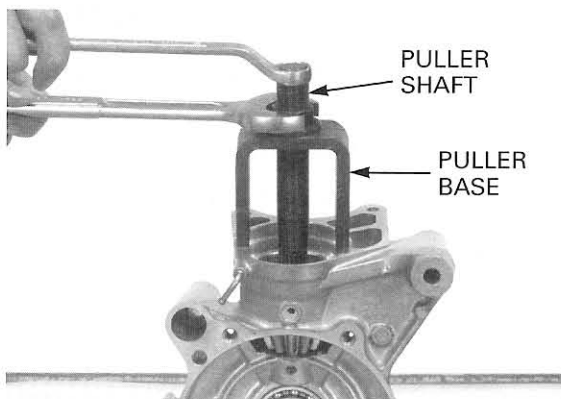
Install the special tools onto the pinion gear shaft and gear case.

TOOLS:

Pinion puller base

07HMC-MM80110 or
07HMC-MM8011A
(U.S.A. only)
07931-ME40000 or
07931-ME4010B and
07931-HB3020A
(U.S.A. only)

Puller shaft

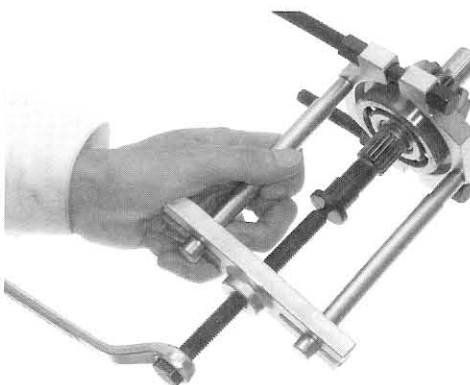


Pull the pinion gear assembly out from the gear case.

PINION GEAR BEARING/SHIM REPLACEMENT

Pull the pinion bearing from the shaft with a commercially available bearing puller.

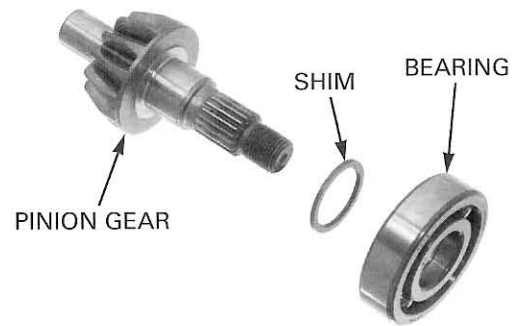
Remove the pinion shim.



Install the shim and bearing onto the pinion gear.

NOTE:

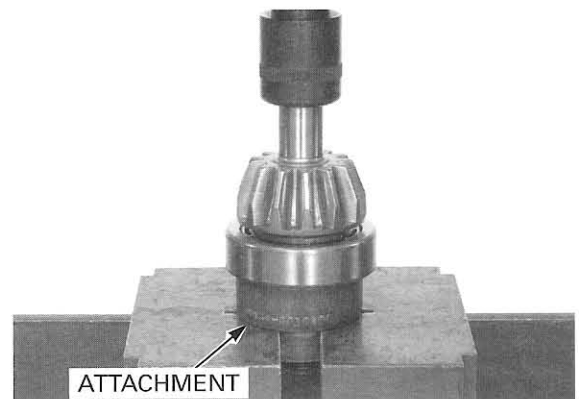
- When the gear set, ring gear bearing, and/or gear case has been replaced, use a 2.00 mm (0.79 in) thick shim for initial reference.



Press the pinion gear in the bearing until it is seated by supporting the bearing with the special tool.

TOOL:

Attachment, 25 mm I.D. 07746-0030200

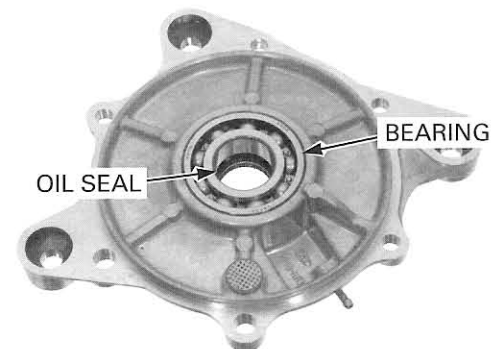


CASE BEARING REPLACEMENT

RING GEAR BEARING

Remove the oil seals from the case and cover.

Drive the bearings out of the case and cover.



Drive each new bearing using the special tools.

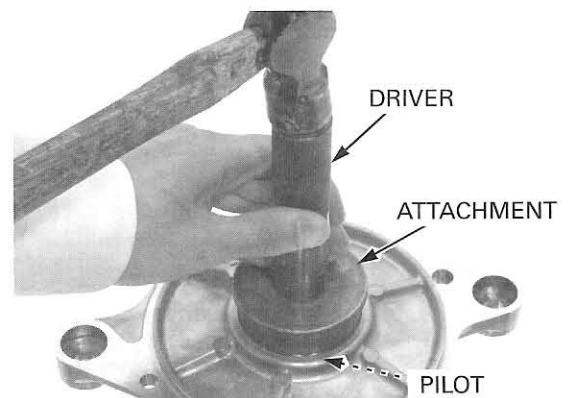
TOOLS:

Case cover:

Driver	07749-0010000
Attachment, 62 x 68 mm	07746-0010500
Pilot, 30 mm	07746-0040700

Gear case:

Driver	07749-0010000
Attachment, 52 x 55 mm	07746-0010500
Pilot, 30 mm	07746-0040700

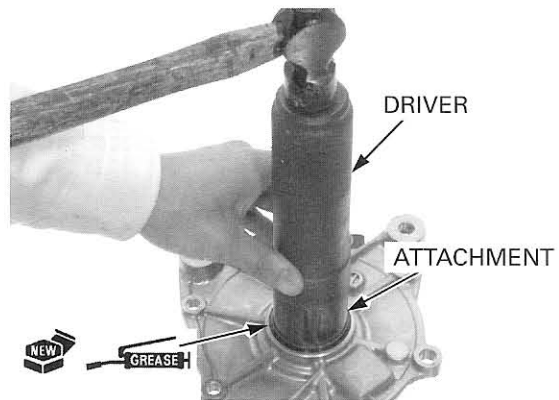


REAR DRIVING MECHANISM

Apply grease to new oil seal lips.
Install each oil seal with the metal side facing out so the exposed height is 4 mm (0.16 in) evenly (the rubber edge flush with the cover).

TOOLS:

Attachment, 35 mm I.D. 07746-0030400
Driver, 40 mm I.D. 07746-0030100



PINION NEEDLE BEARING

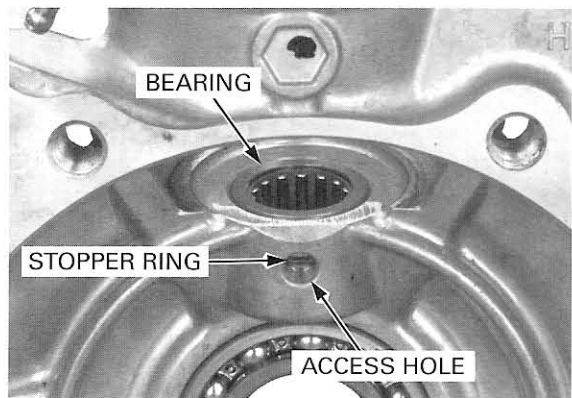
Remove the stopper ring by rotating it until the end of the stopper ring appears in the access hole.
Strike gently near the end of the ring with a punch to bend the end upward.
Grasp the end of the ring with needle-nosed pliers and pull the stopper ring out through the access hole.

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, 17 mm 07936-3710300
Remover handle 07936-3710100
Remover weight 07741-0010201 or 07936-371020A or 07936-3710200 (U.S.A. only)



Remove the bearing cage and bearings from the inside of the pinion bearing to allow the special tool to grip the bearing.

Install the stopper ring into the groove in the bearing.

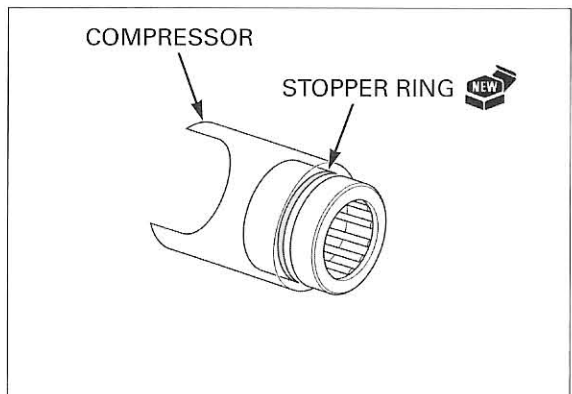
Install the bearing into the special tool until the bearing is flush with the end of the tool.

TOOL:

Bearing clip compressor, 28 mm 070ME-HN80200

Freeze the pinion bearing with the tool on ice or in a freezer.

Heat the gear case to 80°C (176°F).



Tape the clip compressor to the driver for bearing installation.

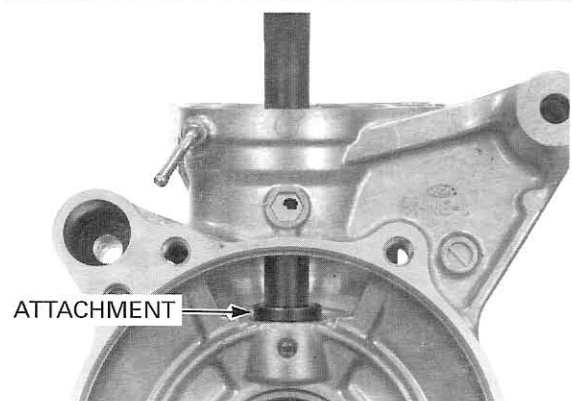
Drive the pinion bearing into the gear case using the special tools as follows.

TOOLS:

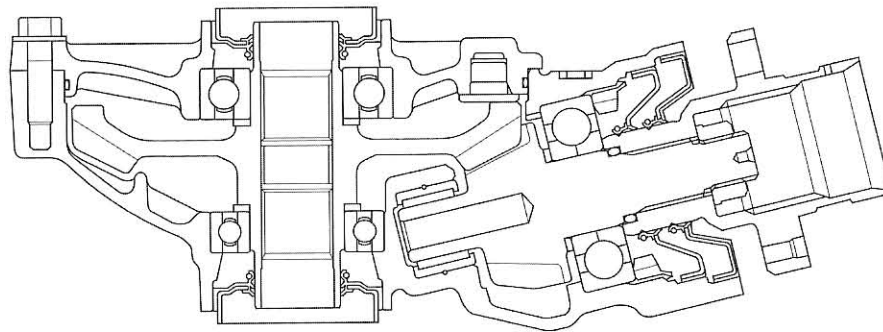
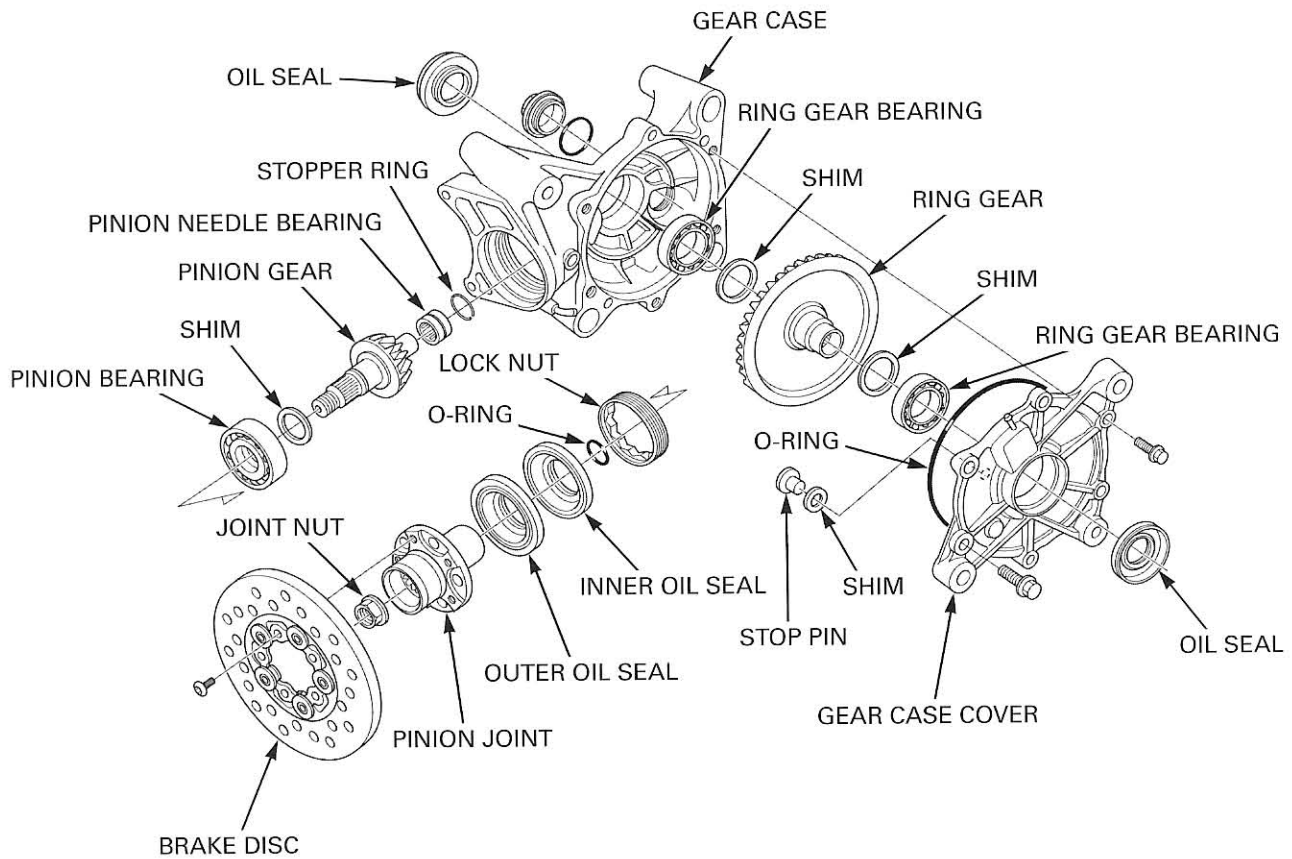
Puller attachment 07YMC-GCS0100 (not available in U.S.A.) or 07949-3710001
Driver 07746-0010700
Attachment, 24 x 26 mm 07746-0040400
Pilot, 17 mm 07746-0040400

Only strike the driver once. If you strike it more than once, the stopper ring may slip out of the groove. If this happens, remove the ring and bearing, and install a new one again.

Make sure that the stopper ring is securely set in the groove of the gear case.



FINAL DRIVE ASSEMBLY



PINION GEAR INSTALLATION

Keep the driver centered with the bearing outer race during installation.

Drive the pinion gear assembly into the gear case.

TOOL:

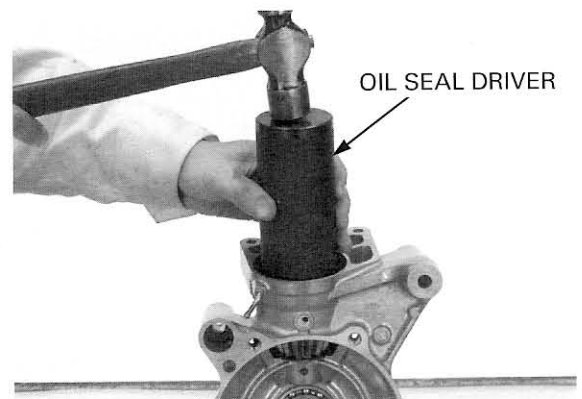
Oil seal driver

07965-KE80200 (not available in U.S.A.)

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.

U.S.A. only:

Freeze the pinion gear and bearing.
Heat the gear case to 80°C (176°F).
Drop the cold pinion assembly into the warm gear case.



REAR DRIVING MECHANISM

Install a new lock nut and tighten it using the special tool.

TOOL:

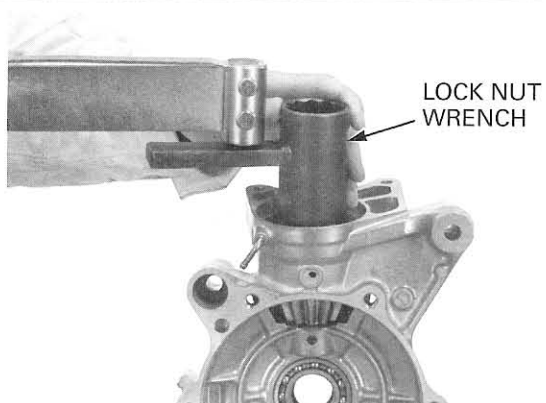
Lock nut wrench, 30 x 64 mm 07916-MB00002

Refer to torque wrench reading information on page 18-3 "Service Information".

TORQUE:

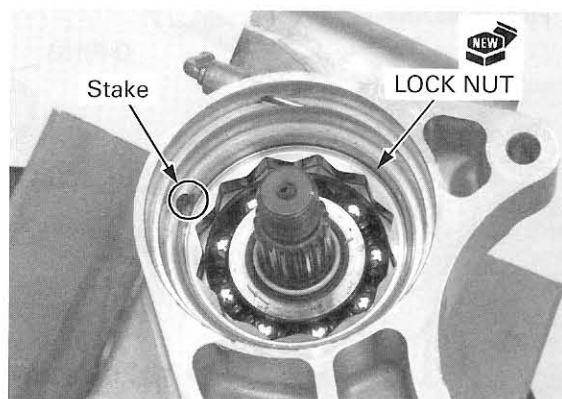
Actual: 98 N·m (10.0 kgf·m, 72 lbf·ft)

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.



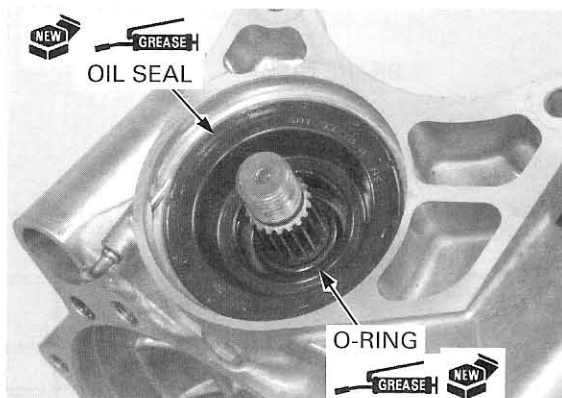
Coat a new O-ring with grease and install it onto the pinion gear shaft.

Apply grease to the lips of new oil seals
Install the inner oil seal (70 mm O.D.) into the gear case until it is flush with the stepped edge.

TOOL:

Driver attachment

07LAD-PW50500



Install the outer oil seal (75 mm O.D.) into the gear case until it is flush with the gear case outer surface, using the same tool.



Clean the threads of the pinion gear shaft thoroughly.

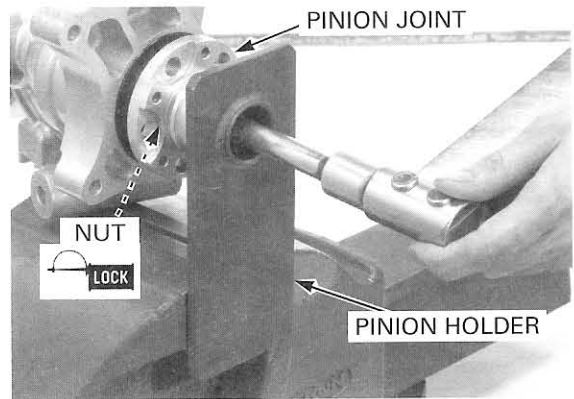
Install the pinion joint onto the pinion gear shaft, being careful not to damage the oil seal lips.

Apply locking agent to the threads of the pinion joint nut and screw it in by hand as far as it goes. Hold the pinion joint with the special tool and tighten the joint nut.

TOOL:

Pinion holder 07SMB-HM70200

TORQUE: 108 N·m (11.0 kgf·m, 80 lbf·ft)

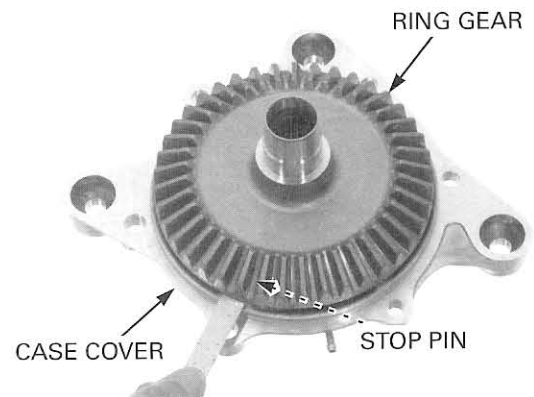


RING GEAR CLEARANCE INSPECTION

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.

If the clearance is not within specification, heat the case cover to approximately 80°C (176°F) and remove the stop pin by tapping the cover.

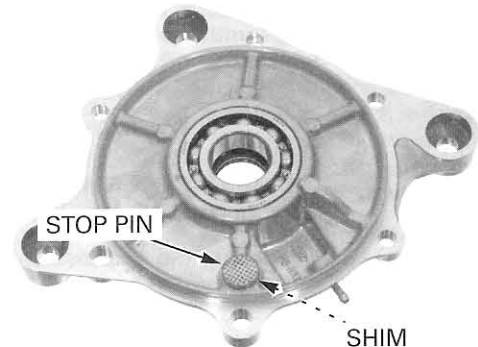
Install a stop pin shim to obtain the correct clearance.

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

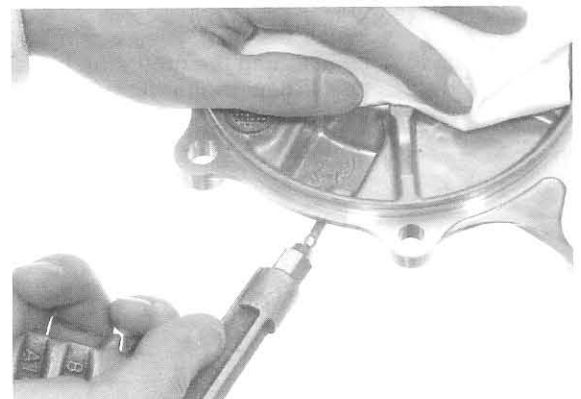
NOTE:

- When the gear set, bearing, and/or gear case has been replaced, check the tooth contact pattern check (page 18-16) and gear backlash (page 18-14).

Keep dust and dirt out of the case and cover.

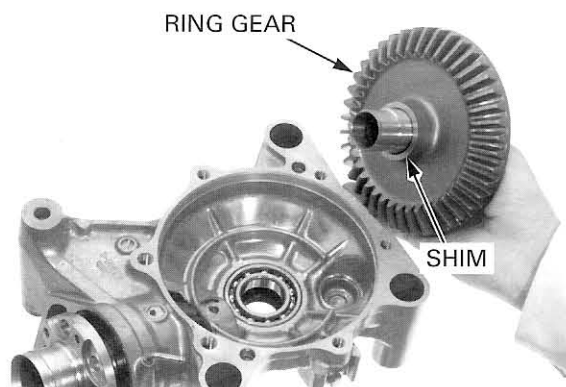
Clean the mating surface of the gear case and cover, being careful not to damage them.

Blow compressed air through the breather holes in the gear case and cover.



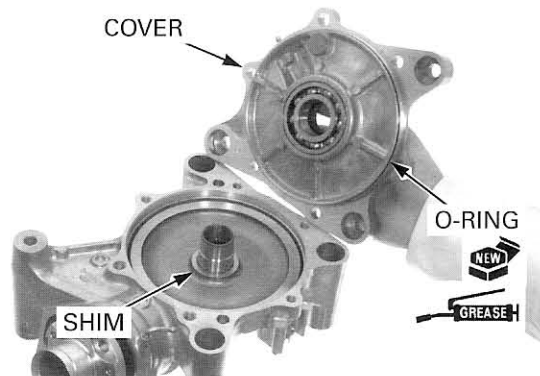
REAR DRIVING MECHANISM

Install the proper ring gear shims onto the ring gear and install them into the gear case.



Coat a new O-ring with grease and install it into the cover groove.

Install the case 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.

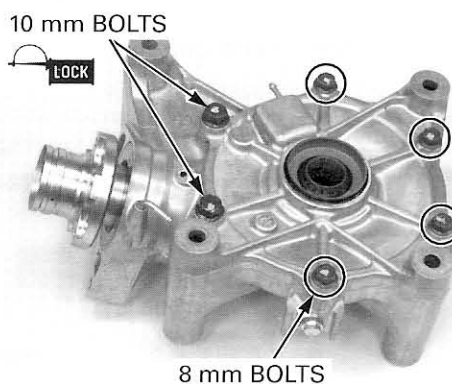
Install the cover bolts and tighten them in several steps until the cover evenly touches the case. Then, while rotating the pinion gear, tighten the bolts to the specified torque in a crisscross pattern in several steps.

TORQUE:

10 mm bolt: 49 N·m (5.0 kgf·m, 36 lbf·ft)

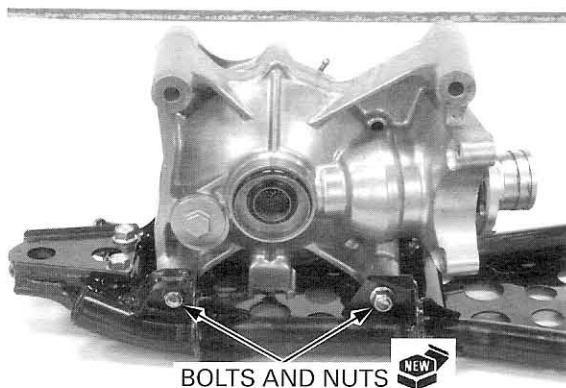
8 mm bolt: 25 N·m (2.6 kgf·m, 19 lbf·ft)

Check that the gear assembly turns smoothly without binding.



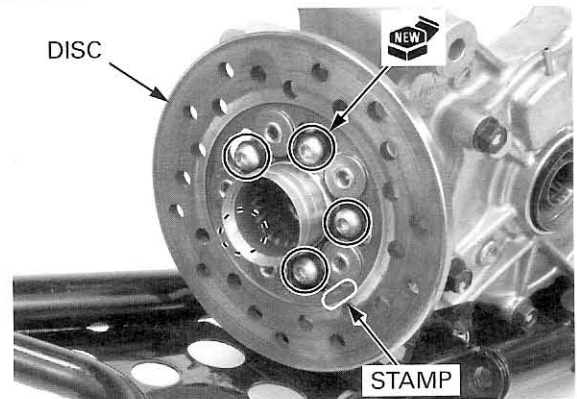
FINAL DRIVE INSTALLATION

Install the final drive assembly onto the sub-frame by inserting the mounting bolts from the left side. Install new mounting nuts but do not tighten them yet.



Install the brake disc with the stamp facing the engine side. Install new disc bolts and tighten them in a crisscross pattern in several steps.

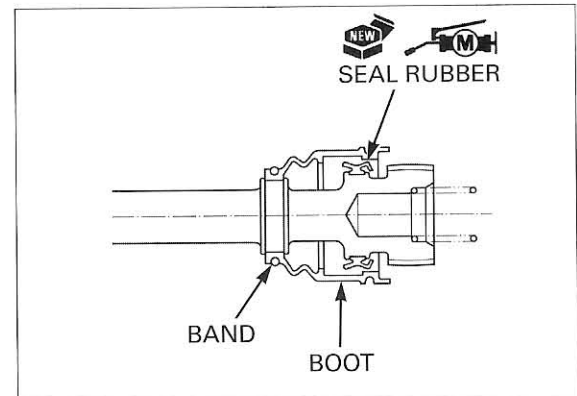
TORQUE: 20 N·m (2.0 kgf·m, 14 lbf·ft)



Install a new seal rubber onto the seal groove in the propeller shaft in the direction as shown.

Install the joint boot onto the boot groove and the boot band into the band groove in the boot.

Apply molybdenum disulfide grease to the seal rubber outer surface.

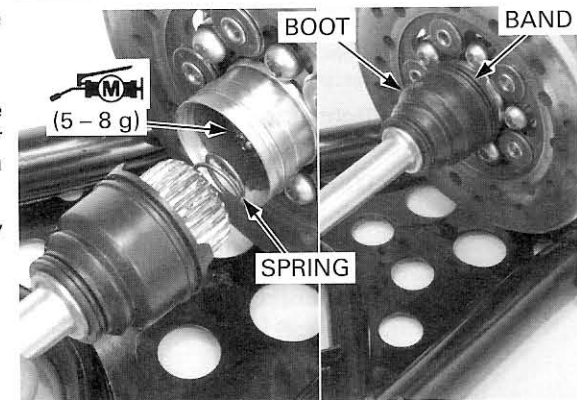


Apply 5 – 8 g of molybdenum disulfide grease to the pinion joint splines.

Install the spring into the propeller shaft.

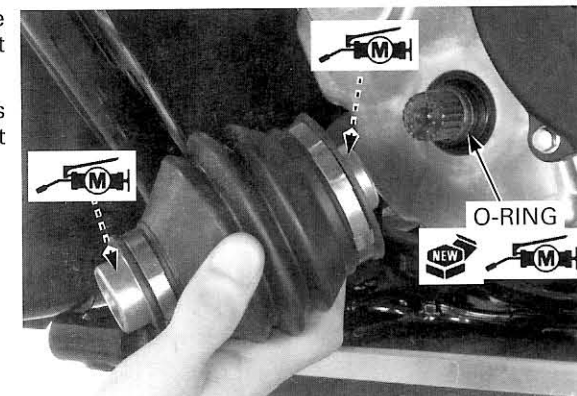
Set the propeller shaft into the pinion joint while compressing the spring, then install the boot over the pinion joint groove securely and secure it with the boot band.

Be sure the propeller shaft is installed properly by pulling on the shaft lightly.



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 splines of the both sides in the universal joint and install it onto the output shaft until it is fully seated.

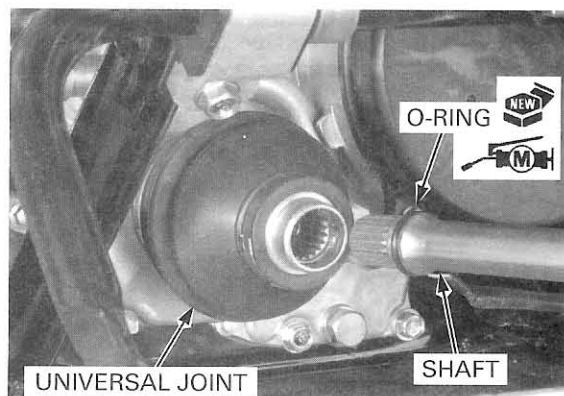


REAR DRIVING MECHANISM

Coat a new O-ring with molybdenum disulfide grease and install it into the propeller shaft groove.

Put the final drive assembly on a floor jack or other adjustable support and place the assembly under the main frame.

While adjusting the jack height, move the final drive assembly forward and connect the propeller shaft into the universal joint.

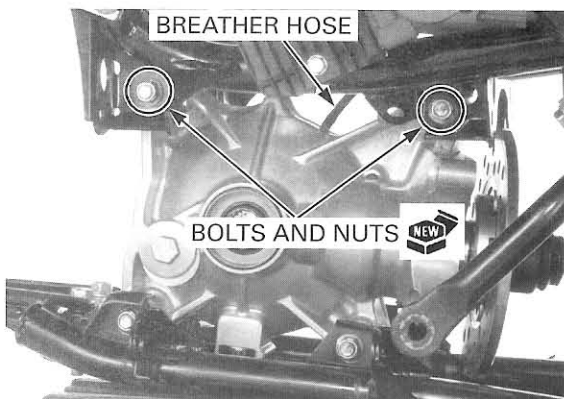


Be careful not to disconnect the propeller shaft and universal joint.

Set the final drive assembly into the main frame and seat the propeller shaft securely to align the bolt holes, then insert the mounting bolts from the left side.

Install new mounting nuts but do not tighten them yet.

Route the breather hoses properly (page 1-21) and connect them.



Insert the sub-frame joint bolt bolts from the inside. Install new joint nuts.

Tighten the four mounting nuts and joint nuts alternately.

TORQUE:

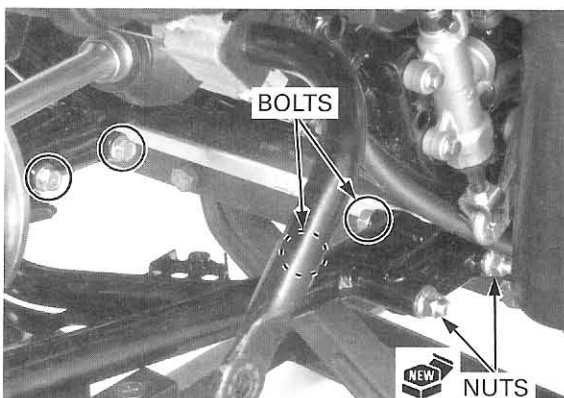
Joint nut: 34 N·m (3.5 kgf·m, 25 lbf·ft)

Mounting bolt (main frame):

34 N·m (3.5 kgf·m, 25 lbf·ft)

Mounting bolt (sub-frame):

39 N·m (4.0 kgf·m, 29 lbf·ft)



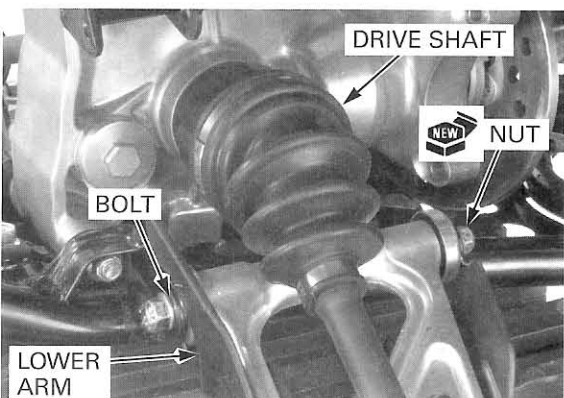
Install each lower arm of the suspension arm/shock absorber assemblies into the frame and insert each pivot bolt from the rear side. Install new pivot nuts and tighten them.

TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)

Install the following:

- drive shafts (page 18-10)
- brake caliper (page 16-34)
- engine guard (page 2-16)

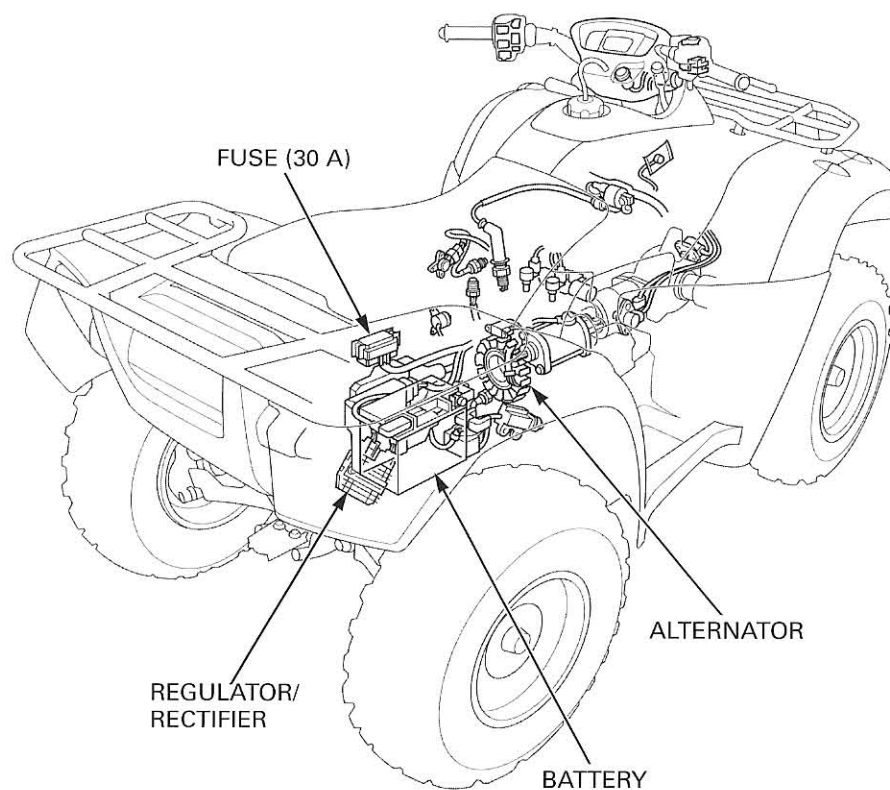
Fill the gear case with the recommended oil (page 3-15).



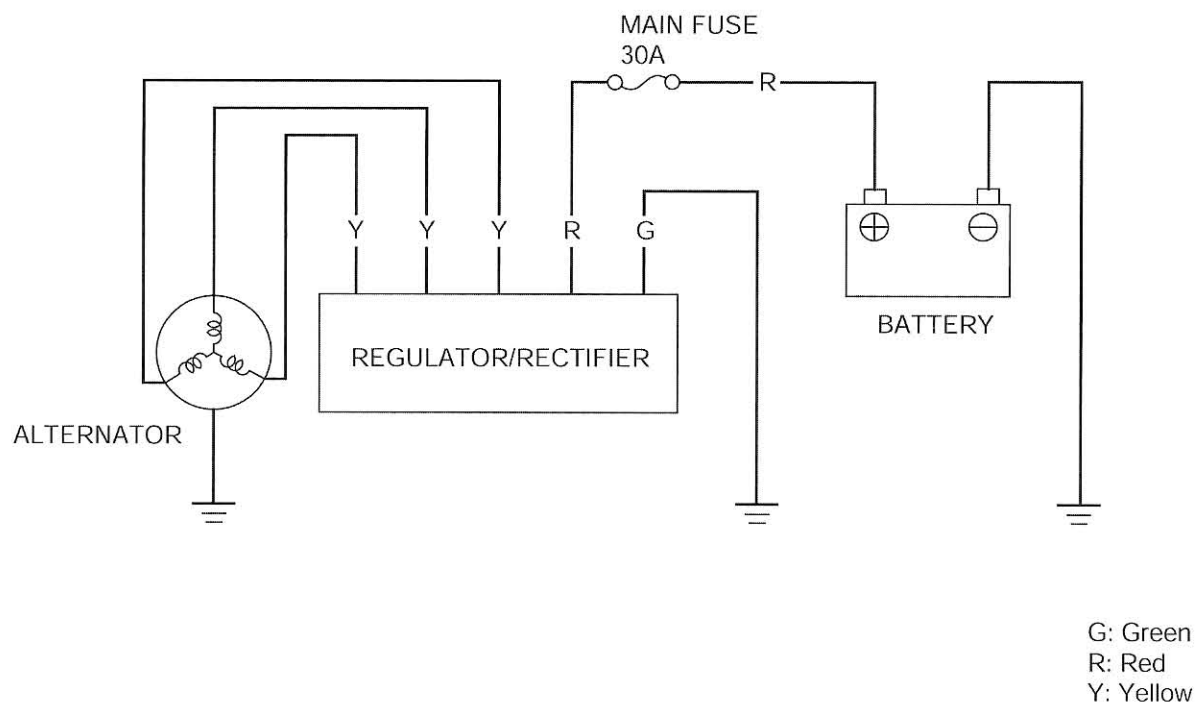
19. BATTERY/CHARGING SYSTEM

COMPONENT LOCATION	19-2	BATTERY.....	19-5
SYSTEM DIAGRAM.....	19-2	CHARGING SYSTEM INSPECTION.....	19-7
SERVICE INFORMATION	19-3	ALTERNATOR CHARGING COIL	19-8
TROUBLESHOOTING	19-4	REGULATOR/RECTIFIER	19-9

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.
- 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 19-4).
- See page 10-7 for alternator removal/installation.

BATTERY CHARGING

- This model comes with a maintenance free (MF) battery. Remember the following about MF batteries:
 - Use only the electrolyte that comes with the battery
 - Use all of the electrolyte
 - Seal the battery properly
 - Never open the seals again
- For battery charging, do not exceed the charging current and time specified on the battery. Using excessive current or extending the charging time may damage the battery.

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 **BM-210-AH, BM-210 or BATTERY MATE or equivalent**

SPECIFICATIONS

ITEM			SPECIFICATIONS
Battery	Capacity		12V – 12 Ah
	Current leakage		1 mA maximum
	Voltage (20°C/68°F)	Fully charged	13.0 – 13.2 V
		Needs charging	Below 12.3 V
	Charging current	Normal	1.4 A/5 – 10 h
		Quick	6.0 A/1.0 h
Alternator	Capacity		360 kW/5,000 rpm
	Charging coil resistance (20°C/68°F)		0.1 – 1.0 Ω

TROUBLESHOOTING

BATTERY IS DAMAGED OR WEAK

1. Battery Test

Remove the battery (page 19-5).

Check the battery condition using the recommended battery tester.

RECOMMENDED BATTERY TESTER:

BM-210-AH, BM-210 or BATTERY MATE or equivalent

Is the battery in good condition?

No – Faulty battery

YES – GO TO STEP 2.

2. Current Leakage Test

Install the battery (page 19-5).

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. 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 – Faulty charging coil

NO – GO TO STEP 5.

5. Charging Voltage Inspection

Measure and record the battery voltage using a digital multimeter (page 19-5).

Start the engine.

Measure the charging voltage (page 19-8).

Compare the measurements to the results of the following calculation.

STANDARD:

Measured battery Voltage < Measured charging voltage < 15.5 V

Is the measured charging voltage within the standard voltage?

YES – Faulty battery

NO – GO TO STEP 6.

6. Regulator/Rectifier System Inspection

Check the voltage and resistance at the regulator/rectifier connector (page 19-9).

Are the measurements correct?

YES – Faulty regulator/rectifier

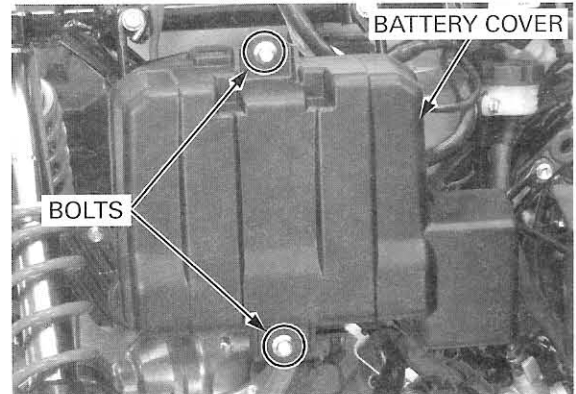
NO –

- Open circuit in related wire
- Loose or poor contacts of related terminal
- Shorted wire harness

BATTERY

REMOVAL/INSTALLATION

Remove the two bolts and the battery cover.



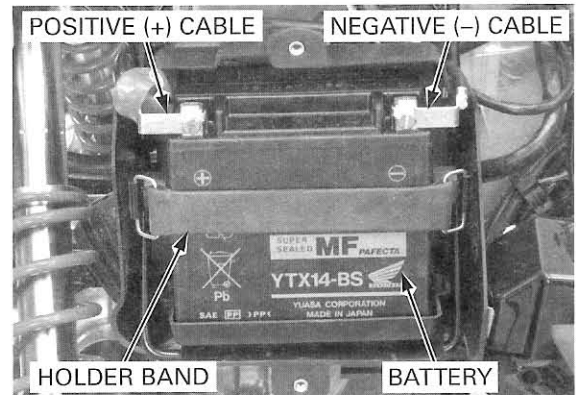
Remove the battery holder band.

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.



VOLTAGE INSPECTION

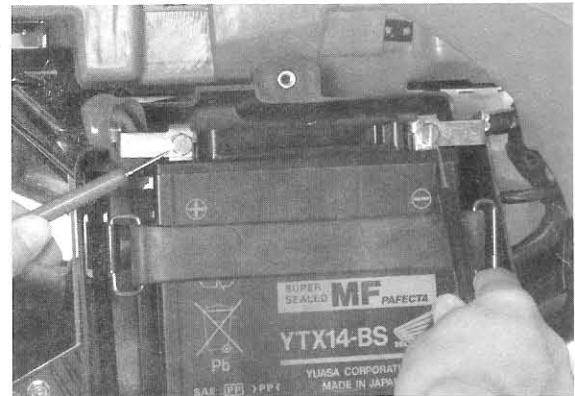
Remove the battery cover (page 19-5).

Measure the battery voltage using a commercially available digital multimeter.

VOLTAGE:

Fully charged: 13.0 – 13.2V

Under charged: Below 12.3V



BATTERY TESTING

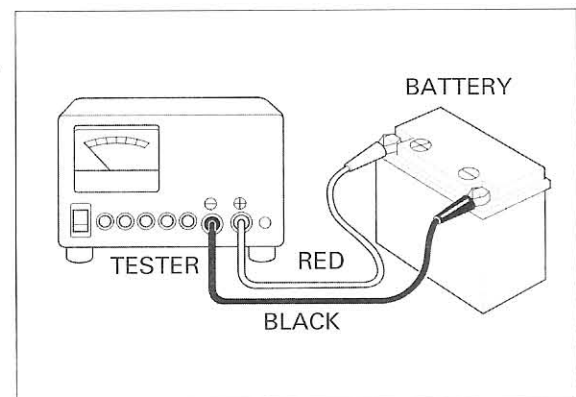
Remove the battery (page 19-5).

Securely connect the tester's positive (+) cable first, then connect the negative (-) cable.

TOOL:

Battery tester BM-210-AH, BM-210 or BATTERY MATE or equivalent

For accurate test results, be sure the tester's cables and clamps are in good working condition and that a secure connection can be made at the battery.



BATTERY/CHARGING SYSTEM

Set the temperature switch to "HIGH" or "LOW" depending on the ambient temperature.

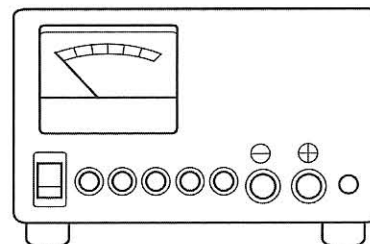
For the first check, DO NOT charge the battery before testing; test it in an "as is" condition.

Push in the appropriate test button for 3 seconds and read the condition of the battery on the meter.

NOTICE

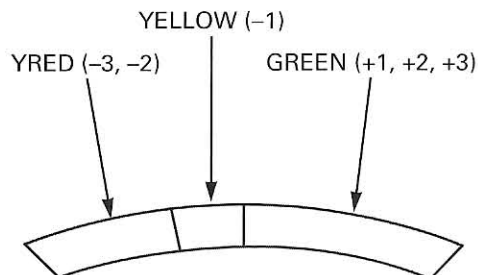
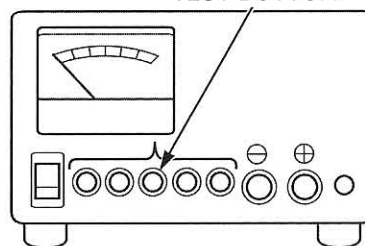
- To avoid damaging the tester, only test batteries with an amperage rating of less than 30 Ah.
- Tester damage can result from overheating when:
 - The test button is pushed in for more than 3 seconds.
 - The tester is used without being allowed to cool for at least 1 minute when testing more than one battery.
 - More than ten consecutive tests are performed without allowing at least a 30-minute cool-down period.

The result of a test on the meter scale is relative to the amp. hour rating of the battery. Any battery reading in the green zone is OK. Batteries should only be charged if they register in the YELLOW or RED zone.



HIGH: 15°C (60°F) or higher
LOW: 15°C (60°F) or lower

TEST BUTTON



BATTERY CHARGING

Remove the battery (page 19-5).

NOTE:

- Make sure the area around the charger is well ventilated, clear of flammable materials, and free from heat, humidity, water and dust.
- Clean the battery terminals and position the battery as far away from the charger as the leads will permit.
- Do not place batteries below the charger – gases from the battery may corrode and damage the charger.
- Do not place batteries on top of the charger. Be sure the air vents are not blocked.

1. Turn the "POWER" switch to "OFF".

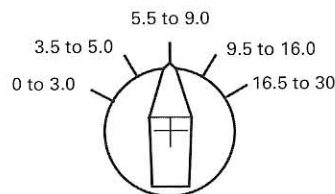
TOOL:

Christie battery charger MC1012/2 (U.S.A. only)

Turn power ON/OFF at the charger, not at the battery terminal.

- Set the "BATTERY AMP. HR. SELECTOR SWITCH" for the size of the battery being charged.

BATTERY AMP. HR. SELECTOR SWITCH

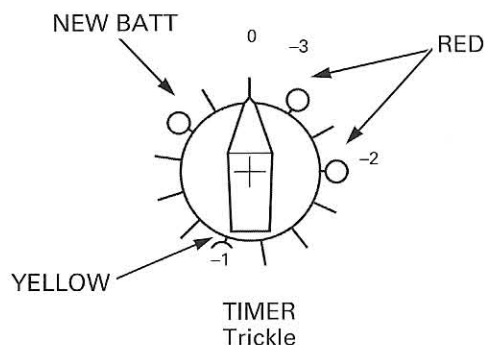


Set the appropriate amp. hour rating.

- Set the "TIMER" to the position indicated by the Honda Battery Tester; RED -3, RED -2 or YELLOW -1. If you are charging a new battery, set the switch to the NEW BATT position.
- Attach the clamps to the battery terminals: red to positive, black to negative.

Connect the battery cables only when the "POWER" switch is turned to "OFF".

Connecting the cables with the POWER switch turned to "ON" can produce a spark which could ignite or explode the battery.



- Turn the "POWER" switch to "ON".

The charger will automatically switch to the "Trickle" mode after the set charging time has elapsed.

- When the timer reaches the "Trickle" position, the charging cycle is complete. Turn the "POWER" switch to "OFF" and disconnect the clamps.
- Let the battery cool for at least 10 minutes or until gassing subsides after charging.
- Retest the battery using the Honda Battery Tester and recharge if necessary using the above steps.

CHARGING SYSTEM INSPECTION

CURRENT LEAKAGE INSPECTION

Remove the battery cover (page 19-5).

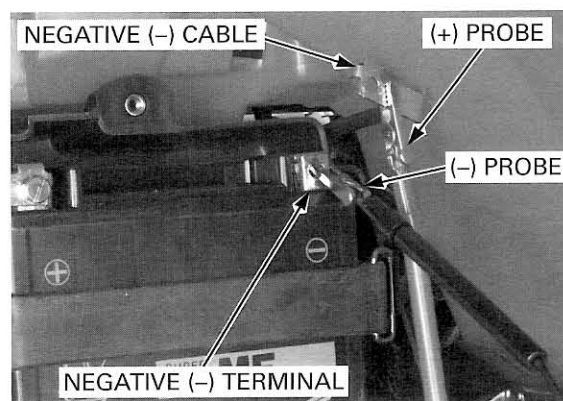
Turn the ignition switch to "OFF" and disconnect the negative (-) cable from the battery.

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



BATTERY/CHARGING SYSTEM

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 battery cover (page 19-5).

Be sure the battery is in good condition before performing this test.

Warm up the engine to normal operating temperature.

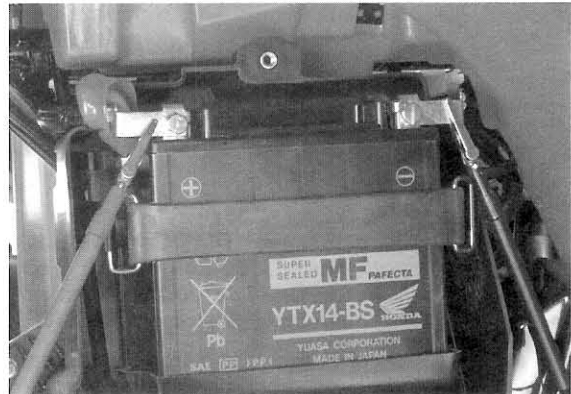
Connect the multimeter between the battery positive (+) and negative (-) terminals.

NOTICE

- 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, measure the voltage on the multimeter when the engine runs at 5,000 rpm.

Standard: Measured battery voltage (page 19-5) < Measured charging voltage < 15.5 V

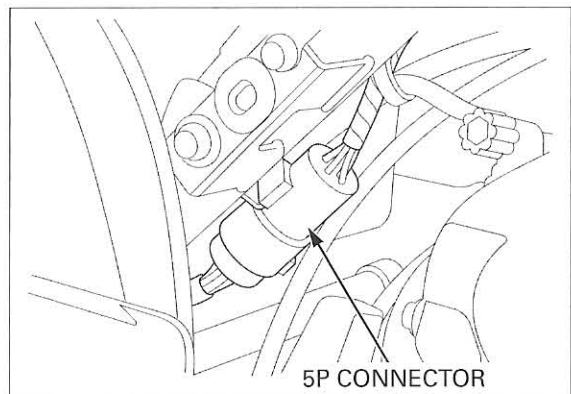


ALTERNATOR CHARGING COIL

INSPECTION

Remove the right side cover (page 2-4).

Disconnect the alternator 5P 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 10-7 for alternator stator replacement.



REGULATOR/RECTIFIER

WIRE HARNESS INSPECTION

Remove the two bolts and regulator/rectifier.
Disconnect the regulator/rectifier 3P gray and black connectors.
Check the connectors for loose contacts or corroded terminals.

BATTERY LINE

Measure the voltage between the Red wire terminal and ground.
There should be battery voltage at all times.

GROUND LINE

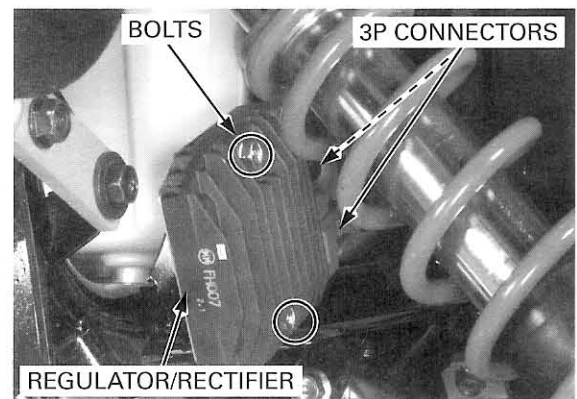
Check the continuity between the Green wire terminal and ground.
There should be continuity at all times.

CHARGING COIL LINE

Measure the resistance between the Yellow wire terminals.

STANDARD: 0.1 – 1.0 Ω (at 20°C/68°F)

Check for continuity between each Yellow wire terminal and ground.
There should be no continuity.

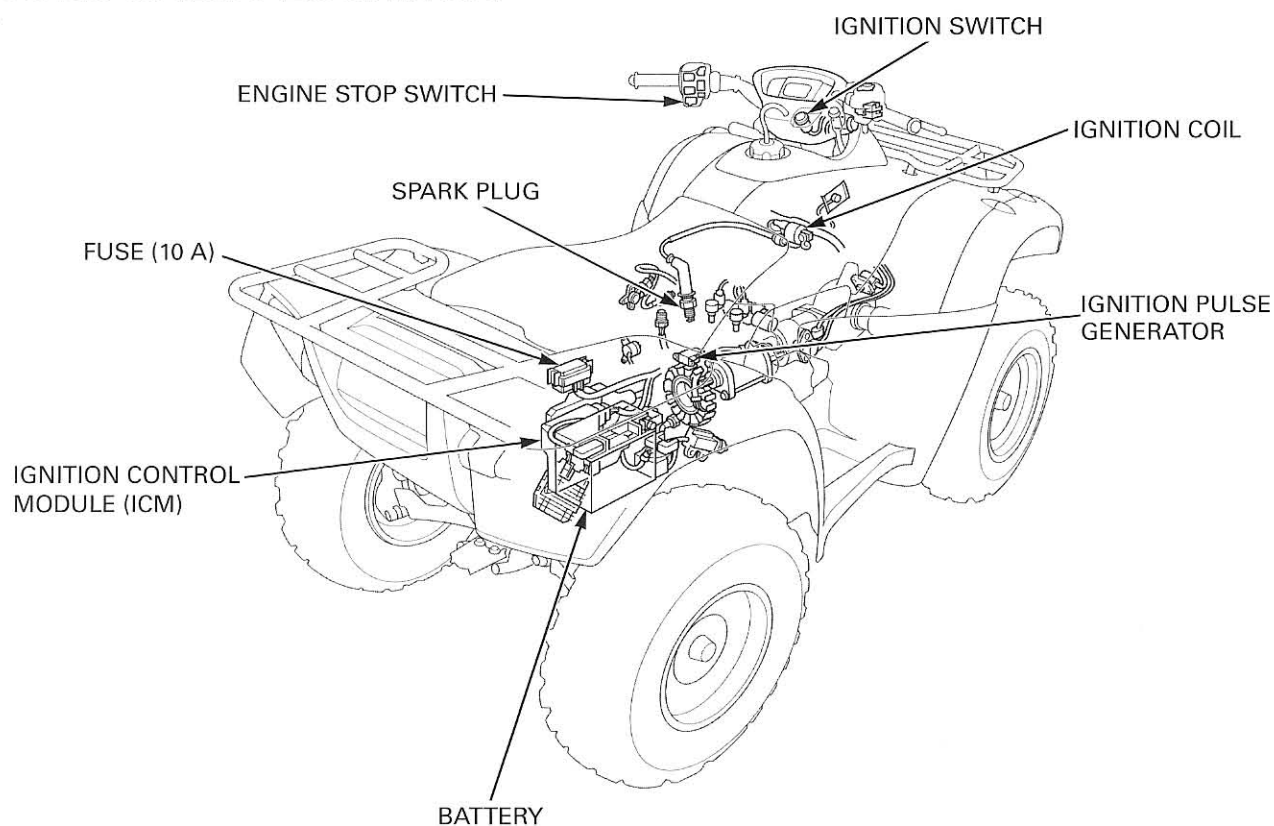


20. IGNITION SYSTEM

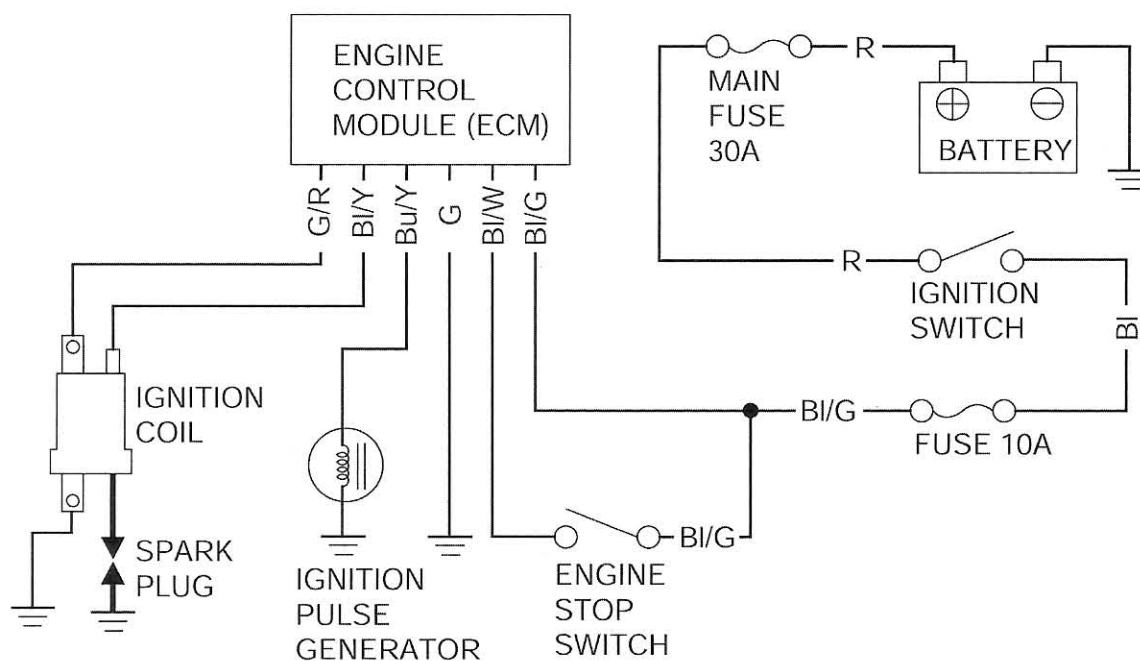
COMPONENT LOCATION	20-2	IGNITION SYSTEM INSPECTION	20-5
SYSTEM DIAGRAM	20-2	IGNITION COIL	20-7
SERVICE INFORMATION	20-3	IGNITION TIMING	20-8
TROUBLESHOOTING	20-4		

IGNITION SYSTEM

COMPONENT LOCATION



SYSTEM DIAGRAM



Bl: Black
G: Green
R: Red
W: White
Y: Yellow
Bu: Bleu

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.
- See page 10-7 for ignition pulse generator removal/installation.
- See page 22-6 for ignition switch servicing.
- See page 22-7 for engine stop switch inspection.
- See page 24-39 for gear position switch servicing.

SPECIFICATION

ITEM		SPECIFICATIONS
Spark plug	Standard	IFR5L11 (NGK) VK16PRZ11 (DENSO)
	For cold climate (below 5°C/41°F)	IFR6L11 (NGK) VK20PRZ11 (DENSO)
Spark plug gap		1.0 – 1.1 mm (0.039 – 0.043 in)
Ignition coil peak voltage		100 V minimum
Ignition pulse generator peak voltage		0.7 V minimum
Ignition timing ("F" mark)		13° BTDC at idle

TORQUE

Spark plug	18 N·m (1.8 kgf·m, 13 lbf·ft)
Timing hole cap	10 N·m (1.0 kgf·m, 7 lbf·ft)

TOOLS

IgnitionMate peak voltage tester (U.S.A. only) or	
Peak voltage adaptor	07HGJ-0020100 (not available in U.S.A.) with commercially available digital multimeter (impedance 10 MΩ/DCV minimum)

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)

No spark at spark plug

UNUSUAL CONDITION		PROBABLE CAUSE (Check in numerical order)
Ignition coil primary voltage	Low peak voltage.	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.	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.	1. Faulty spark plug or leaking ignition coil secondary current. 2. Faulty ignition coil.
Ignition pulse generator	Low peak voltage.	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.	1. Faulty peak voltage adaptor. 2. Faulty ignition pulse generator.

IGNITION SYSTEM INSPECTION

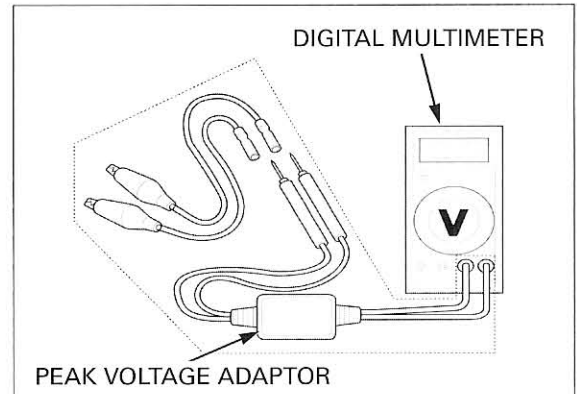
NOTE:

- 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 (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.

Remove the fuel tank (page 5-22).

Disconnect the spark plug cap from the spark plug. 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.



Turn over the heat guard rubber.



IGNITION SYSTEM

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".

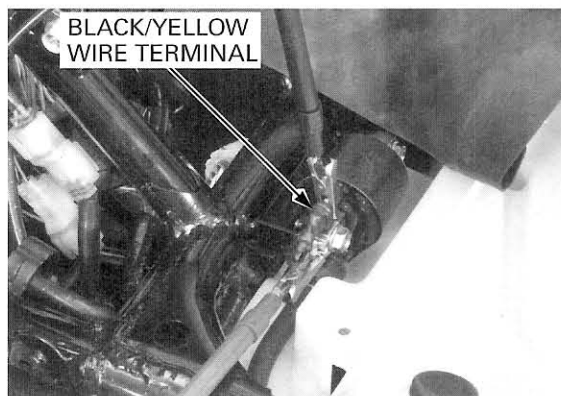
Shift the transmission into neutral.

Avoid touching the spark plug or tester probes to prevent electric shock.

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.



IGNITION PULSE GENERATOR PEAK VOLTAGE

NOTE:

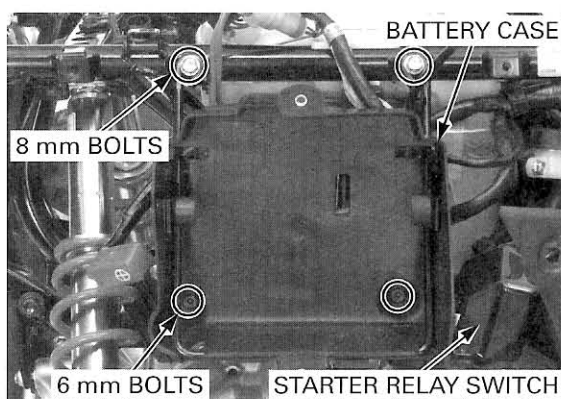
- Check that the cylinder compression is normal and the spark plug is installed correctly in the cylinder head.

Remove the rear carrier/fender assembly (page 2-13).

Remove the battery (page 19-5).

Remove the starter relay switch from the battery case.

Remove the two 6 mm bolts, two 8 mm bolts and battery case.



Seal the ECM connector with tape to prevent dirt and oil from entering the connector after disconnecting the 32P connector.

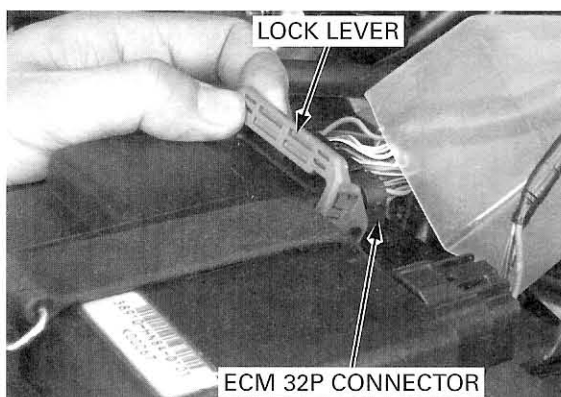
Disconnect the 32P black connector from the engine control module (ECM) by releasing the lock lever as shown.

NOTE:

- When reconnecting the ECM 32P connector, check that there is no dirt and oil in the connector.

Connect the positive cable first and then the negative cable.

Connect the battery cables.



Be careful not to bend the connector terminals.

Connect the peak voltage tester or adaptor probes to the Blue/yellow terminal of the wire harness side 32P connector 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 connector is abnormal, measure the peak voltage at the alternator connector.

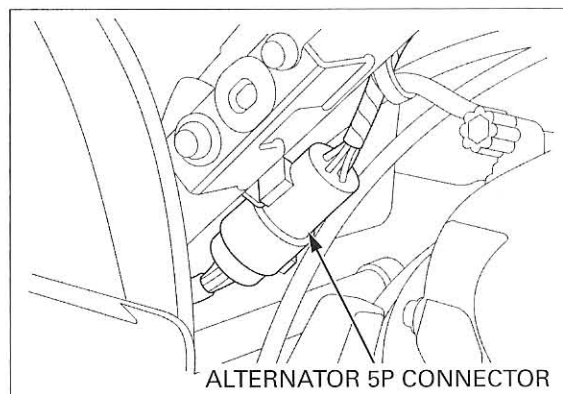
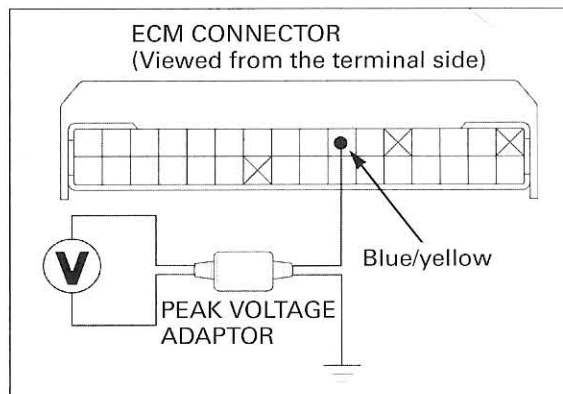
Remove the right fuel tank side cover (page 2-6).

Disconnect the alternator 5P 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 in the troubleshooting chart (page 20-4).

See page 10-7 for ignition pulse generator replacement.



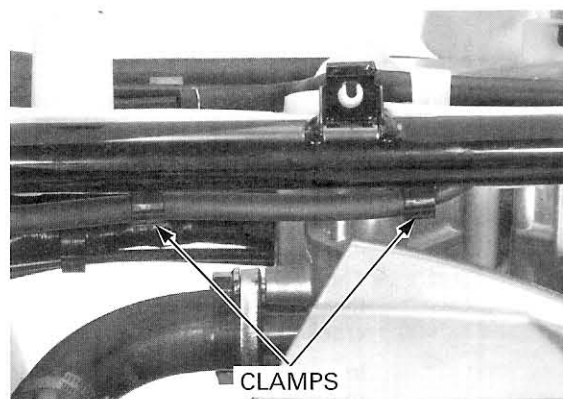
IGNITION COIL

REMOVAL/INSTALLATION

Remove the fuel tank (page 5-22).

Disconnect the plug cap from the plug and free the spark plug wire from the clamps.

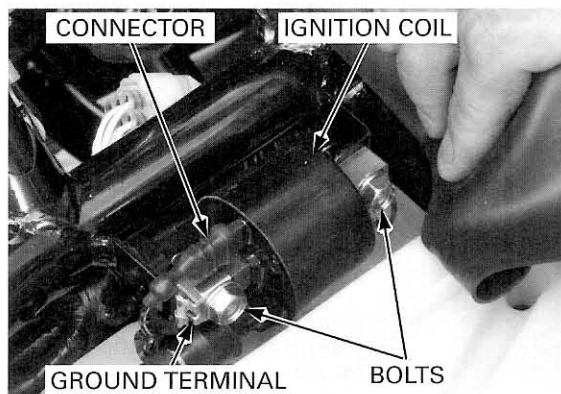
Turn over the heat guard rubber.



IGNITION SYSTEM

Disconnect the ignition coil primary wire connector. Remove the two mounting bolts, ground terminal and the ignition coil.

Installation is in the reverse order of removal.

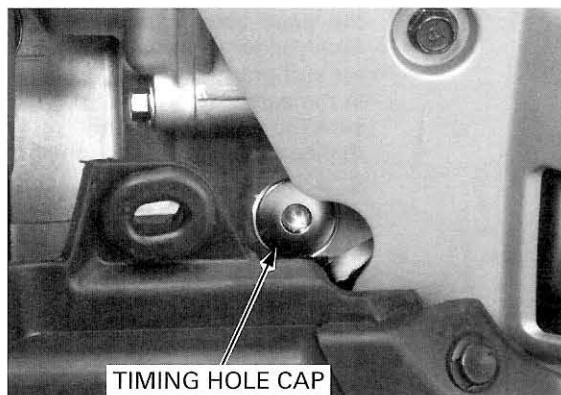


IGNITION TIMING

Remove the right side cover (page 2-6).

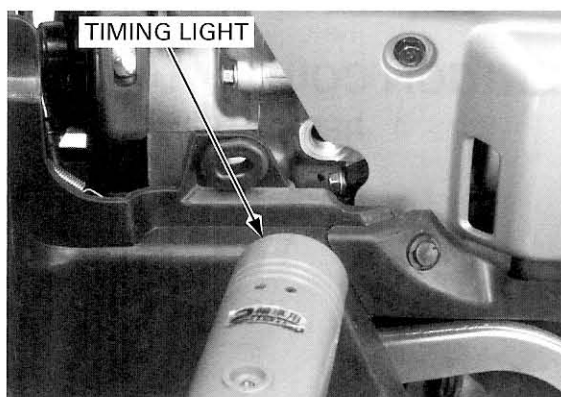
Start the engine and warm it up to operating temperature.

Stop the engine and remove the timing hole cap from the rear crankcase cover.



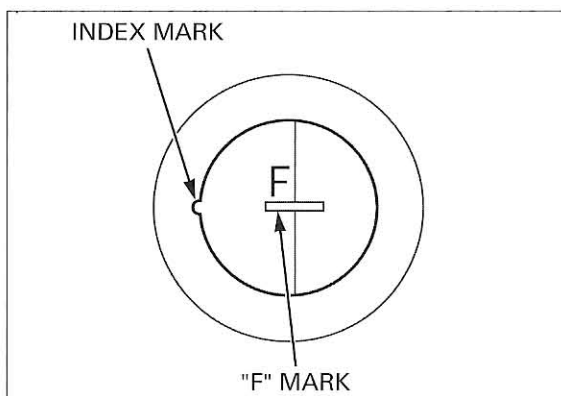
Connect the timing light and tachometer.

Start the engine, let it idle (1,400 rpm) 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.

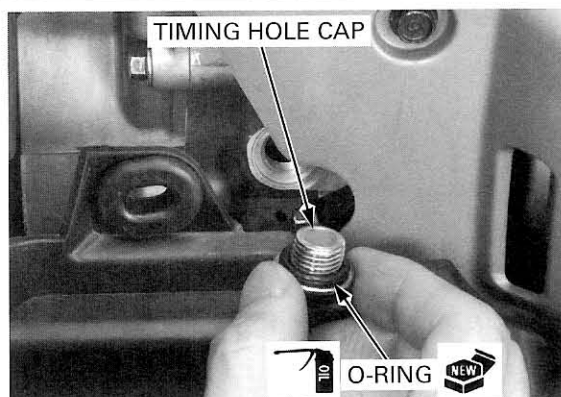


Coat a new O-ring with oil and install it onto the timing hole cap.

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

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

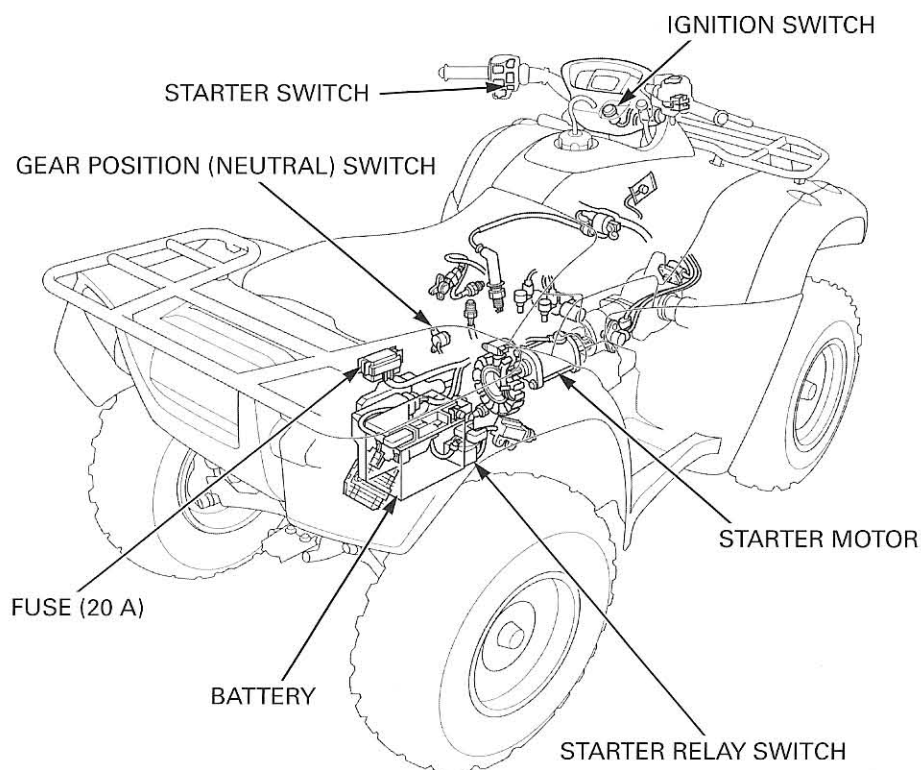
Install the right side cover (page 2-6).



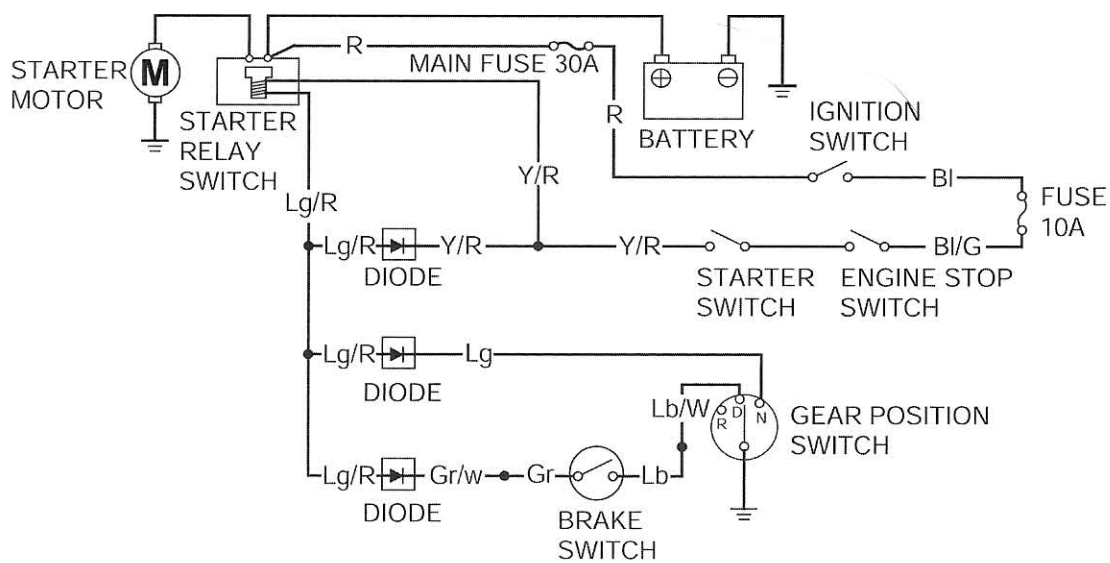
21. ELECTRIC STARTER

COMPONENT LOCATION	21-2	STARTER MOTOR	21-6
SYSTEM DIAGRAM	21-2	STARTER RELAY SWITCH	21-11
SERVICE INFORMATION	21-3	DIODE	21-12
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.
- See page 10-7 for starter clutch servicing.
- See page 22-6 for ignition switch information.
- See page 22-7 for engine stop switch and starter switch inspection.
- See page 22-18 for front brake switch inspection.
- See page 24-39 for gear position switch information.

SPECIFICATIONS

Unit: mm (in)

ITEM	STANDARD	SERVICE LIMIT
Starter motor brush length	12.0 – 13.0 (0.47 – 0.51)	6.5 (0.26)

TROUBLESHOOTING

NOTE:

- 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 21-11).

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 gear position switch (page 24-39).
• Faulty diode (page 21-12).
• Faulty front brake switch (page 22-18).
• 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 22-6).
• Faulty engine stop switch (page 22-7).
• Faulty starter switch (page 22-7).
• 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).

Does 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

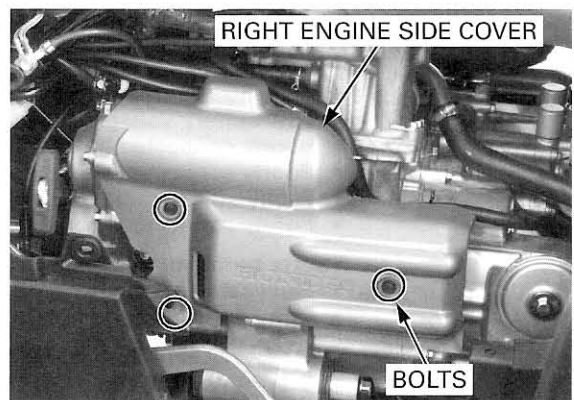
REMOVAL

Remove the following:

- right side cover (page 2-4)
- mud guard lid (page 2-7)

Disconnect the negative (-) cable from the battery (page 19-5).

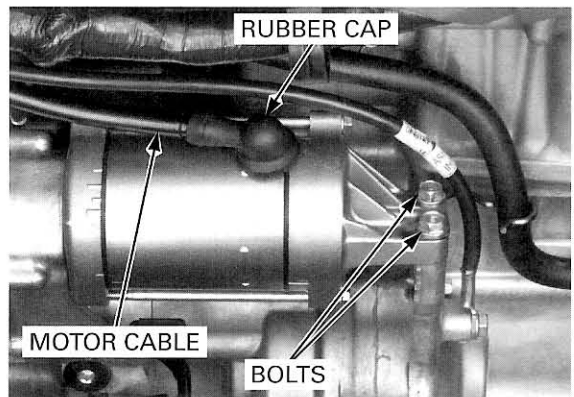
Remove the three bolts and the right engine side cover.



Slide the rubber cap off the starter motor cable terminal and remove the terminal nut and starter motor cable.

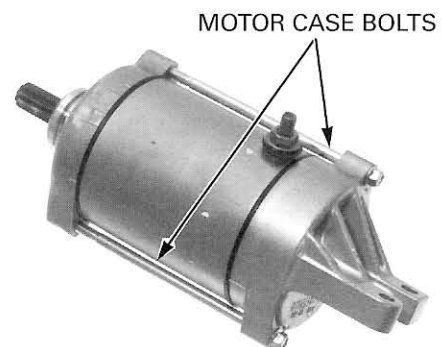
Remove the two mounting bolts and the starter motor from the crankcase.

Remove the O-ring from the starter motor.



DISASSEMBLY/INSPECTION

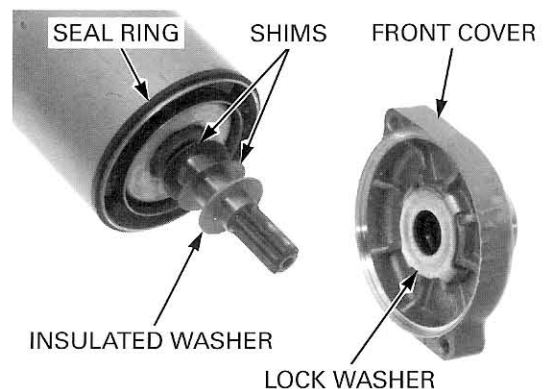
Remove the starter motor case bolts.



Record the location and number of shims.

Remove the following:

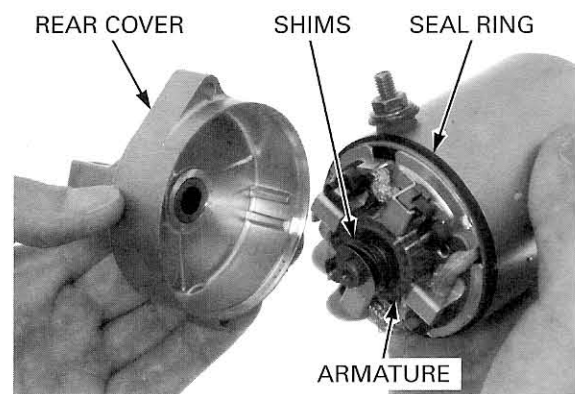
- front cover
- lock washer
- insulated washer
- shims
- seal ring



ELECTRIC STARTER

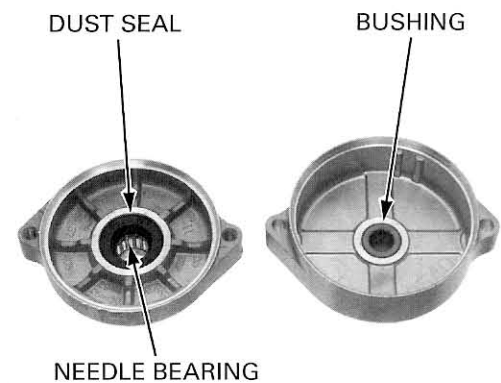
Record the location
and number of
shims.

- rear cover
- shims
- seal ring
- armature



Check the oil seal and needle bearing in the front cover for deterioration, wear or damage.

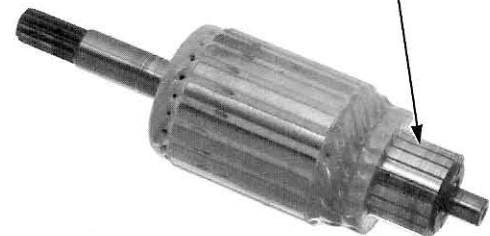
Check the bushing in the rear cover for wear or damage.



Check the commutator bars of the armature for discoloration.

NOTE:

- Do not use emery or sand paper on the commutator.



Check for continuity between pairs of commutator bars.
There should be continuity.

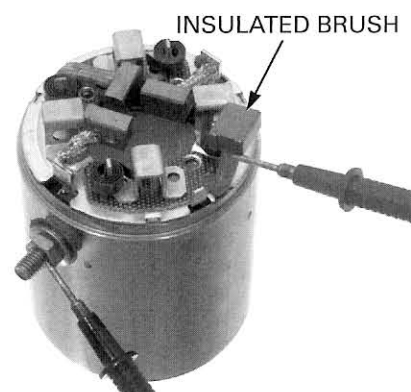


ELECTRIC STARTER

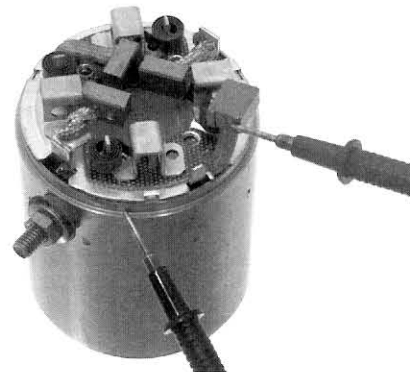
Check for continuity between each commutator bar and the armature shaft.
There should be no continuity.



Check for continuity between the insulated brush and cable terminal.
There should be continuity.



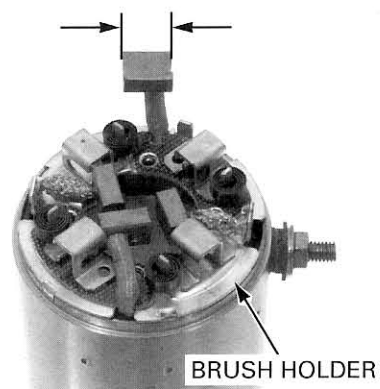
Check for continuity between the insulated brush and motor case.
There should be no continuity.



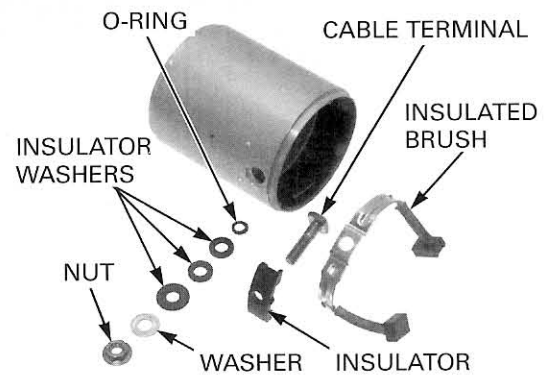
Measure the brush length.

SERVICE LIMIT: 6.5 mm (0.26 in)

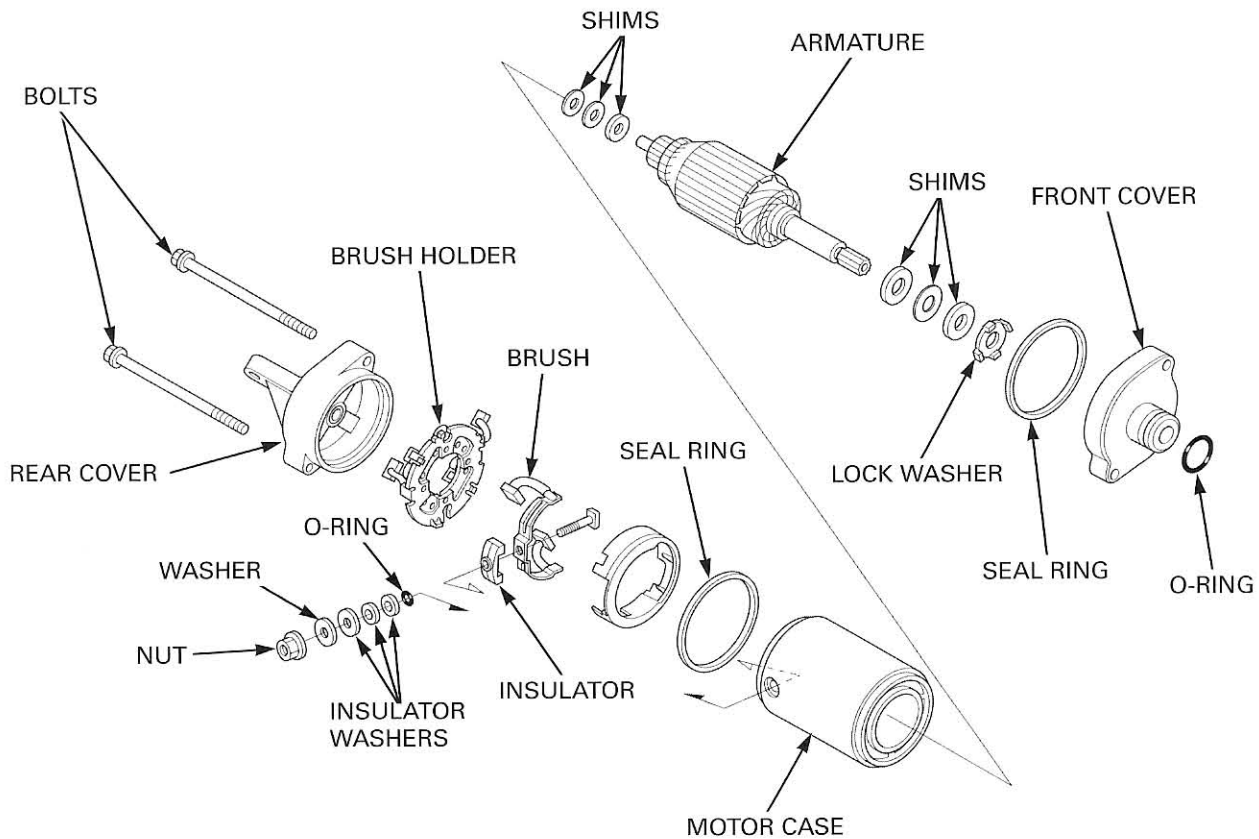
Remove the following if necessary:
– brush holder



- nut
- washer
- insulator washers
- O-ring
- cable terminal
- insulated brush
- insulator

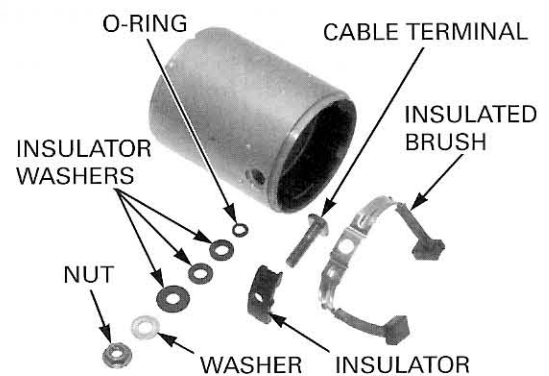


ASSEMBLY



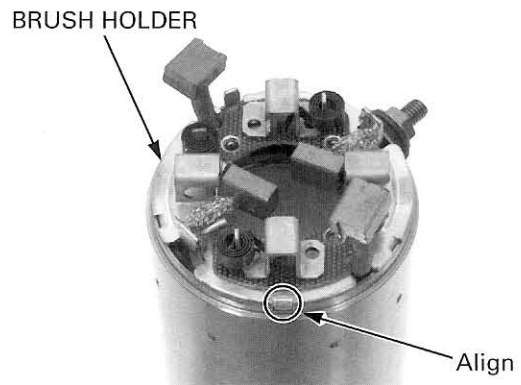
Install the following:

- insulator
- insulated brush
- cable terminal
- O-ring
- insulator washers
- washer
- nut



ELECTRIC STARTER

Install the brush holder, aligning the holder tab with the case groove, and the holder grooves with the insulated brush wires.

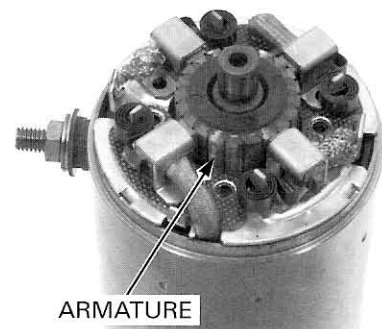


Push and hold the brushes inside the brush holder, and install the armature through the motor case and brush holder.

When installing the armature into the motor case, hold the armature tightly to keep the magnet of the case from pulling the armature against it.

NOTICE

The coil may be damaged if the magnet pulls the armature against the case.

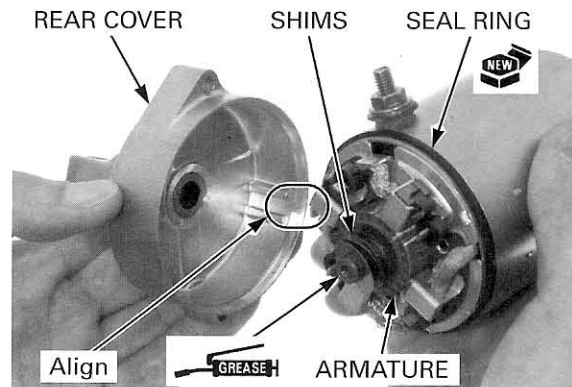


Install the same number of shims in the same location as noted during removal.

Install a new seal ring onto the motor case.

Apply a thin coat of grease to the armature shaft end.

Install the rear cover, aligning its groove with the brush holder tab.



Install the shims properly as noted during removal.

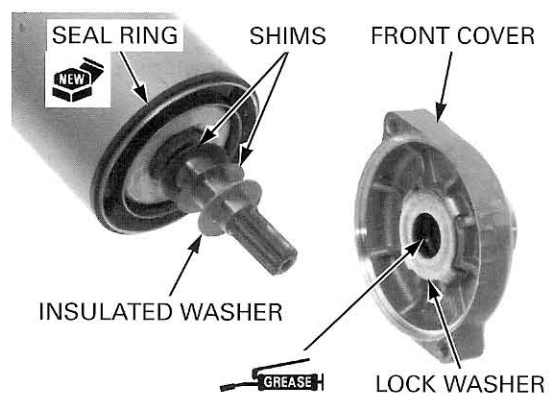
Install the shims and insulated washer onto the armature shaft.

Install a new seal ring onto the motor case.

Apply grease to the oil seal lip and needle bearing in the front cover.

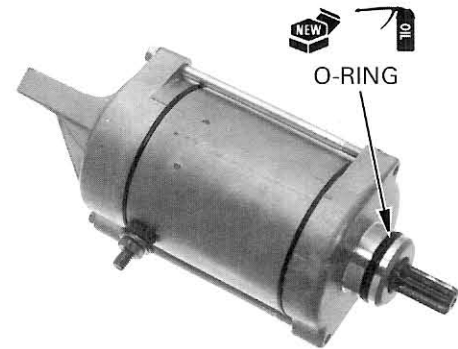
Install the lock washer onto the front cover.

Install the front cover.



INSTALLATION

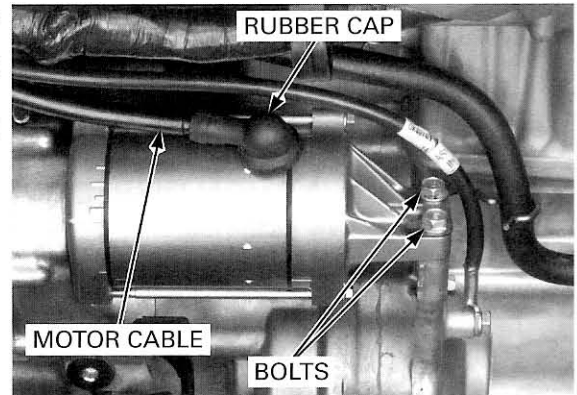
Coat a new O-ring with oil and install it in the starter motor groove.



Install the starter motor into the rear crankcase cover and onto the crankcase. Install the mounting bolts and tighten them securely.

Install the starter motor cable and terminal nut, and tighten the nut.

Install the rubber cap over the cable terminal.

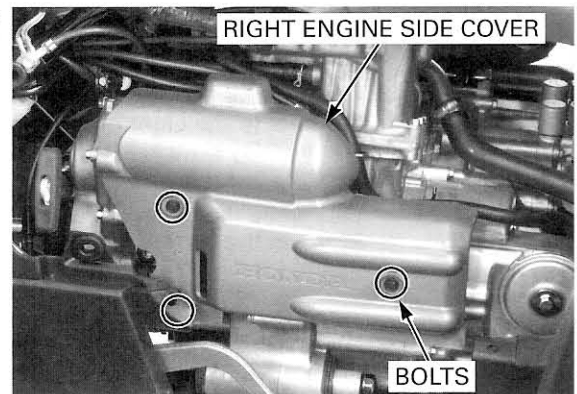


Install the right engine side cover and tighten the three bolts securely.

Connect the battery negative (-) cable (page 19-5).

Install the following:

- mud guard lid (page 2-7)
- right side cover (page 2-4)



STARTER RELAY SWITCH

OPERATION INSPECTION

Remove the battery cover (page 19-5).

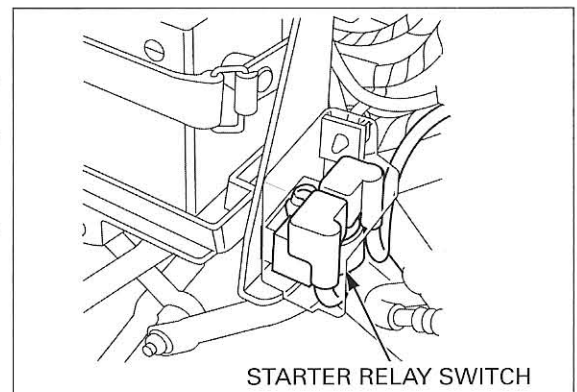
Shift the transmission into neutral.

Make sure the engine stop switch is turned to "RUN".

Turn the ignition switch to "ON" and push the starter switch.

The coil is normal if the starter relay switch clicks.

If you don't hear the switch click, and inspect the relay switch circuits (page 21-12).



CIRCUIT INSPECTION

Remove the rear fender (page 2-14).

Disconnect the starter relay switch 2P connector.

GROUND LINE

Check for continuity between the Light green/red wire terminal of the wire harness side connector and ground.

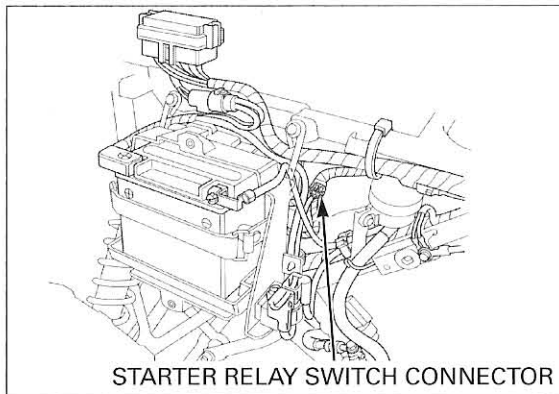
If there is continuity when the transmission is in neutral or when the transmission is in drive and the front brake lever is squeezed, the ground circuit is normal.

POWER INPUT LINE

Turn the engine stop switch to "RUN" and the ignition switch to "ON".

Measure the voltage between the Yellow/red wire terminal (+) of the wire harness side connector.

If the battery voltage appears only when the starter switch is pushed, the circuit is normal.



FUNCTION INSPECTION

Remove the following:

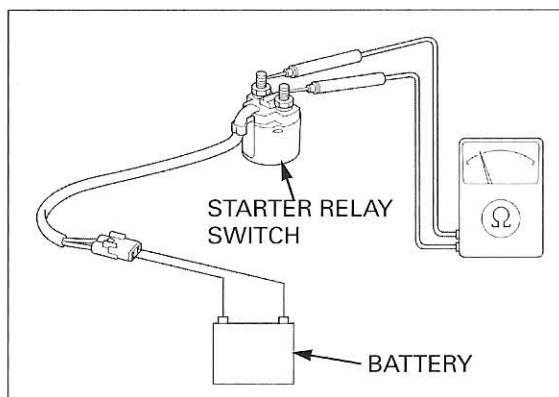
- rear fender (page 2-14)
- battery cover (page 19-5)

Disconnect the negative (-) cable from the battery (page 19-5).

Disconnect the starter relay switch 2P connector. Remove the battery (+) cable and starter motor cable from the starter relay switch.

Connect the fully charged 12 V battery positive terminal to the Yellow/red wire terminal and negative terminal to the Light green/red wire terminal of the starter relay switch.

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

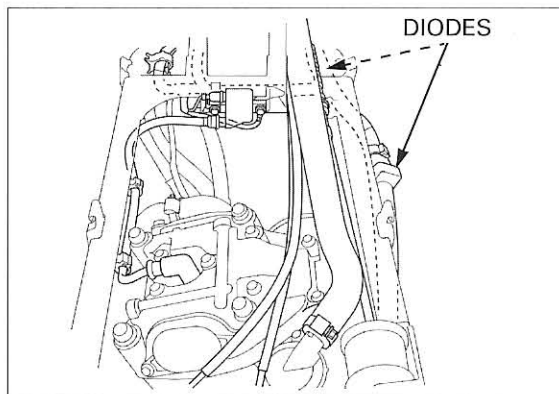


DIODE

INSPECTION

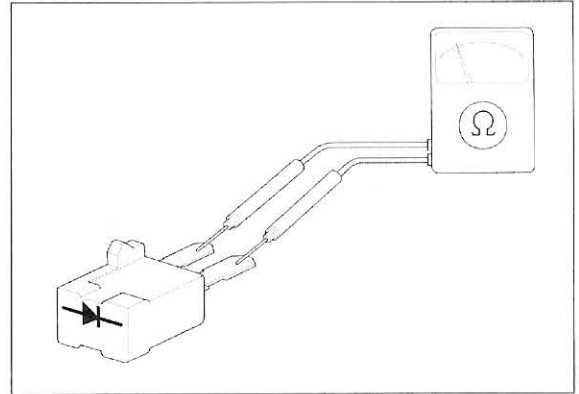
Remove the fuel tank (page 5-22).

Remove the diodes from the wire harness.



Check for continuity between the diode terminals.
When there is continuity, a small resistance value
will register.

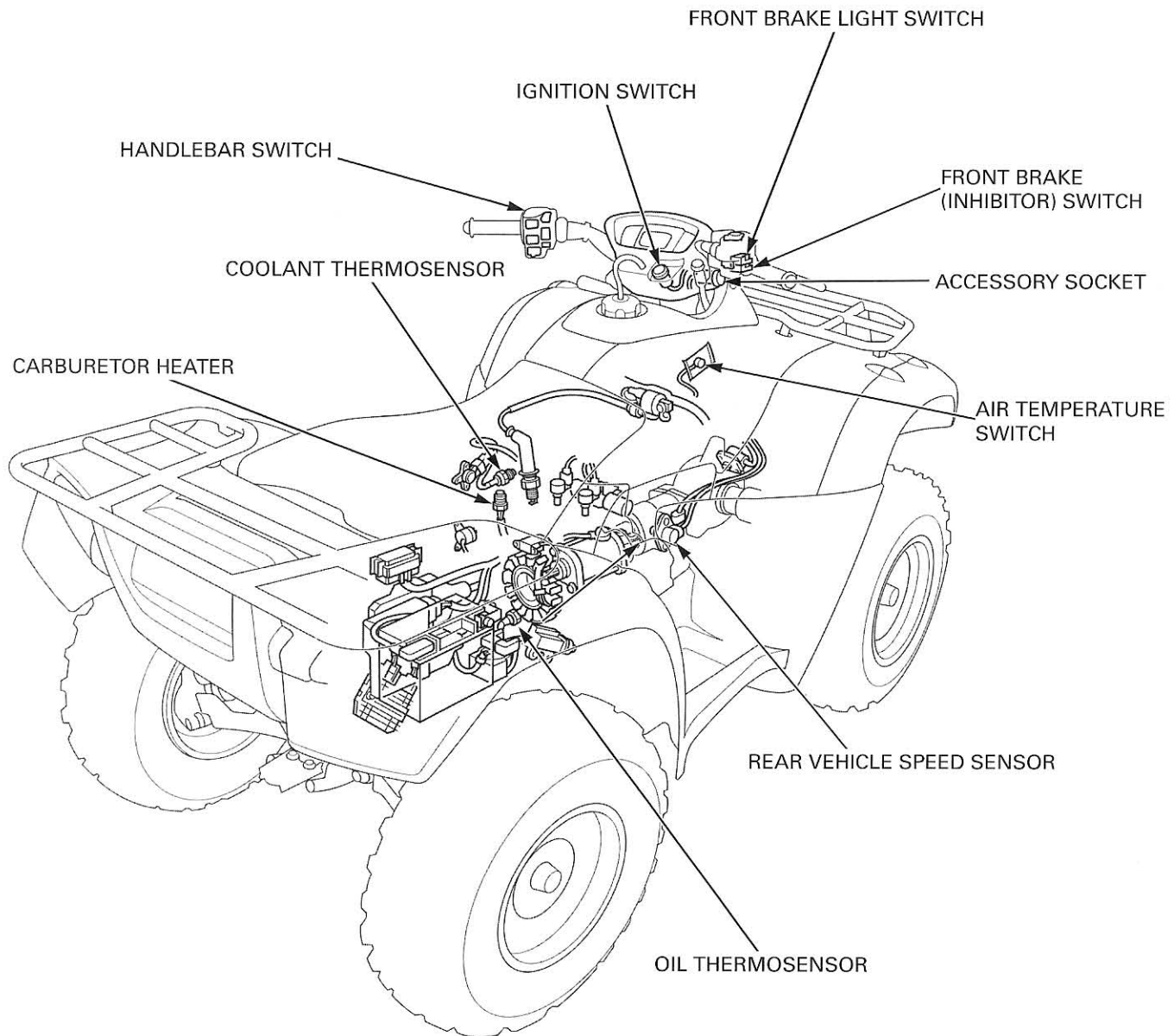
If there is continuity in one direction, the diode is
normal.



22. LIGHTS/METERS/SWITCHES

COMPONENT LOCATION	22-2	CARBURETOR HEATER/AIR TEMPERATURE SWITCH	22-8
SERVICE INFORMATION	22-3	COMBINATION METER/REAR VEHICLE SPEED SENSOR (VSS).....	22-9
HEADLIGHT.....	22-4	FUEL GAUGE/FUEL LEVEL SENSOR	22-11
TAILLIGHT.....	22-4	TEMPERATURE INDICATOR/ TEMPERATURE SENSOR	22-14
ACCESSORY SOCKET.....	22-5	BRAKE LIGHT SWITCH	22-17
IGNITION SWITCH.....	22-6	FRONT BRAKE SWITCH.....	22-18
HANDLEBAR SWITCH.....	22-7		

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.
- To isolate an electrical failure, check the continuity of the electrical path through the part. A continuity check can usually be made without removing the part from the vehicle. Simply disconnect the connectors and connect a continuity tester to the terminals or connections.
- 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	12V – 40/40 W x 2
	Brake/taillight	12V – 21/5 W x 2
	Neutral indicator	LED
	Reverse indicator	LED
	4WD indicator	LED
	Coolant/oil temperature indicator	LED
	Meter light	LED x 12
Fuse	Main fuse	30 A x 2
	Sub-fuse	20 A, 10 A x 3

TORQUE VALUES

Coolant thermosensor	10 N·m (1.0 kgf·m, 7 lbf·ft)	Apply sealant to the threads.
Oil thermosensor	18 N·m (1.8 kgf·m, 13 lbf·ft)	

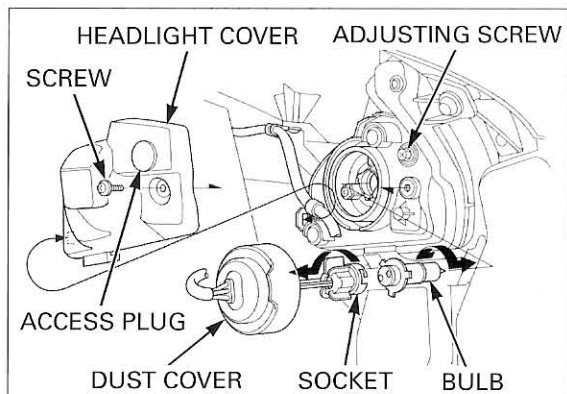
HEADLIGHT

BULB REPLACEMENT

Remove the screw and the headlight cover by releasing the tab from the slit in the headlight case.
Remove the dust cover.
Remove the bulb socket by turning it counterclockwise.
Remove the bulb from the headlight.

Align the socket tabs with the headlight grooves properly.

Install a new bulb in the reverse order of removal.



REMOVAL/INSTALLATION

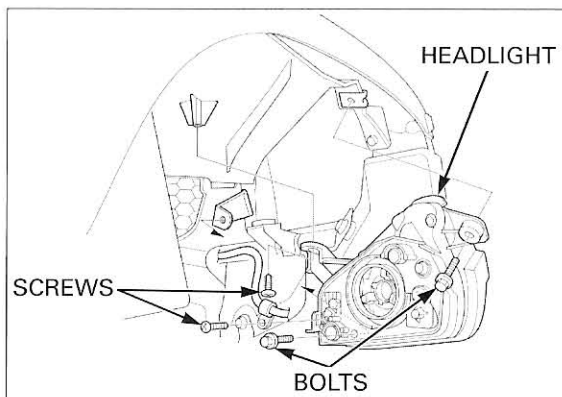
Remove the headlight bulb socket (page 22-4).

Remove the two screws attaching the headlight wire clamps.
Remove the two mounting bolts and the headlight.

Install the headlight in the reverse order of removal.

NOTE:

- The headlight beam can be adjusted vertically by removing the access plug and turning the headlight beam adjusting screw.



TAILLIGHT

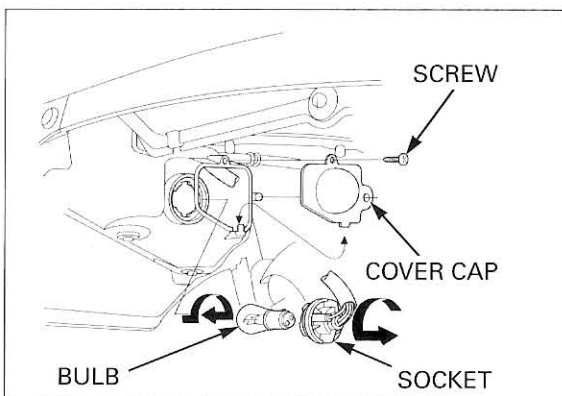
BULB REPLACEMENT

Remove the screw and taillight cover cap.

Turn the bulb socket counterclockwise and remove it.
Turn the taillight bulb counterclockwise while pushing it in and remove it.

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

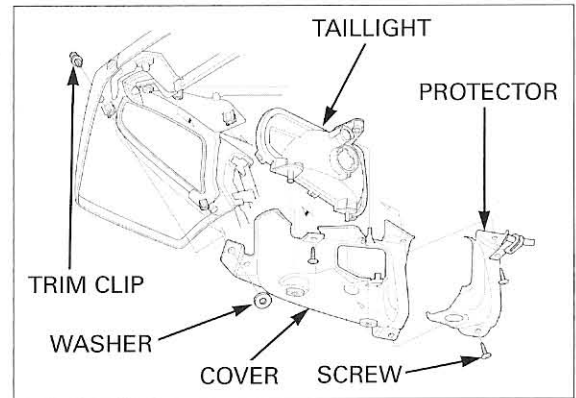
Remove the taillight bulb socket (page 22-4).

Remove the trim clip, washer, three screws, protector and taillight cover.

Remove the taillight from the cover.

Align the bosses and grommets properly.

Install the taillight in the reverse order of removal.



ACCESSORY SOCKET

INSPECTION

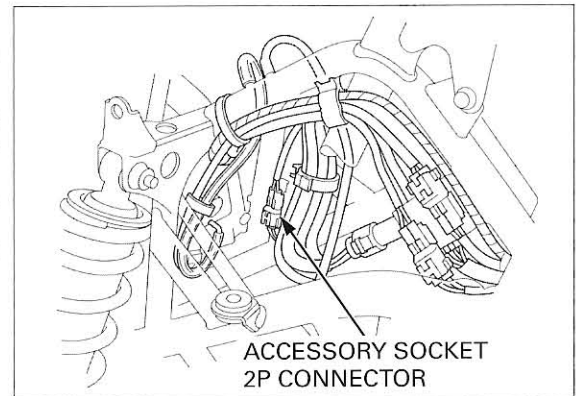
Remove the right inner fender (page 2-9).

Remove the accessory socket 2P connector from the frame and disconnect it.

Measure the voltage between the White/black (+) and Green (-) wire terminals of the wire harness side connector.

There should be battery voltage with the ignition switch turned to "ON".

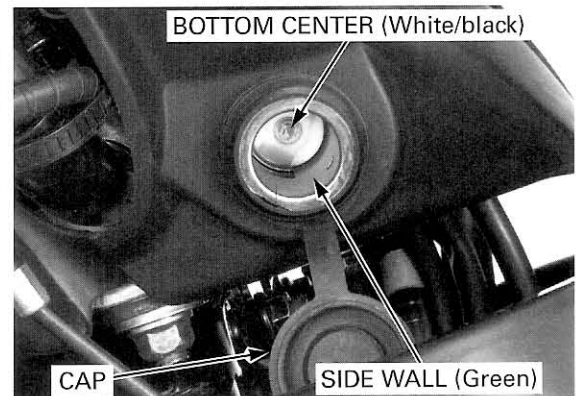
If there is no voltage, check for brown fuse (10 A) and an open circuit in the wire harness.



Remove the accessory socket cap.

Check for continuity between the White/black wire terminal of the socket side 2P connector and bottom center terminal of the socket, and between the Green wire terminal and side wall terminal.

There should be continuity. If there is no continuity, replace the accessory socket.



REPLACEMENT

Remove the meter lower cover (page 2-18).

Disconnect the accessory socket 2P connector (page 22-5).

Release the accessory socket wire from the wire clip on the steering shaft holder.

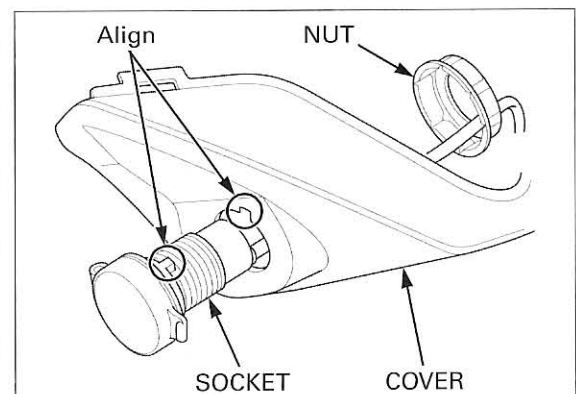
Loosen the nut and remove the accessory socket from the meter lower cover.

Install a new accessory socket by aligning the lug with the groove in the meter lower cover.

Install the nut and tighten it securely.

Route the accessory socket wire properly (page 1-21).

Install the removed parts in the reverse order of removal.

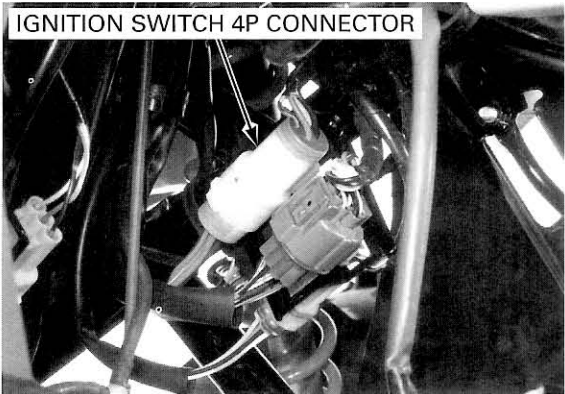


IGNITION SWITCH

INSPECTION

Remove the right inner fender (page 2-9).
Remove the ignition switch 4P connector from the frame and disconnect it.
Check for continuity between the switch side connector terminals in each switch position. Continuity should exist between the color coded wires as follows:

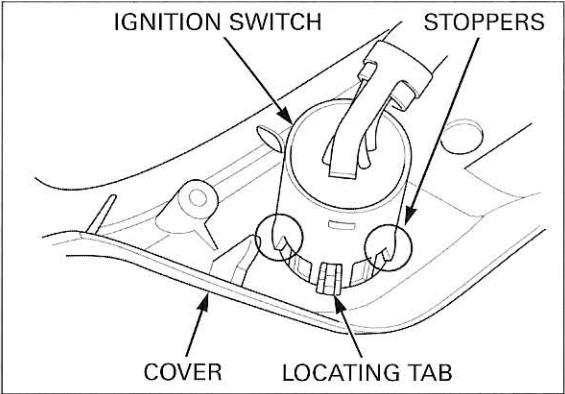
Color Position	Red/ black	Pink	Red	Black
ON	○ — ○	○ — ○	○ — ○	○ — ○
OFF				



REPLACEMENT

Remove the meter upper cover (page 2-18). Disconnect the ignition switch 4P connector (page 22-6).
Release the ignition switch wire from the wire clip on the steering shaft holder.
Remove the ignition switch from the meter upper cover by pushing in the two stoppers.
Install a new ignition switch by aligning the locating tab with the cover groove.
Install the removed parts in the reverse order of removal.

Route the accessory socket wire properly (page 1-21).



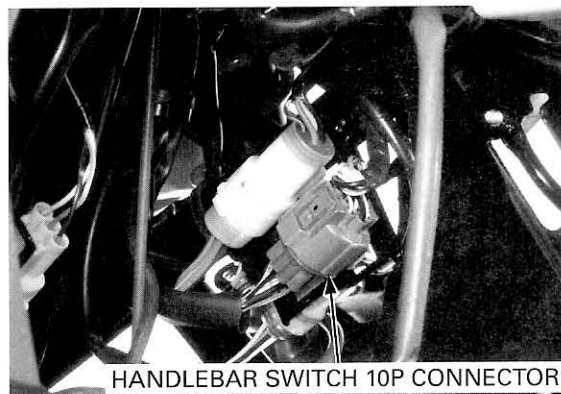
HANDLEBAR SWITCH

INSPECTION

Remove the right inner fender (page 2-9).

Remove the handlebar switch 10P 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:



HANDLEBAR SWITCH 10P CONNECTOR

LIGHTING SWITCH

Color Position	Bl/Br	Br	•
ON	○	○	○
OFF			

DIMMER SWITCH

Color Position	•	W	Bu/Bl
Low	○	○	
(N)	○	○	○
High	○		○

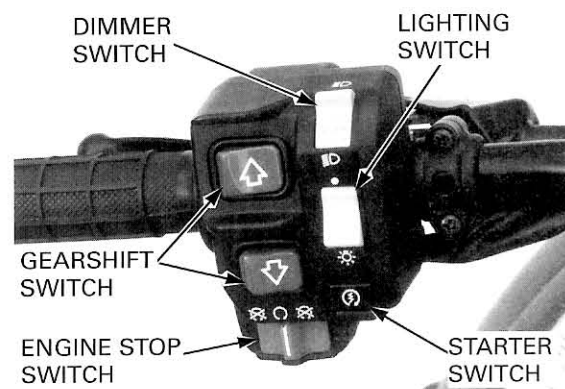
ENGINE STOP SWITCH

Color Position	Bl/G	Bl/W
OFF		
RUN	○	○
OFF		

STARTER SWITCH

Color Position	Bl/W	Y/R
FREE		
PUSH	○	○

See page 24-40 for gearshift switch inspection.



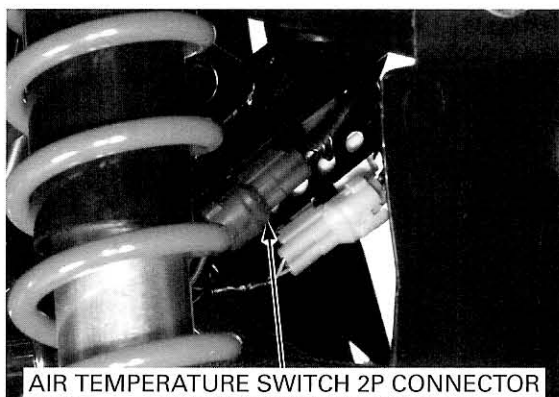
CARBURETOR HEATER/AIR TEMPERATURE SWITCH

SYSTEM INSPECTION

Remove the left inner fender (page 2-9).

Remove the air temperature switch 2P red connector from the frame and disconnect it.

Connect the wire harness side connector terminals with a jumper wire.



AIR TEMPERATURE SWITCH 2P CONNECTOR

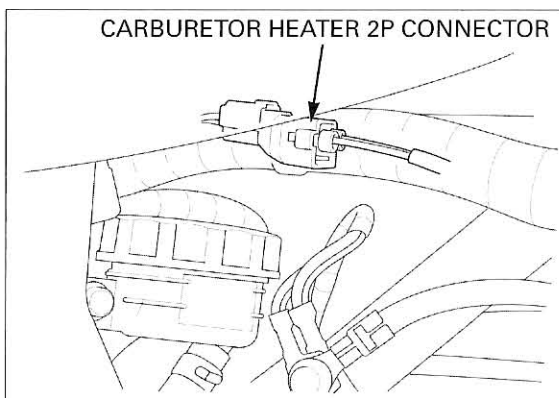
Remove the right side cover (page 2-4).

Disconnect the carburetor heater 2P connector.

Measure the voltage between the Brown/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 an open circuit in the wire harness.



CARBURETOR HEATER 2P CONNECTOR

CARBURETOR HEATER INSPECTION

Remove the right side cover (page 2-4).

Disconnect the carburetor heater 2P connector.

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.

AIR TEMPERATURE SWITCH INSPECTION

Remove the left inner fender (page 2-9).

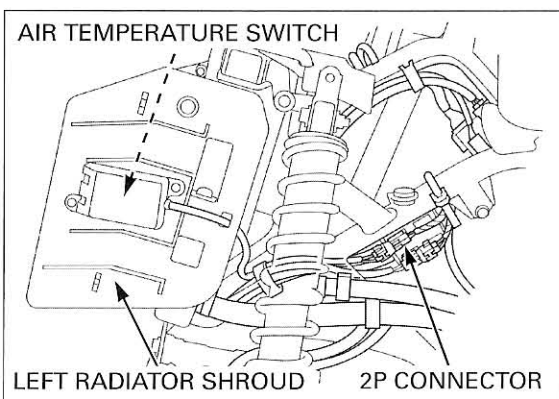
Disconnect the air temperature switch 2P red connector.

Check for continuity between the switch side connector terminals of the air temperature switch 2P connector.

Above 20°C (68°F): No continuity

Below 7°C (45°F): Continuity

If the test result is abnormal, replace the air temperature switch.



COMBINATION METER/REAR VEHICLE SPEED SENSOR (VSS)

POWER/GROUND LINE INSPECTION

Remove the fuel tank (page 5-22).

Remove the combination meter 14P 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 wire terminal (+) and ground (-).

There should be battery voltage at all times.

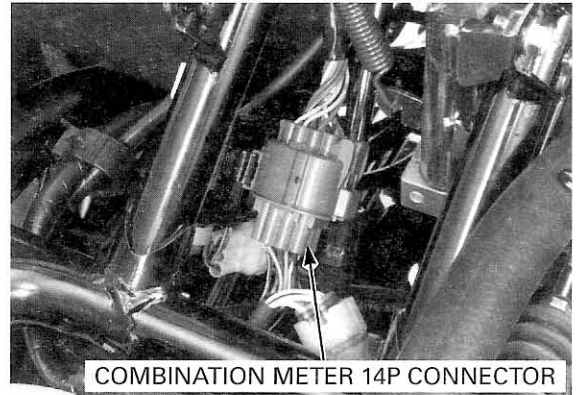
If there is no voltage, check for an open circuit in the wire harness.

GROUND LINE

Check for continuity between the Green wire terminal and ground.

There should be continuity at all times.

If there is no voltage, check for an open circuit in the wire harness.



COMBINATION METER 14P CONNECTOR

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 22-9).
- If they function properly, check as follows:

Remove the left inner fender (page 2-9).

Remove the rear VSS 3P yellow connector from the frame and disconnect it.

Measure the voltage between the Black/green (+) and Green/yellow (-) 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 connectors.

TOOL:

Inspection adaptor

07GMJ-ML80100

Shift the transmission into neutral.

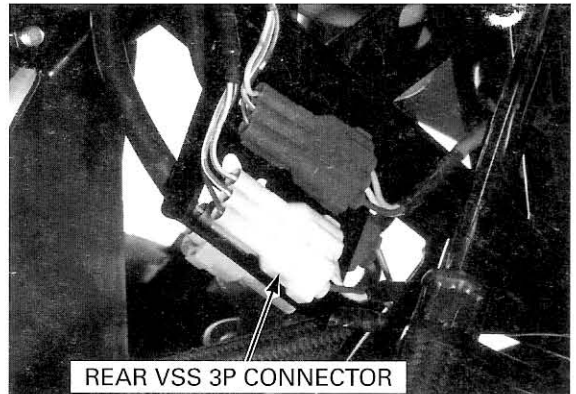
Raise the wheels off the ground and support the vehicle securely with a hoist or equivalent.

Turn the ignition switch to "ON".

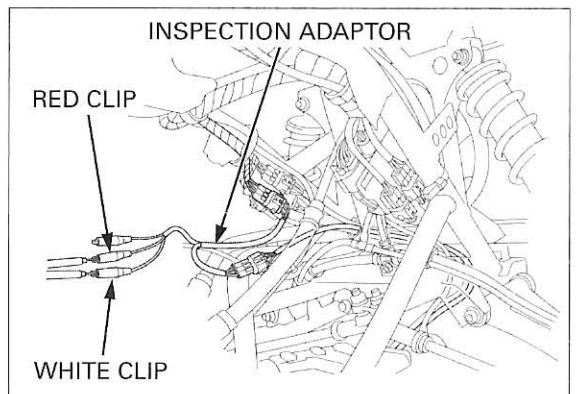
Measure the voltage between the Red clip (+) and White clip (-) while slowly turning the rear wheels by hand.

There should be 0 to 5 V pulse voltage.

- If the pulse voltage does not appear, replace the VSS.



REAR VSS 3P CONNECTOR



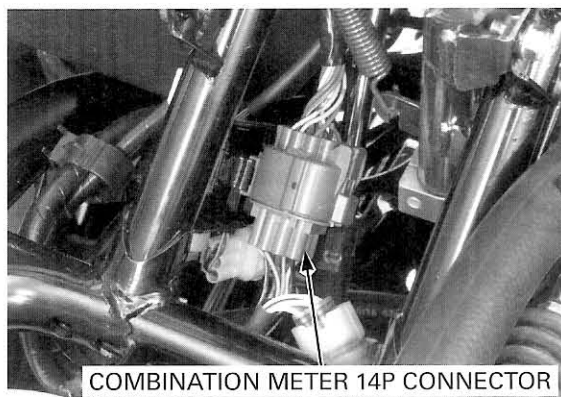
- If the pulse voltage appears, check as follows:

Remove the fuel tank (page 5-22).

Remove the combination meter 14 P connector from the frame and disconnect it.

Check for an open or short circuit in the Pink/green wire between the VSS 3P connector and combination meter 14P connector.

If the Pink/green wire is OK, replace the combination meter.



COMBINATION METER 14P CONNECTOR

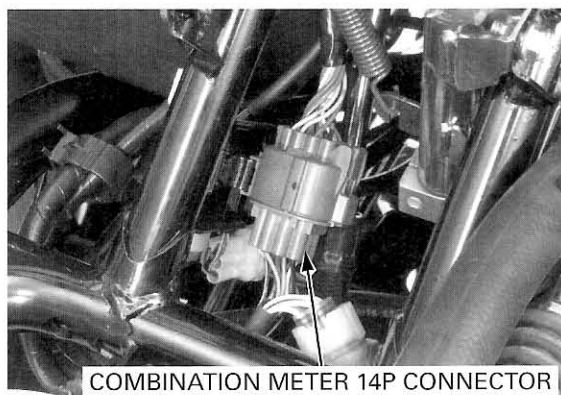
COMBINATION METER REMOVAL/INSTALLATION

Remove the following:

- fuel tank (page 5-22)
- meter covers (page 2-18)

Remove the combination meter 14 P connector from the frame and disconnect it.

Release the meter wire from the wire clip on the steering shaft holder.

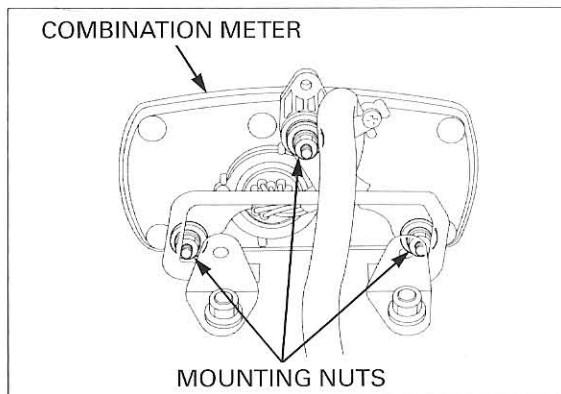


COMBINATION METER 14P CONNECTOR

Remove the three mounting nuts, collars and the combination meter.

Installation is in the reverse order of removal.

Route the accessory socket wire properly (page 1-21).



REAR VSS REPLACEMENT

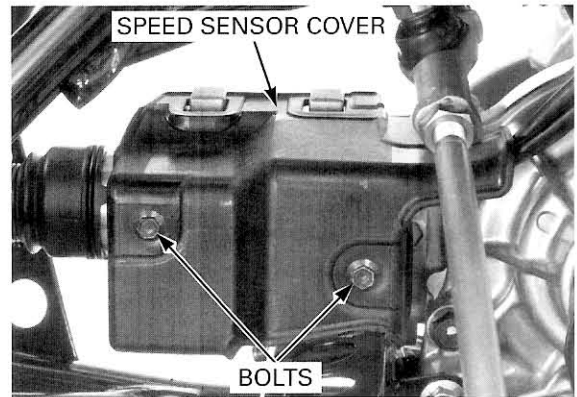
Remove both inner fenders (page 2-9).

Remove the rear VSS 3P yellow connector from the frame and disconnect it.



REAR VSS 3P CONNECTOR

Remove the two bolts and speed sensor cover.

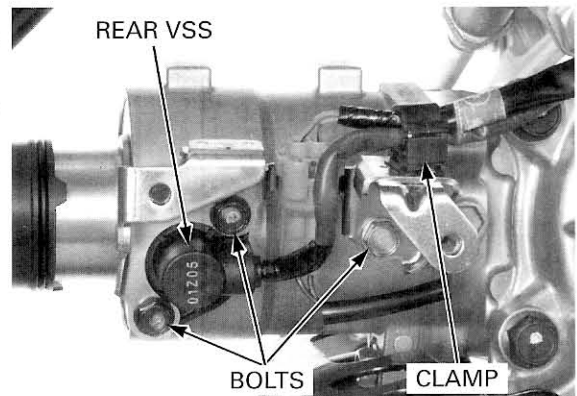


Remove the rear VSS wire from the clamp. Remove the three bolts, sensor cover stay and rear VSS.

Coat a new O-ring with oil and install it onto a new rear VSS.

Route the rear VSS wire properly (page 1-21).

Install the rear VSS in the reverse order of removal.



FUEL GAUGE/FUEL LEVEL SENSOR

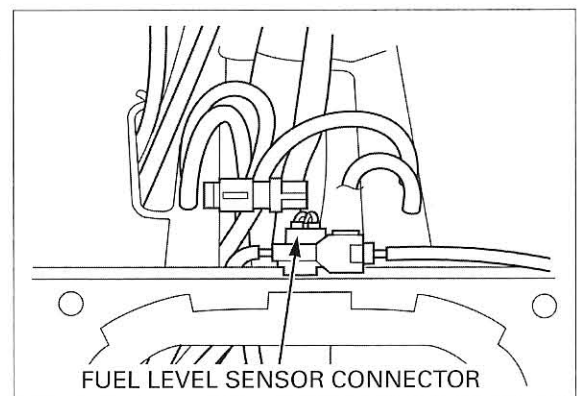
SYSTEM INSPECTION

Check that the speedometer and indicators function properly.

- If they do not function, check the power/ground line (page 22-9).
- If they function, check as follows:

Remove the steering cover (page 2-5).

Turn the ignition switch to "OFF" and disconnect the fuel level sensor 2P connector.



LIGHTS/METERS/SWITCHES

Turn the ignition switch to "ON" and check the fuel gauge.

All segments should blink.

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.

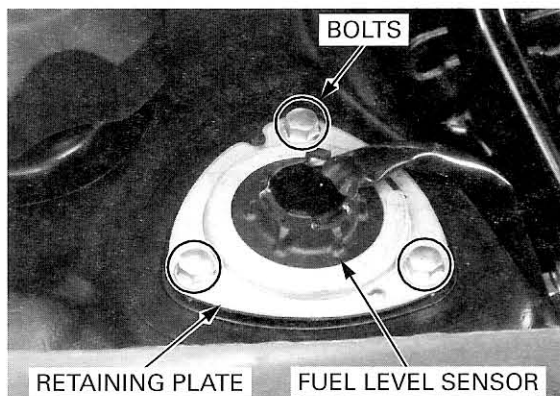
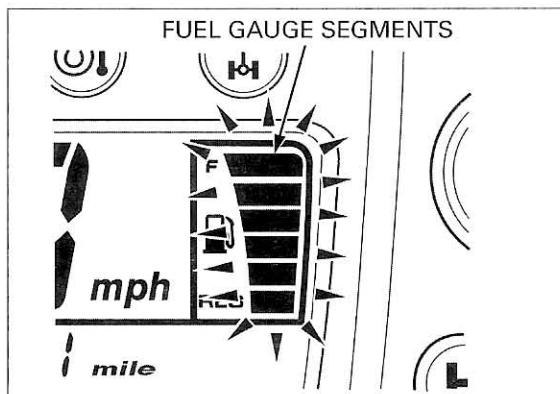
All segments should blink.

If the fuel gauge does not function properly, replace the combination meter (page 22-10).

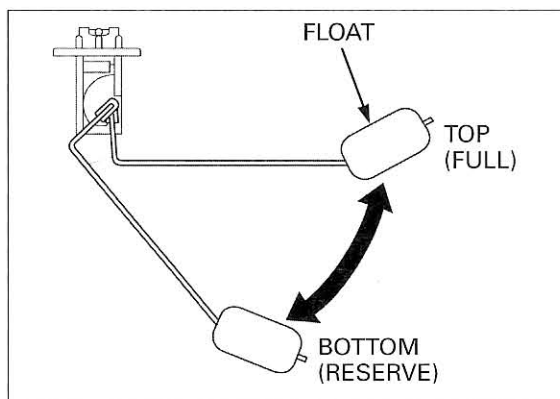
Turn the ignition switch to "OFF".

Remove the fuel tank cover (page 2-5).

Remove the three bolts, retaining plate and fuel level sensor from the fuel tank.

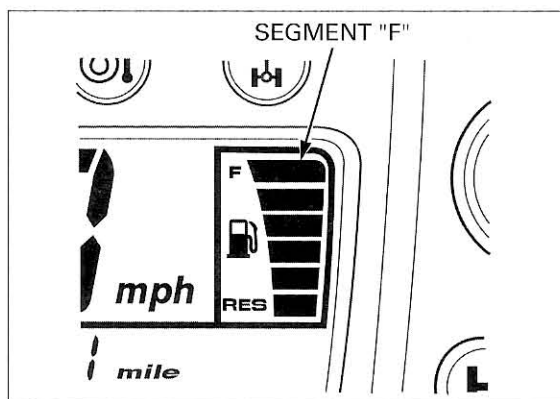


With the fuel level sensor float at the top (FULL) position, turn the ignition switch to "ON" and check the fuel gauge.



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.

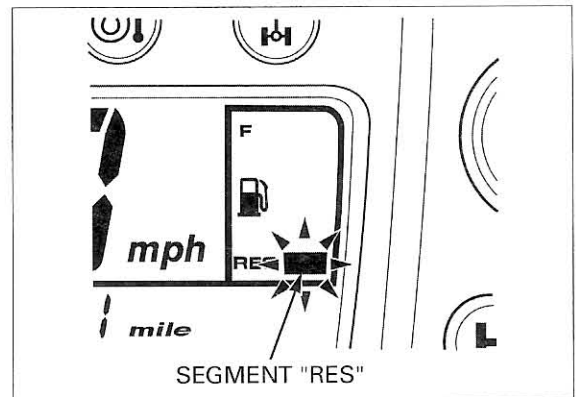
Segment "RES" should blink.

If the fuel gauge does not function properly, check the fuel level sensor (page 22-13).

If the fuel level sensor is OK, replace the combination meter.

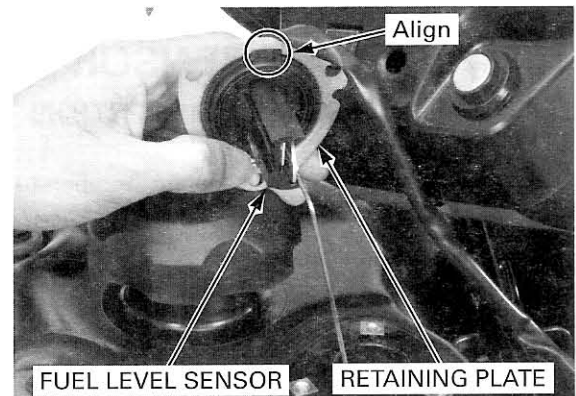
If all segments blink during inspection, replace the combination meter.

Turn the ignition switch to "OFF".



Install a new seal rubber onto the fuel level sensor.

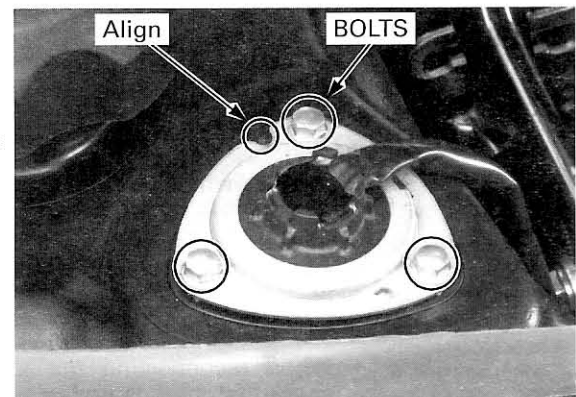
Install the retainer plate onto the sensor by aligning the tab with the groove.



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 securely.

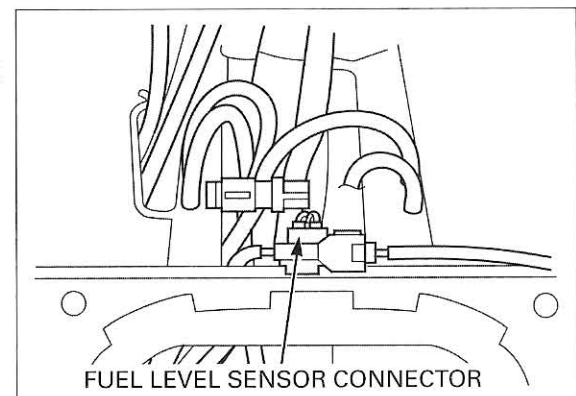
Install the removed parts in the reverse order of removal.



FUEL LEVEL SENSOR INSPECTION

Remove the fuel level sensor (page 22-11).

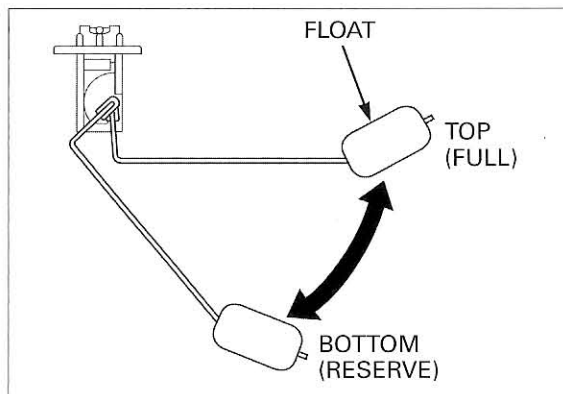
Disconnect the fuel level sensor 2P connector and connect the ohmmeter to the sensor side connector terminals.



LIGHTS/METERS/SWITCHES

Measure the fuel level sensor resistance with the float at the top (FULL) and bottom (RESERVE) positions.

FLOAT POSITION	RESISTANCE (20°C/68°)
TOP (FULL)	5 – 7 Ω
BOTTOM (RESERVE)	204 – 210 Ω



TEMPERATURE INDICATOR/ TEMPERATURE SENSOR

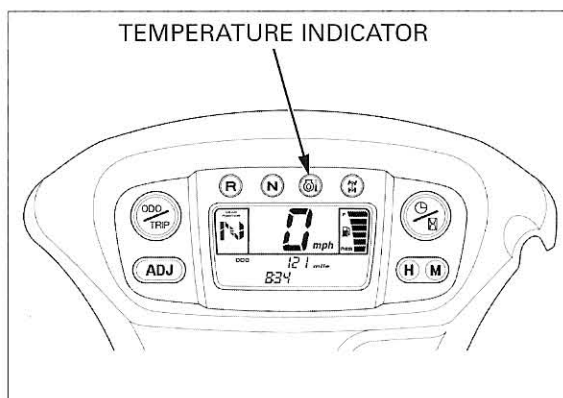
SYSTEM INSPECTION

NOTE:

- The oil/coolant temperature indicator should come on for a few seconds when the ignition switch is turned to "ON", and should extinguish shortly.

Check the neutral indicator and reverse indicator function properly.

- If they do not function, check the power/ground line (page 22-9).
- If they function, check as follows:



Temperature indicator does not come on when the ignition switch turned to "ON"

Seal the ECM connector with tape to prevent dirt and oil from entering the connector after disconnecting the 32P connector.

Release the connector lock lever and disconnect the engine control module (ECM) 32P connector (page 20-6).

NOTE:

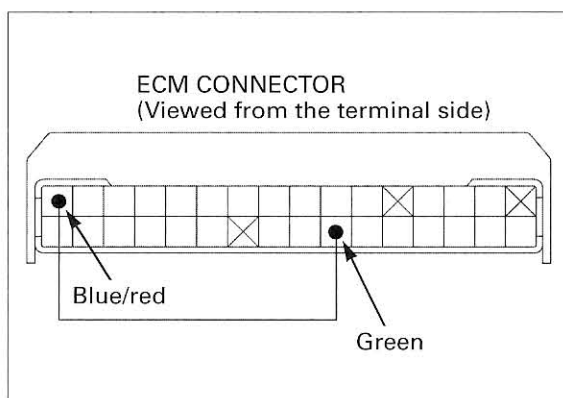
- When reconnecting the ECM 32P connector, check that there is no dirt and oil in the connector.

Be careful not to bend the connector terminals.

Short the Blue/red and Green wire terminals with a jumper wire.

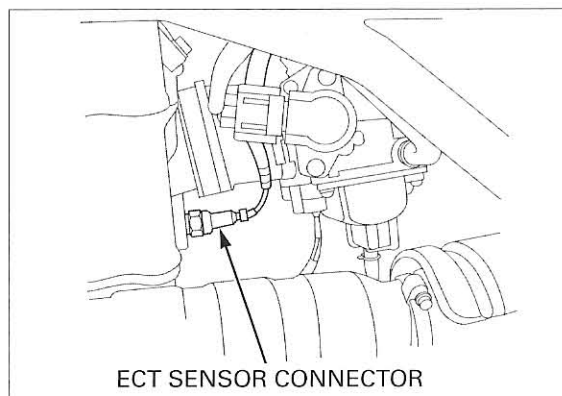
Turn the ignition switch to "ON" and check the temperature indicator.

- If the indicator comes on, replace the ECM.
- If the indicator does not come on, check for an open circuit in the Blue/red and Green wire. If the wires are OK, replace the combination meter.



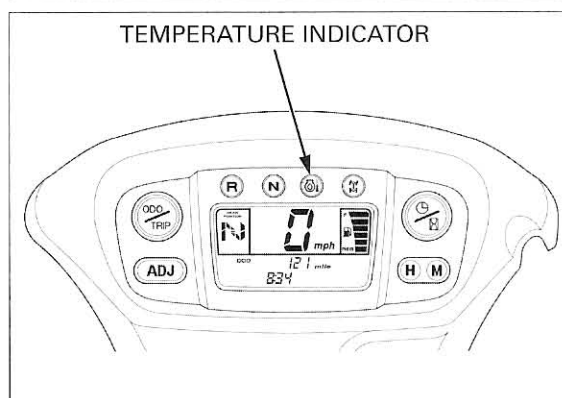
Temperature indicator does not go off with the fan motor stops

Disconnect the connector from the engine coolant temperature (ECT) sensor.

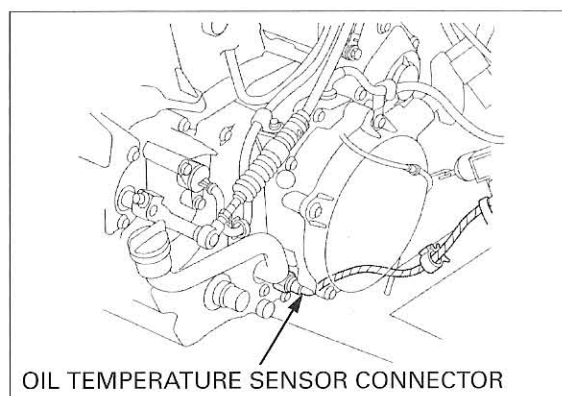


Turn the ignition switch to "ON" and check the temperature indicator.

- If the indicator comes on, then goes off, check the ECT sensor (page 22-15).



- If the indicator comes on and stays on, disconnect the connector from the oil temperature sensor and check the temperature indicator.
 - If the indicator goes off, check the oil temperature sensor (page 22-16).
 - If the indicator stays on, check for short circuit in the Black/blue wire and Light blue wire.

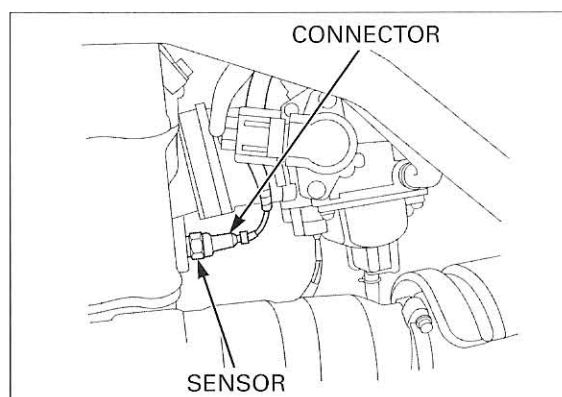


ECT SENSOR INSPECTION

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

Remove the left engine side cover (page 2-17).

Disconnect the ECT sensor connector and remove the ECT sensor.



Suspend the ECT sensor in a pan of coolant (50 – 50 mixture) on an electric heating element and measure the resistance through the sensor as the coolant heats up.

NOTE:

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

Resistance: 49 – 55 k Ω at 80°C (176°F)
27 – 28 Ω at 100°C (212°F)

Replace the ECT sensor if it is out of specifications by more than 10% at any temperature listed.

Apply locking agent to the ECT sensor threads. Do not apply to the sensor head.

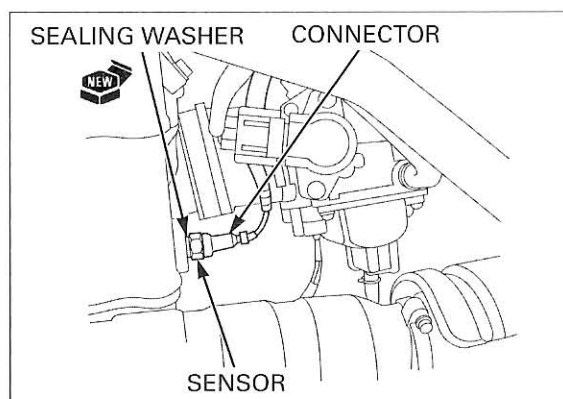
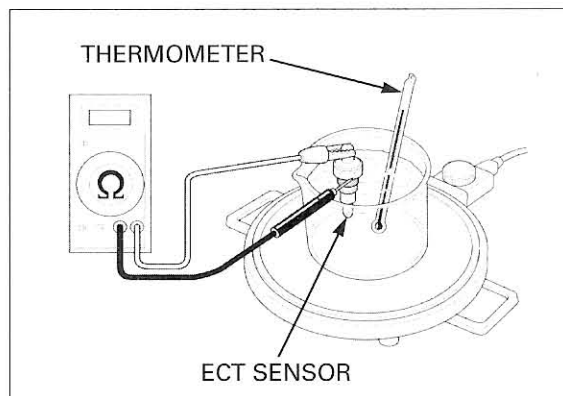
Install the ECT sensor and tighten it.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

Connect the ECT sensor connector.

Install the removed parts in the reverse order of removal.

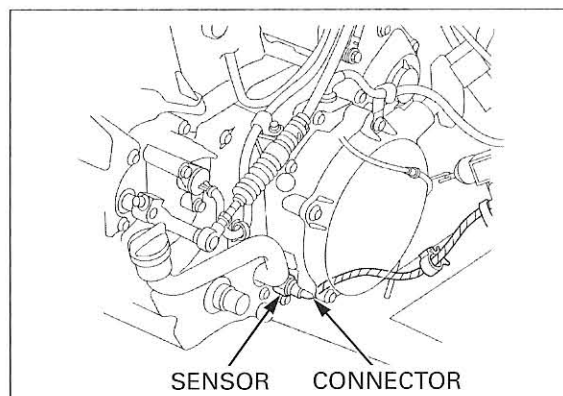
Fill and bleed the cooling system (page 6-7).



OIL TEMPERATURE SENSOR INSPECTION

Drain the engine oil (page 3-11).

Disconnect the oil temperature sensor connector and remove the oil temperature sensor.

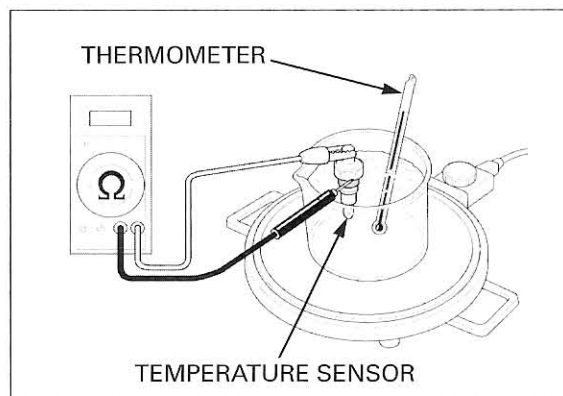


Suspend the oil temperature sensor in a pan of engine oil on an electric heating element and measure the resistance through the sensor as the oil heats up.

NOTE:

- Soak the element 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 temperature sensor touch the pan.

Resistance: 3.3 – 3.7 k Ω at 25°C (77°F)
95 – 112 Ω at 150°C (302°F)



Replace the oil temperature sensor if it is out of specifications by more than 10% at any temperature listed.

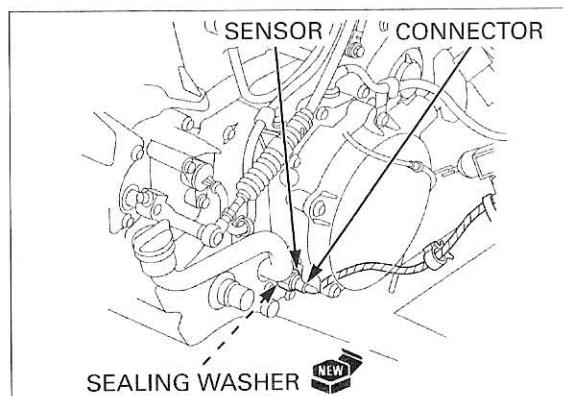
Install the oil temperature sensor with a new sealing washer and tighten it.

TORQUE: 18 N·m (1.8 kgf·m, 13 lbf·ft)

Connect the oil temperature sensor connector.

Install the removed parts in the reverse order of removal.

Fill the recommended engine oil (page 3-11).



BRAKE LIGHT SWITCH

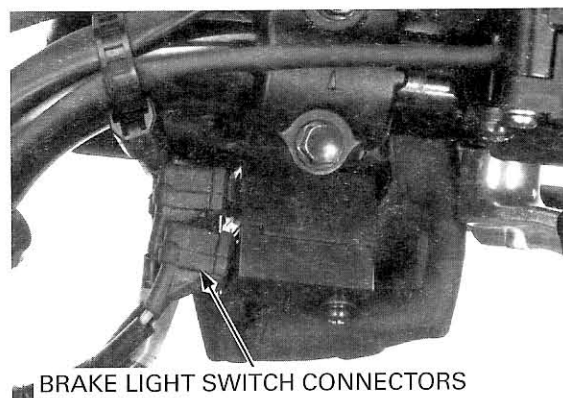
FRONT BRAKE LEVER

NOTE:

- The lower switch is the front brake light switch.

Disconnect the front brake lever switch connectors and check for continuity between the switch terminals.

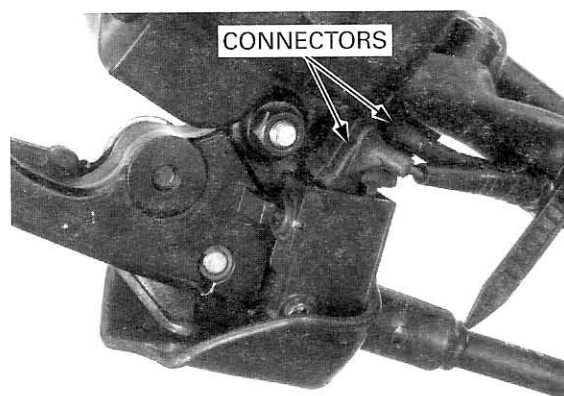
There should be continuity with the front brake lever squeezed and no continuity with the lever released.



REAR BRAKE LEVER

Disconnect the rear brake lever switch connectors and check for continuity between the switch terminals.

There should be continuity with the rear brake lever squeezed and no continuity with the lever released.

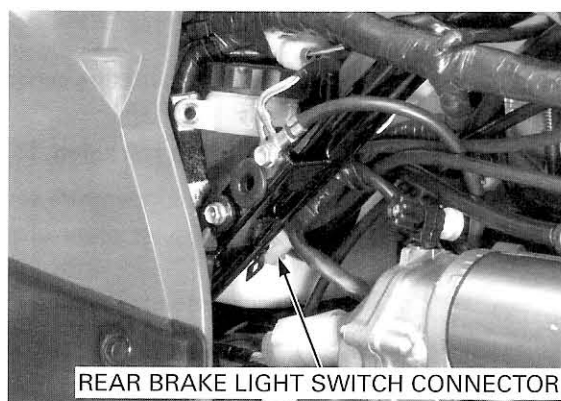


REAR BRAKE PEDAL

Remove the right side cover (page 2-4).

Disconnect the rear brake pedal switch 2P green 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

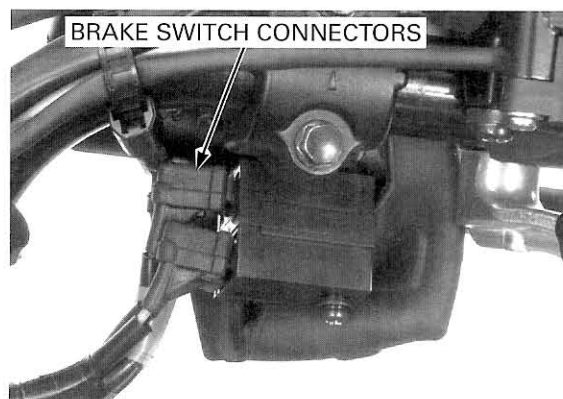
NOTE:

- The upper switch is the front brake (inhibitor) switch.

Check the front brake lever free play and adjust it if necessary (page 3-19).

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.

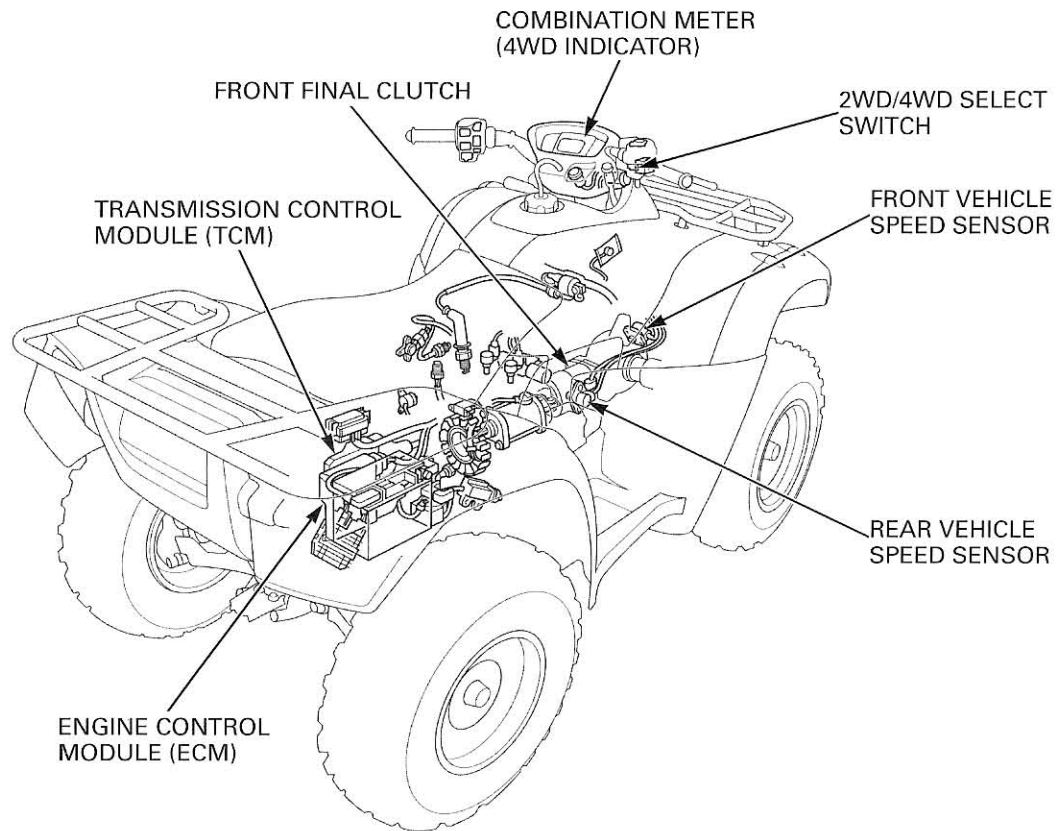


23. SELECTABLE 4WD SYSTEM

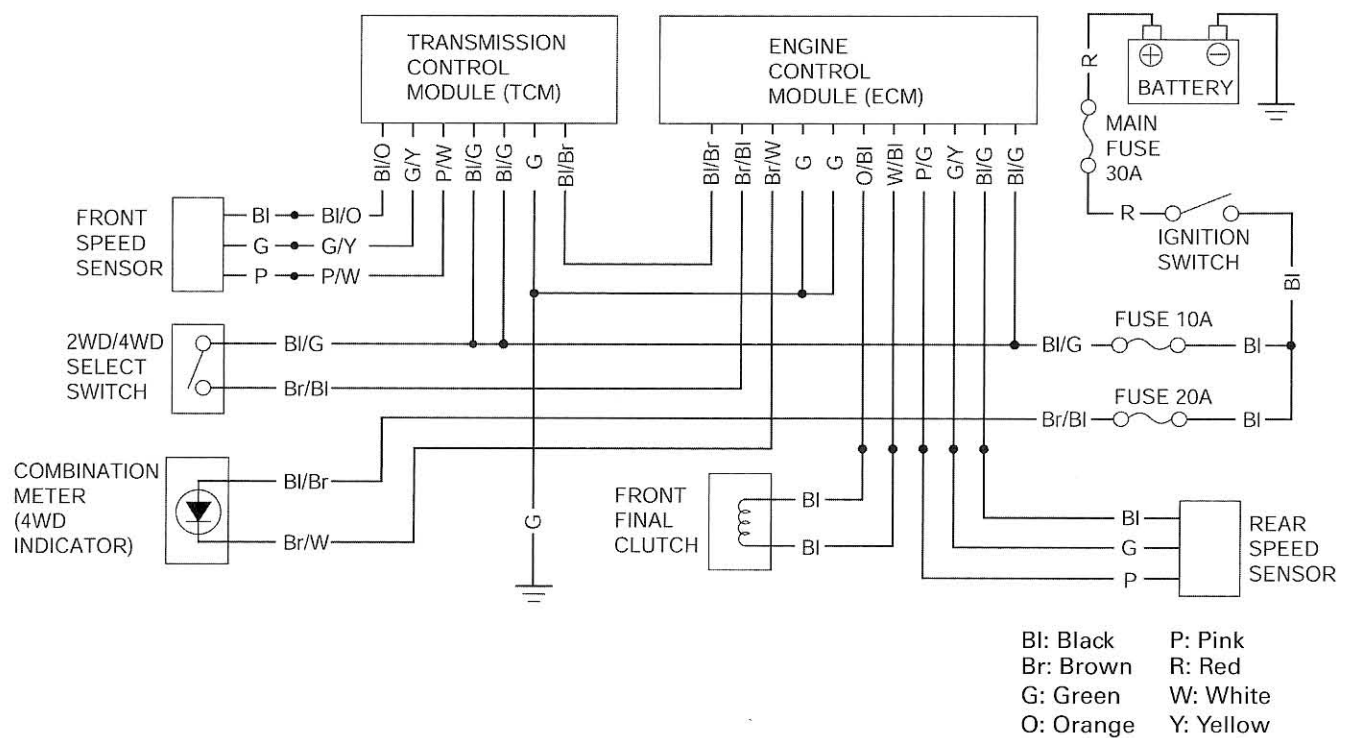
COMPONENT LOCATION	23-2	SERVICE INFORMATION	23-3
SYSTEM DIAGRAM.....	23-2	TROUBLESHOOTING.....	23-4

SELECTABLE 4WD SYSTEM

COMPONENT LOCATION



SYSTEM DIAGRAM



SERVICE INFORMATION

GENERAL

- The drive mode (2WD or 4WD) is changed electrically by operating front final clutch with the 2WD/4WD select switch.
- When checking the selectable 4WD system, always follow the steps in the troubleshooting (page 23-4).
- See page 17-2, for front final clutch information.
- A faulty selectable 4WD system is often related to poorly connected or corroded connections. Check those connections before proceeding.

TOOL

Inspection adaptor

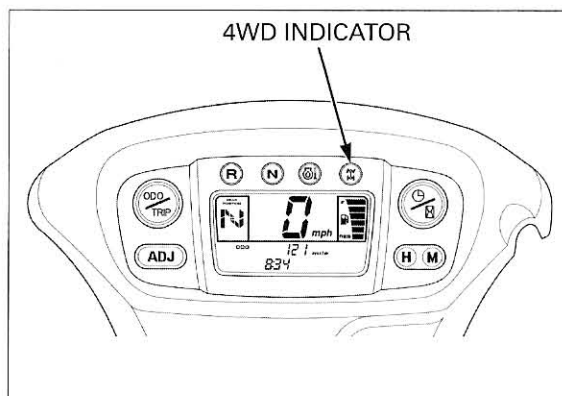
07GMJ-ML80100

TROUBLESHOOTING

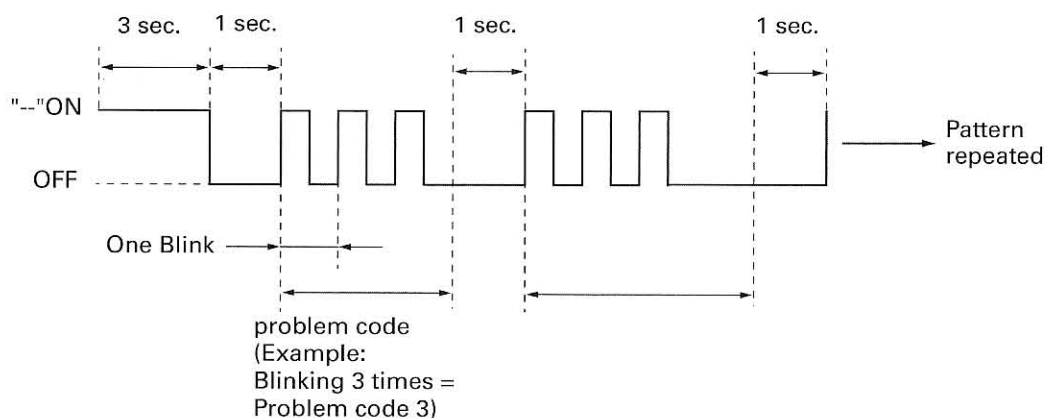
SELF-DIAGNOSTIC FUNCTION

When the Engine Control Module (ECM) detects a problem in the system, the 4WD indicator shows the problem code.

The 4WD indicator denotes the problem codes by blinking from one to five times.



PROBLEM CODE BLINKING PATTERN:



PROBLEM CODE 1: SYSTEM VOLTAGE**1. ECM Connector Inspection**

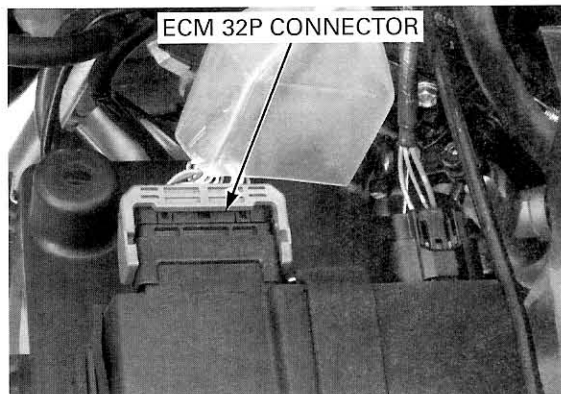
Seal the ECM connector with tape to prevent dirt and oil from entering the connector after disconnecting the 32P connector.

Turn the ignition switch to "OFF".
Disconnect the ECM 32P connector by releasing the lock lever (page 20-6).
Check the connector for loose contacts or corroded terminals.

Is the connector in good condition?

NO – Loose or poorly connected ECM 32P connector.

YES – GO TO STEP 2.

**2. ECM Power Input line Inspection**

Be careful not to bend the connector terminals.

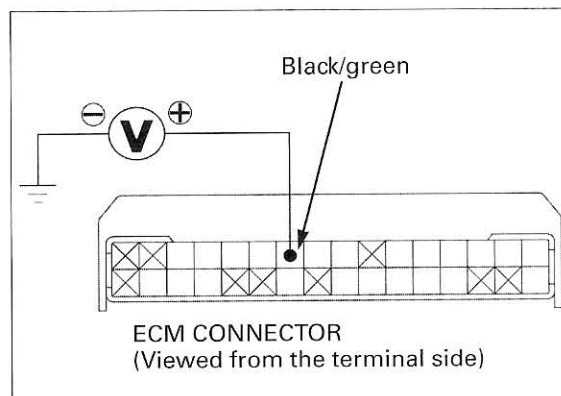
Turn the ignition switch to "ON".
Measure the voltage between the wire harness side connector terminal and ground.

Connection: Black/green (+) – Ground (-)

Is the voltage above 10 V?

NO – • Undercharged battery.
• Faulty battery.

YES – GO TO STEP 3.

**3. Failure Reproduction**

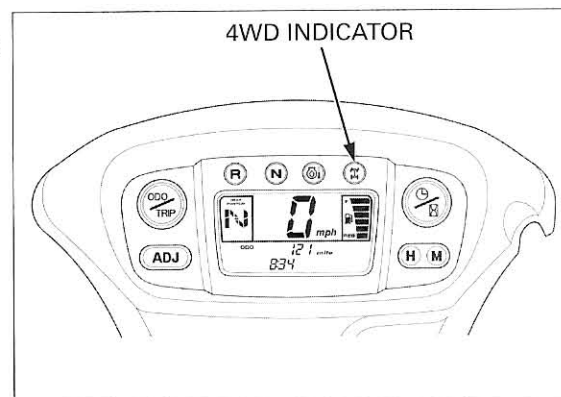
When connecting the ECM 32P connector, check that there is no dirt and oil in the connector.

Connect the ECM 32P connector.
Turn the ignition switch to "ON" and check that the 4WD indicator blinks.

Does the 4WD indicator blink once?

NO – No problem (Temporary failure).

YES – Faulty ECM.



PROBLEM CODE 2 OR 3: FRONT FINAL CLUTCH SYSTEM

1. ECM Connector Inspection

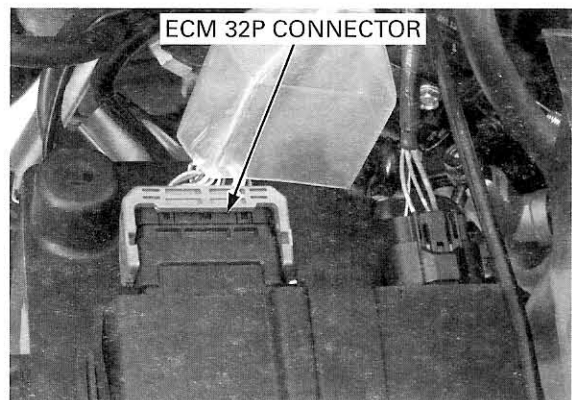
Seal the ECM connector with tape to prevent dirt and oil from entering the connector after disconnecting the 32P connector.

Turn the ignition switch to "OFF".
Disconnect the ECM 32P connector by releasing the lock lever (page 20-6).
Check the connector for loose contacts or corroded terminals.

Is the connector in good condition?

NO – Loose or poorly connected ECM 32P connector.

YES – GO TO STEP 2.



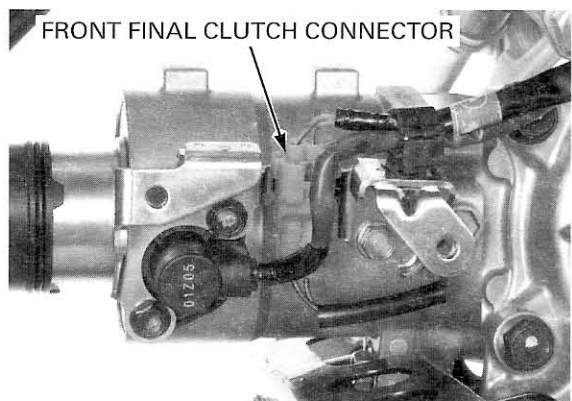
2. Front Final Clutch Connector Inspection

Remove the speed sensor cover (page 17-11).
Disconnect the front final clutch 2P connector.
Check the connector for loose contacts or corroded terminals.

Is the connector in good condition?

NO – Loose or poorly connected front final clutch 2P connector.

YES – GO TO STEP 3.



3. Front Final Clutch Line Open Circuit Inspection

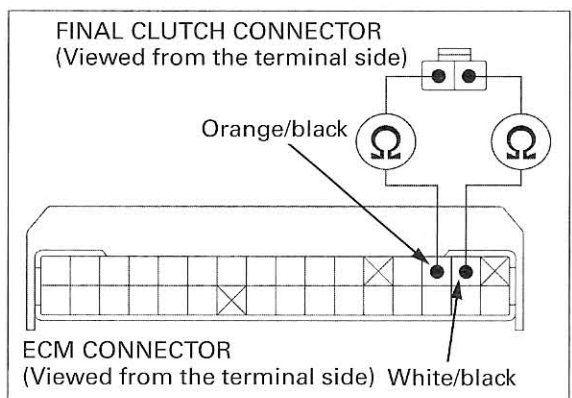
Be careful not to bend the connector terminals.

Check the Orange/black and White/black wires for continuity between the ECM 32P and front final clutch 2P connector terminals.

Is there continuity?

NO – • Open circuit in the Orange/black wire.
• Open circuit in White/black wire.

YES – GO TO STEP 4.



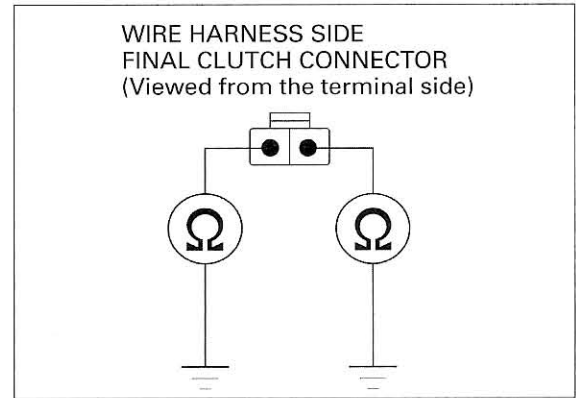
4. Front Final Clutch Line Short Circuit Inspection

Check the Orange/black and White/black wires for continuity between the wire harness side clutch 2P connector terminals and ground.

Is there continuity?

- YES** – • Short circuit in the Orange/black wire.
• Short circuit in White/black wire.

NO – GO TO STEP 5.



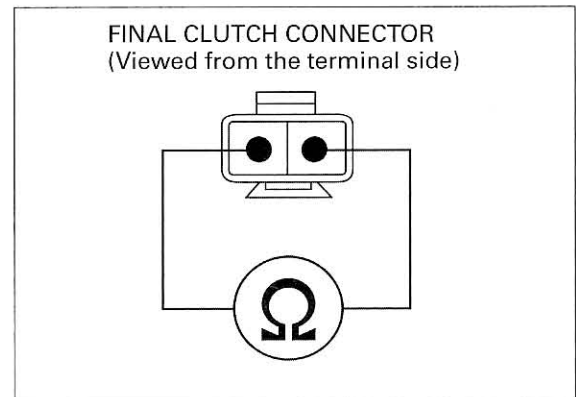
5. Front Final Clutch Inspection

Measure the resistance between the final clutch side 2P connector terminals.

Is the resistance within 5.1 – 5.8 Ω (20°C/68°F)?

NO – Faulty front final clutch.

YES – GO TO STEP 6.



6. Failure Reproduction With The Engine Stopped

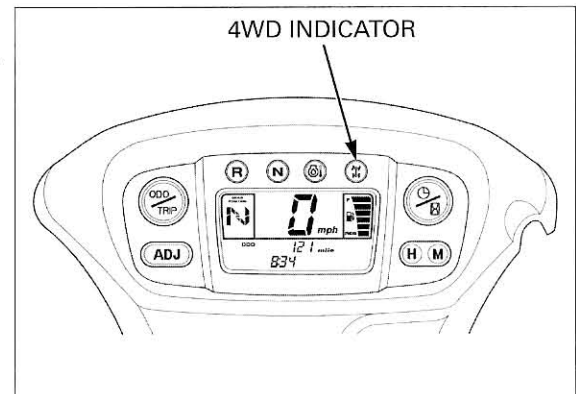
When connecting the ECM 32P connector, check that there is no dirt and oil in the connector.

Connect the ECM 32P and front final clutch 2P connectors. Turn the ignition switch to "ON" and the 2WD/4WD select switch to "4WD", and check that the 4WD indicator blinks.

Does the 4WD indicator blink 2 or 3 times?

NO – No problem (Temporary failure).

YES – GO TO STEP 7.



7. Failure Reproduction With The Engine Running

Start the engine and check that the 4WD indicator blinks.

Does the 4WD indicator blink 2 or 3 times?

NO – No problem (Temporary failure).

YES – Faulty ECM.

PROBLEM CODE 4: REAR VEHICLE SPEED SENSOR (VSS)

1. ECM Connector Inspection

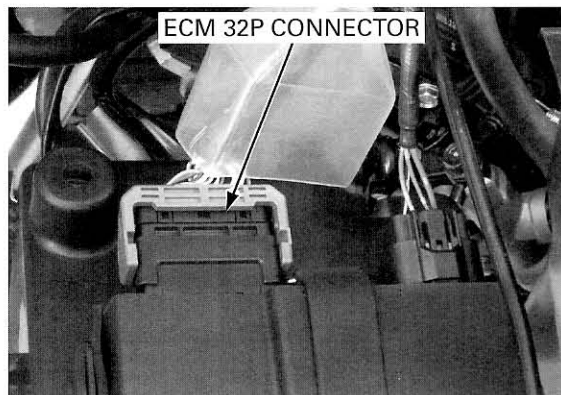
Seal the ECM connector with tape to prevent dirt and oil from entering the connector after disconnecting the 32P connector.

Turn the ignition switch to "OFF".
Disconnect the ECM 32P connector by releasing the lock lever (page 20-6).
Check the connector for loose contacts or corroded terminals.

Is the connector in good condition?

NO – Loose or poorly connected ECM 32P connector.

YES – GO TO STEP 2.



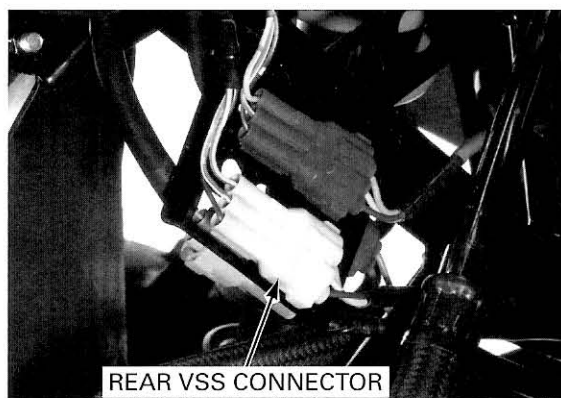
2. Rear VSS Connector Inspection

Remove the left inner fender (page 2-9).
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 3.



3. Rear VSS Input Line Inspection

When connecting the ECM 32P connector, check that there is no dirt and oil in the connector.

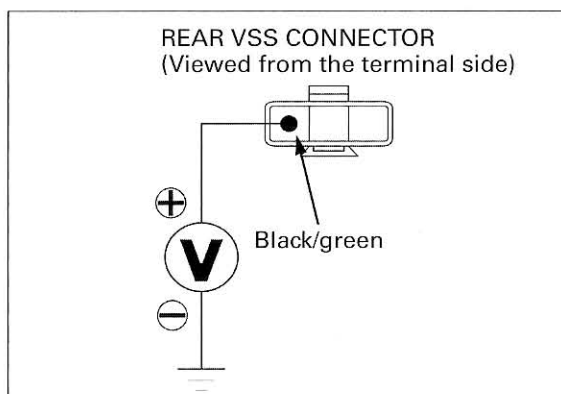
Connect the ECM 32P connector.
Turn the ignition switch to "ON".
Measure the voltage between the wire harness side rear VSS 3P connector terminal and ground.

Connection: Black/green (+) – Ground (–)

Is the voltage more than 10 V?

NO – Open or short circuit in the Black/green wire.

YES – GO TO STEP 4.



4. Rear VSS Ground Line Inspection

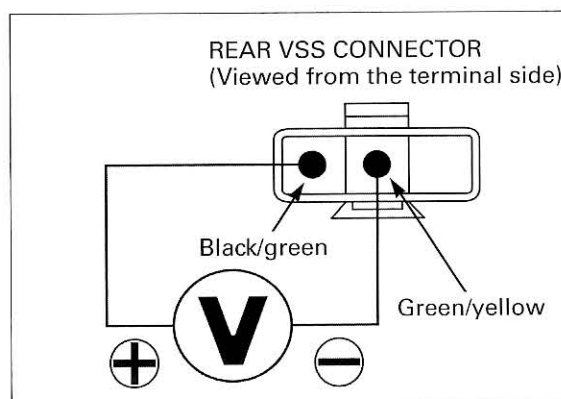
Measure the voltage between the wire harness side rear VSS 3P connector terminals.

Connection: Black/green (+) – Green/yellow (–)

Is the voltage more than 10 V?

NO – Open circuit in the Green/yellow wire.

YES – GO TO STEP 5.



5. Rear VSS Output Line Inspection

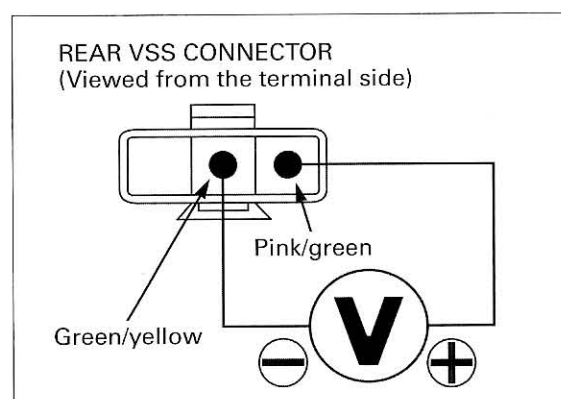
Measure the voltage between the wire harness side rear VSS 3P connector terminals.

Connection: Pink/green (+) – Green/yellow (–)

Is the voltage approximately 5 V?

NO – Open or short circuit in the Pink/green wire.

YES – GO TO STEP 6.



6. Rear VSS Inspection

Turn the ignition switch to "OFF".

Connect the inspection adaptor to the rear VSS 3P connectors.

TOOL:

Inspection adaptor **07GMJ-ML80100**

Shift the transmission in neutral.

Raise the wheels off the ground and support the vehicle securely with a hoist or equivalent.

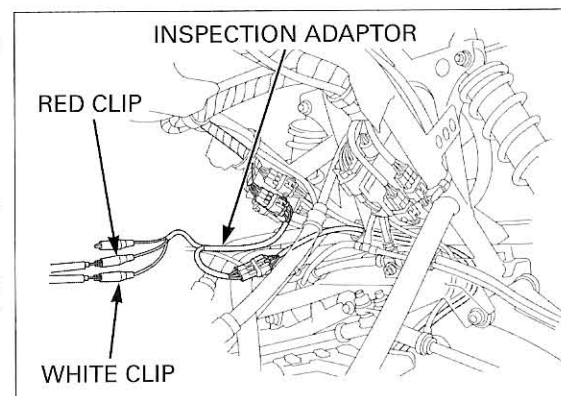
Turn the ignition switch to "ON".

Measure the voltage between the Red clip (+) and White clip (–) while slowly turning the rear wheels by hand.

Is there 0 to 5 V pulse voltage?

NO – Faulty rear VSS.

YES – GO TO STEP 7.



SELECTABLE 4WD SYSTEM

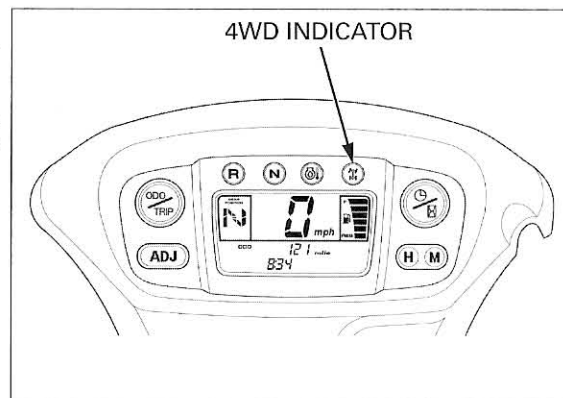
7. Failure Reproduction

Turn the ignition switch to "OFF".
Remove the inspection adaptor and connect the rear VSS connector.
Turn the 2WD/4WD select switch to "4WD".
Test-drive the vehicle above 4 mph for more than 5 seconds and check that the 4WD indicator blinks.

Does the 4WD indicator blink 4 times?

NO – No problem (Temporary failure).

YES – Faulty ECM.



PROBLEM CODE 5: FRONT VEHICLE SPEED SENSOR (VSS)

1. TCM Connector Inspection

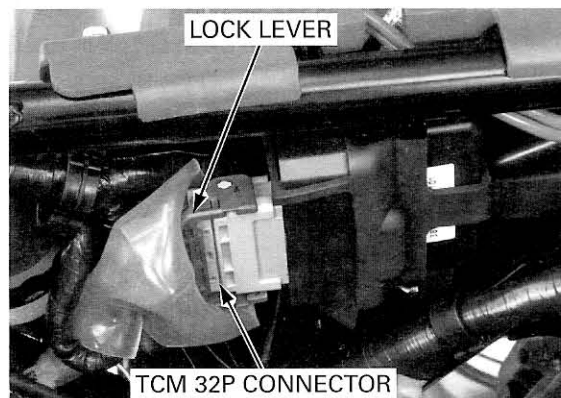
Seal the TCM connector with tape to prevent dirt and oil from entering the connector after disconnecting the 32P connector.

Turn the ignition switch to "OFF".
Remove the air cleaner housing (page 5-5).
Disconnect the Transmission Control Module (TCM) 32P connector by releasing the lock lever. Check the connector for loose contacts or corroded terminals.

Is the connector in good condition?

NO – Loose or poorly connected TCM 32P connector.

YES – GO TO STEP 2.



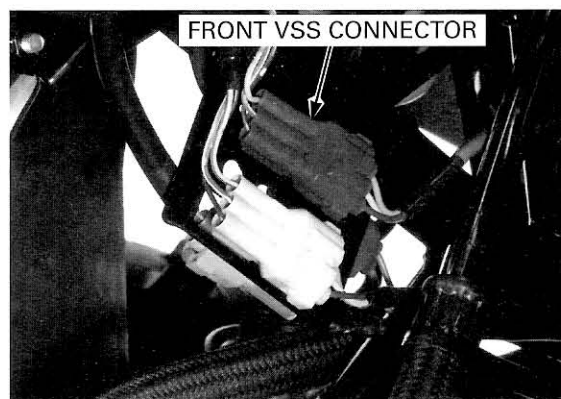
2. Front VSS Connector Inspection

Remove the left inner fender (page 2-9).
Disconnect the front VSS 3P blue 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 3.



3. Front VSS Input Line Inspection

When connecting the TCM 32P connector, check that there is no dirt and oil in the connector.

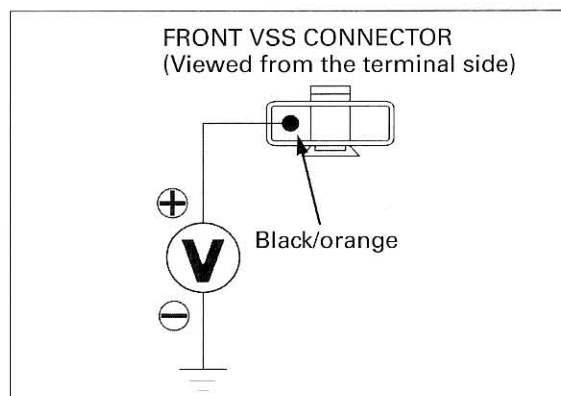
Connect the TCM 32P connector.
Turn the ignition switch to "ON".
Measure the voltage between the wire harness side front VSS 3P connector terminal and ground.

Connection: Black/orange (+) – Ground (–)

Is the voltage more than 10 V?

NO – Open or short circuit in the Black/orange wire.

YES – GO TO STEP 4.



4. Front VSS Ground Line Inspection

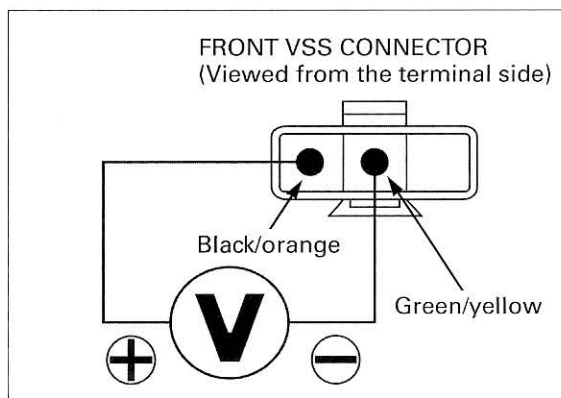
Measure the voltage between the wire harness side front VSS 3P connector terminals.

Connection: Black/orange (+) – Green/yellow (–)

Is the voltage more than 10 V?

NO – Open circuit in the Green/yellow wire.

YES – GO TO STEP 5.



5. Front VSS Output Line Inspection

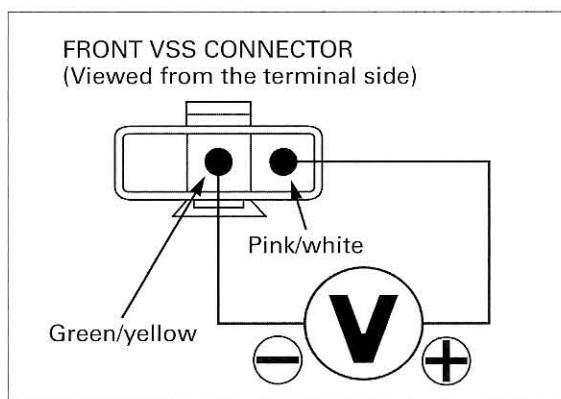
Measure the voltage between the wire harness side front VSS 3P connector terminals.

Connection: Pink/white (+) – Green/Yellow (–)

Is the voltage approximately 5 V?

NO – Open or short circuit in the Pink/white wire.

YES – GO TO STEP 6.



6. Front VSS Inspection

Turn the ignition switch to "OFF".
Connect the inspection adaptor to the front VSS 3P connectors.

TOOL:

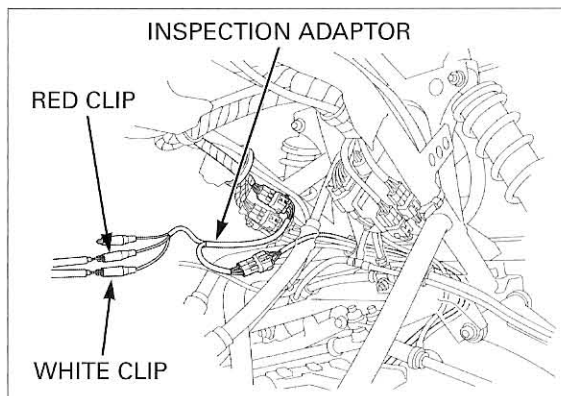
Inspection adaptor 07GMJ-ML80100

Shift the transmission in neutral.
Raise the wheels off the ground and support the vehicle securely with a hoist or equivalent.
Turn the ignition switch to "ON".
Measure the voltage between the Red clip (+) and White clip (–) while slowly turning the front wheels by hand.

Is there 0 to 5 V pulse voltage?

NO – Faulty front VSS.

YES – GO TO STEP 7.



7. Front VSS Signal Line Inspection

Turn the ignition switch to "OFF".
Remove the inspection adaptor and connect the front VSS connector.

Disconnect the ECM and TCM 32P connectors.

Seal the ECM and TCM connectors with tapes to prevent dirt and oil from entering the connectors after disconnecting the 32P connectors.

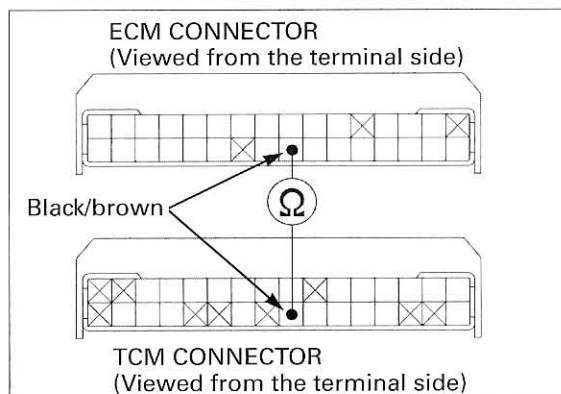
Be careful not to bend the connector terminals.

Check the Black/brown wire for continuity between the ECM and TCM 32P connector terminals.

Is there continuity?

NO – Open circuit in the Black/brown wire.

YES – GO TO STEP 8.



8. Failure Reproduction

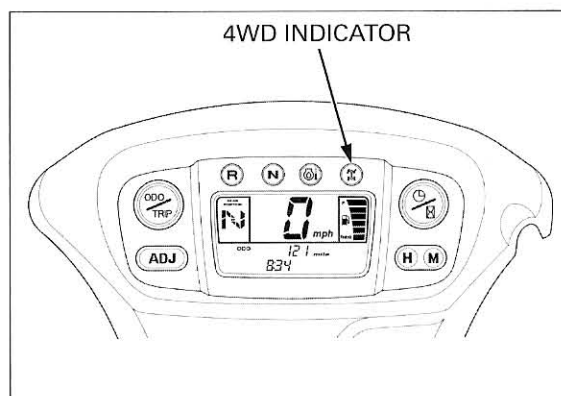
When connecting the ECM and TCM 32P connectors, check that there is no dirt and oil in the connectors.

Connect the ECM and TCM 32P connectors. Turn the 2WD/4WD select switch to "4WD". Test-drive the vehicle above 4 mph for more than 5 seconds and check that the 4WD indicator blinks.

Does the 4WD indicator blink 5 times?

NO – No problem (Temporary failure).

YES – GO TO STEP 9.



9. Failure Reproduction With a New TCM

Replace the TCM with a new one. Turn the 2WD/4WD select switch to "4WD". Test-drive the vehicle above 4 mph for more than 5 seconds and check that the 4WD indicator blinks.

Does the 4WD indicator blink 5 times?

NO – Faulty TCM.

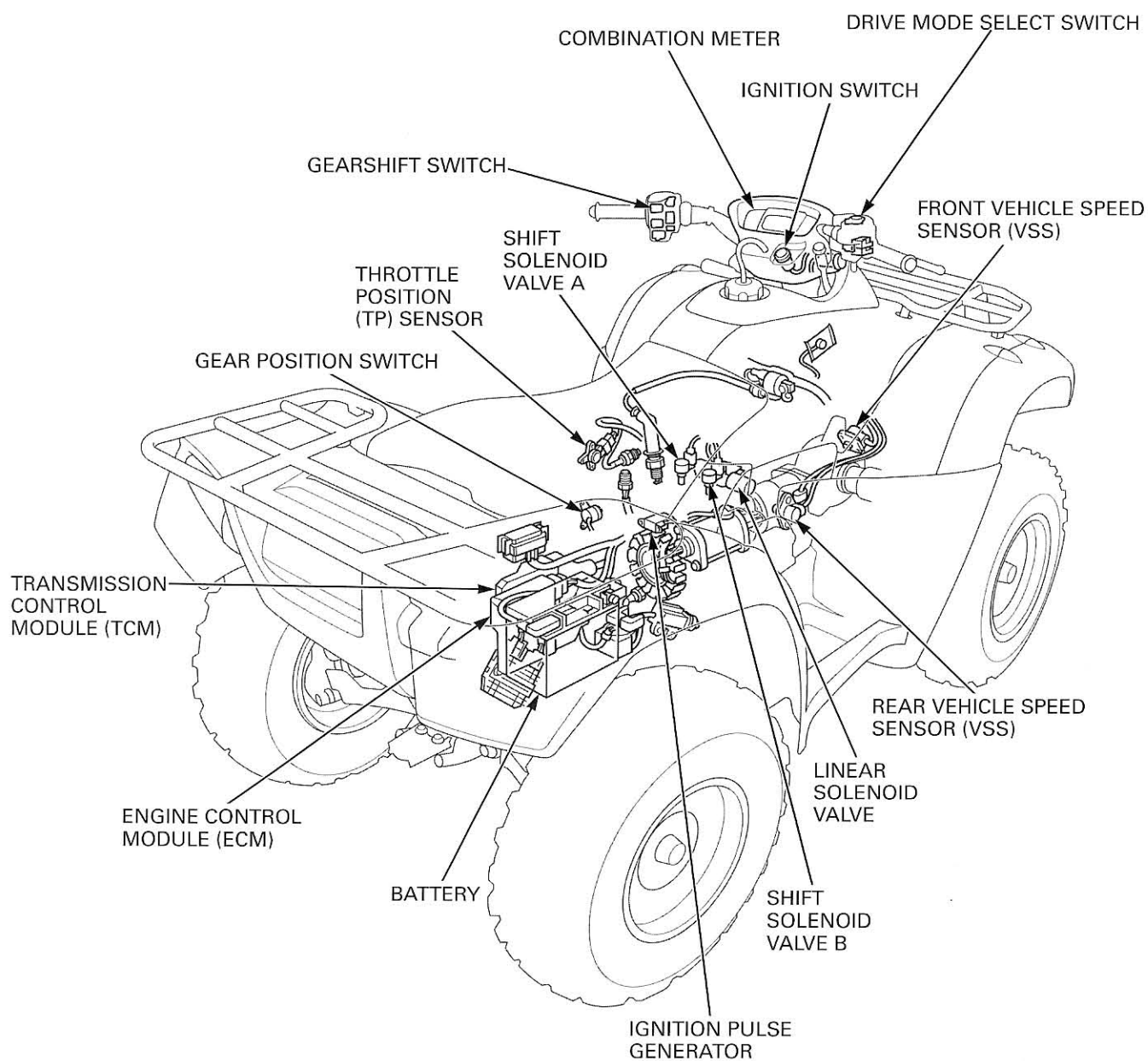
YES – Faulty ECM.

24. AUTOMATIC TRANSMISSION SYSTEM

COMPONENT LOCATION	24-2	DIAGNOSTIC TROUBLESHOOTING	24-13
SERVICE INFOMATION.....	24-3	GEAR POSITION SWITCH.....	24-39
CONNECTOR LOCATION.....	24-4	GEARSHIFT SWITCH.....	24-40
SYSTEM DIAGRAM.....	24-6	DRIVE MODE SELECT SWITCH.....	24-41
BEFORE STARTING TROUBLESHOOTING	24-7	THROTTLE POSITION (TP) SENSOR	24-42
TROUBLESHOOTING CHART	24-12		

AUTOMATIC TRANSMISSION SYSTEM

COMPONENT LOCATION



SERVICE INFORMATION

GENERAL

- This section covers service of the electrical system of the automatic transmission. Refer to page 12-2 if drive performance failure is caused by the mechanical system.
- Read "Before Starting Troubleshooting" carefully, and inspect and troubleshoot the automatic transmission system according to the Diagnostic Troubleshooting. Observe each step of the procedures one by one. Note the problem code and probable faulty part before starting diagnosis and troubleshooting.
- When the Transmission Control Module (TCM) or Engine Control Module (ECM) detects a problem in the automatic transmission system, the TCM stops the automatic shift function and anti-creep function, and defaults the transmission into 2nd gear. Also, the gear position indicator blinks "--" to indicate the problem code.
- The TCM and ECM may be damaged if dropped. Also, if a connector is disconnected when current is flowing, the excessive voltage may damage the TCM and 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

TOOL

Inspection adaptor

07GMJ-ML80100

CONNECTOR LOCATION

Refer to the secondary notes for the parts that must be removed for service.

For example: FRONT SPEED SENSOR 3P

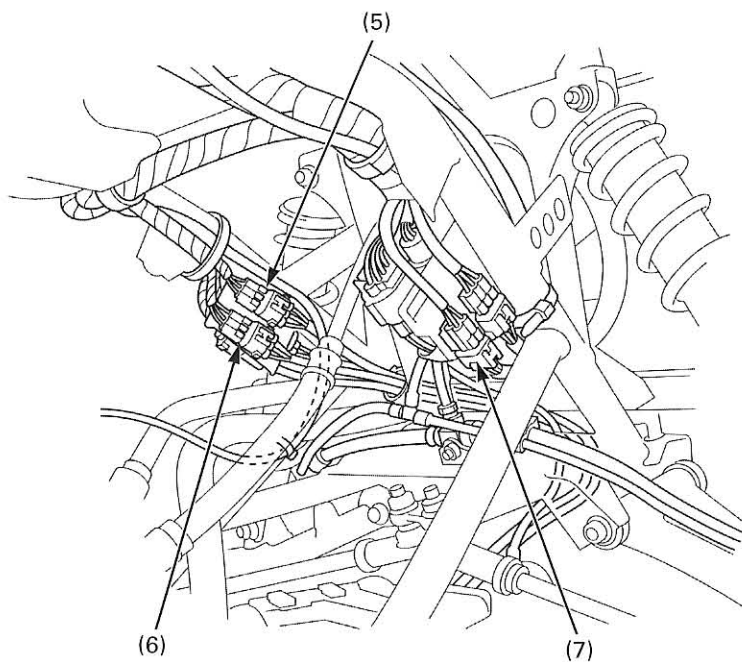
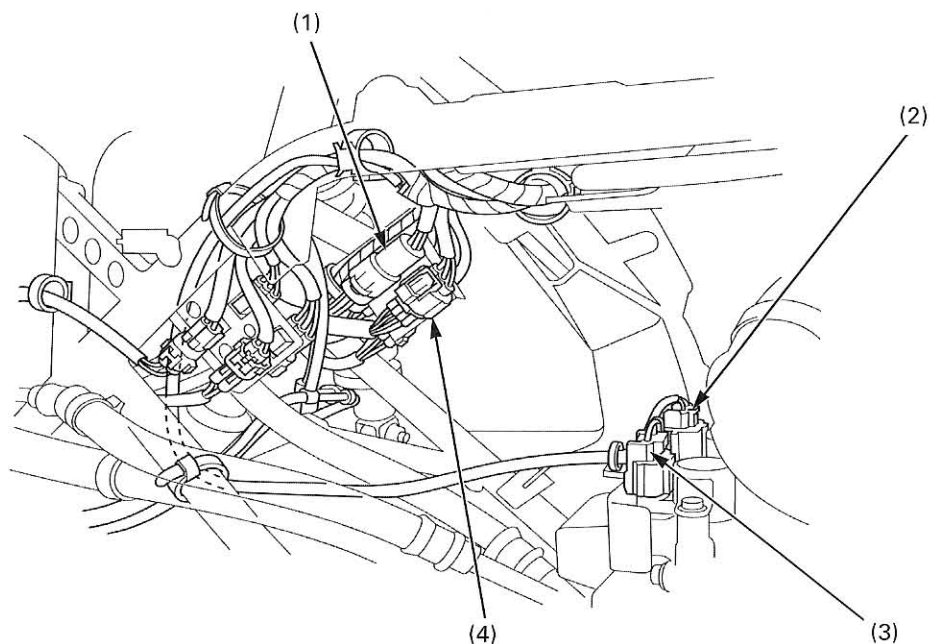
– Left inner fender (page 2-9)

← Electrical component

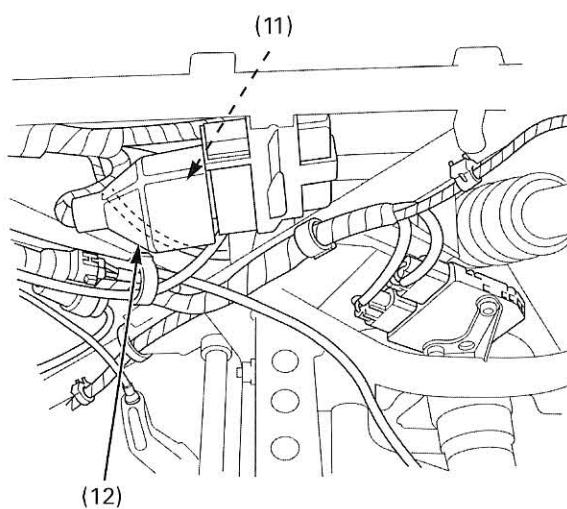
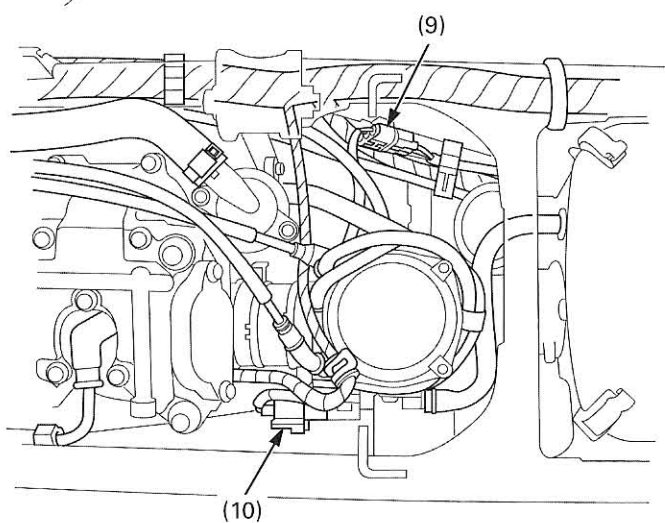
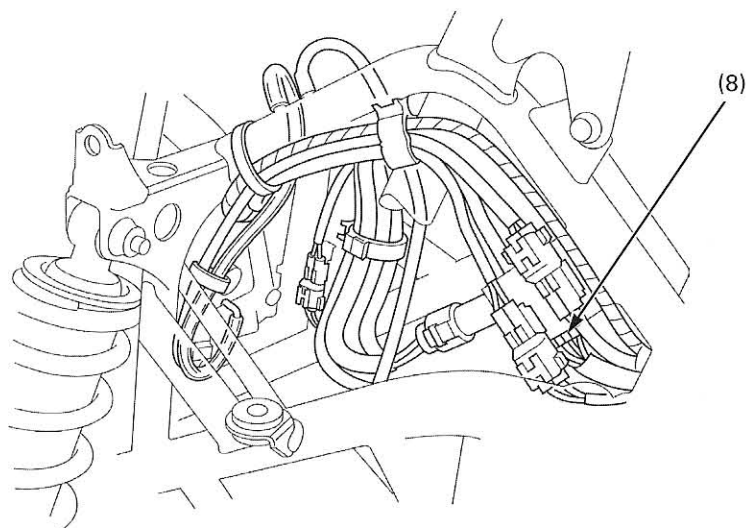
← The parts that must be removed for service

- (1) IGNITION SWITCH 4P
 - Right inner fender (page 2-9)
- (2) SHIFT SOLENOID VALVE B 2P
- (3) SHIFT SOLENOID VALVE A 2P
- (4) LEFT HANDLEBAR SWITCH 10P
 - Right inner fender (page 2-9)

- (5) FRONT VEHICLE SPEED SENSOR (VSS) 3P
 - Left inner fender (page 2-9)
- (6) REAR VEHICLE SPEED SENSOR (VSS) 3P
 - Left inner fender (page 2-9)
- (7) DRIVE MODE SELECT SWITCH 3P
 - Right inner fender (page 2-9)

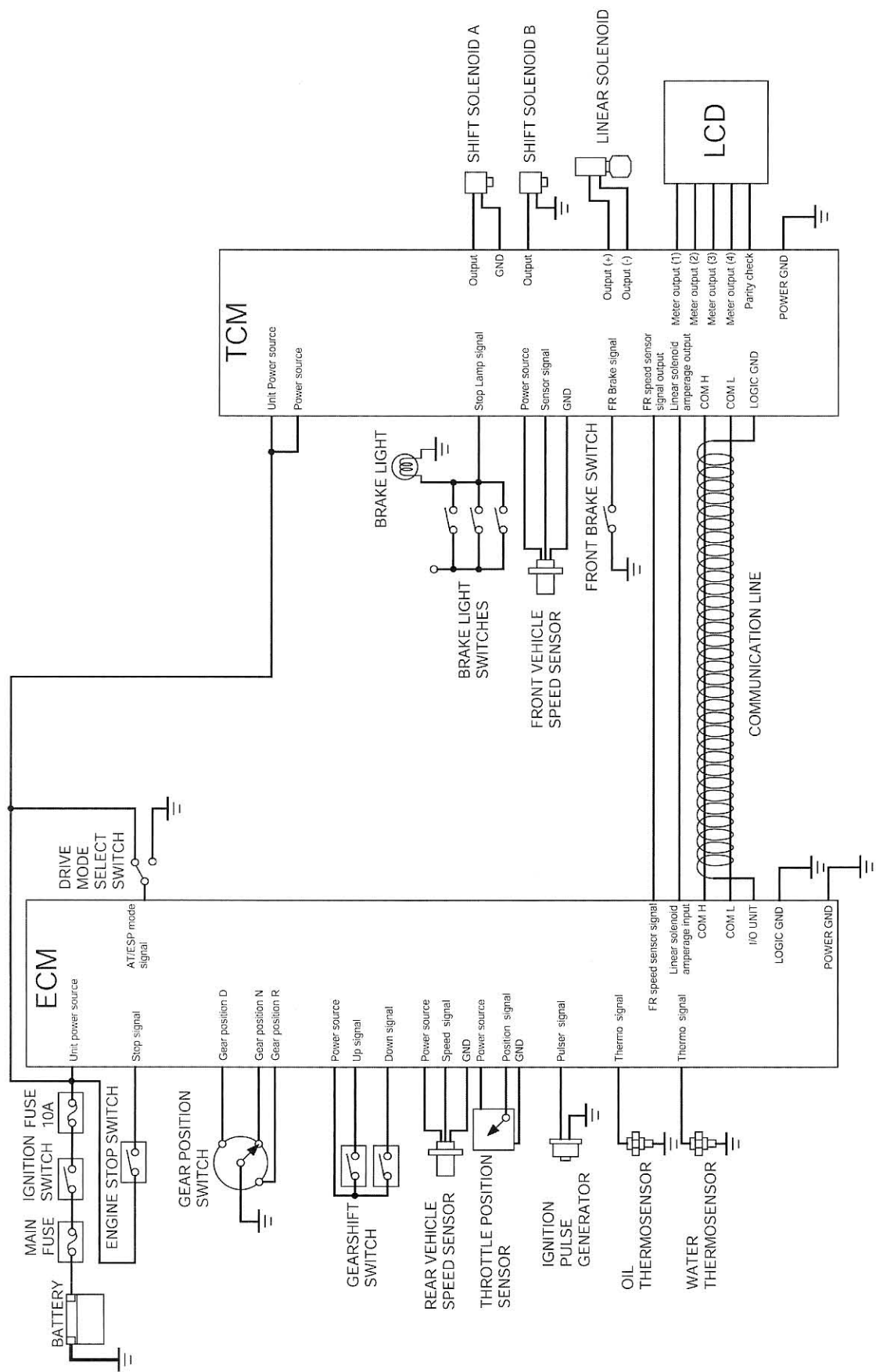


- (8) ICOMBINATION METER 14P
 - Fuel tank (page 5-22)
- (9) GEAR POSITION SWITCH 3P
 - Seat (page 2-4)
 - Right side cover (page 2-4)
- (10) THROTTLE POSITION (TP) SENSOR 3P
 - Left fuel tank side cover (page 2-6)
- (11) ENGINE CONTROL MODULE (ECM) 32P
 - Battery case (page 20-6)
- (12) TRANSMISSION CONTROL MODULE (TCM) 32P
 - Air cleaner housing (page 5-5)



AUTOMATIC TRANSMISSION SYSTEM

SYSTEM DIAGRAM



BEFORE STARTING TROUBLESHOOTING

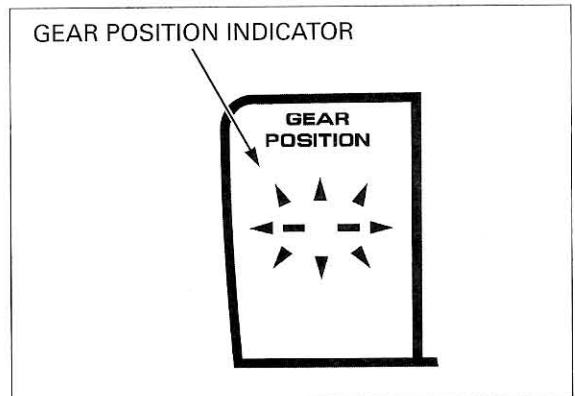
SELF-DIAGNOSTIC FUNCTION

OUTLINE

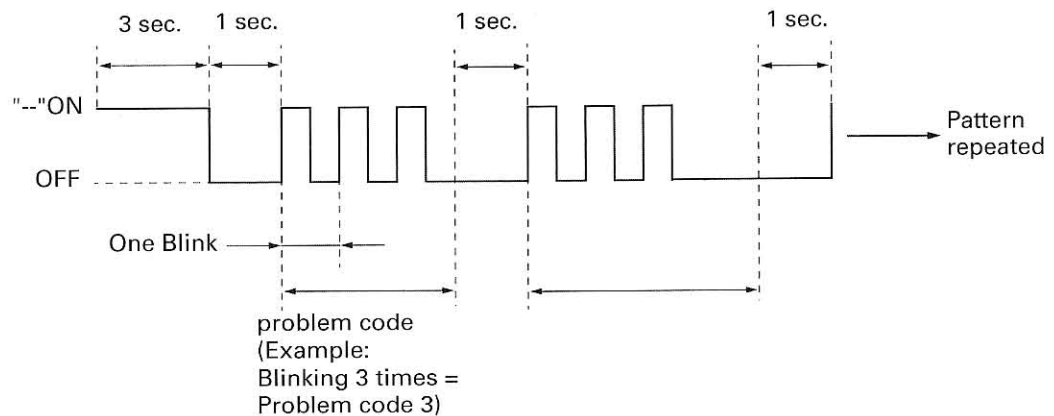
The engine control module (ECM) has a self-diagnostic function to constantly monitor the automatic transmission system with the Transmission Control Module (TCM). When the ECM and TCM detect a problem in the system, they function as follows:

- the gear position indicator on the meter blinks to notify the rider of a problem.
- the shift control stops in a fail-safe mode and the transmission defaults to 2nd gear.
- The ECM and TCM check the condition of the automatic transmission system by detecting the signals from each sensor, switch and solenoid valve when the ignition switch is turned to "ON" and during driving. When the ECM or TCM detects a problem, the ECM indicates the problem code by blinking "--" on the gear position indicator.
- The automatic transmission system stops functioning when a problem occurs, but the vehicle can still drive. The shift function can be reset by turning the ignition switch to "OFF" and "ON", but the shift control stops when the ECM or TCM detects the problem again.

The ECM stores the problem symptom as a problem code in the erasable memory. It is necessary to retrieve the problem code(s) before starting the diagnostic troubleshooting (page 24-8).



PROBLEM CODE BLINKING PATTERN:



AUTOMATIC TRANSMISSION SYSTEM

RETRIEVAL/ERASURE OF PROBLEM CODE

NOTE:

- After retrieval, the problem code is indicated by number of blinks of the "--" on the gear position indicator.
- The problem code is not erased by turning the ignition switch to "OFF" while the problem code is being output. Note that turning the ignition switch to "ON" again may not display the problem code. To show the problem code, perform the problem code retrieval procedures.
- 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, begin diagnostic troubleshooting starting with the latest code (i.e, the code indicated first).
- Be sure to note the retrieval problem code(s).
- After performing diagnostic troubleshooting (including initial setting; page 24-10), erase the problem code(s) (page 24-9) and test-drive the vehicle to be sure that the problem(s) have been removed.

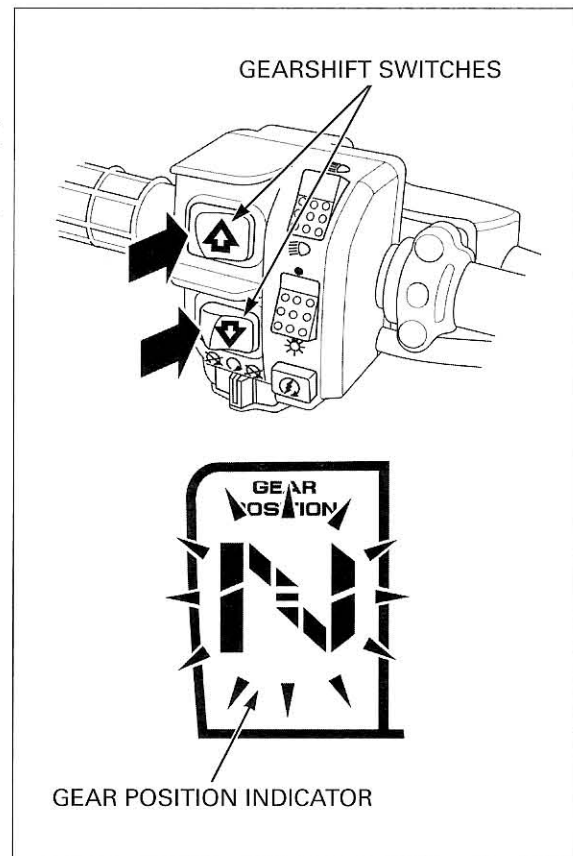
RETRIEVAL

1. With the vehicle stopped, put the gearshift lever in the "N" (neutral), be sure that the neutral indicator comes on and turn the ignition switch to "OFF".
2. Turn the ignition switch to "ON" while pushing the UP and DOWN shift switches (gearshift switches) simultaneously.

The "N" on the gear position indicator starts blinking.

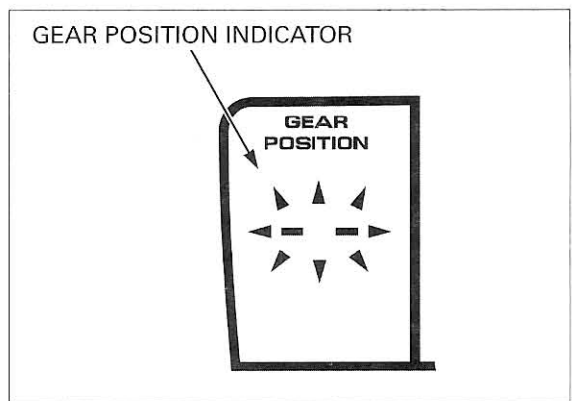
3. Within 5 seconds after turning the ignition switch to "ON", push the UP and DOWN shift switches simultaneously again for 2 seconds or more.

If more than 5 seconds elapse or the procedures are incorrect, the "N" stops blinking and stays on. Repeat the procedures from step 1 at this time.

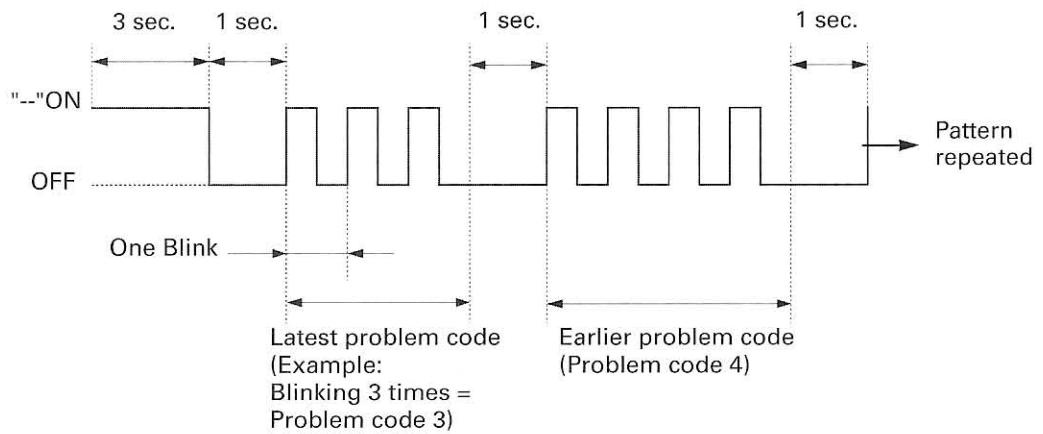


4. The problem code is displayed by the number of blinks of the "--" on the gear position indicator (page 24-12).

If there is no problem code memory in the system, the "--" comes on for 3 seconds and goes out.

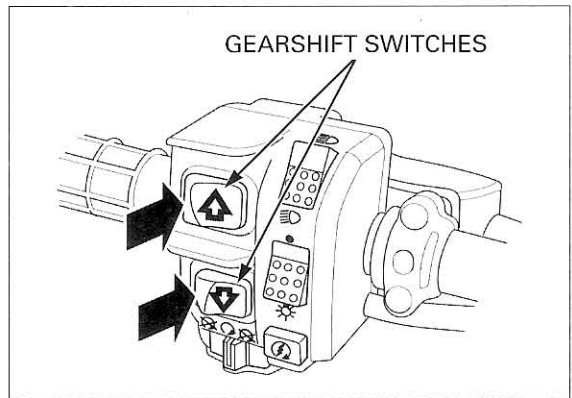


PROBLEM CODE BLINKING PATTERN:



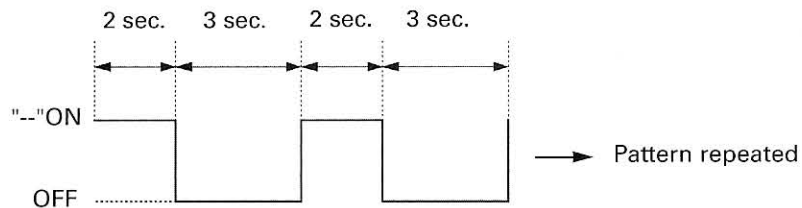
TO ERASE THE PROBLEM CODE

1. Perform the retrieval procedures (page 24-8).
2. 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).
3. When the erasure is completed, the blinking pattern changes to the erasure confirmation blink.
4. Turn the ignition switch to "OFF".



AUTOMATIC TRANSMISSION SYSTEM

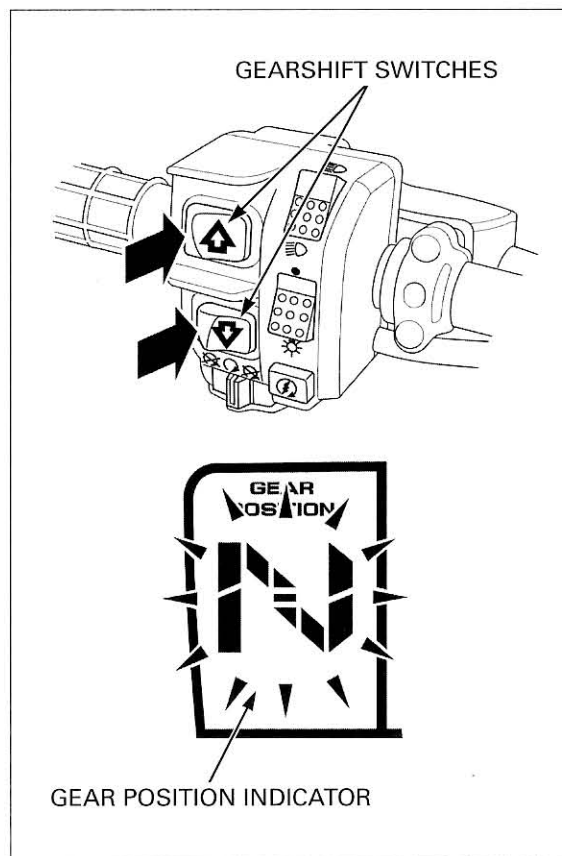
ERASURE CONFIRMATION BLINKING PATTERN:



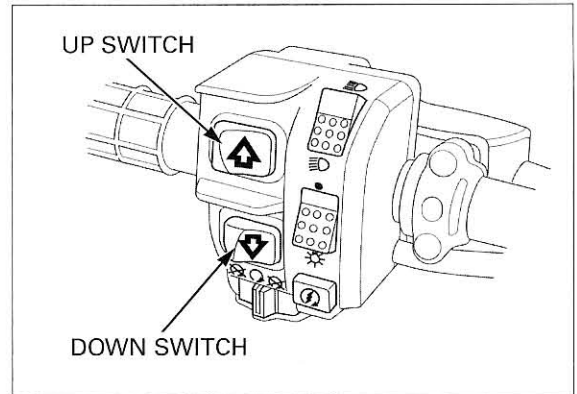
INITIAL SETTING PROCEDURE

NOTE:

- After replacing the ECM or throttle position sensor, perform the initial setting procedure.
- With the vehicle stopped, put the gearshift lever in "N" (neutral), be sure that the neutral indicator comes on and turn the ignition switch to "OFF".
 - Turn the ignition switch to "ON" while pushing the UP and DOWN shift switches (gearshift switches) simultaneously.
The "N" on the gear position indicator starts blinking.

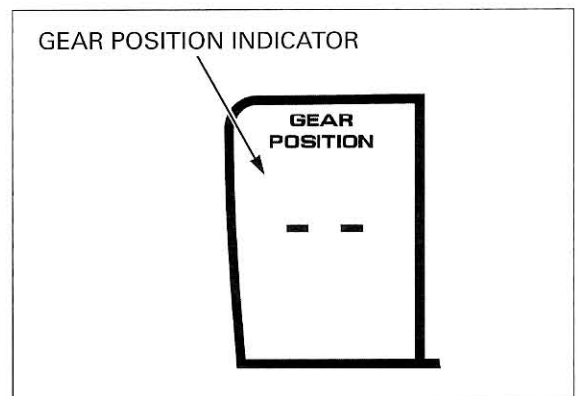


3. Within 5 seconds after turning the ignition switch to "ON", push and release the gearshift switches in the order of UP switch, DOWN switch and UP switch. (Do not hold onto the switch.)



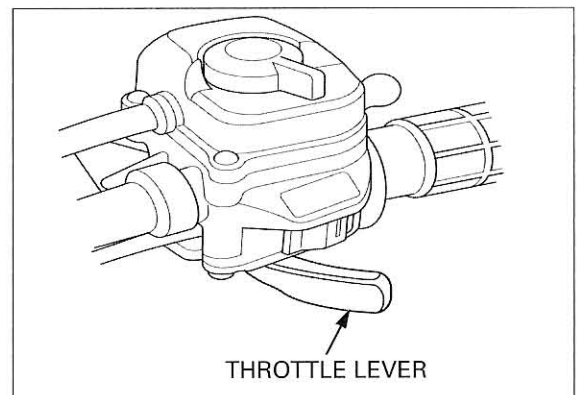
The gear position indicator displays "--" to indicate the system enters the initial setting mode.

If more than 5 seconds elapse or the procedures are incorrect, the "N" stops blinking and stays on. Repeat the procedures from step 1 at this time.



4. Move the throttle lever to the fully closed position, then to the fully open position, and then move it to the fully closed position again within 5 seconds after "--" displays on the gear position indicator.
5. When the initial setting procedure is complete, the indication on the gear position indicator changes from "--" to "N".

If the "--" on the gear position indicator blinks, repeat the procedure from step 1.



TROUBLESHOOTING CHART

Problem code	Check part and system	Probable faulty part	Reference page
1	System voltage	<ul style="list-style-type: none">• Battery• Wire harness• ECM	24-13
2	Gear position switch	<ul style="list-style-type: none">• Gear position switch or related wire harness• ECM	24-14
3	Gearshift switch	<ul style="list-style-type: none">• Gearshift switch or related wire harness• ECM	24-16
4	Rear vehicle speed sensor (VSS)	<ul style="list-style-type: none">• Rear VSS or related wire harness• ECM	24-18
5	Front VSS	<ul style="list-style-type: none">• Front VSS or related wire harness• TCM• ECM	24-21
6	Linear solenoid valve	<ul style="list-style-type: none">• Linear solenoid valve or related wire harness• TCM• ECM	24-24
7	Linear solenoid valve driver	<ul style="list-style-type: none">• TCM• Linear solenoid valve or related wire harness	24-24
8	Shift solenoid valve A	<ul style="list-style-type: none">• Shift solenoid valve A or related wire harness• TCM	24-27
9	Shift solenoid valve B	<ul style="list-style-type: none">• Shift solenoid valve B or related wire harness• TCM	24-29
10	TCM fail-safe relay	<ul style="list-style-type: none">• TCM	24-31
11	Throttle position (TP) sensor	<ul style="list-style-type: none">• TP sensor or related wire harness• ECM	24-32
12	ECM EEPROM	<ul style="list-style-type: none">• ECM	24-35
13	ECM-to-TCM communication line	<ul style="list-style-type: none">• Wire harness• TCM• ECM	24-36
14			
"—" is displayed, but no problem code is indicated and retrievable		<ul style="list-style-type: none">• Shift solenoid valve A• Shift solenoid valve B• Wire harness• TCM	24-37

DIAGNOSTIC TROUBLESHOOTING

NOTE:

- The connector location and the necessary parts to disconnect the connector are described on page 24-4.
- Perform inspection with the ignition switch turned to "OFF", unless otherwise specified.
- When the Engine Control Module (ECM) is replaced, perform the initial setting procedure (page 24-10).
- After troubleshooting, erase the problem code and test-drive the vehicle to be sure that the system is normal.

PROBLEM CODE 1: SYSTEM VOLTAGE

1. ECM Connector Inspection

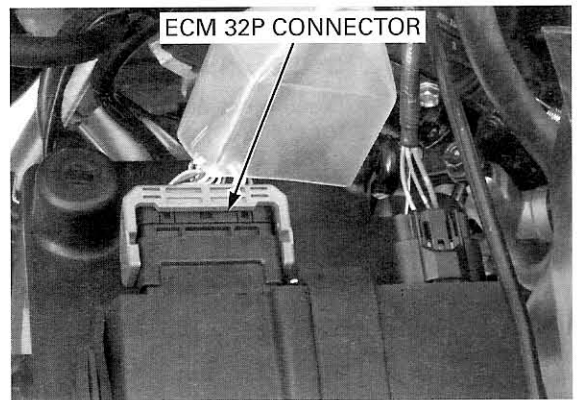
Seal the ECM connector with tape to prevent dirt and oil from entering the connector after disconnecting the 32P connector.

Turn the ignition switch to "OFF".
Disconnect the ECM 32P connector by releasing the lock lever (page 20-6).
Check the connector for loose contacts or corroded terminals.

Is the connector in good condition?

NO – Loose or poorly connected ECM 32P connector.

YES – GO TO STEP 2.



2. ECM Power Input line Inspection

Be careful not to bend the connector terminals.

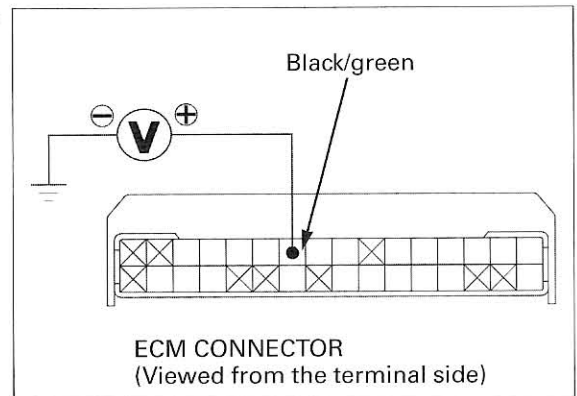
Turn the ignition switch to "ON".
Measure the voltage between the wire harness side connector terminal and ground.

Connection: Black/green (+) – Ground (–)

Is the voltage above 10 V?

NO – • Undercharged battery.
• Faulty battery.

YES – GO TO STEP 3.



3. Failure Reproduction

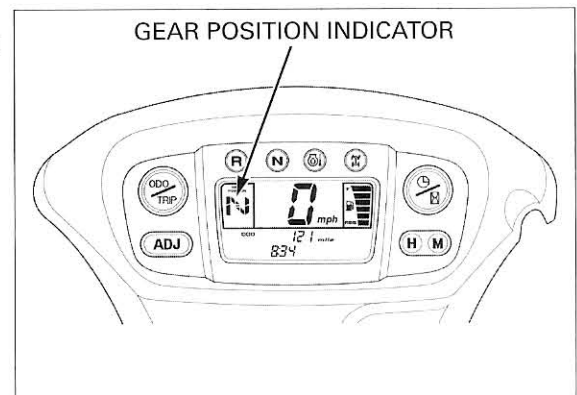
When connecting the ECM 32P connector, check that there is no dirt and oil in the connector.

Connect the ECM 32P connector.
Turn the ignition switch to "ON" and check that the gear position indicator blinks.

Does the gear position indicator blink once?

NO – No problem (Temporary failure).

YES – Faulty ECM.



PROBLEM CODE 2: GEAR POSITION SWITCH

1. ECM Connector Inspection

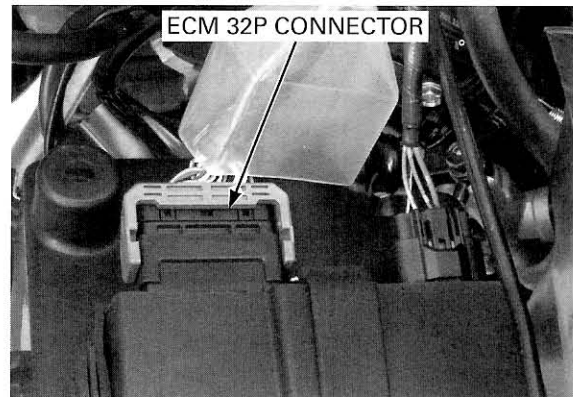
Seal the ECM connector with tape to prevent dirt and oil from entering the connector after disconnecting the 32P connector.

Turn the ignition switch to "OFF".
Disconnect the ECM 32P connector by releasing the lock lever (page 20-6).
Check the connector for loose contacts or corroded terminals.

Is the connector in good condition?

NO – Loose or poorly connected ECM 32P connector.

YES – GO TO STEP 2.



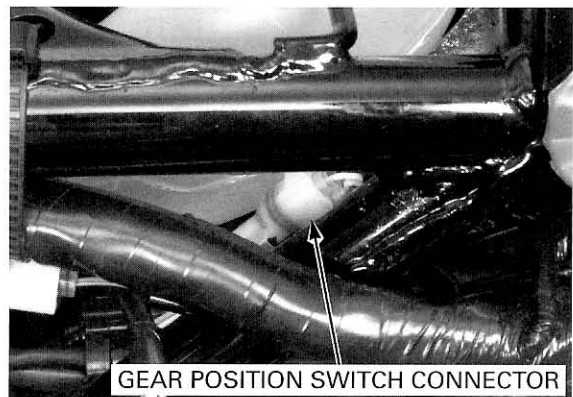
2. Gear Position Switch Connector Inspection

Disconnect the gear position switch 3P connector.
Check the connector for loose contacts or corroded terminals.

Is the connector in good condition?

NO – Loose or poorly connected gear position switch 3P connector.

YES – GO TO STEP 3.



3. Gear Position Switch Line Inspection 1

Be careful not to bend the connector terminals.

Connect the gear position switch connector.
Check for continuity between each gear position switch wire terminal of the ECM 32P connector and ground (page 24-39).

Is there normal continuity?

NO – GO TO STEP 4.

YES – GO TO STEP 5.

4. Gear Position Switch Line Inspection 2

Disconnect the gear position switch connector.
Check for continuity between each terminal of the switch side 3P connector and ground (page 24-39).

Is there normal continuity?

NO – Faulty gear position switch.

YES –

- Open or short circuit in the Light green wire.
- Open or short circuit in the Light blue/white wire.
- Open or short circuit in the Gray wire.

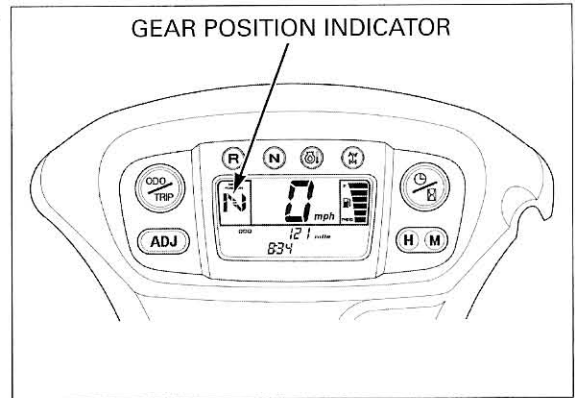
5. Failure Reproduction

When connecting the ECM 32P connector, check that there is no dirt and oil in the connector.

Connect the ECM and gear position switch connectors.
Turn the ignition switch ON.
Check the gear position indicator.

Does the gear position indicator blink 2 times?

- NO** – No problem (Temporary failure).
YES – Faulty ECM.



PROBLEM CODE 3: GEARSHIFT SWITCH

1. ECM Connector Inspection

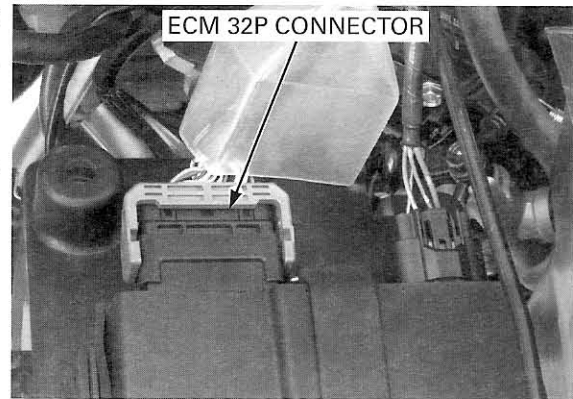
Seal the ECM connector with tape to prevent dirt and oil from entering the connector after disconnecting the 32P connector.

Turn the ignition switch to "OFF".
Disconnect the ECM 32P connector by releasing the lock lever (page 20-6).
Check the connector for loose contacts or corroded terminals.

Is the connector in good condition?

NO – Loose or poorly connected ECM 32P connector.

YES – GO TO STEP 2.



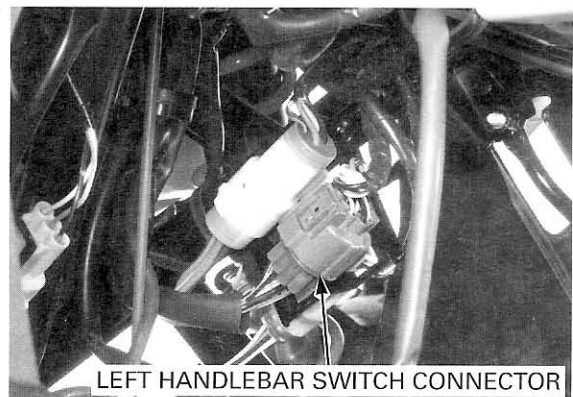
2. Gearshift Switch Connector Inspection

Remove the left handlebar switch 10P connector from the frame and disconnect it.
Check the connector for loose contacts or corroded terminals.

Is the connector in good condition?

NO – Loose or poorly connected left handlebar switch 10P connector.

YES – GO TO STEP 3.



3. Gearshift Switch Line Inspection (ECM side)

Be careful not to bend the connector terminals.

Connect the left handlebar switch 10P connector.
Check for continuity between the ECM connector terminals in each switch position (page 24-41).

Is there normal continuity?

NO – GO TO STEP 4.

YES – GO TO STEP 6.

4. Gearshift Switch Inspection (Handlebar switch side)

Remove the left handlebar switch 10P connector from the frame and disconnect it.
Check for continuity at the switch side 10P connector terminals in each switch position (page 24-41).

Is there normal continuity?

NO – GO TO STEP 5.

YES –

- Open or short circuit in the White/red wire.
- Open or short circuit in the White/yellow wire.
- Open or short circuit in the White/blue wire.

5. Gearshift Switch Condition Inspection

Remove the handlebar switch (page 14-5).
Check for water, mud and other foreign material inside the switch.

Is the condition normal?

NO – Clean inside the switch.

YES – Faulty handlebar (gearshift) switch.

6. Failure Reproduction

When connecting the ECM 32P connector, check that there is no dirt and oil in the connector.

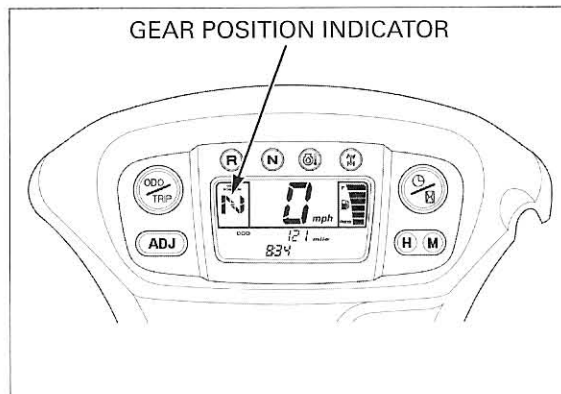
Connect the ECM and gearshift switch connectors.

Turn the ignition switch to "ON" and check the gear position indicator.

Does the gear position indicator blink 3 times?

NO – No problem (Temporary failure).

YES – Faulty ECM.



PROBLEM CODE 4: REAR VEHICLE SPEED SENSOR (VSS)

1. ECM Connector Inspection

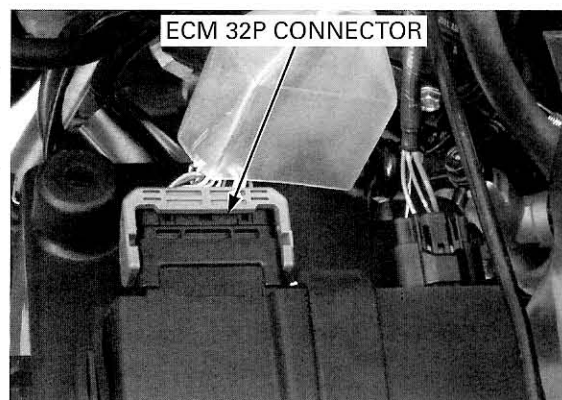
Seal the ECM connector with tape to prevent dirt and oil from entering the connector after disconnecting the 32P connector.

Turn the ignition switch to "OFF".
Disconnect the ECM 32P connector by releasing the lock lever (page 20-6).
Check the connector for loose contacts or corroded terminals.

Is the connector in good condition?

NO – Loose or poorly connected ECM 32P connector.

YES – GO TO STEP 2.



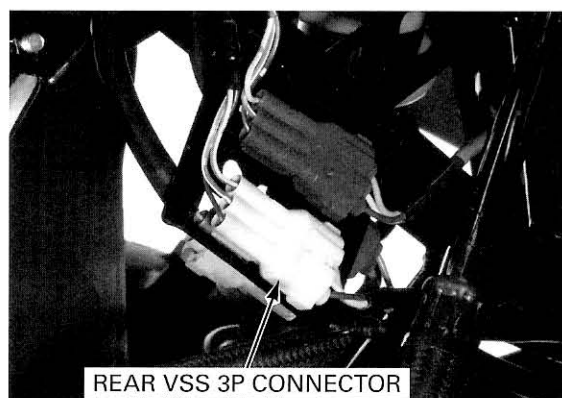
2. Rear VSS Connector Inspection

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 3.



3. Rear VSS Input Line Inspection

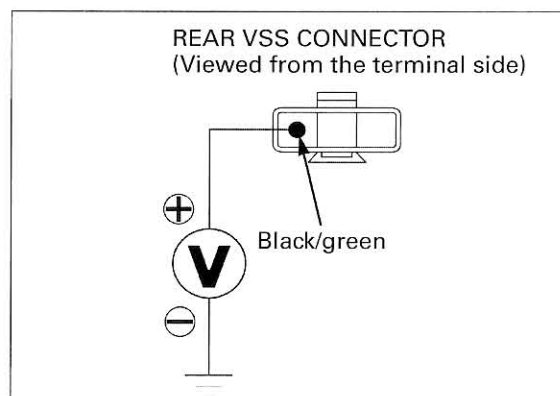
When connecting the ECM 32P connector, check that there is no dirt and oil in the connector.

Connect the ECM 32P connector.
Turn the ignition switch to "ON".
Measure the voltage between the wire harness side rear VSS 3P connector terminal and ground.
Connection: Black/green (+) – Ground (–)

Is the voltage more than 10 V?

NO – Open or short circuit in the Black/green wire.

YES – GO TO STEP 4.



4. Rear VSS Ground Line Inspection

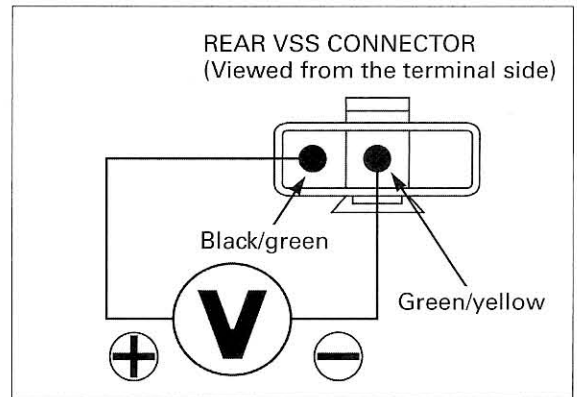
Measure the voltage between the wire harness side rear VSS 3P connector terminals.

Connection: Black/green (+) – Green/yellow (–)

Is the voltage more than 10 V?

NO – Open circuit in the Green/yellow wire.

YES – GO TO STEP 5.



5. Rear VSS Output Line Inspection

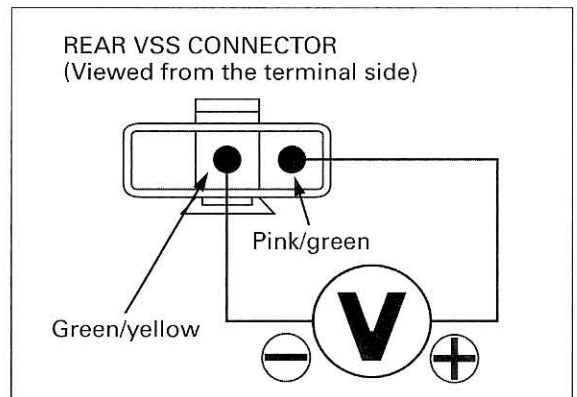
Measure the voltage between the wire harness side rear VSS 3P connector terminals.

Connection: Pink/green (+) – Green/yellow (–)

Is the voltage approximately 5 V?

NO – Open or short circuit in the Pink/green wire.

YES – GO TO STEP 6.



6. Rear VSS Inspection

Turn the ignition switch to "OFF".
Connect the inspection adaptor to the rear VSS 3P connectors.

TOOL:

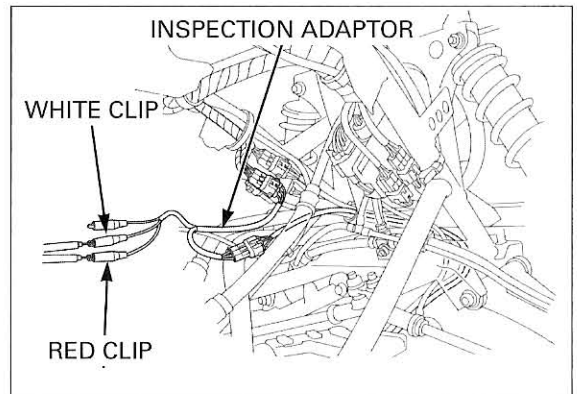
Inspection adaptor **07GMJ-ML80100**

Put the gearshift lever in "N" (neutral).
Raise the wheels off the ground and support the vehicle securely with a hoist or equivalent.
Turn the ignition switch to "ON".
Measure the voltage between the Red clip (+) and White clip (–) while slowly turning the rear wheels by hand.

Is there 0 to 5 V pulse voltage?

NO – Faulty rear VSS.

YES – GO TO STEP 7.



AUTOMATIC TRANSMISSION SYSTEM

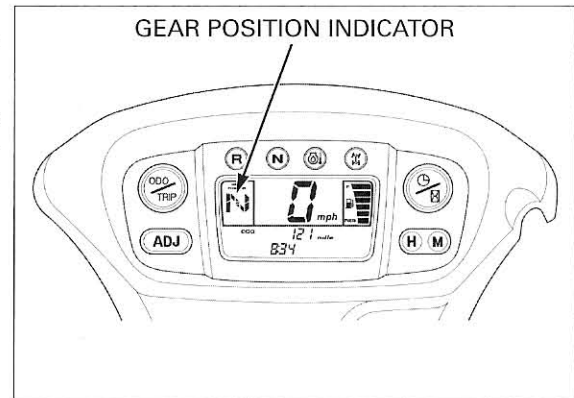
7. Failure Reproduction

Turn the ignition switch to "OFF".
Remove the inspection adaptor and connect the rear VSS connector.
Turn the 2WD/4WD select switch to "4WD".
Test-drive the vehicle above 4mph for more than 5 seconds and check that the gear position indicator blinks.

Does the gear position indicator blink 4 times?

NO – No problem (Temporary failure).

YES – Faulty ECM.



PROBLEM CODE 5: FRONT VEHICLE SPEED SENSOR (VSS)

1. TCM Connector Inspection

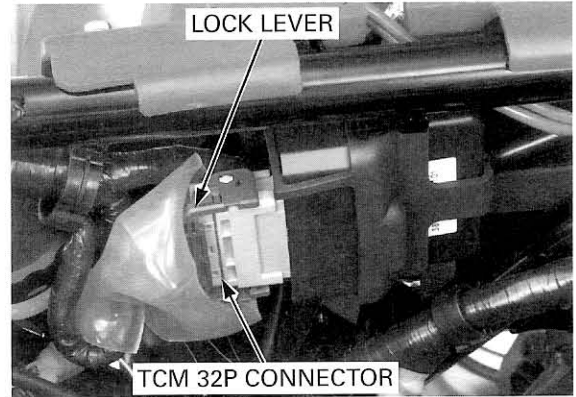
Seal the TCM connector with tape to prevent dirt and oil from entering the connector after disconnecting the 32P connector.

Turn the ignition switch to "OFF".
Remove the air cleaner housing (page 5-5).
Disconnect the Transmission Control Module (TCM) 32P connector by releasing the lock lever.
Check the connector for loose contacts or corroded terminals.

Is the connector in good condition?

NO – Loose or poorly connected TCM 32P connector.

YES – GO TO STEP 2.



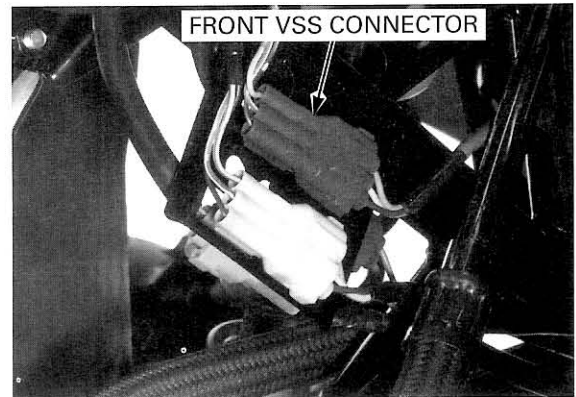
2. Front VSS Connector Inspection

Disconnect the front VSS 3P blue 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 3.



3. Front VSS Input Line Inspection

When connecting the ECM 32P connector, check that there is no dirt and oil in the connector.

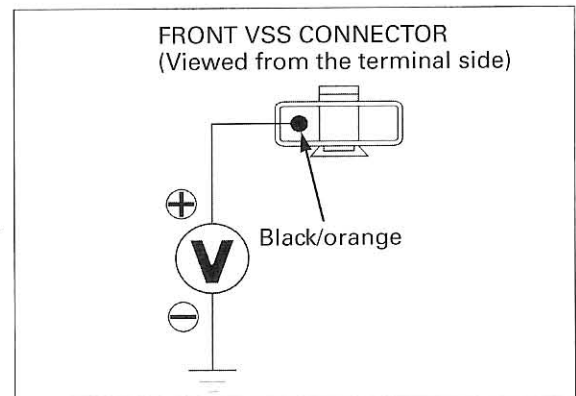
Connect the TCM 32P connector.
Turn the ignition switch to "ON".
Measure the voltage between the wire harness side front VSS 3P connector terminal and ground.

Connection: Black/orange (+) – Ground (–)

Is the voltage more than 10 V?

NO – Open or short circuit in the Black/orange wire.

YES – GO TO STEP 4.



AUTOMATIC TRANSMISSION SYSTEM

4. Front VSS Ground Line Inspection

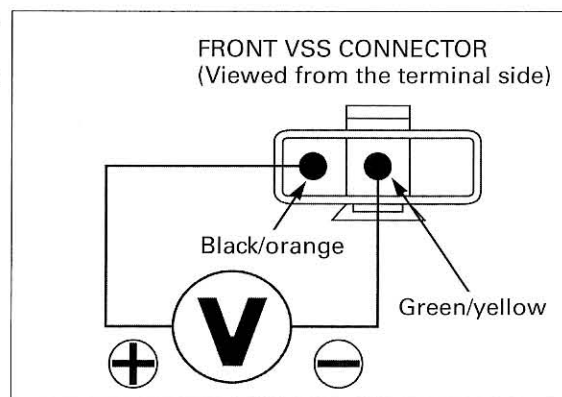
Measure the voltage between the wire harness side front VSS 3P connector terminals.

Connection: Black/orange (+) – Green/yellow (–)

Is the voltage more than 10 V?

NO – Open circuit in the Green/yellow wire.

YES – GO TO STEP 5.



5. Front VSS Output Line Inspection

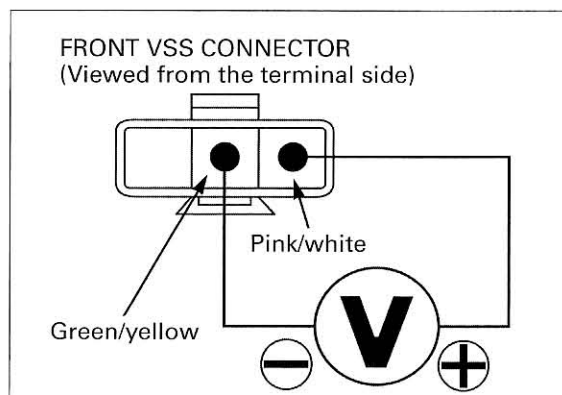
Measure the voltage between the wire harness side front VSS 3P connector terminals.

Connection: Pink/white (+) – Green/yellow (–)

Is the voltage approximately 5 V?

NO – Open or short circuit in the Pink/white wire.

YES – GO TO STEP 6.



6. Front VSS Inspection

Turn the ignition switch to "OFF".
Connect the inspection adaptor to the front VSS 3P connectors.

TOOL:

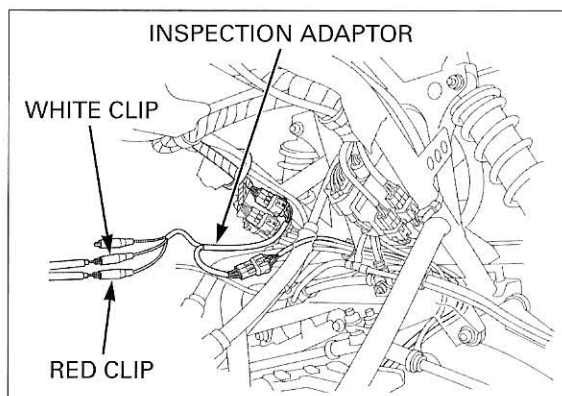
Inspection adaptor 07GMJ-ML80100

Put the gearshift lever in "N" (neutral).
Raise the wheels off the ground and support the vehicle securely with a hoist or equivalent.
Turn the ignition switch to "ON".
Measure the voltage between the Red clip (+) and White clip (–) while slowly turning the front wheels by hand.

Is there 0 to 5 V pulse voltage?

NO – Faulty front VSS.

YES – GO TO STEP 7.



7. Front VSS Signal Line Inspection

Turn the ignition switch to "OFF".
Remove the inspection adaptor and connect the front VSS connector.

Disconnect the ECM and TCM 32P connectors.

Seal the ECM and TCM connectors with tapes to prevent dirt and oil from entering the connectors after disconnecting the 32P connectors.

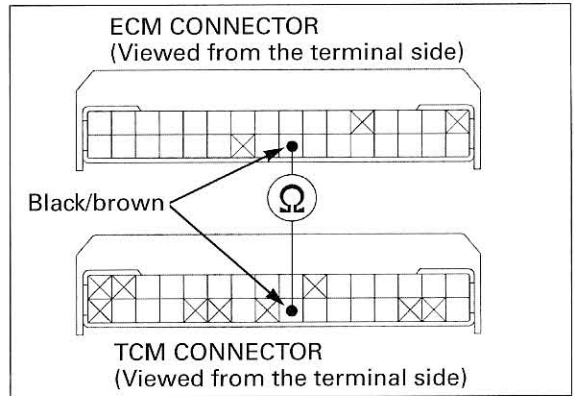
Be careful not to bend the connector terminals.

Check the Black/brown wire for continuity between the ECM and TCM 32P connector terminals.

Is there continuity?

NO – Open circuit in the Black/brown wire.

YES – GO TO STEP 8.



8. Failure Reproduction

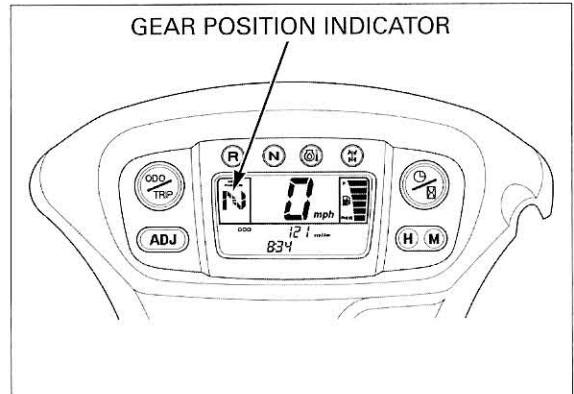
When connecting the ECM and TCM 32P connectors, check that there is no dirt and oil in the connectors.

Connect the ECM and TCM 32P connectors. Turn the 2WD/4WD select switch to "4WD". Test-drive the vehicle above 4 mph for more than 5 seconds and check that the gear position indicator blinks.

Does the gear position indicator blink 5 times?

NO – No problem (Temporary failure).

YES – GO TO STEP 9.



9. Failure Reproduction With a New TCM

Replace the TCM with a new one. Turn the 2WD/4WD select switch to "4WD". Test-drive the vehicle above 4 mph for more than 5 seconds and check that the gear position indicator blinks.

Does the gear position indicator blink 5 times?

NO – Faulty TCM.

YES – Faulty ECM.

PROBLEM CODE 6 OR 7: LINEAR SOLENOID VALVE

1. TCM Connector Inspection

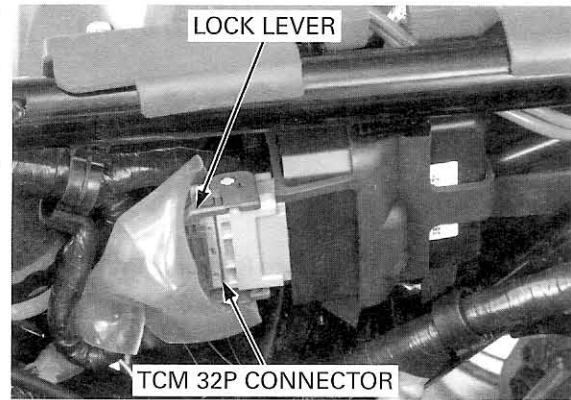
Seal the TCM connector with tape to prevent dirt and oil from entering the connector after disconnecting the 32P connector.

Turn the ignition switch to "OFF".
Remove the air cleaner housing (page 5-5).
Disconnect the Transmission Control Module (TCM) 32P connector by releasing the lock lever. Check the connector for loose contacts or corroded terminals.

Is the connector in good condition?

NO – Loose or poorly connected TCM 32P connector.

YES – GO TO STEP 2.



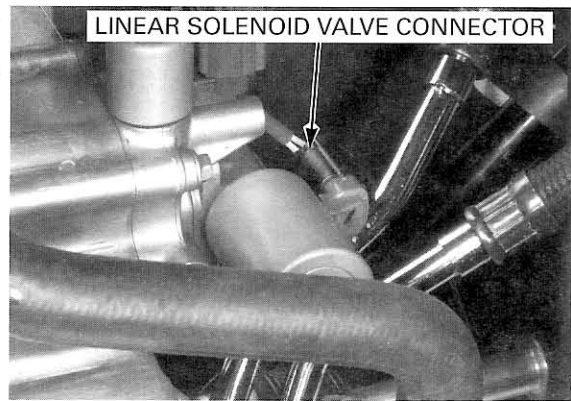
2. Linear Solenoid Valve Connector Inspection

Disconnect the linear solenoid valve 2P connector. Check the connector for loose contacts or corroded terminals.

Is the connector in good condition?

NO – Loose or poorly connected linear solenoid valve 2P connector.

YES – GO TO STEP 3.



3. Linear Solenoid Valve Line Open Circuit Inspection

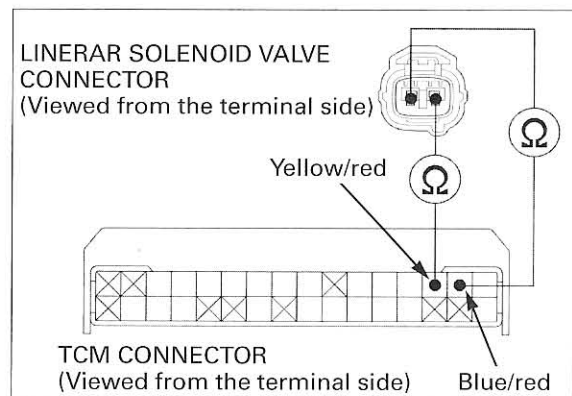
Be careful not to bend the connector terminals.

Check the Yellow/red and Blue/red wires for continuity between the TCM 32P and linear solenoid valve 2P connector terminals.

Is there continuity?

NO – • Open circuit in the Yellow/red wire.
• Open circuit in the Blue/red wire.

YES – GO TO STEP 4.



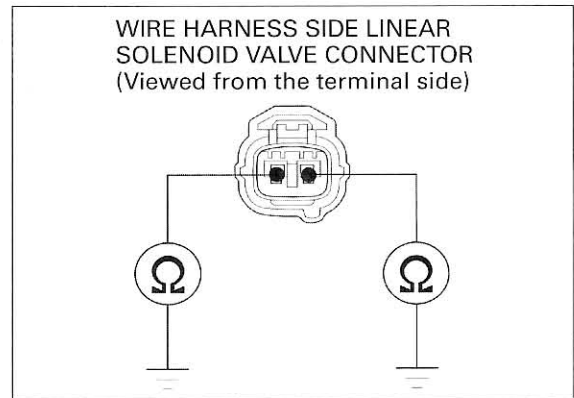
4. Linear Solenoid Valve Line Short Circuit Inspection

Check the Yellow/red and Blue/red wires for continuity between the linear solenoid valve 2P connector terminals of the wire harness side and ground.

Is there continuity?

YES – • Short circuit in the Yellow/red wire.
• Short circuit in the Blue/red wire.

NO – GO TO STEP 5.



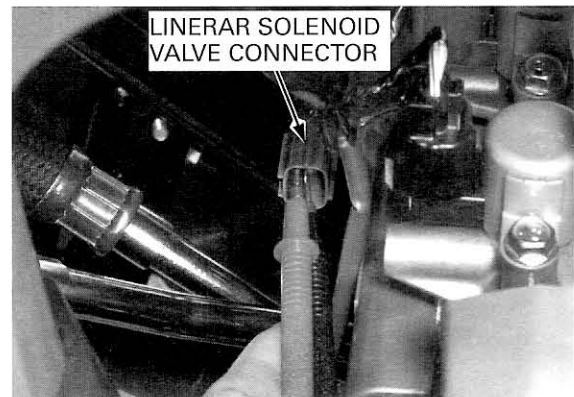
5. Linear Solenoid Valve Inspection

Measure the resistance between the solenoid valve side 2P connector terminals.

Is the resistance within 5.1 – 5.7 Ω (20°C/68°F)?

NO – Faulty linear solenoid valve.

YES – GO TO STEP 6.



6. Linear Solenoid Amperage Detection Line Inspection

Disconnect the ECM 32P connector.

Seal the ECM connector with tape to prevent dirt and oil from entering the connector after disconnecting the 32P connector.

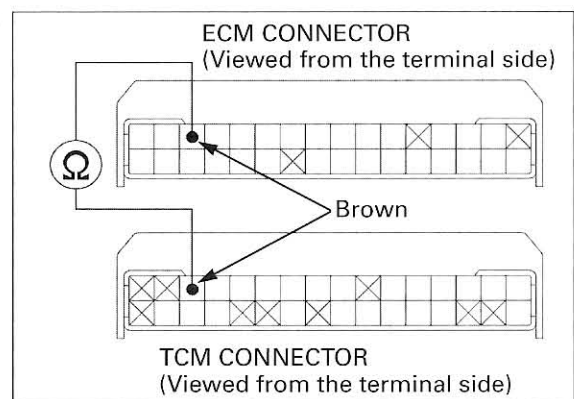
Be careful not to bend the connector terminals.

Check the Brown wire for continuity between the ECM and TCM 32P connector terminals.

Is there continuity?

NO – Open circuit in the Brown wire.

YES – GO TO STEP 7.



AUTOMATIC TRANSMISSION SYSTEM

7. Failure Reproduction

When connecting the ECM and TCM 32P connectors, check that there is no dirt and oil in the connectors.

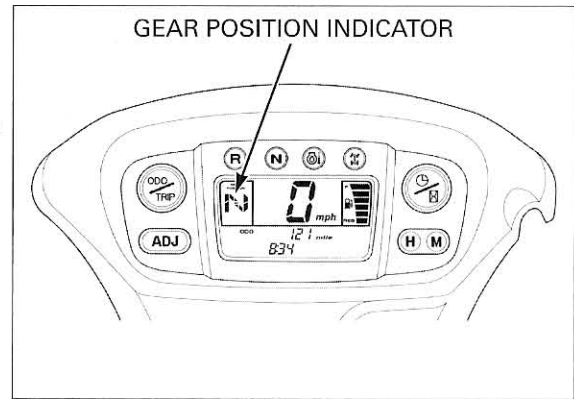
Connect the ECM, TCM and linear solenoid valve connectors.

Turn the ignition switch to "ON" and check the gear position indicator.

Does the gear position indicator blink 6 or 7 times?

NO – No problem (Temporary failure).

YES – GO TO STEP 8.



8. Failure Reproduction With a New TCM

Replace the TCM with a new one.

Turn the ignition switch to "ON" and check the gear position indicator.

Does the gear position indicator blink 6 or 7 times?

NO – Faulty TCM.

YES – Faulty ECM.

PROBLEM CODE 8: SHIFT SOLENOID VALVE A

1. TCM Connector Inspection

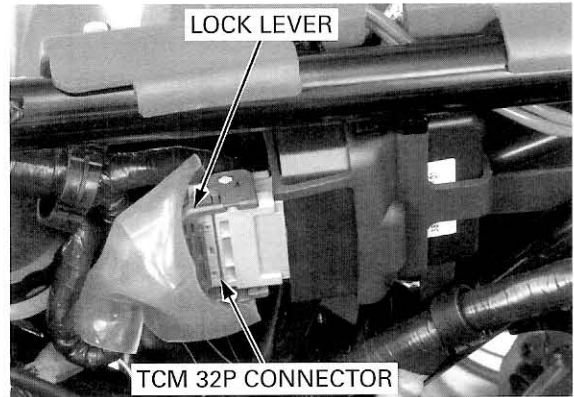
Seal the TCM connector with tape to prevent dirt and oil from entering the connector after disconnecting the 32P connector.

Turn the ignition switch to "OFF".
Remove the air cleaner housing (page 5-5).
Disconnect the Transmission Control Module (TCM) 32P connector by releasing the lock lever. Check the connector for loose contacts or corroded terminals.

Is the connector in good condition?

NO – Loose or poorly connected TCM 32P connector.

YES – GO TO STEP 2.



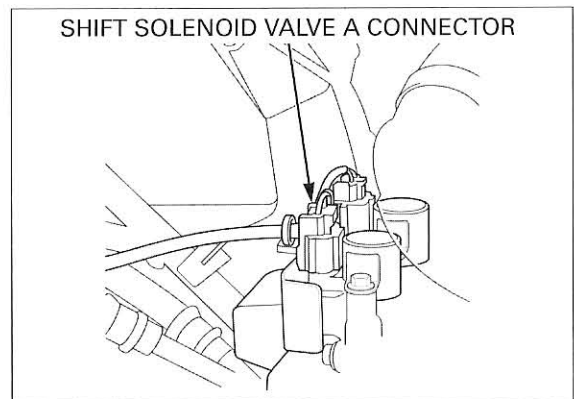
2. Shift Solenoid Valve A Connector Inspection

Disconnect the shift solenoid valve A 2P black connector. Check the connector for loose contacts or corroded terminals.

Is the connector in good condition?

NO – Loose or poorly connected shift solenoid valve A 2P connector.

YES – GO TO STEP 3.



3. Shift Solenoid Valve A Line Open Circuit Inspection

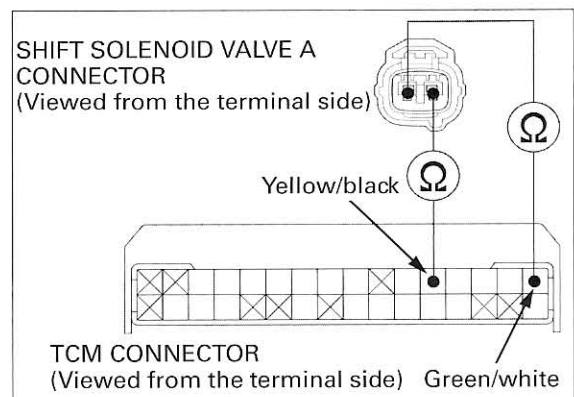
Be careful not to bend the connector terminals.

Check the Yellow/black and Green/white wires for continuity between the TCM 32P and shift solenoid valve A 2P connector terminals.

Is there continuity?

NO – • Open circuit in the Yellow/black wire.
• Open circuit in the Green/white wire.

YES – GO TO STEP 4.



4. Shift Solenoid Valve A Line Short Circuit Inspection

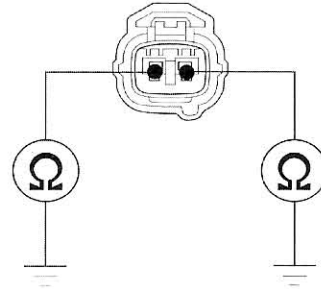
Check the Yellow/black and Green/white wires for continuity between the shift solenoid valve A 2P connector terminals of the wire harness side and ground.

Is there continuity?

YES – • Short circuit in the Yellow/black wire.
• Short circuit in the Green/white wire.

NO – GO TO STEP 5.

WIRE HARNESS SIDE SHIFT
SOLENOID VALVE A CONNECTOR
(Viewed from the terminal side)



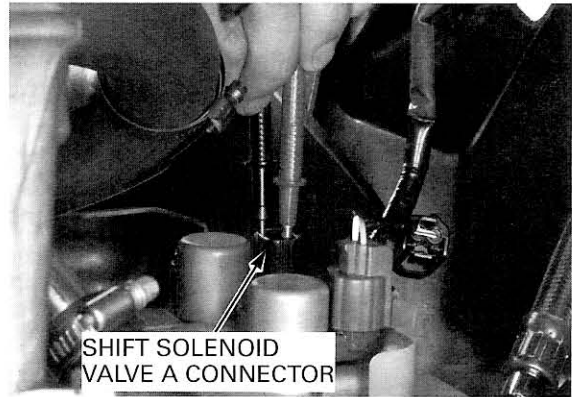
5. Shift Solenoid Valve A Inspection

Measure the resistance between the solenoid valve side 2P connector terminals.

Is the resistance within 14.6 – 16.2 Ω (20°C/68°F)?

NO – Faulty shift solenoid valve A.

YES – GO TO STEP 6.



6. Failure Reproduction With the Gearshift Lever in "N"

When connecting the TCM 32P connector, check that there is no dirt and oil in the connector.

Connect the TCM and shift solenoid valve A connectors.

Turn the ignition switch to "ON".

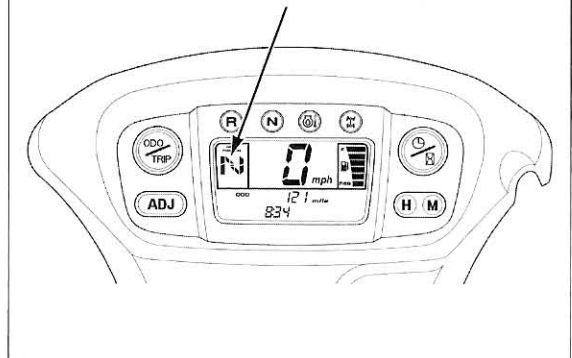
Put the gearshift lever in "N" (neutral) and check the gear position indicator.

Does the gear position indicator blink 8 times?

NO – GO TO STEP 7.

YES – Faulty TCM.

GEAR POSITION INDICATOR



7. Failure Reproduction With the Gearshift Lever in "R"

Put the gearshift lever in "R" (reverse) and check the gear position indicator.

Does the gear position indicator blink 8 times?

NO – No problem (Temporary failure).

YES – Faulty TCM.

PROBLEM CODE 9: SHIFT SOLENOID VALVE B

1. TCM Connector Inspection

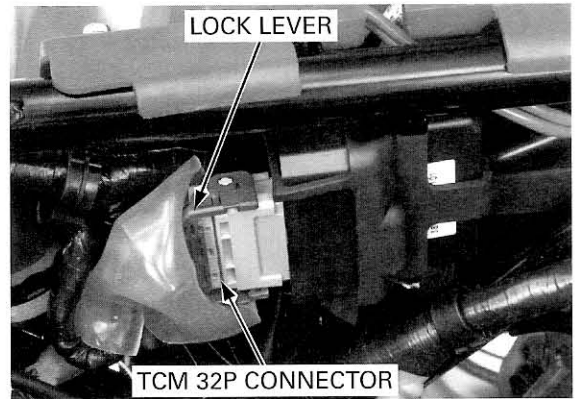
Seal the TCM connector with tape to prevent dirt and oil from entering the connector after disconnecting the 32P connector.

Turn the ignition switch to "OFF".
Remove the air cleaner housing (page 5-5).
Disconnect the Transmission Control Module (TCM) 32P connector by releasing the lock lever.
Check the connector for loose contacts or corroded terminals.

Is the connector in good condition?

NO – Loose or poorly connected TCM 32P connector.

YES – GO TO STEP 2.



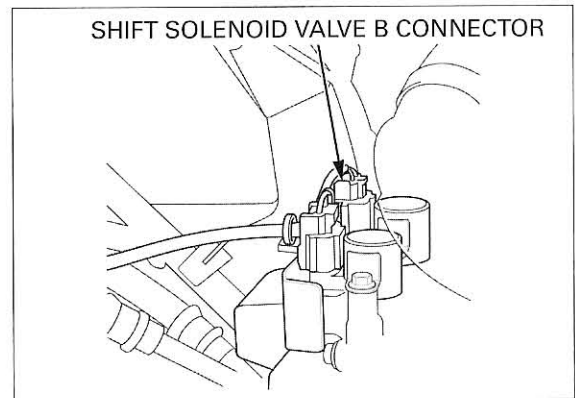
2. Shift Solenoid Valve B Connector Inspection

Disconnect the shift solenoid valve B 2P brown connector.
Check the connector for loose contacts or corroded terminals.

Is the connector in good condition?

NO – Loose or poorly connected shift solenoid valve B 2P connector.

YES – GO TO STEP 3.



3. Shift Solenoid Valve B Line Open Circuit Inspection

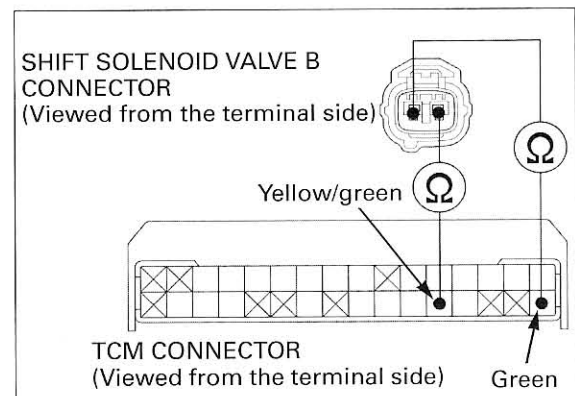
Be careful not to bend the connector terminals.

Check the Yellow/green and Green wires for continuity between the TCM 32P and shift solenoid valve B 2P connector terminals.

Is there continuity?

NO – • Open circuit in the Yellow/green wire.
• Open circuit in the Green wire.

YES – GO TO STEP 4.



4. Shift Solenoid Valve B Line Short Circuit Inspection

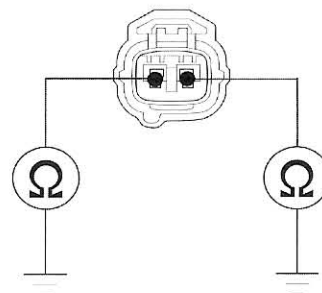
Check the Yellow/green and Green wires for continuity between the shift solenoid valve B 2P connector terminals of the wire harness side and ground.

Is there continuity?

YES – Short circuit in the Yellow/green wire.

NO – GO TO STEP 5.

WIRE HARNESS SIDE SHIFT SOLENOID VALVE B CONNECTOR
(Viewed from the terminal side)



5. Shift Solenoid Valve B Inspection

Measure the resistance between the solenoid valve side 2P connector terminals.

Is the resistance within 14.6 – 16.2 Ω (20°C/68°F)?

NO – Faulty shift solenoid valve B.

YES – GO TO STEP 6.



6. Failure Reproduction With the Gearshift Lever in "N" and "R"

When connecting the TCM 32P connector, check that there is no dirt and oil in the connector.

Connect the TCM and shift solenoid valve A connectors.

Turn the ignition switch to "ON".

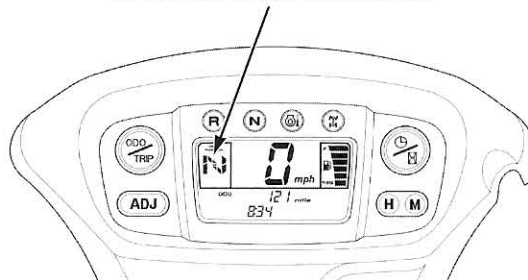
Put the gearshift lever in "N" (neutral) and "R" (reverse), and check the gear position indicator.

Does the gear position indicator blink 9 times?

NO – GO TO STEP 7.

YES – Faulty TCM.

GEAR POSITION INDICATOR



7. Failure Reproduction With the ESP mode in 3rd Position

Put the gearshift lever in "D" (drive) and turn the drive mode select switch to "ESP".

Shift the transmission into "3" (third gear) with the gearshift switch and check the gear position indicator.

Does the gear position indicator blink 9 times?

NO – No problem (Temporary failure).

YES – Faulty TCM.

PROBLEM CODE 10: TCM FAIL-SAFE RELAY

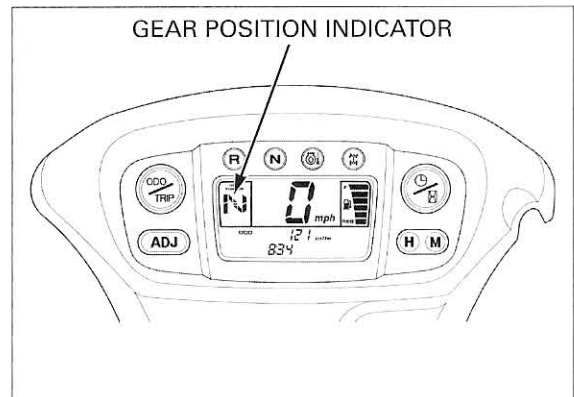
1. Failure Reproduction

Turn the ignition switch to "ON" and check the gear position indicator.

Does the gear position indicator blink 10 times?

NO – No problem (Temporary failure).

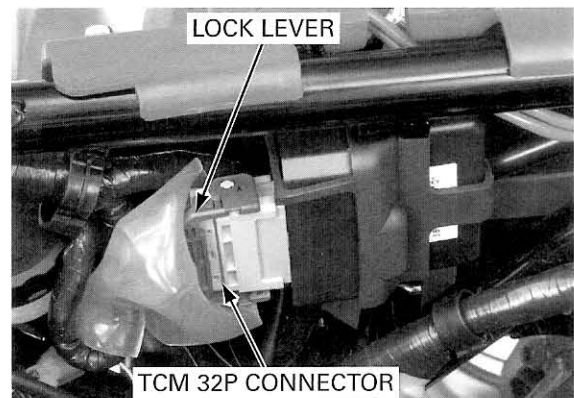
YES – GO TO STEP 2.



2. TCM Power Input Line Inspection

Turn the ignition switch to "OFF".
Remove the air cleaner housing (page 5-5).
Disconnect the Transmission Control Module (TCM) 32P connector by releasing the lock lever.

Seal the TCM connector with tape to prevent dirt and oil from entering the connector after disconnecting the 32P connector.



Turn the ignition switch to "ON".
Measure the voltage between the wire harness side connector terminal and ground.

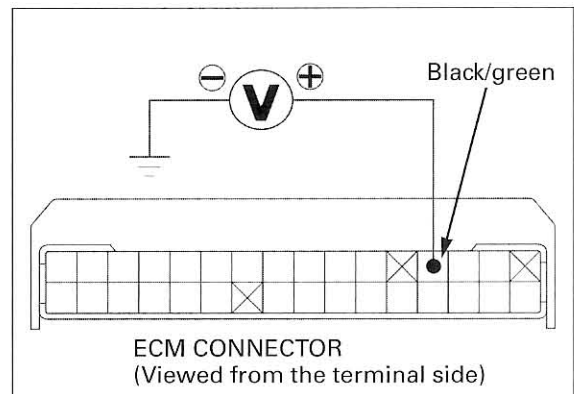
Connection: Black/green (+) – Ground (-)

Is there battery voltage?

NO – Open circuit in the Black/green wire.

YES – GO TO STEP 3.

Be careful not to bend the connector terminals.



3. Problem Code Memory Inspection

Turn the ignition switch to "OFF".
Connect the TCM 32P connector.
Perform the problem code retrieval procedure (page 24-8) and check the gear position indicator.

Does the gear position indicator blink 10 times?

NO – Perform the necessary diagnostic troubleshooting.

YES – Faulty TCM.

When connecting the TCM 32P connector, check that there is no dirt and oil in the connector.

PROBLEM CODE 11: THROTTLE POSITION (TP) SENSOR

1. ECM Connector Inspection

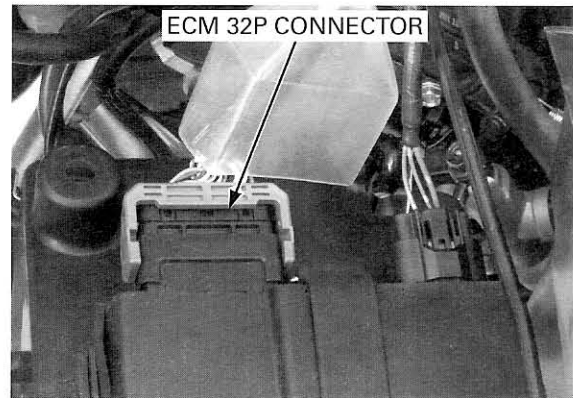
Seal the ECM connector with tape to prevent dirt and oil from entering the connector after disconnecting the 32P connector.

Turn the ignition switch to "OFF".
Disconnect the ECM 32P connector by releasing the lock lever (page 20-6).
Check the connector for loose contacts or corroded terminals.

Is the connector in good condition?

NO – Loose or poorly connected ECM 32P connector.

YES – GO TO STEP 2.



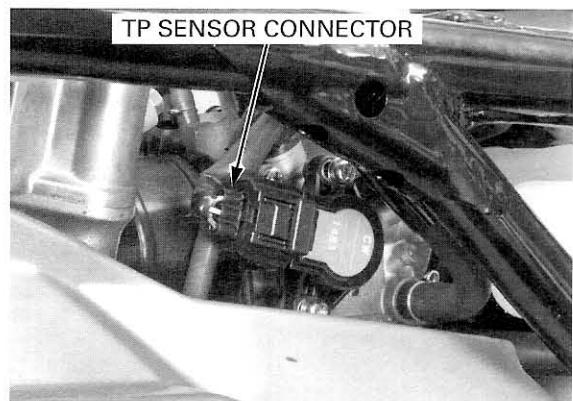
2. TP Sensor Connector Inspection

Disconnect the TP sensor 3P connector.
Check the connector for loose contacts or corroded terminals.

Is the connector in good condition?

NO – Loose or poorly connected TP sensor 3P connector.

YES – GO TO STEP 3.



3. TP Sensor Resistance Inspection 1

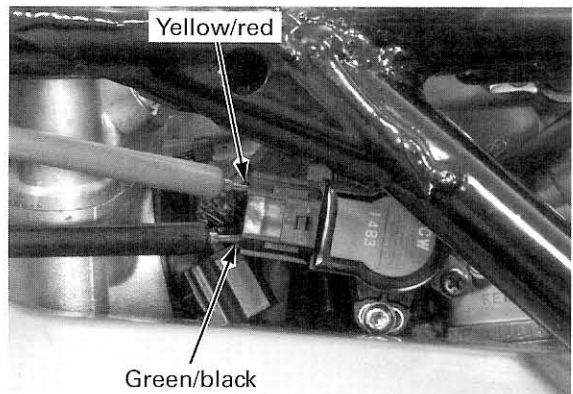
Measure the resistance between the TP sensor connector terminals.

Connection: Yellow/red – Green/black

Is the resistance within 4 – 6 k Ω (20°C/68°F)?

NO – Faulty TP sensor.

YES – GO TO STEP 4.



4. TP Sensor Resistance Inspection 2

Check that the resistance between the TP sensor connector terminals varies with a change in throttle position.

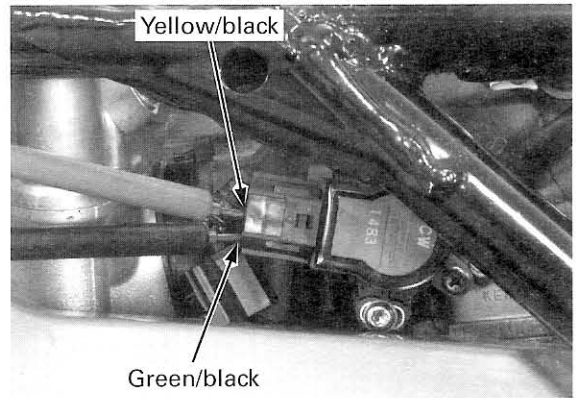
Connection: Yellow/black – Green/black

Standard: Fully close to Fully open
0.5 k Ω to about 4.5 k Ω (20°C/60°F)

Does the resistance vary within specification?

NO – GO TO STEP 5.

YES – GO TO STEP 6.



5. TP Sensor Installation Condition

Check installation condition of the TP sensor (page 24-42).

Is the TP sensor installed properly?

NO – Reinstall the TP sensor properly and perform the initial setting (page 24-10).

YES – Faulty TP sensor.

6. TP Sensor Input Voltage Inspection

When connecting the ECM 32P connector, check that there is no dirt and oil in the connector.

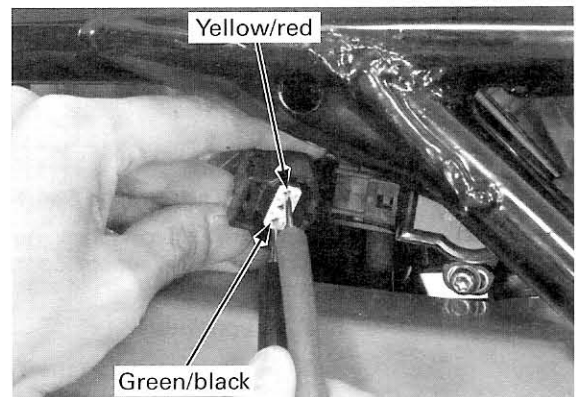
Connect the ECM 32P connector.
Turn the ignition switch to "ON".
Measure the voltage between the wire harness side TP sensor connector terminals.

Connection: Yellow/red (+) – Green/black (–)

Is the voltage within 4.7 – 5.3 V?

NO – GO TO STEP 7.

YES – GO TO STEP 9.



7. TP Sensor Input and Ground Line Open Circuit Inspection

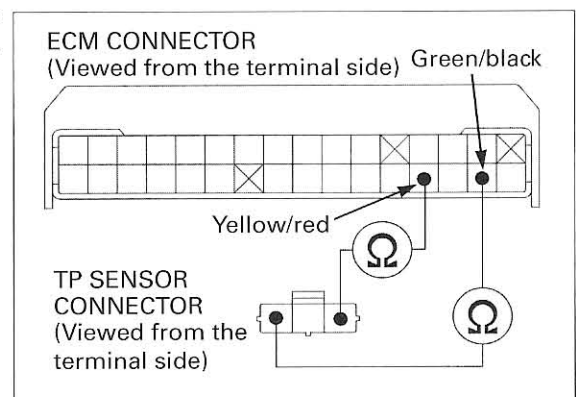
Be careful not to bend the connector terminals.

Turn the ignition switch to "OFF".
Disconnect the ECM 32P connector.
Check the Yellow/red and Green/black wires for continuity between the TP sensor and ECM connectors terminals.

Is there continuity?

NO – • Open circuit in the Yellow/red wire.
• Open circuit in the Green/black wire.

YES – GO TO STEP 8.



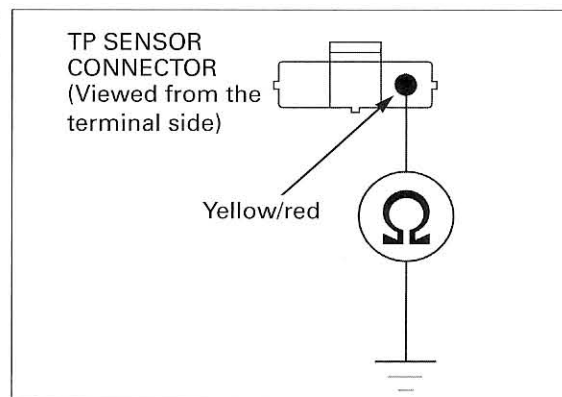
8. TP Sensor Input Line Short Circuit Inspection

Check the Yellow/red wire for continuity between the TP sensor connector terminal and ground.

Is there continuity?

YES – Short circuit in the Yellow/red wire.

NO – Faulty ECM.



9. TP Sensor Output Line Open Circuit Inspection

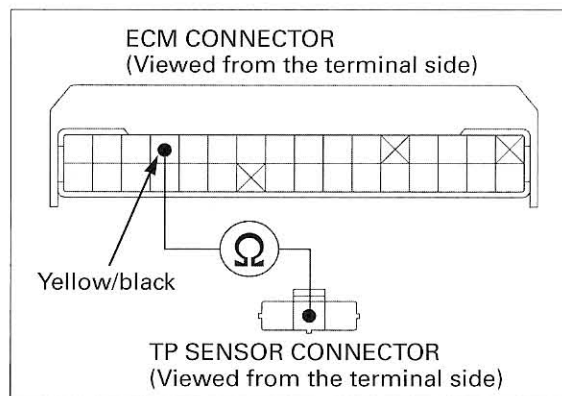
Turn the ignition switch to "OFF".
Disconnect the ECM 32P connector.
Check Yellow/black wire for continuity between the TP sensor and ECM connectors terminals.

Is there continuity?

NO – Open circuit in the Yellow/black wire.

YES – GO TO STEP 10.

Be careful not to bend the connector terminals.



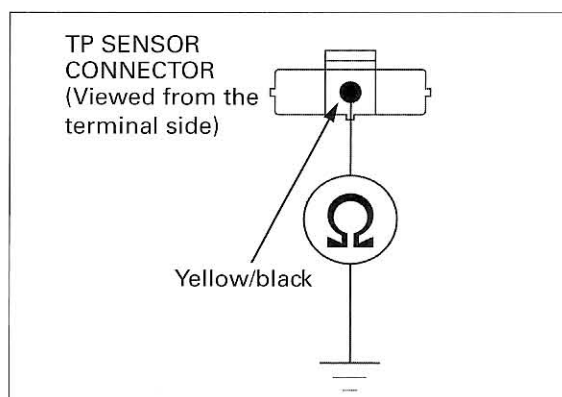
10. TP Sensor Output Line Short Circuit Inspection

Check the Yellow/black wire for continuity between the TP sensor connector terminal and ground.

Is there continuity?

YES – Short circuit in the Yellow/black wire.

NO – GO TO STEP 11.



11. Failure Reproduction

Connect the ECM and TP sensor connectors.
Turn the ignition switch to "ON" and check the gear position indicator.

Does the gear position indicator blink 11 times?

NO – No problem (Temporary failure).

YES – Faulty ECM.

PROBLEM CODE 12: ECM EEPROM

1. Initial Setting Procedure

Perform initial setting procedure (page 24-10).
Turn the ignition switch to "ON" and check the gear position indicator.

Does the gear position indicator blink 12 times?

NO – No problem (Temporary failure).

YES – Faulty ECM.

PROBLEM CODE 13 OR 14: ECM-TO-TCM COMMUNICATION

1. ECM Connector Inspection

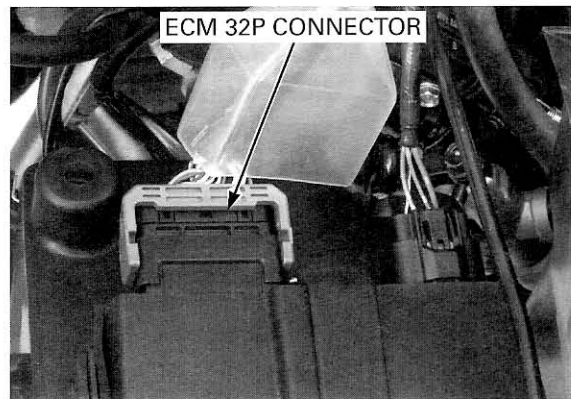
Seal the ECM connector with tape to prevent dirt and oil from entering the connector after disconnecting the 32P connector.

Turn the ignition switch to "OFF".
Disconnect the ECM 32P connector by releasing the lock lever (page 20-6).
Check the connector for loose contacts or corroded terminals.

Is the connector in good condition?

NO – Loose or poorly connected ECM 32P connector.

YES – GO TO STEP 2.



2. TCM Connector Inspection

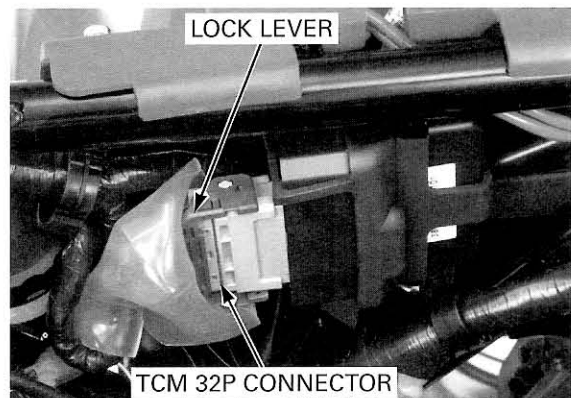
Seal the TCM connector with tape to prevent dirt and oil from entering the connector after disconnecting the 32P connector.

Remove the air cleaner housing (page 5-5).
Disconnect the TCM 32P connector by releasing the lock lever.
Check the connector for loose contacts or corroded terminals.

Is the connector in good condition?

NO – Loose or poorly connected TCM 32P connector.

YES – GO TO STEP 3.



3. Communication Line Open Circuit Inspection

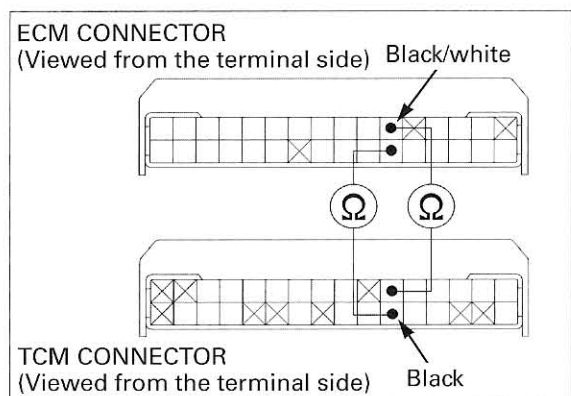
Be careful not to bend the connector terminals.

Check the Black and Black/white wires for continuity between the ECM and TCM connectors terminals.

Is there continuity?

NO – • Open circuit in the Black wire.
• Open circuit in the Black/white wire.

YES – GO TO STEP 4.



4. Failure Reproduction

When connecting the ECM and TCM 32P connectors, check that there is no dirt and oil in the connectors.

Connect the ECM and TCM connectors.
Turn the ignition switch to "ON" and check the gear position indicator.

Does the gear position indicator blink 13 or 14 times?

NO – No problem (Temporary failure).

YES – Faulty ECM or TCM.

"- -" IS DISPLAYED, BUT NO PROBLEM CODE IS INDICATED AND RETRIEVABLE

AUTOMATIC TRANSMISSION DOES NOT SHIFT

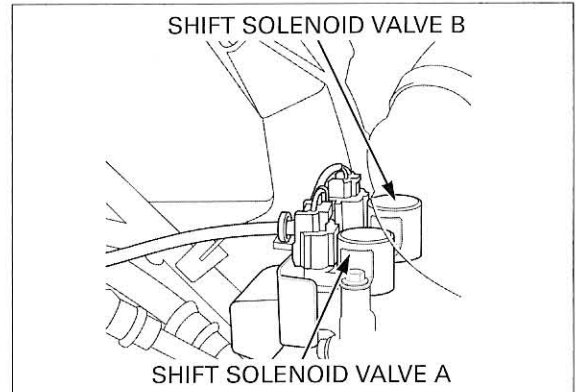
1. Shift Solenoid Valve Inspection When Shifting to "1"

Put the gearshift lever in "D" (drive) and turn the drive mode select switch to "ESP". Shift the transmission into "1" (first gear) with the gearshift switch and check shift solenoid valve A.

Does Shift Solenoid Valve A Operate?

NO – Faulty shift solenoid valve A.

YES – GO TO STEP 2.



2. Shift Solenoid Valve Inspection When Shifting to "2"

Shift the transmission into "2" (second gear) with the gearshift switch and check shift solenoid valves A and B.

Do Shift Solenoid Valves A or B Operate?

NO – GO TO STEP 3.

YES – • Faulty shift solenoid valve A.
• Faulty shift solenoid valve B.

3. Shift Solenoid Valve Inspection When Shifting to "3"

Shift the transmission into "3" (third gear) with the gearshift switch and check shift solenoid valve B.

Does Shift Solenoid Valve B Operate?

NO – Faulty shift solenoid valve B.

YES – No problem (Temporary Failure).

GEAR POSITION INDICATOR DISPLAYS "- -" AND DRIVE MODE INDICATOR "ESP" STAYS ON

1. TCM Connector Inspection

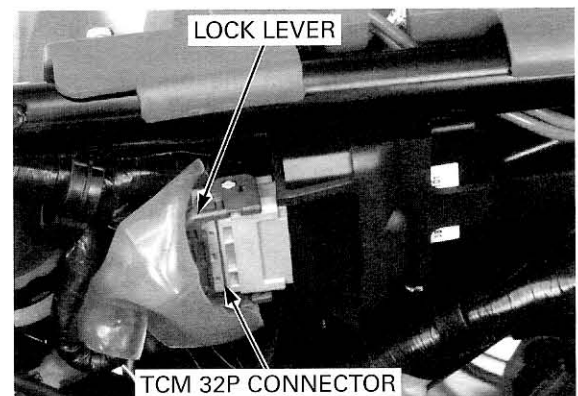
Turn the ignition switch to "OFF". Remove the air cleaner housing (page 5-5). Disconnect the Transmission Control Module (TCM) 32P connector by releasing the lock lever. Check the connector for loose contacts or corroded terminals.

Is the connector in good condition?

NO – Loose or poorly connected TCM 32P connector.

YES – GO TO STEP 2.

Seal the TCM connector with tape to prevent dirt and oil from entering the connector after disconnecting the 32P connector.



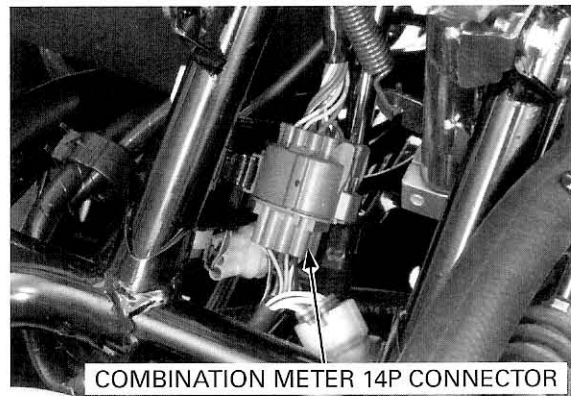
2. Combination Meter Connector Inspection

Remove the combination meter 14P connector and disconnect it.
Check the connector for loose contacts or corroded terminals.

Is the connector in good condition?

NO – Loose or poorly connected combination meter 14P connector.

YES – GO TO STEP 3.



COMBINATION METER 14P CONNECTOR

3. LCD Line Open Circuit Inspection

Be careful not to bend the connector terminals.

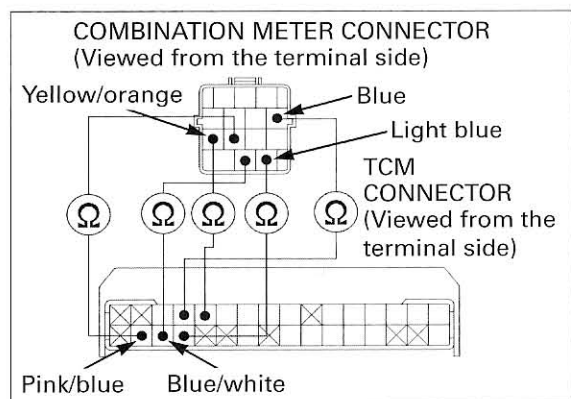
Check the LCD wires for continuity between the combination meter and TCM connectors terminals.

Is there continuity?

NO –

- Open circuit in the Pink/blue wire.
- Open circuit in the Blue/white wire.
- Open circuit in the Light blue wire.
- Open circuit in the Blue wire.
- Open circuit in the Yellow/orange wire.

YES – GO TO STEP 4.



4. LCD Short Circuit Inspection

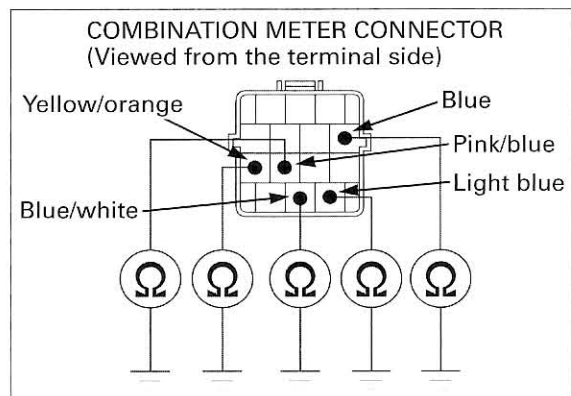
Check the LCD wires for continuity between the combination meter connector terminals of the wire harness side and ground.

Is there continuity?

YES –

- Short circuit in the Pink/blue wire.
- Short circuit in the Blue/white wire.
- Short circuit in the Light blue wire.
- Short circuit in the Blue wire.
- Short circuit in the Yellow/orange wire.

NO – GO TO STEP 5.



5. Shift Solenoid Valve Inspection

When connecting the TCM 32P connector, check that there is no dirt and oil in the connector.

Connect the TCM 32P and combination meter 14P connectors.

Perform the troubleshooting of "AUTOMATIC TRANSMISSION DOES NOT SHIFT" (page 24-37).

Are the shift solenoid valves in good condition?

NO – Faulty shift solenoid valves A and/or B.

YES – Faulty TCM.

GEAR POSITION SWITCH

INSPECTION

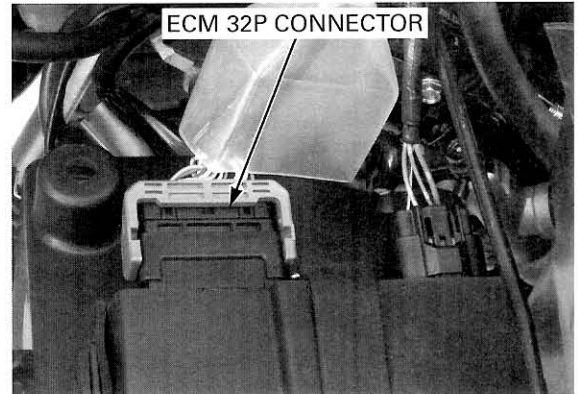
Turn the ignition switch to "OFF".

Seal the ECM connector with tape to prevent dirt and oil from entering the connector after disconnecting the 32P connector.

Disconnect the ECM 32P connector by releasing the lock lever (page 20-6).

NOTE:

- When reconnecting the ECM 32P connector, check that there is no dirt and oil in the connector.



Be careful not to bend the connector terminals.

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 gearshift lever positions shown below, and there should be no continuity at the other terminals.

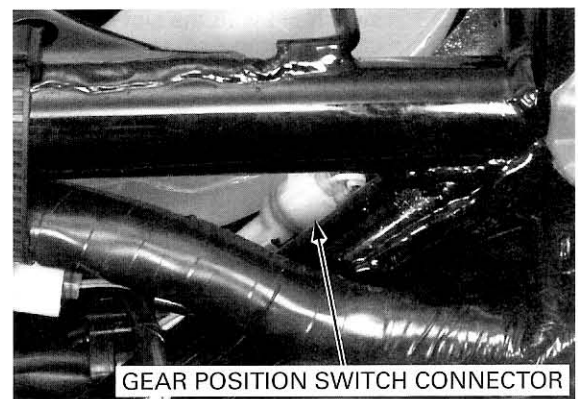
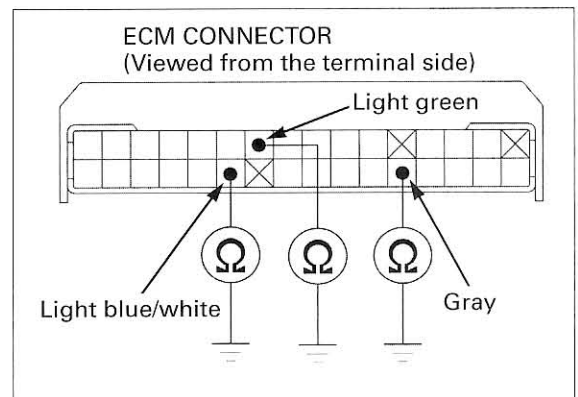
You must test each of the three wires in each gearshift lever position. Therefore, you need to make 9 tests, between each gear position switch wire terminal and ground.

Color \ Position	Light blue/white	Light green	Gray	GND
DRIVE	1 ○	2	3	○
NEUTRAL	4	5 ○	6	○
REVERSE	7	8	9 ○	○

If the test result is abnormal, disconnect the gear position switch 3P connector.

Perform the continuity test at the 3P connector in the same manner as on page 24-39.

- If the test result at the ECM is abnormal and the one at the 4P connector is normal, check for open or short circuit, or loose or poor connector contact.
- If the both test results are abnormal, replace the gear position switch.



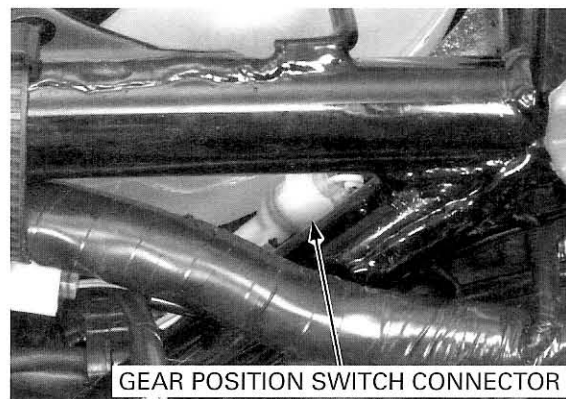
REPLACEMENT

Remove the following:

- seat (page 2-4)
- right side cover (page 2-4)
- left fuel tank side cover (page 2-6)

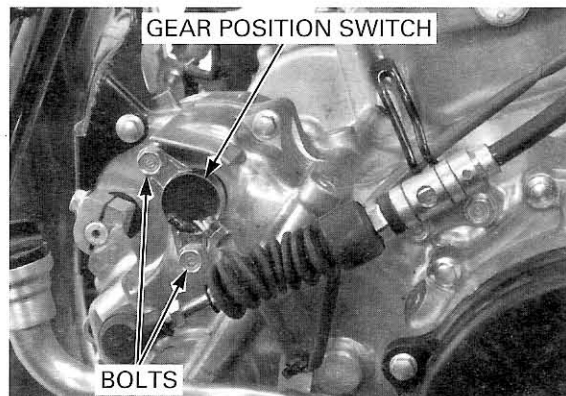
Disconnect the gear position switch 3P connector.

Release the gear position switch wire from the clamps.



Shift the sub-transmission into neutral.

Remove the two bolts and the gear position switch from the crankcase cover.



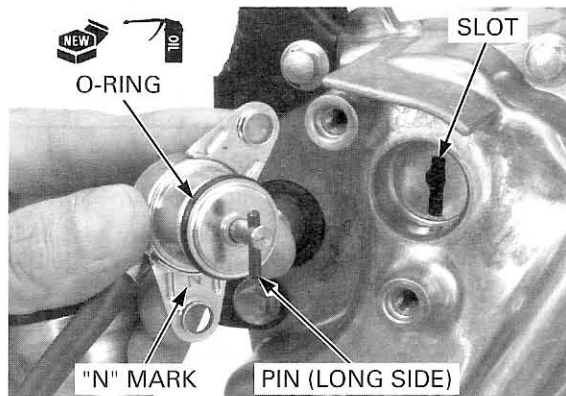
Coat a new O-ring with engine oil and install it onto a new gear position switch.

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.

Route the gear position switch wire properly (page 1-21).



GEARSHIFT SWITCH

NOTE:

- The automatic transmission can shift and the meter indicates the shift position (1 through 3) with the following conditions:
 - Mode select switch at ESP (Electric Shift Program)
 - Gearshift lever in D range
 - Ignition switch turned to "ON"

INSPECTION

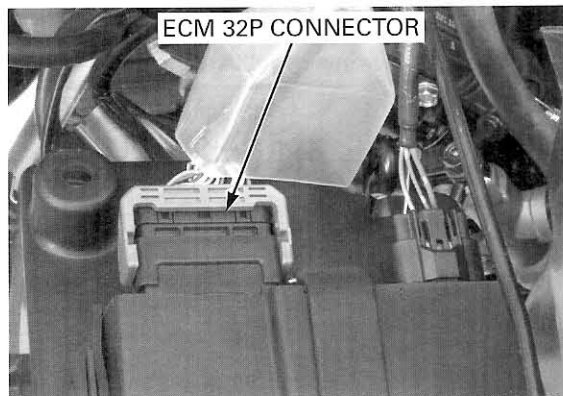
Turn the ignition switch to "OFF".

Seal the ECM connector with tape to prevent dirt and oil from entering the connector after disconnecting the 32P connector.

Disconnect the ECM 32P connector by releasing the connector lock lever (page 20-6).

NOTE:

- When reconnecting the ECM 32P connector, check that there is no dirt and oil in the connector.

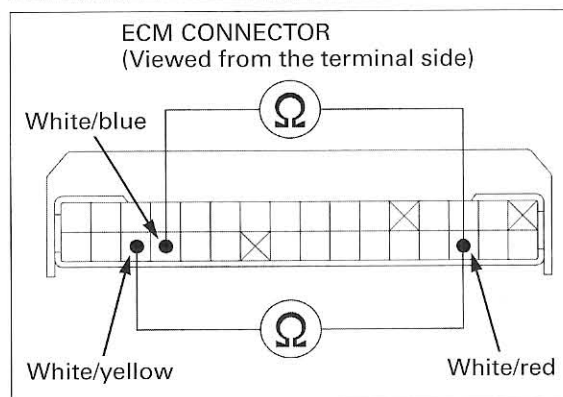


Be careful not to bend the connector terminals.

Check for continuity between the ECM connector terminals in each switch position.

Continuity should exist between the color coded wires as follows:

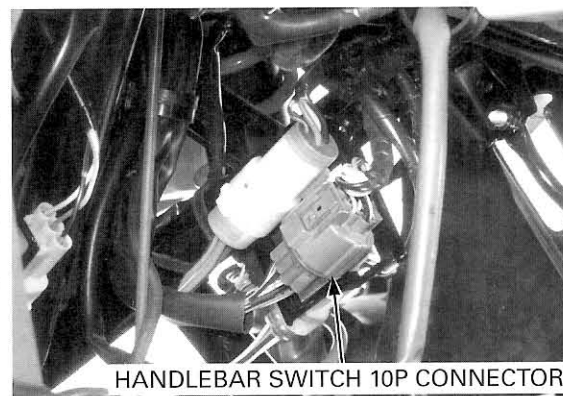
Color Position	White/ blue	White/ red	White/ yellow	White/ red
Up	○ — ○			
Free				
Down			○ — ○	



If the test result is abnormal, remove the right inner fender (page 2-9) and disconnect the left handlebar switch 10P connector.

Perform the continuity test at the 10P connector in the same manner as on page 24-41.

- If the test result at the ECM is abnormal and the one at the 10P connector is normal, check for open or short circuit, or loose or poor connector contact.
- If the both test results are abnormal, replace the handlebar switch (gearshift switch).



DRIVE MODE SELECT SWITCH

INSPECTION

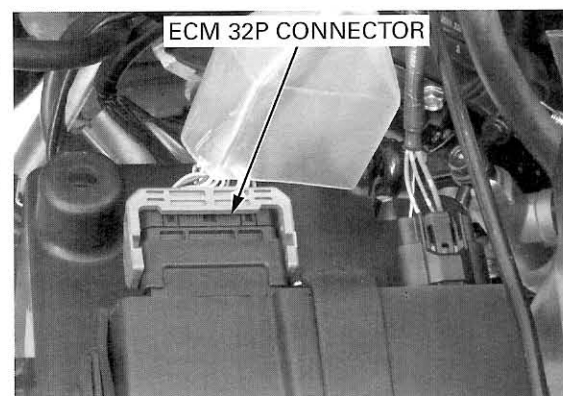
Turn the ignition switch to "OFF".

Seal the ECM connector with tape to prevent dirt and oil from entering the connector after disconnecting the 32P connector.

Disconnect the ECM 32P connector by releasing the connector lock lever (page 20-6).

NOTE:

- When reconnecting the ECM 32P connector, check that there is no dirt and oil in the connector.



AUTOMATIC TRANSMISSION SYSTEM

Be careful not to bend the connector terminals.

Check for continuity between the ECM connector terminals in each switch position.

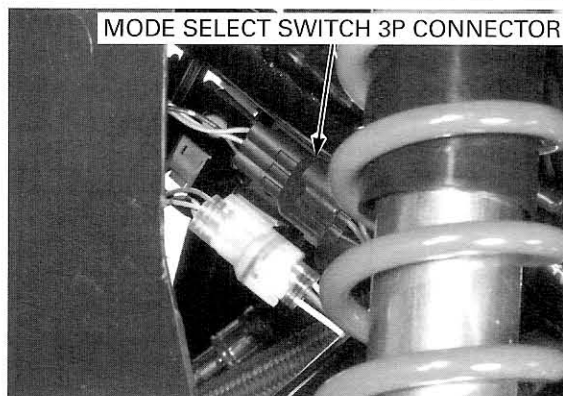
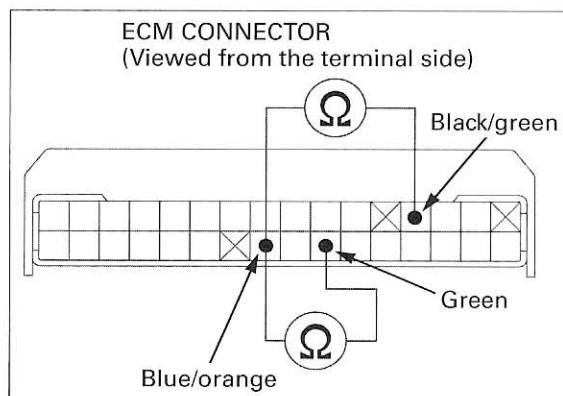
Continuity should exist between the color coded wires as follows:

Color Position	Blue/ orange	Black/ green	Green
ESP	○	○	○
D	○	○	○

If the test result is abnormal, remove the right inner fender (page 2-9) and disconnect the drive mode select switch 3P connector.

Perform the continuity test at the 3P connector in the same manner as on page 24-42.

- If the test result at the ECM is abnormal and the one at the 4P connector is normal, check for open or short circuit, or loose or poor connector contact.
- If the both test results are abnormal, replace the drive mode select switch.



THROTTLE POSITION (TP) SENSOR

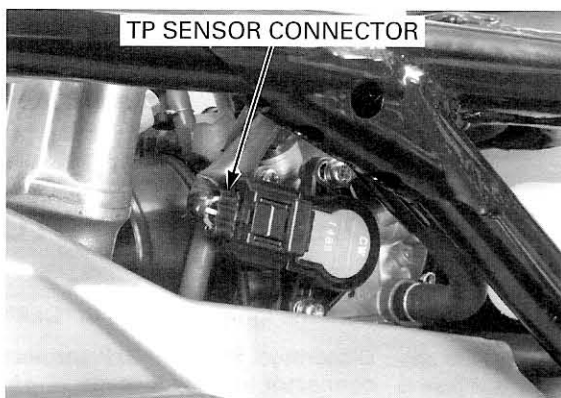
REMOVAL/INSTALLATION

NOTE:

- Do not loosen the TP sensor attaching screws (torx) unless the TP sensor requires replacement. It may cause the sensor to move out of position. See page 24-43 for TP sensor replacement.

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

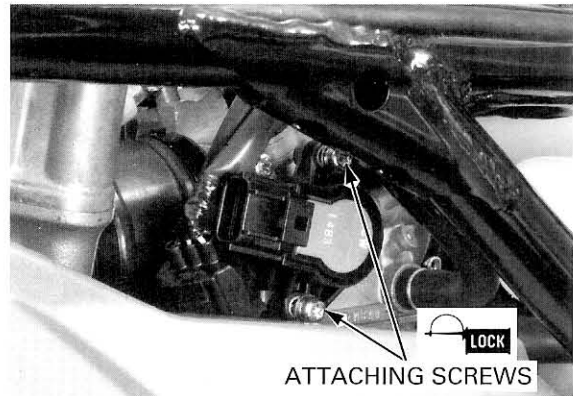
Disconnect the TP sensor 3P connector.



AUTOMATIC TRANSMISSION SYSTEM

Apply locking agent to the torx screw threads and loosely install them.

Check the engine idle speed and adjust it if necessary (page 3-12).



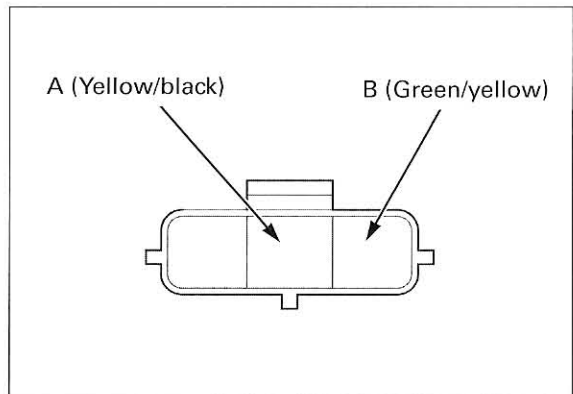
Adjust the TP sensor position so that the resistance between terminals A and B is 490 – 510 Ω , and tighten the torx screws.

TORQUE: 4 N·m (0.4 kgf·m, 2.9 lbf·ft)

Connect the throttle sensor connector.

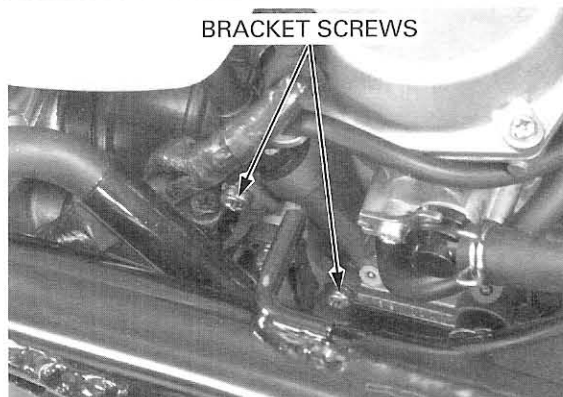
Perform the initial setting procedure (page 24-10).

Install the removed parts in the reverse order of removal.



Remove the two bracket screws, and the TP sensor and bracket as an assembly.

BRACKET SCREWS



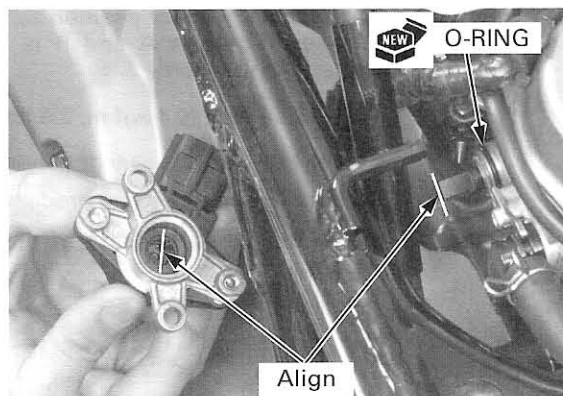
Install a new O-ring onto the carburetor body.

Improper installation can cause damage to the TP sensor.

Install the TP sensor/bracket assembly by aligning the tabs of the sensor with the flat of the shaft as shown.

Install the removed parts in the reverse order of removal.

O-RING



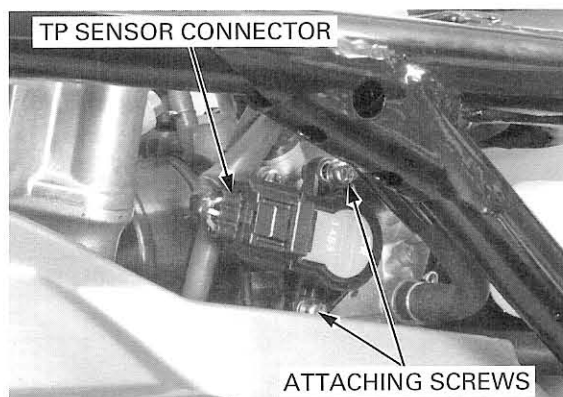
REPLACEMENT

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

Disconnect the TP sensor 3P connector.

Remove the two sensor attaching (torx) screws and TP sensor.

TP SENSOR CONNECTOR



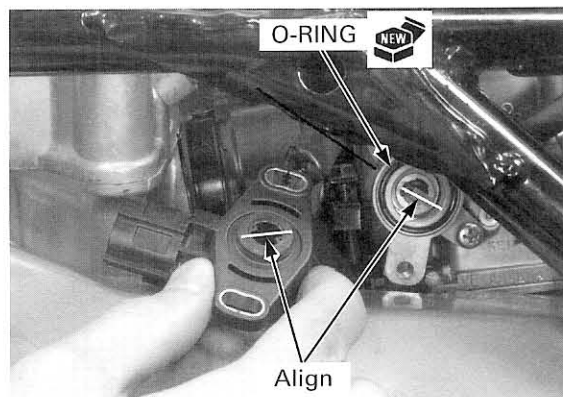
ATTACHING SCREWS

Install a new O-ring into the sensor bracket groove.

Improper installation can cause damage to the TP sensor.

Install a new throttle sensor by aligning the tabs of the sensor with the flat of the shaft as shown.

O-RING



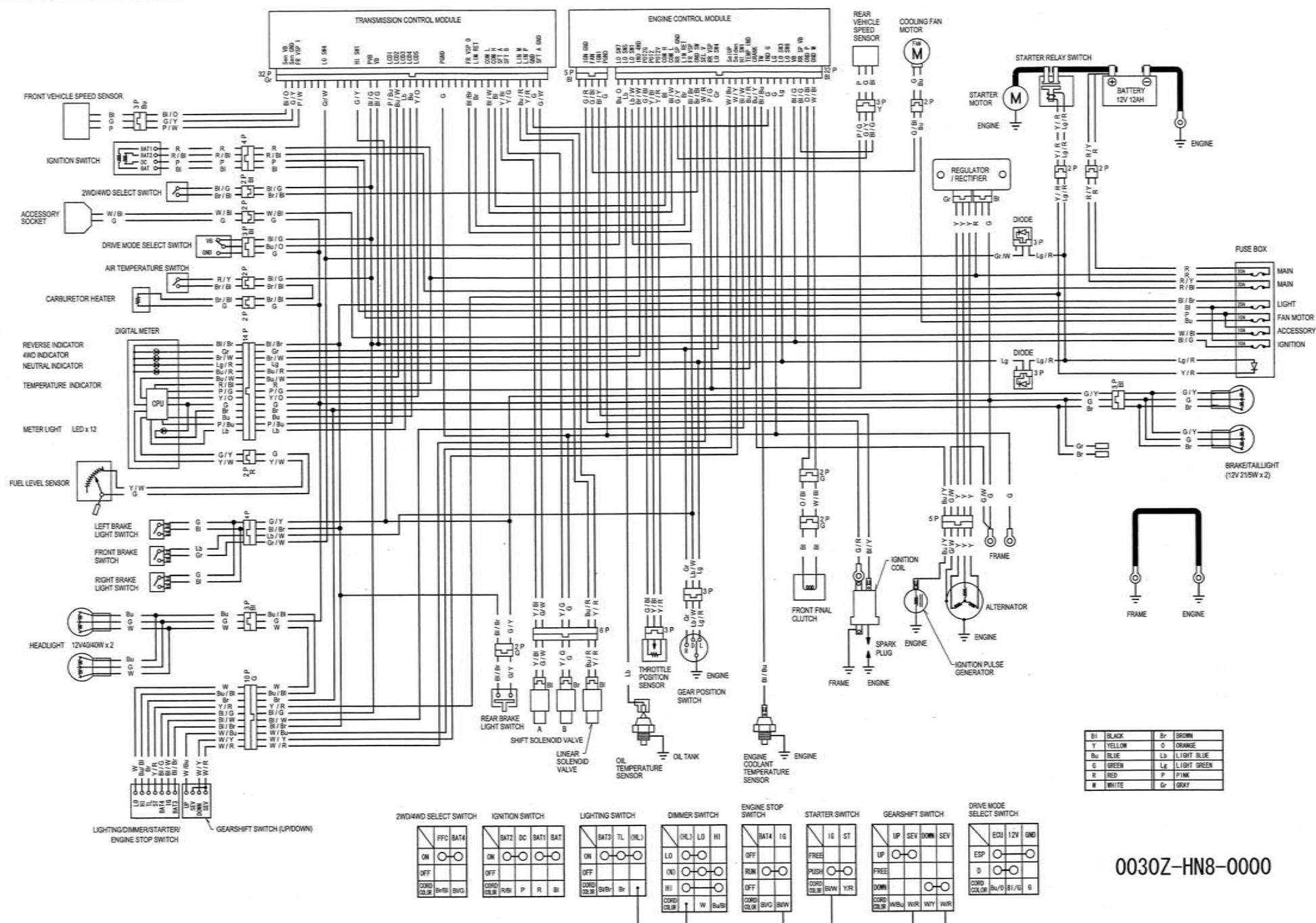
Align

25. WIRING DIAGRAM

WIRING DIAGRAM 25-3

MEMO

WIRING DIAGRAM



26. TECHNICAL FEATURE

AUTOMATIC TRANSMISSION SYSTEM ... 26-2

AUTOMATIC TRANSMISSION SYSTEM

OUTLINE

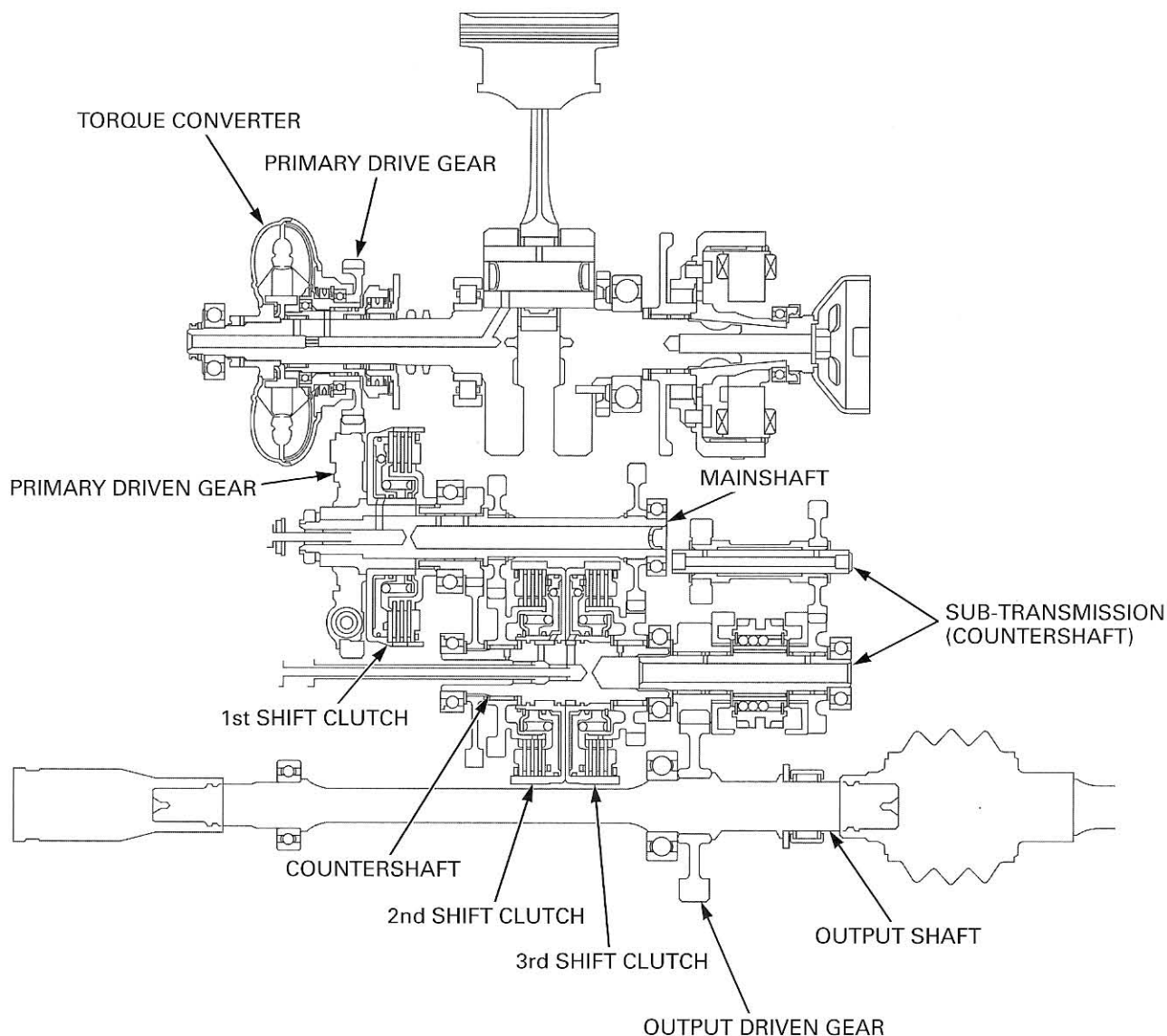
This three-speed automatic transmission system controls gear selection by means of the automatic transmission mechanism that consists of the torque converter and the 3 shift clutches (hydraulic clutch).

To control the hydraulic clutch and to shift, the system changes the supply of hydraulic pressure to each clutch (1st, 2nd, 3rd) by activating the respective spool valves with the corresponding solenoid valves (page 12-2). Each solenoid valve is controlled by the engine control module (ECM), that detects the signal from each sensor and switch, and the transmission control module (TCM) (page 24-2).

The hydraulic oil for this system is the engine oil, which is supplied from the ordinary oil pump for engine lubrication (page 4-2).

The valve body which incorporates solenoid valves and spool valves that control the clutch hydraulic pressure is laid out independently on the crankcase cover to facilitate maintenance (page 12-11)

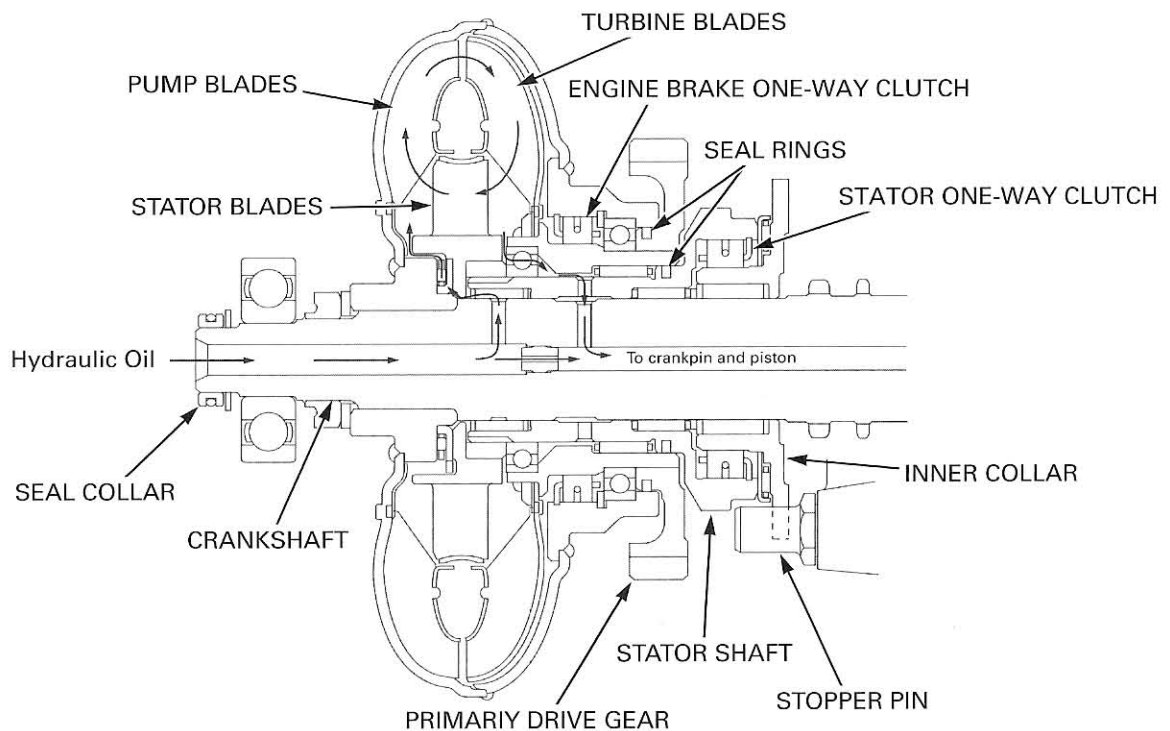
The sub-transmission is laid out in front of the output shaft, and selecting Drive-Neutral-Reverse can be made mechanically by operating the selector lever located near the drivers seat.



TORQUE CONVERTER

STRUCTURE

- Pump
The pump, directly connected to the crankshaft, converts engine output (torque) into oil flow.
- Turbine
Receiving the oil from the pump, the turbine transmits the torque to the transmission by way of the primary drive gear.
- Stator
The stator changes the direction of the oil flow drained from the turbine. It drains the oil toward the pump.
- Stator Shaft
It transmits the stator rotation to the one-way clutch.
- Stator One-way Clutch
The stator one-way clutch locks the stator at stalling and it releases (rotates) the stator at coupling (page 26-3).
- Inner Collar
The inner collar, prevented from turning by the stopper pin fixed on the crankcase, stops the rotation force at stalling, which is transmitted from the stator by way of the one-way clutch.
- Engine Brake One-way Clutch
When the engine braking is applied, the engine brake one-way clutch directly transmits the input torque from the primary drive gear to the crankshaft. This allows the machine to slow down by engine braking.
- Seal Ring and Seal Collar
The seal ring and seal collar are provided to prevent oil leakage.



OPERATION PRINCIPLE

1. Oil Flow:
The oil in the torque converter flows in this order; from the pump, to the turbine, and to the stator. The oil is supplied from the inside of the pump, and the excess oil is drained from the turbine. The torque converter is cooled down by draining (exchanging) the excess oil.
2. Stall Range:
When the difference of rotation speed between the pump and turbine is large, the stator turns in the reverse direction from that of the turbine by receiving the reaction force from the turbine. As this motion is locked by the one-way clutch, the counter torque is applied to the stator. To balance the rotation direction, the turbine torque (output torque) becomes the sum of the pump torque and counter torque of the stator. Therefore, the output torque is amplified by the amount of counter torque of the stator.
3. Coupling Range:
When the difference of rotation speed between the pump and turbine is small (0.8 or more), the reaction force applied from the turbine to the stator is small and the stator turns in the same direction as that of the turbine. As the torque is not amplified this time, the torque ratio is about 1.0 and the torque transfer efficiency to speed ratio changes in the ratio of 1:1.
4. Engine Braking:
The input force from the primary drive gear is directly transmitted to the crankshaft by the one-way clutch, which produces the engine braking (Same as the conventional ATV).

TECHNICAL FEATURE

HYDRAULIC VALVE FUNCTION

- **Linear Solenoid Valve**

It controls the vehicle creep by diverting the hydraulic pressure that flows to the entire clutch system to the linear valve.

- **Shift Solenoid Valves (A and B)**

The shift solenoid valves control the shift timing by supplying and shutting off hydraulic pressure to activate the shift valves.

- **Shift Valves (1-2 and 2-3)**

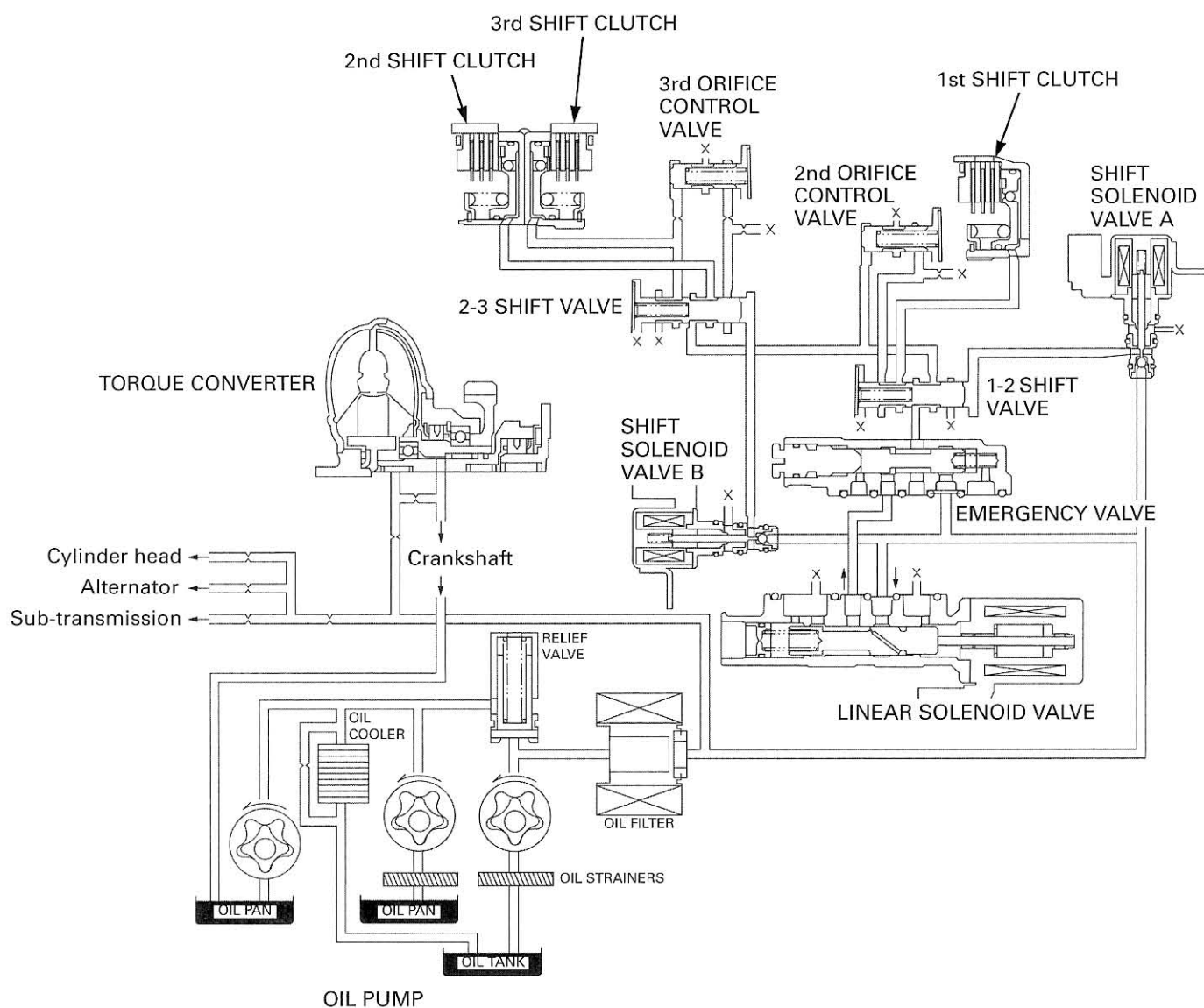
The shift valves switch the hydraulic circuits to the three clutches.

- **Orifice Control Valve (2nd and 3rd)**

The orifice control valves operate when clutch fluid pressure rises during shifting. It releases the pressure to reduce shift shock.

- **Emergency Valve**

The emergency valve is used when the hydraulic pressure is shut off by the faulty linear solenoid valve (stuck; mechanical lock), and the vehicle is hindered from running. Open the bypass oil circuit manually to supply hydraulic fluid. (In this case, the transmission is held in 2nd range and the vehicle creeps during idling.)



SHIFT CLUTCH HYDRAULIC CIRCUIT AND OPERATION

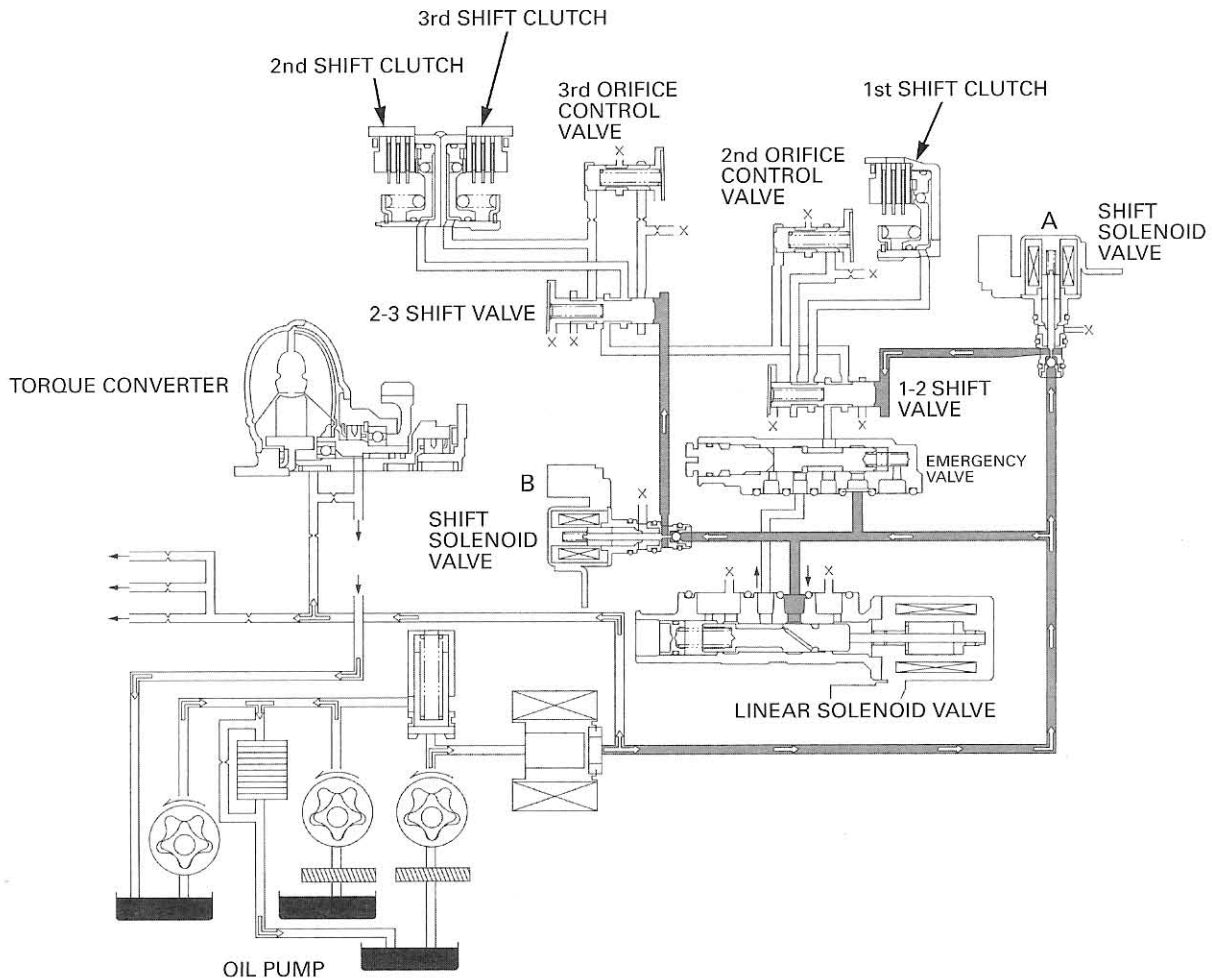
This system activates the linear solenoid valve and shift solenoid valve A and B as the ECM and TCM detect the following signals:

- throttle angle
- vehicle speed
- sub-transmission gear position (D – N – R)
- drive mode (AUTO – ESP)
- engine oil temperature

It controls the shift clutches for the situation according to the combination of the operation of the respective solenoid valves.

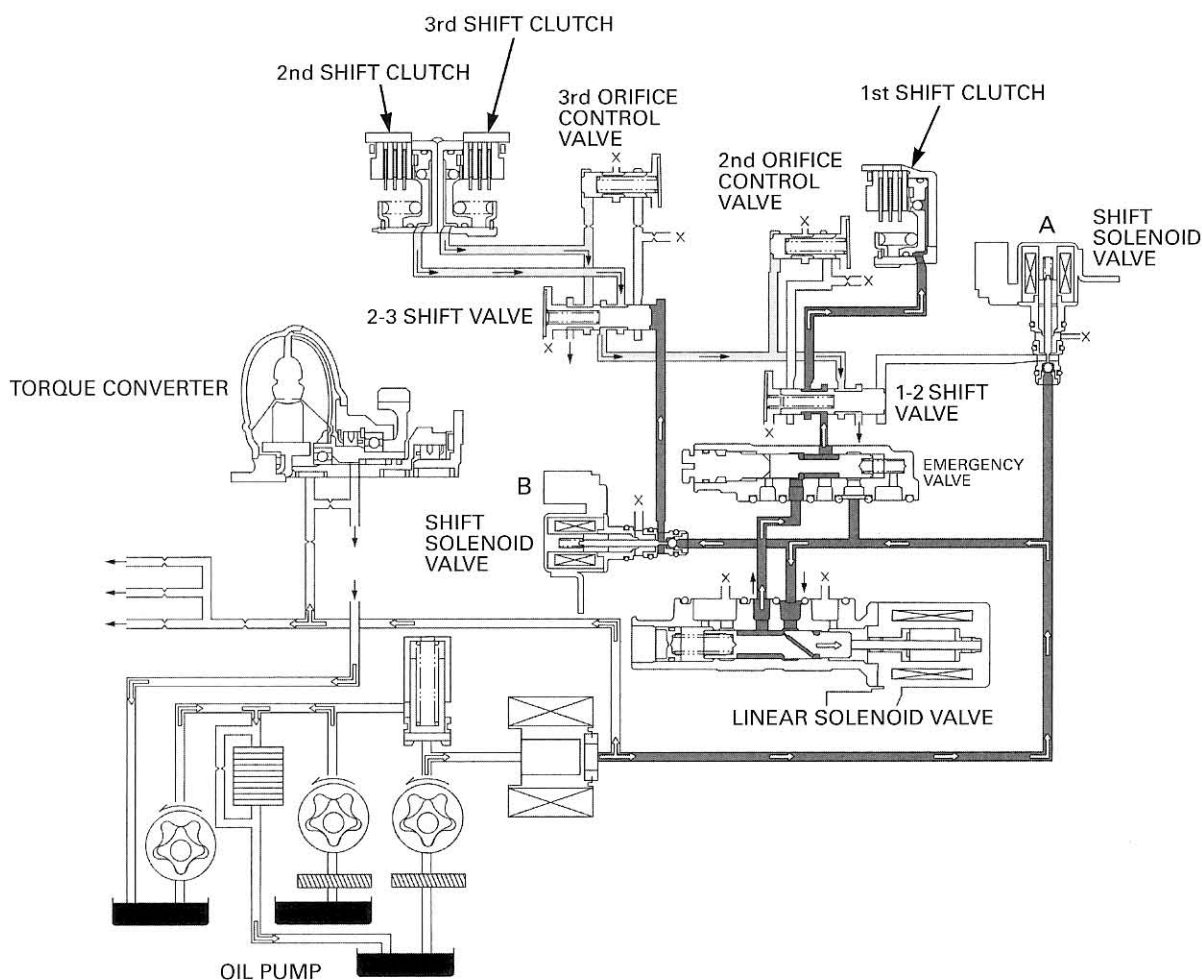
- Gear in Neutral

The hydraulic passage is the same as the transmission being in the 2nd range. The linear solenoid valve is on (valve closed) and the hydraulic oil that flows to activate all shift clutches is shut off. Therefore, all clutches are inactive.

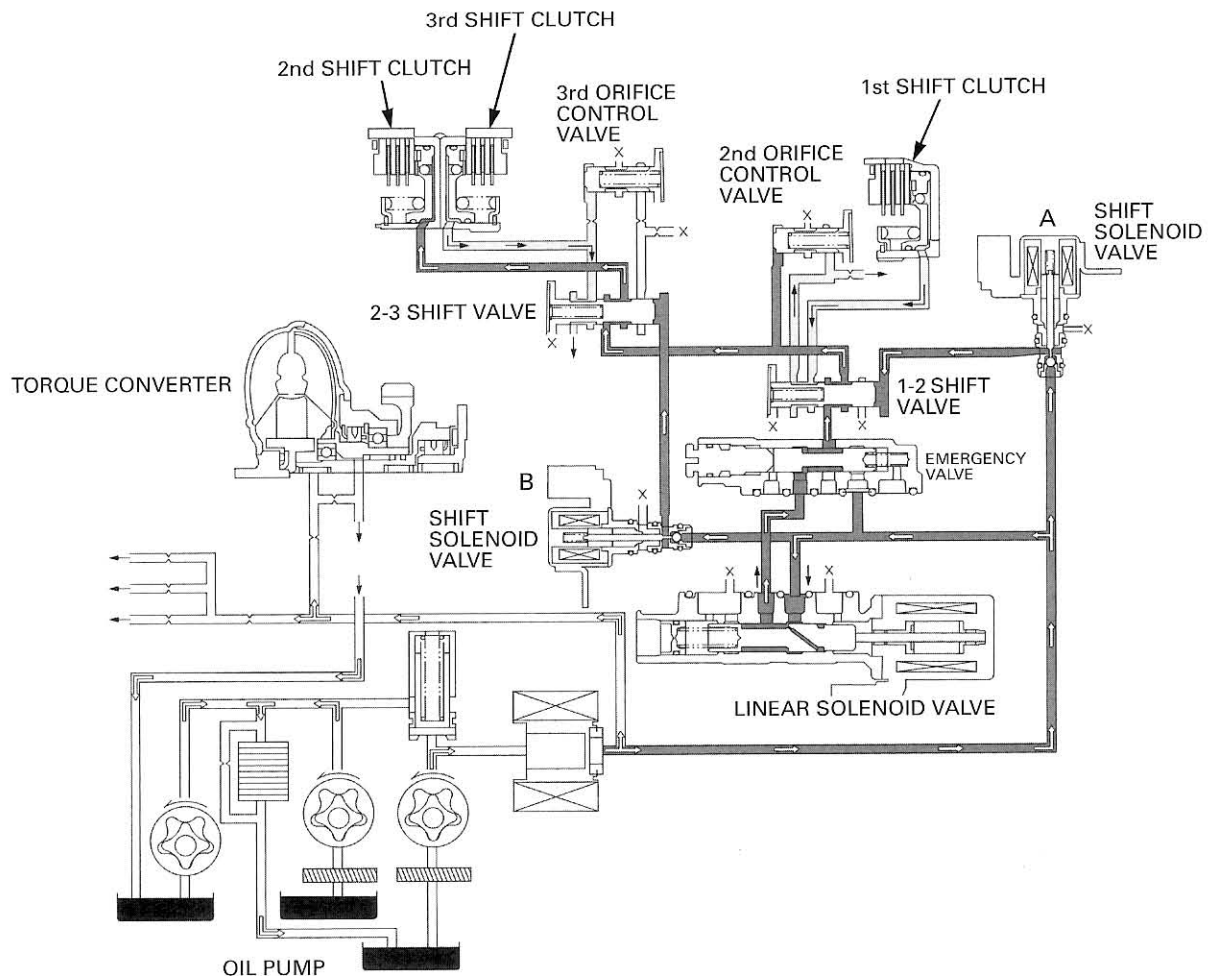


TECHNICAL FEATURE

- Driving in 1st range and Reverse gear
 - The hydraulic passage is connected to supply hydraulic oil to the 1st shift clutch, and the clutch is engaged.
Oil is supplied by way of: Linear solenoid valve ⇒ 1-2 Shift valve ⇒ 1st Shift clutch
(Oil is drained by way of:
2nd Shift clutch ⇒ 2-3 Shift valve ⇒ 1-2 Shift valve
3rd Shift clutch ⇒ 2-3 Shift valve)
 - At idling, the linear solenoid valve is on (valve closed) to eliminate vehicle creep.
At start up, the linear solenoid valve controls the clutch hydraulic pressure to the linear valve in accordance with the signal from the TCM.
 - At driving, the linear solenoid valve is off (valve open) supplying sufficient hydraulic oil to the shift clutch.
 - Control of the hydraulic passage during driving in Reverse gear is the same. However, the vehicle can be driven only in the 1st-hold mode (no shift).

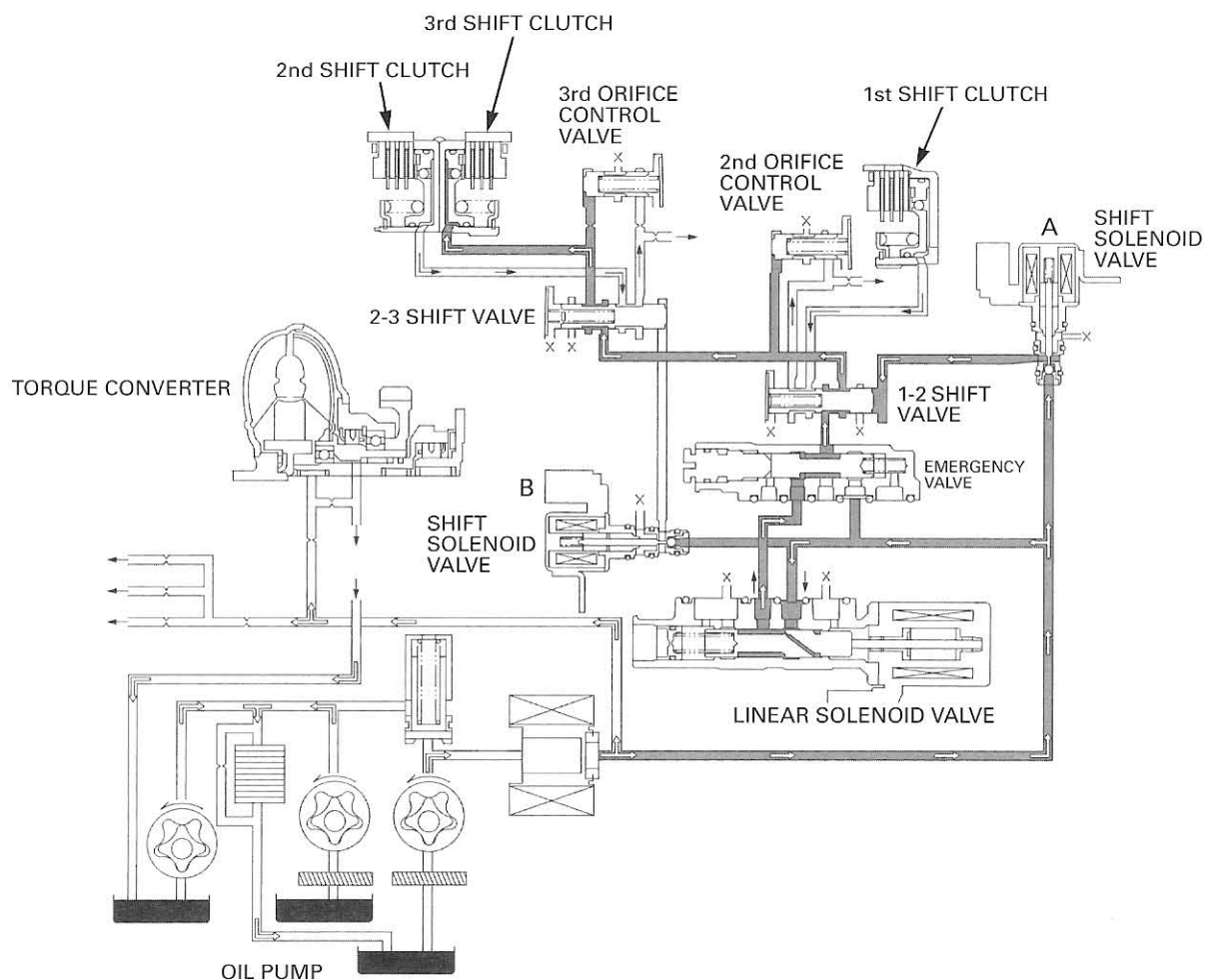


- Driving in 2nd range
 - The hydraulic passage is connected to supply hydraulic oil to the 2nd shift clutch.
Oil is supplied by way of: Linear solenoid valve ⇒ 1-2 Shift valve ⇒ 2-3 Shift valve ⇒ 2nd Shift clutch
(Oil is drained by way of:
1st Shift clutch ⇒ 1-2 Shift valve ⇒ 2nd Orifice control valve
3rd Shift clutch ⇒ 2-3 Shift valve)
 - When shifting from 1st to 2nd position, the draining volume of the 1st clutch hydraulic oil is controlled by the ordinary orifice and the 2nd orifice control valve to reduce the shift shock.*
*When the TCM detects system failure (fail-safe mode), the hydraulic passage is the same as the above. (Therefore, the vehicle can be driven only in the 2nd-hold mode and creeping can occur at idle)



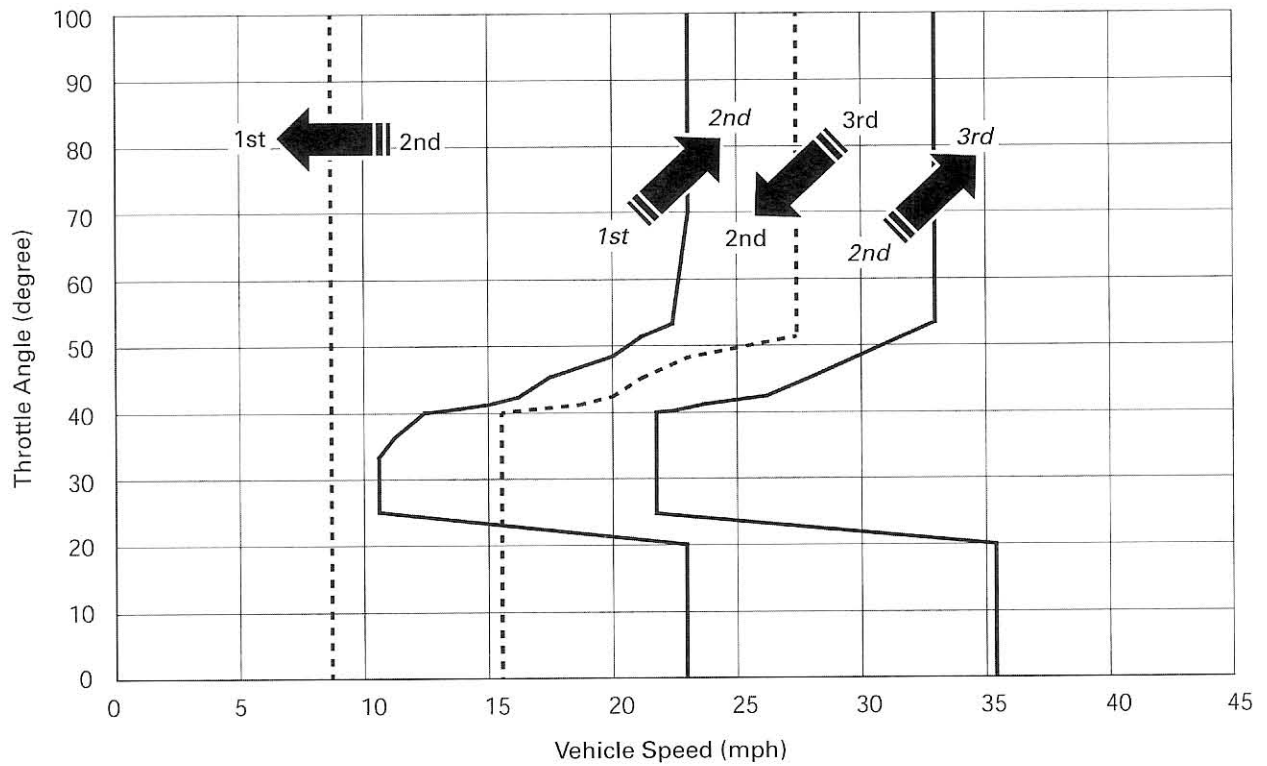
TECHNICAL FEATURE

- Driving in 3rd range
 - The hydraulic passage is connected to supply hydraulic oil to the 3rd shift clutch.
 - Oil is supplied by way of: Linear solenoid valve ⇒ 1-2 Shift valve ⇒ 2-3 Shift valve ⇒ 3rd Shift clutch
 - (Oil is drained by way of:
 - 1st Shift clutch ⇒ 1-2 Shift valve ⇒ 2nd Orifice control valve
 - 2nd Shift clutch ⇒ 2-3 Shift valve ⇒ 3rd Orifice control valve)
 - When shifting from 2nd to 3rd position, the draining volume of the 2nd clutch hydraulic oil is controlled by the ordinary orifice and the 3rd orifice control valve to reduce the shift shock.



AUTOMATIC TRANSMISSION PERFORMANCE CURVE

See the following graph for the relationship between the vehicle speed and the throttle angle.
It shows the shift timing (shift-up shown with the solid lines and shift-down with the dotted lines) and the ranges of shift position.



The vehicle condition is not applied the brake.

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 SPEED27-6

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
• Clogged fuel valve
• Clogged fuel fill cap breather

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 stops?

- Yes** – • Improper choke operation
• Incorrectly adjusted carburetor
• Leaking carburetor insulator
• Improper ignition timing (Faulty ECM or ignition pulse generator)
• Contaminated fuel

NO – GO TO STEP 5.

5. Cylinder Compression

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 fill cap breather

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. 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 7.

TROUBLESHOOTING

7. Carburetor Inspection

Check carburetor for clogging.

Is the carburetor clogged?

YES – • Carburetor not serviced frequently enough

NO – GO TO STEP 8.

8. 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 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 – • 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 5-20

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 fill cap breather
• 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

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

ACCESSORY SOCKET	22-5	DIFFERENTIAL ASSEMBLY	17-24
AIR CLEANER	3-5	DIFFERENTIAL DISASSEMBLY/INSPECTION	17-14
AIR CLEANER HOUSING	5-5	DIFFERENTIAL INSTALLATION	17-29
AIR CLEANER HOUSING DRAIN PLUG	3-7	DIFFERENTIAL REMOVAL	17-11
ALTERNATOR CHARGING COIL	19-8	DIODE	21-12
ALTERNATOR STATOR/STARTER REDUCTION GEARS	10-7	DRIVE MODE SELECT SWITCH	24-41
ALTERNATOR/STARTER CLUTCH SPECIFICATIONS ..	1-8	DRIVE SHAFT BOOTS	3-14
AUTOMATIC TRANSMISSION SPECIFICATIONS	1-9	ELECTRIC STARTER SPECIFICATIONS	1-11
AUTOMATIC TRANSMISSION SYSTEM	26-2	EMISSION CONTROL INFORMATION	
AXLE SHAFT	18-5	LABEL (U.S.A. only)	1-36
BATTERY	19-5	EMISSION CONTROL SYSTEMS	1-35
BATTERY/CHARGING SYSTEM SPECIFICATIONS	1-10	ENGINE & FRAME TORQUE VALUES	1-12
BEFORE STARTING TROUBLESHOOTING	24-7	ENGINE GUARD	2-16
BODY PANEL LOCATIONS	2-3	ENGINE IDLE SPEED	3-12
BRAKE FLUID	3-17	ENGINE INSTALLATION	7-7
BRAKE FLUID REPLACEMENT/AIR BLEEDING	16-6	ENGINE OIL	3-10
BRAKE LIGHT SWITCH	22-17	ENGINE OIL FILTER	3-12
BRAKE PAD/DISC	16-9	ENGINE REMOVAL	7-4
BRAKE PADS WEAR	3-18	ENGINE SIDE COVER	2-17
BRAKE SHOES WEAR	3-18	EXHAUST SYSTEM	2-19
BRAKE SYSTEM	3-19	FINAL DRIVE ASSEMBLY	18-21
BRAKE SYSTEM SPECIFICATIONS	1-10	FINAL DRIVE DISASSEMBLY/INSPECTION	18-14
CABLE & HARNESS ROUTING	1-21	FINAL DRIVE INSTALLATION	18-24
CAMSHAFT INSTALLATION	8-16	FINAL DRIVE REMOVAL	18-11
CAMSHAFT REMOVAL	8-14	FINAL GEAR CASE BEARING REPLACEMENT	18-19
CARBURETOR ASSEMBLY	5-13	FLYWHEEL/STARTER CLUTCH	10-12
CARBURETOR CHOKE	3-5	FRONT BRAKE MASTER CYLINDER	16-11
CARBURETOR DISASSEMBLY/INSPECTION	5-7	FRONT BRAKE SHOES/DRUM	16-21
CARBURETOR HEATER	22-8	FRONT BRAKE SWITCH	22-18
CARBURETOR INSTALLATION	5-19	FRONT CARRIER	2-11
CARBURETOR REMOVAL	5-6	FRONT CARRY PIPE	2-10
CASE BEARING REPLACEMENT	17-21	FRONT CRANKCASE COVER	12-18
CENTER MUD GUARD	2-7	FRONT DRIVE SHAFT	17-5
CHARGING SYSTEM INSPECTION	19-7	FRONT DRIVING MECHANISM SPECIFICATIONS	1-10
COMBINATION METER	22-9	FRONT FENDER	2-11
COMPONENT LOCATION		FRONT GRILLE	2-10
AUTOMATIC TRANSMISSION SYSTEM	24-2	FRONT MUD GUARD	2-8
BATTERY/CHARGING SYSTEM	19-2	FRONT SHOCK ABSORBER	14-17
ELECTRIC STARTER	21-2	FRONT WHEEL	14-9
IGNITION SYSTEM	20-2	FRONT WHEEL CYLINDER/BRAKE PANEL	16-24
LIGHTS/METERS/SWITCHES	22-2	FRONT WHEEL/SUSPENSION/STEERING SPECIFICATIONS	1-9
SELECTABLE 4WD SYSTEM	23-2	FUEL GAUGE/FUEL LEVEL SENSOR	22-11
CONNECTOR LOCATION	24-4	FUEL LINE	3-4
COOLANT REPLACEMENT	6-6	FUEL SYSTEM SPECIFICATIONS	1-7
COOLING SYSTEM	3-13	FUEL TANK	5-22
COOLING SYSTEM FLOW PATTERN	6-2	FUEL TANK COVER	2-5
COOLING SYSTEM SPECIFICATIONS	1-7	FUEL TANK SIDE COVER	2-6
COOLING SYSTEM TESTING	6-5	GEAR POSITION SWITCH	24-39
CRANKCASE ASSEMBLY	13-11	GEAR SELECTOR LEVER LINKAGE	11-14
CRANKCASE BEARING REPLACEMENT	13-9	GEARSHIFT SWITCH	24-40
CRANKCASE SEPARATION	13-4	GENERAL SPECIFICATIONS	1-5
CRANKCASE/CRANKSHAFT/BALANCER SPECIFICATIONS	1-9	HANDLEBAR	14-5
CRANKSHAFT	13-5	HANDLEBAR SWITCH	22-7
CYLINDER COMPRESSION	8-5	HEADLIGHT	22-4
CYLINDER HEAD ASSEMBLY	8-17	HIGH ALTITUDE ADJUSTMENT	5-21
CYLINDER HEAD COVER ASSEMBLY/ INSTALLATION	8-20	IGNITION COIL	20-7
CYLINDER HEAD COVER REMOVAL/DISASSEMBLY ..	8-5	IGNITION SWITCH	22-6
CYLINDER HEAD DISASSEMBLY	8-9	IGNITION SYSTEM INSPECTION	20-5
CYLINDER HEAD INSTALLATION	8-18	IGNITION SYSTEM SPECIFICATIONS	1-11
CYLINDER HEAD REMOVAL	8-8	IGNITION TIMING	20-8
CYLINDER HEAD/VALVE/CAMSHAFT SPECIFICATIONS	1-8	INNER FENDER	2-9
CYLINDER/PISTON INSTALLATION	9-8	LIGHTS/METERS/SWITCHES SPECIFICATIONS	1-11
CYLINDER/PISTON REMOVAL	9-4	LUBRICATION & SEAL POINTS	1-18
CYLINDER/PISTON SPECIFICATIONS	1-8	LUBRICATION SYSTEM DIAGRAM	4-2
DIAGNOSTIC TROUBLESHOOTING	24-13	LUBRICATION SYSTEM SPECIFICATIONS	1-7
		METER COVER	2-18
		MODEL IDENTIFICATION	1-2
		MUFFLER PROTECTOR	2-12

INDEX

NUTS, BOLTS, FASTENERS.....	3-22	SUSPENSION.....	3-21
OIL COOLER.....	4-12	SUSPENSION ARM.....	14-18
OIL PRESSURE CHECK		SYSTEM COMPONENTS	
AUTOMATIC TRANSMISSION.....	12-9	ALTERNATOR/STARTER CLUTCH.....	10-2
LUBRICATION SYSTEM.....	4-5	AUTOMATIC TRANSMISSION.....	12-2
OIL PUMP.....	4-5	BRAKE SYSTEM.....	16-2
OUTER FENDER.....	2-15	CRANKCASE/CRANKSHAFT/BALANCER.....	13-2
PILOT SCREW ADJUSTMENT.....	5-20	CYLINDER HEAD/VALVE/CAMSHAFT.....	8-2
RADIATOR COOLANT.....	3-13	CYLINDER PISTON.....	9-2
RADIATOR RESERVE TANK.....	6-10	ENGINE REMOVAL/INSTALLATION.....	7-2
RADIATOR/COOLING FAN.....	6-10	FRONT DRIVING MECHANISM.....	17-2
REAR BRAKE CALIPER.....	16-29	FRONT WHEEL/SUSPENSION/STEERING.....	14-2
REAR BRAKE DISC.....	16-36	FUEL SYSTEM.....	5-2
REAR BRAKE MASTER CYLINDER/BRAKE PEDAL.....	16-15	REAR DRIVING MECHANISM.....	18-2
REAR CARRIER/MUD GUARD.....	2-13	REAR WHEEL/SUSPENSION.....	15-2
REAR CRANKCASE COVER.....	11-5	SUB-TRANSMISSION/GEARSHIFT LINKAGE.....	11-2
REAR DRIVING MECHANISM SPECIFICATIONS.....	1-10	SYSTEM DIAGRAM	
REAR FENDER.....	2-14	AUTOMATIC TRANSMISSION SYSTEM.....	24-6
REAR FINAL GEAR CASE OIL AND DIFFERENTIAL		BATTERY/CHARGING SYSTEM.....	19-2
OIL.....	3-15	ELECTRIC STARTER.....	21-2
REAR SHOCK ABSORBER/SUSPENSION ARM.....	15-9	IGNITION SYSTEM.....	20-2
REAR WHEEL.....	15-5	SELECTABLE 4WD SYSTEM.....	23-2
REAR WHEEL/SUSPENSION SPECIFICATIONS.....	1-9	TEMPERATURE INDICATOR/THERMOSENSOR.....	22-14
RECOIL STARTER.....	10-4	THERMOSTAT.....	6-8
REGULATOR/RECTIFIER.....	19-9	THROTTLE HOUSING.....	14-8
RIGHT SIDE COVER.....	2-4	THROTTLE OPERATION.....	3-4
SEAT.....	2-4	THROTTLE POSITION (TP) SENSOR.....	24-42
SERVICE INFORMATION.....	3-3	TIALLIGHT.....	22-4
ALTERNATOR/STARTER CLUTCH.....	10-3	TIE-ROD.....	14-29
AUTOMATIC TRANSMISSION.....	12-4	TIRES.....	14-9
AUTOMATIC TRANSMISSION SYSTEM.....	24-3	TOOLS.....	1-16
BATTERY/CHARGING SYSTEM.....	19-3	TORQUE CONVERTER INSTALLATION.....	12-37
BRAKE SYSTEM.....	16-4	TORQUE CONVERTER REMOVAL.....	12-24
COOLING SYSTEM.....	6-3	TROUBLESHOOTING	
CRANKCASE/CRANKSHAFT/BALANCER.....	13-3	ALTERNATOR/STARTER CLUTCH.....	10-3
CYLINDER HEAD/VALVE/CAMSHAFT.....	8-3	AUTOMATIC TRANSMISSION.....	12-5
CYLINDER/PISTON.....	9-3	BATTERY/CHARGING SYSTEM.....	19-4
ELECTRIC STARTER.....	21-3	BRAKE SYSTEM.....	16-5
ENGINE REMOVAL/INSTALLATION.....	7-3	COOLING SYSTEM.....	6-4
FRAME/BODY PANELS/EXHAUST SYSTEM.....	2-2	CRANKCASE/CRANKSHAFT/BALANCER.....	13-3
FRONT DRIVING MECHANISM.....	17-3	CYLINDER HEAD/VALVE/CAMSHAFT.....	8-4
FRONT WHEEL/SUSPENSION/STEERING.....	14-3	CYLINDER/PISTON.....	9-3
FUEL SYSTEM.....	5-3	ELECTRIC STARTER.....	21-4
IGNITION SYSTEM.....	20-3	ENGINE DOES NOT START OR IS HARD	
LIGHTS/METERS/SWITCHES.....	22-3	TO START.....	27-2
LUBRICATION SYSTEM.....	4-3	ENGINE LACKS POWER.....	27-3
MAINTENANCE.....	3-2	FRAME/BODY PANELS/EXHAUST SYSTEM.....	2-2
REAR DRIVING MECHANISM.....	18-3	FRONT DRIVING MECHANISM.....	17-4
REAR WHEEL/SUSPENSION.....	15-3	FRONT WHEEL/SUSPENSION/STEERING.....	14-4
SELECTABLE 4WD SYSTEM.....	23-3	FUEL SYSTEM.....	5-4
SUB-TRANSMISSION/GEARSHIFT LINKAGE.....	11-3	IGNITION SYSTEM.....	20-4
SERVICE RULES.....	1-2	LUBRICATION SYSTEM.....	4-4
SHIFT CLUTCH/MAINSHAFT ASSEMBLY.....	12-31	POOR HANDLING.....	27-6
SHIFT CLUTCH/MAINSHAFT DISASSEMBLY.....	12-26	POOR PERFORMANCE AT HIGH SPEED.....	27-6
SHIFT VALVE BODY.....	12-11	POOR PERFORMANCE AT LOW AND IDLE SPEED.....	27-5
SKID PLATE, ENGINE GUARD.....	3-20	REAR DRIVING MECHANISM.....	18-4
SPARK ARRESTER.....	3-21	REAR WHEEL/SUSPENSION.....	15-4
SPARK PLUG.....	3-7	SELECTABLE 4WD SYSTEM.....	23-4
STANDARD TORQUE VALUES.....	1-12	SUB-TRANSMISSION/GEARSHIFT LINKAGE.....	11-4
STARTER MOTOR.....	21-6	TROUBLESHOOTING CHART.....	24-12
STARTER RELAY SWITCH.....	21-11	VALVE CLEARANCE.....	3-8
STEERING COVER.....	2-5	VALVE GUIDE REPLACEMENT.....	8-11
STEERING SHAFT.....	14-23	VALVE SEAT INSPECTION/REFACING.....	8-12
STEERING SHAFT HOLDER BEARING.....	3-22	WATER PUMP.....	6-14
STEERING SYSTEM.....	3-22	WHEEL HUB/KNUCKLE(FRONT).....	14-13
SUB-TRANSMISSION.....	11-9	WHEEL HUB/KNUCKLE(REAR).....	15-5
SUB-TRANSMISSION/GEARSHIFT LINKAGE		WHEELS/TIRES.....	3-22
SPECIFICATIONS.....	1-9	WIRING DIAGRAM.....	25-3



MADE FROM 50% RECYCLED PAPER
MINIMUM 10% POST-CONSUMER CONTENT