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.

⚠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.

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.

⚠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.

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.

HOW TO USE THIS MANUAL

This service manual describes the service procedures for the TRX680FA and TRX680FGA.

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

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

Sections 1 and 4 apply to the whole vehicle. Section 3 illustrates procedures for removal/installation of components that may be required to perform service described in the following sections.
Sections 5 through 23 describe parts of the vehicle, grouped according to location.

Find the section you want on this page, then turn to the table of contents on the first page of the section.

Most sections start with an assembly or system illustration, service information and troubleshooting for the section. The subsequent pages give detailed procedure.

If you are not familiar with this vehicle, read Technical Features in section 2.
If you don't know the source of the trouble, go to section 25 Troubleshooting.

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

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

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

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

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

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

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

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Honda Motor Co., Ltd.
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CONTENTS

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SYMBOLS

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

	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

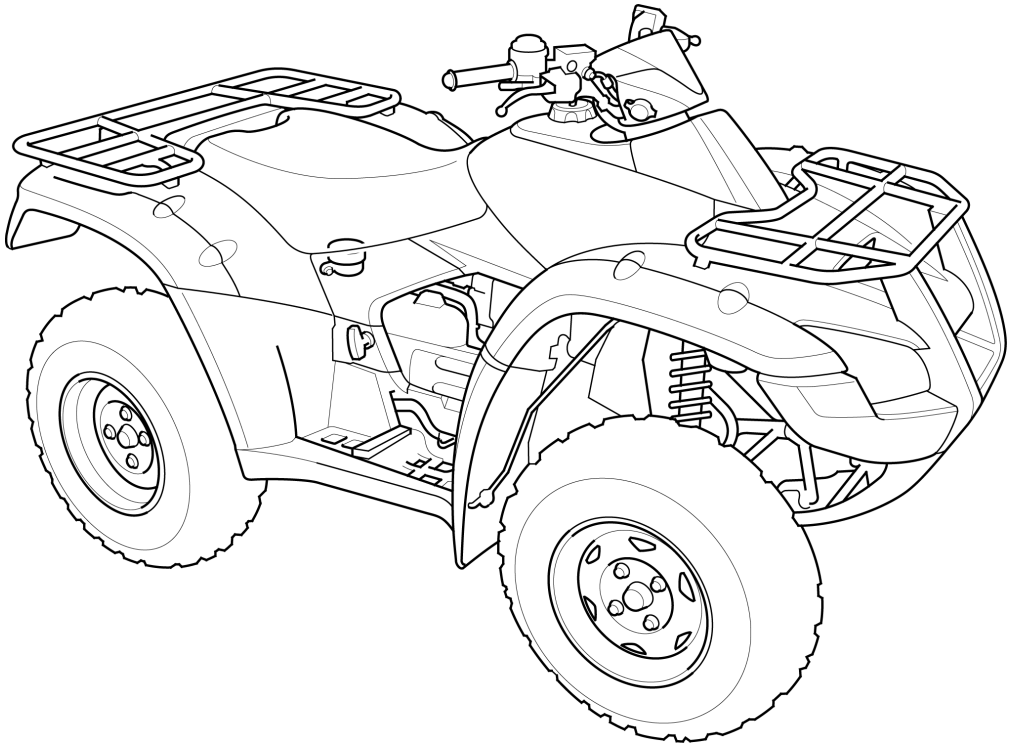
1. Use genuine Honda or Honda-recommended parts and lubricants or their equivalents. Parts that do not meet Honda's design specifications may cause damage to the motorcycle.
2. Use the special tools designed for this product to avoid damage and incorrect assembly.
3. Use only metric tools when servicing 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 1-20).

ABBREVIATION

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

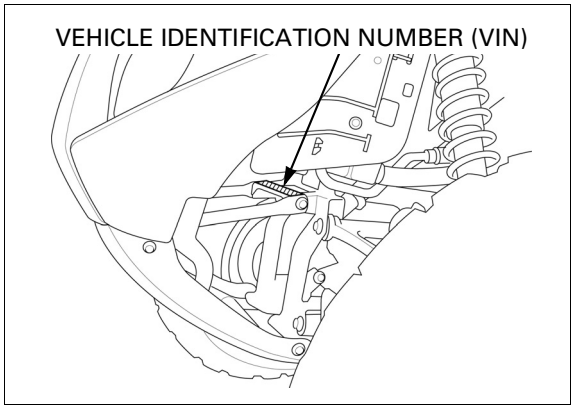
Abbrev. term	Full term
PGM-FI	Programmed Fuel Injection
MAP sensor	Manifold Absolute Pressure sensor
TP sensor	Throttle Position sensor
ECT sensor	Engine Coolant Temperature sensor
IAT sensor	Intake Air Temperature sensor
CKP sensor	Crankshaft Position sensor
VS sensor	Vehicle Speed sensor
EOT sensor	Engine Oil Temperature sensor
IACV	Idle Air Control Valve
PCM (ECM/TCM)	Powertrain Control Module (Engine Control Module/Transmission Control Module)
EEPROM	Electrically Erasable Programmable Read Only Memory
DLC	Data Link Connector
SCS connector	Service Check Short connector
HDS	Honda Diagnostic System
DTC	Diagnostic Trouble Code
MIL	Malfunction Indicator Lamp
A/T	Automatic Transmission
Clutch PC solenoid	Clutch Pressure Control solenoid
4WD	4 Wheel Drive
ESP	Electric Shift Program
GPS	Global Positioning System

MODEL IDENTIFICATION

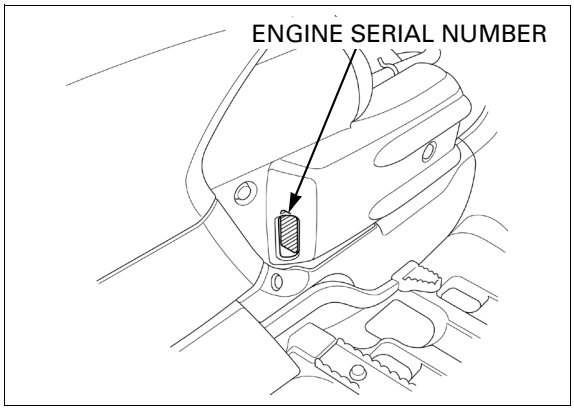


SERIAL NUMBERS

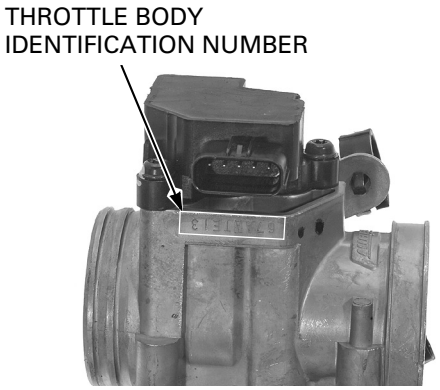
The Vehicle Identification Number (V.I.N) is stamped on the front side of the frame.



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

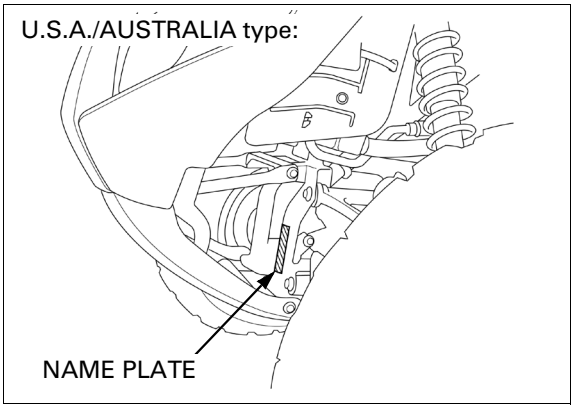


The throttle body identification number is stamped on the left side of the throttle body.

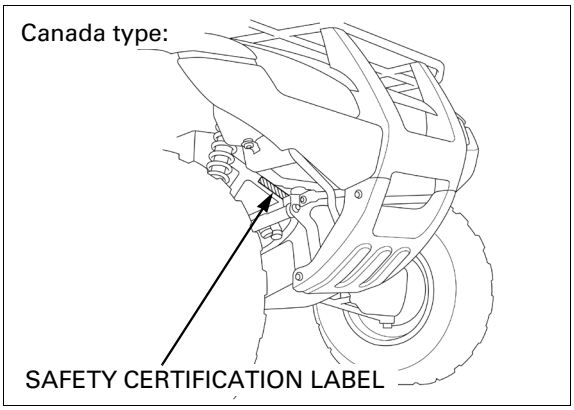


LABELS

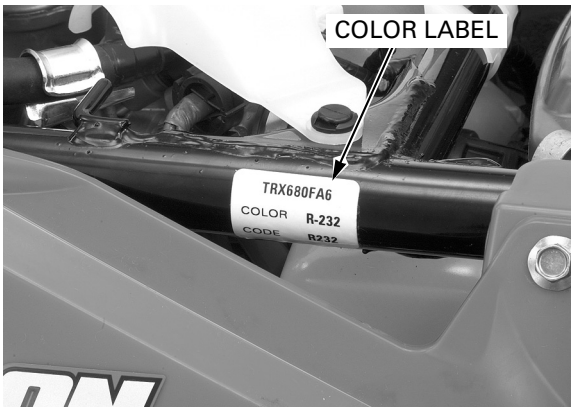
The name plate (U.S.A. and AUSTRALIA type) is located on the left frame down tube.



The safety certification label (Canada type only) is locate on the right frame down tube.



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.



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

GENERAL SPECIFICATIONS

ITEM		SPECIFICATIONS
DIMENSIONS	Overall length	2,113 mm (83.2 in)
	Overall width	1,189 mm (46.8 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 (34.5 in)
	Footpeg height	341 mm (13.4 in)
	Ground clearance	234 mm (9.2 in)
	Curb weight	291 kg (642 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	KT515 (DUNLOP)
	Rear tire brand	KT511 (DUNLOP)
	Front brake	Hydraulic disc brake
	Rear brake	Hydraulic/mechanical disc brake
	Caster angle	1.6°
	Trail length	2.1 mm (3/16 in)
	Camber angle	0°
	Fuel tank capacity	17 liters (4.5 US gal, 3.7 Imp gal)
	Fuel tank reserve capacity	4.1 liters (1.08 US gal, 0.90 Imp gal)

ITEM			SPECIFICATIONS
ENGINE	Cylinder arrangement		Single cylinder, longitudinally installed
	Bore and stroke		102 x 82.6 mm (4.02 x 3.25 in)
	Displacement		674.9 cm^3 (41.19 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		45° ABDC
	Exhaust valve opens at 1 mm (0.04 in) lift		45° BBDC
	Exhaust valve closes at 1 mm (0.04 in) lift		5° ATDC
	Lubrication system		Forced pressure (dry sump)
	Oil pump type		Trochoid
	Cooling system		Liquid cooled
	Air filtration		Oiled urethane foam
	Engine dry weight		60.4 kg (133.2 lbs)
CARBURATION	Type		PGM-FI (Programmed Fuel Injection)
	Throttle bore		40 mm (1.57 in)
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	3.231 (42/13)
		Rear	3.154 (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		Full Transistorized Ignition
	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	2.7 liters (2.9 US qt, 2.4 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 4-stroke oil (USA & Canada) or an equivalent motor oil API service classification: SG or higher JASO T 903 standard: MA Viscosity: SAE 10W-30	–
Oil pressure at 5,000 rpm (min^{-1})/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
Throttle body identification number	GQ67A
Idle speed	1,400 ± 50 rpm (min^{-1})
Throttle lever free play	3 – 8 mm (1/8 – 5/16 in)
ECT sensor resistance (20°C/68°F)	2.3 – 2.6 kΩ
Fuel injector resistance (at 20°C /68°F)	11.1 – 12.3 Ω
Fuel pressure	284 – 304 kPa (2.9 – 3.1 kgf/cm^2, 41 – 44 psi)
Fuel pump flow (at 12 V)	71 cm^3 (2.4 US oz, 2.5 Imp oz) minimum/10 seconds

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

CYLINDER HEAD/VALVE/CAMSHAFT SPECIFICATIONS

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Cylinder compression at 350 rpm (min^{-1})			550 kPa (5.6 kgf/cm^2, 80 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	35.015 – 35.175 (1.3785 – 1.3848)	34.840 (1.3717)
		EX	35.394 – 35.554 (1.3935 – 1.3998)	35.144 (1.3824)
	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.		102.000 – 102.015 (4.0157 – 4.0163)	102.05 (4.018)
	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 20 (0.8) from bottom		101.960 – 101.990 (4.0142 – 4.0153)	101.90 (4.012)
	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)

CRANKCASE/CRANKSHAFT/BALANCER SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Crankshaft	Runout	0.05 (0.002)	0.15 (0.059)
	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)

DRIVETRAIN SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Oil pressure at 5,000 rpm (min^{-1})	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)

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		387.5 ± 1 mm (15.26 ± 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)	–

BRAKE SYSTEM SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Recommended brake fluid		Honda DOT 4 brake fluid	–
Front brake	Brake disc thickness	4.0 (0.16)	3.0 (0.12)
	Brake disc runout	–	0.30 (0.012)
	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)
	Caliper cylinder I.D.	33.960 – 34.010 (1.3370 – 1.3390)	34.02 (1.340)
	Caliper piston O.D.	33.878 – 33.928 (1.3338 – 1.3357)	33.87 (1.333)
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.	30.165 – 30.198 (1.1876 – 1.1889)	30.14 (1.187)
Rear (parking) brake lever free play		25 – 30 (1 – 1-3/16)	–

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 (YTX20L-BS)	Capacity		12V – 18 Ah
	Current leakage		1 mA max.
	Voltage (20°C/68°F)	Fully charged	13.0 – 13.2 V
		Needs charging	Below 12.3 V
	Charging current	Normal	1.8 A/5 – 10 h
		Quick	9.0 A/1.0 h
Alternator	Capacity		360 W/5,000 rpm (min^{-1})
	Charging coil resistance (20°C/68°F)		0.1 – 1.0 Ω

IGNITION SYSTEM SPECIFICATIONS

ITEM		SPECIFICATIONS
Spark plug	Standard	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
CKP sensor peak voltage		0.7 V minimum
Ignition timing ("F" mark)		15° BTDC at idle

ELECTRIC STARTER SPECIFICATIONS

Unit: mm (in)

ITEM	STANDARD	SERVICE LIMIT
Starter motor brush length	12.0 – 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/engine oil temperature indicator	LED
	MIL (PGM-FI indicator)	LED
	Meter light	LED x 10
Fuse	Main	30 A x 2
	Sub-fuse	15 A x 1, 10 A x 4

STANDARD TORQUE VALUES

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

ENGINE

MAINTENANCE

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Spark plug	1	14	22 (2.2, 16)	
Valve adjusting 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)	Apply locking agent

FUEL SYSTEM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Insulator band screw (throttle body side)	1	5	–	page 6-42
Insulator band screw (engine side)	1	5	–	page 6-46
Throttle drum cover screw	1	4	1.5 (0.15, 1.1)	
Sensor unit mounting screw	3	5	3.4 (0.35, 2.5)	
Fuel feed hose bracket screw	1	5	4.2 (0.43, 3.1)	
Harness guide bracket screw	1	5	4.2 (0.43, 3.1)	
Fuel injector/feed hose mounting bolt	2	5	5.1 (0.53, 3.8)	
IACV mounting torx screw	2	5	2.1 (0.21, 1.5)	

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	55 (5.6, 41)	Apply engine oil

CYLINDER/PISTON

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

ALTERNATOR/STARTER CLUTCH

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Starter clutch socket bolt	6	8	30 (3.1, 22)	Apply locking agent
Recoil starter driven pulley bolt	1	12	108 (11.0, 80)	Apply engine oil
Alternator stator bolt	3	6	10 (1.0, 7)	
CKP sensor mounting bolt	2	5	6 (0.6, 4.3)	Apply locking agent

DRIVE TRAIN

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Oil pass bolt	1	20	18 (1.8, 13)	
Primary driven gear lock nut	1	16	108 (11.0, 80)	Apply engine oil, Lock nut: replace with a new one Stake
Stator shaft inner collar stopper pin	1	10	14 (1.4, 10)	Apply locking agent
Torque converter lock nut	1	22	108 (11.0, 80)	Apply engine oil, Lock nut: replace with a new one Stake
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
ECT sensor	1	10	12 (1.2, 9)	
EOT sensor	1	10	12 (1.2, 9)	

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 screw	3	5	3.2 (0.33, 2.4)	
Muffler heat protector screw	3	5	5.4 (0.55, 4.0)	
Muffler cover screw	2	5	3.2 (0.33, 2.4)	
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
Bank angle sensor mounting bolt	2	4	1.5 (0.15, 1.1)	

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)	
Upper engine hanger bolt	1	10	54 (5.5, 40)	
Upper engine hanger bracket bolt	2	8	32 (3.3, 24)	

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)	Lock nut: replace with a new one
Front wheel nut	8	10	64 (6.5, 47)	
Front wheel hub nut	2	16	78 (8.0, 58)	Castle nut: tighten to the specified torque and further tighten until its grooves aligns with the cotter pin hole
Front brake caliper bracket flange bolt	4	10	44 (4.5, 33)	ALOC bolt: replace with a new one
Front brake disc bolt	8	8	42 (4.3, 31)	ALOC bolt: replace with a new one
Front brake splash guard flange bolt	6	6	11 (1.1, 8)	ALOC bolt: replace with a new one
Shock absorber mounting nut	4	10	44 (4.5, 33)	Lock nut: replace with a new one
Brake hose clamp flange bolt	5	6	12 (1.2,9)	
Upper arm pivot nut	2	10	34 (3.5, 25)	Lock nut: replace with a new one
Lower arm pivot nut	4	10	44 (4.5, 33)	Lock nut: replace with a new one
Upper and lower arm ball joint nut	4	12	29 (3.0, 22)	Castle nut: tighten to the specified torque and further tighten until its grooves aligns with the cotter pin hole
Tie-rod ball joint nut	4	12	54 (5.5, 40)	Lock nut: replace with a new one
Combination meter stay mounting nut	2	8	25 (2.5, 18)	
Steering shaft end nut	1	14	108 (11.0, 80)	
Steering shaft holder bolt	2	8	32 (3.3, 24)	
Parking lock lever screw	1	6	7 (0.7, 5.1)	
Rear brake lever pivot bolt	1	6	1 (0.1, 0.7)	
Rear brake lever pivot nut	1	6	6 (0.6, 4.3)	
Parking stopper stay screw	1	4	2 (0.2, 1.4)	
Parking stopper stay screw	1	6	2 (0.2, 1.4)	
Brake light switch (left lever side)	1	4	1 (0.1, 0.7)	Apply locking agent

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)	Castle nut: tighten to the specified torque and further tighten until its grooves aligns with the cotter pin hole
Upper arm pivot nut (frame side)	4	10	34 (3.5, 25)	Lock nut: replace with a new one
Upper arm pivot nut (knuckle side)	2	12	54 (5.5, 40)	Lock nut: replace with a new one
Lower arm pivot nut	4	10	34 (3.5, 25)	Lock nut: replace with a new one

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)	
Front caliper bleed valve	2	8	5.4 (0.55, 4.0)	
Front caliper slide pin flange bolt	2	8	23 (2.3, 17)	
Front brake pipe	2	10	17 (1.7, 12)	
Front brake lever pivot bolt	1	6	1 (0.1, 0.7)	
Front brake lever pivot nut	1	6	5.9 (0.6, 4.3)	
Front master cylinder holder bolt	2	6	12 (1.2, 9)	
Rear brake caliper bleed valve	1	8	5.4 (0.55, 4.0)	
Rear brake reservoir hose joint screw	1	4	2 (0.2, 1.4)	Apply locking agent
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)	ALOC bolt: replace with a new one
Rear brake disc bolt	5	6	20 (2.0, 14)	ALOC bolt: replace with a new one

FRONT DRIVING MECHANISM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Differential ring gear bolt	10	8	49 (5.0, 36)	Special bolt: replace with a new one
Differential case cover bolt	2	10	49 (5.0, 36)	Apply locking agent
	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)	Lock nut: replace with a new one
	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	2	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)	Lock nut: replace with a new one, Stake
Pinion joint nut	1	16	108 (11.0, 80)	Apply locking agent
Final gear case cover bolt	2	10	49 (5.0, 36)	Apply locking agent
	4	8	25 (2.6, 19)	
Final gear case mounting nut (main frame)	2	10	34 (3.5, 25)	Lock nut: replace with a new one
Final gear case mounting nut (sub-frame)	2	10	39 (4.0, 29)	Lock nut: replace with a new one
Sub-frame joint nut	4	10	34 (3.5, 25)	

LUBRICATION & SEAL POINTS

ENGINE

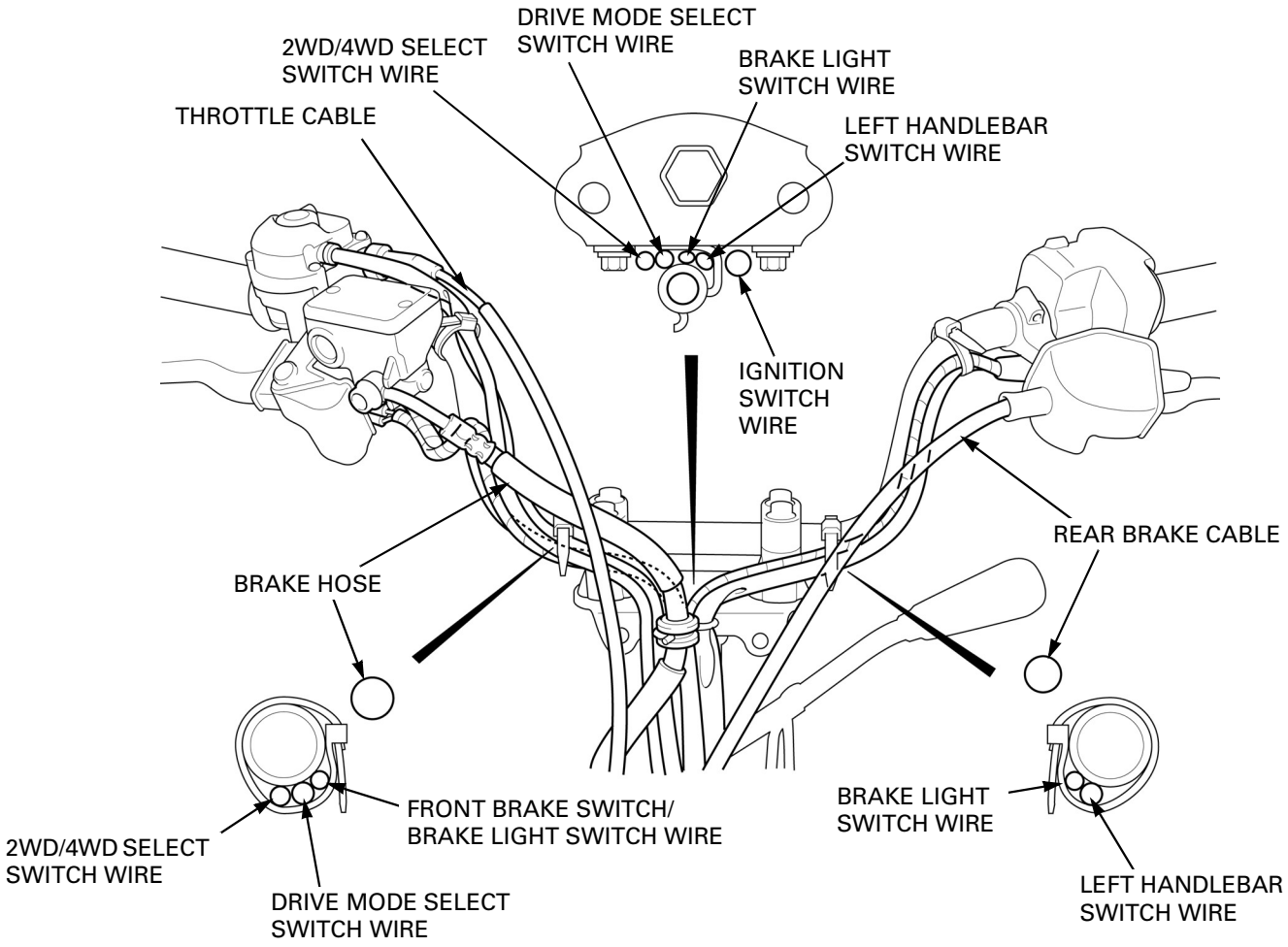
MATERIAL	LOCATION	REMARKS
Molybdenum disulfide solution (a mixture of engine oil and molybdenum disulfide grease in a ratio of 1:1)	Water pump impeller shaft sliding surface Camshaft cam lobes Rocker arm shaft sliding surfaces Valve stems (valve sliding surface) Piston pin outer surface Starter driven gear bearing Starter reduction gear shaft splines Starter reduction gear teeth Starter motor shaft splines Crankshaft torque converter contact surface	
Engine oil	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	
Molybdenum disulfide grease	Camshaft cam surface	Specified area (page 9-18)
Multi purpose grease	Recoil starter driven pulley oil seal lips Recoil starter drive pulley pivot	
Locking agent	Recoil starter center bolt Ignition pulse generator bolt threads Starter clutch bolt threads Shift return spring pin threads Shift drum stopper arm pivot bolt threads Oil pump driven sprocket bolt threads Cam chain tensioner pivot bolt threads	
Sealant (Three Bond 1215 or equivalent)	Alternator wire grommet seating surface Front crankcase cover mating surface Crankcase mating surface	 Specified area (page 14-58) Specified area (page 13-13)

FRAME

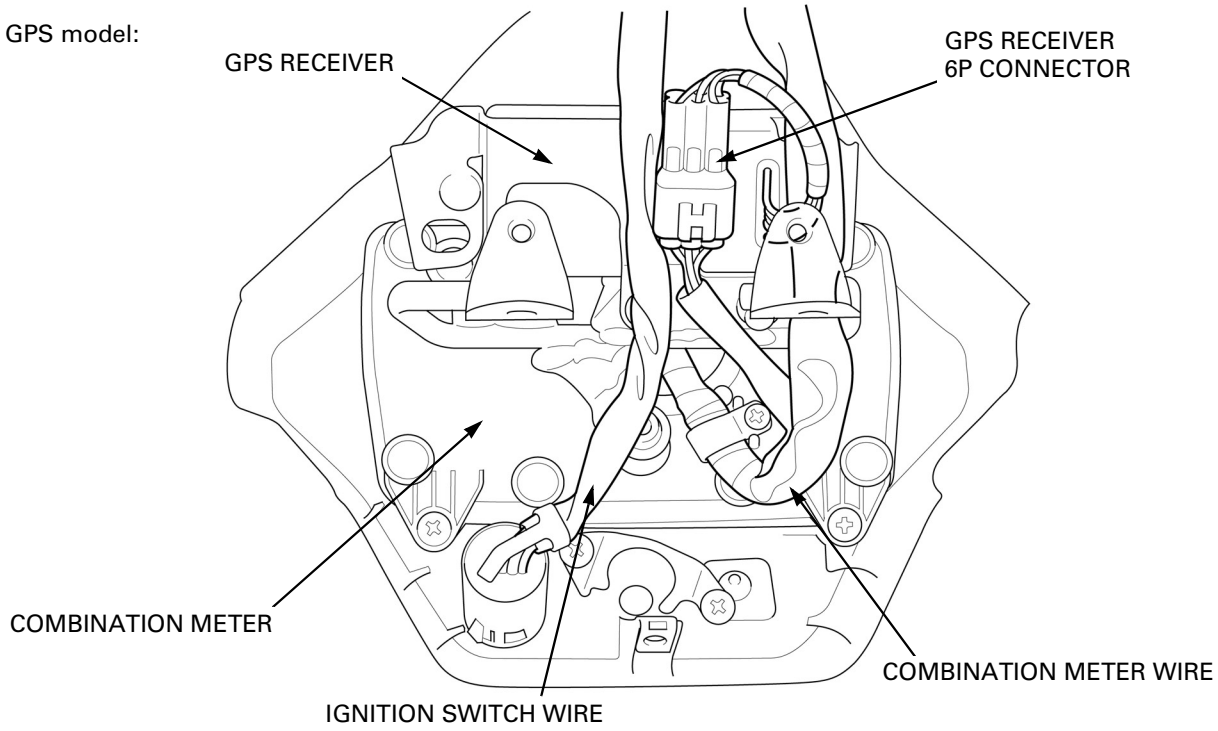
MATERIAL	LOCATION	REMARKS
Multi purpose grease (NLGI #2)	Throttle cable ends	
	Throttle cable adjuster threads	
	Throttle lever pivot and dust seal lips	
	Rear brake lever pivot	
	Parking lock arm pivot (screw)	
	Steering shaft bushing inner surface	Apply 2 – 3 g
	Steering shaft dust seal lips	
	Front knuckle outer dust seal lips	
	Front knuckle inner dust seal lips	Fill up 2.5 – 3 g
	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	Fill up 2.5 – 3 g per each seal
	Rear upper arm pivot bearings (frame side)	Fill up 3 g per each bearing
	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	
Molybdenum disulfide grease	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)	Fill up 5 – 8 g
	Output shaft joint splines (engine side)	
	Differential pinion joint splines	Fill up 5 – 8 g
	Front drive shaft splines (wheel side)	
	Rear propeller shaft seal outer surface	
	Final gear case pinion joint splines (rear propeller shaft side)	Fill up 5 – 8 g
	Universal joint bearing	
	Universal joint splines (both sides)	
	Rear drive shaft splines (each end)	
Molybdenum disulfide paste	Rear shock absorber pivot bushings (upper and lower)	
	Rear shock absorber pivot dust seal lips	
NKG205 (KYODO YUSHI)	Front drive shaft inboard joint inside	Fill up 40 – 60 g per each joint
NKG106 (KYODO YUSHI)	Front drive shaft outboard joint inside	Fill up 55 – 75 g per each joint
NKG205 (KYODO YUSHI)	Rear drive shaft inboard joint inside	Fill up 60 – 80 g per each joint
NKG106 (KYODO YUSHI)	Rear drive shaft outboard joint inside	Fill up 45 – 65 g per each joint
Silicone grease	Front brake lever-to-master piston contacting area	
	Front brake lever pivot bolt	
	Brake caliper dust seal lips	
	Brake caliper slide pin boot grooves and boots inside	
Cable lubricant	Throttle cable outer inside	
	Rear brake cable inside	

MATERIAL	LOCATION	REMARKS
DOT4 brake fluid	Brake master cylinder piston and cups Brake caliper piston and piston seals	
Honda bond A or Honda Hand Grip Cement (U.S.A. only) or equivalent	Handlebar grip rubber inside Air cleaner housing-to-connecting tube (throttle body and intake duct) mating areas	
Locking agent	Cooling fan motor shaft threads	

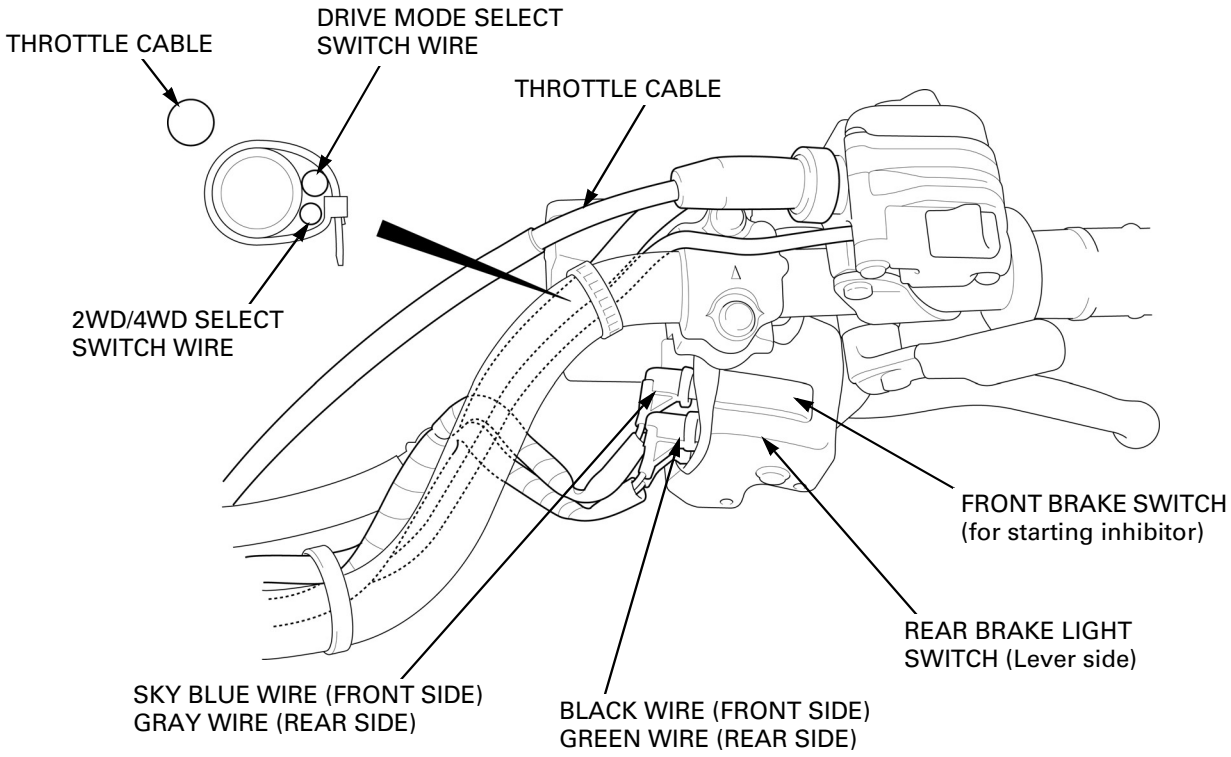
CABLE & HARNESS ROUTING



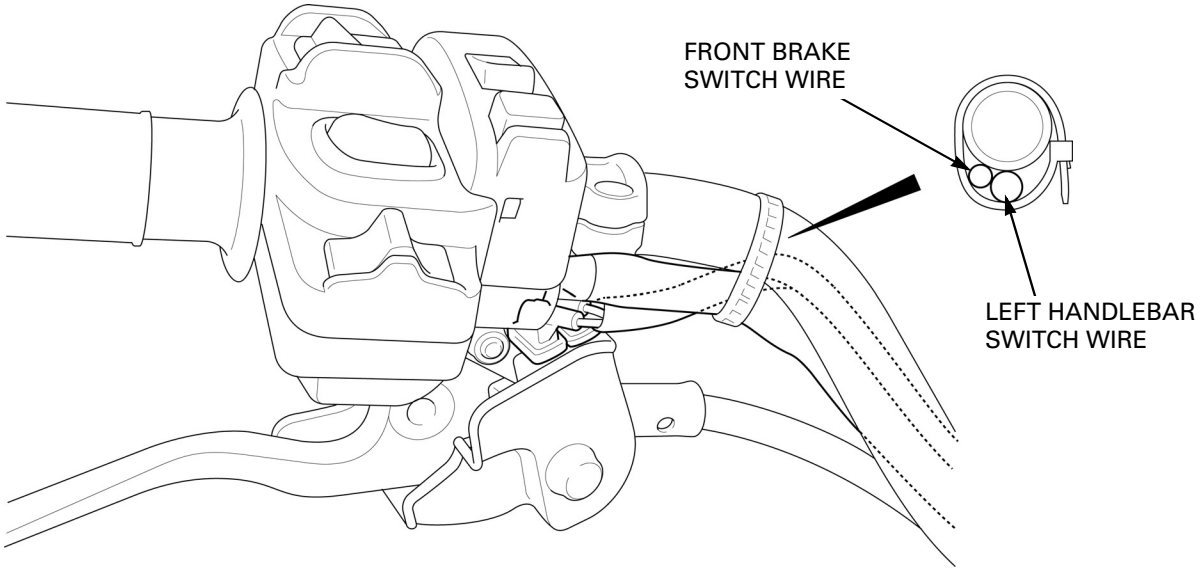
GPS model:

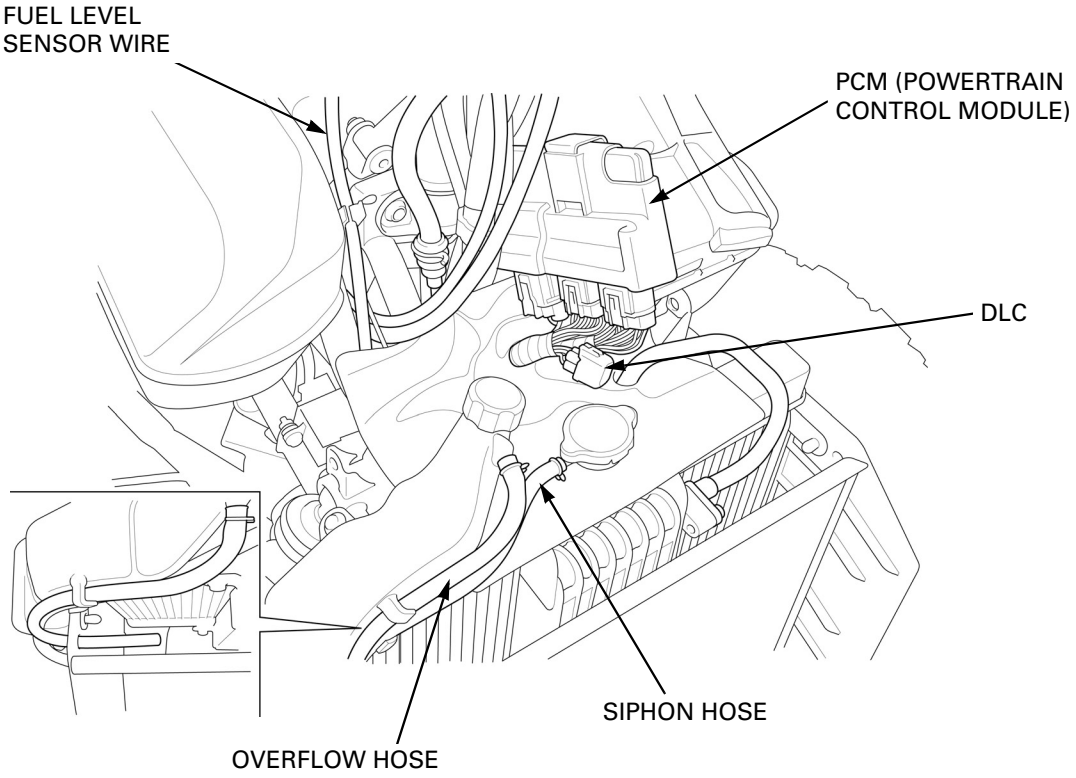


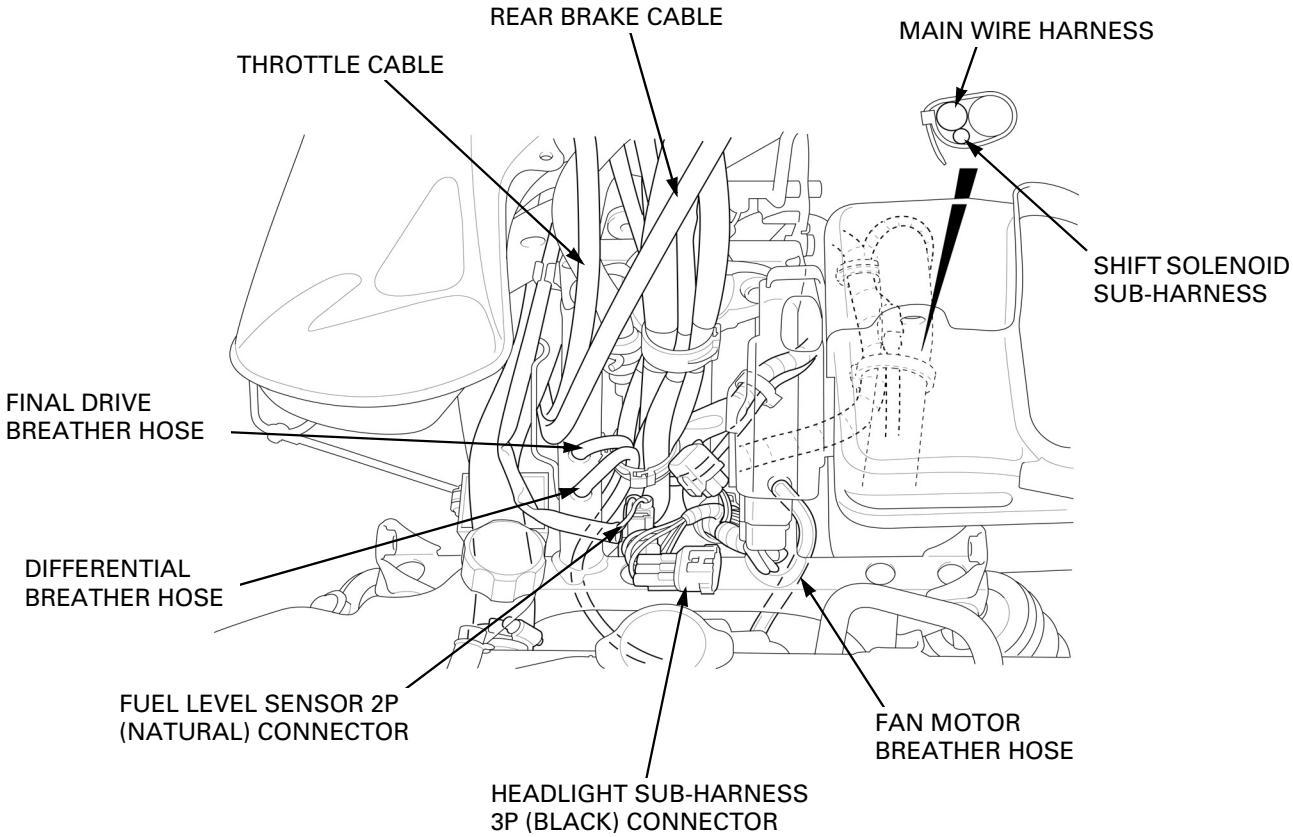
RIGHT HANDLEBAR:

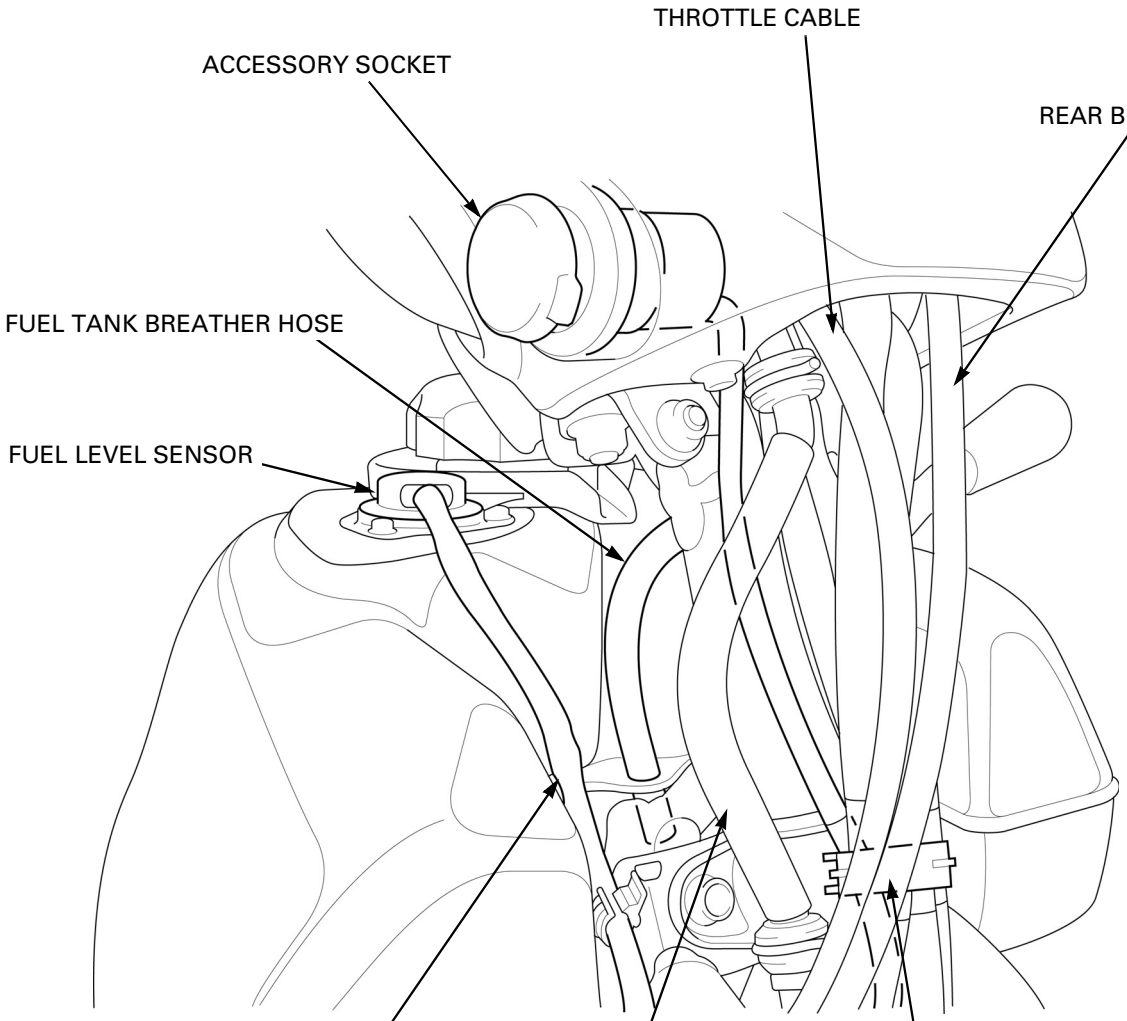


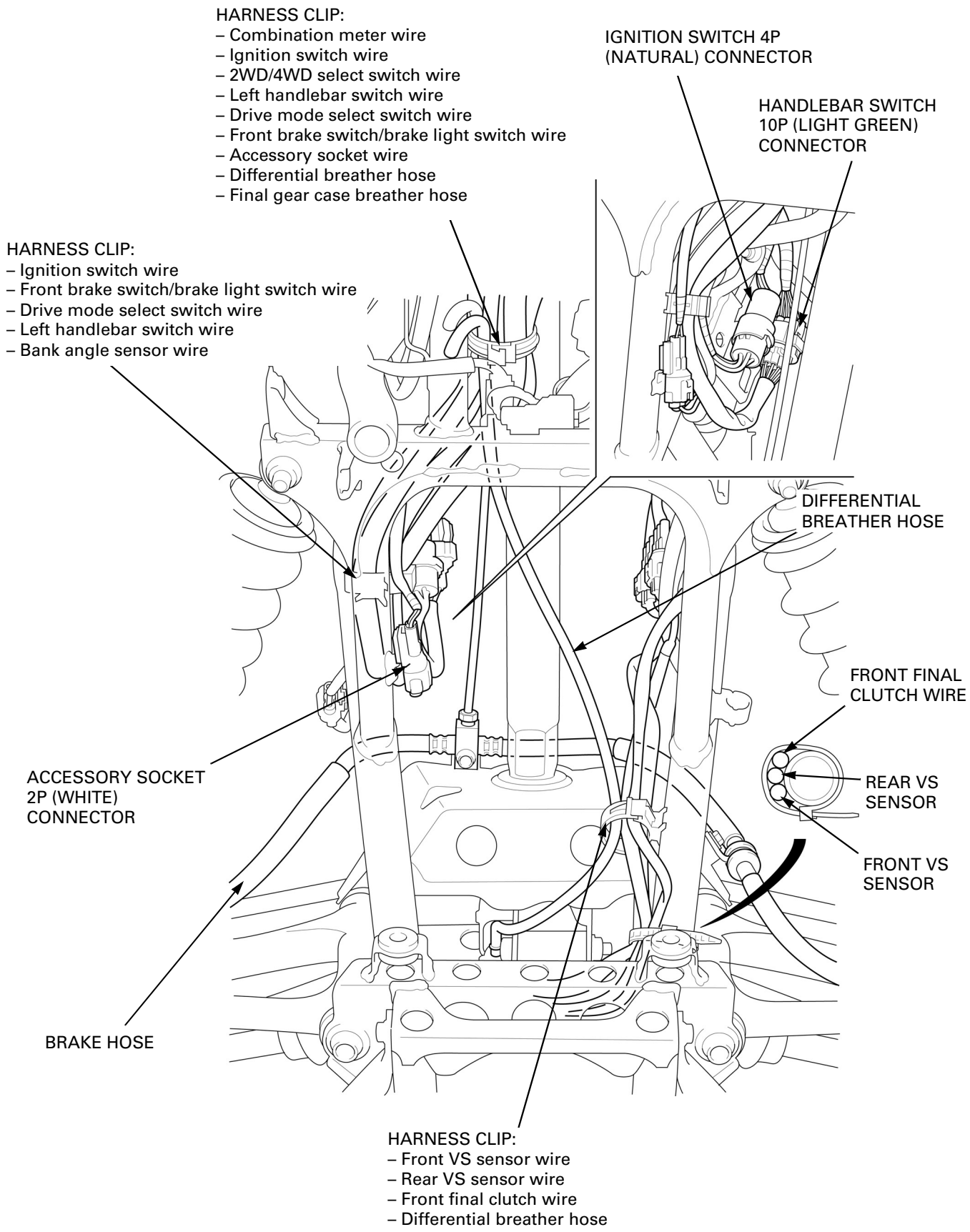
LEFT HANDLEBAR:

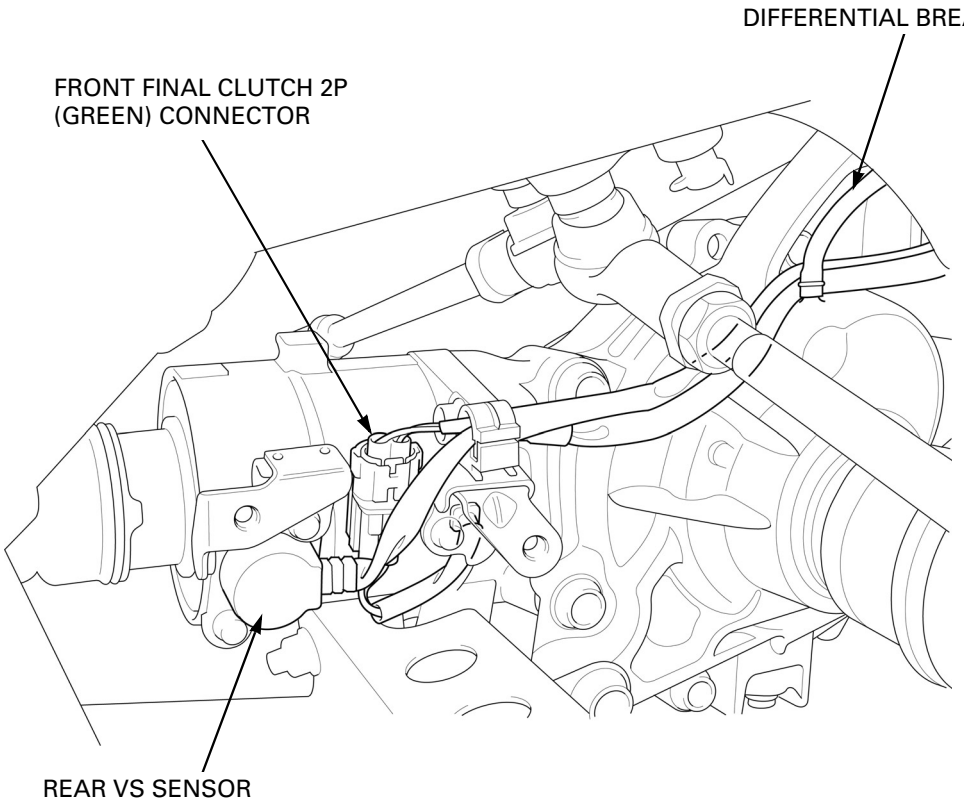


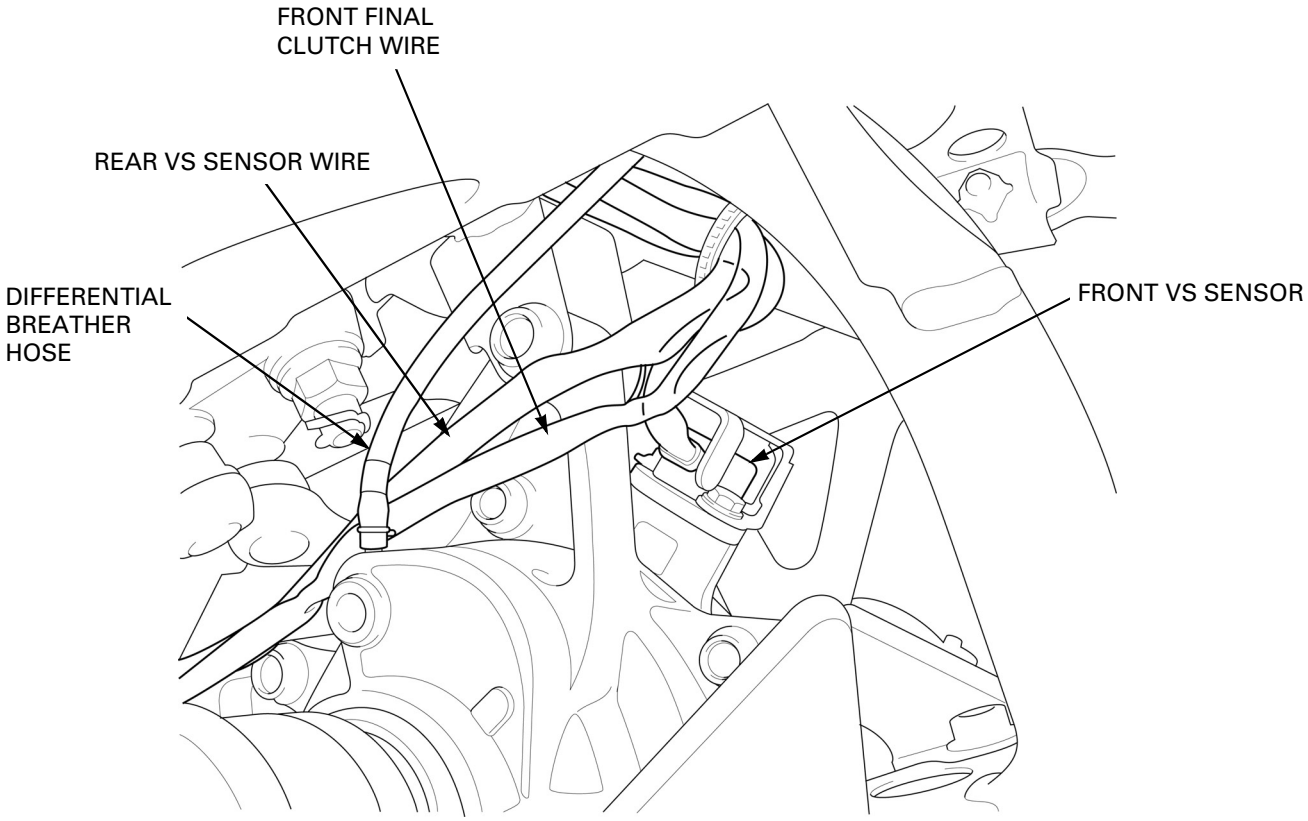

FUEL LEVEL
SENSOR WIRE
PCM (POWERTRAIN
CONTROL MODULE)
DLC
SIPHON HOSE
OVERFLOW HOSE

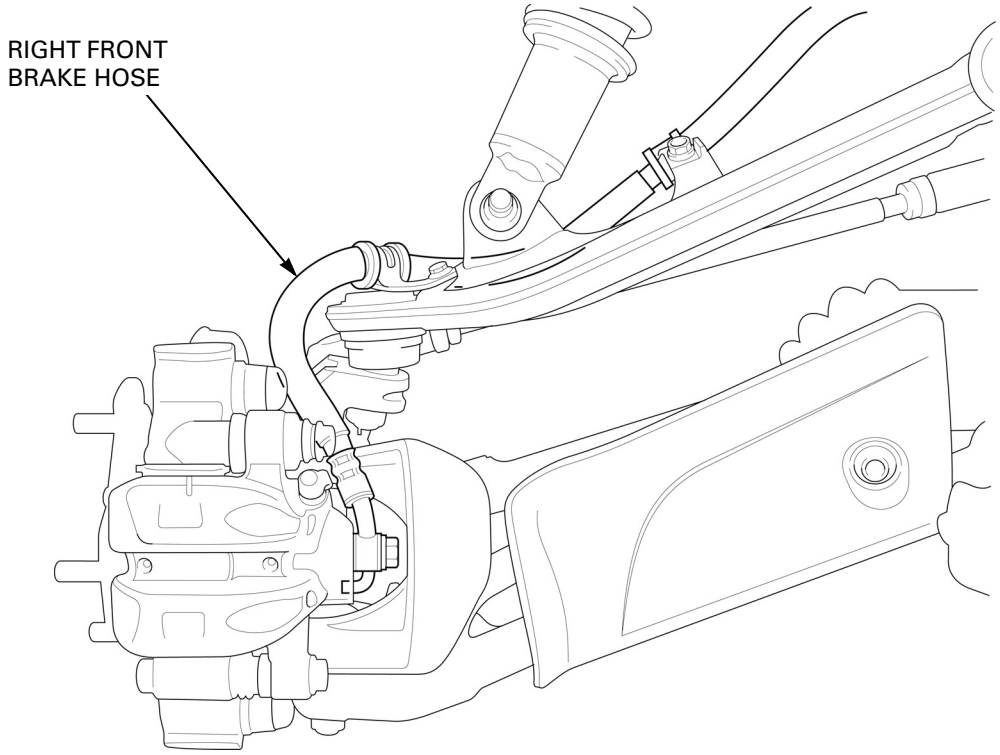

REAR BRAKE CABLE
MAIN WIRE HARNESS
THROTTLE CABLE
SHIFT SOLENOID
SUB-HARNESS
FINAL DRIVE
BREATHER HOSE
DIFFERENTIAL
BREATHER HOSE
FUEL LEVEL SENSOR 2P
(NATURAL) CONNECTOR
FAN MOTOR
BREATHER HOSE
HEADLIGHT SUB-HARNESS
3P (BLACK) CONNECTOR

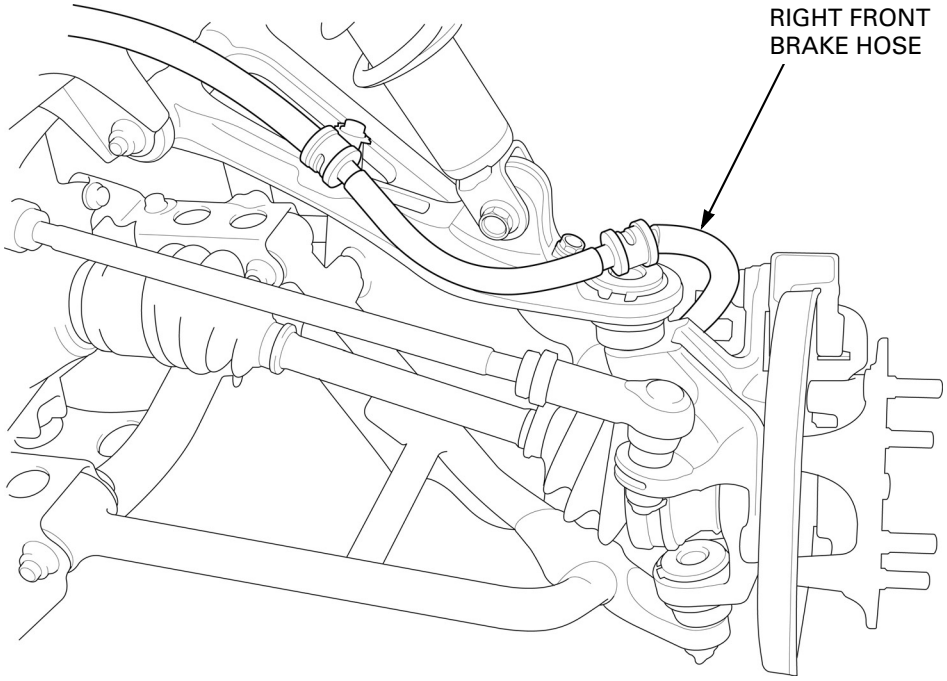

THROTTLE CABLE
ACCESSORY SOCKET
REAR BRAKE CABLE
FUEL TANK BREATHER HOSE
FUEL LEVEL SENSOR
FUEL LEVEL SENSOR WIRE
FRONT BRAKE HOSE
HARNESS CLIP:
– Combination meter wire
– 2WD/4WD select switch wire
– Ignition switch wire
– Left handlebar switch wire
– Drive mode select switch wire
– Front brake switch/brake light switch wire
– Accessory socket wire

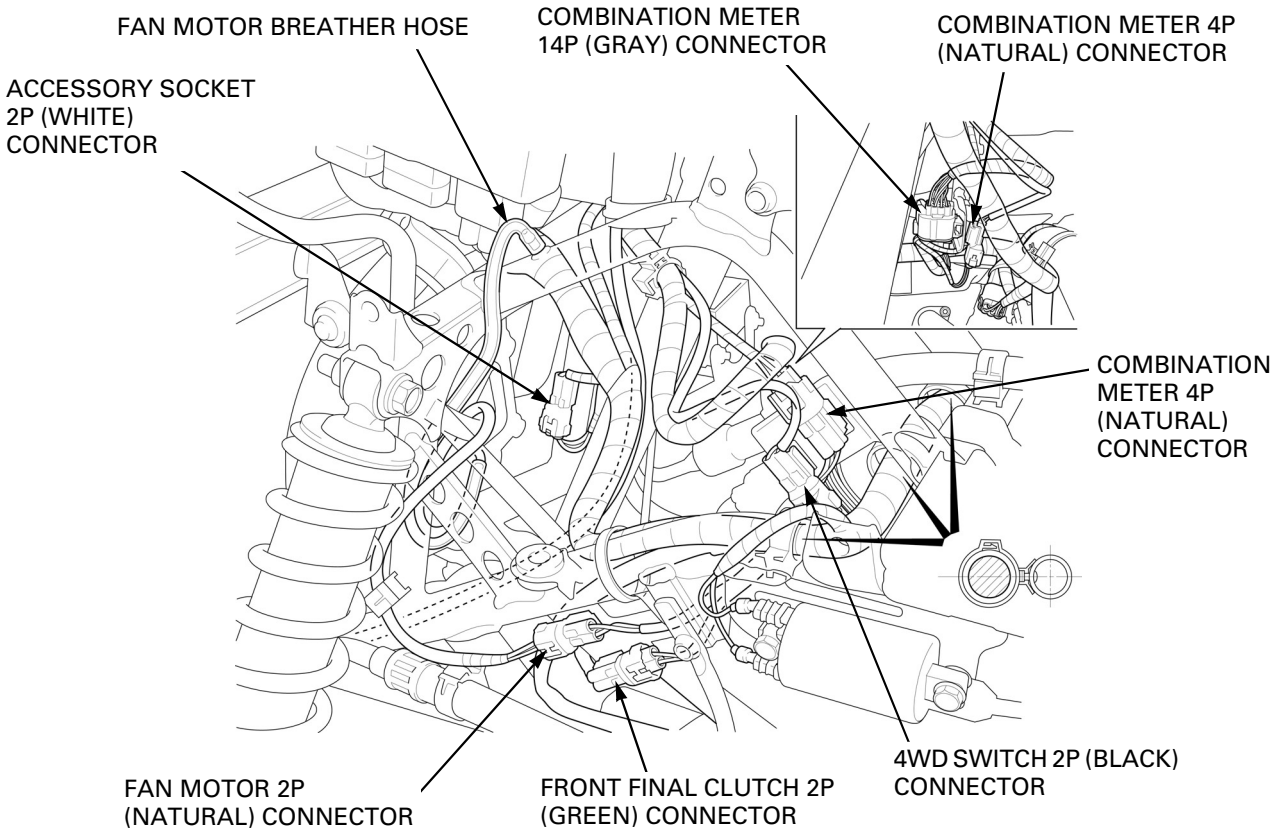

HARNESS CLIP:
– Combination meter wire
– Ignition switch wire
– 2WD/4WD select switch wire
– Left handlebar switch wire
– Drive mode select switch wire
– Front brake switch/brake light switch wire
– Accessory socket wire
– Differential breather hose
– Final gear case breather hose
IGNITION SWITCH 4P (NATURAL) CONNECTOR
HANDLEBAR SWITCH 10P (LIGHT GREEN) CONNECTOR
HARNESS CLIP:
– Ignition switch wire
– Front brake switch/brake light switch wire
– Drive mode select switch wire
– Left handlebar switch wire
– Bank angle sensor wire
DIFFERENTIAL BREATHER HOSE
FRONT FINAL CLUTCH WIRE
REAR VS SENSOR
FRONT VS SENSOR
ACCESSORY SOCKET 2P (WHITE) CONNECTOR
BRAKE HOSE
HARNESS CLIP:
– Front VS sensor wire
– Rear VS sensor wire
– Front final clutch wire
– Differential breather hose

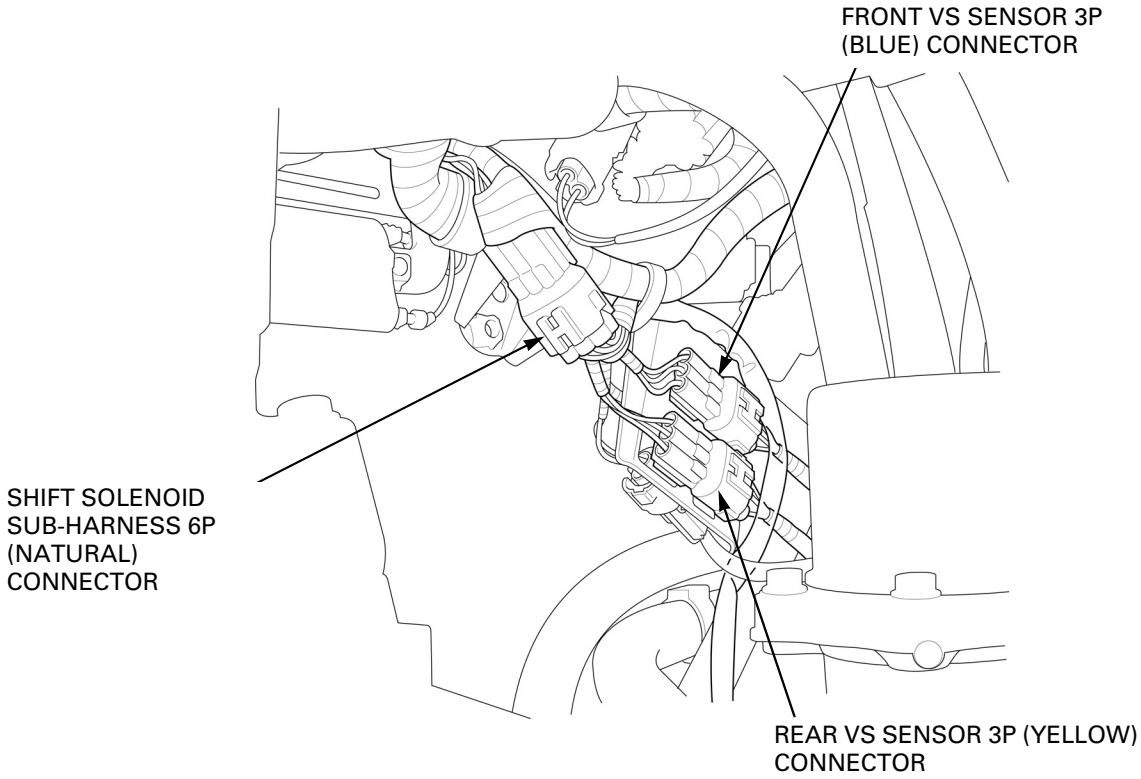

DIFFERENTIAL BREATHER HOSE
FRONT FINAL CLUTCH 2P (GREEN) CONNECTOR
REAR VS SENSOR

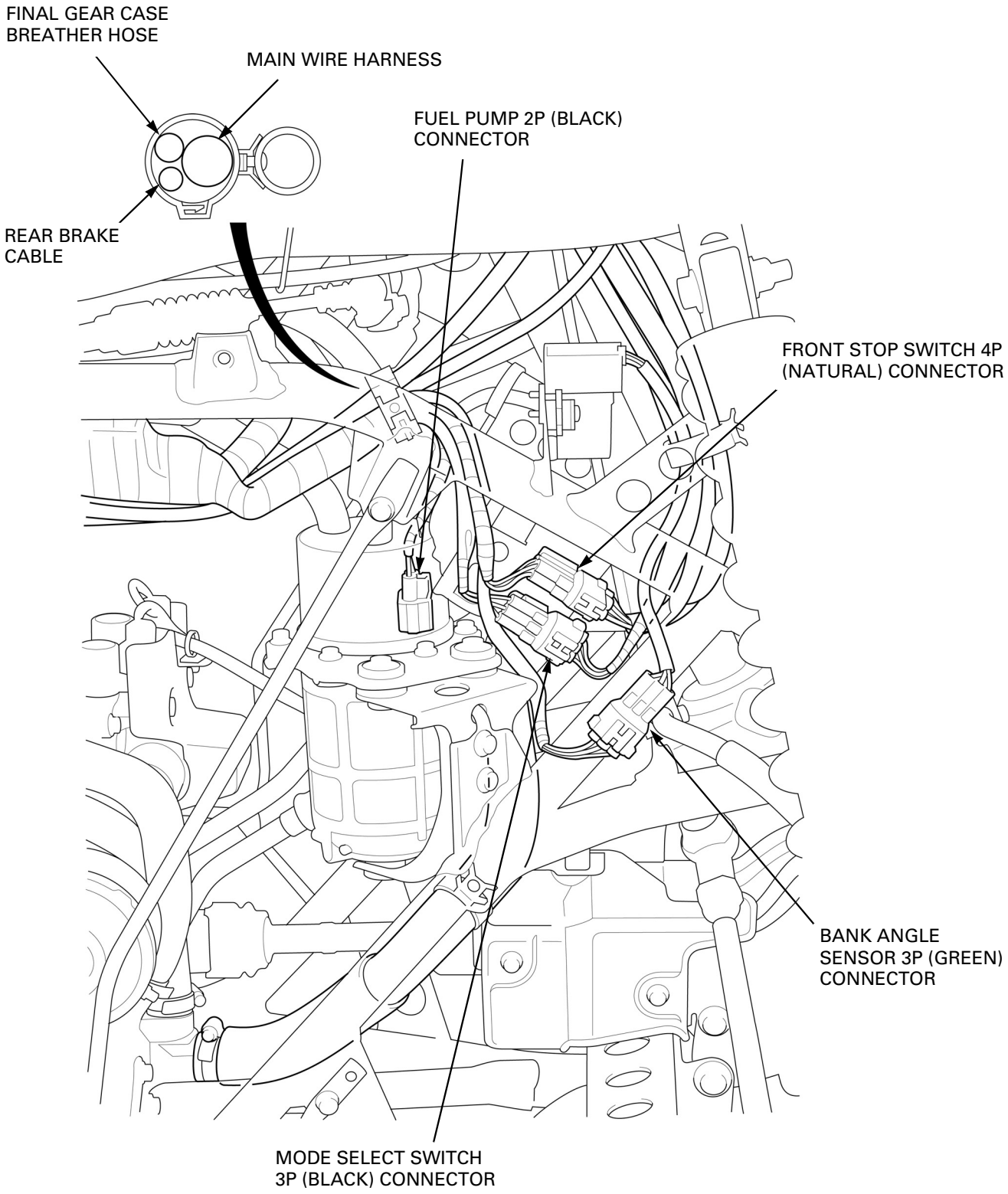

FRONT FINAL CLUTCH WIRE
REAR VS SENSOR WIRE
DIFFERENTIAL BREATHER HOSE
FRONT VS SENSOR

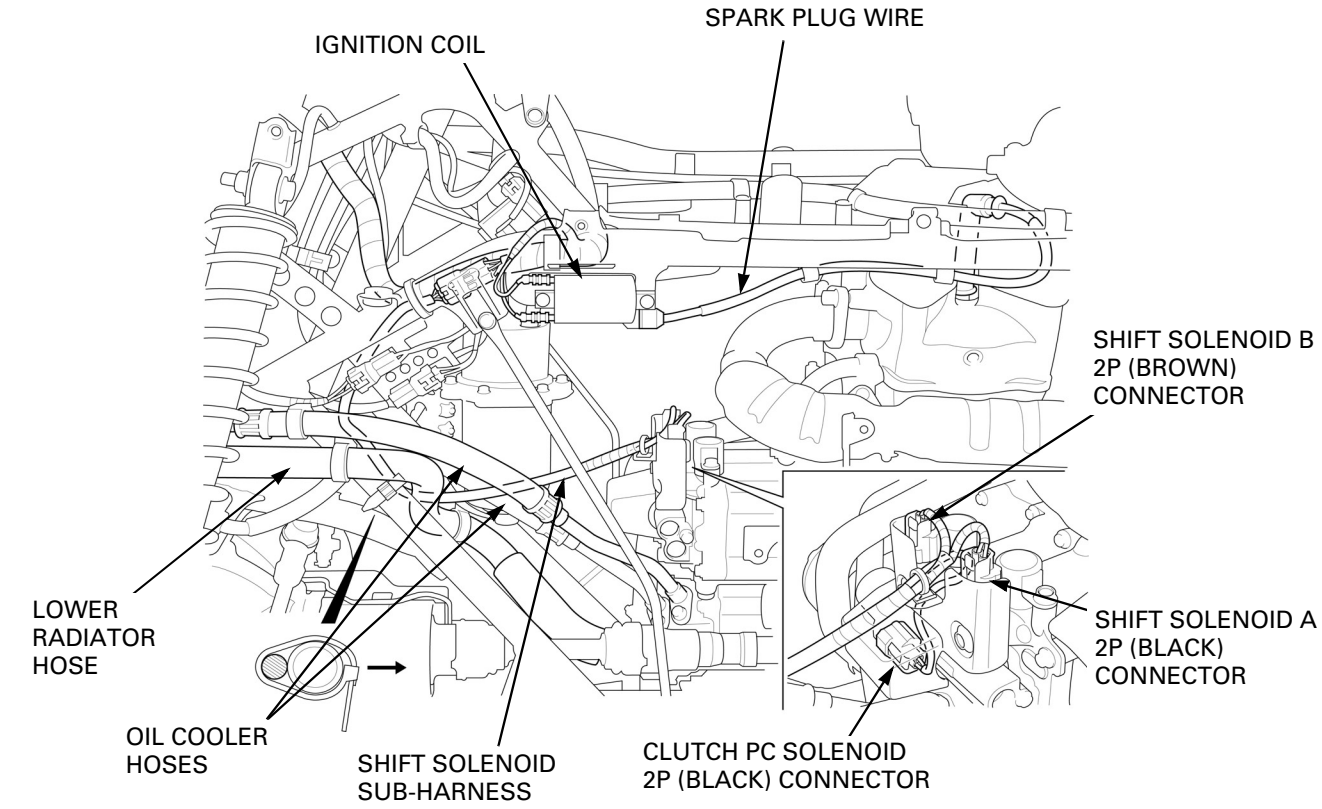

RIGHT FRONT
BRAKE HOSE

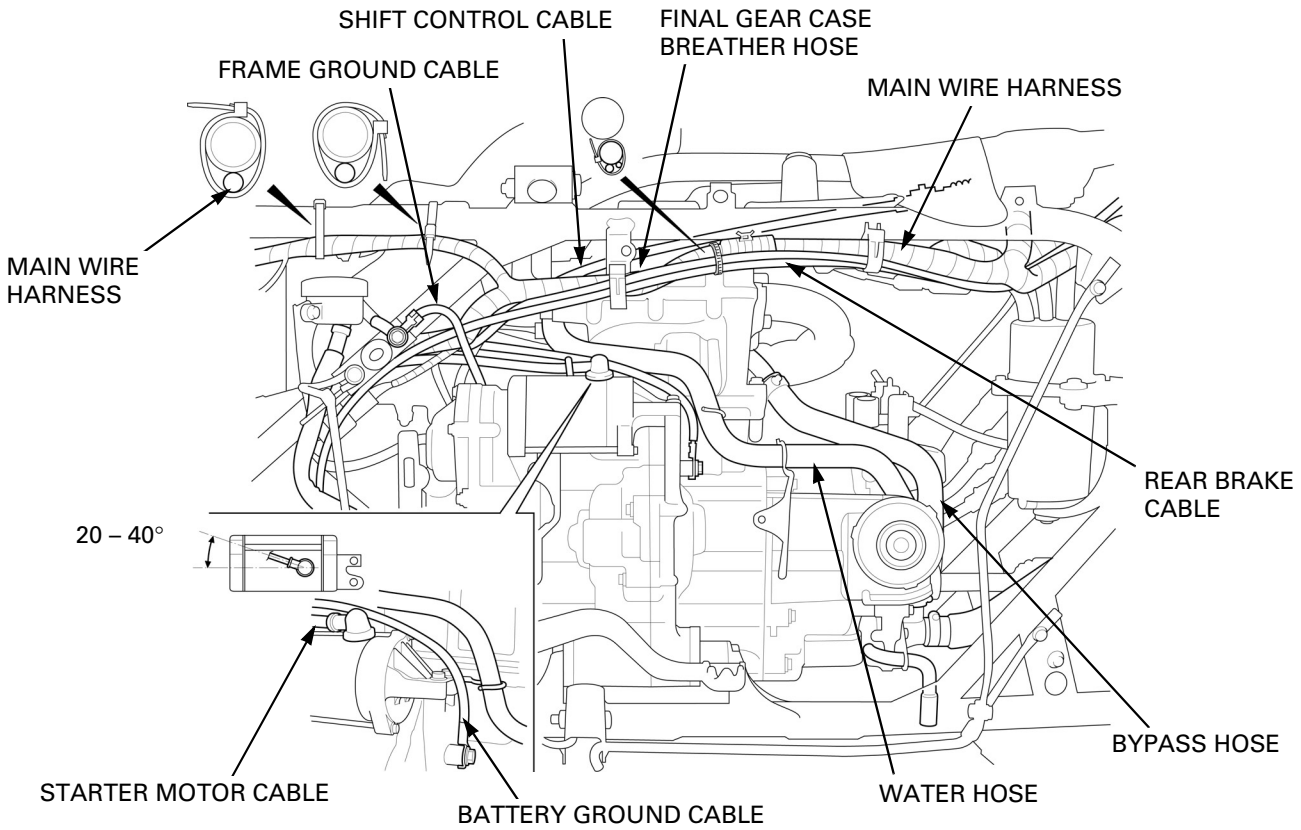

RIGHT FRONT
BRAKE HOSE

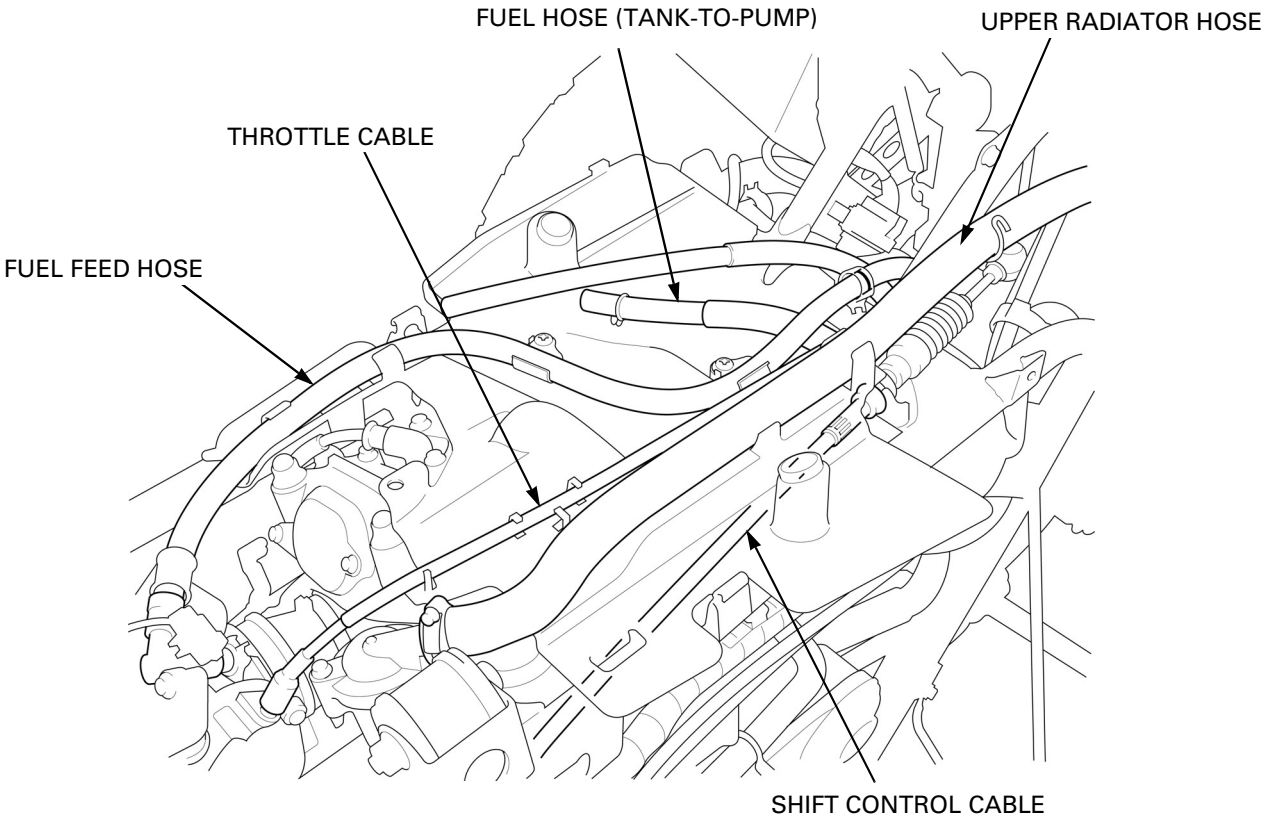

FAN MOTOR BREATHER HOSE
COMBINATION METER 14P (GRAY) CONNECTOR
COMBINATION METER 4P (NATURAL) CONNECTOR
ACCESSORY SOCKET 2P (WHITE) CONNECTOR
COMBINATION METER 4P (NATURAL) CONNECTOR
4WD SWITCH 2P (BLACK) CONNECTOR
FAN MOTOR 2P (NATURAL) CONNECTOR
FRONT FINAL CLUTCH 2P (GREEN) CONNECTOR

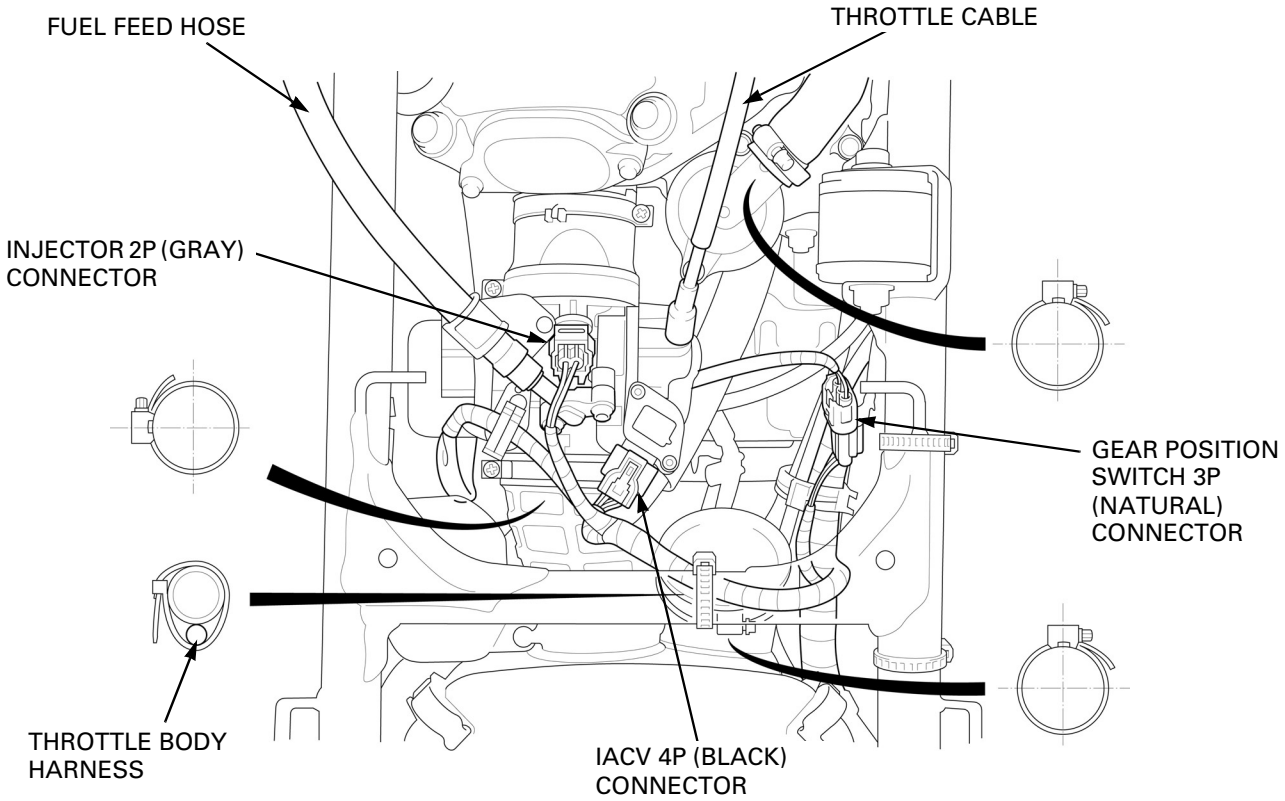

FRONT VS SENSOR 3P (BLUE) CONNECTOR
SHIFT SOLENOID SUB-HARNESS 6P (NATURAL) CONNECTOR
REAR VS SENSOR 3P (YELLOW) CONNECTOR

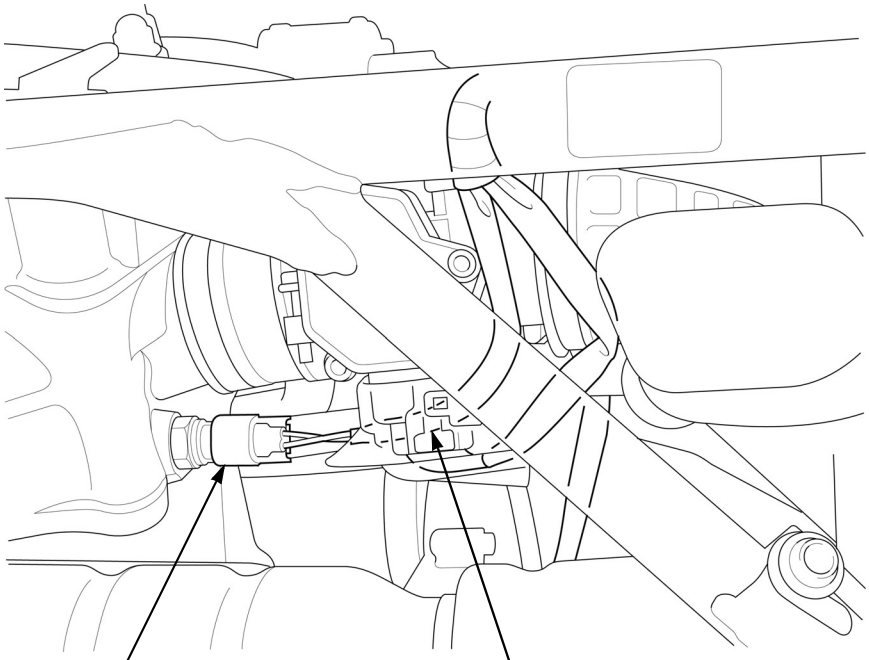

FINAL GEAR CASE
BREATHER HOSE
MAIN WIRE HARNESS
FUEL PUMP 2P (BLACK)
CONNECTOR
REAR BRAKE
CABLE
FRONT STOP SWITCH 4P
(NATURAL) CONNECTOR
BANK ANGLE
SENSOR 3P (GREEN)
CONNECTOR
MODE SELECT SWITCH
3P (BLACK) CONNECTOR

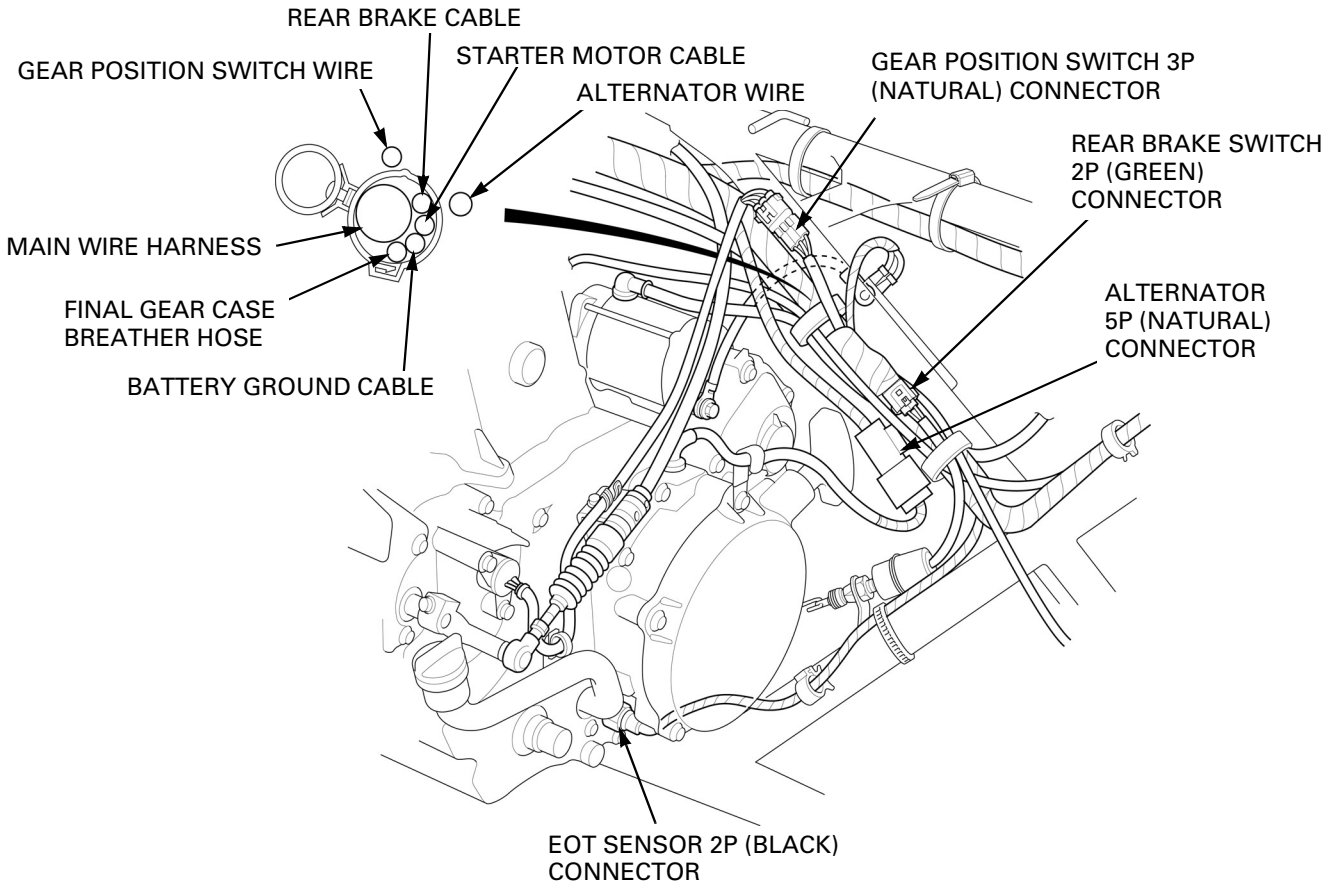

IGNITION COIL
SPARK PLUG WIRE
SHIFT SOLENOID B
2P (BROWN)
CONNECTOR
LOWER
RADIATOR
HOSE
SHIFT SOLENOID A
2P (BLACK)
CONNECTOR
OIL COOLER
HOSES
SHIFT SOLENOID
SUB-HARNESS
CLUTCH PC SOLENOID
2P (BLACK) CONNECTOR

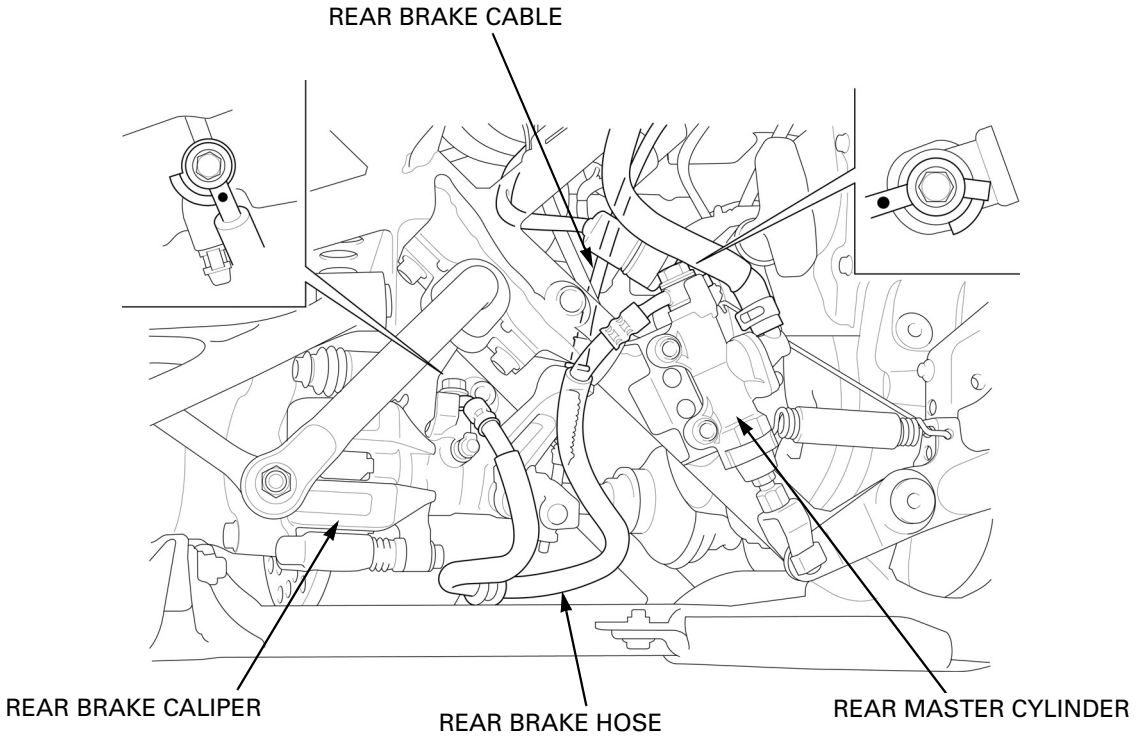

SHIFT CONTROL CABLE
FINAL GEAR CASE
BREATHER HOSE
FRAME GROUND CABLE
MAIN WIRE HARNESS
MAIN WIRE
HARNESS
REAR BRAKE
CABLE
20 – 40°
BYPASS HOSE
STARTER MOTOR CABLE
BATTERY GROUND CABLE
WATER HOSE

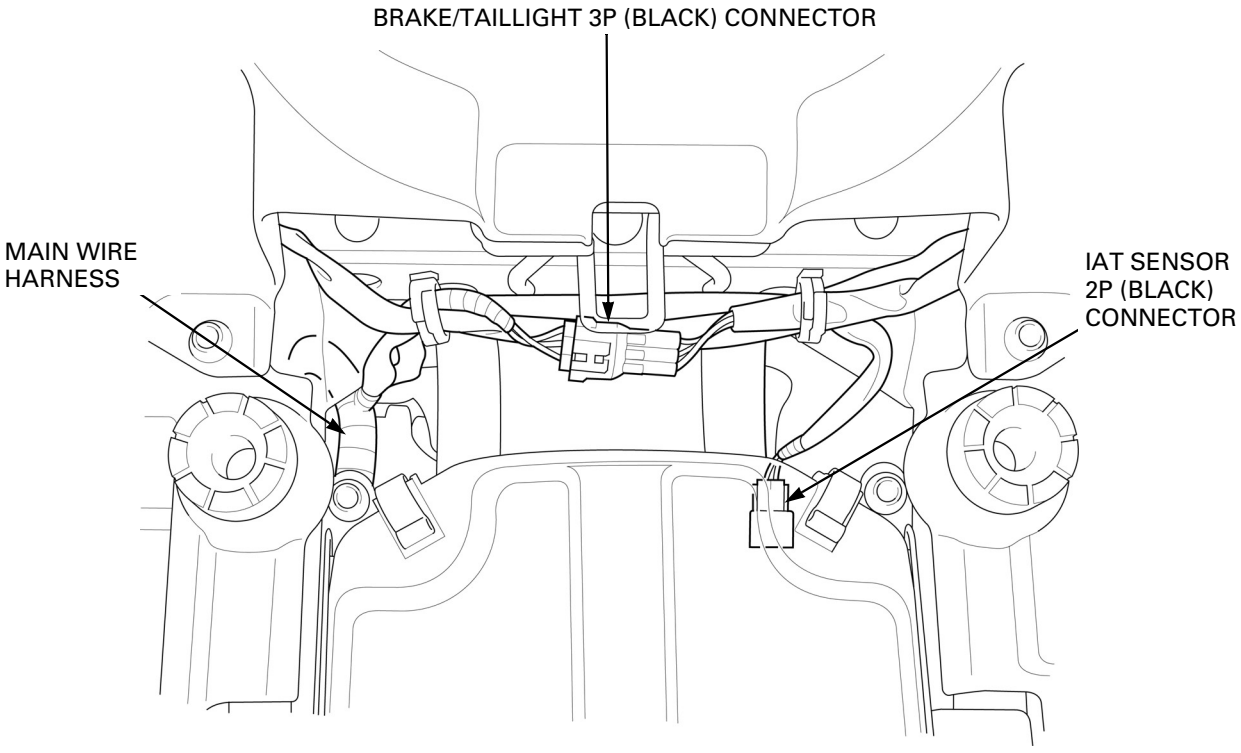

FUEL HOSE (TANK-TO-PUMP)
UPPER RADIATOR HOSE
THROTTLE CABLE
FUEL FEED HOSE
SHIFT CONTROL CABLE

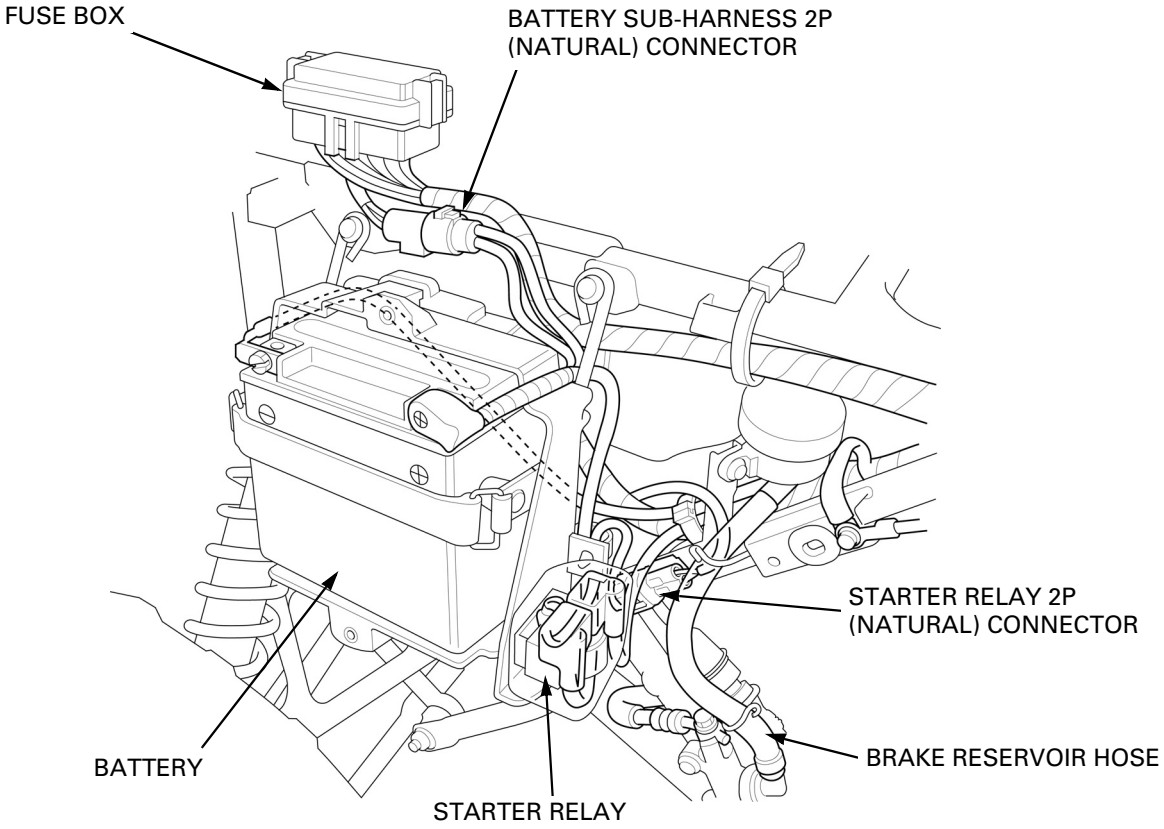

FUEL FEED HOSE
THROTTLE CABLE
INJECTOR 2P (GRAY) CONNECTOR
GEAR POSITION SWITCH 3P (NATURAL) CONNECTOR
THROTTLE BODY HARNESS
IACV 4P (BLACK) CONNECTOR

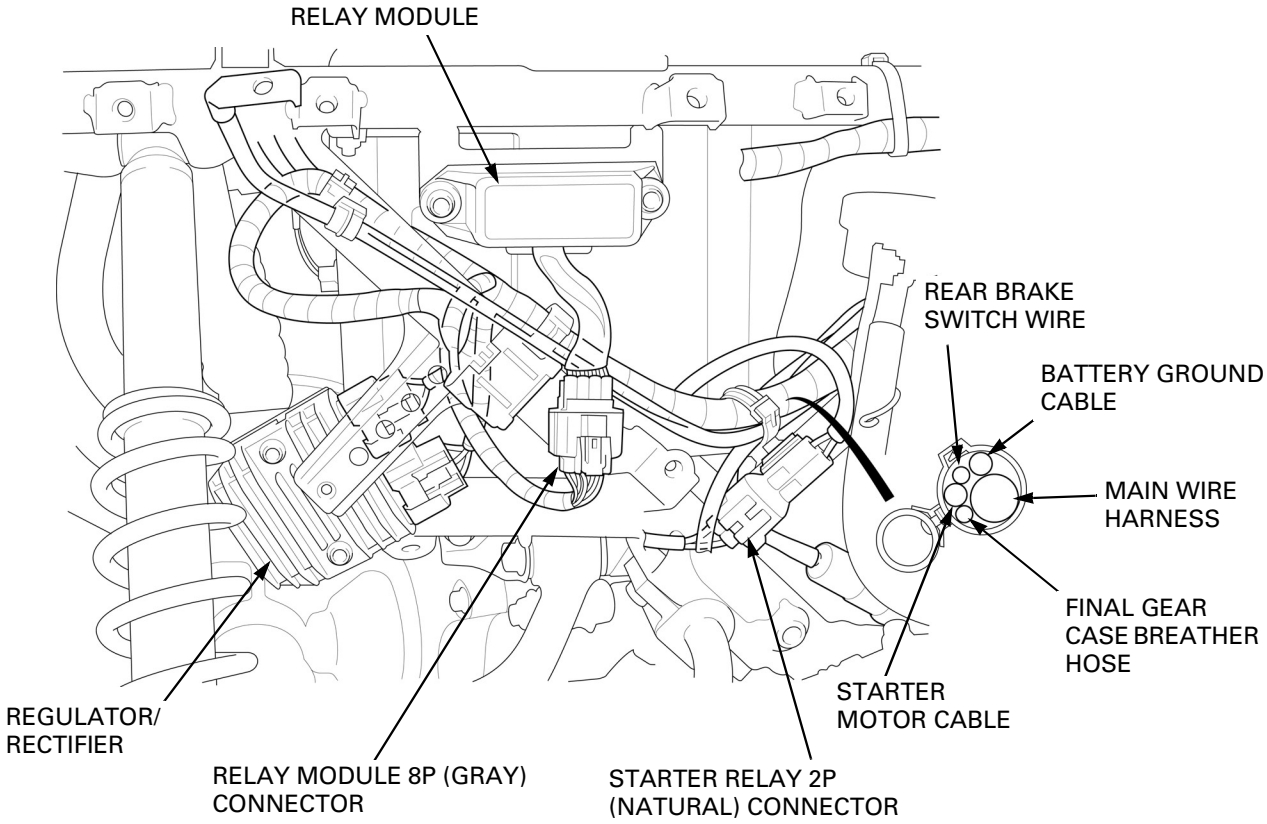

ECT SENSOR 2P
(BLACK) CONNECTOR
MAP/TP SENSOR 5P
(BLACK) CONNECTOR

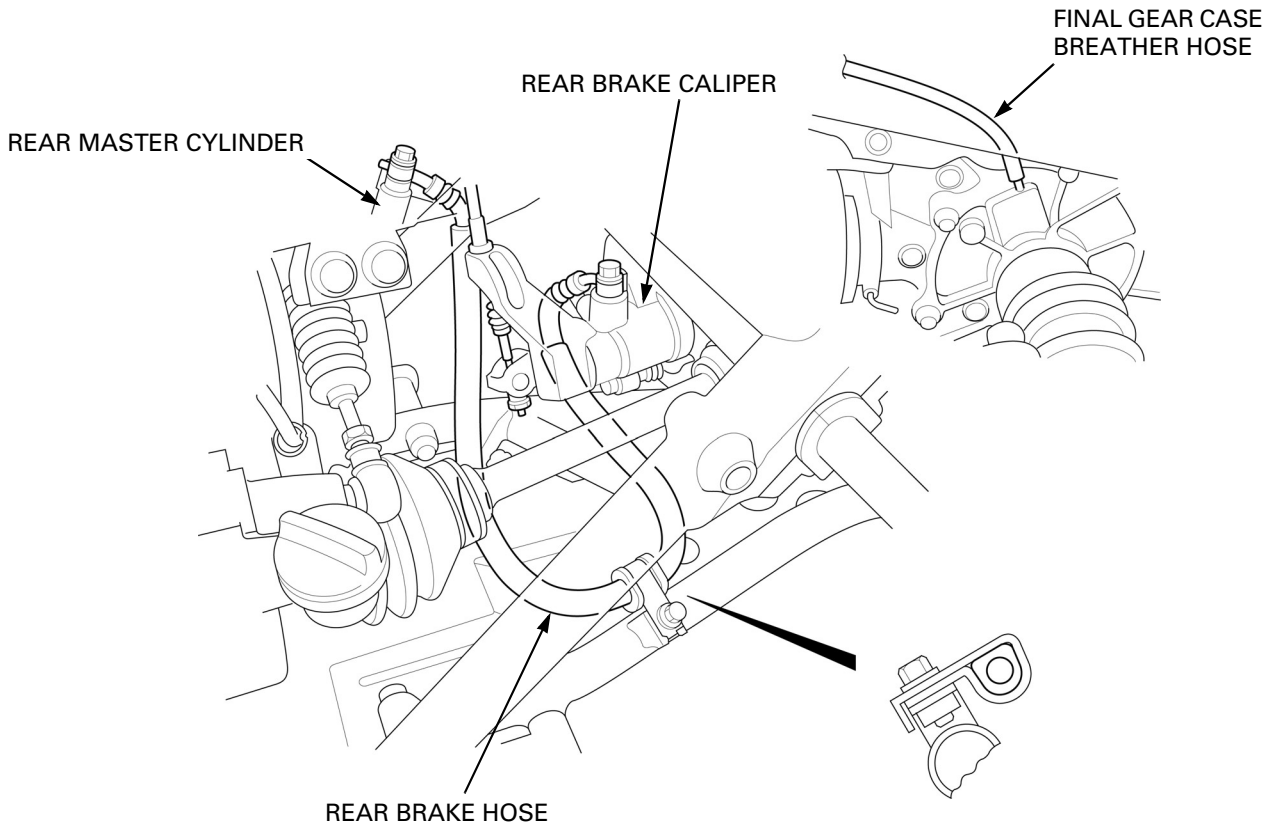

REAR BRAKE CABLE
GEAR POSITION SWITCH WIRE
STARTER MOTOR CABLE
ALTERNATOR WIRE
GEAR POSITION SWITCH 3P
(NATURAL) CONNECTOR
REAR BRAKE SWITCH
2P (GREEN)
CONNECTOR
MAIN WIRE HARNESS
FINAL GEAR CASE
BREATHER HOSE
BATTERY GROUND CABLE
ALTERNATOR
5P (NATURAL)
CONNECTOR
EOT SENSOR 2P (BLACK)
CONNECTOR

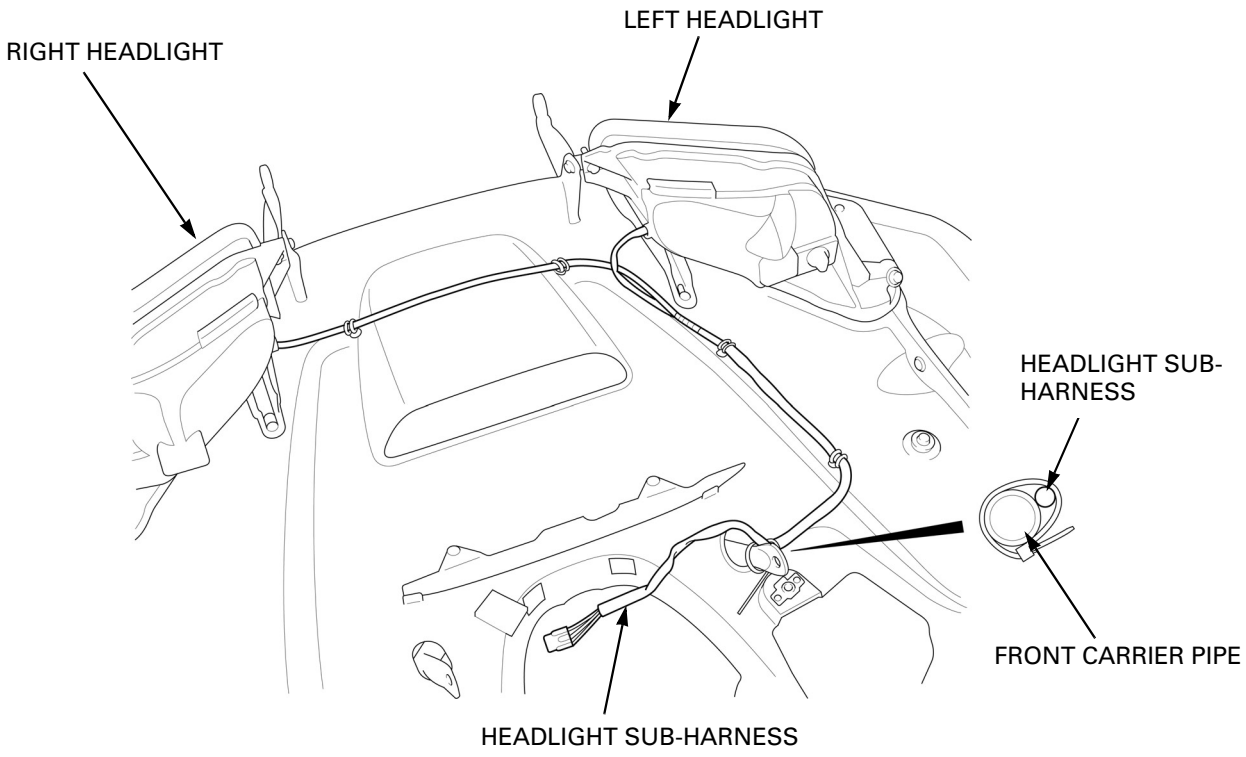

REAR BRAKE CABLE
REAR BRAKE CALIPER
REAR BRAKE HOSE
REAR MASTER CYLINDER

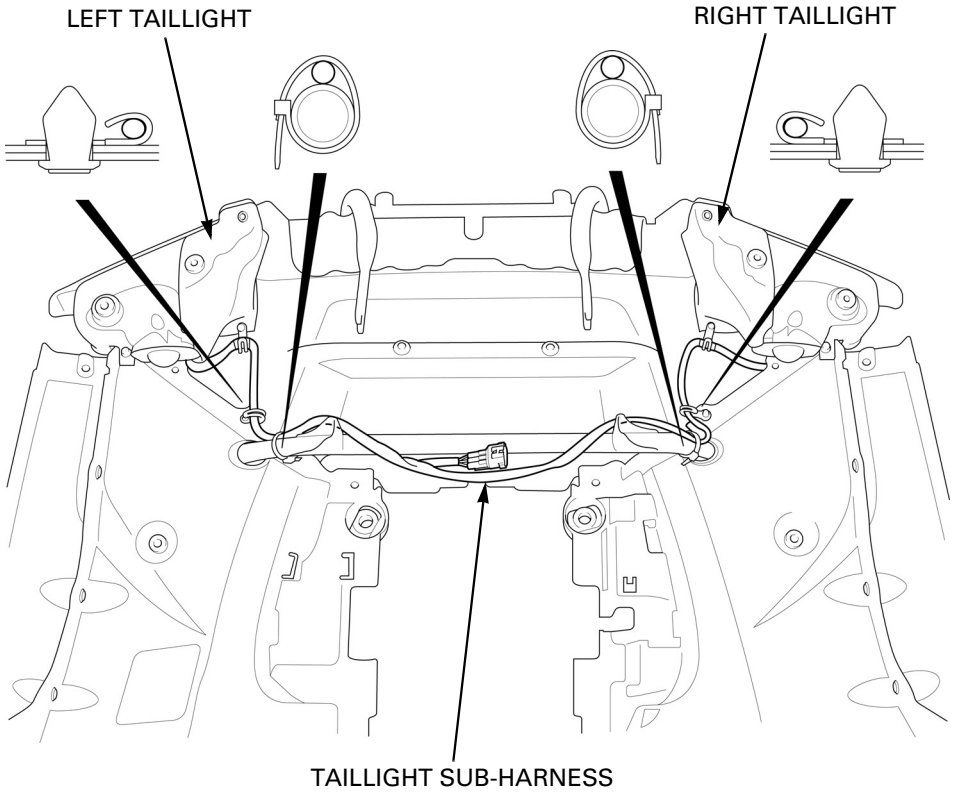

BRAKE/TAILLIGHT 3P (BLACK) CONNECTOR
MAIN WIRE HARNESS
IAT SENSOR 2P (BLACK) CONNECTOR


FUSE BOX
BATTERY SUB-HARNESS 2P (NATURAL) CONNECTOR
STARTER RELAY 2P (NATURAL) CONNECTOR
BRAKE RESERVOIR HOSE
BATTERY
STARTER RELAY


RELAY MODULE
REAR BRAKE SWITCH WIRE
BATTERY GROUND CABLE
MAIN WIRE HARNESS
FINAL GEAR CASE BREATHER HOSE
STARTER MOTOR CABLE
REGULATOR/ RECTIFIER
RELAY MODULE 8P (GRAY) CONNECTOR
STARTER RELAY 2P (NATURAL) CONNECTOR


FINAL GEAR CASE
BREATHER HOSE
REAR BRAKE CALIPER
REAR MASTER CYLINDER
REAR BRAKE HOSE


RIGHT HEADLIGHT
LEFT HEADLIGHT
HEADLIGHT SUB-HARNESS
FRONT CARRIER PIPE
HEADLIGHT SUB-HARNESS


LEFT TAILLIGHT
RIGHT TAILLIGHT
TAILLIGHT SUB-HARNESS

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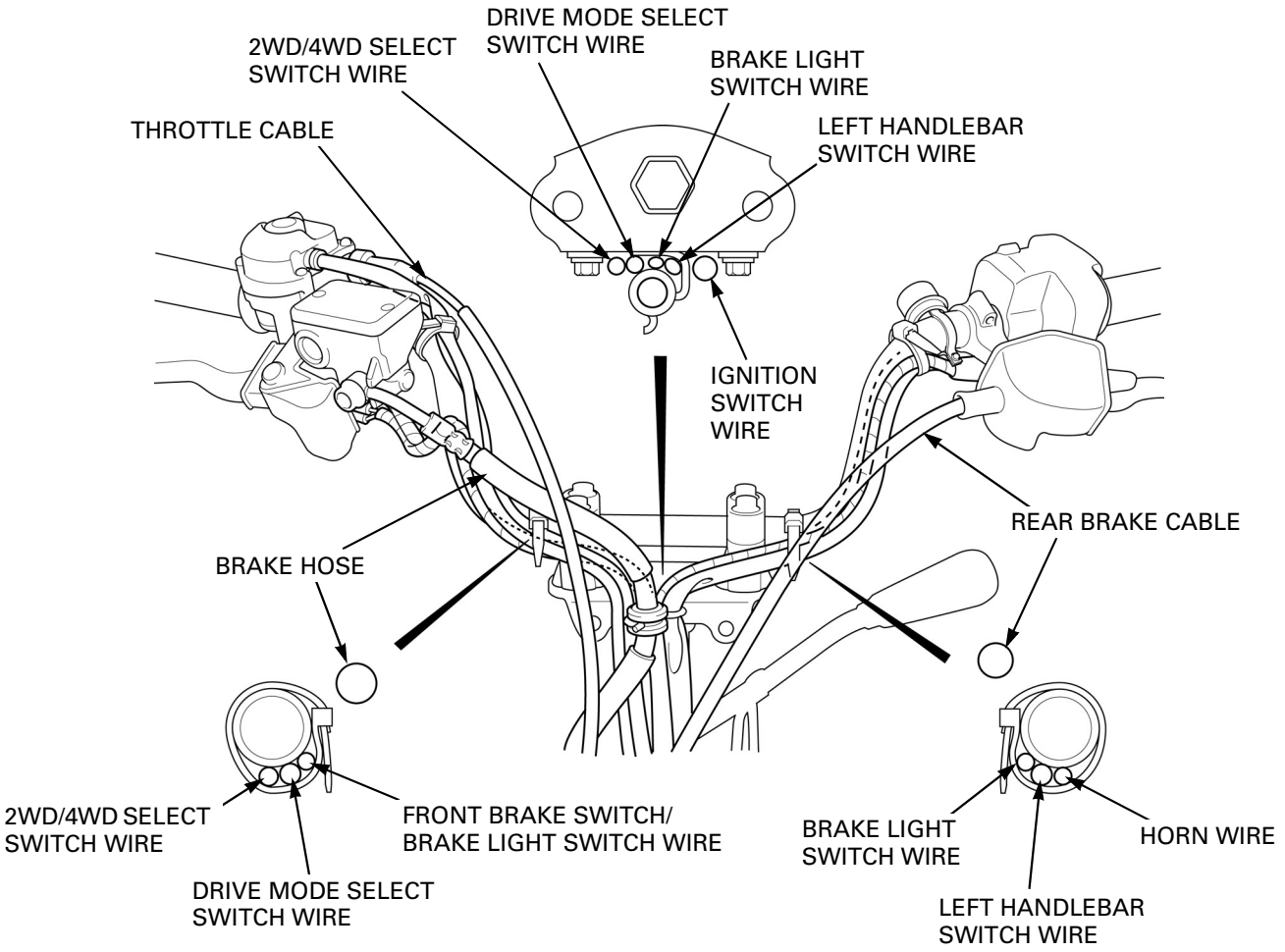
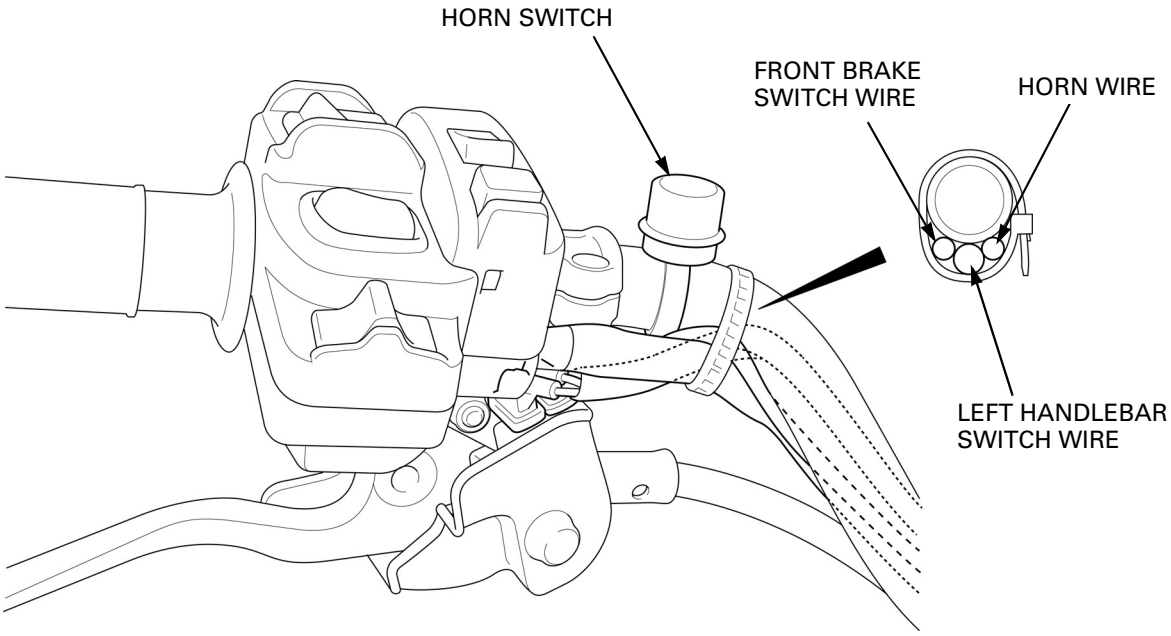


LEFT HANDLEBAR:



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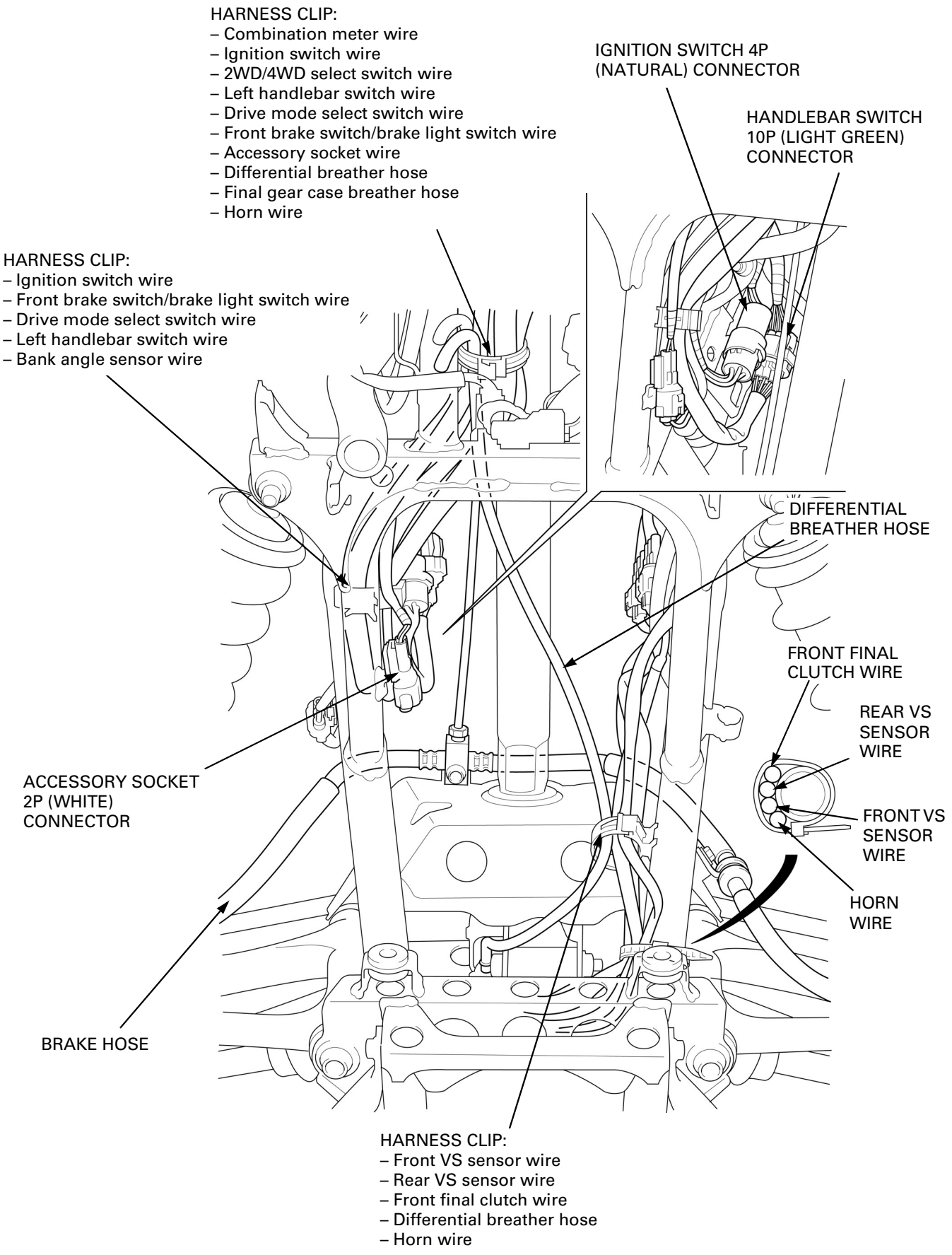

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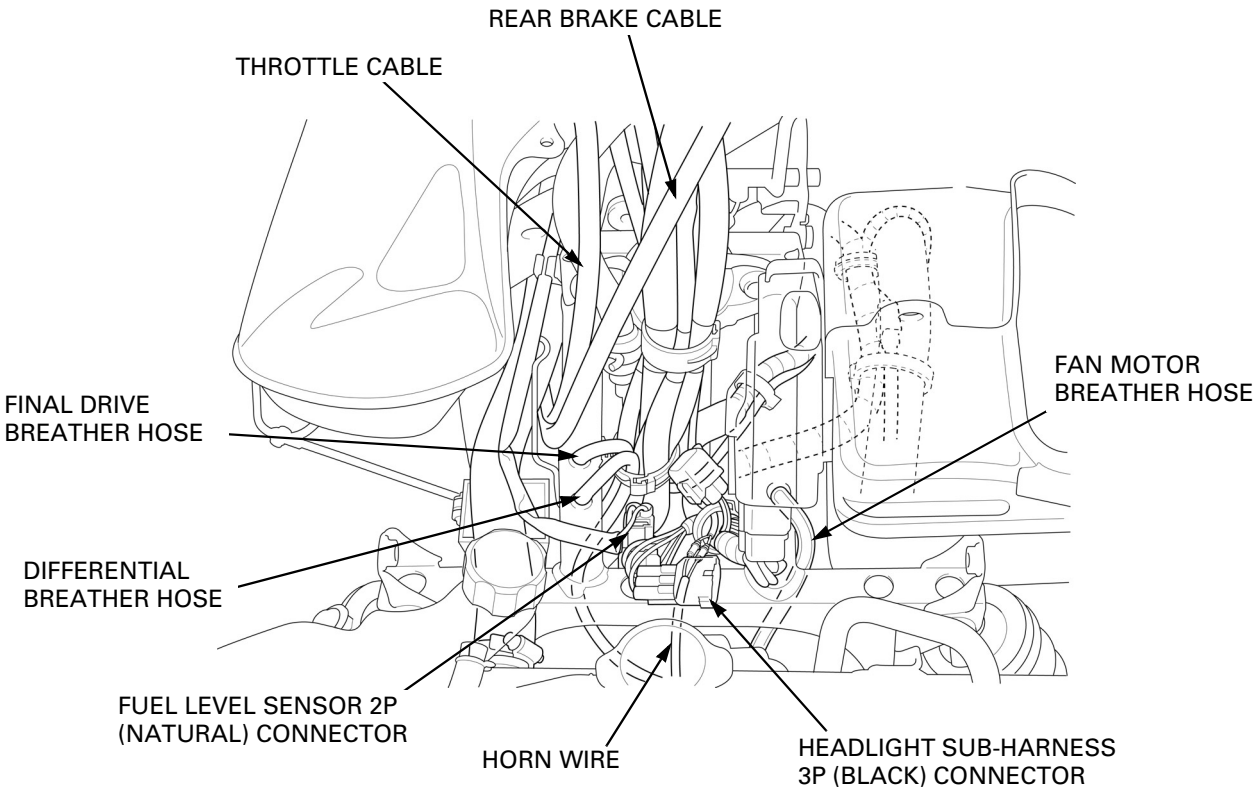
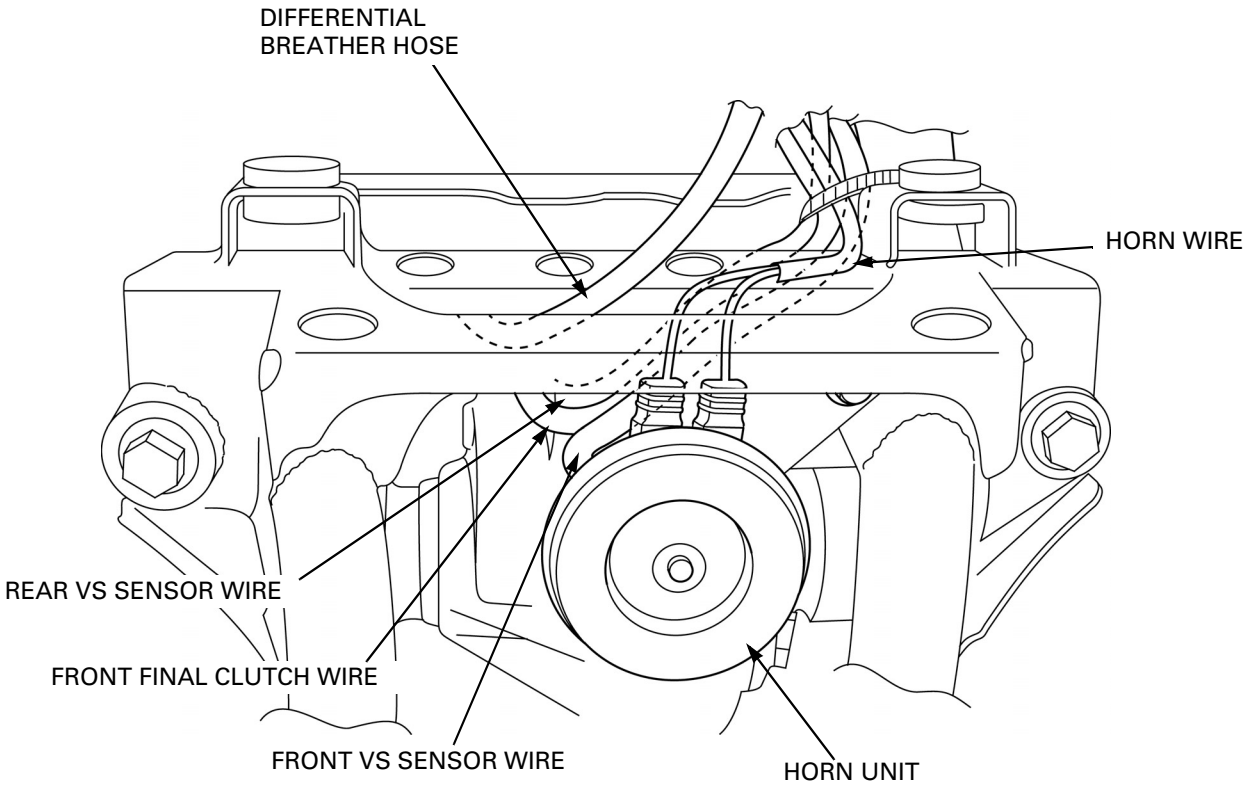




EMISSION CONTROL SYSTEMS

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

SOURCE OF EMISSIONS

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

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

EXHAUST EMISSION CONTROL SYSTEM

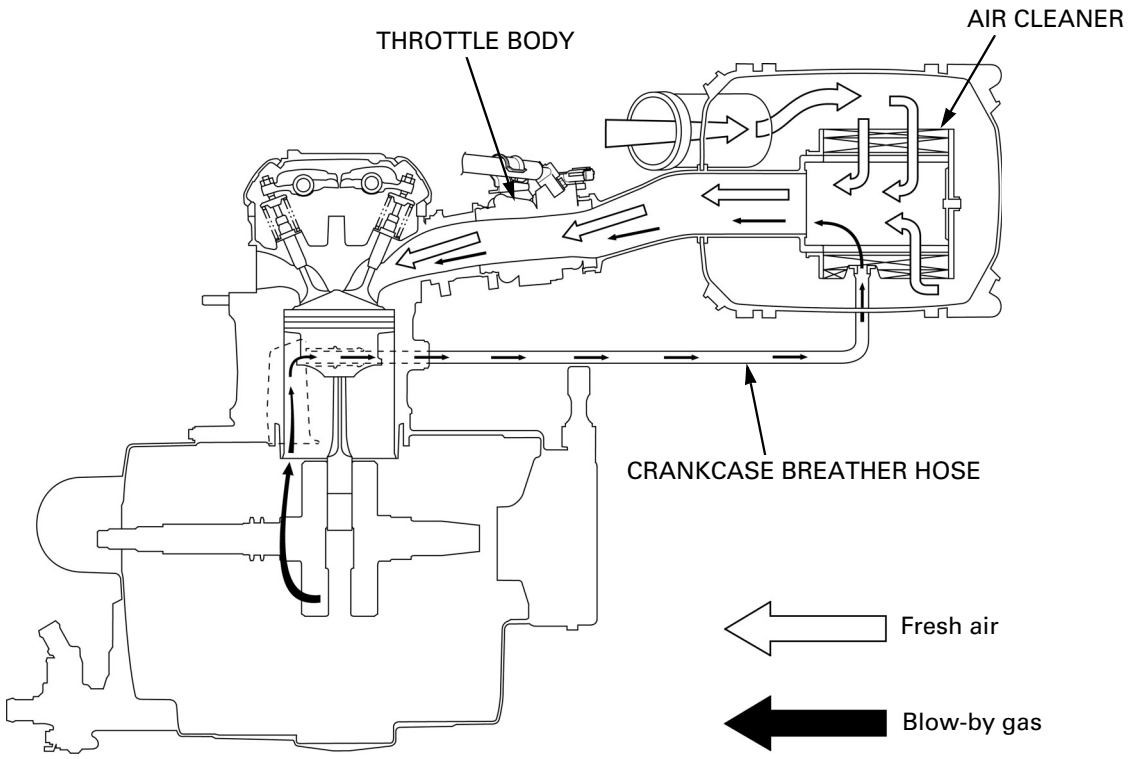
The exhaust emission control system is composed of the PGM-FI system.

No adjustments should be made. 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 throttle body.



SERVICING THE HONDA

U.S.A. Only

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

PROHIBITED ACTIONS

The following prohibitions apply to everyone with respect to the engines emission control system.

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

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

NOISE EMISSION CONTROL SYSTEM

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

AMONG THOSE ACTS PRESUMED TO CONSTITUTE TAMPERING ARE THE FOLLOWING ACTS:
1. Removal of, or puncturing the muffler, baffles, header pipes or any other component which conducts exhaust gases.
2. Removal of, or puncturing of any part of the intake system.
3. Lack of proper maintenance.
4. Replacing any moving parts of the vehicle, or parts of the exhaust or intake system, with parts other then those specified by the manufacturer.

REBUILT ENGINE

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

– Make sure you are technically qualified to rebuild the engine and have the proper tools
– Diagnose and respond to all Diagnostic Trouble Codes (DTC), and clear all DTCs after addressing their cause
– Use only Genuine Honda parts or equivalents
– Make sure to maintain all specifications as described in this Service Manual

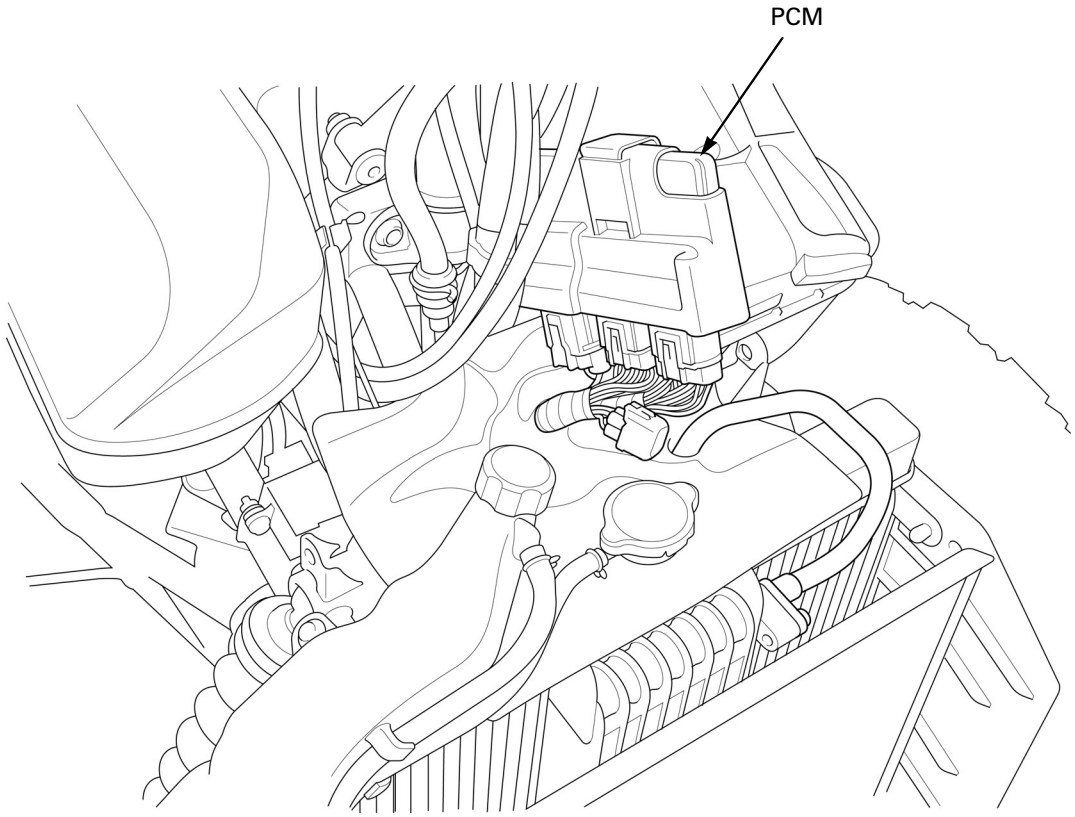
2. TECHNICAL FEATURES

PCM (POWERTRAIN CONTROL MODULE)

The engine and drivetrain systems of this model are controlled by the PCM; the ECM (Engine Control Module) and TCM (Transmission Control Module) are integrated into the PCM.

The PCM controls the following systems:

- Engine management system
  - PGM-FI system
  - Ignition system
  - Cooling fan control system
- Drivetrain system
  - A/T (Automatic Transmission) system
  - Selectable 4WD system



PGM-FI SYSTEM

This PGM-FI system for the ATV is composed of the fuel pump, throttle body and its electronic control system by PCM. This system controls and manages the engine operation, and enhances the emission control performance, fuel economy, starting performance and driveability when compared to a conventional carburetor.

DRIVETRAIN SYSTEM

This manual describes the A/T system and selectable 4WD system as "drivetrain" system. The PCM controls the front final clutch located in the differential by selecting the 2WD/4WD switch. The PCM also controls the A/T system as described in AUTOMATIC TRANSMISSION system feature (page 2-7).

SELF-DIAGNOSTIC FUNCTION

The PCM has a fail-safe function and also a self-diagnostic function for the PGM-FI, A/T and selectable 4WD system. Some detection items (sensors, etc...) are shared by the PGM-FI and drivetrain systems and so their failure may affect the operation of both systems.

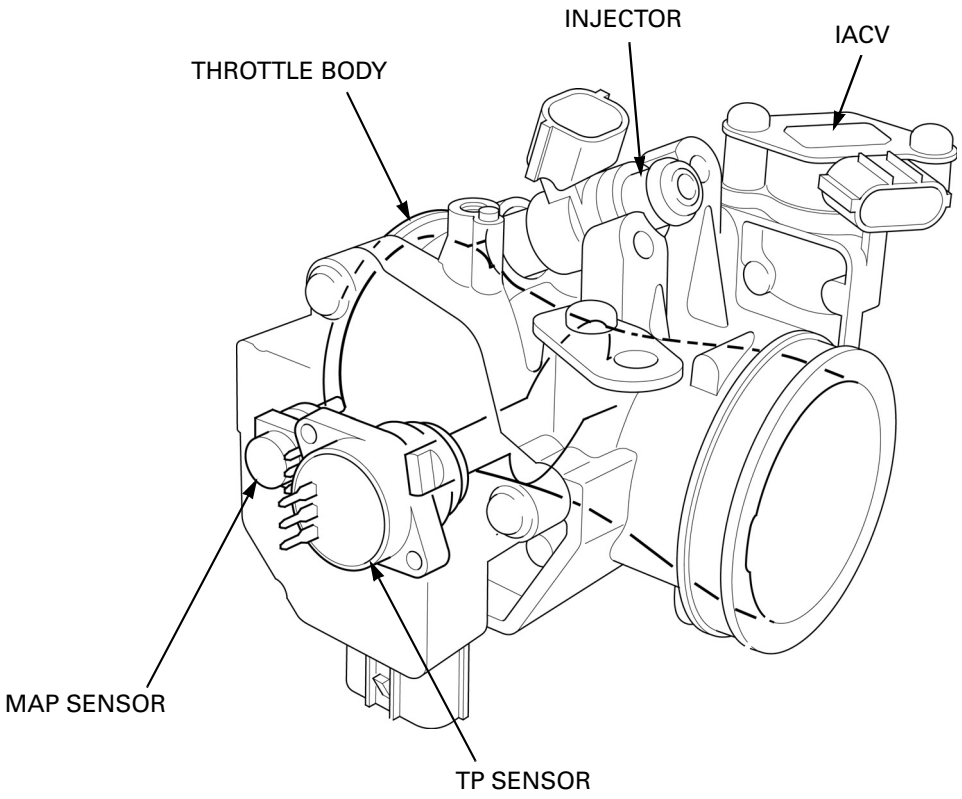
If both PGM-FI and DRIVETRAIN DTCs are indicated at the same time, troubleshoot the PGM-FI system first then check all DTCs again.

PGM-FI SYSTEM

INTEGRATED SENSOR THROTTLE BODY

This model is equipped with a throttle body that integrates the following sensors and device. This throttle body achieves a compact design with simplified inspection capabilities.

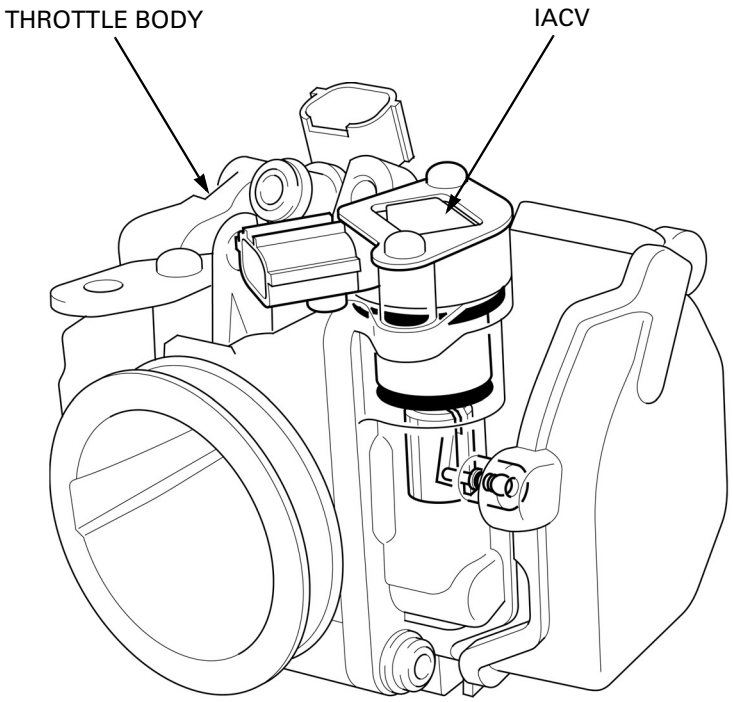
- MAP (Manifold Absolute Pressure) sensor: detects the intake air pressure
- TP (Throttle Position) sensor: detects the throttle opening position
- IACV (Idle Air Control Valve): controls the engine idle speed and enhances the starting
- These components can be removed from the throttle body.

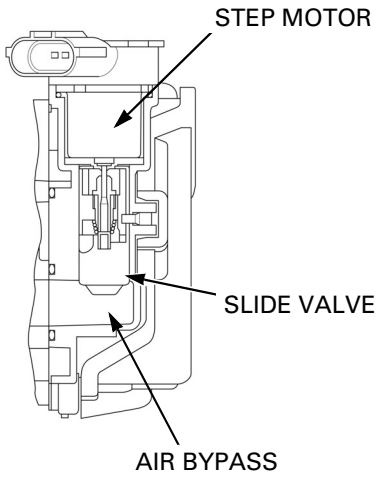


IACV (Idle Air Control Valve)

The IACV consists of a step motor and a slide valve, and controls the amount of air bypassed around the closed throttle valve. With the ignition switch ON, the amount of idle air is determined from information detected by the ECT sensor. During engine start-up or while maintaining idle (throttle valve closed), the amount of inlet air is adjusted by various sensors' information.

This system eliminates the need for a manual idle speed adjustment and high altitude adjustment settings.





OPERATION

The PCM controls the IACV during engine idling only, so the PCM stops controlling the IACV and leaves it in the closed position when the PCM detects the following:

- Throttle valve open
- Neutral switch off (in gear)

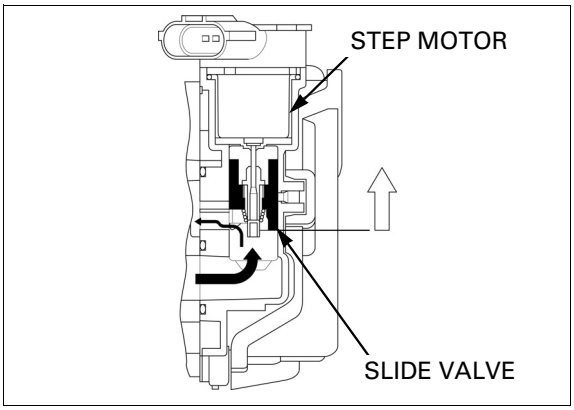
During engine idling and warm up, from the time the ignition switch is turned ON, the PCM controls the IACV step motor as follows:

With the ignition switch ON

- When the ignition switch is turned ON, the IACV is initialized and the step motor will operate:
  the slide valve goes from open-to close-to the open position

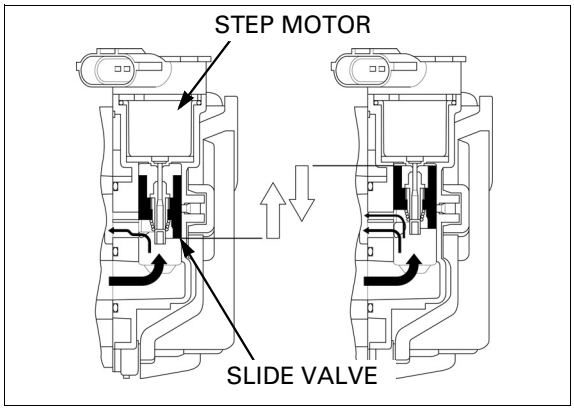
Engine starting and warm up

- While the throttle valve is closed, the bypass opening is optimized by the IACV, and the correct amount of inlet air passes through allowing proper engine starting.
- After the engine has started, the PCM controls the IACV step motor to adjust the slide valve position by processing various sensor's information. This results in a reduced amount of bypassed air compared to the amount during engine start-up, and initiates engine warm-up for several minutes.



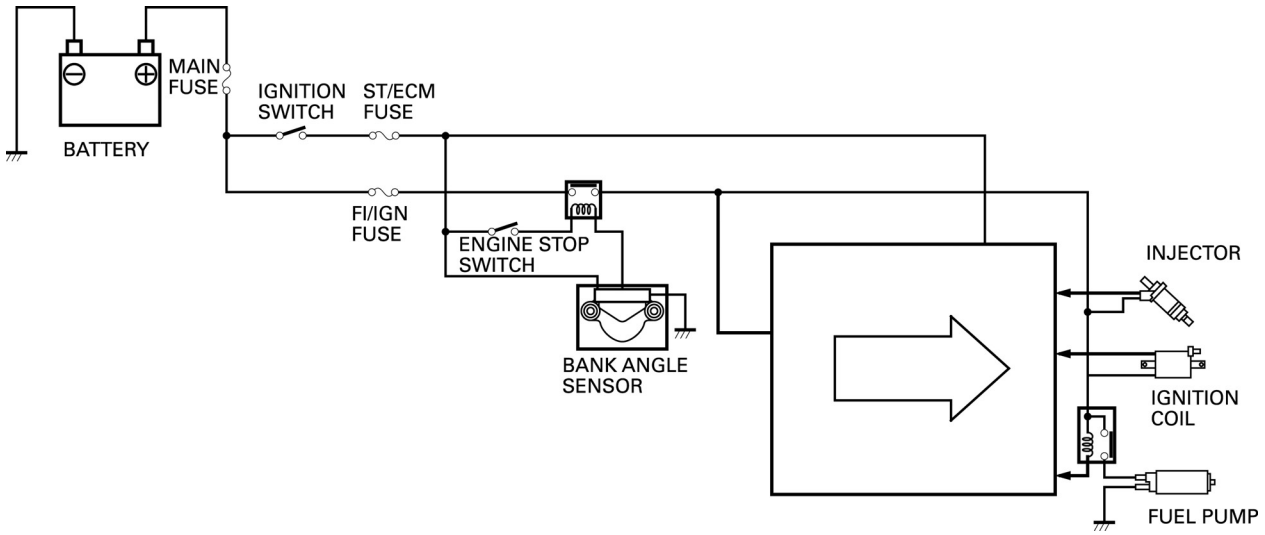
After warming up - idling

- When the PCM receives input signals that indicate the completion of engine warm-up, it operates the step motor to move the slide valve to the downward. This results in a reduced amount of bypassed air compared to the amount during engine warm-up, which maintains proper engine idle speed.



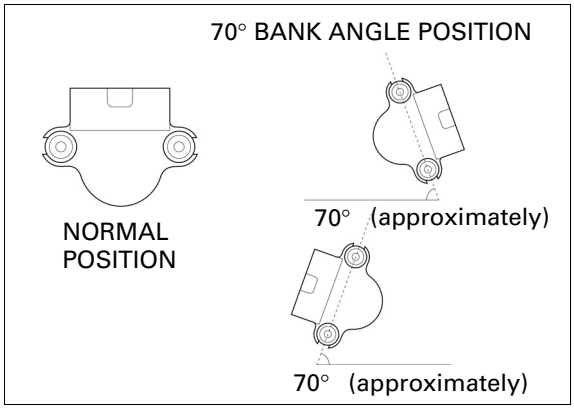
BANK ANGLE SENSOR

The bank angle sensor is located under the steering cover, it detects a vehicle rollover and interrupts the ignition/fuel system control. The bank angle sensor system controls the power supply for the injector, ignition coil and fuel pump directly through the engine stop relay.



OPERATION

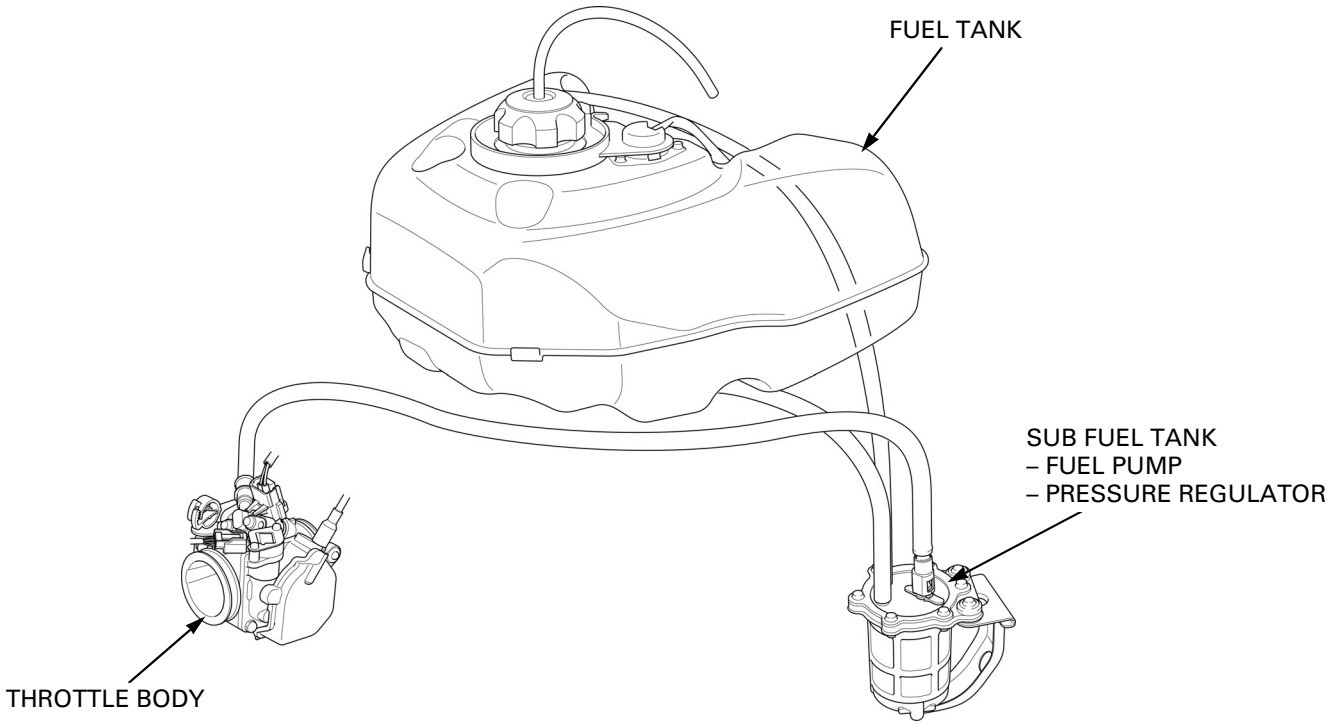
When the vehicle topples over or tilts over 70 degrees horizontal or 135 degrees cross direction, the pendulum magnet inside the bank angle sensor tilts and turns the reed switch on. Then, the bank angle sensor opens the engine stop relay.



FUEL SUPPLY SYSTEM

The fuel supply system is composed of the fuel tank, sub fuel tank, fuel hoses, fuel vapor return hose, throttle body, and injector. While riding in bumpy conditions, the fuel supply from the fuel tank may be unstable because of changes in the vehicle attitude. To stabilize the supply of fuel, this system is equipped with a sub fuel tank between the fuel tank and throttle body. The fuel pump and pressure regulator are located inside the sub fuel tank.

The fuel hose has a quick connector at the sub fuel tank joint. Before disconnecting the quick connector, always relieve the fuel pressure (page 6-32).



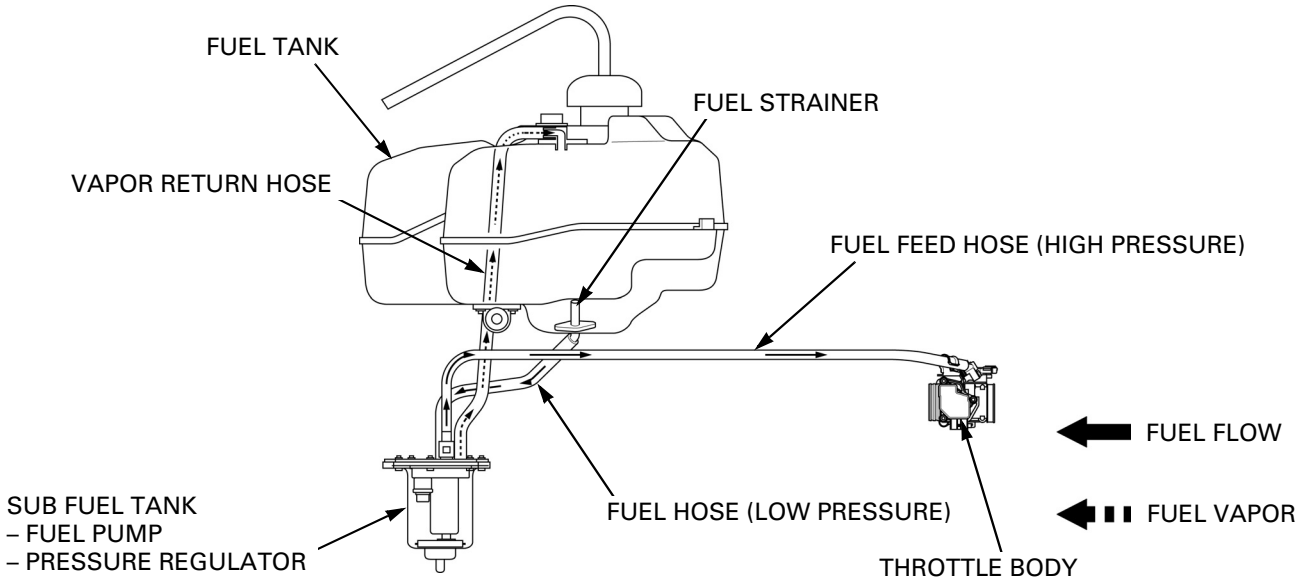
OPERATION

Fuel flows through the fuel strainer inside the fuel tank to the fuel hose (low pressure). Inside the sub fuel tank, fuel flows though the fuel filter and is fed by the fuel pump though the fuel hose (high pressure) to the injector.

The fuel pressure through the fuel pump is regulated by a pressure regulator that is located in the fuel passage in the sub fuel tank and always kept under 343 kPa.

Fuel vapor generated in the sub fuel tank is returned to the fuel tank through the fuel vapor return hose.

FUEL FLOW CHART



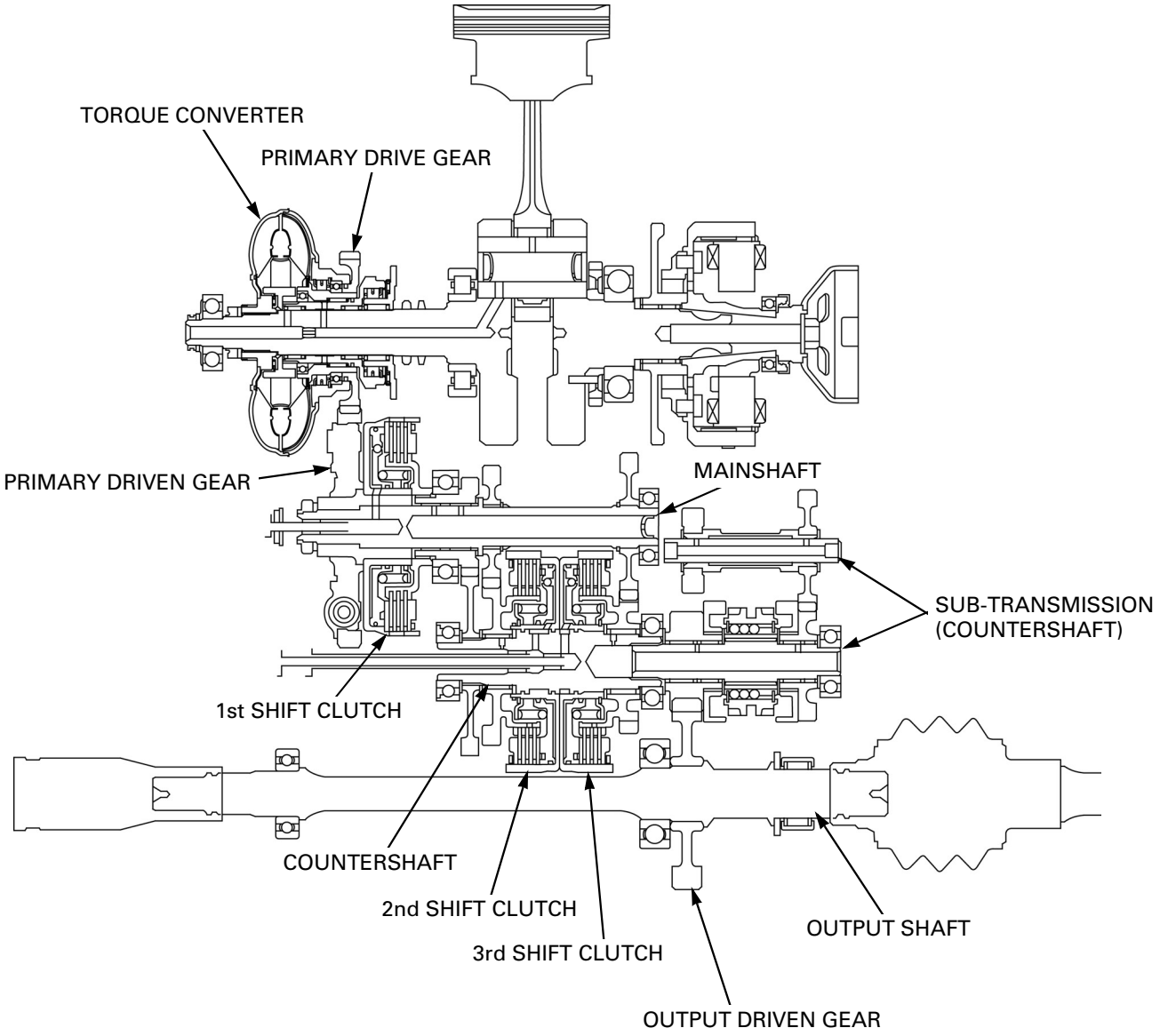
AUTOMATIC TRANSMISSION SYSTEM

OUTLINE

This three-speed A/T (Automatic Transmission) system controls gear selection by means of the A/T 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. Each solenoid valve is controlled by the PCM, that detects the signal from each sensor and switch.
The hydraulic oil for this system is the engine oil, which is supplied from the ordinary oil pump for engine lubrication (page 5-2).

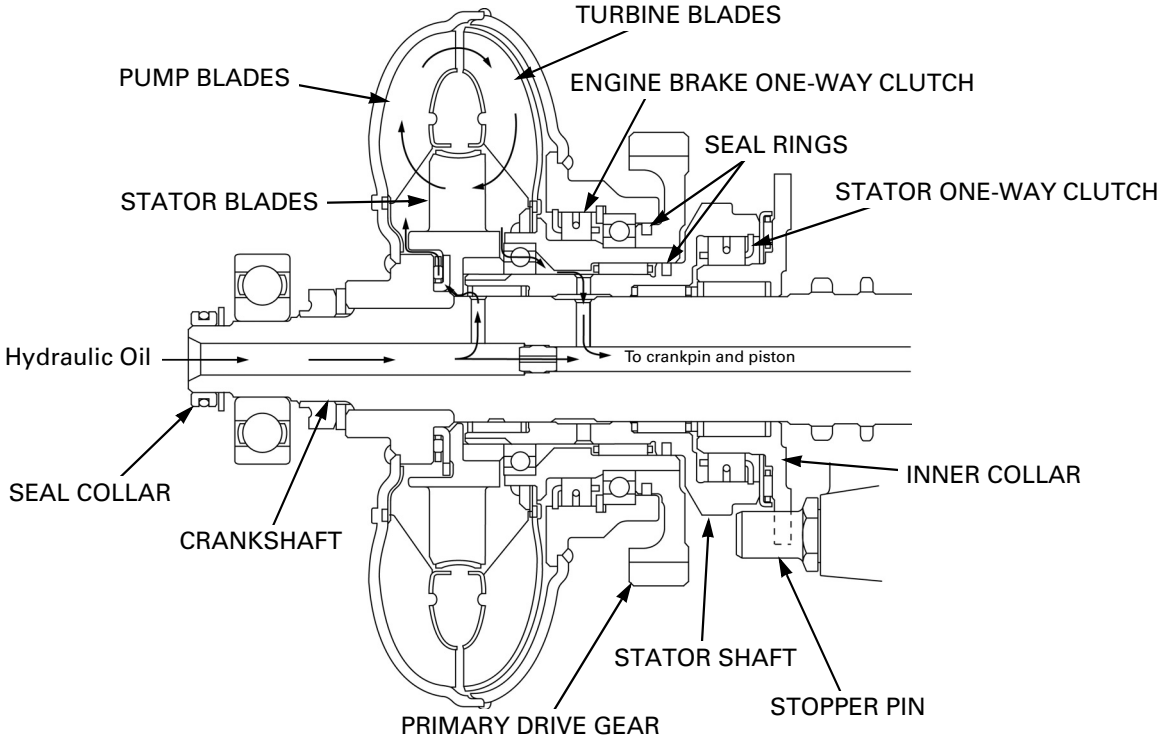
The valve body which incorporates solenoid valves and spool valves that control the clutch hydraulic pressure is laid out independently on the crankcase cover to facilitate maintenance (page 14-47)
The sub-transmission is laid out in front of the output shaft, and selecting Drive-Neutral-Reverse can 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 2-8).
- 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.

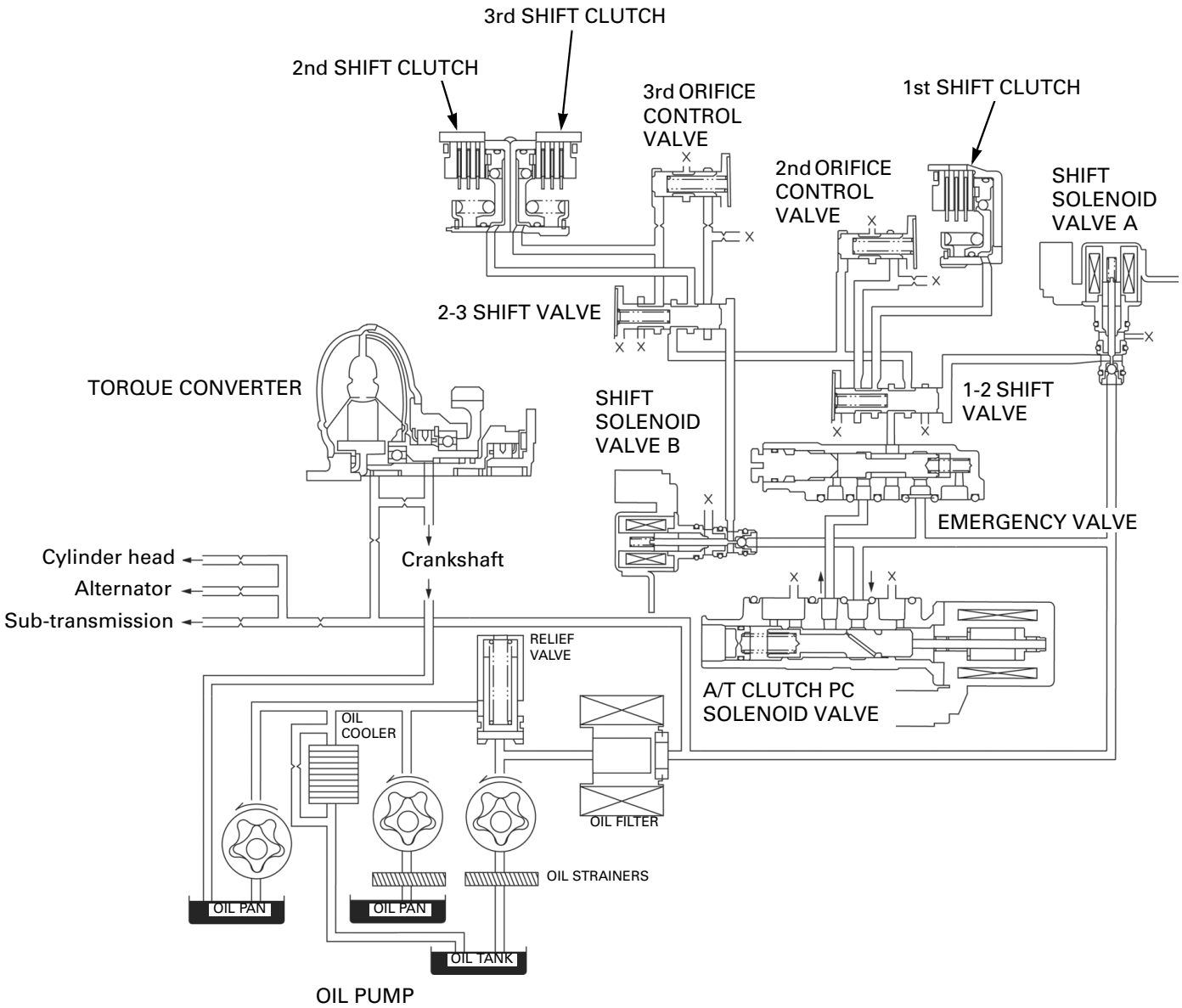


OPERATION PRINCIPLE

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).

HYDRAULIC VALVE FUNCTION

- **A/T Clutch Pressure Control Solenoid Valve (Linear Solenoid Valve)**
  The A/T Clutch PC solenoid valve 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 a faulty clutch PC 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 A/T clutch PC solenoid valve, shift solenoid valve A and B as the PCM detects the following signals:

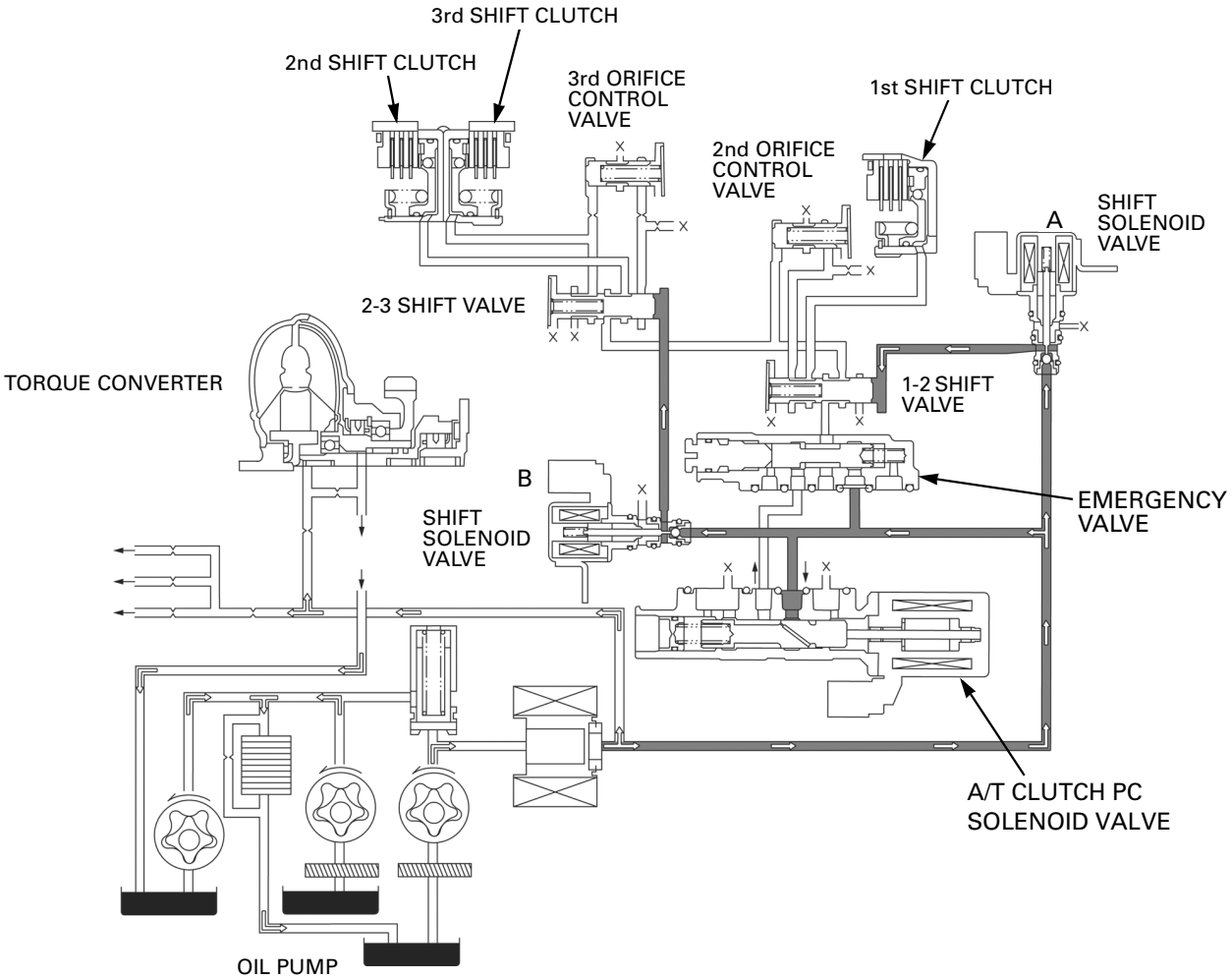
– throttle angle
– vehicle speed
– sub-transmission gear position (D – N – R)
– drive mode (AUTO – ESP)
– engine oil temperature

It controls the shift clutches for the situation according to the combination of the respective solenoid valves operation.

Gear in Neutral

Gear position	Clutch PC Solenoid	Shift Solenoid		Shift Clutch		
		A	B	1st	2nd	3rd
Neutral	ON	OFF	OFF	–	–	–

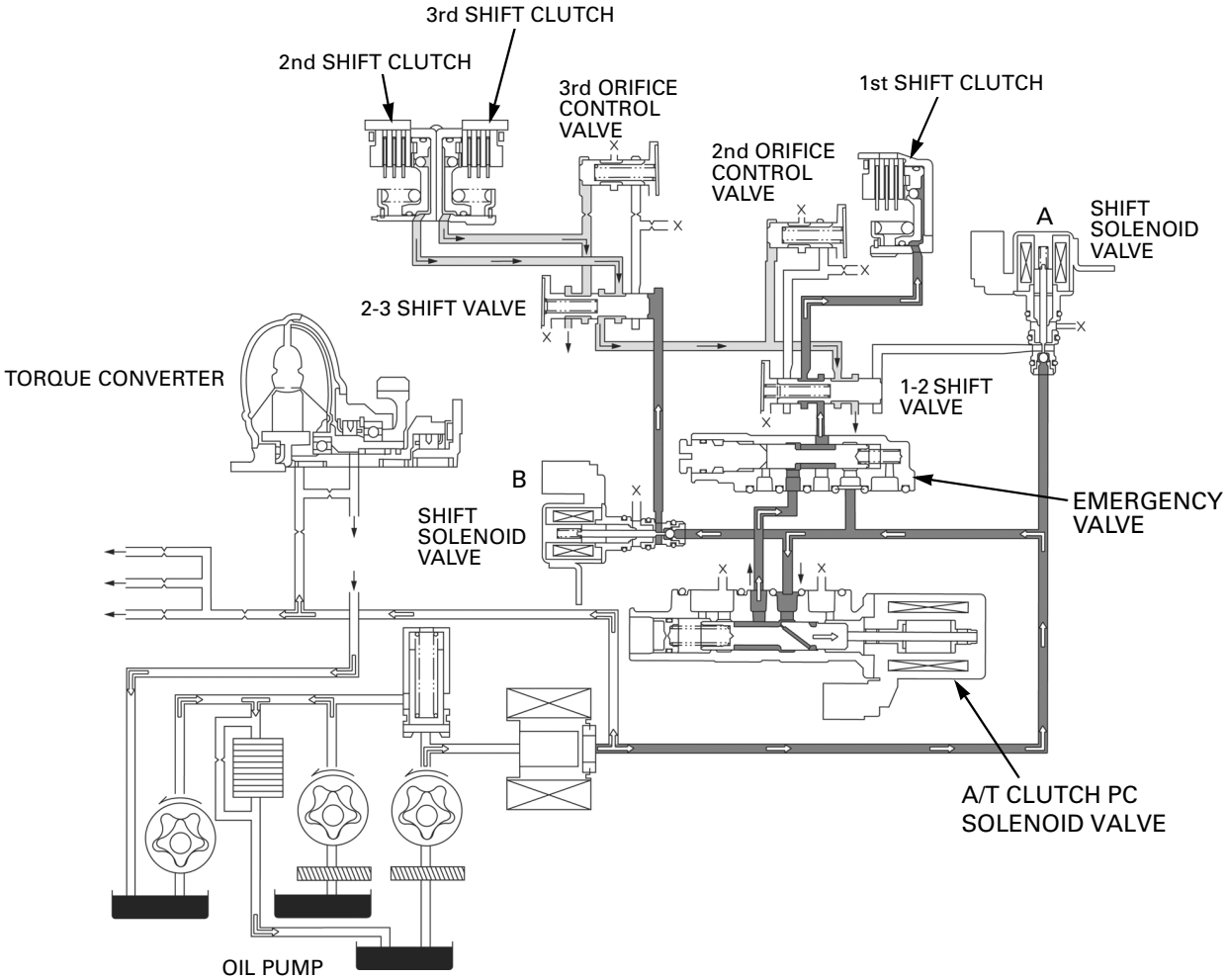
- The hydraulic passage is the same as the transmission being in the 2nd range. The A/T clutch PC solenoid valve is on (valve closed) and the hydraulic oil that flows to all shift clutches is shut off. Therefore, all clutches are inactive.



1st gear and Reverse gear

Gear position	A/T Clutch PC Solenoid	Shift Solenoid		Shift Clutch		
		A	B	1st	2nd	3rd
1st/Reverse (idling)	ON	ON	OFF	"Engaged"	–	–
1st/Reverse (riding)	OFF	ON	OFF	"Engaged"	–	–

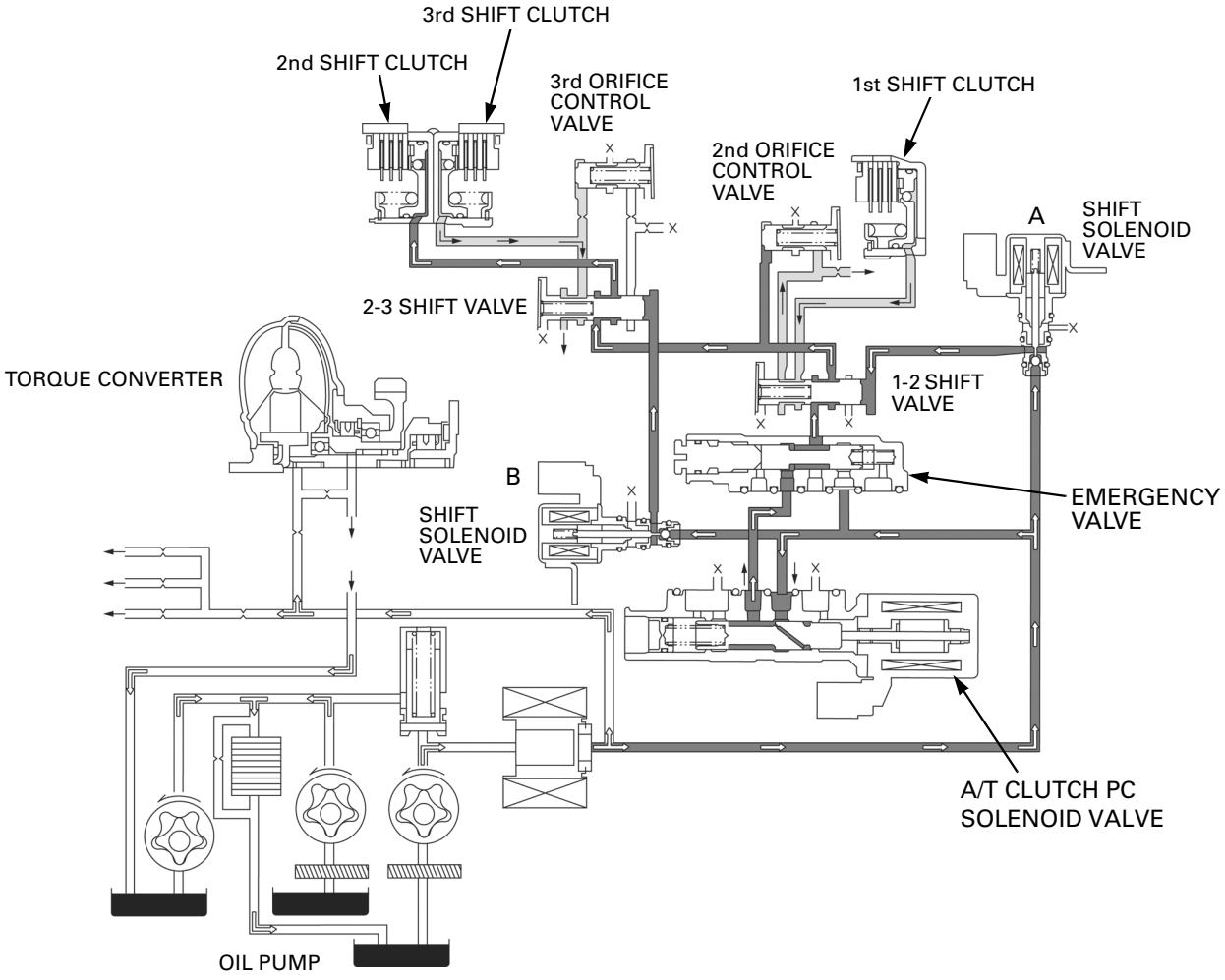
- The hydraulic passage is connected to supply hydraulic oil to the 1st shift clutch, and the clutch is engaged.
  Oil is supplied by way of: A/T clutch PC solenoid valve ⇨ 1-2 Shift valve ⇨ 1st Shift clutch
  (Oil is drained by way of:
  2nd Shift clutch ⇨ 2-3 Shift valve ⇨ 1-2 Shift valve
  3rd Shift clutch ⇨ 2-3 Shift valve)
- At idling, the A/T clutch PC solenoid valve is on (valve closed) to eliminate vehicle creep.
  At start up, the A/T clutch PC solenoid valve controls the clutch hydraulic pressure to the linear valve according to the signal from the PCM.
  At riding, the A/T clutch PC 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).



Riding in 2nd range

Gear position	A/T Clutch PC Solenoid	Shift Solenoid		Shift Clutch		
		A	B	1st	2nd	3rd
2nd gear	OFF	OFF	OFF	–	"Engaged"	–

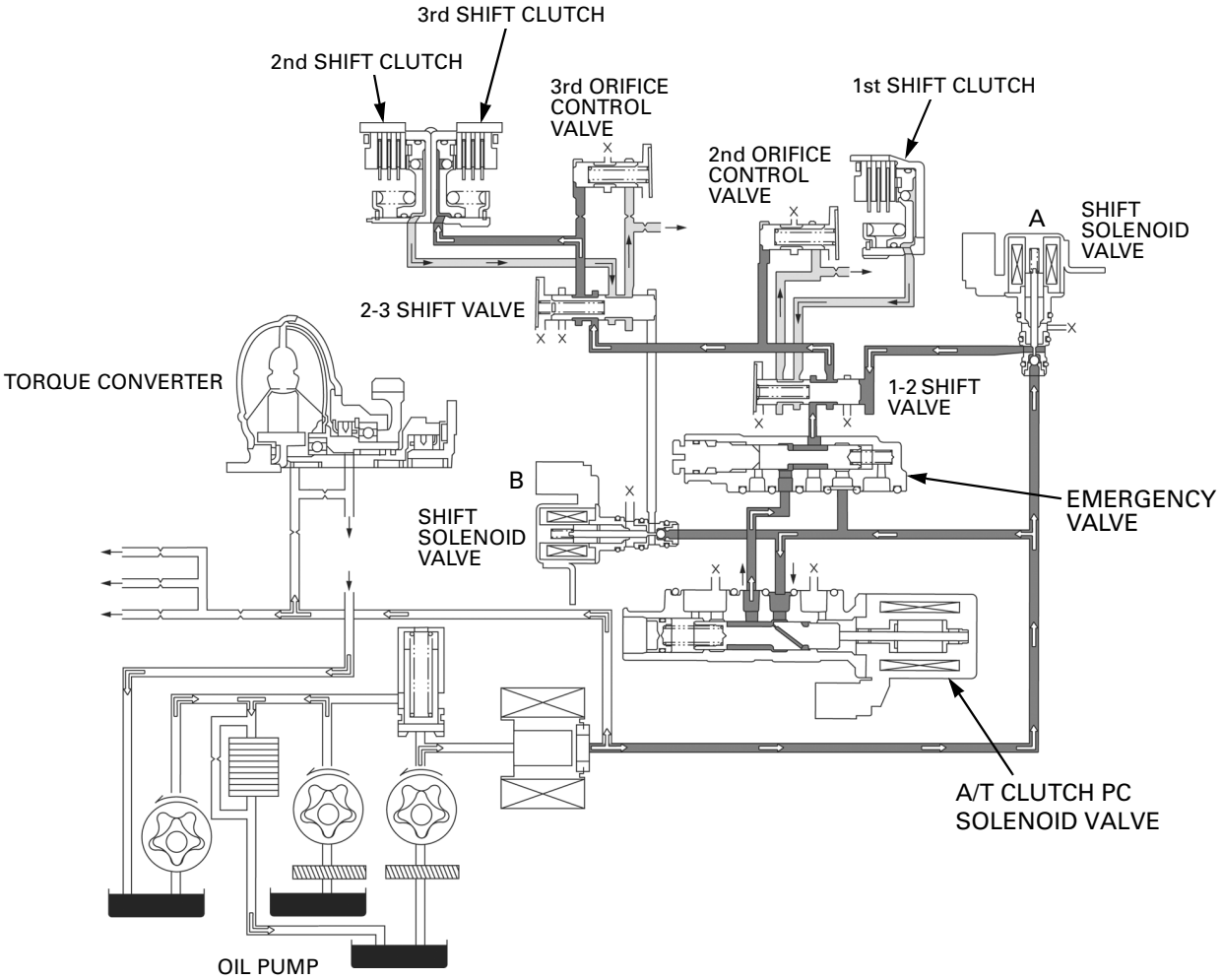
- The hydraulic passage is connected to supply hydraulic oil to the 2nd shift clutch.
  Oil is supplied by way of: A/T clutch PC solenoid valve ⇨ 1-2 Shift valve ⇨ 2-3 Shift valve ⇨ 2nd Shift clutch
  (Oil is drained by way of:
  1st Shift clutch ⇨ 1-2 Shift valve ⇨ 2nd Orifice control valve
  3rd Shift 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 shift shock.*
  *When the PCM detects system failure (fail-safe mode), the hydraulic passage is the same as above. (Therefore, the vehicle can be ridden only in the 2nd-hold mode and creeping can occur at idle)



Riding in 3rd range

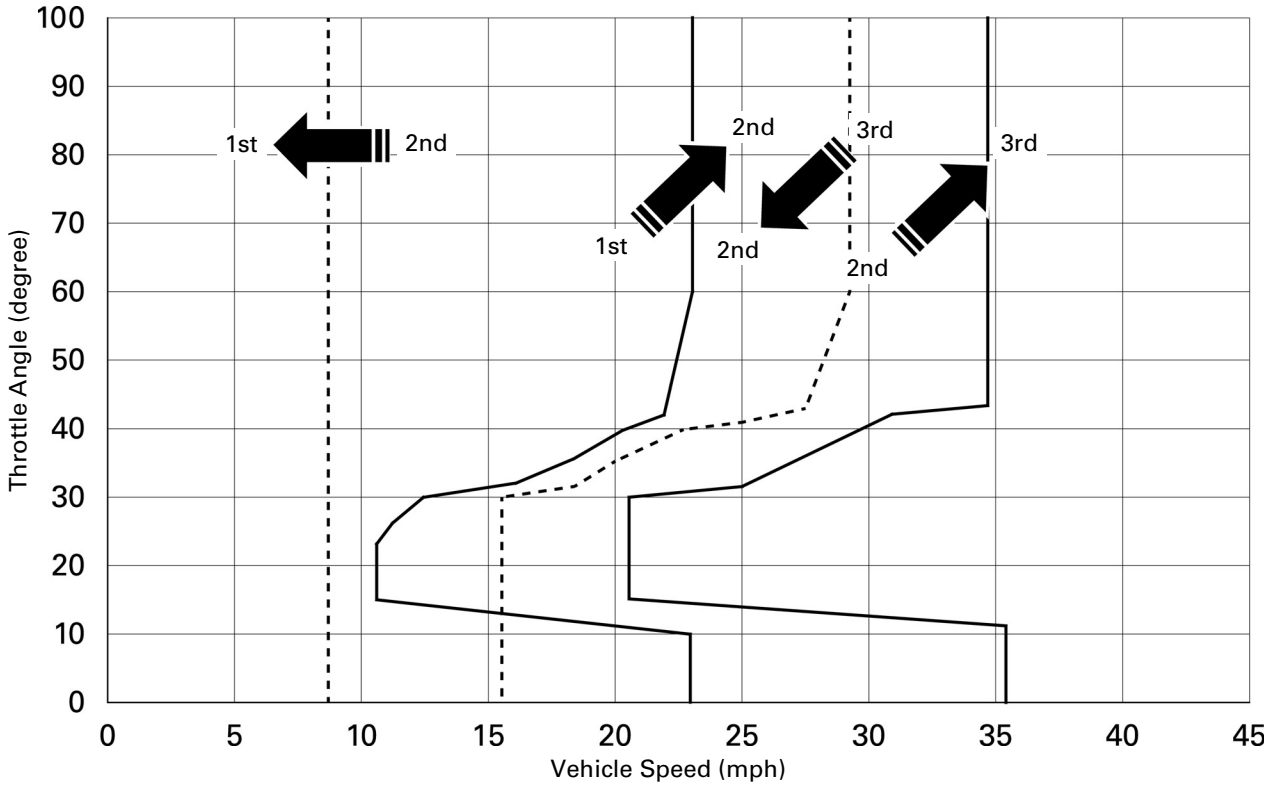
Gear position	A/T Clutch PC Solenoid	Shift Solenoid		Shift Clutch		
		A	B	1st	2nd	3rd
3rd gear	OFF	OFF	ON	–	–	"Engaged"

- The hydraulic passage is connected to supply hydraulic oil to the 3rd shift clutch.
  Oil is supplied by way of: A/T clutch PC 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 shift shock.



AUTOMATIC TRANSMISSION PERFORMANCE CURVE

See the following graph for the relationship between vehicle speed and 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 brake (s) not applied.

3. FRAME/BODY PANELS/EXHAUST SYSTEM

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	3.2 N·m (0.33 kgf·m, 2.4 lbf·ft)
Muffler heat protector screw	5.4 N·m (0.55 kgf·m, 4.0 lbf·ft)
Muffler cover screw	3.2 N·m (0.33 kgf·m, 2.4 lbf·ft)
Footpeg bracket nut	32 N·m (3.3 kgf·m, 24 lbf·ft)

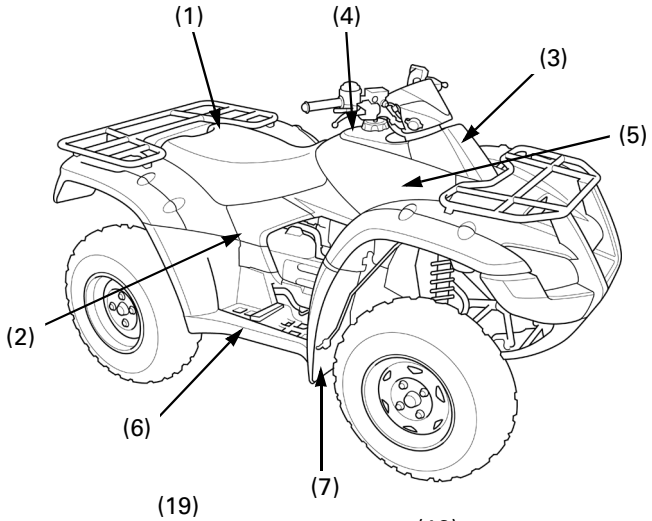
TROUBLESHOOTING

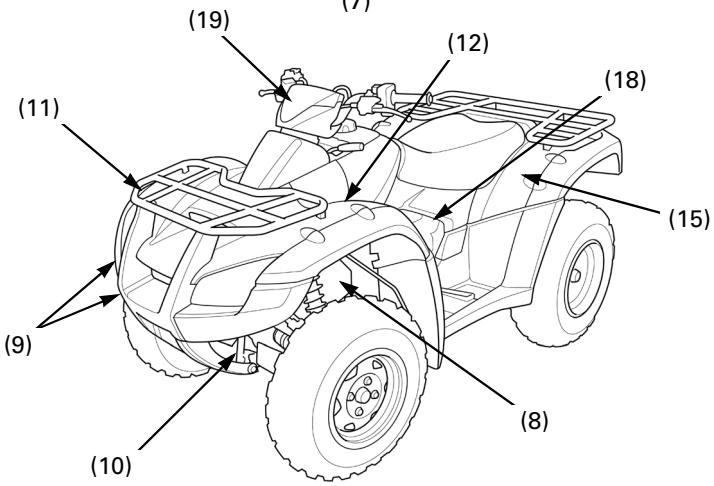
Excessive exhaust noise
- Broken exhaust system
- Exhaust gas leak

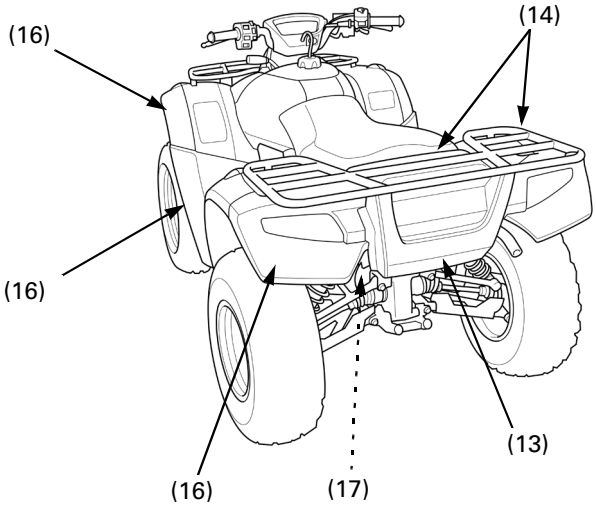
Poor performance
- Deformed exhaust system
- Exhaust gas leak
- Clogged muffler

BODY PANEL LOCATIONS

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







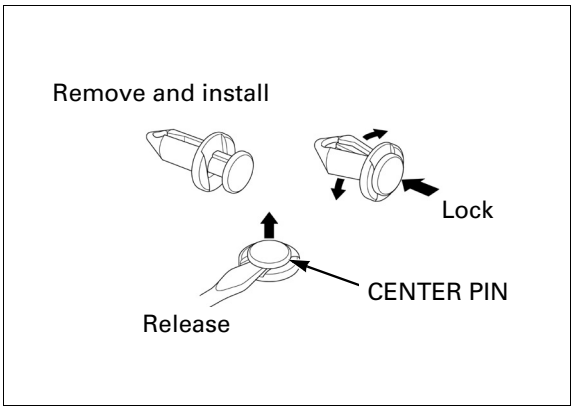
TRIM CLIP

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.



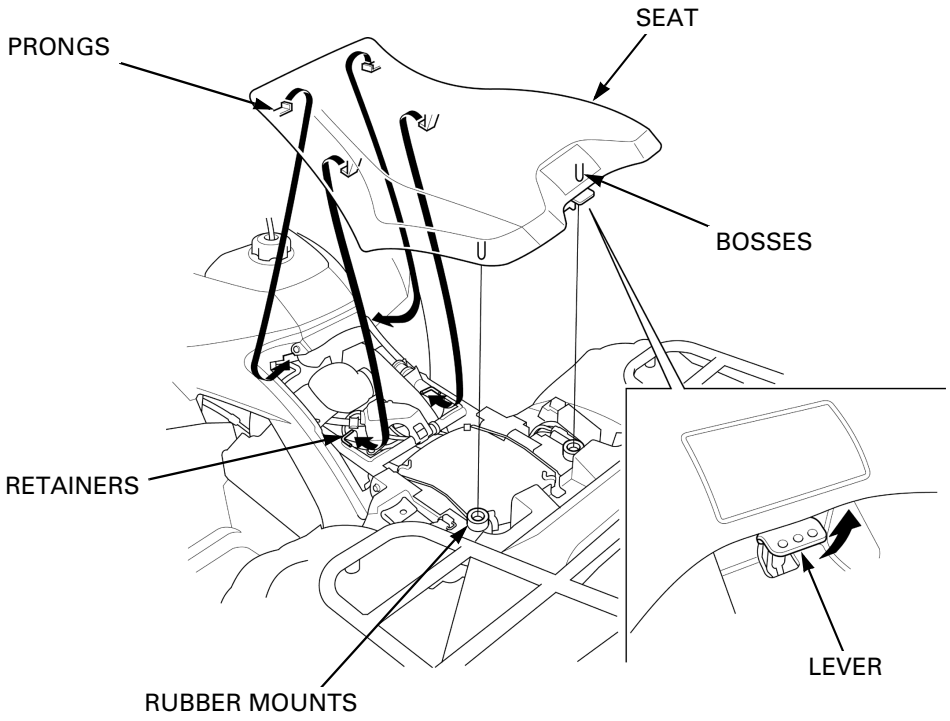
SEAT

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.

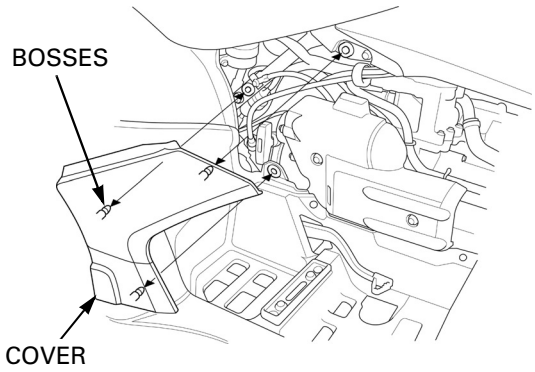


RIGHT SIDE COVER

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

Be careful not to dislodge the grommets.

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

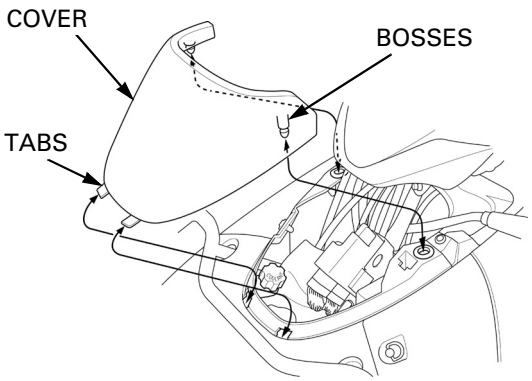


STEERING COVER

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

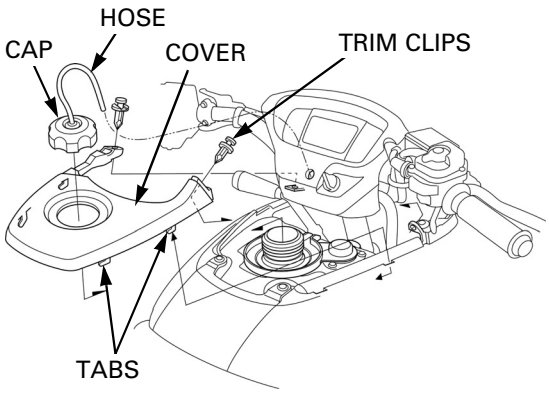
Top Cover

Remove the following:

- steering cover (page 3-5)
- two trim clips
- breather hose and fuel fill cap

Release the four tabs, remove the fuel tank top cover by sliding the cover forward.

Installation is in the reverse order of removal.

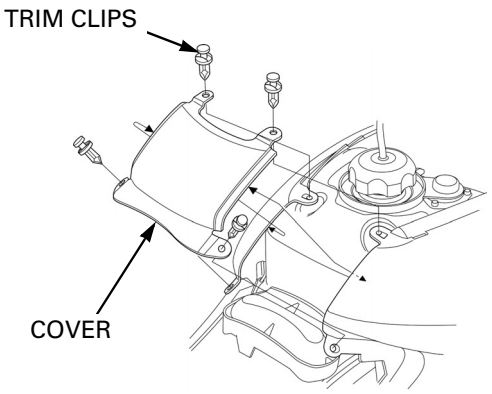


Center Cover

Remove the seat (page 3-4).

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

Installation is in the reverse order of removal.



FUEL TANK SIDE COVER

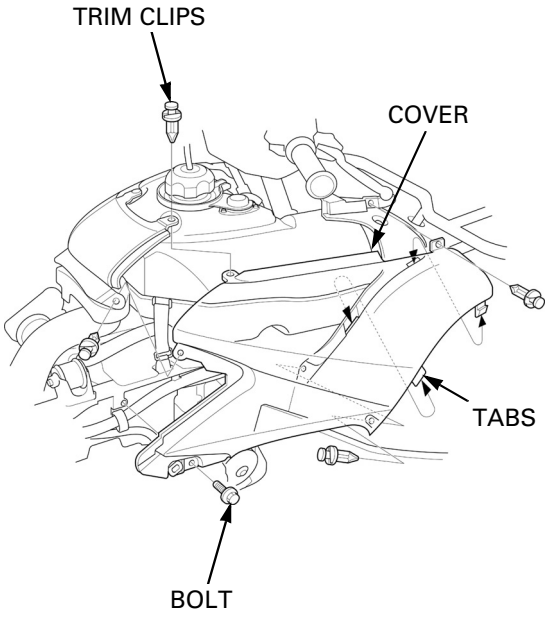
Right side:

Remove the following:

- seat (page 3-4)
- right side cover (page 3-5)
- fuel tank top cover (page 3-5)
- setting bolt
- four trim clips

Release the two tabs of the fuel tank side cover, then remove the cover.

Installation is in the reverse order of removal.



Left side:

Remove the following:

– seat (page 3-4)
– fuel tank top cover (page 3-5)

Turning the compartment lid quick screw counterclockwise
Release the two tabs, then remove the compartment lid.

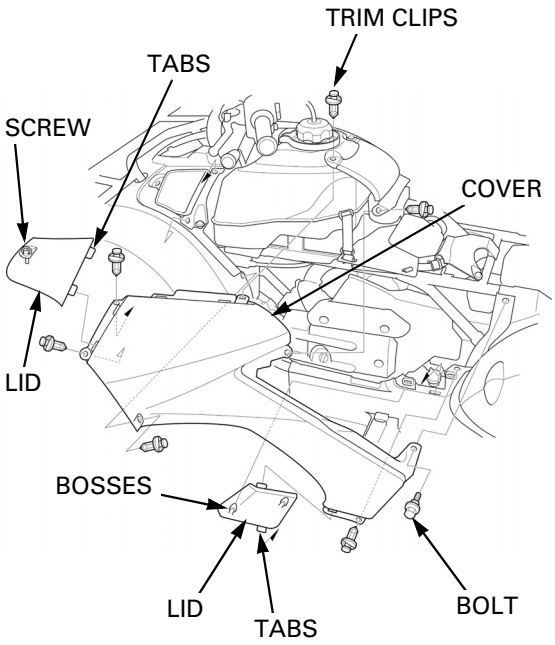
Release the two bosses and tabs, then remove the oil filler lid.

Remove the following:

– 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:

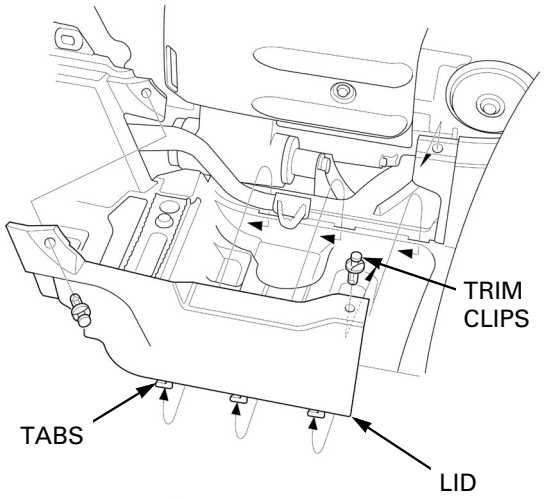
Remove the right side cover (page 3-5).

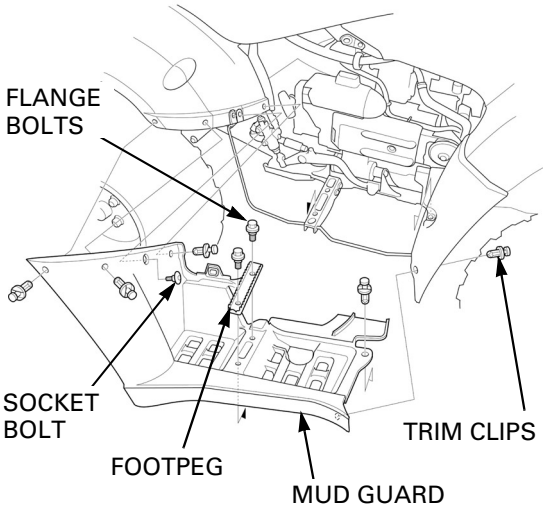
Remove the two trim clips and then remove the mud guard lid by releasing the three tabs.

Remove the following:

– two flange bolts and footpeg
– five trim clips
– socket bolt
– right center mud guard

Installation is in the reverse order of removal.





Left side:

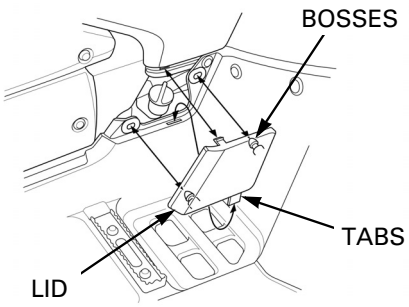
Release the two bosses and tabs, then remove the oil filler lid.

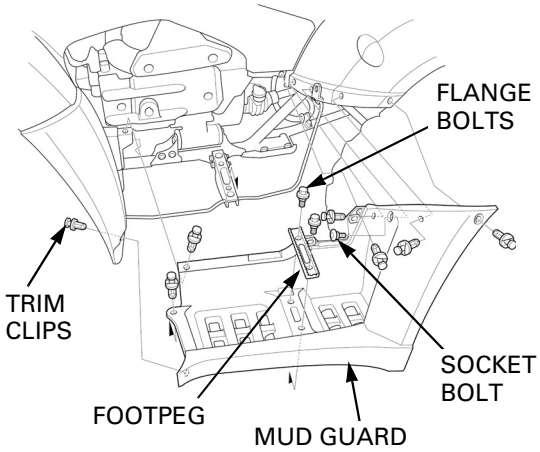
Remove the following:

– two flange bolts and footpeg
– seven trim clips
– socket bolt
– left center mud guard

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

Installation is in the reverse order of removal.



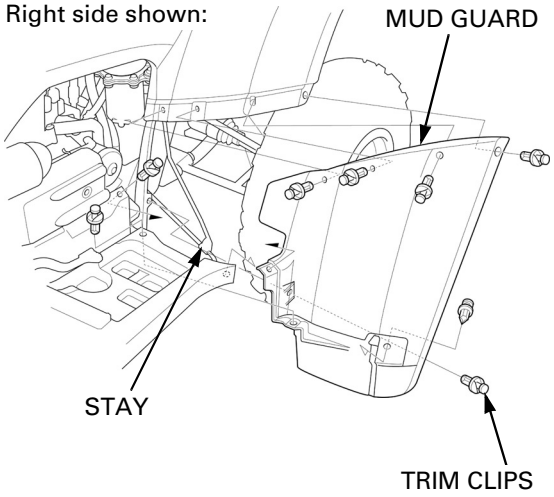


FRONT MUD GUARD

Remove the eight trim clips, then remove the front mud guard from the mud guard stay.

Installation is in the reverse order of removal.

Right side shown:



INNER FENDER

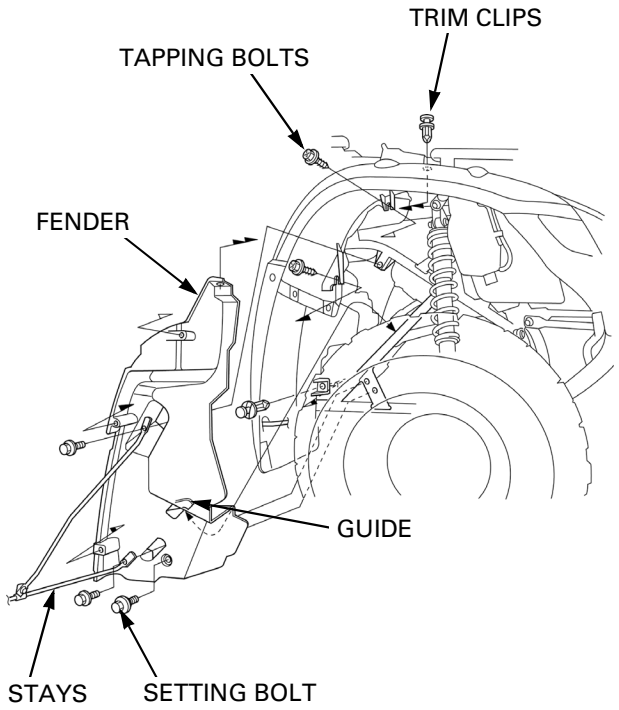
Right side:

Remove the following:

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

Hook the guide over the frame pipe.

Installation is in the reverse order of removal.



Left side:

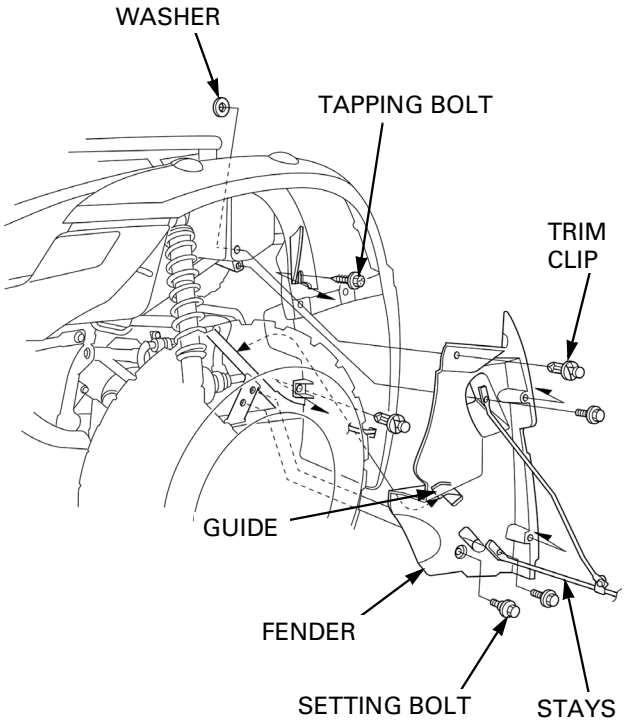
Remove the compartment lid (page 3-7).

Remove the following:

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

Hook the guide over the frame pipe.

Installation is in the reverse order of removal.

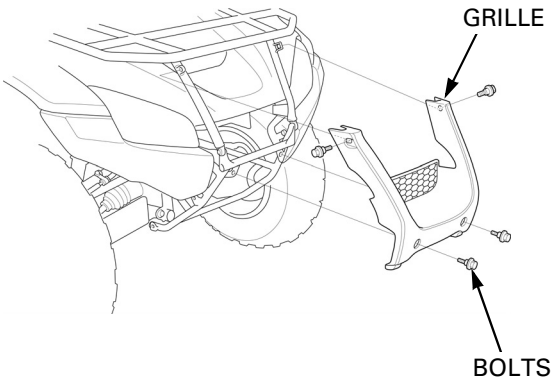


FRONT GRILLE

Center Grille

Remove the stone guard (page 3-10).

Remove the four setting bolts and the center front grille.

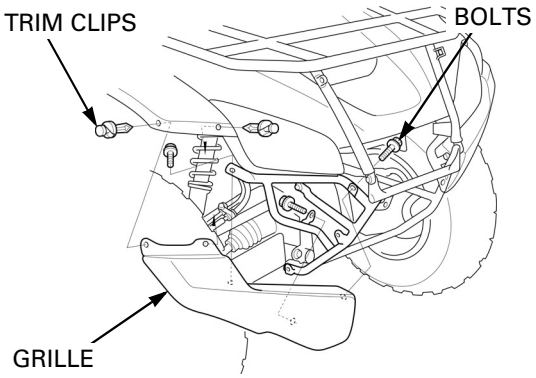


Side Grille

Remove the following:

– two trim clips
– three bolts
– side front grille

Installation is in the reverse order of removal.



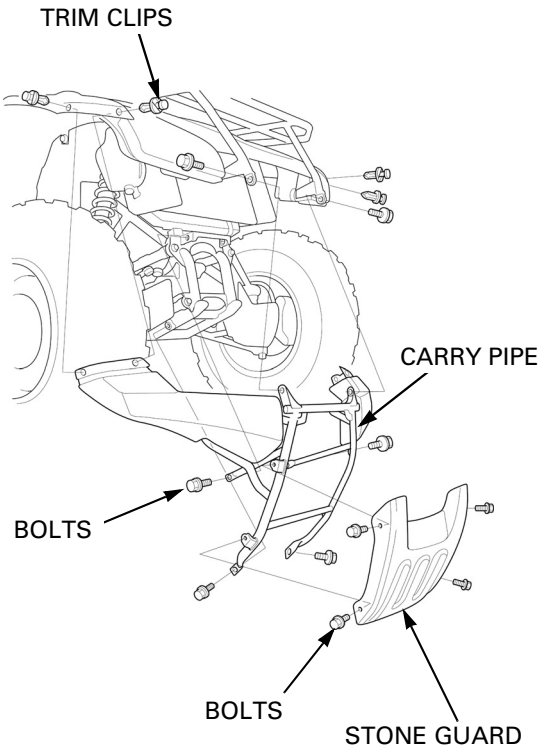
FRONT CARRY PIPE

Remove the following:

– four bolts
– stone guard
– center front grill (page 3-10)
– 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

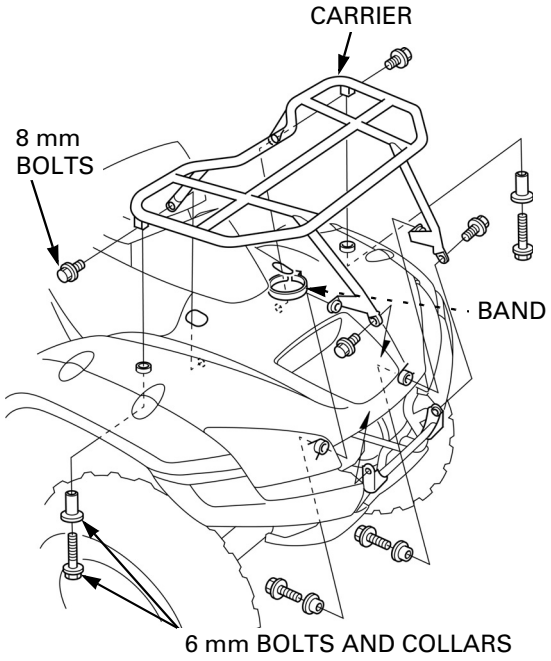
The front carrier and fender can be removed as an assembly for service. If removed, use the procedure described on page 3-12.

Remove the following:

– center front grille (page 3-10)
– 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 3-12.

Remove the following:

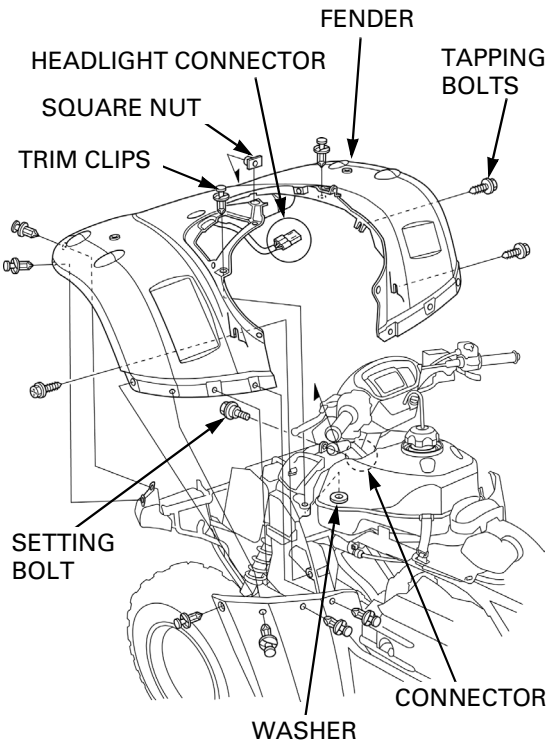
– fuel tank side covers (page 3-6).
– front carrier (page 3-11).

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

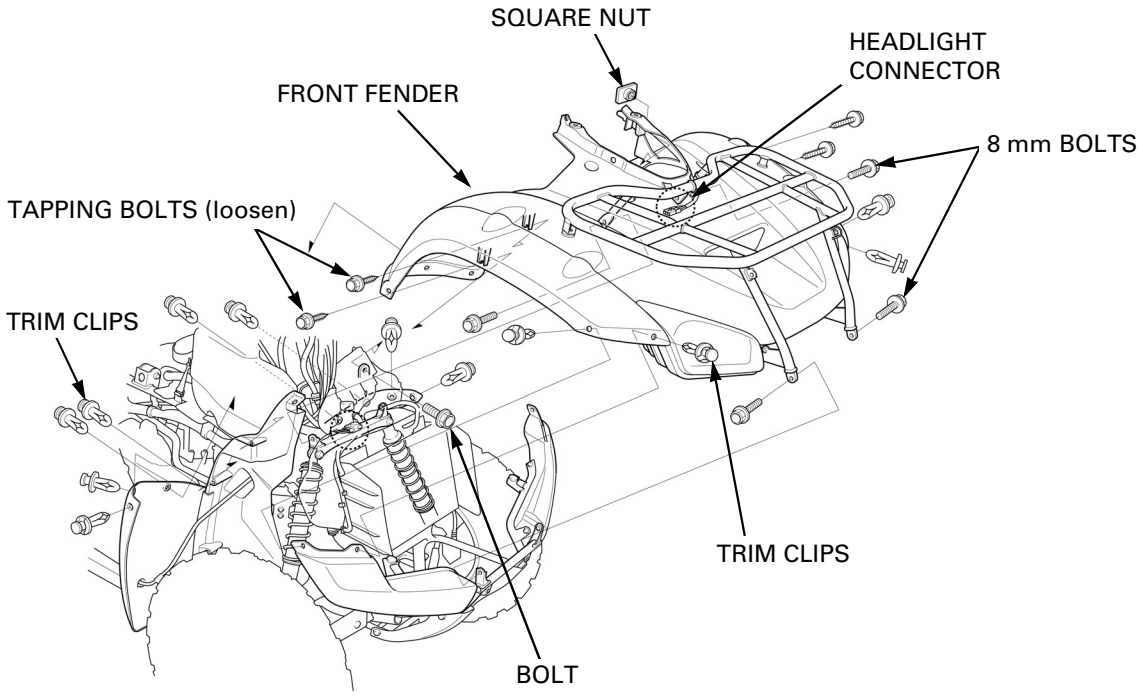
Remove the following:

- fuel tank side covers (page 3-6)
- center front grille (page 3-10)
- headlight connector and fender fasteners (page 3-11)
- four 8-mm bolt (carrier mounting fasteners).

Loosen the three tapping bolts.
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)

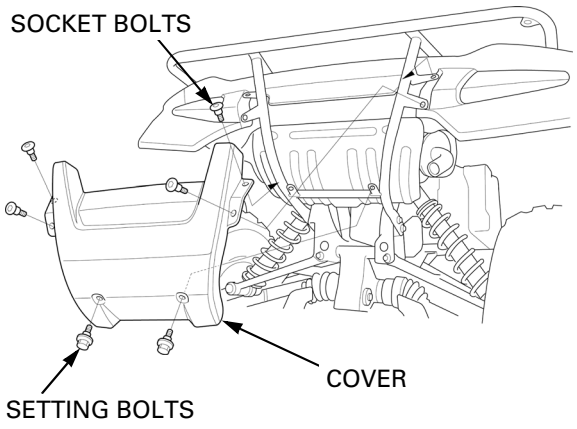


MUFFLER PROTECTOR

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 3-15.

Remove the following:

– seat (page 3-4)
– rear corner outer fenders (page 3-16)

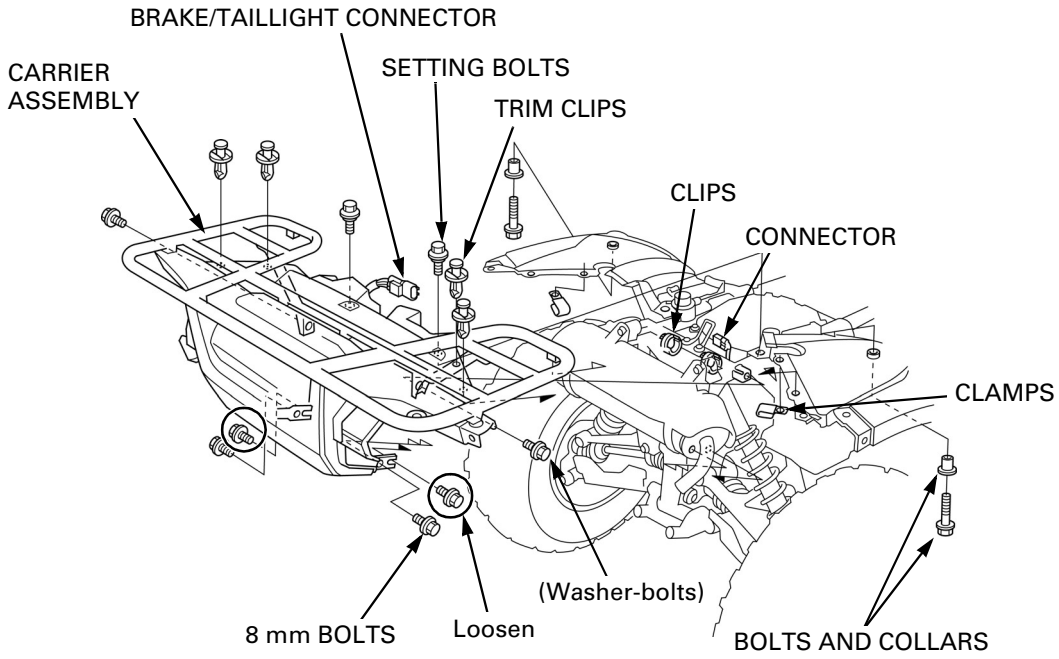
Disconnect the brake/taillight 3P (Black) connector. Release the wires from the clips and remove the 3P connector from the frame.

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

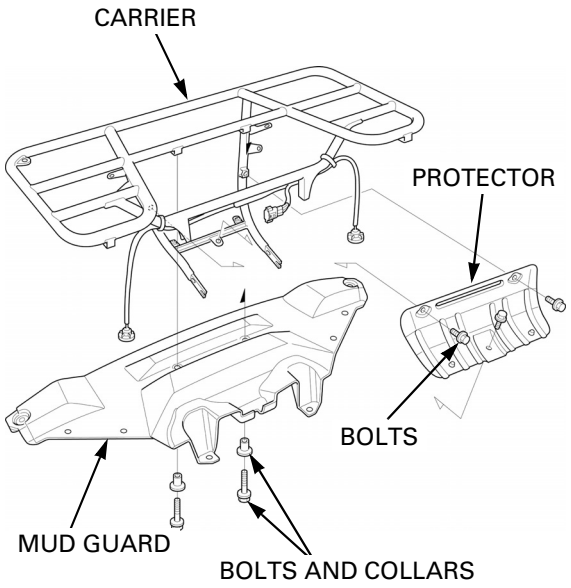


– muffler protector (page 3-12)
– two bolts, collars and rear mud guard
– three bolts and muffler protector
– wire bands and wire harness

Secure the wires with the bands properly (page 1-20).

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 3-15.

Remove the seat (page 3-4).

Right side:

Remove the following:

- right side cover (page 3-5)
- 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

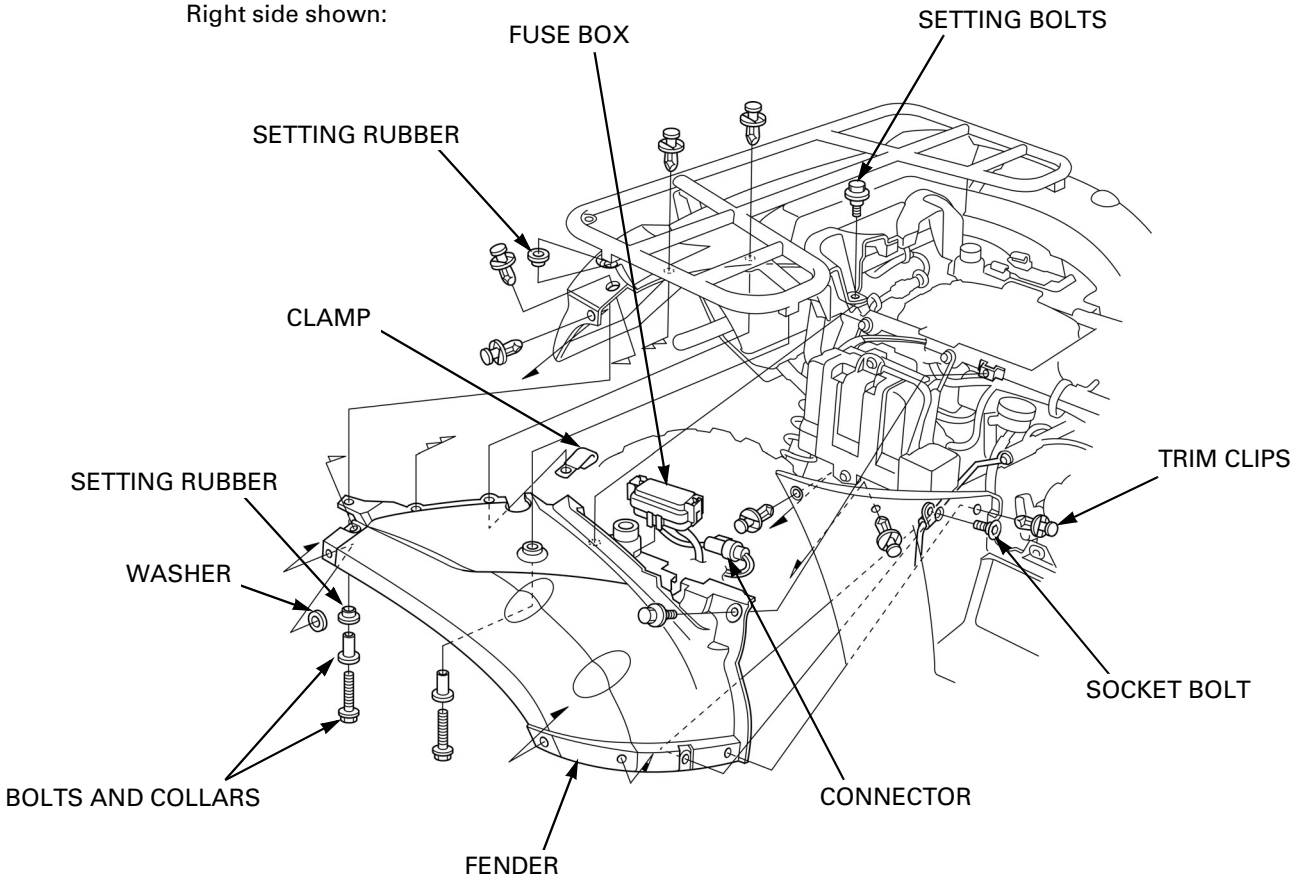
Left side:

Remove the following:

- oil filler lid (page 3-8)
- 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 3-4)
– right side cover (page 3-5)
– oil filler lid (page 3-8)

Disconnect the brake/taillight 3P (Black) connector. Release the wires from the bands 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
– six trim clips

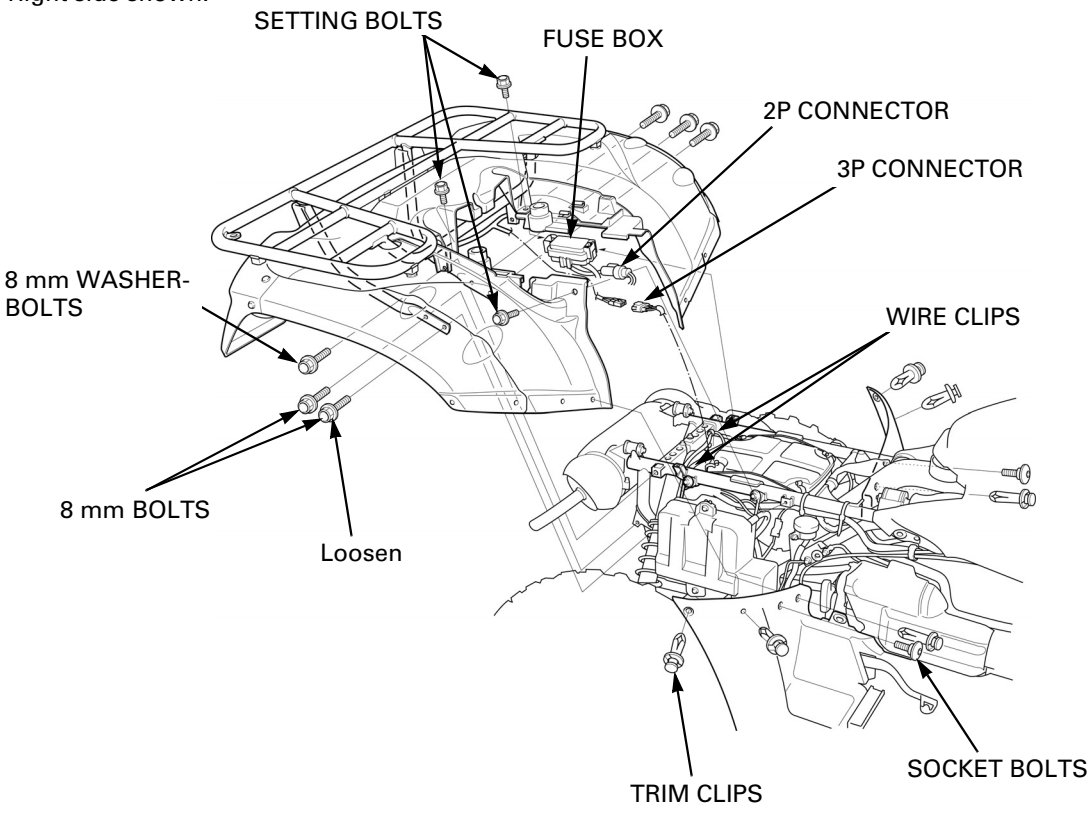
Only loosen the two lower inner bolts.

– 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:



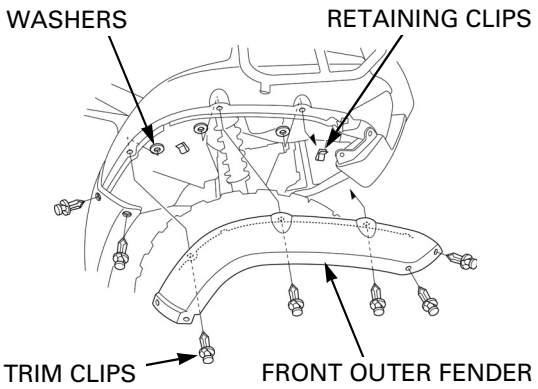
OUTER FENDER

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.

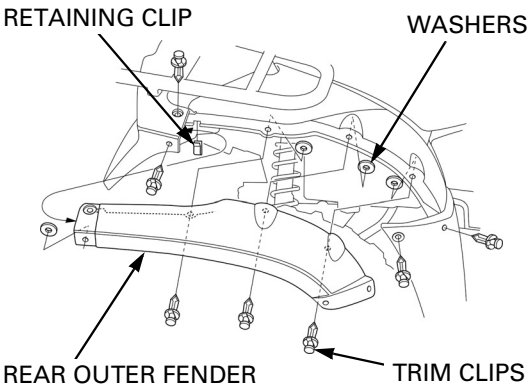


Rear Outer Fender

Remove the following:

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

Installation is in the reverse order of removal.

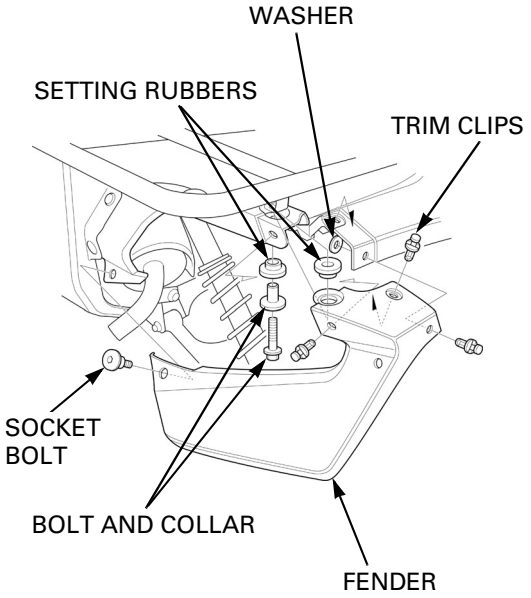


Rear Corner Outer Fender

Remove the following:

– taillight assembly (page 23-5)
– three trim clips and setting washer
– socket bolt
– bolt, collar and setting rubbers
– corner outer fender

Installation is in the reverse order of removal.



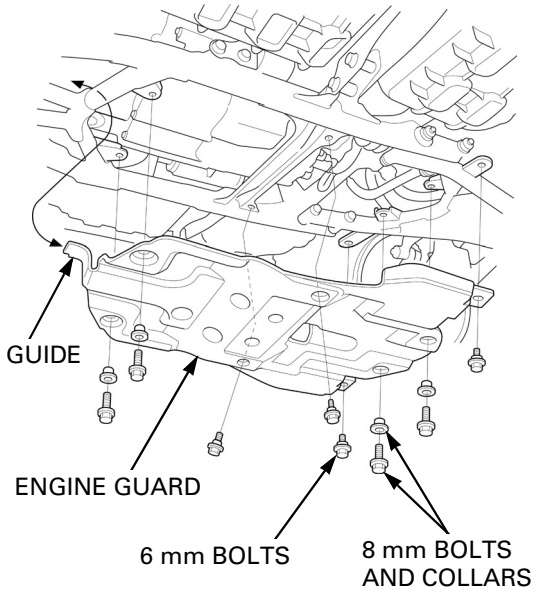
ENGINE GUARD

Remove the following:

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

Hook the guide over the frame pipe.

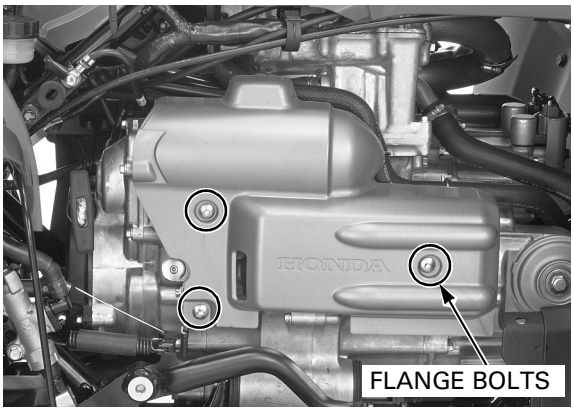
Installation is in the reverse order of removal.



ENGINE SIDE COVER

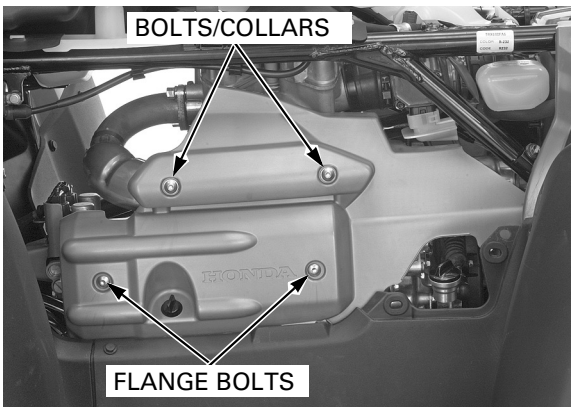
Right side only: Remove the right mudguard (page 3-7).

Remove the flange bolts and the right engine side cover.



Remove the two bolts, two flange bolts, two flange collars and left engine cover.

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

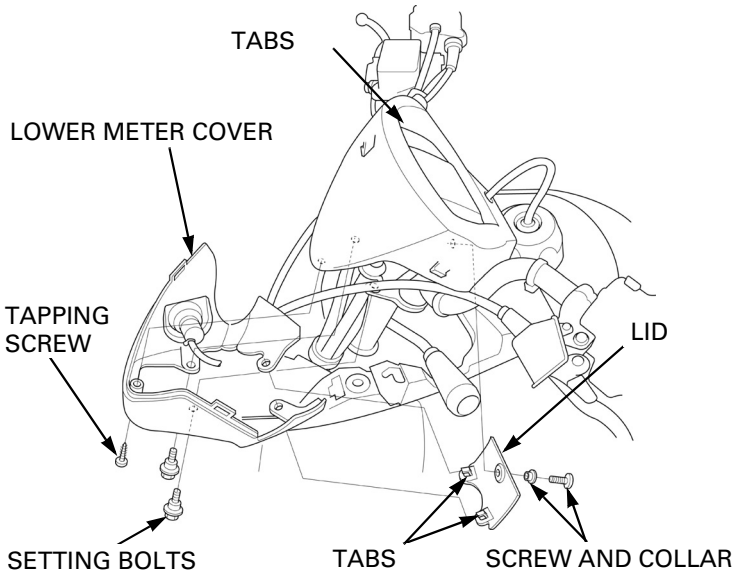


METER COVER

If the lower meter cover will be replaced, remove the accessory socket (page 23-6).

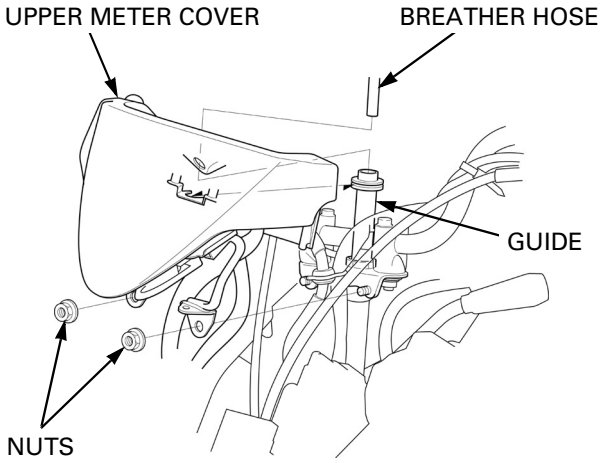
Remove the following:

- 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 23-6).

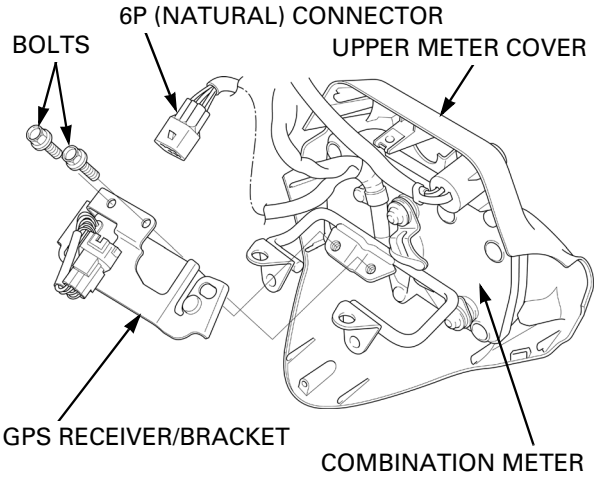
- breather hose
- two bracket nuts
- upper meter cover



GPS type only:

Disconnect the GPS receiver 6P (Natural) connector.

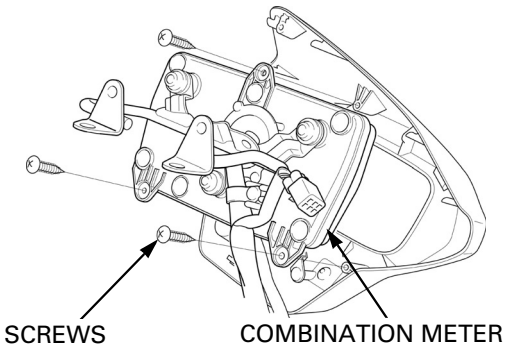
Remove the bolts and GPS receiver/bracket assembly.



Remove the screws and then remove the combination meter from the upper meter cover.

Installation is in the reverse order of removal.

Insert the hose guide into the steering shaft hole (page 3-18).



EXHAUST SYSTEM

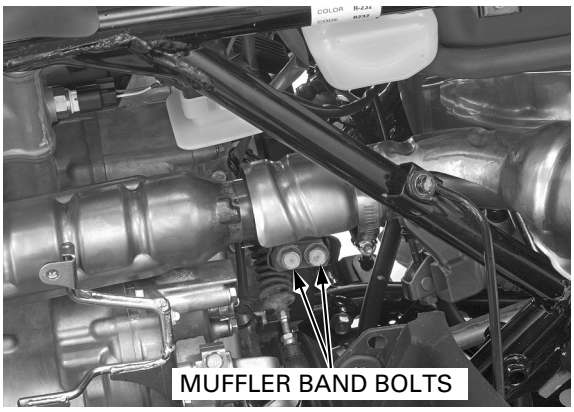
REMOVAL

Remove the left engine side cover (page 3-17).

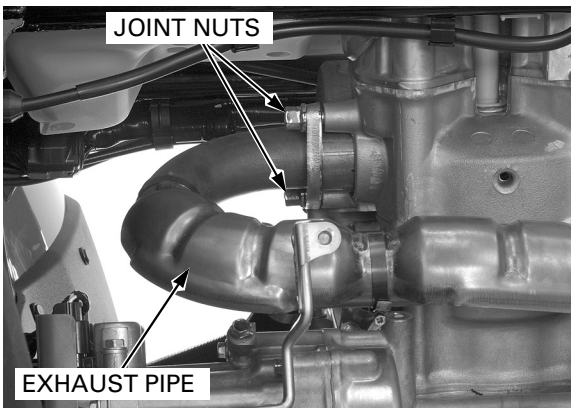
EXHAUST PIPE

Remove the left side cover (page 3-7).

Loosen the muffler band bolts.



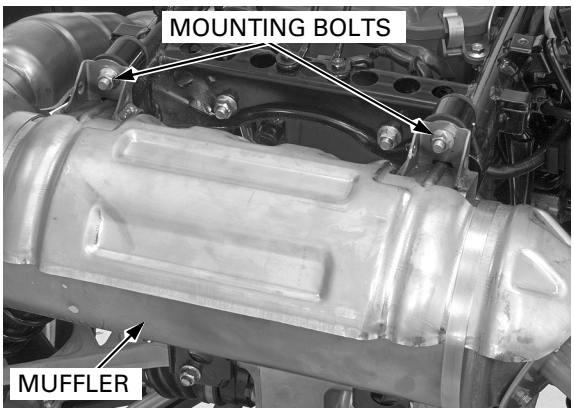
Remove the joint nuts and pull the exhaust pipe forward gradually to disconnect it from the muffler. Remove the joint gasket and muffler gasket.



MUFFLER

Remove the rear carrier assembly (page 3-13).

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.

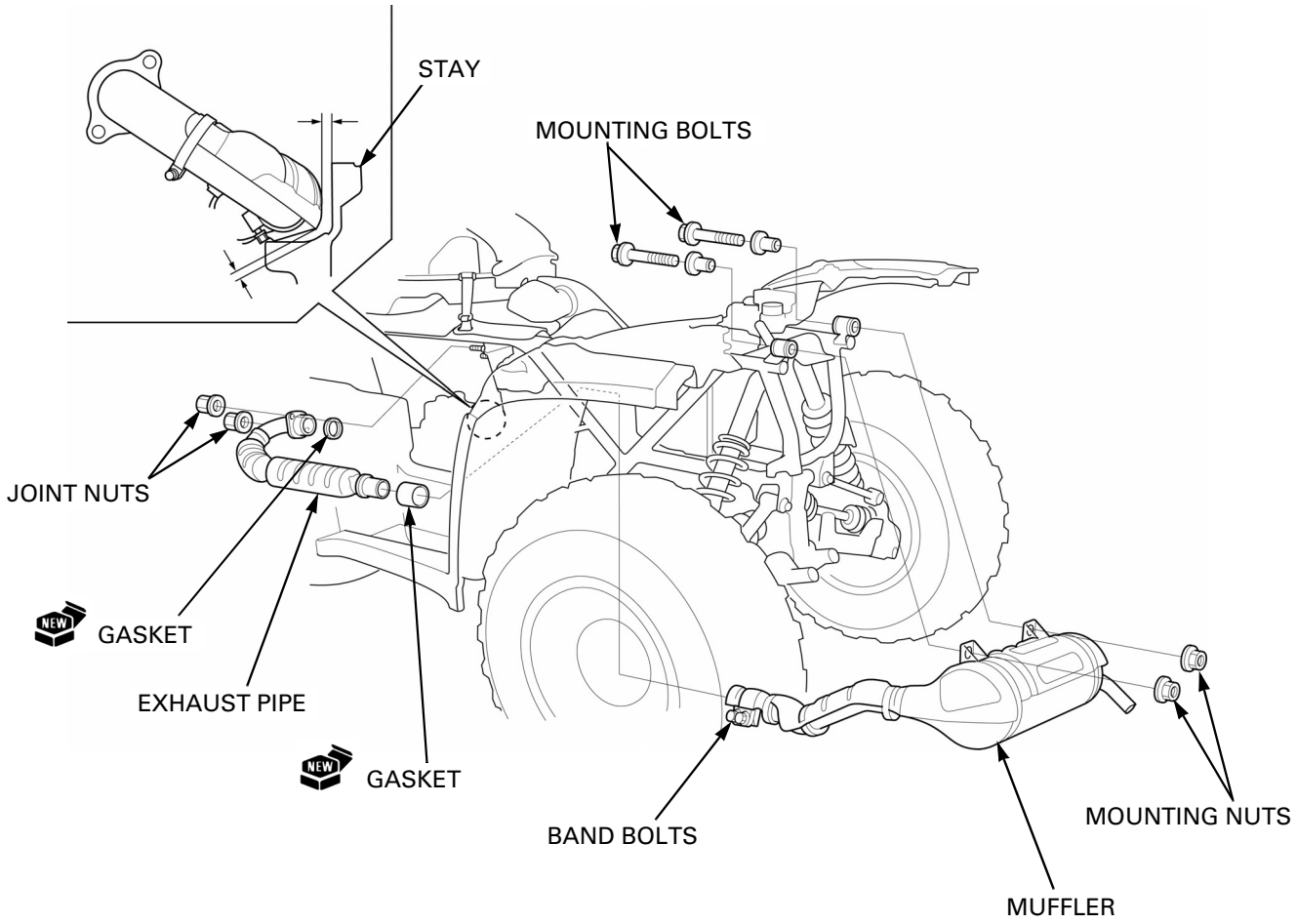
When tightening, adjust the clearance between the exhaust pipe and cover stay as shown so they do not interfere.

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

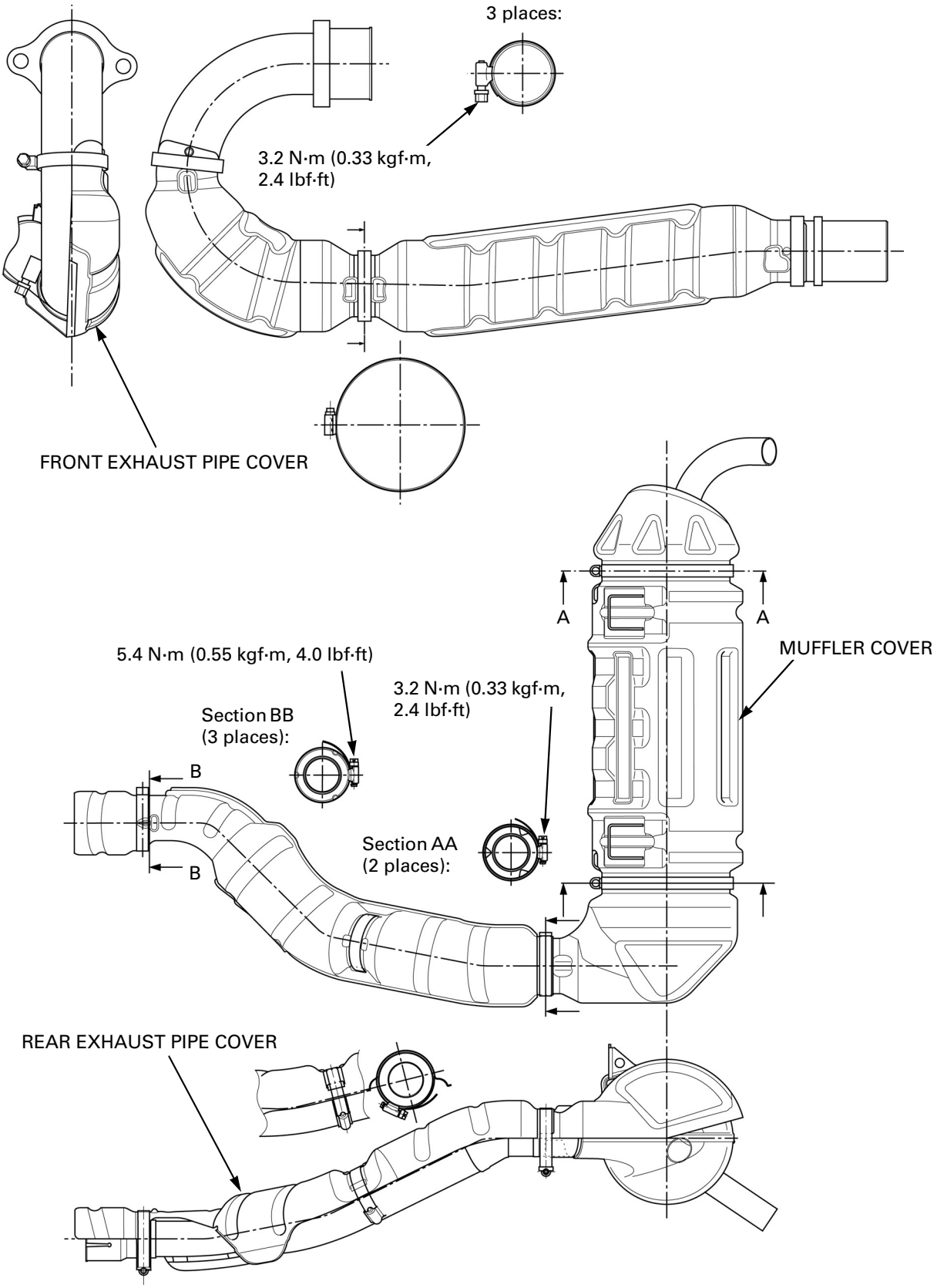
TORQUE:
Muffler band bolt: 23 N·m (2.3 kgf·m, 17 lbf·ft)

After installation, inspect the exhaust system for leaks.

Install the removed covers in the reverse order of removal.



DISASSEMBLY/ASSEMBLY



MEMO

4. 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 extended high speed riding		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 4-stroke oil (U.S.A. and Canada) or equivalent motor oil API service classification SG or higher JASO T 903 standard: MA Viscosity: SAE 10W–30
Engine oil capacity	After draining		2.7 liters (2.9 US qt, 2.4 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 ± 50 rpm (min^{-1})
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			Honda DOT 4 brake fluid
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 8R12★★
	Rear		AT25 x 10R12★★
Tire bland	Front		KT511 (DUNLOP)
	Rear		KT515 (DUNLOP)
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	22 N·m (2.2 kgf·m, 16 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)
Rear Final gear case oil filler cap	12 N·m (1.2 kgf·m, 9 lbf·ft)
Rear Final gear case oil drain-bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)
Front Differential oil filler cap	12 N·m (1.2 kgf·m, 9 lbf·ft)
Front Differential oil drain-bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)
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 / ITEMS	WHICHEVER COMES FIRST ⇩		INITIAL MAINTE-NANCE	REGULAR MAINTENANCE INTERVAL		REFER TO PAGE
			mi	100	600	1,200	
			km	150	1,000	2,000	
			HOURS	20	100	200	
*	FUEL LINE					I	4-4
*	THROTTLE OPERATION					I	4-4
	AIR CLEANER	NOTE 1			C	C	4-5
	AIR CLEANER HOUSING DRAIN HOSE	NOTE 2			I	I	4-7
	SPARK PLUG					I	4-7
*	VALVE CLEARANCE			I	I	I	4-8
	ENGINE OIL			INITIAL = 100 mi (150 km), 20 operating hours or 1 month: R REGULAR = EVERY 600 mi (1000 km), 100 operating hours or 12 month: R			4-10
	ENGINE OIL FILTER			R	R	R	4-12
	RADIATOR COOLANT	NOTE 3			I	I	4-12
*	COOLING SYSTEM	NOTE 2			I	I	4-13
	DRIVE SHAFT BOOTS				I	I	4-14
	REAR FINAL GEAR CASE OIL AND DIFFERENTIAL OIL				(R: Every 2 years)	I	4-15
*	BRAKE FLUID	NOTE 3			I	I	4-17
*	BRAKE PADS WEAR	NOTE 1, 2				I	4-18
*	BRAKE LIGHT SWITCH			I	I	I	4-19
	BRAKE SYSTEM			I	I	I	4-19
	SKID PLATE, ENGINE GUARD				I	I	4-20
*	SUSPENSION				I	I	4-21
*	SPARK ARRESTER				C	C	4-21
*	NUTS, BOLTS, FASTENERS			I		I	4-22
**	WHEELS/TIRES			I	I	I	4-22
**	STEERING SHAFT HOLDER BEARING					I	4-22
**	STEERING SYSTEM					I	4-23

* 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:

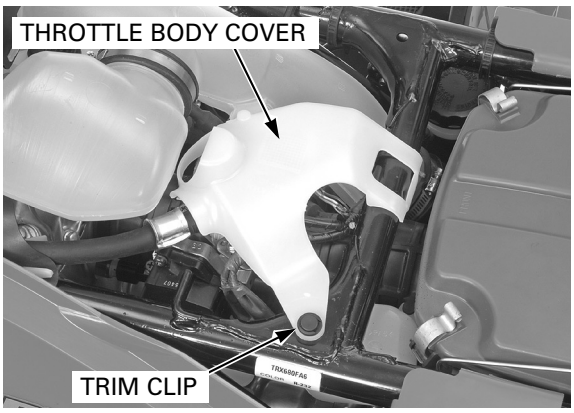
1. Service more frequently when riding in dusty areas, sand or snow.
2. Service more frequency after riding in very wet or muddy conditions.
3. Replace every 2 years. Replacement requires mechanical skill.

FUEL LINE

Remove the following:.

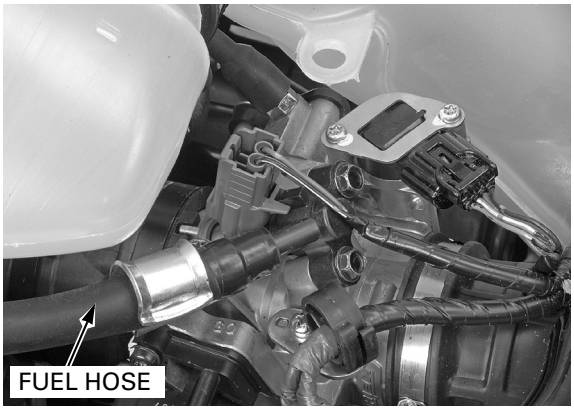
– seat (page 3-4)
– fuel tank side covers (page 3-6)

Remove the trim clip and throttle body cover.



Check the fuel lines for deterioration, damage or leakage.
And also check the fuel hose (fuel tank to fuel pump) and fuel vapor return hose.

Replace the fuel hoses 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 15-10).

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.

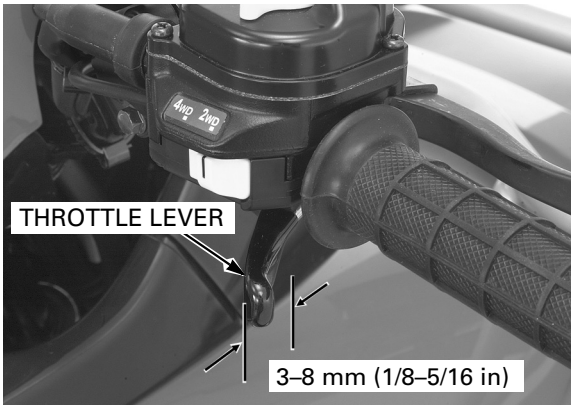
If the throttle lever still does not return properly, replace the throttle cable.

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.

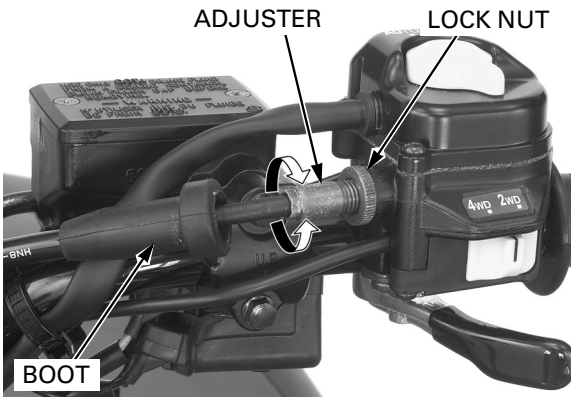
THROTTLE LEVER FREE PLAY:
3 – 8 mm (1/8 – 5/16 mm)

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.



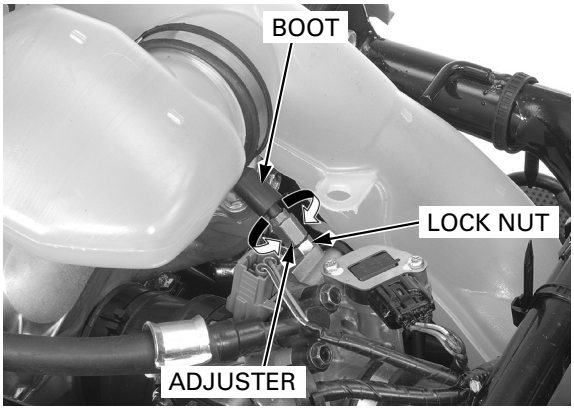
Major adjustments are made with the lower adjuster.

Remove the seat (page 3-4).
Remove the throttle body cover (page 4-4).

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

Install the throttle body cover (page 4-4).
Install the seat (page 3-4).



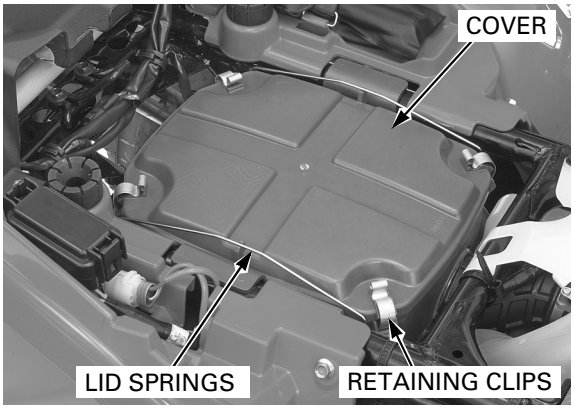
AIR CLEANER

Remove the seat (page 3-4).

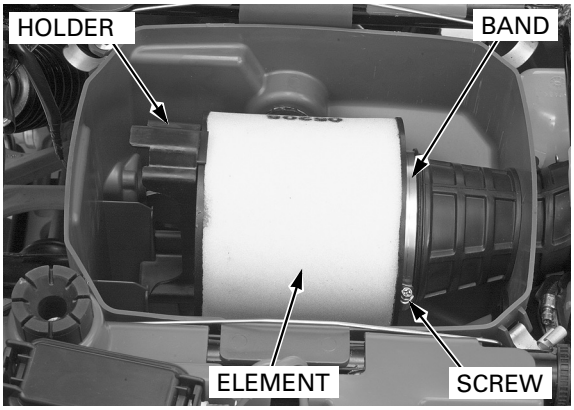
Release the retaining clips and lid springs from the air cleaner housing cover and remove the cover.

NOTE:

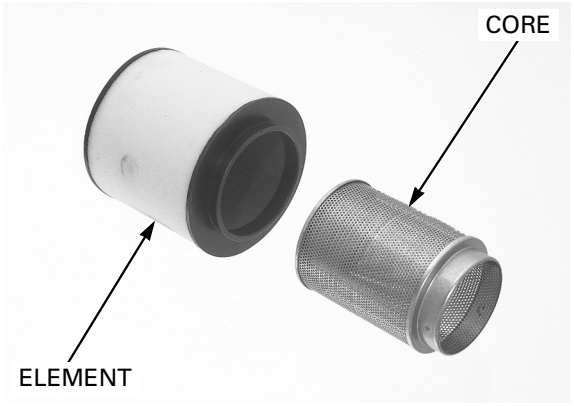
- If the vehicle is used in dusty areas, sand or snow, more frequent inspections are required.



Loosen the air cleaner element band screw.
Remove the air cleaner element holder and then remove the air cleaner element assembly from the housing.

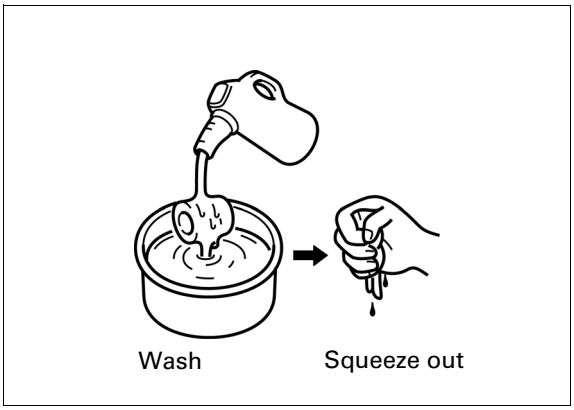


Remove the element band and the element core from the air cleaner element.

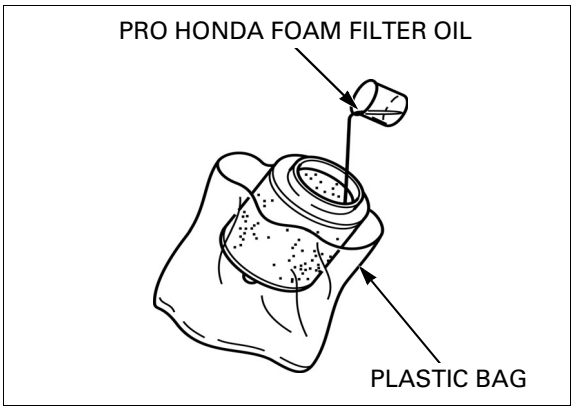


Wash the element and filter in non-flammable or high flash point solvent.
Squeeze out the solvent thoroughly, and allow the element and filter to dry.

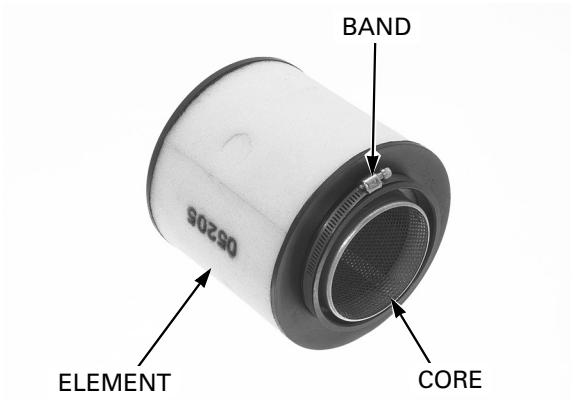
Install the sub-air cleaner filter onto the air cleaner hose joint and secure it with the clip.



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.

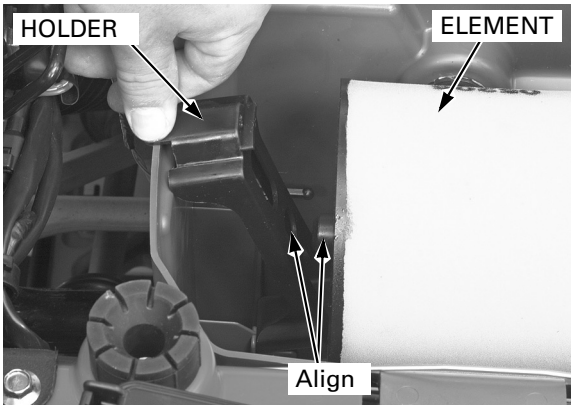


Install the element band onto the air cleaner element and the element assembly over the connecting tube flange of the housing securely.
Tighten the band screw.

NOTE:

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

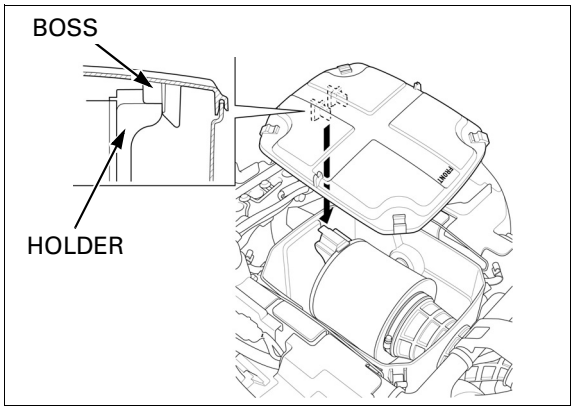
Install the air cleaner element holder while aligning the element core boss with the retainer hole.



Install the air cleaner element housing cover while aligning the cover boss with the element holder as shown.

Secure the air cleaner housing cover with the retaining clips and lid springs.

Install the seat (page 3-4).



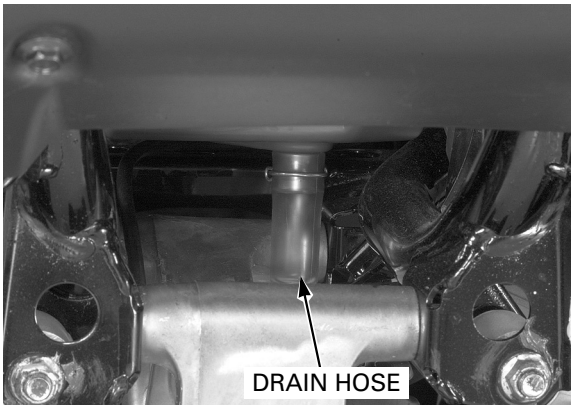
AIR CLEANER HOUSING DRAIN HOSE

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

Install the drain hose securely.

NOTE:

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

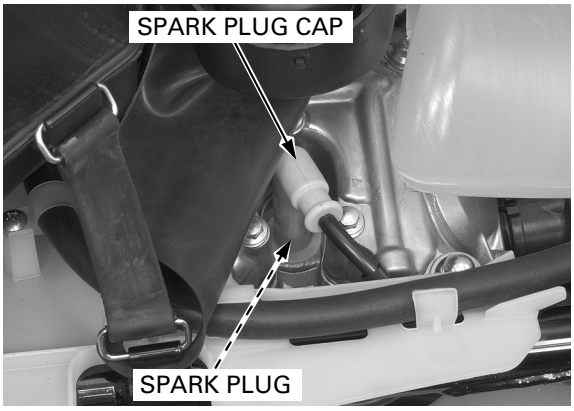


SPARK PLUG

Remove the seat (page 3-4).

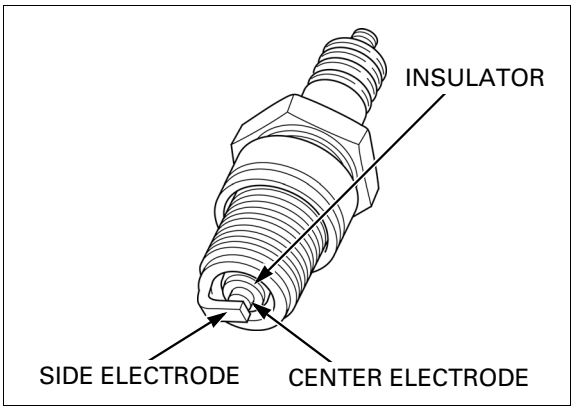
Disconnect the spark plug cap and clean around the spark plug base with compressed air.

Remove the spark plug.

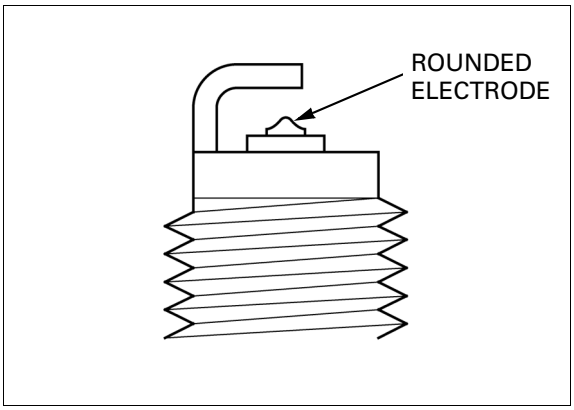


This vehicle's spark plug is equipped with an iridium type center electrode. Do not clean the electrodes.

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.



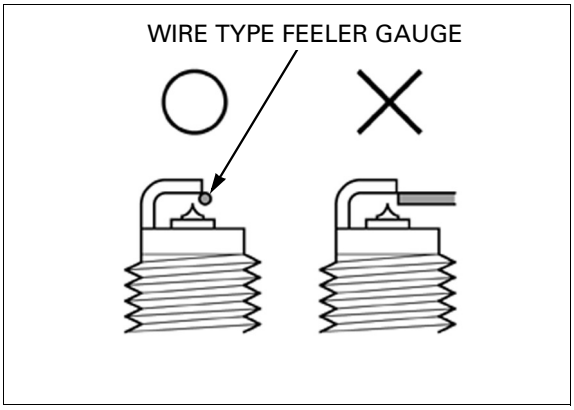
Always use the specified spark plug on this vehicle.

SPECIFIED SPARK PLUG:
Standard:
IFR5L11 (NGK), VK16PRZ11 (DENSO)
For extended high speed riding
IFR6L11 (NGK), VK20PRZ11 (DENSO)

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

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: 22 N·m (2.2 kgf·m, 16 lbf·ft)

Install the removed parts in the reverse order of removal.

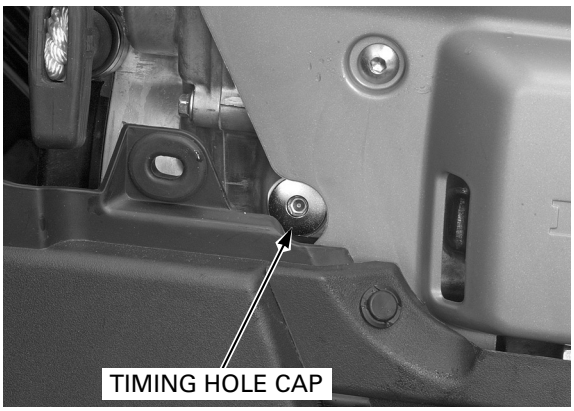
VALVE CLEARANCE

NOTE:
- Inspect and adjust the valve clearance while the engine is cold (below 35°/95°F).
- After the valve clearance inspection, check the engine idle speed (page 6-55).

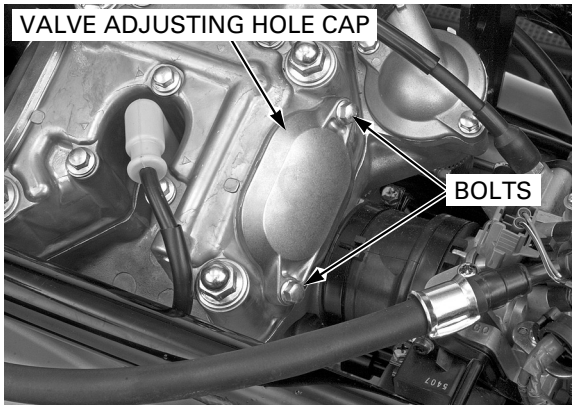
Remove the following:

– right side cover (page 3-5)
– steering cover (page 3-5)
– fuel tank cover (page 3-5)
– rear tank cover (page 3-6)
– right fuel tank side cover (page 3-6)
– left fuel tank side cover (page 3-7)
– fuel tank (page 6-39)
– intake duct (page 6-41)
– fuel tank heat guard plate (page 6-40)

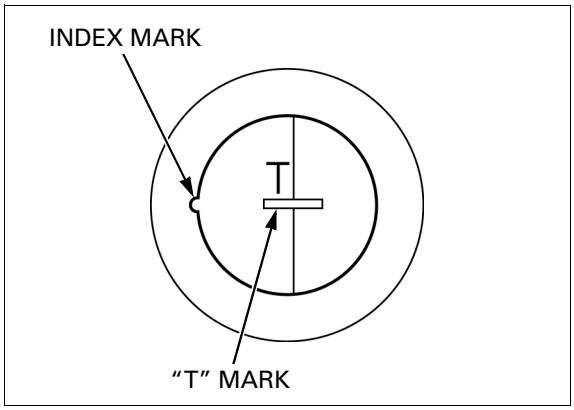
Remove the timing hole cap.



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



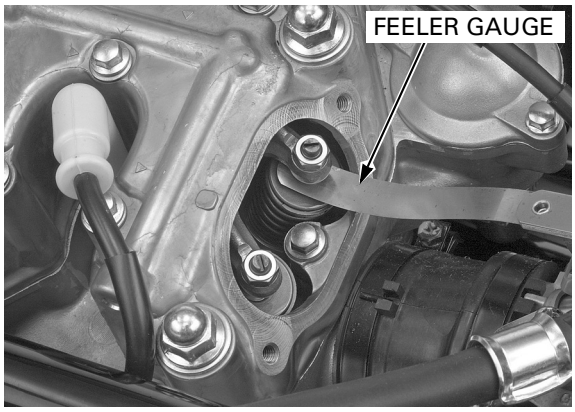
Rotate the crankshaft using the recoil starter knob and align the "T" mark on the flywheel with the index mark on the rear crankcase cover.
Make sure the piston is at TDC (Top Dead Center) on the compression stroke.
This position can be obtained by confirming that there is slack in the rocker arm. If 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)

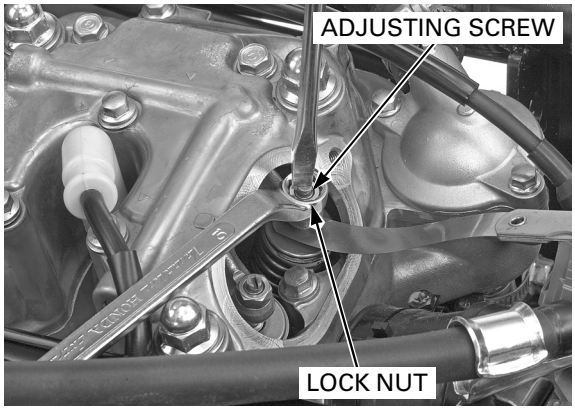


Adjust by loosening the lock nut and turning the adjusting screw until there is a slight drag on the feeler gauge.

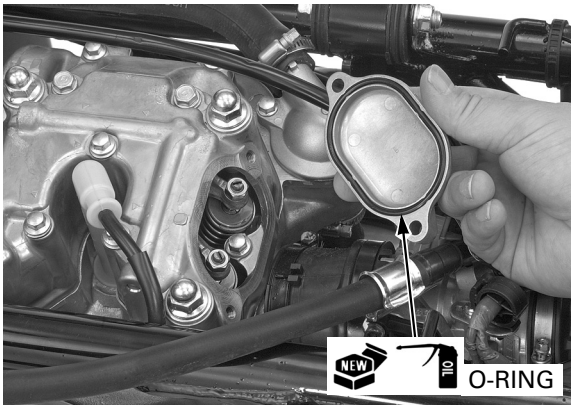
Hold the adjusting screw and tighten the lock nut.

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.

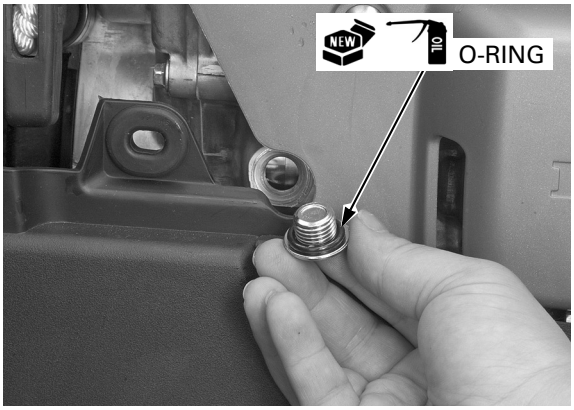


Coat a new O-ring with oil and install it onto the timing hole cap.

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.



ENGINE OIL

⚠CAUTION

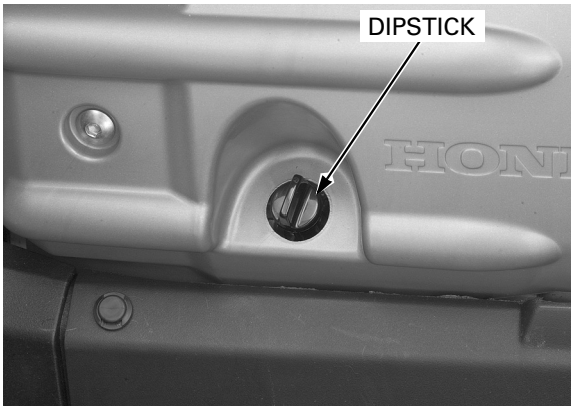
Used engine oil may cause skin cancer if repeatedly left in contact with the skin for prolonged periods. Although this is unlikely unless you handle used oil on a daily basis, it is still advisable to thoroughly wash your hands with soap and water as soon as possible after handling used oil.

LEVEL CHECK

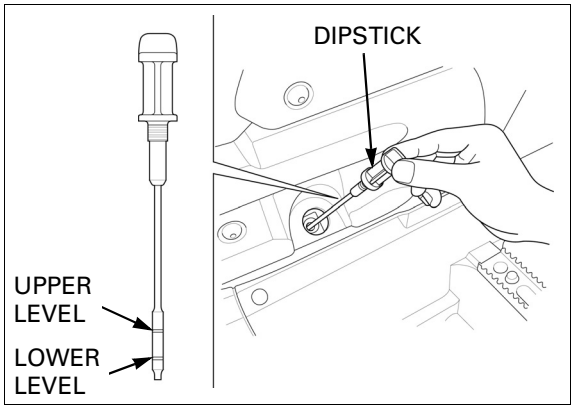
NOTE:

- 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.

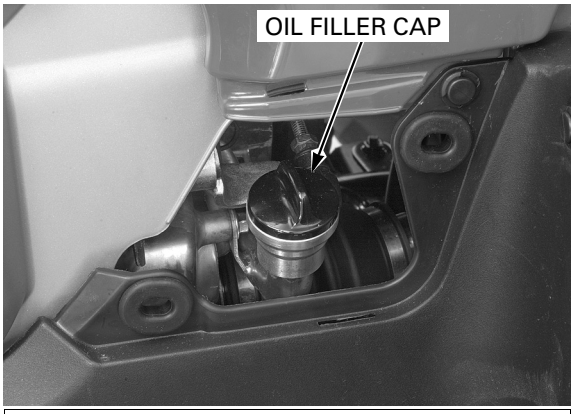
Place the vehicle on level ground.
Start the engine and let it idle for 3 – 5 minutes. If the air temperature is below 10°C (50°F), let the engine idle for an additional 5 minutes (a total of 10 minutes).
Stop the engine, wait for 2 – 3 minutes, and remove the dipstick and wipe it clean.
Check the oil 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.

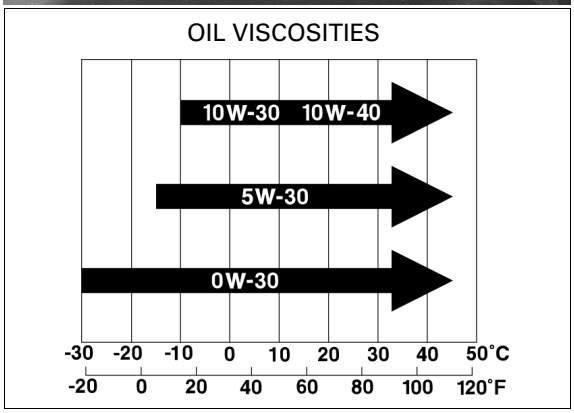


RECOMMENDED ENGINE OIL:

Pro Honda GN4 4-stroke oil (U.S.A. and Canada) or equivalent motor 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-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.

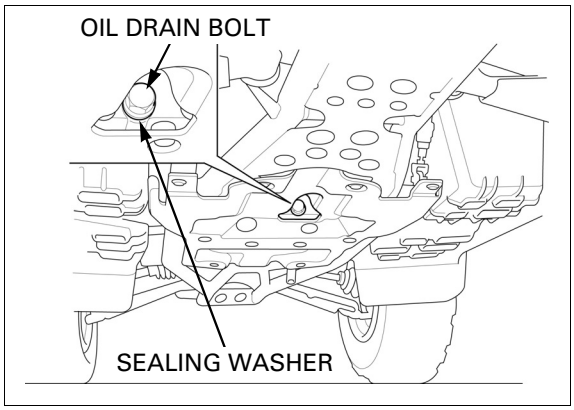
OIL CHANGE

NOTE:

- Pour the engine oil after replacing the oil filter (page 4-12).
- 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.

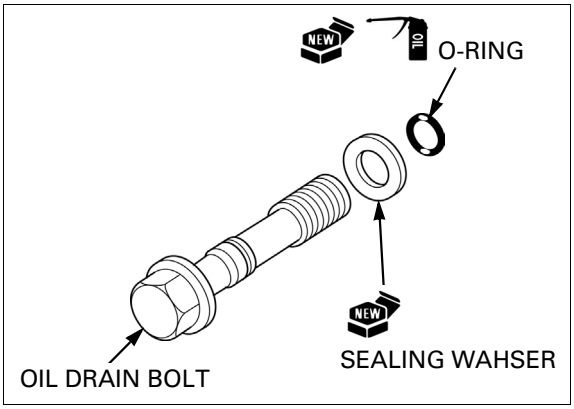
Remove the oil drain bolt and drain the engine oil.



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)



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

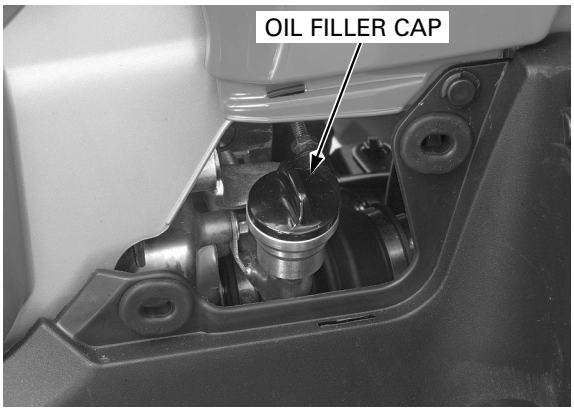
Pour the recommended oil into the engine to the upper level mark on the dipstick (page 4-11).

ENGINE OIL CAPACITY:
2.7 liters (2.9 US qt, 2.4 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 4-10).

Make sure there are no oil leaks.



ENGINE OIL FILTER

Drain the engine oil (page 4-11).

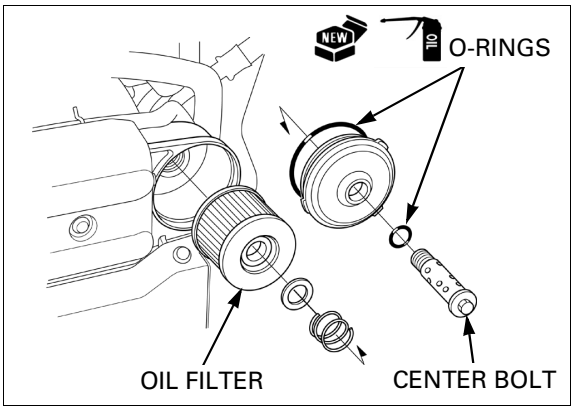
Remove the oil filter center bolt, cover, spring washer and oil filter.
Remove the O-rings from the oil filter cover and center bolt.

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.

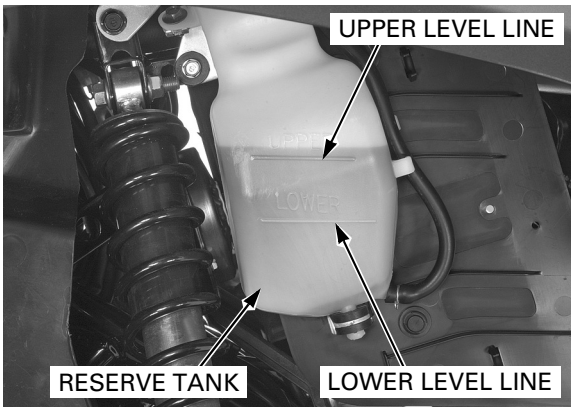
TORQUE: 18 N·m (1.8 kgf·m, 13 lbf·ft)

Fill the engine with the recommended oil (page 4-11).



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 3-5).
Remove the 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 7-6).

RECOMMENDED ANTIFREEZE:

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

NOTICE

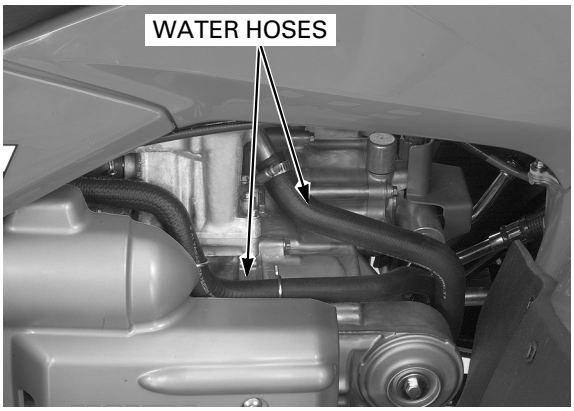
Using coolant with silicate corrosion inhibitors may cause premature wear of water pump seals or blockage of radiator passages. Using tap water may cause engine damage.

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

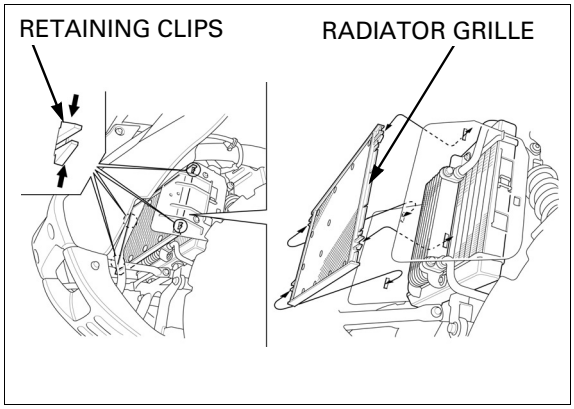
If the reserve tank becomes completely empty, there is a possibility of air getting into the cooling system. Be sure to remove any air from the cooling system (page 7-7).

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.

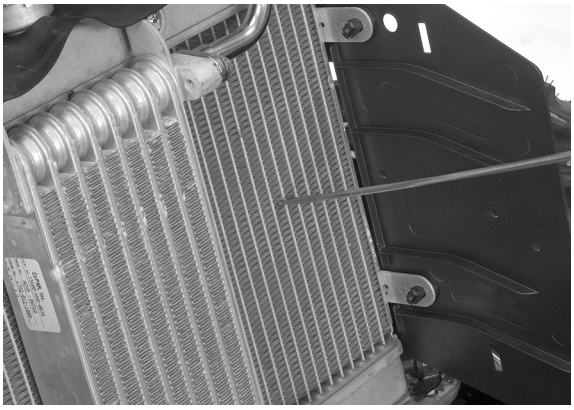


Remove the radiator grille by releasing the four retaining clips.



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.



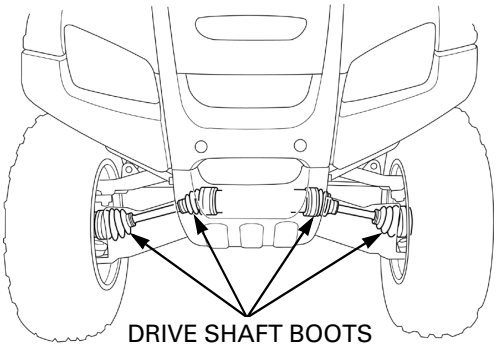
DRIVE SHAFT BOOTS

Check the drive shaft boots for cuts or other damage.

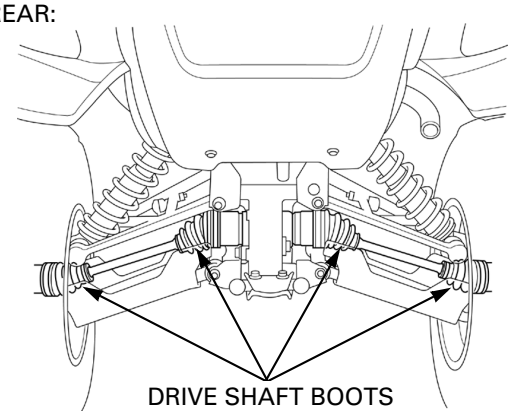
If a boot is damaged, replace it:

– Front drive shaft boot replacement (page 18-7)
– Rear drive shaft boot replacement (page 19-6)

FRONT:



REAR:



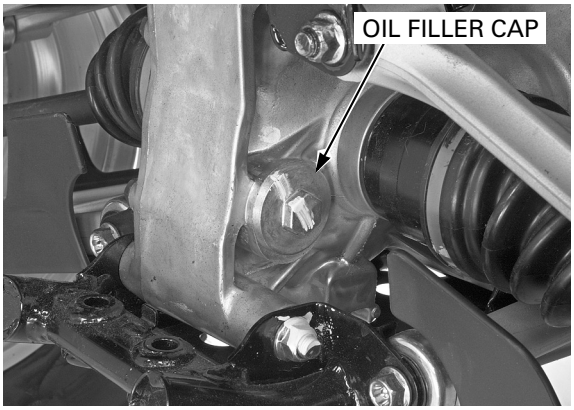
REAR FINAL GEAR CASE OIL AND DIFFERENTIAL OIL

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.

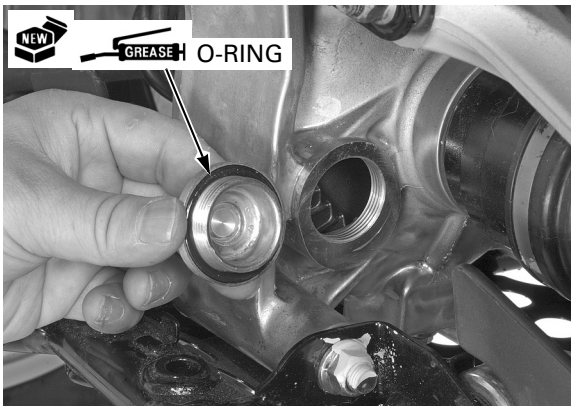
Pour the oil through the filler hole until it reaches the lower edge of the hole.

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

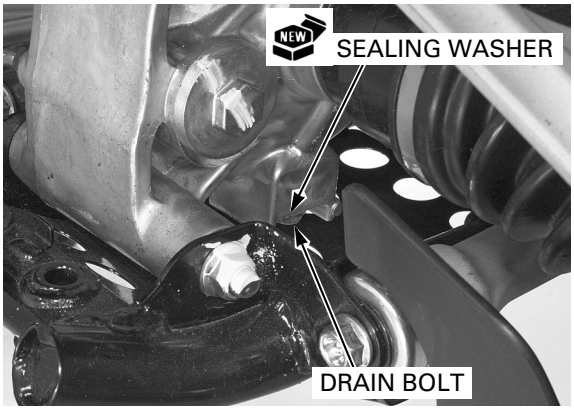
Place the vehicle on a level surface.

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 4-15).

OIL CAPACITY:
78 cm^3 (2.6 US oz, 2.7 Imp oz) at draining
90 cm^3 (3.0 US oz, 3.2 Imp oz) at disassembly



DIFFERENTIAL OIL

LEVEL CHECK

Place the vehicle on a level surface.

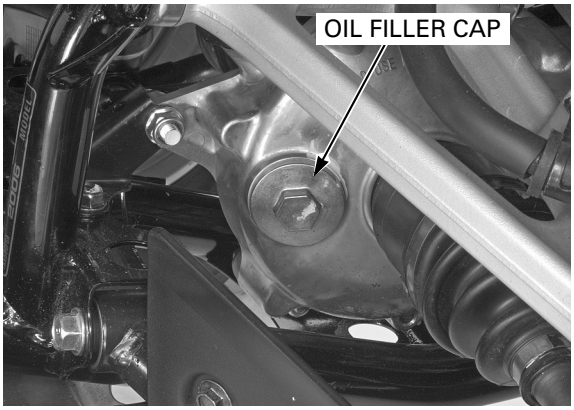
Remove the oil filler cap.

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.

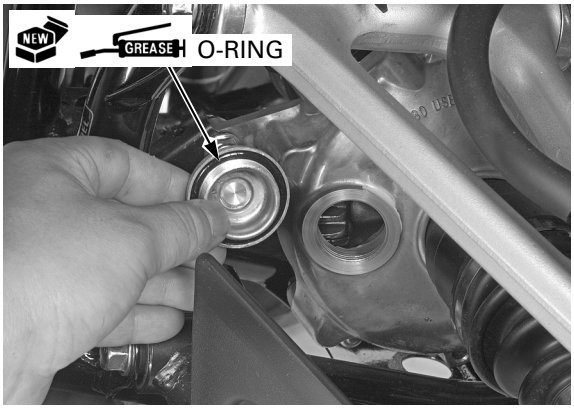
Pour the oil through the filler hole until it reaches the lower edge of the hole.

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

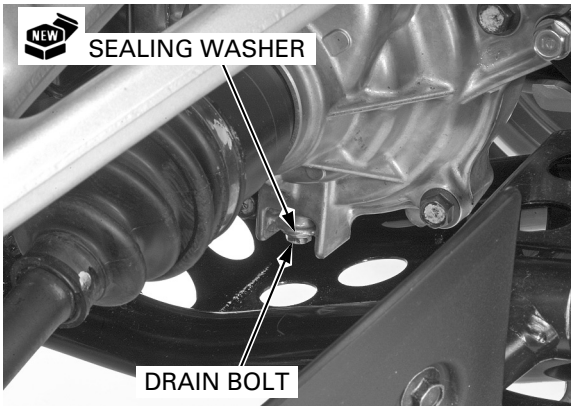
Place the vehicle on a level surface.

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 4-16).

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

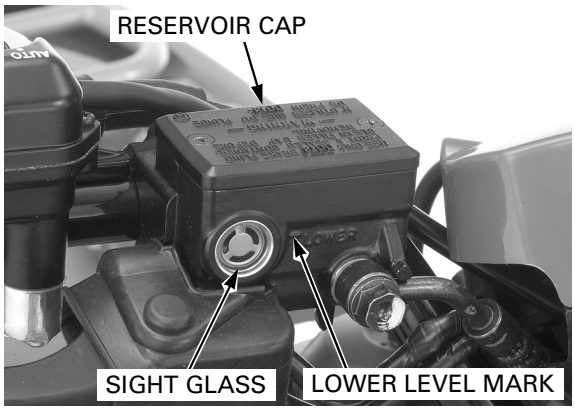
- *Do not mix different types of fluid, as they may not be compatible with each other.*
- *Do not allow foreign material to enter the system when filling the reservoir.*
- *Avoid spilling fluid on painted, plastic or rubber parts. Place a rag over these parts whenever the system is serviced.*

NOTE:

- When the fluid level is low, check the brake pads for wear (page 4-18).
- A low fluid level may be due to worn brake shoes or pads. If the brake pads are worn, the caliper piston is pushed out, and this causes a low reservoir level. If the brake pads are not worn and the fluid level is low, check entire system for leaks (page 4-19).

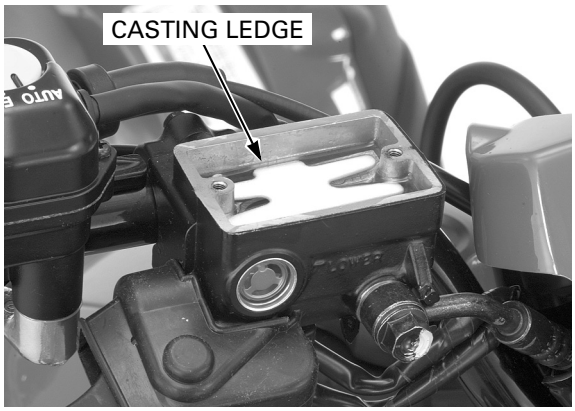
FRONT BRAKE

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 Honda 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

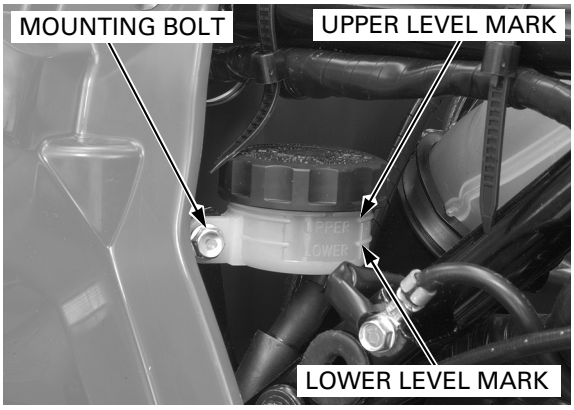
Place the vehicle on a level surface.

Remove the right fuel tank side cover (page 3-6).

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 Honda 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 3-6).



BRAKE PADS WEAR

NOTE:

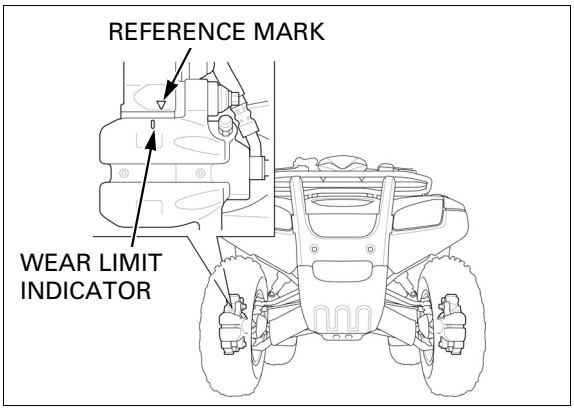
- The front and rear brake has audible brake wear indicator. When the brake pads need replacing, the brake will screech while applying the brake.

FRONT

Remove the front wheel (page 15-11).

Check the brake pads for wear.
Replace the front brake pads if the wear limit indicator mark on the caliper aligns with the reference mark on the caliper bracket when the front brake lever is applied.

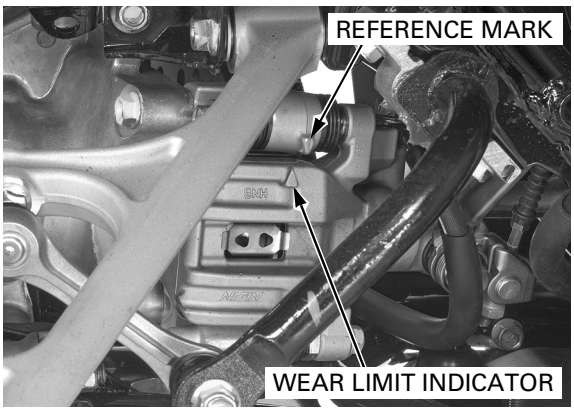
Refer to front brake pad replacement (page 17-10).



REAR

Check the rear 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 rear brake pad replacement (page 17-11).



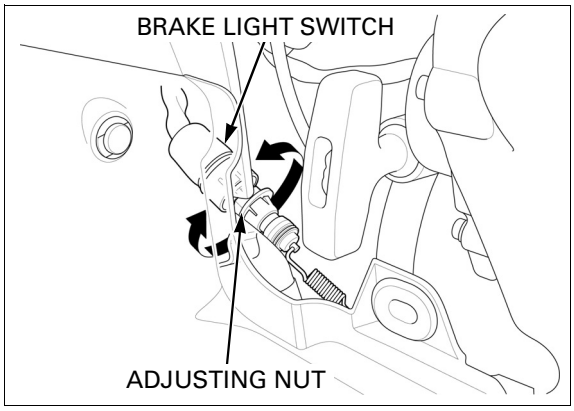
BRAKE LIGHT SWITCH

NOTE:

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

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

If the light fails to come on, adjust the switch so that the light come on at the proper time.
Hold the switch body and turn the adjusting nut. Do not turn the switch body.

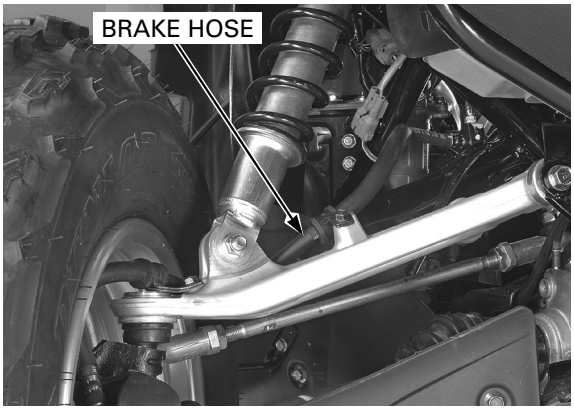


BRAKE SYSTEM

FRONT BRAKE

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

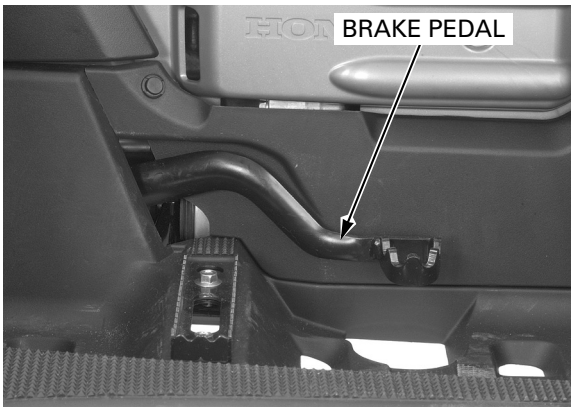
Inspect the brake hose and fittings for deterioration, clacks, damage or signs of leakage.
Tighten any loose fittings.
Replace hoses, pipes and fittings as required.



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 brake bleeding (page 17-7).

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.



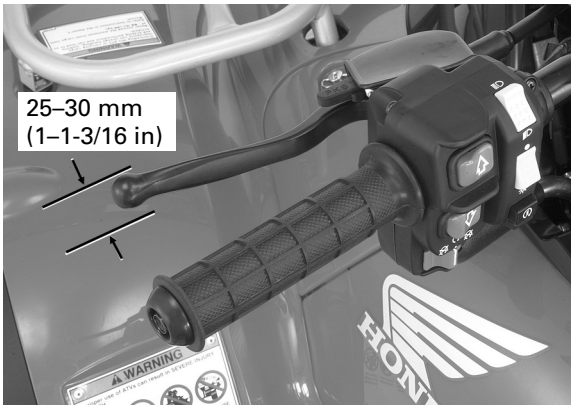
PARKING BRAKE

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.

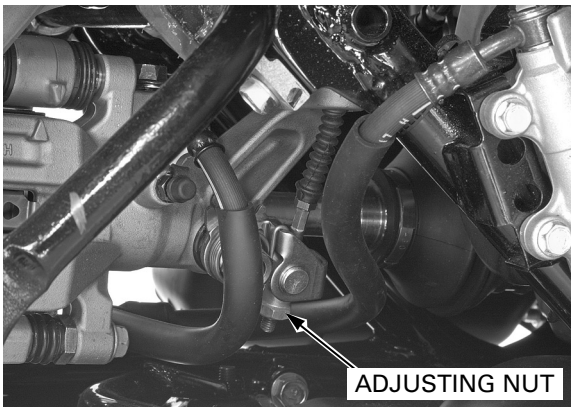
Measure the parking brake lever free play at the end of the lever.

FREE PLAY: 25 – 30 mm (1 – 1-3/16 in)



Make sure the cutout in the adjusting nut is seated on the brake arm joint.

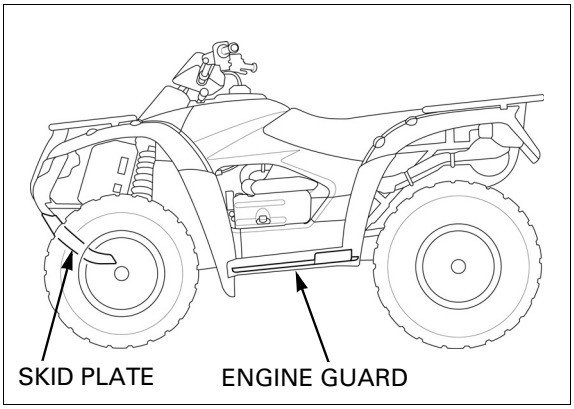
Adjust the parking brake lever free play by turning the adjusting nut at the brake arm.



SKID PLATE, ENGINE GUARD

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

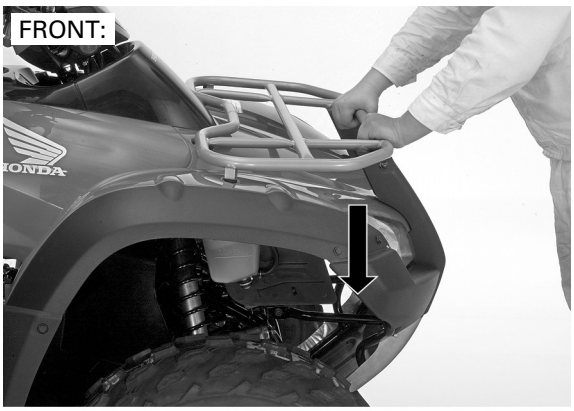
Tighten any loose fasteners.
Replace the skid plates and engine guard as required.

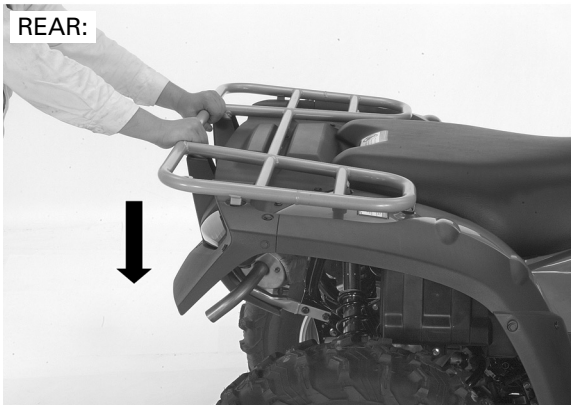


SUSPENSION

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

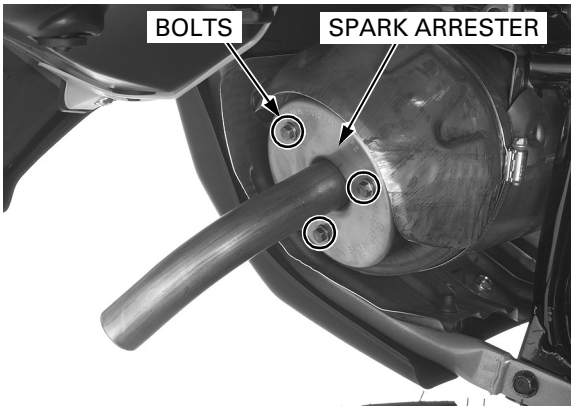
Check the action of the front and rear shock absorbers by compressing them several times.
Check the entire shock absorber assembly for signs of leaks, damage or loose fasteners.
Replace damaged components which cannot be repaired.
Tighten all nuts and bolts.



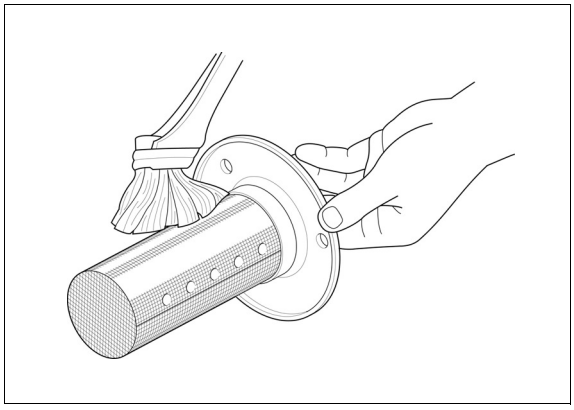


SPARK ARRESTER

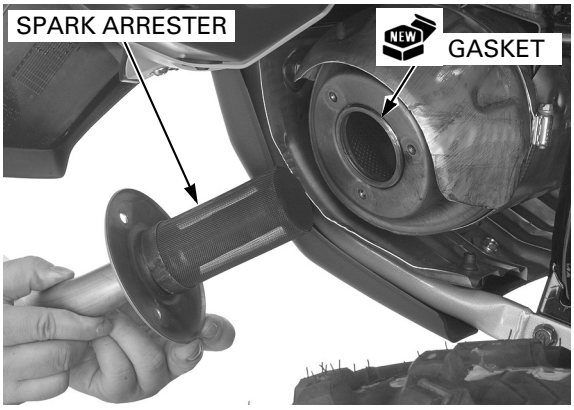
Remove the three bolts and the spark arrester with the gasket.



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.



NUTS, BOLTS, FASTENERS

Check that all chassis nuts and bolts are tightened to their correct torque values (page 1-13).
Check that all cotter pins, safety clips, hose clamps and cable stays are in place and properly secured.

WHEELS/TIRES

Tire pressure should be checked when the tires are cold.

Check the tire pressure with 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, knuckle bearings or tie-rod ball joints for excessive play or abnormal noise.

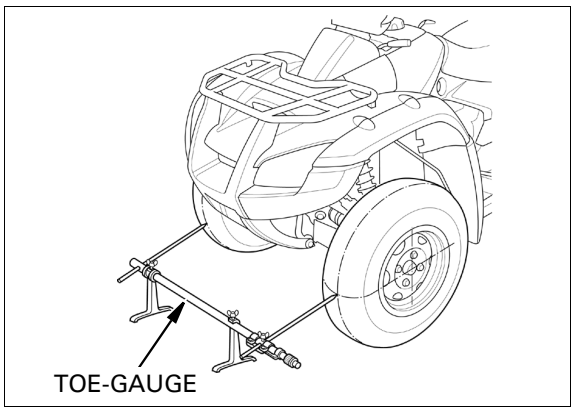
STEERING SHAFT HOLDER BEARING

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 15-28).

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.

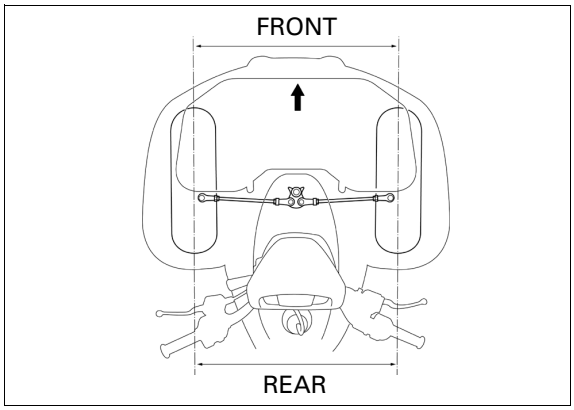


Slowly move the vehicle back until the wheels have turned 180° so the marks on the tires are aligned with the gauge height on the rear side.
Measure the toe on the rear part of the tires at the same points with no load on the vehicle.

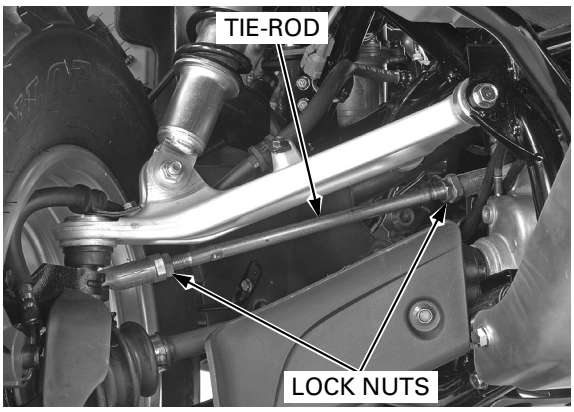
Toe-out: 10.9 ± 15 mm (7/16 ± 9/16 in)

NOTE:

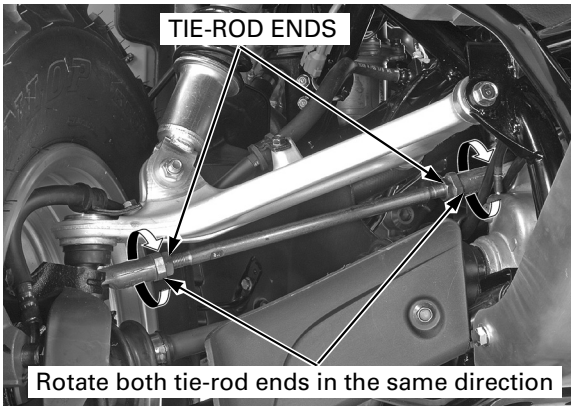
- Toe-out means the front measurement is greater than the rear measurement.



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 tie-rod ends in the same direction, along the tie-rod axis, until they stop against the ball joint stud.

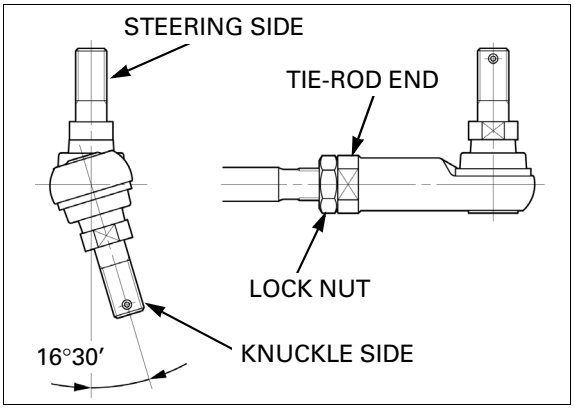


Using a 17 mm wrench, hold the tie-rod ends so that the relative angle of both tie-rods may turn into 16 degrees 30 minutes. Then, using a suitable torque wrench, tighten the tie-rod lock nuts, making sure not to force the tie-rod ends against the ball joint studs.

TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)

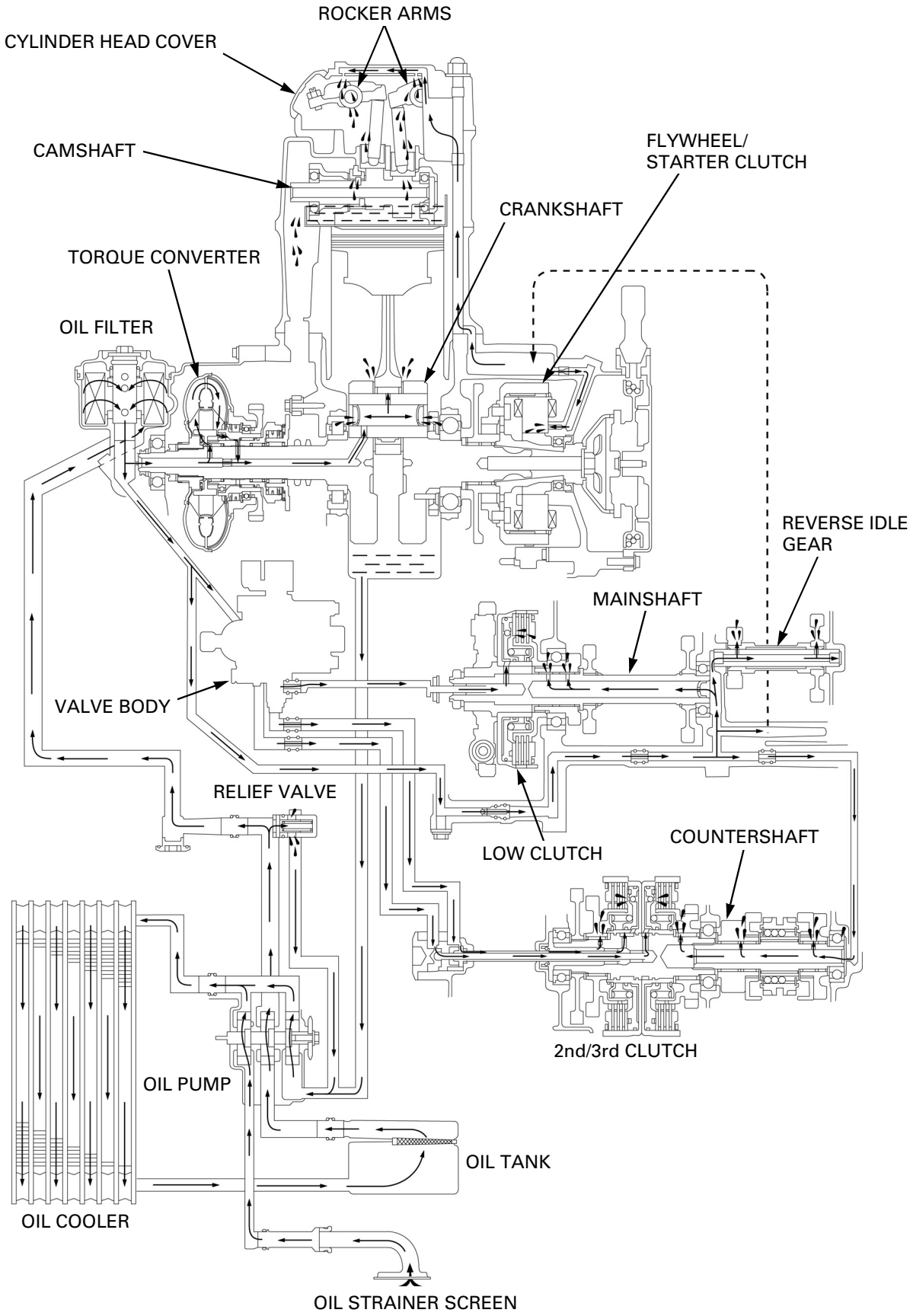
After tightening the lock nuts, rotate the tie-rods to make sure the ball joints have operate properly and have an equal range of movement.

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



5. LUBRICATION SYSTEM

LUBRICATION SYSTEM DIAGRAM



SERVICE INFORMATION

GENERAL

⚠ CAUTION

Used engine oil may cause skin cancer if repeatedly left in contact with the skin for prolonged periods. Although this is unlikely unless you handle used oil on a daily basis, it is still advisable to thoroughly wash your hands with soap and water as soon as possible after handling used oil.

- This section covers service of the oil pump and oil cooler.
- For oil level check, oil change and filter replacement, refer to page 4-10.
- 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)

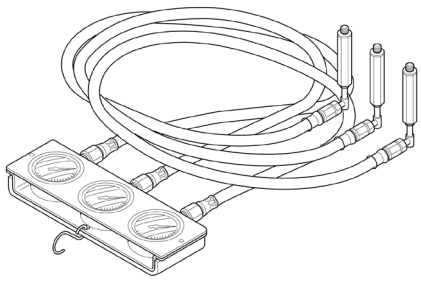
ITEM		STANDARD	SERVICE LIMIT
Engine oil capacity	After draining	2.7 liters (2.9 US qt, 2.4 Imp qt)	–
	After draining/filter change	2.9 liters (3.1 US qt, 2.6 Imp qt)	–
	After disassembly	4.1 liters (4.3 US qt, 3.6 Imp qt)	–
Recommended engine oil		Pro Honda GN4 4-stroke oil (U.S.A. and Canada) or an equivalent motor oil API service classification SG or higher JASO T 903 standard: MA Viscosity: SAE 10W-30	–
Oil pressure at 5,000 rpm (min^{-1})/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 driven sprocket bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	Apply locking agent to the threads.

TOOLS

Oil pressure gauge set
07406-0020005



or 07ZMJ-HN2A100 and 07AMJ-HN8A100 (U.S.A. Only)

TROUBLESHOOTING

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

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

No oil pressure
- Oil level too low
- Oil pressure relief valve stuck open
- Broken oil pump drive chain
- Broken oil pump drive or driven sprocket
- Damaged oil pump
- Internal oil leak

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

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

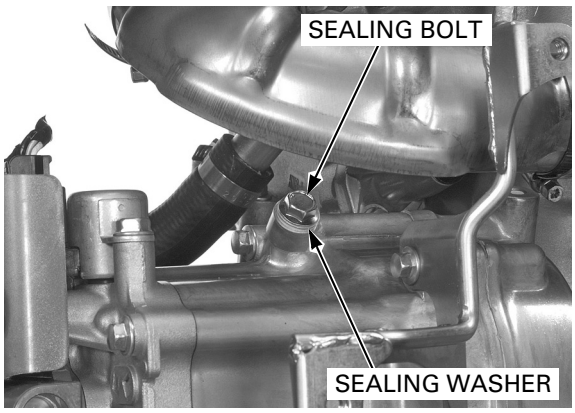
Oil emulsification
- Blown cylinder head gasket
- Leaky coolant passage
- Water entry

OIL PRESSURE CHECK

Failure to warm the engine will cause very high oil pressure readings. External leaks will cause low oil pressure readings.

Check the oil level and add the recommended oil if necessary (page 4-10).
Also, warm the engine to normal operating temperature and check for external leaks.

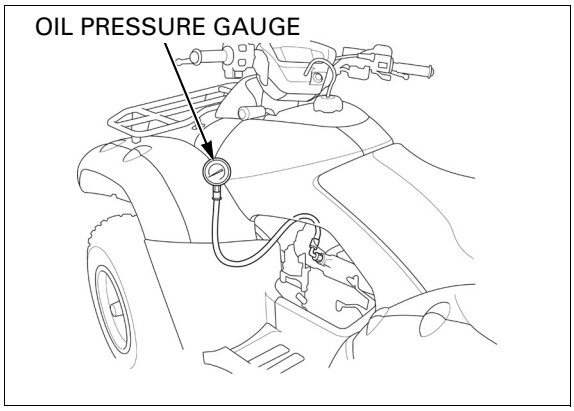
Remove the oil gallery sealing bolt and washer on the left side of the front crankcase cover.



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 adapter to the oil gallery hole.



TOOLS:

Pressure gauge set	**07406-0020005**
	or
Oil pressure gauge 0–160 psi	**07ZMJ-HN2A100 and**
Adapter, banjo 8 x 1.25 mm	**07AMJ-HN8A100**

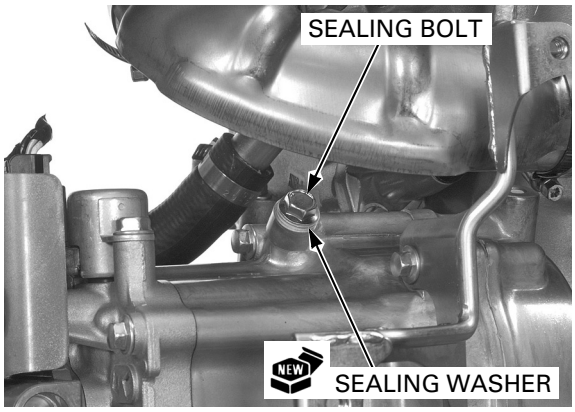
Start the engine and check the oil pressure.

OIL PRESSURE (80°C/176°F):
785 kPa (8.0 kgf/cm^2, 114 psi) at 5,000 rpm (min^{-1})

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.



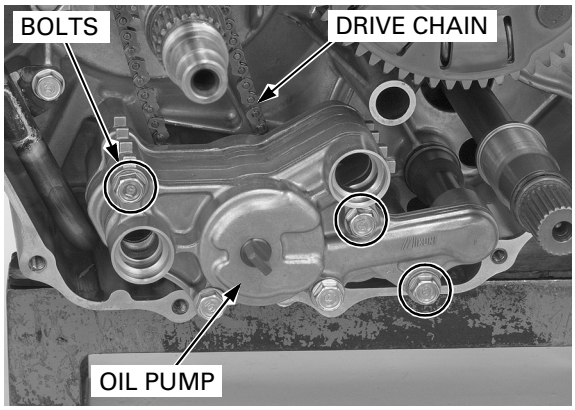
OIL PUMP

REMOVAL

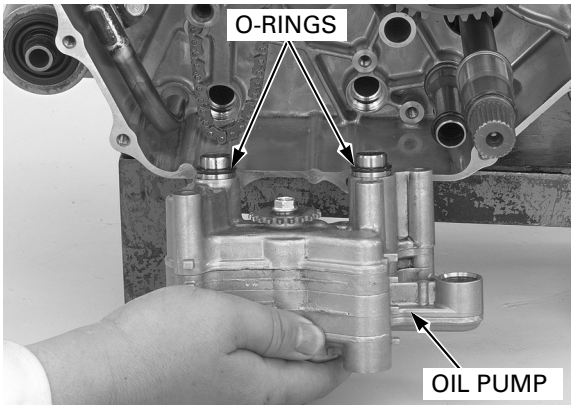
Remove the torque converter (page 14-60).

Remove the three mounting bolts.

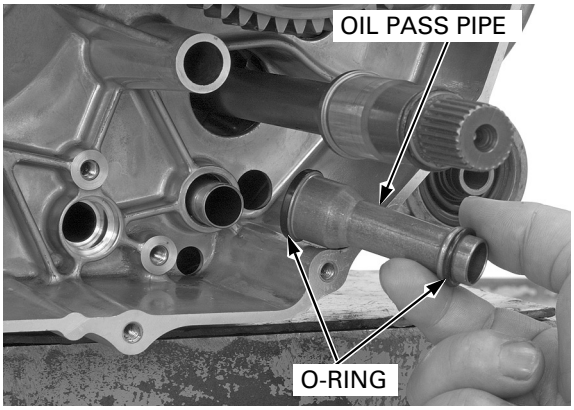
Release the oil pump drive chain from the driven sprocket, then remove the oil pump from the crankcase.



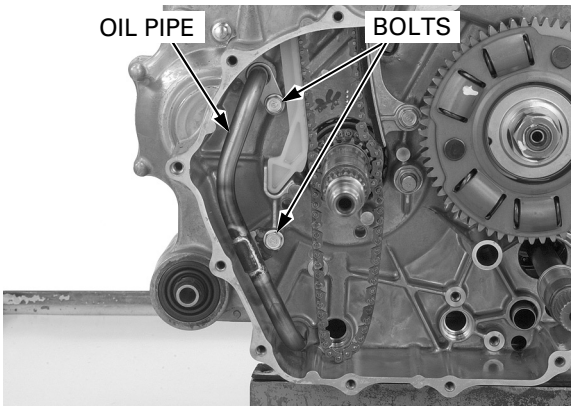
Remove the two O-rings from the oil joint.



Remove the oil pass pipe and O-rings from the oil strainer pipe.



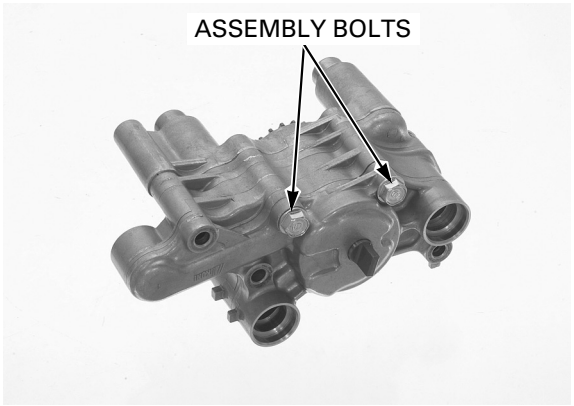
Remove the two bolts, oil pipe and O-ring from the crankcase.



DISASSEMBLY

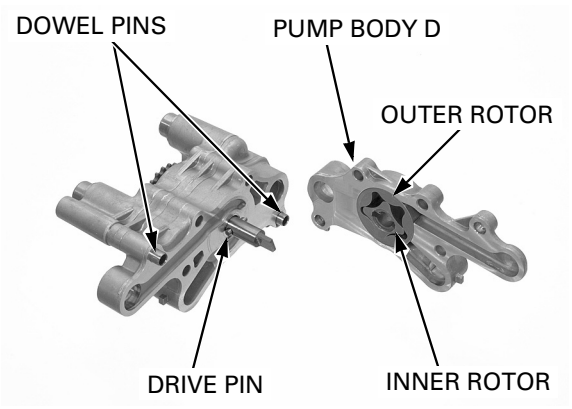
Remove the following:

– two oil pump assembly bolts

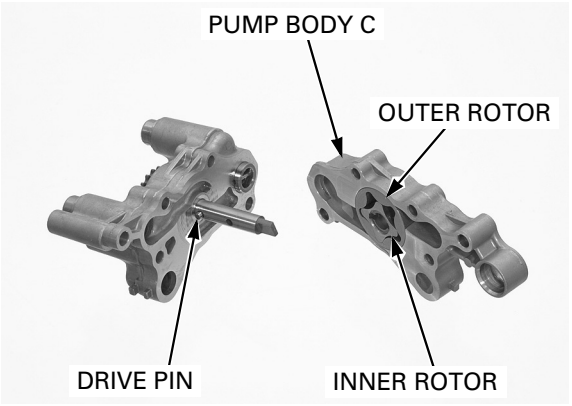


Mark the rotors so they can be reinstalled in their original locations.

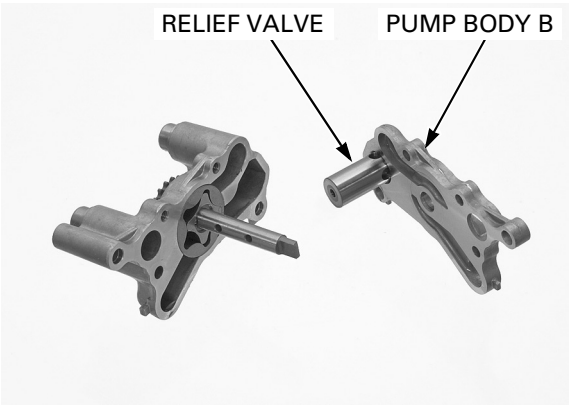
– oil pump body D
– outer rotor
– inner rotor
– drive pin
– two dowel pins



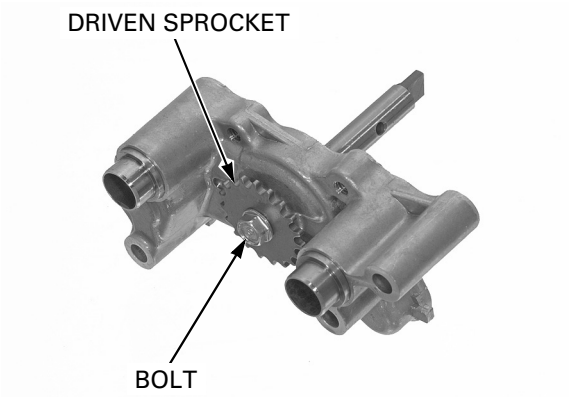
– oil pump body C
– outer rotor
– inner rotor
– drive pin



– oil pump body B
– pressure relief valve

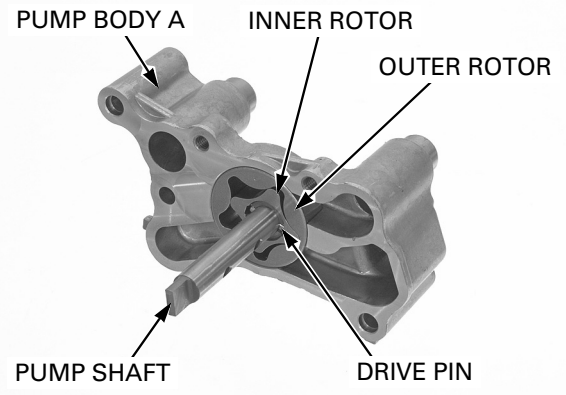


– bolt
– oil pump driven sprocket



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

Clean all the disassembled parts thoroughly.



INSPECTION

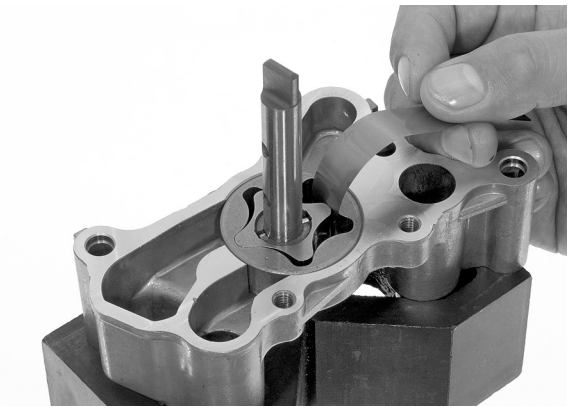
Remove the O-ring from the pressure relief valve.

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.

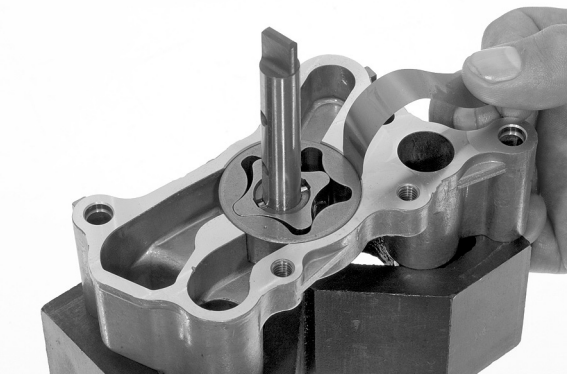
Measure the rotor tip clearance.

SERVICE LIMIT: 0.20 mm (0.008 in)



Measure the pump body clearance.

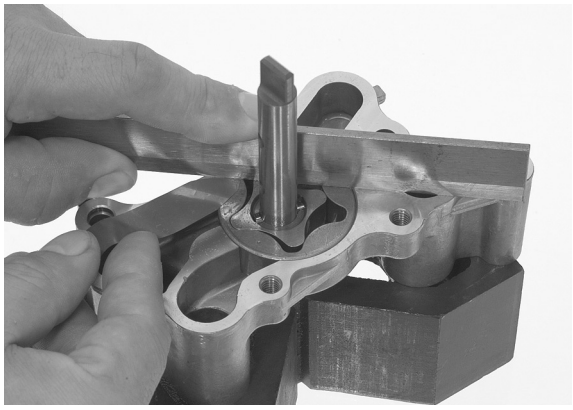
SERVICE LIMIT: 0.25 mm (0.010 in)



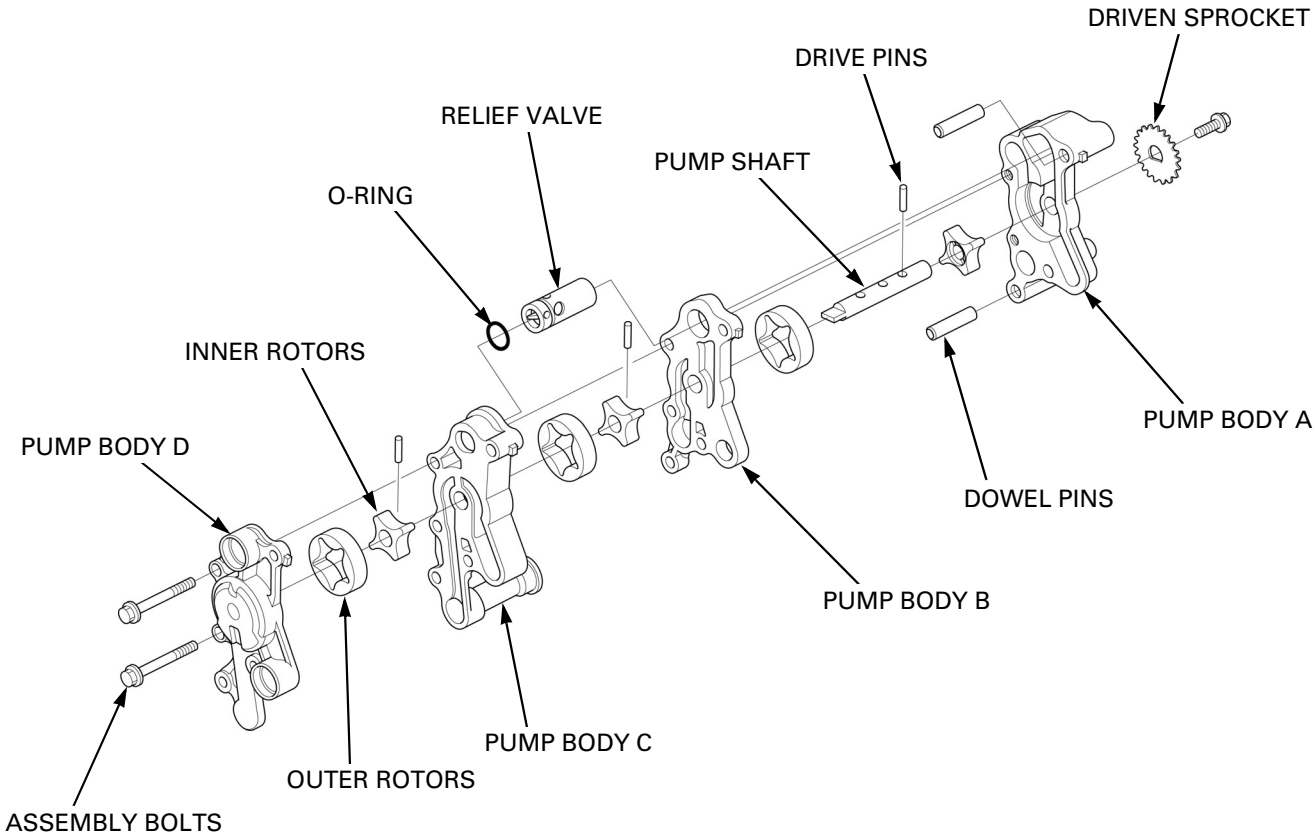
Remove the oil pump shaft and drive pin.

Measure the oil pump side clearance.

SERVICE LIMIT: 0.11 mm (0.004 in)

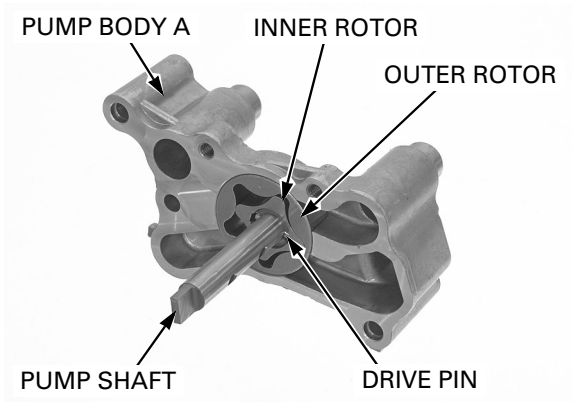


ASSEMBLY



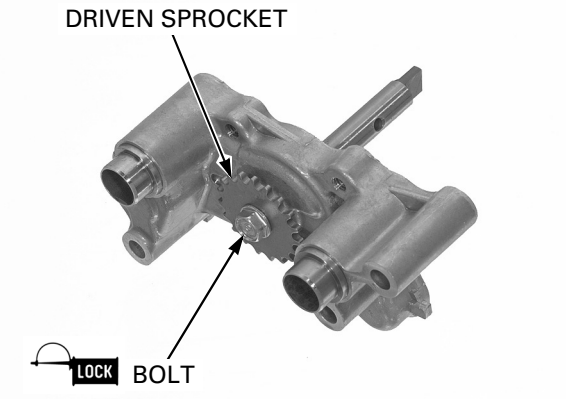
Dip all parts in clean engine oil.

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.



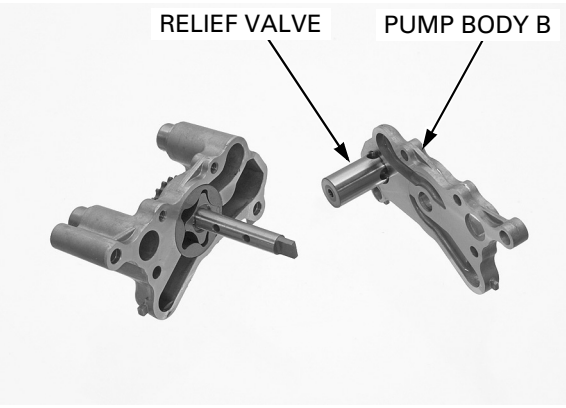
Install the oil pump driven sprocket onto the pump shaft, aligning the flats.
Apply locking agent to the driven sprocket bolt threads.
Install and tighten the driven sprocket bolt.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

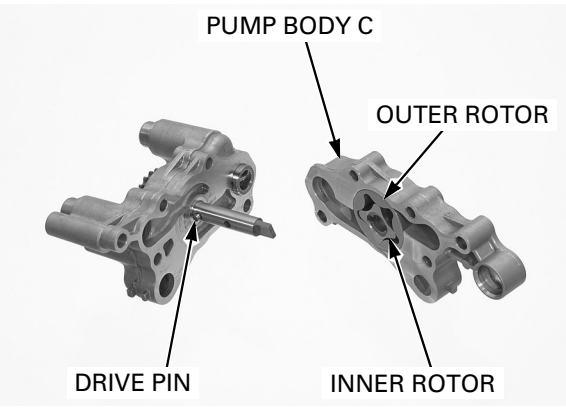


Coat a new O-ring with oil and install it into the relief valve groove.

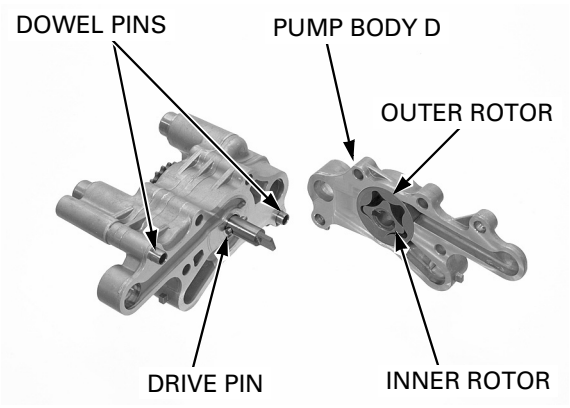
Install the pressure relief valve into oil pump body B.
Install oil pump body B onto pump body A.



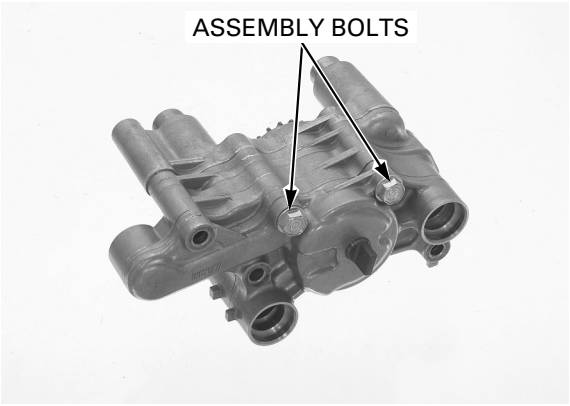
Insert the drive pin into the pump shaft.
Install the inner rotor onto the pump shaft, aligning its grooves with the drive pin.
Install the outer rotor into oil pump body C.
Install pump body C onto pump body B.



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.

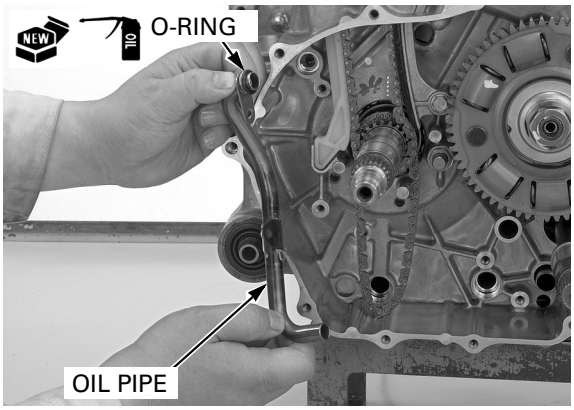


Install and tighten the two oil pump assembly bolts.

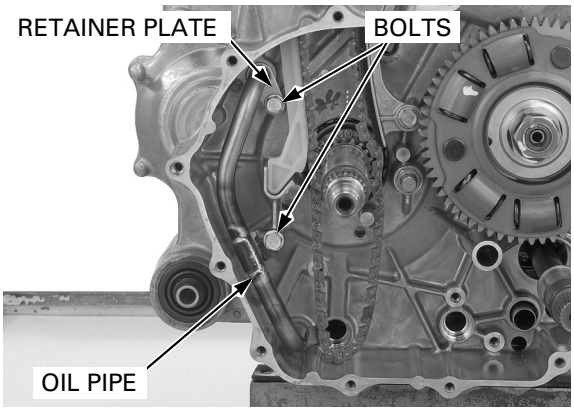


INSTALLATION

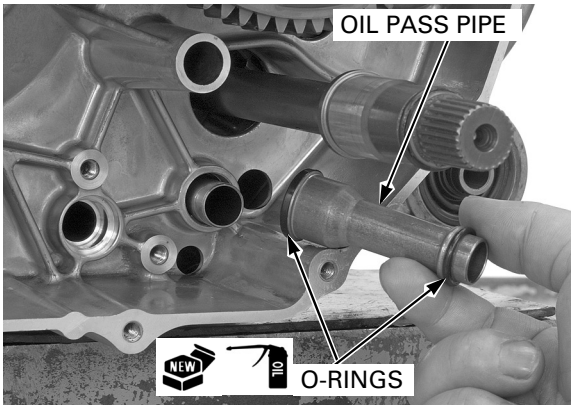
Apply oil to a new O-ring and install it onto the oil pipe.
Install the oil pipe onto the crankcase.



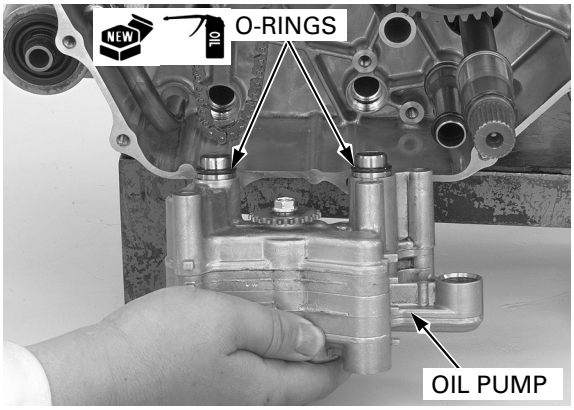
Set the retainer plate and tighten the two bolts securely.



Apply oil to new O-rings and install them onto the oil pass pipe.
Install the oil pass pipe to the oil strainer pipe.

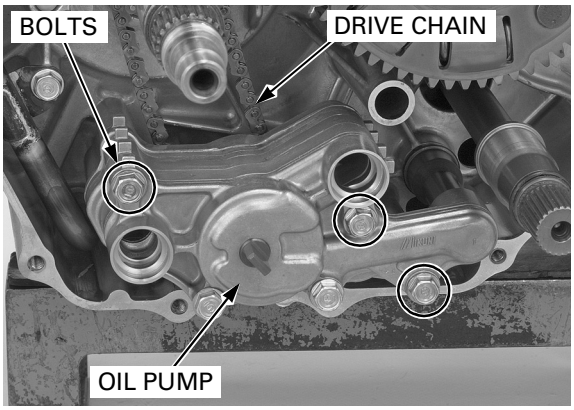


Coat new O-rings with oil and install them onto the oil joint pipes.



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 14-73).

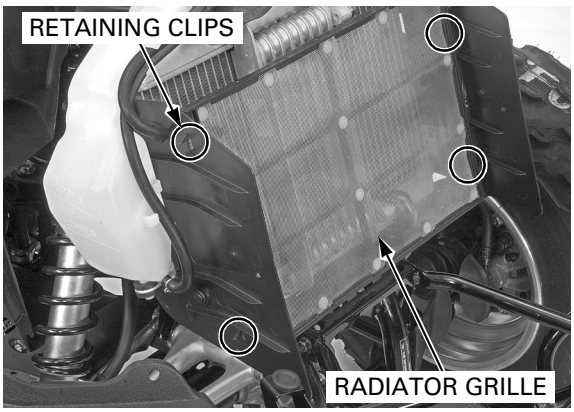


OIL COOLER

REMOVAL

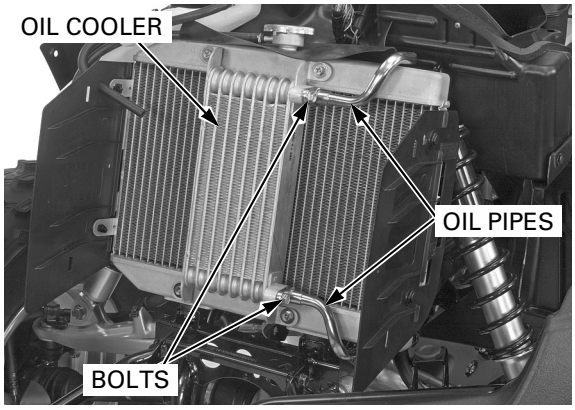
Remove the front fender (page 3-11).

Remove the radiator grille by releasing the four retaining clips.

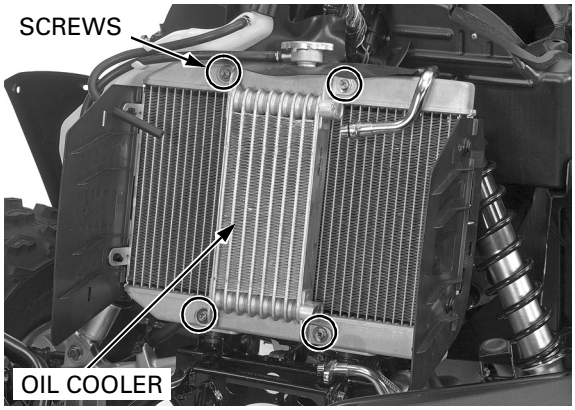


Check the oil cooler hose joints and seams for leaks.
Check the oil cooler air passage for clogging or damage.
Straighten bent fins using a small flat blade screwdriver and remove insects, mud or other obstructions with compressed air or low pressure water.

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

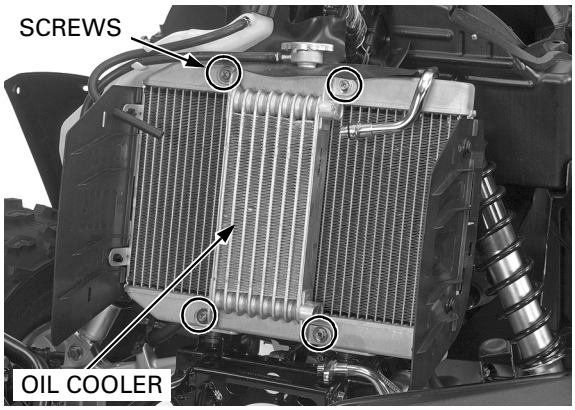


Remove the four mounting screws and oil cooler from the radiator.



INSTALLATION

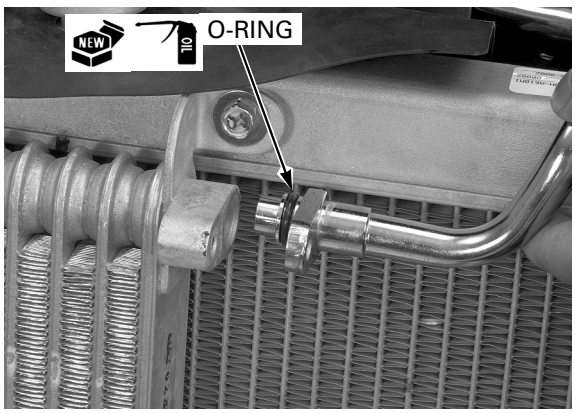
Install the oil cooler onto the radiator and tighten the mounting screws securely.



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.

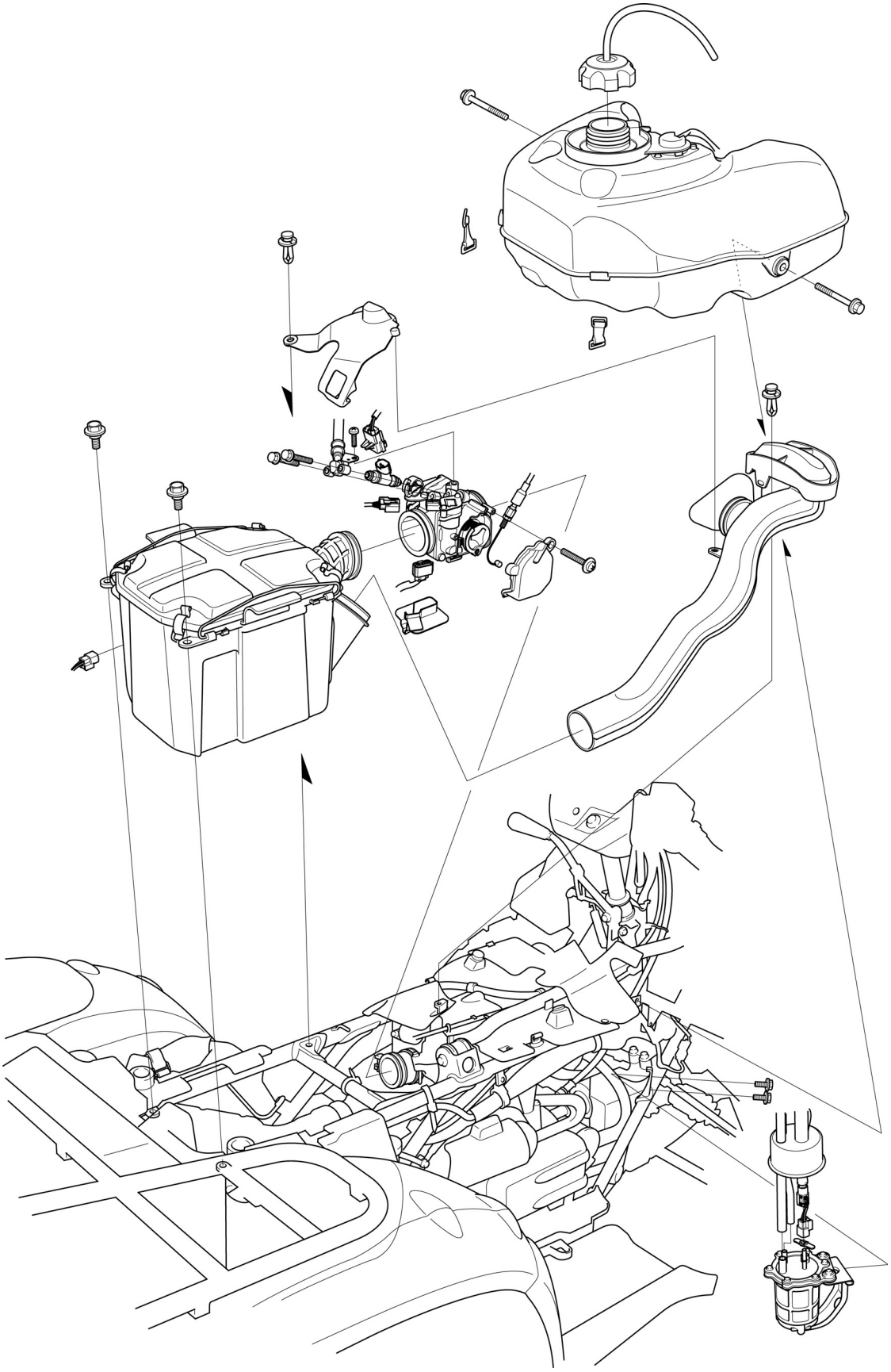
Check the oil level and add the recommended oil if the level is low (page 4-10).



MEMO

6. FUEL SYSTEM (PGM-FI)

SYSTEM COMPONENTS



SERVICE INFORMATION

GENERAL

- This FUEL SYSTEM section covers service of the electrical and mechanical system of the PGM-FI system, fuel supply system and air cleaner.
- Before disconnecting the fuel feed hose, relieve pressure from the system by disconnecting the quick connect fitting in the sub fuel tank (page 6-32).
- Bending or twisting the control cable will impair smooth operation and could cause the cable to stick or bend, resulting in loss of vehicle control.
- Work in a well ventilated area. Smoking or allowing flames or sparks in the work area or where gasoline is stored can cause a fire or explosion.
- Do not snap the throttle valve from full open to full close after the throttle cable has been removed. It may cause incorrect idle operation.
- Seal the cylinder head intake port with tape or a clean cloth to keep dirt and debris from entering the intake port after the throttle body has been removed.
- Do not damage the throttle body. It may cause incorrect throttle valve operation.
- Prevent dirt and debris from entering the throttle bore, IACV, sensor hole and fuel feed hose, clean them using compressed air.
- The throttle body is factory pre-set. Do not disassemble in a way other than shown in this manual.
- Do not loosen or tighten the white painted bolts, nuts and screws of the throttle body. Loosening or tightening them can cause throttle body malfunction.
- Tighten the yellow painted bolts of the throttle body to the specified torque.
- A faulty PGM-FI system is often related to poorly connected or corroded connectors. Check those connections before proceeding.
- When disassembling the PGM-FI parts, note the location of the O-rings. Replace them with new ones upon reassembly.
- Use a digital tester for PGM-FI system inspection.
- Refer to procedures for fuel level sensor inspection (page 23-10).

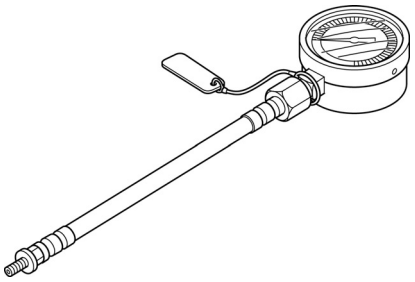
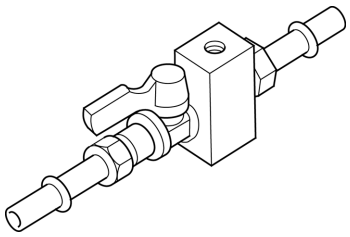
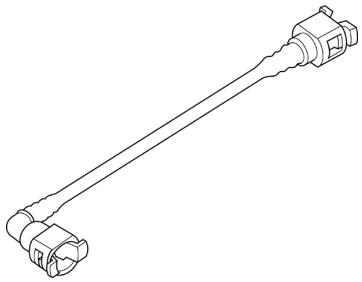
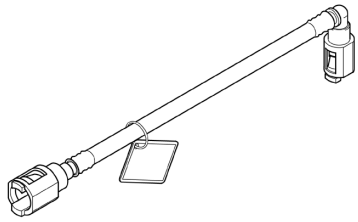
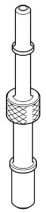
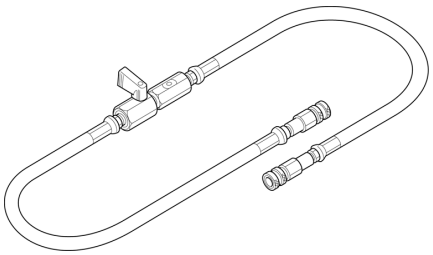
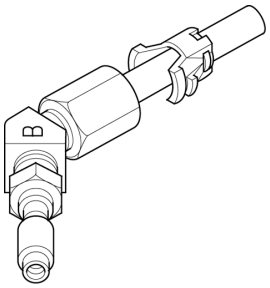
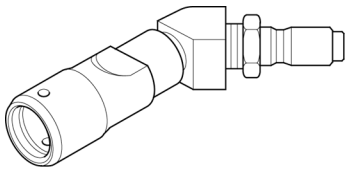
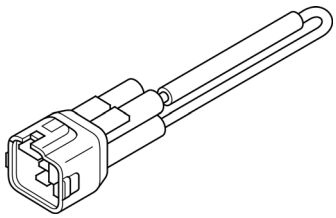
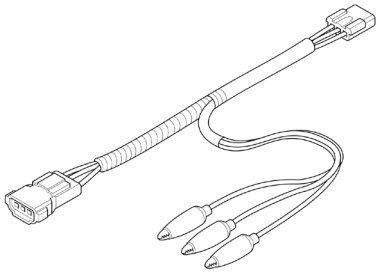
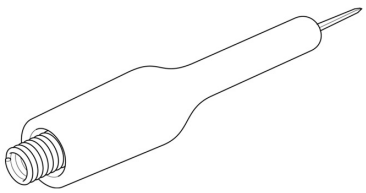
SPECIFICATIONS

ITEM	SPECIFICATIONS
Throttle body identification number	GQ67A
Idle speed	1,400 ± 50 rpm (min^{-1})
Throttle lever free play	3 – 8 mm (1/8 – 5/16 in)
ECT sensor resistance (20°C/68°F)	2.3 – 2.6 kΩ
Fuel injector resistance (at 20°C /68°F)	11.1 – 12.3 Ω
Fuel pressure	284 – 304 kPa (2.9 – 3.1 kgf/cm^2, 41 – 44 psi)
Fuel pump flow (at 12 V)	71 cm^3 (2.4 US oz, 2.5 Imp oz) minimum/10 seconds

TORQUE VALUES

Insulator band screw (throttle body side)	See page 6-42
Insulator band screw (cylinder head side)	See page 6-46
Throttle drum cover screw	1.5 N·m (0.15 kgf·m, 1.1 lbf·ft)
Sensor unit mounting screw	3.4 N·m (0.35 kgf·m, 2.2 lbf·ft)
Fuel feed hose bracket screw	4.2 N·m (0.43 kgf·m, 3.1 lbf·ft)
Harness guide bracket screw	4.2 N·m (0.43 kgf·m, 3.1 lbf·ft)
Fuel injector/feed hose mounting bolt	5.1 N·m (0.53 kgf·m, 3.8 lbf·ft)
IACV mounting torx screw	2.1 N·m (0.21 kgf·m, 1.5 lbf·ft)
Bank angle sensor mounting bolt	1.5 N·m (0.15 kgf·m, 1.1 lbf·ft)

TOOLS

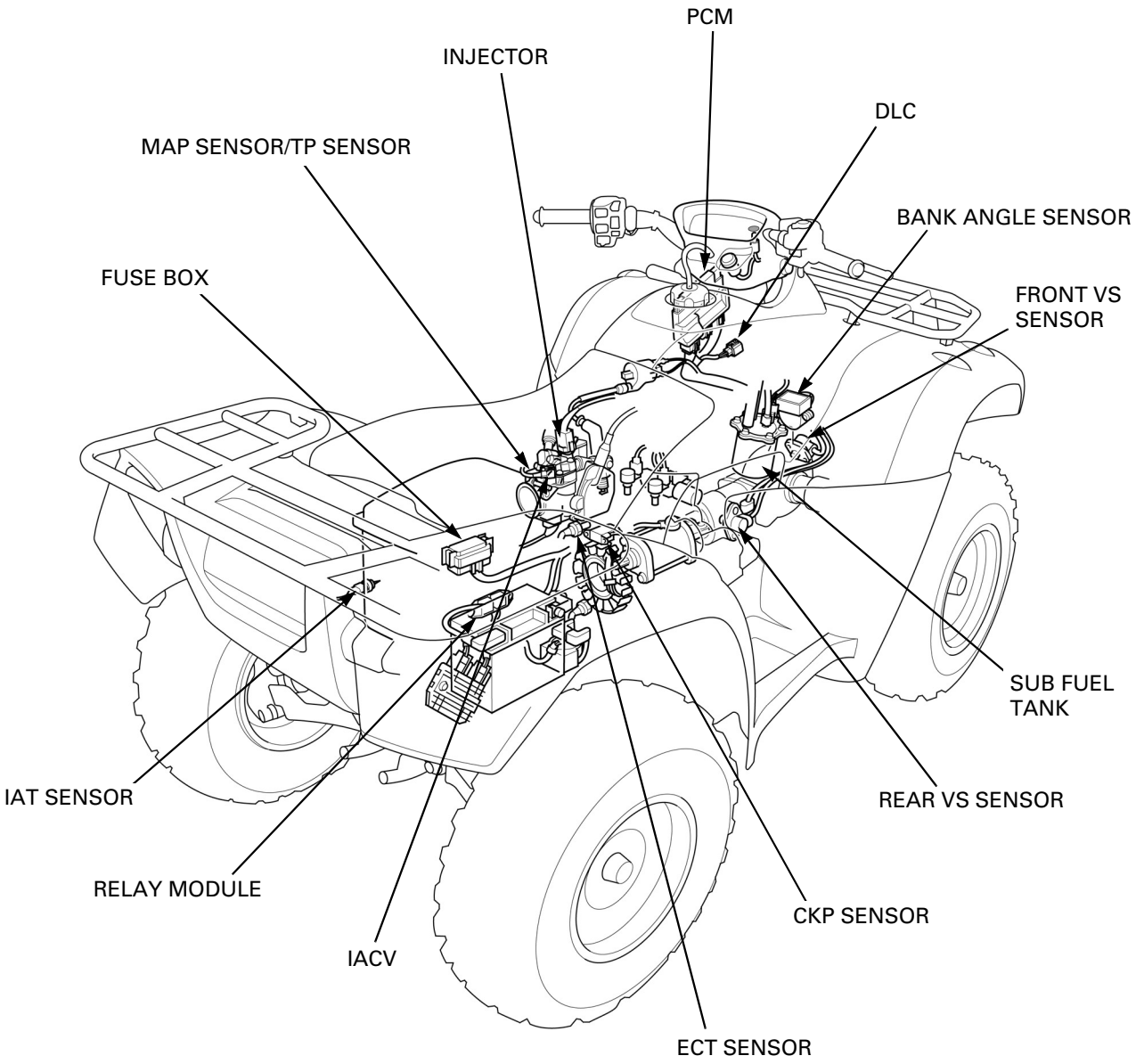
Fuel pressure gauge 07406-0040004  or 07406-00400B (U.S.A. only)	Pressure gauge manifold 07ZAJ-S5A0111  Not available in U.S.A.	Pressure gauge hose attachment A 07ZAJ-S5A0120  Not available in U.S.A.
Pressure gauge hose attachment B 07ZAJ-S5A0130 	Hose attachment B joint 07ZAJ-S5A0150 	Pressure manifold hose 07AMJ-HW3A100 (U.S.A. only) 
Adaptor, male 07AAJ-S6MA200 (U.S.A. only) 	Adaptor, female 07AAJ-S6MA400 (U.S.A. only) 	SCS connector 070PZ-ZY30100 
HDS pocket tester TDS 3557-0112-01 (U.S.A. Only) 	Inspection test harness 07GMJ-ML80100 	Test probe 07ZAJ-RDJA110 

SYMPTOM TROUBLESHOOTING

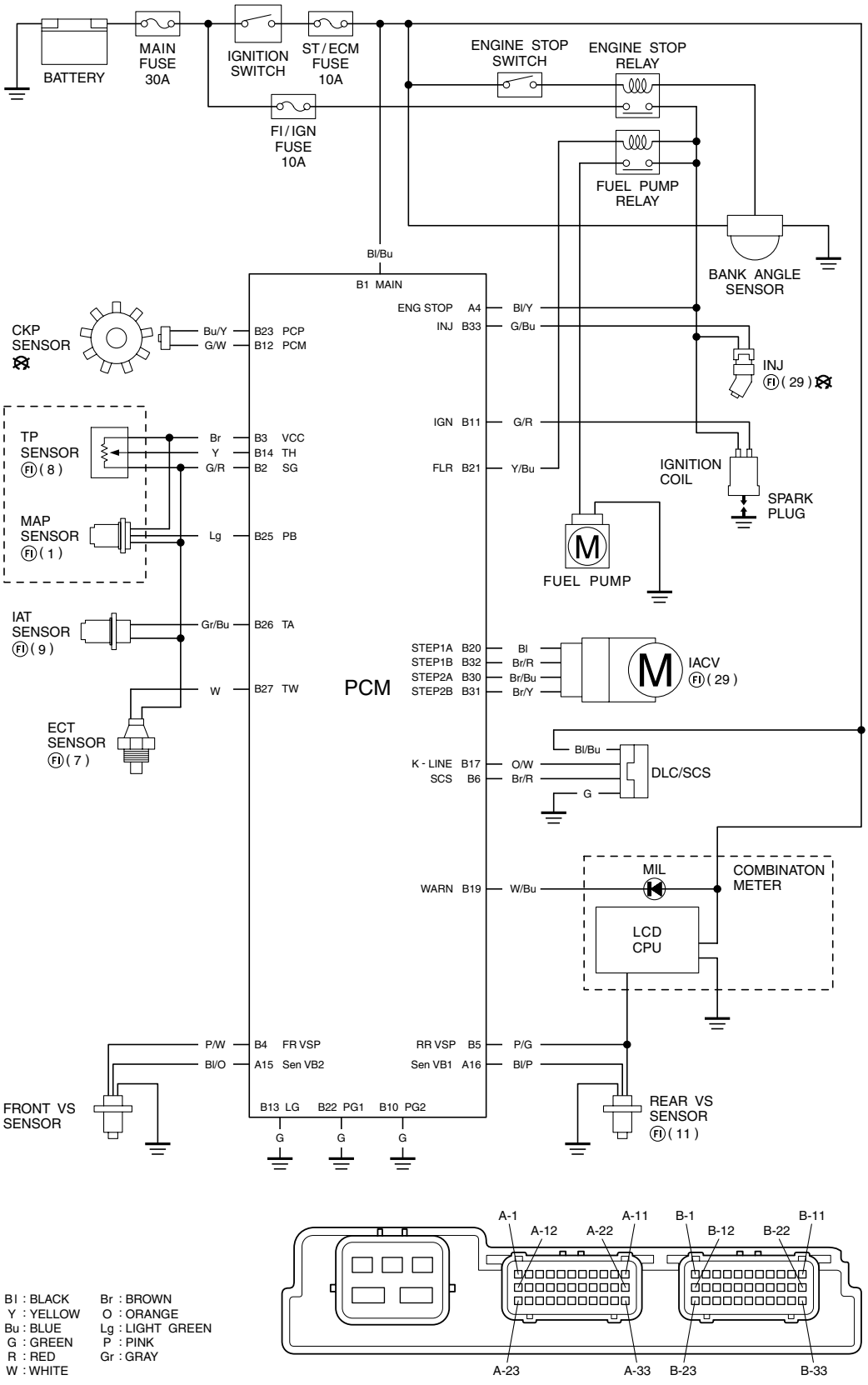
When the vehicle has one of these symptoms, check the DTC or MIL blinking, refer to the DTC index (page 6-17) and begin the appropriate troubleshooting procedure. If there are no DTC/MIL blinking stored in the PCM memory, do the diagnostic procedure for the symptom, in the sequence listed below, until you find the cause.

Symptom	Diagnosis procedure	Also check for
Engine cranks but won't start (No DTC and MIL blinking)	1. Inspect the ignition system (page 21-5). 2. Inspect the fuel supply system (page 6-36).	• No fuel to injector – Clogged fuel filter – Pinched or clogged fuel feed hose – Pinched or clogged fuel tank breather hose – Faulty fuel pump – Faulty fuel pump circuits • Intake air leak • Contaminated/deteriorated fuel • Faulty fuel injector • IACV stuck closed
Engine cranks but won't start (No fuel pump operation sound when the turning the ignition ON and engine stop switch "○")	1. PCM power/ground circuits malfunction (page 6-53) 2. Inspect the fuel supply system (page 6-36).	• Open circuit in the power input and/or ground wire of the PCM • Faulty bank angle sensor or related circuit • Faulty engine stop relay or related circuit • Faulty engine stop switch or related circuit • Blown FI/IGN fuse (10 A) • Blown ST./ECM fuse (10 A)
Engine stalls, hard to start, rough idling	1. Check the idle speed (page 6-55). 2. Check the IACV (page 6-56). 3. Inspect the fuel supply system (page 6-36).	• Restricted fuel feed hose • Contaminated/deteriorated fuel • Intake air leak • Restricted fuel tank breather hose • Faulty ignition system
Backfiring or misfiring during acceleration	Check the ignition system.	• Faulty ignition system
Poor performance (driveability) and poor fuel economy	Inspect the fuel supply system (page 6-36).	• Pinched or clogged fuel feed hose • Faulty injector • Faulty ignition system
Idle speed is below specifications or fast idle too low (No DTC and MIL blinking)	1. Check the idle speed (page 6-55) 2. Check the IACV (page 6-56).	• IACV stuck closed • Faulty fuel supply system • Faulty ignition system
Idle speed is above specifications or fast idle too high (No DTC and MIL blinking)	1. Check the idle speed (page 6-55) 2. Check the throttle operation and lever free play (page 4-4) 3. Check the IACV (page 6-56).	• IACV stuck opened • Faulty ignition system • Intake air leak • Engine top end problem • Air cleaner condition
MIL stays on but no DTCs set, or MIL never comes on at all	Troubleshoot the MIL circuit (page 6-31).	• Faulty MIL circuit
MIL stays on at all times (No DTC set)	Check the DLC circuit (Brown/red wire) for short circuit.	• Short circuit in the DLC related wire

PGM-FI SYSTEM LOCATION



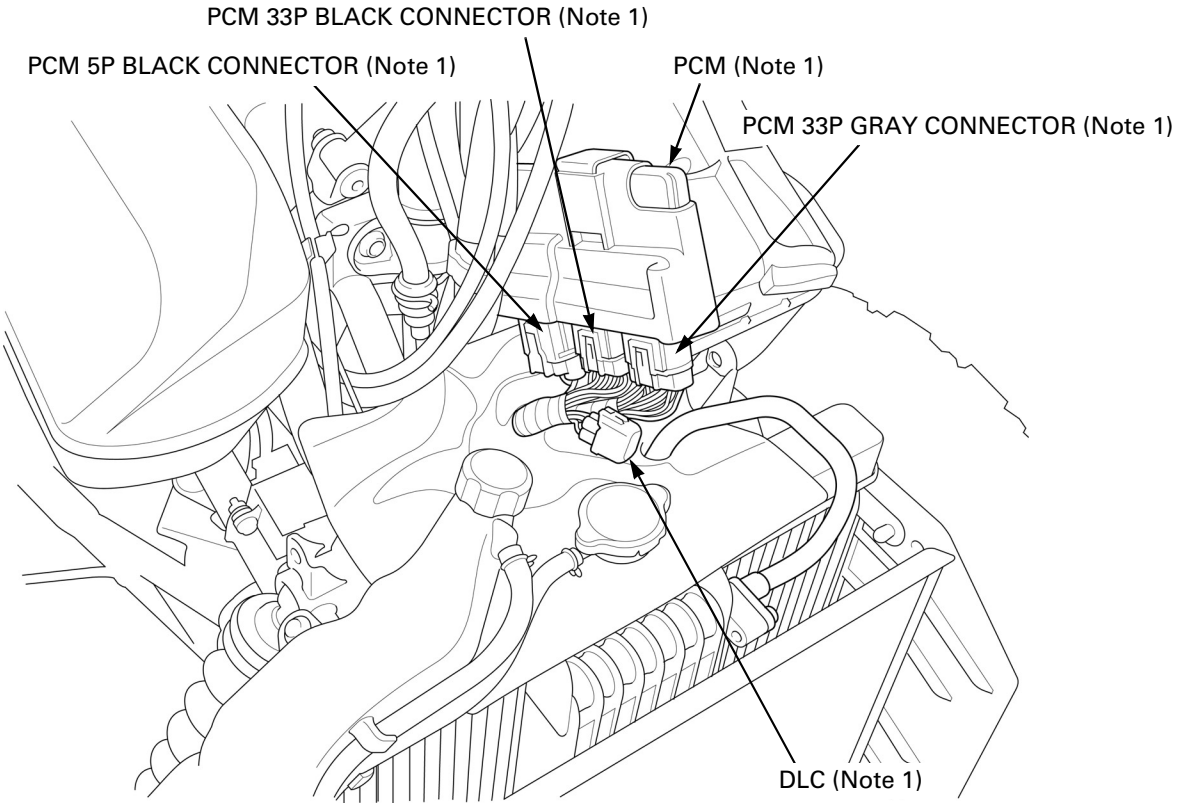
PGM-FI SYSTEM DIAGRAM

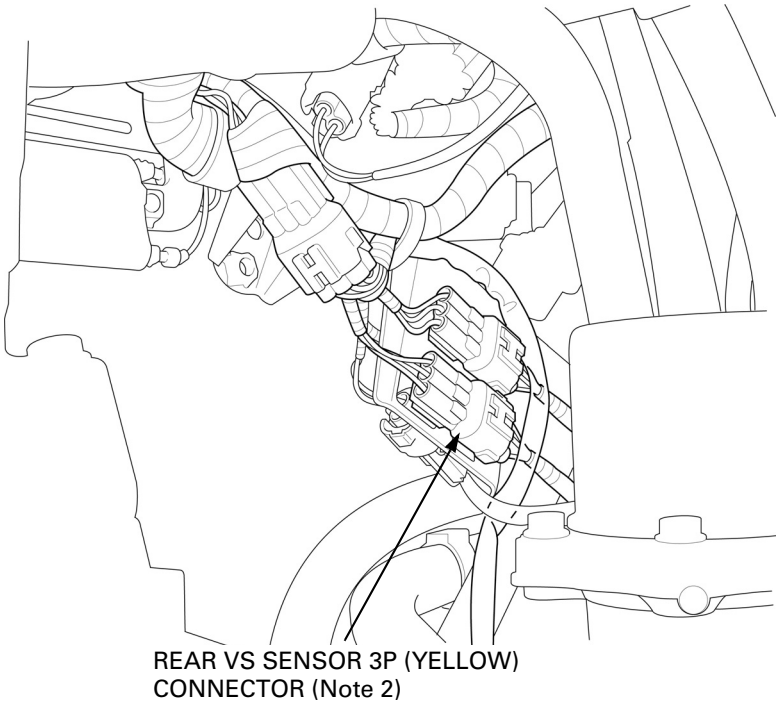


PGM-FI CONNECTOR LOCATION

FRONT CONNECTOR LOCATIONS

Note 1: Remove the steering cover (page 3-5).
Note 2: Remove the left inner fender (page 3-9).

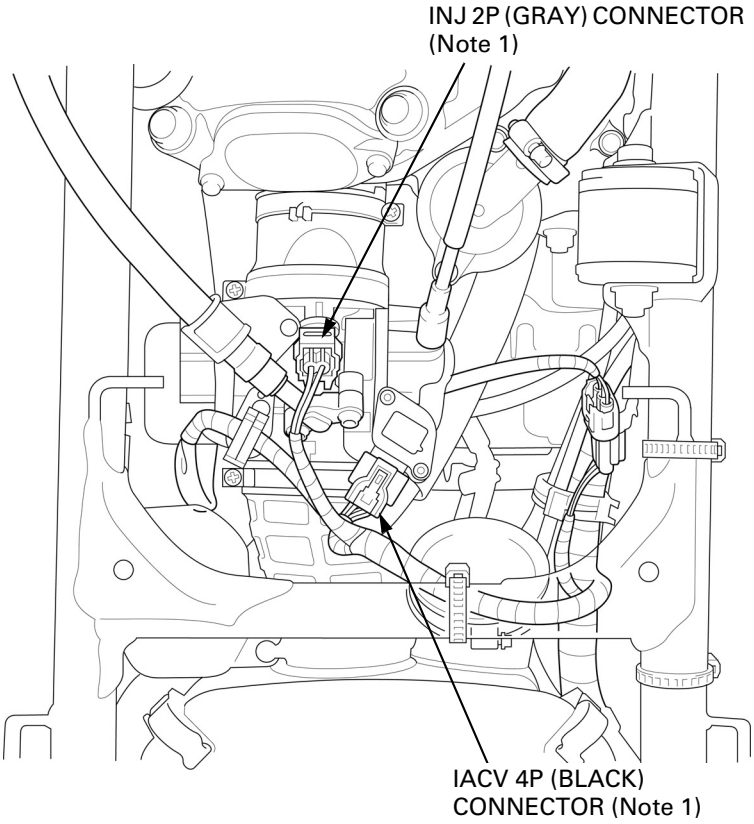


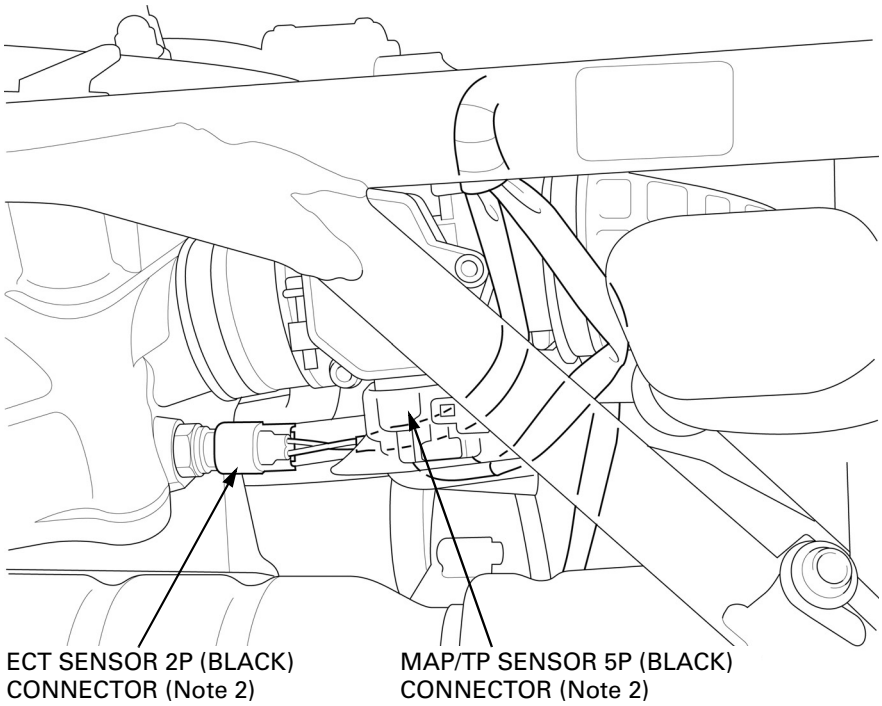


Note 1: Remove the right inner fender (page 3-9).

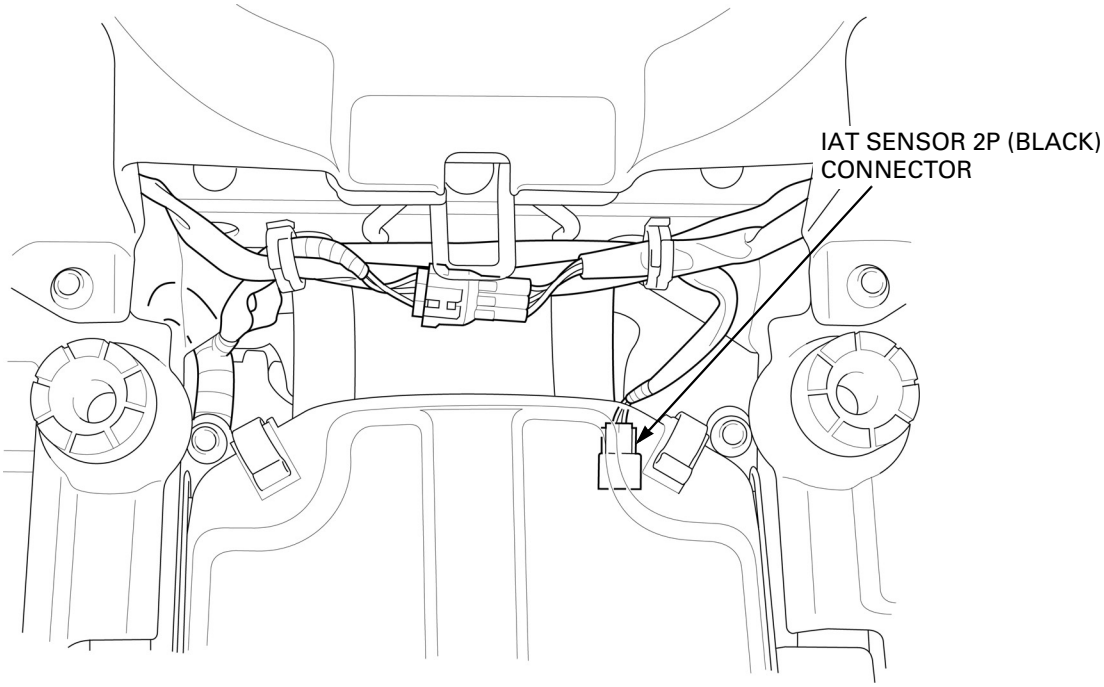
MIDDLE/REAR CONNECTOR LOCATIONS

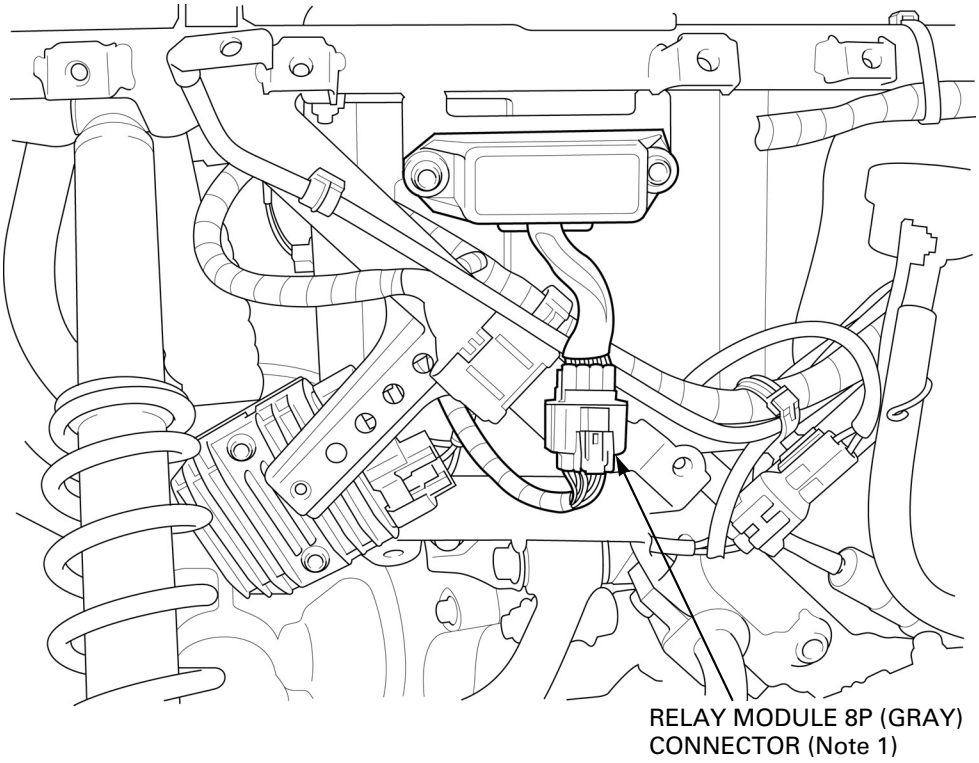
Note 1: Remove the seat (page 3-4).
Note 2: Remove the fuel tank side cover (page 3-6).



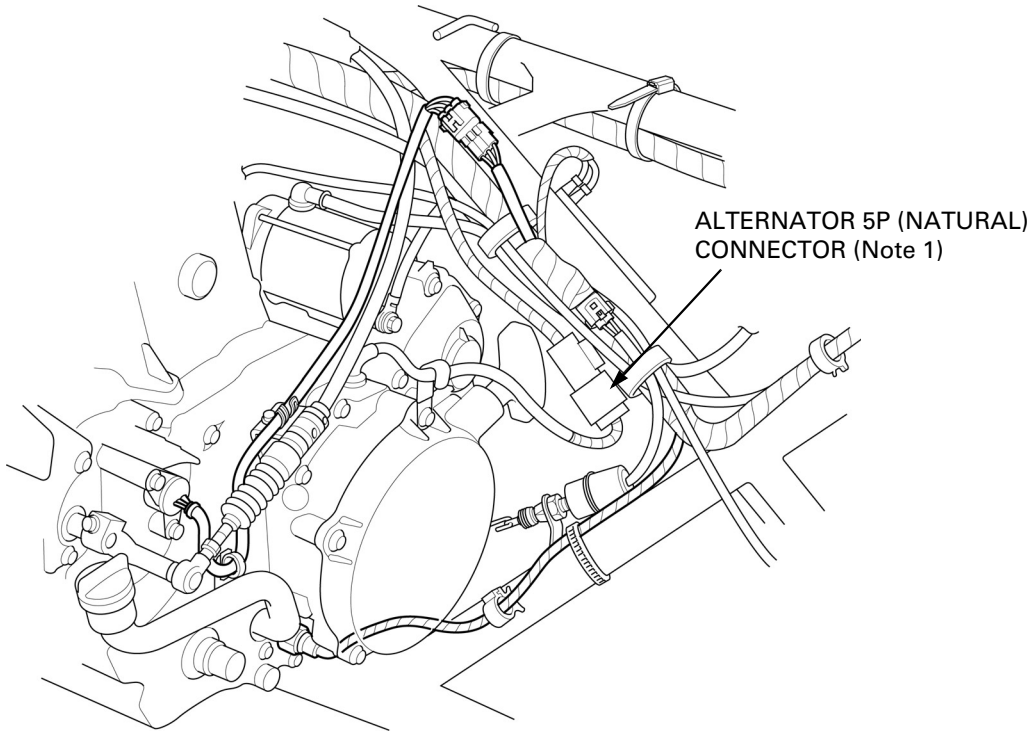


Note 1: Remove the battery case (page 20-6).





Note 1: Remove the right side cover (page 3-5).



PGM-FI TROUBLESHOOTING INFORMATION

GENERAL TROUBLESHOOTING

Intermittent Failure

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

Opens and Shorts

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

If the MIL has come on

Refer to DTC READ OUT (page 6-14).

If the MIL did not stay on

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

SYSTEM DESCRIPTION

SELF-DIAGNOSIS SYSTEM

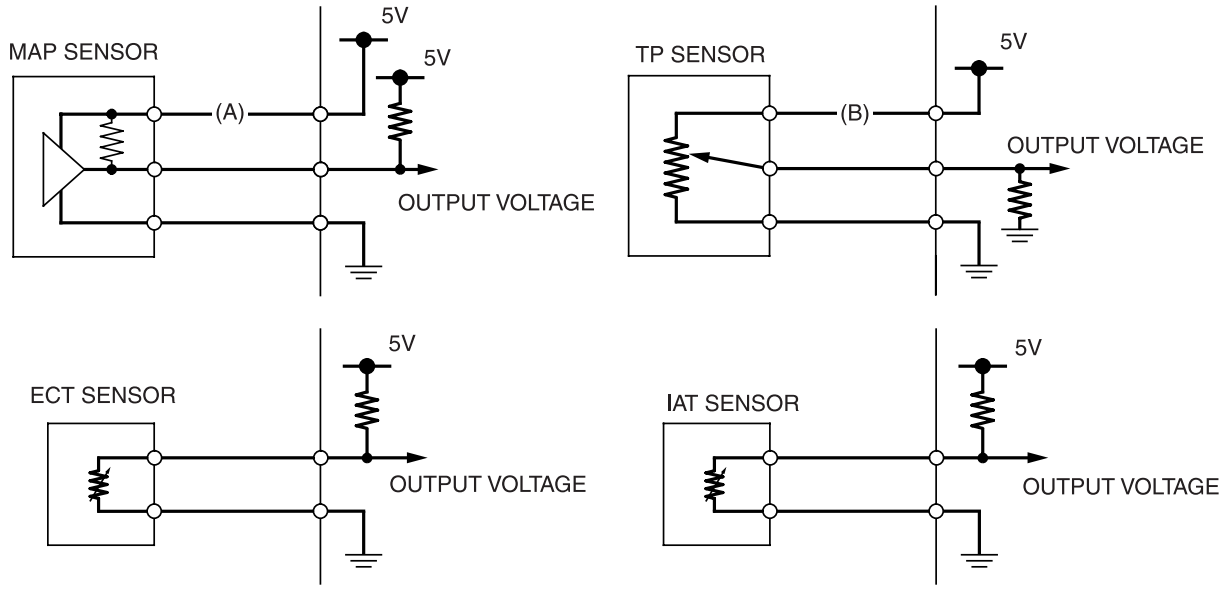
The PGM-FI system is equipped with the self-diagnostic system. When any abnormality occurs in the system, the PCM turns on the MIL and stores a DTC in its erasable memory.

FAIL-SAFE FUNCTION

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

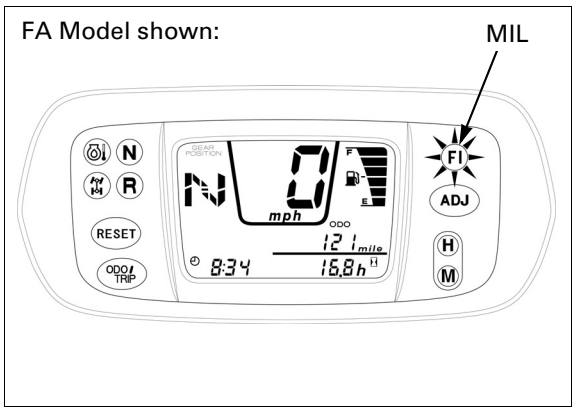
DTC (Diagnostic Trouble Code)

- The DTC is composed of a main code and a sub code and it is displayed as a hyphenated number when retrieved from the PCM with the HDS pocket tester.
  The digits in front of the hyphen are the main code, they indicate the component of function failure.
  The digits behind the hyphen are the sub code, they detail the specific symptom of the component or function failure.
  For example, in the case of the TP sensor:
  – DTC 08 – 1 = (TP sensor voltage) – (lower than the specified value)
  – DTC 08 – 2 = (TP sensor voltage) – (higher than the specified value).
- The MAP, ECT, TP and IAT sensor diagnosis will be made according to the voltage output of the affected sensor.
  If a failure occurs, the PCM determines the Function Failure, compares the sensor voltage output to the standard value, and then outputs the corresponding DTC to the HDS Pocket Tester.
  For example:
  – If the input voltage line (A) on the MAP sensor is opened, the PCM detects the output voltage is about 5 V, then the DTC 1-2 (MAP sensor circuit high voltage) will be displayed.
  – If the input voltage line (B) on the TP sensor is opened, the PCM detects the output voltage is 0 V, then the DTC 8-1 (TP sensor circuit low voltage) will be displayed.



MIL Blink Pattern

- If the HDS pocket tester is not available, DTC can be read from the PCM memory by the MIL blink pattern.
- The number of MIL blinks is the equivalent the main code of the DTC (the sub code cannot be displayed by the MIL).
- The MIL will blink the current DTC, in case the PCM detects the problem at present, when the ignition switch ON or idling. The MIL will stay ON when driving (engine speed is over 2,000 rpm (min^{-1})).
- The MIL has two types of blinks, a long blink and short blink. The long blinking lasts for 1.3 seconds, the short blinking lasts for 0.5 seconds. One long blink is the equivalent of ten short blinks. For example, when two long blinks are followed by five short blinks, the MIL is 25 (two long blinks = 20 blinks, plus five short blinks).
- When the PCM stores more than one DTC, the MIL will indicate them by blinking in the order from the lowest number to highest number.



MIL Check

When the ignition switch is turned ON and engine stop switch is "○", the MIL will stay on for a few seconds, then go off. If the MIL does not come on, troubleshoot the MIL circuit (page 6-31).

CURRENT DTC/FREEZE DTC

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

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

HDS POCKET TESTER INFORMATION

- The HDS can readout the DTC, freeze data, current data and other powertrain control module condition.

How to connect the HDS Pocket Tester

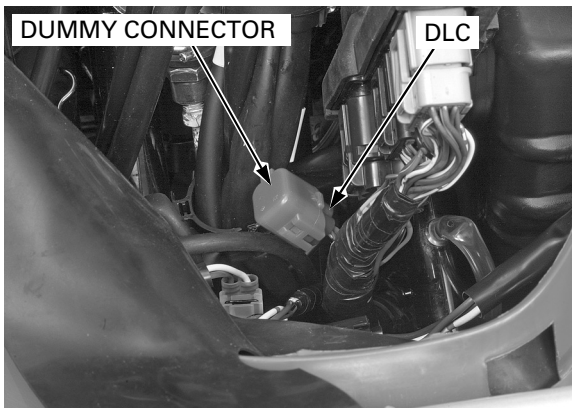
Turn the ignition switch to OFF.

Remove the steering cover (page 3-5).

Remove the dummy connector from the DLC.

Connect the HDS pocket tester to the DLC.

Turn the ignition switch to ON and engine stop switch "○", check the DTC and freeze data.



NOTE:

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

PCM reset

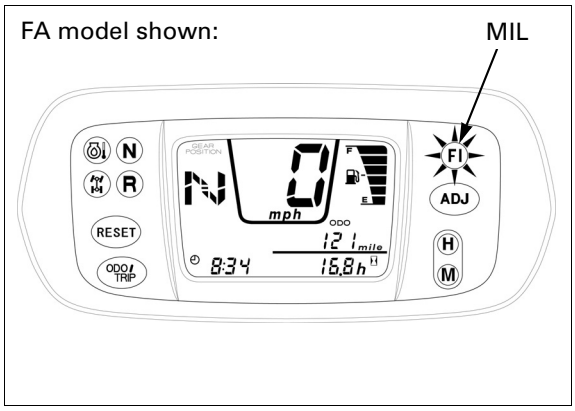
The HDS can reset the PCM data including the DTC, freeze data and some learning memory.

DTC READOUT

- When the ignition switch is turned ON, the MIL will stay on for a few seconds, then go off.
- After performing diagnostic troubleshooting, erase the problem code(s) (page 6-15) and test-ride the vehicle to be sure that the problem(s) have been removed.

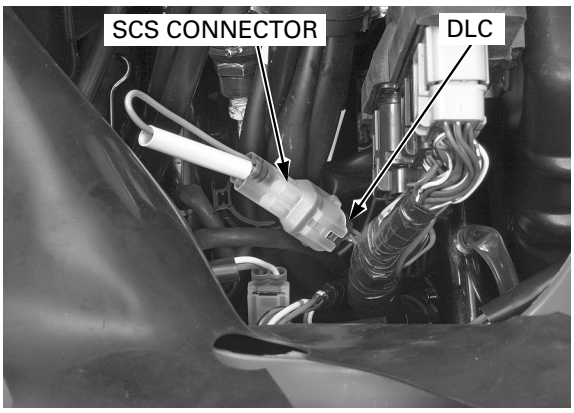
If the MIL stays on or blinks, connect the HDS Pocket Tester to the DLC (page 6-14).
Then read the DTC, freeze data and follow the troubleshooting index (page 6-17).

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



Reading DTC with the MIL

Start the engine and let it idle. Read the MIL blinking that is indicated as the current DTC and refer to the troubleshooting index (page 6-17).
When retrieving the freeze DTC, refer to the following procedure.



Turn the ignition switch to OFF.

Remove the steering cover (page 3-5).

Remove the dummy connector and short DLC terminals using the special tool.

TOOL:
SCS connector 070PZ-ZY30100
CONNECTION: Brown/red – Green

Turn the ignition switch to ON and engine stop switch "○", read, note the MIL blinks and refer to the troubleshooting index (page 6-17).

NOTE:
If the PCM has any DTC in its memory, the MIL will start blinking.

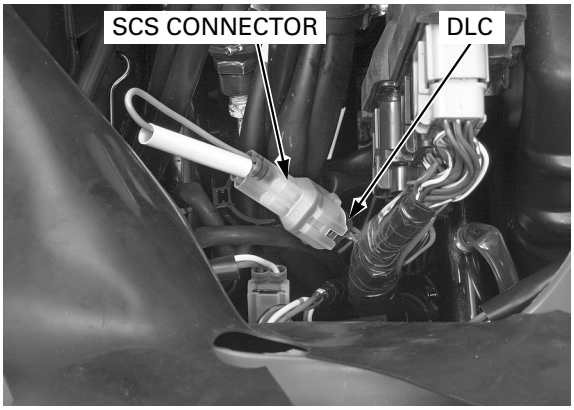
CLEARING DTC

Connect the HDS Pocket Tester to the DLC (page 6-14).

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

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

How to clear the DTC with SCS connector



1. Remove the steering cover (page 3-5).
2. Turn the ignition switch to OFF.

Make sure the engine stop switch is turned to "○."

3. Remove the dummy connector and short the DLC using the special tool.

   TOOL:
   SCS connector 070PZ-ZY30100
   CONNECTION: Brown/red – Green

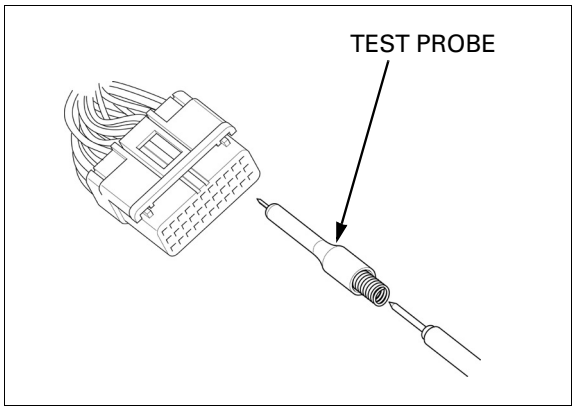
4. Turn the ignition switch to ON.
5. Remove the special tool from the DLC.
6. The MIL will light for approximately 5 seconds. While the MIL lights, short the DLC terminals again with the special tool. The self-diagnostic memory is erased if the malfunction indicator goes off and starts blinking.

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

CIRCUIT INSPECTION

INSPECTION AT PCM CONNECTOR

- Always clean around and keep any foreign material away from the PCM connector before disconnecting it.
- A faulty PGM-FI system is often related to poorly connected or corroded connections. Check those connections before proceeding.
- Do not pull the wire harness while disconnecting the PCM connectors.
- In testing at PCM connector (wire harness side) terminal, always use the test probe. Insert the test probe into the connector terminal, then attach the digital multimeter probe to the test probe.



TOOL:

Test probe	**07ZAJ-RDJA110**

PGM-FI DTC INDEX

DTC (MIL blinks)	Function Failure	Symptom/Fail-safe function	Refer to
1-1 (1)	MAP sensor circuit low voltage (less than 0.19 V) • MAP sensor or its circuit malfunction	• Engine operates normally • Fail-safe value: 29 kPa	6-18
1-2 (1)	MAP sensor circuit high voltage (more than 3.9 V) • Loose or poor contact of the MAP sensor connector • MAP sensor or its circuit malfunction	• Engine operates normally • Fail-safe value: 29 kPa	6-19
7-1 (7)	ECT sensor circuit low voltage (less than 0.07 V) • ECT sensor or its circuit malfunction	• Hard start at a low temperature • Fail-safe value: 78.6°C/173.5°F • Cooling fan turns on	6-20
7-2 (7)	ECT sensor circuit high voltage (more than 4.93 V) • Loose or poor contact of the ECT sensor connector • ECT sensor or its circuit malfunction	• Hard start at a low temperature • Fail-safe value: 78.6°C/173.5°F • Cooling fan turns on	6-22
8-1 (8)	TP sensor circuit low voltage (less than 0.22 V) • TP sensor or its circuit malfunction	• Poor engine acceleration • Fail-safe value: 0° • A/T shift function and anti-creep function does not work (2nd gear only)	6-23
8-2 (8)	TP sensor circuit high voltage (more than 4.93 V) • Loose or poor contact of the TP sensor connector • TP sensor or its circuit malfunction	• Poor engine acceleration • Fail-safe value: 0° • A/T shift function and anti-creep function does not work (2nd gear only)	6-24
9-1 (9)	IAT sensor circuit low voltage (less than 0.07 V) • IAT sensor or its circuit malfunction	• Engine operates normally • Pre-program value: 25°C/77°F	6-25
9-2 (9)	IAT sensor circuit high voltage (more than 4.93 V) • Loose or poor contact of the IAT sensor connector • IAT sensor or its circuit malfunction	• Engine operates normally • Fail-safe value: 25°C/77°F	6-26
11-1 (11)	Rear VS sensor no signal • Loose or poor contact of the VS sensor connector • VS sensor or its circuit malfunction	• Engine operates normally • Selectable 4WD system does not work (2WD mode only) • A/T shift function and anti-creep function does not work (2nd gear only)	6-27
12-1 (12)	Injector circuit malfunction • Loose or poor contact of the injector connector • Injector or its circuit malfunction	• Engine does not start • Injectors, fuel pump and ignition shut down	6-28
29-1 (29)	IACV circuit malfunction • Loose or poor contact of the IACV connector • IACV or its circuit malfunction	• Engine stalls, hard to start, rough idling	6-29
33-2 (–)	PCM EEPROM malfunction	• Engine operates normally	6-53

DTC TROUBLESHOOTING

DTC 1-1 (MAP SENSOR LOW VOLTAGE)

1. MAP Sensor System Inspection

Turn the ignition switch ON and engine stop switch "◯".
Check the MAP sensor with the HDS pocket tester.

Is about 0 V indicated?

YES – GO TO STEP 2.

NO – • Intermittent failure
• Loose or poor contact on the MAP sensor connector

2. MAP Sensor Input Voltage Inspection

Remove the fuel tank left side cover (page 3-6).

Turn the ignition switch OFF.
Disconnect the MAP/TP sensor 5P (Black) connector.

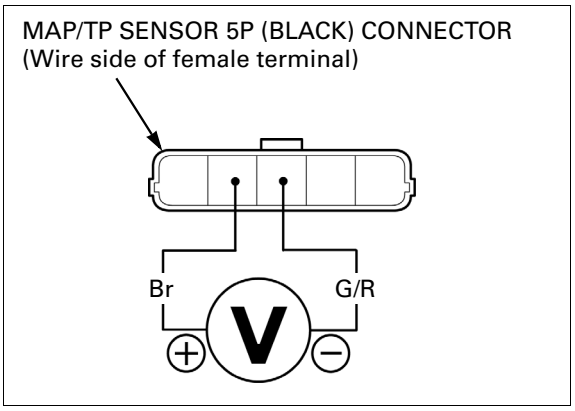
Turn the ignition switch ON and engine stop switch "◯".
Measure the voltage at the wire harness side.

Connection: Brown (+) – Green/red (–)

Is the voltage within 4.75 – 5.25V?

YES – GO TO STEP 4.

NO – GO TO STEP 3.



3. MAP Sensor Input Line Inspection

Turn the ignition switch OFF.
Disconnect the PCM 33P (Gray) connector.

Check for continuity of the Brown wire between the MAP/TP sensor 5P (Black) connector terminal and the PCM 33P (Gray) connector terminals.

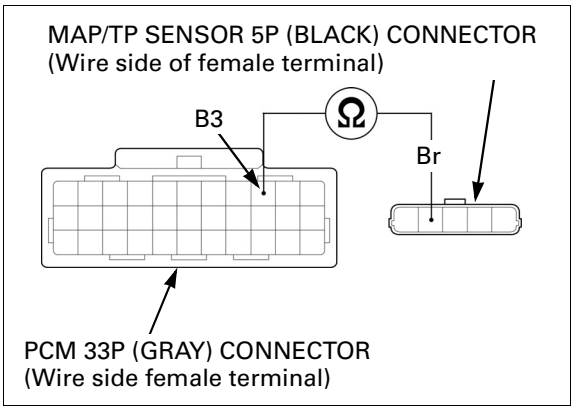
TOOL:
Test probe **07ZAJ-RDJA110**

Connection: B3 – Brown

Is there continuity?

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

NO – Open circuit in Brown wire



4. MAP Sensor Output Line Short Circuit Inspection

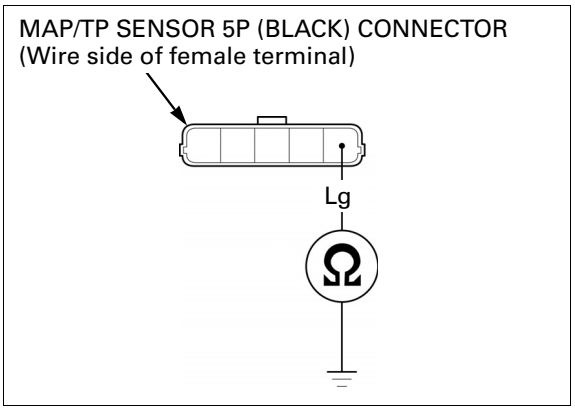
Check for continuity between the MAP/TP sensor 5P (Black) connector terminal of the wire harness side and ground.

Connection: Light green – ground

Is there continuity?

YES – Short circuit in Light green wire

NO – GO TO STEP 5.



5. MAP Sensor Inspection

Replace the MAP/TP sensor with a known good one (page 6-43).
Clear the DTC (page 6-14).
Turn the ignition switch ON and engine stop switch "◯".

Check the MAP sensor with the HDS pocket tester.

Is DTC 1-1 indicated?

YES – Replace the PCM with a known good one, and recheck

NO – Faulty original MAP/TP sensor

DTC 1-2 (MAP SENSOR HIGH VOLTAGE)

- Before starting the inspection, check for loose or poor contact on the MAP/TP sensor 5P (Black) connector and recheck the DTC.

1. MAP Sensor System Inspection 1

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

Check the MAP sensor with the HDS pocket tester.

Is about 5 V indicated?

YES – GO TO STEP 2.

NO – • Intermittent failure
• Loose or poor contact on the MAP/TP sensor connector

2. MAP Sensor System Inspection 2

Turn the ignition switch OFF.

Disconnect the MAP/TP sensor 5P (Black) connector.
Jump the MAP sensor terminals at the wire harness side with a jumper wire.

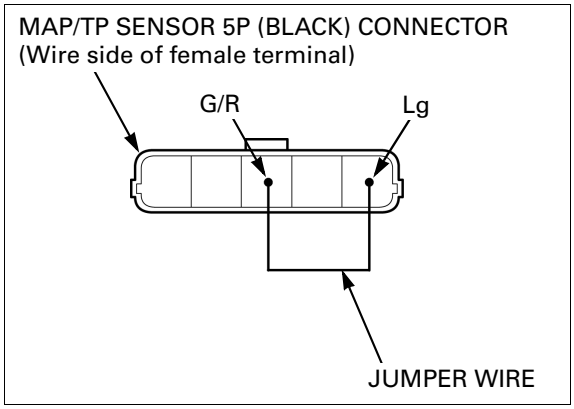
Connection: Light green – Green/red

Turn the ignition switch ON and engine stop switch "◯".
Check the MAP sensor with the HDS pocket tester.

Is about 0 V indicated?

YES – Faulty MAP/TP sensor

NO – GO TO STEP 3.



3. MAP Sensor Input Voltage Inspection

Turn the ignition switch OFF.
Remove the jumper wire.

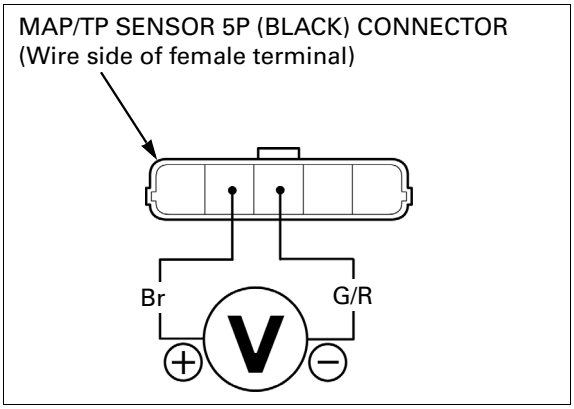
Turn the ignition switch ON and engine stop switch "".
Measure the voltage at the wire harness side terminals.

Connection: Brown (+) – Green/red (–)

Is the voltage within 4.75 – 5.25V?

YES – GO TO STEP 4.

NO – Open circuit in Green/red or Brown wire



4. MAP Sensor Output Line Open Circuit Inspection

Turn the ignition switch OFF.

Disconnect the PCM 33P (Gray) connector.
Check for continuity of the Light green wire between the MAP/TP sensor 5P (Black) connector terminal and the PCM 33P (Gray) connector terminal.

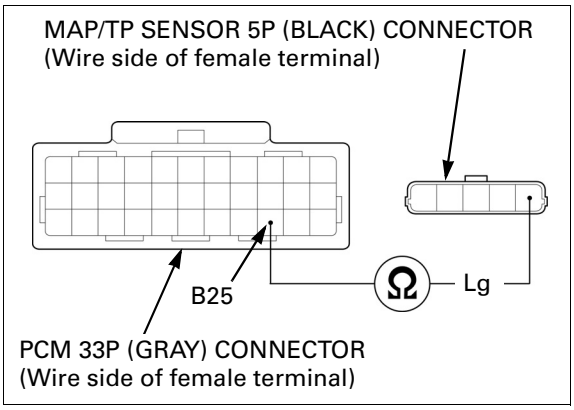
TOOL:
Test probe **07ZAJ-RDJA110**

Connection: B25 – Light green

Is there continuity?

YES – Replace the PCM with a known good one, and recheck

NO – Open circuit in Light green wire



DTC 7-1 (ECT SENSOR LOW VOLTAGE)

1. ECT Sensor System Inspection

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

Check the ECT sensor with the HDS pocket tester.

Is about 0 V indicated?

NO – • Intermittent failure.
• Loose or poor contact on the ECT sensor connector.

YES – GO TO STEP 2.

2. ECT Sensor Inspection

Remove the fuel tank left side cover (page 3-6).

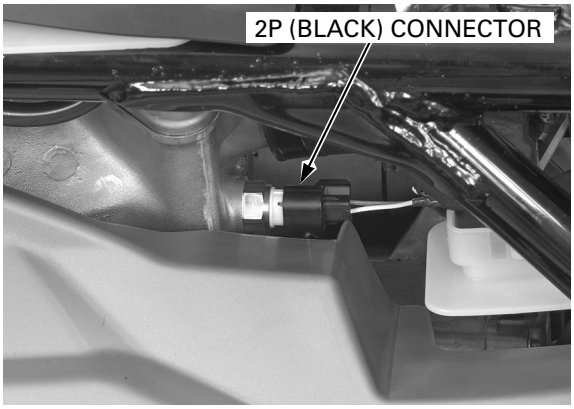
Turn the ignition switch OFF.
Disconnect the ECT sensor 2P (Black) connector.

Turn the ignition switch ON and engine stop switch "".
Check the ECT sensor with the HDS pocket tester.

Is about 0 V indicated?

NO – GO TO STEP 3.

YES – GO TO STEP 4.



3. ECT Sensor Resistance Inspection

Turn the ignition switch OFF.

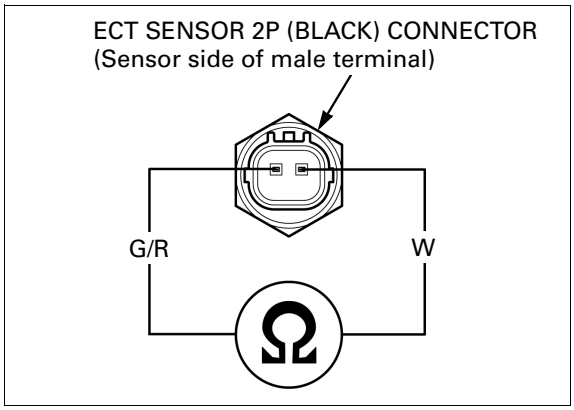
Measure the resistance at the ECT sensor terminals.

Connection: White – Green/red
Standard: 2.3 – 2.6 kΩ (20°C/68°F)

Is the resistance within 2.3 – 2.6 kΩ ?

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

No – Faulty ECT sensor.



4. ECT Sensor Short Circuit Inspection

Disconnect the PCM 33P (Gray) connector from the PCM (page 6-53).

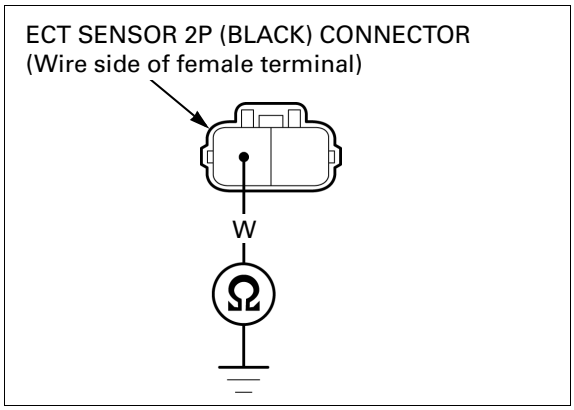
Check for continuity between the ECT sensor 2P (Black) connector terminal of the wire harness side and ground.

Connection: White – Ground

Is there continuity?

YES – Short circuit in White wire.

NO – Replace the PCM with a new one, and recheck.



DTC 7-2 (ECT SENSOR HIGH VOLTAGE)

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

1. ECT Sensor System Inspection

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

Check the ECT sensor with the HDS pocket tester.

Is about 5 V indicated?

NO – • Intermittent failure.
• Loose or poor contact on the ECT sensor 2P (Black) connector.

YES – GO TO STEP 2.

2. ECT Sensor Inspection

Remove the fuel tank left side cover (page 3-6).
Turn the ignition switch OFF.

Disconnect the ECT sensor 2P (Black) connector.
Jump the ECT sensor terminals with a jumper wire.

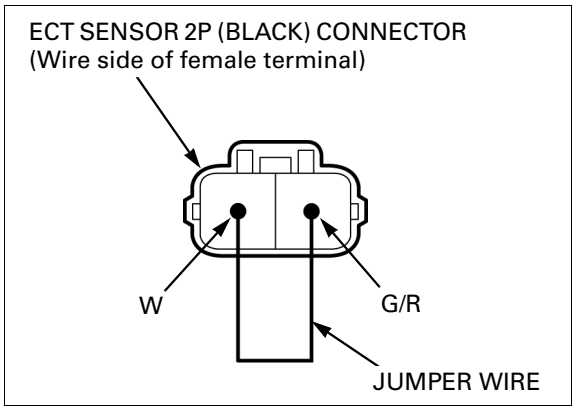
Connection: White – Green/red

Turn the ignition switch ON and engine stop switch "○".
Check the ECT sensor with the HDS pocket tester.

Is about 0 V indicated?

YES – Faulty ECT sensor.

NO – GO TO STEP 3.



3. ECT Sensor Open Circuit Inspection

Turn the ignition switch OFF.
Disconnect the jumper wire.

Disconnect the PCM 33P (Gray) connector (page 6-53).
Check for continuity between the PCM 33P (Gray) connector terminals and ECT sensor 2P (Black) connector terminals of the wire harness side.

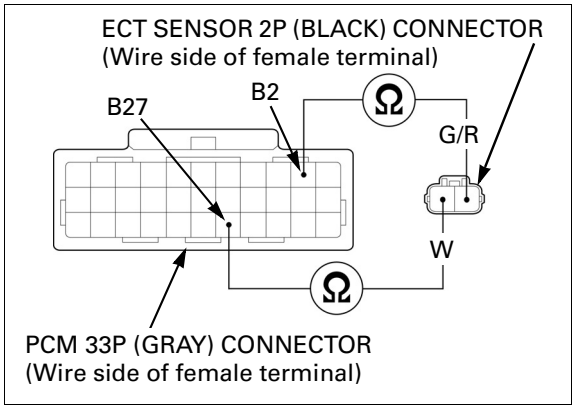
TOOL:
Test probe **07ZAJ-RDJA110**

Connection: B27 – White
B2– Green/red

Is there continuity?

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

NO – • Open circuit in White wire.
• Open circuit in Green/red wire.



DTC 8-1 (TP SENSOR LOW VOLTAGE)

- Before starting the inspection, check for loose or poor contact on the MAP/TP sensor 5P (Black) connector and recheck the DTC.

1. TP Sensor System Inspection

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

Check the TP sensor with the HDS when the throttle is fully closed.

Is about 0 V indicated?

YES – GO TO STEP 3.

NO – GO TO STEP 2.

2. TP Sensor Inspection

Check that the TP sensor voltage is increasing uninterrupted when moving the throttle from fully closed to fully opened using the data list menu of the HDS pocket tester.

Does the voltage increase continuously?

YES – • Intermittent failure.
• Loose or poor contact on the MAP/TP sensor connector

NO – Faulty TP sensor.

3. TP Sensor Input Voltage Inspection

Turn the ignition switch OFF.
Disconnect the MAP/TP sensor 5P (Black) connector.

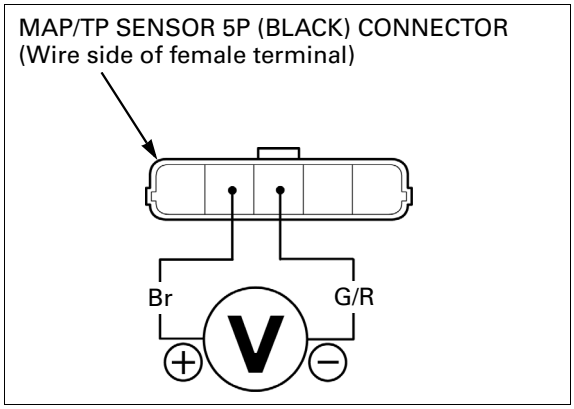
Turn the ignition switch ON and engine stop switch "".
Measure the voltage at the wire harness side terminals.

Connection: Brown (+) – Green/red (–)

Is the voltage within 4.75 – 5.25 V?

YES – GO TO STEP 5.

NO – GO TO STEP 4.



4. TP Sensor Circuit Inspection

Turn the ignition switch OFF.

Disconnect the PCM 33P (Gray) connector.
Check for continuity at the Brown wire between the MAP/TP sensor 5P (Black) connector terminal and the PCM 33P (Gray) connector terminal.

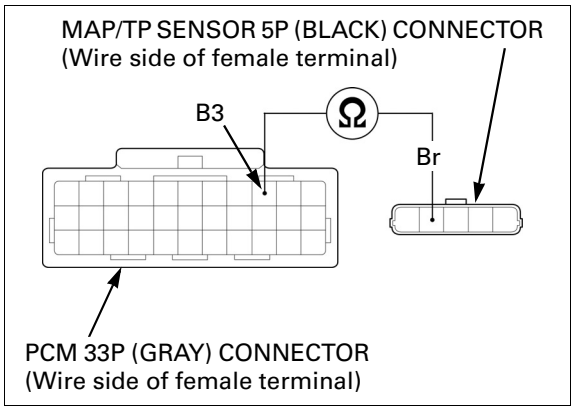
TOOL:
Test probe **07ZAJ-RDJA110**

Connection: B3 – Brown

Is there continuity?

YES – Replace the PCM with a known good one, and recheck

NO – Open circuit in Brown wire



5. TP Sensor Output Line Open Circuit Inspection

Check for continuity at the Yellow wire between the MAP/TP sensor 5P (Black) connector terminal and the PCM 33P (Gray) connector terminal.

TOOL:

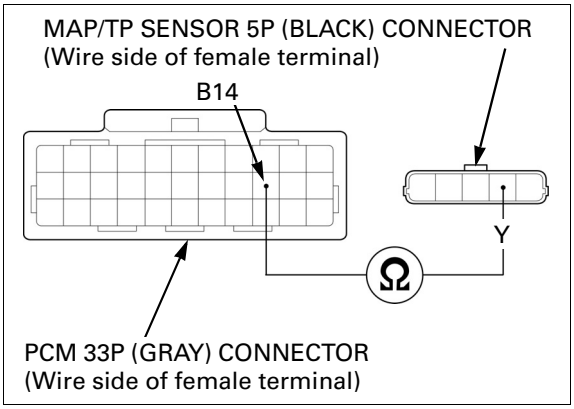
Test probe **07ZAJ-RDJA110**

Connection: B14 – Yellow

Is there continuity?

YES – GO TO STEP 6.

NO – Open circuit in Yellow wire



6. TP Sensor Output Line Short Circuit Inspection

Disconnect the MAP/TP sensor 5P (Black) connector.

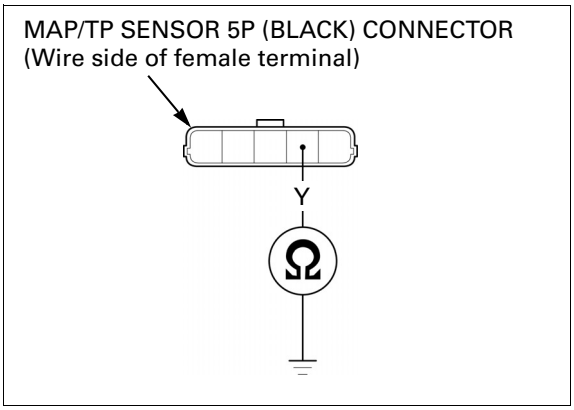
Check for continuity between the MAP/TP sensor 5P (Black) connector terminal of the wire harness side and ground.

Connection: Yellow – Ground

Is there continuity?

YES – Short circuit in Yellow wire

NO – GO TO STEP 7.



7. TP Sensor Inspection

Replace the MAP/TP sensor with a known good one.
Reset the PCM (page 6-14).
Turn the ignition switch ON and engine stop switch "◯".

Check the TP sensor with the HDS pocket tester.

Is DTC 8-1 indicated?

YES – Replace the PCM with a known good one, and recheck

NO – Faulty original MAP/TP sensor

DTC 8-2 (TP SENSOR HIGH VOLTAGE)

1. TP Sensor System Inspection

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

Check the TP sensor with the HDS pocket tester.

Is about 5 V indicated?

YES – GO TO STEP 3.

NO – GO TO STEP 2.

2. TP Sensor Inspection

Check that the TP sensor voltage is increasing continuously when moving the throttle from fully closed to fully opened using the data list menu.

Is the voltage increasing continuously?

YES – • Intermittent failure.
• Loose or poor contact on the MAP/TP sensor connector

NO – Faulty TP sensor.

3. TP Sensor Resistance Inspection

Turn the ignition switch OFF.

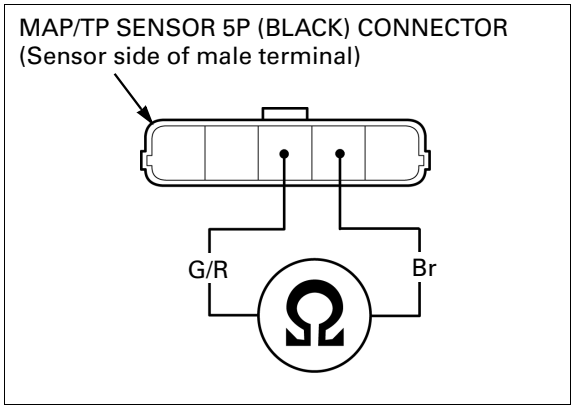
Disconnect the MAP/TP sensor 5P (Black) connector.
Measure the resistance at the TP sensor side terminals.

Connection: Brown – Green/red

Is the resistance within 1.0 - 3.0 kΩ

YES – GO TO STEP 4.

NO – Faulty TP sensor



4. TP Sensor Input Voltage Inspection

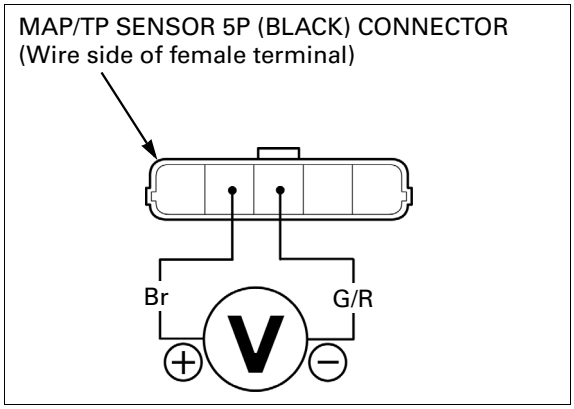
Turn the ignition switch ON and engine stop switch "○".
Measure the voltage at the wire harness side terminals.

Connection: Brown (+) – Green/red (–)

Is the voltage within 4.75 – 5.25 V?

YES – Replace the PCM with a known good one, and recheck

NO – Open circuit in Green/red or Brown wires



DTC 9-1 (IAT SENSOR LOW VOLTAGE)

1. IAT Sensor System Inspection

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

Check the IAT sensor with the HDS pocket tester.

Is about 0 V indicated?

YES – GO TO STEP 2.

NO – • Intermittent failure
• Loose or poor contact on the IAT sensor connector

2. IAT Sensor Inspection

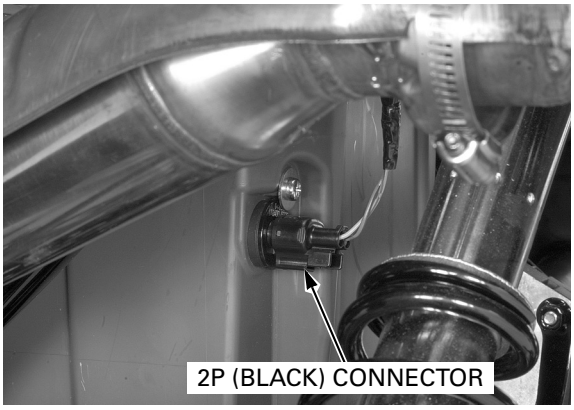
Turn the ignition switch OFF.
Disconnect the IAT sensor 2P (Black) connector.

Turn the ignition switch ON and engine stop switch "○".
Check the IAT sensor with the HDS pocket tester.

Is about 0 V indicated?

YES – GO TO STEP 3.

NO – Faulty IAT sensor



3. IAT Sensor Output Line Short Circuit Inspection

Disconnect the PCM 33P (Gray) connector from the PCM (page 6-43).

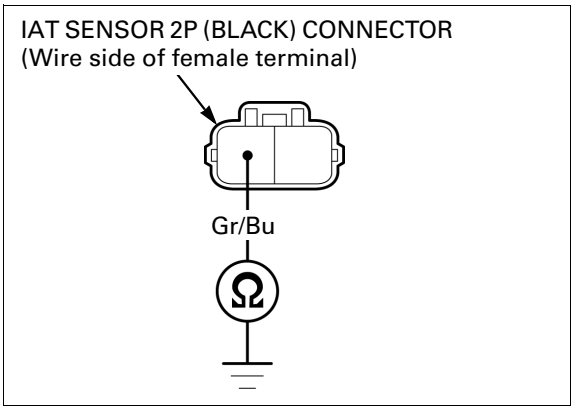
Check for continuity between the IAT sensor 2P (Black) connector terminal of the wire harness side and ground.

Connection: Gray/blue – ground

Is there continuity?

YES – Short circuit in Gray/blue wire

NO – Replace the PCM with a known good one, and recheck



DTC 9-2 (IAT SENSOR HIGH VOLTAGE)

- Before starting the inspection, check for loose or poor contact on the IAT sensor connector and recheck the DTC.

1. IAT Sensor System Inspection

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

Check the IAT sensor with the HDS pocket tester.

Is about 5 V indicated?

YES – GO TO STEP 2.

NO – • Intermittent failure
• Loose or poor contact on the IAT sensor connector

2. IAT Sensor Inspection

Turn the ignition switch OFF.

Disconnect the IAT sensor 2P (Black) connector.
Jump the IAT sensor terminals with a jumper wire.

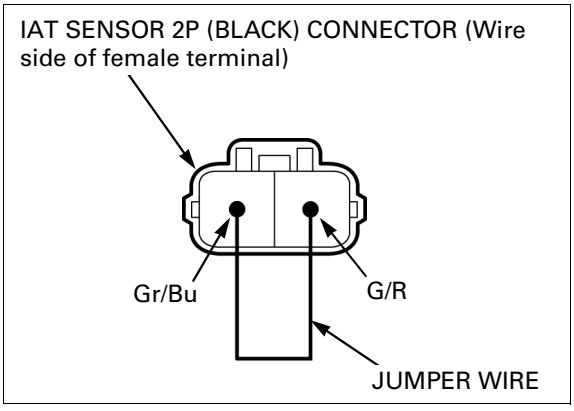
Connection: Gray/blue – Green/red

Turn the ignition switch ON and engine stop switch "○".
Check the IAT sensor with the HDS pocket tester.

Is about 0 V indicated?

YES – Faulty IAT sensor

NO – GO TO STEP 3.



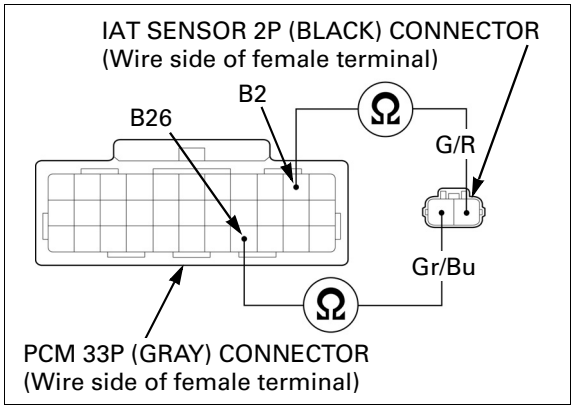
3. IAT Sensor Open Circuit Inspection

Turn the ignition switch OFF.

Disconnect the PCM 33P (Gray) connector.
Check for continuity at the Gray/blue and Green/red wire between the IAT sensor 2P (Black) connector terminals and the PCM 33P (Gray) connector terminals.

TOOL:
Test probe **07ZAJ-RDJA110**

Connection: B2 – Green/red
B26– Gray/blue



Is there continuity?

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

NO – • Open circuit in Gray/blue wire
• Open circuit in Green/red wire

DTC 11-1 (REAR VS SENSOR NO SIGNAL)

- Before starting the inspection, check for loose or poor contact on the rear VS (Vehicle Speed) sensor 3P (Yellow) connector and recheck the DTC.

1. Rear VS Sensor System Inspection

Test-ride the vehicle and check the rear VS sensor with HDS pocket tester.

Is vehicle speed indicated normally?

YES – Intermittent failure.

NO – GO TO STEP 2.

2. Rear VS Sensor Input Voltage Inspection

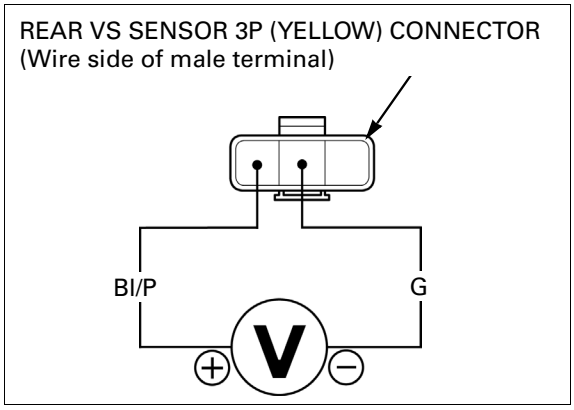
Turn the ignition switch OFF.

Disconnect the rear VS sensor 3P (Yellow) connector (page 23-9).

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

Measure the voltage at the rear VS sensor connector terminals of the wire harness side.

Connection: Black/pink (+) – Green (–)



Is there battery voltage?

NO – • Open or short circuit in the Black/pink wire.
• Open circuit in the Green wire.

YES – GO TO STEP 3.

3. Rear VS Sensor Output Line Inspection

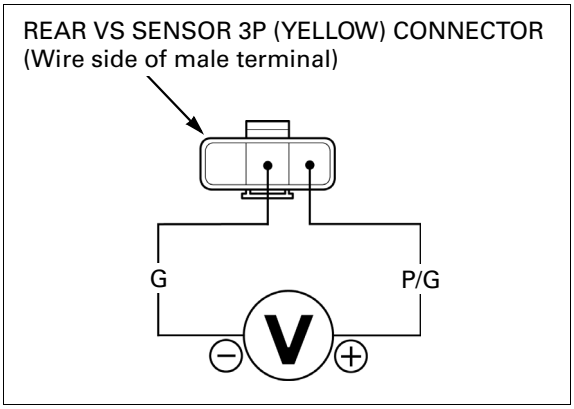
Measure the voltage between the wire harness side rear VS sensor 3P (Yellow) connector terminals.

Connection: Pink/green (+) – Green (–)

Is the voltage about 5 V?

NO – Open or short circuit in the Pink/green wire.

YES – GO TO STEP 4.



4. Rear VS Sensor Inspection

Turn the ignition switch OFF.

Replace the rear VS sensor with a new one (page 23-9).

Clear the DTC, test ride the vehicle and recheck the DTC.

Is the DTC 11-1 indicated?

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

NO – Faulty original rear VS sensor.

DTC 12-1 (INJECTOR)

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

1. Injector System Inspection

Clear the DTC (page 6-15).
Turn the ignition switch ON and engine stop switch "○", or start the engine, recheck the DTC.

Is the DTC 12-1 indicated?

NO – • Intermittent failure.
• Loose or poor contact on the injector 2P (Gray) connector.

YES – GO TO STEP 2.

2. Injector Resistance Inspection

Remove the seat (page 3-4).
Remove the trim clip and throttle body cover (page 6-43).
Disconnect the injector 2P (Gray) connector.

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

Measure the resistance of the injector connector terminals on the injector side.

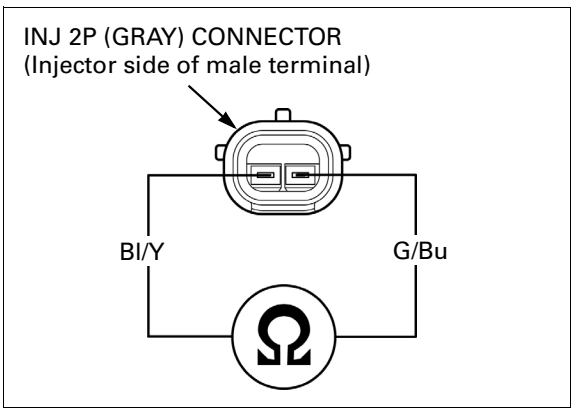
Connection: Black/yellow – Green/blue

Standard: 11.1 – 12.3 Ω (20°C/68°F)

Is the resistance within 11.1 – 12.3 Ω (20°C/68°F)?

NO – Faulty injector.

YES – GO TO STEP 3.



3. Injector Open Circuit Inspection

Turn the ignition switch OFF.

Disconnect the PCM 33P (Gray) and 33P (Black) connector (page 6-43).

Check for continuity between the PCM 33P (Gray and Black) connectors and injector 2P (Gray) connector of the wire harness side.

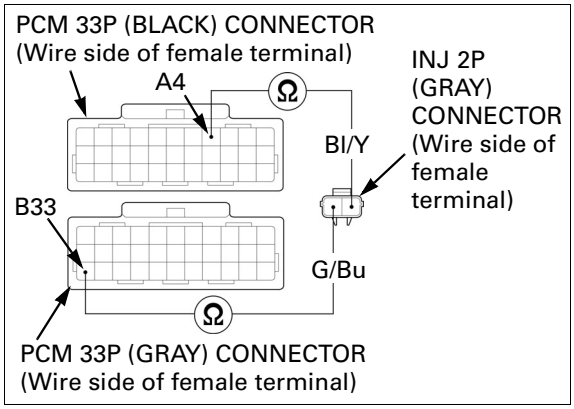
TOOL:
Test probe **07ZAJ-RDJA110**

Connection: B33 – Green/blue
A4 – Black/yellow

Is there continuity?

NO – • Open circuit in Green/blue wire.
• Open circuit in Black/yellow wire.

YES – GO TO STEP 4.



4. Injector Signal Line Short Circuit Inspection

Be sure to disconnect the PCM connector.

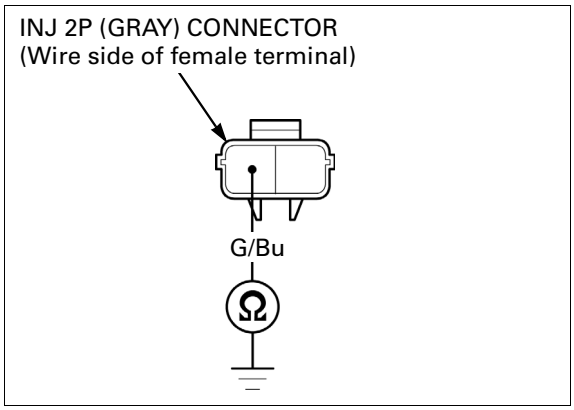
Check for continuity between the injector connector terminal and ground.

Connection: Green/blue – Ground

Is there continuity?

YES – Short circuit in the Green/blue wire.

NO – Replace the PCM with a new one, and recheck.



DTC 29-1 (IACV)

- Before starting the inspection, check for loose or poor contact on the IACV 4P (Black) connector and recheck the DTC.

1. Recheck DTC

Clear the DTC (page 6-15).
Start the engine and recheck the DTC.

Is the DTC 29-1 indicated?

NO – • Intermittent failure.
• Loose or poor contact on the IACV connector.

YES – GO TO STEP 2.

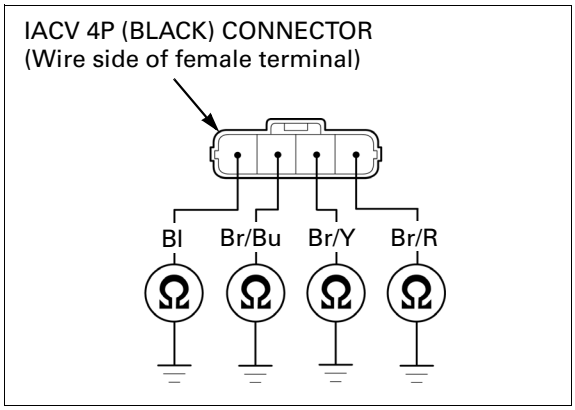
2. IACV Short Circuit Inspection

Remove the seat (page 3-4).
Remove the trim clip and throttle body cover (page 6-43).

Turn the ignition switch OFF.
Disconnect the IACV 4P (Black) connector.

Check for continuity between the IACV 4P (Black) connector and ground on all wires.

Connection: Black – Ground
Brown/blue – Ground
Brown/yellow – Ground
Brown/red – Ground



Is these continuity on all wires?

YES – • Short circuit in Black or Brown/red wire.
• Short circuit in Brown/blue or Brown/yellow wire.

NO – GO TO STEP 3.

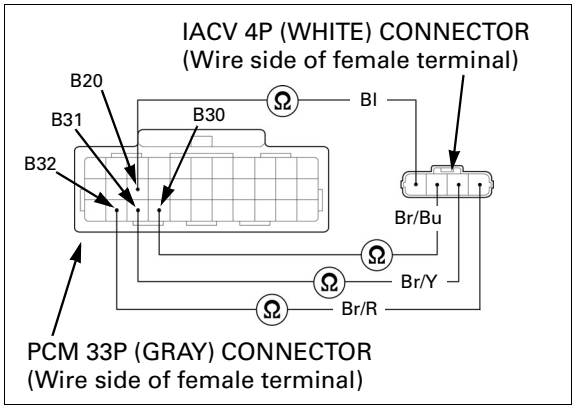
3. IACV Circuit Continuity Inspection

Disconnect the PCM 33P (Gray) connector.

Check for continuity between the PCM 33P (Gray) connector and the IACV 4P (Black) connector.

TOOL:
Test probe 07ZAJ-RDJA110

Connection: B20 – Black
B30 – Brown/blue
B31 – Brown/yellow
B32 – Brown/red



Are there continuities?

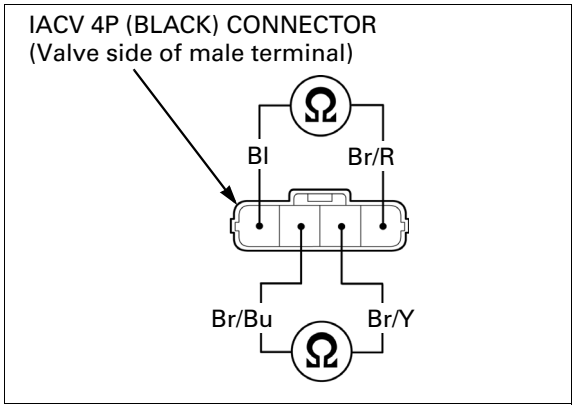
YES – GO TO STEP 4.

NO – • Open or loose contact in Black or Brown/red wire.
• Open or loose contact in Brown/blue or Brown/yellow wire.

4. IACV Resistance Inspection

Measure the resistance at the terminals of the IACV 4P (Black) connector on the valve side

Connection: Black – Brown/red
Brown/blue – Brown/yellow
Standard: 120 – 140 Ω (20°C/68°F)



Is the resistance within 120 – 140 Ω (20°C/68°F)?

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

NO – Faulty IACV.

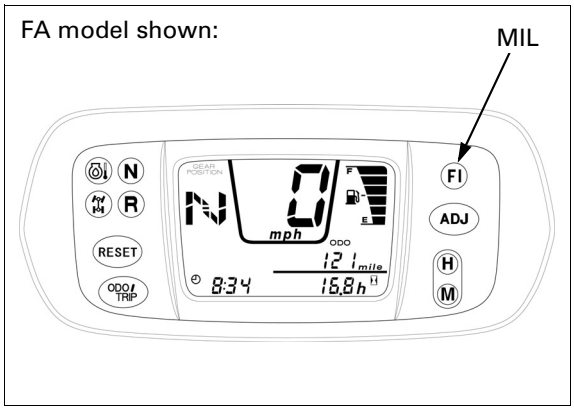
MIL CIRCUIT INSPECTION

If the engine can be started but the MIL does not come on with the ignition switch ON and engine stop switch "○", check as follows:

Check the various functions of the combination meter.

– If they do not function, check the combination meter power input line (page 23-8).
– If they function properly, check as follows:

Turn the ignition switch OFF.
Disconnect the PCM 33P (Gray) connector.

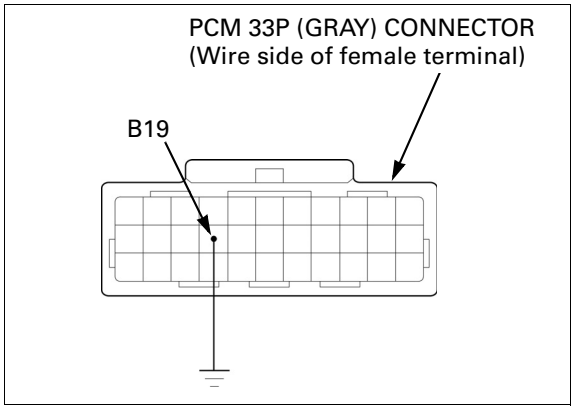


Ground the White/blue (B19) wire terminal of the wire harness side connector with a jumper wire.

TOOL:
Test probe **07ZAJ-RDJA110**

Turn the ignition switch ON and engine stop switch "○", the MIL should come on.

– If the MIL comes on, replace the PCM.
– If the MIL does not come on, check for open circuit in the White/blue wire between the combination meter and PCM.
If the wire is OK, replace the combination meter.



FUEL LINE INSPECTION

FUEL PRESSURE RELIEVING/QUICK CONNECT FITTING REMOVAL

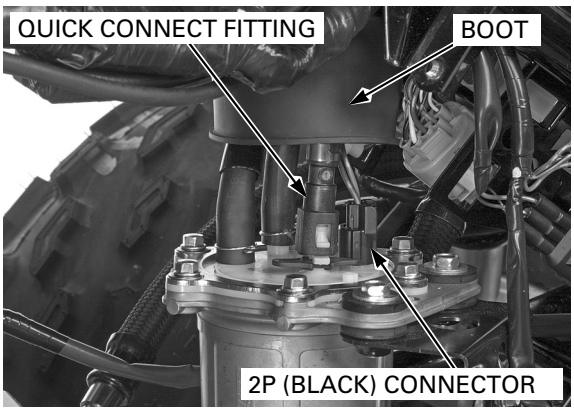
- Before disconnecting fuel feed hose, relieve pressure from the system as following procedures.
- Do not bent or twist fuel feed hose.

1. Turn the ignition switch OFF.

   Pull up the rubber boot and disconnect the fuel pump 2P (Black) connector.

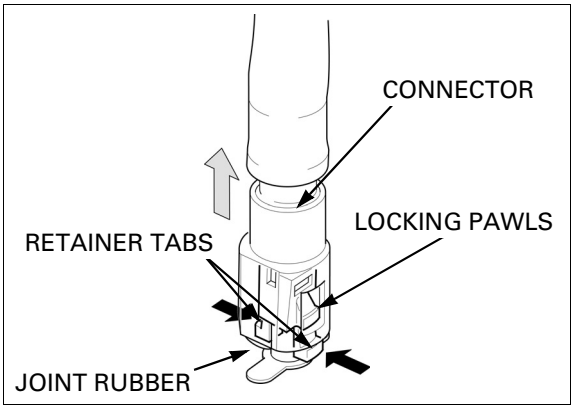
2. Start the engine, and let it idle until it stalls.
3. Turn the ignition switch OFF.
4. Disconnect the battery cable (page 20-6).
5. Check the fuel quick connect fitting for dirt, and clean if necessary.

   Place a shop towel over the quick connect fitting.

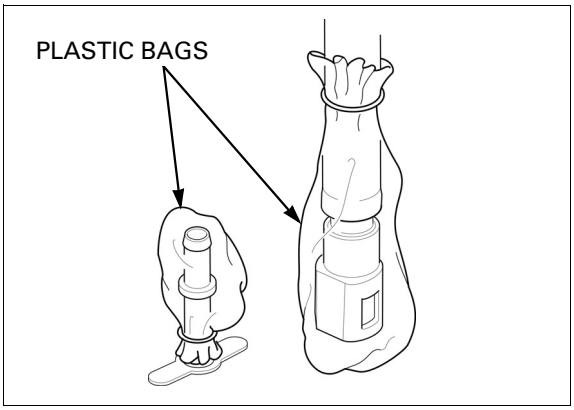


6. Hold the connector with one hand and squeeze the retainer tabs with the other hand release them from the locking pawls.
   Pull the connector off.

- Prevent the remaining fuel in the fuel feed hose from flowing out with a shop towel.
- Be careful not to damage the hose or other parts.
- Do not use tools.
- If the connector does not move, keep the retainer tabs pressed down, and alternately pull and push the connector until it releases.



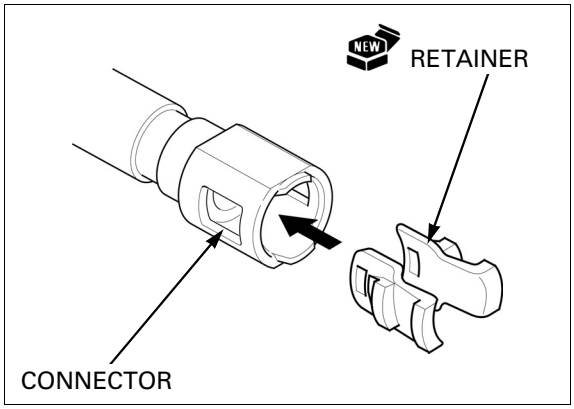
7. To prevent damage and keep foreign matter out, cover the disconnected connector and pipe end with the plastic bags.



QUICK CONNECT FITTING INSTALLATION

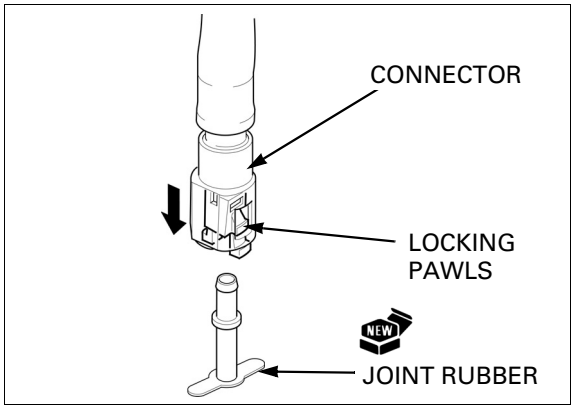
- Always replace the retainer of the quick connect fitting and joint rubber when the fuel feed hose is disconnected.
- If any retainer needs replacing, use the same manufacture's retainer as the ones being removed (The several manufactures feature different retainer specifications).
- If any damage or cut-out on the rubber cap, replace it with a new one.
- Do not bent or twist the fuel feed hose.

1. Insert a new retainer into the connector.

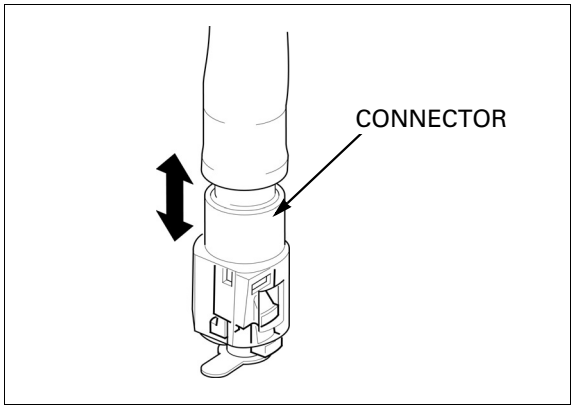


2. Set a new joint rubber to the fuel pipe as shown.
3. Align the quick connect fitting with the pipe and align the new retainer locking pawls with the connector grooves in the rubber lock piece.
   Then press the quick connect fitting onto the pipe until both retainer pawls lock with a "CLICK".

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

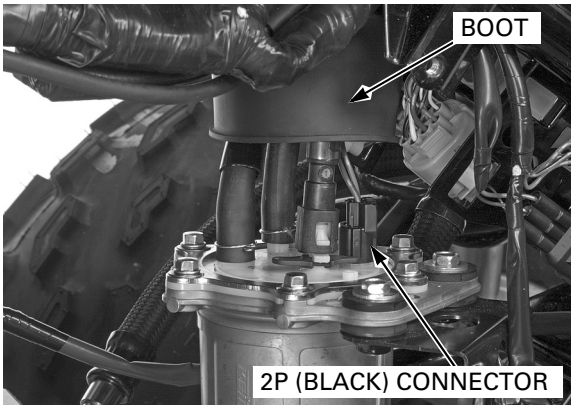


4. Make sure the connection is secure and that the pawls are firmly locked into place; check visually and by pulling the connector.



5. Connect the fuel pump 2P (Black) connector.

   Install the boot properly.



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

Do not start the engine.

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

   The fuel pump will run for about 2 seconds, and fuel pressure will rise.
   Repeat 2 or 3 times, and check that there is no leakage in the fuel supply system.

FUEL PRESSURE TEST

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

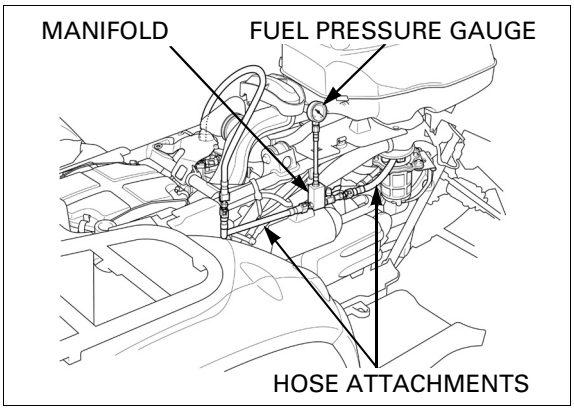
Attach the fuel pressure gauge, attachment and manifold between the fuel pump and quick connector.

TOOLS:

Fuel pressure gauge	**07406-0040004**
Pressure gauge manifold	**07ZAJ-S5A0111**
Pressure gauge hose attachment A	**07ZAJ-S5A0120**
Pressure gauge hose attachment B	**07ZAJ-S5A0130**
Hose attachment B joint	**07ZAJ-S5A0150**

U.S.A. TOOLS:

Fuel pressure gauge, 100psi	**07406-004000B**
Pressure manifold hose	**07AMJ-HW3A100**
Adaptor, male	**07AAJ-S6MA200**
Adaptor, female	**07AAJ-S6MA400**



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

Start the engine and let it idle.

Read the fuel pressure.

Standard: 284 – 304 kPa
(2.9 – 3.1 kgf/cm^2, 41 – 44 psi)

If the fuel pressure is higher than specified, replace the fuel pump assembly (faulty fuel pump or fuel pressure regulator).

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

– Check the fuel flow
– Pinched or clogged fuel feed hose or fuel tank breather hose
– Fuel pump (page 6-36)
– Clogged fuel filter (Faulty fuel pump assembly)

Wrap a shop towel around the attachment to soak up any spilled fuel.

After inspection, relieve the fuel pressure by starting the engine and let it idle until it stalls.

Remove the fuel pressure gauge, attachment and manifold from the fuel pump.

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

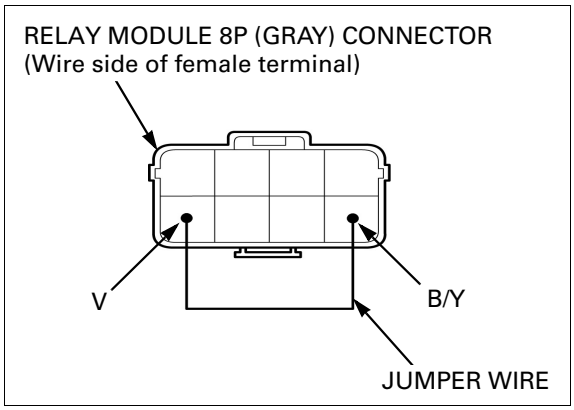
FUEL FLOW INSPECTION

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

Turn the ignition switch OFF.

Disconnect the relay module 8P (Gray) connector.

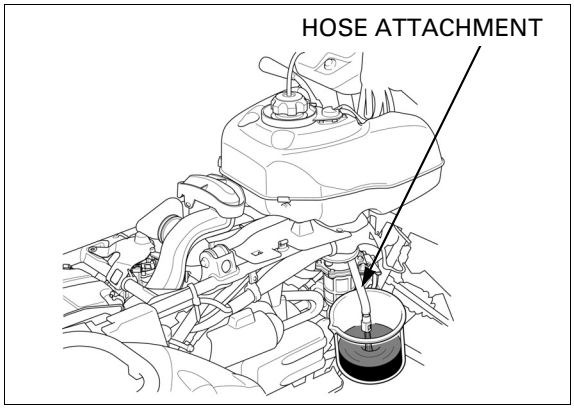
Jump the Black/yellow and Violet wire terminals of the wire harness side using a jumper wire.



Connect the hose attachment to the fuel pump joint.

TOOL:
Pressure gauge hose attachment 07ZAJ-S5A0130

U.S.A. TOOLS:
Pressure manifold hose 07AMJ-HW3A100
Adaptor, female 07AAJ-S6MA400



Wipe spilled gasoline out of the container.

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

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

Turn the ignition switch ON, engine stop switch "○" for 10 seconds.
Measure the amount of fuel flow.

Amount of fuel flow:
71 cm³ (2.4 US oz, 2.5 Imp oz) minimum /10 seconds at 12 V

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

– Fuel pump (page 6-36).
– Clogged fuel filter (Faulty fuel pump assembly)

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

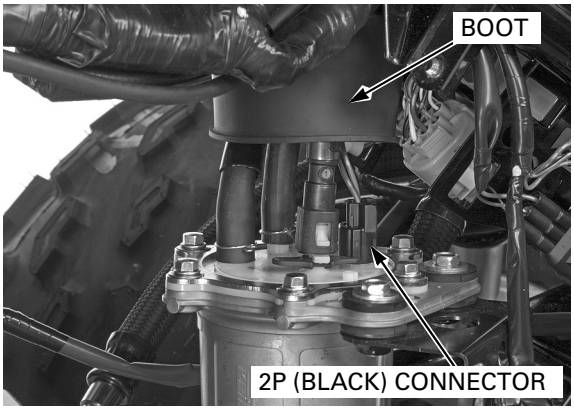
SUB FUEL TANK/FUEL PUMP

INSPECTION

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

Turn the ignition switch OFF.

Pull up the rubber boot and disconnect the fuel pump 2P (Black) connector.



Turn the ignition switch ON, engine stop switch "○" and measure the voltage between the terminals.

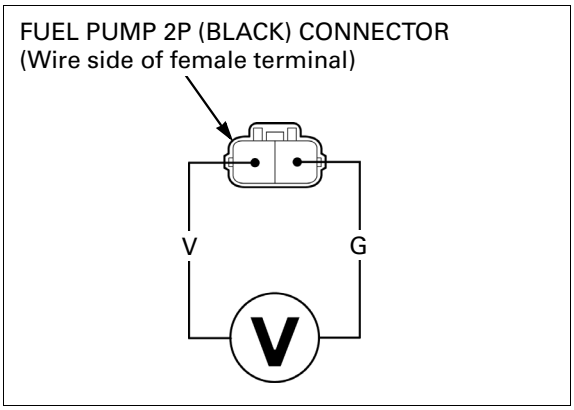
Connection: Violet (+) – Green (–)

There should be battery voltage for a few seconds.

If there is battery voltage, replace the sub fuel tank assembly.

If there is no battery voltage, inspect the following:

– open circuit in Violet wire and/or Green wire
– fuse
– fuel pump relay (page 6-38)
– engine stop relay (page 6-52)
– engine stop switch (page 23-7)
– bank angle sensor (page 6-51)
– PCM (page 6-53)



REMOVAL

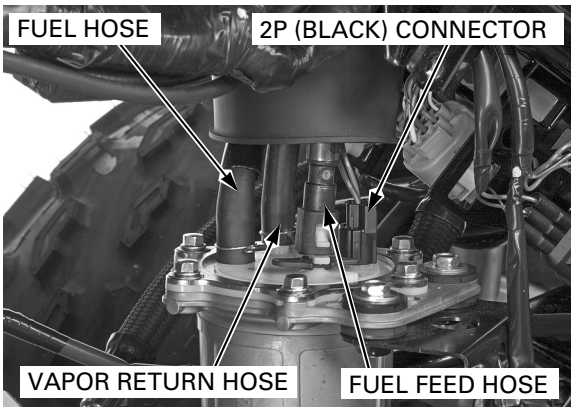
NOTE:

- Do not disassemble the sub fuel tank.

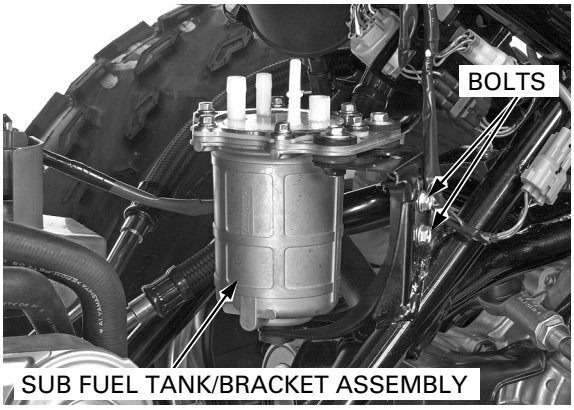
After disconnecting the fuel pump 2P (Black) connector, be sure to relieve the fuel pressure by starting the engine and let it idle until it stalls.

Remove the following:

– fuel pump 2P (Black) connector
– fuel feed hose
– fuel vapor return hose
– fuel hose



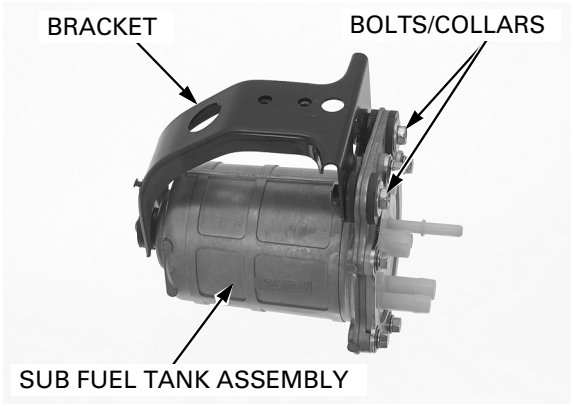
Remove the bolts and sub fuel tank/bracket assembly.



Remove the bolts, then remove the sub fuel tank and collars from the bracket.

Check the sub-fuel tank for damage.

Replace the sub fuel tank as necessary.

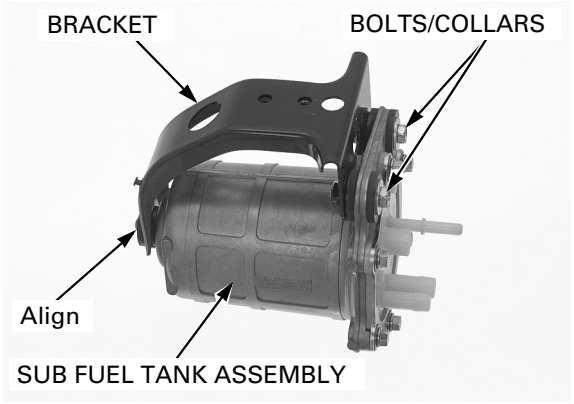


INSTALLATION

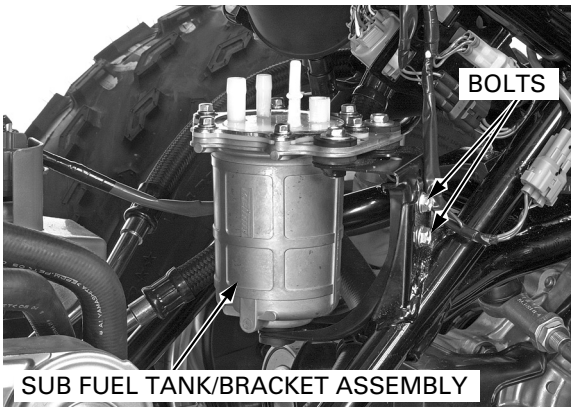
Install the collars into the pump mounting rubbers.

Install the fuel pump onto the bracket while aligning the boss with the grommet on the bracket.

Install and tighten the fuel pump mounting bolts.

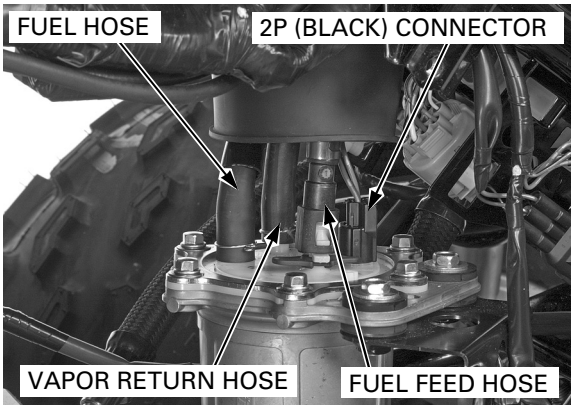


Install the sub fuel tank/bracket assembly onto the frame, tighten the bolts securely.



Connect the fuel hose and fuel vapor return hose to the sub fuel tank/fuel pump.

Connect the fuel feed hose (page 6-33).
Connect the fuel pump 2P (Black) connector.

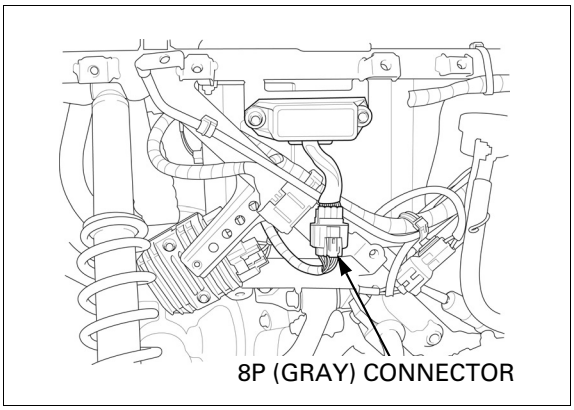


FUEL PUMP RELAY

INSPECTION

Remove the battery and battery case (page 20-6).

Disconnect the relay module 8P (Gray) connector.



Connect an ohmmeter to the 8P (Gray) connector of the module side connector terminals.

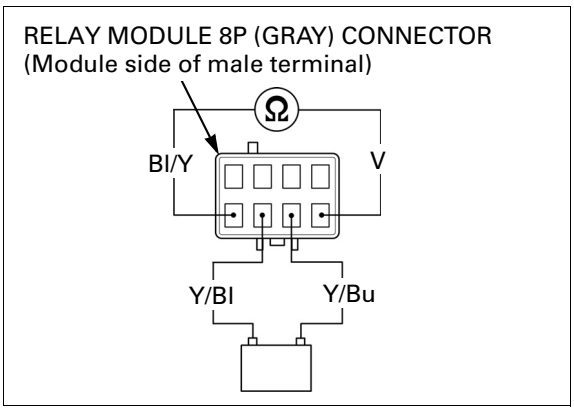
Connection: Black/yellow – Violet

Connect the 12V battery to the 8P (Gray) connector of the module side connector terminals.

Connection: Yellow/black – Yellow/blue

There should be continuity only when the 12V battery is connected.

If there is no continuity when the 12V battery is connected, replace the fuel pump relay.

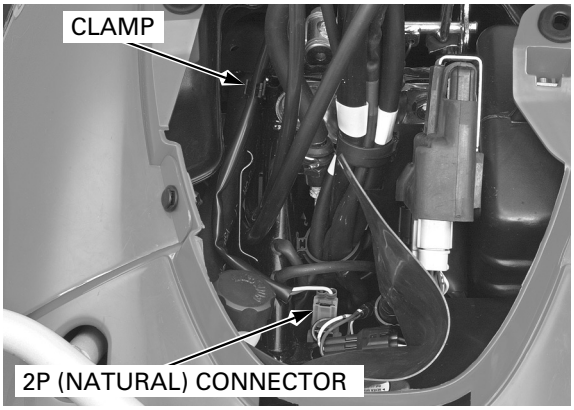


FUEL TANK

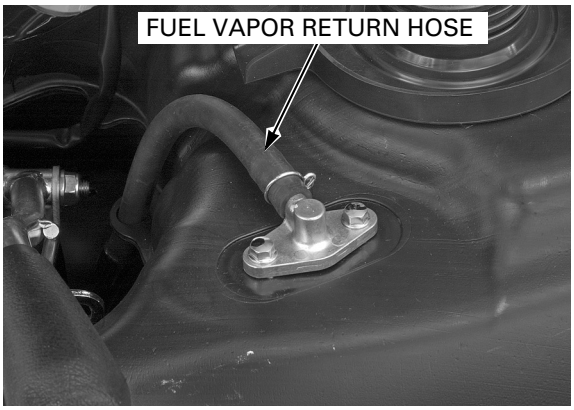
REMOVAL/INSTALLATION

Remove both fuel tank side covers (page 3-6).

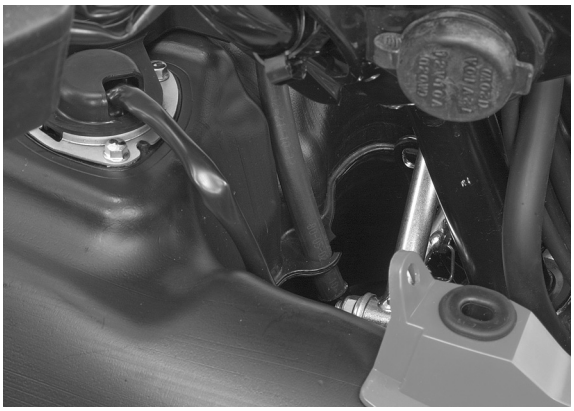
Disconnect the fuel level sensor 2P (Natural) connector.
Release the sensor wire from the clamp.



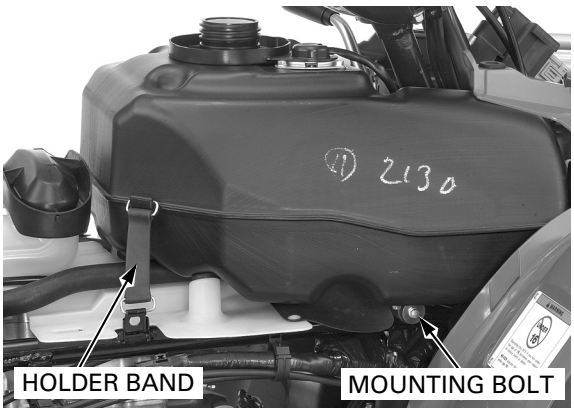
Disconnect the fuel vapor return hose from the fuel tank joint.



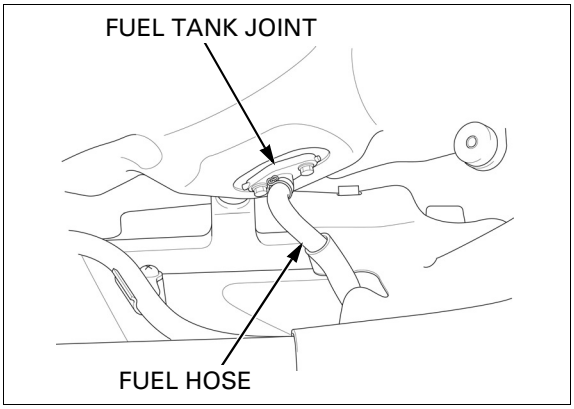
Release the return hose from the hose guide.



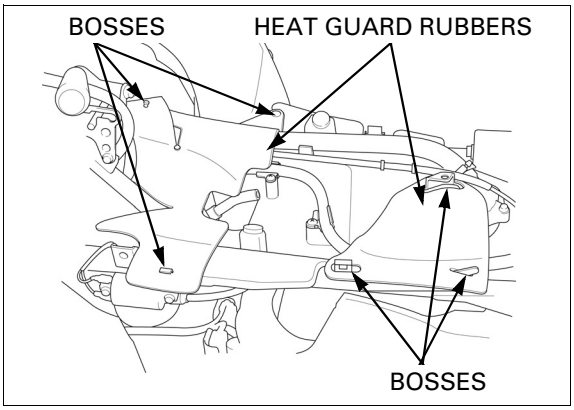
Remove the two fuel tank holder bands and mounting bolts.



Lift the fuel tank and disconnect the fuel hose from the fuel tank joint.



Unhook the heat guard rubbers from the heat guard plate bosses and frame bosses.
Remove the heat guard rubbers.

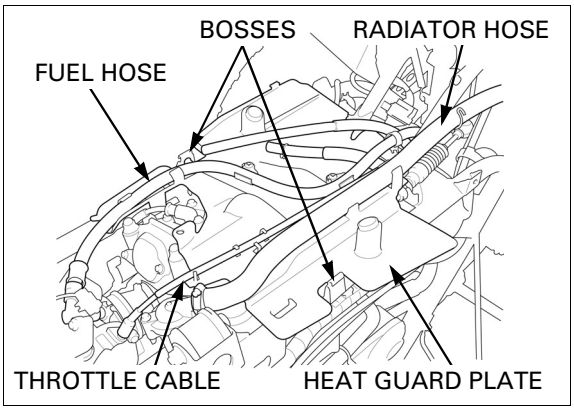


Remove the fuel feed hose, radiator hose and throttle cable from the clamp on the heat guard plate.
Remove the heat guard plate from the frame by releasing the two bosses.

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

NOTE:

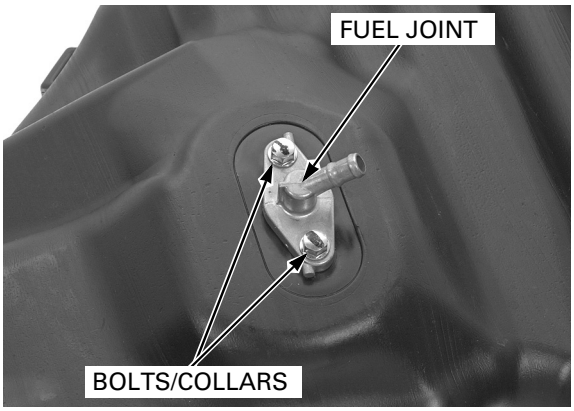
- After installing the fuel tank, turn the ignition switch ON and check that there is no fuel leak.



FUEL STRAINER SCREEN CLEANING

Remove the fuel tank (page 6-39).

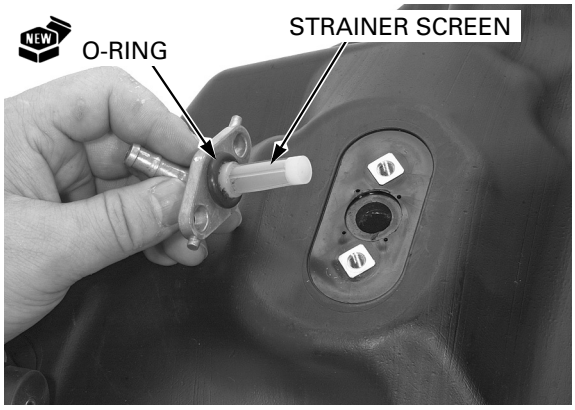
Drain the gasoline into an approved fuel container.
Remove the two mounting bolts, collars and the fuel joint.



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 joint onto the fuel tank.
Install the collars and mounting bolts, and tighten the bolts securely.

Install the fuel tank (page 6-39).



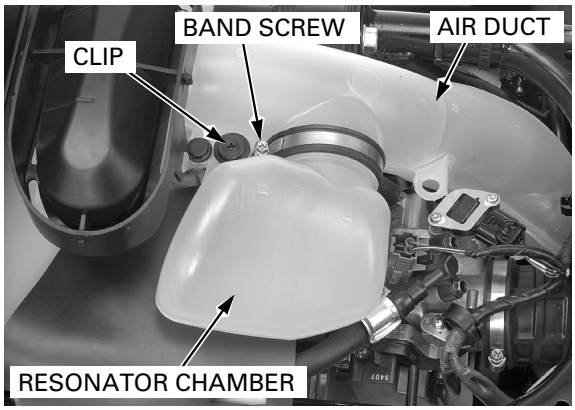
AIR CLEANER HOUSING

REMOVAL/INSTALLATION

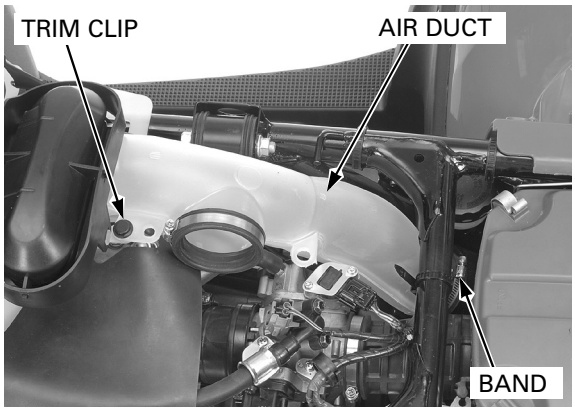
Remove the following:

- seat (page 3-4)
- right side cover (page 3-5)
- fuel tank rear cover (page 3-6)

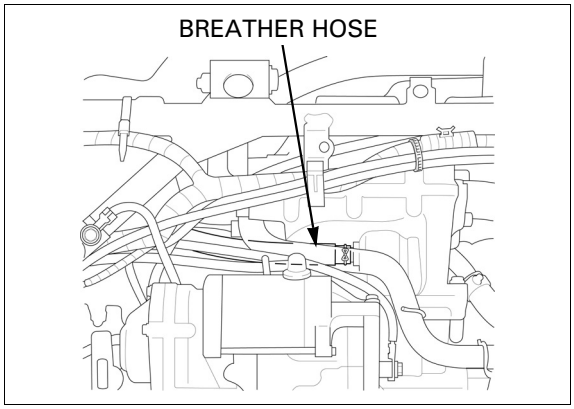
Loosen the screw and remove the retaining clip.
Loosen the band screw and remove the resonator chamber from the air duct.



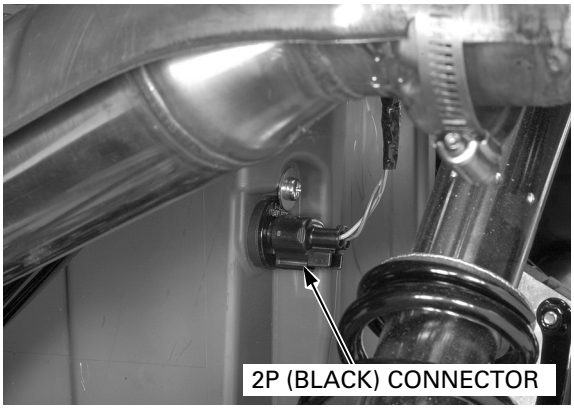
Remove the trim clip, loosen the band screw and remove the intake duct from the air cleaner housing.



Disconnect the crankcase breather hose from the cylinder.



Disconnect the IAT sensor 2P (Black) connector.

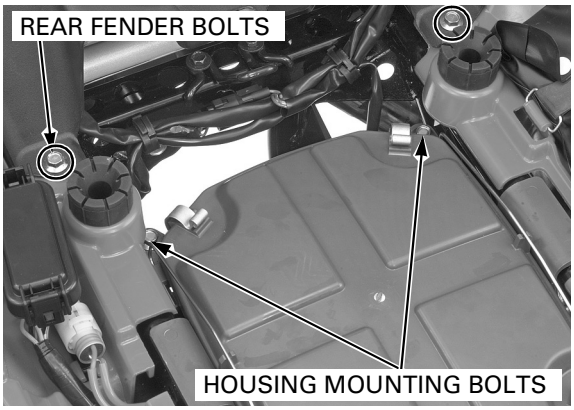


Loosen the air cleaner connecting hose band screw.

For ease of air cleaner housing removal, remove the rear fender mounting bolts.

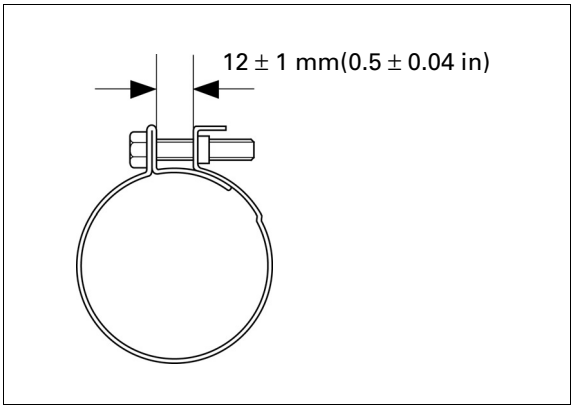
Be careful not to damage the connecting hose.

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



Installation is in the reverse order of removal.

Tighten the connecting hose band screw as shown.



THROTTLE BODY

REMOVAL

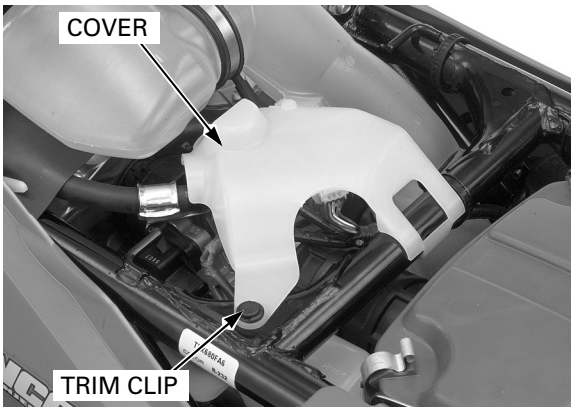
NOTICE

Before disconnecting fuel feed hose, relieve pressure from the system (page 6-32).

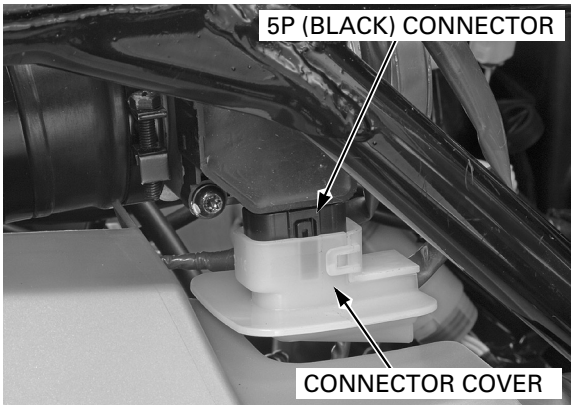
Remove the following:

– relieve the fuel pressure and disconnect the quick connect fitting (page 6-32).
– seat (page 3-4)
– air cleaner housing (page 6-41)

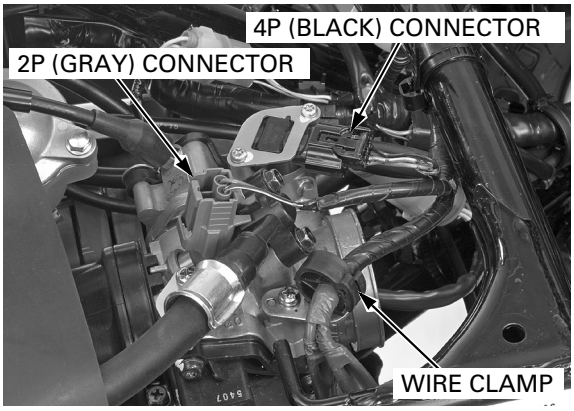
Remove the trim clip and throttle body cover.



Unhook and remove the MAP/TP sensor connector cover, then disconnect the MAP/TP sensor 5P (Black) connector.

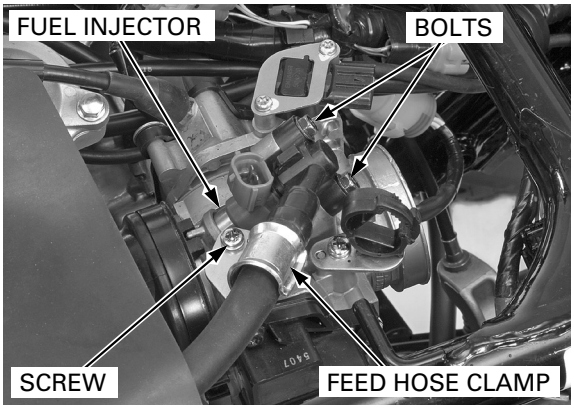


Disconnect the IACV 4P (Black) connector, injector 2P (Gray) connector and release the wire harness from the wire clamp.

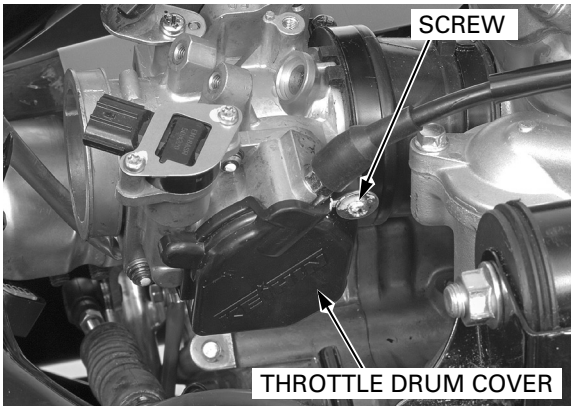


Remove the fuel feed hose clamp screw.

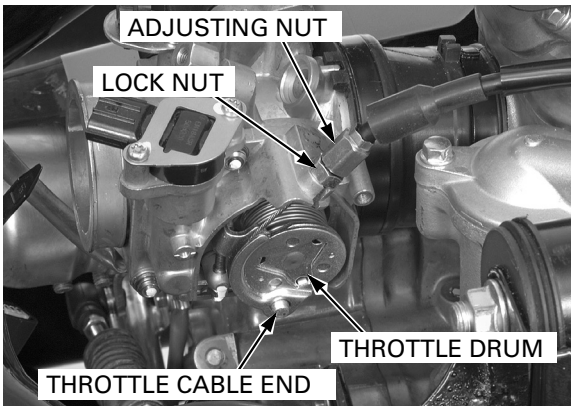
Remove the bolts and fuel injector holder and fuel injector.



Remove the screw and throttle drum cover.

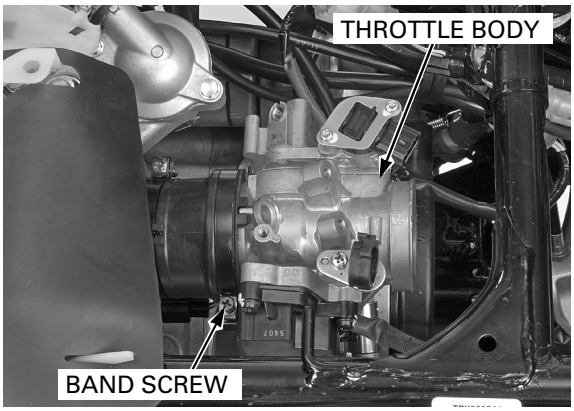


Loosen the throttle cable lock nut and adjusting nut then disconnect the throttle cable from the throttle drum and throttle body.



Loosen the insulator band screw.

Remove the throttle body from the insulator.



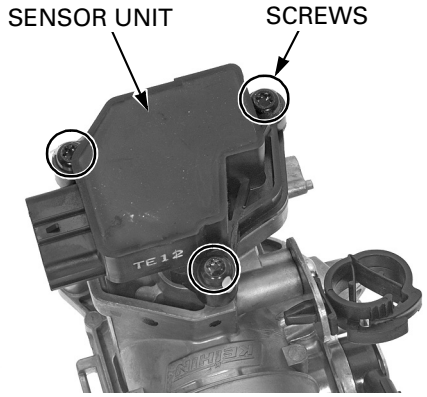
DISASSEMBLY

NOTICE

- *The throttle body is factory pre-set. Do not disassemble in a way other than shown in this manual.*
- *Do not snap the throttle valve from full open to full close after the throttle cable has been removed. It may cause incorrect idle operation.*
- *Do not damage the throttle body. It may cause incorrect throttle valve operation.*
- *Do not loosen or tighten the white painted bolts, nuts and screws of the throttle body.*
- *Always clean the throttle body before disassembly to prevent dirt and debris from entering the passages.*
- *Do not remove the sensor unit unless it is replaced.*

For IACV replacement (page 6-56).

If necessary, remove the screws and MAP/TP sensor unit from the throttle body.

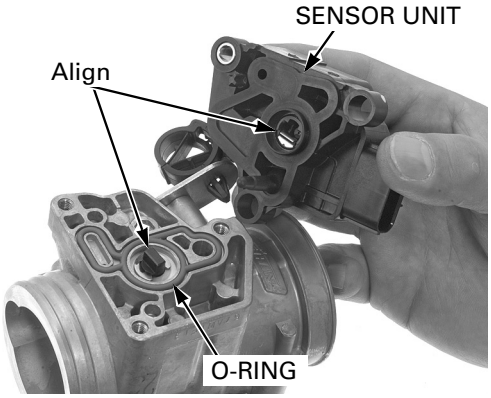


Install a new O-ring into the groove of the throttle body.

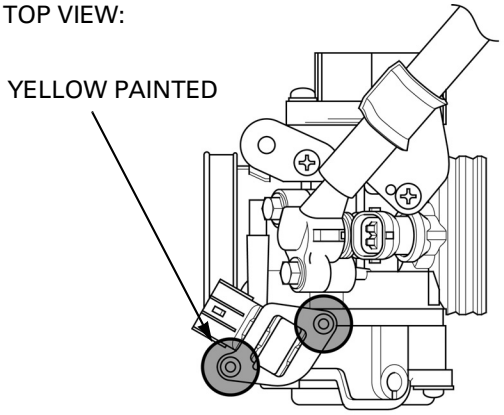
Install the new MAP/TP sensor unit while aligning the lug in the sensor unit with the throttle shaft.

Tighten the screws to the specified torque.

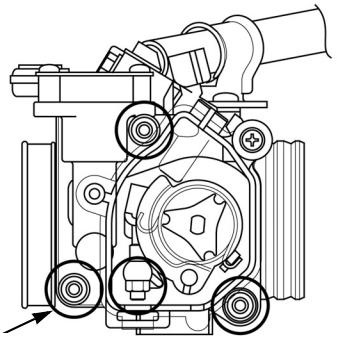
TORQUE: 3.4 N·m (0.35 kgf·m, 2.5 lbf·ft)



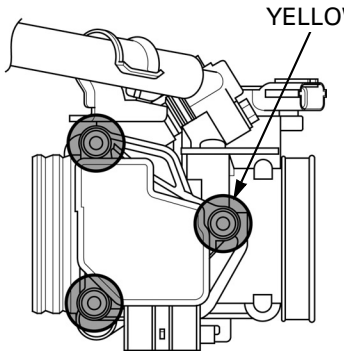
TOP VIEW:



THROTTLE DRUM VIEW:

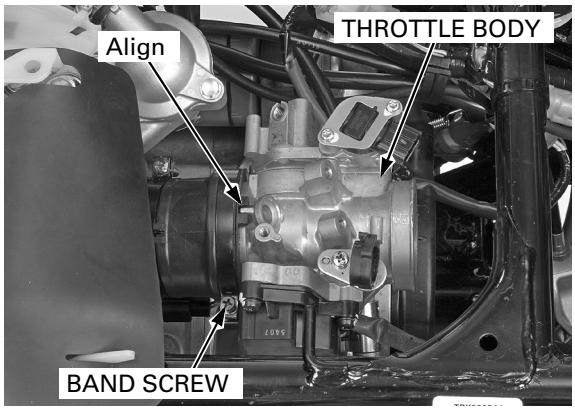


LEFT SIDE VIEW:

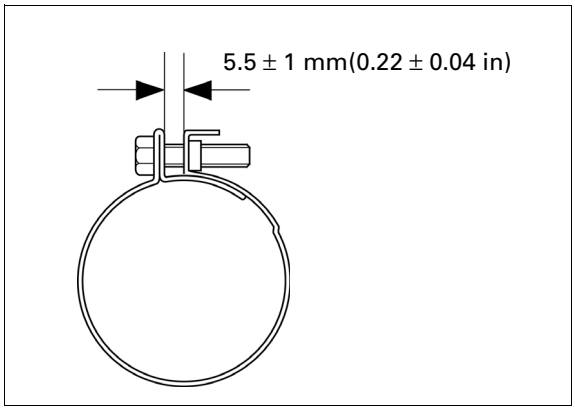


INSTALLATION

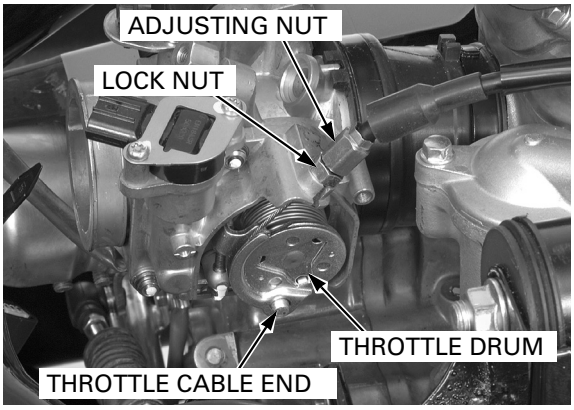
Install the insulator and throttle body by aligning the boss and groove.



Tighten the insulator band screws.



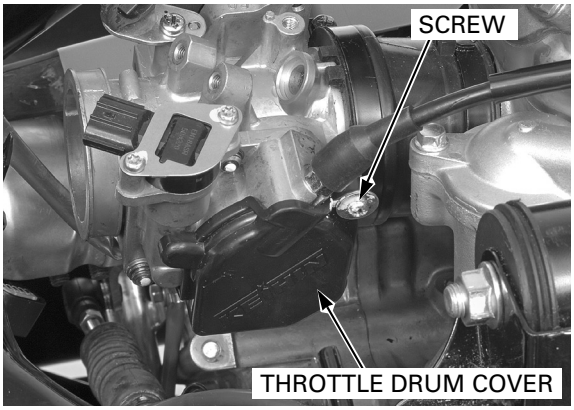
Connect the throttle cable to the throttle drum and throttle body.



Install the throttle drum cover while aligning its boss with the groove in the throttle body.

Install and tighten the screw.

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



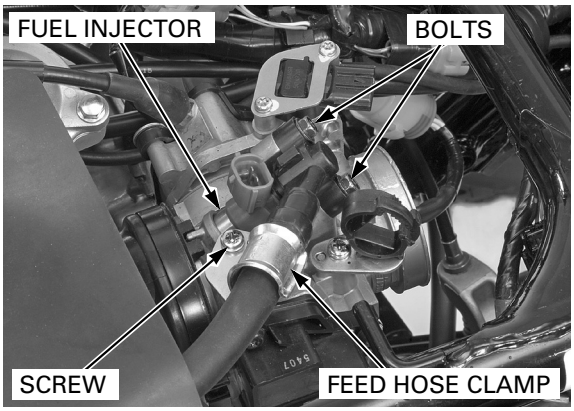
Install the injector onto the throttle body.

Connect the fuel feed hose and tighten the bolts to the specified torque.

TORQUE: 5.1 N·m (0.53 kgf·m, 3.8 lbf·ft)

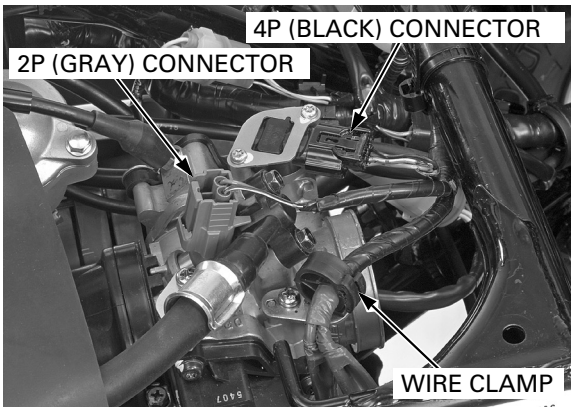
Install the fuel feed hose guide while aligning it hole with the throttle body boss, then install and tighten the screw to the specified torque.

TORQUE: 4.2 N·m (0.43 kgf·m, 3.1 lbf·ft)



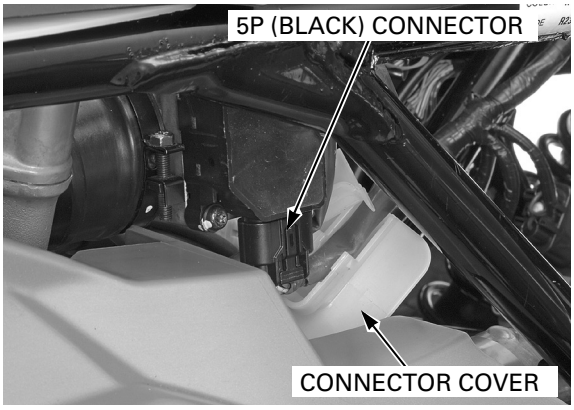
Route the wire harness to the throttle body and clamp it with wire clamp.

Connect the fuel injector 2P (Gray) connector and IACV 4P (Black) connector.



Connect the MAP/TP sensor 5P (Black) connector.

Install the MAP/TP sensor connector cover.

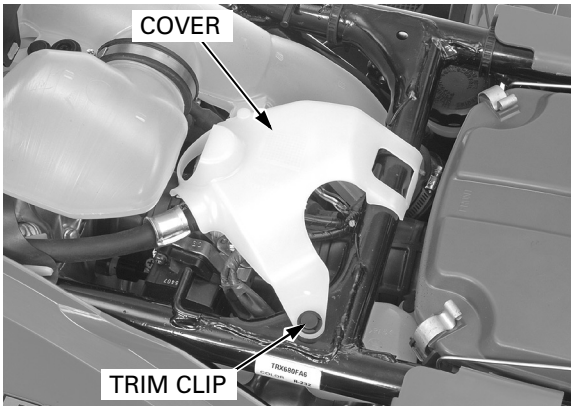


After throttle cable disconnection, adjust the throttle lever free play (page 4-4).

Install the throttle body cover and secure it with a trim clip.

Install the air cleaner housing (page 6-41).

Install the seat (page 3-4).



INJECTOR

REMOVAL

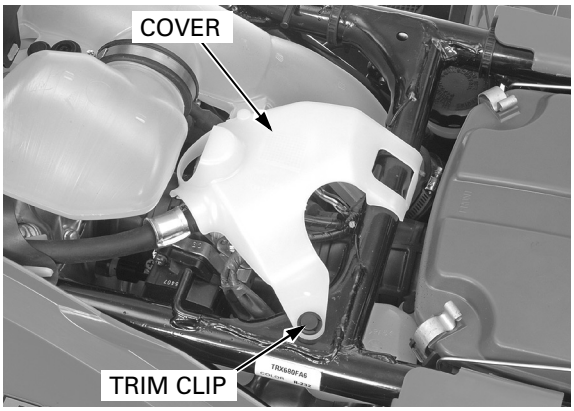
NOTICE

Before disconnecting fuel feed hose, relieve pressure from the system (page 6-32).

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

Remove the seat (page 3-4).

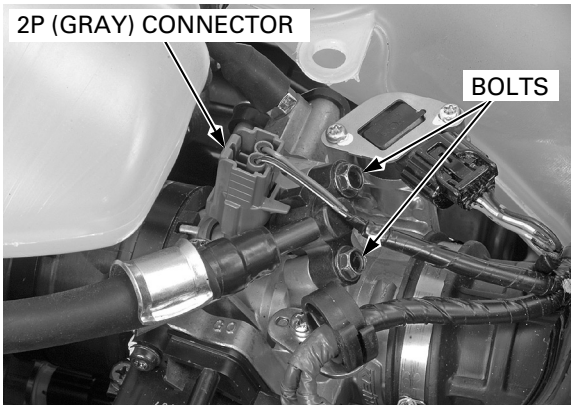
Remove the trim clip and throttle body cover.



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

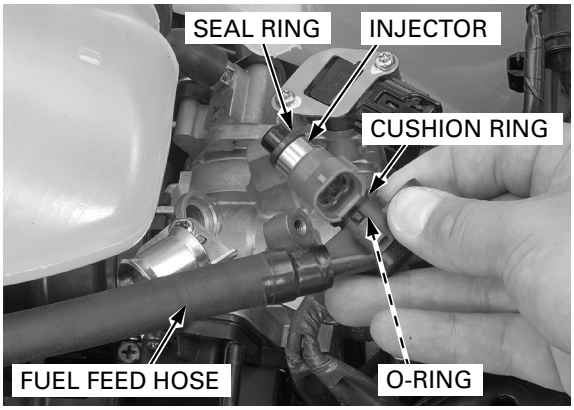
Disconnect the injector 2P (Gray) connector.

Remove the injector holder bolts.
Release the fuel feed hose from the hose guide.



Remove the injector from the fuel feed hose.

Remove the O-ring and seal ring.

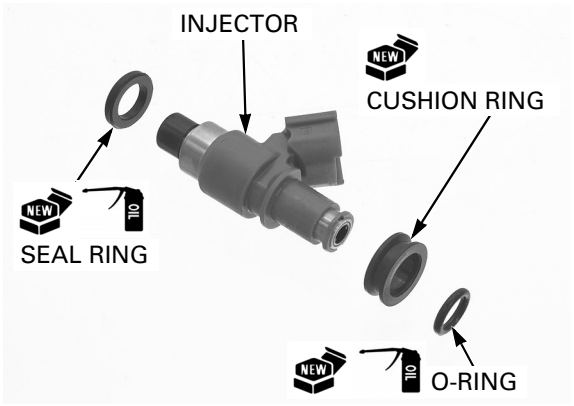


INSTALLATION

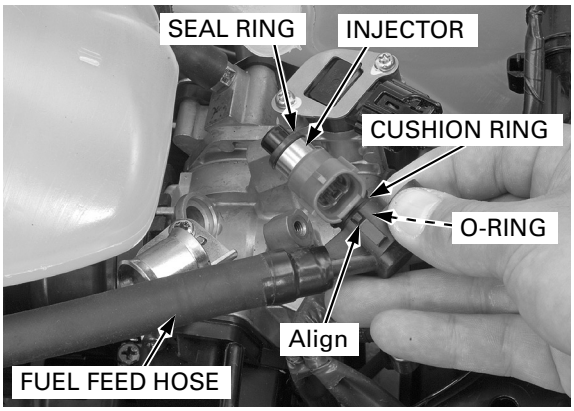
Coat a new O-ring and new seal ring with engine oil.

Replace the O-ring and seal ring with new ones as a set.

Install a new O-ring, new cushion ring and new seal ring, being careful not to damage them.



Install the injector into the fuel feed hose, being careful not to damage the O-ring by aligning the boss of the injector and groove of the hose.

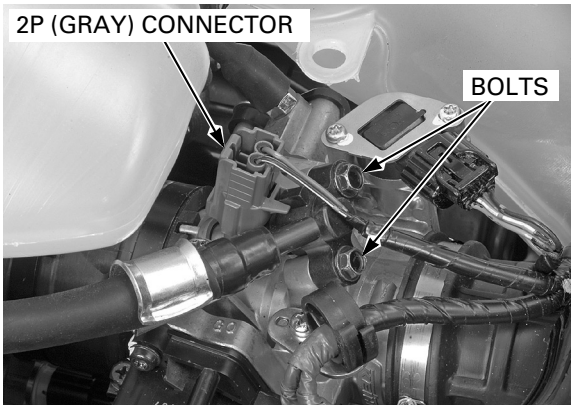


Set the fuel feed hose into the hose guide.
Install the fuel feed hose/injector assembly to the throttle body, being careful not to damage the seal ring.

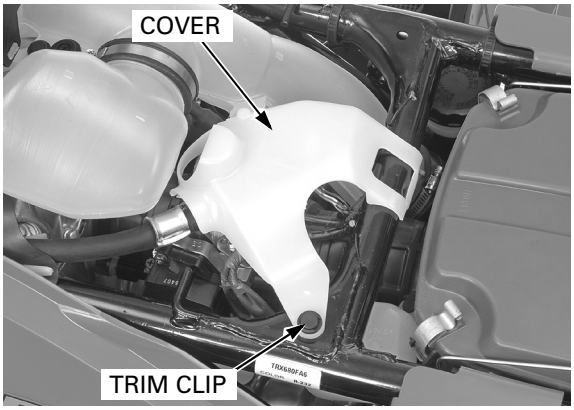
Install and tighten the injector holder bolts to the specified torque.

TORQUE: 5.1 N·m (0.53 kgf·m, 3.8 lbf·ft)

Connect the injector 2P (Gray) connector.



Install the throttle body cover and secure it with trim clip.



ECT SENSOR

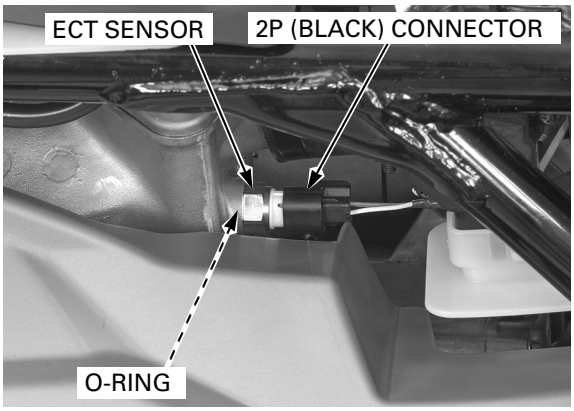
REMOVAL/INSTALLATION

Drain the coolant (page 7-6).

Remove the left engine side cover (page 3-17).

Replace the ECT sensor while the engine is cold.

Disconnect the ECT sensor 2P (Black) connector from the sensor.
Remove the ECT sensor and O-ring.



Always replace the O-ring with a new one.

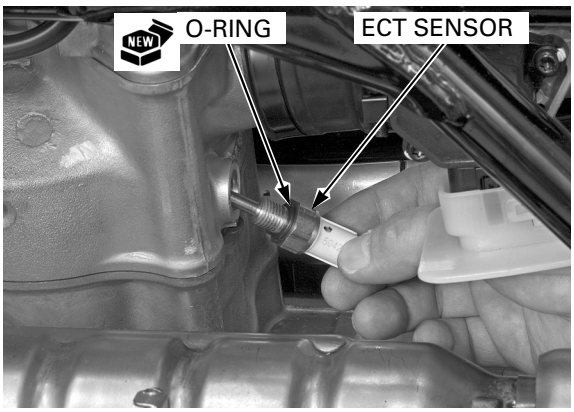
Install the new O-ring and ECT sensor.
Tighten the ECT sensor to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Connect the ECT sensor 2P (Black) connector.

Install the fuel tank right side cover (page 3-6).

Fill the cooling system with recommended coolant (page 7-6).



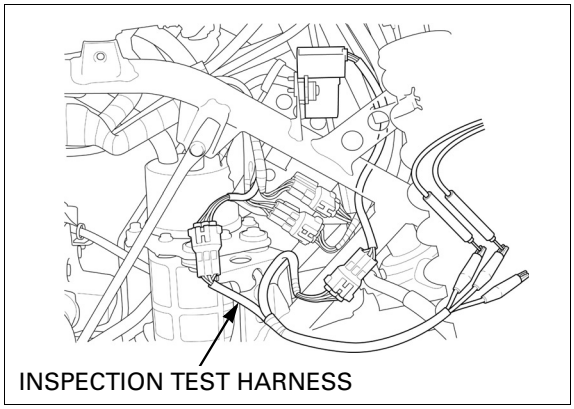
BANK ANGLE SENSOR

INSPECTION

Remove the right inner fender (page 3-9).

Disconnect the bank angle sensor 3P (Green) connector and connect the inspection test harness.

TOOL:
Inspection test harness 07GMJ-ML80100



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

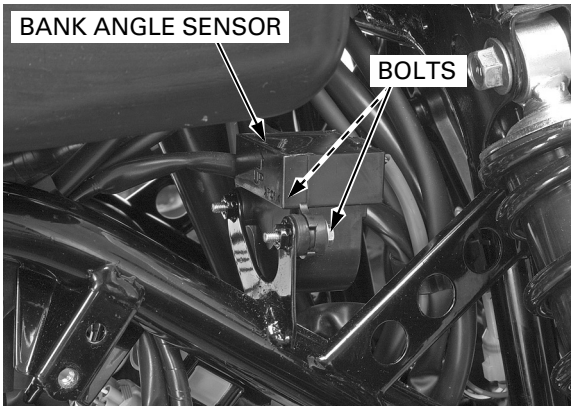
Measure the voltage between the test harness terminals.

CONNECTION	STANDARD
White(+) – Red(–)	Battery voltage
Red(+) – Green(–)	0 – 1 V

Turn the ignition switch OFF.

Do not disconnect the bank angle sensor connector during inspection.

Remove the right bolt and loosen the left bolt.
Remove the bank angle sensor from left side of grommet.

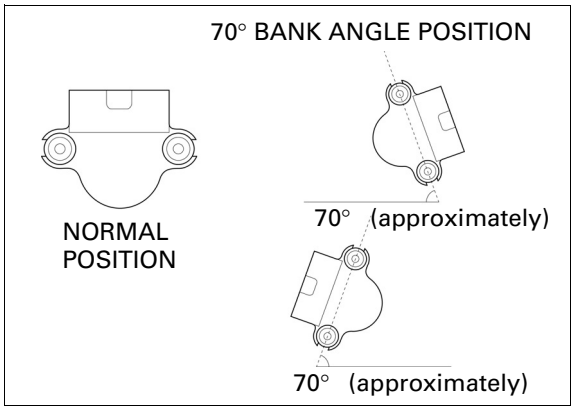


Connect the bank angle sensor 3P (Green) connector.

Before you perform this test, turn the ignition switch OFF, then turn the ignition switch ON and engine stop switch '○".

Place the bank angle sensor is normal position as shown, and ignition switch ON and engine stop switch "○", bank angle sensor is normal if the engine stop relay clicks and power supply is closed.

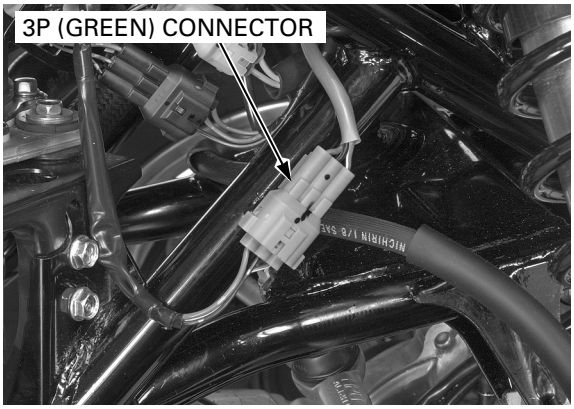
Incline the bank angle sensor approximately 70° to the left or right with keep the ignition switch ON and engine stop switch "○" the bank angle sensor is normal if the engine stop relay clicks and power supply is open.



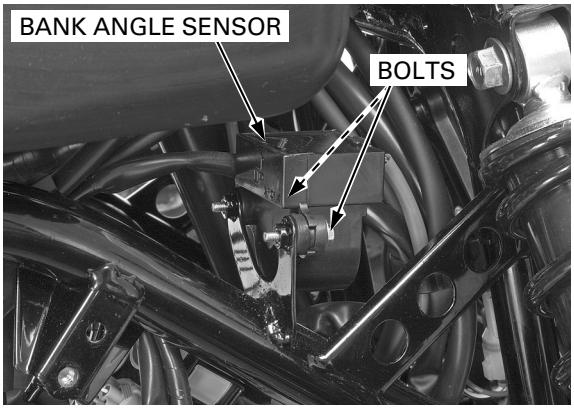
REMOVAL/INSTALLATION

Remove the right inner fender (page 3-9).

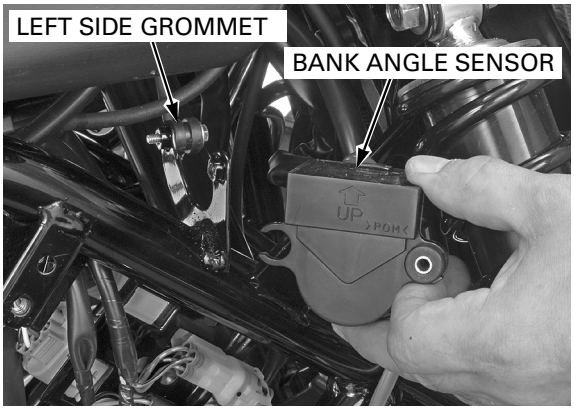
Disconnect the bank angle sensor 3P (Green) connector.



Remove the right side screw and loosen the left side screw.



Remove the bank angle sensor from the left side grommet.



Route the sensor wire correctly (page 1-20).

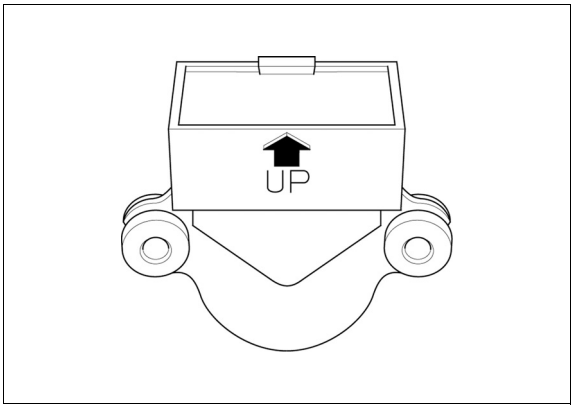
Install the bank angle sensor with its "UP" mark facing up.

Tighten the mounting bolts to the specified torque.

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

Connect the bank angle sensor 3P (Green) connector.

Install the right inner fender (page 3-9).

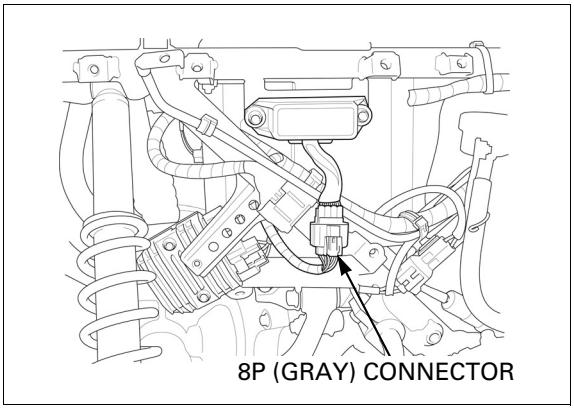


ENGINE STOP RELAY

INSPECTION

Remove the battery and battery case (page 20-6).

Disconnect the relay module 8P (Gray) connector.



Connect the ohmmeter to the 8P (Gray) connector of the module side connector terminals.

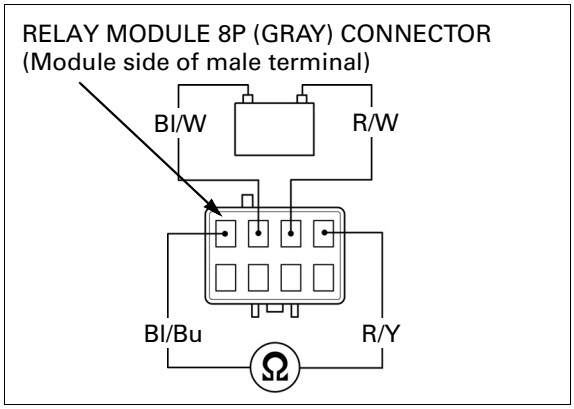
Connection: Black/blue – Red/yellow

Connect a 12V battery to the 8P (Gray) connector of the module side connector terminals.

Connection: Black/white – Red/white

There should be continuity only when the 12V battery is connected.

If there is no continuity when the 12V battery is connected, replace the relay.



PCM (POWERTRAIN CONTROL MODULE)

PCM POWER GROUND LINE MALFUNCTION

Engine does not start (No DTC and MIL blinking)

1. **PCM Power Input Voltage Inspection**

   - Before starting the inspection, check for loose or poor contact on the PCM 33P connectors and recheck the MIL blinking.

   Disconnect the PCM 33P connectors.

   Turn the ignition switch ON and engine stop switch "".
   Measure the voltage between the PCM 33P (Gray) connector terminal and ground.

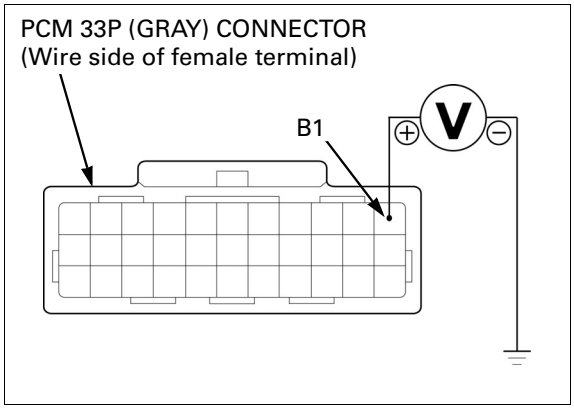
   TOOL:
   Test probe **07ZAJ-RDJA110**

   Connection: B1 (+) – Ground (–)

   Does battery voltage exit?

   YES – GO TO STEP 2.

   NO – GO TO STEP 3.



2. **PCM Ground Line Inspection**

   Turn the ignition switch OFF.
   Check for continuity between the PCM33P (Gray) terminals and ground.

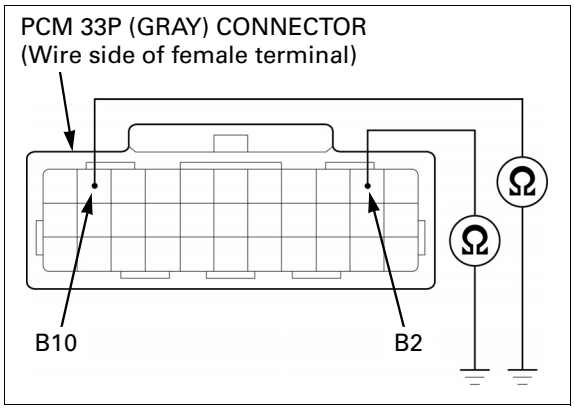
   TOOL:
   Test probe **07ZAJ-RDJA110**

   Connection: B2 – Ground
   B10 – Ground

   Is there continuities?

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

   NO – Open circuit in the Green wire.



3. Engine Stop Relay Inspection 1

Turn the ignition switch OFF.
Disconnect the relay module 8P (Gray) connector.

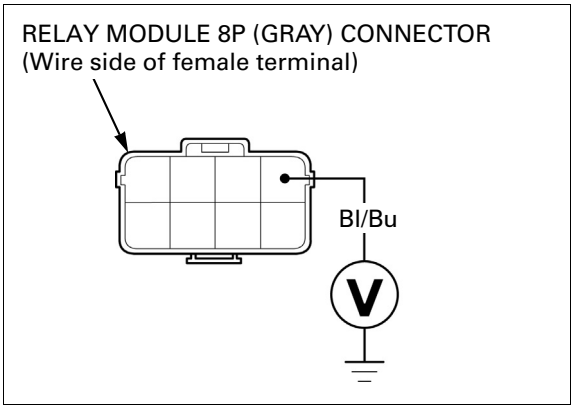
Turn the ignition switch ON and engine stop switch "○".
Measure the voltage at the engine stop relay connector terminal of the wire harness side.

Connection: Black/blue (+) – Ground (–)

Does battery voltage exist?

NO – • Faulty sub fuse.
• Open circuit in the Black/blue wire.

YES – GO TO STEP 4.



4. Engine Stop Relay Inspection 2

Turn the ignition switch OFF.

Jump the engine stop relay connector terminals with jumper wire.

Connection: Black/white – Red/white

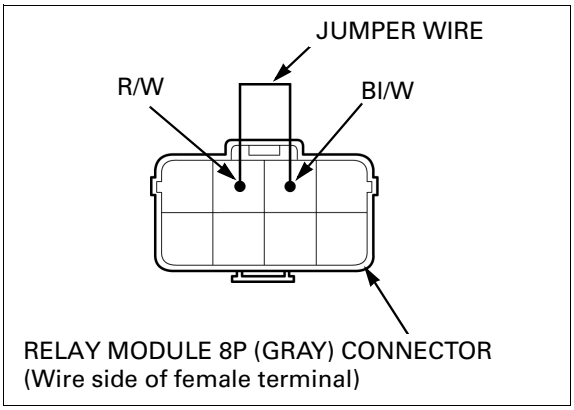
Turn the ignition switch ON and engine stop switch "○".
Measure the voltage at the PCM 33P (Gray) terminal and ground.

Connection: B1 – Ground (–)

Does battery voltage exit?

YES – • Inspect the engine stop relay (page 6-52).
• Inspect the engine stop switch (page 23-7).
• Inspect the bank angle sensor (page 6-51).

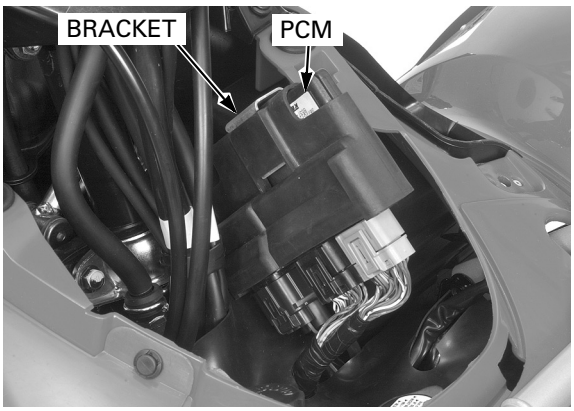
NO – Open circuit in Black/white wire between the engine stop relay and the PCM.



REMOVAL/INSTALLATION

Remove the steering cover (page 3-5).

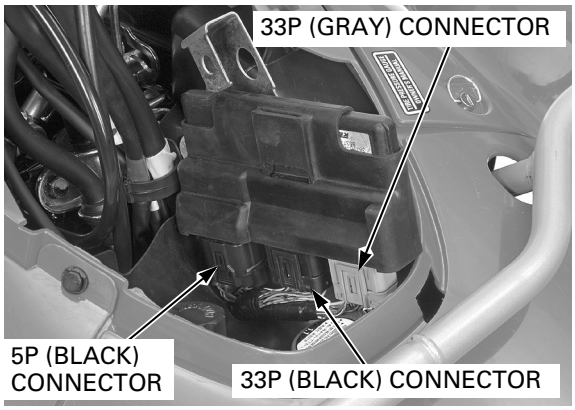
Remove the PCM from the holder bracket.



Do not pull the wire harness while disconnecting the PCM connectors.

Disconnect the PCM 33P (Black), 33P (Gray) and 5P (Black) connectors and then remove the PCM.

Install the PCM in the reverse order of removal.



ENGINE IDLE SPEED

IDLE SPEED INSPECTION

NOTE:

- Inspect the idle speed after all other engine maintenance items have been performed and are within specifications.
- Before checking the idle speed, inspect the following items.
  – No DTC and MIL blinking
  – Spark plug condition (page 4-7)
  – Air cleaner condition (page 4-5)
- The engine must be warm for accurate idle speed inspection.
- This system eliminates the need for manual idle speed adjustment compared to previous designs.
- Use a tachometer with graduations of 50 rpm (min^{-1}) or smaller that will accurately indicate a 50 rpm (min^{-1}) change.

Remove the fuel tank left side cover (page 3-6).

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

Stop the engine and connect a tachometer according to the tachometer manufacturer's instructions.

Start the engine and let it idle. Check the idle speed.

ENGINE IDLE SPEED: 1,400 ± 50 rpm (min^{-1})

If the idle speed is out of the specification, check the following:

- Throttle operation and throttle lever free play (page 4-4).
- Intake air leak or engine top-end problem (page 9-3)
- IACV operation (page 6-56)

IACV

INSPECTION

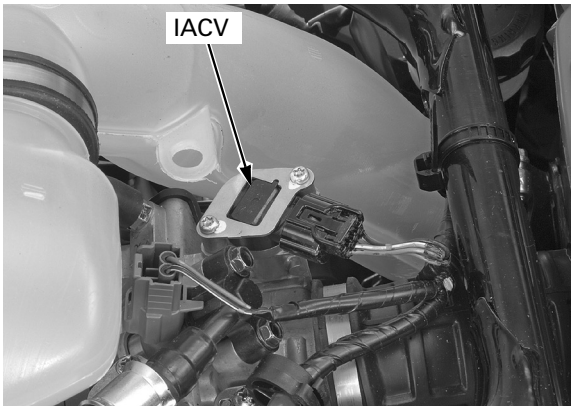
The IACV is installed on the throttle body and is operated by the step motor. When the ignition switch is turned ON, the IACV operates for a few seconds.

Check the step motor operating (beep) sound with the ignition switch turned ON.

NOTE:

The IACV operation can be checked visually as following:

- Remove the IACV from the throttle body with its 4P (Black) connector in place, then turn the ignition switch ON.

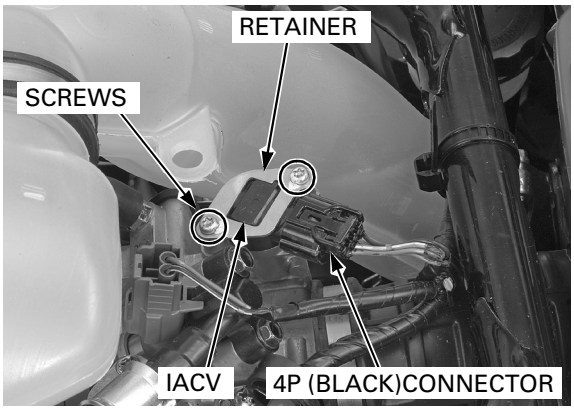


REMOVAL

- Always clean the throttle body before the IACV removal to prevent dirt and debris from entering the IACV passage.

Disconnect the IACV 4P (Black) connector.

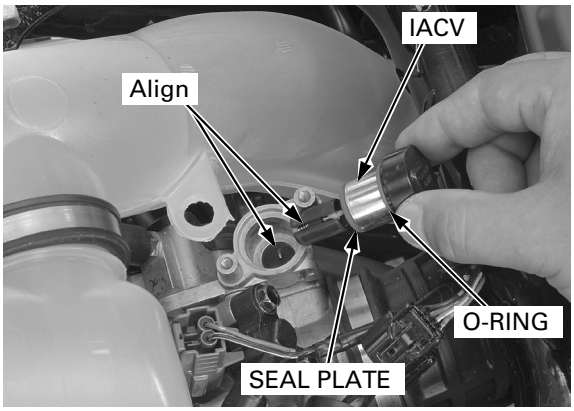
Remove the two screws, IACV retainer and IACV.



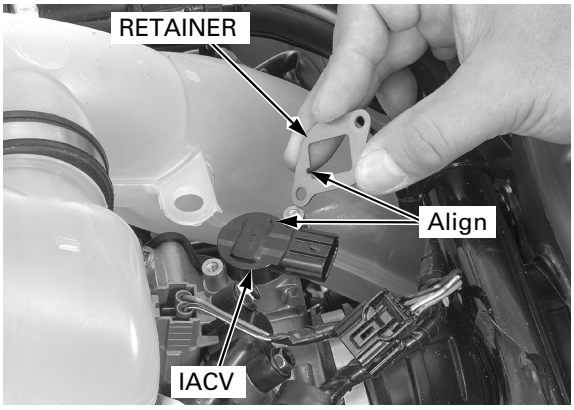
INSTALLATION

Install new O-ring and seal plate onto the IACV.

Install the IACV into the throttle body while aligning the valve slit with the guide pin in the throttle body.



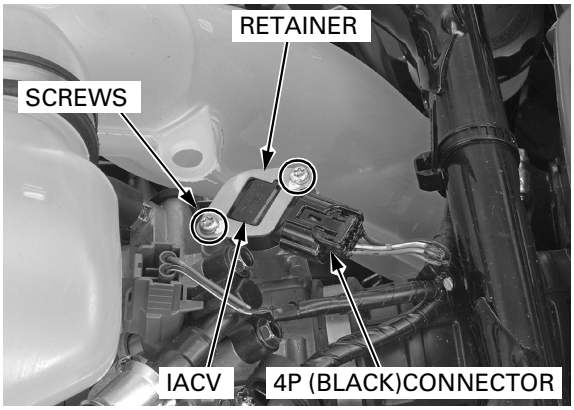
Install the IACV retainer while aligning the valve boss with the groove in the retainer.



Install and tighten the two screws to the specified torque.

TORQUE: 2.1 N·m (0.21 kgf·m, 1.5 lbf·ft)

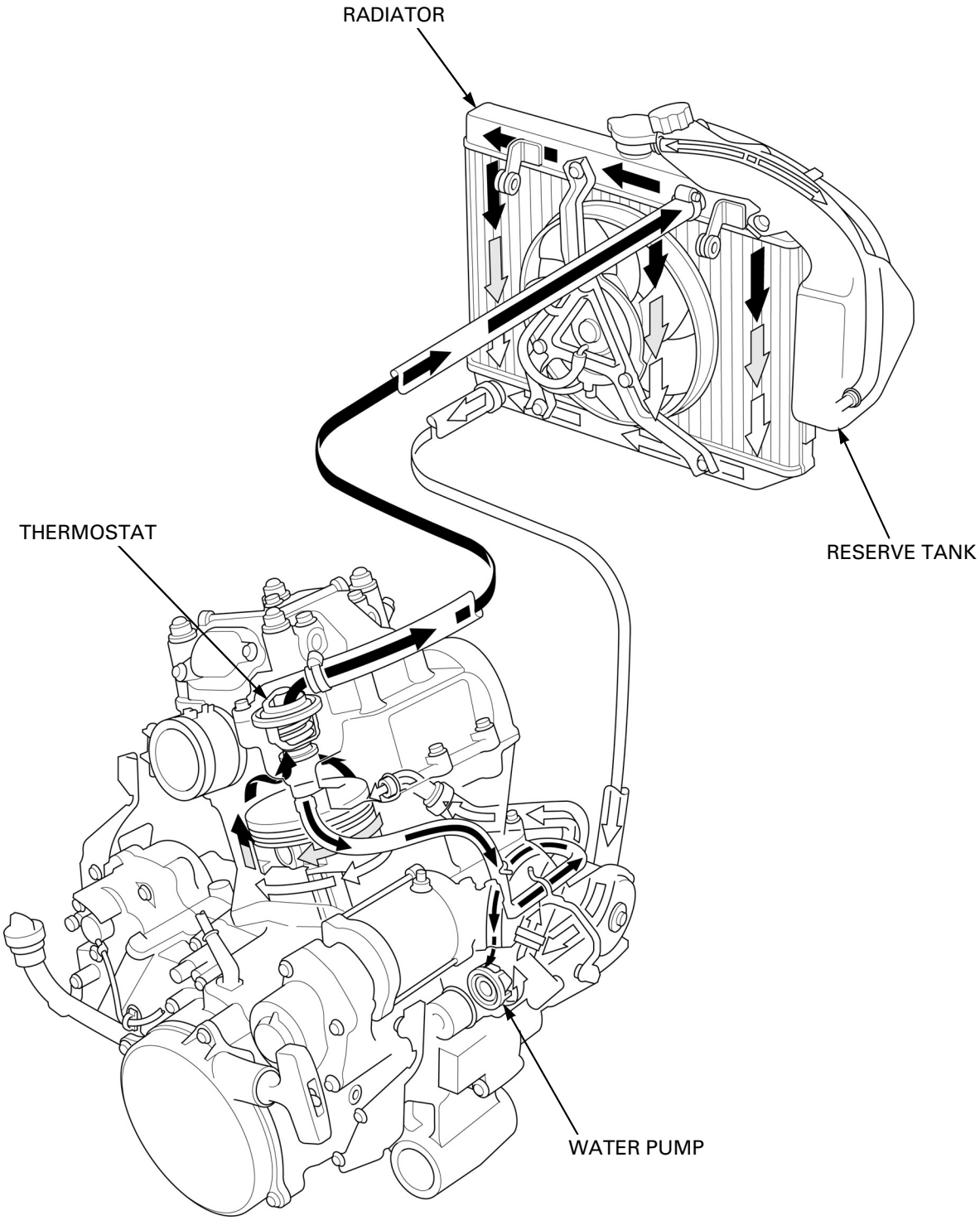
Connect the IACV 4P (Black) connector.



MEMO

7. 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.
- For ECT sensor information (page 6-3).
- For coolant temperature indicator information (page 23-13).

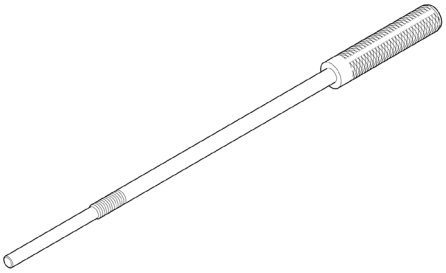
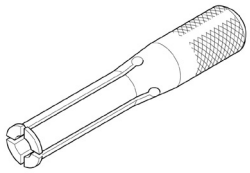
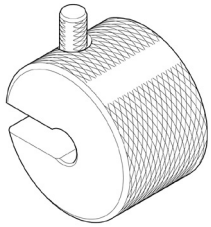
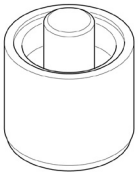
SPECIFICATIONS

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

Bearing remover shaft 07936-KC10100  or 07936-KC10500	Bearing remover head, 15 mm 07936-KC10200  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 23-13)

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

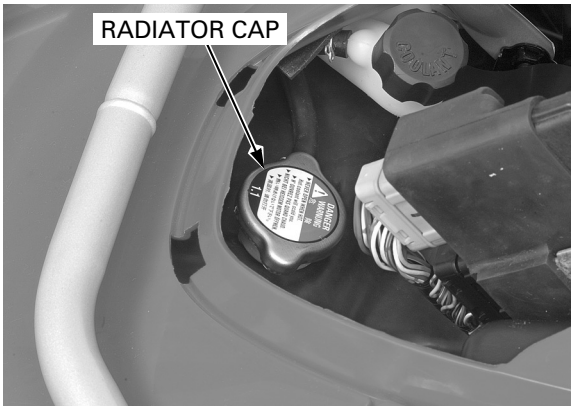
SYSTEM TESTING

COOLANT (HYDROMETER TEST)

Remove the steering cover (page 3-5).

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

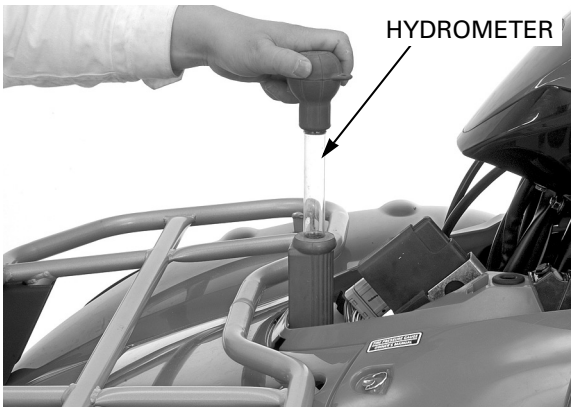
Remove the radiator cap.



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

RADIATOR CAP/SYSTEM PRESSURE INSPECTION

Remove the radiator cap (page 7-5).

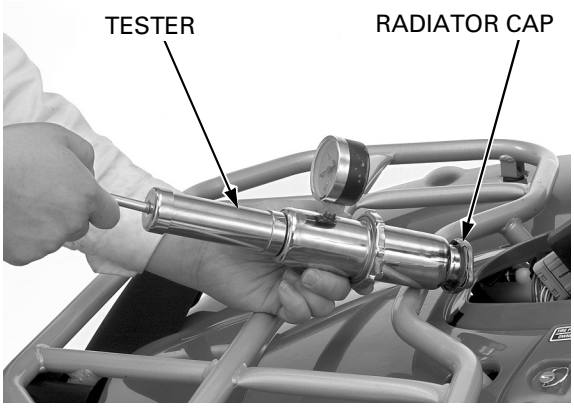
Wet the sealing surfaces of the cap, then install the cap onto tester.

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)



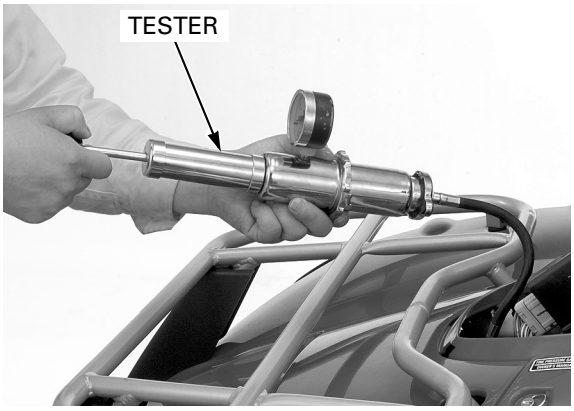
Excessive pressure can damage the cooling system components. Do not exceed 137 kPa (1.4 kgf/cm², 20 psi).

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 3-5).



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.

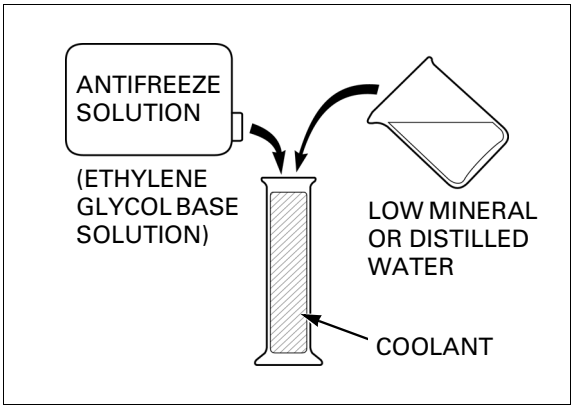
NOTE:

- 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:

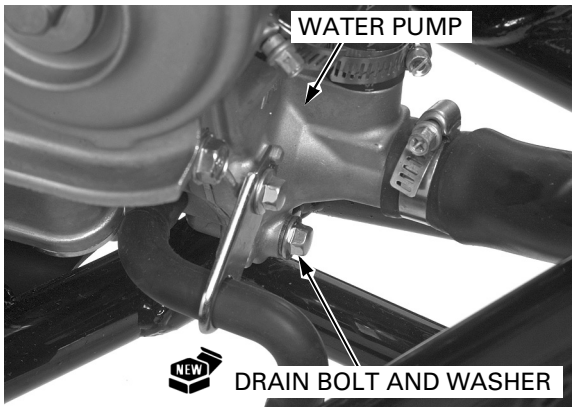
- When filling the system with a coolant, place the vehicle on a flat, level surface.

Remove the steering cover (page 3-5).

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.

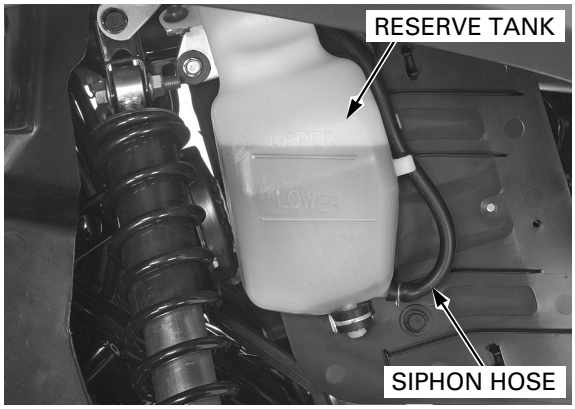
Reinstall the drain bolt with a new sealing washer securely.



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.

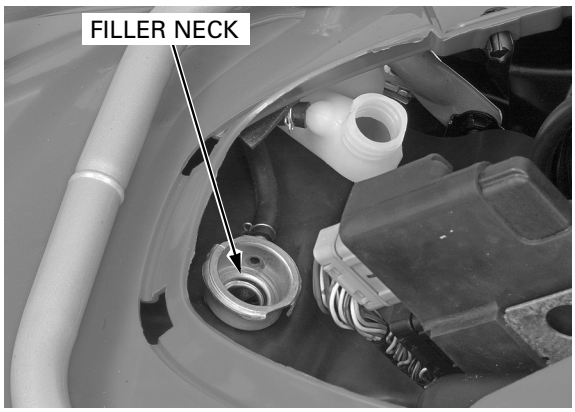
Reconnect the siphon hose.



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

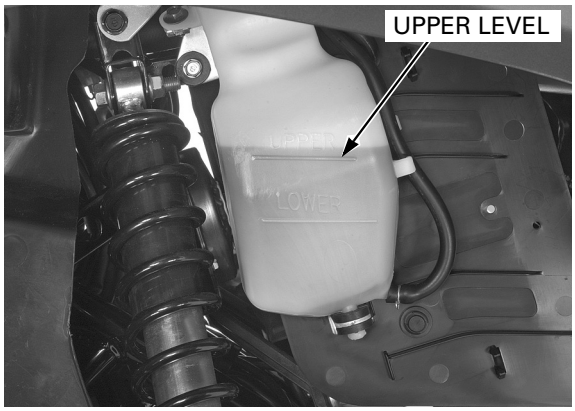
Bleed air from the system as follows:

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.



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

Install the steering cover (page 3-5).

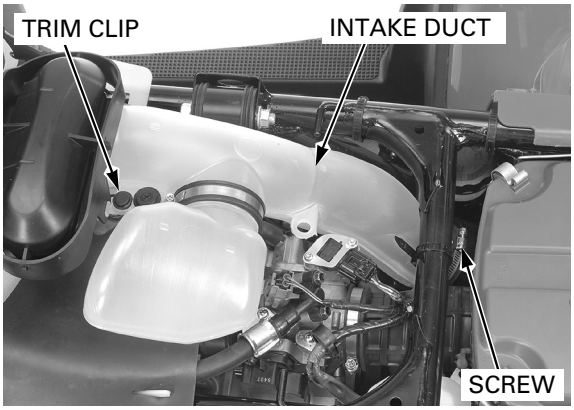


THERMOSTAT

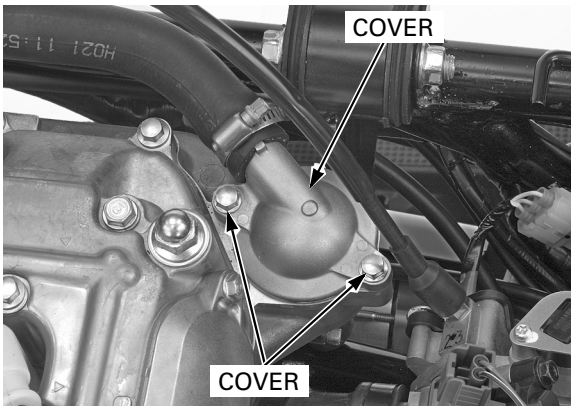
REMOVAL

Drain the coolant from the system (page 7-7).
Remove the fuel tank covers (page 3-5).
Remove the throttle body cover (page 6-48).

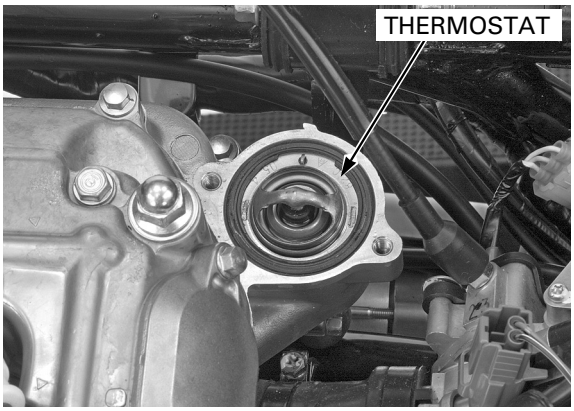
Loosen the band screw.
Remove the trim clip and the air intake duct from the air cleaner housing.



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.

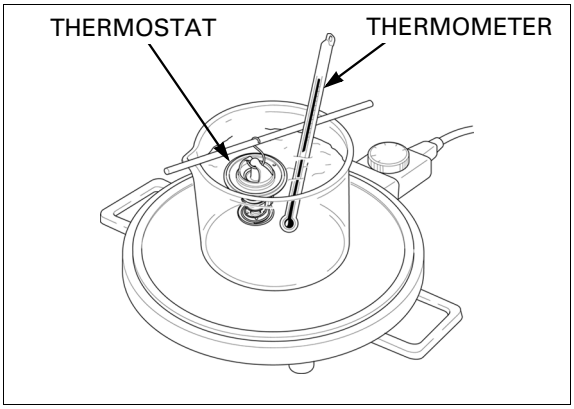
Wear insulated gloves and adequate eye protection.
Keep flammable materials away from the electric heating element.
Do not let the thermostat or thermometer touch the pan, or you will get a false reading.

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)

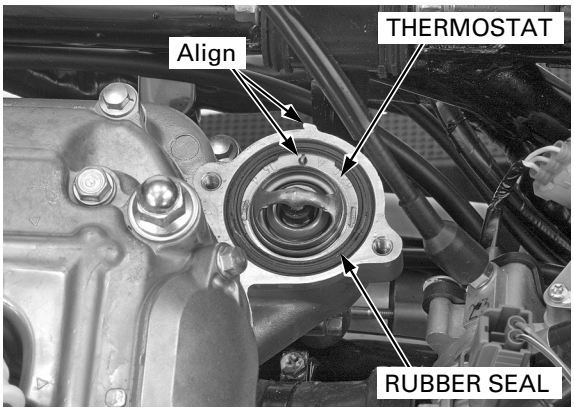
VALVE LIFT:
8 mm (0.3 in) minimum at 95°C (203°F)

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

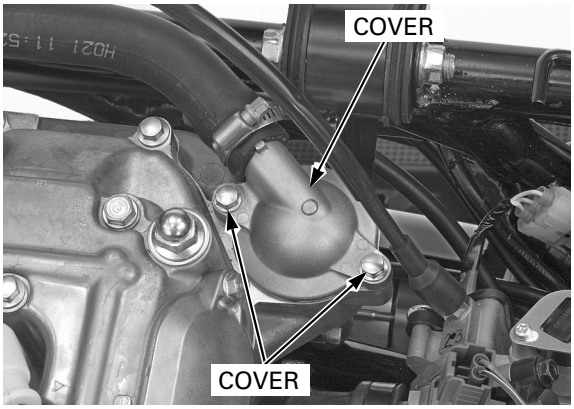


INSTALLATION

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

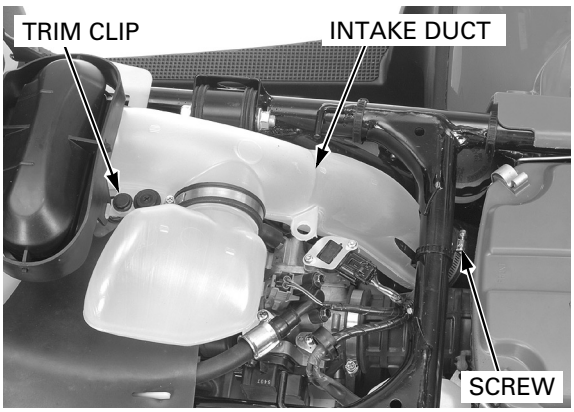


Install the thermostat and tighten the two bolts securely.



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 7-6).
Install the injector cover (page 6-48).
Install the fuel tank covers (page 3-5).



RADIATOR RESERVE TANK

REMOVAL/INSTALLATION

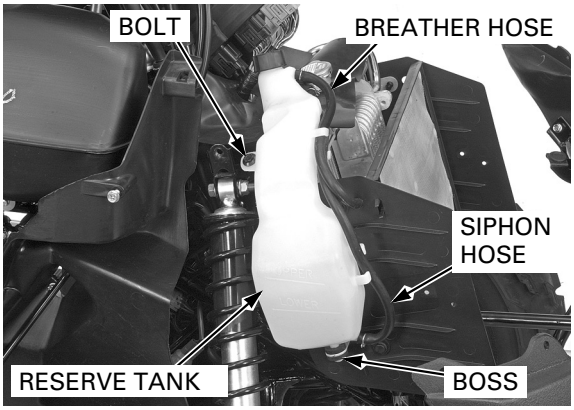
Remove the front fender (page 3-12).

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

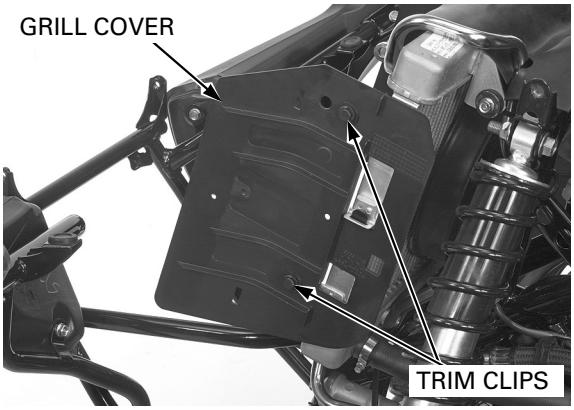
RADIATOR REMOVAL

Remove the following:

– oil cooler (page 5-12)
– radiator reserve tank (page 7-9)
– left inner fender (page 3-9)

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

Remove the two trim clips (page 3-4) and each grill cover.

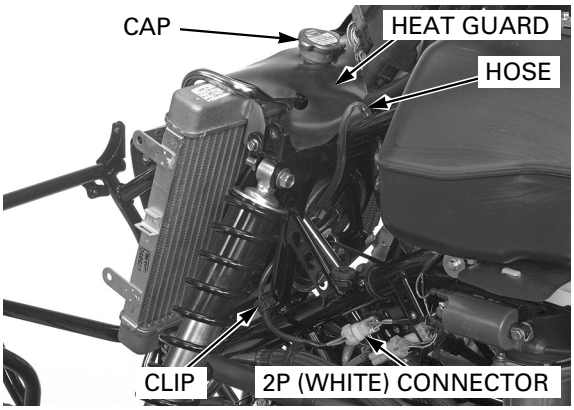


Disconnect the breather hose (pink) from the frame pipe.

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

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

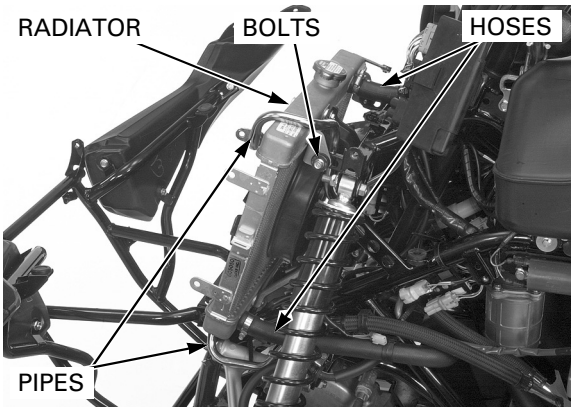
Remove the radiator cap and the rubber heat guard from the filler neck.
Reinstall the radiator cap.



Disconnect the upper and lower water hoses.

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

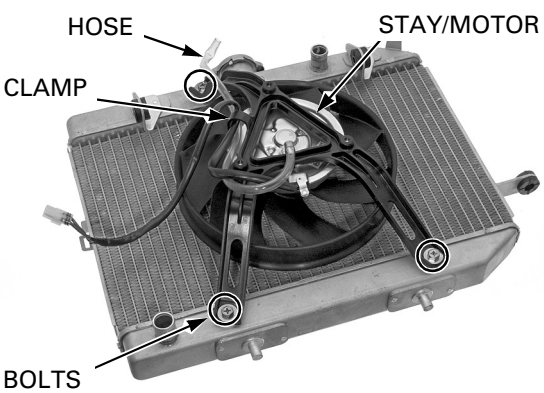
Remove the two mounting bolts.
Release the mounting bosses on the radiator bottom from the frame and remove the radiator assembly while pulling the oil pipes aside.



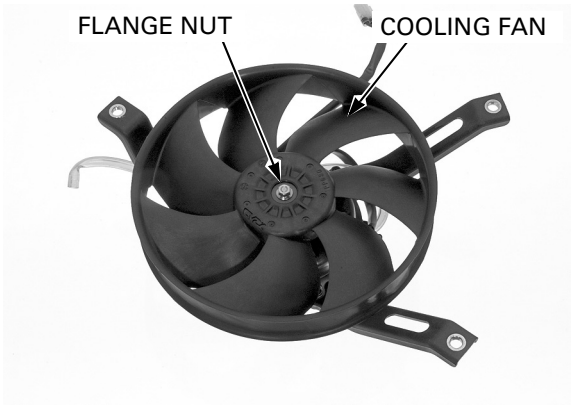
COOLING FAN DISASSEMBLY

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

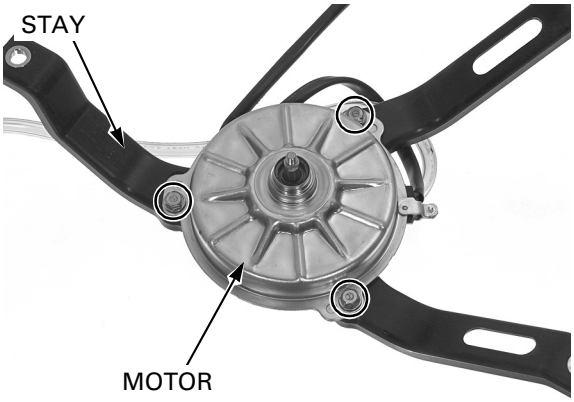
Remove the three washer-bolts and stay/motor assembly from the radiator.



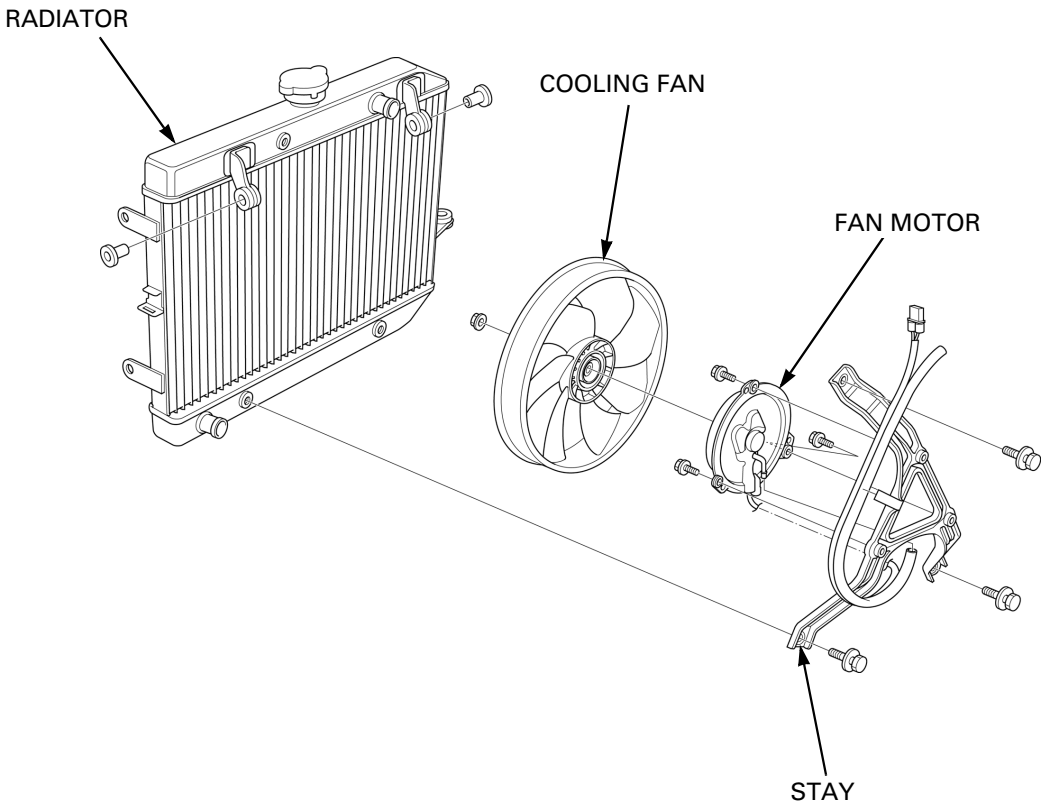
Remove the nut and cooling fan.



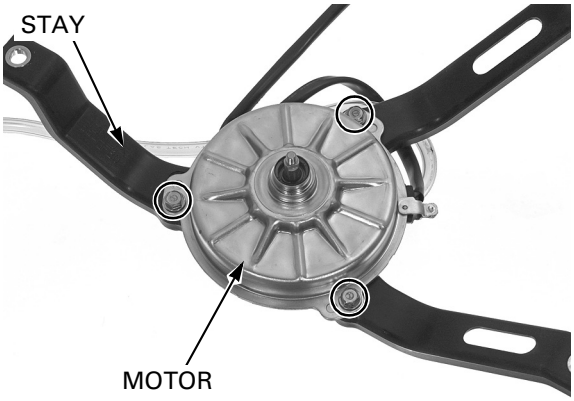
Remove the three bolts and fan motor.



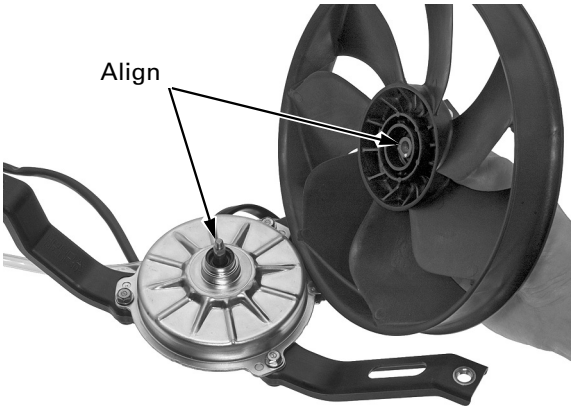
ASSEMBLY



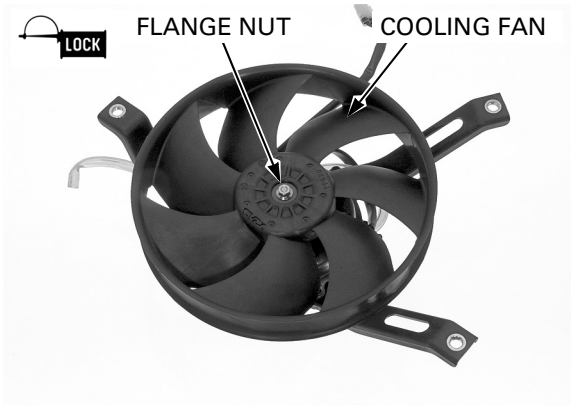
Install the fan motor on the motor stay in the direction as shown and tighten the three bolts securely.



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

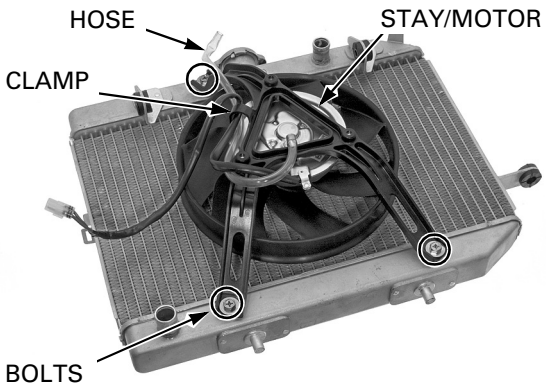


Apply locking agent to the motor shaft threads. Install the nut and tighten it.



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.

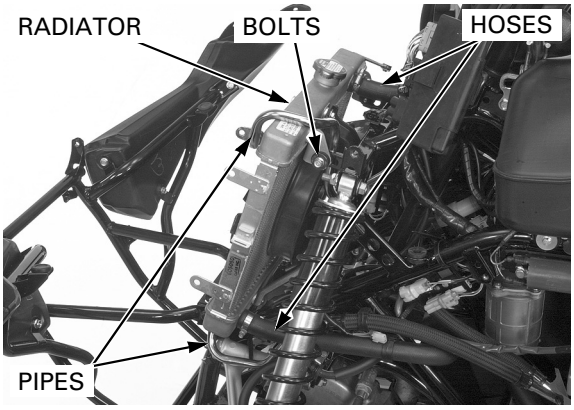


INSTALLATION

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.



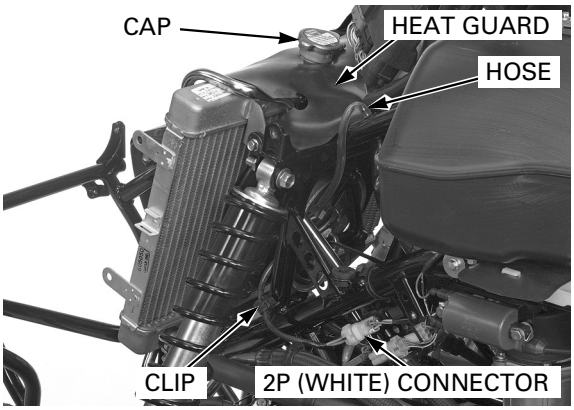
Route the wire and hose properly (page 1-20).

Connect the fan motor 2P (White) connector and secure the wires with the clip.

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 1-20).



Install the left and right grill covers with the trim clips (page 3-4). For the left grill cover, align the tab with the groove in the radiator.

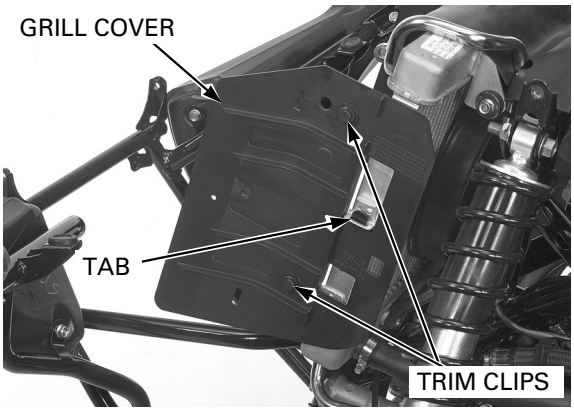
Install the following:

– oil cooler (page 5-13)
– radiator reserve tank (page 7-9)

Fill and bleed the cooling system (page 7-6).

After bleeding, install the following:

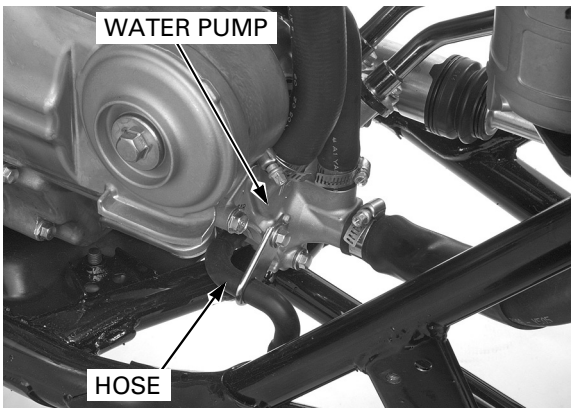
– left inner fender (page 3-9)
– front fender (page 3-12)



WATER PUMP

MECHANICAL SEAL INSPECTION

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.



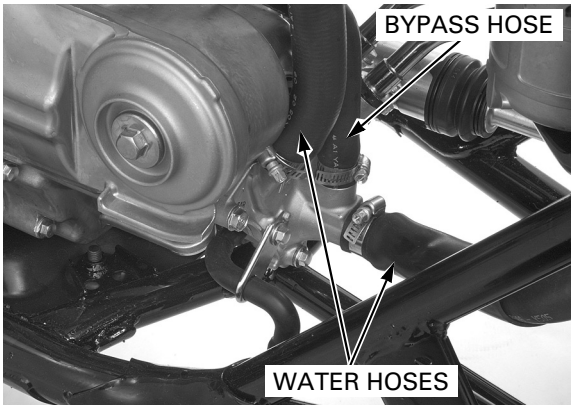
REMOVAL

Remove the following:

- mud guard lid (page 3-7)
- right front mud guard (page 3-8)
- right inner fender (page 3-9)

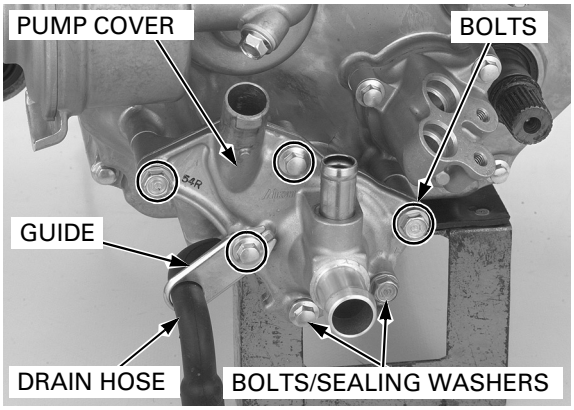
Drain the coolant from the system (page 7-7).

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



Remove the following:

- drain hose
- three cover bolts and sealing washer
- drain hose guide
- two mounting bolts
- pump cover
- O-ring
- water pump body
- O-ring

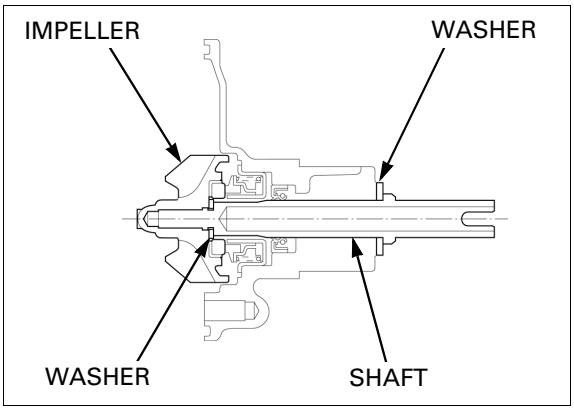


MECHANICAL SEAL REPLACEMENT

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

Remove the following:

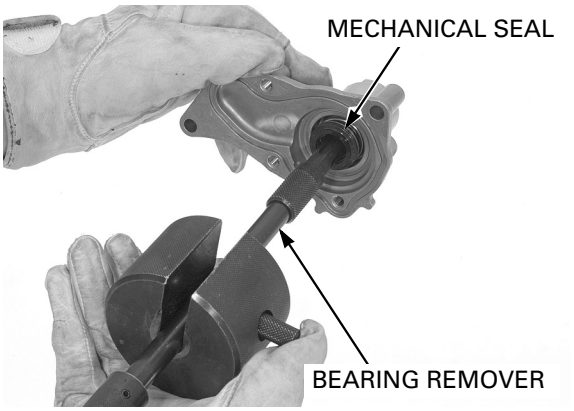
- impeller assembly
- washer
- pump shaft
- thrust washer



Remove the mechanical seal using the special tools.

TOOLS:

Remover head, 15 mm	**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)



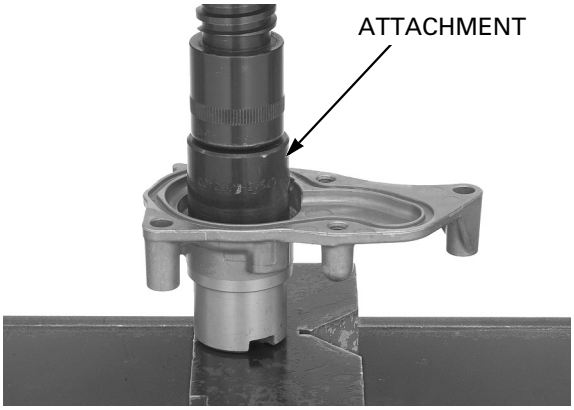
Remove the oil seal.

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	**07945-4150400 or**
Mechanical seal installer	**07965-415000A (U.S.A. only)**

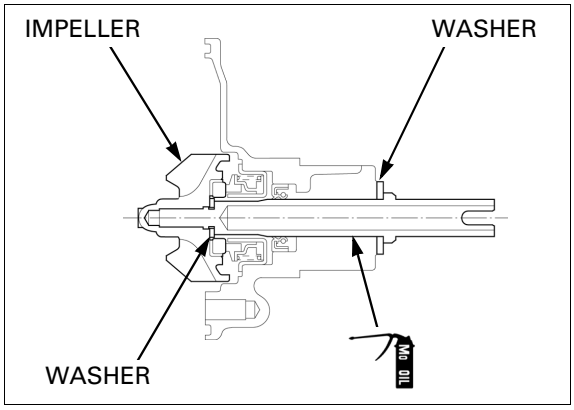


Do not get oil on the pump shaft threads.

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.

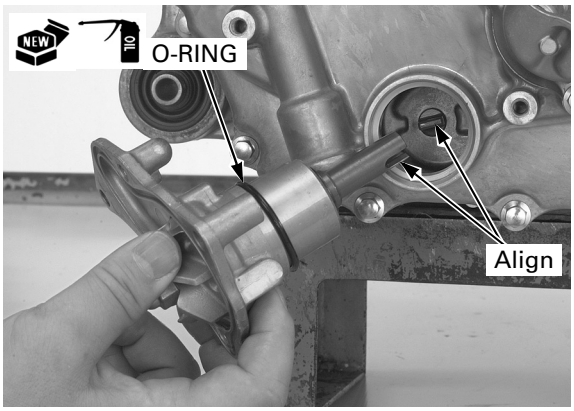
TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)



INSTALLATION

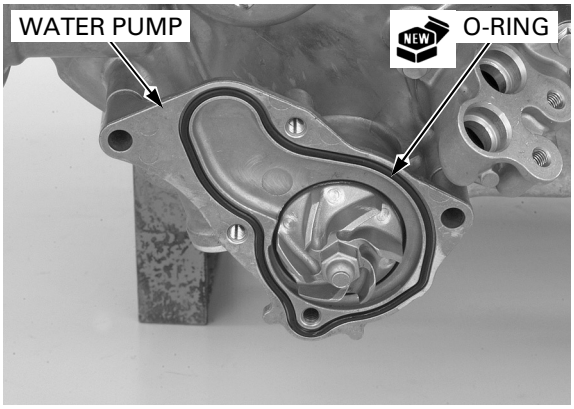
Coat a new O-ring with engine oil and install it on the stepped section of the pump body.

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.

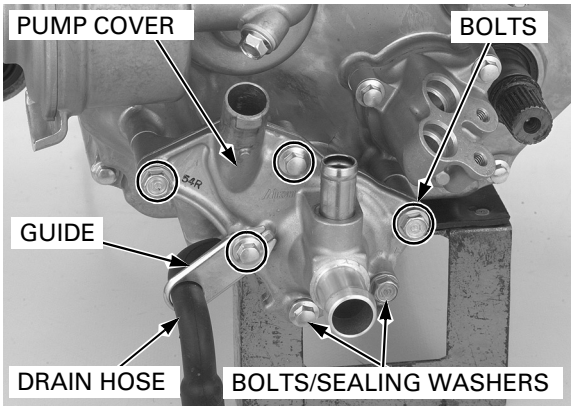


Install the pump cover with the two mounting bolts but do not tighten them.

Install the drain hose guide while aligning its cut-out with the boss on the water pump cover.

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 being careful not to pinch the O-ring.

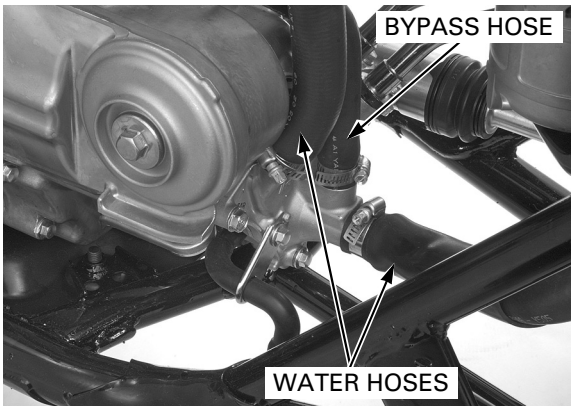


Connect the water hoses and bypass hose, and secure them with the hose clamps.

Fill and bleed the cooling system (page 7-6).

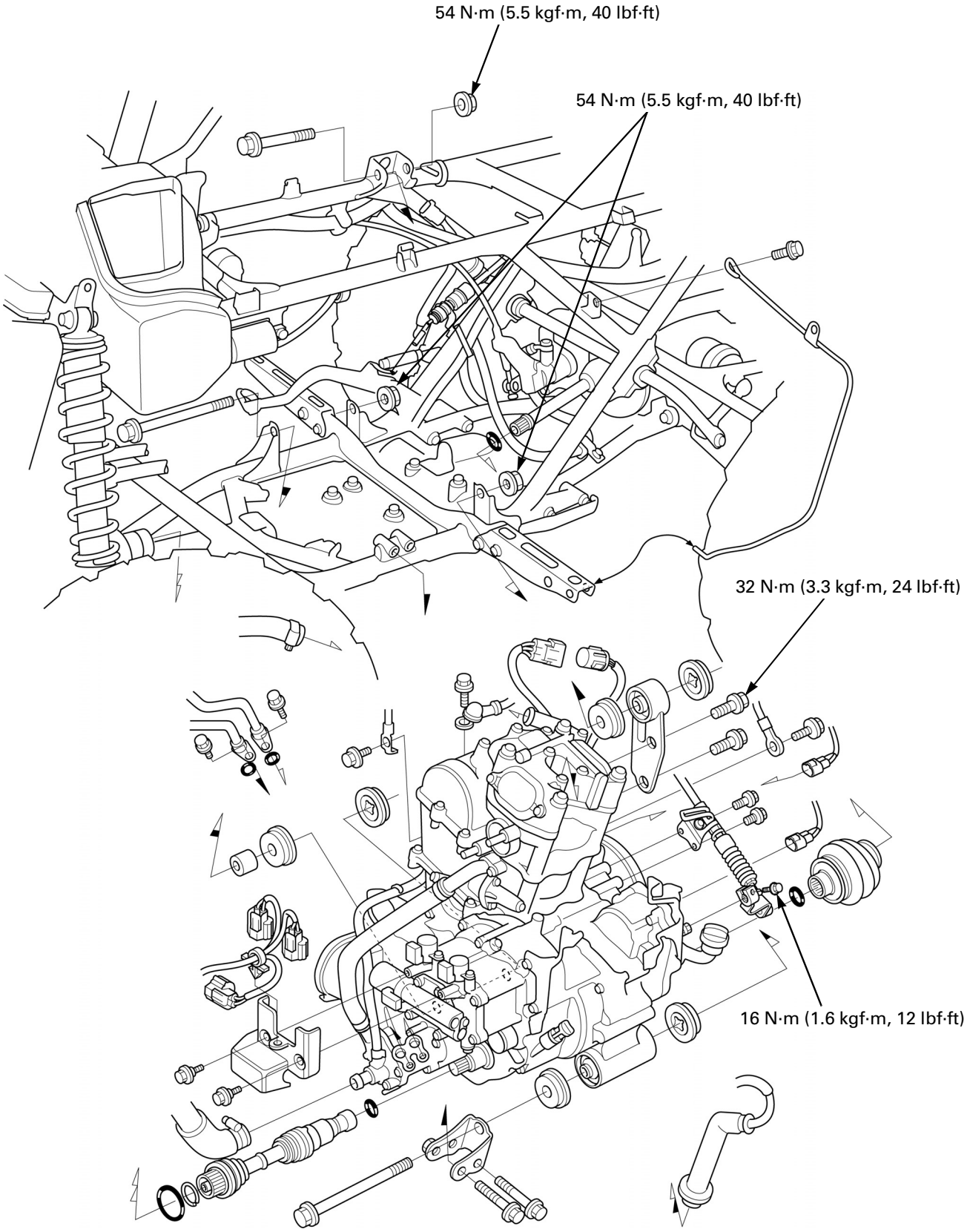
Install the following:

– inner fender (page 3-9)
– front mud guard (page 3-8)
– mud guard lid (page 3-7)



8. 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 14-62)
  – crankshaft/balancer (page 13-2)

SPCIFICATIONS

ITEM		SPECIFICATIONS
Engine dry weight		60.4 kg (133.2 lbs)
Engine oil capacity	After draining	2.7 liters (2.9 US qt, 2.4 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)
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)
Upper engine hanger bolt	54 N·m (5.5 kgf·m, 40 lbf·ft)
Upper engine hanger bracket bolt	32 N·m (3.3 kgf·m, 24 lbf·ft)
Differential mounting bolt (10 mm)	44 N·m (4.5 kgf·m, 33 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)

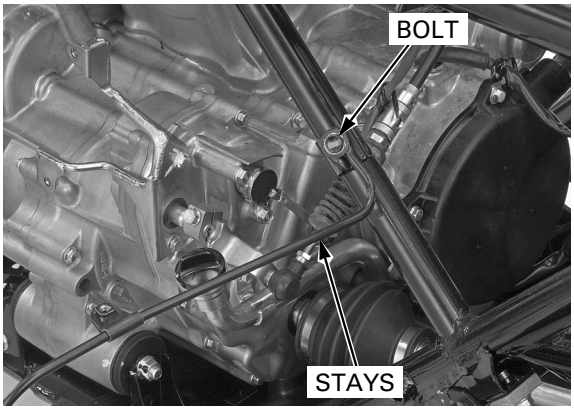
ENGINE REMOVAL

Drain the engine oil (page 4-11).
Drain the coolant (page 7-7).

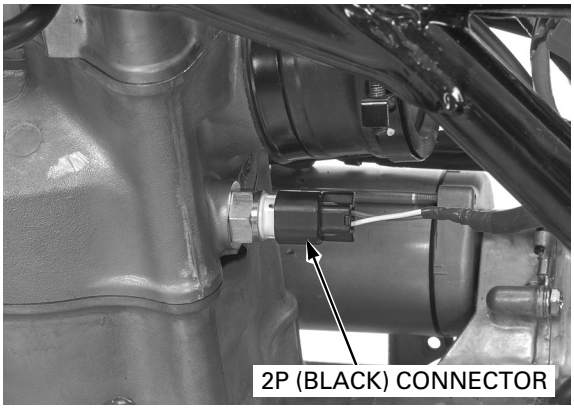
Remove the following:

- front center grille (page 3-10)
- center mud guards (page 3-7)
- front mud guards (page 3-8)
- inner fenders (page 3-9)
- rear fender assembly (page 3-15)
- engine side covers (page 3-17)
- exhaust system (page 3-19)
- throttle body (page 6-43)
- heat guard plate (page 6-39)

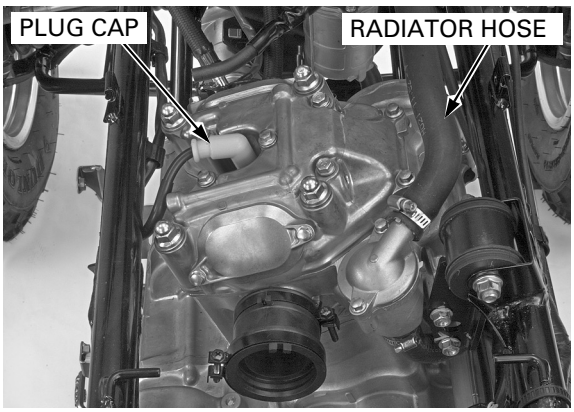
Remove the bolt and the left mud guard stays from the footpeg bracket.



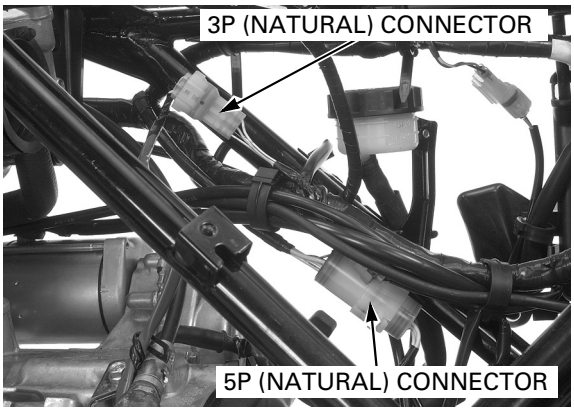
Disconnect the ECT sensor 2P (Black) connector.



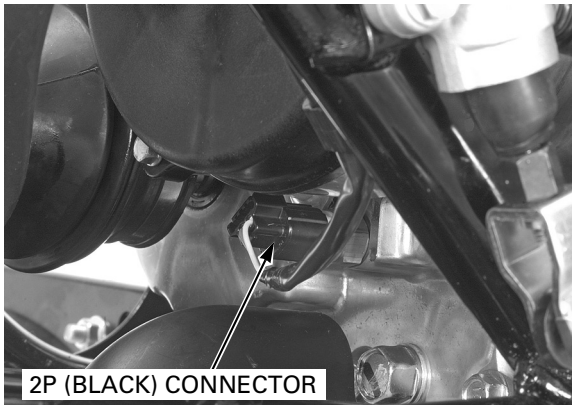
Remove the spark plug cap from the spark plug.
Disconnect the water hose from the thermostat housing.



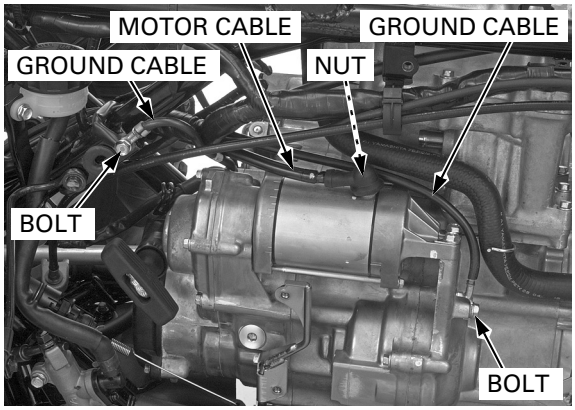
Disconnect the alternator 5P (Natural) connector.
Disconnect the gear position switch 3P (Natural) connector.



Disconnect the EOT sensor 2P (Black) connector.

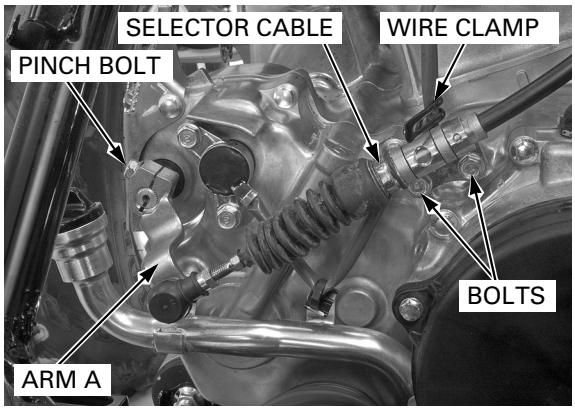


Remove the terminal cap, terminal nut and starter motor cable from the starter motor terminal.
Remove the each bolt and then remove the each ground cable from the engine and frame.



Release the gearshift switch wire from the wire clamp.

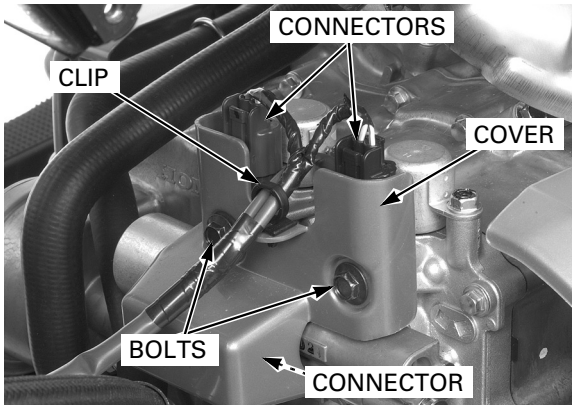
Remove the gearshift arm A pinch bolt and then remove the arm from the gearshift spindle.
Remove the two holder bolts and gear selector cable.



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

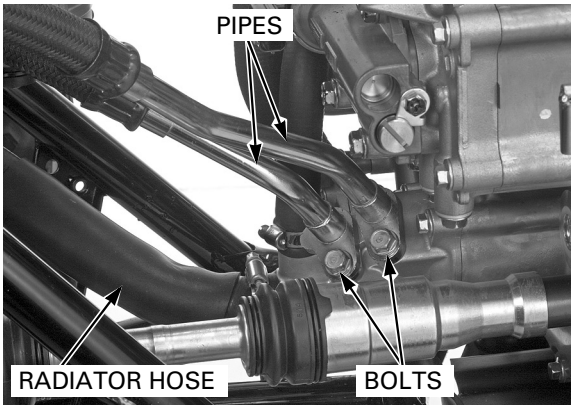
Remove the wire clip.
Remove the two set bolts and shift valve body cover, and disconnect the following connectors:

- shift solenoid A 2P (Black) and shift solenoid B 2P (Brown) connectors
- clutch PC solenoid 2P (Black) connector

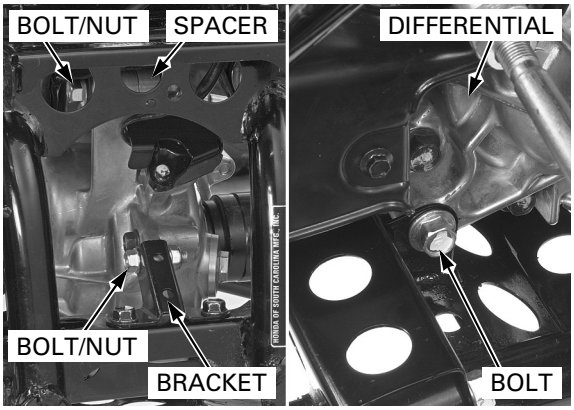


Remove the following:

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

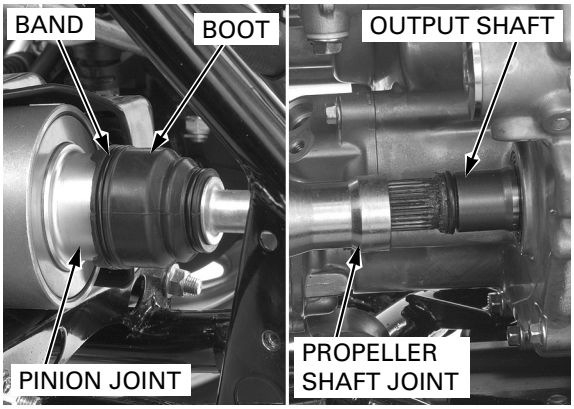


Remove the differential mounting fasteners, spacer and bracket.
Move the front differential forward to get the clearance for front propeller shaft removal.

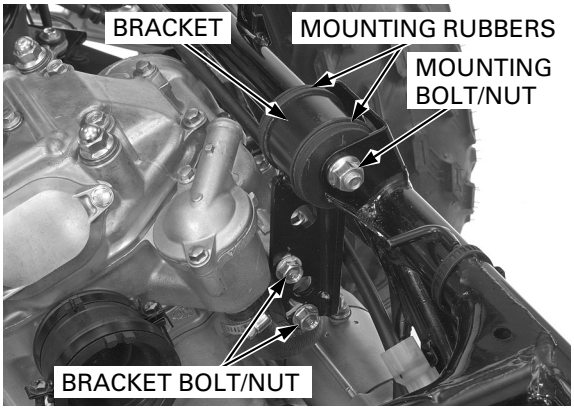


Pull the propeller shaft joint out of the output shaft.

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.

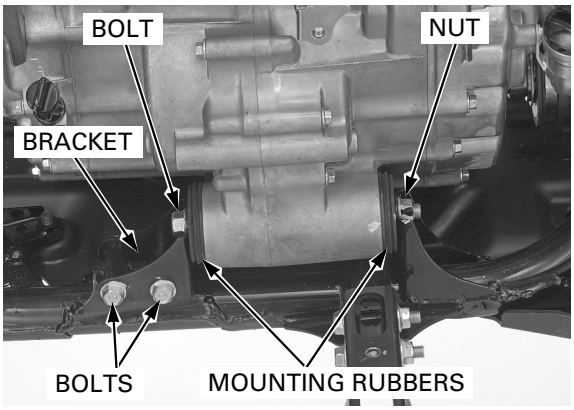


Remove the upper engine hanger bolt and nut.
Remove the upper engine hanger bracket bolts, bracket and mounting rubbers.

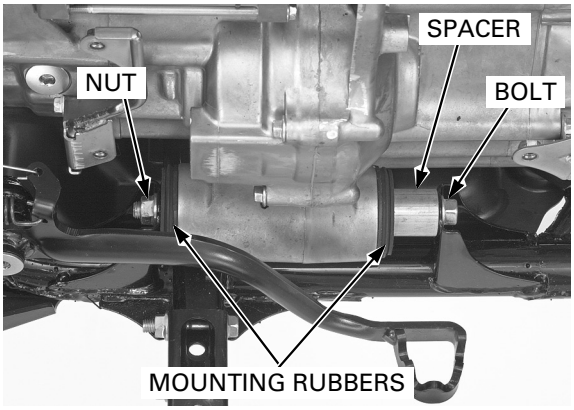


Set suitable wooden blocks between the engine and lower frame pipe to support the engine for ease of bolt removal.

Remove the left lower engine hanger nut, bolt and mounting rubbers.
Remove the two bolts and hanger bracket.



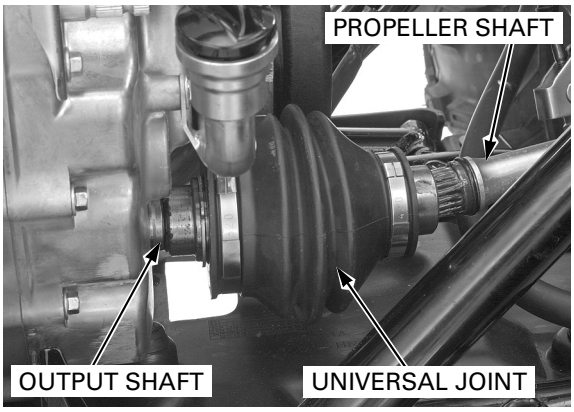
Remove the right lower engine hanger nut, bolt, spacer and mounting rubbers.



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.

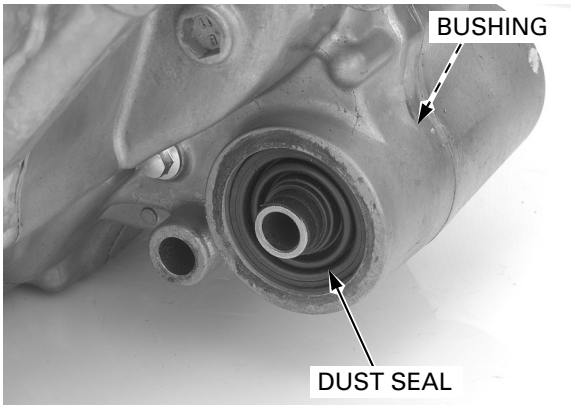
Remove the engine out of the frame toward the left side.



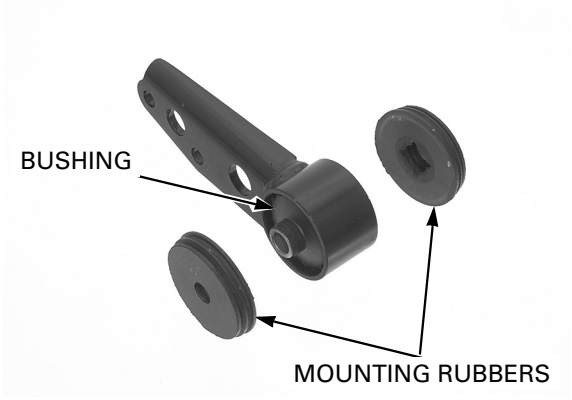
NOTICE

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.



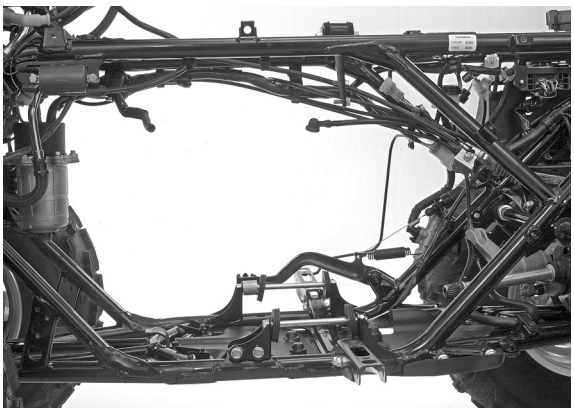
Check the mounting rubbers, hanger bushings and dust seals for wear or damage.



ENGINE INSTALLATION

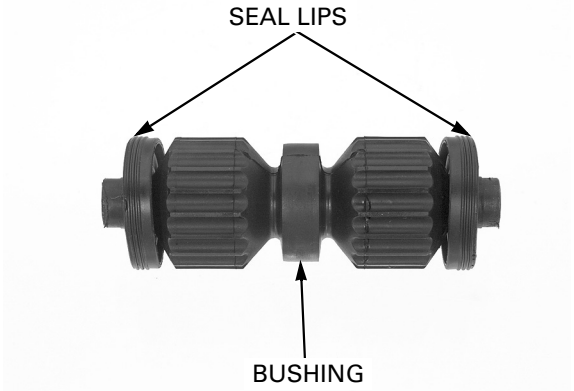
NOTE:

- Before installing the engine, install the valve body cover onto the shift valve body to avoid damaging the solenoid valve (page 8-11).
- Route the wires, cables and hoses properly (page 1-20).



Install the lower hanger bushings into the engine lower mounts.

Install the dust seals with the lip side facing out.

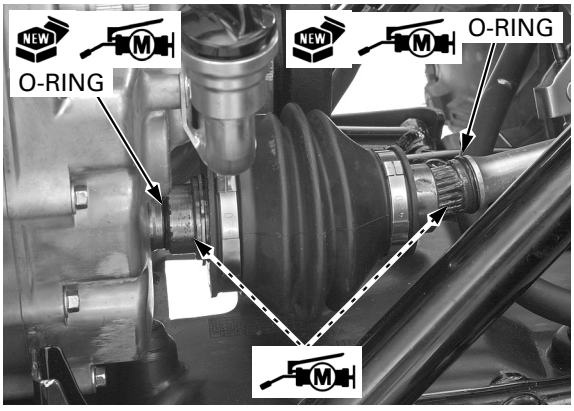


Hold the engine securely and be careful not to damage the frame and engine.

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.

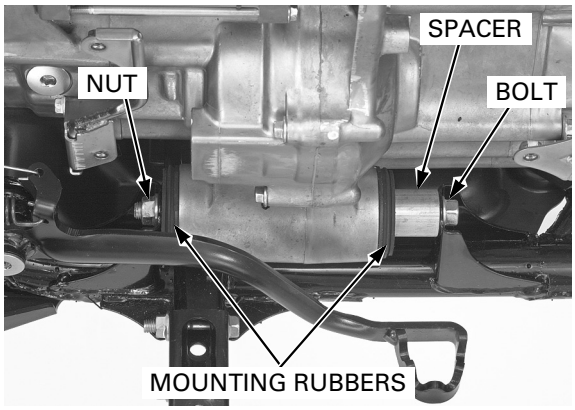
Carefully move the engine and engage the universal joint on the engine with the propeller shaft.

Be sure the universal joint is not disengaged.

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

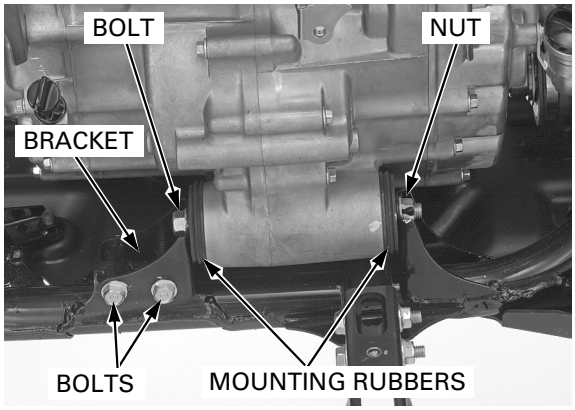
Install the mounting rubbers onto the right lower hanger bushing with the large I.D. side facing in. Install the spacer and the hanger bolt (from the front side) while aligning the bolt holes carefully.

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 engine hanger nuts

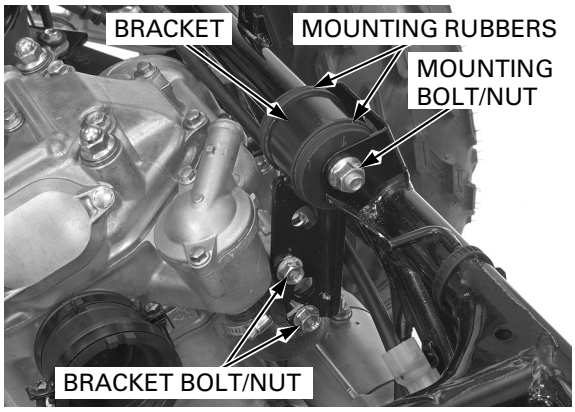
TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)

– left lower engine hanger bracket bolts
– upper engine hanger bracket bolts

TORQUE: 32 N·m (3.2 kgf·m, 24 lbf·ft)

– upper engine hanger bolt

TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)

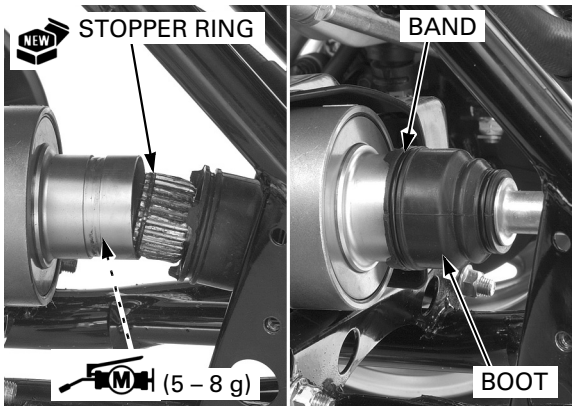


Install a new stopper ring into the groove on the propeller shaft end.

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

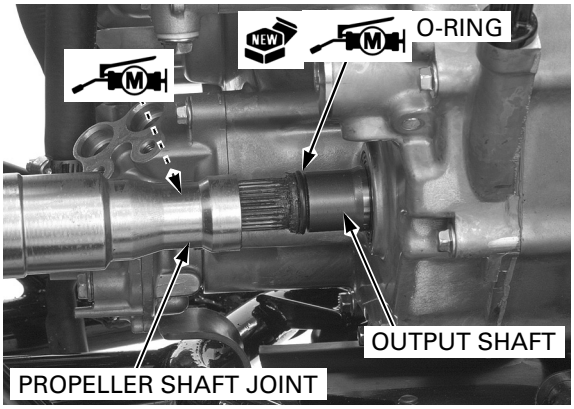
Install the propeller shaft into the pinion joint, aligning the joint and shaft splines until the stopper ring seats in the groove.
Make sure the stopper ring is seated properly by pulling the propeller shaft lightly.

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.



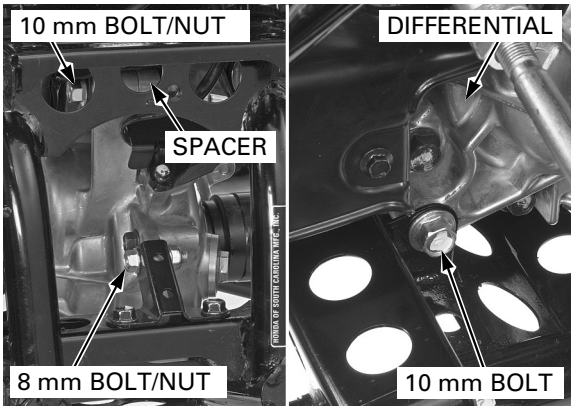
Upper side: Align the mounting points of the differential and frame, and install the spacer (between the left side of the differential and frame) and 10-mm bolt from the right side. Install a new 10-mm nut.

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

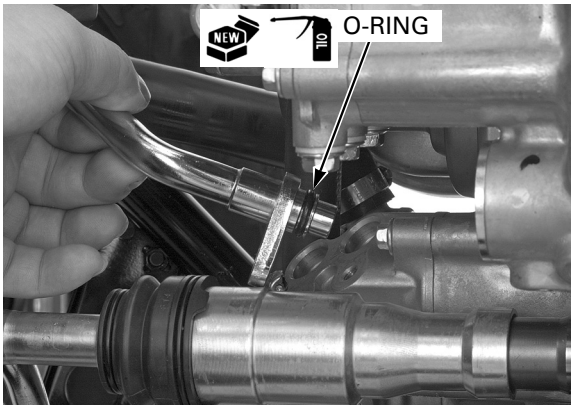
Front side: Install the mounting bracket, 8-mm bolts and nut.

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)

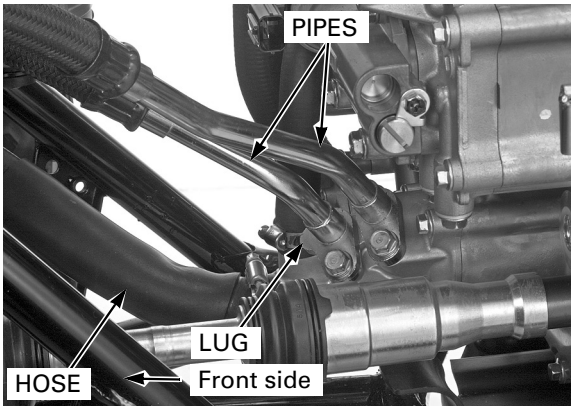


Coat new O-rings with engine oil and install them into each oil pipe grooves.

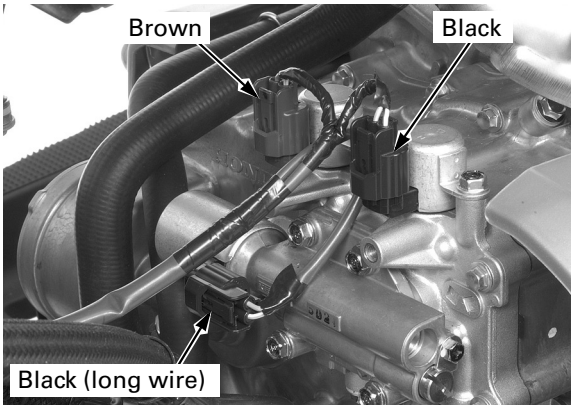


Install the oil pipes to the joint with the oil pipe lug facing forward and tighten the bolts securely.

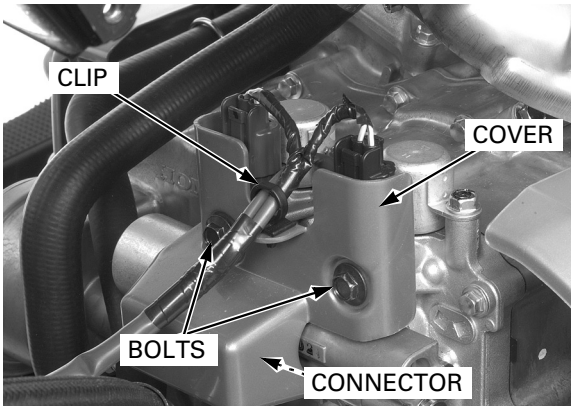
Connect the water hose and tighten the clamp screw securely.



Connect the clutch PC solenoid 2P (Black) connector and shift solenoid 2P (Black and Brown) connectors.



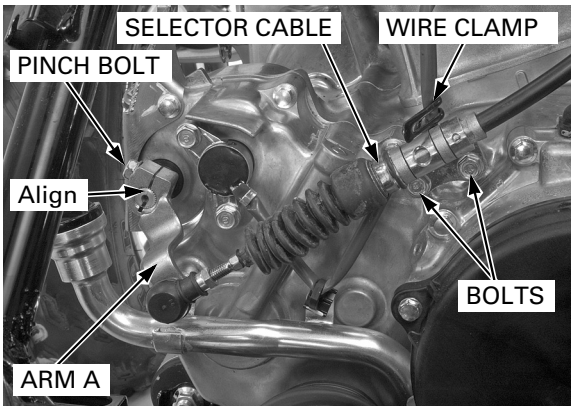
Install the valve body cover and tighten the two set bolts. Install the wire clip over the wire and into the cover.



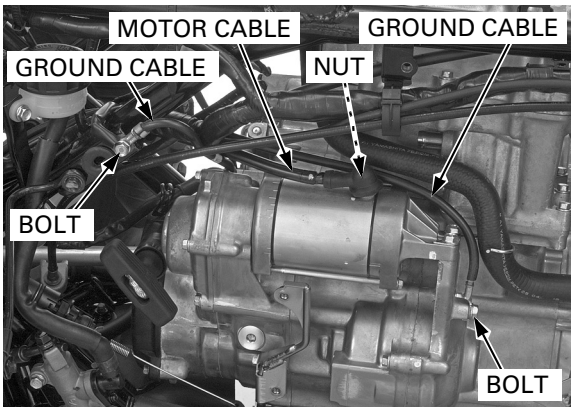
Install the gear selector arm A by aligning the groove with the wide tooth of the spindle. Install the pinch bolt and tighten it.

TORQUE: 16 N·m (1.6 kgf·m, 12 lbf·ft)

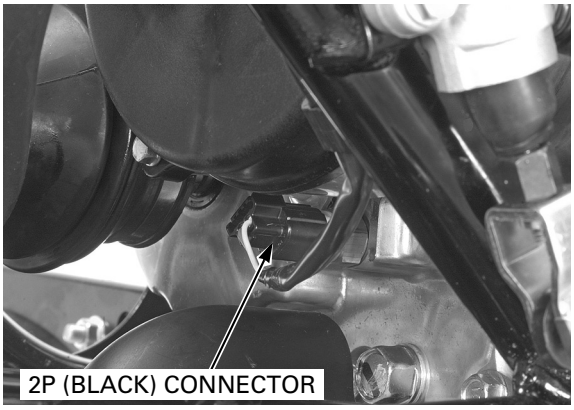
Secure the selector cable onto the engine with the two cable holder bolts.



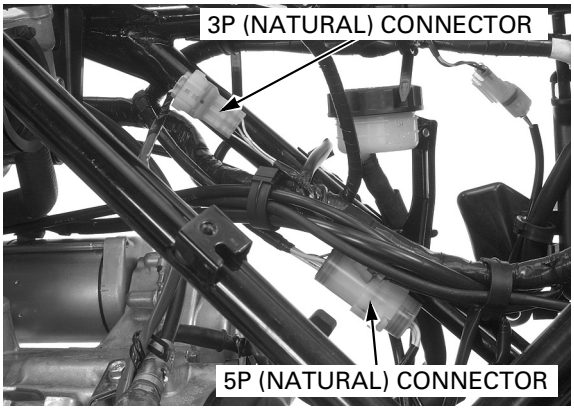
Route the starter motor cables and ground cable properly.
Install the ground cable onto the engine and frame, tighten the bolts securely.
Install the starter motor cable eyelet to the motor terminal and install and tighten the terminal nut.
Install the terminal rubber.



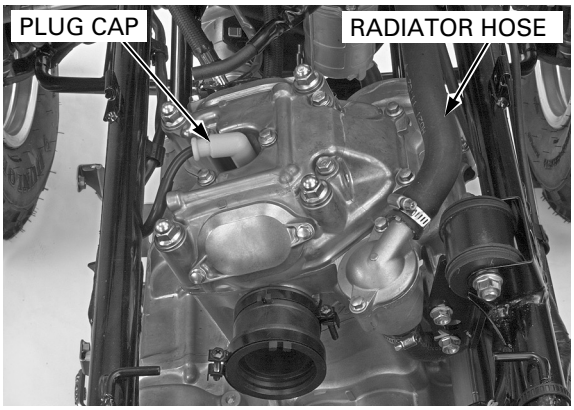
Connect the EOT sensor 2P (Black) connector.



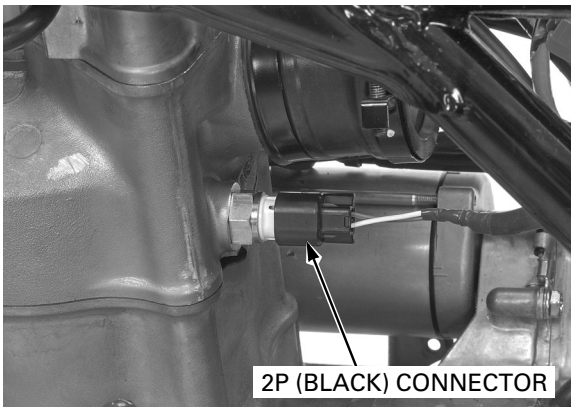
Connect the gear position switch 3P (Natural) connector.
Connect the alternator 5P (Natural) connector.



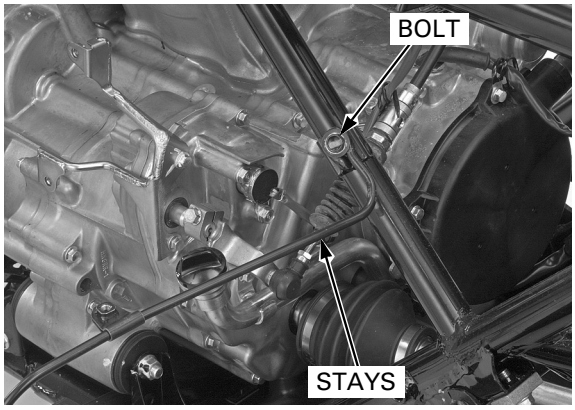
Connect the water hose to the thermostat housing, tighten the hose band.
Install the spark plug cap to the plug.



Connect the ECT sensor 2P (Back) connector.



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:

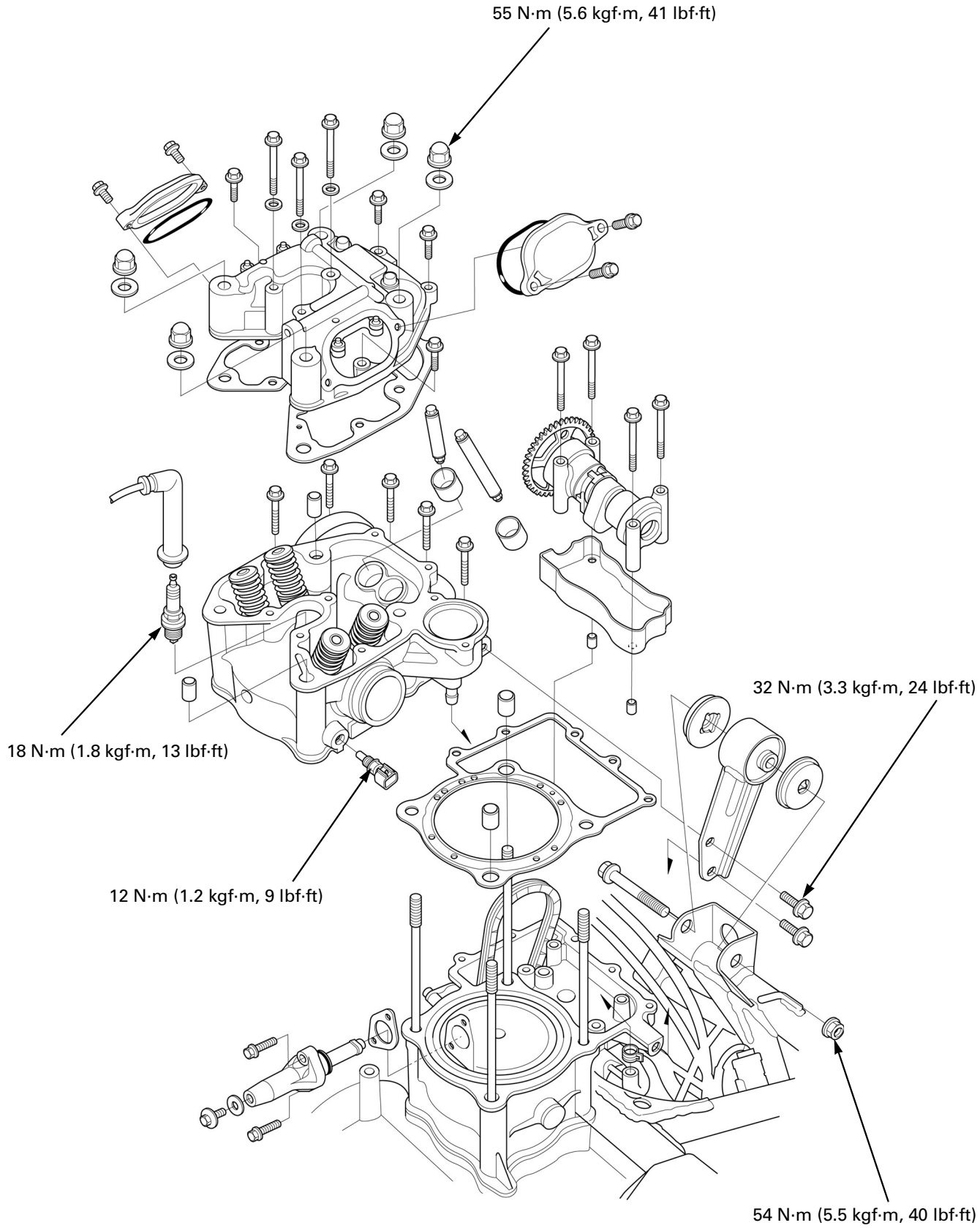
– heat guard plate and fuel tank (page 6-39)
– throttle body (page 6-43)
– exhaust system (page 3-19)
– engine side covers (page 3-17)
– rear fender assembly (page 3-15)
– inner fenders (page 3-9)
– front mud guards (page 3-8)
– center mud guards (page 3-7)
– front center grille (page 3-10)

Fill the engine with recommended oil (page 4-11).
Fill and bleed the cooling system (page 7-6).
Check the engine oil level (page 4-10).

MEMO

9. CYLINDER HEAD/VALVE/CAMSHAFT

SYSTEM COMPONENTS



SERVICE INFORMATION

GENERAL

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

SPECIFICATIONS

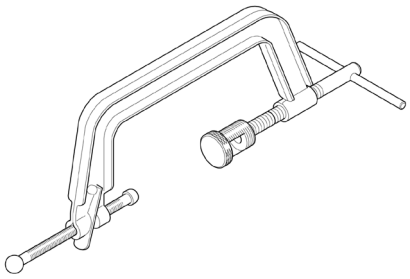
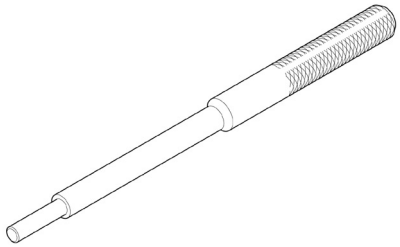
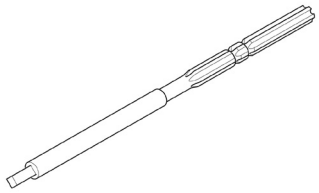
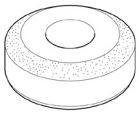
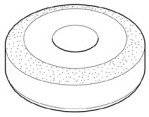
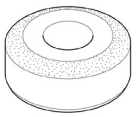
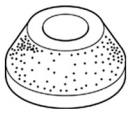
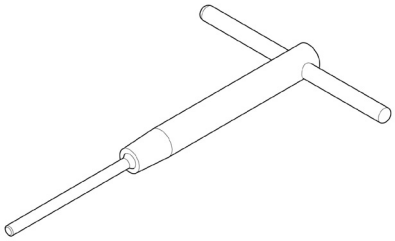
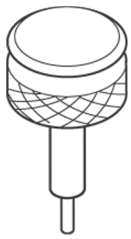
Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Cylinder compression at 350 rpm (min^{-1})			550 kPa (5.6 kgf/cm^2, 80 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	35.015 – 35.175 (1.3785 – 1.3848)	34.840 (1.3717)
		EX	35.394 – 35.554 (1.3935 – 1.3998)	35.144 (1.3824)
	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)

TORQUE VALUE

Cylinder head cover cap nut	55 N·m (5.6 kgf·m, 41 lbf·ft)	Apply engine oil
Upper engine hanger bolt	54 N·m (5.5 kgf·m, 40 lbf·ft)	
Upper engine hanger bracket bolt	32 N·m (3.3 kgf·m, 24 lbf·ft)	
ECT sensor	12 N·m (1.2 kgf·m, 9 lbf·ft)	

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 cutter, 35 mm (45° IN/EX) 07780-0010400  or equivalent commercially available in U.S.A.	Flat cutter, 38.5 mm (32° IN) 07780-0012400  or equivalent commercially available in U.S.A.	Flat cutter, 35 mm (32° EX) 07780-0012300  or equivalent commercially available in U.S.A.
Interior cutter, 34 mm (60° IN/EX) 07780-0014700  or equivalent commercially available in U.S.A.	Cutter holder, 5.5 mm 07781-0010101  or equivalent commercially available in U.S.A.	Tensioner holder B 07ZMG-MCAA400  or 07AMG-001A100 (U.S.A. only)

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 10-2).

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 10-3)

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 10-3)

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 10-3)

Rough idle

- Low cylinder compression

CYLINDER COMPRESSION

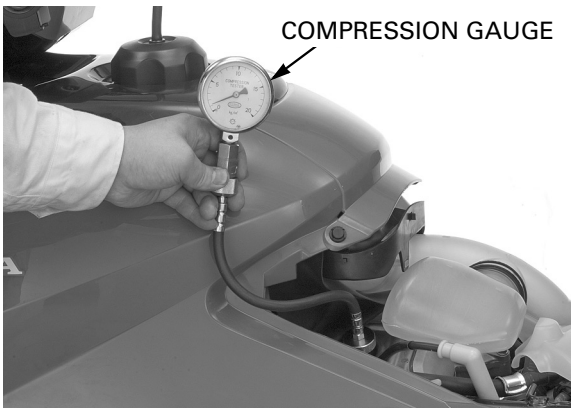
Warm up the engine to normal operating temperature.
Stop the engine, disconnect the spark plug cap and remove the spark plug (page 4-7).

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/cm^2, 74 psi) at 390 rpm (min^{-1})

Check that there is no leakage at the gauge connection.

Low compression can be caused by:

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

High compression can be caused by:

– carbon deposits in combustion chamber or on piston head

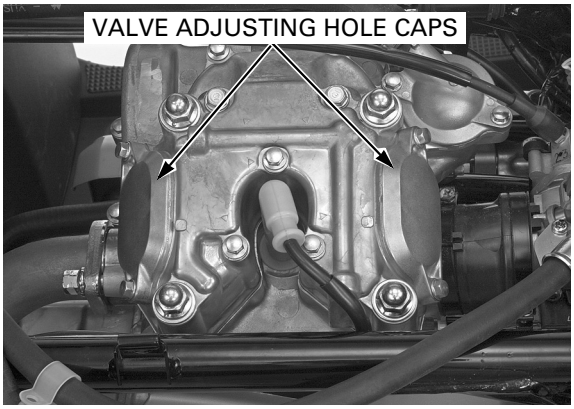
CYLINDER HEAD COVER REMOVAL/ DISASSEMBLY

REMOVAL

Remove the fuel tank and heat guard plate (page 6-39).

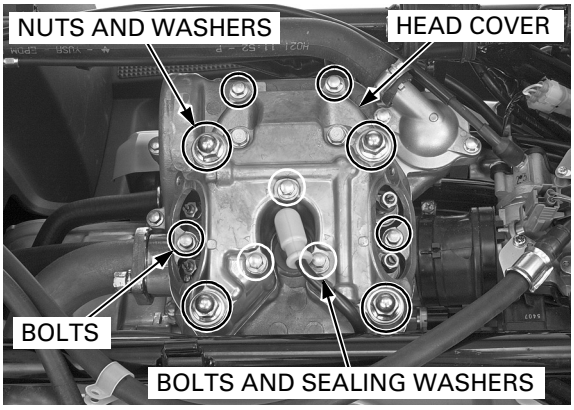
Remove the following and set the piston position to Top Dead Center on the compression stroke (page 4-8):

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



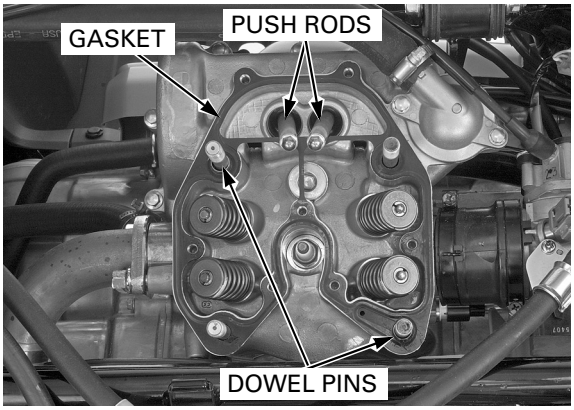
Remove the following:

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

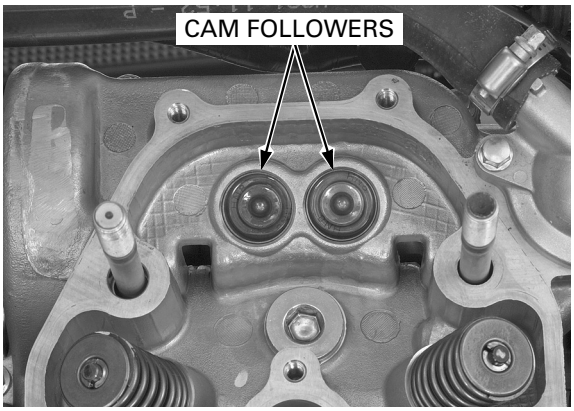


Mark the push rods so they can be placed back in their original locations.

- push rods
- gasket
- dowel pins



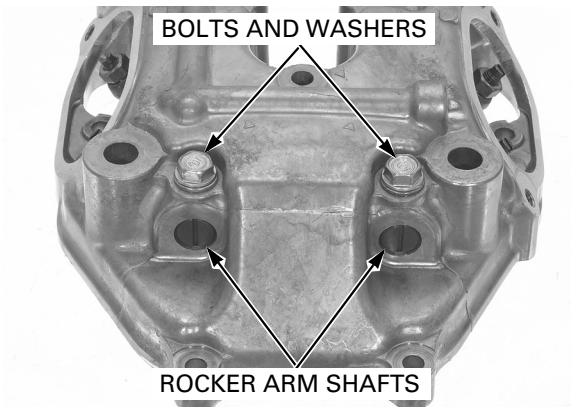
- cam followers



DISASSEMBLY

Remove the two bolts and sealing washers.

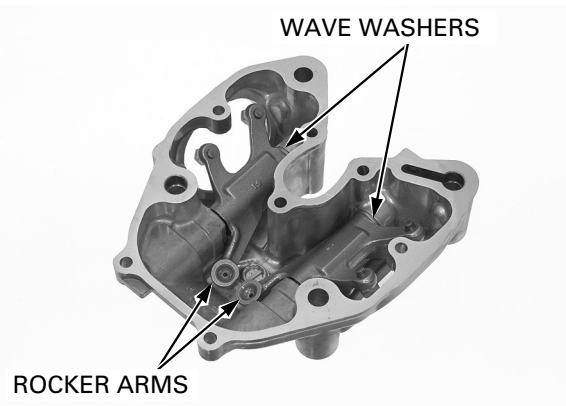
Push the rocker arm shaft with the small screwdriver through the bolt hole until the O-ring on the shaft is removed out of the head cover.



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.

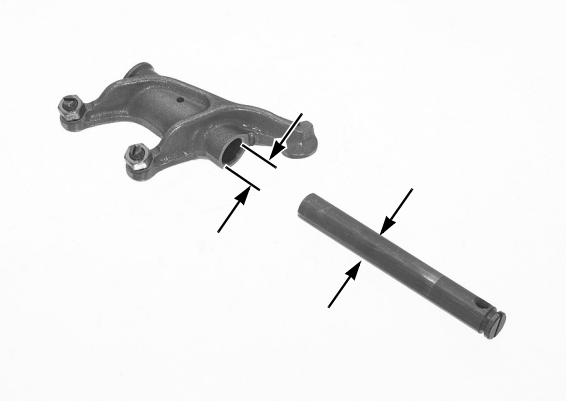
SERVICE LIMIT: 11.92 mm (0.469 in)

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)



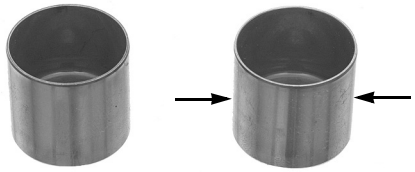
PUSH ROD

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)

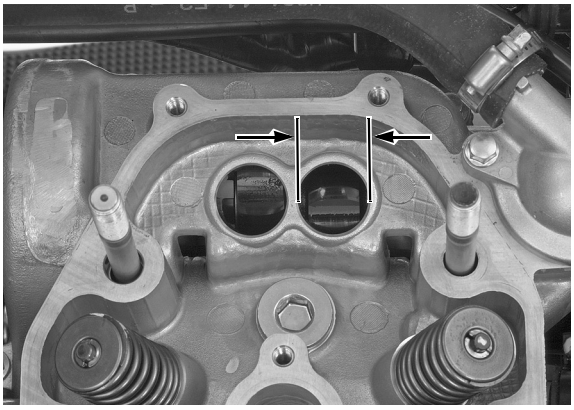


Measure each follower bore I.D.

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)

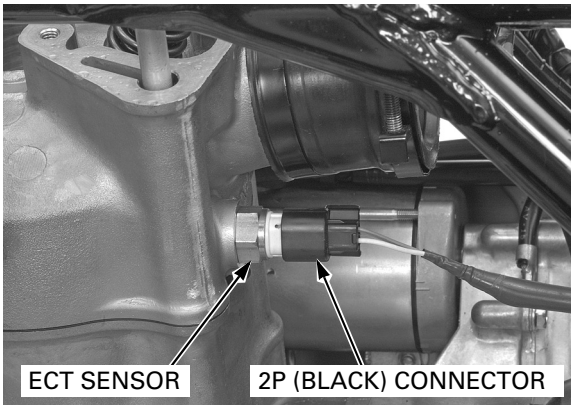


CYLINDER HEAD REMOVAL

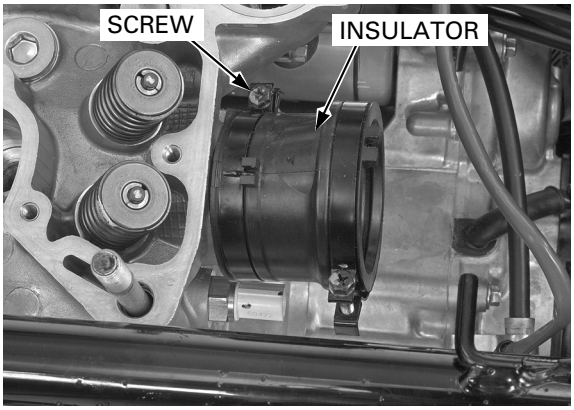
Remove the following:

- thermostat (page 7-8)
- throttle body (page 6-43)
- exhaust pipe (page 3-19)
- cylinder head cover (page 9-6)

Disconnect the ECT sensor 2P (Black) connector.
If necessary, remove the ECT sensor and O-ring from the cylinder head.

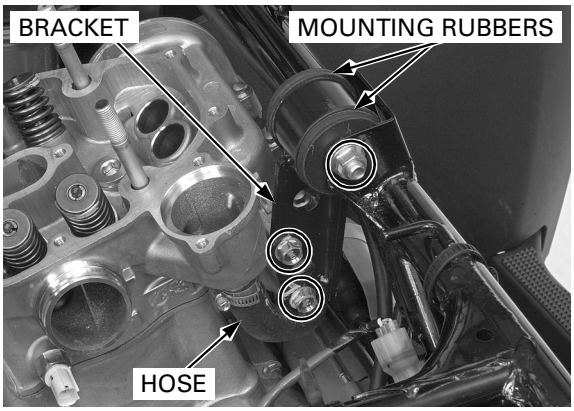


Remove the spark plug cap.
Loosen the band screw and remove the insulator.



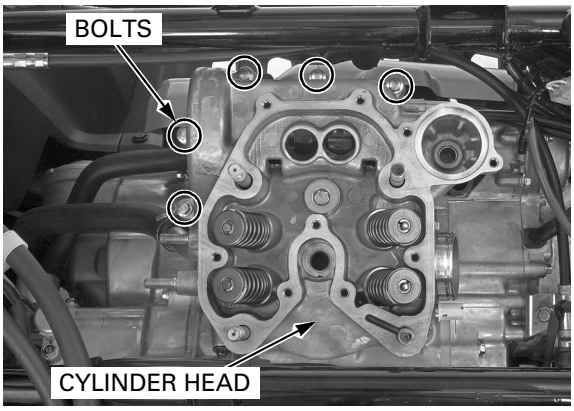
Remove the following:

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

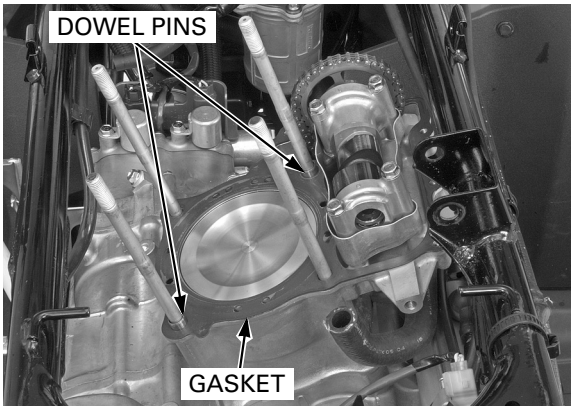


Do not strike the cylinder head too hard and do not damage the mating surface with a screwdriver.

– five bolts
– cylinder head



– gasket
– dowel pins

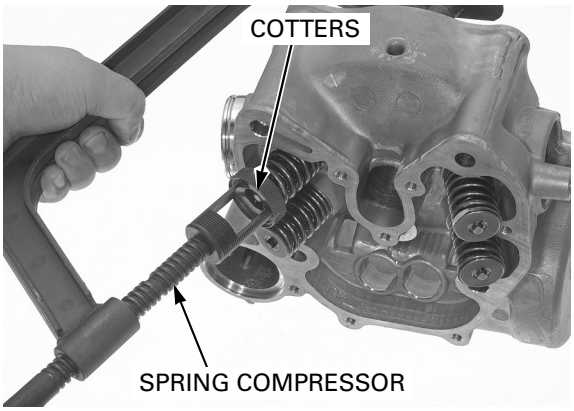


CYLINDER HEAD DISASSEMBLY

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

Remove the valve spring cotters using the valve spring compressor.

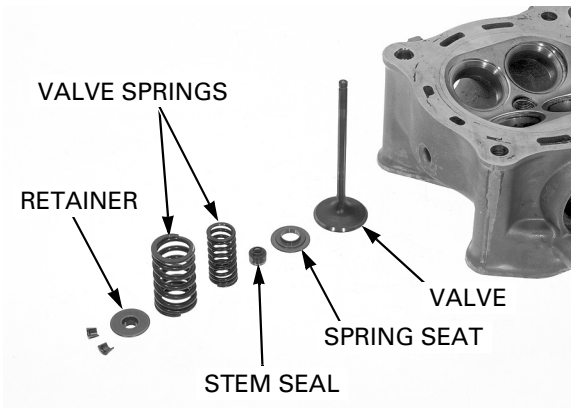
TOOL:
Valve spring compressor 07757-0010000



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

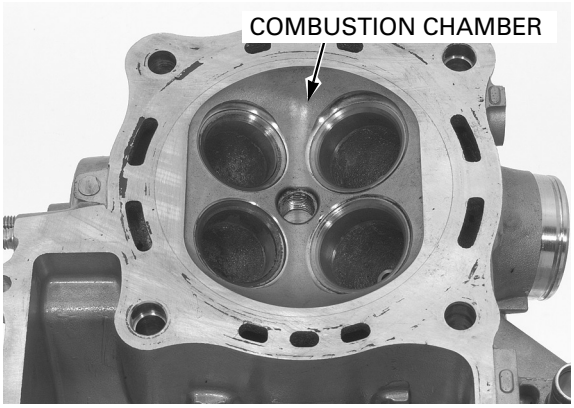


CYLINDER HEAD INSPECTION

CYLINDER HEAD

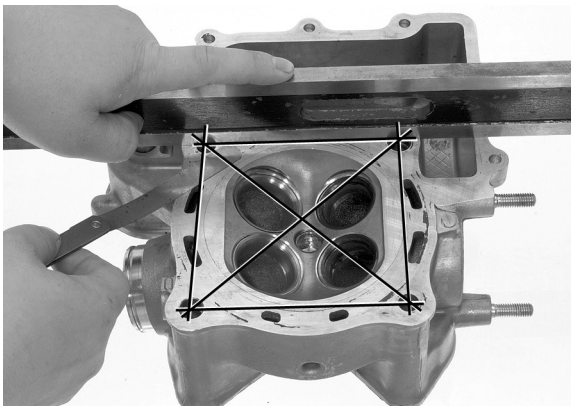
Be careful not to damage the gasket surface.

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.

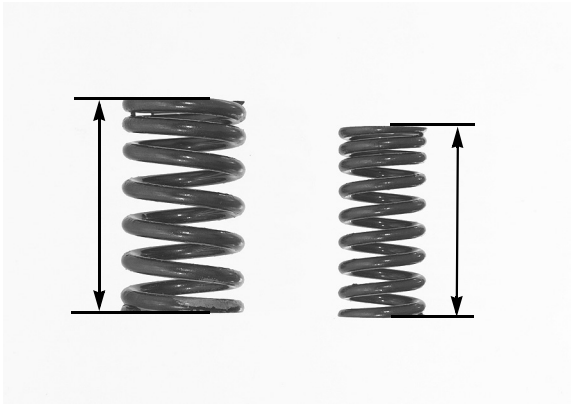
SERVICE LIMIT: 0.05 mm (0.002 in)



VALVE SPRING

Measure the valve spring free length.

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

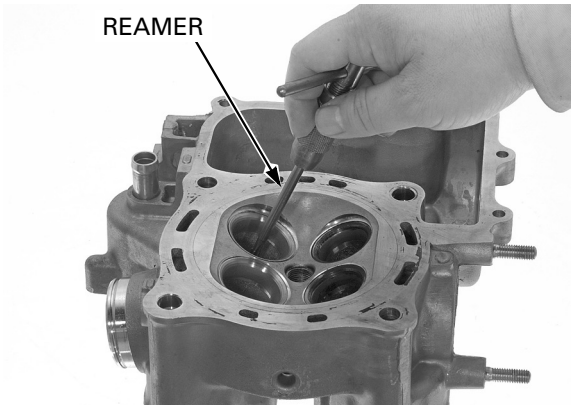


VALVE/VALVE GUIDE

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)

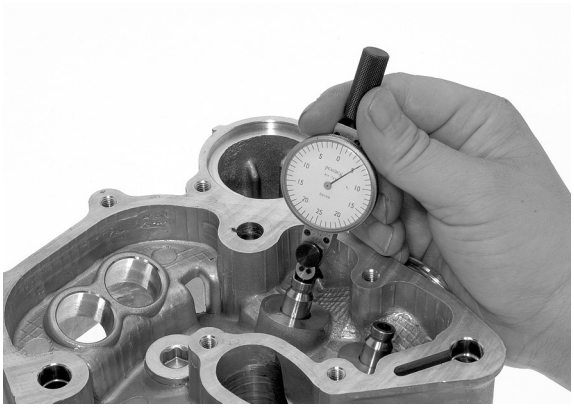
Ream the valve guide to remove any carbon build-up before measuring the guide.
Insert the reamer from the combustion chamber side of the cylinder head and always rotate the reamer clockwise.



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: 5.53 mm (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 9-13).

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

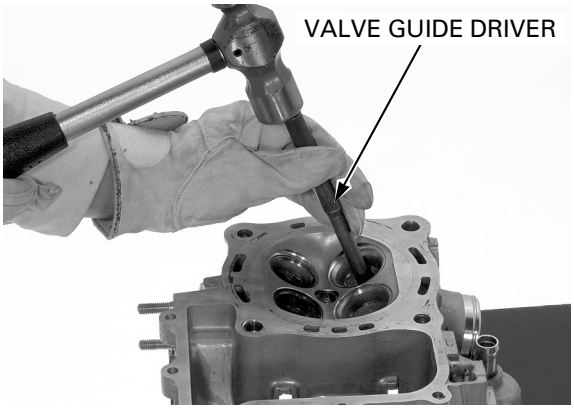
VALVE GUIDE REPLACEMENT

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.

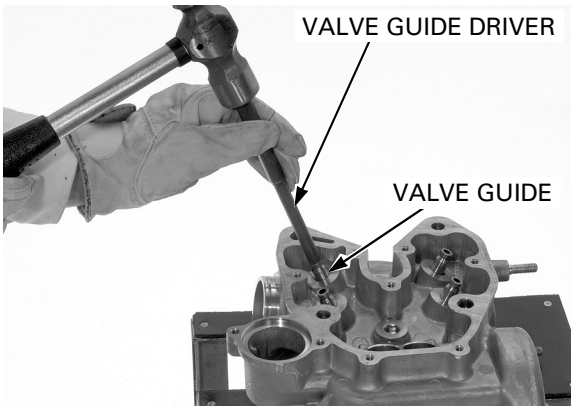
Heat the cylinder head to 130°C–140°C (275°F–290°F) with a hot plate or oven. Do not heat the cylinder head beyond 150°C (300°F). Use temperature indicator sticks, available from welding supply stores, to be sure the cylinder head is heated to the proper temperature.

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)

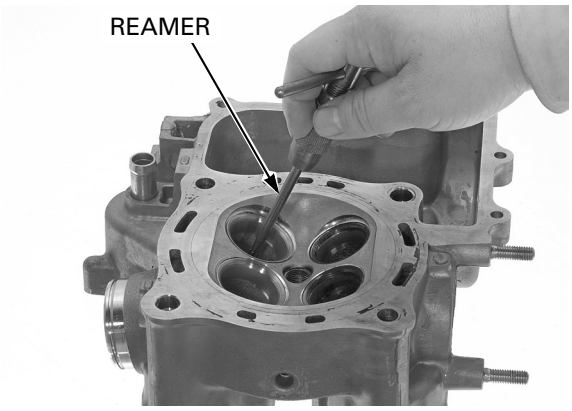
Let the cylinder head cool to room temperature.

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 9-14).

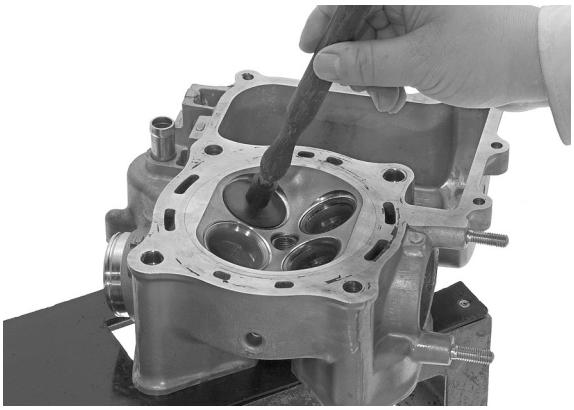


VALVE SEAT INSPECTION/REFACING

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.

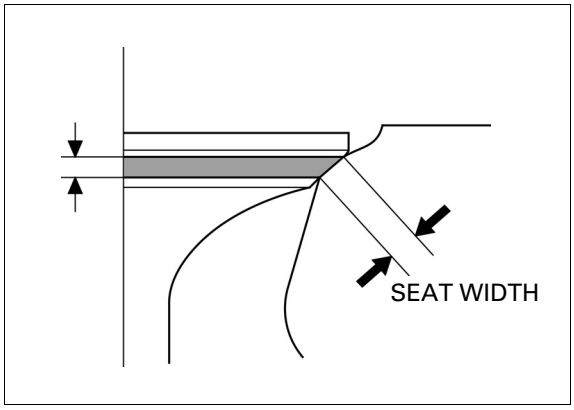


The valve cannot be ground. If the valve face is burned or badly worn or if it contacts the seat unevenly, replace the valve.

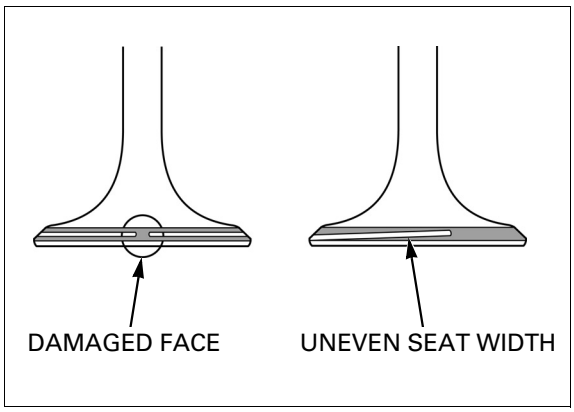
Remove the valve and inspect the valve seat face.
The valve seat contact should be within the specified width and even all around the circumference.

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

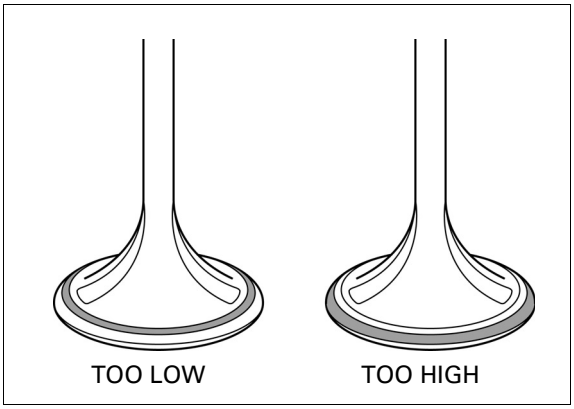
If the valve seat width is not within specification, reface the valve seat.



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.



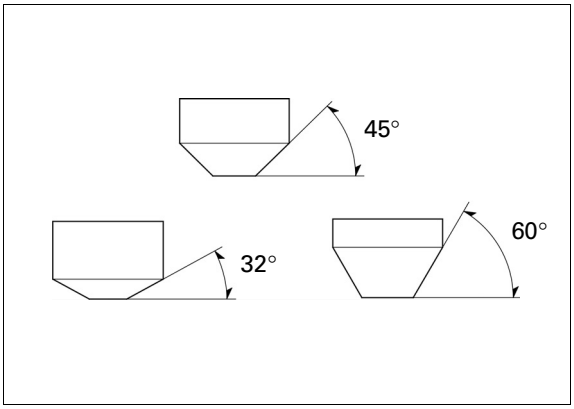
- Contact area (too high or too low)
  – Reface the valve seat.



REFACING

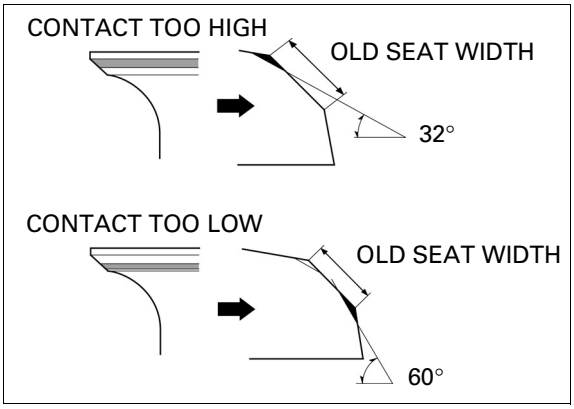
NOTE:

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



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.

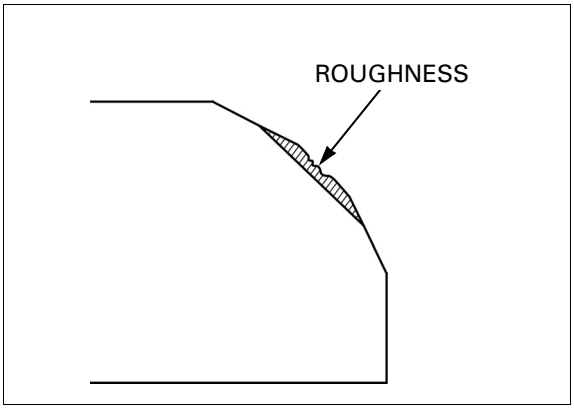


Using a 45° seat cutter, remove any roughness or irregularities from the seat.

TOOLS:

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

or equivalent commercially available in U.S.A.

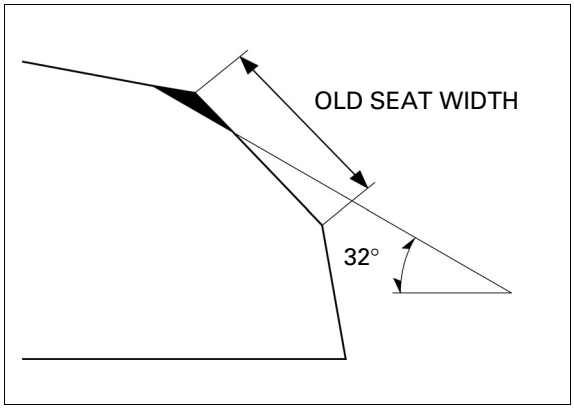


Using a 32° flat cutter, remove 1/4 of the existing valve seat material.

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.

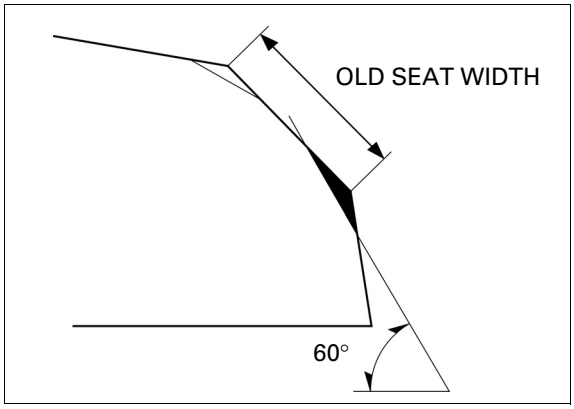


Using a 60° interior cutter, remove 1/4 of the existing valve seat material.

TOOLS:

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

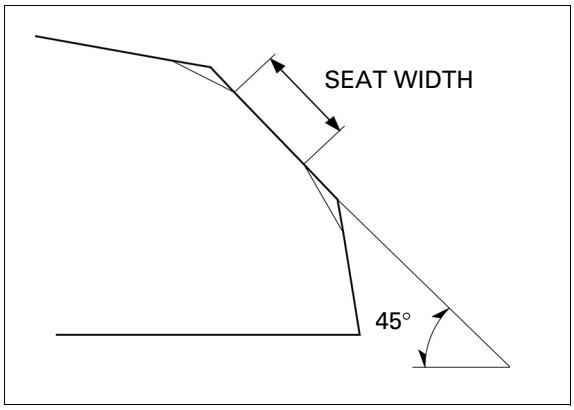
or equivalent commercially available in U.S.A.



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)

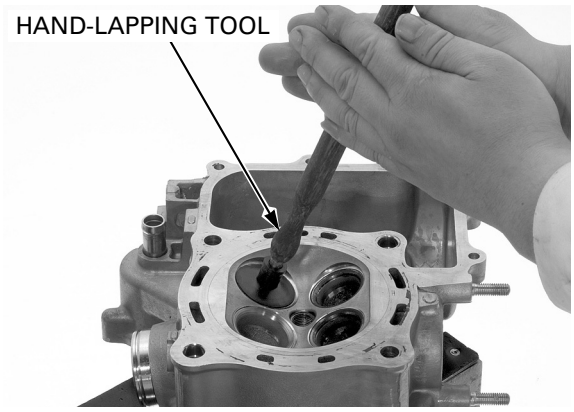
Make sure all pitting and irregularities are removed.



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

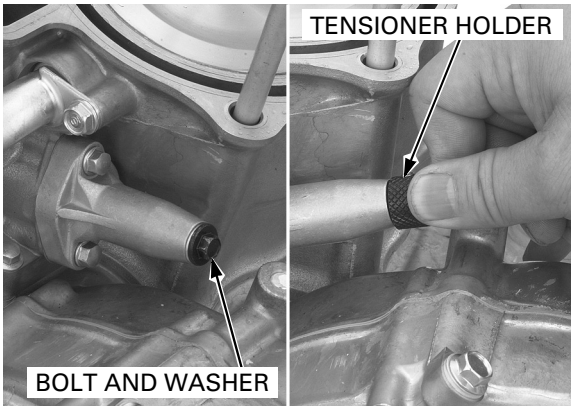
REMOVAL

Remove the cylinder head (page 9-9).

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).

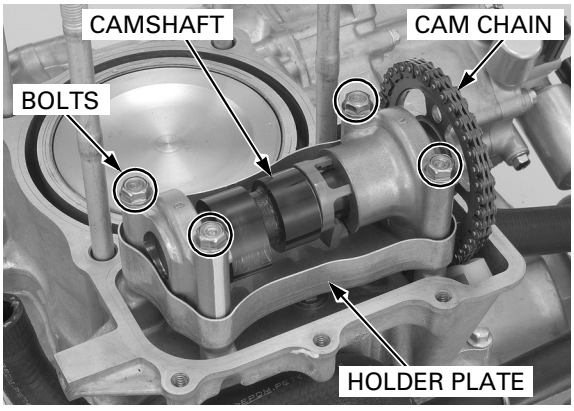
TOOL:
Tensioner holder B — **07ZMG-MCAA400 or 07AMG-001A100 (U.S.A. only)**



Remove the four camshaft holder bolts.

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

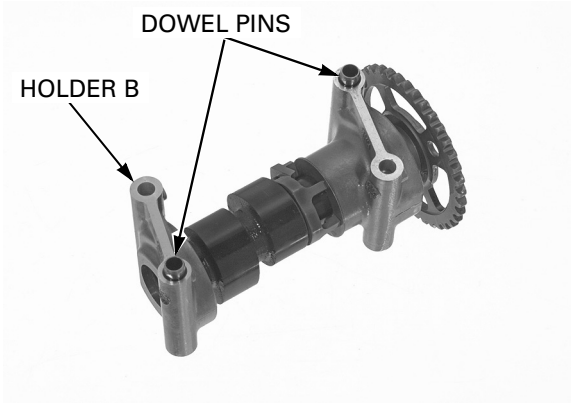
Raise the holder plate so the dowel pins fitted in the camshaft holders are removed off the cylinder.
Release the cam chain from the cam sprocket to remove the camshaft assembly and holder plate.



Remove the camshaft holder B from the camshaft assembly.

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

Remove the dowel pins.



INSPECTION

For cam chain tensioner lifter inspection, see page 10-7.

Check the sprocket teeth for wear or damage.

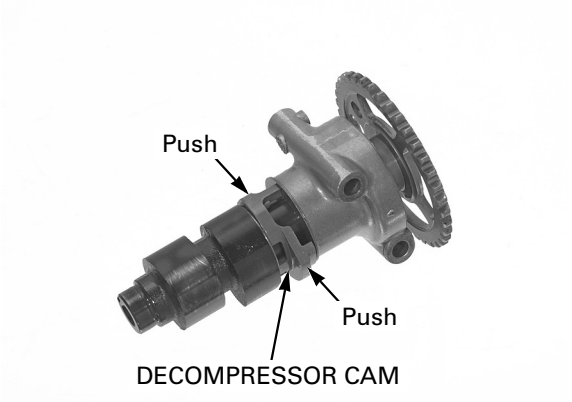
Turn the camshaft holder to check each bearing.
Replace the camshaft assembly if the bearing does not turn smoothly and quietly.

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

Measure each cam lobe height.

SERVICE LIMITS: IN: 34.840 mm (1.3717 in)
EX: 35.144 mm (1.3824 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.

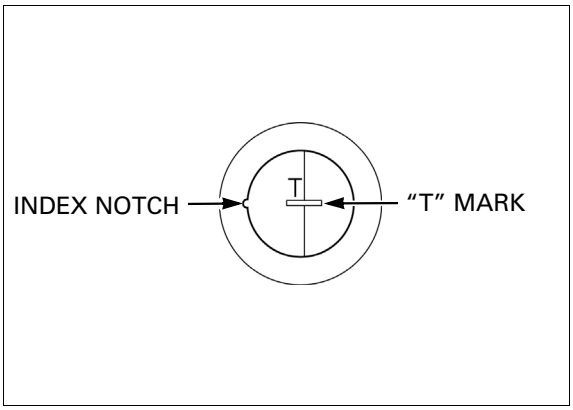


INSTALLATION

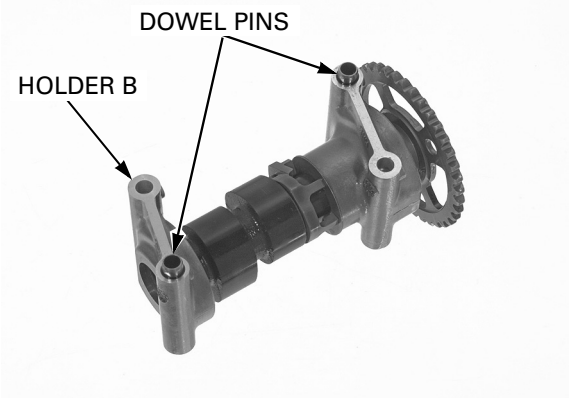
Carefully rotate the crankshaft while holding the cam chain to avoid jamming the cam chain against the timing sprocket of the crankshaft.

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 9-16).



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

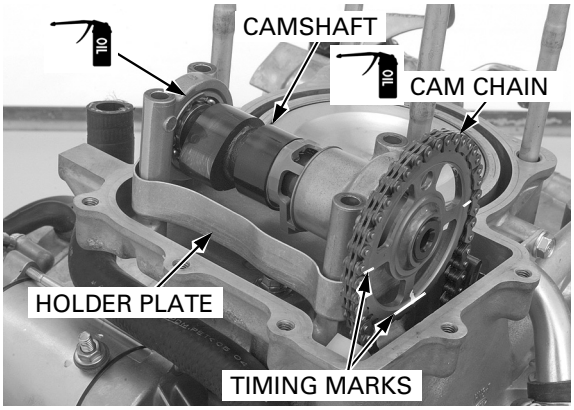


Before installing the camshaft, be sure the cylinder bolt (under the cam shaft) is tightened securely (page 10-9).

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.

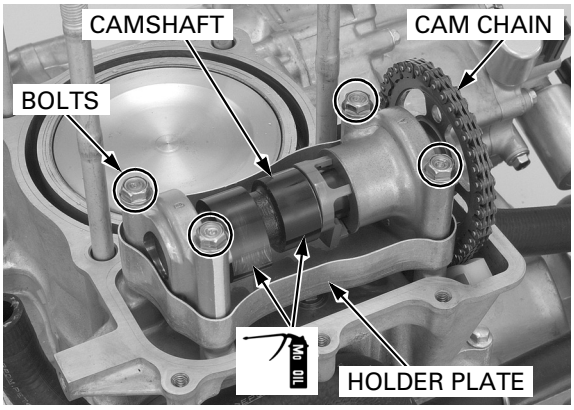
Place the camshaft assembly onto the cylinder and install the cam chain over the sprocket while aligning the timing marks (index lines) on the sprocket with the cylinder top surface and holder plate edge.
Locate the dowel pins into the holes in the cylinder securely.

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.

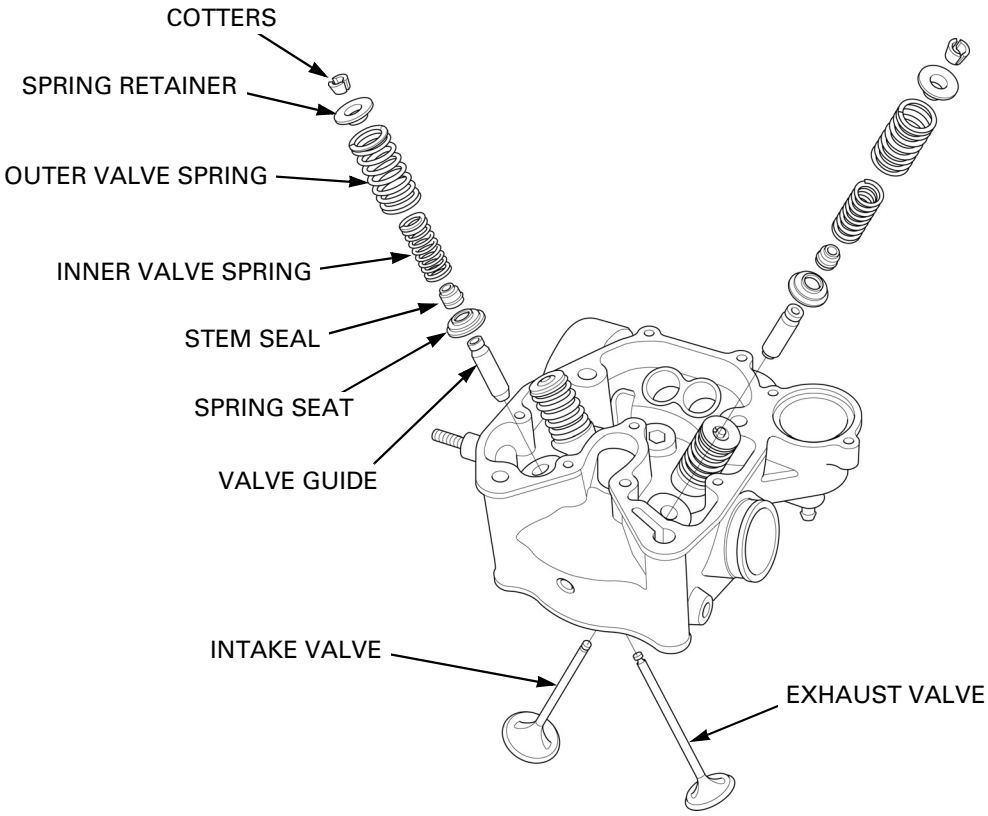


Make sure the timing mark on the sprocket aligns with the cylinder surface when the "T" mark is aligned with the index notch.

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

Install the cylinder head (page 9-20).

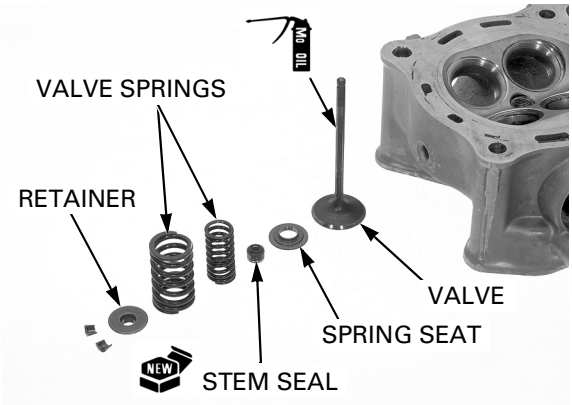
CYLINDER HEAD ASSEMBLY



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

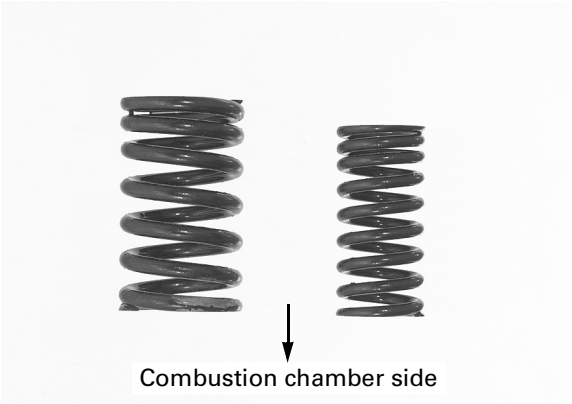
Install the valve spring seats and new stem seals.

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.



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

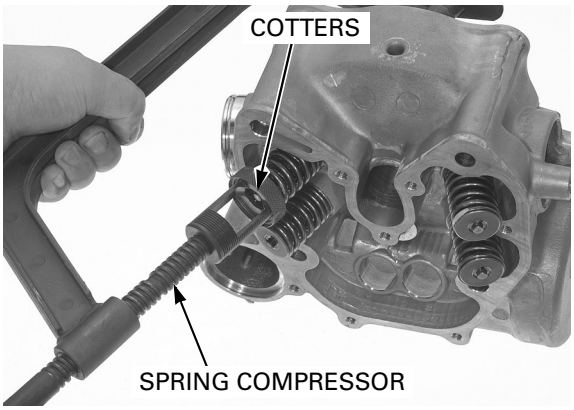
Install the spring retainer.



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

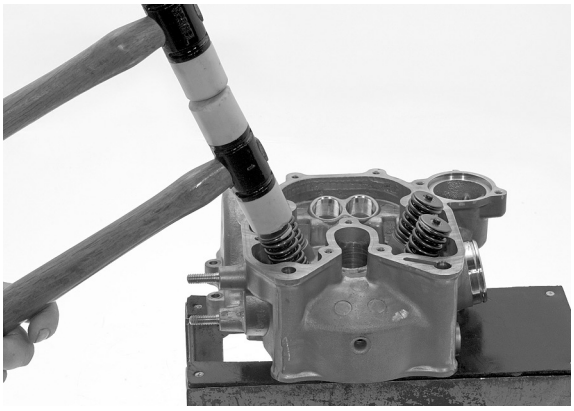
Install the valve cotters using the valve spring compressor.

TOOL:
Valve spring compressor 07757-0010000



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

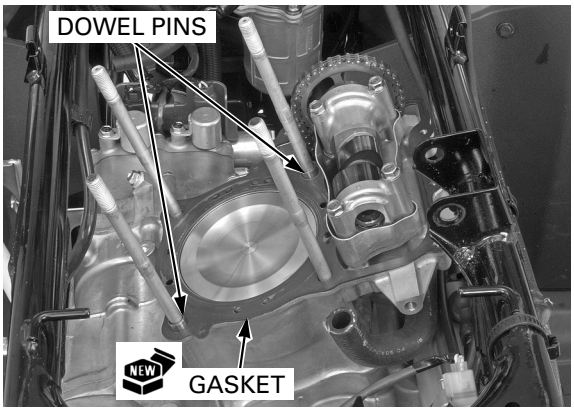
Tap the valve stems gently with two plastic hammers to seat the cotters firmly.



CYLINDER HEAD INSTALLATION

Clean the mating surface of the cylinder and head.

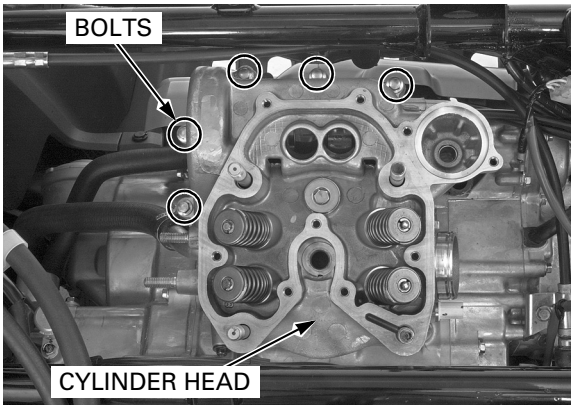
Install the dowel pins and a new gasket.



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.

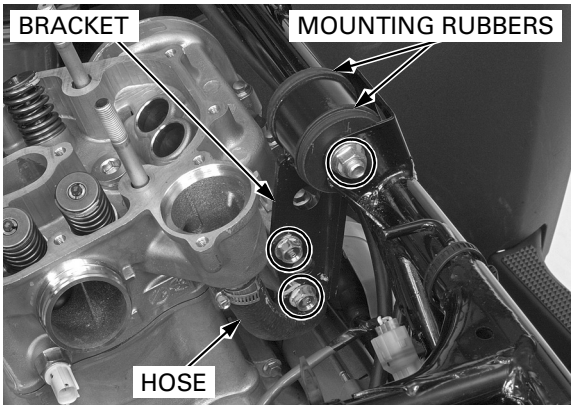


Install the mounting rubbers on the upper engine hanger bushing with the large I.D.side facing in.
Install the upper engine hanger bracket and the three hanger bolts.

Tighten the hanger bolts after installing the cylinder head cover.

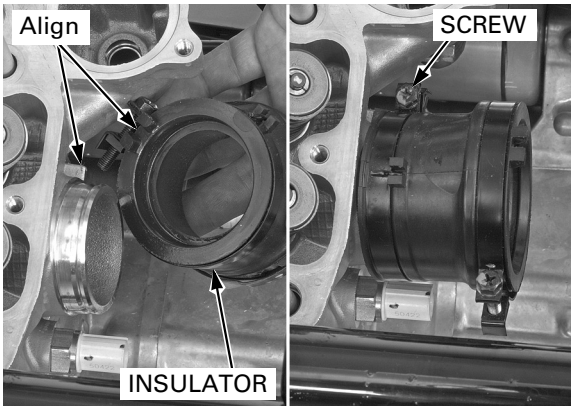
Temporarily tighten the three bolts.

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

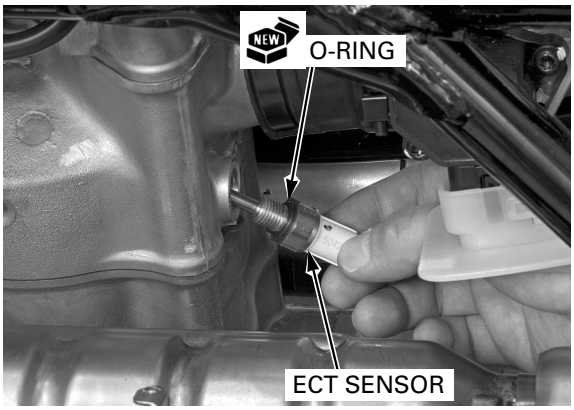


Connect the sensor connector.

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.



If the ECT sensor is removed, install a new O-ring onto the sensor.



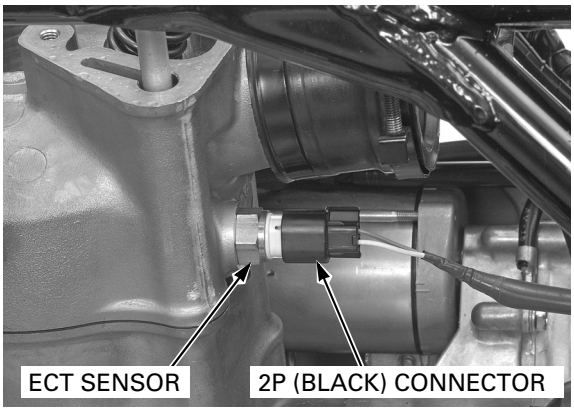
Install and tighten the ECT sensor to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Connect the ECT sensor 2P (Black) connector.

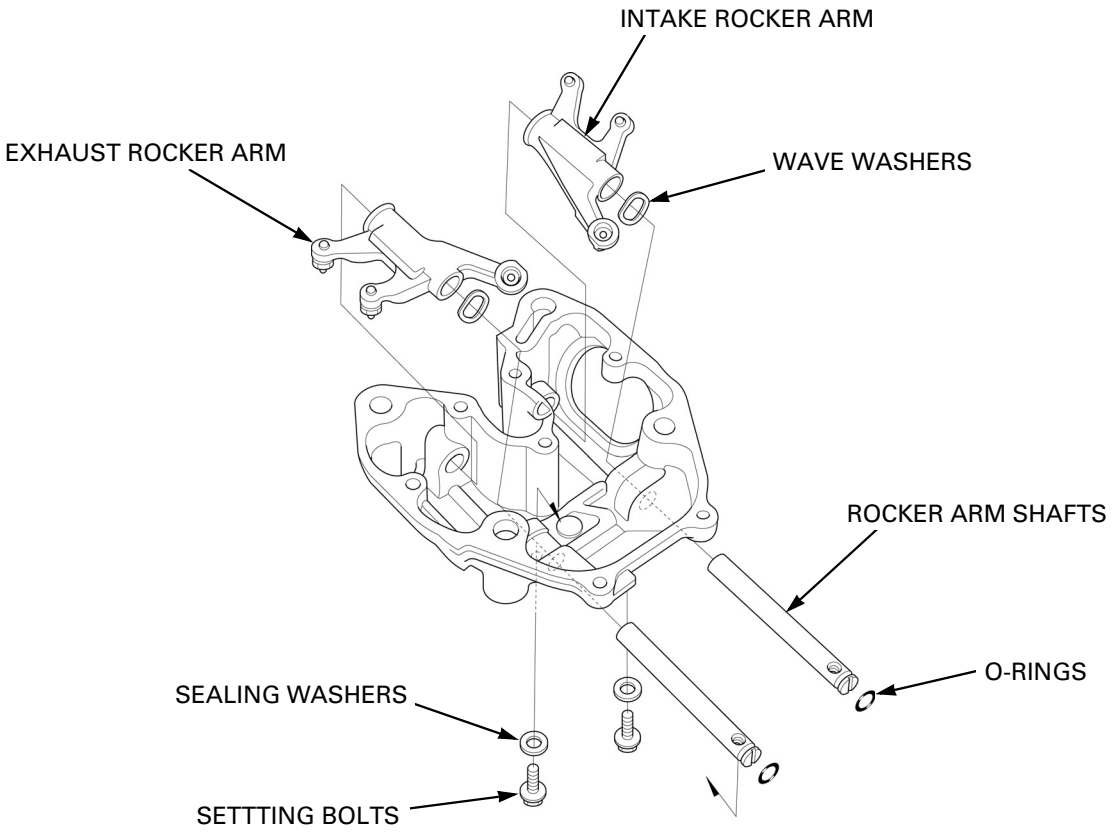
Install the following:

– spark plug (page 4-7)
– cylinder head cover (page 9-22)
– thermostat (page 7-9)
– throttle body (page 6-43)
– exhaust pipe (page 3-19)



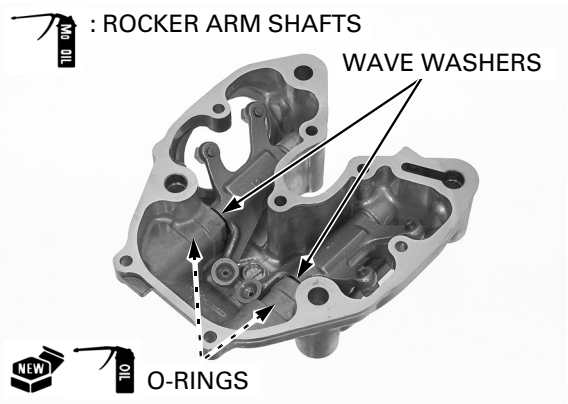
CYLINDER HEAD COVER ASSEMBLY/ INSTALLATION

ASSEMBLY

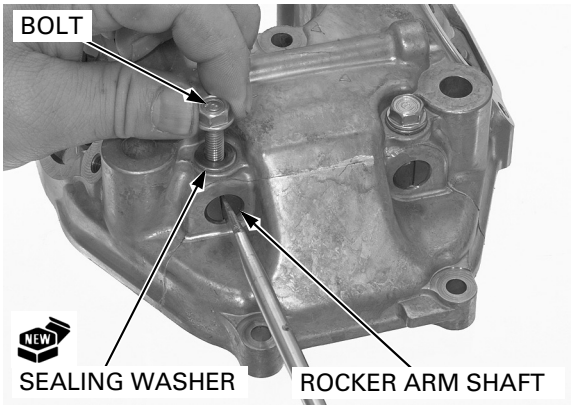


Coat new O-rings with engine oil and install them in each groove on the rocker arm shafts.
Apply molybdenum oil solution to the rocker arm shaft sliding surface.

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



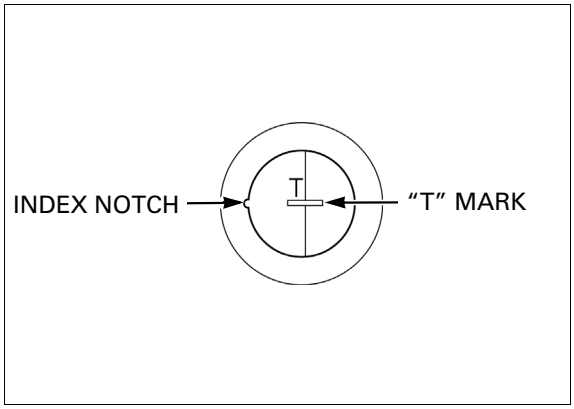
Align the bolt holes in the head cover and rocker arm shaft by turning the shaft.
Install the setting bolts with new sealing washers and tighten the bolts securely.



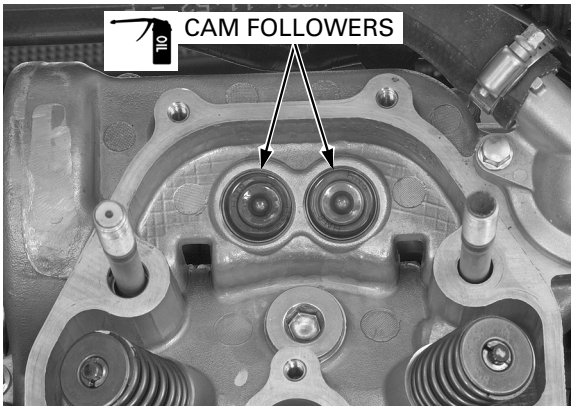
INSTALLATION

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.

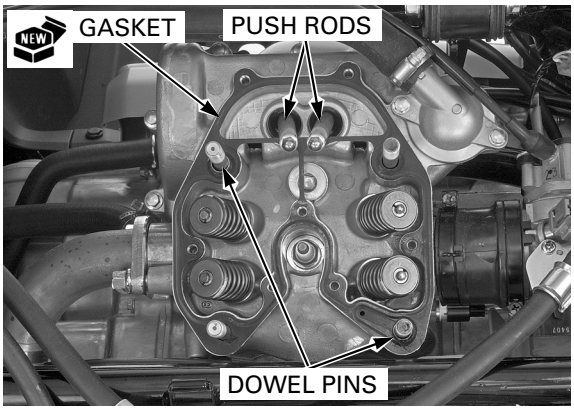


Coat the cam followers with engine oil and install them into the cylinder head.



Install the dowel pins and a new gasket.

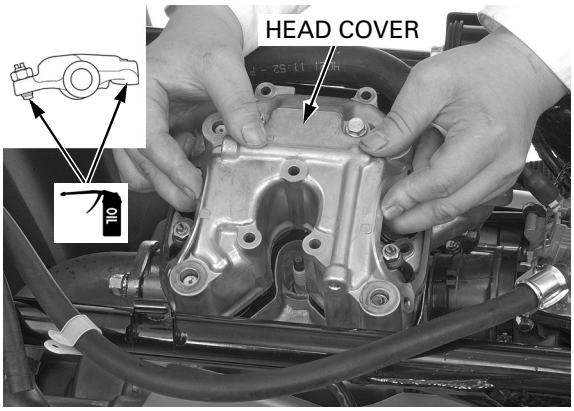
Install the push rods in the cam followers and rest them on the gasket cutout as shown.



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.



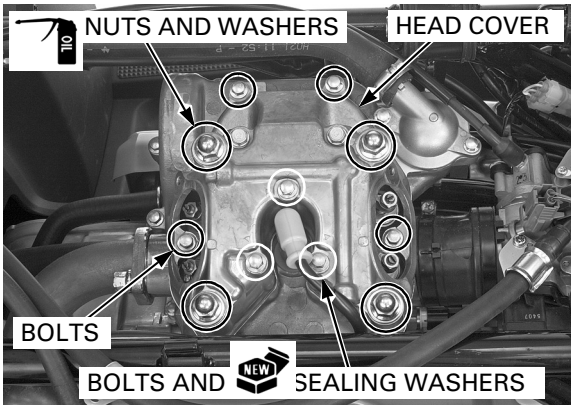
Apply engine oil to the cap nut threads and seating surfaces and install the following fasteners:

– 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:55 N·m (5.6 kgf·m, 41 lbf·ft)

Install the spark plug cap.



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

– three cylinder bolts
– five cylinder head bolts
– upper engine hanger bracket bolts

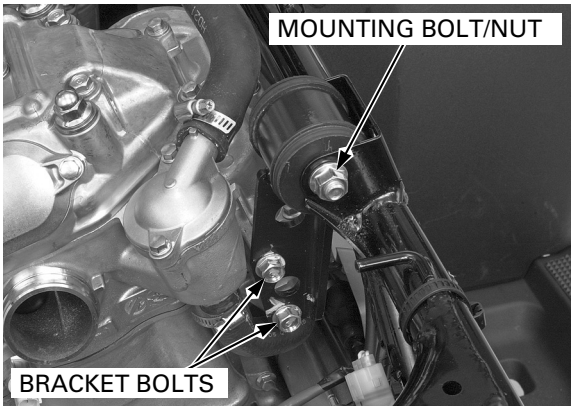
TORQUE: 32 N·m (3.3 kgf·m, 24 lbf·ft)

– upper engine hanger bolt

TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)

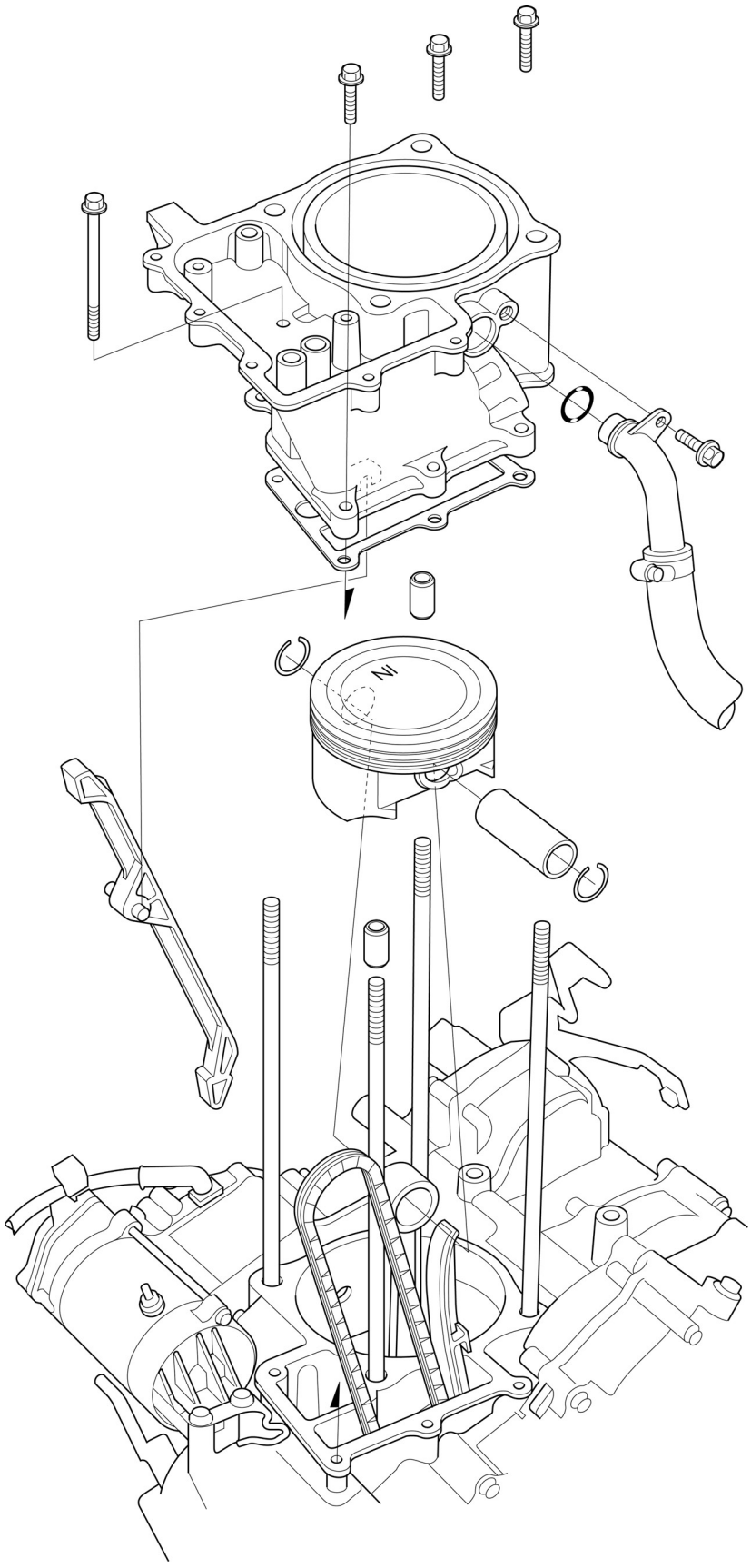
Install the following:

– valve adjusting hole caps and timing hole cap (page 4-10)
– heat guard plate and fuel tank (page 6-39)



10. CYLINDER/PISTON

SYSTEM COMPONENTS



SERVICE INFORMATION

GENERAL

- The cylinder and piston can be serviced with the engine installed in the frame.
- Take care not to damage the cylinder wall and piston.
- Be careful not to damage the mating surfaces when removing the cylinder.
- Rocker arm and valve lubricating oil is fed through the oil passage in the cylinder. Clean the oil passage before installing the cylinder.
- When disassembling, mark and store the disassembled parts to ensure that they are reinstalled in their original locations.

SPECIFICATIONS

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Cylinder	I.D.		102.000 – 102.015 (4.0157 – 4.0163)	102.05 (4.018)
	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 20 (0.8) from bottom		101.960 – 101.990 (4.0142 – 4.0153)	101.90 (4.012)
	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 10-7

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

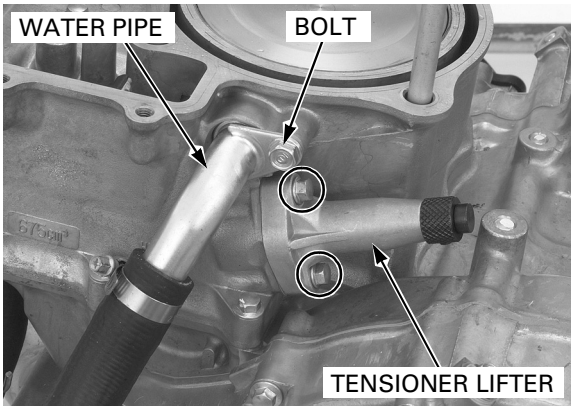
CYLINDER/PISTON REMOVAL

CYLINDER REMOVAL

Remove the camshaft (page 9-16).

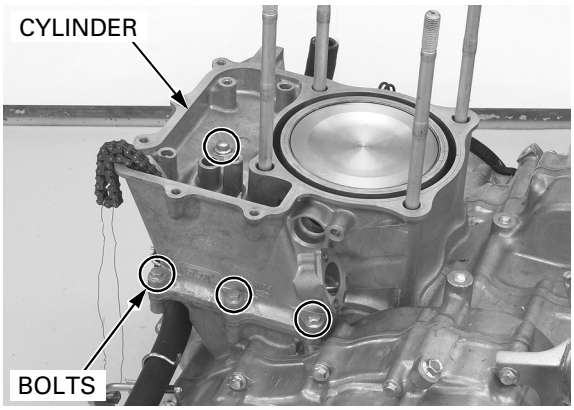
Remove the following:

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

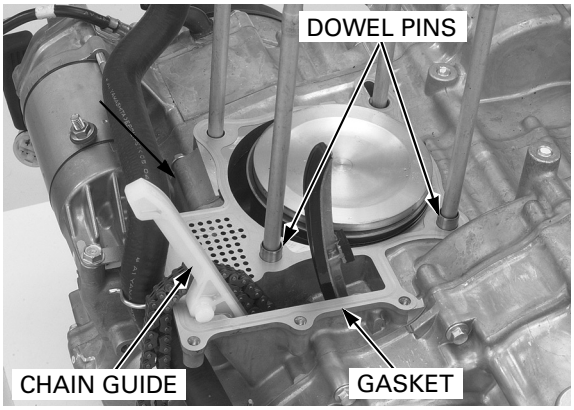


Do not strike the cylinder head too hard and do not damage the mating surface with a screwdriver.

– four bolts
– cylinder



– cam chain guide
– gasket
– dowel pins

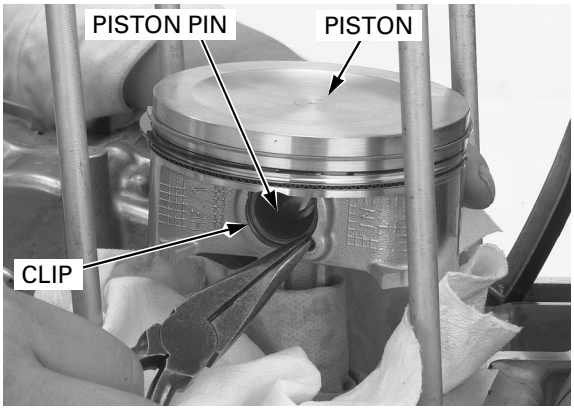


PISTON REMOVAL

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

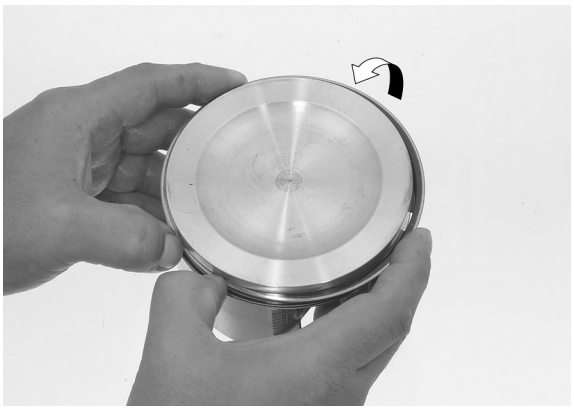
Remove the piston pin clips with pliers.

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



Do not 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.

CYLINDER/PISTON 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.

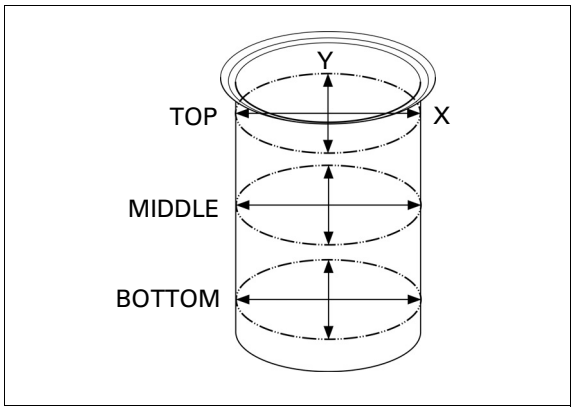
SERVICE LIMIT: 102.05 mm (4.018 in)

Calculate the cylinder-to-piston clearance.
Refer to page 10-6 for measurement of the piston O.D.

SERVICE LIMIT: 0.19 mm (0.007 in)

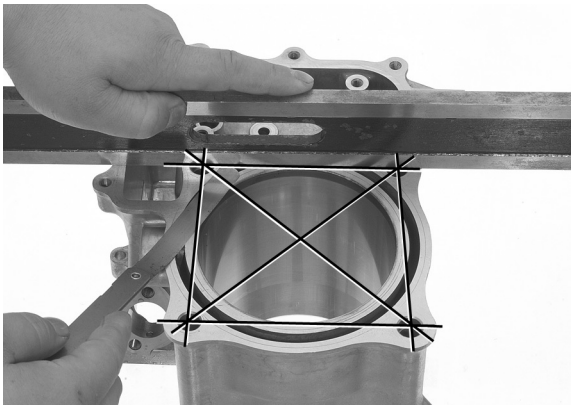
Calculate the cylinder taper and out-of-round at three levels in an X and Y axis. Take the maximum reading to determine the taper and out-of-round.

SERVICE LIMITS:
Taper: 0.05 mm (0.002 in)
Out of round: 0.05 mm (0.002 in)



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.

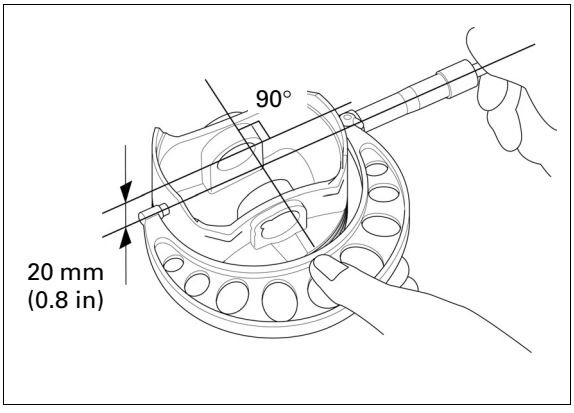
SERVICE LIMITS:

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 20 mm (0.8 in) from the bottom and 90° to the piston pin hole.

SERVICE LIMIT: 101.90 mm (4.012 in)

Compare this measurement against the maximum cylinder I.D. measurement and calculate the cylinder-to-piston clearance (page 10-5).



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

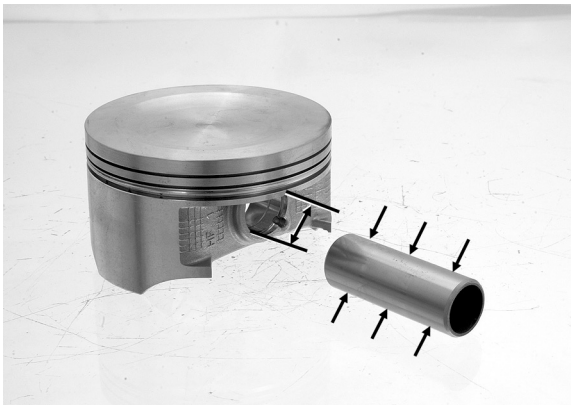
SERVICE LIMIT: 23.03 mm (0.907 in)

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)



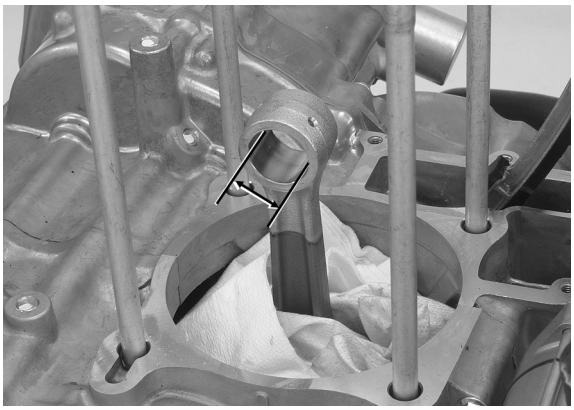
CONNECTING ROD

Measure the connecting rod small end I.D.

SERVICE LIMIT: 23.06 mm (0.908 in)

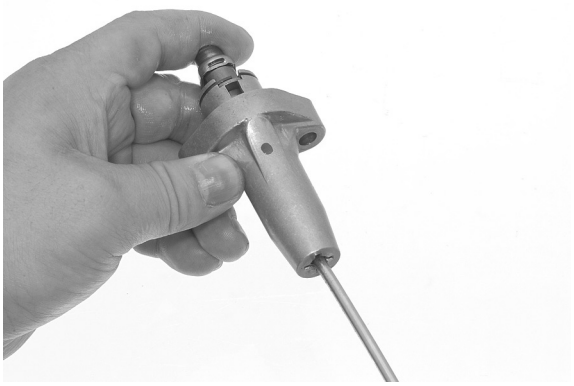
Calculate the connecting rod-to-piston pin clearance.

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

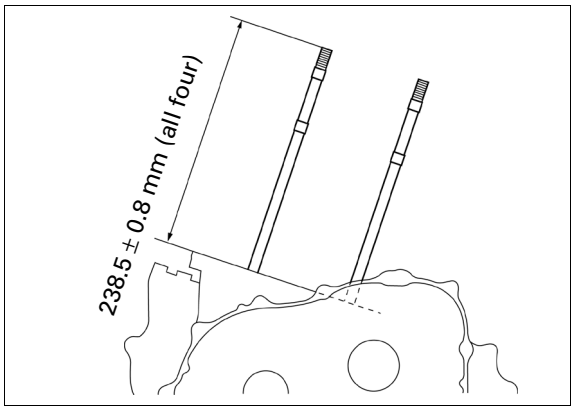
Thread two nuts onto the stud and tighten them together, and use a wrench on them to turn the stud bolt out.

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

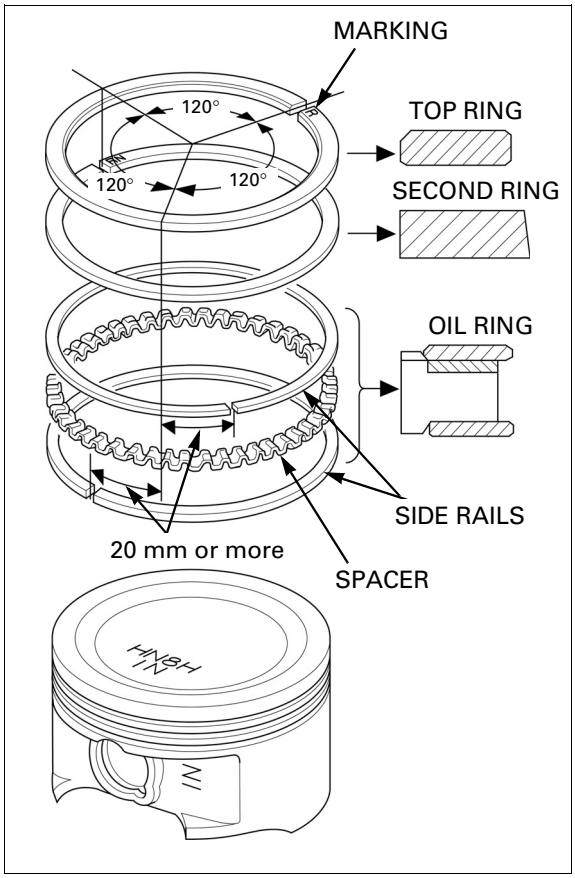
Be careful not to damage the piston and rings.

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.



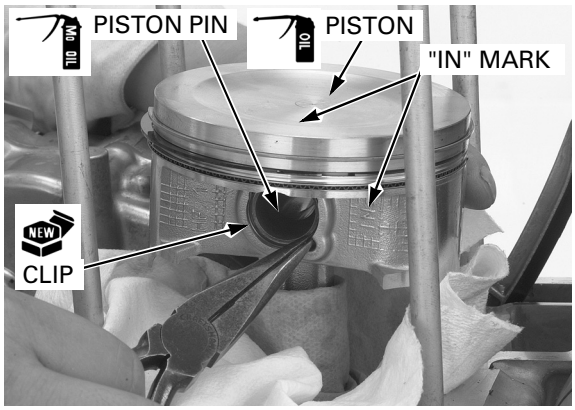
PISTON INSTALLATION

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.

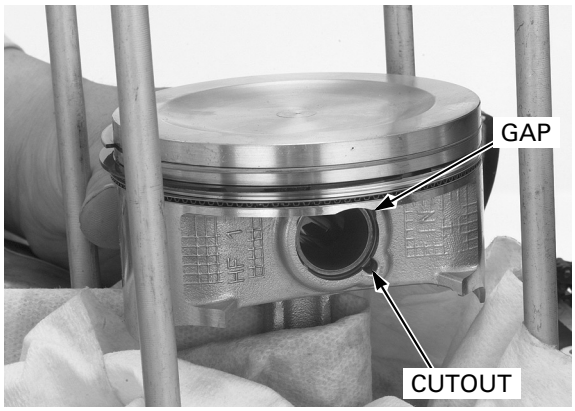
Install the piston with the "IN" mark toward the intake side and insert the piston pin through the piston and connecting rod.

Instal new piston pin clips.



NOTE:

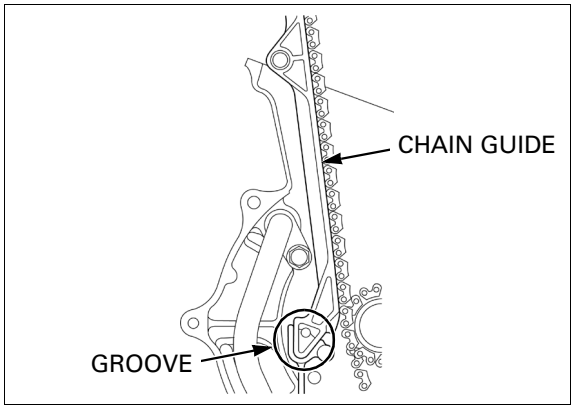
- Make sure the piston pin clips are seated securely.
- Do not align the clip end gap with the piston cutout.



CYLINDER INSTALLATION

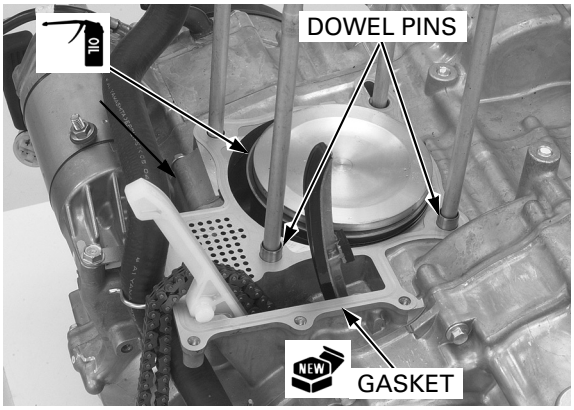
Clean the gasket surface of the crankcase thoroughly, being careful not to damage them, and being careful not to allow gasket material into the crankcase.
Blow through the oil passage (stud bolt hole) in the cylinder with compressed air.

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



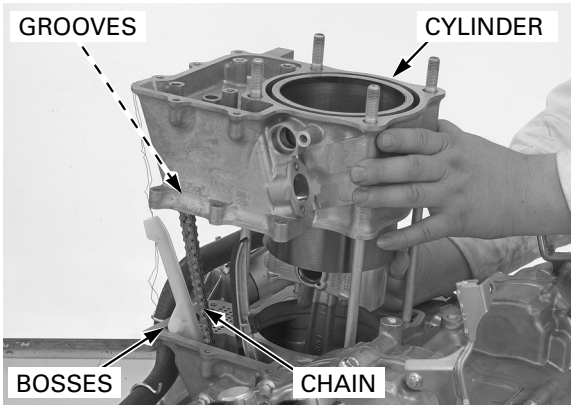
Install the dowel pins and a new gasket.

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



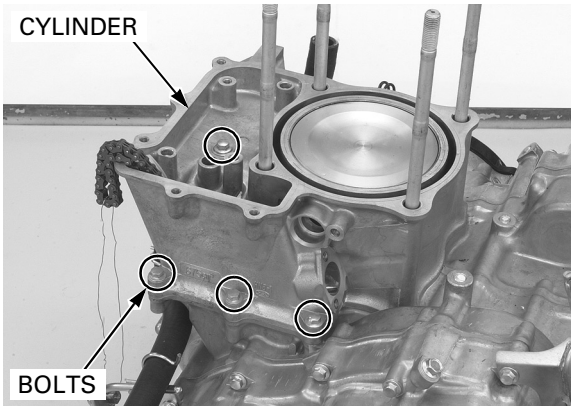
Be careful not to damage the piston rings and cylinder wall.

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.

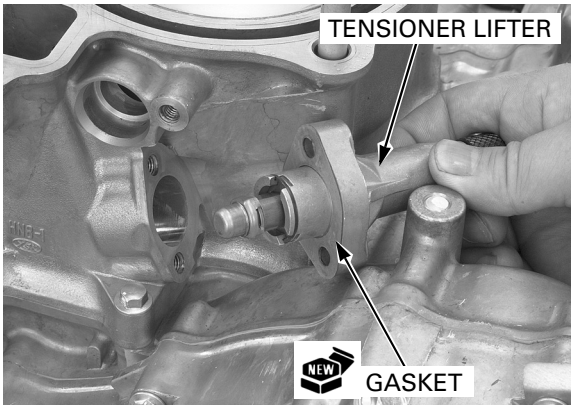


Tighten the three outside bolts again after installing the cylinder head cover.

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

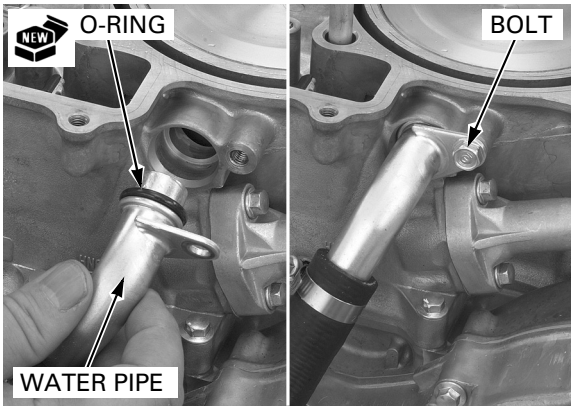


Install the cam chain tensioner lifter with a new gasket and tighten the two mounting bolts.



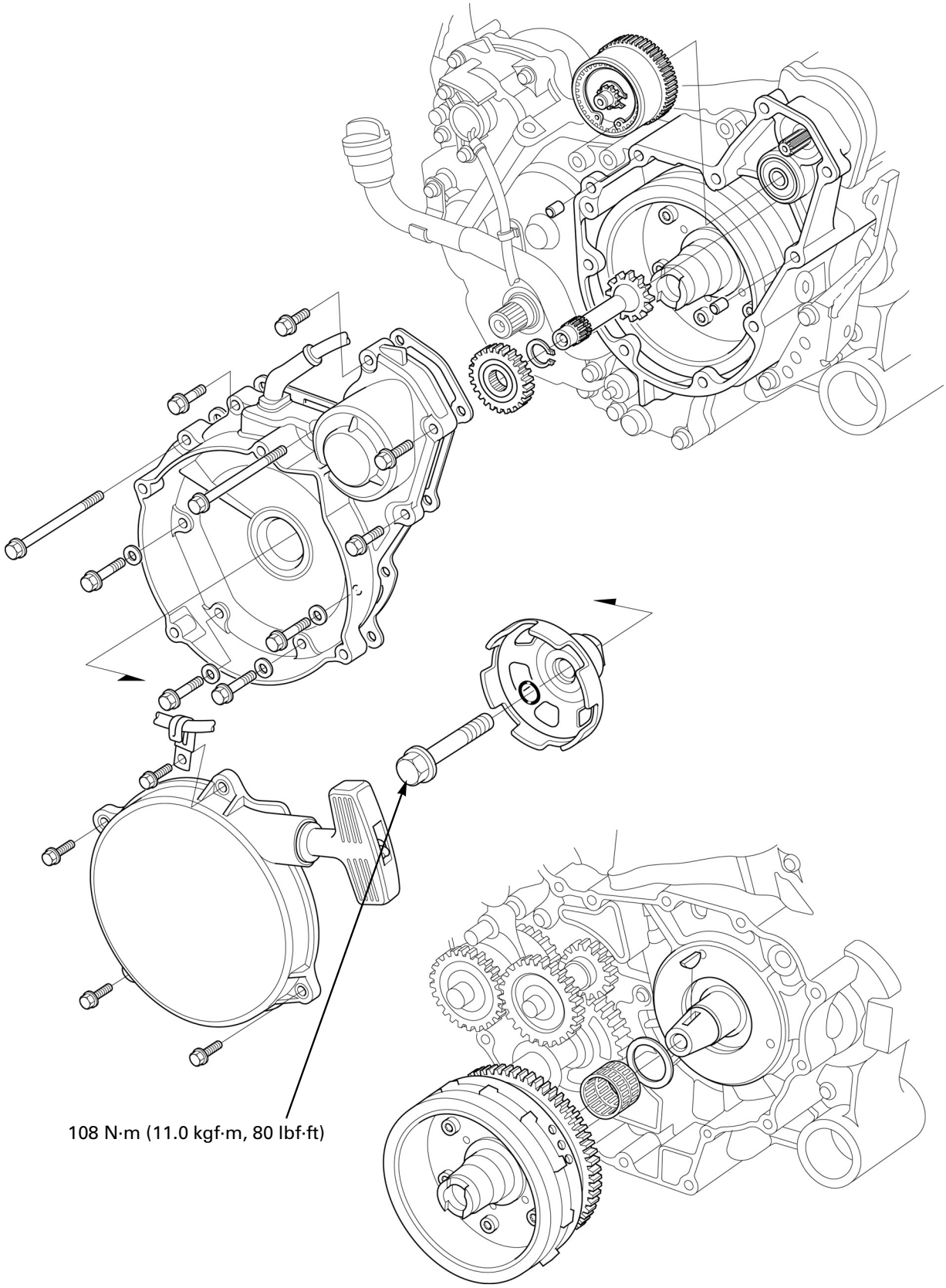
Coat a new O-ring with coolant and install it on the water pipe. Connect the water pipe and secure it with the bolt.

Install the camshaft (page 9-17).



11. 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.
- Rear crankcase cover removal/installation (page 12-5).
- Alternator stator inspection (page 20-8).
- Starter motor servicing (page 22-6).

SPECIFICATION

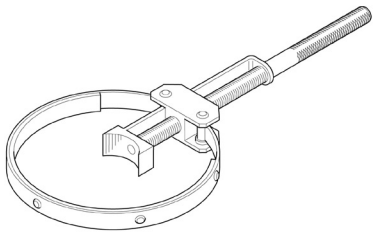
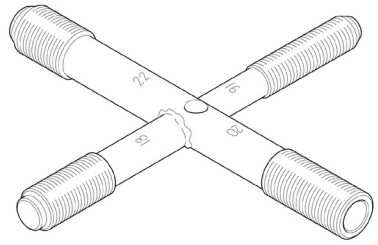
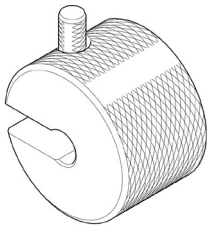
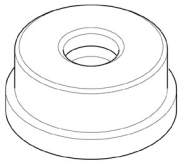
Unit: mm (in)

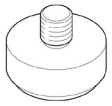
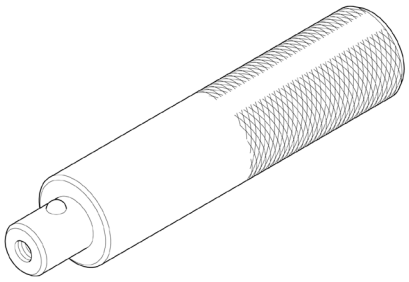
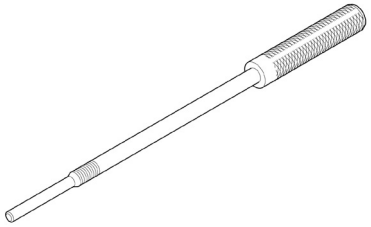
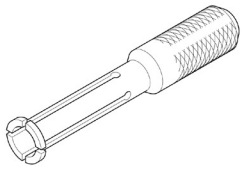
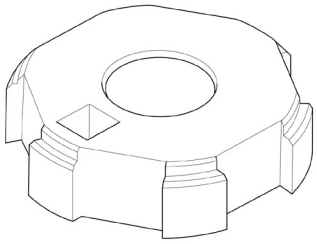
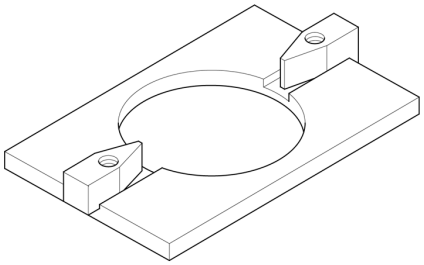
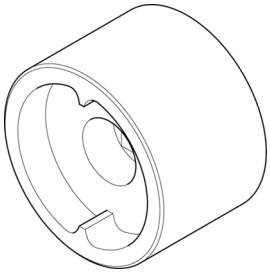
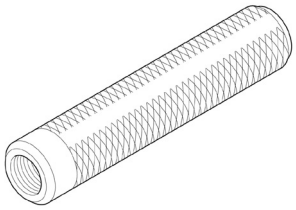
ITEM	STANDARD	SERVICE LIMIT
Starter driven gear boss O.D.	51.705 – 51.718 (2.0356 – 2.0361)	51.61 (2.032)
Torque limiter slip torque	53 – 84 N·m (5.4 – 8.6 kgf·m, 39 – 62 lbf·ft)	–

TORQUE VALUES

Starter clutch socket 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)	
CKP sensor mounting bolt	6 N·m (0.6 kgf·m, 4.3 lbf·ft)	Apply locking agent to the threads

TOOLS

Flywheel holder 07725-0040000  or equivalent commercially available in U.S.A.	Rotor puller 07733-0020001  or 07933-3950000 (U.S.A. only)	Remover weight 07741-0010201  or 07936-371020A or 07936-3710200 (U.S.A. only)
Attachment, 42 x 47 mm 07746-0010300 	Attachment, 24 x 26 mm 07746-0010700 	Pilot, 10 mm 07746-0040100 

Pilot, 30 mm 07746-0040700 	Driver 07749-0010000 	Bearing remover shaft, 10 mm 07936-GE00100  or 07936-GE00A00 (U.S.A. only)
Bearing remover head, 10 mm 07936-GE00200  or 07936-GE00A00 (U.S.A. only)	Recoil pulley holder 07SMB-HM70100 	Torque limiter attachment B 07YMJ-MCF0200  not available in U.S.A.
Torque limiter attachment D 070MJ-HN80100  not available in U.S.A.	Remover handle 07936-3710100 	

TROUBLESHOOTING

Starter motor turns, but engine does not turn
- Faulty starter clutch
- Damaged reduction gears or torque limiter

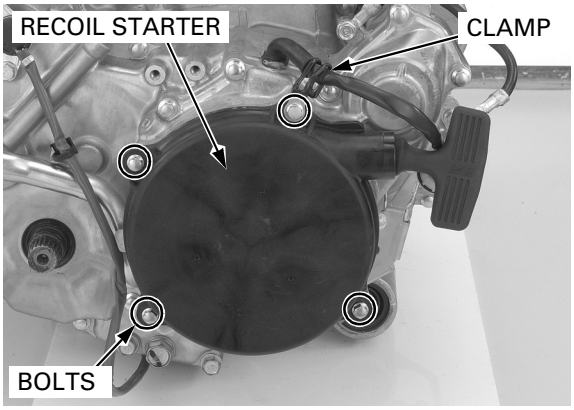
RECOIL STARTER

REMOVAL

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

Remove the following:

– four bolts and clamp
– recoil starter assembly



STARTER ROPE REPLACEMENT

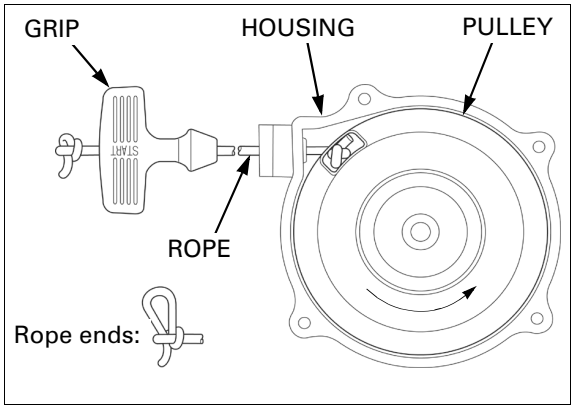
When the rope has broken or the pulley has rewound, align the rope holes by turning the pulley 5-1/2 turns counter-clockwise and hold it.

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.

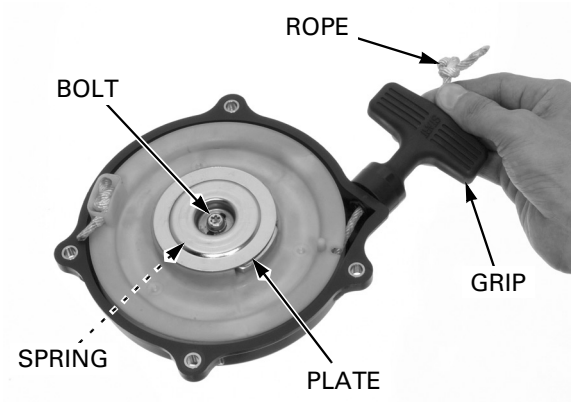


DISASSEMBLY

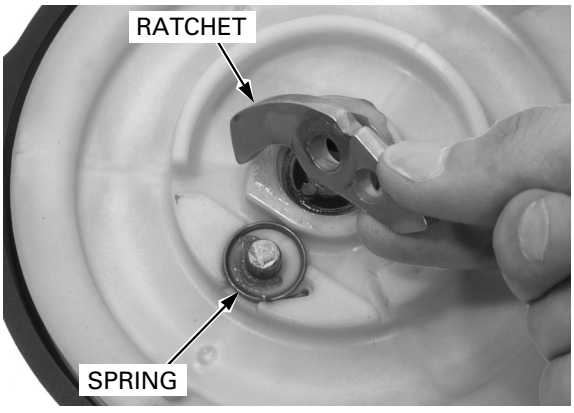
Replace the recoil starter as an assembly.

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.

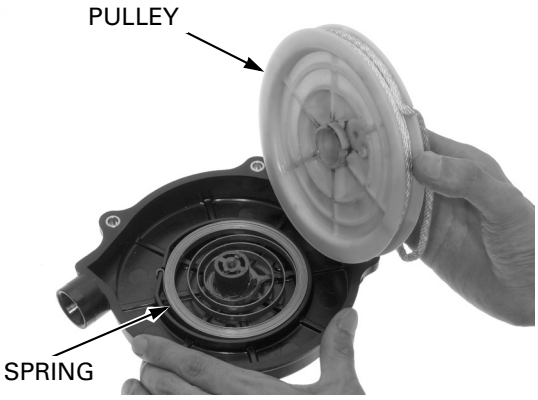


Remove the ratchet and spring.



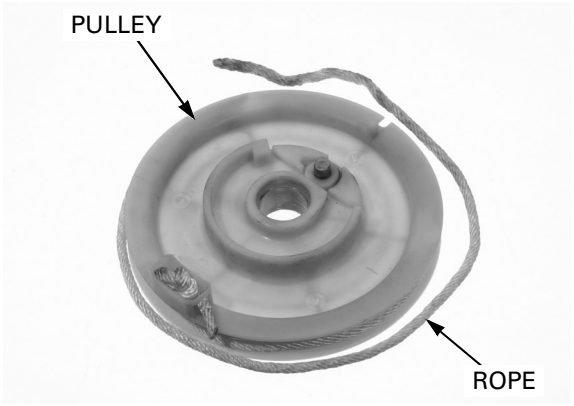
Wear eye protection and use care when removing the drive pulley and starter spring. The spring can pop out of the housing if care is not used.

Carefully remove the starter drive pulley.

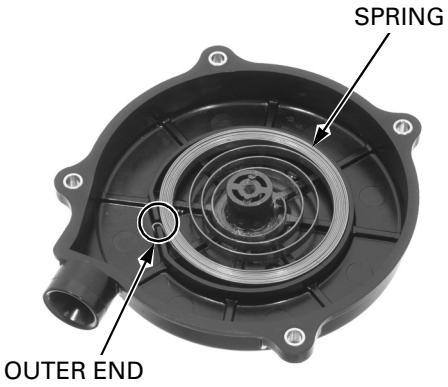


Remove the starter rope from the drive pulley.

Check the starter rope for wear or damage.



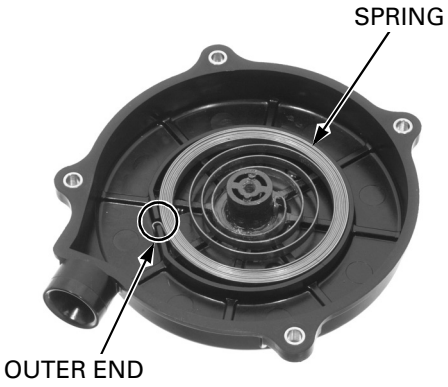
Check the recoil starter spring for damage or broken.



ASSEMBLY

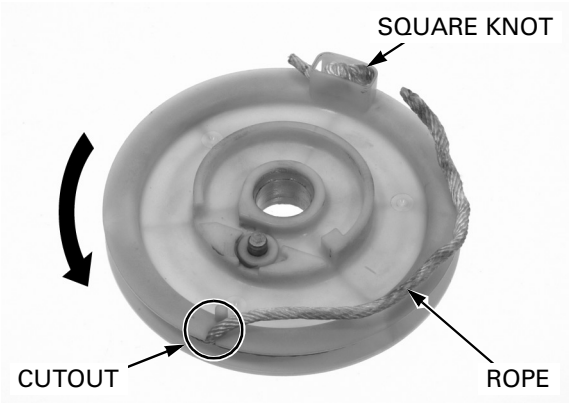
Be sure to wear heavy gloves when installing the spring.

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



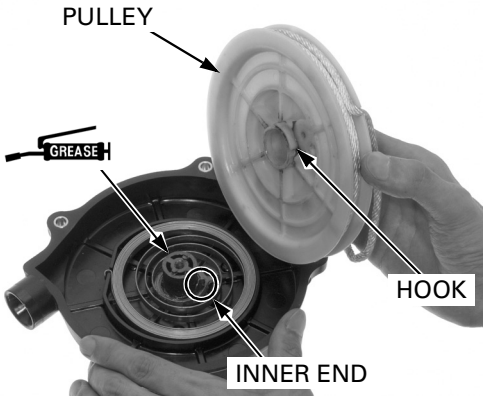
Insert the starter rope into the drive pulley and tie the rope end in a square knot (page 11-5). Set the rope end into the cavity as shown.

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.



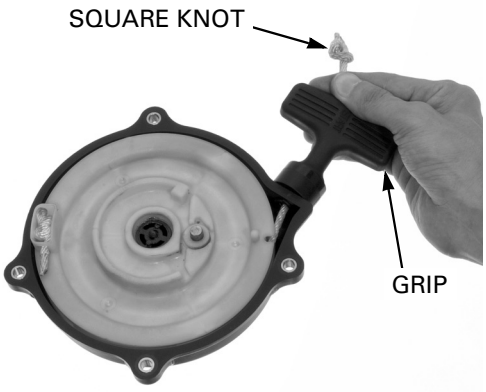
Apply grease to the pulley pivot.

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



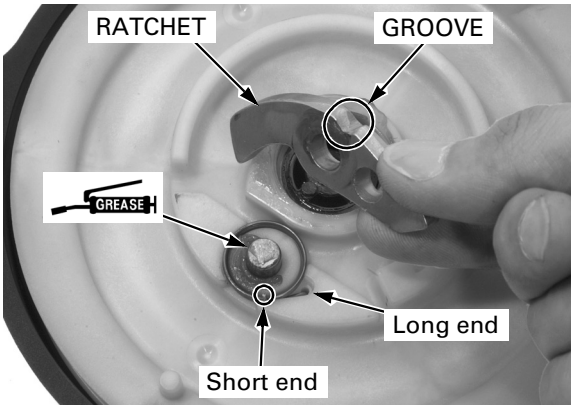
Preload the starter spring by turning the pulley 2 turns counterclockwise and hold it.

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.



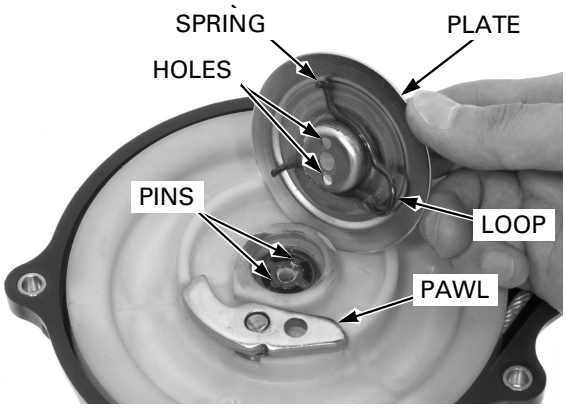
Install the ratchet return spring by inserting the long end into the hole in the pulley.

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.



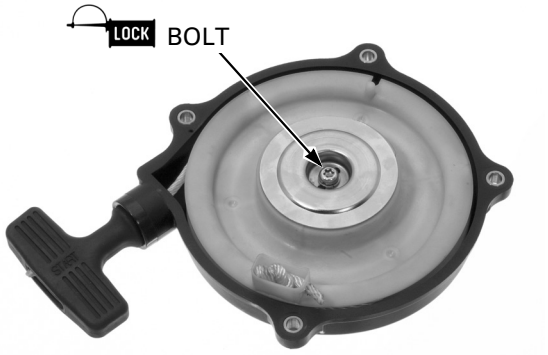
Install the friction spring onto the friction plate with the ends facing the pulley.

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.

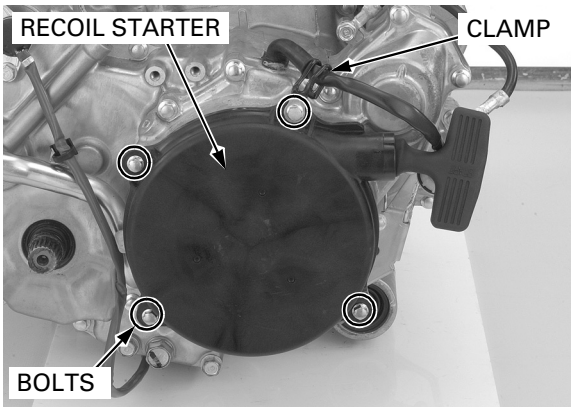


INSTALLATION

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

Secure the alternator wire with the clamp.

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



ALTERNATOR STATOR/STARTER REDUCTION GEARS

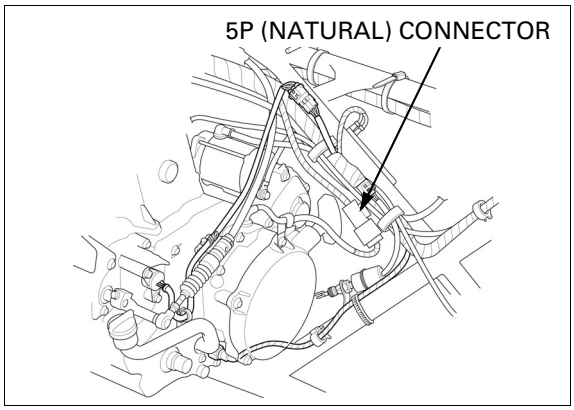
ALTERNATOR COVER REMOVAL

Remove the following:

– air cleaner housing (page 6-41)
– recoil starter (page 11-5)
– engine guard (page 3-17)

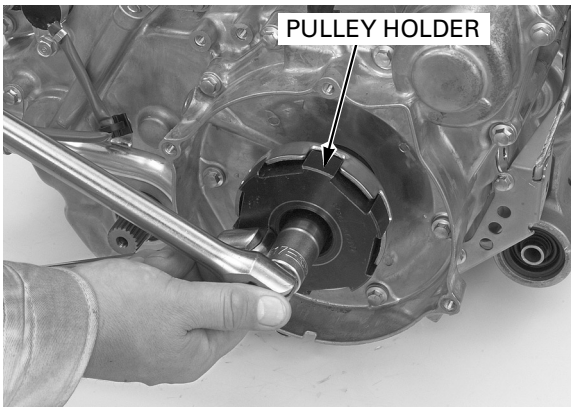
Drain the engine oil (page 4-11).

Disconnect the alternator 5P (Natural) connector.



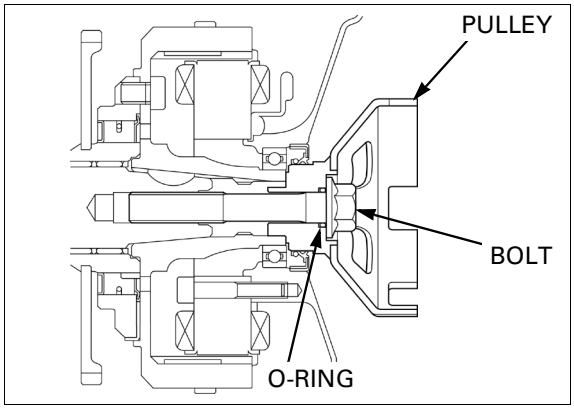
Hold the recoil starter driven pulley using the special tool and loosen the bolt.

TOOL:
Recoil pulley holder **07SMB-HM70100**



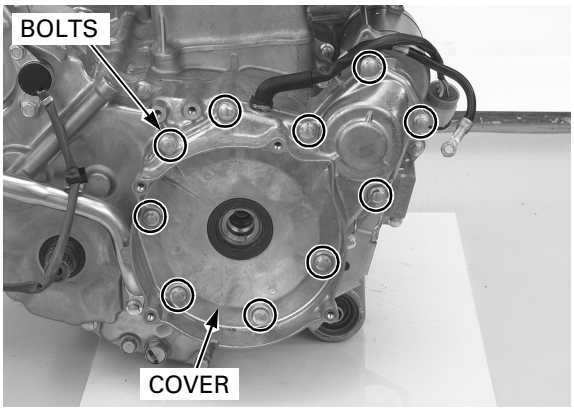
Remove the following:

– bolt and O-ring
– driven pulley

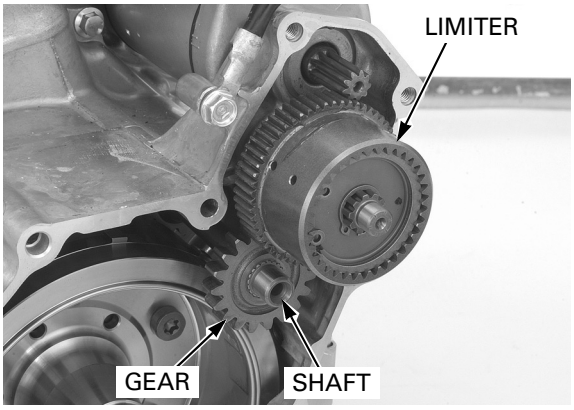


The cover (stator) is magnetically attracted to the flywheel, be careful during removal.

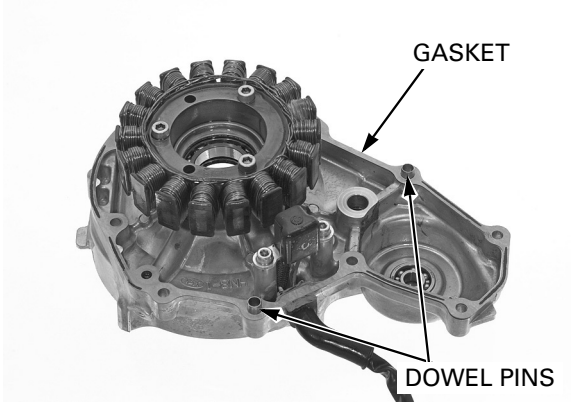
– ten bolts and four sealing washers
– alternator cover



– starter torque limiter
– reduction gear
– gear shaft



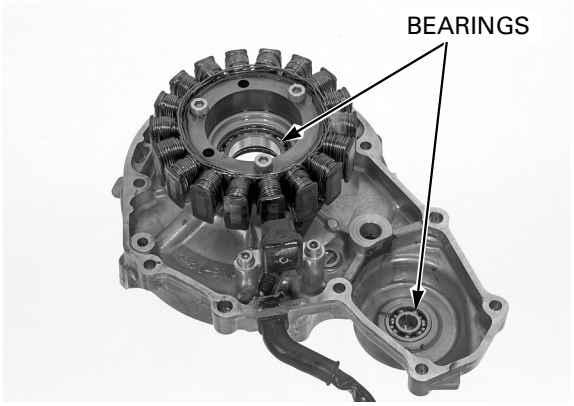
– dowel pins
– gasket



INSPECTION

Check the bearings in the alternator and rear crankcase 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.

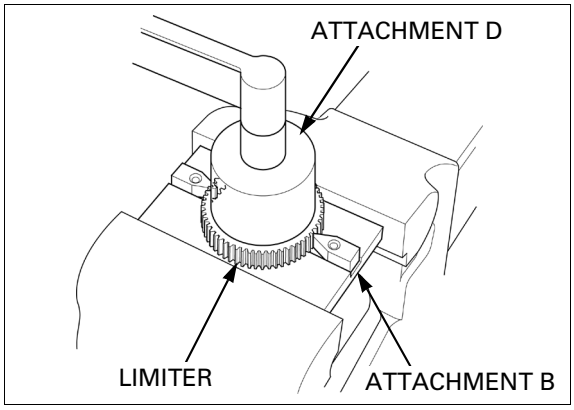
Replace the torque limiter as an assembly.

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

TOOLS:

Torque limiter attachment B	**07YMJ-MCF0200 (not available in U.S.A.)**
Torque limiter attachment D	**070MJ-HN80100 (not available in U.S.A.)**

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

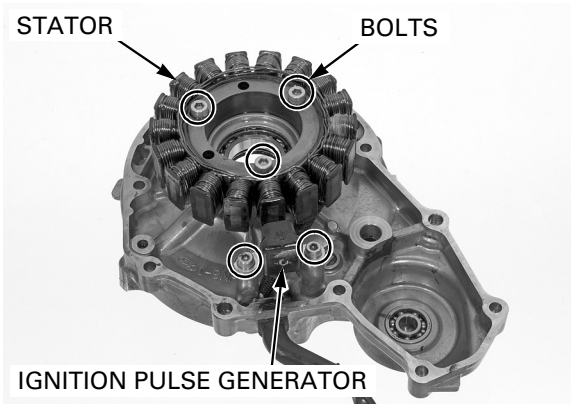


STATOR/CKP SENSOR REMOVAL/ INSTALLATION

Remove the CKP sensor mounting bolts.

Release the wire grommet off the alternator cover.
Remove the three bolts and alternator stator/CKP sensor assembly.

For bearing replacement (page 11-11).



Install the stator/CKP sensor assembly onto the alternator cover.
Apply sealant to the wire grommet seating surface and install the grommet into the cover groove securely.

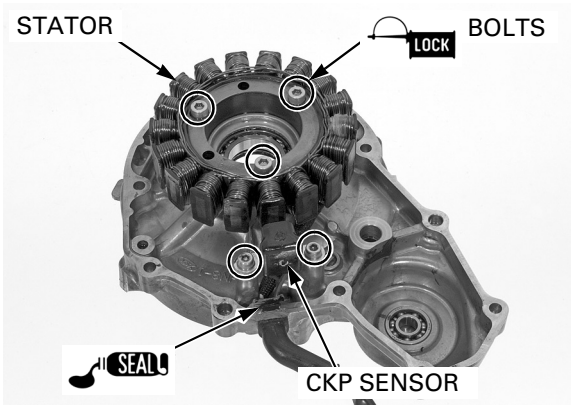
Install and tighten the stator mounting bolts to the specified torque.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

Apply locking agent to the CKP sensor mounting bolt threads.

Install and tighten the CKP sensor mounting bolts to the specified torque.

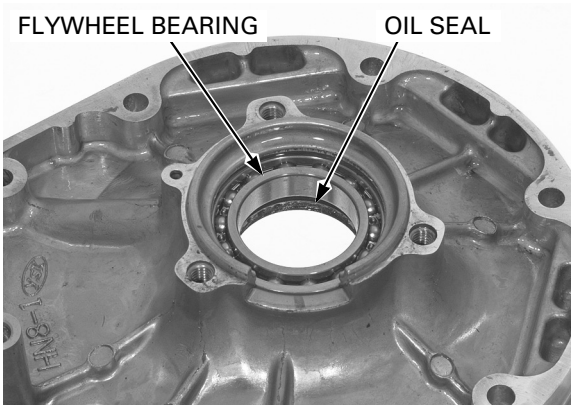
TORQUE: 6 N·m (0.6 kgf·m, 4.3 lbf·ft)



BEARING REPLACEMENT

Remove the stator and CKP sensor (page 11-11).

Remove the driven pulley oil seal.
Drive the flywheel bearing out of the alternator cover.



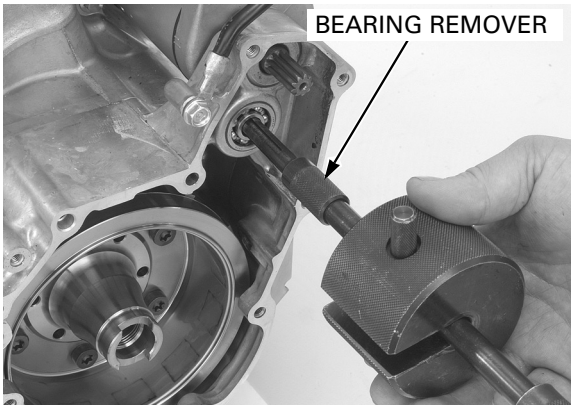
Remove the torque limiter bearings in the alternator and rear crankcase covers, using the special tools.

TOOLS:

Bearing remover head, 10 mm	**07936-GE00200**
Remover shaft, 10 mm	**07936-GE00100**
Remover weight	**07741-0010201**

U.S.A. only tools:

Bearing remover, 10 mm	**07936-GE00A00**
Remover handle	**07936-3710100**
Remover weight	**07936-371020A or 07936-3710200**

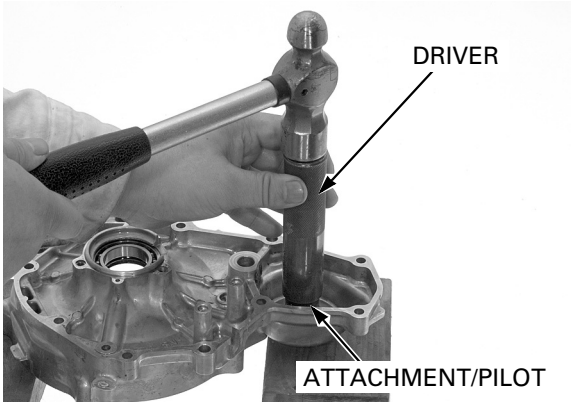


Drive new bearings in with the marks facing up.

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 CKP sensor (page 11-11).

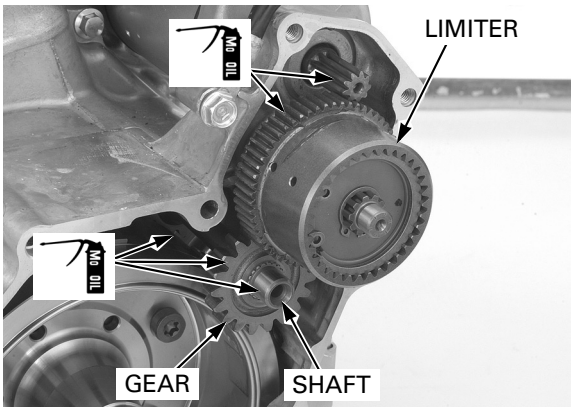


ALTERNATOR COVER INSTALLATION

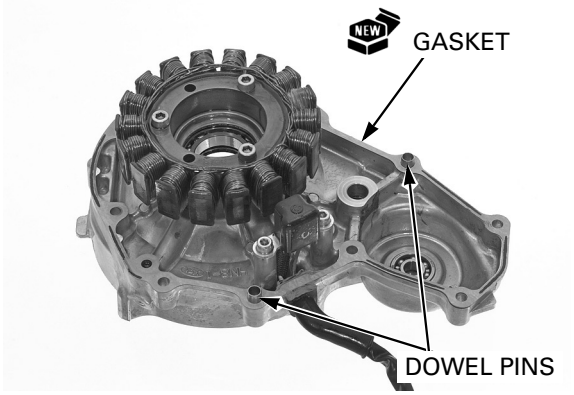
Blow through the oil passage in the alternator cover with compressed air.
Clean the cover mating surfaces.

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 flywheel, be careful not to get anything caught between these parts when installing.

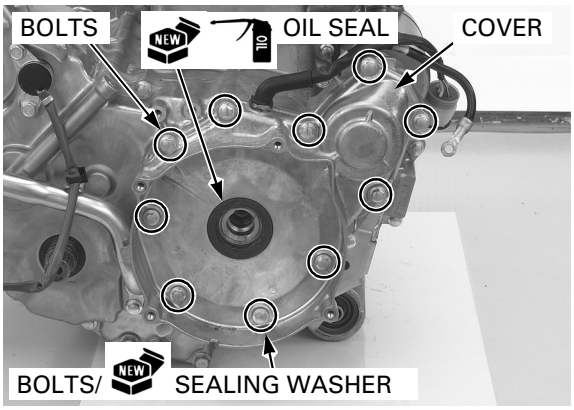
Carefully install the alternator cover.

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

NOTE:

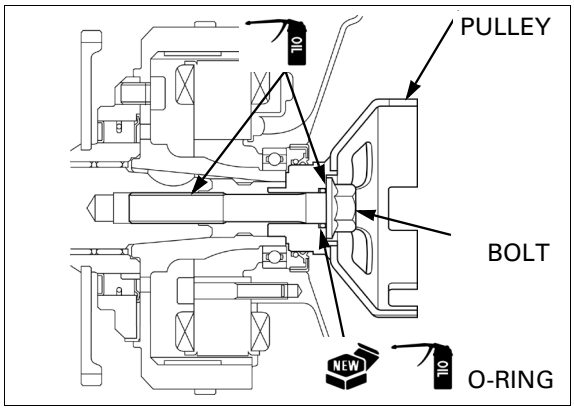
- The location for the bolt with sealing washer is marked △ on the cover (inside of the recoil starter housing).

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.

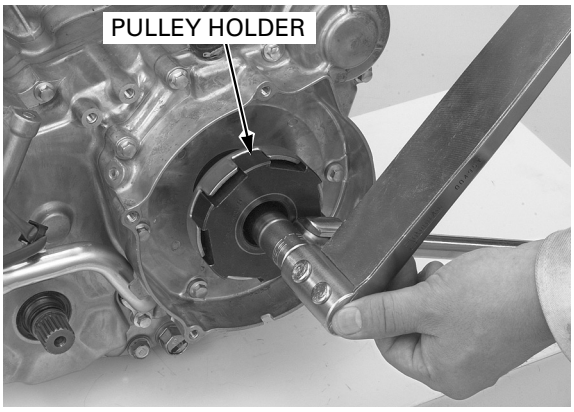
Coat a new O-ring with engine oil and install it onto the pulley bolt.
Apply engine oil to the pulley bolt threads and seating surface, and install the bolt.



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)



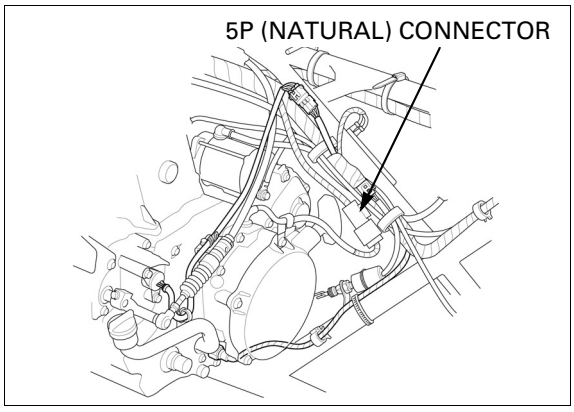
Route the wires properly (page 1-20).

Connect the alternator 5P (Natural) connector.

Install the following:

– recoil starter (page 11-8)
– air cleaner housing (page 6-41)
– engine guard (page 3-17)

Fill the engine with recommended oil (page 4-11).



FLYWHEEL/STARTER CLUTCH

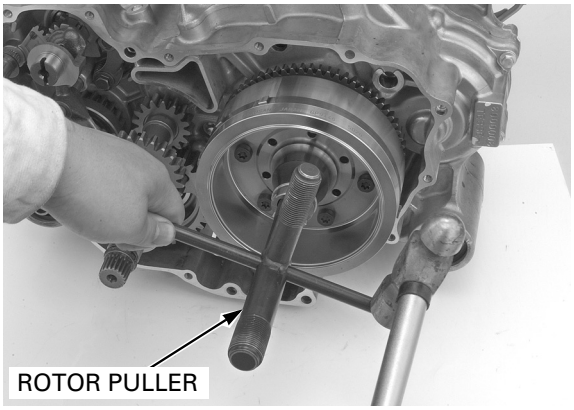
REMOVAL

Remove the rear crankcase cover (page 12-5).

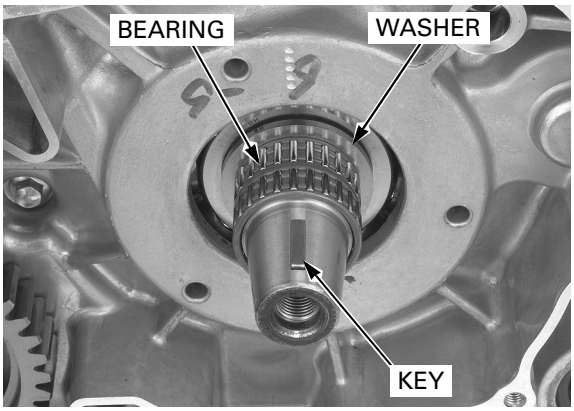
Remove the flywheel and starter driven gear using the special tool.

TOOL:

Rotor puller	**07733-0020001 or 07933-3950000 (U.S.A. only)**



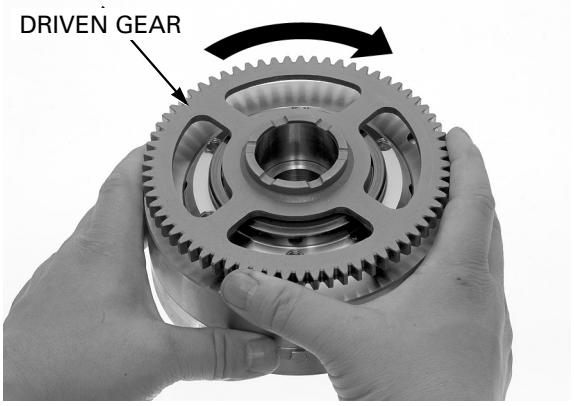
Remove the needle bearing and thrust washer, and the woodruff key.



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.

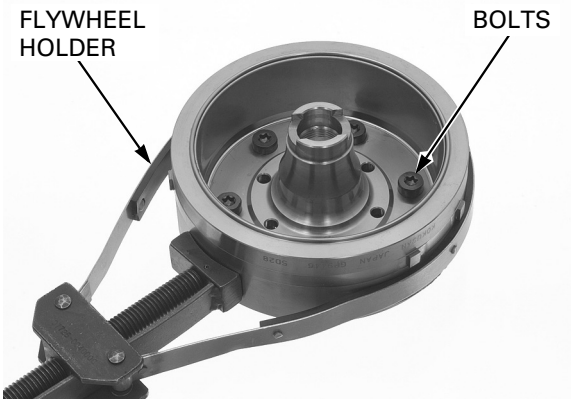


Hold the flywheel with the special tool and remove the starter clutch bolts (T40).

TOOL:

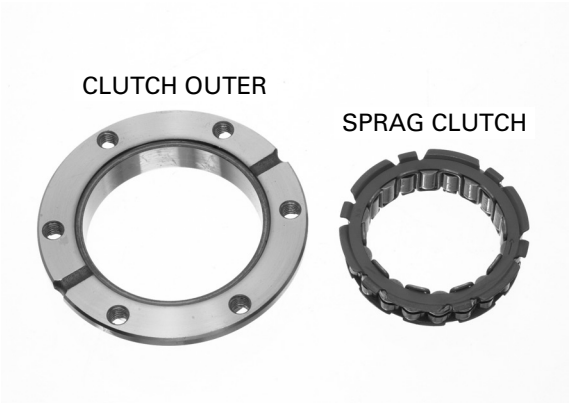
Flywheel holder	**07725-0040000 or equivalent commercially available in U.S.A.**

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.



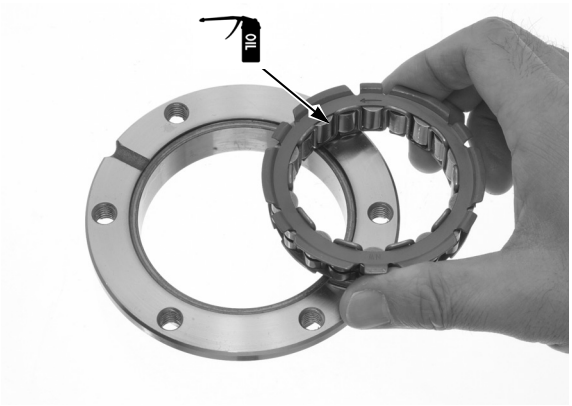
Check the starter driven gear teeth and needle bearing for wear or damage.

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.



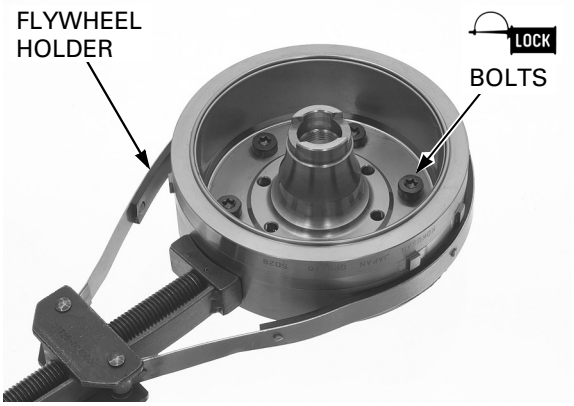
Apply locking agent to the starter clutch bolt threads. Install the flywheel onto the clutch outer and the clutch bolts (T40).

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

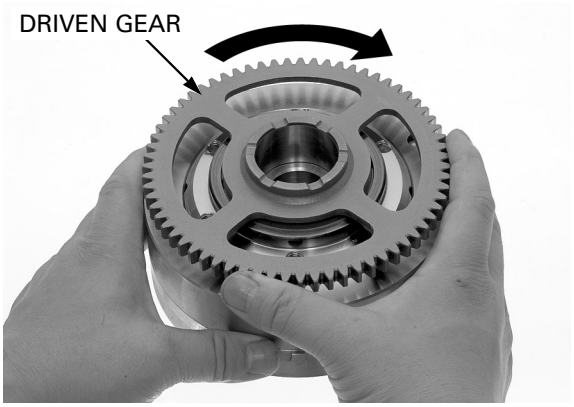
TOOL:

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

TORQUE: 30 N·m (3.1 kgf·m, 22 lbf·ft)

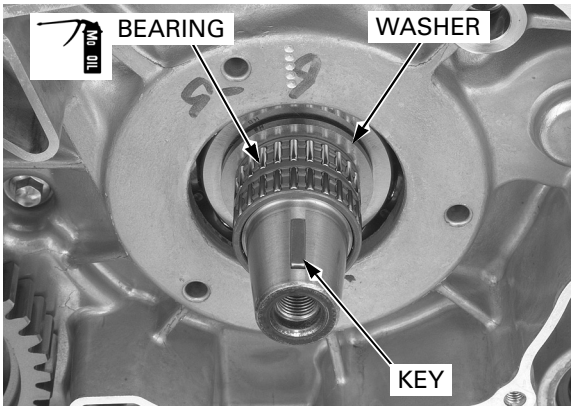


Install the starter driven gear while turning it clockwise.



INSTALLATION

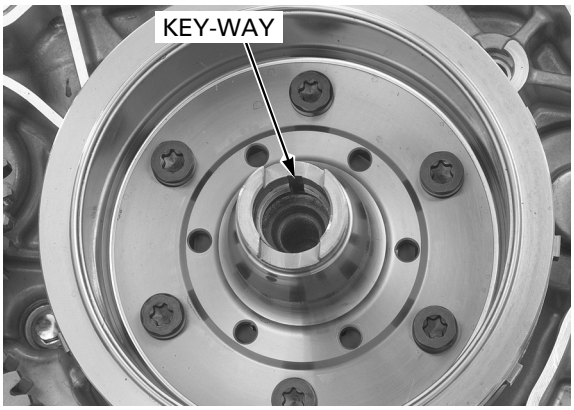
Lubricate the needle bearing with molybdenum oil solution. Install the washer and bearing onto the crankshaft.



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.

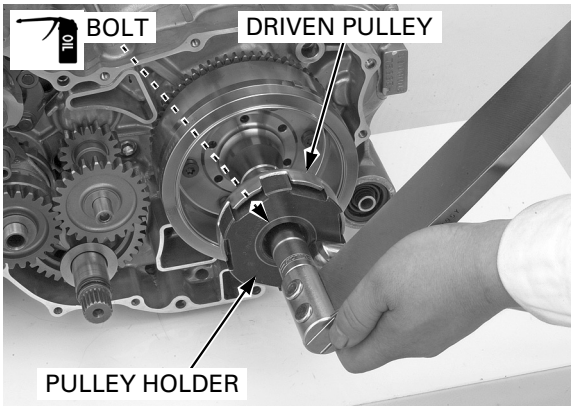


Apply engine oil to the pulley bolt threads and seating surface.
Install the starter driven pulley, aligning the bosses with the grooves in the crankshaft, and secure it with the bolt.

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)

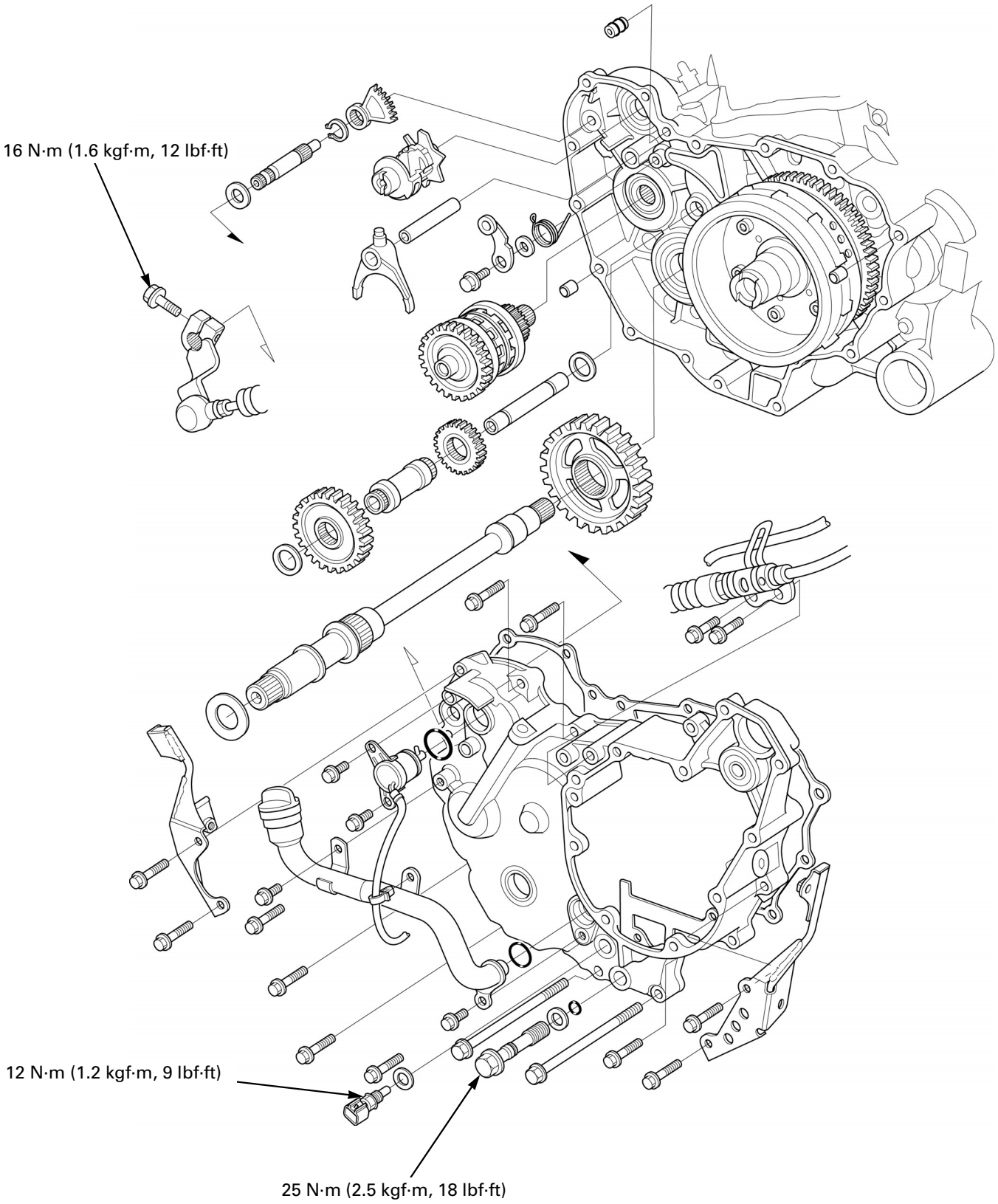


Loosen the pulley bolt, and remove the tool, bolt and driven pulley.

Install the rear crankcase cover (page 12-7).

12. SUB-TRANSMISSION/GEARSHIFT LINKAGE

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 (page 14-3).

SPECIFICATIONS

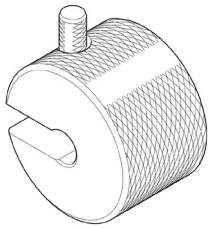
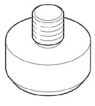
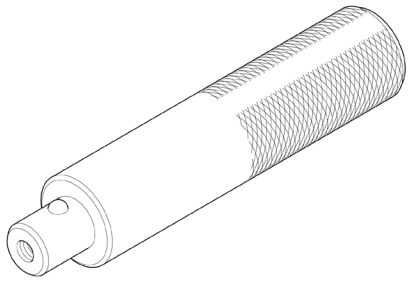
Unit: mm (in)

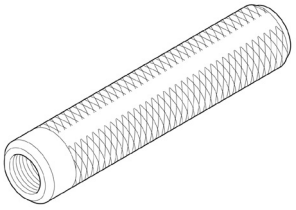
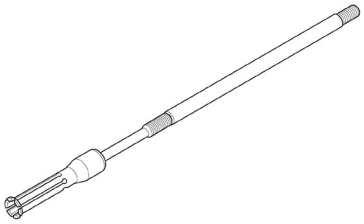
ITEM		STANDARD	SERVICE LIMIT
Shift fork	I.D.	11.000 – 11.021 (0.4331– 0.4339)	11.04 (0.435)
	Claw thickness	4.93 – 5.00 (0.194 – 0.197)	4.5 (0.18)
	Shaft O.D.	10.966 – 10.984 (0.4317 – 0.4324)	10.96 (0.431)
Reverse idle gear	Collar I.D.	13.000 – 13.034 (0.5118 – 0.5131)	13.05 (0.514)
	Shaft O.D.	12.966 – 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

Remover weight 07741-0010201  or 07936-371020A or 07936-3710200 (U.S.A. Only)	Attachment, 37 x 40 mm 07746-0010200 	Pilot, 17 mm 07746-0040400 
Pilot, 25 mm 07746-0040600 	Driver 07749-0010000 	Attachment, 28 x 30 mm 07946-1870100 

Remover handle 07936-3710100	Bearing remover, 17 mm 07936-3710300
	

TROUBLESHOOTING

NOTE:

- Be sure the gear position indicator is not blinking (No drivetrain DTC) before checking the following (page 14-3).

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 12-4).

   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 14-8 while applying the brake as same manner as above.

   NO – Adjust the selector cable (page 12-15).

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

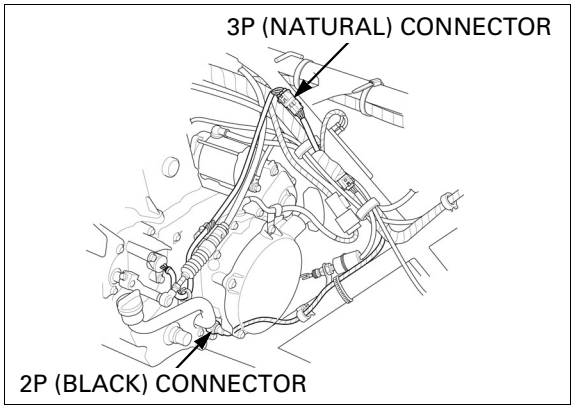
REMOVAL

Remove the following:

– left front mud guard (page 3-8)
– inner fenders (page 3-9)
– front center grille (page 3-10)
– center mud guards (page 3-7)
– engine side covers (page 3-17)
– engine guard (page 3-17)
– starter motor (page 22-6)
– final drive/sub-frame assembly (page 19-12)

Disconnect the front propeller shaft from the output shaft (page 8-6).

Disconnect the oil temperature sensor 2P (Black) connector and gear position switch 3P (Natural) connector.

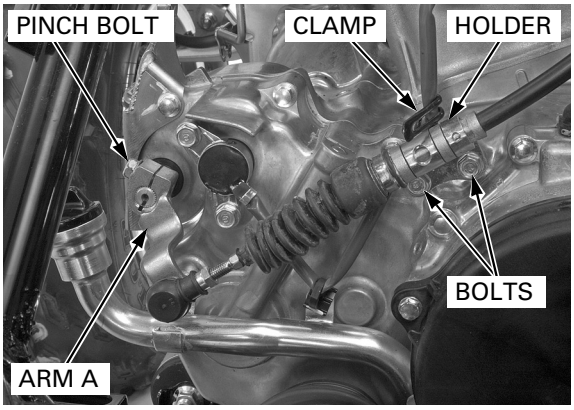


Release the gear position switch wire from the clamp on the cable holder.

Shift the sub-transmission into neutral.

Remove the following:

– two cable holder bolts
– pinch bolt
– selector arm A

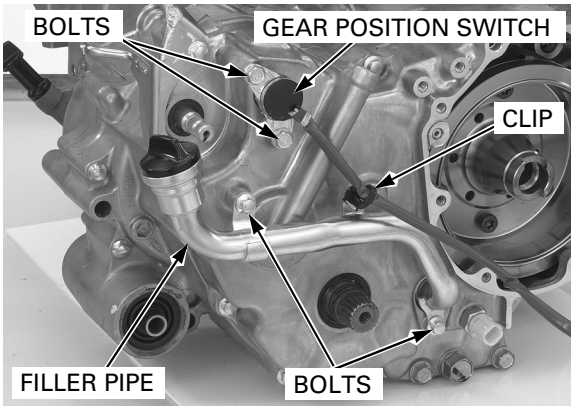


Release the gear position switch wire from the wire clip on the oil filler pipe.

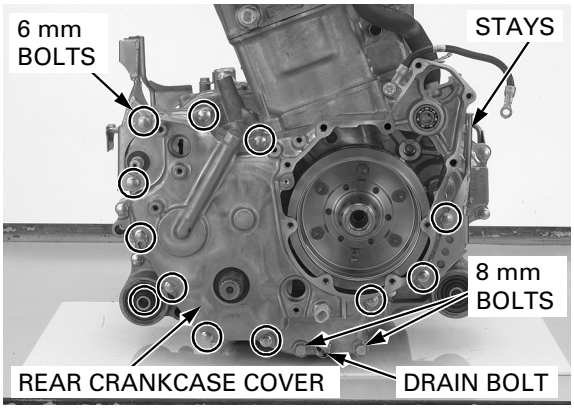
Remove the bolts, gear position switch and O-ring.

Remove the following:

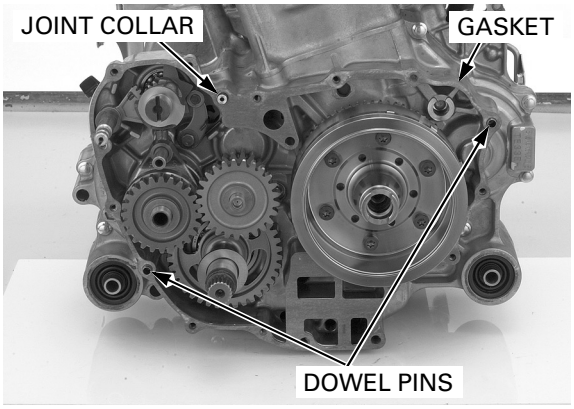
– alternator cover and reduction gears (page 11-9)
– two pipe bolts
– oil filler pipe and O-ring



– two 8-mm bolts
– oil drain bolt, sealing washer and O-ring
– eleven 6-mm bolts
– side cover stays
– rear crankcase cover



– two dowel pins
– oil joint collar and O-rings
– gasket



BEARING REPLACEMENT

For replacement of the bearings in the crankcase, refer to page 13-10.

OUTPUT SHAFT BEARING

Remove the output shaft oil seal.

Press the needle bearing out of the crankcase cover.

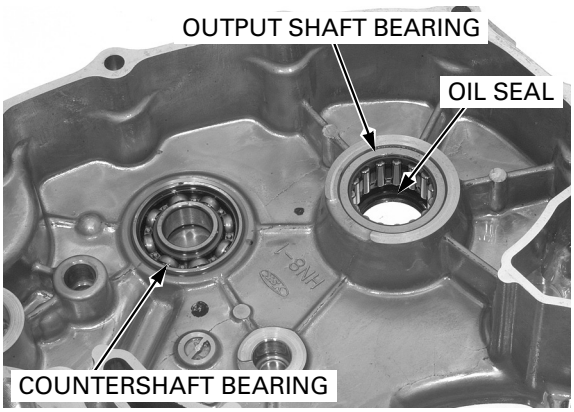
TOOLS:

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**

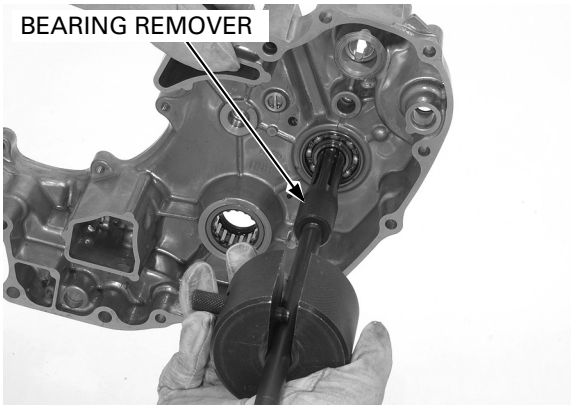


COUNTERSHAFT BEARING

Remove the bearing using the special tools.

TOOLS:

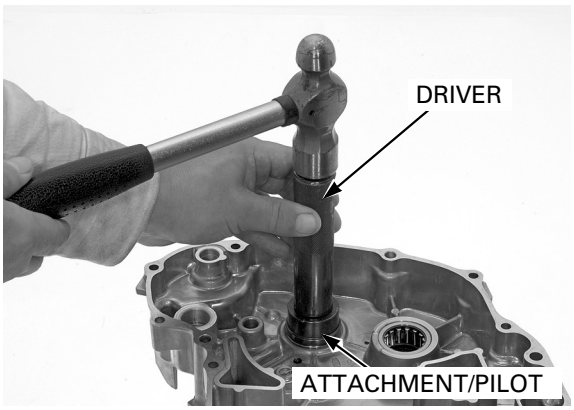
Bearing remover, 17 mm	**07936-3710300**
Remover handle	**07936-3710100**
Remover weight	**07741-0010201 or 07936-371020A or 07936-3710200 (U.S.A. only)**



Drive a new bearing in with the sealed side facing down.

TOOLS:

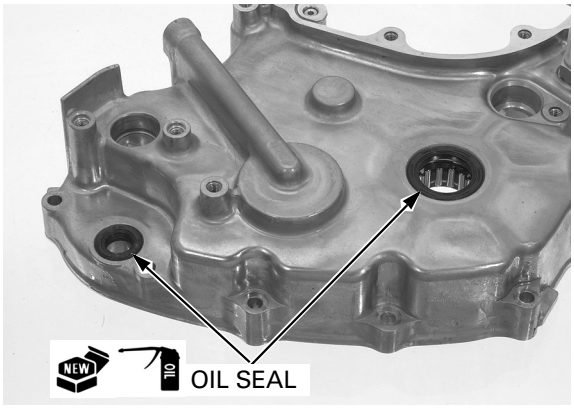
Driver	**07749-0010000**
Attachment, 37 x 40 mm	**07746-0010200**
Pilot, 17 mm	**07746-0040400**



INSTALLATION

Blow through the oil passage in the crankcase cover with compressed air.
Clean the crankcase and cover mating surfaces.

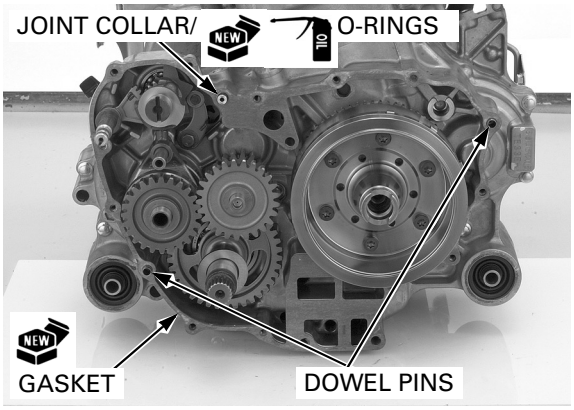
Apply engine oil to the lips of new oil seals, and install them into the crankcase cover until they are fully seated.



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).



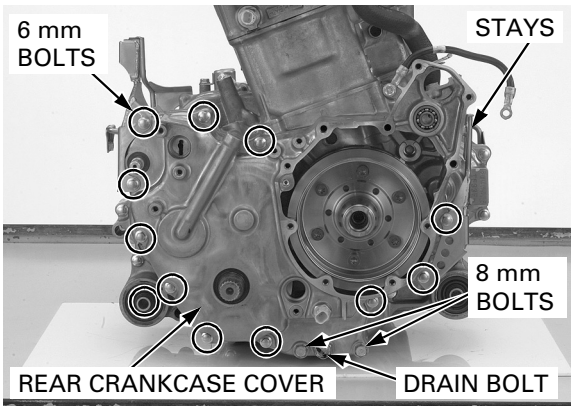
Install a new sealing washer onto the drain bolt.
Coat a new O-ring with engine oil and install it into the drain bolt groove.

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

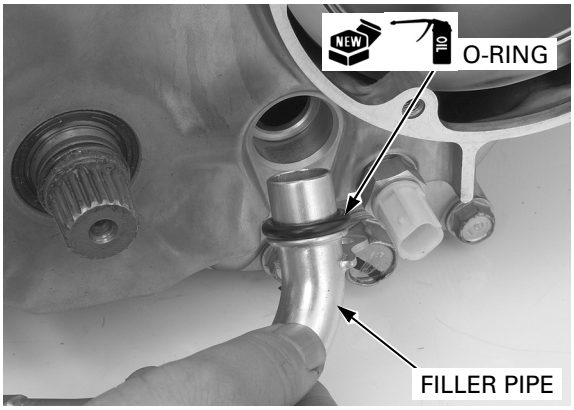
Tighten the bolts in a crisscross pattern in several steps.

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.



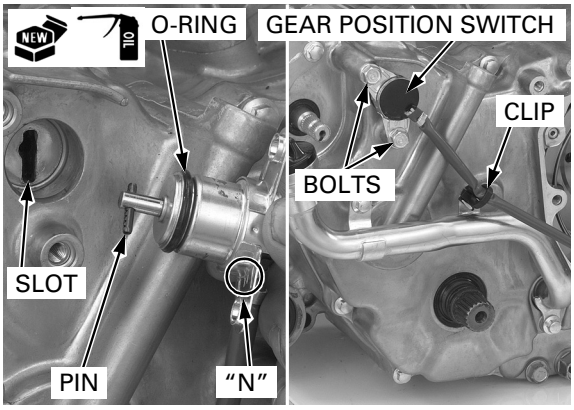
Coat a new O-ring with engine oil and install it into the groove in the gear position switch.

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 alternator cover and reduction gears (page 11-12).

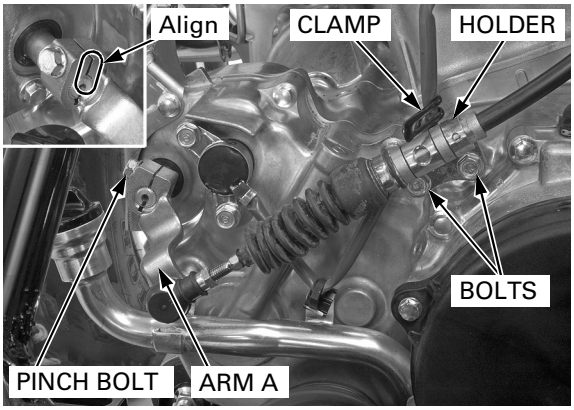


Install the gear selector arm A by aligning the groove with the wide tooth of the spindle. Install the pinch bolt and tighten it.

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 gear position switch wire properly, secure the wire with the clamp on the cable holder.



Route the wires properly (page 1-20).

Connect the oil temperature sensor 2P (Black) connector and gear position switch 3P (Natural) connector.

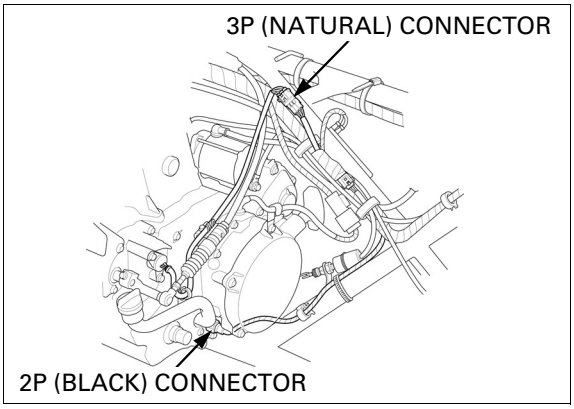
Adjust the gear selector cable if necessary (page 12-15).

Connect the front propeller shaft over the output shaft (page 8-10).

Install the following:

- final drive/sub-frame assembly (page 19-27)
- starter motor (page 22-11)
- engine guard (page 3-17)
- engine side covers (page 3-17)
- center mud guards (page 3-7)
- inner fenders (page 3-9)
- front mud guard (page 3-8)
- front center grille (page 3-10)

Fill the engine with recommended oil (page 4-10).



SUB-TRANSMISSION

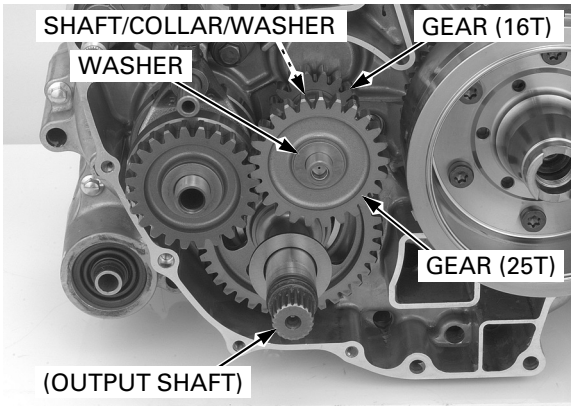
DISASSEMBLY

Remove the rear crankcase cover (page 12-5).

Remove the following:

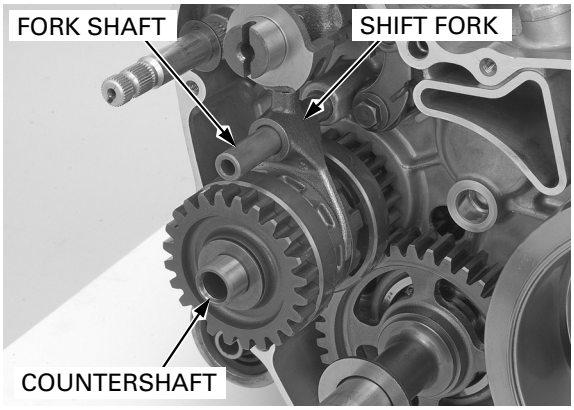
– washer
– idle gear (25T)
– gear shaft and gear collar (inner and outer)
– washer
– idle gear (16T)

The output shaft can be removed at this time (page 12-10).

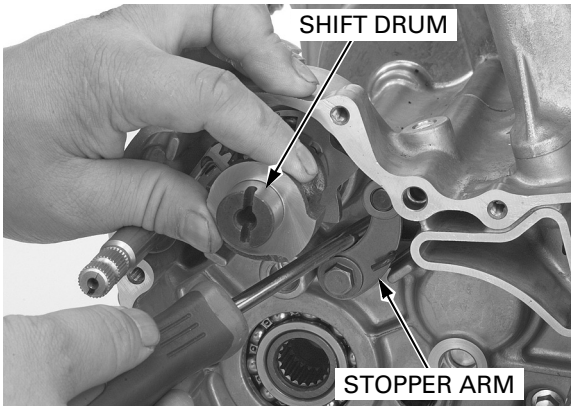


Remove the following:

– shift fork shaft
– shift fork
– countershaft assembly

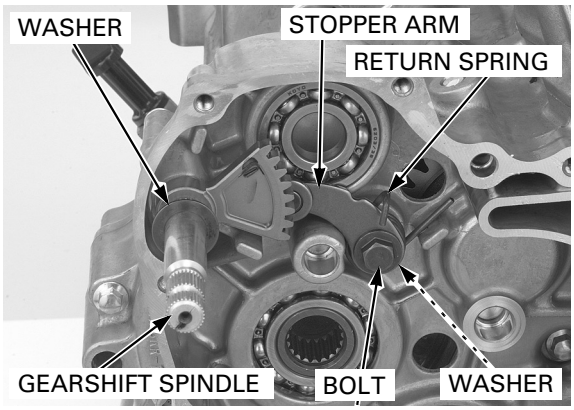


Remove the shift drum while lifting the stopper arm with a screwdriver.

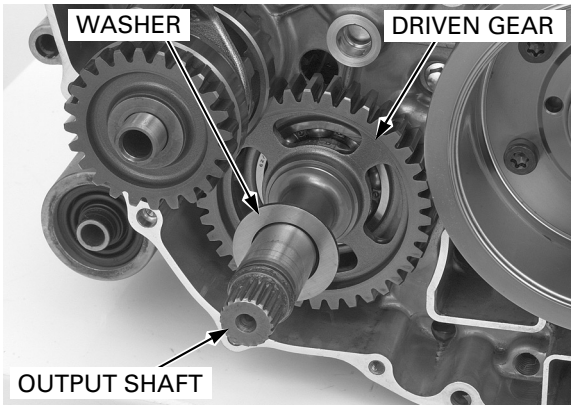


Remove the following:

– washer
– gearshift spindle
– pivot bolt
– stopper arm
– washer
– return spring



– 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.

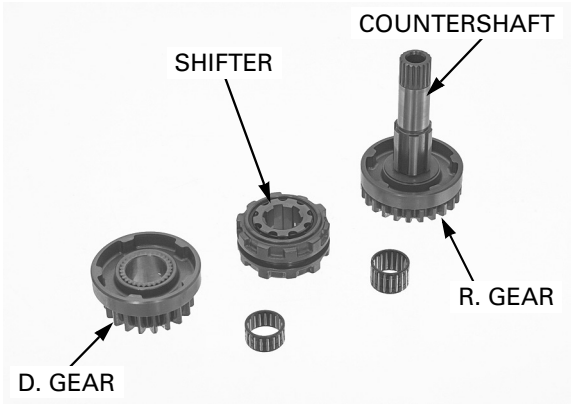
INSPECTION

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.

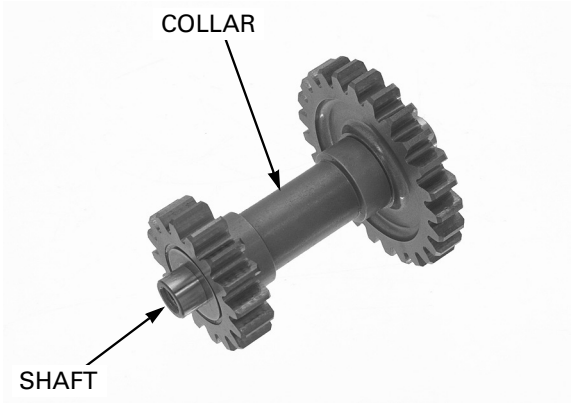


OUTPUT SHAFT

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.

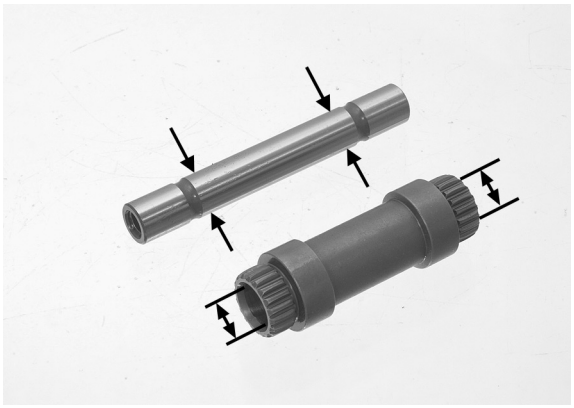
SERVICE LIMIT: 13.05 mm (0.514 in)

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.

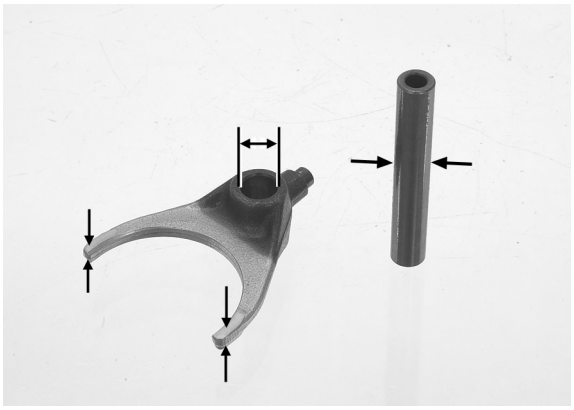
SERVICE LIMIT: 4.5 mm (0.18 in)

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)

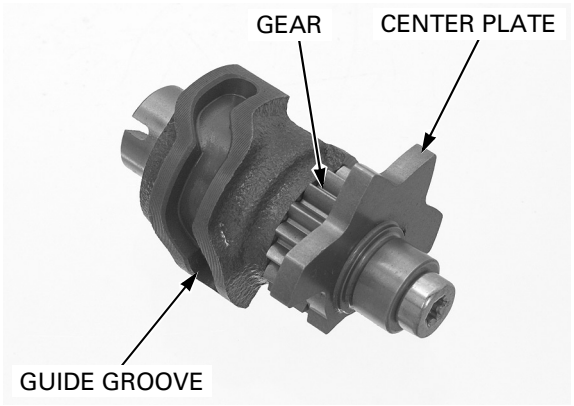


SHIFT DRUM

Replace the shift drum as an assembly.

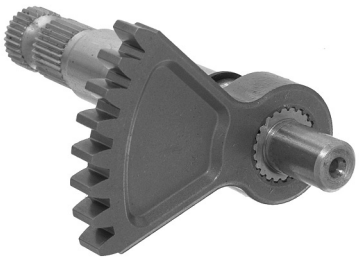
Check the guide groove for abnormal wear or damage.

Check the drum center plate and shifter gear for abnormal wear or damage.



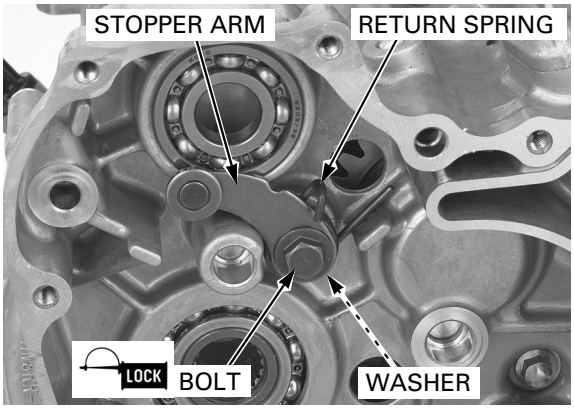
GEARSHIFT SPINDLE

Check the shifter gear and splines for abnormal wear or damage.



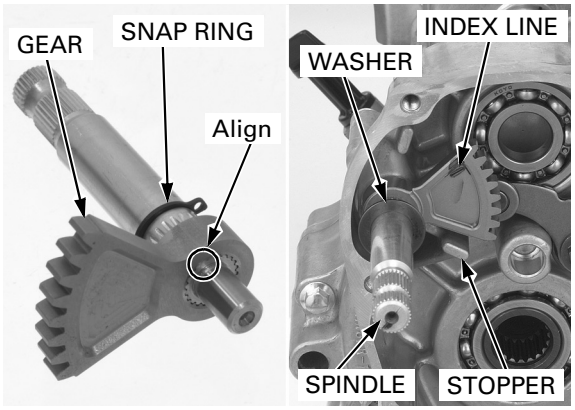
INSTALLATION

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.

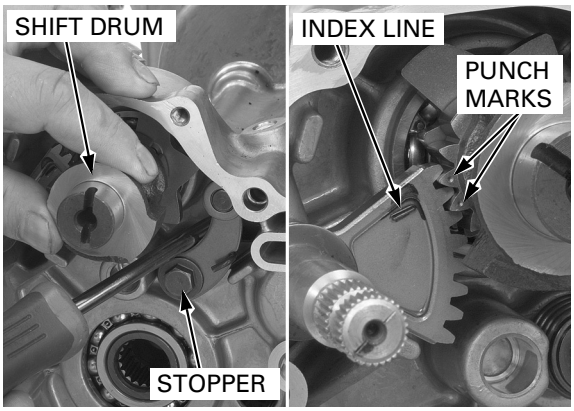
Install the gearshift spindle and rest it onto the stopper on the crankcase.
Install the washer onto the spindle.



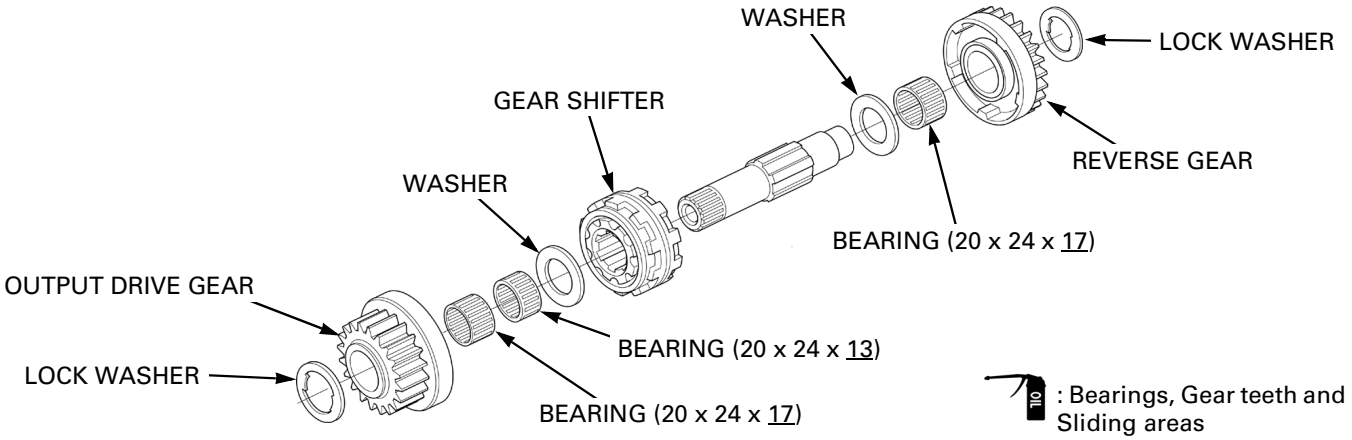
Apply engine oil to the shift drum guide groove.

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.

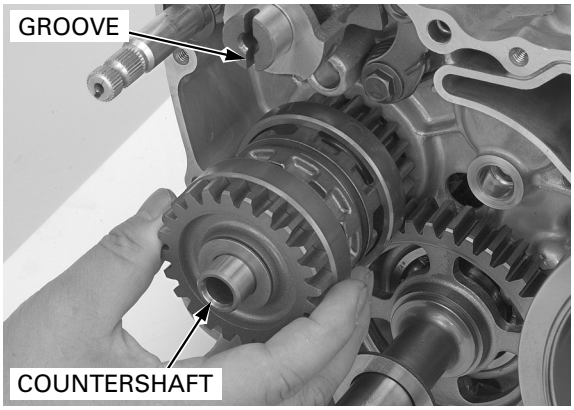


Apply engine oil to the bearings, gear teeth and sliding areas.
Assemble the countershaft.



The output shaft may be installed before installing the countershaft (page 12-13).

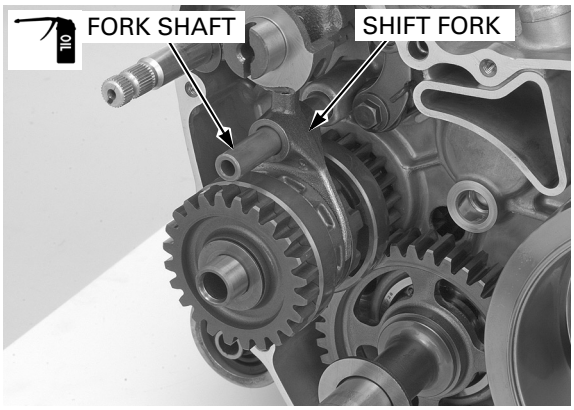
Install the countershaft assembly by engaging the splines.



Apply engine oil to the fork shaft outer surface.

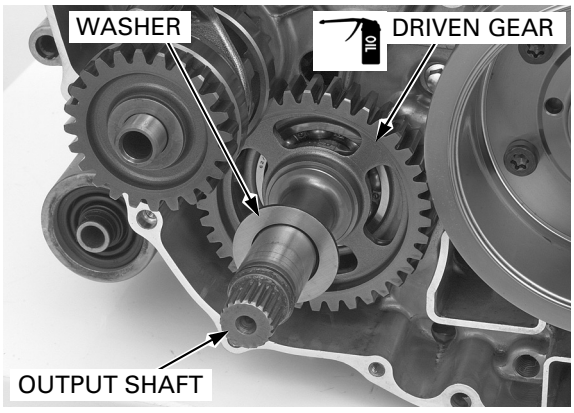
Before installation, be sure that the switch pin groove in the shift drum is lengthwise as shown above.

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.



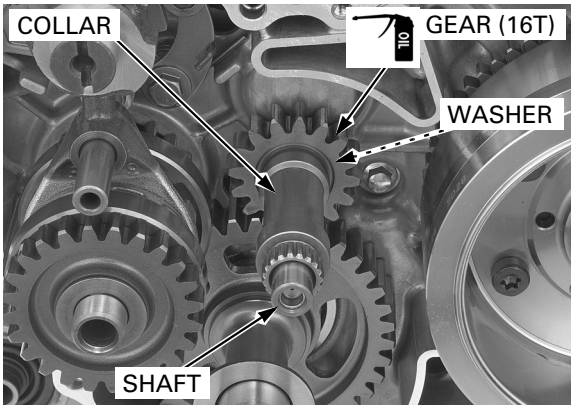
Apply engine oil to the gear teeth and set the output driven gear into the crankcase.
Insert the output shaft through the driven gear and install it into the crankcase.

Install the washer.



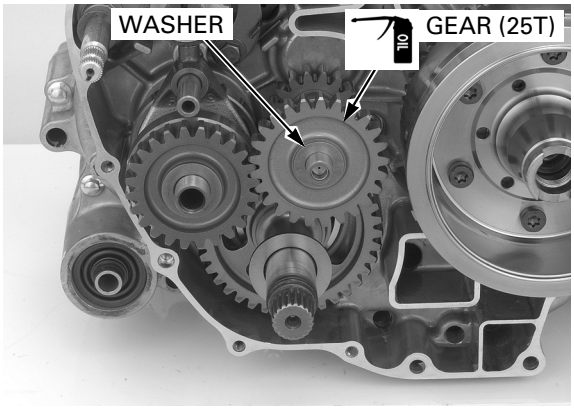
Install the gear shaft with the washer into the crankcase.

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 12-5).



GEAR SELECTOR LEVER LINKAGE

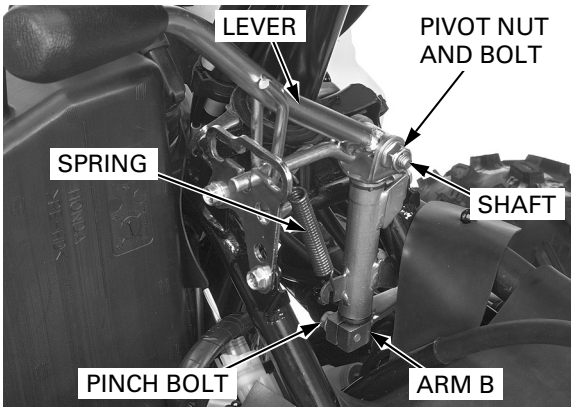
DISASSEMBLY

Remove the fuel tank (page 6-39).

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.



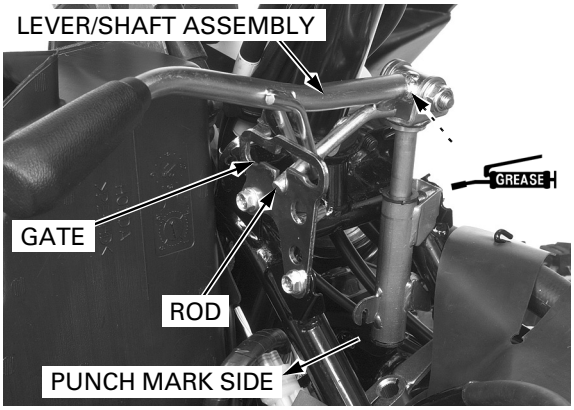
ASSEMBLY

Apply grease to the pivot bolt groove.

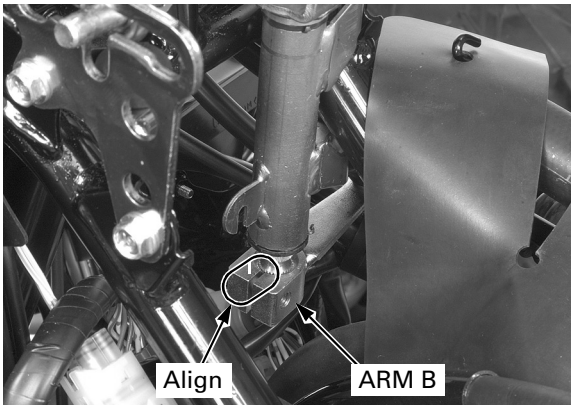
Install the selector lever into the pivot shaft with the pivot bolt and nut so the guide rod is facing toward the punch mark on the shaft bottom.

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).

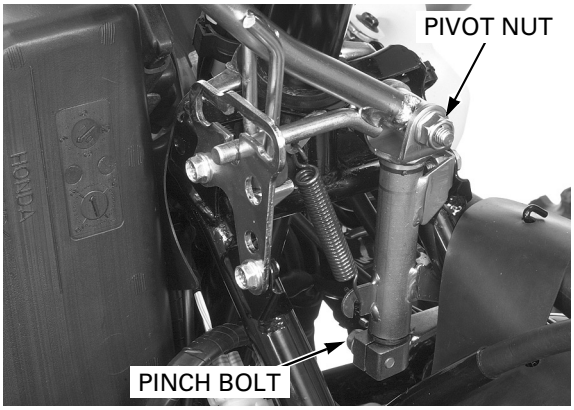


Install the pinch bolt and tighten it.

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)

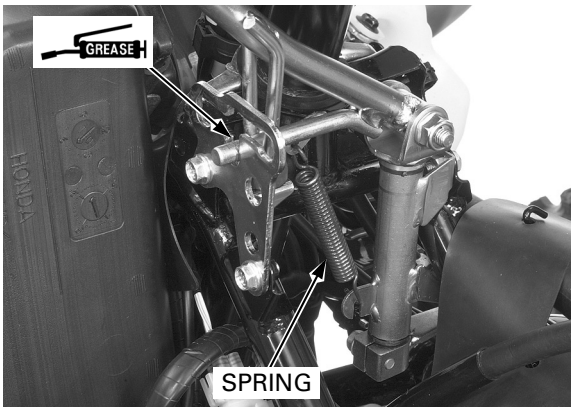


Install the return spring in the direction as shown.

Apply grease to the gate groove.

Check the selector lever for smooth operation.
Adjust the selector cable if necessary (page 12-15).

Install the fuel tank (page 6-39).

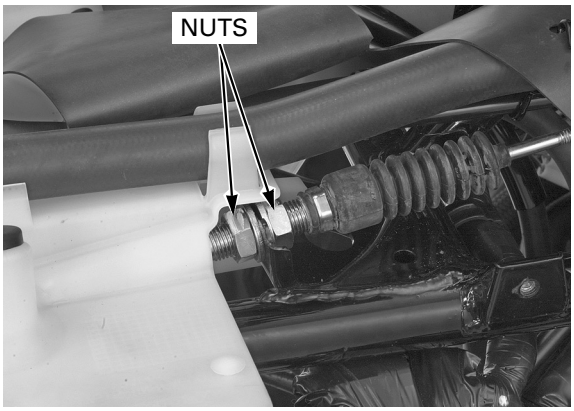


SELECTOR CABLE ADJUSTMENT

Remove the following:

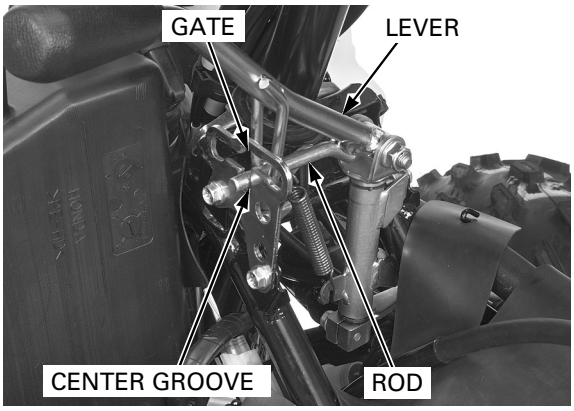
– fuel tank and head guard plate (page 6-39).
– left engine side cover (page 3-17)

Loosen the cable lock nuts fully.

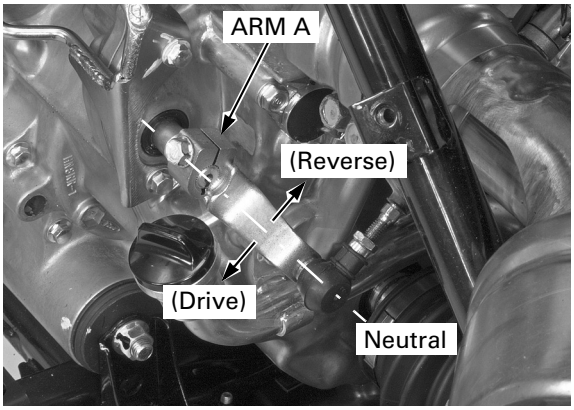


Turn the ignition switch ON and check that the neutral indicator comes on at this time.

Operate the selector lever several times and shift the sub-transmission into neutral.

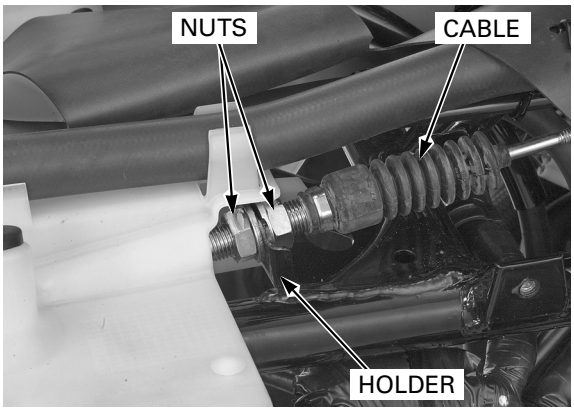


Make sure that the selector arm A stops at the center (neutral) position when setting the guide rod of the lever into the center (neutral) groove in the selector gate.



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)



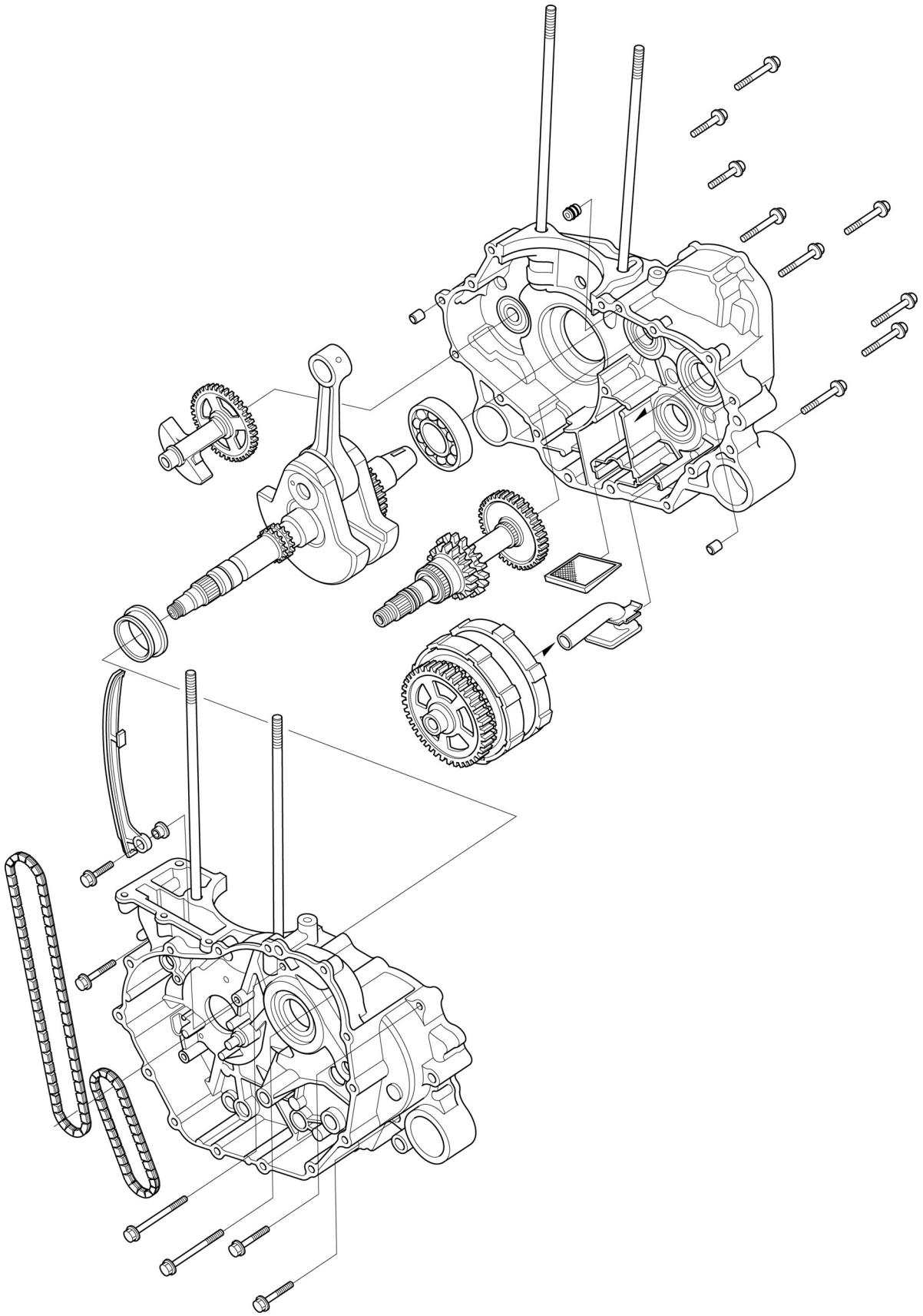
Check that the selector lever operates properly.

Install the following:

– left engine side cover (page 3-17)
– head guard plate and fuel tank (page 6-39).

13. CRANKCASE/CRANKSHAFT/BALANCER

SYSTEM COMPONENTS



SERVICE INFORMATION

GENERAL

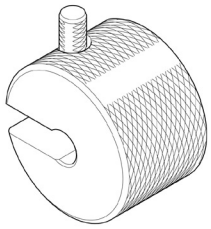
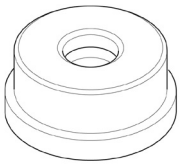
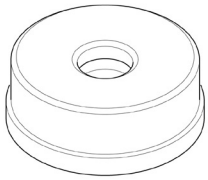
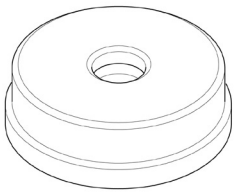
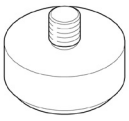
- The crankcase halves must be separated to service the crankshaft and A/T (mainshaft and 2nd/3rd shift clutch [countershaft]). To service these parts, the engine must be removed from the frame (page 8-2).
- For A/T service (page 14-2).
- Be careful not to damage the crankcase mating surfaces when servicing.

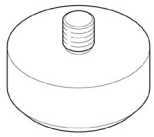
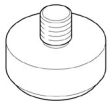
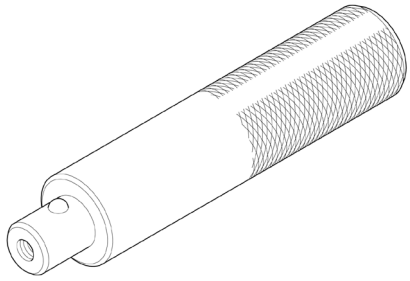
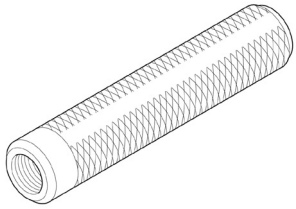
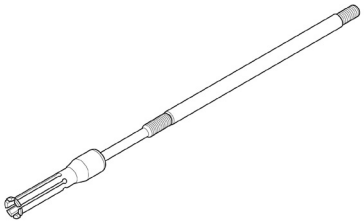
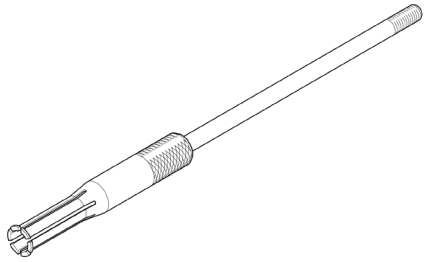
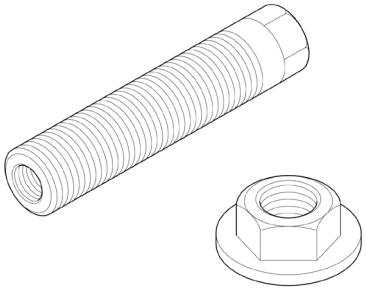
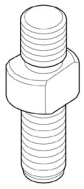
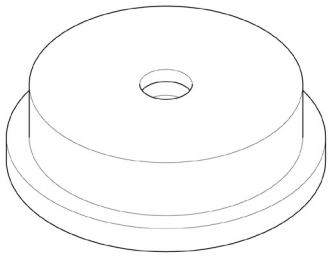
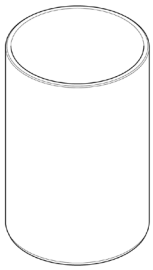
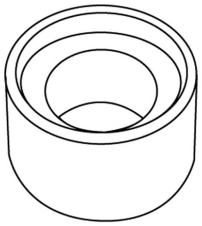
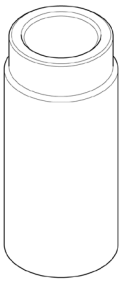
SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Crankshaft	Runout	0.05 (0.002)	0.15 (0.059)
	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

Remover weight 07741-0010201  or 07936-371020A or 07936-3710200 (U.S.A. only)	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, 20 mm I.D. 07746-0020400 
Pilot, 17 mm 07746-0040400 	Pilot, 20 mm 07746-0040500 	Pilot, 35 mm 07746-0040800 

Pilot, 40 mm 07746-0040900 	Pilot, 28 mm 07746-0041100 	Driver 07749-0010000 
Remover handle 07936-3710100 	Bearing remover, 17 mm 07936-3710300 	Bearing remover, 20 mm 07936-3710600 
Assembly shaft 07965-VM00200  or 07931-ME4010B and 07931-HB3020A (U.S.A. Only)	Threaded adaptor 07965-VM00300  or 07931-KF00200 (U.S.A. only)	Attachment, 78 x 90 mm 07GAD-SD40101 
Ball joint remover/installer 07WMF-HN00100 	Assembly collar spacer 07AMF-HM8A100 (U.S.A. only) 	Assembly collar 07965-VM00100 

TROUBLESHOOTING

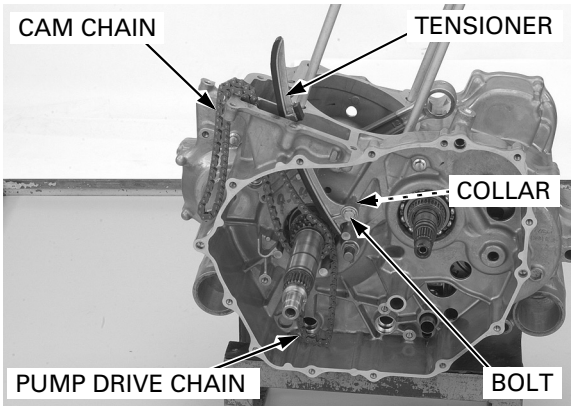
Excessive engine noise
- Worn or damaged connecting rod bearing
- Worn crankshaft main journal bearing
- Worn connecting rod small end
- Worn balancer bearing
- Worn, seized or chipped transmission gear
- Worn transmission bearings

Abnormal vibration
- Improper balancer timing

CRANKCASE SEPARATION

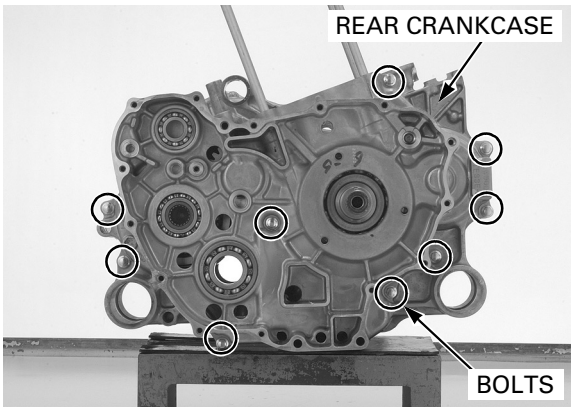
Remove the following:

- engine (page 8-2)
- cylinder and piston (page 10-4)
- sub-transmission/gearshift linkage (page 12-9)
- flywheel/starter clutch (page 11-14)
- torque converter (page 14-60)
- 1st shift clutch (page 14-62)
- oil pump (page 5-5)
- cam chain
- oil pump drive chain
- pivot bolt
- cam chain tensioner and collar



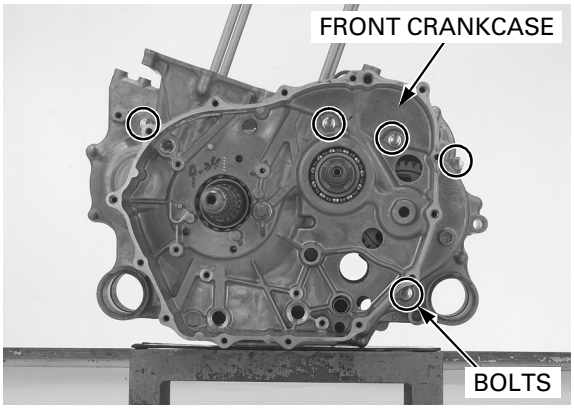
The crankcase bolts are loosened in a crisscross pattern in several steps.

Remove the nine rear crankcase bolts.



Remove the five front crankcase bolts.

Place the crankcase assembly with the rear crankcase down.

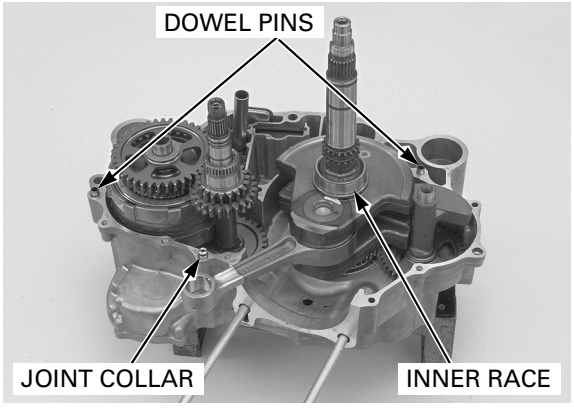


Do not pry the crankcase apart with a screwdriver.

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



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

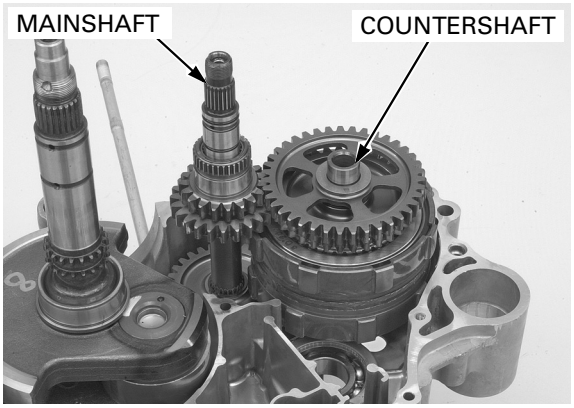
REMOVAL

Separate the crankcase (page 13-6).

Remove the following:

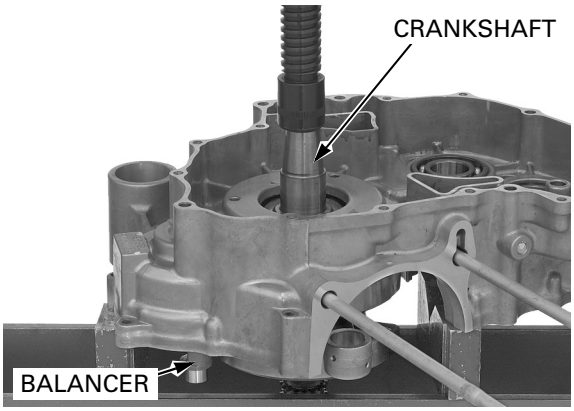
– oil strainers (page 13-7)
– mainshaft and countershaft

For A/T service, see (page 14-64).



Be careful not to damage the crankcase mating surface and crankshaft assembly.

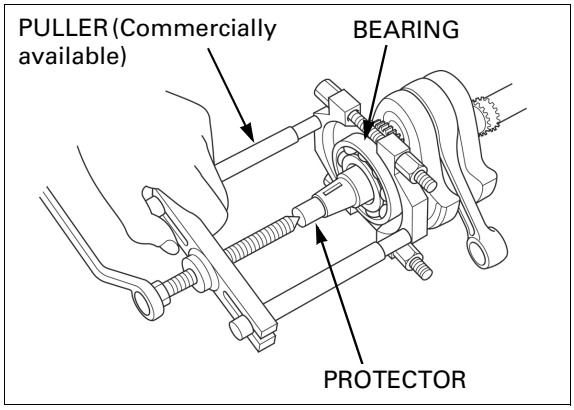
Remove the crankshaft and balancer from the rear crankcase using a hydraulic press. Be sure to hold the crankshaft and balancer while pressing them out of the crankcase.



Remove crankshaft bearing using a bearing puller with a suitable protector.

NOTE:

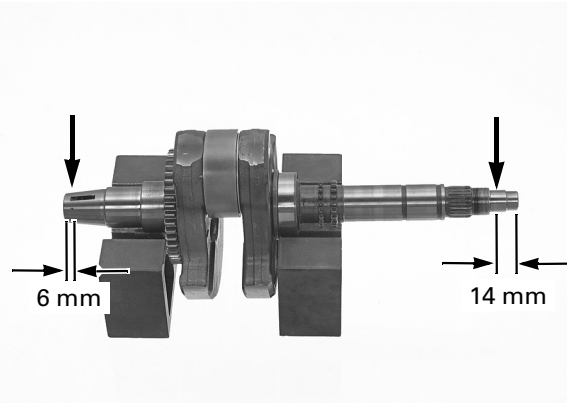
- Always replace the rear crankshaft bearing with a new one whenever the crankshaft is removed.



INSPECTION

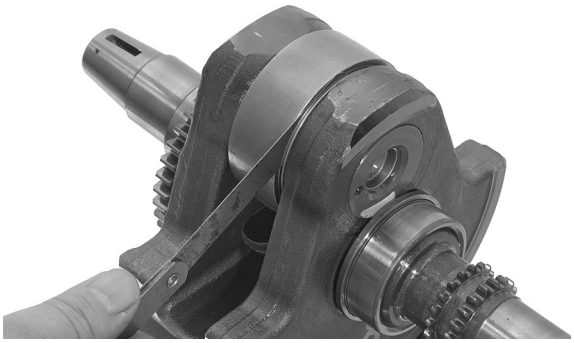
Set the crankshaft in a stand or V-blocks and measure the runout using a dial indicator.

SERVICE LIMIT: 0.15 mm (0.059 in)



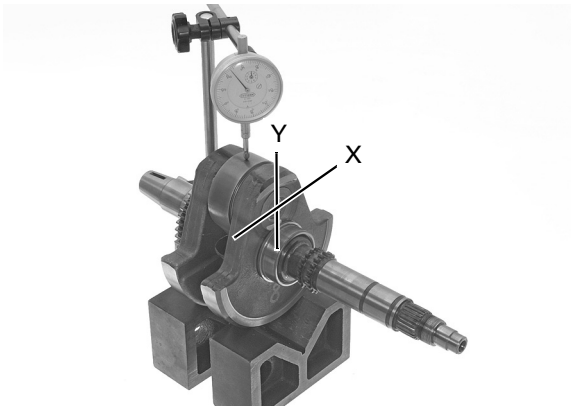
Measure the side clearance between the connecting rod big end and crank weight with a feeler gauge.

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.

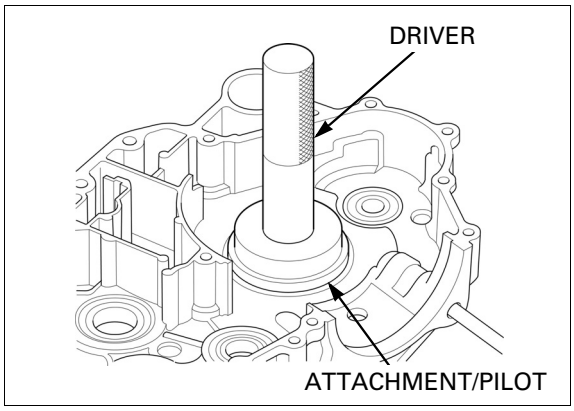
CRANKSHAFT AND BALANCER INSTALLATION

Apply engine oil to a new rear crankshaft bearing. Drive the crankshaft bearing into the rear crankcase with the marking side facing up.

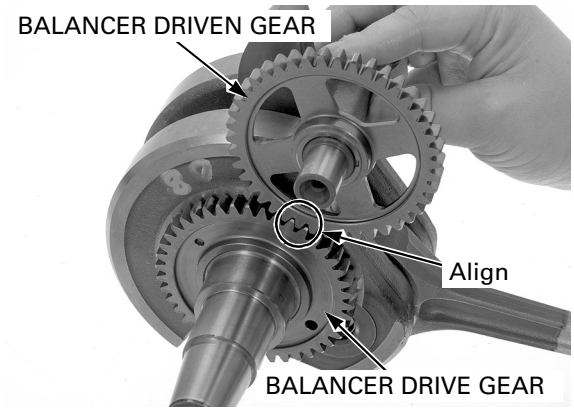
TOOLS:

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 13-10.



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.



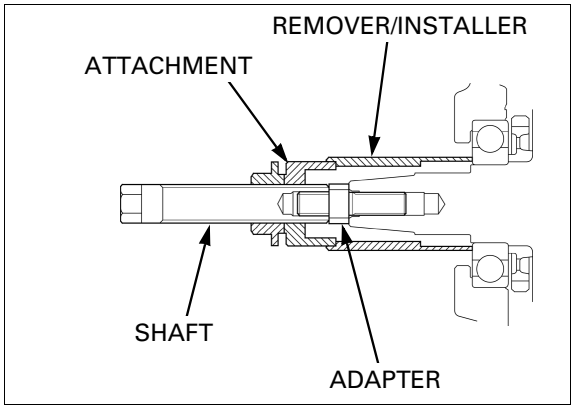
Assemble the special tools onto the crankshaft.

Be careful not to let the connecting rod press against the crankcase mating surface while drawing.

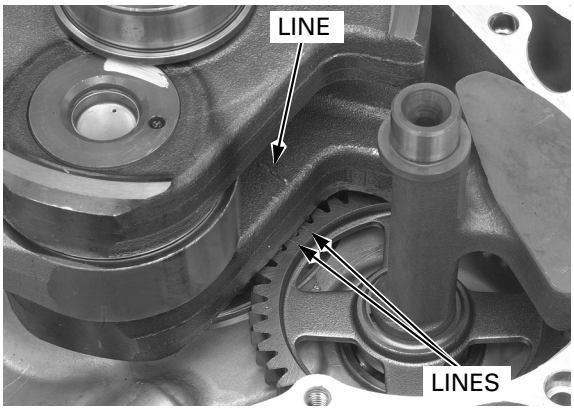
Draw the crankshaft into the bearing inner race by turning the assembly shaft while holding the shaft nut.

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**



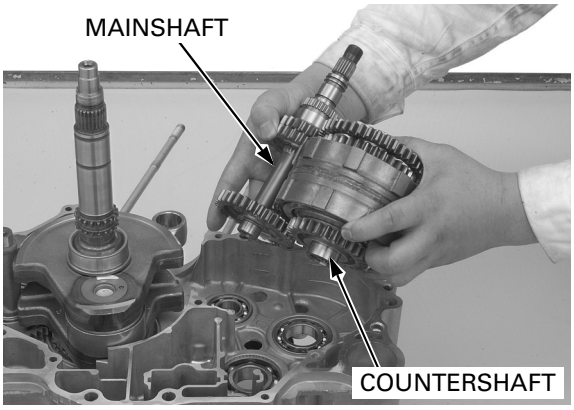
After installing the crankshaft in, make sure the index line on the crank weight is aligned between the index lines on the balancer driven gear.



Install the mainshaft and countershaft assemblies as a set into the rear crankcase.

Install the oil strainers (page 13-7).

Assemble the crankcase halves (page 13-12).



CRANKCASE BEARING REPLACEMENT

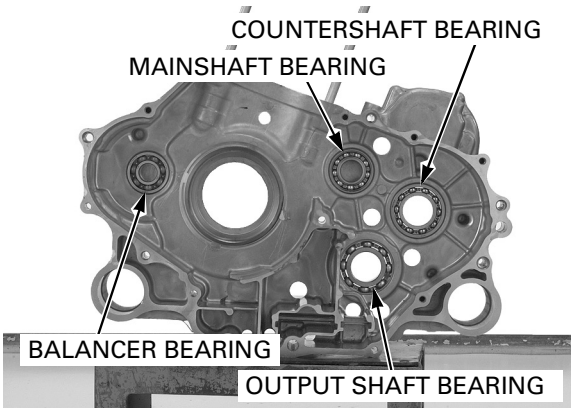
REAR CRANKCASE

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.

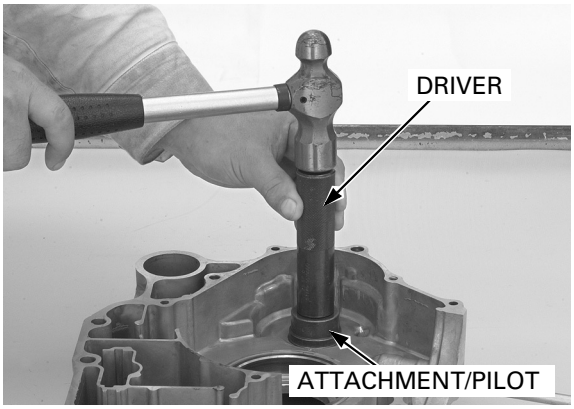


Apply engine oil to new bearings.
Drive the bearings in with the marks facing up.

The mainshaft bearing is installed with the sealed side facing down.

TOOLS:

Mainshaft Bearing	
Driver	**07749-0010000**
Attachment, 42 x 47 mm	**07746-0010300**
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.

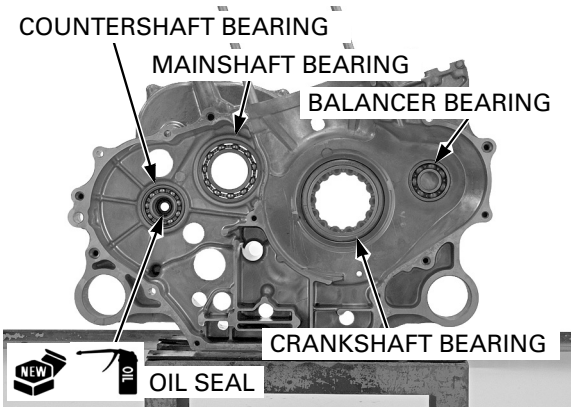
TOOLS:

Balancer Bearing:	
Bearing remover, 17 mm	**07936-3710300**
Remover handle	**07936-3710100**
Remover weight	**07741-0010201 or 07936-371020A or 07936-3710200 (U.S.A. only)**
Countershaft 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)**

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.

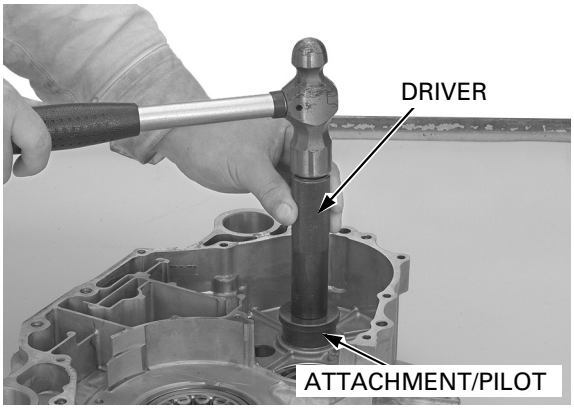


Apply engine oil to new bearings.
Drive the bearings in with the marks facing up.

TOOLS:

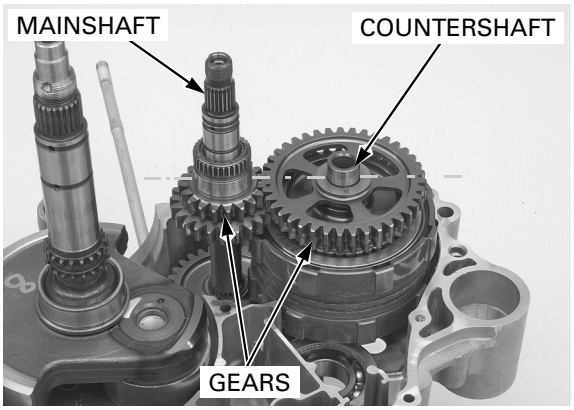
Mainshaft Bearing	
Driver	**07749-0010000**
Attachment, 62 x 68 mm	**07746-0010500**
Pilot, 35 mm	**07746-0040800**
Countershaft Bearing	
Driver	**07749-0010000**
Attachment, 42 x 47 mm	**07746-0010300**
Pilot, 20 mm	**07746-0040500**
Crankshaft Bearing	
Driver	**07749-0010000**
Attachment, 78 x 90 mm	**07GAD-SD40101**
Balancer Bearing	
Driver	**07749-0010000**
Attachment, 37 x 40 mm	**07746-0010200**
Pilot, 17 mm	**07746-0040400**

The countershaft bearing is installed with the sealed side facing down.



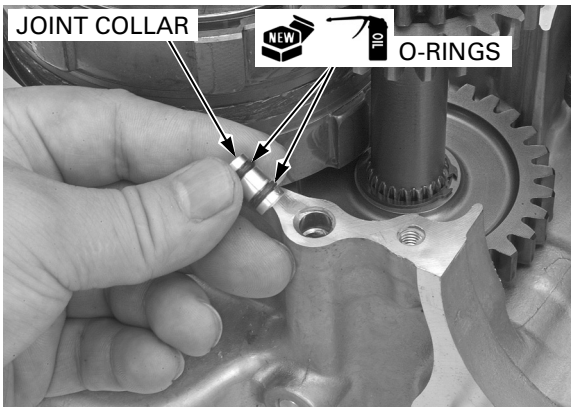
CRANKCASE ASSEMBLY

Before installing the front crankcase cover, make sure the gear side surfaces (C1 and M1 gears) of the countershaft and mainshaft are flush.



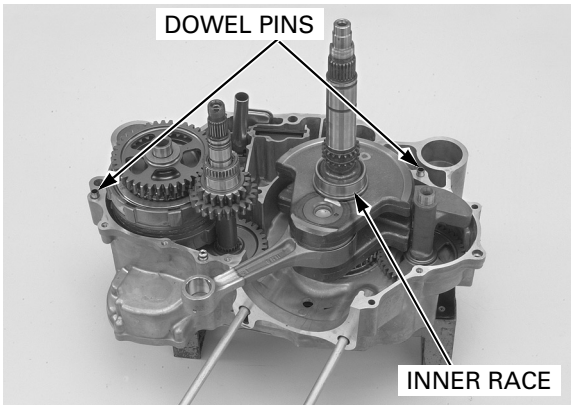
Clean the front and rear crankcase mating surfaces thoroughly, being careful not to damage them.
Blow through the oil passages in the crankcases with compressed air.

Coat new O-rings with engine oil and install them into the joint collar grooves. Install the oil joint collar into the crankcase.



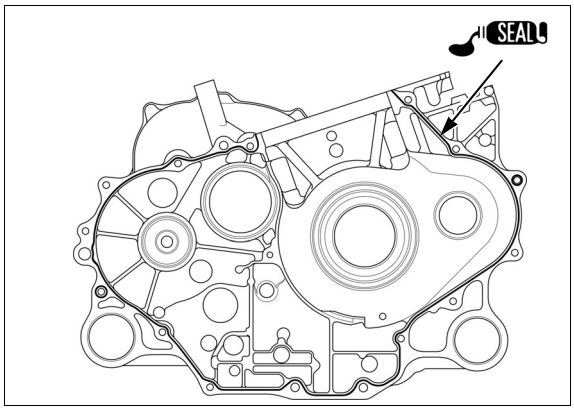
Install the two dowel pins.

Install the bearing inner race onto the crankshaft with the flange side facing in.



Make sure the mating surfaces evenly touch, that there is no clearance between the cases.

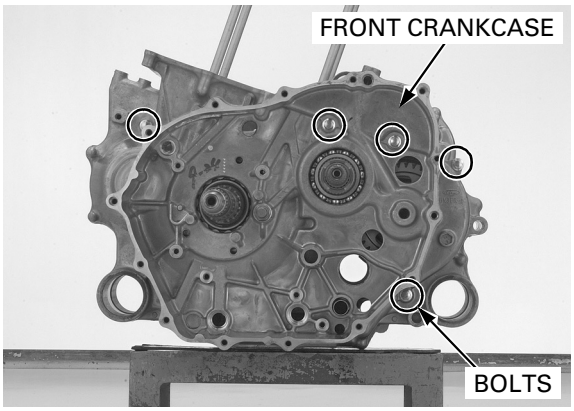
Apply liquid sealant (Three Bond 1215 or equivalent) to the mating surface of the front crankcase.



Install the front crankcase over the rear crankcase, aligning the oil strainer pipe with the pipe hole.

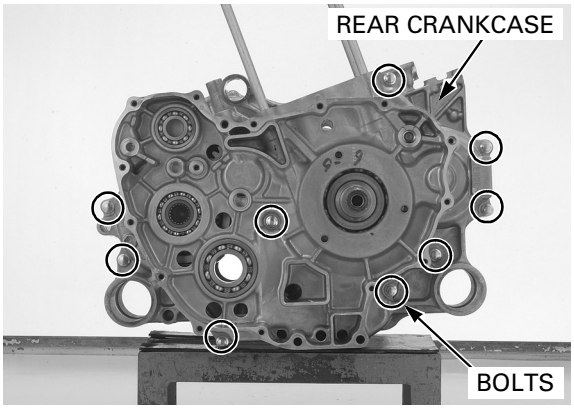
Install the five front crankcase bolts.

Check that the mainshaft and crankshaft turns smoothly and quietly.

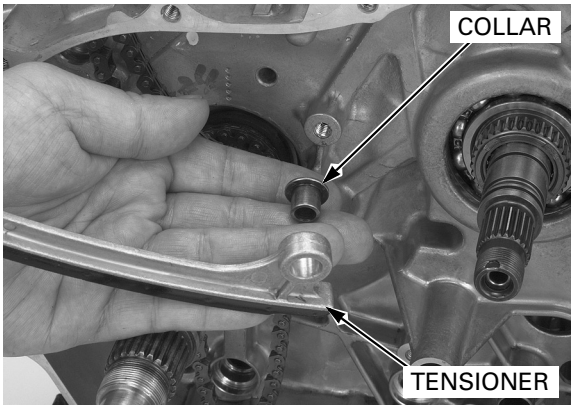


Install the nine rear crankcase bolts.

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.

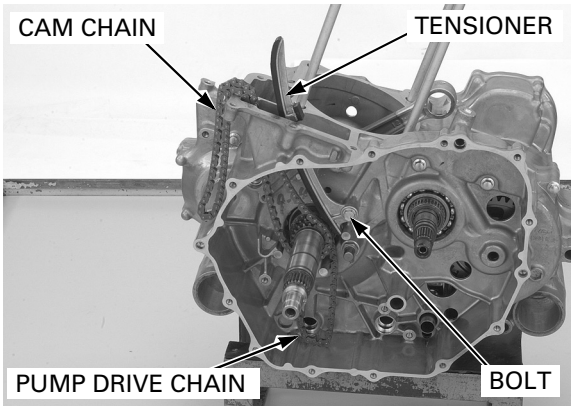


Install and tighten the cam chain tensioner pivot bolt.

Install the oil pump drive and cam chains onto the crankshaft.

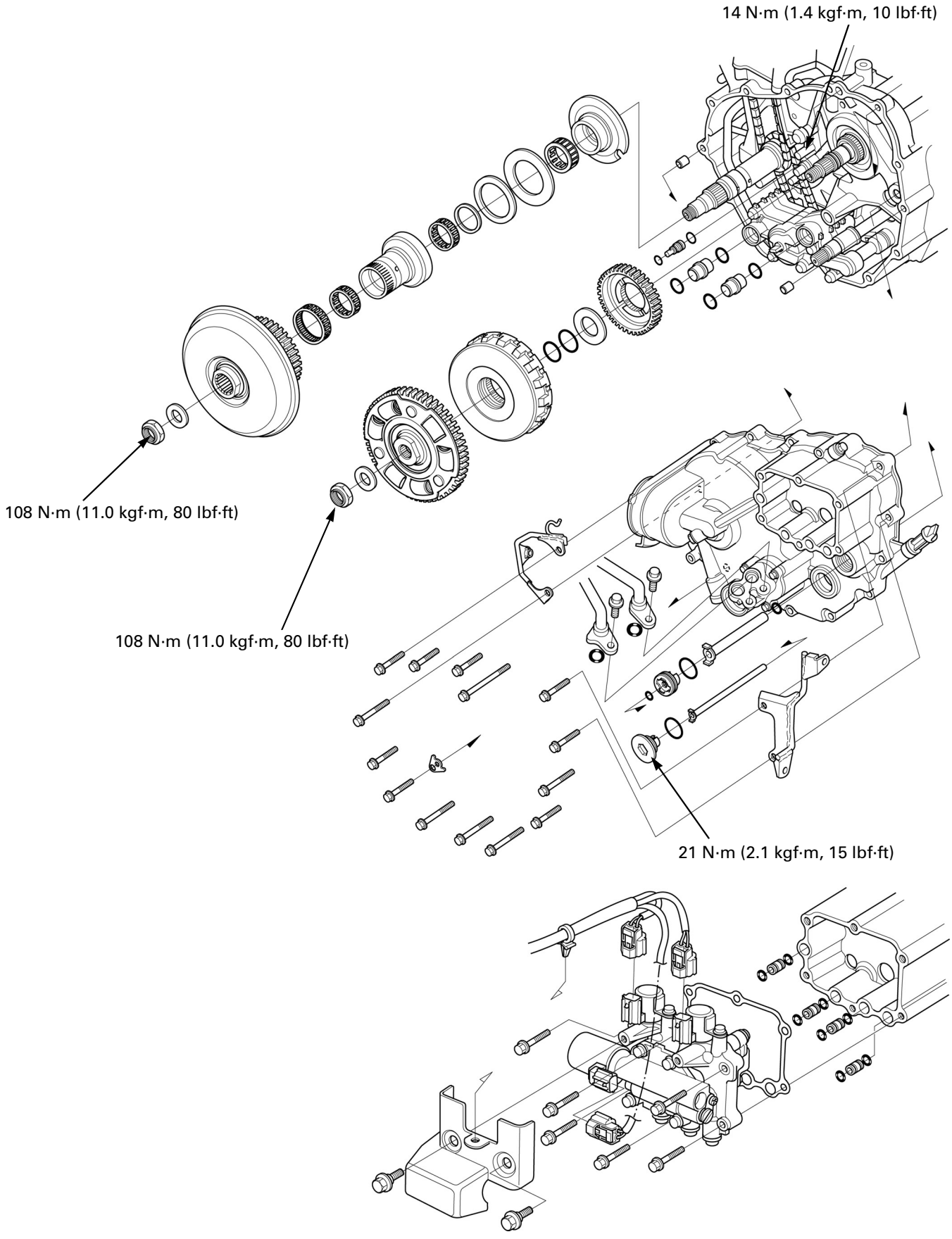
Install the following:

- oil pump (page 5-11)
- 1st shift clutch and torque converter (page 14-72)
- flywheel/starter clutch (page 11-16)
- sub-transmission/gearshift linkage (page 12-12)
- cylinder and piston (page 10-8)
- engine (page 8-8)



14. DRIVETRAIN SYSTEM

SYSTEM COMPONENTS



SERVICE INFORMATION

GENERAL

- This "Drivetrain System" section covers service of the electrical system of the A/T (Automatic Transmission), selectable 4WD system and the mechanical system of the A/T.
- Refer to "Front driving mechanism" for the front final clutch service (page 18-14).
- Refer to “Technical Features” for the control and function of each components by the PCM (page 2-7).
- 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.
- A faulty drivetrain system is often related to poorly connected or corroded connectors. Check those connections before proceeding.
- Read “Drivetrain Troubleshooting Information” carefully, and inspect and troubleshoot the drivetrain system according to the DTC. Observe each step of the procedures one by one. Note the DTC and probable faulty part before starting diagnosis and troubleshooting.
- The PCM may be damaged if dropped. Also, if a connector is disconnected when current is flowing, the excessive voltage may damage the PCM. Always turn off the ignition switch before servicing.
- The drive mode (2WD or 4WD) is changed electrically by operating front final clutch with the 2WD/4WD select switch.
- 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. For crankcase separation and assembly (page 13-6).
- For sub-transmission (Forward-Neutral-Reverse) service (page 12-2).
- The engine oil is used for A/T oil. For lubrication system service (oil pump and oil cooler) (page 5-2).
- A/T 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 Drivetrain System Troubleshooting

The PCM (Powertrain Control Module) is integrated with the ECM (Engine Control Module), the TCM (Transmission Control Module) and the selectable 4WD system control. Therefore some detection items that are shared in the PGM-FI and drivetrain system and they may affect the operation of both systems.

Before starting any troubleshooting, check the items as follows and refer to the appropriate troubleshooting.

1. MIL blinks or DTC for the Fuel system (page 6-13).
2. Gear position indicator blinks, 4WD indicator or DTC for the Drivetrain system (page 14-20).
3. Symptom of the A/T and selectable 4WD system operation (page 14-6).

Refer to "PGM-FI Troubleshooting Information" for the general troubleshooting information (page 6-13).

SPECIFICATIONS

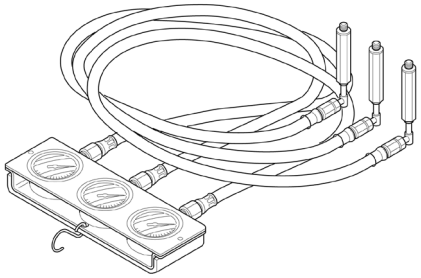
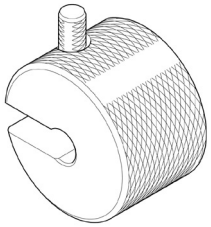
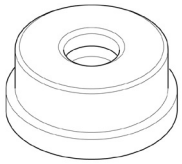
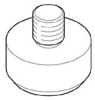
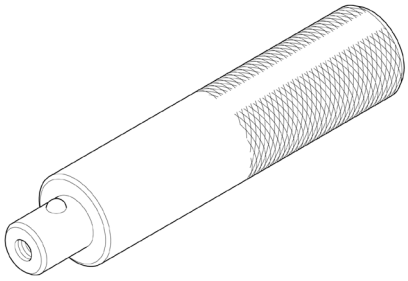
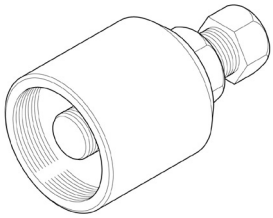
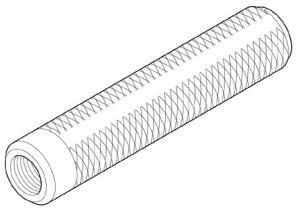
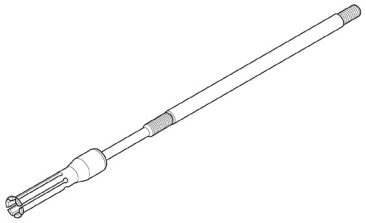
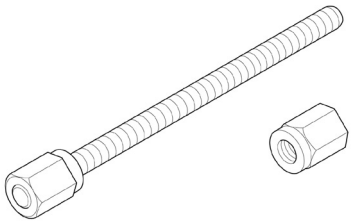
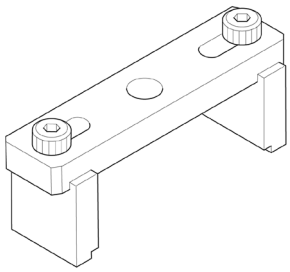
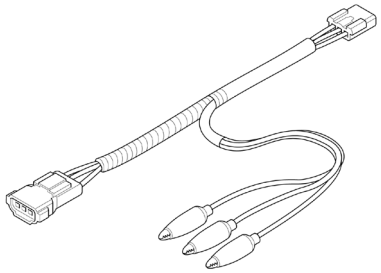
Unit: mm (in)

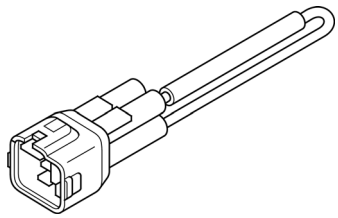
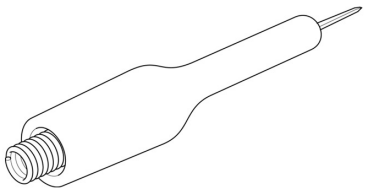
ITEM		STANDARD	SERVICE LIMIT
Oil pressure at 5,000 rpm (min^{-1})	Line	785 kPa (8.0 kgf/cm^2, 114 psi)	–
	1st, 2nd and 3rd clutch	785 kPa (8.0 kgf/cm^2, 114 psi)	–
Shift clutch (1st, 2nd and 3rd)	Initial clearance	0.7 – 0.9 (0.03 – 0.04)	–
	Disc thickness	1.88– 2.00 (0.074 – 0.079)	worn out lining
	Plate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

TORQUE VALUES

Oil pass bolt	18 N·m (1.8 kgf·m, 13 lbf·ft)	
Primary driven gear lock nut	108 N·m (11.0 kgf·m, 80 lbf·ft)	Lock nut: replace with a new one. Apply engine oil to the threads and seating surface. 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	108 N·m (11.0 kgf·m, 80 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

Pressure gauge set 07406-0020005  or 07ZMJ-HN2A100 and 07AMJ-HN8A100 (U.S.A. only)	Bearing remover weight 07741-0010201  or 07936-371020A or 07936-3710200 (U.S.A. only)	Attachment, 42 x 47 mm 07746-0010300 
Pilot, 17 mm 07746-0040400 	Pilot, 25 mm 07746-0040600 	Driver 07749-0010000 
Puller, 35 x 1.0 mm 07933-HA80000  or 07933-HB3000A (U.S.A. only)	Bearing remover handle 07936-3710100 	Bearing remover, 17 mm 07936-3710300 
Compressor bolt assembly 07GAE-PG40200  or 07GAE-PG4020A (U.S.A. only)	Clutch compressor attachment 07LAE-PX40100 (2 required) 	Inspection adaptor 07GMJ-ML80100 

SCS connector 070PZ-ZY30100 	HDS pocket tester TDS 3557-0112-01 (U.S.A. only) 	Test probe 07ZAJ-RDJA110 

SYMPTOM TROUBLESHOOTING

GENERAL INFORMATION

If the ATV has any A/T trouble, check the DTC or gear position indicator blinking, refer to the DTC index and begin the appropriate troubleshooting procedure (page 14-24)

If there are no DTC stored in the PCM memory, do the troubleshooting as following symptom and then inspect the oil pressure and diagnose according to the troubleshooting chart (page 14-14).

Symptom	Diagnosis procedure	Also check for
Acceleration control failure	Refer to the following symptom troubleshooting (page 14-6): • Vehicle does not accelerate • Excessive starting shock • Vehicle creeps (vehicle does not stop) when idling • Driving power falls off when accelerating (insufficient engine brake) • Engine stalls when accelerating	• Engine oil level (page 4-10) • Oil pressure (page 14-12) • Emergency valve
Shift control failure	Refer to the following symptom troubleshooting (page 14-9): • A/T does not shift • When shifting in the AUTO (automatic) mode, excessive shift shock, engine rpm $(min)^{-1}$ rises or driving power falls off	• Engine oil level (page 4-10) • Oil pressure (page 14-12)
Gear position indicator indicates "--" but no DTC set	Refer to the following symptom troubleshooting (page 14-10): • A/T does not shift • Gear position indicator displays "– –" and drive mode indicator "ESP" stays on	• Combination meter circuit
Gear position indicator indicates "– –" and MIL is stays ON at all (No DTC set)	Check the DLC circuit (Brown/red wire) for short circuit.	• Short circuit in the DLC related wire

STARTING CONTROL FAILURE

Vehicle Does Not Accelerate

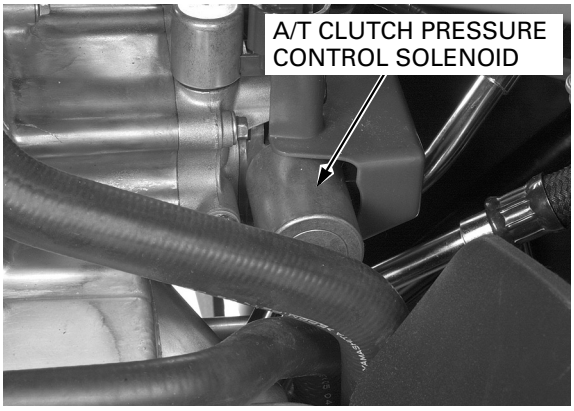
1. **A/T Clutch Pressure Control Solenoid Operation Sound Check**

   Put the gear selector lever in the Drive or Reverse position.
   Check for a "click" sound from the A/T clutch pressure control solenoid when the ignition switch is ON.

   Is there sound?

   NO – GO TO STEP 2.

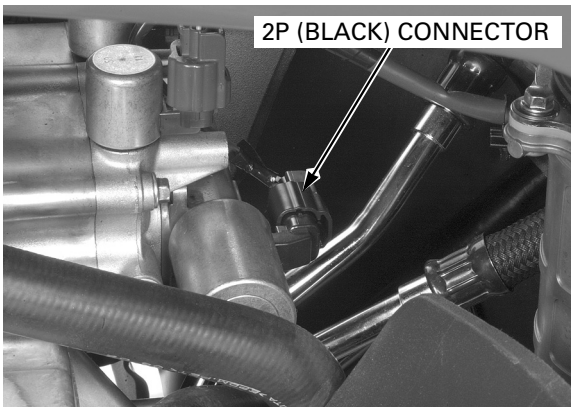
   YES – GO TO STEP 3.



2. A/T Clutch Pressure Control Solenoid Operation Check

Remove the valve body cover (page 14-47).

Disconnect the A/T clutch pressure control solenoid 2P (Black) connector.
Connect a 12 V battery to the solenoid terminals. It should operate (sounds) when the battery is connected.



Does the solenoid operate?

NO – Faulty A/T clutch pressure control solenoid.

YES – Test-ride the vehicle and check the gear position indicator (page 14-44).

3. Vehicle Test-riding

Accelerate the vehicle with the mode select switch at ESP. Check the acceleration performance with the transmission in the 2nd and 3rd ranges.

Does the vehicle accelerate with the transmission in 2nd and 3rd?

YES – Faulty 1st shift clutch system (page 14-66)

NO – Hydraulic circuit malfunction is the likely cause. Check the oil pressure (page 14-12).

Excessive Acceleration Shock

1. Vehicle Test-riding

Accelerate the vehicle with the mode select switch at ESP. Check for acceleration shock with the transmission in the 2nd and 3rd ranges.

Is there acceleration shock with the transmission in 2nd and 3rd?

NO – Faulty 1st shift clutch system (page 14-66)

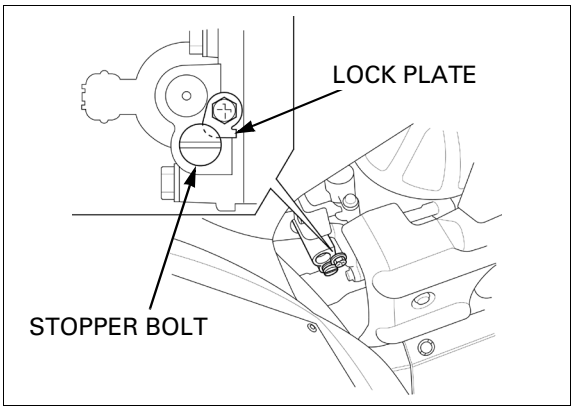
YES – Hydraulic circuit malfunction is the likely cause. Check the oil pressure (page 14-12).

Vehicle Creeps (vehicle does not stop) When Idling

1. Vehicle Test-riding

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 (page 14-47).



Start the engine and shift the sub-transmission in drive position with the mode select switch at ESP. Check the acceleration performance (creep) with the transmission in the 2nd and 3rd ranges.

Does the vehicle creep with the transmission in 2nd and 3rd?

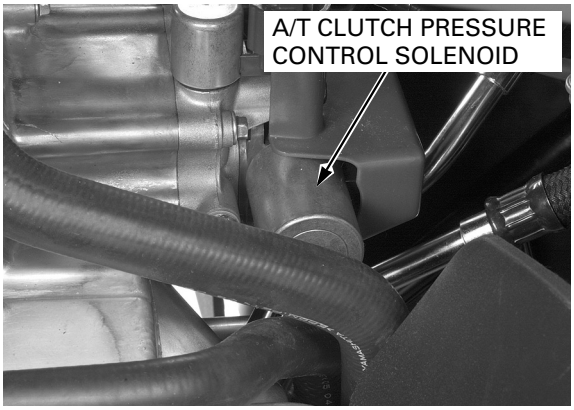
NO – Faulty 1st shift clutch system (page 14-66)

YES – Hydraulic circuit malfunction is the likely cause. Check the oil pressure (page 14-12).

Driving Power Falls Off When Accelerating (insufficient engine brake)

1. A/T Clutch Pressure Control Solenoid Operation Sound Check

Put the gear selector lever in the Drive or Reverse position.
Check for a "click" sound from the A/T clutch pressure control solenoid when the ignition switch is ON.



Is there sound?

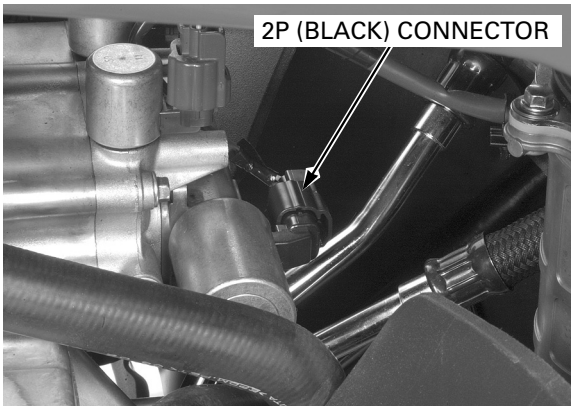
NO – GO TO STEP 2.

YES – GO TO STEP 3.

2. A/T Clutch Pressure Control Solenoid Operation Check

Remove the valve body cover (page 14-47).

Disconnect the A/T clutch pressure control solenoid 2P (Black) connector.
Connect a 12 V battery to the solenoid terminals. It should operate when the battery is connected.



Does the solenoid operate?

NO – Faulty A/T clutch pressure control solenoid.

YES – Test-ride the vehicle and check the gear position indicator (page 14-20).

3. Vehicle Test-riding

Test-ride 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 any range except 1st?

YES – Faulty 1st shift clutch system (page 14-66)

NO – Hydraulic circuit malfunction is the likely cause. Check the oil pressure (page 14-12).

Engine Stalls When Accelerating

1. Vehicle Creep Check

NOTE:

- Perform this test after engine idle speed inspection (page 6-55).

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 while applying the brake in the same manner as above (page 14-8).

NO – Hydraulic circuit malfunction is the likely cause. Check the oil pressure (page 14-12).

SHIFT CONTROL FAILURE

A/T Does Not Shift

1. Vehicle Test-riding

Test-ride 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 system. Check the installation condition (page 6-43).
- Faulty VS sensor system. Check the installation condition (page 18-30).

NO – GO TO STEP 2.

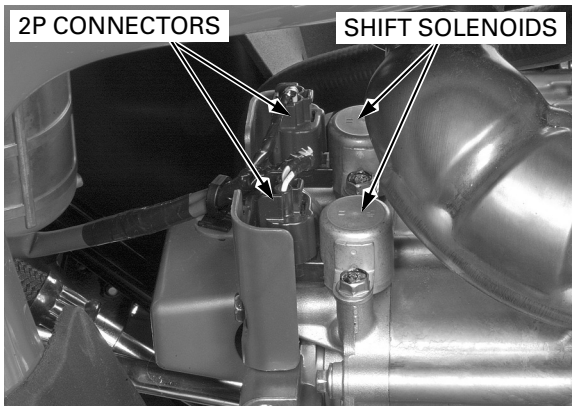
2. Shift Solenoid Valve Operation Check

Disconnect the shift solenoid valve 2P (Black) and 2P (Brown) connectors. Connect a 12 V 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 14-12).



When Shifting in the AUTO (automatic) Mode, Excessive Shift Shock, Engine rpm (min^{-1}) Rises or Driving Power Falls Off

1. **Vehicle Test-riding**

   Test-ride 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 system. Check the installation condition (page 6-43).
   • Faulty VS sensor system. Check the installation condition (page 18-30).

   NO – Hydraulic circuit malfunction is likely cause. Check the oil pressure (page 14-12).

"– –" GEAR POSITION INDICATOR INDICATE BUT NO DTC SET

A/T Does Not Shift

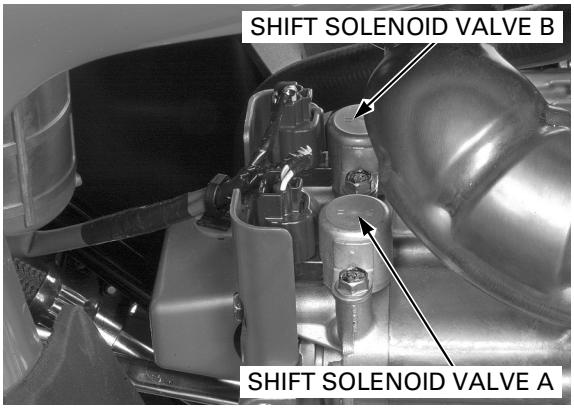
1. **Shift Solenoid Valve Inspection When Shifting to "1"**

   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. PCM Connector Inspection

Turn the ignition switch OFF.
Remove the steering cover (page 3-5).

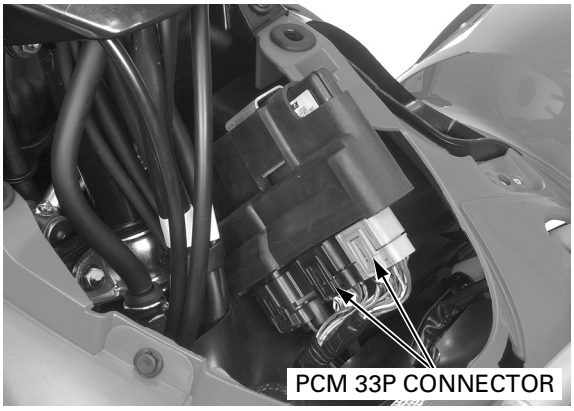
Seal the PCM connector with tape to prevent dirt and oil from entering the connector after disconnecting the 33P connector.

Disconnect the PCM 33P connectors.
Check the connector for loose contacts or corroded terminals.

Is the connector in good condition?

NO – Loose or poorly connected PCM 33P connectors.

YES – GO TO STEP 2.



2. Combination Meter Connector Inspection

Remove the combination meter 14P (Gray) 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 (Gray) connector.

YES – GO TO STEP 3.

3. LCD Line Open Circuit Inspection

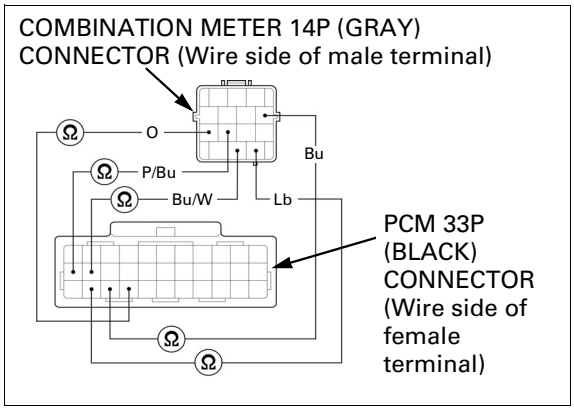
Be careful not to bend the connector terminals.

Check the LCD wires for continuity between the combination meter and PCM connectors terminals.

Is there continuity?

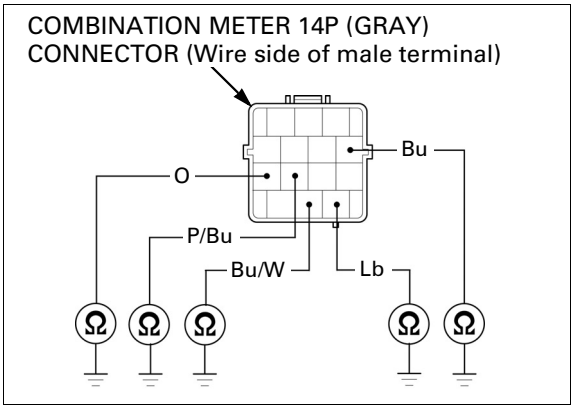
NO – • Open circuit in the Pink/blue wire.
• Open circuit in the Blue/white wire.
• Open circuit in the Light blue wire.
• Open circuit in the Blue wire.
• Open circuit in the Orange wire.

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 Orange wire.

NO – GO TO STEP 5.

5. Shift Solenoid Valve Inspection

When connecting the PCM 33P connectors, check that there is no dirt and oil in the connector.

Connect the PCM 33P and combination meter 14P (Gray) connectors.
Perform the troubleshooting of "A/T Does Not Shift" (page 14-10).

Are the shift solenoid valves in good condition?

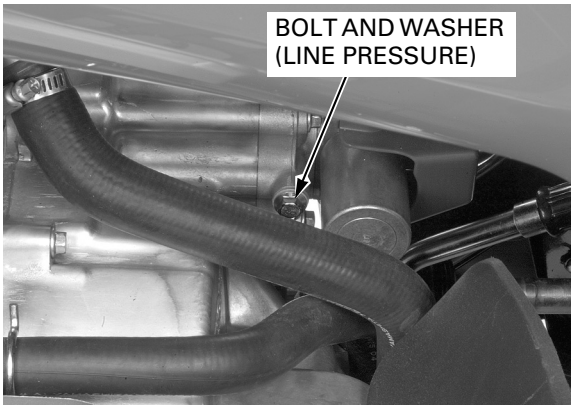
NO – Faulty shift solenoid valves A and/or B.

YES – Faulty PCM.

OIL PRESSURE CHECK

NOTE:

- After checking each oil pressure, perform the inspection and cleaning according to the trouble-shooting chart (page 14-14).
- Failure to warm the engine will cause very high oil pressure readings.
  External leaks will cause low oil pressure readings.



Check the oil level and add the recommended engine oil if necessary (page 4-10).

Also, warm the engine to normal operating temperature and check for external leaks.

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:

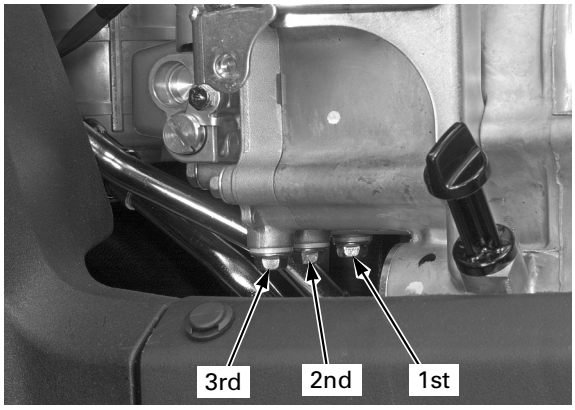
Remove the sealing bolt and washer on the right side of the shift valve body.

For 1st, 2nd and 3rd clutch pressure:

Remove the following:

– left engine side cover (page 3-17)
– left front mud guard (page 3-8)

Remove the sealing bolts and washers on the bottom of the shift valve body.



Connect the oil pressure gauge and adapter to each inspection hole (hole threads; M8 x 1.25).

TOOLS:

Pressure gauge set	**07406-0020005**
	or
Oil pressure gauge 0–160 psi	**07ZMJ-HN2A100 and**
Adapter, banjo 8 x 1.25 mm	**07AMJ-HN8A100 (U.S.A. only)**

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.

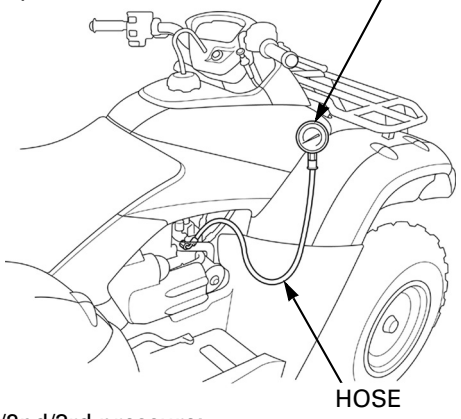
LINE OIL PRESSURE (80°C/176°F):
785 kPa (8.0 kgf/cm^2, 114 psi) at 5,000 rpm (min^{-1})

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.

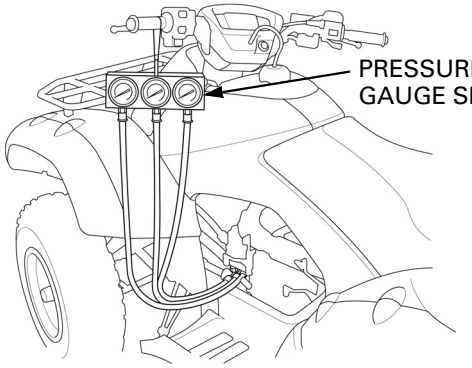
SHIFT CLUTCH OIL PRESSURE (80°C/176°F):
1st, 2nd, 3rd:
785 kPa (8.0 kgf/cm^2, 114 psi) at 5,000 rpm (min^{-1})

Stop the engine.

Line pressure:

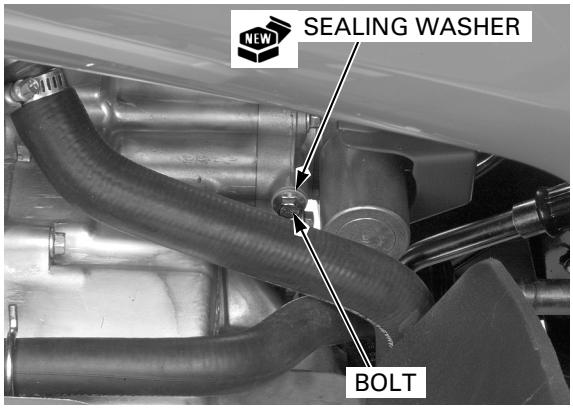


1st/2nd/3rd pressure:



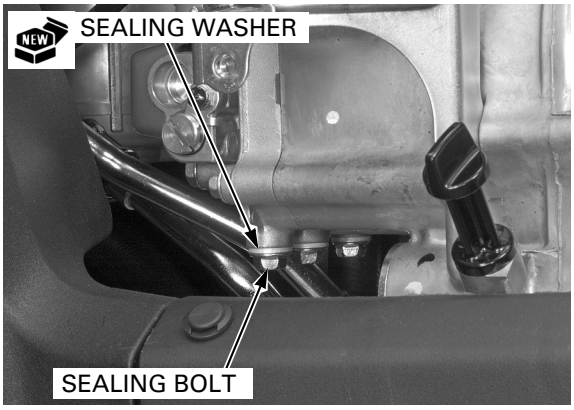
Remove the pressure gauge and hose(s).

Install the new sealing washer and bolt to the right side of the shift valve body, tighten the bolt securely.



Remove the sealing bolts and washers on the bottom of the shift valve body.

After the oil pressure check is completed, start the engine and make sure there are no oil leaks.

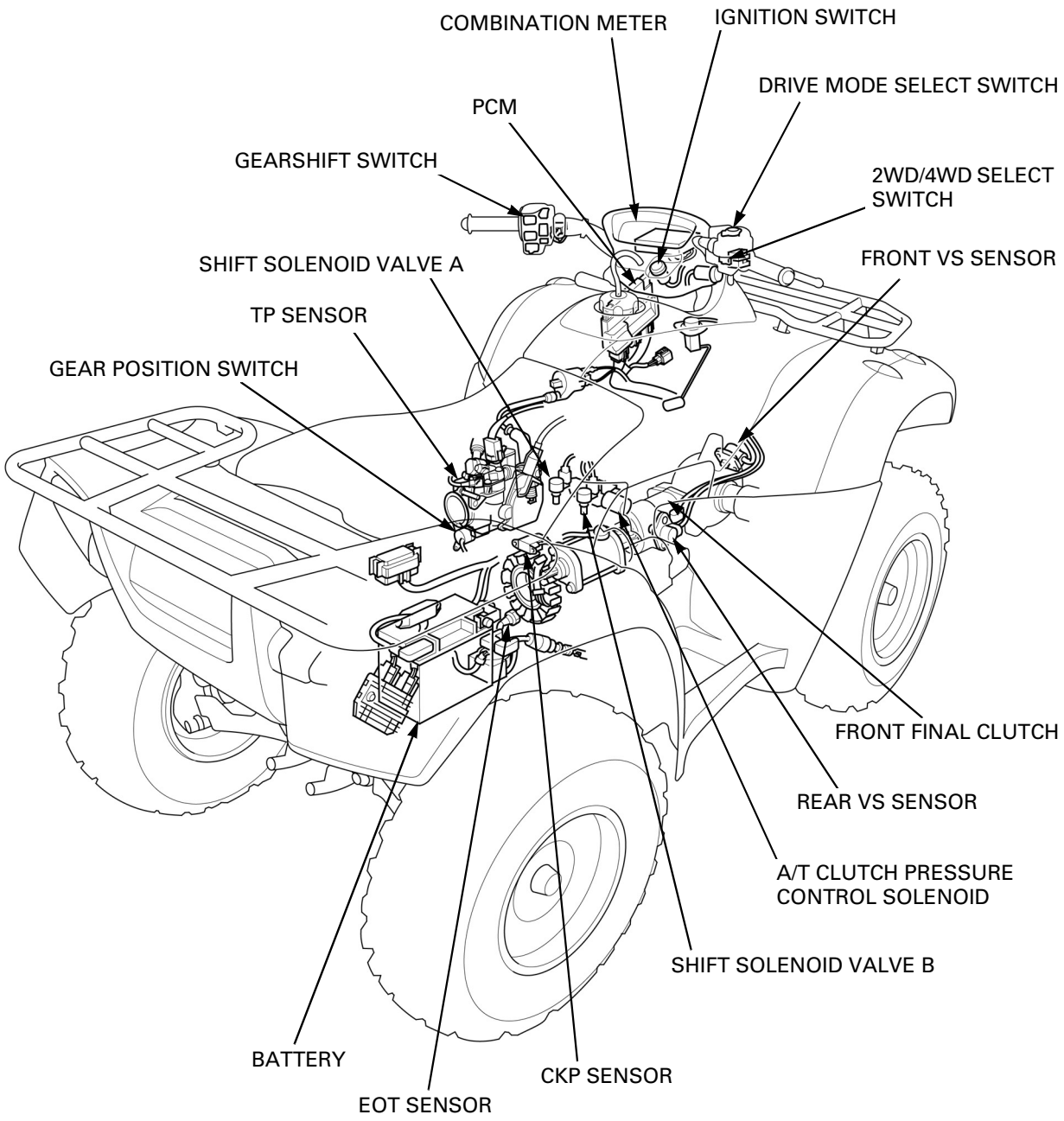


TROUBLESHOOTING CHART OF HYDRAULIC CIRCUIT

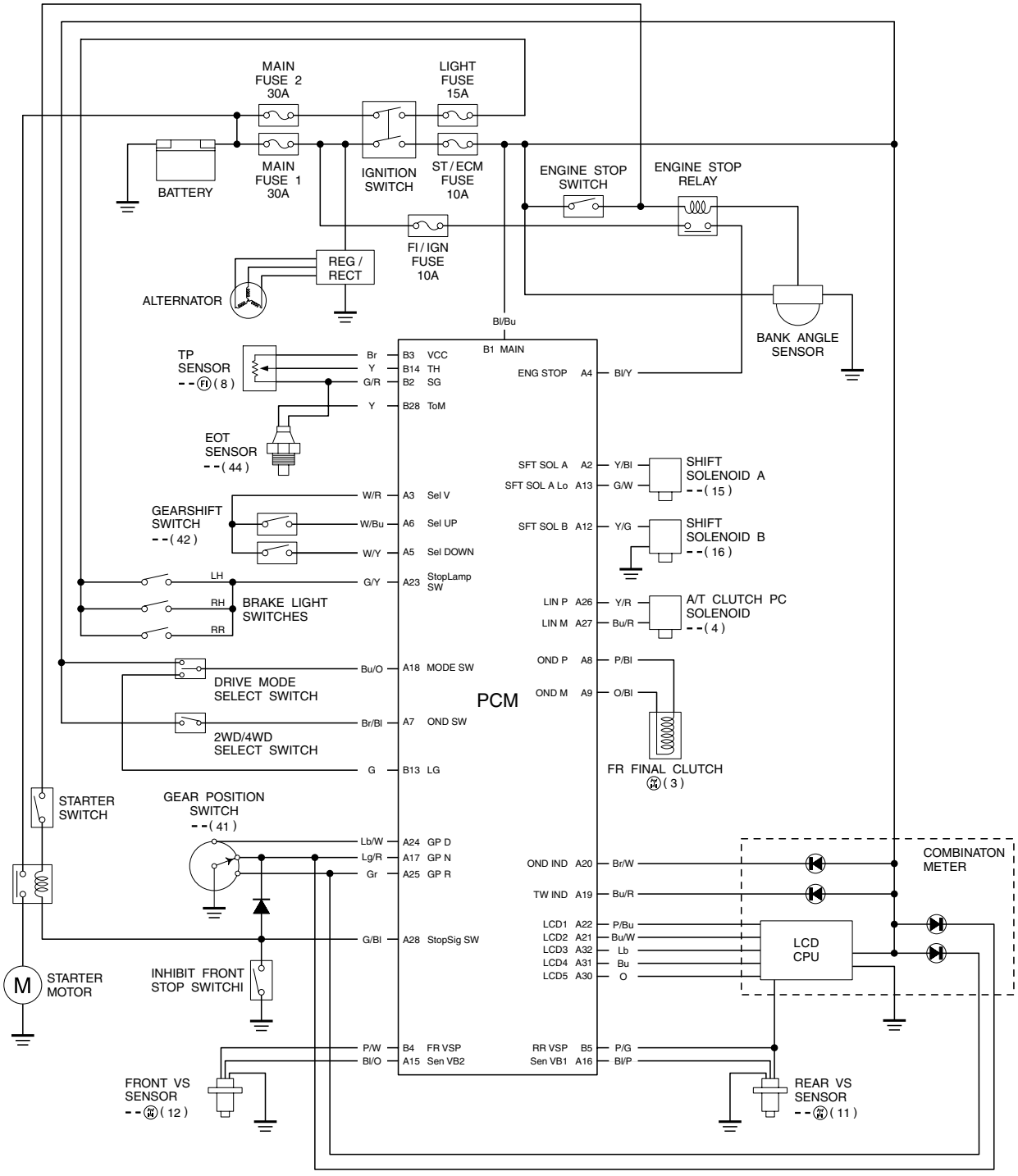
PRESSURE CHECK SECTION		MEASUREMENT RESULT (■: Abnormal / Blank: Normal)								Refer to page
Line pressure									■	
1st clutch pressure				■		■	■	■	■	
2nd clutch pressure			■		■		■	■	■	
3rd clutch pressure		■			■	■		■	■	
Probable Faulty Part (applied to O)	A/T clutch pressure control solenoid							O		14-48
	Emergency valve							O		
	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						14-66
	2nd clutch		O							
	3rd clutch	O								
	Feed pipe A			O						14-56
	Feed pipe B	O	O		O					
	Feed pipe C	O	O		O					
	Torque converter								O	14-60
	Oil pump								O	5-5
	Oil pipe setting collar	O	O	O					O	14-55
	Oil filter								O	4-12
	Oil strainer								O	13-7
	Oil level								O	4-10

For function of each component (page 2-7).

DRIVETRAIN SYSTEM LOCATION



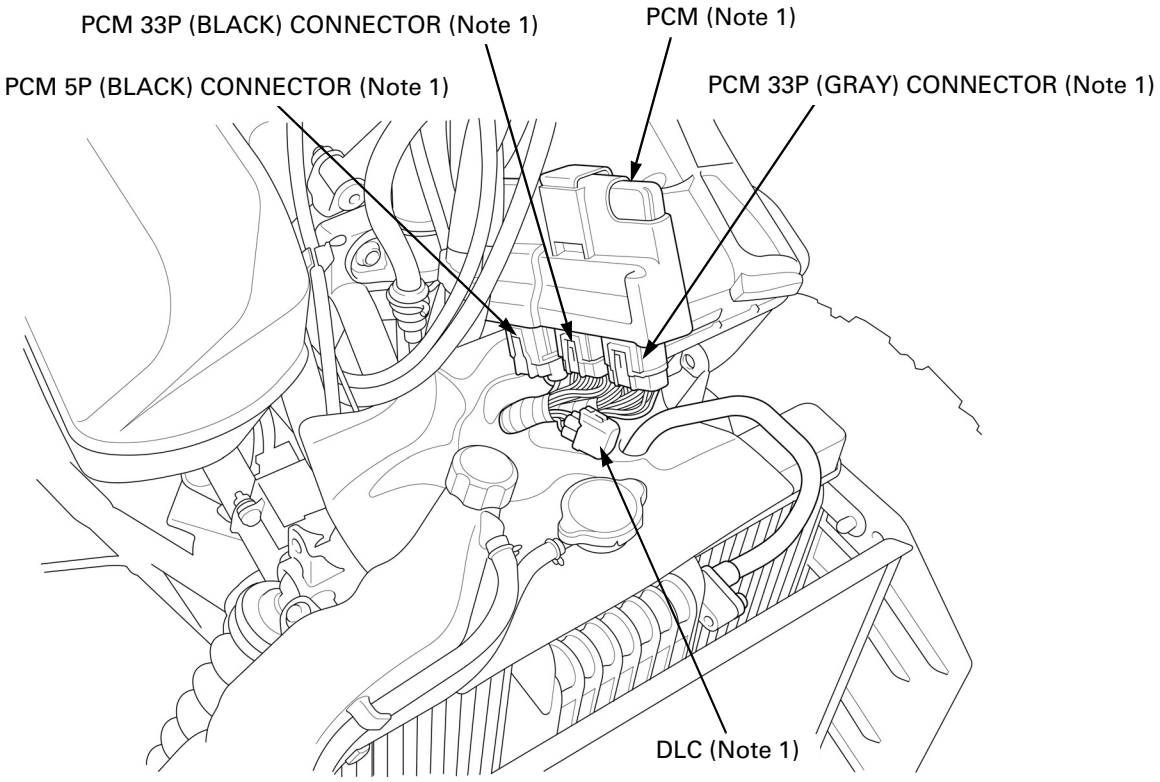
DRIVETRAIN SYSTEM DIAGRAM

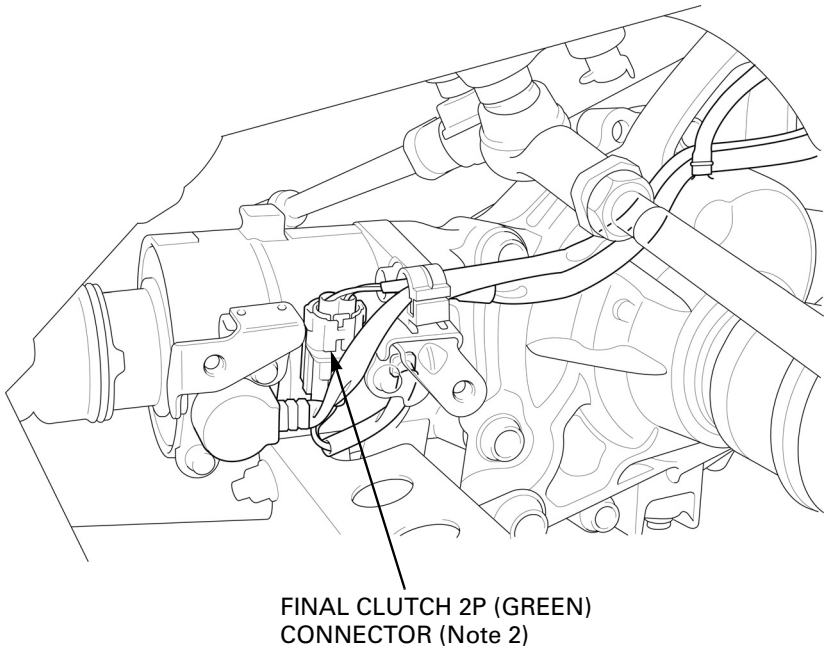


DRIVETRAIN CONNECTOR LOCATION

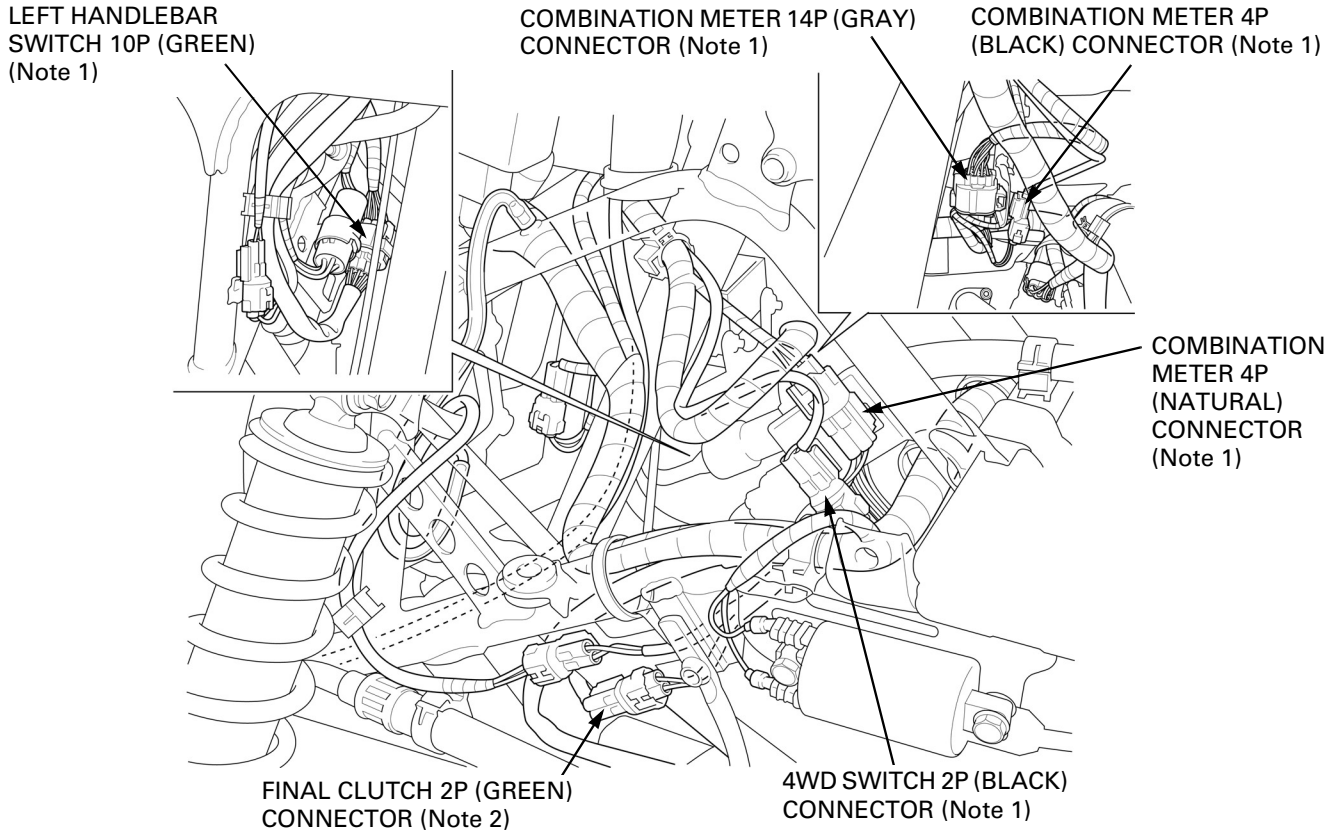
FRONT CONNECTOR LOCATIONS

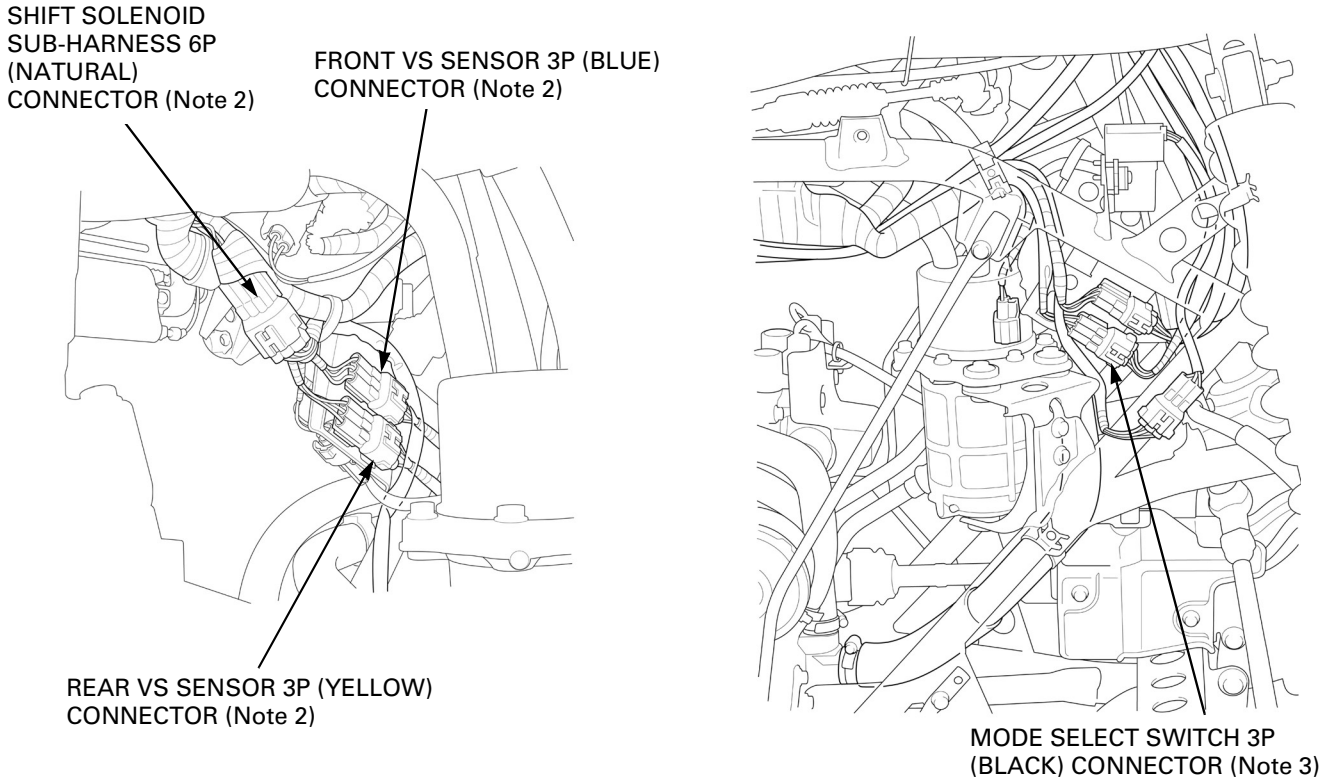
Note 1: Remove the steering cover (page 3-5).
Note 2: Remove the VS sensor cover (page 18-12).





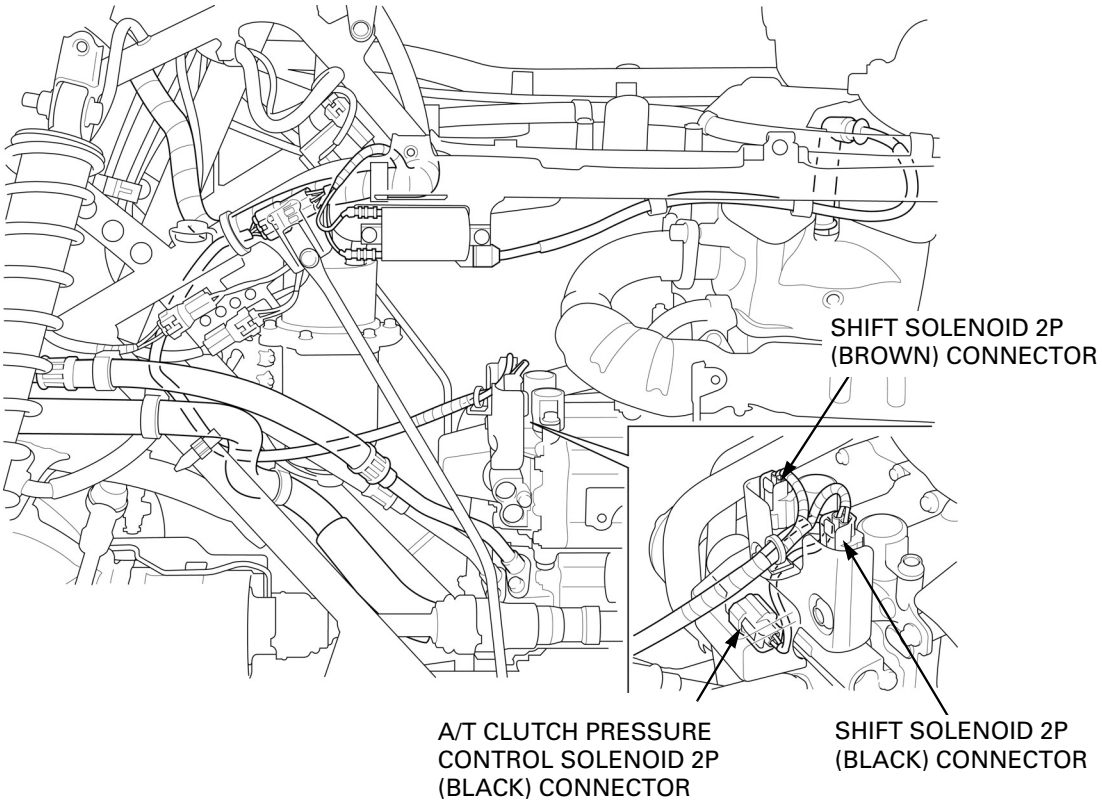
Note 1: Remove the fuel tank (page 6-39).
Note 2: Remove the left inner fender (page 3-9).
Note 3: Remove the right inner fender (page 3-9).

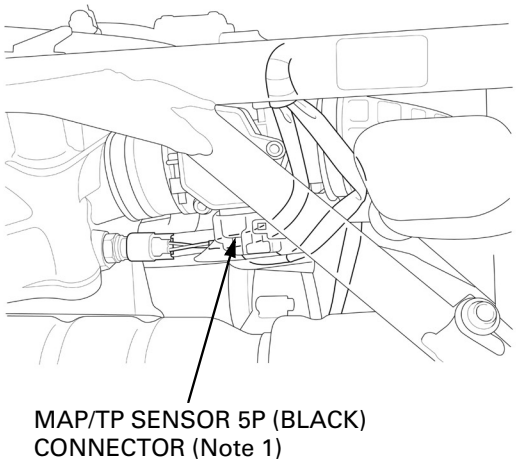


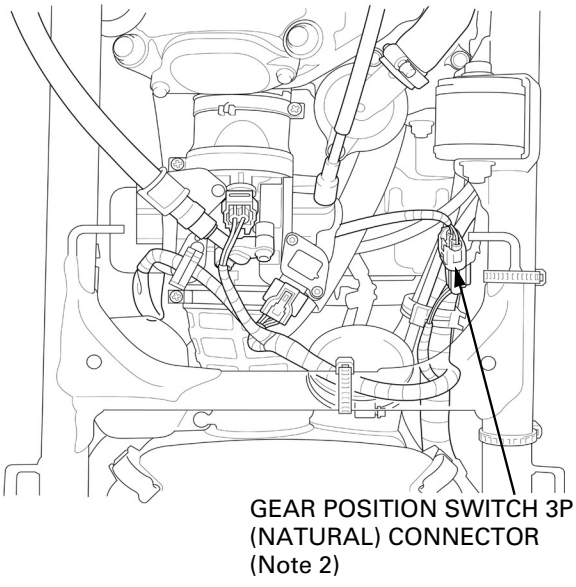


MIDDLE/REAR CONNECTOR LOCATIONS

Note 1: Remove the seat (page 3-4).
Note 2: Remove the fuel tank side cover (page 3-6).







DRIVETRAIN TROUBLESHOOTING INFORMATION

Refer to "PGM-FI Troubleshooting Information" for the general troubleshooting information (page 6-13).

SYSTEM DESCRIPTION

SELF-DIAGNOSIS SYSTEM

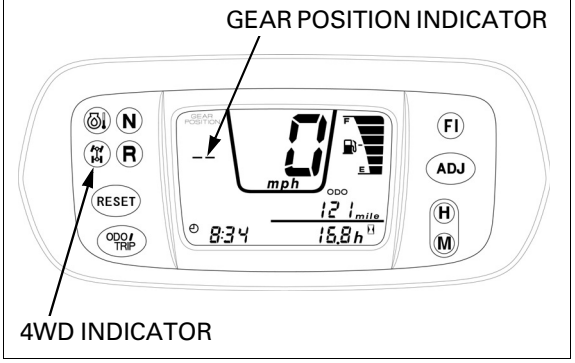
The PCM (Powertrain Control Module) integrates the ECM (Engine Control Module), the TCM (Transmission Control Module) and the selectable 4WD system control. Therefore some detection items are shared by the PGM-FI and drivetrain system and they may affect the system operation of both systems.

And the drivetrain system is equipped with the self-diagnostic system. When any abnormality occurs in the A/T or selectable 4WD system, the PCM turns on the indicators blinking and stores a DTC in its erasable memory for the relevant system failure.

In case of a function failure in the A/T system (e.g.: Shift solenoid valve failure), the gear position indicator will blink "– –" to indicate the DTC.

In case of a function failure in the both, A/T and selectable 4WD, system, both the indicators will blink at the same time to indicate the DTC.

FA model shown:



FAIL-SAFE FUNCTION

The drivetrain system is provided with a fail-safe function to secure a minimum running capability even when there is trouble in the system.

When the PCM detects a problem in the A/T system, the PCM 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 DTC.

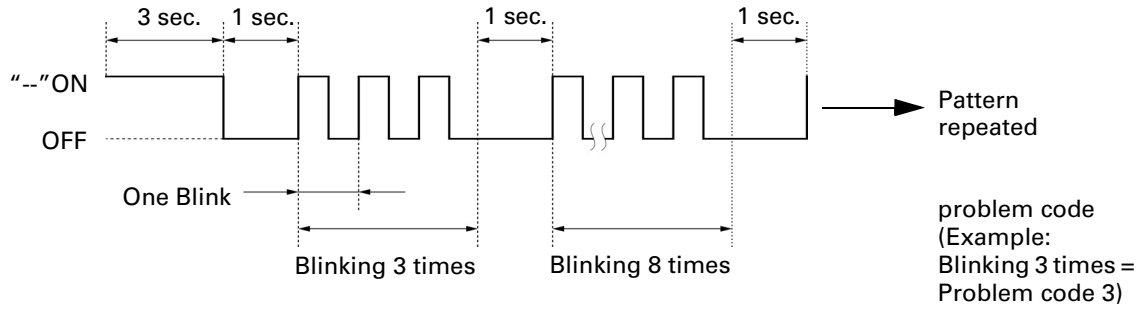
When the PCM detects a problem in the selectable 4WD system, the PCM stops controlling the system and defaults into the 2WD mode. Also, the 4WD indicator blinks to indicate the DTC.

DTC (Diagnostic Trouble Code)

Refer to the DTC information in "Fuel system (PGM-FI)" (page 6-13).

INDICATOR BLINK PATTERN

- The number of indicator blinks is the equivalent the main code of the DTC (the sub code cannot be displayed by the indicator blinking).
- The indicator has two types of blinks, a long blink and short blink. The long blink lasts for 1.3 seconds, the short blink lasts for 0.5 seconds. One long blink is the equivalent of ten short blinks. For example, when one long blink is followed by five short blinks, the DTC is 15 (one long blink = 10 blinks, plus five short blinks).



- When the PCM stores more than one DTC, the indicator displays in the order from the lowest number to highest number.

CURRENT DTC/FREEZE DTC

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

- If the PCM detects the problem at present, the gear position indicator and 4WD indicator will blink at all time. It is possible to readout the indicator blink pattern as the current DTC.
- If the PCM does not detect any problem at present but has a problem stored in its memory, the indicator will not blink. If it is necessary to retrieve the past problem, readout the freeze DTC by following the DTC readout procedure.

HDS POCKET TESTER INFORMATION

Refer to the "How to connect the HDS Pocket Tester" and "ECM Reset" information in "Fuel system (PGM-FI)" (page 6-13).

DTC READOUT

Reading DTC with the indicator

NOTE:

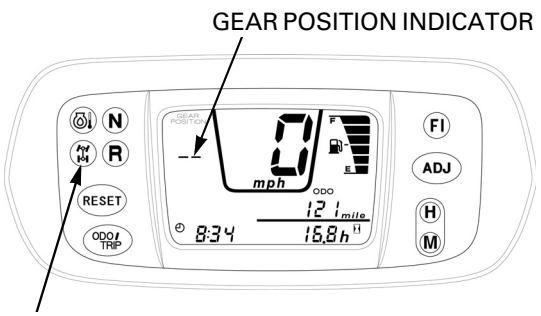
- If the MIL blinks, refer to the "PGM-FI Troubleshooting Information" and troubleshoot the PGM-FI system first. Then recheck the Drivetrain system after clearing the PGM-FI DTC.
- After performing diagnostic troubleshooting, erase the problem code(s) (page 14-22) and test-drive the vehicle to be sure that the problem(s) have been removed.

Turn the ignition switch on and connect the HDS Pocket Tester to the DLC (page 6-14).
Read the DTC, freeze data and follow the troubleshooting index (page 14-24).

To read the DTC without the HDS pocket tester, refer to the following procedure.

Turn the ignition switch ON, read the gear position indicator "– –" or 4WD indicator blinks, the number of blinks indicates the current DTC.
Refer to the troubleshooting index (page 14-24).

FA model shown:

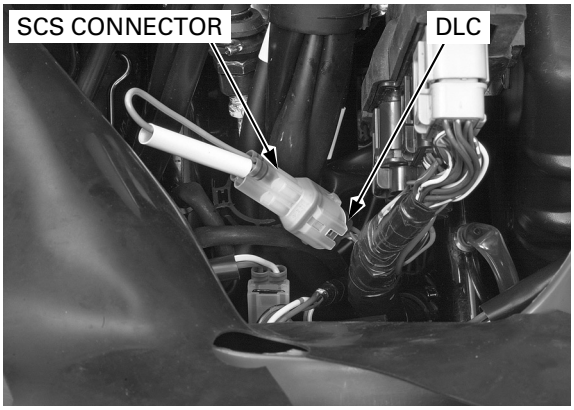


When retrieving the Freeze DTC, refer to the following procedures.

1. Turn the ignition switch OFF and remove the steering cover (page 3-5).
2. Remove the dummy connector and short the DLC terminals using the special tool.

   TOOL:
   SCS connector 070PZ-ZY30100
   CONNECTION: Brown/red – Green

3. Turn the ignition switch to ON, read the gear position indicator "– –" or 4WD indicator blinks, the number of blinks indicates the freeze DTC.
   Refer to the troubleshooting index (page 14-24).



CLEARING DTC

Connect the HDS Pocket Tester to the DLC (page 6-14).

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

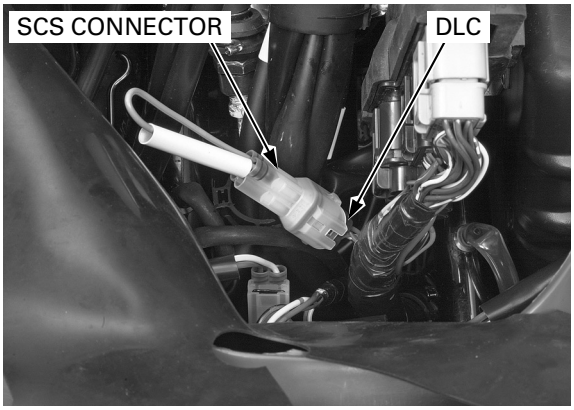
To clear the DTC without HDS, refer to the following procedure.

How to clear the DTC without HDS

NOTE:

- When clearing the Drivetrain DTC as follows, the PGM-FI DTC would also be cleared at the same time, check the MIL blinks and troubleshoot the PGM-FI system before readout/clearing the Drivetrain DTC.

1. Turn the ignition switch OFF and remove the steering cover (page 3-5).



2. Remove the dummy connector and short the Brown/red and Green wire terminals of the DLC using the special tool.

   TOOL:
   SCS connector 070PZ-ZY30100
   CONNECTION: Brown/red – Green

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

NOTE:

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

DRIVETRAIN DTC INDEX

- When the gear position indicator "– –" is lighting constantly, but no problem code is indicated and retrievable, refer to the symptom troubleshooting (page 14-6).

DTC (Refer to)	Function Failure	Symptom/Fail-safe Function	Indicator Blinks		PGM-FI DTC
			A/T	4WD	
3-1 (14-26)	Front final clutch Low input • Loose or poor contact of the front final clutch related connector • Front final clutch or its circuit malfunction	• Selectable 4WD system does not work (2WD mode only)	–	3	–
3-2 (14-27)	Front final clutch High input • Front final clutch or its circuit malfunction	• Selectable 4WD system does not work (2WD mode only)			
3-3 (14-26)	Front final clutch drive circuit • Front final clutch or its circuit malfunction	• Selectable 4WD system does not work (2WD mode only)			
4-1 (14-28)	A/T clutch pressure control solenoid valve Low input • Loose or poor contact of the A/T clutch pressure control solenoid valve related connector • A/T clutch pressure control solenoid valve or its circuit malfunction	• A/T shift function and anti-creep function does not work (2nd gear only)	4	–	–
4-2 (14-30)	A/T clutch pressure control solenoid valve High input • A/T clutch pressure control solenoid valve or its circuit malfunction	• A/T shift function and anti-creep function does not work (2nd gear only)			
4-3 (14-28)	A/T clutch pressure control solenoid valve drive circuit • A/T clutch pressure control solenoid valve or its circuit malfunction	• A/T shift function and anti-creep function does not work (2nd gear only)			
8-1 (6-23)	TP sensor circuit Low voltage (less than 0.22 V) • TP sensor or its circuit malfunction	• Poor engine acceleration • Fail-safe value: 0° • A/T shift function and anti-creep function does not work (2nd gear only)	8		8-1
8-2 (6-24)	TP sensor circuit High voltage (more than 4.93 V) • Loose or poor contact of the TP sensor connector • TP sensor or its circuit malfunction	• Poor engine acceleration • Fail-safe value: 0° • A/T shift function and anti-creep function does not work (2nd gear only)			8-2
11-1 (6-27)	Rear VS sensor no signal • Loose or poor contact of the Rear VS sensor connector • Rear VS sensor or its circuit malfunction	• A/T shift function and anti-creep function does not work (2nd gear only) • Selectable 4WD system does not work (2WD mode only)	11	11	11-1
12-1 (14-31)	Front VS sensor no signal • Loose or poor contact of the Front VS sensor connector • Front VS sensor or its circuit malfunction	• A/T shift function and anti-creep function does not work (2nd gear only) • Selectable 4WD system does not work (2WD mode only)	12	12	–
15-1 (14-32)	Shift solenoid valve A (short) • Shift solenoid valve A or its circuit malfunction	• A/T shift function and anti-creep function does not work (2nd gear only)	15	–	–
15-2 (14-33)	Shift solenoid valve A (open) • Shift solenoid valve A or its circuit malfunction	• A/T shift function and anti-creep function does not work (2nd gear only)			

DTC (Refer to)	Function Failure	Symptom/Fail-safe Function	Indicator Blinks		PGM-FI DTC
			A/T	4WD	
16-1 (14-35)	Shift solenoid valve B (short) • Shift solenoid valve B or its circuit malfunction	• A/T shift function and anti-creep function does not work (2nd gear only)	16	–	–
16-2 (14-36)	Shift solenoid valve B (open) • Shift solenoid valve B or its circuit malfunction	• A/T shift function and anti-creep function does not work (2nd gear only)			
31-1 (14-37)	System voltage Low (less than 9.3 V) • PCM power input circuit malfunction	• A/T shift function and anti-creep function does not work (2nd gear only) • Selectable 4WD system does not work (2WD mode only)	31	31	–
32-1 (14-38)	Fail-safe relay circuit • Fail-safe relay circuit malfunction	• A/T shift function and anti-creep function does not work (2nd gear only)	32	32	–
33-2 (6-53)	EEPROM malfunction	–	–	–	33-2
41-1 (14-39)	Gear position switch circuit • Gear position switch circuit malfunction (Short)	• A/T shift function and anti-creep function does not work (2nd gear only)	41	–	–
42-1 (14-40)	Shift (UP/DOWN) switch circuit • Shift (UP/DOWN) switch circuit malfunction (Short)	• A/T shift function and anti-creep function does not work (2nd gear only)	42	–	–
44-1 (14-41)	EOT sensor circuit low voltage (less than 0.07 V) • EOT sensor or its circuit malfunction	• A/T shift function and anti-creep function does not work (2nd gear only) • Cooling fan turns on	44	–	–
44-2 (14-42)	EOT sensor circuit high voltage (more than 4.85 V) • Loose or poor contact of the EOT sensor connector • EOT sensor or its circuit malfunction	• A/T shift function and anti-creep function does not work (2nd gear only) • Cooling fan turns on	44	–	–

DRIVETRAIN DTC TROUBLESHOOTING

NOTE:

- The connector location and the necessary parts to disconnect the connector (page 14-17).
- Perform inspection with the ignition switch turned OFF, unless otherwise specified.
- After troubleshooting, erase the problem code and test-ride the vehicle to be sure that the system is normal.

DTC 3-1 (FRONT FINAL CLUTCH LOW INPUT), DTC 3-3 (FRONT FINAL CLUTCH DRIVE CIRCUIT)

- Before starting the troubleshooting, check for loose or poor contact on the front final clutch 2P (Green) connector and PCM 33P (Black) connector and then recheck the DTC.

1. Recheck DTC

Turn the ignition switch ON and test-ride the vehicle with 4WD, then recheck the current DTC.

Is DTC 3-1 or 3-3 indicated?

YES – GO TO STEP 2.

NO – Intermittent failure

2. Front Final Clutch Inspection

Turn the ignition switch OFF.

Disconnect the front final clutch 2P (Green) connector.
Measure the resistance between the front final clutch 2P (Green) connector terminals of the clutch side.

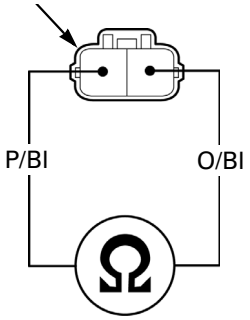
Connection: Orange/black – Pink/black

Is the resistance within 5.1 – 5.8 Ω (20°C/68°F)?

YES – GO TO STEP 3.

NO – Faulty front final clutch.

FRONT FINAL CLUTCH 2P (GREEN) CONNECTOR (Clutch side of male terminal)



3. Front Final Clutch Circuit Inspection

Turn the ignition switch ON.

Measure the voltage between the front final clutch 2P (Green) connector terminals of the wire harness side.

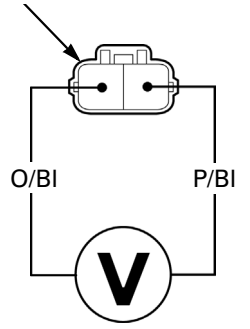
Connection: Orange/black – Pink/black

Is the voltage about 11 V with the select switch into 4WD?

YES – GO TO STEP 6.

NO – GO TO STEP 4.

FRONT FINAL CLUTCH 2P (GREEN) CONNECTOR (Wire side of female terminal)



4. **Front Final Clutch Line Open Circuit Inspection**

Be careful not to bend the connector terminals.

Check for continuity between the PCM 33P (Black) and front final clutch 2P (Green) connector terminals.

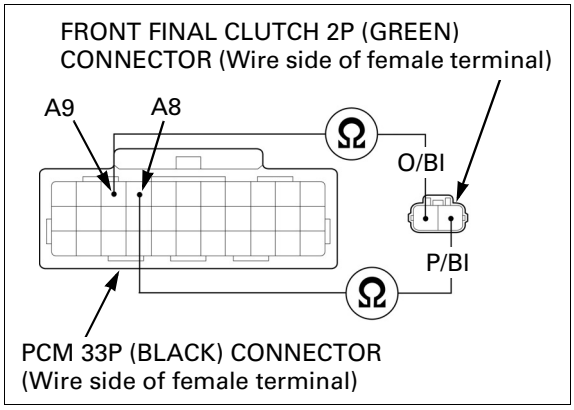
TOOL:
Test probe **07ZAJ-RDJA110**

Connection: A8 – Pink/black
A9 – Orange/black

Is there continuity?

NO – • Open circuit in the Orange/black wire.
• Open circuit in Pink/black wire.

YES – GO TO STEP 5.



5. **Front Final Clutch Line Short Circuit Inspection**

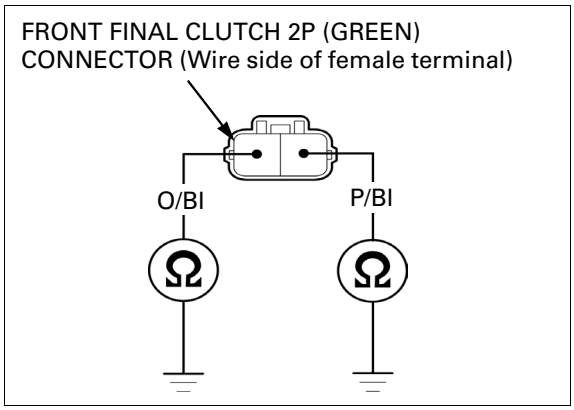
Check for continuity between the front final clutch 2P (Green) connector terminals of the wire harness side and ground.

Connection: Pink/black – Ground
Orange/black – Ground

Is there continuity?

YES – • Short circuit in the Orange/black wire.
• Short circuit in Pink/black wire.

NO – GO TO STEP 6.



6. **Recheck DTC**

Turn the ignition switch ON and test-ride the vehicle with 4WD, then recheck the current DTC.

Is DTC 3-1 or 3-3 indicated?

YES – Replace the PCM with a new one and recheck.

NO – Intermittent failure

DTC 3-2 (FRONT FINAL CLUTCH HIGH INPUT)

1. **Recheck DTC**

Turn the ignition switch ON and test-ride the vehicle with 4WD, then recheck the current DTC.

Is DTC 3-2 indicated?

YES – GO TO STEP 2.

NO – Intermittent failure

2. Front Final Clutch Inspection

Turn the ignition switch OFF.

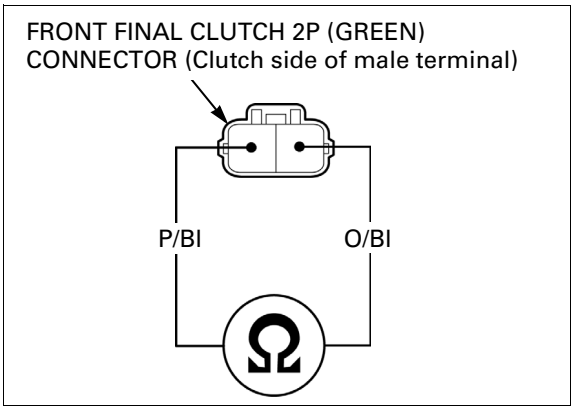
Disconnect the front final clutch 2P (Green) connector.
Measure the resistance between the front final clutch 2P (Green) connector terminals of the clutch side.

Connection: Orange/black – Pink/black

Is the resistance within 5.1 – 5.8 Ω (20°C/68°F)?

YES – GO TO STEP 3.

NO – Faulty front final clutch.



3. Front Final Clutch Line Short Circuit Inspection

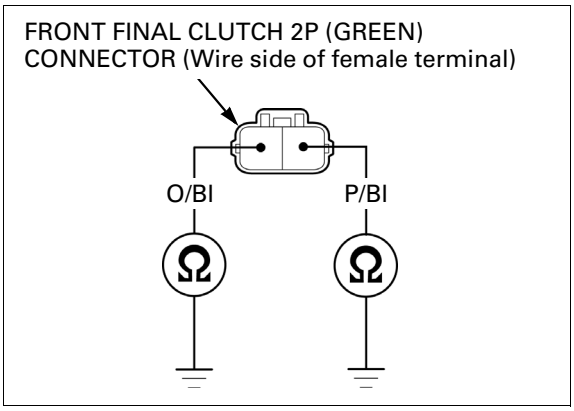
Check the for continuity between the front final clutch 2P (Green) connector terminals of the wire harness side and ground.

Connection: Pink/black – Ground
Orange/black – Ground

Is there continuity?

YES – • Short circuit in the Orange/black wire.
• Short circuit in Pink/black wire.

NO – GO TO STEP 4.



4. Recheck DTC

Turn the ignition switch ON and test-ride the vehicle with 4WD, then recheck the current DTC.

Is DTC 3-2 indicated?

YES – Replace the PCM with a new one and recheck.

NO – Intermittent failure

DTC 4-1 (A/T CLUTCH PRESSURE CONTROL SOLENOID LOW INPUT), DTC 4-3 (A/T CLUTCH PRESSURE CONTROL SOLENOID DRIVE CIRCUIT)

- Before starting the troubleshooting, check for loose or poor contact on the A/T clutch pressure control solenoid 2P (Black) connector, solenoid sub-harness 6P (Natural) connector and PCM 33P (Black) connector and then recheck the DTC.

1. Recheck DTC

Turn the ignition switch ON and test-ride the vehicle, then recheck the current DTC.

Is DTC 4-1 or 4-3 indicated?

YES – GO TO STEP 2.

NO – Intermittent failure

2. A/T Clutch Pressure Control Solenoid Inspection

Turn the ignition switch OFF.

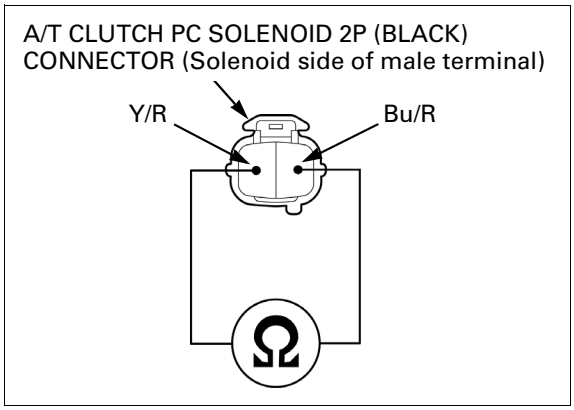
Disconnect the A/T clutch pressure control solenoid 2P (Black) connector.
Measure the resistance between the A/T clutch pressure control solenoid 2P (Black) connector terminals of the solenoid side.

Connection: Yellow/red – Blue/red

Is the resistance within 4.5 – 10.0 Ω ?

YES – GO TO STEP 3.

NO – Faulty A/T clutch pressure control solenoid valve.



3. A/T Clutch Pressure Control Solenoid Circuit Inspection

Turn the ignition switch ON.

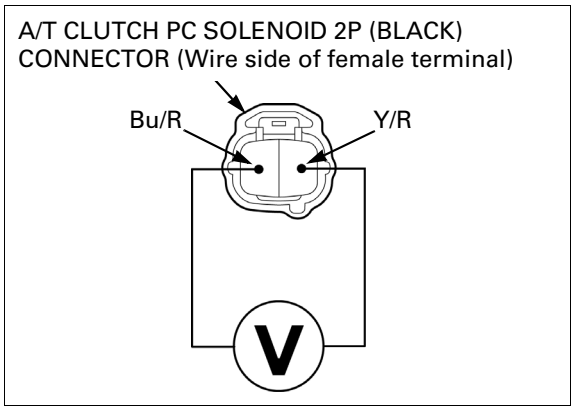
Measure the voltage between the A/T clutch pressure control solenoid 2P (Black) connector terminals of the wire harness side.

Connection: Yellow/red – Blue/red

Is the voltage about 11 V with the ignition switch ON?

YES – GO TO STEP 6.

NO – GO TO STEP 4.



4. A/T Clutch Pressure Control Solenoid Line Open Circuit Inspection

Be careful not to bend the connector terminals.

Check for continuity between the PCM 33P (Black) and the A/T clutch pressure control solenoid 2P (Black) connector terminals.

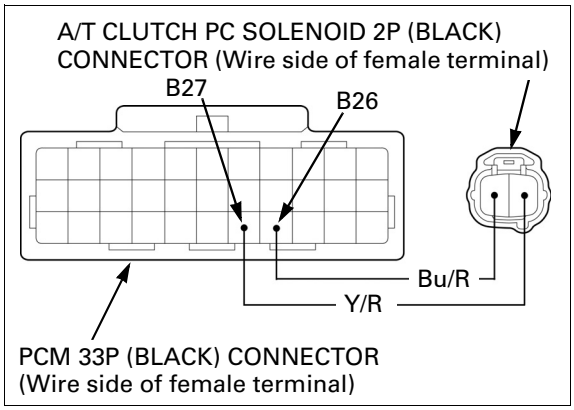
TOOL:
Test probe **07ZAJ-RDJA110**

Connection: B26 – Blue/red
B27 – Yellow/red

Is there continuity?

NO – • Open circuit in the Blue/red wire.
• Open circuit in Yellow/red wire.

YES – GO TO STEP 5.



5. A/T Clutch Pressure Control Solenoid Line Short Circuit Inspection

Check the for continuity between the A/T clutch pressure control solenoid 2P (Black) connector terminals of the wire harness side and ground.

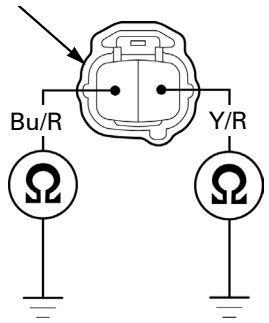
Connection: Blue/red – Ground
Yellow/red – Ground

Is there continuity?

YES – • Short circuit in the Blue/red wire.
• Short circuit in Yellow/red wire.

NO – GO TO STEP 6.

A/T CLUTCH PC SOLENOID 2P (BLACK) CONNECTOR (Wire side of female terminal)



6. Recheck DTC

Turn the ignition switch ON and test-ride the vehicle, then recheck the current DTC.

Is DTC 4-1 or 4-3 indicated?

YES – Replace the PCM with a new one and recheck.

NO – Intermittent failure

DTC 4-2 (A/T CLUTCH PRESSURE CONTROL SOLENOID HIGH INPUT)

1. Recheck DTC

Turn the ignition switch ON and test-ride the vehicle, then recheck the current DTC.

Is DTC 4-2 indicated?

YES – GO TO STEP 2.

NO – Intermittent failure

2. A/T Clutch Pressure Control Solenoid Inspection

Turn the ignition switch OFF.

Disconnect the A/T clutch pressure control solenoid 2P (Black) connector.
Measure the resistance between the A/T clutch pressure control solenoid 2P (Black) connector terminals of the solenoid side.

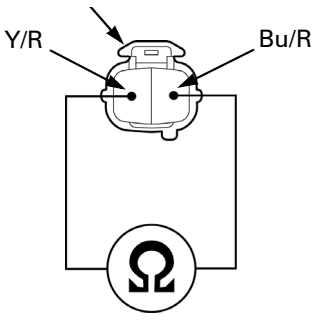
Connection: Yellow/red – Blue/red

Is the resistance within 4.5 – 10.0 Ω ?

YES – GO TO STEP 3.

NO – Faulty A/T clutch pressure control solenoid valve.

A/T CLUTCH PC SOLENOID 2P (BLACK) CONNECTOR (Solenoid side of male terminal)



3. A/T Clutch Pressure Control Solenoid Line Short Circuit Inspection

Check for continuity between the A/T clutch pressure control solenoid 2P (Black) connector terminals of the wire harness side and ground.

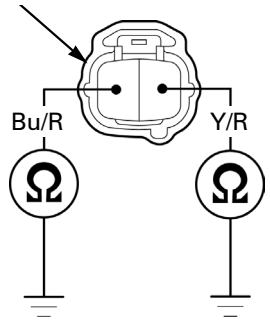
Connection: Blue/red – Ground
Yellow/red – Ground

Is there continuity?

YES – • Short circuit in the Blue/red wire.
• Short circuit in Yellow/red wire.

NO – GO TO STEP 4.

A/T CLUTCH PC SOLENOID 2P (BLACK) CONNECTOR (Wire side of female terminal)



4. Recheck DTC

Turn the ignition switch ON and test-ride the vehicle, then recheck the current DTC.

Is DTC 4-2 indicated?

YES – Replace the PCM with a new one and recheck.

NO – Intermittent failure

DTC 12-1 (FRONT VS SENSOR)

- Before starting the troubleshooting, check for loose or poor contact on the front VS sensor 3P (Blue) connector and PCM 33P (Gray) connector and then recheck the DTC.

1. Front VS Sensor System Check

Clear the DTC, test-ride and check the front VS sensor signal with the HDS pocket tester.

Is the front VS sensor signal indicated normally?

YES – Intermittent failure

NO – GO TO STEP 2.

2. Front VS Sensor Ground Line Inspection

Turn the ignition switch OFF.

Disconnect the front VS sensor 3P (Blue) connector.
Turn the ignition switch ON, measure the voltage between the front VS sensor 3P (Blue) connector terminals of the wire harness side.

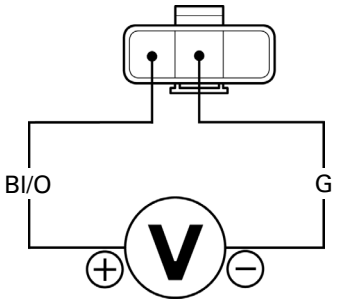
Connection: Black/orange (+) – Green (–)

Is there battery voltage?

NO – • Open or short circuit in the Black/orange wire.
• Open circuit in the Green wire.

YES – GO TO STEP 3.

FRONT VS SENSOR 3P (BLUE) CONNECTOR (Wire side of male terminal)



3. Front VS Sensor Output Line Inspection

Measure the voltage between the front VS sensor 3P (Blue) connector terminals of the wire harness side.

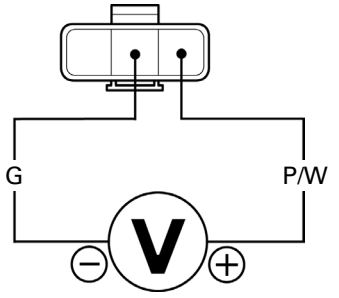
Connection: Pink/white (+) – Green (–)

Is the voltage about 5 V?

NO – Open or short circuit in the Pink/white wire.

YES – GO TO STEP 4.

FRONT VS SENSOR 3P (BLUE) CONNECTOR
(Wire side of male terminal)



4. Front VS Sensor Inspection

Turn the ignition switch OFF.

Replace the front VS sensor with a new one (page 18-12).

Clear the DTC, test ride the vehicle and recheck the DTC.

Is the DTC 12-1 indicated?

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

NO – Faulty original front VS sensor.

DTC 15-1 (SHIFT SOLENOID "A" SHORT)

1. Recheck DTC

Turn the ignition switch ON and test-ride the vehicle, then recheck the DTC.

Is DTC 15-1 indicated (or can not shift)?

YES – GO TO STEP 2.

NO – Intermittent failure

2. Shift Solenoid Valve "A" Inspection

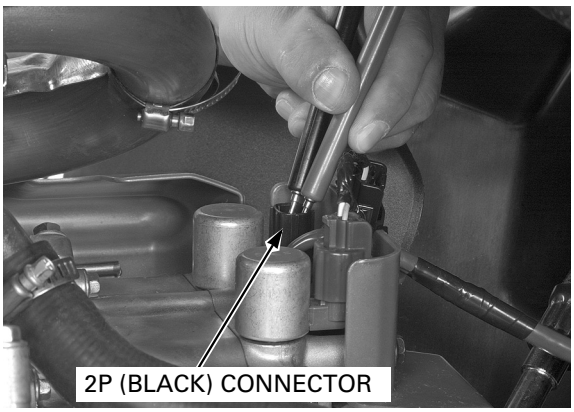
Turn the ignition switch OFF.

Disconnect the shift solenoid "A" 2P (Black) connector.
Measure the resistance between the shift solenoid valve "A" 2P (Black) connector terminals of the solenoid side.

Is the resistance within 14.6 – 16.2 Ω (20°C/68°F)?

YES – GO TO STEP 3.

NO – Faulty shift solenoid valve A.



3. Shift Solenoid "A" Line Short Circuit Inspection

Turn the ignition switch OFF.

Disconnect the shift solenoid "A" 2P (Black) connector.
Check for continuity between the shift solenoid "A" 2P (Black) connector terminals of the wire harness side and ground.

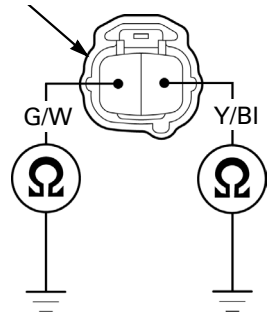
Connection: Green/white – Ground
Yellow/black– Ground

Is there continuity?

YES – • Short circuit in the Yellow/black wire.
• Short circuit in the Green/white wire.

NO – GO TO STEP 4.

SHIFT SOLENOID "A" 2P (BLACK) CONNECTOR (Wire side of male terminal)



4. Failure Reproduction

Connect the shift solenoid "A" 2P (Black) connector.
Turn the ignition switch ON.

Test-ride the vehicle for several minutes under the same conditions as those indicated by the freeze data.

Is DTC 15-1 indicated ?

NO – Intermittent failure

YES – Replace the PCM with a new one and recheck.

DTC 15-2 (SHIFT SOLENOID "A" OPEN)

- Before starting the troubleshooting, check for loose or poor contact on the shift solenoid 2P (Black) connector and PCM 33P (Black) connector and then recheck the DTC.

1. Recheck DTC

Turn the ignition switch ON and test-ride the vehicle, then recheck the DTC.

Is DTC 15-2 indicated ?

YES – GO TO STEP 2.

NO – Intermittent failure

2. Shift Solenoid Valve "A" Inspection

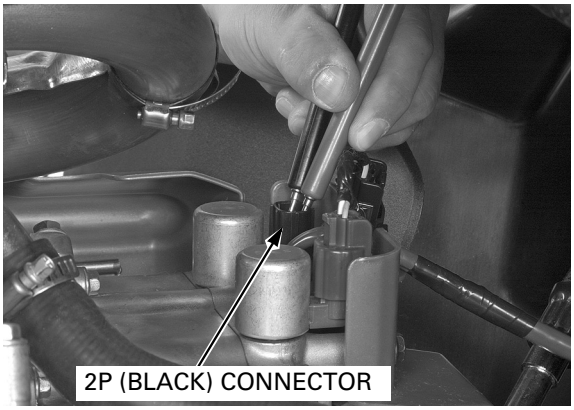
Turn the ignition switch OFF.

Disconnect the shift solenoid "A" 2P (Black) connector.
Measure the resistance between the shift solenoid valve 2P (Black) connector terminals of the solenoid side.

Is the resistance within 14.6 – 16.2 Ω (20°C/68°F)?

YES – GO TO STEP 3.

NO – Faulty shift solenoid valve "A".



3. Shift Solenoid Valve "A" Line Open Circuit Inspection

Be careful not to bend the connector terminals.

Connect the shift solenoid "A" 2P (Black) connector.
Disconnect the PCM 33P (Black) connector.
Measure the resistance at the PCM connector terminals.

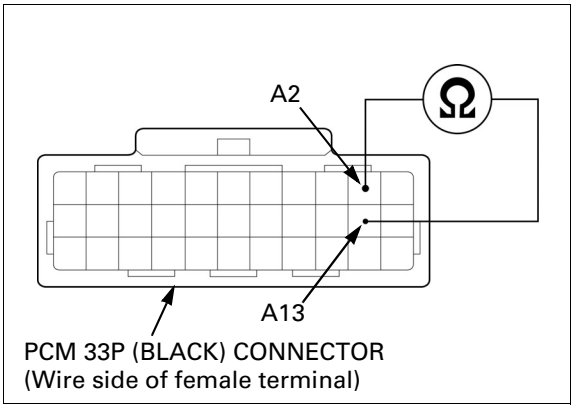
TOOL:
Test probe **07ZAJ-RDJA110**

Connection: A2 – A13

Is the resistance within 14.6 – 16.2 Ω (20°C/68°F)?

NO – • Open circuit in the Yellow/black wire.
• Open circuit in the Green/white wire.

YES – GO TO STEP 4.



4. Shift Solenoid "A" Line Short Circuit Inspection

Turn the ignition switch OFF.

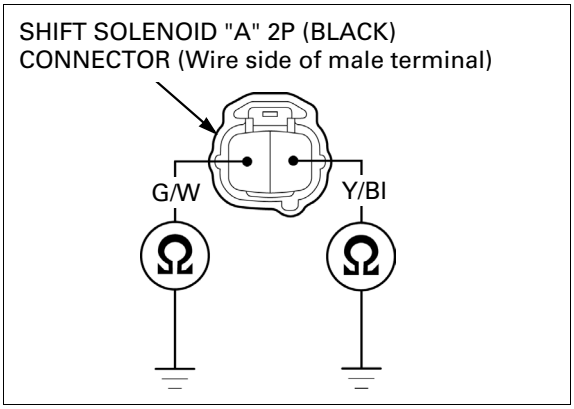
Disconnect the shift solenoid "A" 2P (Black) connector.
Check for continuity between the shift solenoid "A" 2P (Black) connector terminals of the wire harness side and ground.

Connection: Green/white – Ground
Yellow/black– Ground

Is there continuity?

YES – • Short circuit in the Yellow/black wire.
• Short circuit in the Green/white wire.

NO – GO TO STEP 5.



5. Failure Reproduction

Connect the shift solenoid "A" 2P (Black) connector and PCM 33P (Black) connector.
Turn the ignition switch ON.

Test-ride the vehicle for several minutes under the same conditions as those indicated by the freeze data.

Is DTC 15-2 indicated ?

NO – Intermittent failure

YES – Replace the PCM with a new one and recheck.

DTC 16-1 (SHIFT SOLENOID "B" SHORT)

1. Recheck DTC

Turn the ignition switch ON and test-ride the vehicle, then recheck the DTC.

Is DTC 16-1 indicated ?

YES – GO TO STEP 2.

NO – Intermittent failure

2. Shift Solenoid Valve "B" Inspection

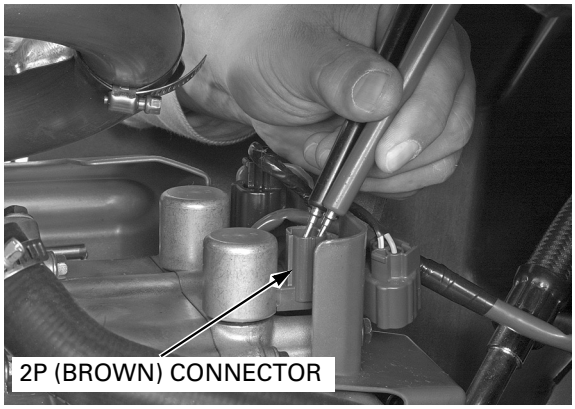
Turn the ignition switch OFF.

Disconnect the shift solenoid "B" 2P (Brown) connector.
Measure the resistance between the shift solenoid valve "B" 2P (Brown) connector terminals of the solenoid side.

Is the resistance within 14.6 – 16.2 Ω (20°C/68°F)?

YES – GO TO STEP 3.

NO – Faulty shift solenoid valve "B".



3. Shift Solenoid "B" Line Short Circuit Inspection

Turn the ignition switch OFF.

Disconnect the shift solenoid "B" 2P (Brown) connector.
Check for continuity between the both shift solenoid "B" 2P (Brown) connector terminals of the wire harness side and ground.

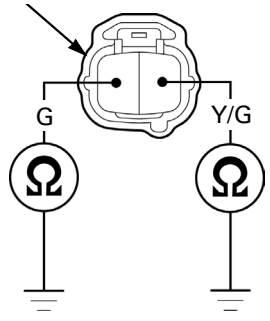
Connection: Yellow/green – Ground
Green – Ground

Is there continuity?

YES – • Short circuit in the Yellow/green wire.
• Short circuit in the Green wire.

NO – GO TO STEP 4.

SHIFT SOLENOID "B" 2P (BROWN) CONNECTOR (Wire side of male terminal)



4. Failure Reproduction

Connect the shift solenoid "B" 2P (Brown) connector.
Turn the ignition switch ON.

Test-ride the vehicle for several minutes under the same conditions as those indicated by the freeze data.

Is DTC 16-1 indicated ?

NO – Intermittent failure

YES – Replace the PCM with a new one and recheck.

DTC 16-2 (SHIFT SOLENOID "B" OPEN)

- Before starting the troubleshooting, check for loose or poor contact on the shift solenoid "B" 2P (Brown) connector and PCM 33P (Black) connector and then recheck the DTC.

1. Recheck DTC

Turn the ignition switch ON and test-ride the vehicle, then recheck the DTC.

Is DTC 16-2 indicated ?

YES – GO TO STEP 2.

NO – Intermittent failure

2. Shift Solenoid Valve "B" Inspection

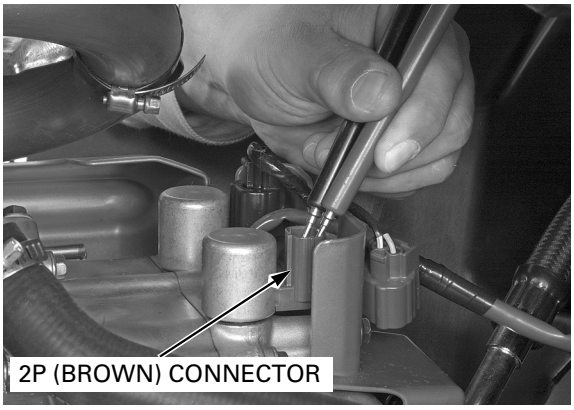
Turn the ignition switch OFF.

Disconnect the shift solenoid "B" 2P (Brown) connector.
Measure the resistance between the shift solenoid valve "B" 2P (Brown) connector terminals of the solenoid side.

Is the resistance within 14.6 – 16.2 Ω (20°C/68°F)?

YES – GO TO STEP 3.

NO – Faulty shift solenoid valve B.



3. Shift Solenoid Valve "B" Line Open Circuit Inspection

Be careful not to bend the connector terminals.

Connect the shift solenoid "B" 2P (Brown) connector.
Disconnect the PCM 33P (Black) connector and 5P (Black) connector.
Measure the resistance at the PCM connectors terminals.

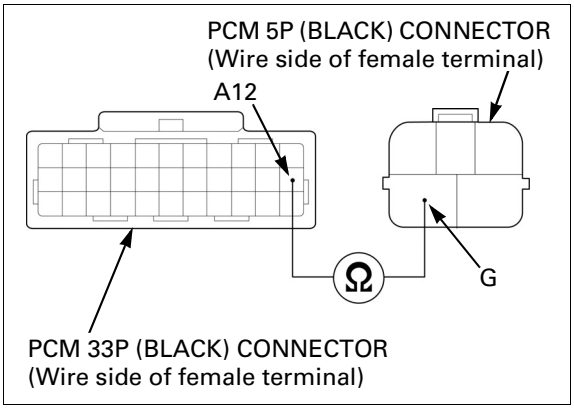
TOOL:
Test probe **07ZAJ-RDJA110**

Connection: A12 – Green

Is the resistance within 14.6 – 16.2 Ω (20°C/68°F)?

NO – • Open circuit in the Yellow/green wire.
• Open circuit in the Green wire.

YES – GO TO STEP 4.



4. Shift Solenoid "B" Line Short Circuit Inspection

Turn the ignition switch OFF.

Disconnect the shift solenoid "B" 2P (Brown) connector.
Check for continuity between the shift solenoid "B" 2P (Brown) connector terminals of the wire harness side and ground.

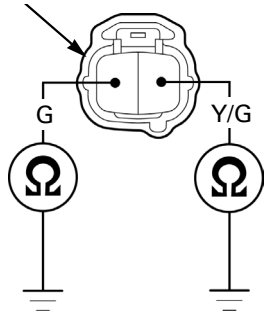
Connection: Yellow/green – Ground
Green – Ground

Is there continuity?

YES – • Short circuit in the Yellow/green wire.
• Short circuit in the Green wire.

NO – GO TO STEP 5.

SHIFT SOLENOID "B" 2P (BROWN) CONNECTOR (Wire side of male terminal)



5. Failure Reproduction

Connect the shift solenoid "B" 2P (Brown) connector, PCM 33P (Black) and 5P (Black) connector.
Turn the ignition switch ON.

Test-ride the vehicle for several minutes under the same conditions as those indicated by the freeze data.

Is DTC 16-2 indicated ?

NO – Intermittent failure

YES – Replace the PCM with a new one and recheck.

DTC 31-1 (SYSTEM VOLTAGE LOW)

- Before starting the troubleshooting, check the combination meter function or starter motor function.
  If these have malfunction, inspect the battery, fuses or ignition switch.
- Before starting the troubleshooting, check for loose or poor contact on the PCM 33P connectors and then recheck the DTC.

1. PCM System Voltage Inspection

Turn the ignition switch ON.

Check the battery voltage in the Data List menu of HDS pocket tester.

Is the voltage less than 9.3 V?

YES – GO TO STEP 2.

NO – Intermittent failure.

2. PCM Power Input Line Inspection

Be careful not to bend the connector terminals.

Turn the ignition switch OFF.

Disconnect the PCM 33P (Gray) connector.
Turn the ignition switch ON.
Measure the voltage between the wire harness side connector terminal and ground.

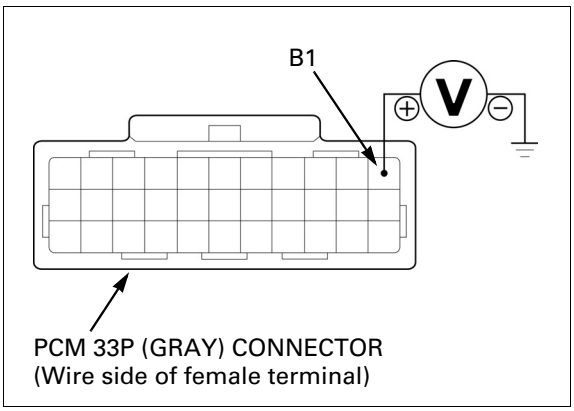
TOOL:
Test probe **07ZAJ-RDJA110**

Connection: B1 (+) – Ground (–)

Is there battery voltage?

NO – • Inspect the battery/charging system (page 20-7).
• Open or short circuit in the Black/blue wire.
• Blown IGN fuse.

YES – GO TO STEP 3.



3. Failure Reproduction

Clear the DTC, test-ride or check the vehicle under the conditions indicated as the freeze data and recheck the DTC.

Is the DTC 31-1 indicated ?

NO – Intermittent failure

YES – Replace the PCM with a new one and recheck.

DTC 32-1 (FAIL SAFE RELAY CIRCUIT)

1. Recheck DTC

Clear the DTC, turn the ignition switch ON and recheck the current DTC.

Is the DTC 32-1 indicated?

NO – Intermittent failure.

YES – Replace the PCM with a new one and recheck.

DTC 41-1 (GEAR POSITION SWITCH CIRCUIT)

- Before starting the troubleshooting, check for loose or poor contact on the gear position switch 3P (Natural) connector and PCM 33P (Black) connector and then recheck the DTC.

1. Gear Position Switch Line Inspection at PCM Connector

Turn the ignition switch OFF.

Disconnect the PCM 33P (Black) connector.

Be careful not to bend the connector terminals.

Perform the gear position switch inspection (page 14-44).
Also check for the short circuit between each gear position switch terminals.

Is there normal continuity?

NO – GO TO STEP 2.

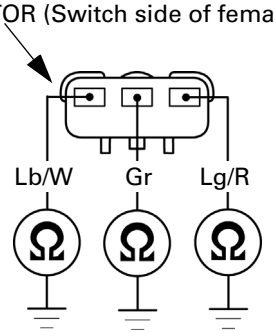
YES – GO TO STEP 3.

2. Gear Position Switch Line Inspection at the Connector

Disconnect the gear position switch connector.
Check for continuity between the gear position switch 3P (Natural) connector of the switch side and ground (page 14-44).
Also check for the short circuit between each gear position switch terminals.

Connection: Light green/red – Ground
Gray – Ground
Light blue/white – Ground

GEAR POSITION SWITCH 3P (NATURAL) CONNECTOR (Switch side of female terminal)



Is there normal continuity?

NO – Faulty gear position switch.

YES – • Open or short circuit in the Light green/red wire.
• Open or short circuit in the Light blue/white wire.
• Open or short circuit in the Gray wire.

3. Failure Reproduction

When connecting the PCM 33P connectors, check that there is no dirt and oil in the connector.

Connect the PCM and gear position switch connectors.
Clear the DTC, turn the ignition switch ON, select the gear position "D", "R" and check the current DTC.

Is the DTC 41-1 indicated?

NO – Intermittent failure.

YES – Replace the PCM with a new one and recheck.

DTC 42-1 (SHIFT UP/DOWN SWITCH CIRCUIT)

- Before starting the troubleshooting, check for loose or poor contact on the handlebar switch 10P (Green) connector and PCM 33P (Black) connector and then recheck the DTC.

1. Shift Switch Status Inspection

Turn the ignition switch ON.

Check the shift switch status and voltage in the Data List Menu of HDS as follows:

	UP	DOWN
"Up" ON	3.64 – 4.08 V	1.76 – 2.09 V
"Down" ON	1.76 – 2.09 V	3.64 – 4.08 V
Both ON	4.0 – 4.99 V	4.0 – 4.99 V
Both OFF	0 – 0.99 V	0 – 0.99 V

Is the shift switch status normal?

YES – Intermittent failure

NO – GO TO STEP 2.

2. Shift Switch Line Inspection (PCM side)

Turn the ignition switch OFF.

Disconnect the PCM 33P (Black) connector.
Check for continuity between the PCM 33P (Black) connector terminals in each switch position (page 14-45).

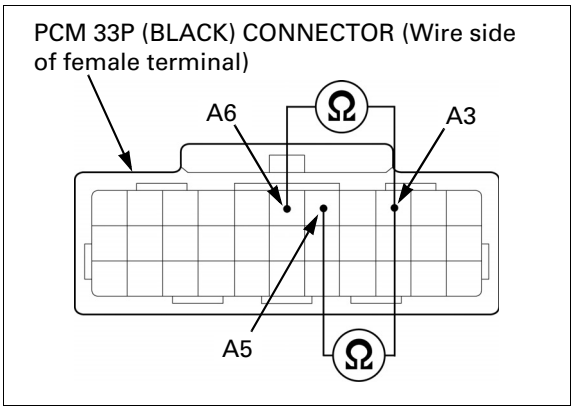
TOOL:
Test probe **07ZAJ-RDJA110**

Connection: A3 – A6
A3 – A5

Is there normal continuity?

NO – GO TO STEP 3.

YES – GO TO STEP 4.



3. Gearshift Switch Inspection (Handlebar Switch Side)

Remove the left handlebar switch 10P (Green) connector from the frame and disconnect it.

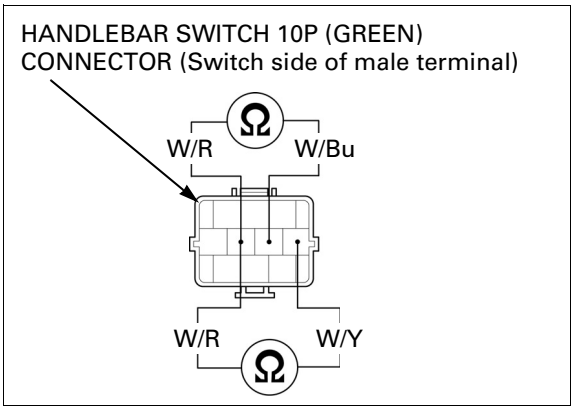
Check for continuity at the switch side 10P (Green) connector terminals in each switch position (page 14-45).

Connection: White/red – White/blue
White/red – White/yellow

Is there normal continuity?

NO – Check the shift switch condition or replace the shift switch with a new one and recheck.

YES – • Open or short circuit in the wires between the PCM 33P (Black) and handlebar switch 10P (Green) connector.
– White/red wire.
– White/yellow wire.
– White/blue wire.



4. Failure Reproduction

Connect the PCM and gearshift switch connectors.
Clear the DTC, turn the ignition switch ON and recheck the current DTC.

Is the DTC 42-1 indicated?

NO – Intermittent failure.

YES – Replace the PCM with a new one and recheck.

DTC 44-1 (EOT SENSOR LOW VOLTAGE)

1. EOT Sensor System Inspection

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

Check the EOT sensor with the HDS.

Is about 0 V indicated?

NO – • Intermittent failure.
• Loose or poor connection on the ECT sensor 2P (Black) connector.

YES – GO TO STEP 2.

2. EOT Sensor Inspection

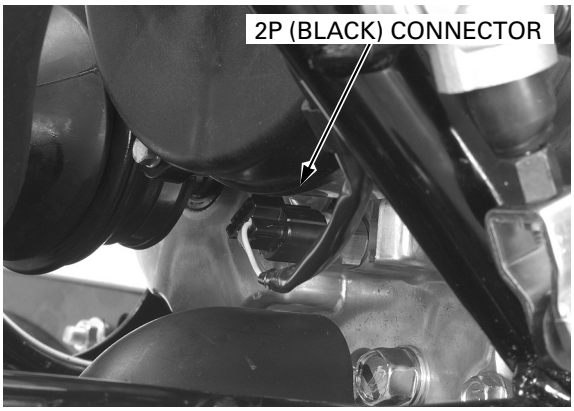
Turn the ignition switch OFF.
Disconnect the EOT sensor 2P (Black) connector.

Turn the ignition switch ON and engine stop switch "".
Check the EOT sensor with the DTC pocket tester.

Is about 0 V indicated?

NO – GO TO STEP 3.

YES – GO TO STEP 4.



3. EOT Sensor Resistance Inspection

Turn the ignition switch OFF.

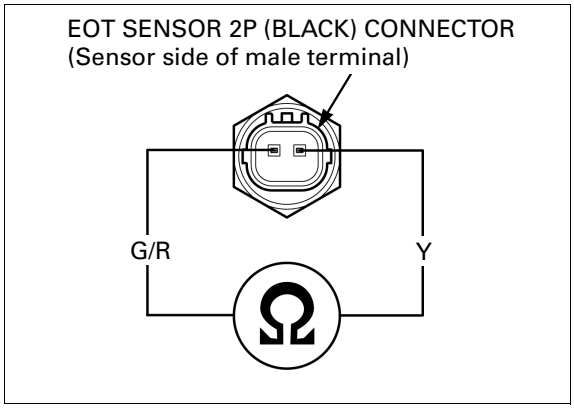
Measure the resistance at the EOT sensor terminals.

Connection: Yellow – Green/red
Standard: 2.3 – 2.6 kΩ (20°C/68°F)

Is the resistance within 2.3 – 2.6 kΩ?

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

No – Faulty EOT sensor.



4. EOT Sensor Short Circuit Inspection

Disconnect the PCM 33P (Gray) connector from the PCM (page 6-54).

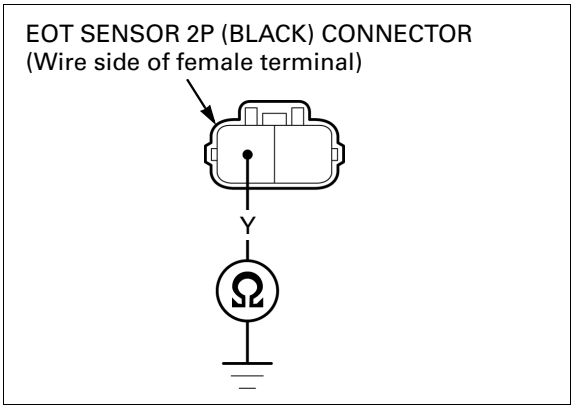
Check for continuity between the EOT sensor 2P (Black) connector terminal of the wire harness side and ground.

Connection: Yellow – Ground

Is there continuity?

YES – Short circuit in Yellow wire.

NO – Replace the PCM with a new one, and recheck.



DTC 44-2 (EOT SENSOR HIGH VOLTAGE)

- Before starting the inspection, check for loose or poor contact on the EOT sensor 2P (Black) connector and recheck the HDS.

1. EOT Sensor System Inspection

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

Check the EOT sensor with the HDS pocket tester.

Is about 5 V indicated?

NO – • Intermittent failure.
• Loose or poor contact on the EOT sensor 2P (Black) connector.

YES – GO TO STEP 2.

2. EOT Sensor Inspection

Turn the ignition switch OFF.

Disconnect the EOT sensor 2P (Black) connector. Jump the EOT sensor terminals with a jumper wire.

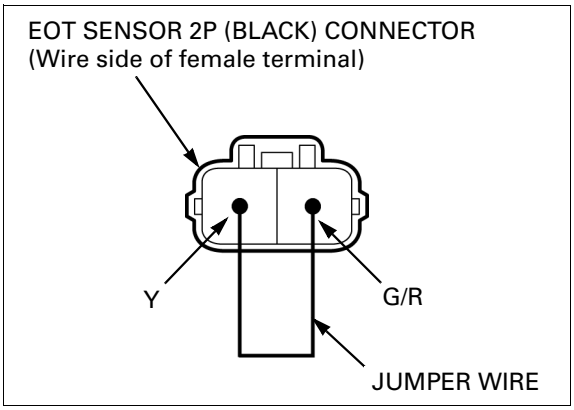
Connection: Yellow – Green/red

Turn the ignition switch ON and engine stop switch "◯".
Check the EOT sensor with the HDS pocket tester.

Is about 0 V indicated?

YES – Faulty EOT sensor.

NO – GO TO STEP 3.



3. EOT Sensor Open Circuit Inspection

Turn the ignition switch OFF.
Remove the jumper wire.

Disconnect the PCM 33P (Gray) connector (page 6-54).
Check for continuity between the PCM 33P (Gray) connector terminals and ECT sensor 2P (Black) connector terminals of the wire harness side.

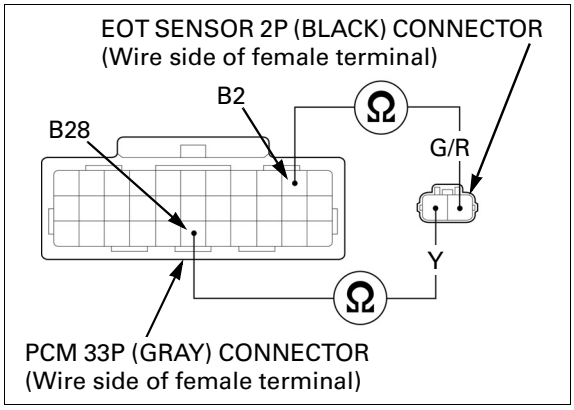
TOOL:
Test probe **07ZAJ-RDJA110**

Connection: B28 – Yellow
B2 – Green/red

Is there continuity?

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

NO – • Open circuit in Yellow wire.
• Open circuit in Green/red wire.



GEAR POSITION SWITCH

INSPECTION

Turn the ignition switch OFF.

Disconnect the PCM 33P (Black) connector (page 21-6).

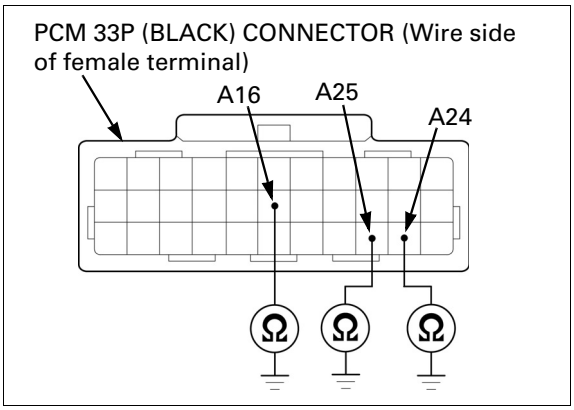
Check for continuity between each gear position switch wire terminal of the PCM connector and ground.

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.

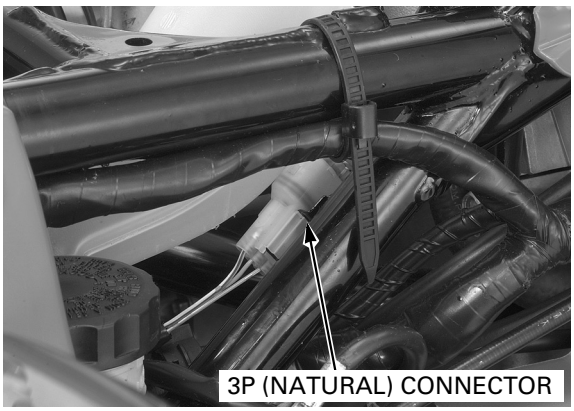
If the test result is abnormal, disconnect the gear position switch 3P (Natural) connector.

Perform the continuity test at the 3P (Natural) connector in the same manner (page 14-44).



Position \ Color	Light blue/ white	Light green	Gray	GND
DRIVE	1	2	3	
NEUTRAL	4	5	6	
REVERSE	7	8	9	

- If the test result at the PCM is abnormal and the one at the 3P 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.



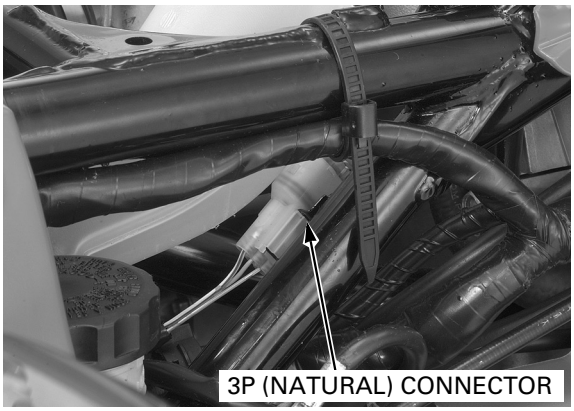
REPLACEMENT

Remove the following:

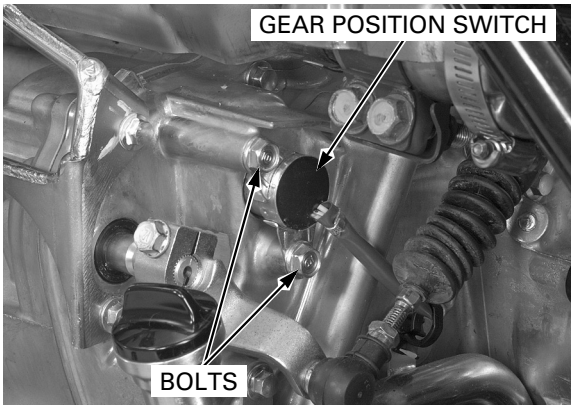
– seat (page 3-4)
– right side cover (page 3-5)
– left fuel tank side cover (page 3-7)

Disconnect the gear position switch 3P (Natural) 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.



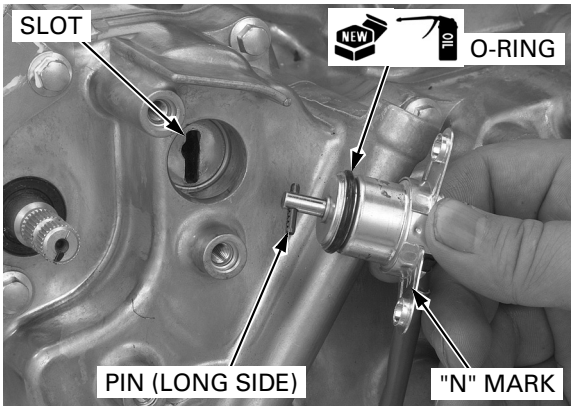
Coat a new O-ring with engine oil and install it onto a new gear position switch.

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 1-20).



GEARSHIFT SWITCH

NOTE:

- The A/T 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 ON

INSPECTION

Turn the ignition switch OFF.

Disconnect the PCM 33P (Black) connector (page 21-6).

NOTE:

- When reconnecting the PCM 33P connector, check that there is no dirt and oil in the connector.

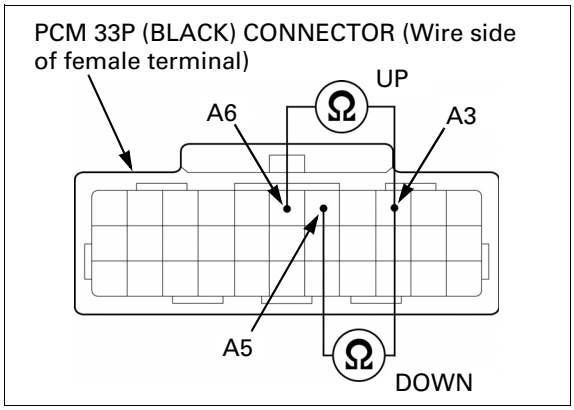
Check for continuity between the PCM connector terminals in each switch position.

Continuity should exist between the color coded wires as follows:

If the test result is abnormal, remove the right inner fender (page 3-9).

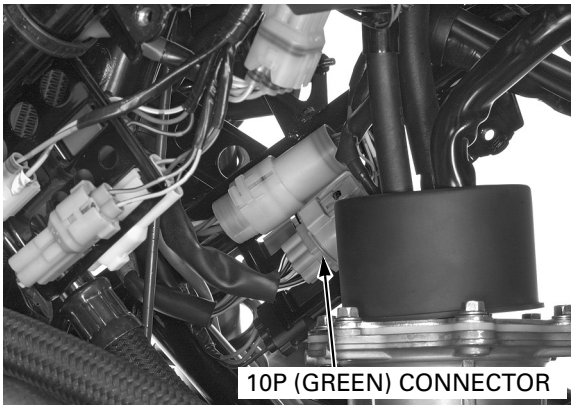
Disconnect the left handlebar switch 10P (Green) connector.

Perform the continuity test at the 10P (Green) connector in the same manner (page 14-45).



Color / Position	White/ blue	White/ red	White/ yellow	White/ red
Up	○—○			
Free				
Down			○—○	

- If the test result at the PCM is abnormal and the one at the 10P (Green) 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 OFF.

Disconnect the PCM 33P (Black) connector (page 21-6).

NOTE:

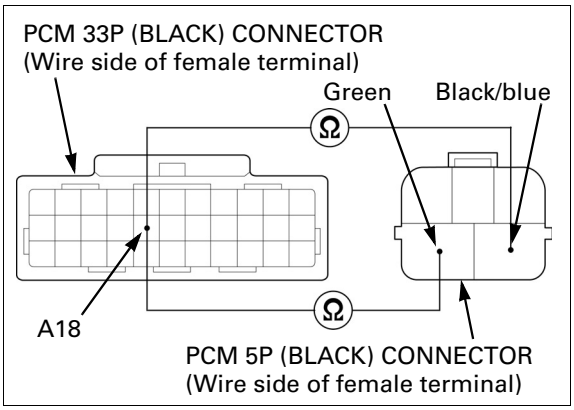
- When reconnecting the PCM 33P connector, check that there is no dirt and oil in the connector.

Check for continuity between the PCM connector terminals in each switch position.

TOOL:

Test probe	**07ZAJ-RDJA110**

Continuity should exist between the color coded wires as follows:



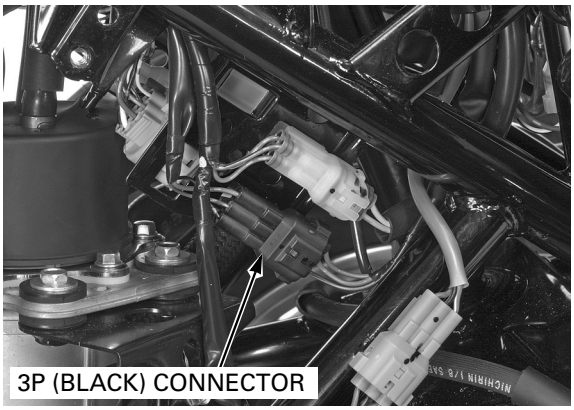
If the test result is abnormal, remove the right inner fender (page 3-9).

Disconnect the drive mode select switch 3P (Black) connector.

Perform the continuity test at the 3P (Black) connector in the same manner (page 14-46).

Position \ Color	Blue/ orange	Black/ green	Green
ESP	○		○
D	○	○	

- If the test result at the PCM is abnormal and the one at the 3P (Black) 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.



SHIFT VALVE BODY

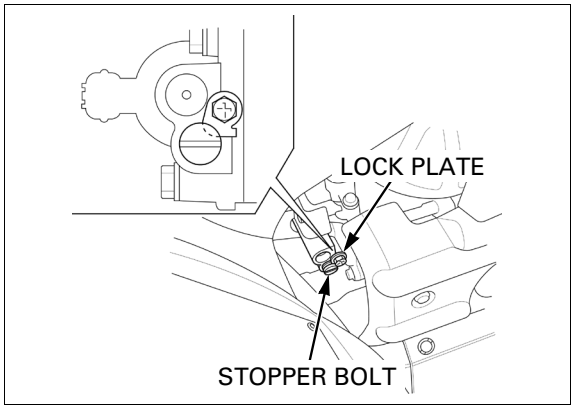
NOTICE

Do not drop or strike the solenoid valves when servicing. Excessive shock may damage the solenoid valve.

EMERGENCY VALVE FUNCTION

NOTE:

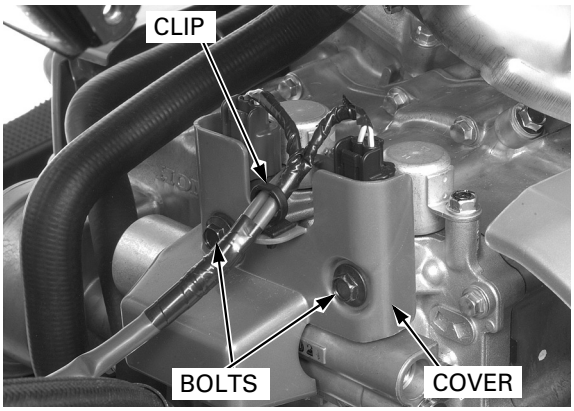
- The emergency valve is used when the hydraulic pressure is shut off by the faulty A/T clutch pressure control solenoid (stuck; mechanical lock), and the vehicle is hindered from running. Open the bypass oil circuit manually to supply hydraulic pressure (In this case, the transmission will be fixed 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

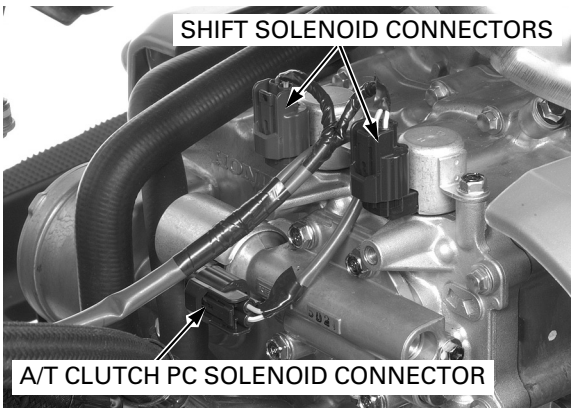
Remove the following:

– left engine side cover (page 3-17)
– left front mud guard (page 3-8)
– left inner fender (page 3-9)
– wire clip
– two setting bolts
– valve body cover



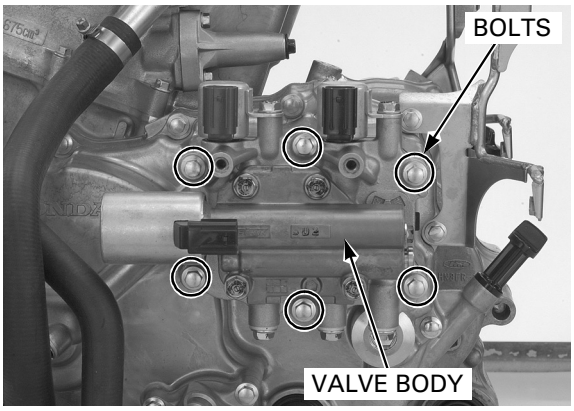
Clean around the valve body with compressed air to remove dust, dirt and foreign material.

– shift solenoid valve 2P (Black and Brown) connectors
– A/T clutch pressure control 2P (Black) connector

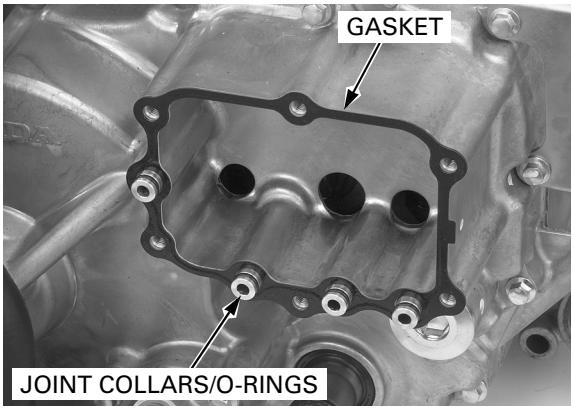


If the valve body will be disassembled, loosen the six solenoid valve bolts and four sealing bolts (large head; gold). Place a shop towel under the valve body.

– six bolts (small head)
– shift valve body assembly



– gasket
– four oil joint collars
– O-rings



DISASSEMBLY/INSPECTION

NOTE:

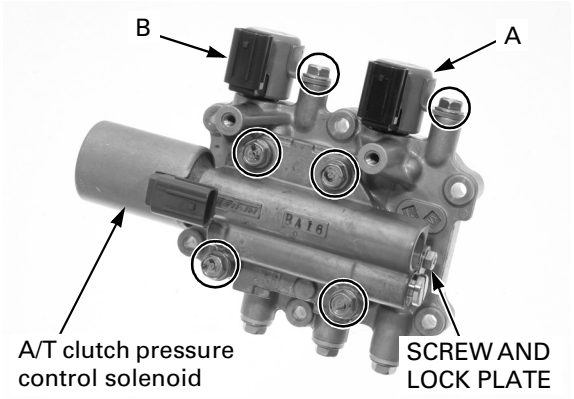
- Keep dust and dirt away from all the parts.
- Take care not to damage the mating surfaces of the valve bodies.

The emergency valve is built in the A/T clutch pressure control solenoid.

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 A/T clutch pressure control solenoid assembly
– rubber seal (from the valve body)



Use a hand-operated air pump only. Do not use a high pressure air source.

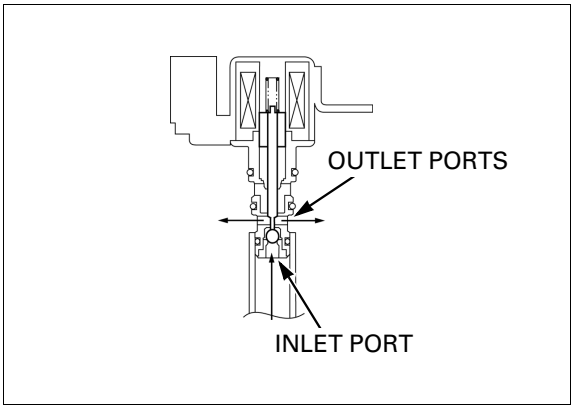
Be careful not to short the positive and negative terminals.

Connect a pressure pump to the input port (filter side) of the shift solenoid valve.

Connect a 12 V 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 (-)

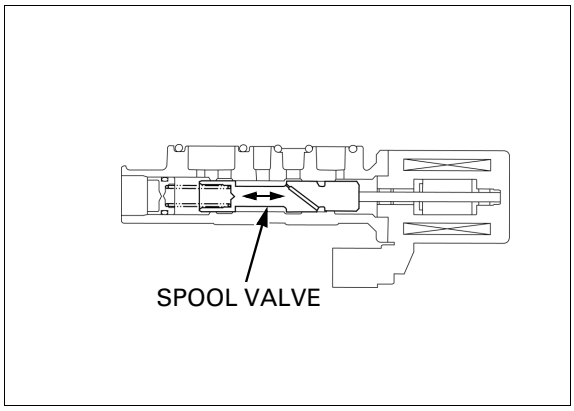
Air should not flow (the pressure should maintained) while the battery is connected, and should flow out of the output ports that goes to the shift valve when the battery is disconnected.



Be careful not to short the positive and negative terminals.

Connect the 12 V battery positive terminal to the Yellow/red terminal and negative terminal to the Blue/red terminal of the A/T clutch pressure control solenoid 2P (Black) 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.



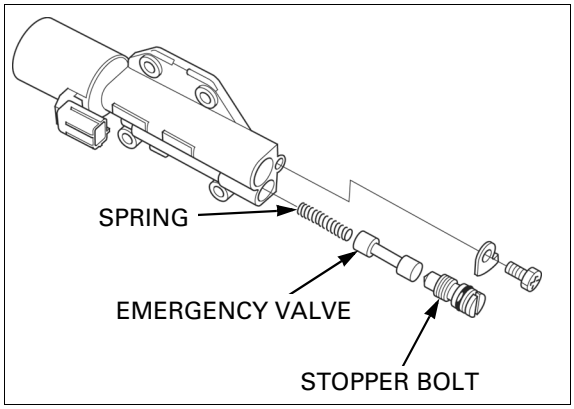
Remove the following from the linear solenoid assembly:

– 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.

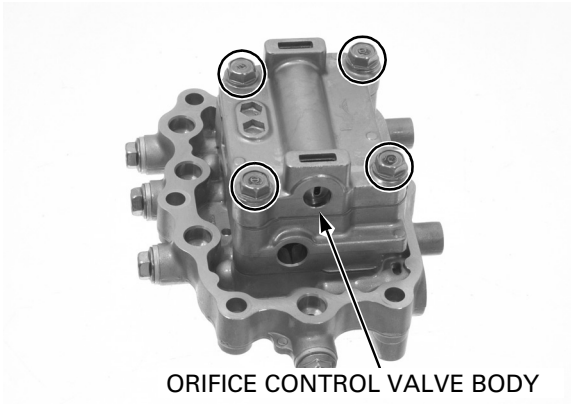
Check the emergency valve and valve bore for scoring, scratch or abnormal wear.



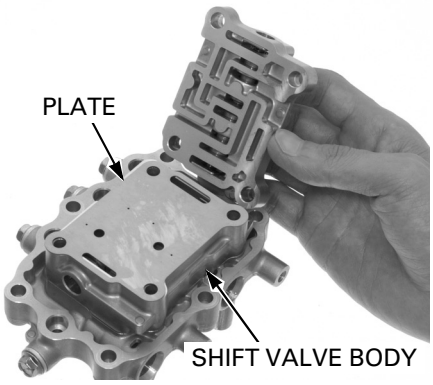
ORIFICE CONTROL AND SHIFT VALVES

Remove the following:

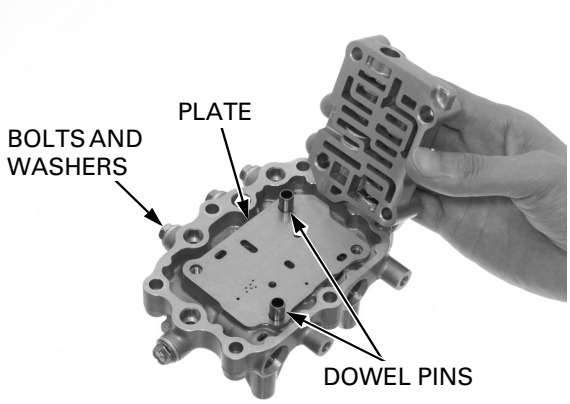
– four bolts
– orifice control valve body



– separator plate
– shift valve body

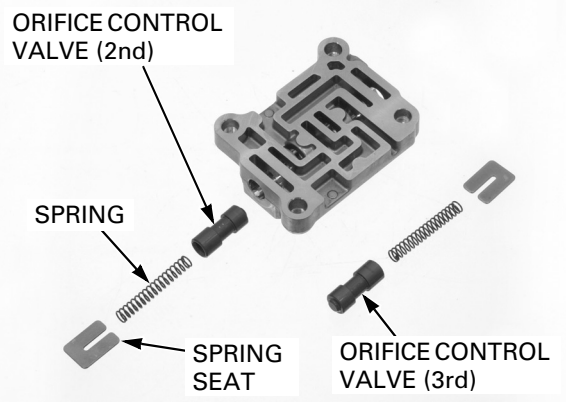


– separator plate
– two dowel pins
– four sealing bolts and washers



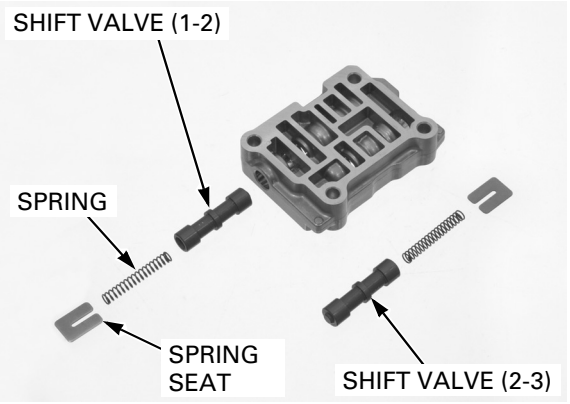
Remove the following from the orifice control valve body:

– 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.

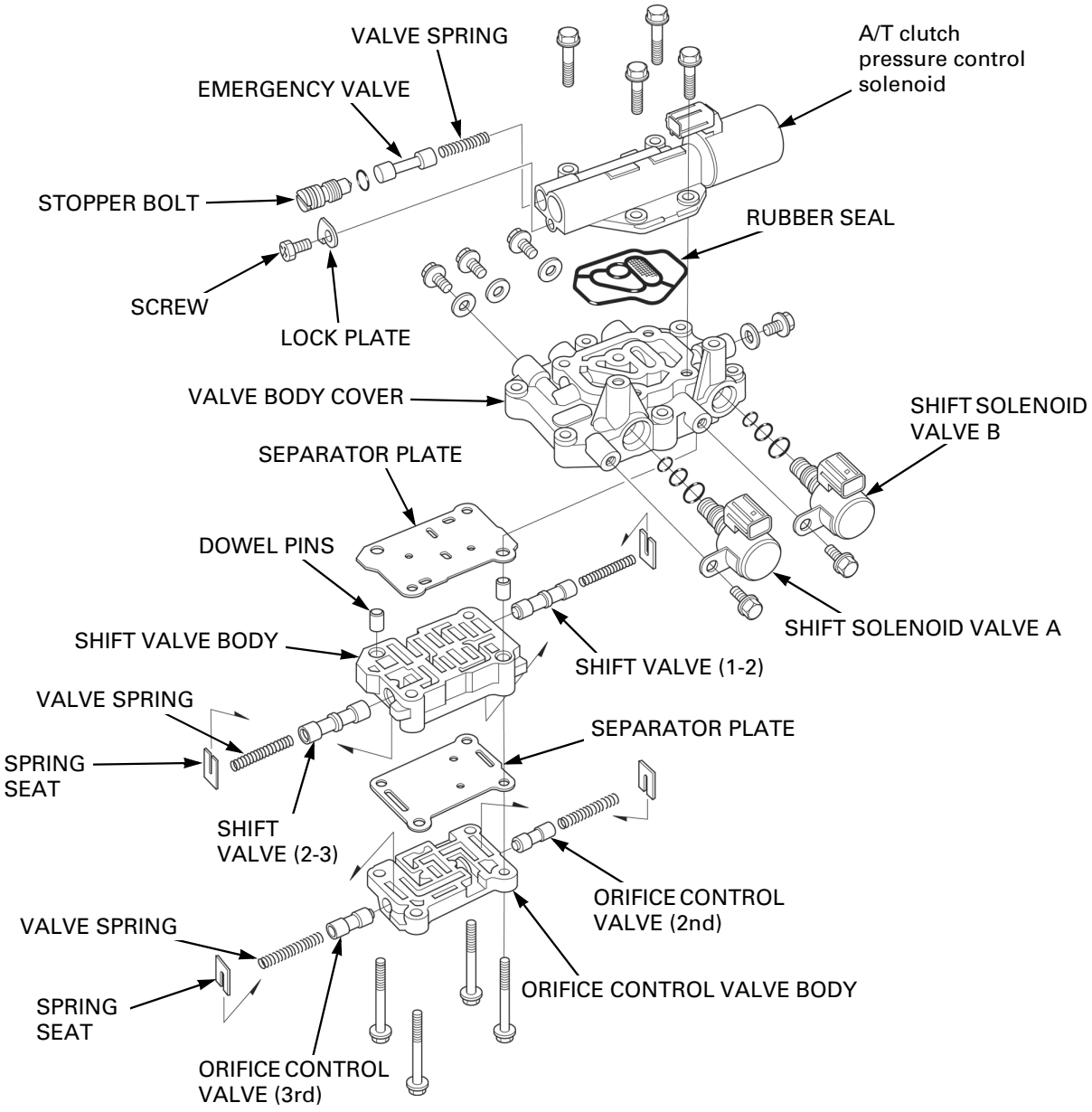
Wash all the parts with a high flash point or non-flammable solvent and blow dry them with compressed air to clean completely.

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.

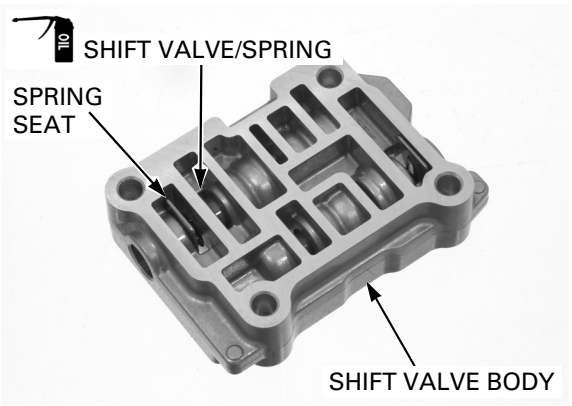


SHIFT AND ORIFICE CONTROL VALVES

Apply engine oil to the outer surface of the spool (shift and orifice control) valves.

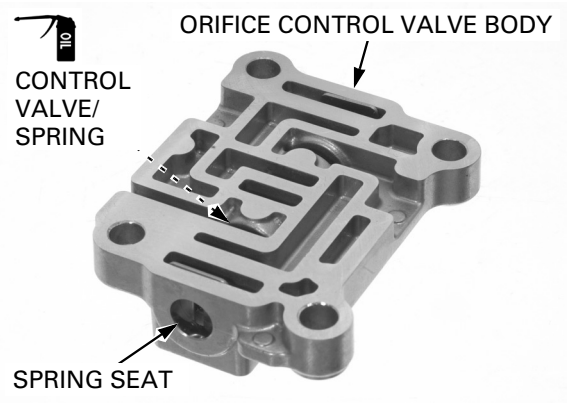
Install the spring seats with the slit facing away from the orifice control valve body (page 14-51).

Insert each shift valve (1-2 and 2-3) and spring into the shift valve body and secure it with the spring seat.



Install the spring seats with the slit facing away from the shift valve body (page 14-51).

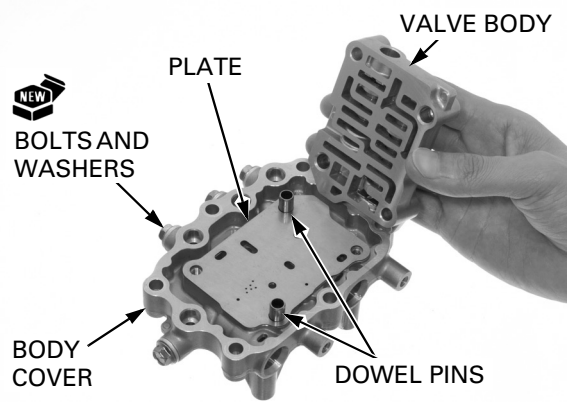
Insert each orifice control valve (2nd and 3rd) and spring into the shift valve body and secure it with the spring seat.



Install the four sealing bolts with new sealing washers.

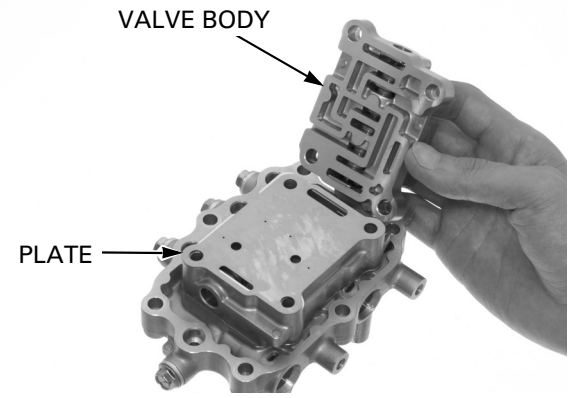
Install the following onto the valve body cover:

- 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.

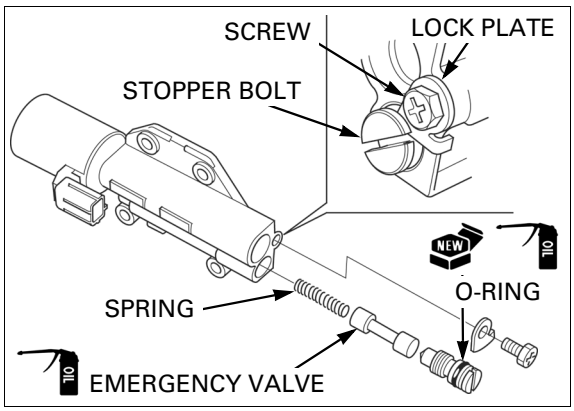
Tighten the four sealing bolts.

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.

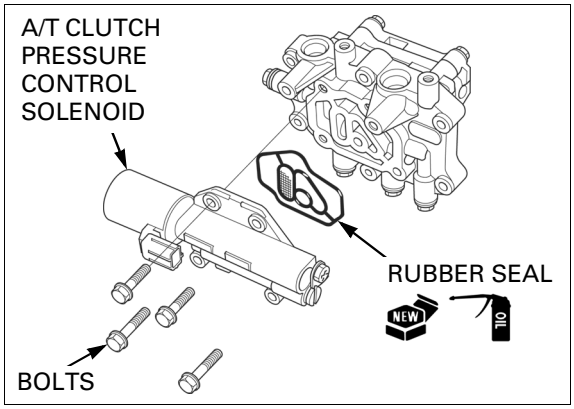
Install the spring and emergency valve into the A/T clutch pressure control solenoid body with the concave head end portion of valve facing in.
Install the valve stopper bolt and screw it in until the groove edge is aligned with the valve body surface.

Install the lock plate and screw as shown.



Coat a new rubber seal with engine oil and install it into the groove in the A/T clutch pressure control solenoid body.

Install the A/T clutch pressure control solenoid assembly with the four bolts.

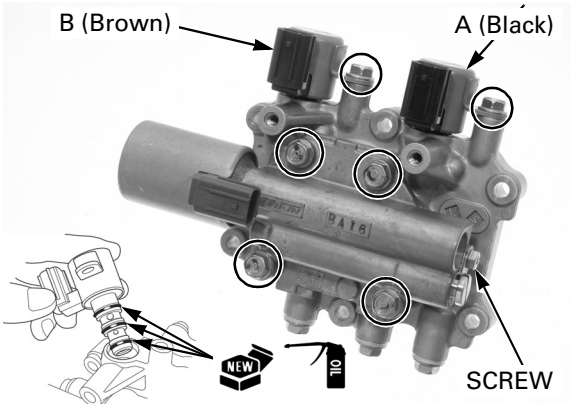


Coat new O-rings with engine oil and install them into the grooves in each shift solenoid valve.

Do not interchange A and B.

Install the shift solenoid valve A and B with the bolts.

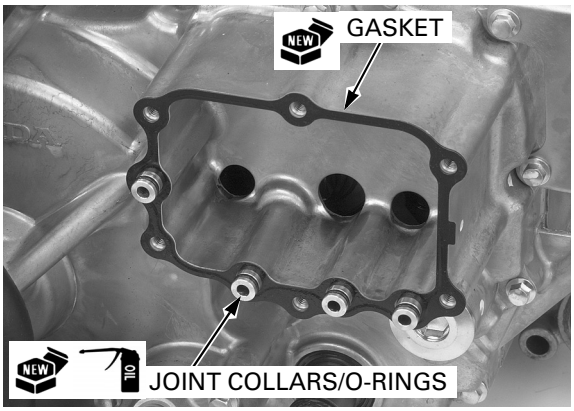
Tighten the six solenoid valve bolts and lock plate screw securely.



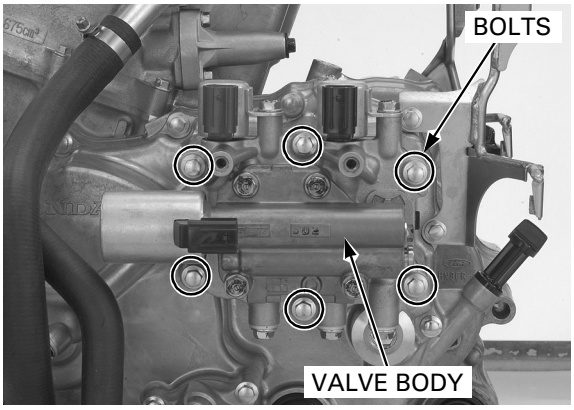
INSTALLATION

Clean the mating surface of the valve body assembly and front crankcase cover.

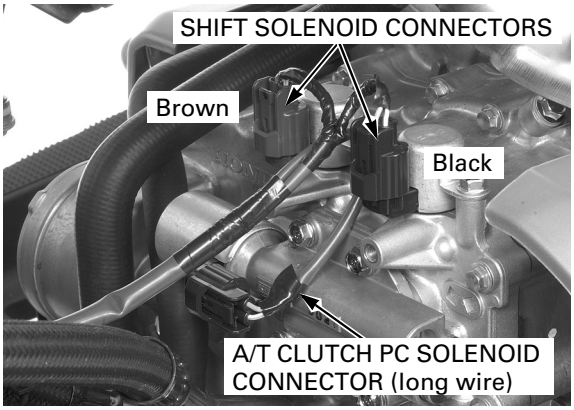
Coat new O-rings with engine oil and install them into the grooves in the oil joint collars.
Install the four joint collars and a new gasket.



Install the shift valve body assembly with the six bolts and tighten them securely.



Connect the solenoid valve 2P (Black and Brown) connectors.
Connect the A/T clutch pressure control 2P (Black) connector.



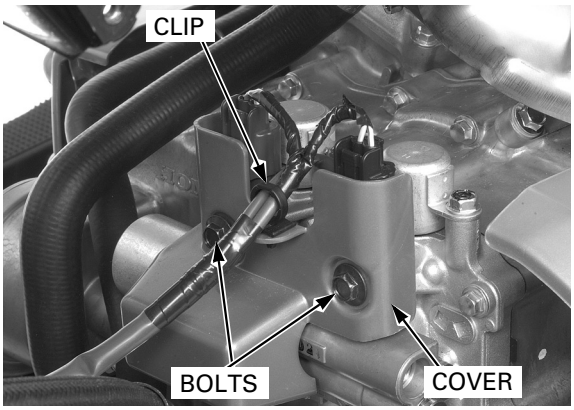
Install the valve body cover with the two setting bolts and tighten them.

Install the wire clip over the wire harness and into the body cover.

Perform the transmission oil pressure check, if necessary (page 14-12).

Install the following:

– inner fender (page 3-9)
– front mud guard (page 3-8)
– engine side cover (page 3-17)

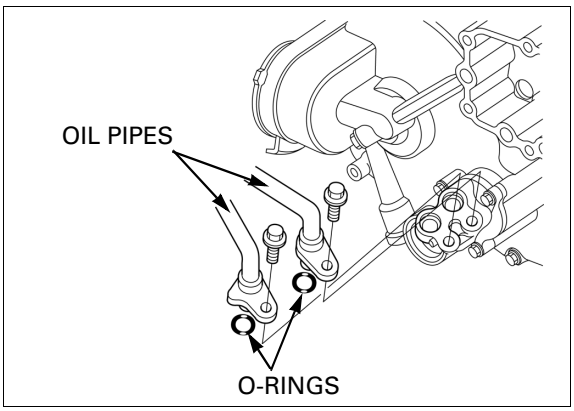


FRONT CRANKCASE COVER

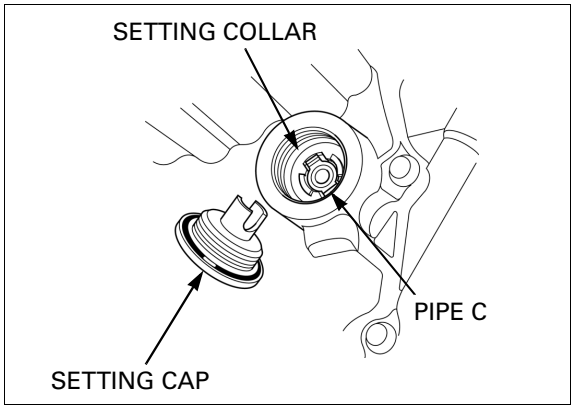
REMOVAL

Remove the following:

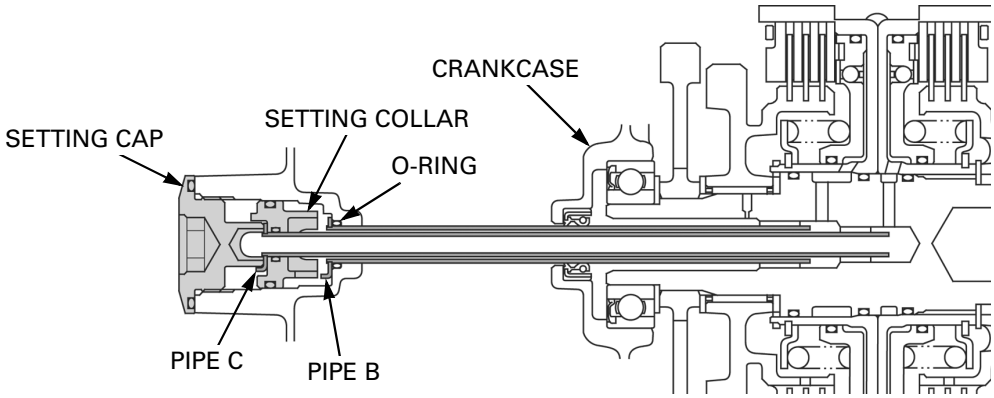
– front mud guards (page 3-8)
– inner fenders (page 3-9)
– front center grille (page 3-10)
– center mud guards (page 3-7)
– engine side covers (page 3-17)
– engine guard (page 3-17)
– front propeller shaft (page 8-6).
– water pump (page 7-14)
– shift valve body (page 14-47)
– oil pipes (by removing each joint bolt)
– O-rings



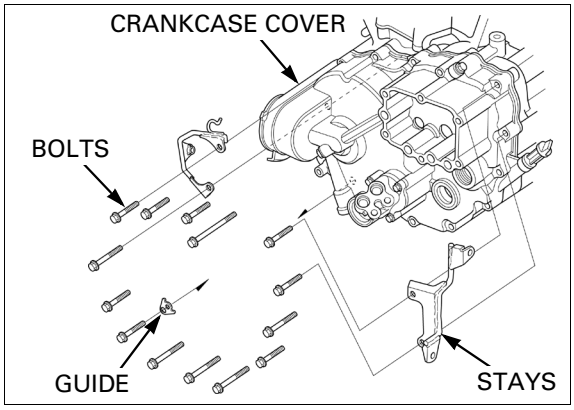
– pipe setting cap and O-ring
– oil feed pipe C
– pipe setting collar (by pulling it out with a needle nose pliers) and O-rings



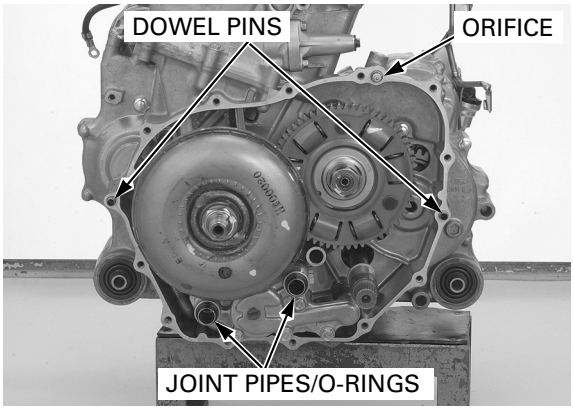
– oil feed pipe B and O-ring



– 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

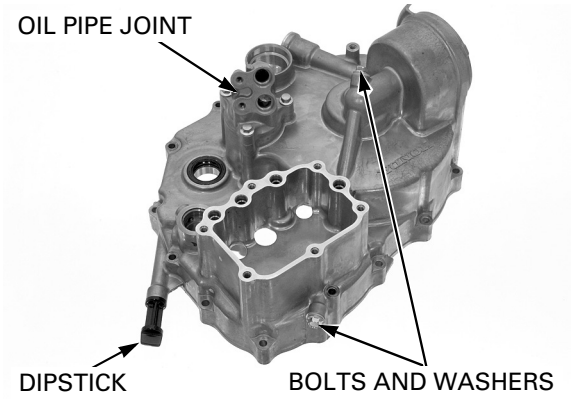


CLEANING/INSPECTION

Remove the following:

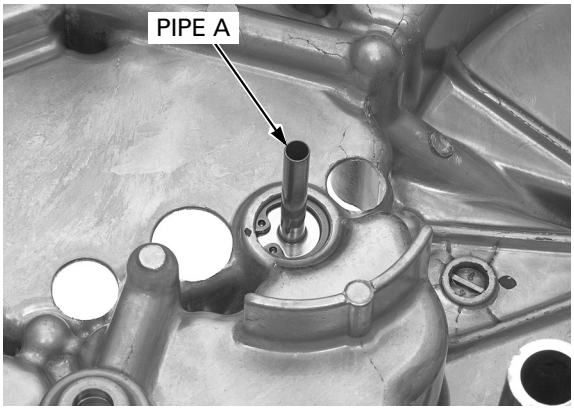
- oil filter (page 4-12)
- dipstick
- sealing bolts and washers
- three bolts and oil pipe joint

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.

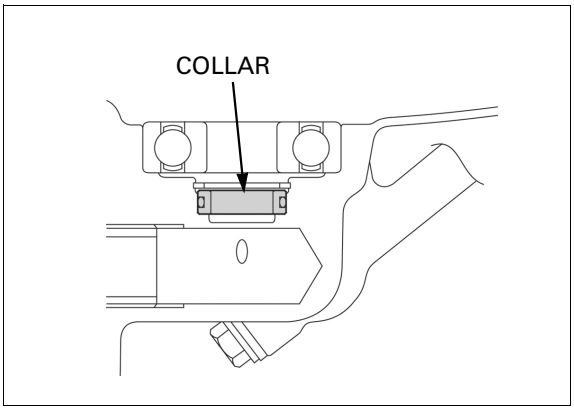
Check the feed pipe A, B and C for abnormal wear or damage.



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 14-56.



BEARING REPLACEMENT

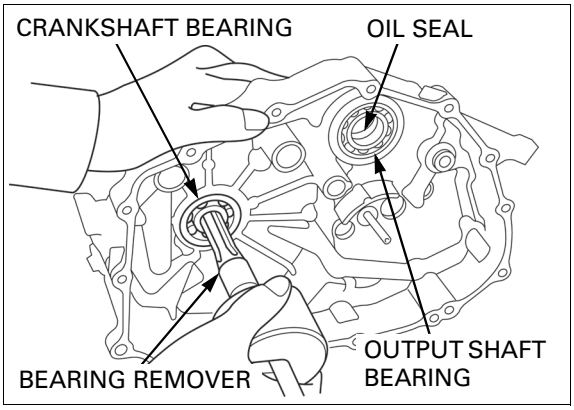
Remove the crankshaft bearing using the special tools.

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)**

Remove the output shaft oil seal.

Drive the output shaft bearings out of the crankcase cover.

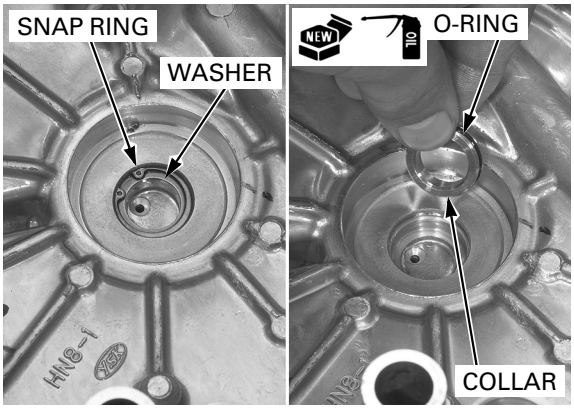


Remove the snap ring and washer, and the seal collar.

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.

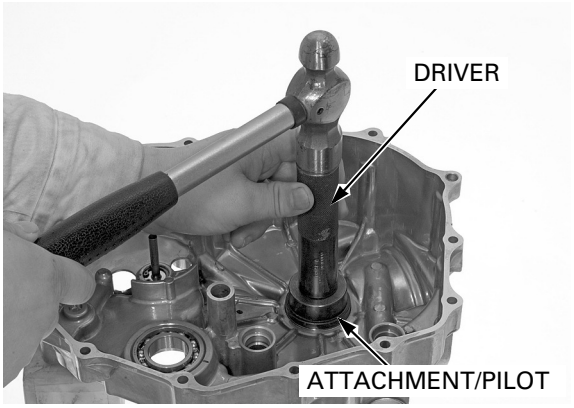
Install the collar until it is seated. Install the washer and the snap ring into the cover groove properly.



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**



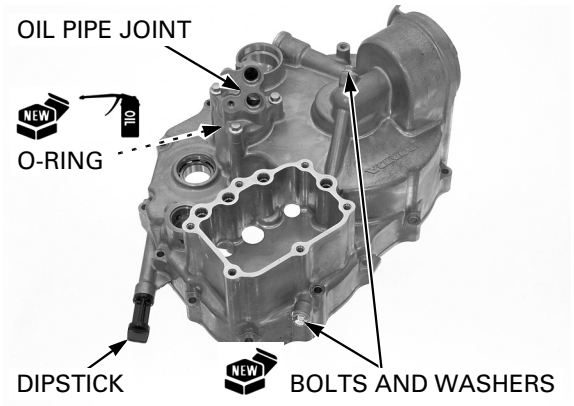
INSTALLATION

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

Clean the crankcase and cover mating surfaces.

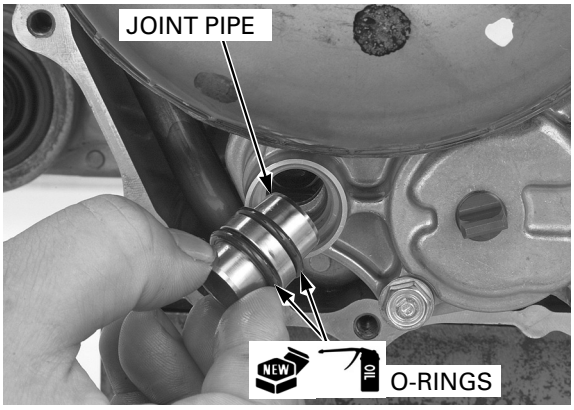
Install the following if they were removed:

- sealing bolts with new washers
- oil pipe joint with a new O-ring
- dip stick
- oil filter (page 4-12)

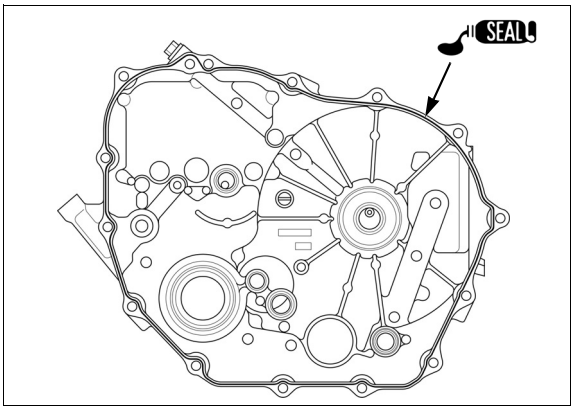


Apply engine oil to the lips of a new oil seal, and install it into the crankcase cover until it is fully seated.

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

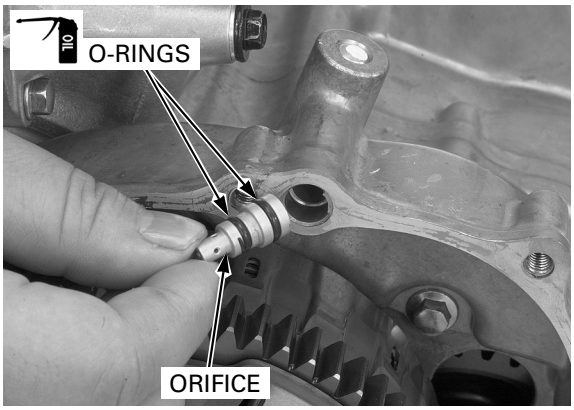


Apply liquid sealant (Three Bond 1215 or equivalent) to the mating surface of the crankcase cover.

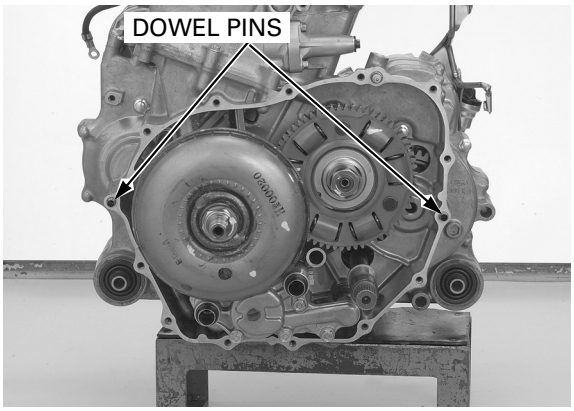


Blow the oil orifice with compressed air to clean the passage.

Coat new O-rings with engine oil and install them into the orifice groove.
Install the oil orifice with the stepped side facing out.

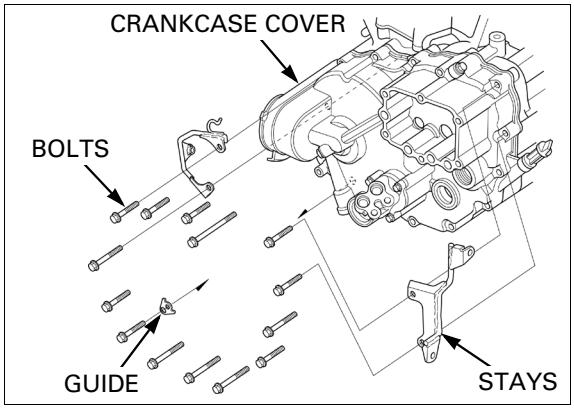


Install the two dowel pins.



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.

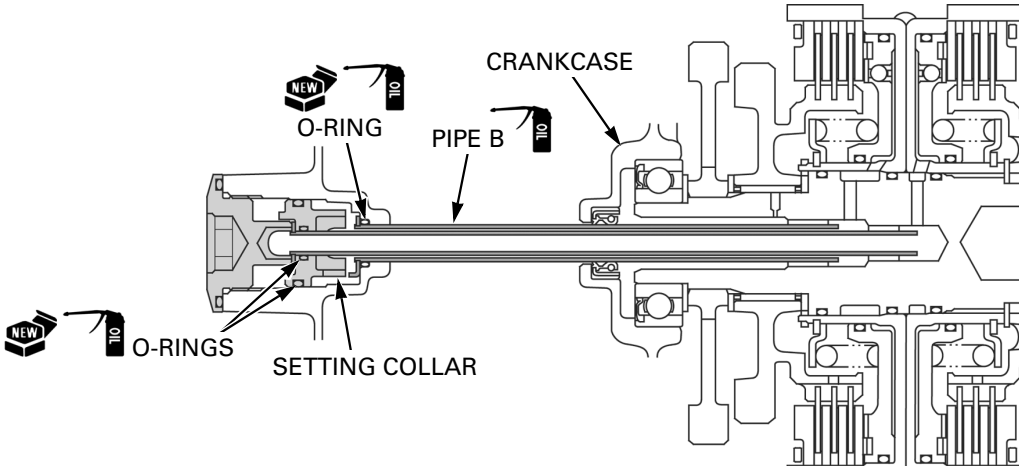
Coat a new O-ring with engine oil and install it onto the flange of the feed pipe B.
Apply engine oil to the outer surface of pipe B.

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.

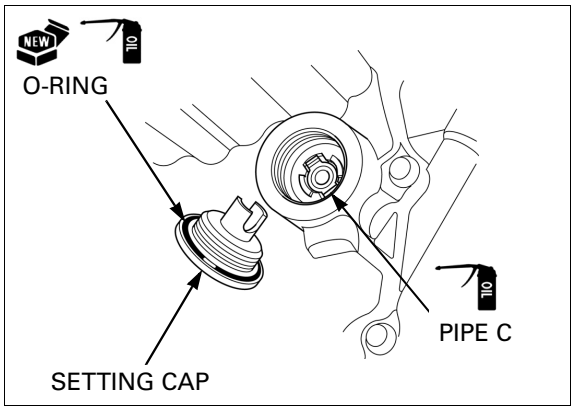
Align the flange tabs with the grooves in the collar.

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)



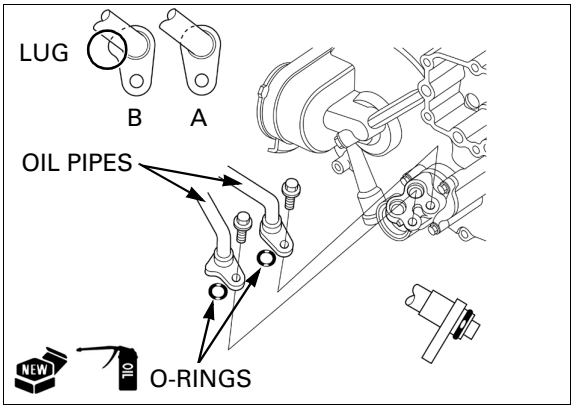
Coat new O-rings with engine oil and install them into the oil pipe grooves.

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 14-53)
- water pump (page 7-15)
- front propeller shaft (page 8-10)
- engine side covers (page 3-17)
- center mud guards (page 3-7)
- front center grille (page 3-10)
- inner fenders (page 3-9)
- front mud guards (page 3-8)



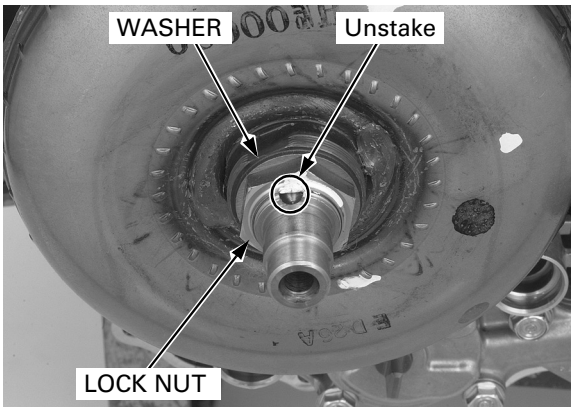
TORQUE CONVERTER REMOVAL

Remove the front crankcase cover (page 14-54).

Be careful not to damage the crankshaft threads.

Unstake the lock nut.

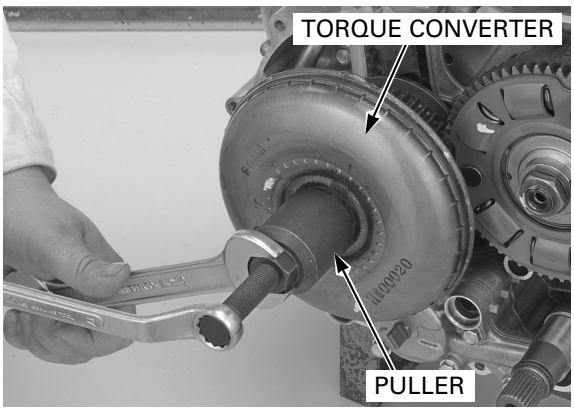
Loosen the lock nut while holding the converter boss with an open end wrench (width across flats: 32 mm).
Remove the lock nut and washer.



Remove the torque converter assembly using the special tools.

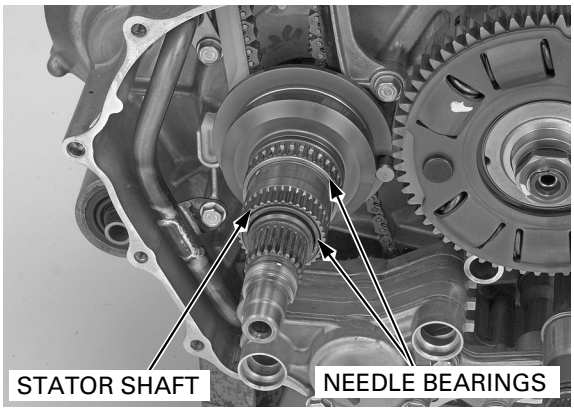
TOOL:

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

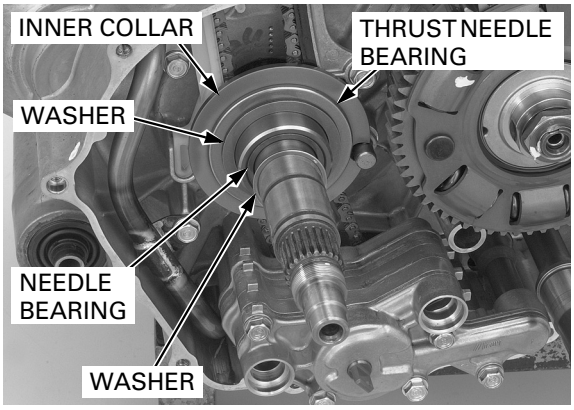


Remove the following:

- stator shaft (while turning it counterclockwise)
- needle bearings



– washers
– inner collar
– needle bearings



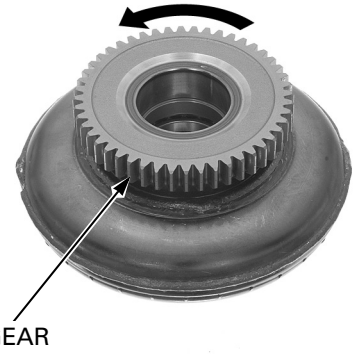
TORQUE CONVERTER INSPECTION

NOTE:

- Replace the torque converter as an assembly (from converter to inner collar).

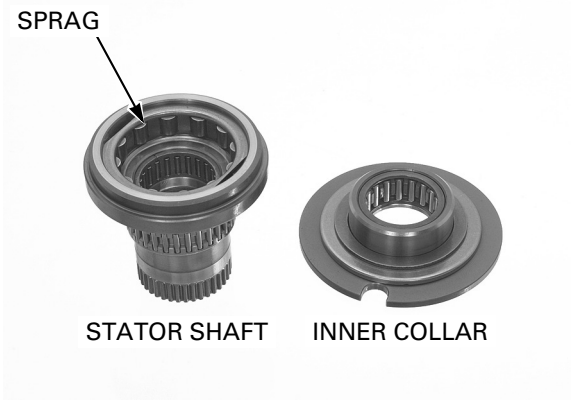
Check the primary drive gear teeth for abnormal wear or damage.

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.

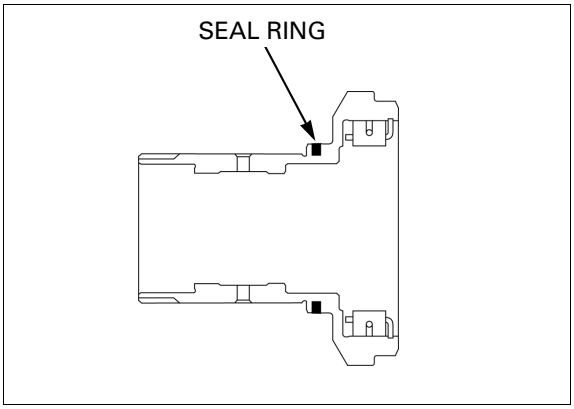


Check the needle bearings for abnormal wear or damage.

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.



Check the seal ring on the stator shaft for abnormal wear or damage.



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 (page 13-2).

1st SHIFT CLUTCH REMOVAL

Remove the torque converter (page 14-60).

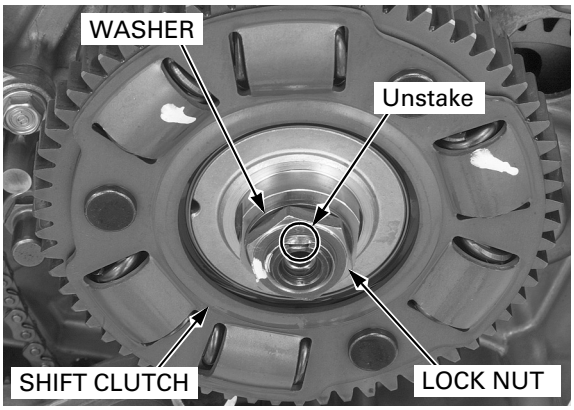
Be careful not to damage the mainshaft threads.

Unstake the lock nut.

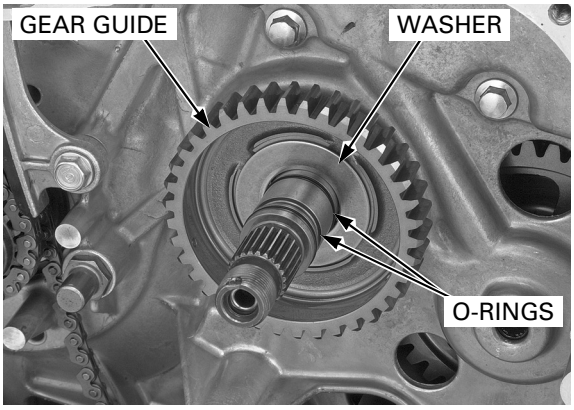
Loosen the lock nut while holding the driven gear boss with an open end wrench (width across flats: 29 mm).

Remove the following:

– lock nut
– washer
– 1st shift clutch assembly



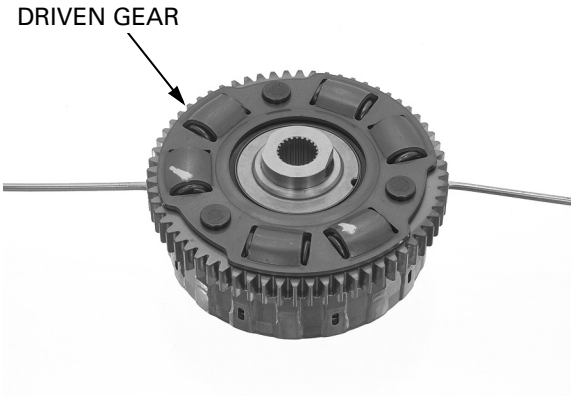
– washer
– M1 gear guide
– O-rings



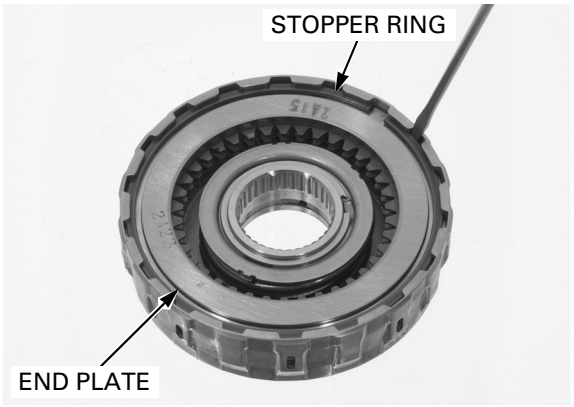
1st SHIFT CLUTCH DISASSEMBLY

Remove the following from the clutch drum:

– primary driven gear
– O-rings

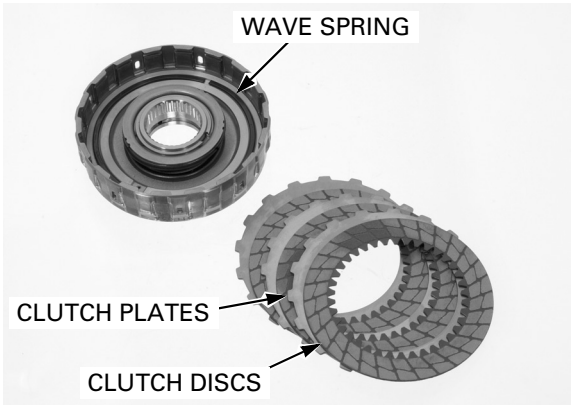


– stopper ring
– end plate



– three clutch discs and plates
– wave spring

Remove the return spring and clutch piston (page 14-65).

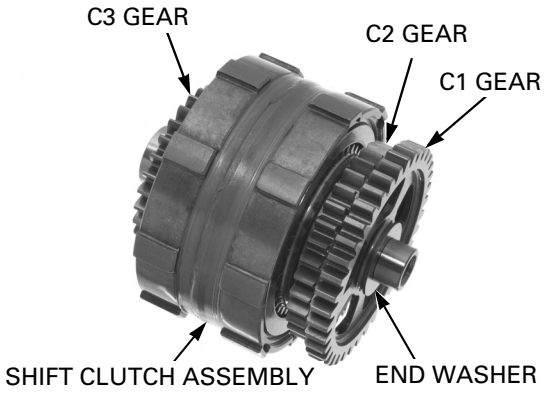


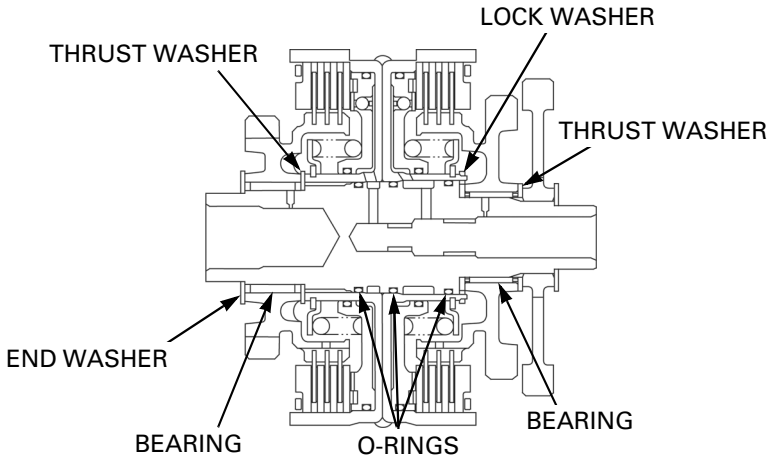
2nd/3rd SHIFT CLUTCH AND MAINSHAFT DISASSEMBLY

Remove the countershaft (2nd/3rd shift clutch) and mainshaft (page 13-7).

Remove the end washers with a screwdriver and disassemble the countershaft:

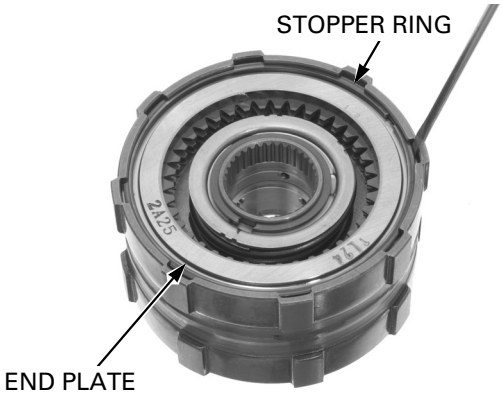
- C1 gear
- thrust washer
- C2 gear
- bearing
- lock washer
- C3 gear
- bearing
- thrust washer
- 2nd/3rd shift clutch assembly
- O-rings





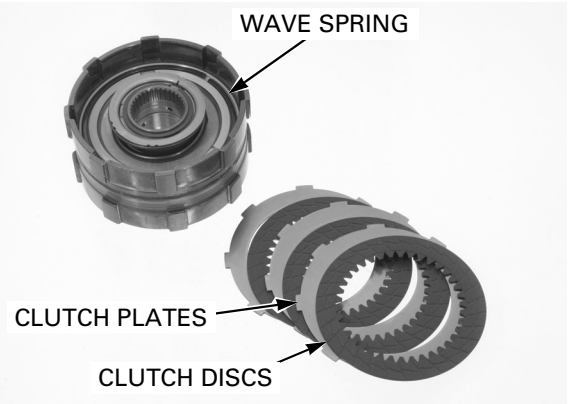
Remove the following from each clutch drum:

- stopper ring
- end plate



- three clutch discs and plates
- wave spring

Remove the return spring and clutch piston (page 14-65).

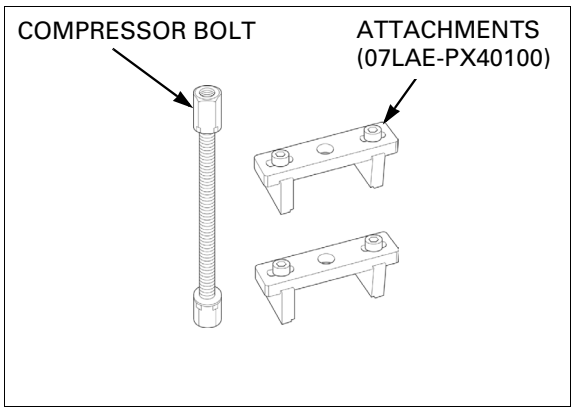


CLUTCH PISTON REMOVAL

Install the following special tools onto the shift clutch.

TOOLS:

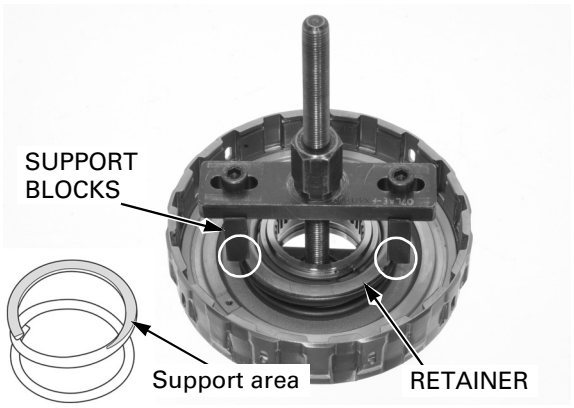
Clutch compressor attachment	**07LAE-PX40100 (2 required)**
Compressor bolt assembly	**07GAE-PG40200 or 07GAE-PG4020A (U.S.A. only)**



NOTE:

- Be sure the special tool is adjusted to have full contact the stepped areas with the spring retainer.

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.



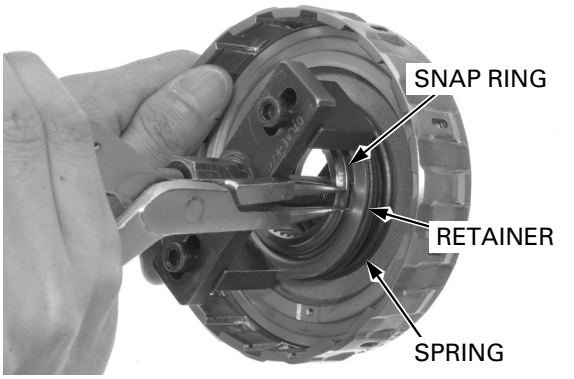
To prevent loss of spring tension, do not compress more than necessary.

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.

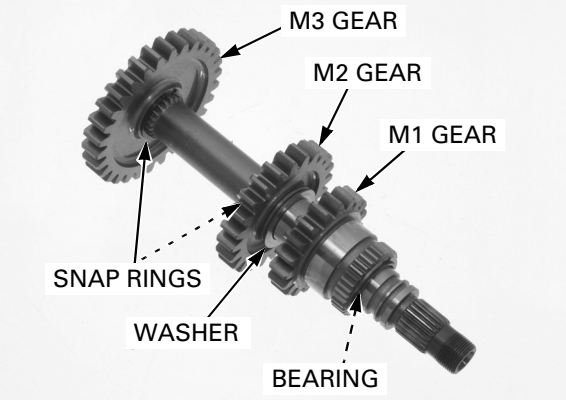
Clean all the parts of the shift clutch in solvent thoroughly and blow dry them with compressed air.

MAINSHAFT DISASSEMBLY

Remove the mainshaft (page 13-7).

Disassemble the mainshaft:

- M1 gear
- bearing
- washer
- M3 gear
- snap rings
- M2 gear



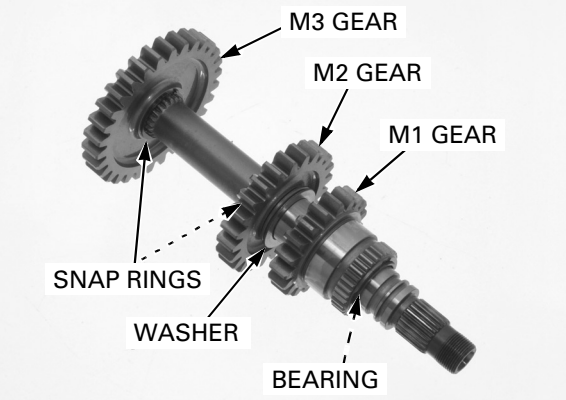
INSPECTION

MAINSHAFT

The M1 gear bearing has one roller missing from each cage by design.

Check each gear tooth and bearing for abnormal wear or damage.

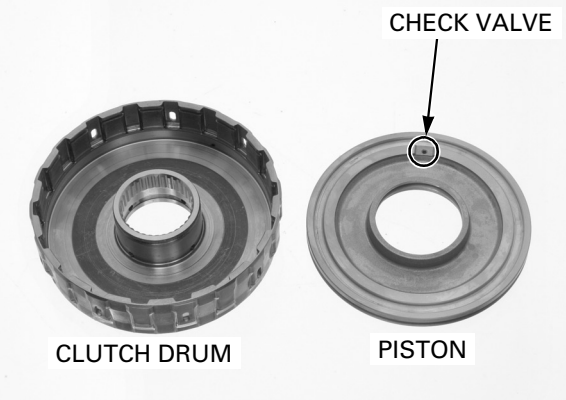
Check the oil holes in the mainshaft for clogs.



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.

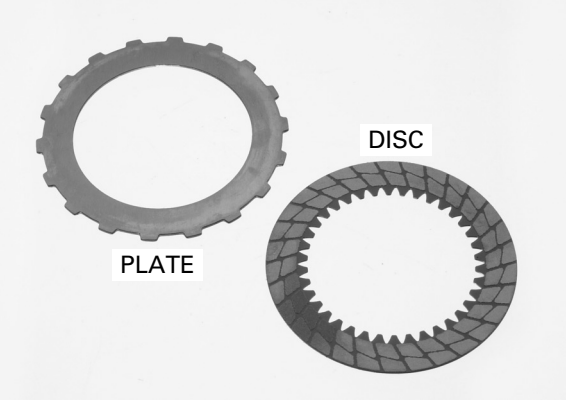


CLUTCH DISC AND PLATE

Replace the clutch discs and plates as a set.

Check the linings of the clutch discs for wear (disc groove disappearance).

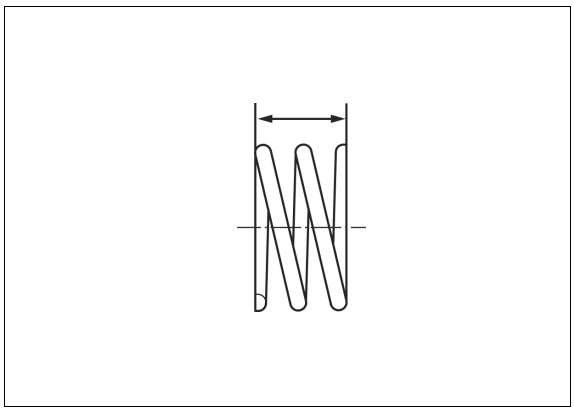
Check the clutch plates for discoloration.



CLUTCH RETURN SPRING

Measure the spring free length.

SERVICE LIMIT: 31.8 mm (1.25 in)



SHIFT CLUTCH/MAINSHAFT ASSEMBLY

MAINSHAFT ASSEMBLY

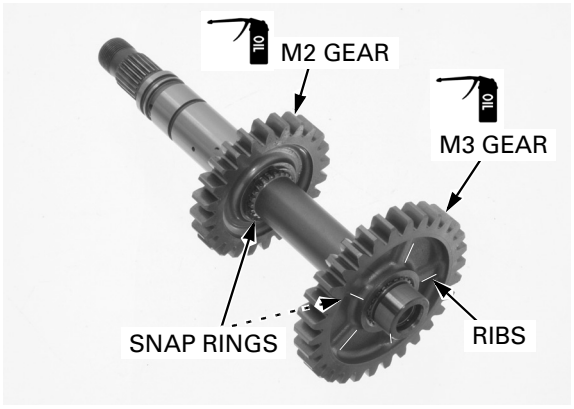
Blow through the oil passages in the mainshaft with compressed air.

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)

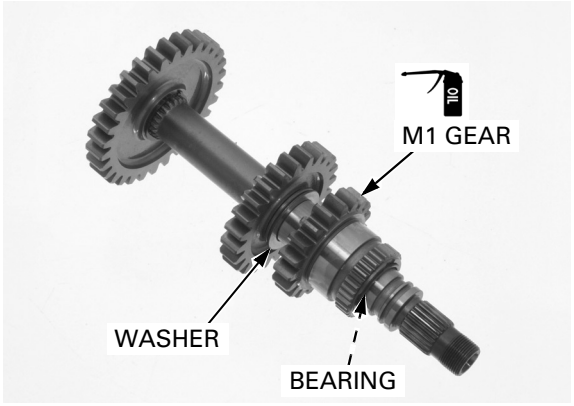


The M1 gear bearing has one roller missing from each cage by design.

- washer
- bearing
- M1 gear

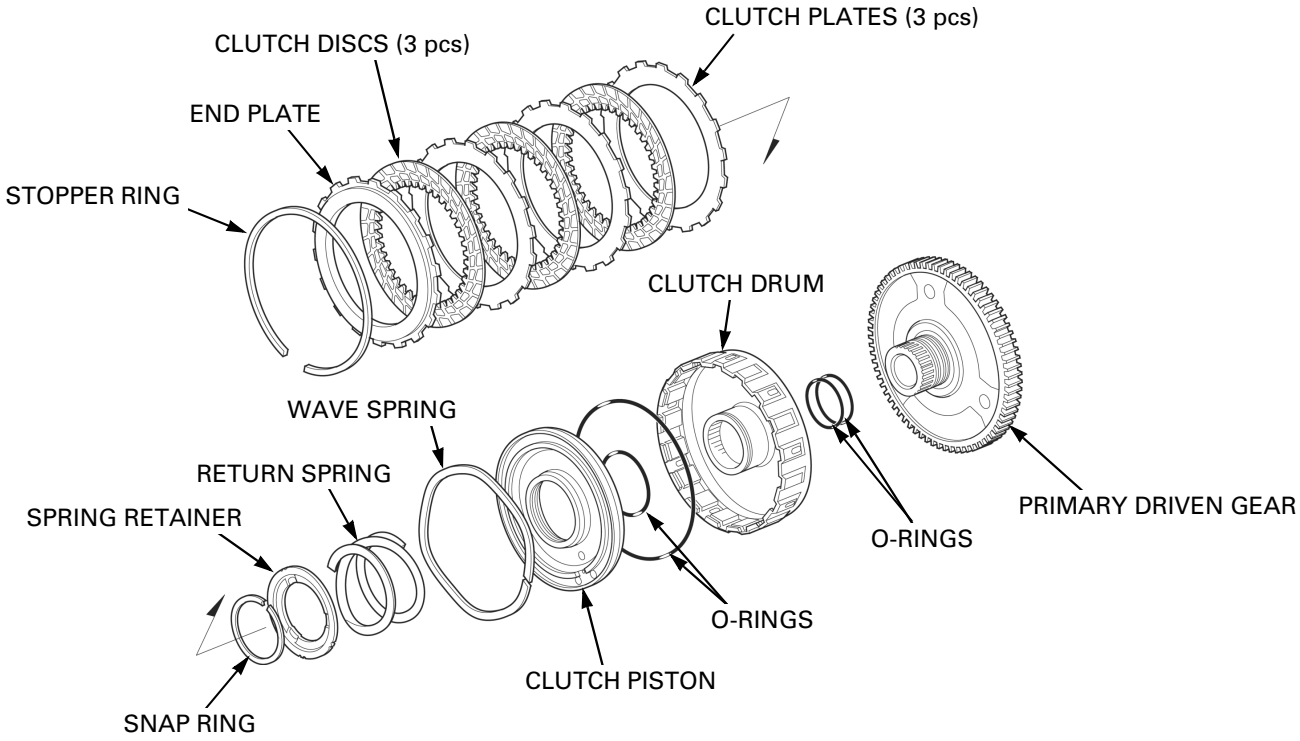
Make sure the snap rings are fully seated in the shaft grooves.

Install the mainshaft assembly with the countershaft (2/3 shift clutch) (page 13-10).

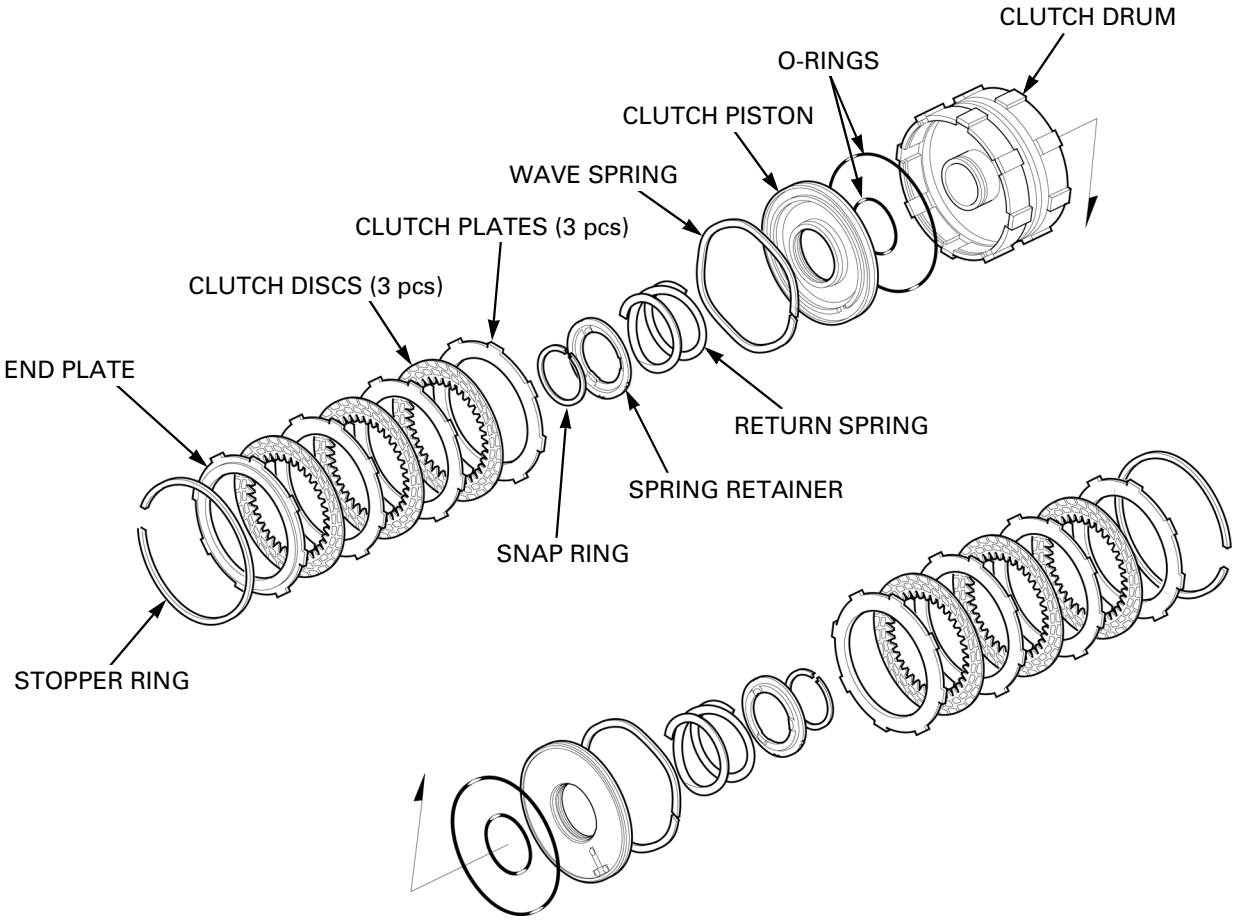


SHIFT CLUTCH ASSEMBLY

1st SHIFT CLUTCH



2nd/3rd SHIFT CLUTCH

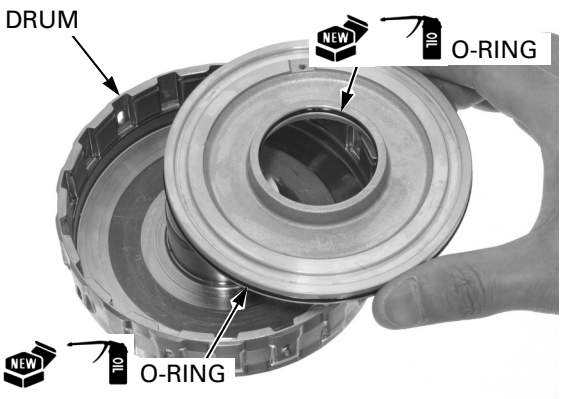


All shift clutches (1st, 2nd and 3rd) use the following procedure.

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.

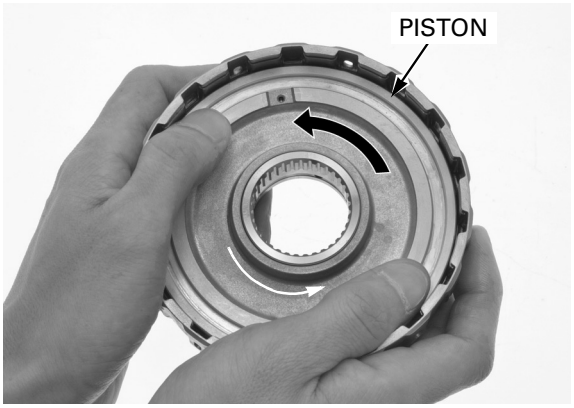
Apply engine oil to new O-rings and install them into the piston groove.

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.



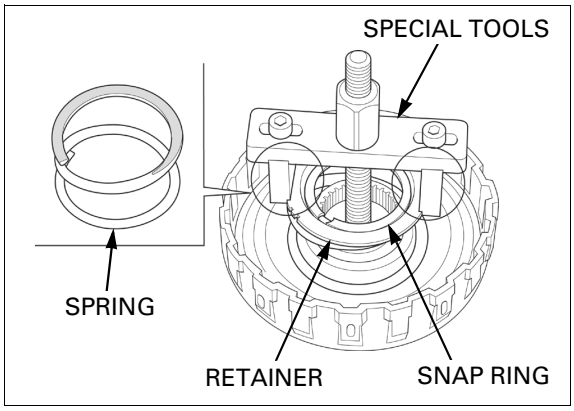
Place the following into the clutch drum.

– return spring
– spring retainer
– snap ring

Install the special tools while adjusting their position carefully (page 14-65).

To prevent loss of spring tension, do not compress more than necessary.

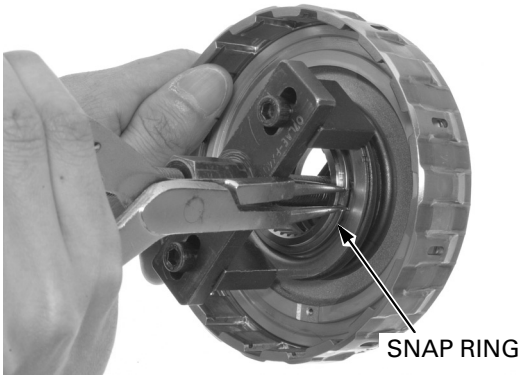
Compress the return spring by tightening the nut.



Align the end gap with the groove (3 places) in the spring retainer.

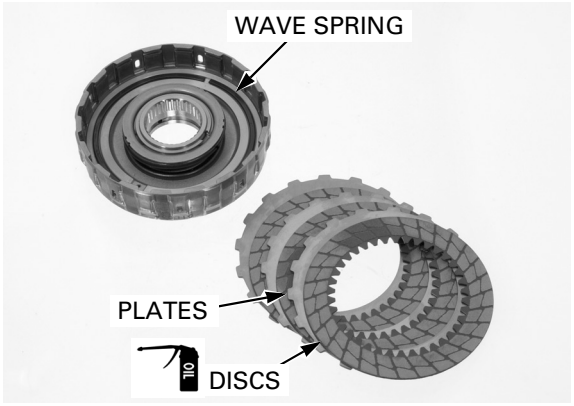
Install the snap ring into the groove in the drum boss properly.

Loosen the special tools and remove them.



Install the wave spring into the piston groove.

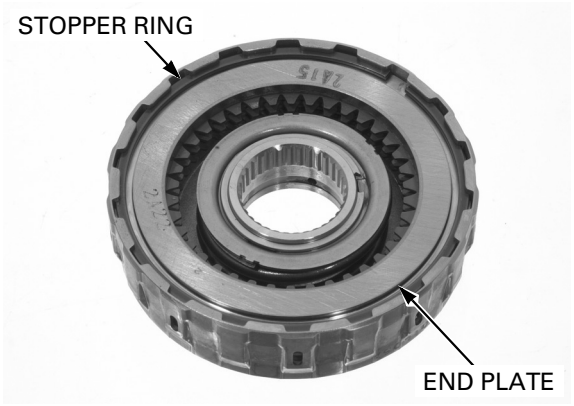
Coat the clutch discs with clean engine oil.
Install the three clutch plates and discs alternately, starting with the plate.



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 14-70).



CLUTCH INITIAL CLEARANCE CHECK

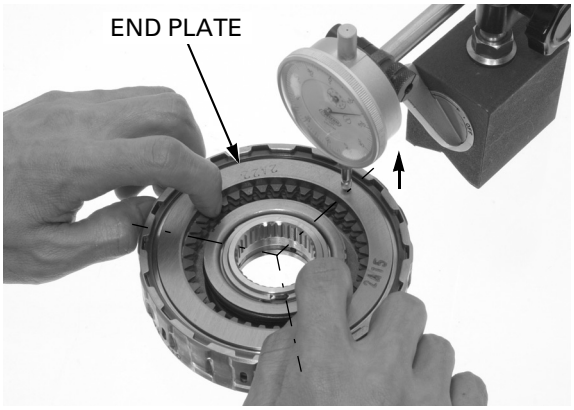
Assemble the shift clutch.

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.



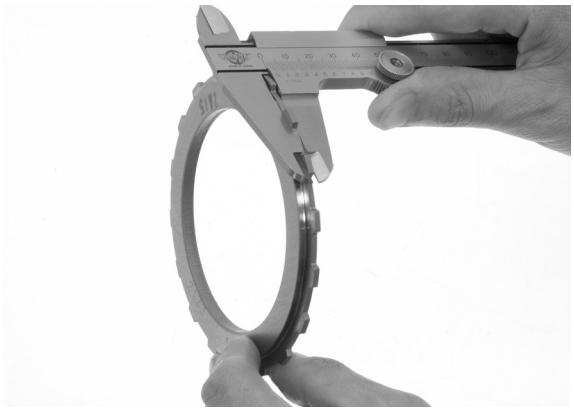
Remove the stopper ring and end plate.

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 14-71).

1st shift clutch: Install the primary drive gear (page 14-72).

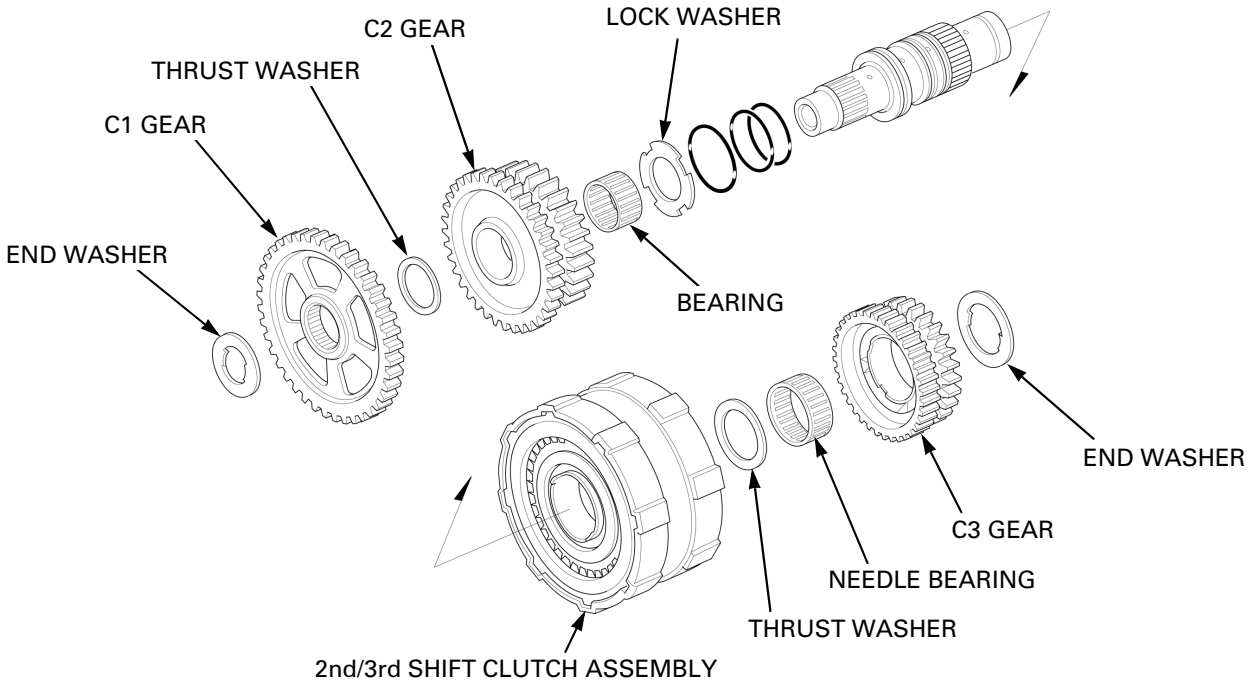
COUNTERSHAFT ASSEMBLY (2nd/3rd Shift Clutch)

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.



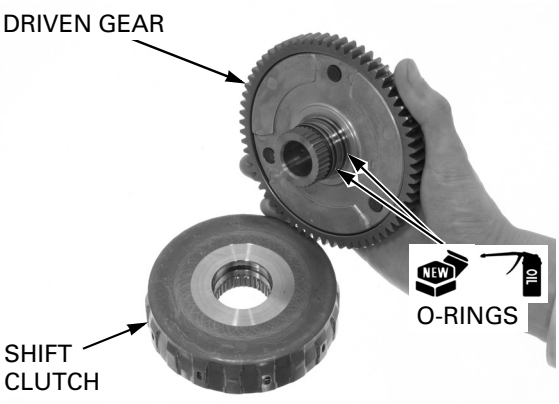
Install the countershaft assembly with the mainshaft (page 13-10).

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.

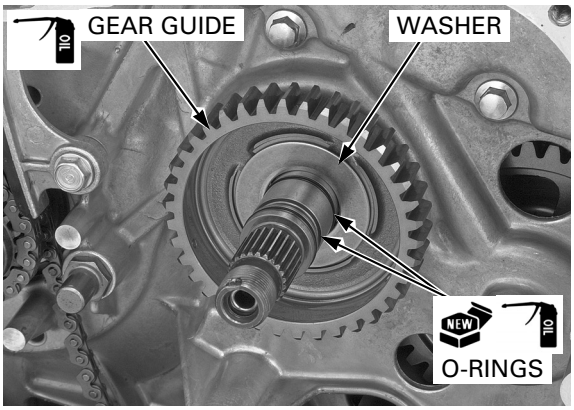
Install the 1st shift clutch assembly (page 14-72).



1st SHIFT CLUTCH INSTALLATION

Install the following:

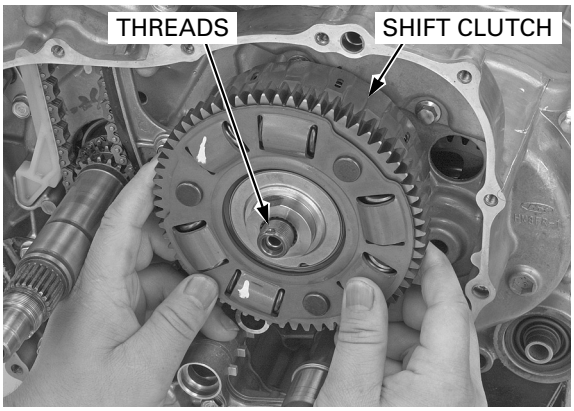
- M1 gear guide (apply engine oil to the gear teeth)
- washer
- new O-rings (apply engine oil)



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).



Apply engine oil to the threads of a new lock nut.
Install the washer and lock nut.

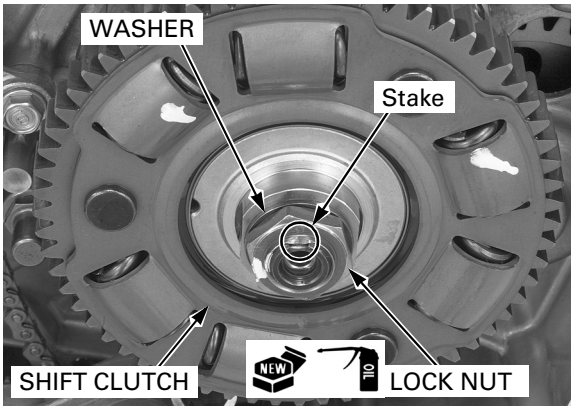
Tighten the lock nut while holding the driven gear boss with an open end wrench (width across flats: 29 mm).

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

Be careful not to damage the mainshaft threads.

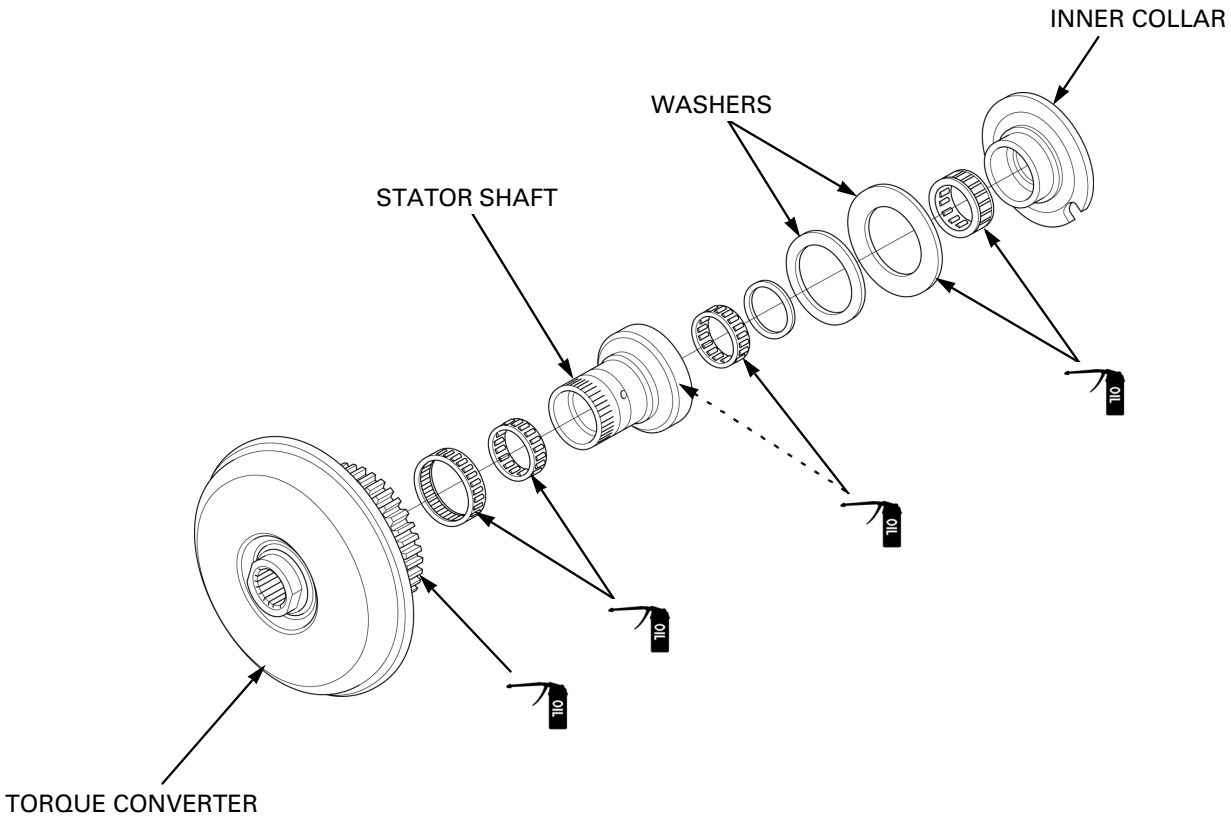
Stake the lock nut into the shaft groove.

Install the torque converter (page 14-73).



TORQUE CONVERTER INSTALLATION

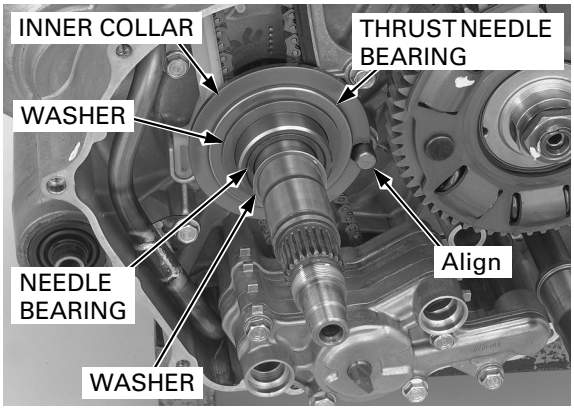
Apply engine oil to the bearings, gear teeth and clutch sprag.



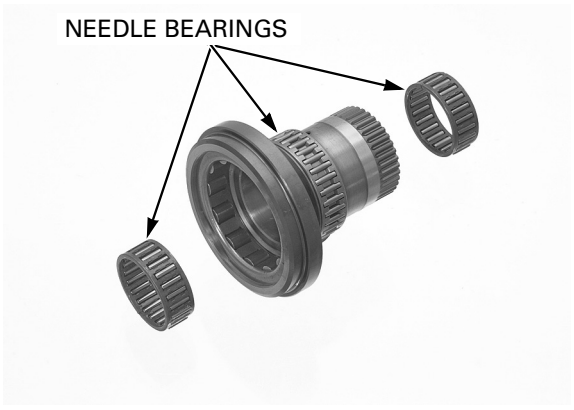
Install the needle bearing into the inner collar.
Install the inner collar and onto the crankshaft by aligning the cutout with the stopper pin.

Install the thrust needle bearing onto the inner collar with the needle roller side facing in.

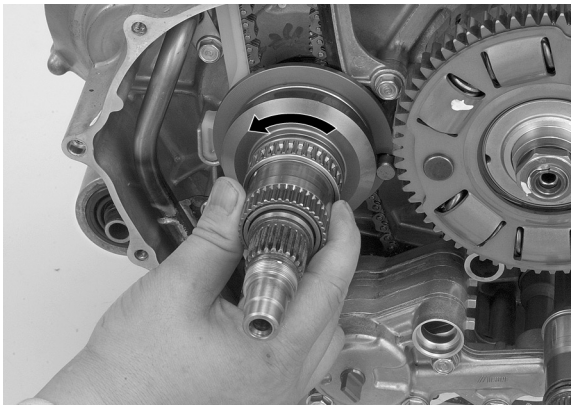
Install the washers.



Install the three bearings onto the stator shaft.



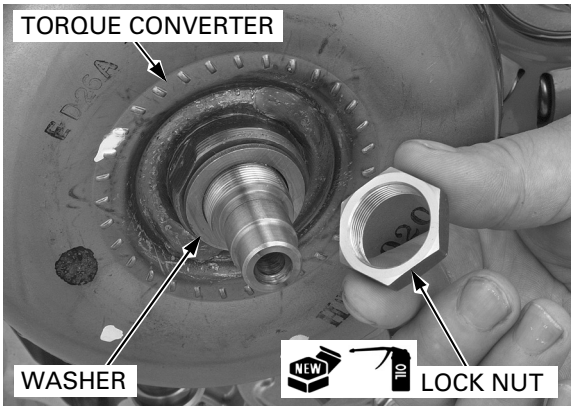
Install the stator shaft while turning it counterclockwise.



Install the torque converter, aligning the splines carefully.

Install the washer.

Apply engine oil to the threads of a new lock nut.



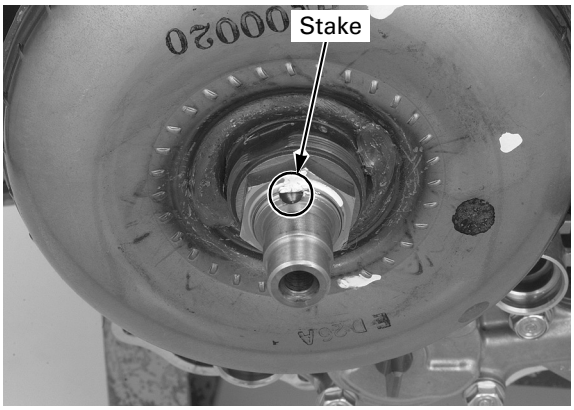
Install the lock nut and tighten it while holding the converter boss with an open end wrench (width across flats: 32 mm).

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

Be careful not to damage the crankshaft threads.

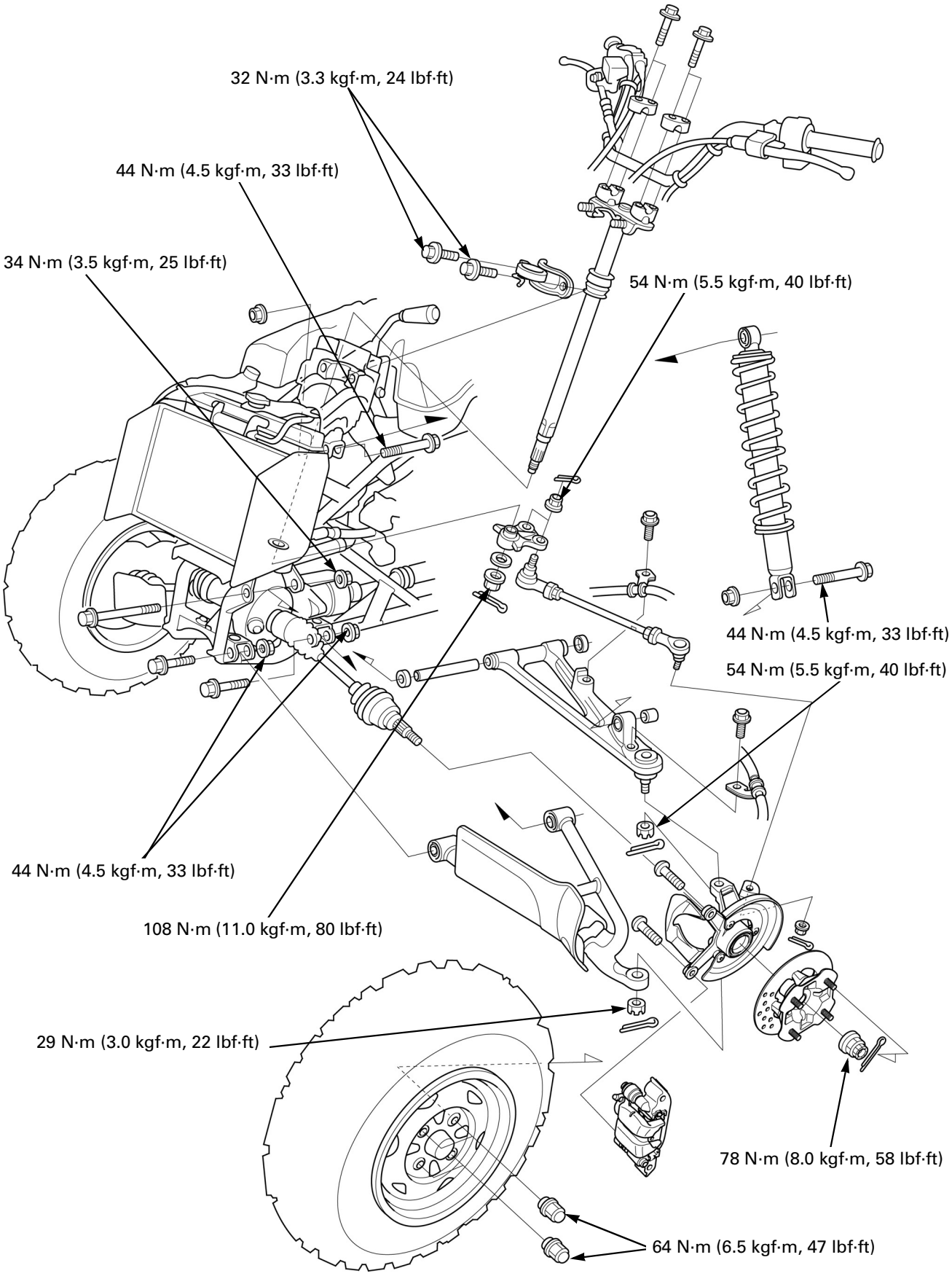
Stake the lock nut into the crankshaft groove.

Install the front crankcase cover (page 14-57)



15. FRONT WHEEL/SUSPENSION/STEERING

SYSTEM COMPONENTS



SERVICE INFORMATION

GENERAL

- A contaminated brake disc or pad reduces stopping power. Discard contaminated pads and clean a contaminated disc with a high quality brake degreasing agent.
- A jack or other support is required to support the vehicle.
- Adjust toe whenever the tie-rod, knuckle or steering shaft are replaced or removed (page 4-23).
- 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.
- For brake system information (page 17-2).
- For handlebar switch inspection (page 23-7).

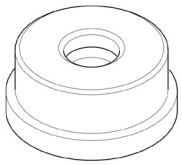
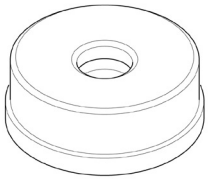
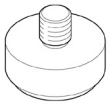
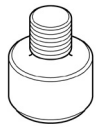
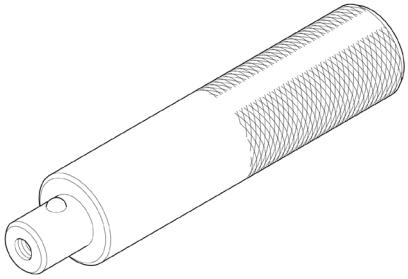
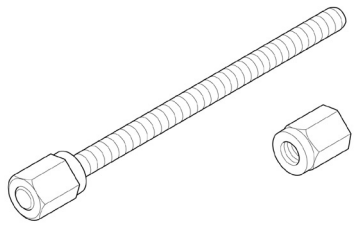
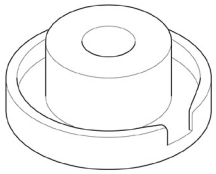
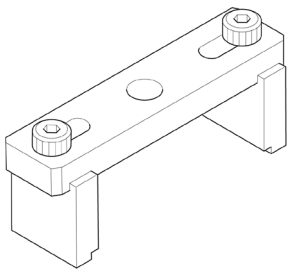
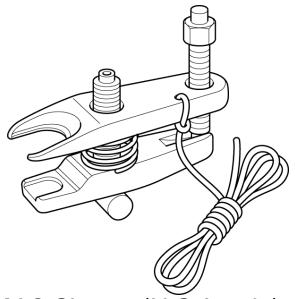
SPECIFICATIONS

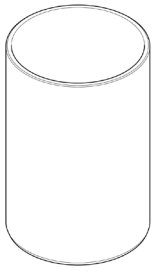
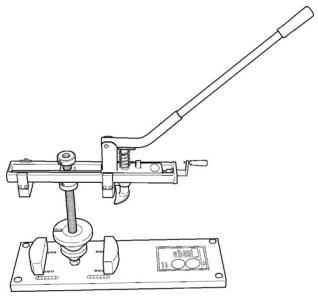
ITEM		STANDARD	SERVICE LIMIT
Minimum tire tread depth		–	4 mm (0.16 in)
Cold tire pressure	Standard	30 kPa (0.30 kgf/cm^2, 4.4 psi)	–
	Minimum	26 kPa (0.26 kgf/cm^2, 3.8 psi)	–
	Maximum	34 kPa (0.34 kgf/cm^2, 5.0 psi)	–
	With cargo	30 kPa (0.30 kgf/cm^2, 4.4 psi)	–
Tie-rod distance between the ball joints		387.5 ± 1 mm (15.26 ± 0.4 in)	–
Toe		Toe-out: 10.9 ± 15 mm (7/16 ± 9/16 in)	–

TORQUE VALUES

Handlebar lower holder nut	39 N·m (4.0 kgf·m, 29 lbf·ft)	Lock nut: replace with a new one.
Front wheel nut	64 N·m (6.5 kgf·m, 47 lbf·ft)	
Front wheel hub nut	78 N·m (8.0 kgf·m, 58 lbf·ft)	Castle nut: tighten to the specified torque and further tighten until its grooves aligns with the cotter pin hole.
Front brake caliper bracket flange bolt	44 N·m (4.5 kgf·m, 33 lbf·ft)	ALOC bolt: replace with a new one
Front brake disc bolt	42 N·m (4.3 kgf·m, 31 lbf·ft)	ALOC bolt: replace with a new one
Front brake splash guard flange bolt	11 N·m (1.1 kgf·m, 8 lbf·ft)	ALOC bolt: replace with a new one
Shock absorber mounting nut	44 N·m (4.5 kgf·m, 33 lbf·ft)	Lock nut: replace with a new one.
Brake hose clamp flange bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	
Upper arm pivot nut	34 N·m (3.5 kgf·m, 25 lbf·ft)	Lock nut: replace with a new one.
Lower arm pivot nut	44 N·m (4.5 kgf·m, 33 lbf·ft)	Lock nut: replace with a new one.
Upper and lower arm ball joint nut	29 N·m (3.0 kgf·m, 21 lbf·ft)	Castle nut: tighten to the specified torque and further tighten until its grooves aligns with the cotter pin hole.
Tie-rod stud joint nut	54 N·m (5.5 kgf·m, 40 lbf·ft)	Lock nut: replace with a new one.
Combination meter stay mounting nut	25 N·m (2.5 kgf·m, 18 lbf·ft)	
Steering shaft end nut	108 N·m (11.0 kgf·m, 80 lbf·ft)	
Steering shaft holder bolt	32 N·m (3.3 kgf·m, 24 lbf·ft)	
Parking lock lever screw	7 N·m (0.7 kgf·m, 5.1 lbf·ft)	
Rear brake lever pivot bolt	1 N·m (0.1 kgf·m, 0.7 lbf·ft)	
Rear brake lever pivot nut	6 N·m (0.6 kgf·m, 4.3 lbf·ft)	
Parking stopper stay screw	2 N·m (0.2 kgf·m, 1.4 lbf·ft)	
Brake light switch (left lever side)	1 N·m (0.1 kgf·m, 0.7 lbf·ft)	Apply locking agent

TOOLS

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 07746-0020200	Pilot, 30 mm 07746-0040700 	Pilot, 16 mm 07746-0041300 
Driver 07749-0010000 	Attachment, 28 x 30 mm 07946-1870100 	Compressor bolt assembly 07GAE-PG40200  or 07GAE-PG4020A (U.S.A. only)
Oil seal driver 07JAD-PH80101 	Clutch compressor attachment 07LAE-PX40100 	Ball joint remover, 28 mm 07MAC-SL00201  07MAC-SL0202 (U.S.A.only) or 07MAC-SL00200 and 07MAC-SL0A300 (U.S.A.only)

Ball joint remover/installer 07WMF-HN00100 	ATV Bead Buster KLS379024  (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

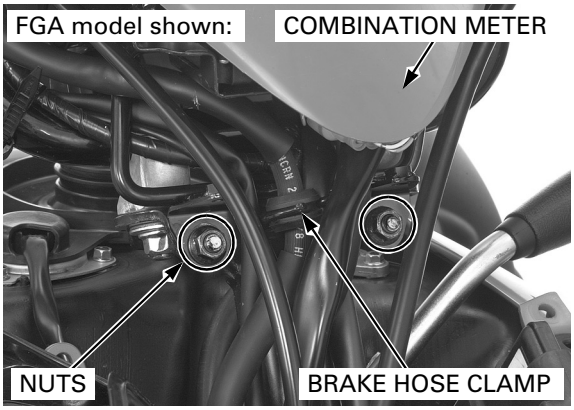
HANDLEBAR

REMOVAL

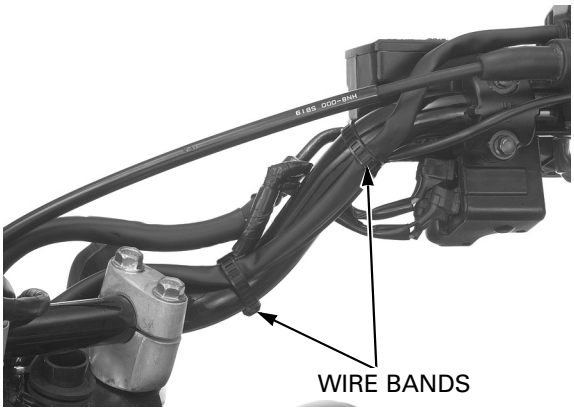
Remove the meter covers (page 3-18).

Remove the following:

– two nuts
– combination meter/stay assembly
– brake hose (from the hose clamp)

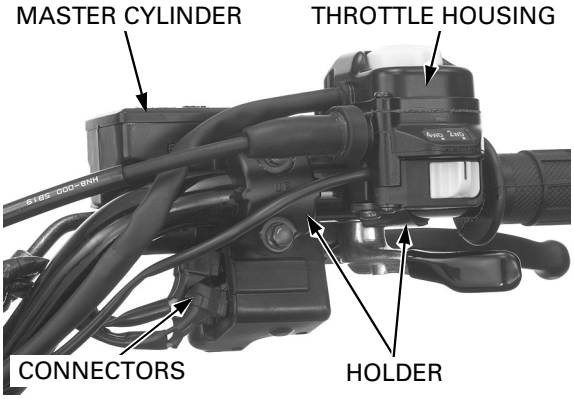


– three wire bands



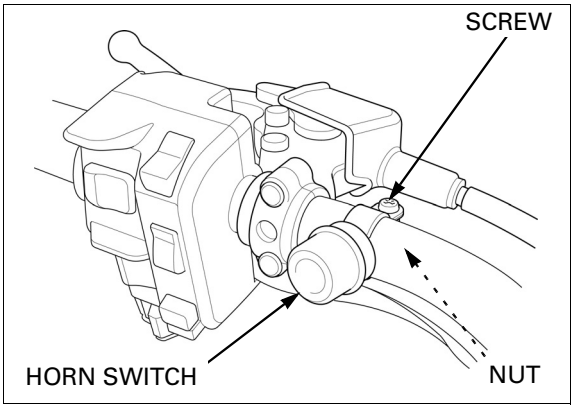
Keep the master cylinder upright to prevent air from entering the hydraulic system.

– two screws
– throttle housing holder
– throttle housing
– connectors
– two bolts
– master cylinder holder
– brake master cylinder

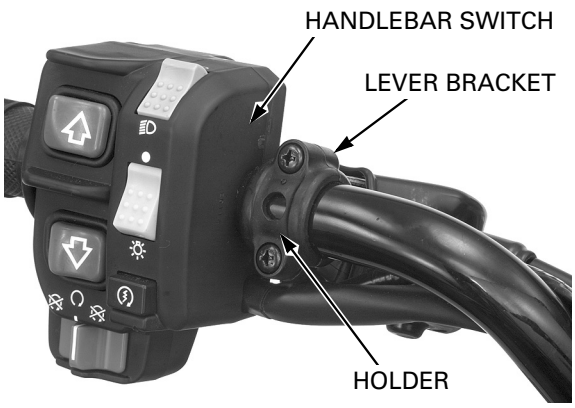


AUSTRALIA type only:

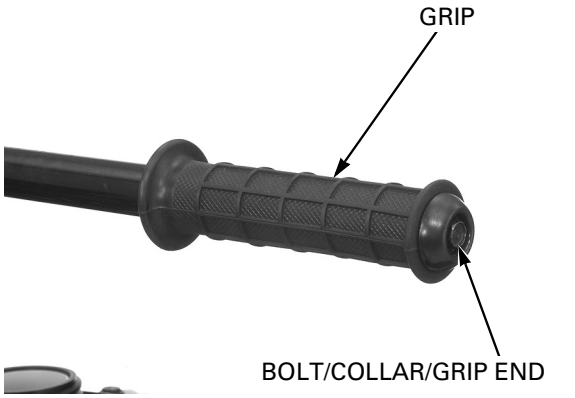
– screw
– nut
– horn switch



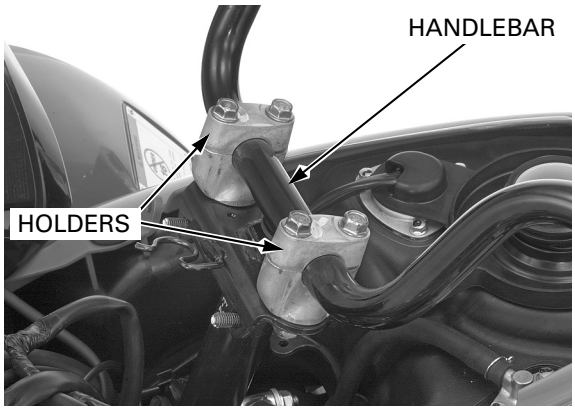
– two screws
– bracket holder
– rear brake lever bracket
– three screws
– handlebar switch



– bolts
– grip ends and collars
– handlebar grips



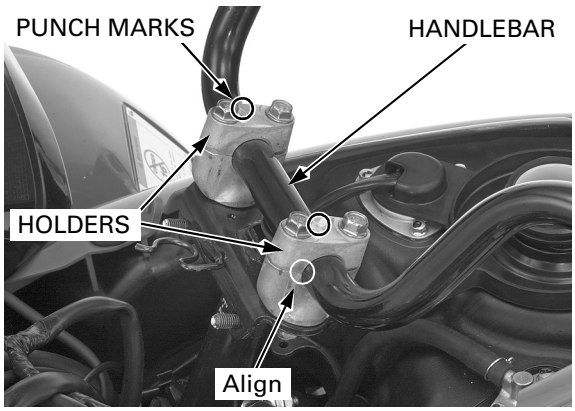
– four bolts
– upper holders
– handlebar



INSTALLATION

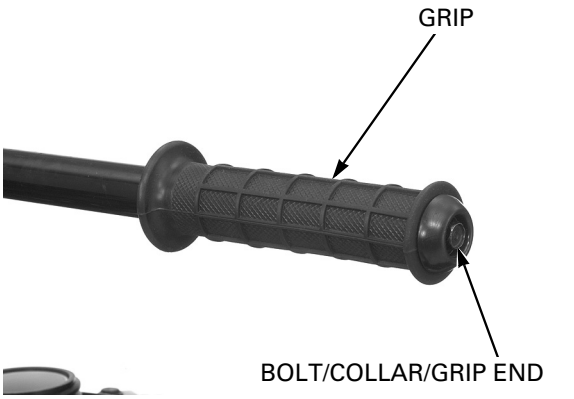
Align the punch mark on the handlebar with the with the top edge of the lower holder.

Install the handlebar and upper holders with the punch marks facing forward. Tighten the front bolts first, then tighten the rear bolts.



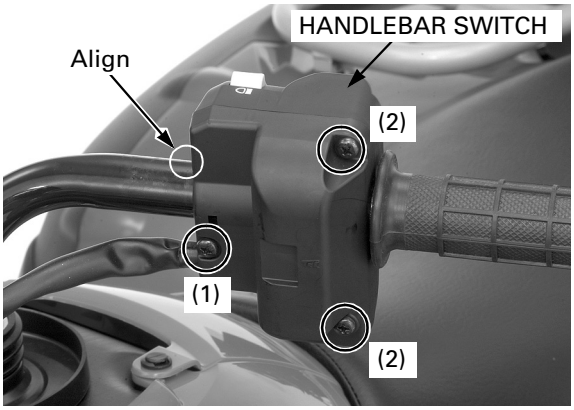
Apply Honda Bond A or Honda Hand Grip Cement (U.S.A only) to the inside surface of each handlebar grip and to the clean surfaces of the handlebar.
Wait 3–5 minutes and install the grips. Rotate the grips for even application of the adhesive.

Install the grip ends with the collars and tighten the bolts.



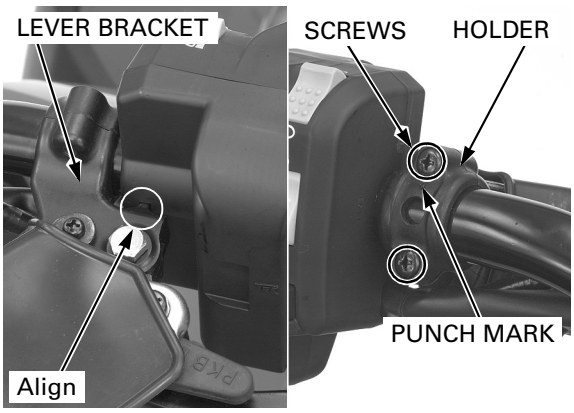
Align the seam of the switch with the punch mark on the handlebar.

Install the left handlebar switch, and tighten the inside screw (1) first, then tighten the outside screws (2).



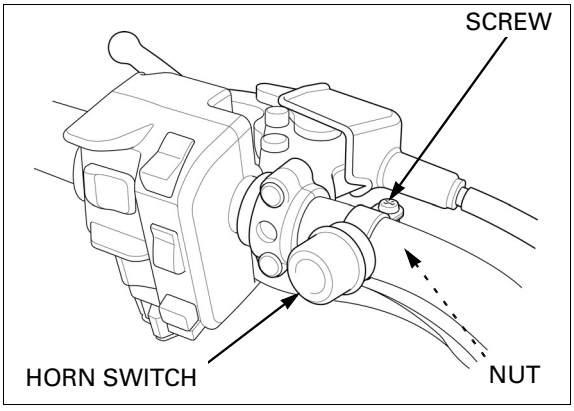
Align the locating pin on the bracket with the hole in the switch housing.

Install the brake lever bracket and holder with the punch mark facing up. Tighten the upper screw first, then tighten the lower screw.



AUSTRALIA type only:

Install the horn switch and tighten the screw and nut.

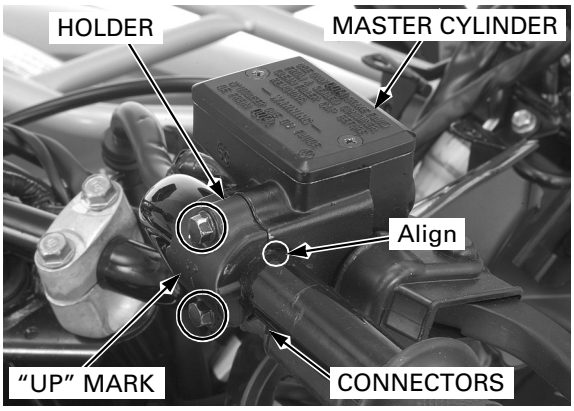


Align the edge of the master cylinder with the punch mark on the handlebar.

Install the brake master cylinder and holder with the "UP" mark facing up. Tighten the upper bolt first, then tighten the lower bolt.

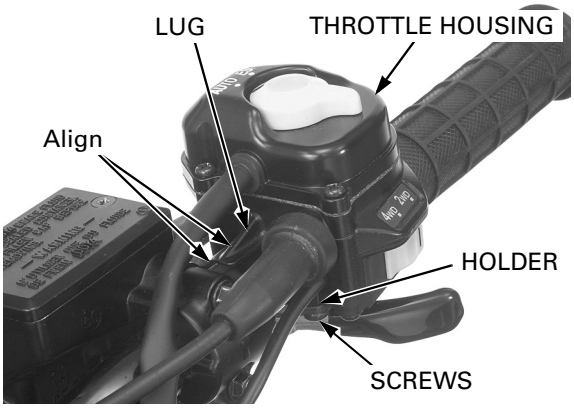
TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Connect the connectors to the brake and brake light switches.

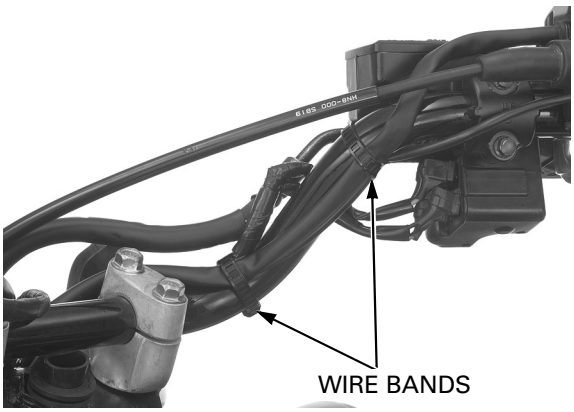


Align the lug on the throttle housing with the mating line of the master cylinder.

Install the throttle housing and holder against the master cylinder. Tighten the front screw first, then tighten the rear screw.



Secure the switch wires with the three wire bands.

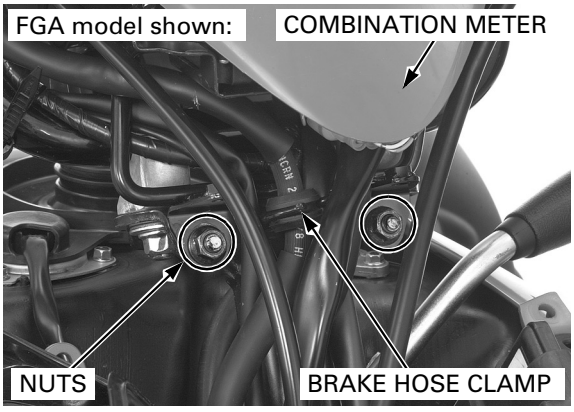


Route the wires and hose properly (page 1-20).

Install the combination meter/stay and tighten the two nuts.

TORQUE: 25 N·m (2.5 kgf·m, 18 lbf·ft)

Install the brake hose into the clamp.



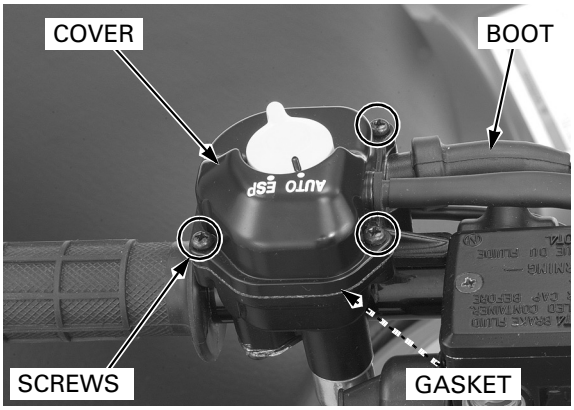
THROTTLE HOUSING

DISASSEMBLY

Remove the following:

– three screws
– throttle housing cover
– gasket

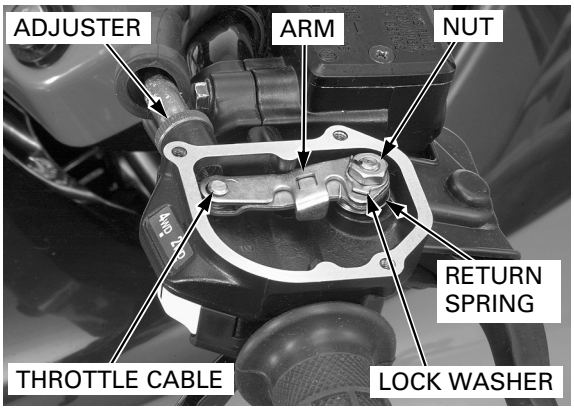
Slide the boot off the throttle cable adjuster.



Loosen the lock nut and cable adjuster.

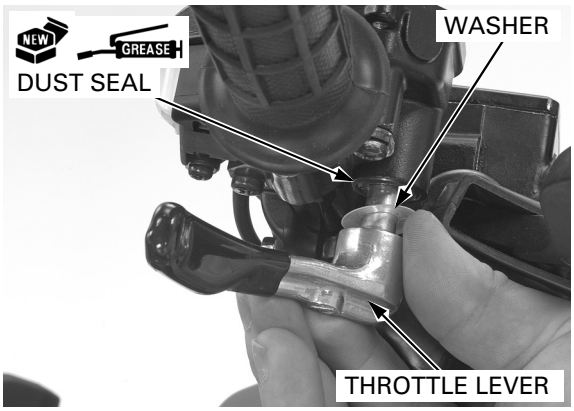
Bend down the lock washer tab and remove the following:

– 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.

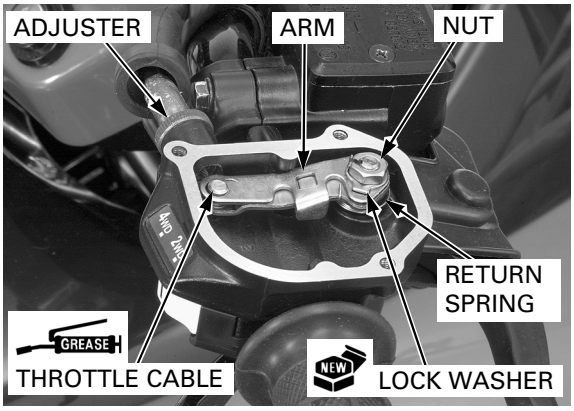


Apply grease to the throttle lever pivot in the housing and to the throttle cable end.

Connect the cable to the throttle arm.

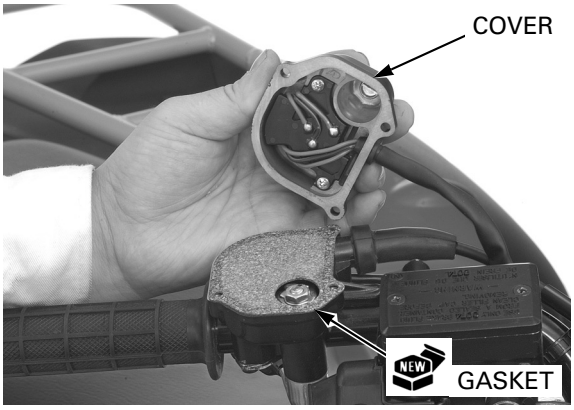
Install the washer onto the throttle lever and insert the throttle lever into the throttle housing.
Install the throttle arm with the spring over the lever pivot by aligning the flat surfaces as shown.

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.

Adjust the throttle lever free play (page 4-4).



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 (U.S.A. only)

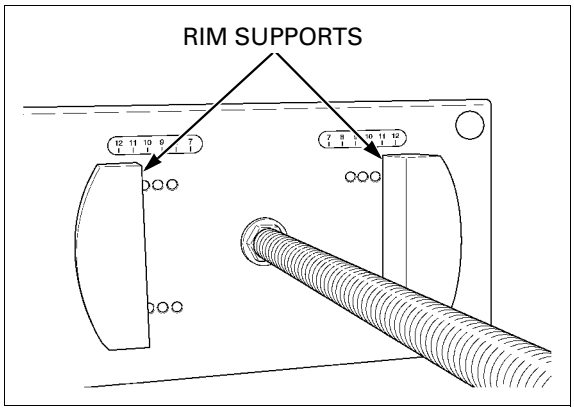
NOTE:

- This service requires the ATV Bead Buster (KLS379024).
- Remove and install the tire from the rim side opposite the valve stem.

Remove the core from the valve stem.

Use a pneumatic tire changer or equivalent to remove the tire from the rim. If a tire changer is not available, rim protectors and tire irons may be used.

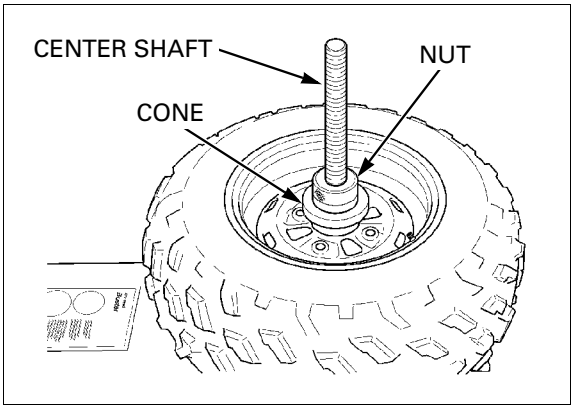
Adjust the bottom rim supports to the proper rim size. Align the flat side of the support with the corresponding rim size indicator.



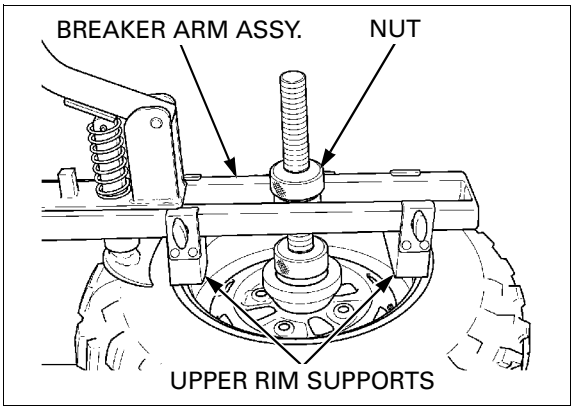
Use only water as a lubricant when removing or mounting tires. Soap or some mounting lubricants may leave a slipperly residue which can cause the tire to shift on the rim and lose tire pressure during riding.

Lube the bead area of the tire with water, pressing down on the tire sidewall/bead area in several places to allow the water to run into and around the bead.

Place the wheel assembly over the center shaft and use the correct size cone to keep the wheel centered during operation.
Install the bottom hold down nut, bearing side down, and finger tighten it so the wheel can rotate freely during operation.

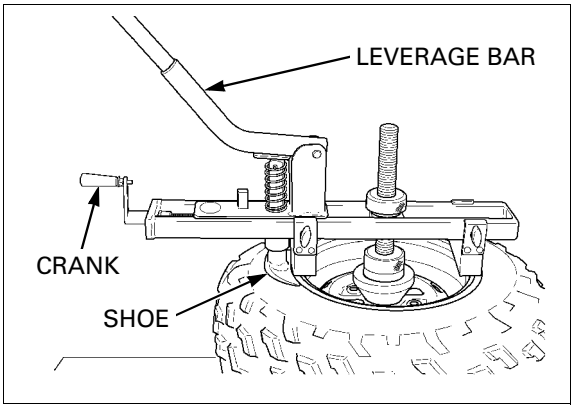


Install the breaker arm assembly over the center shaft and adjust the upper rim supports to fit the outside rim diameter.
Install the top hold down nut and tighten it finger tight.



Failure to back out the breaker shoe two turns will cause the shoe to scratch the bead lock, which may cause the tire to leak.

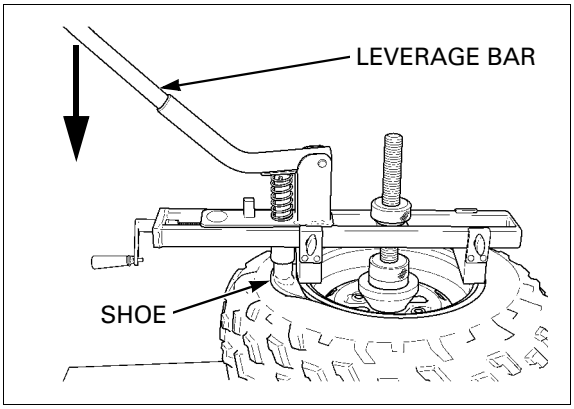
Pull the leverage bar down so the breaker shoe is just below the rim lip. Turn the crank to fully push the breaker shoe between the tire bead and rim. Once the shoe contacts the rim, back the crank out two turns to allow the shoe to clear the rim's bead lock.



Push down on the leverage bar to push the tire bead over the bead lock. Use only short strokes on the handle. While the shoe is still engaged, turn the wheel as far as it will go between strokes as you break the bead around the rim.

Remove the breaker arm assembly and flip the wheel over. Install the breaker arm assembly, adjust the shoe properly and break the other bead by following the above procedures.

Remove the tire from the rim using a tire changing machine or tire irons and rim protectors.

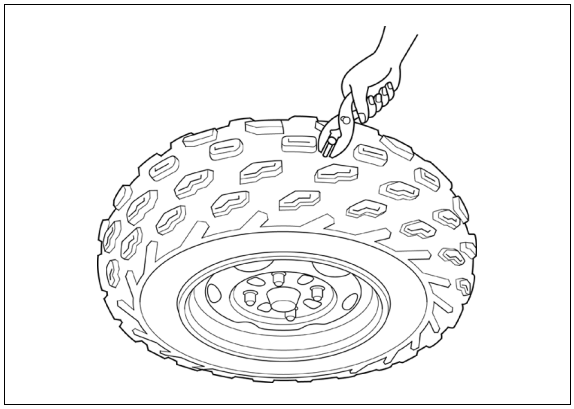


TIRE REPAIR

NOTE:

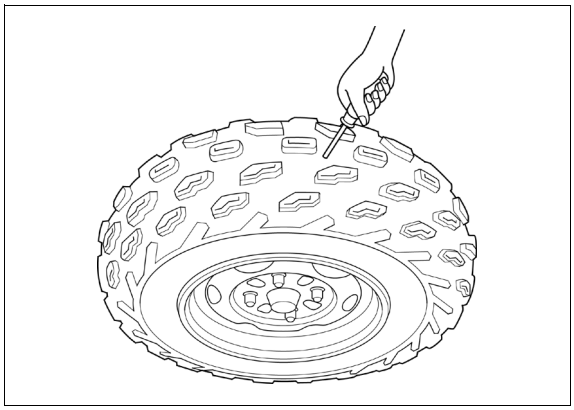
- Use the manufacturer's instructions for the tire repair kit you are using. If your kit does not have instructions, use the procedures described below.

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.



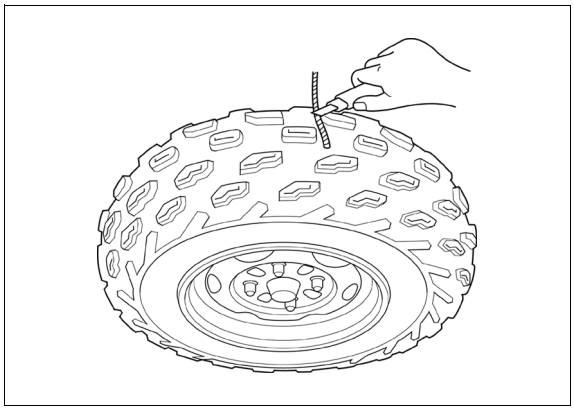
Insert and center a rubber plug through the eye of the inserting needle.

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.

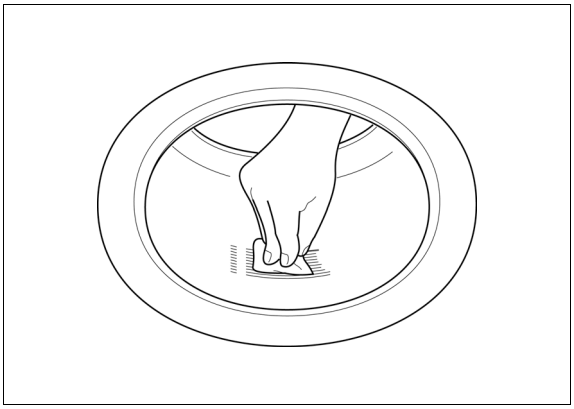


Allow the repair to dry. Drying time will vary with air temperature. Refer to the tire repair kit manufacturer's recommendations.

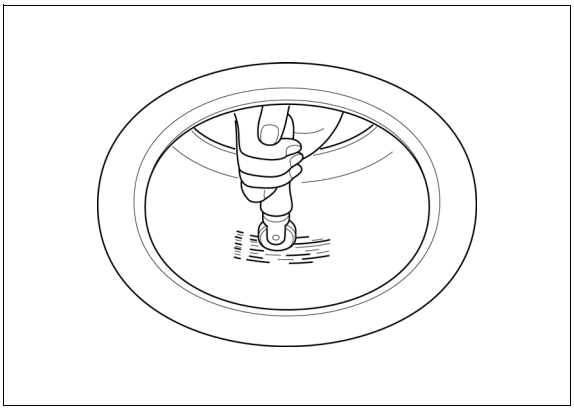
Inflate the tire and test the seal by dabbing a small amount of cement around the plug. Escaping air will cause a bubble in the cement. If there is leakage, remove the tire (page 15-11) and apply a cold patch to the inside of the tire.

If a plug has been inserted, trim it even with the inner tire surface.

Temporarily place a rubber patch that is at least twice the size of the puncture over the injury. Make a mark around the patch, slightly larger than the patch itself.
Rough the area marked inside the tire with a tire buffer or a wire brush. Clean the rubber dust from the buffed area.



Apply cement over the area marked and allow it to dry until tacky.
Do not touch the cement with dirty or greasy hands.
Remove the lining from the patch and center over the injury.
Press the patch against the injury using a special roller.



ASSEMBLY

Install the tire onto the rim, where the rim shoulder width is the narrowest, to simplify installation.

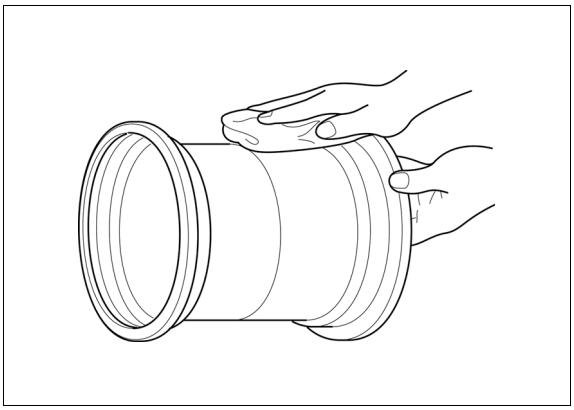
Clean the rim bead seat and flanges.

Use only water as a lubricant when removing or mounting tires. Soap or some mounting lubricants may leave a slippery residue which can cause the tire to shift on the rim and lose air pressure during riding.

Apply clean water to the rim flanges, bead seat and base.

Install the valve core in the valve stem.
Install the tire with the arrow mark facing in the normal rotating direction.
Inflate the tire to seat the tire bead.

Deflate the tire. Wait 1 hour and inflate the tire to the specified pressure.



RECOMMENDED TIRE PRESSURE:
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)**

Check for air leaks and install the valve cap.

WHEEL HUB AND KNUCKLE

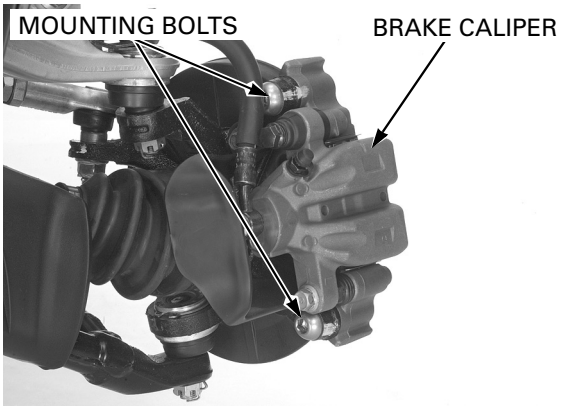
REMOVAL

Remove the front wheel (page 15-11).

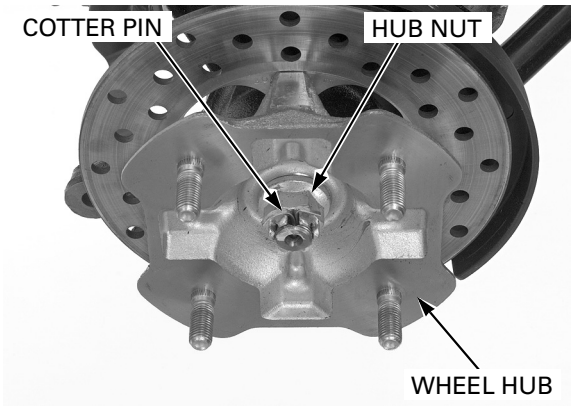
Support the caliper so that it does not hang from the brake hose. Do not twist or bend the brake hose.

Remove the following:

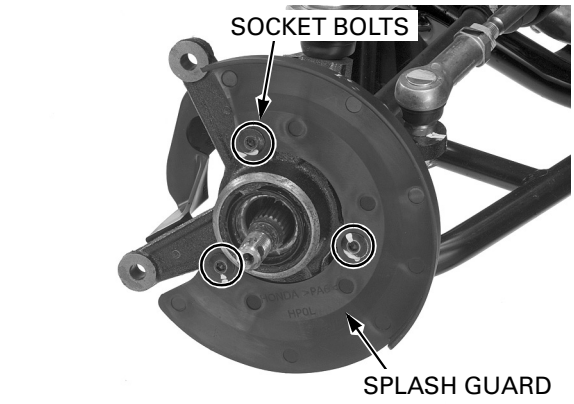
– mounting bolts
– front brake caliper



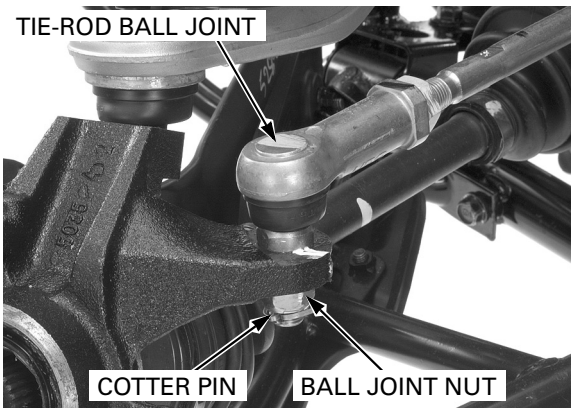
– cotter pin
– hub nut
– wheel hub



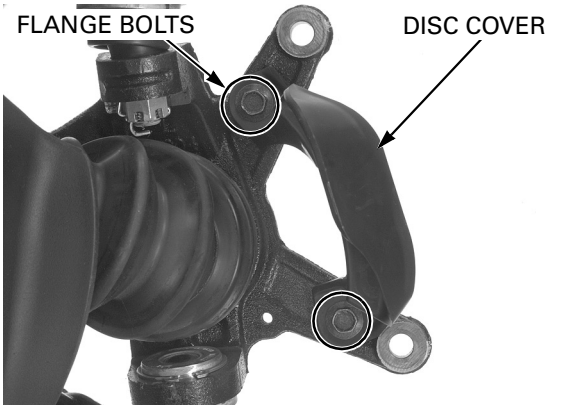
– socket bolts
– splash guard



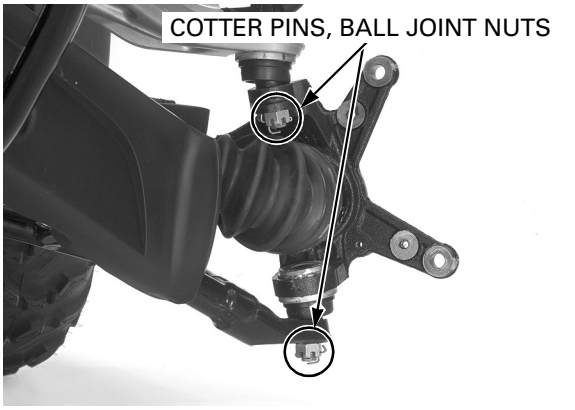
Remove the cotter pin from the tie-rod ball joint stud.
Remove the ball joint nut by holding the joint stud flat surfaces.



Remove the brake disc cover flange bolts and brake disc cover.



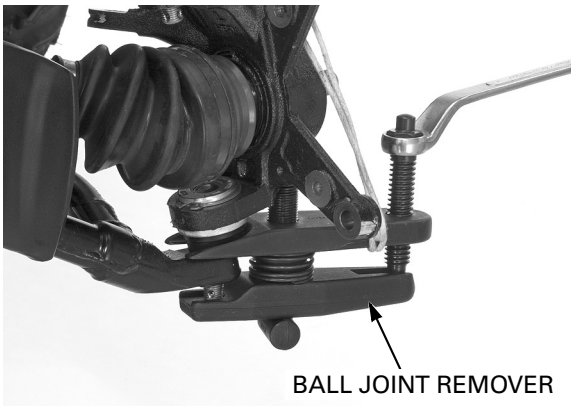
Remove the cotter pins from the ball joint studs. Loosen the ball joint nuts, but do not remove them yet.



Release the ball joints, using the special tool according to the following instructions.

TOOL:

Ball joint remover, 28 mm	**07MAC-SL00201 or 07MAC-SL0202 (U.S.A. only) or 07MAC-SL00200 and 07MAC-SL0A300 (U.S.A. only)**

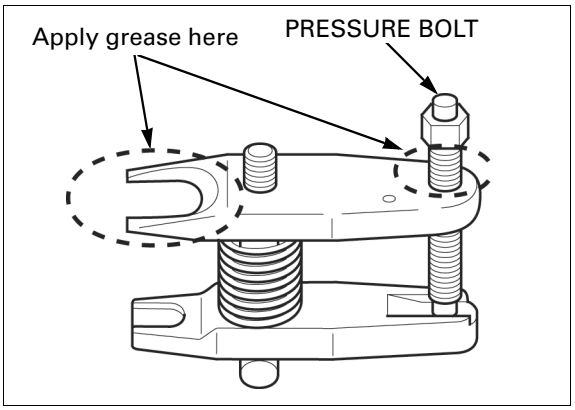


Apply grease to the ball joint remover at the point shown.
This will ease installation of the tool and prevent damage to the pressure bolt threads.

Insert the jaws carefully, making sure that you do not damage the ball joint boot.

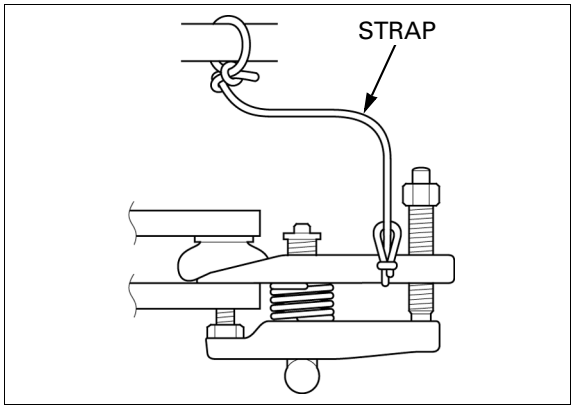
If necessary, apply penetrating type lubricant to loosen the ball joint.

Adjust the jaw spacing by turning the pressure bolt.



To prevent the tool from dropping, tie the strap on a neighboring solid part such as the lower arm, tie-rod, etc. before operation.

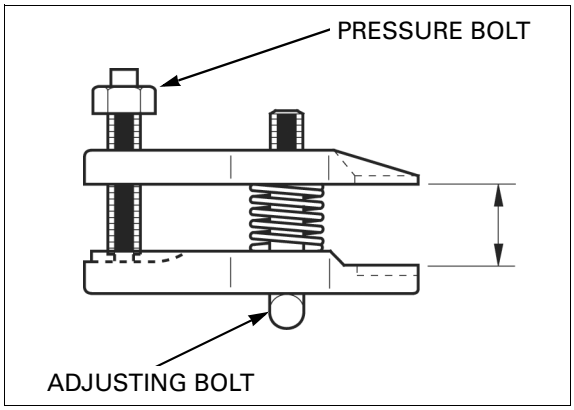
- Do not tie the strap on the brake hose, brake pipe, rubber boot, and other parts that can be damaged easily.



Once the tool is in place, turn the adjusting bolt as necessary to make the jaws parallel.
Then hand-tighten the pressure bolt and recheck the jaws to make sure they are still parallel.

Tighten the pressure bolt with a wrench until the ball joint stud pops loose.

Remove the ball joint nuts and the knuckle from the upper and lower arms.

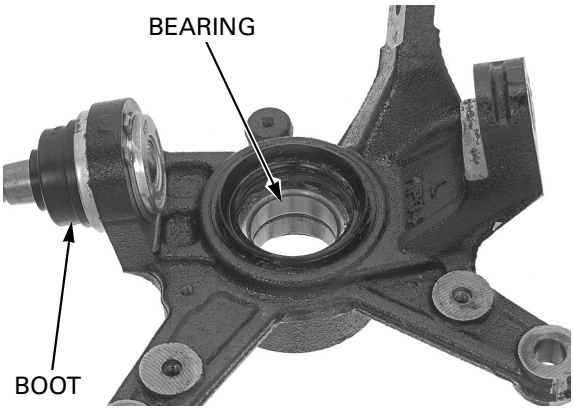


INSPECTION

Turn the inner race of the bearing in the knuckle with your finger. The bearings should turn smoothly and quietly. Also check that the bearing outer race fits tightly knuckle.

Inspect the knuckle for damage or cracks.

Inspect the ball joint boot for tears or other damage by moving the ball joint stud.
It should move freely and smoothly.

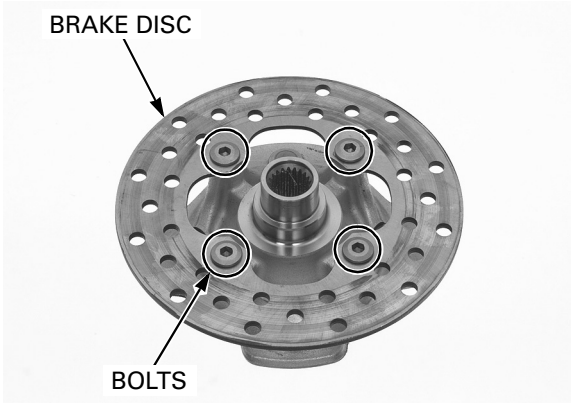


BRAKE DISC REPLACEMENT

Remove the four socket bolts and brake disc from the wheel hub.

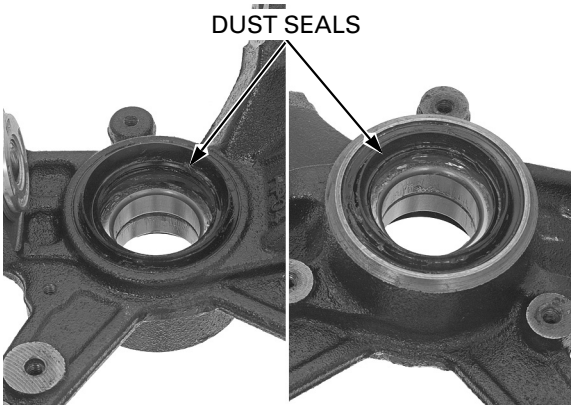
Install a new brake disc with new socket bolts and tighten the bolts.

TORQUE: 42 N·m (4.3 kgf·m, 31 lbf·ft)



BEARING REPLACEMENT

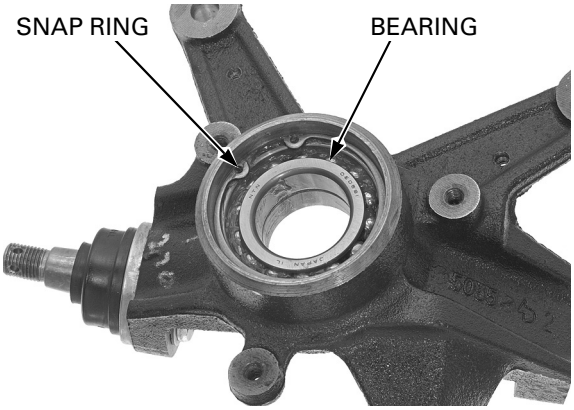
Remove the dust seals from the knuckle.



Remove the snap ring and drive the bearings out of the knuckle.

TOOLS:

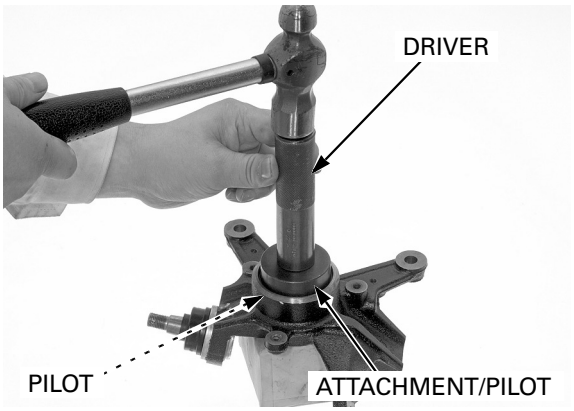
Driver	**07749-0010000**
Attachment, 42 x 47 mm	**07746-0010300**
Pilot, 30 mm	**07746-0040700**



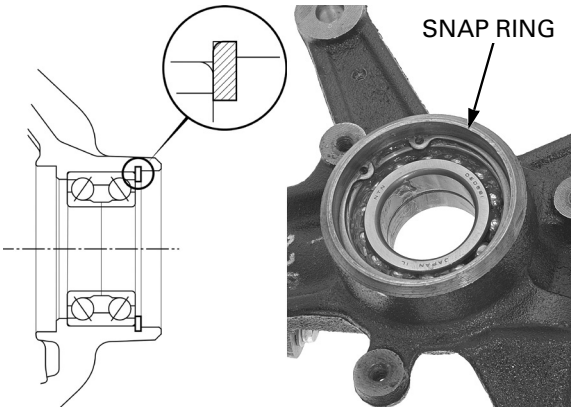
Pack the cavities of a new bearings with grease. Drive in the bearing squarely with the marked side facing up until they are fully seated.

TOOLS:

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 side facing in.

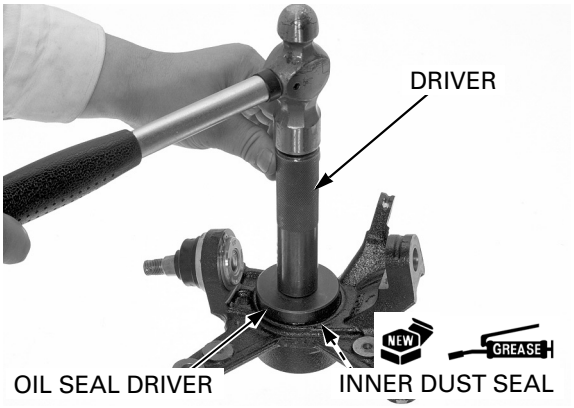


Apply grease to a new outer dust seal lip and install seal using the same tools until it is flush with the knuckle end.

Apply grease to the lips of a new inner dust seal and install seal until it is flush with the knuckle end, being careful not to damage the lip.

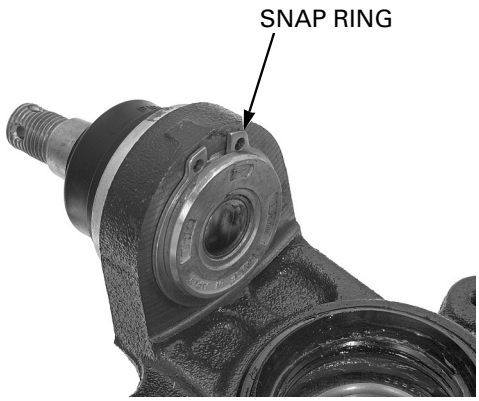
TOOLS:

Driver	**07749-0010000**
Oil seal driver	**07JAD-PH80101**



BALL JOINT REPLACEMENT

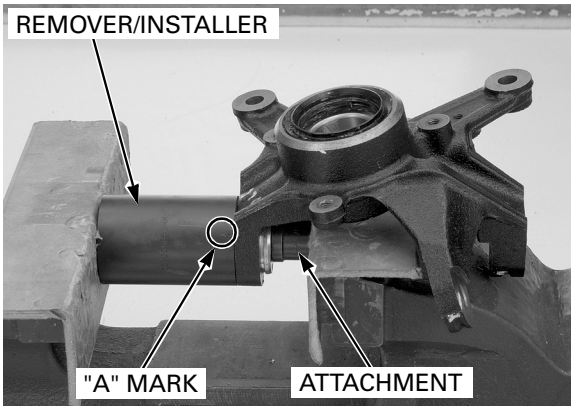
Remove the snap ring from the ball joint.



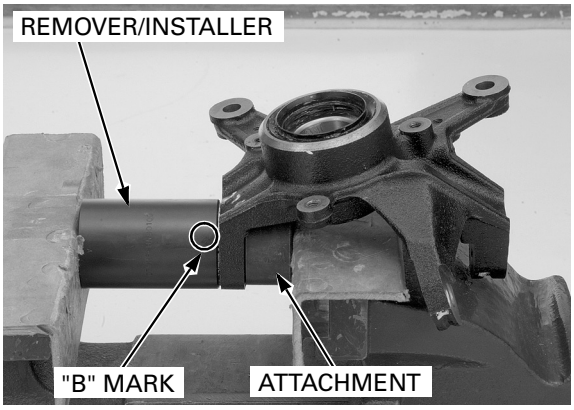
Set the knuckle and special tools with "A" mark side of the remover/installer facing to the ball joint in the vise as shown.
Press the ball joint out of the knuckle.

TOOLS:

Ball joint remover/installer	**07WMF-HN00100**
Attachment, 28 x 30 mm	**07946-1870100**



Set the knuckle and special tools with "B" mark side of the remover/installer facing to the ball joint in the vise as shown.
Press the ball joint into the knuckle until it is fully seated.



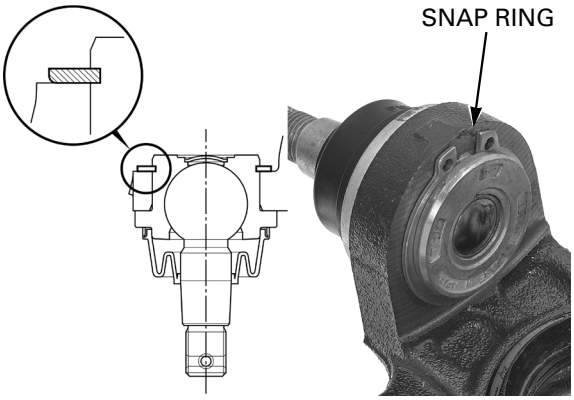
TOOLS:

Ball joint remover/installer	**07WMF-HN00100**
Attachment, 20 mm I.D.	**07746-0020400**

NOTICE

If you feel strong resistance when compressing the vise, stop. Reset the attachment of the tool so that the ball joint head can go into the hollow of the attachment and try again.

Install the snap ring with the chamfered edge facing in.



INSTALLATION

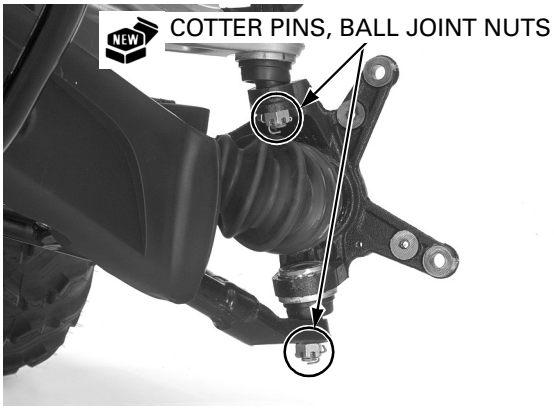
Install the knuckle onto the drive shaft, and lower and upper arms with the ball joint nuts.

Install the tie-rod ball joint into the knuckle with a new nut.

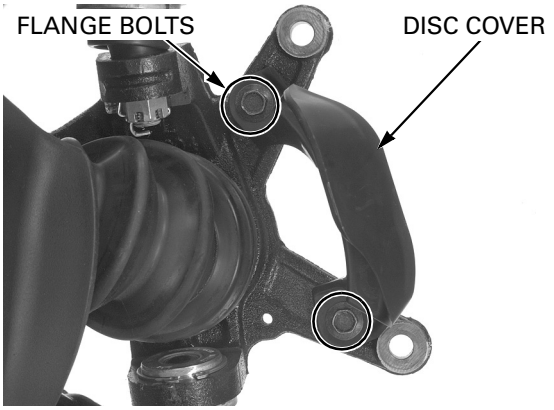
Tighten each arm ball joint nut to the specified torque and further tighten until its grooves align with the cotter pin hole.

TORQUE: 29 N·m (3.0 kgf·m, 21 lbf·ft)

Install new cotter pins.



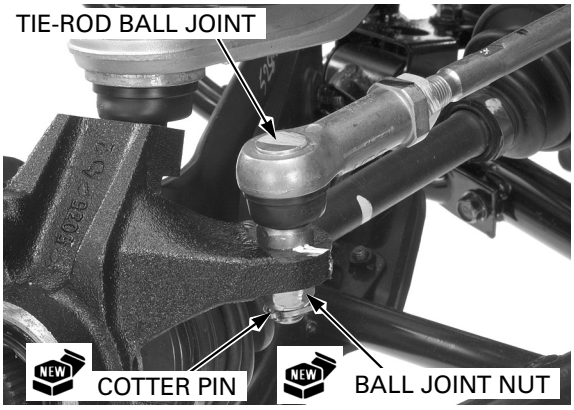
Install the brake disc cover and tighten the brake disc cover flange bolts.



Tighten the tie-rod ball joint nut by holding the joint stud flat surfaces.

TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)

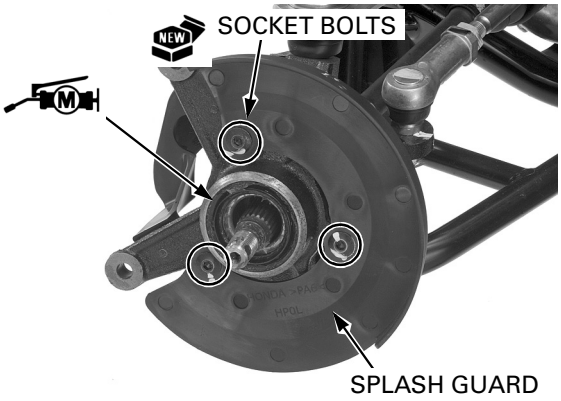
Install a new cotter pin.



Apply molybdenum disulfide grease to the drive shaft splines.

Install the splash guard with new bolts and tighten the bolts.

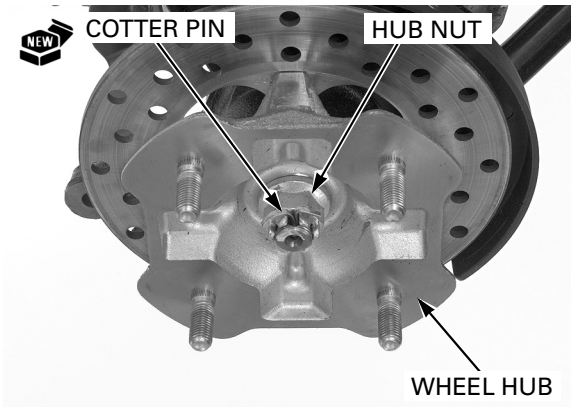
TORQUE: 11 N·m (1.1 kgf·m, 8 lbf·ft)



Install the wheel hub and hub nut.
Tighten the nut to the specified torque and further tighten until its grooves align with the cotter pin hole.

TORQUE: 78 N·m (8.0 kgf·m, 58 lbf·ft)

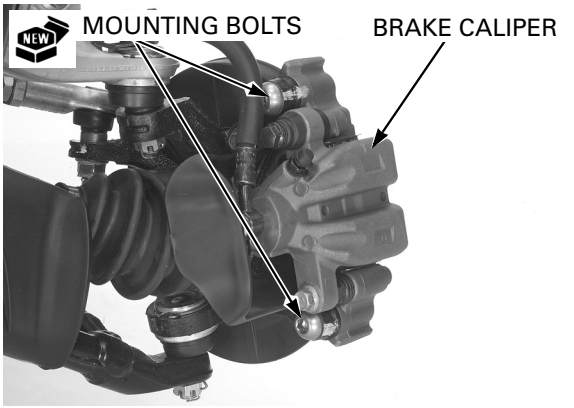
Install a new cotter pin.



Install the front brake caliper with new mounting bolts and tighten the bolts.

TORQUE: 44 N·m (4.5 kgf·m, 32 lbf·ft)

Install the front wheel (page 15-11).

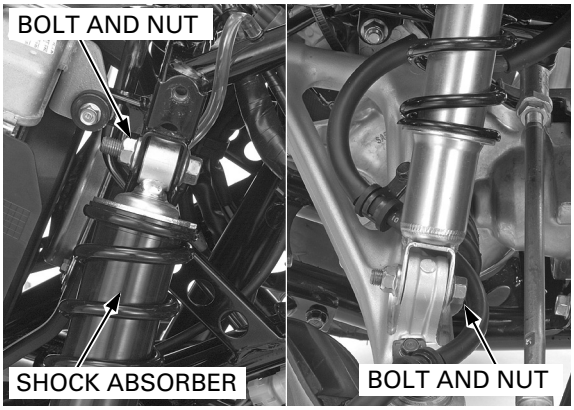


FRONT SHOCK ABSORBER

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

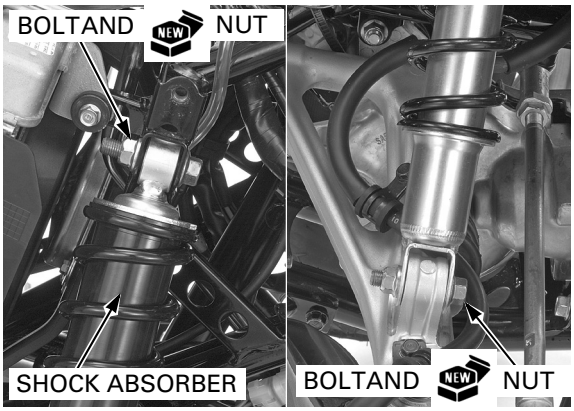
Check the upper pivot bushing for wear or damage.
Check the damper unit for leaks or other damage.
Replace the shock absorber assembly if necessary.

For lower pivot bearing inspection and replacement (page 15-26).

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)



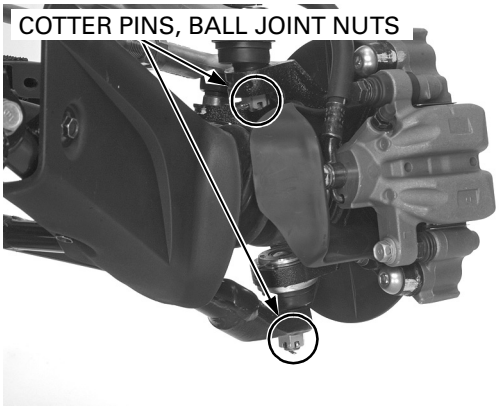
SUSPENSION ARM

REMOVAL

Remove the front carry pipe (page 3-10)
Remove the front wheel (page 15-11).

Remove the cotter pins from the ball joint studs.

Loosen the ball joint nuts, but do not remove them yet.

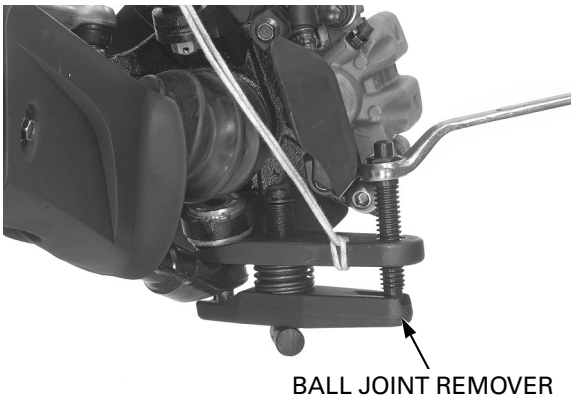


Release the ball joints, using the special tool according to the instructions (page 15-16).

TOOL:

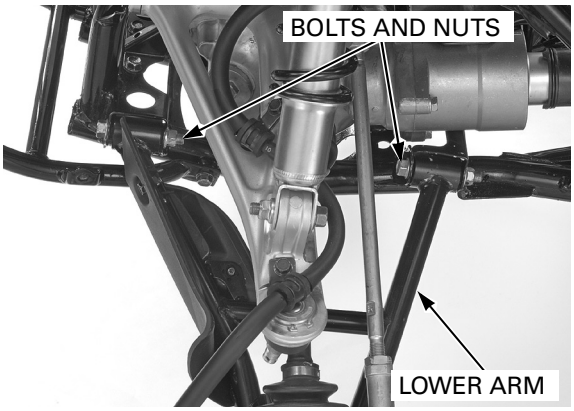
Ball joint remover, 28 mm	**07MAC-SL00201 or 07MAC-SL0202 (U.S.A. only) or 07MAC-SL00200 and 07MAC-SL0A300 (U.S.A. only)**

Support the wheel hub/knuckle assembly securely.



Remove the following:

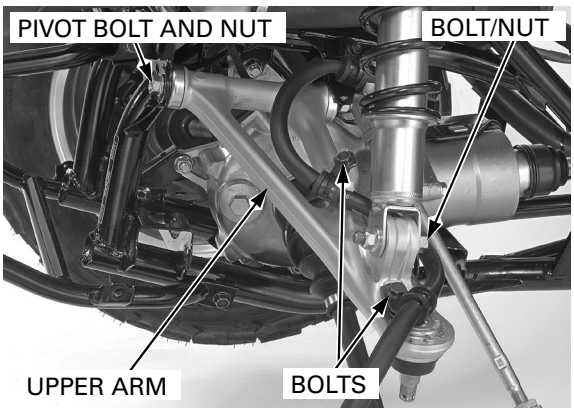
– pivot nut, bolt and lower arm



Remove the two brake hose clamp bolts.

Remove the following:

– shock absorber lower mounting nut and bolt
– pivot nuts, bolts and upper arm

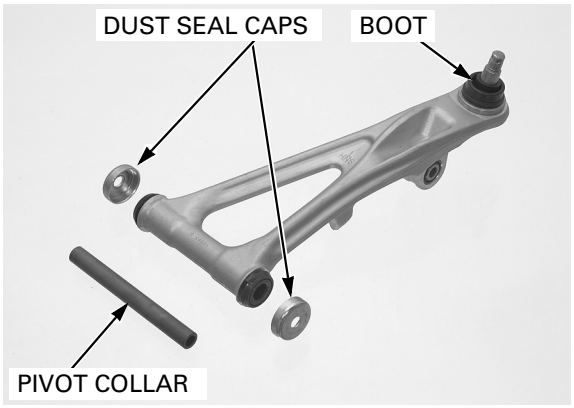


INSPECTION

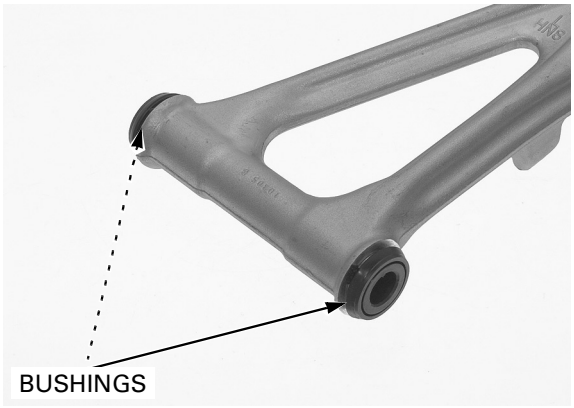
Remove the seal caps and pivot collar from the upper arm.

For ball joint replacement (page 15-25)

Inspect the ball joint boot for tears or other damage by moving the ball joint stud.
It should moves freely and smoothly.



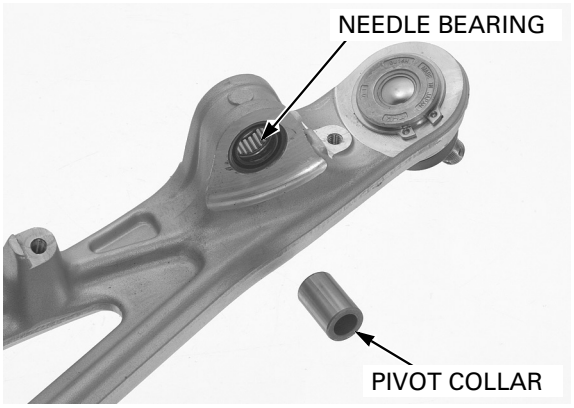
Check the pivot bushings in the upper arm for wear or damage.



Remove the shock absorber lower pivot collar.

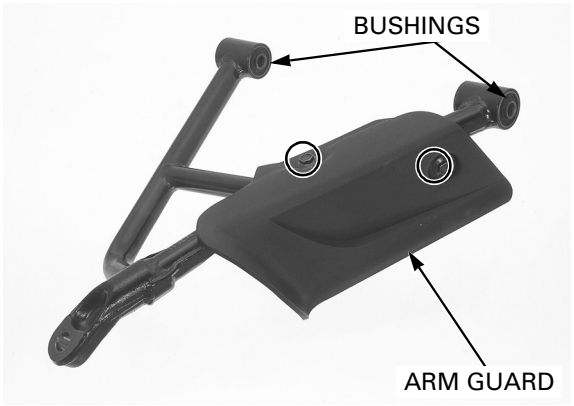
For bearing replacement (page 15-26)

Check the pivot bearing for wear or damage.



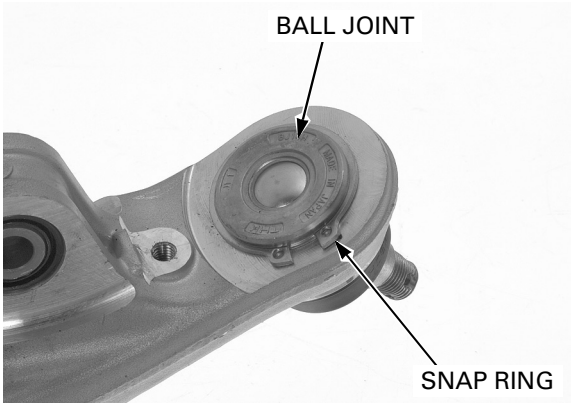
Remove the two flange bolts and lower arm guard if necessary.

Check the pivot bushings in the lower arm for wear or damage.



BALL JOINT REPLACEMENT

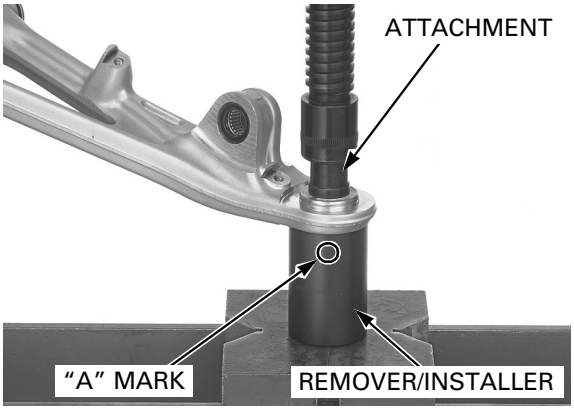
Remove the snap ring from the ball joint.



Set the upper arm and special tools with "A" mark side of the remover/installer facing to the ball joint as shown.
Press the ball joint out of the upper arm.

TOOLS:

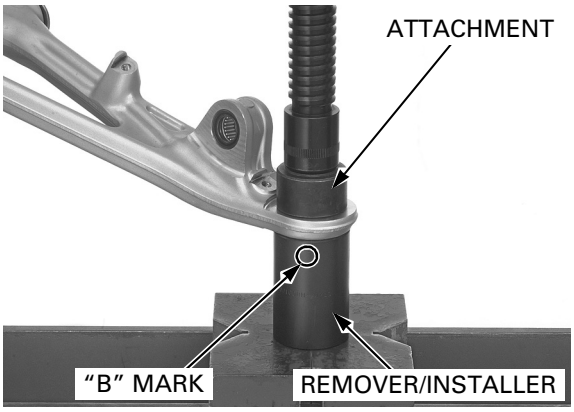
Ball joint remover/installer	**07WMF-HN00100**
Attachment, 28 x 30 mm	**07946-1870100**



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:

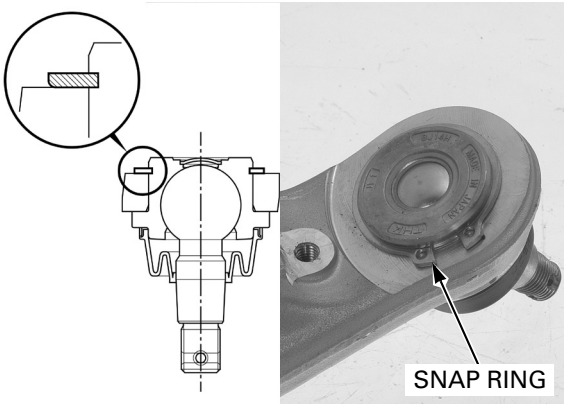
Ball joint remover/installer	**07WMF-HN00100**
Attachment, 20 mm I.D.	**07746-0020400 or**
Attachment, 17 mm I.D.	**07746-0020300 or**
Attachment, 15 mm I.D.	**07746-0020200**



NOTICE

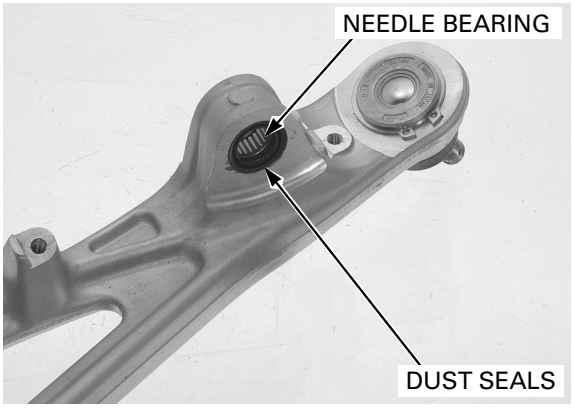
If you feel strong resistance when lowering the press, stop. Reset the attachment of the tool so the ball joint head can go into the hollow of the attachment and try again. Failure to reset the attachment will damage the ball joint and/or the upper arm.

Install the snap ring with the chamfered edge facing in.



SHOCK ABSORBER LOWER PIVOT BEARING REPLACEMENT

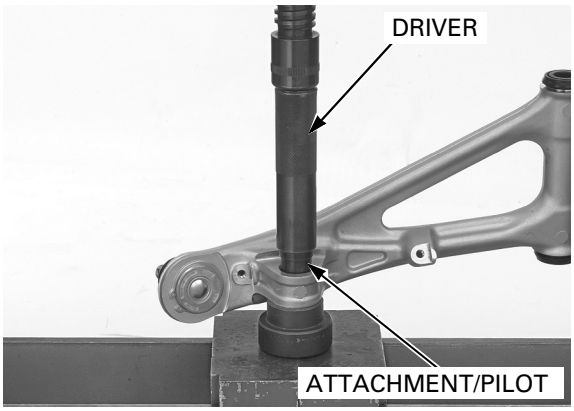
Remove the dust seals.



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**

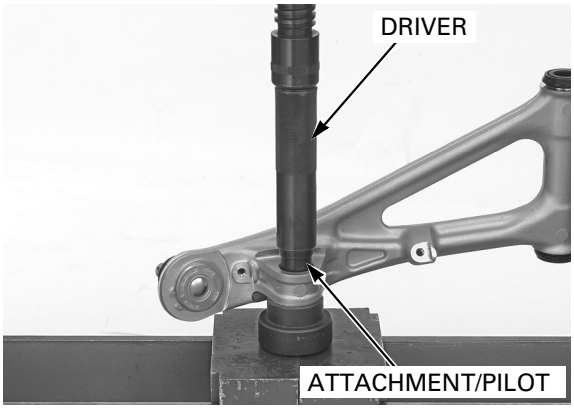


Press the bearing with the marked side facing up.

Carefully press in a new bearing until it is flush with the pivot edge (until the press stops).

TOOLS:

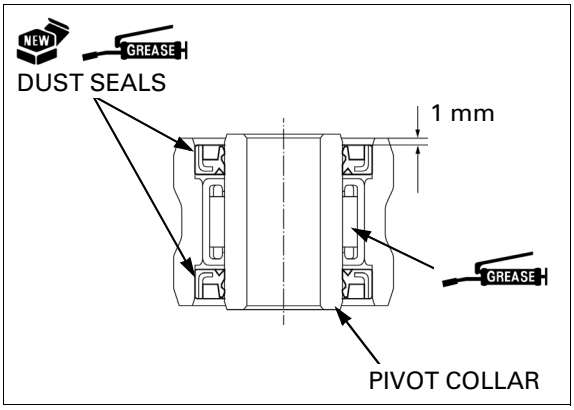
Driver	**07749-0010000**
Attachment, 22 x 24 mm	**07746-0010800**
Pilot, 16 mm	**07746-0041300**



Install new dust seals with the flat side facing in until the depth from the pivot outer surface is 1 mm (0.04 in).

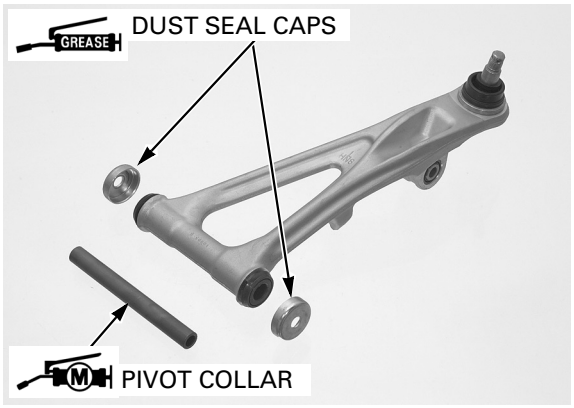
Apply grease to the dust seal lips and the needle rollers of the bearing.

Install the pivot collar.



INSTALLATION

Apply grease to the pivot collar outer surface and install the collar into the upper arm.
Apply molybdenum disulfide grease to the dust seal lips and install the dust seal caps onto the upper arm.



Install the upper arm into the frame with the pivot bolt and a new nut, and tighten the nut to the specified torque.

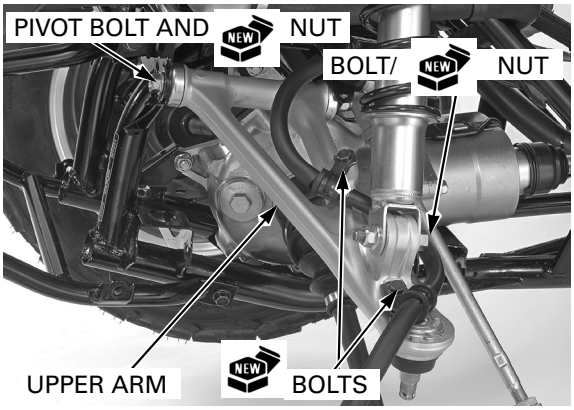
TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)

Install the shock absorber lower mount to the upper arm with the mounting bolt and a new nut, and tighten the nut to the specified torque.

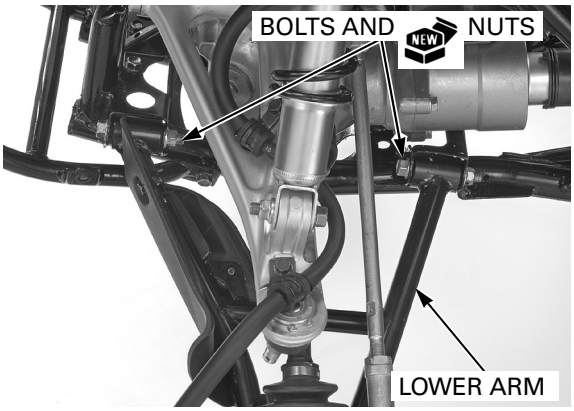
TORQUE: 44 N·m (4.5 kgf·m, 32 lbf·ft)

Install and tighten the two new brake hose clamp bolts to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)



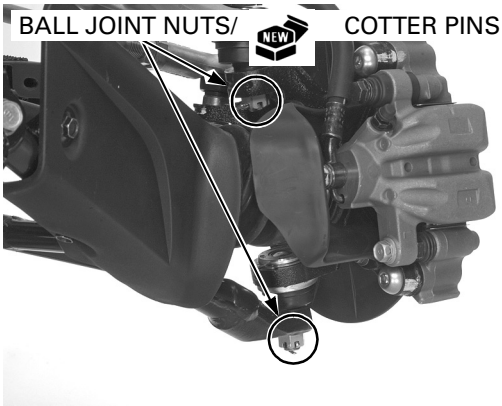
Install the lower arm into the frame with the pivot bolts and new nuts, and loosely tighten the nuts.



Install the wheel hub/knuckle assembly onto the upper and lower arms and install the ball joint nuts. Tighten each nut to the specified torque and further tighten until its grooves align with the cotter pin hole.

TORQUE: 29 N·m (3.0 kgf·m, 21 lbf·ft)

Install new cotter pins.

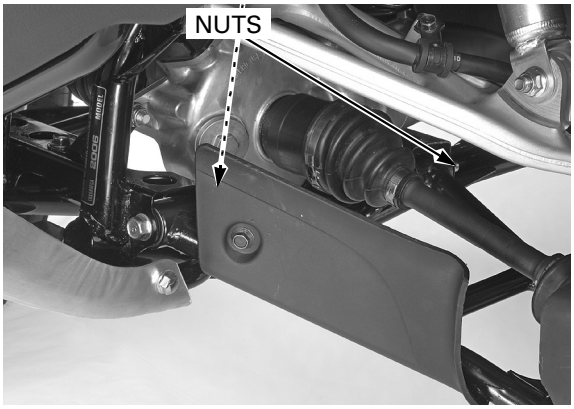


Install the front wheel (page 15-11).

Place the vehicle on level ground and tighten the lower arm pivot nuts.

TORQUE: 44 N·m (4.5 kgf·m, 32 lbf·ft)

Install the front carrier pipe (page 3-10).

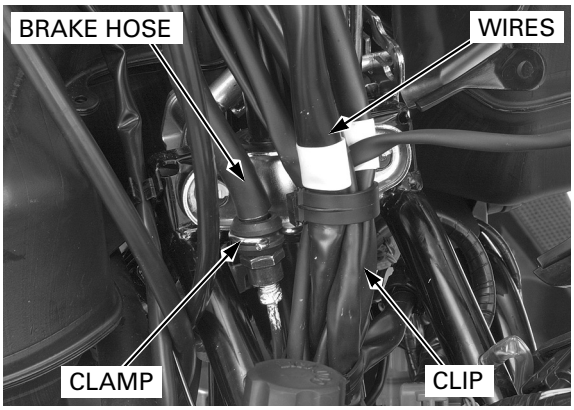


STEERING SHAFT

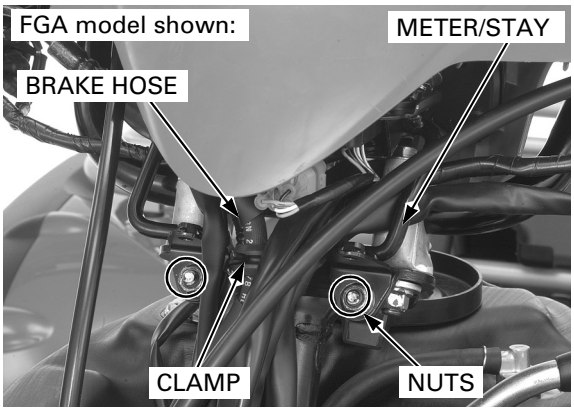
REMOVAL

Remove the following:

- front wheels (page 15-11)
- inner fenders (page 3-9)
- front fender (page 3-12)
- lower meter covers (page 3-18)
- brake hose (from the clamp)
- wires (from the clip)

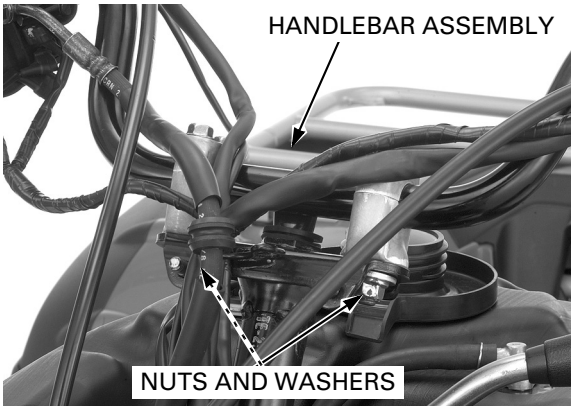


- two nuts
- combination meter/stay assembly
- brake hose (from the hose clamp)

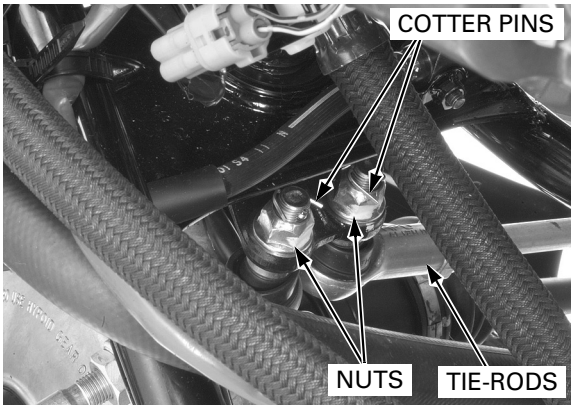


Keep the master cylinder reservoir upright.

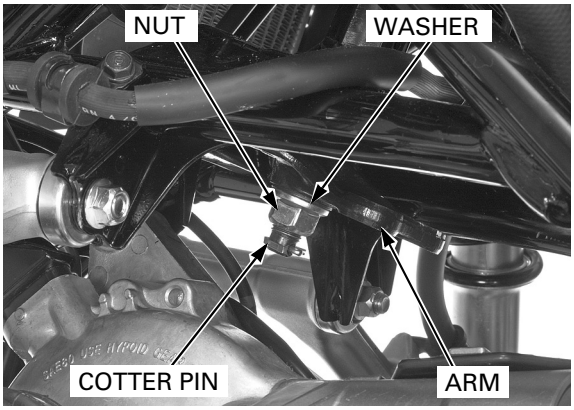
- handlebar lower holder nuts and washers
- handlebar assembly (from the steering shaft)



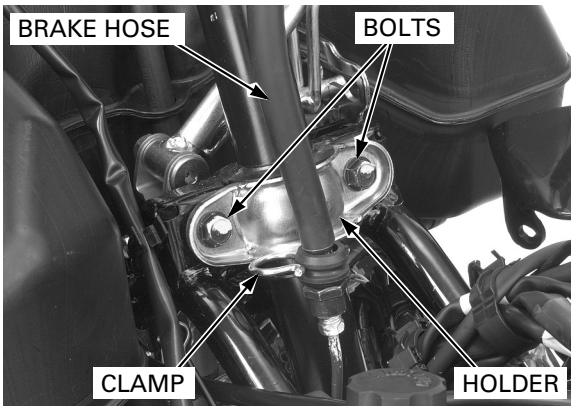
– cotter pins
– tie-rod ball joint nuts (while holding the joint stud flats with an open end wrench)
– tie-rods (from the steering shaft arm)



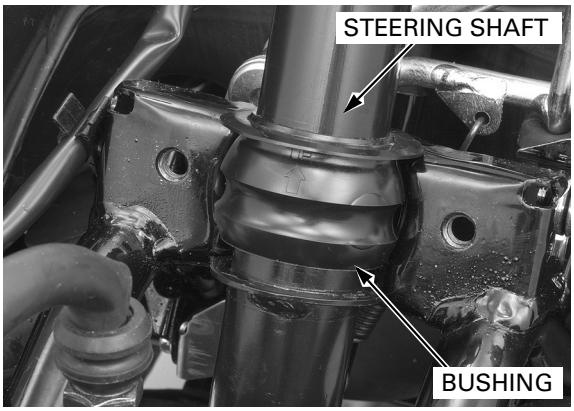
– cotter pin
– shaft end nut and washer
– shaft arm



– brake hose (release from clamp)
– two holder bolts
– shaft holder



– steering shaft (from the shaft bearing)
– shaft bushing

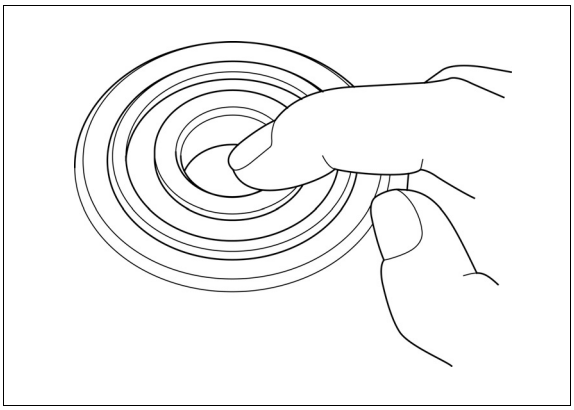


INSPECTION

Check the steering shaft bushing for wear or damage.

Check the steering shaft for distortion or damage.

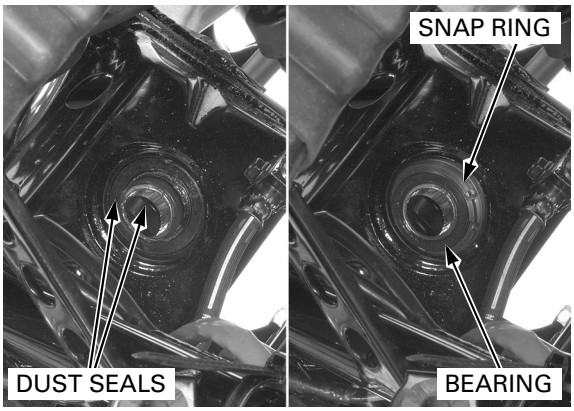
Turn the inner race of the steering shaft bearing with your finger. The bearing should turn smoothly and quietly. Also check that the bearing outer race fits tightly in the frame.



BEARING REPLACEMENT

Remove the upper and lower dust seals.

Remove the snap ring.

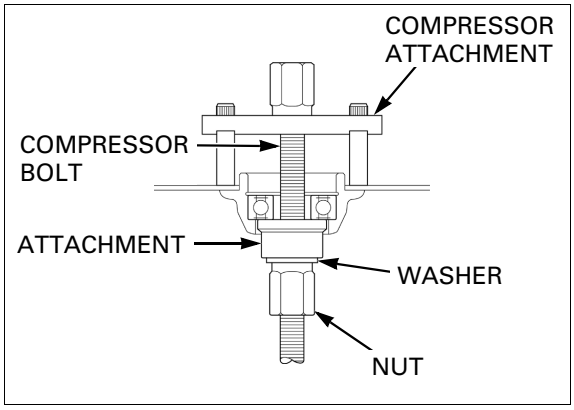


Assemble the special tools onto the steering shaft bearing.

Remove the bearing from the frame by tightening the nut.

TOOLS:

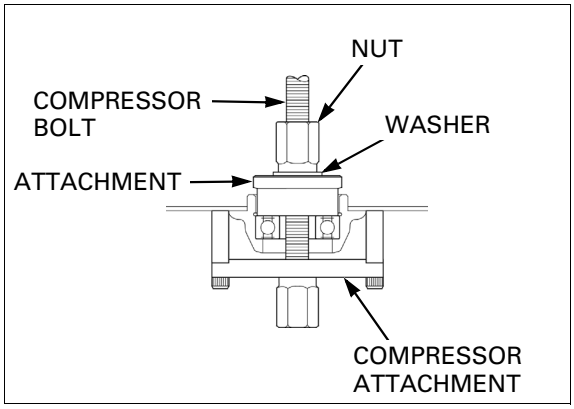
Clutch compressor attachment	**07LAE-PX40100**
Compressor bolt assembly	**07GAE-PG40200 or 07GAE-PG4020A (U.S.A. only)**
Attachment, 28 x 30 mm	**07946-1870100**
10 mm washer	**Common hardware**



Draw a new bearing into the frame with the marked side facing up until it is fully seated.

TOOLS:

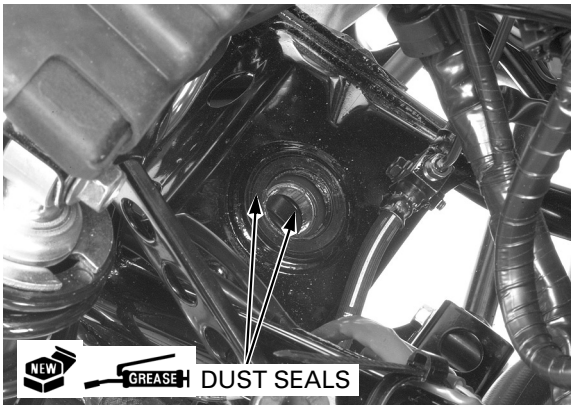
Clutch compressor attachment	**07LAE-PX40100**
Compressor bolt assembly	**07GAE-PG40200 or 07GAE-PG4020A (U.S.A. only)**
Attachment, 42 x 47 mm	**07746-0010300**
10 mm washer	**Common hardware**



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.



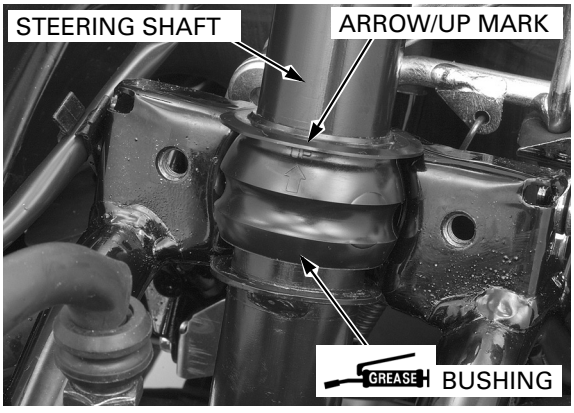
INSTALLATION

NOTE:

- Route the wires, hose and cables properly (page 1-20).

Apply grease to the shaft bushing inner surface. Install the shaft bushing onto the steering shaft with the arrow mark facing up.

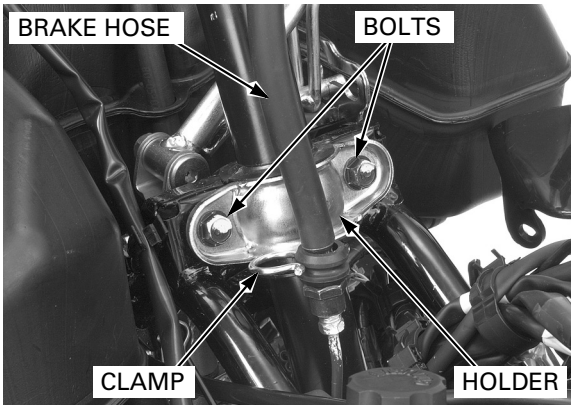
Install the steering shaft into the shaft bearing.



Install the shaft holder with the hose clamp facing the right side and tighten the two bolts alternately, then tighten to the specified torque.

TORQUE: 32 N·m (3.3 kgf·m, 24 lbf·ft)

Install the brake hose to the hose clamp.

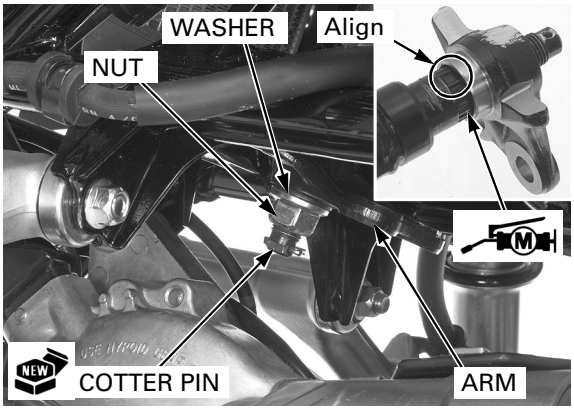


Apply molybdenum disulfide grease to the steering shaft splines.

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)

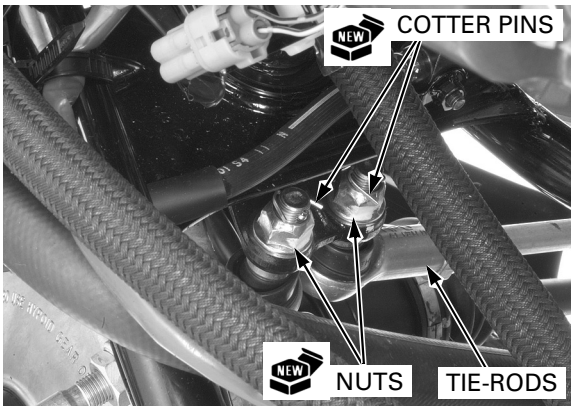
Install a new cotter pin.



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.

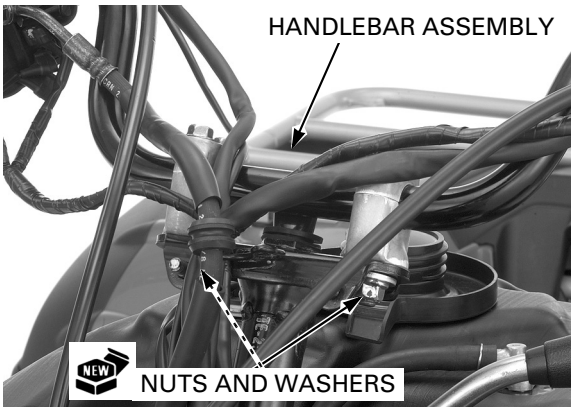
TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)

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)

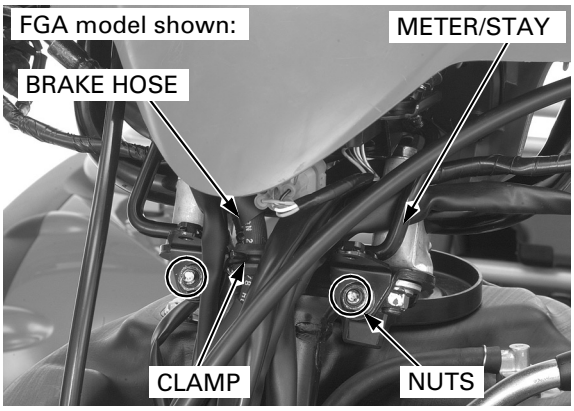


Route the wires and hose properly (page 1-20).

Install the combination meter/stay and tighten the two nuts.

TORQUE: 25 N·m (2.5 kgf·m, 18 lbf·ft)

Install the brake hose into the clamps on the steering shaft and shaft holder (see below).



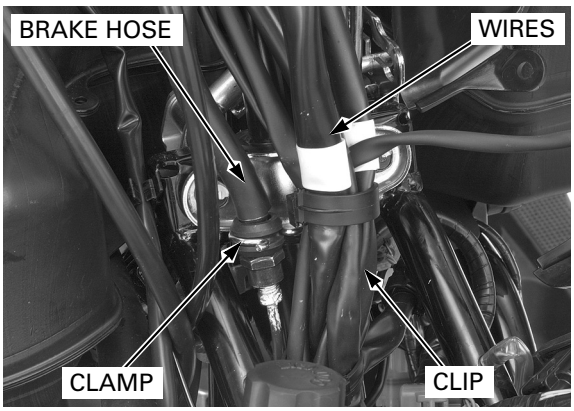
Make sure all the wires and hose are properly routed (page 1-20).

Secure the wires with the wire clip.

Install the brake hose into the clamps on the steering shaft holder.

Install the following:

– lower meter covers (page 3-18)
– front fender (page 3-12)
– inner fenders (page 3-9)
– front wheels (page 15-11)



TIE-ROD

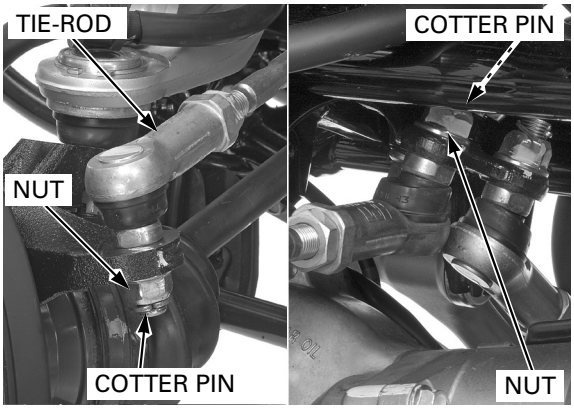
REMOVAL

Remove the following:

– front wheel (page 15-11)
– inner fender (page 3-9)

Remove the cotter pins.

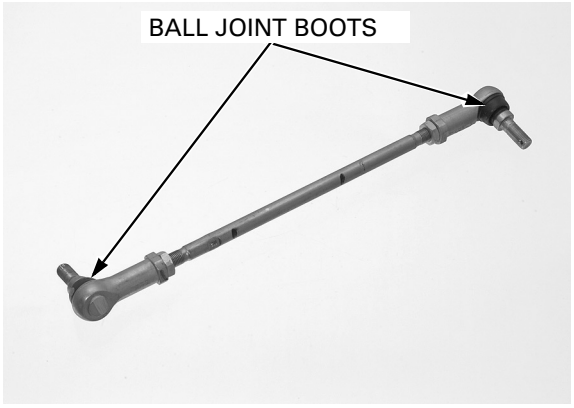
Remove the tie-rod ball joint nuts while holding the joint stud flats with an open end wrench.
Remove the tie-rod from the knuckle and steering shaft arm.



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.

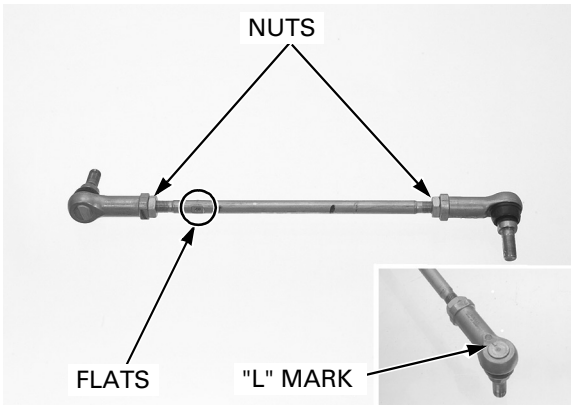
Replace the ball joint if necessary.



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.

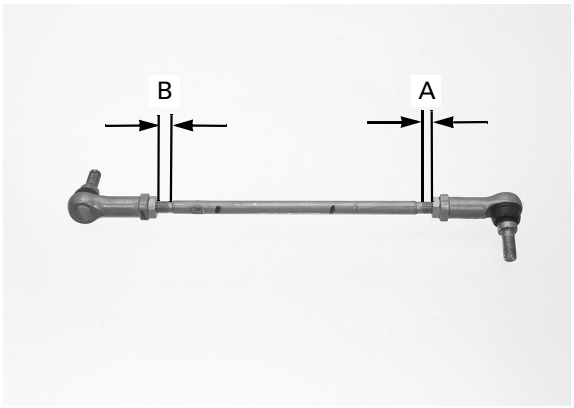


The ball joint positions are 180° from each other. Tighten these nuts after installing the tie-rod.

Hand-tighten the lock nuts and measure the distance between the lock nut and thread end.

STANDARD DISTANCE: A/B: 8.3 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 4-23).

Tighten the joint nuts by holding the ball joint stud flats with an open end wrench.

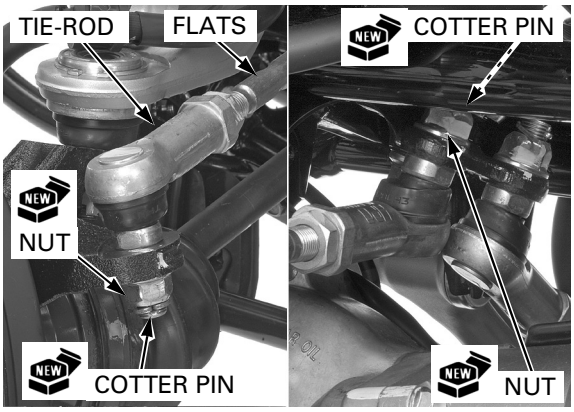
TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)

Install new cotter pins.

Install the following:

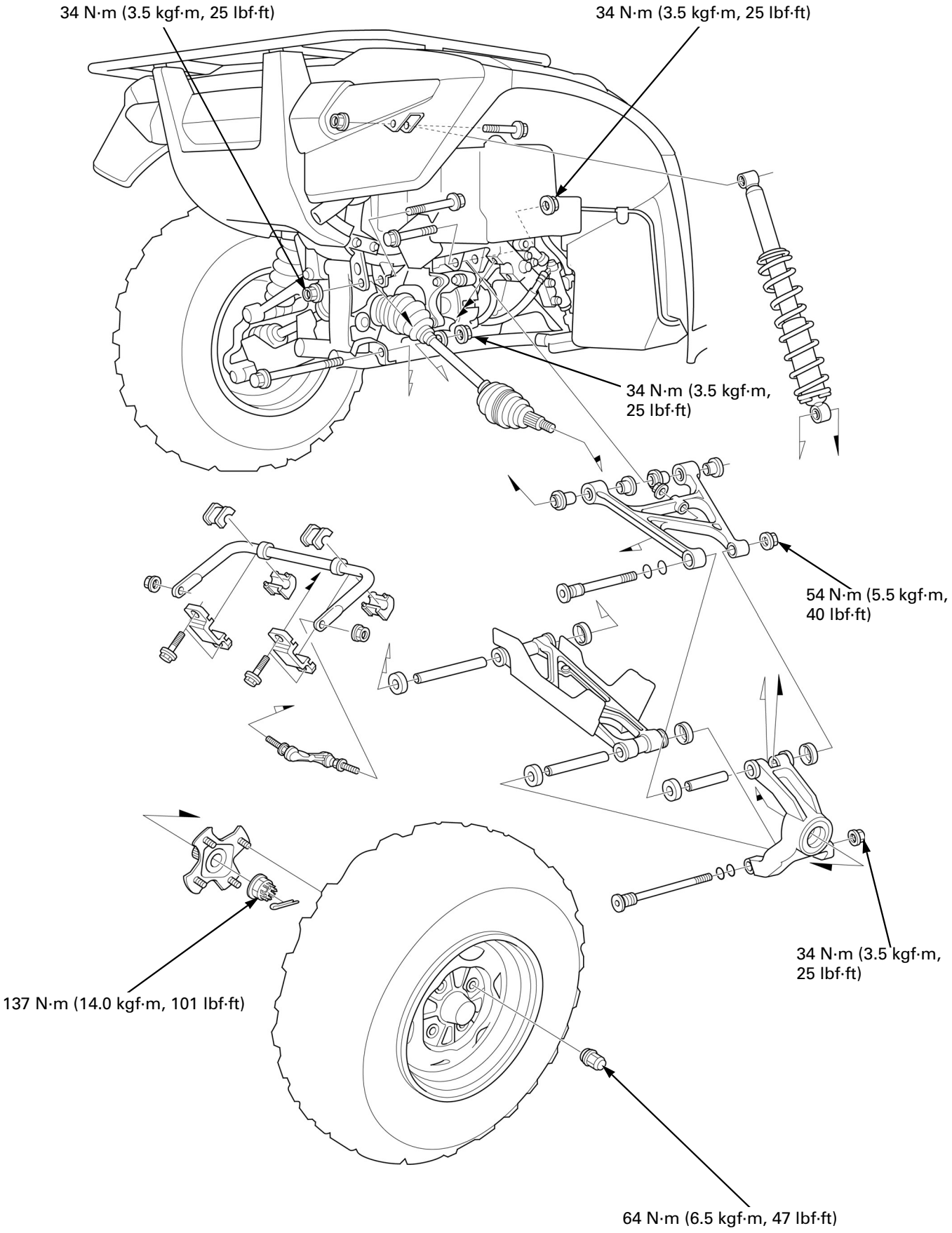
– inner fender (page 3-9)
– front wheel (page 15-11)

Adjust the toe and ball joint angle (page 4-23)



16. REAR WHEEL/SUSPENSION

SYSTEM COMPONENTS



SERVICE INFORMATION

GENERAL

- This section covers service of the rear wheel and rear suspension.
- For tire information (page 15-11).
- For brake system service (page 17-2).
- For rear driving mechanism service (page 19-2).
- 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.

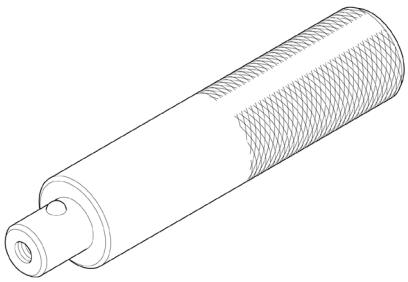
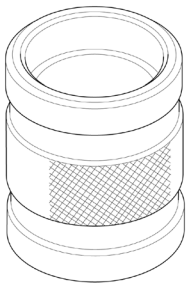
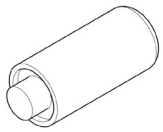
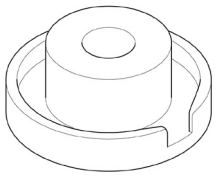
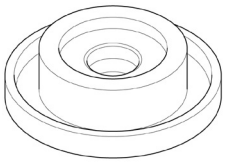
SPECIFICATIONS

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: tighten to the specified torque and further tighten until its grooves aligns with the cotter pin hole.
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.

TOOLS

Driver 07749-0010000 	Fork seal driver body 07947-KA50100 	Spherical bearing driver 07HMF-HC00100  not available in U.S.A., use a suitable collar.
Oil seal driver 07JAD-PH80101 	Oil seal driver 07LAD-SM40100 	

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

Stiff 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 (page 15-11).

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)

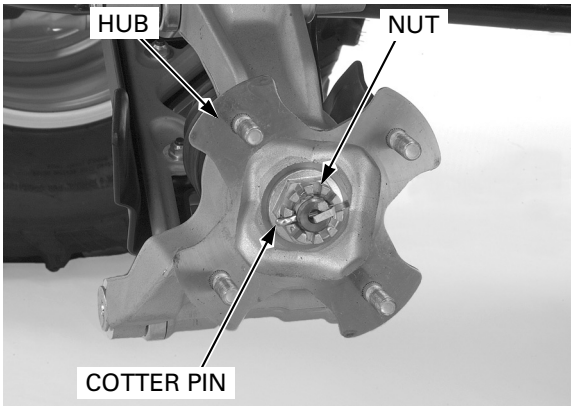
WHEEL HUB/KNUCKLE

REMOVAL

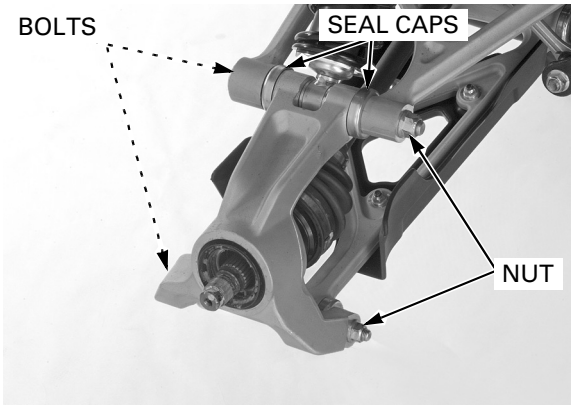
Remove the rear wheel (page 16-6).

Remove the following:

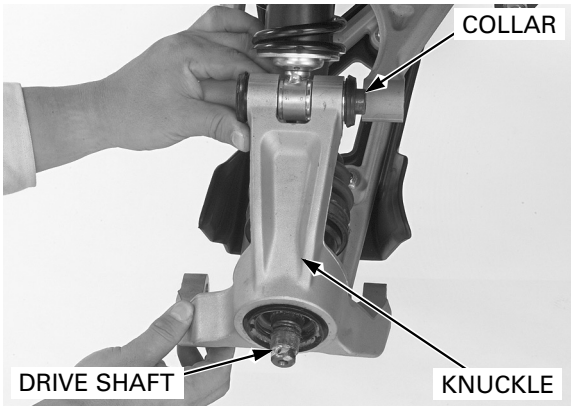
– cotter pin
– hub nut
– wheel hub



– lower arm pivot nut and bolt
– upper arm pivot nut and bolt
– seal caps (from the knuckle)



– pivot collar (to disconnect the shock absorber)
– knuckle (from the drive shaft)



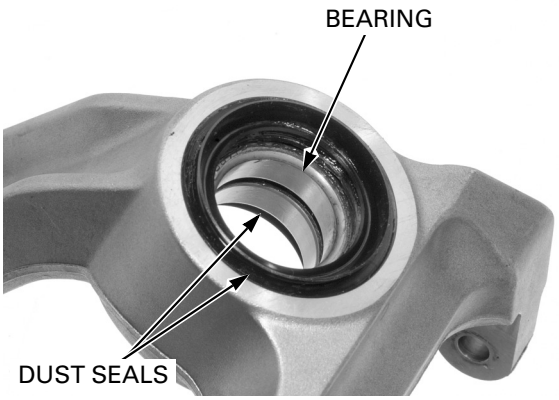
INSPECTION

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.

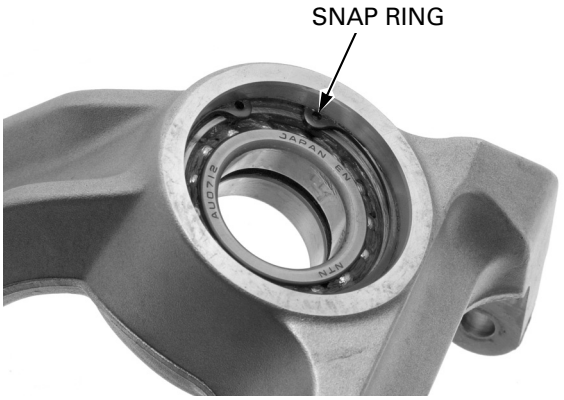
For suspension pivot inspection (page 16-13).



BEARING REPLACEMENT

Remove the snap ring.

Press the bearing out of the knuckle using a suitable collar.

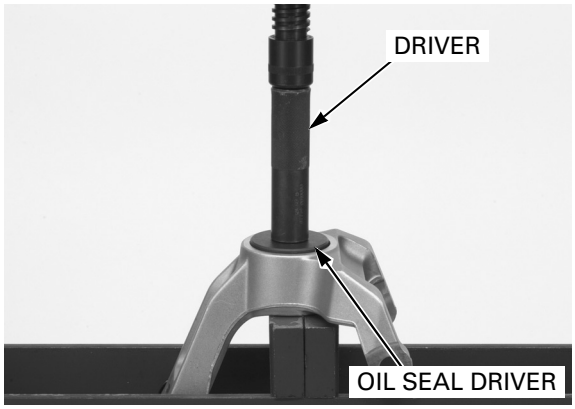


Pack the cavities of a new bearing with grease.
Carefully press the bearing in the knuckle with the marking side facing up until it is fully seated.

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.

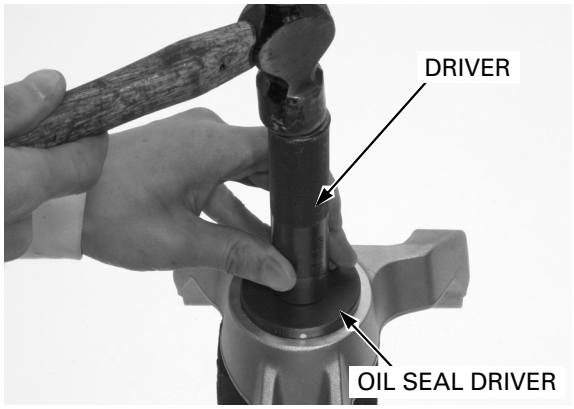
TOOLS:
OUTER SEAL:

Driver	**07749-0010000**
Oil seal driver	**07LAD-SM40100**

Support the knuckle with the driver weight to avoid damaging the outer dust seal.

INNER SEAL:

Driver	**07749-0010000**
Oil seal driver	**07LAD-SM40100**
Fork seal driver body	**07947-KA50100**



INSTALLATION

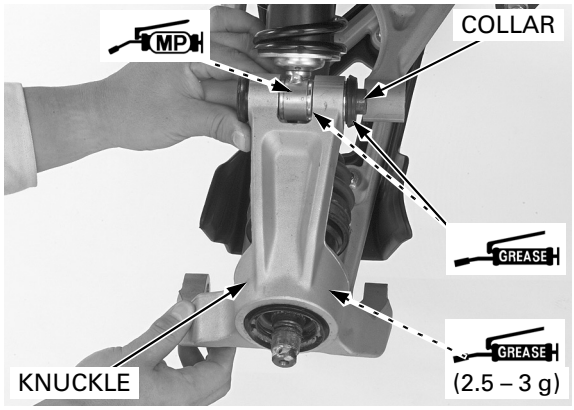
KNUCKLE

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.

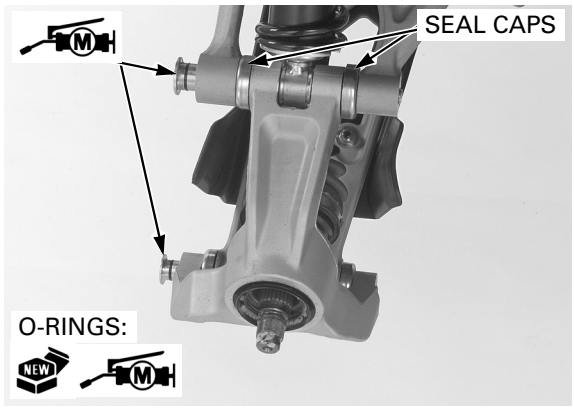
Pack the lip cavities of the inner dust seal with 2.5 – 3 g of grease and set the knuckle over the drive shaft.

Install the seal caps onto the dust seals on the knuckle.



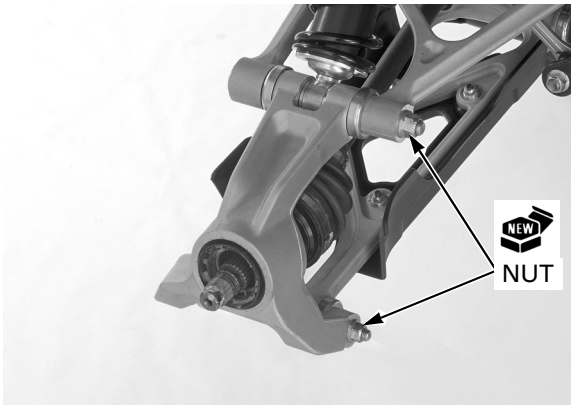
Coat new O-rings with molybdenum disulfide grease and install them into the pivot bolt grooves.
Apply molybdenum disulfide grease to each bolt head (between the O-rings).

Connect the upper and lower arms to the knuckle with the pivot bolts.



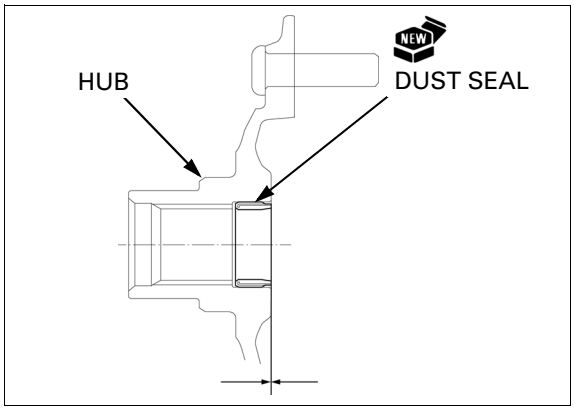
Install new nuts and tighten them.

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)

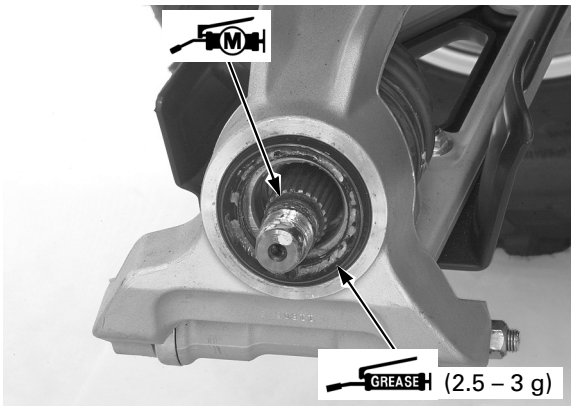


WHEEL HUB

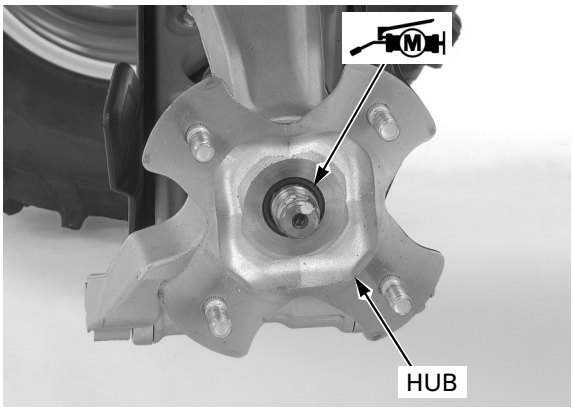
Install a new dust seal into the hub with the metal side facing out until it is flush with the hub surface.



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.

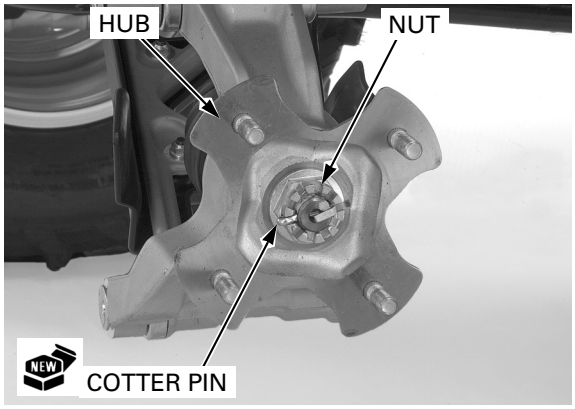


Install the hub nut and tighten it to the specified torque and further tighten until its grooves align with the cotter pin hole.

TORQUE: 137 N·m (14.0 kgf·m, 101 lbf·ft)

Install a new cotter pin.

Install the wheel (page 16-6).



REAR SHOCK ABSORBER/ SUSPENSION ARM

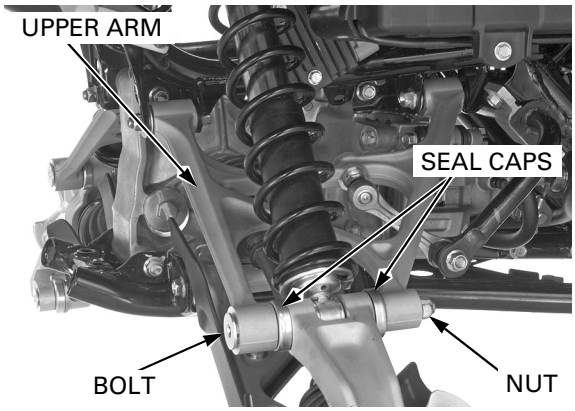
SHOCK ABSORBER REMOVAL

Remove the rear wheel (page 16-6).
Remove the seat (page 3-4).

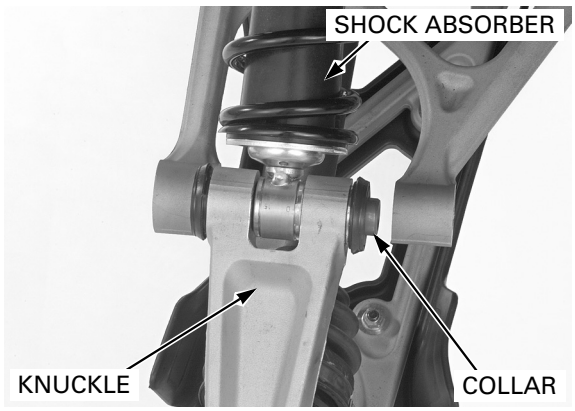
Support the knuckle with a support block.

Remove the following:

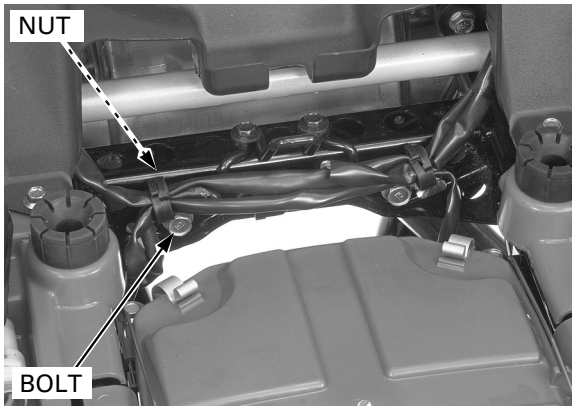
– upper arm pivot nut and bolt (to disconnect the upper arm)
– seal caps



– pivot collar (to disconnect the knuckle)



– mounting nut and bolt
– shock absorber



SUSPENSION ARM REMOVAL

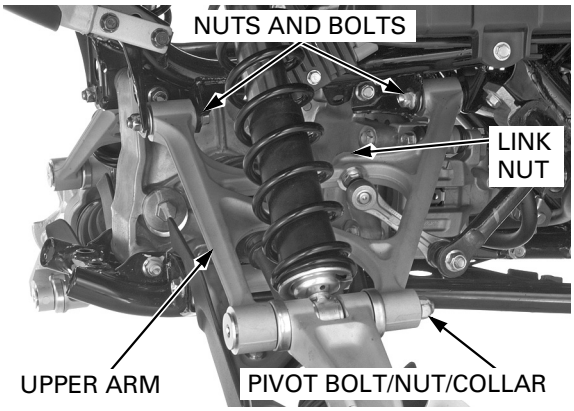
UPPER ARM

Remove the pivot collar (page 16-10).

Right upper arm: Remove the right side cover (page 3-5).
Left upper arm: Remove the oil filler lid (page 3-8).

Remove the following:

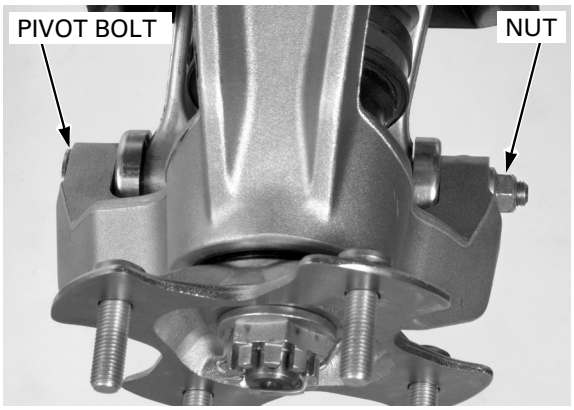
– stabilizer link nut (to disconnect the link)
– two pivot nuts and bolts
– upper arm



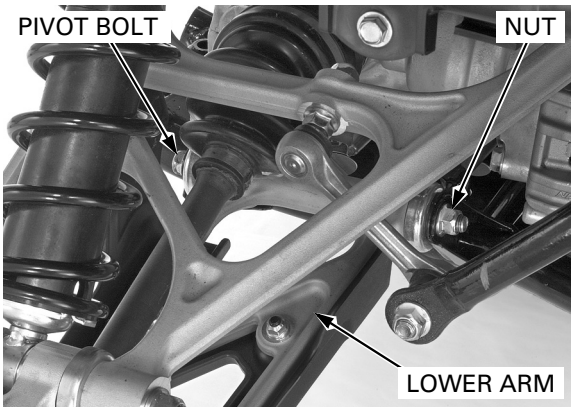
LOWER ARM

Remove the following:

– lower arm pivot nut and bolt (to disconnect the knuckle)



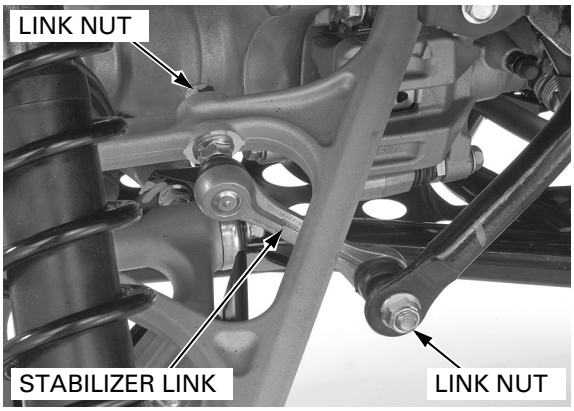
– lower arm pivot nut and bolt
– lower arm



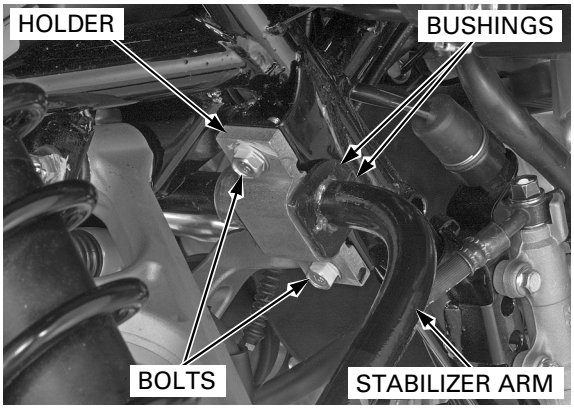
STABILIZER ARM AND LINK

Remove the following:

– link nuts
– stabilizer links



– four bolts and arm holders
– stabilizer arm
– stabilizer bushings

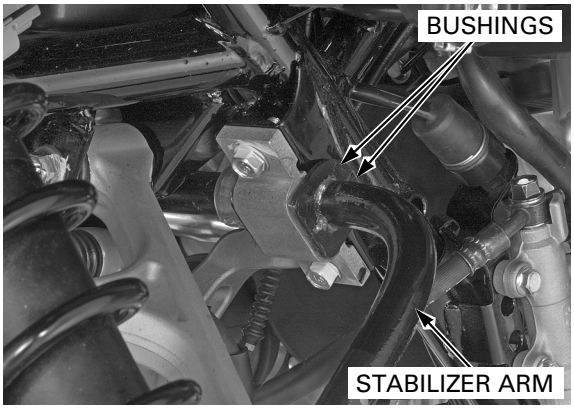


INSPECTION

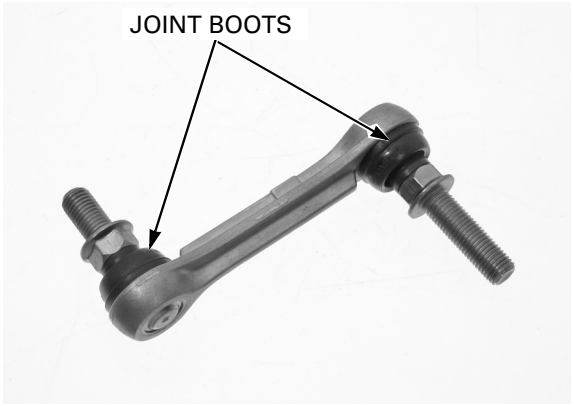
SUPENSION ARMS

Check the stabilizer bushings for wear or damage.

Check the stabilizer arm for distortion or damage.



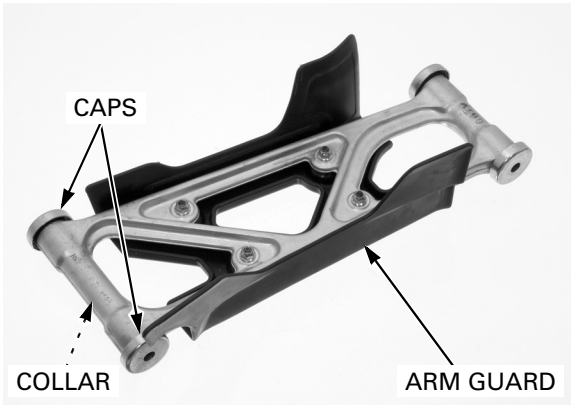
Inspect the ball joint boot of the link for tears or other damage.



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.

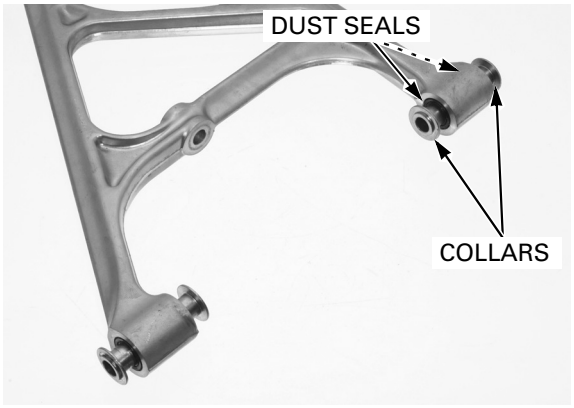
Check the pivot bushings for wear or damage.



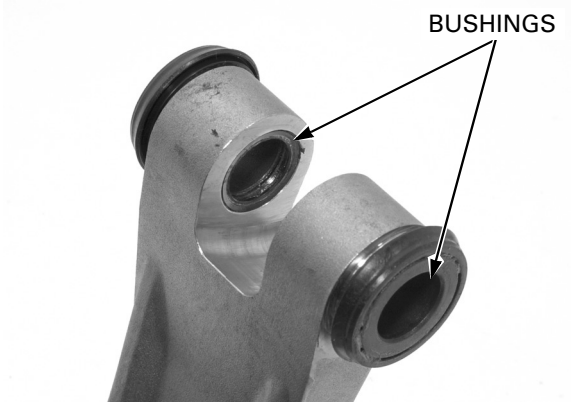
Remove the pivot collars and the dust seals from the upper arm.

Check the pivot bearings for wear or damage.

For bearing replacement (page 16-13).



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.

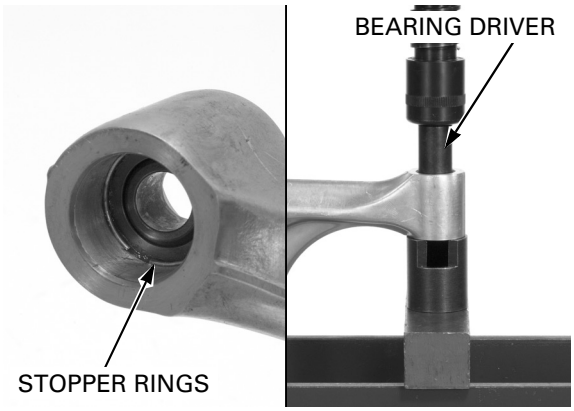
PIVOT BEARING REPLACEMENT

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)**



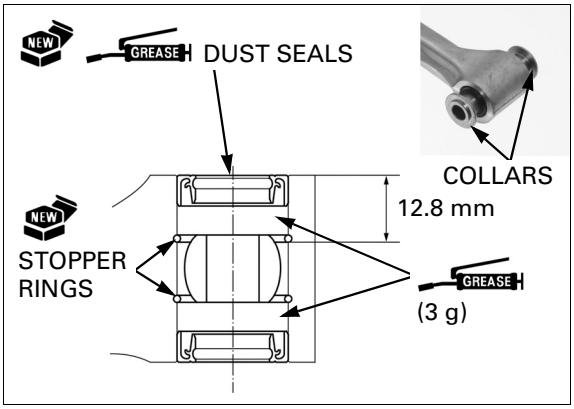
Install a new stopper ring into the inner groove in the pivot securely.

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.

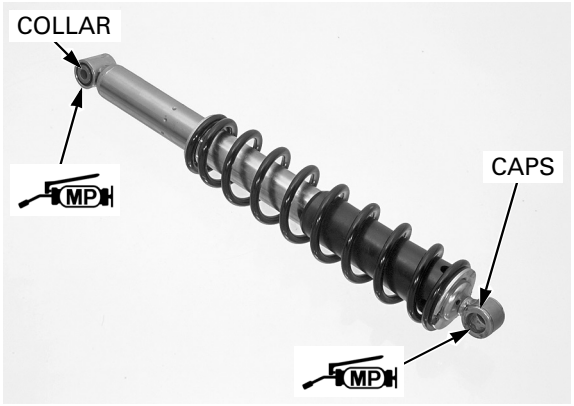
Install the pivot collars.



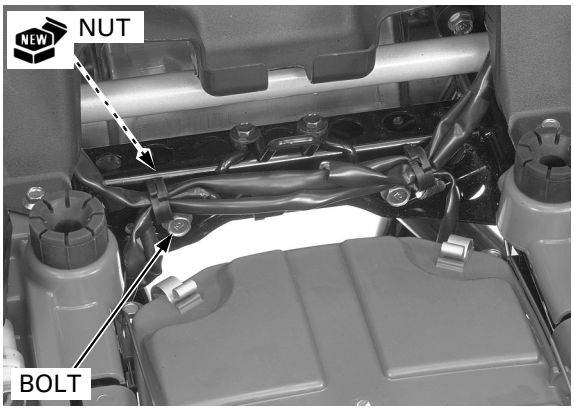
SHOCK ABSORBER INSTALLATION

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.

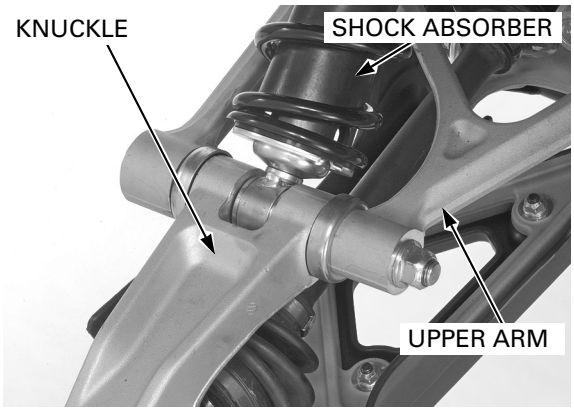


Install the shock absorber into the frame with the mounting bolt. Install a new nut.



Connect the shock absorber to the knuckle and upper arm (page 16-16).

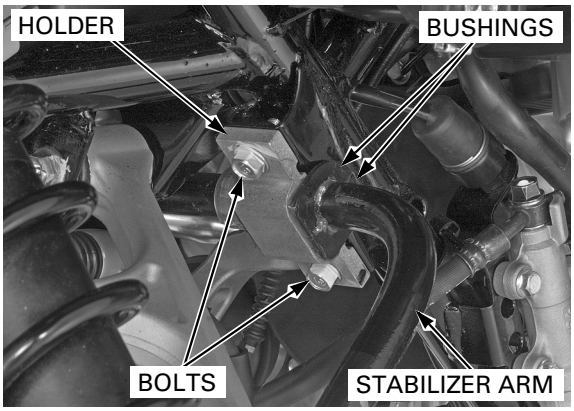
Install the seat (page 3-4).



SUSPENSION ARM INSTALLATION

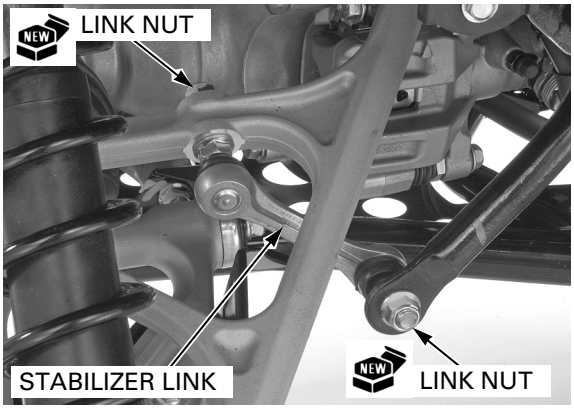
STABILIZER ARM AND LINK

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.



Install with the short threads into the stabilizer arm.

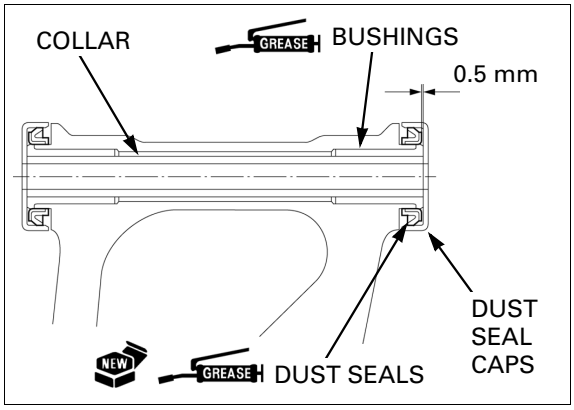
Install the stabilizer links with new nuts and tighten them.



LOWER ARM

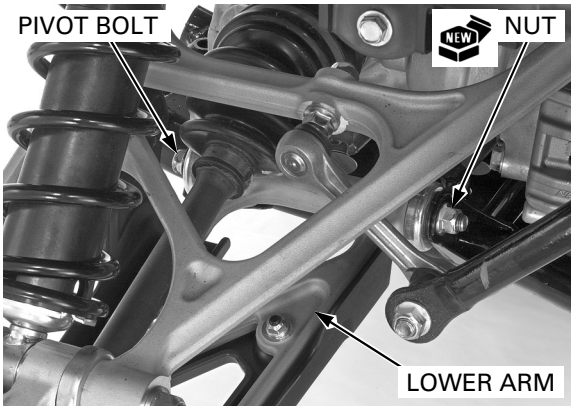
Install new dust seals with the lip side facing out until the depth from the bushing end is 0.5 mm (0.02 in).

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.

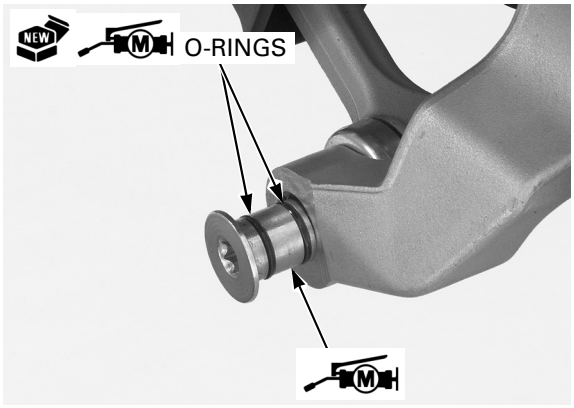


Install the lower arm into the frame. Align the bolt holes in the frame and arm, and insert the pivot bolt from the rear side.

Install a new pivot nut.

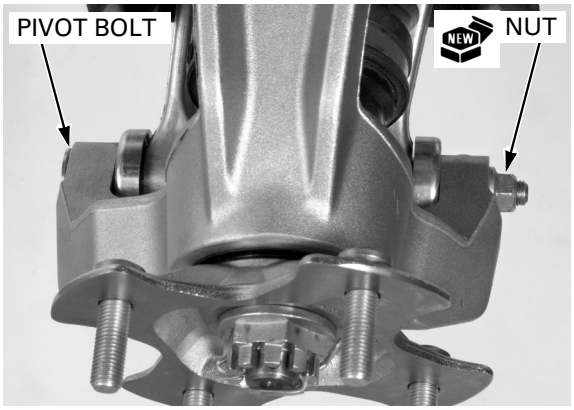


Coat new O-rings with molybdenum disulfide grease and install them into the pivot bolt groove.
Apply molybdenum disulfide grease to the bolt head (between the O-rings) and insert the pivot bolt through the knuckle and lower arm.



Install a new pivot nut and tighten each pivot nut.

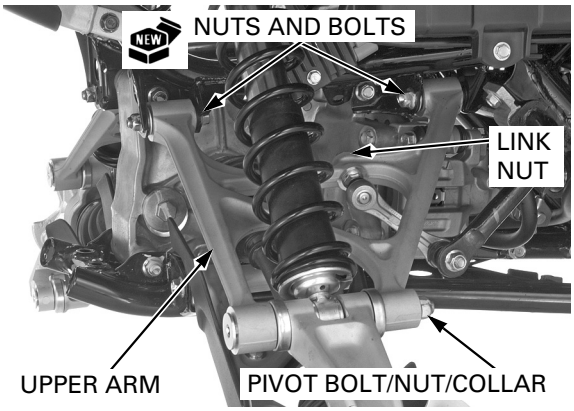
TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)



UPPER ARM

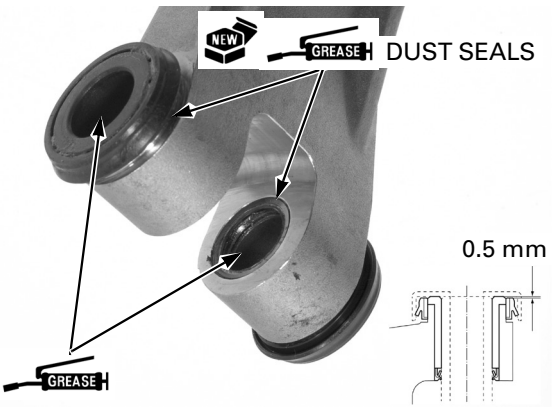
Insert the pivot bolts from the inside.

Install the upper arm into the frame with the pivot bolts and new nuts.



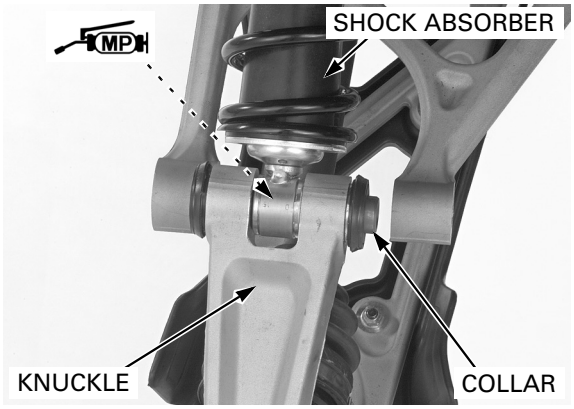
Install new inner dust seals into the knuckle pivots with the lip side facing the bushing until they are seated.
Install new outer dust seals with the lip side facing out until the depth from the bushing end is 0.5 mm (0.02 in).

Apply grease to the pivot bushings and dust seal lips.

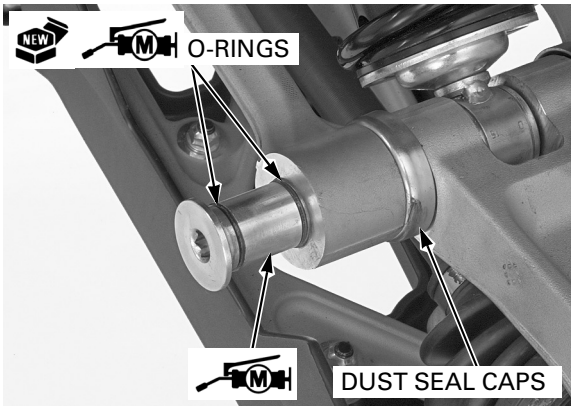


Apply molybdenum disulfide paste to the pivot bushing in the shock absorber.

Connect the knuckle to the shock absorber with the pivot collar and install the seal caps over the dust seals.



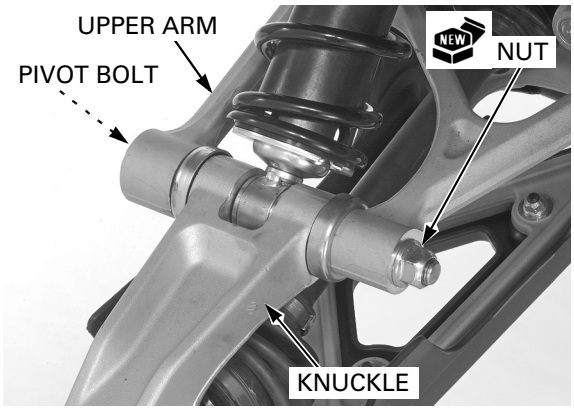
Coat new O-rings with molybdenum disulfide grease and install them into the pivot bolt grooves.
Apply molybdenum disulfide grease to the bolt head (between the O-rings).



Connect the knuckle to the upper arm with the pivot bolt. Install a new pivot nut.

Tighten the each pivot nut.

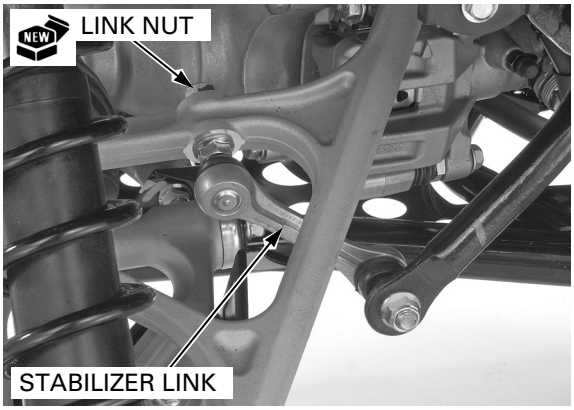
TORQUE:
Frame side: 34 N·m (3.5 kgf·m, 25 lbf·ft)
Knuckle side: 54 N·m (5.5 kgf·m, 40 lbf·ft)



Connect the stabilizer link with a new nut and tighten it.

Right side: Install the right side cover (page 3-5).
Left side: Install the oil filler lid (page 3-8).

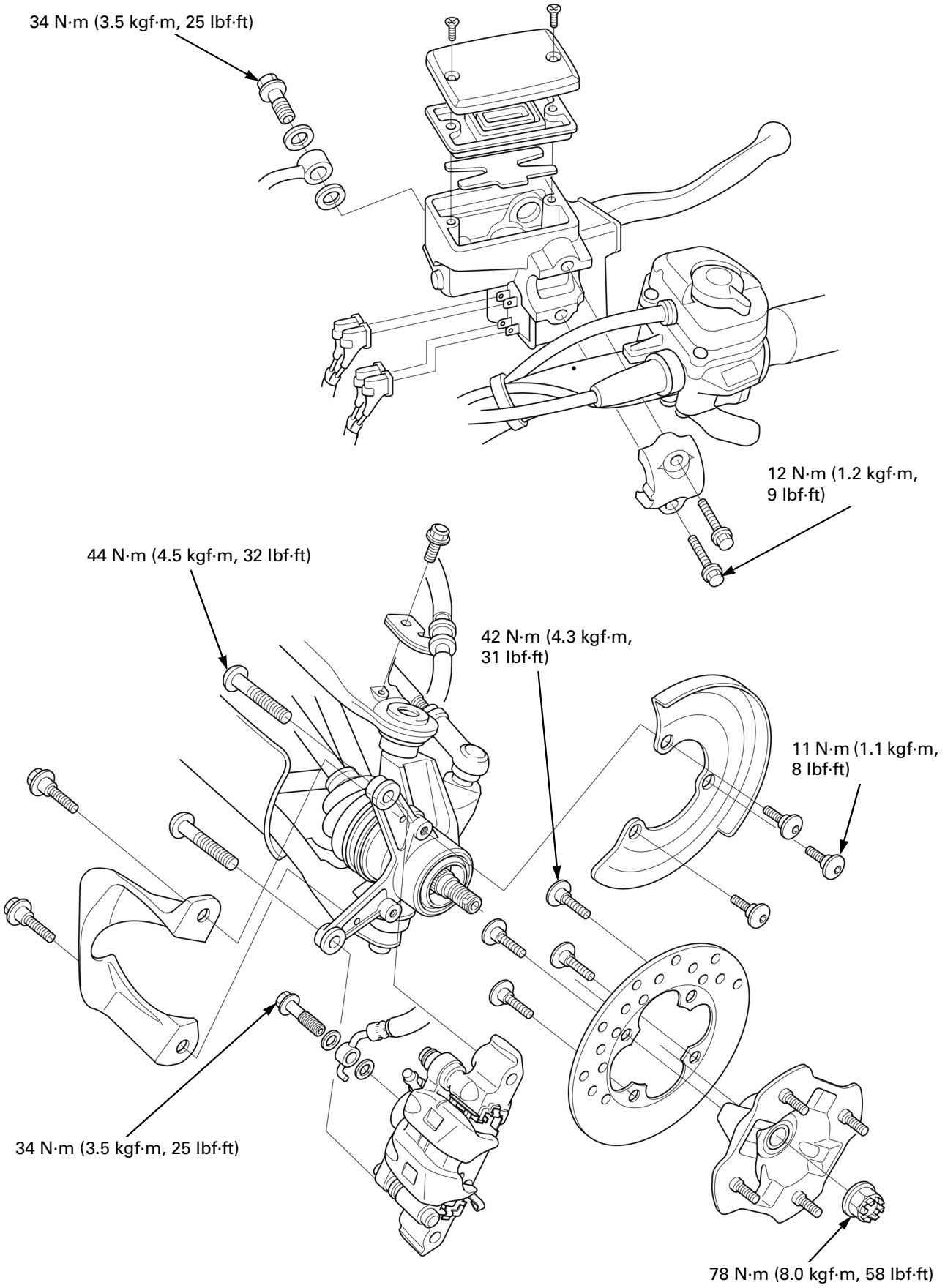
Install the rear wheel (page 16-6).

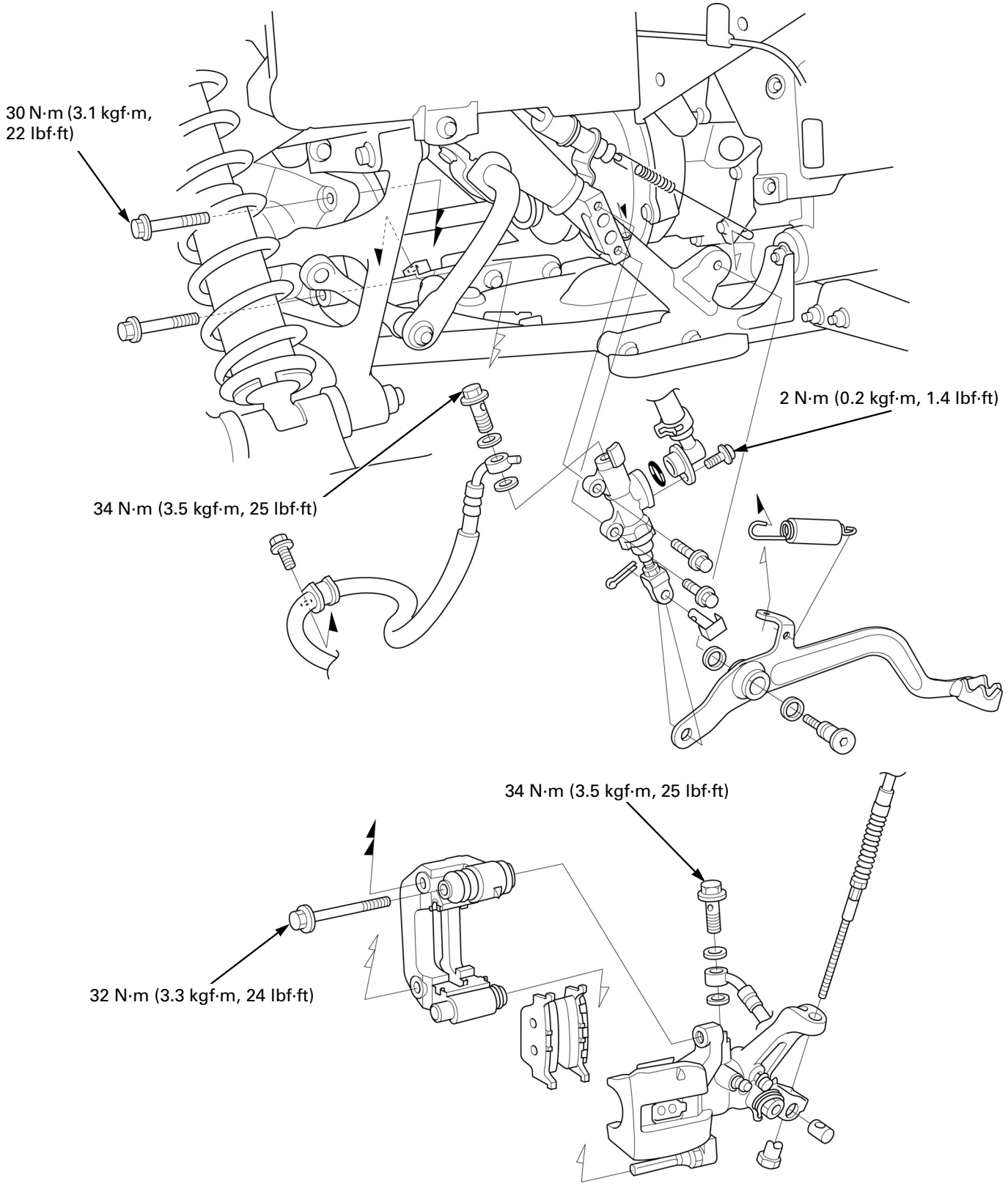


MEMO

17. BRAKE SYSTEM

SYSTEM COMPONENTS




30 N·m (3.1 kgf·m, 22 lbf·ft)
34 N·m (3.5 kgf·m, 25 lbf·ft)
2 N·m (0.2 kgf·m, 1.4 lbf·ft)
34 N·m (3.5 kgf·m, 25 lbf·ft)
32 N·m (3.3 kgf·m, 24 lbf·ft)

SERVICE INFORMATION

GENERAL

⚠ CAUTION

Frequent inhalation of brake pad dust, regardless of material composition could be hazardous to your health.
- Avoid breathing dust particles.
- Never use an air hose or brush to clean brake assemblies. Use an OSHA-approved vacuum cleaner.

- A contaminated brake disc or pad reduces stopping power. Discard contaminated pads, and clean a contaminated 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 contaminates (dirt, water, etc.) to get into an open reservoir.
- Once the hydraulic system has been opened, or if the brake feels spongy, the system must be bled.
- Always use fresh DOT 4 brake fluid from a sealed container when servicing the system. Do not mix different types of fluid as they may not be compatible.
- Always check brake operation before riding the vehicle.

SPECIFICATIONS

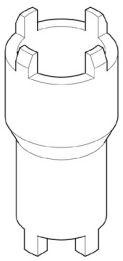
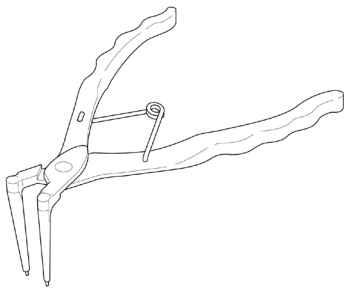
Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Recommended brake fluid		DOT 4 brake fluid	–
Front brake	Brake disc thickness	4.0 (0.16)	3.0 (0.12)
	Brake disc runout	–	0.30 (0.012)
	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)
	Caliper cylinder I.D.	33.960 – 34.010 (1.3370 – 1.3390)	34.02 (1.340)
	Caliper piston O.D.	33.878 – 33.928 (1.3338 – 1.3357)	33.87 (1.333)
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.	30.165 – 30.198 (1.1876 – 1.1889)	30.14 (1.187)
Rear (parking) brake lever free play		25 – 30 (1– 1-3/16)	–

TORQUE VALUES

Brake hose oil bolt	34 N·m (3.5 kgf·m, 25 lbf·ft)	
Front caliper bleed valve	5.4 N·m (0.55 kgf·m, 4.0 lbf·ft)	
Front caliper slider pin flange bolt	23 N·m (2.3 kgf·m, 17 lbf·ft)	
Front brake pipe	17 N·m (1.7 kgf·m, 12 lbf·ft)	
Front Brake lever pivot bolt	1 N·m (0.1 kgf·m, 0.7 lbf·ft)	
Front brake lever pivot nut	5.9 N·m (0.6 kgf·m, 4.3 lbf·ft)	
Front master cylinder holder bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	
Rear brake caliper bleed valve	5.4 N·m (0.55 kgf·m, 4.0 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.
Rear brake caliper parking nut	27 N·m (2.8 kgf·m, 20 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 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

Lock nut wrench 07716-0020100 	Snap ring pliers 07914-SA50001  or 07914-3230001

TROUBLESHOOTING

FRONT DISC BRAKE

Brake lever soft or spongy
- Air in hydraulic system
- Leaking hydraulic system
- Contaminated brake pad/disc
- Worn caliper piston seal
- Worn master cylinder piston cups
- Worn brake pad/disc
- Contaminated caliper
- Contaminated master cylinder
- Caliper not sliding properly
- Low brake fluid level
- Clogged fluid passage
- Warped/deformed brake disc
- Sticking/worn caliper piston
- Sticking/worn master cylinder piston
- Bent brake lever

Brake lever hard
- Clogged/restricted brake system
- Sticking/worn caliper piston
- Sticking/worn master cylinder piston
- Caliper not sliding properly
- Bent brake lever

Brake drags
- Contaminated brake pad/disc
- Badly worn brake pad/disc
- Warped/deformed brake disc
- Caliper not sliding properly
- Clogged/restricted fluid passage
- Sticking caliper piston

REAR 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

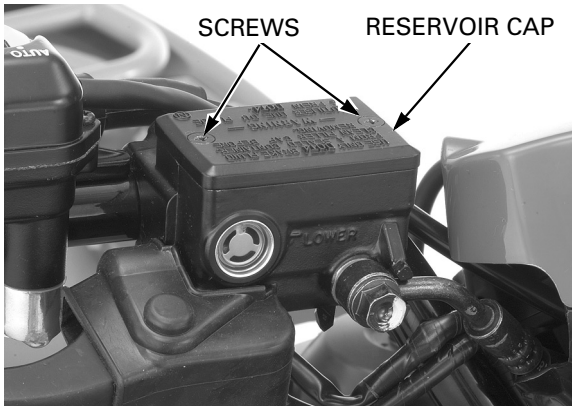
- *Do not allow foreign material to enter the system when filling the reservoir. Foreign material can cause brake system failure.*
- *Avoid spilling fluid on painted, plastic, or rubber parts. Place a rag over these parts whenever the system is serviced. Brake fluid will damage these types of materials.*
- *Use only DOT 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.

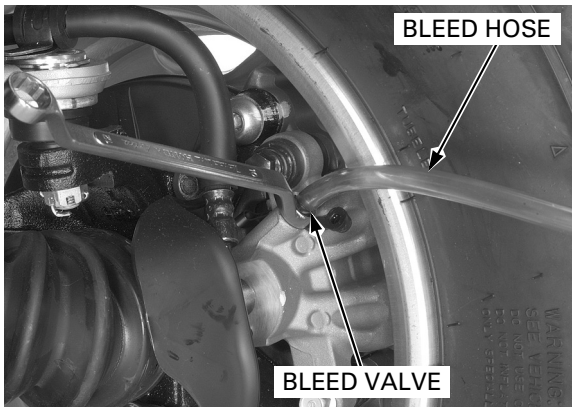
Remove the screws, reservoir cap, set plate and diaphragm from the front master cylinder.



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.

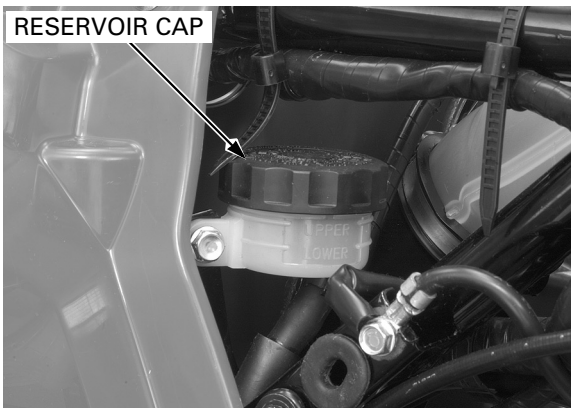
Perform above procedure for other side bleed valve.



REAR BRAKE

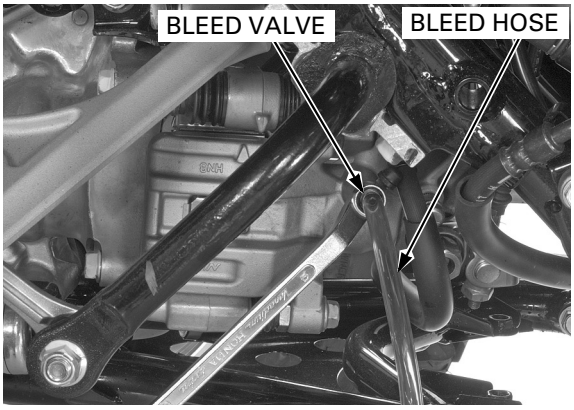
Remove the right side cover (page 3-5).

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 front brake caliper bleed valve.

Fill the front master cylinder reservoir with DOT 4 brake fluid from a sealed container.

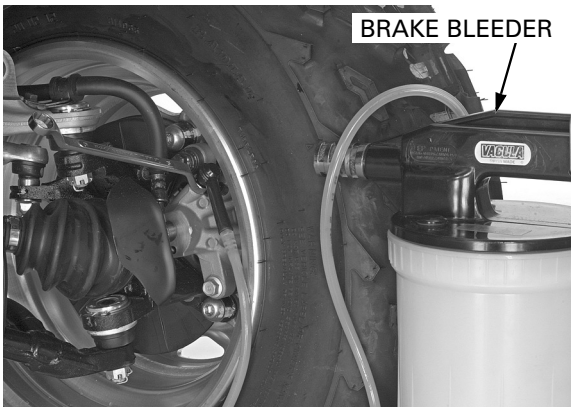
Follow the manufacturer's operating instructions.

Connect a commercially available brake bleeder to the bleed valve.

Check the fluid level often while bleeding the brake to prevent air from being pumped into the system.

Operate the brake bleeder and loosen the bleed valve.

If an automatic refill system is not used, add fluid when the fluid level in the reservoir is low.



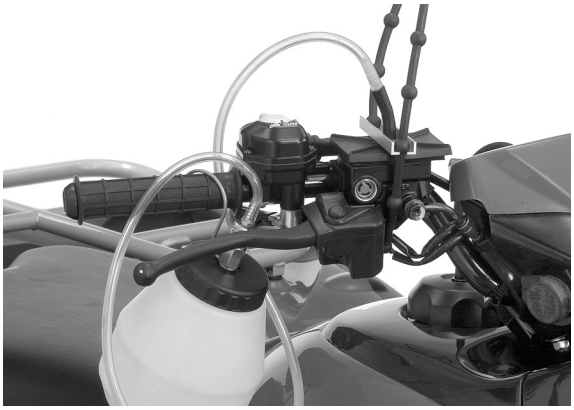
If air enters the bleeder from around the bleed valve threads, seal the threads with teflon tape.

Perform the bleeding procedure until the system is completely flushed/bled.

Tighten the bleed valve.

TORQUE: 5.4 N·m (0.55 kgf·m, 4.0 lbf·ft)

Perform air bleeding for the other side bleed valve.



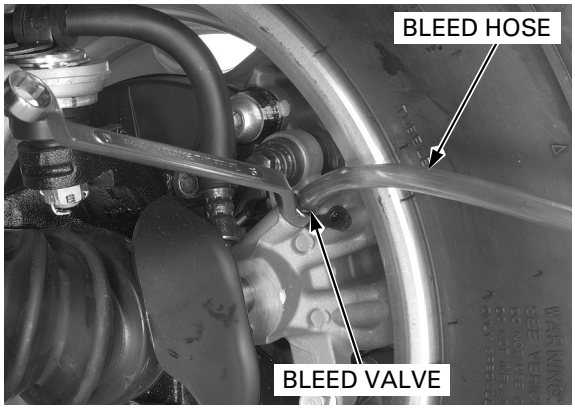
If the brake bleeder is not available, perform the following procedure:

Pump up the system pressure with the front brake lever until the lever resistance is felt.

Connect a bleed hose to the front brake caliper bleed valve and bleed the system as follows:

Do not release the brake lever until the bleed valve has been closed.

1. Squeeze the brake lever all the way and loosen the bleed valve 1/2 of a turn. Wait several seconds and then close the bleed valve.
2. Release the brake lever slowly and wait several seconds after it reaches the end of its travel.
3. Repeat the steps 1 and 2 until there are no air bubbles in the bleed hose.



Tighten the bleed valve.

TORQUE: 5.4 N·m (0.55 kgf·m, 4.0 lbf·ft)

Perform air bleeding for the other side bleed valve.

After bleeding air, operate the front brake lever. If it still feels spongy, bleed the system again.

Fill the front master cylinder reservoir to the casting ledge with DOT 4 brake fluid from a sealed container.

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

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

REAR BRAKE

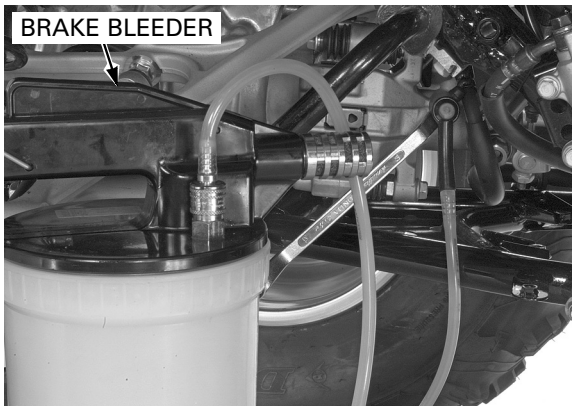
Close the caliper bleed valve.

Fill the rear brake reservoir with 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:

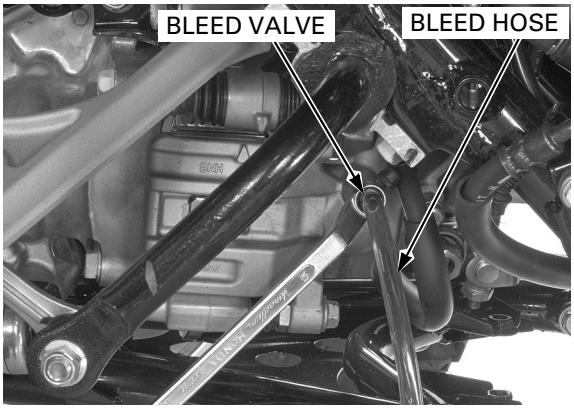
- Do not release the brake pedal until the bleed valve has been closed.

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.

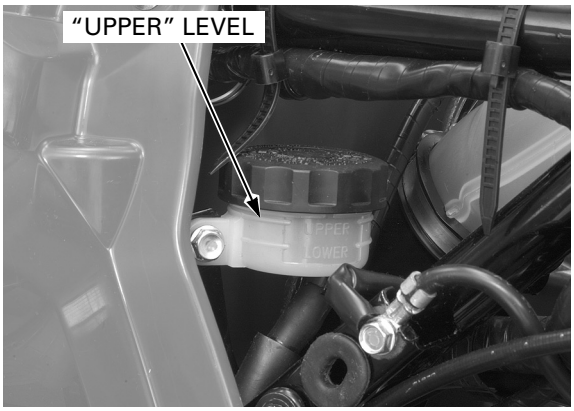
TORQUE: 5.4 N·m (0.55 kgf·m, 4.0 lbf·ft)



Fill the reservoir to the "UPPER" level with DOT 4 brake fluid from a sealed container.

Install the diaphragm, set plate and reservoir cap.

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



BRAKE PAD/DISC

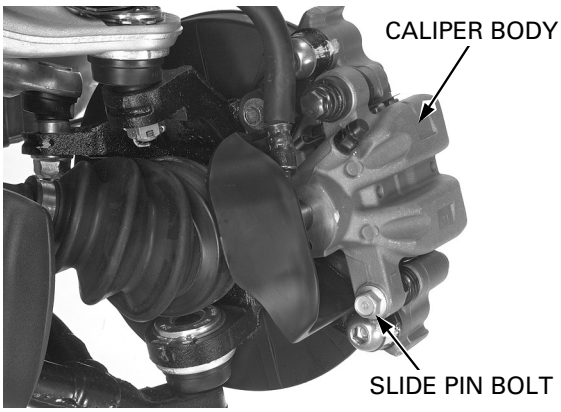
FRONT BRAKE PAD REPLACEMENT

Remove the front wheel (page 15-11).

Check the fluid level in the master cylinder reservoir as this operation causes the fluid level to rise.

Push the caliper piston all the way in by pushing the caliper body against the disc to allow installation of new brake pads.

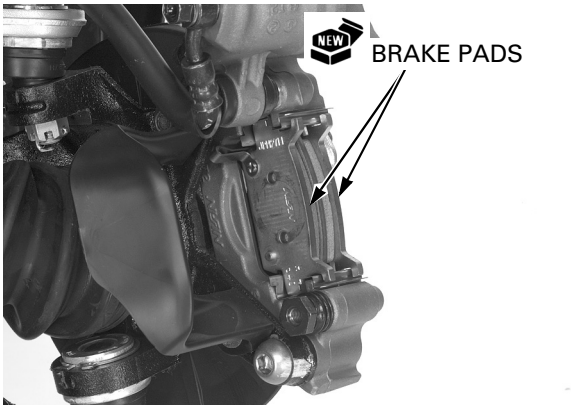
Remove the caliper pin bolt.



Pivot the caliper body up and remove the brake pads from the caliper bracket.

Always replace the brake pads in pairs to ensure even disc pressure.

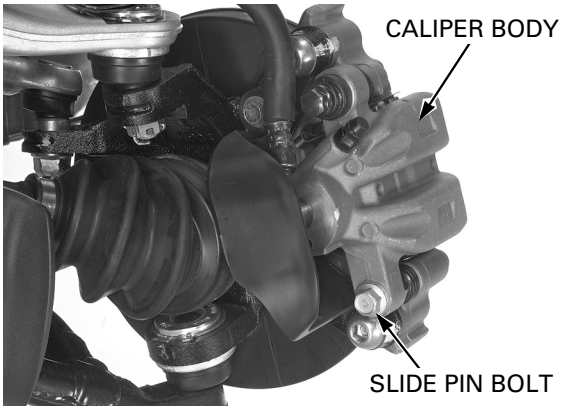
Install new brake pads into the caliper bracket properly as shown.



Lower the caliper body, install the caliper pin bolt and tighten it.

TORQUE: 23 N·m (2.3 kgf·m, 17 lbf·ft)

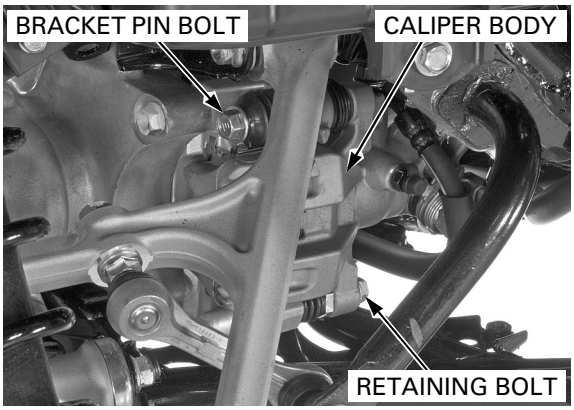
Squeeze the front brake lever to seat the caliper piston against the pad.



REAR BRAKE PAD REPLACEMENT

Remove the right rear wheel (page 16-6).

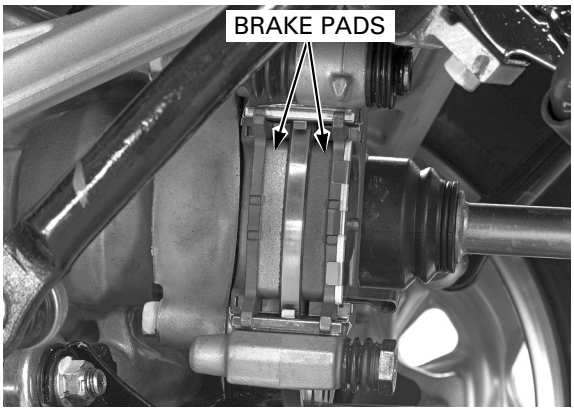
Remove the bracket pin retaining bolt and bracket pin bolt.
Remove the caliper body from the caliper bracket.



Remove the brake pads from the caliper bracket.

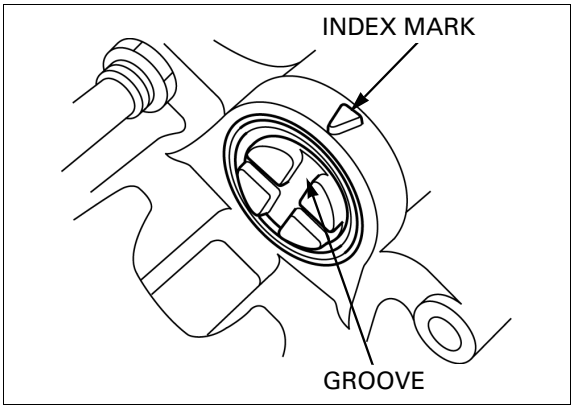
Always replace the brake pads in pairs to ensure even disc pressure.

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.

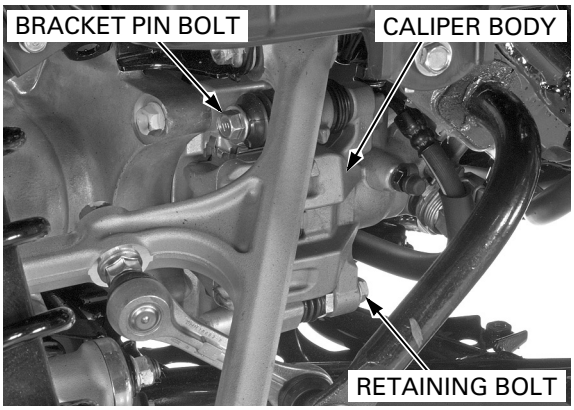
TOOL:
Lock nut wrench, 20 x 24 mm 07716-0020100



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 16-6).

Operate the brake pedal to seat the caliper piston against the pad.

FRONT BRAKE DISC INSPECTION

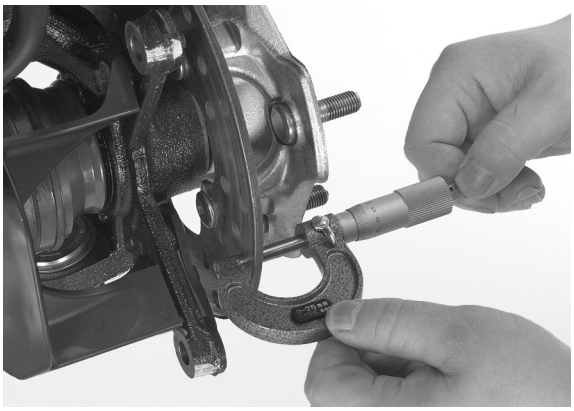
Remove the front wheel (page 15-11).
Remove the caliper body (page 17-17).

Visually inspect the brake disc for damage or crack.

Measure the brake disc thickness at several points.

SERVICE LIMIT: 3.0 mm (0.12 in)

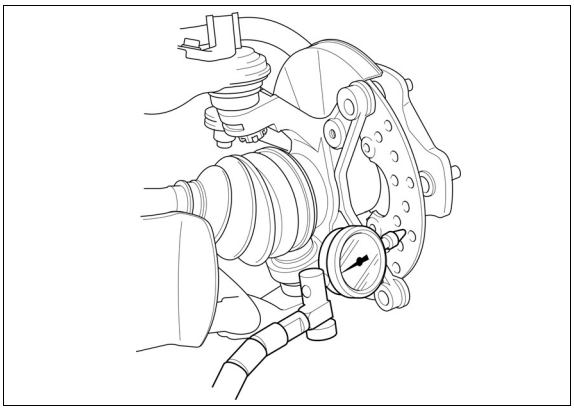
Replace the brake disc if the smallest measurement is less than service limit.



Check the brake disc for warpage.

SERVICE LIMIT: 0.30 mm (0.012 in)

Check the front wheel hub bearings or rear axle bearings for excessive play, if the warpage exceeds the service limit.
Replace the brake disc if the bearings are normal.



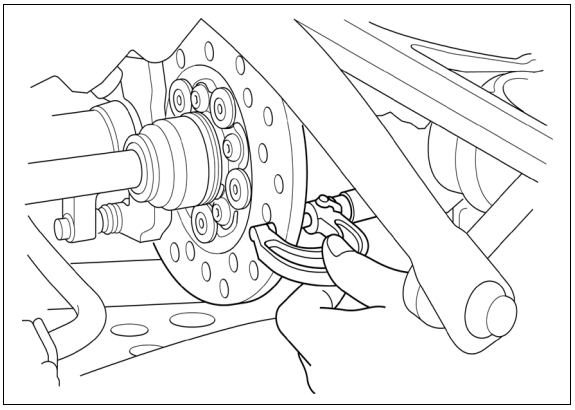
REAR BRAKE DISC INSPECTION

Visually inspect the disc for damage or cracks.

Measure the brake disc thickness at several points.

SERVICE LIMIT: 6 mm (0.2 in)

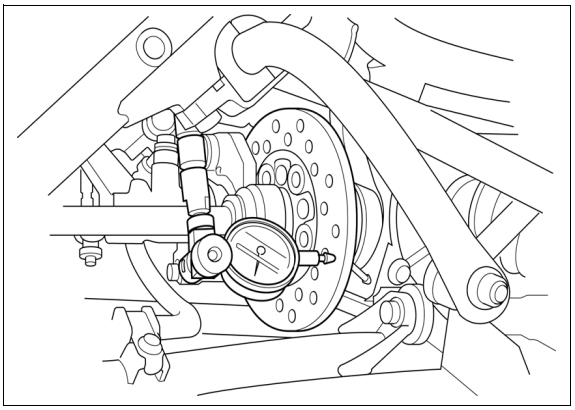
Replace the brake disc if the smallest measurement is less than the service limit.



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 MASTER CYLINDER

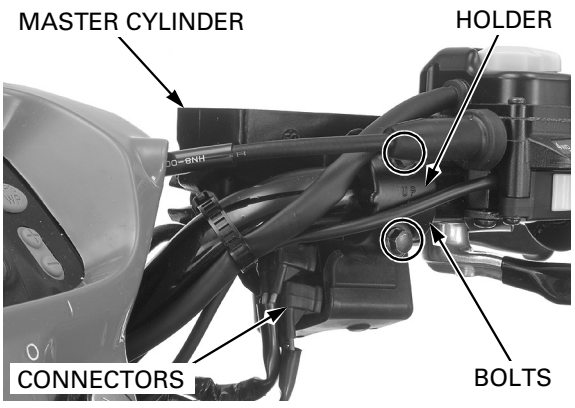
DISASSEMBLY

Drain the brake fluid from the front brake hydraulic system (page 17-7).

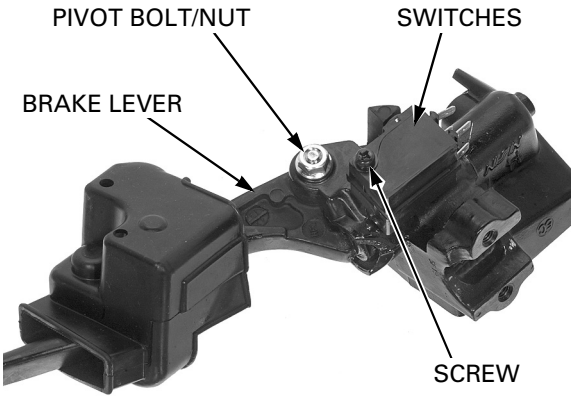
Disconnect the brake hose by removing the oil bolt and sealing washers.

Disconnect the front brake switch connectors.

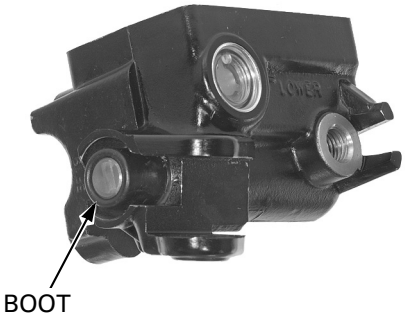
Remove the master cylinder holder bolts, holder and master cylinder.



Remove the pivot nut, bolt and brake lever.
Remove the screw and brake switches.



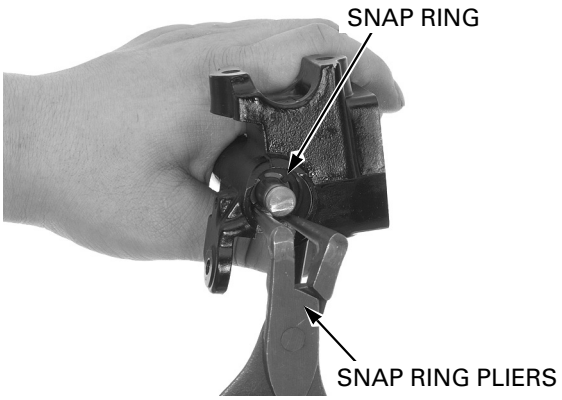
Remove the boot from the master cylinder and master piston.



Remove the snap ring using the special tool.

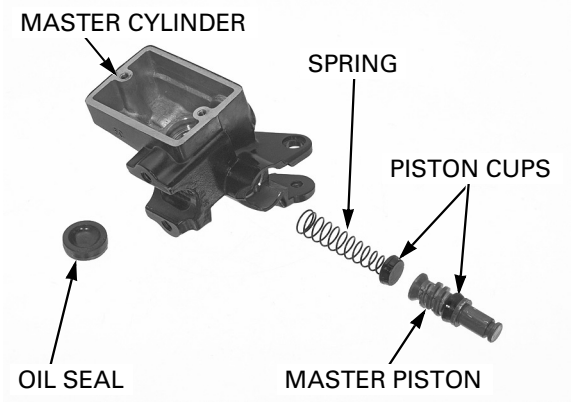
TOOL:

Snap ring pliers	**07914-SA50001 or 07914-3230001**



Remove the master piston and spring.
Remove the oil seal

Clean the master cylinder, reservoir and master piston in clean brake fluid.



INSPECTION

Check the master cylinder and master piston for scoring, scratches or damage.

Check the piston cups and oil seal for wear, deterioration or damage.

Measure the master cylinder I.D.

SERVICE LIMIT: 14.055 mm (0.5333 in)

Measure the master cylinder piston O.D.

SERVICE LIMIT: 13.945 mm (0.5490 in)

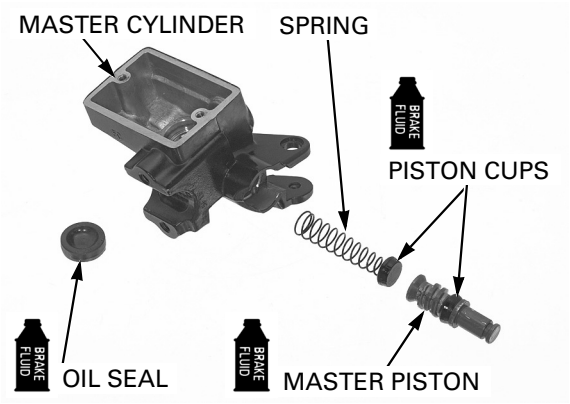
ASSEMBLY

Coat the master piston, piston cups and oil seal with clean DOT 4 brake fluid.
Install the oil seal into the master cylinder.

Install the spring onto the piston end.

Do not allow the piston cup lips to turn inside out.

Install the spring and master piston into the master cylinder.

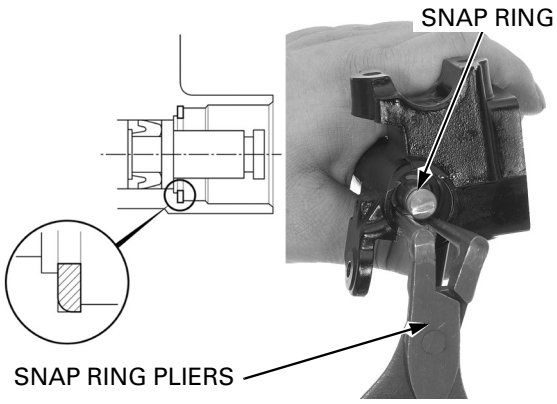


Be certain the snap ring is firmly seated in the groove.

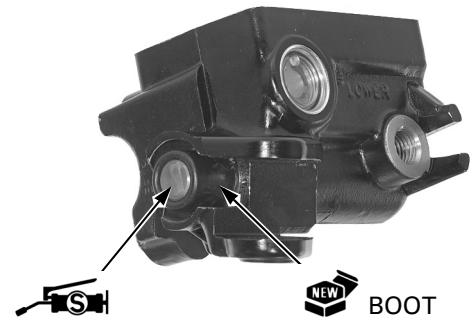
Install the snap ring into the groove in the master cylinder with the chamfered edge facing in using the special tool.

TOOL:

Snap ring pliers	**07914-SA50001 or 07914-3230001**



Install a new boot into the master cylinder and the groove in the piston
Apply silicone grease to the brake lever pivot-to-master piston contact area.



Apply silicone grease to the brake lever pivot bolt sliding surface.

Install the pivot bolt and tighten it.

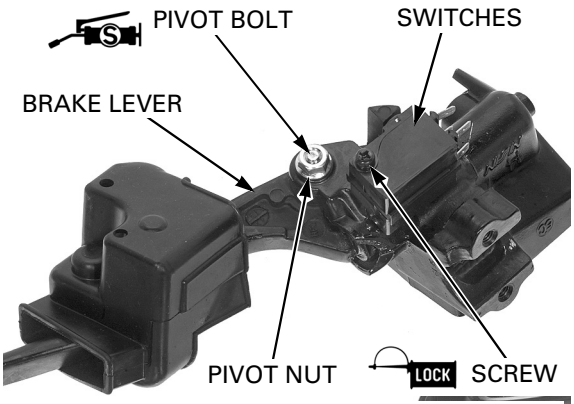
TORQUE: 1 N·m (0.1 kgf·m, 0.7 lbf·ft)

Install the pivot nut and tighten it.

TORQUE: 5.9 N·m (0.6 kgf·m, 4.3 lbf·ft)

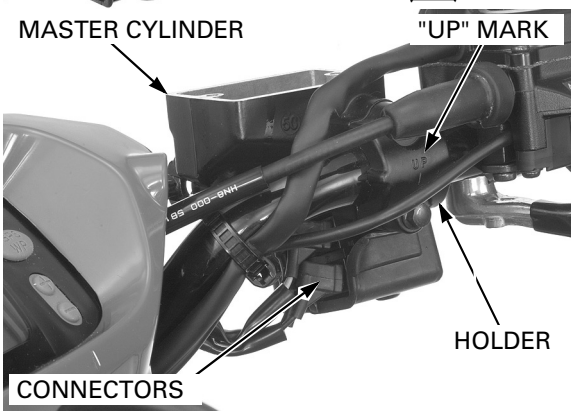
Install the brake light switch and tighten the screw.

TORQUE: 1.2 N·m (0.12 kgf·m, 0.9 lbf·ft)



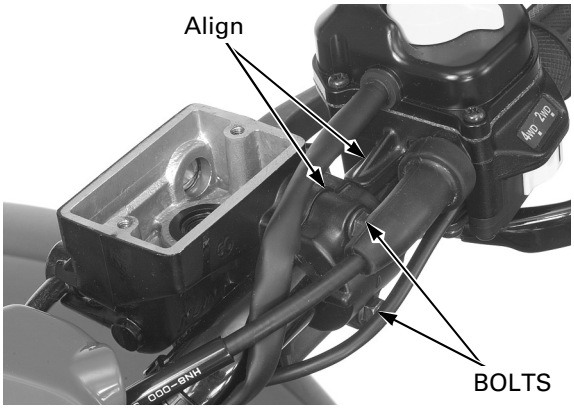
Install the front brake master cylinder and holder with the "UP" mark facing up, and install the bolts.

Connect the front brake light switch connectors.



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.

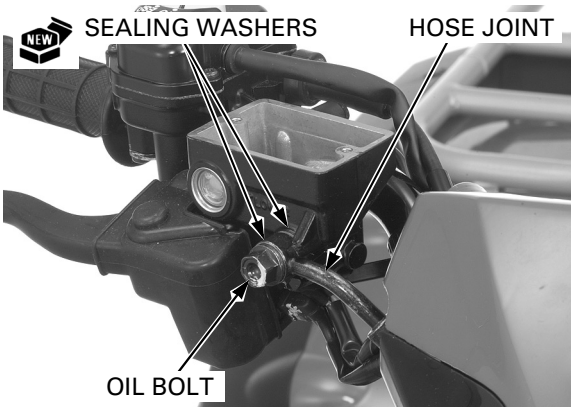
TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)



Rest the brake hose joint between the stoppers on the master cylinder.
Connect the brake hose with the oil bolt and new sealing washers, and tighten the oil bolt.

TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)

Fill and bleed the front brake hydraulic system (page 17-7).

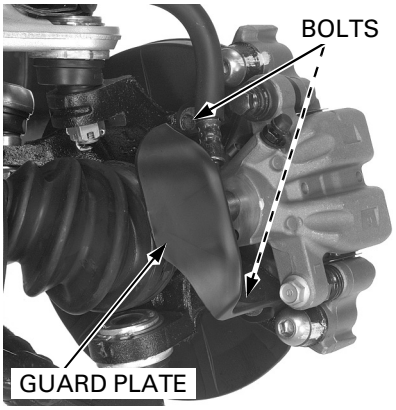


FRONT BRAKE CALIPER

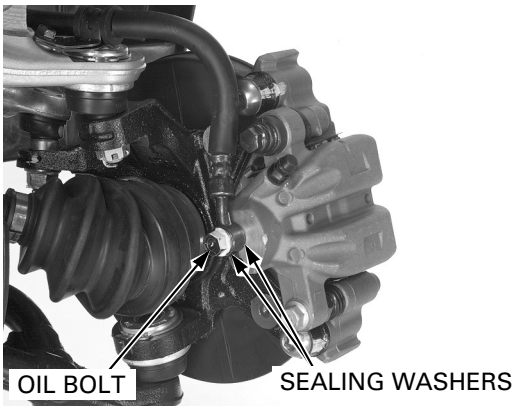
DISASSEMBLY

Drain the brake fluid from the front brake hydraulic system (page 17-7).

Remove the two bolts and guard plate.

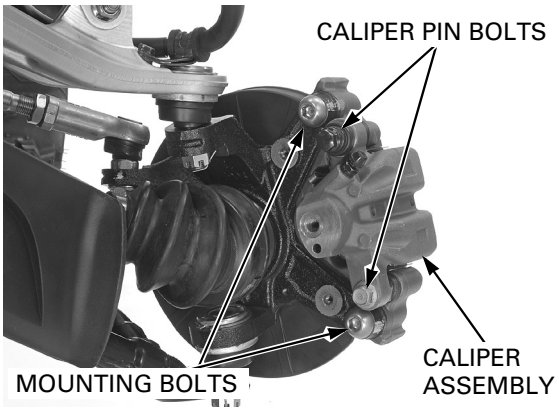


Disconnect the brake hose from the brake caliper by removing the oil bolt and sealing washer.



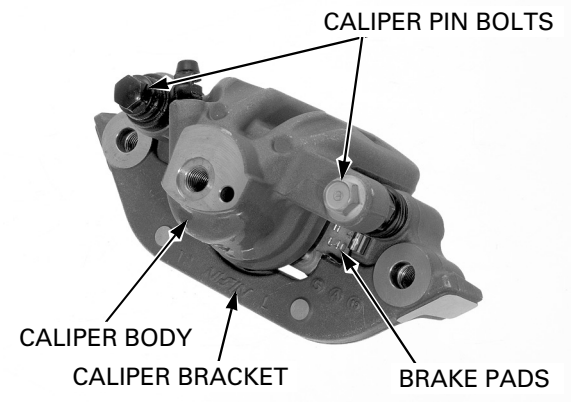
Loosen the two caliper pin bolts.

Remove the two mounting bolts and brake caliper assembly.



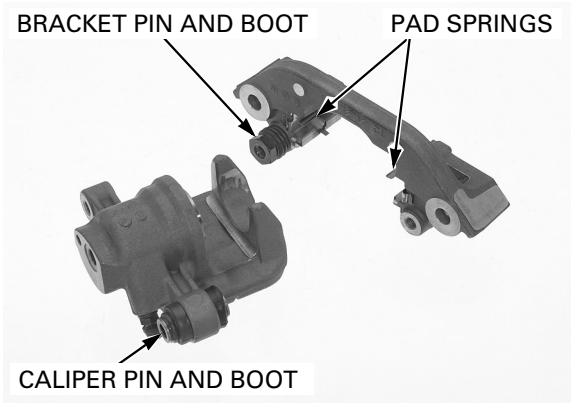
Remove the two caliper pin bolts and separate the caliper bracket from the caliper body.

Remove the brake pads.



Remove the bracket pin, boot and pad springs from the caliper bracket.

Remove the caliper pin and boot from the caliper body.

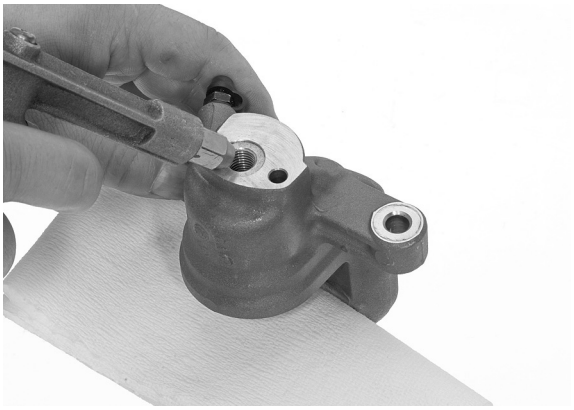


Place a shop towel over the piston.

Do not use high pressure air or bring the nozzle too close to the inlet.

Position the caliper body with the piston down and apply small squirts of air pressure to the fluid inlet to remove the piston.

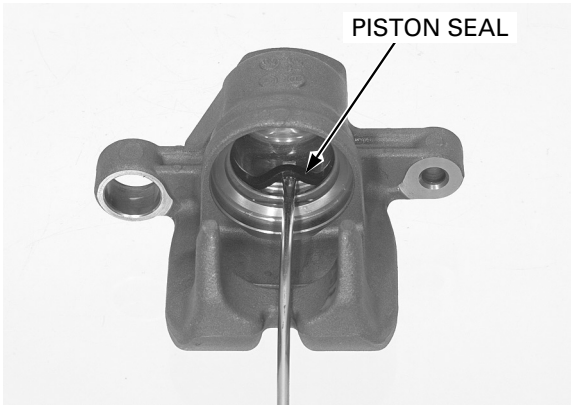
Remove the caliper piston boot.



Be careful not to damage the piston sliding surface.

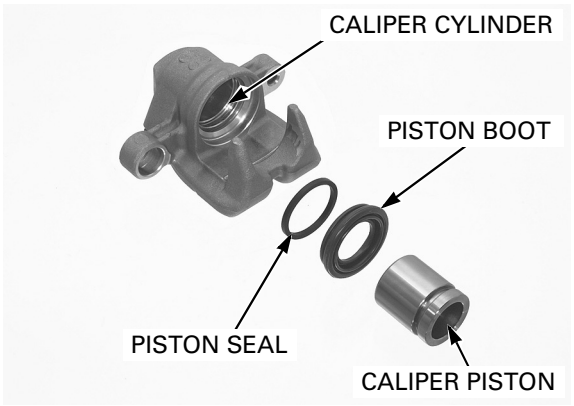
Push the piston seal in and lift it out.

Clean the boot and seal grooves, caliper cylinder, and piston with clean brake fluid.



INSPECTION

Check the caliper cylinder and piston for scoring, scratches or damage.

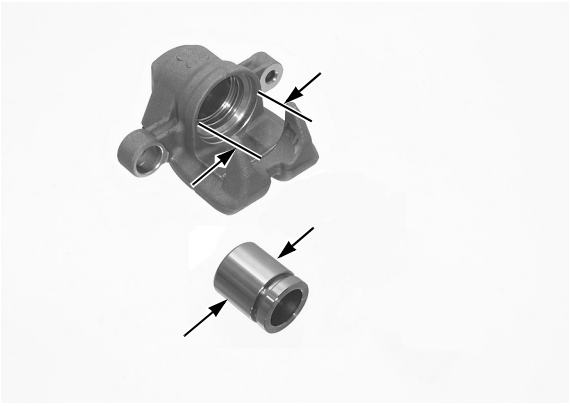


Measure the caliper cylinder I.D.

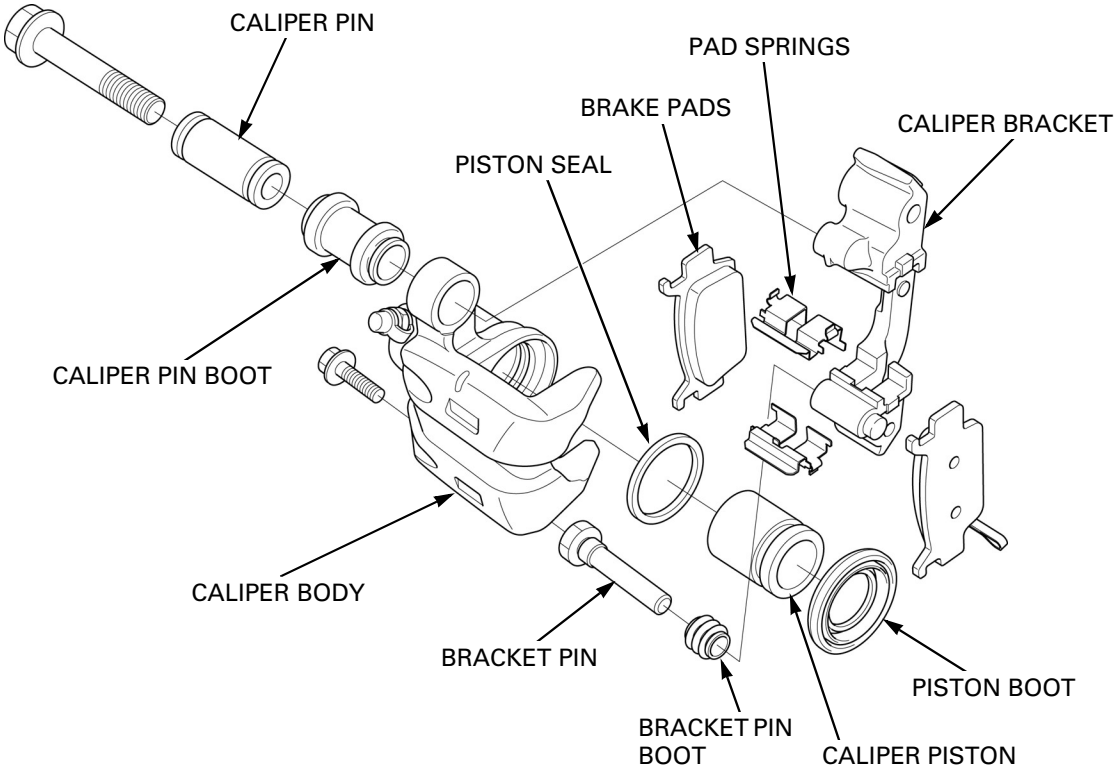
SERVICE LIMIT: 34.020 mm (1.3394 in)

Measure the caliper cylinder piston O.D.

SERVICE LIMIT: 33.870 mm (1.3335 in)



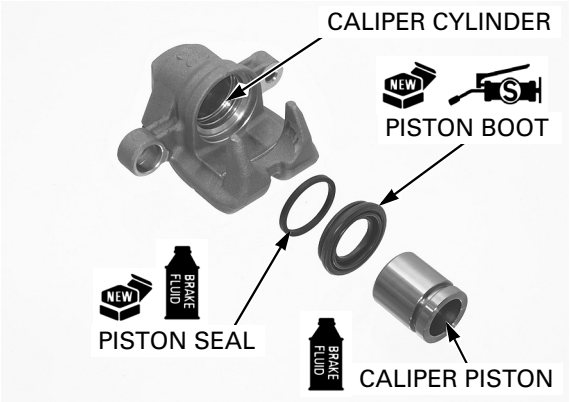
ASSEMBLY



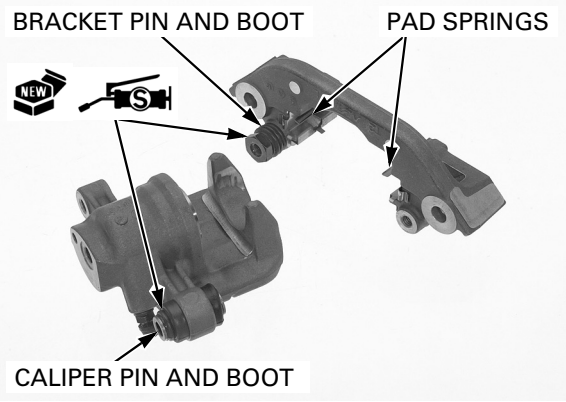
Coat new piston seal with clean brake fluid and install it into the seal groove in the caliper cylinder.

Apply silicone grease to the inside of a new piston boot and install it into the caliper cylinder groove properly.

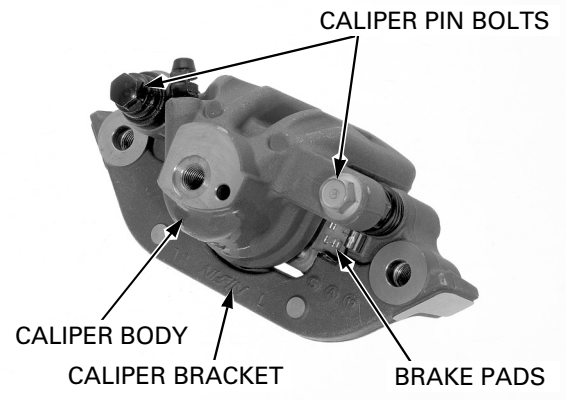
Coat the caliper piston with clean brake fluid and install them into the caliper cylinder with the open side toward the pads, and install the piston boot into the piston groove properly.



Install the pad springs onto the caliper body as shown.
Apply silicone grease to the insides of new pin boots.
Install the caliper pin boot and pin into the caliper body.
Install the bracket pin boot and pin into the caliper bracket.



Install the brake pads onto the caliper bracket.
Install the caliper body onto the bracket.
Loosely install the caliper pin bolts.

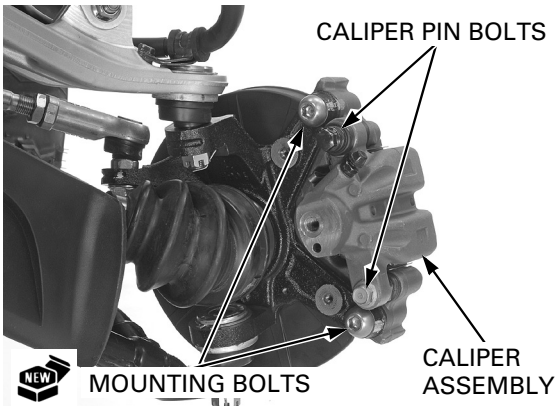


Install the brake caliper assembly onto the knuckle with new mounting bolts, and tighten the bolts.

TORQUE: 44 N·m (4.5 kgf·m, 32 lbf·ft)

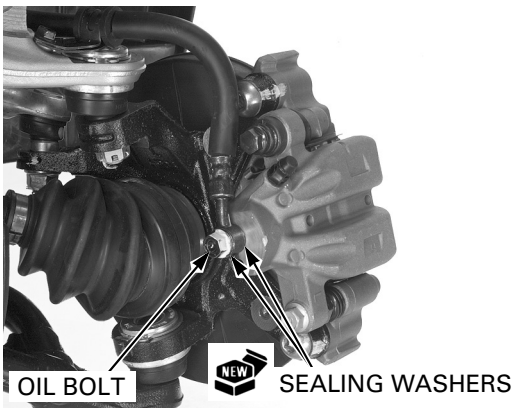
Tighten the caliper pin bolts.

TORQUE: 23 N·m (2.3 kgf·m, 17 lbf·ft)



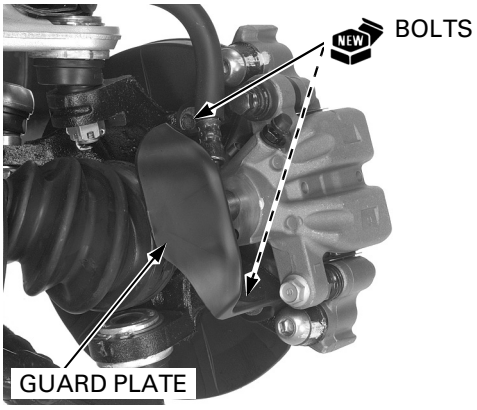
Connect the brake hose with the oil bolt and new sealing washers while inserting the stopper pin into the hole in the caliper body.
Tighten the oil bolt.

TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)



Install the guard plate with new bolts and tighten the bolts securely.

Fill and bleed the front brake hydraulic system (page 17-7).



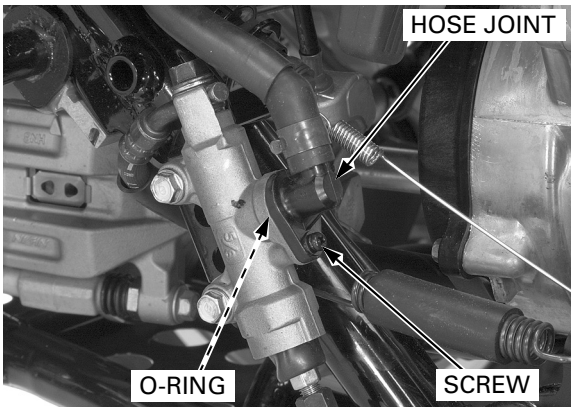
REAR BRAKE MASTER CYLINDER/ BRAKE PEDAL

DISASSEMBLY

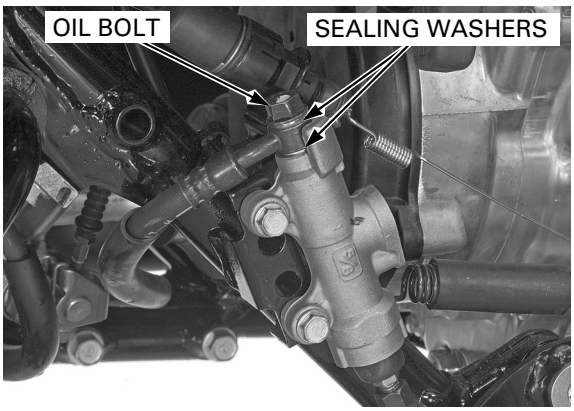
Drain the brake fluid from the rear brake hydraulic system (page 17-8).

Remove the right center mud guard (page 3-7).

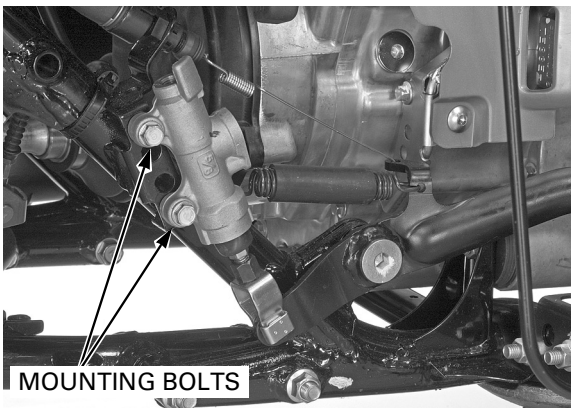
Remove the screw and reservoir hose joint from the master cylinder.
Remove the O-ring.



Disconnect the brake hose from the master cylinder by removing the oil bolt and sealing washers.

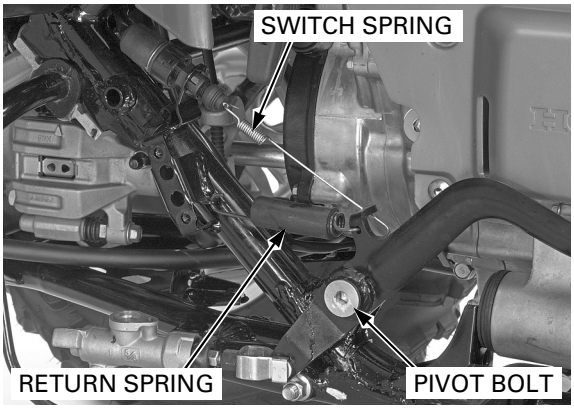


Remove the master cylinder mounting bolts while holding the brake pedal.

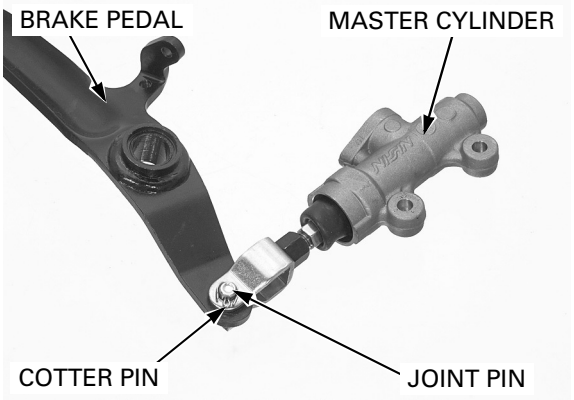


Remove the brake pedal pivot bolt and dust seals.

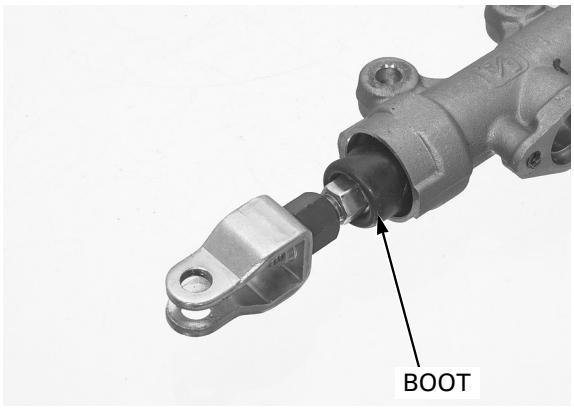
Unhook the brake switch spring from the return spring.
Unhook the return spring from the pedal and frame.



Separate the master cylinder from the brake pedal by removing the cotter pin and joint pin.



Remove the boot from the master cylinder.

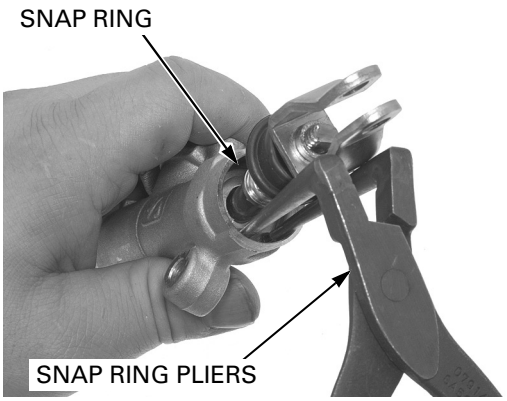


Remove the snap ring using the special tool.

TOOL:

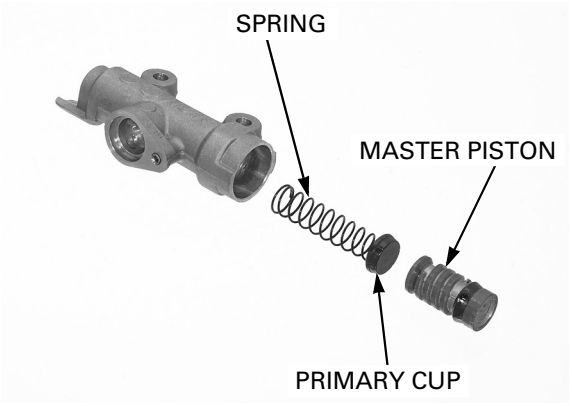
Snap ring pliers	**07914-SA50001 or 07914-3230001**

Remove the push rod.



Remove the master piston, primary cup and spring.

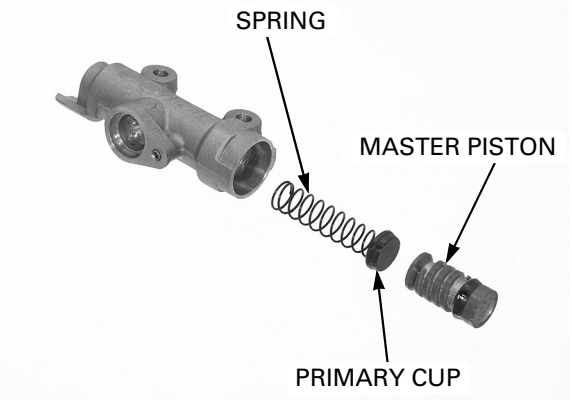
Clean the master cylinder, spring and master piston in clean brake fluid.



INSPECTION

Check the piston cups and boot for wear, deterioration or damage.

Check the spring for damage.



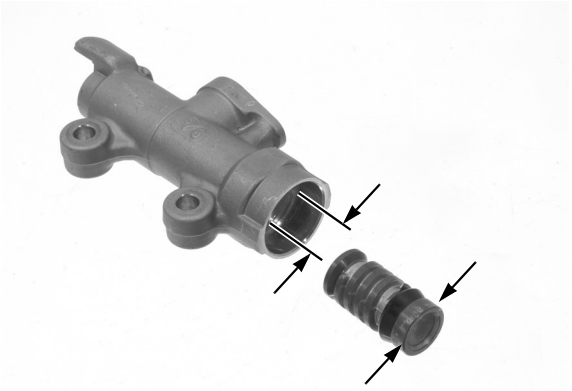
Check the master cylinder and piston for scoring, scratches or damage.

Measure the master cylinder I.D.

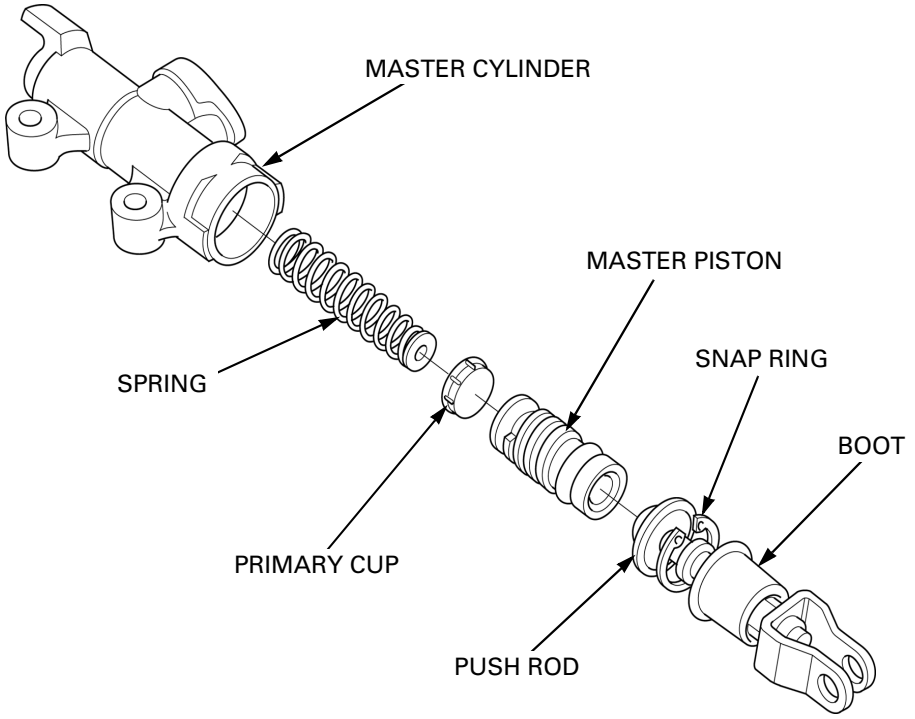
SERVICE LIMIT: 14.055 mm (0.5533 in)

Measure the master piston O.D.

SERVICE LIMIT: 13.945 mm (0.5490 in)



ASSEMBLY



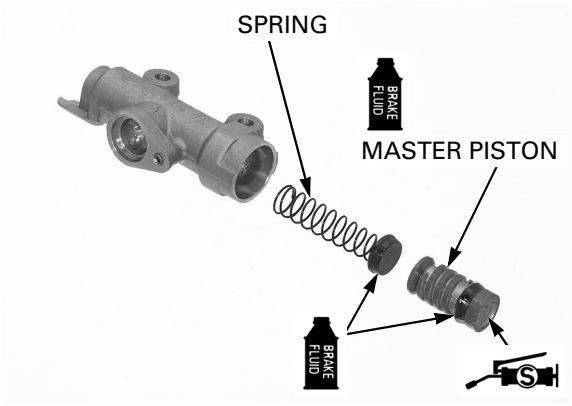
Coat the master piston and piston cups and with clean brake fluid.

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.



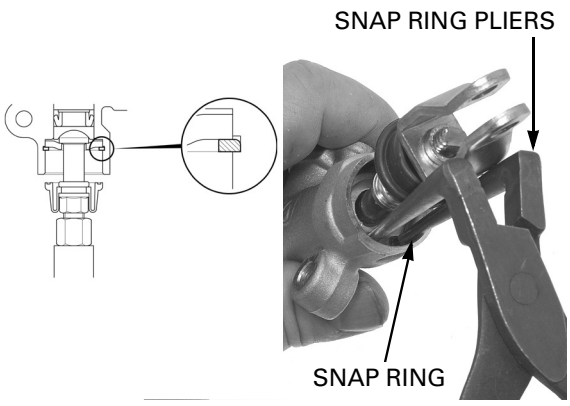
Install the push rod into the master cylinder.

Be certain the snap ring is firmly seated in the groove.

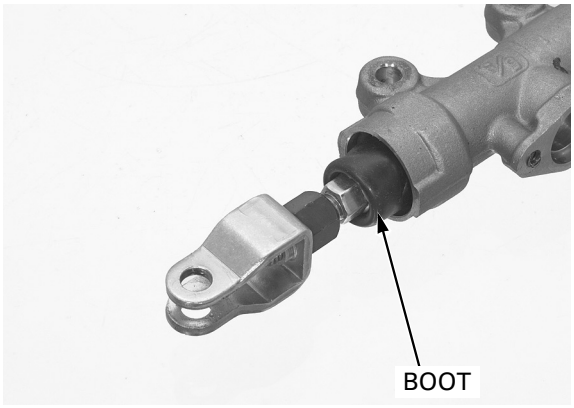
Install the snap ring into the groove in the master cylinder with the chamfered edge facing in using the special tool.

TOOL:

Snap ring pliers	**07914-SA50001 or 07914-3230001**

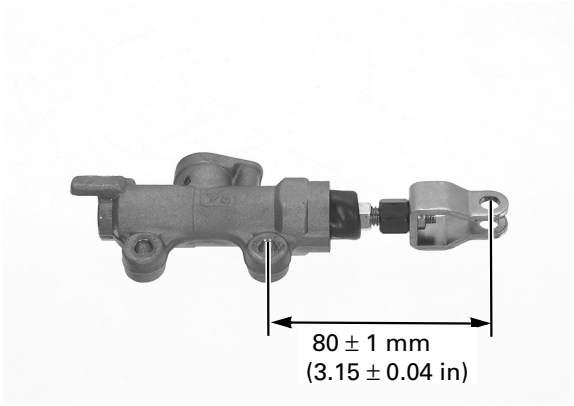


Install the boot into the master cylinder.

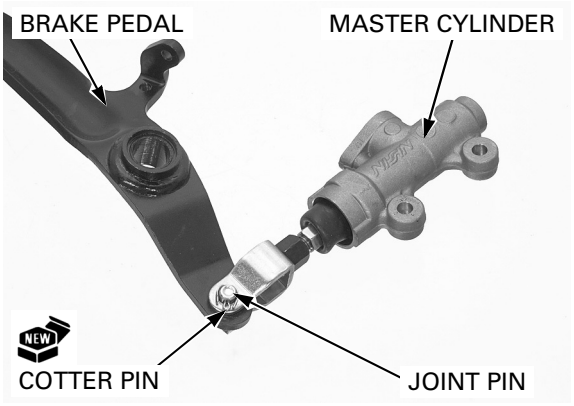


If the push rod joint is reinstalled, adjust the push rod length so that the distance between the centers of the master cylinder lower mounting bolt hole and the centers of the joint pin hole is 80 ± 1 mm (3.15 ± 0.04 in). After adjustment, tighten the joint nut.

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.

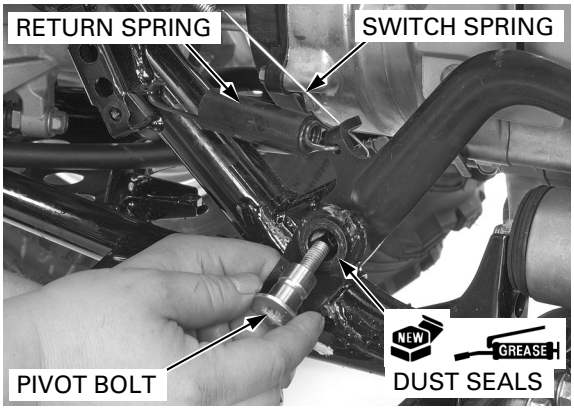


Apply grease to new dust seal lips.
Install the dust seals into the brake pedal.

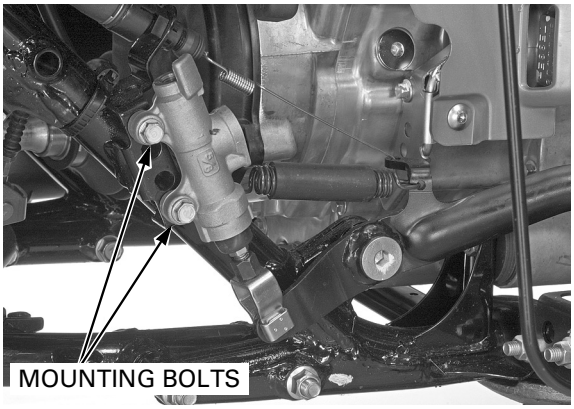
Hook the return spring to the pedal and frame as shown.

Connect the brake switch spring to the return spring.

Install and tighten the brake pedal pivot bolt.



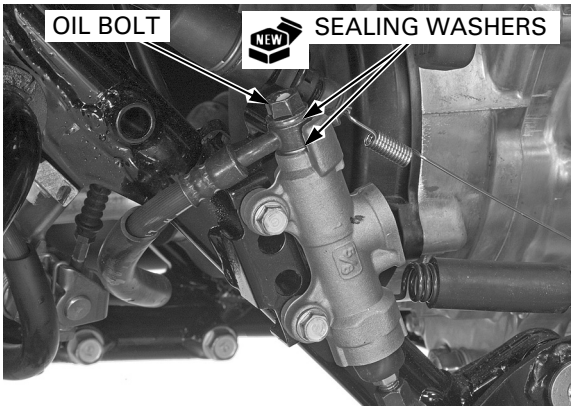
Install the master cylinder onto the frame and tighten the mounting bolts securely.



Connect the brake hose to the master cylinder with the oil bolt and new sealing washers.

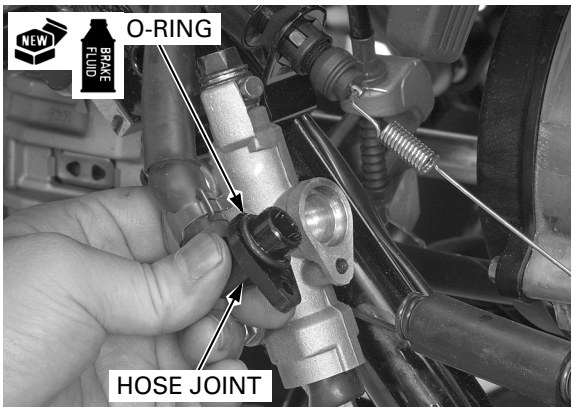
Rest the hose joint pin against the stopper and tighten the oil bolt.

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.



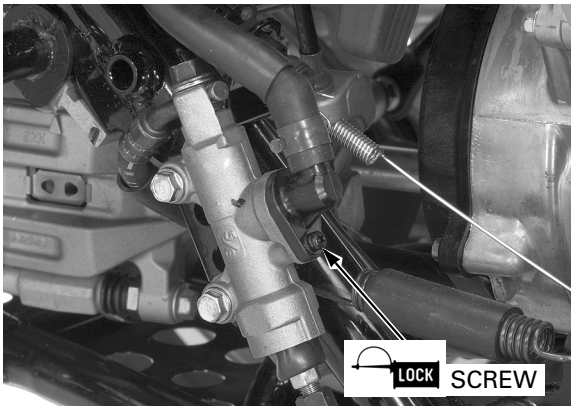
Route the wires and hose properly (page 1-20).

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 17-7).

Install the right center mud guard (page 3-7).

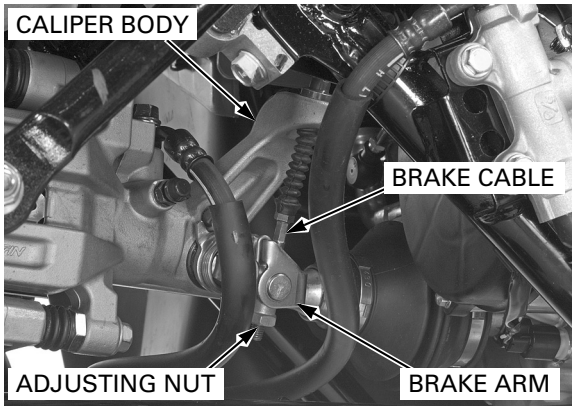


REAR BRAKE CALIPER

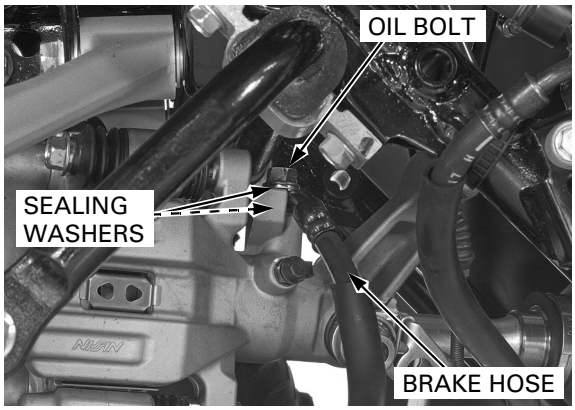
DISASSEMBLY

Remove the right rear wheel (page 16-6).
Drain the brake fluid from the rear brake hydraulic system (page 17-8).

Remove the rear brake adjusting nut and disconnect the brake cable from the brake arm.
Remove the brake cable from the caliper body.

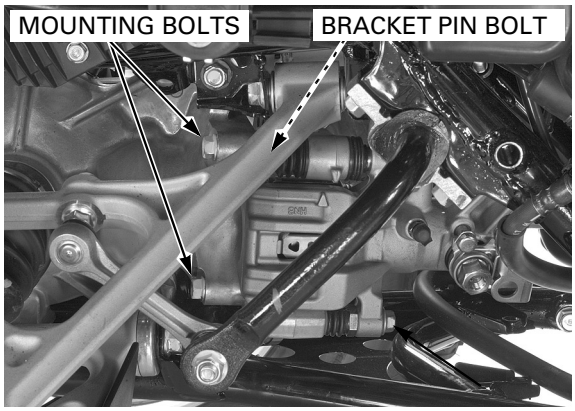


Disconnect the brake hose from the caliper body by removing the oil bolt and sealing washers.

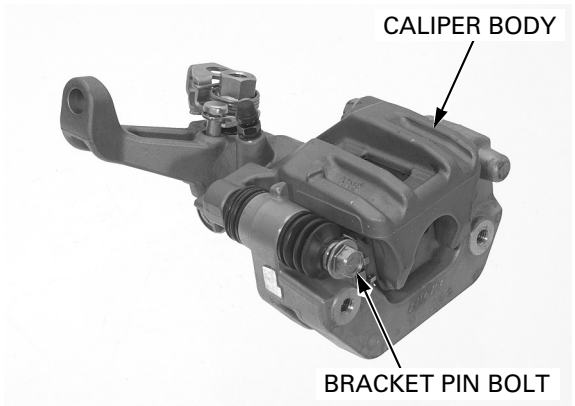


Loosen the bracket pin bolt.

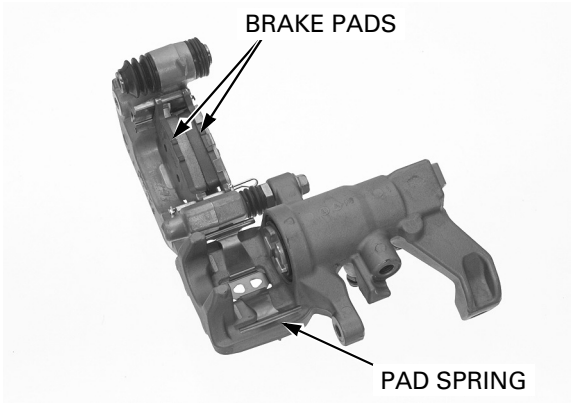
Remove the two mounting bolts and the brake caliper from the frame.



Remove the bracket pin bolt and pivot the caliper body.

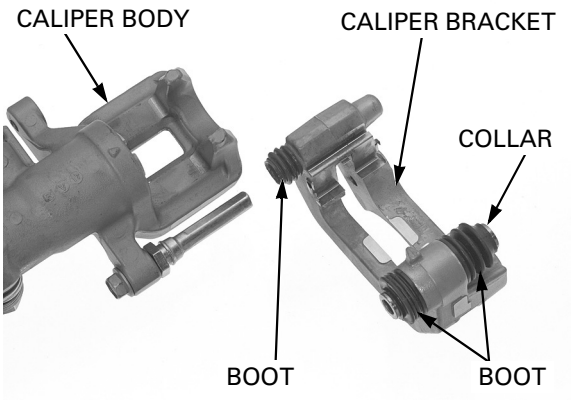


Remove the brake pads and pad spring.



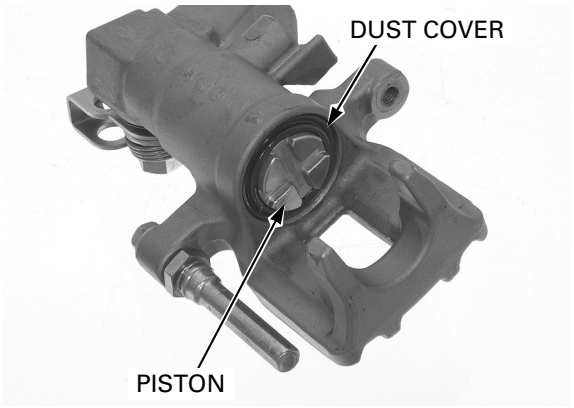
Separate the caliper body from the caliper bracket.

Remove the boots and collar from the caliper bracket.



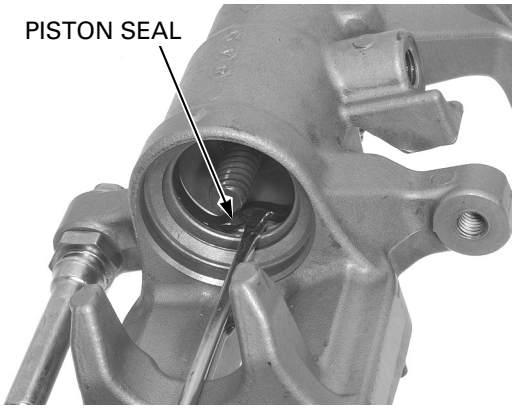
Remove the caliper piston by turning it counter-clockwise.

Remove the piston dust cover.



Be careful not to damage the piston sliding surface.

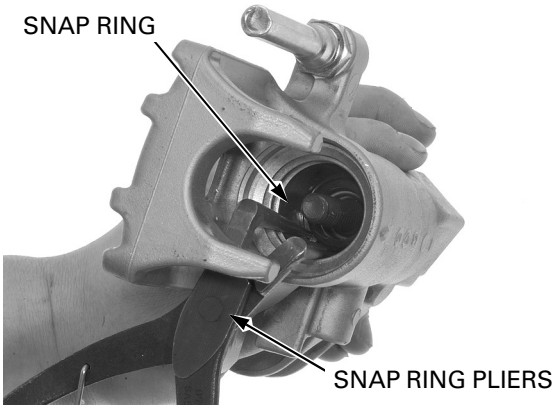
Push the piston seal in and lift it out.



Remove the snap ring using the snap ring pliers.

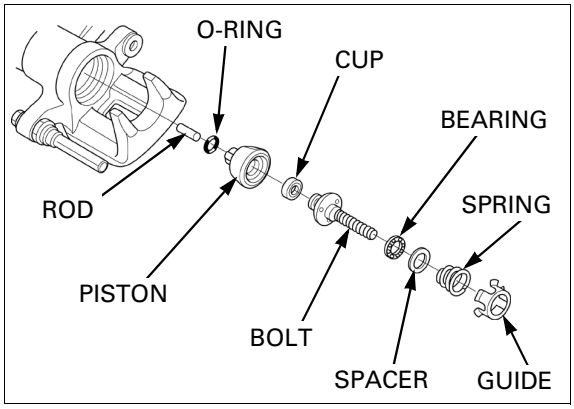
TOOL:

Snap ring pliers	**07914-SA50001 or 07914-3230001**

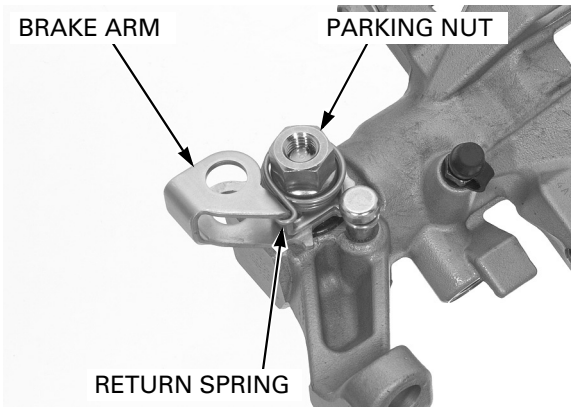


Remove the following:

- spring guide
- adjusting spring B
- spacer
- bearing A
- adjusting bolt
- cup
- sleeve piston
- rod
- O-ring

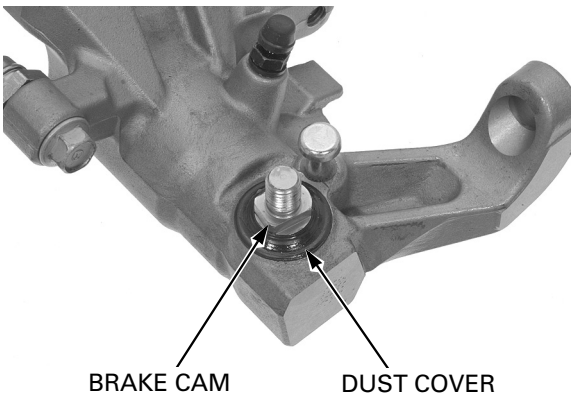


- return spring
- parking nut
- spring washer
- brake arm



- brake cam
- dust cover

Clean the disassembled parts in clean brake fluid.



INSPECTION

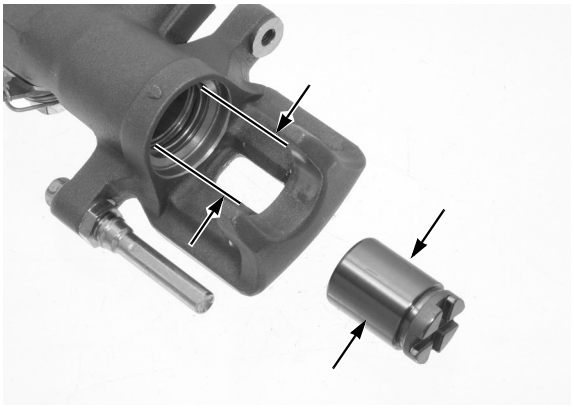
Check the caliper cylinder and piston for scoring or other damage.

Measure the caliper cylinder I.D.

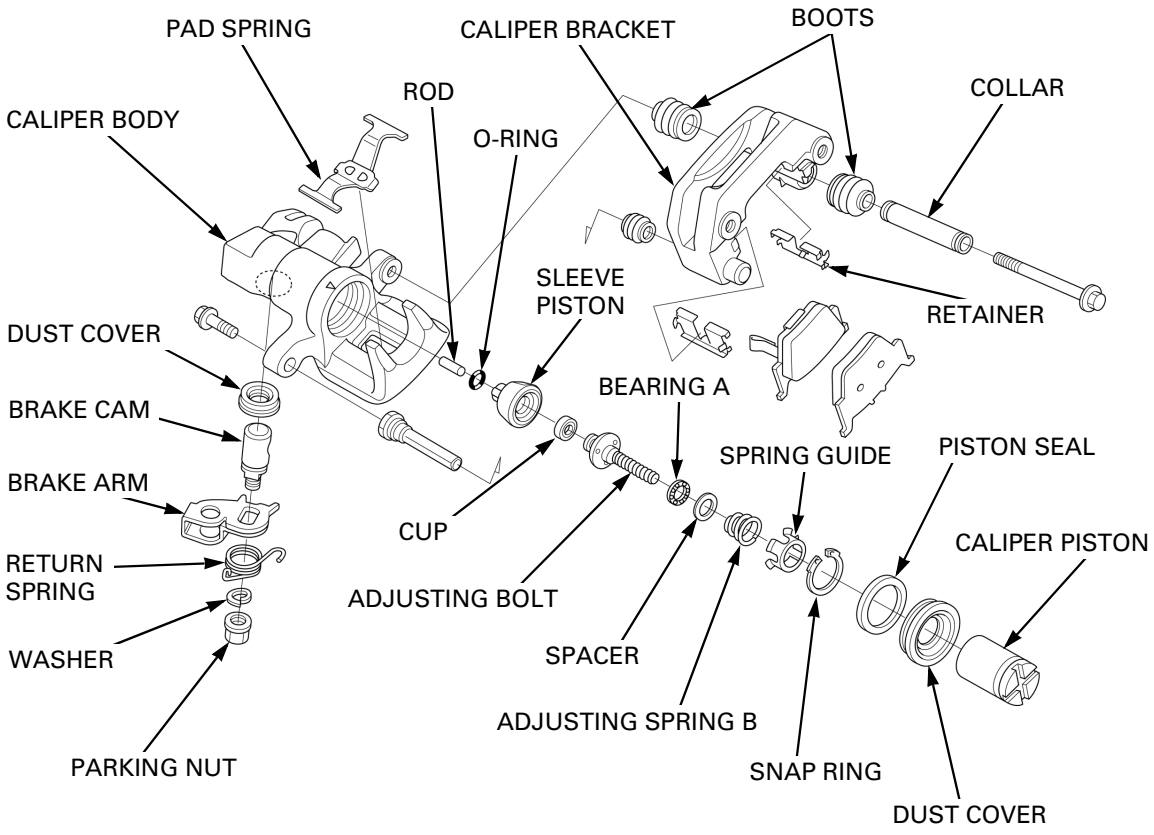
SERVICE LIMIT: 30.29 mm (1.193 in)

Measure the caliper piston O.D.

SERVICE LIMIT: 30.14 mm (1.187 in)

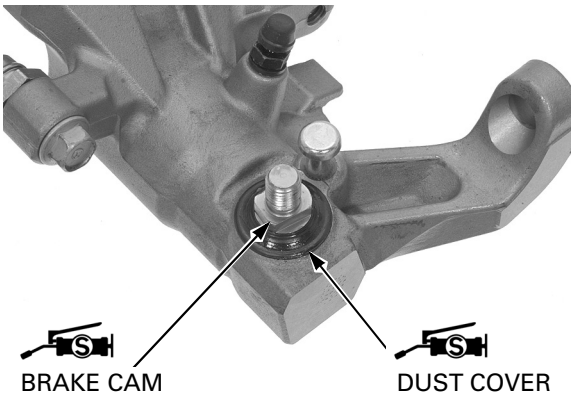


ASSEMBLY/INSTALLATION



Apply silicone grease to the dust cover lips and install it into the caliper body.

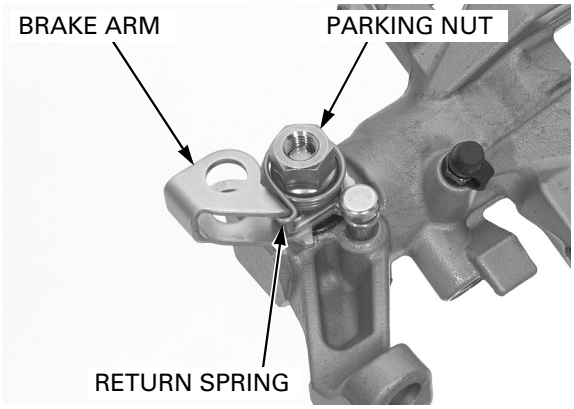
Apply silicone grease to the brake cam groove and install it into the caliper body with the groove facing the caliper cylinder.



Install the brake arm, washer and parking nut.
Tighten the parking nut.

TORQUE: 27 N·m (2.8 kgf·m, 20 lbf·ft)

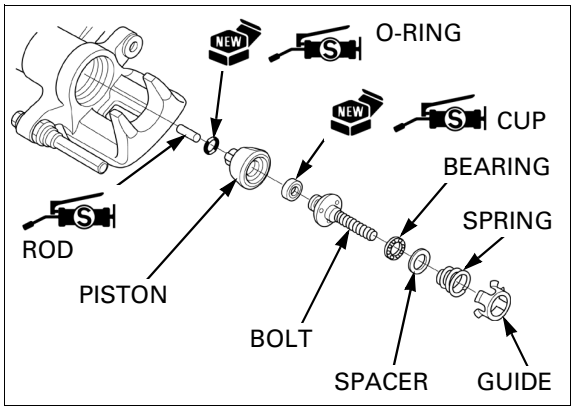
Install the return spring as shown.



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.

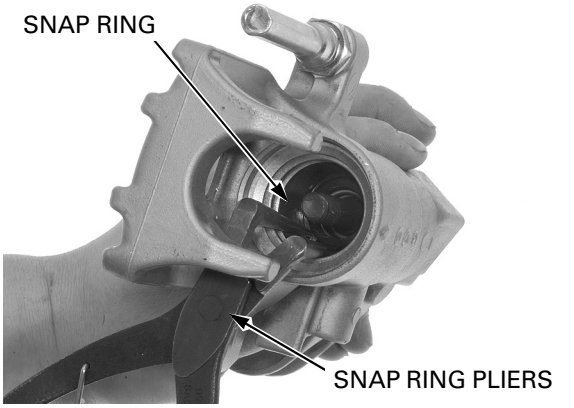
Install bearing A, spacer, adjusting spring B and spring guide onto the adjusting bolt.



Install the snap ring using the snap ring pliers.

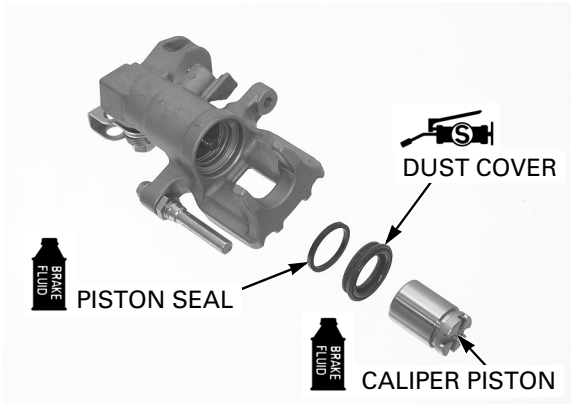
TOOL:

Snap ring pliers	**07914-SA50001 or 07914-3230001**



Coat a new piston seal with clean brake fluid and install it into the seal groove in the caliper.

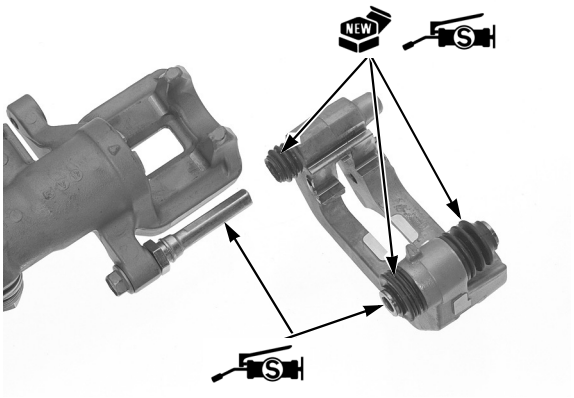
Coat the caliper piston with clean brake fluid.
Apply silicone grease to the lips of a new dust cover.
Install the dust cover onto the caliper piston.
Install the dust cover into the groove in the caliper.
Install the caliper piston into the caliper cylinder and onto the adjusting bolt by turning it clockwise.
Install the dust cover into the groove in the caliper piston.



Apply silicone grease to the lips of new boots and install them into the caliper bracket.

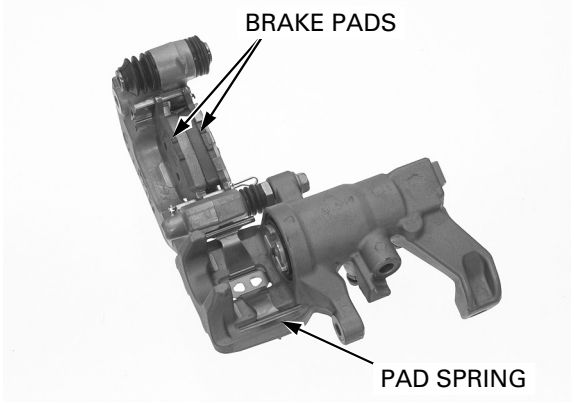
Coat the collar with silicone grease and install it into the caliper bracket.

Coat the caliper pin of the caliper body with silicone grease and install it into the caliper bracket.



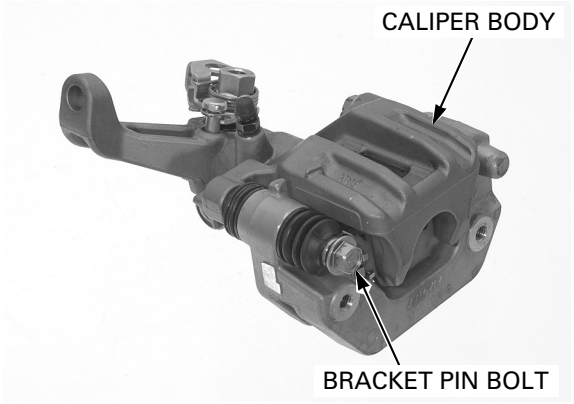
Install the pad spring in the caliper body as shown.

Install the brake pads onto the caliper bracket.



Pivot the caliper body over the pads and bracket.

Temporarily install the bracket pin bolt.

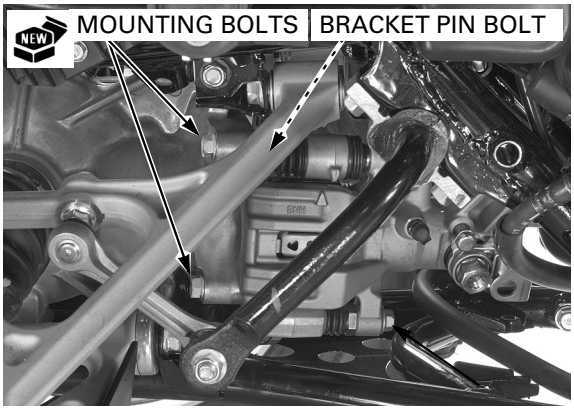


Install the brake caliper with new mounting bolts and tighten the bolts.

TORQUE: 30 N·m (3.1 kgf·m, 22 lbf·ft)

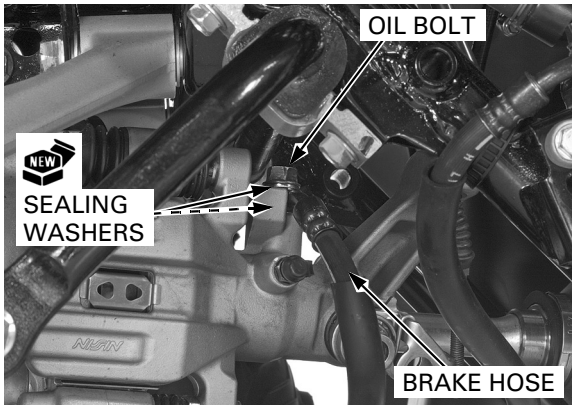
Tighten the bracket pin bolt.

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)

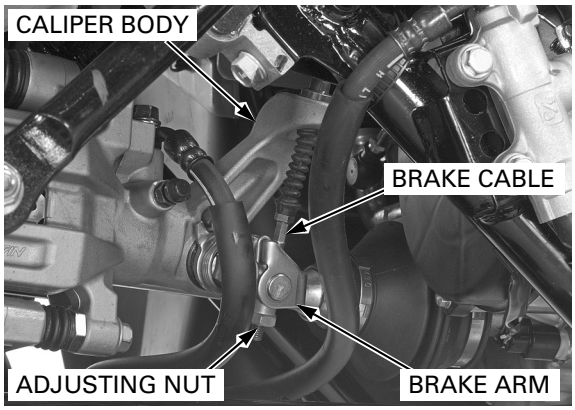


Install the rear brake cable into the caliper body and connect it to the brake arm with the joint pin.
Install the rear brake adjusting nut.

Fill and bleed the rear brake hydraulic system (page 17-7).

Adjust the rear (parking) brake lever free play (page 4-20).

Install the right rear wheel (page 16-6).



REAR BRAKE DISC

REMOVAL

Remove the following:

- oil filler lid
- right side cover (page 3-5)
- engine guard (page 3-17)
- both rear wheels (page 16-6)
- 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.

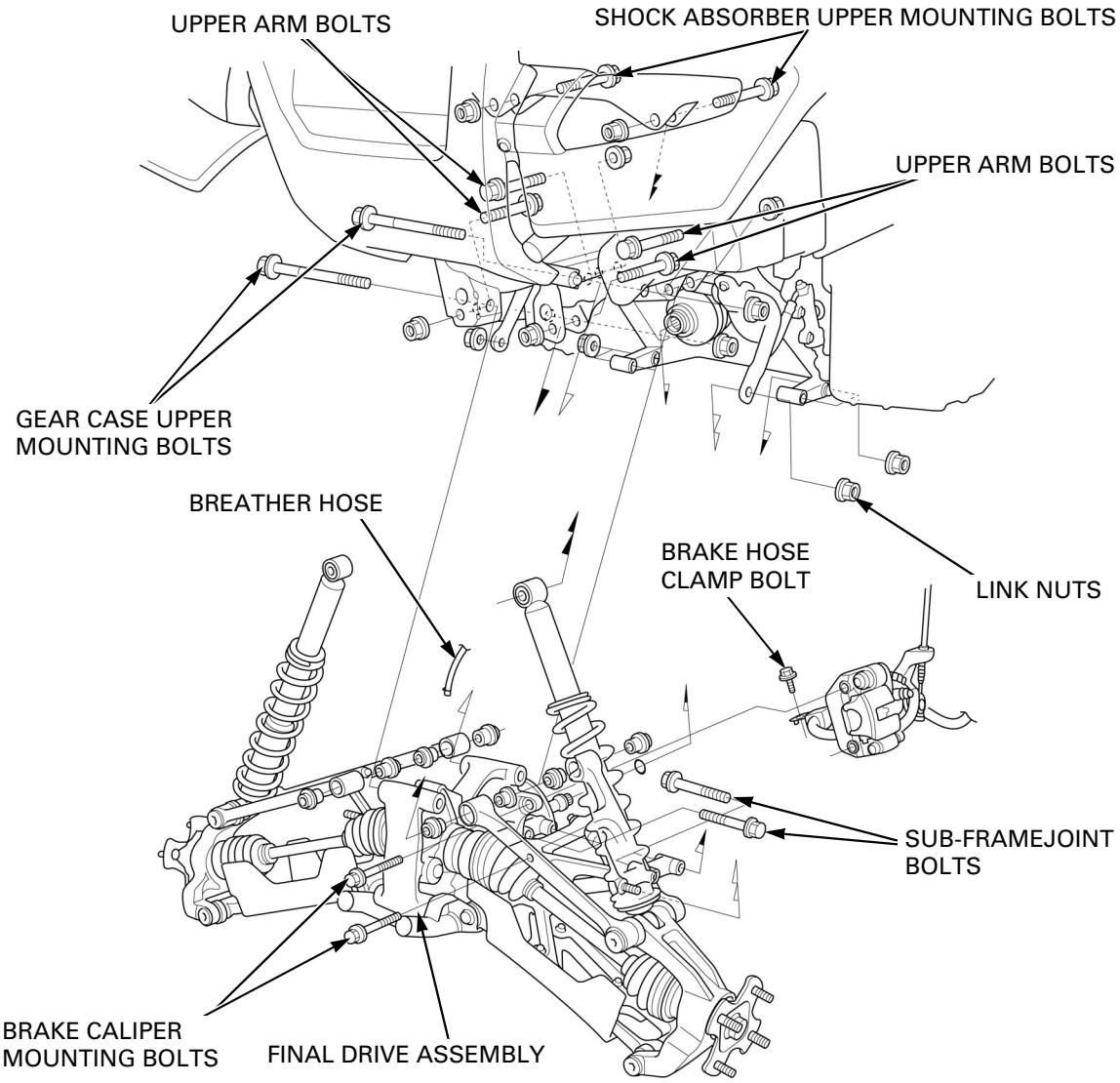
Lift the rear of the frame and place a jack or stand under the sub-frame at the final gear case.

Disconnect the breather hose from the final gear case.

Remove the following:

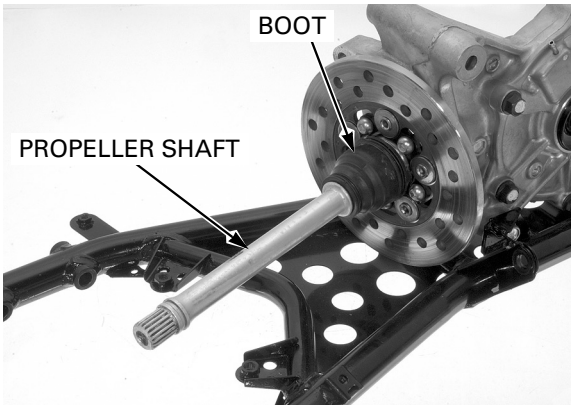
- four sub-frame joint nuts and bolts
- two final gear case upper mounting nuts and bolts

Remove the final drive assembly from the frame by moving it rearward.

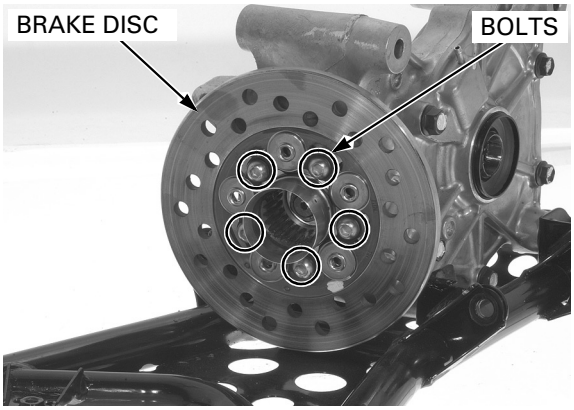


Remove the following:

– boot band
– boot (off the pinion joint)
– propeller shaft
– spring



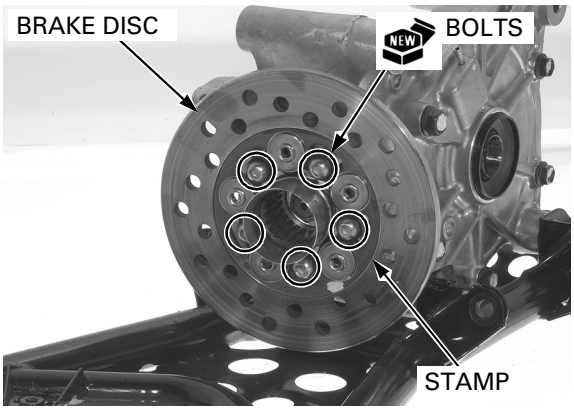
– five disc bolts
– brake disc



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.

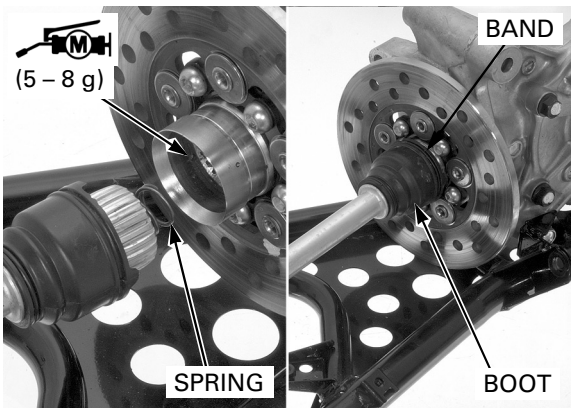
TORQUE: 20 N·m (2.0 kgf·m, 14 lbf·ft)



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.

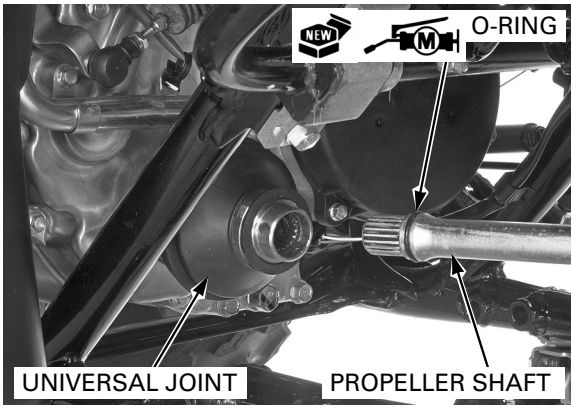
Be sure the propeller shaft is installed properly by pulling on the shaft lightly.



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.

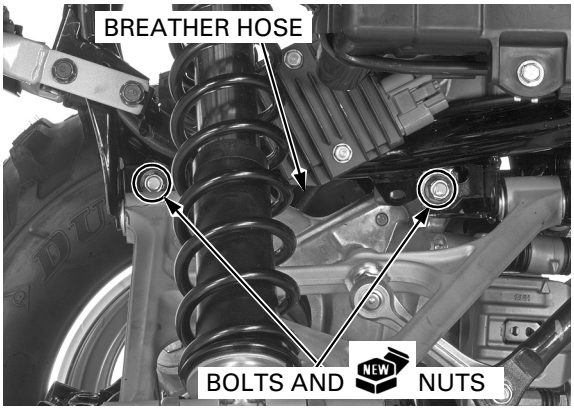
While adjusting the jack height, move the final drive assembly forward and connect the propeller shaft into the universal joint.



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.

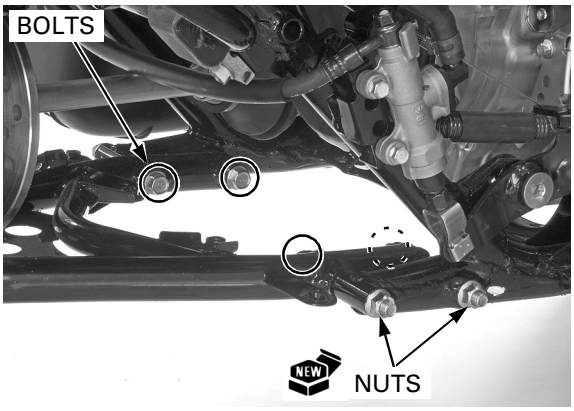
Route the breather hoses properly (page 1-20) and connect them.



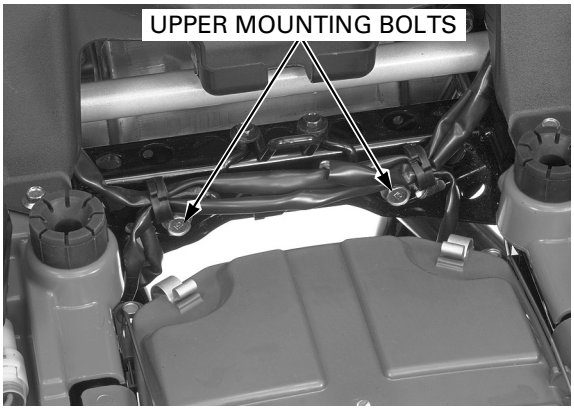
Insert the sub-frame joint bolt bolts from the inside. Install new joint nuts.

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)

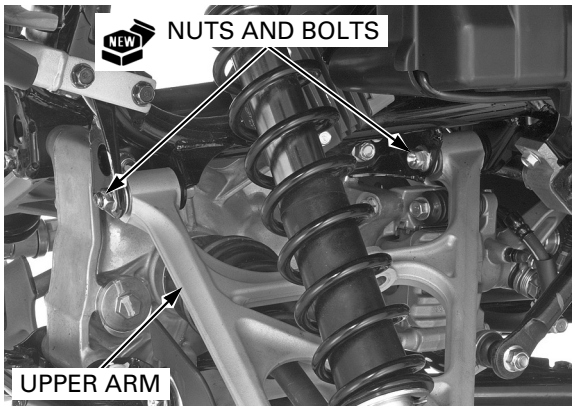


Install the rear shock absorber upper mounting bolts and nuts, and tighten them.

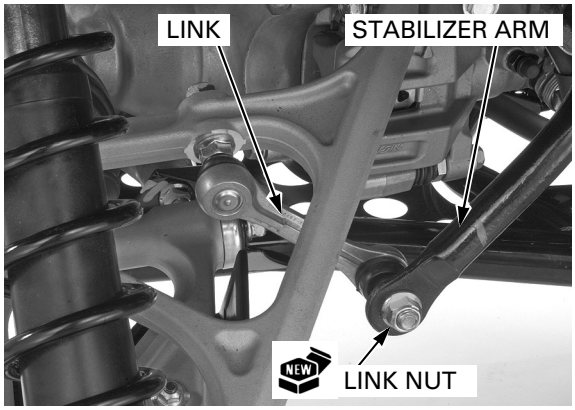


Insert the pivot bolts from the inside.

Install the upper arm into the frame with the pivot bolts and new nuts, and tighten the nuts.

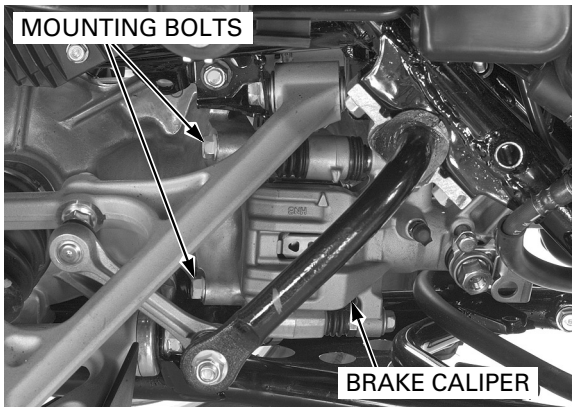


Connect the stabilizer links to the stabilizer arms with new nuts and tighten them.



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)

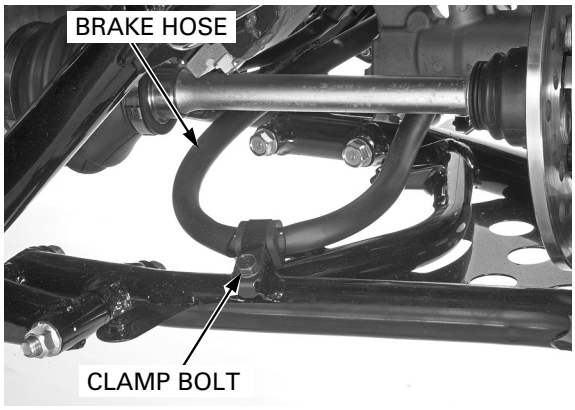


Align the shapes of the brake hose clamp and grommet properly.

Install the rear brake hose clamp onto the sub-frame and tighten the bolt securely.

Install the following:

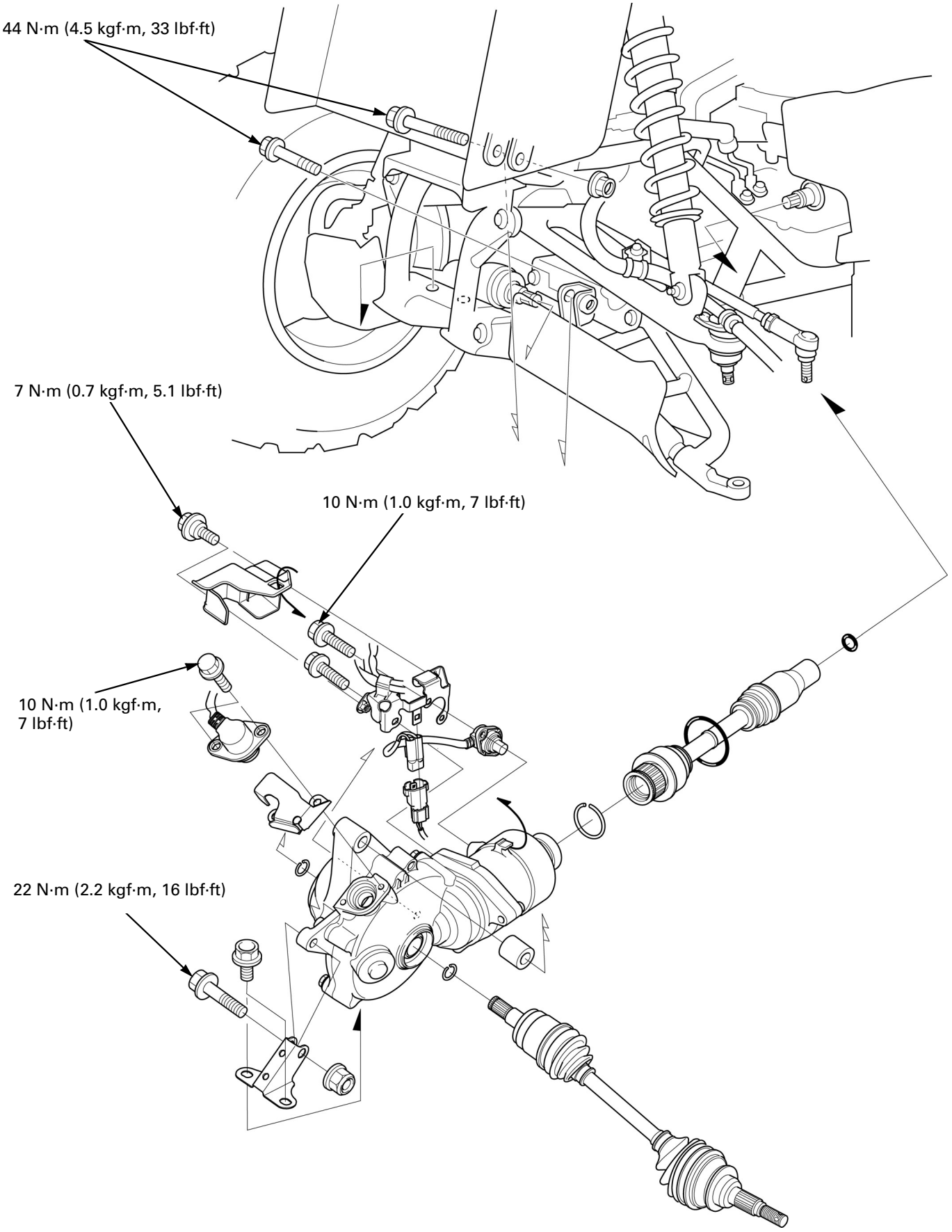
- both rear wheels (page 16-6)
- engine guard (page 3-17)
- right side cover (page 3-5)
- oil filler lid



MEMO

18. 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

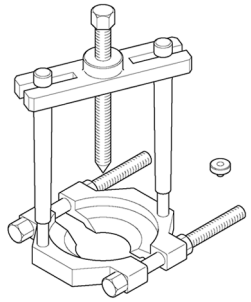
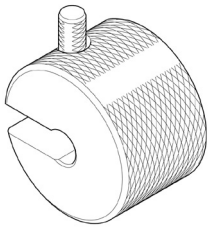
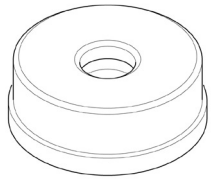
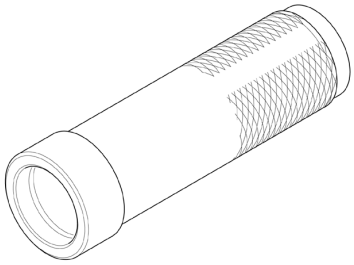
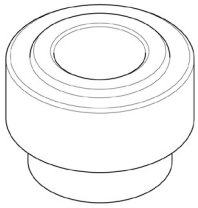
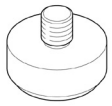
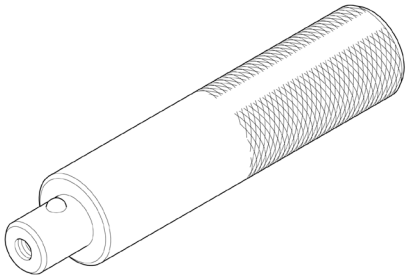
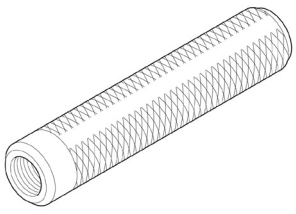
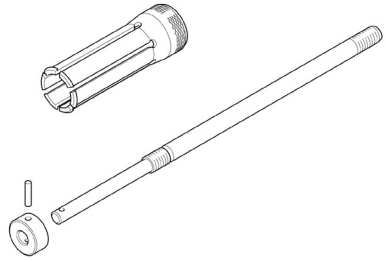
Unit: mm (in)

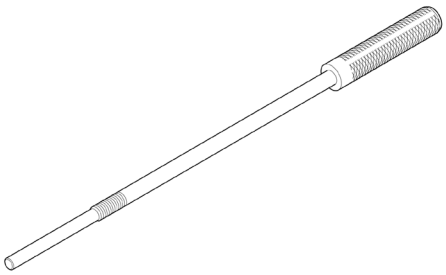
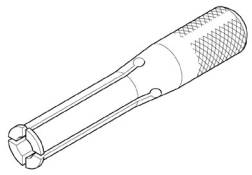
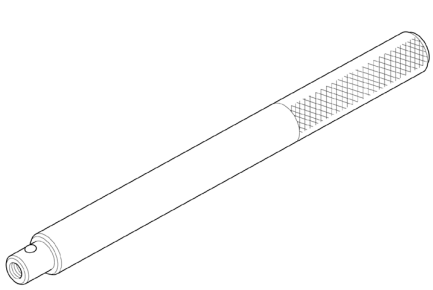
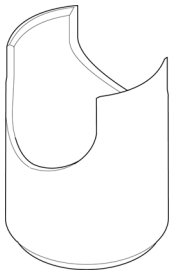
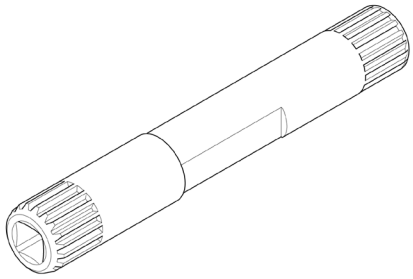
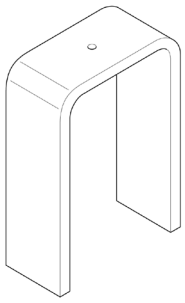
ITEM			STANDARD	SERVICE LIMIT
Front differential	Oil capacity	At draining	175 cm^3 (5.9 US oz, 6.2 Imp oz)	–
		At disassembly	220 cm^3 (7.4 US oz, 7.7 Imp oz)	–
	Recommended oil		Hypoid gear oil SAE #80	–
	Gear backlash		0.05 – 0.25 (0.002 – 0.010)	0.4 (0.02)
	Backlash difference		–	0.2 (0.01)
	Slip 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

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)	

TOOLS

Universal bearing puller 07631-0010000  or equivalent commercially available in U.S.A.	Remover weight 07741-0010201  or 07936-371020A or 07936-3710200 (U.S.A. only)	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 	Remover handle 07936-3710100 	Bearing remover set, 30 mm 07936-8890300 

Bearing remover shaft 07936-KC10100  or 07936-KC10500 (U.S.A. only)	Bearing remover head, 15 mm 07936-KC10200  or 07936-KC10500 (U.S.A. only)	Driver 07949-3710001 
Bearing clip compressor, 25 mm 070ME-HN8A100 	Differential inspection tool 07KMK-HC50101  or 07KMK-HC5010A (U.S.A. only)	Press attachment 07LME-GE20100 

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

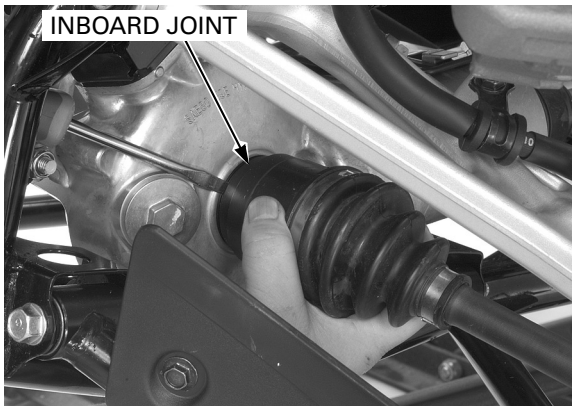
REMOVAL

It is not necessary to remove the splash guard.

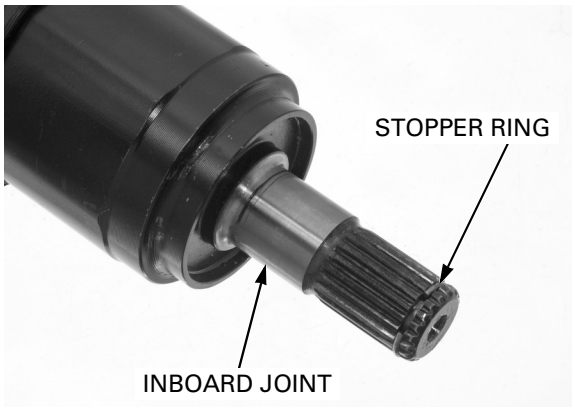
Remove the knuckle (page 15-15)

To prevent damage to the differential oil seal, hold the inboard joint horizontal until the drive shaft is clear of the differential.

Hold the inboard joint of the drive shaft and tug firmly to force the stopper ring on the inboard joint end past the groove while prying with a screwdriver.



Remove the stopper ring from the inboard joint.

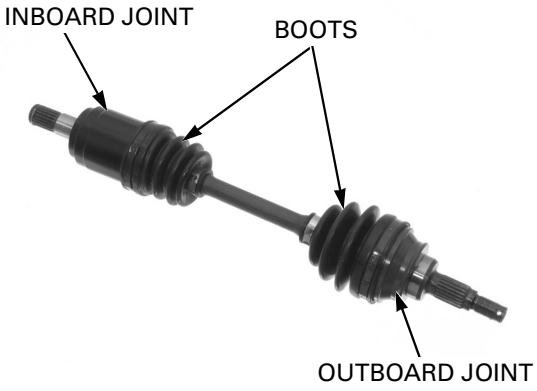


DISASSEMBLY/INSPECTION

Check the boots for cuts or other damage.
Check the drive shaft joints for excessive play or noise by moving the joints in a circular direction.
If the outboard joint seems to be worn or damaged, the drive shaft must be replaced.

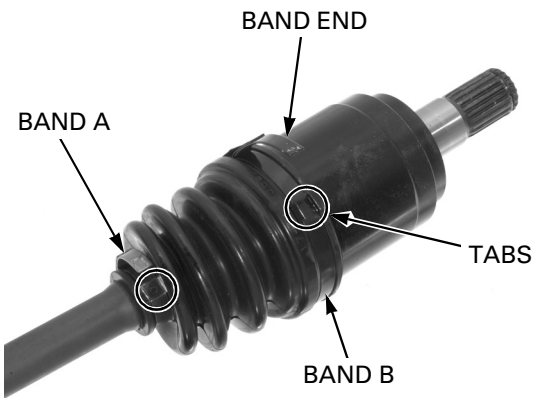
NOTE:

- To replace the outboard boot, first remove the inboard boot as described in the following steps. Then remove the bands and outboard boot from the inboard end of the shaft.
- The outboard joint cannot be disassembled.



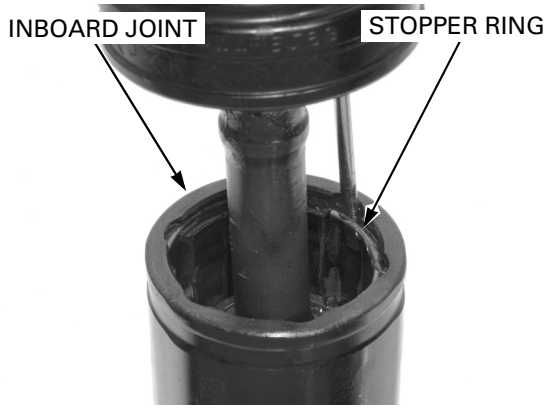
Replace the band with new ones whenever removing them.

Bend up the lock tabs and raise the band ends to loosen the bands on the inboard side.
Remove band B.
Remove the boot from the inboard joint.

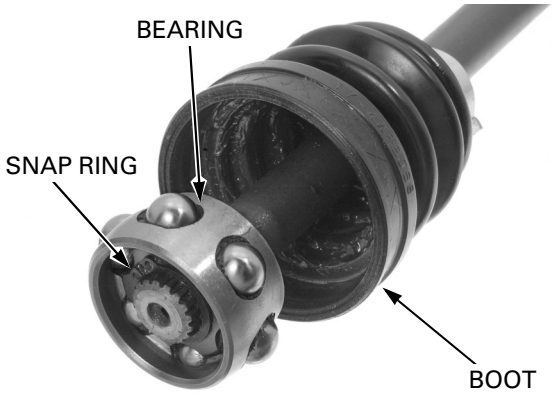


Remove the following:

- stopper ring
- inboard joint



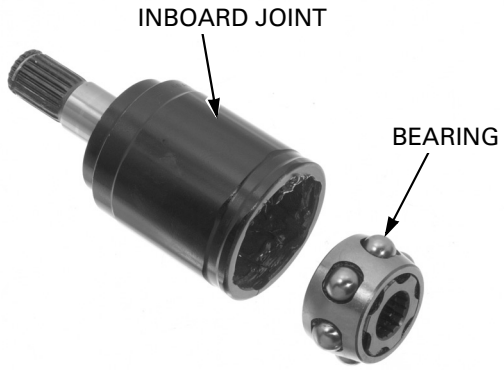
- snap ring
- bearing
- inboard boot
- inboard band A



Replace the components as an assembly.

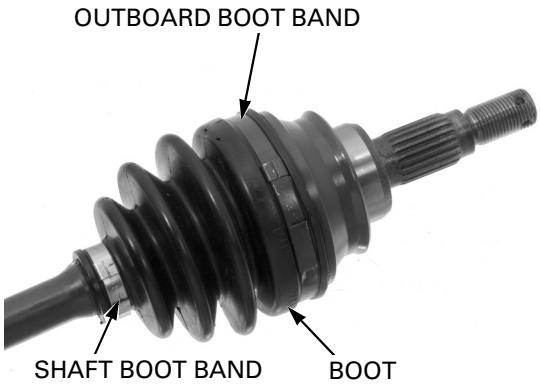
Check the following for wear or damage:

- bearing cage
- race
- steel balls
- inboard joint

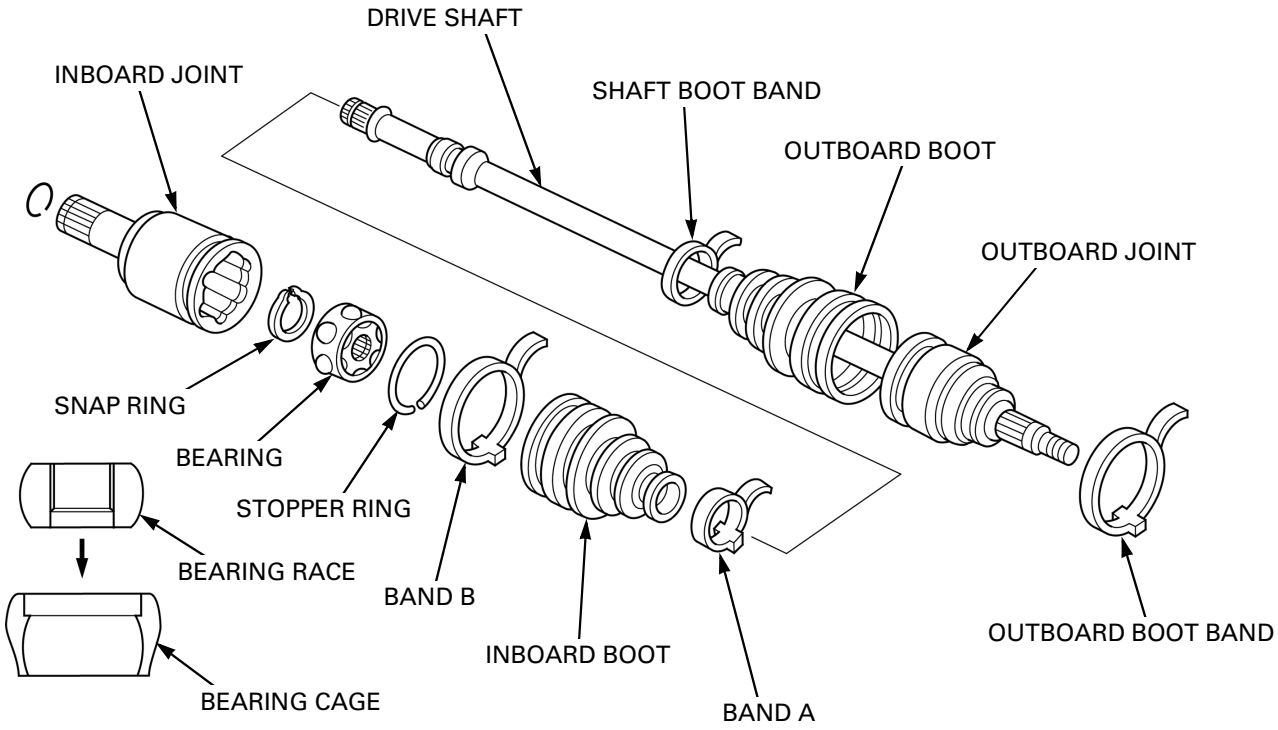


Remove the following:

- shaft boot band
- outboard boot band
- outboard boot

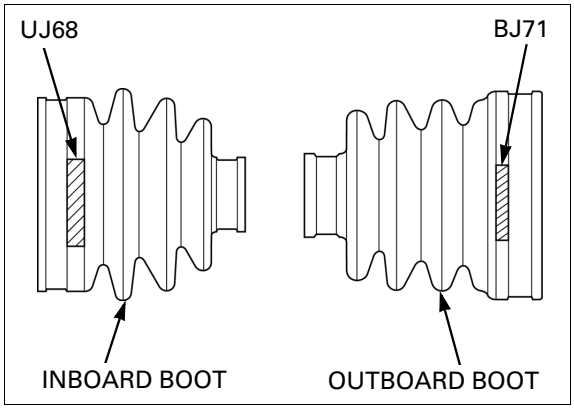


ASSEMBLY

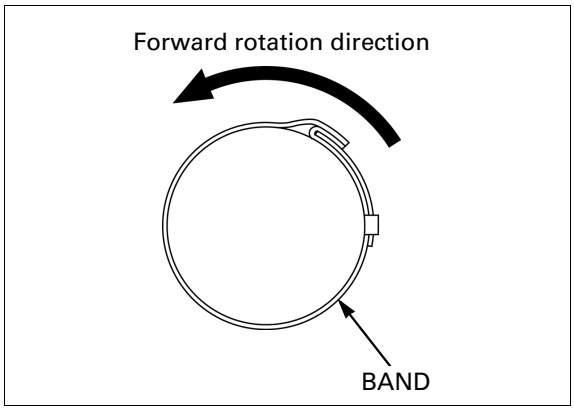


Each boot has an identification mark; "BJ71" for the outboard and "UJ68" for inboard.

Inboard: UJ68
Outboard: BJ71



Note the installation direction of the boot bands.

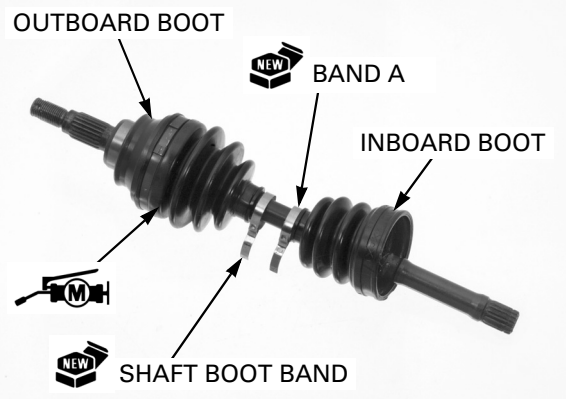


Pack the outboard joint with 55 – 75 g of specified grease.

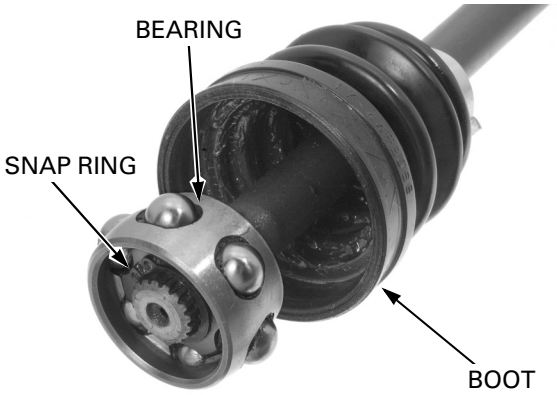
Specified grease:
NKG106 (KYODO YUSHI)

Install the following:
– outboard boot
– new shaft boot band
– new inboard band A
– inboard boot

Do not tighten the bands at this time.



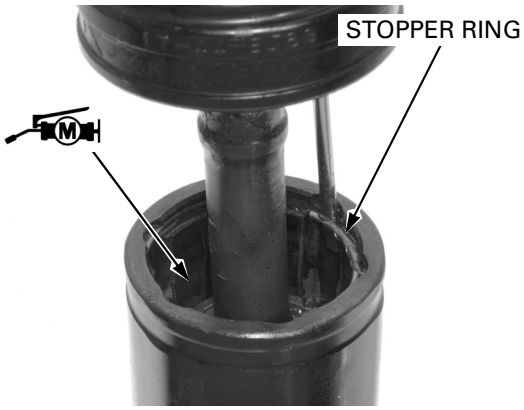
Install the bearing with the small O.D. facing the drive shaft.
Install the snap ring with the chamfered side facing the bearing.



Pack the inboard joint with 40 – 60 g of specified grease.

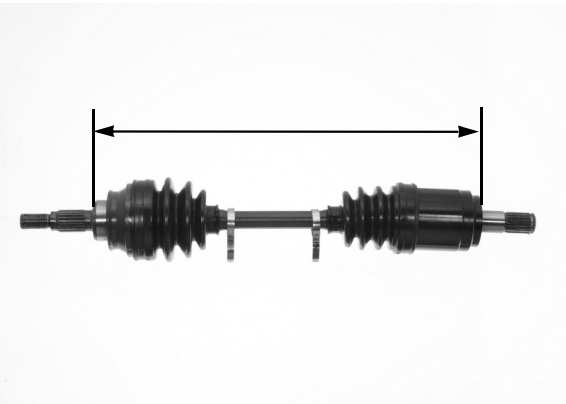
Specified grease:
NKG205 (KYODO YUSHI)

Install the inboard joint over the bearing.
Install the stopper ring into the groove in the inboard joint properly.



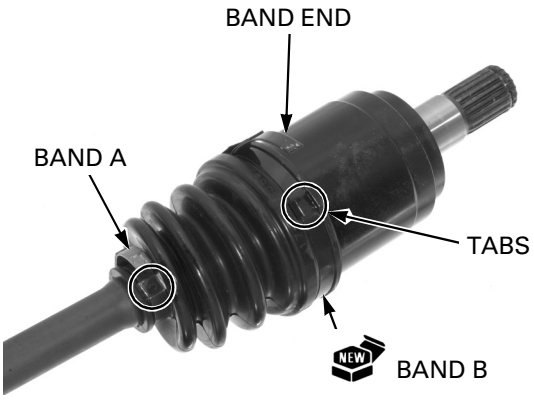
Adjust the length of the drive shaft to the figure given below.

DRIVE SHAFT LENGTH:
Left: 363.3 mm (14.30 in)
Right: 383.1 mm (15.08 in)

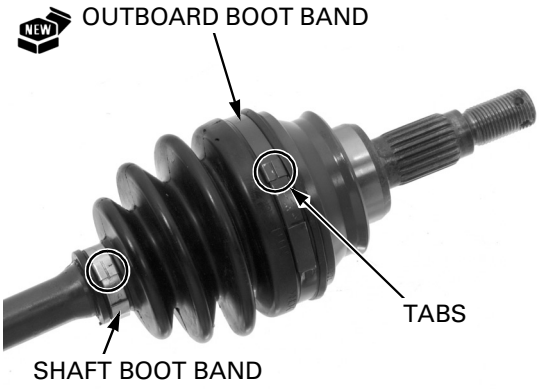


For band installation direction See page 18-9.

Install inboard band A and a new inboard band B.
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

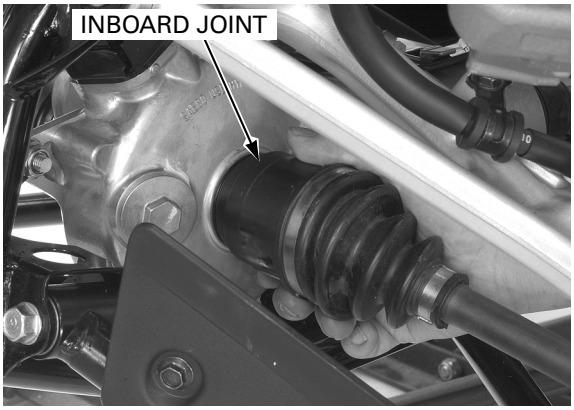
Install a new stopper ring into the groove in the inboard joint spline.

Be careful not to damage the oil seal in the differential gear case.

Install the drive shaft by holding the inboard joint until the stopper ring seats in the groove of the differential.

Make sure that the stopper ring is seated properly by pulling on the inboard joint lightly.

Install the knuckle (page 15-20).

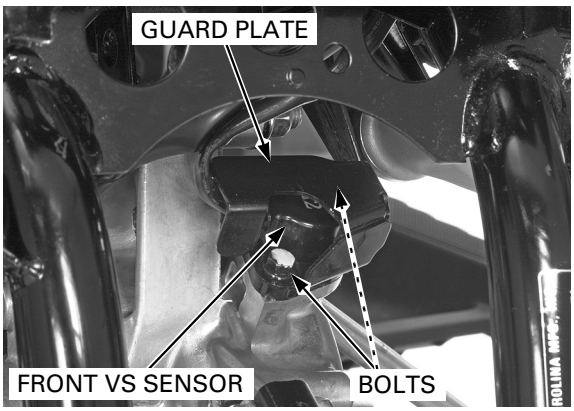


DIFFERENTIAL REMOVAL

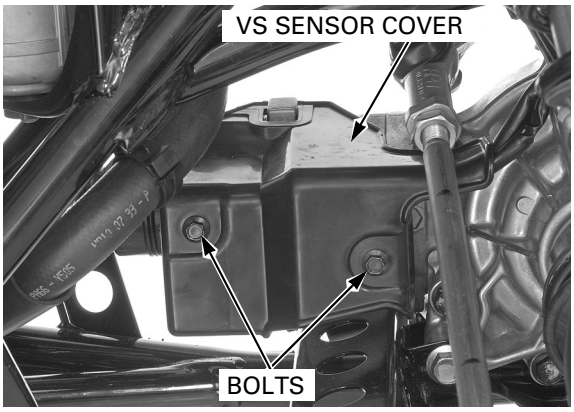
Drain the differential oil (page 4-16).

Remove the following:

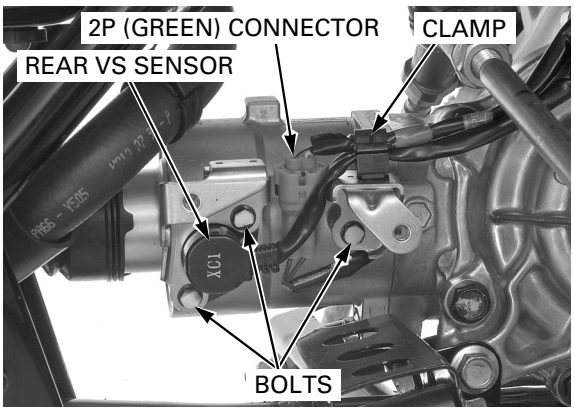
- left front mud guard (page 3-8)
- both inner fenders (page 3-9)
- front grille (page 3-10)
- left drive shaft (page 18-7)
- two bolts, guard plate and front Vehicle Speed Sensor (VS sensor).



- two bolts and VS sensor cover

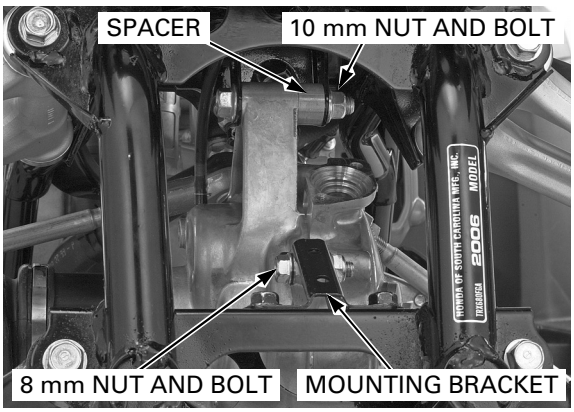


Remove the rear VS sensor wire and front final clutch wire from the clamp.
Remove the three bolts, VS sensor cover stay and rear VS sensor.
Disconnect the front final clutch 2P (Green) connector.

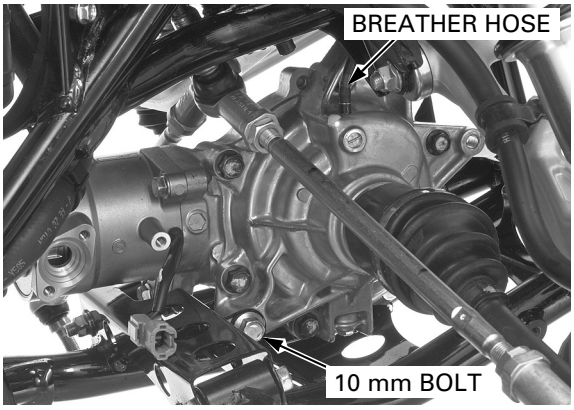


Remove the following:

- 8 mm mounting nut and bolt
- two 8 mm bolts and mounting bracket
- 10 mm mounting nut, bolt and spacer



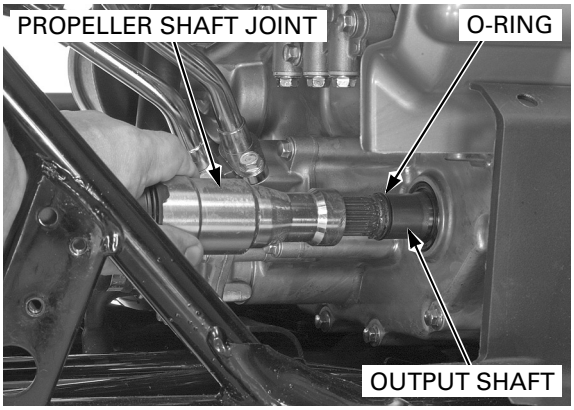
– breather tube
– 10 mm mounting bolt



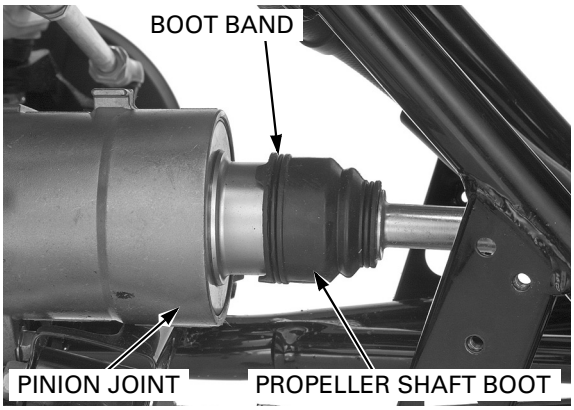
Move the differential forward for maximum clearance between the propeller shaft joint and engine.

Pull the propeller shaft joint out of the output shaft of the engine.

Remove the O-ring.

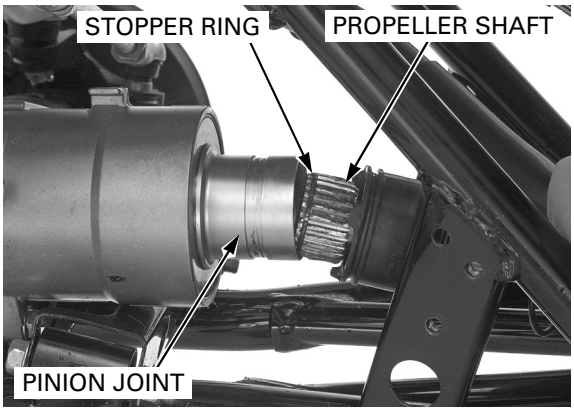


Remove the boot band and propeller shaft boot from the pinion joint.



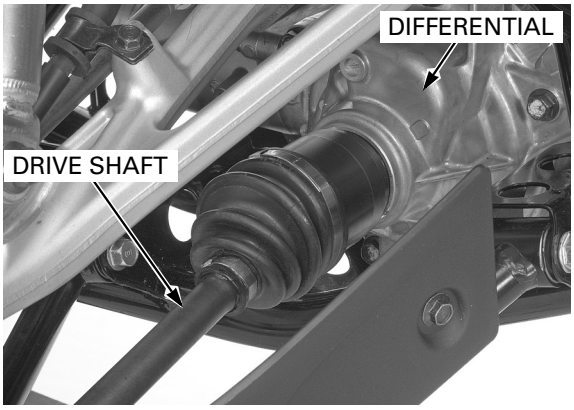
Pull the propeller shaft to force the stopper ring past the groove in the pinion joint and remove the propeller shaft.

Remove the stopper ring from the propeller shaft end.



Separate the other drive shaft from the differential as you remove it.

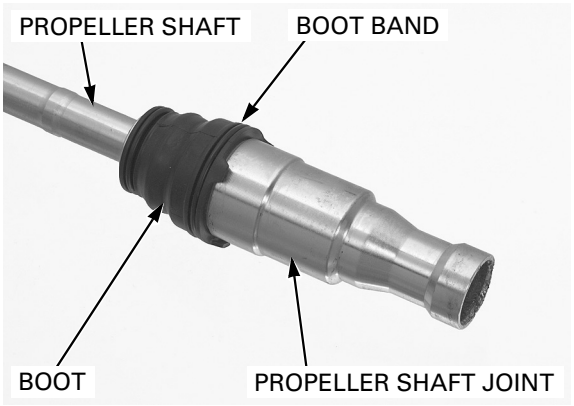
Remove the differential assembly from the frame.



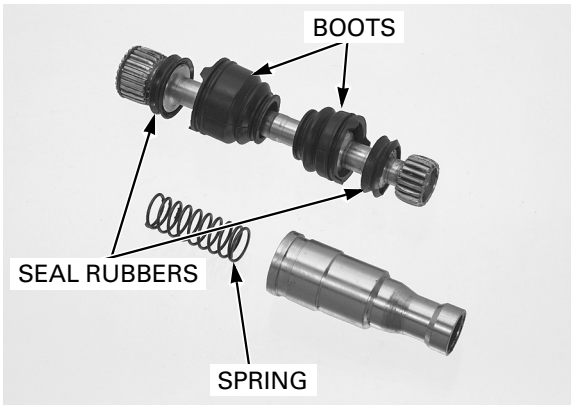
DIFFERENTIAL DISASSEMBLY/ INSPECTION

PROPELLER SHAFT INSPECTION

Remove the boot band and boot from the propeller shaft joint, and remove the propeller shaft joint and spring.

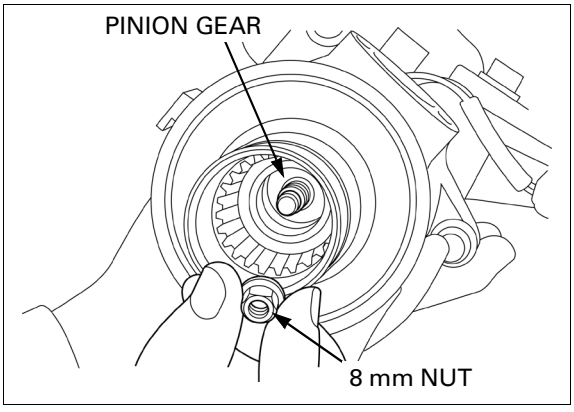


Check the splines of the propeller shaft and joint for wear or damage.
If damaged, check the output shaft and the pinion joint also.
Check the seal rubbers for fatigue or damage.
Check the boots for cuts, deterioration or damage.



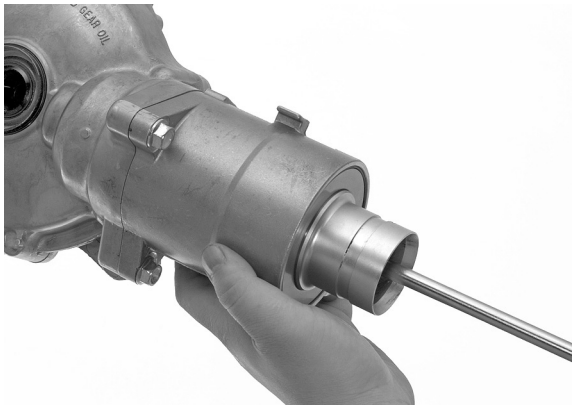
OPERATION CHECK

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

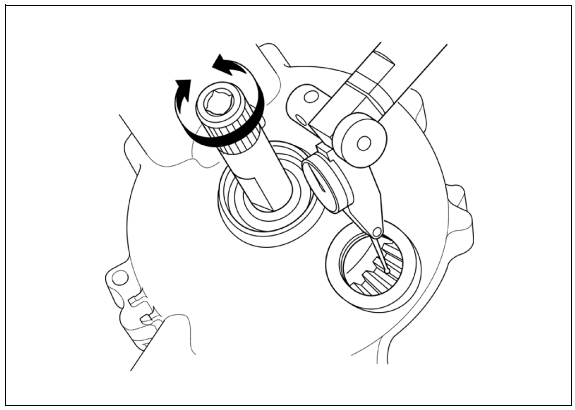
Hold the pinion gear with the 8 mm nut.

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.

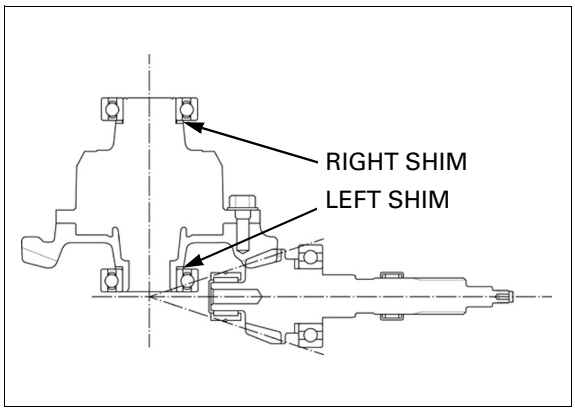
STANDARD: 0.05 – 0.25 mm (0.002 – 0.010 in)
SERVICE LIMIT: 0.4 mm (0.02 in)

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.

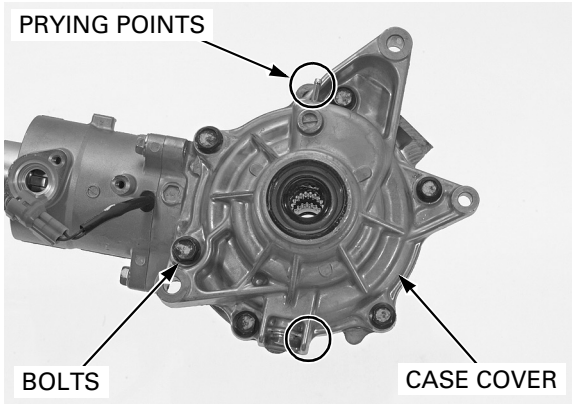
Ring gear shims:
A: (thinnest): 0.50 mm (0.020 in)
K: (standard): 1.00 mm (0.039 in)
W: (thickest): 1.60 mm (0.063 in)

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.

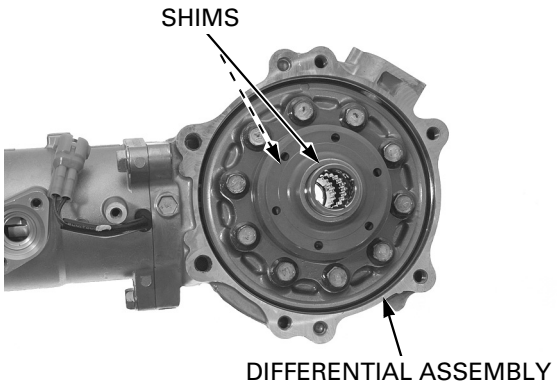
DIFFERENTIAL REMOVAL

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.

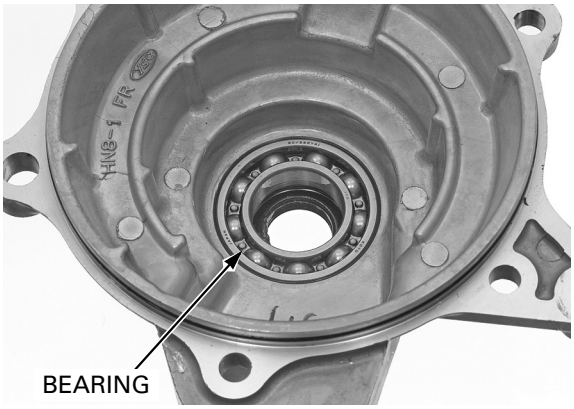


Remove the differential assembly and shims.



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.



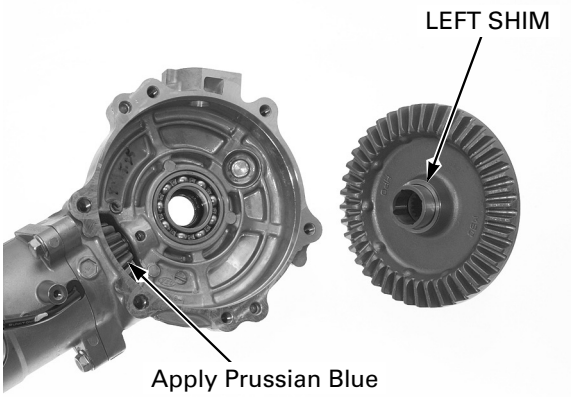
GEAR TOOTH CONTACT PATTERN CHECK

Keep dust and dirt out of the case and cover.

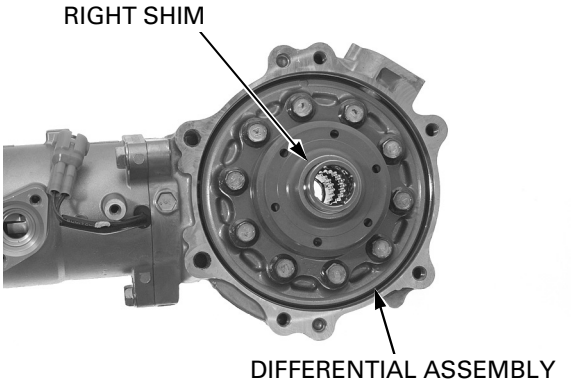
Clean sealing material off the mating surfaces of the differential case and cover, being careful not to damage them.

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.



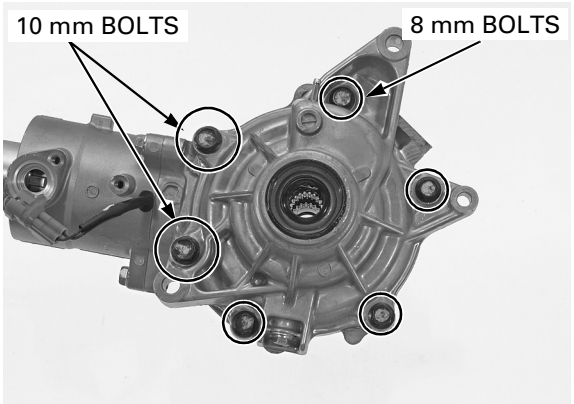
Install the differential assembly into the gear case.



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.

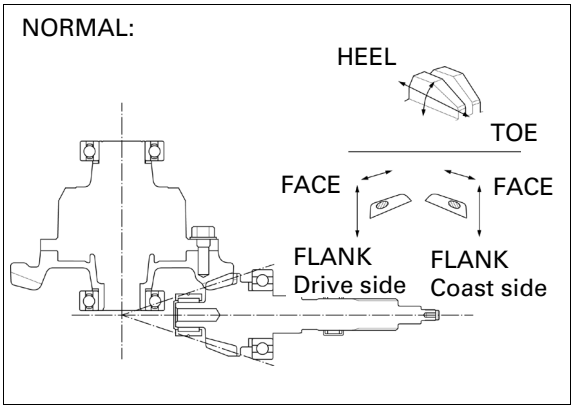
Rotate the ring gear several times in both directions of rotation.

Check the gear tooth contact pattern through the oil filler hole.

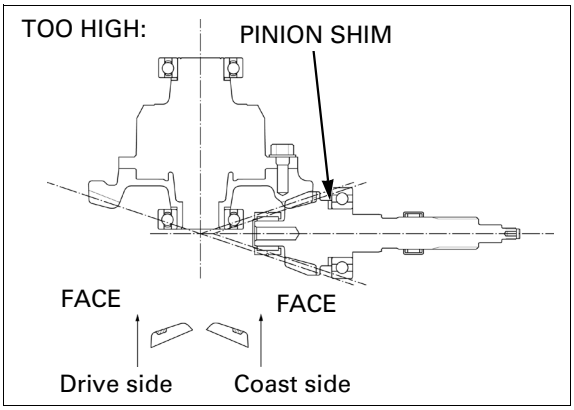
The pattern is indicated by the Prussian Blue applied to the pinion.

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.

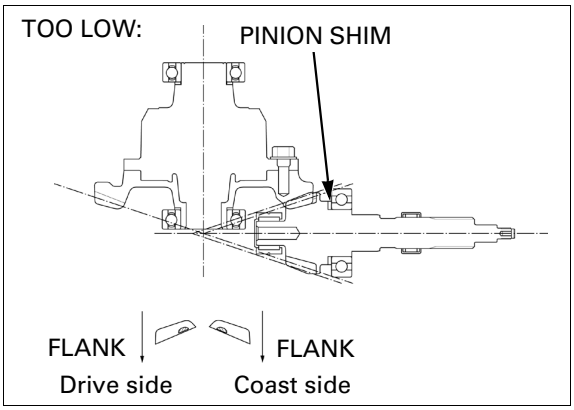


Replace the pinion shim with a thinner one if the contact pattern is too low, toward the flank.

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.

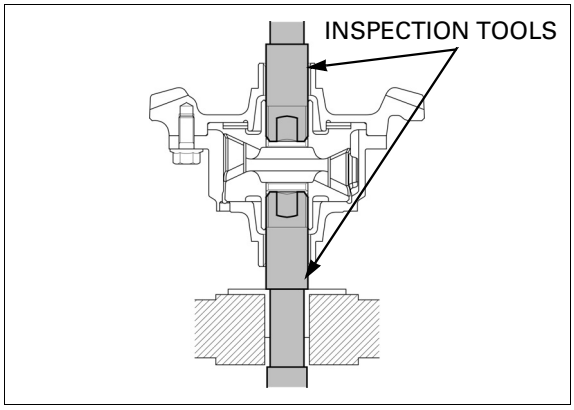


Ring gear shims:
A: (thinnest): 1.64 mm (0.064 in)
G: (standard): 2.00 mm (0.079 in)
J: (thickest): 2.18 mm (0.086 in)

For pinion shim replacement (page 18-21)

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:

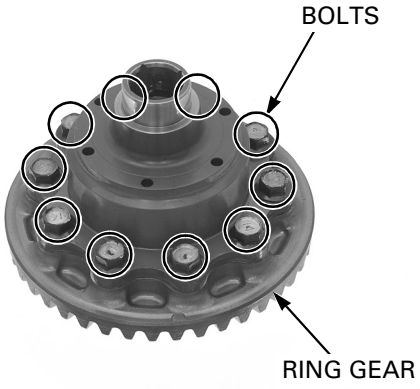
14 – 17 N·m (14.5 – 17.5 kgf·m, 10 – 13 lbf·ft)

SERVICE LIMIT: 12 N·m (1.2 kgf·m, 9 lbf·ft)

If the slip torque is out of specification, disassemble the differential and perform the components inspection (page 18-20) since the differential may be faulty.

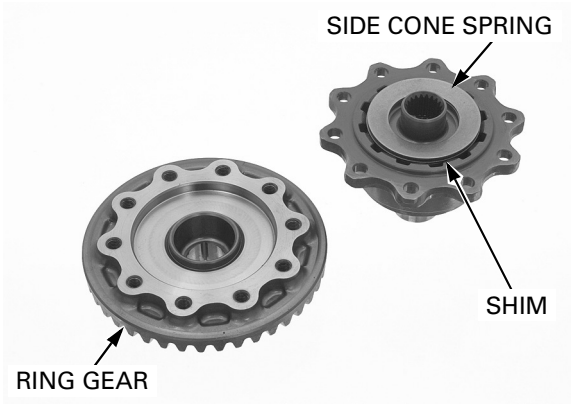
DIFFERENTIAL DISASSEMBLY

Remove the ten bolts, then place the differential assembly with the ring gear side up.

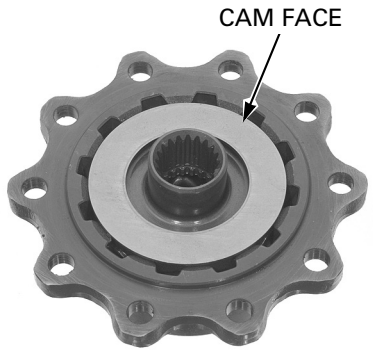


Remove the following:

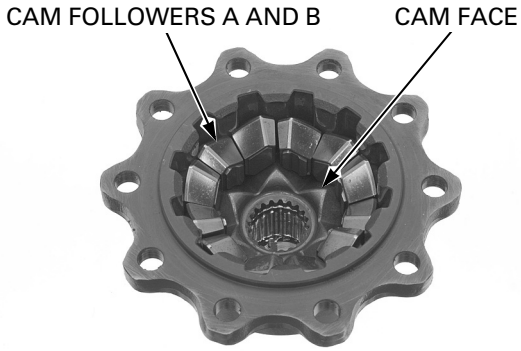
– ring gear
– side cone spring
– shim



– face cam



– six cam followers A and six cam followers B
– face cam



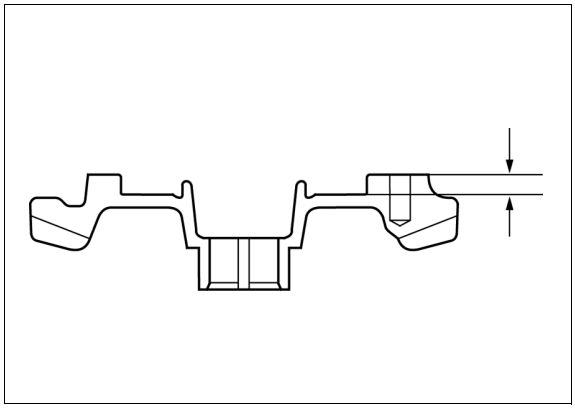
DIFFERENTIAL COMPONENTS INSPECTION

RING GEAR

Check the sliding surface of the ring gear for damage or discoloration.

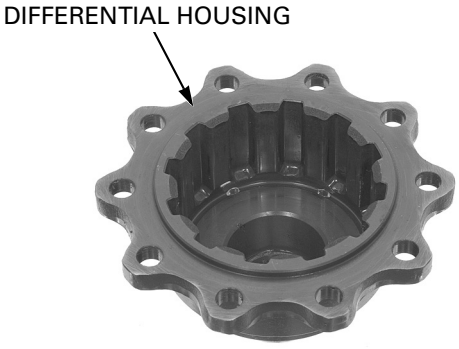
Measure the depth of the ring gear from the mating surface as shown.

SERVICE LIMIT: 6.55 mm (0.2568 in)



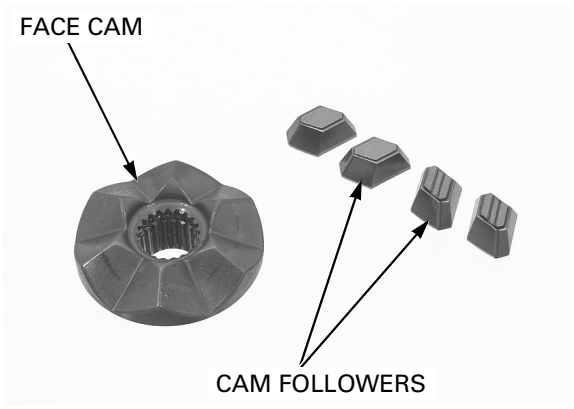
DIFFERENTIAL HOUSING/FACE CAM/CAM FOLLOWERS

Check the sliding surface and grooves of the housing for damage or discoloration.



Replace the cam followers as a set (12 pieces).

Check the shim, face cams and followers for damage.

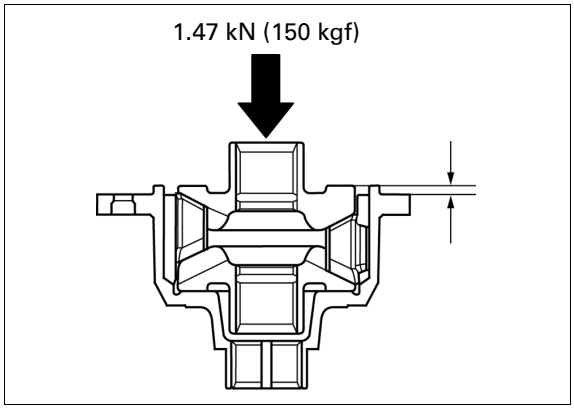


Temporarily assemble the differential housing, face cams and cam followers (page 18-27).

Measure the height of the face cam from the housing mating surface as shown while applying a load of 1.47 kN (150 kgf) to the face cam boss using a hydraulic press.

SERVICE LIMIT: 3.3 mm (0.13 in)

If the height is smaller than the service limit, replace the differential as an assembly.



SIDE CONE SPRING

Check the cone spring for damage.

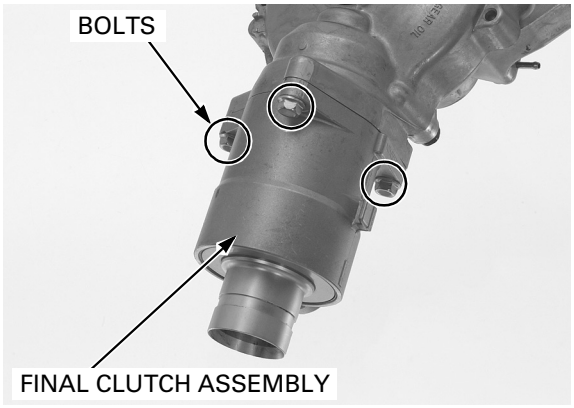
Measure the height of the cone spring.

SERVICE LIMIT: 2.6 mm (0.10 in)

PINION GEAR REMOVAL

Remove the three bolts and front final clutch assembly from the differential.

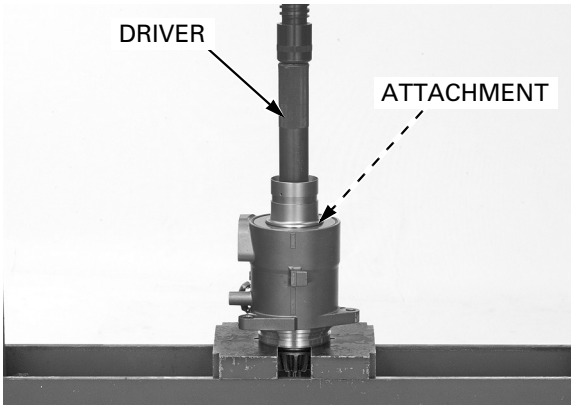
Remove the O-ring from the final clutch assembly.



Press the pinion gear out of the final clutch assembly using the special tools.

TOOLS:

Driver	**07749-0010000**
Pilot, 15 mm	**07746-0040300**



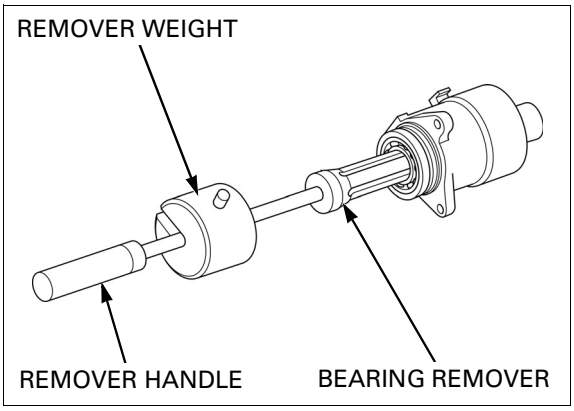
Be sure to wear heavy gloves to avoid burns when handling the heated final clutch.
Using a torch to heat the final clutch may damage the clutch.

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	**07936-8890300**
Remover handle	**07936-3710100**
Remover weight	**07936-371020A or 07936-3710200**

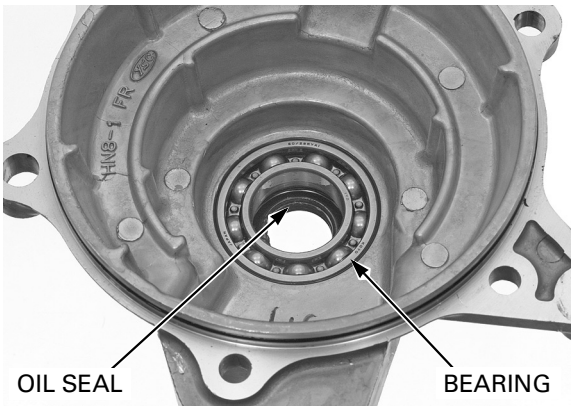


CASE BEARING REPLACEMENT

DIFFERENTIAL BEARING

Remove the oil seals from the differential case and cover.

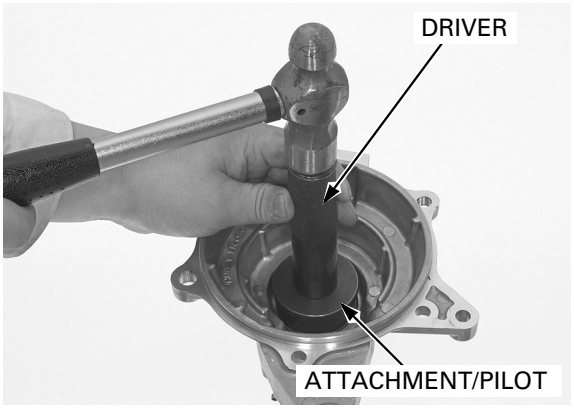
Drive the differential bearing out of the case and cover.



Drive new bearings into the differential case and cover.

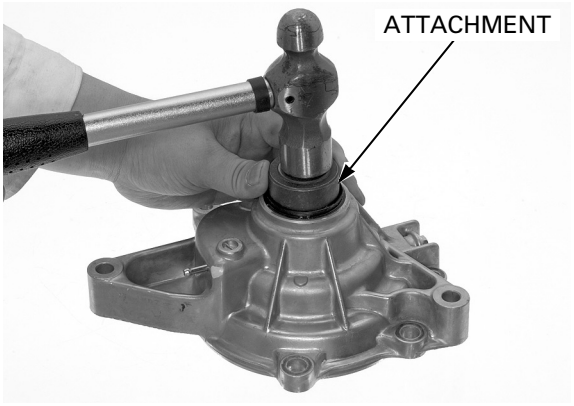
TOOLS:

Driver	**07749-0010000**
Attachment, 52 x 55 mm	**07746-0010400**
Pilot, 28 mm	**07746-0041100**



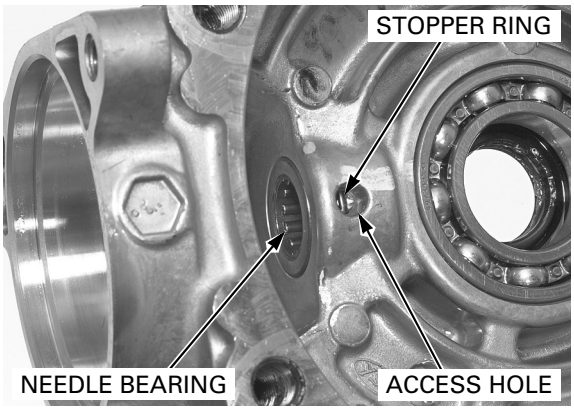
Apply grease to new oil seal lips and install them into the differential case and cover.

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.



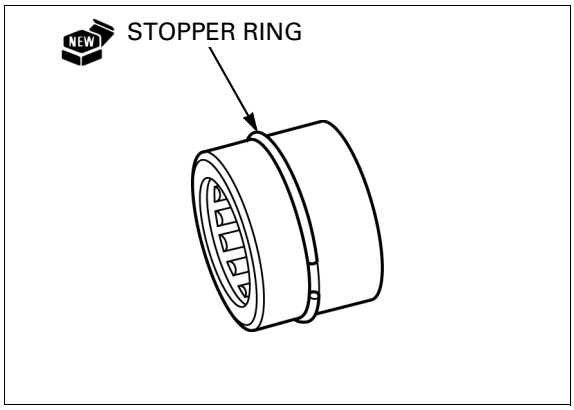
Be sure to wear heavy gloves to avoid burns when handling the heated gear case. Using a torch to heat the gear case may cause warpage.

Heat the gear case to 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)**

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 070ME-HN8A100

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**

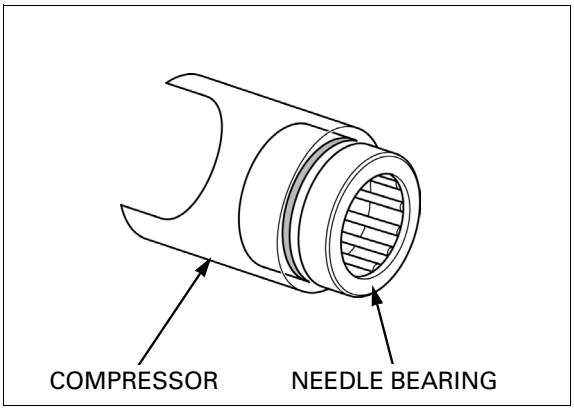
Place the bearing and tool assembly into a freezer for at least 30 minutes.

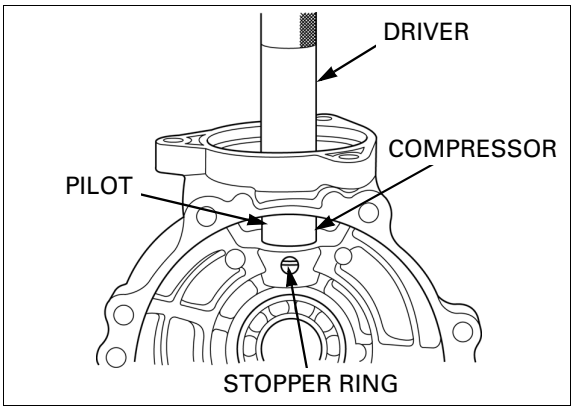
Heat the gear case to 80°C (176°F).

Remove the bearing and tool assembly from the freezer and drive the bearing into the gear case using the special tools.

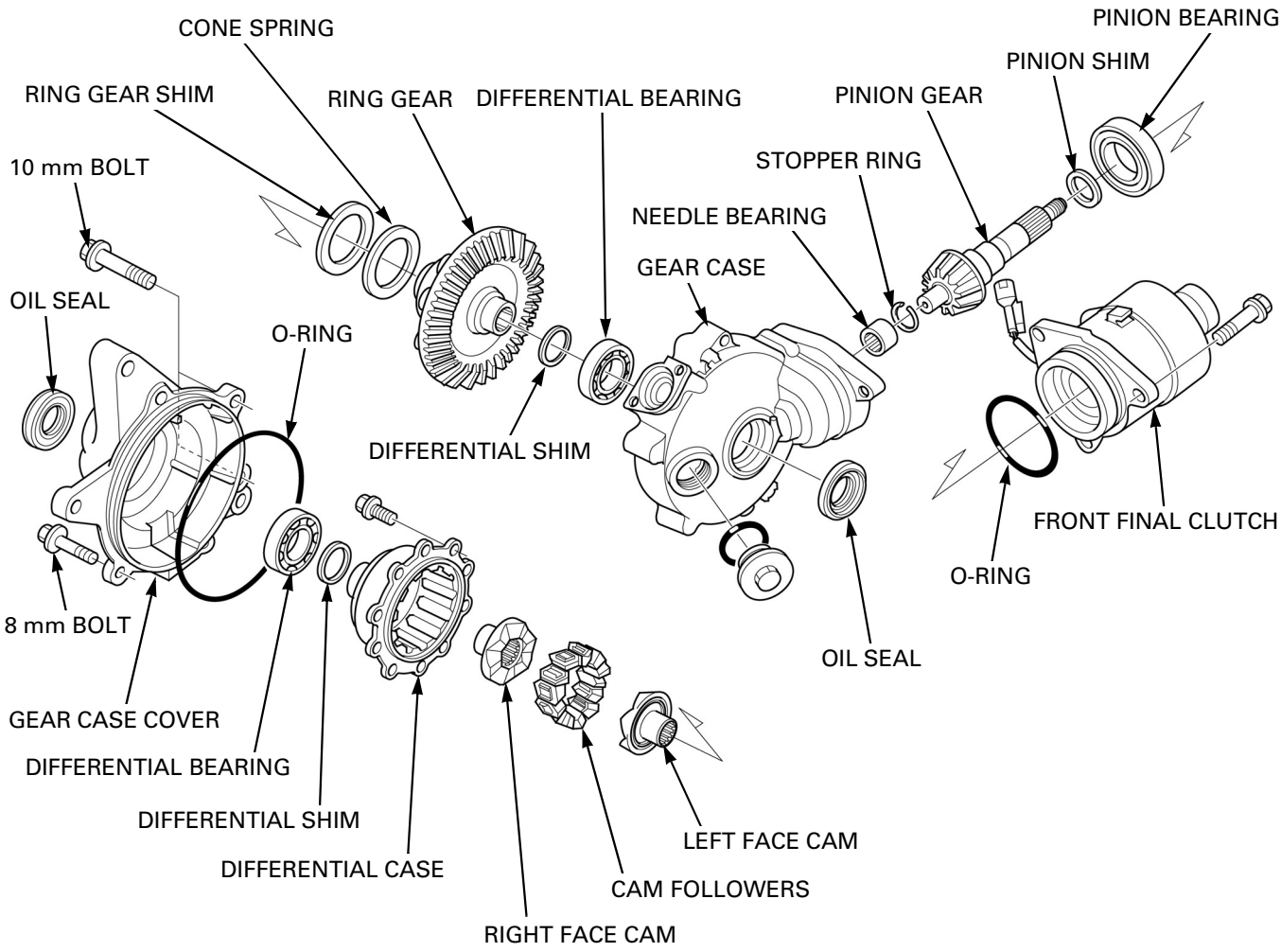
Only strike the driver once. If you strike it more than once, the ring may slip out of the groove. If this happens, remove the ring and bearing, and install a new ring.

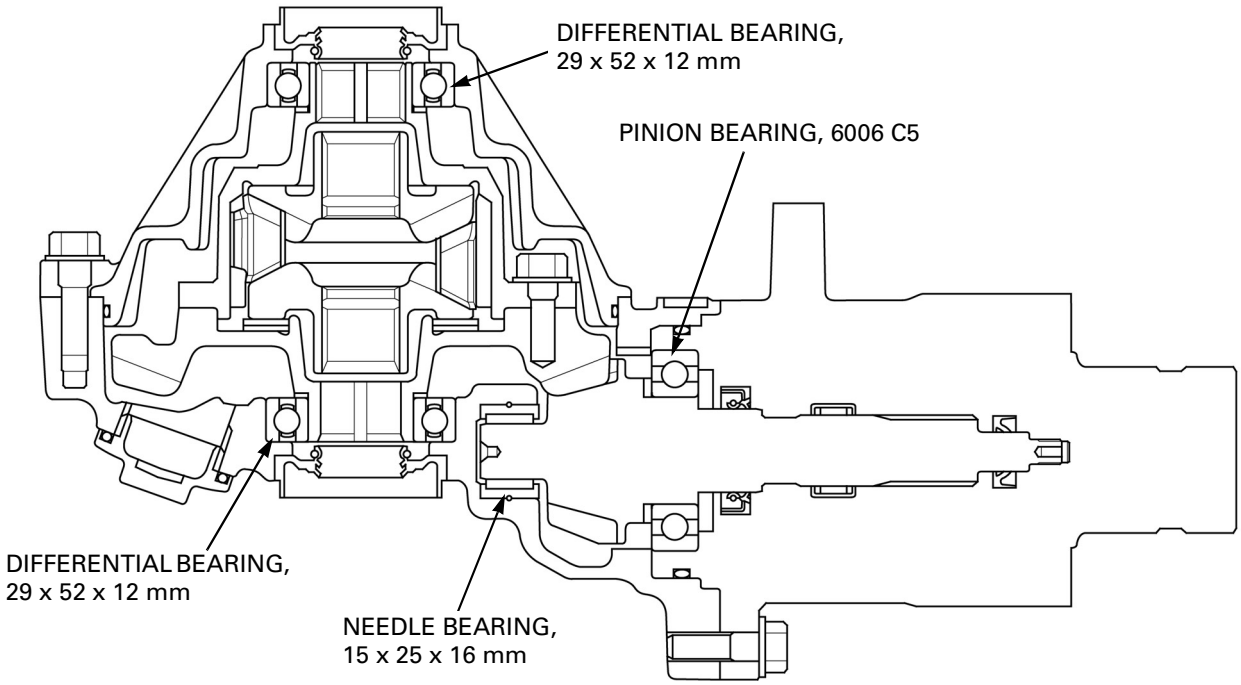
Make sure that the stopper ring is securely set in the groove of the gear case.





DIFFERENTIAL ASSEMBLY



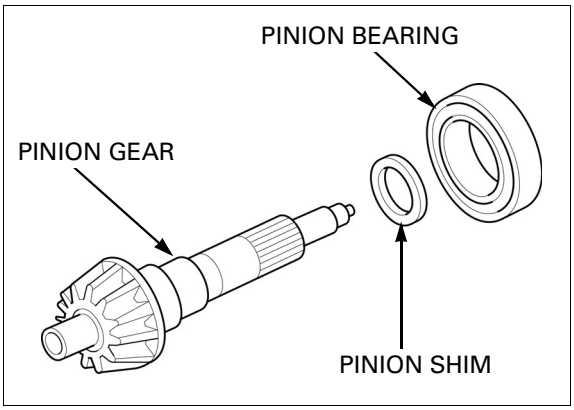


PINION GEAR INSTALLATION

Install the shim and bearing onto the pinion gear.

NOTE:

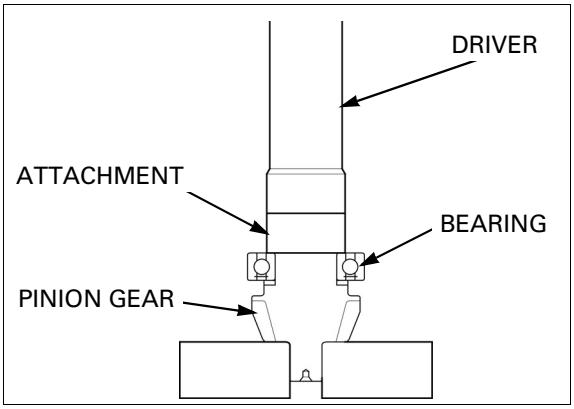
- When the gear set, differential bearing, differential housing and/or gear case has been replaced, use a 2.00 mm (0.079 in) thick shim for initial reference.



Press the pinion bearing onto the pinion gear.

TOOLS:

Driver, 40 mm I.D.	**07746-0030100**
Attachment, 30 mm I.D.	**07746-0030300**

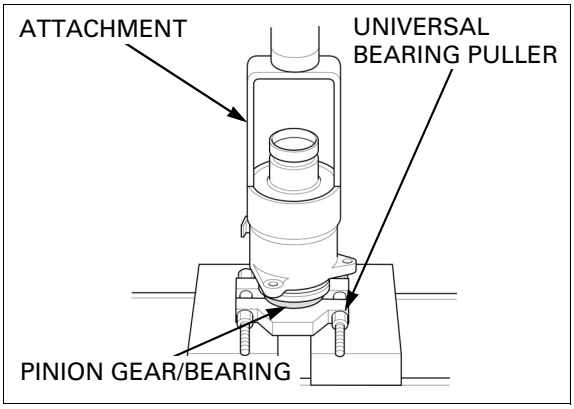


Be careful not to damage the oil seal lips in the final clutch.

Press the pinion gear/bearing assembly into the front final clutch using the special tools.

TOOLS:

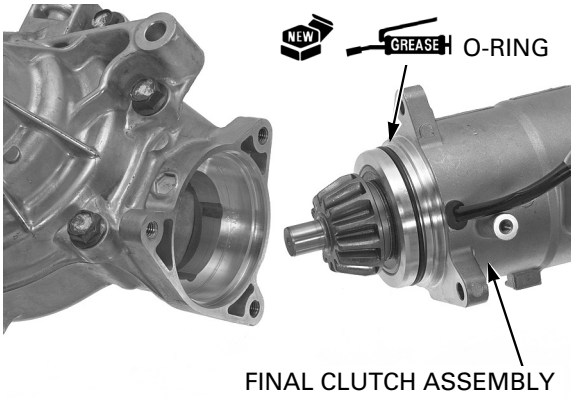
Press attachment	**07LME-GE20100**
Universal bearing puller	**07631-0010000 or equivalent commercially available in U.S.A.**



Be sure to wear heavy gloves to avoid burns when handling the heated final clutch case.

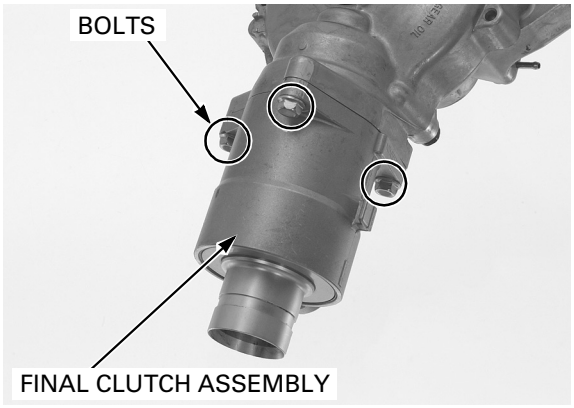
U.S.A. only:
Heat the final clutch case to about 100°C (212°F).
Drop the pinion gear assembly into the warm final clutch case.

Coat a new O-ring with grease and install it into the groove in the front final clutch assembly.



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)

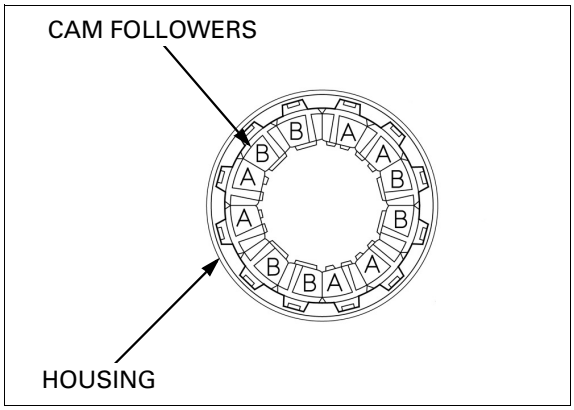


Keep dust and dirt out of the differential housing.

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.



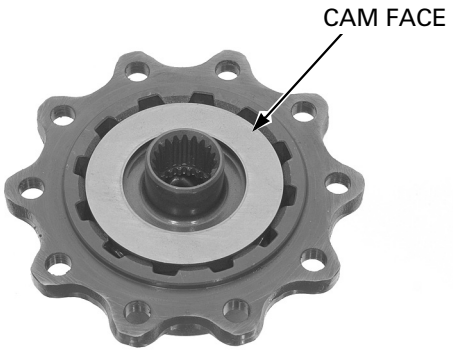
Install the face cam onto the cam followers.

Measure the depth of the ring gear and record it (page 18-20).
Measure the height of the housing-to-cam and record it (page 18-20).

Calculate the shim thickness using the equation below. The correct shim is nearly this dimension.

A = B – C – 1.6 mm

A: New shim thickness
B: Recorded ring gear depth
C: Recorded face cam height

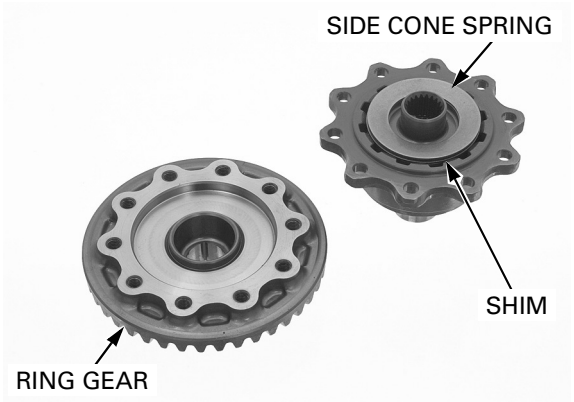


Select the shim and install it onto the face cam.

Differential shims:

A: 1.3 mm (0.051 in)	**E: 1.7 mm (0.067 in)**
B: 1.4 mm (0.055 in)	**F: 1.8 mm (0.071 in)**
C: 1.5 mm (0.059 in)	**G: 1.9 mm (0.075 in)**
D: 1.6 mm (0.063 in)	

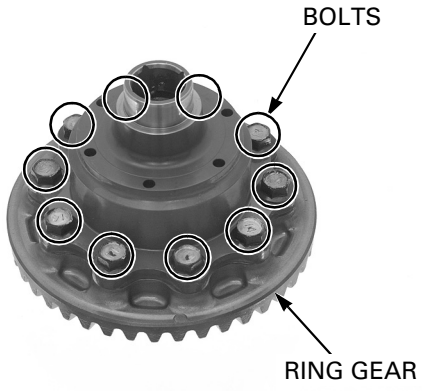
Install the cone spring with the concaved side facing up (ring gear side).
Install the ring gear.



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 18-19).
If the slip torque is out of specification, perform the shim adjustment. Replace the differential assembly when the replacement shim is changed by 0.3 mm or more from the selected shim (page 18-27).



DIFFERENTIAL CASE ASSEMBLY

NOTE:

- When the gear set, bearing, differential housing and/or gear case has been replaced, check the tooth contact pattern (page 18-17).
  Check the gear backlash (page 18-15).

Keep dust and dirt out of the case and cover.

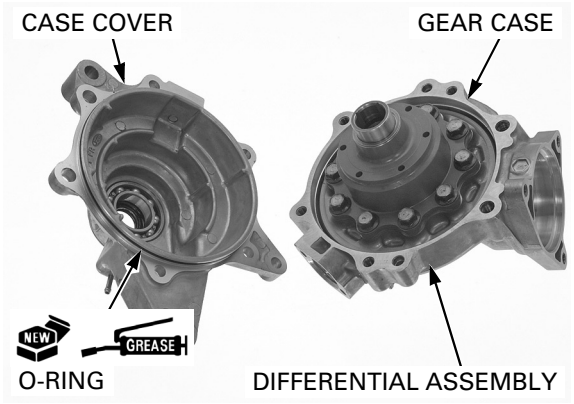
Clean the mating surface of the gear case and cover, being careful not to damage them.

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.

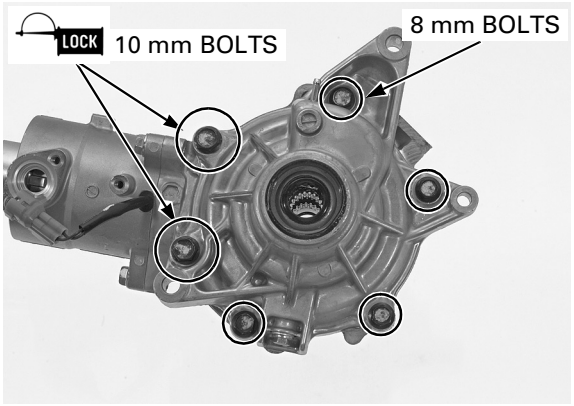


It is important to turn the pinion gear while tightening the bolts. If the ring gear shim is too thick, the gears will lock after only light tightening.

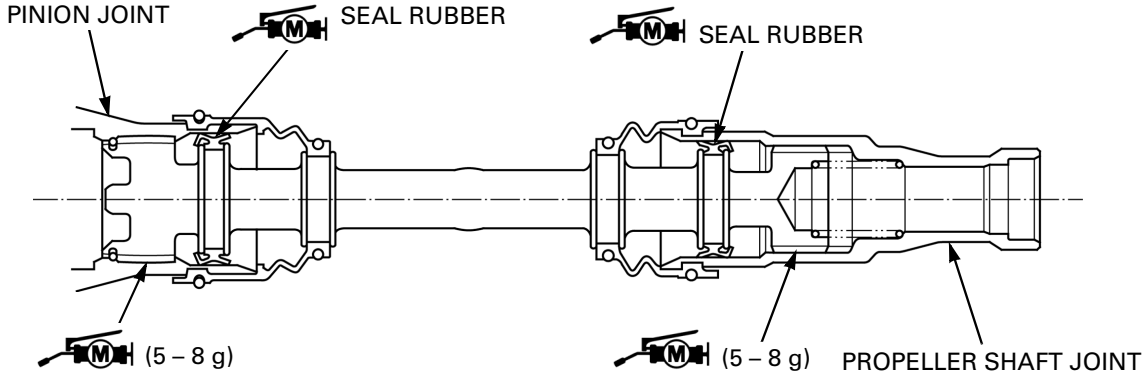
Apply locking agent to the threads of the two 10 mm bolts.
Install the bolts and tighten them in several steps until the cover evenly touches the gear case. Then, while rotating the pinion gear, tighten the bolts to the specified torque in a crisscross pattern in several steps.

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.

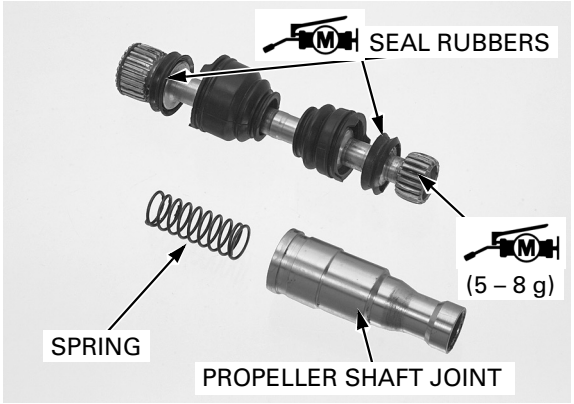


PROPELLER SHAFT ASSEMBLY

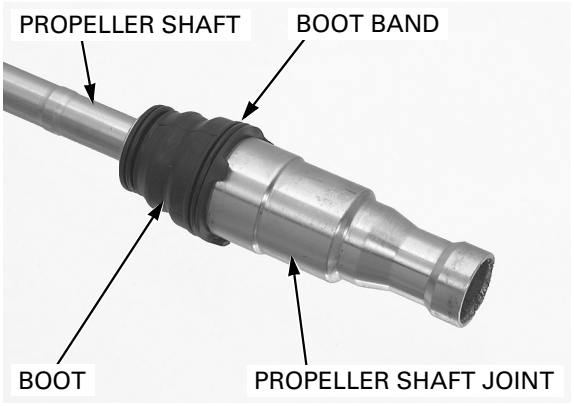


Apply molybdenum disulfide grease to the seal rubbers.
Apply 5 – 8 g of molybdenum disulfide grease to the propeller shaft joint splines.

Set the spring and propeller shaft joint onto the propeller shaft.



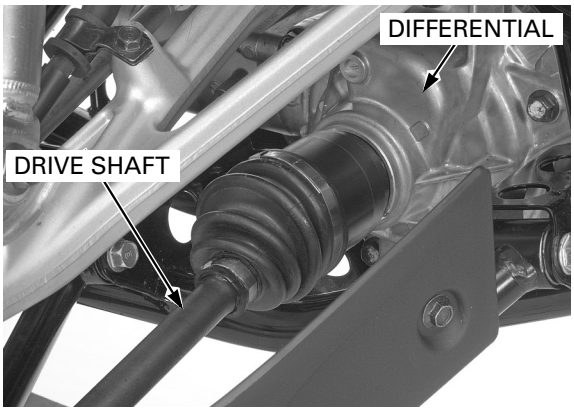
Install the boot over the propeller shaft joint while compressing the spring.
Install the boot band into the boot groove.



DIFFERENTIAL INSTALLATION

Place the differential into the frame.

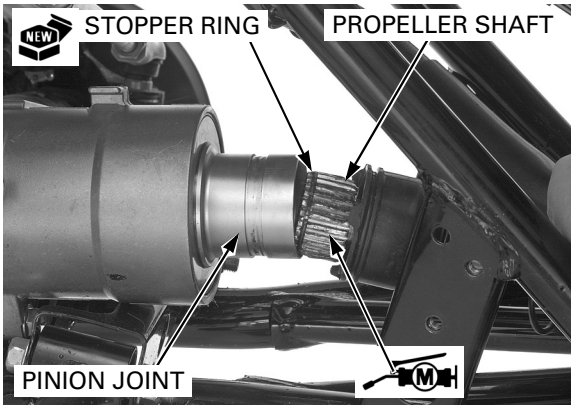
Install the right drive shaft onto the differential in the same manner as on (page 18-11).



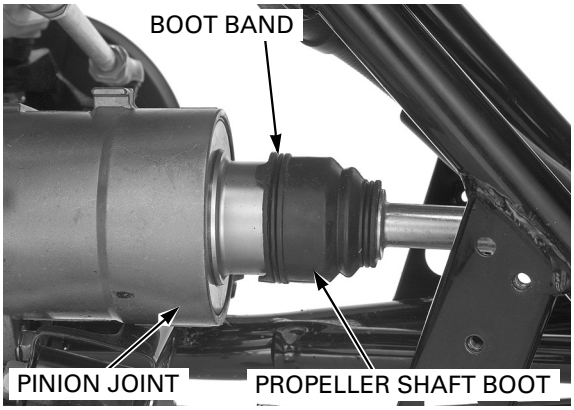
Install a new stopper ring into the groove in the propeller shaft.

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.



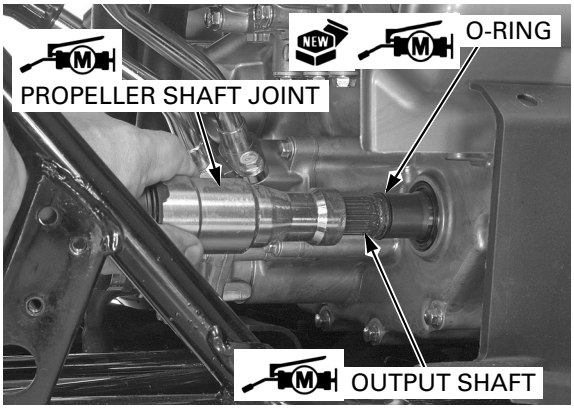
Coat a new O-ring with molybdenum disulfide grease and install it into the groove in the output shaft.

Apply molybdenum disulfide grease to the output shaft splines.

Apply molybdenum disulfide grease to the propeller shaft joint splines.

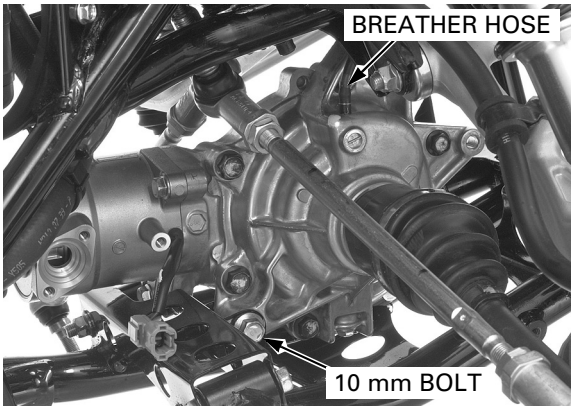
Move the differential forward for maximum clearance between the propeller shaft joint and output shaft.

Install the propeller shaft joint over the output shaft.



Align the bolt holes in the differential and frame, and install the 10 mm mounting bolt.

Connect the breather hose.

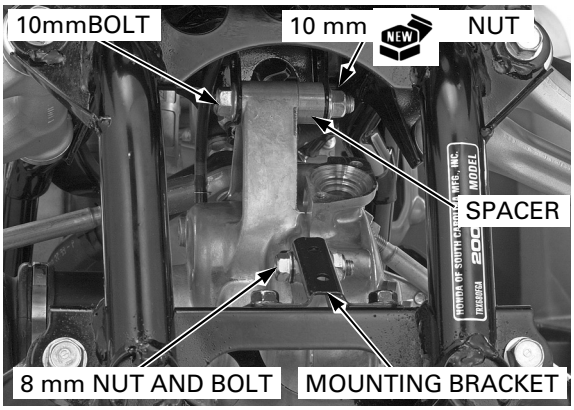


Install the spacer, 10 mm mounting bolt and nut.

Install the mounting bracket, 8 mm bolts, 8 mm mounting bolt and nut.

Tighten the all mounting fasteners.

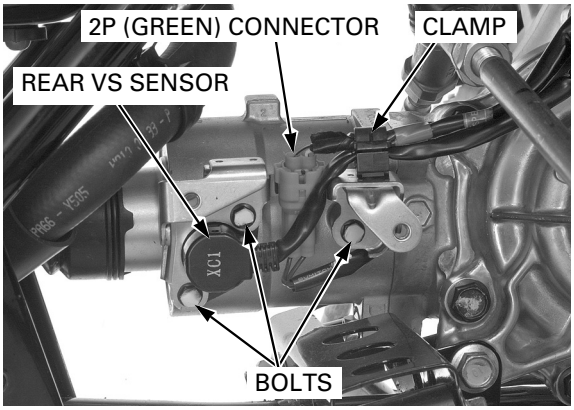
TORQUE: 10 mm: 44 N·m (4.5 kgf·m, 33 lbf·ft)
8 mm: 22 N·m (2.2 kgf·m, 16 lbf·ft)



Connect the front final clutch 2P (Green) connector and install it onto the sensor cover stay.
Install the rear VS sensor, VS sensor cover stay and three bolts, and tighten the bolts.

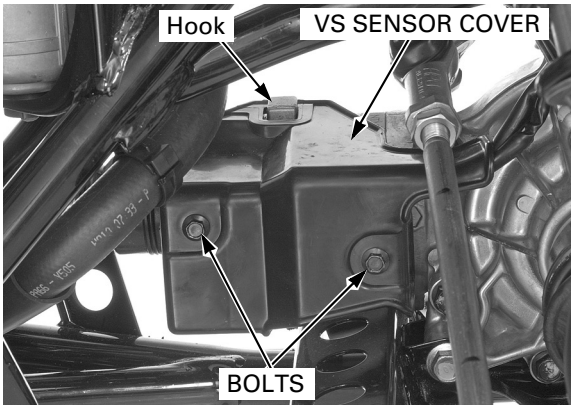
TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

Clamp the rear VS sensor wire and front final clutch wire.



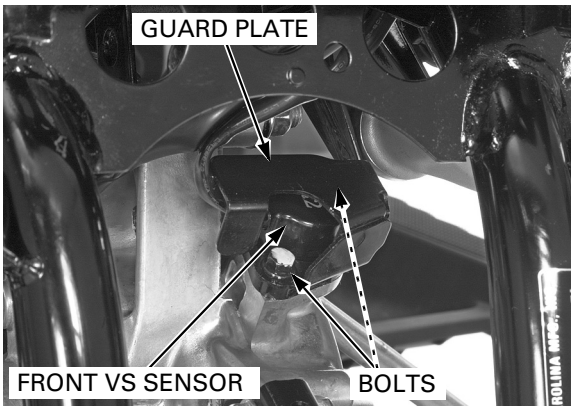
Install the VS sensor cover while hooking it on the boss on the case, and install and tighten the two bolts.

TORQUE: 7 N·m (0.7 kgf·m, 5.1 lbf·ft)



Install the front VS sensor, guard plate and two bolts, and tighten the bolts.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)



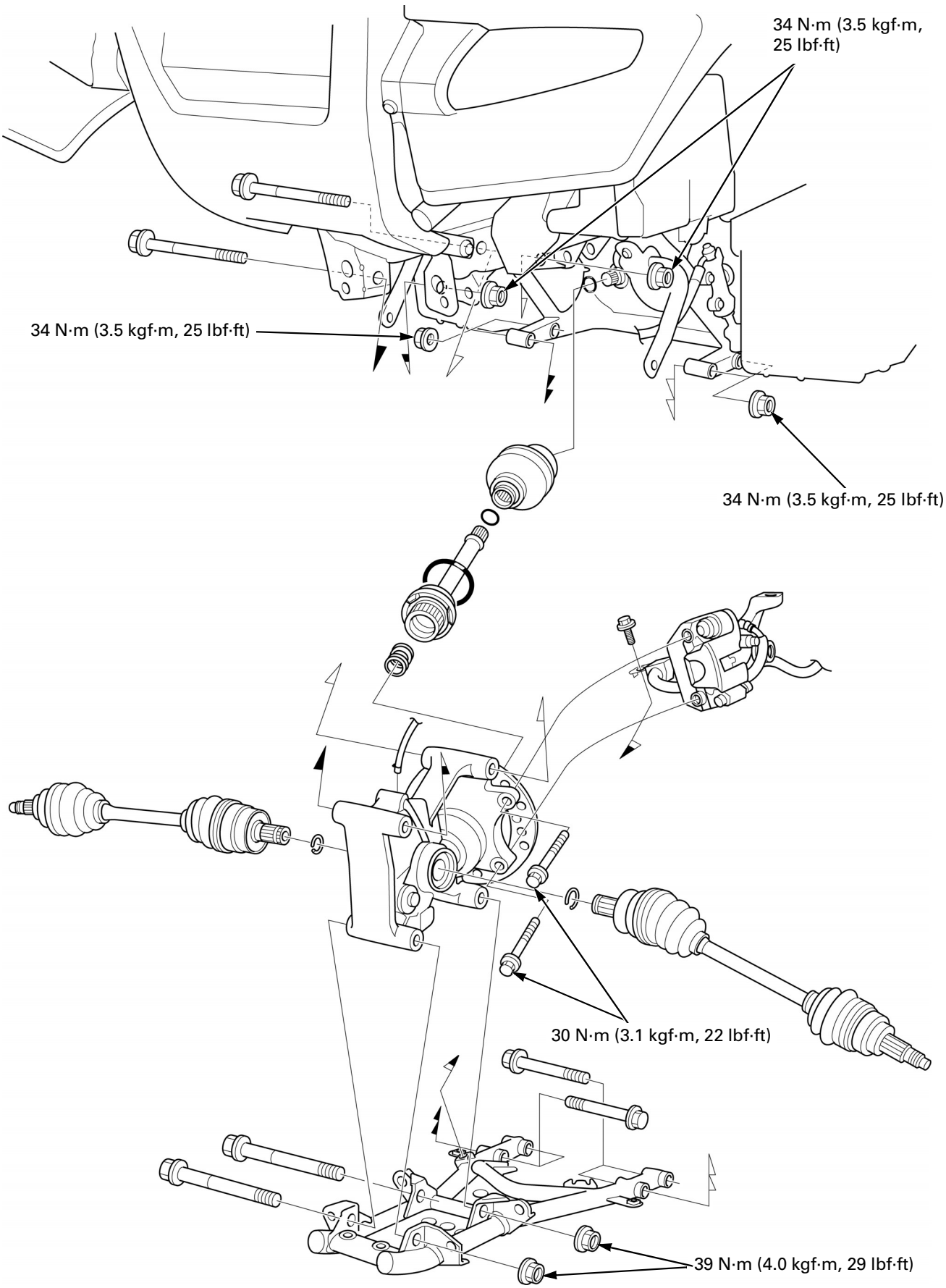
Install the following:

– left drive shaft (page 18-7)
– front grille (page 3-10)
– inner fenders (page 3-9)
– left front mud guard (page 3-8)

Fill the differential with the recommended oil (page 4-16).

19. 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 (page 16-7).

SPECIFICATIONS

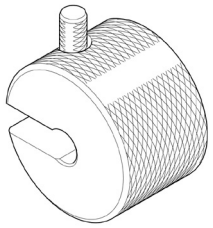
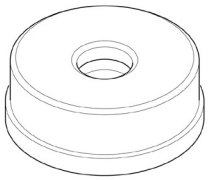
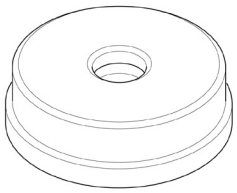
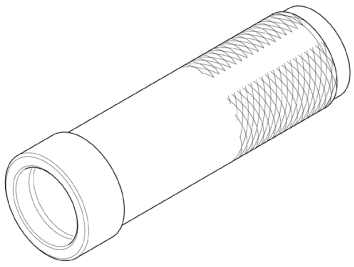
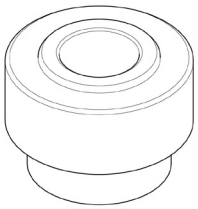
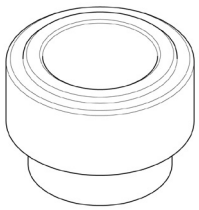
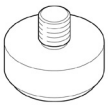
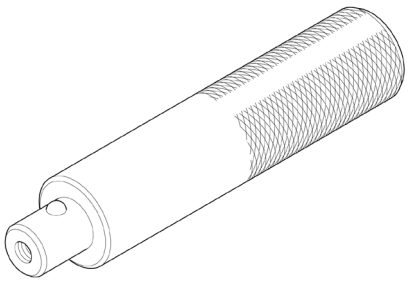
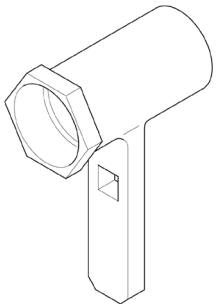
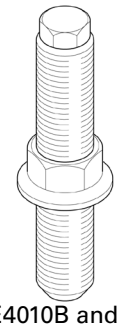
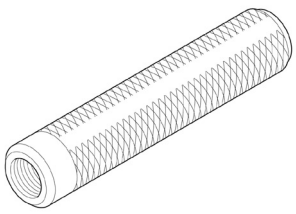
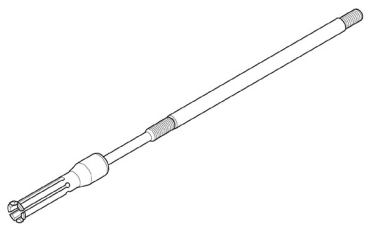
Unit: mm (in)

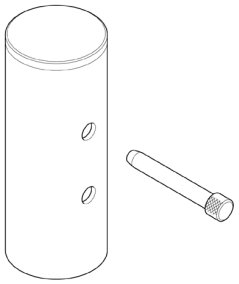
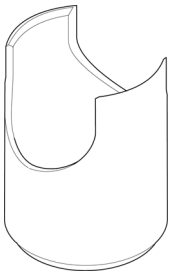
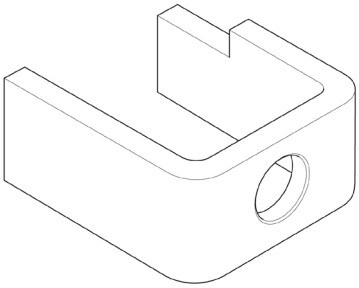
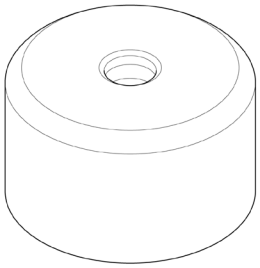
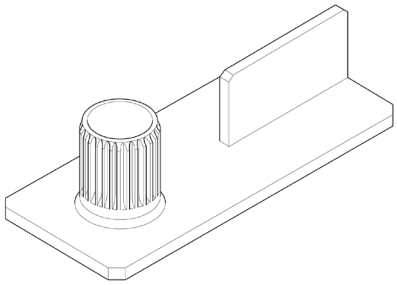
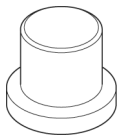
ITEM			STANDARD	SERVICE LIMIT
Final drive	Oil capacity	At draining	78 cm^3 (2.6 US oz, 2.7 Imp oz)	–
		At disassembly	90 cm^3 (3.0 US oz, 3.2 Imp oz)	–
	Recommended oil		Hypoid gear oil SAE #80	–
	Gear backlash		0.05 – 0.25 (0.002 – 0.010)	0.4 (0.02)
	Backlash difference		–	0.2 (0.01)
	Ring gear-to-stop pin clearance		0.3 – 0.6 (0.01 – 0.02)	–

TORQUE VALUES

Final gear case pinion bearing lock nut	98 N·m (10.0 kgf·m, 72 lbf·ft) Lock nut: replace with a new one. 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

Remover weight 07741-0010201  or 07936-371020A or 07936-3710200 (U.S.A. only)	Attachment, 52 x 55 mm 07746-0010400 	Attachment, 62 x 68 mm 07746-0010500 
Driver, 40 mm I.D. 07746-0030100 	Attachment, 25 mm I.D. 07746-0030200 	Attachment, 35 mm I.D. 07746-0030400 
Pilot, 30 mm 07746-0040700 	Driver 07749-0010000 	Lock nut wrench, 30 x 64 mm 07916-MB00002 
Puller shaft 07931-ME40000  or 07931-ME4010B and 07931-HB3020A (U.S.A. only)	Remover handle 07936-3710100 	Bearing remover set, 17 mm 07936-3710300 

Oil seal driver 07965-KE80200  not available in U.S.A.	Bearing clip compressor, 28 mm 070ME-HN8A200 	Pinion puller base 07HMC-MM80110  or 07HMC-MM8011A (U.S.A. only)
Driver attachment 07LAD-PW50500 	Pinion holder 07SMB-HM70200 	Puller attachment 07YMC-GCS0100  (not available in U.S.A.) or 07949-3710001, 07746-0010700 and 07746-0040400

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 16-6)
– seat (page 3-4)

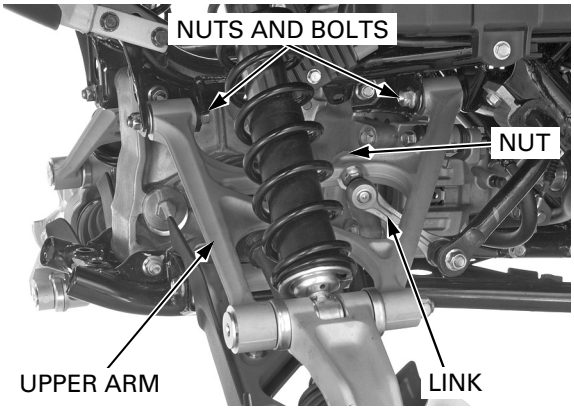
Right drive shaft: Remove the right side cover (page 3-5).

Left drive shaft: Remove the oil filler lid (page 3-8).

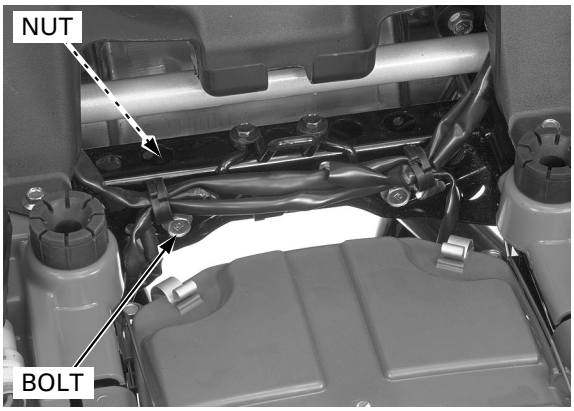
Support the lower arm with a support block.

Remove the following:

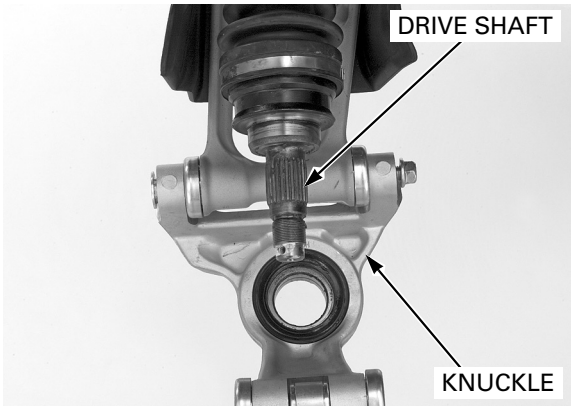
– stabilizer link nut (to disconnect the link)
– two upper arm pivot nuts and bolts



– shock absorber upper mounting nut and bolt



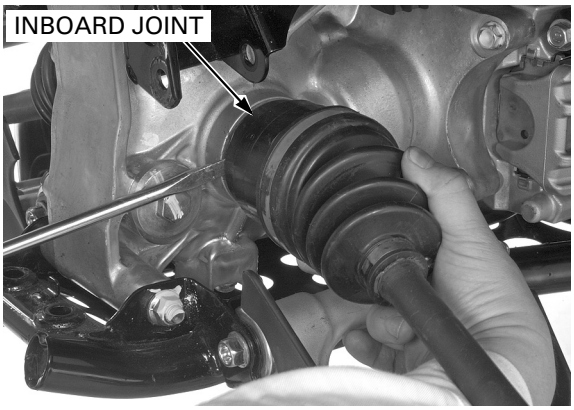
Remove the shock absorber and upper arm off the frame, and pivot the knuckle outward to release it from the drive shaft.



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.

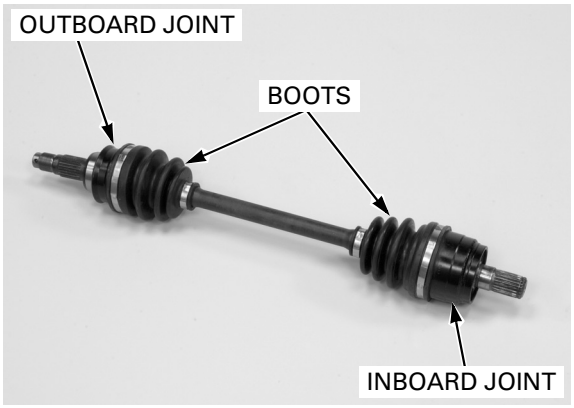


DISASSEMBLY/INSPECTION

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:

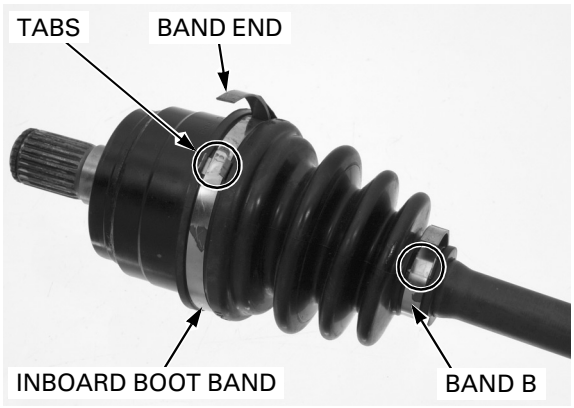
- To replace the outboard boot, first remove the inboard boot as described in the following steps. Then remove the bands and outboard boot from the inboard end of the shaft.
- The outboard joint cannot be disassembled.



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.

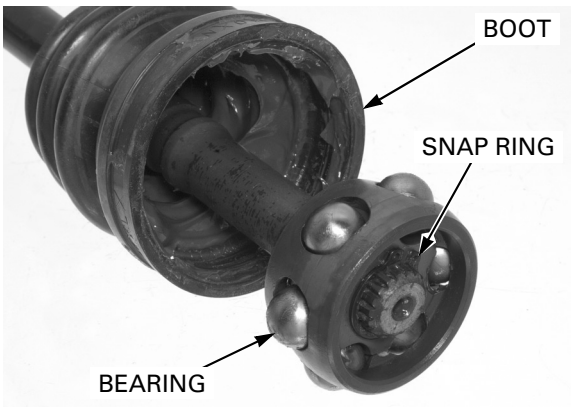
Remove the boot from the inboard joint.



Remove the following:

– stopper ring
– inboard joint

– snap ring
– bearing
– inboard boot
– boot band B



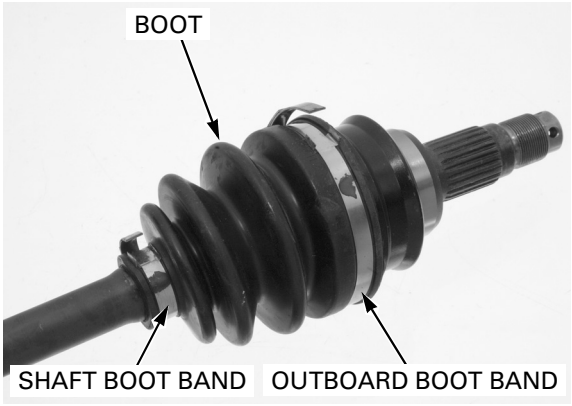
Replace their components as an assembly.

Check the following for wear or damage:

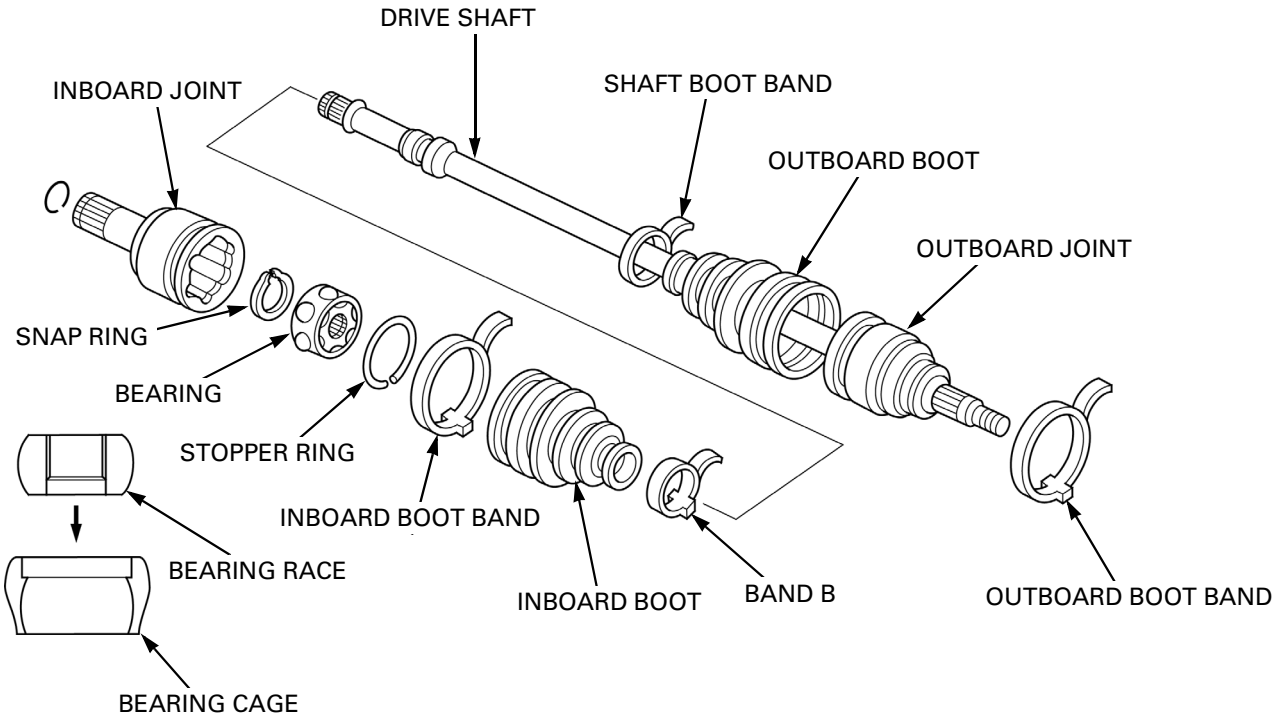
- bearing cage
- race
- steel balls
- inboard joint

Remove the following:

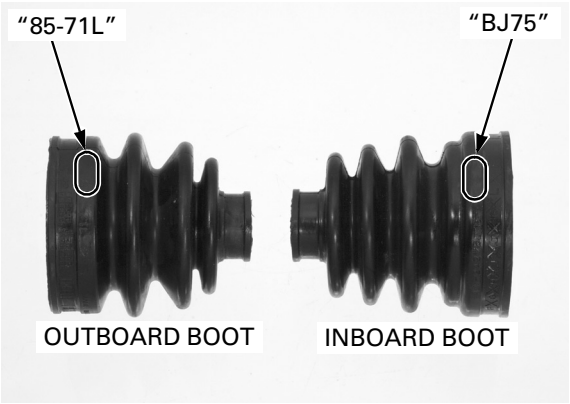
- shaft boot band
- outboard boot band
- outboard boot



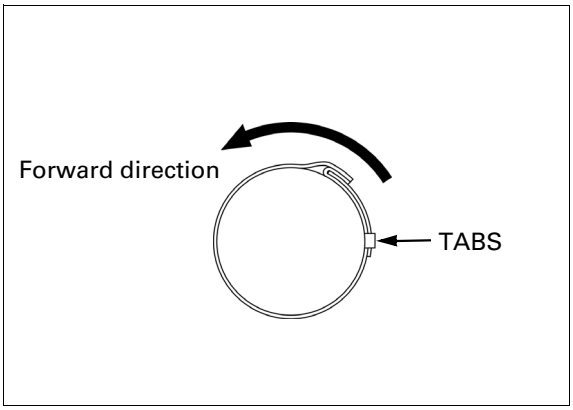
ASSEMBLY



Each boot has an identification mark; "85-71L" for the outboard and "BJ75" for inboard.



Note the installation direction of the boot bands.



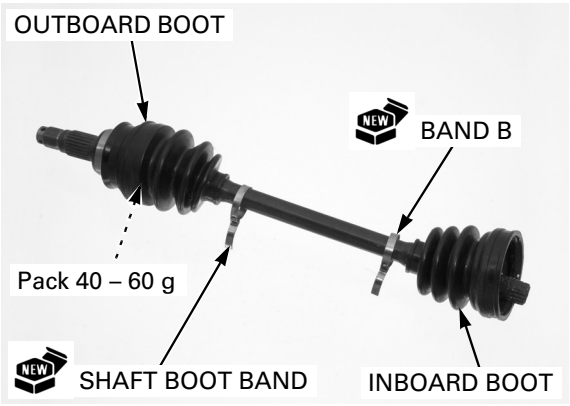
Pack the outboard joint with 45 – 65 g of specified grease.

Specified grease: NKG106 (KYODO YUSHI)

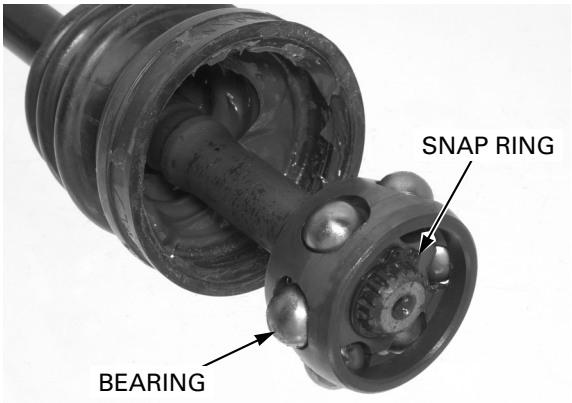
Install the following:

- 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.

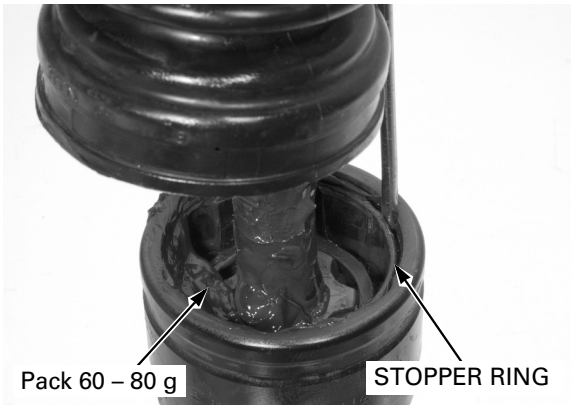


Pack the inboard joint with 60 – 80 g of specified grease.

Specified grease: NKG205 (KYODO YUSHI)

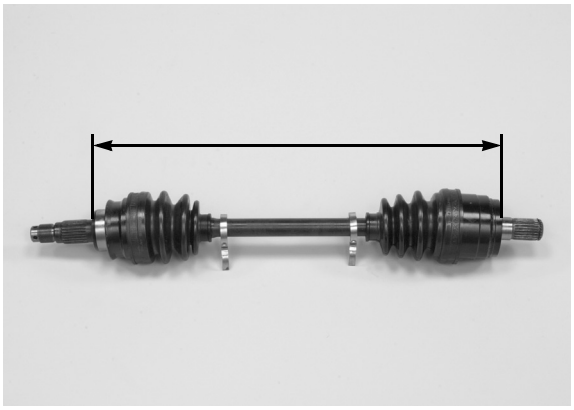
Install the inboard joint over the bearing.
Install the stopper ring into the groove in the inboard joint properly.

Install the inboard boot over the inboard joint securely.



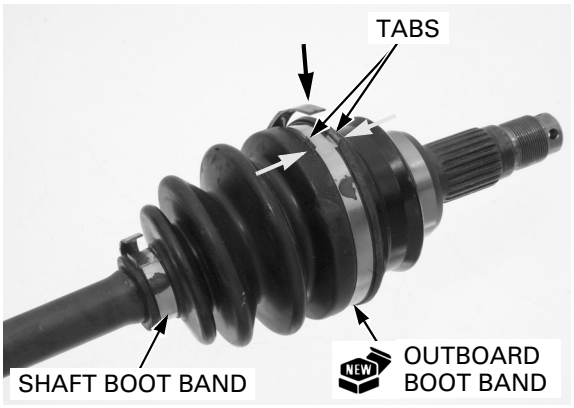
Be sure the length of the drive shaft to be set the figure given below.

DRIVE SHAFT LENGTH: 425.2 mm (16.74 in)

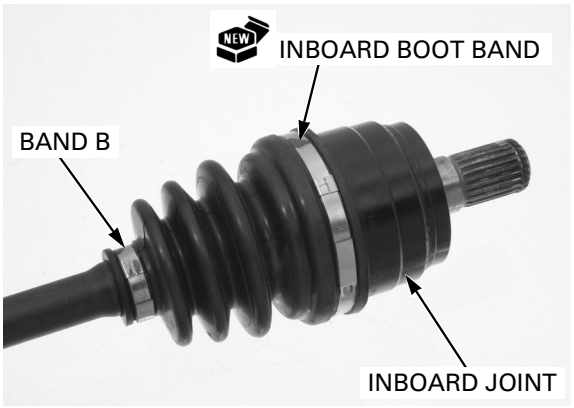


For band installation direction (page 19-9).

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.



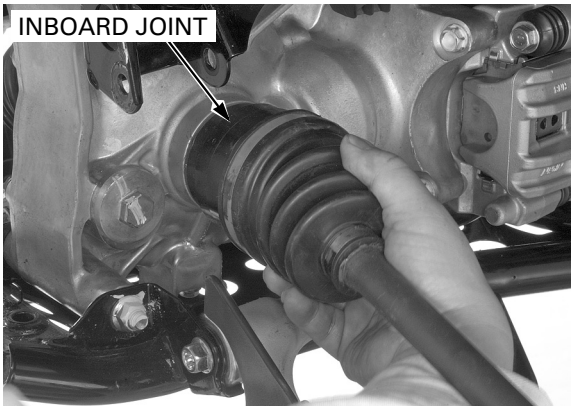
INSTALLATION

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.

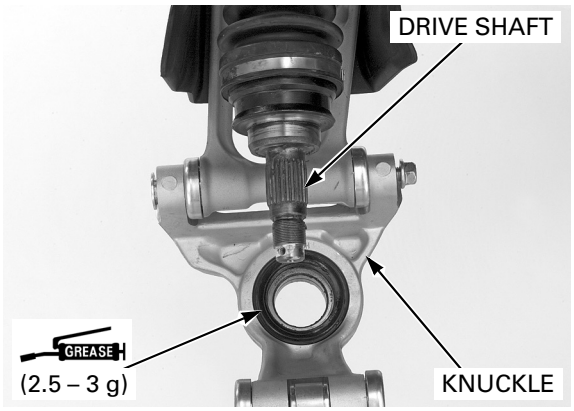
Install the drive shaft by holding the inboard joint until the stopper ring seats in the groove.

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.

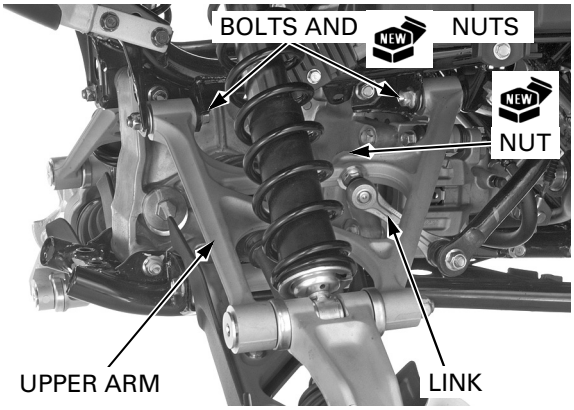


Insert the pivot bolts from the inside.

Install the upper arm pivot bolts and new nuts, and tighten them.

TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)

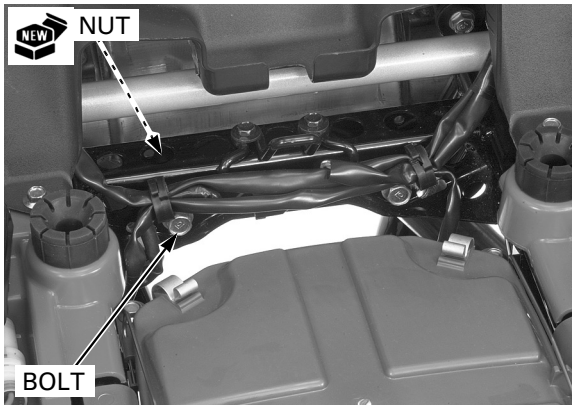
Connect the stabilizer link into the upper arm with a new nut and tighten it securely.



Install the shock absorber upper mounting bolt and a new nut, and tighten it securely.

Install the following:
– wheel hub (page 16-9).

Right side:
– right side cover (page 3-5)
Left side:
– oil filler lid (page 3-8)
– seat (page 3-4).



FINAL DRIVE REMOVAL

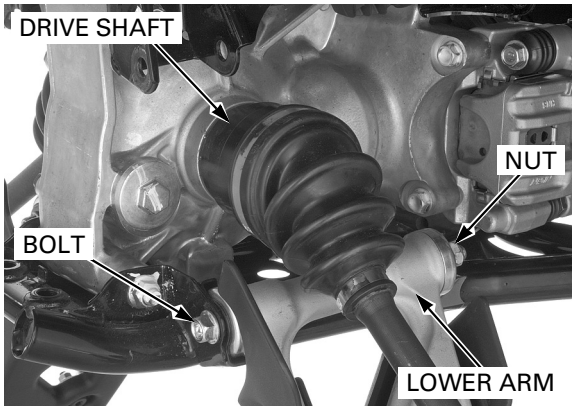
Drain the final gear case oil (page 4-15).

Remove the following:

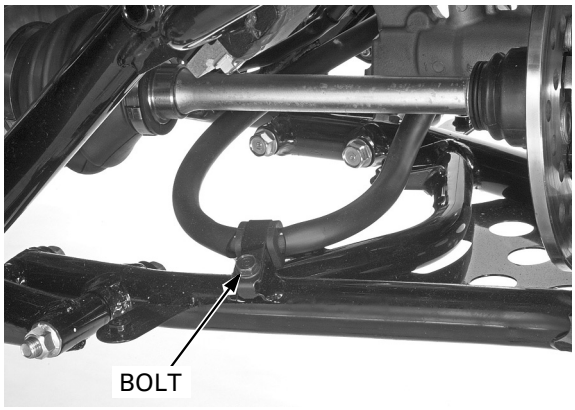
– engine guard (page 3-17)
– rear brake caliper without disconnecting the brake hose (page 17-27)
– drive shafts (page 19-6)

Remove the following from the frame:

– pivot nuts and bolts
– suspension arm/shock absorber assemblies

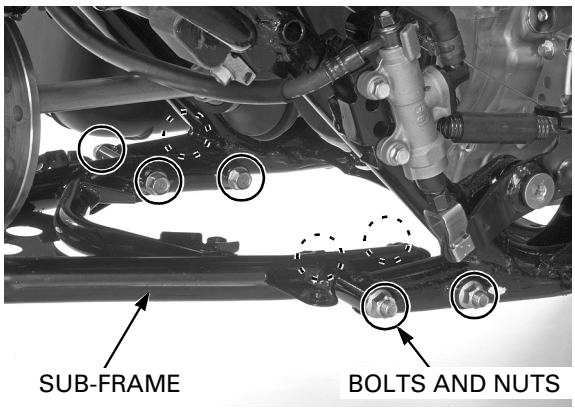


Remove the brake hose clamp bolt.

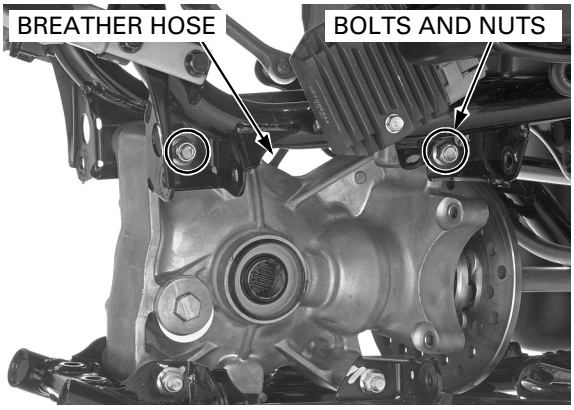


Place a floor jack or other adjustable support under the sub-frame.

– sub-frame joint nuts and bolts



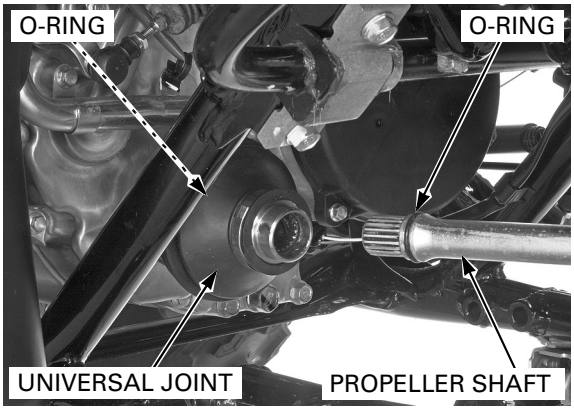
– breather hose
– upper mounting nuts and bolts



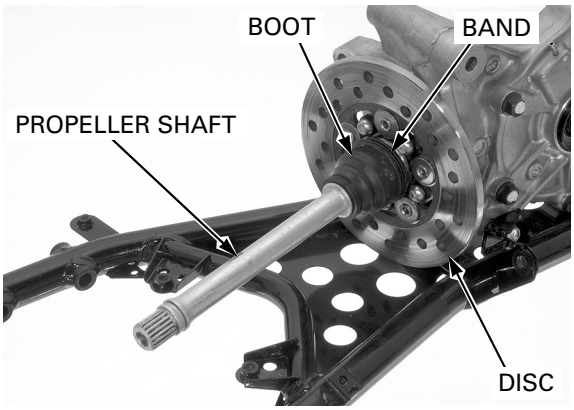
Lower the jack slightly and move it rearward to disconnect the propeller shaft. Remove the final drive assembly out of the vehicle.

Remove the following:

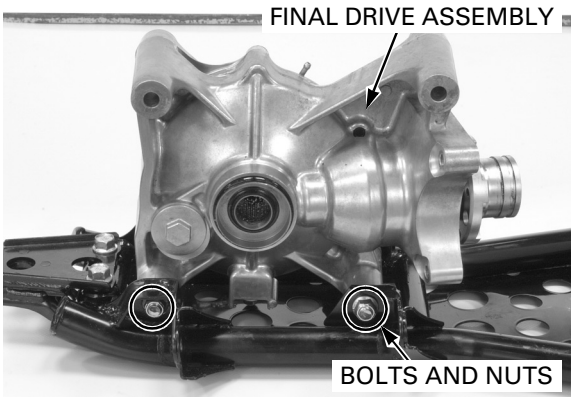
– universal joint
– O-rings (from the propeller shaft and output shaft of the engine)



– boot band
– joint boot (off the pinion joint)
– propeller shaft
– spring
– disc bolts
– brake disc



– mounting nuts and bolts
– final drive assembly

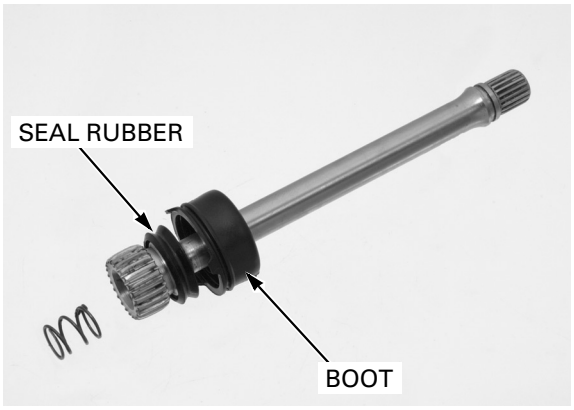


FINAL DRIVE INSPECTION

PROPELLER SHAFT

For boot and seal replacement (page 19-27).

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.



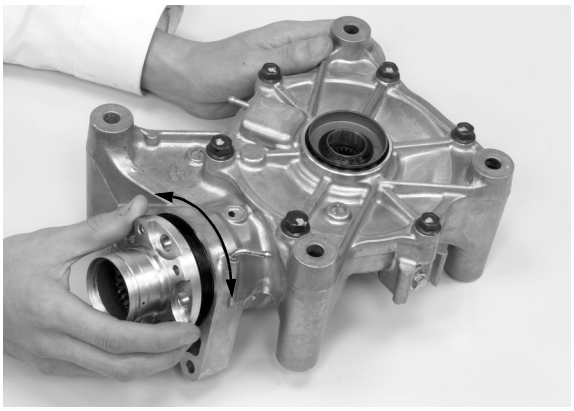
UNIVERSAL JOINT

Check the boot for cuts or other damage.
Check that the joint moves smoothly without binding or noise.

FINAL DRIVE OPRRATION

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

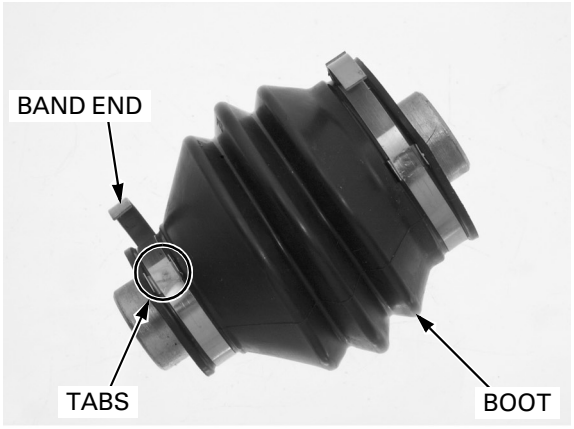
UNIVERSAL JOINT DISASSEMBLY/ ASSEMBLY

Bend up the lock tabs and raise the band ends to loosen the boot bands.

Remove the joint boot.

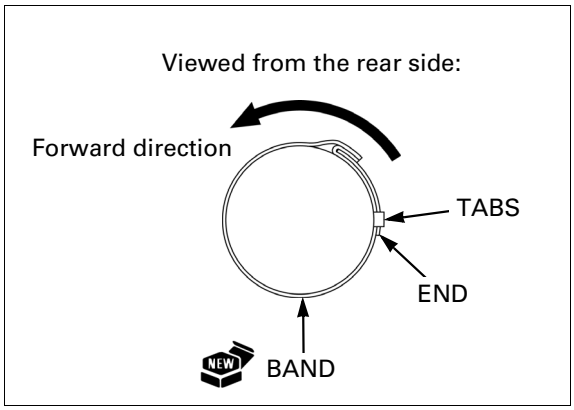
Apply molybdenum disulfide grease to the joint bearing.

Install the boot and set it onto the universal joint properly.



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

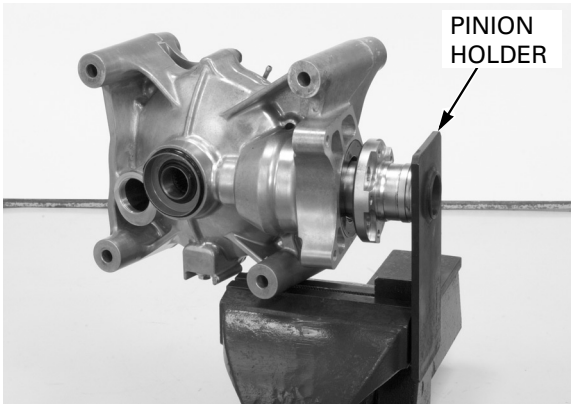
BACKLASH INSPECTION

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.

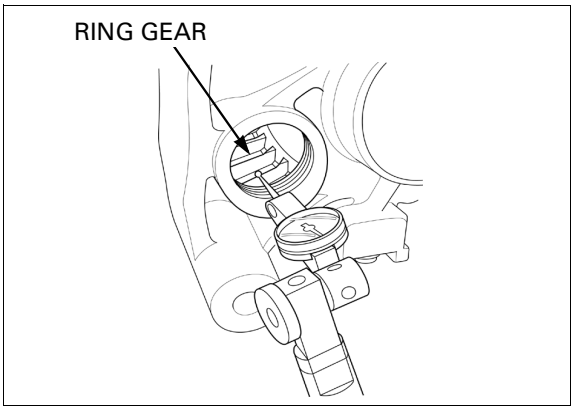


Set a horizontal type dial indicator on the ring gear through the filler hole.
Turn the ring gear back and forth with the drive shaft to read backlash.

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)

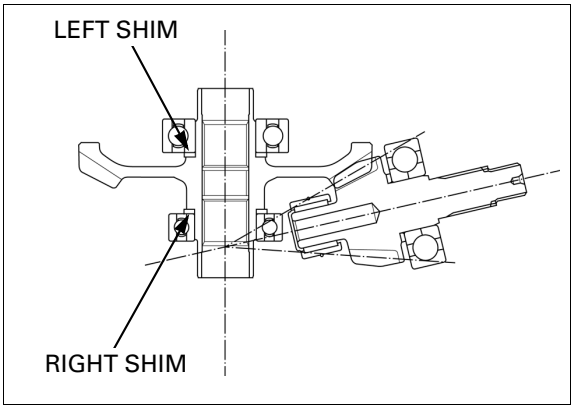


If the difference in measurements exceeds the service limit, it indicates that the bearing is not installed squarely, or the case is deformed.
Inspect the bearings and case.

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).



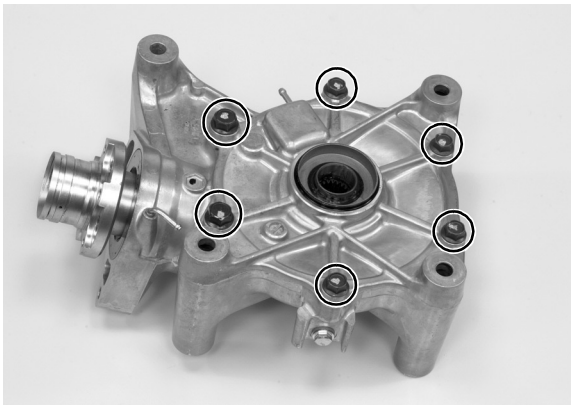
Ring gear shims:

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.

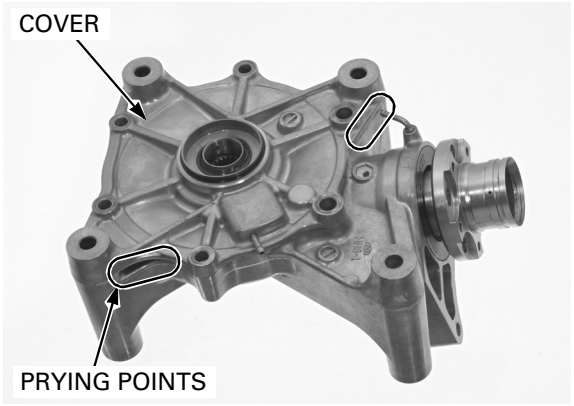
FINAL GEAR CASE DISASSEMBLY

Loosen the cover bolts in a crisscross pattern in several steps and remove them.

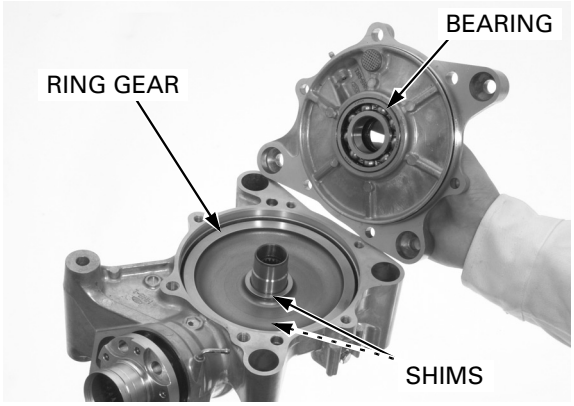


Pry the cover at the prying points using a screwdriver and remove the case cover.

Remove the O-ring.



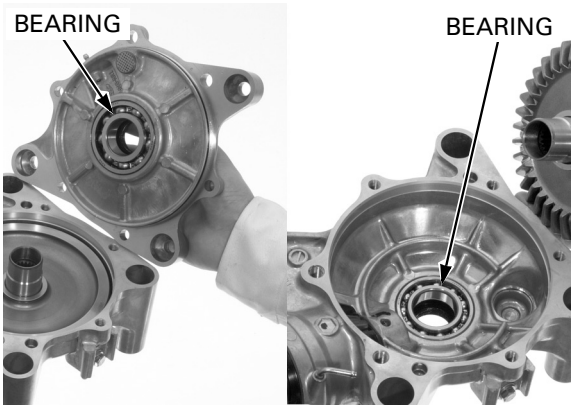
Remove the ring gear and shims.



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 (page 19-21).



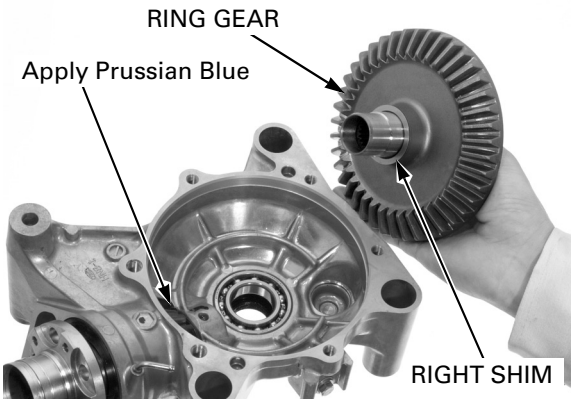
GEAR TOOTH CONTACT PATTERN CHECK

Keep dust and dirt out of the case and cover.

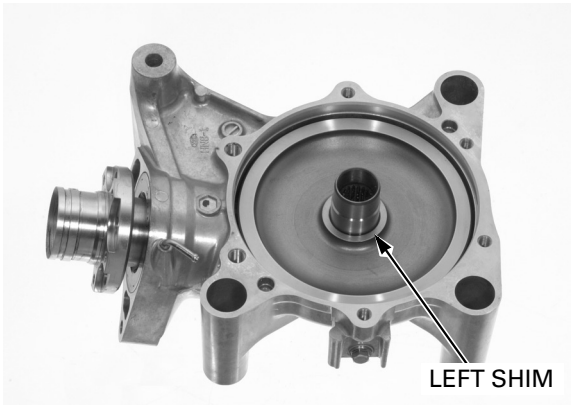
Clean the mating surfaces of the gear case and cover.

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.

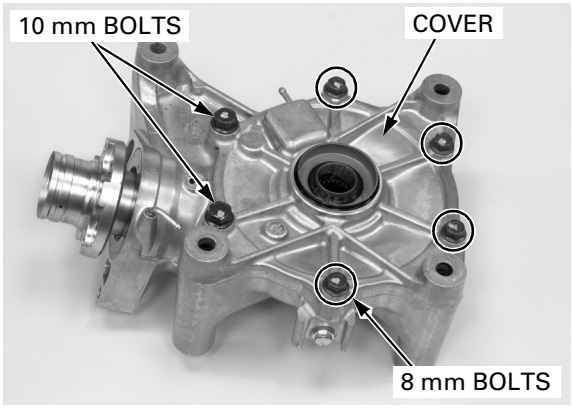


Align the bolt holes and install the case cover.

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)

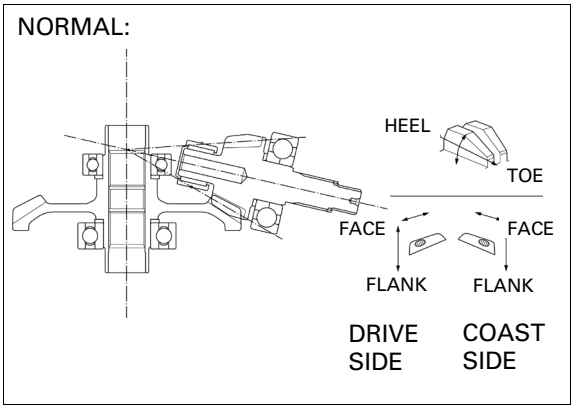


Remove the oil filler cap.

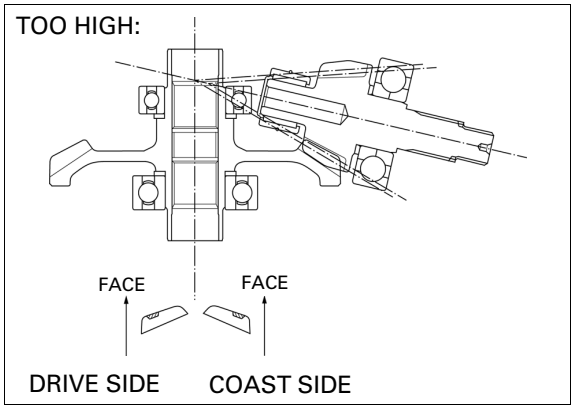
Rotate the ring gear several times in both directions of rotation.

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.

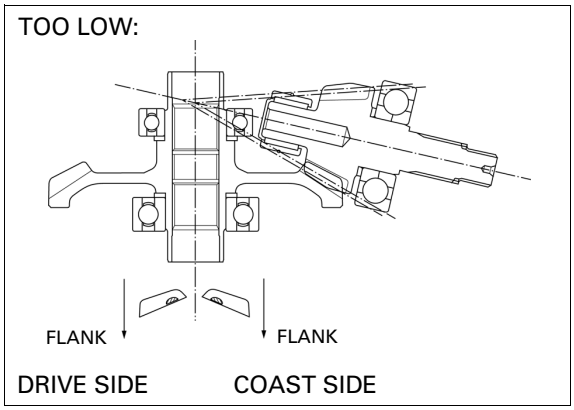


Replace the pinion shim with a thicker one if the contact pattern is too high, toward the face.



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 (page 19-20).

PINION GEAR REMOVAL

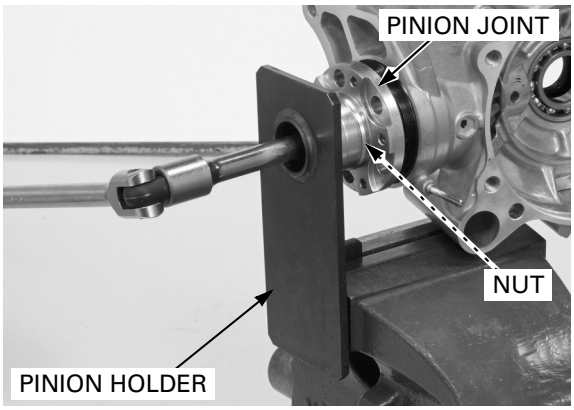
Install the special tool into the pinion joint, and set the final drive assembly and tool in a vise.

TOOL:

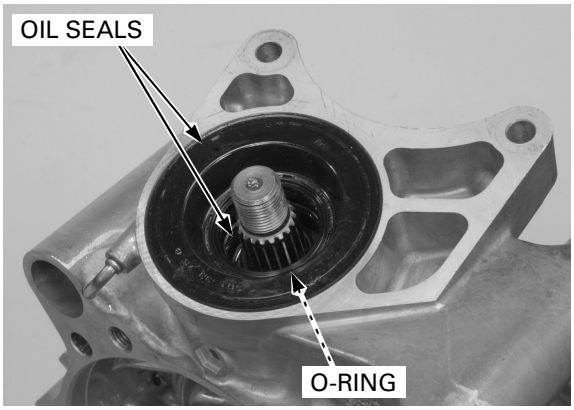
Pinion holder	**07SMB-HM70200**

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.

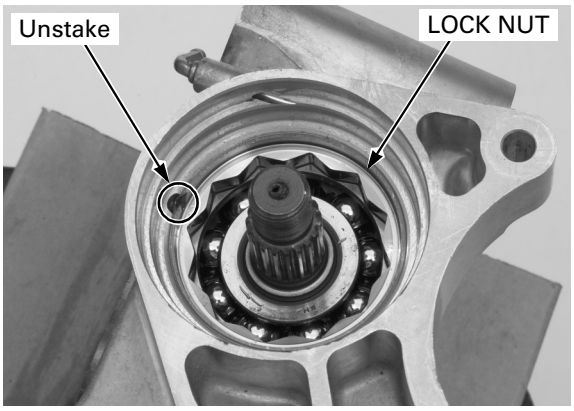


Remove the oil seals and O-ring.



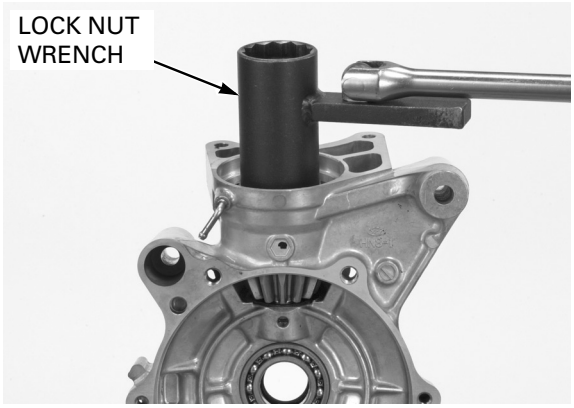
Be careful that metal particles do not enter the bearing and the threads of the case are not damaged.

Unstake the pinion bearing lock nut with a drill or grinder.



Remove the lock nut using the special tool.

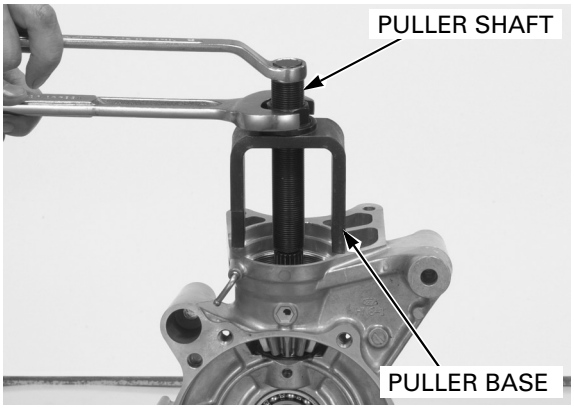
TOOL:
Lock nut wrench, 30 x 64 mm 07916-MB00002



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)**
Puller shaft	**07931-ME40000 or 07931-ME4010B and 07931-HB3020A (U.S.A. only)**



Pull the pinion gear assembly out from the gear case.

PINION GEAR BEARING/SHIM REPLACEMENT

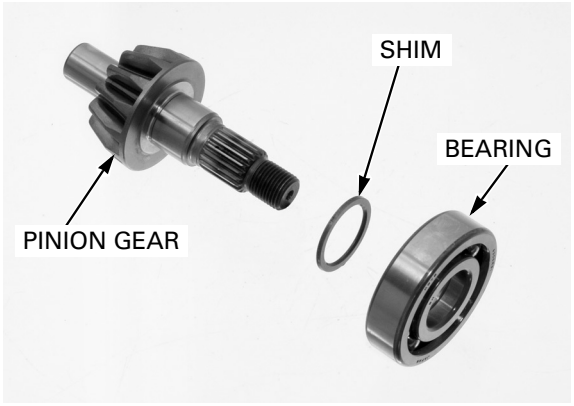
Pull the pinion bearing from the shaft with a commercially available bearing puller.

Remove the pinion shim.

Install the shim and bearing onto the pinion gear.

NOTE:

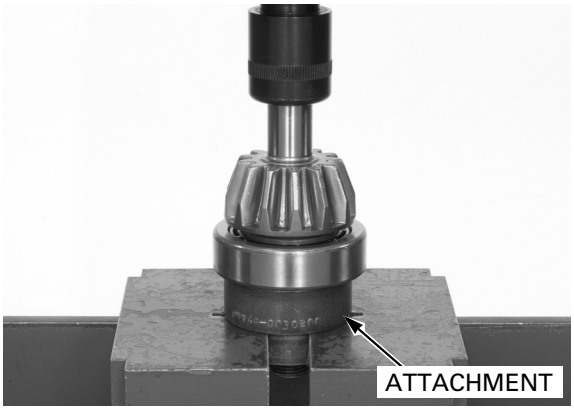
- When the gear set, ring gear bearing, and/or gear case has been replaced, use a 2.00 mm (0.79 in) thick shim for initial reference.



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**

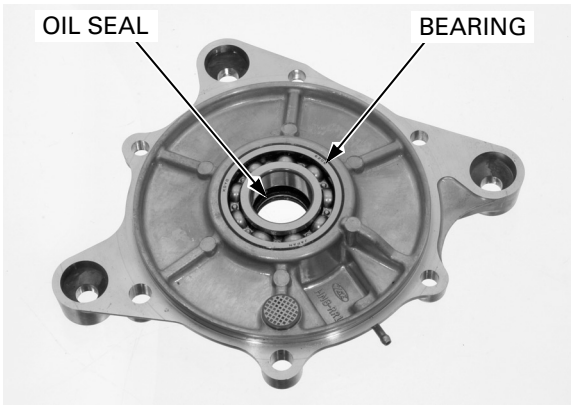


CASE BEARING REPLACEMENT

RING GEAR BEARING

Remove the oil seals from the case and cover.

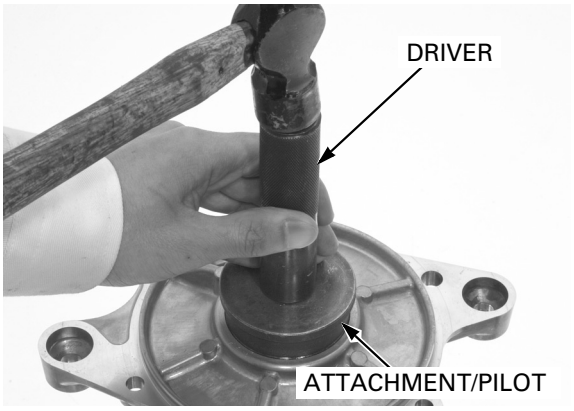
Drive the bearings out of the case and cover.



Drive each new bearing using the special tools.

TOOLS:

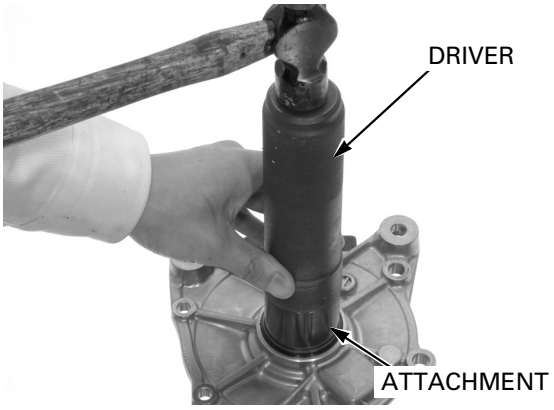
Case cover:	
Driver	**07749-0010000**
Attachment, 62 x 68 mm	**07746-0010500**
Pilot, 30 mm	**07746-0040700**
Gear case:	
Driver	**07749-0010000**
Attachment, 52 x 55 mm	**07746-0010400**
Pilot, 30 mm	**07746-0040700**



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).

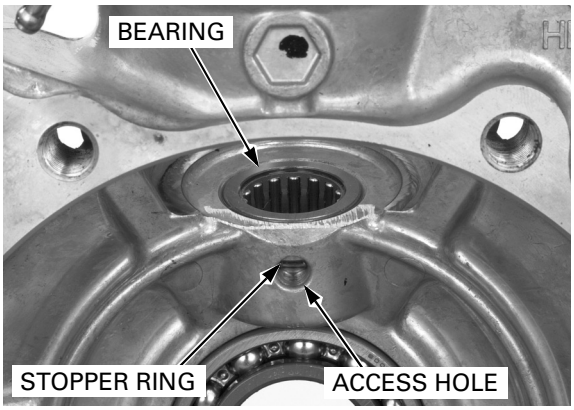
TOOLS:

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)**

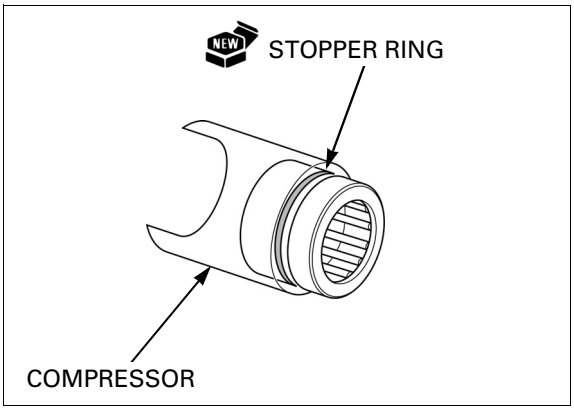
Remove the bearing cage and bearings from the inside of the pinion bearing to allow the special tool to grip the bearing.

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-HN8A200**

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.

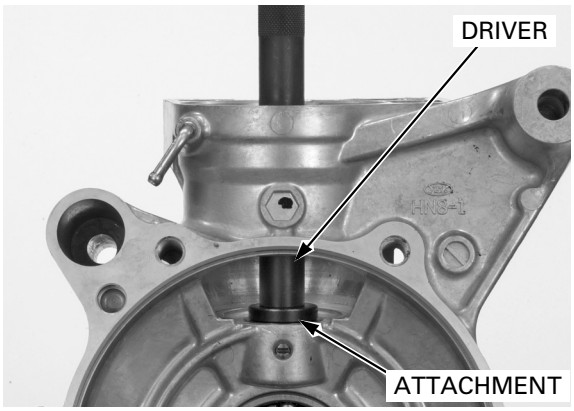
Drive the pinion bearing into the gear case using the special tools as follows.

TOOLS:

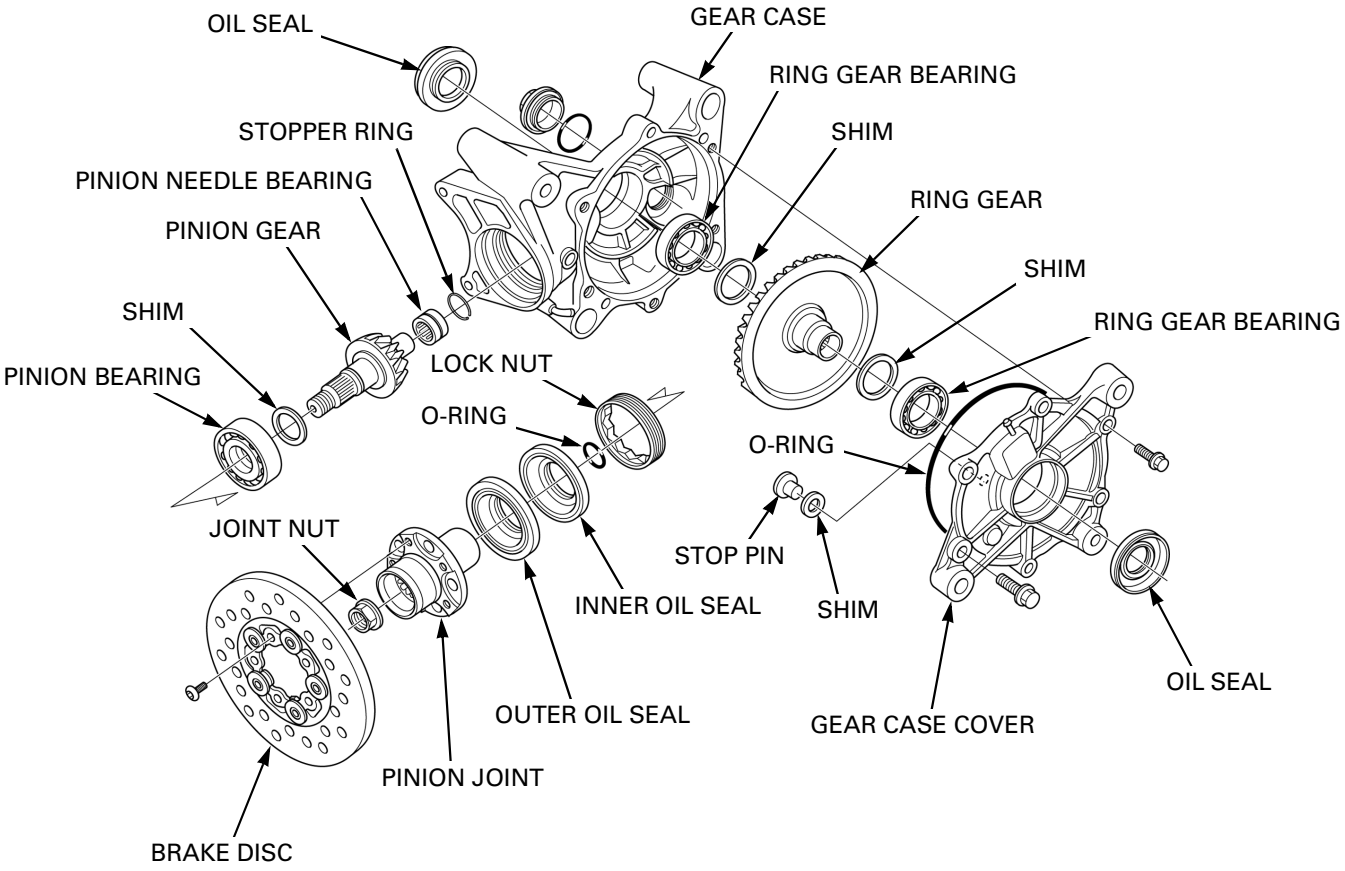
Puller attachment	**07YMC-GCS0100 (not available in U.S.A.) or**
Driver	**07949-3710001**
Attachment, 24 x 26 mm	**07746-0010700**
Pilot, 17 mm	**07746-0040400**

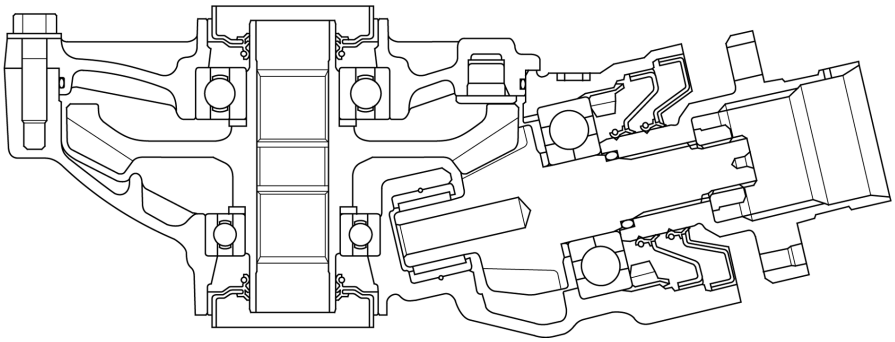
Only strike the driver once. If you strike it more than once, the stopper ring may slip out of the groove.
If this happens, remove the ring and bearing, and install a new one again.

Make sure that the stopper ring is securely set in the groove of the gear case.



FINAL DRIVE ASSEMBLY





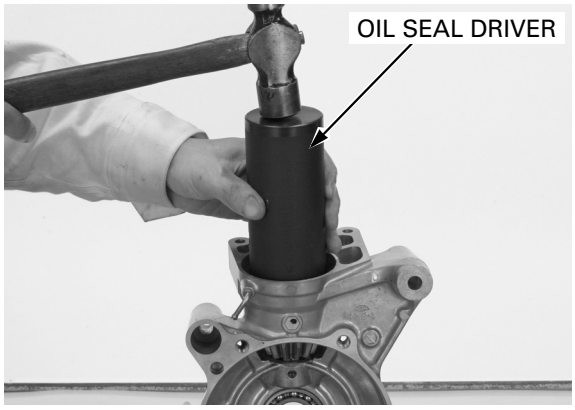
PINION GEAR INSTALLATION

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.)**



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.

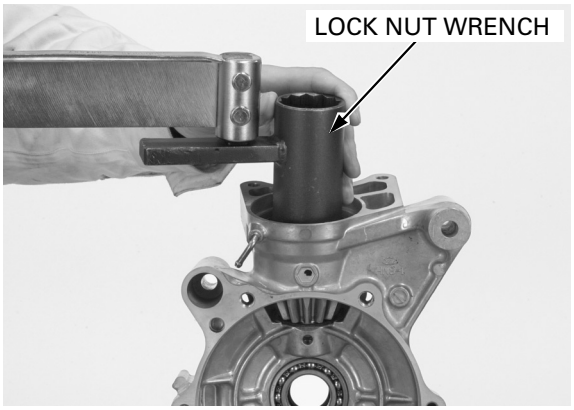
Freeze the pinion gear and bearing.
Heat the gear case to 80°C (176°F).
Drop the cold pinion assembly into the warm gear case.

Install a new lock nut and tighten it using the special tool.

TOOL:
Lock nut wrench, 30 x 64 mm 07916-MB00002

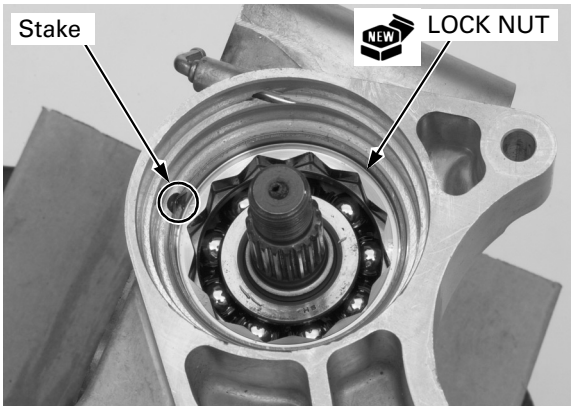
Refer to torque wrench reading information on "Service Information" (page 19-3).

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.

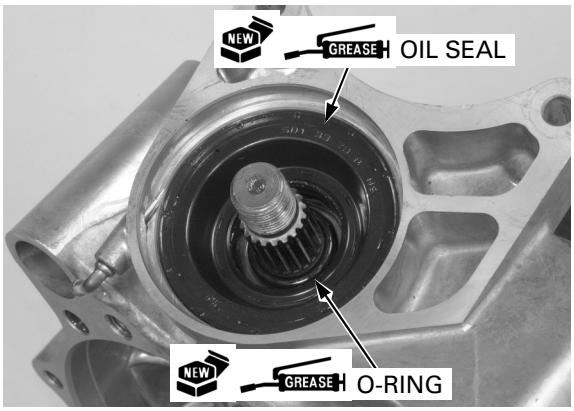
Stake the lock nut into the case groove.



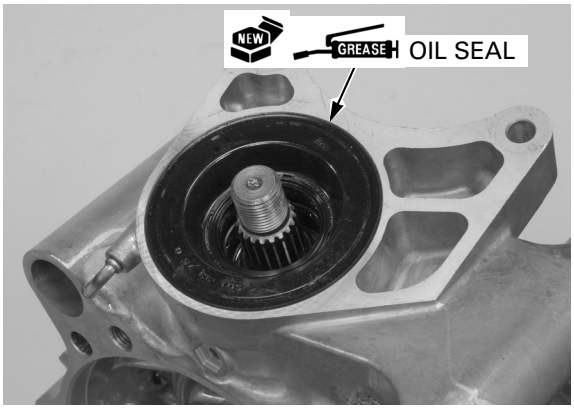
Coat a new O-ring with grease and install it onto the pinion gear shaft.

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.



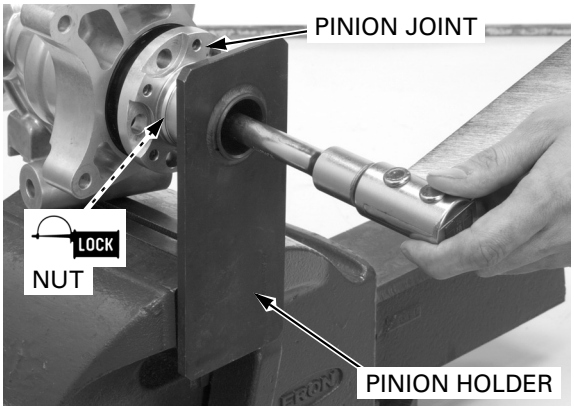
Clean the threads of the pinion gear shaft thoroughly.

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)

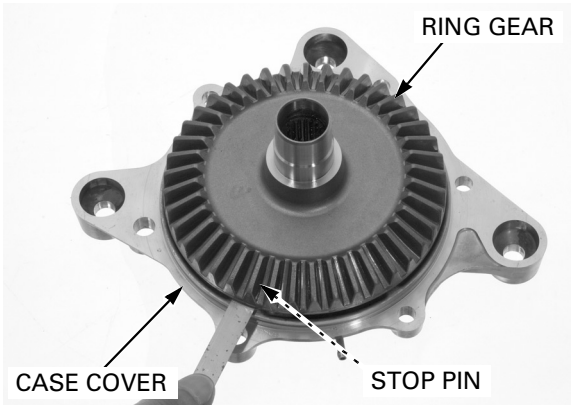


RING GEAR CLEARANCE INSPECTION

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.

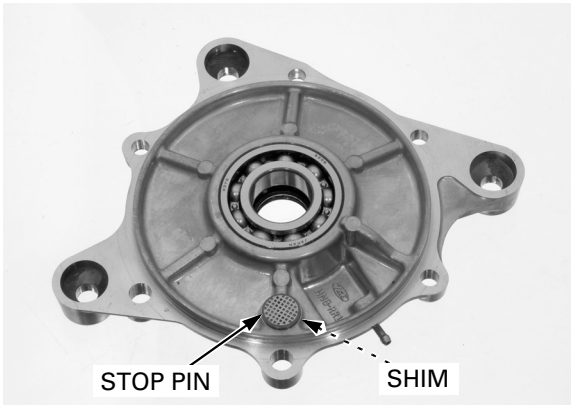
Be sure to wear heavy gloves to avoid burns when handling the heated case cover. Using a torch to heat the case cover may cause warpage.

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

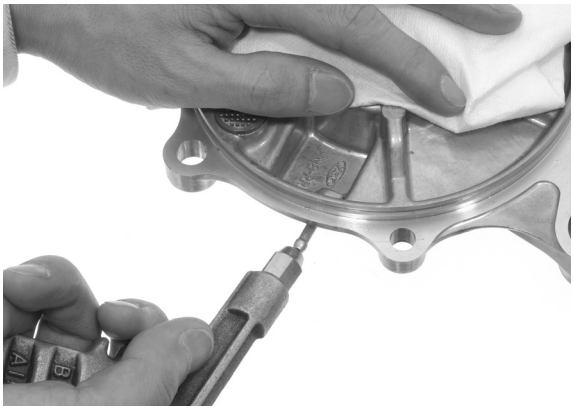
NOTE:

- When the gear set, bearing, and/or gear case has been replaced, check the tooth contact pattern check (page 19-18).
  Check the gear backlash (page 19-16).

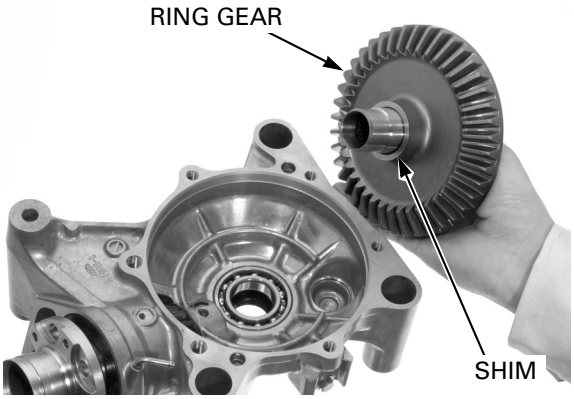
Keep dust and dirt out of the case and cover.

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.

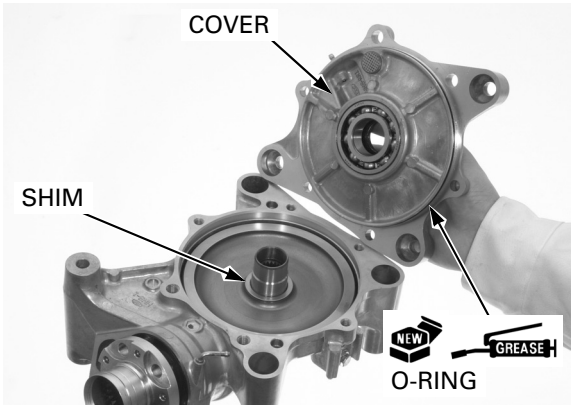


Install the proper ring gear shims onto the ring gear and install them into the gear case.



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.

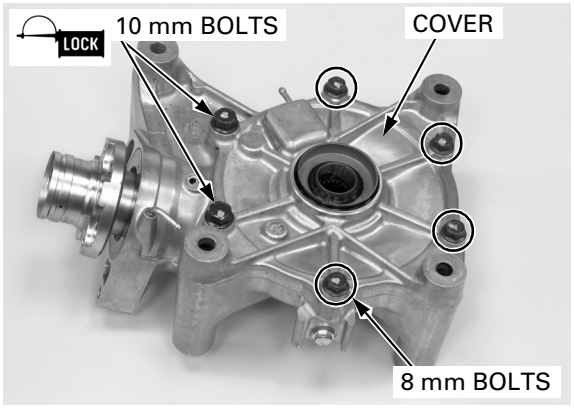
It is important to turn the pinion while tightening the bolts. If the ring gear shim is too thick, the gears will lock after only light tightening.

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:

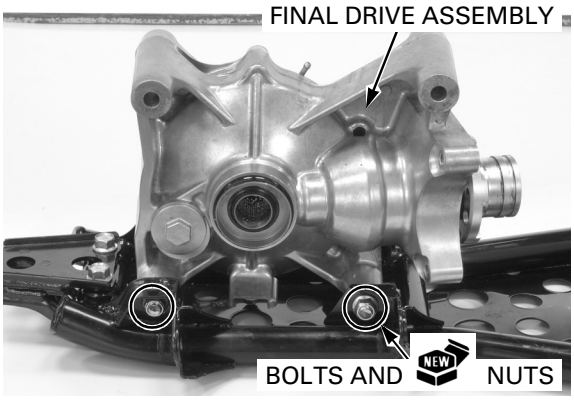
10 mm bolt: 49 N·m (5.0 kgf·m, 36 lbf·ft)
8 mm bolt: 25 N·m (2.6 kgf·m, 19 lbf·ft)

Check that the gear assembly turns smoothly without binding.



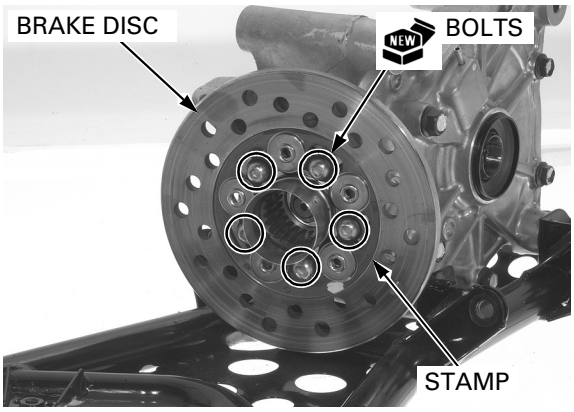
FINAL DRIVE INSTALLATION

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.

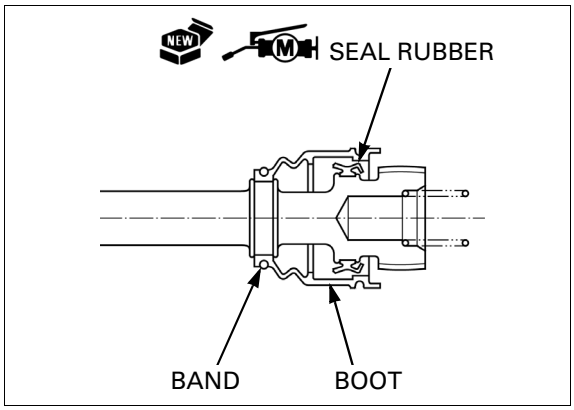
TORQUE: 20 N·m (2.0 kgf·m, 14 lbf·ft)



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.

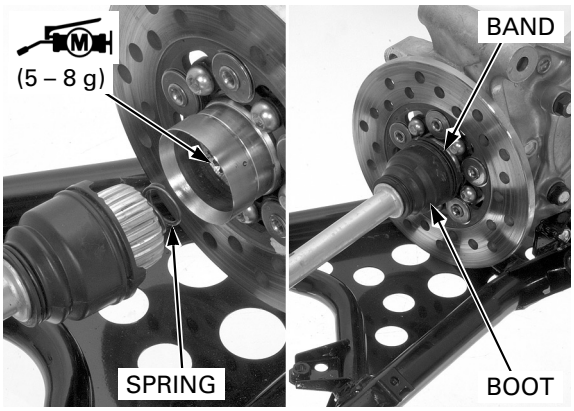
Apply molybdenum disulfide grease to the seal rubber outer surface.



Apply 5 – 8 g of molybdenum disulfide grease to the pinion joint splines.

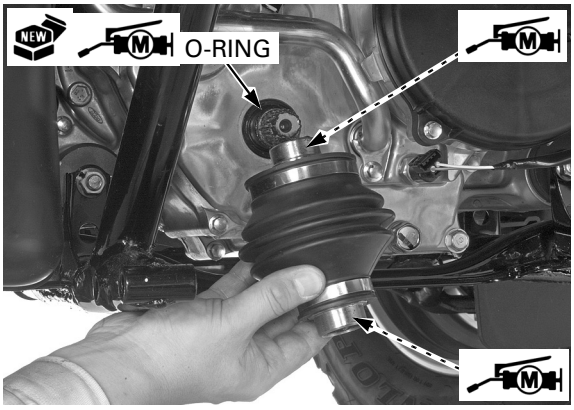
Install the spring into the propeller shaft.
Set the propeller shaft into the pinion joint while compressing the spring, then install the boot over the pinion joint groove securely and secure it with the boot band.

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.

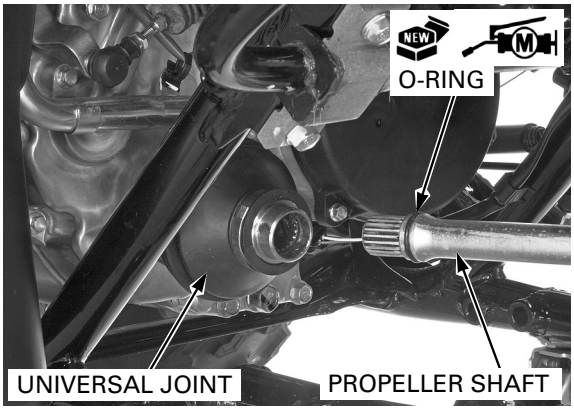
Apply molybdenum disulfide grease to the splines of the both sides in the universal joint and install it onto the output shaft until it is fully seated.



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.

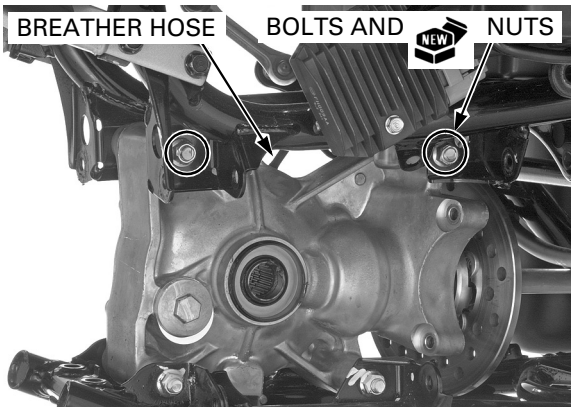
While adjusting the jack height, move the final drive assembly forward and connect the propeller shaft into the universal joint.



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.

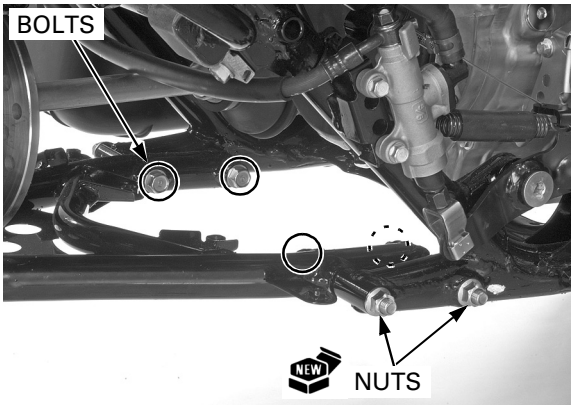
Route the breather hoses properly (page 1-20) and connect them.



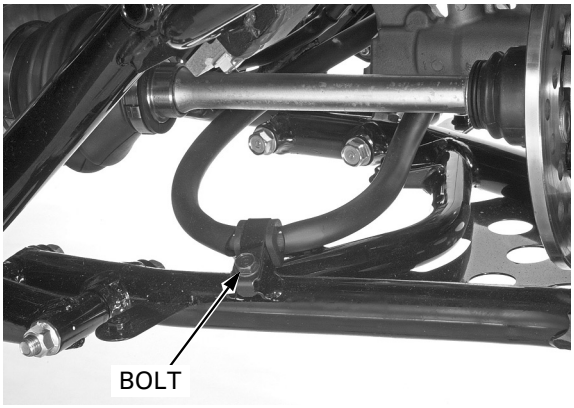
Insert the sub-frame joint bolt bolts from the inside. Install new joint nuts.

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 the brake hose clamp and tighten the brake house clamp bolt securely.



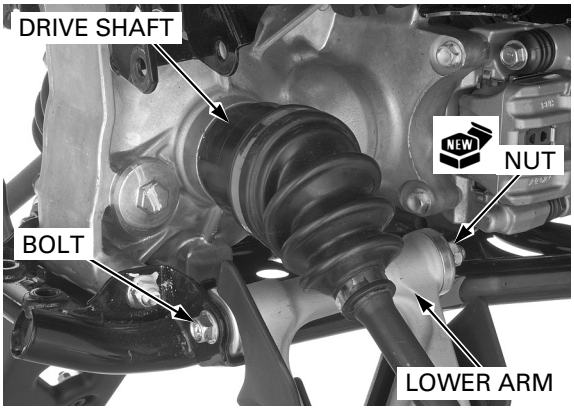
Install each lower arm of the suspension arm/shock absorber assemblies into the frame and insert each pivot bolt from the rear side.
Install new pivot nuts and tighten them.

TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)

Install the following:

– drive shafts (page 19-11)
– brake caliper (page 17-32)
– engine guard (page 3-17)

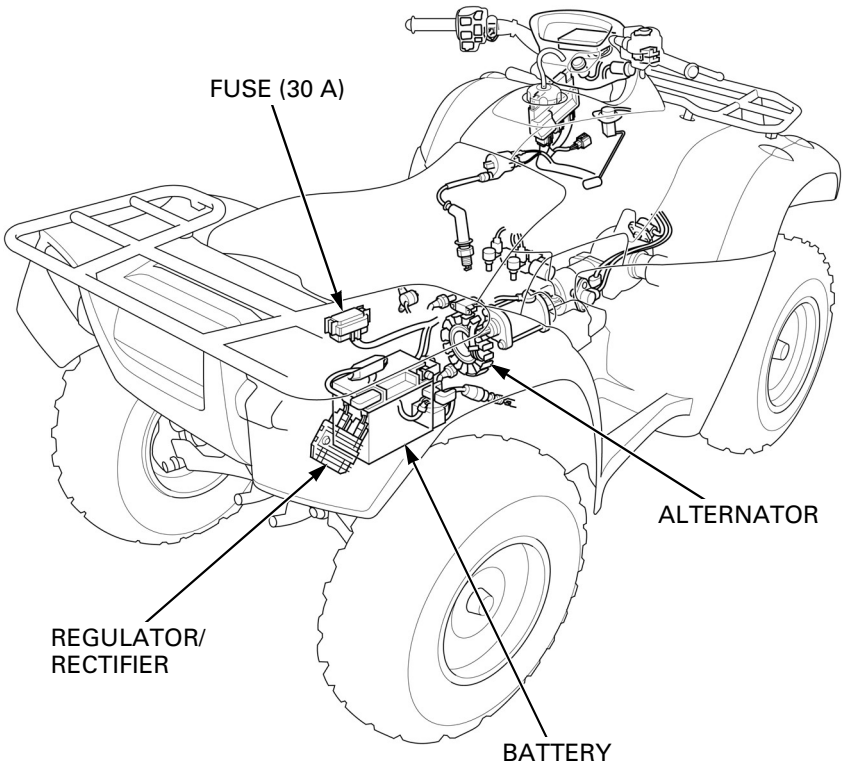
Fill the gear case with the recommended oil (page 4-15).



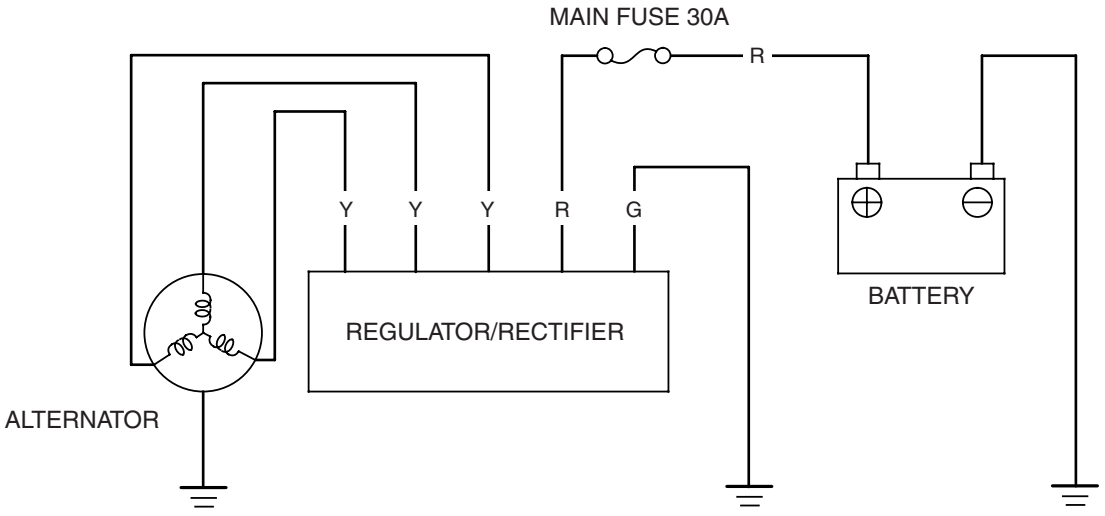
MEMO

20. BATTERY/CHARGING SYSTEM

COMPONENT LOCATION



SYSTEM DIAGRAM



G : GREEN
R : RED
Y : YELLOW

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 20-5).
- For alternator removal/installation (page 11-9).

BATTERY CHARGING

- Turn power ON/OFF at the charger, not at the battery terminal.
- For battery charging, do not exceed the charging current and time specified on the battery. Using excessive current or extending the charging time may damage the battery.
- Quick charging should only be done in an emergency; slow charging is preferred.

BATTERY TESTING

Refer to the instructions in the Operation Manual for the recommended battery tester for details about battery testing. The recommended battery tester puts a "load" on the battery so that the actual battery condition can be measured.

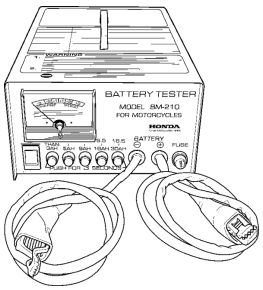
Recommended Battery Tester: BM-210-AH (U.S.A. only), BM-210, BATTERY MATE (MTP08-0192, U.S.A. only) or equivalent

SPECIFICATIONS

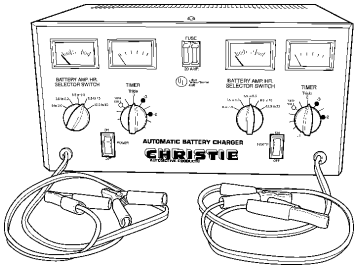
ITEM			SPECIFICATIONS
Battery (YTX20L–BS)	Capacity		12V – 18 Ah
	Current leakage		1 mA maximum
	Voltage (20°C/68°F)	Fully charged	13.0 – 13.2 V
		Needs charging	Below 12.3 V
	Charging current	Normal	1.8 A/5 – 10 h
		Quick	9.0 A/1.0 h
Alternator	Capacity		360 W/5,000 rpm (min^{-1})
	Charging coil resistance (20°C/68°F)		0.1 – 1.0 Ω

TOOLS

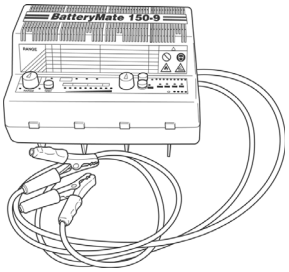
Battery tester
BM-210-AH (U.S.A. only)



Christie battery charger
MC1012/2 (U.S.A. only)



Battery Mate tester/charger
MTP08-0192 (U.S.A only)



TROUBLESHOOTING

BATTERY IS DAMAGED OR WEAK

1. **Battery Test**

   Remove the battery (page 20-6).

   Check the battery condition using the recommended battery tester.

   RECOMMENDED BATTERY TESTER: BM-210-AH (U.S.A. only), BM-210, BATTERY MATE (MTP08-0192, U.S.A. only) or equivalent

   Is the battery in good condition?

   No – Faulty battery

   YES – GO TO STEP 2.

2. **Current Leakage Test**

   Install the battery (page 20-6).

   Check the battery current leakage test (Leak test: page 20-7).

   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 20-8).

   Is the alternator charging coil resistance within 0.1 – 1.0Ω (20°C/68°F)?

   YES – GO TO STEP 5.

   NO – Faulty charging coil

5. **Charging Voltage Inspection**

   Measure and record the battery voltage using a digital multimeter (page 20-6).

   Start the engine.

   Measure the charging voltage (page 20-8).

   Compare the measurements to the results of the following calculation.

   STANDARD: Measured BV < Measured CV < 15.5 V

   - **BV = Battery voltage**
   - **CV = Charging voltage**

   Is the measured charging voltage within the standard voltage?

   YES – Faulty battery

   NO – GO TO STEP 6.

6. **Regulator/Rectifier System Inspection**

   Check the voltage and resistance at the regulator/rectifier connector (page 20-9).

   Are the measurements correct?

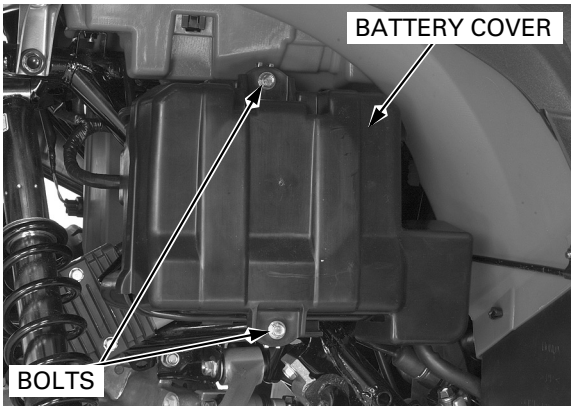
   YES – Faulty regulator/rectifier

   NO – • Open circuit in related wire
   • Loose or poor contacts of related terminal
   • Shorted wire harness

BATTERY

BATTERY REMOVAL/INSTALLATION

Remove the two bolts and the battery cover.

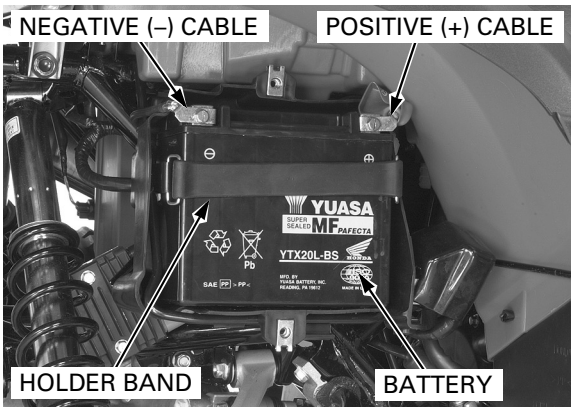


With the ignition switch OFF, disconnect the negative (-) cable first, then disconnect the positive (+) cable by removing each terminal bolt.
Remove the battery holder band.
Remove the battery.

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.



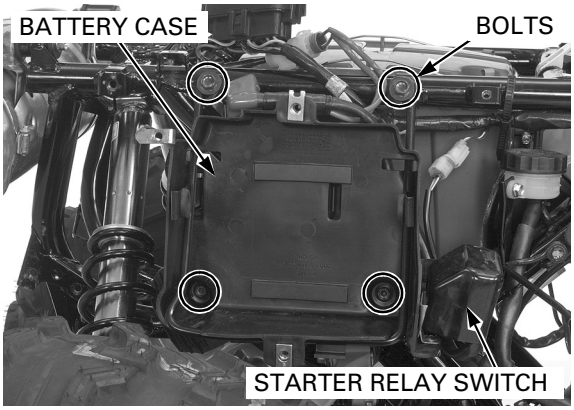
BATTERY CASE REMOVAL/INSTALLATION

Remove the rear fender (page 3-14).

Remove the starter relay switch from the battery case.

Remove the four bolts and battery case.

Installation is the reverse order of removal.



VOLTAGE INSPECTION

Remove the battery cover (page 20-6).

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 20-6).

Refer to the instructions that are appropriate to the battery testing equipment available to you.

TOOL:

Battery tester	**BM-210-AH (U.S.A. only), BM-210, BATTERY MATE (MTP08-0192, U.S.A. only) or equivalent**

BATTERY CHARGING (U.S.A. only)

Remove the battery (page 20-6).

Refer to the instructions that are appropriate to the battery charging equipment available to you.

TOOL:

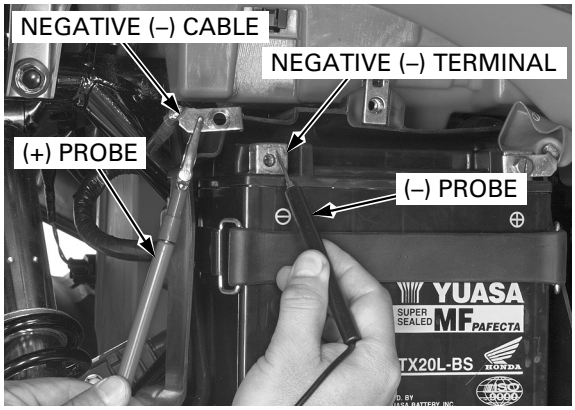
Battery charger	**Christie battery charger (MC1012/2, U.S.A. only), BATTERY MATE (MTP08-0192, U.S.A. only) or equivalent**

CHARGING SYSTEM INSPECTION

CURRENT LEAKAGE INSPECTION

Remove the battery cover (page 20-6).

Turn the ignition switch 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 OFF, check for current leakage.



- When measuring current using a tester, set it to a high range, and then bring the range down to an appropriate level. Current flow higher than the range selected may blow out the fuse in the tester.
- While measuring current, do not turn the ignition switch ON. A sudden surge of current may blow out the fuse in the tester.

SPECIFIED CURRENT LEAKAGE: 1 mA maximum

If current leakage exceeds the specified value, a shorted circuit is likely.
Locate the short by disconnecting connections one by one and measuring the current.

CHARGING VOLTAGE INSPECTION

Remove the battery cover (page 20-6).

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 (min^{-1}).

STANDARD: Measured BV < Measured CV < 15.5 V
BV = Battery voltage (page 20-6)
CV = Charging voltage

ALTERNATOR CHARGING COIL

INSPECTION

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

Disconnect the alternator 5P (Natural) connector. Check the connector for loose contacts or corroded terminals.

Measure the resistance between the Yellow wire terminals of the alternator side connector.

STANDARD: 0.1 – 1.0 Ω (at 20°C/68°F)

Check for continuity between each Yellow wire terminal of the alternator side connector and ground. There should be no continuity.

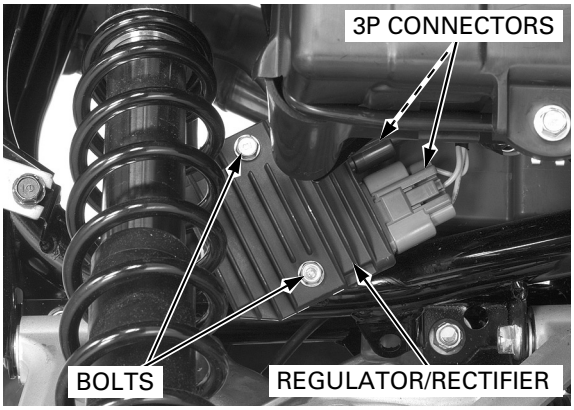
Replace the alternator stator if resistance is out of specification, or if any wire has continuity to ground.

Alternator stator replacement (page 11-9).

REGULATOR/RECTIFIER

WIRE HARNESS INSPECTION

Remove the two bolts and regulator/rectifier.
Disconnect the regulator/rectifier 3P (Gray) and 3P (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.

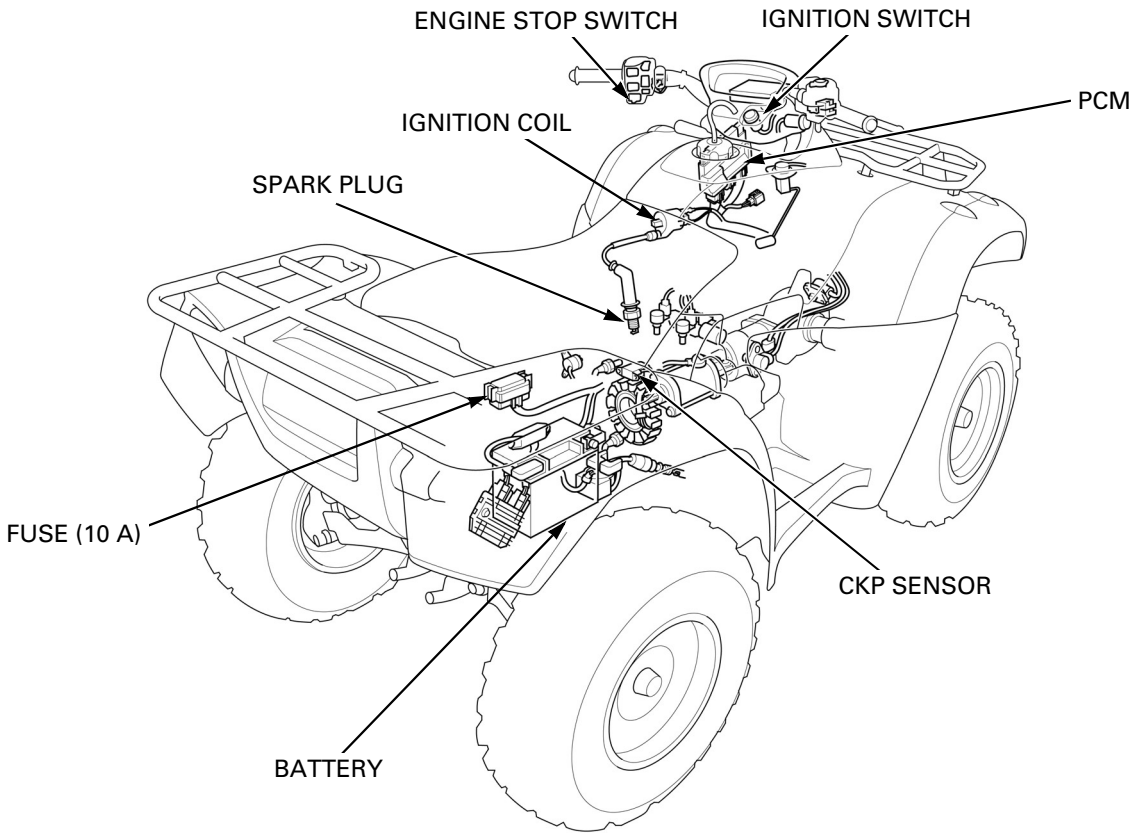
STANDARD: 0.1 – 1.0 Ω (at 20°C/68°F)

Check for continuity between each Yellow wire terminal and ground.
There should be no continuity.

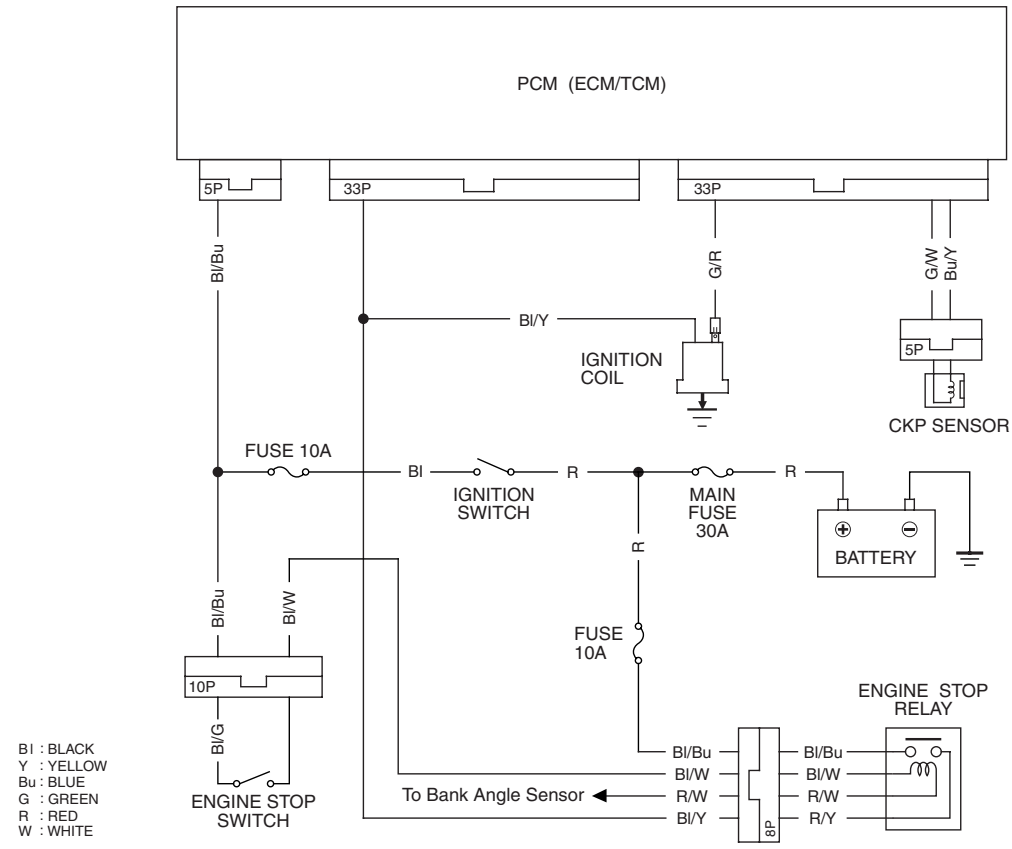
MEMO

21. IGNITION SYSTEM

COMPONENT LOCATION



SYSTEM DIAGRAM



SERVICE INFORMATION

GENERAL

- Some electrical components may be damaged if terminals or connectors are connected or disconnected while the ignition switch is ON and current is present.
- When servicing the ignition system, always follow the steps in the troubleshooting table on page 21-4.
- This ignition system is controlled by PCM.
- The ignition timing cannot be adjusted since the PCM is factory preset.
- The PCM may be damaged if dropped. Also, if the connector is disconnected when current is flowing, the excessive voltage may damage the PCM. 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.
- For CKP sensor removal/installation (page 11-9).
- For ignition switch servicing (page 23-6).
- For engine stop switch inspection (page 23-7).
- For gear position switch servicing (page 14-44).

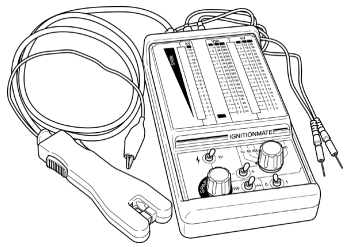
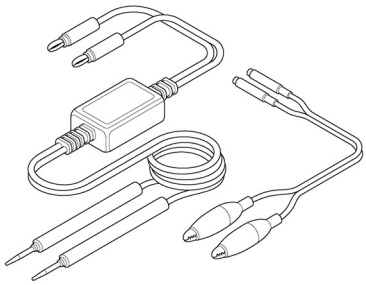
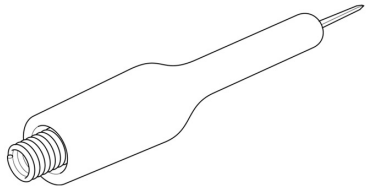
SPECIFICATION

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
CKP sensor peak voltage		0.7 V minimum
Ignition timing ("F" mark)		15° BTDC at idle

TORQUE

Spark plug	22 N·m (2.2 kgf·m, 16 lbf·ft)
Timing hole cap	10 N·m (1.0 kgf·m, 7 lbf·ft)

TOOLS

IgnitionMate peak voltage tester MTP07-0286 (U.S.A. only) 	Peak voltage adaptor 07HGJ-0020100  (not available in U.S.A.) with commercially available digital multimeter (impedance 10 MΩ/DCV minimum) or Imrie diagnostic tester (model 625) (not available in U.S.A.)	Test probe 07ZAJ-RDJA110 

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 Powertrain Control Module (PCM) (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 PCM connectors. 5. No voltage at the Black/white (power source) wire of the PCM. 6. Open circuit or poor connection in the Green (ground) wire of the PCM. 7. Faulty peak voltage adaptor. 8. Faulty CKP sensor (Measure peak voltage) 9. Faulty PCM (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.
CKP sensor	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 CKP sensor (when above No. 1 through 3 are normal).
	No peak voltage.	1. Faulty peak voltage adaptor. 2. Faulty CKP sensor

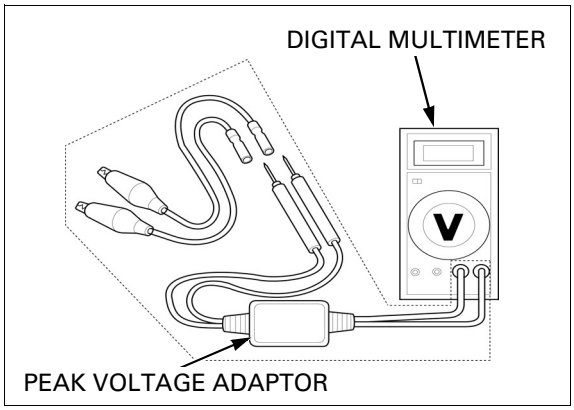
IGNITION SYSTEM INSPECTION

PEAK VOLTAGE CONNECTION

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 MΩ/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:

U.S.A. and Canada type:

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)
Imrie diagnostic tester (model 625) (not available in U.S.A.)

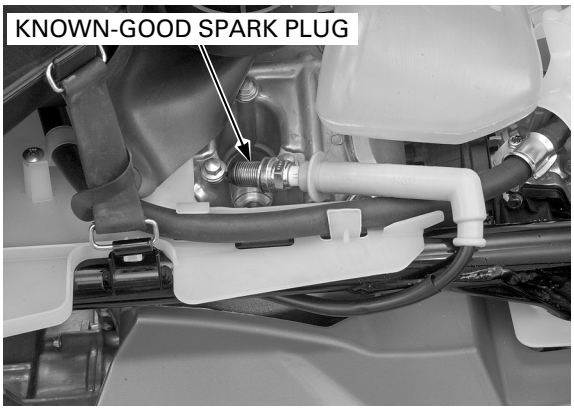
IGNITION COIL PRIMARY PEAK VOLTAGE

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 6-39).

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.



With the connector connected, connect the peak voltage tester or adaptor probes to the ignition coil primary terminal and body ground.

CONNECTION: Green/red (–) – Body ground (+)

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

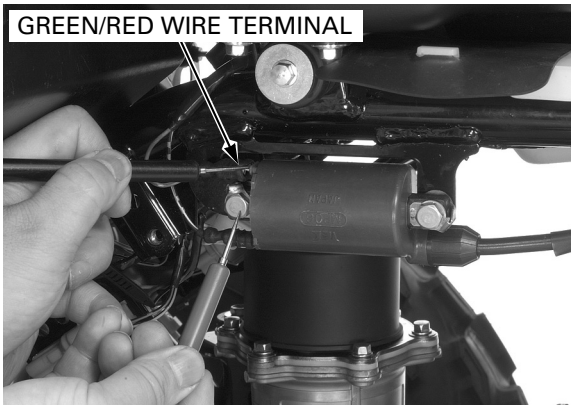
Shift the transmission into neutral.

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 (page 21-4).



CKP SENSOR PEAK VOLTAGE

NOTE:

- Check that the cylinder compression is normal and the spark plug is installed correctly in the cylinder head.

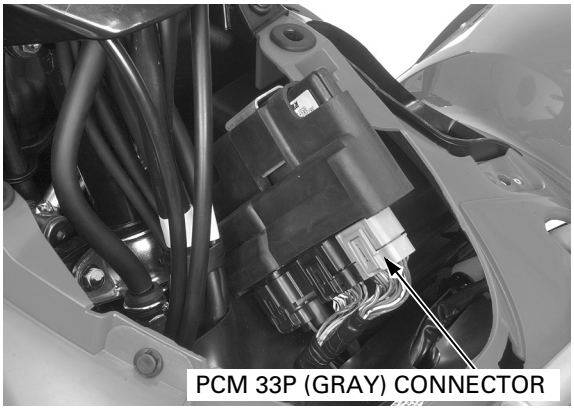
Remove the steering cover (page 3-5).

Seal the PCM connector with tape to prevent dirt and oil from entering the connector after disconnecting the 33P connector.

Disconnect the 33P (Gray) connector from the Powertrain Control Module (PCM).

NOTE:

- When reconnecting the PCM 33P (Gray) connector, check that there is no dirt and oil in the connector.



Be careful not to bend the connector terminals.

Connect the peak voltage tester or adaptor probes to the Blue/yellow and Green/white terminals of the wire harness side 33P (Gray) connector.

TOOL:

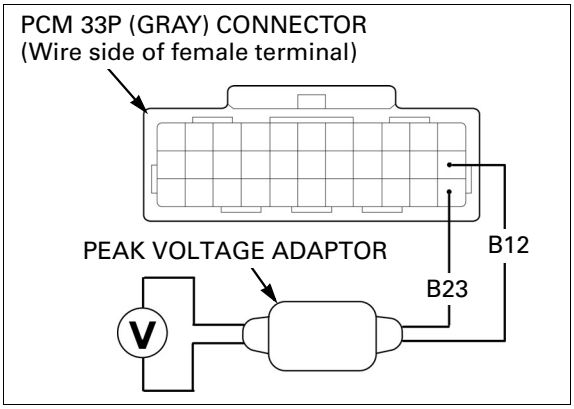
Test probe	**07ZAJ-RDJA110**

CONNECTION: B23 (+) – B12 (–)

Shift the transmission into neutral.
Turn the ignition switch ON.
Crank the engine with the starter motor and read the CKP sensor peak voltage.

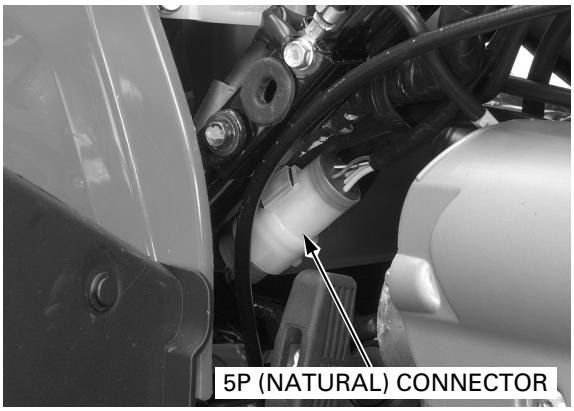
PEAK VOLTAGE: 0.7 V minimum

If the voltage measured at the PCM connector is abnormal, measure the peak voltage at the alternator connector.



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

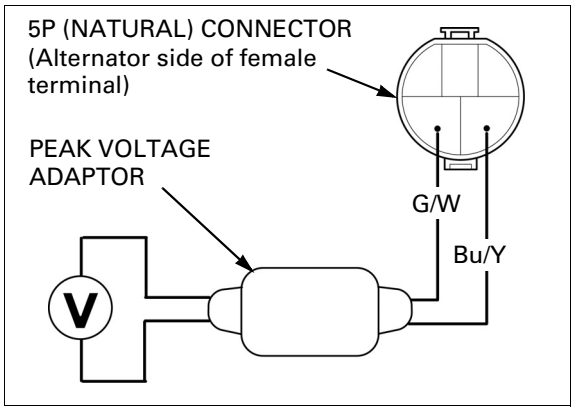
Disconnect the alternator 5P (Natural) connector and connect the peak voltage tester or adaptor probes to the Blue/yellow and Green/white wire terminals of the alternator side connector.



In the same manner as at the PCM connector, measure the peak voltage and compare it to the voltage measured at the PCM connector.

- If the peak voltage measured at the PCM connector is abnormal and the one measured at the alternator connector is normal, the Blue/yellow or Green/white 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 21-4).

If the CKP sensor is faulty, replace the stator/CKP sensor assembly (page 11-11).

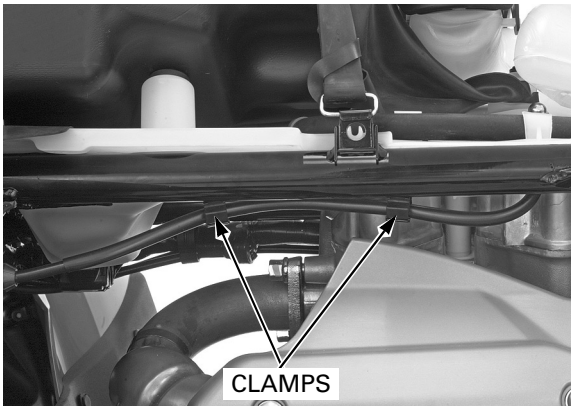


IGNITION COIL

REMOVAL/INSTALLATION

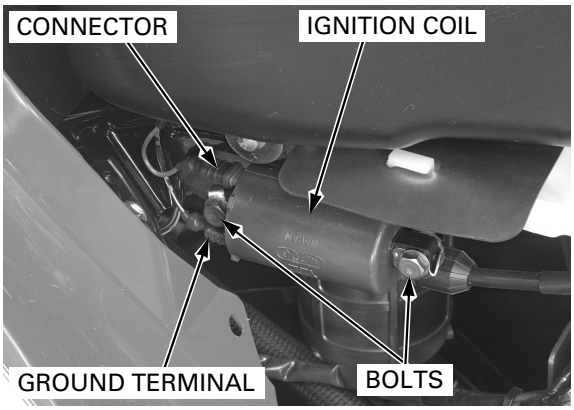
Remove the left side cover (page 3-6).

Disconnect the plug cap from the plug and free the spark plug wire from the clamps.



Disconnect the ignition coil primary wire connector. Remove the two mounting bolts, ground terminal and the ignition coil.

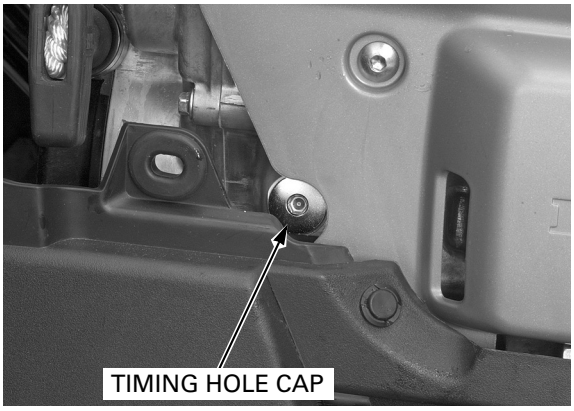
Installation is in the reverse order of removal.



IGNITION TIMING

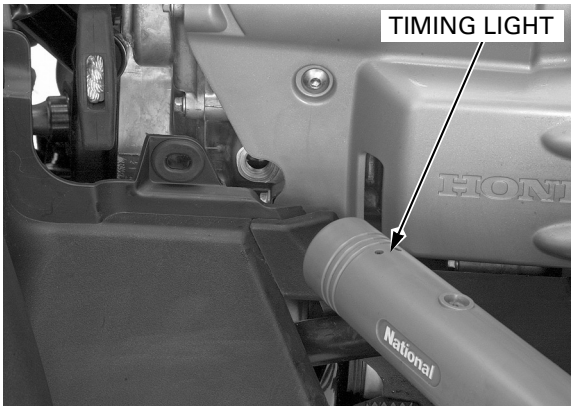
Remove the right side cover (page 3-6).

Start the engine and warm it up to operating temperature.
Stop the engine and remove the timing hole cap from the rear crankcase cover.



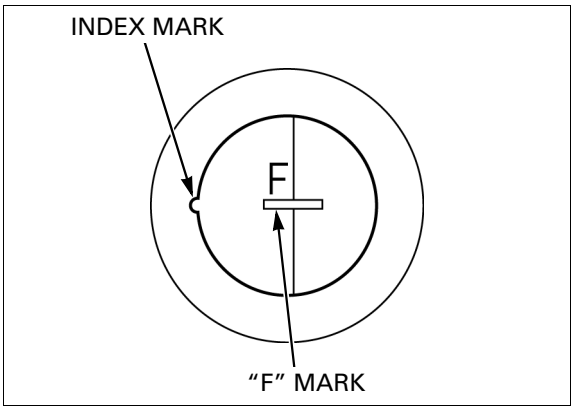
Connect the timing light and tachometer.

Start the engine, let it idle 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.

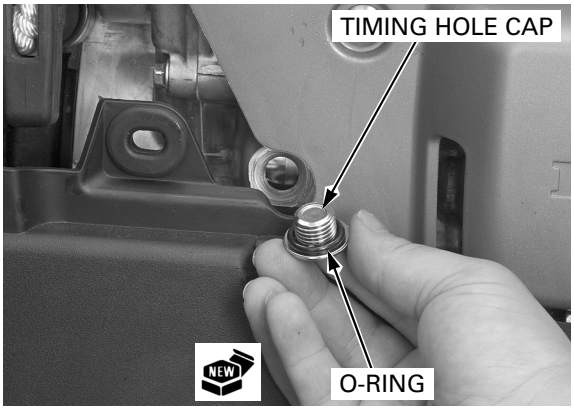


Coat a new O-ring with oil and install it onto the timing hole cap.

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

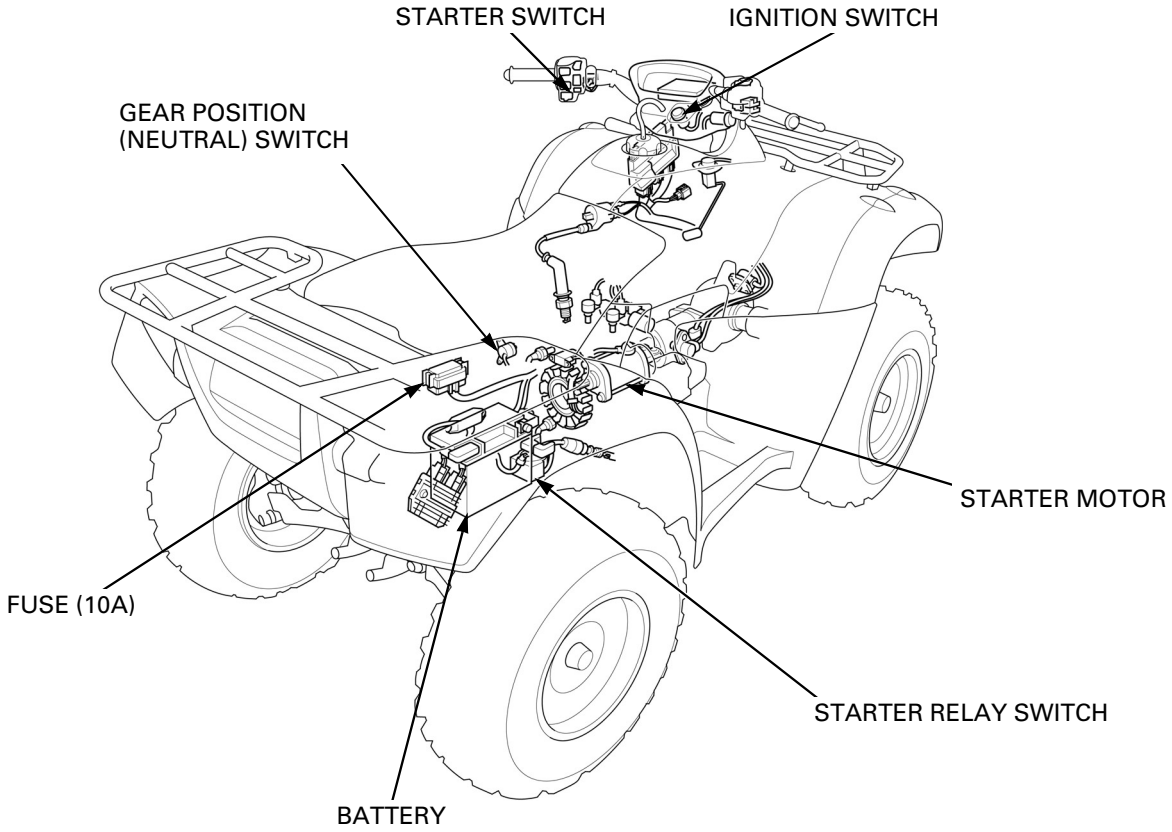
TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

Install the right side cover (page 3-6).

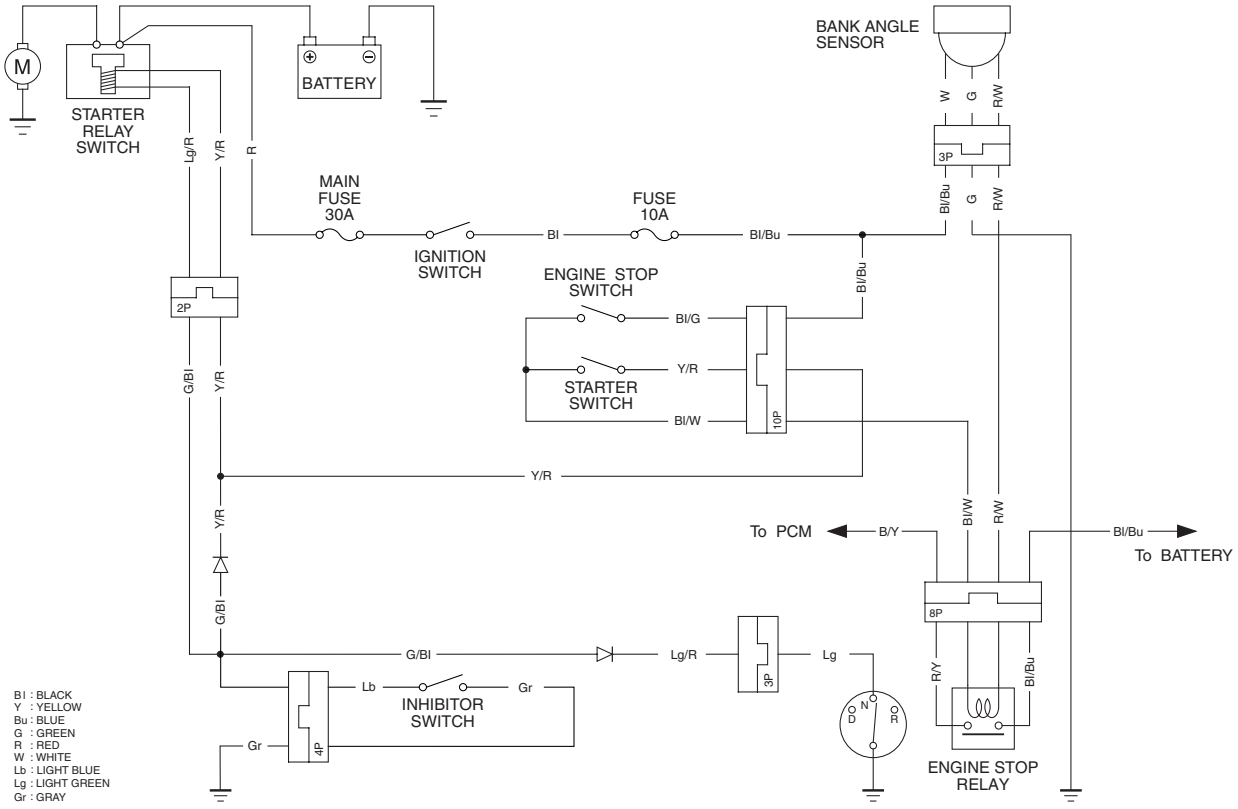


22. ELECTRIC STARTER

COMPONENT LOCATION



SYSTEM DIAGRAM



SERVICE INFORMATION

GENERAL

- Always turn the ignition switch OFF before servicing the starter motor. The motor could suddenly start, causing serious injury.
- 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 22-4).
- 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.
- For starter clutch servicing (page 11-9).
- For ignition switch information (page 23-6).
- For engine stop switch and starter switch inspection (page 23-7).
- For front brake switch inspection (page 23-20).
- For gear position switch information (page 14-44).

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 "○" before starting the engine. The starter motor does not operate with the engine stop switch turned 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 20-7).

3. **Starter Relay Switch Operation Inspection**

   Check the operation of the starter relay switch (page 22-12).

   Does the starter relay switch click?

   YES – GO TO STEP 4.

   NO – GO TO STEP 5.

4. **Starter Motor Inspection**

   Turn the ignition switch 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 22-13).

   NO – Faulty starter motor (page 22-6).

5. **Relay Coil Ground Line Inspection**

   Turn the ignition switch OFF.
   Check the ground line of the starter relay switch (page 22-13).

   Is the ground line normal?

   NO –
   - Faulty gear position switch (page 14-44).
   - Faulty diode (page 22-14).
   - Faulty front brake switch (page 23-20).
   - 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 22-13).

   Is the power input line normal?

   NO –
   - Faulty ignition switch (page 23-6).
   - Faulty engine stop switch (page 23-7).
   - Faulty starter switch (page 23-7).
   - 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 22-13).

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

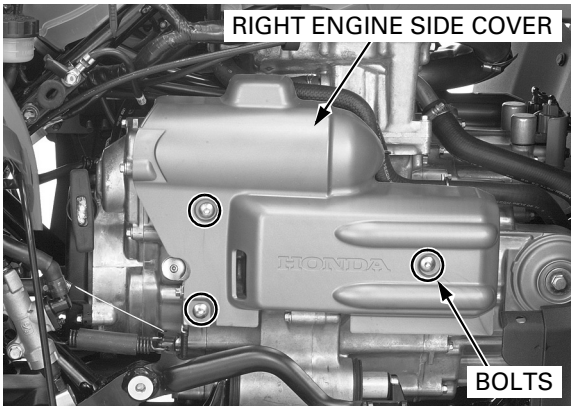
REMOVAL

Remove the following:

– right side cover (page 3-5)
– right center mud guard (page 3-7)

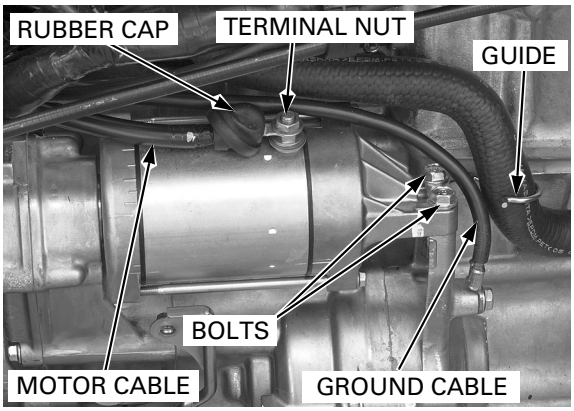
Disconnect the negative (–) cable from the battery (page 20-6).

Remove the three bolts and the right engine side cover.

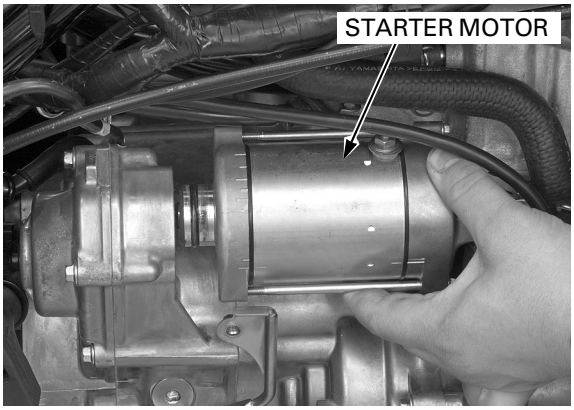


Slide the rubber cap off the starter motor cable terminal and remove the terminal nut and starter motor cable.

Remove the two mounting bolts and hose guide.
Remove the bolt and ground cable from the engine.

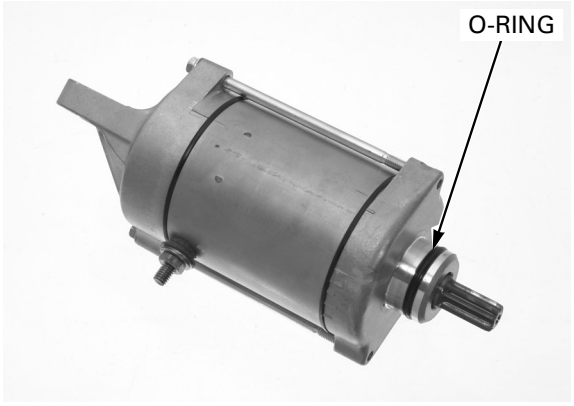


Pull out the starter motor.

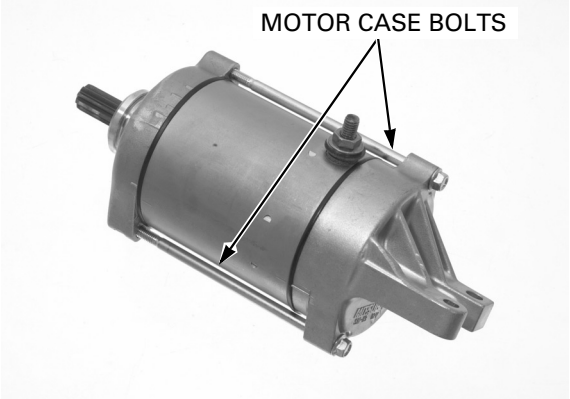


DISASSEMBLY/INSPECTION

Remove the O-ring from the starter motor.



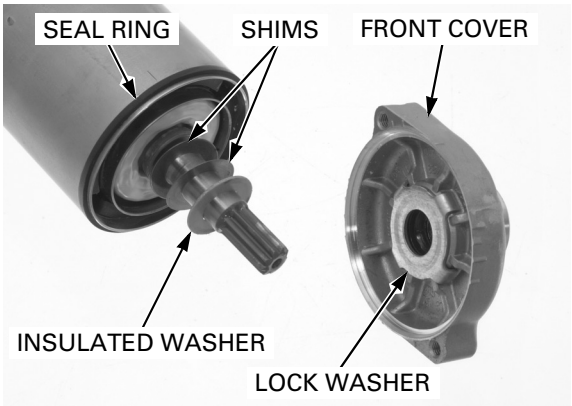
Remove the starter motor case bolts.



Record the location and number of shims.

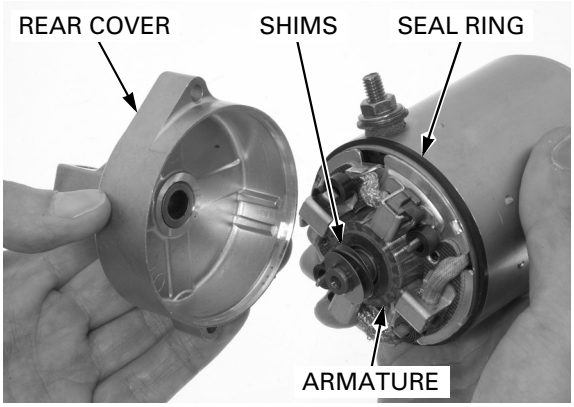
Remove the following:

- front cover
- lock washer
- insulated washer
- shims
- seal ring



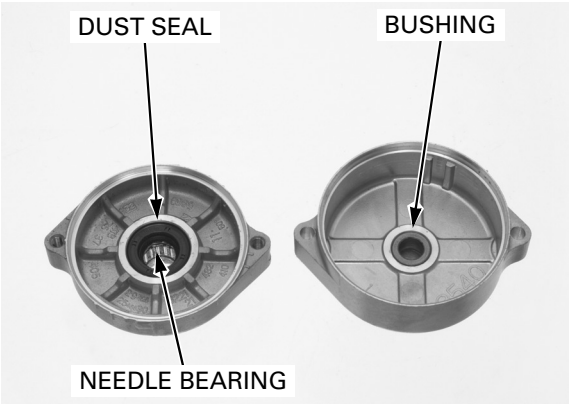
Record the location and number of shims.

- rear cover
- shims
- seal ring
- armature



Check the oil seal and needle bearing in the front cover for deterioration, wear or damage.

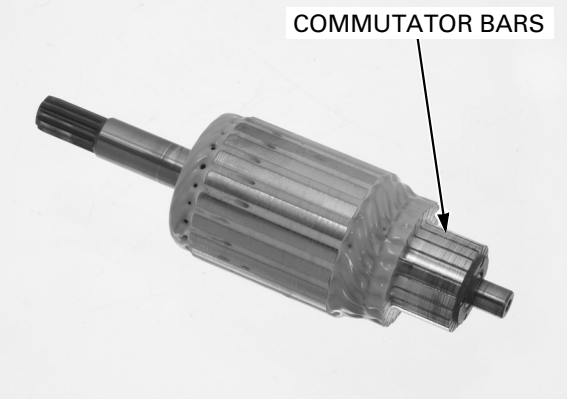
Check the bushing in the rear cover for wear or damage.



Check the commutator bars of the armature for discoloration.

NOTE:

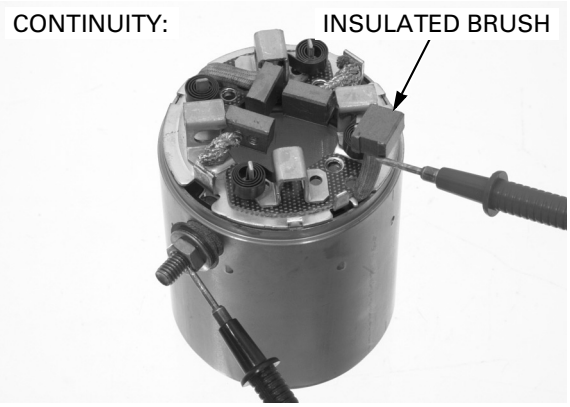
- Do not use emery or sand paper on the commutator.



Check for continuity between pairs of commutator bars.
There should be continuity.

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.



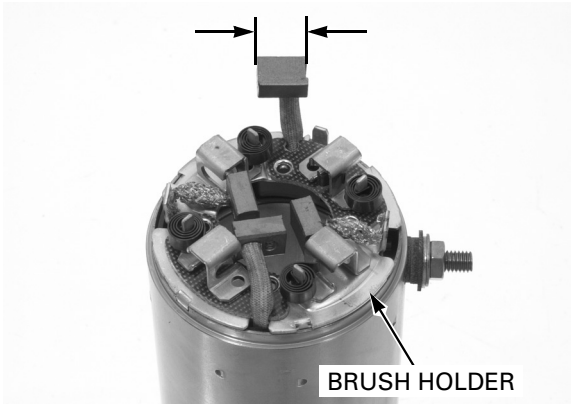
Check for continuity between the insulated brush and motor case.
There should be no continuity.

Measure the brush length.

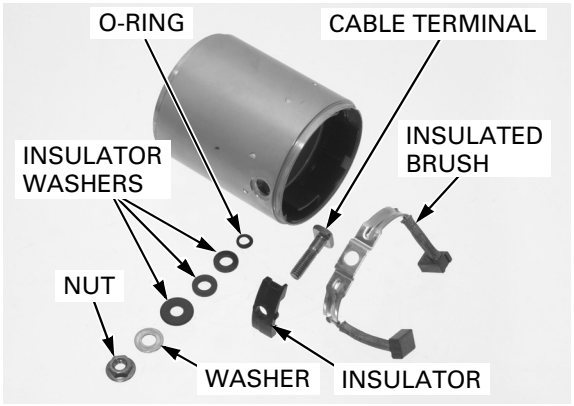
SERVICE LIMIT: 6.5 mm (0.26 in)

Remove the following if necessary:

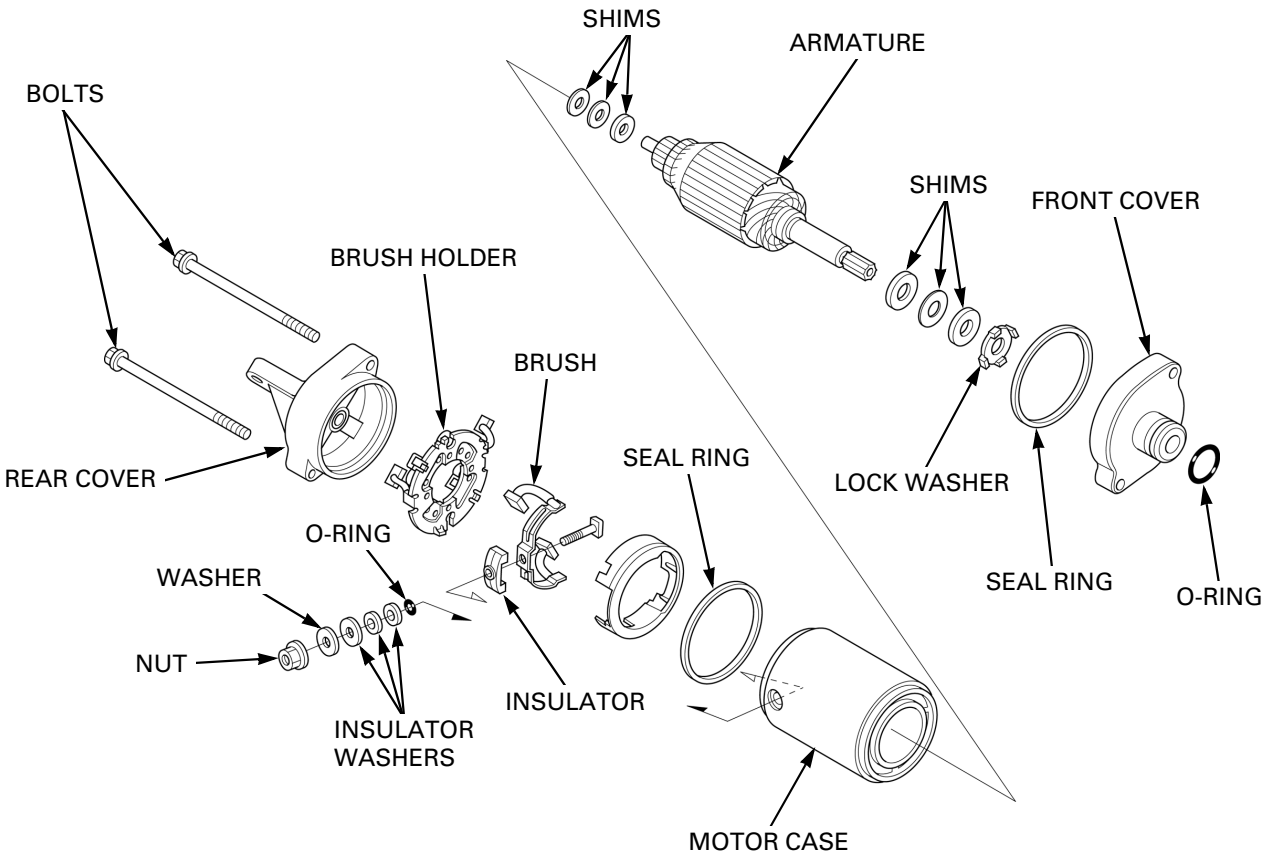
– brush holder



– nut
– washer
– insulator washers
– O-ring
– cable terminal
– insulated brush
– insulator

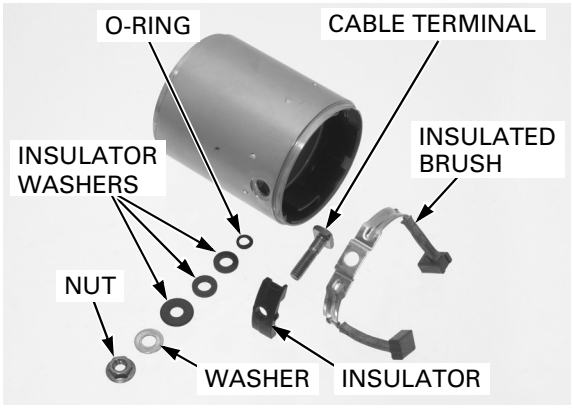


ASSEMBLY

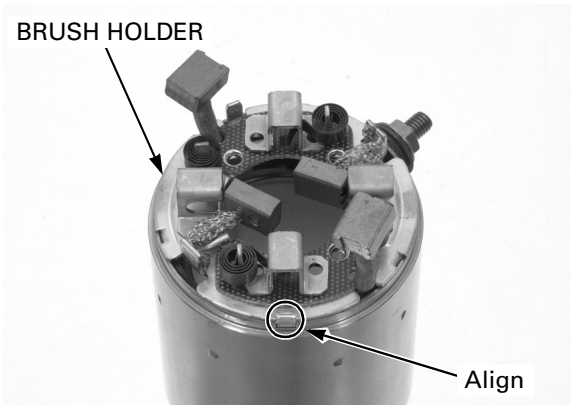


Install the following:

- insulator
- insulated brush
- cable terminal
- O-ring
- insulator washers
- washer
- nut



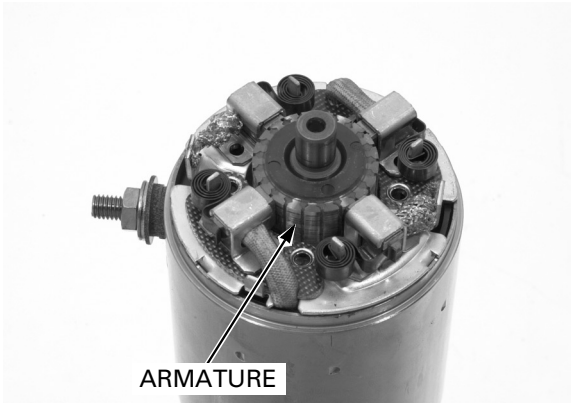
Install the brush holder, aligning the holder tab with the case groove, and the holder grooves with the insulated brush wires.



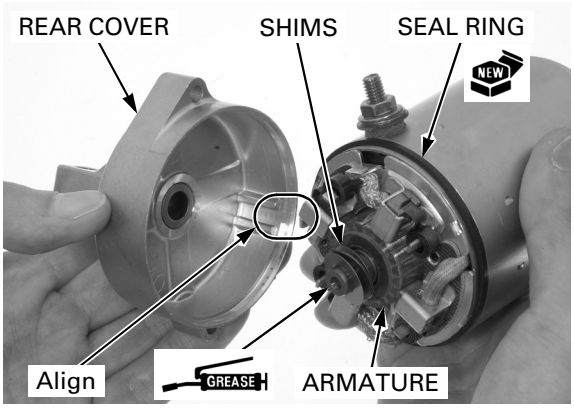
Push and hold the brushes inside the brush holder, and install the armature through the motor case and brush holder.
When installing the armature into the motor case, hold the armature tightly to keep the magnet of the case from pulling the armature against it.

NOTICE

The coil may be damaged if the magnet pulls the armature against the case.

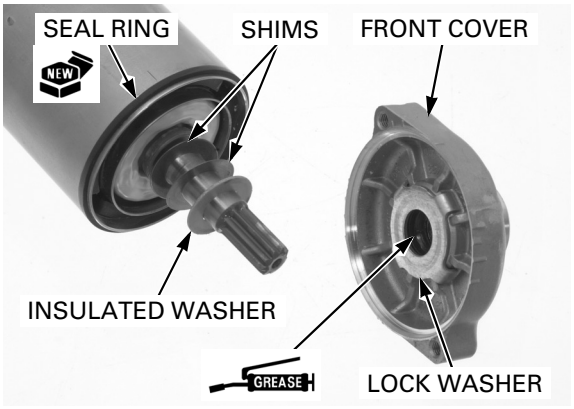


Install the same number of shims in the same location as noted during removal.
Install a new seal ring onto the motor case.
Apply a thin coat of grease to the armature shaft end.
Install the rear cover, aligning its groove with the brush holder tab.



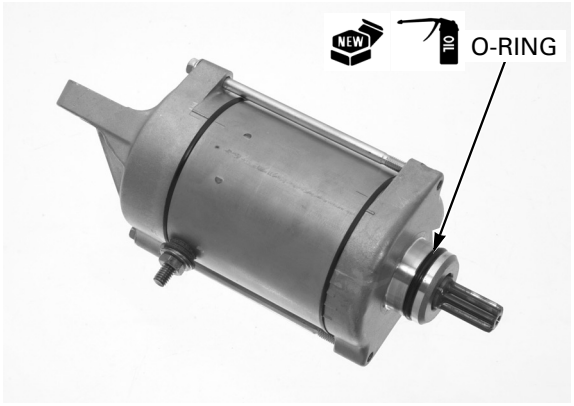
Install the shims properly as noted during removal.

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.

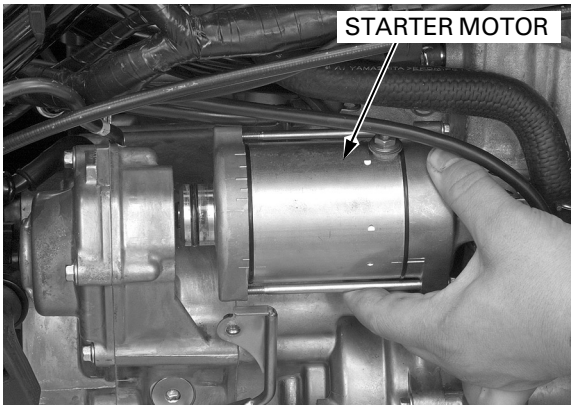


INSTALLATION

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.

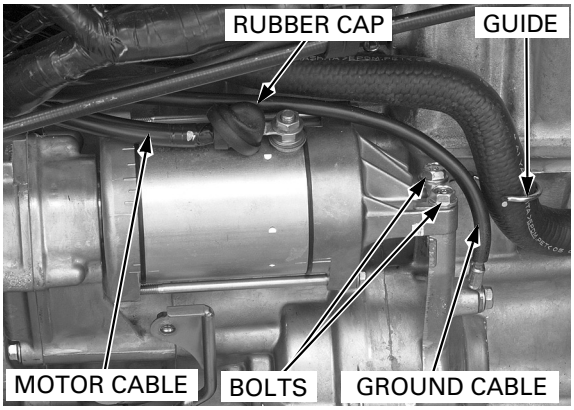


Install the hose guide and mounting bolts, then tighten the bolts securely.

Route the ground cable and tighten the bolt.

Install the starter motor cable and terminal nut, and tighten the nut.

Install the rubber cap over the cable terminal.

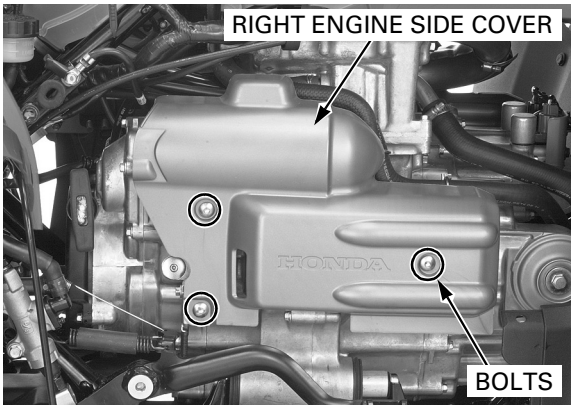


Install the right engine side cover and tighten the three bolts securely.

Connect the battery negative (–) cable (page 20-6).

Install the following:

– right center mud guard lid (page 3-7)
– right side cover (page 3-5)



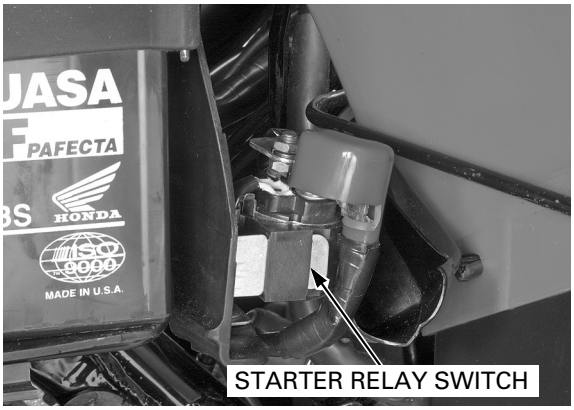
STARTER RELAY SWITCH

OPERATION INSPECTION

Remove the battery cover (page 20-6).

Shift the transmission into neutral.
Make sure the engine stop switch is turned "○."
Turn the ignition switch ON and push the starter switch.
The coil is normal if the starter relay switch clicks.

If you don't hear the switch click, and inspect the relay switch circuits (page 22-13).



CIRCUIT INSPECTION

Remove the rear fender (page 3-14).

Disconnect the starter relay switch 2P (Natural) connector.

GROUND LINE

Check for continuity between the Green/black wire terminal of the wire harness side connector and ground.

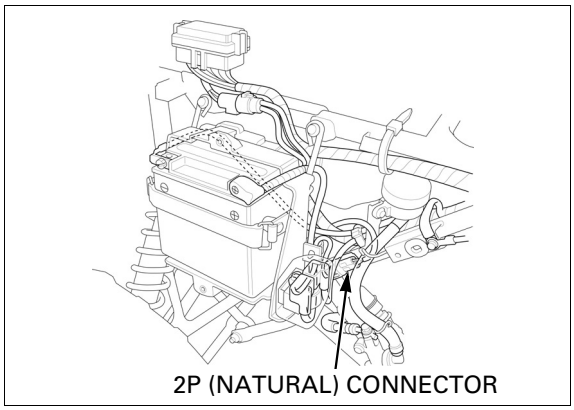
If there is continuity when the transmission is in neutral or when the transmission is in drive and the front brake lever is squeezed, the ground circuit is normal.

POWER INPUT LINE

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

Measure the voltage between the Yellow/red wire terminal (+) of the wire harness side connector and ground.

If the battery voltage appears only when the starter switch is pushed, the circuit is normal.



FUNCTION INSPECTION

Remove the following:

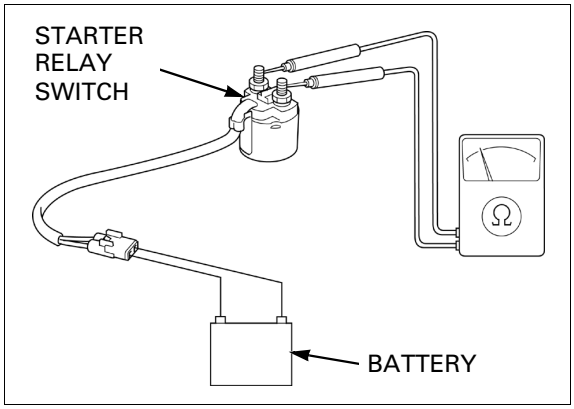
– rear fender (page 3-14)
– battery cover (page 20-6)

Disconnect the negative (–) cable from the battery (page 20-6).

Disconnect the starter relay switch 2P (Natural) connector.
Remove the battery (+) cable and starter motor cable from the starter relay switch and ground (–).

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.

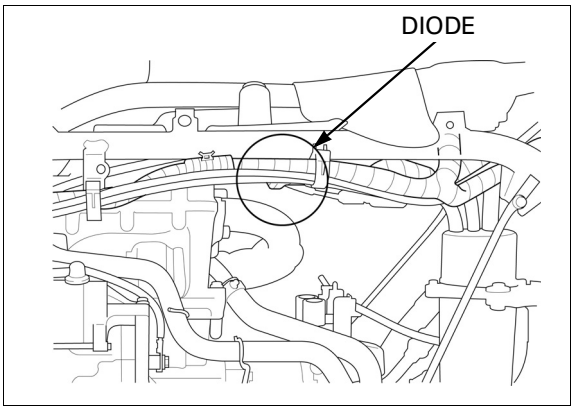


DIODE

INSPECTION

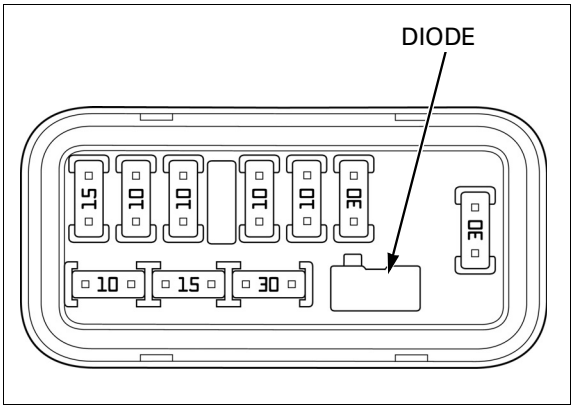
Remove the fuel tank (page 6-39).

Remove the diode from the wire harness.

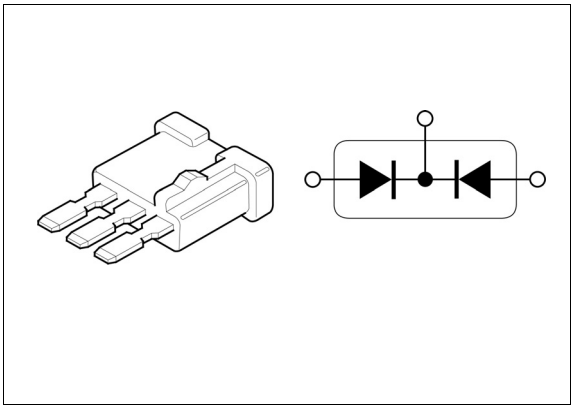


Remove the seat (page 3-4).

Remove the diode from the fuse box.

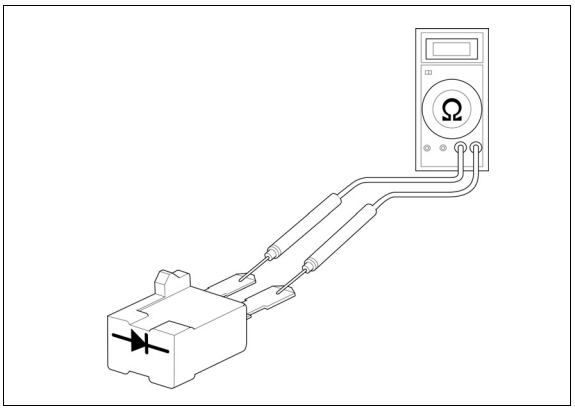


Check for continuity between the diode terminals.



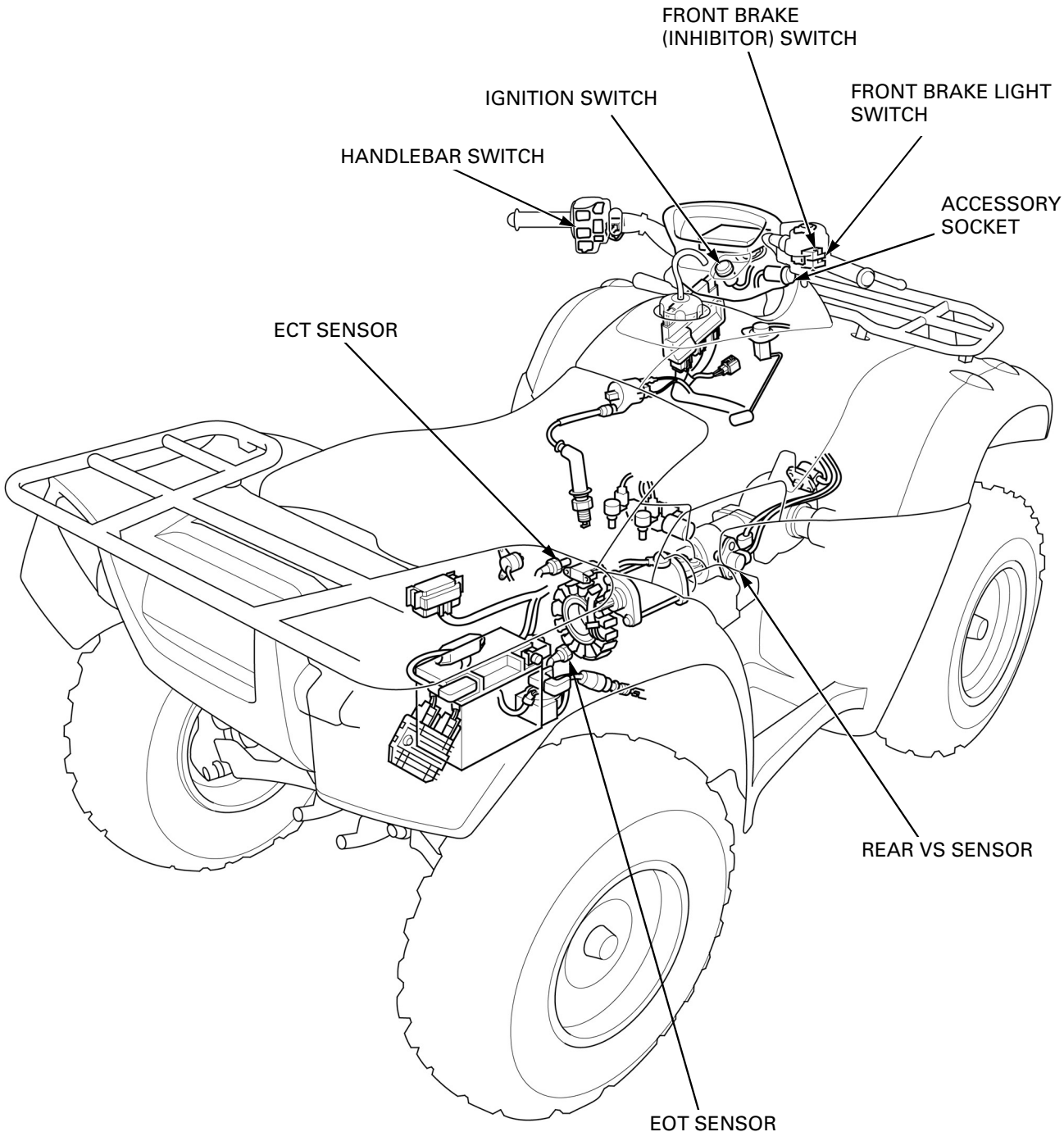
When there is continuity, a small resistance value will register.

If there is continuity in one direction, the diode is normal.



23. LIGHTS/METERS/SWITCHES

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

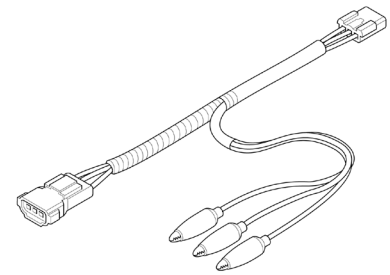
ITEM		SPECIFICATIONS
Bulb	Headlight	12V-40/40 W x 2
	Brake/taillight	12V-21/5 W x 2
	Neutral indicator	LED
	Reverse indicator	LED
	4WD indicator	LED
	Coolant/engine oil temperature indicator	LED
	MIL (PGM-FI indicator)	LED
	Meter light	LED x 10
Fuse	Main	30 A x 2
	Sub-fuse	15 A x 1, 10 A x 4

TORQUE VALUES

ECT sensor	12 N·m (1.2 kgf·m, 9 lbf·ft)	Apply sealant to the threads.
EOT sensor	12 N·m (1.2 kgf·m, 9 lbf·ft)	

TOOLS

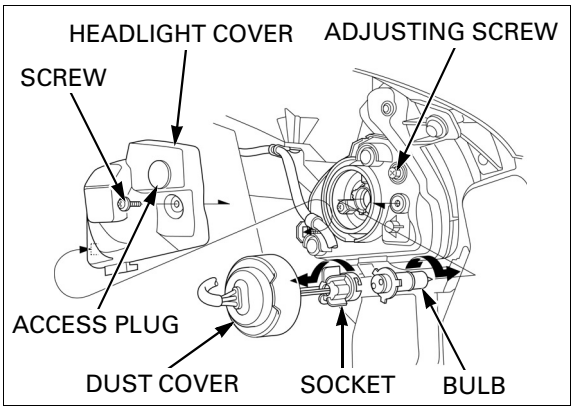
Inspection adaptor
07GMJ-ML80100



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

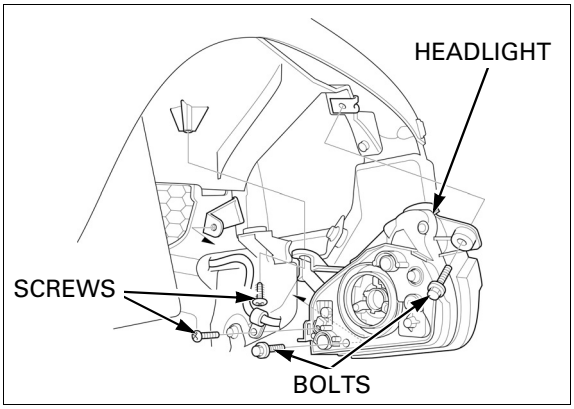
Remove the headlight bulb socket (page 23-4).

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.

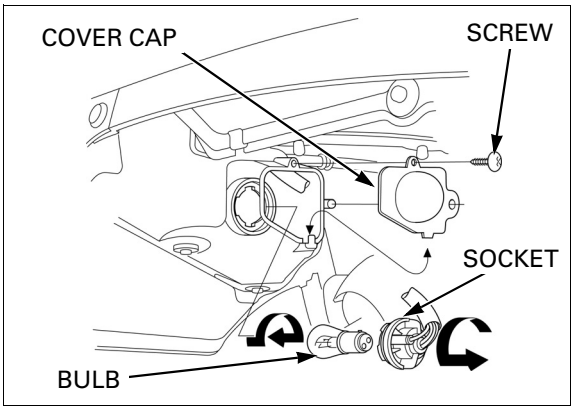


TAILLIGHT

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.

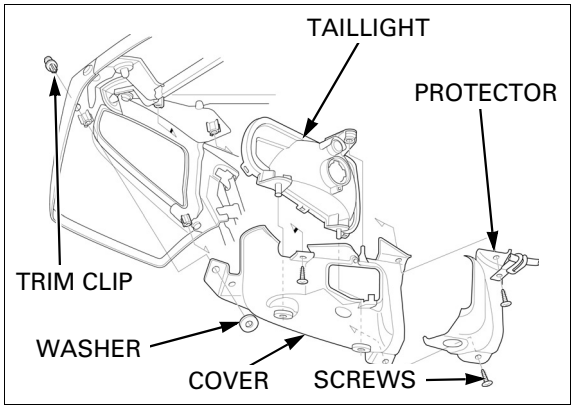
REMOVAL/INSTALLATION

Remove the taillight bulb socket (page 23-4).

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.



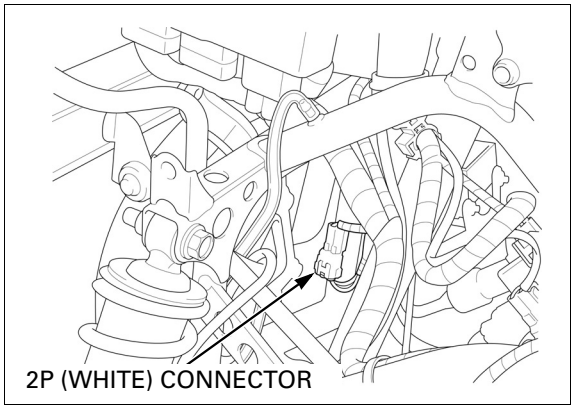
ACCESSORY SOCKET

INSPECTION

Remove the right inner fender (page 3-9).

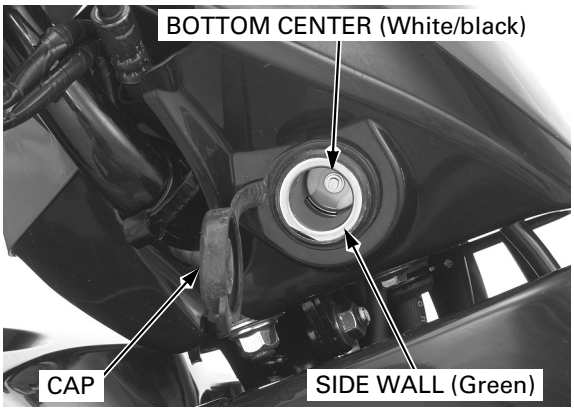
Remove the accessory socket 2P (White) connector from the frame and disconnect it.

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

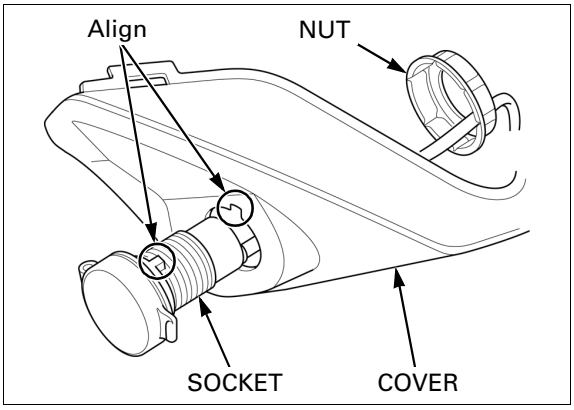
Remove the meter lower cover (page 3-18).
Disconnect the accessory socket 2P (White) connector (page 23-5).

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 1-20).

Install the removed parts in the reverse order of removal.



IGNITION SWITCH

INSPECTION

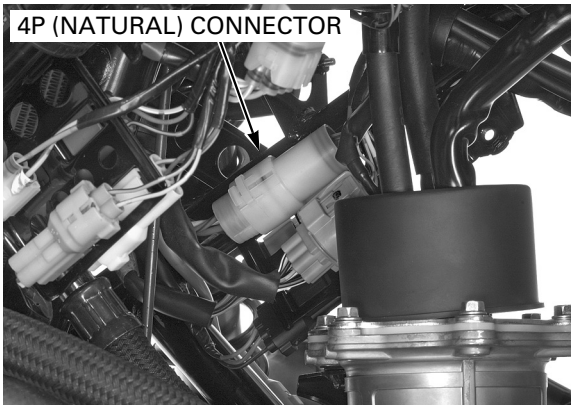
Remove the right inner fender (page 3-9).

Remove the ignition switch 4P (Natural) 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	O—O		O—O	
OFF				



REPLACEMENT

Remove the meter upper cover (page 3-18).
Disconnect the ignition switch 4P (Natural) connector (page 23-6).

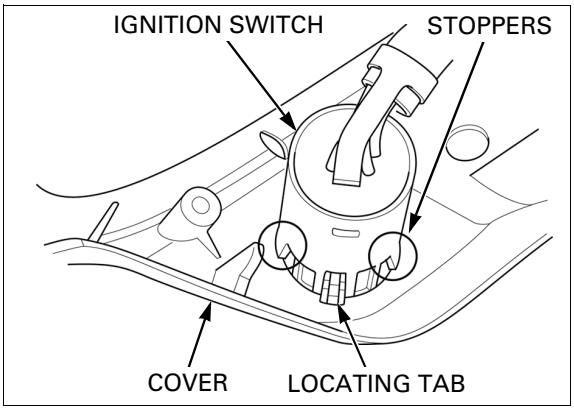
Release the ignition switch wire from the wire clip on the steering shaft holder.

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.

Route the ignition switch wire properly (page 1-20).

Install the removed parts in the reverse order of removal.

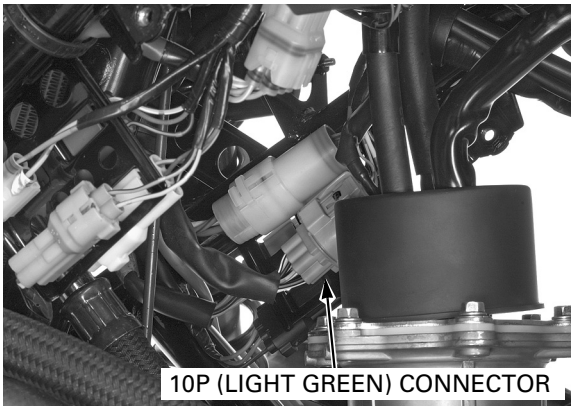


HANDLEBAR SWITCH

INSPECTION

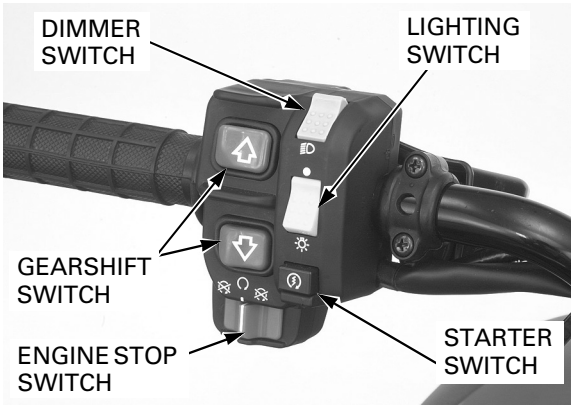
Remove the right inner fender (page 3-9).

Remove the handlebar switch 10P (Light green) connector from the frame and disconnect it.



For gearshift switch inspection (page 14-45).

Check for continuity between the switch side connector terminals in each switch position.
Continuity should exist between the color coded wires as shown below:



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	○	○

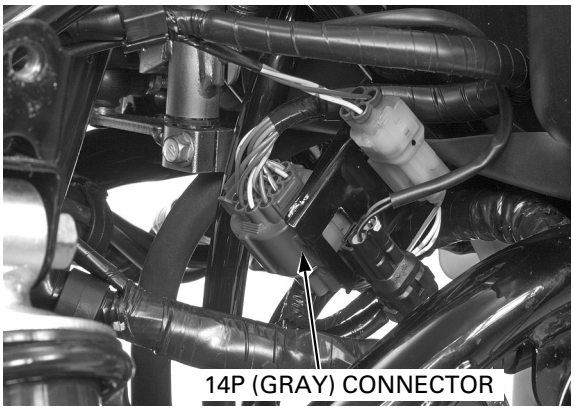
COMBINATION METER/REAR VS SENSOR

POWER/GROUND LINE INSPECTION

Remove the left inner fender (page 3-9).

Remove the combination meter 14P (Gray) connector from the frame and disconnect it.

Check the following at the wire harness side connector.



POWER INPUT LINE

Measure the voltage between the Black/blue wire terminal (+) and ground (–).
There should be battery voltage with the ignition switch turned ON.
If there is no voltage, check for an open circuit in the wire harness.

BACK-UP VOLTAGE LINE

Measure the voltage between the Red/black wire terminal (+) and ground (–).
There should be battery voltage at all times.
If there is no voltage, check for an open circuit in the wire harness.

GROUND LINE

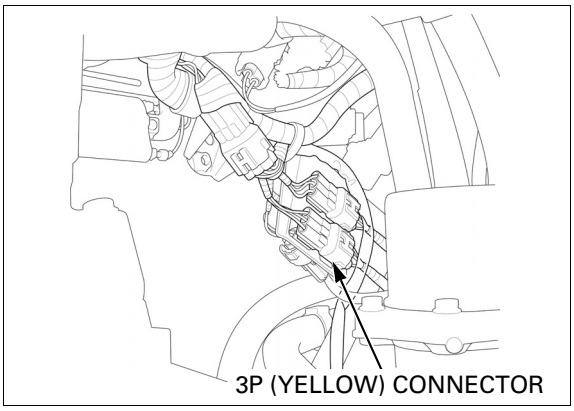
Check for continuity between the Green wire terminal and ground.
There should be continuity at all times.
If there is no voltage, check for an open circuit in the wire harness.

SPEEDOMETER/REAR VS SENSOR

Check there is no DTC before the speedometer rear VS sensor inspection. If there is any DTC, refer to the PGM–FI troubleshooting (page 6-13).

Check that the hour meter and odometer/trip meter function properly.

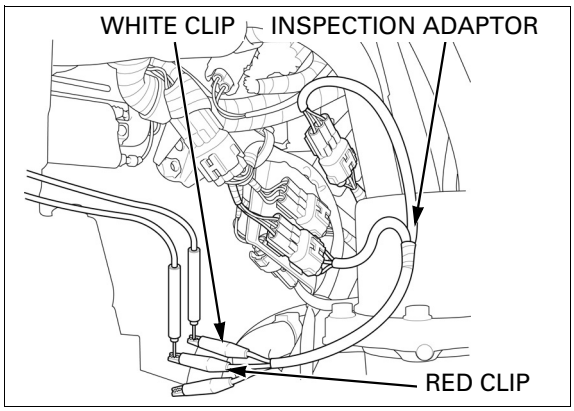
- If they do not function, check the power/ground line (page 23-8).
- If they function properly, check as follows:



Remove the left inner fender (page 3-9).

Remove the rear VS sensor 3P (Yellow) connector from the frame and disconnect it.
Measure the voltage between the Black/pink (+) and Green (–) wire terminals of the wire harness side connector.
There should be 10 V or more with the ignition switch turned ON.
If there is no voltage, check for an open circuit in the wire harness.

Connect the inspection adaptor to the rear VS sensor 3P (Yellow) connectors.



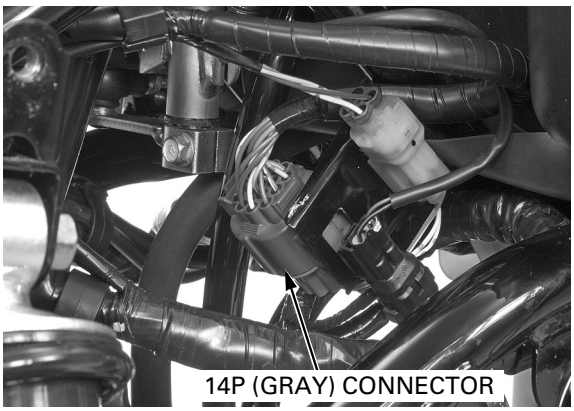
TOOL:

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 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 VS sensor.
- If the pulse voltage appears, check as follows:

Remove the left inner fender (page 3-9).
Remove the combination meter 14P (Gray) connector from the frame and disconnect it.
Check for an open or short circuit in the Pink/green wire between the rear VS sensor 3P (Yellow) connector and combination meter 14P (Gray) connector.
If the Pink/green wire is OK, replace the combination meter.



COMBINATION METER REMOVAL/ INSTALLATION

Remove the left inner fender (page 3-9).

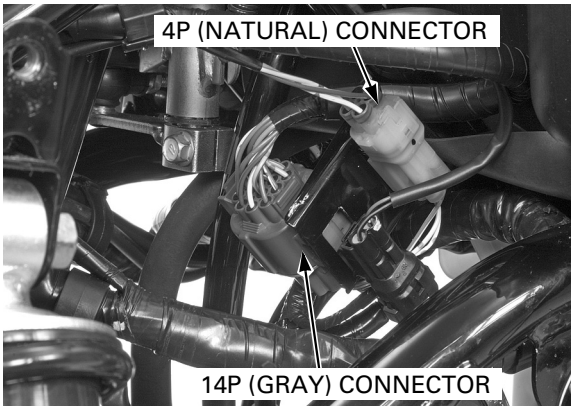
Remove the combination meter 14P (Gray) connector and 4P (Natural) connector from the frame and disconnect it.

Release the meter wire from the wire clip on the steering shaft holder.

Remove the meter cover (page 3-18).

Installation is in the reverse order of removal.

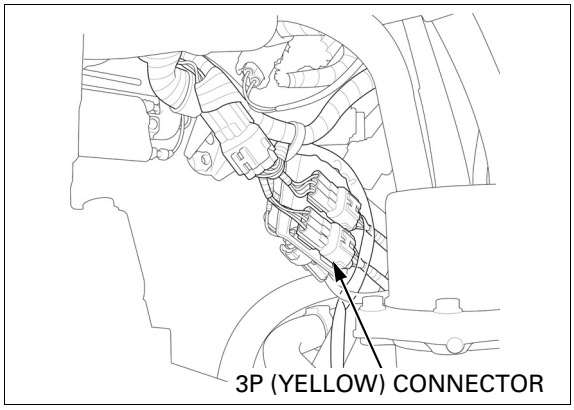
Route the accessory socket wire properly (page 1-20).



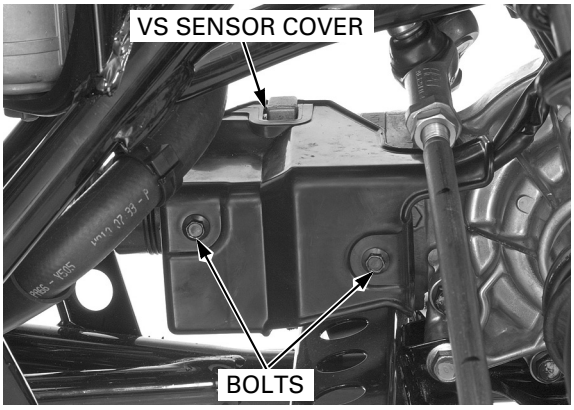
REAR VS SENSOR REPLACEMENT

Remove both inner fenders (page 3-9).

Remove the rear VS sensor 3P (Yellow) connector from the frame and disconnect it.



Remove the two bolts and VS sensor cover.

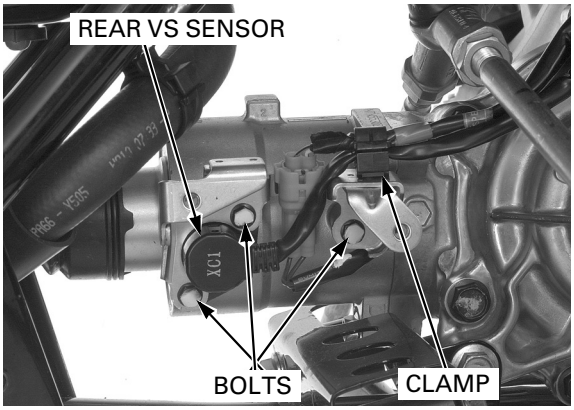


Remove the rear VS sensor wire from the clamp.
Remove the three bolts, sensor cover stay and rear VS sensor.

Coat a new O-ring with oil and install it onto a new rear VS sensor.

Route the rear VS sensor wire properly (page 1-20).

Install the rear VS sensor in the reverse order of removal.



FUEL GAUGE/FUEL LEVEL SENSOR

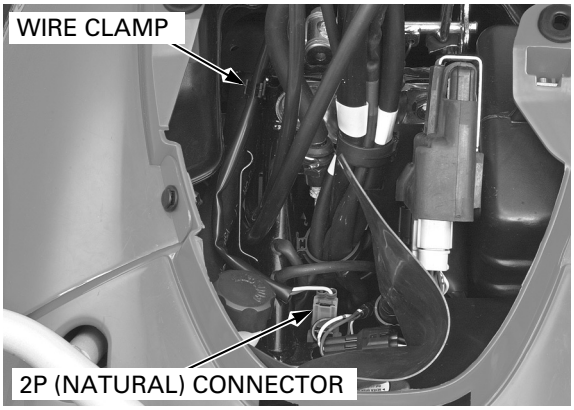
SYSTEM INSPECTION

Check that the speedometer and indicators function properly.

- If they do not function, check the power/ground line (page 23-8).
- If they function, check as follows:

Remove the steering cover (page 3-5).

Turn the ignition switch OFF and disconnect the fuel level sensor 2P (Natural) connector.
Release the sensor wire from the wire clamp.

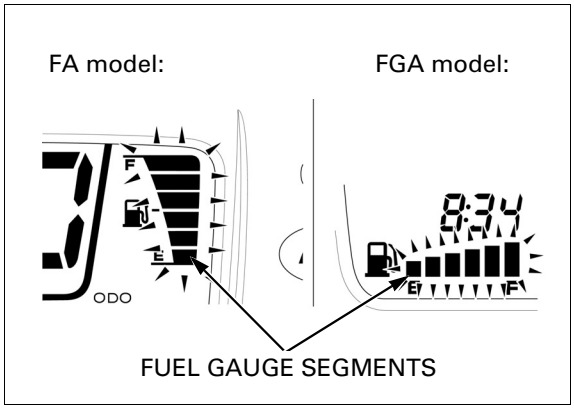


Turn the ignition switch ON and check the fuel gauge.
All segments should blink.

Turn the ignition switch OFF.
Connect the meter side connector terminals with a jumper wire.
Turn the ignition switch ON and check the fuel gauge.
All segments should blink.

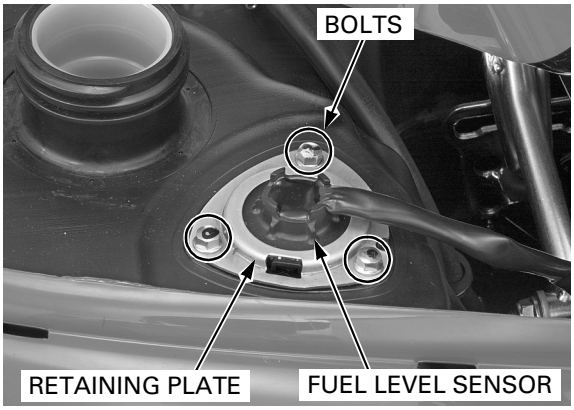
If the fuel gauge does not function properly, replace the combination meter (page 23-9).

Turn the ignition switch OFF.

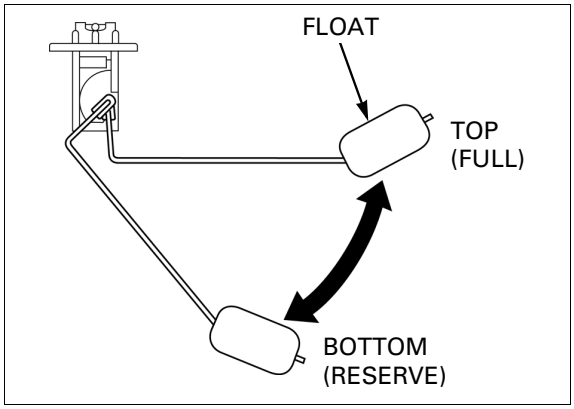


Remove the fuel tank cover (page 3-5).

Remove the three bolts, retaining plate and fuel level sensor from the fuel tank.

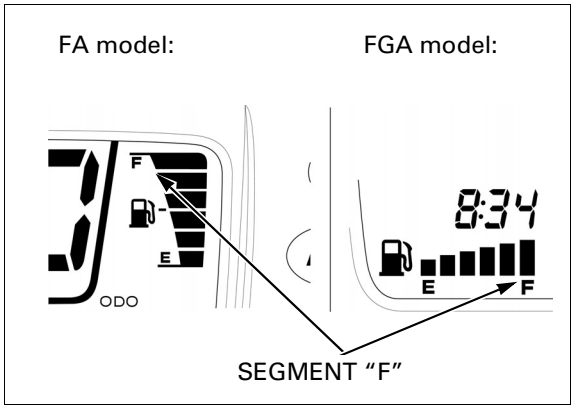


With the fuel level sensor float at the top (FULL) position, turn the ignition switch ON and check the fuel gauge.



All segments up to segment "F" should come on.

Turn the ignition switch OFF.



Move the float to the bottom (RESERVE) position, turn the ignition switch to ON and check the fuel gauge.

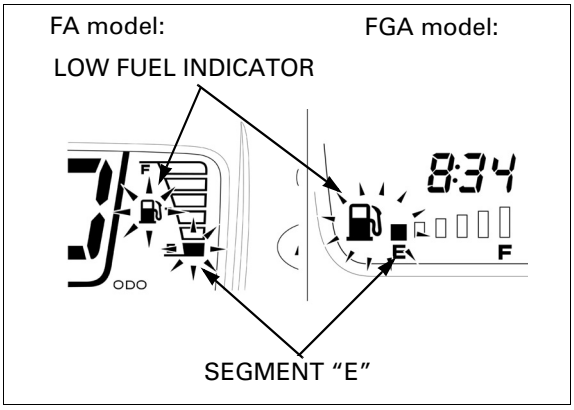
Segment "E" and low fuel indicator should blink.

If the fuel gauge does not function properly, check the fuel level sensor (page 23-12).

If the fuel level sensor is OK, replace the combination meter.

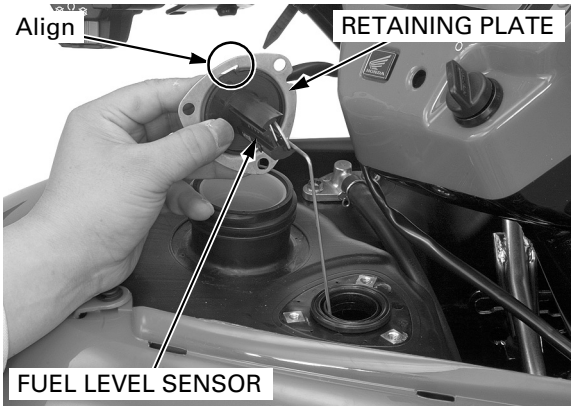
If all segments blink during inspection, replace the combination meter.

Turn the ignition switch OFF.



Install a new seal rubber onto the fuel level sensor.

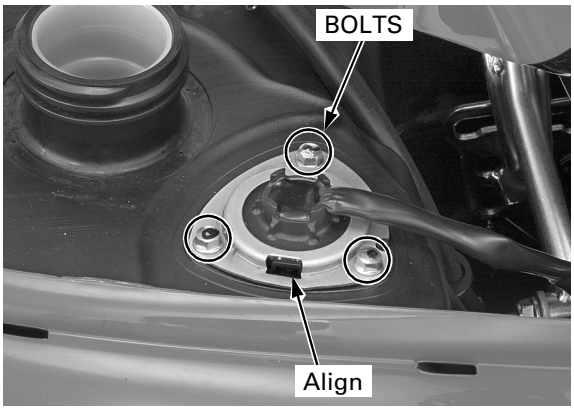
Install the retainer plate onto the sensor by aligning the tab with the groove.



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.

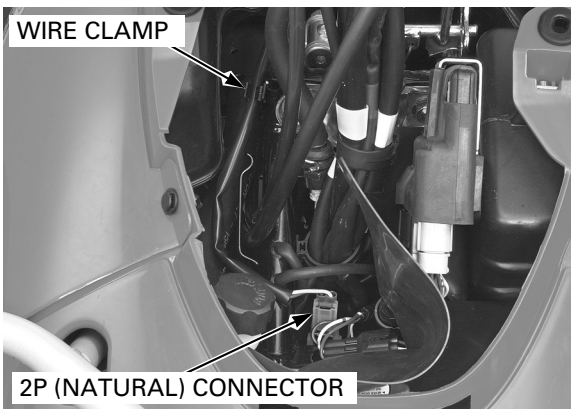
Install the removed parts in the reverse order of removal.



FUEL LEVEL SENSOR INSPECTION

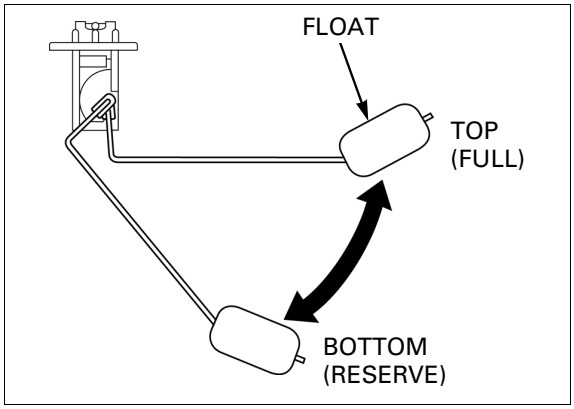
Remove the fuel level sensor (page 23-10).

Disconnect the fuel level sensor 2P (Natural) connector and connect the ohmmeter to the sensor side connector terminals.



Measure the fuel level sensor resistance with the float at the top (FULL) and bottom (RESERVE) positions.

FLOAT POSITION	RESISTANCE (20°C/68°)
TOP (FULL)	5 – 7 Ω
BOTTOM (RESERVE)	204 – 210 Ω



TEMPERATURE INDICATOR/ TEMPERATURE SENSOR

SYSTEM INSPECTION

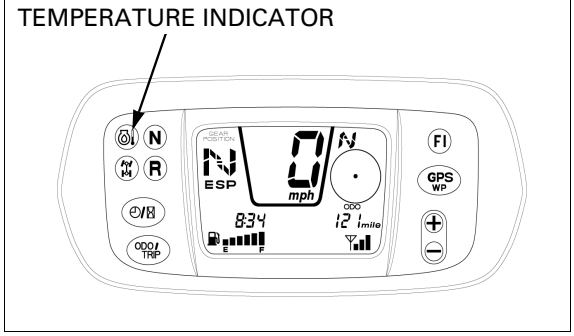
NOTE:

- The coolant/engine oil temperature indicator should come on for a few seconds when the ignition switch is turned 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 23-8).
- If they function, check as follows:

FGA model shown:



Temperature indicator does not come on when the ignition switch turned to ON

Seal the PCM connectors with tape to prevent dirt and oil from entering the connector after disconnecting the 33P connectors.

Disconnect the Powertrain Control Module (PCM) 33P connectors.

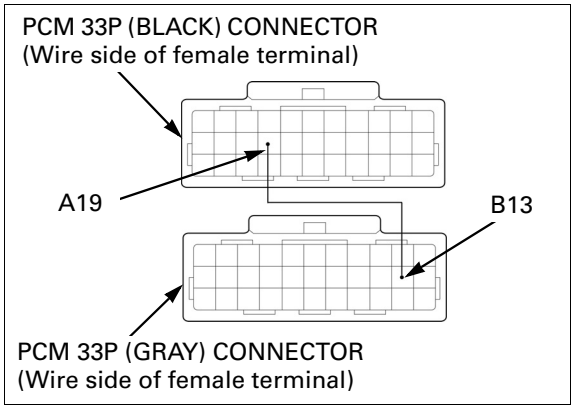
NOTE:

- When reconnecting the PCM 33P connectors, 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 ON and check the temperature indicator.

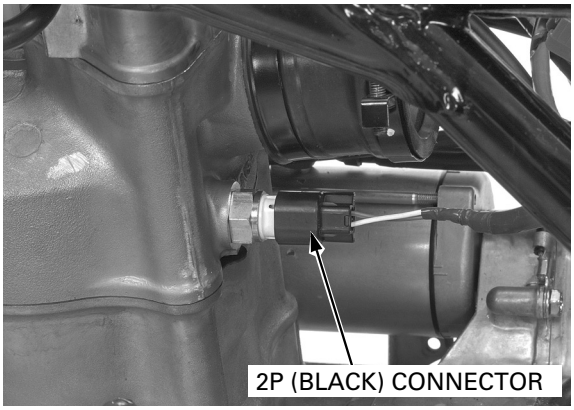
- If the indicator comes on, replace the PCM.
- If the indicator does not come on, check for an open circuit in the Blue/red and Green wire. If the wires are OK, replace the combination meter.



Temperature indicator does not go off with the fan motor stops

Remove the left engine side cover (page 3-17).

Disconnect the ECT sensor 2P (Black) connector.

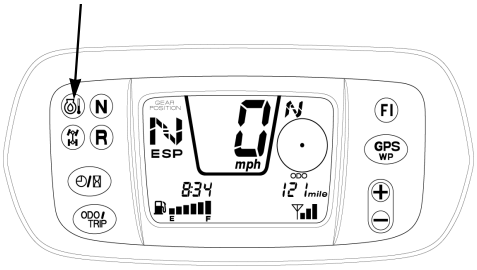


Turn the ignition switch ON and check the temperature indicator.

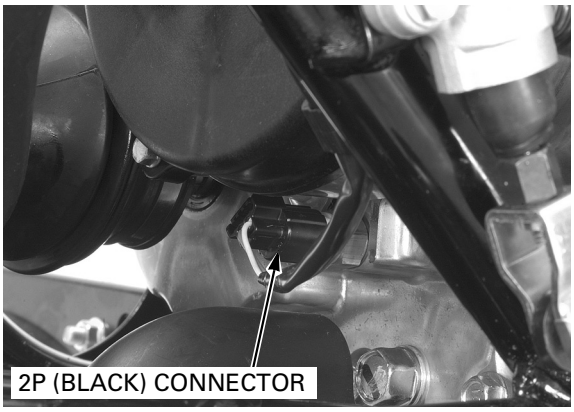
- If the indicator comes on, then goes off, check the ECT sensor (page 23-14).

FGA model shown:

TEMPERATURE INDICATOR



- If the indicator comes on and stays on, disconnect the connector from the EOT sensor and check the temperature indicator.
  - If the indicator goes off, check the EOT sensor (page 23-15).
  - If the indicator stays on, check for short circuit in the White and Green/red wire on ECT sensor wire or Yellow and Green/red wire on EOT sensor.



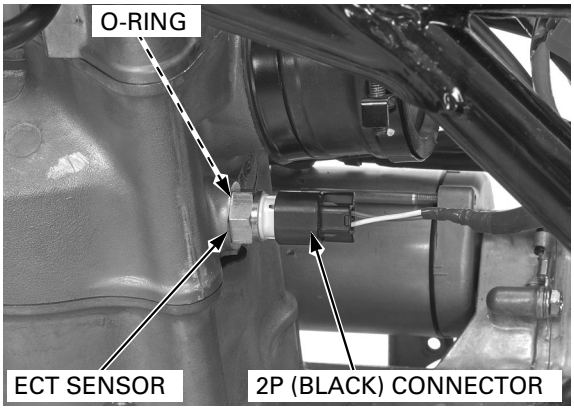
ECT SENSOR INSPECTION

Drain the coolant from the engine (page 7-7).

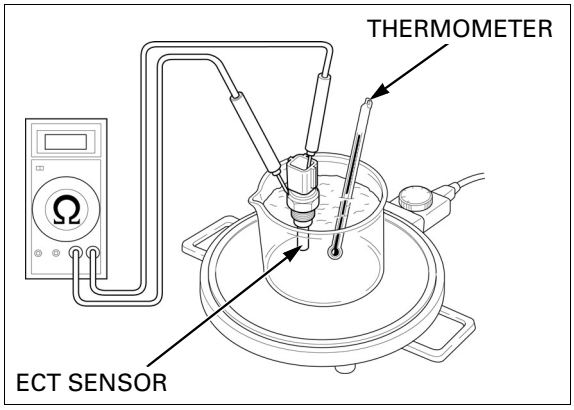
Remove the left engine side cover (page 3-17).

Replace the ECT sensor while the engine is cold.

Disconnect the ECT sensor 2P (Black) connector from the sensor.
Remove the ECT sensor and O-ring.



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.

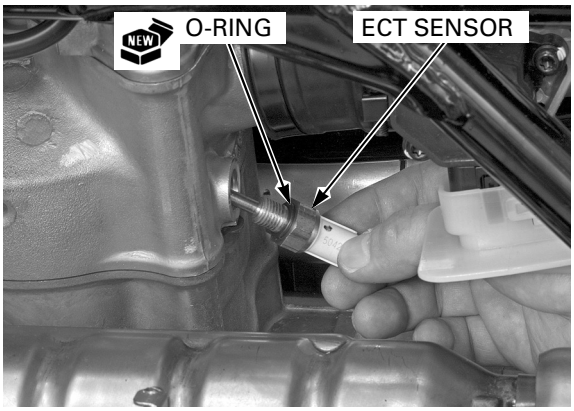
Resistance: 0.15 – 0.16 kΩ at 100°C (212°F)
0.08 – 0.10 kΩ at 120°C (248°F)

Replace the ECT sensor if it is out of specifications by more than 10% at any temperature listed.

Always replace the O-ring with a new one.

Install the new O-ring and ECT sensor.
Tighten the ECT sensor to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)



Connect the ECT sensor 2P (Black) connector.

Install the removed parts in the reverse order of removal.

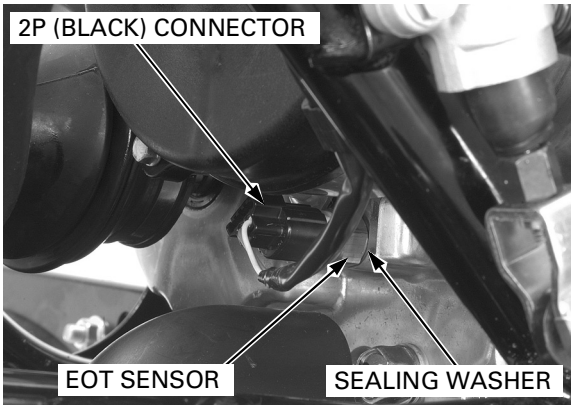
Fill and bleed the cooling system (page 7-7).

EOT SENSOR INSPECTION

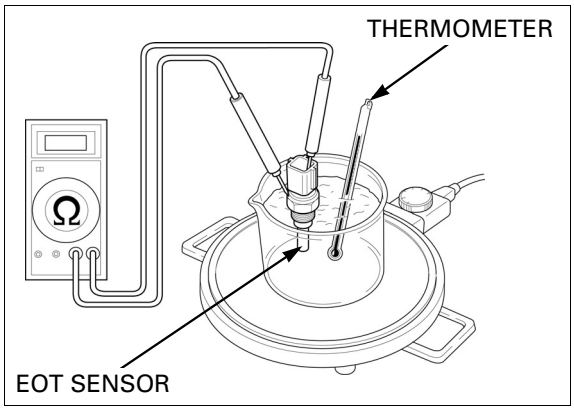
Drain the engine oil (page 4-11).

Remove the left center mud guard (page 3-7).

Disconnect the EOT sensor 2P (Black) connector and remove the EOT sensor.



Suspend the EOT sensor in a pan of engine oil on an electric heating element and measure the resistance through the sensor as the oil heats up.



NOTE:

- Soak the 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 EOT sensor touch the pan.

Resistance: 1.23 – 1.32 kΩ at 40°C (104°F)

Replace the EOT sensor if it is out of specifications by more than 10% at any temperature listed.

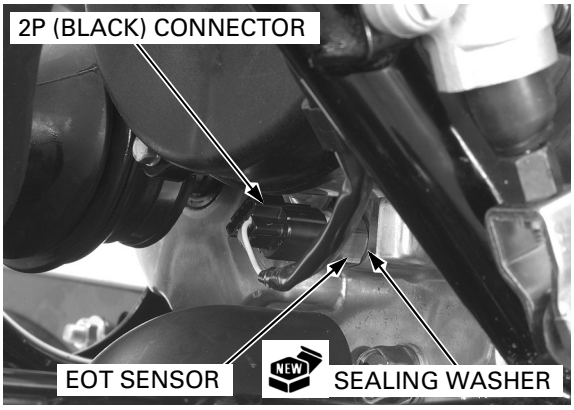
Install the EOT sensor with a new sealing washer and tighten it.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Connect the EOT sensor 2P (Black) connector.

Install the removed parts in the reverse order of removal.

Fill the recommended engine oil (page 4-11).



GPS RECEIVER (GPS model only)

INSPECTION

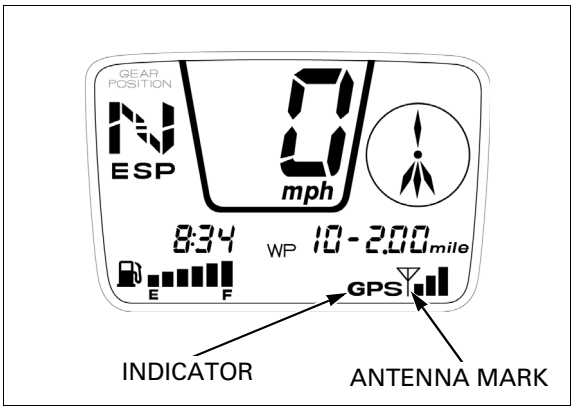
If the GPS indicator is blinking and the antenna mark and all segments do not indicate at all, check the system by following the troubleshooting "GPS INDICATOR BLINKS" (page 23-17).

If the GPS start-up time is too long every time the ignition switch is turned to ON despite of the hot start condition, check the system by following the troubleshooting "GPS START-UP TIME IS TOO LONG" (page 23-18).

NOTE:

The start-up time of the positioning varies as follows:

- Hot start
  When the ignition switch is turned ON within 2 hours after it was turned OFF, the position fix will be completed in about 25 seconds.
- Warm start
  When the ignition switch is turned ON more than 2 hours after it was turned OFF, the position fix will be completed in about 2 minutes.
- Cold start
  The position fix will be completed within about 8 minutes in the following situations;
  – When the ignition switch is turned ON more than 1 month after it was turned OFF
  – When the vehicle is transported for more than 100 km (62 miles) with the ignition switch turned OFF
  – When the battery is disconnected



GPS INDICATOR BLINKS (COMMUNICATION ERROR)

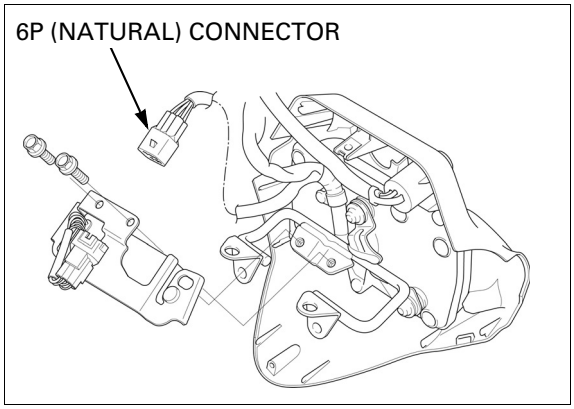
1. GPS Receiver Connector Check

Remove the meter covers (page 3-18).
Turn the ignition switch OFF.
Remove the GPS receiver 6P (Natural) connector from the stay and disconnect it.
Check for loose connection or poor contact of the GPS receiver connector.
Connect the GPS receiver 6P (Natural) connector.
Turn the ignition switch ON, wait for 8 minutes and check the GPS indicator.

Is the GPS indicator still blinking?

YES – GO TO STEP 2.

NO – No problem (Temporary failure).



2. GPS Receiver Input Voltage Line Inspection

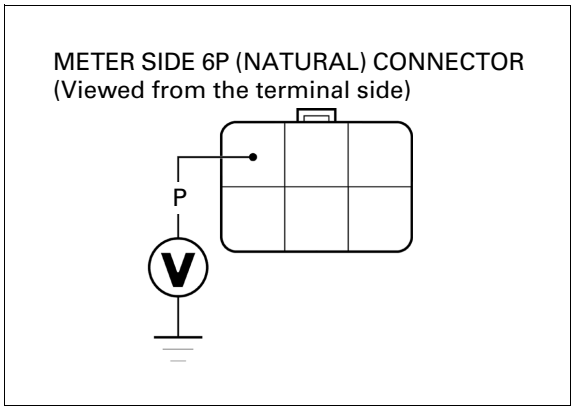
Turn the ignition switch OFF.
Disconnect the GPS receiver 6P (Natural) connector.
Turn the ignition switch ON.
Measure the voltage between the meter side connector terminal and ground.

Connection: Pink (+) – Ground (–)

Is there about 5 V?

YES – GO TO STEP 3.

NO – • Open or short circuit in the Pink wire.
• Inspect the power input line of the combination meter (page 23-8).



3. GPS Receiver Ground Line Inspection

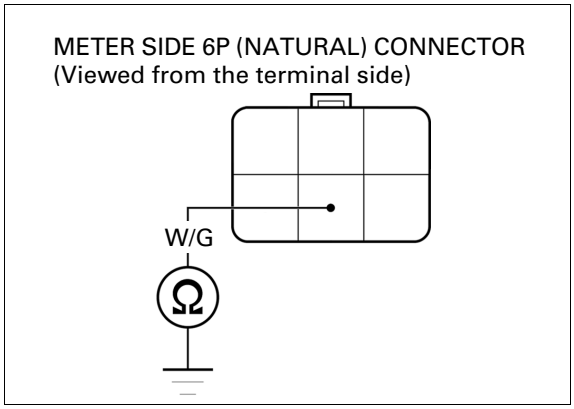
Turn the ignition switch OFF.
Check for continuity between the meter side connector terminal and ground.

Connection: White/green – Ground

Is there continuity?

YES – GO TO STEP 4.

NO – • Open circuit in the White/green wire
• Inspect the ground line of the combination meter (page 23-8).



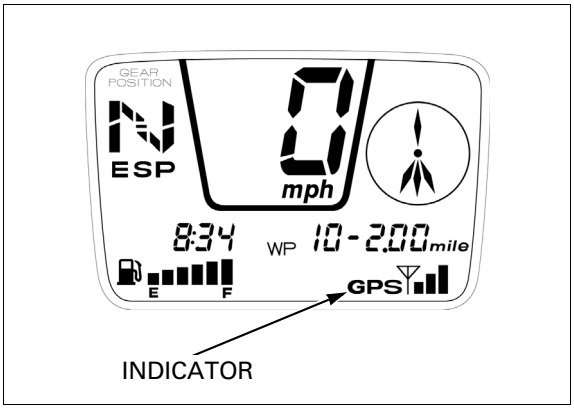
4. GPS Receiver Replacement

Replace the GPS receiver with a known good one.
Turn the ignition switch ON, wait for 5 minutes and recheck the GPS indicator.

Is the GPS indicator still blinking?

YES – Faulty combination meter.

NO – Faulty original GPS receiver.



GPS START-UP TIME IS TOO LONG

1. Recheck With the GPS System Reset

Disconnect the battery negative (–) cable and reconnect it.
Turn the ignition switch ON, wait until GPS system starts-up, and turn the ignition switch to OFF and ON.

Does the GPS start-up within 30 seconds?

YES – No problem (Temporary failure).

NO – GO TO STEP 2.

2. GPS Receiver Back-up Voltage Inspection

Remove the meter covers (page 3-18).
Turn the ignition switch OFF.
Remove the GPS receiver 6P (Natural) connector from the stay and disconnect it.
Measure the voltage between the meter side connector terminal and ground.

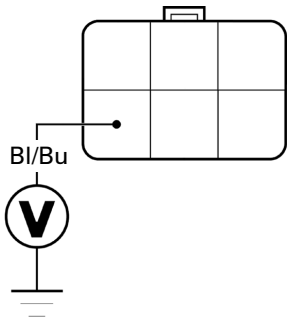
Connection: Black/blue (+) – Ground (–)

Is there about 5V?

YES – Faulty GPS receiver.

NO – • Open or short circuit in the Black/blue wire.
• Inspect the back-up voltage line of the combination meter (page 23-8).

METER SIDE 6P (NATURAL) CONNECTOR
(Viewed from the terminal side)



GPS receiver removal and installation (page 3-18).

BRAKE LIGHT SWITCH

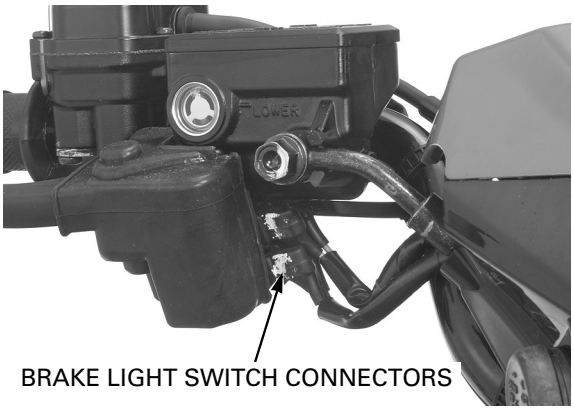
FRONT BRAKE LEVER

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.

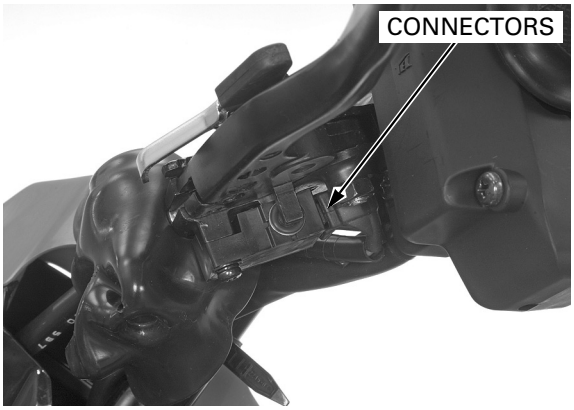
There should be continuity with the front brake lever squeezed and no continuity with the lever released.



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 3-5).

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

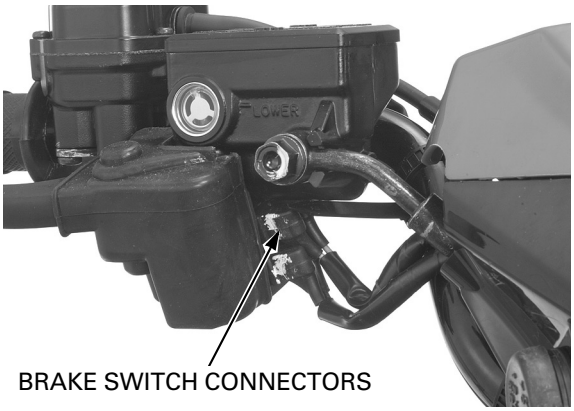
NOTE:

- The upper switch is the front brake (inhibitor) switch.

Check the front brake lever free play and adjust it if necessary (page 4-19).

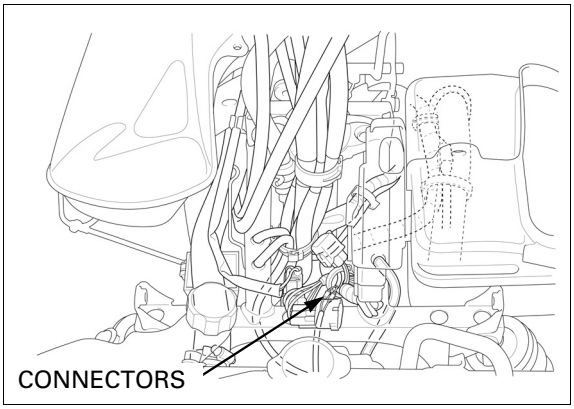
Disconnect the front brake switch connectors and check for continuity between the switch terminals.

There should be continuity with the front brake lever squeezed and no continuity with the lever released.



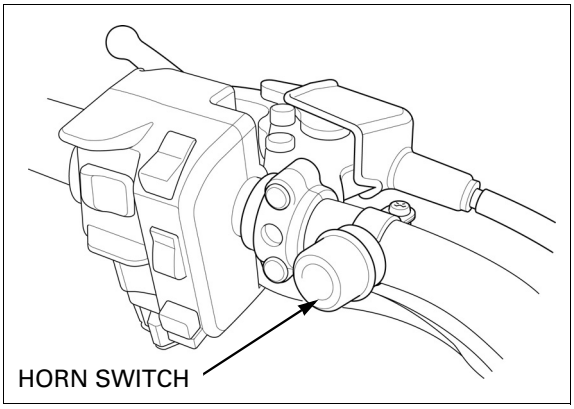
HORN SWITCH (AUSTRALIA type only)

Disconnect the horn switch wire connectors.



Check the continuity between the connector terminals.

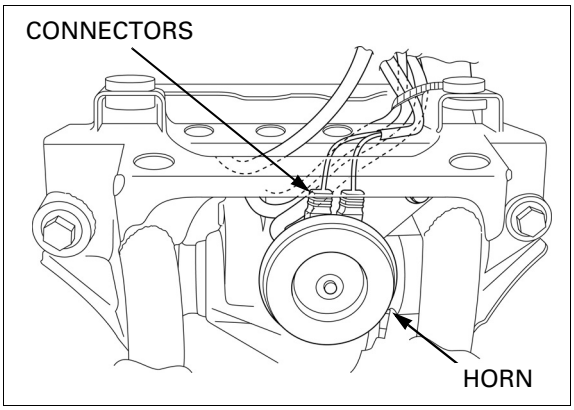
There should be continuity when the horn switch is pushed, and be no continuity when the switch is released.



HORN (AUSTRALIA type only)

Disconnect the wire connectors from the horn. Connect a 12 V battery to the horn terminals.

The horn is normal if it sounds when the 12V battery is connected across the horn terminals.



24. WIRING DIAGRAM

25. TROUBLESHOOTING

ENGINE DOES NOT START OR IS HARD TO START

1. **Spark Plug Inspection**

   Remove and inspect spark plug.

   Is the spark plug in good condition?

   NO – • Incorrect spark plug heat range
   • Incorrect spark plug gap
   • Dirty air cleaner

   YES – GO TO STEP 2.

2. **Spark Test**

   Perform spark test.

   Is there weak or no spark?

   YES – • Loose or disconnected ignition system wire
   • Faulty ignition coil
   • Broken or shorted spark plug wire
   • Loose or disconnected ignition system wires
   • Faulty CKP sensor
   • Faulty engine stop switch
   • Faulty ignition switch
   • Faulty PCM

   NO – GO TO STEP 3.

3. **Fuel Pump Inspection**

   Check for operation of the fuel pump and inspect the fuel flow.

   Is the fuel pump unit normal?

   NO – • Faulty fuel pump unit

   YES – GO TO STEP 4.

4. **PGM–FI System Inspection**

   Check the PGM–FI system.

   Is the PGM–FI system normal?

   NO – Faulty PGM–FI system

   Yes – 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

   NO – GO TO STEP 5.

6. **Engine Start Condition**

   Start by following normal procedure.

   Did the engine start but stops?

   YES – • Leaking intake manifold
   • Leaking intake pipe
   • Improper ignition timing (Faulty PCM or CKP sensor)
   • Contaminated fuel

ENGINE LACKS POWER

1. **Drivetrain 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 correct?

   NO – • Faulty tire valve
   • Punctured tire

   YES – GO TO STEP 3.

3. **Engine Condition Inspection**

   Accelerate lightly.

   Does the engine speed increase?

   NO – • 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 PCM)

   NO – GO TO STEP 7.

5. **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 6.

6. **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 7.

7. **Ignition Timing Inspection**

   Check the ignition timing.

   Is the ignition timing correct?

   NO – • Faulty PCM
   • Faulty CKP sensor

   YES – GO TO STEP 8.

8. 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 9.

9. Fuel pump Inspection

Inspect the fuel flow.

Is the fuel pump unit normal?

NO – Faulty fuel pump unit (page 6-36)

YES – GO TO STEP 10.

10. PGM–FI System Inspection

Check the PGM–FI system.

Is the PGM–FI System normal?

NO – Faulty PGM–FI system (page 6-13)

YES – GO TO STEP 11.

11. lubrication Inspection

Remove cylinder head cover and inspect lubrication.

Is the valve train lubricated properly?

NO – • Clogged oil passage
• Clogged oil orifice

YES – • Faulty A/T system

POOR PERFORMANCE AT LOW AND IDLE SPEED

1. **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 CKP sensor
   • Faulty engine stop switch
   • Faulty ignition switch
   • Faulty PCM

   NO – GO TO STEP 2.

2. **Fuel Pump Inspection**

   Inspect the fuel flow.

   Is the fuel pump unit normal?

   NO – Faulty fuel pump unit (page 6-36)

   YES – GO TO STEP 3.

3. **PGM–FI System Inspection**

   Check the PGM–FI system.

   Is the PGM–FI system normal?

   NO – Faulty PGM–FI system (page 6-13)

   YES – GO TO STEP 4.

4. **Intake Air Leak Inspection**

   Check for leaks at the intake manifold pipes.

   Are there leaks?

   YES – • Loose insulator bands
   • Damaged insulator

   NO – GO TO STEP 5.

5. **Ignition Timing Inspection**

   Check the ignition timing.

   Is the ignition timing correct?

   NO – • Faulty PCM
   • Faulty CKP sensor

   YES – • Faulty A/T system

POOR PERFORMANCE AT HIGH SPEED

1. **Fuel Pump Inspection**

   Inspect the fuel flow.

   Is the fuel pump unit operation normal?

   NO – Faulty fuel pump unit (page 6-36)

   YES – GO TO STEP 2.

2. **PGM–FI System Inspection**

   Check the PGM–FI system.

   Is the PGM–FI system normal?

   NO – Faulty PGM–FI system (page 6-13)

   YES – GO TO STEP 3.

3. **Ignition Timing Inspection**

   Check ignition timing.

   Is the ignition timing correct?

   NO – • Faulty PCM
   • Faulty CKP sensor

   YES – GO TO STEP 4.

4. **Valve Timing Inspection**

   Check valve timing.

   Is the valve timing correct?

   NO – Camshaft not installed properly

   YES – GO TO STEP 5.

5. **Valve Spring Inspection**

   Check valve springs.

   Are the valve springs weak?

   YES – • Faulty valve spring

   NO – • Faulty A/T 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

26. INDEX