2012

HONDA

SERVICE MANUAL

TRX500FM/FPM/FE/FPE

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 Honda Genuine 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 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 recommend that you do not attempt to perform the procedures described in this manual.

Some of the most important general service safety precautions are given below. However, we cannot warn you of every conceivable hazard that can arise in performing service or 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 manual describes the service procedures for the TRX500FM/FE/FPM/FPE.

Sections 1 and 3 apply to the whole vehicle. Section 2 illustrates procedures for removal/installation of components that may be required to perform service described in the following sections.
Section 4 through 24 describe parts of the vehicle, grouped according to location.

Follow the Maintenance Schedule recommendations to ensure that the vehicle is in peak operating condition.
Performing the first scheduled maintenance is very important. It compensates for the initial wear that occurs during the break-in period.

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.

Refer to the troubleshooting in each section according to the malfunction or symptom. In case of an engine trouble, refer to PGM-FI section troubleshooting first.

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.

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.

CONTENTS

MEMO

1. GENERAL INFORMATION

SERVICE RULES

1. Use Honda Genuine or Honda-recommended parts and lubricants or their equivalents. Parts that don't meet Honda's design specifications may cause damage to the vehicle.
2. Use the special tools designed for this product to avoid damage and incorrect assembly.
3. Use only metric tools when servicing the vehicle. Metric bolts, nuts and screws are not interchangeable with English fasteners.
4. Install new gaskets, O-rings, cotter pins, and lock plates when reassembling.
5. When tightening bolts or nuts, begin with the larger diameter or inner bolt first. Then tighten to the specified torque diagonally in incremental steps unless a particular sequence is specified.
6. Clean parts in cleaning solvent upon disassembly. Lubricate any sliding surfaces before reassembly.
7. After reassembly, check all parts for proper installation and operation.
8. Route all electrical wires as shown in the Cable & Harness Routing (page 1-23).
9. Do not bend or twist control cables. Damaged control cables will not operates smoothly and may stick or bind.
10. Do not tow your ATV behind a car or other vehicle.

ABBREVIATION

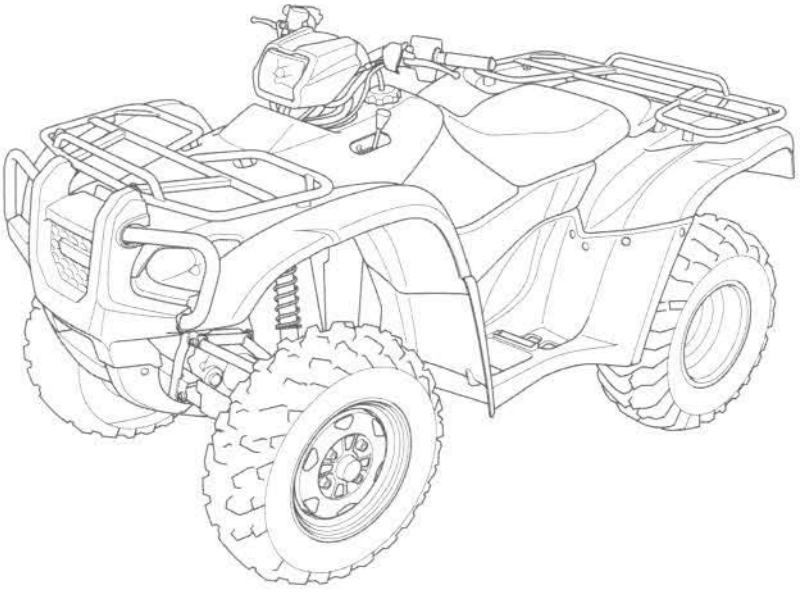
Throughout this manual, the following abbreviation are used to identify the respective parts or systems.

Abbrev. term	Full term
CKP sensor	Crankshaft Position sensor
LCD	Liquid Crystal Display
DLC	Data Link Connector
DTC	Diagnostic Trouble Code
PCM (FE/FPE models)	Powertrain Control Module
ECM (FM/FPM models)	Engine Control Module
ECT sensor	Engine Coolant Temperature sensor
EEPROM	Electrically Erasable Programmable Read Only Memory
EPS	Electric Power Steering
ESP	Electric Shift Program
ECU	Electric Control Unit
HDS	Honda Diagnostic System
IACV	Idle Air Control Valve
IAT sensor	Intake Air Temperature sensor
MAP sensor	Manifold Absolute Pressure sensor
MIL	Malfunction Indicator Lamp
PGM-FI	Programmed Fuel Injection
SCS service connector	Service Check Short service connector
TP sensor	Throttle Position sensor
VS sensor	Vehicle Speed sensor
4WD	4 Wheel Drive

MODEL IDENTIFICATION

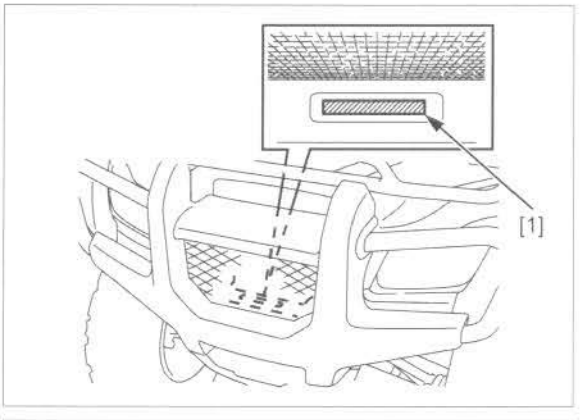
This manual covers 4 types of TRX500 models:
- FM – 4WD/Left foot operated gearshift
- FE – 4WD/Electric shift program (ESP)
- FPM – 4WD/Left foot operated gearshift/Electric Power Steering (EPS)
- FPE – 4WD/Electric shift program (ESP)/Electric Power Steering (EPS)

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

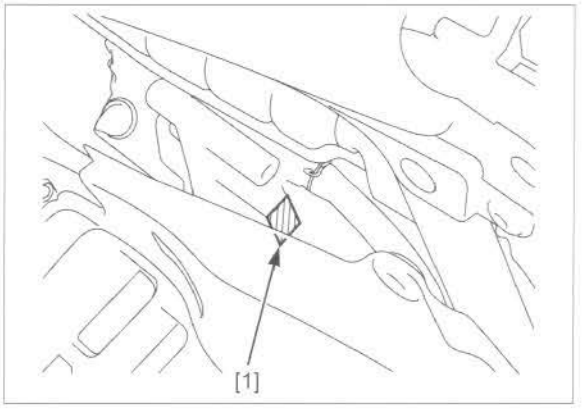


SERIAL NUMBERS

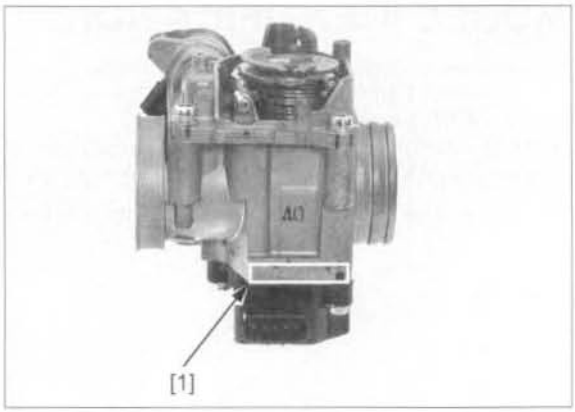
The Vehicle Identification Number (VIN) [1] is stamped on the front side of the frame through the front fender.



The engine serial number [1] is stamped on the left side of the rear crankcase.

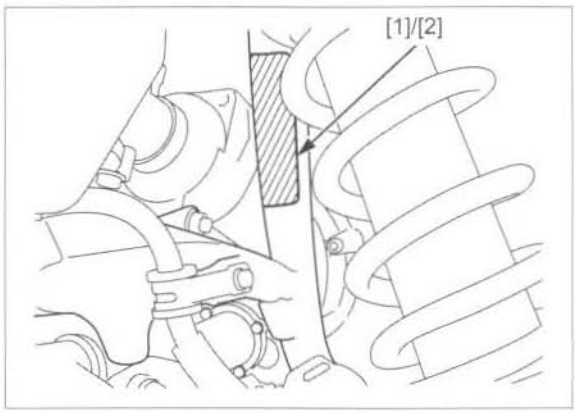


The throttle body identification number [1] is stamped on the lower side of the throttle body.

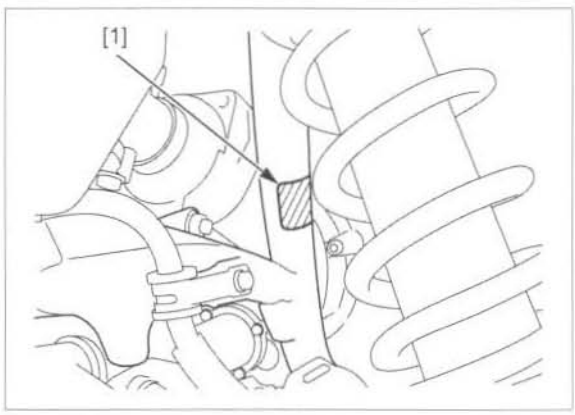


LABELS

The certification label [1] (U.S.A. type) or safety certification label [2] (Canada type) is attached on the left front frame down pipe.

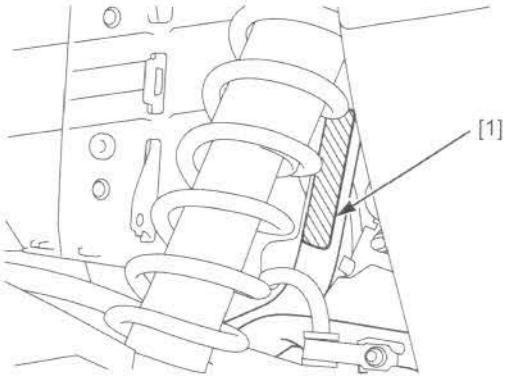


The color label [1] is attached on the left front frame down pipe. When ordering color-coded parts, always specify the designated color code.

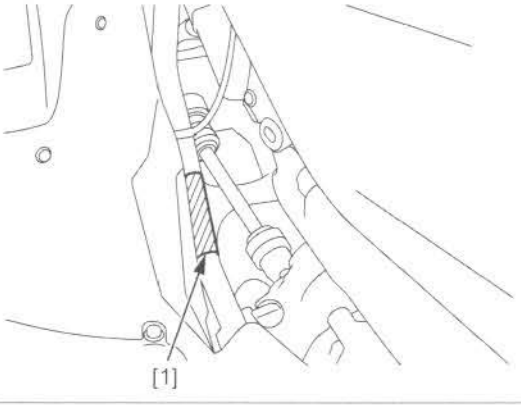


The vehicle emission control information label [1] is attached on the left front frame pipe.

U.S.A. and Canada type:



Canada type only:



SPECIFICATIONS

GENERAL SPECIFICATIONS

ITEM			SPECIFICATIONS
DIMENSIONS	Overall length		2,127 mm (83.7 in)
	Overall width		1,205 mm (47.4 in)
	Overall height		1,197 mm (47.1 in)
	Wheelbase		1,281 mm (50.4 in)
	Front tread		915 mm (36.0 in)
	Rear tread		925 mm (36.4 in)
	Seat height		881 mm (34.7 in)
	Footpeg height	FM/FPM:	365 mm (14.4 in)
		FE/FPE:	355 mm (14.0 in)
	Ground clearance		194 mm (7.6 in)
	Curb weight	FM:	U.S.A.: 284 kg (626 lbs)
			Canada: 286 kg (631 lbs)
		FE:	U.S.A.: 285 kg (628 lbs)
			Canada: 286 kg (631 lbs)
		FPM:	U.S.A.: 291 kg (642 lbs)
			Canada: 293 kg (646 lbs)
		FPE:	U.S.A.: 292 kg (644 lbs)
			Canada: 294 kg (648 lbs)
	Maximum weight capacity		220 kg (485 lbs)
FRAME	Frame type		Double cradle
	Front suspension		Double wishbone
	Front wheel travel		171 mm (6.7 in)
	Front damper		Double tube
	Rear suspension		Swingarm (trailing type)
	Rear wheel travel		174 mm (6.9 in)
	Rear damper		Double tube
	Front tire size		AT25 x 8-12 **
	Rear tire size		AT25 x 10-12 **
	Front rim size		12 x 6.0 AT
	Rear rim size		12 x 7.5 AT
	Front tire brand		M975 (MAXXIS)
	Rear tire brand		M978 (MAXXIS)
	Front brake		Hydraulic disc brake
	Rear brake		Mechanical drum brake
	Caster angle		3°
	Trail length		11 mm (0.4 in)
	Camber angle		0°
	Fuel tank capacity		15.0 liters (3.96 US gal, 3.30 Imp gal)
	Fuel tank reserve capacity		4.6 liters (1.22 US gal, 1.01 Imp gal)
ENGINE	Cylinder arrangement		Single cylinder, longitudinally installed
	Bore and stroke		92.0 x 71.5 mm (3.62 x 2.81 in)
	Displacement		475 cm^3 (29.0 cu-in)
	Compression ratio		9.5 : 1
	Valve train		OHV
	Intake valve	opens: at 1 mm (0.04 in) lift	7° BTDC
		closes: at 1 mm (0.04 in) lift	43° ABDC
	Exhaust valve	opens: at 1 mm (0.04 in) lift	44° BBDC
		closes: at 1 mm (0.04 in) lift	1° ATDC
	Lubrication system		Forced pressure and wet sump
	Oil pump type		Trochoid
	Cooling system		Liquid cooled
	Air filtration		Oiled double urethane foam
	Engine dry weight	FM/FPM:	U.S.A.: 51.4 kg (113.3 lbs)
			Canada: 52.5 kg (115.7 lbs)
		FE/FPE:	U.S.A.: 52.3 kg (115.3 lbs)
			Canada: 53.4 kg (117.7 lbs)
FUEL DELIVERY SYSTEM	Type		PGM-FI (Programmed Fuel Injection)
	Throttle bore		36 mm (1.4 in)

ITEM			SPECIFICATIONS
DRIVE TRAIN	Clutch system		Centrifugal and multi-plate, wet
	Clutch operation system		Automatic
	Transmission		Constant mesh, 5-speeds with reverse
	Primary reduction		2.103 (61/29)
	Secondary reduction		1.875 (30/16)
	Final reduction	Front	3.231 (42/13)
		Rear	3.154 (41/13)
	Gear ratio	1st	4.230 (55/13)
		2nd	2.388 (43/18)
		3rd	1.608 (37/23)
		4th	1.178 (33/28)
		5th	0.848 (28/33)
		Reverse	5.743 (48/13 x 28/18)
	Gearshift pattern		R – N – 1 – 2 – 3 – 4 – 5
		FM/FPM:	Left foot operated return system
		FE/FPE:	Electric shift (left hand operated) return system
ELECTRICAL	Ignition system		Full transistorized ignition
	Starting system	U.S.A.:	Electric starter motor
		Canada:	Electric starter motor and emergency recoil stater
	Charging system		Triple phase output alternator
	Regulator/rectifier		FET shorted, triple phase full wave rectification
	Lighting system		Battery

PGM-FI SYSTEM SPECIFICATIONS

ITEM	SPECIFICATIONS
IAT sensor resistance (20°C/68°F)	2.2 – 2.7 kΩ
ECT sensor resistance (40 ± 5°C/104 ± 41°F)	0.86 – 1.55 kΩ
Fuel injector resistance (20°C/68°F)	11.6 – 12.4 Ω

IGNITION SYSTEM SPECIFICATIONS

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

ELECTRIC STARTER SPECIFICATIONS

Unit: mm (in)

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

FUEL SYSTEM SPECIFICATIONS

ITEM	SPECIFICATIONS
Throttle body identification number	GQ3RA
Idle speed	1,400 ± 100 rpm
Throttle lever freeplay	3 – 8 mm (0.1 – 0.3 in)
Fuel pressure at idle	316 – 387 kPa (3.2 – 3.9 kgf/cm^2, 46 – 56 psi)
Fuel pump flow (at 12 V)	125 cm^3 (4.2 US oz, 4.4 Imp oz) minimum/10 seconds

COOLING SYSTEM SPECIFICATIONS

ITEM		SPECIFICATIONS
Coolant capacity	Radiator and engine	1.5 liters (1.6 US qt, 1.3 Imp qt)
	Reserve tank	0.3 liter (0.3 US qt, 0.3 Imp qt)
Radiator cap relief pressure		108 – 137 kPa (1.1 – 1.4 kgf/cm^2, 16 – 20 psi)
Thermostat	Begin to open	80 – 84°C (176 – 183°F)
	Fully open	95°C (203°F)
	Valve lift	8 mm (0.3 in) minimum at 95°C (203°F)
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

LUBRICATION SYSTEM SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Engine oil capacity	After draining	2.9 liters (3.1 US qt, 2.6 Imp qt)	–
	After draining/filter change	3.0 liters (3.2 US qt, 2.6 Imp qt)	–
	After disassembly	3.3 liters (3.5 US qt, 2.9 Imp qt)	–
Recommended engine oil		Pro Honda GN4 4-stroke oil (U.S.A. and Canada) or Honda 4-stroke oil (Canada only), 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	–
Oil pump	Tip clearance	0.15 (0.006)	0.20 (0.008)
	Body clearance	0.15 – 0.24 (0.006 – 0.009)	0.25 (0.010)
	Side clearance	0.02 – 0.09 (0.001 – 0.004)	0.11 (0.004)

CYLINDER HEAD/VALVE SPECIFICATIONS

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Cylinder compression at 400 rpm			600 kPa (6.1 kgf/cm^3, 87 psi)	–
Valve clearance		IN	0.15 ± 0.02 (0.006 ± 0.001)	–
		EX	0.23 ± 0.02 (0.009 ± 0.001)	–
Valve, valve guide	Valve stem O.D.	IN	5.975 – 5.990 (0.2352 – 0.2358)	5.95 (0.234)
		EX	5.955 – 5.970 (0.2344 – 0.2350)	5.93 (0.233)
	Valve guide I.D.	IN/EX	6.000 – 6.012 (0.2362 – 0.2367)	6.02 (0.237)
	Stem-to-guide clearance	IN	0.010 – 0.037 (0.0004 – 0.0015)	0.12 (0.005)
		EX	0.030 – 0.057 (0.0012 – 0.0022)	0.14 (0.006)
	Valve guide projection above cylinder head	IN/EX	14.8 – 15.0 (0.58 – 0.59)	–
	Valve seat width	IN/EX	1.2 (0.05)	1.5 (0.06)
Valve spring	Free length	Inner	42.94 (1.691)	42.08 (1.657)
		Outer	43.63 (1.718)	42.76 (1.683)
Rocker arm	Arm I.D.	IN/EX	12.000 – 12.018 (0.4724 – 0.4731)	12.05 (0.474)
	Shaft O.D.	IN/EX	11.964 – 11.984 (0.4710 – 0.4718)	11.92 (0.469)
	Arm-to-shaft clearance	IN/EX	0.016 – 0.054 (0.0006 – 0.0021)	0.08 (0.003)
Camshaft and cam follower	Cam lobe height	IN	35.9400 – 36.1800 (1.41496 – 1.42441)	35.74 (1.407)
		EX	35.6811 – 35.9211 (1.40476 – 1.41421)	35.48 (1.397)
	Cam follower O.D.	IN/EX	22.467 – 22.482 (0.8845 – 0.8851)	22.46 (0.884)
	Follower bore I.D.	IN/EX	22.510 – 22.526 (0.8862 – 0.8868)	22.54 (0.887)
	Follower-to-bore clearance	IN/EX	0.028 – 0.059 (0.0011 – 0.0023)	0.07 (0.003)
Cylinder head warpage			–	0.10 (0.004)

CYLINDER/PISTON SPECIFICATIONS

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Cylinder	I.D.		92.000 – 92.010 (3.6220 – 3.6224)	92.10 (3.626)
	Out-of-round		–	0.10 (0.004)
	Taper		–	0.10 (0.004)
	Warpage		–	0.10 (0.004)
Piston, pis-ton pin, piston ring	Piston O.D. at 15 (0.6) from bottom		91.970 – 91.990 (3.6209 – 3.6216)	91.90 (3.618)
	Piston pin hole I.D.		19.002 – 19.008 (0.7481 – 0.7483)	19.04 (0.750)
	Piston pin O.D.		18.994 – 19.000 (0.7478 – 0.7480)	18.96 (0.746)
	Piston-to-piston pin clearance		0.002 – 0.014 (0.0001 – 0.0006)	0.08 (0.003)
	Piston ring end gap	Top	0.15 – 0.30 (0.006 – 0.012)	0.5 (0.02)
		Second	0.30 – 0.45 (0.012 – 0.018)	0.6 (0.02)
		Oil (side rail)	0.20 – 0.70 (0.008 – 0.028)	0.9 (0.04)
	Piston ring-to-ring groove clearance	Top	0.030 – 0.060 (0.0012 – 0.0024)	0.09 (0.004)
		Second	0.030 – 0.060 (0.0012 – 0.0024)	0.09 (0.004)
Cylinder-to-piston clearance			0.010 – 0.040 (0.0004 – 0.0016)	0.10 (0.004)
Connecting rod small end I.D.			19.020 – 19.041 (0.7488 – 0.7496)	19.07 (0.751)
Connecting rod-to-piston pin clearance			0.020 – 0.047 (0.0008 – 0.0019)	0.10 (0.004)

CLUTCH/GEARSHIFT LINKAGE SPECIFICATIONS

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Centrifugal clutch	Drum I.D.		150.0 – 150.2 (5.906 – 5.913)	150.4 (5.92)
	Weight lining thickness		2.0 (0.08)	1.3 (0.05)
	Clutch spring height		2.96 (0.117)	2.84 (0.112)
	Clutch weight spring free length		24.72 (0.973)	25.7 (1.01)
Change clutch	Spring free length	FM/FPM	52.2 (2.06)	50.7 (2.00)
		FE/FPE	46.8 (1.84)	45.3 (1.78)
	Disc thickness		2.62 – 2.78 (0.103 – 0.109)	2.3 (0.09)
	Plate warpage		–	0.20 (0.008)
	Outer I.D.		29.000 – 29.021 (1.1417 – 1.1426)	29.05 (1.144)
	Outer guide	I.D.	22.000 – 22.021 (0.8661 – 0.8670)	22.05 (0.868)
		O.D.	28.959 – 28.980 (1.1401 – 1.1409)	28.93 (1.139)
	Mainshaft O.D. at clutch outer guide		21.967 – 21.980 (0.8648 – 0.8654)	21.93 (0.863)
Primary drive gear	Gear I.D.		29.000 – 29.021 (1.1417 – 1.1426)	29.05 (1.144)
	Crankshaft O.D. at drive gear		28.959 – 28.980 (1.1401 – 1.1409)	28.93 (1.139)

ALTERNATOR/STARTER CLUTCH SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Starter driven gear boss	O.D.	51.705 – 51.718 (2.0356 – 2.0361)	51.69 (2.035)
	I.D.	31.946 – 31.962 (1.2577 – 1.2583)	31.90 (1.256)
Crankshaft O.D. at starter driven gear		31.884 – 31.900 (1.2553 – 1.2559)	31.85 (1.254)

CRANKCASE/TRANSMISSION/CRANKSHAFT/BALANCER SPECIFICATIONS

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Shift fork	I.D.	Front, rear	13.000 – 13.021 (0.5118 – 0.5126)	13.04 (0.513)
		Center	13.000 – 13.018 (0.5118 – 0.5125)	13.04 (0.513)
	Claw thickness		4.93 – 5.00 (0.194 – 0.197)	4.5 (0.18)
	Shaft O.D.		12.966 – 12.984 (0.5105 – 0.5112)	12.96 (0.510)
Transmission	Gear I.D.	M3	25.000 – 25.021 (0.9843 – 0.9851)	25.05 (0.986)
		M5	20.000 – 20.021 (0.7874 – 0.7882)	20.05 (0.789)
		C1, C2, C4, CR	28.020 – 28.041 (1.1031 – 1.1040)	28.07 (1.105)
		Reverse idle	13.000 – 13.021 (0.5118 – 0.5126)	13.04 (0.513)
	Gear bushing O.D.	M3	24.959 – 24.980 (0.9826 – 0.9835)	24.93 (0.981)
		M5	19.966 – 19.984 (0.7861 – 0.7868)	19.94 (0.785)
		C2	27.984 – 28.005 (1.1017 – 1.1026)	27.94 (1.100)
		C1, C4, CR	27.979 – 28.000 (1.1015 – 1.1024)	27.93 (1.100)
	Gear-to-bushing clearance	M3	0.020 – 0.062 (0.0008 – 0.0024)	0.10 (0.004)
		M5	0.016 – 0.055 (0.0006 – 0.0022)	0.10 (0.004)
		C2	0.015 – 0.057 (0.0006 – 0.0022)	0.08 (0.003)
		C1, C4, CR	0.020 – 0.062 (0.0008 – 0.0024)	0.10 (0.004)
	Gear bushing I.D.	M3	22.000 – 22.021 (0.8661 – 0.8670)	22.04 (0.868)
		M5	17.016 – 17.034 (0.6699 – 0.6706)	17.06 (0.672)
		C4	25.000 – 25.021 (0.9843 – 0.9851)	25.05 (0.986)
	Mainshaft O.D.	at M3	21.959 – 21.980 (0.8645 – 0.8654)	21.93 (0.863)
		at M5	16.976 – 16.987 (0.6683 – 0.6688)	16.93 (0.667)
	Countershaft O.D.	at C4	24.959 – 24.980 (0.9826 – 0.9835)	24.93 (0.981)
	Reverse idle shaft O.D.		12.966 – 12.984 (0.5105 – 0.5112)	12.94 (0.509)
	Bushing-to-shaft clearance	M3	0.020 – 0.062 (0.0008 – 0.0024)	0.10 (0.004)
		M5	0.029 – 0.058 (0.0011 – 0.0023)	0.10 (0.004)
		C4	0.020 – 0.062 (0.0008 – 0.0024)	0.10 (0.004)
	Reverse idle gear-to-shaft clearance		0.016 – 0.055 (0.0006 – 0.0022)	0.10 (0.004)
Crankshaft	Runout		–	0.15 (0.006)
	Big end side clearance		0.05 – 0.65 (0.002 – 0.026)	0.8 (0.03)
	Big end radial clearance		0.006 – 0.018 (0.0002 – 0.0007)	0.05 (0.002)

ENGINE REMOVAL/INSTALLATION

ITEM			SPECIFICATIONS
Engine dry weight	FM/FPM	U.S.A.	51.4 kg (113.3 lbs)
		Canada	52.5 kg (115.7 lbs)
	FE/FPE	U.S.A.	52.3 kg (115.3 lbs)
		Canada	53.4 kg (117.7 lbs)
Engine oil capacity	After draining		2.9 liters (3.1 US qt, 2.6 Imp qt)
	After draining/filter change		3.0 liters (3.2 US qt, 2.6 Imp qt)
	After disassembly		3.3 liters (3.5 US qt, 2.9 Imp qt)
Coolant capacity (radiator and engine)			1.5 liters (1.6 US qt, 1.3 Imp qt)
Reverse selector lever freeplay			2 – 4 mm (0.1 – 0.2 in)

FRONT WHEEL/SUSPENSION/STEERING SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Minimum tire tread depth		–	4.0 (0.16)
Cold tire pressure	Standard	30 kPa (0.30 kgf/cm^2, 4.4 psi)	–
	With cargo	30 kPa (0.30 kgf/cm^2, 4.4 psi)	–
Tie-rod distance between the ball joints		383.1 (15.08)	–
Toe		Toe-out: 28 ± 15 (1.1 ± 0.6)	–

REAR WHEEL/SUSPENSION SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Minimum tire tread depth		–	4.0 (0.16)
Cold tire pressure	Standard	30 kPa (0.30 kgf/cm^2, 4.4 psi)	–
	With cargo	30 kPa (0.30 kgf/cm^2, 4.4 psi)	–

BRAKE SYSTEM SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Front brake	Recommended brake fluid	Honda DOT 4 brake fluid	–
	Disc thickness	3.8 – 4.2 (0.15 – 0.17)	3.0 (0.12)
	Disc runout	–	0.30 (0.012)
	Master cylinder I.D.	14.000 – 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.	32.030 – 32.080 (1.2610 – 1.2630)	32.090 (1.2634)
	Caliper piston O.D.	31.984 – 31.998 (1.2578 – 1.2598)	31.94 (1.257)
Rear brake	Drum I.D.	180.0 – 180.2 (7.086 – 7.094)	181.0 (7.13)
	Shoe lining thickness	5.3 (0.21)	To index mark
Rear (parking) brake lever freeplay		15 – 20 mm (0.6 – 0.8 in)	–
Rear brake pedal freeplay		15 – 20 mm (0.6 – 0.8 in)	–

FRONT DRIVING MECHANISM SPECIFICATIONS

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Front final drive	Oil capacity	After draining	200 cm^3 (6.8 US oz, 7.0 Imp oz)	–
		After disassembly	250 cm^3 (8.5 US oz, 8.8 Imp oz)	–
	Recommended oil		Honda shaft drive oil or equivalent hypoid gear oil, SAE # 80	–
	Gear backlash		0.05 – 0.25 (0.002 – 0.010)	0.4 (0.02)
	Backlash difference		–	0.2 (0.01)
	Slip torque		14 – 17 N·m (1.45 – 1.75 kgf·m, 10 – 13 lbf·ft)	12 N·m (1.2 kgf·m, 9 lbf·ft)
	Face cam-to-housing distance		3.3 – 3.7 (0.13 – 0.15)	3.3 (0.13)
	Differential ring gear depth		6.55 – 6.65 (0.258 – 0.262)	6.55 (0.258)
	Cone spring free height		2.8 (0.11)	2.6 (0.10)

REAR DRIVING MECHANISM SPECIFICATIONS

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Axle runout			–	3.0 (0.12)
Rear final drive	Oil capacity	After draining	75 cm^3 (2.5 US oz, 2.6 Imp oz)	–
		After disassembly	100 cm^3 (3.4 US oz, 3.5 Imp oz)	–
	Recommended oil		Honda shaft drive oil or equivalent 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	Type		GYZ16H
	Capacity		12 V – 16 Ah
	Current leakage		0.62 mA max.
	Voltage (20°C/68°F)	Fully charged	13.0 – 13.2 V
		Needs charging	Below 12.4 V
	Charging current	Normal	1.6 A x 5 – 10 h
		Quick	8.0 A x 1.0 h
Alternator	Capacity		0.416 kW/5,000 rpm
	Charging coil resistance (20°C/68°F)		0.1 – 1.0 Ω

LIGHTS/METERS/SWITCHES SPECIFICATIONS

ITEM			SPECIFICATIONS
Bulbs	Headlight (high/low beam)		12 V - 30/30 W x 2
	Assist headlight		12 V - 45 W
	Brake/taillight		LED
	Neutral indicator		LED
	Reverse indicator		LED
	Coolant temperature indicator		LED
	MIL		LED
	4WD indicator		LED
	Meter light		LED
	EPS indicator (FPM/FPE)		LED
Fuse	Main fuse	FM/FPM	30 A
		FE/FPE	30 A x 2
	Sub-fuse		15 A x 2, 10 A x 2
	EPS fuse (FPM/FPE)		40 A

TORQUE VALUES

STANDARD TORQUE VALUES

FASTENER TYPE	TORQUE N·m (kgf·m, lbf·ft)	FASTENER TYPE	TORQUE N·m (kgf·m, lbf·ft)
5 mm bolt and nut	5.2 (0.5, 3.8)	5 mm screw	4.2 (0.4, 3.1)
6 mm bolt and nut	10 (1.0, 7)	6 mm screw	9 (0.9, 6.6)
8 mm bolt and nut	22 (2.2, 16)	6 mm flange bolt (8 mm head, small flange)	10 (1.0, 7)
10 mm bolt and nut	34 (3.5, 25)		
12 mm bolt and nut	54 (5.5, 40)	6 mm flange bolt (8 mm head, large flange)	12 (1.2, 9)
		6 mm flange bolt (10 mm head) and nut	12 (1.2, 9)
		8 mm flange bolt and nut	27 (2.8, 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.

FRAME/BODY PANELS/EXHAUST SYSTEM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Rear carrier bolt	4	10	74 (7.5, 55)	
Mudguard bracket nut	8	8	32 (3.3, 24)	
Muffler band bolt	2	8	23 (2.3, 17)	
Muffler cover bolt	2	6	22 (2.2, 16)	
Exhaust pipe cover band bolt	3	–	2.0 (0.2, 1.5)	
Muffler cover band screw (front side)	1	–	2.0 (0.2, 1.5)	
Muffler cover band screw (rear side)	1	–	3.2 (0.33, 2.4)	
Exhaust pipe stud bolt	2	8	6.0 (0.6, 4.4)	See page 2-15

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	2	6	17 (1.7, 13)	
Valve adjusting hole cap	2	36	12 (1.2, 9)	
Timing hole cap	1	14	10 (1.0, 7)	
Engine oil drain bolt	1	12	25 (2.5, 18)	
Rear final gear case oil check bolt	1	8	12 (1.2, 9)	
Rear final gear case oil filler cap	1	30	12 (1.2, 9)	
Rear final gear case oil drain bolt	1	8	12 (1.2, 9)	
Rear final gear case skid plate bolt	3	8	32 (3.3, 24)	ALOC bolt: replace with a new one.
Front final gear case oil filler cap	1	30	12 (1.2, 9)	
Front final gear case oil drain bolt	1	8	12 (1.2, 9)	
Final clutch arm cover bolt	3	6	10 (1.0, 7)	
Front master cylinder reservoir cap screw	2	4	2.0 (0.2, 1.5)	
Tie-rod lock nut (knuckle side)	2	12	54 (5.5, 40)	See page 3-26
Tie-rod lock nut (steering arm side)	2	12	54 (5.5, 40)	Left hand threads. See page 3-26

PGM-FI SYSTEM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Sensor unit torx screw (T25)	3	5	3.4 (0.3, 2.5)	
ECT sensor	1	10	12 (1.2, 9)	
Bank angle sensor mounting bolt	2	6	10 (1.0, 7)	

IGNITION SYSTEM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Timing hole cap	1	14	10 (1.0, 7)	

ELECTRIC STARTER

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Starter motor case bolt	2	5	4.9 (0.5, 3.6)	
Negative brush set screw	1	5	3.7 (0.4, 2.7)	

FUEL SYSTEM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Sub-fuel tank/fuel pump assembly bolt	6	6	8.8 (0.9, 6.5)	See page 7-20
Fuel joint mounting bolt	2	6	9.0 (0.9, 6.6)	
Wire harness clamp stay screw	1	5	3.4 (0.3, 2.5)	
Fuel feed hose clamp stay screw	1	5	3.4 (0.3, 2.5)	
Insulator band screw (Cylinder head side)	1	5	–	See page 7-25
Insulator band screw (Throttle body side)	1	5	–	See page 7-26
Throttle drum cover screw	1	4	1.8 (0.2, 1.3)	
IACV torx screw (T20)	2	4	2.1 (0.2, 1.5)	
Fuel injector mounting bolt	2	5	5.1 (0.5, 3.8)	

COOLING SYSTEM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Cooling fan nut	1	5	2.7 (0.3, 2.0)	Apply locking agent to the threads.
Fan motor bolt	3	5	5.2 (0.5, 3.8)	
Fan motor stay bolt	3	6	8.4 (0.9, 6.2)	

CYLINDER HEAD/VALVE

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Cylinder head nut	4	10	48 (4.9, 35)	Apply engine oil to the threads and seating surface.
Cam chain tensioner pivot bolt	1	6	12 (1.2, 9)	Apply locking agent to the threads.
Spark plug	1	14	22 (2.2, 16)	
ECT sensor	1	10	12 (1.2, 9)	
Upper engine hanger nut (frame side)	1	10	54 (5.5, 40)	
Upper engine hanger bolt (engine side)	2	8	32 (3.3, 24)	

CYLINDER/PISTON

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Cylinder stud bolt	4	10	12 (1.2, 9)	See page 11-8

CLUTCH/GEARSHIFT LINKAGE

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Clutch spring bolt	4	6	13 (1.3, 10)	
Centrifugal clutch lock nut	1	20	118 (12.0, 87)	Lock nut: replace with a new one. Apply engine oil to the threads and seating surface. Stake.
Change clutch lock nut	1	18	108 (11.0, 80)	Lock nut: replace with a new one. Apply engine oil to the threads and seating surface. Stake.
Shift drum stopper arm pivot bolt	1	6	12 (1.2, 9)	Apply locking agent to the threads.
Gearshift cam bolt	1	6	16 (1.6, 12)	Apply locking agent to the threads.
Gearshift spindle return spring pin	1	8	22 (2.2, 16)	Apply locking agent to the threads.
Gearshift spindle A stopper bolt (FM/FPM)	1	8	27 (2.8, 20)	Apply locking agent to the threads.

ALTERNATOR/STARTER CLUTCH

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Starter clutch bolt	6	8	37 (3.8, 27)	Apply locking agent to the threads.
Flywheel bolt (U.S.A. type)	1	12	108 (11.0, 80)	Apply engine oil to the threads and seating surface.
Flywheel/driven pulley bolt (Canada type)	1	12	108 (11.0, 80)	Apply engine oil to the threads and seating surface.
CKP sensor bolt	2	5	6.0 (0.6, 4.4)	Apply locking agent to the threads.

CRANKCASE/TRANSMISSION/CRANKSHAFT/BALANCER

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Mainshaft bearing setting plate bolt	2	6	12 (1.2, 9)	Apply locking agent to the threads.

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 nut (frame side)	1	10	54 (5.5, 40)	
Upper engine hanger bolt (engine side)	2	8	32 (3.3, 24)	
Gearshift pedal pinch bolt (FM/FPM)	1	6	20 (2.0, 15)	
Front final gear case mounting nut	2	10	44 (4.5, 32)	Lock nut: replace with a new one.

FRONT WHEEL/SUSPENSION/STEERING

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Throttle housing cover screw	3	4	1.5 (0.2, 1.1)	
Throttle housing holder screw	2	5	4.2 (0.4, 3.1)	
Throttle lever pivot nut	1	6	7.0 (0.7, 5.2)	
Meter cover stay bolt	2	8	32 (3.3, 24)	
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 align with the cotter pin hole.
Front brake disc bolt	8	8	42 (4.3, 31)	ALOC bolt: replace with a new one.
Splash guard bolt	6	6	11 (1.1, 8)	ALOC bolt: replace with a new one.
Shock absorber mounting nut	4	10	39 (4.0, 29)	Lock nut: replace with a new one.
Upper arm pivot nut	2	10	34 (3.5, 25)	Lock nut: replace with a new one.
Lower arm pivot nut	4	10	39 (4.0, 29)	Lock nut: replace with a new one.
Upper and lower arm ball joint nut	4	12	29 (3.0, 21)	Castle nut: tighten to the specified torque and further tighten until its grooves align with the cotter pin hole.
Brake hose clamp bolt	7	6	12 (1.2, 9)	ALOC bolt: replace with a new one.
Tie-rod joint nut	4	12	54 (5.5, 40)	Lock nut: replace with a new one.
Steering shaft end nut	1	14	108 (11.0, 80)	Lock nut: replace with a new one.
Steering shaft holder bolt	2	8	32 (3.3, 24)	
Steering shaft pinch bolt (FPM/FPE)	1	10	60 (6.1, 44)	ALOC bolt: replace with a new one.
EPS unit mounting nut (FPM/FPE)	2	8	22 (2.2, 16)	
Handlebar switch housing screw (FM/FPM)	2	5	4.2 (0.4, 3.1)	
Handlebar switch housing screw (FE/FPE)	3	5	4.2 (0.4, 3.1)	
Rear brake lever bracket holder screw	2	5	4.2 (0.4, 3.1)	
Front master cylinder holder bolt	2	6	12 (1.2, 9)	
Front brake caliper mounting bolt	4	8	30 (3.1, 22)	ALOC bolt: replace with a new one.

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)	
Shock absorber upper mounting nut	1	10	39 (4.0, 29)	Lock nut: replace with a new one.
Shock absorber lower mounting nut	1	10	39 (4.0, 29)	Lock nut: replace with a new one.
Universal joint guard bolt	2	6	10 (1.0, 7)	ALOC bolt: replace with a new one.
Swingarm pivot bolt	2	12	118 (12.0, 87)	ALOC bolt: 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	3	10	34 (3.5, 25)	
Front brake caliper bleed valve	2	8	5.4 (0.6, 4.0)	
Front master cylinder reservoir cap screw	2	4	2.0 (0.2, 1.5)	
Pad pin	4	10	17 (1.7, 13)	
Pad pin plug	4	10	2.4 (0.2, 1.8)	
Front brake lever pivot bolt	1	6	1.0 (0.1, 0.7)	
Front brake lever pivot nut	1	6	5.9 (0.6, 4.4)	
Front brake light/inhibitor switch screw	1	4	1.2 (0.1, 0.9)	Apply locking agent to the threads.
Front master cylinder holder bolt	2	6	12 (1.2, 9)	
Front brake caliper mounting bolt	4	8	30 (3.1, 22)	ALOC bolt: replace with a new one.
Front brake caliper slide pin	2	8	22 (2.2, 16)	Apply locking agent to the threads.
Front brake caliper bracket pin	2	8	17 (1.7, 13)	
Rear brake arm pinch bolt/nut	1	8	20 (2.0, 15)	
Rear wheel hub nut	2	20	137 (14.0, 101)	Castle nut: tighten to the specified torque and further tighten until its grooves align with the cotter pin hole.
Rear brake panel drain bolt	1	8	12 (1.2, 9)	
Brake pipe joint bolt	2	10	14 (1.4, 10)	

FRONT DRIVING MECHANISM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Front final gear pinion bearing lock nut	1	60	98 (10.0, 72)	Lock nut: replace with a new one. Stake.
Differential ring gear bolt	11	8	49 (5.0, 36)	ALOC bolt: replace with a new one.
Front final gear case cover bolt	2	10	47 (4.8, 35)	Apply locking agent to the threads.
	4	8	25 (2.5, 18)	
Front final clutch shift fork bolt	1	6	10 (1.0, 7)	ALOC bolt: replace with a new one.
Front final clutch housing bolt	3	8	25 (2.5, 18)	
Front final gear case mounting nut	2	10	44 (4.5, 32)	Lock nut: replace with a new one.
4WD select switch	1	10	12 (1.2, 9)	
4WD select switch wire clamp bolt	1	6	10 (1.0, 7)	
Final clutch arm cover bolt	3	6	10 (1.0, 7)	

REAR DRIVING MECHANISM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Rear final gear case cover bolt	2	10	47 (4.8, 35)	Apply locking agent to the threads.
	6	8	25 (2.5, 18)	
Rear final gear pinion bearing lock nut	1	64	98 (10.0, 72)	Lock nut: replace with a new one. Stake.
Right axle housing mounting nut	4	10	52 (5.3, 38)	Lock nut: replace with a new one.
Rear final gear case mounting nut	8	10	47 (4.8, 35)	Lock nut: replace with a new one.
Shock absorber lower mounting nut	1	10	39 (4.0, 29)	Lock nut: replace with a new one.
Rear final gear case skid plate bolt	3	8	32 (3.3, 24)	ALOC bolt: replace with a new one.
Rear brake panel mounting nut	4	10	47 (4.8, 35)	Lock nut: replace with a new one.
Rear wheel hub nut	2	20	137 (14.0, 101)	Castle nut: tighten to the specified torque and further tighten until its grooves align with the cotter pin hole. For tightening procedure: See page 20-24
Trailer hitch nut	2	10	34 (3.5, 25)	Lock nut: replace with a new one.

LIGHTS/METERS/SWITCHES

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Combination meter mounting screw	3	5	0.8 (0.1, 0.6)	
Gear position switch wire clamp bolt	2	6	12 (1.2, 9)	Apply locking agent to the threads.
Rear brake light switch screw	1	4	1.2 (0.1, 0.9)	Apply locking agent to the threads.
Front brake light/inhibitor switch screw	1	4	1.2 (0.1, 0.9)	Apply locking agent to the threads.
4WD select switch	1	10	12 (1.2, 9)	
Fuel level sensor bolt	3	6	9.0 (0.9, 6.6)	

ELECTRIC SHIFT PROGRAM (ESP: FE/FPE models)

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Shift angle sensor bolt	2	5	6.0 (0.6, 4.4)	Apply locking agent to the threads.

OTHERS

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Parking brake lever pivot screw	1	4	6.9 (0.7, 5.1)	
Rear brake lever pivot bolt	1	6	9.8 (1.0, 7.2)	
Rear brake lever pivot nut	1	6	9.8 (1.0, 7.2)	

LUBRICATION & SEAL POINTS

ENGINE

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

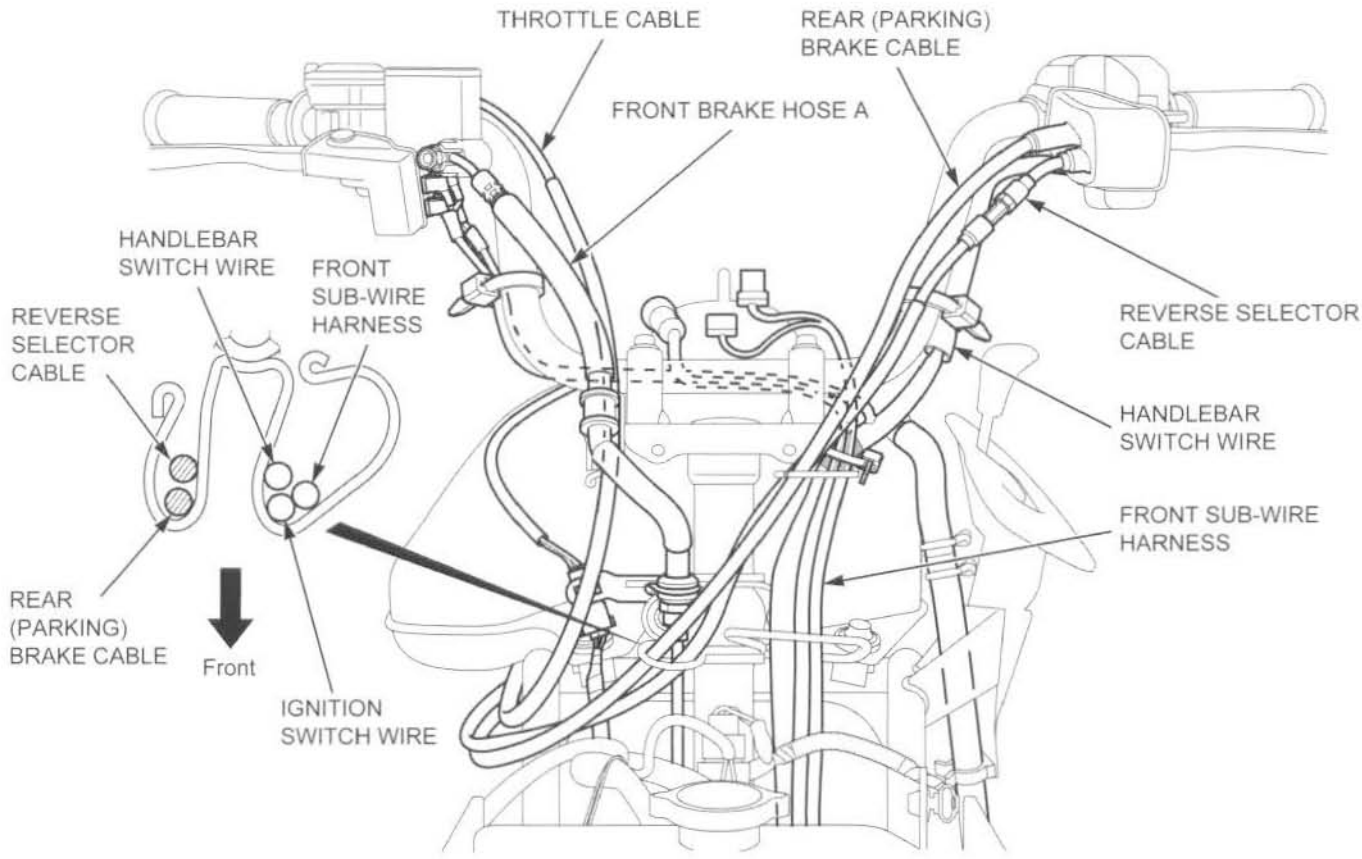
MATERIAL	LOCATION	REMARKS
Locking agent	Cam chain tensioner lifter bolt threads	Coating width: 6.5 ± 1 mm (0.26 ± 0.04 in)
	Cam chain tensioner pivot bolt threads	Coating width: 6.5 ± 1 mm (0.26 ± 0.04 in)
	Camshaft bearing setting plate bolt threads	Coating width: 5 – 8 mm (0.20 ± 0.31 in)
	Shift drum stopper arm pivot bolt threads	Coating width: 6.5 ± 2 mm (0.26 ± 0.08 in)
	Gearshift cam bolt threads	Coating width: 6.5 ± 1 mm (0.26 ± 0.04 in)
	Gearshift spindle return spring pin threads	Coating width: 6.5 ± 1 mm (0.26 ± 0.04 in)
	Gearshift spindle A stopper bolt threads	FM/FPM Coating width: 6.5 ± 1 mm (0.26 ± 0.04 in)
	Starter clutch bolt threads	Coating width: 6.5 ± 1 mm (0.26 ± 0.04 in)
	CKP sensor bolt threads	Coating width: 6 ± 1 mm (0.24 ± 0.04 in)
	Mainshaft bearing setting plate bolt threads	Coating width: 6.5 ± 1 mm (0.26 ± 0.04 in)
	Gear position switch retaining bolt threads	Coating width: 6.5 ± 1 mm (0.26 ± 0.04 in)
	Gear position switch wire clamp bolt threads	Coating width: 6.5 ± 1 mm (0.26 ± 0.04 in)
	Shift angle sensor bolt threads	FE/FPE Coating width: 5 ± 1 mm (0.20 ± 0.04 in)
	Recoil starter assembly mounting bolt	Canada type Coating width: 6.5 ± 1 mm (0.26 ± 0.04 in)
Liquid sealant (ThreeBond 1215 or equivalent)	Front crankcase cover mating surface	See page 12-23
	Alternator/CKP sensor wire grommet seating surface	
	Gear position switch wire grommet seating surface	
	Rear crankcase cover mating surface	See page 13-9
	Crankcase mating surface	See page 14-21
	Reduction gear cover mating surface	FE/FPE See page 23-32
UNIREX N3 grease (EXXON)	Electric shift reduction gear/spindle gear teeth and journals (front crankcase cover and gear cover)	FE/FPE 2 – 4 g (0.07 – 0.14 oz) See page 23-31

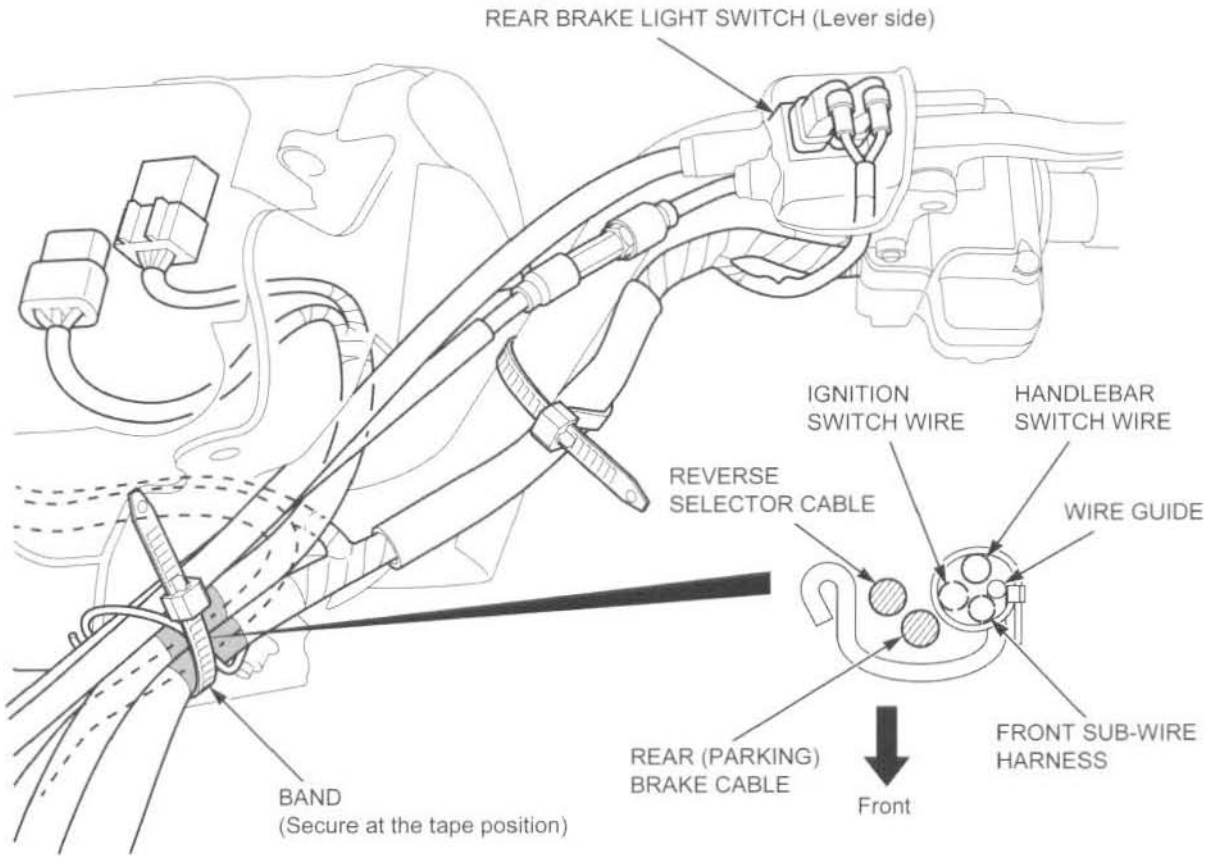
FRAME

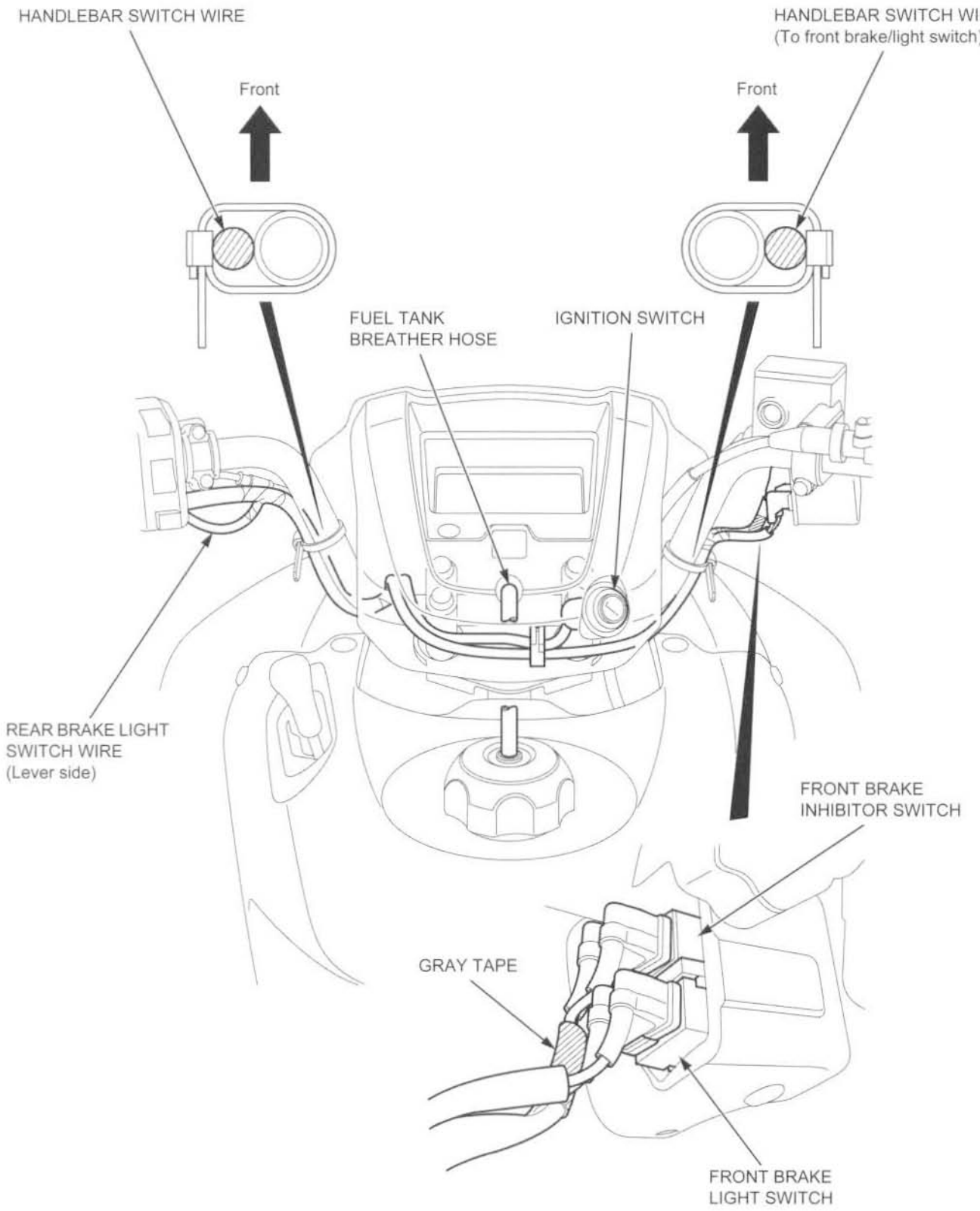
MATERIAL	LOCATION	REMARKS
Multi-purpose grease	Throttle cable end (lever side)	
	Throttle cable outer threads (each end)	
	Throttle lever pivot and dust seal lip	
	Rear (parking) brake lever pivot	
	Parking arm pin	
	Knuckle inner and outer dust seal lips	2.5 – 3.0 g (0.09 – 0.11 oz) per each seal
	Steering shaft bushing sliding surface	2 – 3 g (0.07 – 0.11 oz)
	Steering shaft dust seal lips	
	Rear brake cam dust seal lips	
	Rear brake cam spindle	0.2 – 0.3 g (0.007 – 0.011 oz)
	Rear brake cam shoe contacting surfaces	0.2 – 0.3 g (0.007 – 0.011 oz)
	Rear brake panel anchor pin shoe contacting surfaces	0.2 – 0.3 g (0.007 – 0.011 oz)
	Rear brake drum cover dust seal lips	3 – 4 g (0.11 – 0.14 oz)
	Rear brake panel O-ring (drum cover and right axle housing side)	
	Rear brake panel dust seal lips	
	Rear brake pedal pivot	
	Rear brake pedal pivot dust seal lips	
	Rear brake cable ends (lever and pedal side)	
	Front final gear case oil seal lips (for drive shafts)	
	Front final gear case cover O-ring	
	Front final gear oil filler cap O-ring	
	Front final clutch arm shaft oil seal	
	Front final clutch arm shaft O-ring	
	Front final clutch arm shaft outer surface	
	Front final clutch pinion joint oil seal lips	
	Front final clutch housing O-ring	
	Rear final gear case oil seal lips (for propeller shaft)	
	Rear final gear case oil seal lips (for ring gear)	
	Rear final gear case O-ring (right axle housing side)	
	Rear final gear oil filler cap O-ring	
	Left axle housing O-ring	
	Left axle housing dust seal lips	
	Rear wheel hub dust seal lips	
Molybdenum disulfide grease	Front drive shaft splines (wheel side)	
	Front shock absorber lower pivot bushing and dust seal lips	
	Upper arm pivot bushing inner surface	
	Upper arm pivot dust seal cap lips	
	Steering shaft spline	FM/FE
	EPS unit output shaft spline	FPM/FPE
	Rear shock absorber lower pivot bushing and dust seal lips	
	Swingarm pivot bearing	
	Swingarm pivot dust seal lips	
	Front propeller shaft boot lip	
	Front propeller shaft joint splines (both sides)	Propeller shaft side: 5 – 8 g (0.2 – 0.3 oz)
	Front final clutch pinion joint splines	5 – 8 g (0.2 – 0.3 oz)
	Front propeller shaft end (pinion joint contacting area)	
	Universal joint splines (both sides)	
	Rear propeller shaft splines (gear case side)	
	Output shaft O-ring	
	Rear propeller shaft O-ring	
	Rear axle splines (3 places)	
NKG106 (Kyodo Yushi)	Front drive shaft outboard joint inside	50 – 70 g (1.8 – 2.5 oz)
NKG205 (Kyodo Yushi)	Front drive shaft inboard joint inside	40 – 60 g (1.4 – 2.1 oz)

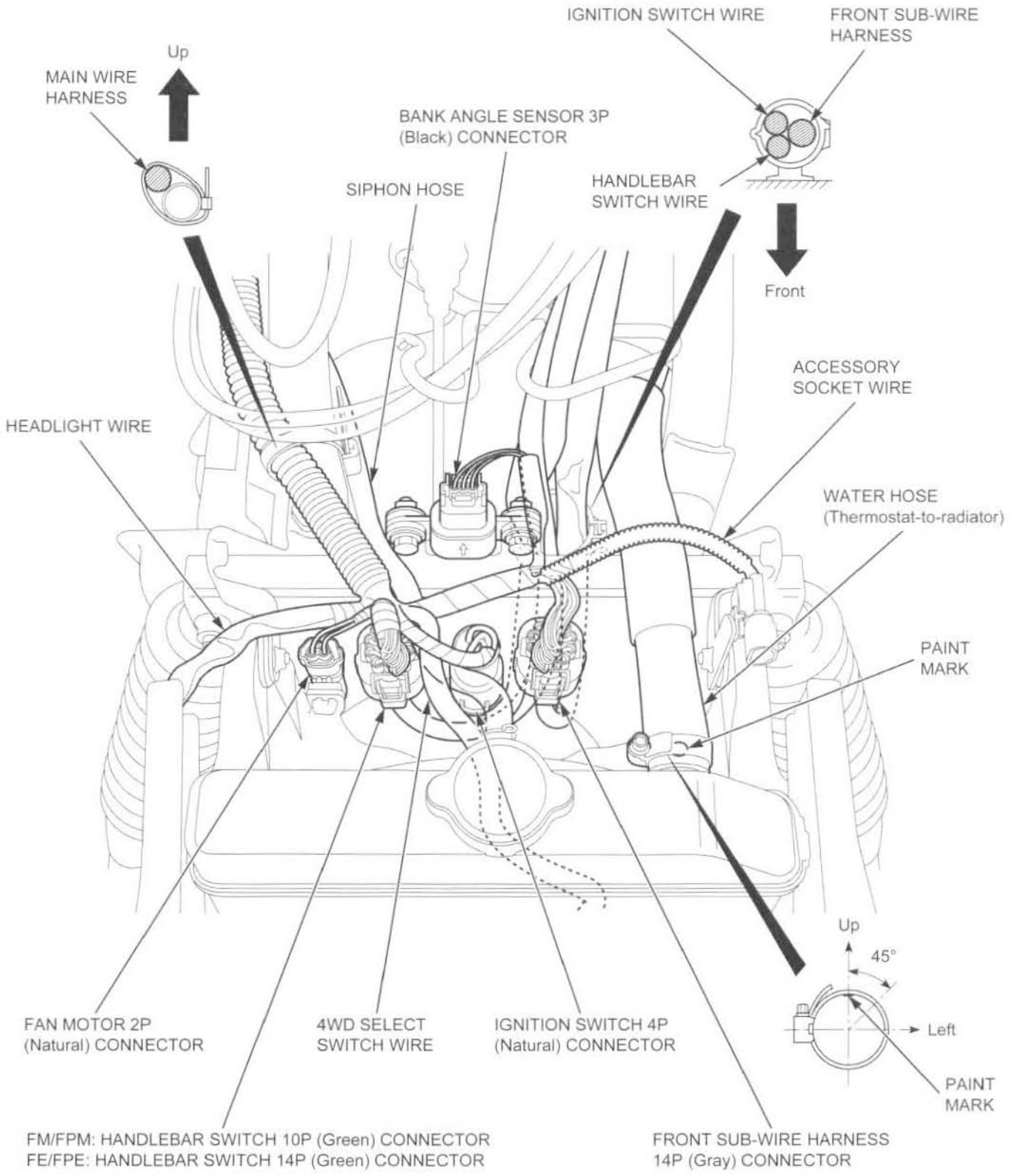
MATERIAL	LOCATION	REMARKS
Honda Bond A or Pro Honda Handgrip Cement (U.S.A. only) or equivalent	Handlebar grip rubber inside	
	Air cleaner housing-to-connecting tube mating area	
	Air cleaner housing-to-intake air duct tube mating area	
	Air cleaner housing-to-air cleaner sub chamber tube mating area	
	Air cleaner housing-to-IAT sensor grommet mating area	
Engine oil	Rear brake cam felt seal	
Silicone grease	Sub-fuel tank/fuel pump O-rings	
	Front brake lever-to-master piston contacting area	
	Front brake lever pivot	
	Front brake caliper piston boot inside	0.2 g (0.01 oz) minimum
	Front brake caliper slide pin groove and sliding area	0.4 g (0.01 oz) minimum
	Front brake caliper bracket pin boot inside	0.4 g (0.01 oz) minimum
DOT 4 brake fluid	Brake master cylinder piston and cups	
	Brake caliper piston and piston seal	
Cable lubricant	Throttle inner cable	
	Rear brake inner cables	
	2WD/4WD selector inner cable	
Liquid sealant (ThreeBond 1215 or equivalent)	Rear final gear case cover mating surface	
Locking agent	Cooling fan nut threads	
	Front brake caliper slide pin threads	
	Front final gear case cover 10 mm bolt threads	Coating width: 5 ± 1 mm (0.20 ± 0.04 in)
	Rear final gear case cover 10 mm bolt threads	Coating width: 5 ± 1 mm (0.20 ± 0.04 in)
	Front brake light/inhibitor switch screw threads	
	Rear brake light switch screw threads	
Pro Honda Foam Filter Oil or equivalent	Air cleaner element inside	17 – 23 g (0.6 – 0.8 oz)

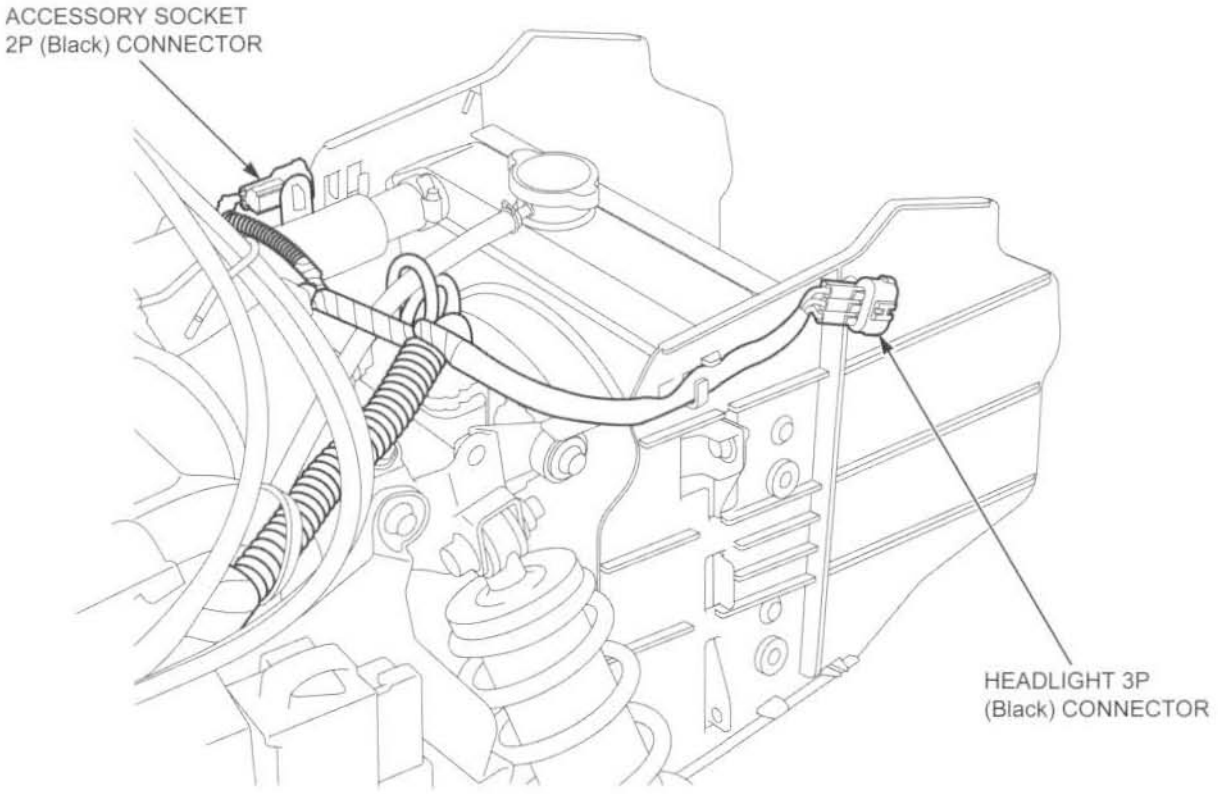
CABLE & HARNESS ROUTING



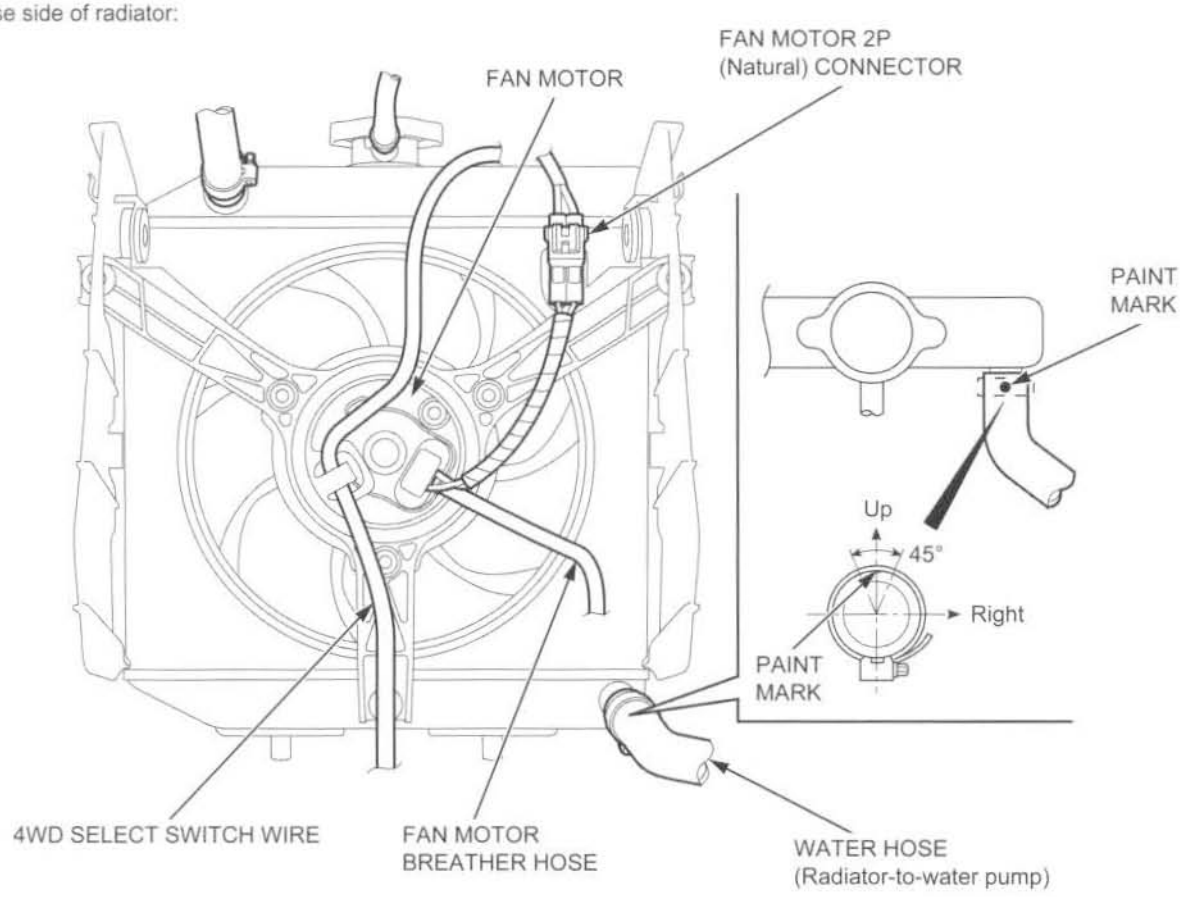


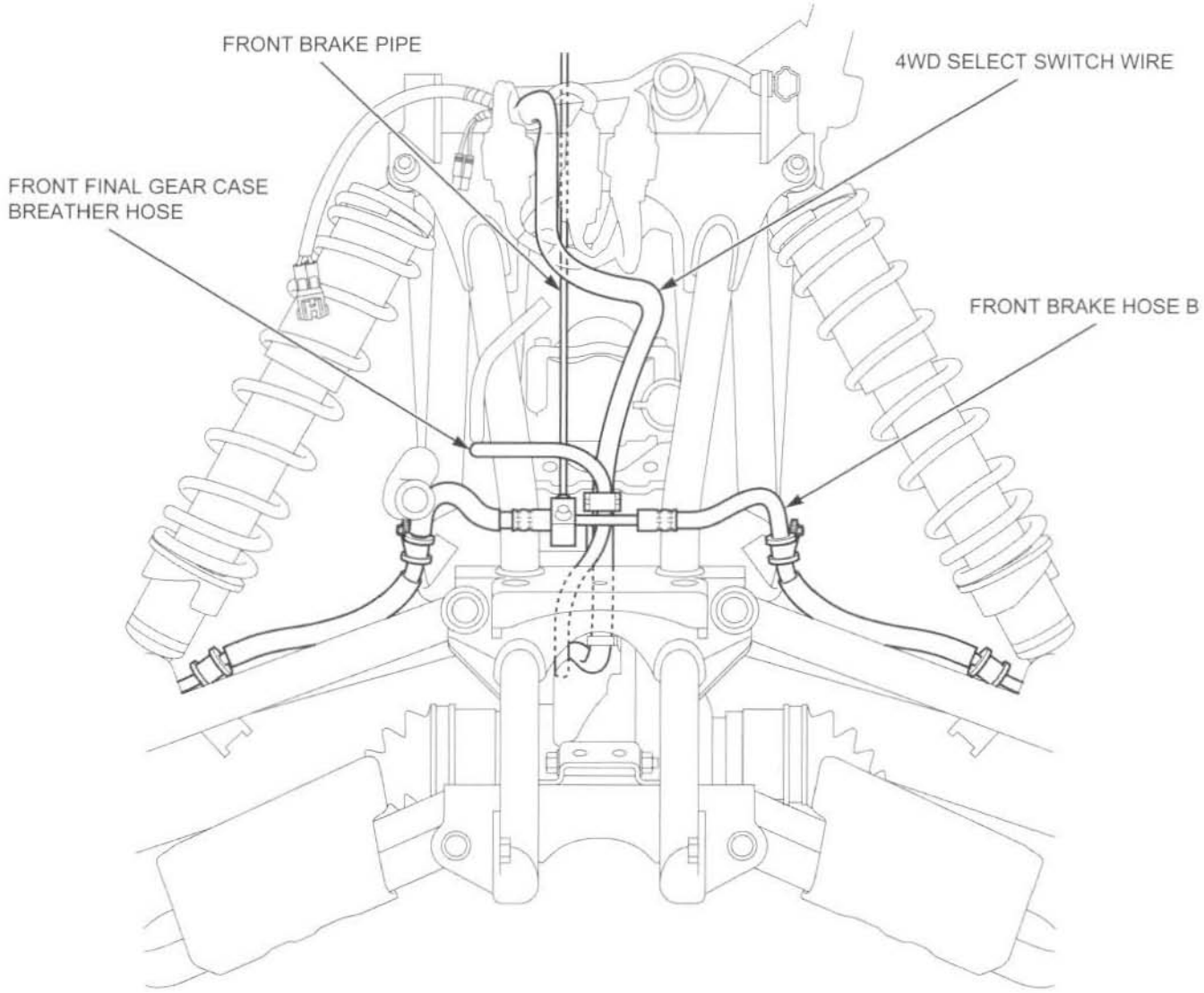

HANDLEBAR SWITCH WIRE
Front
HANDLEBAR SWITCH WIRE
(To front brake/light switch)
Front
FUEL TANK
BREATHER HOSE
IGNITION SWITCH
REAR BRAKE LIGHT
SWITCH WIRE
(Lever side)
FRONT BRAKE
INHIBITOR SWITCH
GRAY TAPE
FRONT BRAKE
LIGHT SWITCH

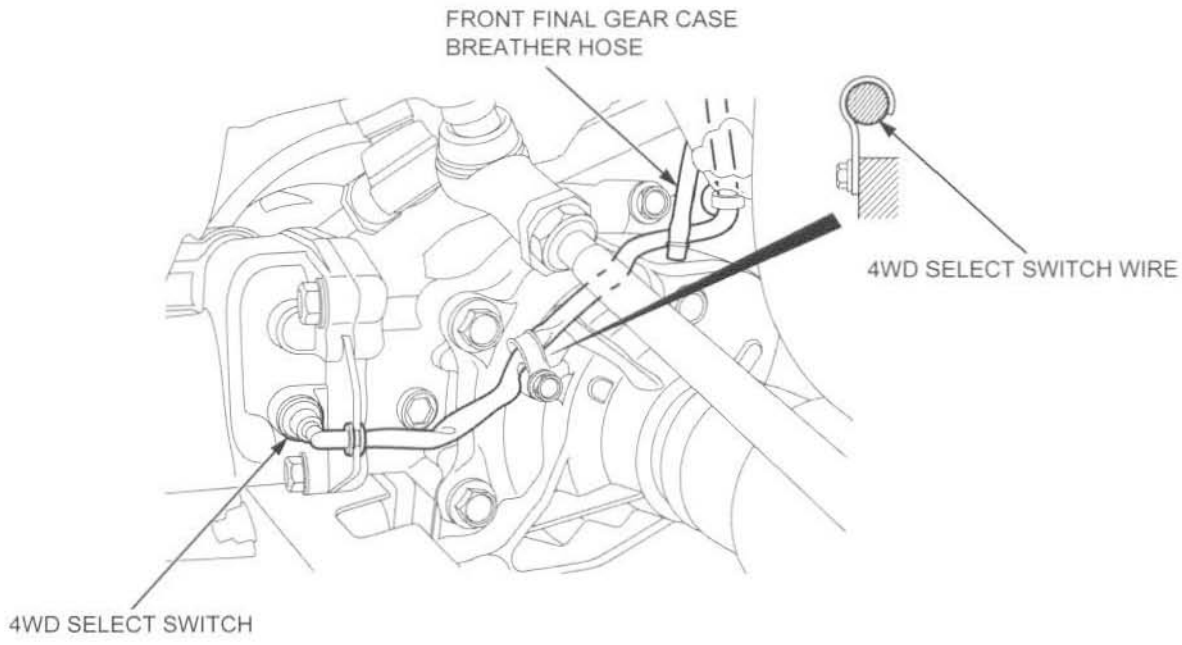

IGNITION SWITCH WIRE
FRONT SUB-WIRE HARNESS
Up
MAIN WIRE HARNESS
BANK ANGLE SENSOR 3P (Black) CONNECTOR
SIPHON HOSE
HANDLEBAR SWITCH WIRE
Front
ACCESSORY SOCKET WIRE
HEADLIGHT WIRE
WATER HOSE (Thermostat-to-radiator)
PAINT MARK
Up
45°
Left
PAINT MARK
FAN MOTOR 2P (Natural) CONNECTOR
4WD SELECT SWITCH WIRE
IGNITION SWITCH 4P (Natural) CONNECTOR
FM/FPM: HANDLEBAR SWITCH 10P (Green) CONNECTOR
FE/FPE: HANDLEBAR SWITCH 14P (Green) CONNECTOR
FRONT SUB-WIRE HARNESS 14P (Gray) CONNECTOR



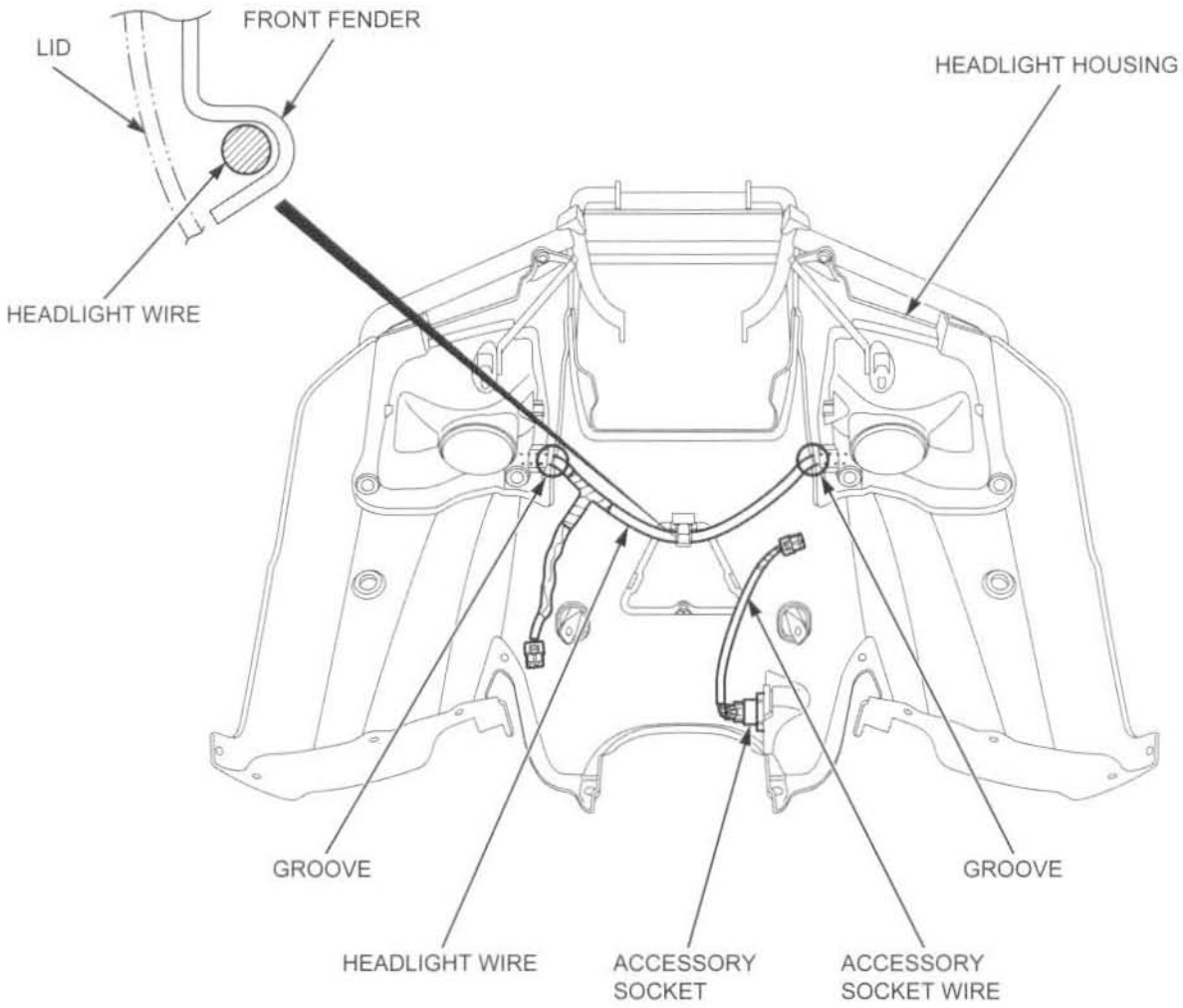
Reverse side of radiator:

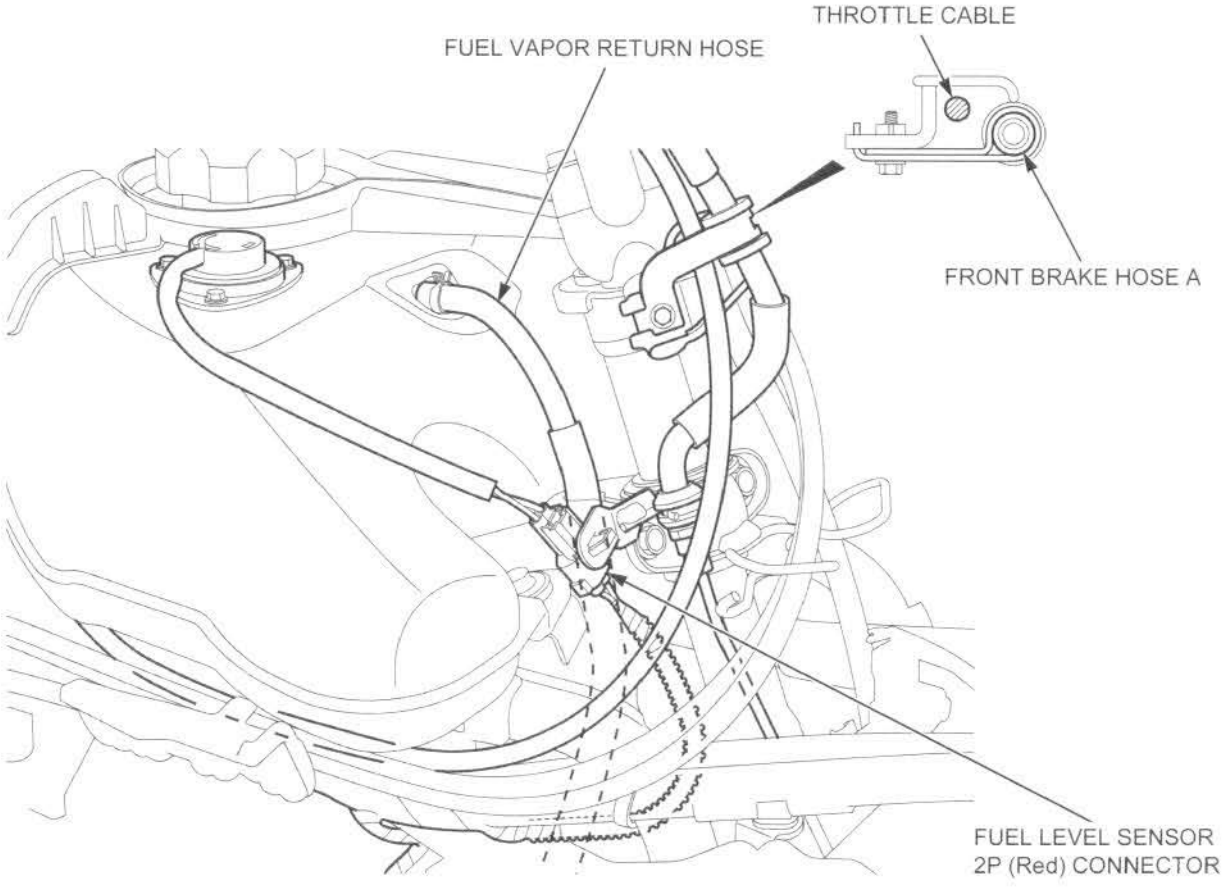


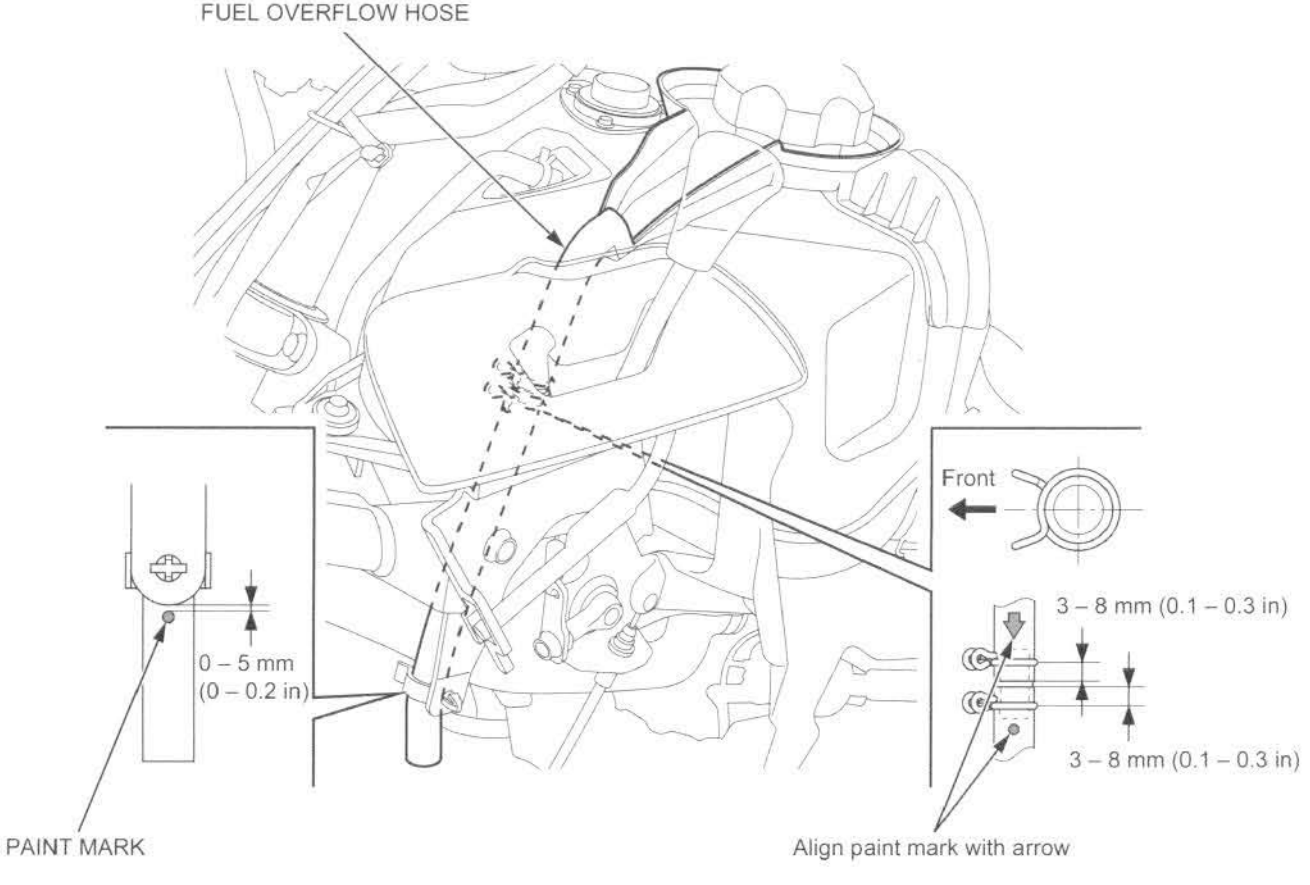

FRONT BRAKE PIPE
4WD SELECT SWITCH WIRE
FRONT FINAL GEAR CASE
BREATHER HOSE
FRONT BRAKE HOSE B

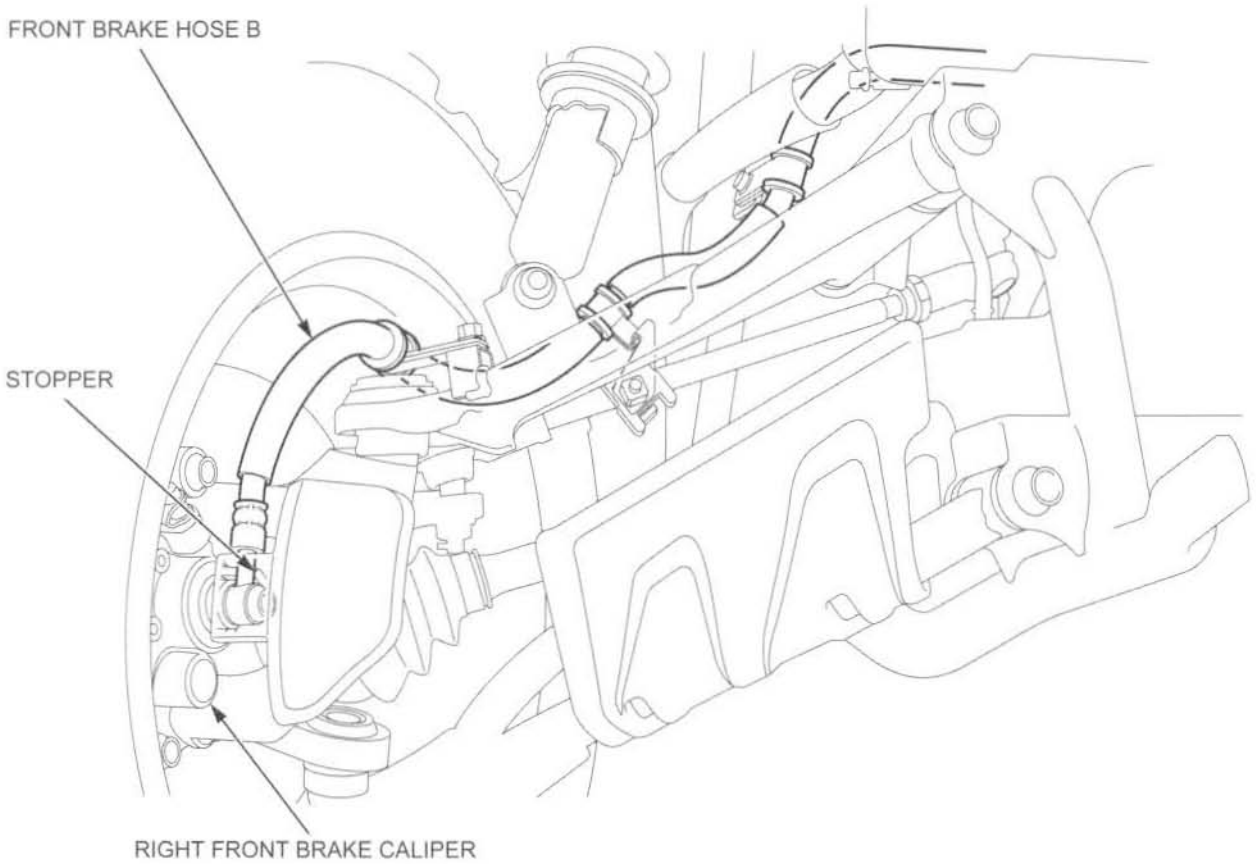

FRONT FINAL GEAR CASE
BREATHER HOSE
4WD SELECT SWITCH WIRE
4WD SELECT SWITCH

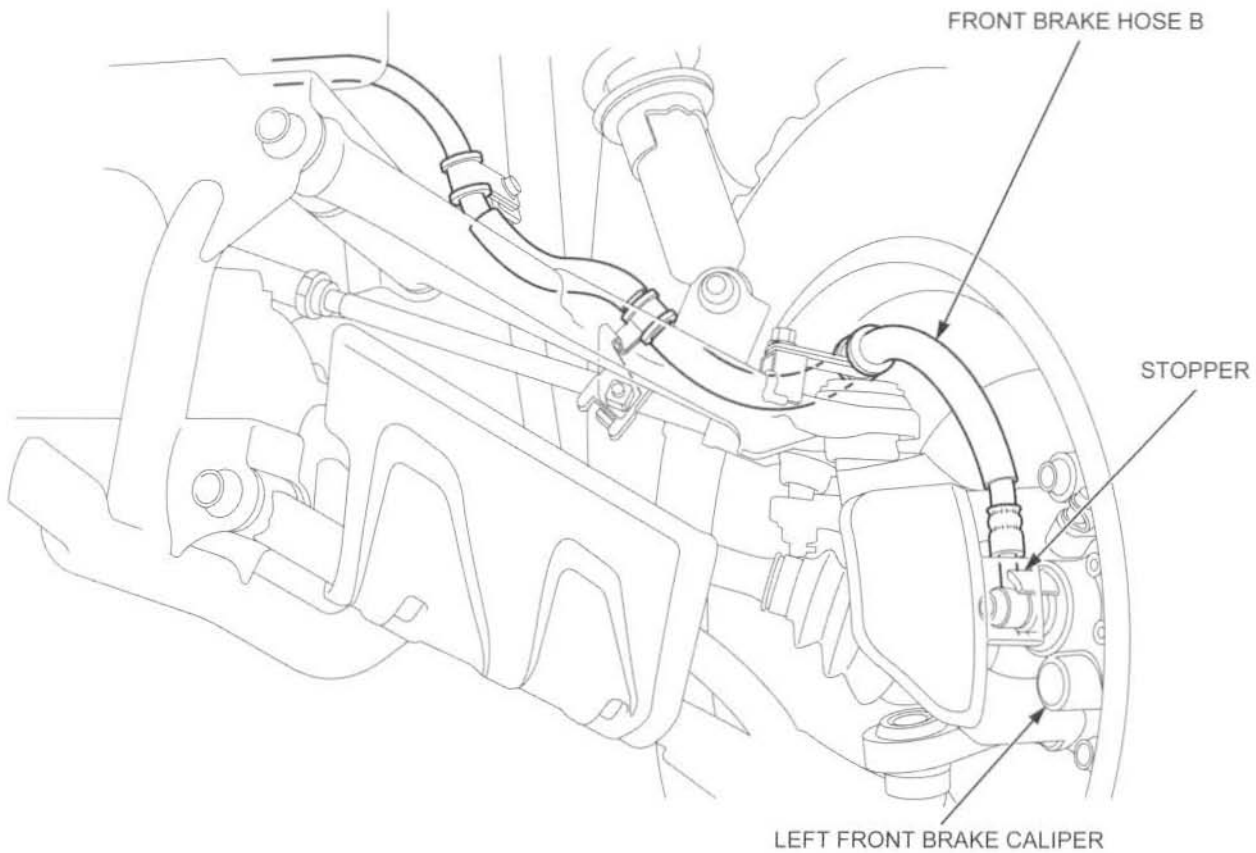
Inside of front fender:

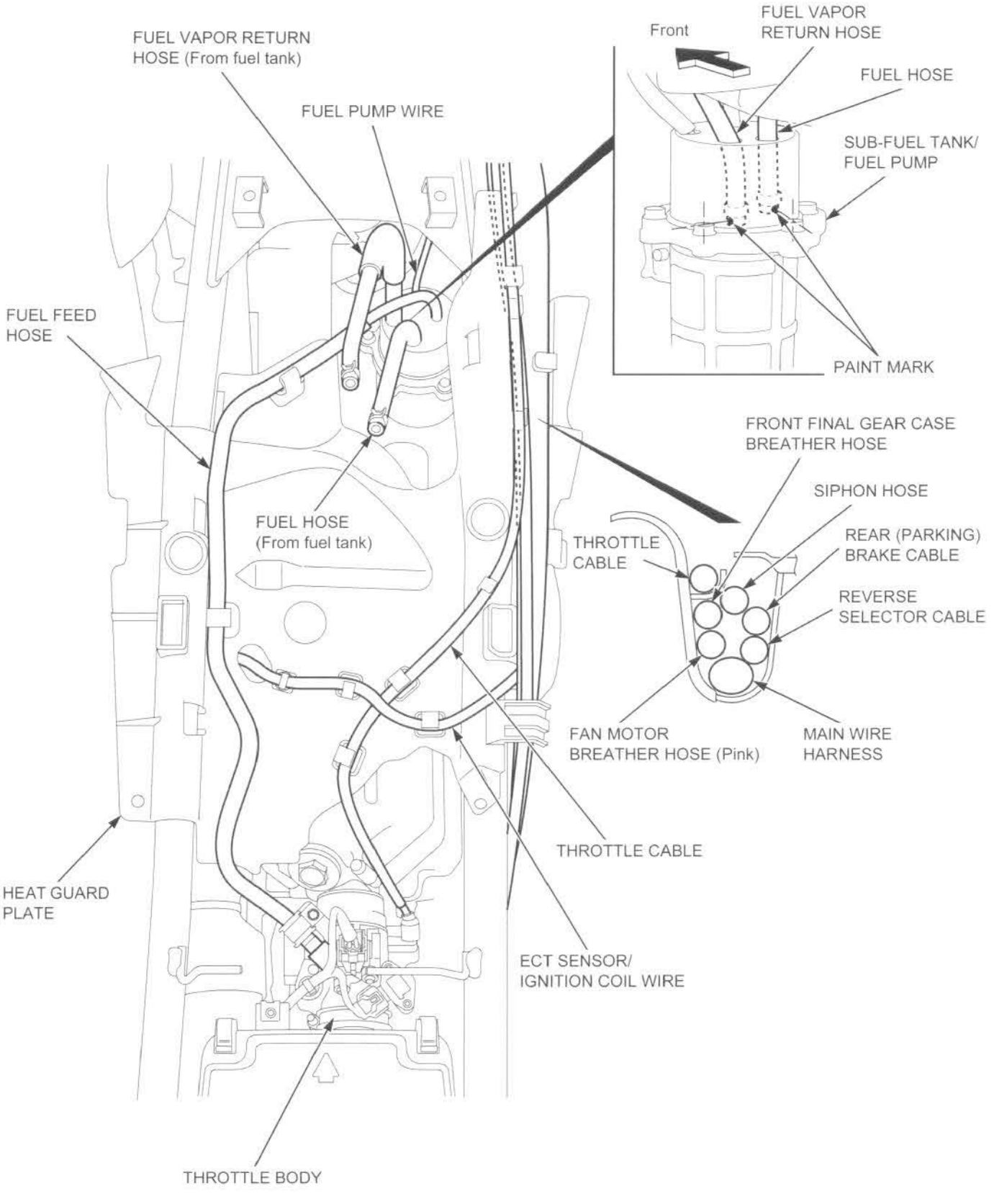



THROTTLE CABLE
FUEL VAPOR RETURN HOSE
FRONT BRAKE HOSE A
FUEL LEVEL SENSOR
2P (Red) CONNECTOR

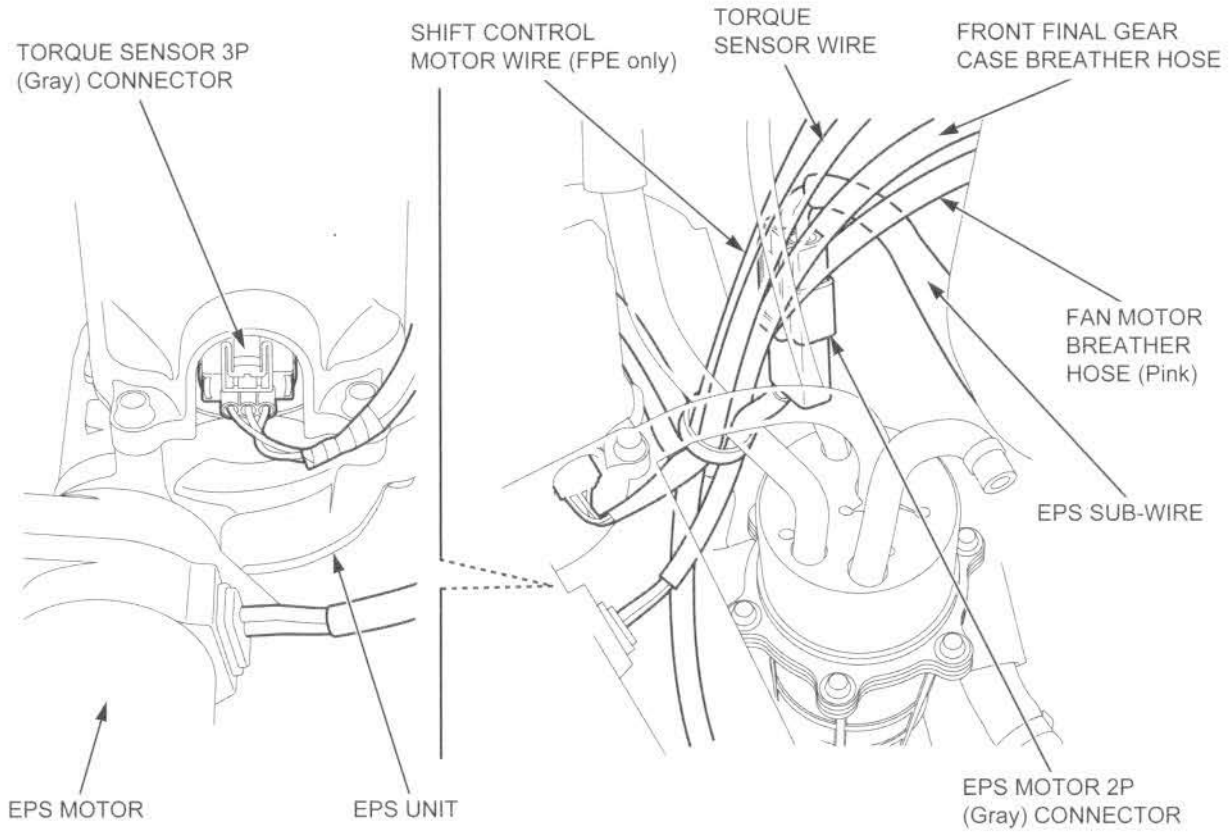

FUEL OVERFLOW HOSE
Front
0 – 5 mm
(0 – 0.2 in)
3 – 8 mm (0.1 – 0.3 in)
3 – 8 mm (0.1 – 0.3 in)
PAINT MARK
Align paint mark with arrow


FRONT BRAKE HOSE B
STOPPER
RIGHT FRONT BRAKE CALIPER

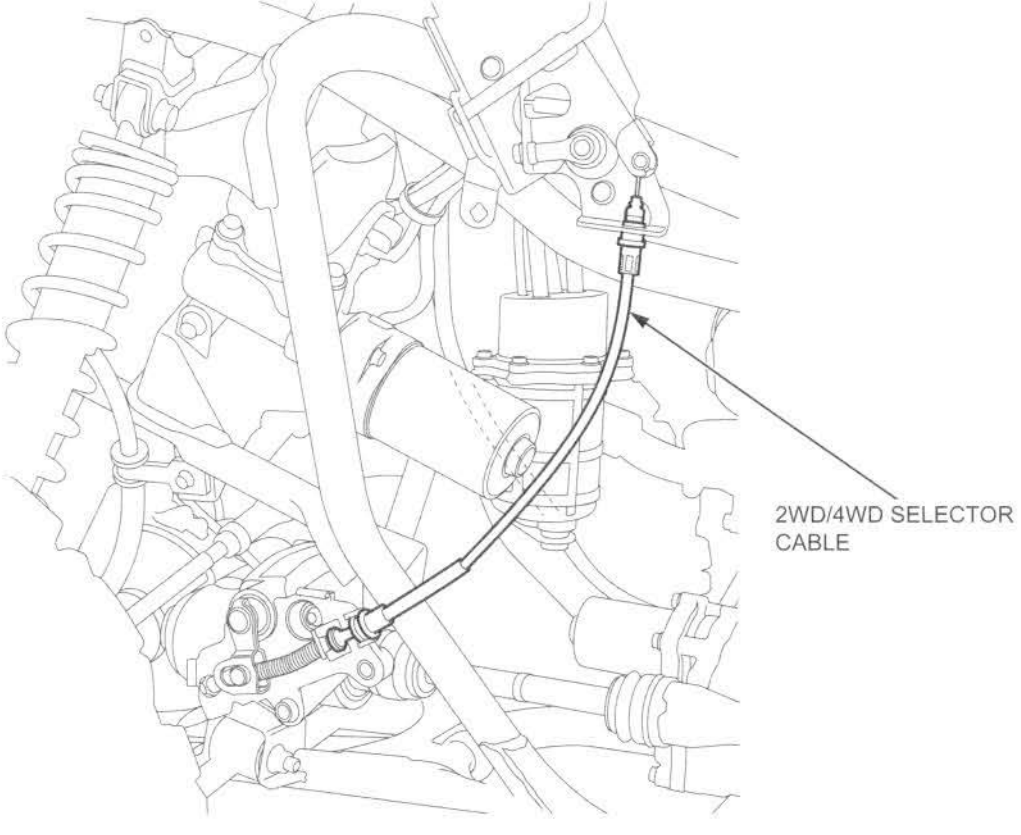

FRONT BRAKE HOSE B
STOPPER
LEFT FRONT BRAKE CALIPER


FUEL VAPOR RETURN HOSE (From fuel tank)
FUEL PUMP WIRE
FUEL FEED HOSE
FUEL HOSE (From fuel tank)
HEAT GUARD PLATE
THROTTLE BODY
Front
FUEL VAPOR RETURN HOSE
FUEL HOSE
SUB-FUEL TANK/ FUEL PUMP
PAINT MARK
FRONT FINAL GEAR CASE BREATHER HOSE
SIPHON HOSE
REAR (PARKING) BRAKE CABLE
REVERSE SELECTOR CABLE
THROTTLE CABLE
FAN MOTOR BREATHER HOSE (Pink)
MAIN WIRE HARNESS
THROTTLE CABLE
ECT SENSOR/ IGNITION COIL WIRE

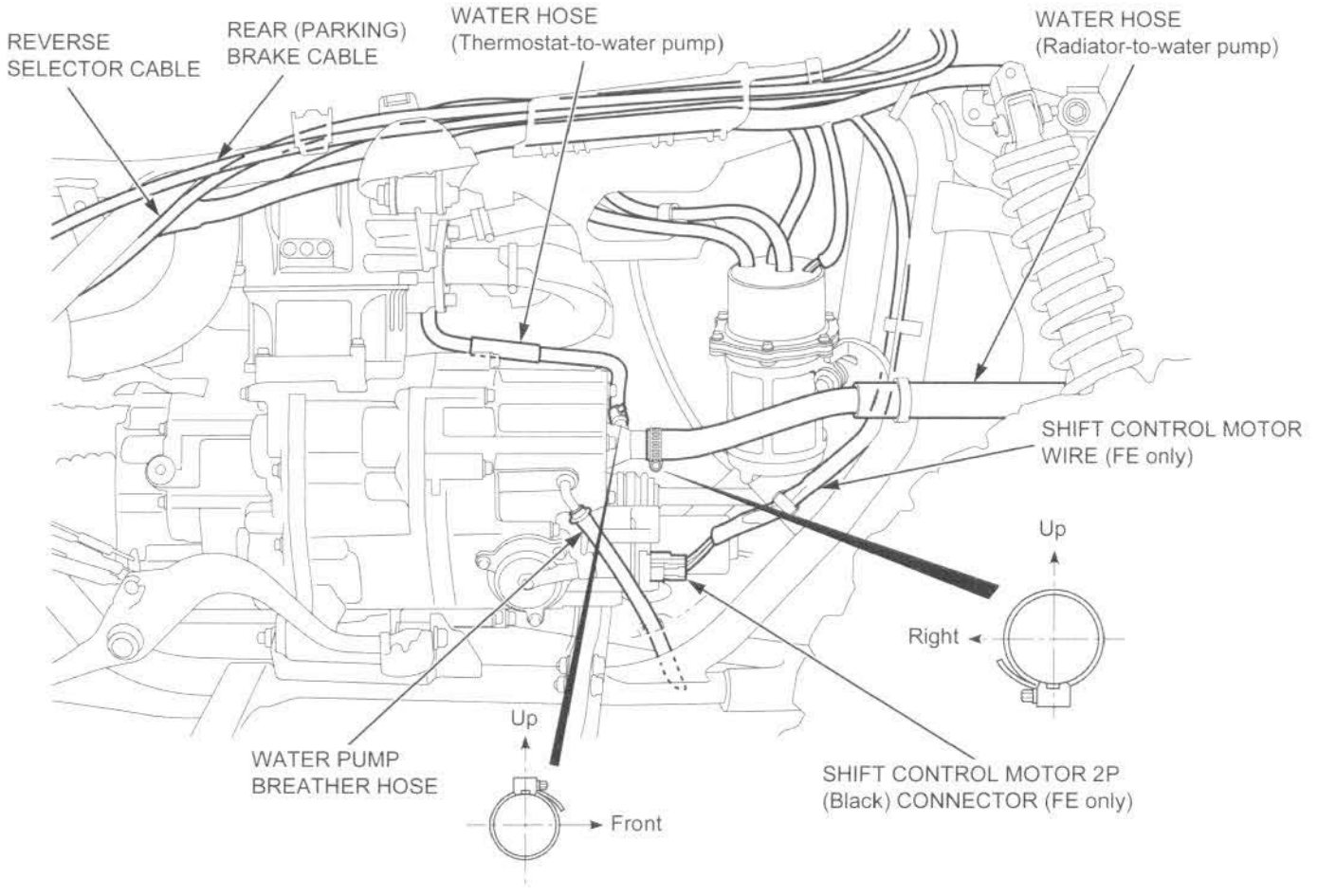
FPM/FPE:

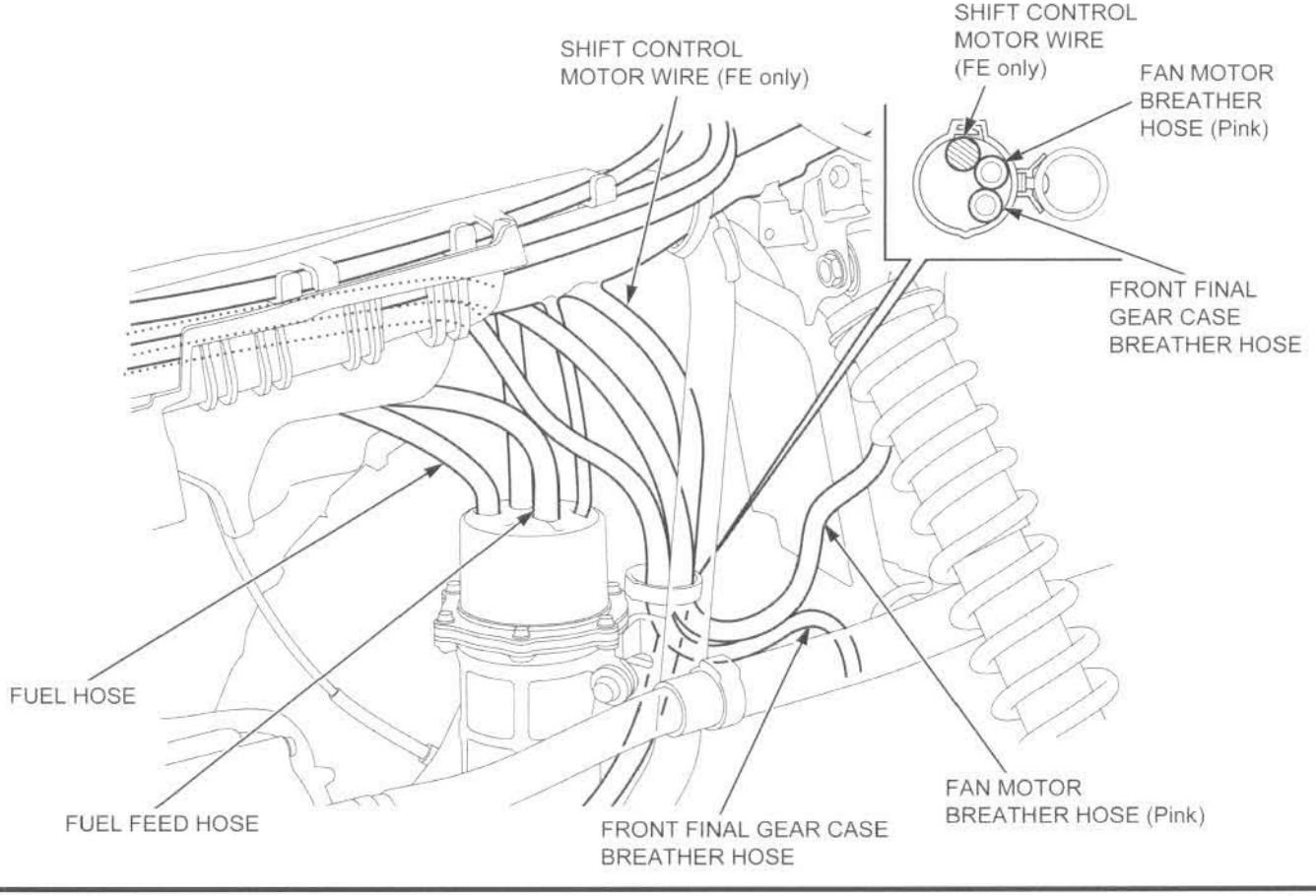


All models (FPM/FPE shown):

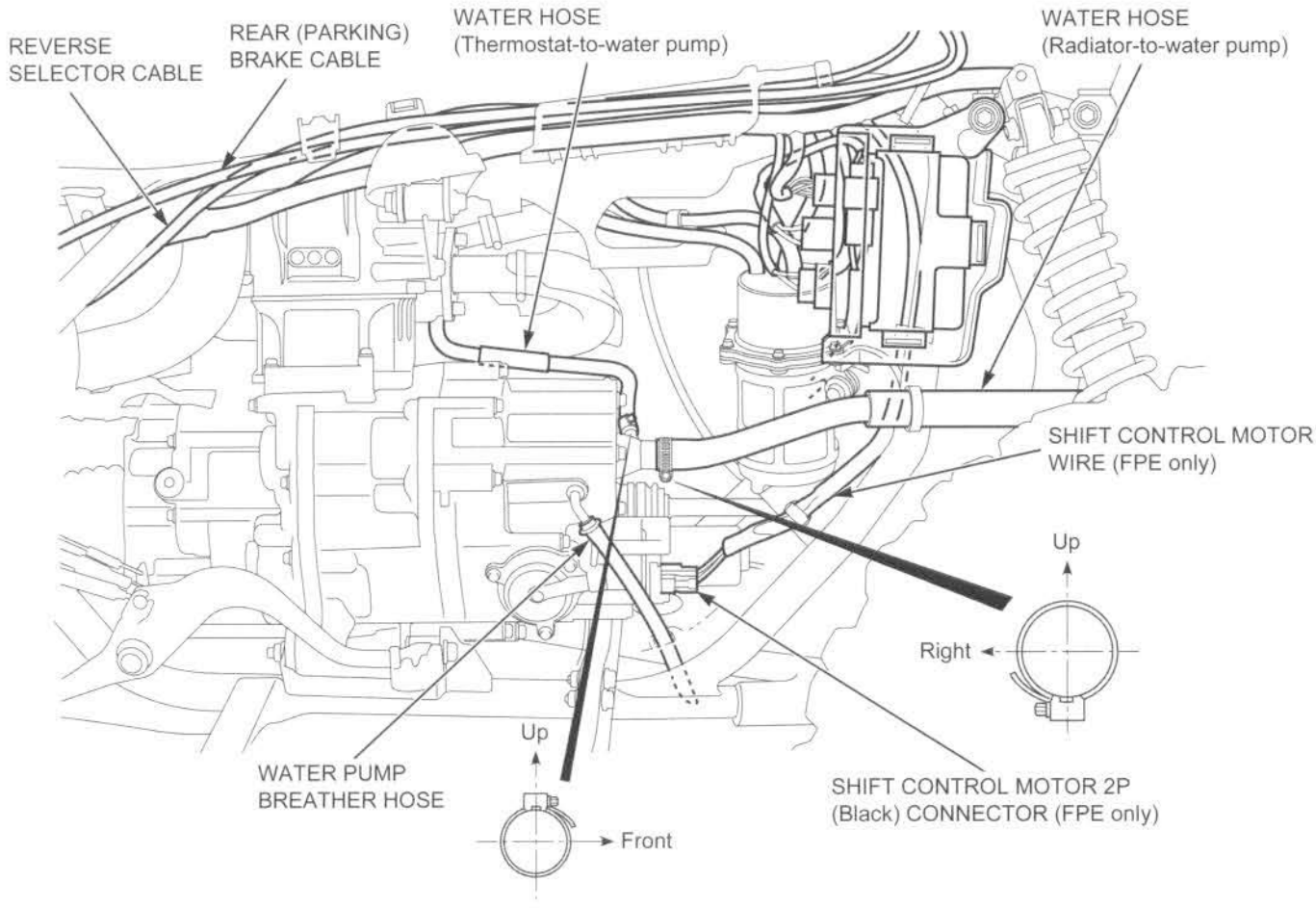


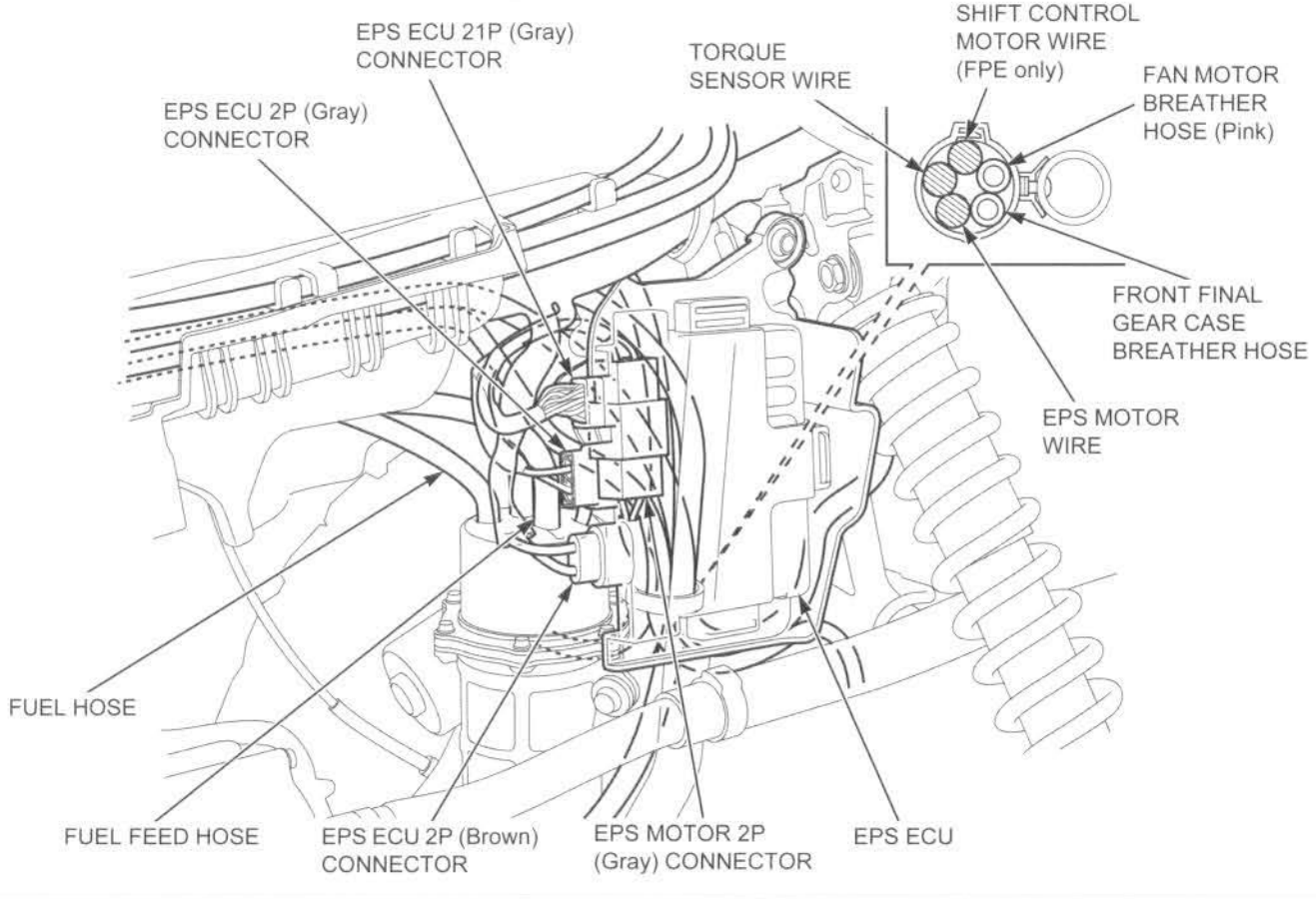
FM/FE:

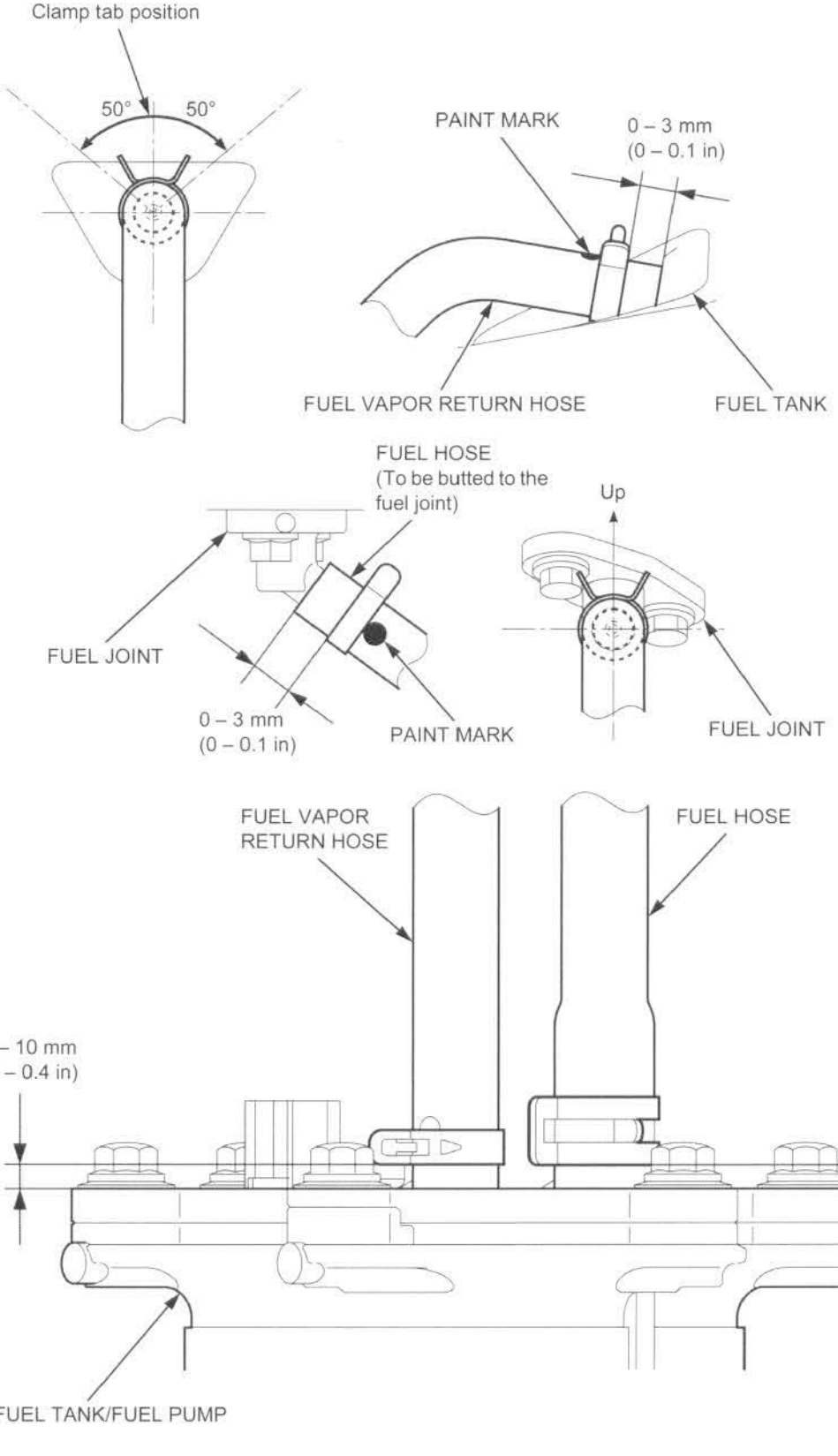

REVERSE SELECTOR CABLE
REAR (PARKING) BRAKE CABLE
WATER HOSE (Thermostat-to-water pump)
WATER HOSE (Radiator-to-water pump)
SHIFT CONTROL MOTOR WIRE (FE only)
Up
Right
Up
WATER PUMP BREATHER HOSE
Front
SHIFT CONTROL MOTOR 2P (Black) CONNECTOR (FE only)

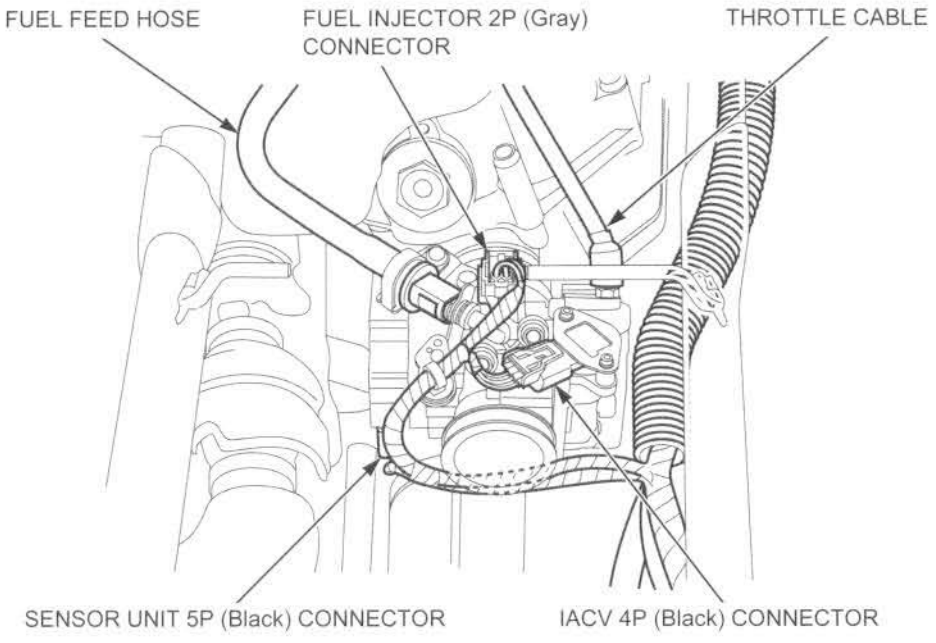

SHIFT CONTROL MOTOR WIRE (FE only)
SHIFT CONTROL MOTOR WIRE (FE only)
FAN MOTOR BREATHER HOSE (Pink)
FRONT FINAL GEAR CASE BREATHER HOSE
FUEL HOSE
FUEL FEED HOSE
FRONT FINAL GEAR CASE BREATHER HOSE
FAN MOTOR BREATHER HOSE (Pink)

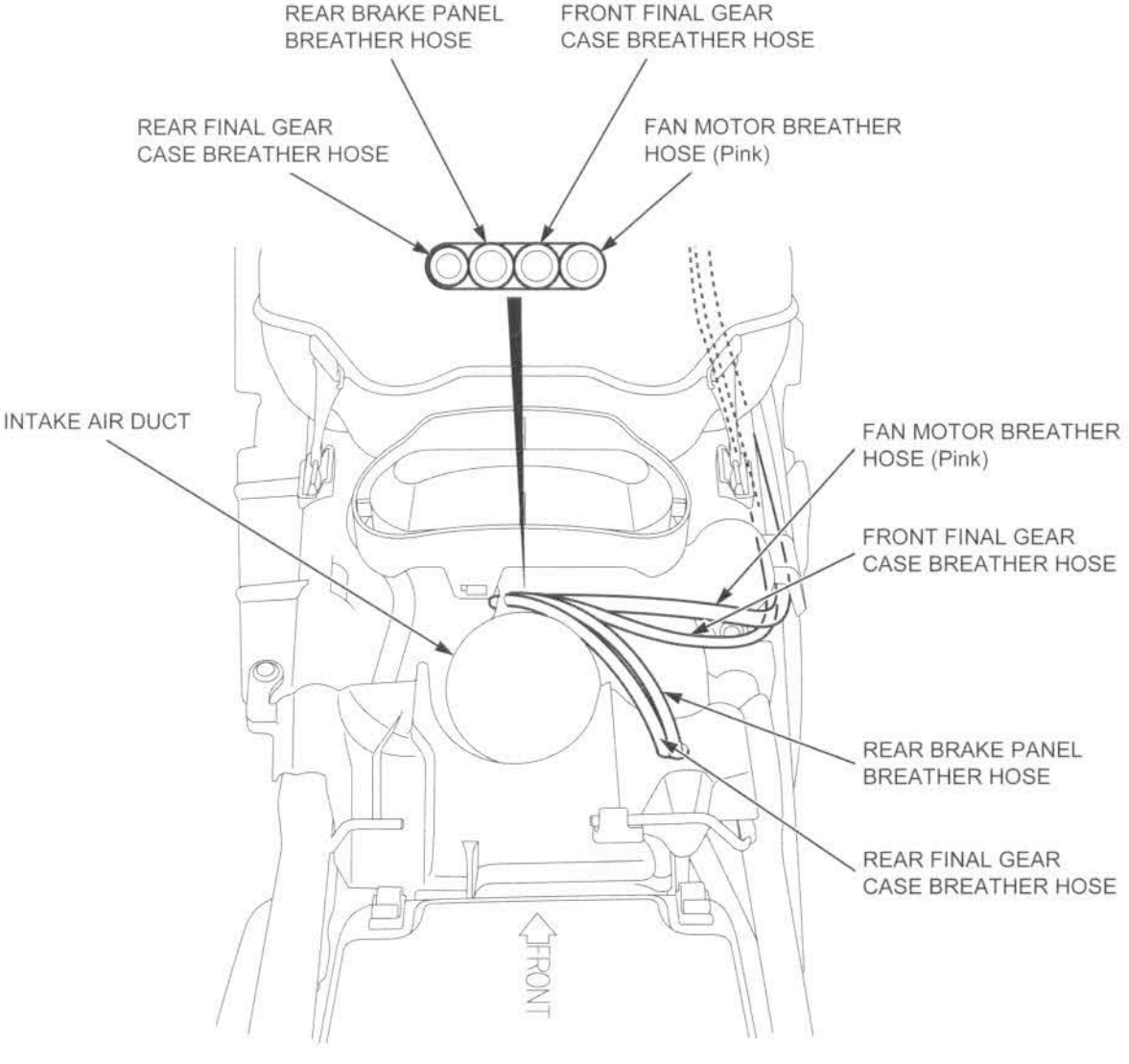
FPM/FPE:

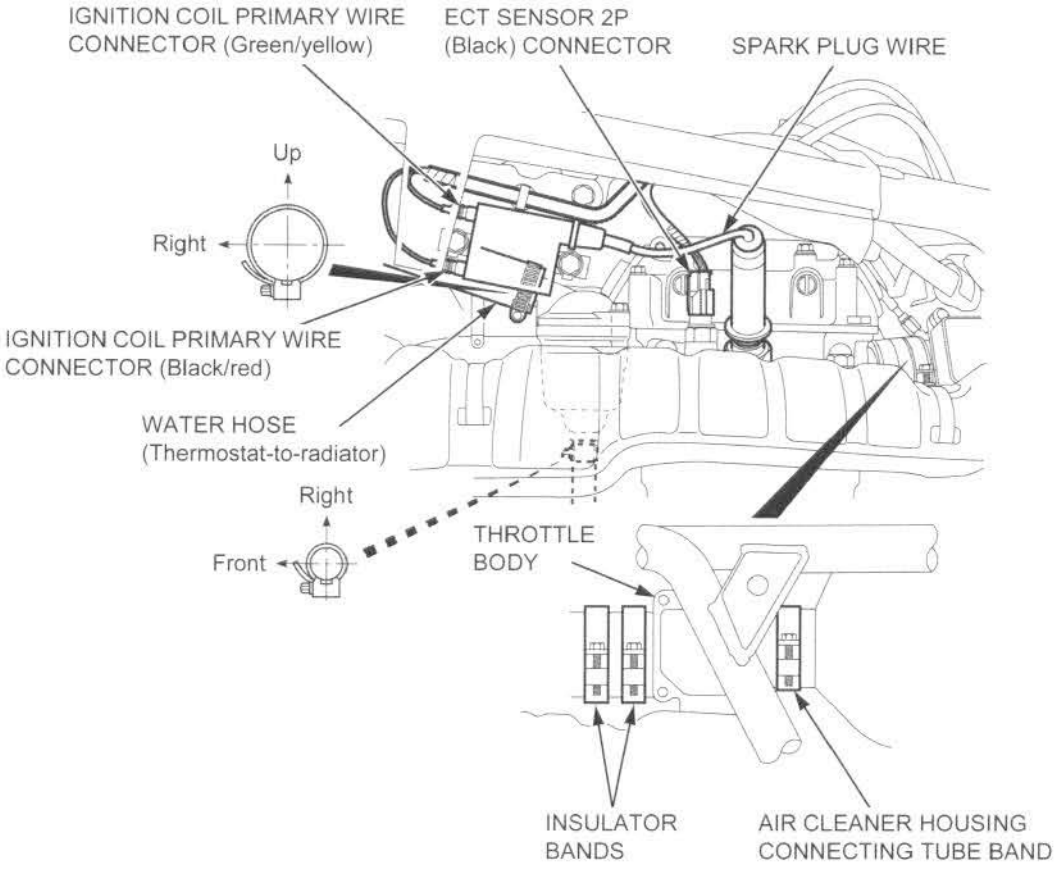

REVERSE SELECTOR CABLE
REAR (PARKING) BRAKE CABLE
WATER HOSE (Thermostat-to-water pump)
WATER HOSE (Radiator-to-water pump)
SHIFT CONTROL MOTOR WIRE (FPE only)
Up
Right
Up
WATER PUMP BREATHER HOSE
Front
SHIFT CONTROL MOTOR 2P (Black) CONNECTOR (FPE only)

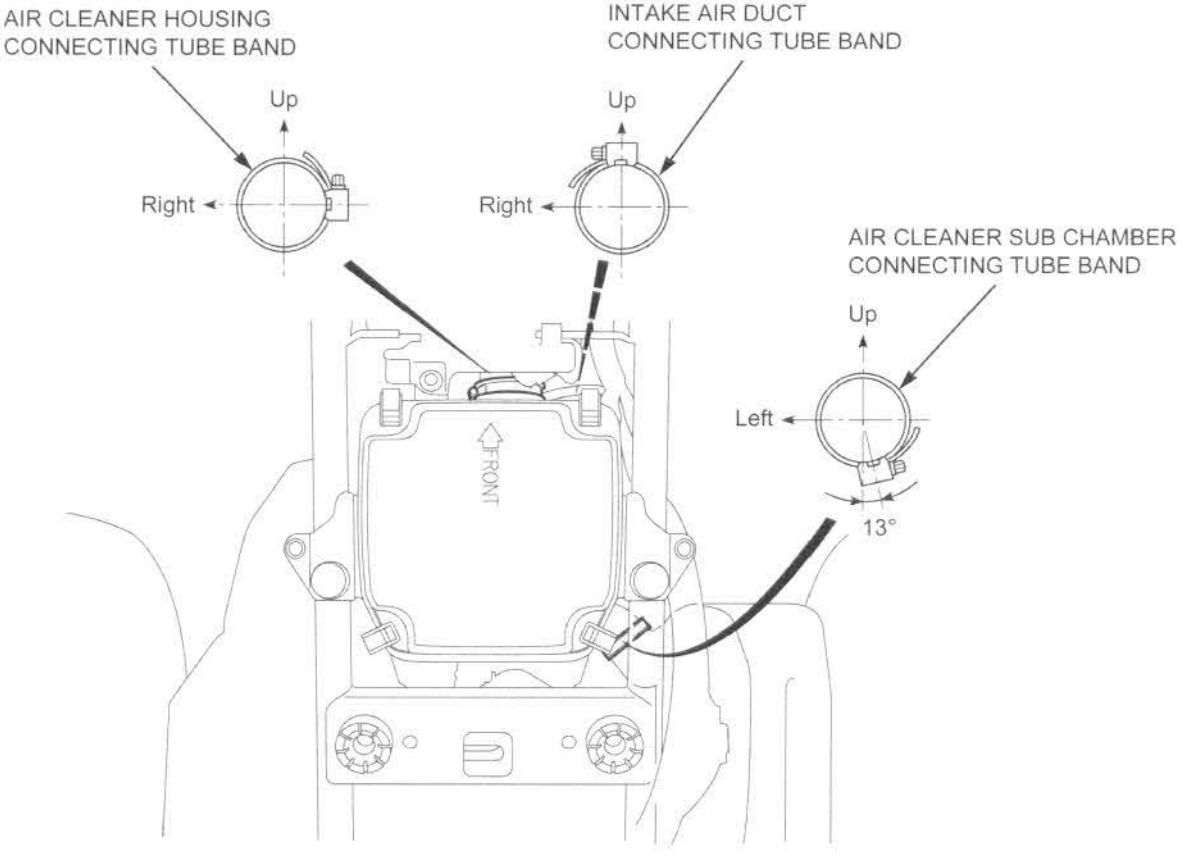

EPS ECU 21P (Gray) CONNECTOR
EPS ECU 2P (Gray) CONNECTOR
TORQUE SENSOR WIRE
SHIFT CONTROL MOTOR WIRE (FPE only)
FAN MOTOR BREATHER HOSE (Pink)
FRONT FINAL GEAR CASE BREATHER HOSE
EPS MOTOR WIRE
FUEL HOSE
FUEL FEED HOSE
EPS ECU 2P (Brown) CONNECTOR
EPS MOTOR 2P (Gray) CONNECTOR
EPS ECU

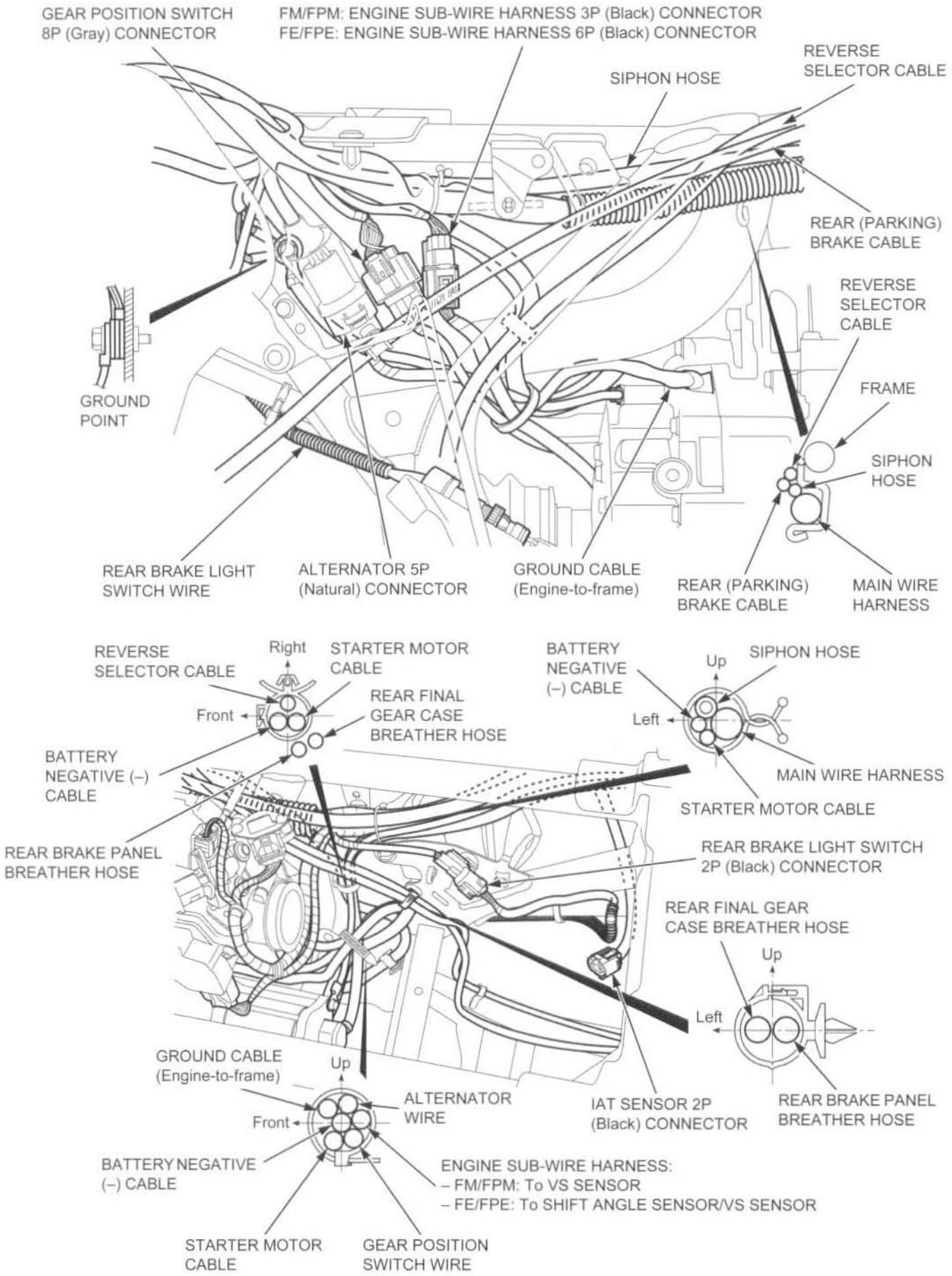

Clamp tab position
50°
50°
PAINT MARK
0 – 3 mm
(0 – 0.1 in)
FUEL VAPOR RETURN HOSE
FUEL TANK
FUEL HOSE
(To be butted to the
fuel joint)
Up
FUEL JOINT
0 – 3 mm
(0 – 0.1 in)
PAINT MARK
FUEL JOINT
FUEL VAPOR
RETURN HOSE
FUEL HOSE
0 – 10 mm
(0 – 0.4 in)
0 – 5 mm
(0 – 0.2 in)
SUB-FUEL TANK/FUEL PUMP

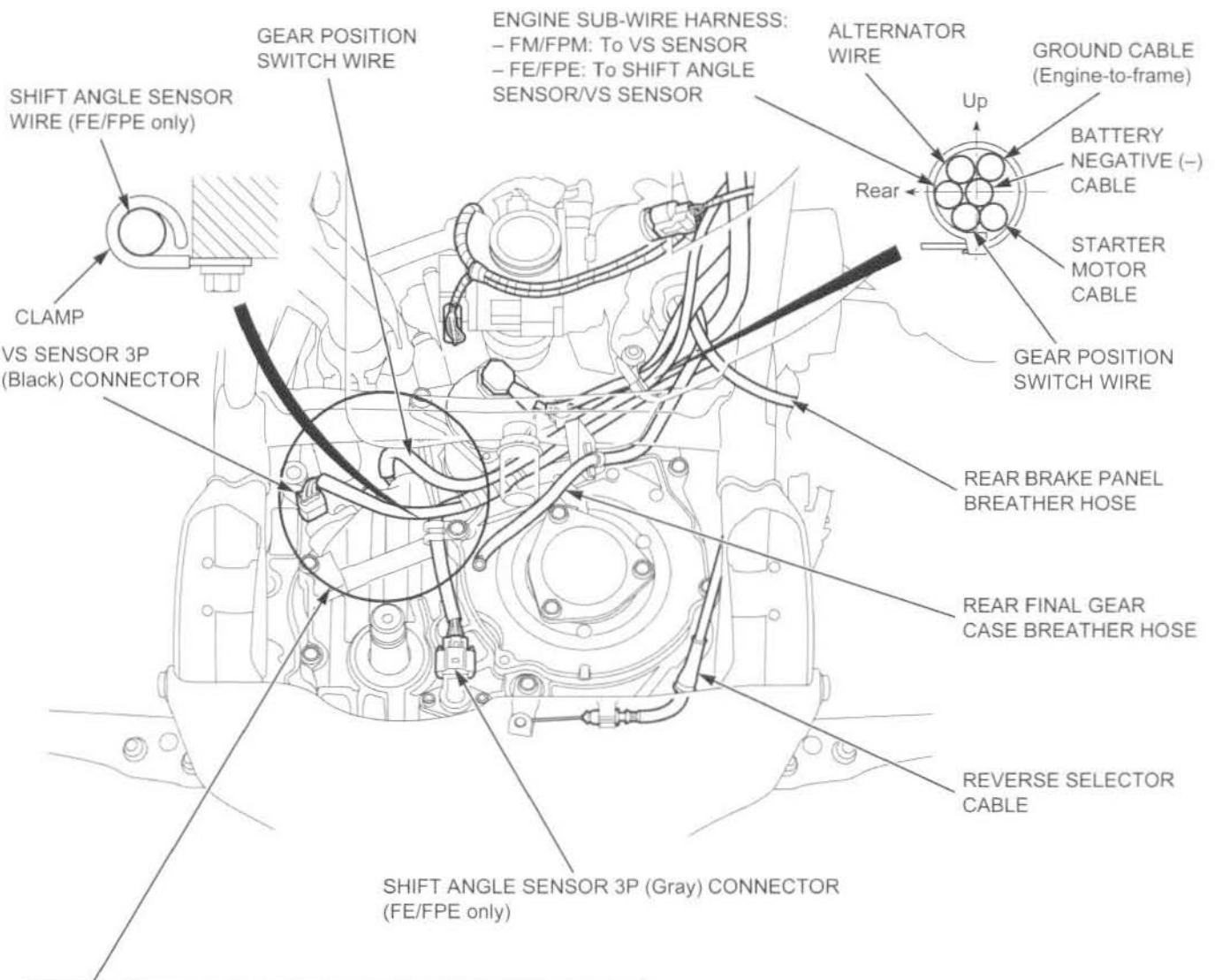

FUEL FEED HOSE
FUEL INJECTOR 2P (Gray) CONNECTOR
THROTTLE CABLE
SENSOR UNIT 5P (Black) CONNECTOR
IACV 4P (Black) CONNECTOR

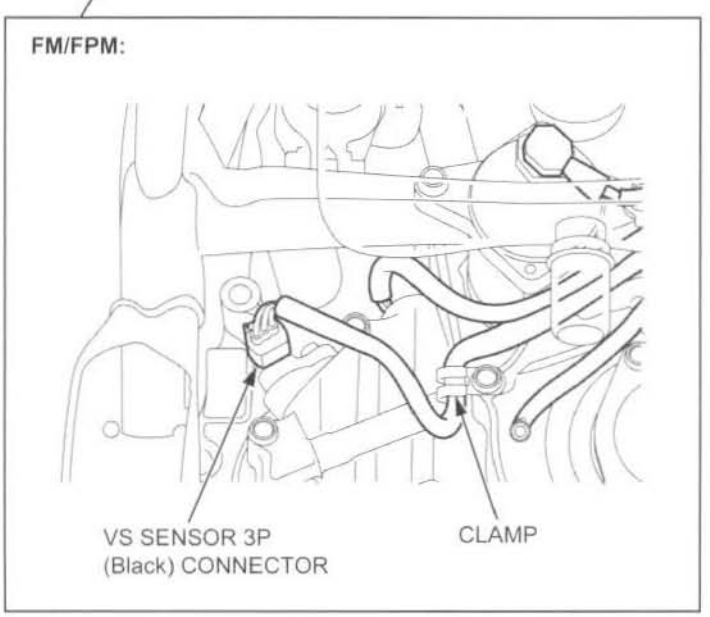

REAR BRAKE PANEL BREATHER HOSE
FRONT FINAL GEAR CASE BREATHER HOSE
REAR FINAL GEAR CASE BREATHER HOSE
FAN MOTOR BREATHER HOSE (Pink)
INTAKE AIR DUCT
FAN MOTOR BREATHER HOSE (Pink)
FRONT FINAL GEAR CASE BREATHER HOSE
REAR BRAKE PANEL BREATHER HOSE
REAR FINAL GEAR CASE BREATHER HOSE
FRONT

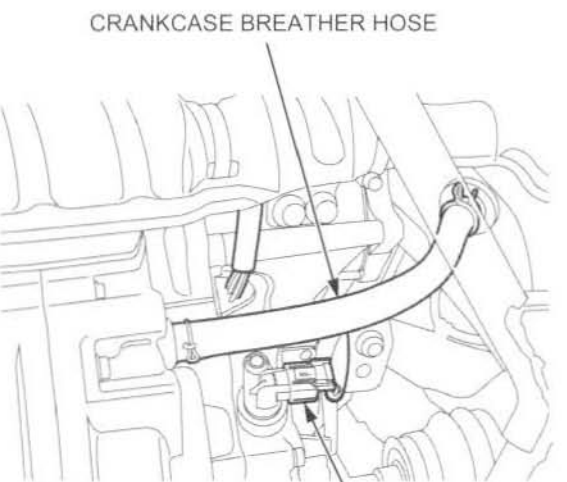

IGNITION COIL PRIMARY WIRE CONNECTOR (Green/yellow)
ECT SENSOR 2P (Black) CONNECTOR
SPARK PLUG WIRE
Up
Right
IGNITION COIL PRIMARY WIRE CONNECTOR (Black/red)
WATER HOSE (Thermostat-to-radiator)
Right
Front
THROTTLE BODY
INSULATOR BANDS
AIR CLEANER HOUSING CONNECTING TUBE BAND

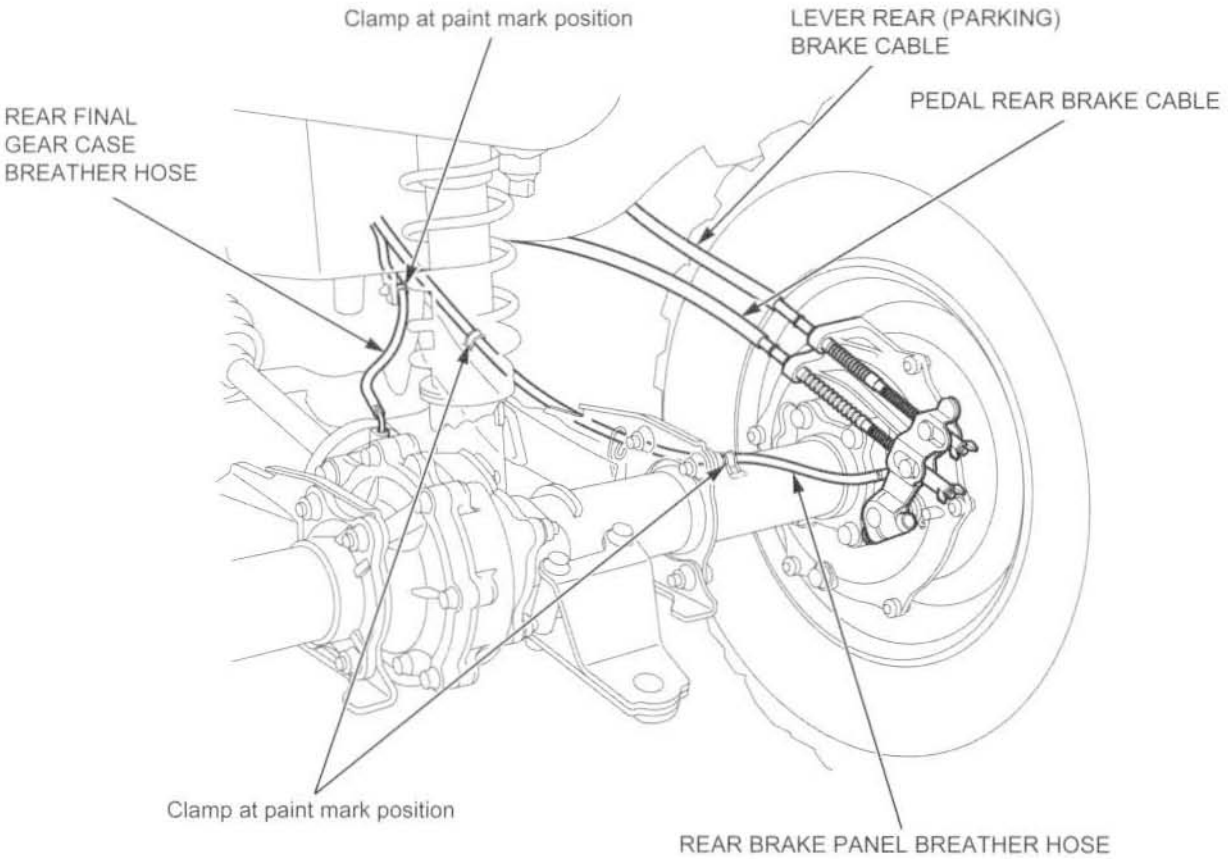

AIR CLEANER HOUSING CONNECTING TUBE BAND
Up
Right
INTAKE AIR DUCT CONNECTING TUBE BAND
Up
Right
AIR CLEANER SUB CHAMBER CONNECTING TUBE BAND
Up
Left
13°
FRONT

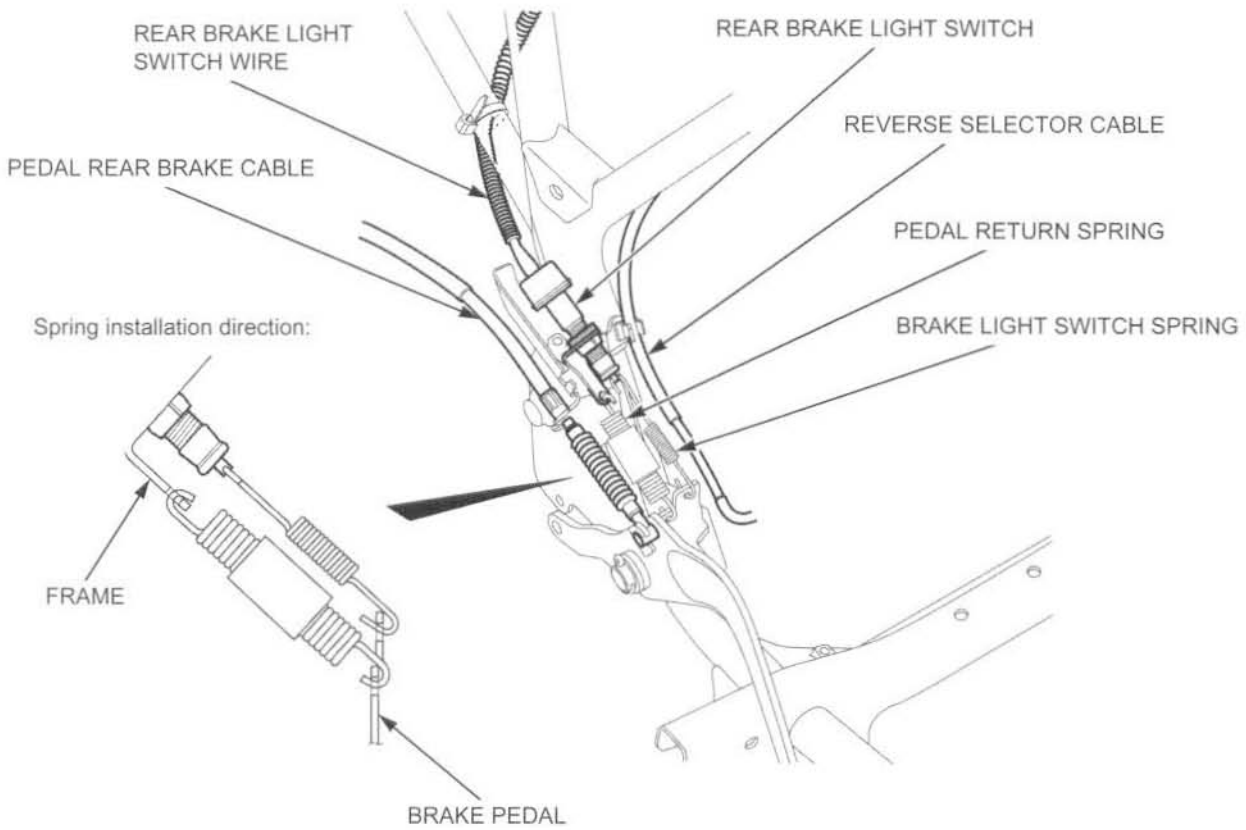

GEAR POSITION SWITCH 8P (Gray) CONNECTOR
FM/FPM: ENGINE SUB-WIRE HARNESS 3P (Black) CONNECTOR
FE/FPE: ENGINE SUB-WIRE HARNESS 6P (Black) CONNECTOR
SIPHON HOSE
REVERSE SELECTOR CABLE
REAR (PARKING) BRAKE CABLE
REVERSE SELECTOR CABLE
FRAME
SIPHON HOSE
GROUND POINT
REAR BRAKE LIGHT SWITCH WIRE
ALTERNATOR 5P (Natural) CONNECTOR
GROUND CABLE (Engine-to-frame)
REAR (PARKING) BRAKE CABLE
MAIN WIRE HARNESS
REVERSE SELECTOR CABLE
Right
STARTER MOTOR CABLE
Front
REAR FINAL GEAR CASE BREATHER HOSE
BATTERY NEGATIVE (–) CABLE
BATTERY NEGATIVE (–) CABLE
Up
SIPHON HOSE
Left
MAIN WIRE HARNESS
STARTER MOTOR CABLE
REAR BRAKE PANEL BREATHER HOSE
REAR BRAKE LIGHT SWITCH 2P (Black) CONNECTOR
REAR FINAL GEAR CASE BREATHER HOSE
Up
Left
GROUND CABLE (Engine-to-frame)
Up
ALTERNATOR WIRE
Front
IAT SENSOR 2P (Black) CONNECTOR
REAR BRAKE PANEL BREATHER HOSE
BATTERY NEGATIVE (–) CABLE
ENGINE SUB-WIRE HARNESS:
– FM/FPM: To VS SENSOR
– FE/FPE: To SHIFT ANGLE SENSOR/VS SENSOR
STARTER MOTOR CABLE
GEAR POSITION SWITCH WIRE

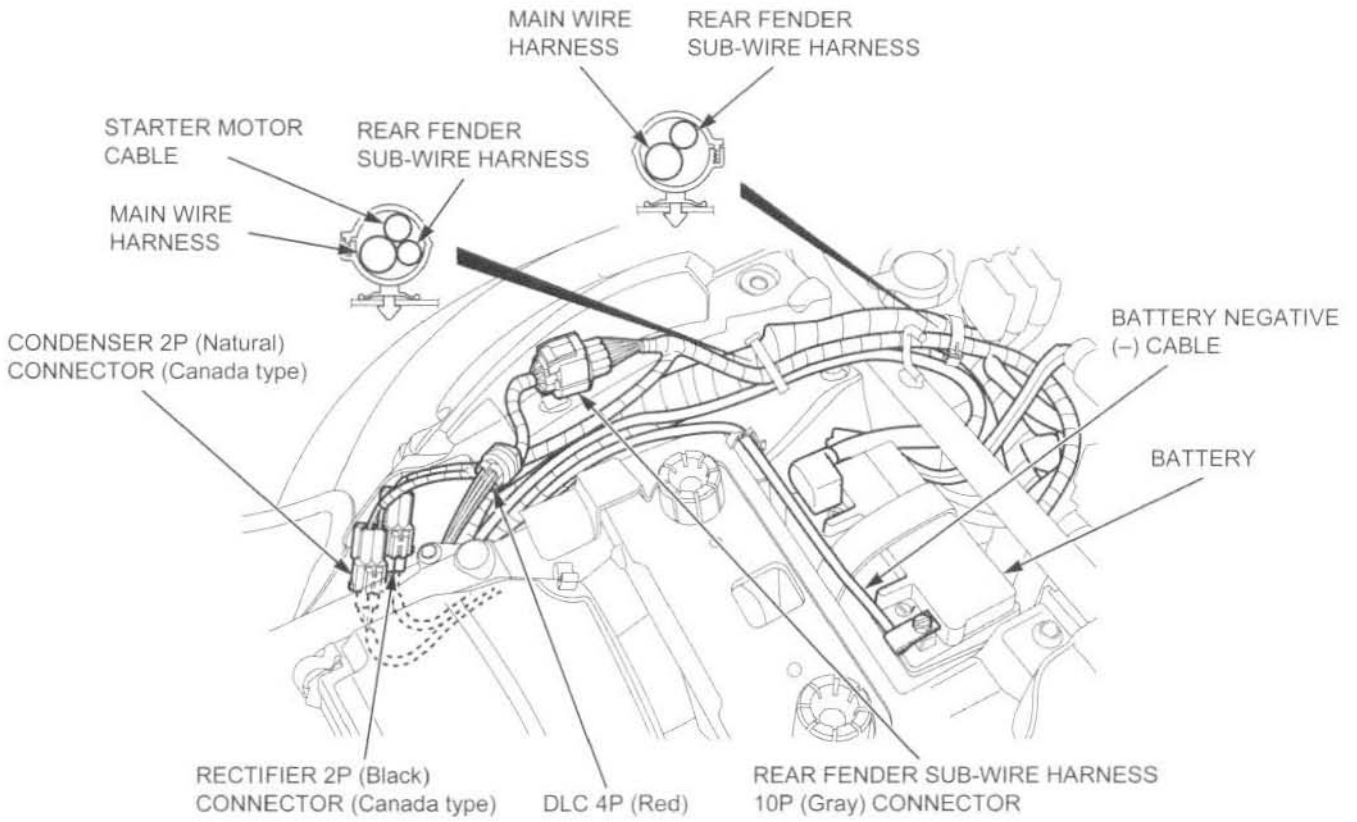

GEAR POSITION SWITCH WIRE
ENGINE SUB-WIRE HARNESS:
– FM/FPM: To VS SENSOR
– FE/FPE: To SHIFT ANGLE SENSOR/VS SENSOR
ALTERNATOR WIRE
GROUND CABLE (Engine-to-frame)
SHIFT ANGLE SENSOR WIRE (FE/FPE only)
Up
Rear
BATTERY NEGATIVE (–) CABLE
STARTER MOTOR CABLE
CLAMP
VS SENSOR 3P (Black) CONNECTOR
GEAR POSITION SWITCH WIRE
REAR BRAKE PANEL BREATHER HOSE
REAR FINAL GEAR CASE BREATHER HOSE
REVERSE SELECTOR CABLE
SHIFT ANGLE SENSOR 3P (Gray) CONNECTOR (FE/FPE only)

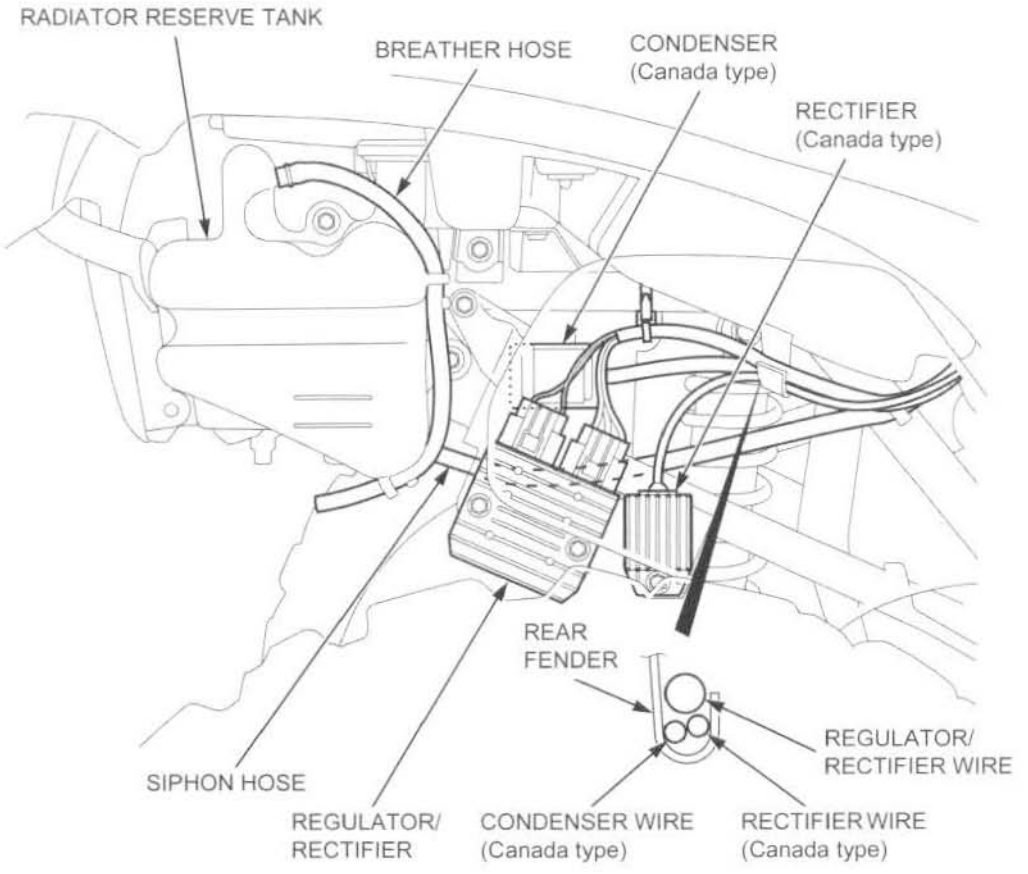

FM/FPM:
VS SENSOR 3P (Black) CONNECTOR
CLAMP


CRANKCASE BREATHER HOSE
VS SENSOR 3P (Black) CONNECTOR

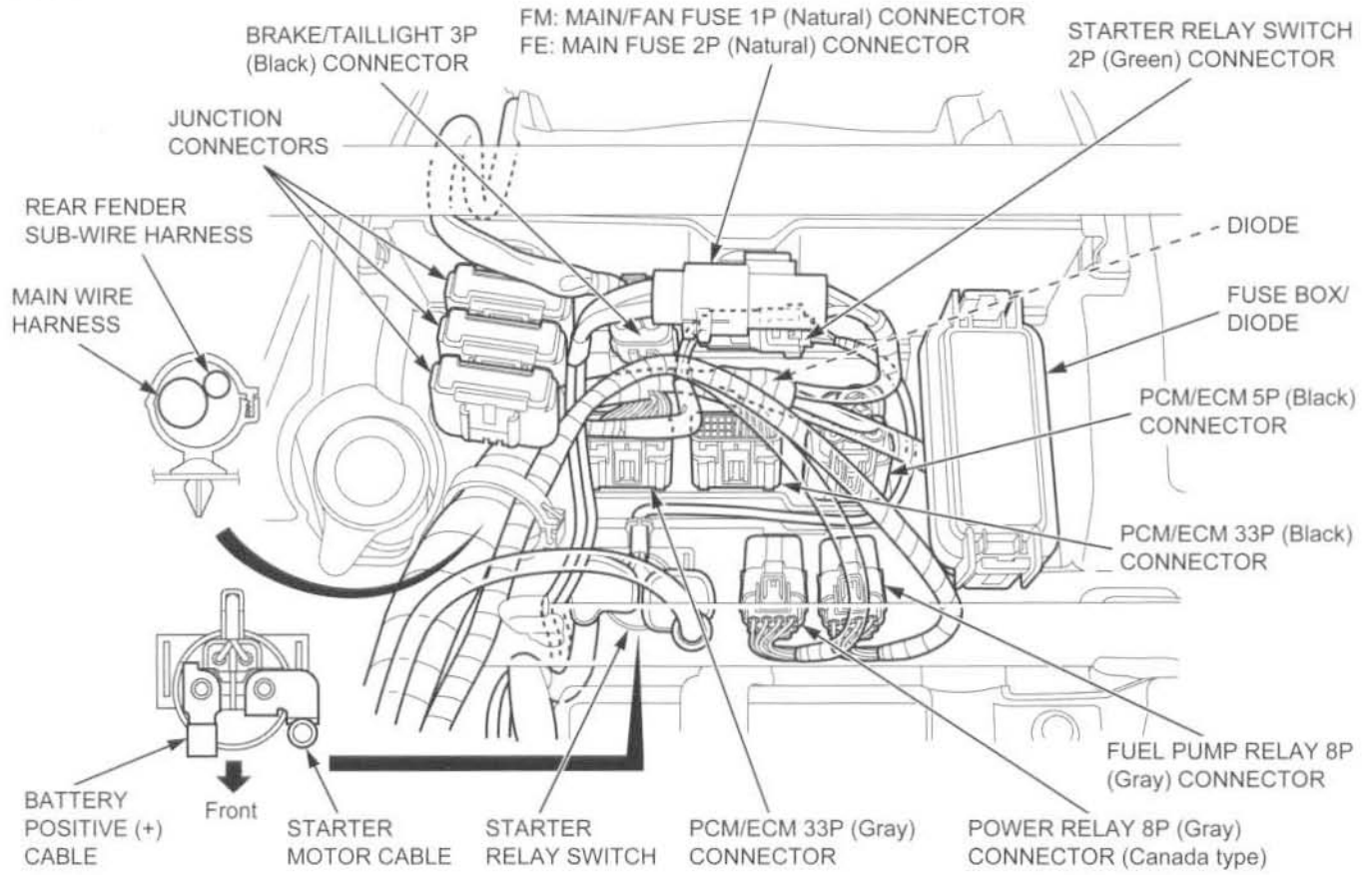

Clamp at paint mark position
LEVER REAR (PARKING) BRAKE CABLE
PEDAL REAR BRAKE CABLE
REAR FINAL GEAR CASE BREATHER HOSE
Clamp at paint mark position
REAR BRAKE PANEL BREATHER HOSE


REAR BRAKE LIGHT SWITCH WIRE
REAR BRAKE LIGHT SWITCH
REVERSE SELECTOR CABLE
PEDAL REAR BRAKE CABLE
PEDAL RETURN SPRING
Spring installation direction:
BRAKE LIGHT SWITCH SPRING
FRAME
BRAKE PEDAL

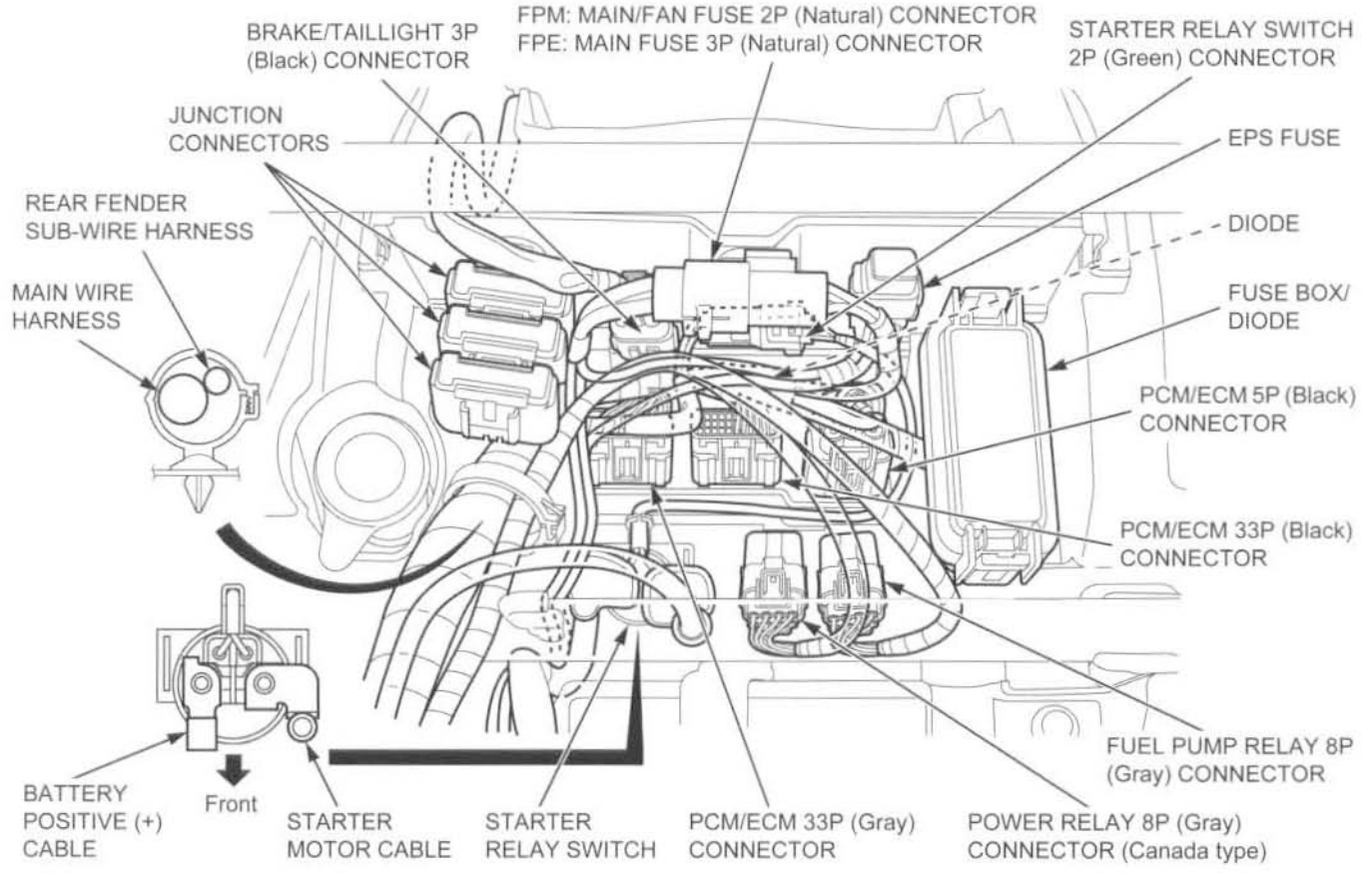

MAIN WIRE HARNESS
REAR FENDER SUB-WIRE HARNESS
STARTER MOTOR CABLE
REAR FENDER SUB-WIRE HARNESS
MAIN WIRE HARNESS
CONDENSER 2P (Natural) CONNECTOR (Canada type)
BATTERY NEGATIVE (–) CABLE
BATTERY
RECTIFIER 2P (Black) CONNECTOR (Canada type)
DLC 4P (Red)
REAR FENDER SUB-WIRE HARNESS 10P (Gray) CONNECTOR

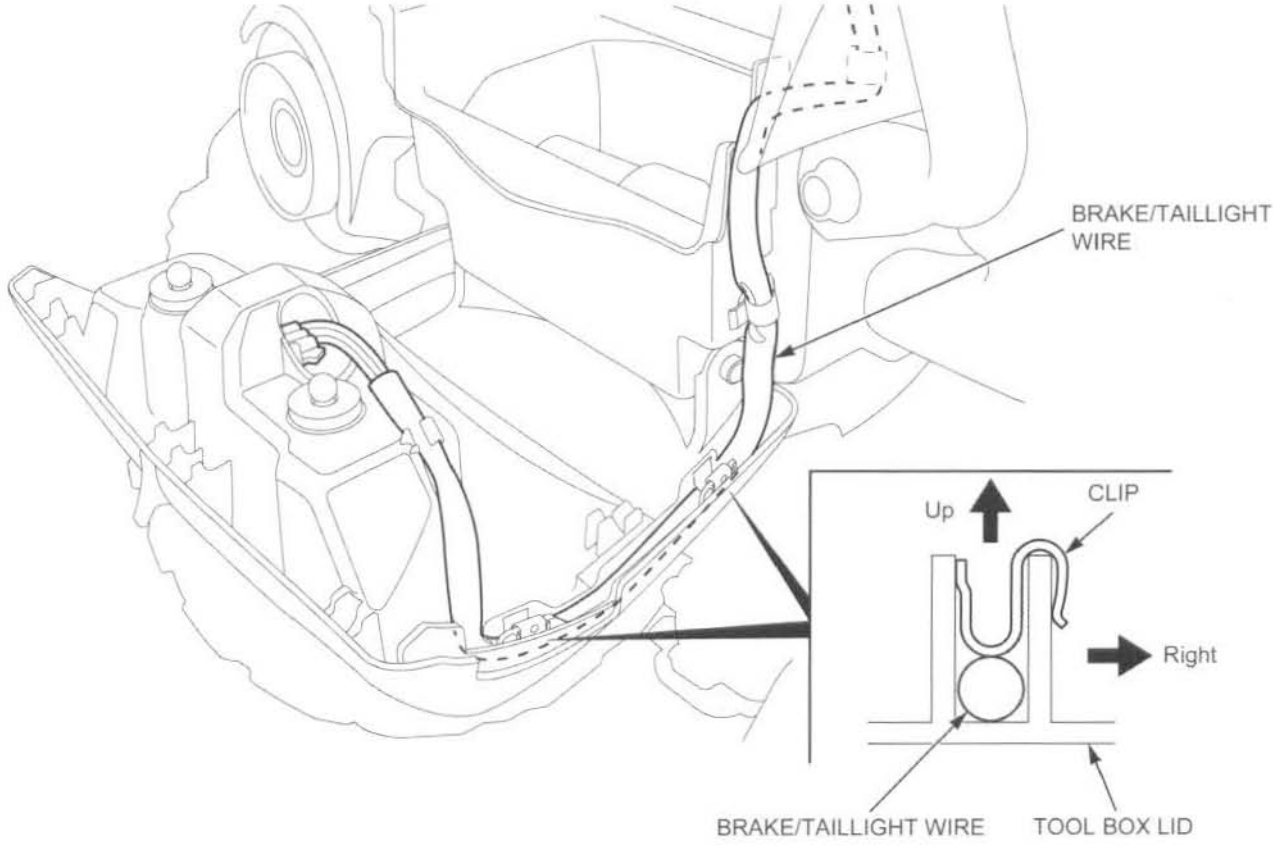

RADIATOR RESERVE TANK
BREATHER HOSE
CONDENSER (Canada type)
RECTIFIER (Canada type)
REAR FENDER
REGULATOR/ RECTIFIER WIRE
SIPHON HOSE
REGULATOR/ RECTIFIER
CONDENSER WIRE (Canada type)
RECTIFIER WIRE (Canada type)

FM/FE:


BRAKE/TAILLIGHT 3P (Black) CONNECTOR
FM: MAIN/FAN FUSE 1P (Natural) CONNECTOR
FE: MAIN FUSE 2P (Natural) CONNECTOR
STARTER RELAY SWITCH 2P (Green) CONNECTOR
JUNCTION CONNECTORS
REAR FENDER SUB-WIRE HARNESS
DIODE
MAIN WIRE HARNESS
FUSE BOX/ DIODE
PCM/ECM 5P (Black) CONNECTOR
PCM/ECM 33P (Black) CONNECTOR
FUEL PUMP RELAY 8P (Gray) CONNECTOR
BATTERY POSITIVE (+) CABLE
Front
STARTER MOTOR CABLE
STARTER RELAY SWITCH
PCM/ECM 33P (Gray) CONNECTOR
POWER RELAY 8P (Gray) CONNECTOR (Canada type)

FPM/FPE:


BRAKE/TAILLIGHT 3P (Black) CONNECTOR
FPM: MAIN/FAN FUSE 2P (Natural) CONNECTOR
FPE: MAIN FUSE 3P (Natural) CONNECTOR
STARTER RELAY SWITCH 2P (Green) CONNECTOR
JUNCTION CONNECTORS
EPS FUSE
REAR FENDER SUB-WIRE HARNESS
DIODE
MAIN WIRE HARNESS
FUSE BOX/ DIODE
PCM/ECM 5P (Black) CONNECTOR
PCM/ECM 33P (Black) CONNECTOR
FUEL PUMP RELAY 8P (Gray) CONNECTOR
BATTERY POSITIVE (+) CABLE
Front
STARTER MOTOR CABLE
STARTER RELAY SWITCH
PCM/ECM 33P (Gray) CONNECTOR
POWER RELAY 8P (Gray) CONNECTOR (Canada type)


BRAKE/TAILLIGHT
WIRE
Up
CLIP
Right
BRAKE/TAILLIGHT WIRE
TOOL BOX LID

EMISSION CONTROL SYSTEMS

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

SOURCE OF EMISSIONS

The combustion process produces carbon monoxide (CO), oxides of nitrogen (NO_x) and hydrocarbons (HC). The control of hydrocarbons and oxides of nitrogen is very important because, under certain conditions, they react to form photochemical smog when subject to sunlight. Carbon monoxide does not react in the same way, but it is toxic. Uncontrolled fuel evaporation also releases hydrocarbons to the atmosphere.

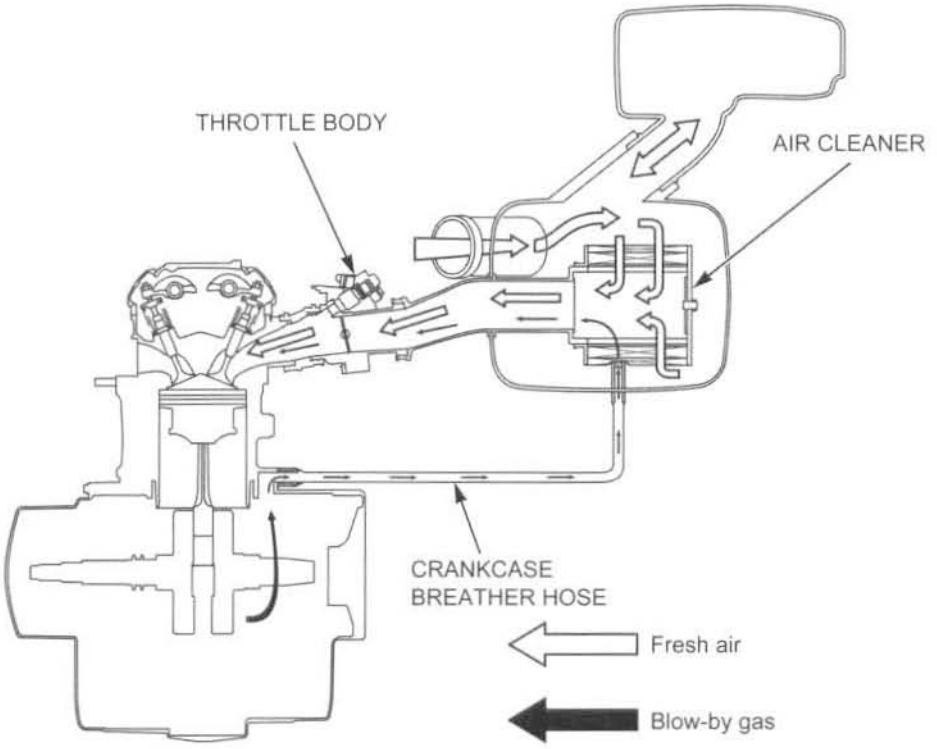
Honda Motor Co., Ltd. utilizes various systems to reduce carbon monoxide, oxides of nitrogen, and hydrocarbons.

EXHAUST EMISSION CONTROL SYSTEM

The exhaust emission control system is composed of the PGM-FI system, and no adjustments should be made. The exhaust emission control system is separate from the crankcase emission control system.

CRANKCASE EMISSION CONTROL SYSTEM

The engine is equipped with a closed crankcase system to prevent discharging crankcase emissions into the atmosphere. Blow-by gas is returned to the combustion chamber through the air cleaner and 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 ATV repair establishment or individual using parts that are "certified" to EPA standards.

PROHIBITED ACTIONS

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

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

NOISE EMISSION CONTROL SYSTEM

TAMPERING WITH THE NOISE EMISSION CONTROL SYSTEM IS PROHIBITED: U.S. Federal law prohibits, or Canadian provincial law 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 vehicle for the purpose of noise control prior to its sale or delivery to the ultimate customer or while it is in use: or (2) the use of any vehicle after such device or element of design has been removed or rendered inoperative by any person.

AMONG THOSE ACTS PRESUMED TO CONSTITUTE TAMPERING ARE THE 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.

FUEL PERMEATION EMISSION CONTROL SYSTEM

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

REBUILT ENGINE

When you rebuild the engine including a major overhaul in which you replace the engine's piston 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 erase all DTCs after addressing their cause
- Use only Honda Genuine parts or equivalents
- Make sure to maintain all specifications as described in this Service Manual

MEMO

2. FRAME/BODY PANELS/EXHAUST SYSTEM

SERVICE INFORMATION

GENERAL

- This section covers removal and installation of the body panels and exhaust system.
- For assist headlight cover removal/installation, refer to "Lights/Meters/Switches" section (page 22-4).
- For meter cover removal/installation, refer to "Lights/Meters/Switches" section (page 22-6).
- Always replace the gaskets when removing the exhaust system.
- Always inspect the exhaust system for leaks after installation.

TORQUE VALUES

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Rear carrier bolt	4	10	74 (7.5, 55)	
Mudguard bracket nut	8	8	32 (3.3, 24)	
Muffler band bolt	2	8	23 (2.3, 17)	
Muffler cover bolt	2	6	22 (2.2, 16)	
Exhaust pipe cover band bolt	3	–	2.0 (0.2, 1.5)	
Muffler cover band screw (front side)	1	–	2.0 (0.2, 1.5)	
Muffler cover band screw (rear side)	1	–	3.2 (0.33, 2.4)	
Exhaust pipe stud bolt	2	8	6.0 (0.6, 4.4)	See page 2-15

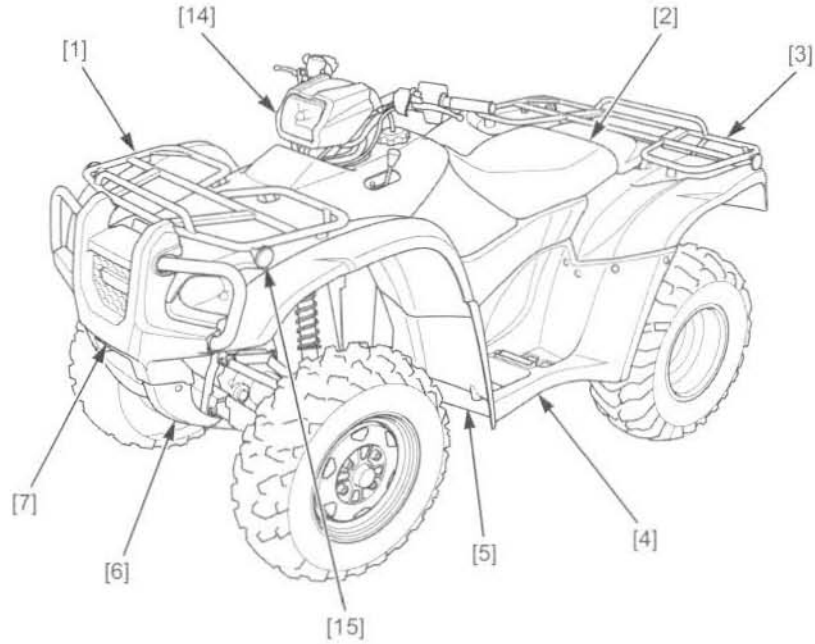
TROUBLESHOOTING

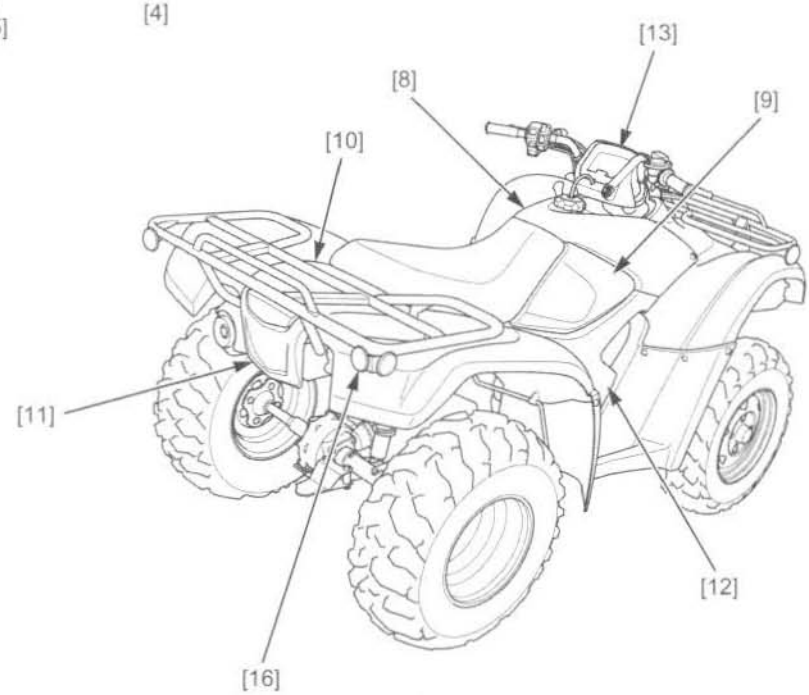
Excessive exhaust noise
- Broken exhaust system
- Exhaust gas leaks

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

BODY PANEL LOCATIONS

TRX500FE model shown:





[1] FRONT FENDER/CARRIER (page 2-8)
[2] SEAT (page 2-4)
[3] REAR FENDER/CARRIER (page 2-11)
[4] MUDGUARD (page 2-6)
[5] MUDGUARD BRACKET (page 2-13)
[6] ENGINE GUARD (page 2-7)
[7] FRONT GRILLE (page 2-7)
[8] FUEL TANK COVER (page 2-5)
[9] FUEL TANK SIDE COVER (page 2-5)
[10] REAR FENDER COVER (page 2-9)
[11] TOOL BOX LID (page 2-10)
[12] SIDE COVER (page 2-4)
[13] METER COVER (page 22-11)
[14] ASSIST HEADLIGHT COVER (page 22-4)
[15] FRONT REFLECTOR (Canada type only) (page 2-9)
[16] REAR REFLECTOR (Canada type only) (page 2-12)

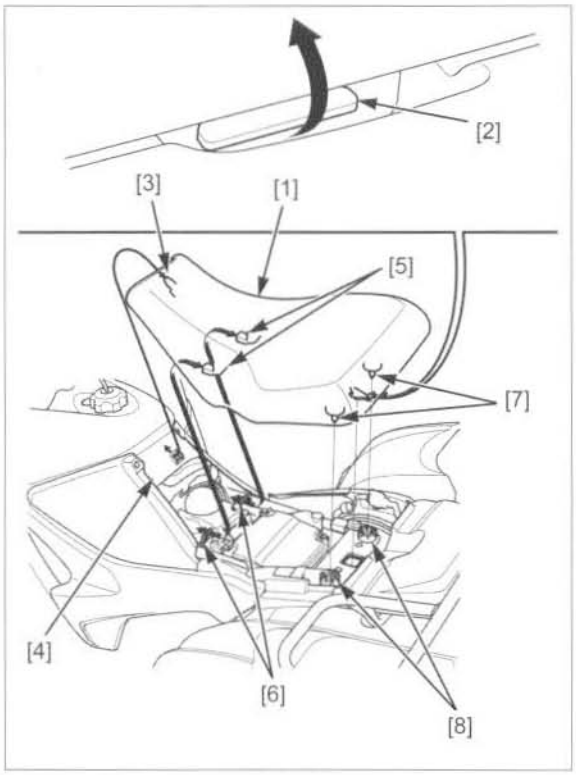
SEAT

REMOVAL

Unlock the seat [1] by turning the release lever [2] up. Raise the rear of the seat, slide it rearward and remove it.

INSTALLATION

Install the seat by inserting the front prong [3] into the fuel tank cover [4] and hooking the center prongs [5] to the seat retainers [6] of the frame.
Push the seat forward and align the mounting bosses [7] with the rubber mounts [8], then press down to lock it.



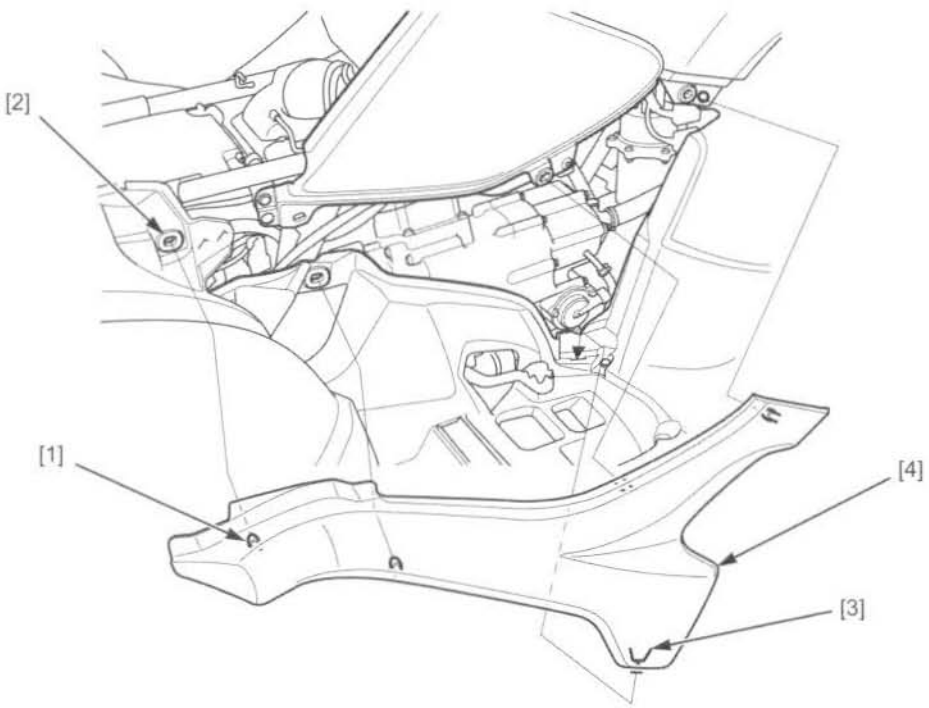
SIDE COVER

Remove the seat (page 2-4).

Release the four bosses [1] from the grommets [2], then release the tab [3] of the side cover [4] to remove the side cover.

Be careful not to dislodge the grommets.

Installation is in the reverse order of removal.

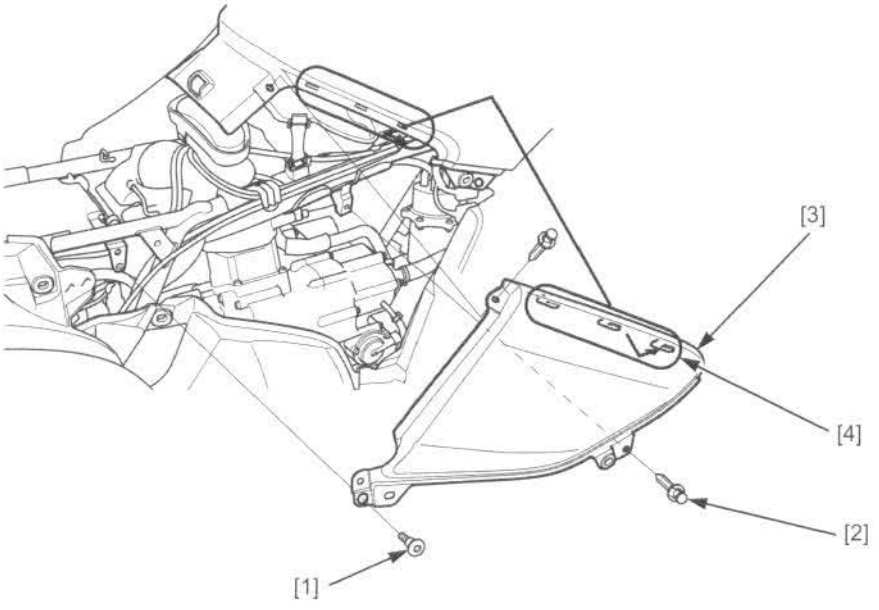


FUEL TANK SIDE COVER

Remove the side cover (page 2-4).

Remove the following:
- socket bolt [1]
- two trim clips [2]
- fuel tank side cover [3] (release the three tabs [4] by sliding the cover rearward)

Installation is in the reverse order of removal.



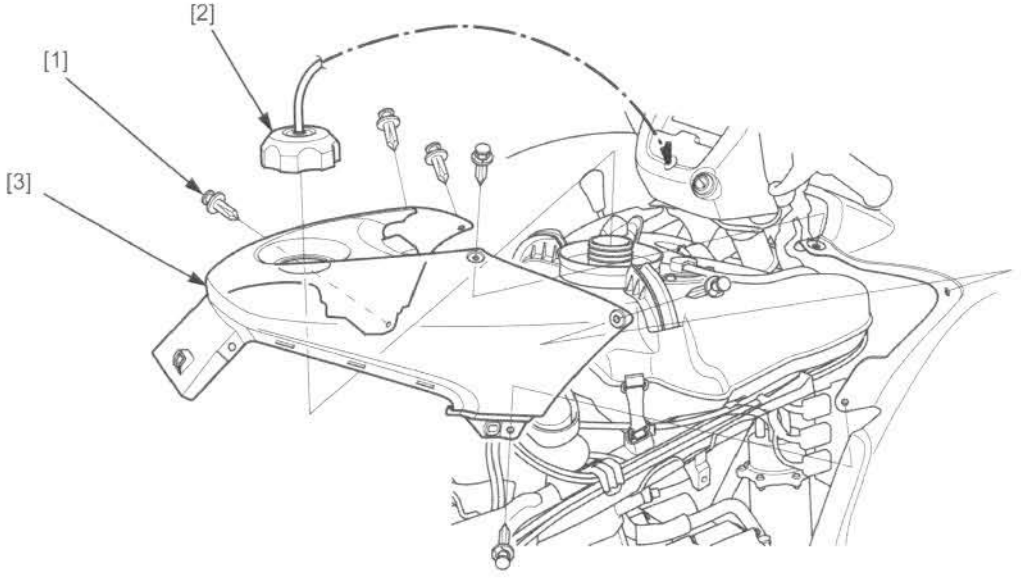
FUEL TANK COVER

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

Remove the following:
- six trim clips [1]
- fuel fill cap [2]
- fuel tank cover [3]

Install the fuel fill cap after removing the tank cover.

Installation is in the reverse order of removal.



MUDGUARD

NOTE:

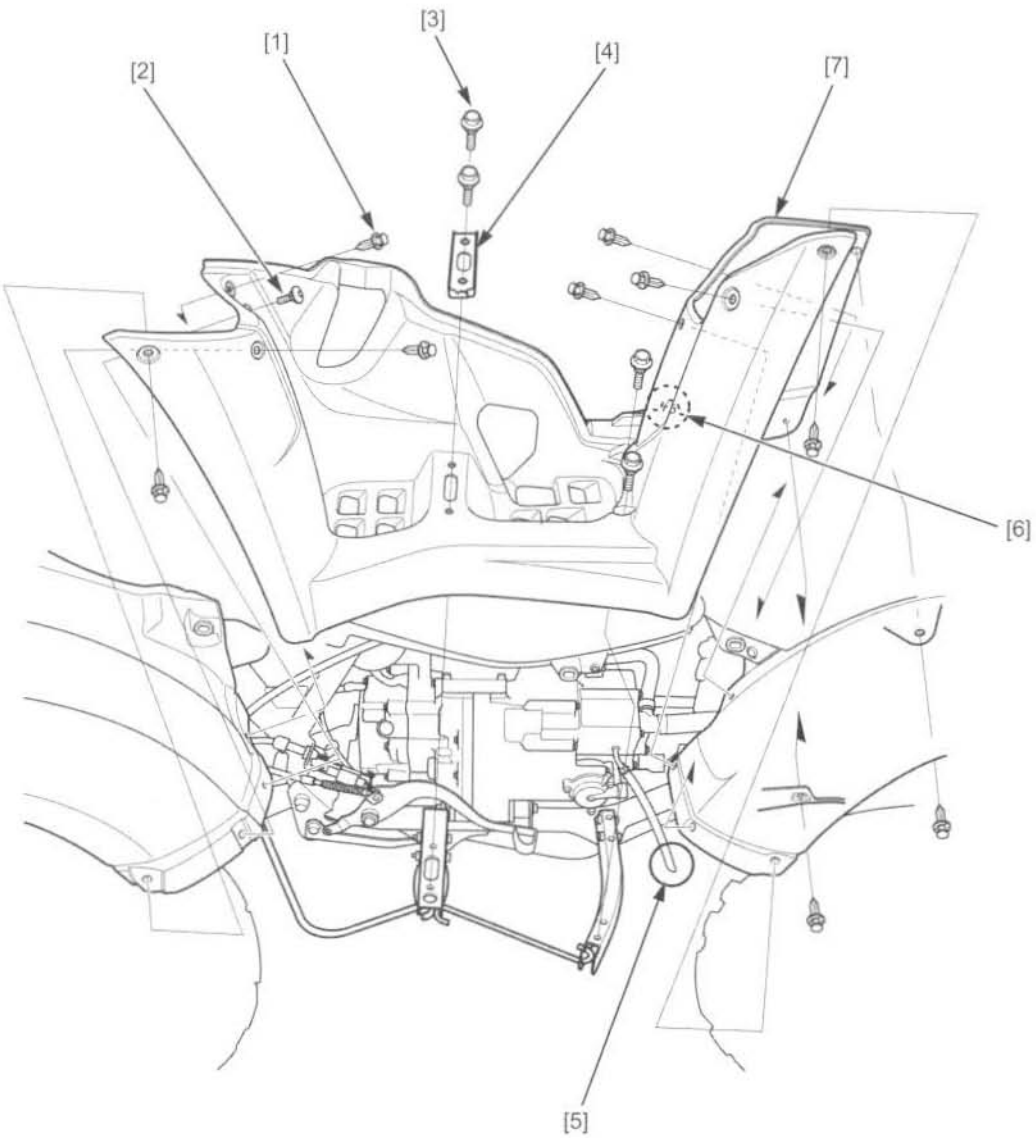
- Take care not to scratch the front and rear fenders when removing and installing the mudguard.

Remove the side cover (page 2-4).

Remove the following:

- nine trim clips [1]
- socket bolt (rear side) [2]
- four flange bolts [3] and footpeg [4]
- Right mudguard only: water pump breather hose [5] (from the hose guide [6] of the mudguard)
- mudguard [7]

Installation is in the reverse order of removal.

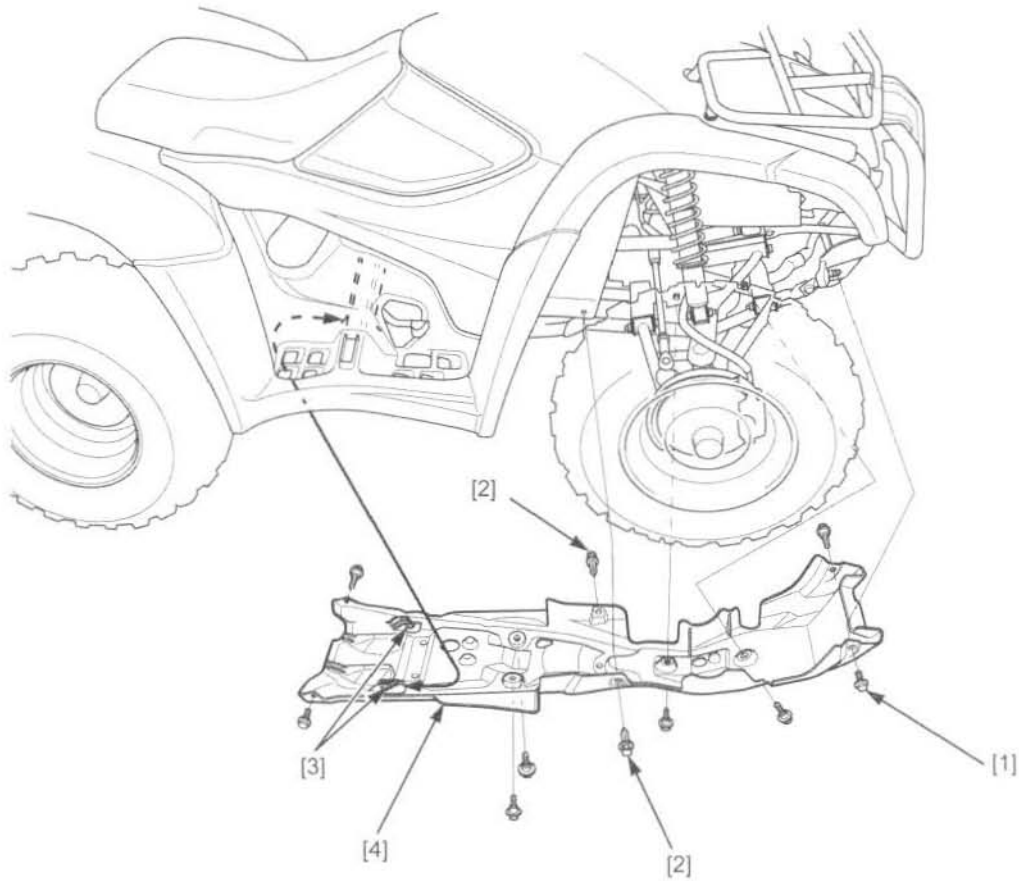


ENGINE GUARD

Remove the eight setting bolts [1] and two trim clips [2].

Release the two hooks [3] of the engine guard [4] from the frame and then remove the engine guard.

Installation is in the reverse order of removal.

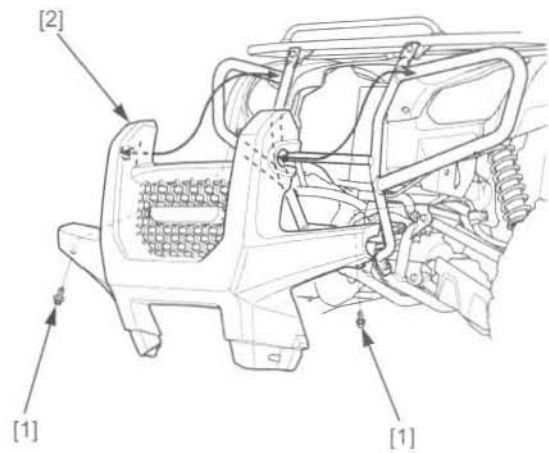


FRONT GRILLE

Remove the engine guard (page 2-7).

Remove the following:
- two trim clips [1]
- front grille [2]

Installation is in the reverse order of removal.



FRONT FENDER/CARRIER

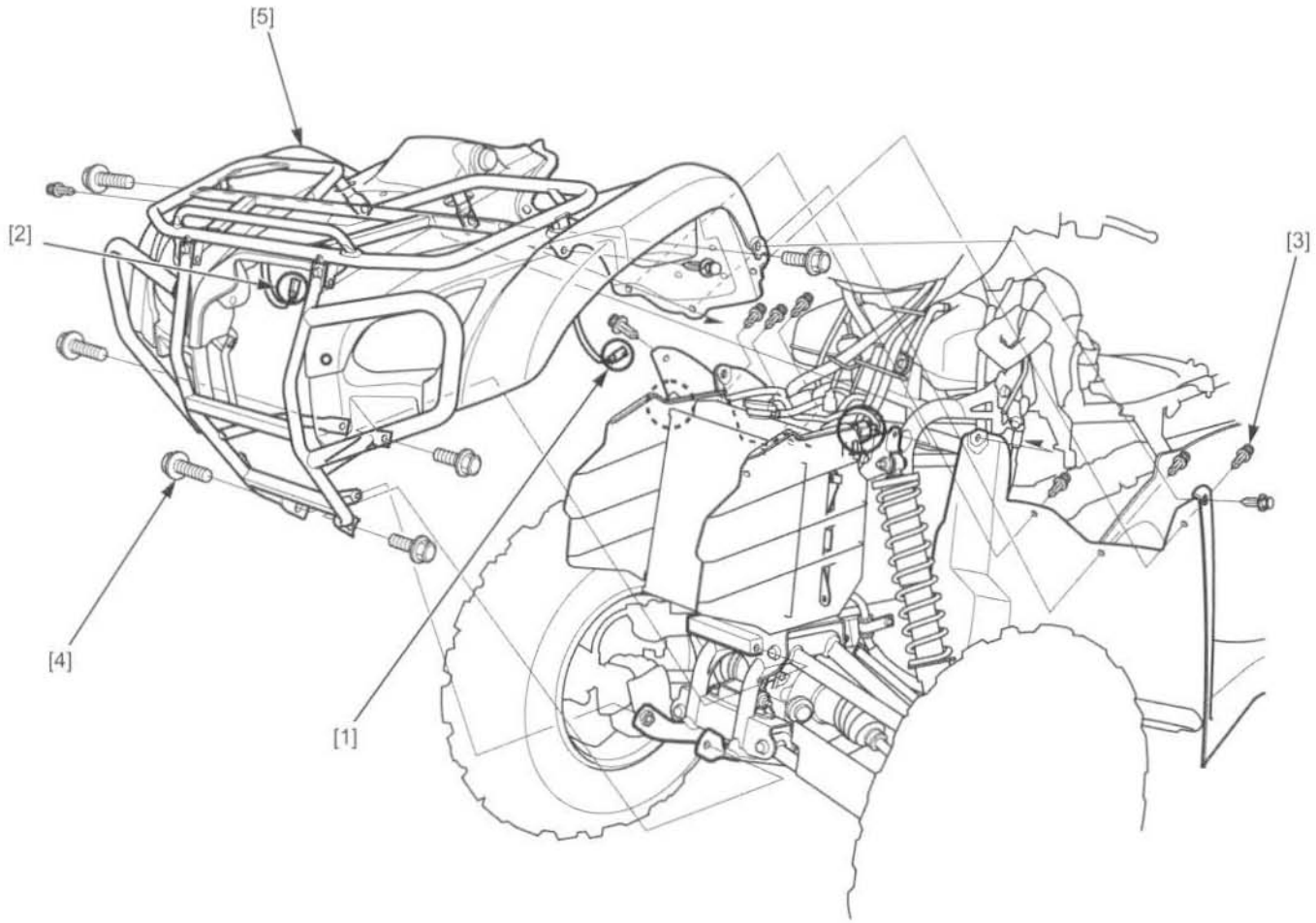
REMOVAL/INSTALLATION

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

Remove the front grille (page 2-7)

Remove the following:
- accessory socket 2P (Black) connector [1]
- headlight 3P (Black) connector [2] (release from the side air guide plate and disconnect it)
- ten trim clips [3]
- six 8 mm bolts [4]
- front fender/carrier assembly [5]

Installation is in the reverse order of removal.



DISASSEMBLY/ASSEMBLY

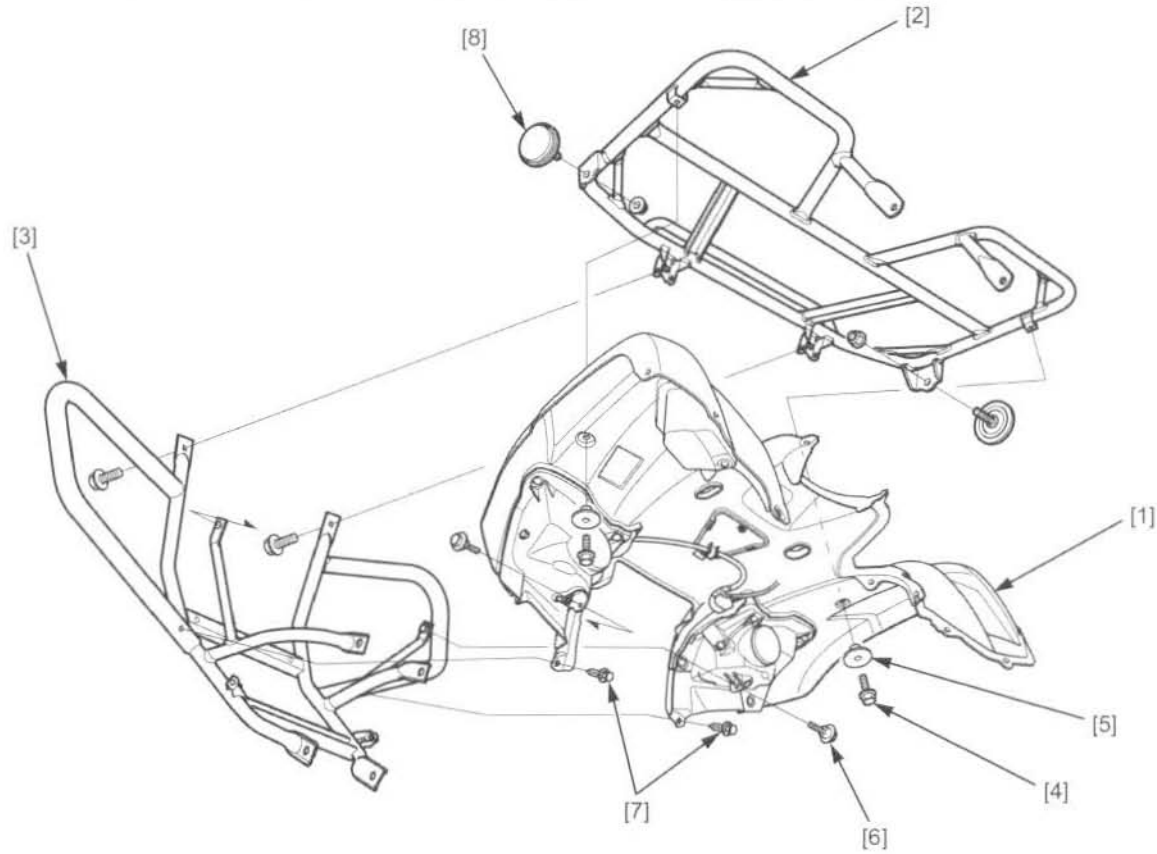
Remove the following fasteners and separate the front fender [1], front luggage carrier [2] and front carry pipe [3].

- four bolts [4] and two collars [5]
- two setting bolts [6] (securing each headlight housing)
- two trim clips [7]

Remove the two nuts and reflectors [8] (Canada type only)

Installation is in the reverse order of removal.

For headlight removal/installation, see "Lights/meters/Switches" section (page 22-5).



REAR FENDER COVER

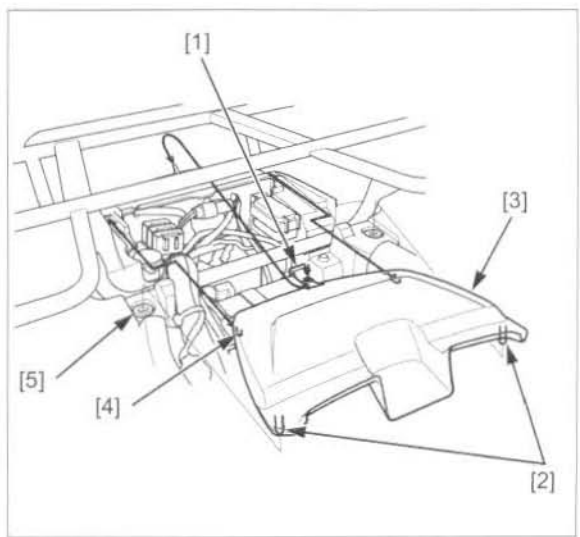
Remove the seat (page 2-4).

Be careful not to scratch the cover with the carrier pipe.

Remove the following:
- retaining strap [1] (from the tool box lid)
- two bosses [2]
- rear fender cover [3] (release the two tabs [4] by sliding the cover forward)

Be careful not to dislodge the grommets [5].

Installation is in the reverse order of removal.

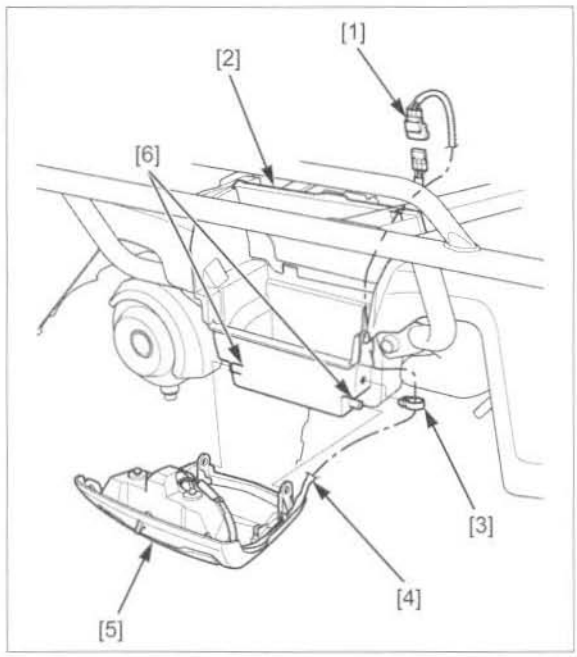


TOOL BOX LID

Remove the rear fender cover (page 2-9).

Remove the following:
- brake/taillight 3P (Black) connector [1] (release from the holder plate [2] and disconnect it)
- wire clip [3]
- brake/taillight wire [4] (from the wire guides)
- tool box lid [5] (from the pivots [6])

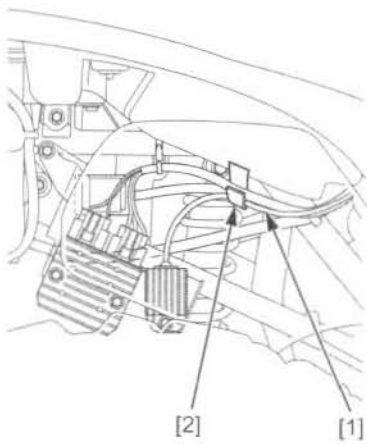
Installation is in the reverse order of removal.

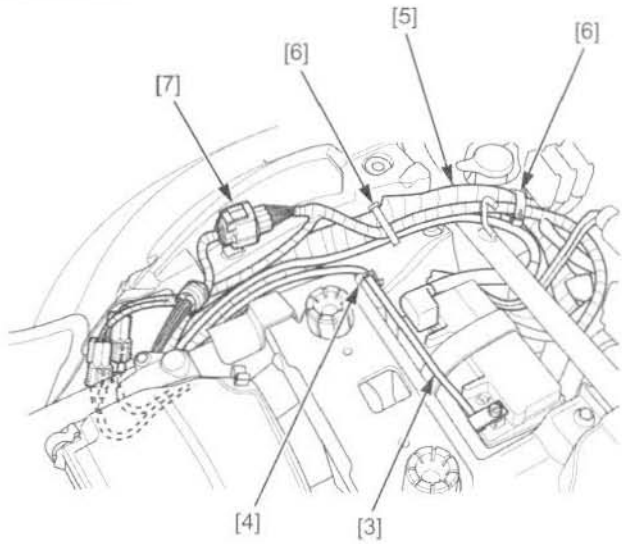


REAR FENDER/CARRIER

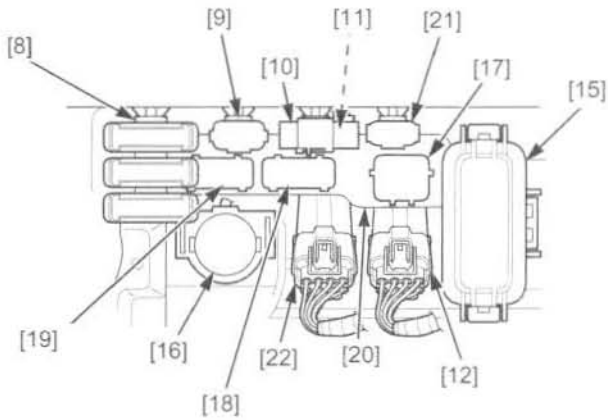
Remove the following:
- side covers (page 2-4)
- tool box lid (page 2-10)
- battery (page 21-8)
- air cleaner sub chamber (page 7-22)

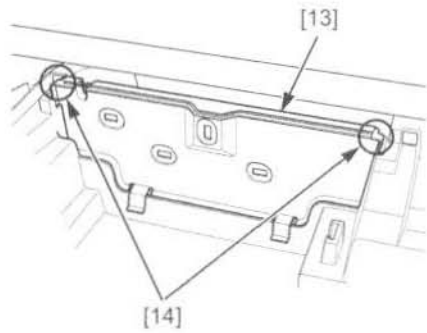
Remove the following from the rear fender:
- regulator/rectifier wires [1] (from the wire guide [2])
- battery (–) cable [3] (by releasing the cable guide [4])
- wire harnesses [5] (by releasing the wire clips [6])
- rear fender sub-wire harness 10P (gray) connector [7]





- junction connectors [8]
- brake/taillight 3P (Black) connector [9]
- main fuse connector [10]
- starter relay switch 2P (Green) connector [11]
- fuel pump relay [12]
- connector holder plate [13] (by releasing the two tabs [14])
- fuse box [15]
- starter relay switch [16]
- PCM/ECM 5P (Black) [17]
- PCM/ECM 33P (Black) connector [18] and 33P (Gray) connector [19]
- PCM/ECM [20]
- EPS fuse [21] (FPM/FPE model)
- power relay [22] (Canada type)





Remove the following fasteners and remove the rear fender/carrier assembly [1]:
- six trim clips [2]
- two socket bolts [3]
- two 6-mm setting bolts [4]
- four 10-mm bolts [5]

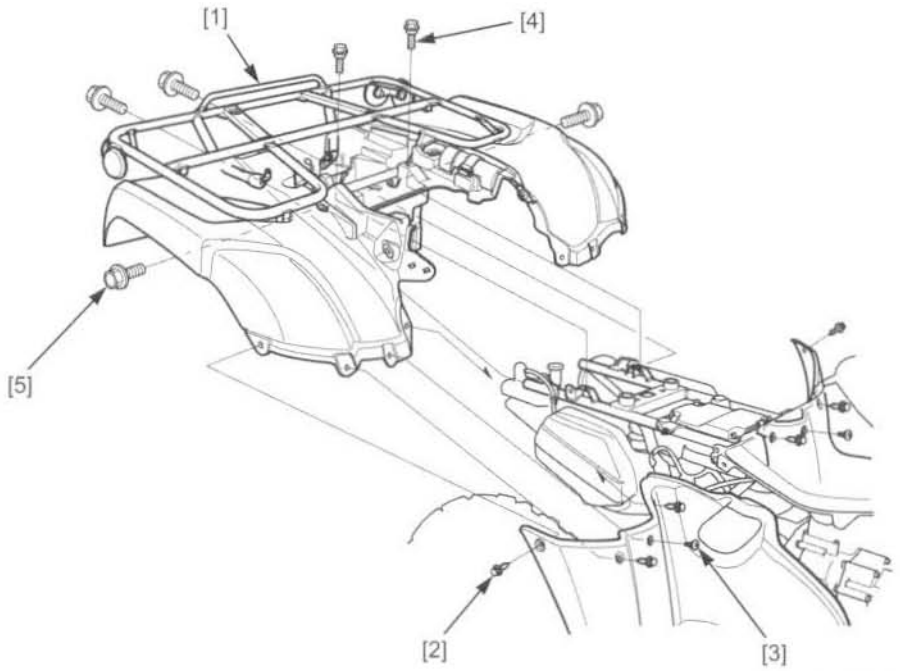
Remove the four bolts [6] and collars [7], two trim clips [8], and separate the rear fender [9] and carrier [10].

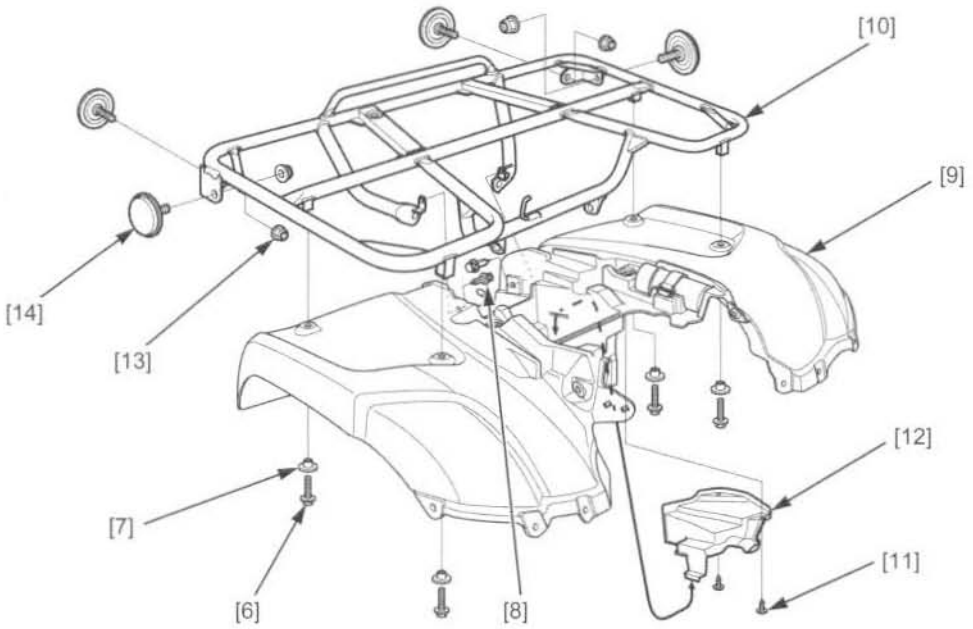
Remove the two screws [11] and muffler protector [12].

Remove the four nuts [13] and reflectors [14] (Canada type only).

Installation is in the reverse order of removal.

TORQUE: 10 mm bolt [5]: 74 N·m (7.5 kgf·m, 55 lbf·ft)





MUDGUARD BRACKET

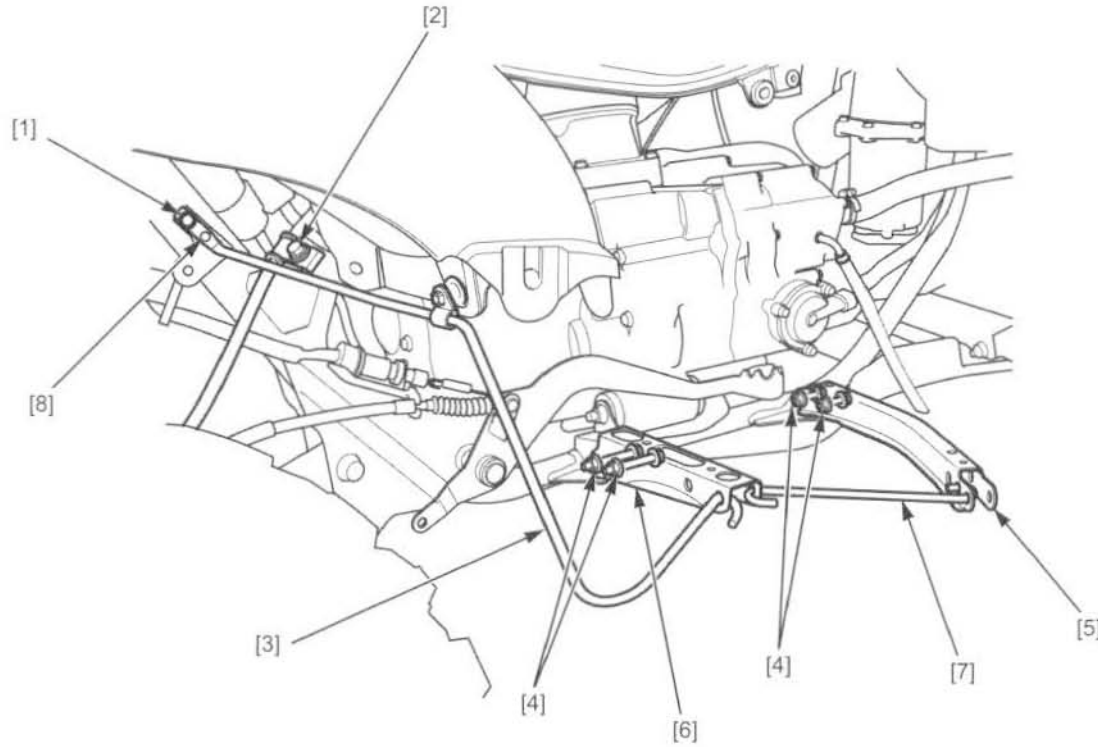
Remove the mudguard (page 2-6).

Remove the following:
- 6-mm bolt [1]
- 6-mm bolt [2] (securing lever rear brake cable)
- rear fender stay [3]
- four 8-mm bolts and nuts [4]
- mudguard bracket [5] and step bracket [6]
- center mudguard stay [7]

Installation is in the reverse order of removal.

TORQUE: 8 mm nut [4]: 32 N·m (3.3 kgf·m, 24 lbf·ft)

When installing the rear fender stay, align the locating pin [8] with the hole in the frame.



EXHAUST SYSTEM

REMOVAL

Remove the side covers (page 2-4).

Remove the left mudguard (page 2-6).

Loosen the two muffler band bolts [1].

Remove the following:
- two joint nuts [2]
- exhaust pipe [3]
- exhaust pipe gasket [4]
- muffler gasket [5]
- mounting bolt [6]
- muffler [7]

INSTALLATION

Install a new exhaust pipe gasket and muffler gasket.

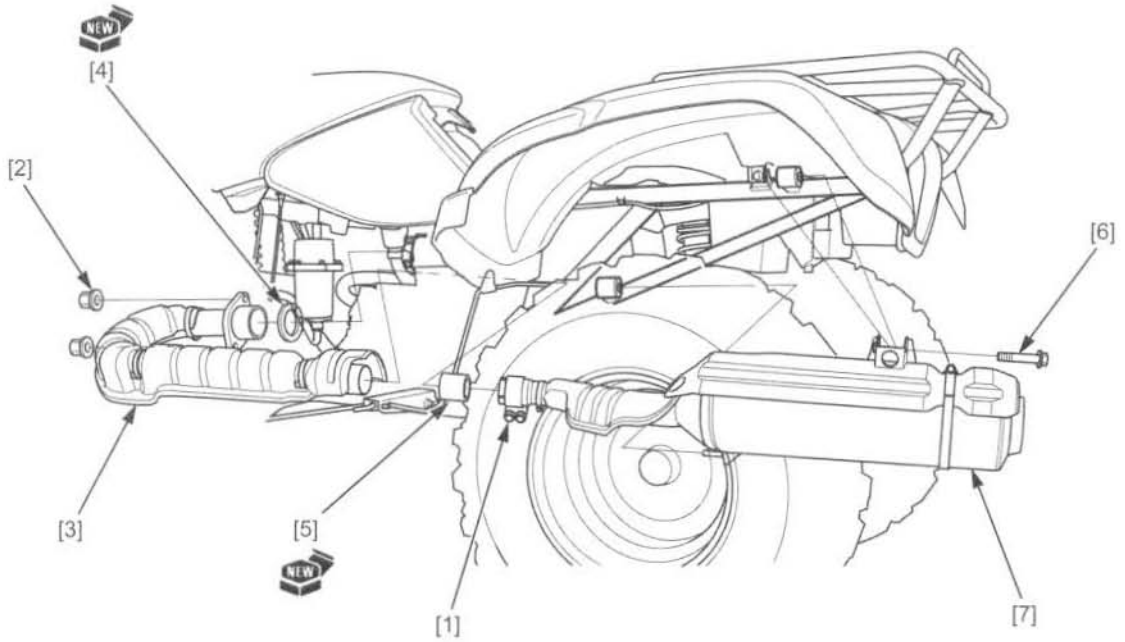
Install the following by loosely tightening all the fasteners:
- muffler (onto the stays)
- mounting bolt
- exhaust pipe (into the muffler and onto the cylinder head)
- two joint nuts (by setting the exhaust pipe flange properly)

Tighten the mounting bolt first, then tighten the joint nuts.

Tighten the muffler band bolts to the specified torque.

TORQUE: 23 N·m (2.3 kgf·m, 17 lbf·ft)

After installation, inspect the exhaust system for leaks.



EXHAUST PIPE STUD BOLT REPLACEMENT

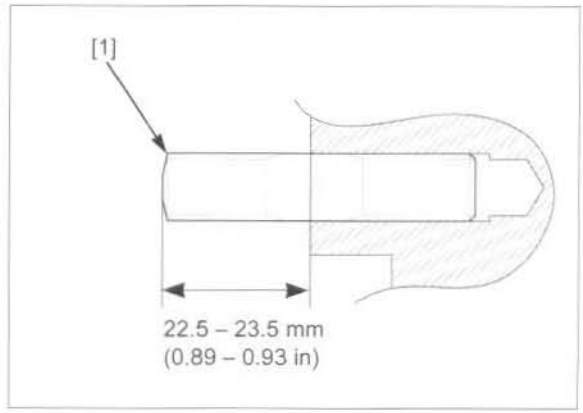
Thread two nuts to the stud bolt and tighten them together, then use a wrench on them to turn the stud bolt out.

Install the stud bolts with their rounded end [1] facing out.

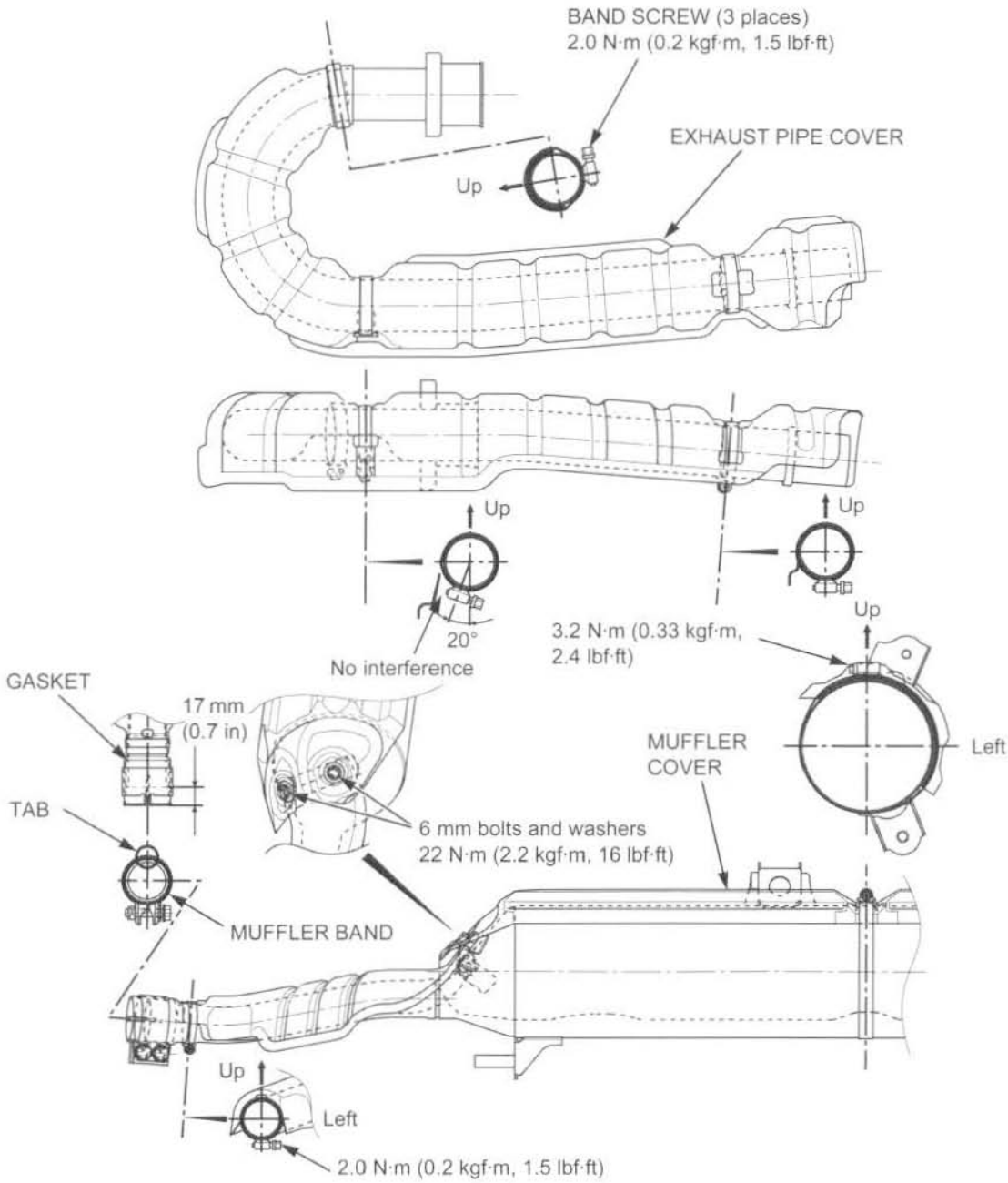
Install and tighten new stud bolts into the cylinder head to the specified torque.

TORQUE: 6.0 N·m (0.6 kgf·m, 4.4 lbf·ft)

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



DISASSEMBLY/ASSEMBLY



MEMO

SERVICE INFORMATION

GENERAL

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

TORQUE VALUES

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	2	6	17 (1.7, 13)	
Valve adjusting hole cap	2	36	12 (1.2, 9)	
Timing hole cap	1	14	10 (1.0, 7)	
Engine oil drain bolt	1	12	25 (2.5, 18)	
Rear final gear case oil check bolt	1	8	12 (1.2, 9)	
Rear final gear case oil filler cap	1	30	12 (1.2, 9)	
Rear final gear case oil drain bolt	1	8	12 (1.2, 9)	
Rear final gear case skid plate bolt	3	8	32 (3.3, 24)	ALOC bolt: replace with a new one.
Front final gear case oil filler cap	1	30	12 (1.2, 9)	
Front final gear case oil drain bolt	1	8	12 (1.2, 9)	
Final clutch arm cover bolt	3	6	10 (1.0, 7)	
Front master cylinder reservoir cap screw	2	4	2.0 (0.2, 1.5)	
Tie-rod lock nut (knuckle side)	2	12	54 (5.5, 40)	See page 3-26
Tie-rod lock nut (steering arm side)	2	12	54 (5.5, 40)	Left hand threads. See page 3-26

TOOLS

Adjusting screwdriver
07GMA-KT80110

Valve adjusting wrench
07GMA-ML70120

MAINTENANCE SCHEDULE

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

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

	ITEMS	FREQUENCY / WHICHEVER COMES FIRST		INITIAL MAINTENANCE	REGULAR MAINTENANCE INTERVAL		REFER TO PAGE
			mi	100	600	1,200	
			km	150	1,000	2,000	
			MONTH	1	6	12	
			HOURS	20	100	200	
*	FUEL LINE					I	3-4
*	THROTTLE OPERATION					I	3-4
	AIR CLEANER	NOTE 1			C	C	3-5
	AIR CLEANER HOUSING DRAIN TUBE	NOTE 2			I	I	3-7
	SPARK PLUG				I	I	3-8
*	VALVE CLEARANCE			I	I	I	3-9
	ENGINE OIL		INITIAL = 100 mi (150 km), 20 operating hours or 1 month: R REGULAR = Every 600 mi (1,000 km), 100 operating hours or 12 months: R				3-12
	ENGINE OIL FILTER						3-14
*	ENGINE IDLE SPEED			I	I	I	3-15
	RADIATOR COOLANT	NOTE 3			I	I	3-15
*	COOLING SYSTEM	NOTE 2			I	I	3-16
	DRIVE TRAIN BOOTS				I	I	3-17
	REAR FINAL GEAR CASE OIL AND DIFFERENTIAL OIL				(R: Every 2 years)	I	3-17
*	2WD/4WD SELECT SYSTEM					I	3-19
*	BRAKE FLUID	NOTE 3			I	I	3-20
*	BRAKE SHOES WEAR	NOTE 1, 2				I	3-21
*	BRAKE PADS WEAR	NOTE 1, 2				I	3-21
*	BRAKE LIGHT SWITCH			I	I	I	3-21
	BRAKE SYSTEM			I	I	I	3-22
*	REVERSE LOCK SYSTEM			I	I	I	3-23
	GUARDS				I	I	3-24
*	CLUTCH SYSTEM			I	I	I	3-24
*	SUSPENSION				I	I	3-25
*	SPARK ARRESTER				C	C	3-25
*	NUTS, BOLTS, FASTENERS			I		I	3-25
**	WHEELS/TIRES			I	I	I	3-25
**	TIE-ROD AND JOINT BOOTS			I	I	I	3-26
**	STEERING SHAFT HOLDER BEARING					I	3-26
**	STEERING SYSTEM					I	3-26

* Should be serviced by a 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 a dealer.

NOTES:

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

FUEL LINE

Remove the fuel tank (page 7-20).

Check the fuel lines [1] for deterioration, cracks, damage or leakage.

Replace the fuel hose if necessary.

THROTTLE OPERATION

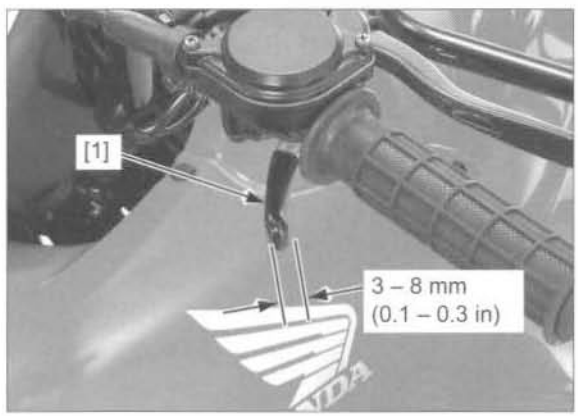
Check for any deterioration or damage to the throttle cable. Check the throttle lever [1] for smooth operation. Check that the throttle opens and automatically closes in all steering positions.

If the throttle lever does not return properly, lubricate the throttle cable and overhaul and lubricate the throttle housing (page 16-11).
If the throttle lever still does not return properly, replace the throttle cable.

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

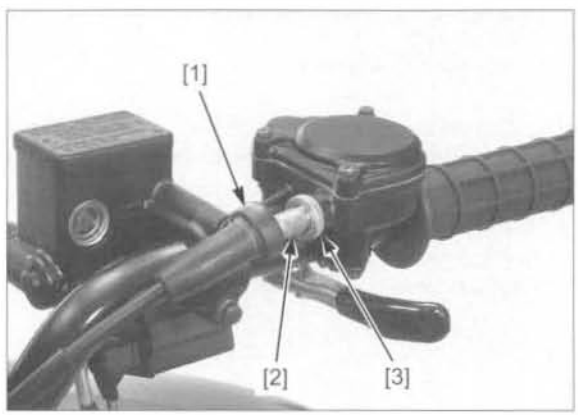
Measure the throttle lever freeplay at the tip of the throttle lever.

THROTTLE LEVER FREEPLAY:
3 – 8 mm (0.1 – 0.3 in)



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

Slide the rubber boot [1] off the adjuster [2].
Loosen the lock nut [3], turn the adjuster as required and tighten the lock nut.
Install the rubber boot securely.

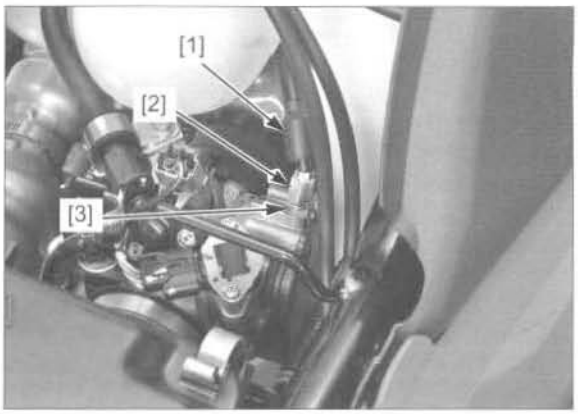


Major adjustments are made with the lower adjuster.

Remove the throttle body cover (page 7-13).

Slide the rubber boot [1] off the adjuster [2].
Loosen the lock nut [3], turn the adjuster as required and tighten the lock nut.
Install the rubber boot securely.

Recheck the throttle operation and install the throttle body cover (page 7-13).



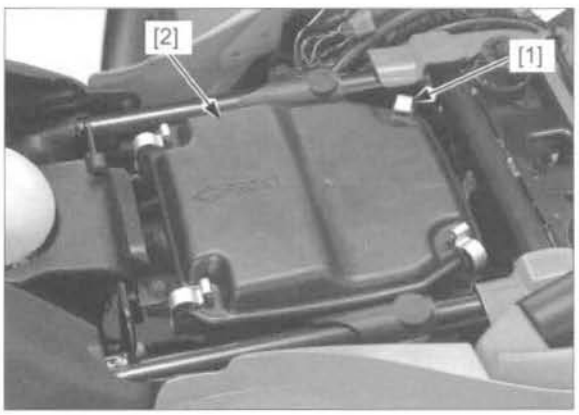
AIR CLEANER

NOTE:

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

Remove the seat (page 2-4).

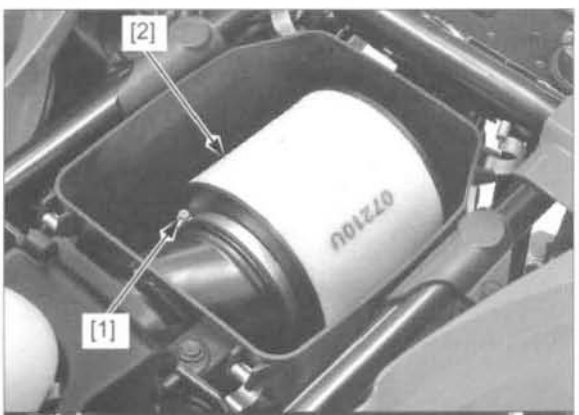
Release the four retaining clips [1] and remove the air cleaner cover [2].

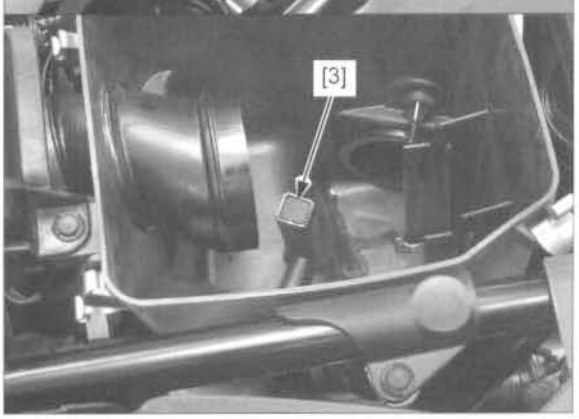


Loosen the band screw [1] and remove the air cleaner element assembly [2].

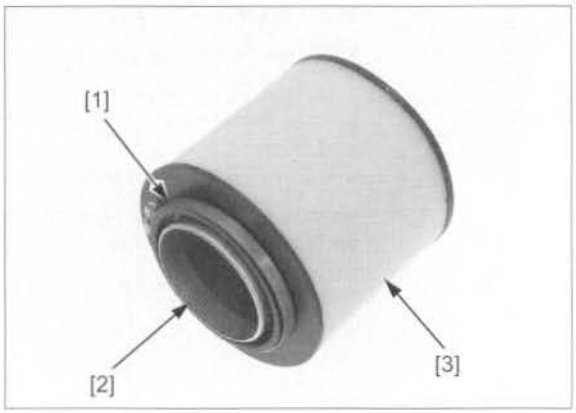
Remove the dust filter [3] from the element holder in the air cleaner housing.

Check the dust filter for dirt, and clean it if necessary.

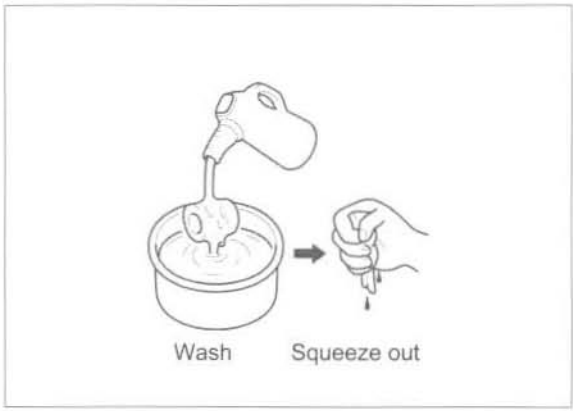




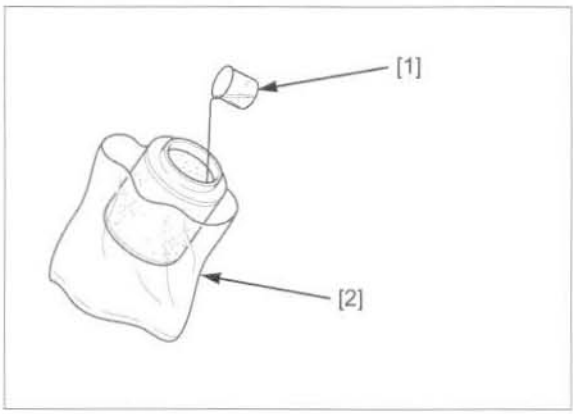
Remove the element band [1] and the element core [2] from the air cleaner element [3].



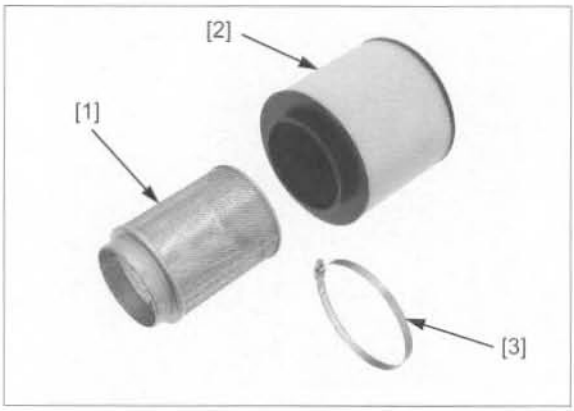
Wash the element and filter in non-flammable or high flash point solvent.
Squeeze out the solvent thoroughly, and allow the element and filter to dry.



Apply approximately 20 g (0.7 oz) of Pro Honda Foam Filter Oil [1] or equivalent oil from the inside of the element.
Place the element into a plastic bag [2] and spread the oil evenly by hand.



Install the element core [1] into the air cleaner element [2] properly.
Install the element band [3] onto the element flange.

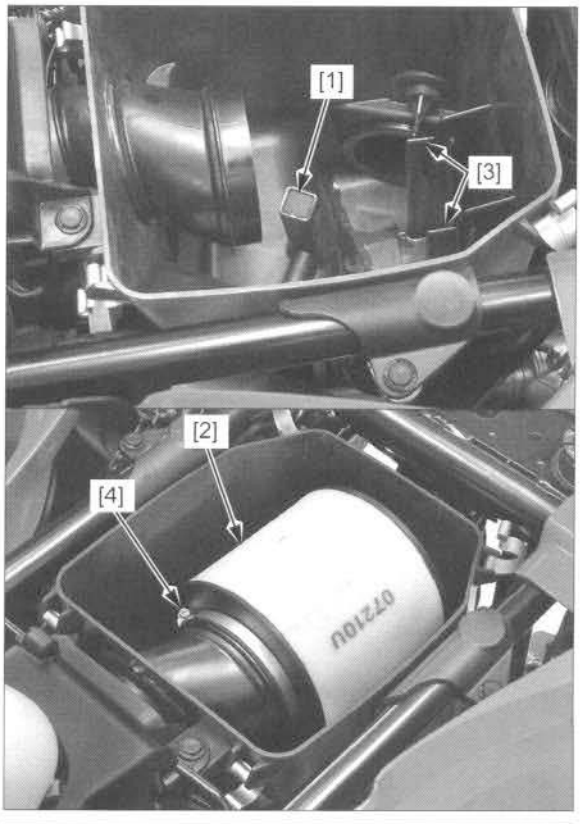


Clean the inside of the air cleaner housing and cover.

Make sure the rubber seal in the cover is in position and in good condition.

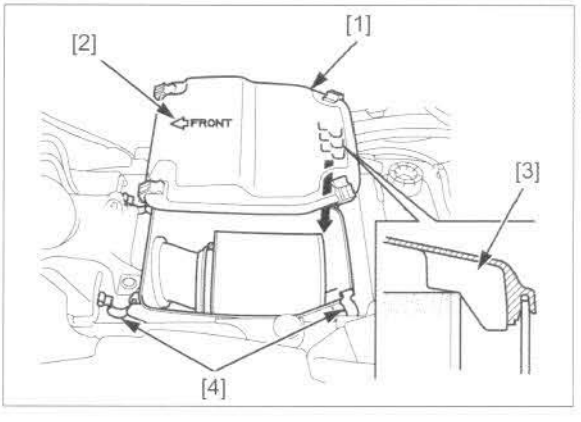
Install the dust filter [1] into the housing port.

Install the element assembly [2] over the connecting tube on the housing.
Be sure to rest the element onto the stepped area [3] of the housing and tighten the band screw [4].



Install the air cleaner cover [1] with the arrow [2] facing forward by aligning the stepped area [3] with the element.
Secure the cover with the four retaining clips [4].

Install the seat (page 2-4).



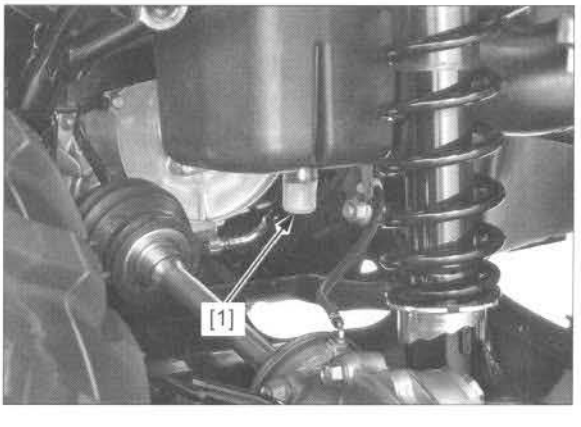
AIR CLEANER HOUSING DRAIN TUBE

NOTE:

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

Remove the drain tube [1] from the bottom of the air cleaner housing to empty any deposits.

Install the drain tube securely.



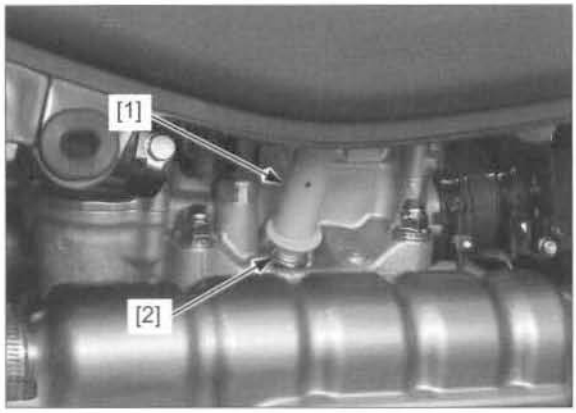
SPARK PLUG

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

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

Disconnect the spark plug cap [1] and clean around the spark plug base.

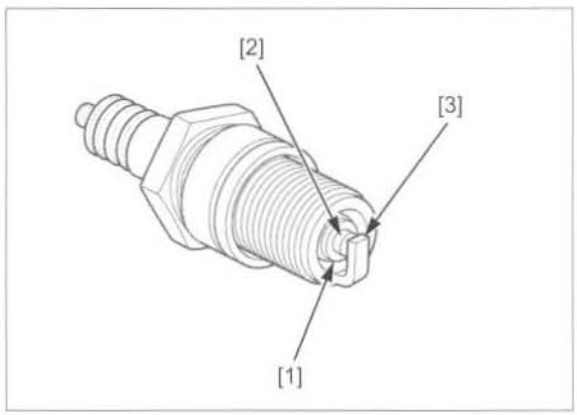
Remove the spark plug [2].



Check the insulator [1] for cracks or damage, and the electrodes for wear, fouling or discoloration. Replace the plug if necessary.

RECOMMENDED SPARK PLUG:
BKR5E-11 (NGK), K16PR-U11 (DENSO)

Clean the spark plug center electrode [2] and side electrode [3] with a wire-type brush or special plug cleaner.



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

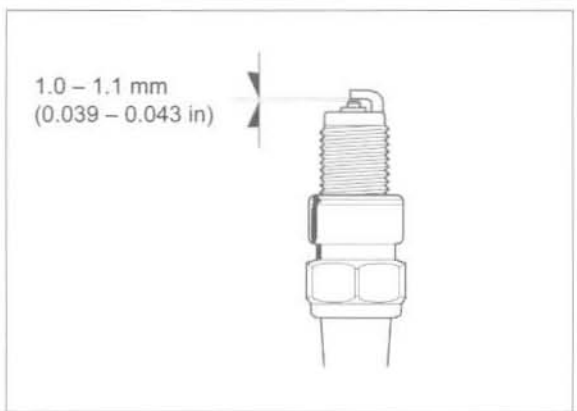
SPARK PLUG GAP: 1.0 – 1.1 mm (0.039 – 0.043 in)

If necessary, adjust the gap by bending the side electrode carefully.

Thread the spark plug in by hand to prevent cross-threading and tighten it to the specified torque with a spark plug wrench.

TORQUE: 22 N·m (2.2 kgf·m, 16 lbf·ft)

Connect the spark plug cap and install the left side cover (page 2-4).



VALVE CLEARANCE

NOTE:

- Inspect and adjust the valve clearance while the engine is cold (below 35°C/95°F).
- Check the engine idle speed after the valve clearance inspection (page 3-15).

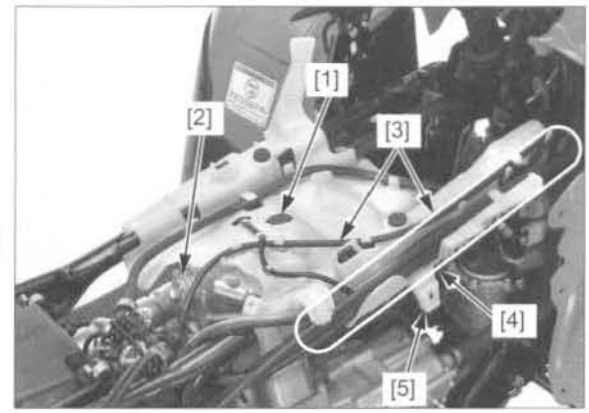
Remove the following:

- fuel tank (page 7-20)
- intake air duct (page 7-22)
- right mudguard (page 2-6)

Remove the following:

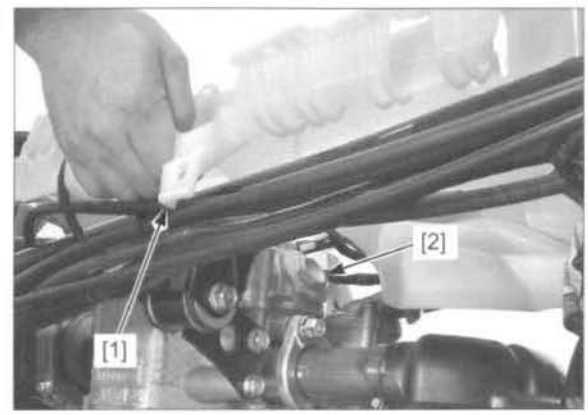
- rubber plug [1] (from the heat guard plate)
- intake valve adjusting hole cap [2]

Release the cables [3], wire harness and hoses [4] out of the heat guard plate [5].



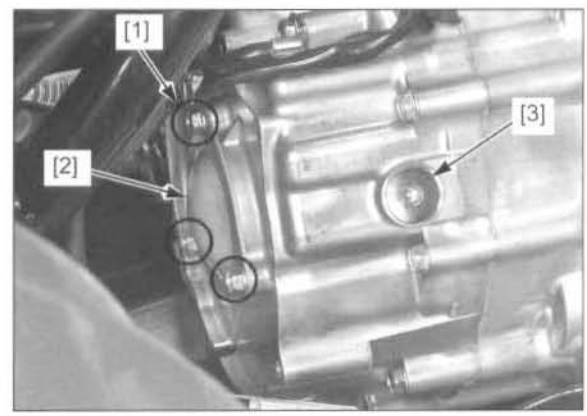
Be careful not to damage the fuel hose.

Lift the right side of the heat guard plate up [1] and remove the exhaust valve adjusting hole cap [2].



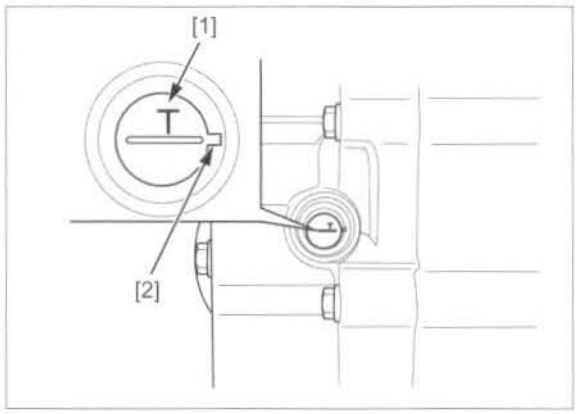
Remove the following:

- three bolts [1]
- crankshaft hole cap [2]
- timing hole cap [3]



If the "T" mark is passed when trying to align it with the index mark, continue to rotate the crankshaft clockwise to align. Do not rotate the crankshaft counterclockwise. This is to prevent the one-way decompressor system from functioning, which would cause an incorrect valve clearance measurement.

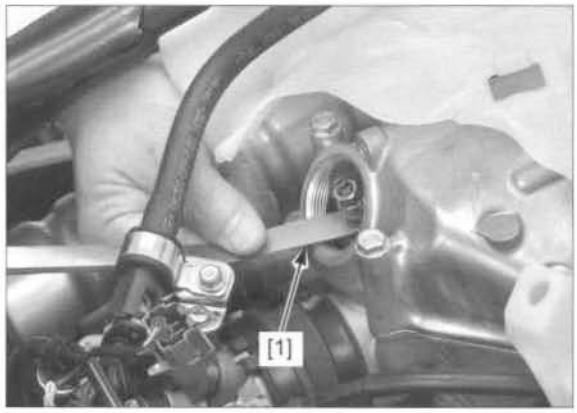
Rotate the crankshaft clockwise to align the "T" mark [1] on the flywheel with the index mark [2] on the crankcase.
Make sure the piston is at TDC (Top Dead Center) on the compression stroke.
This position can be obtained by confirming that there is slack in both rocker arms. If there is no slack, rotate 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 valve clearances by inserting a feeler gauge [1] between the adjusting screw and valve stem.

VALVE CLEARANCE:
IN: 0.15 ± 0.02 mm (0.006 ± 0.001 in)
EX: 0.23 ± 0.02 mm (0.009 ± 0.001 in)



Adjust by loosening the lock nut [1] and turning the adjusting screw [2] until there is a slight drag on the feeler gauge.

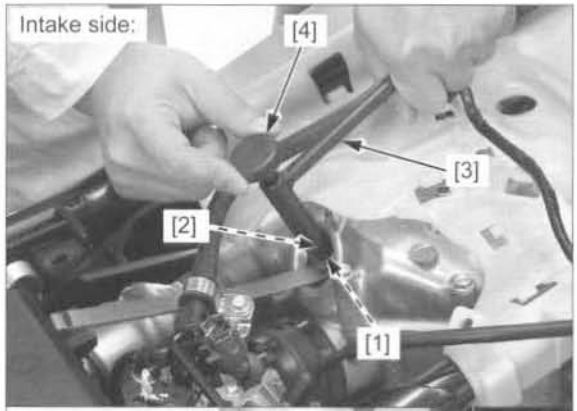
TOOLS:

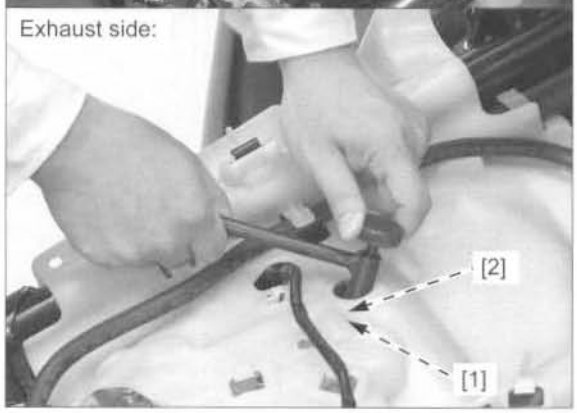
[3] Valve adjusting wrench	**07GMA-ML70120**
[4] Adjusting screwdriver	**07GMA-KT80110**

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

TORQUE: 17 N·m (1.7 kgf·m, 13 lbf·ft)

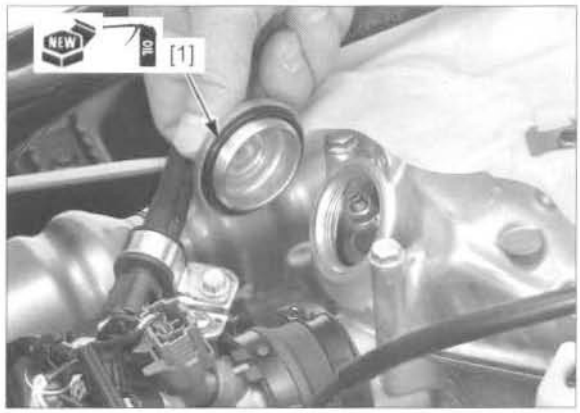
After tightening the lock nut, recheck the valve clearance.





Coat new O-rings [1] with engine oil and install them into the groove in each valve adjusting hole cap.
Install the valve adjusting hole caps and tighten them to the specified torque.

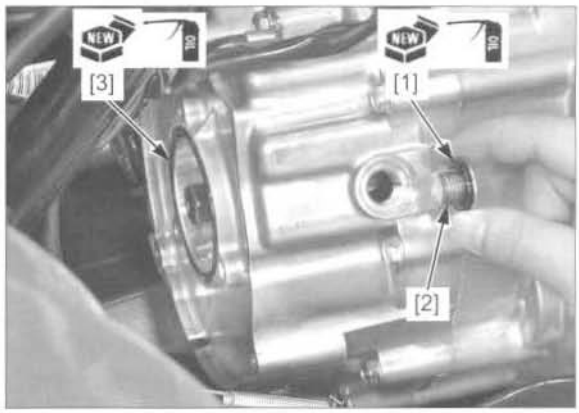
TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)



Coat a new O-ring [1] with engine oil and install it onto the timing hole cap [2].
Install the timing hole cap and tighten it to the specified torque.

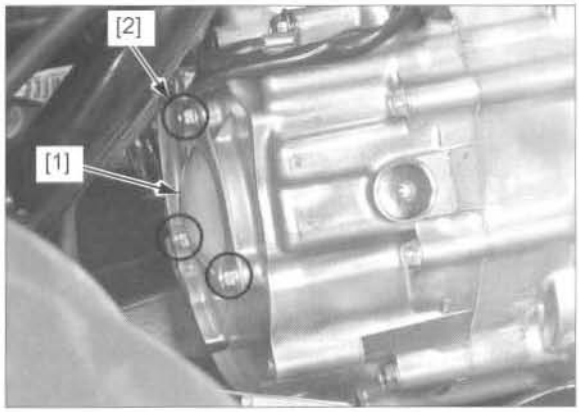
TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

Coat a new O-ring [3] with engine oil and install it into the crankcase cover groove.



Install the crankshaft hole cap [1] and tighten the three bolts [2].

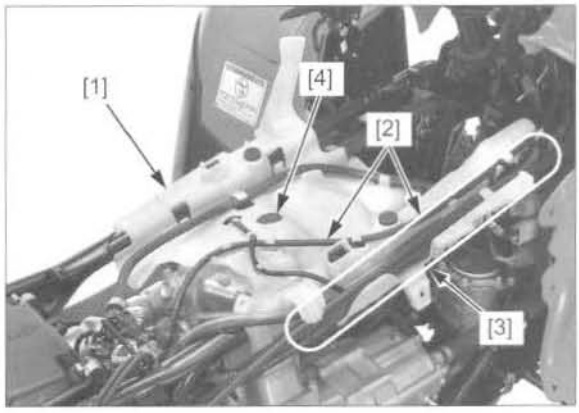
Install the removed parts in the reverse order of removal.



Install the heat guard plate [1] on the frame while routing the cables [2], wire harness and hoses [3] into the guides of the plate properly, being careful not to damage them.

Install the rubber plug [4].

Be sure the routing items are in place and install the following:
- right mudguard (page 2-6)
- intake air duct (page 7-22)
- fuel tank (page 7-20)



ENGINE 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.

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

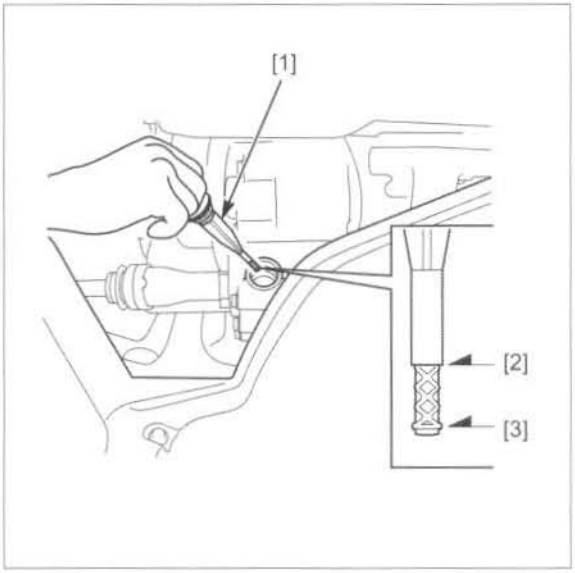
Place the vehicle on level ground.

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 and wait 2 – 3 minutes.

Remove the oil filler cap/dipstick [1] and wipe it clean. Check the oil level by inserting the oil filler cap/dipstick into the engine without screwing it in.

The engine contains a sufficient amount of oil if the oil level is between the upper level [2] and lower level [3] marks on the dipstick.

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

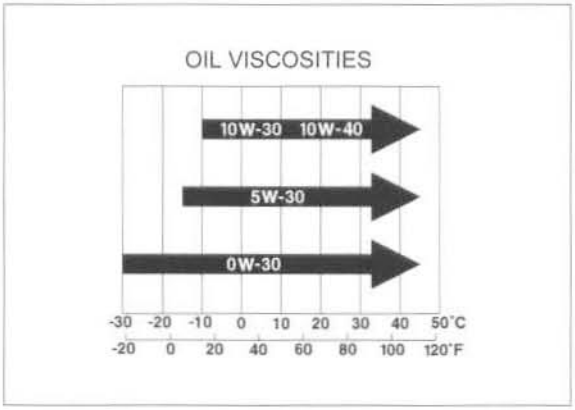


RECOMMENDED ENGINE OIL:

Pro Honda GN4 4-stroke oil (U.S.A. and Canada) or Honda 4-stroke oil (Canada only), 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/dipstick.

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

OIL CHANGE

NOTE:

- Change the oil with the engine warm to assure complete and rapid draining.

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

Place the vehicle on level ground.

Start the engine and let it idle for a few minutes.

Stop the engine.
Remove the drain bolt [1] and the oil filler cap/dipstick [2] to drain the engine oil.

After the oil has drained, install the drain bolt with a new sealing washer [3] and tighten it to the specified torque.

TORQUE: 25 N·m (2.5 kgf·m, 18 lbf·ft)

Pour the recommended oil (page 3-12) into the engine to the upper level mark on the dipstick.

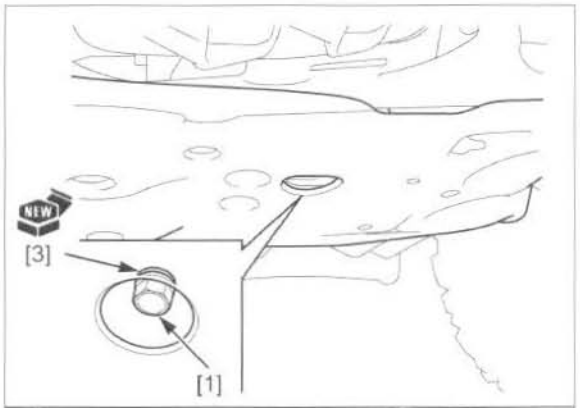
OIL CAPACITY:

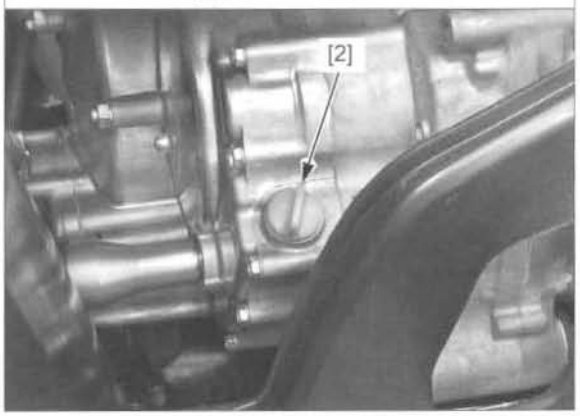
2.9 liters (3.1 US qt, 2.6 Imp qt) after draining
3.0 liters (3.2 US qt, 2.6 Imp qt) after draining/filter change
3.3 liters (3.5 US qt, 2.9 Imp qt) after disassembly

Install the filler cap/dipstick.

Check the oil level (page 3-12).

Reset the oil change indicator after changing the engine oil as follows.

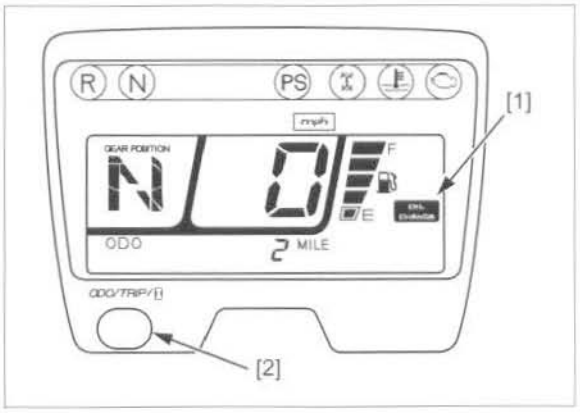




OIL CHANGE INDICATOR RESET

To reset the indicator [1], press and hold the odometer/tripmeter/hourmeter select button [2] and turn the ignition switch ON for more than 5 seconds. The indicator message will disappear.

If the oil is changed before the oil change indicator appears, be sure to reset the oil change indicator after changing the oil, except after the initial oil change. Press and hold the odometer/tripmeter/hourmeter select button and turn the ignition switch ON for more than 5 seconds. When the indicator lights for 2 seconds and then turns off, the oil change indicator is reset.



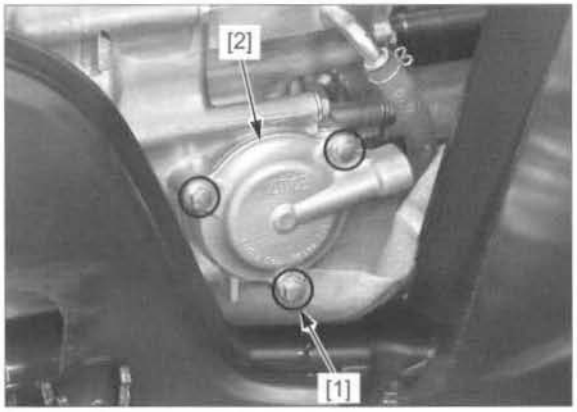
ENGINE OIL FILTER

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

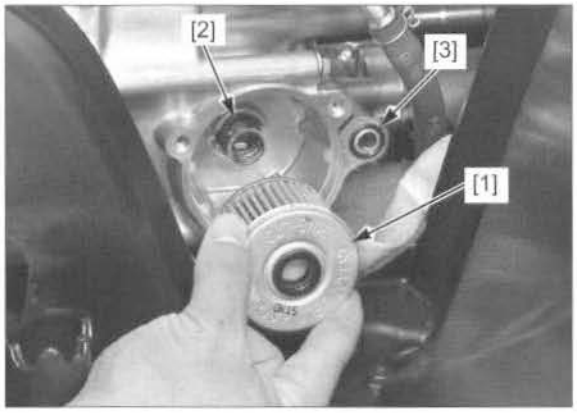
Drain the engine oil (page 3-13).

Place shop towels under the filter cover because oil will flow out.

Remove the following:
- three bolts [1]
- filter cover [2] and O-ring



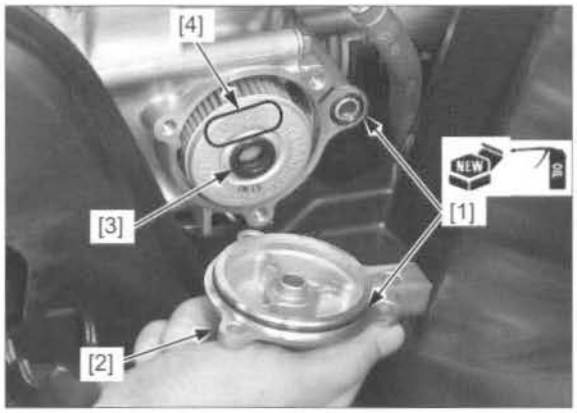
- oil filter [1]
- setting spring [2]
- O-ring [3]



Coat new O-rings [1] with engine oil and install them into each groove in the filter cover [2] and front crankcase cover.

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

Install the setting spring onto the lugs and a new oil filter with the rubber seal [3] facing out, away from the engine ("OUT-SIDE" mark [4] on the filter is visible), then set the filter cover onto the filter and tighten the bolts while holding the cover.



Fill the crankcase with the engine oil (page 3-13).

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

ENGINE 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, check the following:
  - DTC or MIL blinking (page 4-11)
  - spark plug condition (page 3-8)
  - air cleaner condition (page 3-5)
- 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 or smaller that will accurately indicate a 50 rpm change.

Remove the left fuel tank side cover (page 2-5).

Start the engine and warm it up until the coolant temperature rises to 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 ± 100 rpm

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

- throttle operation and throttle lever freeplay (page 3-4).
- intake air leak
- engine top-end problem (page 10-6)
- IACV operation (page 7-26)

RADIATOR COOLANT

Check the coolant level of the reserve tank [1] with the engine running at normal operating temperature.

The level should be between the upper [2] and lower level lines [3] with the vehicle upright on a level surface.

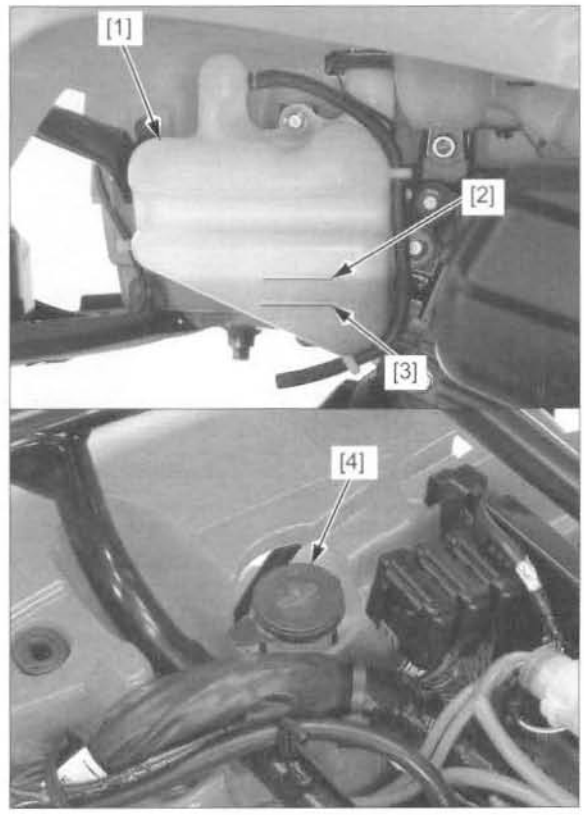
If the level is low, add coolant as follows.

Remove the rear fender cover (page 2-9).

Remove the reserve tank cap [4] and fill the tank up to the upper level line with a 1:1 mixture of distilled water and antifreeze (coolant preparation: page 8-6).

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 8-7).

COOLING SYSTEM

NOTE:

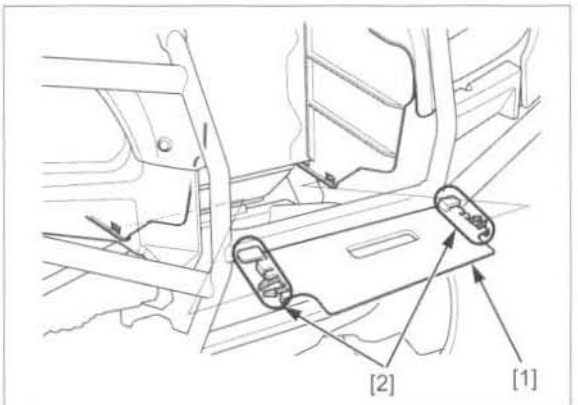
- If the vehicle is used in very wet or muddy conditions, more frequent inspections are required.

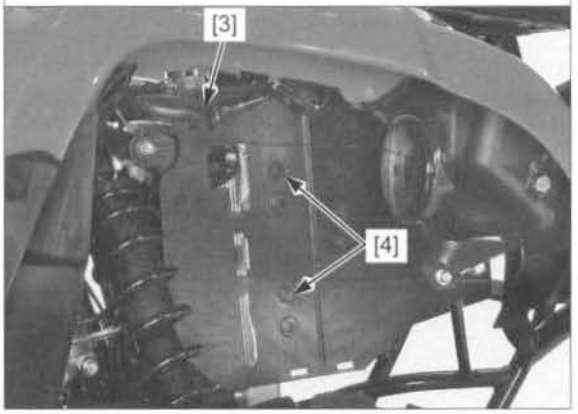
Remove the front grille (page 2-7).
Remove the side covers (page 2-4).

Be careful not to damage the radiator fins.

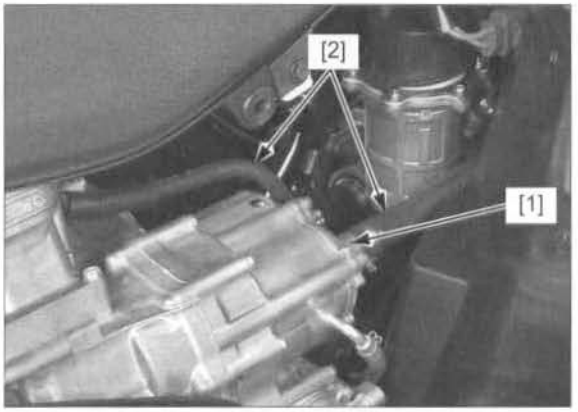
Remove the radiator grille under cover [1] by releasing the four tabs [2].

Remove the following:
- connector and wire [3] (from right side air guide plate)
- two trim clips [4] (from each side air guide plate by pushing the center pin)
- side air guide plates (by releasing each tab)
- radiator grille (by releasing the two tabs)





Check for any coolant leakage from the water pump [1], water hoses [2] and hose joints.
Check the water hoses for cracks or deterioration and replace if necessary.
Check that all hose clamps are tight.

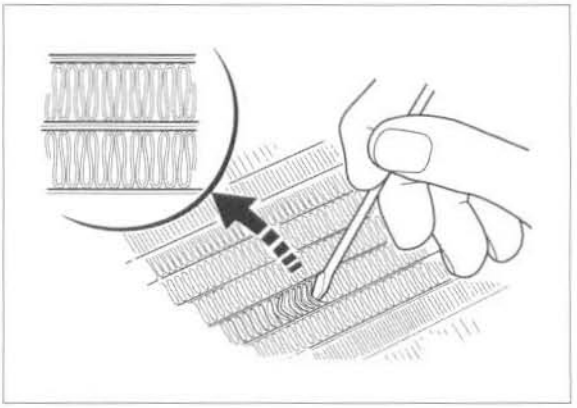


Check the radiator air passage for clogs or damage.
Straighten bent fins with a small, flat blade screwdriver and remove insects, mud or other obstructions with compressed air or low water pressure.
Also, clean the radiator grille thoroughly.
Replace the radiator if the air flow is restricted over more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

Install the removed parts in the reverse order of removal.

NOTE:

- When installing the trim clip, carefully align the clip holes in the radiator, grille and air guide plate.



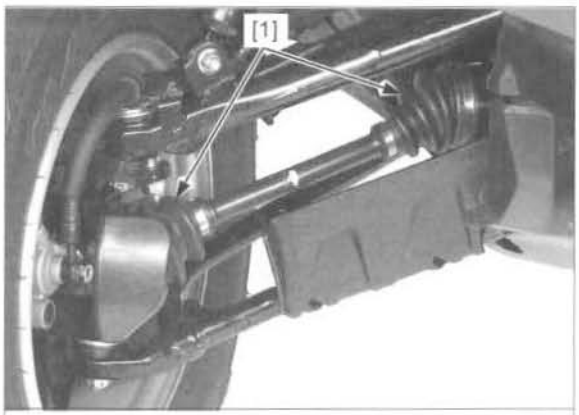
DRIVE TRAIN BOOTS

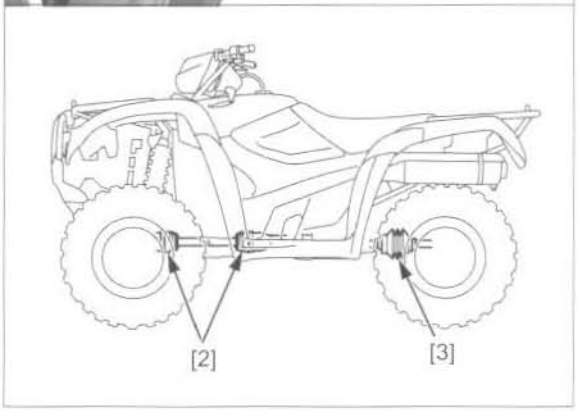
Raise all the wheels off the ground by supporting the frame securely.

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

Check the drive shaft boots [1], propeller shaft boots [2] and universal joint boot [3] for cuts, damage or leaking grease.

If the boot is damaged, replace it
- front driving mechanism (page 19-2)
- rear driving mechanism (page 20-2)





REAR FINAL GEAR CASE OIL AND DIFFERENTIAL OIL

FINAL GEAR CASE OIL

LEVEL CHECK

Place the vehicle on a level surface.

Remove the oil check bolt [1] and check that the oil flows out of the check bolt hole.

Check for leaks if there is no oil flow.

Remove the oil filler cap [2] and pour the oil slowly through the filler hole until oil starts to flow out of the check bolt hole.

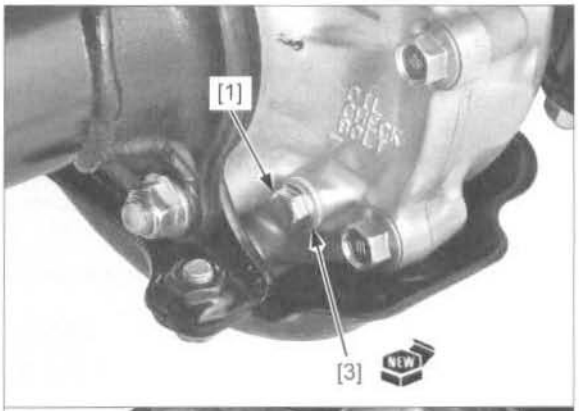
RECOMMENDED OIL: Honda shaft drive gear oil or equivalent hypoid gear oil, SAE # 80

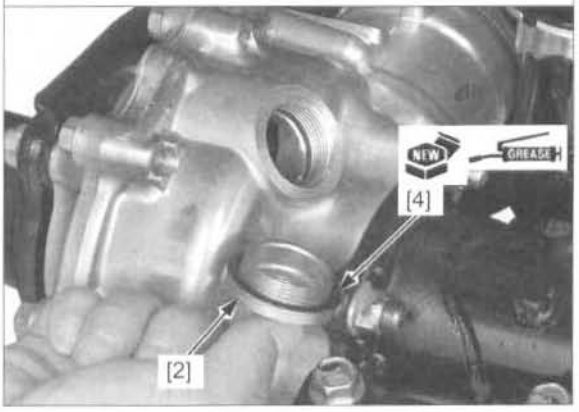
Install the check bolt with a new sealing washer [3] and tighten it to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Coat a new O-ring [4] with grease and install it into the cap groove.
Install the filler cap and tighten it to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

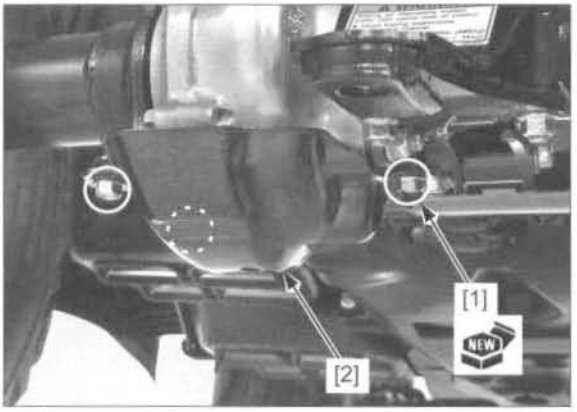




OIL CHANGE

Place the vehicle on a level surface.

Remove the three bolts [1] and rear final gear case skid plate [2].

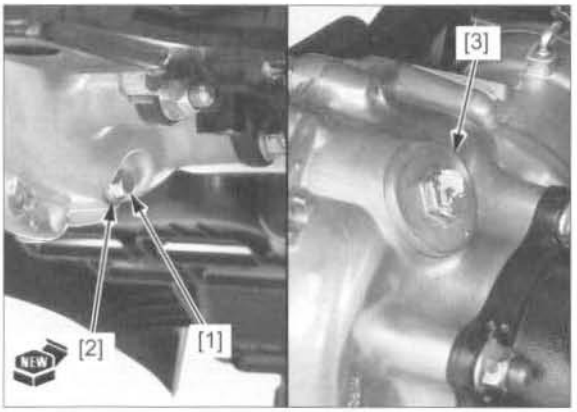


Remove the drain bolt [1] and sealing washer [2], and the filler cap [3] to drain the oil.
When the oil is completely drained, install the drain bolt with a new sealing washer and tighten it to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Fill the gear case with the recommended oil (page 3-17).

OIL CAPACITY:
75 cm³ (2.5 US oz, 2.6 Imp oz) after draining
100 cm³ (3.4 US oz, 3.5 Imp oz) after disassembly



Install the skid plate with new three bolts and tighten the bolts to the specified torque.

TORQUE: 32 N·m (3.3 kgf·m, 24 lbf·ft)

DIFFERENTIAL OIL

LEVEL CHECK

Place the vehicle on a level surface.

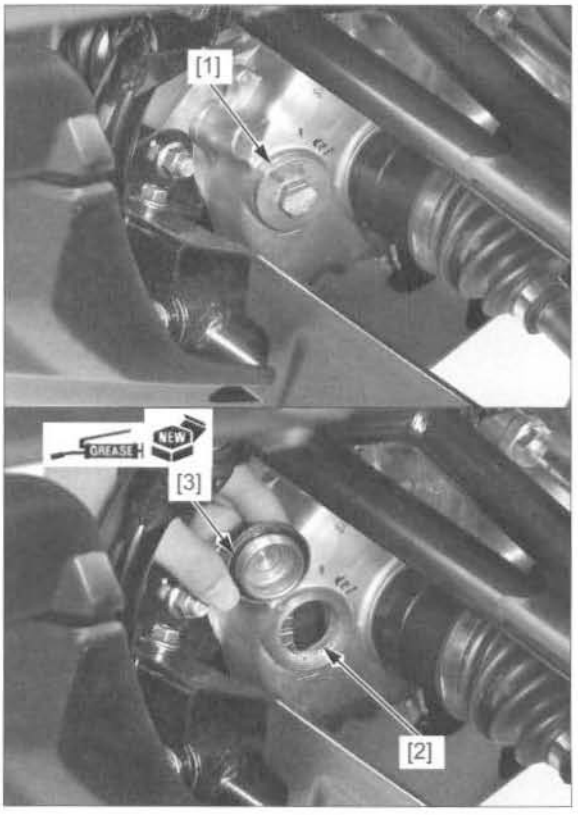
Remove the oil filler cap [1] and check that the oil level is up to the lower edge of the oil filler hole [2].

Check for leaks if the oil level is low.
Pour the oil into the filler hole until it reaches the lower edge of the hole.

RECOMMENDED OIL: Honda shaft drive gear oil or equivalent hypoid gear oil, SAE # 80

Coat a new O-ring [3] with grease and install it into the cap groove.
Install the filler cap and tighten it to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)



OIL CHANGE

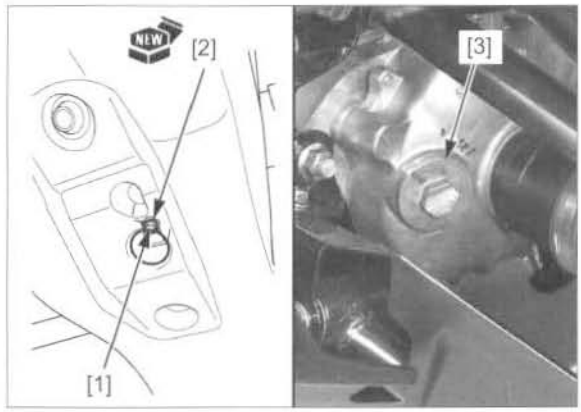
Place the vehicle on a level surface.

Remove the drain bolt [1] and sealing washer [2], and the oil filler cap [3] to drain the oil.
When the oil is completely drained, install the drain bolt with a new sealing washer and tighten it to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

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

OIL CAPACITY:
200 cm³ (6.8 US oz, 7.0 Imp oz) after draining
250 cm³ (8.5 US oz, 8.8 Imp oz) after disassembly



2WD/4WD SELECT SYSTEM

2WD/4WD SELECTOR CABLE ADJUSTMENT

Remove the bolt [1] and the clutch arm cover [2] by releasing the two tabs [3].

Shift the select lever to the 2WD position.
Be sure the clutch arm [4] position is between the 2WD marks [5].

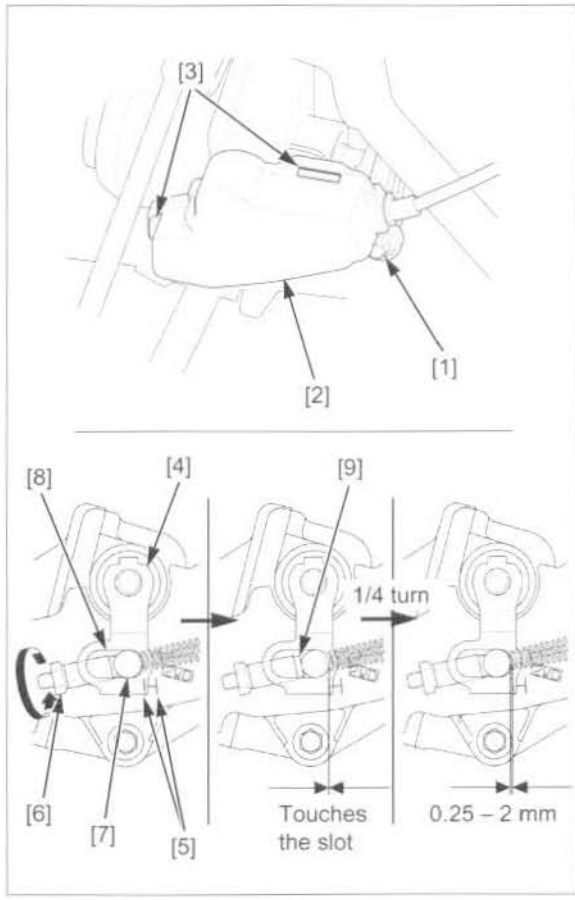
Temporarily loosen the adjusting nut [6] by turning it counterclockwise.
Turn the adjusting nut clockwise until the joint pin [7] just touches the clutch arm slot [8] with the nut ends [9] are contacted the joint pin (cutout is not seated). Then further turn it clockwise 1/4 of a turn to seat the cutout in the nut onto the joint pin.

Make sure that the clearance between the joint pin and arm slot is 0.25 – 2 mm.

After adjustment, check the select lever for smooth operation.

Install the arm cover by aligning the slits with the tabs and tighten the bolt to the specified torque.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)



BRAKE FLUID

NOTICE

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

NOTE:

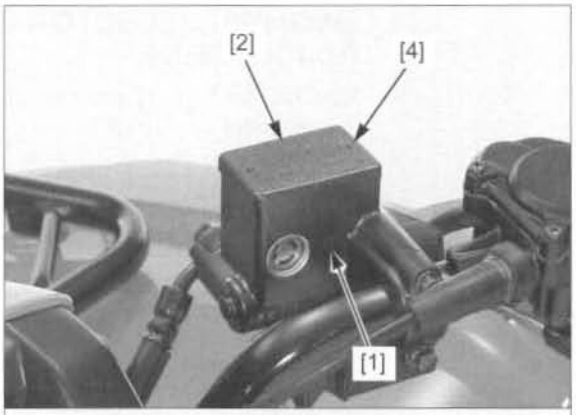
- Do not mix different types of fluid, as they may not be compatible with each other.
- Do not allow foreign material to enter the system when filling the reservoir.
- When the fluid level is low, check the brake pads for wear (page 3-21). A low fluid level may be due to wear of the brake pads. If the brake pads are worn and the caliper pistons are pushed out, this accounts for a low reservoir level. If the brake pads are not worn and the fluid level is low, check the entire system for leaks (page 3-22).

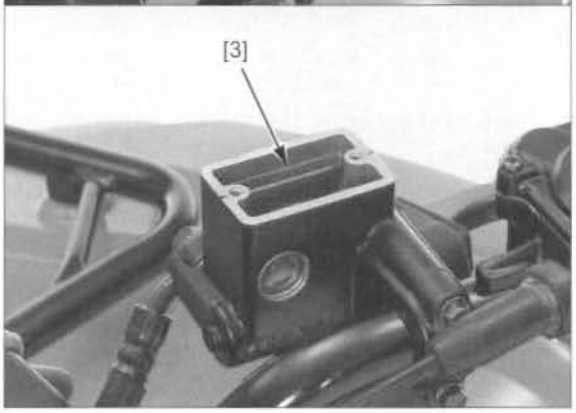
Turn the handlebar to the left side so the reservoir is level and check the reservoir fluid level through the sight glass.

If the fluid level is near the "LOWER" level mark [1], remove the reservoir cap [2], set plate and diaphragm and fill the reservoir with DOT 4 brake fluid from a sealed container to the casting ledge [3].

Install the diaphragm, set plate and reservoir cap, and tighten the cap screws [4] to the specified torque.

TORQUE: 2.0 N·m (0.2 kgf·m, 1.5 lbf·ft)

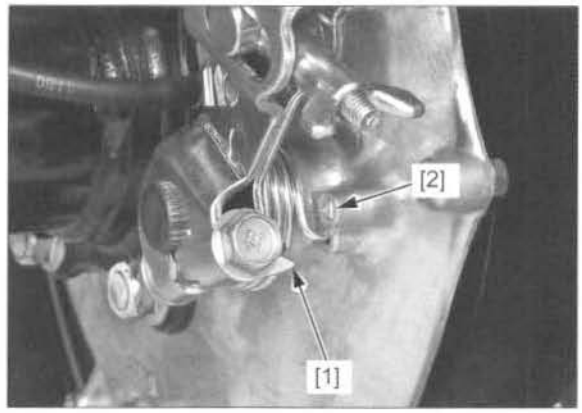




BRAKE SHOES WEAR

Replace the brake shoes if the wear indicator plate [1] aligns with the reference mark [2] on the brake panel when the rear brake lever or brake pedal is applied.

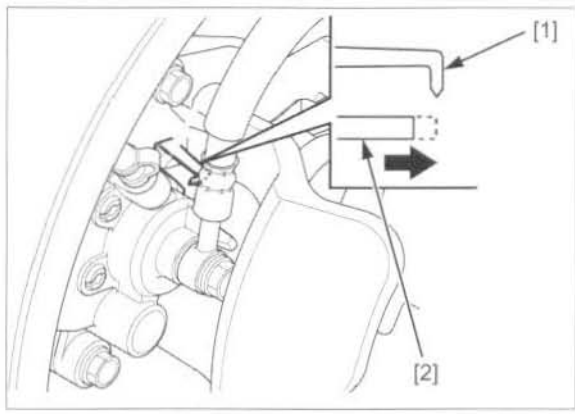
See Brake System section for brake shoe replacement (page 18-16).



BRAKE PADS WEAR

Replace the brake pads if the wear indicator [1] aligns with the reference mark (lug) [2] on the caliper body when the front brake is applied.

See Brake System section for brake pad replacement (page 18-8).



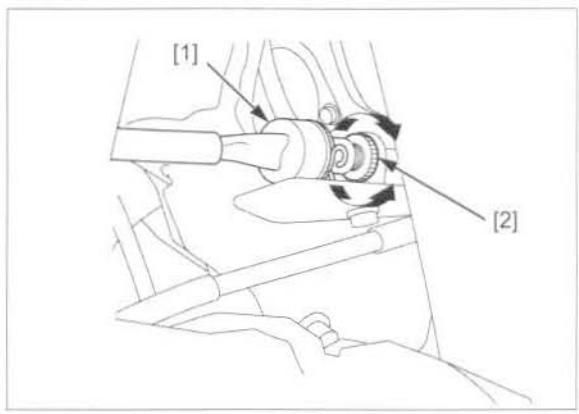
BRAKE LIGHT SWITCH

NOTE:

- The front brake light switch cannot be adjusted. If the front brake light switch actuation and brake engagement are out of synchronization, 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 rear brake light switch [1] so that the light comes on at the proper time. Hold the switch body and turn the adjusting nut [2]. Do not turn the switch body.

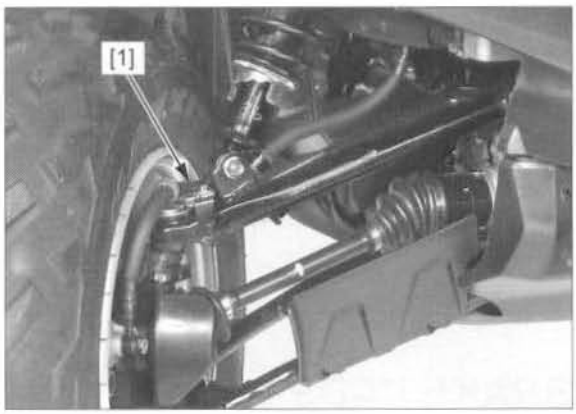


BRAKE SYSTEM

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.
See Brake System section for air bleeding procedures (page 18-7).

Inspect the brake hoses [1] and fittings for deterioration, cracks, damage or signs of leakage.
Tighten any loose fittings.
Replace hoses, pipes and fittings as required.



REAR BRAKE

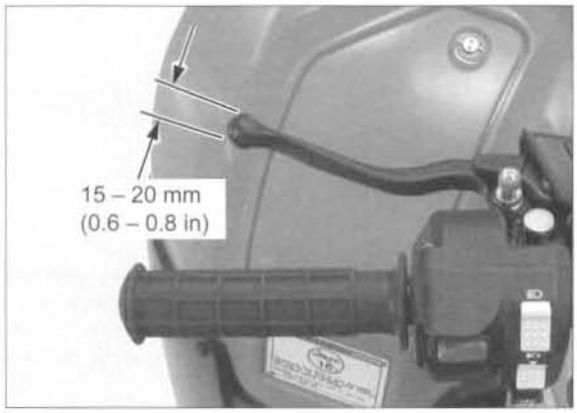
Make sure the brake pedal operates smoothly and that the brake pedal position is correct.
Make sure the brakes do not drag.

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

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

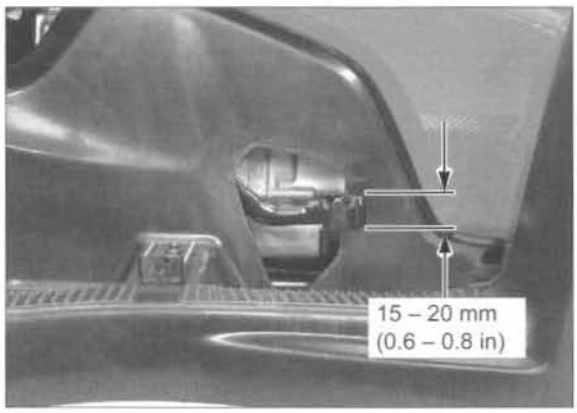
Measure the rear brake lever freeplay at the end of the lever.

FREEPLAY: 15 – 20 mm (0.6 – 0.8 in)



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

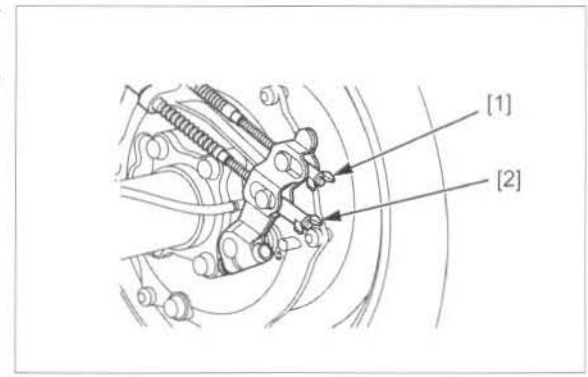
FREEPLAY: 15 – 20 mm (0.6 – 0.8 in)



Make sure the indent in the adjusting nut is seated on the brake arm pin.

Adjust the brake lever freeplay by turning the upper adjusting nut [1] at the brake arm.

Adjust the brake pedal freeplay by turning the lower adjusting nut [2] at the brake arm.



REVERSE LOCK SYSTEM

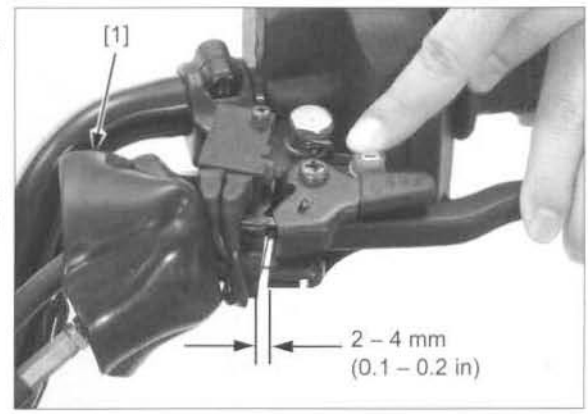
Check the reverse selector cable and lever for loose connections, excessive play or other damage.
Replace or repair if necessary.

Release the dust cover [1].
Measure the lever freeplay at the lever end near the cable.

FREEPLAY: 2 – 4 mm (0.1 – 0.2 in)

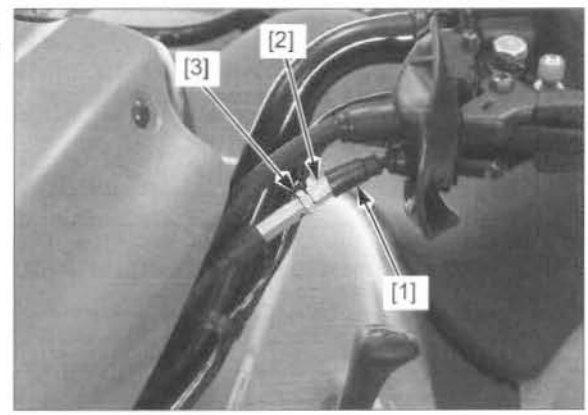
NOTE:

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



Slide the rubber boot [1] off the adjuster [2].
Adjust by loosening the lock nut [3] and turning the adjuster.
Tighten the lock nut.

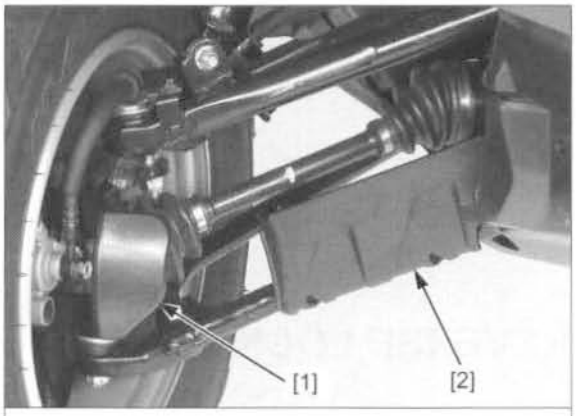
Install the dust cover properly.

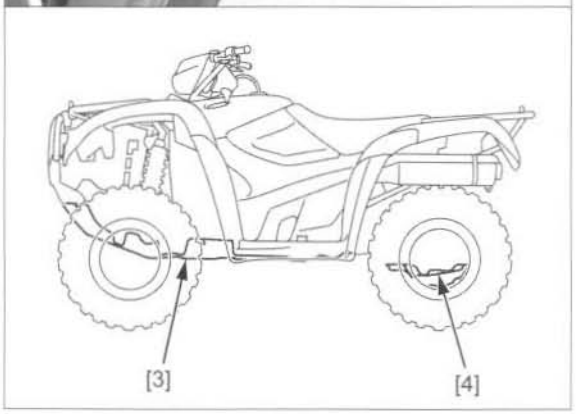


GUARDS

Check the outboard guard [1], inboard guard [2], engine guard [3] and rear final gear skid plate [4], for cracks, damage or looseness.

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





CLUTCH SYSTEM

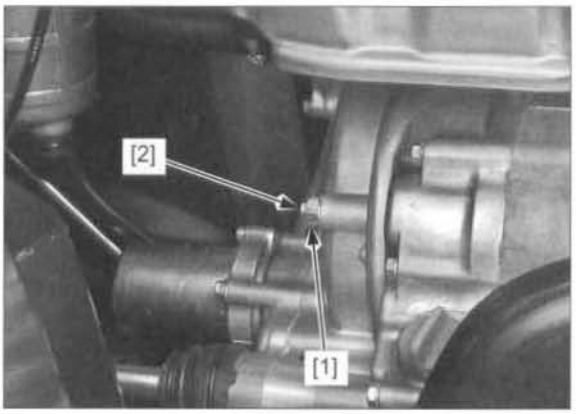
Remove the left side cover (page 2-4).

Loosen the lock nut [1] and turn the adjusting screw [2] one full turn clockwise.
Slowly turn the adjusting screw counterclockwise until resistance is felt, then turn the adjusting screw 1/4 turn clockwise.

Hold the adjusting screw and tighten the lock nut.

Start the engine and check for proper clutch operation.

Install the side cover (page 2-4)



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.

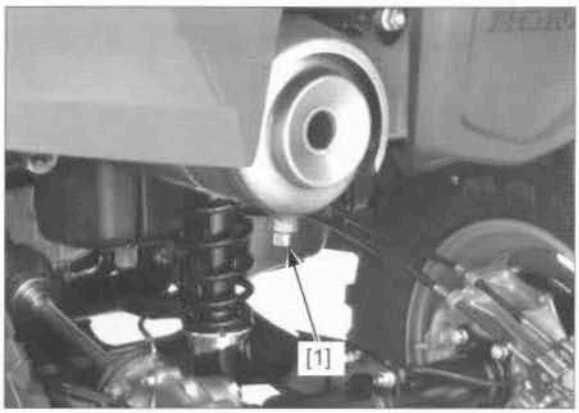
Raise the rear wheel off the ground by supporting the frame securely.
Check for worn swingarm bearings by grabbing the rear axle housing and attempting to move the wheels side to side.
Replace the bearings if any looseness is noted (page 17-8).

SPARK ARRESTER

Remove the arrester bolt [1].

Block the end of the muffler with a shop towel.
Start the engine with the transmission in neutral, and purge accumulated carbon from the muffler by momentarily revving the engine several times.

Stop the engine and allow the exhaust system to cool.
Install the bolt and tighten it 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 a tire pressure gauge.

RECOMMENDED TIRE PRESSURE

Front: Standard: 30 kPa (0.30 kgf/cm², 4.4 psi)
With cargo: 30 kPa (0.30 kgf/cm², 4.4 psi)
Rear: Standard: 30 kPa (0.30 kgf/cm², 4.4 psi)
With cargo: 30 kPa (0.30 kgf/cm², 4.4 psi)

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

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

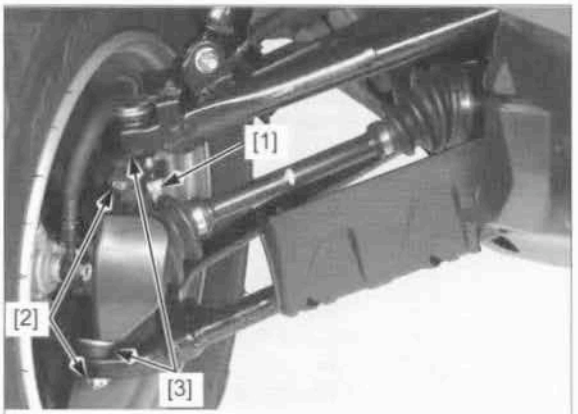
MINIMUM TREAD DEPTH (Front/Rear):
4.0 mm (0.16 in)

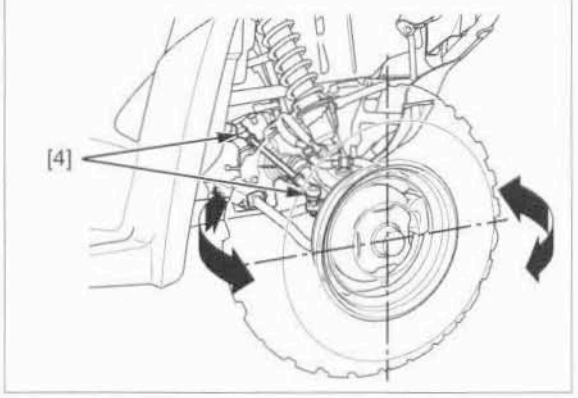
Raise the wheel off the ground and check the bearings in the knuckle for excessive play or abnormal noise.

TIE-ROD AND JOINT BOOTS

Check the tie-rod joint nuts [1] and the suspension arm ball joint nuts [2] for looseness.
Check the ball joint boots [3] of the tie-rod and suspension arm for tears or other damage.
Check for looseness of the tie-rod ball joints [4] or bearings by grabbing each front wheel side to side with the wheels on the ground.

If any looseness is noted, inspect the following.
- tie-rod (page 16-40)
- knuckle bearing (page 16-16)





STEERING SHAFT HOLDER BEARING

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

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

Check that the handlebar moves freely from side to side.

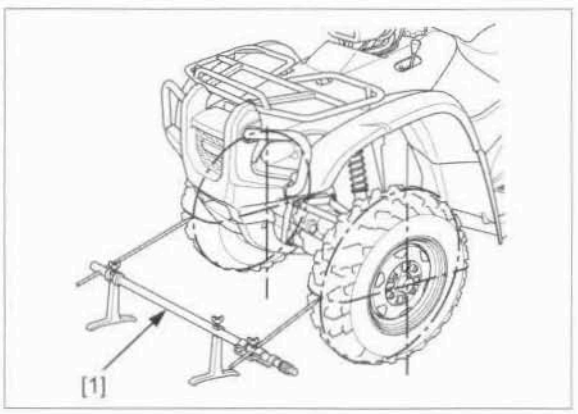
If the handlebar moves unevenly, binds, or has horizontal or vertical movement, inspect the steering shaft holder bushing and bearing.

- FM/FE model (page 16-27)
- FPM/FPE model (page 16-32)

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 toe-gauge [1] with the marks on the tires as shown.
Check the readings on the gauge scales.

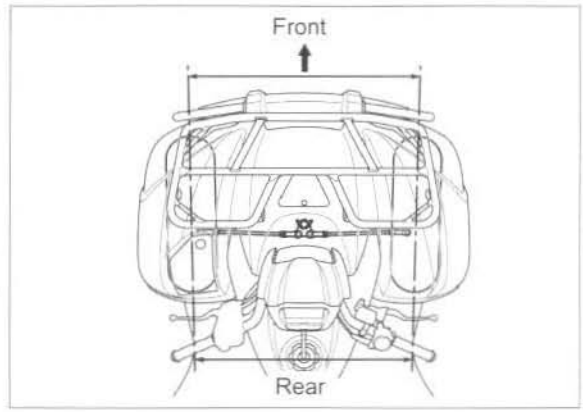


Slowly move the vehicle back until the wheels have turned 180° so the marks on the tires are aligned with the gauge height on the rear side.
Measure the toe on the rear part of the tires at the same points with no load on the vehicle.

Toe-out: 28 ± 15 mm (1.1 ± 0.6 in)

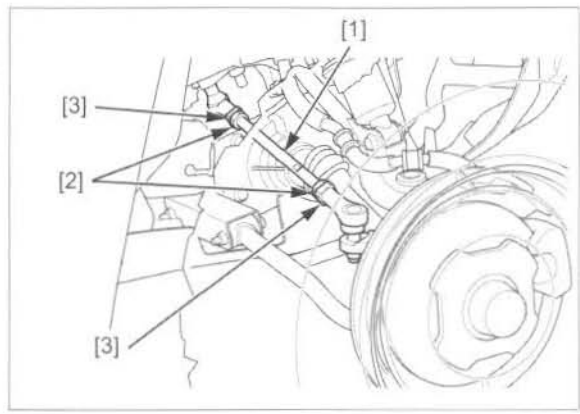
NOTE:

- Toe-in means the rear measurement is greater than the front measurement.
- 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 [1] equally by loosening the lock nuts [2] and turning the tie-rods while holding the ball joints [3].

After adjusting each tie-rod, rotate both ball joints in the same direction, along the tie-rod axis until they stop against the ball joint stud.

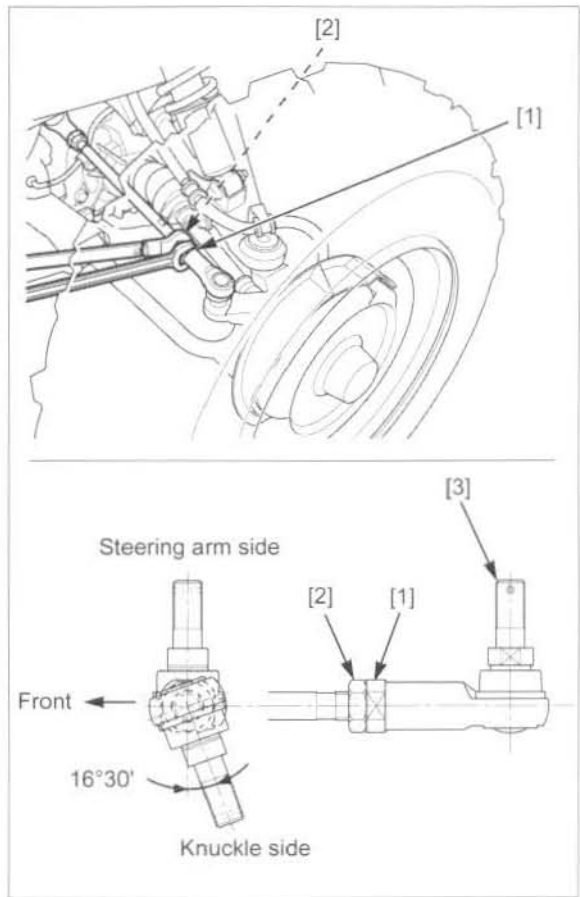


Using a 22 mm wrench, hold the ball joint ends (flats) [1] so that the relative angle of both ball joints may turn into specified angle. Then, tighten each lock nut [2] to the specified torque, making sure not to force the ball joint end against the ball joint stud [3].

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.

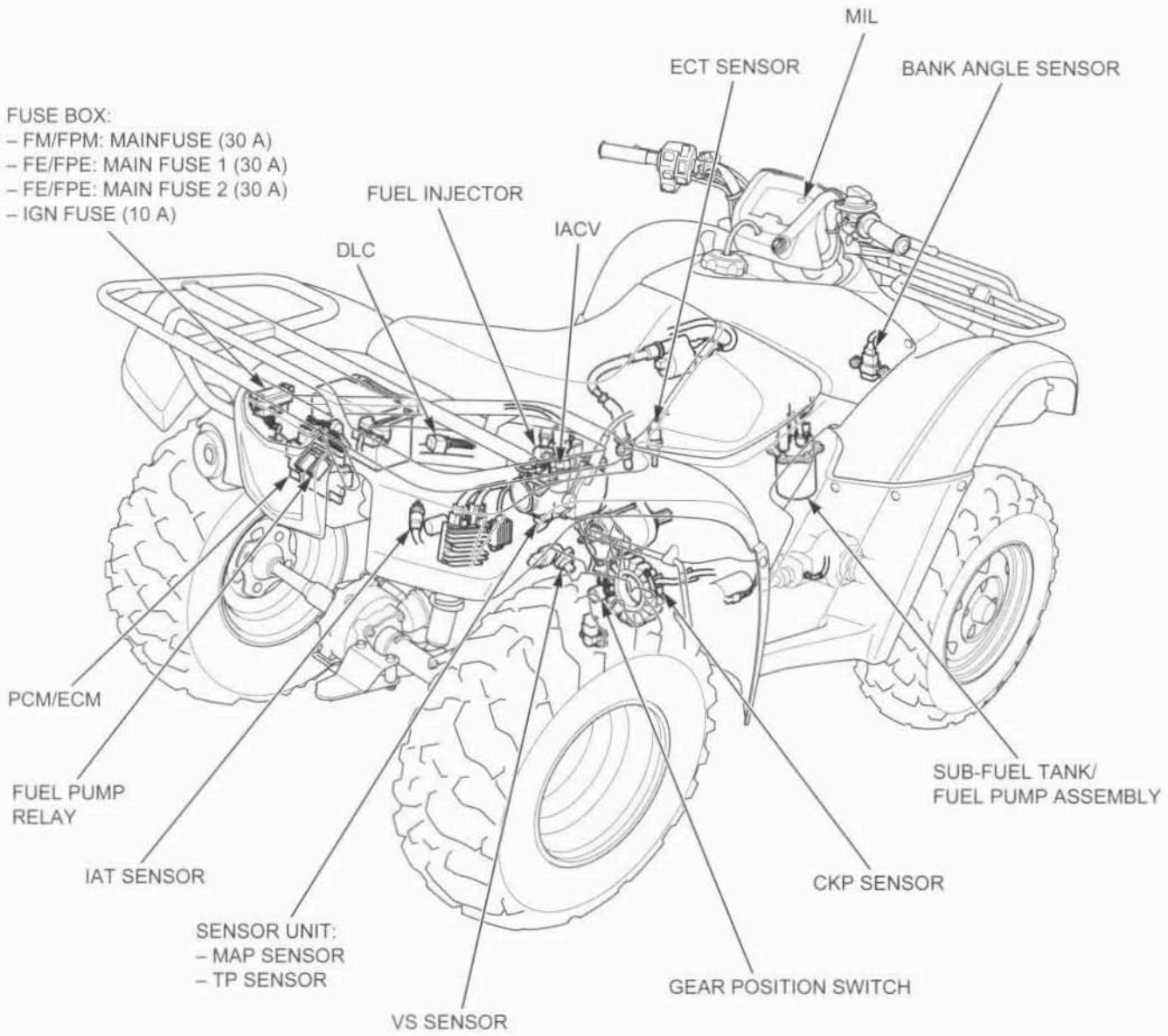
Raise the wheel off the ground and check the knuckle bearings or tie-rod ball joints for excessive play or abnormal noise.



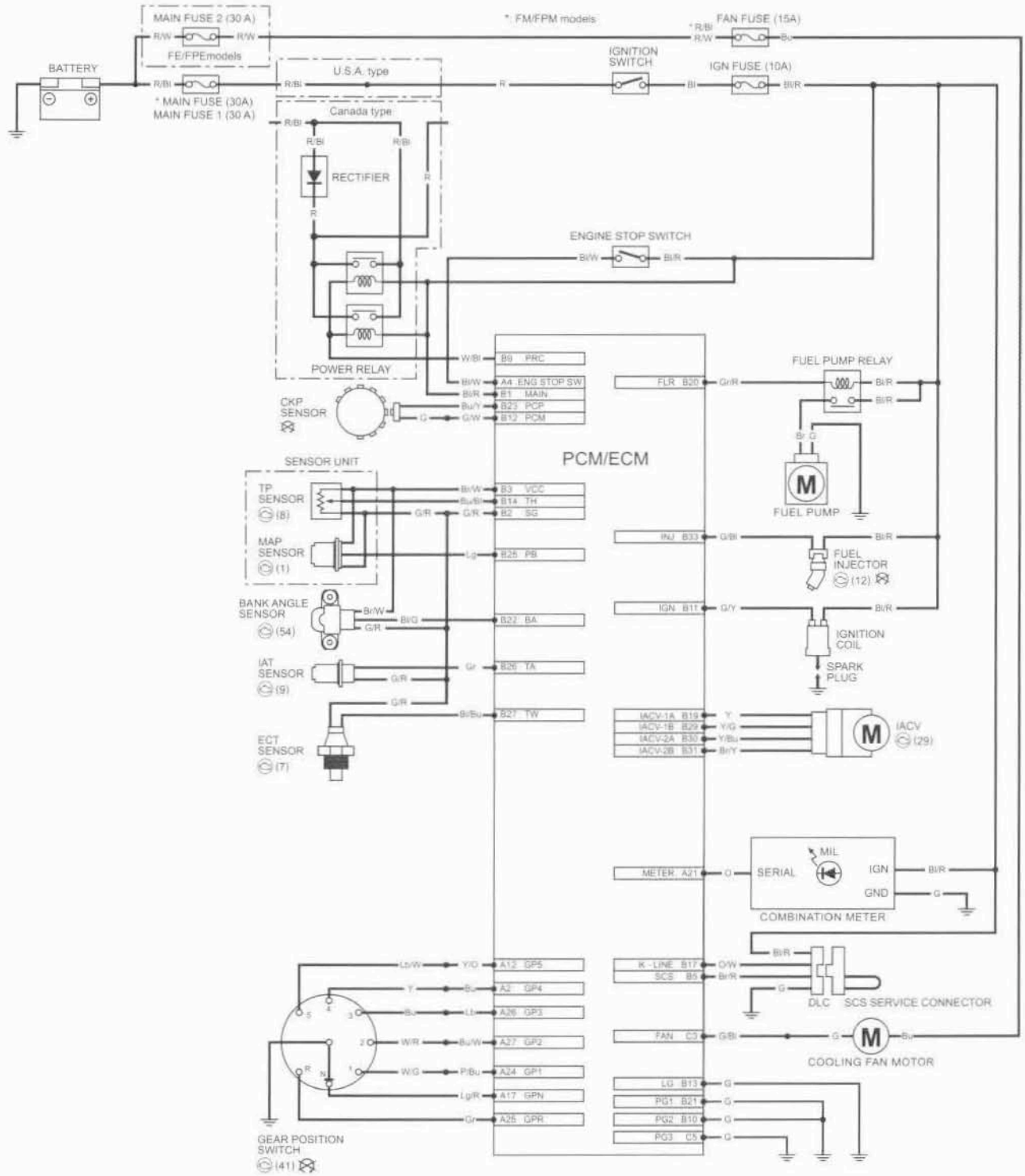
MEMO

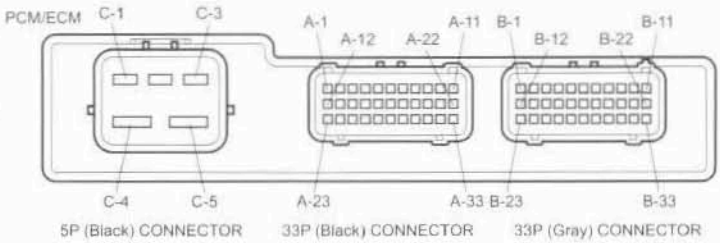
4. PGM-FI SYSTEM

PGM-FI COMPONENT LOCATION



PGM-FI SYSTEM DIAGRAM





( ): MIL Blink

: Engine does not start when detecting DTC

: Short terminals for reading DTC

Bl: Black
Br: Brown
Bu: Blue
G: Green
Gr: Gray
Lg: Light green
Lb: Light blue
O: Orange
P: Pink
R: Red
W: White
Y: Yellow

SERVICE INFORMATION

GENERAL

- This section covers service of the electrical system of the PGM-FI system. For mechanical system service of the PGM-FI system and the fuel supply system, see Fuel System section (page 7-2).
- 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 damage the throttle body. It may cause incorrect throttle valve operation.
- Prevent dirt and debris from entering the sensor hole. 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 screws and nut of the throttle body. Loosening or tightening them can cause throttle body malfunction.
- Tighten the yellow painted screws 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.
- The engine stop switch line is connected to the PCM/ECM on this vehicle. Its signal permits the PCM/ECM to control the fuel pump, injector and ignition coil.

SPECIFICATIONS

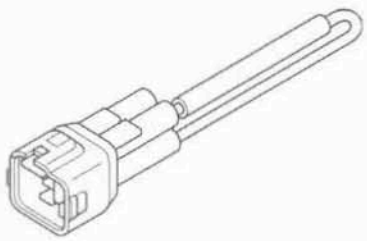
ITEM	SPECIFICATIONS
IAT sensor resistance (20°C/68°F)	2.2 – 2.7 kΩ
ECT sensor resistance (40 ± 5°C/104 ± 41°F)	0.86 – 1.55 kΩ
Fuel injector resistance (20°C/68°F)	11.6 – 12.4 Ω

TORQUE VALUES

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Sensor unit torx screw (T25)	3	5	3.4 (0.3, 2.5)	
ECT sensor	1	10	12 (1.2, 9)	
Bank angle sensor mounting bolt	2	6	10 (1.0, 7)	

TOOLS

SCS service connector
070PZ-ZY30100



Test probe
07ZAJ-RDJA110

HDS pocket tester
TDS 3557-0112-01 (U.S.A. Only)

SYMPTOM TROUBLESHOOTING

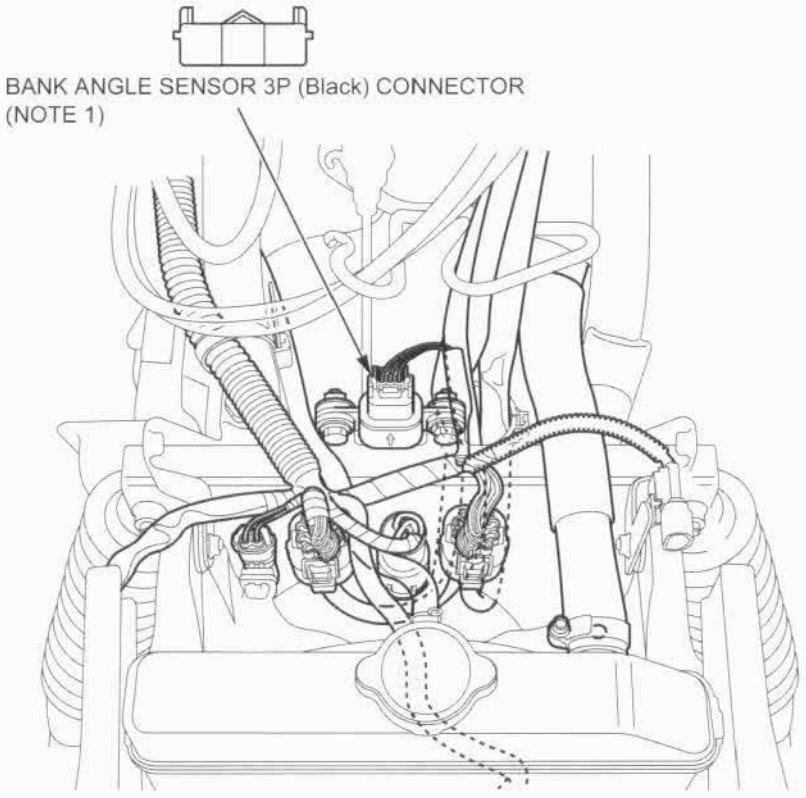
When the vehicle has one of these symptoms, check the DTC or MIL blinking, refer to the DTC index (page 4-13) and begin the appropriate troubleshooting procedure. If there are no DTC/MIL blinking stored in the PCM/ECM memory, do the diagnostic procedure for the symptom, in the sequence listed below, until you find the cause.

Symptom	Diagnosis procedure	Also check for
Engine cranks but won't start (No DTC and MIL blinking)	1. Check the spark plug (page 3-8). 2. Inspect the ignition system (page 5-5). 3. Inspect the fuel supply system. – fuel pressure/flow (page 7-11) – fuel pump (page 7-13) 4. Inspect the cylinder compression (page 10-7)	• Spark plug condition • Faulty ignition system • No fuel to fuel injector – Pinched or clogged fuel tank breather hose – Pinched or clogged fuel hose – Pinched or clogged fuel feed hose – Clogged fuel tank strainer screen – Clogged fuel pump filter – Faulty fuel pump circuits – Faulty fuel pump • Intake air leak • Contaminated/deteriorated fuel • Faulty fuel injector • IACV stuck closed • Low cylinder compression – blown cylinder head gasket – improper valve adjustment – valve leakage – worn piston ring or cylinder
Engine cranks but won't start (Gear position indicator continuously blinking "–")	1. PCM/ECM power/ground circuits malfunction (page 4-35).	• Open circuit in the power input and/or ground wire of the PCM/ECM
Engine cranks but won't start (No fuel pump operation sound when turning the ignition switch ON and engine stop switch "○")	1. PCM/ECM engine stop switch circuit malfunction (page 4-36). 2. Inspect the fuel supply system (page 7-13).	• Open circuit in the engine stop switch wire of the PCM/ECM • Faulty fuel pump relay or related circuit • Faulty fuel pump or related circuits
Engine stalls, hard to start, rough idling	1. Check the spark plug (page 3-8). 2. Check the air cleaner (page 3-5). 3. Check the idle speed (page 3-15). 4. Check the IACV (page 7-26). 5. Inspect the fuel supply system. – fuel pressure/flow (page 7-11) – fuel pump (page 7-13) 6. Inspect the cylinder compression (page 10-7)	• Spark plug condition • Air cleaner condition • Restricted fuel feed hose • Contaminated/deteriorated fuel • Intake air leak • Restricted fuel tank breather hose • Faulty ignition system • Low cylinder compression – blown cylinder head gasket – improper valve adjustment – valve leakage – worn piston ring or cylinder
Engine stalls, rough idling, lacks power (after warm up the engine)	Troubleshoot the fuel line (page 7-5).	• Pinched or clogged fuel tank breather hose • Pinched or clogged fuel hose • Pinched or clogged fuel feed hose • Clogged fuel tank strainer screen • Clogged fuel pump filter • Faulty fuel pump or related circuits
Backfiring or misfiring during acceleration	Inspect the ignition system (page 5-5).	• Faulty ignition system
Poor performance (driveability) and poor fuel economy	1. Check the brake system (page 3-22). 2. Check the muffler tail (spark arrester) (page 3-25). 3. Check the air cleaner (page 3-5). 4. Inspect the fuel supply system. – fuel pressure/flow (page 7-11) – fuel pump (page 7-13) 5. Inspect the ignition system (page 5-5). 6. Inspect the cylinder compression (page 10-7)	• Brake dragged • Clogged muffler tail (spark arrester) • air cleaner condition • Pinched or clogged fuel tank breather hose • Pinched or clogged fuel hose • Pinched or clogged fuel feed hose • Clogged fuel tank strainer screen • Clogged fuel pump filter • Faulty fuel injector • Faulty ignition system • Low cylinder compression – blown cylinder head gasket – improper valve adjustment – valve leakage – worn piston ring or cylinder

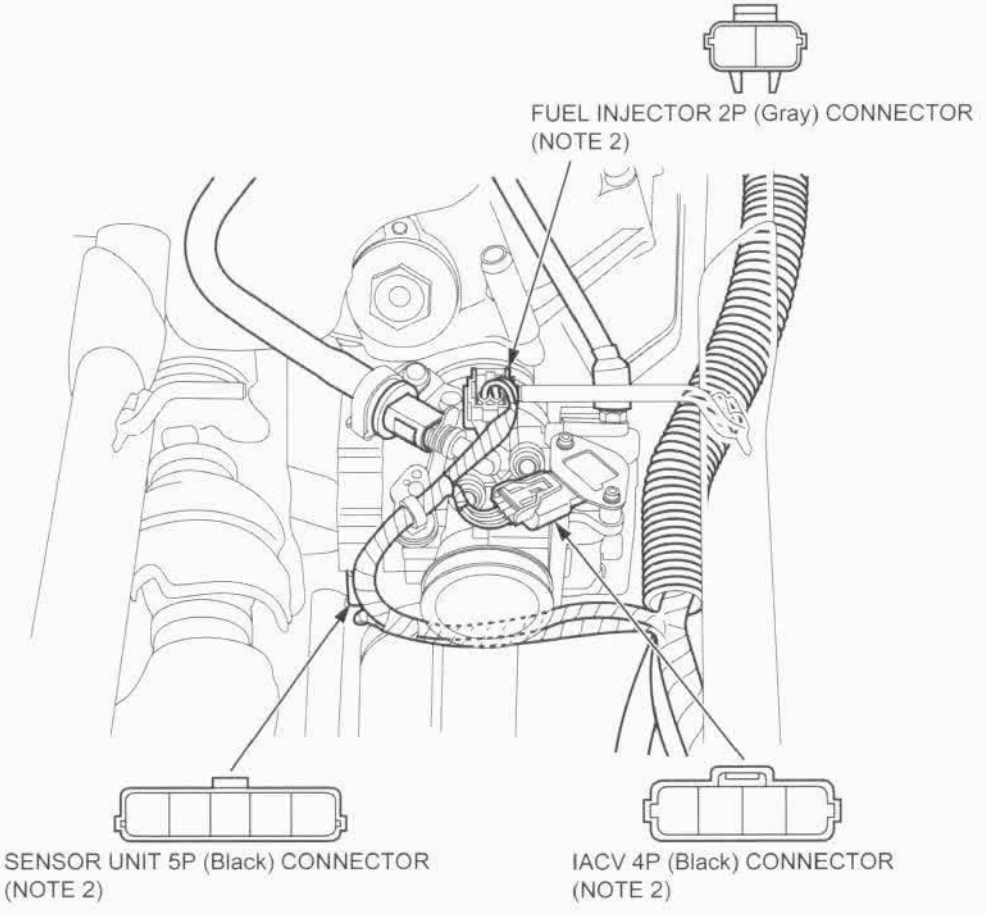
Symptom	Diagnosis procedure	Also check for
Idle speed is below specifications or fast idle too low (No DTC and MIL blinking)	1. Check the idle speed (page 3-15). 2. Check the spark plug (page 3-8). 3. Check the air cleaner (page 3-5). 4. Check the IACV (page 7-26). 5. Inspect the fuel supply system. – fuel pressure/flow (page 7-11) – fuel pump (page 7-13) 6. Inspect the ignition system (page 5-5).	• Spark plug condition • air cleaner condition • 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 3-15). 2. Check the throttle operation and lever freeplay (page 3-4). 3. Check the IACV (page 7-26). 4. Inspect the ignition system (page 5-5).	• IACV stuck opened • Faulty ignition system • Intake air leak • Engine top end problem
MIL stays on but no DTCs set, or MIL never comes ON at all	Inspect the MIL circuit (page 4-29).	• Faulty MIL circuit
MIL stays on at all times (No DTC set)	Inspect the DLC circuit (page 4-29).	• Short circuit in the DLC related wire

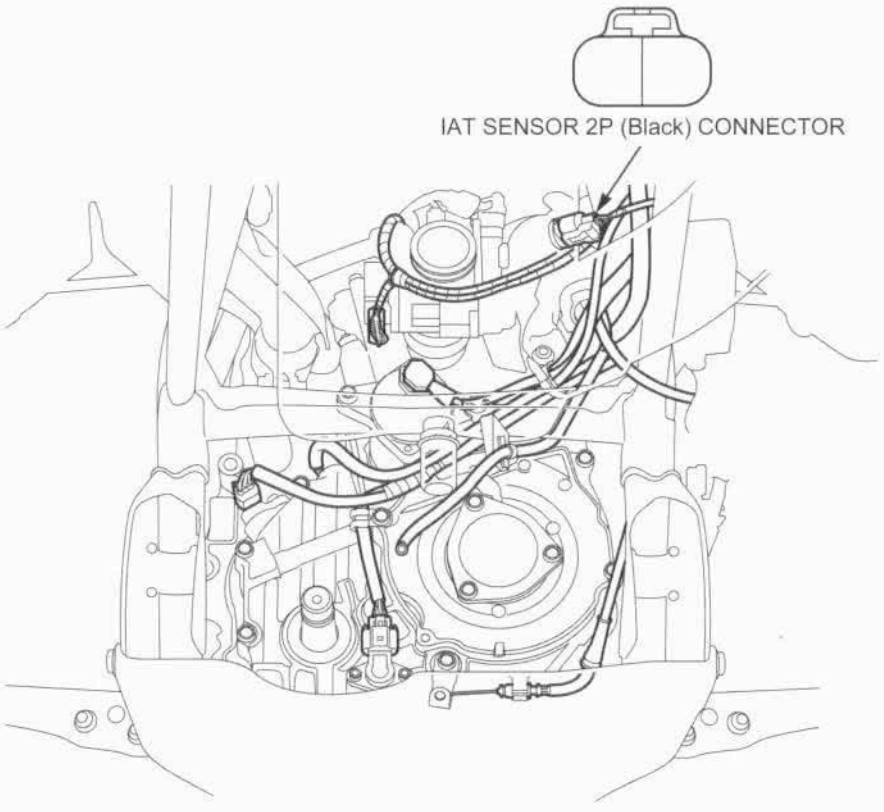
PGM-FI CONNECTOR LOCATION

NOTE 1: Remove the front fender/carrier (page 2-8).

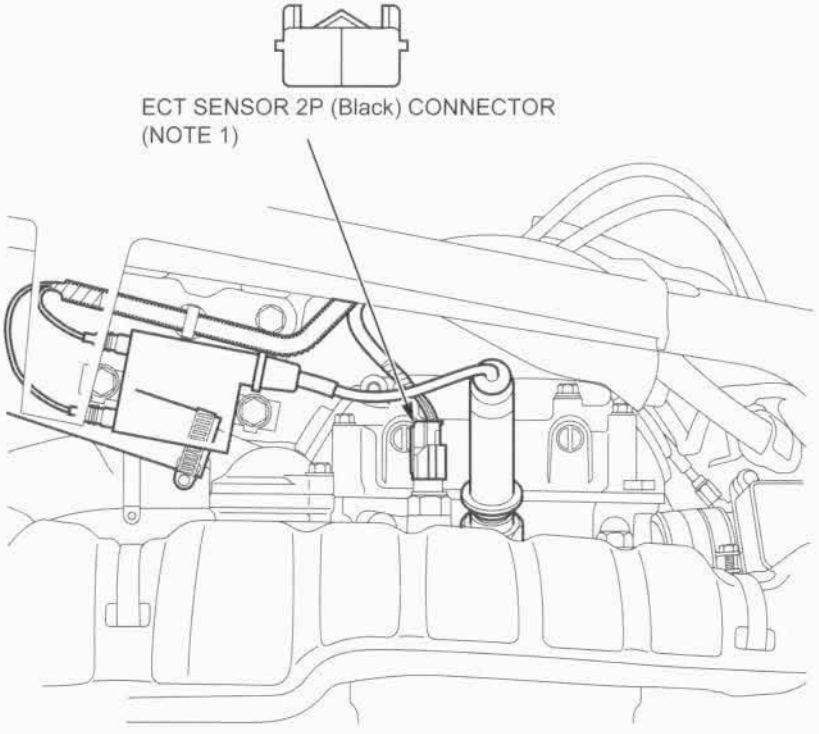


NOTE 2: Remove the throttle body cover (page 7-13).

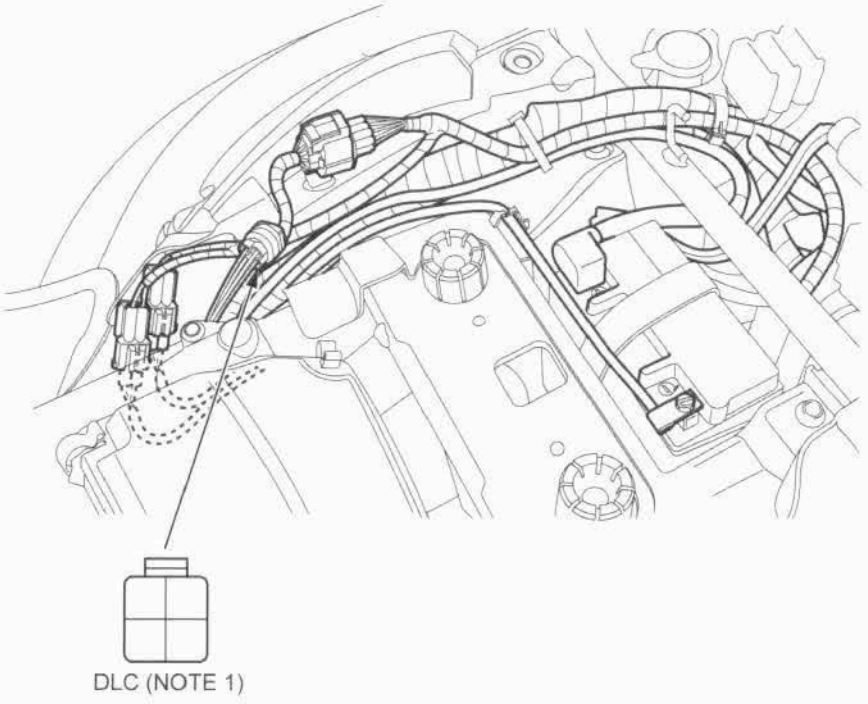




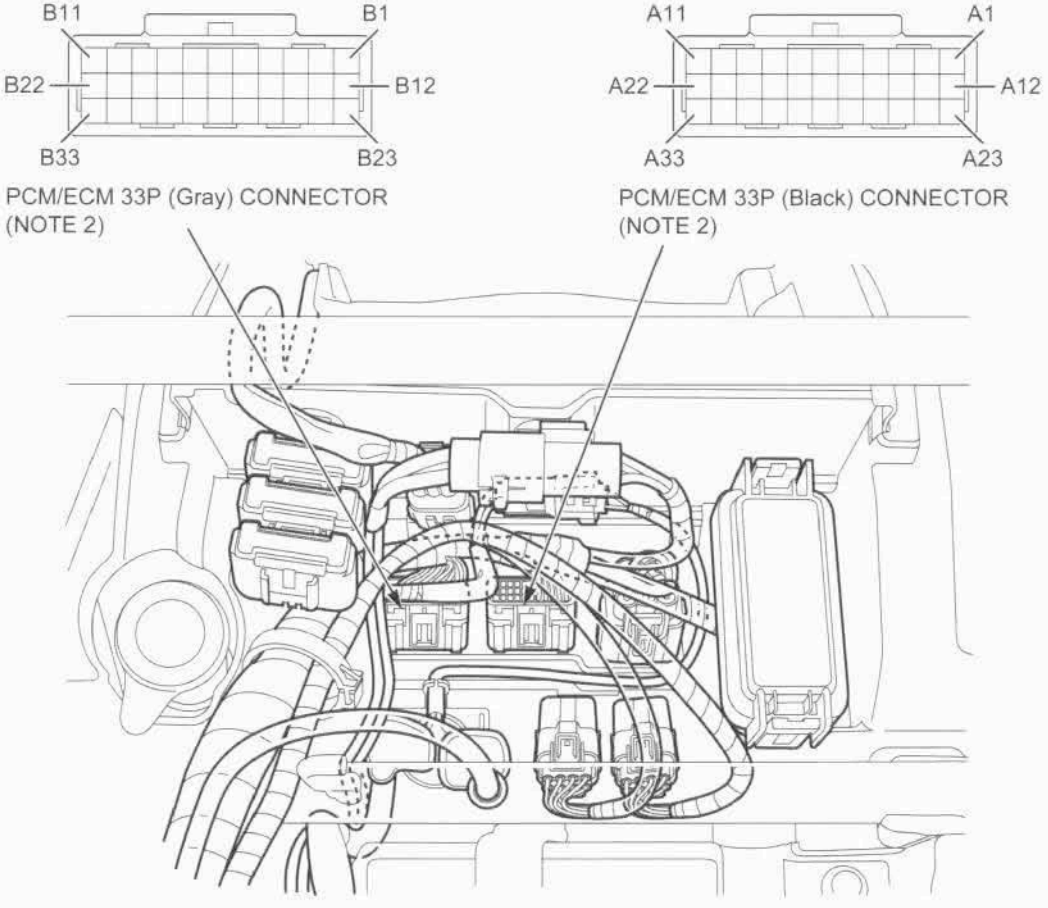
NOTE 1: Remove the left fuel tank side cover (page 2-5).



NOTE 1: Remove the seat (page 2-4).



NOTE 2: Remove the rear fender cover (page 2-9).



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 PCM/ECMs this can mean something will work, but not the way it's supposed to.

If the MIL has come on

Refer to DTC READOUT (page 4-11).

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 4-5).

SYSTEM DESCRIPTION

SELF-DIAGNOSIS SYSTEM

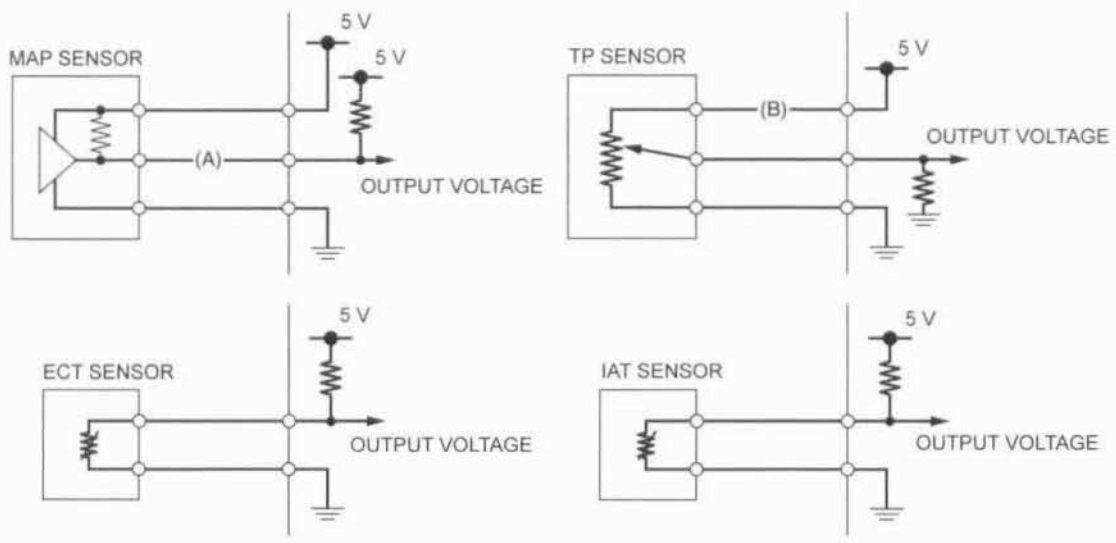
The PGM-FI system is equipped with the self-diagnostic system. When any abnormality occurs in the system, the PCM/ECM turns on the MIL and stores a DTC in its erasable memory.

FAIL-SAFE FUNCTION

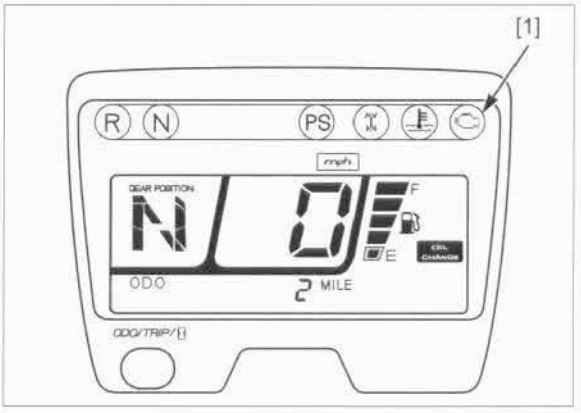
The PGM-FI system is provided with a fail-safe function to secure a minimum running capability even when there is trouble in the system. When any abnormality is detected by the self-diagnosis function, running capability is maintained by pre-programed value in the simulated program map. When any abnormality is detected in the fuel 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/ECM 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/ECM 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 output voltage line (A) on the MAP sensor is opened, the PCM/ECM 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/ECM 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/ECM memory by the MIL [1] 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/ECM detects the problem at present, when the ignition switch ON or idling. The MIL will stay ON when driving.
- The MIL has two types of blinks, a long blink and short blink. The long blinking lasts for 1.2 seconds, the short blinking lasts for 0.4 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 29 (two long blinks = 20 blinks, plus nine short blinks).
- When the PCM/ECM 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 "○", the MIL will stay on for a few seconds, then go off. If the MIL does not come on, troubleshoot the MIL circuit (page 4-29).

CURRENT DTC/STORED DTC

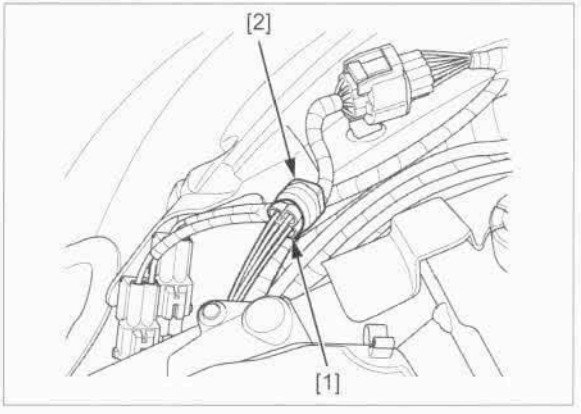
The DTC is indicated in two ways according to the failure status.

- In case the PCM/ECM 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/ECM 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 stored DTC by following the DTC readout procedure.

HDS POCKET TESTER INFORMATION

- The HDS can readout the DTC, stored data, current data and other PCM/ECM condition.

How to connect the HDS Pocket Tester



Turn the ignition switch OFF.

Remove the seat (page 2-4).

Remove the DLC [1] from the dummy connector [2].

Connect the HDS pocket tester to the DLC.

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

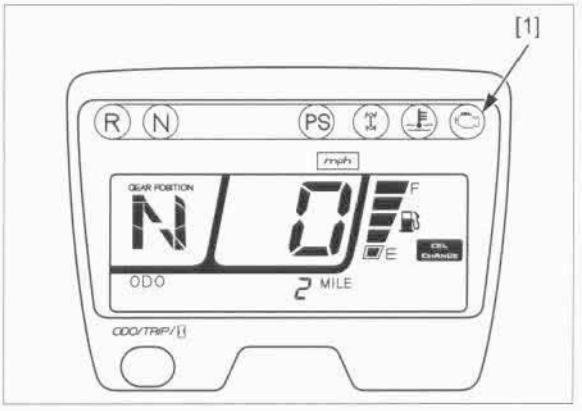
NOTE:

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

PCM/ECM reset

The HDS can reset the PCM/ECM data including the DTC, stored data and some learning memory.

DTC READOUT



- When the ignition switch is turned ON and engine stop switch "○", the MIL [1] will stay on for a few seconds, then go off.
- After performing diagnostic troubleshooting, erase the problem code(s) (page 4-12) 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 4-11).

Read the DTC, stored data and follow the troubleshooting index (page 4-13).

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 4-13).

When retrieving the stored DTC, refer to the following procedure.

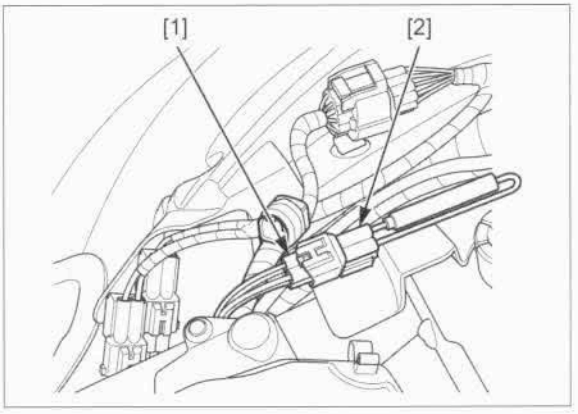
Remove the DLC from the dummy connector (page 4-11).

Short the DLC [1] terminals using the special tool.

TOOL:
[2] SCS service connector 070PZ-ZY30100

Connection: Brown/red – Green

Turn the ignition switch ON and engine stop switch "○", read, note the MIL blinks and refer to the troubleshooting index (page 4-13).



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

ERASING DTC

Connect the HDS Pocket Tester to the DLC (page 4-11).

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

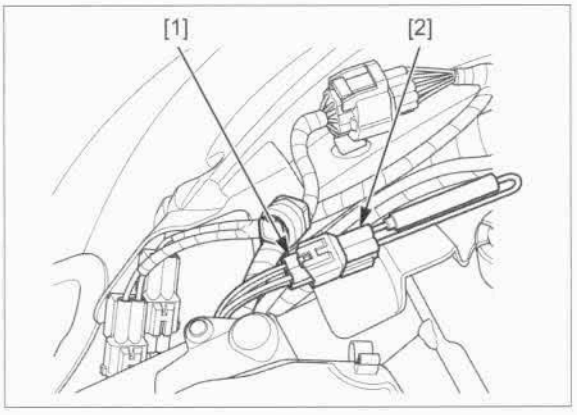
To erase the DTC without HDS, use the following procedure.

How to erase the DTC without HDS

1. Remove the DLC from the dummy connector (page 4-11).
2. Short the DLC [1] terminals using the special tool.

   TOOL:
   [2] SCS service connector 070PZ-ZY30100

   Connection: Brown/red – Green
3. Turn the ignition switch ON and engine stop switch "○".
4. Remove the special tool from the DLC.
5. 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.



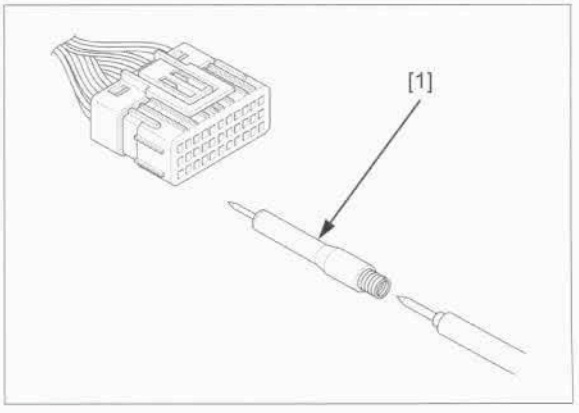
NOTE:
- The DLC must be shorted while the MIL lights. If not, the MIL will not start blinking.
- Note that the self-diagnostic memory cannot be erased if the ignition switch is turned OFF before the MIL starts blinking.

CIRCUIT INSPECTION

INSPECTION AT PCM/ECM CONNECTOR

- Always clean around and keep any foreign material away from the PCM/ECM 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/ECM connectors.
- In testing at PCM/ECM 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:
[1] 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	4-14
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	4-15
7-1 (7)	ECT sensor circuit low voltage (less than 0.07 V) • ECT sensor or its circuit malfunction	• Hard to start at a low temperature • Fail-safe value: 78.6°C/173.5°F • Cooling fan turns on	4-16
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 to start at a low temperature • Fail-safe value: 78.6°C/173.5°F • Cooling fan turns on	4-17
8-1 (8)	TP sensor circuit low voltage (less than 0.22 V) • Loose or poor contact of the TP sensor connector • TP sensor or its circuit malfunction	• Poor engine acceleration • Fail-safe value: 0° • ESP does not work	4-18
8-2 (8)	TP sensor circuit high voltage (more than 4.93 V) • TP sensor or its circuit malfunction	• Poor engine acceleration • Fail-safe value: 0° • ESP does not work	4-19
9-1 (9)	IAT sensor circuit low voltage (less than 0.07 V) • IAT sensor or its circuit malfunction	• Engine operates normally • Fail-safe value: 25°C/77°F	4-21
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	4-22
11-1 (11)	VS sensor no signal • Loose or poor contact of the rear VS sensor connector • Rear VS sensor or its circuit malfunction	• Engine operates normally • ESP does not work	23-14
12-1 (12)	Fuel Injector circuit malfunction • Loose or poor contact of the fuel injector connector • Fuel Injector or its circuit malfunction	• Engine does not start • Fuel Injector, fuel pump and ignition shut down	4-23
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	4-24
33-2 (–)	PCM/ECM EEPROM malfunction	• Engine operates normally	4-25
41-1 (41)	Gear position switch malfunction • Loose or poor contact of the gear position switch connector • Gear position switch or its circuit malfunction	• Engine does not start • ESP does not work • Gear position indicator blinks "–"	23-22
54-1 (54)	Bank angle sensor circuit low voltage (less than 0.31 V) • Bank angle sensor or its circuit malfunction	• Engine operates normally • Bank angle sensor stops the control	4-26
54-2 (54)	Bank angle sensor circuit high voltage (more than 4.53 V) • Loose or poor contact of the bank angle sensor connector • Bank angle sensor or its circuit malfunction	• Engine operates normally • Bank angle sensor stops the control	4-27

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.

2. **MAP Sensor Input Voltage Inspection**

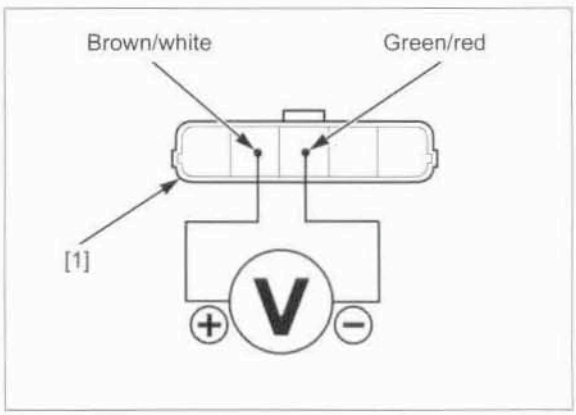
   Turn the ignition switch OFF.
   Disconnect the sensor unit 5P (Black) connector [1].
   Turn the ignition switch ON and engine stop switch "○".
   Measure the voltage between the wire harness side sensor unit 5P (Black) connector terminals.

   Connection: Brown/white (+) – Green/red (–)

   Is the voltage within 4.75 – 5.25 V?

   YES – GO TO STEP 4.

   NO – GO TO STEP 3.



3. **MAP Sensor Input Line Open Circuit Inspection**

   Turn the ignition switch OFF.
   Disconnect the PCM/ECM 33P (Gray) connector [1].
   Check for continuity between the wire harness side sensor unit 5P (Black) connector [2] and PCM/ECM 33P (Gray) connector terminals.

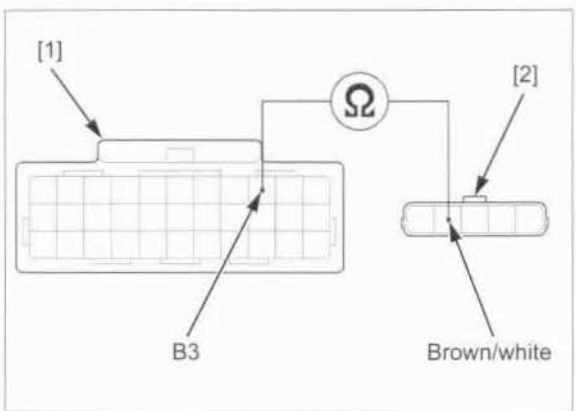
   Connection: B3 – Brown/white

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

   Is there continuity?

   YES – Replace the PCM/ECM with a known good one (page 4-34), and recheck.

   NO – Open circuit in the Brown/white wire.



4. **MAP Sensor Output Line Short Circuit Inspection**

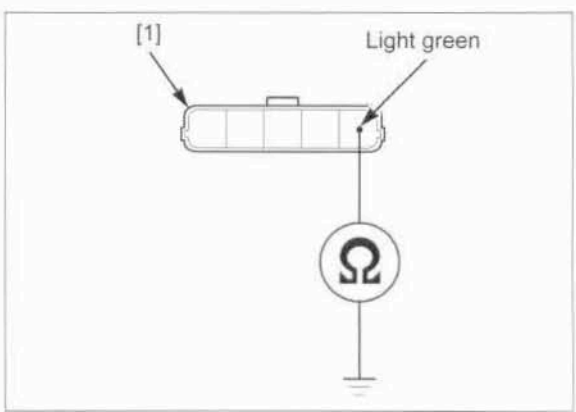
   Turn the ignition switch OFF.
   Check for continuity between the wire harness side sensor unit 5P (Black) connector [1] terminal and ground.

   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 sensor unit with a known good one (page 4-30).
Erase the DTC (page 4-12).
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/ECM with a known good one (page 4-34), and recheck.

NO – Faulty original sensor unit (MAP sensor).

DTC 1-2 (MAP SENSOR HIGH VOLTAGE)

- Before starting the inspection, check for loose or poor contact on the sensor unit 5P (Black) connector and PCM/ECM 33P connectors, and recheck the DTC.

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 5 V indicated?

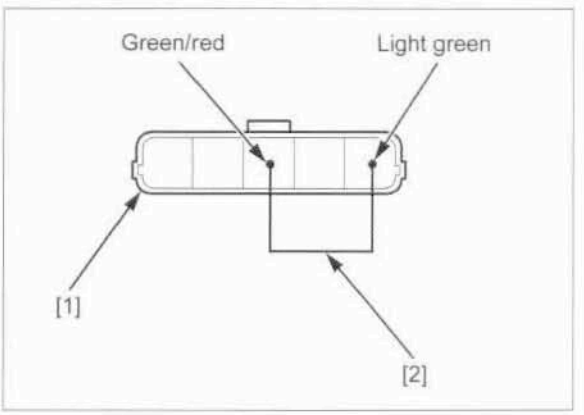
YES – GO TO STEP 2.

NO – • Intermittent failure.
• Loose or poor contact of the sensor unit 5P (Black) connector.

2. **MAP Sensor Inspection**

Turn the ignition switch OFF.
Disconnect the sensor unit 5P (Black) connector [1].
Connect the wire harness side sensor unit 5P (Black) connector terminals with a jumper wire [2].

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?

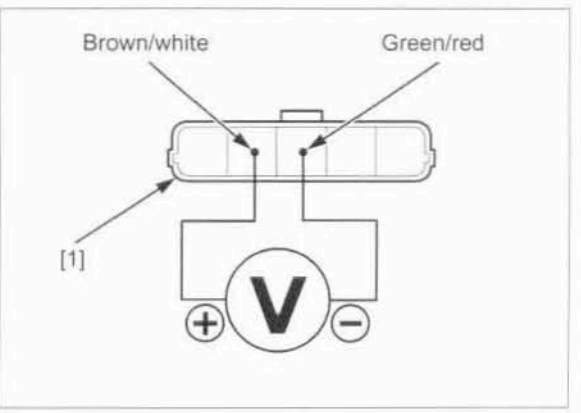
YES – Faulty sensor unit (MAP sensor).

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 between the wire harness side sensor unit 5P (Black) connector [1] terminals.

Connection: Brown/white (+) – Green/red (–)



Is the voltage within 4.75 – 5.25 V?

YES – GO TO STEP 4.

NO – Open circuit in the Brown/white or Green/red wire.

4. **MAP Sensor Output Line Open Circuit Inspection**

Turn the ignition switch OFF.
Disconnect the PCM/ECM 33P (Gray) connector [1].
Check for continuity between the wire harness side sensor unit 5P (Black) connector [2] and PCM/ECM 33P (Gray) connector terminals.

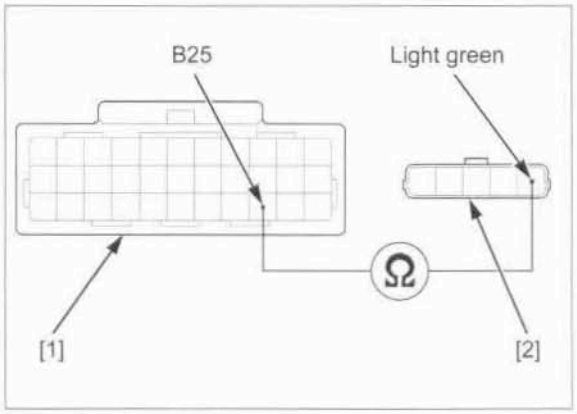
Connection: B25 – Light green

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

Is there continuity?

YES – Replace the PCM/ECM with a known good one (page 4-34), and recheck.

NO – Open circuit in the 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?

YES – GO TO STEP 2.

NO – Intermittent failure.

2. **ECT Sensor Inspection**

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?

YES – GO TO STEP 3.

NO – Faulty ECT sensor.

3. **ECT Sensor Output Line Short Circuit Inspection**

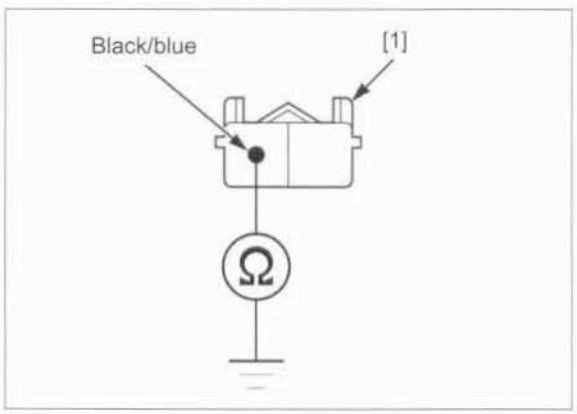
Turn the ignition switch OFF.
Disconnect the PCM/ECM 33P (Gray) connector.
Check for continuity between the wire harness side ECT sensor 2P (Black) connector [1] terminal and ground.

Connection: Black/blue – Ground

Is there continuity?

YES – Short circuit in the Black/blue wire.

NO – Replace the PCM/ECM with a known good one (page 4-34), 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 PCM/ECM 33P connectors, 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?

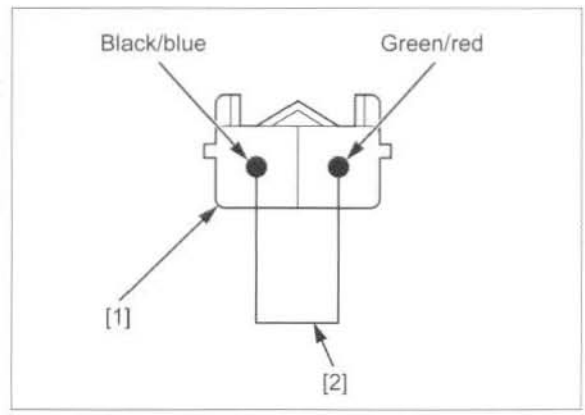
   YES – GO TO STEP 2.

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

2. **ECT Sensor Inspection**

   Turn the ignition switch OFF.
   Disconnect the ECT sensor 2P (Black) connector [1].
   Connect the wire harness side ECT sensor 2P (Black) connector terminals with a jumper wire [2].

   Connection: Black/blue – 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?

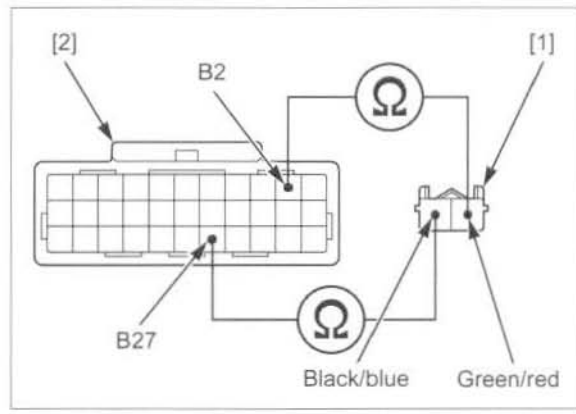
   YES – Faulty ECT sensor.

   NO – GO TO STEP 3.

3. **ECT Sensor Line Open Circuit Inspection**

   Turn the ignition switch OFF.
   Remove the jumper wire.
   Disconnect the PCM/ECM 33P (Gray) connector [1].
   Check for continuity between the wire harness side ECT sensor 2P (Black) connector [2] and PCM/ECM 33P (Gray) connector terminals.

   Connection: B2 – Green/red
   B27 – Black/blue

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

   Is there continuity?

   YES – Replace the PCM/ECM with a known good one (page 4-34), and recheck.

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

DTC 8-1 (TP SENSOR LOW VOLTAGE)

- Before starting the inspection, check for loose or poor contact on the sensor unit 5P (Black) connector and PCM/ECM 33P connectors, 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 pocket tester with the throttle 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 increases continuously when the throttle is moved to fully closed position to fully open position, using the data list menu of the HDS pocket tester.

Does the voltage increase continuously?

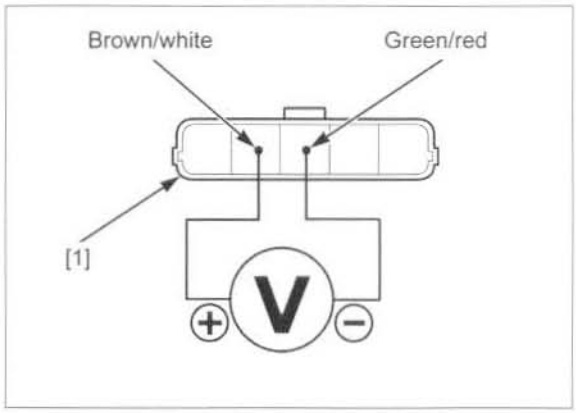
YES – • Intermittent failure.
• Loose or poor contact of the sensor unit 5P (Black) connector.

NO – Faulty sensor unit (TP sensor).

3. TP Sensor Input Voltage Inspection

Turn the ignition switch OFF.
Disconnect the sensor unit 5P (Black) connector [1].
Turn the ignition switch ON and engine stop switch "○".
Measure the voltage between the wire harness side sensor unit 5P (Black) connector terminals.

Connection: Brown/white (+) – Green/red (–)



Is the voltage within 4.75 – 5.25 V?

YES – GO TO STEP 5.

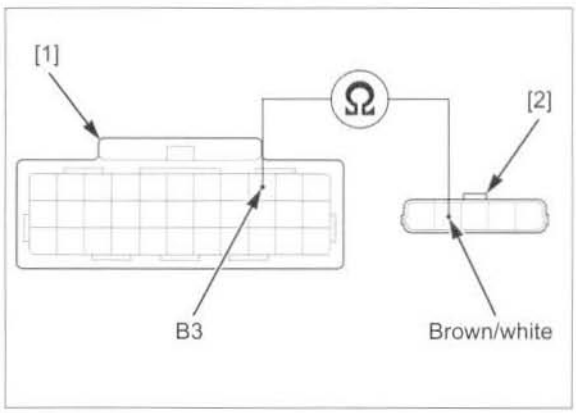
NO – GO TO STEP 4.

4. TP Sensor Input Line Open Circuit Inspection

Turn the ignition switch OFF.
Disconnect the PCM/ECM 33P (Gray) connector [1].
Check for continuity between the wire harness side sensor unit 5P (Black) connector [2] and PCM/ECM 33P (Gray) connector terminals.

Connection: B3 – Brown/white

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



Is there continuity?

YES – Replace the PCM/ECM with a known good one (page 4-34), and recheck.

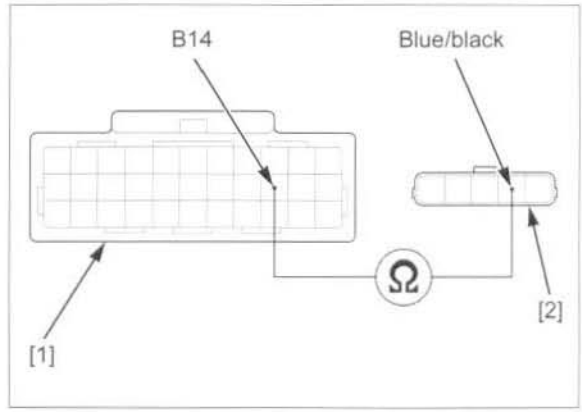
NO – Open circuit in the Brown/white wire.

5. **TP Sensor Output Line Open Circuit Inspection**

Turn the ignition switch OFF.
Disconnect the PCM/ECM 33P (Gray) connector [1].
Check for continuity between the wire harness side sensor unit 5P (Black) connector [2] and PCM/ECM 33P (Gray) connector terminals.

Connection: B14 – Blue/black

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



Is there continuity?

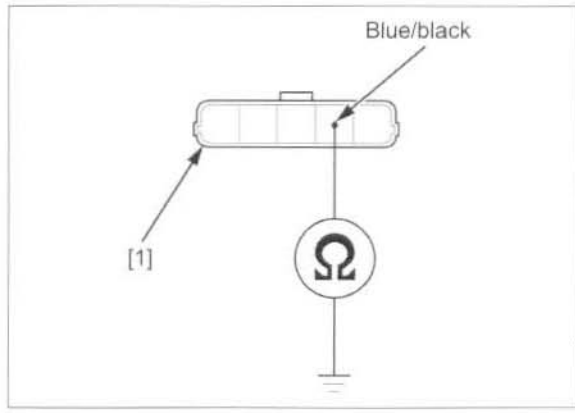
YES – GO TO STEP 6.

NO – Open circuit in the Blue/black wire.

6. **TP Sensor Output Line Short Circuit Inspection**

Check for continuity between the wire harness side sensor unit 5P (Black) connector [1] terminal and ground.

Connection: Blue/black – Ground



Is there continuity?

YES – Short circuit in the Blue/black wire.

NO – GO TO STEP 7.

7. **TP Sensor Inspection**

Replace the sensor unit with a known good one (page 4-30).
Erase the DTC (page 4-12).
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/ECM with a known good one (page 4-34), and recheck.

NO – Faulty original sensor unit (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 with the throttle fully closed.

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 increases continuously when the throttle is moved to fully closed position to fully open position, using the data list menu of the HDS pocket tester.

   Does the voltage increase continuously?

   YES – Intermittent failure.

   NO – Faulty sensor unit (TP sensor).

3. **TP Sensor Resistance Inspection at PCM/ECM Connector**

   Turn the ignition switch OFF.
   Disconnect the PCM/ECM 33P (Gray) connector [1].
   Measure the resistance between the wire harness side PCM/ECM 33P (Gray) connector terminals.

   Connection: B2 – B3

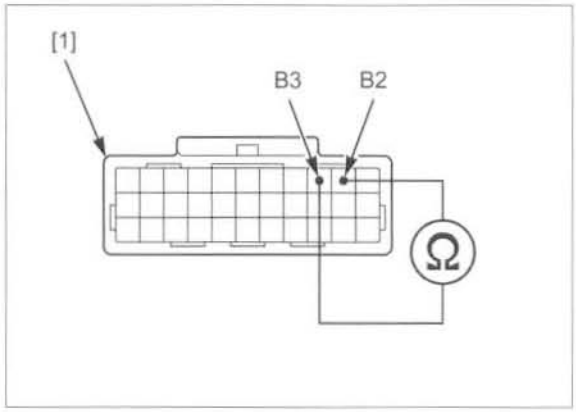
   TOOL:
   Test probe **07ZAJ-RDJA110**

   Standard: 1.0 – 3.0 kΩ (20°C/68°F)

   Is the resistance within 1.0 – 3.0 kΩ (20°C/68°F)?

   YES – GO TO STEP 5.

   NO – GO TO STEP 4.



4. **TP Sensor Ground Line Open Circuit Inspection**

   Disconnect the sensor unit 5P (Black) connector [1].
   Check for continuity between the wire harness side sensor unit 5P (Black) connector [2] and PCM/ECM 33P (Gray) connector [2] terminals.

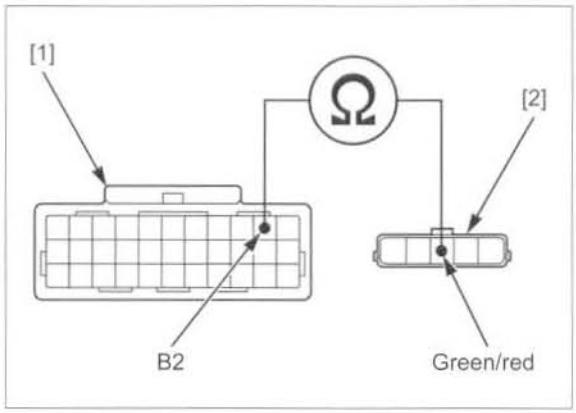
   Connection: B2 – Green/red

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

   Is there continuity?

   YES – GO TO STEP 5.

   NO – Open circuit in the Green/red wire.



5. **TP Sensor Input Voltage Inspection**

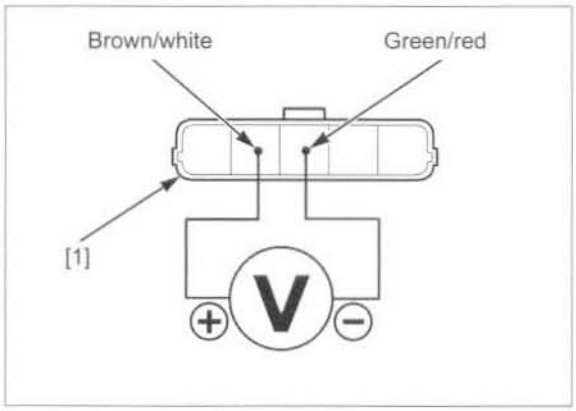
   Disconnect the sensor unit 5P (Black) connector [1].
   Turn the ignition switch ON and engine stop switch "○".
   Measure the voltage between the wire harness side sensor unit 5P (Black) connector terminals.

   Connection: Brown/white (+) – Green/red (–)

   Is the voltage within 4.75 – 5.25 V?

   YES – Replace the PCM/ECM with a known good one (page 4-34), and recheck.

   NO – Faulty sensor unit (TP sensor).



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.

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 4.

   NO – GO TO STEP 3.

3. **IAT Sensor Resistance Inspection at PCM/ECM Connector**

   Turn the ignition switch OFF.
   Connect the IAT sensor 2P (Black) connector.
   Disconnect the PCM/ECM 33P (Gray) connector [1].
   Measure the resistance between the wire harness side PCM/ECM 33P (Gray) connector terminals.

   Connection: B2 – B26

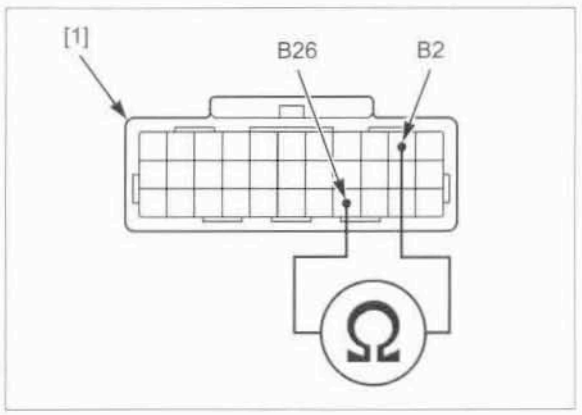
   TOOL:
   Test probe **07ZAJ-RDJA110**

   Standard: 2.2 – 2.7 kΩ (20°C/68°F)

   Is the resistance within 2.2 – 2.7 kΩ (20°C/68°F)?

   YES – Replace the PCM/ECM with a known good one (page 4-34), and recheck.

   NO – • Faulty IAT sensor.



4. **IAT Sensor Output Line Short Circuit Inspection**

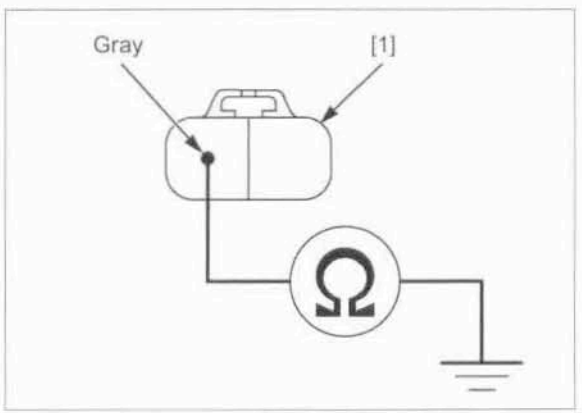
   Disconnect the IAT sensor 2P (Black) connector [1].
   Check for continuity between the wire harness side IAT sensor 2P (Black) connector terminal and ground.

   Connection: Gray – Ground

   Is there continuity?

   YES – Short circuit in the Gray wire.

   NO – Replace the PCM/ECM with a known good one (page 4-34), and recheck.



DTC 9-2 (IAT SENSOR HIGH VOLTAGE)

- Before starting the inspection, check for loose or poor contact on the IAT sensor 2P (Black) connector and PCM/ECM 33P connectors, 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?

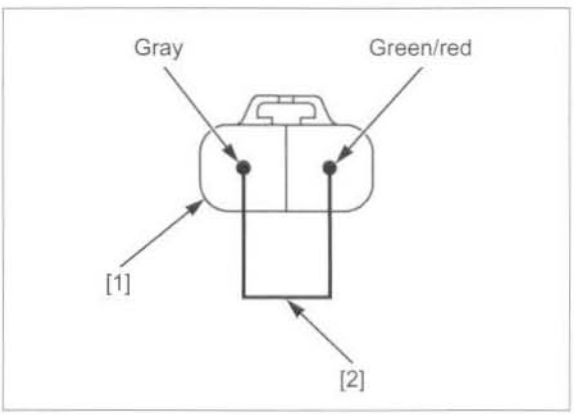
YES – GO TO STEP 2.

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

2. IAT Sensor Inspection

Turn the ignition switch OFF.
Disconnect the IAT sensor 2P (Black) connector [1].
Connect the wire harness side IAT sensor 2P (Black) connector terminals with a jumper wire [2].

Connection: Gray – 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?

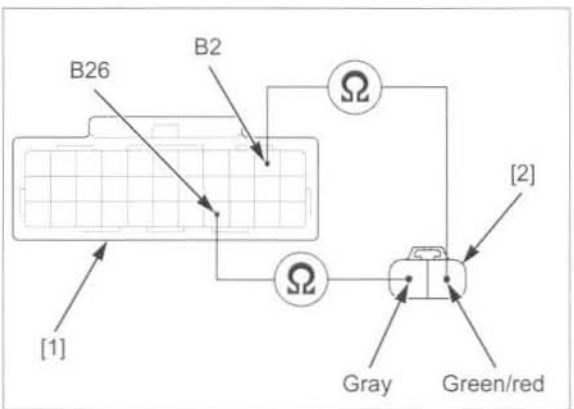
YES – Faulty IAT sensor

NO – GO TO STEP 3.

3. IAT Sensor Open Circuit Inspection

Turn the ignition switch OFF.
Remove the jumper wire.
Disconnect the PCM/ECM 33P (Gray) connector [1].
Check for continuity between the wire harness side IAT sensor 2P (Black) connector [2] and PCM/ECM 33P (Gray) connector terminals.

Connection: B2 – Green/red
B26 – Gray



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

Is there continuity?

YES – Replace the PCM/ECM with a known good one (page 4-34), and recheck.

NO – • Open circuit in the Green/red wire.
• Open circuit in the Gray wire.

DTC 12-1 (FUEL INJECTOR)

- Before starting the inspection, check for loose or poor contact on the fuel injector 2P (Gray) connector and PCM/ECM 33P connectors, and recheck the DTC.

1. Fuel Injector System Inspection

Erase the DTC (page 4-12).
Turn the ignition switch ON and engine stop switch "○".
Check the fuel injector with the HDS pocket tester.

Is the DTC 12-1 indicated?

YES – GO TO STEP 2.

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

2. Fuel Injector Resistance Inspection

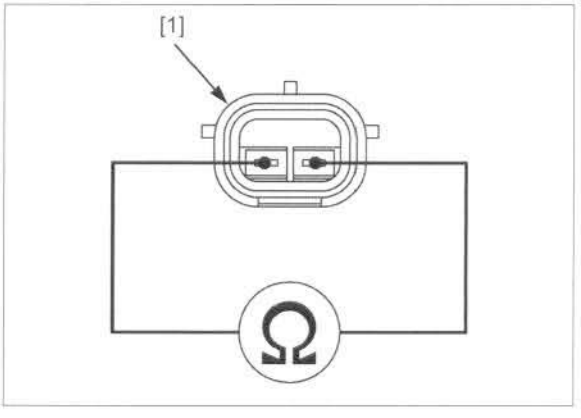
Turn the ignition switch OFF.
Disconnect the fuel injector 2P (Gray) connector.
Measure the resistance at the injector side connector [1] terminals.

Standard: 11.6 – 12.4 Ω (20°C/68°F)

Is the resistance within 11.6 – 12.4 Ω (20°C/68°F)?

YES – GO TO STEP 3.

NO – Faulty fuel injector.



3. Fuel Injector Input Voltage Inspection

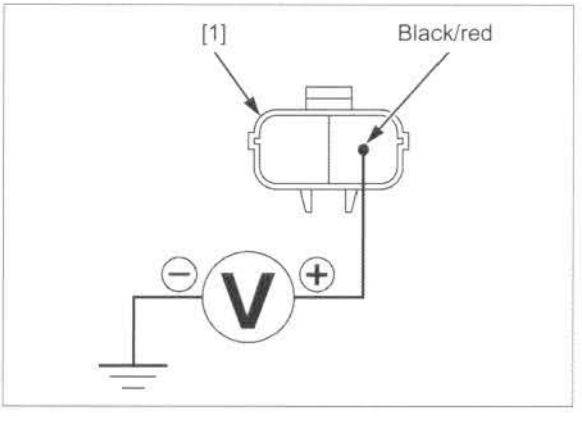
Turn the ignition switch ON and engine stop switch "○".
Measure the voltage between the wire harness side fuel injector 2P (Gray) connector [1] terminal and ground.

Connection: Black/red(+) – Ground (–)

Is there battery voltage?

YES – GO TO STEP 4.

NO – Open circuit in the Black/red wire.



4. Fuel Injector Signal Line Open Circuit Inspection

Turn the ignition switch OFF.
Disconnect the PCM/ECM 33P (Gray) connector [1].
Check for continuity between the wire harness side fuel injector 2P (Gray) connector [2] and PCM/ECM 33P (Gray) connector terminals.

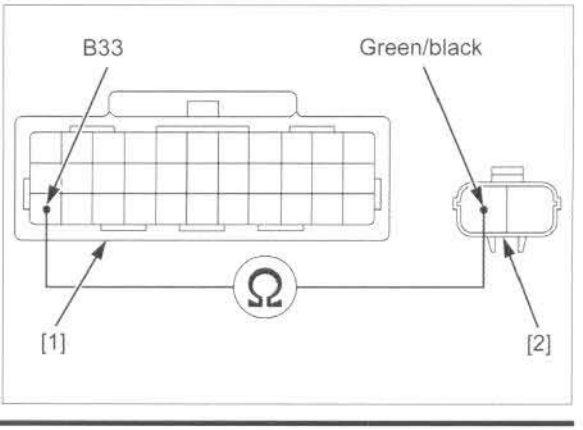
Connection: B33 – Green/black

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

Is there continuity?

YES – GO TO STEP 5.

NO – Open circuit in the Green/black wire.



5. **Fuel Injector Signal Line Short Circuit Inspection**

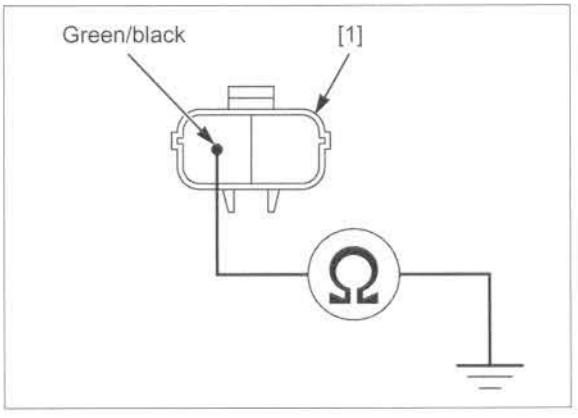
Check for continuity between the wire harness side fuel injector 2P (Gray) connector [1] terminal and ground.

Connection: Green/black – Ground

Is there continuity?

YES – Short circuit in the Green/black wire.

NO – Replace the PCM/ECM with a known good one (page 4-34), and recheck.



DTC 29-1 (IACV)

- Before starting the inspection, check for loose or poor contact on the IACV 4P (Black) connector and PCM/ECM 33P connectors, and recheck the DTC.

1. **Recheck DTC**

Erase the DTC (page 4-12).
Start the engine and recheck the DTC with the HDS pocket tester.

Is the DTC 29-1 indicated?

YES – GO TO STEP 2.

NO – • Intermittent failure.
• Loose or poor contact of the IACV 4P (Black) connector.

2. **IACV Short Circuit Inspection**

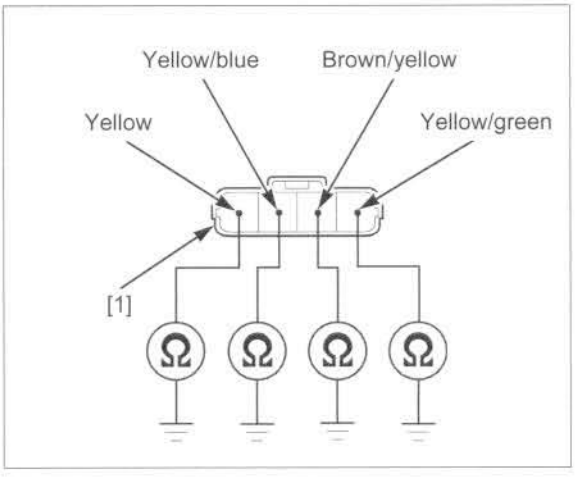
Turn the ignition switch OFF.
Disconnect the IACV 4P (Black) connector [1].
Check for continuity between the wire harness side IACV 4P (Black) connector terminals and ground.

Connection: Yellow – Ground
Yellow/blue – Ground
Brown/yellow – Ground
Yellow/green – Ground

Is there continuity?

YES – • Short circuit in the Yellow or Yellow/green wire.
• Short circuit in the Yellow/blue or Brown/yellow wire.

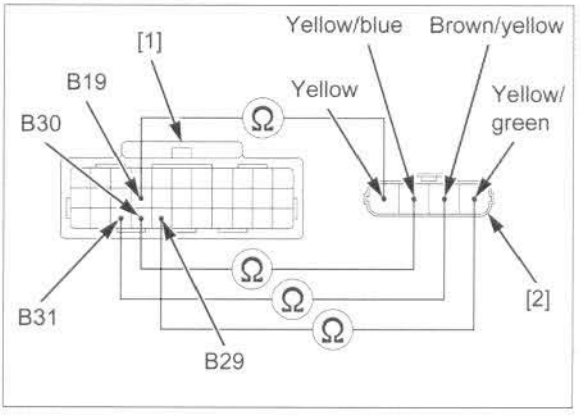
NO – GO TO STEP 3.



3. **IACV Circuit Continuity Inspection**

Disconnect the PCM/ECM 33P (Gray) connector [1]. Check for continuity between the wire harness side IACV 4P (Black) connector [2] and PCM/ECM 33P (Gray) connector terminals.

Connection: B19 – Yellow
B29 – Yellow/green
B30 – Yellow/blue
B31 – Brown/yellow



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

Are there continuities?

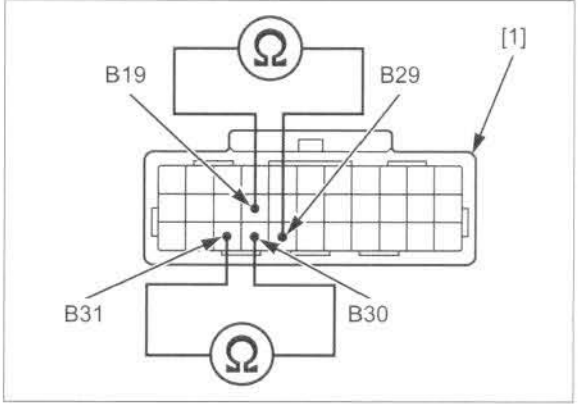
YES – GO TO STEP 4.

NO – • Open circuit in the Yellow or Yellow/green wire.
• Open circuit in the Yellow/blue or Brown/yellow wire.

4. **IACV Resistance Inspection at PCM/ECM Connector**

Measure the resistance between the wire harness side PCM/ECM 33P (Gray) connector [1] terminals.

Connection: B19 – B29
B30 – B31



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

Standard: 100 – 120 Ω (25°C/77°F)

Is the resistance within 100 – 120 Ω (20°C/68°F)?

YES – Replace the PCM/ECM with a known good one (page 4-34), and recheck.

NO – Faulty IACV.

DTC 33-2 (EEPROM)

1. **Recheck DTC**

Erase the DTC (page 4-12).
Turn the ignition switch ON and engine stop switch "○".
Recheck the PCM/ECM EEPROM with the HDS pocket tester.

Is the DTC 33-2 indicated?

YES – Replace the PCM/ECM with a known good one (page 4-34), and recheck.

NO – Intermittent failure.

DTC 54-1 (BANK ANGLE SENSOR LOW VOLTAGE)

1. **Recheck DTC**

   Erase the DTC (page 4-12).
   Turn the ignition switch ON and engine stop switch "○".
   Check the bank angle sensor with the HDS pocket tester.

   Is the DTC 54-1 indicated?

   YES – GO TO STEP 2.

   NO – • Intermittent failure.
   • Loose or poor contact of the bank angle sensor 3P (Black) connector.

2. **Bank Angle Sensor Power Input Voltage Inspection**

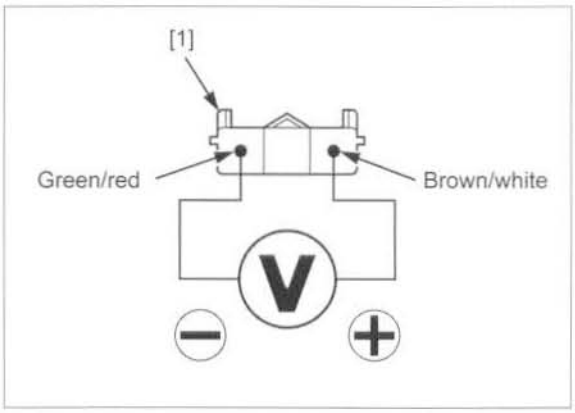
   Turn the ignition switch OFF.
   Disconnect the bank angle sensor 3P (Black) connector [1].
   Turn the ignition switch ON and engine stop switch "○".
   Measure the voltage between the wire harness side bank angle sensor 3P (Black) connector terminals.

   Connection: Brown/white (+) – Green/red (–)

   Is the voltage within 4.75 – 5.25 V?

   YES – GO TO STEP 4.

   NO – GO TO STEP 3.



3. **Bank Angle Sensor Input Voltage Line Short Circuit Inspection**

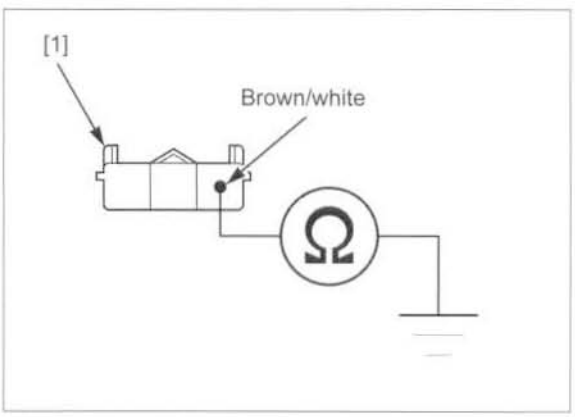
   Turn the ignition switch OFF.
   Disconnect the PCM/ECM 33P (Gray) and (Black) connectors.
   Check for continuity between the wire harness side bank angle sensor 3P (Black) connector [1] terminal and ground.

   Connection: Brown/white – Ground

   Is there continuity?

   YES – Short circuit in the Brown/white wire.

   NO – Replace the PCM/ECM with a known good one (page 4-34), and recheck.



4. **Bank Angle Sensor Output Line Short Circuit Inspection**

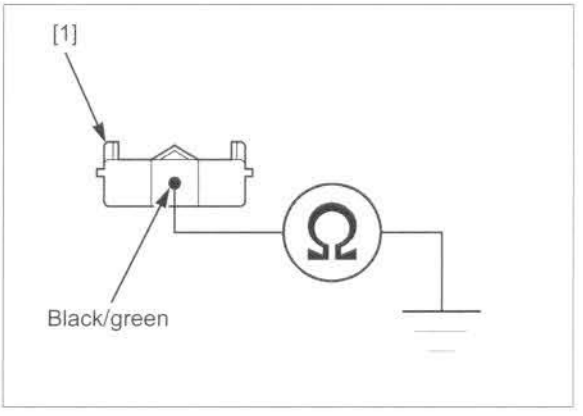
Turn the ignition switch OFF.
Disconnect the PCM/ECM 33P (Gray) connector.
Check for continuity between the wire harness side bank angle sensor 3P (Black) connector [1] terminal and ground.

Connection: Black/green – Ground

Is there continuity?

YES – Short circuit in the Black/green wire.

NO – GO TO STEP 5.



5. **Bank Angle Sensor Inspection**

Replace the bank angle sensor with a known good one (page 4-33).
Erase the DTC (page 4-12).
Connect the bank angle sensor 3P (Black) connector.
Turn the ignition switch ON and engine stop switch "○".
Check the bank angle sensor with the HDS pocket tester.

Is DTC 54-1 indicated?

YES – Replace the PCM/ECM with a known good one (page 4-34), and recheck.

NO – Faulty original bank angle sensor.

DTC 54-2 (BANK ANGLE SENSOR HIGH VOLTAGE)

- Before starting the inspection, check for loose or poor contact on the bank angle sensor 3P (Black) connector and PCM/ECM 33P connectors, and recheck the DTC.

1. **Recheck DTC**

Erase the DTC (page 4-12).
Turn the ignition switch ON and engine stop switch "○".
Check the bank angle sensor with the HDS pocket tester.

Is the DTC 54-2 indicated?

YES – GO TO STEP 2.

NO – • Intermittent failure.
• Loose or poor contact of the bank angle sensor 3P (Black) connector.

2. **Bank Angle Sensor Power Input Voltage Inspection**

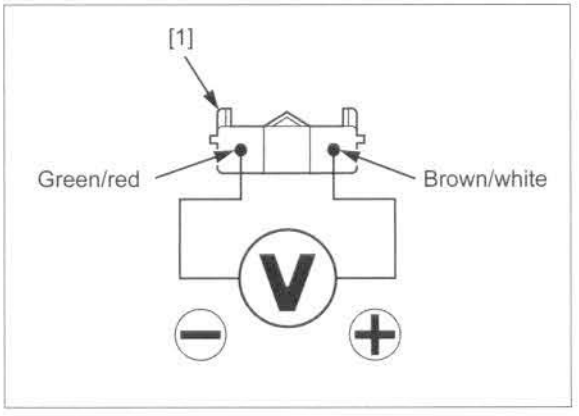
Turn the ignition switch OFF.
Disconnect the bank angle sensor 3P (Black) connector [1].
Turn the ignition switch ON and engine stop switch "○".
Measure the voltage between the wire harness side bank angle sensor 3P (Black) connector terminals.

Connection: Brown/white (+) – Green/red (–)

Is there within 4.75 – 5.25 V?

YES – GO TO STEP 4.

NO – GO TO STEP 3.



3. **Bank Angle Sensor Input Voltage Line Open Circuit Inspection**

Turn the ignition switch OFF.
Disconnect the PCM/ECM 33P (Gray) connector [1].
Check for continuity between the wire harness side bank angle sensor 3P (Black) connector [2] and PCM/ECM 33P (Gray) connector terminals.

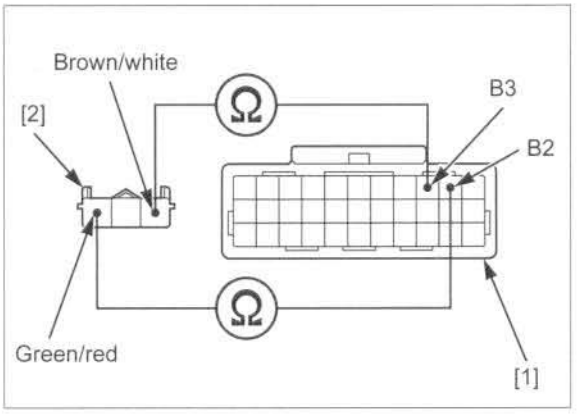
Connection: B2 – Green/red
B3 – Brown/white

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

Are there continuities?

YES – Replace the PCM/ECM with a known good one (page 4-34), and recheck.

NO – • Open circuit in the Green/red wire.
• Open circuit in the Brown/white wire.



4. **Bank Angle Sensor Output Line Open Circuit Inspection**

Turn the ignition switch OFF.
Disconnect the PCM/ECM 33P (Gray) connector [1].
Check for continuity between the wire harness side bank angle sensor 3P (Black) connector [2] and PCM/ECM 33P (Gray) connector terminals.

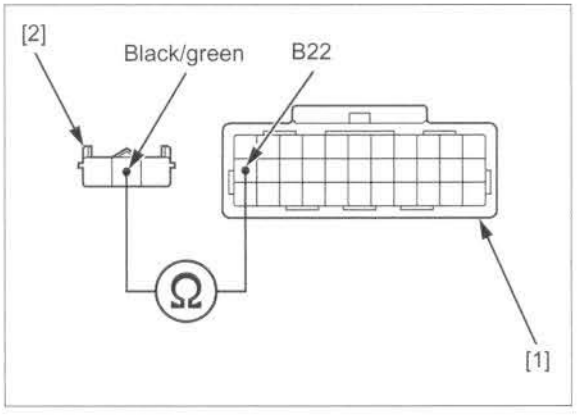
Connection: B22 – Black/green

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

Is there continuity?

YES – Inspect the bank angle sensor (page 4-34).

NO – Open circuit in the Black/green wire.

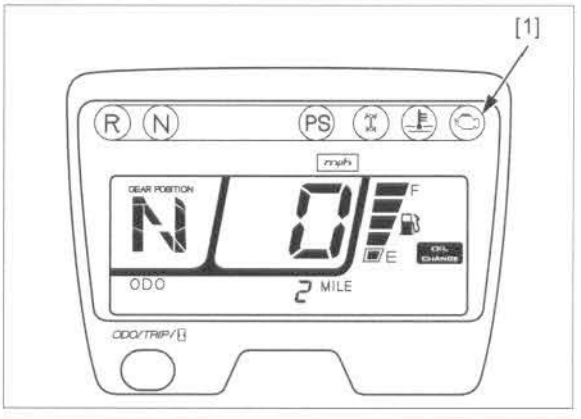


MIL CIRCUIT INSPECTION

NOTE:

- Under normal conditions, the MIL will stay on for a few seconds, then goes off when the ignition switch is turned on with the engine stop switch "○".

Check that the MIL [1] comes on when the ignition switch is turned ON and engine stop switch "○".



If the MIL does not come on at all, inspect the combination meter (page 22-7).

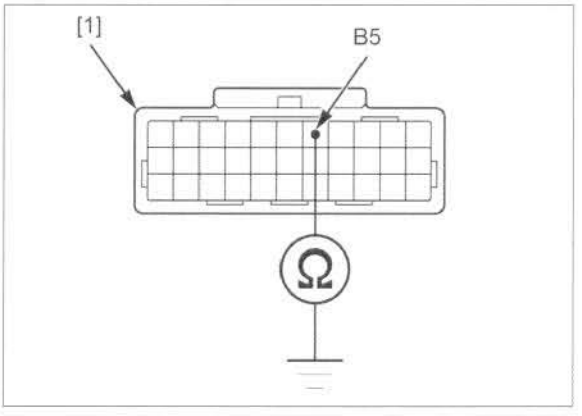
If the MIL comes on for few seconds, then goes off with the gear position indicator continuously blinking "–", check the serial communication line (page 22-7).

If the MIL does not go off within a few seconds comes on and it, check as follows:

Turn the ignition switch OFF.

Disconnect the PCM/ECM 33P (Gray) connector [1].

Check for continuity between the wire harness side PCM/ECM 33P (Gray) connector and ground.



Connection: B5 – Ground

TOOL:

Test probe	**07ZAJ-RDJA110**

- If there is continuity, check for short circuit in the Brown/red wire between the DLC and PCM/ECM.
- If there is no continuity, replace the PCM/ECM with a known good one (page 4-34), and recheck.

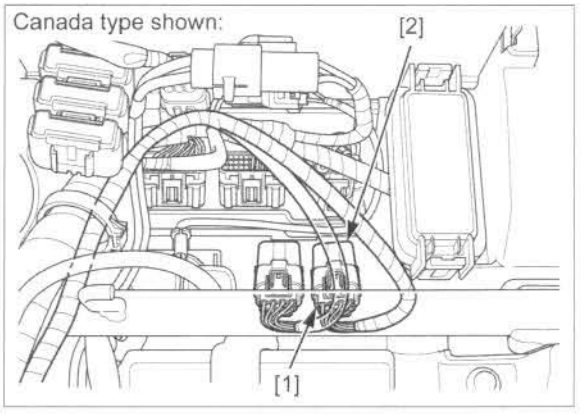
FUEL PUMP RELAY

INSPECTION

Remove the rear fender cover (page 2-9).

Disconnect the fuel pump relay 8P (Gray) connector [1].

Remove the fuel pump relay [2] from the rear fender.



Connect an ohmmeter to the fuel pump relay side 8P connector [1] terminals as shown.

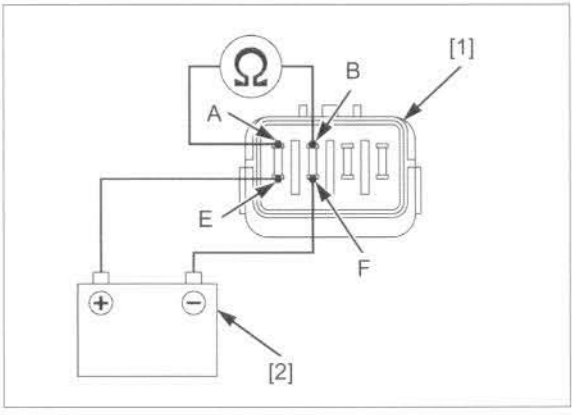
Connection: A – B

Connect the 12 V battery [2] to the fuel pump relay side 8P connector terminals as shown.

Connection: E – F

There should be continuity with the battery connected and no continuity with the battery disconnected.

If the test result is abnormal, replace the fuel pump relay.



SENSOR UNIT (MAP/TP SENSOR)

REMOVAL/INSTALLATION

NOTE:

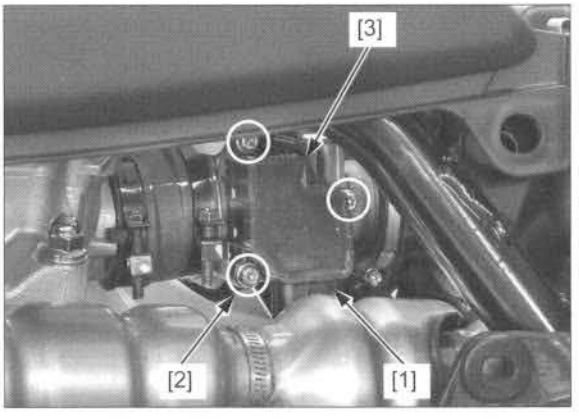
- If the sensor unit has been removed, perform the TP sensor reset procedure (page 4-31).
- Always clean around the throttle body before the sensor unit removal to prevent dirt and debris from entering the air passage.

Remove the following:

– throttle body cover (page 7-13)
– left side cover (page 2-4)

Disconnect the sensor unit 5P (Black) connector [1].

Remove the three torx screws (T25) [2] and the sensor unit [3] from the throttle body.



Install a new O-ring [1] into the groove of the throttle body.

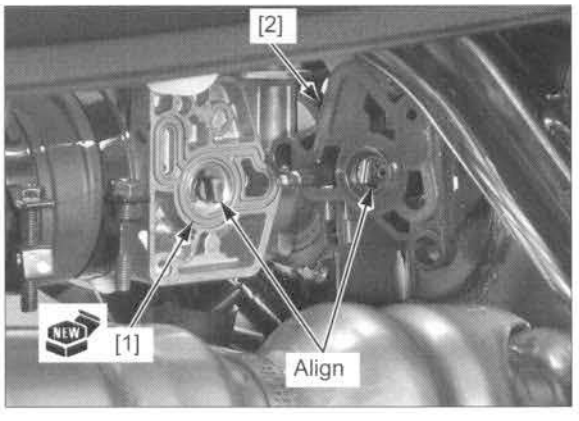
Install the sensor unit [2] to the throttle body by aligning the slot with the throttle shaft end.

Install and tighten the torx screws (T25) to the specified torque.

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

Install the removed parts in the reverse order of removal.

Perform the TP sensor reset procedure (page 4-31).



TP SENSOR RESET PROCEDURE

NOTE:

- Make sure that the DTC is not stored in the PCM/ ECM memory. If the DTC is stored, the reset mode will not start.

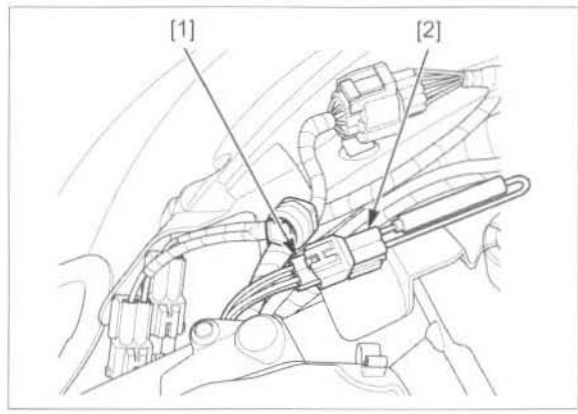
1. Remove the following:

– seat (page 2-4)
– left fuel tank side cover (page 2-5)

2. Turn the ignition switch OFF.
3. Remove the DLC from the dummy connector (page 4-11).
4. Short the DLC [1] terminals using the special tool.

   Connection: Brown/red – Green

   TOOL:
   [2] SCS service connector 070PZ-ZY30100

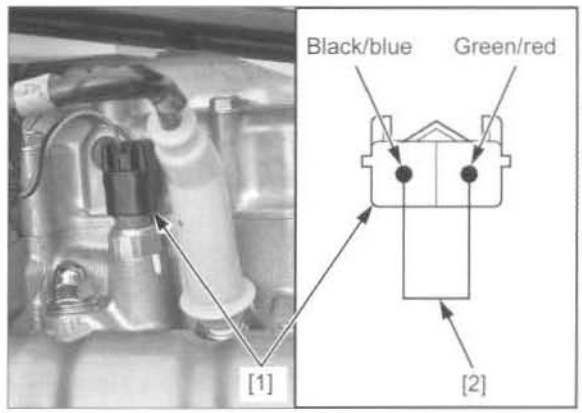


5. Disconnect the ECT sensor 2P (Black) connector [1].

   Short the wire harness side connector terminals with a jumper wire [2].

   Connection: Black/blue – Green/red

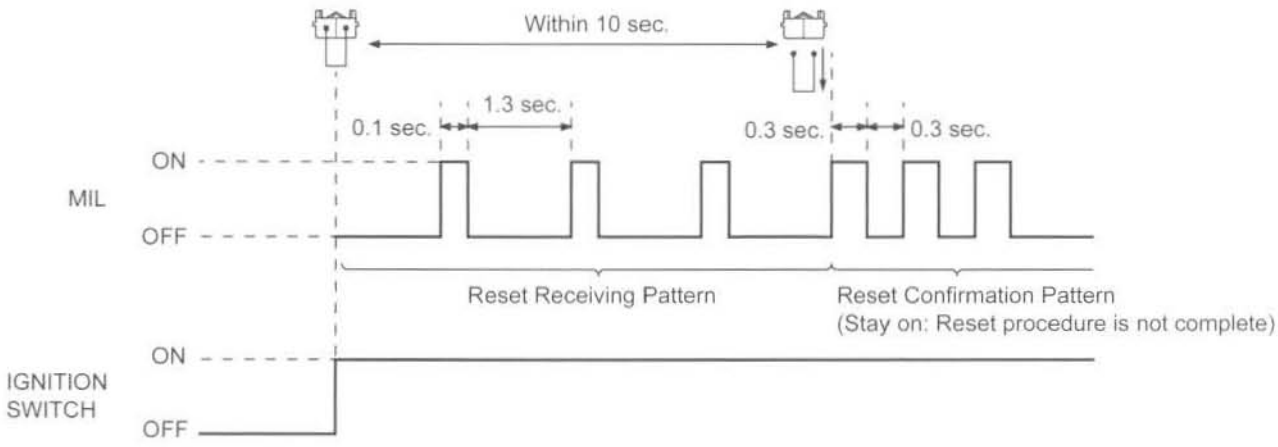
6. Turn the ignition switch ON and engine stop switch "○", then disconnect the jumper wire from the ECT sensor 2P (Black) connector within 10 seconds while the MIL is blinking (reset receiving pattern).



7. When the reset procedure is complete, the MIL blinking changes from Reset Receiving Pattern to Confirmation Pattern.

   Turn the ignition switch OFF.

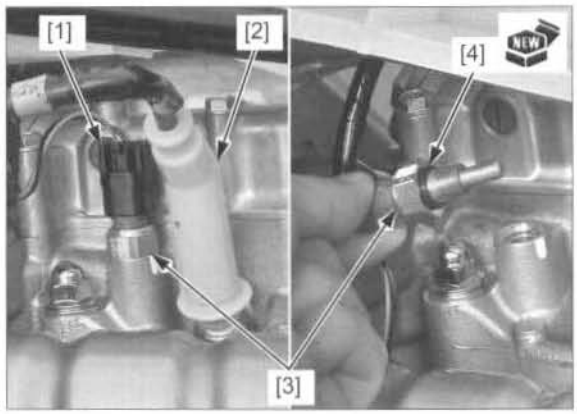
   If more than 10 seconds elapse or the procedures are incorrect, the MIL stays on. Repeat the reset procedures from the step 4.



8. Connect the ECT sensor 2P (Black) connector.
9. Disconnect the special tool from the DLC.
10. Install the dummy connector to the DLC (page 4-11).
11. Check the engine idle speed (page 3-15).
12. Install the removed parts in the reverse order of removal.

ECT SENSOR

REMOVAL/INSTALLATION



Drain the coolant (page 8-6).

Remove the left fuel tank side cover (page 2-5).

Disconnect the spark plug cap [1] and ECT sensor 2P (Black) connector [2].

Replace the ECT sensor while the engine is cold.

Remove the ECT sensor [3] and O-ring [4].

Install the a new O-ring onto the ECT sensor.

Install the ECT sensor to the cylinder head and tighten it to the specified torque.

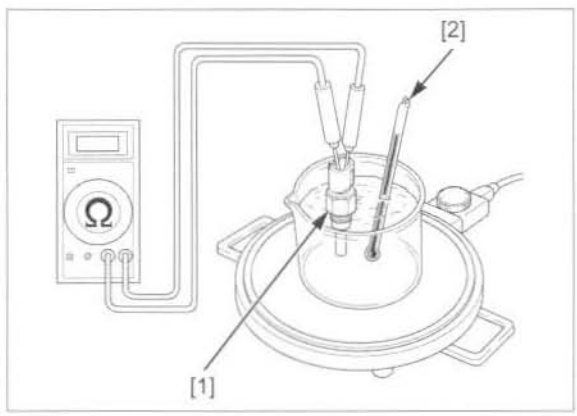
TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Connect the ECT sensor 2P (Black) connector and spark plug cap.

Fill the cooling system with recommended coolant (page 8-6).

Install the left fuel tank side cover (page 2-5).

INSPECTION



Remove the ECT sensor [1] (page 4-32).

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

Heat the coolant (1:1 mixture) with an electric heating element.

Suspend the ECT sensor in heated coolant and check the continuity through the sensor as the coolant heats up.

NOTE:

- Soak the ECT sensor in coolant up to its metal area thoroughly with at least 40 mm (1.6 in) from the bottom of the pan to the bottom of the sensor.
- Slowly stir the coolant while heating and keep temperature constant for 3 minutes before testing. A sudden change of temperature will result in incorrect readings. Do not let the thermometer [2] or ECT sensor touch the pan.

Measure the resistance between ECT sensor terminals.

Temperature	40 ± 5°C (104 ± 41°F)
Resistance	0.86 – 1.55 kΩ

Replace the ECT sensor if it is out of specifications.

Install the ECT sensor (page 4-32).

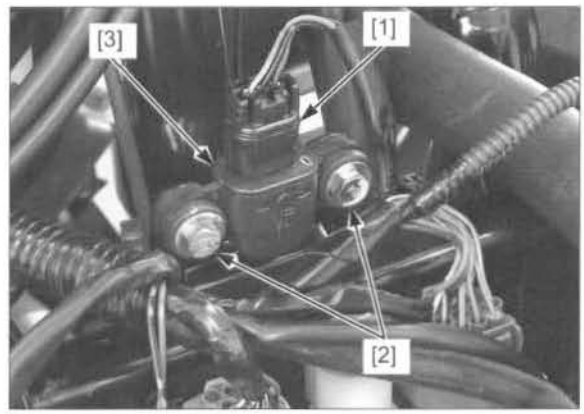
BANK ANGLE SENSOR

REMOVAL/INSTALLATION

Remove the front fender/carrier (page 2-8).

Disconnect the bank angle sensor 3P (Black) connector [1].

Remove the two mounting bolts [2] and bank angle sensor [3] from the frame.

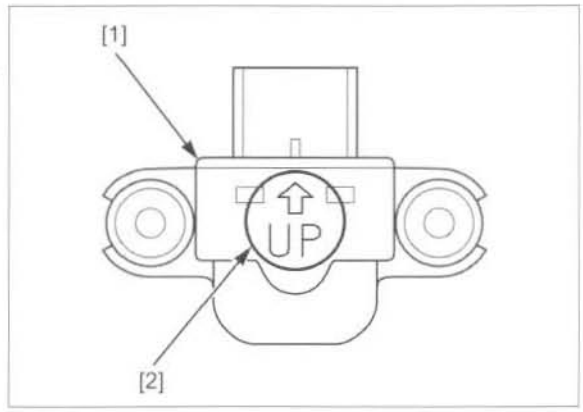


Install the bank angle sensor [1] with its "UP" mark [2] facing up.

Install the removed parts in the reverse order of removal.

TORQUE:

Bank angle sensor mounting bolt:
10 N·m (1.0 kgf·m, 7 lbf·ft)



OPERATION INSPECTION

NOTE:

- Before you perform this inspection, check that the engine idle speed is normal (page 3-15).

Remove the bank angle sensor [1] with the bank angle sensor 3P (Black) connector is connected (page 4-33).

- Do not disconnect the bank angle sensor 3P (Black) connector during inspection.

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

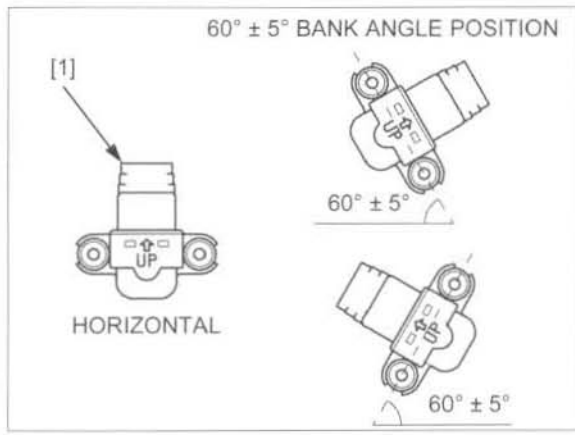
Place the bank angle sensor is horizontal (normal position) as shown, and turn the ignition switch ON and engine stop switch "○".

Start the engine.

Incline the bank angle sensor 60° ± 5° to the left or right with keeping with the engine running.

The bank angle sensor is normal if the engine stops after a few seconds when the bank angle sensor Inclined.

- If you repeat this test, first turn the ignition switch OFF, then turn the ignition switch ON and engine stop switch "○".



INSPECTION WITH HDS POCKET TESTER

Connect the HDS pocket tester (page 4-11).

Remove the bank angle sensor [1] with the bank angle sensor 3P (Black) connector is connected (page 4-33).

Place the bank angle sensor horizontal as shown.

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

Read the voltage with the HDS pocket tester.

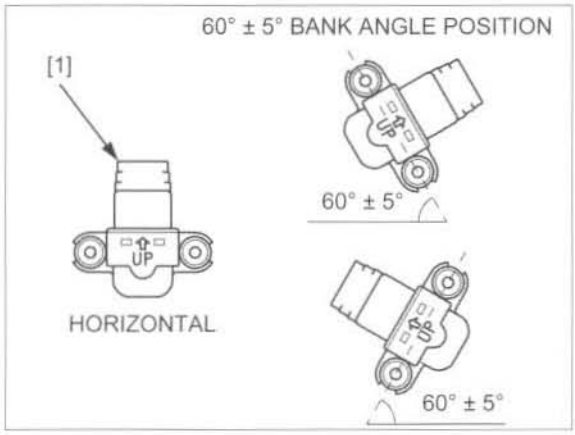
Standard: 3.6 – 4.4 V

Incline the bank angle sensor 60° ± 5° to the left or right with keeping the ignition switch ON and engine stop switch "○".

Read the voltage with HDS pocket tester.

Standard: 0.7 – 1.3 V

- If you repeat this test, first turn the ignition switch OFF, then turn the ignition switch ON and engine stop switch "○".



PCM/ECM

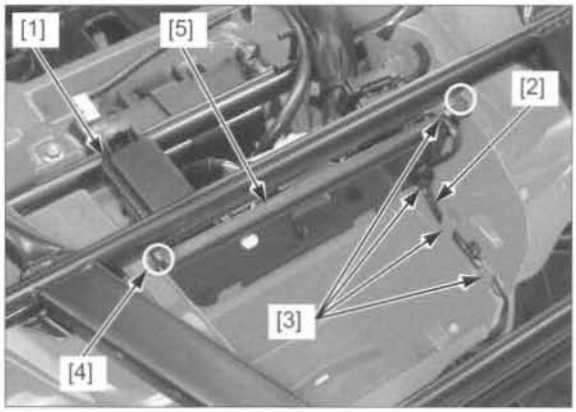
REMOVAL/INSTALLATION

Remove the rear fender cover (page 2-9).

Release the following:

- fuse box [1]
- brake/taillight wire [2] from the wire guides [3]

Release the tabs [4] of the connector holder plate [5] from the rear fender, then remove the connector holder plate.

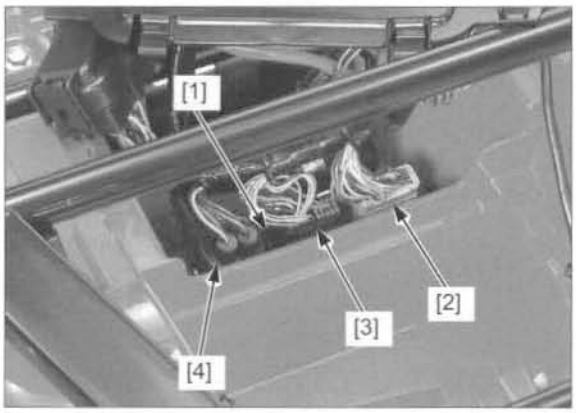


Turn the ignition switch OFF.

Remove the PCM/ECM [1] from the rear fender.

Disconnect the 33P (Gray) connector [2], 33P (Black) connector [3] and 5P (Black) connector [4] from the PCM/ECM.

Installation is in the reverse order of removal.



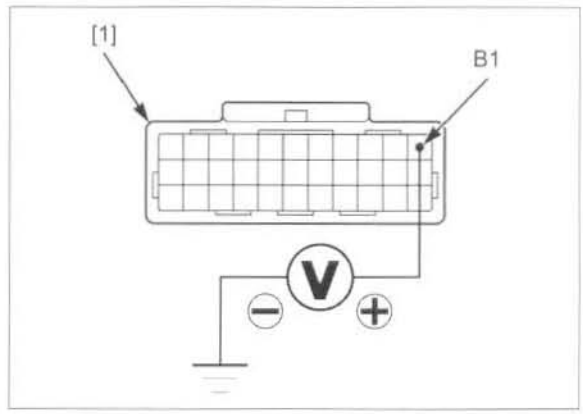
POWER/GROUND LINE INSPECTION

- Before starting the inspection, check for loose or poor contact on the PCM/ECM 33P (Gray) connector.

1. PCM/ECM Power Line Inspection

Turn the ignition switch OFF.
Disconnect the PCM/ECM 33P (Gray) connector [1].
Turn the ignition switch ON and engine stop switch "○".
Measure the voltage between the wire harness side PCM/ECM 33P (Gray) connector terminal and ground.

Connection: B1 (+) – Ground (–)



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

Does the battery voltage exist?

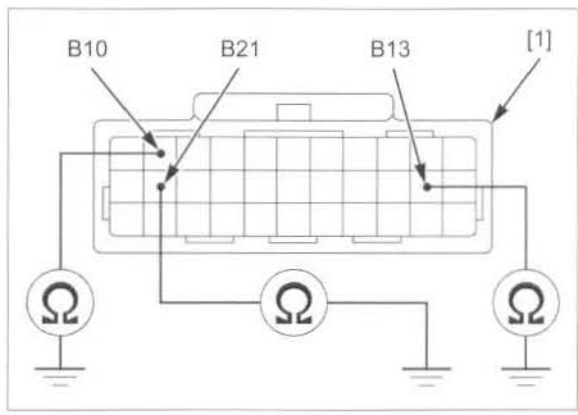
YES – GO TO STEP 2.

NO – • Open circuit in the Black/red wire between the fuse box and PCM/ECM.
• Open circuit in the Black wire between the ignition switch and fuse box.
• Blown IGN fuse (10A).
• Inspect the ignition switch (page 22-11).

2. PCM/ECM Ground Line Inspection

Turn the ignition switch OFF.
Check for continuity between the wire harness side PCM/ECM 33P (Gray) connector [1] terminal and ground.

Connection: B10 – Ground
B13 – Ground
B21 – Ground



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

Is there continuity?

YES – Replace the PCM/ECM with a known good one (page 4-34), and recheck.

NO – Open circuit in the Green wire.

ENGINE STOP SWITCH LINE INSPECTION

- Before starting the inspection, check for loose or poor contact on the PCM/ECM 33P (Black) and (Gray) connectors.

ENGINE DOES NOT START (NO FUEL PUMP OPERATION SOUND)

1. **Fuse Inspection**

   Check the IGN fuse (10 A) for blown.

   Is the fuse blown?

   YES – Replace the fuse.

   NO – GO TO STEP 2.

2. **Engine Stop Switch Line Inspection**

   Turn the ignition switch OFF.
   Disconnect the PCM/ECM 33P (Black) connector [1].
   Turn the ignition switch ON and engine stop switch "○".
   Measure the voltage between the wire harness side PCM/ECM 33P (Black) connector terminal and ground.

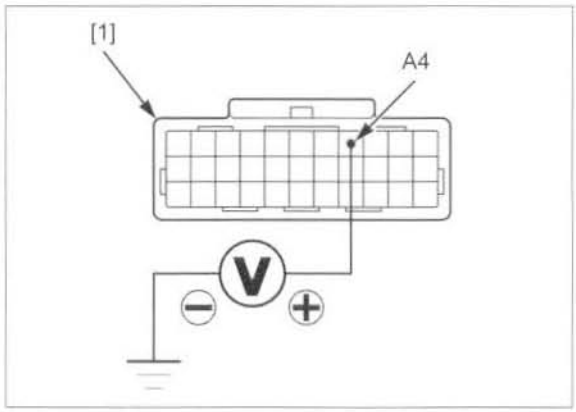
   Connection: A4 (+) – Ground (–)

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

   Does the battery voltage exist?

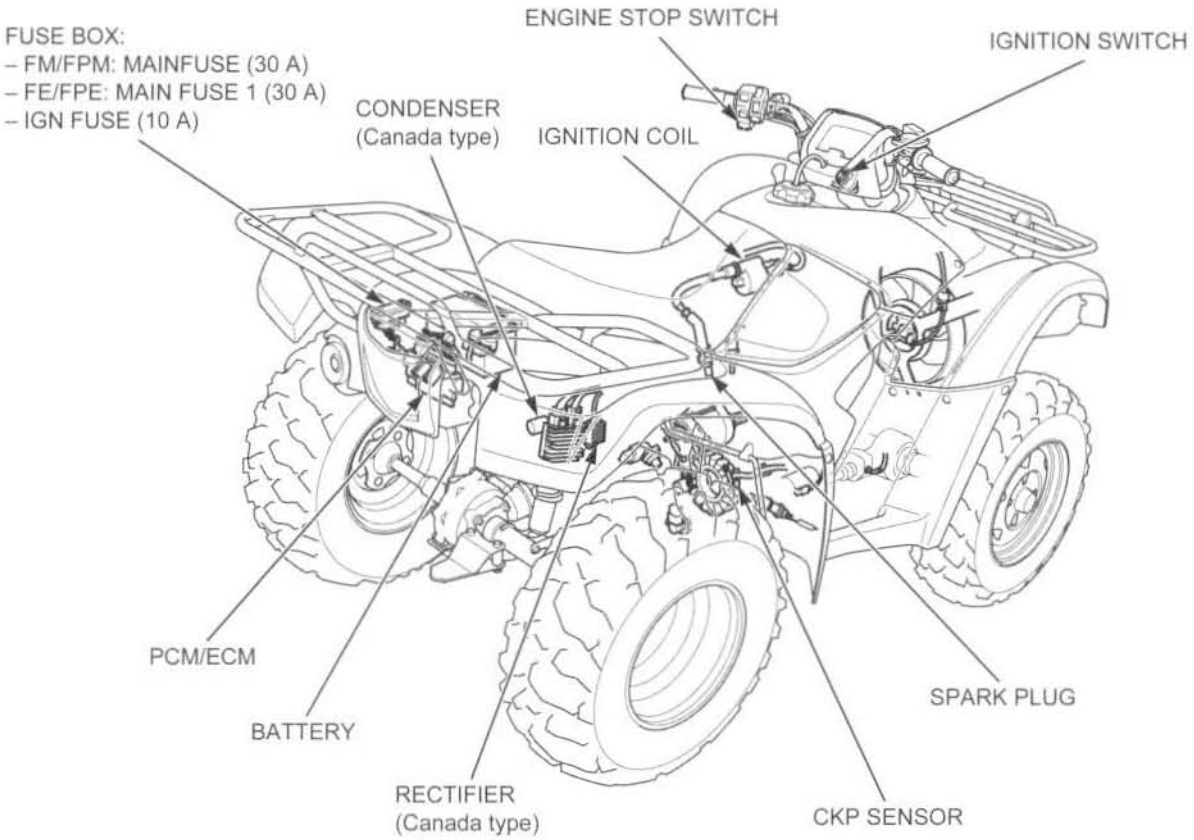
   YES – • Inspect the fuel supply system (page 7-13).

   NO – • Open circuit in the Black/white wire between the engine stop switch and PCM/ECM.
   • Open circuit in the Black/red wire between the fuse box and engine stop switch.
   • Inspect the engine stop switch (page 22-11).
   • Open circuit in the Black wire between the ignition switch and fuse box.
   • Inspect the ignition switch (page 22-11).

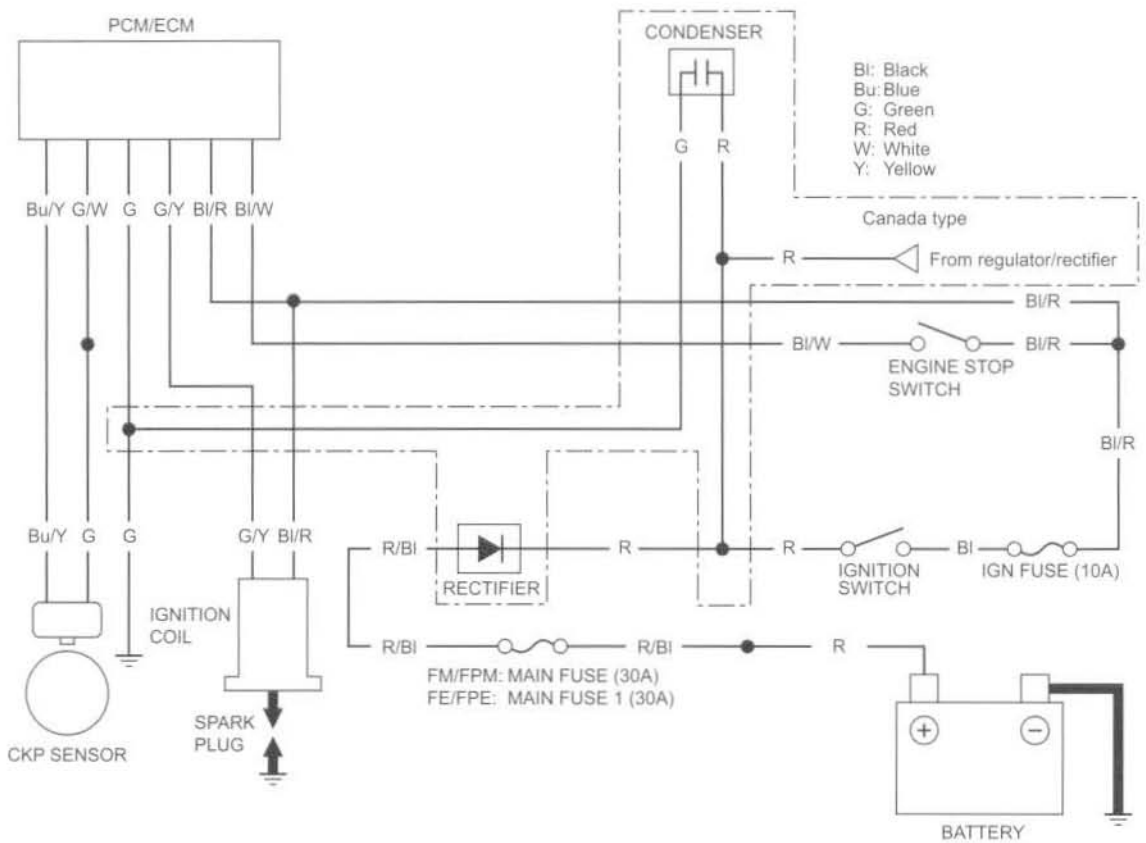


5. IGNITION SYSTEM

COMPONENT LOCATION



SYSTEM DIAGRAM



SERVICE INFORMATION

GENERAL

NOTICE

- *The PCM/ECM may be damaged if dropped. Also, if the connector is disconnected when current is flowing, the excessive voltage may damage the PCM/ECM. Always turn the ignition switch OFF before servicing.*
- *Use spark plugs with the correct heat range. Using spark plugs with an incorrect heat range can damage the engine.*

- Some electrical components may be damaged if terminals or connectors are connected or disconnected while the ignition switch is ON and current is present.
- When servicing the ignition system, always follow the checks described in the troubleshooting chart (page 5-4).
- This ignition system is controlled by PCM/ECM.
- The transistorized ignition system uses an electrically controlled ignition timing system. No adjustments can be made to the ignition timing.
- 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.
- The engine stop switch line is connected to the PCM/ECM on this vehicle. Its signal permits the PCM/ECM to control the fuel pump, injector and ignition coil.
- Refor to each section for the following components information.
  - CKP sensor (page 13-6).
  - Ignition switch (page 22-11).
  - Engine stop switch (page 22-11).

SPECIFICATION

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

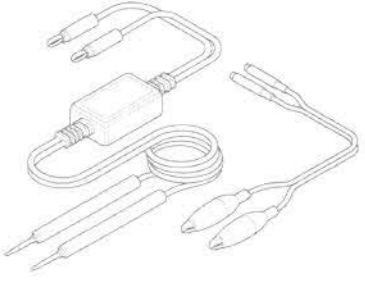
TORQUE VALUES

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Timing hole cap	1	14	10 (1.0, 7)	

TOOLS

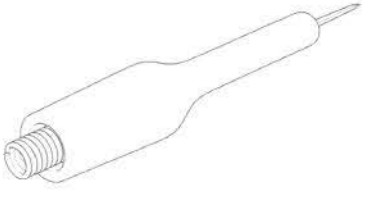
IgnitionMate peak voltage tester
MTP07-0286 (U.S.A. only)

Peak voltage adaptor
07HGJ-0020100



(not available in U.S.A.) with commercially available digital multimeter (impedance 10 MΩ/DCV minimum)

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)
- "Initial voltage" of the ignition primary coil is the battery voltage with the ignition switch turned ON. (The engine is not cranked by the starter motor)

No spark at spark plug

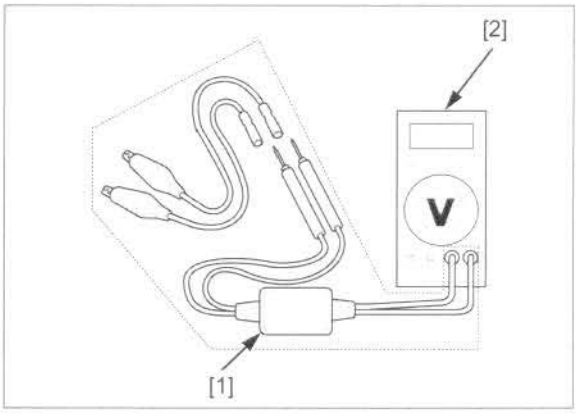
UNUSUAL CONDITION		PROBABLE CAUSE (Check in numerical order)
Ignition coil primary voltage	No initial voltage with the ignition switch turned ON. (Other electrical components are normal.)	1. Faulty ignition switch. 2. An open circuit in the Black/red wire between the ignition coil and ignition switch. 3. Loose or poor connection of the primary terminal, or an open circuit in the primary coil. 4. Faulty PCM/ECM (in case when the initial voltage is normal with the PCM/ECM (Gray) connector disconnected).
	Initial voltage is normal, but it drops by 2 – 4 V while cranking the engine.	1. Incorrect peak voltage adaptor connections. (System is normal if measured voltage is over the specifications with reverse connections) 2. Battery is undercharged. (Voltage drops largely when the engine is started) 3. No voltage at the Black/red wire of the PCM/ECM (Gray) connector, or loose or poorly connected PCM/ECM (Gray) connector. 4. Loose or poor connection, or an open circuit in the Green (ground) wire of the PCM/ECM. 5. Loose or poor connection, or an open circuit in the Green/yellow wire between the ignition coil and PCM/ECM. 6. A short circuit in the ignition primary coil. 7. Faulty engine stop switch. 8. No voltage at the Black/white wire of the PCM/ECM (Black) connector, or loose or poorly connected PCM/ECM (Black) connector. 9. Faulty CKP sensor. (Measure the peak voltage) 10. Faulty PCM/ECM (in case when above No. 1 through 9 are normal).
	Initial voltage is normal but there is no peak voltage while cranking the engine.	1. Incorrect peak voltage adaptor connections. (System is normal if measured voltage is over the specifications with reverse connections) 2. Faulty peak voltage adaptor. 3. Faulty engine stop switch. 4. Faulty CKP sensor. (Measure the peak voltage) 5. Faulty PCM/ECM (in case when above No. 1 and 4 are normal).
	Initial voltage is normal but peak voltage is lower than the standard value.	1. The multimeter impedance is too low; below 10 MΩ/DCV. 2. Cranking speed is too slow. (Battery is undercharged) 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 PCM/ECM (in case when above No. 1 through 3 are normal).
	Initial and peak voltages are normal but no spark jumps.	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 undercharged) 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 (in case when above No. 1 through 3 are normal).
	No peak voltage.	1. Faulty peak voltage adaptor. 2. Faulty CKP sensor.

IGNITION SYSTEM INSPECTION

NOTE:

- If there is no spark at the plug, check all connections for loose or poor contact before measuring the peak voltage.
- Use 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 [1] to the digital multimeter [2].



TOOL:

IgnitionMate peak voltage tester	**MTP07-0286 (U.S.A. only) or**
Peak voltage adaptor	**07HGJ-0020100 (not available in U.S.A.)**

with commercially available digital multimeter (impedance 10 MΩ/DCV minimum)

IGNITION COIL PRIMARY PEAK VOLTAGE

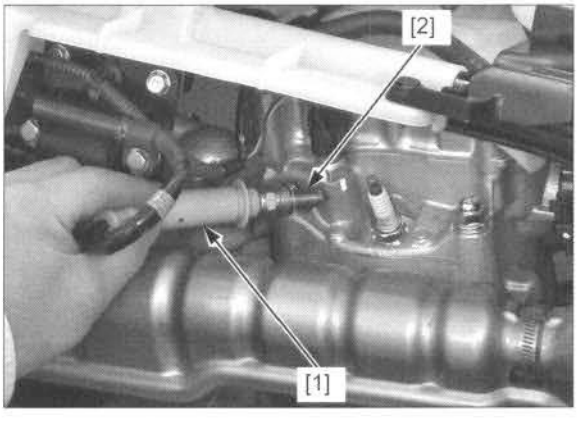
NOTE:

- Check all system connections before this inspection. Poor connected connectors can cause incorrect readings.
- Check that the cylinder compression is normal and the spark plug is installed correctly in the cylinder head.

Remove the left fuel tank side cover (page 2-5).

Disconnect the spark plug cap [1] from the spark plug.

Connect a known good spark plug [2] 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 terminals.

Connection: Green/yellow (+) – Black/red (–)

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

Check the initial voltage at this time.

The battery voltage should be measured.

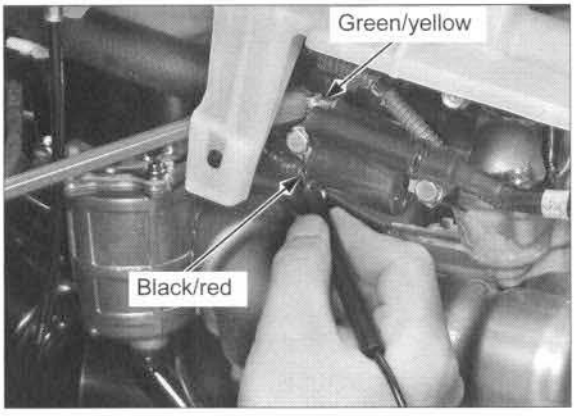
If the initial voltage cannot be measured, follow the checks in the troubleshooting chart (page 5-4).

Shift the transmission into neutral.

Crank the engine with the starter motor and read the ignition coil primary peak voltage.

PEAK VOLTAGE: 100 V minimum

If the peak voltage is lower than the standard value, follow the checks described in the troubleshooting chart (page 5-4).



CKP SENSOR PEAK VOLTAGE

NOTE:

- Check that the cylinder compression is normal and the spark plug is installed correctly in the cylinder head.

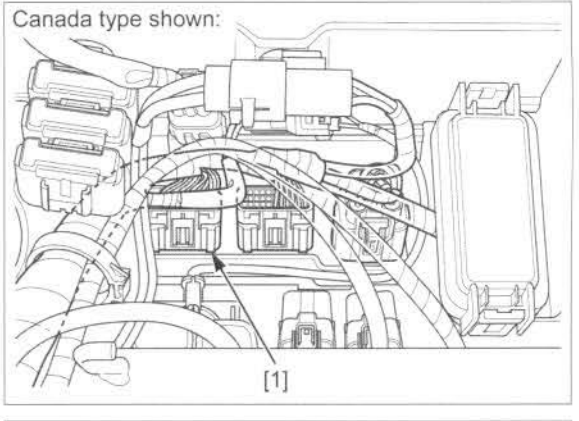
Remove the rear fender cover (page 2-9).

Seal the PCM/ECM connector with tape to prevent dirt and oil from entering the connector after disconnecting it.

Turn the ignition switch OFF and disconnect the PCM/ECM 33P (Gray) connector [1].

NOTE:

- When reconnecting the PCM/ECM connector, check that there is no dirt and oil in the connector.



Connect the peak voltage tester or adaptor [1] probes to the wire harness side PCM/ECM 33P (Gray) connector [2] terminals

Connection:
B23 (Blue/yellow) (+) – B12 (Green/white) (–)

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

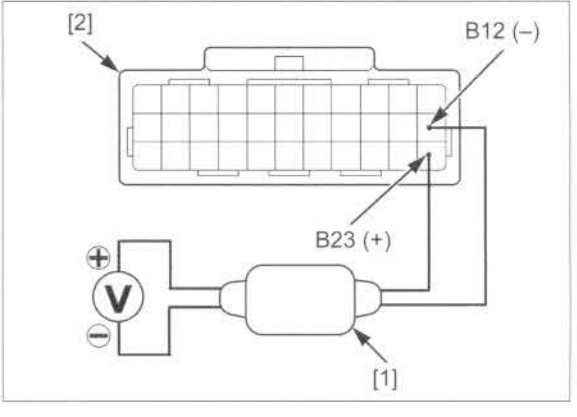
Shift the transmission into neutral.

Turn the ignition switch ON.

Crank the engine with the starter motor and measure the CKP sensor peak voltage.

PEAK VOLTAGE: 0.7 V minimum

If the voltage measured at the PCM/ECM connector is abnormal, measure the peak voltage at the alternator connector.



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

Turn the ignition switch OFF and disconnect the alternator 5P (Natural) connector [1].

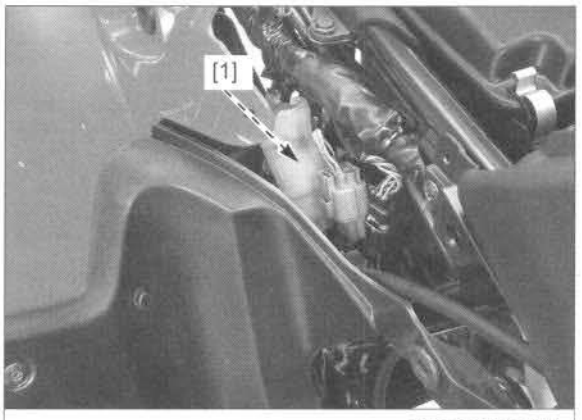
Connect the peak voltage tester or adaptor [2] probes to the alternator side connector terminals.

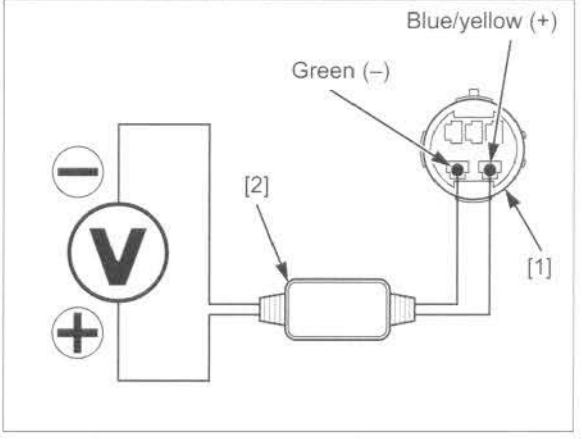
Connection: Blue/yellow (+) – Green (–)

In the same manner as at the PCM/ECM connector, measure the peak voltage and compare it to the voltage measured at the PCM/ECM connector.

- If the peak voltage measured at the PCM/ECM 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 5-4).

If the CKP sensor is faulty, replace the alternator stator/ CKP sensor assembly (page 13-6).





IGNITION COIL

REMOVAL/INSTALLATION

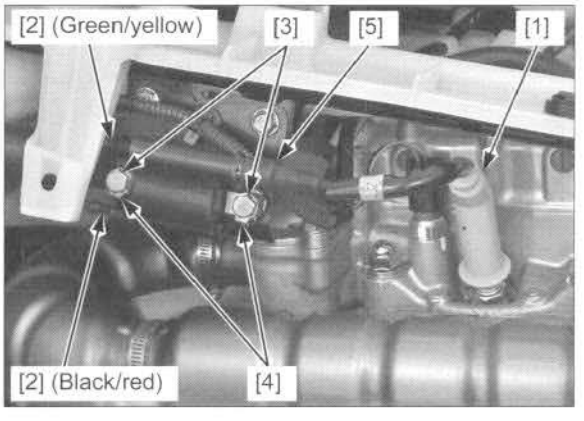
Remove the left fuel tank side cover (page 2-5).

Disconnect the spark plug cap [1] from the spark plug.

Disconnect the ignition coil primary wire connectors [2].

Remove the bolts [3], spacers [4] and ignition coil [5].

Installation is in the reverse order of removal.



IGNITION TIMING

NOTE:

- Before you performing this inspection, check the engine idle speed (page 3-15).

Remove the following:

- right mudguard (page 2-6)
- left fuel tank side cover (page 2-5)

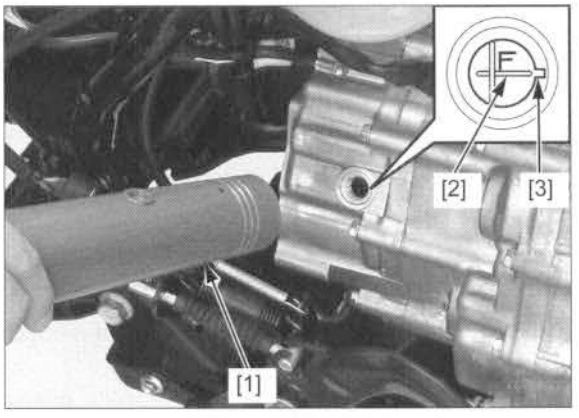
Start the engine and warm it up to operating temperature.

Stop the engine and remove the timing hole cap from the rear crankcase cover.

Connect the timing light [1] and tachometer.

Start the engine, let it idle and check the ignition timing.

The ignition timing is correct if the "F" mark [2] on the flywheel aligns with the index notch [3] on the rear crankcase cover at idle.

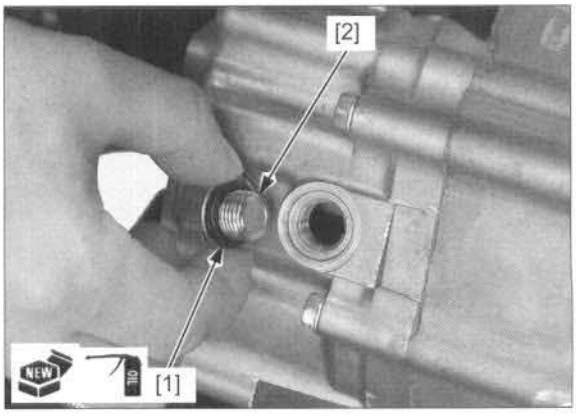


Coat a new O-ring [1] with engine oil and install it onto the timing hole cap [2].

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

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

Install the removed parts in the reverse order of removal.



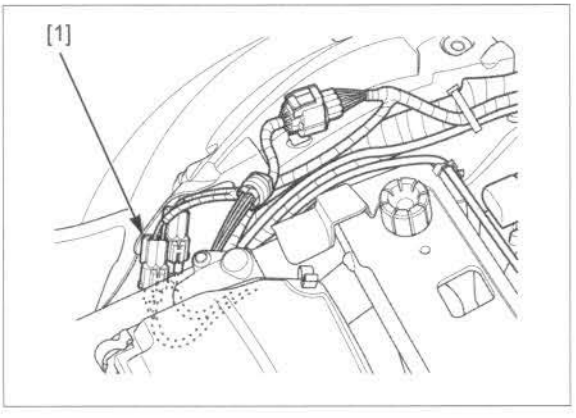
CONDENSER (Canada type)

REMOVAL/INSTALLATION

Remove the seat (page 2-4).

Disconnect the battery negative (–) cable (page 21-8).

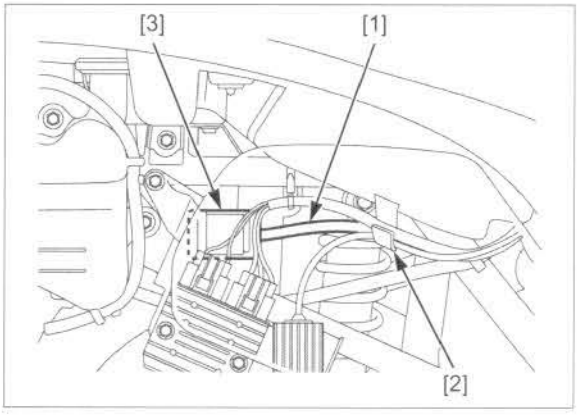
Disconnect the condenser 2P (Natural) connector [1].



Release the condenser wire [1] from the wire guide [2] of the rear fender.

Remove the condenser [3].

Installation is in the reverse order of removal.



INSPECTION

NOTE:

- Perform this inspection using a fully charged battery.

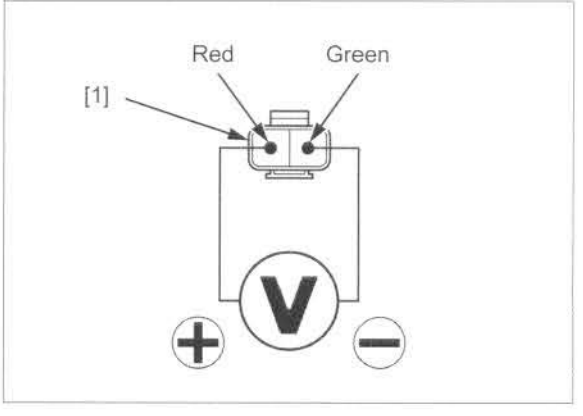
Disconnect the condenser 2P (Natural) connector [1] (page 5-8).

Connect the battery negative (–) cable (page 21-8).

Measure the voltage between the wire harness side condenser 2P (Natural) connector terminals.

Connection: Red (+) – Green (–)

Standard: Battery voltage at all time

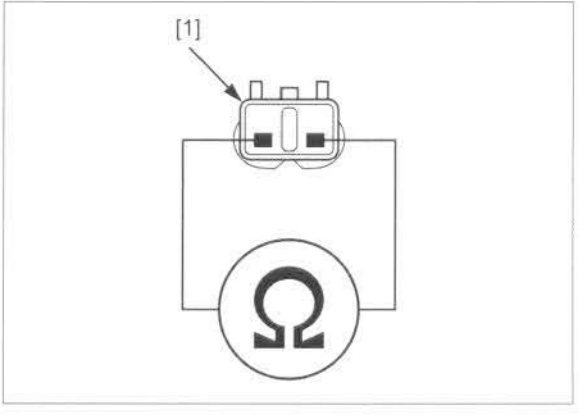


If there is no voltage, check the following:

- FM/FPM: main fuse (30A), FE/FPE: main fuse 1 (30A) and/or related circuits
- open circuit in the Red or Green wires
- rectifier and/or related circuits (page 5-10)

If there is voltage, check the condenser as following:

1. Disconnect the battery negative (–) cable (page 21-8) and connect the condenser 2P (Natural) connector [1].
2. Connect the battery negative (–) cable for a few seconds and charge the condenser.
3. Disconnect the battery negative (–) cable and discharge the condenser.
4. Disconnect the condenser 2P (Natural) connector and check the resistance between the condenser side connector terminals.



Select the kΩ range of the tester.

The condenser is normal if the resistance comes near 0Ω once and eventually becomes ∞.

If the resistance stays at 0Ω or does not change, replace the condenser.

NOTE:

- If the inspection is interrupted, connect the condenser 2P (Natural) connector and restart the procedure from the step 1.

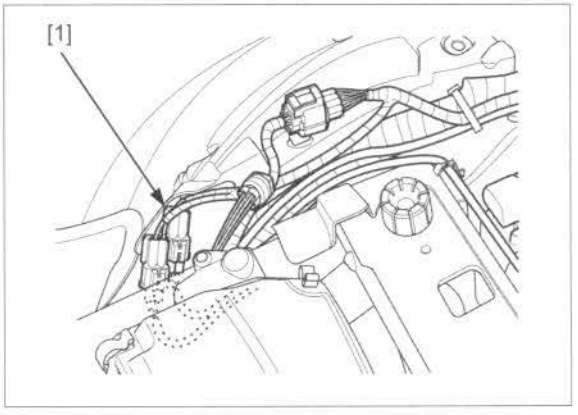
RECTIFIER (Canada type)

REMOVAL/INSTALLATION

Remove the seat (page 2-4).

Disconnect the battery negative (–) cable (page 21-8).

Disconnect the rectifier 2P (Black) connector [1].

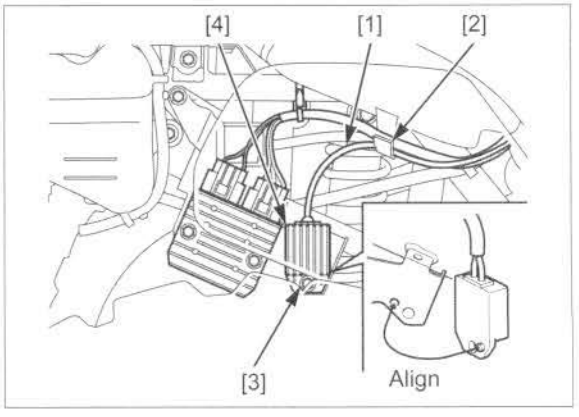


Release the rectifier wire [1] from the wire guide [2] of the rear fender.

Remove the mounting bolt [3] and rectifier [4].

Install the rectifier by aligning its boss with the hole of the frame.

Install the removed parts in the reverse order of removal.



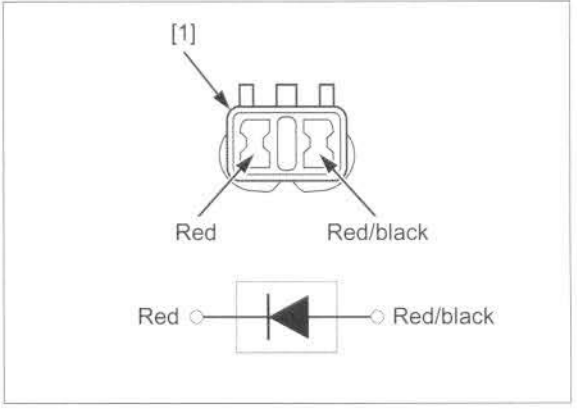
INSPECTION

Remove the rectifier [1] (page 5-10).

Check for continuity between the rectifier side 2P (Black) connector terminals.

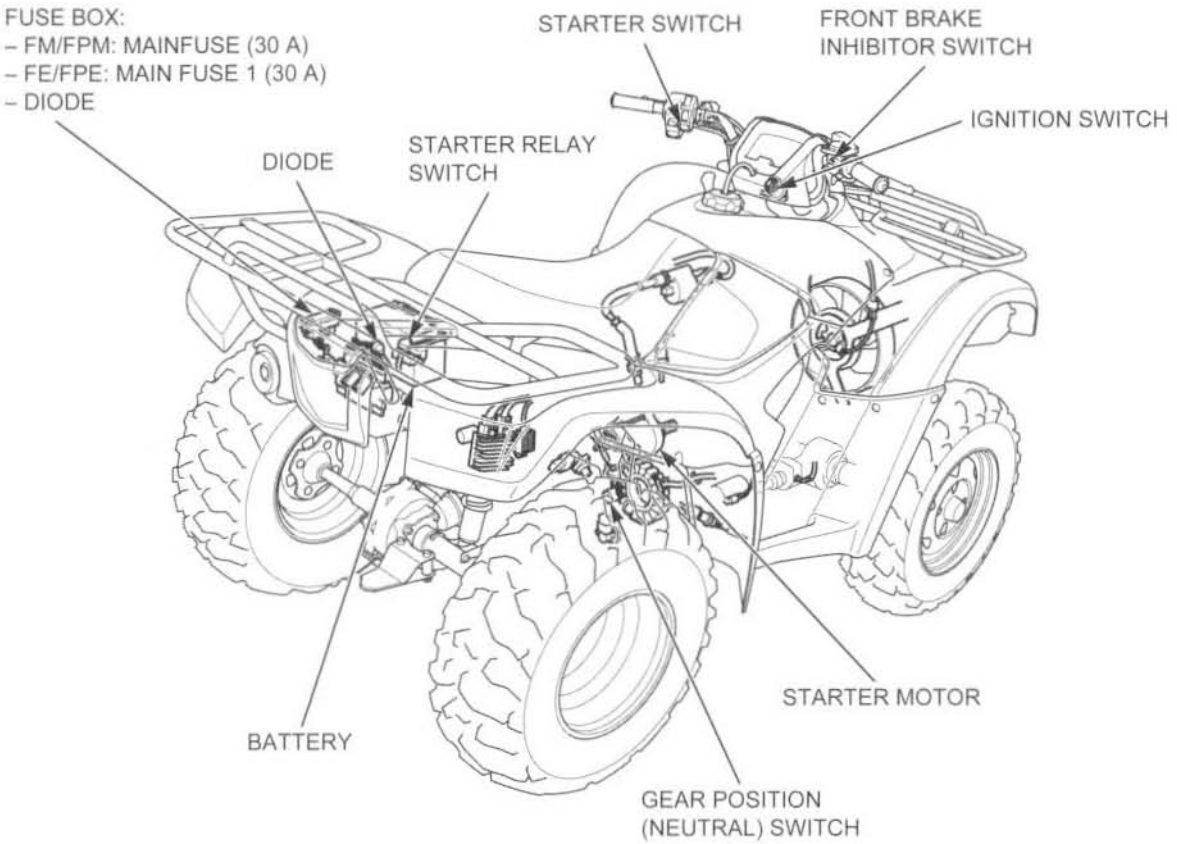
When there is continuity, a small resistance value will register.

If there is continuity in one direction, the rectifier is normal.

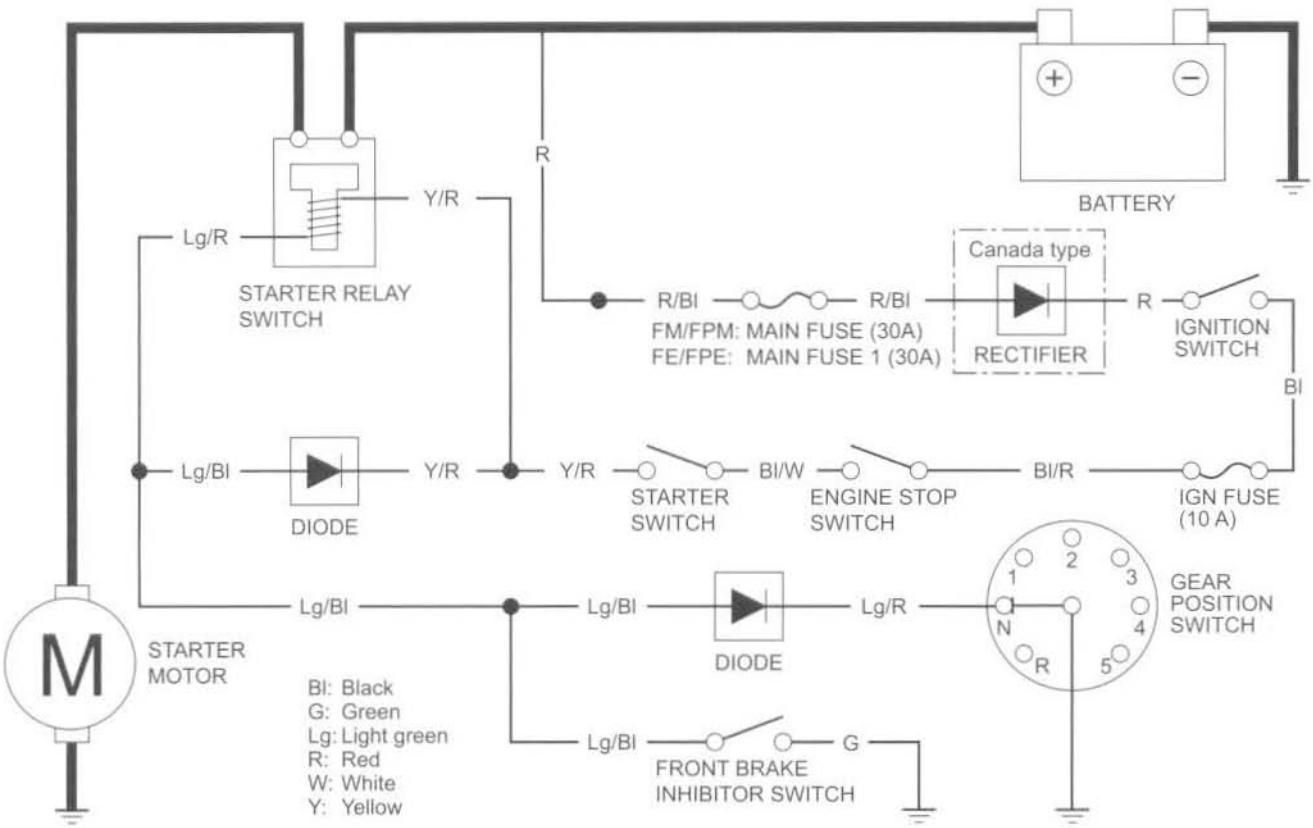


6. ELECTRIC STARTER

COMPONENT LOCATION



SYSTEM DIAGRAM



SERVICE INFORMATION

GENERAL

NOTICE

- *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.*

- 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 6-4).
- A weak battery may be unable to turn the starter motor quickly enough, or supply adequate ignition current.
- Refor to each section for the following components information.
  - Starter clutch (page 13-11)
  - Ignition switch (page 22-11)
  - Engine stop switch and starter switch (page 22-11)
  - Front brake inhibitor switch (page 22-12)
  - Gear position switch (page 22-14)

SPECIFICATIONS

Unit: mm (in)

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

TORQUE VALUES

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Starter motor case bolt	2	5	4.9 (0.5, 3.6)	
Negative brush set screw	1	5	3.7 (0.4, 2.7)	

TROUBLESHOOTING

NOTE:

- The starter motor can be operated when the transmission is in neutral or when the transmission is in gear 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 "⊠".

Starter motor does not turn

1. **Fuse Inspection**

   Check for blown FM/FPM: main fuse (30A), FE/FPE: main fuse 1 (30A) 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 or replace the battery (page 21-8).

3. **Starter Relay Switch Operation Inspection**

   Check the operation of the starter relay switch (page 6-8).

   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. (Do not use a thin wire because a large amount of current flows)

   Does the starter motor turn?

   YES – • Loose or poorly connected battery cable or starter motor cable.
   • Faulty starter relay switch (page 6-9).

   NO – Faulty starter motor (page 6-6).

5. **Relay Coil Ground Line Inspection**

   Turn the ignition switch OFF.
   Check the ground line of the starter relay switch (page 6-9).

   Is the ground line normal?

   YES – GO TO STEP 6.

   NO – • Faulty gear position switch (page 22-14).
   • Faulty diode (page 6-10).
   • Faulty front brake inhibitor switch (page 22-12).
   • Loose or poor contact of the related connector.
   • Open circuit in the wire harness.

6. **Relay Coil Power Input Line Inspection**

   Check the power input line of the starter relay switch (page 6-9).

   Is the power input line normal?

   YES – GO TO STEP 7.

   NO – • Faulty ignition switch (page 22-11).
   • Faulty engine stop switch (page 22-11).
   • Faulty starter switch (page 22-11).
   • Faulty rectifier (Canada type) (page 5-10).
   • Loose or poor contact of the related connector.
   • Open circuit in the wire harness.

7. **Starter Relay Switch Inspection**

   Check the function of the starter relay switch (page 6-9).

   Does the starter relay switch function properly?

   NO – Faulty starter relay switch.

   YES – Loose or poor contact of the starter relay switch connector.

Starter motor turns engine slowly
- Low battery voltage
- Poorly connected battery cables
- Poorly connected starter motor cable
- Poorly connected ground cable
- Faulty starter motor

Starter motor turns, but engine does not turn
- Starter motor is running backwards
  - Case assembled improperly
  - Terminals connected improperly
- Faulty starter clutch
- Damaged or faulty starter reduction gear

Starter relay switch clicks, but engine does not turn over
- Crankshaft does not turn due to engine problems

STARTER MOTOR

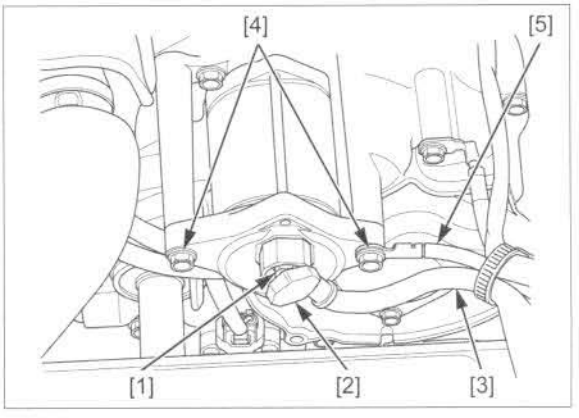
REMOVAL/INSTALLATION

Remove the intake air duct (page 7-22).

Disconnect the battery negative (–) cable (page 21-8).

Remove the following:

- terminal nut [1] (open the rubber cap [2])
- starter motor cable [3]
- two mounting bolts [4] and ground cable [5]



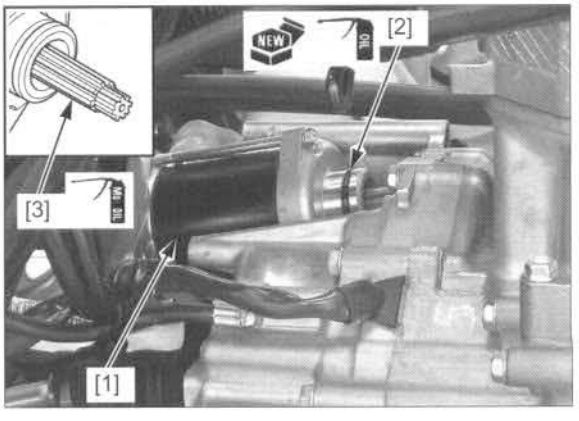
Remove the starter motor [1] from the rear crankcase cover.

Remove the O-ring [2] from the starter motor.

Coat a new O-ring with engine oil and install it into the starter motor groove.

Apply molybdenum oil solution to the starter motor shaft splines [3].

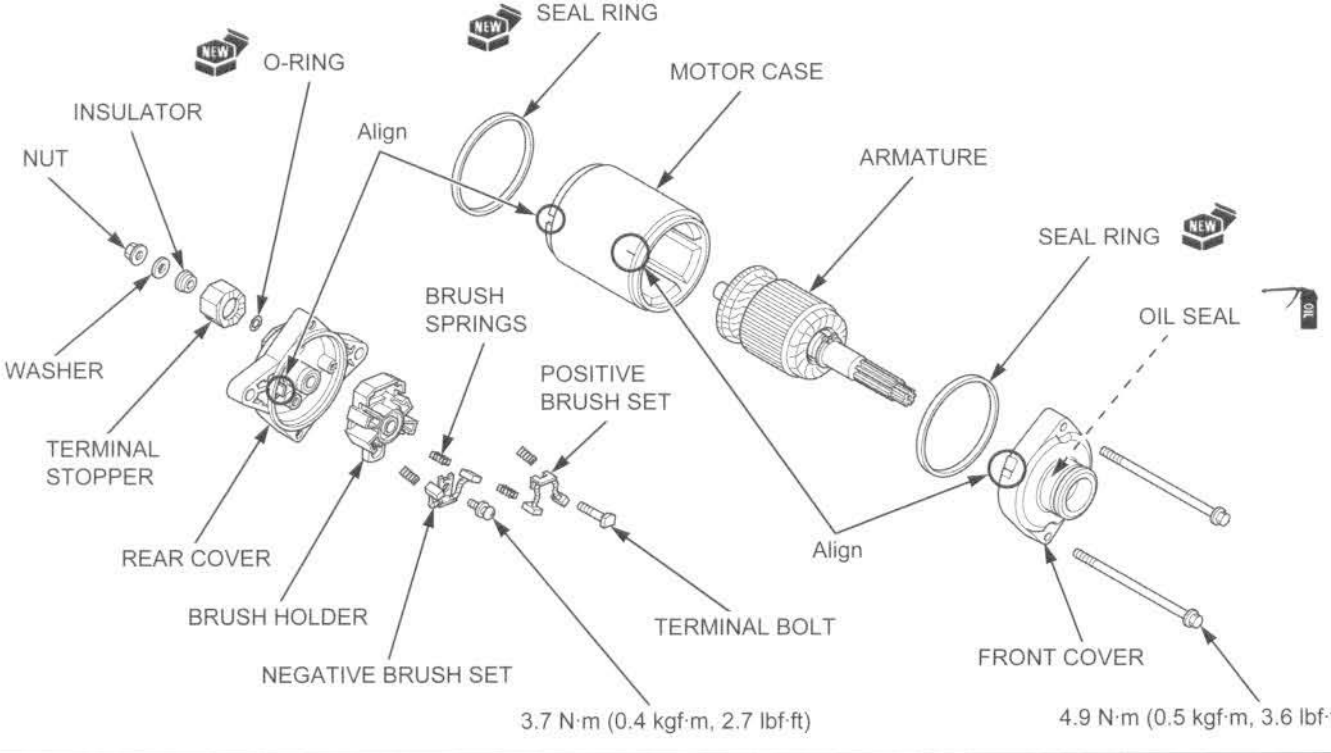
Install the removed parts in the reverse order of removal.



DISASSEMBLY/ASSEMBLY

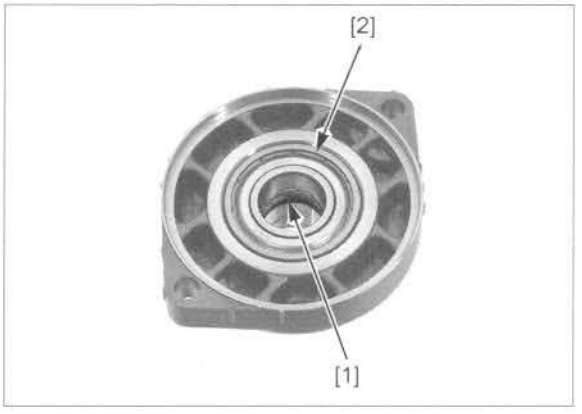
NOTICE

The armature coil may be damaged if the magnet in the motor case pulls the armature against the case.



INSPECTION

Check the oil seal [1] and ball bearing [2] in the front cover for wear or damage.



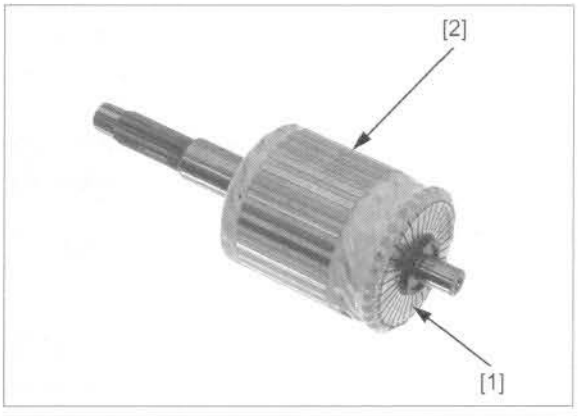
Check the commutator bars [1] for damage or abnormal wear.

Check the commutator bars of the armature [2] for discoloration.

Clean any metal debris from between commutator bars.

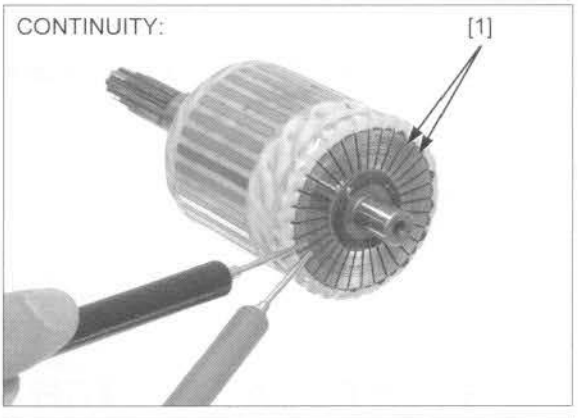
NOTE:

- Do not use emery or sand paper on the commutator.



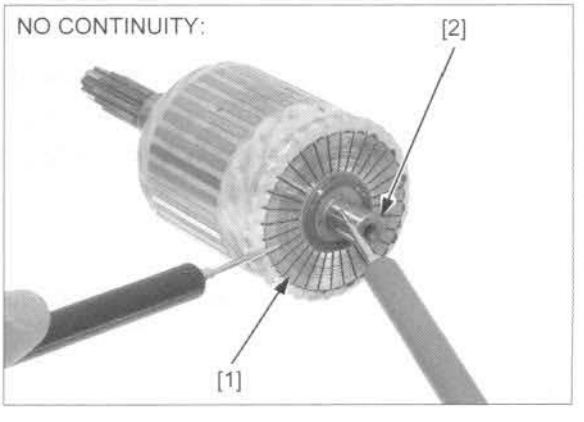
Check for continuity between pairs of commutator bars [1].

There should be continuity.



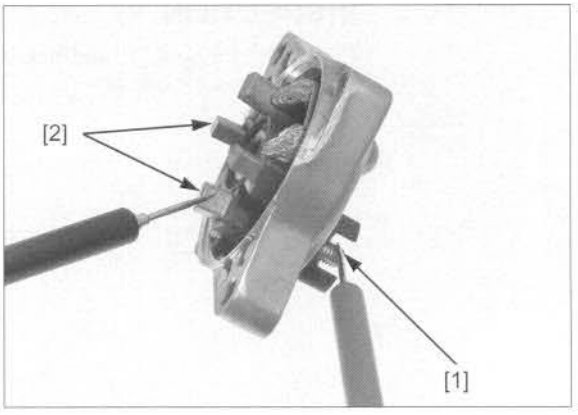
Check for continuity between each commutator bar [1] and the armature shaft [2].

There should be no continuity.



Check for continuity between the starter motor cable terminal [1] and positive brushes [2].

There should be continuity.



Check for continuity between the positive brushes [1] and the rear cover [2].

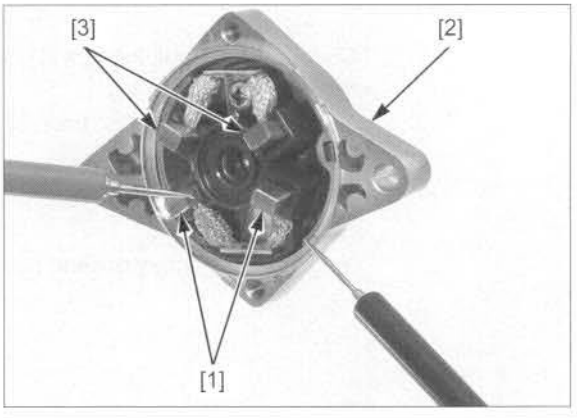
There should be no continuity.

Check for continuity between the negative brushes [3] and the rear cover.

There should be continuity.

Check for continuity between the positive and negative brushes.

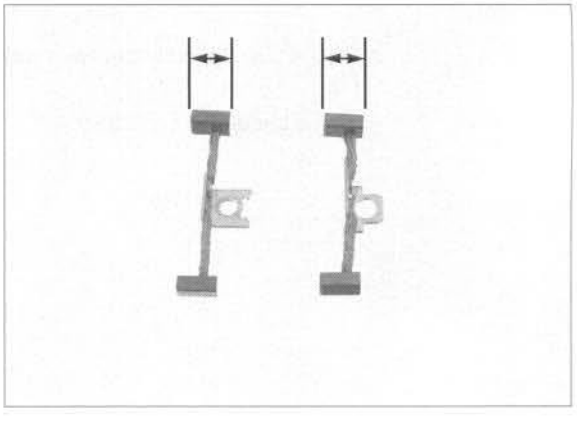
There should be no continuity.



Remove the brushes from the brush holder (page 6-6).

Measure the brush length.

SERVICE LIMIT: 6.5 mm (0.26 in)



STARTER RELAY SWITCH

OPERATION INSPECTION

Remove the rear fender cover (page 2-9).

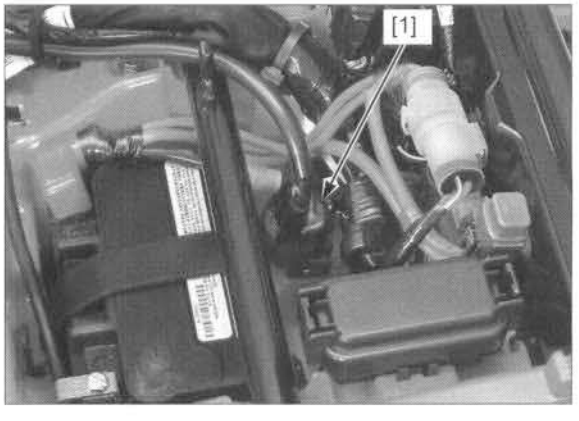
Shift the transmission into neutral.

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

Push the starter switch.

The relay coil is normal if the starter relay switch [1] clicks.

If you don't hear the switch "CLICK", inspect the relay switch using the procedure below.



CIRCUIT INSPECTION

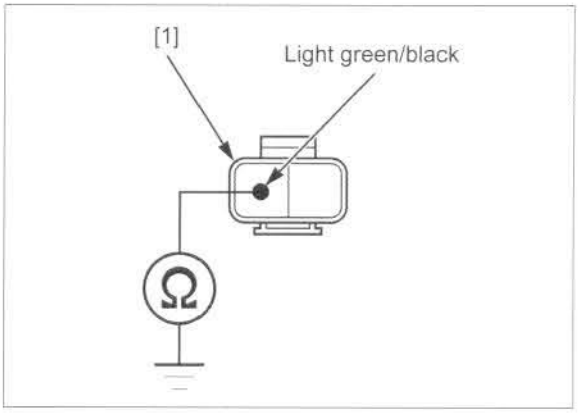
Ground Line:

Disconnect the starter relay switch 2P (Green) connector (page 6-9).

Check for continuity between the wire harness side starter relay switch 2P (Green) connector [1] terminal and ground.

Connection: Light green/black – Ground

There should be continuity when the transmission is in neutral or when the transmission is in gear and the front brake lever is squeezed.



Power Input Line:

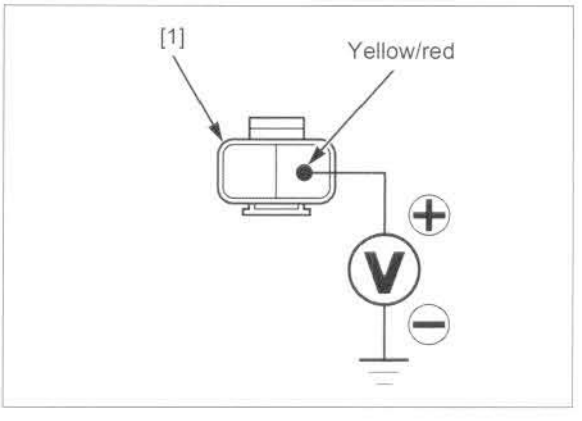
Disconnect the starter relay switch 2P (Green) connector (page 6-9).

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

Measure the voltage between the wire harness side starter relay switch 2P (Green) connector [1] terminal and ground.

Connection: Yellow/red (+) – Ground (–)

There should be battery voltage only when the starter switch is pushed.



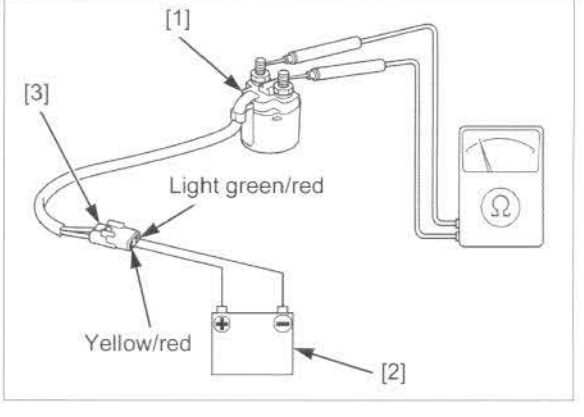
CONTINUITY INSPECTION

Remove the starter relay switch [1] (page 6-9).

Connect the fully charged 12 V [2] battery to the starter relay switch 2P (Green) connector [3] terminals.

Connection: Battery (+) terminal – Yellow/red
Battery (–) terminal – Light green/red

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



REMOVAL/INSTALLATION

Disconnect the battery negative (–) cable (page 21-8).

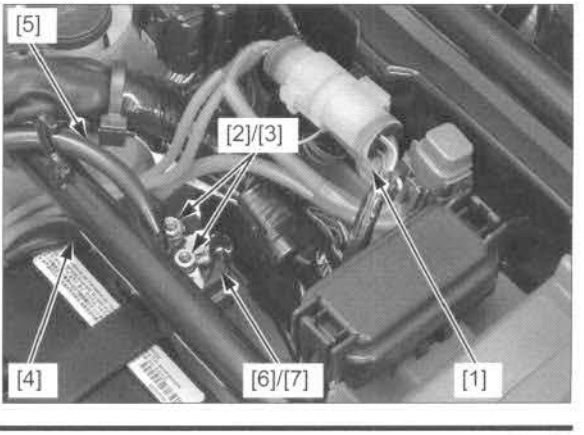
Disconnect the starter relay switch 2P (Green) connector [1].

Remove the terminal nuts [2], spring washers [3], battery positive (+) cable [4] and starter motor cable [5].

Remove the starter relay switch [6] from the rear fender with the shock rubber [7].

Remove the starter relay switch from the shock rubber.

Installation is in the reverse order of removal.



DIODE

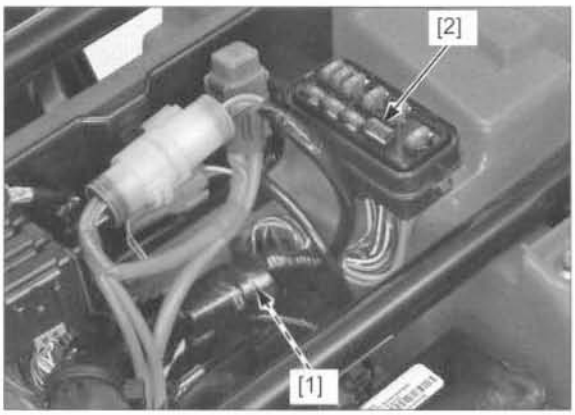
REMOVAL/INSTALLATION

Remove the rear fender cover (page 2-9).

Remove the diode [1] from the wire harness.

Remove the fuse box cover and the diode [2] from the fuse box.

Installation is in the reverse order of removal.



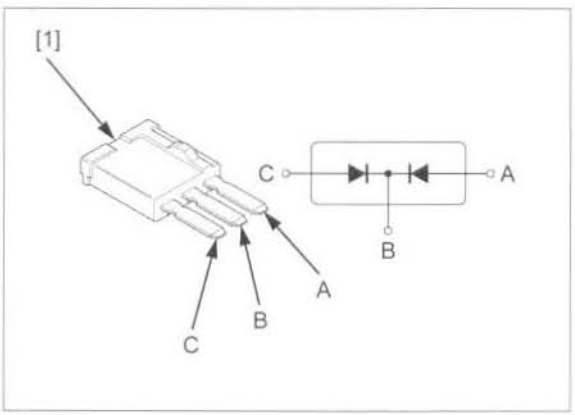
INSPECTION

Remove the diode [1] (page 6-10).

Check for continuity between the diode terminals.

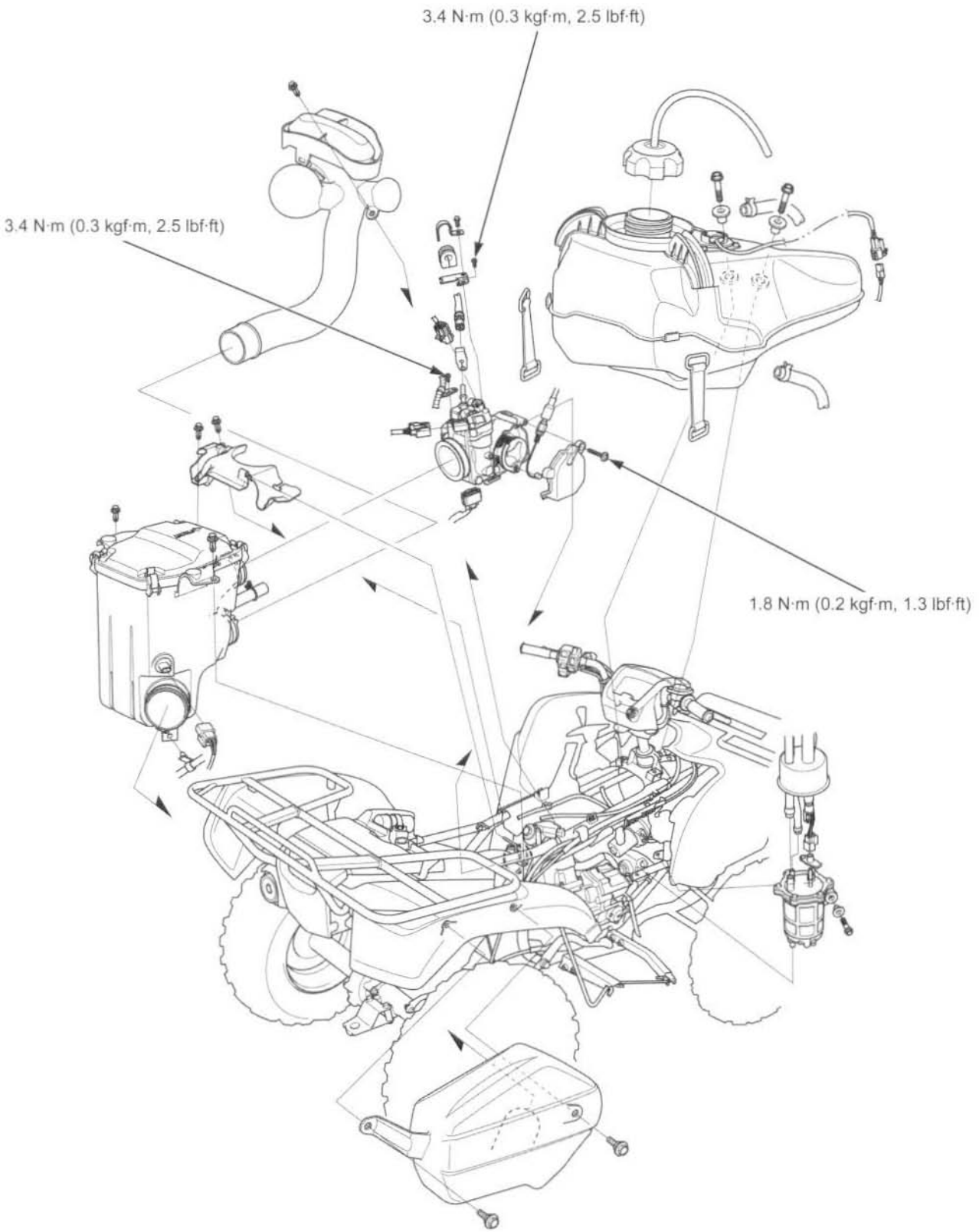
When there is continuity, a small resistance value will register.

If there is continuity in one direction, the diode is normal.



7. FUEL SYSTEM

SYSTEM COMPONENTS



SERVICE INFORMATION

GENERAL

- This section covers service of the mechanical system of the PGM-FI system and the fuel supply system. For electrical system service of the PGM-FI system, see PGM-FI System section (page 4-2).
- Before disconnecting the fuel feed hose, relieve pressure from the system (page 7-6).
- 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 screws and nut of the throttle body. Loosening or tightening them can cause throttle body malfunction.
- Tighten the yellow painted screws of the throttle body to the specified torque.
- When disassembling the fuel system parts, note the location of the O-rings. Replace them with new ones upon reassembly.
- When servicing the fuel feed hose, be careful not to bend or kink it.
- The engine stop switch line is connected to the PCM/ECM on this vehicle. Its signal permits the PCM/ECM to control the fuel pump, fuel injector and ignition coil.

SPECIFICATIONS

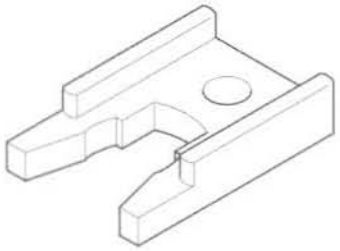
ITEM	SPECIFICATIONS
Throttle body identification number	GQ3RA
Idle speed	1,400 ± 100 rpm
Throttle lever freeplay	3 – 8 mm (0.1 – 0.3 in)
Fuel pressure at idle	316 – 387 kPa (3.2 – 3.9 kgf/cm^2, 46 – 56 psi)
Fuel pump flow (at 12 V)	125 cm^3 (4.2 US oz, 4.4 Imp oz) minimum/10 seconds

TORQUE VALUES

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Sub-fuel tank/fuel pump assembly bolt	6	6	8.8 (0.9, 6.5)	See page 7-20
Fuel joint mounting bolt	2	6	9.0 (0.9, 6.6)	
Wire harness clamp stay screw	1	5	3.4 (0.3, 2.5)	
Fuel feed hose clamp stay screw	1	5	3.4 (0.3, 2.5)	
Insulator band screw (Cylinder head side)	1	5	–	See page 7-25
Insulator band screw (Throttle body side)	1	5	–	See page 7-26
Throttle drum cover screw	1	4	1.8 (0.2, 1.3)	
IACV torx screw (T20)	2	4	2.1 (0.2, 1.5)	
Fuel injector mounting bolt	2	5	5.1 (0.5, 3.8)	

TOOLS

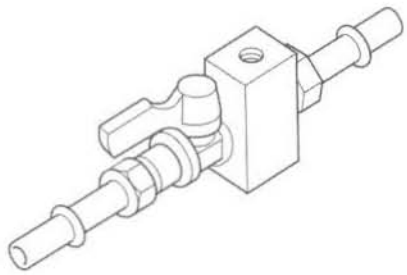
Fuel connector remover
070MF-HP50200



Fuel pressure gauge
07406-0040004

or 07406-004000B (U.S.A. only)

Pressure gauge manifold
07ZAJ-S5A0111

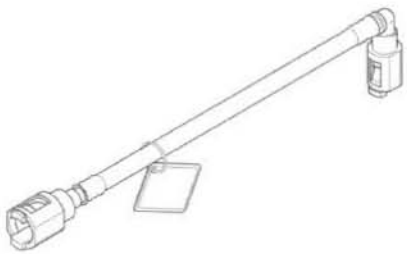


Not available in U.S.A.

Hose attachment, 9 mm/9 mm
07ZAJ-S5A0120

Not available in U.S.A.

Hose attachment, 6 mm/9 mm
07ZAJ-S5A0130

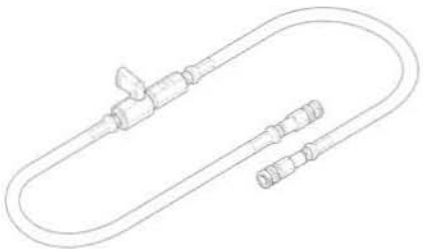


Not available in U.S.A.

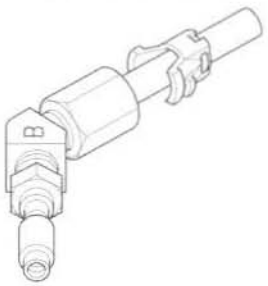
Attachment joint, 6 mm/9 mm
07ZAJ-S5A0150

Not available in U.S.A.

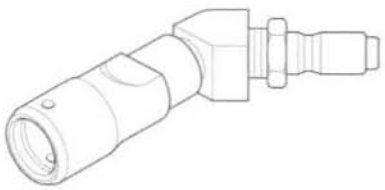
Pressure manifold hose
07AMJ-HW3A100 (U.S.A. only)



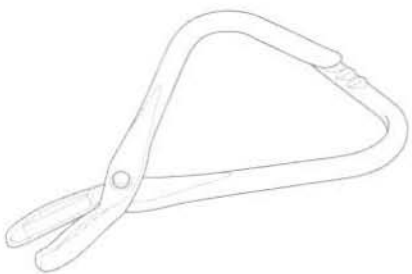
Adapter, male
07AAJ-S6MA200 (U.S.A. only)



Adapter, female
07AAJ-S6MA400 (U.S.A. only)



Hose clip
07614-0050101



or equivalent commercially available in U.S.A.

FUEL LINE TROUBLESHOOTING

- For the following symptoms, always follow the steps in the troubleshooting flow chart.
  - engine stall after warm up the engine
  - rough idling after warm up the engine
  - engine lacks power after warm up the engine
- Before starting the inspection, check for pinched or clogged fuel tank breather hose, fuel hose and fuel feed hose.

1. **Fuel pump operation inspection**

   Turn the ignition switch ON and engine stop switch "○".
   You should hear the fuel pump operation sound for a few seconds.

   Is there fuel pump operation sound?

   YES – GO TO STEP 3.

   NO – GO TO STEP 2.

2. **Fuel pump Input Voltage inspection**

   Inspect the fuel pump input voltage (page 7-13).

   Is there battery voltage?

   YES – Faulty fuel pump.

   NO – • open circuit in the Brown wire and/or Green wire.
   • blown IGN fuse (10 A).
   • faulty fuel pump relay (page 4-29) and its circuits.
   • open circuit in the engine stop switch line of the PCM/ECM (page 4-36).
   • open circuit in the power/ground lines of the PCM/ECM (page 4-35).

3. **Fuel flow inspection**

   Inspect the fuel flow (page 7-12).

   Is the fuel flow as specified?

   YES – GO TO STEP 5.

   NO – GO TO STEP 4.

4. **Fuel tank strainer screen inspection**

   Inspect the fuel tank strainer screen for clogged (page 7-21).

   Is the fuel tank strainer screen normal?

   YES – • Replace the fuel pump filter with a new one (page 7-14), and recheck the fuel flow (page 7-12). If the fuel flow is less than specified, replace the fuel pump (page 7-14).

   NO – Clean the strainer screen (page 7-21), and recheck the fuel flow (page 7-12).

5. **Fuel pressure inspection**

   Inspect the fuel pressure (page 7-11).

   Is the fuel pressure as specified?

   YES – • Inspect the ignition system (page 5-5).
   • Inspect the cylinder compression (page 10-7).

   NO – Replace the fuel pump with a new one (page 7-14), and recheck.

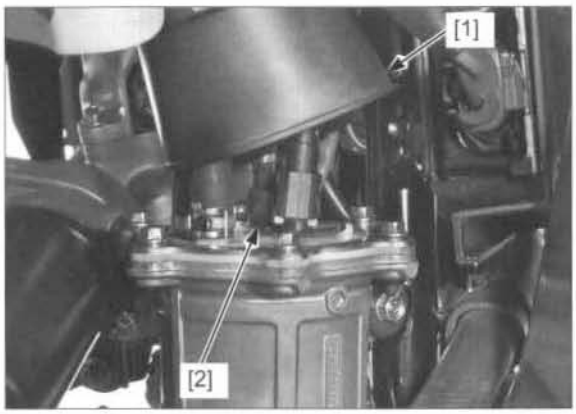
FUEL LINE INSPECTION

FUEL PRESSURE RELIEVING

NOTE:

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

1. Remove the side cover (page 2-4).
2. Turn the ignition switch OFF.
3. Pull the rubber boot [1] off the sub-fuel tank/fuel pump assembly and disconnect the fuel pump 2P (Black) connector [2].
4. Start the engine, and let it idle until the it stalls.
5. Turn the ignition switch OFF.
6. Disconnect the battery negative (–) cable (page 21-8).



QUICK CONNECT FITTING REMOVAL

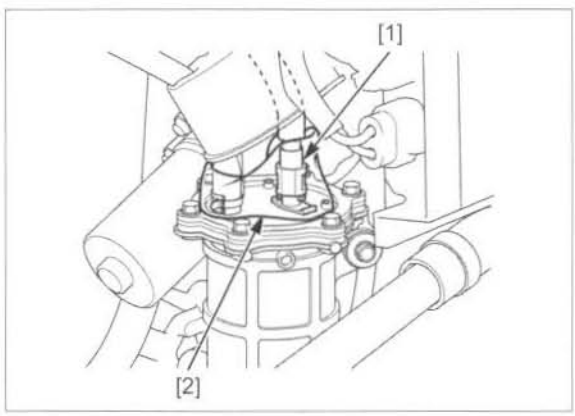
NOTE:

- Do not bend or twist the fuel feed hose.

FUEL PUMP SIDE

1. Relive the fuel pressure (page 7-6).
2. Check the fuel quick connect fitting [1] for dirt, and clean if necessary.

   Place a shop towel [2] over the quick connect fitting.



3. Pull and release the connector damper [1] from the retainer.
4. Hold the connector [2] with one hand and squeeze the retainer [3] tabs with the other hand to release them from the locking pawls [4].

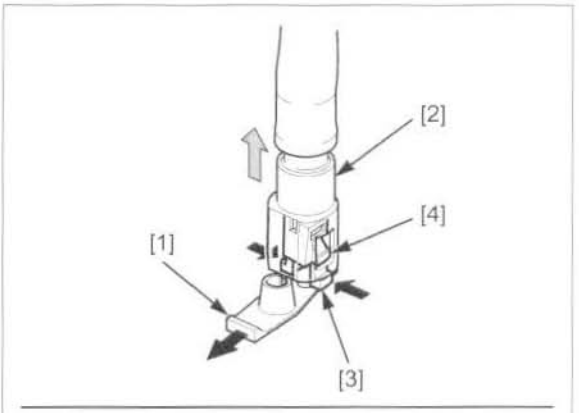
   If using the special tool:

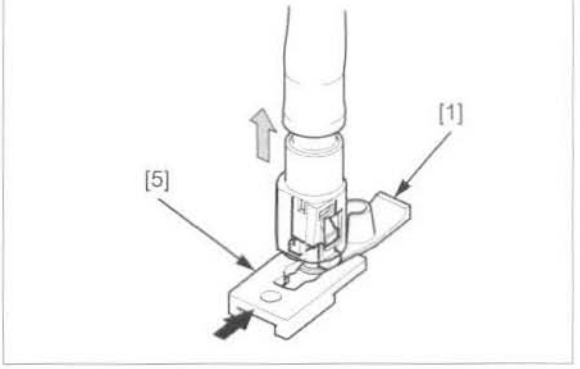
   Pull and release the connector damper [1] from the retainer as shown.

   Set the special tool to the retainer tabs and push and release them from the locking pawls.

   TOOL:
   [5] Fuel connector remover 070MF-HP50200

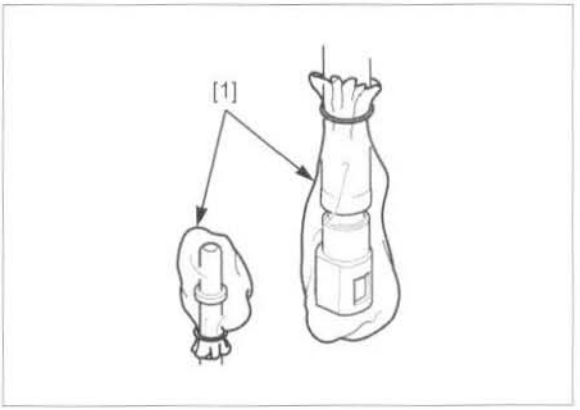
   Pull the connector off, then remove the retainer and connector damper from the pipe end.





NOTE:
- Absorb 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.
- Use the specified special tool only.
- If the connector does not move, keep the retainer tabs pressed down, and alternately pull and push the connector until it comes off easily.

5. To prevent damage and keep foreign matter out, cover the disconnected connector and pipe end with the plastic bags [1].

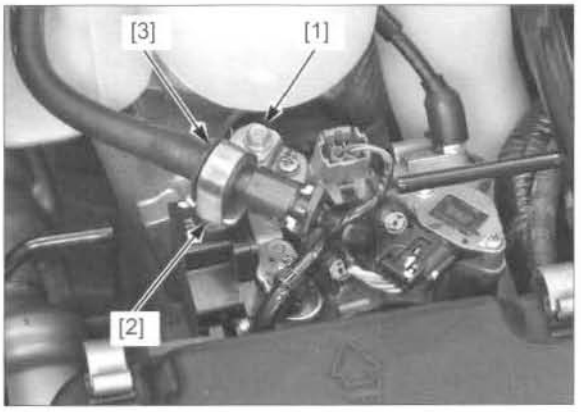


INJECTOR SIDE

1. Relive the fuel pressure (page 7-6).

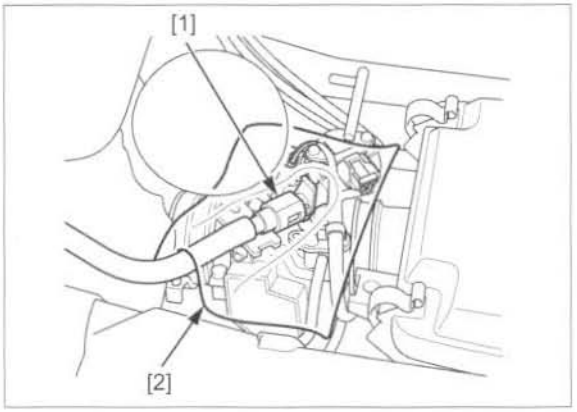
   Remove the throttle body cover (page 7-13).

   Remove the bolt [1], clamp [2] and setting rubber [3].



2. Check the fuel quick connect fitting [1] for dirt, and clean if necessary.

   Place a shop towel [2] over the quick connect fitting.



3. Pull and release the connector damper [1] from the retainer.
4. Hold the connector [2] with one hand and squeeze the retainer [3] tabs with the other hand to release them from the locking pawls [4].

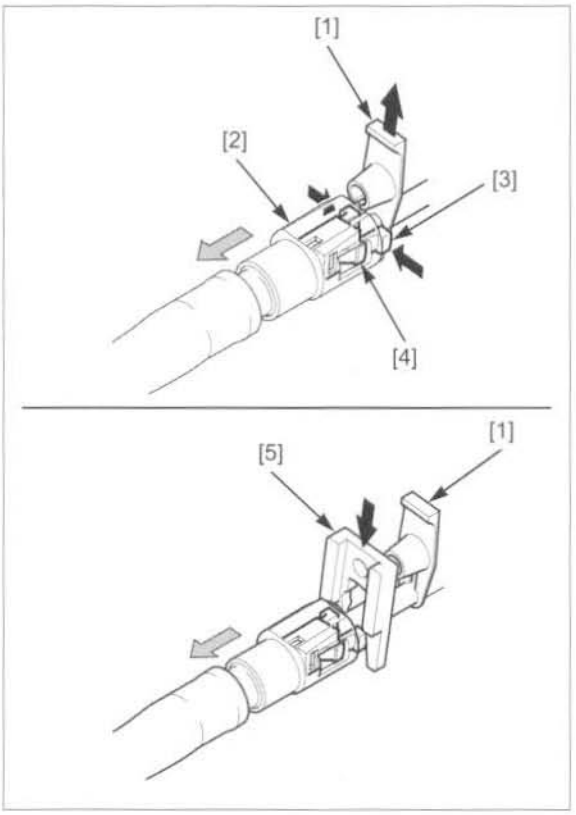
   If using the special tool:

   Pull and release the connector damper [1] from the retainer as shown.

   Set the special tool to the retainer tabs and push and release them from the locking pawls.

   TOOL:
   [5] Fuel connector remover 070MF-HP50200

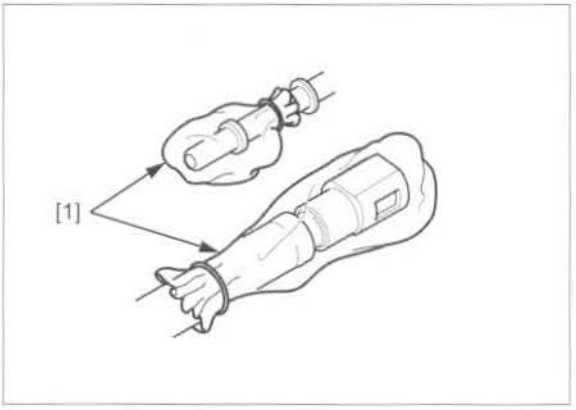
   Pull the connector off, then remove the retainer and connector damper from the pipe end.



NOTE:

- Absorb 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.
- Use the specified special tool only.
- If the connector does not move, keep the retainer tabs pressed down, and alternately pull and push the connector until it comes off easily.

5. To prevent damage and keep foreign matter out, cover the disconnected connector and pipe end with the plastic bags [1].



QUICK CONNECT FITTING INSTALLATION

NOTE:

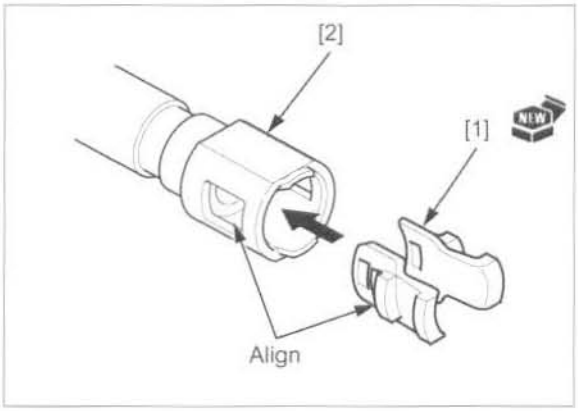
- Always replace the retainer and connector damper of the quick connect fitting when the fuel feed hose is disconnected.
- If any retainer needs replacing, use the same manufacturer's retainer as the ones being removed (The various manufactures feature different retainer specifications).
- Do not bend or twist fuel feed hose.

FUEL PUMP SIDE

1. Insert a new retainer [1] into the connector [2].

NOTE:

- Align the retainer locking pawls with the connector grooves.



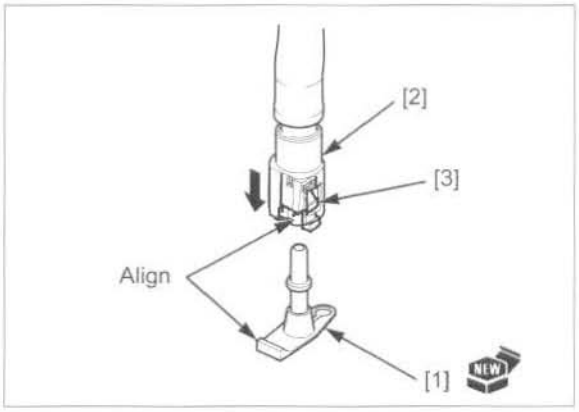
2. Set a new connector damper [1] to the pipe end as shown.

   Then press the quick connect fitting [2] onto the pipe until both locking pawls [3] lock with a "CLICK".

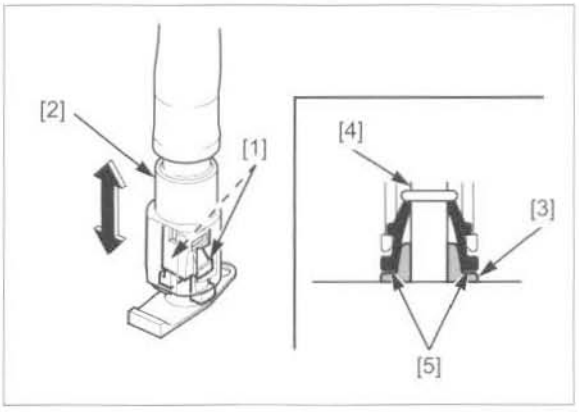
NOTE:

- Align the retainer groove with the connector damper tabs.

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



3. Make sure the connection is secure and that the locking pawls [1] are firmly locked into place; check visually and by pulling the connector [2].
4. Make sure the connector damper [3] is positioned correctly (between the pipe [4] and retainer tabs [5]).
5. Increase the fuel pressure and check that there is no leakage in fuel supply system (page 7-11).

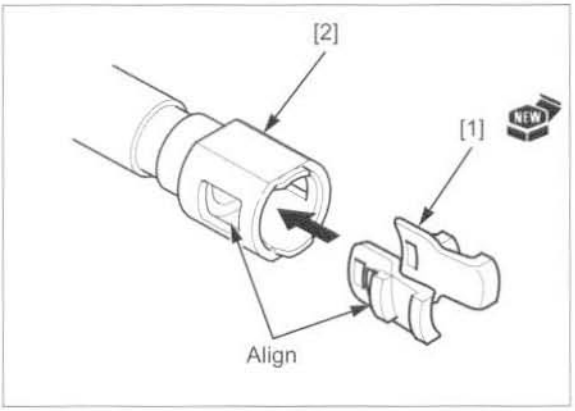


INJECTOR SIDE

1. Insert a new retainer [1] into the connector [2].

NOTE:

- Align the retainer locking pawls with the connector grooves.



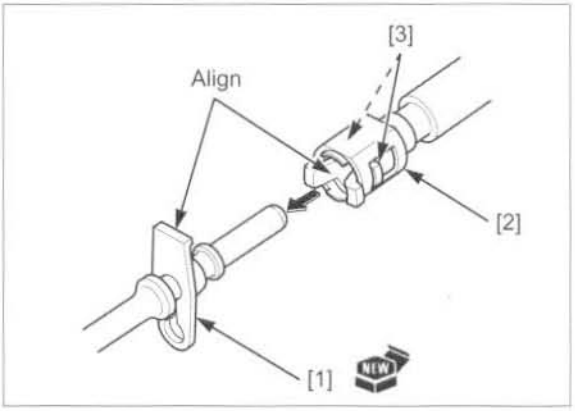
2. Set a new connector damper [1] to the injector joint as shown.

   Then press the quick connect fitting [2] onto the pipe until both locking pawls [3] lock with a "CLICK".

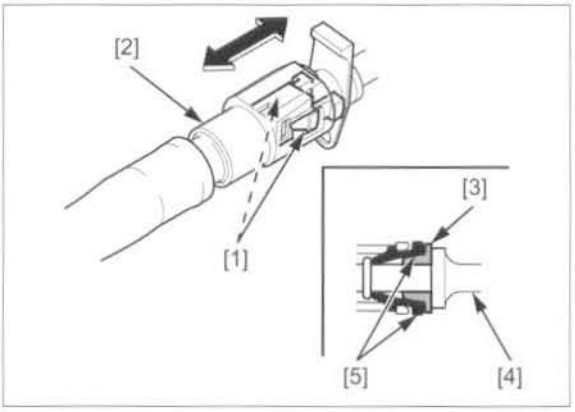
NOTE:

- Align the retainer groove with the connector damper tabs.

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



3. Make sure the connection is secure and that the locking pawls [1] are firmly locked into place; check visually and by pulling the connector [2].
4. Make sure the connector damper [3] is positioned correctly (between the pipe [4] and retainer tabs [5]).



5. Install the setting rubber [1] and clamp [2].

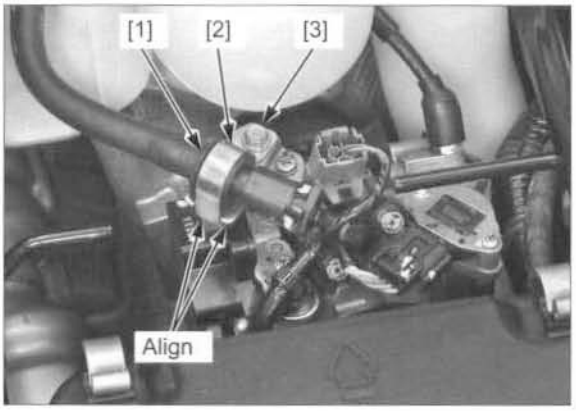
NOTE:

- Install the clamp by aligning its tab with the groove of the fuel feed hose clamp stay.

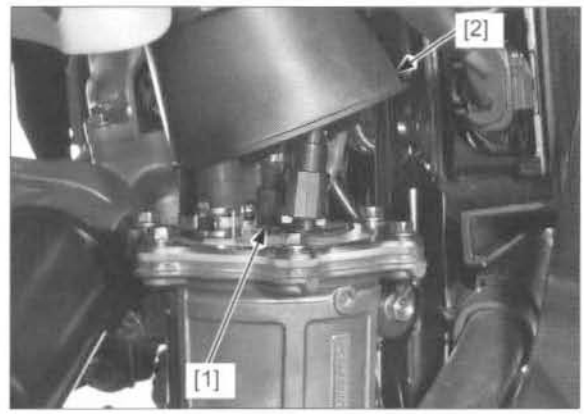
  Install and tighten the bolt [3] securely.

6. Increase the fuel pressure and check that there is no leakage in fuel supply system (page 7-11).

   Install the throttle body cover (page 7-13).



FUEL PRESSURE INCREASING



1. Connect the fuel pump 2P (Black) connector [1].
2. Connect the battery negative (–) cable (page 21-8).
3. Turn the ignition switch ON and engine stop switch "○".

NOTE:

- Do not start the engine.

4. The fuel pump will run for about 2 seconds, and fuel pressure will rise.

   Turn the ignition switch OFF.

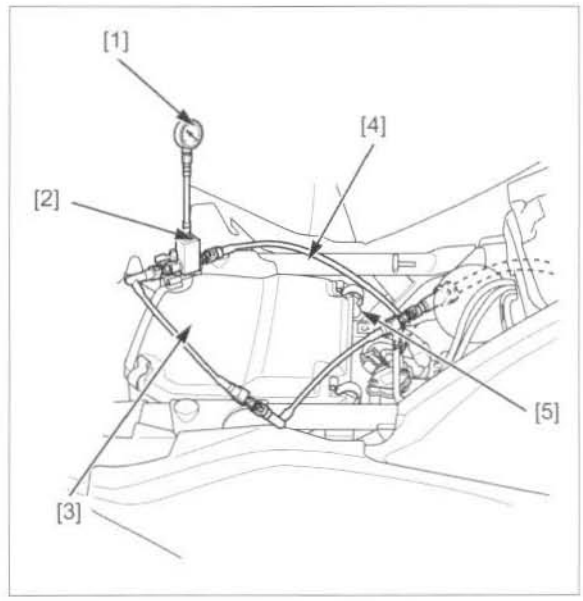
   Repeat this procedure 2 or 3 times, and check that there is no leakage in the fuel supply system.

5. Install the rubber boot [2] on the sub-fuel tank/fuel pump assembly properly.
6. Install the right side cover (page 2-4).

FUEL PRESSURE INSPECTION

Relieve the fuel pressure and disconnect the quick connect fitting from the fuel injector (page 7-7).

Attach the special tools between the fuel injector and fuel feed hose.



Except U.S.A. TOOLS:

[1] Fuel pressure gauge	**07406-0040004**
[2] Pressure gauge manifold	**07ZAJ-S5A0111**
[3] Hose attachment, 9 mm/9 mm	**07ZAJ-S5A0120**
[4] Hose attachment, 6 mm/9 mm	**07ZAJ-S5A0130**
[5] Attachment joint, 6 mm/9 mm	**07ZAJ-S5A0150**

U.S.A. TOOLS:

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

Connect the fuel pump 2P (Black) connector.
Temporarily connect the battery negative (–) cable (page 21-8).
Start the engine and let it idle.
Read the fuel pressure.

Standard:
316 – 387 kPa (3.2 – 3.9 kgf/cm², 46 – 56 psi)

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

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

- pinched or clogged fuel feed hose, fuel hose or fuel tank breather hose
- fuel flow (page 7-12)
- clogged fuel tank strainer screen (page 7-21)
- clogged fuel pump filter (page 7-14)
- fuel pump (page 7-13)

After inspection, relieve the fuel pressure (page 7-6).

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

Remove the special tools from the fuel injector and fuel feed hose.

Connect the quick connect fitting to the fuel injector (page 7-10).

FUEL FLOW INSPECTION

NOTE:

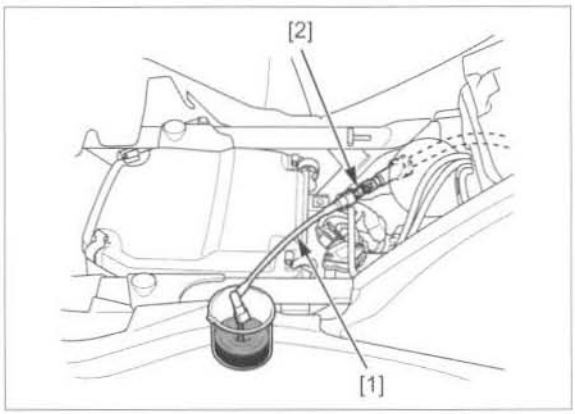
- Before starting the inspection, start the engine and let it idle for 30 minutes.

Relieve the fuel pressure and disconnect the quick connect fitting from the fuel injector (page 7-7).

Connect the special tools to the fuel feed hose.

Except U.S.A. TOOLS:
[1] Hose attachment, 6 mm/9 mm 07ZAJ-S5A0130
[2] Attachment joint, 6 mm/9 mm 07ZAJ-S5A0150

U.S.A. TOOLS:
Pressure manifold hose 07AMJ-HW3A100
Adapter, male 07AAJ-S6MA200
Fuel pressure gauge, 100 psi 07406-004000B
Note: The fuel pressure gauge must be installed for these tests.



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

Connect the fuel pump 2P (Black) connector.
Temporarily connect the battery negative (–) cable to the battery (page 21-8).

Turn the ignition switch ON and engine stop switch "○".
Measure the amount of fuel flow.

NOTE:

- The fuel pump operates for 2 seconds when the ignition switch is turned ON and engine stop switch "○". Repeat 5 times so that the total measuring time.

Amount of fuel flow:
125 cm³ (4.2 US oz, 4.4 Imp oz) minimum/ 10 seconds at 12 V

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

- pinched or clogged fuel feed hose, fuel hose or fuel tank breather hose
- clogged fuel tank strainer screen (page 7-21)
- clogged fuel pump filter (page 7-14)
- fuel pump (page 7-13)

Turn the ignition switch OFF.

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

Remove the special tools from the fuel feed hose.

Connect the quick connect fitting to the fuel injector (page 7-10).

THROTTLE BODY COVER REMOVAL/ INSTALLATION

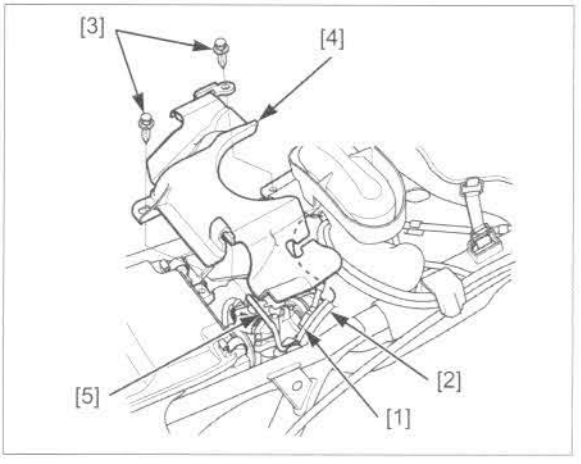
Remove the seat (page 2-4).

Release the following:

- rear final gear case breather hose [1]
- rear brake panel breather hose [2]

Remove the two trim clips [3] and the throttle body cover [4] from the seat retainer [5].

Installation is in the reverse order of removal.



SUB-FUEL TANK/FUEL PUMP

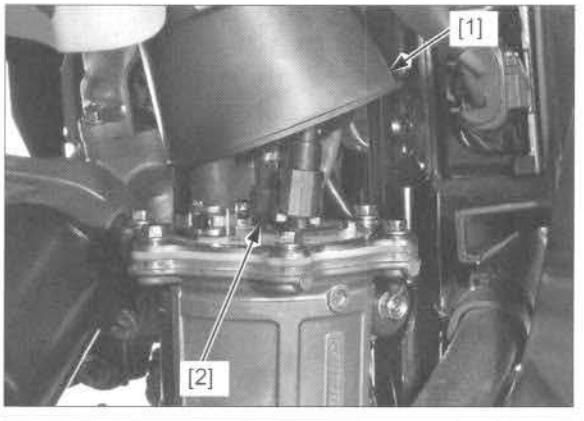
INSPECTION

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

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

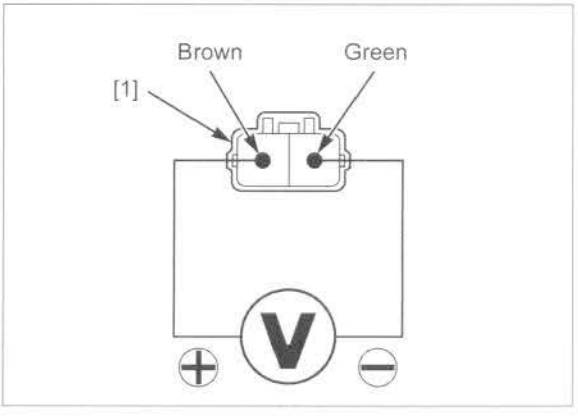
Turn the ignition switch OFF.

Pull the rubber boot [1] off the sub-fuel tank/fuel pump assembly and disconnect the fuel pump 2P (Black) connector [2].



Turn the ignition switch ON and engine stop switch "○", measure the voltage between the terminals of the wire harness side 2P (Black) connector [1].

Connection: Brown (+) – Green (–)



There should be battery voltage for a few seconds after the ignition switch turned ON and engine stop switch "○".

If there is battery voltage, replace the fuel pump unit.

If there is no voltage, check the following:

- open circuit in the Brown or Green wires
- IGN fuse (10 A)
- fuel pump relay (page 4-29) and its circuits
- engine stop switch line of the PCM/ECM (page 4-36)
- power/ground lines of the PCM/ECM (page 4-35)

REMOVAL/INSTALLATION

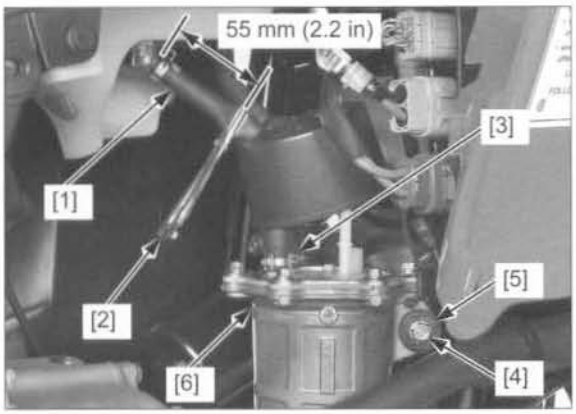
Remove the right mudguard (page 2-6).

Relieve the fuel pressure and disconnect the quick connect fitting from the sub-fuel tank/fuel pump assembly (page 7-6).

Clamp the fuel hose [1] at the point from the upper hose end is 55 mm (2.2 in), using the hose clip.

TOOL:

[2] Hose clip	**07614-0050101 or equivalent commercially available in U.S.A.**



Wipe off spilled out gasoline.

Disconnect the fuel hose and fuel vapor return hose [3].

Remove the bolt [4], collar [5] and the sub-fuel tank/fuel pump assembly [6] from the frame.

Install the sub-fuel tank/fuel pump assembly [1] onto the frame by aligning the bosses with the mounting grommets.

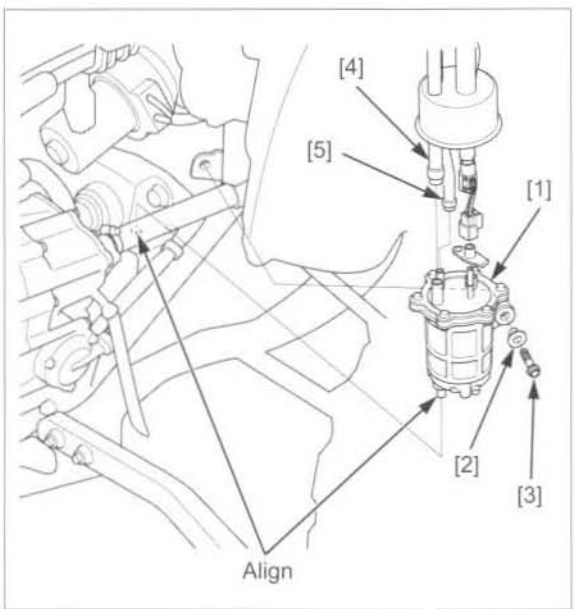
Install the collar [2] and bolt [3], then tighten the bolt securely.

Connect the fuel hose [4] and fuel vapor return hose [5] to the sub-fuel tank/fuel pump assembly.

Remove the hose clip from the fuel hose.

Connect the quick connect fitting to the sub-fuel tank/fuel pump assembly (page 7-9).

Install the removed parts in the reverse order of removal.



DISASSEMBLY

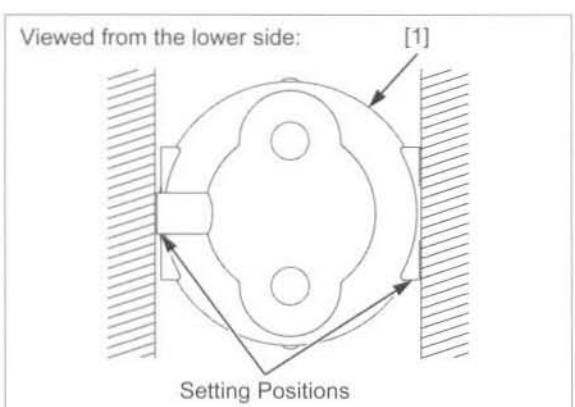
NOTE:

- To prevent dirt and debris from entering the fuel pump, always clean it before disassembly.
- Clean the inside of the fuel pump case, fuel pump unit and fuel pump filter with clean gasoline. Never use commercially available carburetor cleaners.
- Always replace all O-rings with new ones when the fuel pump has been disassembled.
- Be careful not to damage the fuel pump unit wire.

Drain the fuel from the fuel pump case [1] and store it in an approved container.

Do not over-tighten the vise.

Set the fuel pump case in a vise with soft jaws as shown.



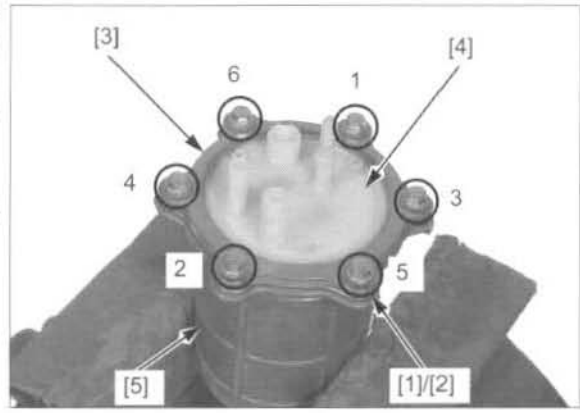
Be careful not to drop the fuel pump unit.

Loosen the fuel pump assembly bolts [1] in the sequence as shown, and remove the bolts and spring washers [2].

Remove the cover plate [3] and fuel pump unit [4] from the fuel pump case [5].

NOTE:

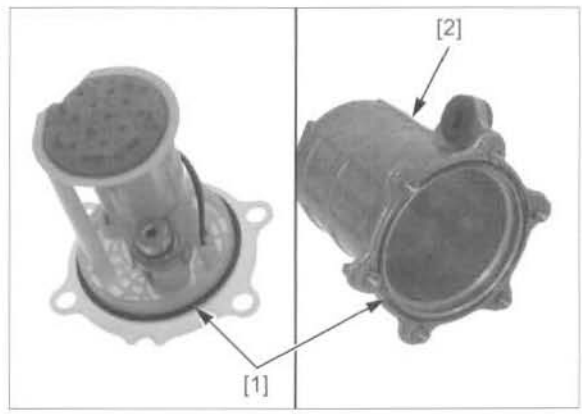
- Be careful not to damage the fuel pump unit and its wires.



Do not reuse the O-rings.

Remove the O-rings [1].

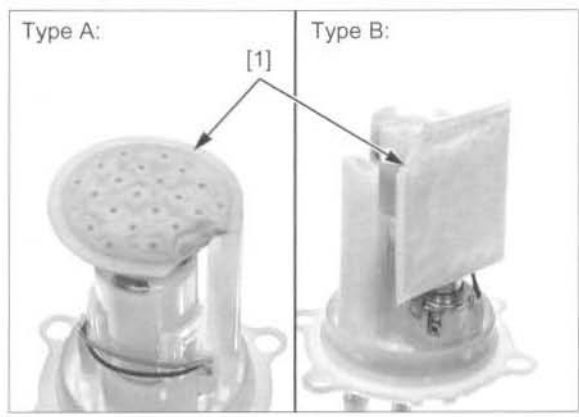
Clean the inside of the fuel pump case [2] with clean gasoline.



Visually inspect the fuel pump filter [1] for dirt, debris or any clogging, and replace it if necessary.

Fuel pump filter replacement:

- Type A (page 7-15)
- Type B (page 7-17)

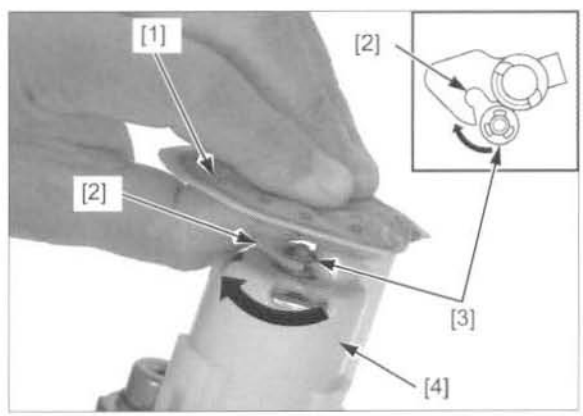


FUEL PUMP FILTER REPLACEMENT (TYPE A)

Be careful not to damage the fuel pump filter and fuel pump unit [4].

Hold the bottom of the fuel pump filter [1] as shown.

Disengage the fuel pump filter hook [2] from the fuel pump unit boss [3] by turning the fuel pump filter clockwise, then remove the fuel pump filter.

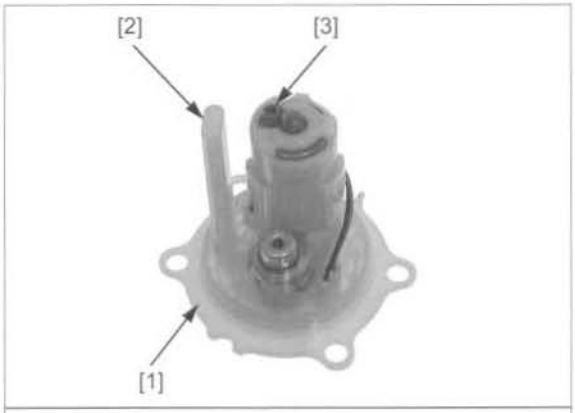


Before installing a new fuel pump filter, check that there is no dirt or dust on the fuel pump unit [1].

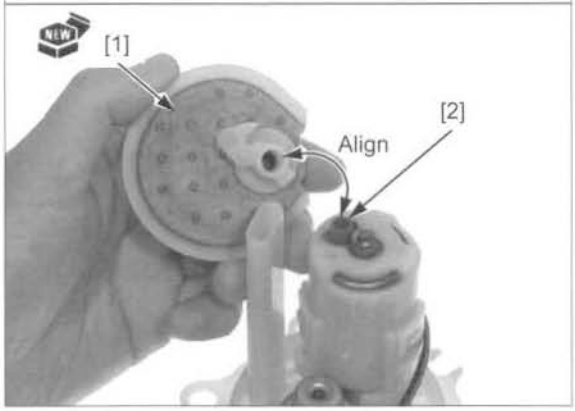
If necessary, clean the fuel pump unit with compressed air.

NOTE:

- Place a shop towel over the fuel pump unit to prevent dirt from entering the feed pipe [2] and suction port [3].
- Do not blow compressed air directly into the feed pipe or suction port.



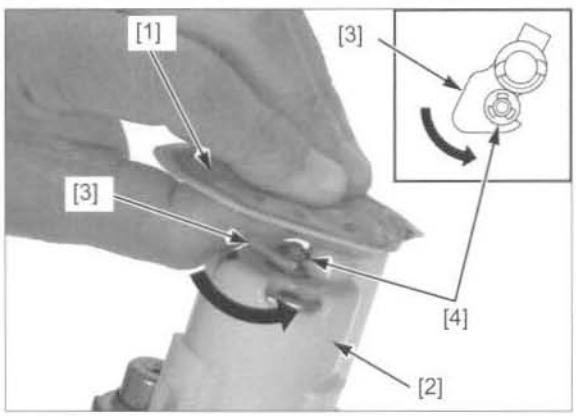
Install a new fuel pump filter [1] to the fuel pump unit while aligning the holes for the suction port [2].



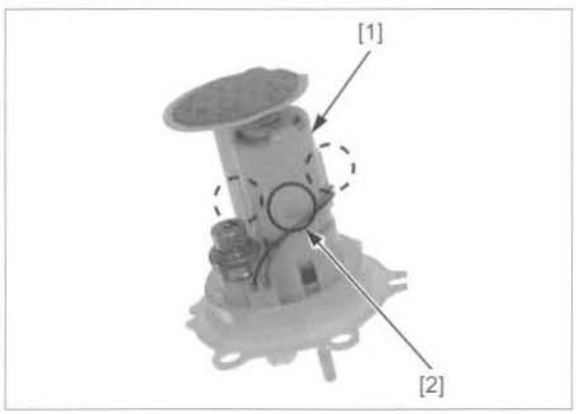
Be careful not to damage the fuel pump filter and fuel pump unit.

Hold the bottom of the fuel pump filter [1] as shown and push in until it is fully seated on the fuel pump unit holder [2].

Engage the fuel pump filter hook [3] to the fuel pump unit holder boss [4] by turning the fuel pump filter counterclockwise.



Make sure the fuel pump unit holder [1] securely connected and that the locking tabs [2] are firmly locked into place.



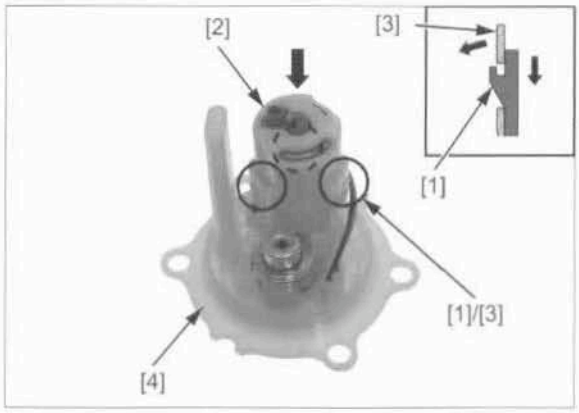
FUEL PUMP UNIT HOLDER REMOVAL (TYPE A)
(Only when Type A filter is replaced with Type B)

Remove the fuel pump filter (page 7-15).

Be careful not to damage the hooks and tabs.

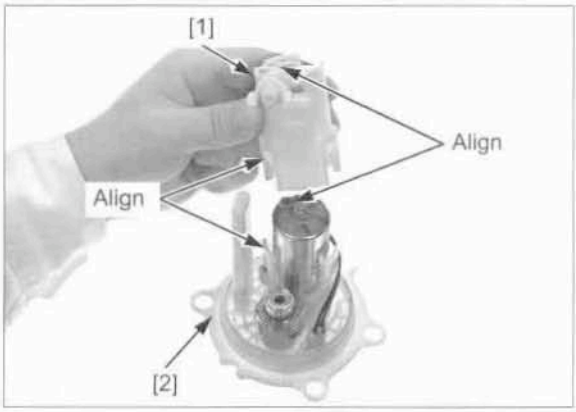
Release the locking tabs [1] of the fuel pump unit holder [2] from the grooves in the fuel unit base hooks [3] while pushing the holder against the unit base [4] and slightly spreading the unit base hooks.

Remove the fuel pump unit holder from the fuel pump base.



Be careful not to damage the fuel pump unit holder and fuel pump unit.

Install a new fuel pump unit holder [1] to the fuel pump unit [2] while aligning the holes for the suction port and three locking tabs with the grooves.



Make sure the fuel pump unit holder [1] securely connected and that the locking tabs [2] are firmly locked into place.

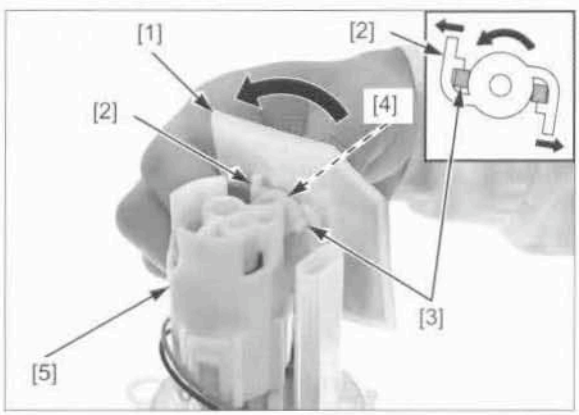
Install the fuel pump filter (page 7-17).

FUEL PUMP FILTER REPLACEMENT (TYPE B)

Be careful not to damage the fuel pump filter and fuel pump holder [5].

Hold the side surfaces of fuel pump filter [1] as shown.

Release and disengage the fuel pump filter hooks [2] from the fuel pump holder bosses [3] by turning the fuel pump filter in the direction as shown, then remove the fuel pump filter and O-ring [4].

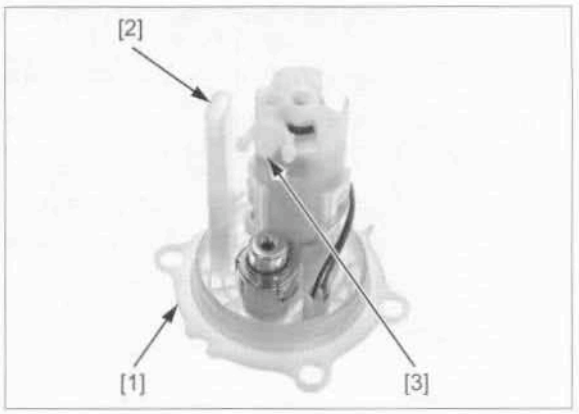


Before installing a new fuel pump filter, check that there is no dirt or dust on the fuel pump unit [1].

If necessary, clean the fuel pump unit with compressed air.

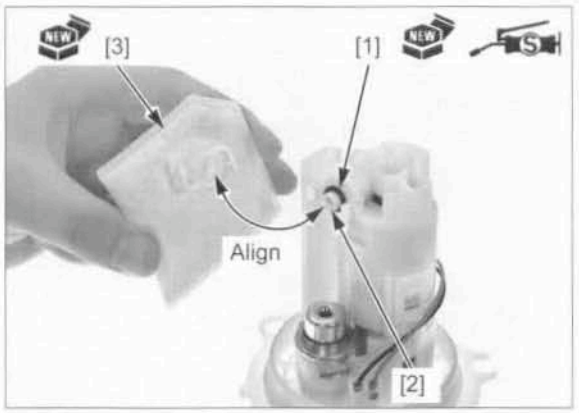
NOTE:

- Place a shop towel over the fuel pump unit to prevent dirt from entering the feed pipe [2] and suction port [3].
- Do not blow compressed air directly into the feed pipe or suction port.



Apply silicone grease to a new O-ring [1] and install it to the suction port [2] of the fuel pump unit holder.

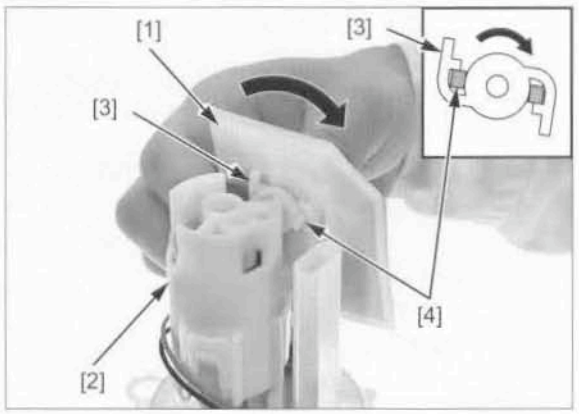
Install a new fuel pump filter [3] to the fuel pump unit holder while aligning the suction ports.



Be careful not to damage the fuel pump filter and fuel pump holder.

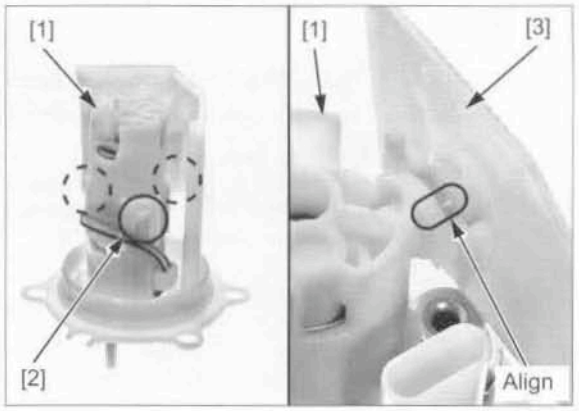
Hold the fuel pump filter [1] as shown and push in until it is fully seated on the fuel pump unit holder [2].

Engage the fuel pump filter hooks [3] to the fuel pump unit holder bosses [4] by turning the fuel pump filter in the direction as shown.



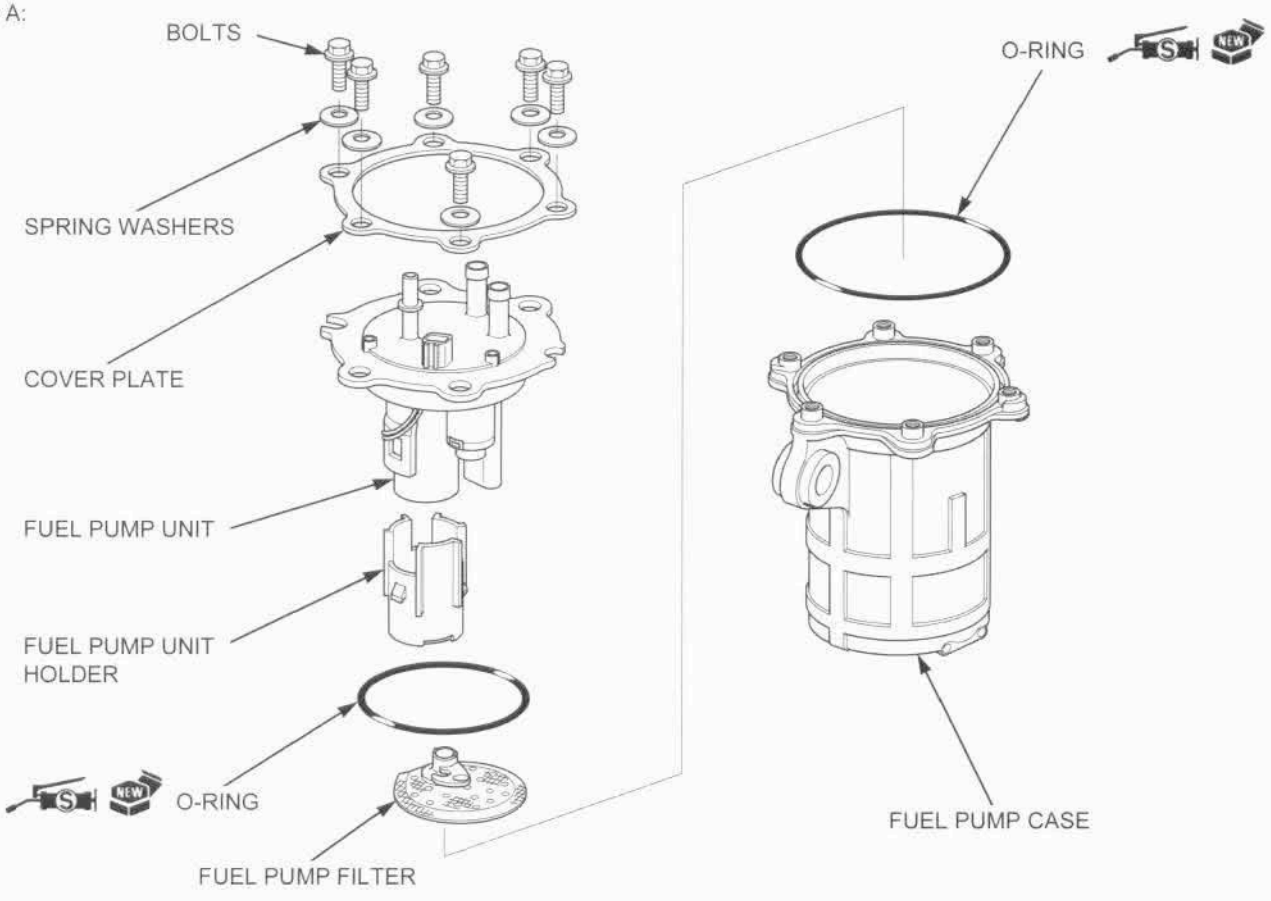
Make sure the fuel pump unit holder [1] securely connected and that the locking tabs [2] are firmly locked into place.

Make sure that the "△" marks of the fuel unit holder and fuel pump filter [3] are aligned.

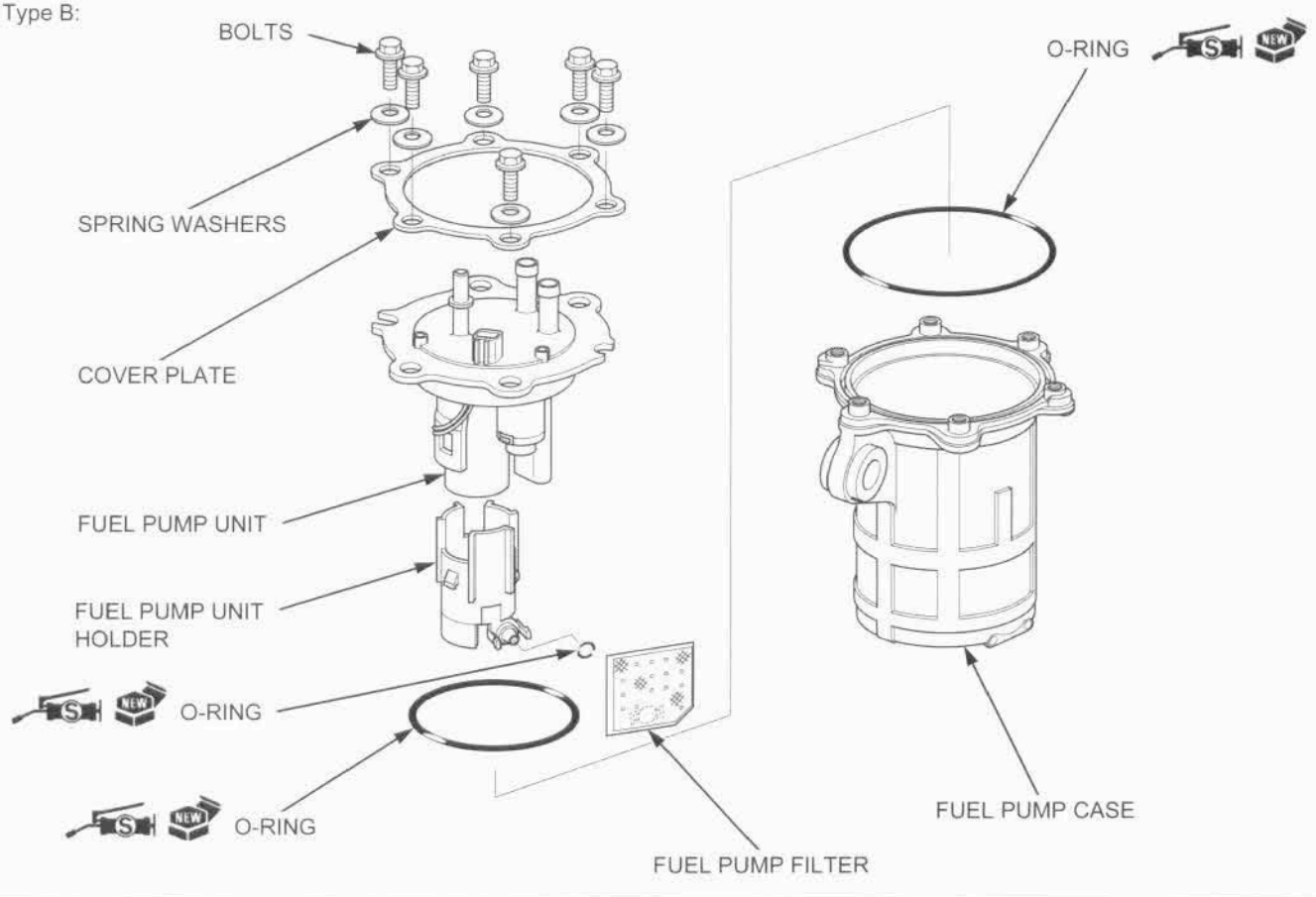


ASSEMBLY

Type A:



Type B:

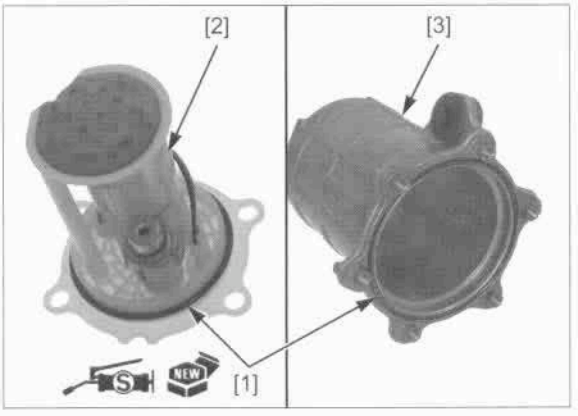


Apply silicone grease to new O-rings [1].

Do not get grease on the pump unit and housing except the O-ring seating areas.

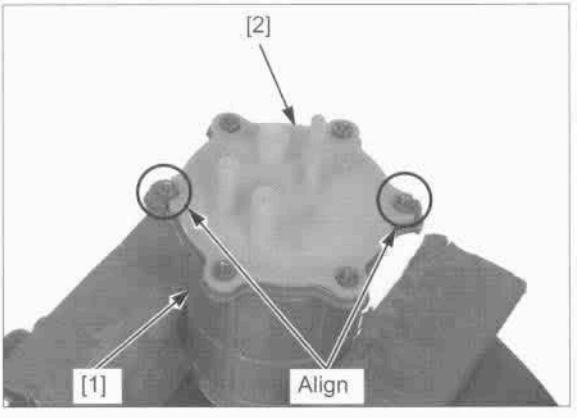
Install the O-rings onto the fuel pump unit [2] and into the fuel pump case [3] groove.

Wipe off any excess grease from the pump unit and housing.



Set the fuel pump case [1] in a vise (page 7-14).

Install the fuel pump unit [2] into the fuel pump case by aligning the grooves with the bosses until the fuel pump unit base is seated against the fuel pump case.



Install the cover plate [1] with the chamfered edges facing up.

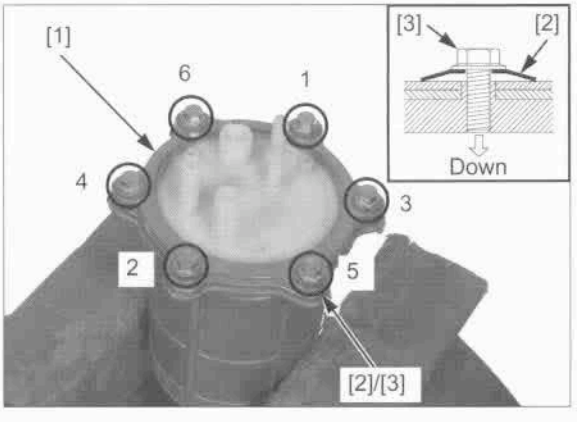
Install the spring washers [2] onto the fuel pump assembly bolts [3] as shown.

Install the fuel pump assembly bolts.

Be careful not to drop the fuel pump unit.

Tighten the fuel pump assembly bolts to the specified torque in the sequence as shown.

TORQUE: 8.8 N·m (0.9 kgf·m, 6.5 lbf·ft)



FUEL TANK

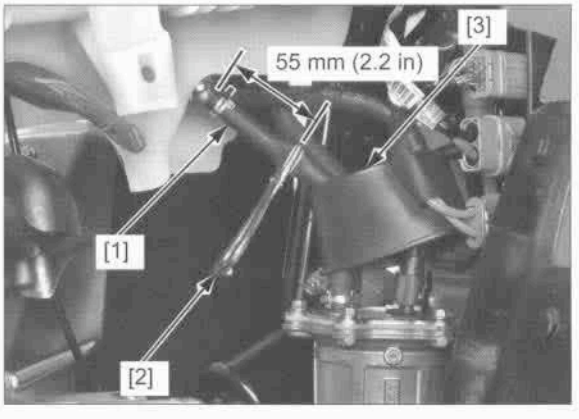
REMOVAL/INSTALLATION

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

Clamp the fuel hose [1] at the point from the upper hose end is 55 mm (2.2 in), using the hose clip.

TOOL:

[2] Hose clip — **07614-0050101 or equivalent commercially available in U.S.A.**



Pull the rubber boot [3] off the sub-fuel tank/fuel pump assembly.

Wipe off spilled out gasoline.

Disconnect the fuel hose from the sub-fuel tank/fuel pump assembly.

Disconnect the following:

- fuel tank breather hose [1] from the meter cover
- fuel vapor return hose [2] from the fuel tank
- fuel level sensor 2P (Red) connector [3]

Release the fuel overflow hose [4] from the clamp.

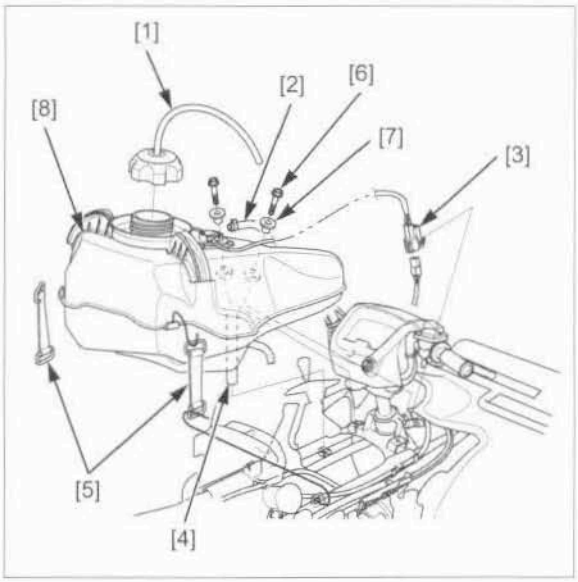
Remove the two holder bands [5].

Remove the two mounting bolts [6], collars [7] and the fuel tank [8] from the frame.

Installation is in the reverse order of removal.

NOTE:

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

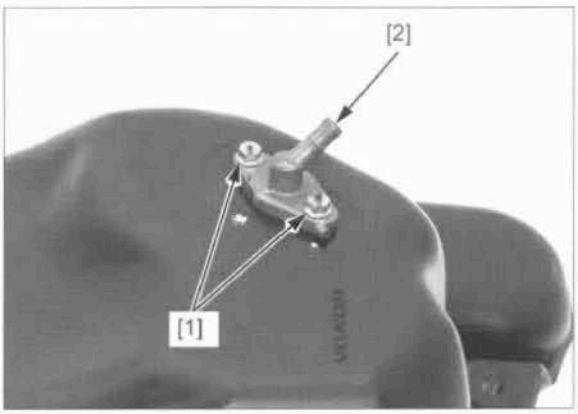


FUEL STRAINER SCREEN CLEANING

Remove the fuel tank (page 7-20).

Drain the gasoline into an approved fuel container.

Remove the two mounting bolts [1] and the fuel joint [2] from the fuel tank.



Remove the O-ring [1] and fuel strainer screen [2] from the fuel joint.

Clean the strainer screen with non-flammable or high flash point solvent and compressed air for cleaning.

Dry the strainer screen thoroughly.

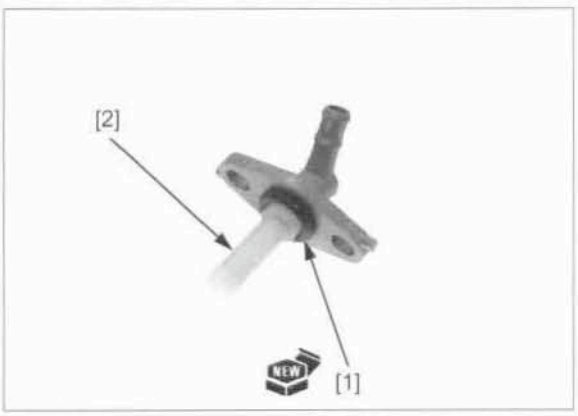
Install the strainer screen and a new O-ring onto the fuel joint.

Install the fuel joint onto the fuel tank.

Install and tighten the two mounting bolts to the specified torque.

TORQUE: 9.0 N·m (0.9 kgf·m, 6.6 lbf·ft)

Install the fuel tank (page 7-20).



AIR CLEANER HOUSING

REMOVAL/INSTALLATION

Remove the following:

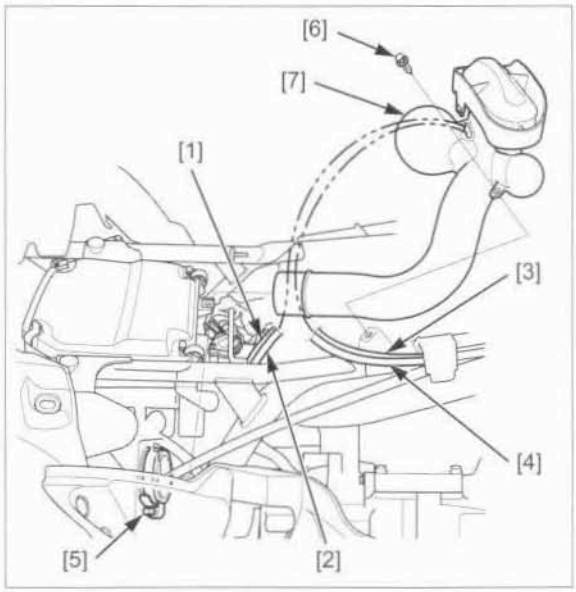
- fuel tank cover (page 2-5)
- throttle body cover (page 7-13)

Release the following:

- rear final gear case breather hose [1]
- rear brake panel breather hose [2]
- front final gear case breather hose [3]
- fan motor breather hose [4]

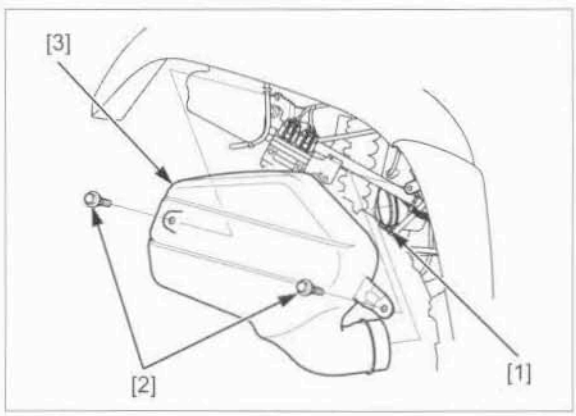
Loosen the connecting tube band screw [5].

Remove the trim clip [6] and the intake air duct [7].



Loosen the connecting tube band screw [1].

Remove the two bolts [2] and the air cleaner sub chamber [3].



Disconnect the IAT sensor 2P (Black) connector [1] and the crankcase breather hose [2].

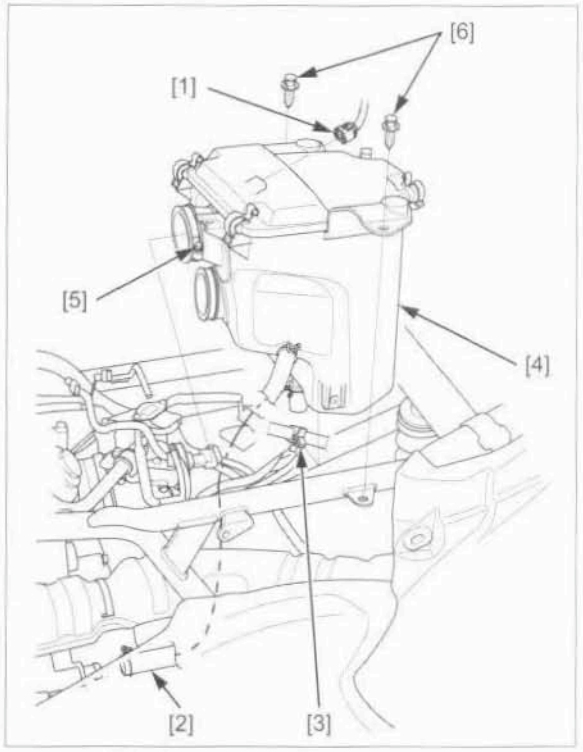
Release the rear final gear case breather hose clip [3] from the air cleaner housing [4].

Loosen the connecting tube band screw [5].

Be careful not to damage the crankcase breather hose.

Remove the two trim clips [6] and the air cleaner housing.

Installation is in the reverse order of removal.



THROTTLE BODY

NOTE:

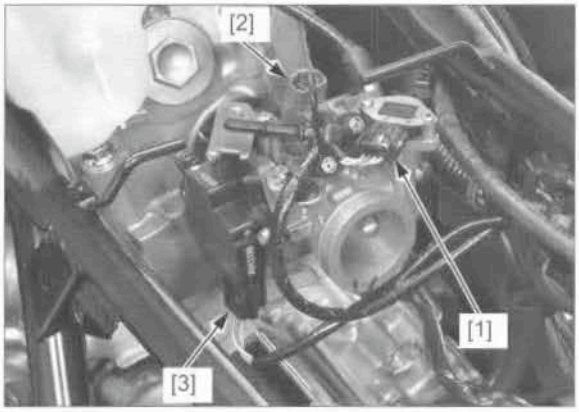
- If the sensor unit is removed from the throttle body, the TP sensor reset procedure must be performed after installing the throttle body (page 4-31).

REMOVAL

Relieve the fuel pressure and disconnect the quick connect fitting from the fuel injector (page 7-7).

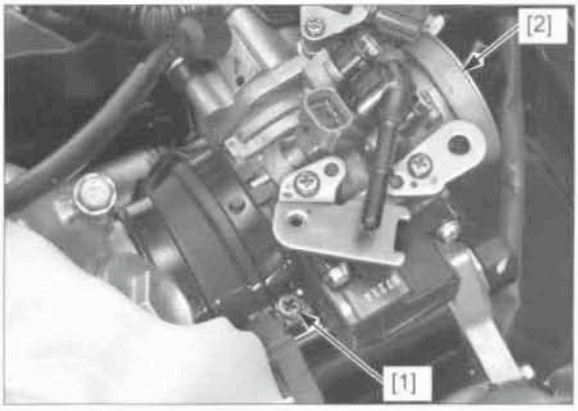
Remove the air cleaner housing (page 7-22).

Disconnect the IACV 4P (Black) connector [1], fuel injector 2P (Gray) connector [2] and sensor unit 5P (Black) connector [3].



Loosen the throttle body side insulator band screw [1].

Remove the throttle body [2] from the insulator.

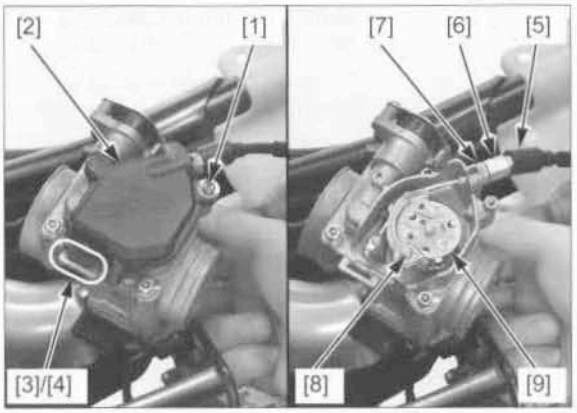


Remove the screw [1].

Remove the throttle drum cover [2] while releasing its tab [3] from the throttle body slot [4].

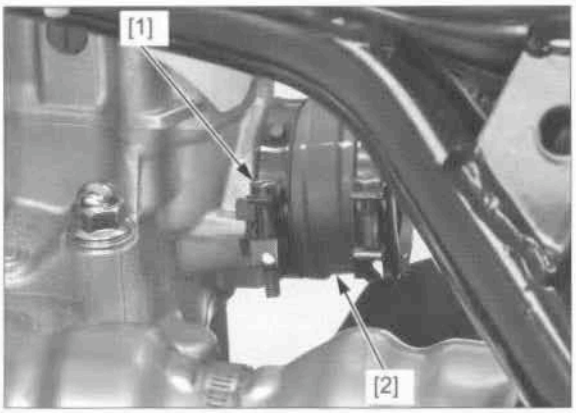
Slide the rubber boot [5] off the adjuster [6].

Loosen the throttle cable adjuster lock nut [7], remove the adjuster from the throttle body and disconnect the cable end [8] from the throttle drum [9].



Loosen the cylinder head side insulator band screw [1].

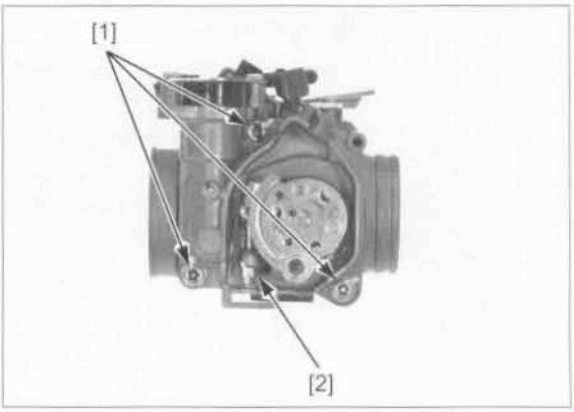
Remove the insulator [2] from the cylinder head.



DISASSEMBLY/ASSEMBLY

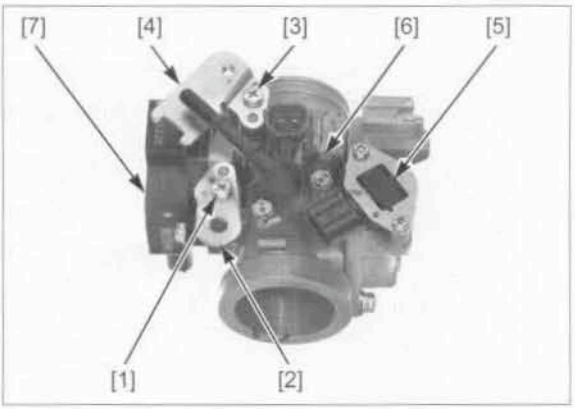
NOTICE

- *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 screws [1] and nut [2] of the throttle body. Loosening or tightening them can cause throttle valve and idle control failure.*
- *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.*



Remove the following:

- screw [1] and wire harness clamp stay [2]
- screw [3] and fuel feed hose clamp stay [4]
- IACV [5] (page 7-27)
- fuel injector [6] (page 7-28)
- sensor unit [7] (page 4-30)



Cleaning the air passages and sensor hole with a piece of wire will damage the throttle body.

Clean the air passage of the throttle body using compressed air.
Check the air passage for clogs.

NOTE:

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

Assembly is in the reverse order of disassembly.

TORQUE:
Wire harness clamp stay screw:
3.4 N·m (0.3 kgf·m, 2.5 lbf·ft)
Fuel feed hose clamp stay screw:
3.4 N·m (0.3 kgf·m, 2.5 lbf·ft)

NOTE:

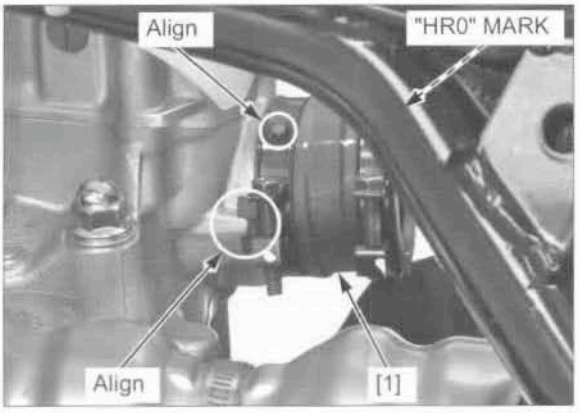
- Install the wire harness clamp stay and fuel feed hose clamp stay by aligning each stay hole with the pin of the throttle body.

INSTALLATION

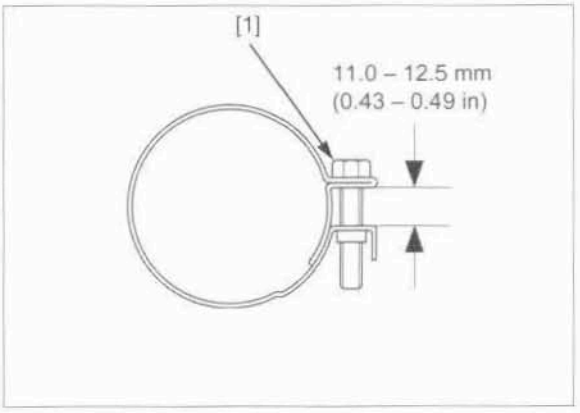
Face the "HR0" mark toward the throttle body.

Install the insulator [1] onto the cylinder head by aligning the groove with the lug.

Align the cylinder head side insulator band hole with the insulator boss.



Tighten the cylinder head side insulator band screw [1] so that the distance between the band tabs is as shown.



Connect the throttle cable end [1] to the throttle drum [2].

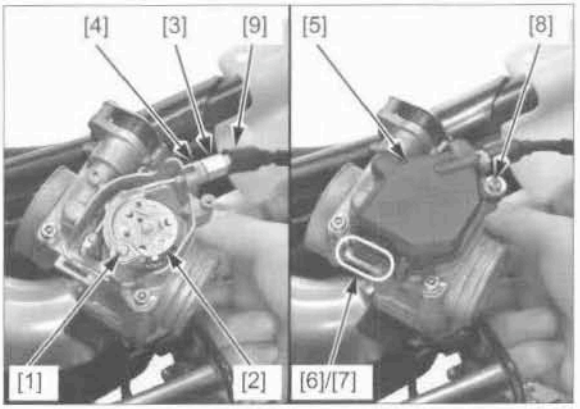
Tighten the lock nut and install the adjuster rubber boot [9] after adjustment the throttle lever freeplay.

Install the throttle cable adjuster [3] to the throttle body and temporarily tighten the lock nut [4].

Install the throttle drum cover [5] by aligning the locating tab [6] with the slot [7] in the throttle body.

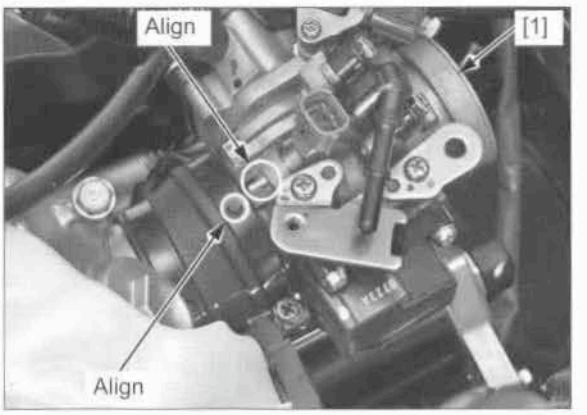
Install and tighten the screw [8] to the specified torque.

TORQUE: 1.8 N·m (0.2 kgf·m, 1.3 lbf·ft)

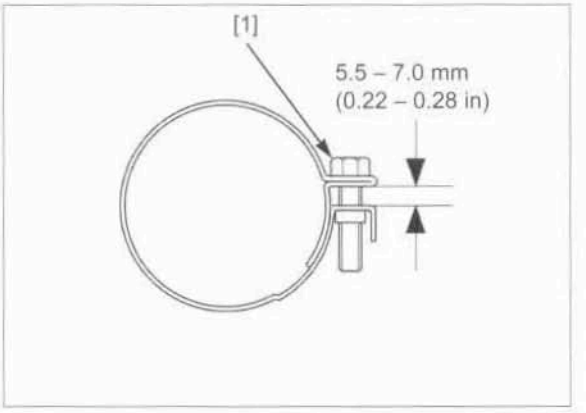


Install the throttle body [1] into the insulator by aligning the lug with the groove.

Align the throttle body side insulator band hole with the insulator boss.



Tighten the throttle body side insulator band screw [1] so that the distance between the band tabs is as shown.

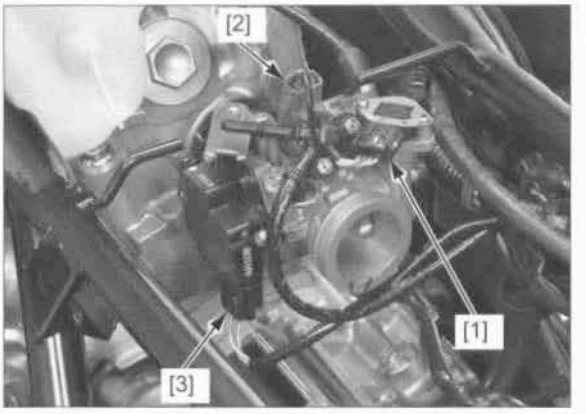


Connect the IACV 4P (Black) connector [1], fuel injector 2P (Gray) connector [2] and sensor unit 5P (Black) connector [3].

Install the air cleaner housing (page 7-22).

Adjust the throttle lever freeplay (page 3-4).

Connect the quick connect fitting to the fuel injector (page 7-10).



IACV

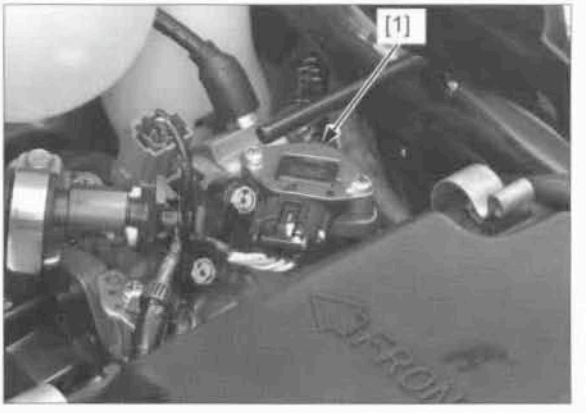
INSPECTION

Remove the throttle body cover (page 7-13).

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.

Turn the ignition switch ON and engine stop switch "○", check the IACV [1].

If the step motor operating (beep) sound is heard, the IACV is normal.



The IACV operation can be checked visually as follows:

1. Remove the IACV (page 7-27).
2. Connect the IACV 4P (Black) connector [1].
3. Turn the ignition switch ON and engine stop switch "○", check the IACV operation.

REMOVAL/INSTALLATION

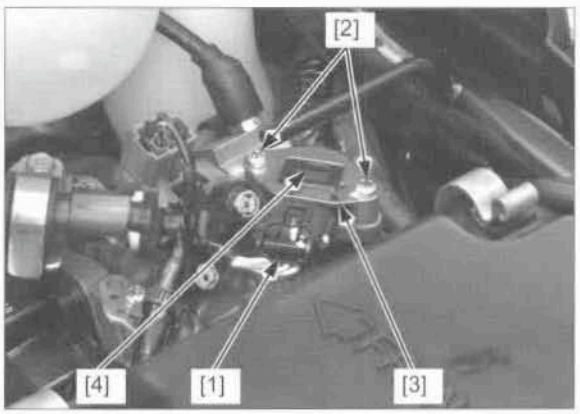
Remove the throttle body cover (page 7-13).

Clean the throttle body to prevent dirt and debris from entering the IACV passage.

Turn the ignition switch OFF.

Disconnect the IACV 4P (Black) connector [1].

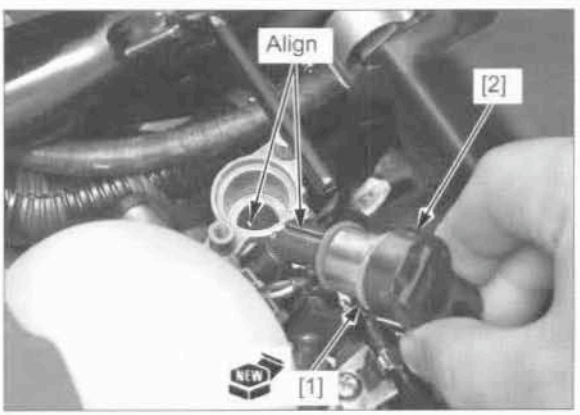
Remove the two torx screws (T20) [2], retainer plate [3] and IACV [4].



Before installing the IACV, turn the slide valve [1] clockwise until lightly seated on IACV.

Install a new O-ring [1] onto the IACV [2].

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



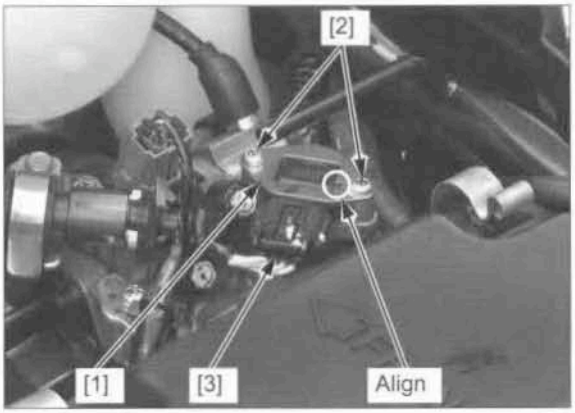
Install the retainer plate [1] by aligning the groove with the valve boss.

Install and tighten the two torx screws (T20) [2] to the specified torque.

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

Connect the IACV 4P (Black) connector [3].

Install the throttle body cover (page 7-13).



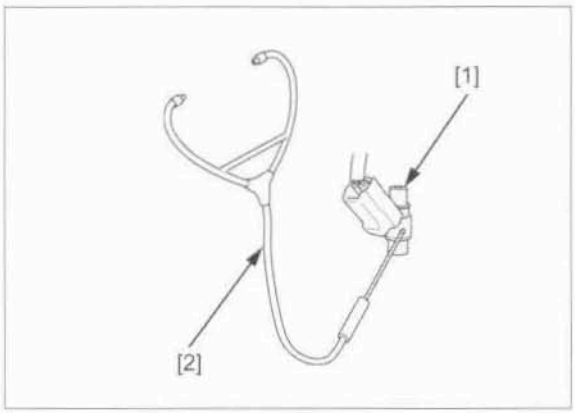
FUEL INJECTOR

INSPECTION

Remove the throttle body cover (page 7-13).

Start the engine and let it idle.

Confirm the fuel injector [1] operating sounds with a sounding rod or stethoscope [2].



REMOVAL

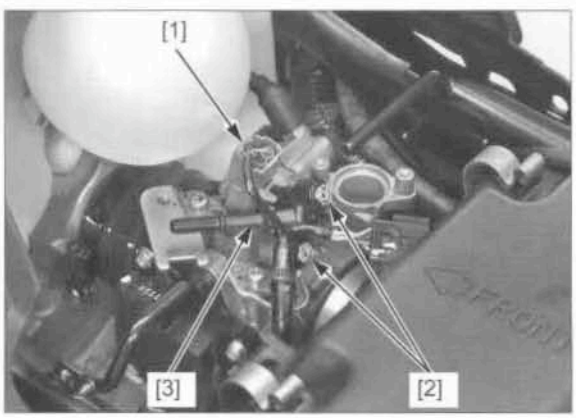
Clean around the fuel injector base with compressed air and be sure that no debris is allowed to enter the combustion chamber.

Relieve the fuel pressure and disconnect the quick connect fitting from the fuel injector (page 7-7).

Remove the IACV (page 7-27).

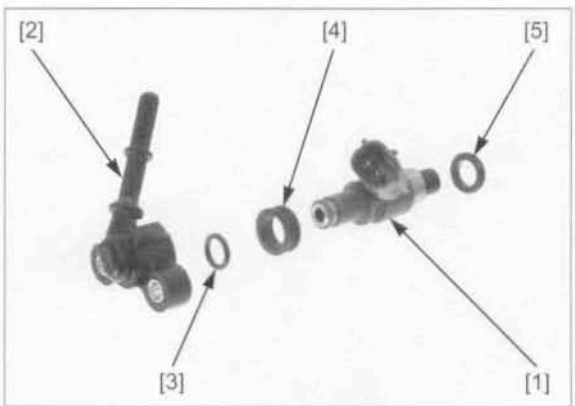
Disconnect the fuel injector 2P (Gray) connector [1].

Remove the fuel injector mounting bolts [2] and fuel injector assembly [3] from the throttle body.



Remove the fuel injector [1] from the injector joint [2].

Remove the O-ring [3], cushion ring [4] and seal ring [5].



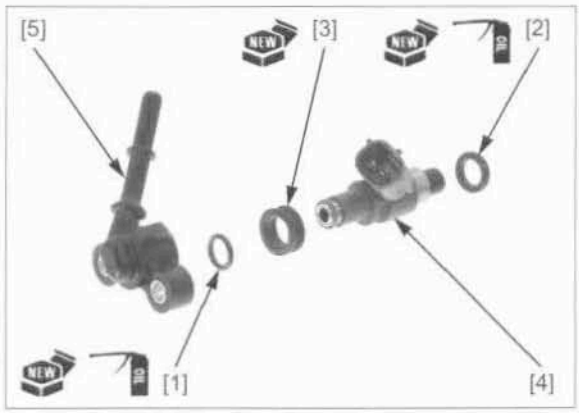
INSTALLATION

Coat a new O-ring [1] and seal ring [2] with engine oil.

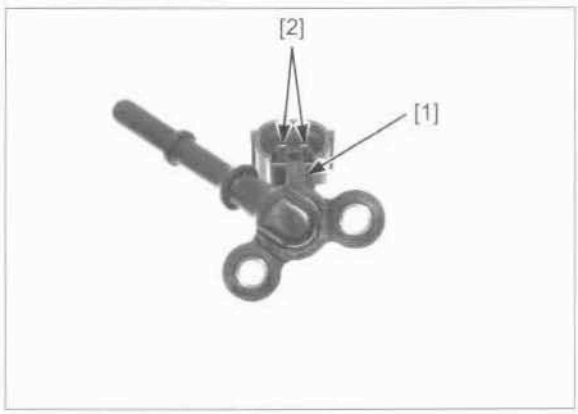
Install a new O-ring, cushion ring [3] and seal ring to the fuel injector [4], being careful not to damage them.

Be careful not to damage the O-ring.

Install the fuel injector into the injector joint [5].



Align the boss [1] of the injector joint with the injector terminals [2] as shown



Be careful not to damage the seal ring.

Install the fuel injector assembly [1] into the throttle body.

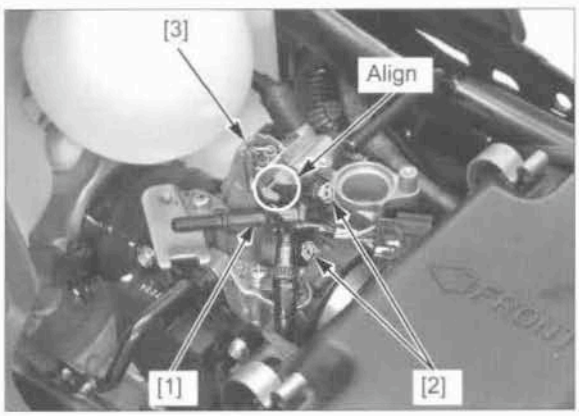
Install and tighten the fuel injector mounting bolts [2] to the specified torque.

TORQUE: 5.1 N·m (0.5 kgf·m, 3.8 lbf·ft)

Connect the fuel injector 2P (Gray) connector [3] by aligning its groove with injector joint boss.

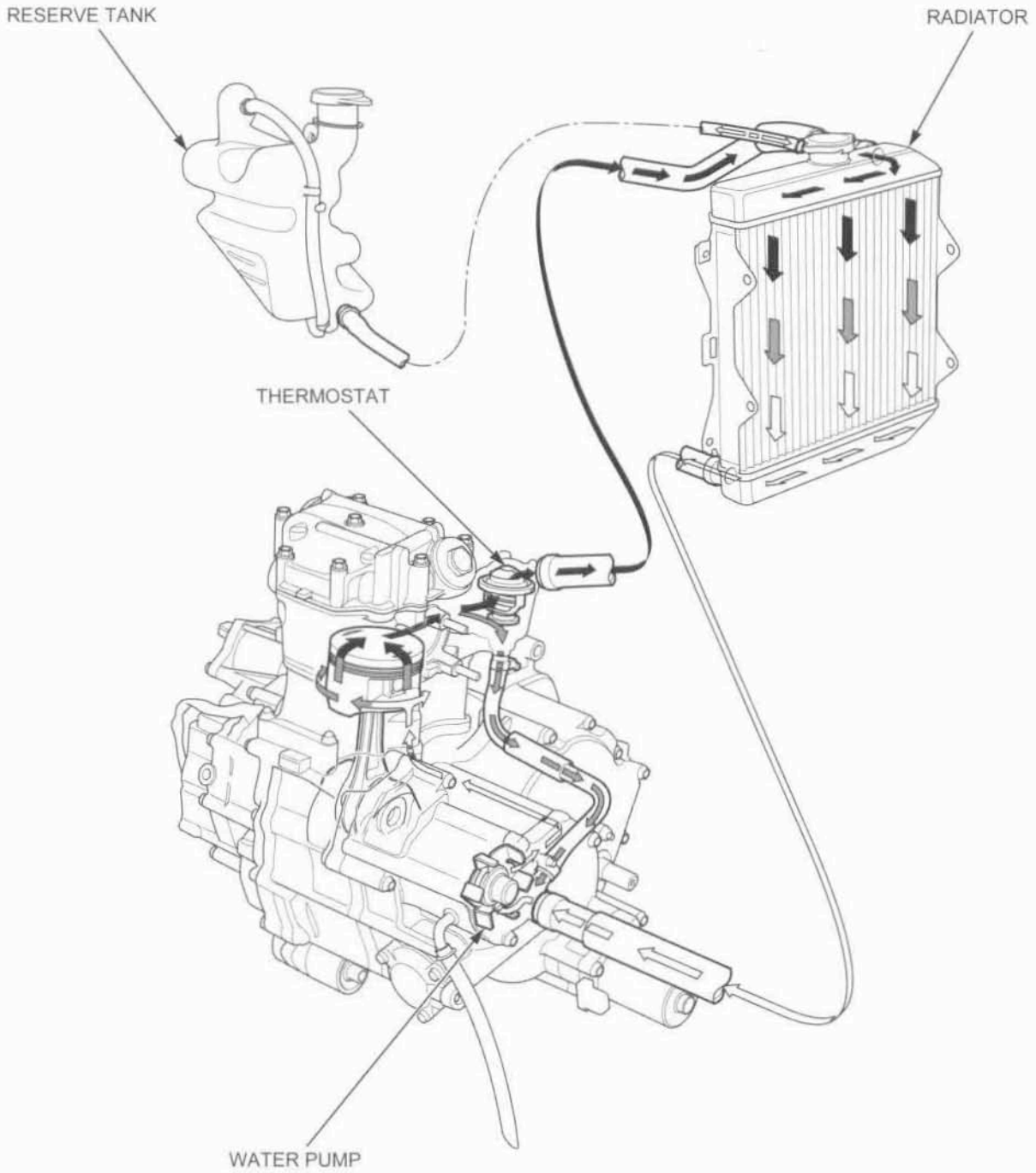
Install the IACV (page 7-27).

Connect the quick connect fitting to the fuel injector (page 7-10).



8. 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.

- If any coolant gets in your eyes, rinse them with water and consult a doctor immediately.
- If any coolant is swallowed, induce vomiting, gargle and consult a physician immediately.
- If any coolant gets on your skin or clothes, rinse thoroughly with plenty of water.

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.

- Add cooling system at the reserve tank. Do not remove the radiator cap except to refill or drain the system.
- Avoid spilling coolant on painted surfaces.
- After servicing the system, check for leaks with a cooling system tester.
- For cooling fan motor inspection, refer to "Lights/Meters/Switches" section (page 22-15).

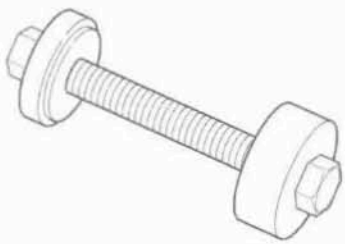
SPECIFICATIONS

ITEM		SPECIFICATIONS
Coolant capacity	Radiator and engine	1.5 liters (1.6 US qt, 1.3 Imp qt)
	Reserve tank	0.3 liter (0.3 US qt, 0.3 Imp qt)
Radiator cap relief pressure		108 – 137 kPa (1.1 – 1.4 kgf/cm², 16 – 20 psi)
Thermostat	Begin to open	80 – 84°C (176 – 183°F)
	Fully open	95°C (203°F)
	Valve lift	8 mm (0.3 in) minimum at 95°C (203°F)
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 VALUES

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Cooling fan nut	1	5	2.7 (0.3, 2.0)	Apply locking agent to the threads.
Fan motor bolt	3	5	5.2 (0.5, 3.8)	
Fan motor stay bolt	3	6	8.4 (0.9, 6.2)	

TOOLS

Remover weight 07741-0010201  or 07936-371020A or 07936-3710200 (U.S.A. only)	Driver 07749-0010000 	Remover shaft, 15 mm 07936-KC10100 
Remover head, 15 mm 07936-KC10200 	Bearing remover, 15 mm 07936-KC10500 (U.S.A. only) 	Mechanical seal driver attachment 07945-4150400 
Mechanical seal installer 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

Engine temperature too low
- Thermostat stuck open

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

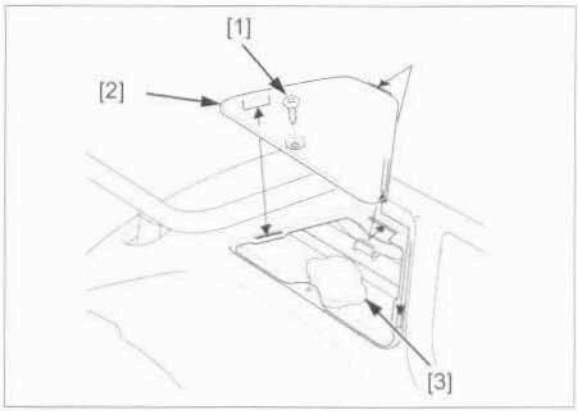
SYSTEM TESTING

COOLANT (HYDROMETER TEST)

Remove the screw [1] and the maintenance lid [2].

The engine must be cool before removing the radiator cap.

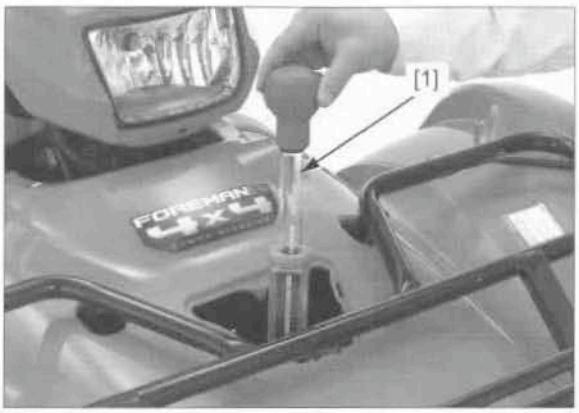
Remove the radiator cap [3].



Test the coolant gravity using a hydrometer [1].

STANDARD COOLANT CONCENTRATION:
1:1 mixture of distilled water and antifreeze

Look for contamination and replace the coolant if necessary (page 8-6).



		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

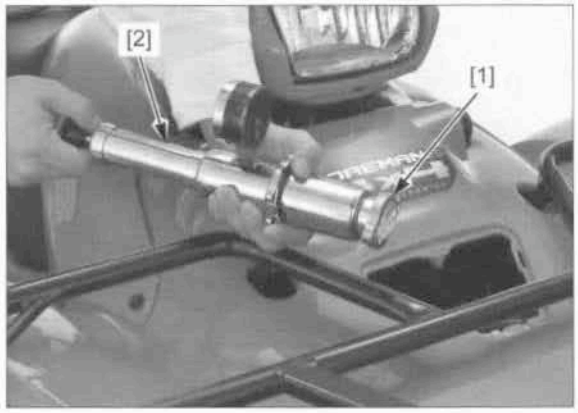
Remove the radiator cap (page 8-5).

Wet the sealing surfaces of the cap [1], then install the cap onto tester [2].

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)



Pressurize the radiator, engine and hoses using the tester [1], and check for leaks.

NOTICE

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

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

Remove the tester and install the radiator cap.

Install the lid in the reverse order of removal.

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 (mixture with distilled water)

REPLACEMENT/AIR BLEEDING

NOTE:

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

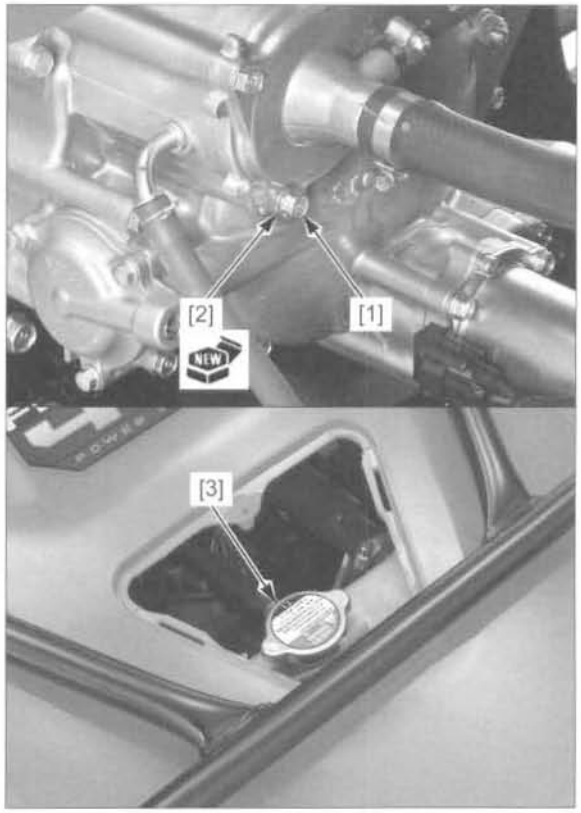
The engine must be cool before servicing the cooling system.

Remove the following:
- right mudguard (page 2-6)
- rear fender cover (page 2-9)
- maintenance lid (page 8-5)

Place a funnel under the water pump to catch coolant with the container.

Drain the coolant from the system by removing the drain bolt [1] and sealing washer [2] on the water pump, and the radiator cap [3].

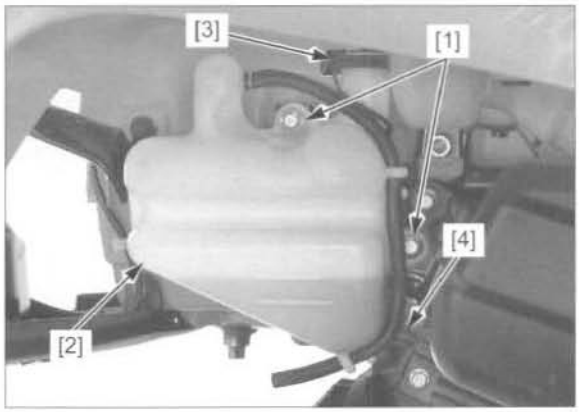
Reinstall the drain bolt with a new sealing washer securely.



Remove the two bolts [1] and reserve tank [2], then open the tank cap [3] to drain the tank.
Disconnect the siphon hose [4] to remove the tank.

Rinse the inside of the reserve tank with water.

Reconnect the siphon hose and install the reserve tank with the two bolts.

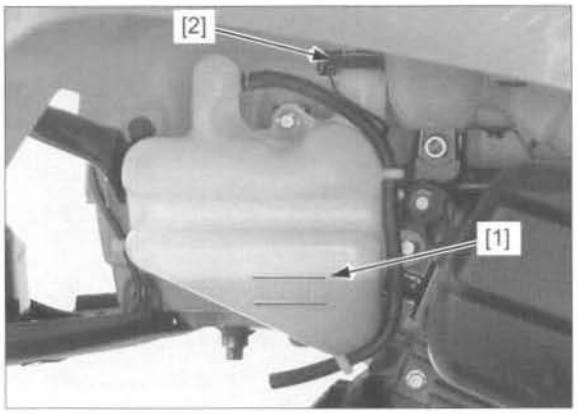


Fill the system with the recommended coolant up to the filler neck [1].

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 [1] and install the tank cap [2].

Install the following:
- maintenance lid (page 8-5)
- rear fender cover (page 2-9)
- right mudguard (page 2-6)



THERMOSTAT

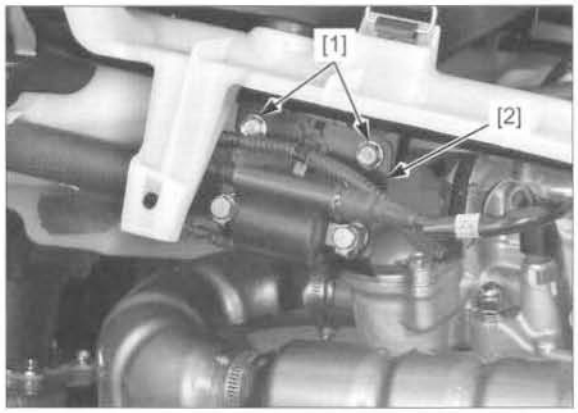
REMOVAL/INSTALLATION

Drain the coolant from the system (page 8-7).

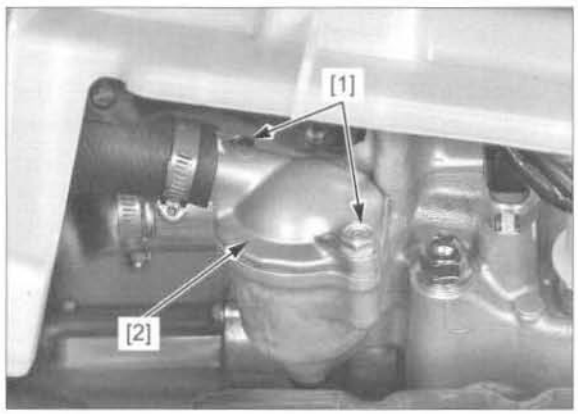
Remove the left fuel tank side cover (page 2-5).

Do not hang the assembly from the wires.

Remove the two bolts [1] and ignition coil stay assembly [2].



Remove the two bolts [1] and thermostat cover [2].



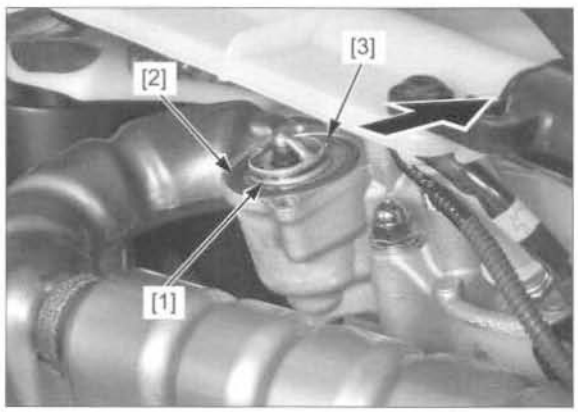
Remove the thermostat [1] from the housing.

Make sure the rubber seal [2] on the thermostat is in good condition.
Apply coolant to the rubber seal and install the thermostat into the housing with the bleed hole facing [3] inboard.

Install the thermostat cover and tighten the two bolts securely.

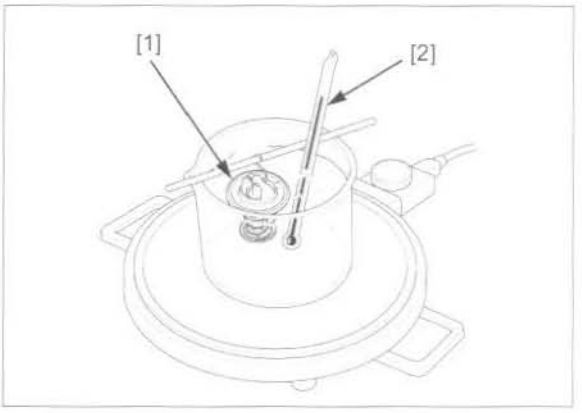
Install the left fuel tank side cover (page 2-5).

Fill and bleed the cooling system (page 8-6).



INSPECTION

Visually inspect the thermostat [1] for damage.
Replace the thermostat if the valve stays open at room temperature.



Do not let the thermostat or thermometer [2] 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.

RADIATOR/COOLING FAN

RADIATOR REMOVAL/INSTALLATION

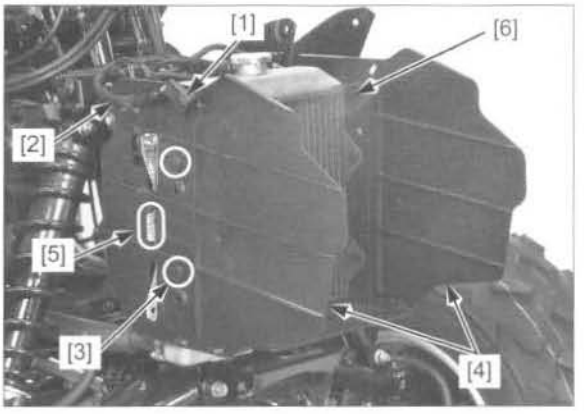
NOTE:

- Take care not to damage the radiator fins while servicing the radiator.

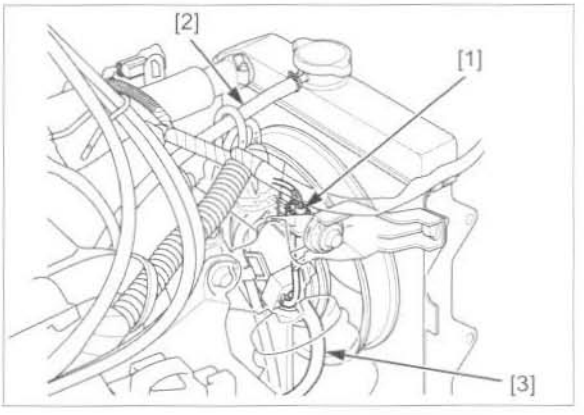
Remove the front fender/carrier (page 2-8).

Drain the coolant from the system (page 8-7).

Remove the following:
- headlight 3P (black) connector [1] and wire [2] (from right side air guide plate)
- two trim clips [3] (from each side air guide plate by pushing the center pin)
- side air guide plates [4] (by releasing each tab [5])
- radiator grille [6] (by releasing the two tabs)



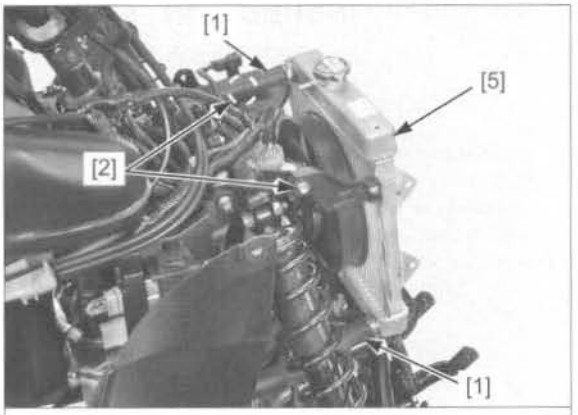
- fan motor 2P (natural) connector [1] (disconnect)
- siphon hose [2]
- breather hose [3] (pink)

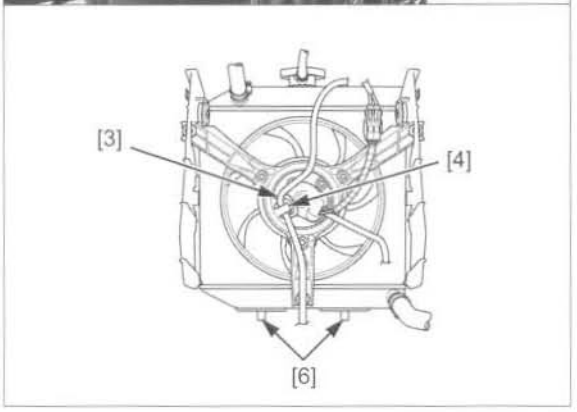


- water hoses [1]
- two bolts [2]
- 4WD select switch wire [3] (from the wire guide [4])
- radiator assembly [5] (release the mounting bosses [6] from the grommets)

Installation is in the reverse order of removal.

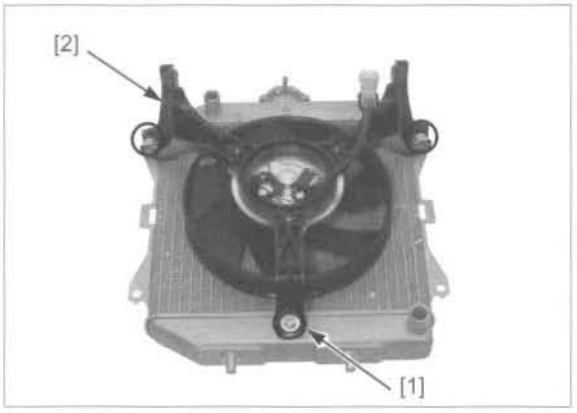
Fill and bleed the cooling system (page 8-6).



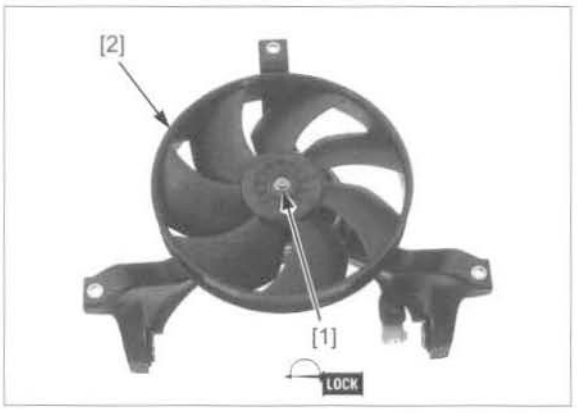


COOLING FAN REMOVAL/ INSTALLATION

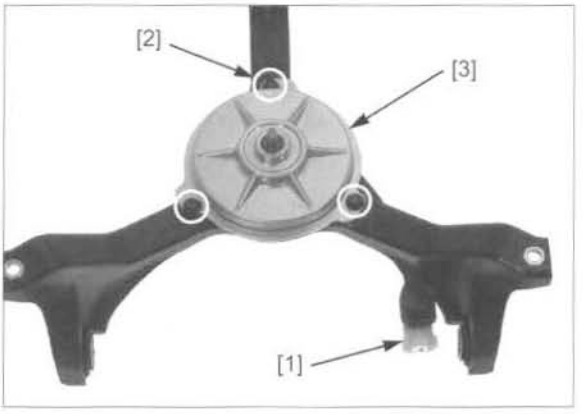
Remove the following:
- three washer-bolts [1]
- motor/stay assembly [2]



- nut [1]
- cooling fan [2]



– connector [1]
– three bolts [2]
– fan motor [3]



Apply locking agent to the fan nut threads.

Installation is in the reverse order of removal.

TORQUE:
Cooling fan nut: 2.7 N·m (0.3 kgf·m, 2.0 lbf·ft)
Fan motor bolt: 5.2 N·m (0.5 kgf·m, 3.8 lbf·ft)
Fan motor stay bolt: 8.4 N·m (0.9 kgf·m, 6.2 lbf·ft)

RADIATOR RESERVE TANK

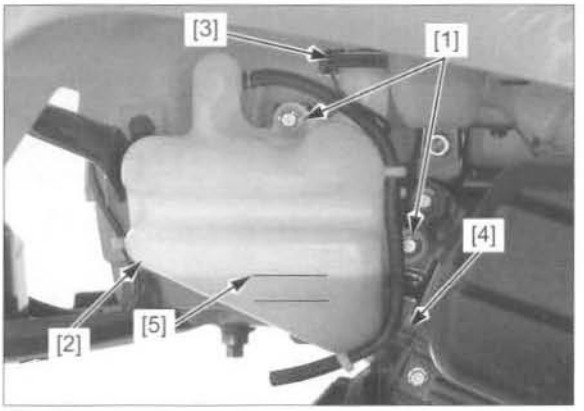
REMOVAL/INSTALLATION

Remove the rear fender cover (page 2-9).

Remove the two bolts [1] and reserve tank [2] from the frame, then open the tank cap [3] to drain the tank. Disconnect the siphon hose [4] to remove the tank.

Connect the siphon hose and install the reserve tank with the two bolts.
Fill the reserve tank to the upper level line [5] and install the tank cap.

Install the rear fender cover (page 2-9).



WATER PUMP

MECHANICAL SEAL INSPECTION

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

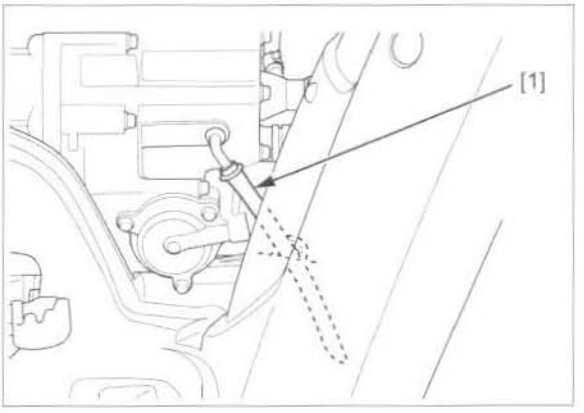
Check the breed hose [1] of the water pump for signs of coolant leakage.

If there is leakage, replace the mechanical seal (page 8-12).

Make sure that there are no continuous coolant leakage from the bleed hose while operating the engine.

NOTE:

- A small amount of coolant weeping from the bleed hose is normal.



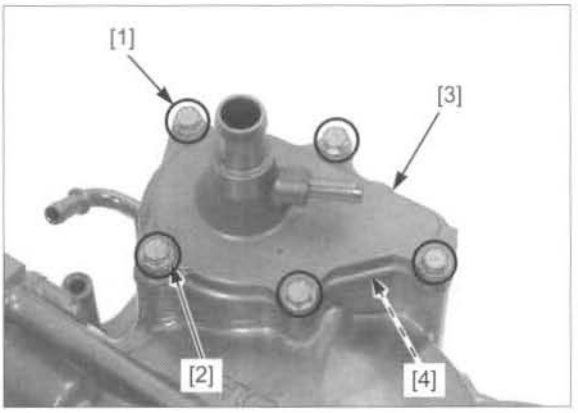
MECHANICAL SEAL REPLACEMENT

NOTE:

- When replacing the mechanical seal, the impeller and pump shaft must be replaced with new ones.

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

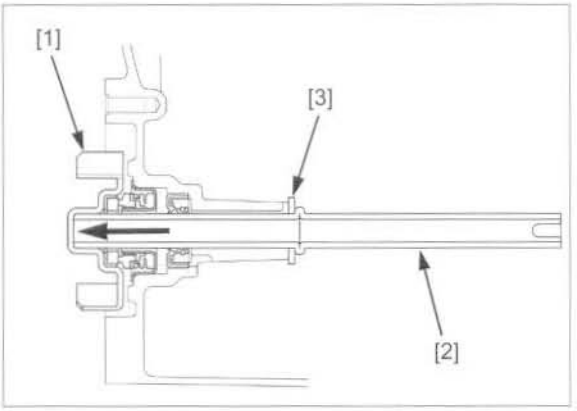
Remove the following:
- five bolts [1] and sealing washer [2]
- pump cover [3]
- O-ring [4] (from the cover)



Remove the impeller assembly from the pump shaft by tapping the inside of the impeller [1] through the pump shaft [2], using a screwdriver or equivalent.

Remove the mating ring and cup gasket of the mechanical seal from the impeller.

Remove the following:
- pump shaft
- thrust washer [3]



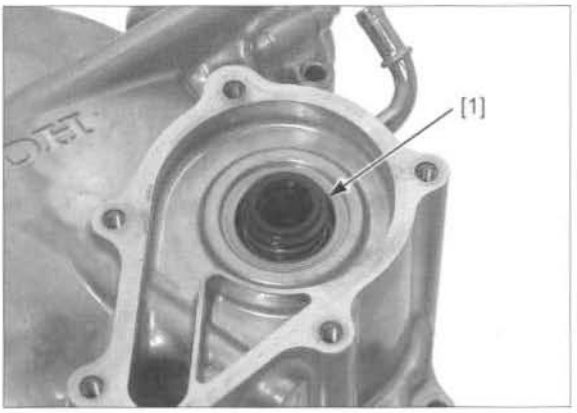
Remove the mechanical seal [1].

TOOLS:

Remover head, 15 mm	**07936-KC10200**
Remover shaft, 15 mm	**07936-KC10100**
Remover weight	**07741-0010201**

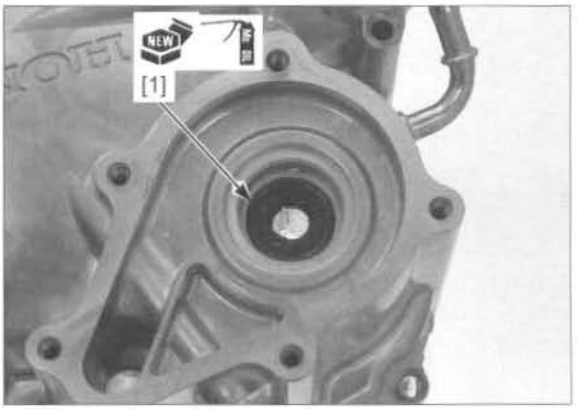
U.S.A. TOOLS:

Bearing remover, 15 mm	**07936-KC10500**
Remover weight	**07936-371020A or 07936-3710200**



Remove the oil seal [1].

Apply molybdenum oil solution to the lips of a new oil seal.
Install the oil seal with the flat side facing out until it is fully seated.

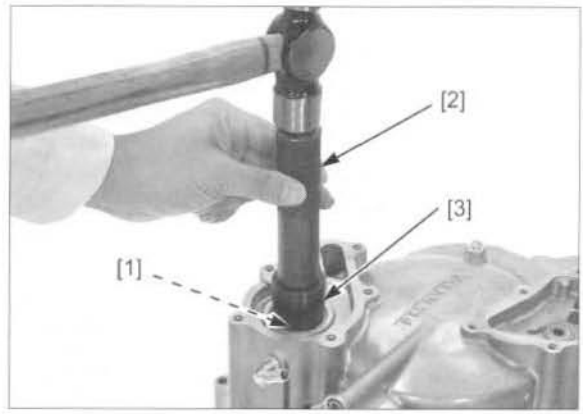


Be careful not to damage the sliding surface of the mechanical seal.

Drive a new mechanical seal [1] in until it is seated.

TOOLS:

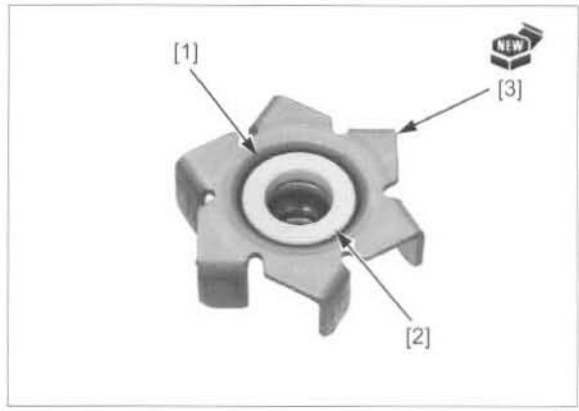
[2] Driver	**07749-0010000**
[3] Mechanical seal driver attachment	**07945-4150400 or**
Mechanical seal installer	**07965-415000A (U.S.A. only)**



Be careful not to damage the sliding surface of the mating ring.

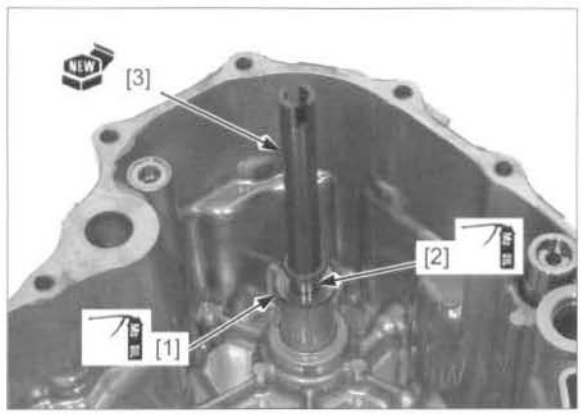
Install a new cup gasket [1] over a new mating ring [2].

Apply coolant around the cup gasket. Install the gasket/ ring assembly into a new impeller [3] with the gasket facing the impeller until it is fully seated.



Do not get oil on the mechanical seal.

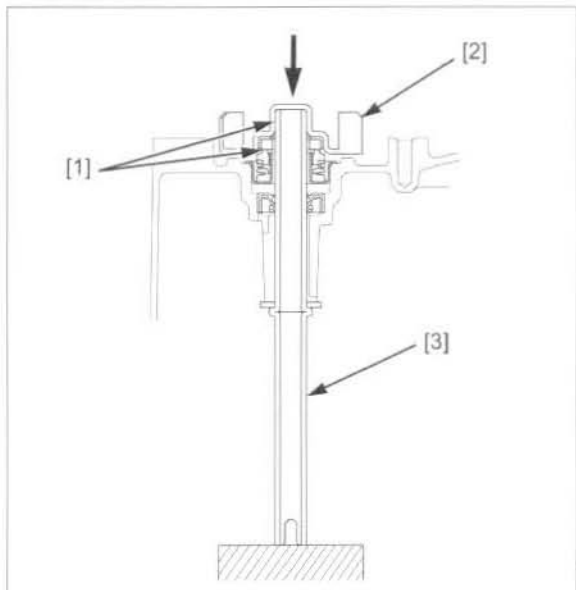
Apply molybdenum oil solution to the thrust washer [1] and the journal [2] of a new pump shaft [3].
Install the washer onto the pump shaft, and insert the shaft into the crankcase cover.



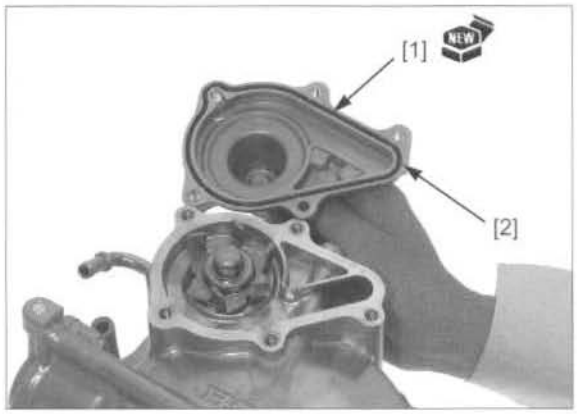
Never allow dirt or dust to get onto the sliding surfaces of the mechanical seal and mating ring.

Degrease [1] the press fitting areas of the impeller [2] and shaft [3], and the sliding surfaces of the mechanical seal and mating ring.
Press the impeller assembly onto the shaft.

Check that the pump shaft turns smoothly without binding.

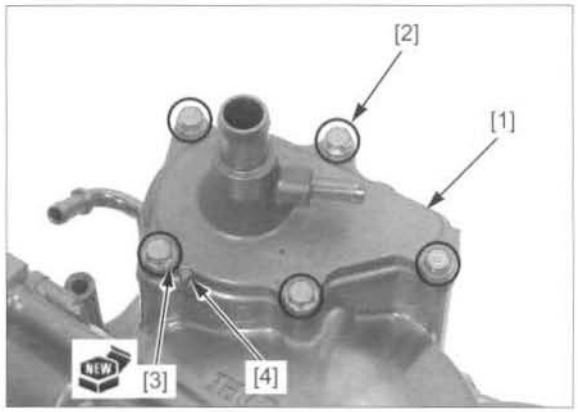


Install a new O-ring [1] into the cover groove [2].



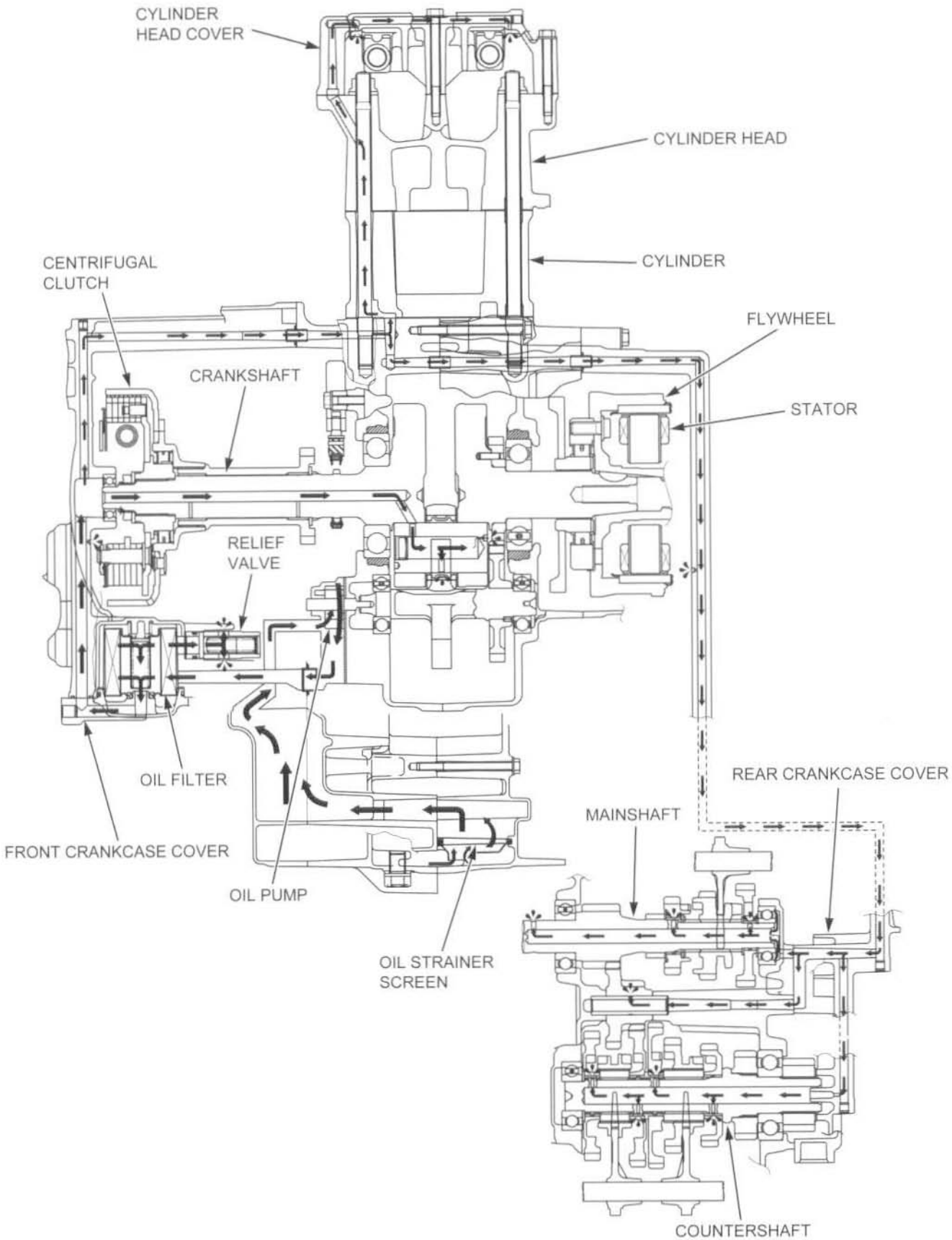
Install the pump cover [1] and the five bolts [2] with a new sealing washer [3] in position as shown (triangular mark [4]). Tighten the bolts in a crisscross pattern in several steps.

Install the front crankcase cover (page 12-23).



9. 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 relief valve. 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.
- For following service, see Maintenance section.
  - oil level check and oil change (page 3-12)
  - oil filter replacement (page 3-14)

SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Engine oil capacity	After draining	2.9 liters (3.1 US qt, 2.6 Imp qt)	–
	After draining/filter change	3.0 liters (3.2 US qt, 2.6 Imp qt)	–
	After disassembly	3.3 liters (3.5 US qt, 2.9 Imp qt)	–
Recommended engine oil		Pro Honda GN4 4-stroke oil (U.S.A. and Canada) or Honda 4-stroke oil (Canada only), 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	–
Oil pump	Tip clearance	0.15 (0.006)	0.20 (0.008)
	Body clearance	0.15 – 0.24 (0.006 – 0.009)	0.25 (0.010)
	Side clearance	0.02 – 0.09 (0.001 – 0.004)	0.11 (0.004)

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

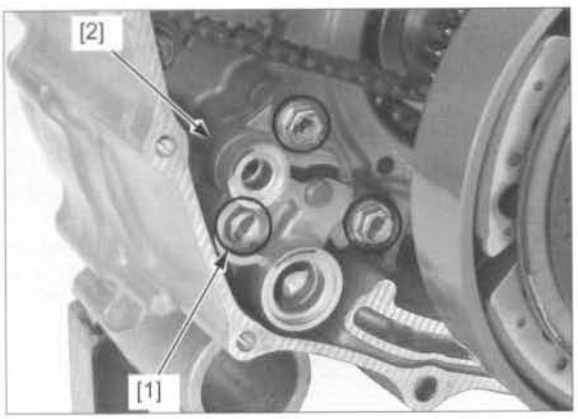
Oil emulsification
- Blown cylinder head gasket
- Leaky coolant passage
- Water entry

OIL PUMP

REMOVAL

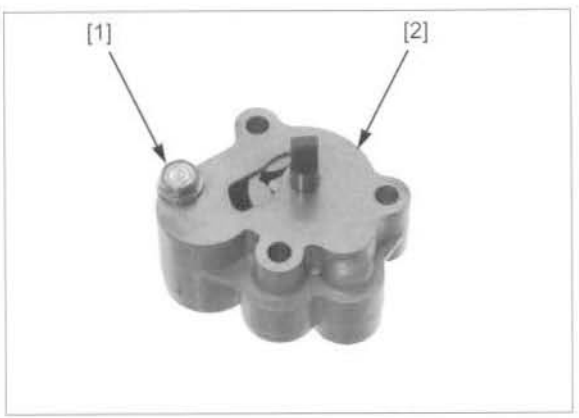
Remove the front crankcase cover (page 12-6).

Remove the three bolts [1] and oil pump [2].



DISASSEMBLY/INSPECTION

Remove the bolt [1] and rotor side plate [2].



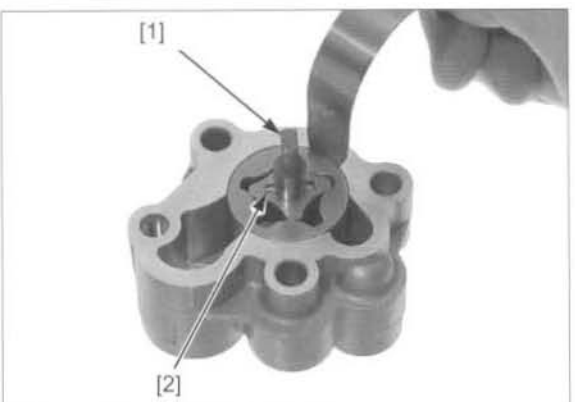
Measure the rotor tip clearance.

SERVICE LIMIT: 0.20 mm (0.008 in)

Measure the pump body clearance.

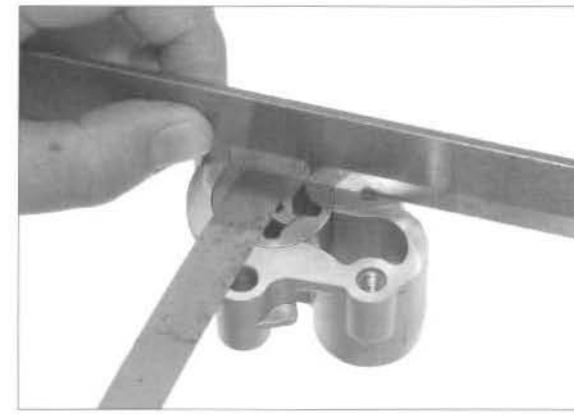
SERVICE LIMIT: 0.25 mm (0.010 in)

Remove the oil pump shaft [1] and drive pin [2].



Measure the pump side clearance.

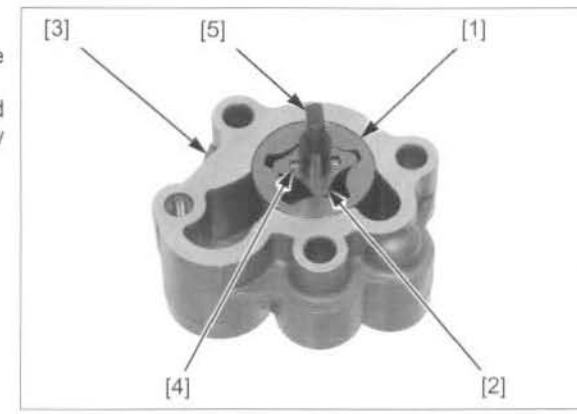
SERVICE LIMIT: 0.11 mm (0.004 in)



ASSEMBLY

Dip all parts in clean engine oil.

Install the outer rotor [1] and inner rotor [2] into the pump body [3].
Install the drive pin [4] into the pump shaft [5], and install the shaft into the inner rotor and pump body by aligning the drive pin with the inner rotor groove.

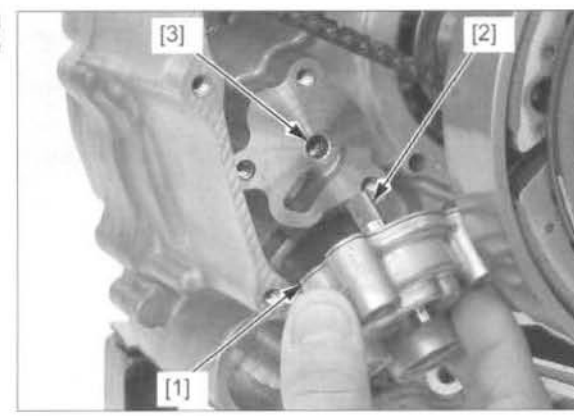


Install the rotor side plate [1] and bolt [2].

Tighten the bolt securely.

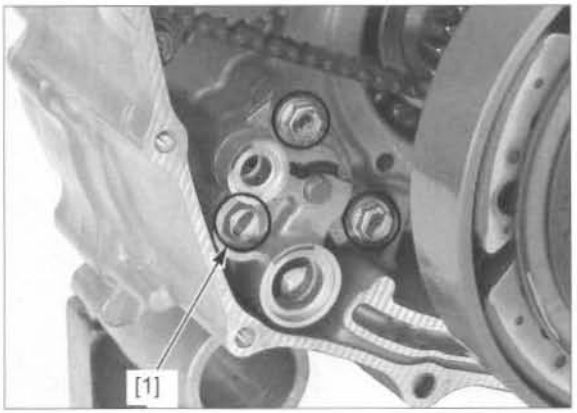
INSTALLATION

Install the oil pump [1] onto the crankcase while aligning the pump shaft end [2] with the balancer shaft groove [3].



Install the three bolts [1] and tighten them securely.

Install the front crankcase cover (page 12-23).

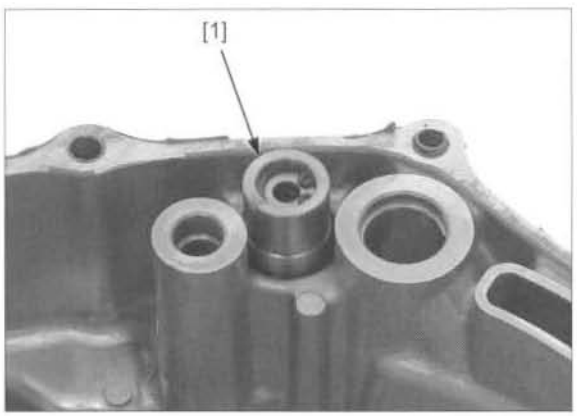


RELIEF VALVE

DISASSEMBLY/INSPECTION

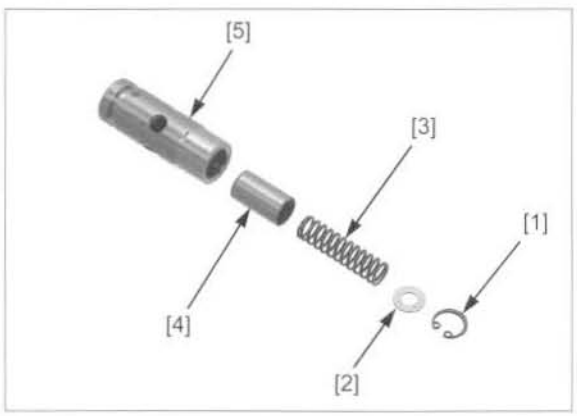
Remove the front crankcase cover (page 12-6).

Remove the relief valve assembly [1] from the front crankcase cover.
Remove the O-ring from the relief valve body.



Remove the snap ring [1], washer [2], spring [3] and relief valve [4] from the valve body [5].

Check the relief valve and spring for wear or damage.
Replace the relief valve assembly if necessary.

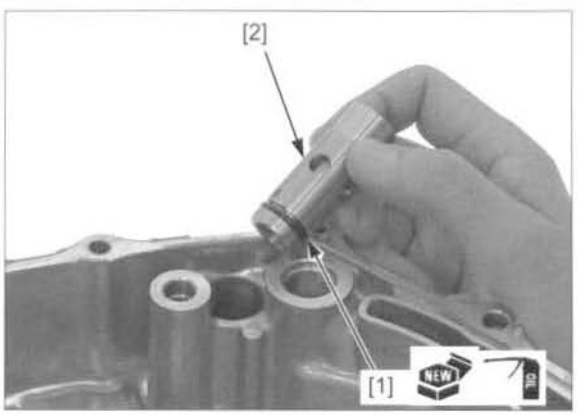


ASSEMBLY

Install the relief valve into the body with the open end facing to the spring.
Install the relief valve spring, washer and snap ring.

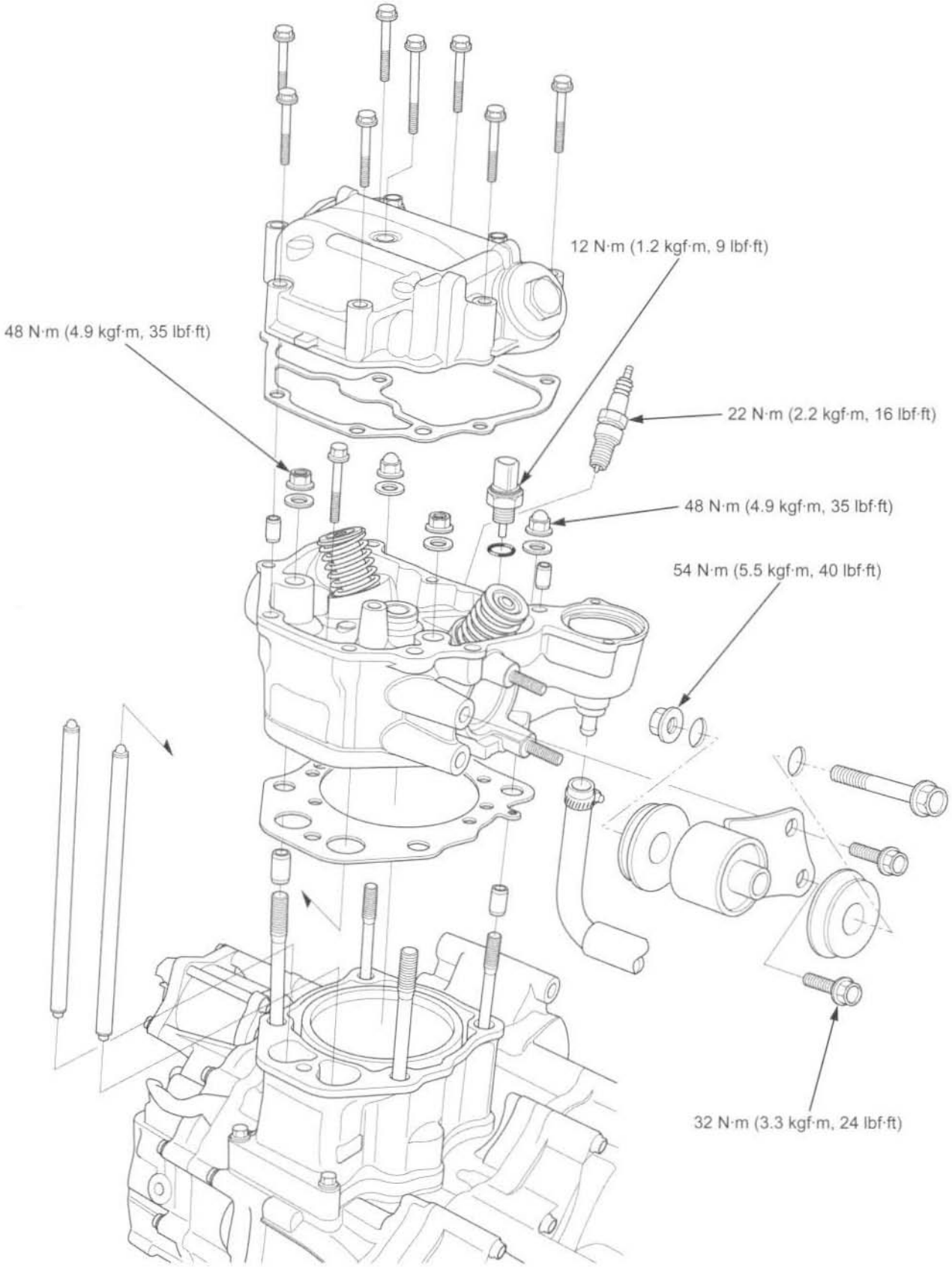
Coat a new O-ring [1] with oil and install it into the relief valve body groove.
Install the relief valve assembly [2] into the front crankcase cover.

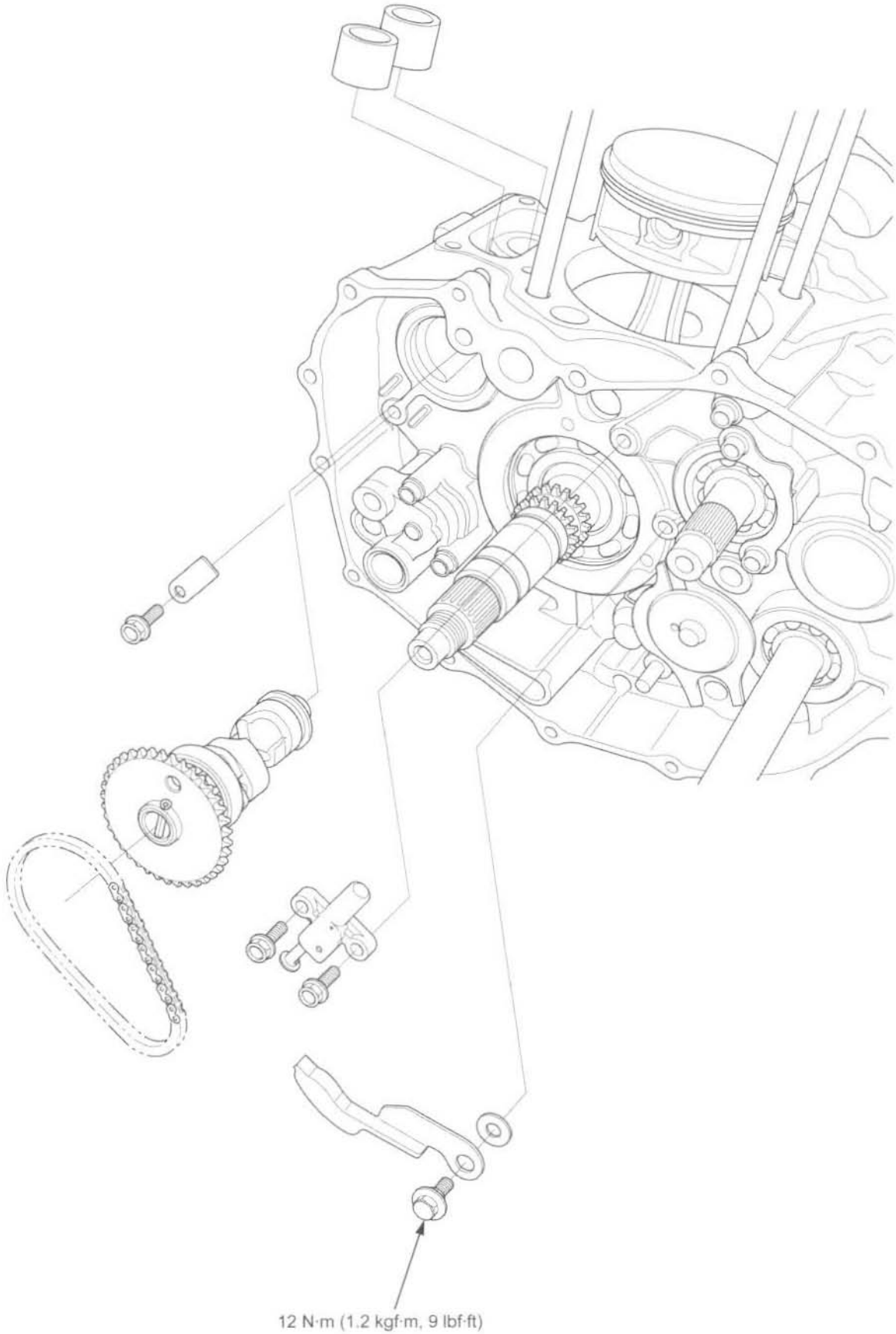
Install the front crankcase cover (page 12-23).



10. CYLINDER HEAD/VALVE

SYSTEM COMPONENTS




12 N·m (1.2 kgf·m, 9 lbf·ft)

SERVICE INFORMATION

GENERAL

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

SPECIFICATIONS

Unit: mm (in)

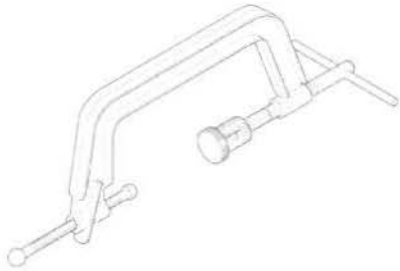
ITEM			STANDARD	SERVICE LIMIT
Cylinder compression at 400 rpm			600 kPa (6.1 kgf/cm^3, 87 psi)	–
Valve clearance		IN	0.15 ± 0.02 (0.006 ± 0.001)	–
		EX	0.23 ± 0.02 (0.009 ± 0.001)	–
Valve, valve guide	Valve stem O.D.	IN	5.975 – 5.990 (0.2352 – 0.2358)	5.95 (0.234)
		EX	5.955 – 5.970 (0.2344 – 0.2350)	5.93 (0.233)
	Valve guide I.D.	IN/EX	6.000 – 6.012 (0.2362 – 0.2367)	6.02 (0.237)
	Stem-to-guide clearance	IN	0.010 – 0.037 (0.0004 – 0.0015)	0.12 (0.005)
		EX	0.030 – 0.057 (0.0012 – 0.0022)	0.14 (0.006)
	Valve guide projection above cylinder head	IN/EX	14.8 – 15.0 (0.58 – 0.59)	–
	Valve seat width	IN/EX	1.2 (0.05)	1.5 (0.06)
Valve spring	Free length	Inner	42.94 (1.691)	42.08 (1.657)
		Outer	43.63 (1.718)	42.76 (1.683)
Rocker arm	Arm I.D.	IN/EX	12.000 – 12.018 (0.4724 – 0.4731)	12.05 (0.474)
	Shaft O.D.	IN/EX	11.964 – 11.984 (0.4710 – 0.4718)	11.92 (0.469)
	Arm-to-shaft clearance	IN/EX	0.016 – 0.054 (0.0006 – 0.0021)	0.08 (0.003)
Camshaft and cam follower	Cam lobe height	IN	35.9400 – 36.1800 (1.41496 – 1.42441)	35.74 (1.407)
		EX	35.6811 – 35.9211 (1.40476 – 1.41421)	35.48 (1.397)
	Cam follower O.D.	IN/EX	22.467 – 22.482 (0.8845 – 0.8851)	22.46 (0.884)
	Follower bore I.D.	IN/EX	22.510 – 22.526 (0.8862 – 0.8868)	22.54 (0.887)
	Follower-to-bore clearance	IN/EX	0.028 – 0.059 (0.0011 – 0.0023)	0.07 (0.003)
Cylinder head warpage			–	0.10 (0.004)

TORQUE VALUES

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Cylinder head nut	4	10	48 (4.9, 35)	Apply engine oil to the threads and seating surface.
Cam chain tensioner pivot bolt	1	6	12 (1.2, 9)	Apply locking agent to the threads.
Spark plug	1	14	22 (2.2, 16)	
ECT sensor	1	10	12 (1.2, 9)	
Upper engine hanger nut (frame side)	1	10	54 (5.5, 40)	
Upper engine hanger bolt (engine side)	2	8	32 (3.3, 24)	

TOOLS

Valve spring compressor
07757-0010000



Seat cutter, 40 mm (45° IN)
07780-0010500

or equivalent commercially available in U.S.A.

Seat cutter, 33 mm (45° EX)
07780-0010800

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, 33 mm (32° EX)
07780-0012900

or equivalent commercially available in U.S.A.

Interior cutter, 37.5 mm (60° IN)
07780-0014100

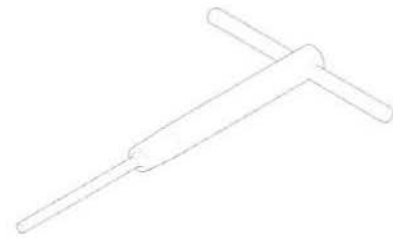
or equivalent commercially available in U.S.A.

Interior cutter, 34 mm (60° EX)
07780-0014700

or equivalent commercially available in U.S.A.

Valve guide driver, 6 mm
07942-6570100

Cutter holder, 6 mm
07VMH-MBB0100



or equivalent commercially available in U.S.A.

Valve guide reamer, 6 mm
07VMH-MBB0200

or 07VMH-MBB020A (U.S.A. only)

TROUBLESHOOTING

- Engine top-end problems usually affect engine performance. These problems can be diagnosed by a compression test, or by tracing top-end noise with a sounding rod or stethoscope.
- If the performance is poor at low speeds, check for a white smoke in the crankcase breather hose. If the hose is smoky, check for seized piston ring (page 11-2).

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

- Valves
  - Incorrect valve adjustment
  - Burned or bent valves
  - Incorrect valve timing
  - Broken valve spring
  - Uneven valve seating
  - Valve stuck open
- Cylinder head
  - Leaking or damaged cylinder head gasket
  - Warped or cracked cylinder head
  - Loose spark plug
- Cylinder/piston problem (page 11-3)

Compression too high

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

Excessive smoke

- Worn valve stem or valve guide
- Damaged stem seal
- Cylinder/piston problem (page 11-3)

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 11-3)

Rough idle

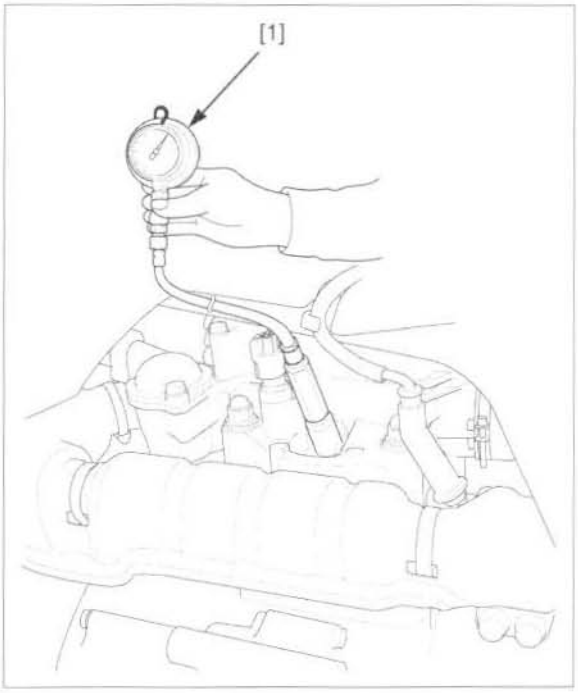
- Low cylinder compression

CYLINDER COMPRESSION

Warm up the engine to normal operating temperature.

Stop the engine and remove the spark plug (page 3-8). Install the compression gauge [1] into the spark plug hole.

Shift the transmission into 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.



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

COMPRESSION PRESSURE:
600 kPa (6.1 kgf/cm², 87 psi) at 400 rpm

Check that there is no leakage at the gauge connection.

Low compression can be caused by:
- blown cylinder head gasket
- improper valve adjustment
- valve leakage
- worn piston ring or cylinder

High compression can be caused by:
- carbon deposits in combustion chamber or on piston head

CYLINDER HEAD COVER REMOVAL/ DISASSEMBLY

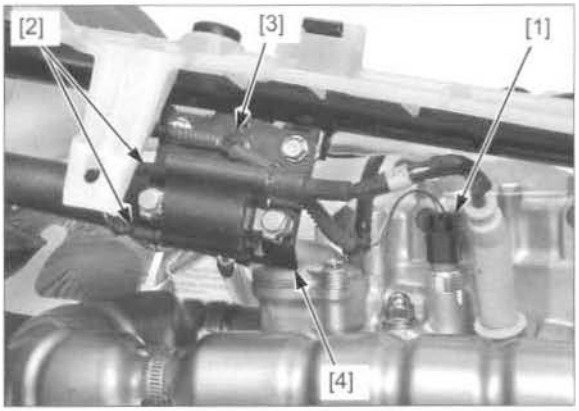
REMOVAL

Remove the following:

- fuel tank (page 7-20)
- injector side quick connect fitting (page 7-11)

Disconnect the ECT sensor 2P connector [1] and ignition coil primary wire connectors [2].

Remove the ignition coil primary wire clip [3] from the ignition coil bracket [4].

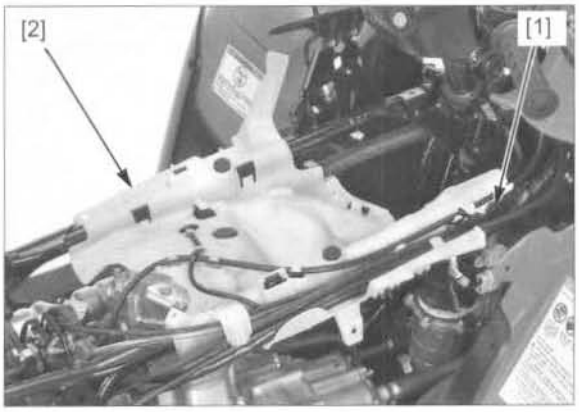


Remove the trim clip [1].

Be careful not to bend or kink the fuel feed hose.

Release the wires, cables and hoses from the clamps of the heat guard plate [2].

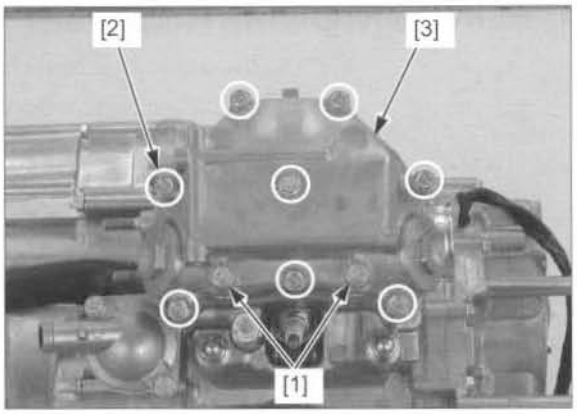
Remove the heat guard plate from the frame.



Set the piston position to Top Dead Center on the compression stroke (page 3-9).

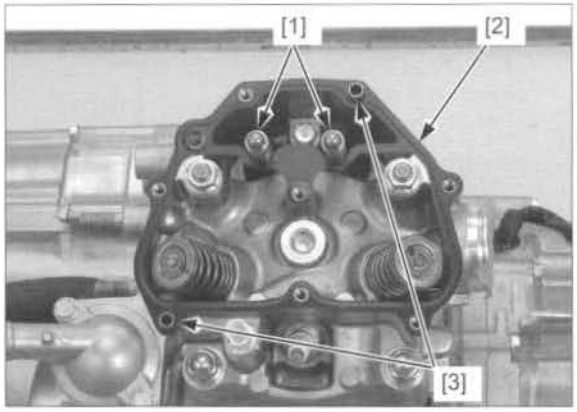
If you plan to remove the rocker arms, loosen the two rocker arm shaft retaining bolts [1].

Remove the following:
- eight cylinder head cover bolts [2]
- cylinder head cover [3]



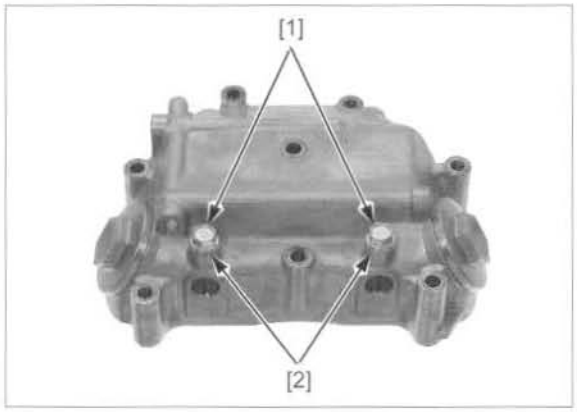
Mark the push rods so they can be placed back in their original locations.

- push rods [1]
- gasket [2]
- two dowel pins [3]



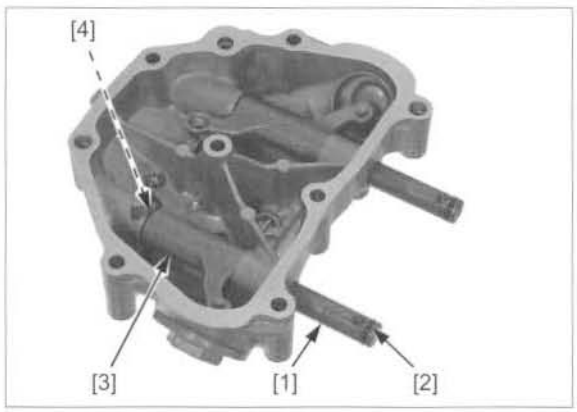
DISASSEMBLY

Remove the two rocker arm shaft retaining bolts [1] and sealing washers [2].



Push each rocker arm shaft [1] with a small screwdriver through the bolt hole until the O-ring [2] on the shaft is removed out of the head cover.

Remove the following:
- rocker arm shafts
- rocker arms [3]
- setting plates [4]
- O-rings



INSPECTION

ROCKER ARM/SHAFT

Check the rocker arms and shafts for wear or damage.
If the rocker arm follower is worn or damaged, check the push rod and oil passage.

Measure the each rocker arm shaft O.D.

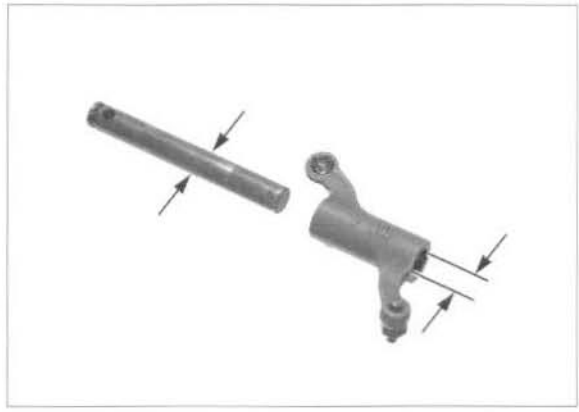
SERVICE LIMIT: 11.92 mm (0.469 in)

Measure each rocker arm I.D.

SERVICE LIMIT: 12.05 mm (0.474 in)

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

SERVICE LIMIT: 0.08 mm (0.003 in)



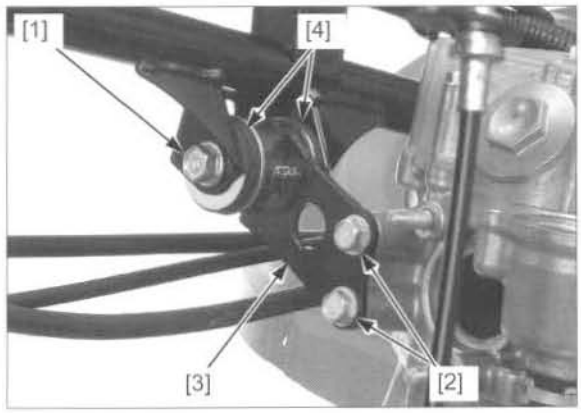
PUSH ROD

Check the push rods for wear or damage.
If the push rod is worn or damaged, check the cam follower and camshaft (page 10-20).

CYLINDER HEAD REMOVAL

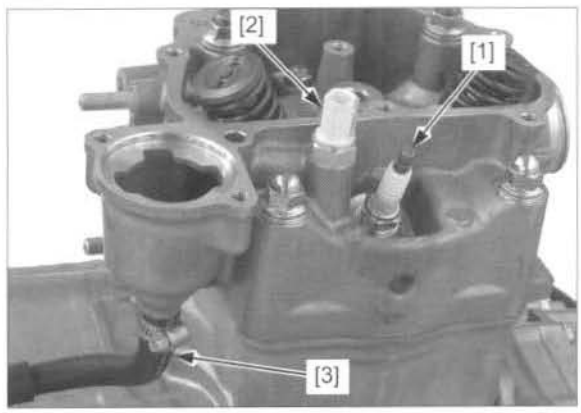
Remove the following:

- throttle body (page 7-23)
- exhaust system (page 2-14)
- thermostat (page 8-8)
- upper engine hanger nut and bolt (frame side) [1]
- upper engine hanger bolts (engine side) [2]
- engine hanger bracket [3] and mounting rubbers [4]
- cylinder head cover (page 10-7)



- spark plug [1]
- ECT sensor [2] and O-ring

Disconnect the water hose [3] from the cylinder head.

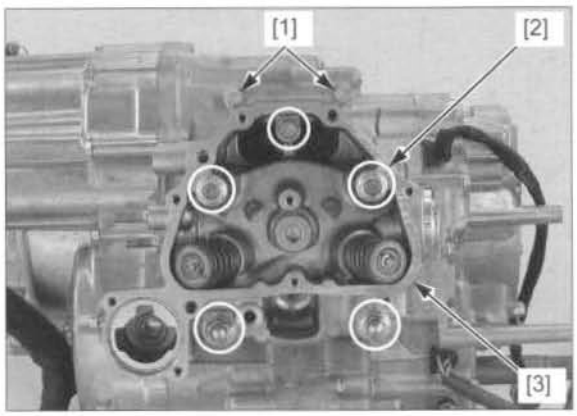


Loosen the two cylinder bolts [1].

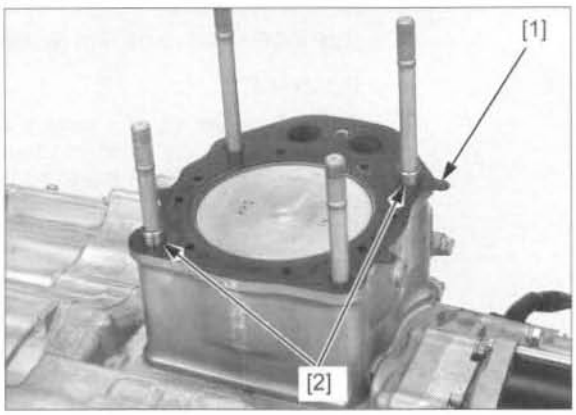
Be careful not to let the nuts and washers fall into the crankcase.

Loosen the cylinder head bolt and nuts [2] in a crisscross pattern in several steps, and remove the bolt, nuts and washers.

Remove the cylinder head [3], being careful not to damage the mating surfaces.



Remove the gasket [1] and two dowel pins [2].



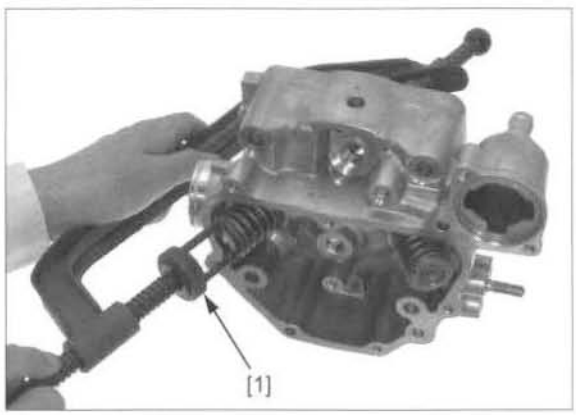
CYLINDER HEAD DISASSEMBLY

Remove the cylinder head (page 10-9).

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

Remove the valve spring cotters using the valve spring compressor [1].

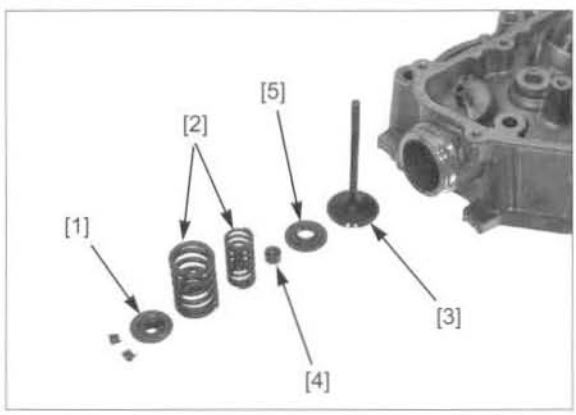
TOOL:
Valve spring compressor **07757-0010000**



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

Remove the following:

- spring retainer [1]
- outer and inner valve springs [2]
- valve [3]
- stem seal [4]
- spring seat [5]

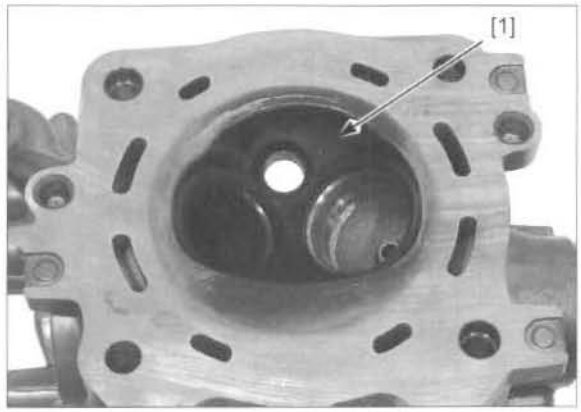


INSPECTION

CYLINDER HEAD

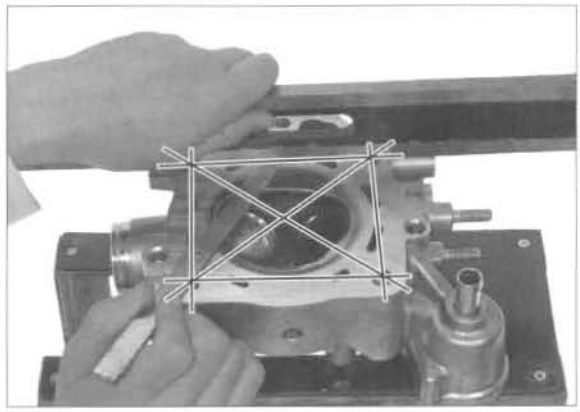
Be careful not to damage the valve seat and gasket surfaces.

Remove the carbon deposits from the combustion chamber [1].
Check the spark plug hole and valve areas for cracks.



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

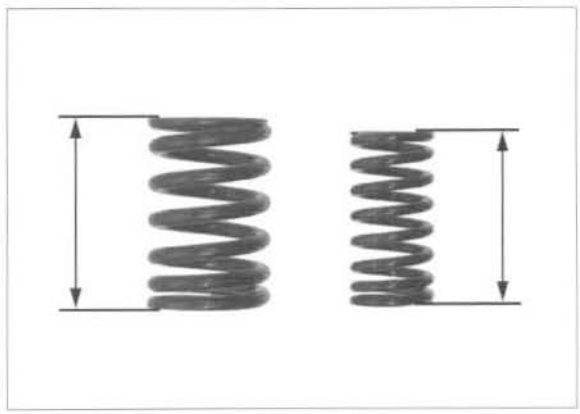
SERVICE LIMIT: 0.10 mm (0.004 in)



VALVE SPRING

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

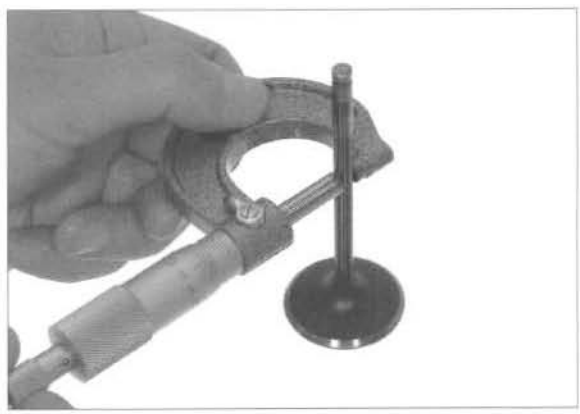
SERVICE LIMITS: Inner: 42.08 mm (1.657 in)
Outer: 42.76 mm (1.683 in)



VALVE/ VALVE GUIDE

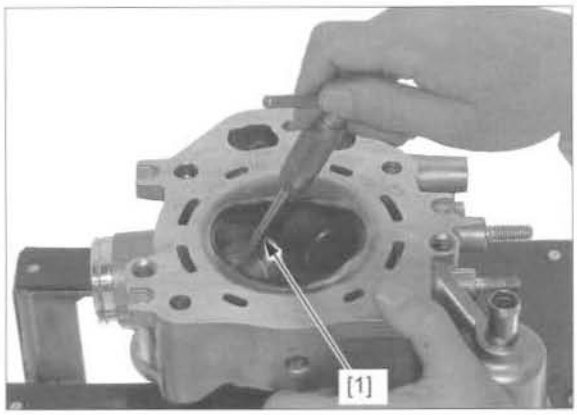
Check that the valve moves smoothly in the guide.
Check the valve for bending, burning or abnormal wear.
Measure each valve stem O.D. and record it.

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



Ream the valve guides to remove any carbon build-up before measuring the guide.
Insert the valve guide reamer [1] from the combustion chamber side of the cylinder head and always rotate the reamer clockwise.

TOOL:
Valve guide reamer, 6 mm **07VMH-MBB0200 or 07VMH-MBB020A (U.S.A. only)**

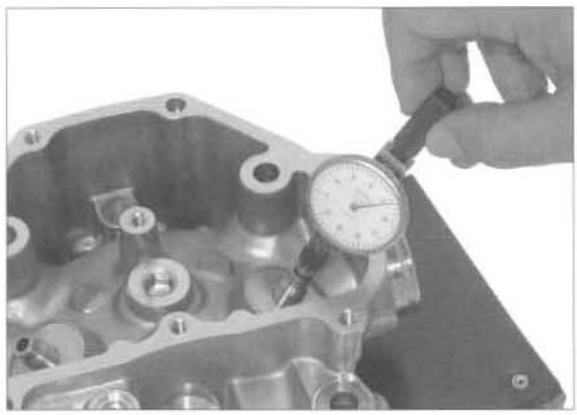


Measure each valve guide I.D. and record it.

SERVICE LIMITS: IN/EX: 6.02 mm (0.237 in)

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

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



Inspect and reface the valve seats whenever the valve guides are replaced (page 10-13).

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

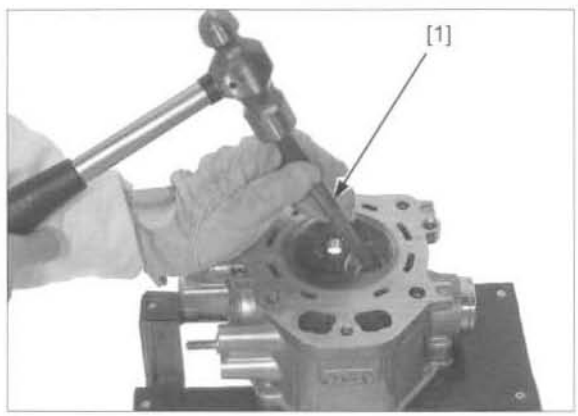
Mark new valve guide at the specified height indicated below, using a marker.
Chill the new valve guides in a freezer for about an hour.

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

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

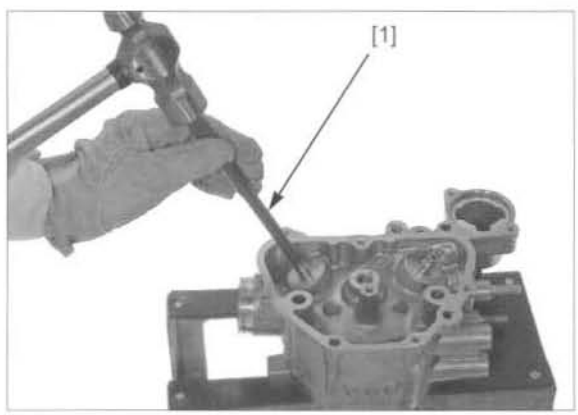
TOOL:
[1] Valve guide driver, 6 mm **07942-6570100**



Remove the new valve guides from the freezer.
While the cylinder head is still heated, drive each valve guide in the cylinder head from the rocker arm side until the exposed height is at the specified value (at the mark).

TOOL:
[1] Valve guide driver, 6 mm **07942-6570100**

VALVE GUIDE PROJECTION:
IN/EX: 14.8 – 15.0 mm (0.58 – 0.59 in)



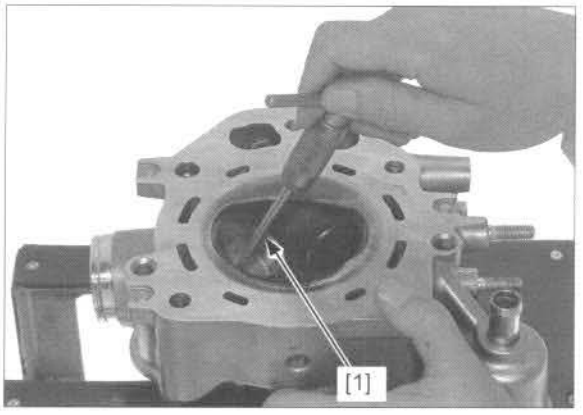
Let the cylinder head cool to room temperature.

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

Ream the new valve guides.
Insert the reamer from the combustion chamber side of the cylinder head and always rotate the reamer clockwise.

TOOL:
[1] Valve guide reamer, 6 mm **07VMH-MBB0200 or 07VMH-MBB020A (U.S.A. only)**

Clean the cylinder head thoroughly to remove any metal particles after reaming and reface the valve seat (page 10-13).

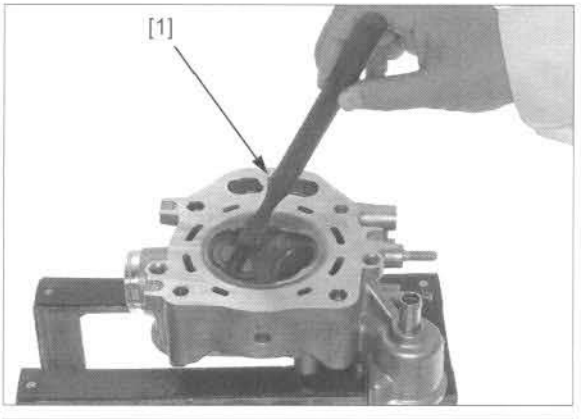


VALVE SEAT INSPECTION/REFACING

INSPECTION

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

Apply a light coating of Prussian Blue to each valve seat.
Tap the valve against the valve seat several times using the hand-lapping tool [1] 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.

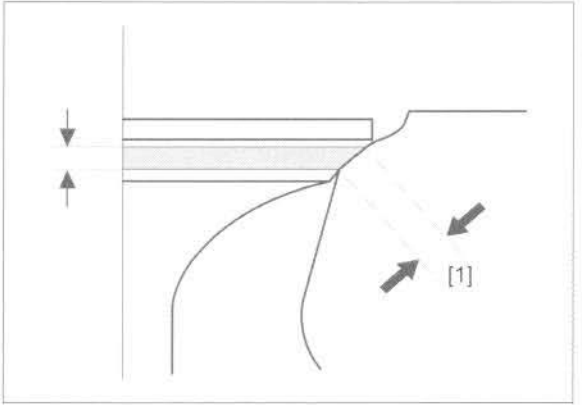
Remove the valve and inspect the valve seat face.
The valve seat contact should be within the specified seat width [1] and even all around the circumference.

STANDARD: 1.2 mm (0.05 in)
SERVICE LIMIT: 1.5 mm (0.06 in)

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

Inspect the valve seat face for:

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



REFACING

Follow the refacing manufacturer's operating instructions.

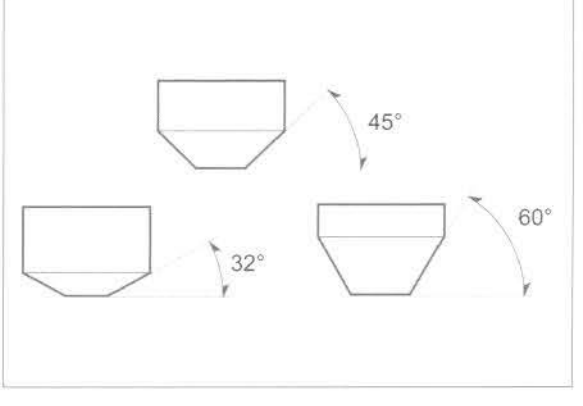
Valve seat cutters/grinders or equivalent valve seat refacing equipment are recommended to correct worn valve seats.

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

TOOLS:

Seat cutter, 40 mm (45° IN)	**07780-0010500**
Seat cutter, 33 mm (45° EX)	**07780-0010800**
Cutter holder, 6 mm	**07VMH-MBB0100**

or equivalent commercially available in U.S.A.



TOOLS:

Flat cutter, 38.5 mm (32° IN)	**07780-0012400**
Flat cutter, 33 mm (32° EX)	**07780-0012900**
Cutter holder, 6 mm	**07VMH-MBB0100**

or equivalent commercially available in U.S.A.

TOOLS:

Interior cutter, 37.5 mm (60° IN)	**07780-0014100**
Interior cutter, 34 mm (60° EX)	**07780-0014700**
Cutter holder, 6 mm	**07VMH-MBB0100**

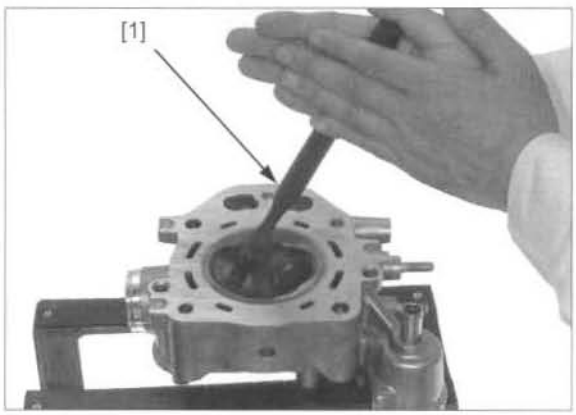
or equivalent commercially available in U.S.A.

After cutting the seat, apply lapping compound to the valve face, and lap the valve using a hand-lapping tool [1] with a light pressure.

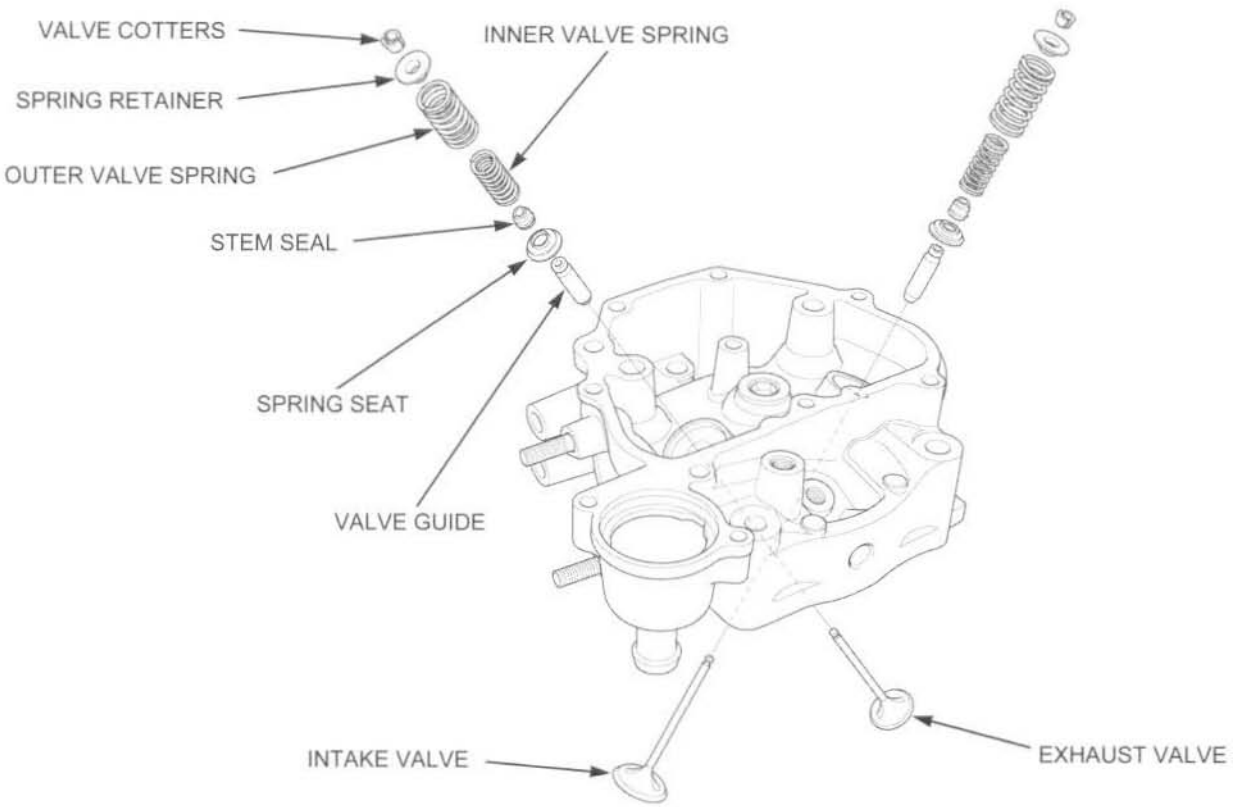
NOTE:

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

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

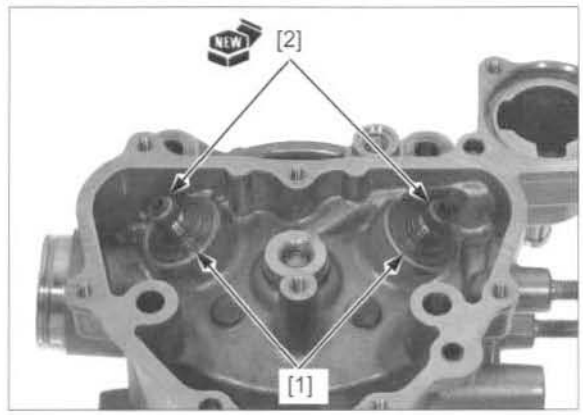


CYLINDER HEAD ASSEMBLY



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

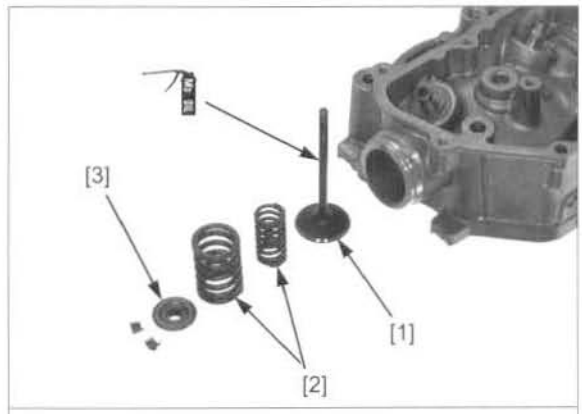
Install the spring seats [1] and new stem seals [2].

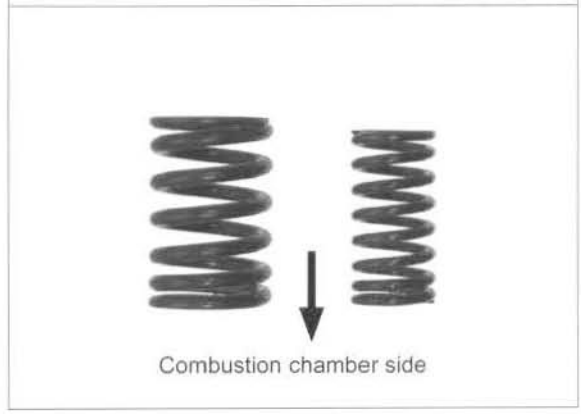


Lubricate the valve [1] stem sliding surface with molybdenum oil solution.
Insert the valve into the guide while turning it slowly to avoid damaging the stem seal.

Install the inner and outer valve springs [2] with the tightly wound coils facing the combustion chamber.

Install the spring retainer [3].

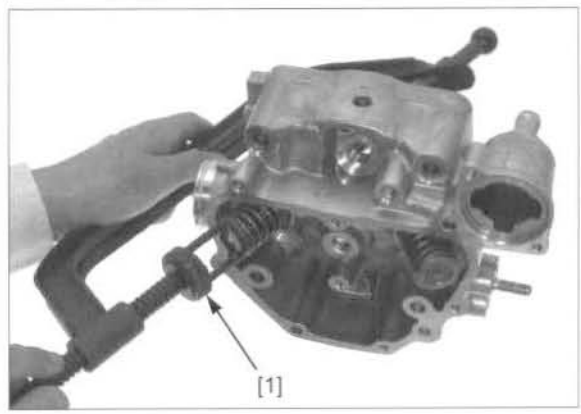




Grease the cotters to ease installation. To prevent loss of tension, do not compress the valve springs more than necessary.

Install the valve spring cotters using the valve spring compressor [1].

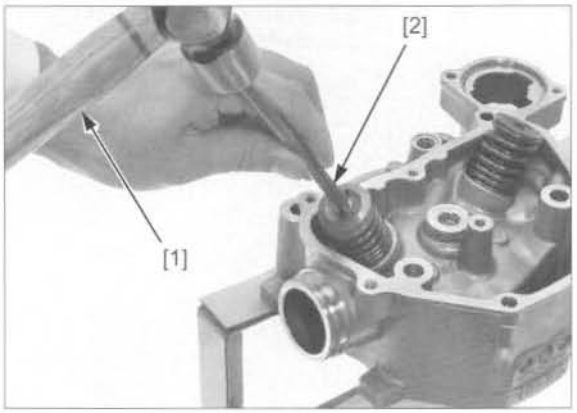
TOOL:
Valve spring compressor **07757-0010000**



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

Tap the valve stems gently with a hammer [1] and a shaft [2] as shown to seat the cotters firmly.

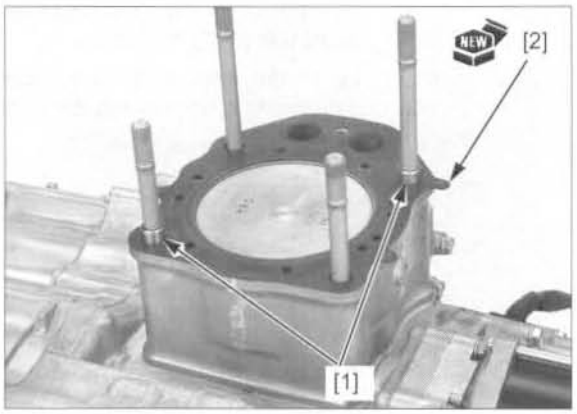
Install the cylinder head (page 10-16).



CYLINDER HEAD INSTALLATION

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

Install the two dowel pins [1] and a new gasket [2] with the mark facing up.



Install the cylinder head on the cylinder.

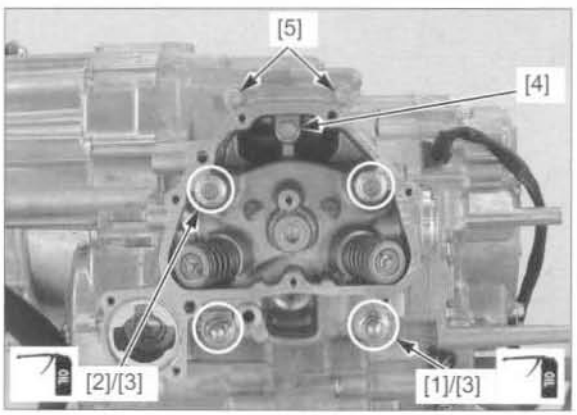
Be careful not to let the nuts and washers fall into the crankcase.

Apply engine oil to the threads and seating surface of the cap nuts [1] and flange nuts [2], and install the washers [3] and nuts.
Tighten the nuts to the specified torque in a crisscross pattern in several steps.

TORQUE: 48 N·m (4.9 kgf·m, 35 lbf·ft)

Install the cylinder head bolt [4] and tighten it securely.

Tighten the two cylinder bolts [5] securely.



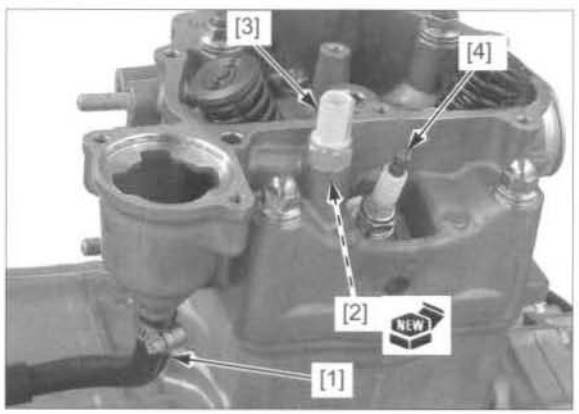
Connect the water hose [1] to the cylinder head.

Install a new O-ring [2] onto the ECT sensor [3].
Install the ECT sensor and tighten it to the specified torque.

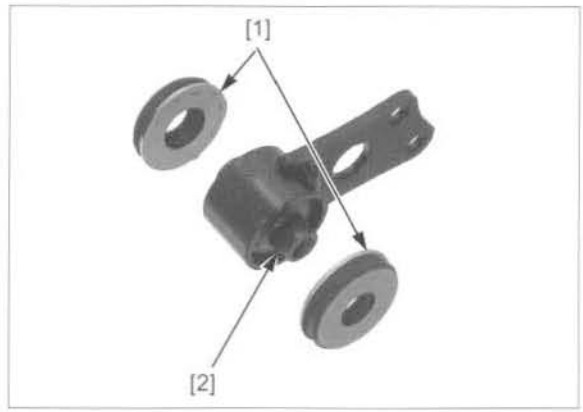
TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Install the spark plug [4] and tighten it to the specified torque.

TORQUE: 22 N·m (2.2 kgf·m, 16 lbf·ft)



Install the mounting rubbers [1] onto the hanger bracket bushing [2] with the large I.D. side facing in.

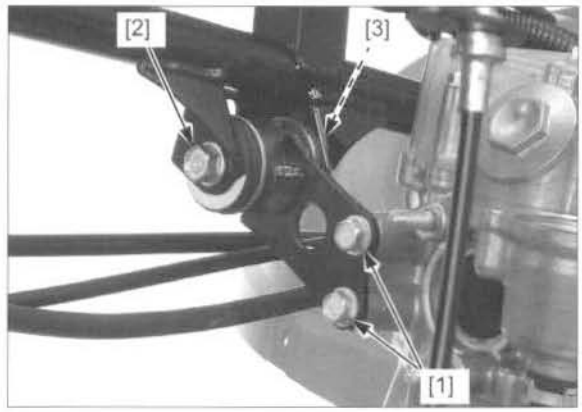


Insert the 10 mm (frame side) bolt from the front side.

Install the engine hanger bracket with the 8-mm bolts [1], 10-mm bolt [2] and nut [3].

Tighten the engine hanger bolts and nut to the specified torque.

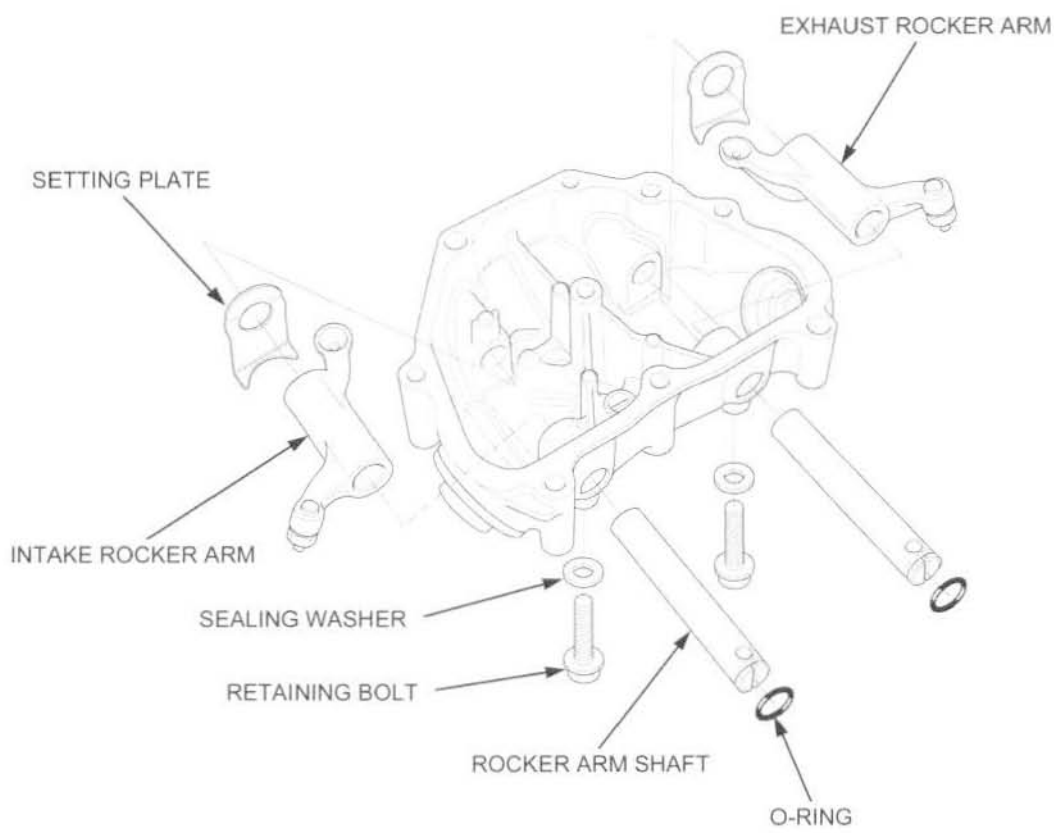
TORQUE:
10 mm nut: 54 N·m (5.5 kgf·m, 40 lbf·ft)
8 mm bolt: 32 N·m (3.3 kgf·m, 24 lbf·ft)



Install the following:
- cylinder head cover (page 10-17)
- throttle body (page 7-25)
- exhaust system (page 2-14)
- thermostat (page 8-8)

CYLINDER HEAD COVER ASSEMBLY/ INSTALLATION

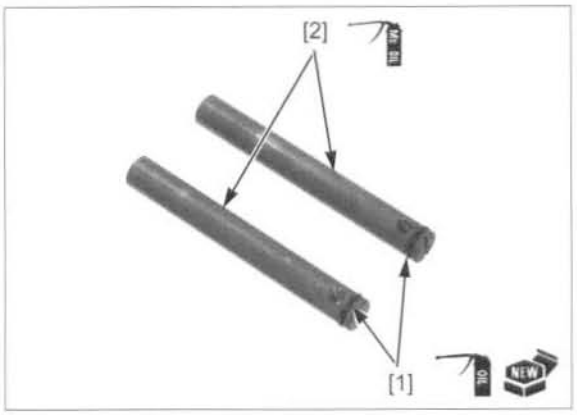
ASSEMBLY



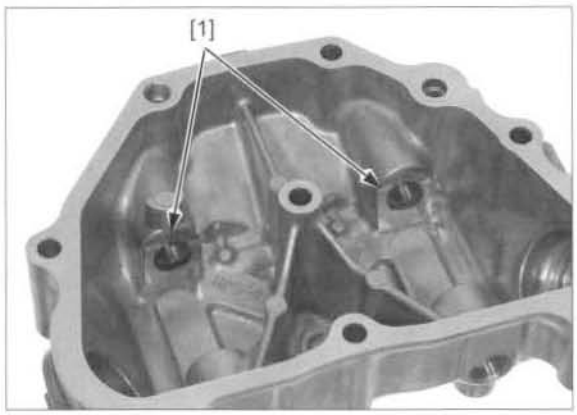
Blow through the oil passages in the cylinder head cover with compressed air.

Coat new O-rings [1] with engine oil and install them into the grooves in the rocker arm shafts [2].

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



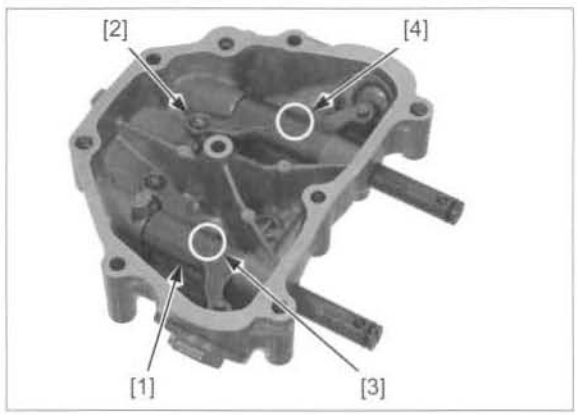
Place the setting plates [1] on the cylinder head cover as shown.



Install the intake rocker arm [1] and exhaust rocker arm [2] properly, and insert the rocker arm shafts.

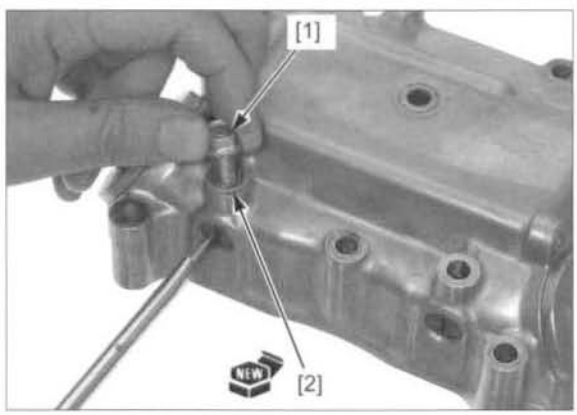
NOTE:

Intake rocker arm has "IN" mark [3] and exhaust rocker arm has "EX" mark [4].



Align the bolt holes in the cylinder head cover and rocker arm shaft by turning the shaft with a screwdriver.

Install the rocker arm shaft retaining bolts [1] with new sealing washers [2].
Tighten the retaining bolts securely.

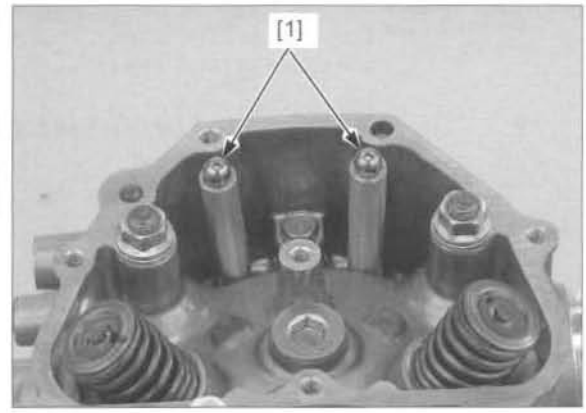


INSTALLATION

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

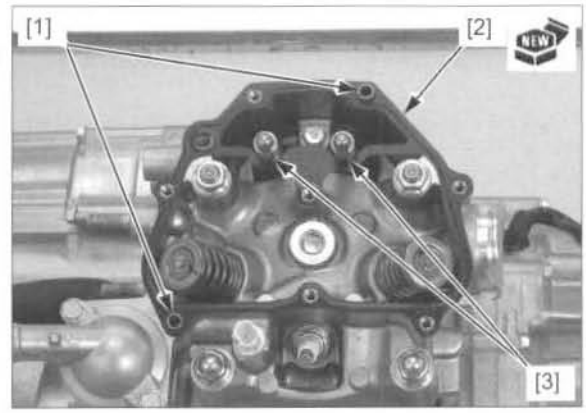
Install the push rods [1] onto the cam followers.

Make sure the piston is TDC (Top Dead Center) on the compression stroke by checking the push rod height.
If the exhaust side push rod height is high, rotate the crankshaft clockwise one full turn and align the "T" mark with the index mark again.



Install the two dowel pins [1] and a new gasket [2].

Rest the push rods onto the gasket grooves [3] as shown.

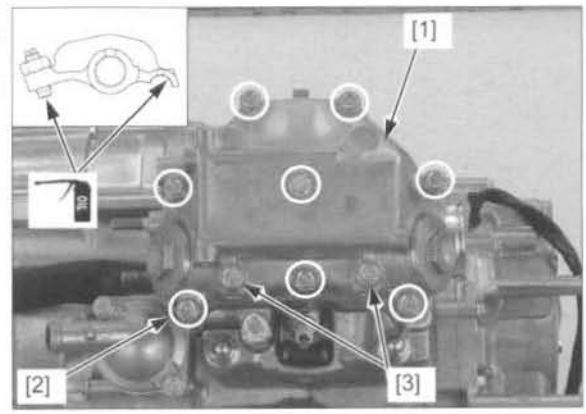


Apply engine oil to the rocker arm followers and adjusting screw tips, and install the cylinder head cover [1].
Make sure there is no clearance at the mating surface of the cylinder head and cover.

Install the eight bolts [2] and tighten them in a crisscross pattern in several steps.

Tighten the rocker arm shaft retaining bolts [3] securely.

Adjust the valve clearance (page 3-9).

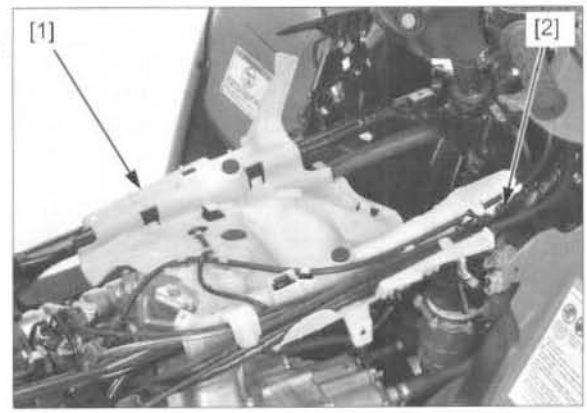


Be careful not to damage the fuel feed hose.

Install the heat guard plate [1] onto the frame.

Route the hoses, cables and wires into the clamps of the heat guard plate properly (page 1-23).

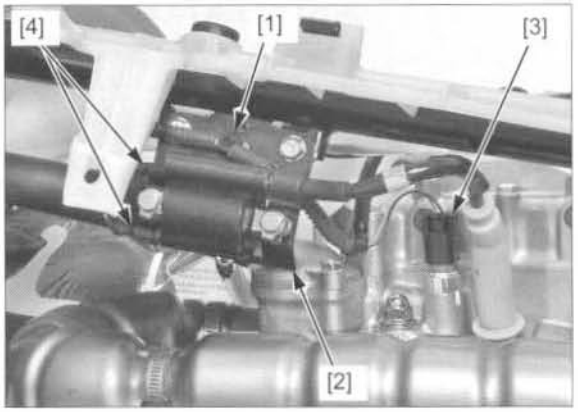
Install the trim clip [2].



Install the ignition coil primary wire clip [1] to the ignition coil bracket [2].

Connect the ECT sensor 2P connector [3] and ignition coil primary connectors [4].

Install the following:
- quick connect fitting (page 7-9)
- fuel tank (page 7-20)

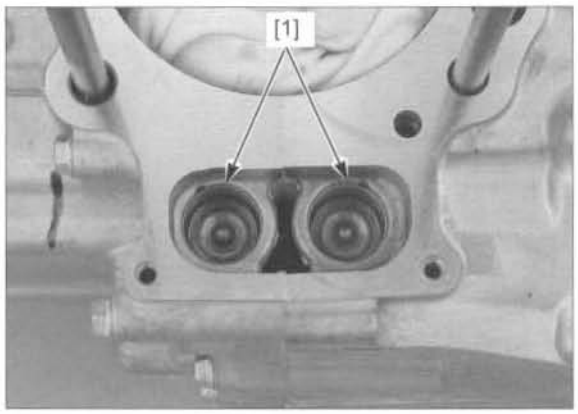


CAMSHAFT REMOVAL

Remove the following:
- cylinder (page 11-4)
- primary drive gear (page 12-13)

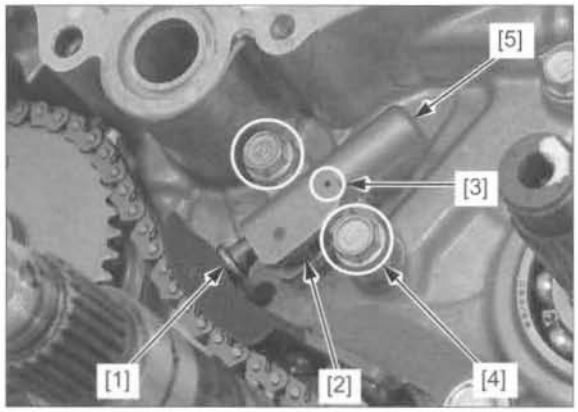
Mark the followers so they can be placed back in their original locations.

Remove the cam followers [1] from the crankcase.

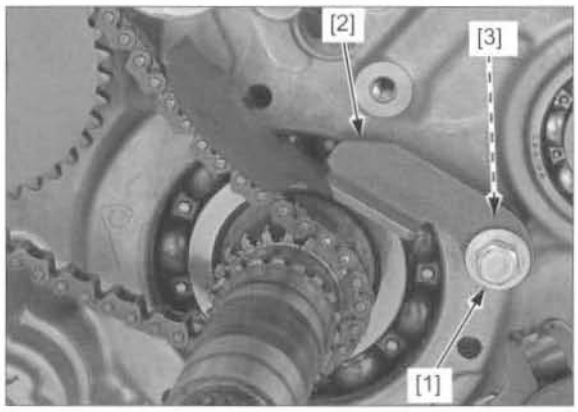


Push in the tensioner lifter shaft [1] while pressing the ratchet pawl [2] and insert a pin into the hole [3] to hold the tensioner lifter shaft.

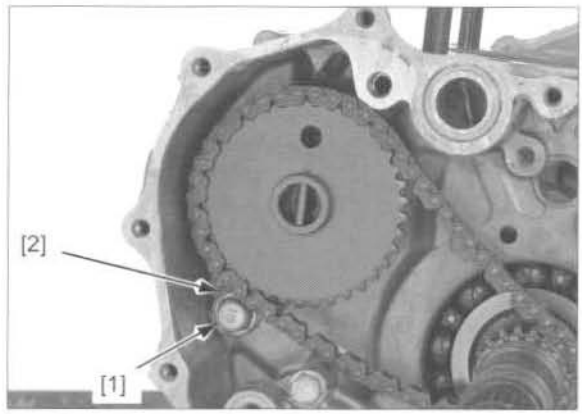
Remove the two bolts [4] and cam chain tensioner lifter [5].



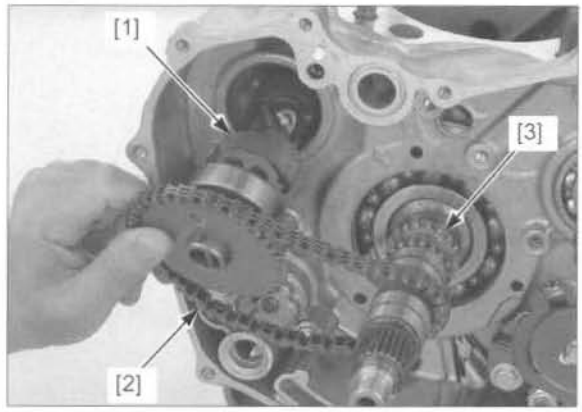
Remove the following:
- tensioner pivot bolt [1]
- cam chain tensioner [2]
- washer [3]



– bolt [1] and bearing setting plate [2]



Remove the bearing of the camshaft [1] from the crankcase, derail the cam chain [2] from the timing sprocket [3] of the crankshaft, and remove the camshaft and cam chain.

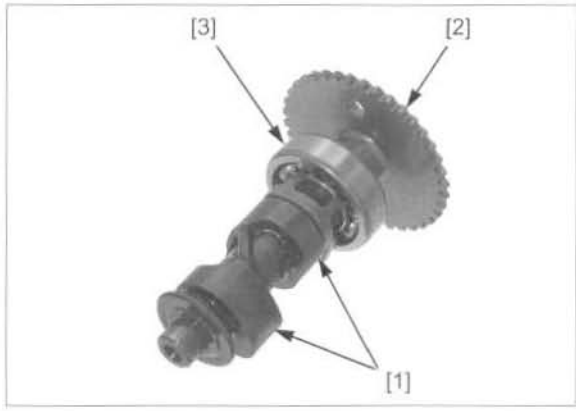


INSPECTION

CAMSHAFT

Check the cam lobe surfaces [1] for scoring, scratches or evidence of insufficient lubrication.
Check the cam sprocket teeth [2] for wear or damage.

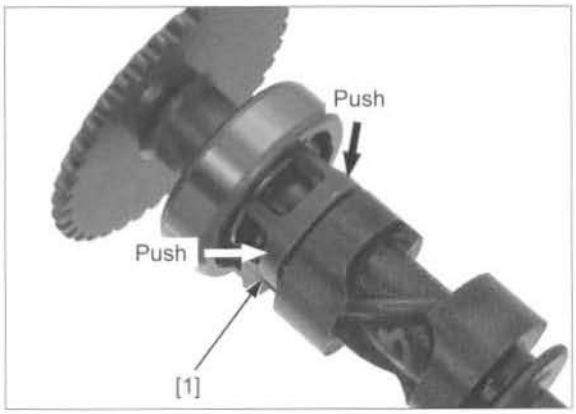
Turn the outer race of the bearing [3] with your finger. The bearing should turn smoothly and quietly.
Replace the camshaft assembly if the bearing does not turn smoothly and quietly.



Measure each cam lobe height.

SERVICE LIMITS: IN: 35.74 mm (1.407 in)
EX: 35.48 mm (1.397 in)

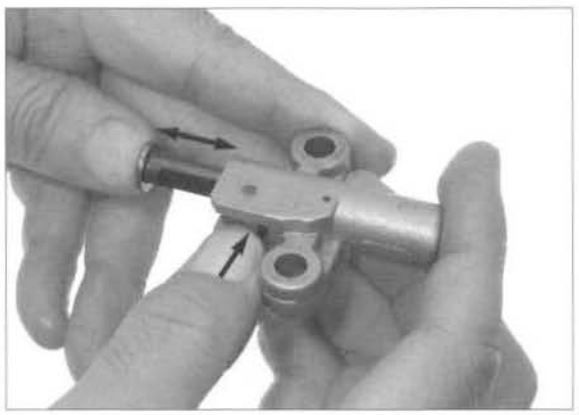
Check the decompressor cam [1] operation.
Press on the decompressor cam as shown.
As you press on one side, the decompressor cam should lock above the base circle of the exhaust cam lobe.
As you press on other side, the decompressor lobe will drop below the base circle of the exhaust cam lobe.



CAM CHAIN TENSIONER

Check the slipper surface [1] of the tensioner for wear or damage.

Check the tensioner lifter operation:
- The tensioner lifter shaft should not go into the body when it is pushed.
- When the ratchet pawl is pressed in, the tensioner shaft should be pushed into the lifter body and the shaft springs out of the body.

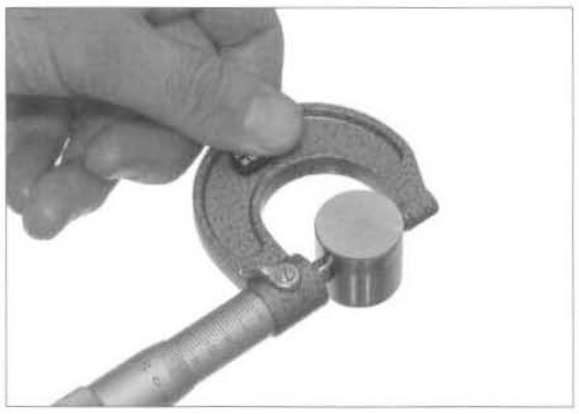


CAM FOLLOWER

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

Measure each follower O.D.

SERVICE LIMIT: 22.46 mm (0.884 in)

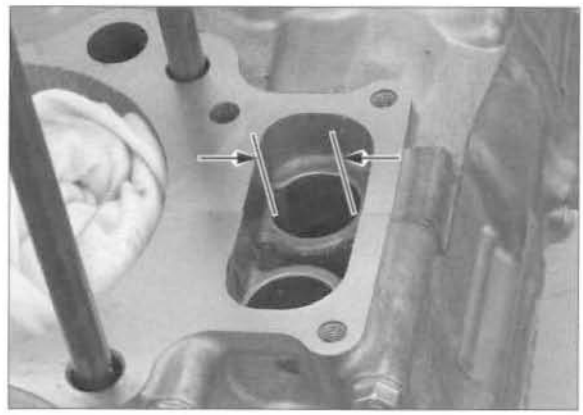


Measure each follower bore I.D.

SERVICE LIMIT: 22.54 mm (0.887 in)

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

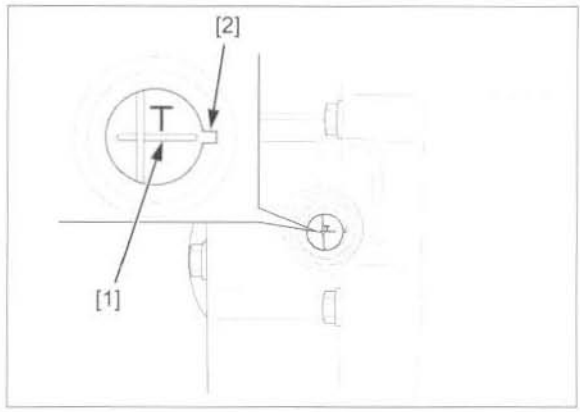
SERVICE LIMIT: 0.07 mm (0.003 in)



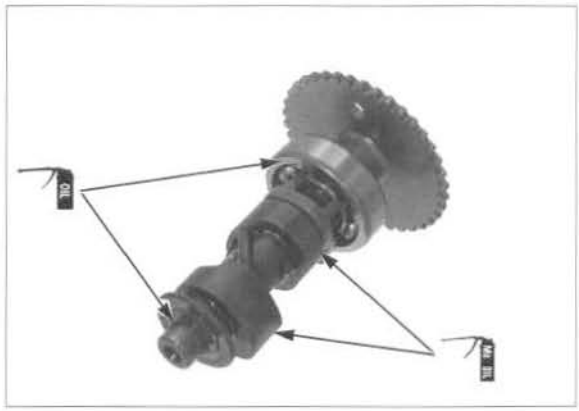
CAMSHAFT INSTALLATION

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

Rotate the crankshaft to align the "T" mark [1] on the flywheel with the index mark [2] on the crankcase cover.

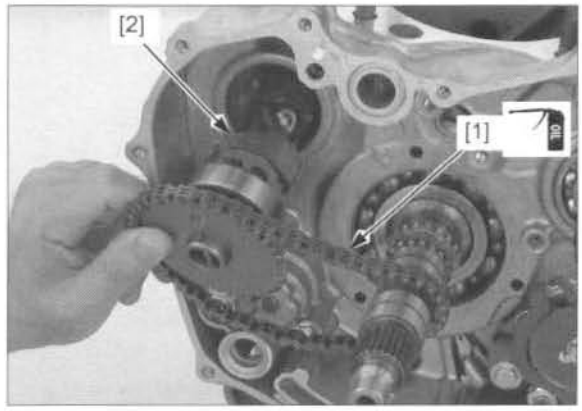


Lubricate the camshaft bearing and journal with engine oil.
Apply molybdenum oil solution to the cam lobes.



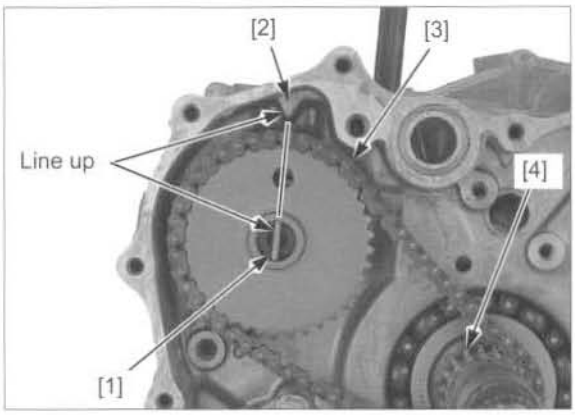
Lubricate the cam chain [1] whole surface with engine oil and install it on the cam sprocket.

Loosely install the camshaft [2] into the crankcase.

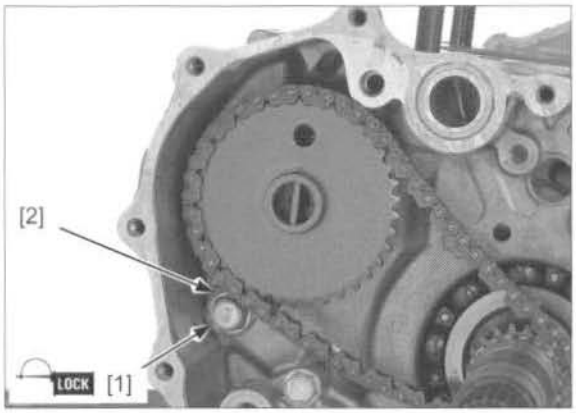


Do not turn the crankshaft during installation.

Line up the camshaft pin [1] and index mark (▽) [2] on the crankcase with the sprocket hole facing up and install the cam chain [3] over the timing sprocket [4] on the crankshaft.
Install the camshaft into the crankcase completely and make sure that the camshaft pin and index mark (▽) line up.

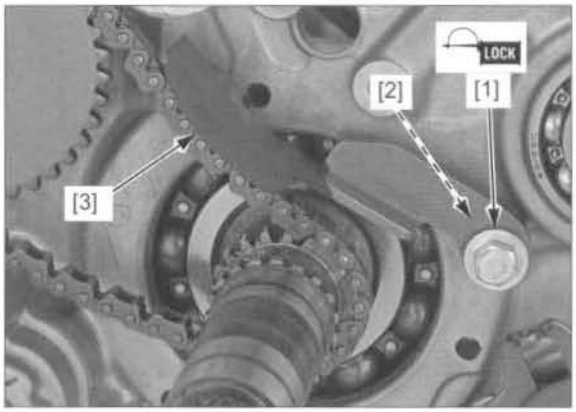


Apply locking agent to the threads of the setting plate bolt [1].
Install the bearing setting plate [2] onto the crankcase and tighten the bolt securely.

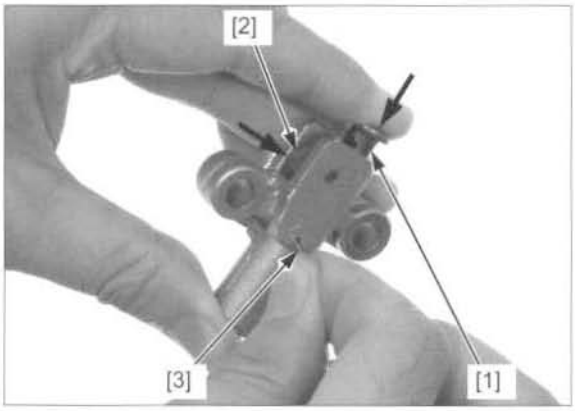


Apply locking agent to the threads of the tensioner pivot bolt [1].
Install the washer [2] (in between the tensioner and crankcase), cam chain tensioner [3] and pivot bolt, and tighten the bolt to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)



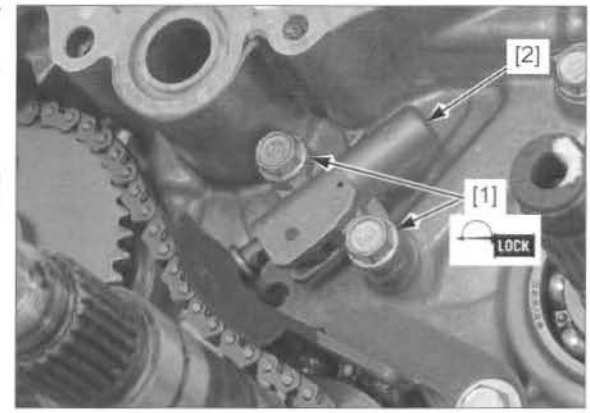
Push in the tensioner lifter shaft [1] while pressing the ratchet pawl [2] and insert a pin [3] into the hole to hold the tensioner lifter shaft.



Apply locking agent to the threads of the tensioner lifter bolt [1].
Install the tensioner lifter [2] and tighten the bolts securely.

Remove the pin from the tensioner lifter.

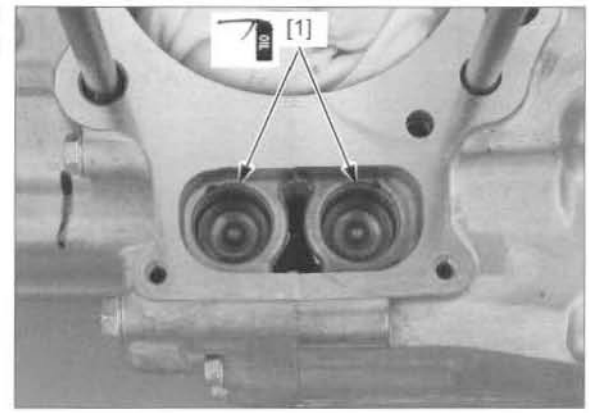
Make sure that the camshaft pin and index mark (▽) line up when the "T" mark on the flywheel is aligned with the index mark on the crankcase cover.



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

Apply engine oil to the whole surfaces of the cam followers [1] and install them into the crankcase with the opening facing up.

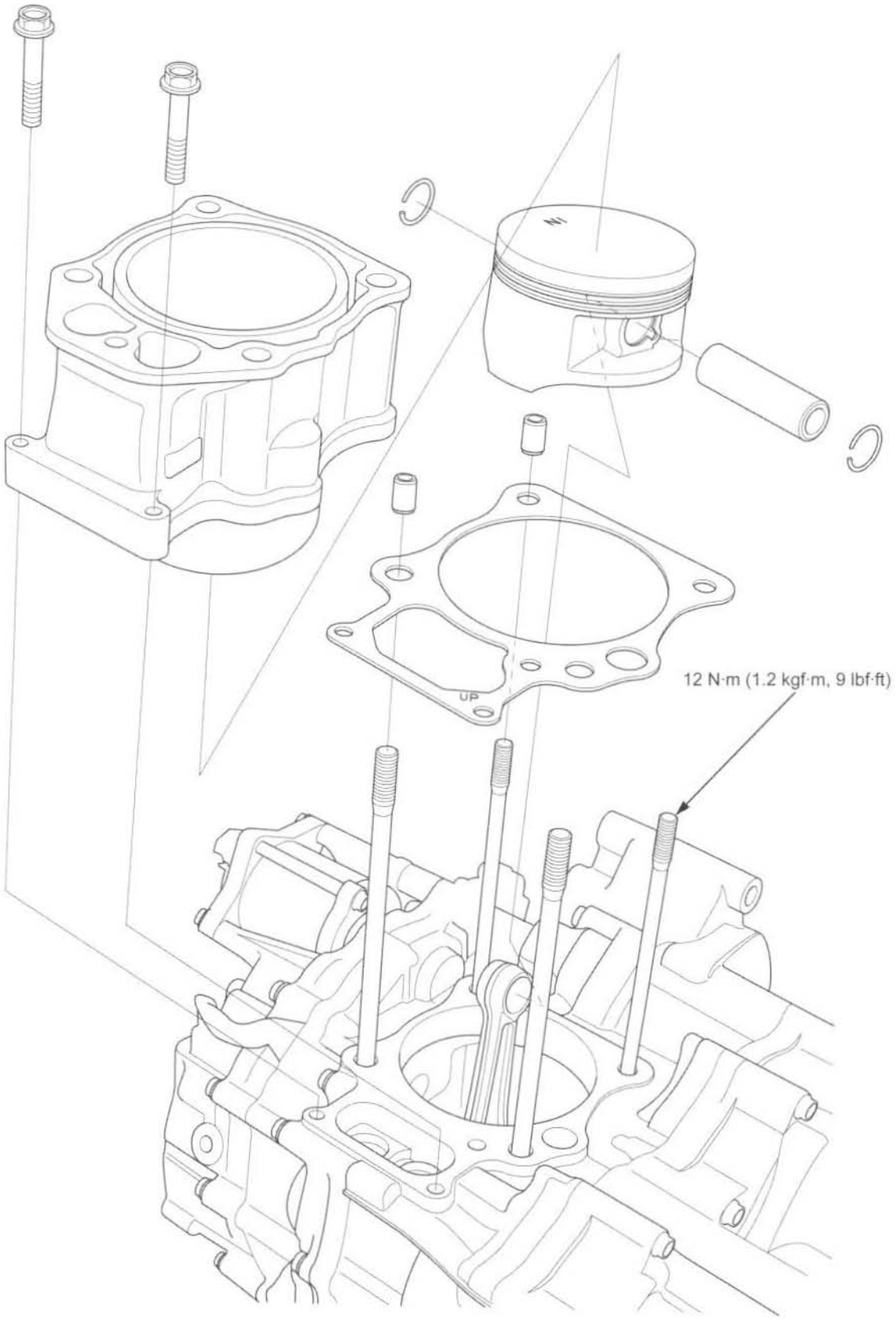
Install the following:
- change clutch (page 12-17)
- cylinder (page 11-9)



MEMO

11. 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.

SPECIFICATIONS

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Cylinder	I.D.		92.000 – 92.010 (3.6220 – 3.6224)	92.10 (3.626)
	Out-of-round		–	0.10 (0.004)
	Taper		–	0.10 (0.004)
	Warpage		–	0.10 (0.004)
Piston, pis-ton pin, piston ring	Piston O.D. at 15 (0.6) from bottom		91.970 – 91.990 (3.6209 – 3.6216)	91.90 (3.618)
	Piston pin hole I.D.		19.002 – 19.008 (0.7481 – 0.7483)	19.04 (0.750)
	Piston pin O.D.		18.994 – 19.000 (0.7478 – 0.7480)	18.96 (0.746)
	Piston-to-piston pin clearance		0.002 – 0.014 (0.0001 – 0.0006)	0.08 (0.003)
	Piston ring end gap	Top	0.15 – 0.30 (0.006 – 0.012)	0.5 (0.02)
		Second	0.30 – 0.45 (0.012 – 0.018)	0.6 (0.02)
		Oil (side rail)	0.20 – 0.70 (0.008 – 0.028)	0.9 (0.04)
	Piston ring-to-ring groove clearance	Top	0.030 – 0.060 (0.0012 – 0.0024)	0.09 (0.004)
		Second	0.030 – 0.060 (0.0012 – 0.0024)	0.09 (0.004)
Cylinder-to-piston clearance			0.010 – 0.040 (0.0004 – 0.0016)	0.10 (0.004)
Connecting rod small end I.D.			19.020 – 19.041 (0.7488 – 0.7496)	19.07 (0.751)
Connecting rod-to-piston pin clearance			0.020 – 0.047 (0.0008 – 0.0019)	0.10 (0.004)

TORQUE VALUE

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Cylinder stud bolt	4	10	12 (1.2, 9)	See page 11-8

TROUBLESHOOTING

Compression too low, hard starting or poor performance at low speed
- Leaking cylinder head gasket
- Worn, stuck or broken piston ring
- Worn or damaged cylinder and piston

Compression too high, overheating or knocking
- Excessive carbon build-up on piston head or combustion chamber

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

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

CYLINDER/PISTON REMOVAL

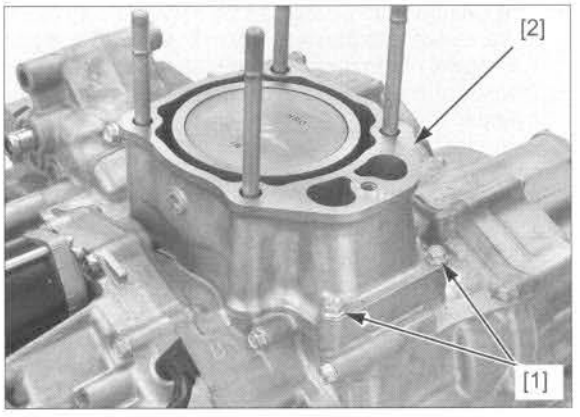
CYLINDER REMOVAL

Remove the cylinder head (page 10-7)

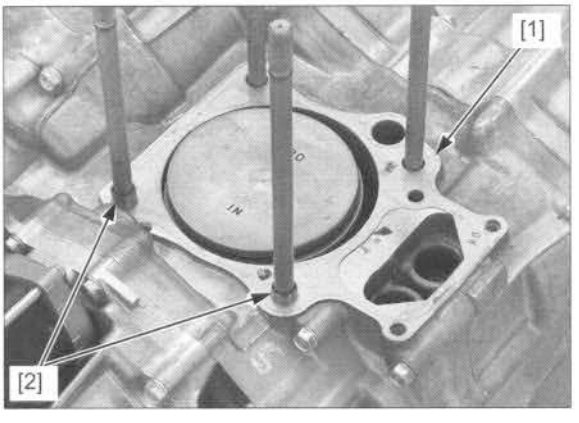
Remove the two bolts [1].

Do not use a screwdriver or other tool to pry the cylinder off as it could damage the mating surface.

Lift the cylinder [2] and remove it, being careful not to damage the piston and piston rings with the stud bolts.



Remove the gasket [1] and the two dowel pins [2].

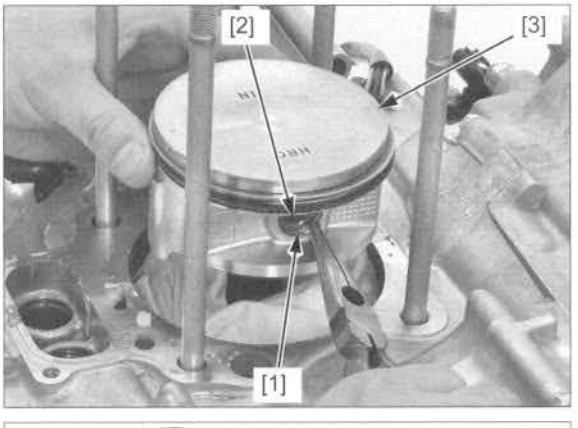


PISTON REMOVAL

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

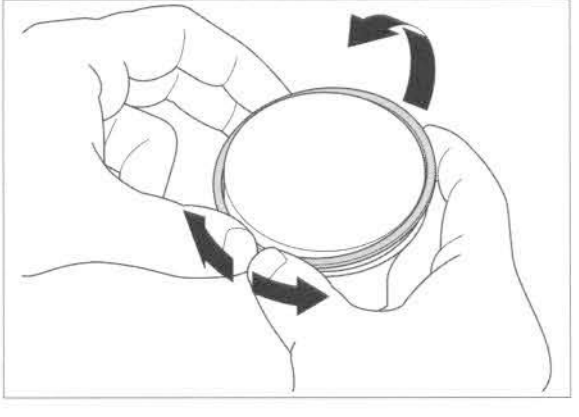
Remove the piston pin clips [1] with the pliers.

Push the piston pin [2] out of the piston and connecting rod, and remove the piston [3].



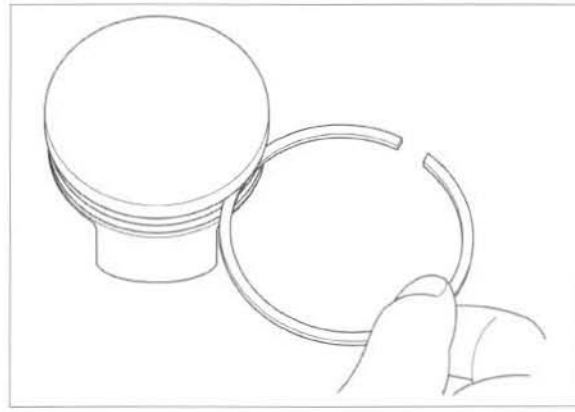
Do not damage the piston ring by spreading the ends too far.

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



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

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



INSPECTION

CYLINDER

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

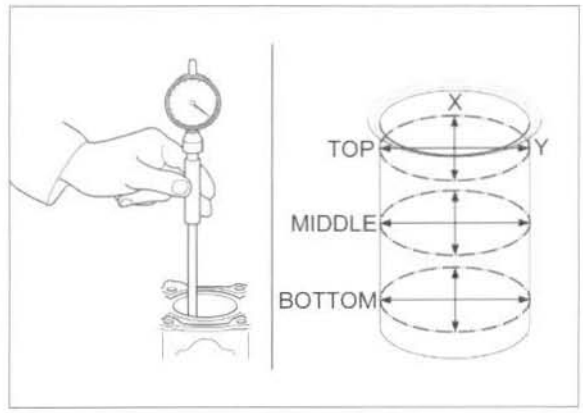
SERVICE LIMIT: 92.10 mm (3.626 in)

Calculate the cylinder-to-piston clearance. Refer to page 11-6 for measurement of the piston O.D.

SERVICE LIMIT: 0.10 mm (0.004 in)

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

SERVICE LIMIT: Taper: 0.10 mm (0.004 in)
Out-of-round: 0.10 mm (0.004 in)



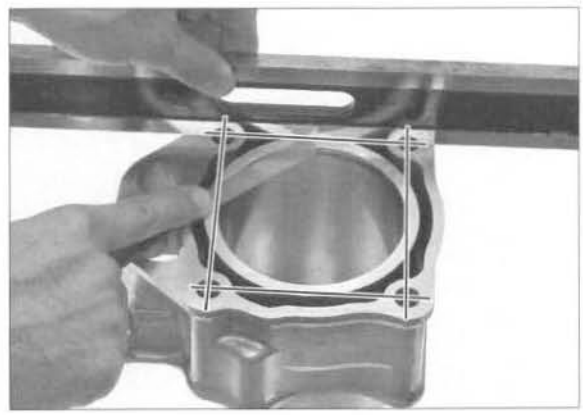
The cylinder must be rebored and an oversize piston fitted if the service limits are exceeded.

The 0.25 mm and 0.5 mm oversize pistons are available.

The cylinder must be rebored so the clearance for an oversize piston is 0.010 – 0.040 mm
(0.0004 – 0.0016 in).

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

SERVICE LIMIT: 0.10 mm (0.004 in)

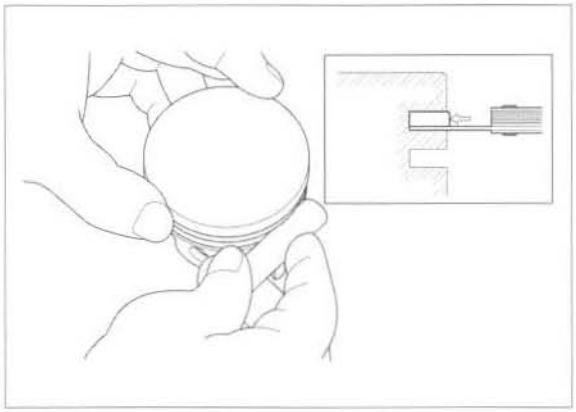


PISTON/PISTON RING

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

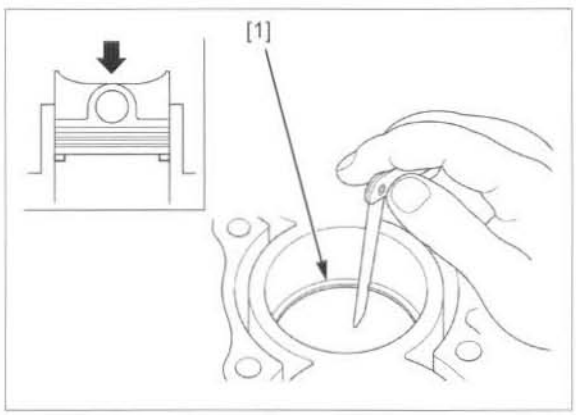
Push the ring until the outer surface of the piston ring is nearly flush with the piston and measure the ring-to-ring groove clearance.

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



Insert each piston ring [1] into the bottom of the cylinder squarely using the piston.
Measure the ring end gap.

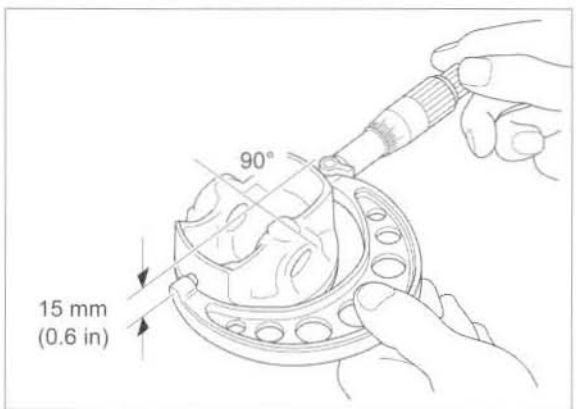
SERVICE LIMITS: Top: 0.5 mm (0.02 in)
Second: 0.6 mm (0.02 in)
Oil (side rail): 0.9 mm (0.04 in)



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

SERVICE LIMIT: 91.90 mm (3.618 in)

Compare this measurement against the maximum cylinder I.D. measurement and calculate the piston-to-cylinder clearance (page 11-5).



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

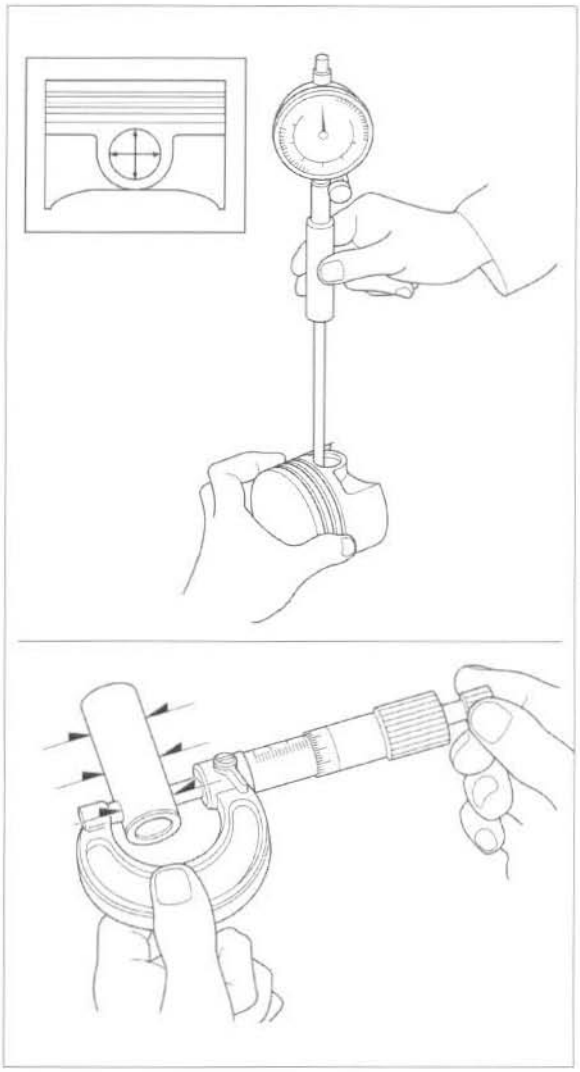
SERVICE LIMIT: 19.04 mm (0.750 in)

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

SERVICE LIMIT: 18.96 mm (0.746 in)

Calculate the piston-to-piston pin clearance.

SERVICE LIMIT: 0.08 mm (0.003 in)

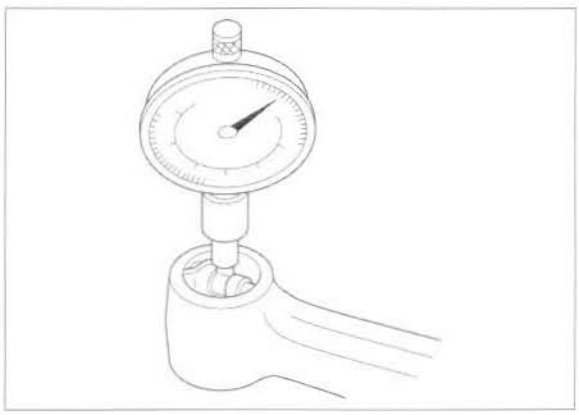


Measure the connecting rod small end I.D.

SERVICE LIMIT: 19.07 mm (0.751 in)

Calculate the connecting rod-to-piston pin clearance.

SERVICE LIMIT: 0.10 mm (0.004 in)



CYLINDER STUD BOLT REPLACEMENT

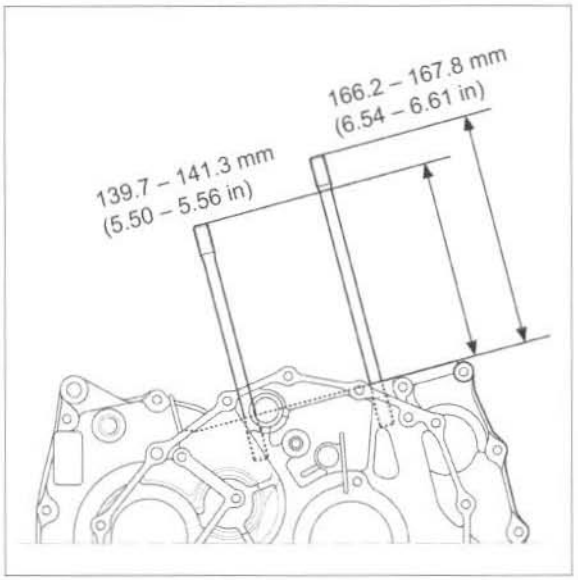
Thread two nuts onto the stud and tighten them together, and use a wrench on them to turn the stud bolt out.

Install new stud bolts and tighten them to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Be sure to verify the stud height from the cylinder mating surface of the crankcase.

Adjust the height if necessary.



CYLINDER/PISTON INSTALLATION

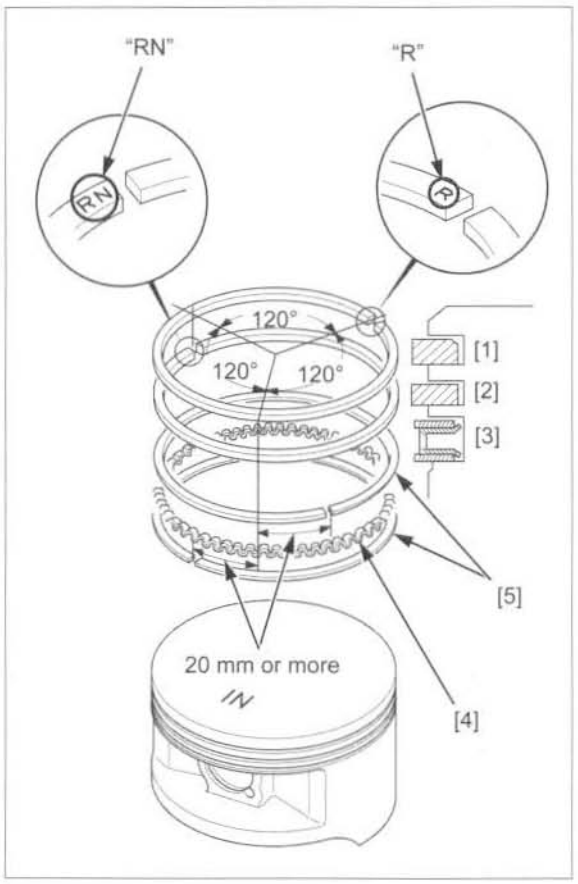
PISTON RING INSTALLATION

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

NOTE:

- Do not confuse the top [1] and second rings [2].
- To install the oil ring [3], install the spacer [4] first, then install the side rails [5].

Stagger the piston ring end gaps 120° degrees apart from each other.
Stagger the side rail end gaps as shown.



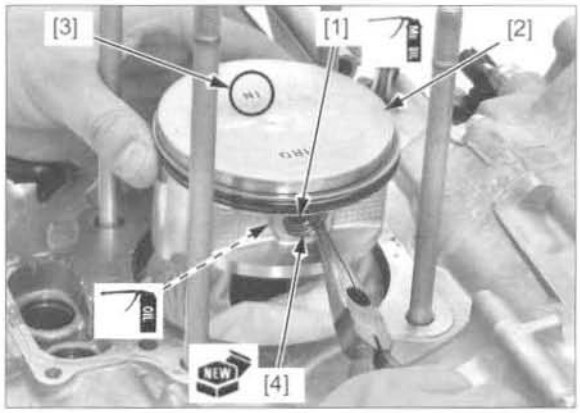
PISTON INSTALLATION

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

Apply engine oil to the piston pin hole and connecting rod inner surface.
Apply molybdenum oil solution to the outer surface of the piston pin [1].

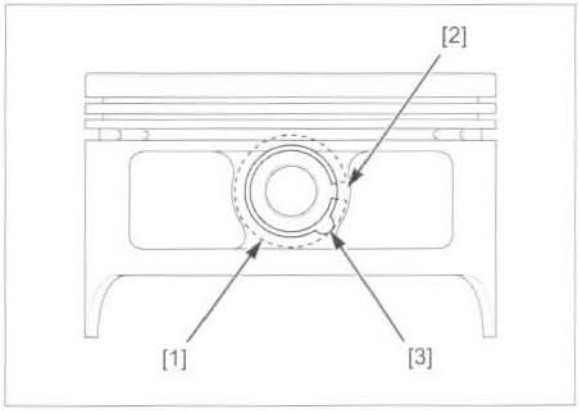
Install the piston [2] with the "IN" mark [3] toward the intake side and insert the piston pin through the piston and connecting rod.

Install new piston pin clips [4] into the grooves in the piston pin hole.



NOTE:

- Make sure that the piston pin clips [1] are seated securely.
- Do not align the piston pin clip end gap [2] with the piston cutout [3].

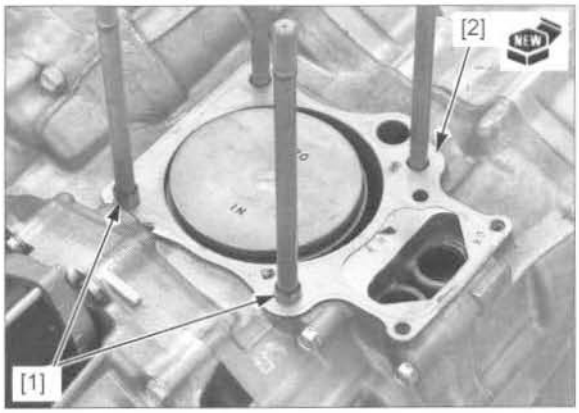


CYLINDER INSTALLATION

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

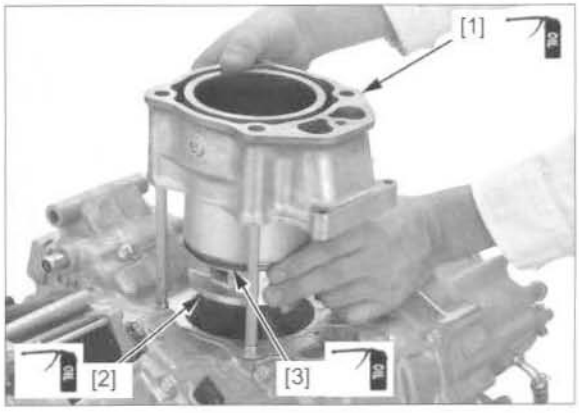
Blow through the oil passage in the cylinder with compressed air.

Install the two dowel pins [1] and a new gasket [2].



Apply engine oil to the cylinder [1] wall, piston [2] outer surface and piston rings [3].

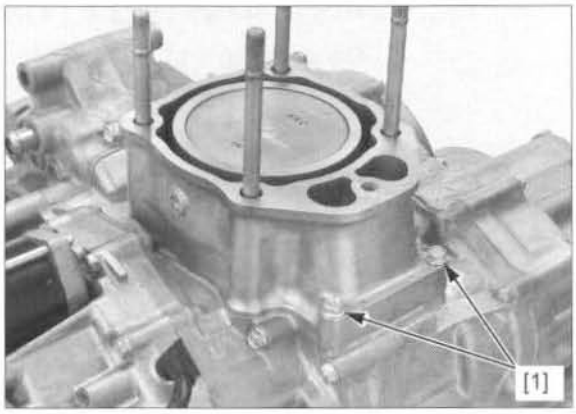
Install the cylinder over the piston while compressing the piston rings with your fingers.



Make sure that the cylinder touches the crankcase evenly.

Install the two bolts [1].

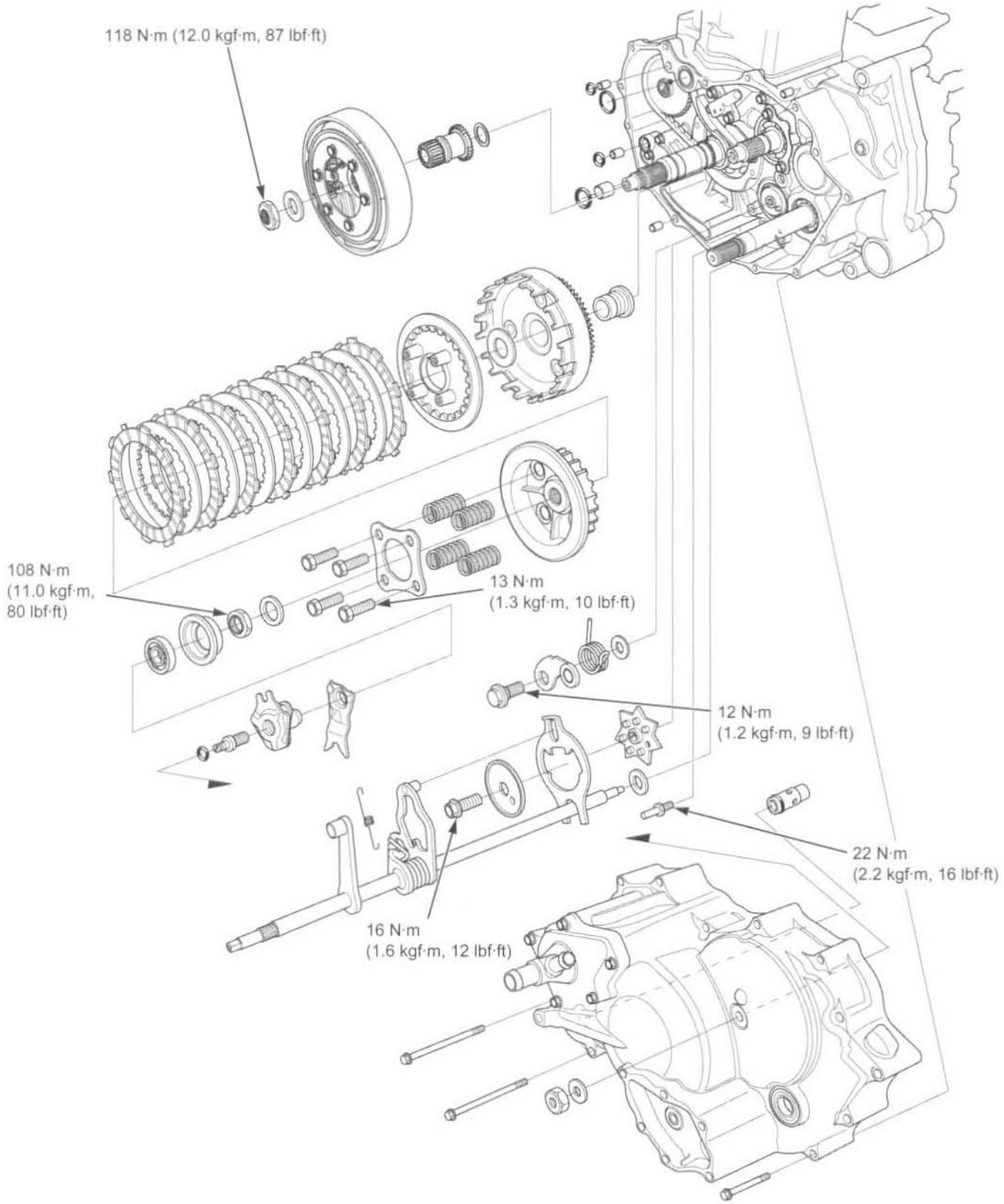
Install the cylinder head (page 10-16).



12. CLUTCH/GEARSHIFT LINKAGE

SYSTEM COMPONENTS

FE/FPE models shown:



SERVICE INFORMATION

GENERAL

- This section covers service of the clutch (centrifugal clutch and change clutch) and gearshift linkage. To service the gearshift spindles of the FM/FPM models and reverse stopper shaft, the engine must be removed from the frame.
- The crankcase must be separated when the transmission, shift drum and shift forks require service (page 14-2).
- Engine oil viscosity and level and the use of oil additives have an effect on clutch operation. Oil additives of any kind are specifically not recommended. When the clutch does not disengage or the vehicle creeps, inspect the engine oil and oil level before servicing the clutch system.
- Engine lubricating oil is fed through the oil passages in the front crankcase cover. Clean the oil passages before installing the crankcase cover.
- The FE/FPE models are equipped with the electric shift program (ESP). ESP service (page 23-30).

SPECIFICATIONS

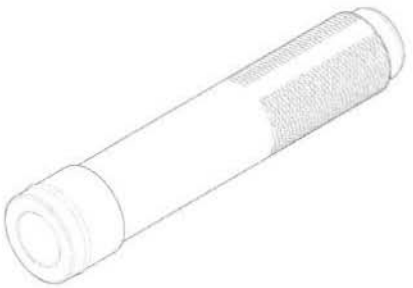
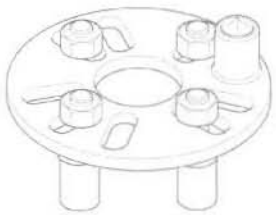
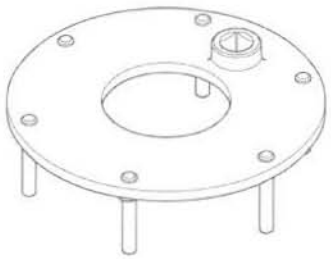
Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Centrifugal clutch	Drum I.D.		150.0 – 150.2 (5.906 – 5.913)	150.4 (5.92)
	Weight lining thickness		2.0 (0.08)	1.3 (0.05)
	Clutch spring height		2.96 (0.117)	2.84 (0.112)
	Clutch weight spring free length		24.72 (0.973)	25.7 (1.01)
Change clutch	Spring free length	FM/FPM	52.2 (2.06)	50.7 (2.00)
		FE/FPE	46.8 (1.84)	45.3 (1.78)
	Disc thickness		2.62 – 2.78 (0.103 – 0.109)	2.3 (0.09)
	Plate warpage		–	0.20 (0.008)
	Outer I.D.		29.000 – 29.021 (1.1417 – 1.1426)	29.05 (1.144)
	Outer guide	I.D.	22.000 – 22.021 (0.8661 – 0.8670)	22.05 (0.868)
		O.D.	28.959 – 28.980 (1.1401 – 1.1409)	28.93 (1.139)
	Mainshaft O.D. at clutch outer guide		21.967 – 21.980 (0.8648 – 0.8654)	21.93 (0.863)
Primary drive gear	Gear I.D.		29.000 – 29.021 (1.1417 – 1.1426)	29.05 (1.144)
	Crankshaft O.D. at drive gear		28.959 – 28.980 (1.1401 – 1.1409)	28.93 (1.139)

TORQUE VALUES

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Clutch spring bolt	4	6	13 (1.3, 10)	
Centrifugal clutch lock nut	1	20	118 (12.0, 87)	Lock nut: replace with a new one. Apply engine oil to the threads and seating surface. Stake.
Change clutch lock nut	1	18	108 (11.0, 80)	Lock nut: replace with a new one. Apply engine oil to the threads and seating surface. Stake.
Shift drum stopper arm pivot bolt	1	6	12 (1.2, 9)	Apply locking agent to the threads.
Gearshift cam bolt	1	6	16 (1.6, 12)	Apply locking agent to the threads.
Gearshift spindle return spring pin	1	8	22 (2.2, 16)	Apply locking agent to the threads.
Gearshift spindle A stopper bolt (FM/FPM)	1	8	27 (2.8, 20)	Apply locking agent to the threads.

TOOLS

Remover weight 07741-0010201  or 07936-371020A or 07936-3710200 (U.S.A. only)	Attachment, 32 x 35 mm 07746-0010100 	Driver, 22 mm I.D. 07746-0020100 
Pilot, 15 mm 07746-0040300 	Driver 07749-0010000 	Puller, 35 x 1.0 mm 07933-HA80000  or 07933-HB3000A (U.S.A. only)
Bearing remover shaft, 15 mm 07936-KC10100 	Bearing remover head, 15 mm 07936-KC10200 	Bearing remover, 15 mm 07936-KC10500 (U.S.A. only) 
Clutch center holder 07JMB-MN50302  or 07HGB-001010B or 07HGB-001010A (U.S.A. only) with 07HGB-001020B or 07HGB-001020A (U.S.A. only)	Clutch holder set 07ZMB-HN20001  or 07ZMB-HN2A101 (U.S.A. only)	

TROUBLESHOOTING

Clutch slips when accelerating
- Incorrect clutch adjustment (page 3-24)
- Worn clutch discs
- Weak clutch springs
- Faulty clutch lifter
- Improper oil viscosity or oil additive used

Clutch will not disengage
- Faulty clutch lifter
- Warped clutch plates

The vehicle creeps
- Faulty centrifugal clutch

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

Hard to shift
- Incorrect clutch adjustment (page 3-24)
- Worn or damaged gearshift linkage components
- Faulty clutch lifter
- Improper engine oil viscosity
- Faulty gearshift spindle
- Faulty shift forks/shaft or shift drum (page 14-6)

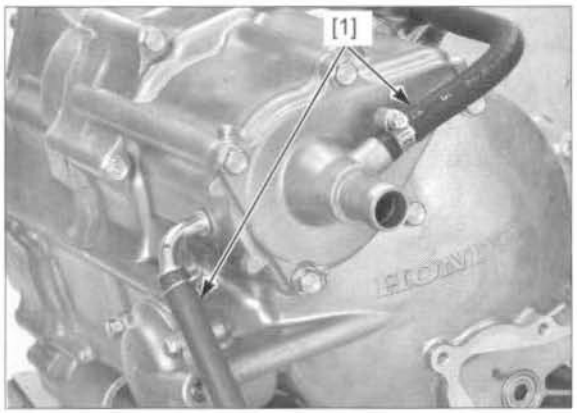
Transmission jumps out of gear
- Broken shift drum stopper arm
- Weak or broken shift linkage return springs
- Worn or damaged gearshift cam
- Faulty gearshift spindle
- Faulty shift forks/shaft or shift drum (page 14-6)
- Faulty transmission gears (page 14-6)

FRONT CRANKCASE COVER REMOVAL

Drain the engine oil (page 3-13).
Drain the coolant (page 8-7).

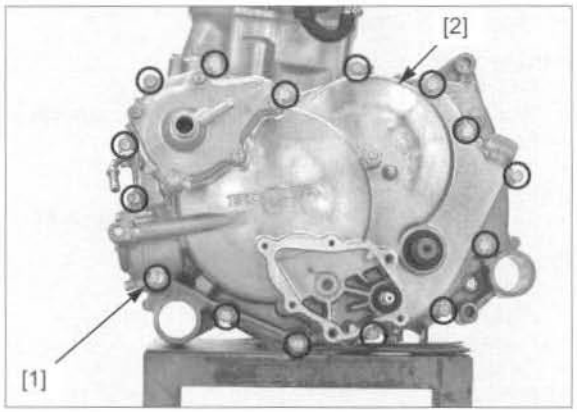
Remove the following:
- mudguards (page 2-6)
- front propeller shaft (page 19-12)
- FE/FPE models only: shift control motor and reduction gears (page 23-30)

Disconnect the water hoses [1] from the front crankcase cover.

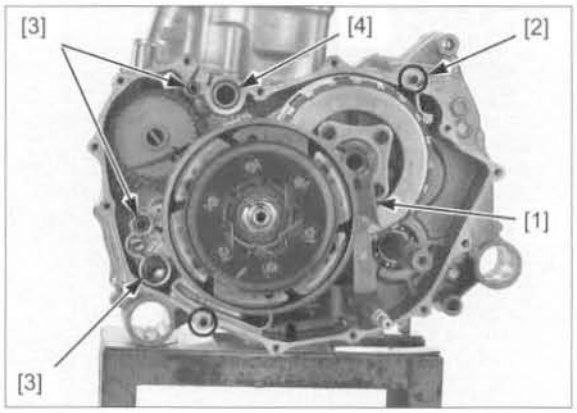


Remove the following:

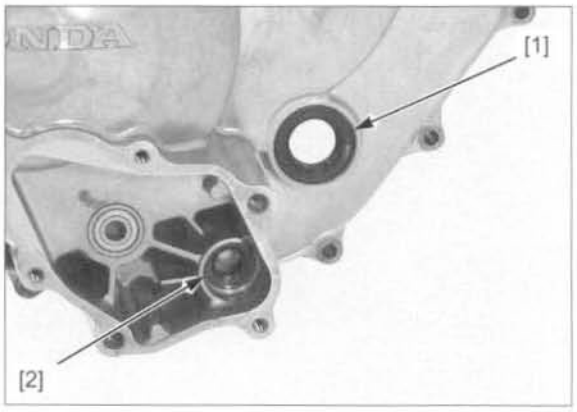
- fifteen bolts [1]
- front crankcase cover [2]



- lifter cam plate [1]
- two dowel pins [2]
- joint collars and O-rings [3]
- O-ring [4]



- output shaft oil seal [1]
- gearshift spindle oil seal (FE/FPE models only) [2]



CRANKSHAFT BEARING REPLACEMENT

Check the crankshaft bearing [1].
If the inner race does not turn smoothly, quietly, or if the outer race fits loosely in the cover, replace the bearing as follows:

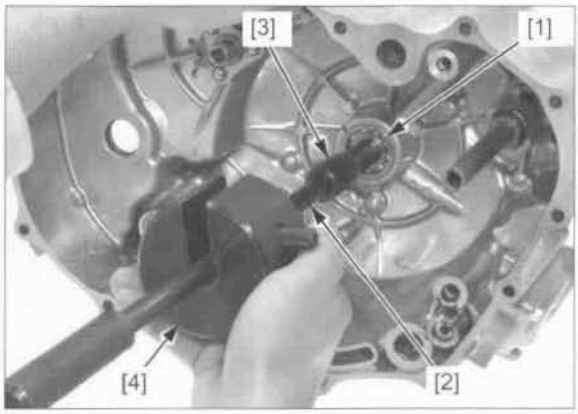
Remove the crankshaft bearing with the special tools.

TOOLS:

[2] Remover shaft, 15 mm	**07936-KC10100**
[3] Remover head, 15 mm	**07936-KC10200**
[4] Remover weight	**07741-0010201**

U.S.A. TOOLS:

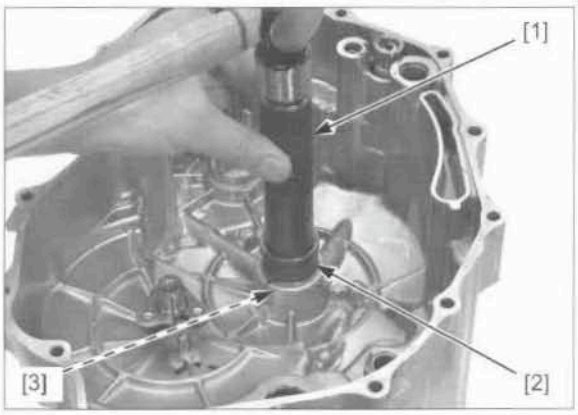
Bearing remover, 15 mm	**07936-KC10500**
Remover weight	**07936-371020A or 07936-3710200**



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

TOOLS:

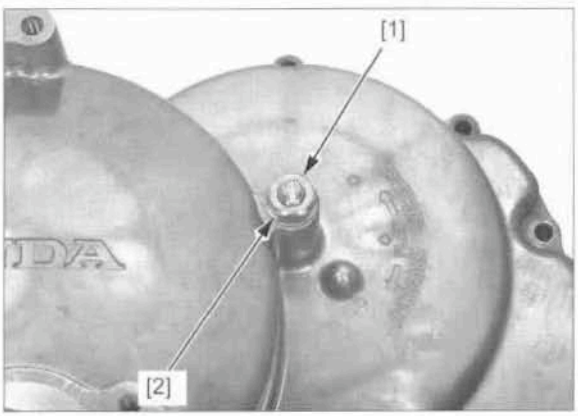
[1] Driver	**07749-0010000**
[2] Attachment, 32 x 35 mm	**07746-0010100**
[3] Pilot, 15 mm	**07746-0040300**



CLUTCH LIFTER

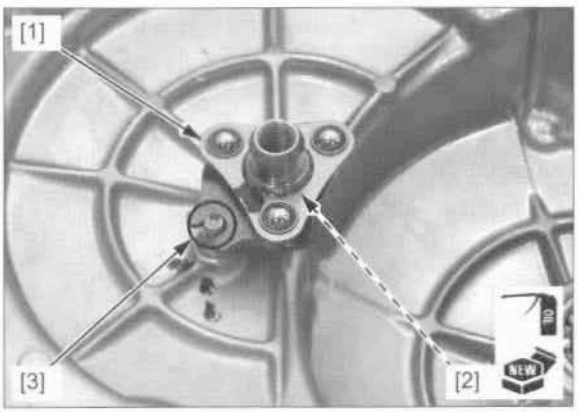
Check the clutch lifter plate assembly and cam plate for wear or damage, replace them if necessary.

Remove the lock nut [1] and washer [2].



Remove the adjusting bolt/lifter plate assembly [1] and O-ring [2].
Remove the adjusting bolt from the lifter plate assembly.

Install the adjusting bolt into the lifter plate assembly.
Coat a new O-ring with engine oil and install it onto the adjusting bolt.
Install the adjusting bolt/lifter plate assembly by aligning the groove with the stopper pin [3].
Temporarily install the washer and lock nut.



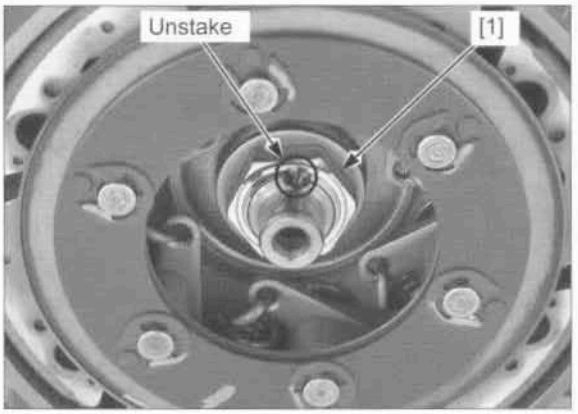
CENTRIFUGAL CLUTCH

REMOVAL

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

Be careful not to damage the crankshaft threads.

Unstake the clutch lock nut [1].



Hold the clutch drive plate using the special tool [1] and loosen the lock nut [2].

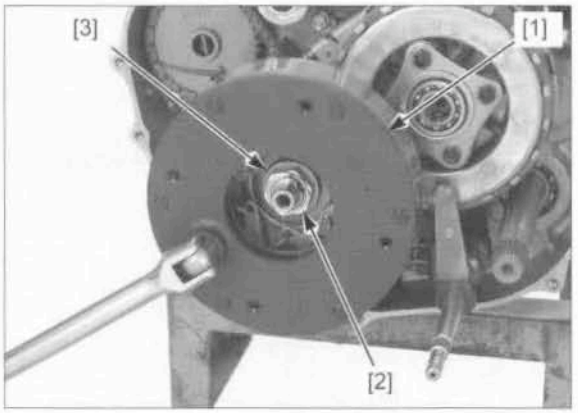
TOOL:

Clutch holder set	**07ZMB-HN20001**
– holder plate	**07ZMB-HN20101**
– holder pin	**07ZMB-HN20200**

U.S.A. TOOL:

Clutch holder	**07ZMB-HN2A101**

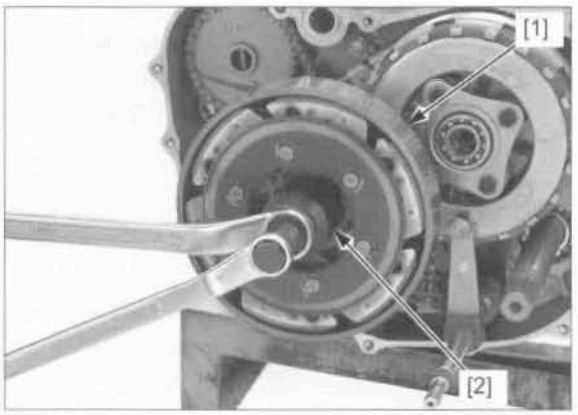
Remove the lock nut and washer [3].



Remove the centrifugal clutch assembly [1] using the special tool.

TOOL:

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

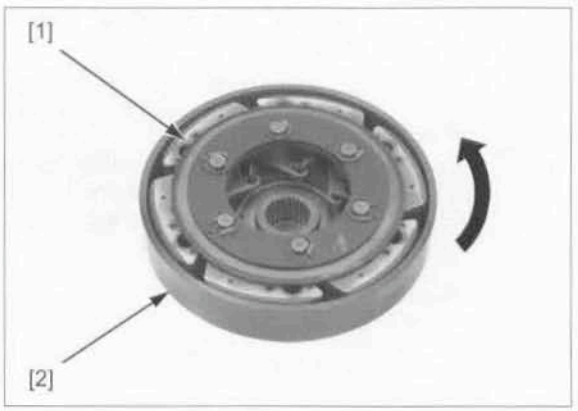


DISASSEMBLY/INSPECTION

ONE-WAY CLUTCH

You should be able to turn the clutch weight assembly [1] counterclockwise smoothly, but the assembly should not turn clockwise.

Remove the clutch weight assembly from the clutch drum [2] while turning it counterclockwise.



CLUTCH DRUM

Check the weight contacting surface for scratches or abnormal wear.

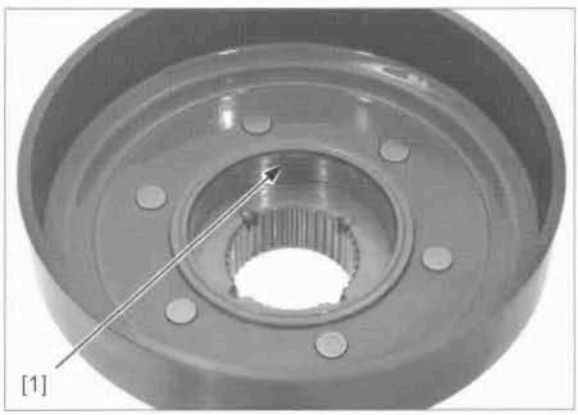
Measure the drum I.D.

SERVICE LIMIT: 150.4 mm (5.92 in)

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

Remove the sprag clutch [1] from the clutch drum.

Check the sprag clutch contacting surface [1] for abnormal wear or damage.



DRIVE PLATE

Check the sprag clutch contacting surface [1] for abnormal wear or damage.

CLUTCH WEIGHT LINING

Replace the clutch weights as a set.

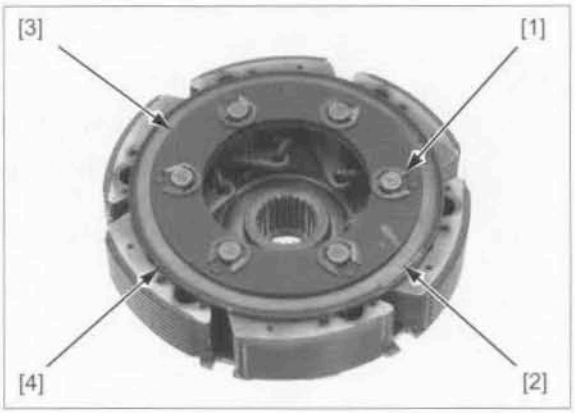
Measure the lining thickness.

SERVICE LIMIT: 1.3 mm (0.05 in)

CLUTCH SPRING

Remove the E-clips [1] using a screwdriver while compressing the clutch spring [2].

Remove the following:
- outer plate [3]
- clutch spring
- inner plate [4]



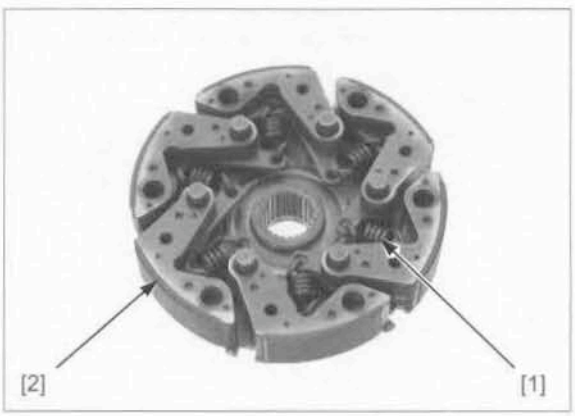
Measure the clutch spring height.

SERVICE LIMIT: 2.84 mm (0.112 in)

WEIGHT SPRING

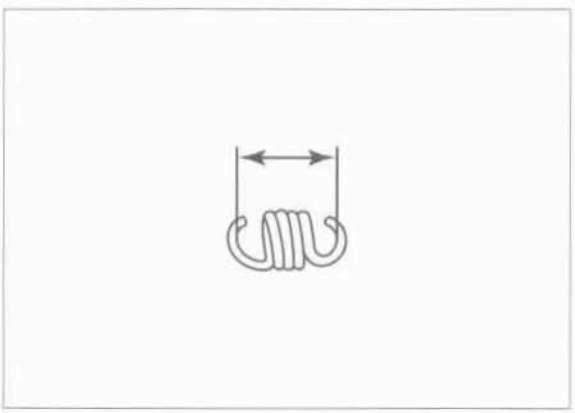
Replace the springs as a set.

Check the weight springs [1] for wear or damage. Remove the clutch weights [2] and springs from the drive plate.

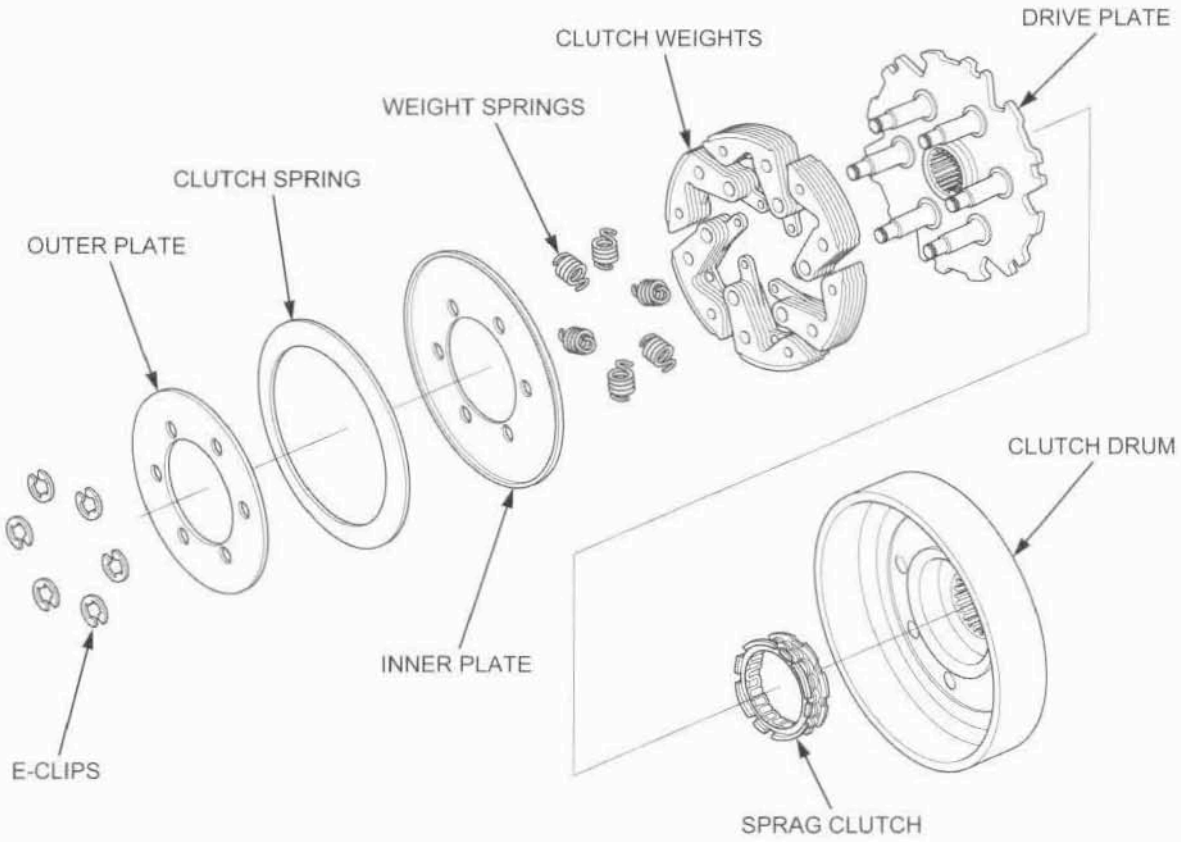


Measure the spring length.

SERVICE LIMIT: 25.7 mm (1.01 in)

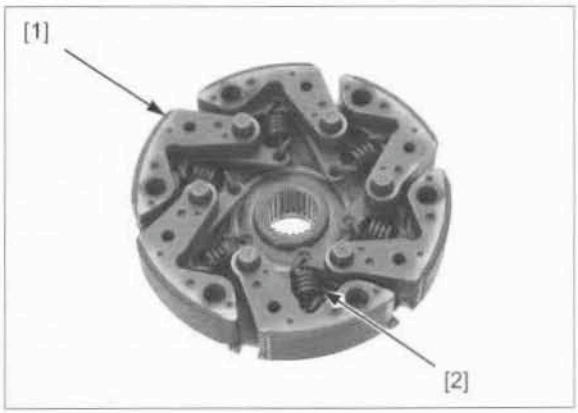


ASSEMBLY

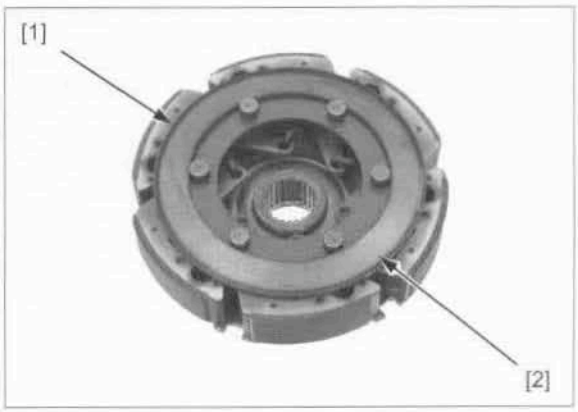


Install with the spring's open ends facing in.

Install the clutch weights [1] and springs [2] onto the drive plate as shown.



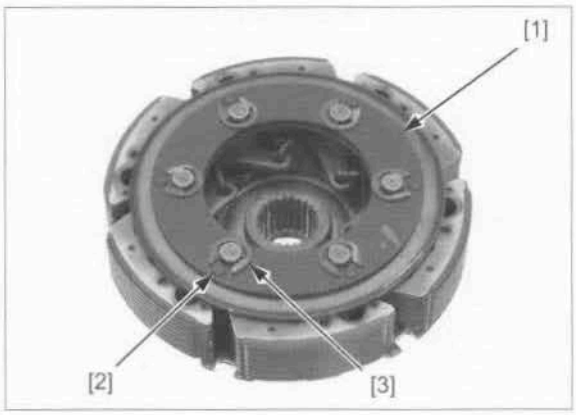
Install the inner plate [1] with flange side facing up.
Install the clutch spring [2] with concavity side facing down.



Install the outer plate [1] with the pins [2] facing up.

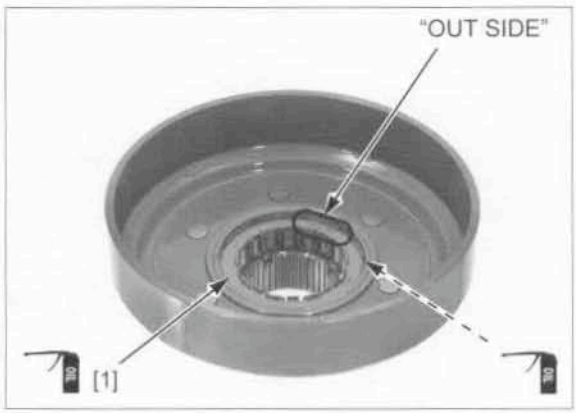
Be careful not to damage the clutch weights while compressing.

Install the E-clips [3] into the spindle grooves with its gap facing towards the pin by using the pliers while compressing the clutch spring.



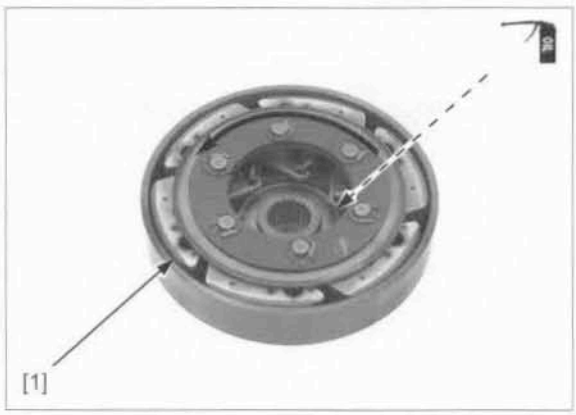
Apply engine oil to the whole surface of the sprag clutch [1] and the sprag clutch contacting surface of the clutch drum.

Install the sprag clutch into the clutch drum with the "OUT SIDE" mark facing up.



Apply engine oil to the sprag clutch contacting surface of the drive plate boss.

Install the clutch weight assembly [1] while turning it counterclockwise.



INSTALLATION

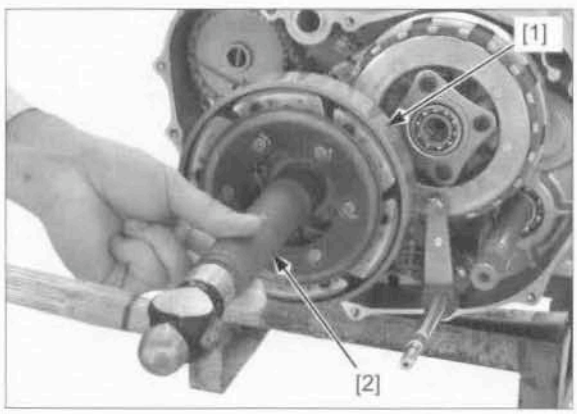
Set the centrifugal clutch assembly [1] onto the crankshaft by aligning the splines of the drive plate and crankshaft, and the splines of the clutch drum and primary drive gear.

Be careful not to damage the crankshaft threads.

Tap the drive plate to seat it.

TOOL:

[2] Driver, 22 mm I.D. 07746-0020100



Install the washer [1].
And apply engine oil to the threads and seating surface of a new lock nut [2] and install it.

Hold the drive plate of the centrifugal clutch assembly with the special tool and tighten the lock nut to the specified torque.

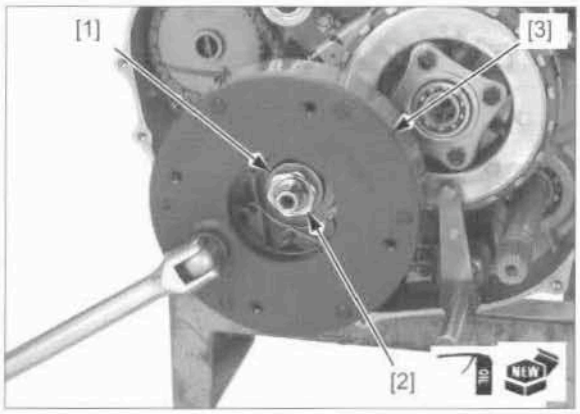
TOOL:

[3] Clutch holder set	**07ZMB-HN20001**
– holder plate	**07ZMB-HN20101**
– holder pin	**07ZMB-HN20200**

U.S.A. TOOL:

Clutch holder	**07ZMB-HN2A101**

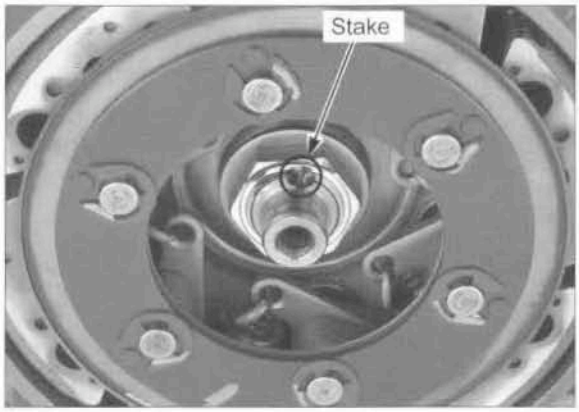
TORQUE: 118 N·m (12.0 kgf·m, 87 lbf·ft)



Be careful not to damage the crankshaft threads.

Stake the lock nut into the crankshaft groove.

Install the front crankcase cover (page 12-23).

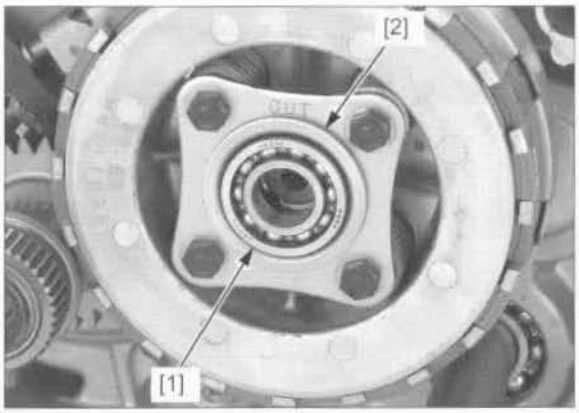


CHANGE CLUTCH

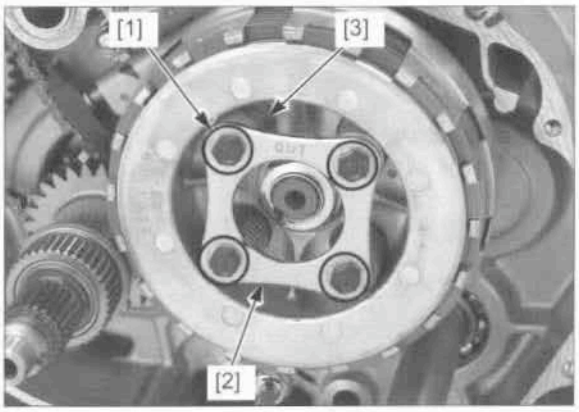
DISASSEMBLY

Remove the following:

- centrifugal clutch assembly (page 12-8)
- FE/FPE models: gearshift linkage (page 12-19)
- FM/FPM models: clutch lifter lever (page 12-20)
- lifter bearing [1] and collar [2]

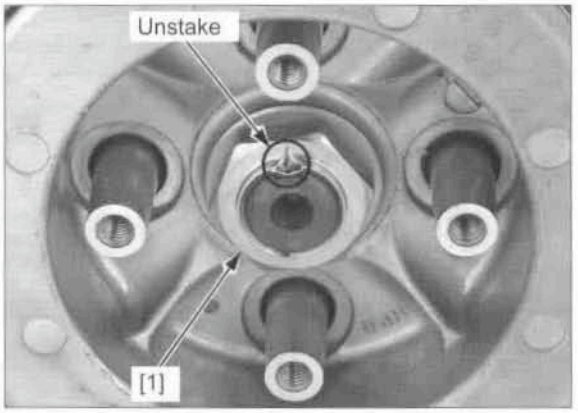


Loosen the clutch spring bolts [1] in a crisscross pattern in several steps, and remove the bolts, lifter plate [2] and clutch springs [3].



Be careful not to damage the mainshaft threads.

Unstake the clutch center lock nut [1].



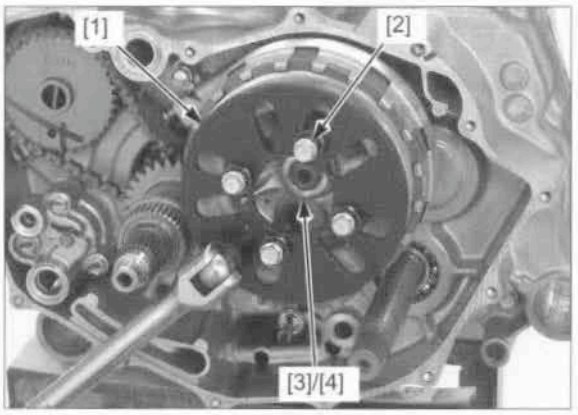
Install the clutch center holder [1] onto the pressure plate bosses with the four clutch spring bolts [2].

TOOL:

Clutch center holder	**07JMB-MN50302**

U.S.A. TOOLS:

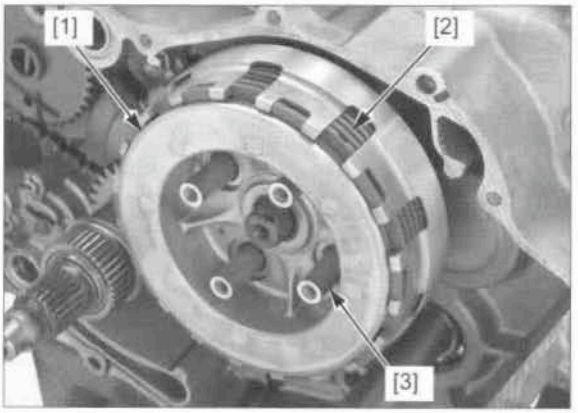
Holder plate	**07HGB-001010B or 07HGB-001010A with**
Holder collar A	**07HGB-001020B or 07HGB-001020A**



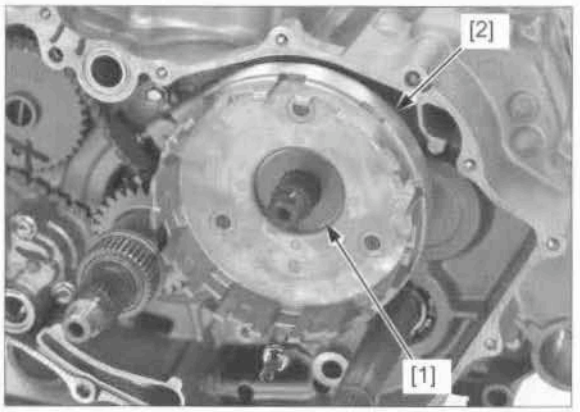
Hold the clutch center and loosen the clutch center lock nut [3].
Remove the lock nut and washer [4].

Remove the following:

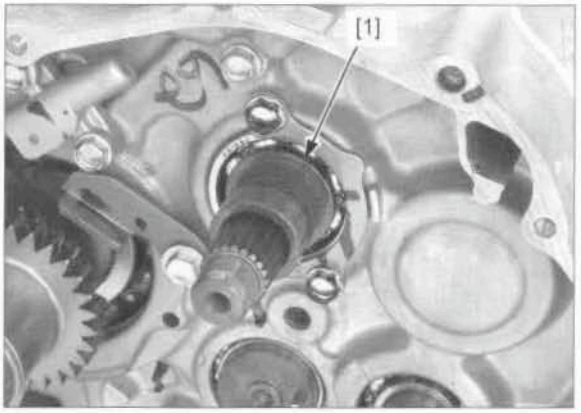
- clutch center [1]
- clutch discs and plates [2]
- pressure plate [3]



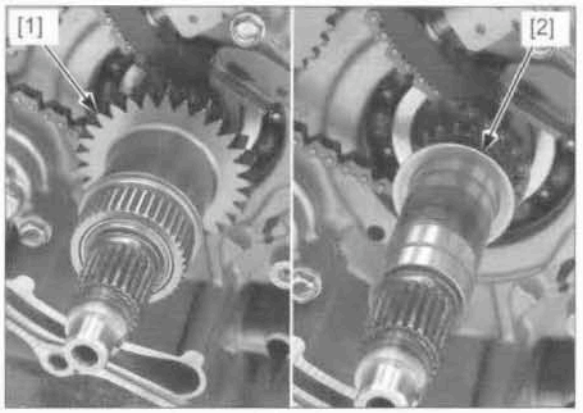
- thrust washer [1]
- clutch outer [2]



– clutch outer guide [1]



Remove the primary drive gear [1] and washer [2] from the crankshaft.

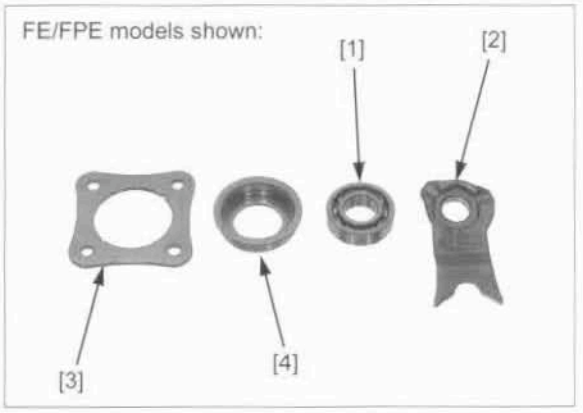


INSPECTION

CLUTCH LIFTER

Turn the inner race of the lifter bearing [1] with your finger.
The bearing should turn smoothly and quietly.
Replace if necessary.

Check the lifter cam plate [2], lifter plate [3] and collar [4] for deformation or damage.

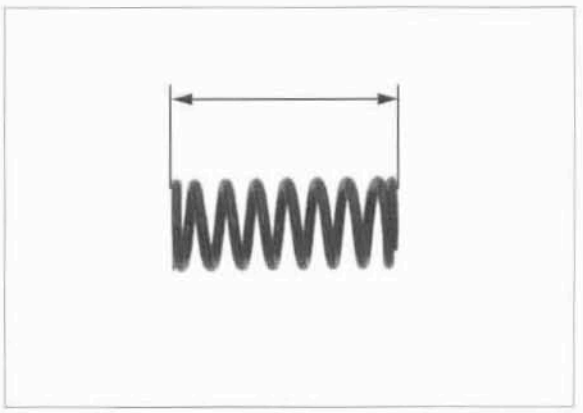


CLUTCH SPRING

Replace the clutch springs as a set.

Measure the clutch spring free length.

SERVICE LIMITS: FM/FPM: 50.7 mm (2.00 in)
FE/FPE: 45.3 mm (1.78 in)

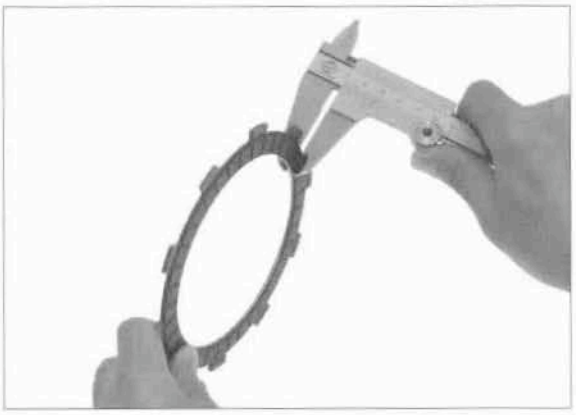


CLUTCH DISC

Replace the clutch discs and plates as a set.

Check the clutch discs for signs of scoring or discoloration.
Measure the clutch disc thickness.

SERVICE LIMIT: 2.3 mm (0.09 in)

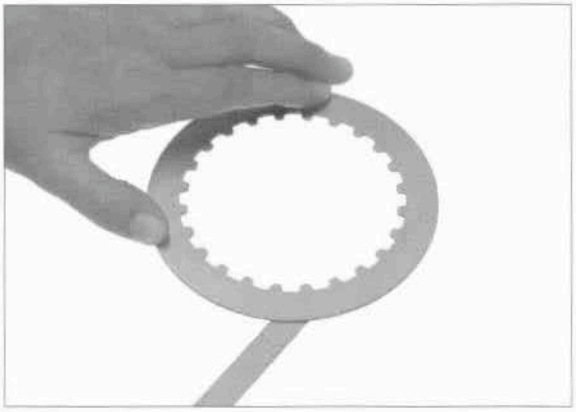


CLUTCH PLATE

Replace the clutch discs and plates as a set.

Check the plates for discoloration.
Check the plate warpage on a surface plate using a feeler gauge.

SERVICE LIMIT: 0.20 mm (0.008 in)



CLUTCH CENTER

Check the clutch center and pressure plate for nicks, indentations or abnormal wear made by the plates.

CLUTCH OUTER

Check the primary driven gear teeth for wear or damage.
Check the slots in the clutch outer for nicks, indentation or abnormal wear made by the clutch discs.

Measure the clutch outer I.D.

SERVICE LIMIT: 29.05 mm (1.144 in)

CLUTCH OUTER GUIDE

Check the outer guide for wear or damage.

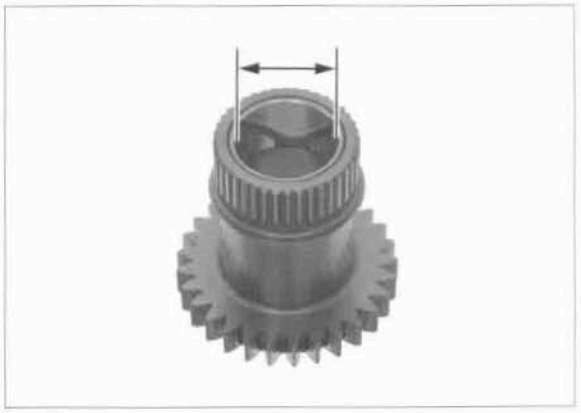
Measure the clutch outer guide I.D. and O.D.

SERVICE LIMITS: I.D.: 22.05 mm (0.868 in)
O.D.: 28.93 mm (1.139 in)

PRIMARY DRIVE GEAR

Check the gear teeth for wear or damage.
Measure the drive gear I.D.

SERVICE LIMIT: 29.05 mm (1.144 in)



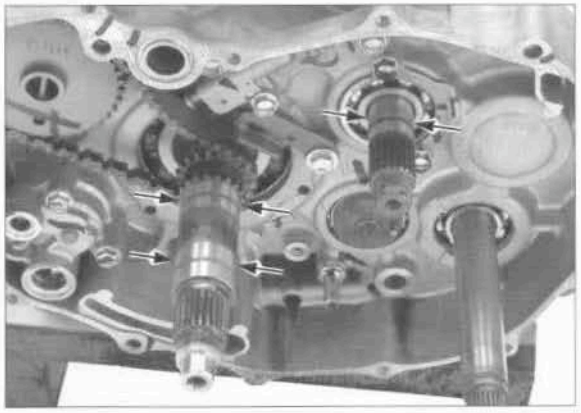
MAINSHAFT AND CRANKSHAFT

Measure the mainshaft O.D. at the clutch outer guide.

SERVICE LIMIT: 21.93 mm (0.863 in)

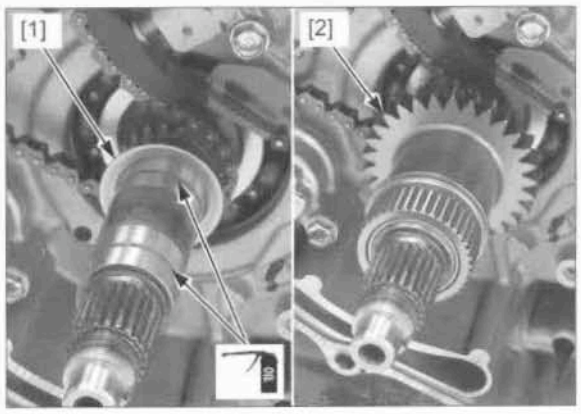
Measure the crankshaft O.D. at the primary drive gear.

SERVICE LIMIT: 28.93 mm (1.139 in)

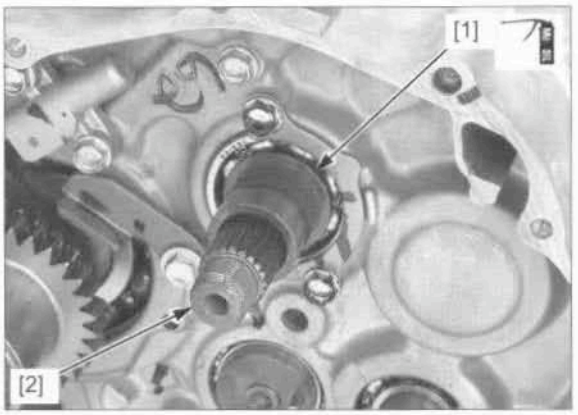


ASSEMBLY

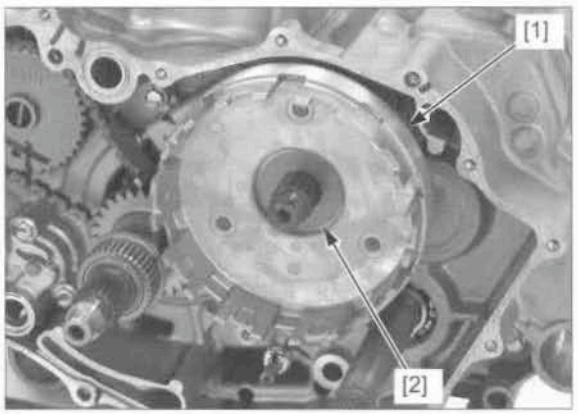
Apply engine oil to the primary drive gear sliding surface of the crankshaft.
Install the thrust washer [1] and the primary drive gear [2] onto the crankshaft.



Apply molybdenum oil solution to the inner and outer surfaces of the clutch outer guide [1].
Install the outer guide onto the mainshaft [2].



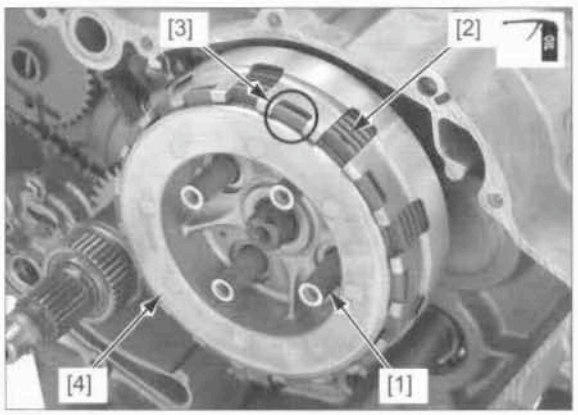
Install the clutch outer [1] and thrust washer [2].



Coat the clutch discs with clean engine oil.

Install the discs and plate alternately, starting with a disc. Set the outside clutch disc tabs into the shallow slots [3] in the clutch outer.

Install the following:
- pressure plate [1]
- clutch discs and plates [2]
- clutch center [4]



Install the washer [1] to the mainshaft.
Apply engine oil to the threads and seating surface of a new lock nut [2], and install it.

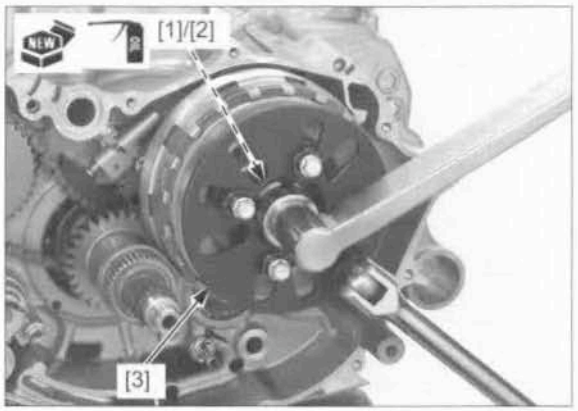
Install the clutch center holder [3] onto the pressure plate bosses with the four clutch spring bolts.

TOOL:

Clutch center holder	**07JMB-MN50302**

U.S.A. TOOLS:

Holder plate	**07HGB-001010B or 07HGB-001010A with**
Holder collar A	**07HGB-001020B or 07HGB-001020A**

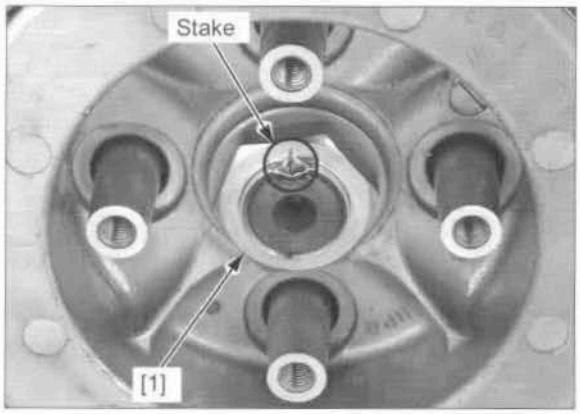


Hold the clutch center holder and tighten the lock nut to the specified torque.

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

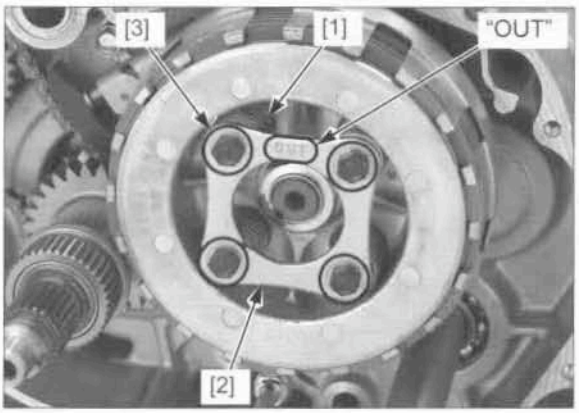
Be careful not to damage the mainshaft threads.

Stake the lock nut [1] into the mainshaft groove.



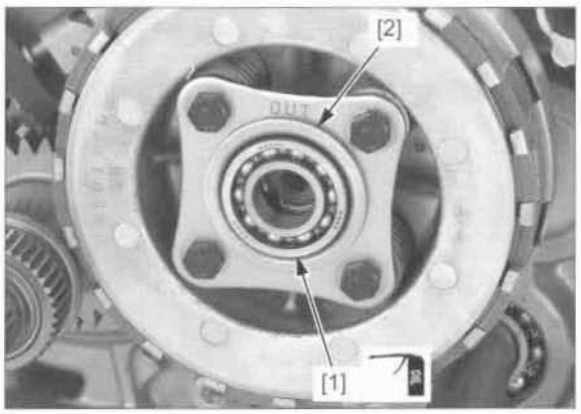
Install the clutch springs [1] and the lifter plate [2] with the "OUT" mark facing out.
Install the clutch spring bolts [3] and tighten them to the specified torque in a crisscross pattern in several steps.

TORQUE: 13 N·m (1.3 kgf·m, 10 lbf·ft)



Apply engine oil to the lifter bearing [1], and install the lifter collar [2] and bearing.

Install the following:
- FE/FPE models: gearshift linkage (page 12-22)
- FM/FPM models: lifter lever (page 12-22)
- lifter bearing and collar
- centrifugal clutch assembly (page 12-12)



GEARSHIFT LINKAGE

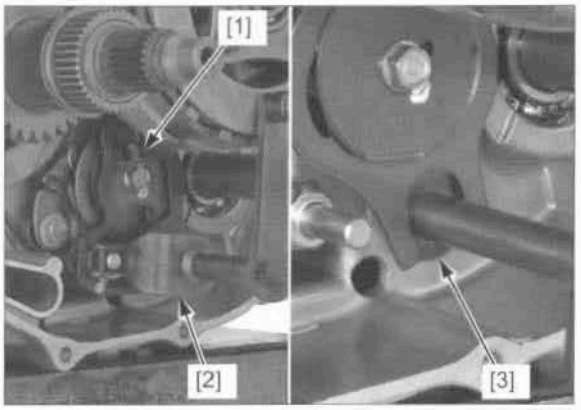
REMOVAL

NOTE:
- To service the reverse stopper shaft, engine removal is required (page 14-7).

Remove the centrifugal clutch (page 12-8).

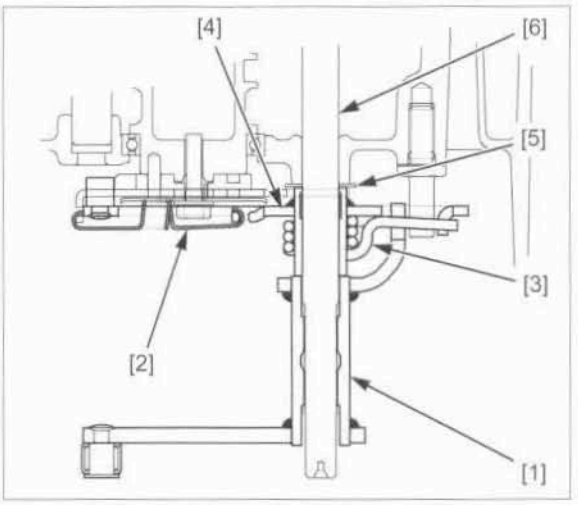
Remove the following:

FE/FPE models:
- angle sensor (page 23-28)
- shift arm spring [1]
- gearshift spindle assembly [2] and washer [3]

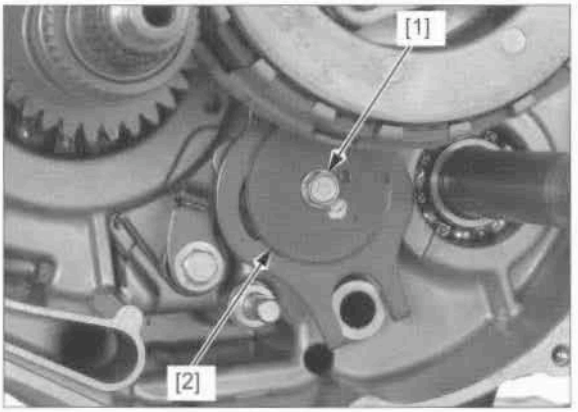


FM/FPM models:
- clutch lifter lever [1]
- shift arm spring [2]
- return spring [3] and gearshift arm [4]
- washer [5]

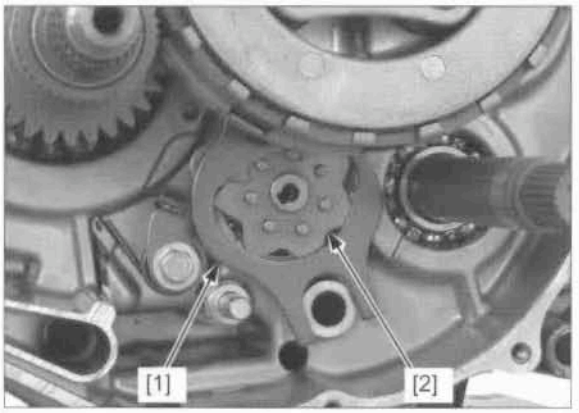
To service the gearshift spindles [6], remove the rear crankcase cover (page 12-22).



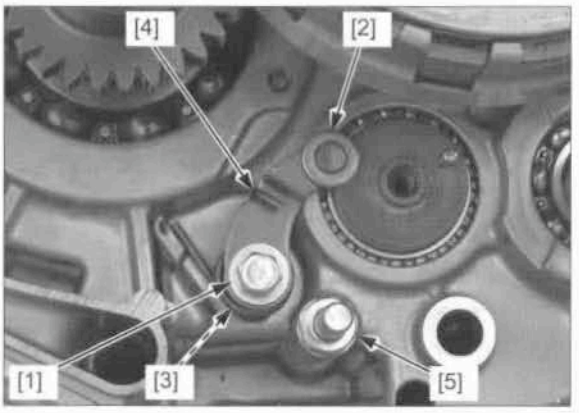
- bolt [1]
- guide plate [2]



- gearshift plate [1]
- FM/FPM models only: washer from the gearshift spindle
- gearshift cam [2] (while holding stopper arm with a screwdriver)



- bolt [1]
- stopper arm [2]
- washer [3]
- return spring [4]
- gearshift spindle return spring pin [5]



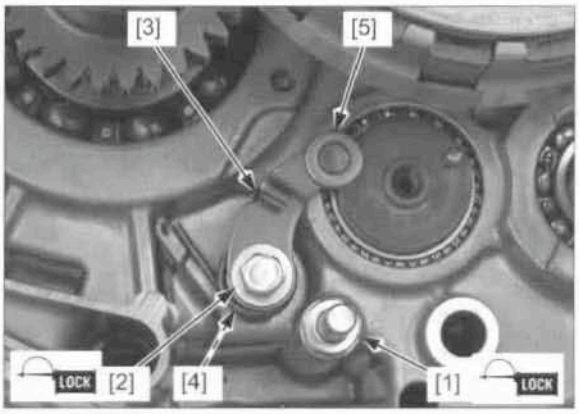
INSTALLATION

Apply locking agent to the threads of the gearshift return spring pin [1].
Install the gearshift return spring pin and tighten it to the specified torque.

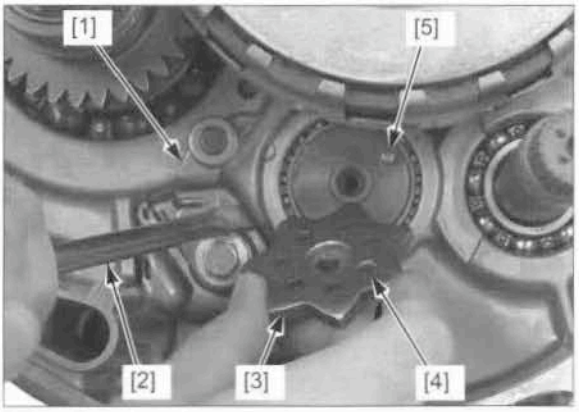
TORQUE: 22 N·m (2.2 kgf·m, 16 lbf·ft)

Apply locking agent to the threads of the stopper arm bolt [2].
Install the return spring [3], washer [4] (between the arm and crankcase), stopper arm [5] and bolt, and tighten the bolt to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)



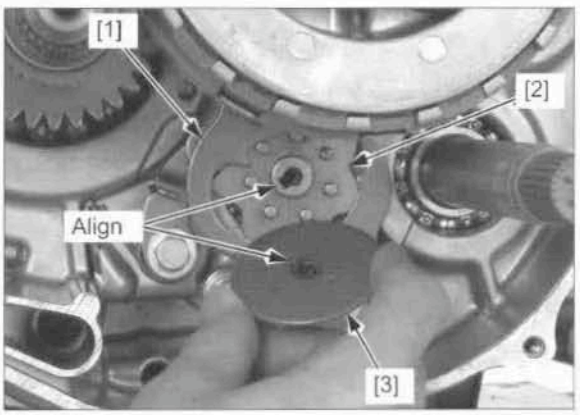
Hold the stopper arm [1] with a screwdriver [2] and install the gearshift cam [3] by aligning the pin hole [4] with the dowel pin [5].



FM/FPM models only: Install the washer onto the gearshift spindle.

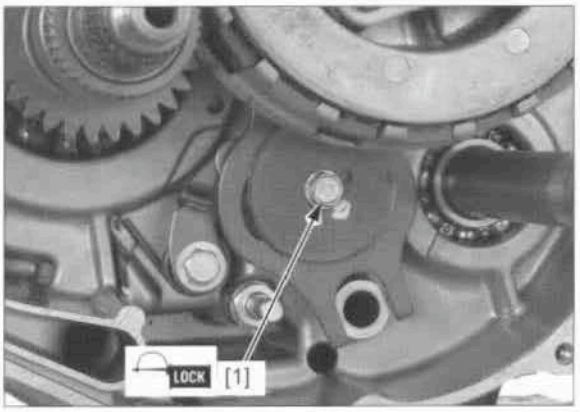
Install the gearshift plate [1] onto the cam [2] as shown.

Install the guide plate [3] by aligning the tab with the groove in the cam.



Apply locking agent to the threads of the cam bolt [1].
Install the cam bolt and tighten it to the specified torque.

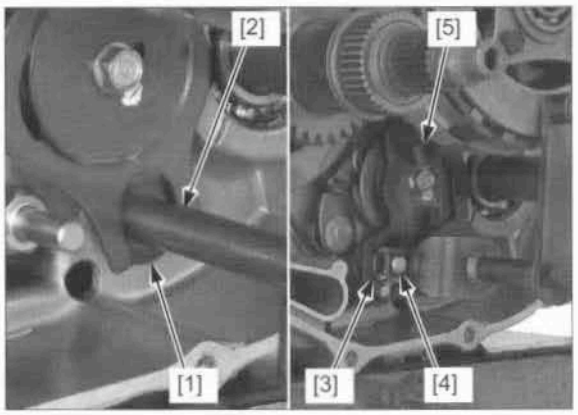
TORQUE: 16 N·m (1.6 kgf·m, 12 lbf·ft)



FE/FPE models: Install the washer [1] behind the gearshift plate and insert the gearshift spindle assembly [2] into the crankcase.
Align the return spring ends [3] with the stopper pin [4].

Hook the shift arm spring [5] to the gearshift arm and plate.

Install the angle sensor (page 23-28).



FM/FPM models: Insert the gearshift spindle [1] from the rear crankcase side, then install the washer [2] in between the gearshift plate [3] and crankcase.

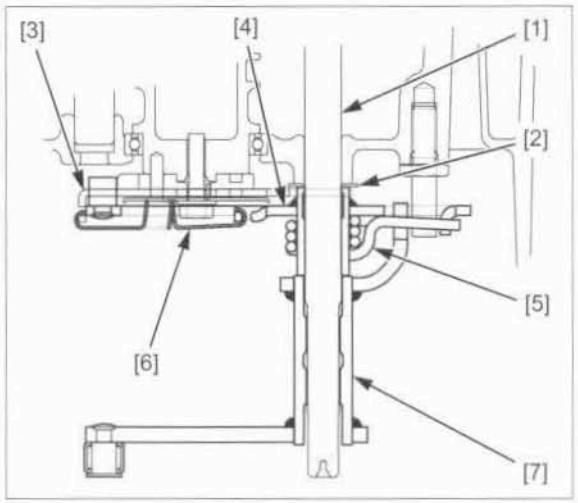
Install the gearshift arm [4] and return spring [5], aligning the spring ends with the stopper pin.

Hook the shift arm spring [6] to the gearshift arm and plate.

Install the lifter lever [7] by aligning the wide groove with the wide tooth of the splines.

Install the rear crankcase cover (page 13-9).

All models: Install the centrifugal clutch (page 12-12).



GEARSHIFT SPINDLE A (FM/FPM models only)

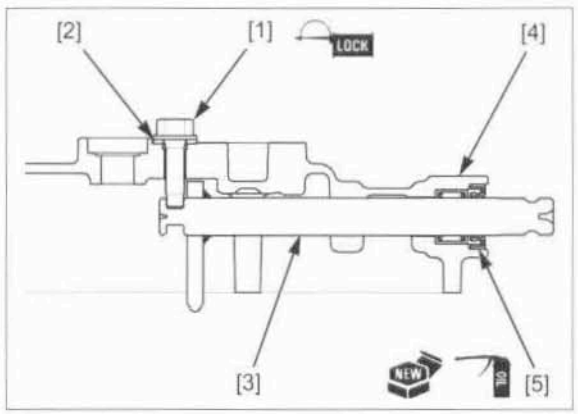
Remove the rear crankcase cover (page 13-6)

Remove the stopper bolt [1], washer [2] and gearshift spindle A [3] from the rear crankcase cover [4].
Remove the oil seal [5] from the rear crankcase cover.

Install a new oil seal.
Apply engine oil to the oil seal lip and install the gearshift spindle A.
Apply locking agent to the stopper bolt threads.
Install the washer and stopper bolt, and tighten the bolt.

TORQUE: 27 N·m (2.8 kgf·m, 20 lbf·ft)

Install the rear crankcase cover (page 13-9)

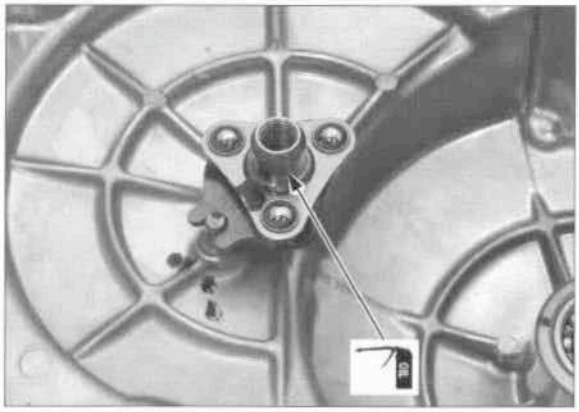


FRONT CRANKCASE COVER INSTALLATION

Clean the mating surfaces of the front crankcase cover and crankcase thoroughly, being careful not to damage them.

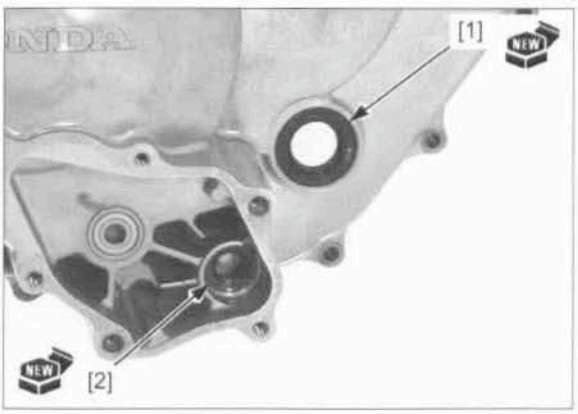
Blow through the oil passages in the front crankcase cover with compressed air.

Apply engine oil to the boss of the adjusting plate.



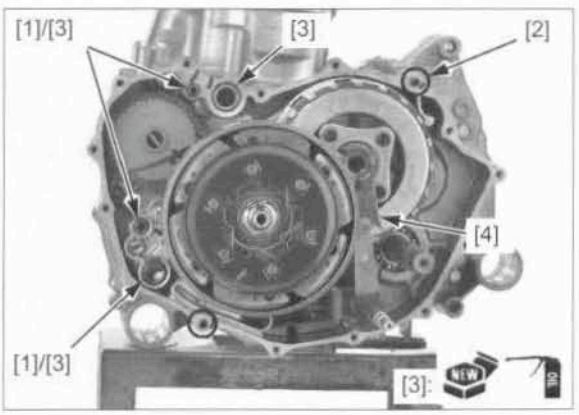
Install a new output shaft oil seal [1] into the front crankcase cover.

FE/FPE models only: Install a new gearshift spindle oil seal [2] into the front crankcase cover.

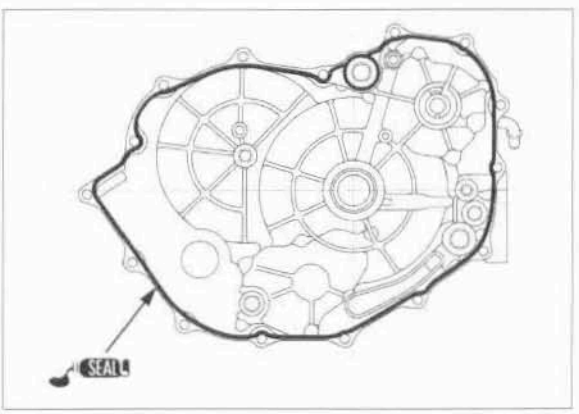


Install the joint collars [1] and dowel pins [2].
Coat new O-rings [3] with engine oil and install them.

Install the lifter cam plate [4].



Apply liquid sealant (TB1215 or equivalent) to the mating surface (shadowed area) of the front crankcase cover as shown.

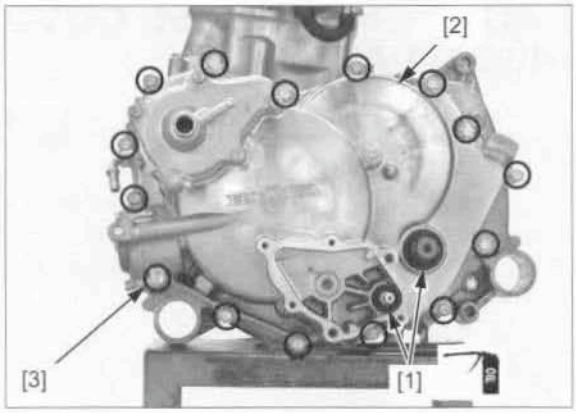


Apply engine oil to the lips of the oil seal [1].

Be careful not to drop the lifter cam plate.

Install the crankcase cover [2], being careful not to damage the oil seal lips.

Install the fifteen bolts [3] and tighten them in a crisscross pattern in several steps.

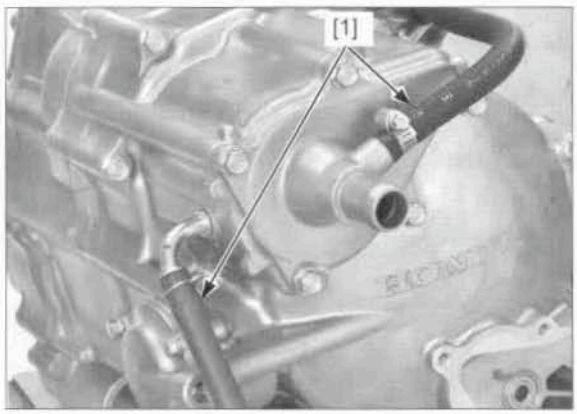


Connect the water hoses [1] to the crankcase cover.

Install the following:
- FE/FPE models only: reduction gears and shift control motor (page 23-31)
- front propeller shaft (page 19-37)
- mudguards (page 2-6)

Adjust the clutch system (page 3-24).

Fill the engine with recommended oil (page 3-13).
Fill and bleed the cooling system (page 8-6).
Check the engine oil level (page 3-12).

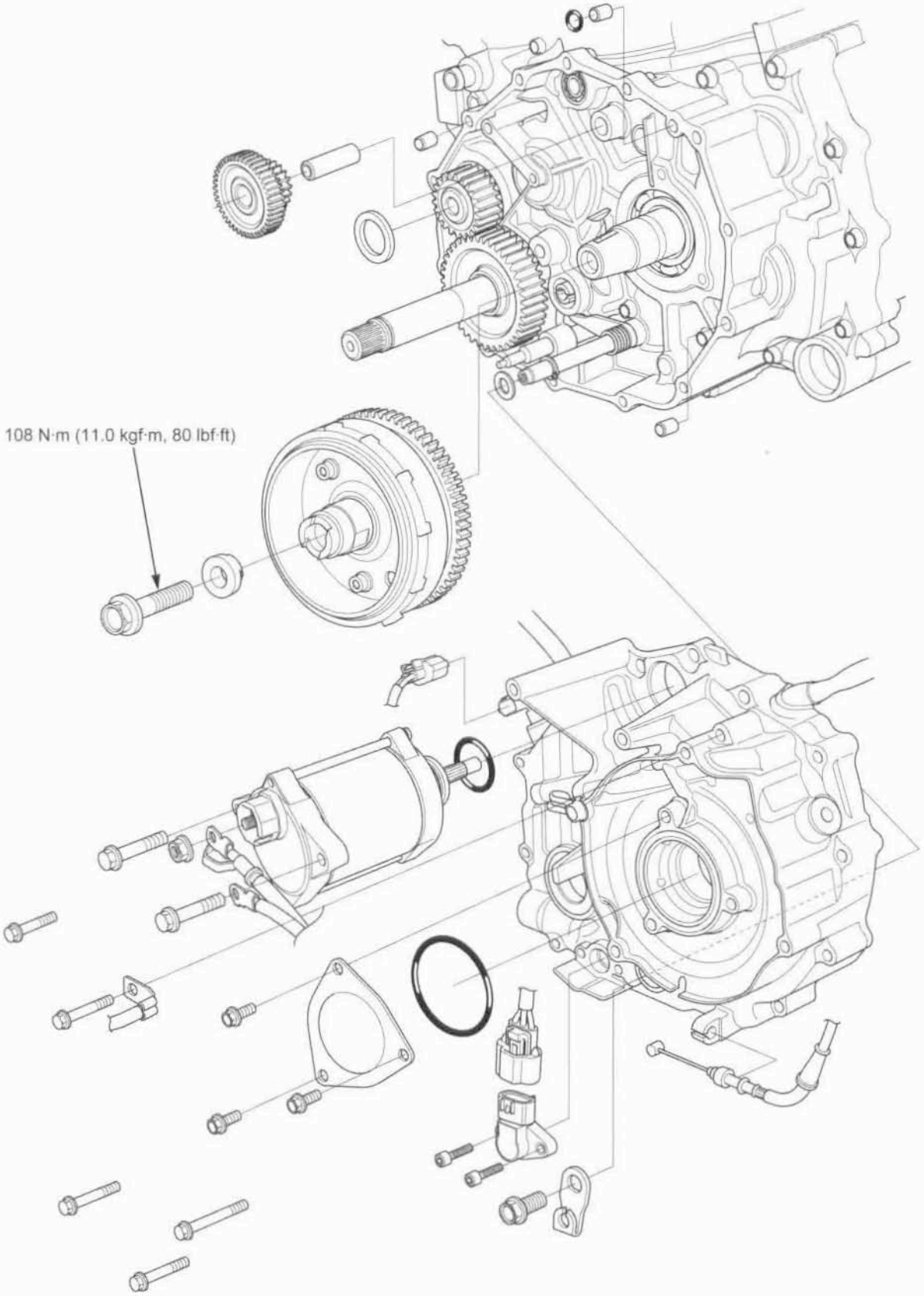


13. ALTERNATOR/STARTER CLUTCH

SYSTEM COMPONENTS

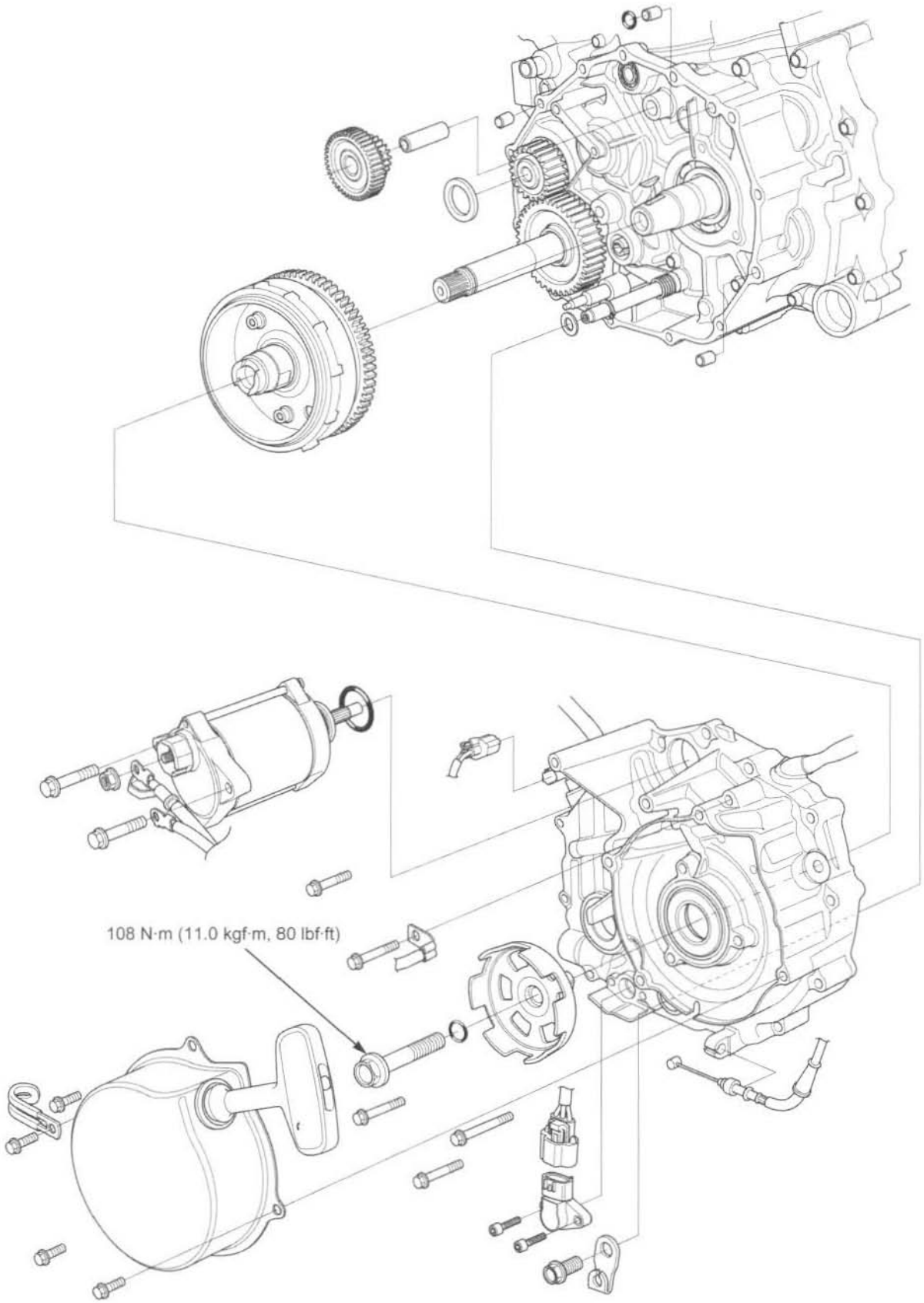
U.S.A. type:

FE/FPE models shown:



Canada type:

FE/FPE models shown:



SERVICE INFORMATION

GENERAL

- This section covers service of the alternator stator, flywheel and starter clutch. To service these parts, the engine must be removed from the frame (page 15-2).
- Transmission lubricating oil is fed through the oil passages in the rear crankcase cover. Clean the oil passages before installing the cover.
- For alternator stator inspection, see Battery/Charging System section (page 21-10)
- For starter motor servicing, see Electric Starter section (page 6-6).

SPECIFICATIONS

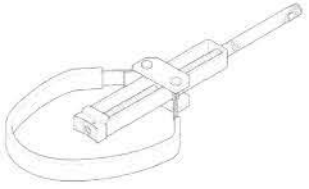
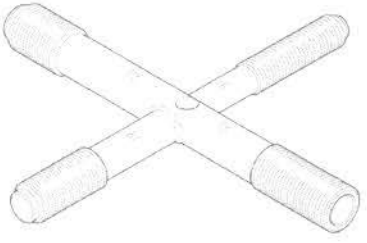
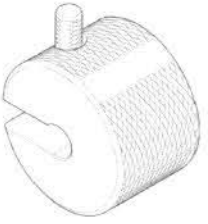
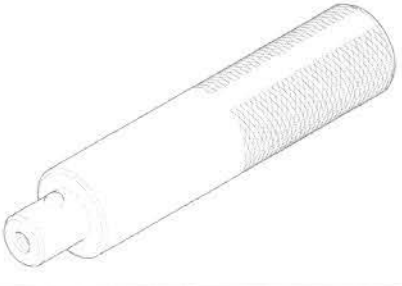
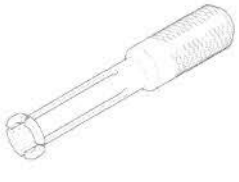
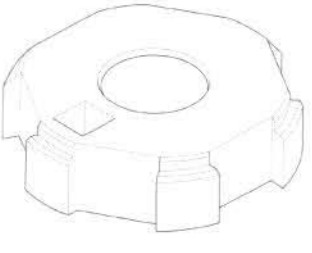
Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Starter driven gear boss	O.D.	51.705 – 51.718 (2.0356 – 2.0361)	51.69 (2.035)
	I.D.	31.946 – 31.962 (1.2577 – 1.2583)	31.90 (1.256)
Crankshaft O.D. at starter driven gear		31.884 – 31.900 (1.2553 – 1.2559)	31.85 (1.254)

TORQUE VALUES

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Starter clutch bolt	6	8	37 (3.8, 27)	Apply locking agent to the threads.
Flywheel bolt (U.S.A. type)	1	12	108 (11.0, 80)	Apply engine oil to the threads and seating surface.
Flywheel/driven pulley bolt (Canada type)	1	12	108 (11.0, 80)	Apply engine oil to the threads and seating surface.
CKP sensor bolt	2	5	6.0 (0.6, 4.4)	Apply locking agent to the threads.

TOOLS

Flywheel holder 07725-0040001 	Rotor puller 07733-0020001  or 07933-3950000	Remover weight 07741-0010201  or 07936-371020A or 07936-3710200 (U.S.A. only)
Attachment, 52 x 55 mm 07746-0010400 	Attachment, 24 x 26 mm 07746-0010700 	Pilot, 10 mm 07746-0040100 
Pilot, 25 mm 07746-0040600 	Driver 07749-0010000 	Bearing remover shaft, 10 mm 07936-GE00100 
Bearing remover head, 10 mm 07936-GE00200 	Bearing remover, 10 mm 07936-GE0A000 (U.S.A. only) 	Recoil pulley holder 07SMB-HM70100 

TROUBLESHOOTING

Starter motor turns, but engine does not turn

- Faulty starter clutch
- Damaged starter reduction gear and/or driven gear

RECOIL STARTER (Canada type)

REMOVAL/INSTALLATION

Remove the mudguards (page 2-6).

Remove the following:

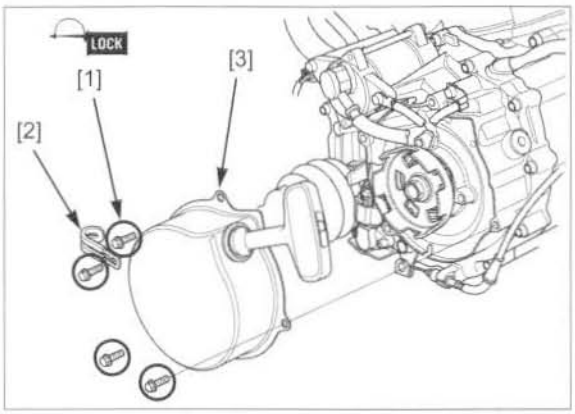
- four bolts [1] and clamp [2]
- recoil starter assembly [3]

Apply locking agent to the bolt threads.

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

Secure the wire with the clamp properly.

Install the mudguards (page 2-6).



STARTER ROPE REPLACEMENT

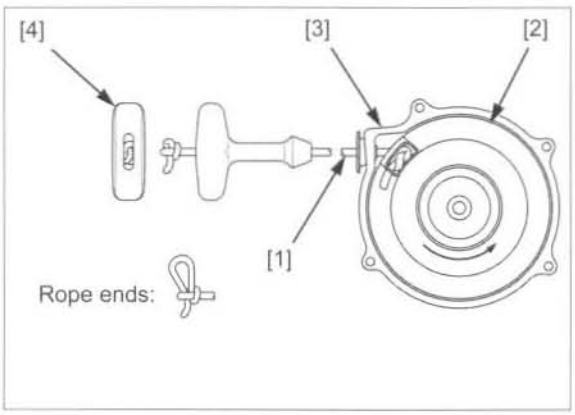
When the rope has broken or the pulley has rewound, align the rope holes by turning the pulley 6-1/2 turns counterclockwise and hold it

Pull the starter rope [1] fully to align the rope holes in the drive pulley [2] and housing [3], 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 [4], 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.



ALTERNATOR STATOR

REAR CRANKCASE COVER REMOVAL

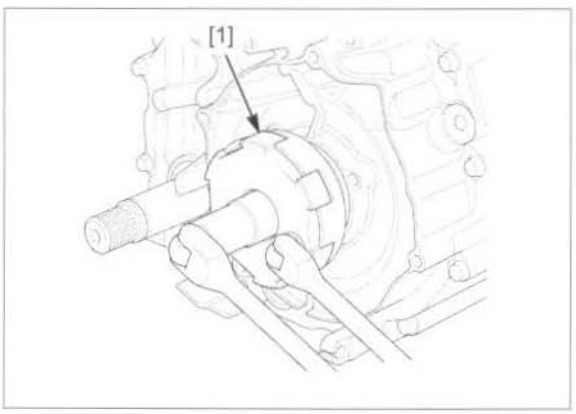
Remove the following:

- engine from the frame (page 15-4)
- Canada type only: recoil starter (page 13-6)
- FE/FPE only: shift angle sensor (page 23-28)

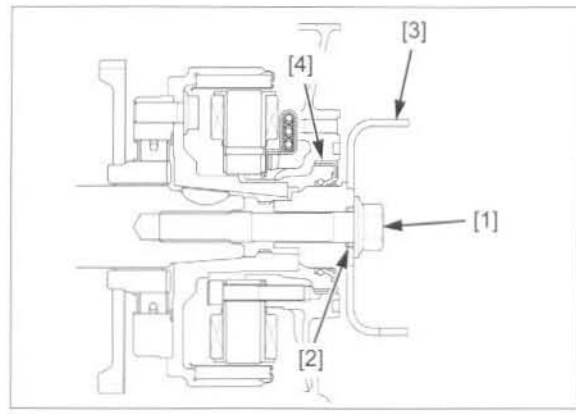
Canada type: Hold the recoil starter driven pulley using the special tool and loosen the bolt.

TOOL:

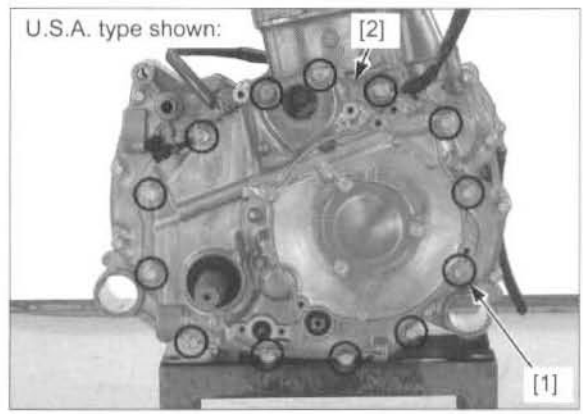
[1] Recoil pulley holder **07SMB-HM70100**



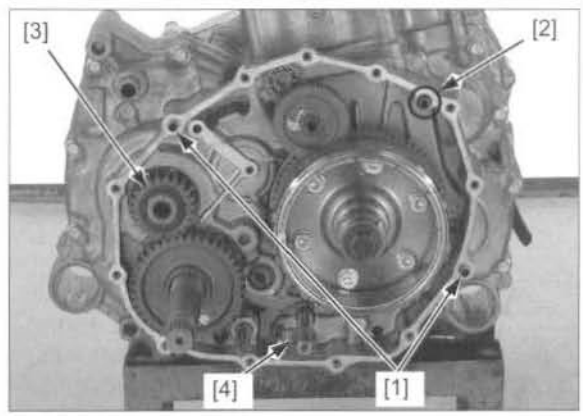
Canada type: Remove the following:
- bolt [1] and O-ring [2]
- driven pulley [3]
- oil seal [4]



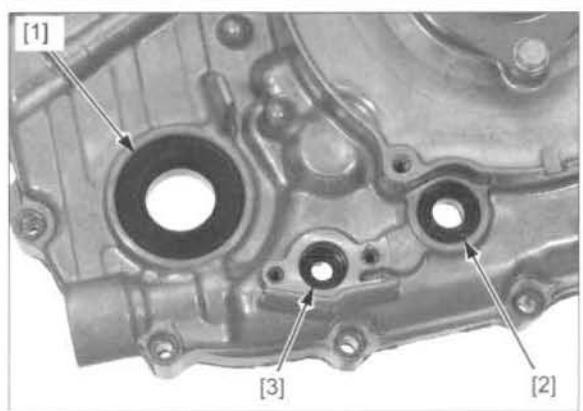
The cover (stator) is magnetically attracted to the flywheel, be careful during removal.
- thirteen bolts [1]
- rear crankcase cover [2]



- two dowel pins [1]
- oil joint pipe and O-ring [2]
- countershaft thrust washer [3]
- reverse stopper shaft thrust washer [4]



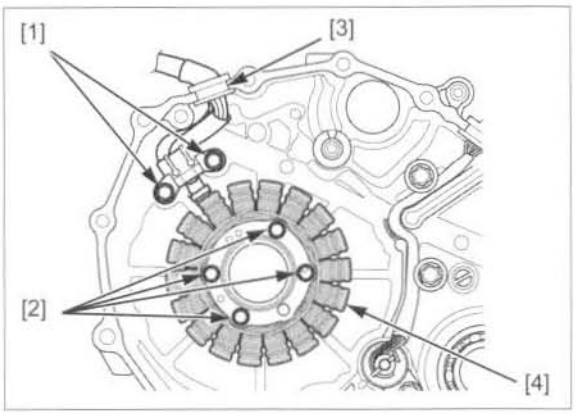
- output shaft oil seal [1]
- reverse lock lever oil seal [2]
- FE/FPE models only: gearshift spindle oil seal [3]



STATOR AND CKP SENSOR REMOVAL

Remove the following:

- two CKP sensor bolts [1]
- four stator bolts [2]
- grommet [3]
- stator/CKP sensor assembly [4]



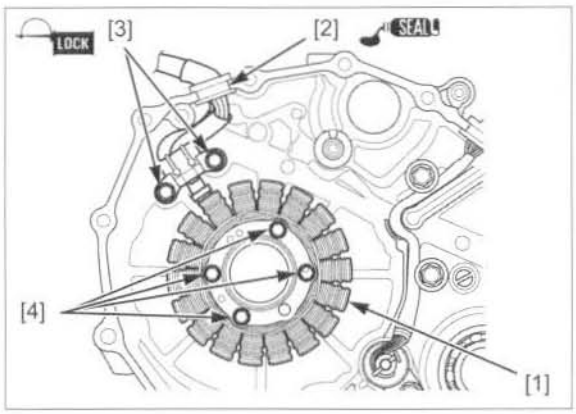
STATOR AND CKP SENSOR INSTALLATION

Set the stator/CKP sensor assembly [1] onto the alternator cover.

Apply sealant to the seating surface of the grommet [2] and install the grommet into the cover groove securely.

Apply locking agent to the threads of the CKP sensor bolt [3].
Install the stator bolts [4] and CKP sensor bolts, and tighten them to the specified torque.

TORQUE:
CKP sensor bolt: 6.0 N·m (0.6 kgf·m, 4.4 lbf·ft)



OUTPUT SHAFT BEARING REPLACEMENT

Turn the inner race of the bearing [1] with your finger. The bearing should turn smoothly and quietly.
Also check that the bearing outer race fits tightly in the rear crankcase cover.

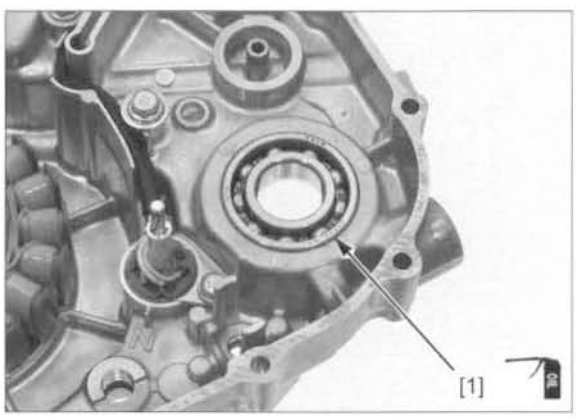
Replace the bearing if the inner race does not turn smoothly, quietly or if the outer race fits loosely in the cover.

Drive the bearing out of the cover.

Apply engine oil to a new bearing.
Drive the bearing into the cover with the marked side facing up.

TOOLS:

Driver	**07749-0010000**
Attachment, 52 x 55 mm	**07746-0010400**
Pilot, 25 mm	**07746-0040600**



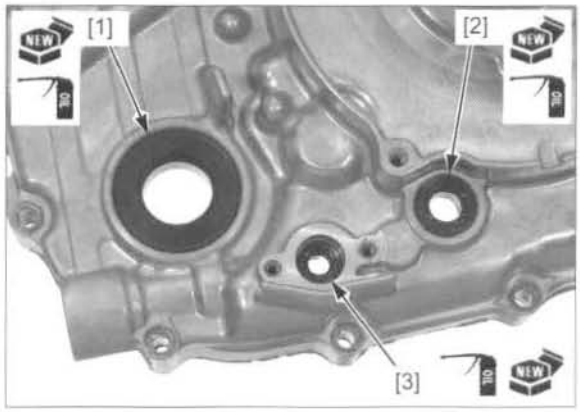
REAR CRANKCASE COVER INSTALLATION

Clean the mating surfaces of the crankcase and rear crankcase cover thoroughly, being careful not to damage them.

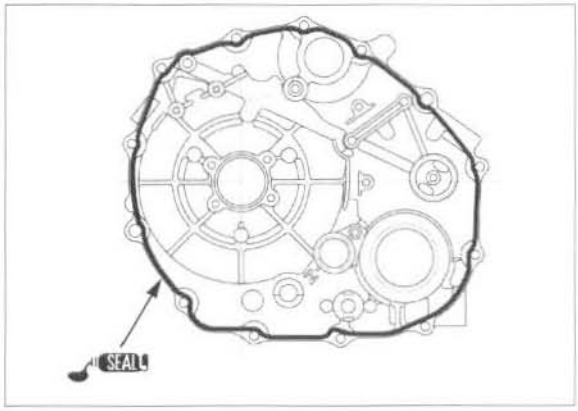
Blow through the oil passage in the rear crankcase cover with compressed air.

Install the following:
- new output shaft oil seal [1]
- new reverse lock lever oil seal [2]
- FE/FPE models only: new gearshift spindle oil seal [3]

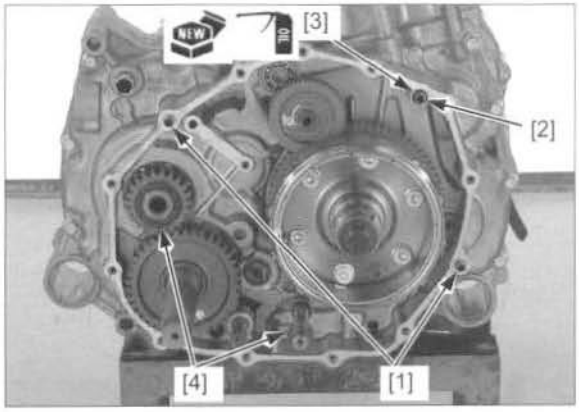
Apply engine oil to the oil seal lips.



Apply liquid sealant (TB1215 or equivalent) to the mating surface (shadowed area) of the rear crankcase cover as shown.



Install the two dowel pins [1] and oil joint pipe [2].
Coat a new O-ring [3] with engine oil and install it onto the oil joint pipe.
Install the thrust washers [4] onto the countershaft and reverse stopper shaft.



Shift the transmission into neutral to align the groove in the shift drum [1] with the lug [2] on the crankcase.

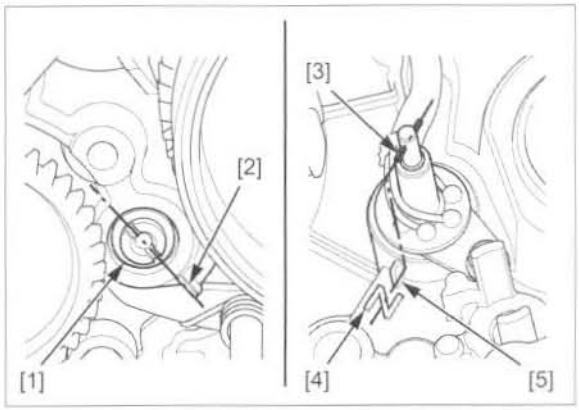
Align the long end [3] of the gear position switch pin with the "N" mark [4] (lug [5]) on the rear crankcase cover.

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

Install the rear crankcase cover aligning the switch pin with the shift drum groove properly, being careful not to damage the switch pin and oil seal lips.

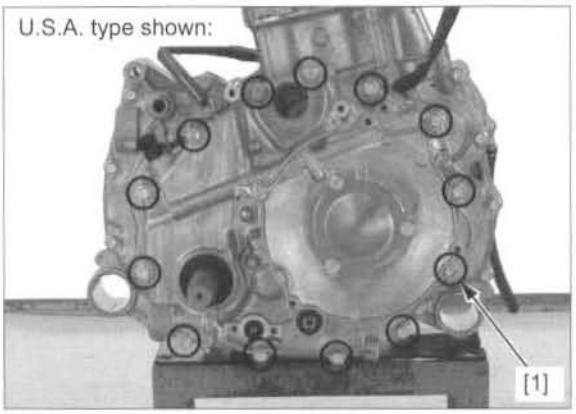
NOTE:
- FM/FPM models only: Align the arm of gearshift spindle A with the arm hole in the gearshift spindle when installing the cover.

If the cover doesn't install easily, remove it and check the alignment of the switch pin and the shift drum or the switch for damage.



After installing the crankcase cover, make sure that the oil seals in the cover are not turned inside out.

Install the thirteen bolts [1] and tighten them in a crisscross pattern in 2 or 3 steps.



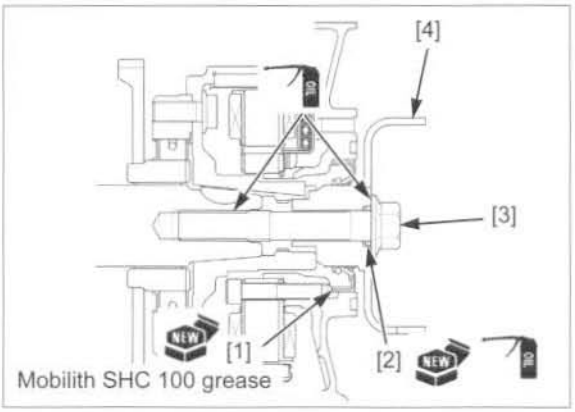
Canada type: Apply specified grease to the lips of a new oil seal [1] and install it into the crankcase cover until it is fully seated.

SPECIFIED GREASE: Mobilith SHC 100 (EXXON)

Coat a new O-ring [2] with engine oil and install it onto the pulley bolt flange.

Apply engine oil to the threads and seating surface of the pulley bolt [3].

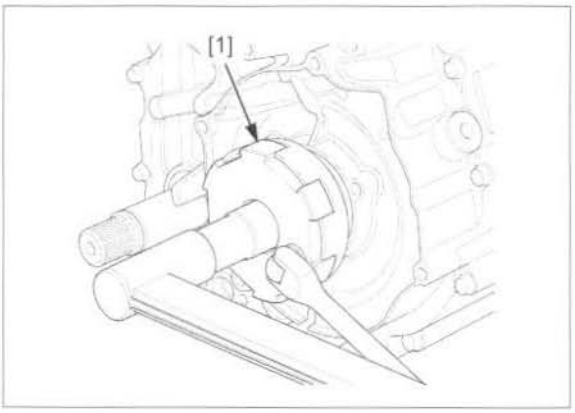
Install the driven pulley [4] with the bolt, aligning the bosses with the grooves in the crankshaft.



Canada type: Hold the driven pulley using the special tool and tighten the bolt.

TOOL:
[1] Recoil pulley holder 07SMB-HM70100

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



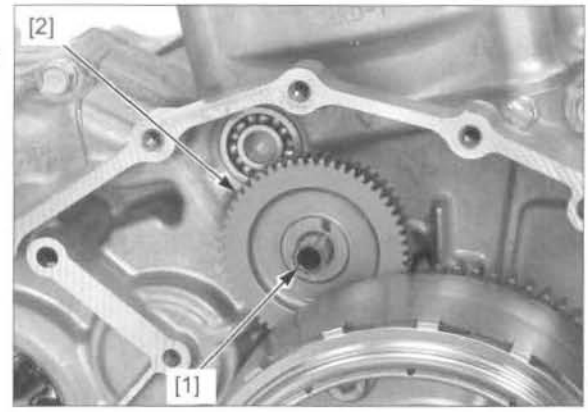
Install the following:
- FE/FPE only: shift angle sensor (page 23-28)
- Canada type only: recoil starter (page 13-6)
- engine into the frame (page 15-9)

FLYWHEEL/STARTER CLUTCH

REMOVAL

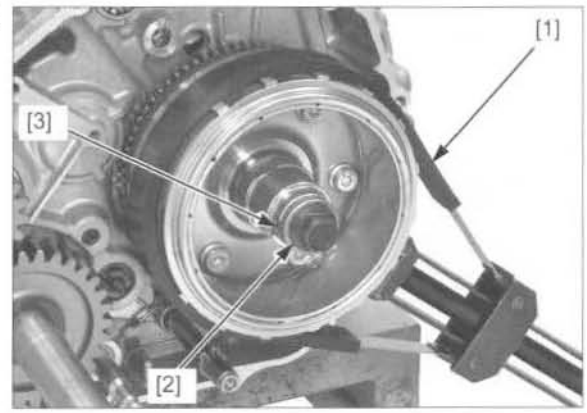
Remove the rear crankcase cover (page 13-6).

Remove the starter reduction gear shaft [1] and gear [2].



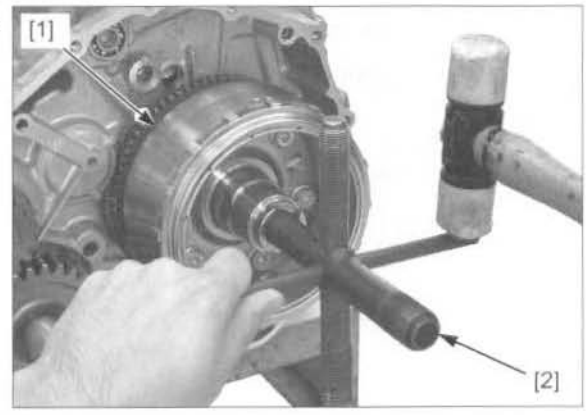
U.S.A. type: Hold the flywheel using the special tool [1] and remove the flywheel bolt [2] and collar [3].

TOOL:
Flywheel holder **07725-0040001**

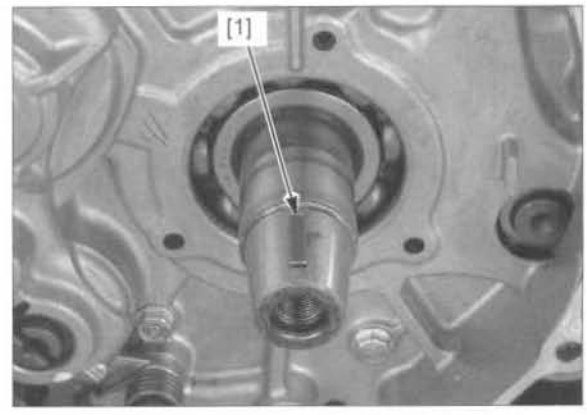


Hold the flywheel [1] and remove it from the crankshaft using the special tools.

TOOL:
[2] Rotor puller **07733-0020001 or 07933-3950000**



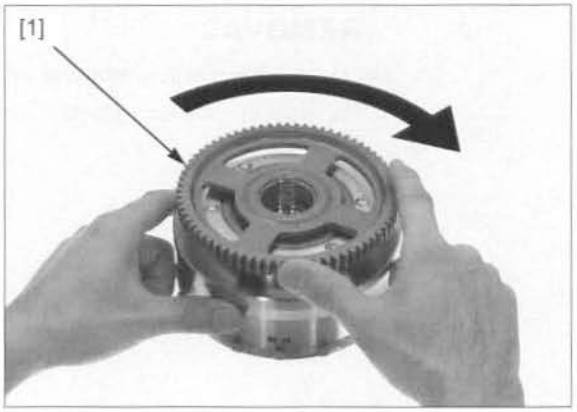
Remove the woodruff key [1] from the crankshaft.



STARTER CLUTCH DISASSEMBLY

Make sure that the starter driven gear [1] turns clockwise smoothly and does not turn counterclockwise.

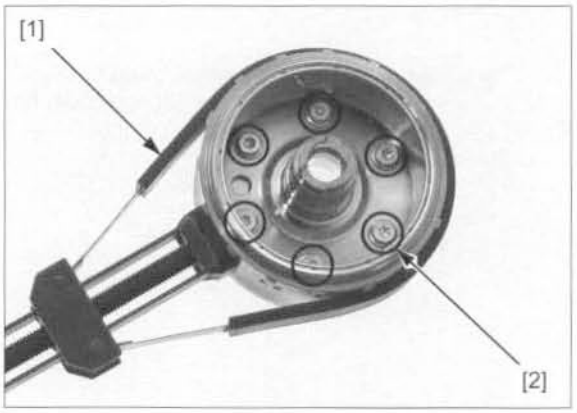
Remove the driven gear while turning it clockwise.



Hold the flywheel with the special tool [1] and remove the starter clutch bolts (T40) [2].

TOOL:
Flywheel holder 07725-0040001

Remove the starter clutch assembly from the flywheel.



INSPECTION

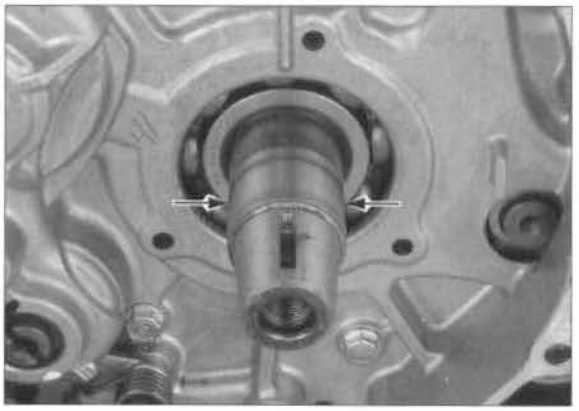
Check the starter driven gear teeth for wear or damage.

Measure the driven gear boss O.D. and I.D.

SERVICE LIMITS: O.D.: 51.69 mm (2.035 in)
I.D.: 31.90 mm (1.256 in)

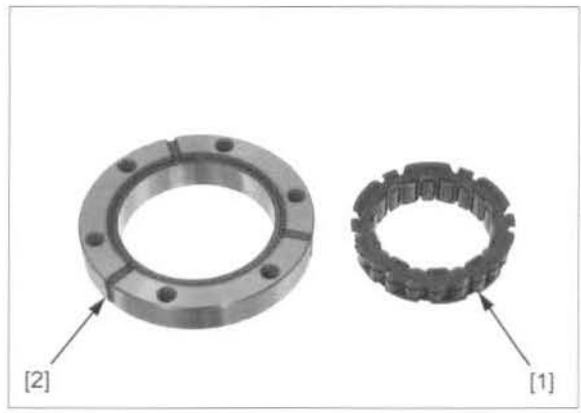
Measure the crankshaft O.D. at the starter driven gear.

SERVICE LIMIT: 31.85 mm (1.254 in)



Remove the sprag clutch [1] from the clutch outer [2].

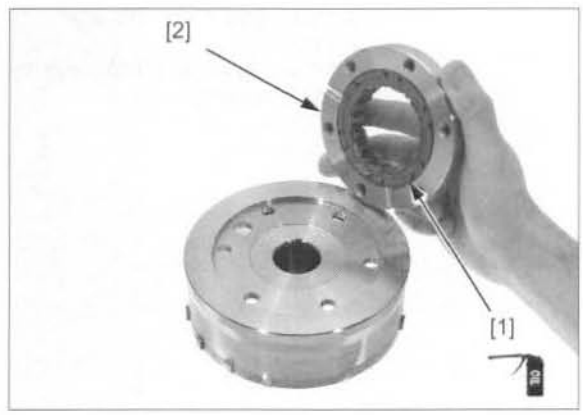
Check the starter clutch outer and sprag clutch for abnormal wear or damage.



Check the starter reduction gear and shaft for wear or damage.

STARTER CLUTCH ASSEMBLY

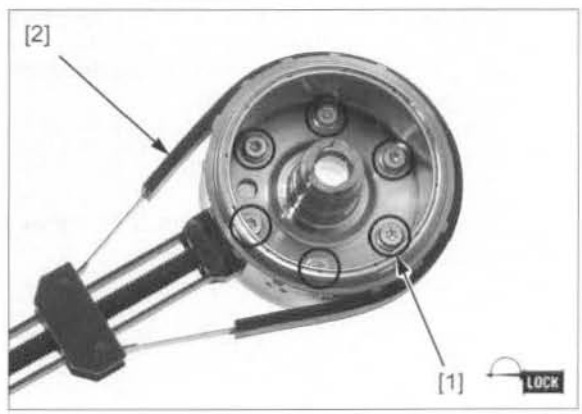
Lubricate the sprag clutch [1] with engine oil and install it into the clutch outer [2] with the flange facing the flywheel side.
Install the starter clutch onto the flywheel.



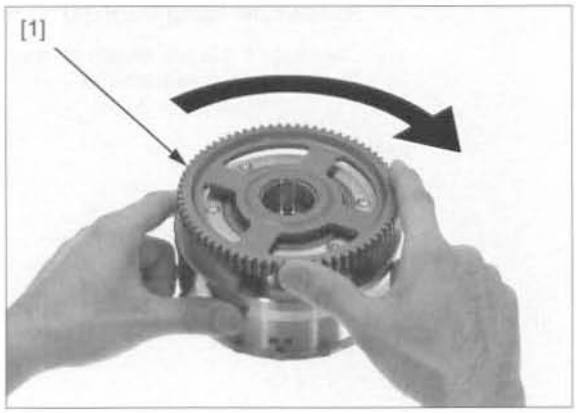
Apply locking agent to the threads of the starter clutch (T40) bolt [1].
Align the bolt holes in the flywheel and starter clutch, and install the bolts.
Hold the flywheel with the special tool [2] and tighten the bolts to the specified torque.

TOOL:
Flywheel holder **07725-0040001**

TORQUE: 37 N·m (3.8 kgf·m, 27 lbf·ft)



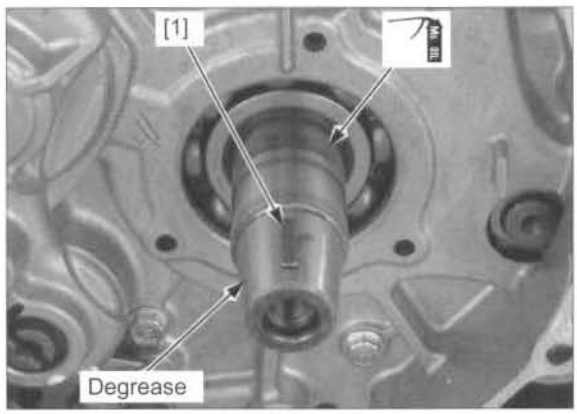
Install the starter driven gear [1] while turning it clockwise.



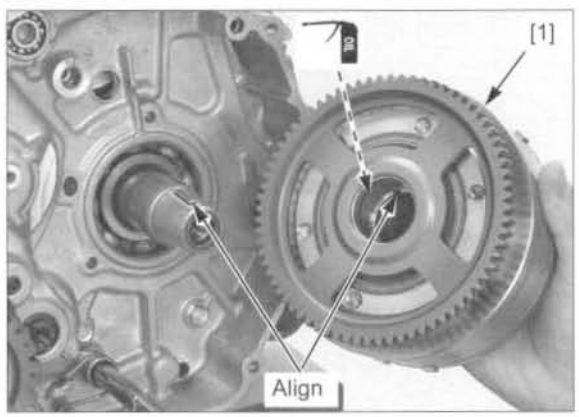
INSTALLATION

Install the woodruff key [1] into the key groove.

Apply molybdenum oil solution to the starter driven gear sliding surface of the crankshaft.
Clean any oil from the tapered portions of the crankshaft and flywheel.



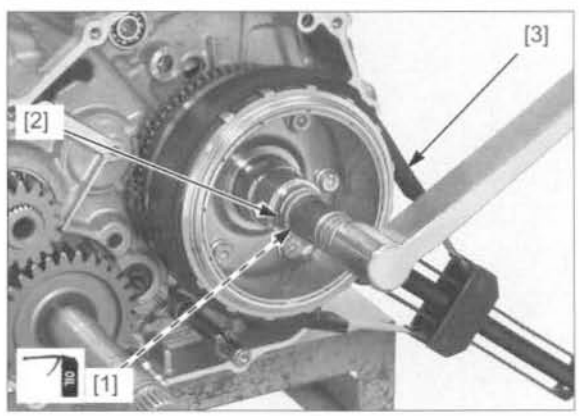
Apply engine oil to the starter driven gear boss inner surface.
Install the flywheel [1] aligning the key way with the key on the crankshaft.



U.S.A. type: Apply engine oil to the threads and seating surface of the flywheel bolt [1] and install it with the collar [2].
Hold the flywheel using the special tool [3] and tighten the flywheel bolt.

TOOL:
Flywheel holder 07725-0040001

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



Canada type: Temporarily tighten the pulley bolt to seat the flywheel as follows.

Apply engine oil to the threads and seating surface of the pulley bolt [1].

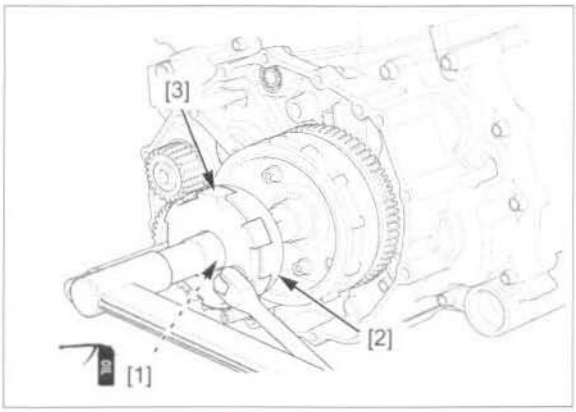
Install the driven pulley [2], aligning the bosses with the grooves in the crankshaft, and secure it with the bolt.

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

TOOL:
[3] Recoil pulley holder 07SMB-HM70100

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

Loosen the pulley bolt. Remove the tool, bolt and pulley.

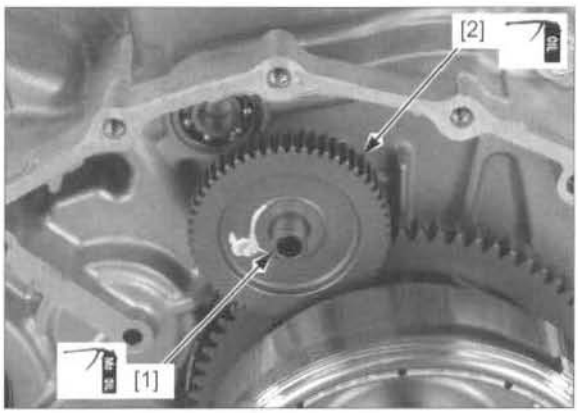


Apply molybdenum oil solution to the starter reduction gear shaft [1].

Apply engine oil to the reduction gear teeth [2].

Install the gear and shaft.

Install the rear crankcase cover (page 13-9).



STARTER MOTOR BEARING REPLACEMENT

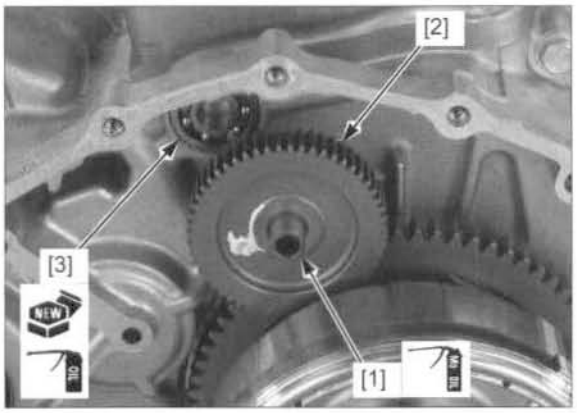
Remove the rear crankcase cover (page 13-6).

Remove the starter reduction gear shaft [1] and gear [2].

Turn the inner race of the bearing [3] with your finger. The bearing should turn smoothly and quietly.
Also check that the bearing outer race fits tightly in the rear crankcase cover.

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

Remove the bearing using the special tools.



TOOLS:

Bearing remover shaft, 10 mm	**07936-GE00100**
Bearing remover head, 10 mm	**07936-GE00200**
Remover weight	**07741-0010201**

U.S.A. TOOLS:

Bearing remover, 10 mm	**07936-GE0A000**
Remover weight	**07936-371020A or 07936-3710200**

Apply engine oil to a new bearing.
Drive a new bearing into the crankcase with the marked side facing out, using the special tools.

TOOLS:

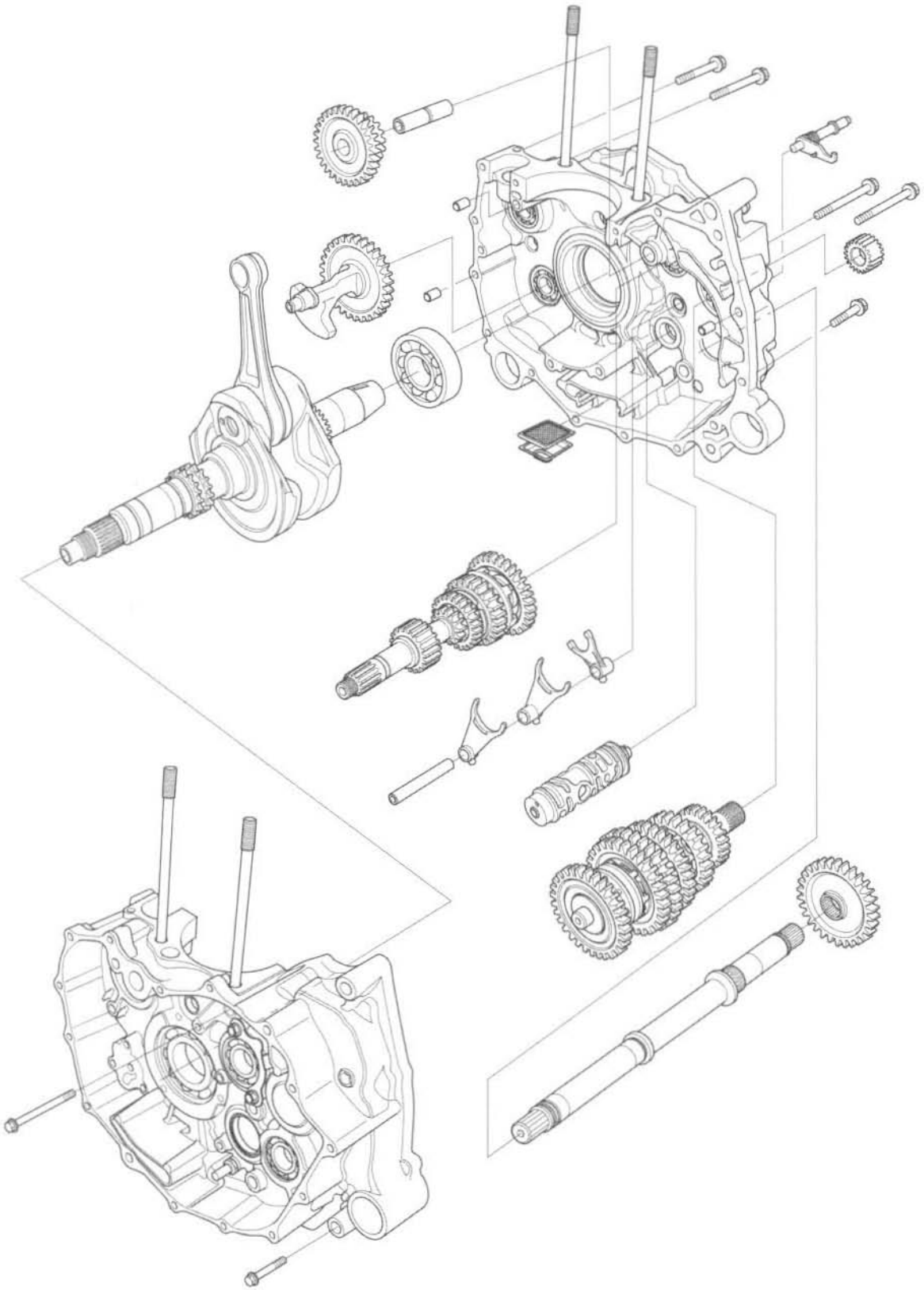
Driver	**07749-0010000**
Attachment, 24 x 26 mm	**07746-0010700**
Pilot, 10 mm	**07746-0040100**

Apply molybdenum oil solution to the starter reduction gear shaft, and install the gear and shaft.

Install the rear crankcase cover (page 13-9).

14. CRANKCASE/TRANSMISSION/CRANKSHAFT/BALANCER

SYSTEM COMPONENTS



SERVICE INFORMATION

GENERAL

- The crankcase halves must be separated to service the transmission and crankshaft. To service these parts, the engine must be removed from the frame (page 15-4).
- Be careful not to damage the crankcase mating surfaces when servicing.
- Engine lubricating oil is fed through the oil passages in the crankcase. Clean the oil passages before assembling the crankcase halves.

SPECIFICATIONS

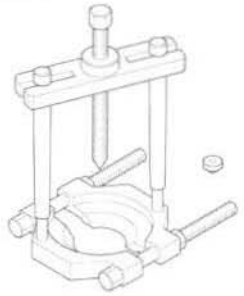
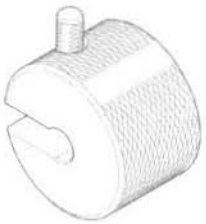
Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Shift fork	I.D.	Front, rear	13.000 – 13.021 (0.5118 – 0.5126)	13.04 (0.513)
		Center	13.000 – 13.018 (0.5118 – 0.5125)	13.04 (0.513)
	Claw thickness		4.93 – 5.00 (0.194 – 0.197)	4.5 (0.18)
	Shaft O.D.		12.966 – 12.984 (0.5105 – 0.5112)	12.96 (0.510)
Transmission	Gear I.D.	M3	25.000 – 25.021 (0.9843 – 0.9851)	25.05 (0.986)
		M5	20.000 – 20.021 (0.7874 – 0.7882)	20.05 (0.789)
		C1, C2, C4, CR	28.020 – 28.041 (1.1031 – 1.1040)	28.07 (1.105)
		Reverse idle	13.000 – 13.021 (0.5118 – 0.5126)	13.04 (0.513)
	Gear bushing O.D.	M3	24.959 – 24.980 (0.9826 – 0.9835)	24.93 (0.981)
		M5	19.966 – 19.984 (0.7861 – 0.7868)	19.94 (0.785)
		C2	27.984 – 28.005 (1.1017 – 1.1026)	27.94 (1.100)
		C1, C4, CR	27.979 – 28.000 (1.1015 – 1.1024)	27.93 (1.100)
	Gear-to-bushing clearance	M3	0.020 – 0.062 (0.0008 – 0.0024)	0.10 (0.004)
		M5	0.016 – 0.055 (0.0006 – 0.0022)	0.10 (0.004)
		C2	0.015 – 0.057 (0.0006 – 0.0022)	0.08 (0.003)
		C1, C4, CR	0.020 – 0.062 (0.0008 – 0.0024)	0.10 (0.004)
	Gear bushing I.D.	M3	22.000 – 22.021 (0.8661 – 0.8670)	22.04 (0.868)
		M5	17.016 – 17.034 (0.6699 – 0.6706)	17.06 (0.672)
		C4	25.000 – 25.021 (0.9843 – 0.9851)	25.05 (0.986)
	Mainshaft O.D.	at M3	21.959 – 21.980 (0.8645 – 0.8654)	21.93 (0.863)
		at M5	16.976 – 16.987 (0.6683 – 0.6688)	16.93 (0.667)
	Countershaft O.D.	at C4	24.959 – 24.980 (0.9826 – 0.9835)	24.93 (0.981)
	Reverse idle shaft O.D.		12.966 – 12.984 (0.5105 – 0.5112)	12.94 (0.509)
	Bushing-to-shaft clearance	M3	0.020 – 0.062 (0.0008 – 0.0024)	0.10 (0.004)
		M5	0.029 – 0.058 (0.0011 – 0.0023)	0.10 (0.004)
		C4	0.020 – 0.062 (0.0008 – 0.0024)	0.10 (0.004)
	Reverse idle gear-to-shaft clearance		0.016 – 0.055 (0.0006 – 0.0022)	0.10 (0.004)
Crankshaft	Runout		–	0.15 (0.006)
	Big end side clearance		0.05 – 0.65 (0.002 – 0.026)	0.8 (0.03)
	Big end radial clearance		0.006 – 0.018 (0.0002 – 0.0007)	0.05 (0.002)

TORQUE VALUE

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Mainshaft bearing setting plate bolt	2	6	12 (1.2, 9)	Apply locking agent to the threads.

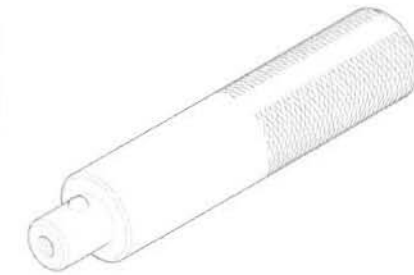
TOOLS

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, 32 x 35 mm 07746-0010100 
Attachment, 37 x 40 mm 07746-0010200 	Attachment, 42 x 47 mm 07746-0010300 	Attachment, 62 x 68 mm 07746-0010500 
Attachment, 72 x 75 mm 07746-0010600 	Pilot, 15 mm 07746-0040300 	Pilot, 17 mm 07746-0040400 
Pilot, 20 mm 07746-0040500 	Pilot, 25 mm 07746-0040600 	Pilot, 35 mm 07746-0040800 

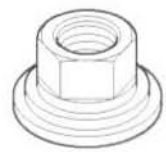
Pilot, 40 mm
07746-0040900

Pilot, 22 mm
07746-0041000

Driver
07749-0010000



Special nut
07931-HB3020A (U.S.A. only)

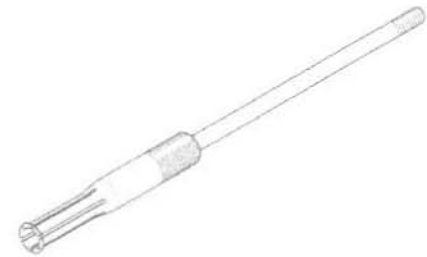


Puller shaft
07931-ME4010B (U.S.A. only)

Remover handle
07936-3710100

Bearing remover, 17 mm
07936-3710300

Bearing remover, 20 mm
07936-3710600



Bearing remover shaft, 15 mm
07936-KC10100

Bearing remover head, 15 mm
07936-KC10200

Bearing remover, 15 mm
07936-KC10500 (U.S.A. only)

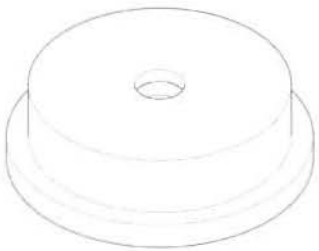
Attachment, 45 x 50 mm
07946-6920100

Assembly collar
07965-VM00100

Puller shaft and nut
07965-VM00200

Threaded adapter
07965-VM00300

or 07931-KF00200 (U.S.A. only)

Attachment, 78 x 90 mm 07GAD-SD40101	Pilot, 32 mm 07MAD-PR90200
	

TROUBLESHOOTING

Excessive engine noise
- Worn, seized or chipped transmission gears
- Worn transmission bearings
- Worn connecting rod big end bearing
- Worn crankshaft main journal bearing
- Worn balancer bearing
- Improper balancer installation

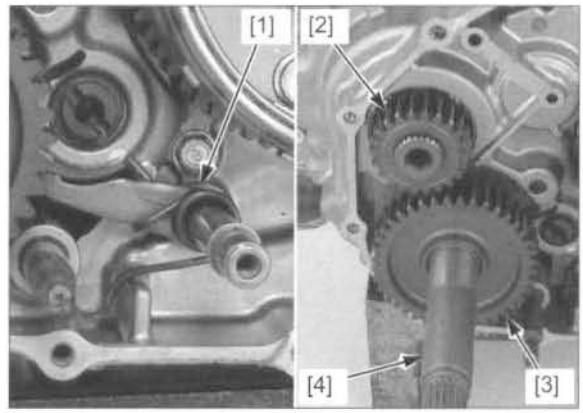
Transmission jumps out of gear
- Worn gear dogs or dog holes
- Worn shift drum guide groove
- Worn shift fork guide pin
- Worn gear shifter groove
- Worn shift fork
- Bent shift fork shaft
- Faulty gearshift linkage (page 12-5)

Hard to shift
- Damaged shift fork
- Bent shift fork shaft
- Damaged shift fork guide pin
- Damaged shift drum guide groove
- Bent gearshift spindle
- Faulty gearshift linkage (page 12-5)

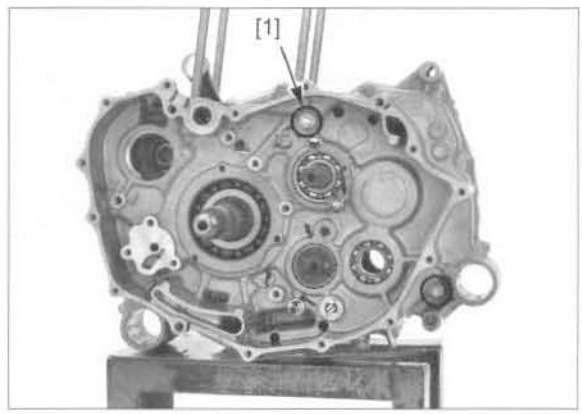
Abnormal vibration
- Improper balancer timing

CRANKCASE SEPARATION

Remove the following:
- engine (page 15-4)
- cylinder head (page 10-9)
- cylinder and piston (page 11-4)
- gearshift linkage (page 12-19)
- change clutch (page 12-13)
- oil pump (page 9-4)
- flywheel and starter clutch (page 13-11)
- reverse stopper shaft assembly [1]
- output shaft drive gear [2], driven gear [3] and output shaft [4]



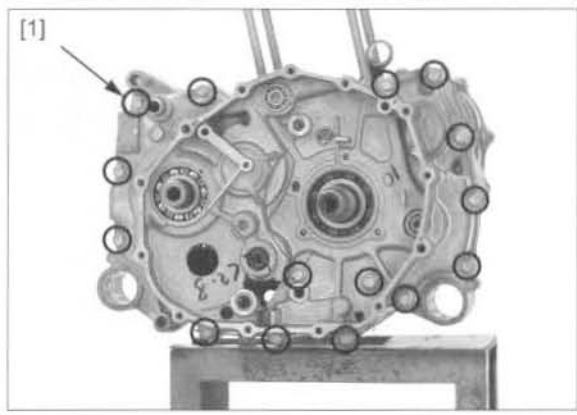
- two front crankcase bolts [1]



Loosen the crankcase bolts in a crisscross pattern in several steps.

- fifteen rear crankcase bolts [1]

Place the crankcase assembly with the rear crankcase down.

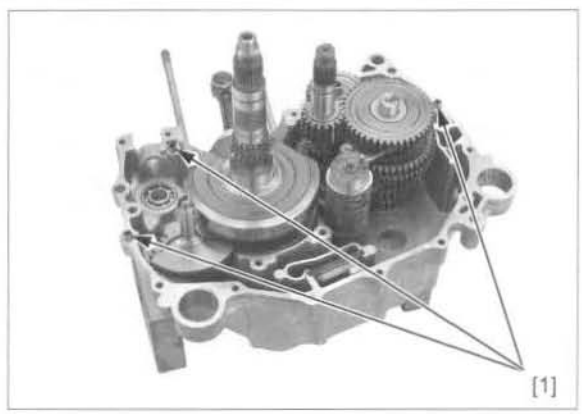


Do not pry the crankcase apart with a screwdriver.

Remove the front crankcase while tapping it at several locations with a soft hammer.

Remove the three dowel pins [1].

Remove any sealant material from the crankcase mating surfaces.



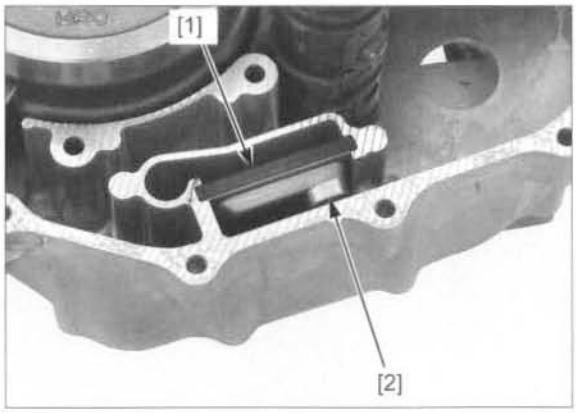
OIL STRAINER CLEANING

Remove the oil strainer [1] and strainer plate [2].

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

Before installing the strainer, the screen mesh should be examined closely for damage.

Install the strainer and plate with the wedge facing the crankcase.

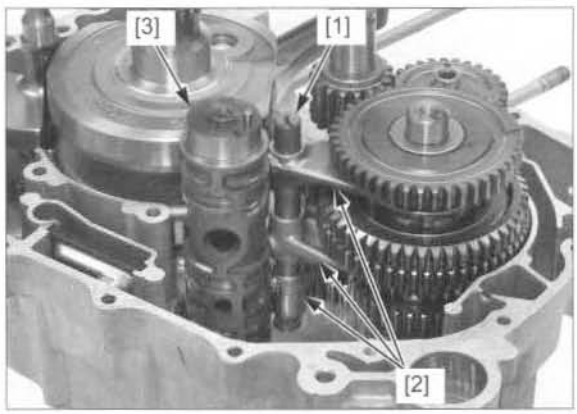


TRANSMISSION

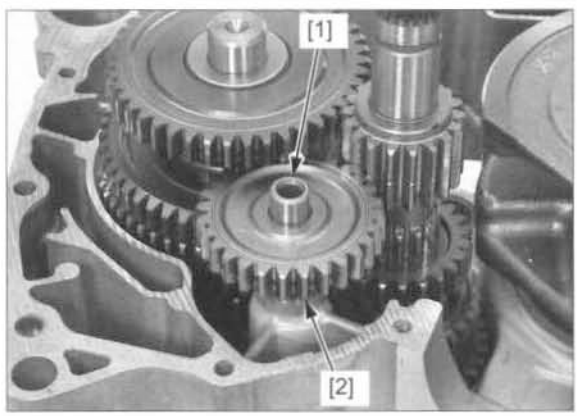
DISASSEMBLY

Separate the crankcase (page 14-7).

Remove the following:
- shift fork shaft [1]
- shift forks [2]
- shift drum [3]

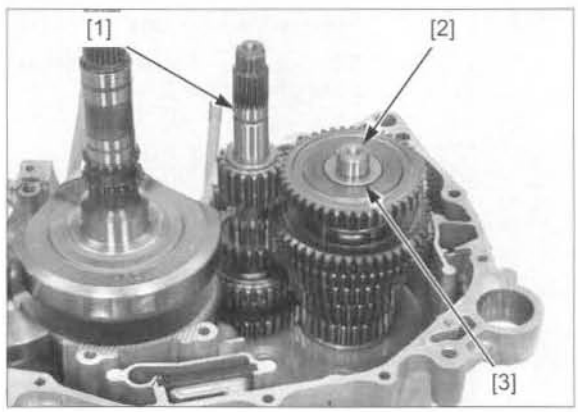


- reverse idle shaft [1] and idle gear [2]



Position the crank weights so that they do not interfere with the mainshaft gears.

- mainshaft [1], countershaft [2] and washer [3] as an assembly



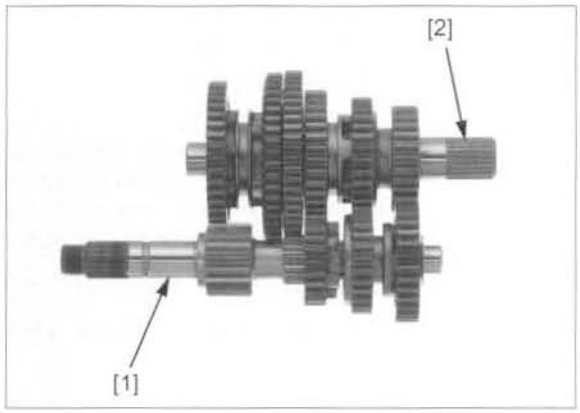
Do not expand the snap ring more than necessary for removal.

Disassemble the mainshaft [1] and countershaft [2].

Clean all disassembled parts in solvent thoroughly.

NOTE:

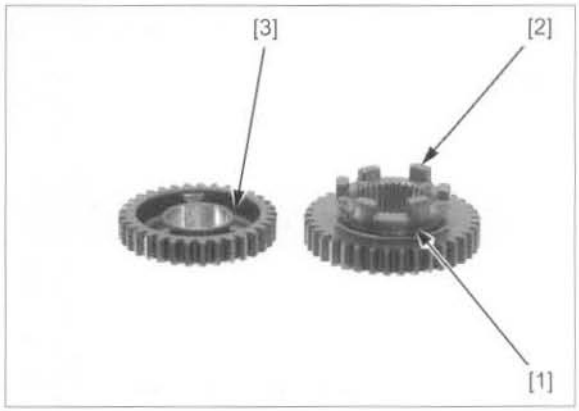
- Keep track of the disassembled parts (gears, bushings, washers and snap ring) by sliding them onto a tool or slipping them onto a piece of wire.



INSPECTION

GEAR/BUSHING/SHAFT

Check the shifter groove [1] for abnormal wear or damage.
Check the gear dogs [2], dog slots [3] and teeth for abnormal wear or damage.



Measure the I.D. of each gear.

SERVICE LIMITS:
M3: 25.05 mm (0.986 in)
M5: 20.05 mm (0.789 in)
C1, C2, C4, CR: 28.07 mm (1.105 in)
Reverse idle: 13.04 mm (0.513 in)

Measure the gear bushing O.D.

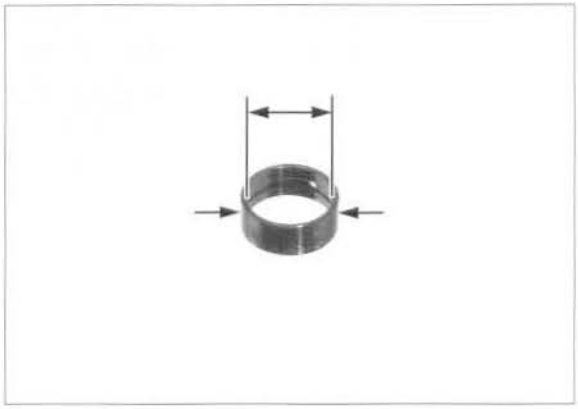
SERVICE LIMITS:
M3: 24.93 mm (0.981 in)
M5: 19.94 mm (0.785 in)
C2: 27.94 mm (1.100 in)
C1, C4, CR: 27.93 mm (1.100 in)

Calculate the gear-to-bushing clearance.

SERVICE LIMITS:
M3, M5, C1, C4, CR: 0.10 mm (0.004 in)
C2: 0.08 mm (0.003 in)

Measure the gear bushing I.D.

SERVICE LIMITS:
M3: 22.04 mm (0.868 in)
M5: 17.06 mm (0.672 in)
C4: 25.05 mm (0.986 in)



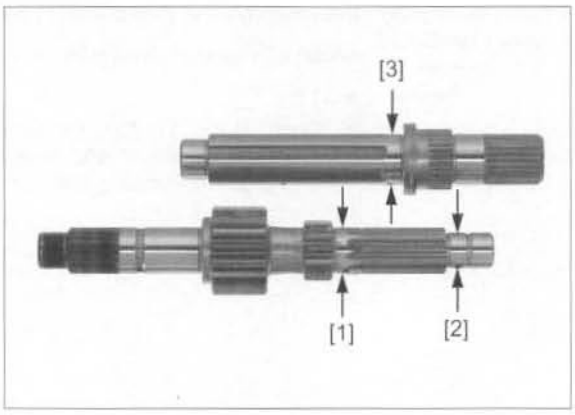
Check the mainshaft and countershaft for abnormal wear or damage.

Measure the shaft O.D.

SERVICE LIMITS:
At M3 [1]: 21.93 mm (0.863 in)
At M5 [2]: 16.93 mm (0.667 in)
At C4 [3]: 24.93 mm (0.981 in)
Reverse idle: 12.94 mm (0.509 in)

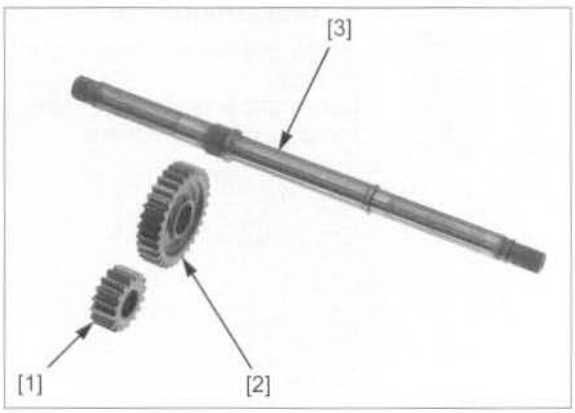
Calculate the bushing-to-shaft clearance.

SERVICE LIMIT: 0.10 mm (0.004 in)



OUTPUT SHAFT/GEAR

Check the output shaft drive gear [1], driven gear [2] teeth and each gear, output shaft [3] splines for abnormal wear or damage.



SHIFT FORK/SHAFT

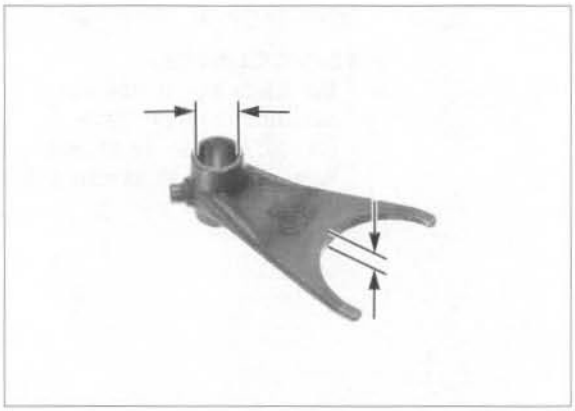
Check the shift forks for abnormal wear or damage.

Measure each shift fork I.D.

SERVICE LIMIT: 13.04 mm (0.513 in)

Measure the claw thickness of each shift fork.

SERVICE LIMIT: 4.5 mm (0.18 in)



Check the shift fork shaft for damage or bending.

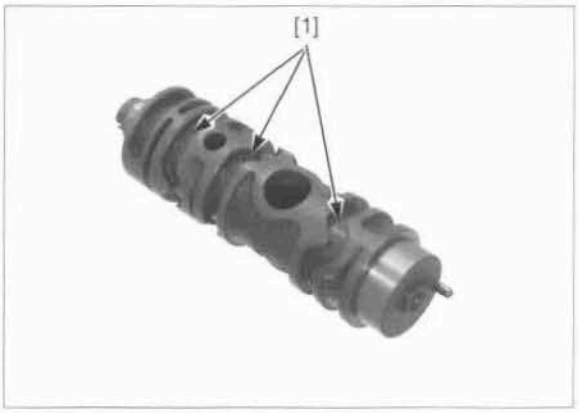
Measure the shift fork shaft O.D.

SERVICE LIMIT: 12.96 mm (0.510 in)

SHIFT DRUM

Check the guide grooves [1] for abnormal wear or damage.

Check the shift drum journals for scoring, scratches or evidence of insufficient lubrication.



ASSEMBLY

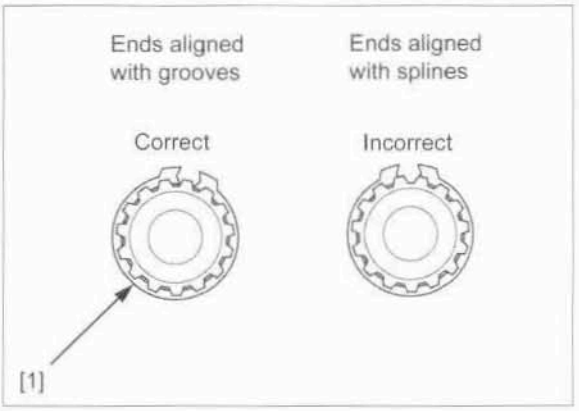
NOTE:

- Always install the thrust washers and snap ring with the chamfered (rolled) edge facing away from the thrust load.
- Install the snap ring [1] so its ends aligns with the grooves in the splines.
- Make sure the snap ring is fully seated in the shaft groove after installing it.

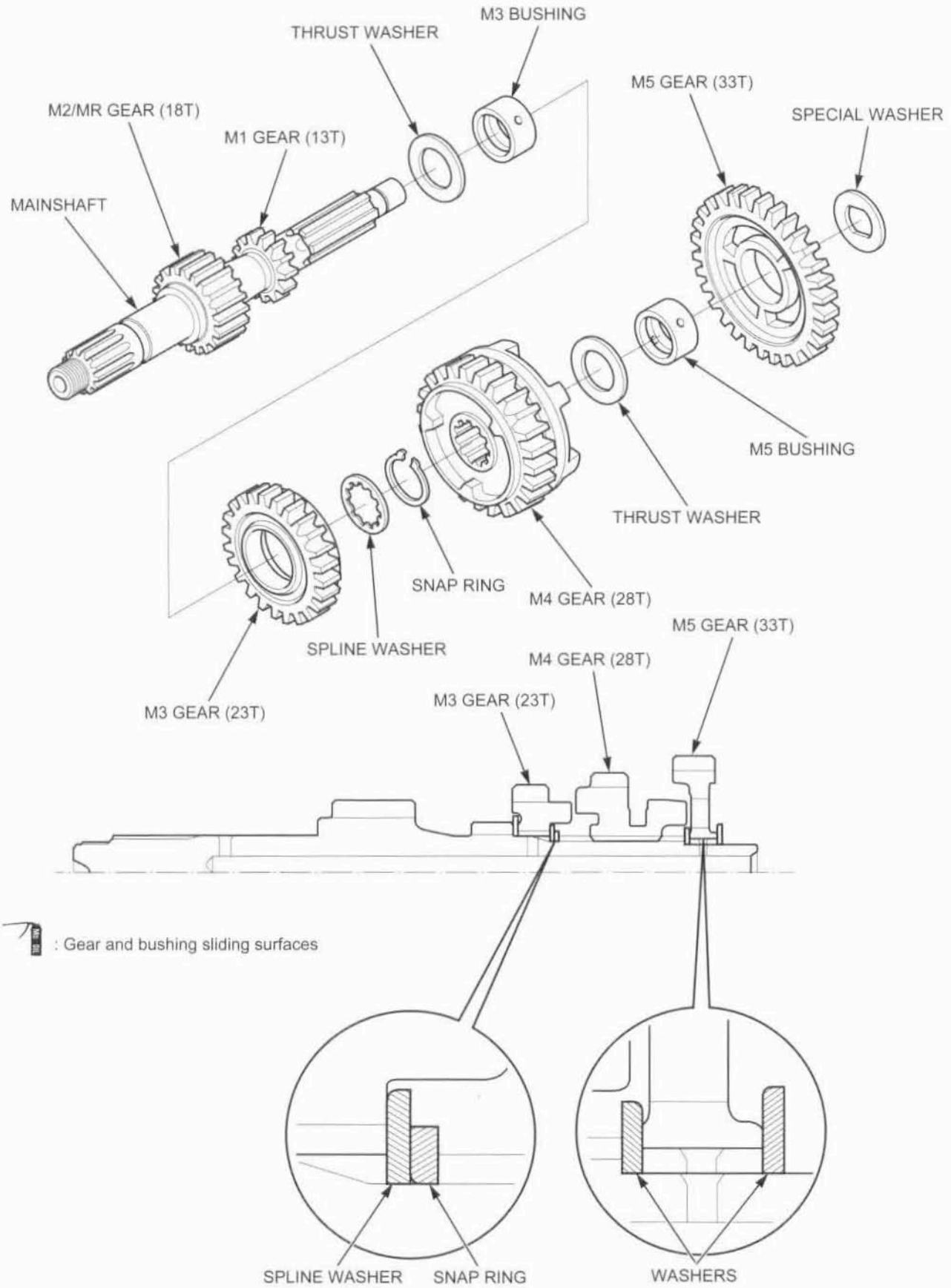
Clean all parts in solvent and dry them thoroughly.

Apply molybdenum oil solution to the gear and bushing sliding surfaces.

Assemble the mainshaft and countershaft.

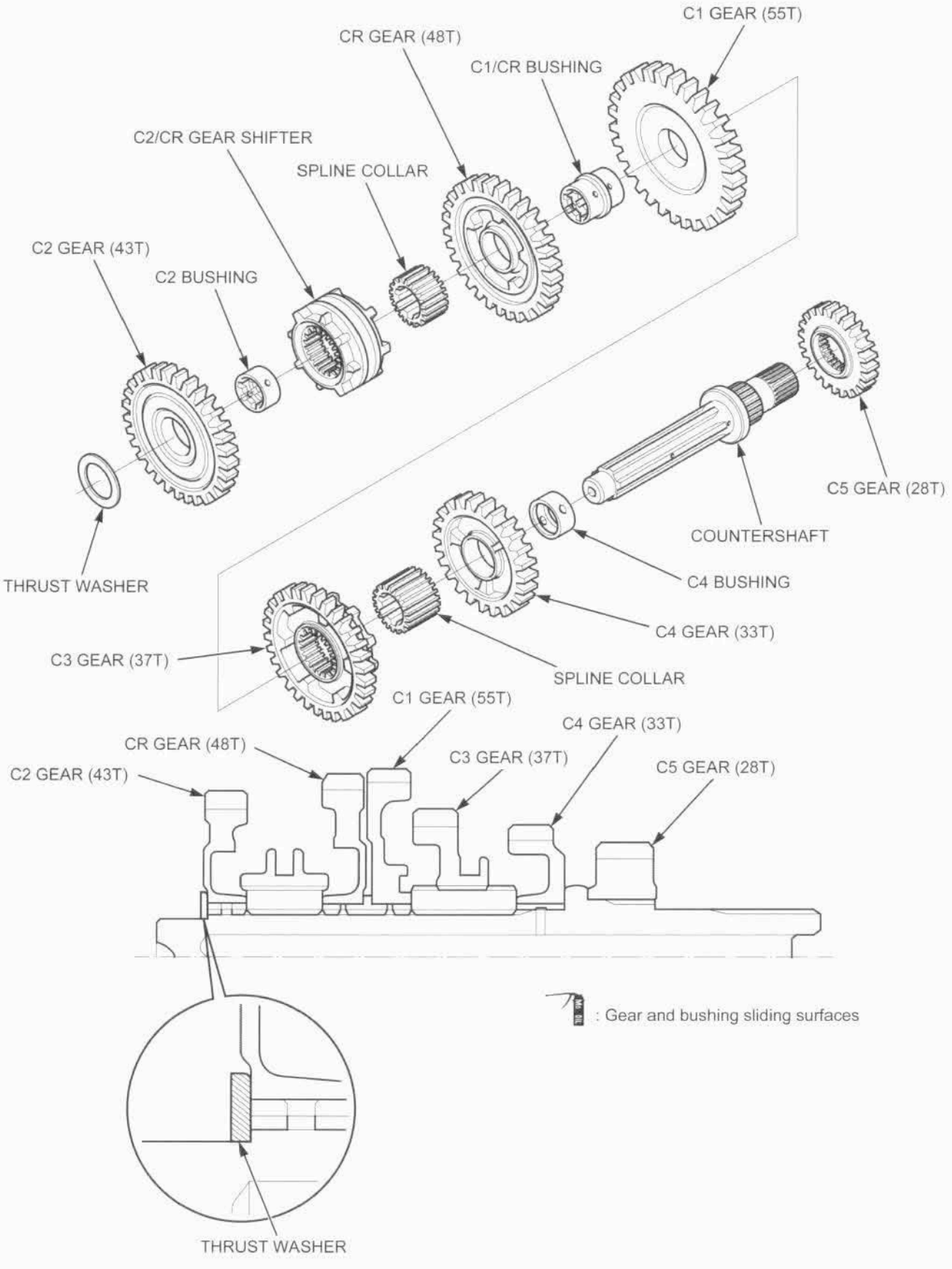


MAINSHAFT



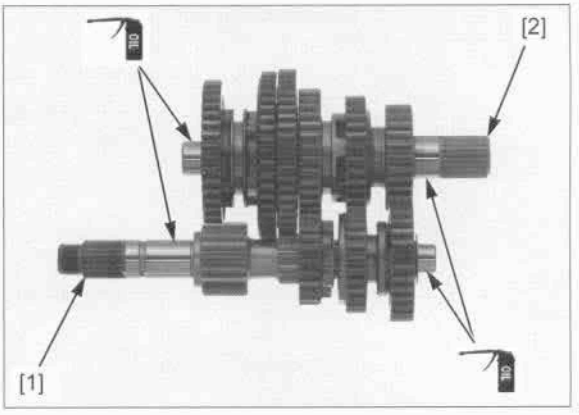
Washer and snap ring direction:

COUNTERSHAFT



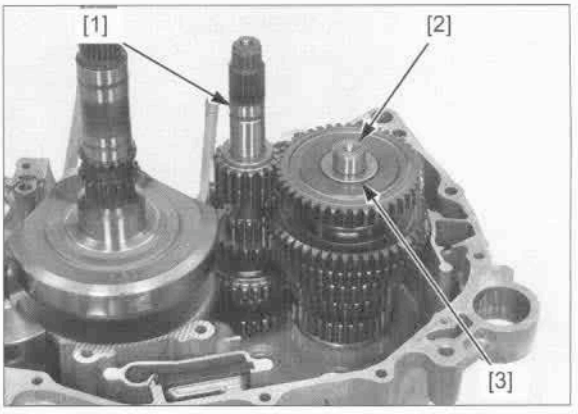
Check the gears for freedom of movement or rotation on the shaft.

Apply engine oil to the journals of the mainshaft [1] and countershaft [2].
Engage the mainshaft and countershaft gears.



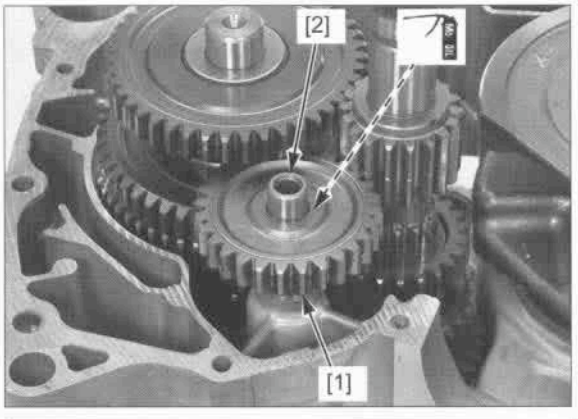
Position the crank weights so that they do not interfere with the mainshaft [1].

Install the mainshaft, countershaft [2] and washer [3] assemblies as a set into the rear crankcase.

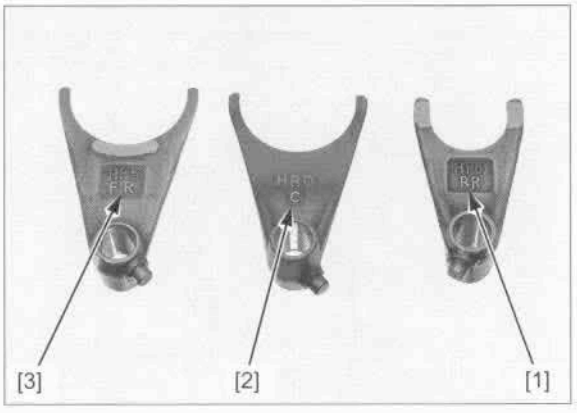


Apply molybdenum oil solution to the sliding surface of the reverse idle gear [1].

Install the reverse idle gear and shaft [2].



Each shift fork has an identification mark; "RR" [1] for the rear fork, "C" [2] for the center fork and "FR" [3] for the front fork.



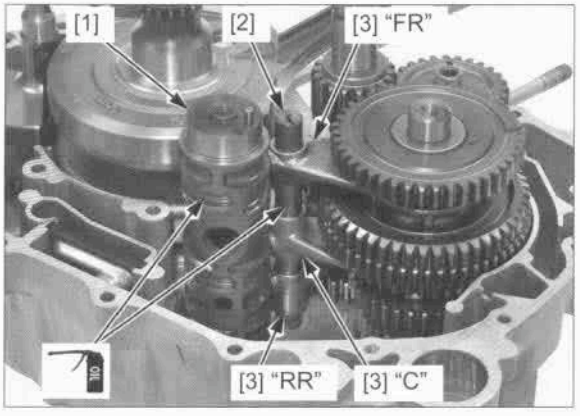
Apply engine oil to the shift drum guide pin grooves and install the shift drum [1].

Install each shift fork into the gear shifter grooves and shift drum groove with their identification marks facing up (front crankcase side).

- rear shift fork into the M4 gear
- center shift fork into the C3 gear
- front shift fork into the C2/reverse gear shifter

Apply engine oil to the fork shaft [2].
Install the fork shaft through the shift forks [3] and into the crankcase.

Assemble the crankcase halves (page 14-21).



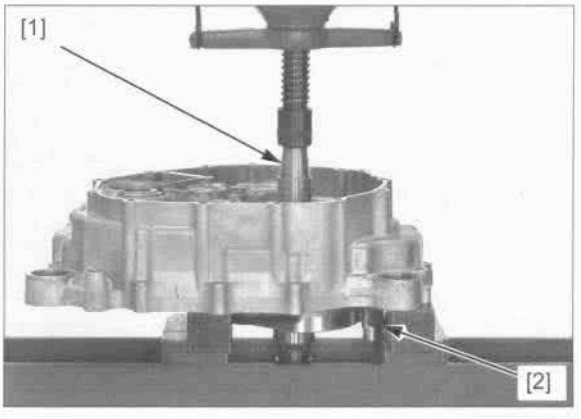
CRANKSHAFT/BALANCER

REMOVAL

Separate the crankcase halves (page 14-7).
Remove the transmission (page 14-8).

Be careful not to damage the crankcase mating surface and crankshaft assembly.

Remove the crankshaft [1] and balancer [2] from the rear crankcase using a hydraulic press.
Be sure to hold the crankshaft and balancer while pressing them out of the crankcase.



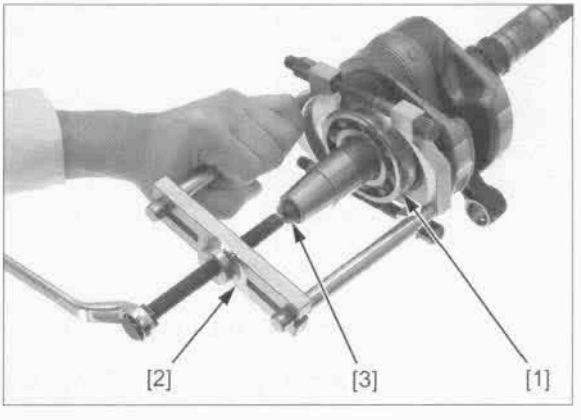
Remove the rear crankshaft bearing [1] using the bearing puller [2] with a suitable protector [3] and discard the bearing.

TOOL:

Universal bearing puller	**07631-0010000 or equivalent commercially available in U.S.A.**

NOTE:

- Always replace the rear crankshaft bearing with a new one when the crankshaft is removed.

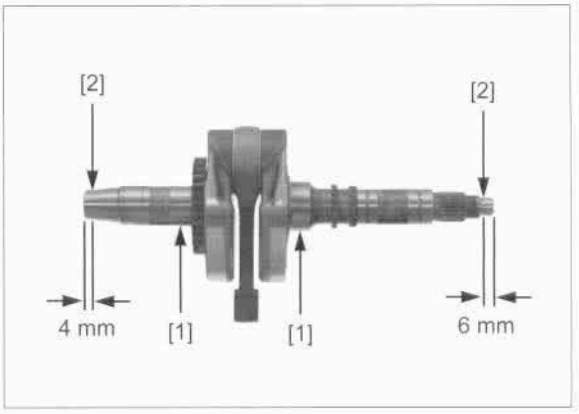


INSPECTION

Check the balancer drive and driven gears for wear or damage.

Set the crankshaft in a stand or V-blocks [1] and measure the runout using a dial indicator [2].

SERVICE LIMIT: 0.15 mm (0.006 in)

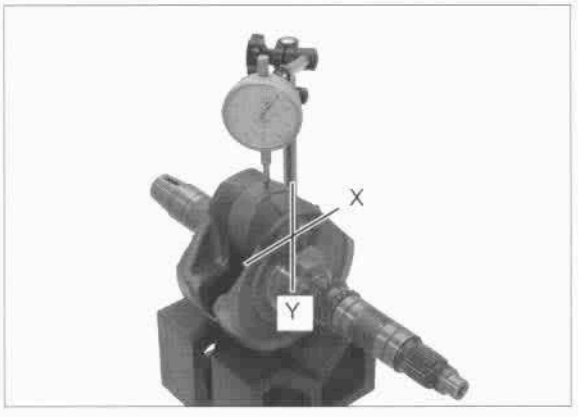


Measure the side clearance between the connecting rod big end and crank weight with a feeler gauge.

SERVICE LIMIT: 0.8 mm (0.03 in)

Measure the radial clearance at the connecting rod big end in an X and Y directions.

SERVICE LIMIT: 0.05 mm (0.002 in)



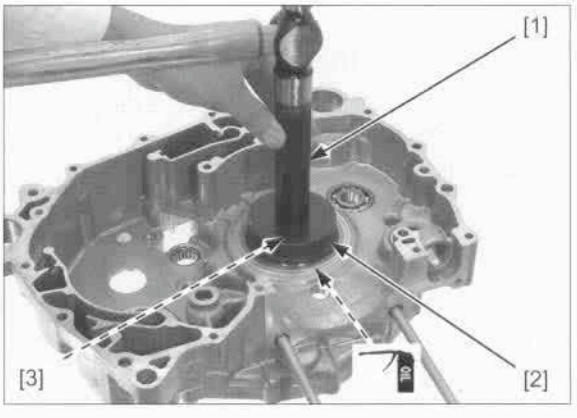
INSTALLATION

Apply engine oil to a new rear crankshaft bearing.
Drive the crankshaft bearing into the rear crankcase with the marking side facing up.

TOOLS:

[1] Driver	**07749-0010000**
[2] Attachment, 72 x 75 mm	**07746-0010600**
[3] Pilot, 32 mm	**07MAD-PR90200**

Other bearing replacement in the crankcase halves (page 14-18).



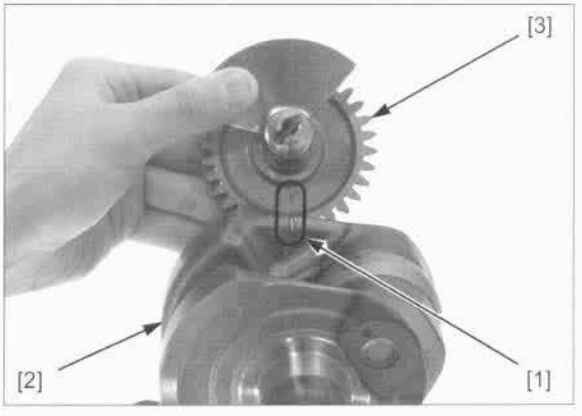
Install the special tool [1] onto the rear crankshaft end.

TOOL:

Threaded adapter	**07965-VM00300 or 07931-KF00200 (U.S.A. only)**

Be careful not to disengage the gears.

Engage the balancer and crankshaft by aligning the index lines [1] on the crank weight [2] and balancer driven gear [3], and install them together into the rear crankcase.

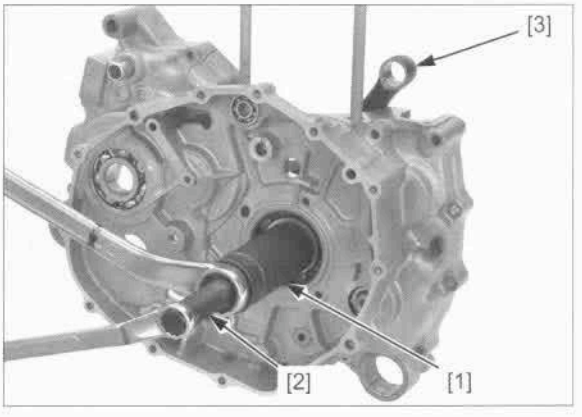


Take care that the crankshaft and balancer do not fall out of the crankcase when installing the special tools.

Install the special tools onto the crankshaft and crankshaft bearing.

TOOLS:

[1] Assembly collar	**07965-VM00100**
[2] Puller shaft and nut	**07965-VM00200 or 07931-ME4010B and 07931-HB3020A (U.S.A. only)**

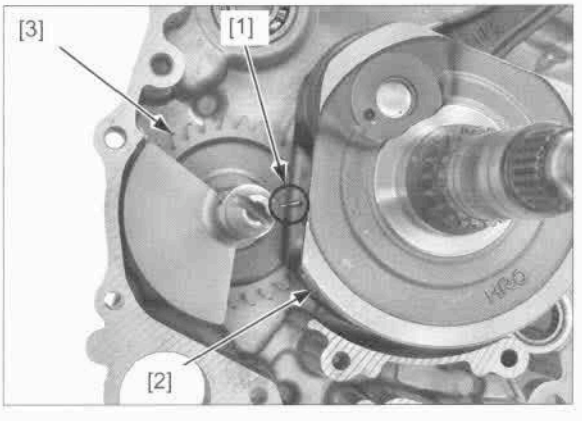


Be careful not to let the connecting rod [3] press against the crankcase mating surface.

Draw the crankshaft into the bearing inner race.

After installing the crankshaft, make sure the index lines [1] on the crank weight [2] and balancer driven gear [3] are aligned.

Install the transmission (page 14-11).
Assemble the crankcase halves (page 14-21).



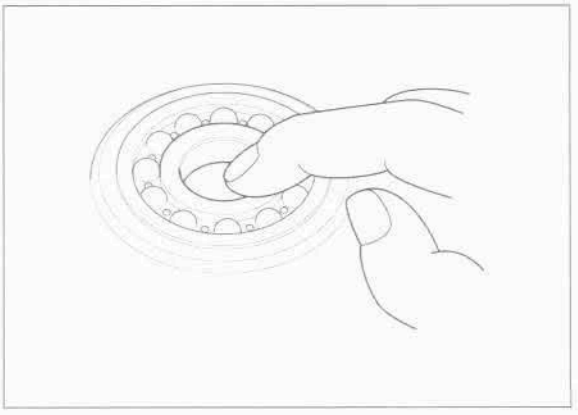
CRANKCASE BEARING

INSPECTION

Remove the crankshaft and balancer (page 14-15).

Turn the inner race of each crankcase bearing with your finger. The bearing should turn smoothly and quietly. Also check that the bearing outer race fits tightly in the crankcase.

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



FRONT CRANKCASE BEARING REPLACEMENT

Remove the balancer bearing [1] and countershaft bearing [2] with the special tools.

TOOLS:

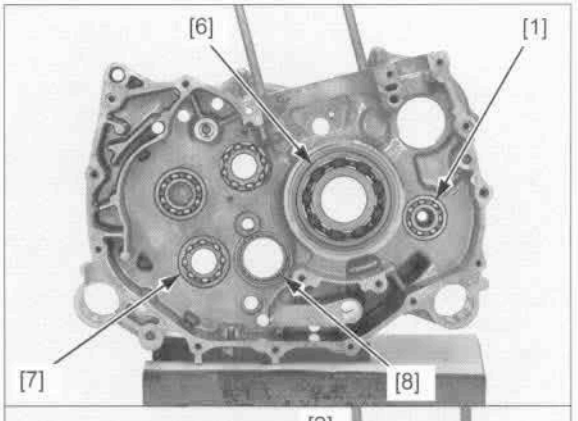
Countershaft bearing:

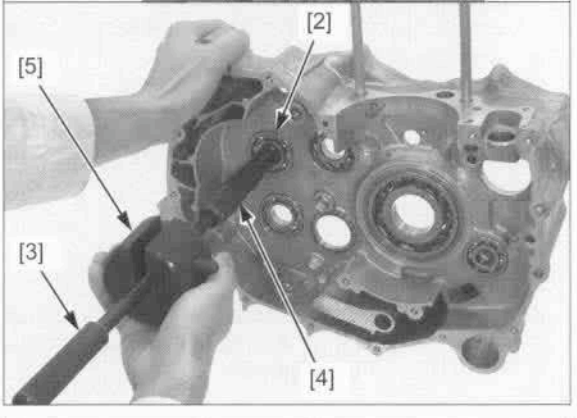
[3] Remover handle	**07936-3710100**
[4] Bearing remover, 20 mm	**07936-3710600**
[5] Remover weight	**07741-0010201 or 07936-3710200 or 07936-371020A (U.S.A. only)**

Balancer bearing:

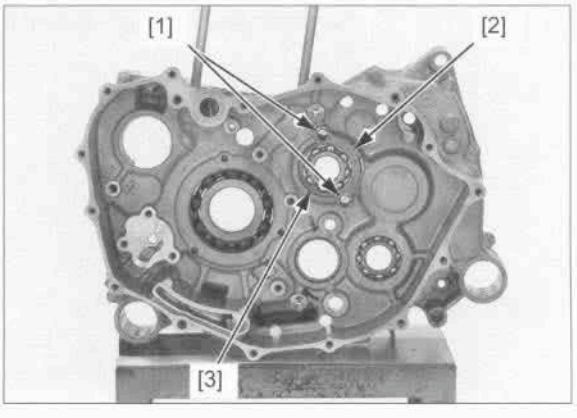
Remover handle	**07936-3710100**
Bearing remover, 17 mm	**07936-3710300**
Remover weight	**07741-0010201 or 07936-3710200 or 07936-371020A (U.S.A. only)**

Drive the crankshaft bearing [6], output shaft bearing [7] and shift drum bearing [8] out of the front crankcase.



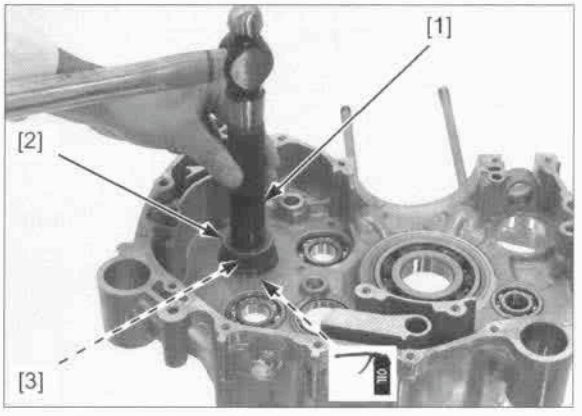


Remove the two bolts [1] and mainshaft bearing setting plate [2].
Drive the mainshaft bearing [3] out of the front crankcase.



Apply engine oil to new bearings.

Drive the bearings in with the marked side facing up.

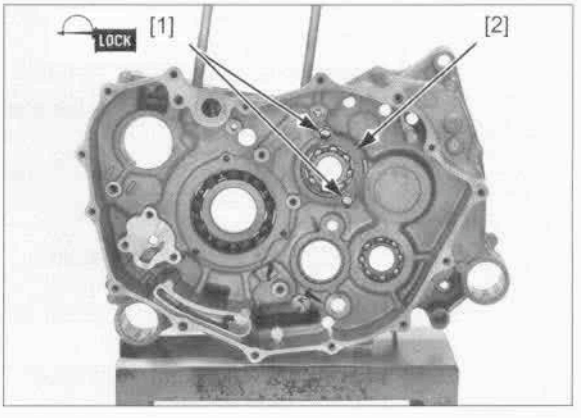


TOOLS:

Crankshaft bearing:	
[1] Driver	**07749-0010000**
[2] Attachment, 78 x 90 mm	**07GAD-SD40101**
[3] Pilot, 40 mm	**07746-0040900**
Balancer bearing:	
[1] Driver	**07749-0010000**
[2] Attachment, 37 x 40 mm	**07746-0010200**
[3] Pilot, 17 mm	**07746-0040400**
Mainshaft bearing:	
[1] Driver	**07749-0010000**
[2] Attachment, 45 x 50 mm	**07946-6920100**
[3] Pilot, 22 mm	**07746-0041000**
Countershaft bearing:	
[1] Driver	**07749-0010000**
[2] Attachment, 42 x 47 mm	**07746-0010300**
[3] Pilot, 20 mm	**07746-0040500**
Output shaft bearing:	
[1] Driver	**07749-0010000**
[2] Attachment, 42 x 47 mm	**07746-0010300**
[3] Pilot, 22 mm	**07746-0041000**
Shift drum bearing:	
[1] Driver	**07749-0010000**
[2] Attachment, 42 x 47 mm	**07746-0010300**
[3] Pilot, 35 mm	**07746-0040800**

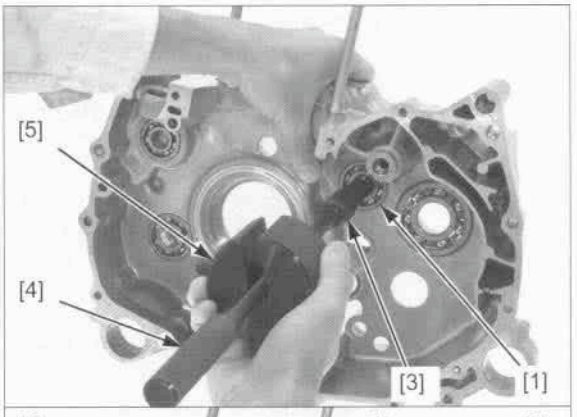
Apply locking agent to the threads of the setting plate bolts [1].
Install the mainshaft setting plate [2] with the bolts and tighten them to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)



REAR CRANKCASE BEARING REPLACEMENT

Remove the mainshaft bearing/plate [1] and camshaft bearing [2] with the special tools.



TOOLS:

Mainshaft bearing:

[3] Bearing remover, 17 mm	**07936-3710300**
[4] Remover handle	**07936-3710100**
[5] Remover weight	**07741-0010201 or 07936-3710200 or 07936-371020A (U.S.A. only)**

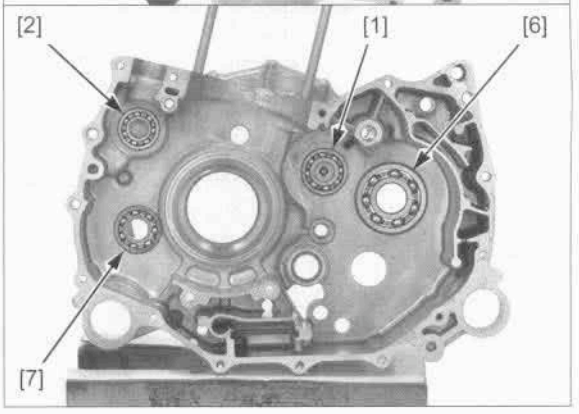
Camshaft bearing:

Bearing remover shaft, 15 mm	**07936-KC10100**
Bearing remover head, 15 mm	**07936-KC10200**
Remover weight	**07741-0010201**

U.S.A. TOOLS:

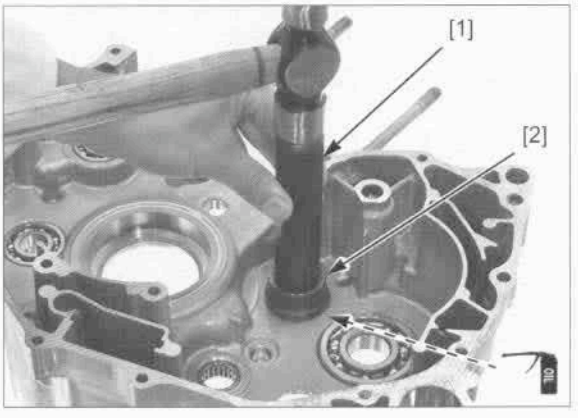
Bearing remover, 15 mm	**07936-KC10500**
Remover weight	**07936-3710200 or 07936-371020A**

Drive the countershaft bearing [6] and balancer bearing [7] out of the rear crankcase.



Apply engine oil to new bearings.

Drive the bearings in with the marked side facing up.



TOOLS:

Balancer bearing:

[1] Driver	**07749-0010000**
[2] Attachment, 37 x 40 mm	**07746-0010200**
[3] Pilot, 17 mm	**07746-0040400**

Mainshaft bearing:

[1] Driver	**07749-0010000**
[2] Attachment, 37 x 40 mm	**07746-0010200**

Countershaft bearing:

[1] Driver	**07749-0010000**
[2] Attachment, 62 x 68 mm	**07746-0010500**
[3] Pilot, 25 mm	**07746-0040600**

Camshaft bearing:

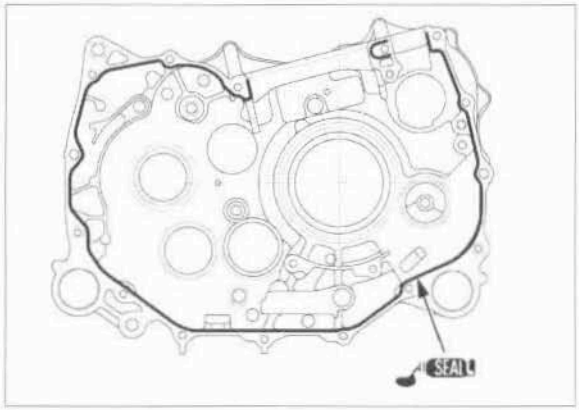
[1] Driver	**07749-0010000**
[2] Attachment, 32 x 35 mm	**07746-0010100**
[3] Pilot, 15 mm	**07746-0040300**

CRANKCASE ASSEMBLY

Clean the front and rear crankcase mating surfaces thoroughly, being careful not to damage them.

Blow through the oil passages in the crankcases with compressed air.

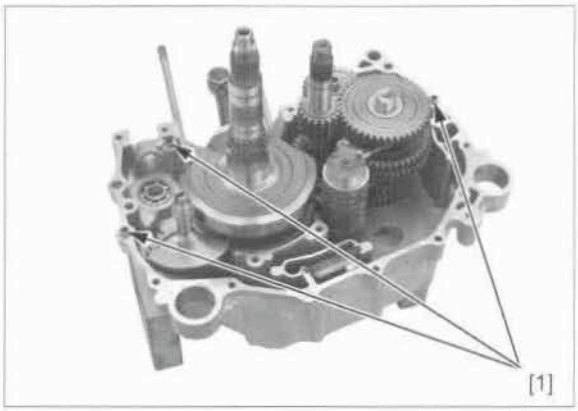
Apply liquid sealant (TB1215 or equivalent) to the mating surface (shadowed area) of the front crankcase as shown.



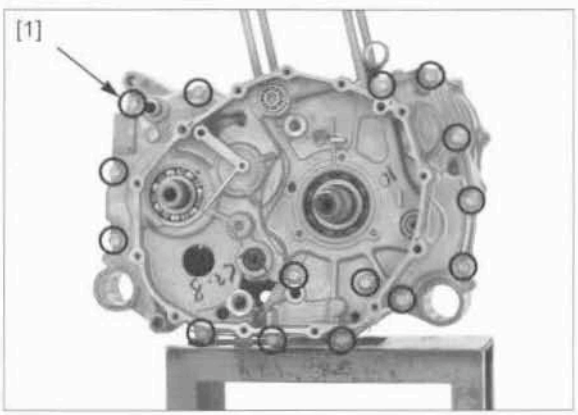
Install the three dowel pins [1] to the rear crankcase.

Make sure all the parts are installed in the rear crankcase.

Install the front crankcase over the rear crankcase.

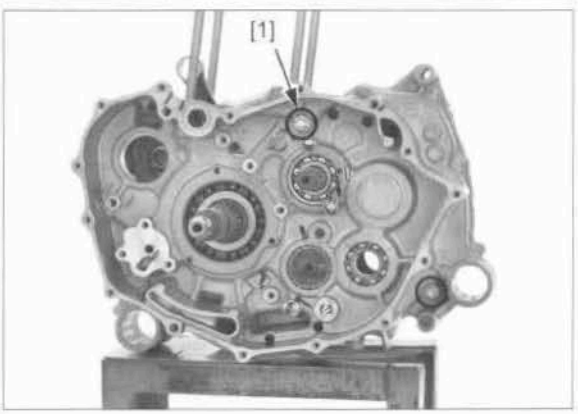


Install the fifteen rear crankcase bolts [1].



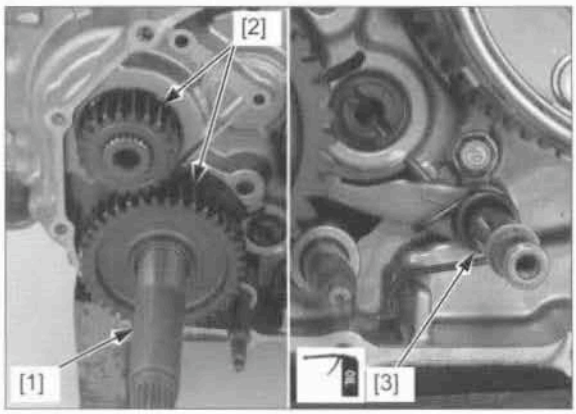
Install the two front crankcase bolts [1].

Tighten all the bolts in a crisscross pattern in several steps.



Insert the output shaft [1] into the crankcase until it seats against the bearing in the front crankcase.
Install the output shaft drive and driven gears [2].

Apply engine oil to the journal surfaces of the reverse stopper shaft [3].
Install the reverse stopper shaft assembly into the crankcase as shown.

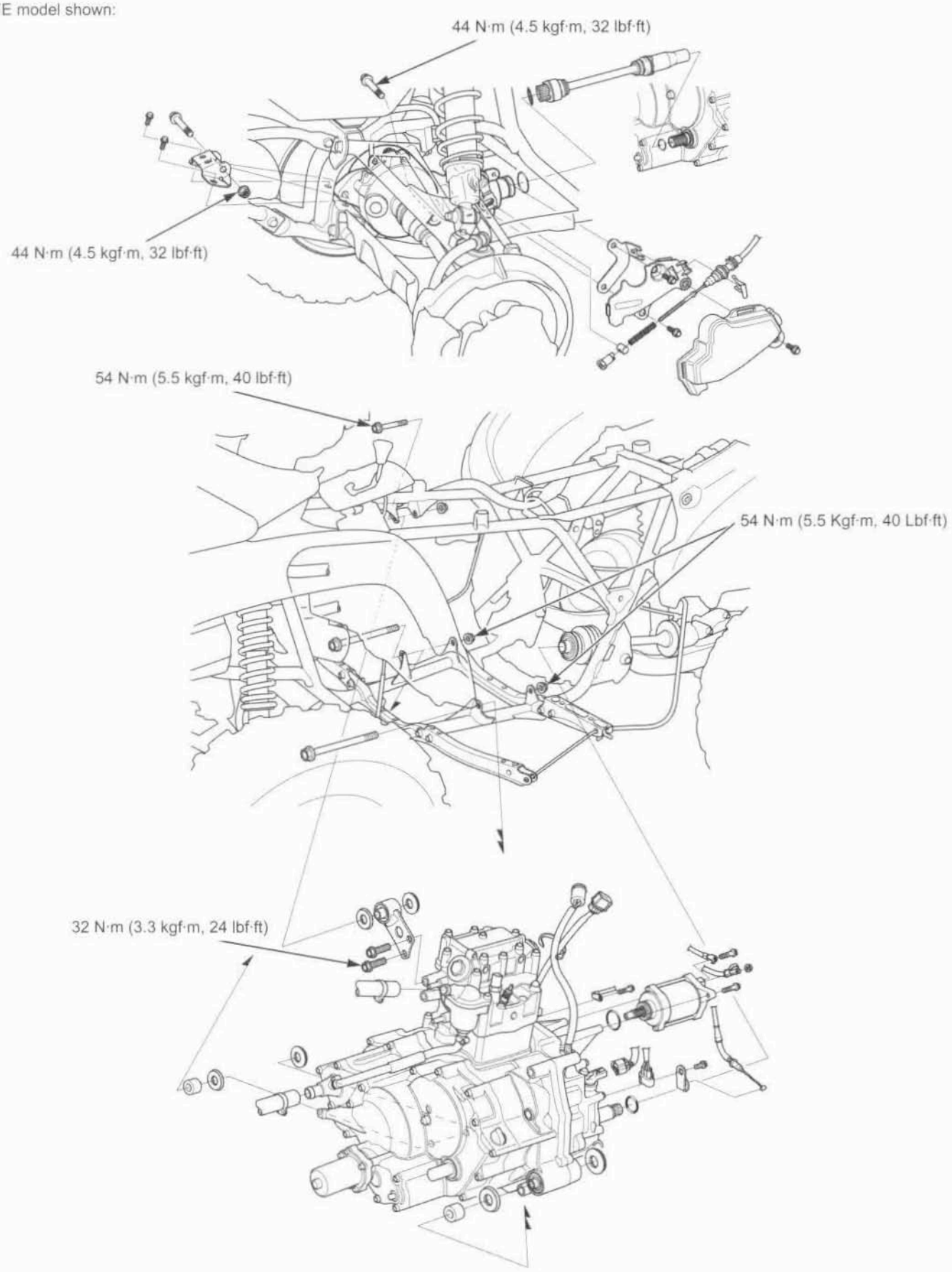


Install the following:
- flywheel and starter clutch (page 13-14)
- oil pump (page 9-5)
- change clutch (page 12-17)
- gearshift linkage (page 12-21)
- cylinder and piston (page 11-8)
- cylinder head (page 10-16)
- engine (page 15-9)

15. ENGINE REMOVAL/INSTALLATION

SYSTEM COMPONENTS

FE model shown:



SERVICE INFORMATION

GENERAL

- When removing and installing the engine, tape the frame around the engine beforehand for frame protection.
- The following components require engine removal for service.
  - alternator/starter clutch (page 13-2)
  - crankcase/transmission/crankshaft/balancer (page 14-2)

SPECIFICATIONS

ITEM			SPECIFICATIONS
Engine dry weight	FM/FPM	U.S.A.	51.4 kg (113.3 lbs)
		Canada	52.5 kg (115.7 lbs)
	FE/FPE	U.S.A.	52.3 kg (115.3 lbs)
		Canada	53.4 kg (117.7 lbs)
Engine oil capacity	After draining		2.9 liters (3.1 US qt, 2.6 Imp qt)
	After draining/filter change		3.0 liters (3.2 US qt, 2.6 Imp qt)
	After disassembly		3.3 liters (3.5 US qt, 2.9 Imp qt)
Coolant capacity (radiator and engine)			1.5 liters (1.6 US qt, 1.3 Imp qt)
Reverse selector lever freeplay			2 – 4 mm (0.1 – 0.2 in)

TORQUE VALUES

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 nut (frame side)	1	10	54 (5.5, 40)	
Upper engine hanger bolt (engine side)	2	8	32 (3.3, 24)	
Gearshift pedal pinch bolt (FM/FPM)	1	6	20 (2.0, 15)	
Front final gear case mounting nut	2	10	44 (4.5, 32)	Lock nut: replace with a new one.

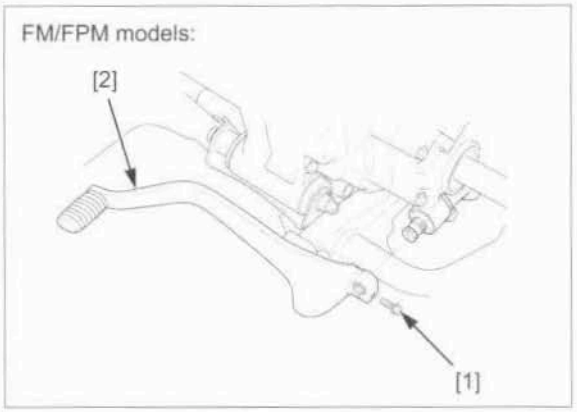
ENGINE REMOVAL

Remove the following:
- mudguards (page 2-6)
- engine guard (page 2-7)

Drain the engine oil (page 3-13).
Drain the coolant (page 8-7).

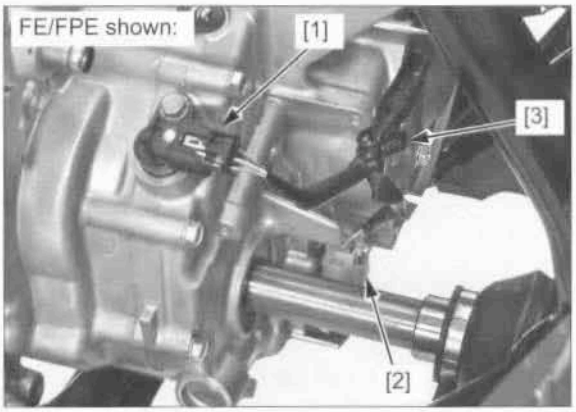
Remove the following:
- heat guard plate (page 10-7)
- throttle body (page 7-23)
- exhaust system (page 2-14)
- battery (–) cable (page 21-8)

FM/FPM only: Remove the pinch bolt [1] and the gearshift pedal [2].

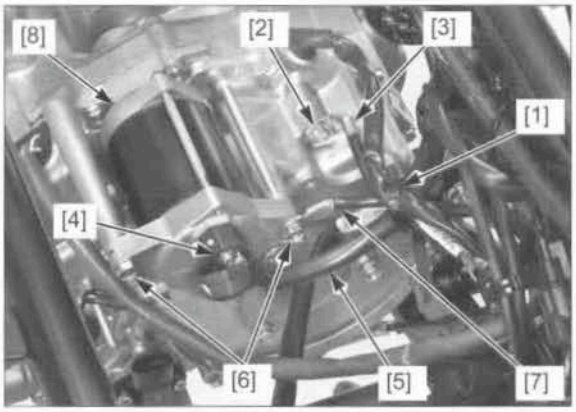


Disconnect the following:

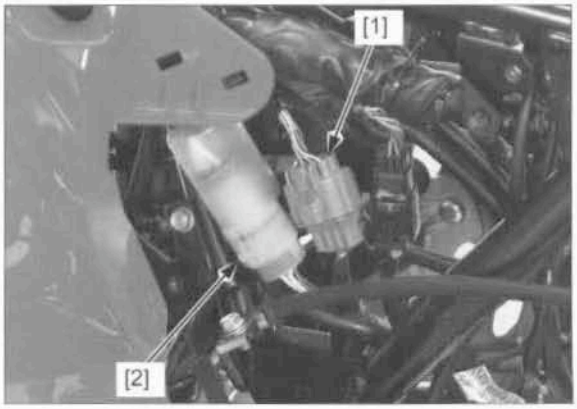
- VS sensor 3P (Black) connector [1]
- FE/FPE only: shift angle sensor 3P (Gray) connector [2]
- sub-wire harness (from the clamp [3])



- wire band [1]
- bolt [2] and ground cable [3]
- nut [4] and starter motor cable [5]
- two bolts [6] and battery (–) cable [7]
- starter motor [8]

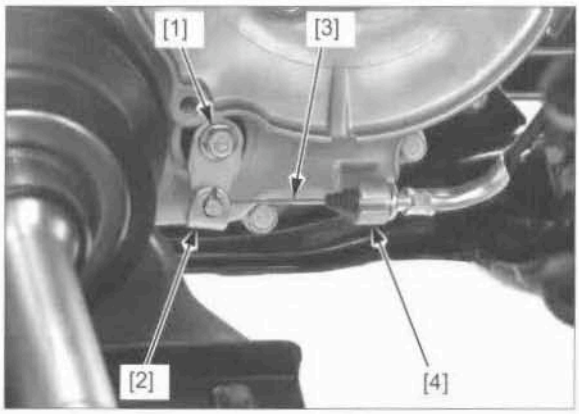


- gear position switch 8P (Gray) connector [1] (remove from the frame and disconnect it)
- alternator 5P (Natural) connector [2] (remove from the frame and disconnect it)

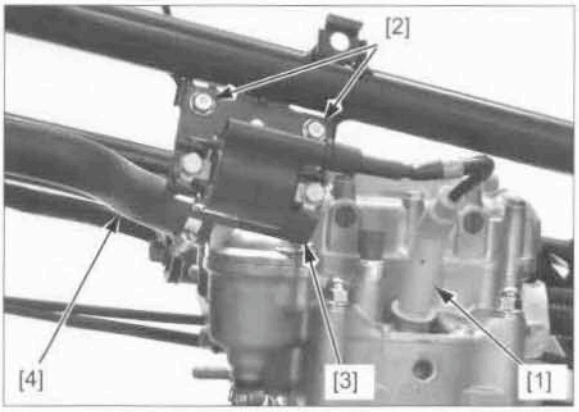


Loosen the adjuster of the reverse selector cable (page 3-23).

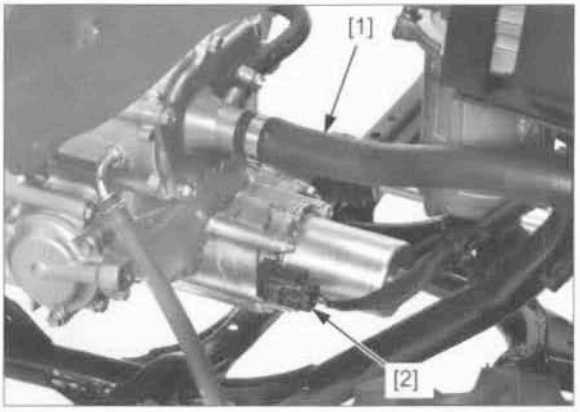
Remove the following:
- bolt [1] and selector arm [2] (to disconnect the selector cable)
- selector cable [3] (from the cable holder [4] of the engine)



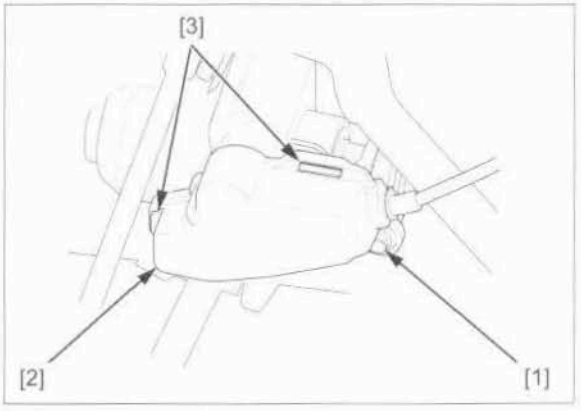
- spark plug cap [1]
- bolts [2] and ignition coil/bracket [3]
- water hose [4]



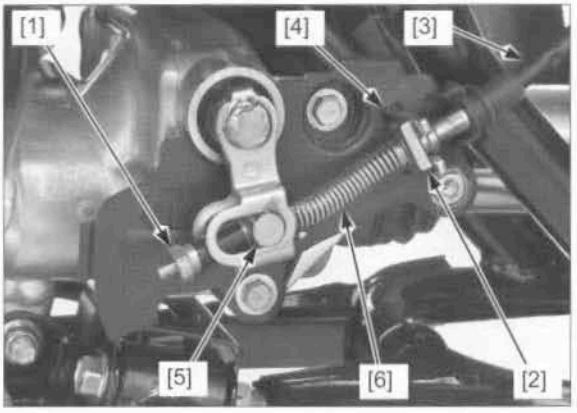
- water hose [1]
- shift control motor connector [2] (FE/FPE only)



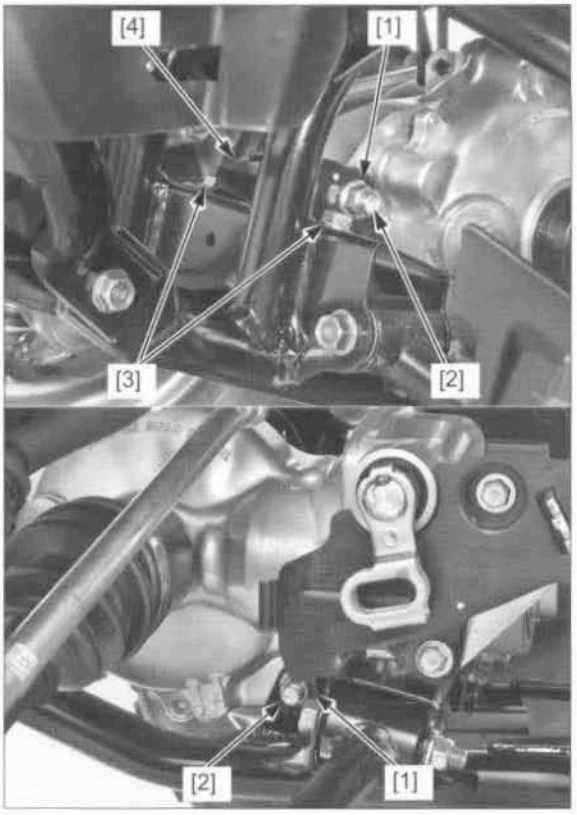
- bolt [1] and clutch arm cover [2] (release from the two tabs [3])



- adjusting nut [1]
- cable retaining plate [2]
- 2WD/4WD selector cable [3] (remove from the cable holder [4] and joint pin [5])
- cable spring [6]
- joint pin



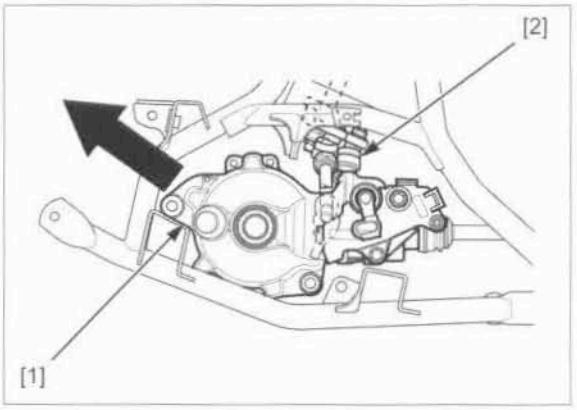
- final gear case mounting nuts [1] and bolts [2]
- two bolts [3] and mounting bracket [4]



Move the gear case assembly [1] forward for maximum clearance between the propeller shaft joint and engine.

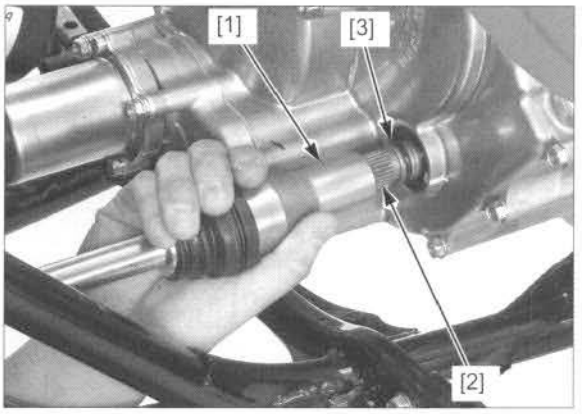
NOTE:

- Turn the handlebar all the way to the right to move the gear case assembly.
- Put some cloth on the gear case to avoid scratch or damage the tie-rod end [2].



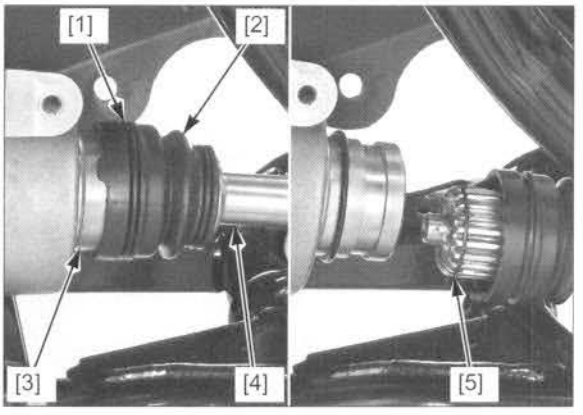
Pull the shaft joint [1] out of the output shaft [2] from the engine.

Remove the O-ring [3] from the output shaft.

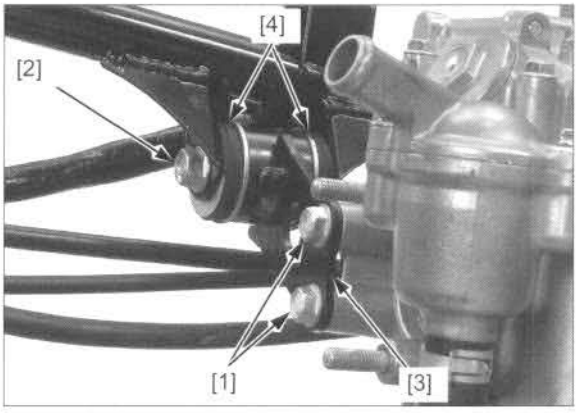


Remove the boot band [1] and release the propeller shaft boot [2] off the pinion joint [3] of the gear case assembly.
Pull the propeller shaft [4] to force the stopper ring [5] past the groove in the pinion joint to remove the propeller shaft.

Remove the stopper ring from the propeller shaft.



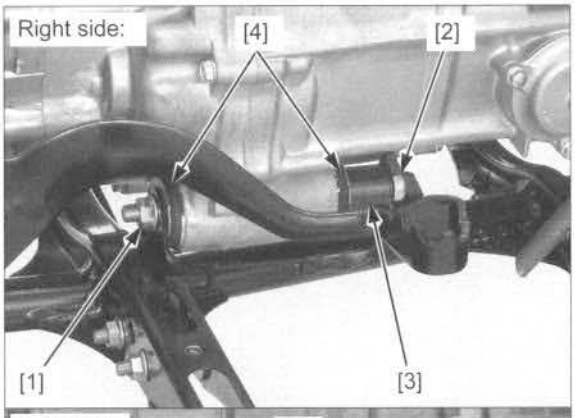
Remove the following from the engine upper mount:
- two engine hanger bolts [1] (engine side)
- engine hanger nut and bolt [2] (frame side)
- hanger bracket [3]
- mounting rubbers [4]

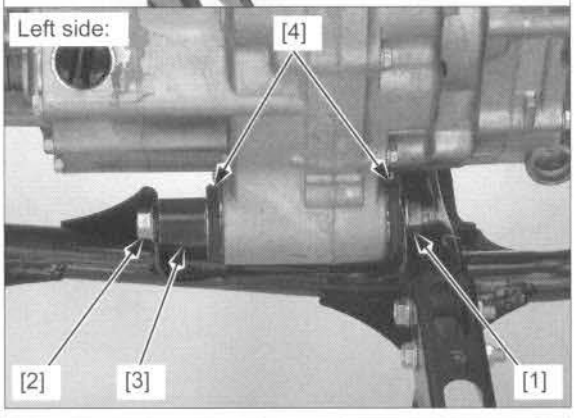


Set suitable wooden blocks between the engine and lower frame pipe to support the engine.

Remove the following from each engine lower mount:

- engine hanger nut [1] and bolt [2]
- spacer [3]
- mounting rubbers [4]



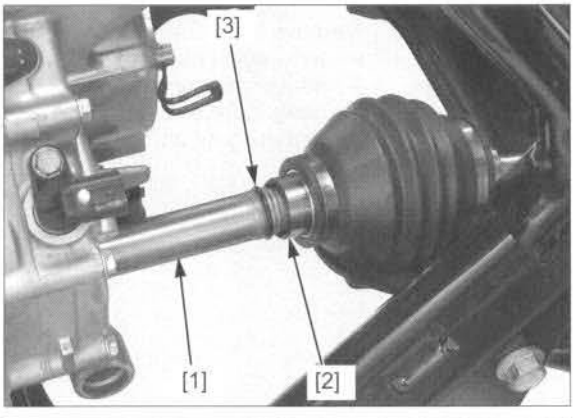


Move the engine forward and disconnect the output shaft [1] from the universal joint [2].

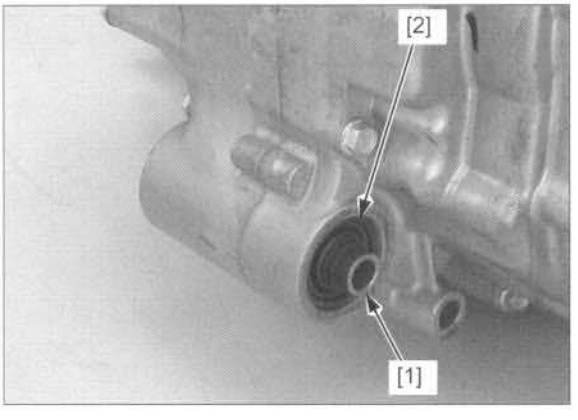
Hold the engine securely and take care not to damage the frame and engine.

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

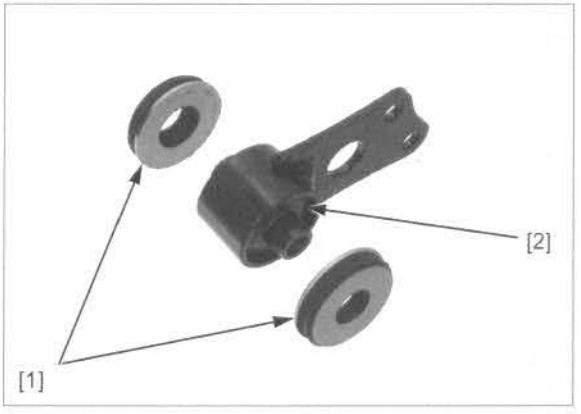
Remove the O-ring [3] from the output shaft.



Remove the engine mounting bushings [1] and dust seals [2].



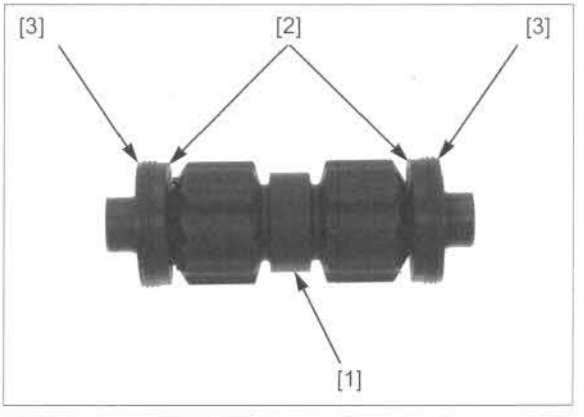
Check the mounting rubbers [1], bushings [2] and dust seals for deterioration, wear or damage.



ENGINE INSTALLATION

Install the lower engine mounting bushings [1] into the engine.

Install the dust seals [2] with the lip side [3] facing out.



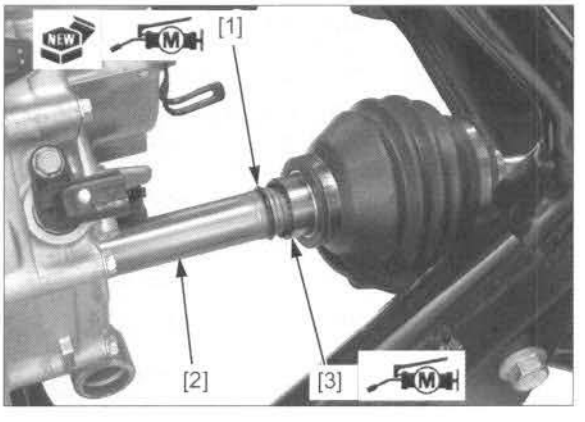
Hold the engine securely and be careful not to damage the frame and engine.

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

Coat a new O-ring [1] with molybdenum disulfide grease and install it into the output shaft [2] groove.

Apply molybdenum disulfide grease to the splines of the universal joint [3].

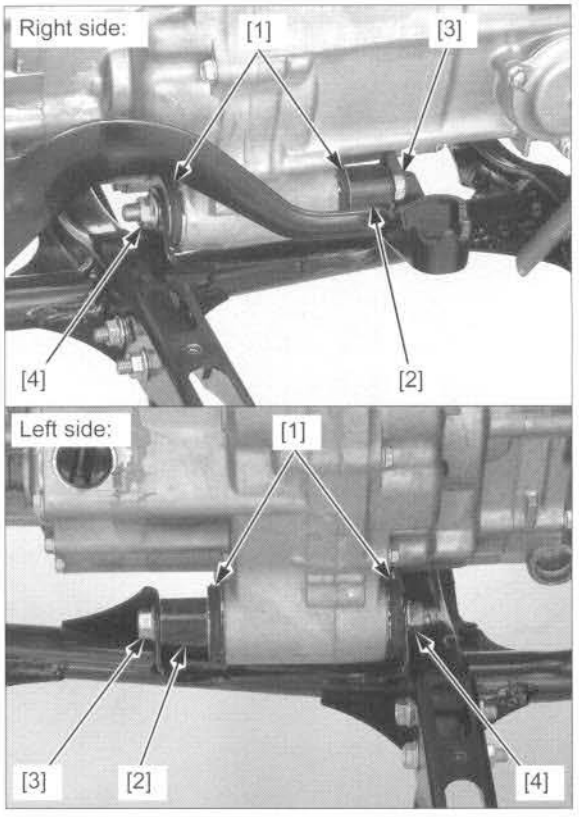
Carefully move the engine and engage the output shaft with the universal joint.



Be sure the universal joint is not disengaged.

Install the mounting rubbers [1] onto the lower mounting bushing with the larger I.D. side facing in.
Install the spacer [2] and the hanger bolt [3] (from the front side) while aligning the bolt holes carefully.
Loosely install the hanger nut [4].

Install the other side mounting fasteners in the same manner as above.



Install the mounting rubbers [1] onto the upper mounting bushing in the hanger bracket [2] with the large I.D. side facing in.
Install the hanger bracket with the 10 mm hanger bolt [3] (from the front side) and nut [4].
Install the two 8 mm hanger bolts [5].

After installing all the mounting fasteners and seat them, tighten the fasteners to the specified torque in order as follows:
– left and right lower engine hanger nuts

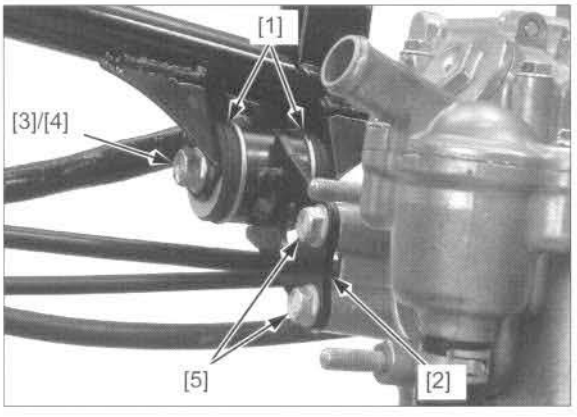
TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)

– engine side upper engine hanger bolts

TORQUE: 32 N·m (3.3 kgf·m, 24 lbf·ft)

– frame side upper engine hanger nut

TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)

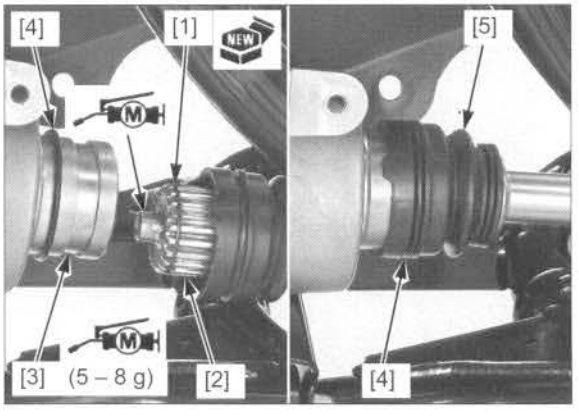


Install a new stopper ring [1] into the groove in the propeller shaft [2] end.

Apply 5 – 8 g of molybdenum disulfide grease to the splines of the pinion joint [3].
Apply molybdenum disulfide grease to the front end of the propeller shaft.
Place the boot band [4] over the pinion joint temporarily.

Install the propeller shaft into the pinion joint, aligning the 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 [5] over the pinion joint groove securely and the boot band into the boot groove.



Coat a new O-ring [1] with molybdenum disulfide grease and install it into the output shaft [2] groove.

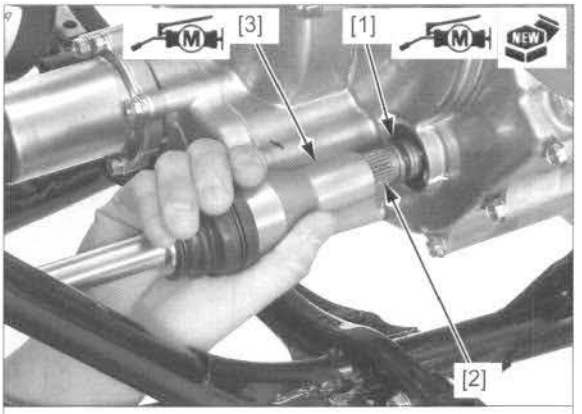
Apply molybdenum disulfide grease to the splines of the propeller shaft joint [3].

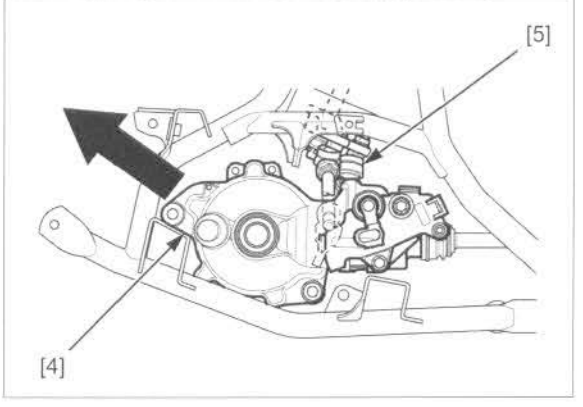
Move the gear case assembly [4] forward for maximum clearance between the shaft joint and output shaft.

NOTE:

- Turn the handlebar all the way to the right to move the gear case assembly.
- Put some cloth on the gear case to avoid scratch or damage the tie-rod end [5].

Engage the shaft joint over the output shaft and move the gear case assembly rearward.





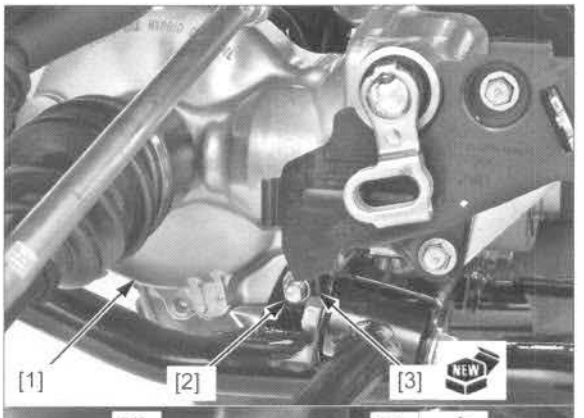
Align the rear mounting bolt holes in the gear case [1] and frame, then install the mounting bolt [2] from the right side and a new mounting nut [3].

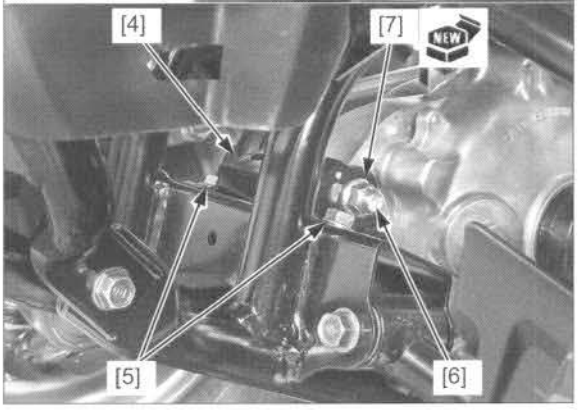
Install the mounting bracket [4] with the two bolts [5].
Install the front mounting bolt [6] from the right side and a new mounting nut [7].

Tighten all the gear case mounting fasteners in the following sequence.

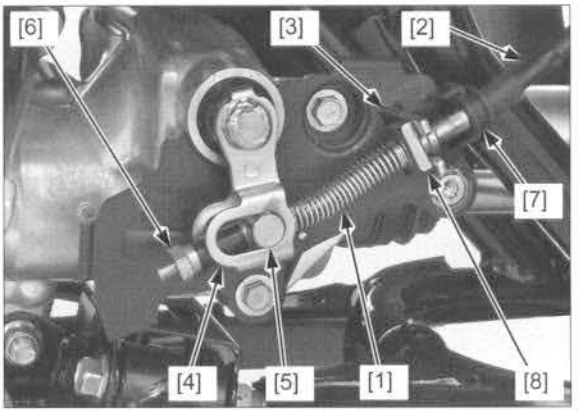
- Rear mounting nut
- Mounting bracket bolts
- Front mounting nut

TORQUE:
Rear mounting nut: 44 N·m (4.5 kgf·m, 32 lbf·ft)
Front mounting nut: 44 N·m (4.5 kgf·m, 32 lbf·ft)



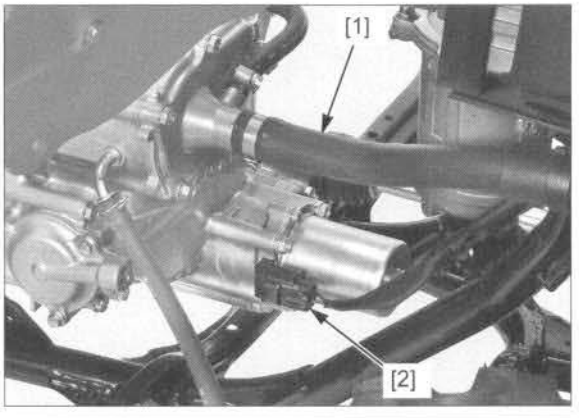


Install the spring [1] onto the selector cable [2].
Insert the cable into the cable holder [3] and connect it to the clutch arm [4] with the joint pin [5] and adjusting nut [6].
Set the groove in the cable grommet [7] onto the cover base end properly.
Install the retaining plate [8] onto the cable with the concave side facing the cable holder to secure the cable.



Install the water hose [1].

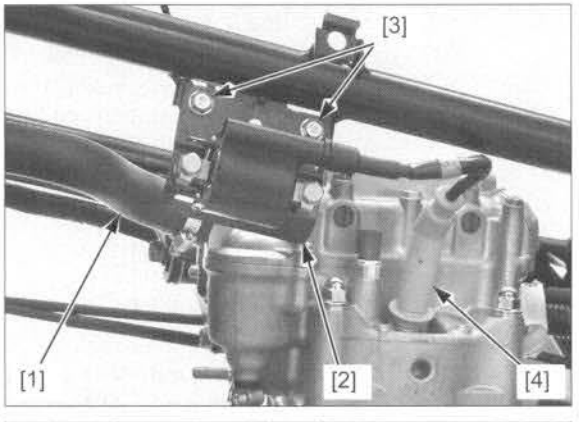
Connect the shift control motor connector [2] (FE/FPE only).



Install the water hose [1].

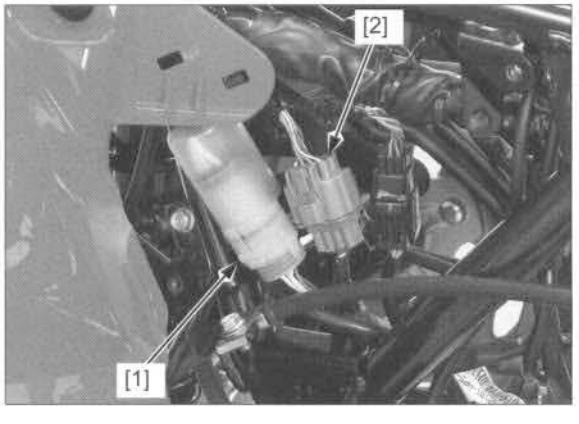
Install the ignition coil/bracket [2] and bolts [3]. Tighten the bolts securely.

Connect the spark plug cap [4].

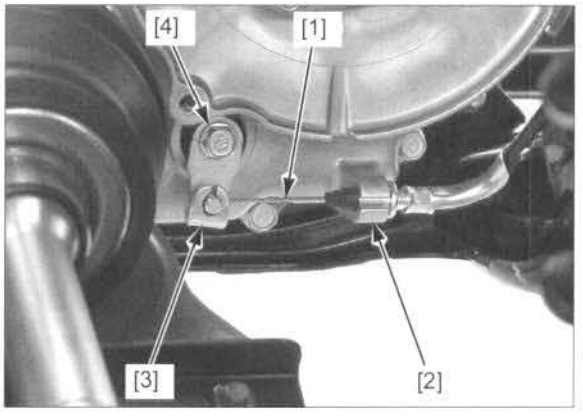


Connect the following and install them onto the frame:

- alternator 5P (Natural) connector [1]
- gear position switch 8P (Gray) connector [2]



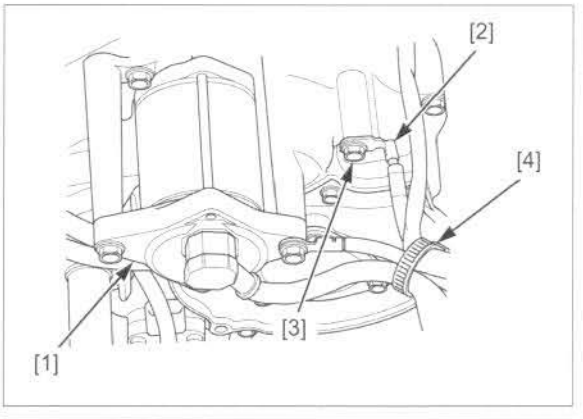
Install the reverse selector cable [1] into the cable holder [2] of the engine.
Connect the cable to the selector arm [3] and install the arm by aligning the flat surfaces, and tighten the bolt [4].



Install the starter motor [1] (page 6-6).

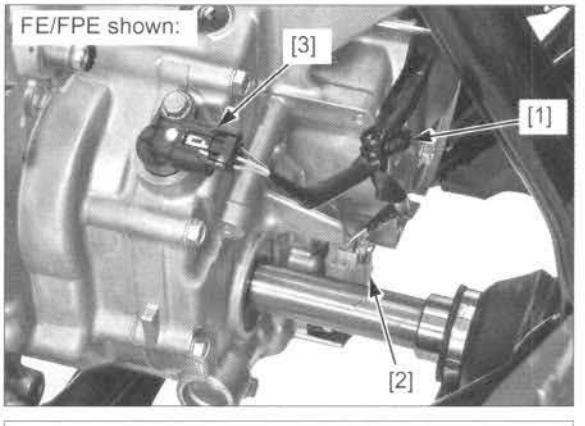
Connect the ground cable [2] to the engine with the bolts [3]. Tighten the bolt securely.

Secure the wires and cables with the wire band [4].



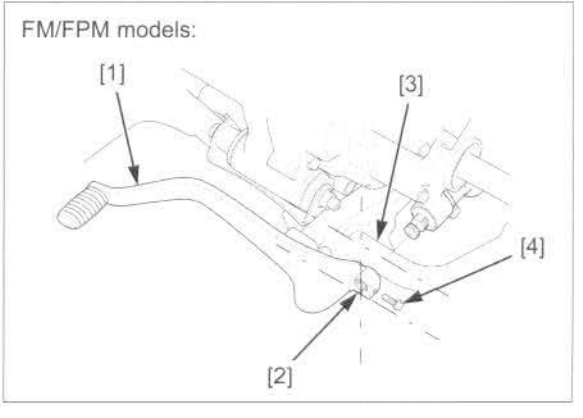
Connect the following and secure the wire with the clamp [1]:

- FE/FPE only: shift angle sensor 3P (Gray) connector [2]
- VS sensor 3P (Black) connector [3]



FM/FPM only: Install the gearshift pedal [1] so that the bottom surface of the pedal joint [2] is parallel with the frame pipe [3]. Install the pinch bolt [4] and tighten it to the specified torque.

TORQUE: 20 N·m (2.0 kgf·m, 15 lbf·ft)



Adjust the following:
- reverse selector cable (page 3-23).
- 2WD/4WD selector cable (page 3-19)

Install the following:
- exhaust system (page 2-14)
- throttle body (page 7-25)
- engine guard (page 2-7)
- mudguards (page 2-6)
- heat guard plate (page 10-19)
- battery (–) cable (page 21-8)

Fill the engine with recommended oil (page 3-13).
Fill and bleed the cooling system (page 8-6).
Check the engine oil level (page 3-12).

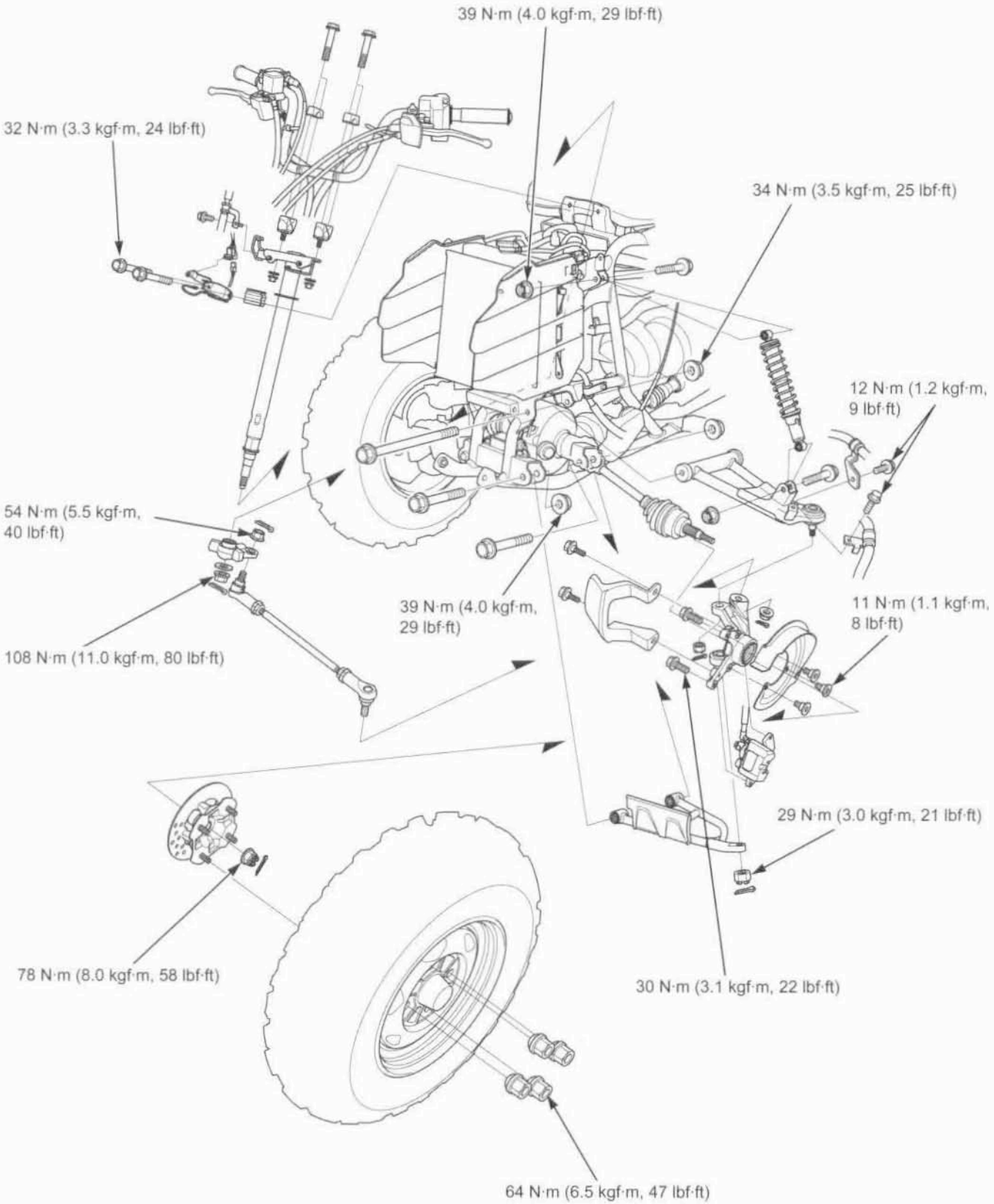
MEMO

16. FRONT WHEEL/SUSPENSION/STEERING

SYSTEM COMPONENTS

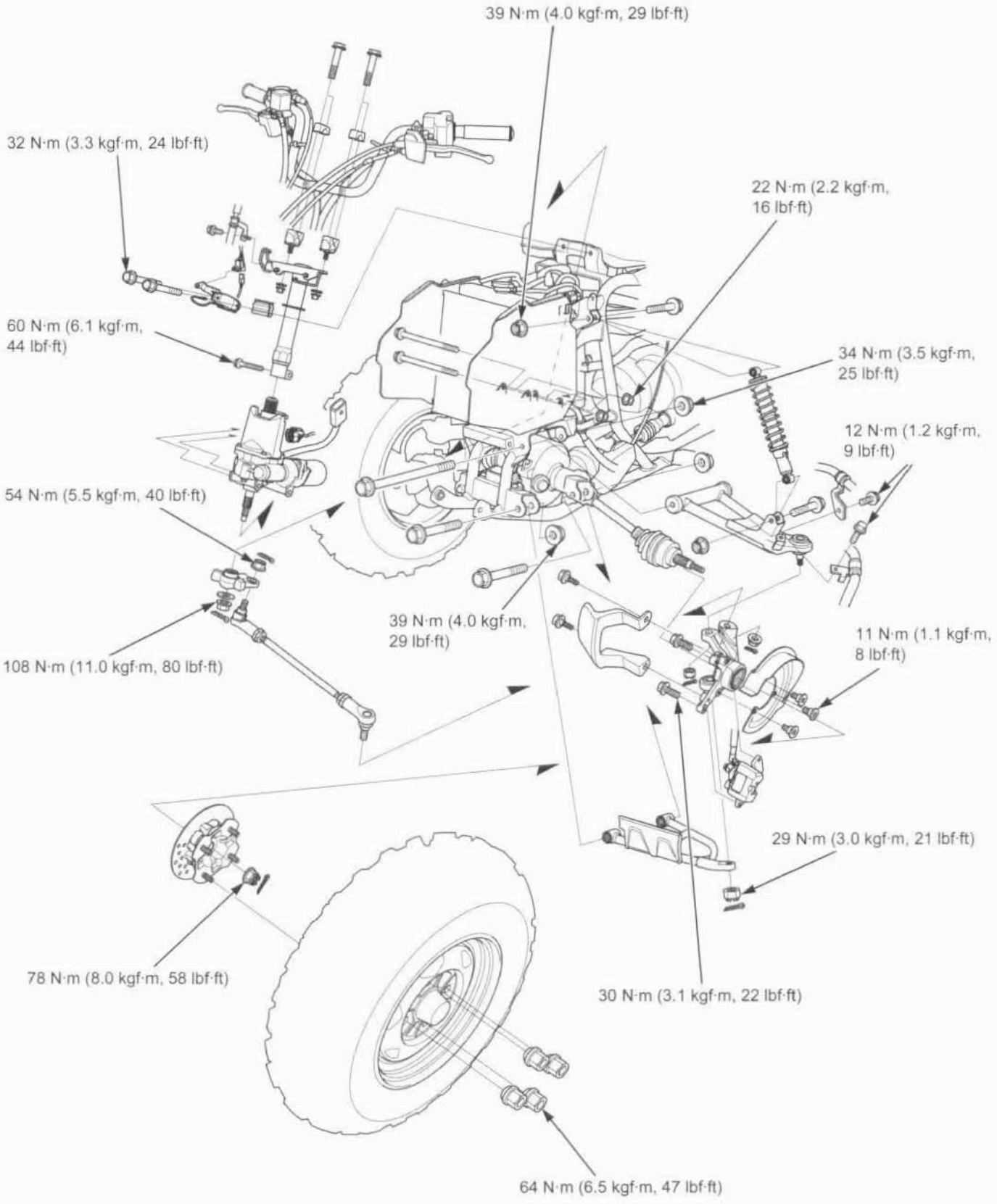
FM/FE models

FE model shown:



FPM/FPE models

FPE model shown:



SERVICE INFORMATION

GENERAL

- This section covers service of the front wheel, suspension and steering (including EPS unit; FPM/FPE models). For electrical system service of the EPS, see Electric Power Steering (EPS) section (page 24-2).
- 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 3-26).
- Do not twist or bend the brake hose when servicing.
- Use Honda Genuine replacement bolts and nuts for all suspension pivots and mounting points.
- For brake system service, see Brake System section (page 18-2).
- For each switch inspection, see Lights/Meters/Switches section.
  - handlebar switch (page 22-11)
  - front brake switch (page 22-12)
  - rear brake light switch (page 22-13)
- FPM/FPE model only: Perform the torque sensor initialization when you service the following components (page 24-13)

Service Location	Replacement	Removal/Installation
Cables and harness around handlebar	INITIALIZE	INITIALIZE
Handlebar	INITIALIZE	INITIALIZE
Steering shaft and steering shaft bushing	INITIALIZE	INITIALIZE
Steering arm and nut	INITIALIZE	INITIALIZE
EPS unit	INITIALIZE	INITIALIZE
EPS ECU	INITIALIZE	NO NEED

SPECIFICATIONS

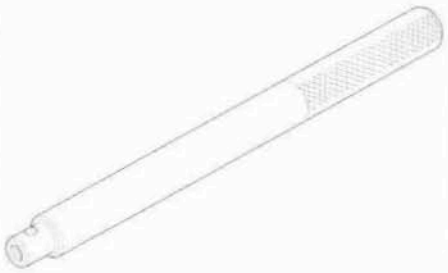
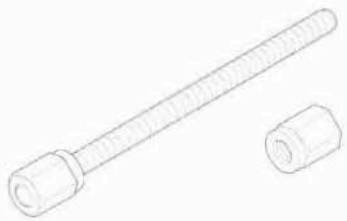
Unit: mm (in)

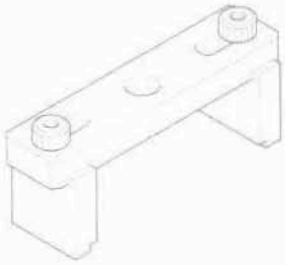
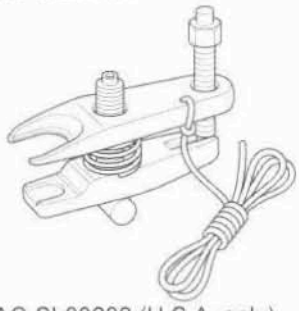
ITEM		STANDARD	SERVICE LIMIT
Minimum tire tread depth		–	4.0 (0.16)
Cold tire pressure	Standard	30 kPa (0.30 kgf/cm^2, 4.4 psi)	–
	With cargo	30 kPa (0.30 kgf/cm^2, 4.4 psi)	–
Tie-rod distance between the ball joints		383.1 (15.08)	–
Toe		Toe-out: 28 ± 15 (1.1 ± 0.6)	–

TORQUE VALUES

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Throttle housing cover screw	3	4	1.5 (0.2, 1.1)	
Throttle housing holder screw	2	5	4.2 (0.4, 3.1)	
Throttle lever pivot nut	1	6	7.0 (0.7, 5.2)	
Meter cover stay bolt	2	8	32 (3.3, 24)	
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 align with the cotter pin hole.
Front brake disc bolt	8	8	42 (4.3, 31)	ALOC bolt: replace with a new one.
Splash guard bolt	6	6	11 (1.1, 8)	ALOC bolt: replace with a new one.
Shock absorber mounting nut	4	10	39 (4.0, 29)	Lock nut: replace with a new one.
Upper arm pivot nut	2	10	34 (3.5, 25)	Lock nut: replace with a new one.
Lower arm pivot nut	4	10	39 (4.0, 29)	Lock nut: replace with a new one.
Upper and lower arm ball joint nut	4	12	29 (3.0, 21)	Castle nut: tighten to the specified torque and further tighten until its grooves align with the cotter pin hole.
Brake hose clamp bolt	7	6	12 (1.2, 9)	ALOC bolt: replace with a new one.
Tie-rod joint nut	4	12	54 (5.5, 40)	Lock nut: replace with a new one.
Steering shaft end nut	1	14	108 (11.0, 80)	Lock nut: replace with a new one.
Steering shaft holder bolt	2	8	32 (3.3, 24)	
Steering shaft pinch bolt (FPM/FPE)	1	10	60 (6.1, 44)	ALOC bolt: replace with a new one.
EPS unit mounting nut (FPM/FPE)	2	8	22 (2.2, 16)	
Handlebar switch housing screw (FM/FPM)	2	5	4.2 (0.4, 3.1)	
Handlebar switch housing screw (FE/FPE)	3	5	4.2 (0.4, 3.1)	
Rear brake lever bracket holder screw	2	5	4.2 (0.4, 3.1)	
Front master cylinder holder bolt	2	6	12 (1.2, 9)	
Front brake caliper mounting bolt	4	8	30 (3.1, 22)	ALOC bolt: replace with a new one.

TOOLS

Attachment, 42 x 47 mm 07746-0010300 	Attachment, 52 x 55 mm 07746-0010400 	Attachment, 40 x 42 mm 07746-0010900 
Attachment, 20 mm I.D. 07746-0020400 	Pilot, 20 mm 07746-0040500 	Pilot, 30 mm 07746-0040700 
Pilot, 22 mm 07746-0041000 	Driver 07749-0010000 	Attachment, 28 x 30 mm 07946-1870100 
Fork seal driver attachment 07947-KA40200 	Driver 07949-3710001 	Compressor bolt assembly 07GAE-PG40200  07GAE-PG4020A (U.S.A. only)

Oil seal driver attachment 07JAD-PH80101 	Clutch compressor attachment 07LAE-PX40100 	Ball joint remover, 28 mm 07MAC-SL00201  07MAC-SL00202 (U.S.A. only)
Ball joint remover/installer 07WMF-HN00100 	Attachment, 34 mm 07ZMD-MBW0100 	

TROUBLESHOOTING

Hard steering
- Steering shaft holder too tight
- Damaged steering shaft bearing/bushing
- Insufficient tire pressure
- Faulty EPS (FPM/FPE models) (page 24-9)

Steers one side or does not track straight
- Incorrect wheel alignment
- Unequal tire pressure
- Bent tie-rod, suspension arm or frame
- Worn or damaged knuckle bearing or wheel hub bearing
- Weak shock absorber

Front wheel wobbling
- Bent rim
- Worn or damaged knuckle bearing or wheel hub bearing
- Faulty tire
- Loose wheel hub nut

Soft suspension
- Weak shock absorber spring
- Oil leakage from damper unit

Stiff suspension
- Damaged shock absorber damper
- Faulty shock absorber pivot bushings
- Improperly installed suspension arms
- Faulty suspension arm bushings

Front suspension noise
- Faulty front shock absorber
- Loose front suspension fasteners
- Worn front suspension pivot bushings
- Damaged suspension components

HANDLEBAR

REMOVAL

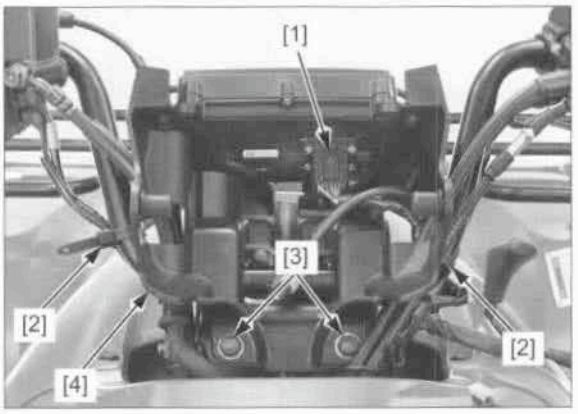
Remove the assist headlight cover (page 22-4).

Remove the fuel tank breather hose [1] from the meter cover [2].

Remove the screw [3] and meter cover.

Disconnect the 21P connector [1] from the combination meter.

Remove the following:
- two wire bands [2]
- two bolts and collars [3]
- meter cover stay [4]

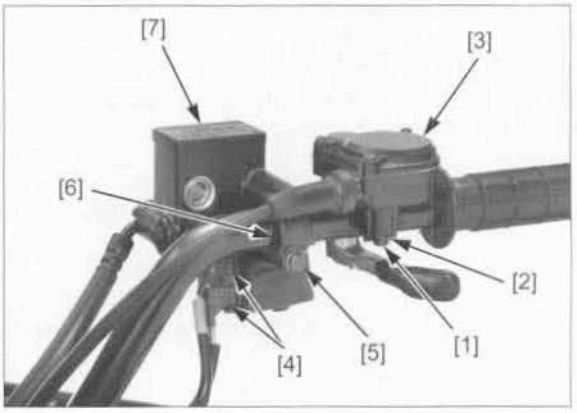


Remove the two screws [1], throttle housing holder [2] and throttle housing [3].

Disconnect the connectors [4].

Keep the master cylinder reservoir upright to prevent air from entering the hydraulic system.

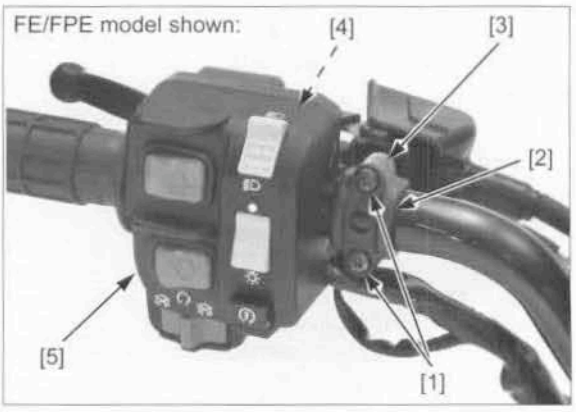
Remove the two bolts [5], master cylinder holder [6] and brake master cylinder [7].



Remove the two screws [1], lever bracket holder [2] and rear brake lever bracket [3].

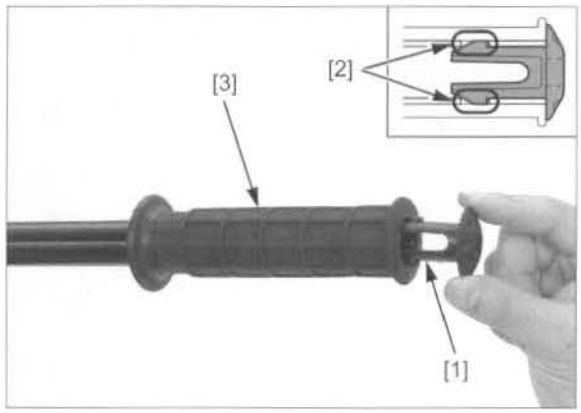
FE/FPE models: Remove the three screws [4] and handlebar switch [5].

FM/FPM models: Remove the two screws and handlebar switch.

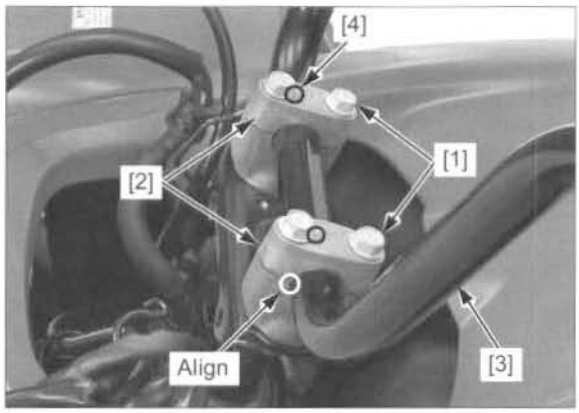


Remove the grip ends [1] (turn the grip end to release the setting tabs [2] and pry it using a screwdriver).

Remove the handlebar grips [3].



Remove the four bolts [1], upper holders [2] and handlebar [3].



INSTALLATION

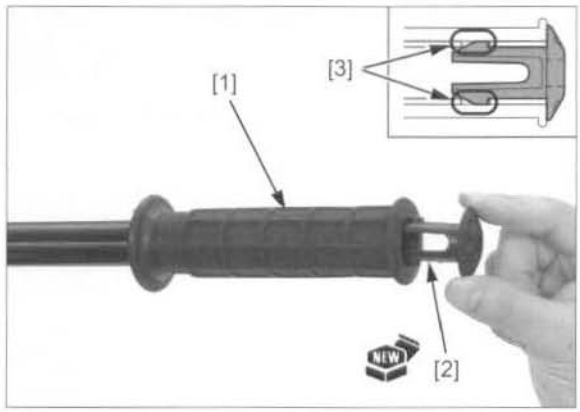
Align the punch mark on the handlebar with the top edge of the lower holder.

Install the handlebar and upper holders with the punch mark [4] facing forward. Tighten the front bolts first, then tighten the rear bolts.

Allow the adhesive to dry for an hour before using.

Apply Honda Bond A or Pro Honda Handgrip Cement (U.S.A. only) to the inside surface of each handlebar grip [1] and to the clean surfaces of the handlebar.
Wait 3 – 5 minutes and install the grips. Rotate the grip for even application of the adhesive.

Install new grip ends [2] by aligning the tabs [3] with the holes in the handlebar.



FM/FPM models: Align the locating pin on the switch housing with the hole in the handlebar.

Install the handlebar switch [1]. Tighten the upper screw first, then tighten the lower screw to the specified torque.

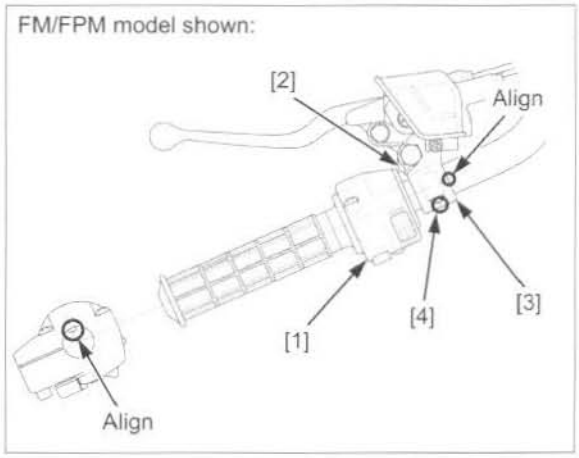
TORQUE: 4.2 N·m (0.4 kgf·m, 3.1 lbf·ft)

Align the edge of the bracket with the punch mark on the handlebar.

Install the brake lever bracket [2] and holder [3] with the punch mark [4] facing up.
Tighten the upper screw first, then tighten the lower screw to the specified torque.

TORQUE: 4.2 N·m (0.4 kgf·m, 3.1 lbf·ft)

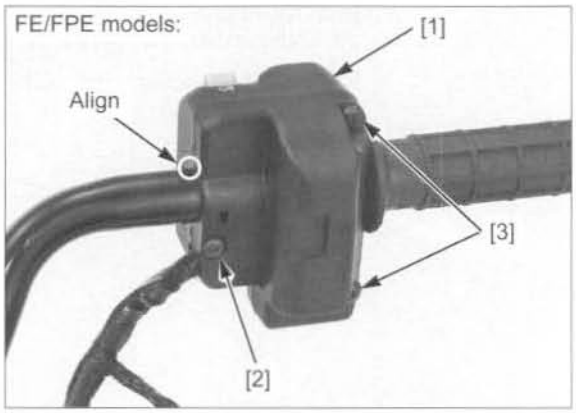
FM/FPM model shown:



FE/FPE models: Align the seam of the switch with the punch mark on the handlebar.

Install the handlebar switch [1]. Tighten the inside screw [2] first, then tighten the outside screws [3] to the specified torque.

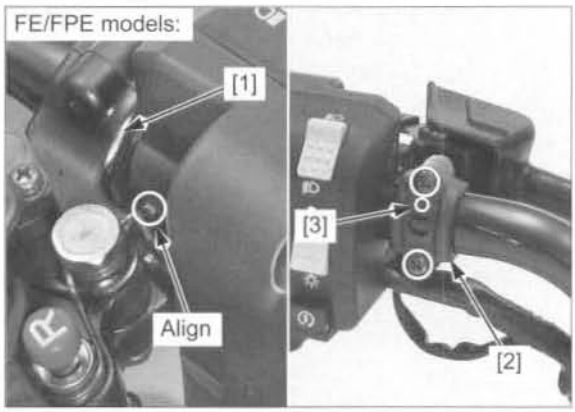
TORQUE: 4.2 N·m (0.4 kgf·m, 3.1 lbf·ft)



FE/FPE models: Align the locating pin on the bracket with the hole in the switch housing.

Install the brake lever bracket [1] and holder [2] with the punch mark [3] facing up. Tighten the upper screw first, then tighten the lower screw to the specified torque.

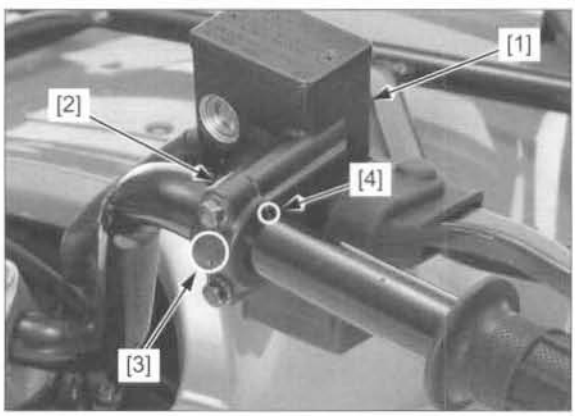
TORQUE: 4.2 N·m (0.4 kgf·m, 3.1 lbf·ft)



Align the edge of the master cylinder with the punch mark [4] on the handlebar.

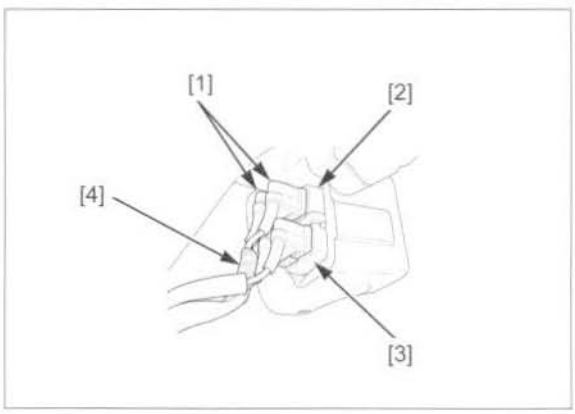
Install the brake master cylinder [1] and holder [2] with the "UP" mark [3] facing up. Tighten the upper bolt first, then tighten the lower bolt to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)



Connect the gray tape [4] wire connectors to the upper terminals.

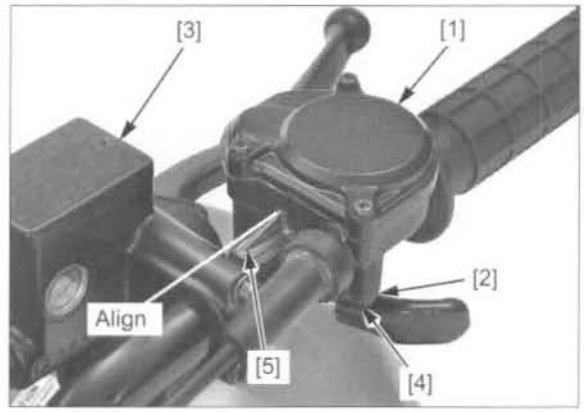
Connect the connectors [1] to the inhibitor switch [2] and brake light switch [3].



Align the lug [5] on the throttle housing with the mating line of the master cylinder and holder.

Install the throttle housing [1] and holder [2] against the master cylinder [3]. Tighten the front screw first, then tighten the rear screw [4] to the specified torque.

TORQUE: 4.2 N·m (0.4 kgf·m, 3.1 lbf·ft)

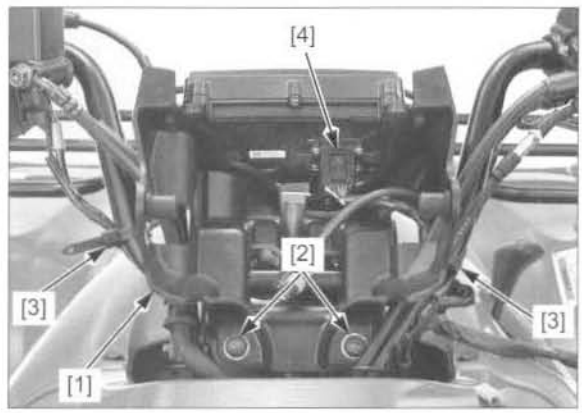


Install the meter cover stay [1] with the two bolts and collars [2], and tighten them to the specified torque.

TORQUE: 32 N·m (3.3 kgf·m, 24 lbf·ft)

Secure the wires with the two wire bands [3].

Connect the 21P connector [4] to the combination meter.



Install the meter cover [1] and tighten the screw [2].

Install the fuel tank breather hose [3] into the meter cover.

Install the assist headlight cover (page 22-4).

FPM/FPE only: Refer to "Service Information" for service location of the initialization (page 16-4).

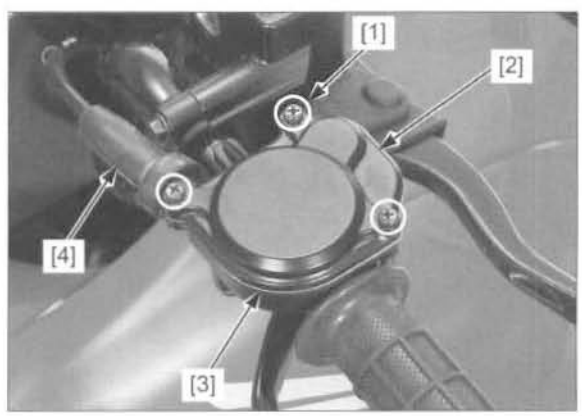
Perform the torque sensor initialization (page 24-13).

THROTTLE HOUSING

DISASSEMBLY

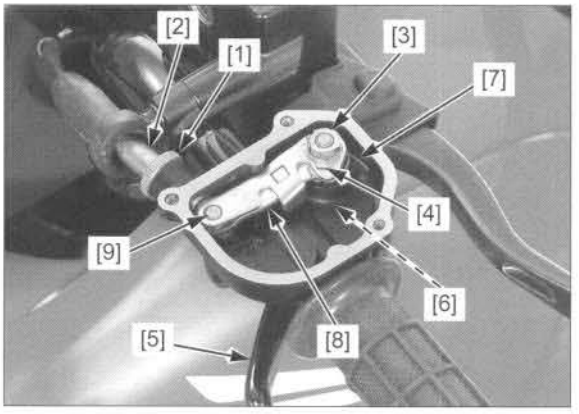
Remove the following:
- three screws [1]
- throttle housing cover [2]
- gasket [3]

Slide the boot [4] off the throttle cable adjuster.



Loosen the lock nut [1] and cable adjuster [2].

Bend down the lock washer tab and remove the following:
- pivot nut [3]
- lock washer [4]
- throttle lever [5] and plastic washer [6]
- return spring [7]
- throttle arm [8] (by disconnecting the cable [9])
- dust seal (from the housing)



ASSEMBLY

Coat the lips of a new dust seal [1] with grease and install it into the housing until it is fully seated.

Apply grease to the throttle lever pivot in the housing and to the throttle cable end.

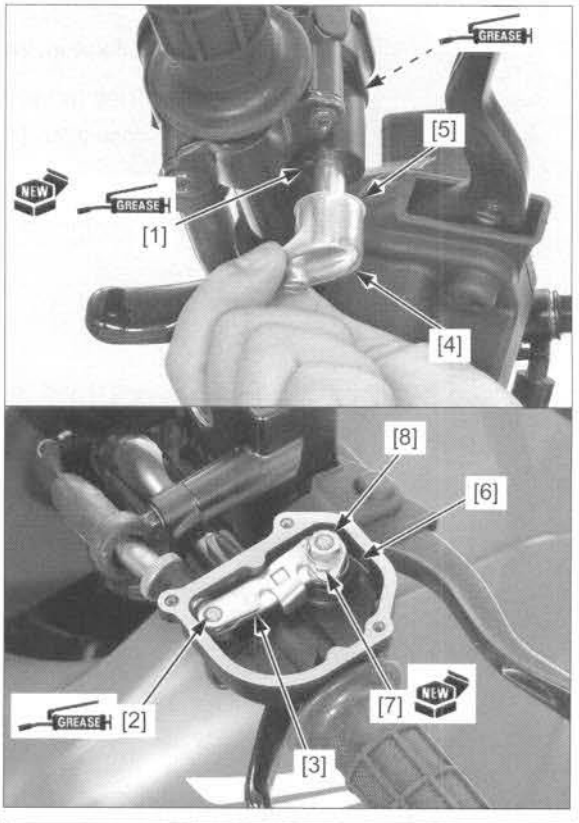
Connect the cable [2] to the throttle arm [3].

Insert the throttle lever [4] with the plastic washer [5] into the housing.
Install the throttle arm with the spring [6] over the throttle lever pivot by aligning the flat surfaces.

Install a new lock washer [7] and the nut [8], and tighten the it to the specified torque.

TORQUE: 7.0 N·m (0.7 kgf·m, 5.2 lbf·ft)

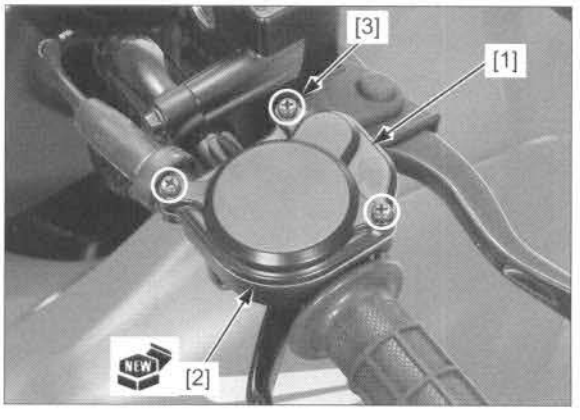
Bend up the lock washer tab against the nut.



Install the housing cover [1] with a new gasket [2] and tighten the three screws [3] to the specified torque.

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

Adjust the throttle lever freeplay (page 3-4).



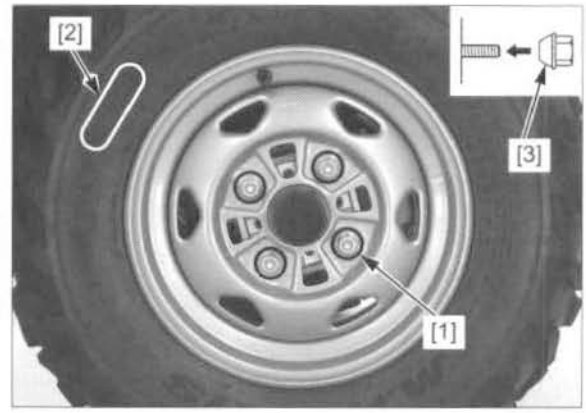
FRONT WHEEL

REMOVAL

Loosen the wheel nuts [1].

Support the vehicle using a hoist or equivalent and raise the front wheels off the ground.

Remove the wheel nuts and wheel.



INSTALLATION

Do not interchange the left and right wheels

Install the front wheel with the tire valve facing out and the arrow mark [2] facing in the normal rotating direction.

Install the wheel nuts with the tapered side [3] facing inward and tighten them to the specified torque.

TORQUE: 64 N·m (6.5 kgf·m, 47 lbf·ft)

TIRES

REMOVAL

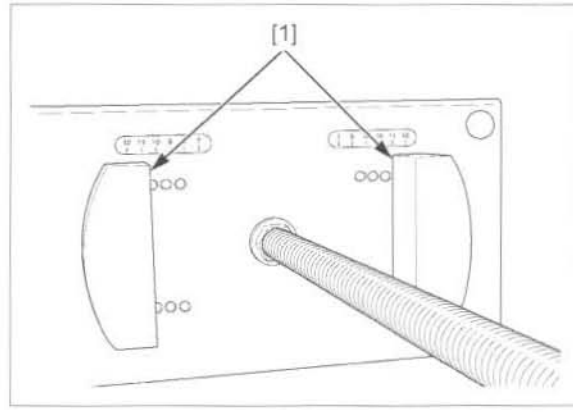
NOTE:

- This service requires the ATV Bead Buster (KLS379024).
- Remove and install the tire from the rim side opposite the valve stem.

Remove the core from the valve stem.

Use a pneumatic tire changer or equivalent to remove the tire from the rim. If a tire changer is not available, rim protectors and tire irons may be used.

Adjust the bottom rim supports [1] to the proper rim size. Align the flat side of the support with the corresponding rim size indicator.

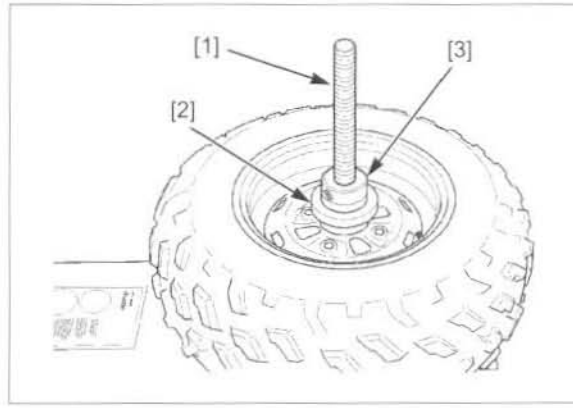


Use only water as a lubricant when removing or mounting tires. Soap or some mounting lubricants may leave a slippery residue that can cause the tire to shift on the rim and lose tire pressure during riding.

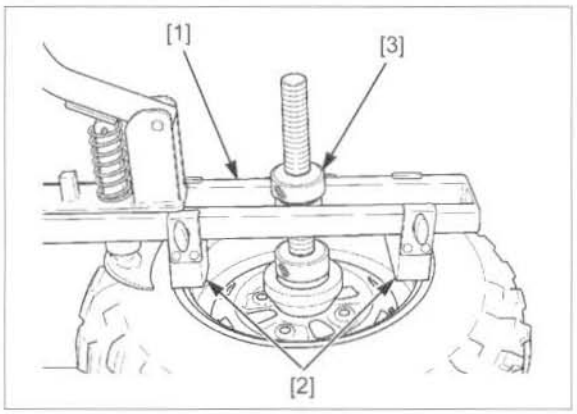
Lube the bead area of the tire with water, pressing down on the tire sidewall/bead area in several places to allow the water to run into and around the bead.

Place the wheel assembly over the center shaft [1] and use the correct size cone [2] to keep the wheel centered during operation.

Install the bottom hold down nut [3], bearing side down, and finger tighten it so the wheel can rotate freely during operation.

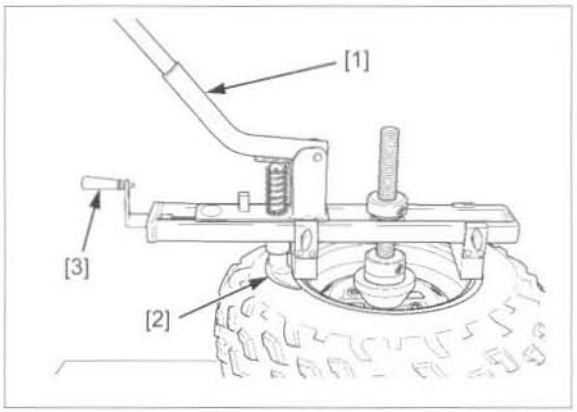


Install the breaker arm assembly [1] over the center shaft and adjust the upper rim supports [2] to fit the outside rim diameter.
Install the top hold down nut [3] and tighten it finger tight.



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.

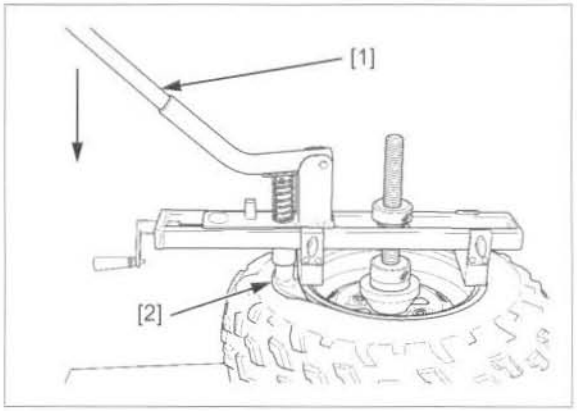
Pull the leverage bar [1] down so the breaker shoe [2] is just below the rim lip. Turn the crank [3] to fully push the breaker shoe between the tire bead and rim. Once the shoe contacts the rim, back the crank out two turns to allow the shoe to clear the rim's bead lock.



Push down on the leverage bar [1] to push the tire bead over the bead lock. Use only short strokes on the handle. While the shoe [2] is still engaged, turn the wheel as far as it will go between strokes as you break the bead around the rim.

Remove the breaker arm assembly and flip the wheel over. Install the breaker arm assembly, adjust the shoe properly and break the other bead by following the above procedures.

Remove the tire from the rim using a tire changing machine or tire irons and rim protectors.

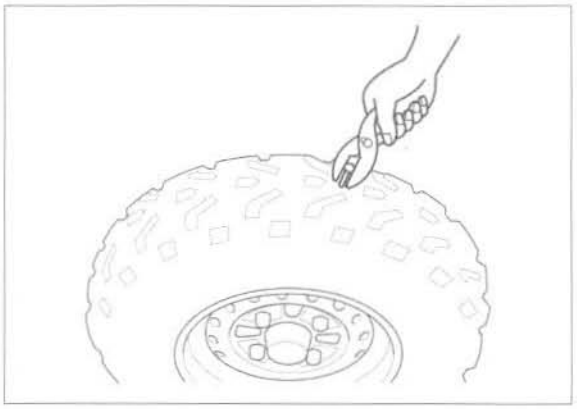


TIRE REPAIR

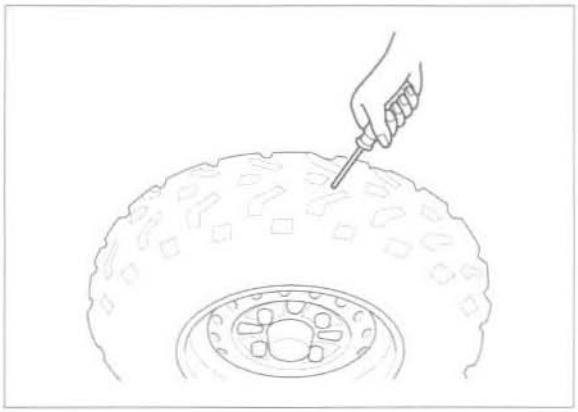
NOTE:

- Use the manufacturer's instructions for the tire repair kit you are using. If your kit does not have instructions, use the procedures provided here.

Check the tire for puncturing objects.
Chalk mark the punctured area and remove the puncturing object.
Inspect and measure the puncture hole.
Tire repairs for puncture holes larger than 15 mm (0.6 in) should be a section repair.
Section repairs should be done by a professional tire repair shop.
If the puncture hole is smaller than 15 mm (0.6 in), proceed with the repair as described here.



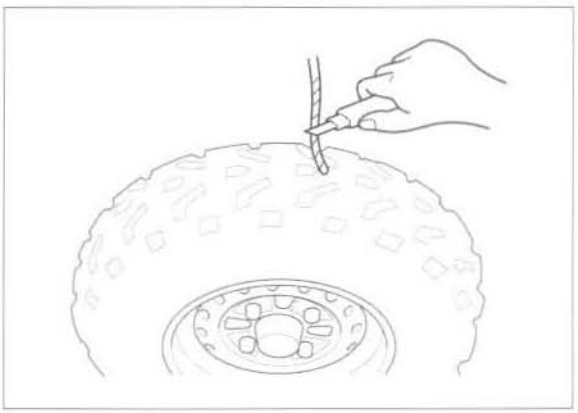
Install a rubber plug into the puncture hole as follows:
Apply a cement to a plug inserting needle and work the needle into the puncture hole to clean and lubricate it.
Do this three times.
Do not let the cement dry.



Be careful not to push the plug all the way into the tire to prevent it from falling inside.

Insert and center a rubber plug through the eye of the inserting needle.

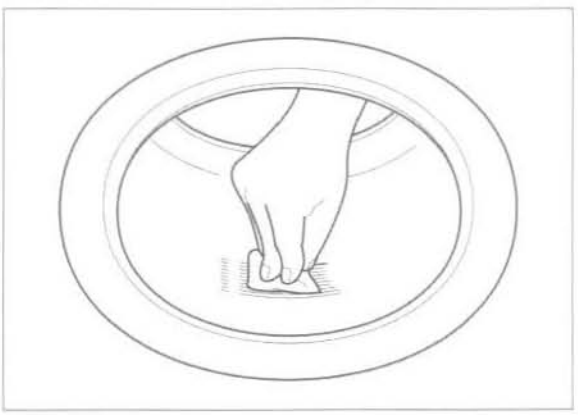
Apply cement to the rubber plug.
Push the inserting needle with plug into the puncture hole until the plug is slightly above the tire.
Twist the needle and remove it from the tire; the plug will stay in the tire.



Trim the plug 6 mm (0.2 in) above the tire surface.
Repeat the above procedure if the puncture is large.
Do not use more than two plugs per puncture hole.

Allow the repair to dry. Drying time will vary with air temperature. Refer to the tire repair kit manufacturer's recommendations.

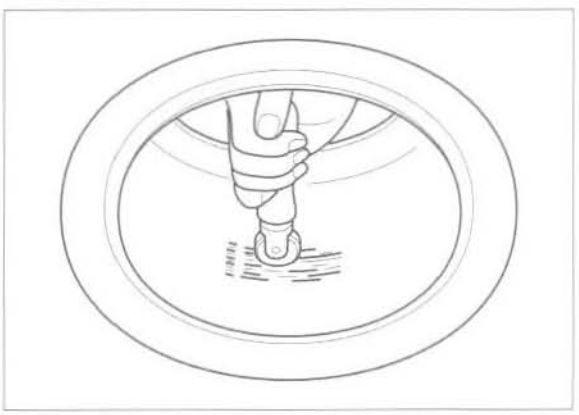
Inflate the tire and test the seal by dabbing a small amount of cement around the plug. Escaping air will cause a bubble in the cement. If there is leakage, remove the tire (page 16-13) and apply a cold patch to the inside of the tire as described below.



If a plug has been inserted, trim it even with the inner tire surface.

Temporarily place a rubber patch that is at least twice the size of the puncture hole over it. Make a mark around the patch, slightly larger than the patch itself.
Rough the area marked inside the tire with a tire buffer or a wire brush. Clean the rubber dust from the buffed area.

Apply cement over the area marked and allow it to dry until tacky.
Do not touch the cement with dirty or greasy hands.
Remove the lining from the patch and center it over the puncture hole.



Press the patch against the puncture hole 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.

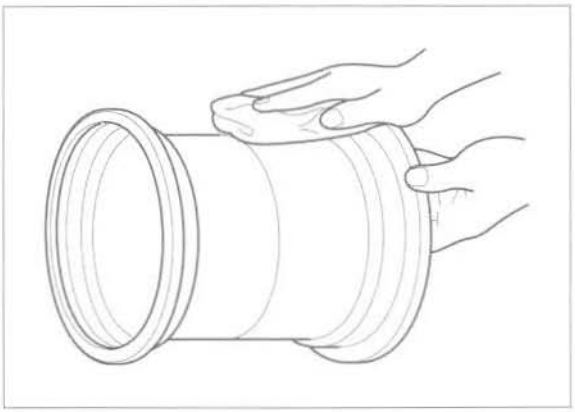
Apply clean water to the rim flanges, bead seat and base.

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/cm², 4.4 psi)
With cargo: 30 kPa (0.30 kgf/cm², 4.4 psi)
Rear: Standard: 30 kPa (0.30 kgf/cm², 4.4 psi)
With cargo: 30 kPa (0.30 kgf/cm², 4.4 psi)



Check for air leaks and install the valve cap.

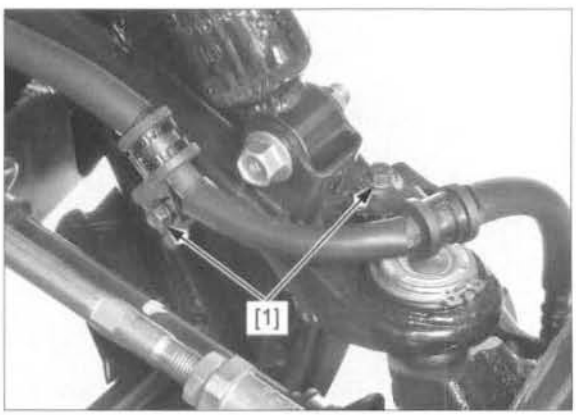
WHEEL HUB AND KNUCKLE

REMOVAL

Remove the engine guard if the suspension arm will be removed (page 2-7).

Remove the front wheel (page 16-13).

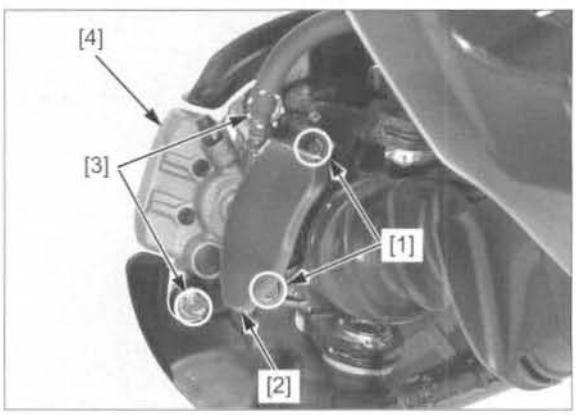
Remove the two hose clamp bolts [1] from the upper arm.



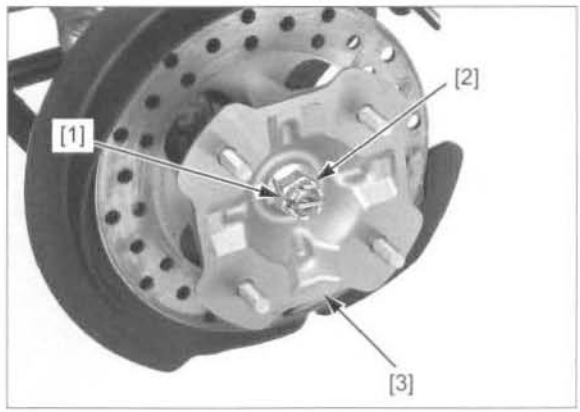
Remove the two setting bolts [1] and outboard guard [2].

Support the caliper so that it does not hang from the brake hose. Do not twist or bend the brake hose.

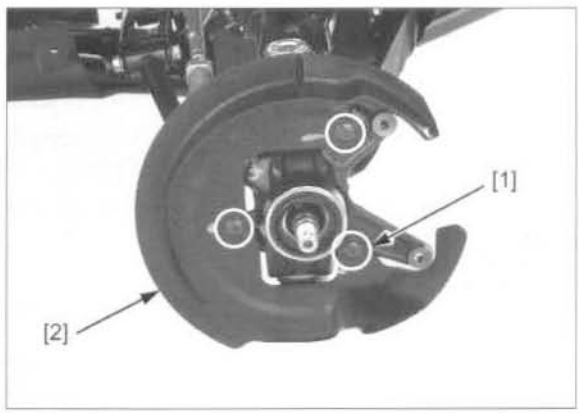
Remove the following:
- two mounting bolts [3]
- brake caliper [4]



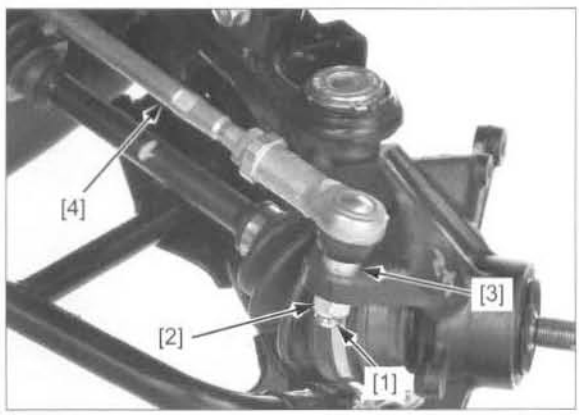
- cotter pin [1]
- hub nut [2]
- wheel hub [3]



- three socket bolts [1]
- splash guard [2]

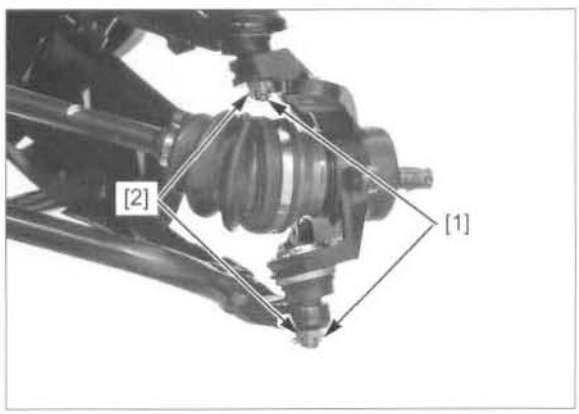


- cotter pin [1] (from the tie-rod ball joint stud)
- ball joint nut [2] (by holding the joint stud flat surfaces [3])
- tie-rod [4]



- cotter pins [1]

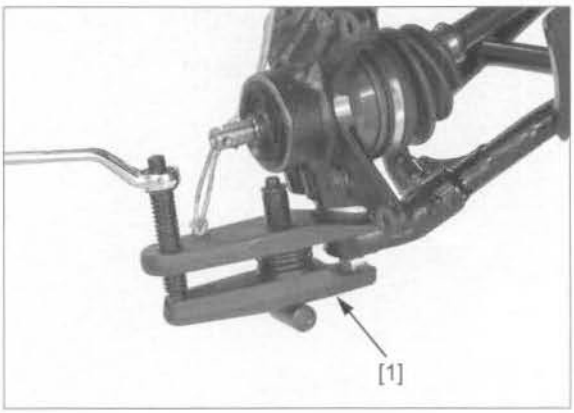
Loosen the ball joint nuts [2], but do not remove them yet.



Release the ball joints, using the special tool according to the following instructions.

TOOL:

[1] Ball joint remover, 28 mm	**07MAC-SL00201 or 07MAC-SL00202 (U.S.A. only)**

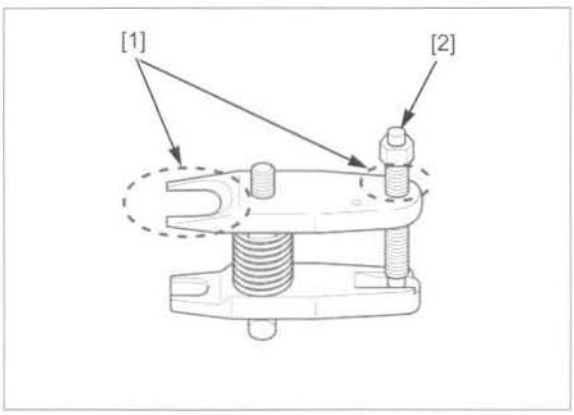


Apply grease to the ball joint remover at the point [1] shown.
This will ease installation of the tool and prevent damage to the pressure bolt [2] threads.

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.

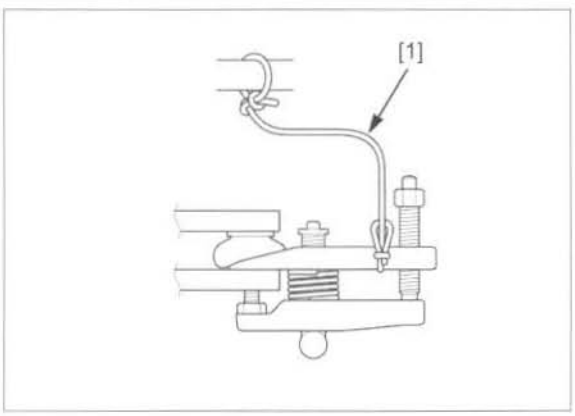
Adjust the jaw spacing by turning the pressure bolt.



To prevent the tool from dropping, tie the strap [1] on a neighboring solid part such as the suspension arm, tie-rod, etc. before operation.

NOTE:

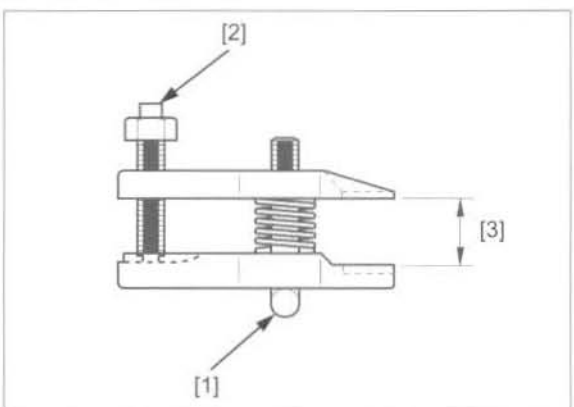
- Do not tie the strap on the brake hose, brake pipe, rubber boot, and other parts that can be damaged easily.



Once the tool is in place, turn the adjusting bolt [1] as necessary to make the jaws parallel.
Then hand-tighten the pressure bolt [2] and recheck the jaws to make sure they are still parallel [3].

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.



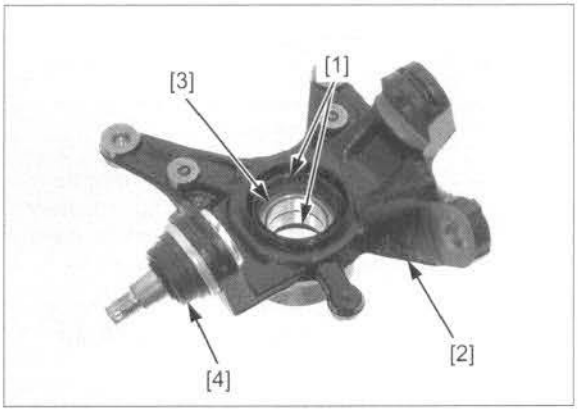
INSPECTION

Remove the dust seals [1] from the knuckle [2].

Turn the inner race of each bearing [3] in the knuckle with your finger. The bearings should turn smoothly and quietly. Also check that the bearing outer race fits tightly in the hub or knuckle.

Inspect the knuckle for damage or cracks.

Inspect the ball joint boot [4] for tears or other damage by moving the ball joint stud.
It should move freely and smoothly.



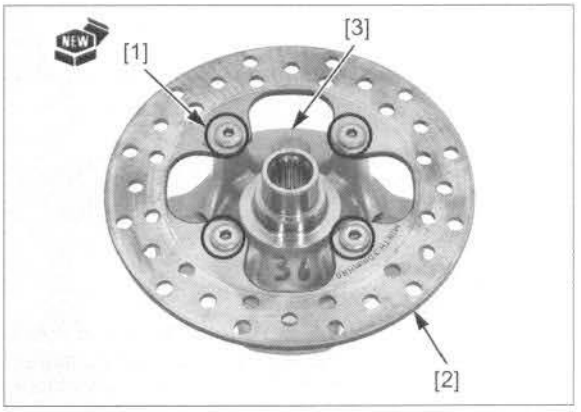
BRAKE DISC REPLACEMENT

Remove the four disc bolts [1] and brake disc [2] from the wheel hub [3].

Do not get grease on the brake disc or stopping power will be reduced.

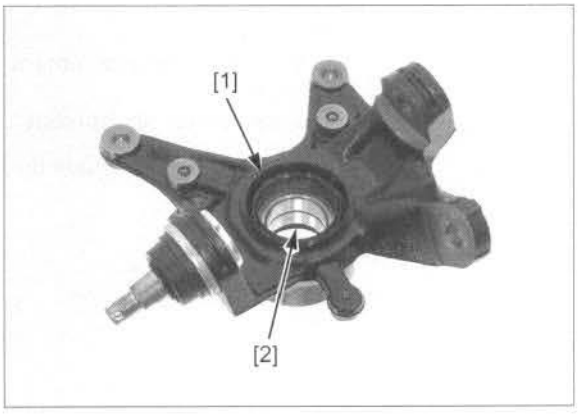
Install a new brake disc with new disc bolts and tighten them to the specified torque.

TORQUE: 42 N·m (4.3 kgf·m, 31 lbf·ft)



BEARING REPLACEMENT

Remove the inner dust seal [1] and outer dust seal [2] from the knuckle.



Remove the snap ring [1] and drive the bearings [2] out of the knuckle.

TOOLS:

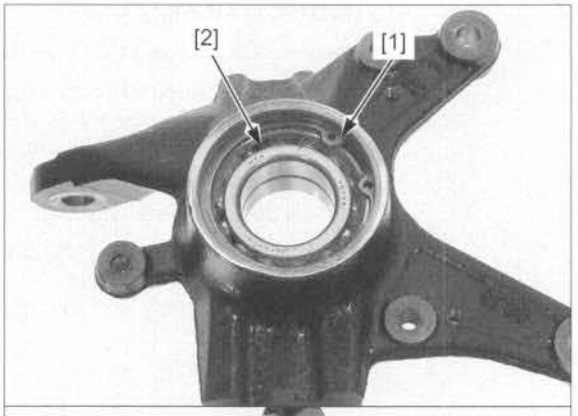
Driver	**07749-0010000**
Attachment, 40 x 42 mm	**07746-0010900**
Pilot, 30 mm	**07746-0040700**

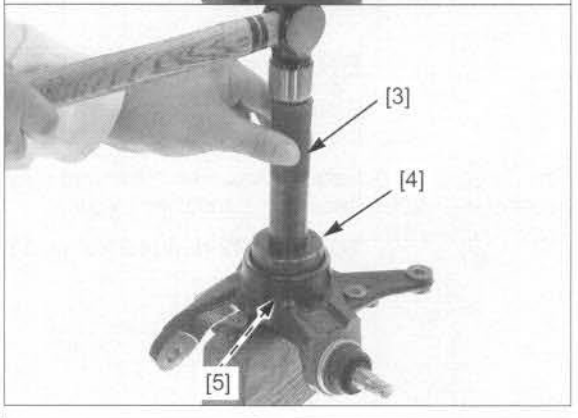
Pack the cavities of a new bearings with grease.
Drive in the bearing squarely with the marked side facing up until they are fully seated.

TOOLS:

[3] Driver	**07749-0010000**
[4] Attachment, 52 x 55 mm	**07746-0010400**
[5] Pilot, 30 mm	**07746-0040700**

Install the snap ring into the knuckle groove with the chamfered side facing in.



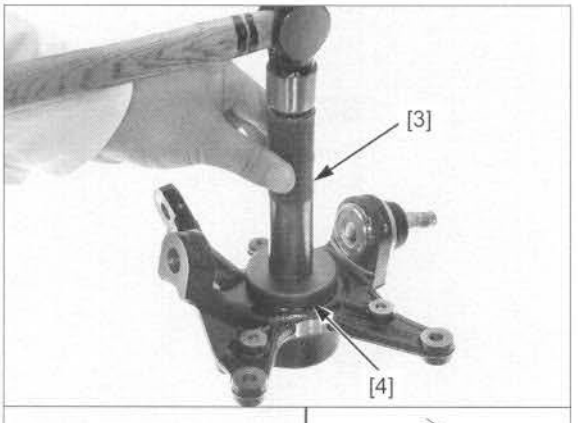


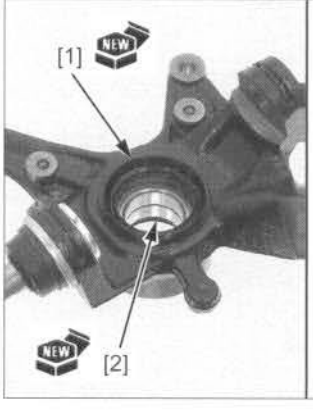
Apply grease to the lips of new inner dust seal [1] and outer dust seal [2] and install each seal until it is flush with the knuckle, being careful not to damage the lip.

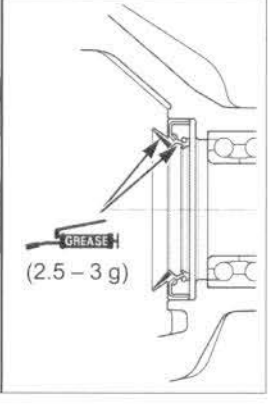
TOOLS:

Inner dust seal:	
[3] Driver	**07749-0010000**
[4] Oil seal driver attachment	**07JAD-PH80101**
Outer dust seal:	
Fork seal driver attachment	**07947-KA40200**

Pack the seal lips of the inner dust seal with 2.5 – 3 g of grease.

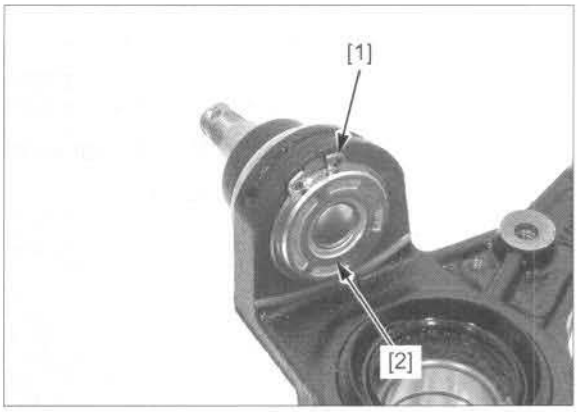






BALL JOINT REPLACEMENT

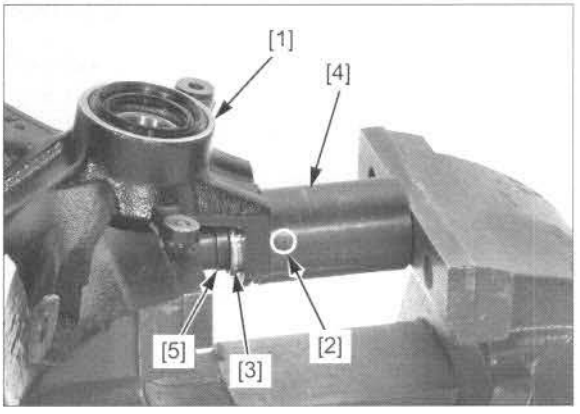
Remove the snap ring [1] from the ball joint [2].



Set the knuckle [1] and special tools with "A" mark [2] side of the remover/installer facing to the ball joint in the vise as shown.
Press the ball joint [3] out of the knuckle.

TOOLS:

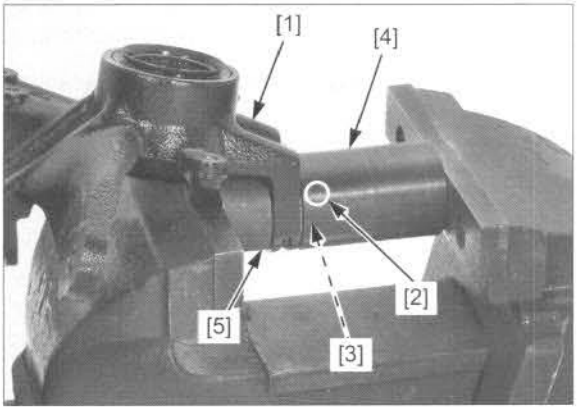
[4] Ball joint remover/installer	**07WMF-HN00100**
[5] Attachment, 28 x 30 mm	**07946-1870100**



Set the knuckle [1] and special tools with "B" mark [2] side of the remover/installer facing to the ball joint [3] in the vise as shown.
Press the ball joint into the knuckle until it is fully seated.

TOOLS:

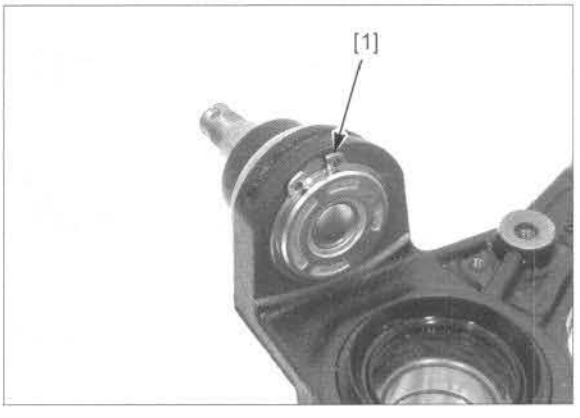
[4] Ball joint remover/installer	**07WMF-HN00100**
[5] Attachment, 20 mm I.D.	**07746-0020400**



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 [1] with the chamfered edge facing in.



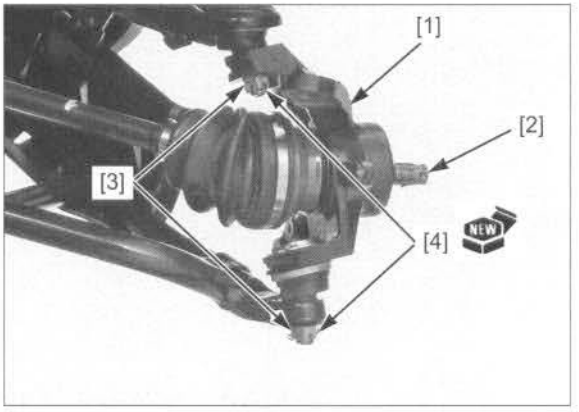
INSTALLATION

Install the knuckle [1] onto the drive shaft [2], and lower and upper arms with the ball joint nuts [3].

Tighten each joint nut to the specified torque and further tighten until its grooves align with the cotter pin hole.

TORQUE: 29 N·m (3.0 kgf·m, 21 lbf·ft)

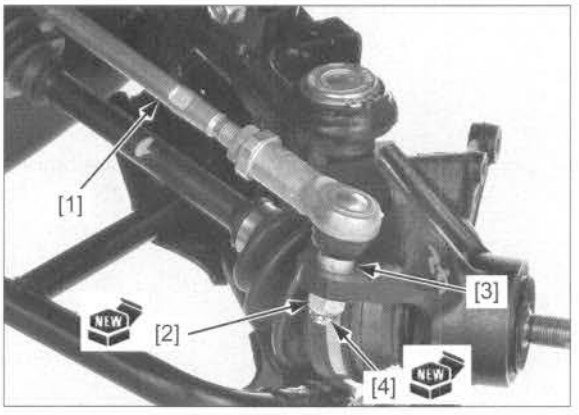
Install new cotter pins [4].



Install the tie-rod [1] into the knuckle with a new joint nut [2].
Tighten the nut to the specified torque by holding the joint stud flat surfaces [3].

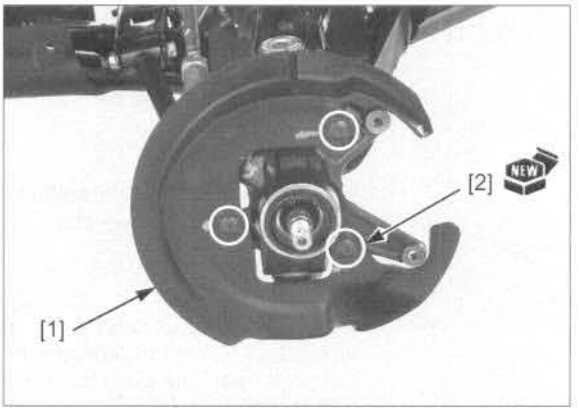
TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)

Install a new cotter pin [4].



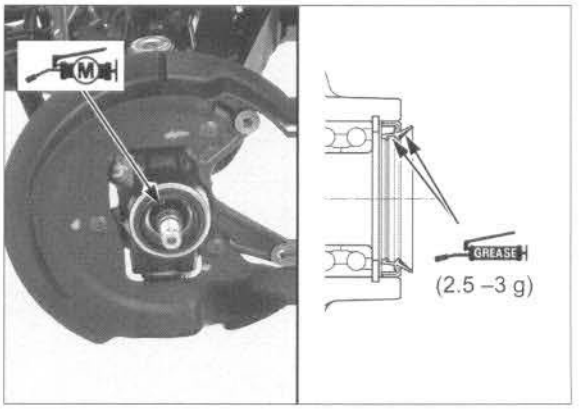
Install the splash guard [1] with new bolts [2] and tighten them to the specified torque.

TORQUE: 11 N·m (1.1 kgf·m, 8 lbf·ft)



Apply molybdenum disulfide grease to the drive shaft splines.

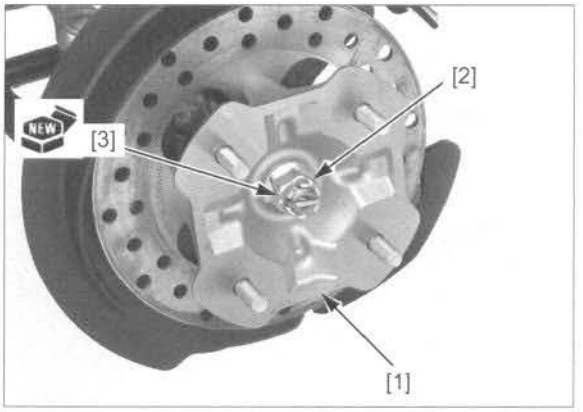
Pack the dust seal lips with 2.5 – 3 g of grease.



Install the wheel hub [1] and hub nut [2].
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)

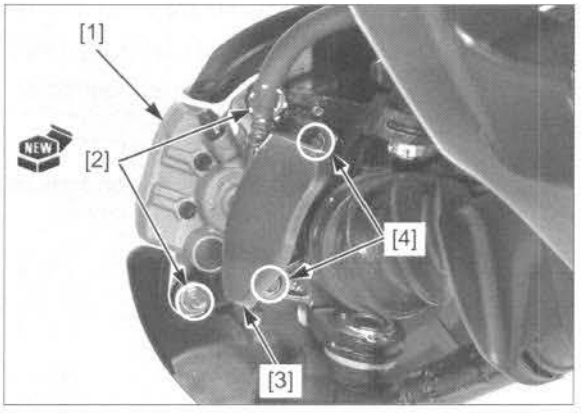
Install a new cotter pin [3].



Install the brake caliper [1] with new mounting bolts [2] and tighten them to the specified torque.

TORQUE: 30 N·m (3.1 kgf·m, 22 lbf·ft)

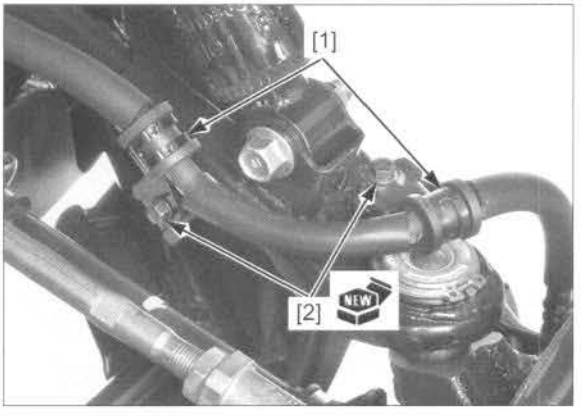
Install the outboard guard [3] and tighten the bolts [4].



Install the hose clamps [1] with new clamp bolts [2] and tighten them to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Install the front wheel (page 16-13).

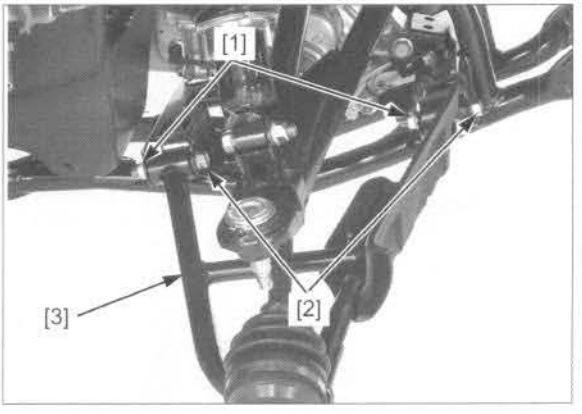


SUSPENSION ARM

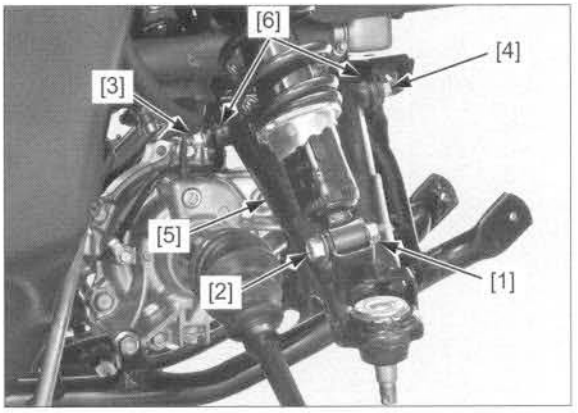
REMOVAL

Remove the wheel hub and knuckle (page 16-16).

Remove the following:
- pivot nuts [1] and bolts [2]
- lower arm [3]



- shock absorber lower mounting nut [1] and bolt [2]
- pivot nut [3] and bolt [4]
- upper arm [5]
- dust seal caps [6]

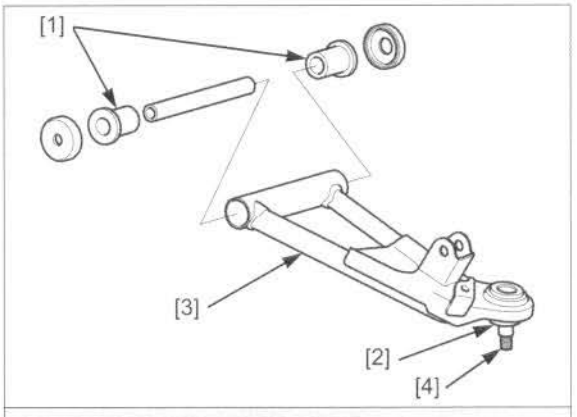


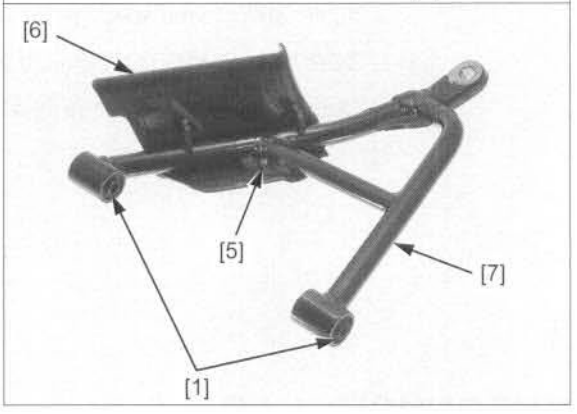
INSPECTION

Check the pivot bushings [1] for wear or damage.

Inspect the ball joint boot [2] on the upper arm [3] for tears or other damage by moving the ball joint stud [4]. It should move freely and smoothly.

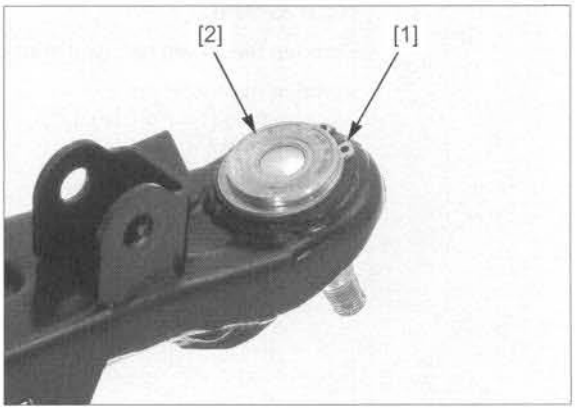
Remove the bolt [5] and inboard guard [6] from the lower arm [7] if necessary.





BALL JOINT REPLACEMENT

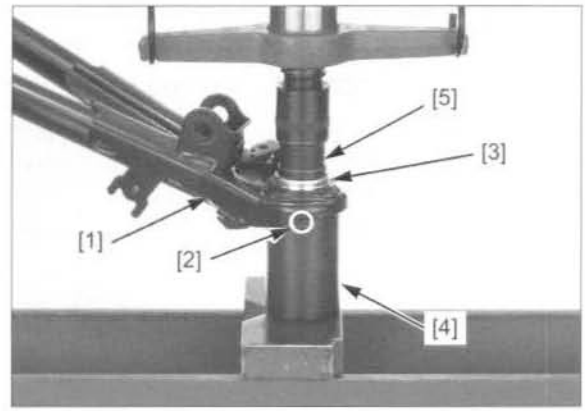
Remove the snap ring [1] from the ball joint [2].



Set the upper arm [1] and special tools with "A" mark [2] side of the remover/installer facing to the ball joint [3] in the hydraulic press as shown.
Press the ball joint out of the upper arm.

TOOLS:

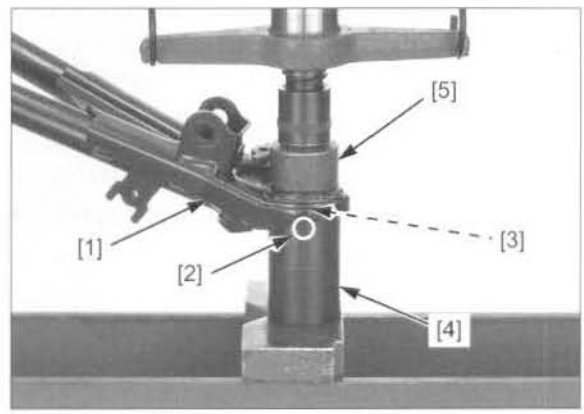
[4] Ball joint remover/installer	**07WMF-HN00100**
[5] Attachment, 28 x 30 mm	**07946-1870100**



Set the upper arm [1] and special tools with "B" mark [2] side of the remover/installer facing to the ball joint [3] as shown.
Press the ball joint into the upper arm until it is fully seated.

TOOLS:

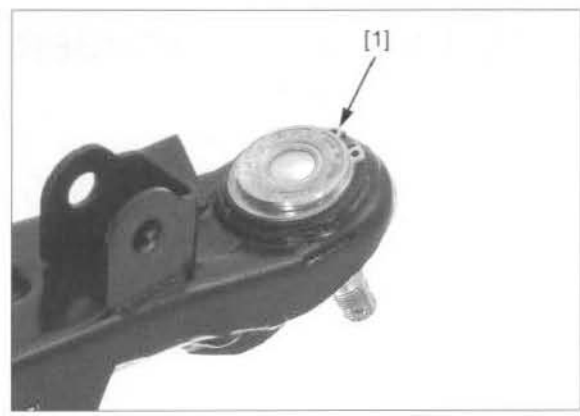
[4] Ball joint remover/installer	**07WMF-HN00100**
[5] Attachment, 20 mm I.D.	**07746-0020400**



NOTICE

If you feel strong resistance when lowering the press, stop. Reset the attachment of the tool so that the ball joint head can go into the hollow of the attachment and try again.

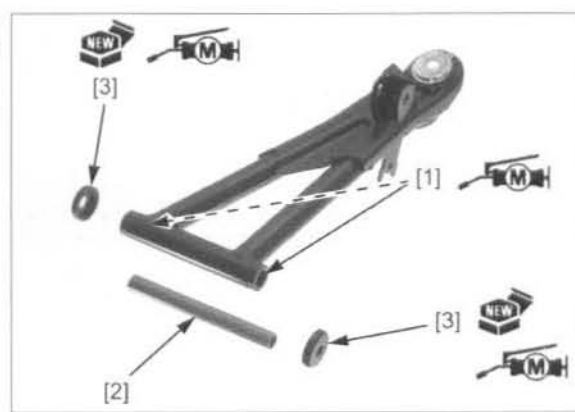
Install the snap ring [1] with the chamfered edge facing in.



INSTALLATION

Apply molybdenum disulfide grease to the inner surfaces of the pivot bushings [1] and install the pivot collar [2] into the upper arm.

Apply molybdenum disulfide grease to the lips of new dust seal caps [3] and install them onto the upper arm.



Insert the bolts from the front side.

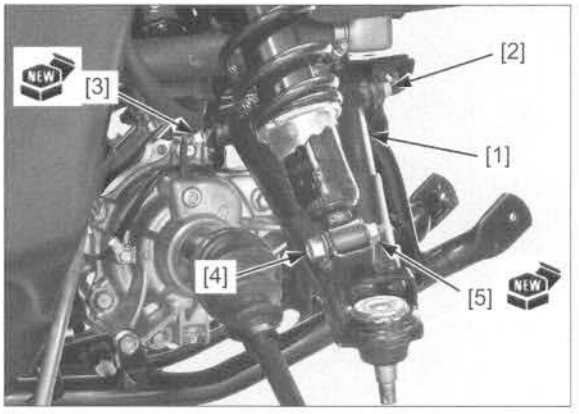
Install the upper arm [1] into the frame with the bolt [2] and a new nut [3] to the specified torque.

TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)

Insert the bolt from the rear side.

Connect the shock absorber to the upper arm with the bolt [4] (10 x 45 mm) and a new nut [5] to the specified torque.

TORQUE: 39 N·m (4.0 kgf·m, 29 lbf·ft)



Insert the bolts from the front side.

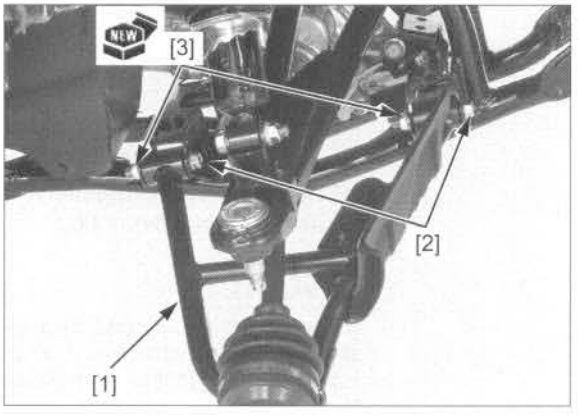
Install the lower arm [1] with the pivot bolts [2] and new nuts [3], and loosely tighten them.

Install the knuckle and wheel hub (page 16-22).

Install the front wheel (page 16-13).
Place the vehicle on level ground and tighten the lower arm pivot nuts to the specified torque.

TORQUE: 39 N·m (4.0 kgf·m, 29 lbf·ft)

Install the engine guard (page 2-7).

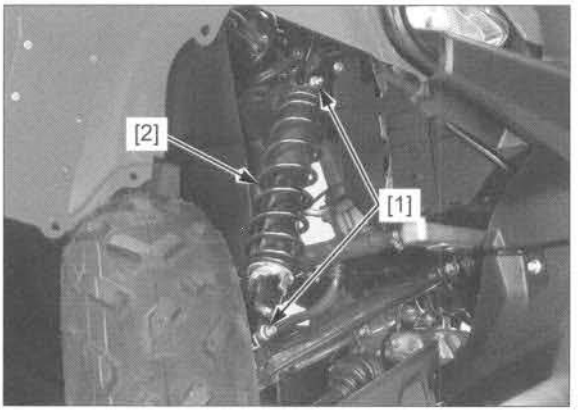


FRONT SHOCK ABSORBER

REMOVAL

Support the vehicle using a hoist or equivalent and raise the front wheels off the ground.

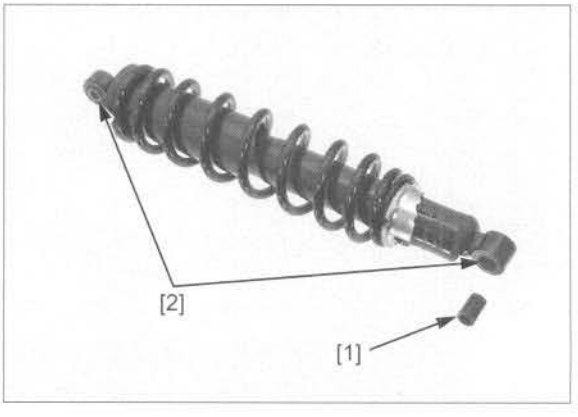
Support the lower arm. Remove the mounting nuts and bolts [1], and front shock absorber [2].



INSPECTION

Remove the pivot collar [1].

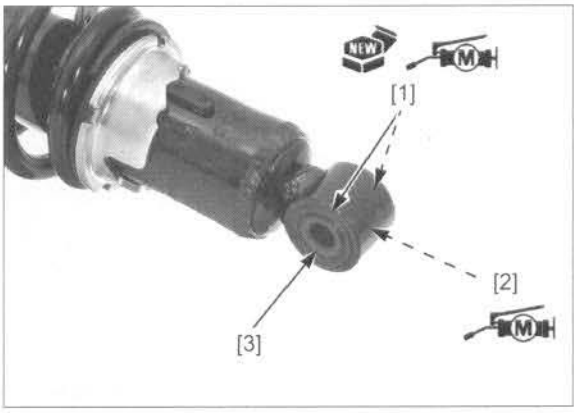
Check the pivot bushings [2] for wear or damage.
Check the damper unit for leakage or other damage.
Replace the shock absorber assembly if necessary.



INSTALLATION

Install new dust seals [1] into the lower pivot with the lip side facing the bushing until they are fully seated.
Apply molybdenum disulfide grease to the lower pivot bushing [2] and dust seal lips.

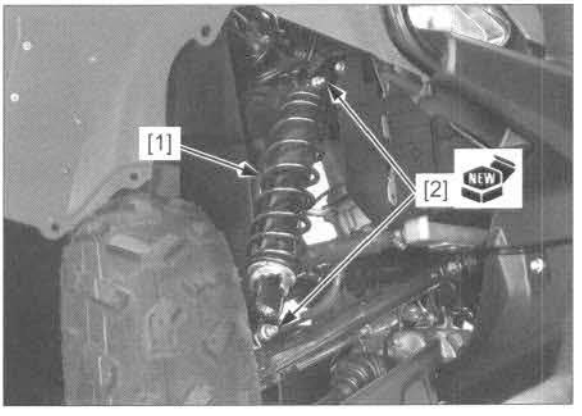
Install the pivot collar [3].



Insert the bolts from the rear side.

Install the shock absorber [1] with the mounting bolts (upper: 10 x 42 mm, lower: 10 x45 mm) and new nuts [2], and tighten them to the specified torque.

TORQUE: 39 N·m (4.0 kgf·m, 29 lbf·ft)



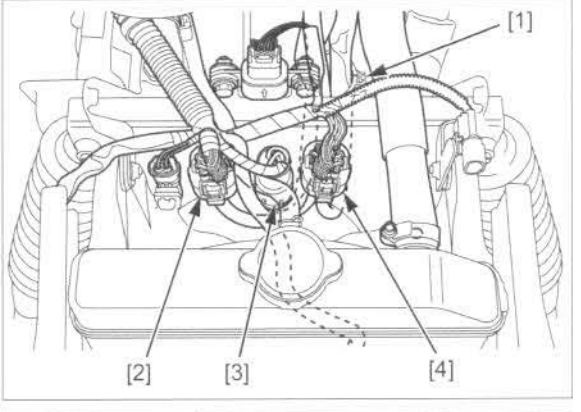
STEERING SHAFT (FM/FE models)

REMOVAL

Remove the following:
- mudguards (page 2-6)
- front fender/carrier (page 2-8)
- front wheels (page 16-13)
- meter cover stay (page 16-8)

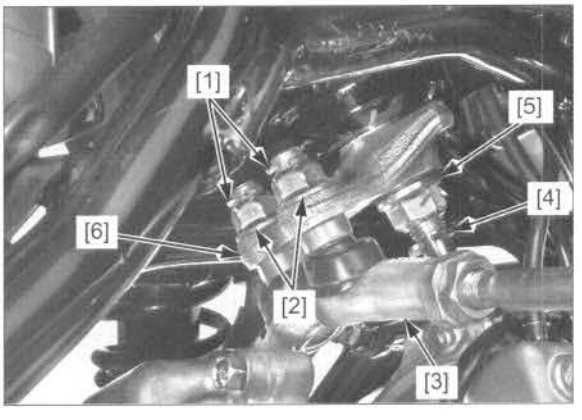
Release the wire clip [1].

Remove the following connectors from the frame and disconnect them:
- FM model: handlebar switch 10P (Green) [2]
  FE model: handlebar switch 14P (Green) [2]
- ignition switch 4P (White) [3]
- front sub-wire harness 14P (Gray) [4]



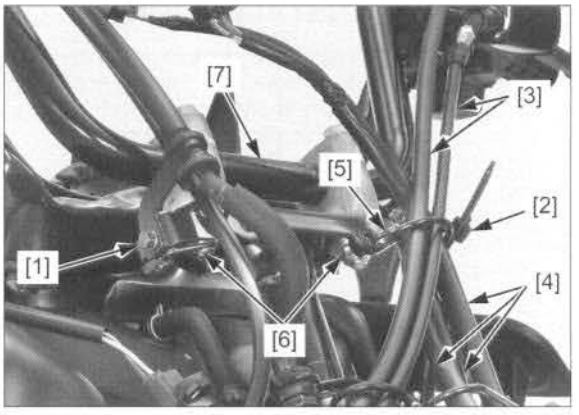
Remove the following:

- cotter pins [1] (from the tie-rods)
- joint nuts [2] (by holding the joint stud flat surfaces)
- tie-rods [3] (from the steering arm)
- cotter pin [4] (from the steering shaft)
- shaft end nut and washer [5]
- steering arm [6]

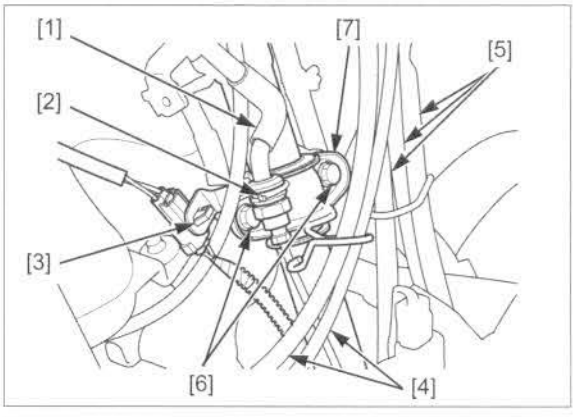


Support the handlebar securely while keeping the master cylinder reservoir upright.

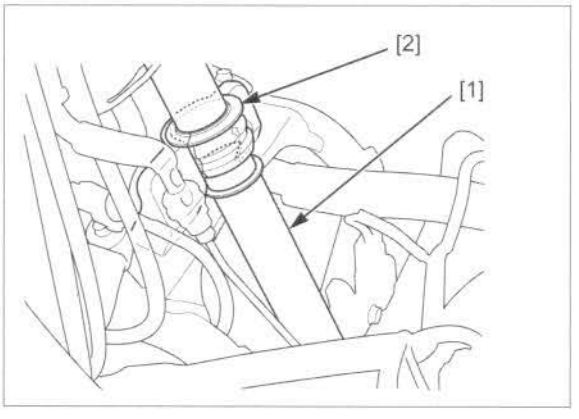
- hose clamp bolt [1]
- wire band [2]
- cables [3] and wires [4] (from the upper guide [5])
- two nuts and washers [6]
- handlebar assembly [7] (from the steering shaft)



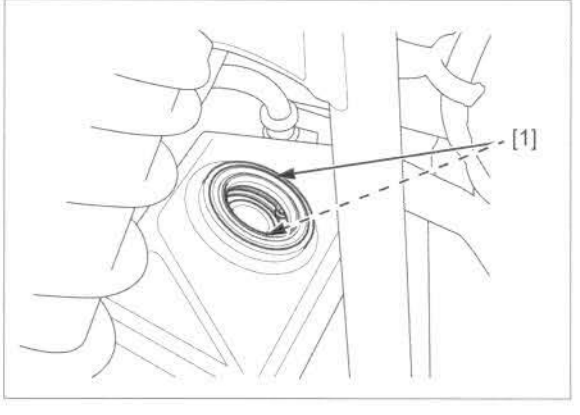
- brake hose [1] (from the clamp [2])
- connector clip [3]
- cables [4] and wires [5] (from the lower guide)
- two holder bolts [6]
- steering shaft holder [7]



- steering shaft [1] (from the shaft bearing)
- shaft bushing [2]



- dust seals [1]



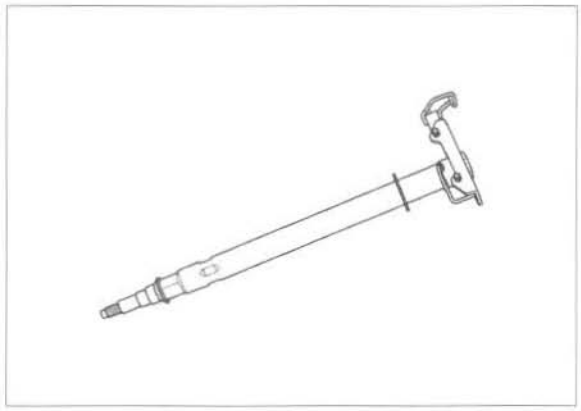
INSPECTION

SHAFT BUSHING

Check the shaft bushing for wear or damage.

STEERING SHAFT

Check the steering shaft for distortion or damage.



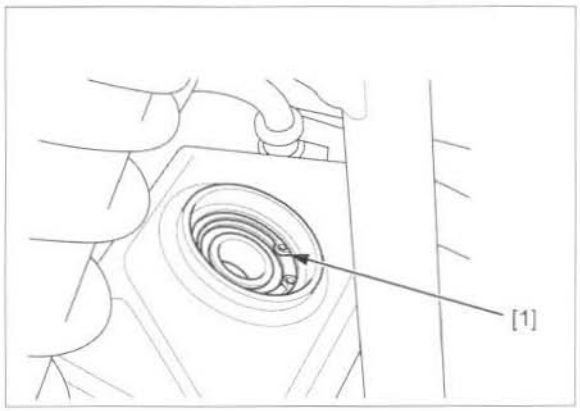
STEERING SHAFT BEARING

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

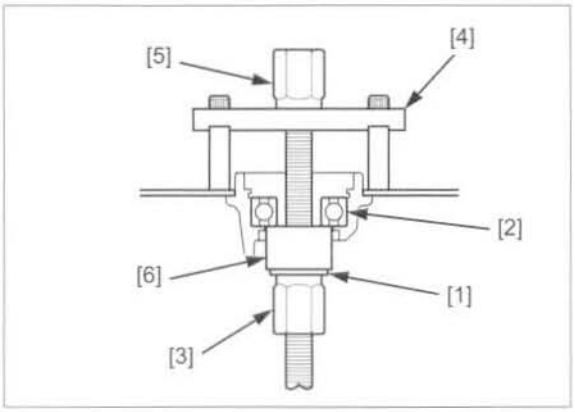
Remove the snap ring [1].



Assemble the special tools and a 10 mm washer [1] onto the steering shaft bearing [2].
Remove the bearing by tightening the nut [3].

TOOLS:

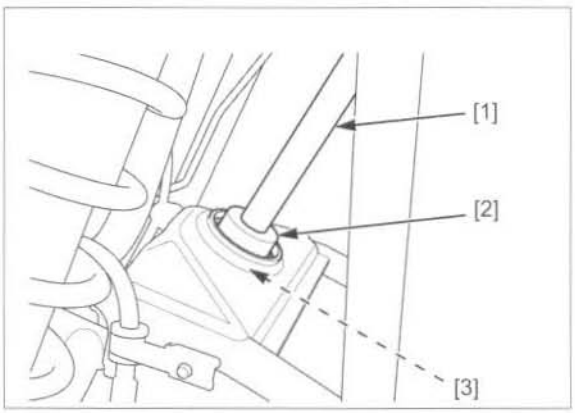
[4] Clutch compressor attachment	**07LAE-PX40100**
[5] Compressor bolt assembly	**07GAE-PG40200 or 07GAE-PG4020A (U.S.A. only)**
[6] Attachment, 34 mm	**07ZMD-MBW0100**



Drive a new bearing into the frame with the marked side facing up.

TOOLS:

[1] Driver	**07949-3710001**
[2] Attachment, 42 x 47 mm	**07746-0010300**
[3] Pilot, 22 mm	**07746-0041000**



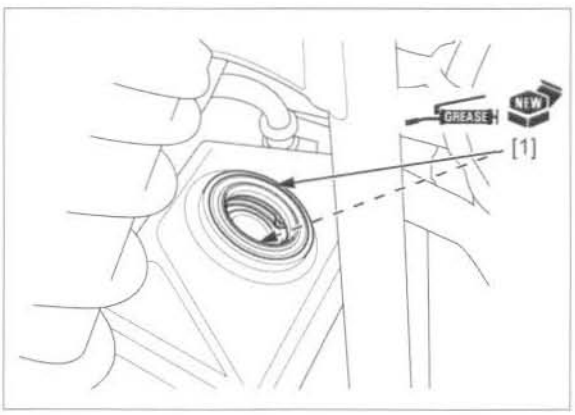
Make sure the snap ring is firmly seated in the groove.

Install the snap ring into the groove properly with the chamfered edge facing down.

INSTALLATION

Coat the lips of new dust seals with grease.

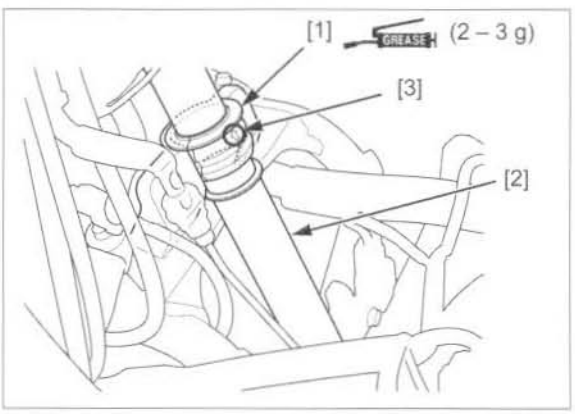
Install each dust seal [1] with the flat side facing out so that it is flush with the frame edge.



Apply 2 – 3 g of grease to the shaft bushing inner surface.

Install the shaft bushing [1] onto the steering shaft [2] with the arrow mark [3] facing up.

Install the steering shaft into the bearing.



Temporarily install the handlebar assembly onto the steering shaft.

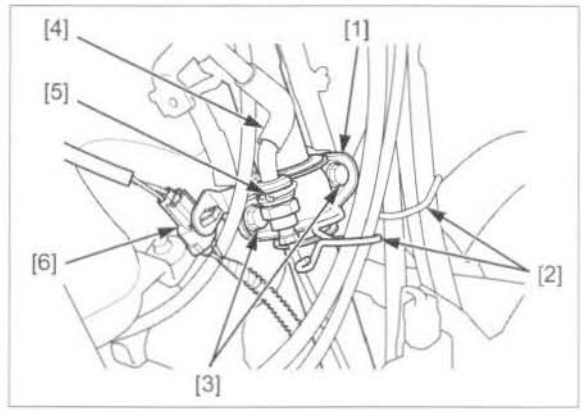
Install the steering shaft holder [1] with the guide [2] facing down while routing the wires and cables into the guide. Install the two holder bolts [3].

Install the brake hose [4] into the clamp [5].

Install the 2P (Red) connector [6] onto the shaft holder.

Tighten the holder bolts alternately in several steps.

TORQUE: 32 N·m (3.3 kgf·m, 24 lbf·ft)



Apply molybdenum disulfide grease to the steering shaft spline [1].

Install the steering arm [2] over the steering shaft with the marked side facing down by aligning the wide tooth with the wide groove.
Install the washer and a new end nut [3], and tighten the nut to the specified torque.

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

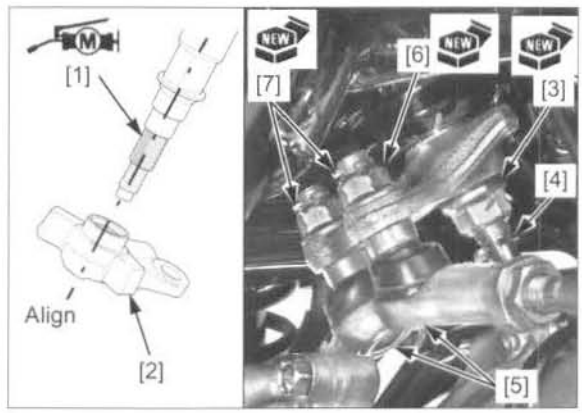
Install a new cotter pin [4].

Install the tie-rods [5] into the steering arm.

Install new joint nuts [6] and tighten them to the specified torque by holding the joint stud flat surfaces.

TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)

Install new cotter pins [7] into the ball joint studs.



Install the handlebar assembly [1] onto steering shaft with the washers and new lower holder nuts [2].

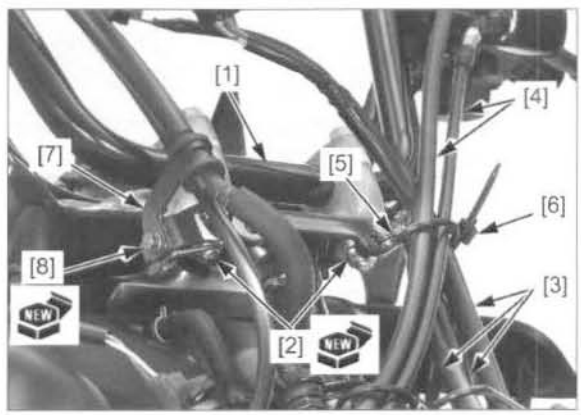
Tighten the nuts.

Install the wires [3] and cables [4] into the guide [5].

Secure the wires to the guide with the wire band [6].

Install the hose clamp [7] with a new clamp bolt [8] and tighten it to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

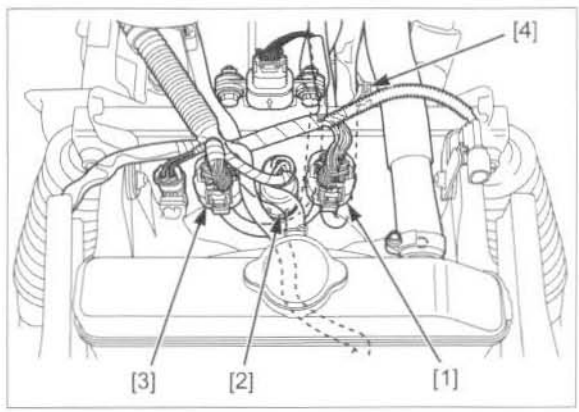


Connect the following connectors and install them onto the frame.

- front sub-wire harness 14P (Gray) [1]
- ignition switch 4P (White) [2]
- FM model: handlebar switch 10P (Green) [3]
  FE model: handlebar switch 14P (Green) [3]

Secure the wires with the wire clip [4].

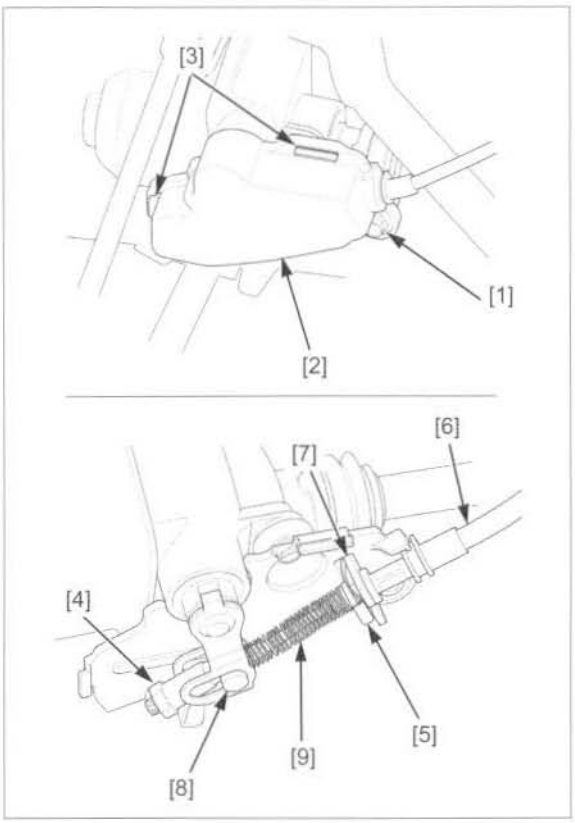
Install the following:
- meter cover stay (page 16-9)
- front wheels (page 16-13)
- front fender/carrier (page 2-8)
- mudguards (page 2-6)



STEERING SHAFT/EPS UNIT (FPM/FPE models)

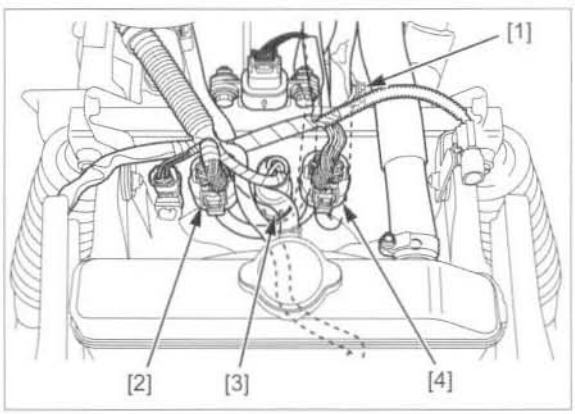
REMOVAL

Remove the following:
- mudguards (page 2-6)
- front fender/carrier (page 2-8)
- front wheels (page 16-13)
- meter cover stay (page 16-8)
- bolt [1] and clutch arm cover [2] (release from the two tabs [3])
- adjusting nut [4]
- cable retaining plate [5]
- 2WD/4WD selector cable [6] (remove from the cable holder [7] and joint pin [8])
- cable spring [9]
- joint pin



Release the wire clip [1].

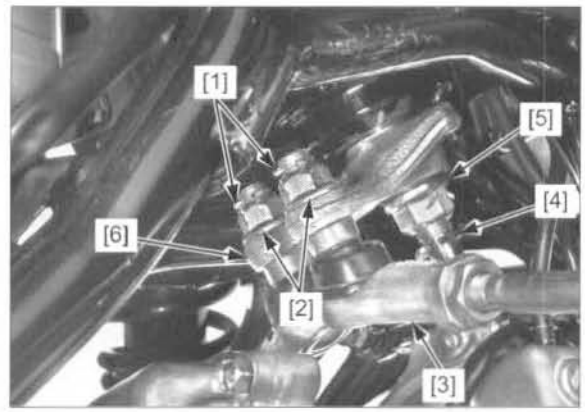
Remove the following connectors from the frame and disconnect them:
- FPM: handlebar switch 10P (Green) [2]
  FPE: handlebar switch 14P (Green) [2]
- ignition switch 4P (White) [3]
- front sub-wire harness 14P (Gray) [4]



Remove the following:

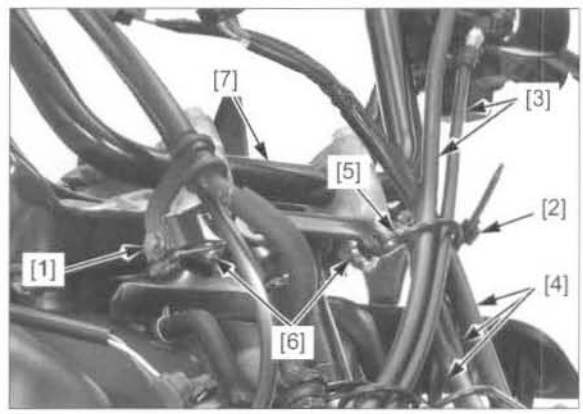
- EPS motor 2P (Gray) connector [1]
- torque sensor 3P (Gray) connector [2]

- cotter pins [1] (from the tie-rods)
- joint nuts [2] (by holding the joint stud flat surfaces)
- tie-rods [3] (from the steering arm)
- cotter pin [4] (from the steering shaft)
- shaft end nut and washer [5]
- steering arm [6]

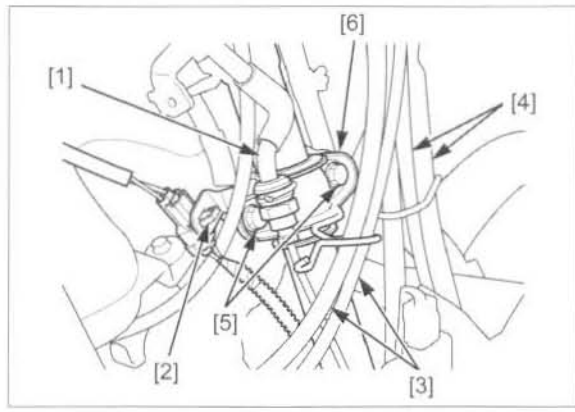


Support the handlebar securely while keeping the master cylinder reservoir upright.

- hose clamp bolt [1]
- wire band [2]
- cables [3] and wires [4] (from the upper guide [5])
- two nuts and washers [6]
- handlebar assembly [7] (from the steering shaft)



- brake hose [1] (from the clamp)
- connector clip [2] (from the shaft holder)
- cables [3] and wires [4] (from the lower guide)
- two holder bolts [5]
- steering shaft holder [6]

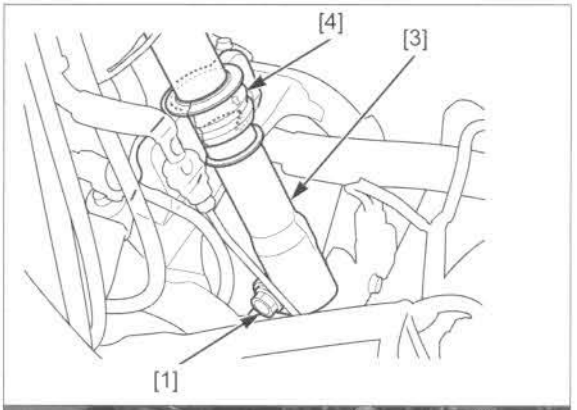


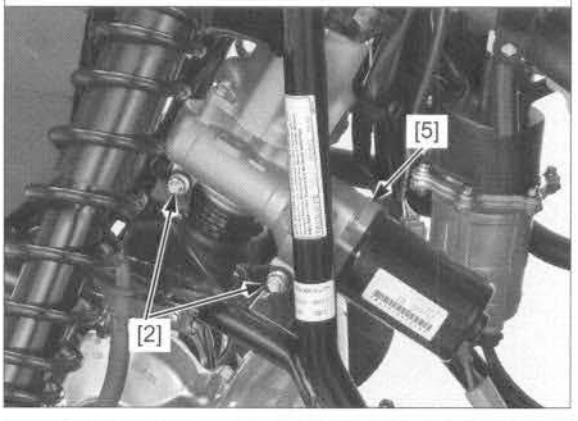
– steering shaft pinch bolt [1]

Loosen the EPS unit mounting fasteners [2].

Hold the EPS unit securely and maneuver it out of the frame to the left side, being careful not to damage the shaft splines.

Remove the following:
– steering shaft [3]
– shaft bushing [4]
– mounting nuts and bolts [2]
– EPS unit [5]



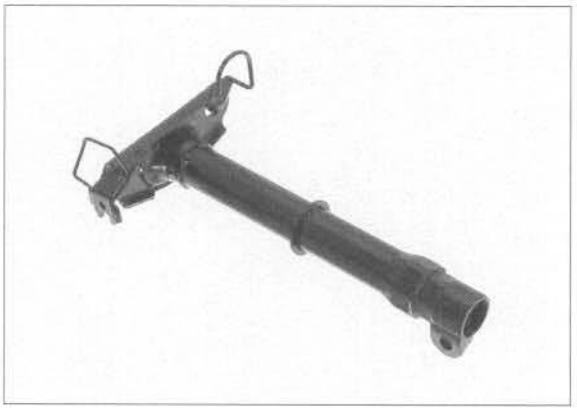


– dust seals [1]

INSPECTION

STEERING SHAFT

Check the steering shaft for distortion or damage.

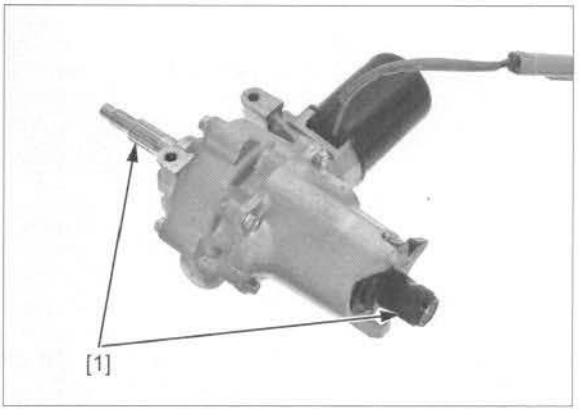


SHAFT BUSHING

Check the shaft bushing for wear or damage.

EPS UNIT

Check each shaft [1] of the EPS unit for wear or damage.

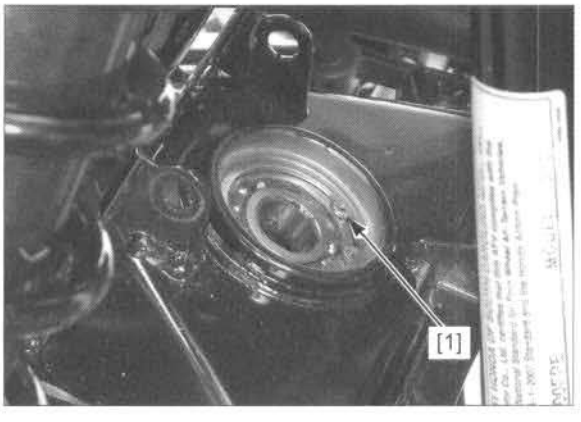


STEERING SHAFT BEARING

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

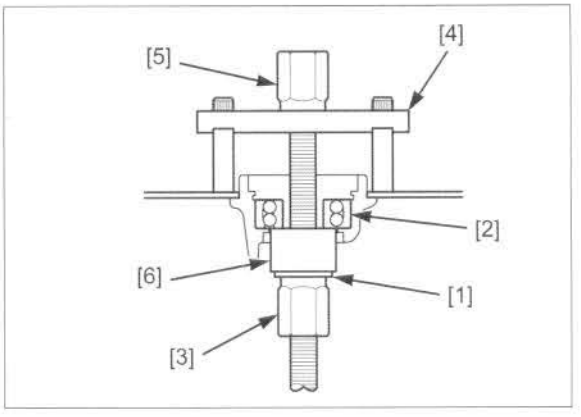
Remove the snap ring [1].



Assemble the special tools and a 10 mm washers [1] onto the steering bearing [2].
Remove the bearing by tightening the nut [3].

TOOLS:

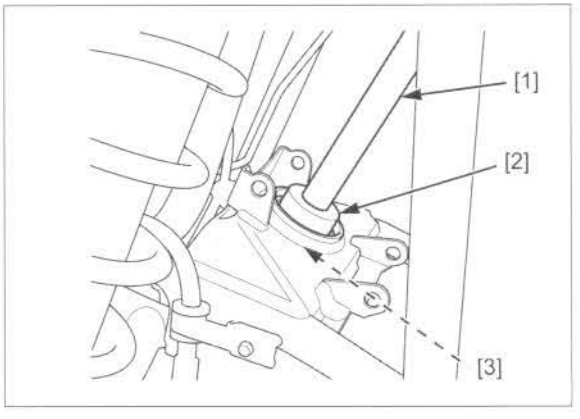
[4] Clutch compressor attachment	**07LAE-PX40100**
[5] Compressor bolt assembly	**07GAE-PG40200 or 07GAE-PG4020A (U.S.A. only)**
[6] Attachment, 34 mm	**07ZMD-MBW0100**



Drive a new bearing into the frame with the marked side facing up.

TOOLS:

[1] Driver	**07949-3710001**
[2] Attachment, 42 x 47 mm	**07746-0010300**
[3] Pilot, 20 mm	**07746-0040500**



Make sure the snap ring is firmly seated in the groove.

Install the snap ring [1] into the groove properly with the chamfered edge facing down.

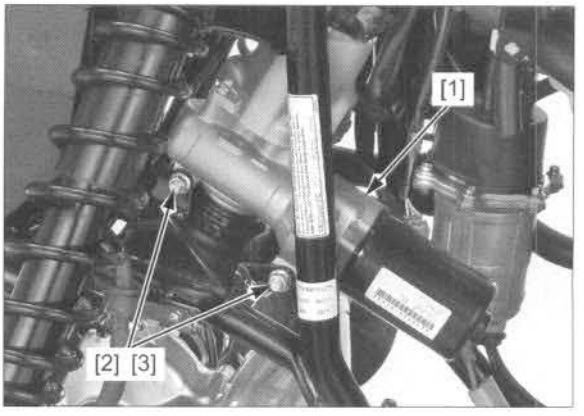
INSTALLATION

Pack the seal lips of new dust seals [1] with grease.
Install each dust seal with the flat side facing out so that it is flush with the frame edge.

Hold the EPS unit securely and carefully maneuver it into place, being careful not to damage the dust seal in the frame and shaft splines.

Place the EPS unit [1] into the frame and install it into the bearing.

Install the mounting bolts [2] from the right side and the nuts [3], but do not tighten them yet.

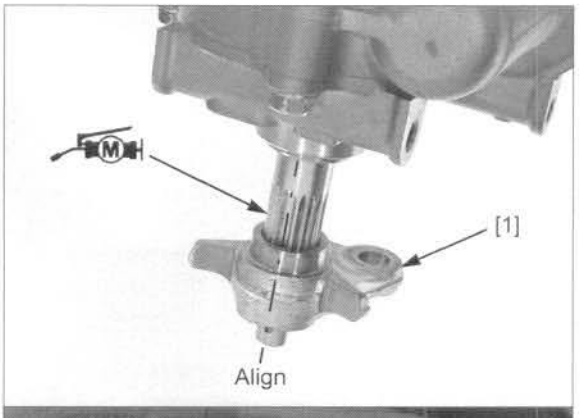


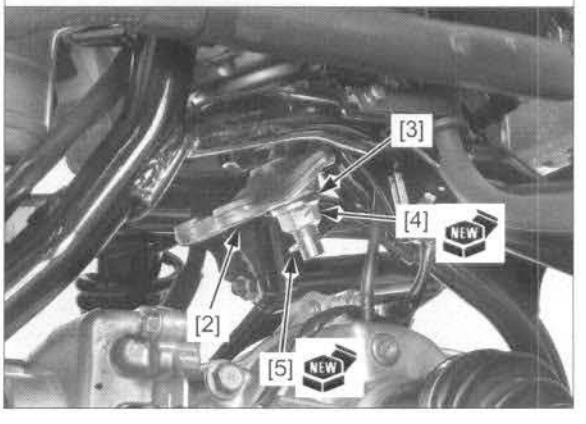
Apply molybdenum disulfide grease to the splines.

Install the steering arm [1] with the marked side [2] facing down by aligning the wide tooth with the wide groove in the shaft.
Install the washer [3] and a new end nut [4], and tighten it to the specified torque.

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

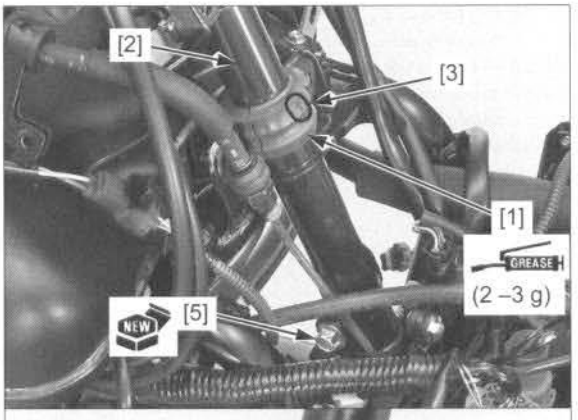
Install a new cotter pin [5].

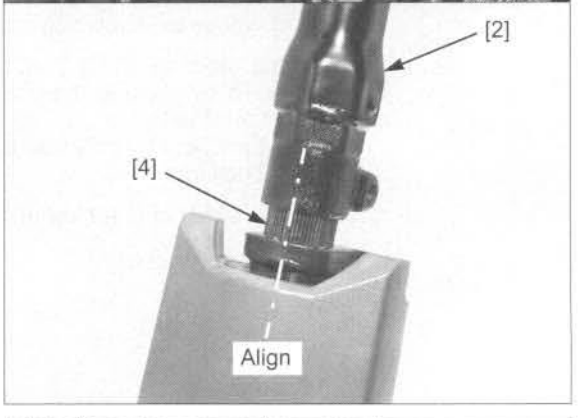




Apply 2 – 3 g of grease to the shaft bushing inner surface.
Install the shaft bushing [1] onto the steering shaft [2] with the arrow mark [3] facing up.

Install the steering shaft over the input shaft [4] of the EPS unit by aligning the wide tooth with the wide groove. Install a new pinch bolt [5].





Temporarily install the handlebar assembly onto the steering shaft.

Install the steering shaft holder [1] with the guide [2] facing down while routing the wires and cables into the guide. Install the two holder bolts [3].

Install the brake hose [4] into the clamp [5].

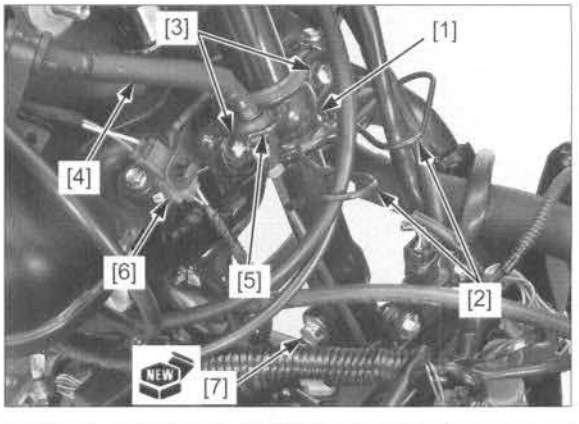
Install the 2P (Red) connector [6] onto the shaft holder.

Be sure the steering shaft is fully seated onto the EPS unit. Install and tighten a new pinch bolt [7] to the specified torque.

TORQUE: 60 N·m (6.1 kgf·m, 44 lbf·ft)

Tighten the holder bolts alternately in several steps.

TORQUE: 32 N·m (3.3 kgf·m, 24 lbf·ft)



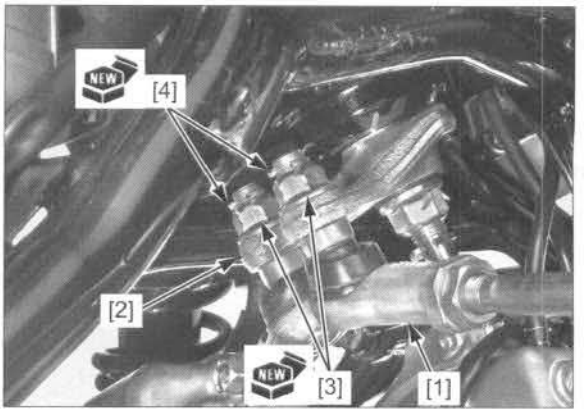
Tighten the EPS unit mounting nut [1] to the specified torque.

TORQUE: 22 N·m (2.2 kgf·m, 16 lbf·ft)

Install the tie-rods [1] into the steering arm [2].
Install new joint nuts [3] and tighten them to the specified torque by holding the joint stud flat surfaces.

TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)

Install new cotter pins [4] into the ball joint studs.



Install the handlebar assembly [1] onto steering shaft with the washers and new lower holder nuts [2].

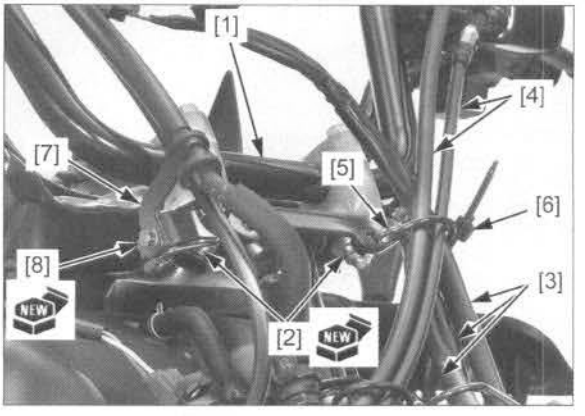
Tighten the nuts.

Install the wires [3] and cables [4] into the guide [5].

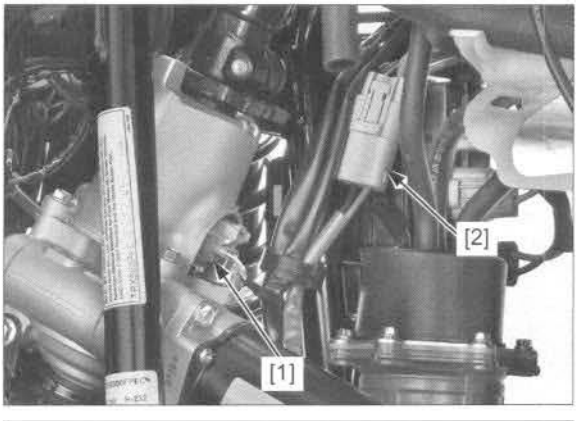
Secure the wires to the guide with the wire band [6].

Install the hose clamp [7] with a new clamp bolt [8] and tighten it to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)



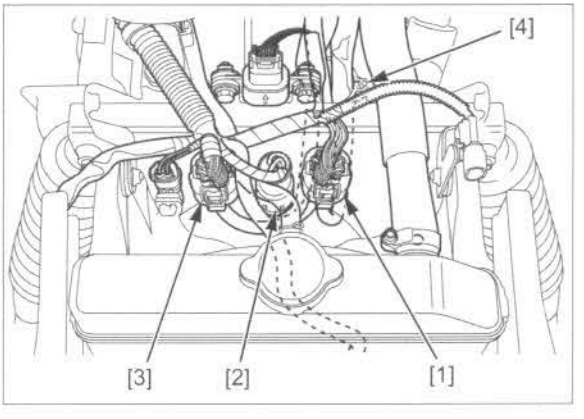
Connect the torque sensor 3P (Gray) connector [1] and the EPS motor 2P (Gray) connector [2].



Connect the following connectors and install them onto the frame.

- front sub-wire harness 14P (Gray) [1]
- ignition switch 4P (White) [2]
- FPM: handlebar switch 10P (Green) [3]
  FPE: handlebar switch 14P (Green) [3]

Secure the wires with the wire clip [4].



Install the spring [1] onto the selector cable [2].

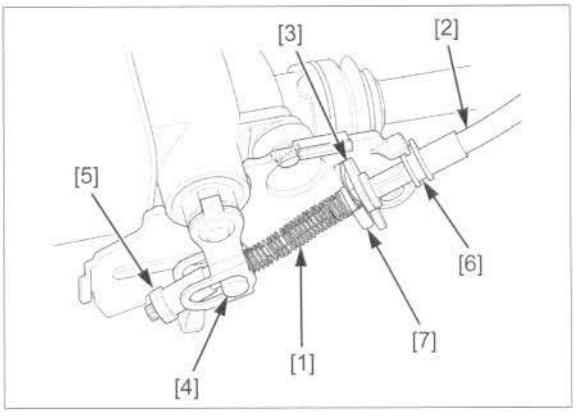
Insert the cable into the cable holder [3] and connect it to the clutch arm with the joint pin [4] and adjusting nut [5].

Set the groove in the cable grommet [6] onto the cover base end properly.

Install the retaining plate [7] onto the cable with the concave facing the cable holder to secure the cable.

Adjust the 2WD/4WD selector cable (page 3-19).

Install the following:
- meter cover stay (page 16-9)
- front wheels (page 16-13)
- front fender/carrier (page 2-8)
- mudguard (page 2-6)



Refer to "Service Information" for service location of the initialization (page 16-4).

Perform the torque sensor initialization (page 24-13).

TIE-ROD

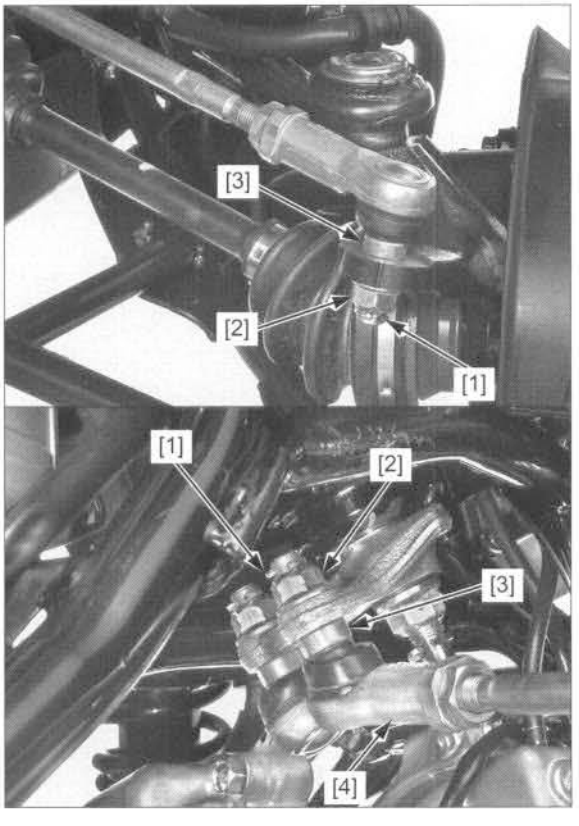
REMOVAL

Remove the following:

- mudguards (page 2-6)
- front wheel (page 16-13)

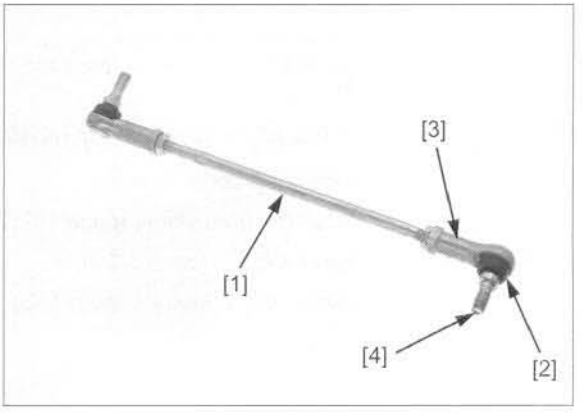
Remove the cotter pins [1].

Remove the joint nuts [2] by holding the joint stud flat surfaces [3] with an open end wrench.
Remove the tie-rod [4] from the steering arm and knuckle.



INSPECTION

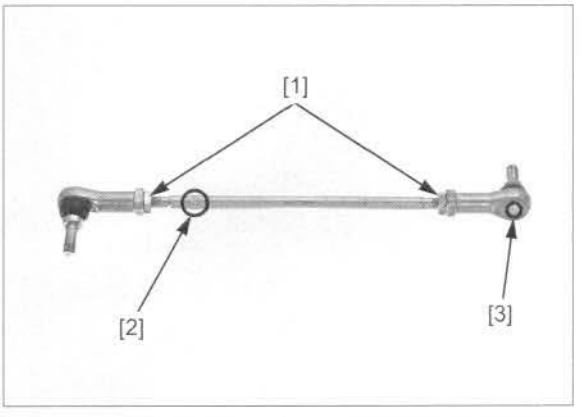
Inspect the tie-rod [1] for distortion or damage.
Inspect the ball joint boots [2] for tears or other damage and the ball joints [3] for looseness by moving the ball joint studs [4].
They should move freely and smoothly without binding.



DISASSEMBLY/ASSEMBLY

Loosen the lock nuts [1], and remove the ball joints and lock nuts from the tie-rod.

Install the right-hand threads nut and unmarked ball joint on the flat (wrench holding area for toe adjustment) side [2] of the tie-rod, and the left-hand threads nut and "L" marked [3] ball joint on the opposite side.



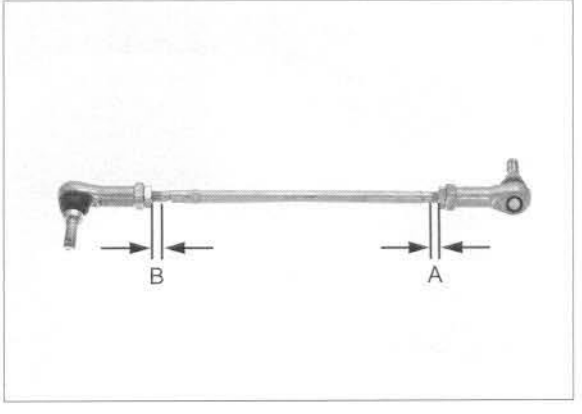
Note the reference distances (between the lock nut and thread end).

REFERENCE DISTANCES:
A: 8.0 mm (0.31 in)
B: 8.0 mm (0.31 in)

A difference between distances A and B should be 3 mm (0.12 in) max.

Tighten these nuts after installing the tie-rod and adjusting the toe.

Temporarily tighten the lock nuts while the ball joint positions are approximately 180° from each other.



Install the tie-rod [1] with the flats [2] of the rod toward the knuckle [3].

Install new joint nuts [4] and tighten them to the specified torque by holding the joint stud flat surfaces [5].

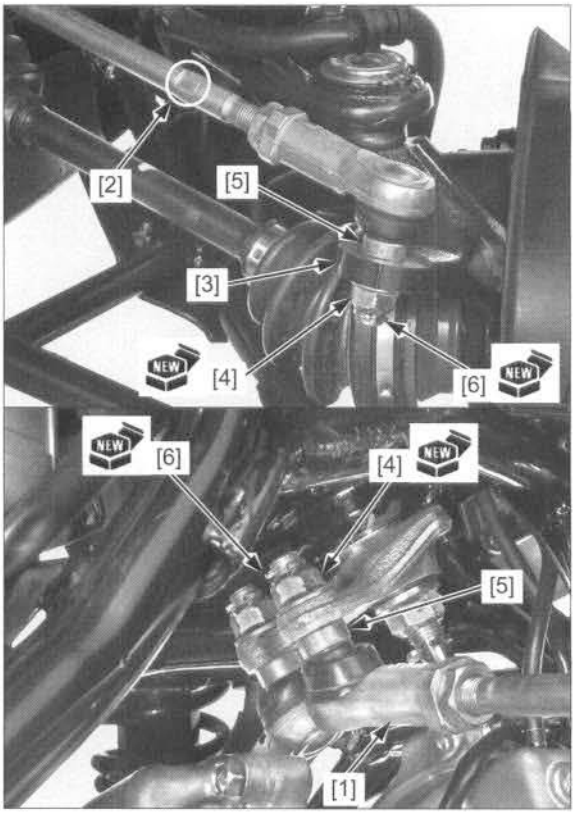
TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)

Install new cotter pins [6].

Install the front wheel (page 16-13).

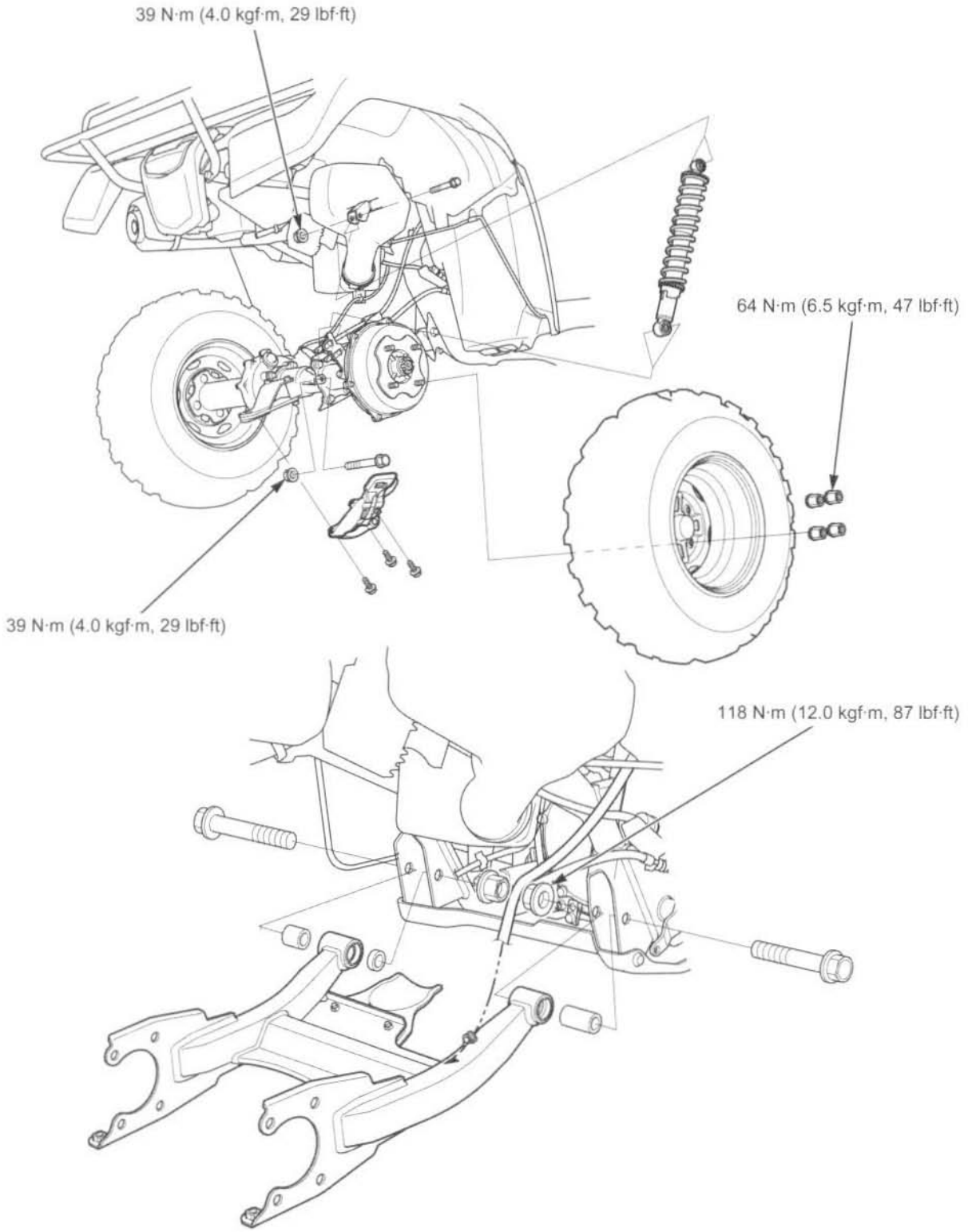
Adjust the toe (page 3-26).

Install the mudguards (page 2-6).



17. REAR WHEEL/SUSPENSION

SYSTEM COMPONENTS



SERVICE INFORMATION

GENERAL

- This section covers service of the rear wheel, rear shock absorber and swingarm.
- A jack or other support is required to support the vehicle.
- Use Honda Genuine replacement bolts and nuts for all suspension pivots and mounting points.
- For tire information, see Front Wheel/Suspension/Steering section (page 16-13).
- For brake system service, see Brake System section (page 18-2).
- For driving mechanism service, see Rear Driving Mechanism section (page 20-2).

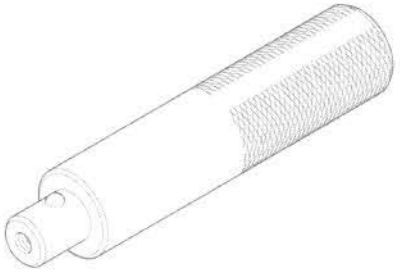
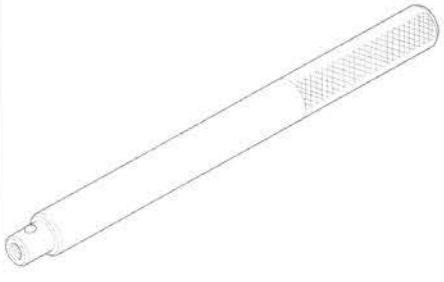
SPECIFICATIONS

ITEM		STANDARD	SERVICE LIMIT
Minimum tire tread depth		–	4.0 mm (0.16 in)
Cold tire pressure	Standard	30 kPa (0.30 kgf/cm^2, 4.4 psi)	–
	With cargo	30 kPa (0.30 kgf/cm^2, 4.4 psi)	–

TORQUE VALUES

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Rear wheel nut	8	10	64 (6.5, 47)	
Shock absorber upper mounting nut	1	10	39 (4.0, 29)	Lock nut: replace with a new one.
Shock absorber lower mounting nut	1	10	39 (4.0, 29)	Lock nut: replace with a new one.
Universal joint guard bolt	2	6	10 (1.0, 7)	ALOC bolt: replace with a new one.
Swingarm pivot bolt	2	12	118 (12.0, 87)	ALOC bolt: replace with a new one.

TOOLS

Attachment, 24 x 26 mm 07746-0010700 	Pilot, 12 mm 07746-0040200 	Pilot, 20 mm 07746-0040500 
Pilot, 25 mm 07746-0040600 	Driver 07749-0010000 	Attachment, 28 x 30 mm 07946-1870100 
Driver 07949-3710001 		

TROUBLESHOOTING

Rear wheel wobbling
- Bent rim
- Worn or damaged rear axle bearings
- Faulty tire
- Loose wheel hub nut
- Faulty swingarm pivot bearings

Rear wheel hard to turn
- Faulty rear axle bearings
- Bent rear axle
- Rear brake drag

Soft suspension
- Weak shock absorber spring
- Oil leakage from damper unit

Stiff suspension
- Damaged shock absorber damper
- Faulty shock absorber pivot bushings
- Damaged swingarm pivot bearing

Rear suspension noise
- Faulty rear shock absorber
- Loose rear suspension fasteners
- Worn rear suspension pivot bearings or bushings

Steering is heavy
- Steering shaft nut or holder too tight
- Damaged steering shaft bushing
- Damaged steering shaft bearing

Any wheel is wobbling
- Excessive knuckle or hub 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
- Improper wheel alignment
- Bent frame

REAR WHEEL

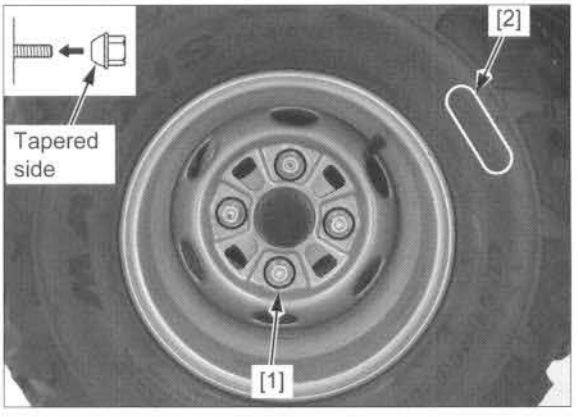
REMOVAL

Loosen the wheel nuts [1].

Support the vehicle using a hoist or equivalent and raise the rear wheels off the ground.

Remove the wheel nuts and rear wheel.

For tire removal/installation and repair, see Front Wheel/Suspension/Steering section (page 16-13).



INSTALLATION

Do not interchange the left and right wheels

Install the rear wheel with the tire valve facing out and the arrow mark [2] facing in the normal rotating direction.

Install the wheel nuts with the tapered side facing inward and tighten them to the specified torque.

TORQUE: 64 N·m (6.5 kgf·m, 47 lbf·ft)

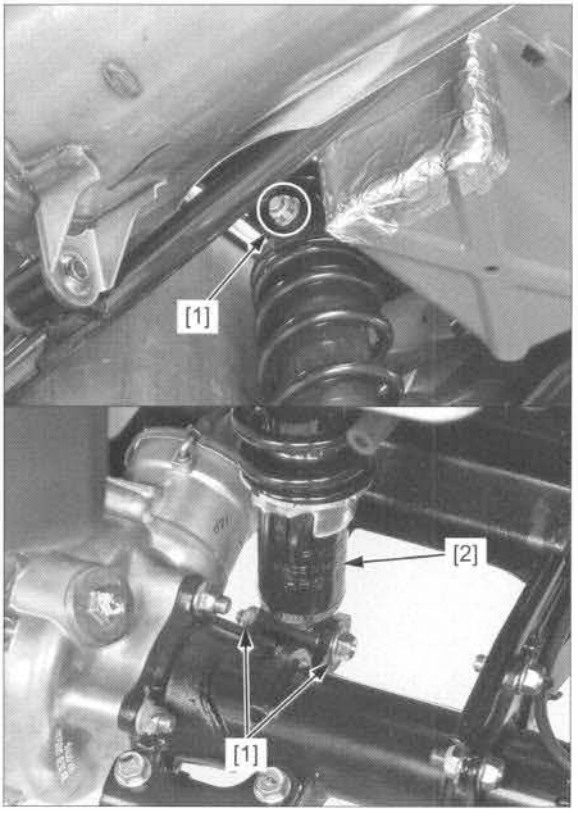
REAR SHOCK ABSORBER

REMOVAL

Remove the skid plate (page 3-18).

Support the vehicle using a hoist or equivalent and raise the rear wheels off the ground.

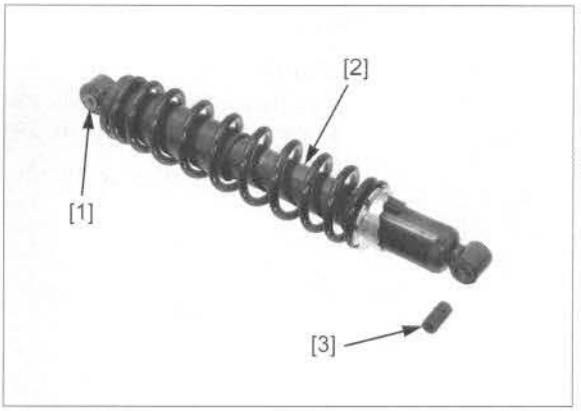
Support the swingarm. Remove the nuts and bolts [1], and the shock absorber [2].



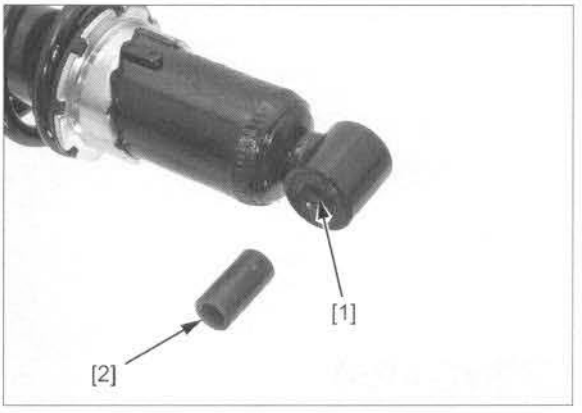
INSPECTION

Check the upper pivot bushing [1] for wear or damage.
Check the damper unit [2] for leakage or other damage.
Replace the shock absorber assembly if necessary.

Remove the lower pivot collar [3].



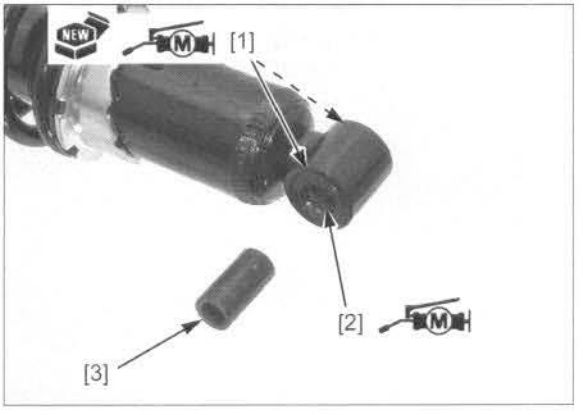
Check the lower pivot bushing [1] and collar [2] for wear or damage.



INSTALLATION

Install new dust seals [1] into the lower pivot with the flat side facing out until they are fully seated.
Apply molybdenum disulfide grease to the lower pivot bushing [2] and dust seal lips.

Install the pivot collar [3].

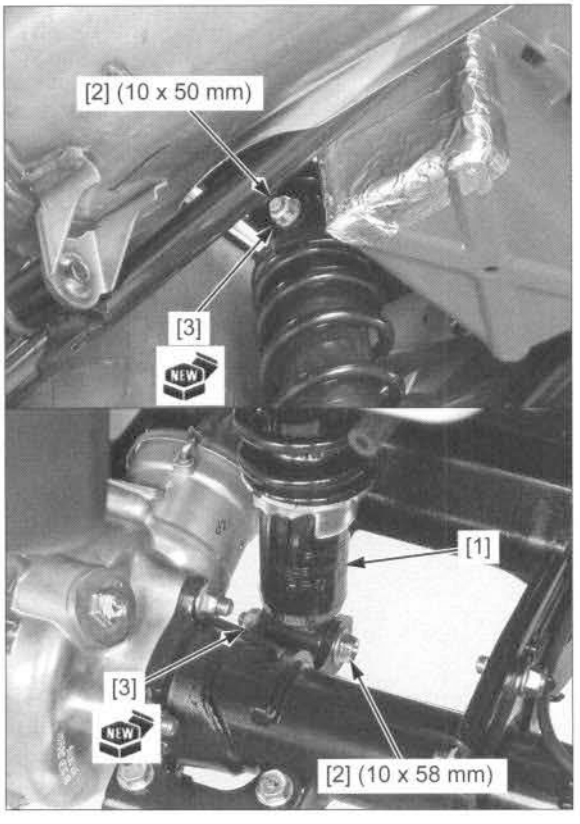


Insert the bolts from the right side.

Install the shock absorber [1] with the mounting bolts [2] and new nuts [3], and tighten them to the specified torque.

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

Install the skid plate (page 3-18).

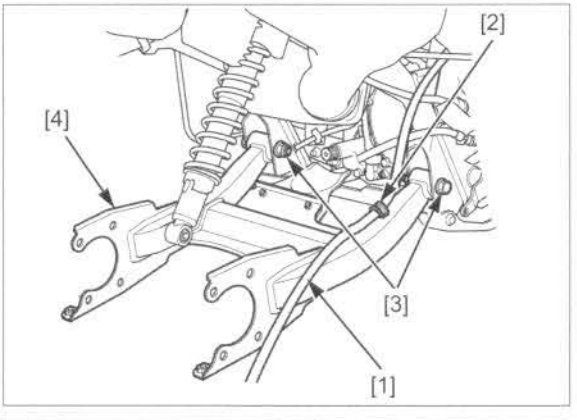


SWINGARM

REMOVAL

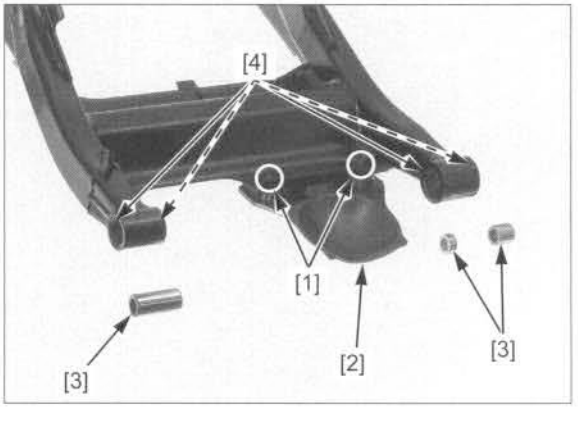
Remove the mudguards (page 2-6)
Remove the final gear assembly (page 20-9).

Remove the following:
- breather hose [1] (from the clamp [2])
- pivot nuts and bolts [3]
- swingarm [4]



- two bolts [1] and universal joint guard [2]
- pivot collars [3]
- dust seals [4]

Check the bearings in the pivots for wear or damage.



BEARING REPLACEMENT

REMOVAL

Press the needle bearing out of the right pivot using the special tool.

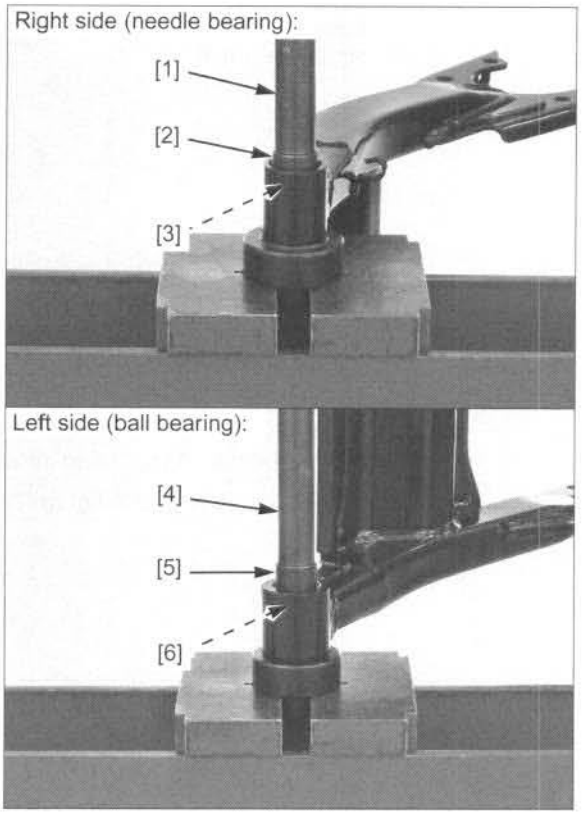
TOOLS:

[1] Driver	**07949-3710001**
[2] Attachment, 24 x 26 mm	**07746-0010700**
[3] Pilot, 20 mm	**07746-0040500**

Press the ball bearing and setting collar out of the left pivot.

TOOLS:

[4] Driver	**07949-3710001**
[5] Attachment, 24 x 26 mm	**07746-0010700**
[6] Pilot, 12 mm	**07746-0040200**



INSTALLATION

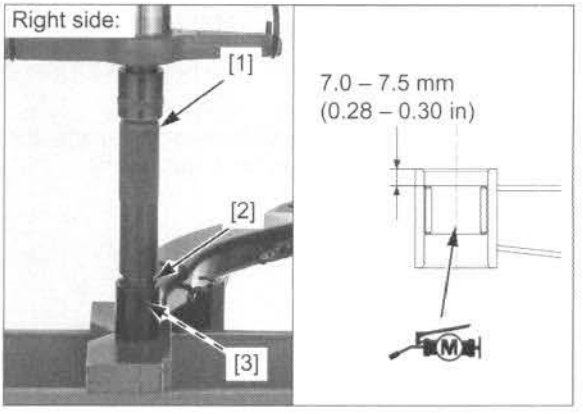
Apply molybdenum disulfide grease to the rollers of a new needle bearing.

Press in the bearing with the marked side facing up.

Press the needle bearing into the right pivot until the depth from the outer surface is 7.0 – 7.5 mm (0.28 – 0.30 in).

TOOLS:

[1] Driver	**07749-0010000**
[2] Attachment, 24 x 26 mm	**07746-0010700**
[3] Pilot, 20 mm	**07746-0040500**



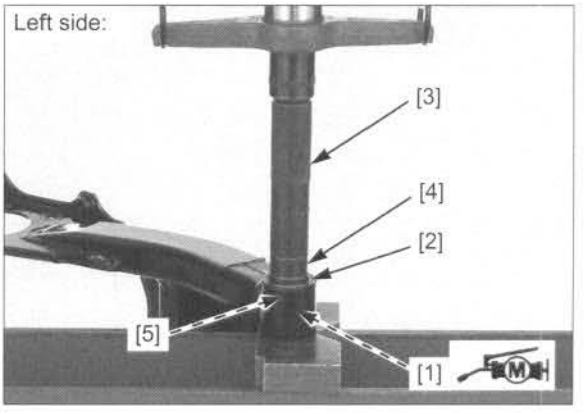
Pack molybdenum disulfide grease into the cavity of a new ball bearing [1].

Press in the bearing with the marked side facing up.

Press the ball bearing and the collar [2] into the left pivot until they are fully seated.

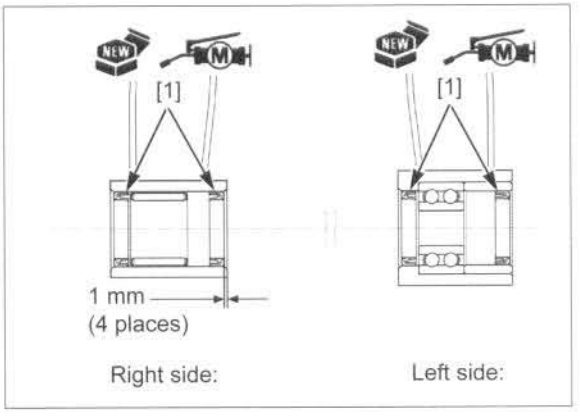
TOOLS:

Bearing:	
[3] Driver	**07749-0010000**
[4] Attachment, 28 x 30 mm	**07946-1870100**
Pilot, 12 mm	**07746-0040200**
Collar:	
Driver	**07749-0010000**
Attachment, 28 x 30 mm	**07946-1870100**
[5] Pilot, 25 mm	**07746-0040600**



INSTALLATION

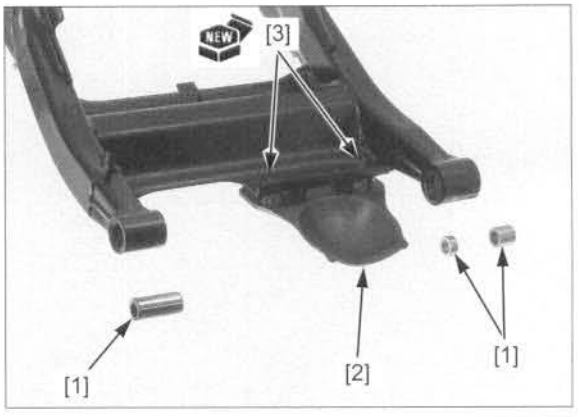
Pack molybdenum disulfide grease into the seal lip cavity of each new dust seal [1].
Install the dust seals until the depth from the outer surface is 1 mm.



Install the pivot collars [1] in position as shown.

Install the universal joint guard [2] with new bolts [3] and tighten them to the specified torque.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)



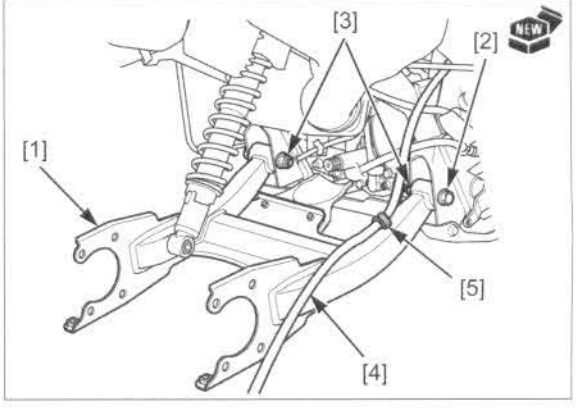
Insert the bolts from the outside.

Install the swingarm [1] with new pivot bolts [2] and nuts [3], and tighten them to the specified torque.

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

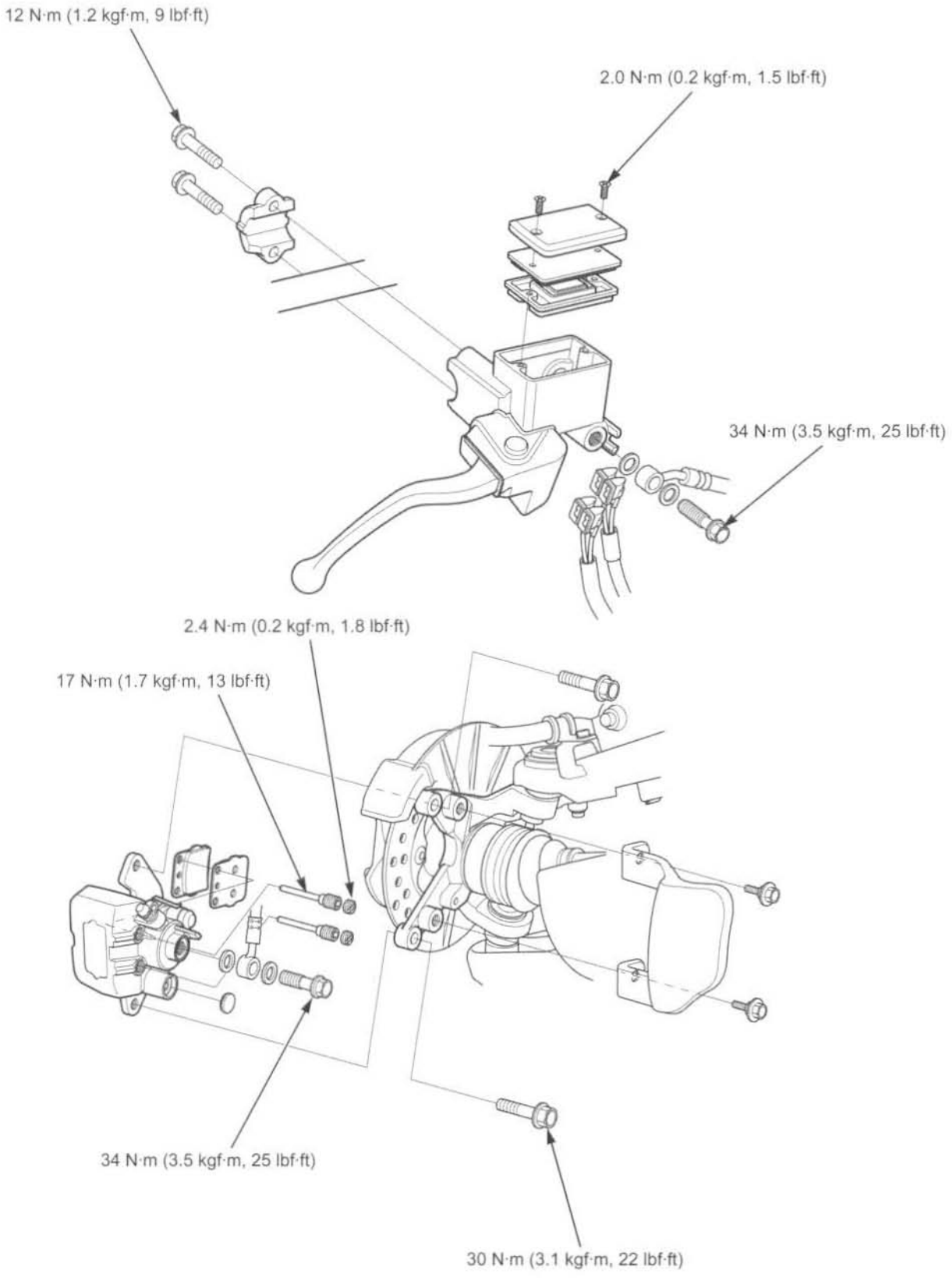
Install the breather hose [4] into the clamp [5].

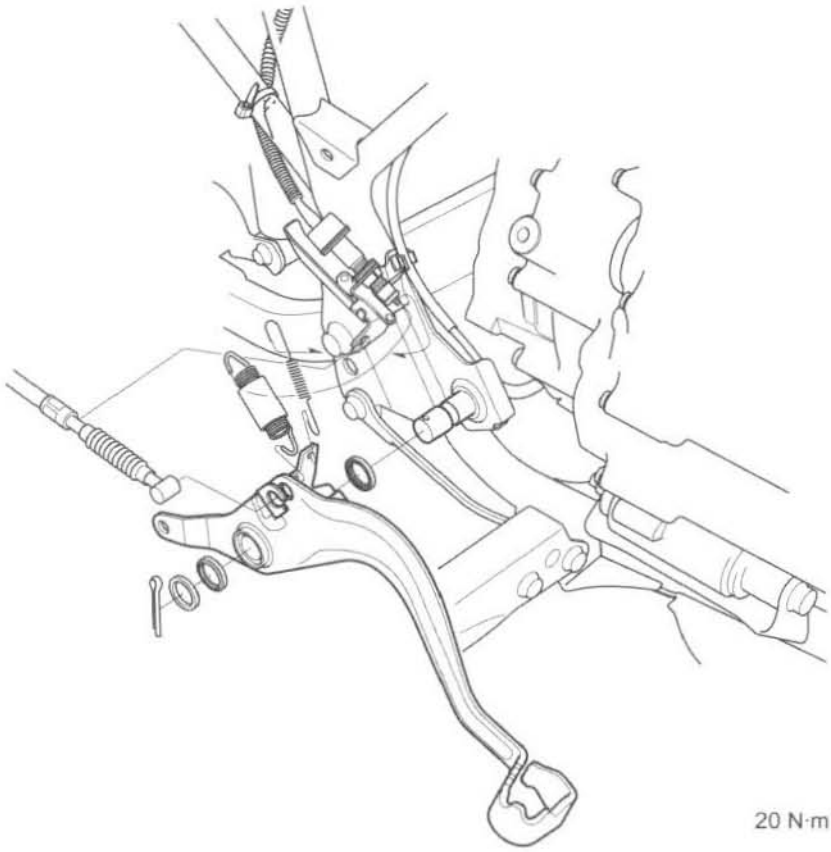
Install the following:
- final gear assembly (page 20-22)
- mudguards (page 2-6)

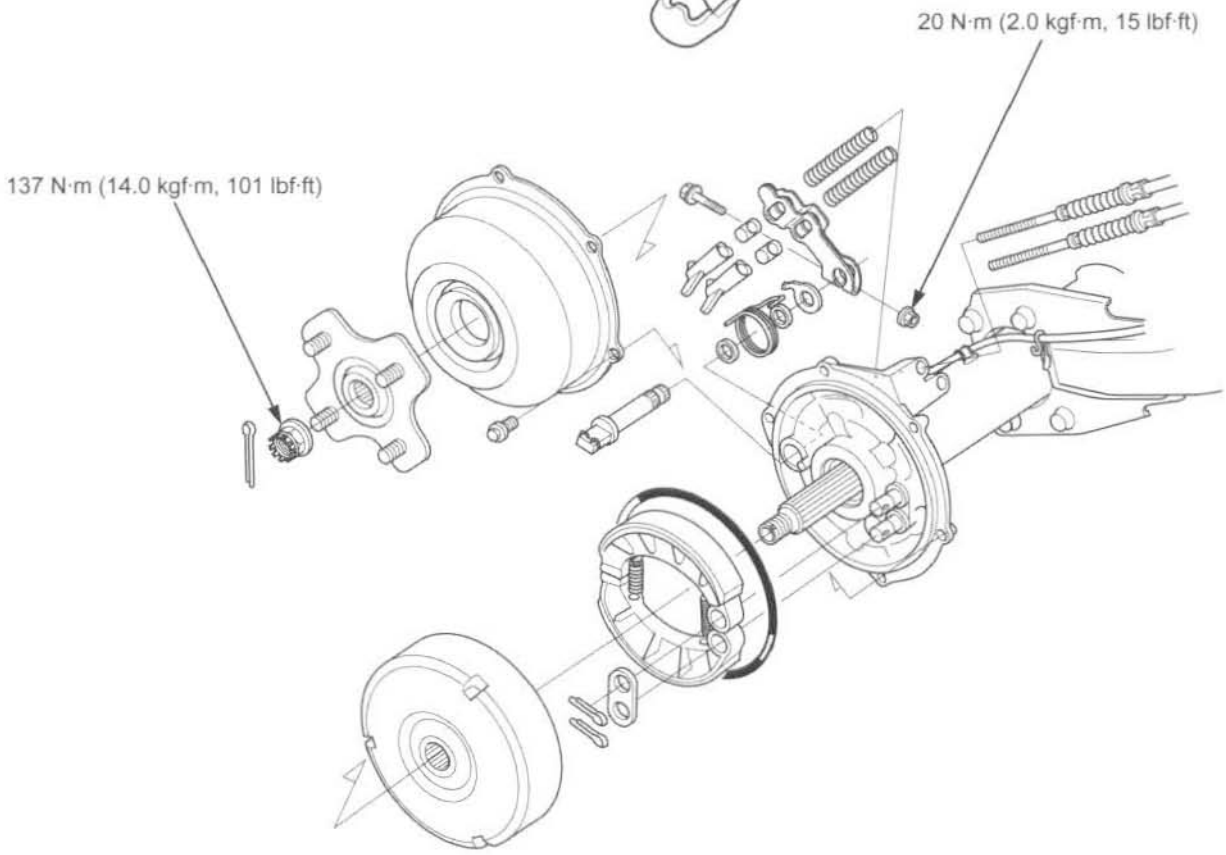


18. BRAKE SYSTEM

SYSTEM COMPONENTS






20 N·m (2.0 kgf·m, 15 lbf·ft)
137 N·m (14.0 kgf·m, 101 lbf·ft)

SERVICE INFORMATION

GENERAL

⚠CAUTION

Frequent inhalation of brake pad or lining dust, regardless of material composition could be hazardous to your health.
- Avoid breathing dust particles.
- Never use an air hose or brush to clean brake assemblies. Use an OSHA-approved vacuum cleaner.

NOTICE

Spilled brake fluid will severely damage the plastic parts and painted surfaces. It is also harmful to some rubber parts. Be careful whenever you remove the reservoir cap; make sure the front reservoir is horizontal first.

- A contaminated brake disc, pad, drum or shoe reduces stopping power. Discard contaminated pads or shoes, and clean a contaminated disc or drum with a high quality brake degreasing agent.
- Never allow contaminants (dirt, water, etc.) to get into an open reservoir.
- Once the hydraulic system has been opened, or if the brake feels spongy, the system must be bled.
- Always use fresh DOT 4 brake fluid from a sealed container when servicing the system. Do not mix different types of fluid as they may not be compatible.
- Always check brake operation before riding the vehicle.

SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Front brake	Recommended brake fluid	Honda DOT 4 brake fluid	–
	Disc thickness	3.8 – 4.2 (0.15 – 0.17)	3.0 (0.12)
	Disc runout	–	0.30 (0.012)
	Master cylinder I.D.	14.000 – 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.	32.030 – 32.080 (1.2610 – 1.2630)	32.090 (1.2634)
	Caliper piston O.D.	31.984 – 31.998 (1.2578 – 1.2598)	31.94 (1.257)
Rear brake	Drum I.D.	180.0 – 180.2 (7.086 – 7.094)	181.0 (7.13)
	Shoe lining thickness	5.3 (0.21)	To index mark
Rear (parking) brake lever freeplay		15 – 20 mm (0.6 – 0.8 in)	–
Rear brake pedal freeplay		15 – 20 mm (0.6 – 0.8 in)	–

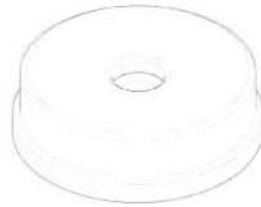
TORQUE VALUES

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Brake hose oil bolt	3	10	34 (3.5, 25)	
Front brake caliper bleed valve	2	8	5.4 (0.6, 4.0)	
Front master cylinder reservoir cap screw	2	4	2.0 (0.2, 1.5)	
Pad pin	4	10	17 (1.7, 13)	
Pad pin plug	4	10	2.4 (0.2, 1.8)	
Front brake lever pivot bolt	1	6	1.0 (0.1, 0.7)	
Front brake lever pivot nut	1	6	5.9 (0.6, 4.4)	
Front brake light/inhibitor switch screw	1	4	1.2 (0.1, 0.9)	Apply locking agent to the threads.
Front master cylinder holder bolt	2	6	12 (1.2, 9)	
Front brake caliper mounting bolt	4	8	30 (3.1, 22)	ALOC bolt: replace with a new one.
Front brake caliper slide pin	2	8	22 (2.2, 16)	Apply locking agent to the threads.
Front brake caliper bracket pin	2	8	17 (1.7, 13)	
Rear brake arm pinch bolt/nut	1	8	20 (2.0, 15)	
Rear wheel hub nut	2	20	137 (14.0, 101)	Castle nut: tighten to the specified torque and further tighten until its grooves align with the cotter pin hole.
Rear brake panel drain bolt	1	8	12 (1.2, 9)	
Brake pipe joint bolt	2	10	14 (1.4, 10)	

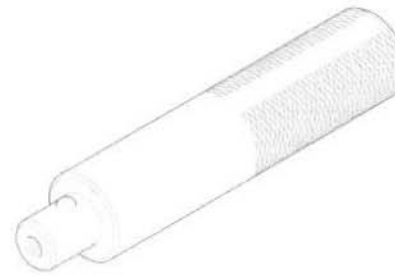
TOOLS

Oil seal driver
070MF-MEG0300

Attachment 72 x 75 mm
07746-0010600



Driver
07749-0010000



TROUBLESHOOTING

FRONT DISC BRAKE

Brake lever soft or spongy
- Air in hydraulic system
- Leaking hydraulic system
- Contaminated brake pad/disc
- Worn caliper piston seal
- Worn master cylinder piston cups
- Worn brake pad/disc
- Contaminated caliper
- Contaminated master cylinder
- Caliper not sliding properly
- Low brake fluid level
- Clogged fluid passage
- Warped/deformed brake disc
- Sticking/worn caliper piston
- Sticking/worn master cylinder piston
- Bent brake lever

Brake lever hard
- Clogged/restricted brake system
- Sticking/worn caliper piston
- Sticking/worn master cylinder piston
- Caliper not sliding properly
- Bent brake lever

Brake drags
- Contaminated brake pad/disc
- Badly worn brake pad/disc
- Warped/deformed brake disc
- Caliper not sliding properly
- Clogged/restricted fluid passage
- Sticking caliper piston

REAR DRUM BRAKE

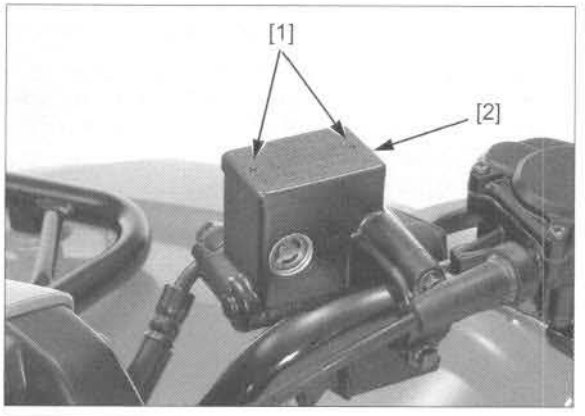
Poor brake performance
- Brake not adjusted properly
- Worn or contaminated brake shoes
- Worn or contaminated brake drum
- Water in brake drum
- Incorrectly installed rear brake arm
- Worn rear brake cam

BRAKE FLUID REPLACEMENT/AIR BLEEDING

BRAKE FLUID DRAINING

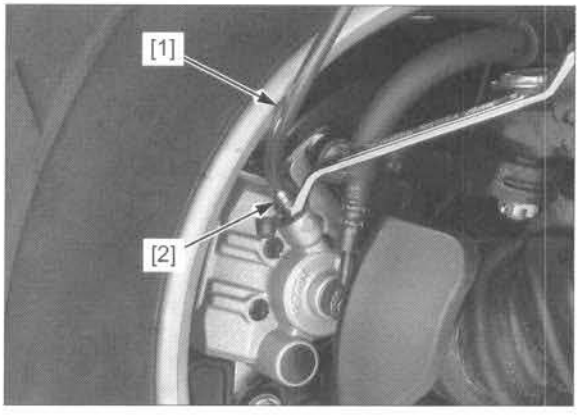
Turn the handlebar to the left until the reservoir is level before removing the reservoir cap.

Remove the screws [1], reservoir cap [2], set plate and diaphragm.



Connect a bleed hose [1] to the front brake caliper bleed valve [2].
Loosen the bleed valve and pump the front brake lever until no more fluid flows out of the bleed valve.

Perform above procedure for the other side bleed valve.



BRAKE FLUID FILLING/BLEEDING

Close each brake caliper bleed valve.

Fill the master cylinder reservoir with DOT 4 brake fluid from a sealed container.

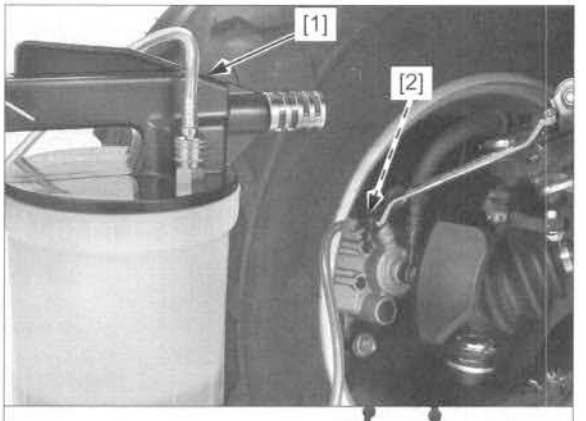
Follow the manufacturer's operating instructions.

Connect a commercially available brake bleeder [1] to the bleed valve.

Operate the brake bleeder and loosen the bleed valve [2].

Check the fluid level often while bleeding the brake to prevent air from being pumped into the system.

If an automatic refill system is not used, add fluid when the fluid level in the reservoir is low.



If air enters the bleeder from around the bleed valve threads, seal the threads with teflon tape.

Perform the bleeding procedure until the system is completely flushed/bled.

Tighten the bleed valve to the specified torque.

TORQUE: 5.4 N·m (0.6 kgf·m, 4.0 lbf·ft)

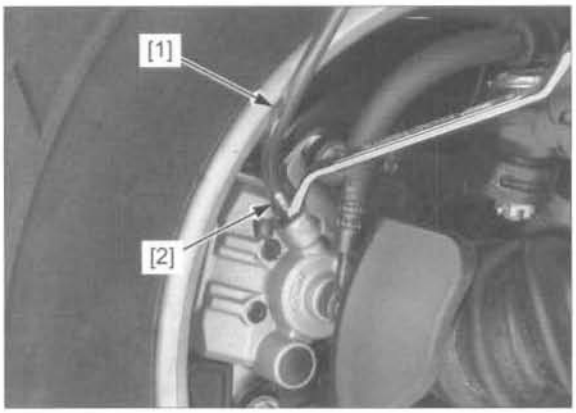
Perform air bleeding for the other side bleed valve.

After bleeding air, operate the front brake lever. If it still feels spongy, bleed the system again.

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 [1] to the front brake caliper bleed valve [2] 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 1/4 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.

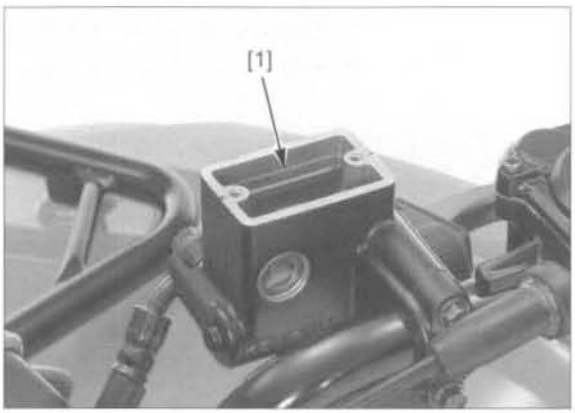
Tighten the bleed valve to the specified torque.

TORQUE: 5.4 N·m (0.6 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 master cylinder reservoir to the casting ledge [1] with DOT 4 brake fluid from a sealed container.



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

TORQUE: 2.0 N·m (0.2 kgf·m, 1.5 lbf·ft)

BRAKE PAD/DISC

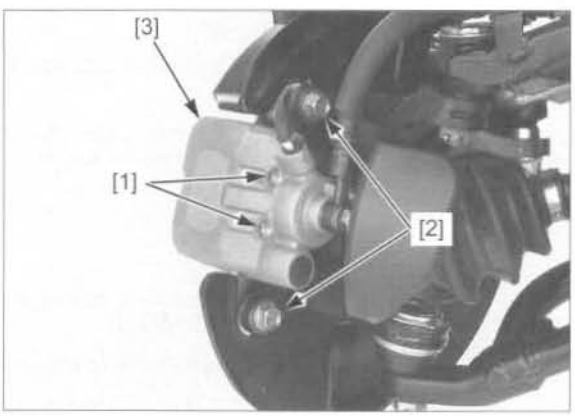
BRAKE PAD REPLACEMENT

Remove the front wheel (page 16-13).

Remove the pad pin plugs.

Loosen the pad pins [1].

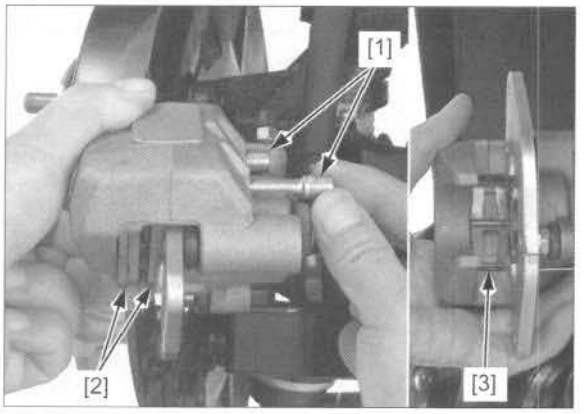
Remove the two mounting bolts [2] and brake caliper [3].



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 prying the brake pads to allow installation of new pads.

Pull the pad pins [1] out of the caliper while pushing the brake pads [2] in against the pad spring [3], and remove the pads.



Make sure the pad spring is installed correctly. Always replace the brake pads in pairs to ensure even disc pressure.

Install new brake pads into the caliper body.
Align the pad pin holes in the caliper body and pads by pushing the pads in against the pad spring, and install the pad pins.

Install the brake caliper [1] so the disc is positioned between the pads, being careful not to damage the pads.
Install new mounting bolts [2] and tighten them to the specified torque.

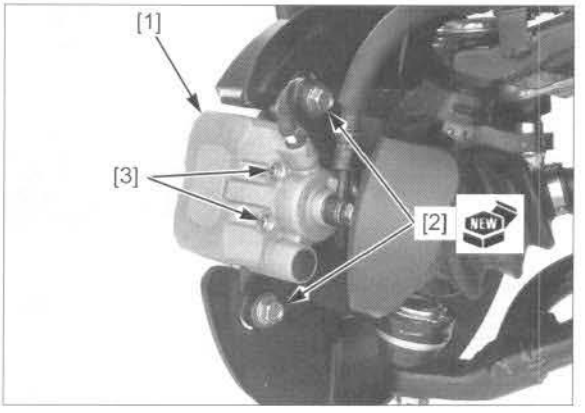
TORQUE: 30 N·m (3.1 kgf·m, 22 lbf·ft)

Tighten the pad pins [3] to the specified torque.

TORQUE: 17 N·m (1.7 kgf·m, 13 lbf·ft)

Install the pad pin plugs and tighten them to the specified torque.

TORQUE: 2.4 N·m (0.2 kgf·m, 1.8 lbf·ft)



Squeeze the front brake lever to seat the caliper piston against the pad.

Install the front wheel (page 16-13).

BRAKE DISC INSPECTION

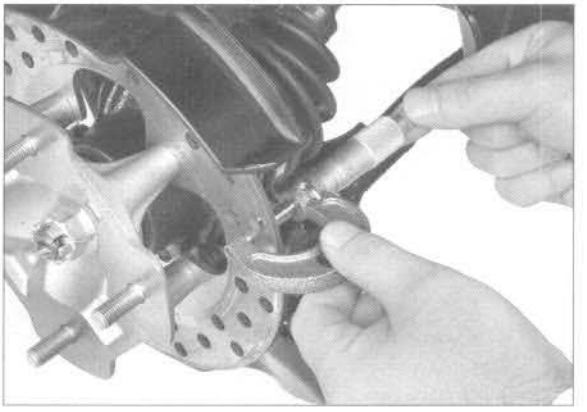
Remove the brake caliper without disconnecting the brake hose (page 18-12).

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.

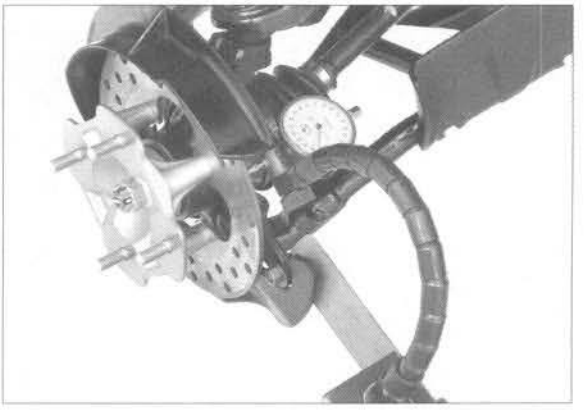


Check the brake disc for warpage.

SERVICE LIMIT: 0.30 mm (0.012 in)

Check the knuckle bearing for excessive play, if the warpage exceeds the service limit.
Replace the brake disc if the bearings are normal.

Brake disc replacement (page 16-19).



FRONT MASTER CYLINDER

REMOVAL

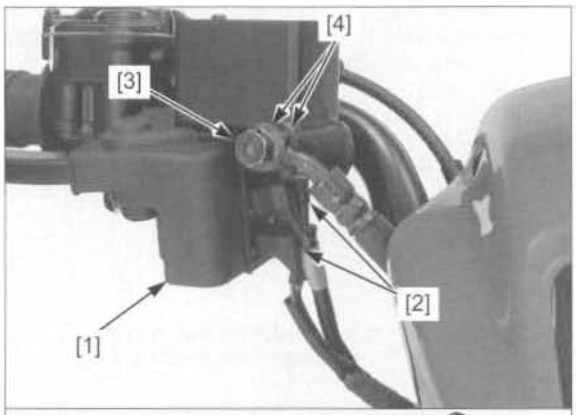
Drain the brake fluid (page 18-7).

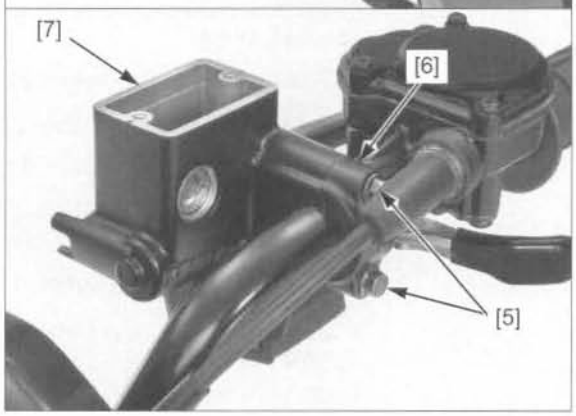
Remove the dust cover [1] and disconnect the connectors [2] from the switches.

When removing the oil bolt, cover the end of the hose to prevent contamination.

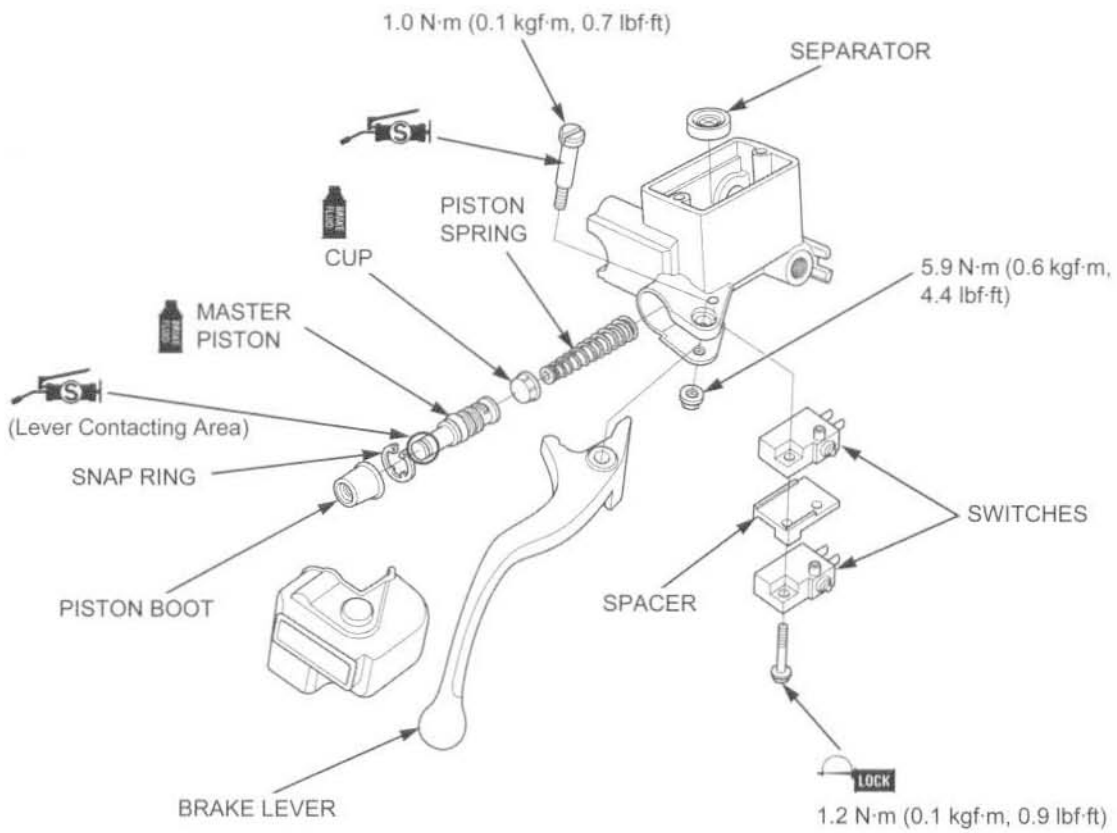
Disconnect the brake hose by removing the oil bolt [3] and sealing washers [4].

Remove the two bolts [5], holder [6] and master cylinder [7].





DISASSEMBLY/ASSEMBLY



INSPECTION

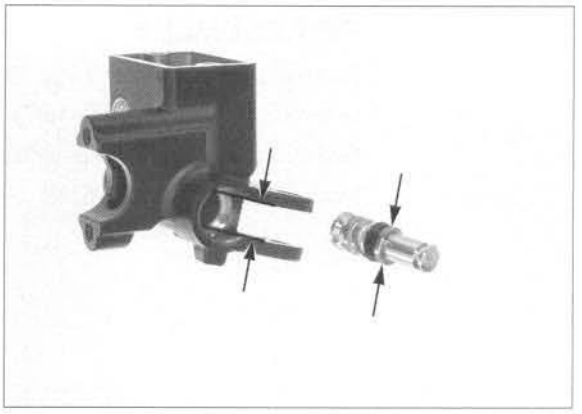
Check the piston cups and boot for wear, deterioration or damage.
Check the spring for damage.
Check the master cylinder and piston for scoring, scratches or damage.

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)



INSTALLATION

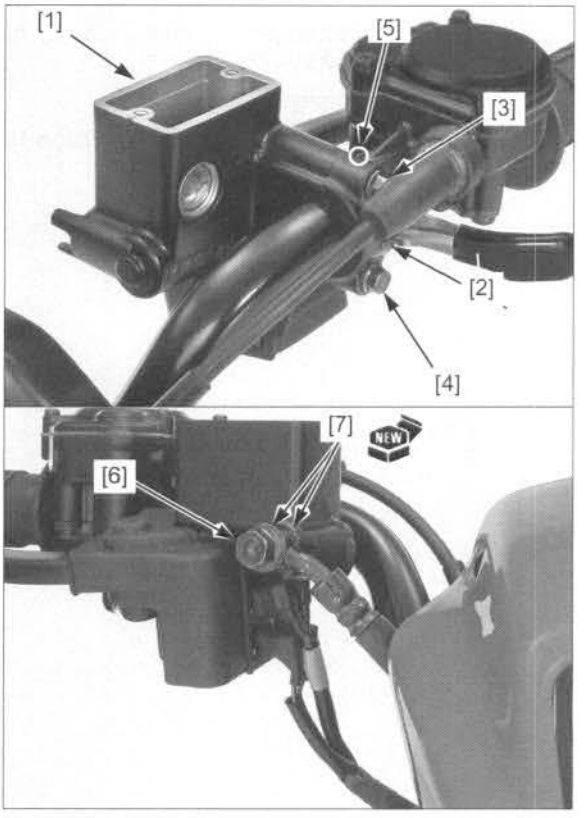
Align the edge of the master cylinder with the punch mark [5] on the handlebar.

Install the brake master cylinder [1] and holder [2] with the "UP" mark facing up. Tighten the upper bolt [3] first, then tighten the lower bolt [4] to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Set the brake hose joint between the stopper groove in the master cylinder.
Connect the brake hose with the oil bolt [6] and new sealing washers [7], and tighten the oil bolt to the specified torque.

TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)

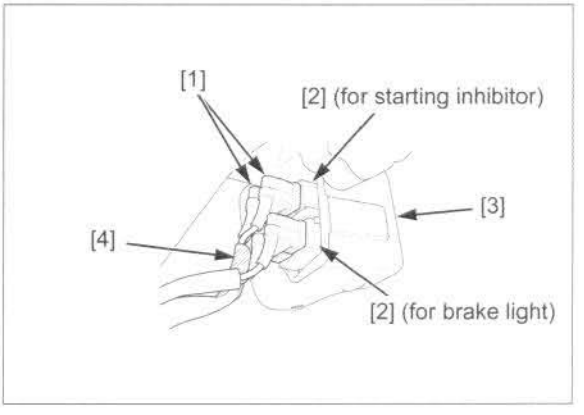


Connect the gray tape [4] wire connectors to the upper terminals.

Connect the connectors [1] to the switches [2].

Install the dust cover [3] properly.

Fill and bleed the hydraulic system (page 18-7).



FRONT BRAKE CALIPER

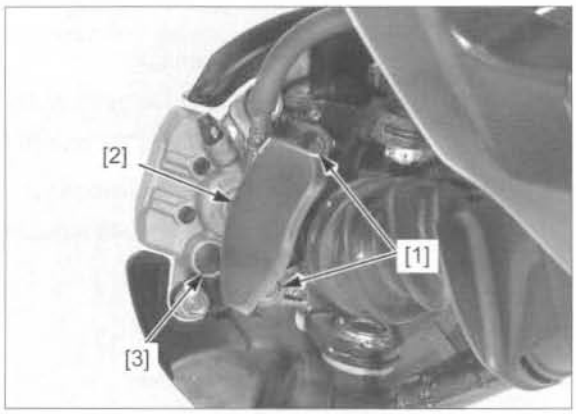
DISASSEMLBY

Remove the front wheel (page 16-13).

Drain the brake fluid (page 18-7).

Remove the two bolts [1] and outboard guard [2].

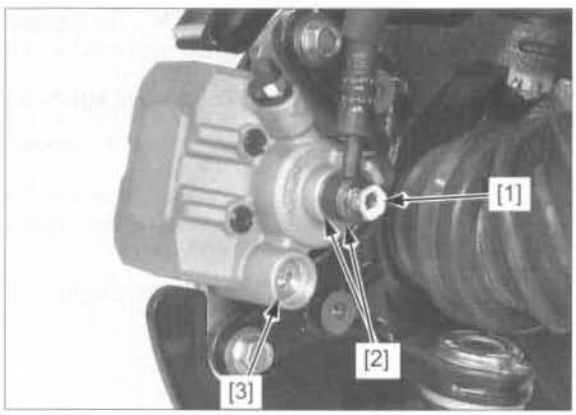
Remove the slide pin plug [3].



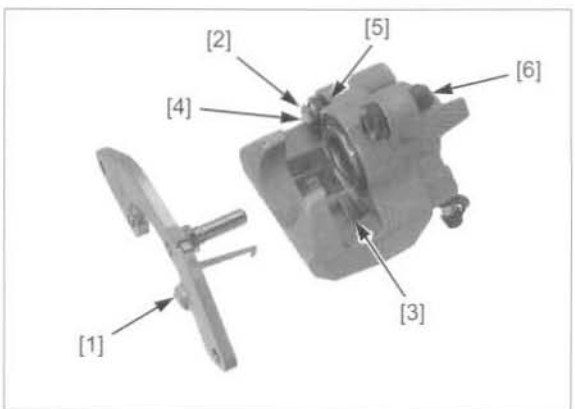
Disconnect the brake hose by removing the oil bolt [1] and sealing washers [2].

Loosen the slide pin [3].

Remove the brake pads (page 18-8).

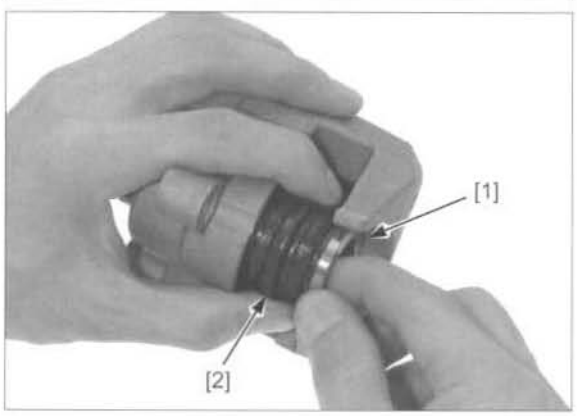


Remove the following:
- caliper bracket [1] (loosen the slide pin)
- spring washer [2]
- pad spring [3]
- slide pin [4] (by releasing the boot rib from the pin groove)
- slide pin boot [5]
- bracket pin boot [6]



Take care not to damage the piston with the caliper body.

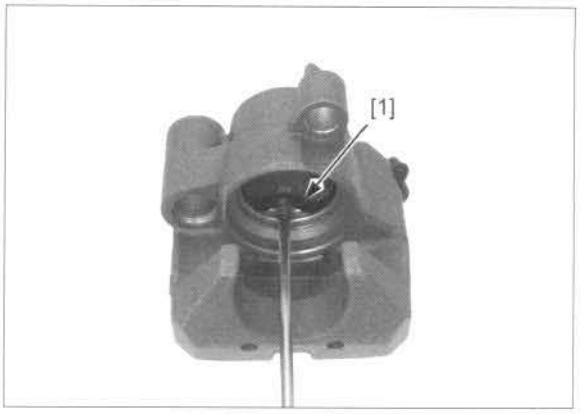
Remove caliper piston [1] out of the cylinder by pushing it through the fluid inlet.
Release the piston boot [2] from the piston groove to remove them.



Be careful not to damage the piston sliding surface.

Push the piston seal [1] in and lift it out.

Clean the seal and boot grooves, caliper cylinder, and piston with clean brake fluid.



INSPECTION

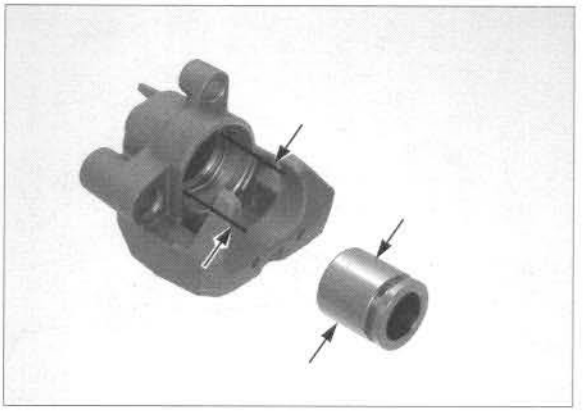
Check the caliper cylinder and piston for scoring, scratches or damage.

Measure the caliper cylinder I.D.

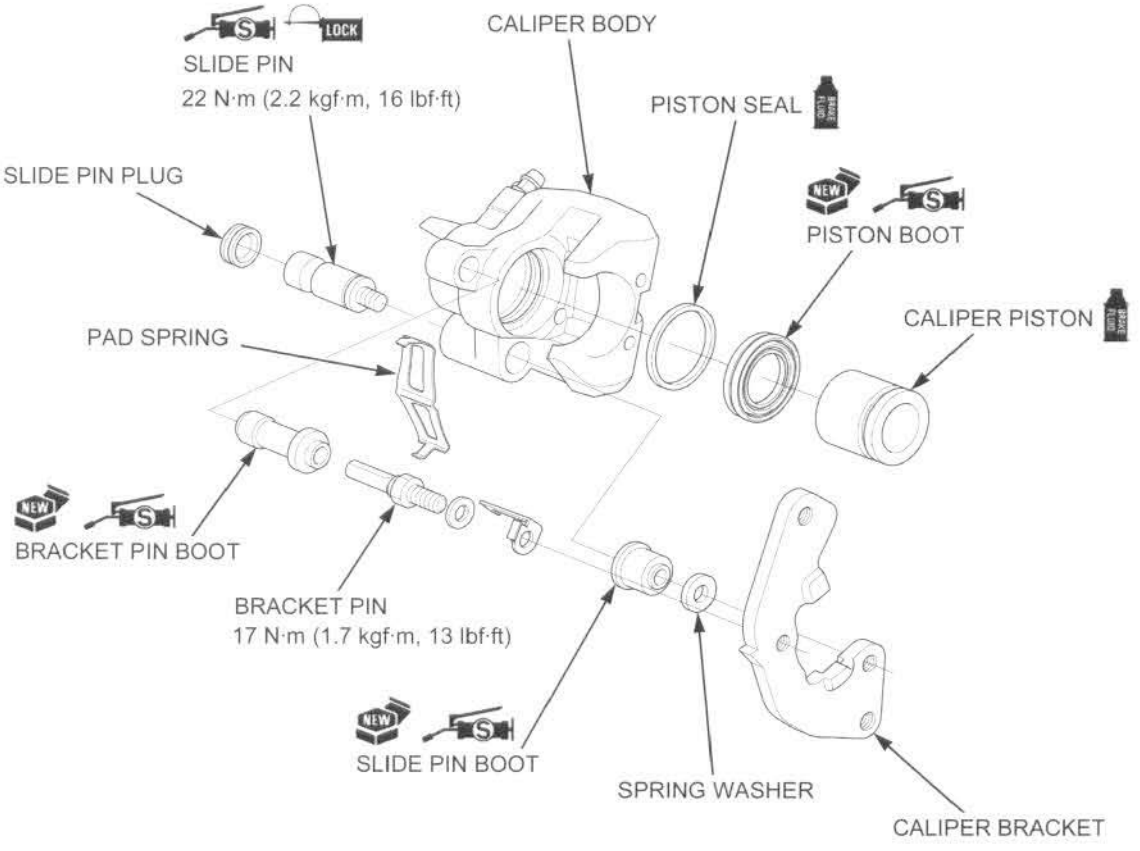
SERVICE LIMIT: 32.090 mm (1.2634 in)

Measure the caliper piston O.D.

SERVICE LIMIT: 31.94 mm (1.257 in)



ASSEMBLY

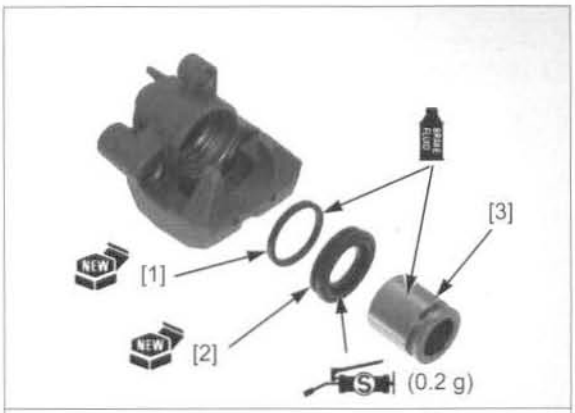


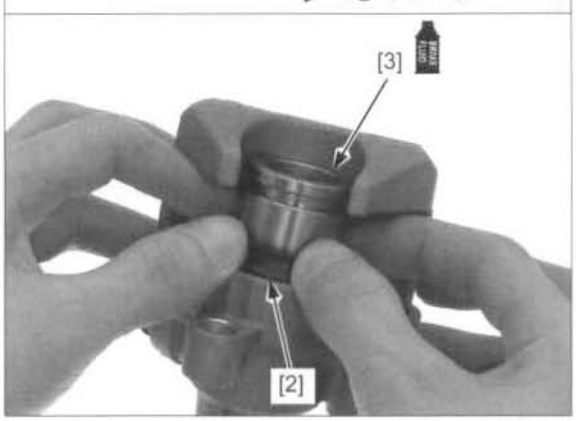
Coat a new piston seal [1] with clean brake fluid and install it into the seal groove in the caliper cylinder.

Apply 0.2 g of silicone grease to the inside and seal areas (boot ribs) of a new piston boot [2].

Install the inside boot rib of piston boot into the boot groove in the caliper cylinder properly.

Coat the caliper piston [3] with clean brake fluid and place it into the caliper body with the open side toward the brake pad. Cover the piston with the boot carefully, then push the piston and set the outside boot rib into the boot groove in the piston to seat the piston.

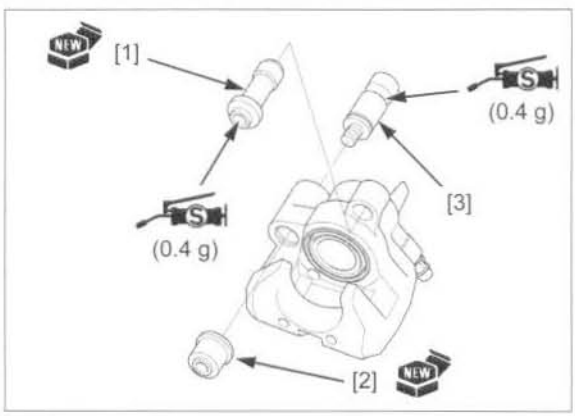




Install a new bracket pin boot [1] into the caliper body and pack the inside of the boot with 0.4 g of silicone grease.

Install a new slide pin boot [2] into the groove in the caliper body.

Apply 0.4 g of silicone grease to the grease groove and sliding area of the slide pin [3]. Install the slide pin and set the boot rib into the boot groove in the slide pin.



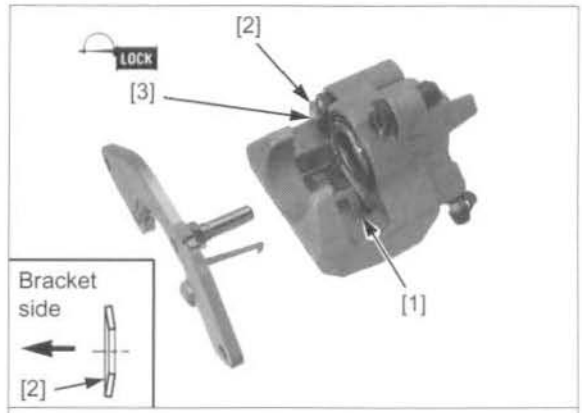
Install the pad spring [1] as shown.

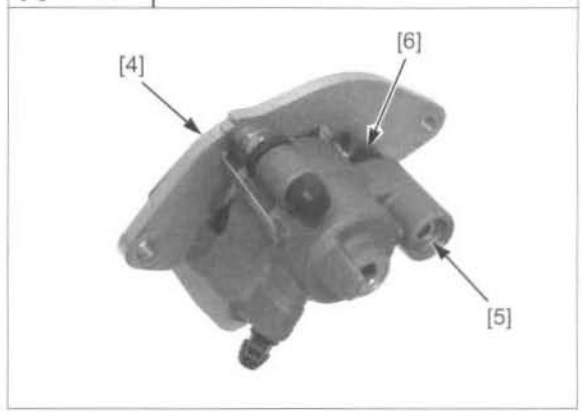
Install the spring washer [2] onto the slide pin with the concavity toward the bracket side.

Apply locking agent to the slide pin threads.
Install the caliper bracket [4] over the caliper body and thread the slide pin [5] into the bracket, being careful not damage the slide pin boot [6].

Make sure the boot ribs are seated into the boot grooves in the slide and bracket pins properly.

Install the brake pads (page 18-9).



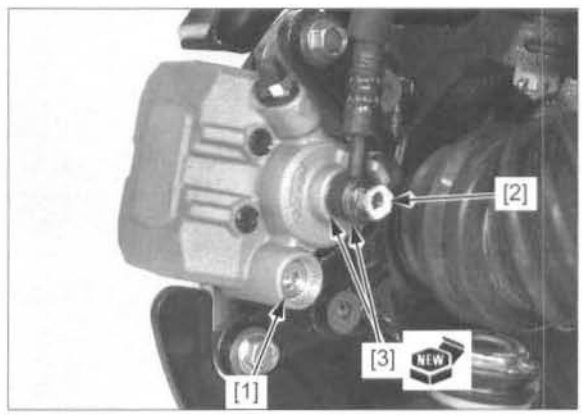


Tighten the slide pin [1] to the specified torque.

TORQUE: 22 N·m (2.2 kgf·m, 16 lbf·ft)

Rest the brake hose joint onto the stopper on the caliper body.
Connect the brake hose with the oil bolt [2] and new sealing washers [3], and tighten the oil bolt to the specified torque.

TORQUE: 34 N·m (3.5 kgf·m, 25 lbf·ft)

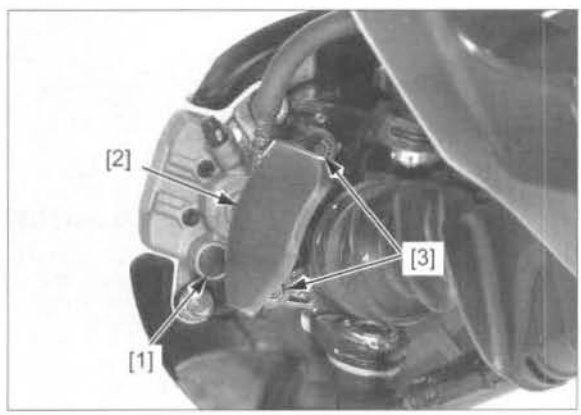


Install the slide pin plug [1].

Install the outboard guard [2] and tighten the bolts [3].

Fill and bleed the hydraulic system (page 18-7).

Install the front wheel (page 16-13).

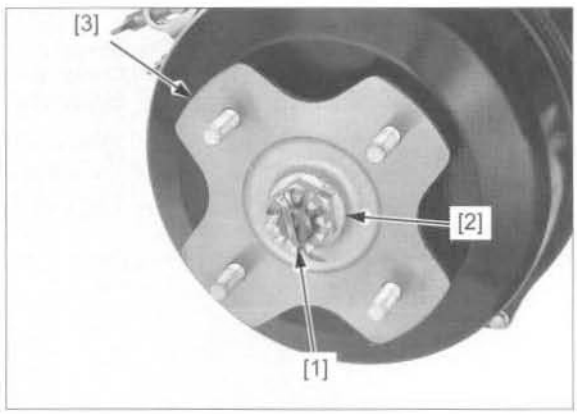


REAR BRAKE DRUM/SHOES

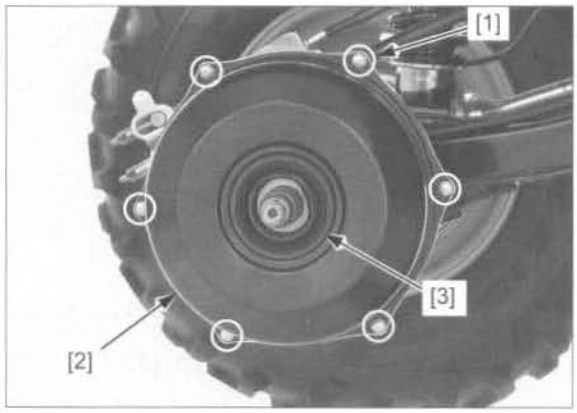
BRAKE DRUM REMOVAL

Remove the right rear wheel (page 17-6).

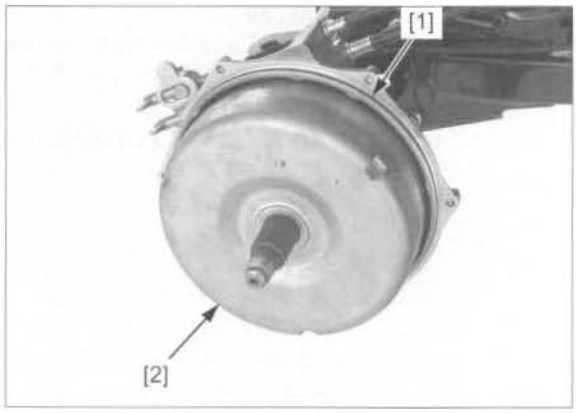
Remove the following:
- cotter pin [1]
- hub nut [2]
- wheel hub [3]



- six bolts [1]
- drum cover [2]
- dust seal [3]



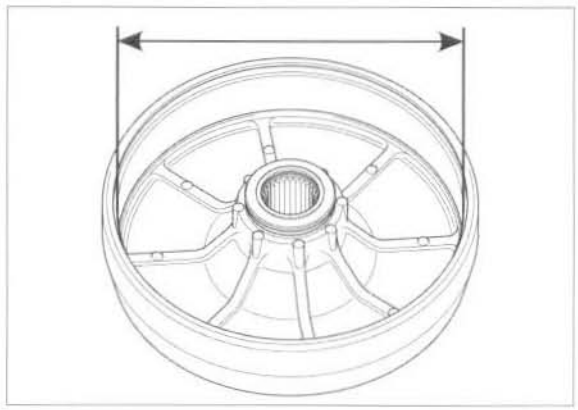
- O-ring [1]
- brake drum [2]



INSPECTION

Measure the brake drum I.D.

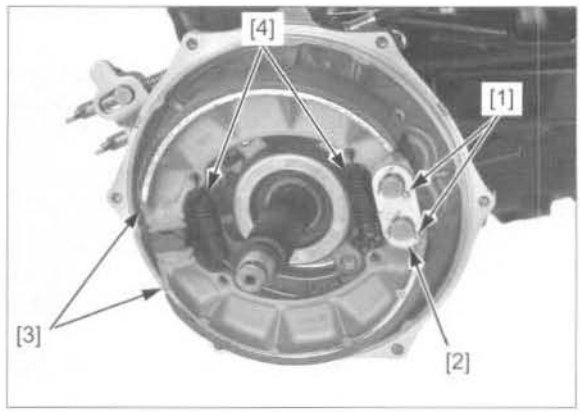
SERVICE LIMIT: 181.0 mm (7.13 in)



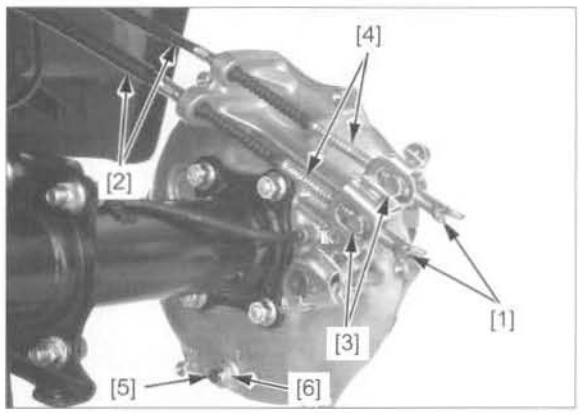
DISASSEMBLY

Always replace the brake shoes in pairs.

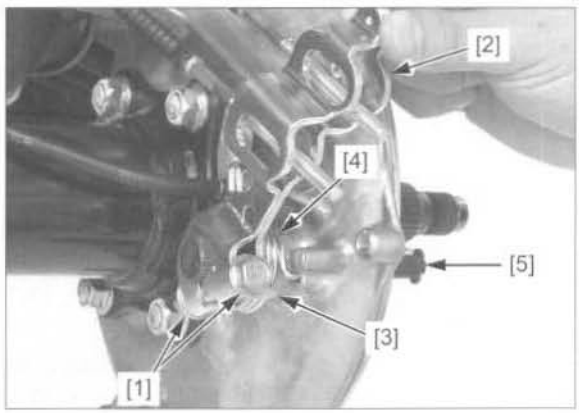
Remove the following:
- cotter pins [1]
- setting plate [2]
- brake shoes [3]
- springs [4]



- adjusting nuts [1]
- brake cables [2]
- joint pins [3]
- springs [4]
- brake panel drain bolt [5] and washer [6]



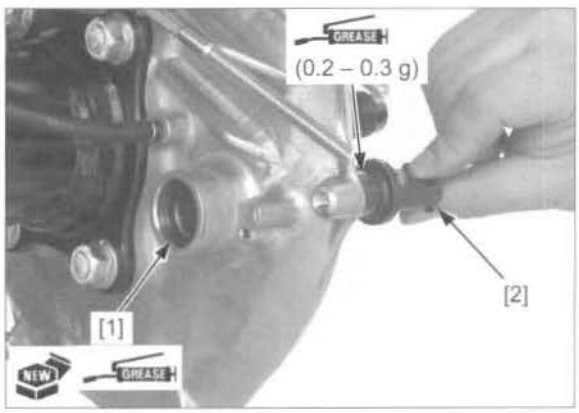
- nut and bolt [1]
- brake arm [2]
- wear indicator [3]
- return spring [4]
- brake cam [5]
- felt seal
- dust seal



ASSEMBLY

Apply grease to the lips of a new dust seal [1] and install it with the flat side facing toward the brake arm until it is fully seated.

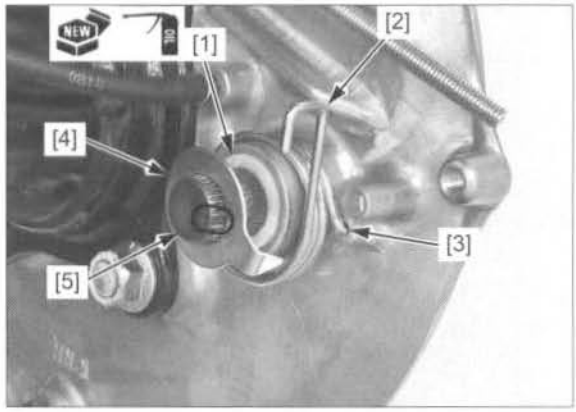
Apply 0.2 – 0.3 g of grease to the brake cam [2] spindle and install it.



Apply engine oil to a new felt seal [1] and install it over the brake cam.

Install the return spring [2] by aligning its end with the hole [3].

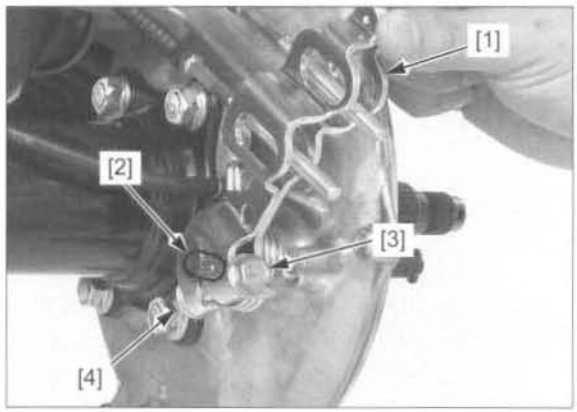
Install the wear indicator [4] by aligning the wide teeth with the wide groove of the brake cam [5].



Install the brake arm [1] by aligning the punch marks [2].

Install the pinch bolt [3] from the punch mark side and the nut [4], and tighten it to the specified torque.

TORQUE: 20 N·m (2.0 kgf·m, 15 lbf·ft)

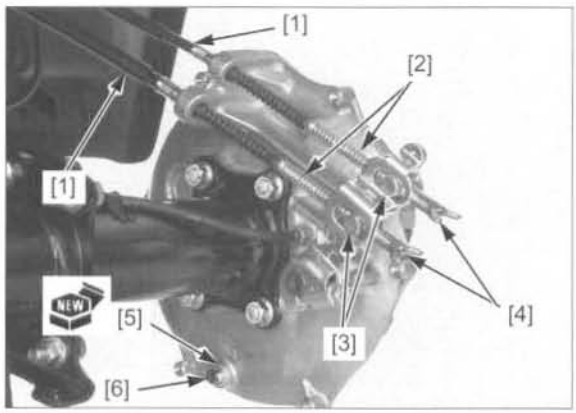


Install the brake cables [1] into the cable holders on the brake panel (upper holder for lever brake cable and lower holder for pedal brake cable).

Install the cable springs [2] onto the cables and the joint pins [3] into the brake arm. Connect the brake cables to the brake arm with the adjusting nuts [4].

Install the brake panel drain bolt with a new searing washer [5] and tighten the bolt [6] to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)



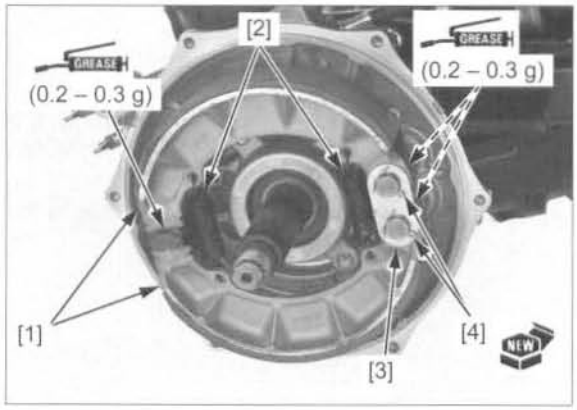
Apply 0.2 – 0.3 g of grease to each anchor pin groove and the brake cam sliding surfaces.

Do not get grease on the shoe linings.

Assemble the brake shoes [1] and springs [2] so that the spring ends are facing outside as shown and install the assembly onto the brake panel.

The cotter pins are installed from the front side.

Install the setting plate [3] with the chamfered side (rolled edge side) facing in and secure it with new cotter pins [4].



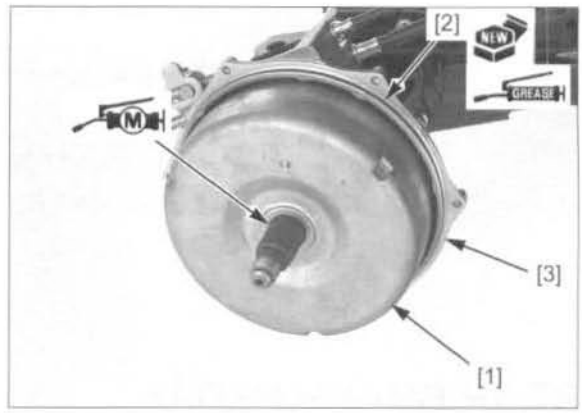
BRAKE DRUM INSTALLATION

Apply molybdenum disulfide grease to the axle splines.

Do not get grease on the brake drum and shoes.

Install the brake drum [1] onto the axle until it is fully seated.

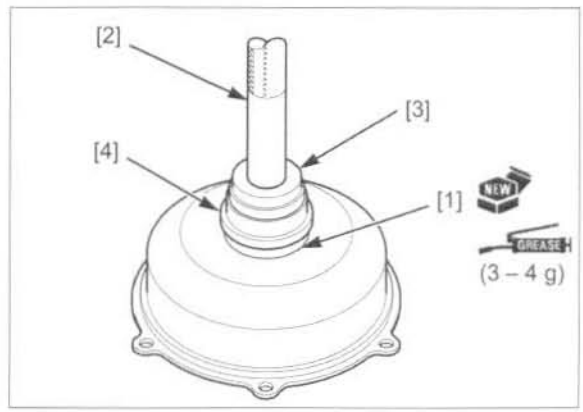
Coat a new O-ring [2] with grease and install it into the groove in the brake panel [3].



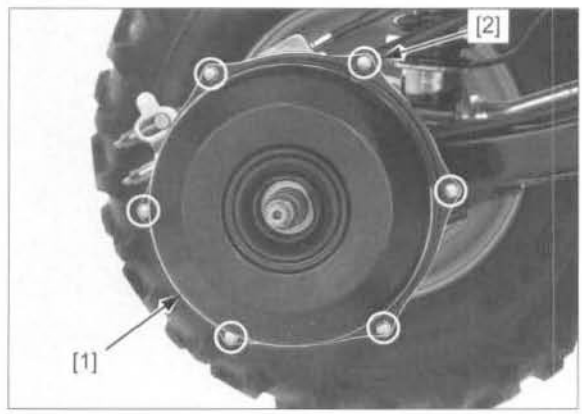
Pack the seal lips of a new dust seal [1] with 3 – 4 g of grease.
Install the dust seal into the drum cover so that it is flush with the cover surface.

TOOL:

[2] Driver	**07749-0010000**
[3] Attachment 72 x 75 mm	**07746-0010600**
[4] Oil seal driver	**070MF-MEG0300**



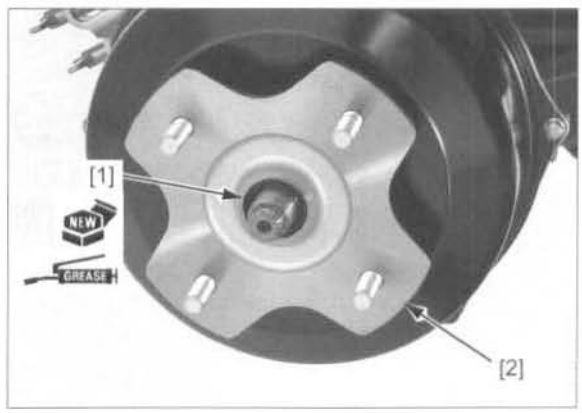
Install the drum cover [1], aligning the bolt holes.
Install the six bolts [2] and tighten them.



Apply grease to the lips of a new dust seal [1] and install it into the wheel hub [2] with the flat side facing in until it is fully seated.

Do not get grease on the axle threads.

Install the wheel hub onto the axle.



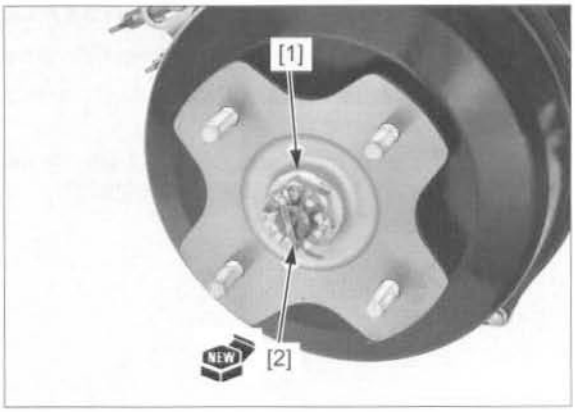
Install the hub nut [1] and tighten it to the specified torque and further tighten until its grooves align with the cotter pin hole.

TORQUE: 137 N·m (14.0 kgf·m, 101 lbf·ft)

Install a new cotter pin [2].

Install the rear wheel (page 17-6).

Adjust the rear brake (page 3-22).



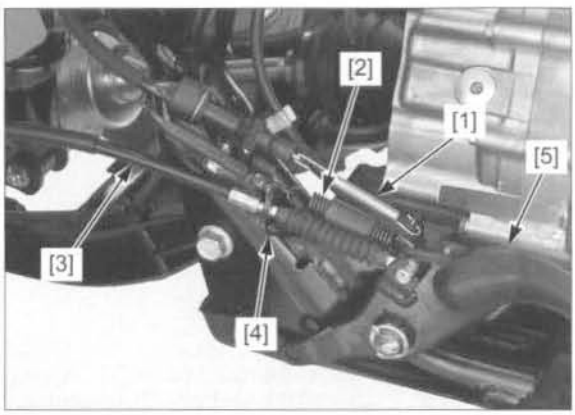
REAR BRAKE PEDAL

REMOVAL

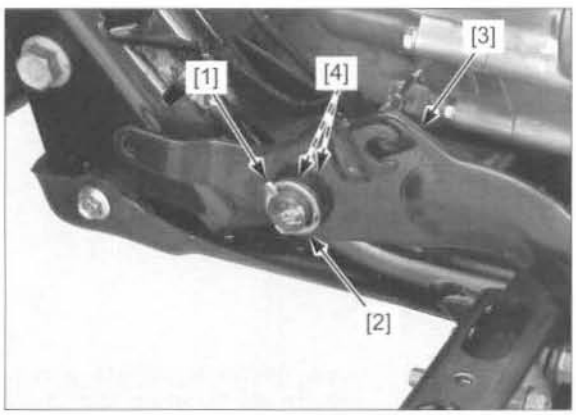
Remove the right mudguard (page 2-6).

Disconnect the pedal brake cable from the brake arm (page 18-17).

Remove the following:
- switch spring [1]
- return spring [2]
- brake cable [3] (from the cable holder [4] and pedal [5])



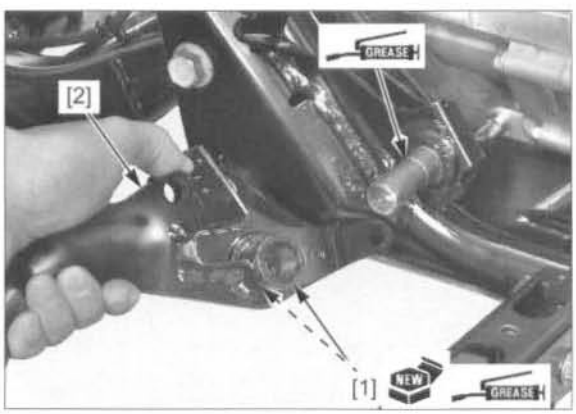
- cotter pin [1]
- washer [2]
- brake pedal [3]
- dust seals [4]



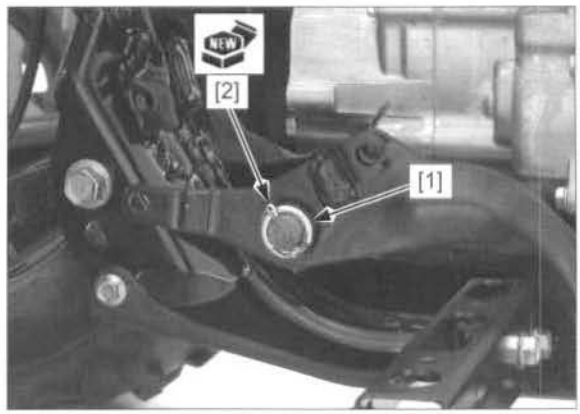
INSTALLATION

Apply grease to the lips of new dust seals [1].
Install the dust seals with the flat side facing out so that they are flush with the pedal [2].

Apply grease to the groove in the pivot shaft and install the brake pedal.



Install the washer [1] and a new cotter pin [2].



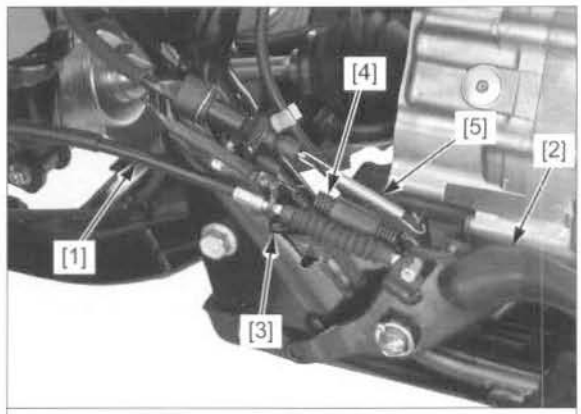
Install the brake cable [1] into the pedal [2] and cable holder [3].

Install the return spring [4] and switch spring [5] in the direction as shown.

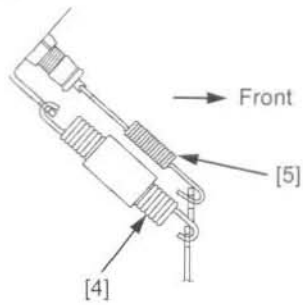
Connect the brake cable to the brake arm (page 18-18).

Adjust the brake pedal freeplay (page 3-22).

Install the right mudguard (page 2-6).



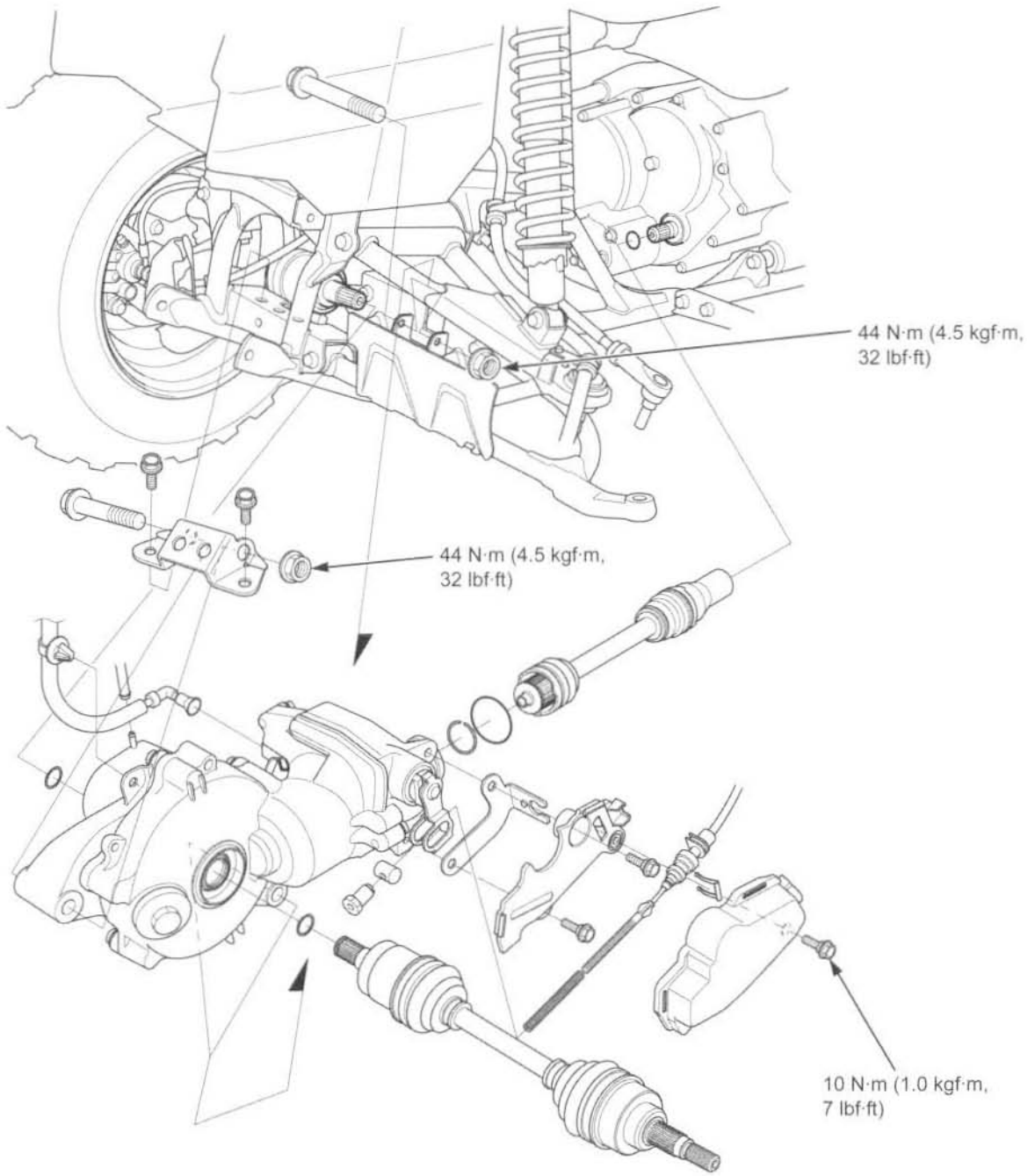
Spring installation direction:



MEMO

19. 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.
- When using the lock nut wrench, use a deflecting beam type torque wrench 20 inches long. The lock nut wrench increases the torque wrench's leverage, so the torque wrench reading will be less than the torque actually applied to the lock nut. The specification given is the actual torque applied to the lock nut, not the reading on the torque wrench. Do not overtighten the lock nut. The specification later in the text gives both actual and indicated.
- Replace the ring and pinion gears as a set.
- Replace the cam followers (12 pieces) as a set, and the cam followers, face cams and differential housing as an assembly if the face cam or differential housing is faulty.
- Do not confuse the left and right drive shaft parts.

SPECIFICATIONS

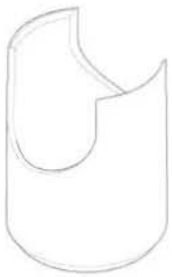
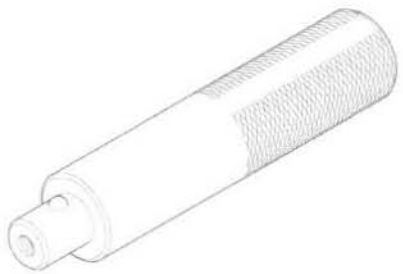
Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Front final drive	Oil capacity	After draining	200 cm^3 (6.8 US oz, 7.0 Imp oz)	–
		After disassembly	250 cm^3 (8.5 US oz, 8.8 Imp oz)	–
	Recommended oil		Honda shaft drive oil or equivalent hypoid gear oil, SAE # 80	–
	Gear backlash		0.05 – 0.25 (0.002 – 0.010)	0.4 (0.02)
	Backlash difference		–	0.2 (0.01)
	Slip torque		14 – 17 N·m (1.45 – 1.75 kgf·m, 10 – 13 lbf·ft)	12 N·m (1.2 kgf·m, 9 lbf·ft)
	Face cam-to-housing distance		3.3 – 3.7 (0.13 – 0.15)	3.3 (0.13)
	Differential ring gear depth		6.55 – 6.65 (0.258 – 0.262)	6.55 (0.258)
	Cone spring free height		2.8 (0.11)	2.6 (0.10)

TORQUE VALUES

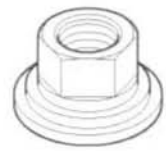
ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Front final gear pinion bearing lock nut	1	60	98 (10.0, 72)	Lock nut: replace with a new one. Stake.
Differential ring gear bolt	11	8	49 (5.0, 36)	ALOC bolt: replace with a new one.
Front final gear case cover bolt	2	10	47 (4.8, 35)	Apply locking agent to the threads.
	4	8	25 (2.5, 18)	
Front final clutch shift fork bolt	1	6	10 (1.0, 7)	ALOC bolt: replace with a new one.
Front final clutch housing bolt	3	8	25 (2.5, 18)	
Front final gear case mounting nut	2	10	44 (4.5, 32)	Lock nut: replace with a new one.
4WD select switch	1	10	12 (1.2, 9)	
4WD select switch wire clamp bolt	1	6	10 (1.0, 7)	
Final clutch arm cover bolt	3	6	10 (1.0, 7)	

TOOLS

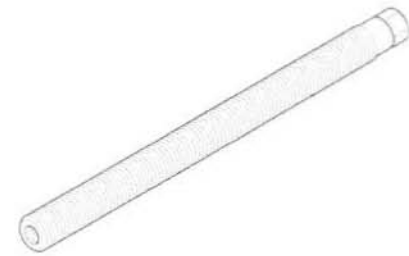
Bearing clip compressor, 25 mm 070ME-HN80100  or 070ME-HN8A100 (U.S.A. only)	Threaded adaptor 070MF-HP50100  or 070MF-HP5A100 (U.S.A. only)	Remover weight 07741-0010201  or 07936-371020A or 07936-3710200 (U.S.A. only)
Attachment, 52 x 55 mm 07746-0010400 	Attachment, 22 x 24 mm 07746-0010800 	Attachment, 30 mm I.D. 07746-0030300 
Pilot, 12 mm 07746-0040200 	Pilot, 15 mm 07746-0040300 	Pilot, 30 mm 07746-0040700 
Fork seal driver weight 07747-0010100 	Driver attachment, 33 mm I.D. 07747-0010501 	Driver 07749-0010000 

Lock nut wrench, 34 x 44 mm
07916-ME50001

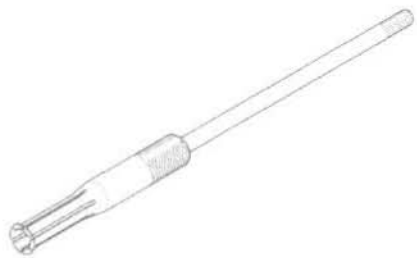
Special nut
07931-HB3020A (U.S.A. only)



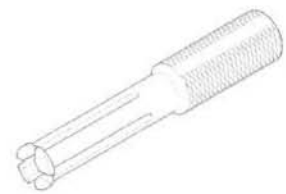
Puller shaft
07931-ME4010B (U.S.A. only)



Bearing remover, 12 mm
07936-166010A (U.S.A. only)



Remover head, 12 mm
07936-1660110



Remover shaft, 12 mm
07936-1660120

Remover handle
07936-3710100

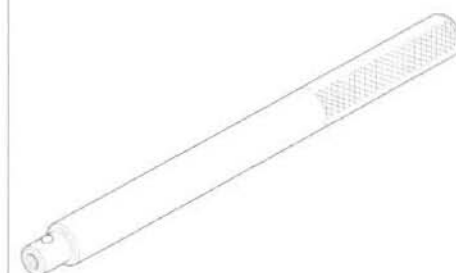
Remover shaft, 15 mm
07936-KC10100

Remover head, 15 mm
07936-KC10200

Bearing remover, 15 mm
07936-KC10500 (U.S.A. only)

Attachment, 45 x 50 mm
07946-6920100

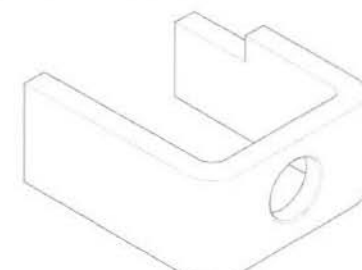
Driver
07949-3710001



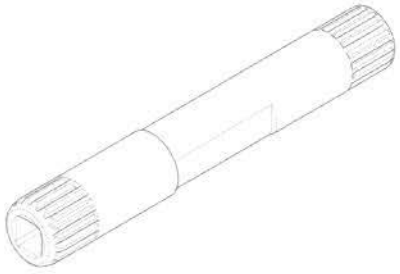
Puller shaft and nut
07965-VM00200

Attachment
07GAF-SE00200

Pinion puller base
07HMC-MM80110



or 07HMC-MM8011A (U.S.A. only)

Differential inspection tool 07KMK-HC50101  or 07KMK-HC5010A (U.S.A. only)	Pilot, 32 mm 07MAD-PR90200 

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 gear case
- Improper tooth contact between ring gear and pinion gear

Gear noises while running
- Oil level too low
- Foreign matter contaminating gear oil
- Chipped or damaged gears
- Improper tooth contact between ring gear and pinion gear

Gear noises while coasting
- Chipped or damaged gears

Abnormal noises when turning
- Worn or damaged ring gear bearing
- Worn or damaged face cams and cam followers
- Worn or damaged differential housing grooves
- Worn cone spring or shim

Abnormal noises at start or during acceleration
- Excessive backlash between ring gear and pinion gear
- Worn differential splines
- Loose fasteners
- Worn cone spring or shim

Oil leak
- Oil level too high
- Clogged breather
- Damaged seals
- Loose case cover bolt

Overheating
- Oil level too low
- Insufficient backlash between ring gear and pinion gear

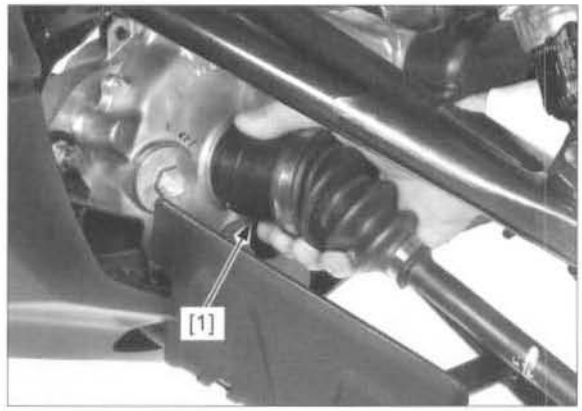
FRONT DRIVE SHAFT

REMOVAL

Remove the knuckle (page 16-16).

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 [1] 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.



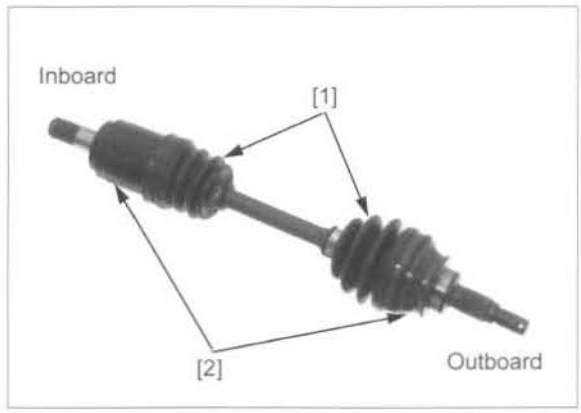
Remove the stopper ring [1] from the inboard joint.

DISASSEMBLY/INSPECTION

Check the boots [1] for cuts or other damage.
Check the drive shaft joints [2] for excessive play or noise by moving the joints in a circular direction.
If the outboard joint seems to be worn or damaged, the drive shaft must be replaced.

NOTE:

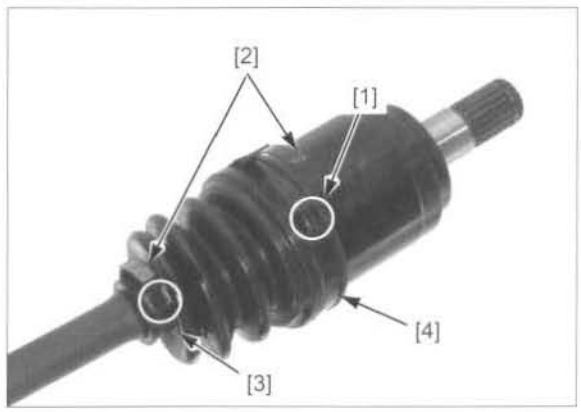
- To replace the outboard boot, first remove the inboard boot as described in following steps. Then remove bands and the outboard boot off the inboard end of the shaft.
- The outboard joint can not be disassembled.



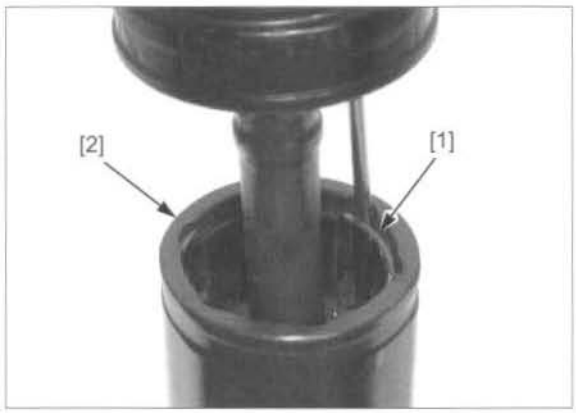
Replace the bands with new ones whenever removing them.

Bend up the lock tabs [1] and raise the band ends [2] to loosen the boot bands A [3] and B [4] on the inboard side.
Remove the band B.

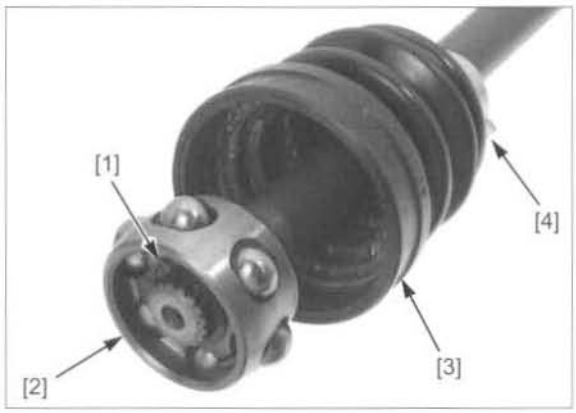
Remove the boot from the inboard joint.



Remove the following:
- stopper ring [1]
- inboard joint [2]

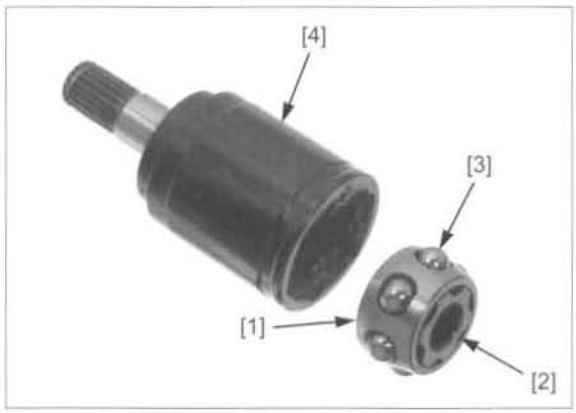


- snap ring [1]
- bearing [2]
- inboard boot [3]
- boot band A [4]

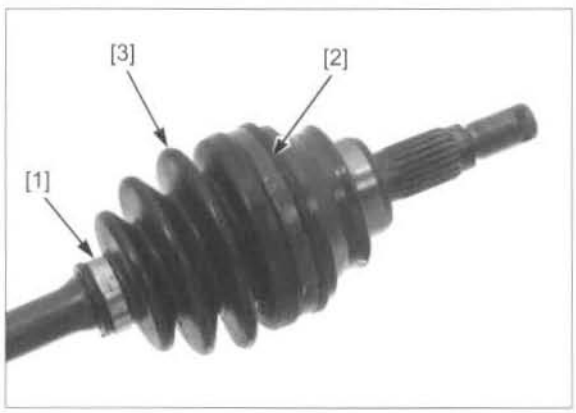


Replace these components as an assembly.

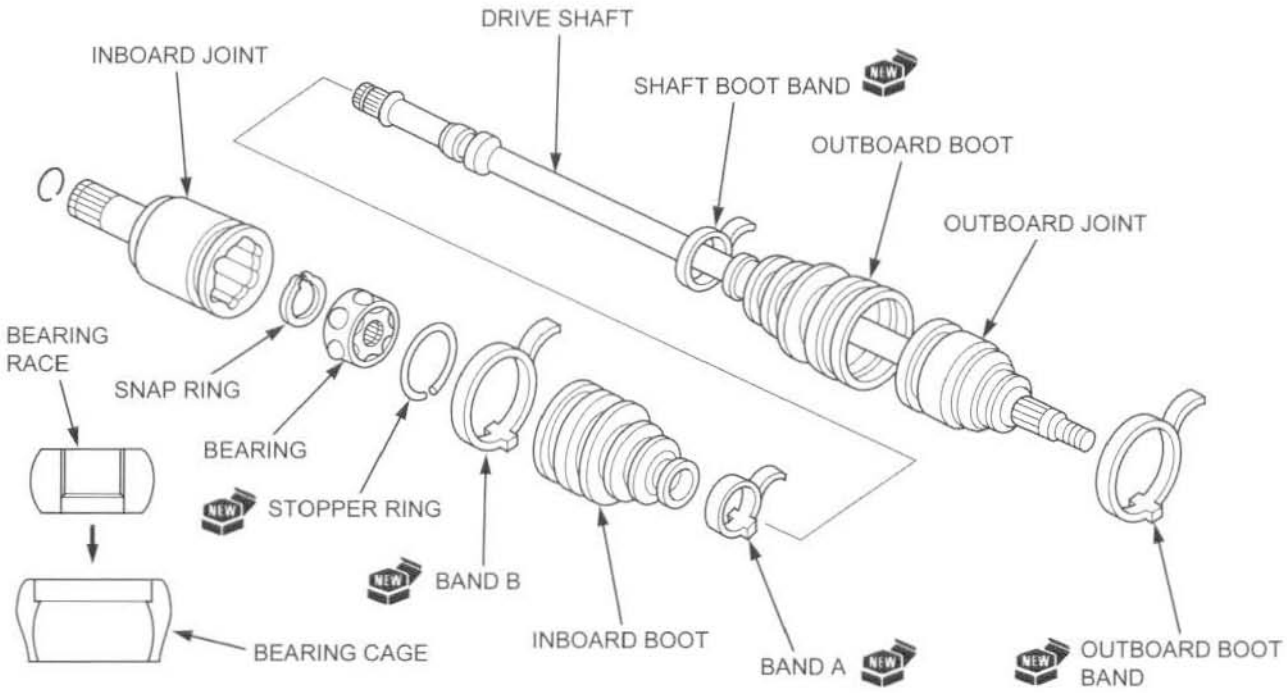
Check the following for wear or damage.
- bearing cage [1]
- race [2]
- steel balls [3]
- inboard joint [4]



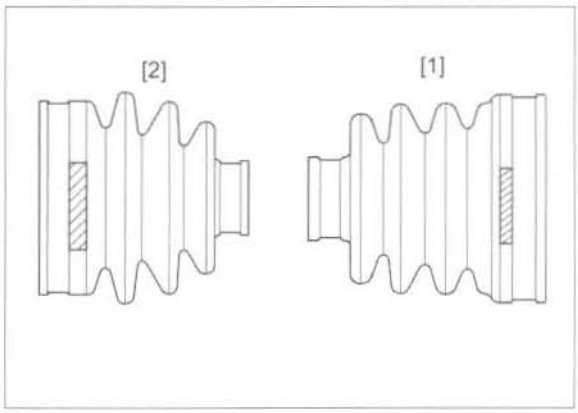
Remove the following:
- shaft boot band [1]
- outboard boot band [2]
- outboard boot [3]



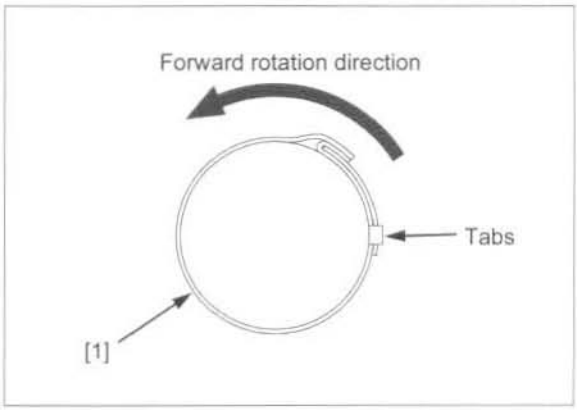
ASSEMBLY



The outboard boot [1] is larger than the inboard boot [2]. Do not interchange them.



Note the installation direction of the boot bands [1].

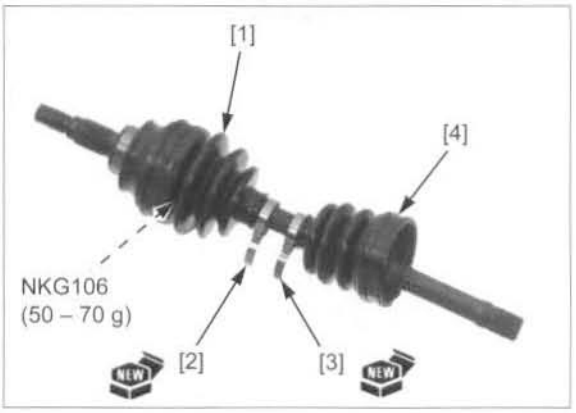


Pack the outboard joint with 50 – 70 g of specified grease.

SPECIFIED GREASE: NKG106 (Kyodo Yushi)

Install the following:
- outboard boot [1]
- new shaft boot band [2]
- new band A [3]
- inboard boot [4]

Do not tighten the bands at this time.

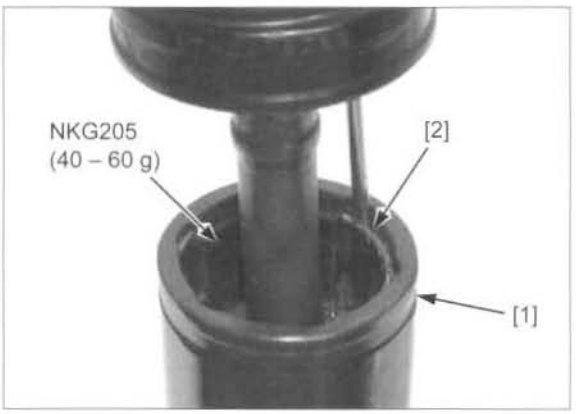


Install the bearing [1] with the small O.D. facing the drive shaft.
Install the snap ring [2] with the chamfered side facing the bearing.

Pack the inboard joint [1] with 40 – 60 g of specified grease.

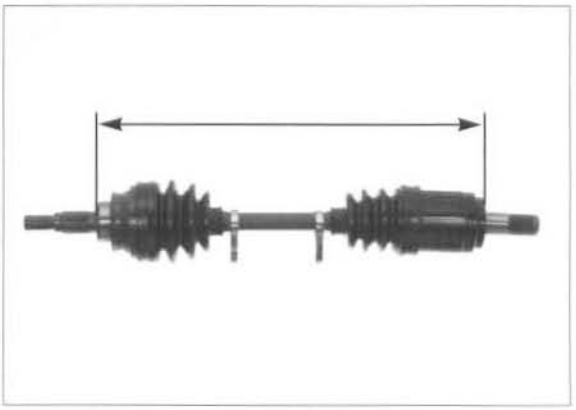
SPECIFIED GREASE: NKG205 (Kyodo Yushi)

Install the inboard joint over the bearing.
Install the stopper ring [2] into the groove in the inboard joint properly.
Install the boot over the inboard joint.



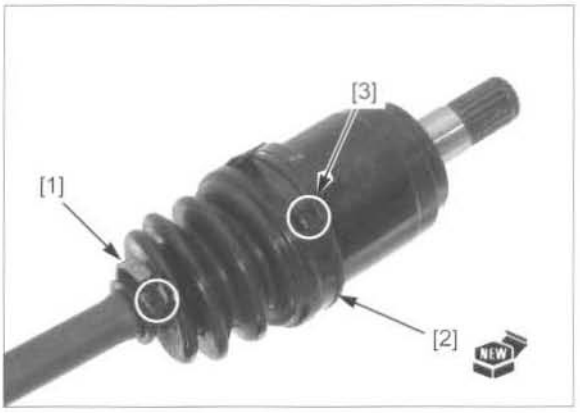
Adjust the length of the drive shaft to the figure given below.

DRIVE SHAFT LENGTH: Left: 363.2 mm (14.30 in)
Right: 383 mm (15.1 in)

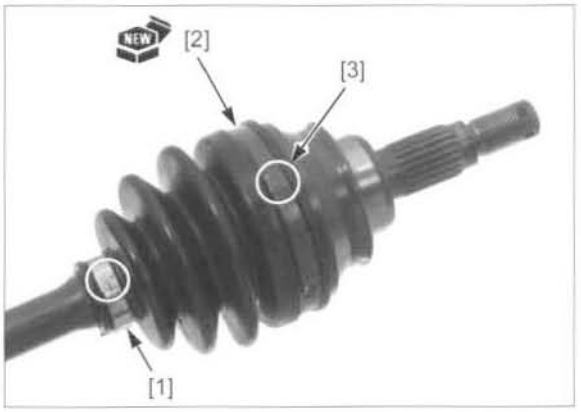


Note the installation direction of the band (page 19-9).

Install the band A [1] and a new band B [2] onto the inboard boot.
Bend down each band end and secure it with the lock tabs [3]. Tap the lock tabs with a plastic hammer.



Install the shaft boot band [1] and a new outboard boot band [2] onto the outboard boot.
Bend down the band end and secure it with the lock tabs [3]. Tap the lock tabs with a plastic hammer.



INSTALLATION

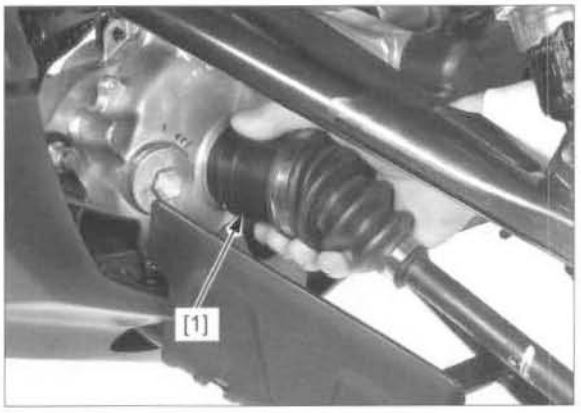
Install a new stopper ring [1] into the groove in the inboard joint spline.

Be careful not to damage the oil seal in the gear case.

Install the drive shaft by holding the inboard joint [1] 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 16-22).

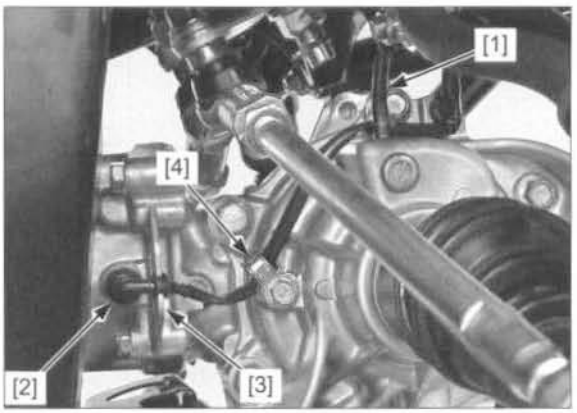


FRONT FINAL DRIVE REMOVAL

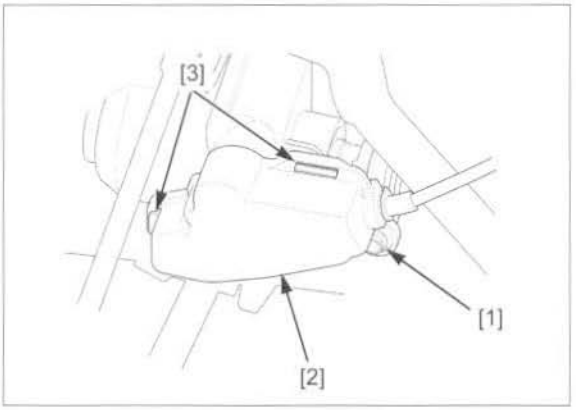
Remove the following:
- left mudguard (page 2-6)
- engine guard (page 2-7)
- left drive shaft (page 19-7)

Drain the differential oil (page 3-19).

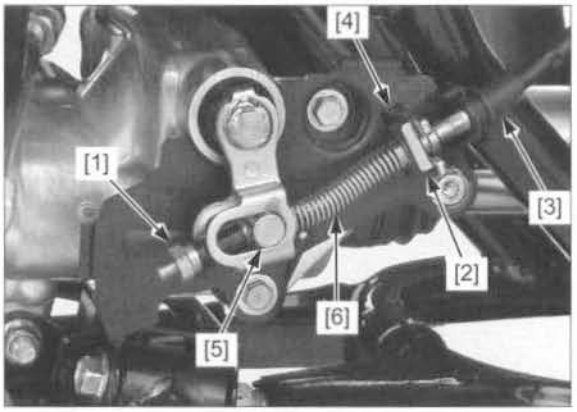
Remove the following from the final gear case:
- breather hose [1]
- select switch connector [2] (disconnect it and remove its wire from the guide [3] and clamp [4])



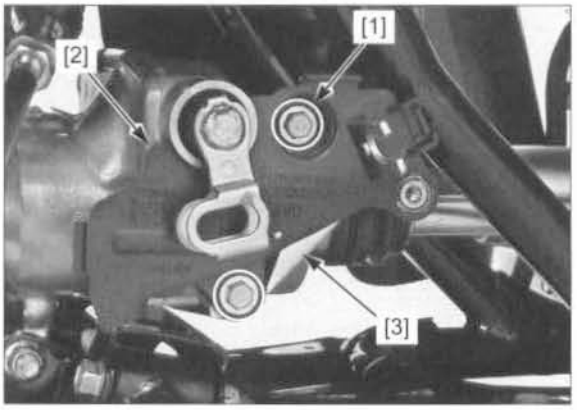
- cover bolt [1]
- clutch arm cover [2] (by releasing the two tabs [3])



- adjusting nut [1]
- cable retaining plate [2]
- selector cable [3] (remove from the cable holder [4] and joint pin [5])
- cable spring [6]
- joint pin



- base bolts [1]
- arm cover base [2]
- holder bracket [3]

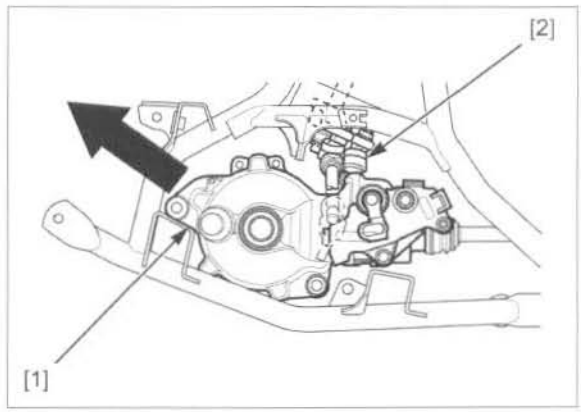


– final gear case mounting nuts and bolts [1]
– two bolts [2] and mounting bracket [3]

Move the gear case assembly [1] forward for maximum clearance between the propeller shaft joint and engine.

NOTE:

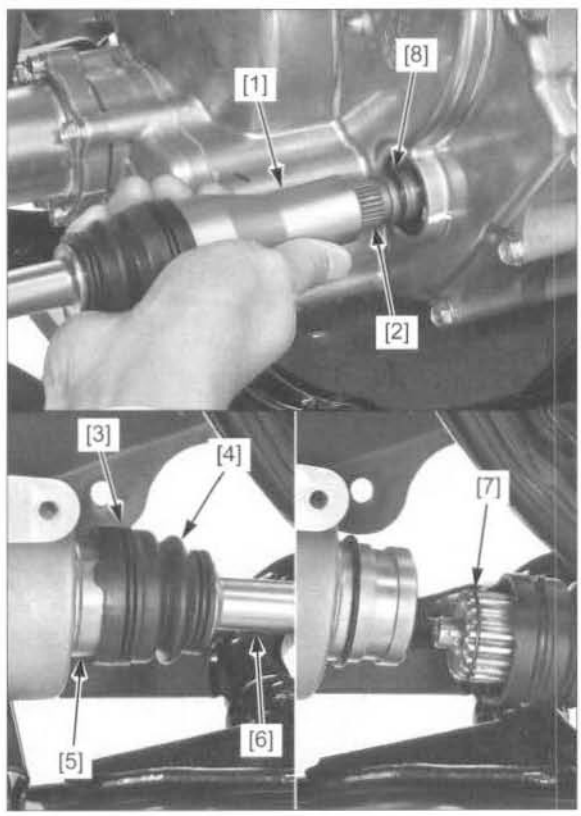
- Turn the handlebar all the way to the right to move the gear case assembly.
- Put some cloth on the gear case to avoid scratch or damage the tie-rod end [2].



Pull the shaft joint [1] out of the output shaft [2] of the engine.

Remove the boot band [3] and release the propeller shaft boot [4] off the pinion joint [5] of the gear case assembly.
Pull the propeller shaft [6] to force the stopper ring [7] past the groove in the pinion joint to remove the propeller shaft.

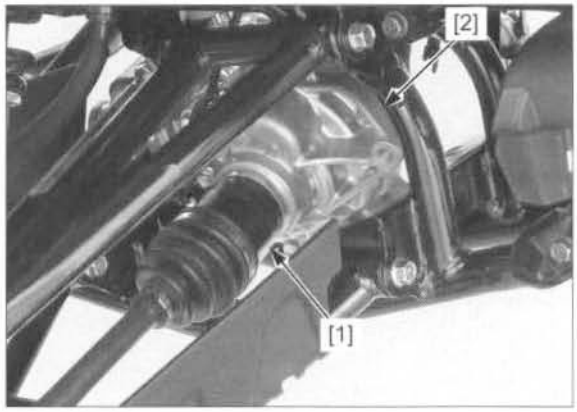
Remove the stopper ring from the propeller shaft.
Remove the O-ring [8] from the output shaft.



Loosen the left lower arm pivot nuts and lower the lower arm.

Separate the right drive shaft [1] from the final gear case assembly [2] by tapping the right drive shaft end lightly through the gear case, using a screwdriver or equivalent.

Remove the gear case assembly from the frame.

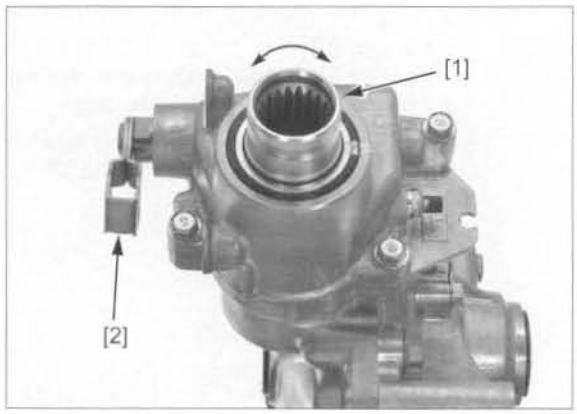


OPERATION CHECK

Turn the pinion joint [1] while the clutch arm [2] is set to the rear (4WD position), and check that the gear turns smoothly and quietly without binding.

If the gear does not turn smoothly or quietly, the pinion gear, ring gear, bearing and/or clutch components may be damaged or faulty. They must be checked after disassembly; replace them if necessary.

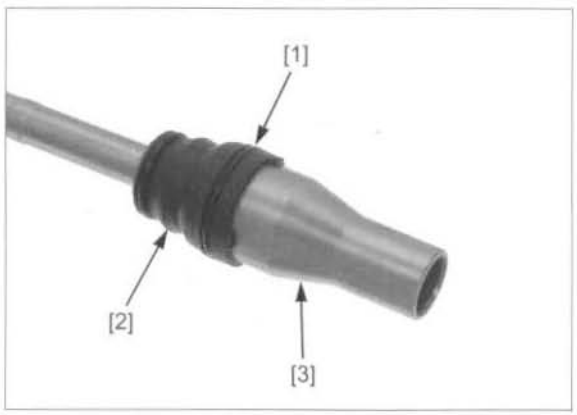
Operate the change-over mechanism while turning the pinion joint, check for smooth engagement/ disengagement.



FRONT PROPELLER SHAFT

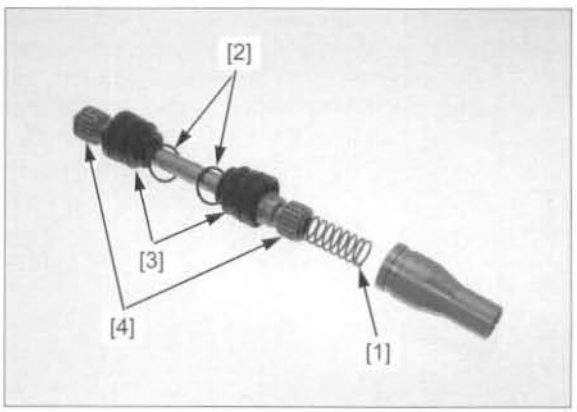
DISASSEMBLY/INSPECTION

Remove the outer boot band [1] and the shaft boot [2] from the propeller shaft joint [3] to remove the shaft joint.

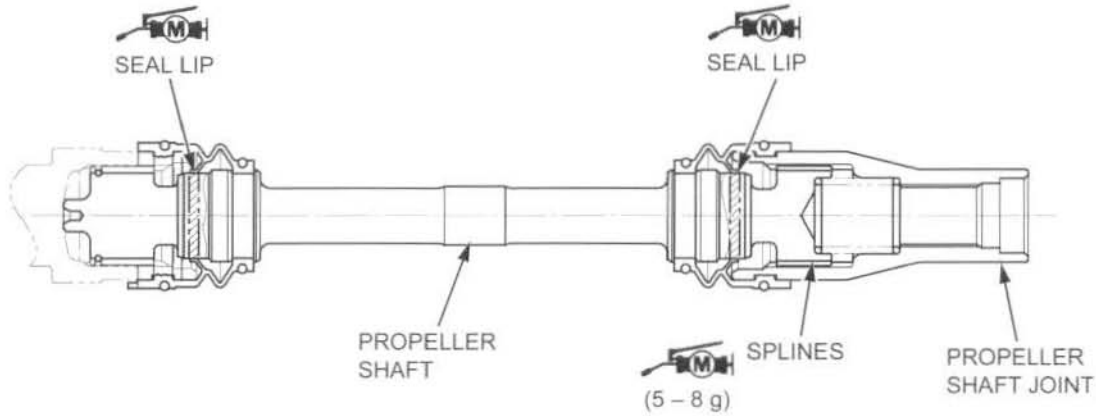


Remove the following:
- joint spring [1]
- inner boot bands [2]
- shaft boots [3]

Check the splines [4] of the propeller shaft and joint for wear or damage.
If they are damaged, check the splines of the output shaft and pinion joint.
Check the boots for cuts, deterioration or damage.
Check the seal lip in each boots for damage.



ASSEMBLY

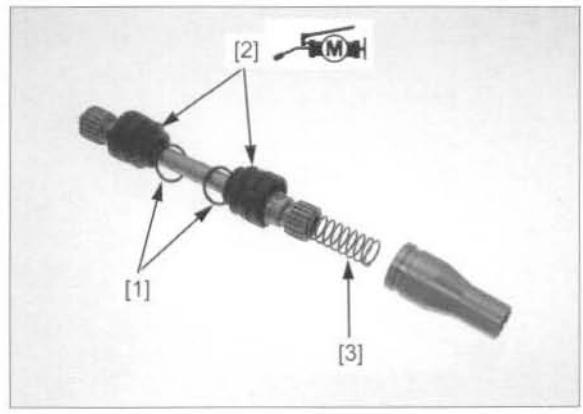


Place the inner boot bands [1] on the propeller shaft.

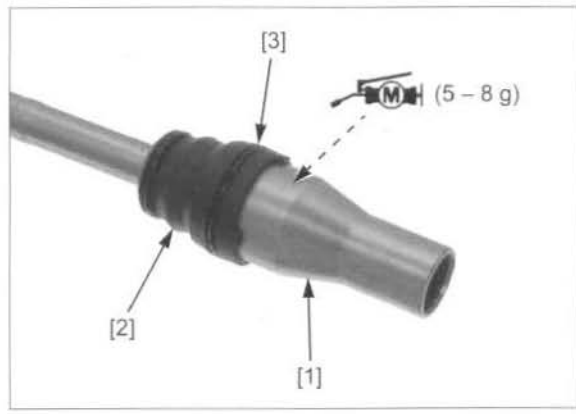
Do not allow the seal lip to turn inside out.

Apply molybdenum disulfide grease to the seal lip of each boot.
Install the boots [2] onto the shaft grooves, being careful not to damage the seal lip.
Install the boot bands into the each boot groove.

Install the joint spring [3] into the propeller shaft securely.



Apply 5 – 8 g of molybdenum disulfide grease to the propeller shaft joint splines.
Set the shaft joint [1] onto the propeller shaft while compressing the spring, then install the boot [2] over the shaft joint groove and the outer boot band [3] into the boot groove to secure it.



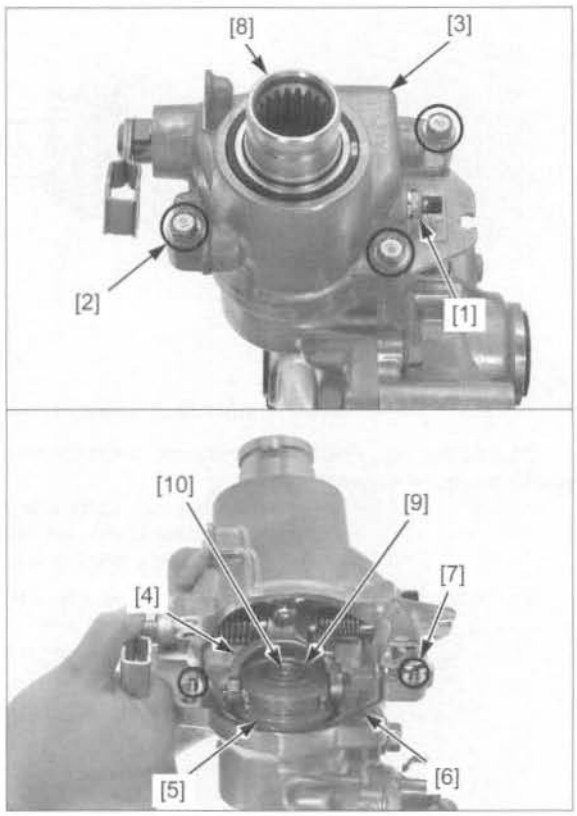
FRONT FINAL CLUTCH

DISASSEMBLY

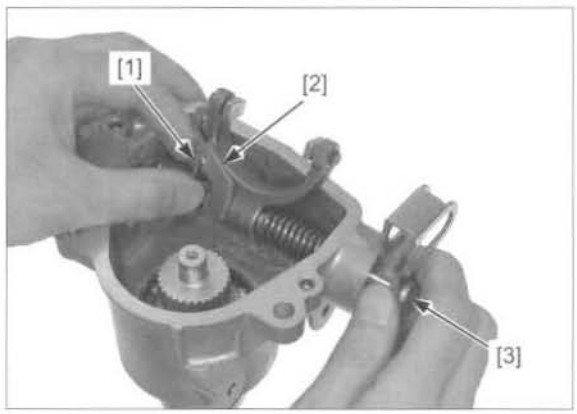
The housing is under spring pressure; hold the housing when loosening the bolt.

Remove the following:
- select switch and sealing washer [1]
- three bolts [2]
- final clutch housing [3] (by releasing the shift fork [4] from the clutch sleeve [5])
- clutch sleeve
- O-ring [6]
- dowel pins [7]

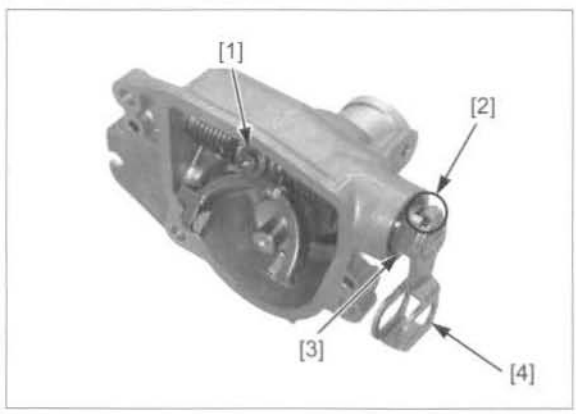
Check the splines of the pinion joint [8], clutch sleeve and pinion gear shaft [9] for wear or damage.
Check the needle bearing [10] in the pinion gear shaft for wear or damage.



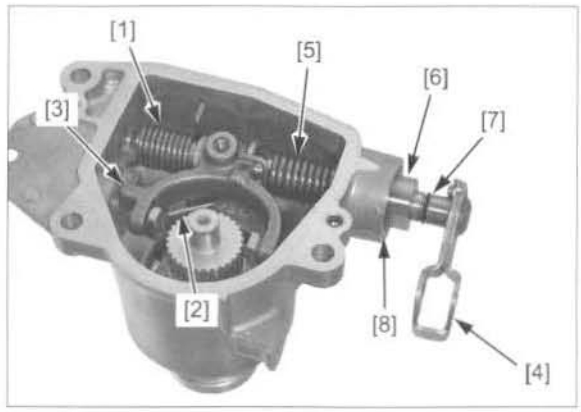
Release the clutch spring end [1] from the stopper plate [2] by pulling the arm shaft [3].



Remove the shift fork bolt [1].
Pry the clutch arm tab [2] to release it from the collar [3] and slide the clutch arm shaft [4] outward.



Remove the following:
- clutch spring [1]
- stopper plate [2]
- shift fork [3]
- clutch arm shaft [4]
- lock spring [5]
- collar [6]
- O-ring [7]
- oil seal [8]



INSPECTION

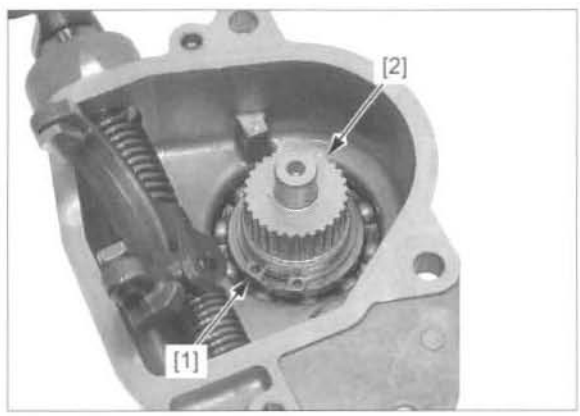
Check the shift fork craws for wear or damage.

Check the arm shaft and stopper plate for deformation or damage.

Check the each spring for fatigue or damage.

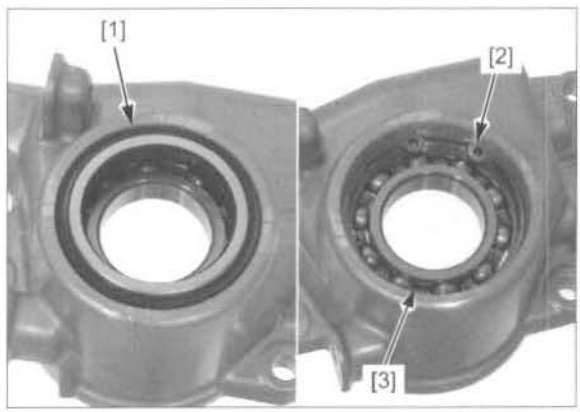
PINION JOINT BALL BEARING REPLACEMENT

Remove the snap ring [1] and drive the pinion joint [2] out of the bearing.



Remove the oil seal [1] and the snap ring [2].

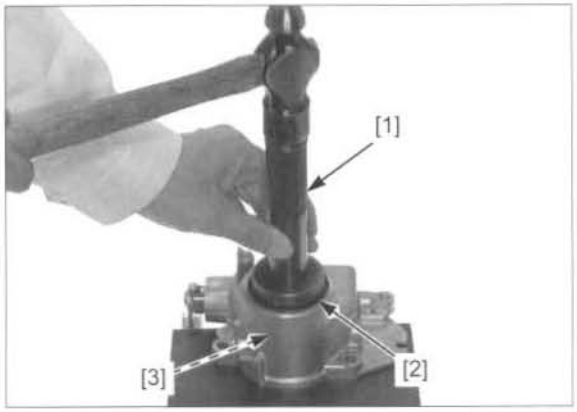
Drive the bearing [3] out of the housing.



Drive a new bearing into the housing.

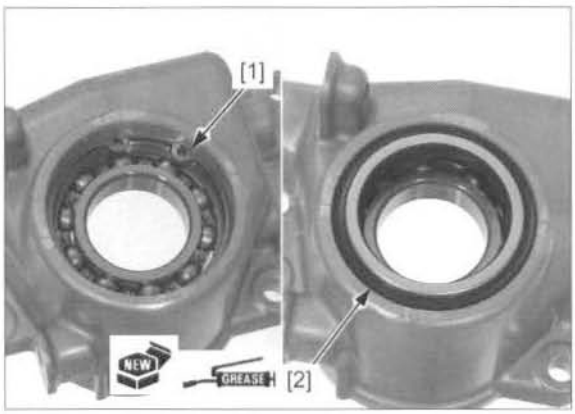
TOOLS:

[1] Driver	**07749-0010000**
[2] Attachment, 52 x 55 mm	**07746-0010400**
[3] Pilot, 32 mm	**07MAD-PR90200**



Install the snap ring [1] into the housing groove securely with the chamfered edge facing the bearing.

Pack the seal lips of a new oil seal [2] with grease. Install the oil seal so that its rubber area flush with the housing end.

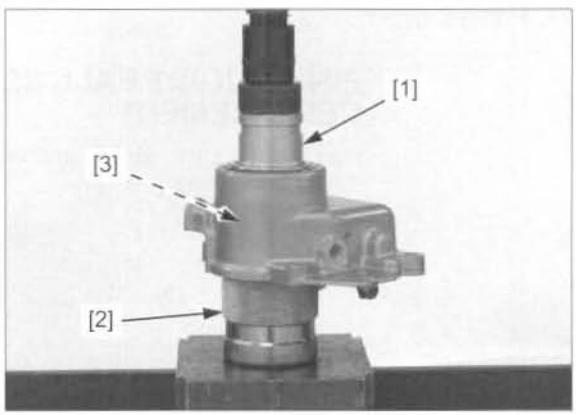


Be careful not to damage the oil seal lips.

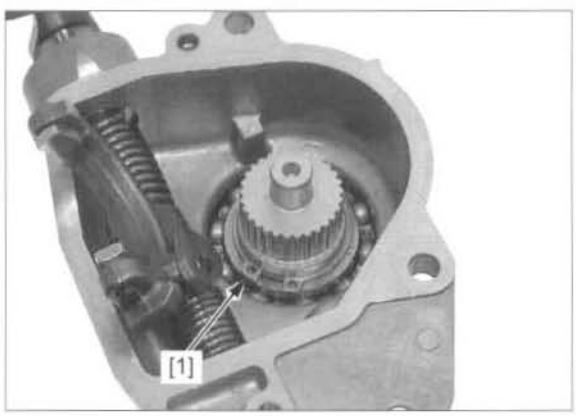
Hold the bearing inner race and press the pinion joint [1] into the bearing until it is fully seated.

TOOLS:

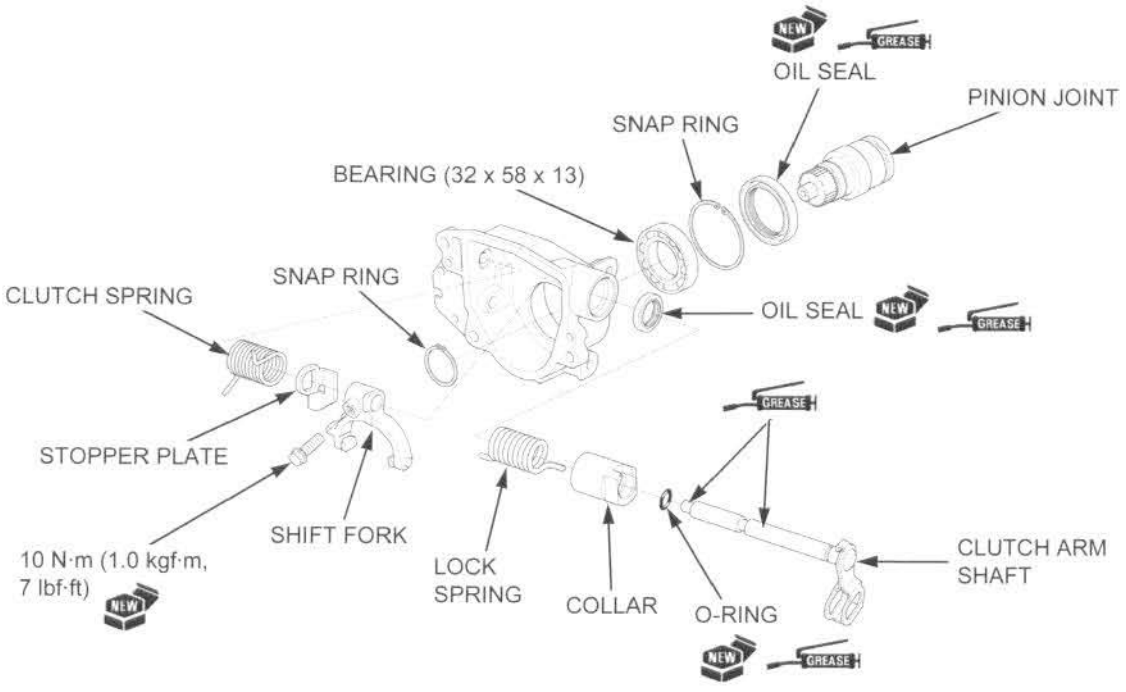
[2] Fork seal driver weight	**07747-0010100**
[3] Driver attachment, 33 mm I.D.	**07747-0010501**



Install the snap ring [1] into the pinion joint groove securely with the chamfered edge facing the bearing.

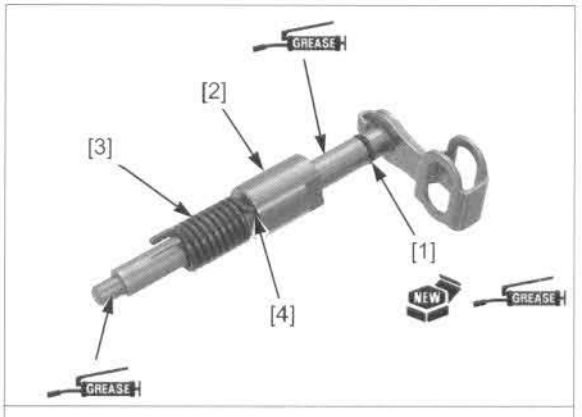


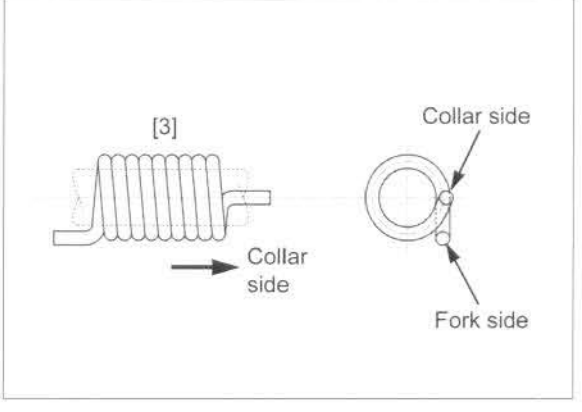
ASSEMBLY



Coat a new O-ring [1] with grease and install it into the clutch arm shaft groove.
Apply grease to the clutch arm shaft outer surface.

Install the collar [2] and the lock spring [3] with the short end toward the collar, and set the spring end into the hole [4] in the collar.

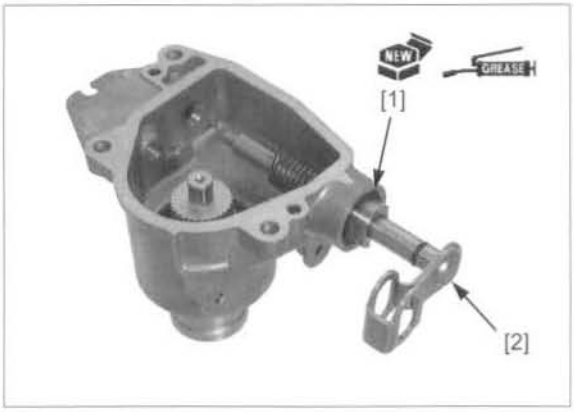




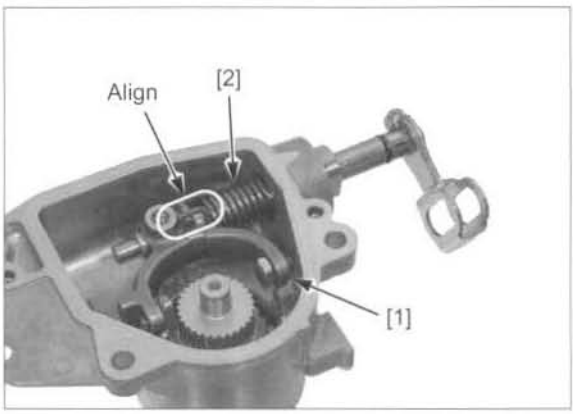
Apply grease to the lips of a new oil seal [1] and install it into the clutch housing until it is fully seated.

Take care not to let the lock spring come off the collar during assembly.

Install the clutch arm shaft assembly [2], being careful not to damage the oil seal.



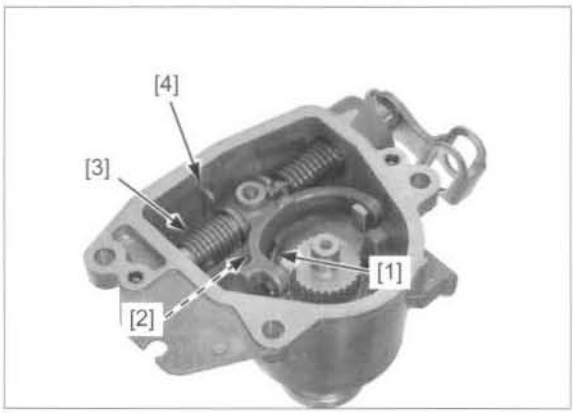
Install the shift fork [1] and align the groove with the end of the lock spring [2].



While holding the shift fork, push the arm shaft to slide it inward and install the shaft end into the pivot hole in the housing.

Install the stopper plate [1] by aligning the flat surfaces so the plate is attached onto the fork lug [2].

Install the clutch spring [3] with the bended end [4] toward the shift fork.

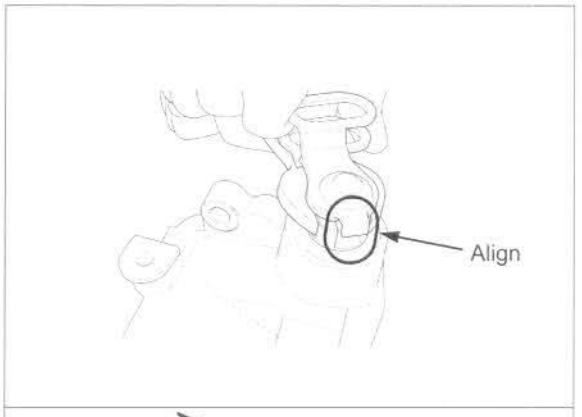


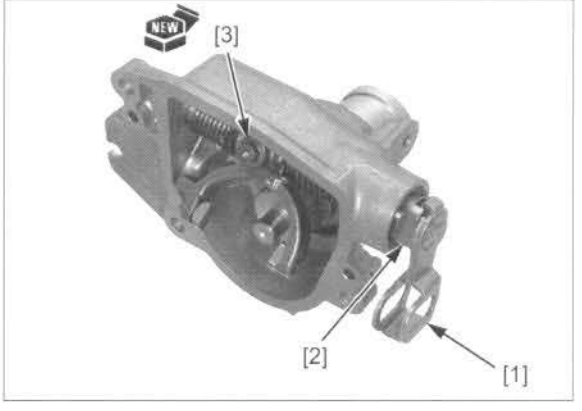
Turn the clutch arm shaft [1] clockwise by holding the collar [2] with a open end wrench and align the arm tab with the collar groove, then tap the shaft to fit them securely.

Align the bolt hole in the fork with the groove in the shaft and install a new fork bolt [3].

Tighten the fork bolt to the specified torque.

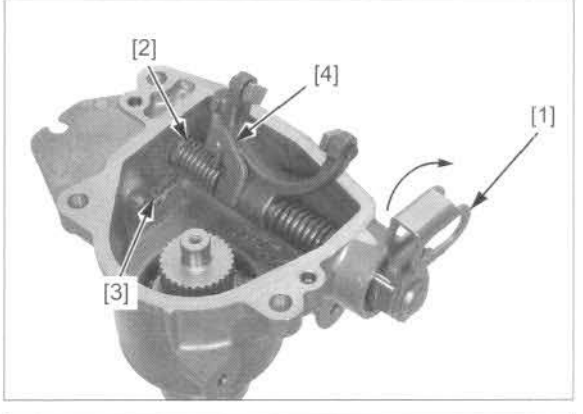
TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)





Turn the clutch arm shaft [1] and set the ends of the clutch spring [2] onto the housing groove [3] and the reverse side of the stopper plate [4] as shown.

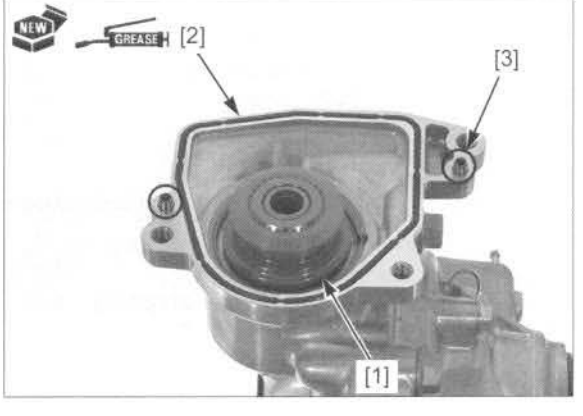
Check the clutch arm shaft for smooth operation.



Install the clutch sleeve [1] with the large O.D. side facing the inside.

Coat a new O-ring [2] with grease and install it into the case groove.

Install the two dowel pins [3].

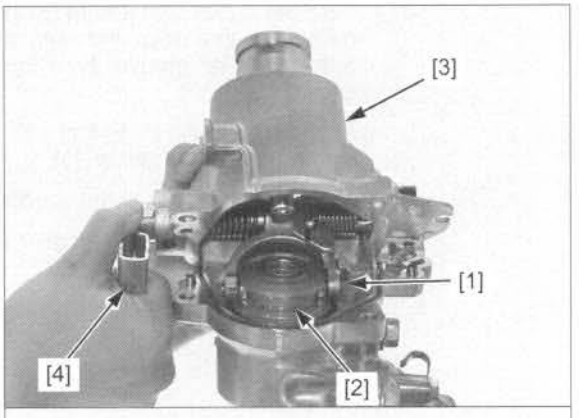


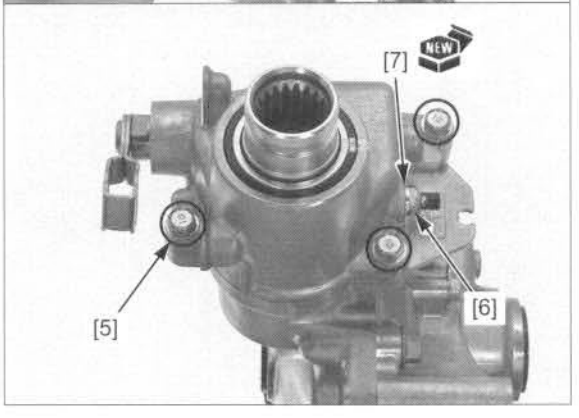
Aligning the fork claws [1] with the sleeve groove [2], install the final clutch housing [3] while turning the clutch arm [4], then secure it with the bolts [5].
Tighten the three bolts to the specified torque.

TORQUE: 25 N·m (2.5 kgf·m, 18 lbf·ft)

Install the select switch [6] with a new sealing washer [7] and tighten it to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)





FRONT FINAL GEAR DISASSEMBLY/ INSPECTION

Remove the final clutch housing (page 19-16).

BACKLASH INSPECTION

Set the final gear case into a jig or vise with soft jaws.

Remove the oil filler cap.

Cover the clutch housing mating surface with protective tape [2] or an equivalent to prevent damage.

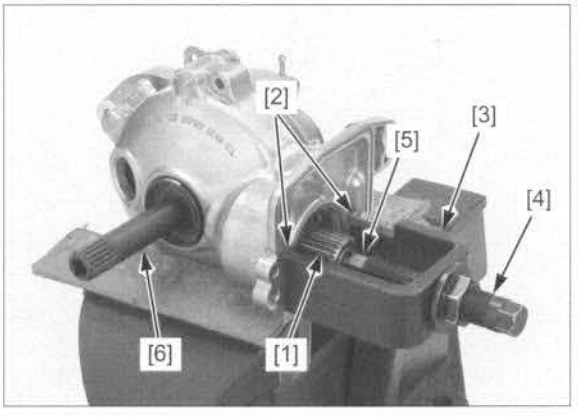
Hold the pinion gear [1] with the special tools.

TOOLS:

[3] Pinion puller base	**07HMC-MM80110**
[4] Puller shaft and nut	**07965-VM00200**
[5] Threaded adaptor	**070MF-HP50100**

U.S.A. TOOLS:

Pinion puller base	**07HMC-MM8011A**
Puller shaft	**07931-ME4010B**
Special nut	**07931-HB3020A**
Threaded adaptor	**070MF-HP5A100**



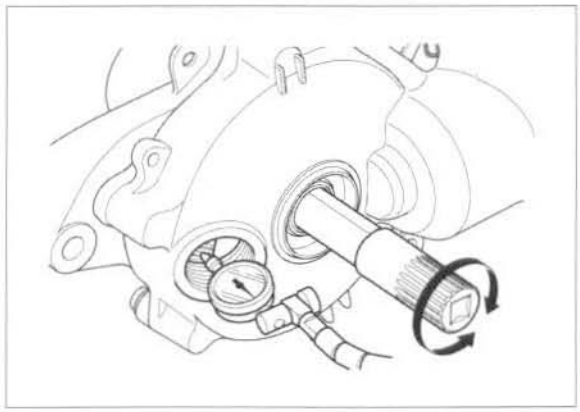
Install the differential inspection tool into the left side of the gear case.

TOOL:

[6] Differential inspection tool	**07KMK-HC50101 or 07KMK-HC5010A (U.S.A. only)**

Set a horizontal type dial indicator on the ring gear through the filler hole.
Turn the ring gear back and forth to read backlash.

STANDARD: 0.05 – 0.25 mm (0.002 – 0.010 in)
SERVICE LIMIT: 0.4 mm (0.02 in)

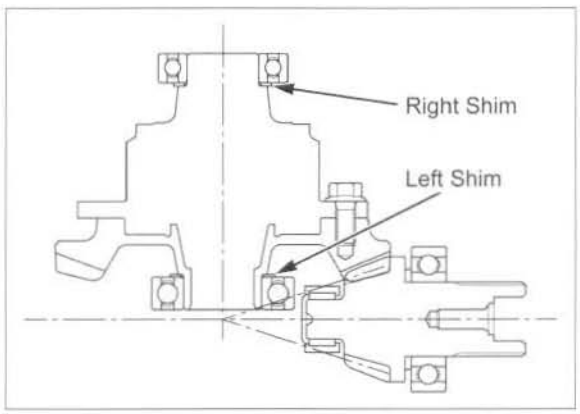


Remove the dial indicator. Turn the ring gear 120° and measure backlash. Repeat this procedure once more. Compare the difference of the three measurements.

SERVICE LIMIT: 0.2 mm (0.01 in)

If the difference in measurements exceeds the service limit, it indicates that the bearing is not installed squarely, or the case is deformed.
Inspect the bearings and case.

If the backlash is excessive, replace the ring gear left side shim with a thinner one.
If the backlash is too small, replace the ring gear left side shim with a thicker one.
The backlash is changed by about 0.06 mm (0.002 in) when the thickness of the shim is changed by 0.10 mm (0.004 in).



NOTE:

- Twenty-three different thickness shims are available from the thinnest (0.50 mm thickness: A) shim to the thickest (1.60 mm thickness: W) in intervals of 0.05 mm.

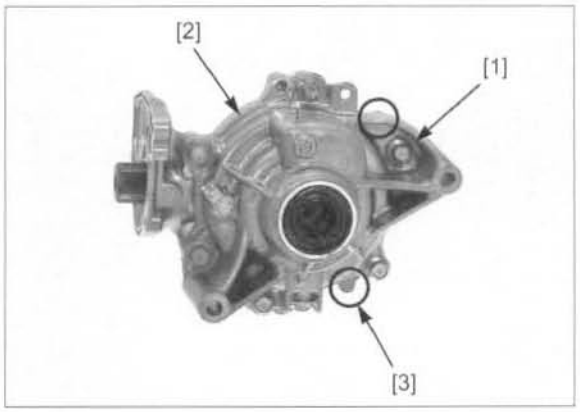
Ring gear shims:
A: (thinnest): 0.50 mm (0.020 in)
K: (standard): 1.00 mm (0.039 in)
W: (thickest): 1.60 mm (0.063 in)

Change the right side shim as follows: If the left shim was replaced with a 0.10 mm (0.004 in) thicker shim, replace the right shim with one that is 0.10 mm (0.004 in) thinner.

DIFFERENTIAL REMOVAL

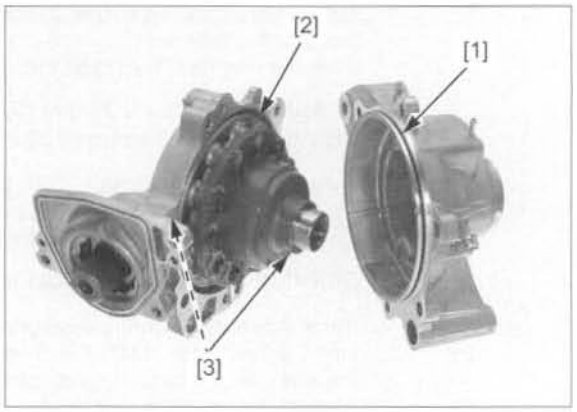
Loosen the six cover bolts [1] in a crisscross pattern in several steps and remove them.

Pry the final gear case cover [2] at the points [3] as shown by using a screwdriver and remove it.



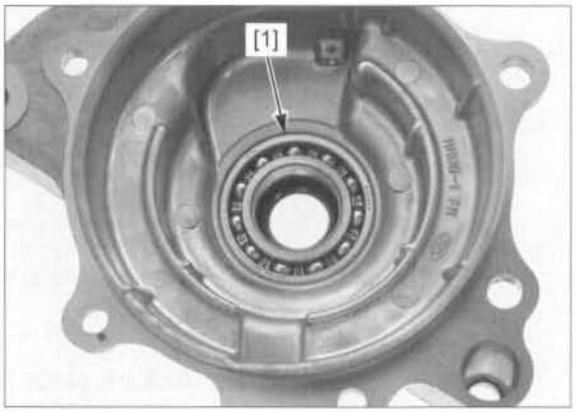
Remove the O-ring [1].

Remove the differential assembly [2] and shims [3].



BEARING INSPECTION

Turn the inner race of each bearing [1] in the gear case and case cover with your finger. The bearings should turn smoothly and quietly. Also check that the bearing outer race fits tightly in the case or cover.



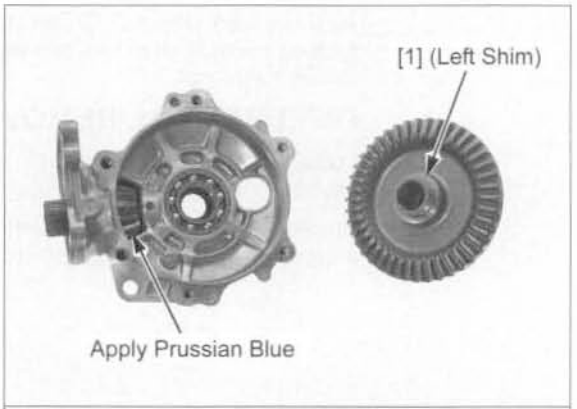
GEAR TOOTH CONTACT PATTERN CHECK

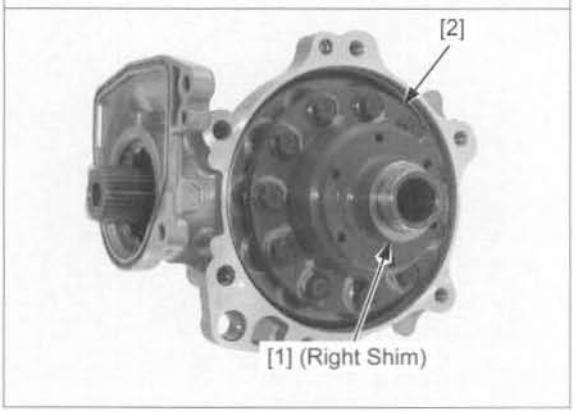
Keep dust and dirt out of the case and cover.

Apply thin coat of Prussian Blue to the pinion gear teeth for a tooth contact pattern check.

Install the ring gear shims [1] onto the differential assembly.

Install the differential assembly [2] into the gear case.

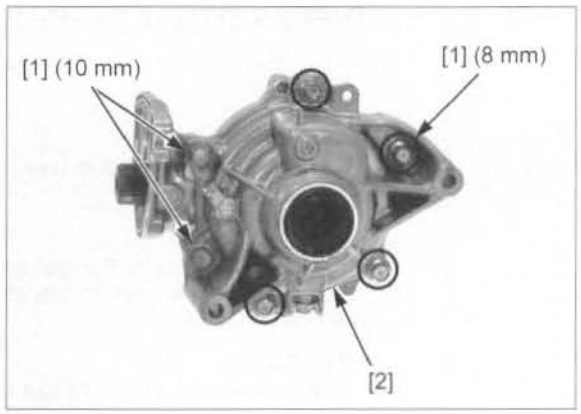




It is important to turn the pinion gear while tightening the bolts. If the ring gear shim is too thick, the gears will lock after only light tightening.

Install the case cover and tighten the bolts [1] in several steps until the cover [2] 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.

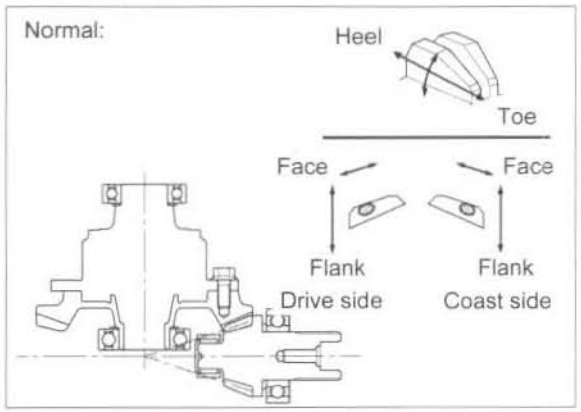
TORQUE: 10 mm bolt: 47 N·m (4.8 kgf·m, 35 lbf·ft)
8 mm bolt: 25 N·m (2.5 kgf·m, 18 lbf·ft)



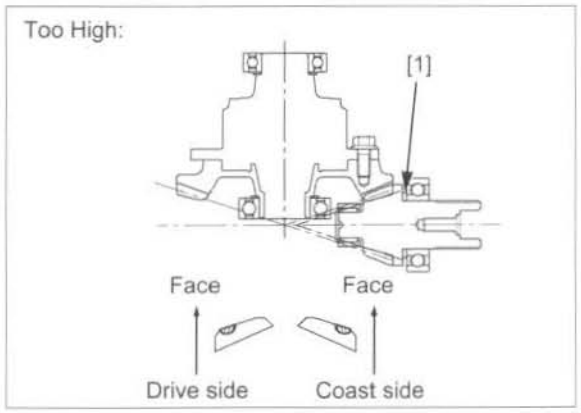
Rotate the ring gear several times in both directions of rotation.

Check the gear tooth contact pattern through the oil filler hole.
The pattern is indicated by the Prussian Blue applied to the pinion.
Contact is normal if the Prussian Blue is transferred to the approximate center of each tooth, but slightly to the heel side and to the flank side.

If the patterns are not correct, remove and change the pinion shim with one of an alternate thickness.



Replace the pinion shim [1] with a thicker one if the contact pattern is too high, toward the face.



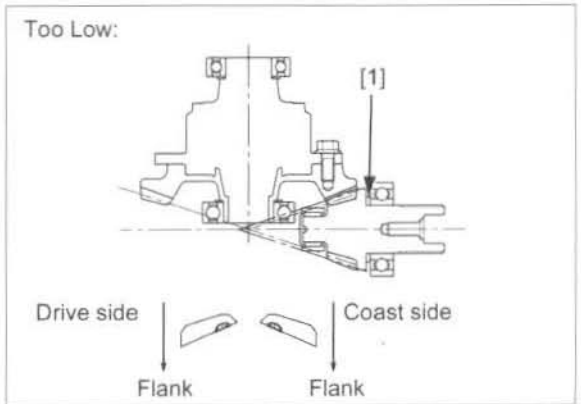
Replace the pinion shim [1] with a thinner one if the contact pattern is too low, toward the flank.

The pattern will shift about 0.5 – 1.0 mm (0.02 – 0.04 in) when the thickness of the shim is changed by 0.12 mm (0.005 in).

NOTE:

- Fifteen different thickness shims are available from the thinnest (1.64 mm thickness: A) shim to the thickest (2.48 mm thickness: O) in intervals of 0.06 mm.

Pinion shims:
A: (thinnest): 1.64 mm (0.065 in)
G: (standard): 2.00 mm (0.079 in)
O: (thickest): 2.48 mm (0.098 in)



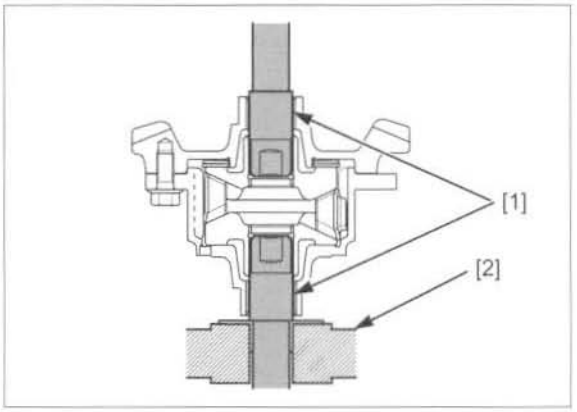
Pinion shim replacement (page 19-29).

DIFFERENTIAL INSPECTION

Install the inspection tools into both sides of the differential.

TOOL:

[1] Differential inspection tool 07KMK-HC50101 or 07KMK-HC5010A (U.S.A. only)



Hold the flat surface of the tool with a bench vise [2]. Attach a torque wrench to the other tool and measure the limited slip torque.

STANDARD:

14 – 17 N·m (1.45 – 1.75 kgf·m, 10 – 13 lbf·ft)

SERVICE LIMIT: 12 N·m (1.2 kgf·m, 9 lbf·ft)

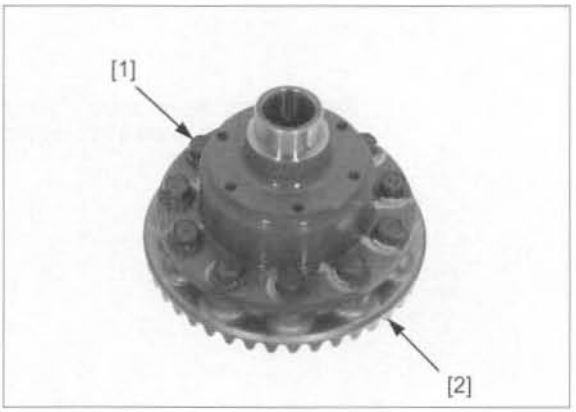
If the slip torque is out of specification, disassemble the differential and perform the components inspection (page 19-27) since the differential may be faulty.

DIFFERENTIAL DISASSEMBLY

NOTE:

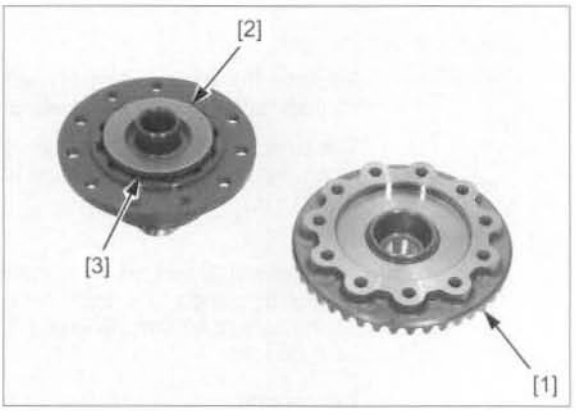
- When assembling the differential, both drive shafts are required to perform the face cam-to-housing alignment (page 19-34). The other drive shaft must be removed from the knuckle (page 16-16).

Remove the eleven bolts [1], then place the differential assembly with the ring gear side [2] up.

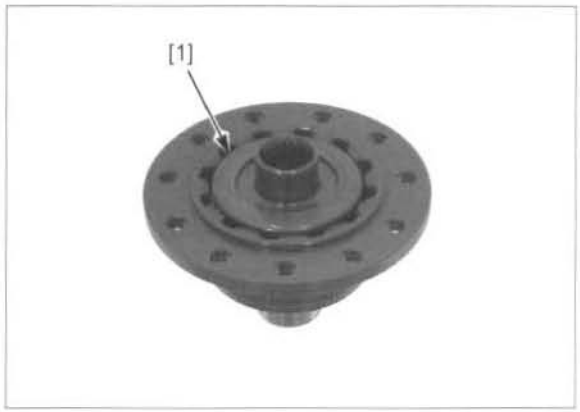


Remove the following:

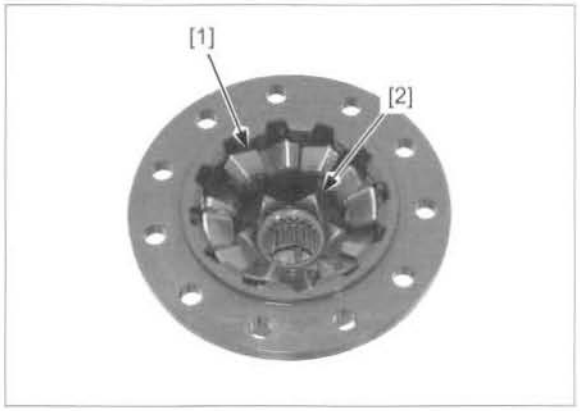
- ring gear [1]
- side cone spring [2]
- shim [3]



– face cam [1]



– six cam followers A and six cam followers B [1]
– face cam [2]

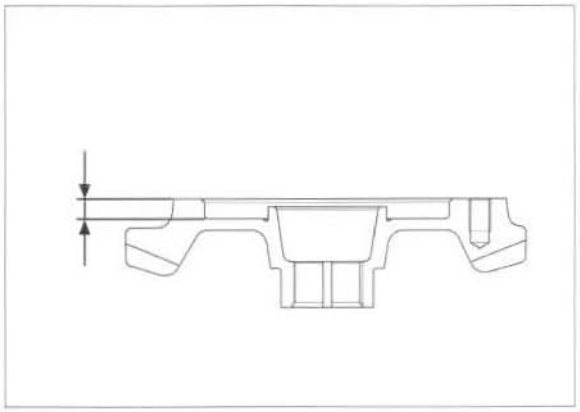


DIFFERENTIAL COMPONENTS INSPECTION

RING GEAR

Check the sliding surface of the ring gear for damage or discoloration.
Measure the depth of the ring gear from the mating surface as shown.

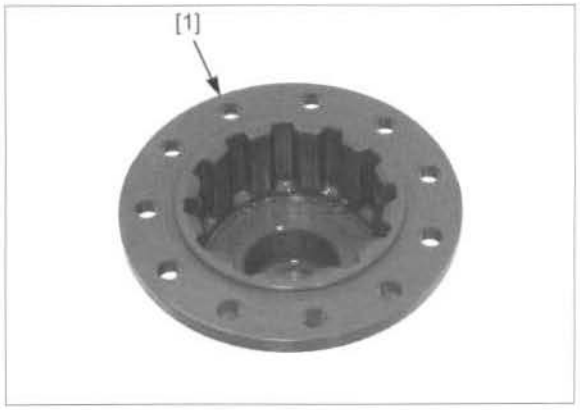
SERVICE LIMIT: 6.55 mm (0.258 in)



DIFFERENTIAL HOUSING/FACE CAM/ CAM FOLLOWER

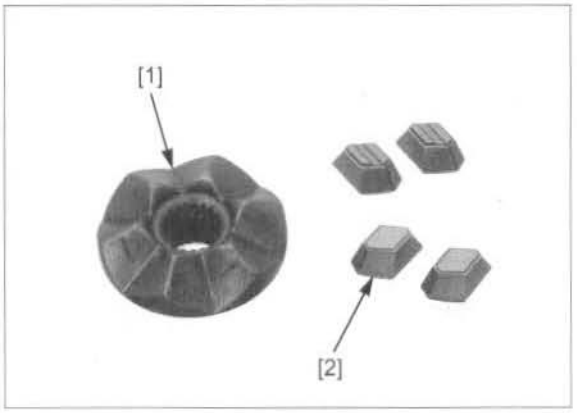
If the differential housing or face cam are faulty, replace the differential as an assembly.

Check the sliding surface and grooves of the housing [1] for damage or discoloration.



Replace the cam followers as a set (12 pieces).

Check the shim, face cams [1] and followers [2] for damage.

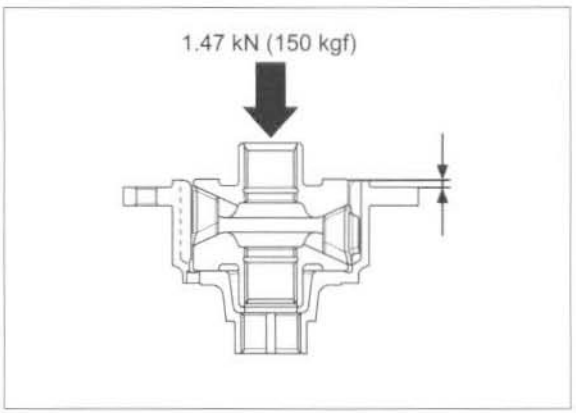


Temporarily assemble the differential housing, face cams and cam followers (page 19-34).

Measure the height of the face cam from the housing mating surface as shown while applying a load of 1.47 kN (150 kgf) to the face cam boss using a hydraulic press.

SERVICE LIMIT: 3.3 mm (0.13 in)

If the height is less than the limit, replace the differential as an assembly.



SIDE CONE SPRING

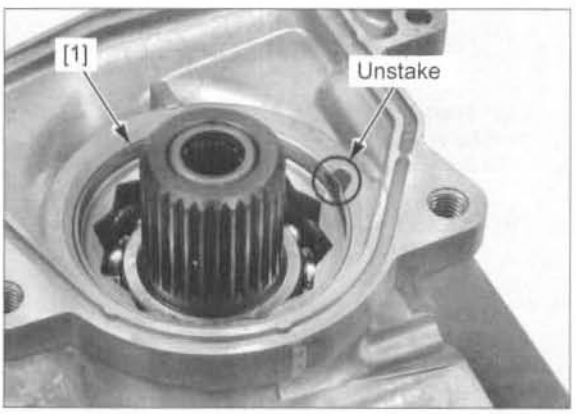
Check the cone spring for damage.
Measure the height of the spring.

SERVICE LIMIT: 2.6 mm (0.10 in)

PINION GEAR REMOVAL

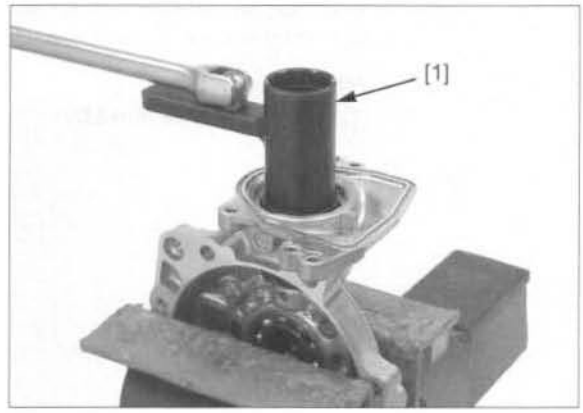
Be careful that metal particles do not enter the bearing and the threads of the case are not damaged.

Unstake the bearing lock nut [1] with a drill or grinder.



Remove the lock nut and discard it.

TOOL:
[1] Lock nut wrench, 34 x 44 mm 07916-ME50001



Cover the clutch housing mating surface with protective tape [4] or an equivalent to prevent damage.

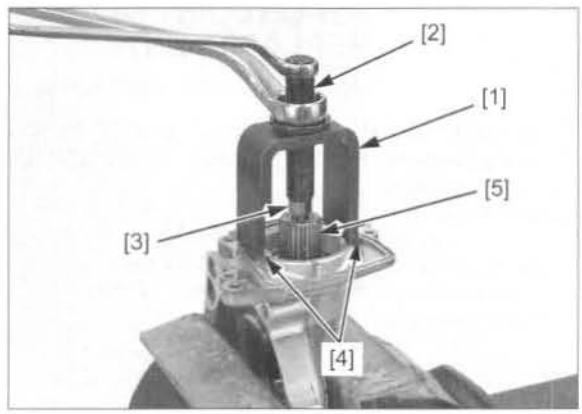
Install the special tools onto the pinion gear shaft and gear case.

TOOLS:

[1] Pinion puller base	**07HMC-MM80110**
[2] Puller shaft and nut	**07965-VM00200**
[3] Threaded adaptor	**070MF-HP50100**

U.S.A. TOOLS:

Pinion puller base	**07HMC-MM8011A**
Puller shaft	**07931-ME4010B**
Special nut	**07931-HB3020A**
Threaded adaptor	**070MF-HP5A100**



Pull the pinion assembly [5] out from the gear case.

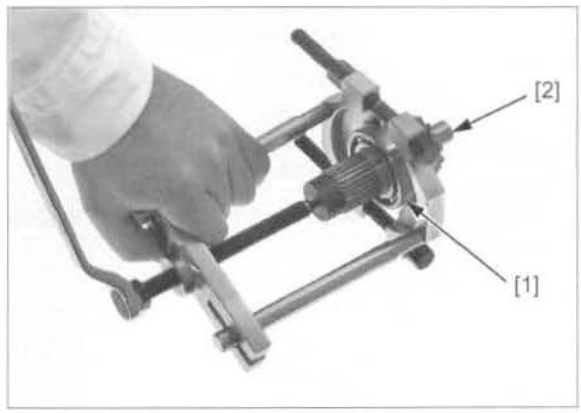
PINION BALL BEARING AND SHIM REPLACEMENT

Protect the shaft end with the pilot or an equivalent.

Pull the bearing [1] from the pinion gear [2] with a commercially available bearing puller.

Remove the bearing and pinion shim.

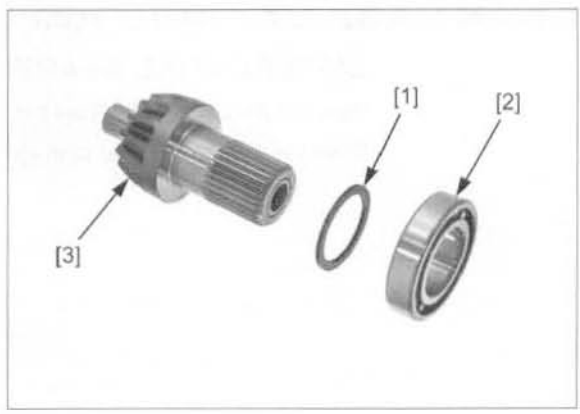
Replace the pinion joint needle bearing in the shaft end if necessary (page 19-30).



Install the pinion shim [1] and bearing [2] onto the pinion gear [3].

NOTE:

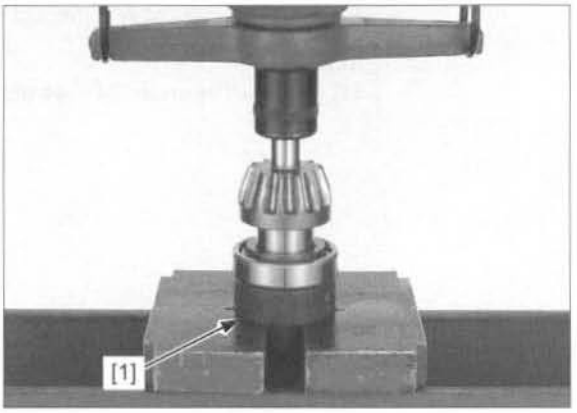
- When the gear set, differential bearing, differential housing and/or gear case has been replaced, use a 2.00 mm (0.079 in) thick shim for initial reference.



Press the pinion gear into a new bearing until it is fully seated by supporting the bearing inner race.

TOOL:

[1] Attachment, 30 mm I.D.	**07746-0030300**



PINION JOINT NEEDLE BEARING REPLACEMENT

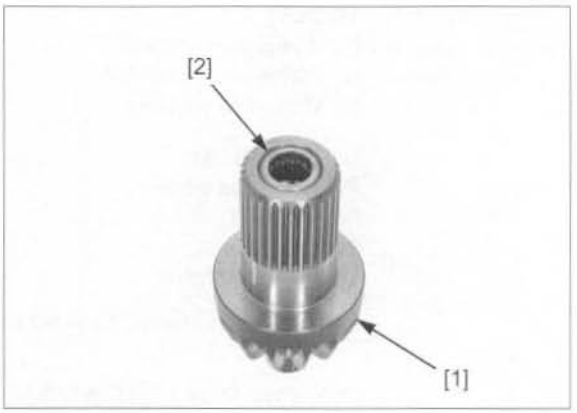
Remove the pinion ball bearing (page 19-29).

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

Heat the pinion gear [1] to about 80°C (176°F) and remove the needle bearing [2], using the special tools.

TOOLS:

Remover head, 12 mm	**07936-1660110**
Remover shaft, 12 mm	**07936-1660120 or**
Bearing remover, 12 mm	**07936-166010A (U.S.A. only) with 07936-3710100**
Remover weight	**07741-0010201 or 07936-371020A or 07936-3710200 (U.S.A. only)**

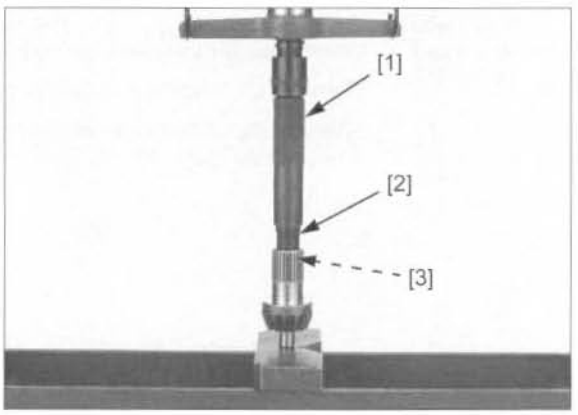


Press a new bearing into the pinion gear with the marking facing up so that it is flush with the shaft end.

TOOLS:

[1] Driver	**07749-0010000**
[2] Attachment, 22 x 24 mm	**07746-0010800**
[3] Pilot, 12 mm	**07746-0040200**

Install the pinion ball bearing (page 19-29).

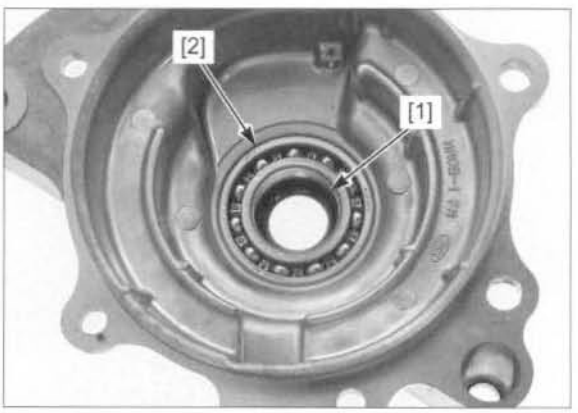


GEAR CASE BEARING REPLACEMENT

DIFFERENTIAL BEARING

Remove the oil seals [1] from the gear case and cover.

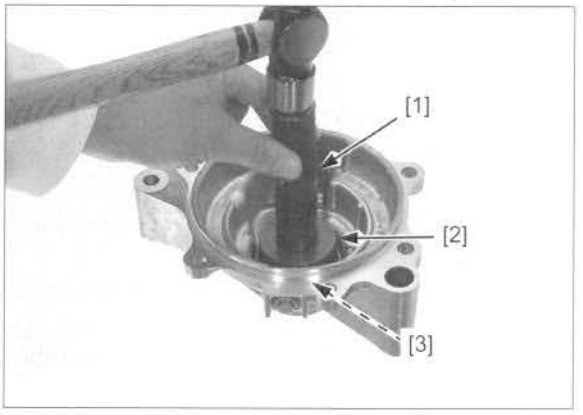
Drive the bearings [2] out of the case and cover.



Drive the new bearings into the gear case and cover.

TOOLS:

[1] Driver	**07749-0010000**
[2] Attachment, 52 x 55 mm	**07746-0010400**
[3] Pilot, 30 mm	**07746-0040700**

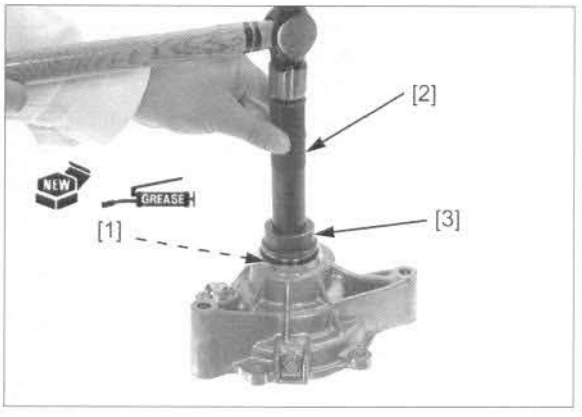


Apply grease to the seal lips of new dust seals [1].

Install each dust seal into the case and cover with the metal side facing out.

TOOLS:

[2] Driver	**07749-0010000**
[3] Attachment, 45 x 50 mm	**07946-6920100**



PINION NEEDLE BEARING

Rotate the stopper ring [1] until its end appears in the access hole [2].
Strike gently near the end of the ring with a punch to bend the end upward.
Grasp the end of the ring with needle-nose pliers and pull the stopper ring out through the access hole.

Remove the oil filler cap.

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.

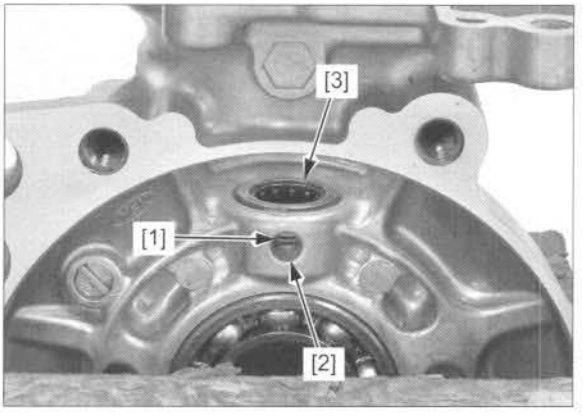
Heat the gear case to about 80°C (176°F) and remove the needle bearing [3], using the special tools.

TOOLS:

Remover head, 15 mm	**07936-KC10200**
Remover shaft, 15 mm	**07936-KC10100**
Remover weight	**07741-0010201**

U.S.A. TOOLS:

Bearing remover, 15 mm	**07936-KC10500**
Remover weight	**07936-371020A or 07936-3710200**



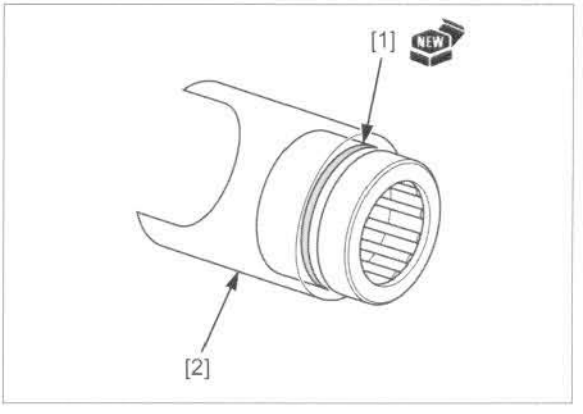
Install a new stopper ring [1] into the groove in a new bearing.

Make sure the stopper ring stays in the groove.

Install the bearing into the compressor [2] until the stopper ring is flush with the end of the tool.

TOOL:

Bearing clip compressor, 25 mm	**070ME-HN80100 or 070ME-HN8A100 (U.S.A. only)**



Place the driver, attachment and pilot on the top of the bearing and tape the driver to the compressor [1].

TOOLS:

[2] Driver	**07949-3710001**
[3] Attachment, 22 x 24 mm	**07746-0010800**
[4] Pilot, 15 mm	**07746-0040300**

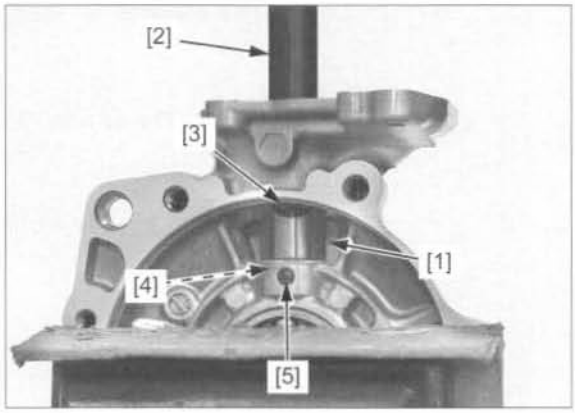
Place the bearing and tool assembly into a freezer for at least 30 minutes.

Heat the gear case to 80°C (176°F).

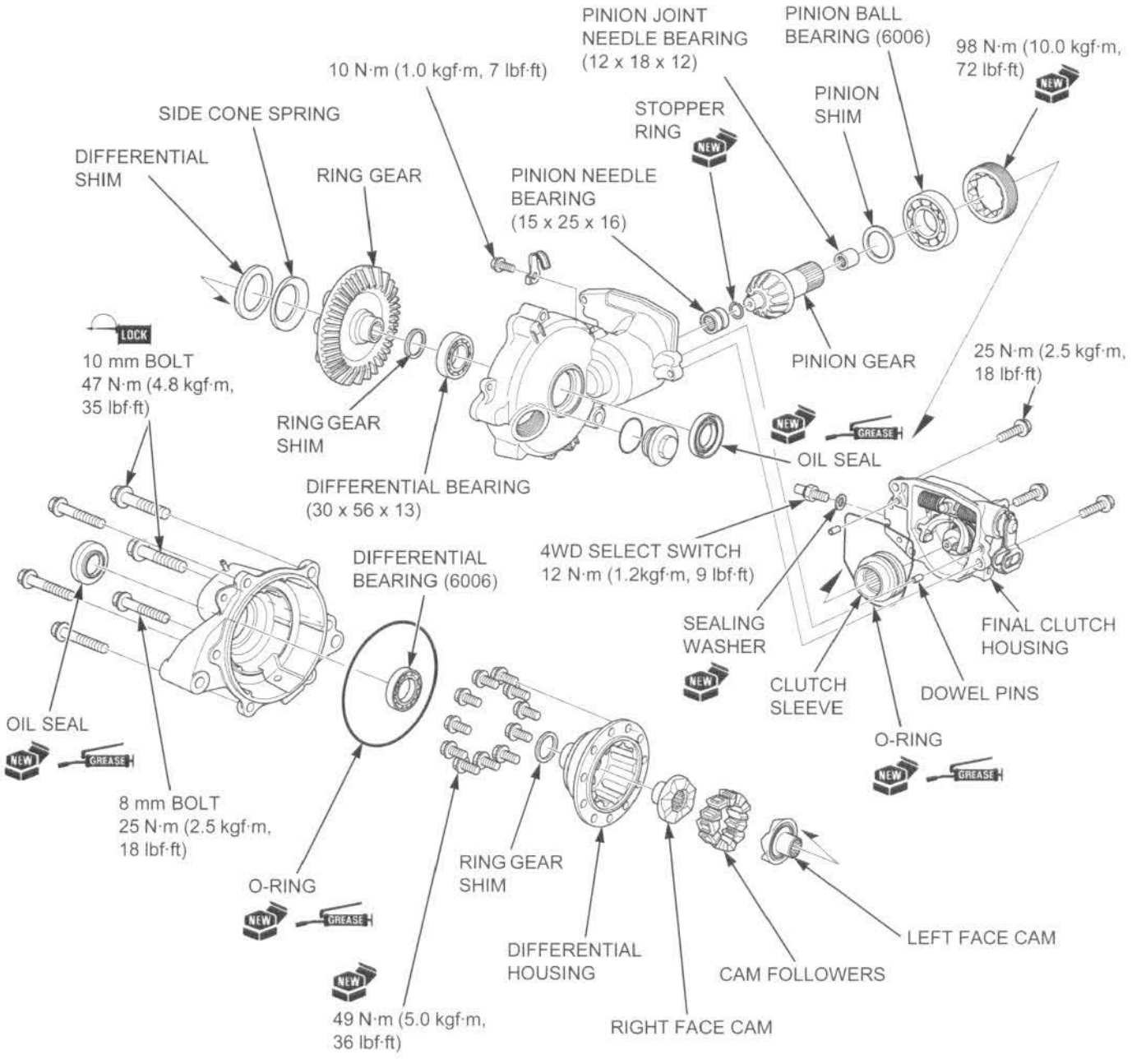
Remove the bearing and tool assembly from the freezer and drive the bearing into the gear case using the special tools.

Only strike the driver once. If you strike it more than once, the ring [5] may slip out of the groove. If this happens, remove the ring and bearing, and install a new ring.

Make sure the stopper ring is securely set in the groove of the gear case.



FRONT FINAL GEAR ASSEMBLY

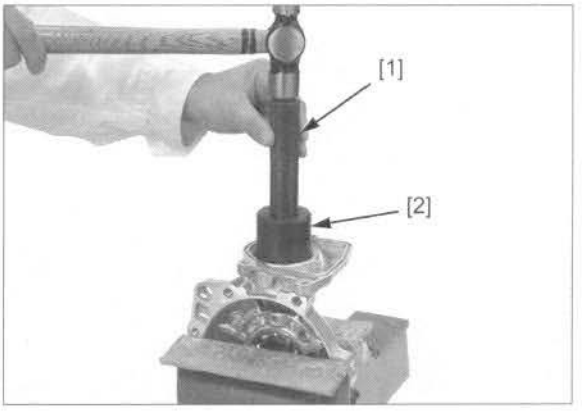


PINION GEAR INSTALLATION

Drive the pinion gear assembly into the gear case.

TOOLS:

[1] Driver	**07749-0010000**
[2] Attachment	**07GAF-SE00200**

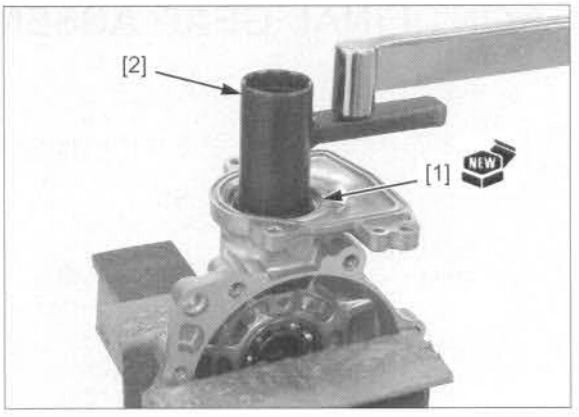


Install a new lock nut [1] and tighten it.

TOOL:
[2] Lock nut wrench, 34 x 44 mm 07916-ME50001

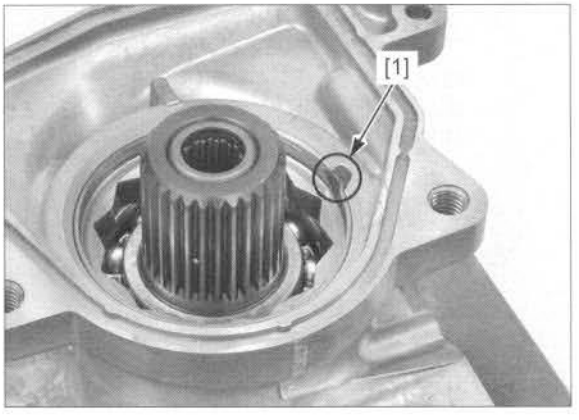
Refer to "Service Information" for torque wrench reading information (page 19-3).

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 [1] the lock nut into the case groove.



DIFFERENTIAL ASSEMBLY

Keep dust and dirt out of the differential housing.

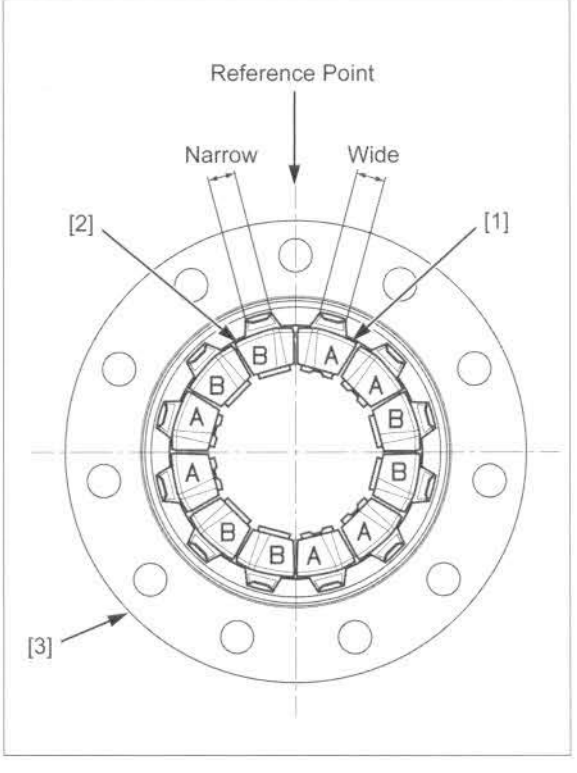
Install the face cam into the differential housing.

Install six cam followers A (rib) [1] and six followers B (flat) [2] into the specified grooves in the housing [3] by two and two as shown.

For easy installation, find the reference point that is lined up the bolt hole and housing lug in a straight line, and mark the housing using a marker. Start follower setting from the housing groove near by this point in successively.

NOTE:

- The housing grooves are sized differently to accommodate the differently sized A and B cam followers. Make sure to install the followers correctly.



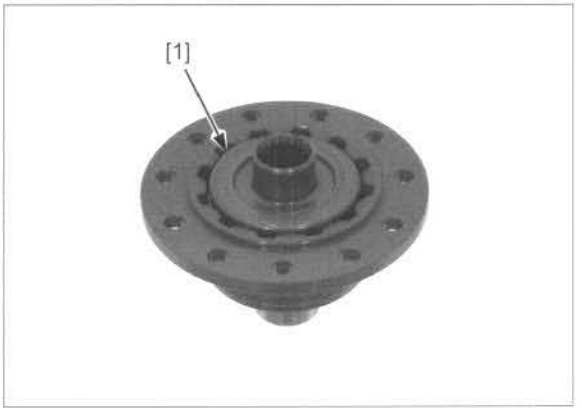
Install the face cam [1] onto the cam followers.

Measure the following dimensions and record them.
- depth of the ring gear (page 19-27)
- height of the housing-to-cam (page 19-28)

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 cam height

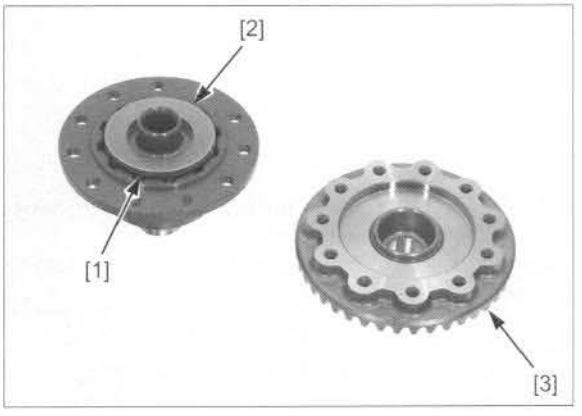


Select the shim [1] and install it onto the face cam.

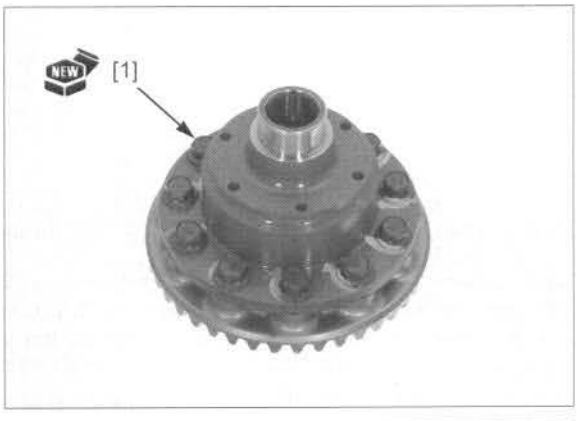
Differential shims:

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 [2] with the concave side facing up (ring gear side).
Install the ring gear [3].



Install new ring gear bolts [1] and screw them until the seating surfaces of all the bolts touches the housing, but do not tighten them yet.



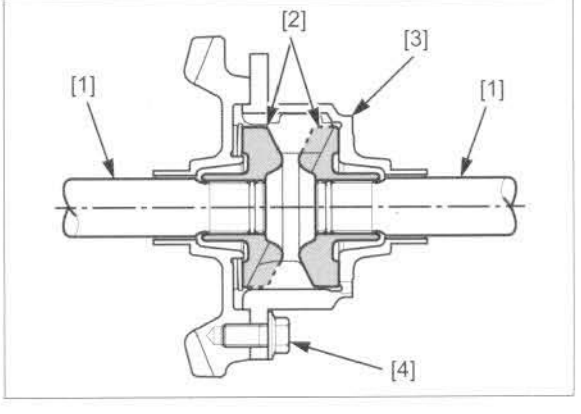
Temporarily install the drive shafts [1] into the differential assembly without the stopper rings until they are fully seated to align the face cams [2] with the differential housing [3].

Tighten the ring gear bolts [4] to the specified torque in a crisscross pattern in several steps.

TORQUE: 49 N·m (5.0 kgf·m, 36 lbf·ft)

Remove the drive shafts.

Inspect the slip torque (page 19-26).
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.



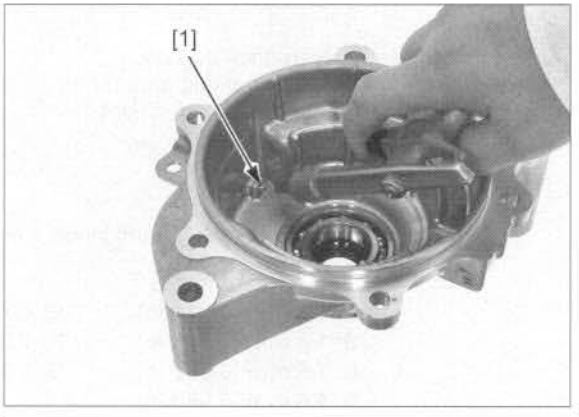
FINAL GEAR CASE ASSEMBLY

NOTE:

- When the gear set, bearing, differential housing and/or gear case has been replaced, check the following:
  - tooth contact pattern (page 19-24)
  - gear backlash (page 19-22)

Keep dust and dirt out of the case and cover.

Blow compressed air through the breather hole [1] in the case cover.



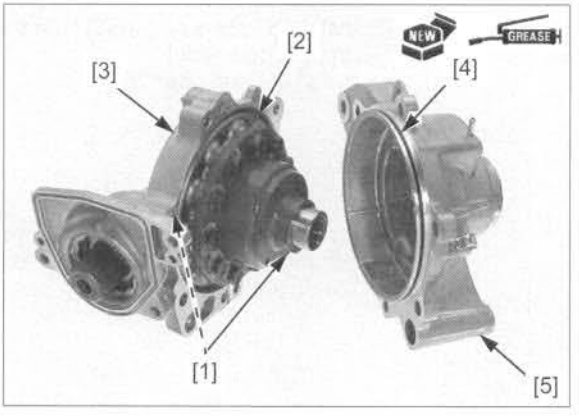
Install the proper ring gear shims [1] onto the differential assembly [2].

Before installing the assembly, be sure to verify the alignment using the drive shafts (page 19-35).

Install the differential assembly into the gear case [3].

Coat a new O-ring [4] with grease and install it into the groove in the case cover [5].

Install the 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.

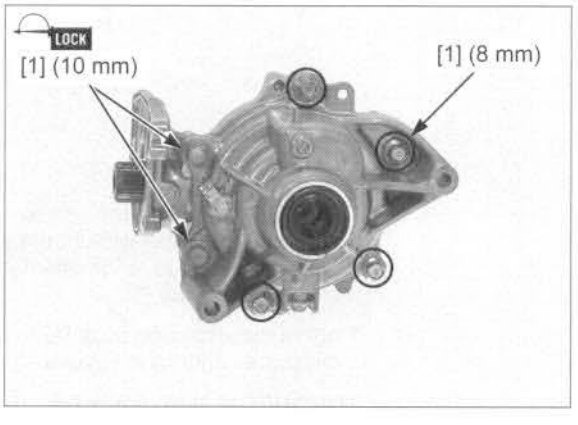
Apply locking agent to the threads of the two 10 mm bolts.

Install the six bolts [1] and screw them 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: 47 N·m (4.8 kgf·m, 35 lbf·ft)
8 mm bolt: 25 N·m (2.5 kgf·m, 18 lbf·ft)

Make sure that the gear assembly rotates smoothly without binding.

Install the final clutch housing (page 19-21).

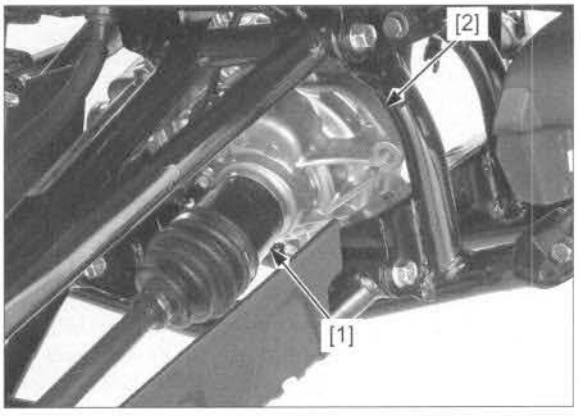


FRONT FINAL DRIVE INSTALLATION

Place the final gear case assembly into the frame.

If both drive shafts are removed, install them after mounting the gear case assembly completely.

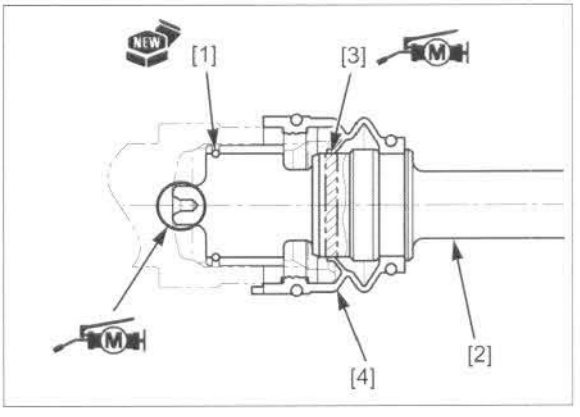
Install the right drive shaft [1] into the gear case [2]. (page 19-11).



Install a new stopper ring [1] into the groove in the propeller shaft [2].

Apply molybdenum disulfide grease to the seal lip [3] of the front side boot [4].
Make sure the seal lip is not turned outside in.

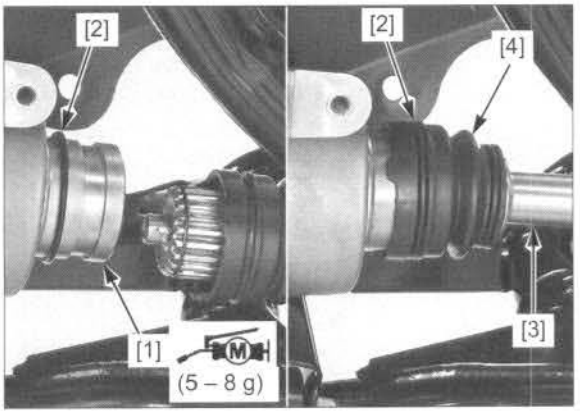
Apply molybdenum disulfide grease to the front end of the propeller shaft.



Apply 5 – 8 g of molybdenum disulfide grease to the splines of the pinion joint [1].
Place the boot band [2] over the pinion joint temporarily.

Install the propeller shaft [3] into the pinion joint, aligning the 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 [4] over the pinion joint groove securely and the boot band into the boot groove.



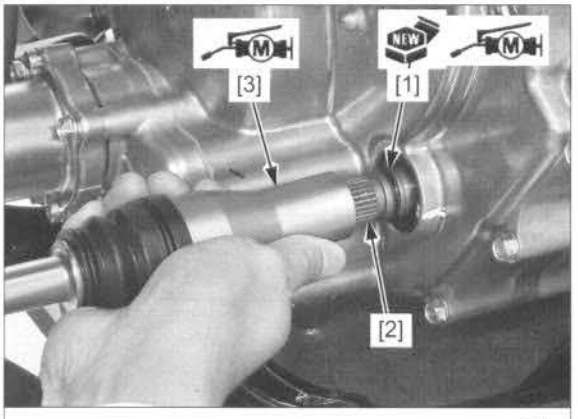
Coat a new O-ring [1] with molybdenum disulfide grease and install it into the groove of the output shaft [2].

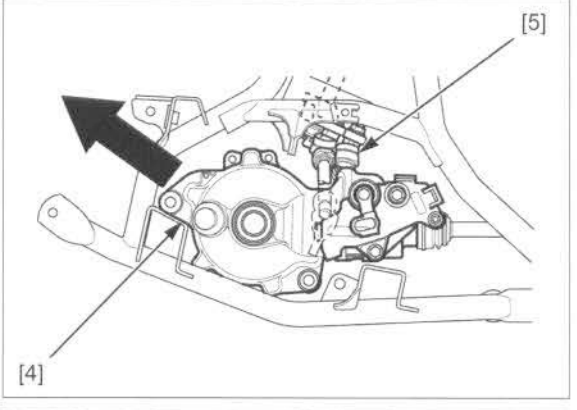
Apply molybdenum disulfide grease to the splines of the propeller shaft joint [3].
Move the gear case assembly [4] forward for maximum clearance between the shaft joint and output shaft.

NOTE:

- Turn the handlebar all the way to the right to move the gear case assembly.
- Put some cloth on the gear case to avoid scratch or damage the tie-rod end [5].

Engage the shaft joint over the output shaft and move the gear case assembly rearward.





Align the rear mounting bolt holes in the gear case and frame, then install the mounting bolt [1] from the right side and a new mounting nut [2].

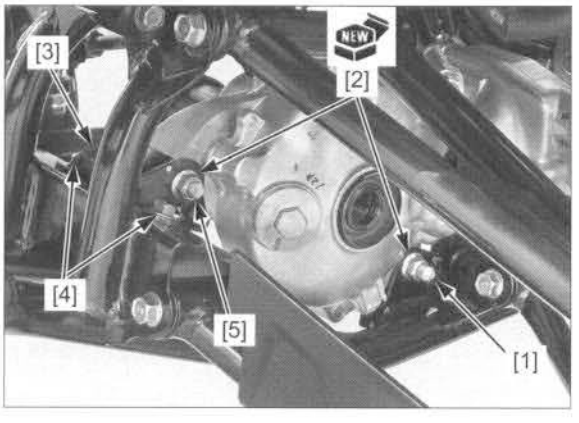
Install the mounting bracket [3] with the two bolts [4].
Install the front mounting bolt [5] from the right side and a new mounting nut.

Tighten all the gear case mounting fasteners in the following sequence.

- Rear mounting nut
- Mounting bracket bolts
- Front mounting nut

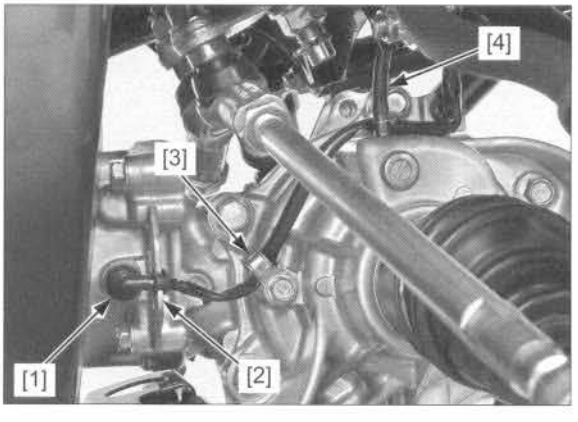
TORQUE:

Rear mounting nut:
44 N·m (4.5 kgf·m, 32 lbf·ft)
Front mounting nut:
44 N·m (4.5 kgf·m, 32 lbf·ft)



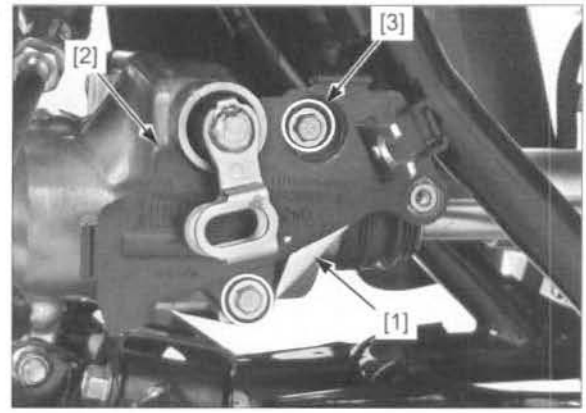
Connect the 4WD switch connector [1] and install the wire grommet into the guide [2] in the gear case. Secure the wire with the clamp [3].

Connect the breather hose [4].

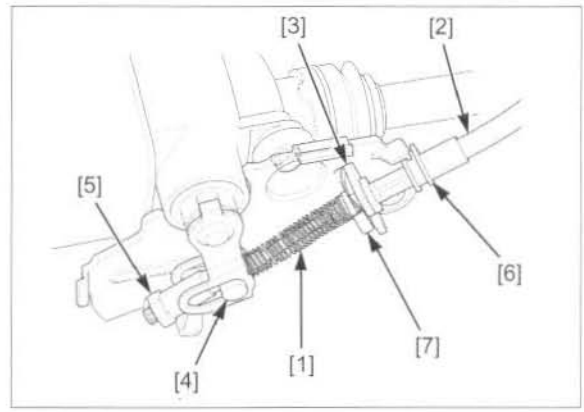


Install the holder bracket [1] and cover base [2] with the two bolts [3], and tighten them to the specified torque.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)



Install the spring [1] onto the selector cable [2].
Insert the cable into the cable holder [3] and connect it to the clutch arm with the joint pin [4] and adjusting nut [5].
Set the groove in the cable grommet [6] onto the cover base end properly.
Install the retaining plate [7] onto the cable with the concave facing the cable holder to secure the cable .



Adjust the selector cable (page 3-19).

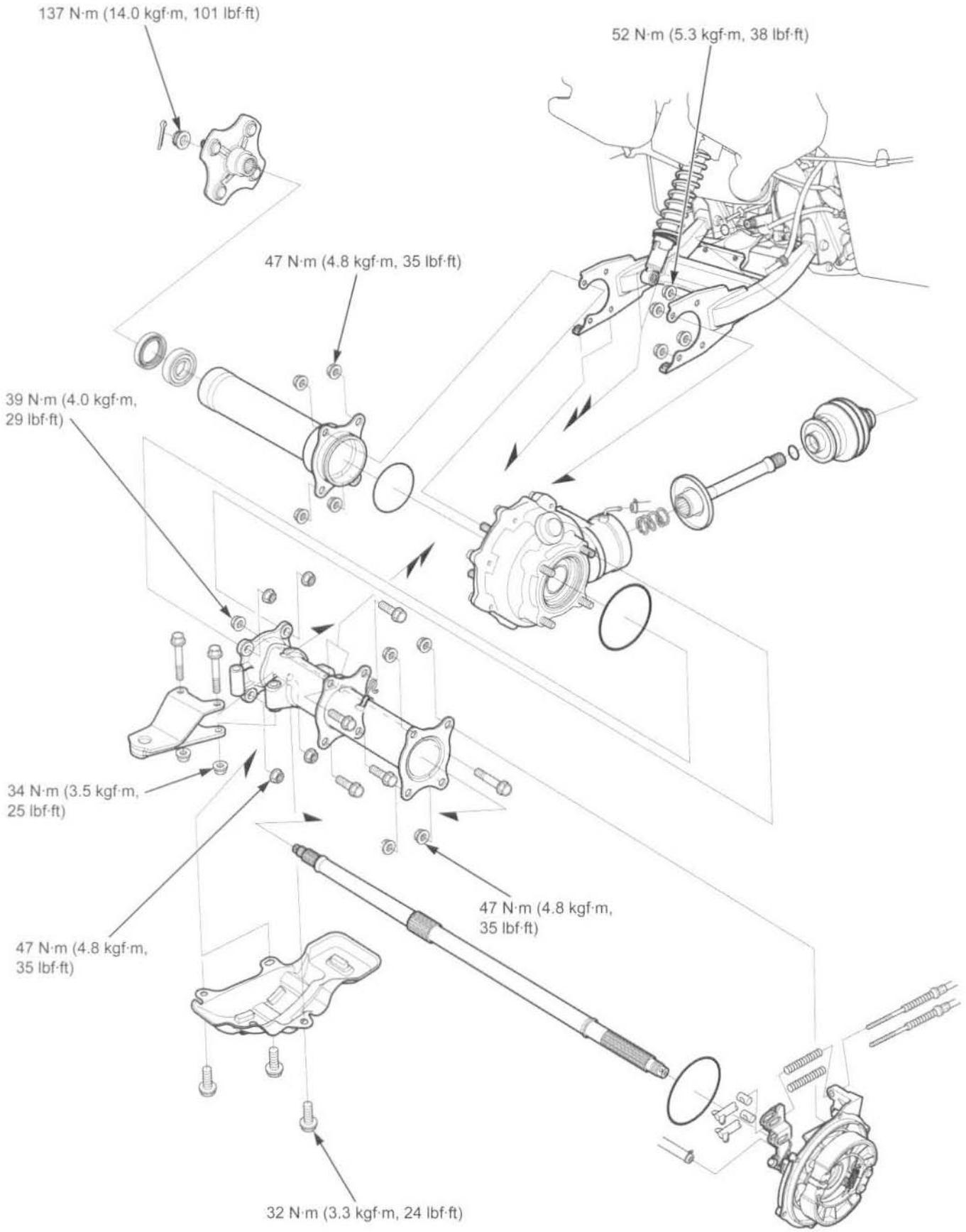
Install the following:
- drive shaft(s) (page 19-11)
- engine guard (page 2-7)
- mudguards (page 2-6)

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

MEMO

20. 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 nut. The specification given is the actual torque applied to the lock nut, not the reading on the torque wrench. Do not overtighten the lock nut. The specification later in the text gives both actual and indicated.
- Replace the ring and pinion gears as a set.

SPECIFICATIONS

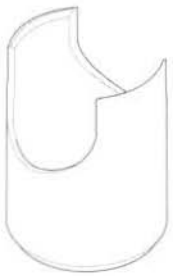
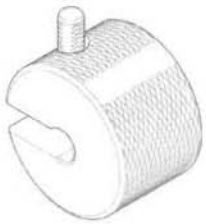
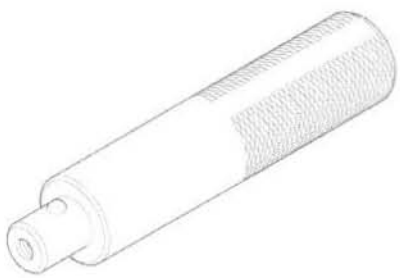
Unit: mm (in)

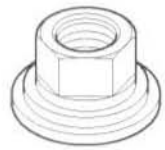
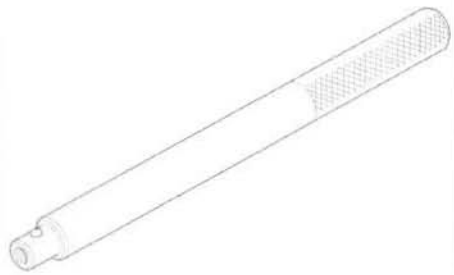
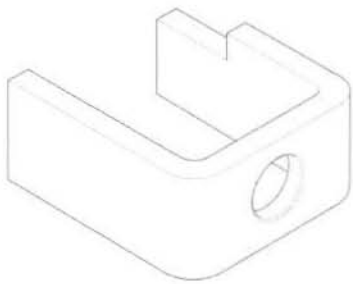
ITEM			STANDARD	SERVICE LIMIT
Axle runout			–	3.0 (0.12)
Rear final drive	Oil capacity	After draining	75 cm^3 (2.5 US oz, 2.6 Imp oz)	–
		After disassembly	100 cm^3 (3.4 US oz, 3.5 Imp oz)	–
	Recommended oil		Honda shaft drive oil or equivalent hypoid gear oil, SAE # 80	–
	Gear backlash		0.05 – 0.25 (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

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Rear final gear case cover bolt	2	10	47 (4.8, 35)	Apply locking agent to the threads.
	6	8	25 (2.5, 18)	
Rear final gear pinion bearing lock nut	1	64	98 (10.0, 72)	Lock nut: replace with a new one. Stake.
Right axle housing mounting nut	4	10	52 (5.3, 38)	Lock nut: replace with a new one.
Rear final gear case mounting nut	8	10	47 (4.8, 35)	Lock nut: replace with a new one.
Shock absorber lower mounting nut	1	10	39 (4.0, 29)	Lock nut: replace with a new one.
Rear final gear case skid plate bolt	3	8	32 (3.3, 24)	ALOC bolt: replace with a new one.
Rear brake panel mounting nut	4	10	47 (4.8, 35)	Lock nut: replace with a new one.
Rear wheel hub nut	2	20	137 (14.0, 101)	Castle nut: tighten to the specified torque and further tighten until its grooves align with the cotter pin hole. For tightening procedure: See page 20-24
Trailer hitch nut	2	10	34 (3.5, 25)	Lock nut: replace with a new one.

TOOLS

Bearing clip compressor, 26 mm 070ME-HP50100 	Remover weight 07741-0010201  or 07936-371020A or 07936-3710200 (U.S.A. only)	Attachment, 42 x 47 mm 07746-0010300 
Attachment, 52 x 55 mm 07746-0010400 	Attachment, 62 x 68 mm 07746-0010500 	Attachment, 24 x 26 mm 07746-0010700 
Attachment, 35 mm I.D. 07746-0030400 	Pilot, 15 mm 07746-0040300 	Pilot, 35 mm 07746-0040800 
Pilot, 28 mm 07746-0041100 	Fork seal driver weight 07747-0010100 	Driver 07749-0010000 

Lock nut wrench, 30 x 64 mm 07916-MB00002 	Special nut 07931-HB3020A (U.S.A. only) 	Puller shaft and nut 07931-ME40000 
Puller shaft 07931-ME4010B (U.S.A. only) 	Remover shaft, 15 mm 07936-KC10100 	Remover head, 15 mm 07936-KC10200 
Bearing remover, 15 mm 07936-KC10500 (U.S.A. only) 	Attachment 07946-3290000 	Driver 07949-3710001 
Pinion puller base 07HMC-MM80110  or 07HMC-MM8011A (U.S.A. only)	Oil seal driver attachment 07JAD-PH80101 	Pilot, 32 mm 07MAD-PR90200 

TROUBLESHOOTING

Excessive noise
- Worn or scored ring gear and axle splines
- Worn or scored pinion gear and propeller shaft splines
- Worn or damaged bearing
- Worn pinion and ring gears
- Excessive backlash between pinion and ring gears
- Oil level too low

Wobble or vibration in vehicle
- Axle not tightened properly
- Bent axle

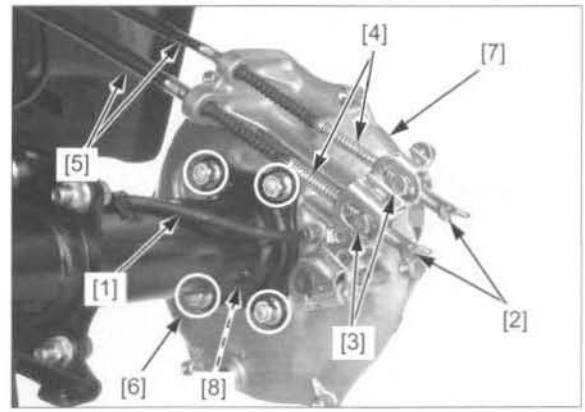
Oil leak
- Oil level too high
- Clogged breather
- Damaged seals
- Loose case cover bolt

REAR AXLE REMOVAL

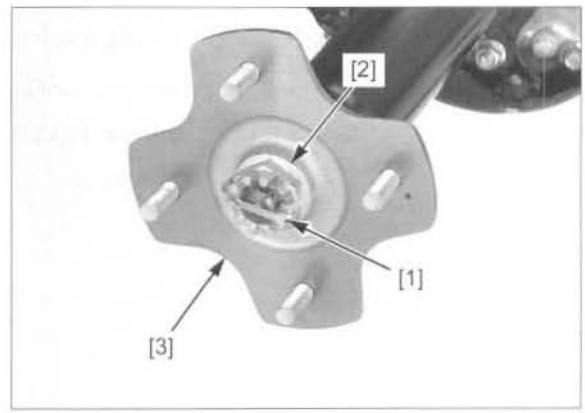
Remove the rear wheels (page 17-6).
Remove the rear brake drum (page 18-16).

Do not get grease on the brake shoe linings.

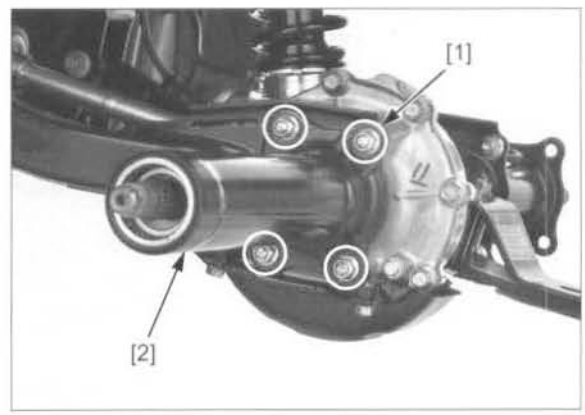
Support the swingarm and remove the following:
- breather hose [1]
- adjusting nuts [2]
- joint pins [3]
- springs [4]
- brake cables [5]
- four nuts [6]
- brake panel assembly [7]
- O-ring [8](from the brake panel)



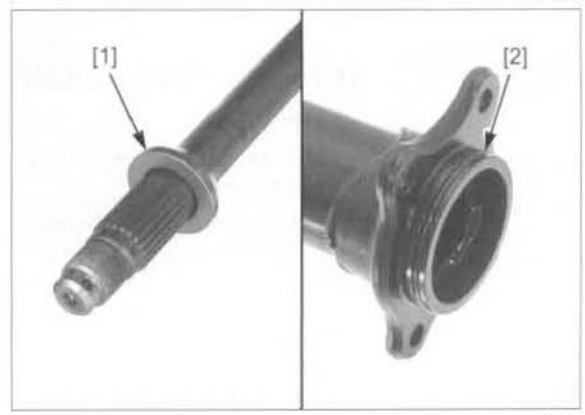
- cotter pin [1]
- hub nut [2]
- left wheel hub [3]



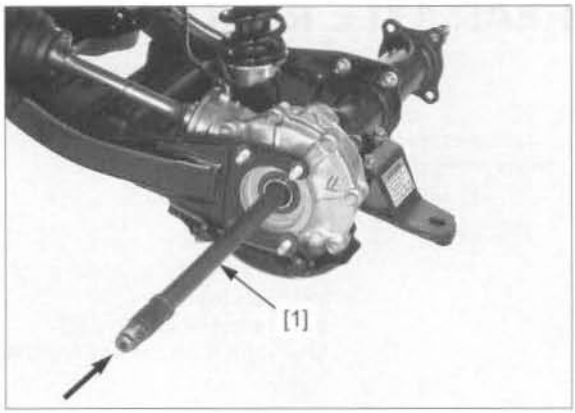
- four nuts [1]
- left axle housing [2]



- side collar [1]
- O-ring [2]



Remove the rear axle [1] by driving it from the left side using a rubber mallet.

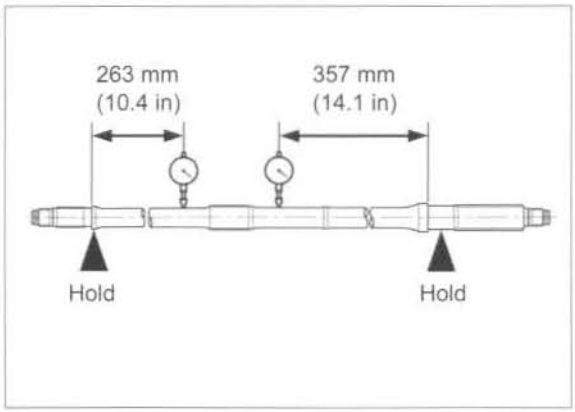


INSPECTION

AXLE

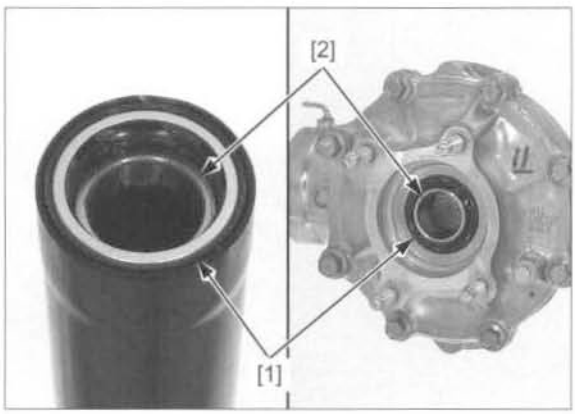
Set the axle in V-blocks and measure the axle runout with a dial indicator.
Axle runout is 1/2 the total indicator reading.

SERVICE LIMIT: 3.0 mm (0.12 in)



AXLE BEARING

Remove the dust seals [1] from the axle housing and brake panel.
Turn the inner race of the bearing [2] with your finger.
The bearings should turn smoothly and quietly.
Also check that the bearing outer race fits tightly in the housing or panel.



BEARING REPLACEMENT

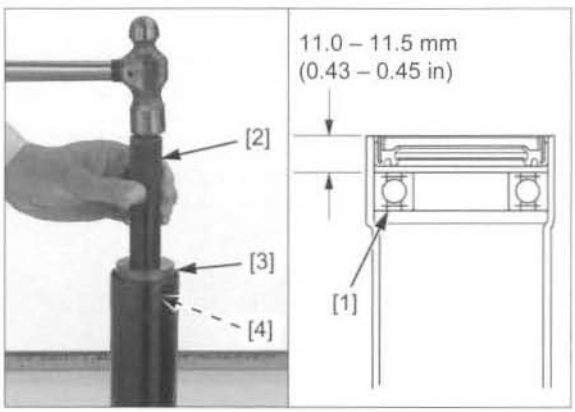
AXLE HOUSING

Remove the dust seal and drive the axle bearing out of the axle housing.

Press the bearing [1] into the axle housing until the depth from the housing edge is 11.0 – 11.5 mm (0.43 – 0.45 in).

TOOLS:

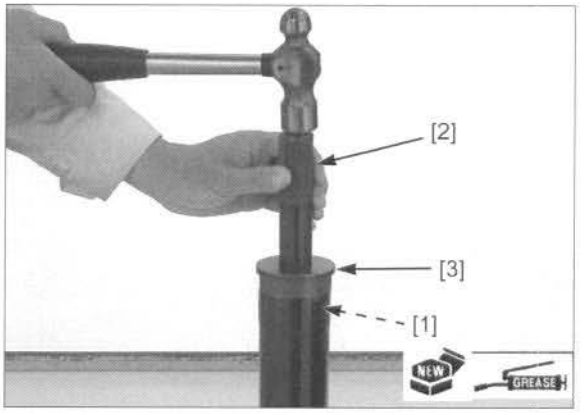
[2] Driver	**07749-0010000**
[3] Attachment, 52 x 55 mm	**07746-0010400**
[4] Pilot, 32 mm	**07MAD-PR90200**



Apply grease to the lips of a new dust seal [1].
Install the dust seal with the metal plate side facing up until it is flush with the housing end.

TOOLS:

[2] Driver	**07749-0010000**
[3] Attachment, 62 x 68 mm	**07746-0010500**



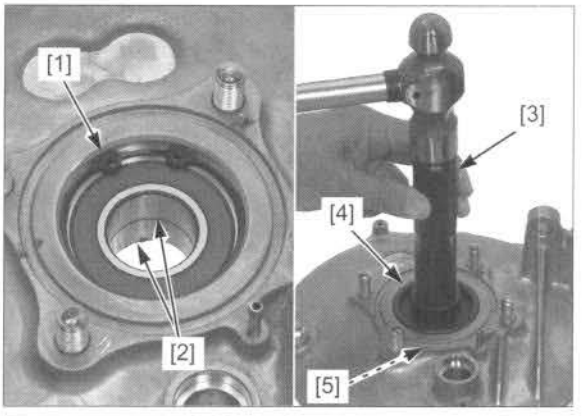
Remove the snap ring [1].
Drive the bearings [2] out of the brake panel.

Support the bearing housing section of the brake panel when installing.

Drive a new bearing into the brake panel with the sealed side facing down (brake drum side).

TOOLS:

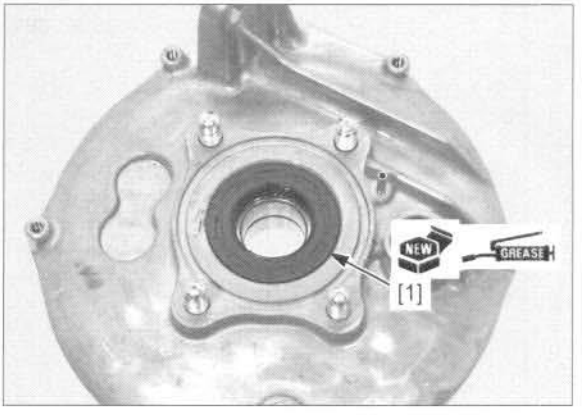
[3] Driver	**07749-0010000**
[4] Oil seal driver attachment	**07JAD-PH80101**
[5] Pilot, 28 mm	**07746-0041100**



Drive a new bearing with the sealed side facing up (axle housing side) using the same tools.

Install the snap ring into the groove with the chamfered edge facing the bearing.

Apply grease to the seal lips of a new dust seal [1].
Install the dust seal into the brake panel so that it is flush with the brake panel.

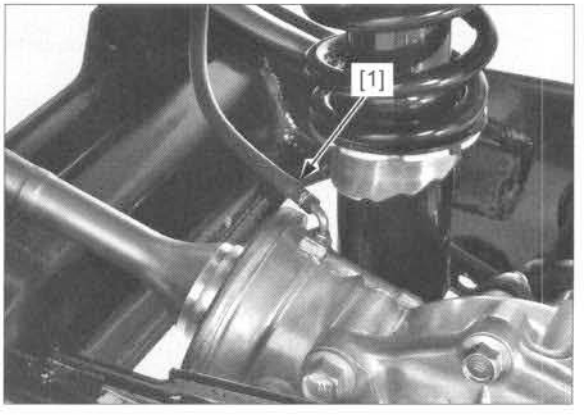


REAR FINAL DRIVE REMOVAL

Drain the gear case oil if the final gear case will be disassembled (page 3-17).

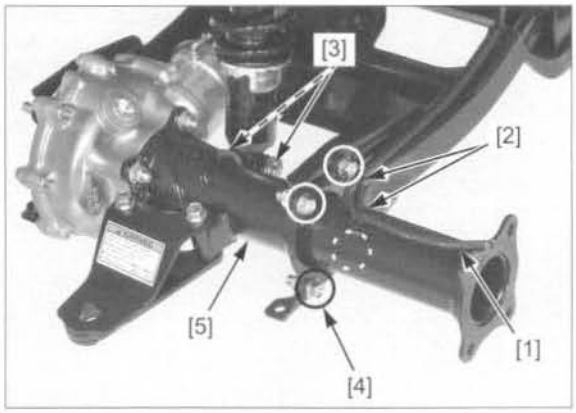
Remove the rear axle (page 20-7).

Support the swingarm and remove the following:
– breather hose [1] (from the gear case)

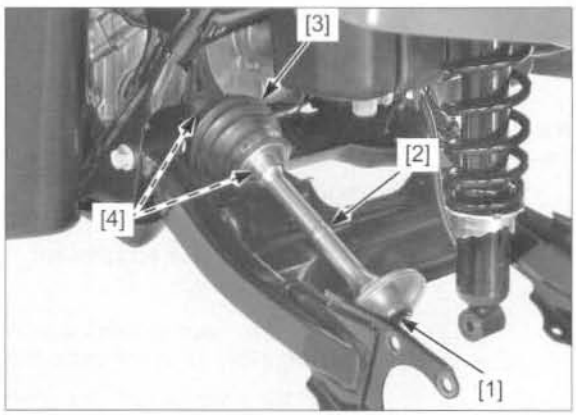


If the gear case will be disassembled, loosen the four gear case mounting nuts slightly before removing the housing-to-swingarm fasteners.

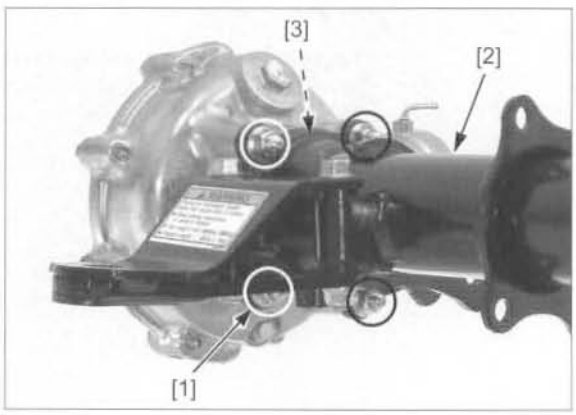
- breather hose [1] (off of the clamps [2] on the housing)
- shock absorber lower mounting nut and bolt [3]
- four nuts and bolts [4] (attaching to the swingarm; while supporting the gear case securely)
- gear case/axle housing assembly [5]



- joint spring [1]
- propeller shaft [2]
- universal joint [3]
- O-rings [4] (from the propeller shaft and output shaft)



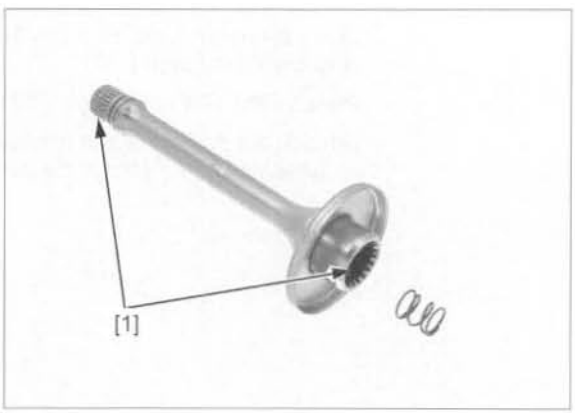
- four nuts [1]
- right axle hosing [2]
- O-ring [3] (from the gear case)



INSPECTION

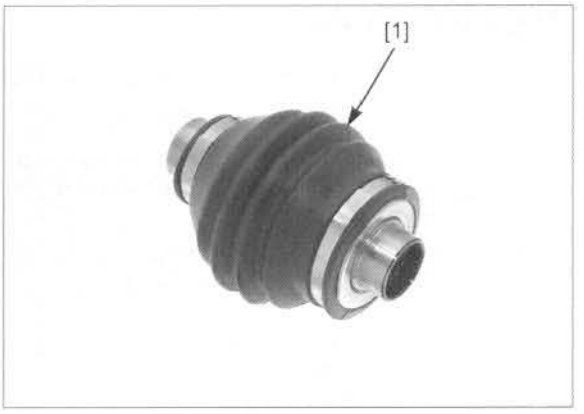
PROPELLER SHAFT

Check the splines [1] of the drive shaft for wear or damage.
If the they are damaged, check the pinion and universal joint splines also.



UNIVERSAL JOINT

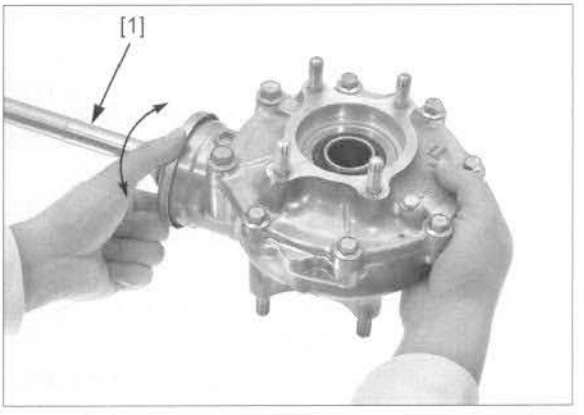
Check the boot [1] for cuts or other damage.
Check that the joint moves smoothly without binding or noise.



OPERATION CHECK

Temporarily install the propeller shaft [1].
Turn the pinion gear 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 them if necessary.

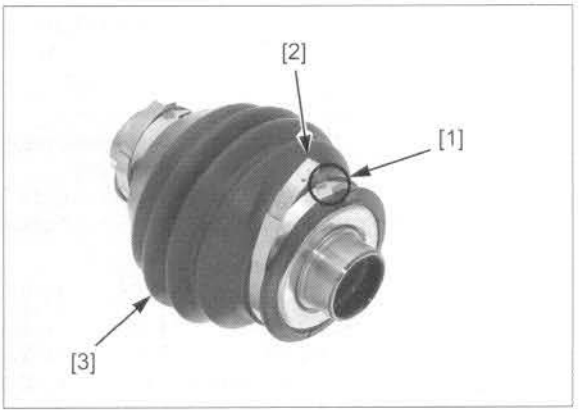


JOINT BOOT REPLACEMENT

Bend up the lock tabs [1] and raise each band end [2] to loosen the boot bands.

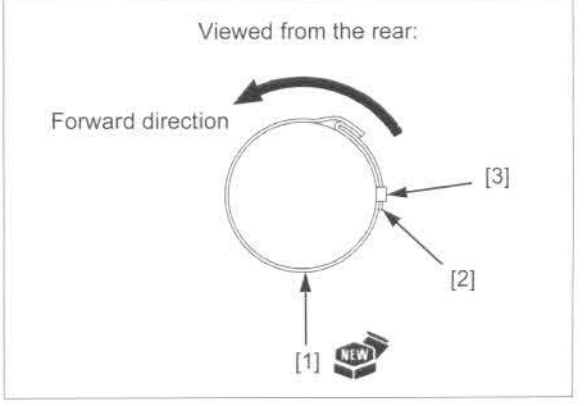
Remove the joint boot [3].

Install the boot and set it onto the universal joint properly.



Install new boot bands [1] so the band ends [2] are facing opposite the forward direction.

Bend down each band end and secure it with the lock tabs [3]. Tap the lock tabs with a plastic hammer.



REAR FINAL GEAR DISASSEMBLY/ INSPECTION

BACKLASH INSPECTION

Remove the oil filler cap.

Set the gear case assembly in a vise.
Hold the pinion gear with the special tools.

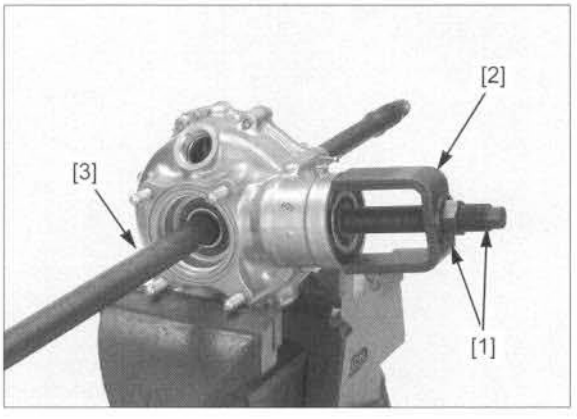
TOOLS:

[1] Puller shaft and nut	**07931-ME40000**
[2] Pinion puller base	**07HMC-MM80110**

U.S.A. TOOLS:

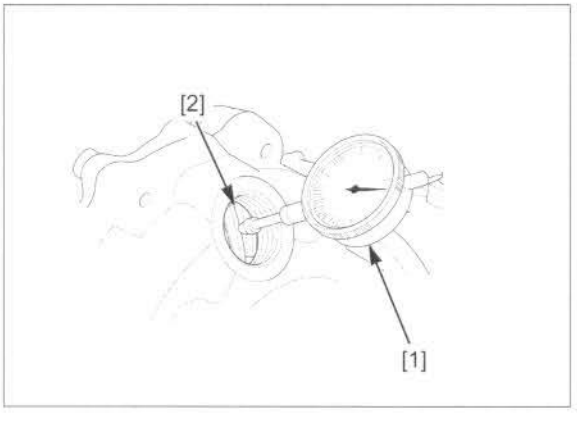
Puller shaft	**07931-ME4010B**
Special nut	**07931-HB3020A**
Pinion puller base	**07HMC-MM8011A**

Install the axle [3] into the gear case assembly from the right side (filler hole side).



Set a horizontal type dial indicator [1] on the ring gear [2] through the oil filler hole.
Turn the ring gear back and forth with the axle to read backlash.

STANDARD: 0.05 – 0.25 mm (0.002 – 0.010 in)
SERVICE LIMIT: 0.4 mm (0.02 in)

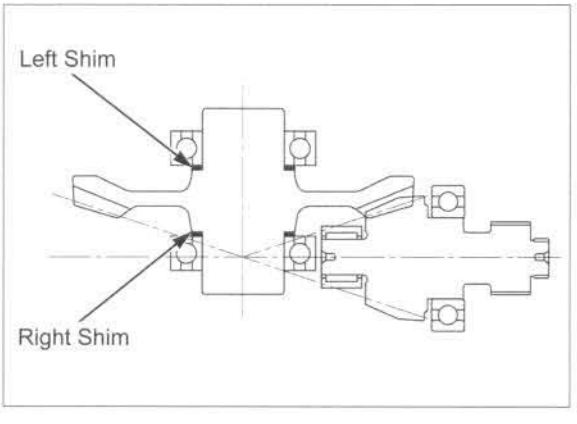


Remove the dial indicator. Turn the ring gear 120° and measure backlash. Repeat this procedure once more.
Compare the difference of the three measurements.

SERVICE LIMIT: 0.2 mm (0.01 in)

If the difference in measurements exceeds the service limit, it indicates that the bearing is not installed squarely, or the case is deformed.
Inspect the bearings and case.

If the backlash is excessive, replace the ring gear right side shim with a thinner one.
If the backlash is too small, replace the ring gear right side shim with a thicker one.
Backlash changed by about 0.06 mm (0.002 in) when thickness of the shim is changed by 0.12 mm (0.005 in).



Ring gear shims:

A: 1.82 mm (0.072 in)	**F: 2.12 mm (0.083 in)**
B: 1.88 mm (0.074 in)	**G: 2.18 mm (0.086 in)**
C: 1.94 mm (0.076 in)	**H: 2.24 mm (0.088 in)**
D: 2.00 mm (0.079 in)	**I: 2.30 mm (0.091 in)**
E: 2.06 mm (0.081 in)	

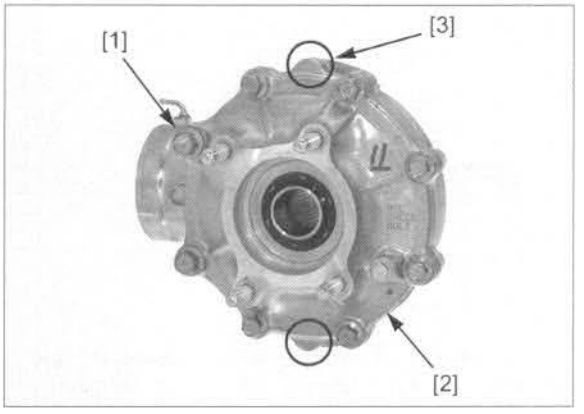
Change the left side shim as follows: If the right shim was replaced with a 0.12 mm (0.005 in) **thicker** shim, replace the left shim with one that is 0.12 mm (0.005 in) **thinner**.

REAR FINAL GEAR CASE DISASSEMBLY

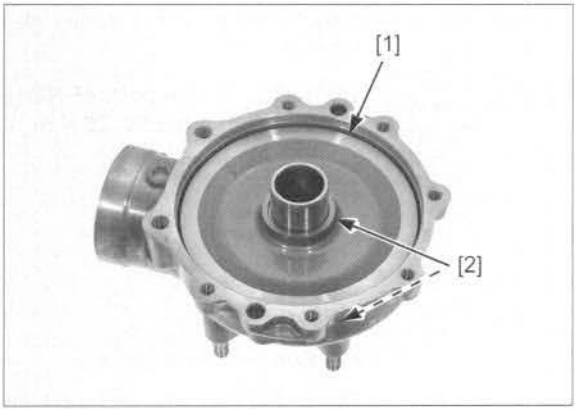
Loosen the eight cover bolts [1] in a crisscross pattern in several steps and remove them.

Be careful not to damage the mating surfaces.

Pry the case cover [2] at the prying points [3] using a screwdriver and remove it.



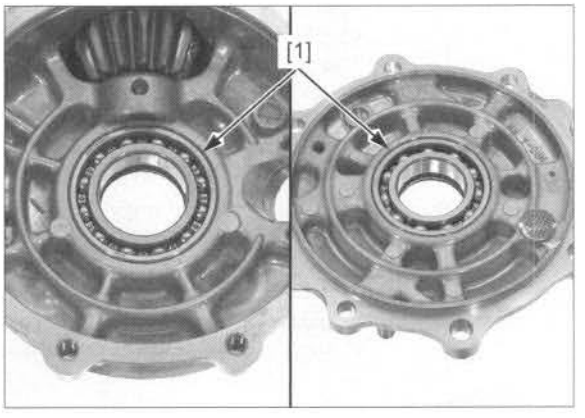
Remove the ring gear [1] and shims [2].



BEARING INSPECTION

Turn the inner race of each bearing [1] 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.

Ring gear bearing replacement (page 20-17).



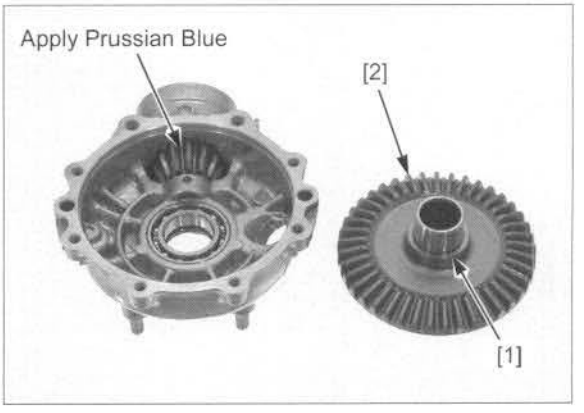
GEAR TOOTH CONTACT PATTERN CHECK

Keep dust and dirt out of the case and cover.

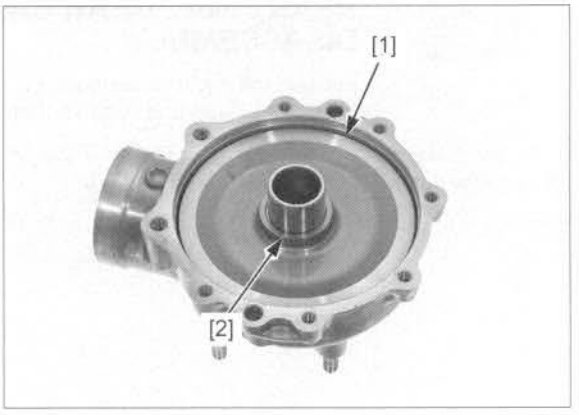
Clean sealing material off the mating surfaces of the gear case and cover, being careful not to damage them.

Apply thin coat of Prussian Blue to the pinion gear teeth for a tooth contact pattern check.

Install the right shim [1] onto the ring gear [2].



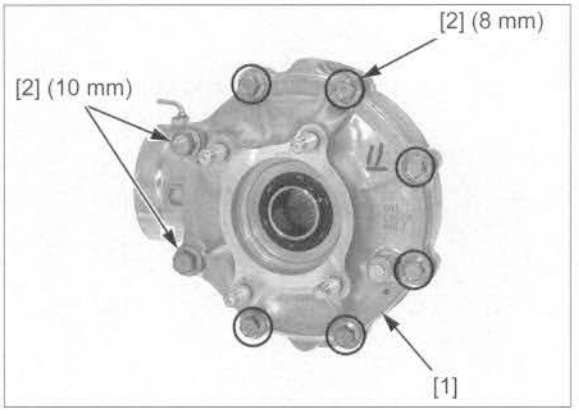
Install the ring gear [1] with the shim into the gear case.
Install the left shim [2] onto the ring gear.



It is important to turn the pinion gear while tightening the bolts. If the ring gear shim is too thick, the gears will lock after only light tightening.

Install the case cover [1] and tighten the bolts [2] 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: 47 N·m (4.8 kgf·m, 35 lbf·ft)
8 mm bolt: 25 N·m (2.5 kgf·m, 18 lbf·ft)

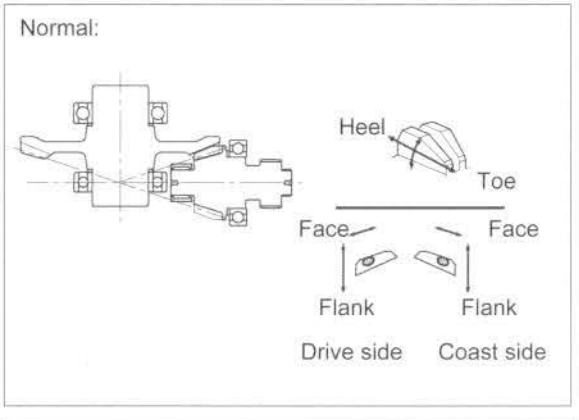


Remove the oil filler cap.

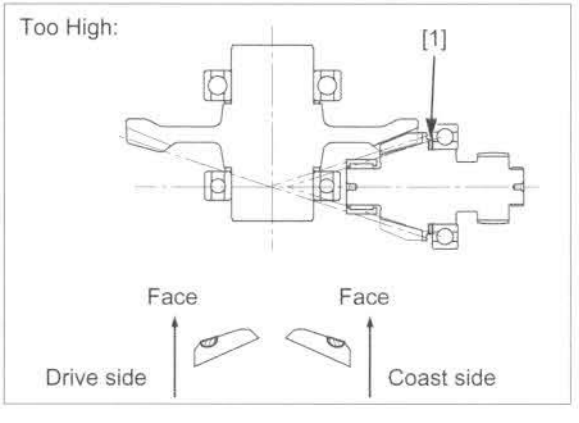
Rotate the ring gear several times in both directions of rotation.

Check the gear tooth contact pattern through the oil filler hole.
The pattern is indicated by the Prussian Blue applied to the pinion gear.
Contact is normal if the Prussian Blue is transferred to the approximate center of each tooth, but slightly to the heel side and to the flank side.

If the patterns are not correct, remove and change the pinion shim with one of an alternate thickness.



Replace the pinion shim [1] with a thicker one if the contact pattern is too high, toward the face.



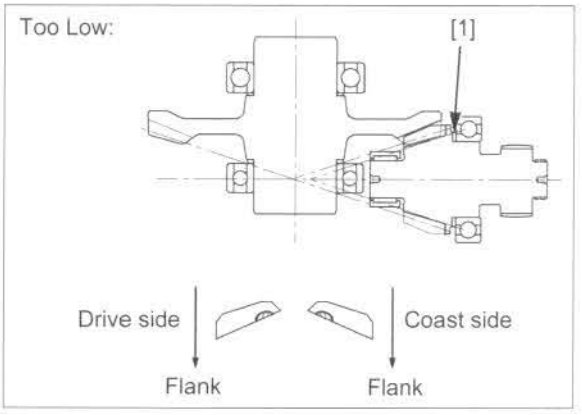
Replace the pinion shim [1] with a thinner one if the contact pattern is too low, toward the flank.

The pattern will shift about 0.5 – 1.0 mm (0.02 – 0.04 in) when the thickness of the shim [1] is changed by 0.12 mm (0.005 in).

Pinion shims:

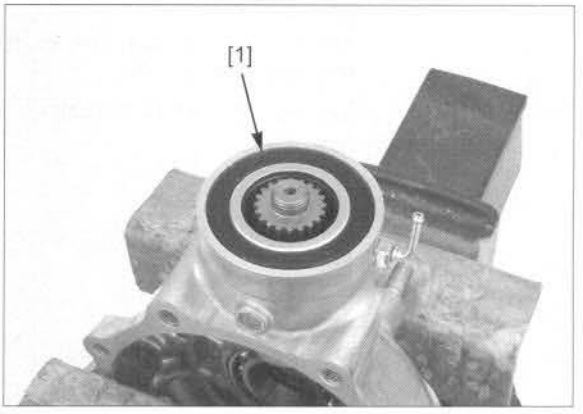
A: 1.82 mm (0.072 in)
B: 1.88 mm (0.074 in)
C: 1.94 mm (0.076 in)
D: 2.00 mm (0.079 in)
E: 2.06 mm (0.081 in)
F: 2.12 mm (0.083 in)
G: 2.18 mm (0.086 in)
H: 2.24 mm (0.088 in)
I: 2.30 mm (0.091 in)

Pinion shim replacement (page 20-16).



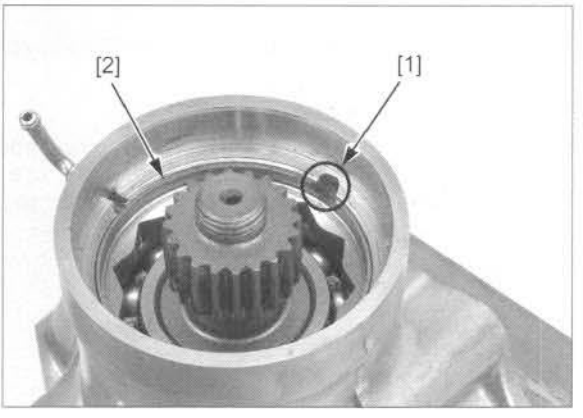
PINION GEAR REMOVAL

Remove the oil seal [1] from the gear case.



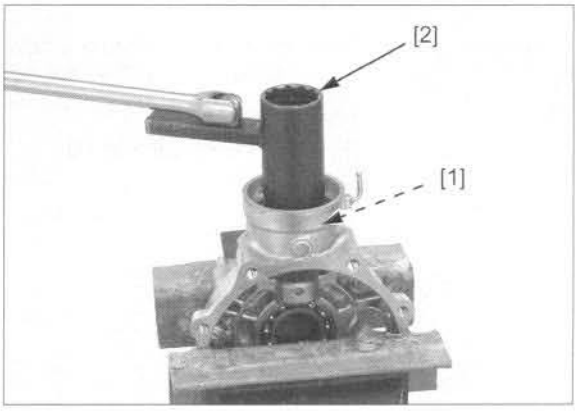
Be careful that metal particles do not enter the bearing and the threads of the case are not damaged.

Unstake [1] the bearing lock nut [2] with a drill or grinder.



Remove the lock nut [1] and discard it.

TOOL:
[2] Lock nut wrench, 30 x 64 mm 07916-MB00002



Install the special tools onto the pinion gear shaft and gear case.

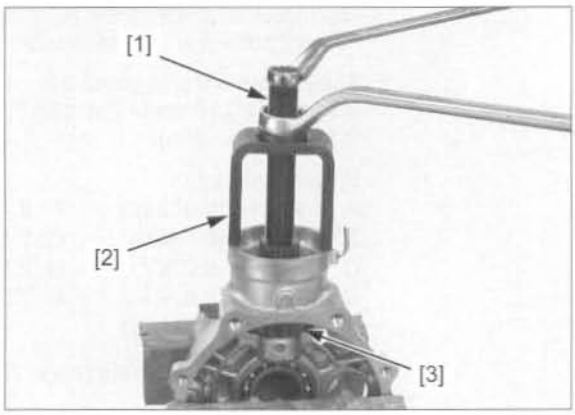
TOOLS:

[1] Puller shaft and nut	**07931-ME40000**
[2] Pinion puller base	**07HMC-MM80110**

U.S.A. TOOLS:

Puller shaft	**07931-ME4010B**
Special nut	**07931-HB3020A**
Pinion puller base	**07HMC-MM8011A**

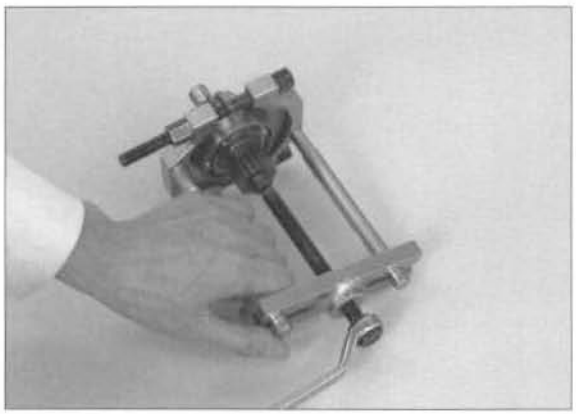
Pull the pinion assembly [3] out from the gear case.



PINION BEARING AND SHIM REPLACEMENT

Pull the bearing from the shaft with a commercially available bearing puller.

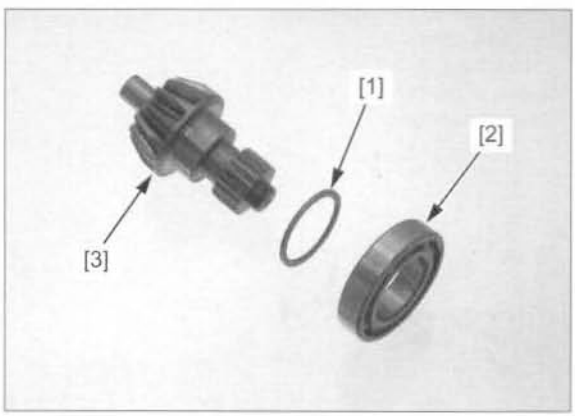
Remove the bearing and shim.



Install the shim [1] and bearing [2] onto the pinion gear [3].

NOTE:

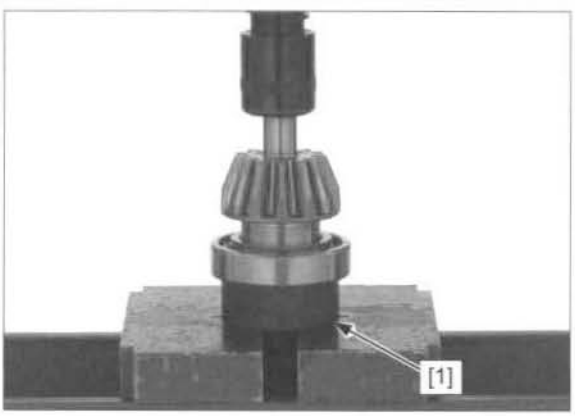
- When the gear set, ring gear bearing, and/or gear case has been replaced, use a 2.00 mm (0.079 in) thick shim for initial reference.



Press the pinion gear into a new bearing until it is fully seated by supporting the bearing inner race.

TOOL:

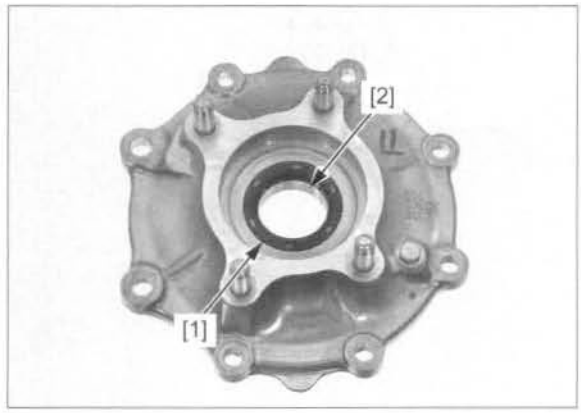
[1] Attachment, 35 mm I.D.	**07746-0030400**



GEAR CASE BEARING REPLACEMENT

RING GEAR BEARING

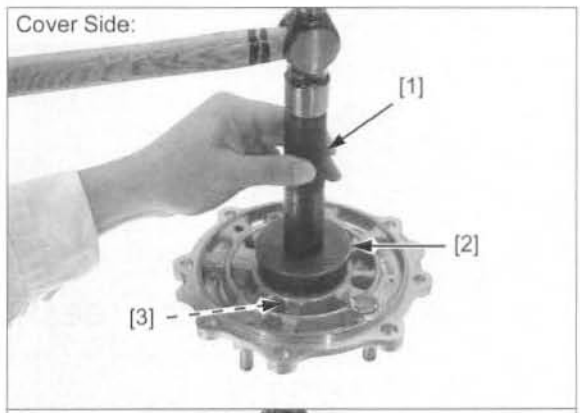
Remove the oil seals [1] from the gear case and cover.
Drive the bearings [2] out of the gear case and cover.

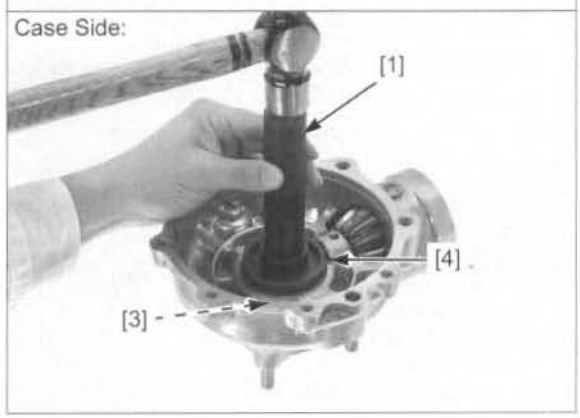


Drive new bearings into the gear case and cover.

TOOLS:

Cover Side:	
[1] Driver	**07749-0010000**
[2] Attachment, 62 x 68 mm	**07746-0010500**
[3] Pilot, 35 mm	**07746-0040800**
Case Side:	
[1] Driver	**07749-0010000**
[4] Oil seal driver attachment	**07JAD-PH80101**
[3] Pilot, 35 mm	**07746-0040800**



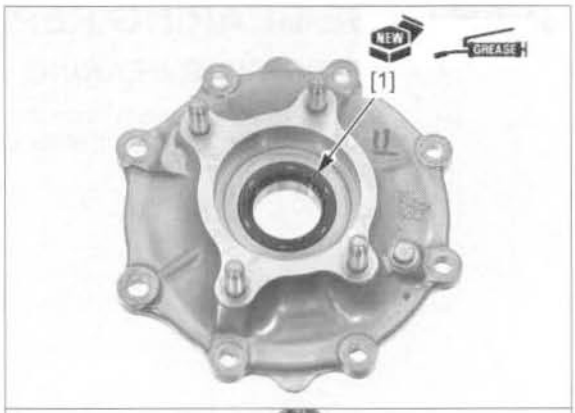


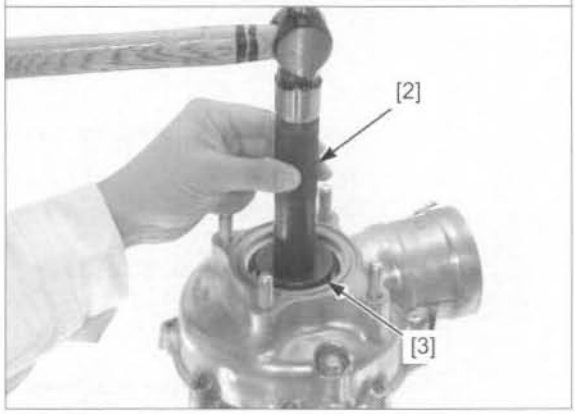
Apply grease to the seal lips of new oil seals [1].

Install each oil seal with the flat side facing out so that it is flush with the cover or case.

TOOLS:

[2] Driver:	**07749-0010000**
[3] Attachment	**07946-3290000**





PINION NEEDLE BEARING

Rotate the stopper ring [1] until its end appears in the access hole [2].
Strike gently near the end of the ring with a punch to bend the end upward.
Grasp the end of the ring with needle-nose pliers and pull the stopper ring out through the access hole.

Remove the oil filler cap.

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.

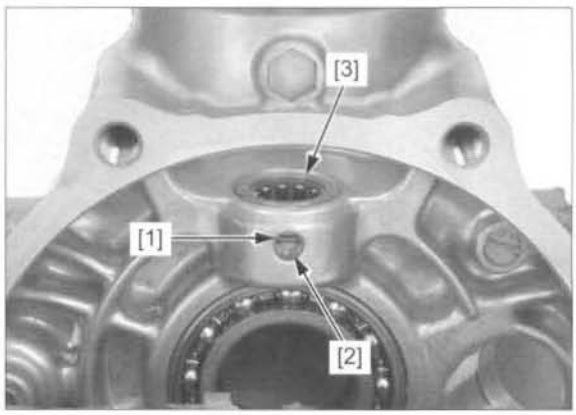
Heat the gear case to about 80°C (176°F) and remove the needle bearing [3], using the special tools.

TOOLS:

Remover head, 15 mm	**07936-KC10200**
Remover shaft, 15 mm	**07936-KC10100**
Remover weight	**07741-0010201**

U.S.A. TOOLS:

Bearing remover, 15 mm	**07936-KC10500**
Remover weight	**07936-371020A or 07936-3710200**



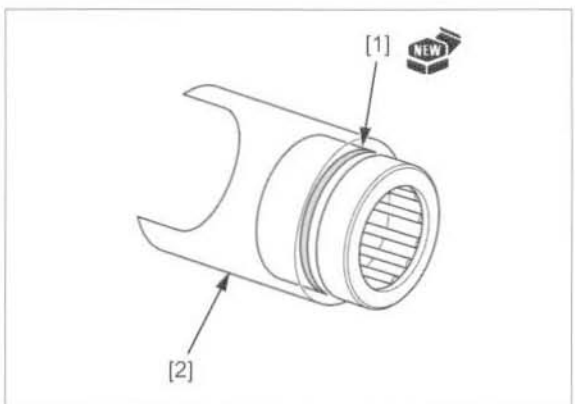
Install a new stopper ring [1] into the groove in a new bearing.

Make sure the stopper ring stays in the groove.

Install the bearing into the compressor [2] until the stopper ring is flush with the end of the tool.

TOOL:

Bearing clip compressor, 26 mm 070ME-HP50100



Place the driver, attachment and pilot on the top of the bearing and tape the driver to the compressor [1].

TOOLS:

[2] Driver	**07949-3710001**
[3] Attachment, 24 x 26 mm	**07746-0010700**
[4] Pilot, 15 mm	**07746-0040300**

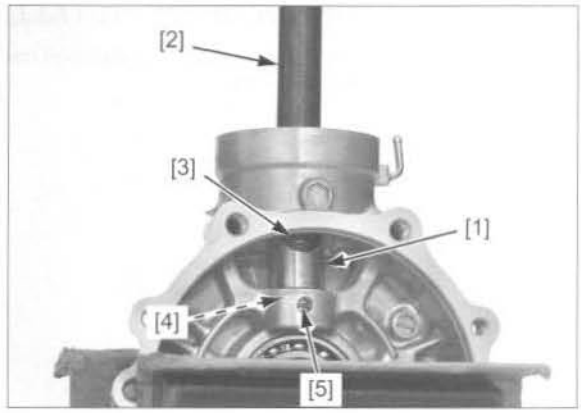
Place the bearing and tool assembly into a freezer for at least 30 minutes.

Heat the gear case to 80°C (176°F).

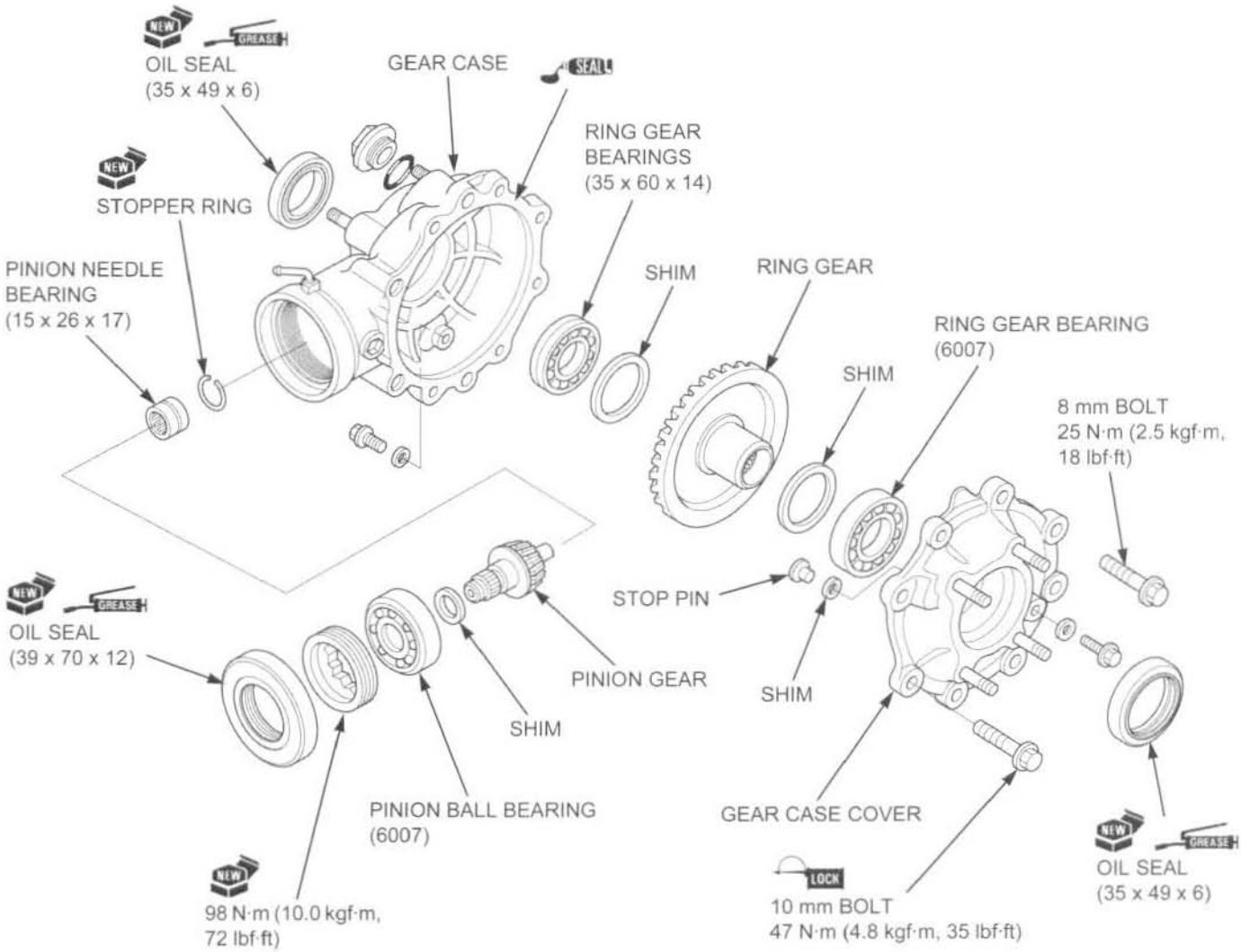
Remove the bearing and tool assembly from the freezer and drive the bearing into the gear case using the special tools.

Only strike the driver once. If you strike it more than once, the stopper ring [5] may slip out of the groove. If this happens, remove the stopper ring and bearing, and install a new stopper ring.

Make sure the stopper ring is securely set in the groove of the gear case.

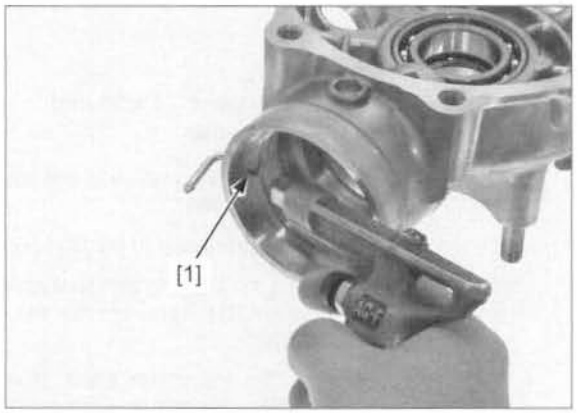


REAR FINAL GEAR ASSEMBLY



PINION GEAR INSTALLATION

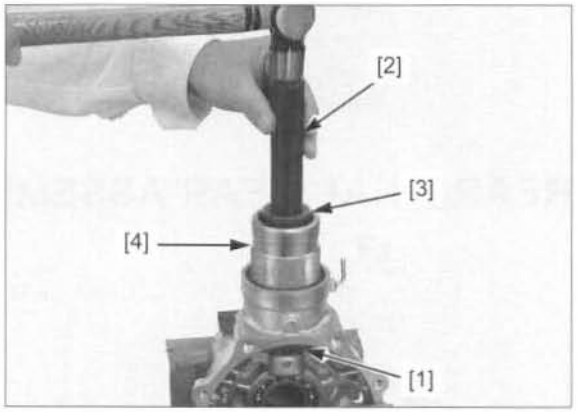
Blow compressed air through the breather hole [1] in the gear case.



Drive the pinion gear assembly [1] into the gear case.

TOOLS:

[2] Driver	**07749-0010000**
[3] Attachment, 42 x 47 mm	**07746-0010300**
[4] Fork seal driver weight	**07747-0010100**



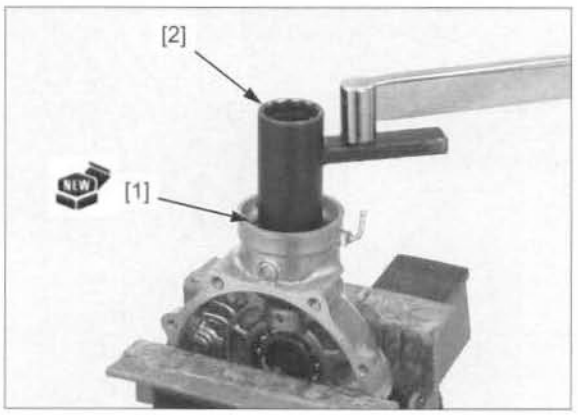
Install a new lock nut [1] and tighten it to the specified torque.

TOOL:

[2] Lock nut wrench, 30 x 64 mm 07916-MB00002

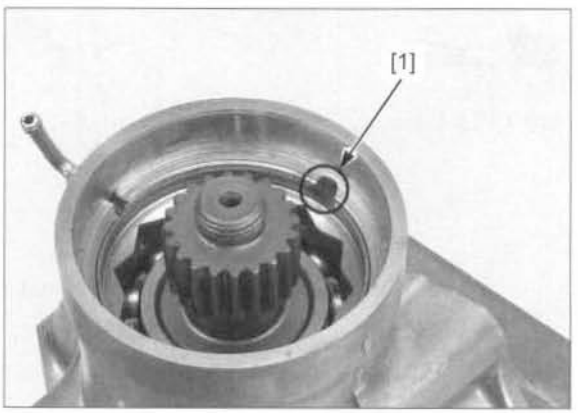
Refer to "Service Information" for torque wrench reading information (page 20-3).

TORQUE: Actual: 98 N·m (10.0 kgf·m, 72 lbf·ft)
Indicated: 89 N·m (9.1 kgf·m, 66 lbf·ft)

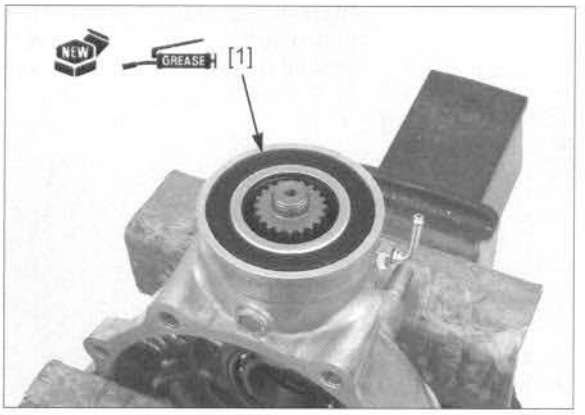


Be careful not to damage the threads of the case.

Stake [1] the lock nut into the case groove.



Apply grease to the lips of a new oil seal [1] and install it so that it is flush with the gear case.



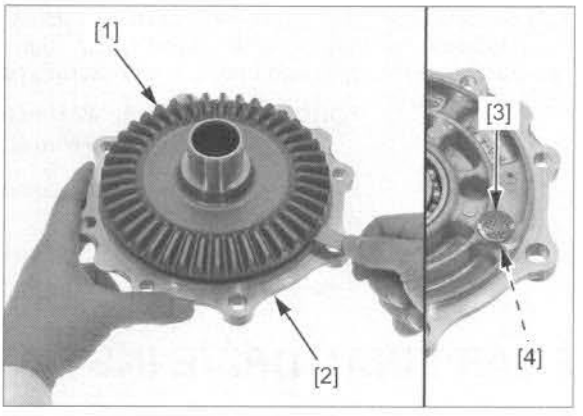
RING GEAR CLEARANCE INSPECTION

Install the ring gear [1] with the left shim into the case cover [2].

Measure the clearance between the ring gear and stop pin [3] 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 cover may cause warpage.

If the clearance exceeds the standard value, heat the case cover to approximately 80°C (176°F) and remove the stop pin by tapping the cover.

Install a stop pin shim [4] to obtain the correct clearance.

Stop pin shims:
A: 0.10 mm (0.004 in)
B: 0.15 mm (0.006 in)

Install the shim and drive the stop pin into the case cover.

FINAL GEAR CASE ASSEMBLY

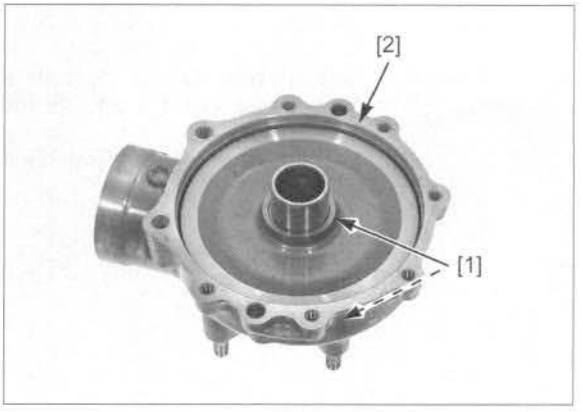
NOTE:

- When the gear set, bearing, and/or gear case has been replaced, check the following:
  - tooth contact pattern (page 20-13)
  - gear backlash (page 20-12)

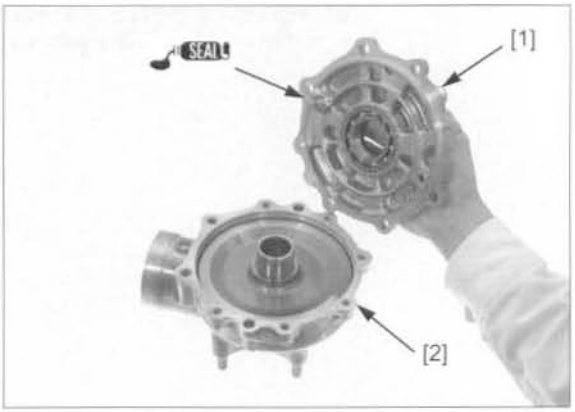
Keep dust and dirt out of the case and cover.

Clean the mating surface of the gear case and cover, being careful not to damage them.

Install the proper ring gear shims [1] onto the ring gear [2] and install them into the gear case.



Apply liquid sealant (TB1215 or equivalent) to the mating surface of the case cover [1].
Install the cover onto the gear case [2].

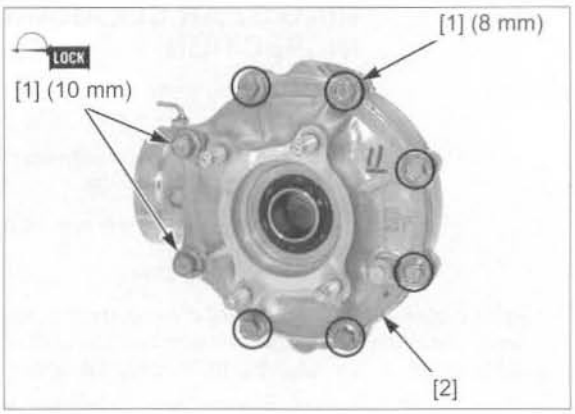


It is important to turn the pinion while tightening the bolts. If the ring gear shim is too thick, the gears will lock after only light tightening.

Apply locking agent to the threads of the two 10 mm bolts [1].
Install the eight bolts and tighten them several steps until the cover [2] 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: 47 N·m (4.8 kgf·m, 35 lbf·ft)
8 mm bolt: 25 N·m (2.5 kgf·m, 18 lbf·ft)

Make sure that the gear assembly rotates smoothly without binding.



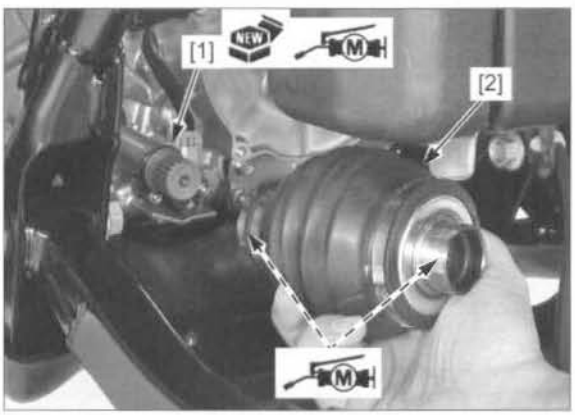
REAR FINAL DRIVE INSTALLATION

Coat a new O-ring [1] with molybdenum disulfide grease and install it into the groove in the output shaft.

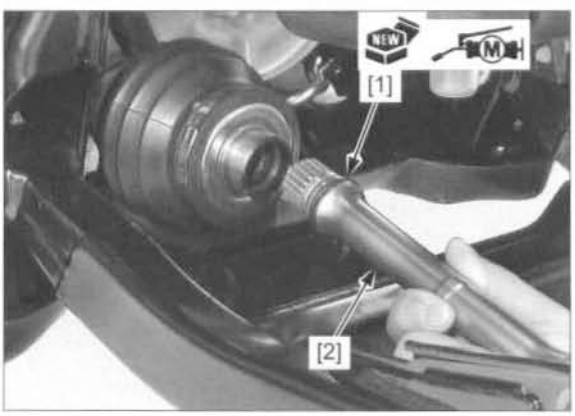
Apply molybdenum disulfide grease to the splines of both sides in the universal joint [2].

Install with the small O.D. side facing the engine.

Install the universal joint onto the output shaft until it is fully seated.

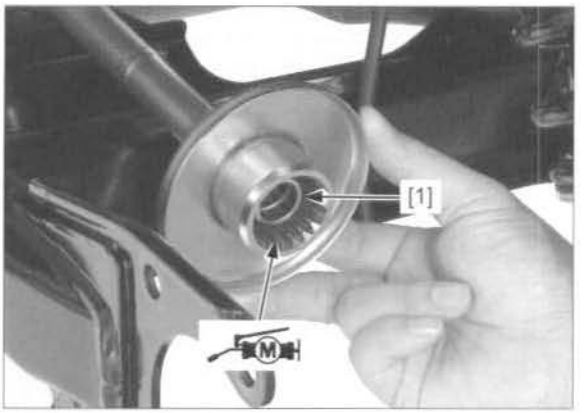


Coat a new O-ring [1] with molybdenum disulfide grease and install it into the groove in the propeller shaft [2].
Install the propeller shaft into the universal joint until it is fully seated.



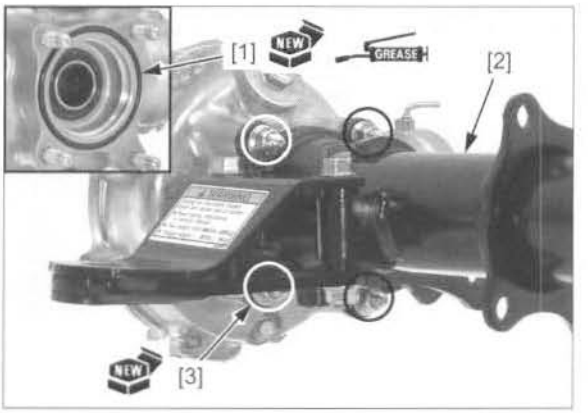
Install the joint spring [1] into the propeller shaft firmly.

Apply molybdenum disulfide grease to the splines of the propeller shaft.



Coat a new O-ring [1] with grease and install it into the gear case groove.

Install the axle housing [2] onto the gear case with new nuts [3] and temporarily tighten them.



Support the swingarm securely.

Insert the bolts from the right side.

Install the gear case assembly into the swingarm while connecting the propeller shaft [1], then install the four bolts [2] and new nuts [3]. Temporarily tighten the nuts.

Connect the breather hose [4] to the gear case.

Tighten the four (axle housing-to-swingarm) nuts [3] to the specified torque.

TORQUE: 52 N·m (5.3 kgf·m, 38 lbf·ft)

Tighten the four (axle housing-to-gear case) nuts [5] to the specified torque.

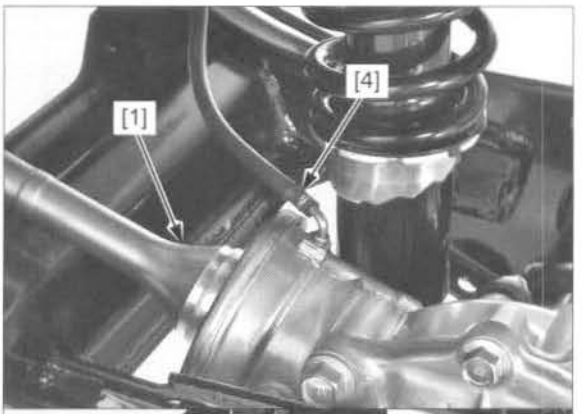
TORQUE: 47 N·m (4.8 kgf·m, 35 lbf·ft)

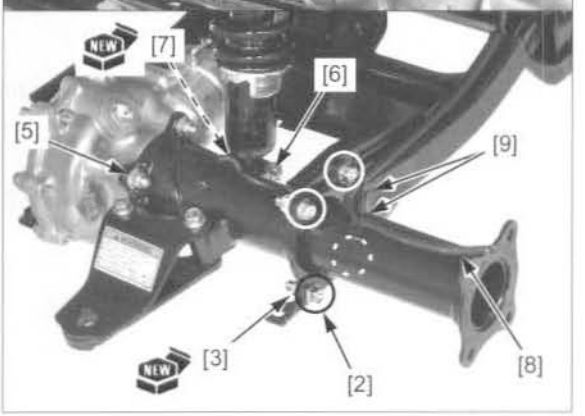
Insert the bolt from the right side.

Connect the shock absorber with the bolt [6] and a new nut [7] and tighten it to the specified torque.

TORQUE: 39 N·m (4.0 kgf·m, 29 lbf·ft)

Install the breather hose [8] into the clamps [9] on the axle housing.

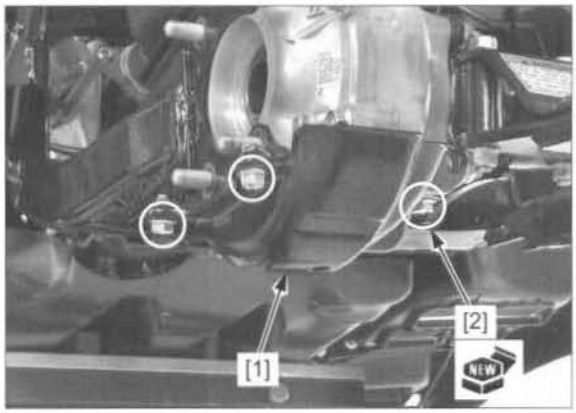




Install the skid plate [1] with new bolts [2] and tighten them to the specified torque.

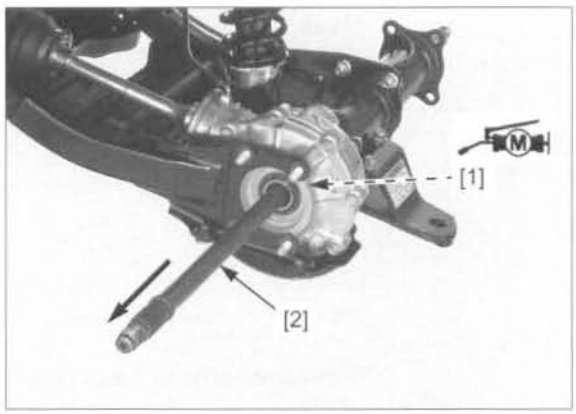
TORQUE: 32 N·m (3.3 kgf·m, 24 lbf·ft)

Install the rear axle (page 20-24).



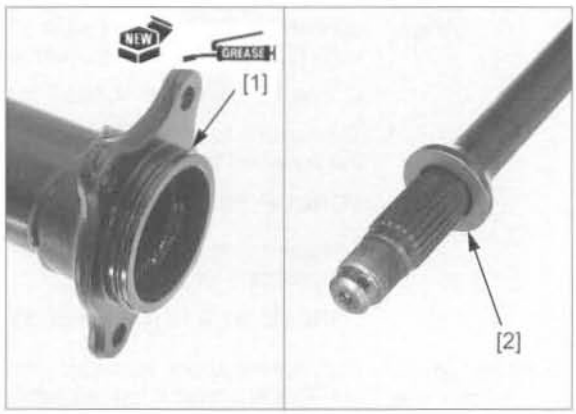
REAR AXLE INSTALLATION

Apply molybdenum disulfide grease to the center splines [1] of the axle [2].
Install the axle into the final gear case from right side until it is fully seated.



Coat a new O-ring [1] with grease and install it into the groove in the left axle housing.

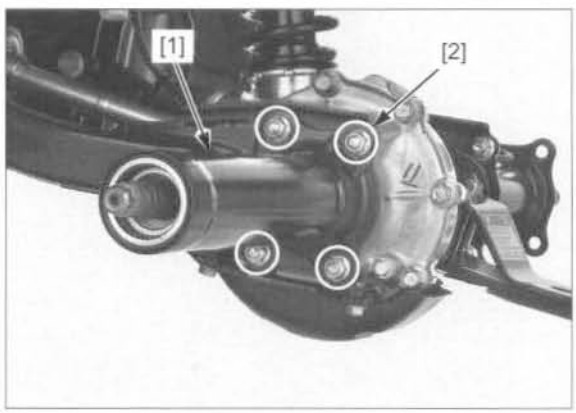
Install the side collar [2] onto the rear axle with the tapered side facing inward.



Install the axle housing [1] into the gear case.

Install the four new nuts [2] and tighten the them to the specified torque.

TORQUE: 47 N·m (4.8 kgf·m, 35 lbf·ft)



Apply grease to the lips of a new dust seal [1] and install it into the wheel hub [2] with the flat side facing in until it is fully seated.

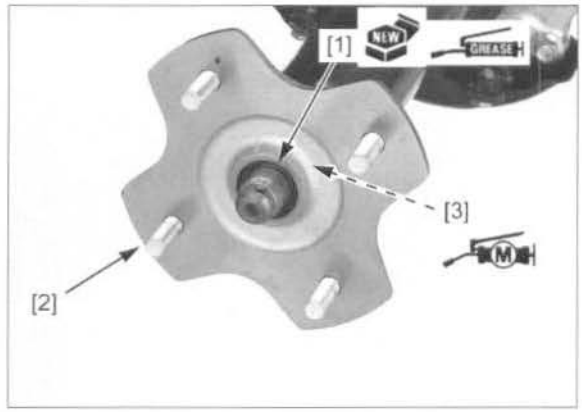
Apply molybdenum disulfide grease to the axle splines [3].

Do not get grease on the axle threads.

Install the wheel hub onto the left side of the axle.

Do not tighten it yet.

Install the hub nut loosely.



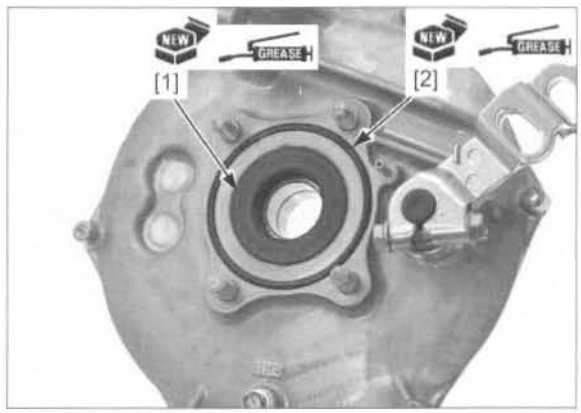
Apply grease to the lips of a new dust seal [1].

Install the dust seal into the brake panel so that it is flush with the brake panel.

Coat a new O-ring [2] with grease and install it into the brake panel groove.

Do not get grease on the brake shoe linings.

Install the brake panel assembly onto the axle.



Install four new nuts [1] and tighten them to the specified torque.

TORQUE: 47 N·m (4.8 kgf·m, 35 lbf·ft)

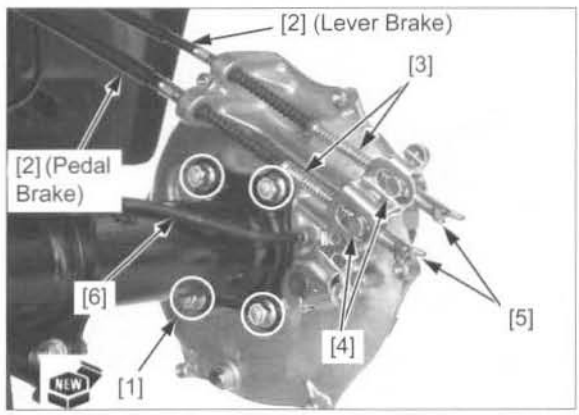
Install the brake cables [2] into the cable holders on the brake panel (upper holder for lever brake cable and lower holder for pedal brake cable).

Install the cable springs [3] onto the cables. Connect the brake cables to the brake arm with the joint pins [4] and adjusting nuts [5].

Connect the breather hose [6].

Whenever removing both hub nuts, first tighten right side, then tighten the left side.

Install the rear brake drum (torque the hub nut) (page 18-19).



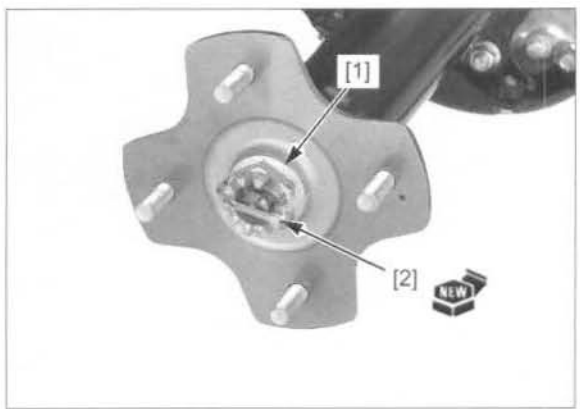
Tighten the hub nut [1] to the specified torque and further tighten until its grooves align with the cotter pin hole.

TORQUE: 137 N·m (14.0 kgf·m, 101 lbf·ft)

Install a new cotter pin [2].

Install the left rear wheel (page 17-6).

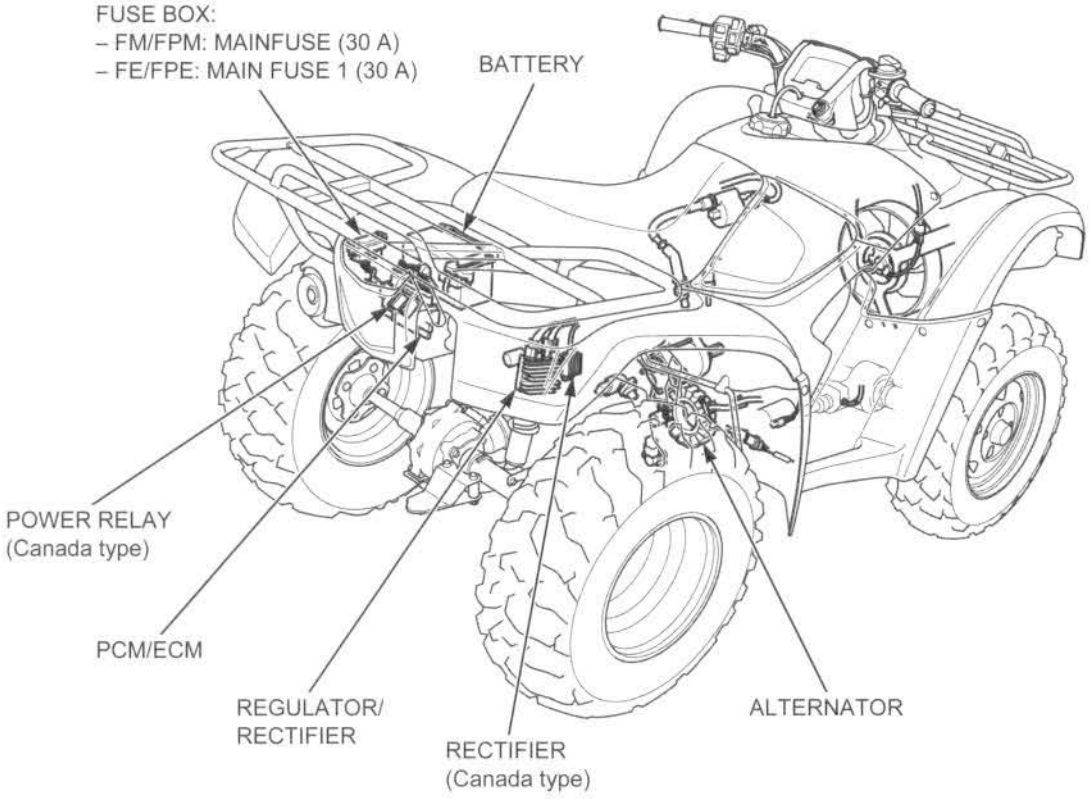
Fill the gear case with the recommended oil (page 3-17).



MEMO

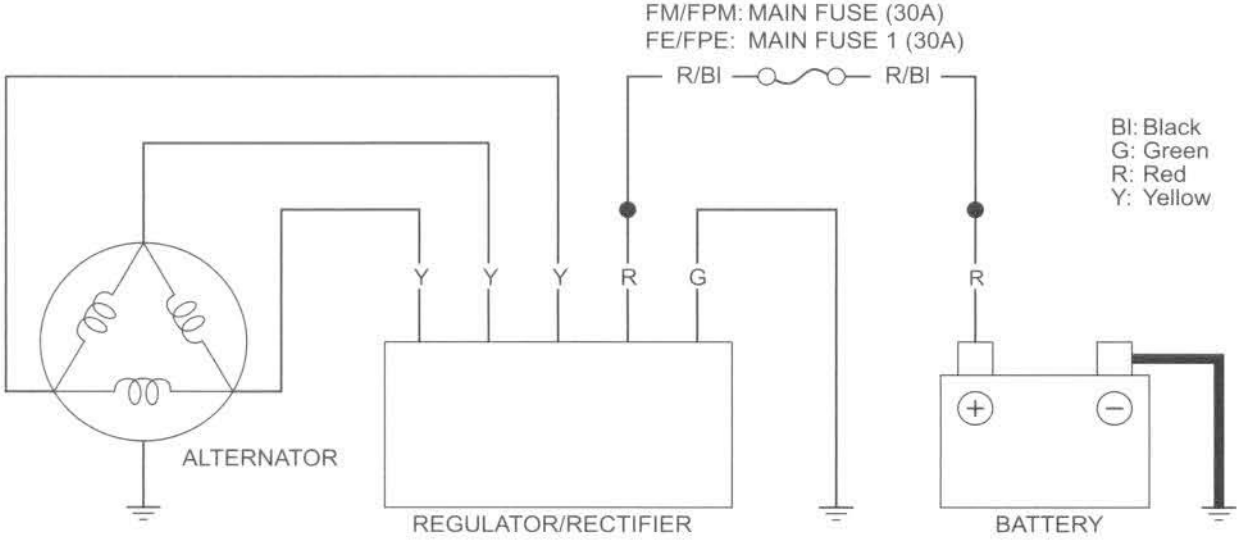
21. BATTERY/CHARGING SYSTEM

COMPONENT LOCATION

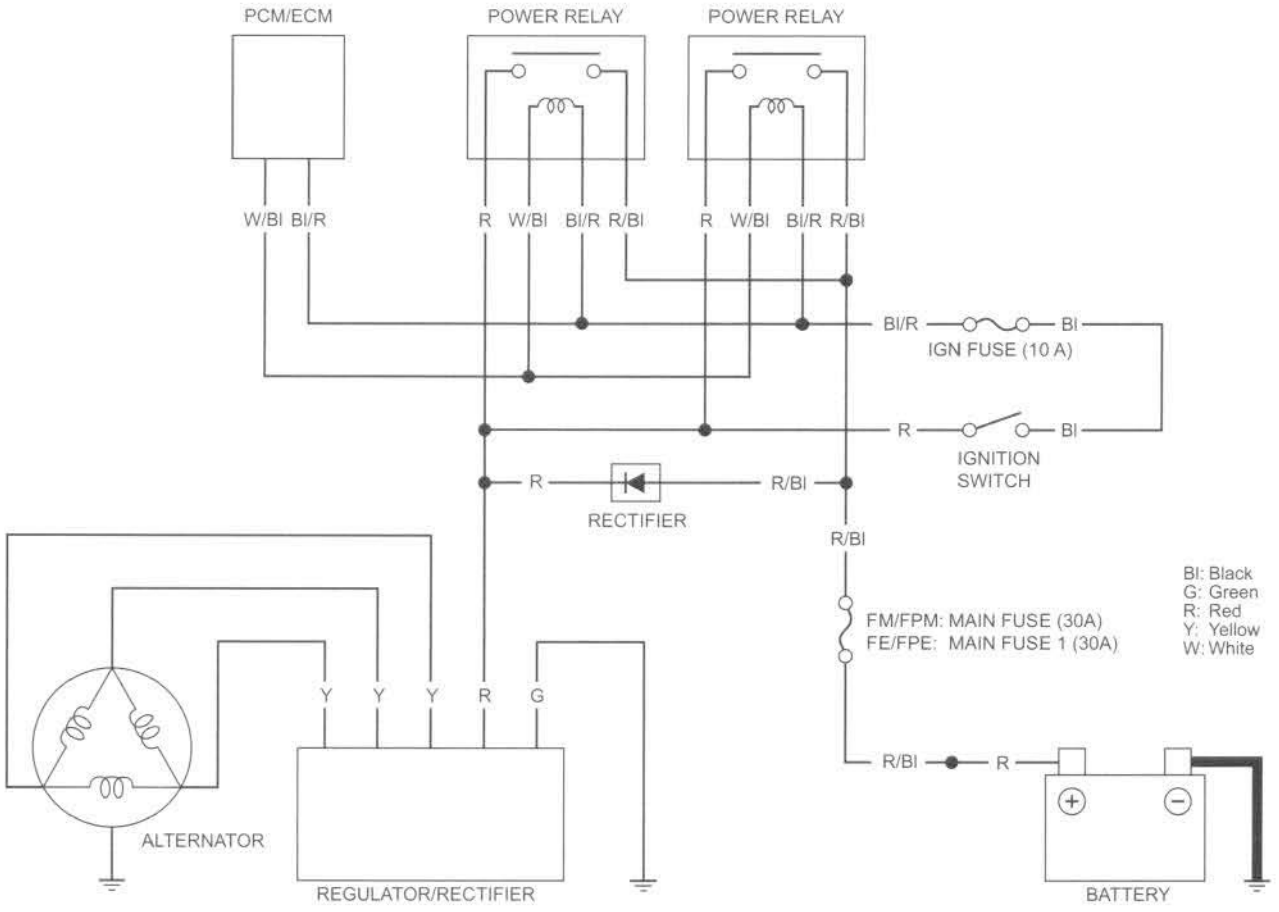


SYSTEM DIAGRAM

U.S.A. type:



Canada type:


PCM/ECM
POWER RELAY
POWER RELAY
W/Bl Bl/R
R W/Bl Bl/R R/Bl
R W/Bl Bl/R R/Bl
Bl/R
Bl
IGN FUSE (10 A)
R
Bl
IGNITION SWITCH
R
R/Bl
RECTIFIER
R/Bl
Bl: Black
G: Green
R: Red
Y: Yellow
W: White
FM/FPM: MAIN FUSE (30A)
FE/FPE: MAIN FUSE 1 (30A)
Y Y Y R G
R/Bl
R
ALTERNATOR
REGULATOR/RECTIFIER
BATTERY

SERVICE INFORMATION

GENERAL

⚠WARNING

- The battery gives off explosive gases; keep sparks, flames and cigarettes away. Provide adequate ventilation when charging.
- The battery contains sulfuric acid (electrolyte). Contact with skin or eyes may cause severe burns. Wear protective clothing and a face shield.
  - If electrolyte gets on your skin, flush with water.
  - If electrolyte gets in your eyes, flush with water for at least 15 minutes and call a physician immediately.
- Electrolyte is poisonous.
  - If swallowed, drink large quantities of water or milk and call your local Poison Control Center or a physician immediately.

NOTICE

- *Always turn OFF the ignition switch before disconnecting any electrical component.*
- *Some electrical components may be damaged if terminals or connectors are connected or disconnected while the ignition switch is ON and current is present.*

- For extended storage, remove the battery, give it a full charge, and store it in a cool, dry 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.
- When checking the charging system, always follow the steps in the troubleshooting (page 21-6).
- For alternator removal/installation, refer to Alternator/Starter Clutch section (page 13-6).

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

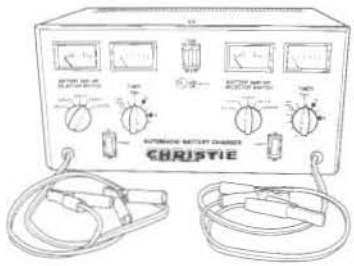
Refer to the instructions in the Operation Manual for the recommended battery tester for details about battery testing. The recommended battery tester puts a "load" on the battery so that the actual battery condition can be measured.

Recommended battery tester: Micro 404XL (U.S.A. only)

SPECIFICATIONS

ITEM			SPECIFICATIONS
Battery	Type		GYZ16H
	Capacity		12 V – 16 Ah
	Current leakage		0.62 mA max.
	Voltage (20°C/68°F)	Fully charged	13.0 – 13.2 V
		Needs charging	Below 12.4 V
	Charging current	Normal	1.6 A x 5 – 10 h
		Quick	8.0 A x 1.0 h
Alternator	Capacity		0.416 kW/5,000 rpm
	Charging coil resistance (20°C/68°F)		0.1 – 1.0 Ω

TOOLS

Motorcycle battery analyzer Micro 404XL (U.S.A. only)	Christie battery charger MC1012/2T (U.S.A. only)
	

TROUBLESHOOTING

BATTERY IS DAMAGED OR WEAK

1. **Battery Test**

   Remove the battery (page 21-8).
   Check the battery condition using the recommended battery tester.

   Recommended battery tester: Micro 404XL (U.S.A. only)

   Is the battery in good condition?

   YES – GO TO STEP 2.

   NO – Faulty battery.

2. **Current Leakage Test**

   Install the battery (page 21-8).
   Check the battery current leakage (page 21-9).

   Is the current leakage below 0.62 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 0.62 mA?

   YES – Faulty regulator/rectifier.

   NO – • Shorted wire harness.
   • Faulty ignition switch.

4. **Alternator Charging Coil Inspection**

   Measure the alternator charging coil resistance (page 21-10).

   Standard: 0.1 – 1.0 Ω (20°C/68°F)

   Is the alternator charging coil resistance within the standard value?

   YES – GO TO STEP 5.

   NO – Faulty charging coil.

5. **Charging Voltage Inspection**

   Measure and record the battery voltage using a digital multimeter (page 21-8).
   Start the engine.
   Measure the charging voltage (page 21-9).
   Compare the measurements to the results of the following calculation.

   Standard: Measured BV < Measured CV < 15.5 V
   - **BV = Battery voltage (page 21-8)**
   - **CV = Charging voltage**

   Is the measured charging voltage within the standard voltage?

   YES – Faulty battery.

   NO – Canada type: GO TO STEP 6.
   U.S.A. type: GO TO STEP 7.

6. **Power Relay Inspection (Canada type)**

   Check the power relays and their circuits (page 21-11).

   Are the relay and circuits normal?

   YES – GO TO STEP 7.

   NO – • Faulty power relay.
   • Loose or poor contacts of related connector terminal.
   • Open or short circuit in related wire.
   • Faulty PCM/ECM.

7. **Regulator/Rectifier Wire Harness Inspection**

   Perform the regulator/rectifier wire harness inspection (page 21-10).

   Are the measurements correct?

   YES – Faulty regulator/rectifier.

   NO – • Open circuit in related wire.
   • Loose or poor contacts of related terminal.
   • Shorted wire harness.

BATTERY

REMOVAL/INSTALLATION

Remove the rear fender cover (page 2-9).

Turn the ignition switch OFF and disconnect the negative (–) cable [1] first, then disconnect the positive (+) cable [2] by removing the terminal bolts.

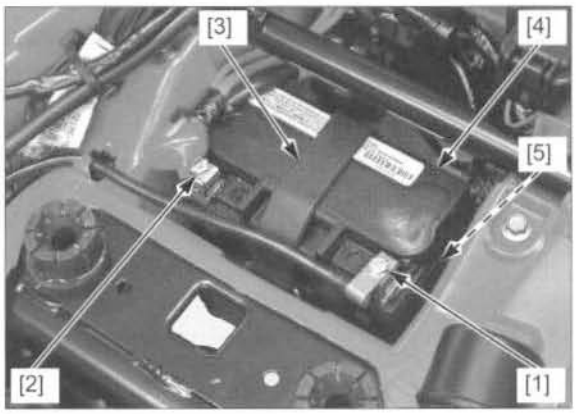
Remove the battery holder band [3].

Remove the battery [4] and battery rubber [5].

Installation is in the reverse order of removal.

NOTE:

- Connect the positive (+) cable first and then the negative (–) cable.



VOLTAGE INSPECTION

Remove the rear fender cover (page 2-9).

Measure the battery voltage using a commercially available digital multimeter.

VOLTAGE (20°C/68°F):
Fully charged: 13.0 – 13.2 V
Under charged: Below 12.4 V

BATTERY TESTING

Remove the battery (page 21-8).

Refer to the instructions that are appropriate to the battery testing equipment available to you.

TOOL:
Battery tester **Micro 404XL (U.S.A. only)**

BATTERY CHARGING (U.S.A. only)

Remove the battery (page 21-8).

Refer to the instructions that are appropriate to the battery charging equipment available to you.

TOOL:
Christie battery charger MC1012/2T (U.S.A. only)

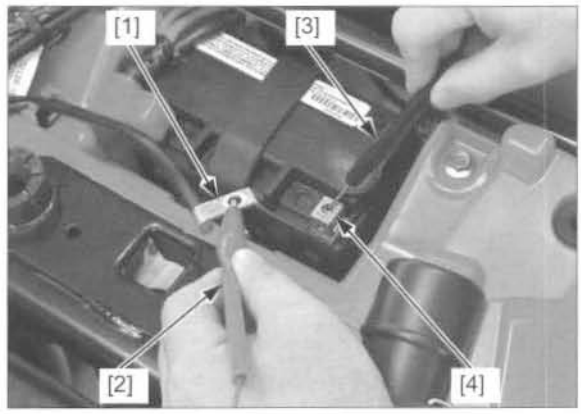
CHARGING SYSTEM INSPECTION

CURRENT LEAKAGE INSPECTION

Remove the rear fender cover (page 2-9).

Turn the ignition switch OFF and disconnect the negative (–) cable [1] from the battery.

Connect the ammeter (+) probe [2] to the negative (–) cable and the ammeter (–) probe [3] to the battery (–) terminal [4].



With the ignition switch turned OFF, check for current leakage.

NOTE:

- When measuring current using a tester, set it to a high range, and then bring the range down to an appropriate level. Current flow higher than the range selected may blow out the fuse in the tester.
- While measuring current, do not turn the ignition switch ON. A sudden surge of current may blow out the fuse in the tester.

SPECIFIED CURRENT LEAKAGE:
0.62 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

NOTE:

- Be sure the battery is in good condition before performing this test.

Remove the rear fender cover (page 2-9).

Warm up the engine to normal operating temperature.

Connect the multimeter between the battery positive (+) and negative (–) terminals.

NOTE:

- To prevent a short, make absolutely certain which are the positive (+) and negative (–) terminals or cables.
- Do not disconnect the battery or any cable in the charging system without first switching off the ignition switch. Failure to follow this precaution can damage the tester or electrical components.

Restart the engine and turn the headlight on.

Measure the voltage on the multimeter when the engine runs at 5,000 rpm.

Standard:
Measured BV < Measured CV < 15.5 V

- **BV = Battery voltage (page 21-8)**
- **CV = Charging voltage**

ALTERNATOR CHARGING COIL

INSPECTION

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

Disconnect the alternator 5P (Natural) connector [1].

Check the connector for loose contacts or corroded terminals.

Measure the resistance between the Yellow wire terminals of the alternator side connector.

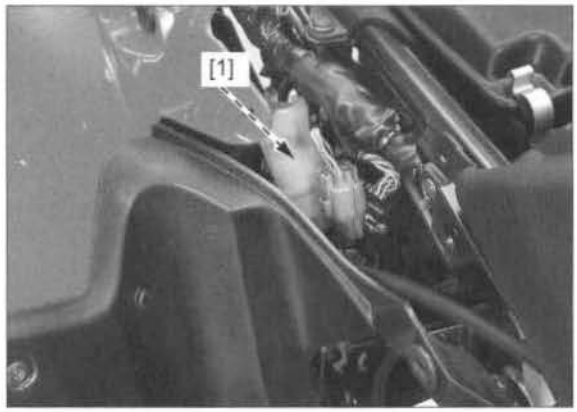
Standard: 0.1 – 1.0 Ω (20°C/68°F)

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.

For alternator stator replacement (page 13-6).



REGULATOR/RECTIFIER

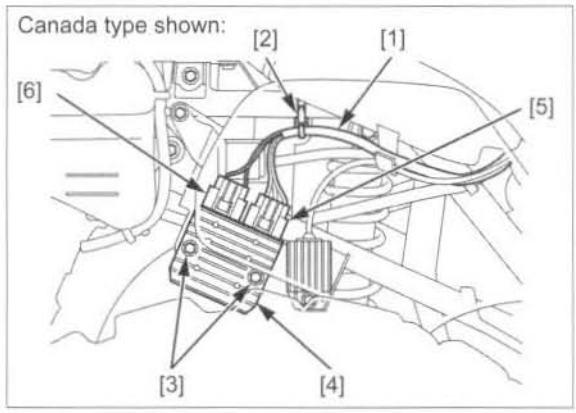
REMOVAL/INSTALLATION

Release the regulator/rectifier wire [1] from the wire band [2].

Remove the two mounting bolts [3] and regulator/ rectifier [4].

Disconnect the regulator/rectifier 3P (Gray) [5] and (Black) [6] connectors.

Installation is in the reverse order of removal.



WIRE HARNESS INSPECTION

Disconnect the regulator/rectifier 3P (Gray) [1] and (Black) [2] connectors (page 21-10).

Check the connectors for loose contacts or corroded terminals.

Check the following at the wire harness side connectors.

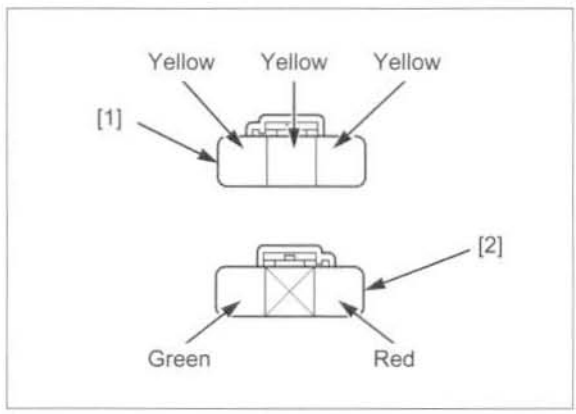
Battery Line (Black connector):
Measure the voltage between the Red wire terminal and ground.
There should be battery voltage at all times.

Ground Line (Black connector):
Check for continuity between the Green wire terminal and ground.
There should be continuity at all times.

Charging Coil Line (Gray connector):
Measure the resistance between the Yellow wire terminals.

Standard: 0.1 – 1.0 Ω (20°C/68°F)

Check for continuity between each Yellow wire terminal and ground.
There should be no continuity.



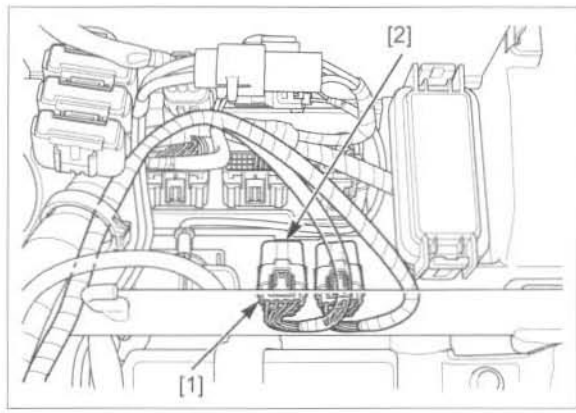
POWER RELAY (Canada type)

RELAY INSPECTION

Remove the rear fender cover (page 2-9).

Disconnect the power relay 8P (Gray) connector [1].

Remove the power relay [2] from the rear fender.



Connect an ohmmeter to the power relay side 8P connector [1] terminals as shown.

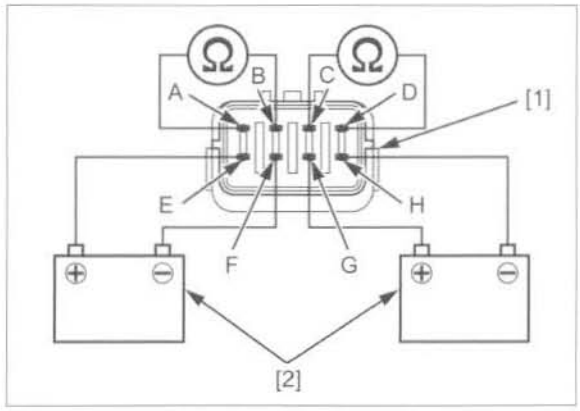
Connection: A (Red/black) – B (Red)
C (Red/black) – D (Red)

Connect the 12 V battery [2] to the power relay side 8P connector terminals as shown.

Connection: E (Black/red) – F (White/black)
G (Black/red) – H (White/black)

There should be continuity with the battery connected and no continuity with the battery disconnected.

If the test result is abnormal, replace the power relay.



CIRCUIT INSPECTION

Disconnect the power relay 8P (Gray) connector [1] (page 21-11).

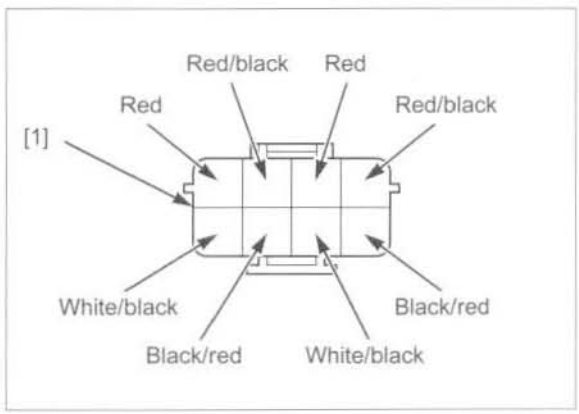
Check the following at the wire harness side power relay 8P (Gray) connector.

Charging Line (Battery side):
Measure the voltage between the Red/black wire terminal (+) and ground (–).
There should be battery voltage at all times.

Charging Line (Regulator/rectifier side):
Measure the voltage between the Red wire terminal (+) and ground (–).
There should be battery voltage at all times.

Relay Coil Input Line:
Measure the voltage between the Black/red wire terminal (+) and ground (–).
There should be battery voltage when the ignition switch is turned ON.

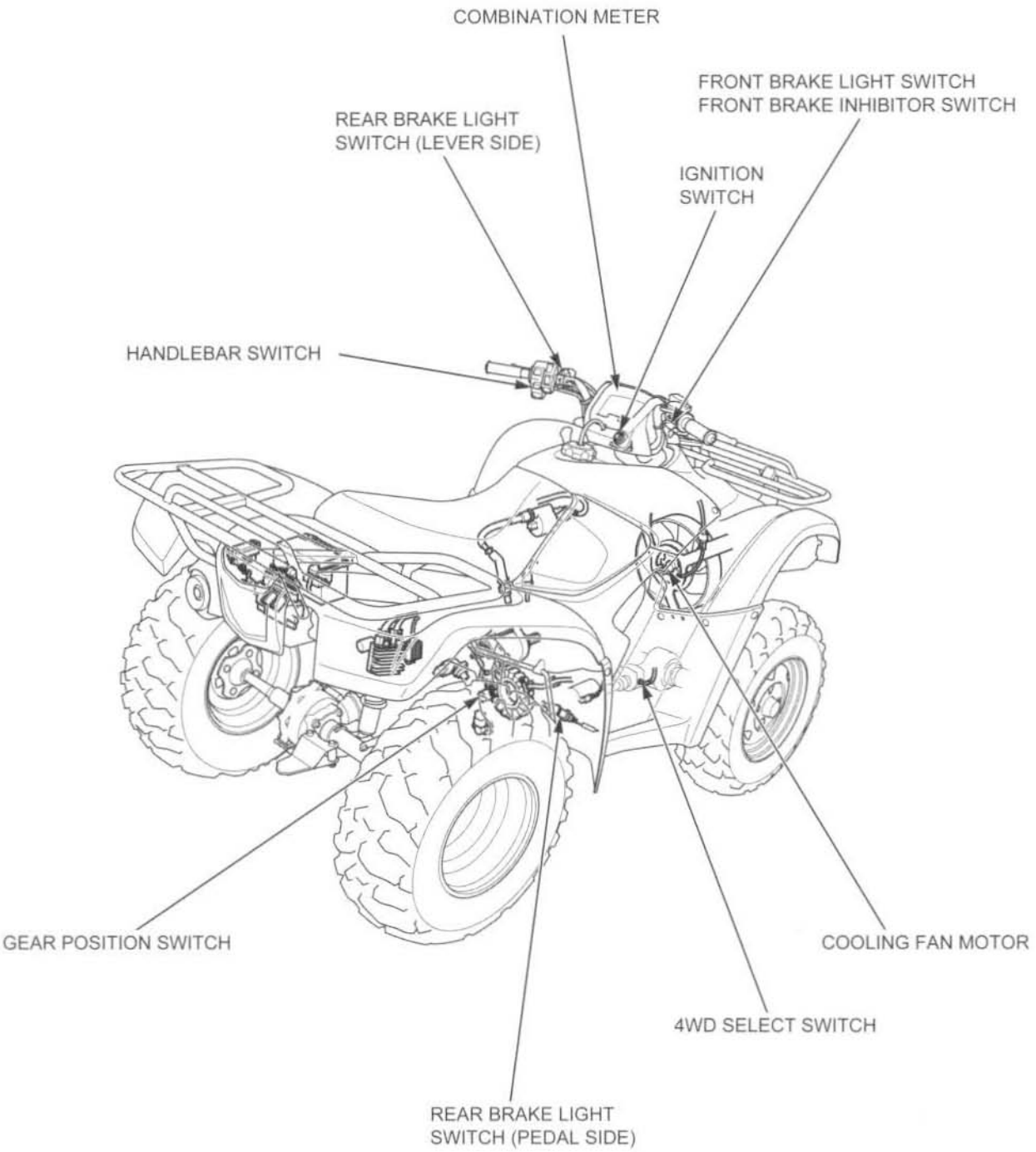
Relay Coil Ground Line:
Check for continuity between the White/black wire terminal and ground.
There should be continuity when the engine speed is more than 100 rpm.



MEMO

22. LIGHTS/METERS/SWITCHES

COMPONENT LOCATION



SERVICE INFORMATION

GENERAL

- 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.

Bl: Black	G: Green	Lg: Light green	R: Red
Br: Brown	Gr: Gray	O: Orange	W: White
Bu: Blue	Lb: Light blue	P: Pink	Y: Yellow

SPECIFICATIONS

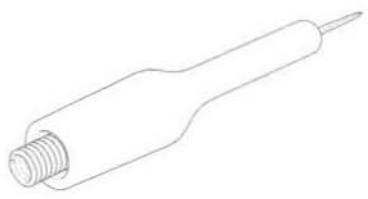
ITEM			SPECIFICATIONS
Bulbs	Headlight (high/low beam)		12 V - 30/30 W x 2
	Assist headlight		12 V - 45 W
	Brake/taillight		LED
	Neutral indicator		LED
	Reverse indicator		LED
	Coolant temperature indicator		LED
	MIL		LED
	4WD indicator		LED
	Meter light		LED
	EPS indicator (FPM/FPE)		LED
Fuse	Main fuse	FM/FPM	30 A
		FE/FPE	30 A x 2
	Sub-fuse		15 A x 2, 10 A x 2
	EPS fuse (FPM/FPE)		40 A

TORQUE VALUES

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Combination meter mounting screw	3	5	0.8 (0.1, 0.6)	
Gear position switch wire clamp bolt	2	6	12 (1.2, 9)	Apply locking agent to the threads.
Rear brake light switch screw	1	4	1.2 (0.1, 0.9)	Apply locking agent to the threads.
Front brake light/inhibitor switch screw	1	4	1.2 (0.1, 0.9)	Apply locking agent to the threads.
4WD select switch	1	10	12 (1.2, 9)	
Fuel level sensor bolt	3	6	9.0 (0.9, 6.6)	

TOOL

Test probe
07ZAJ-RDJA110



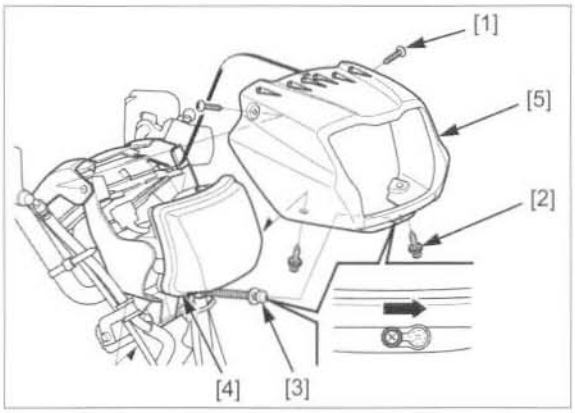
ASSIST HEADLIGHT

BULB REPLACEMENT

Remove the two screws [1] and two trim clips [2].

Disengage the adjusting screw [3] by push in on the headlight unit [4] until the screw head clears the ridge, then slide the screw head over into the opening.

Remove the assist headlight cover [5].



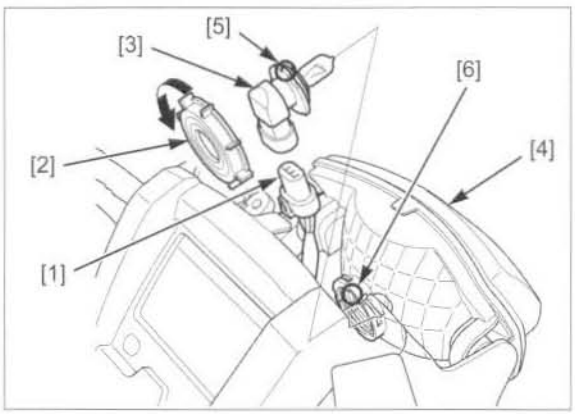
Disconnect the assist headlight connector [1].

Remove the retaining ring [2] by turning it counterclockwise and remove the bulb [3] from the assist headlight [4].

Align the bulb tab [5] with housing groove [6].

Install a new bulb and removed parts in the reverse order of removal.

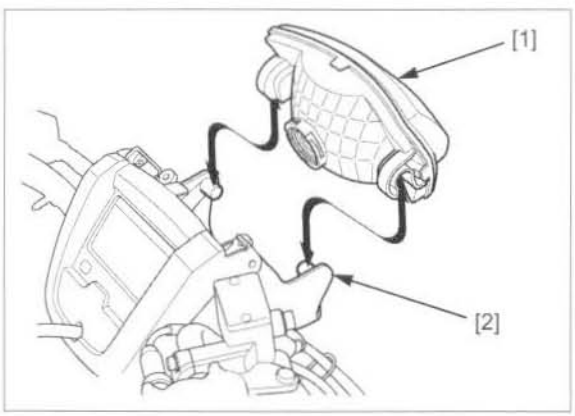
After installing the removed parts, adjust the assist headlight aiming (page 22-4).



REMOVAL/INSTALLATION

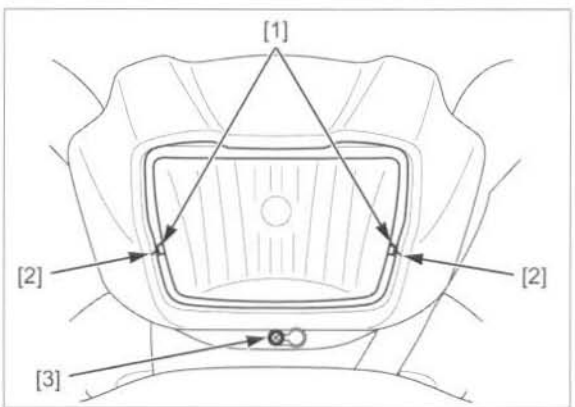
Remove the assist headlight bulb (page 22-4).

Remove the assist height unit [1] from the stays [2].



Install the assist headlight unit and removed parts in the reverse order of removal.

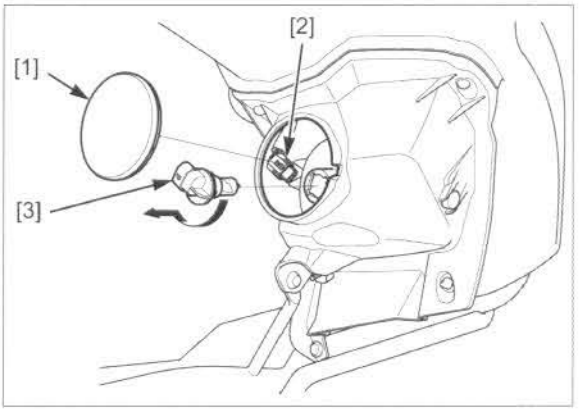
After installing the headlight, align the reference marks [1] on the assist headlight with the index marks [2] on the cover by turning the adjusting screw [3].



HEADLIGHT

BULB REPLACEMENT

Remove the headlight cover cap [1].
Disconnect the headlight 3P connector [2].
Remove the headlight bulb [3] by turning it clockwise for the right headlight and counterclockwise for the left headlight.



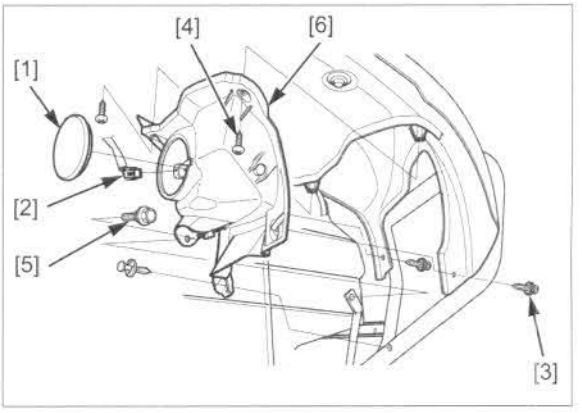
Align the bulb tabs with the headlight grooves properly.

Install a new bulb in the reverse order of removal.

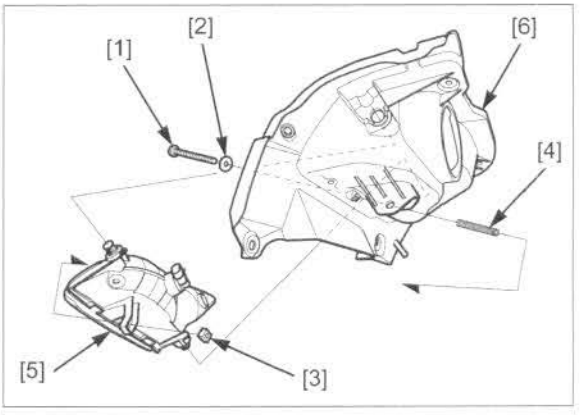
REMOVAL/INSTALLATION

Remove the front grille (page 2-7).

Remove the following:
- headlight cover cap [1]
- headlight 3P connector from the bulb [2]
- three trim clips [3]
- two tapping screws [4]
- mounting bolt [5]
- headlight assembly [6]



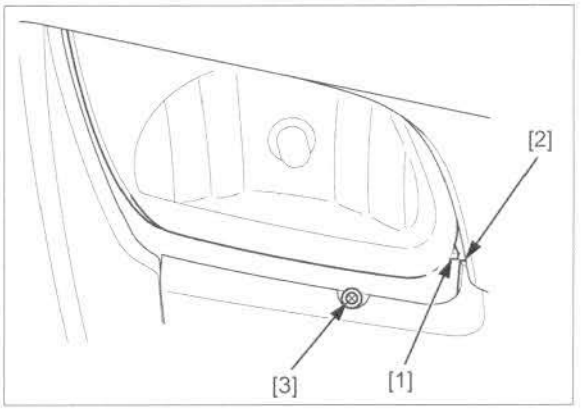
- adjusting screw [1]
- washer [2]
- nut [3]
- spring [4]
- headlight unit [5] from the cover [6] by releasing the bosses from the holes



Route the headlight wire into the groove in the headlight cover properly.

Install the headlight unit in the reverse order of removal.

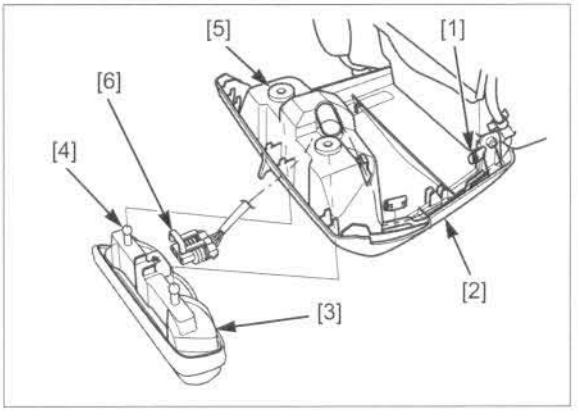
After installing the headlight, align the reference mark [1] on the headlight with the top of the index mark [2] on the cover by turning the adjusting screw [3].



BRAKE/TAILLIGHT

REPLACEMENT

Unhook the retaining strap and open the tool box lid.
Remove the two wire clips [1] and brake/taillight wire from the guides of the tool box lid [2].
Remove the brake/taillight [3] from the tool box lid by releasing the bosses [4] from the grommets [5].
Disconnect the 3P connector [6] from the brake/taillight.



Be careful not to damage the seal rubber.

Install a new brake/taillight in the reverse order of removal.

COMBINATION METER

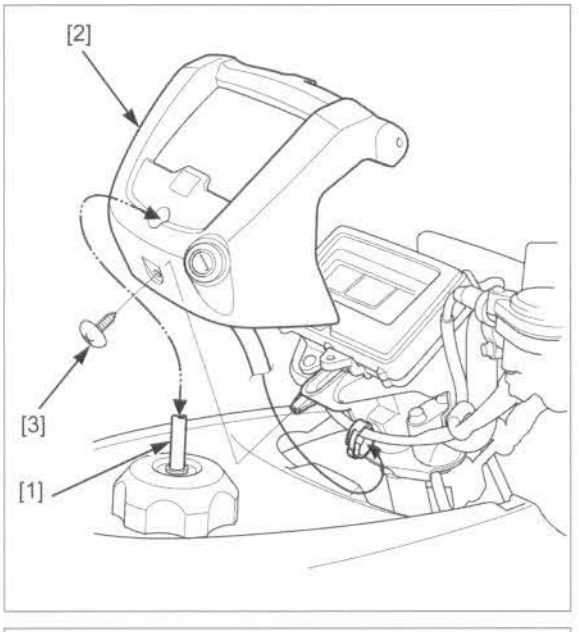
REMOVAL/INSTALLATION

Remove the assist headlight cover (page 22-4).

Remove the fuel tank breather hose [1] from the meter cover [2].

Remove the screw [3].

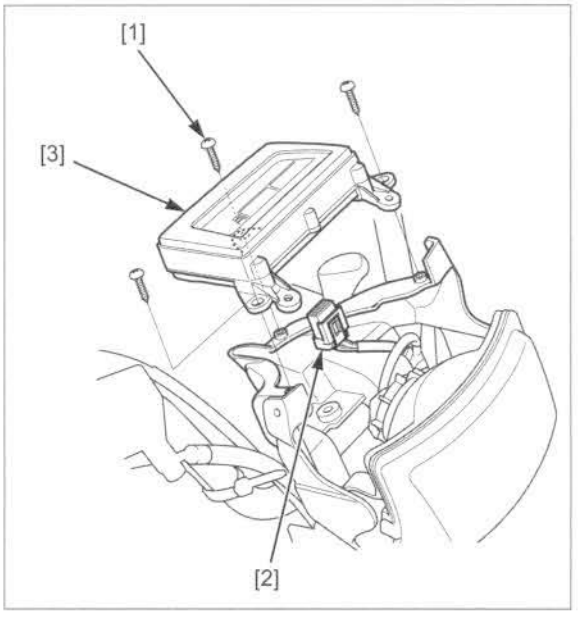
Remove the meter cover from the meter cover stay.



Remove the three tapping screws [1].
Disconnect the 21P connector [2] from the combination meter [3].

Installation is in the reverse order of removal.

TORQUE:
Combination meter mounting screw:
0.8 N·m (0.1 kgf·m, 0.6 lbf·ft)



POWER/GROUND LINE INSPECTION

Disconnect the combination meter 21P connector (page 22-6).

Check the power and ground lines at the wire harness side connector.

POWER INPUT LINE

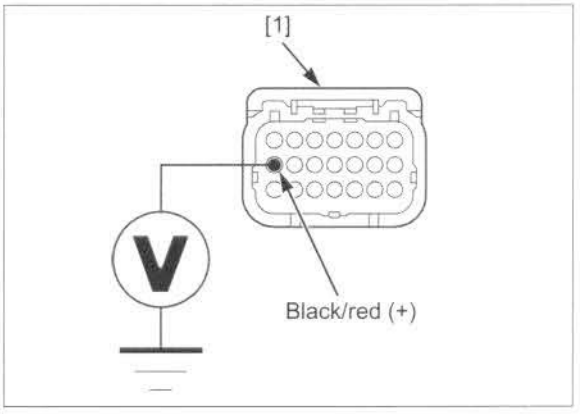
Measure the voltage between the combination meter 21P connector [1] terminal and ground.

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

There should be battery voltage with the ignition switch turned ON.

If there is no voltage, check the following:

- IGN fuse (10 A)
- Black/red wire between the combination meter and fuse box for an open circuit
- ignition switch (page 22-11)
- Black wire between the ignition switch and fuse box for an open circuit



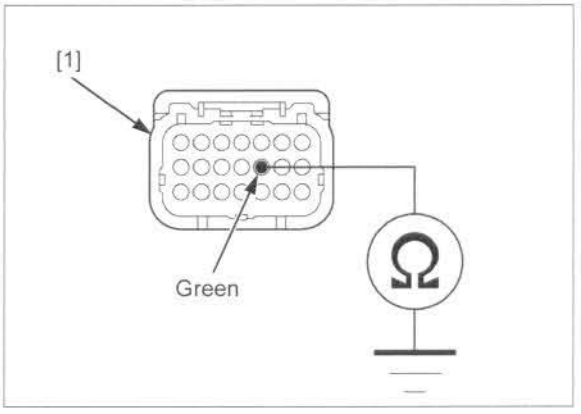
GROUND LINE

Check for continuity between the combination meter 21P connector [1] terminal and ground.

There should be continuity all times.

Connection: Green – Ground

If there is no continuity, check for an open circuit in the Green wire.



SERIAL COMMUNICATION LINE

Gear position indicator continuously blinks "–", MIL and engine coolant temperature indicator do not come on

1. **PCM/ECM Power Input Inspection**

   Check that the engine can be started normally.

   Can the engine start?

   YES – GO TO STEP 2.

   NO – Check the PCM/ECM power/ground line (page 4-35).

2. **Connector Inspection**

   Check the combination meter 21P connector and PCM/ECM 33P (Black) connector for loose contacts or corroded terminals.

   Are the connectors in good condition?

   YES – GO TO STEP 3.

   NO – Loose or poor contacts at the combination meter 21P connector or PCM/ECM 33P (Black) connector.

3. **Combination Meter Serial Line Short Circuit Inspection**

Turn the ignition switch OFF.
Disconnect the PCM/ECM 33P (Black) connector [1] and combination meter 21P connector.
Check for continuity between the wire harness side PCM/ECM 33P (Black) connector terminal and ground.

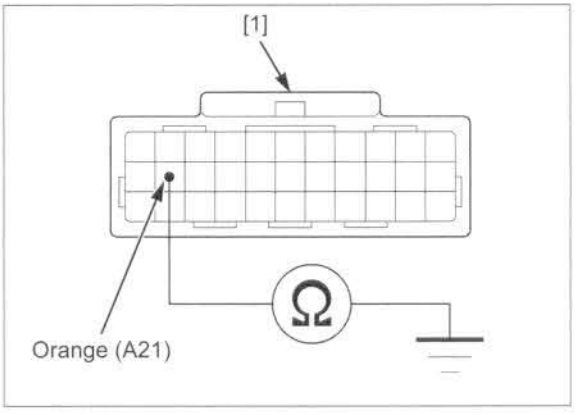
TOOL:
Test probe **07ZAJ-RDJA110**

Connection:
Orange (A21) – ground

Is there continuity?

YES – Short circuit in the Orange wire.

NO – GO TO STEP 4.



4. **Combination Meter Serial Line Open Circuit Inspection**

Check the continuity between the PCM/ECM 33P (Black) connector [1] and combination meter 21P connector [2] terminals.

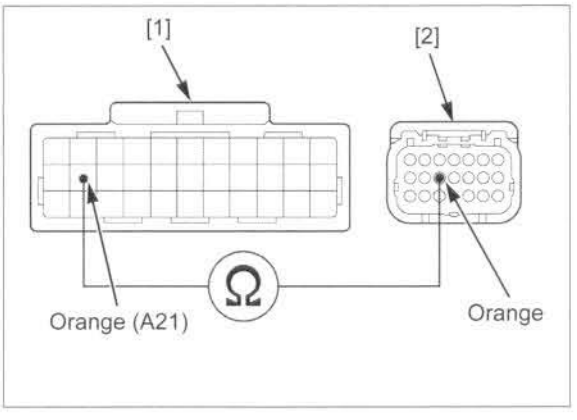
TOOL:
Test probe **07ZAJ-RDJA110**

Connection:
Orange (A21) – Orange

Is there continuity?

YES – GO TO STEP 5.

NO – Open circuit in the Orange wire.



5. **PCM/ECM Circuit Inspection**

Connect the PCM/ECM 33P (Black) connector.

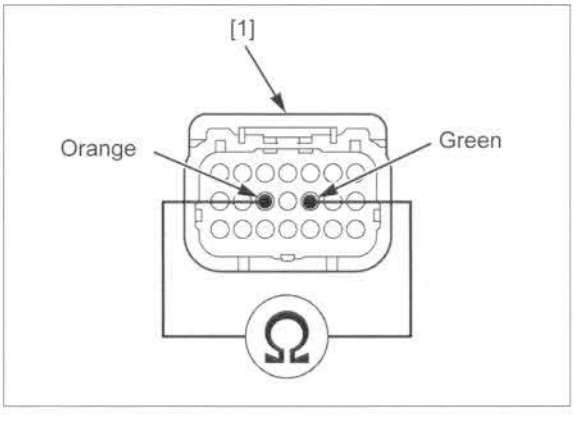
Turn the ignition switch ON and wait 5 seconds or more. Measure resistance at the combination meter 21P connector [1] terminals.

Connection: Orange – Green

Is the resistance 0.1 kΩ – 100 kΩ?

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

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



SPEEDOMETER

Speedometer does not operate

1. **Combination Meter Power/Ground Line Inspection**

   Check the odometer/trip meter and indicators functions.

   Do they function properly?

   YES – GO TO STEP 2.

   NO – Check the combination meter power/ground lines (page 22-7).

2. **ESP System DTC Inspection**

   Check the ESP system DTC (page 23-11).

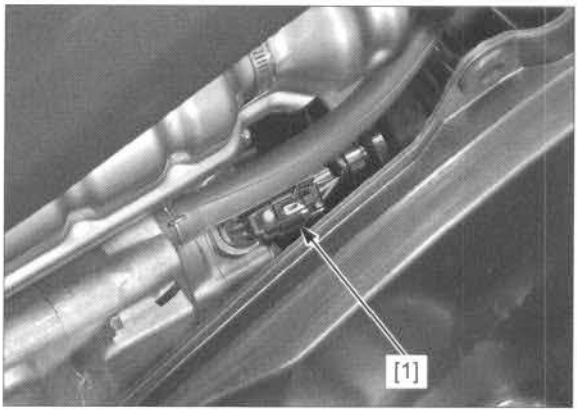
   Is DTC 11-1 indicated?

   YES – Perform the DTC 11-1 troubleshooting (page 23-14).

   NO – GO TO STEP 3.

3. **Speedometer Line Open Circuit Inspection**

   Remove the left side cover (page 2-4).
   Disconnect the VS sensor 3P (Black) connector [1].



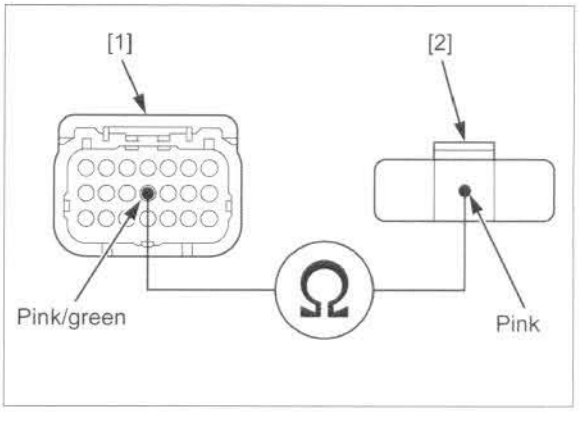
   Disconnect the combination meter 21P connector (page 22-6).
   Check the continuity between the combination meter 21P connector [1] and VS sensor connector [2] terminals.

   Connection: Pink/green – Pink

   Is there continuity?

   YES – Replace the combination meter (page 22-6).

   NO – • Open circuit in the Pink/green or Pink wire.
   • Loose or poorly connected related connectors.



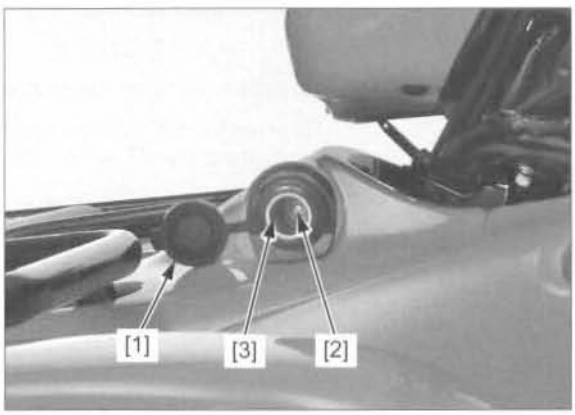
ACCESSORY SOCKET

INSPECTION

Remove the accessory socket 2P (Black) connector [1] 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 ON.
If there is no voltage, check for brown ACC fuse (10 A) and an open circuit in the wire harness.

Remove the accessory socket cap [1].



Check for continuity between the White/black wire terminal of the socket side 2P connector and bottom center terminal [2] of the socket, and between the Green wire terminal and side wall terminal [3].

There should be continuity.

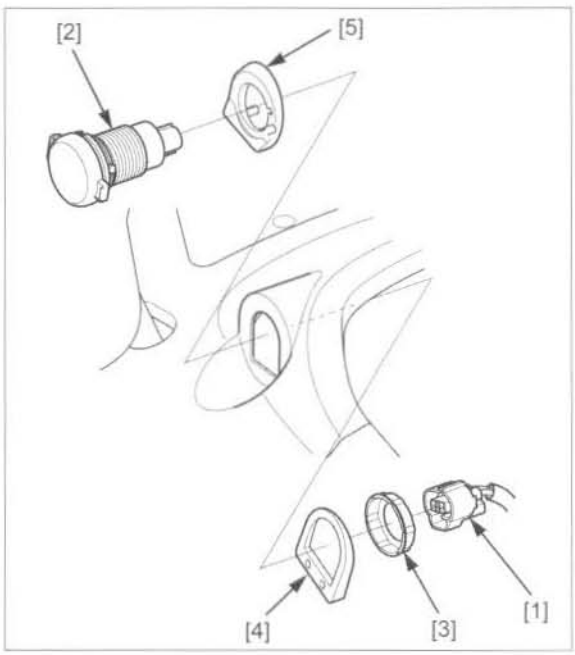
If there is no continuity, replace the accessory socket (page 22-10).

REPLACEMENT

Remove the left fuel tank side cover (page 2-5).

Disconnect the accessory sub harness 2P (Black) connector [1] from the accessory socket [2].

Remove the nut [3] and inner spacer [4], accessory socket, outer spacer [5].



Assemble the outer spacer and a new accessory socket by aligning the groove with the lug, and place them into the fender.

Install the inner spacer while aligning the holes with the outer spacer bosses.

Install the nut and tighten it securely.

Connect the accessory sub harness 2P (Black) connector.

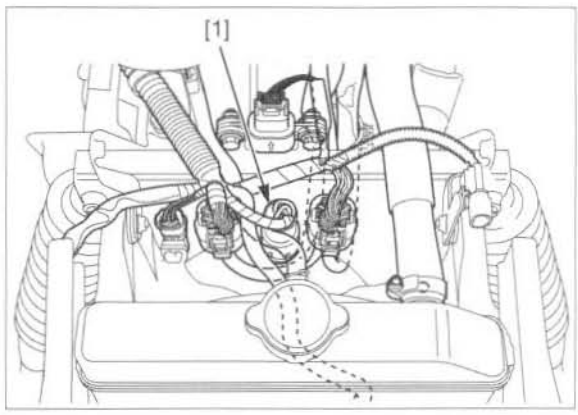
Install the left fuel tank side cover (page 2-5).

IGNITION SWITCH

INSPECTION

Remove the front fender/carrier (page 2-8).

Remove the ignition switch 4P connector [1] 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:

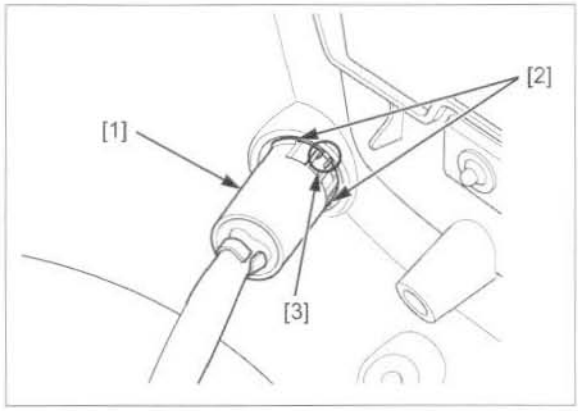
Color / Position	R/Bl	P	R	Bl
ON	○——	——○	○——	——○
OFF				

REPLACEMENT

Disconnect the ignition switch 4P connector (page 22-11).

Remove the meter cover (page 22-6).

Release the ignition switch wire from the wire band, wire clips and wire guides.



Remove the ignition switch [1] from the meter cover by pushing in the two stoppers [2].

Install a new ignition switch by aligning the locating tab [3] with the cover groove.

Install the removed parts in the reverse order of removal.

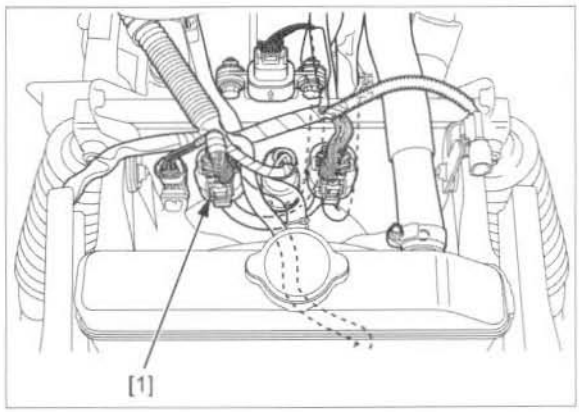
HANDLEBAR SWITCH

INSPECTION

Remove the front fender/carrier (page 2-8).

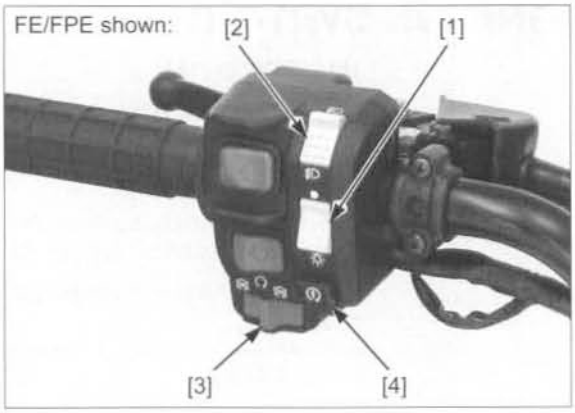
Remove the handlebar switch connector [1] from the frame and disconnect it.

- FM/FPM: 10P (Green)
- FE/FPE: 14P (Green)



For gearshift switch inspection (page 23-29).

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 [1]/DIMMER SWITCH [2]

Color / Position	Bl/Br	Br
●		
☼	○	○

Color / Position	●	W	Bu/Bl
≡D	○		○
(N)	○	○	○
≡D	○	○	

ENGINE STOP SWITCH [3]/STARTER SWITCH [4]

Color / Position	Bl/R	Bl/W
⊗		
○	○	○
⊗		

Color / Position	Bl/W	Y/R
FREE		
PUSH	○	○

FRONT BRAKE SWITCH

INSPECTION

NOTE:

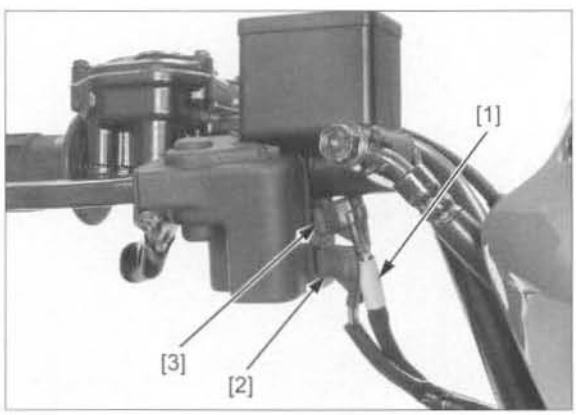
- The lower switch is the brake light switch and the upper switch is the inhibitor switch.

The inhibitor switch wire has gray tape [1].

Disconnect the brake light switch connectors [2] and the inhibitor switch connectors [3].

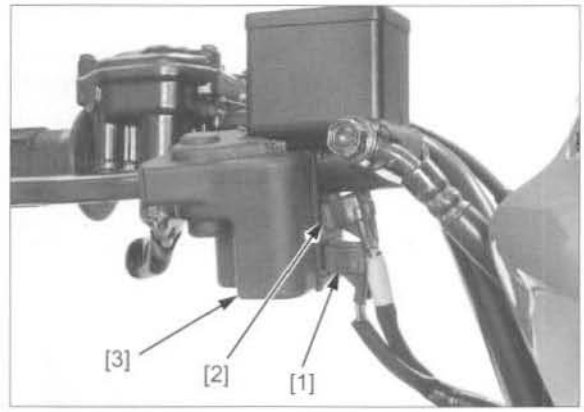
Check for continuity between the switch terminals.

There should be continuity with the front brake lever squeezed and no continuity with the lever released.



REPLACEMENT

Disconnect the brake light switch connectors [1] and the inhibitor switch connectors [2] from the switches.
Remove the dust cover [3] from the switches.



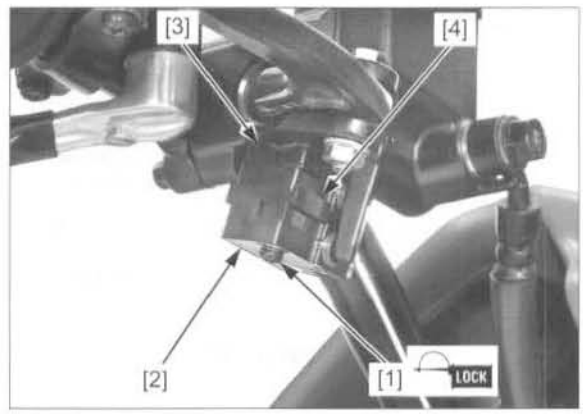
Squeeze the front brake lever and secure it.

Remove the screw [1], brake light switch [2], inhibitor switch [3] and spacer [4] from the master cylinder.

Apply locking agent to the screw threads.
Install the switches and spacer by aligning the switch cutout with the lug of the master cylinder and spacer.
Install and tighten the screw to the specified torque.

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

Install the dust cover onto the switches properly.
Connect the connectors to the switches.

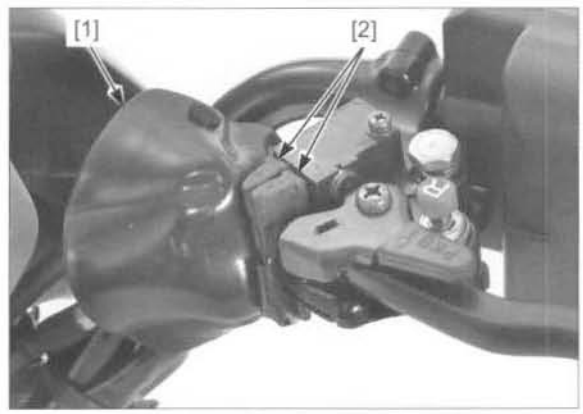


REAR BRAKE LIGHT SWITCH

LEVER SWITCH INSPECTION

Remove the dust cover [1] from the brake light switch.
Disconnect the rear brake lever switch connectors [2] 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.



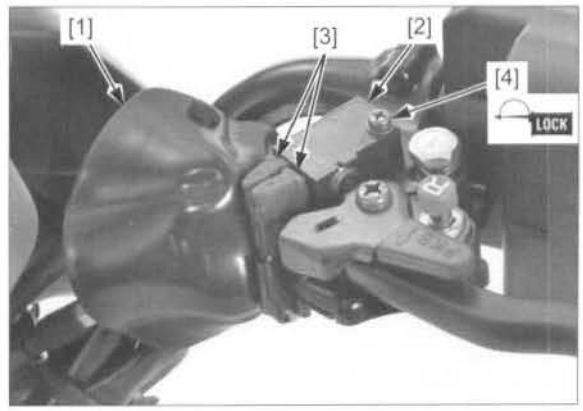
LEVER SWITCH REPLACEMENT

Remove the dust cover [1] from the brake light switch [2].
Disconnect the rear brake lever switch connectors [3].
Remove the screw [4] and switch from the brake lever bracket.

Apply locking agent to the screw threads.
Install the switch by aligning the switch cutout with the lug of the brake lever bracket.
Install and tighten the screw to the specified torque.

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

Connect the connectors to the switch.
Install the dust cover onto the switch properly.

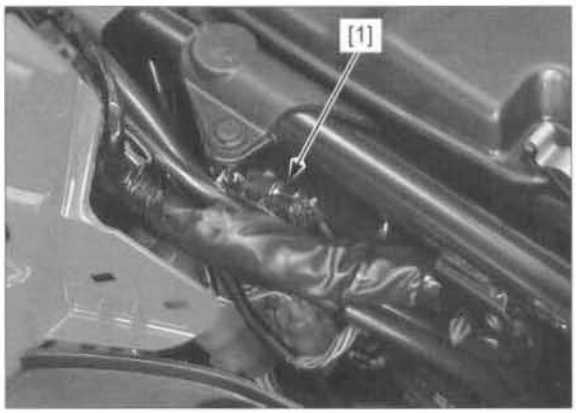


PEDAL SWITCH INSPECTION

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

Disconnect the rear brake pedal switch 2P connector [1] 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.



GEAR POSITION SWITCH

INSPECTION

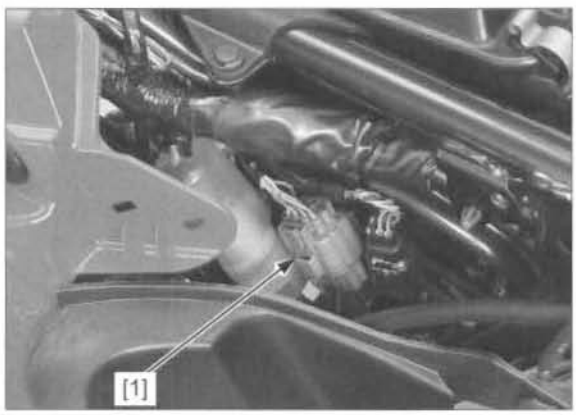
Remove the right side cover (page 2-4).

Remove the gear position switch 8P connector [1] from the frame and disconnect it.

If the transmission will not shift with the gearshift switches, use the gear change tool included with the tool kit (FE/FPE models).

Check for continuity at the switch side connector terminals.
There should be continuity in each gear position as follows:

Gear position	Connection
Reverse	Gray – ground
Neutral	Light green/red – ground
1st	White/green – ground
2nd	White/red – ground
3rd	Blue – ground
4th	Yellow – ground
5th	Light blue/white – ground



REPLACEMENT

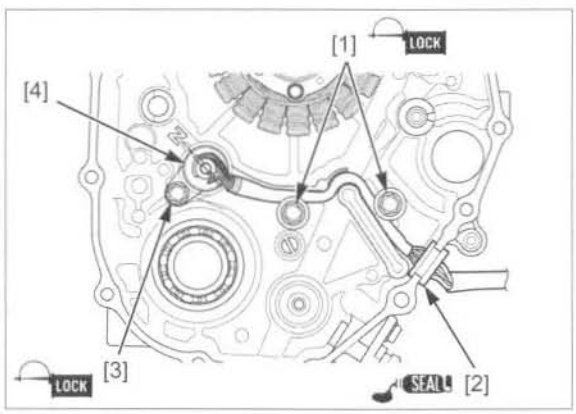
Remove the rear crankcase cover (page 13-6).

Remove the two wire clamp bolts [1].
Remove the wire grommet [2] from the rear crankcase cover.
Remove the retaining bolt [3] and gear position switch [4] from the rear crankcase cover.

Apply locking agent to all the bolt threads.
Install a new gear position switch onto the rear crankcase cover and tighten the retaining bolt.
Apply liquid sealant to the grommet seating surface.
Route the wire as shown and install the grommet into the crankcase cover groove properly.
Install the two clamp bolts and tighten them to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Install the rear crankcase cover (page 13-9).



COOLING FAN

Cooling fan does not start

1. **Fuse Inspection**

   Check the FAN fuse (15 A).

   Is the fuse blown?

   YES – Replace the FAN fuse.

   NO – GO TO STEP 2.

2. **PGM-FI System DTC Inspection**

   Check the PGM-FI system DTC (page 4-11).

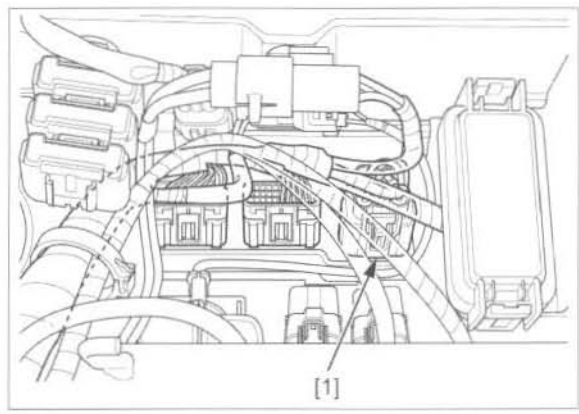
   Is DTC 7-1 and/or 7-2 indicated?

   YES – • Perform the DTC 7-1 troubleshooting (page 4-16).
   • Perform the DTC 7-2 troubleshooting (page 4-17).

   NO – GO TO STEP 3.

3. **Ground Line Inspection**

   Remove the rear fender cover.
   Disconnect the PCM/ECM 5P (Black) connector [1].



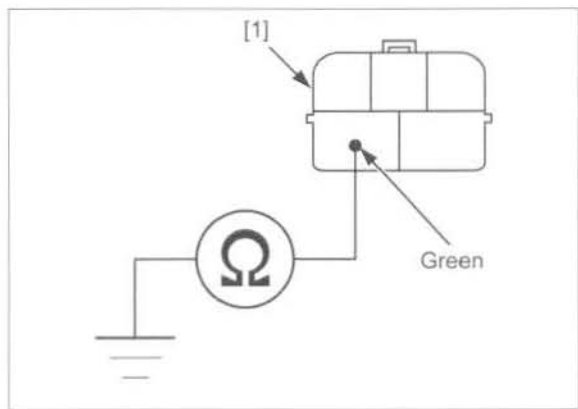
   Check for continuity between the PCM/ECM 5P (Black) connector [1] terminal and ground.

   Connection: Green – ground

   Is there continuity?

   YES – GO TO STEP 4.

   NO – Open circuit in the Green wire.



4. **Cooling Fan Operation Inspection**

Connect the PCM/ECM 5P (Black) connector [1] terminals with jumper wire [2].

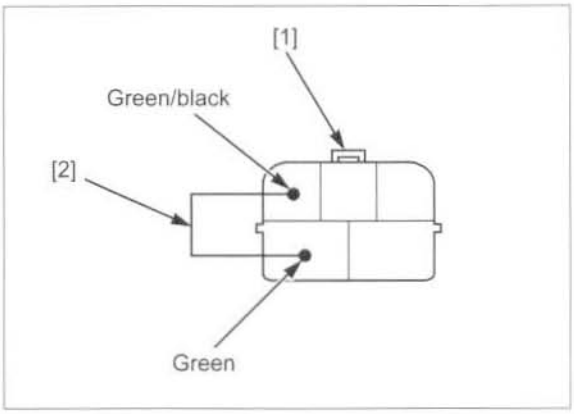
Connection: Green/black – green

Check the cooling fan when connecting the jumper wire.

Does the cooling fan start?

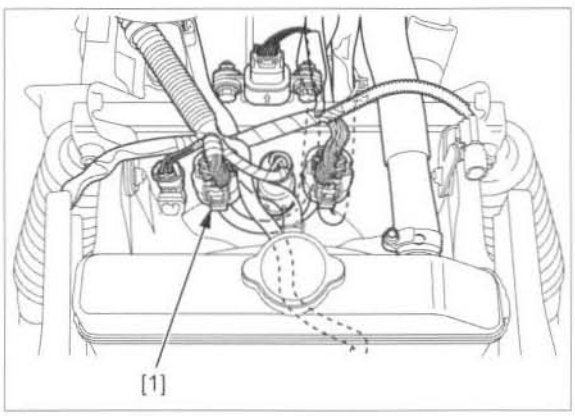
YES – Replace the PCM/ECM with a known good one, and recheck.

NO – GO TO STEP 5.



5. **Cooling Fan Ground Line Inspection**

Remove the front fender/carrier (page 2-8).
Remove the cooling fan 2P connector [1] from the frame and disconnect it.



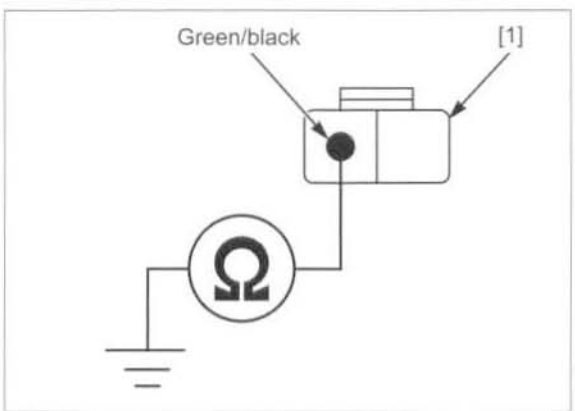
With the jumper wire connected to the PCM/ECM 5P connector, check for continuity between the fan motor 2P connector [2] terminal and ground.

Connection: Green/black – ground

Is there continuity?

YES – GO TO STEP 6.

NO – Open circuit in the Green/black wire.



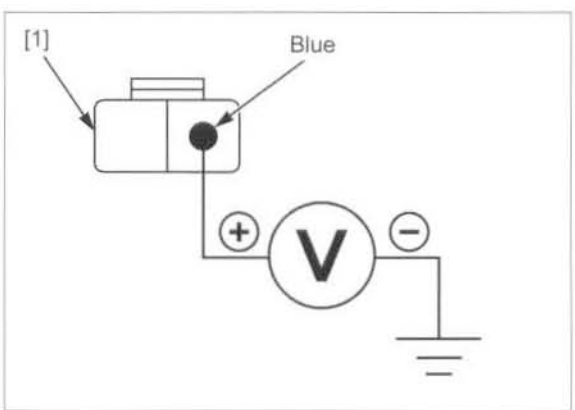
6. **Cooling Fan Power Input Line Inspection**

Measure the voltage between the fan motor 2P [1] terminal (+) and ground (–).

Is there battery voltage?

YES – Replace the cooling fan with a new one (page 8-9).

NO – Open circuit in the Blue wire between the cooling fan and fuse box.



4WD SELECT SWITCH

SYSTEM INSPECTION

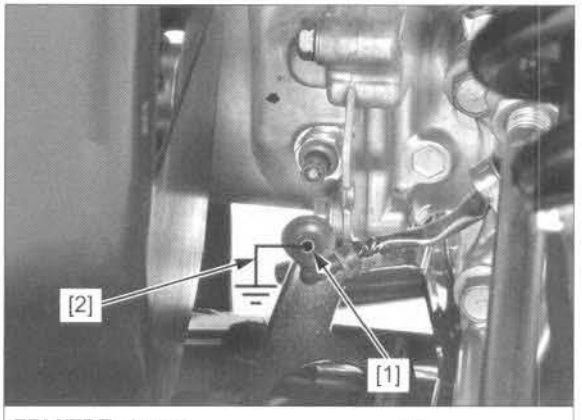
Release the wire grommet from the guide of the gear case and disconnect the 4WD select switch connector [1].
Ground the switch connector terminal with a jumper wire [2].

Turn the ignition switch ON and check the 4WD indicator.

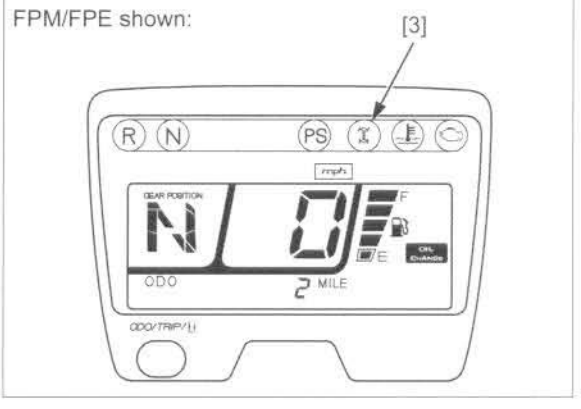
The indicator should light when the connector terminal is grounded.
The indicator should not light when the jumper wire is removed.

FPM/FPE models: If the 4WD indicator [3] operation is abnormal, check the Brown/white wire between the 4WD select switch and EPS ECU, and the Blue/white wire between the EPS ECU and combination meter.

FM/FE models: If the 4WD indicator operation is abnormal, check the Blue/white wire between the 4WD select switch and combination meter.



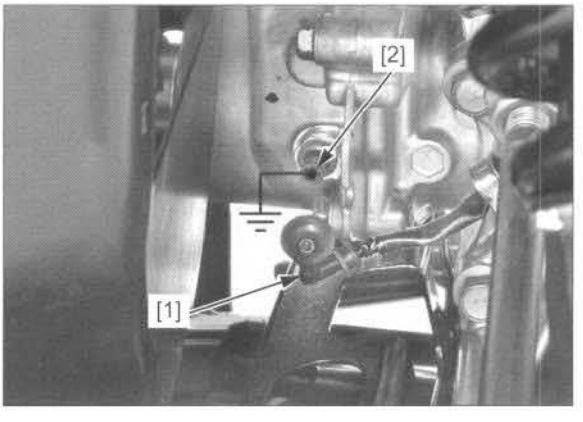
FPM/FPE shown:



SWITCH INSPECTION

Disconnect the select switch connector [1].

Check for continuity between the switch terminal [2] and ground.
There should be continuity when the 2WD/4WD select lever is 4WD position, and no continuity when the lever is 2WD position.



REPLACEMENT

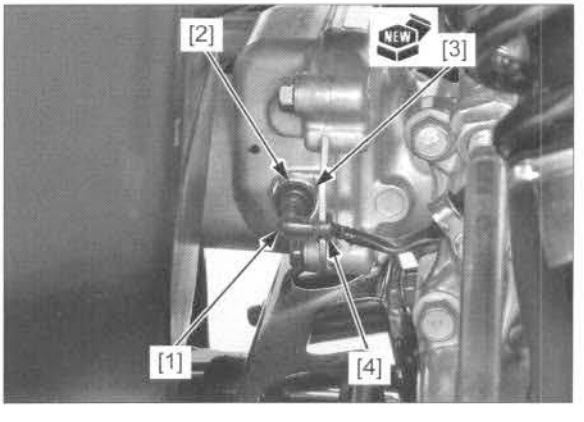
Disconnect the select switch connector [1].

Remove the 4WD select switch [2] and sealing washer [3].

Install the 4WD select switch with a new sealing washer and tighten it.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Connect the switch connector and install its wire (grommet [4]) in the wire guide.

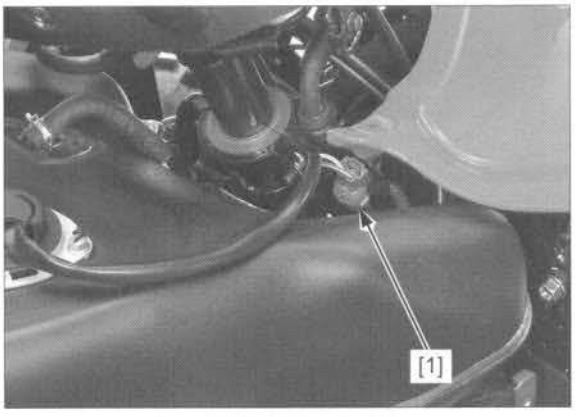


FUEL GAUGE/FUEL LEVEL SENSOR

REMOVAL/INSTALLATION

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

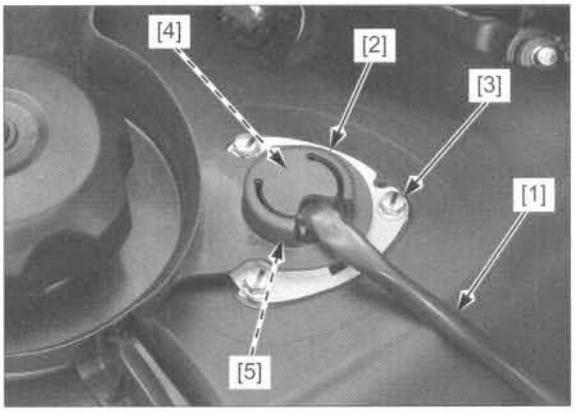
Disconnect the fuel level sensor 2P (Red) connector [1].



Release the sensor wire [1] out of the sensor cover [2].

Be careful not to deform the float arm.

Remove the three bolts [3], fuel level sensor [4] and O-ring [5] from the fuel tank.



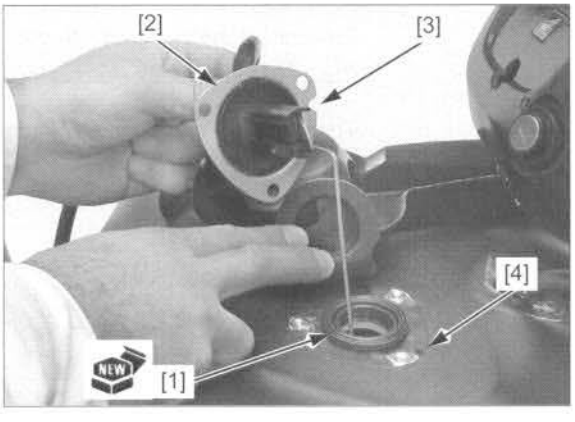
Install a new O-ring [1] onto the fuel tank.

Install the fuel level sensor [2] into the fuel tank while aligning the groove [3] with the boss [4] on the fuel tank.

Install and tighten the bolts to the specified torque.

TORQUE: 9.0 N·m (0.9 kgf·m, 6.6 lbf·ft)

Install the removed parts in the reverse order of removal.



SYSTEM INSPECTION

Check that the speedometer and indicators function properly.

- If they do not function, check the power/ground line (page 22-7).
- If they function, check as follows:

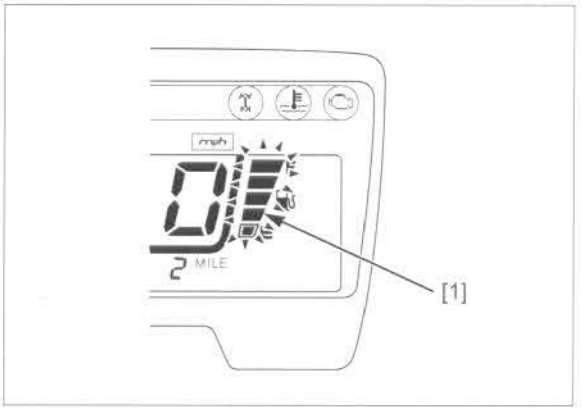
Remove the fuel level sensor 2P (Red) connector (page 22-18).

Turn the ignition switch ON and check the fuel gauge. All segments [1] 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 22-6).

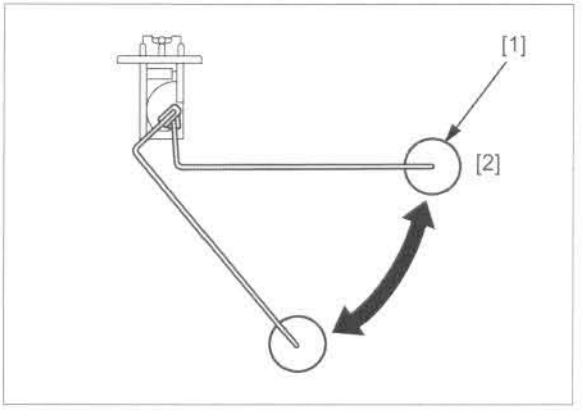
Turn the ignition switch OFF.



Remove the fuel level sensor (page 22-18).

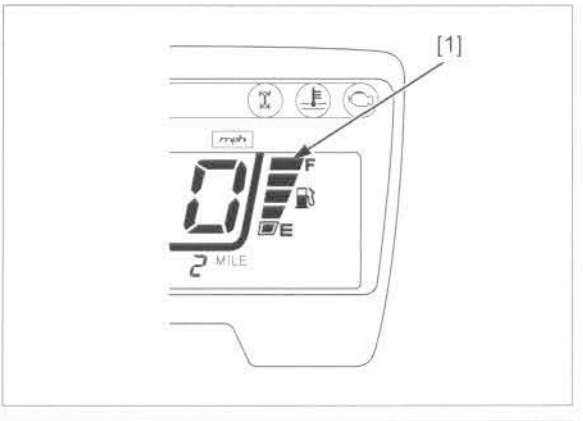
Connect the fuel level sensor 2P (Red) connector.

With the fuel level sensor float [1] at the top (FULL) position [2], turn the ignition switch ON and check the fuel gauge.



All segments up to segment "F" [1] should come on.

Turn the ignition switch OFF.



Move the float to the bottom (RESERVE) position, turn the ignition switch ON and check the fuel gauge.

Segment "E" [1] and low fuel indicator [2] should blink.

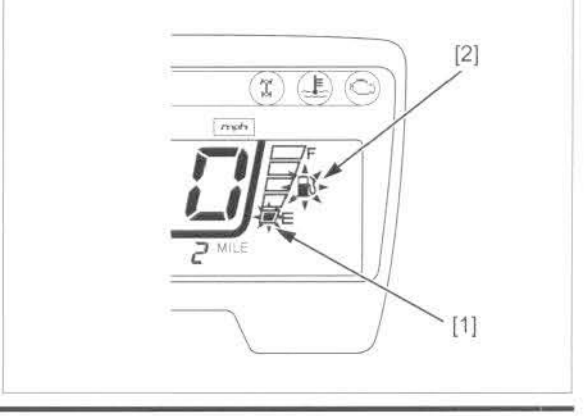
If the fuel gauge does not function properly, check the fuel level sensor (page 22-20).

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 the fuel level sensor (page 22-18).



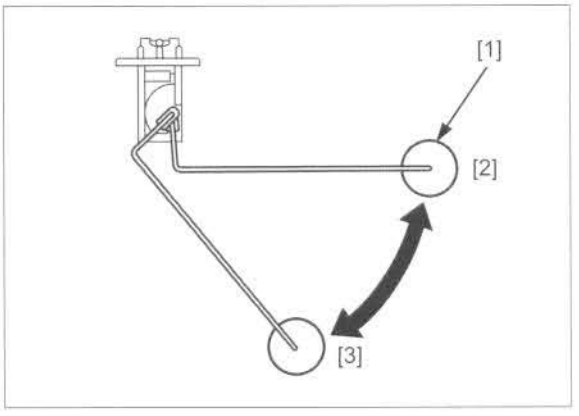
FUEL LEVEL SENSOR INSPECTION

Remove the fuel level sensor (page 22-18).

Measure the fuel level sensor resistance with the float [1] at the top (FULL) [2] and bottom (RESERVE) [3] positions.

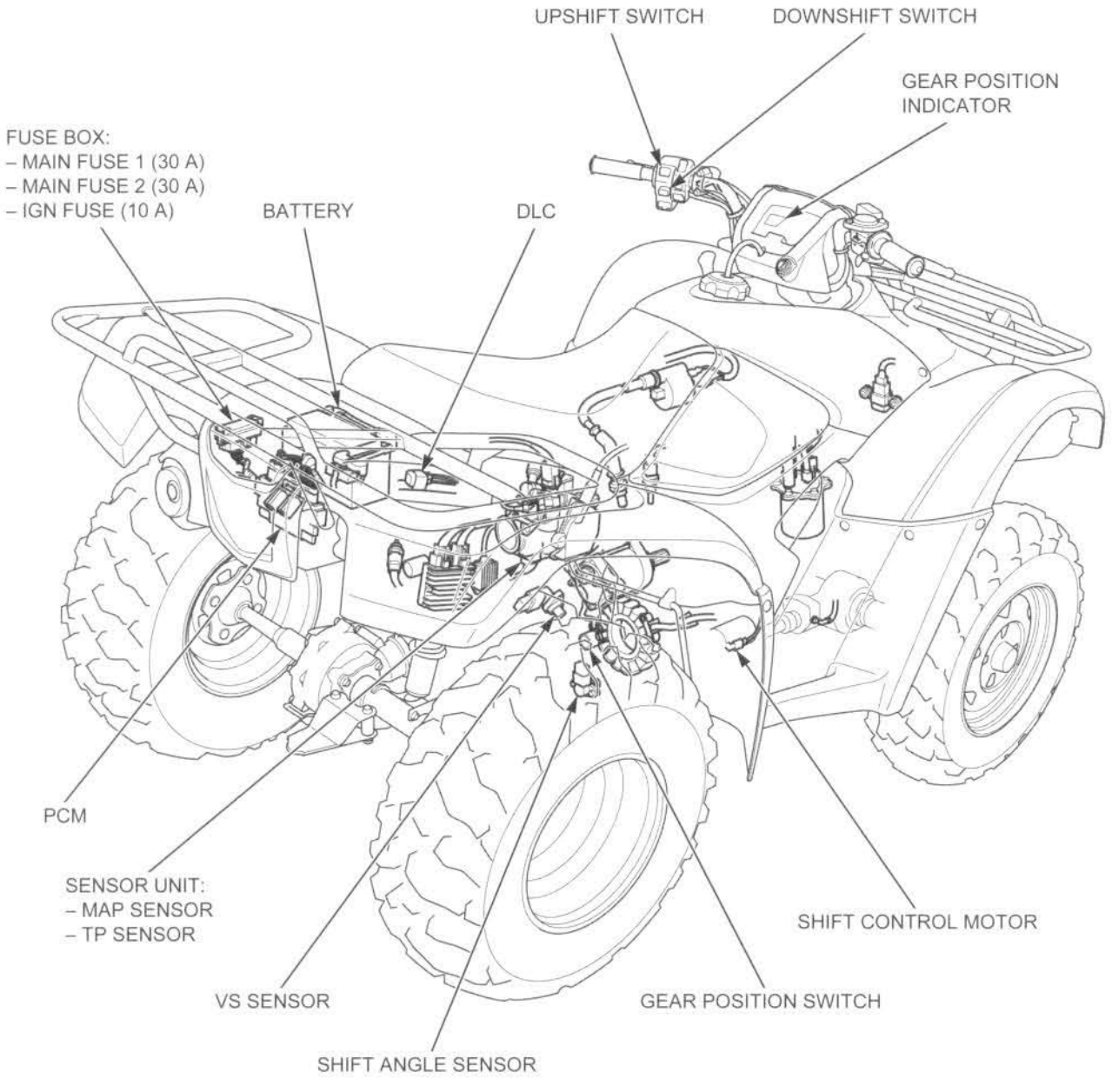
Connection: Green/yellow – Yellow/white

FLOAT POSITION	RESISTANCE (20°C/68°F)
TOP (FULL)	11 – 13 Ω
BOTTOM (RESERVE)	204 – 210 Ω

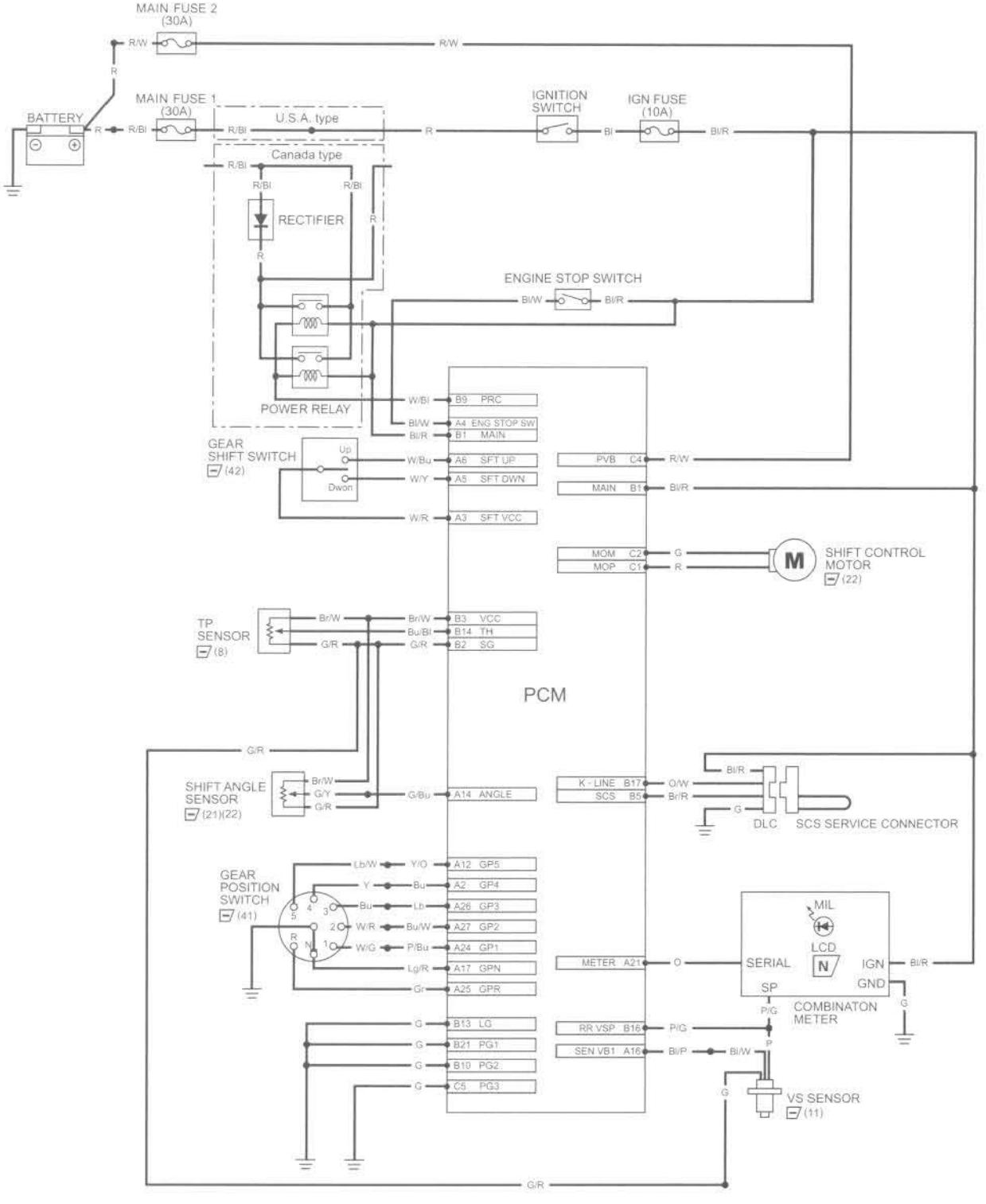


23. ELECTRIC SHIFT PROGRAM (ESP: FE/FPE models)

ESP COMPONENT LOCATION

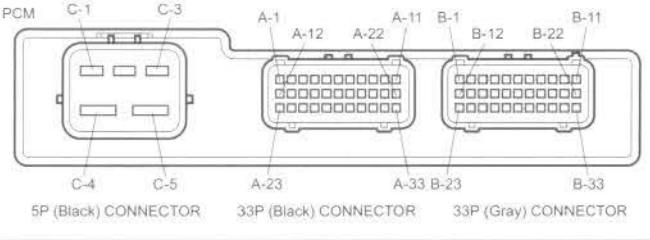


ESP SYSTEM DIAGRAM



( ): Gear position indicator brink

: Short terminals for reading DTC



Bl: Black
Br: Brown
Bu: Blue
G: Green
Gr: Gray
Lg: Light green
Lb: Light blue
O: Orange
P: Pink
R: Red
W: White
Y: Yellow

SERVICE INFORMATION

GENERAL

- Refer to "Before Troubleshooting" first and begin the troubleshooting (page 23-5).
- When performing the DTC troubleshooting, read "ESP Troubleshooting Information" carefully, and inspect and troubleshoot 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 the connector is disconnected when current is flowing, the excessive voltage may damage the PCM. Always turn off the ignition switch before disconnecting or connecting the connectors.
- Use a digital tester for ESP system inspection.

For ESP Troubleshooting

The PCM controls the PGM-FI and ESP systems. Therefore some detection items are shared by the PGM-FI and ESP 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 PGM-FI system (page 4-10).
2. Gear position indicator blinks or DTC for the ESP (page 23-10).
3. Symptom of the ESP operation (page 23-5).

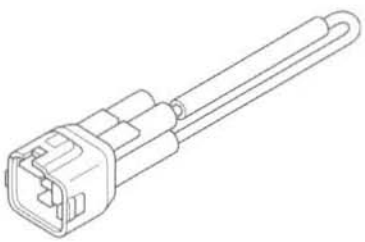
Refer to PGM-FI System section for "General Troubleshooting" information (page 4-10).

TORQUE VALUE

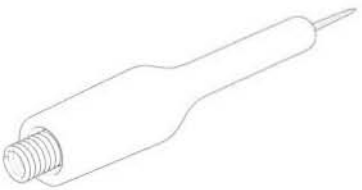
ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Shift angle sensor bolt	2	5	6.0 (0.6, 4.4)	Apply locking agent to the threads.

TOOLS

SCS service connector
070PZ-ZY30100



Test probe
07ZAJ-RDJA110



HDS pocket tester
TDS 3557-0112-01 (U.S.A. Only)

BEFORE TROUBLESHOOTING

NOTE:

- If the ATV has any ESP trouble, the gear position indicator brinks to indicate the DTC (Diagnostic Trouble Code) (page 23-10). Check the DTC and refer to the DTC index and begin the appropriate troubleshooting procedure (page 23-13).
- If there are no DTC stored in the PCM memory, do the troubleshooting as "Symptom Troubleshooting" (page 23-5).

VERIFY THE COMPLAINT

- Check the accuracy of the customer complaint by test riding the ATV.
- Note the symptoms.
- Do not begin disassembly or testing until you have determined if the problem is electrical or mechanical by shifting the gear manually (page 23-6).
- Temporarily failures can occur. Under certain conditions, the ESP system can "miss a shift." When this happens, the PCM may record a DTC. Be sure to note and erase any stored DTC(s) when verifying the customer's complaint. If the customer's complaint is duplicated during the test-ride, and the blinking gear position indicator displays a DTC, proceed with troubleshooting.

PRELIMINARY ESP SYSTEM INSPECTION

Inspect the following before diagnosing the system.

- Make sure the battery is fully charged and in good condition (page 21-8)
- Make sure the clutch is adjusted properly (page 3-24)
- Check the main fuse 1 (30A), main fuse 2 (30A) and IGN fuse (10A) for blown

SYMPTOM TROUBLESHOOTING

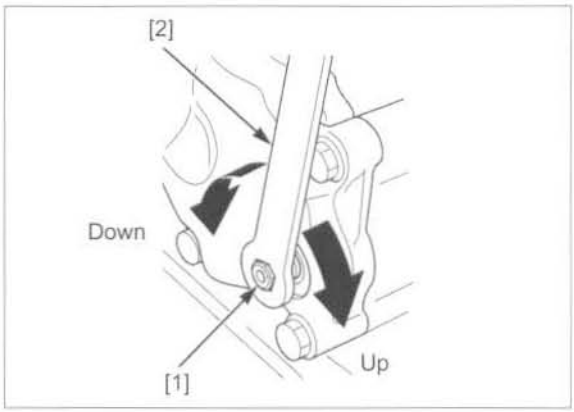
Symptom	Diagnosis	Also check for
Shift control failure but no DTC set	Toroubleshoot the "Electric Shift Does Not Operate" (page 23-6)	clutch adjustment (page 3-24)
Gear position indicator blinks "–" constantly (No DTC set)	Inspect the serial communication line (page 22-7)	–
Gear position indicator is no indication and MIL stays on, but no DTC is set	Inspect the DLC circuit (page 4-29)	Short circuit in the DLC related wire

ELECTRIC SHIFT DOES NOT OPERATE

1. **Shifting Operation Check**

DTC 23-1 will be indicated with the ignition switch turned ON.

Remove the left side cover (page 2-4).
Turn the ignition switch OFF.
Manually shift the transmission by rotating the gearshift spindle [1] with the emergency gear change tool [2].



Can the gears be changed manually?

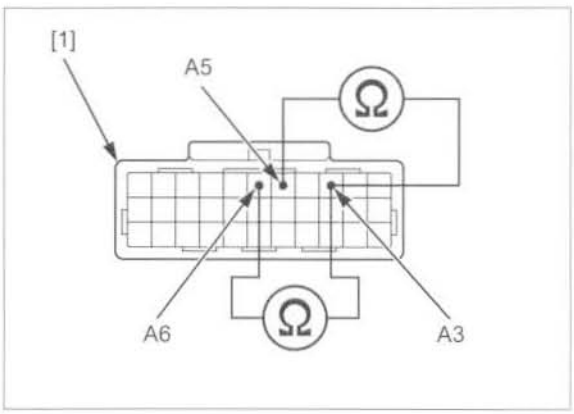
YES – GO TO STEP 2.

NO – Check the gearshift linkage (page 12-19) and the transmission (page 14-8).

2. **Gearshift Switch Inspection at PCM Connector**

Disconnect the PCM 33P (Black) connector [1].
Check for continuity between the wire harness side PCM 33P (Black) connector terminals while pushing the gearshift switch.

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



Connection:
With the upshift switch pushed:
A3 – A6
With the downshift switch pushed:
A3 – A5

Is there continuity?

YES – Loose or poor contact of the PCM 33P (Black) connector.

NO – GO TO STEP 3.

3. **Gearshift Switch Inspection**

Check the gearshift switch (page 23-29).

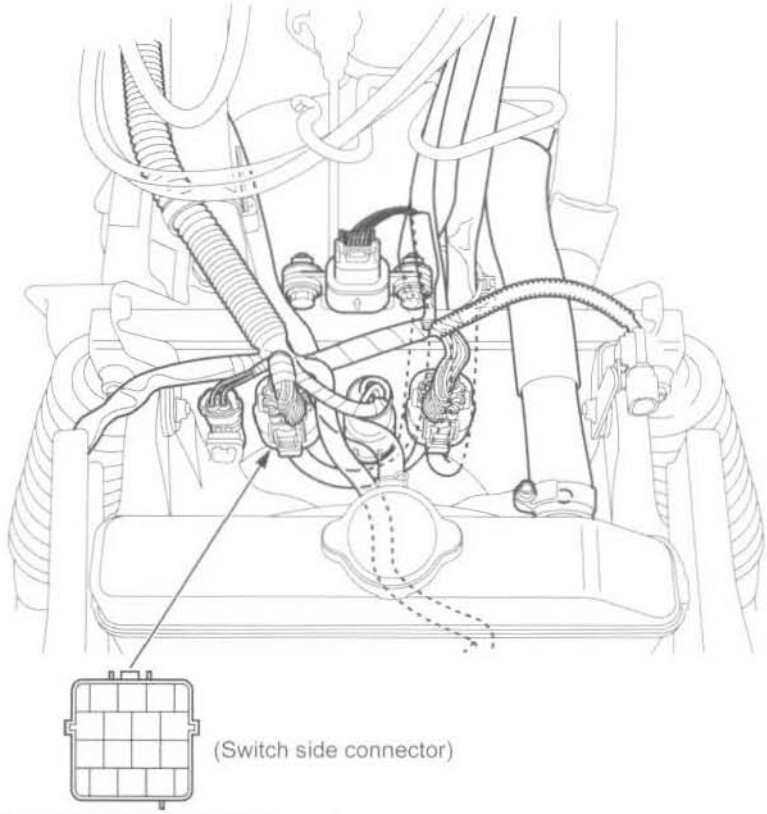
Is the gearshift switch normal?

YES – • Open circuit in the following wire between the handlebar switch 14P (Green) connector and PCM 33P (Black) connector.
– White/red or White/blue
– White/red or White/yellow

NO – Faulty gearshift switch.

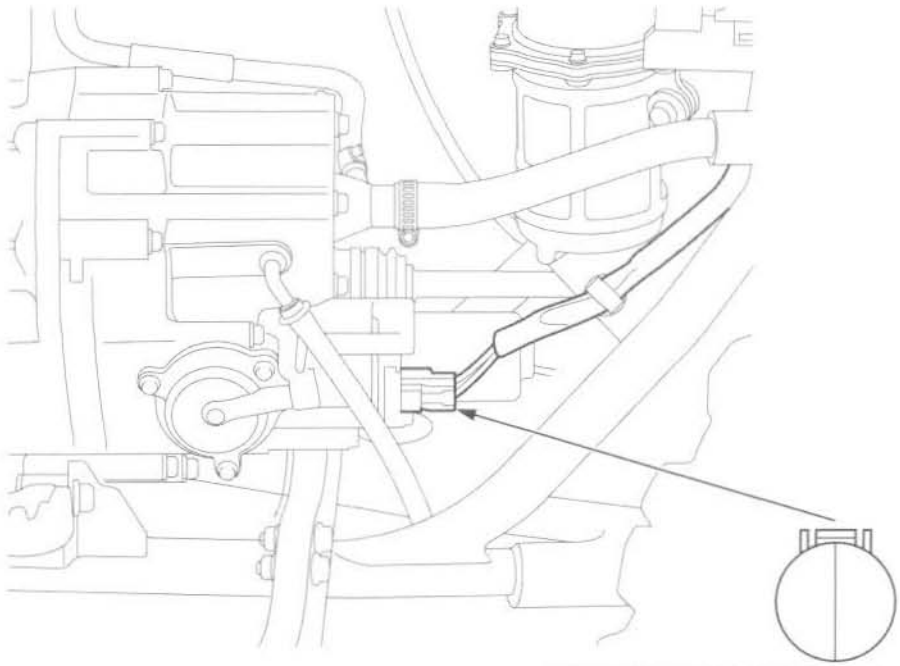
ESP CONNECTOR LOCATION

NOTE 1: Remove the front fender/carrier (page 2-8).



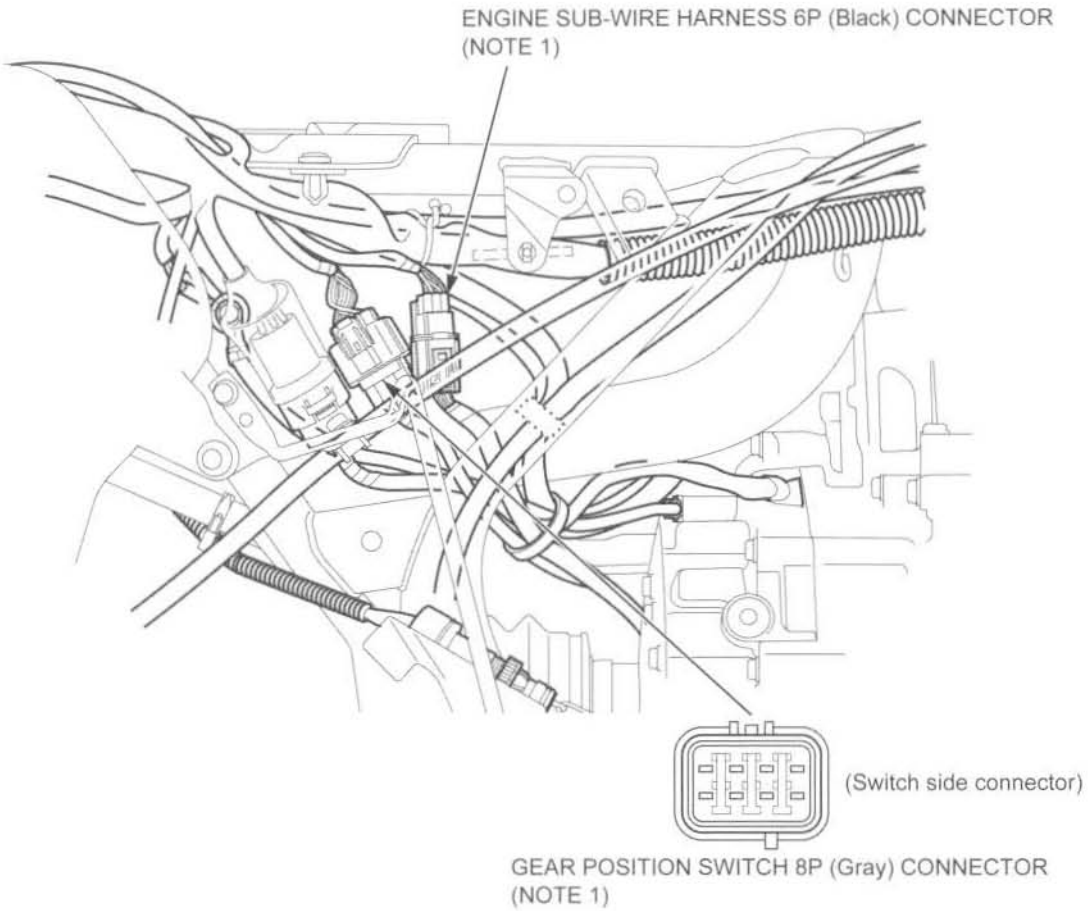
HANDLEBAR SWITCH 14P (Green) CONNECTOR (NOTE 1)

NOTE 2: Remove the right mudguard (page 2-6).



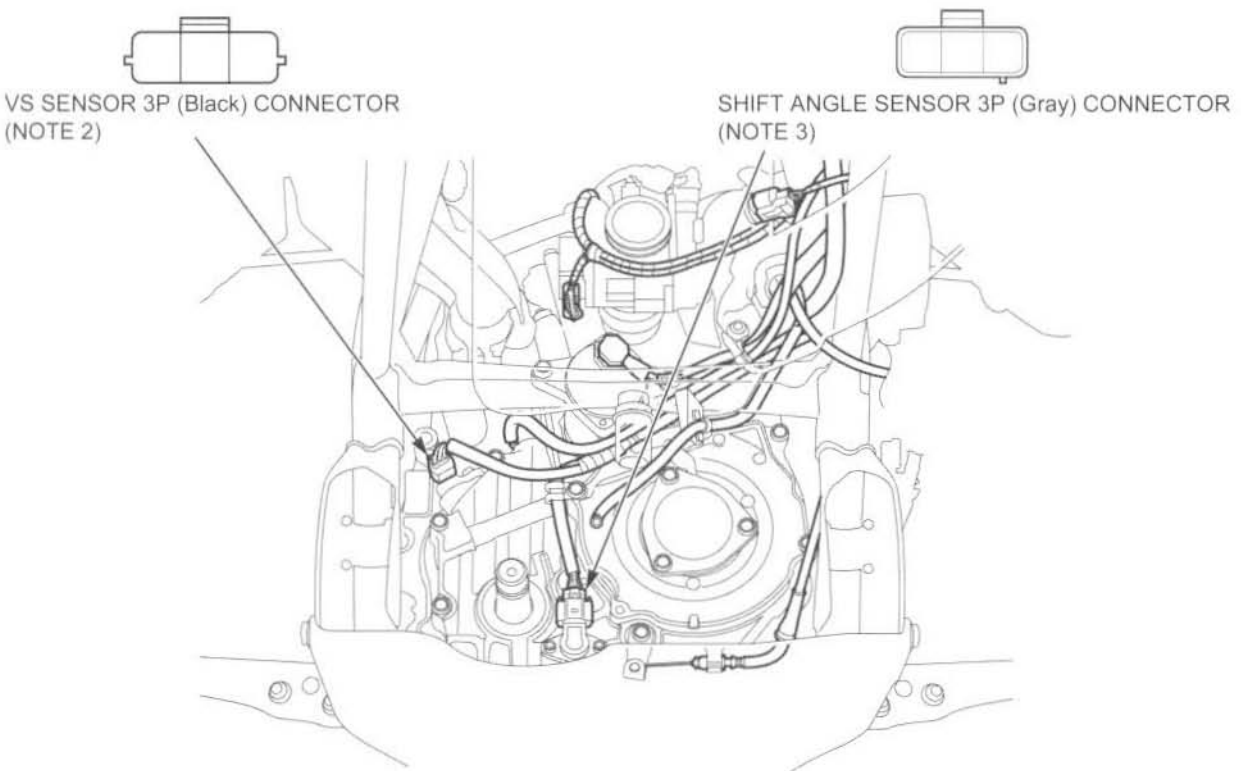
SHIFT CONTROL MOTOR 2P (Black) CONNECTOR (NOTE 2)

NOTE 1: Remove the right side cover (page 2-4).

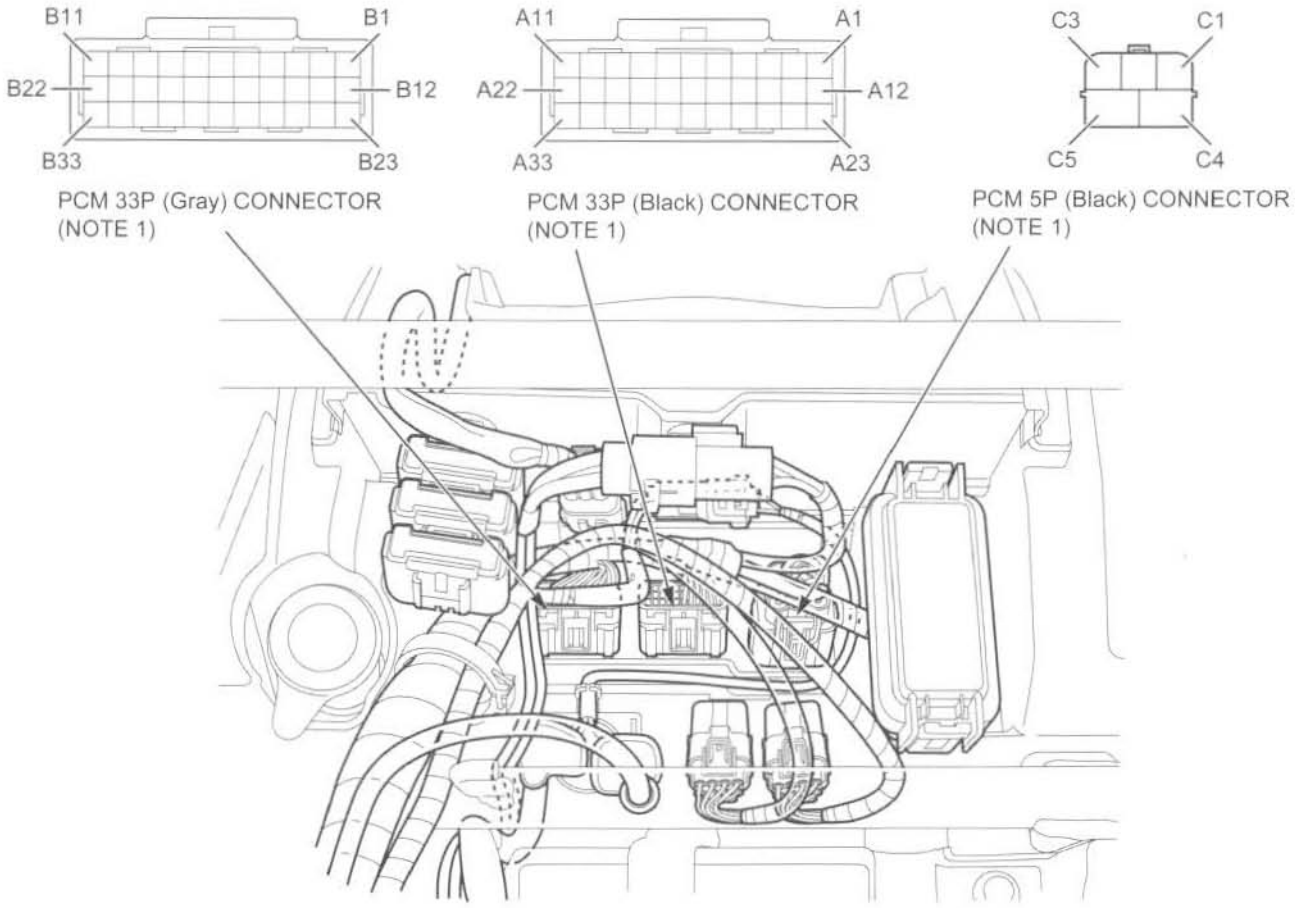


NOTE 2: Remove the left side cover (page 2-4).

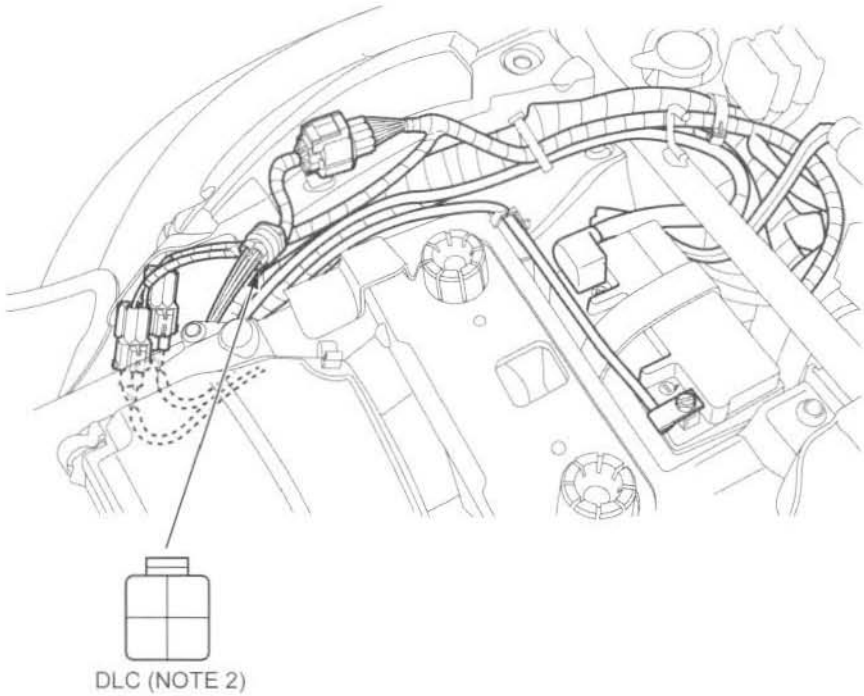
NOTE 3: Remove the left mudguard (page 2-6).



NOTE 1: Remove the rear fender cover (page 2-9).



NOTE 2: Remove the seat (page 2-4).



ESP TROUBLESHOOTING INFORMATION

- Refer to PGM-FI System section for "General Troubleshooting" information (page 4-10).

SYSTEM DESCRIPTION

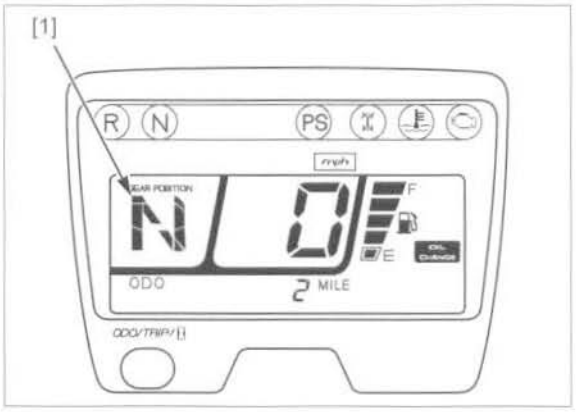
SELF-DIAGNOSIS SYSTEM

The PCM controls the PGM-FI and ESP systems. Therefore some detection items are shared by the PGM-FI and ESP and they may affect the operation of both systems.

The ESP system is equipped with the self-diagnostic system. If the PCM detects an ESP failure, it stops the system function and turns on the gear position indicator [1] blinking in failed gear position to indicate the DTC, and stores a DTC in its erasable memory for the relevant system failure.

To reset the ESP system, turn the ignition switch from ON to OFF and back to ON again. However, if the PCM still detects a problem, it will continue to stop the ESP system function. When this occurs, the gear position indicator will blink a certain number of times to indicate the DTC.

To indicate the DTC, the gear position indicator blinks "–"; depending on the kind of trouble.

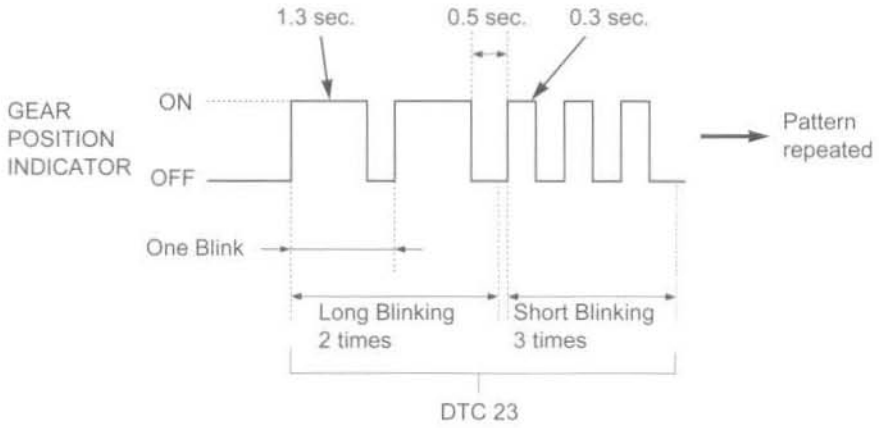


DTC (Diagnostic Trouble Code)

Refer to PGM-FI System section for DTC information (page 4-10).

INDICATOR BLINKING PATTERN

- The number of indicator blinks is the equivalent of 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 0.3 seconds. One long blink is the equivalent of ten short blinks. For example, when two long blinks are followed by three short blinks, the DTC is 23 (two long blink = 20 blinks, plus three 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/STORED 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 will blink at all times. 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 stored DTC by following the DTC readout procedure.

HDS POCKET TESTER INFORMATION

- The HDS can readout the DTC, stored data, current data and other PCM condition.

How to connect the HDS Pocket Tester

Turn the ignition switch OFF.

Remove the seat (page 2-4).

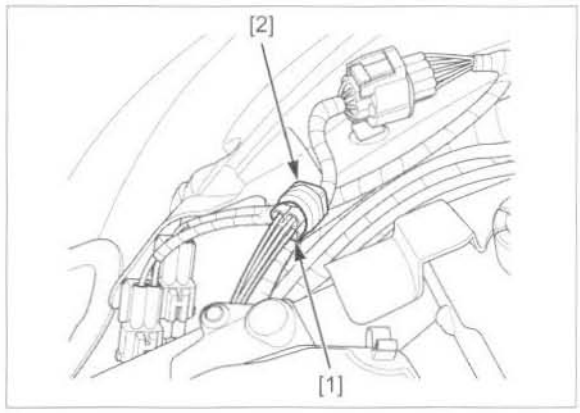
Remove the DLC [1] from the dummy connector [2].

Connect the HDS pocket tester to the DLC.

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

NOTE:

- Stored data indicates the engine and ESP conditions when the first malfunction was detected.



PCM reset

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

DTC READOUT

NOTE:

- If the MIL blinks, refer to "PGM-FI Troubleshooting Information" and troubleshoot the PGM-FI system first. Then recheck the ESP after erasing the PGM-FI DTC.
- After performing diagnostic troubleshooting, erase the problem DTC(s) (page 23-12) and test-ride the vehicle to be sure that the problem(s) have been removed.

Connect the HDS pocket tester to the DLC (page 23-11).

Read the DTC, stored data and follow the troubleshooting index (page 23-13).

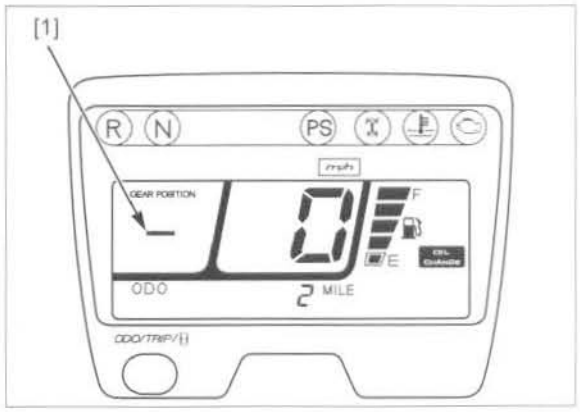
To read the DTC without the HDS pocket tester, refer to the following procedure.

Reading DTC with the gear position indicator

Turn the ignition switch ON and engine stop switch "○", read and note the gear position indicator [1] blinks "–".

The number of blinks indicates the current DTC.

Refer to the troubleshooting index (page 23-13).



When retrieving the stored DTC, refer to the following procedures.

1. Remove the DLC from the dummy connector (page 23-11).
2. Short the DLC [1] terminals using the special tool.

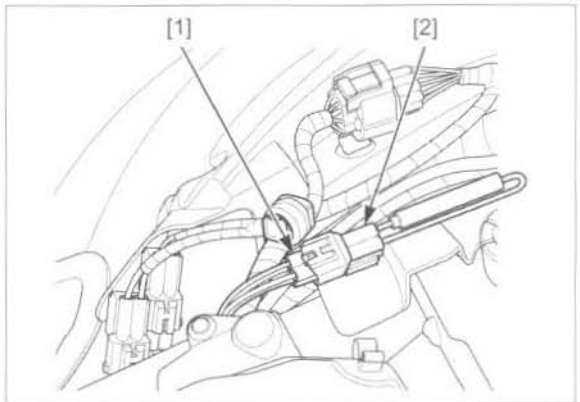
   TOOL:
   [2] SCS service connector 070PZ-ZY30100

   Connection: Brown/red – Green

3. Turn the ignition switch ON and engine stop switch "○", read and note the gear position indicator blinks.

   The number of blinks indicates the stored DTC.

   Refer to the troubleshooting index (page 23-13).



ERASING DTC

NOTE:

- When erasing the ESP DTC as follows, the PGM-FI DTC would also be erased at the same time, check the MIL blinks and troubleshoot the PGM-FI system before readout/erasing the ESP DTC.

Connect the HDS pocket tester to the DLC (page 23-11).

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

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

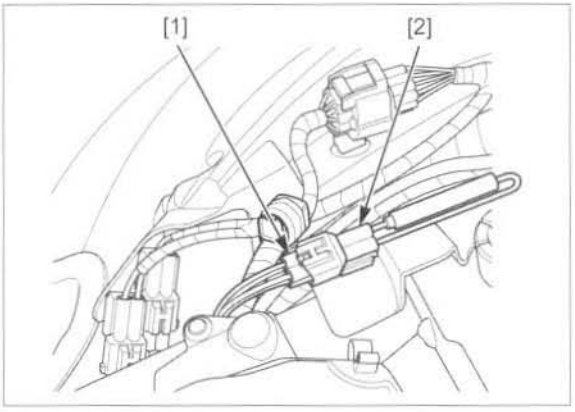
How to erase the DTC without HDS

1. Remove the DLC from the dummy connector (page 23-11).
2. Short the DLC [1] terminals using the special tool.

   TOOL:
   [2] SCS service connector 070PZ-ZY30100

   Connection: Brown/red – Green

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

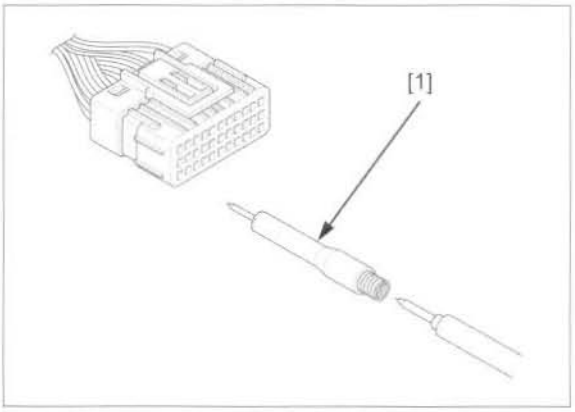
- The DLC must be shorted while the indicator lights. If not, the indicator will not start blinking.
- Note that the self-diagnostic memory cannot be erased if the ignition switch is turned OFF before the indicator starts blinking.

CIRCUIT INSPECTION

INSPECTION AT PCM CONNECTOR

- Always clean around and keep any foreign material away from the PCM connector before disconnecting it.
- A faulty ESP 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:
[1] Test probe 07ZAJ-RDJA110



ESP DTC INDEX

NOTE:

- When the gear position indicator "–" is blinking constantly (and the MIL and coolant temperature indicator lights are dark), but no DTC is indicated or retrievable, check the serial communication line (page 22-7).
- There are some DTCs (21-1 thru 23-1) related to the shift angle sensor circuit that have different conditions of malfunction detection. In case of the low voltage (about 0 V) or high voltage (about 5 V) in the shift angle sensor circuit, DTC 22-2 will be indicated when the control motor does not operate.

DTC ("–" blinks)	Function Failure	Symptom/Fail-safe function	Refer to
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° • ESP does not work	4-18
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° • ESP does not work	4-19
11-1 (11)	VS sensor no signal • Loose or poor contact of the Rear VS sensor connector • Rear VS sensor or its circuit malfunction	• Engine operates normally • ESP does not work	23-14
21-1 (21)	Shift angle sensor circuit Low voltage (less than 0.37 V) • Shift angle sensor or its circuit malfunction	• ESP does not work	23-15
21-2 (21)	Shift angle sensor circuit High voltage (more than 4.62 V) • Loose or poor contact of the Sub-gearshift spindle angle sensor connector • Shift angle sensor or its circuit malfunction	• ESP does not work	23-17
22-1 (22)	Shift angle sensor response (Control motor lock) • PCM activates the motor but the angle sensor voltage does not change in middle position • Control motor or its circuit malfunction • Shift angle sensor or its circuit malfunction	• ESP does not work	23-18
22-2 (22)	Shift angle sensor response (Control motor stuck) • PCM does not activate the motor but angle sensor voltage stays out of middle position (1.95 – 3.05 V) • Control motor or its circuit malfunction • Shift angle sensor or its circuit malfunction	• ESP does not work	23-18
23-1 (23)	Shift angle sensor response (Voltage variation) • PCM does not activate the motor but angle sensor voltage varies constantly • Shift angle sensor installation problem • Shift angle sensor or its circuit malfunction • Control motor or its circuit malfunction	• ESP does not work	23-19
24-1 (24)	Shift control motor drive circuit • Control motor or its circuit malfunction • Control motor drive circuit malfunction	• ESP does not work	23-20
32-1 (32)	Fail-safe relay circuit • Fail-safe relay circuit malfunction	• ESP does not work	23-21
33-2 (–)	EEPROM malfunction	• Engine operates normally	4-25
41-1 (41)	Gear position switch circuit • Gear position switch circuit malfunction (Short)	• Engine does not start • ESP does not work • Gear position indicator blinks "–"	23-22
41-2 (41)	Gear position switch circuit • Gear position switch circuit malfunction (Open)	• ESP does not work • Gear position indicator blinks "–"	23-23
42-1 (42)	Gearshift (UP/DOWN) switch circuit • Gearshift (UP/DOWN) switch circuit malfunction (Short)	• ESP does not work	23-25

DTC TROUBLESHOOTING

NOTE:

- Refer to "ESP Connector Location" for the connector location and the necessary parts to disconnect the connector (page 23-7).
- After troubleshooting, erase the DTC and test-ride the vehicle to be sure that the system is normal.

VERIFY PROPER CONNECTOR CONTACT

Many ESP shifting problems and subsequent DTCs are caused by poor connector contacts. The first step in troubleshooting any DTC is to inspect the affected connectors.

CONNECTOR INSPECTION

- Check for moisture in the affected connector
- Check for corrosion
- Check for folded pins on the male side of the connector
- Check for loose pins and/or pins pushed out of the connector

DTC 11-1 (VS SENSOR NO SIGNAL)

NOTE:

- Before starting the troubleshooting, check for loose or poor contact of the following connectors, and recheck the DTC (page 23-14).
  - VS sensor 3P (Black)
  - engine sub-wire harness 6P (Black)
  - PCM 33P (Black and Gray)
- Make sure the battery is fully charged.

1. **VS Sensor System Inspection**

   Erase the DTC (page 23-12).
   Test-ride the vehicle and check the VS sensor signal with the HDS pocket tester.

   Is the VS sensor signal indicated normally?

   YES – • Intermittent failure.
   • Loose or poor contact of the connector.

   NO – GO TO STEP 2.

2. **VS Sensor Input Voltage Inspection**

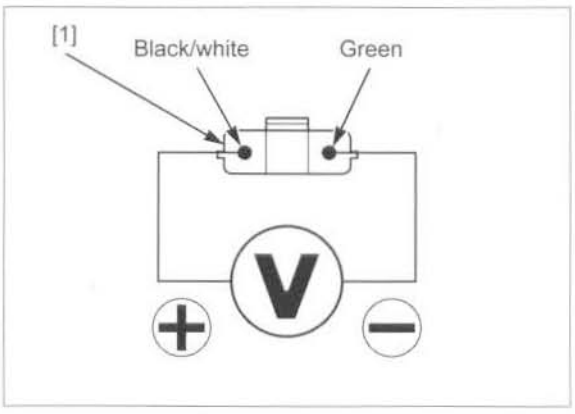
   Turn the ignition switch OFF.
   Disconnect the VS sensor 3P (Black) connector [1].
   Turn the ignition switch ON and engine stop switch "○".
   Measure the voltage between the wire harness side VS sensor 3P (Black) connector terminals.

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

   Is the voltage more than 10 V?

   YES – GO TO STEP 3.

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

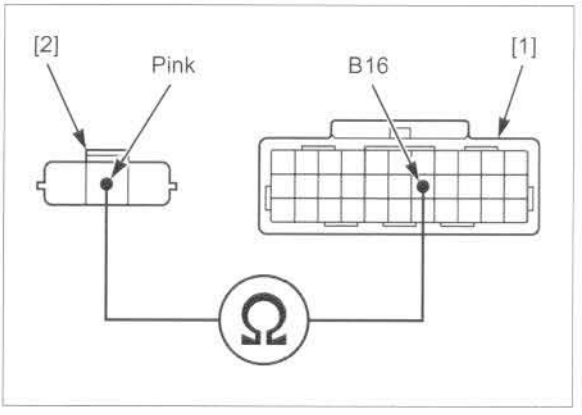


3. **VS Sensor Signal Line Open Circuit Inspection**

Turn the ignition switch OFF.
Disconnect the PCM 33P (Gray) connector [1].
Check for continuity between the wire harness side VS sensor 3P (Black) connector [2] and PCM 33P (Gray) connector terminals.

Connection: B16 – Pink

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



Is there continuity?

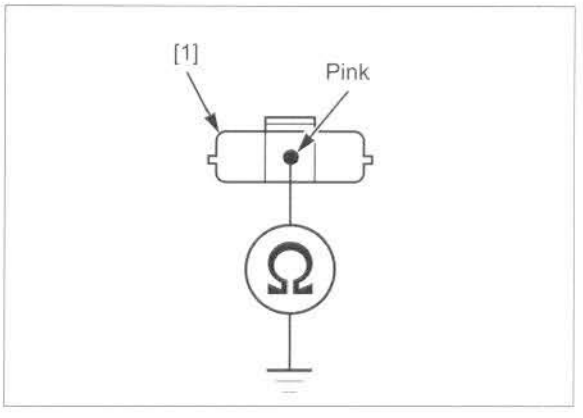
YES – GO TO STEP 4.

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

4. **VS Sensor Signal Line Short Circuit Inspection**

Check for continuity between the wire harness side VS sensor 3P (Black) connector [1] and ground.

Connection: Pink – Ground



Is there continuity?

YES – Short circuit in the pink or Pink/green wire.

NO – GO TO STEP 5.

5. **VS Sensor Inspection**

Turn the ignition switch OFF.
Replace the VS sensor with a new one (page 23-27).
Erase the DTC (page 23-12).
Test-ride the vehicle and recheck the DTC.

Is the DTC 11-1 indicated?

YES – Replace the PCM with a known good one (page 4-34), and recheck.

NO – Faulty original VS sensor.

DTC 21-1 (SHIFT ANGLE SENSOR LOW VOLTAGE)

NOTE:

- Before starting the troubleshooting, check for loose or poor contact of the following connectors, and recheck the DTC (page 23-14).
  - shift angle sensor 3P (Gray)
  - engine sub-wire harness 6P (Black)
  - PCM 33P (Black)

1. **Shift Angle Sensor System Inspection**

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

Is about 0 V (low voltage) indicated?

YES – GO TO STEP 2.

NO –
- Intermittent failure.
- Loose or poor contact of the connector.

2. **Shift Angle Sensor Resistance Inspection**

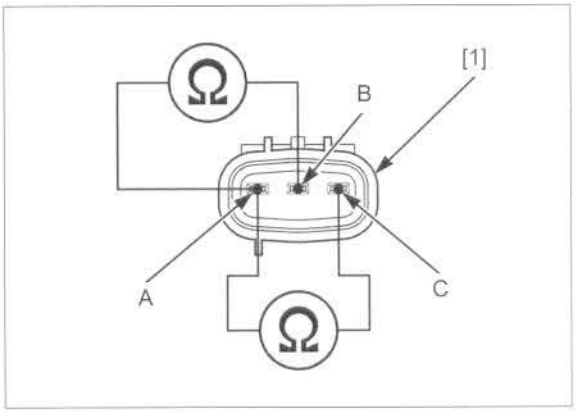
Turn the ignition switch OFF.
Disconnect the shift angle sensor 3P (Gray) connector.
Measure the resistance at the shift angle sensor side connector [1] terminals.

Connection: A – C
Standard: 4 – 6 kΩ (20°C/68°F)
Connection: A – B
Standard: 2 – 3 kΩ (20°C/68°F)

Is the resistance within specification?

YES – GO TO STEP 3.

NO – Faulty shift angle sensor.



3. **Shift Angle Sensor Input Voltage Inspection**

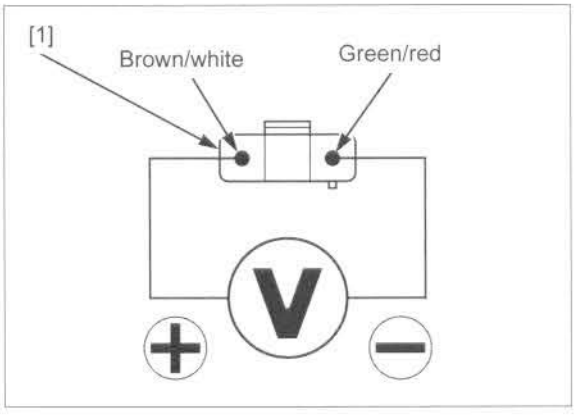
Turn the ignition switch ON and engine stop switch "○".
Measure the voltage between the wire harness side shift angle sensor 3P (Gray) connector [1] terminals.

Connection: Brown/white (+) – Green/red (–)

Is the voltage within 4.75 – 5.25 V?

YES – GO TO STEP 4.

NO – Open circuit in Brown/white or Green/red wire. If the wire is normal, faulty PCM.



4. **Shift Angle Sensor Output Line Open/short Circuit Inspection**

Turn the ignition switch OFF.
Disconnect the PCM 33P (Black) connector [1].
Check for continuity between the wire harness side shift angle sensor 3P (Gray) connector [2] and PCM 33P (Black) connector terminals.

Connection: A14 – Green/yellow

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

There should be continuity.

Check for continuity between the wire harness side shift angle sensor 3P (Gray) connector terminal and ground.

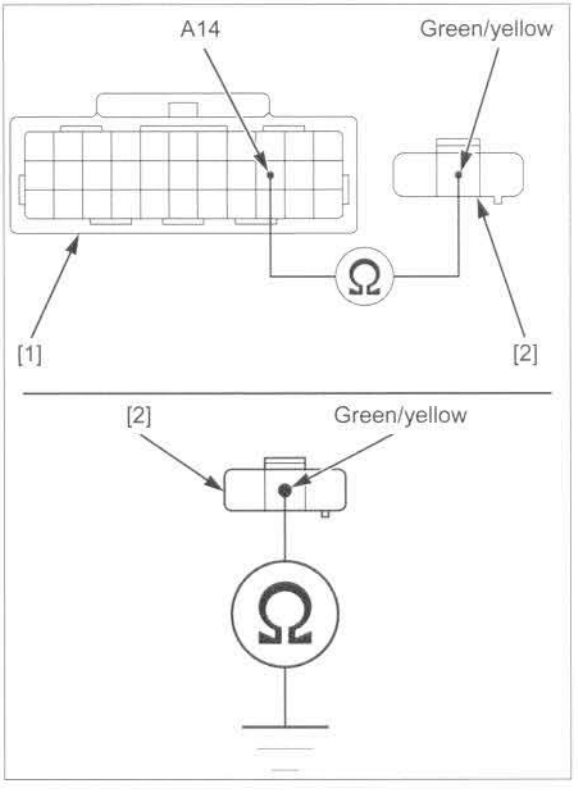
Connection: Green/yellow – Ground

There should be no continuity.

Is there normal condition?

YES – Replace the PCM with a known good one (page 4-34), and recheck.

NO – Open or short circuit in Green/yellow or Green/blue wire.



DTC 21-2 (SHIFT ANGLE SENSOR HIGH VOLTAGE)

1. **Shift Angle Sensor System Inspection**

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

   Is about 5 V indicated?

   YES – GO TO STEP 2.

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

2. **Shift Angle Sensor Resistance Inspection**

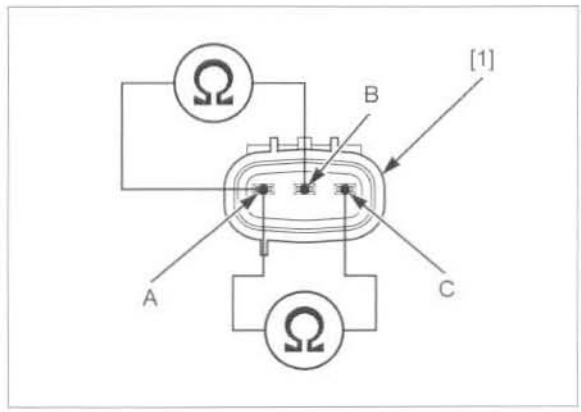
   Turn the ignition switch OFF.
   Disconnect the shift angle sensor 3P (Gray) connector [1].
   Measure the resistance at the shift angle sensor side connector [1] terminals.

   Connection: A – C
   Standard: 4 – 6 kΩ (20°C/68°F)
   Connection: A – B
   Standard: 2 – 3 kΩ (20°C/68°F)

   Is the resistance within specification?

   YES – GO TO STEP 3.

   NO – Faulty shift angle sensor.



3. **Shift Angle Sensor Input Voltage Inspection**

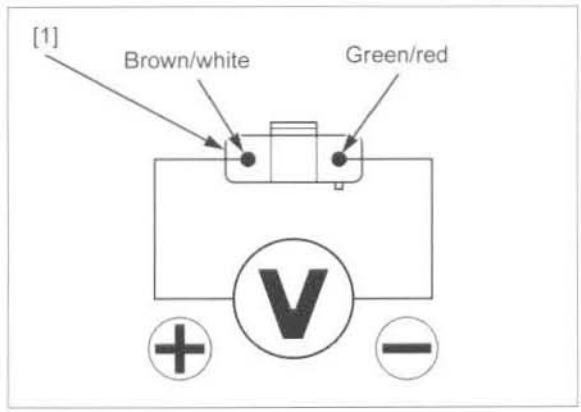
   Turn the ignition switch ON and engine stop switch "○".
   Measure the voltage between the wire harness side shift angle sensor 3P (Gray) connector [1] terminals.

   Connection: Brown/white (+) – Green/red (–)

   Is the voltage within 4.75 – 5.25 V?

   YES – Replace the PCM with a known good one (page 4-34), and recheck.

   NO – Open circuit in Brown/white or Green/red wire.



DTC 22-1/22-2 (SHIFT ANGLE SENSOR RESPONSE: CONTROL MOTOR LOCK/ STUCK)

NOTE:

- Before starting the troubleshooting, check for loose or poor contact of the following connectors, and recheck the DTC (page 23-14).
  - shift angle sensor 3P (Gray)
  - engine sub-wire harness 6P (Black)
  - PCM 33P (Black)

1. Shift Angle Sensor System Inspection

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

Is about Low voltage (about 0 V) or High voltage (about 5 V) indicated?

YES – • 0 V: Refer to DTC 21-1 (page 23-15).
• 5 V: Refer to DTC 21-2 (page 23-17).

NO – GO TO STEP 2.

2. Shifting Operation Check

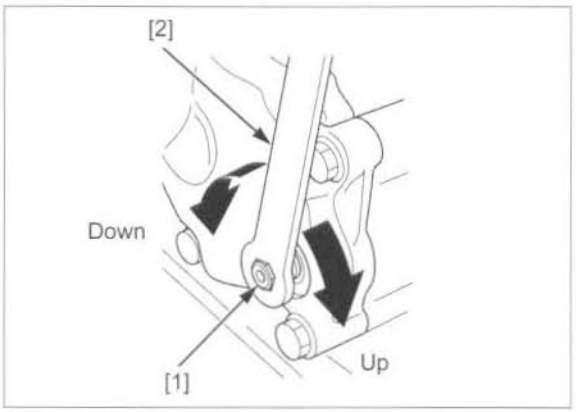
DTC 23-1 will be indicated with the ignition switch turned ON.

Remove the left side cover (page 2-4).
Turn the ignition switch OFF.
Manually shift the transmission by rotating the gearshift spindle [1] with the emergency gear change tool [2].

Can the gears be changed manually?

YES – GO TO STEP 3.

NO – Check the gearshift linkage (page 12-19) and the transmission (page 14-8).



3. Shift Angle Sensor Operation Resistance Inspection

Disconnect the shift angle sensor 3P (Gray) connector.
Measure the resistance at the shift angle sensor side connector [1] terminals varies while shifting the gear manually (page 23-27).

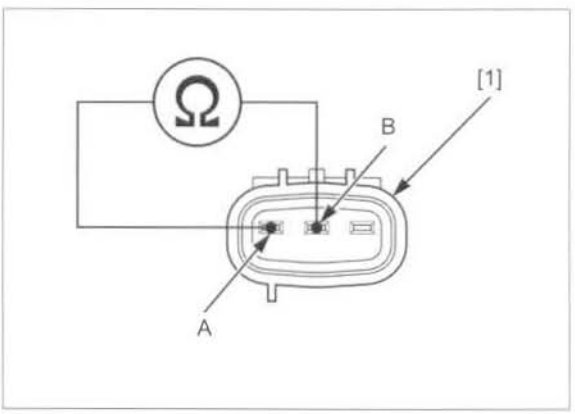
Connection: A – B

When shifting up: Resistance increase
When shifting down: Resistance decreases

Does the resistance vary properly?

YES – GO TO STEP 4.

NO – Faulty shift angle sensor.



4. Shift Angle Sensor Condition Check

Check the shift angle sensor for installation condition or any damage (page 23-28).

Is the shift angle sensor installed properly and in normal condition?

YES – GO TO STEP 5.

NO – Install properly or replace the angle sensor.

5. **Reduction Gear Condition Check**

   Check the reduction gears and control motor for installation condition or any damage (page 23-30).

   Are the reduction gears and control motor installed properly and in normal condition?

   YES – Replace the PCM with a known good one (page 4-34), and recheck.

   NO – Install properly or replace faulty part.

DTC 23-1 (SHIFT ANGLE SENSOR RESPONSE: VOLTAGE VARIATION)

NOTE:

- Before starting the troubleshooting, check for loose or poor contact of the following connectors, and recheck the DTC (page 23-14).
  – shift angle sensor 3P (Gray)
  – engine sub-wire harness 6P (Black)
  – PCM 33P (Black)
- This code will be indicated when shifting the gear manually while the ignition switch is turned ON.

1. **Shift Angle Sensor System Inspection**

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

   Is about Low voltage (about 0 V) or High voltage (about 5 V) indicated?

   YES – • 0 V: Refer to DTC 21-1 (page 23-15).
   • 5 V: Refer to DTC 21-2 (page 23-17)

   NO – GO TO STEP 2.

2. **Shift Angle Sensor Condition Check**

   Check the shift angle sensor for looseness (page 23-28).

   Is the shift angle sensor installed properly?

   YES – GO TO STEP 3.

   NO – Install properly or replace the shift angle sensor.

3. **Shift Angle Sensor Operation Resistance Inspection**

   Turn the ignition switch OFF.
   Disconnect the shift angle sensor 3P (Gray) connector.
   Measure the resistance at the shift angle sensor side connector [1] terminals varies while shifting the gear manually (page 23-27).

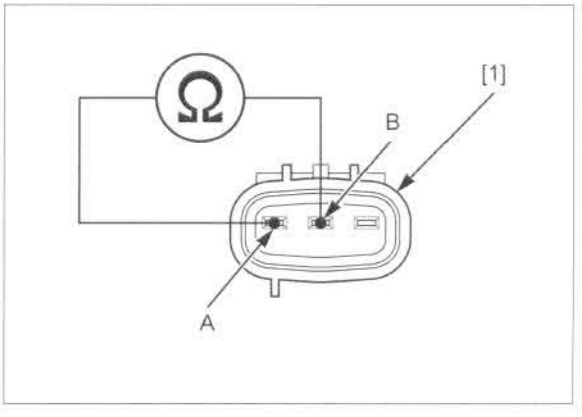
   Connection: A – B

   When shifting up: Resistance increase
   When shifting down: Resistance decreases

   Does the resistance vary properly?

   YES – Replace the PCM with a known good one (page 4-34), and recheck.

   NO – Faulty shift angle sensor.



DTC 24-1 (SHIFT CONTROL MOTOR DRIVE CIRCUIT)

NOTE:

- Before starting the troubleshooting, check for loose or poor contact of the control motor 2P (Black) and PCM 5P (Black) connectors, and recheck the DTC (page 23-14).

1. PCM Motor Power Input Line Inspection

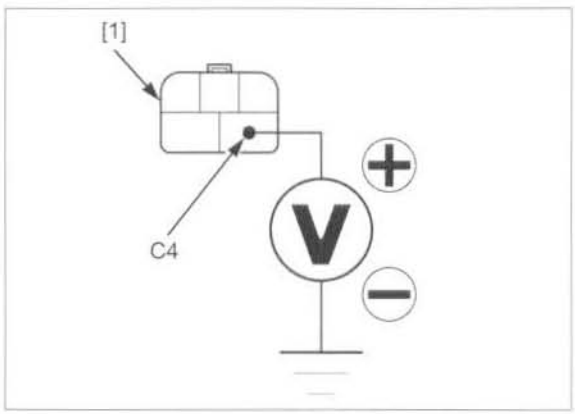
Turn the ignition switch OFF.
Disconnect the PCM 5P (Black) connector [1].
Measure the voltage between the wire harness side PCM 5P (Black) connector terminal and ground.

Connection: C4 (+) – Ground (–)

Is there battery voltage?

YES – GO TO STEP 2.

NO – • Blown main fuse 2 (30 A).
• Open circuit in the Red/white or Red wire.



2. PCM Motor Power Ground Line Inspection

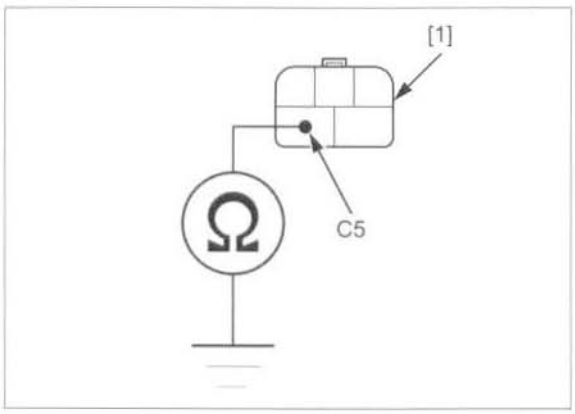
Check for continuity between the wire harness side PCM 5P (Black) connector [1] terminal and ground.

Connection: C5 – Ground

Is there continuity?

YES – GO TO STEP 3.

NO – Open circuit in the Green wire.



3. Control Motor Line Open Circuit Inspection

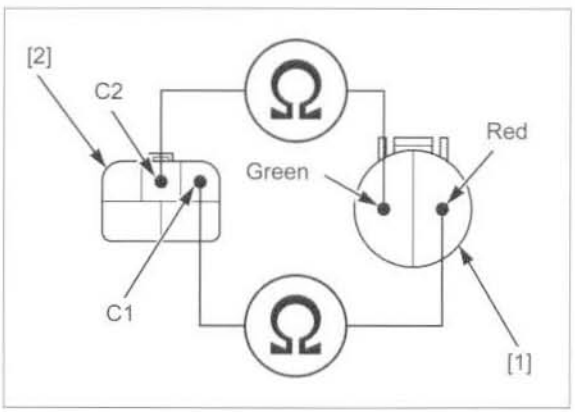
Disconnect the control motor 2P (Black) connector [1].
Check for continuity between the wire harness side control motor 2P (Black) connector and PCM 5P (Black) connector [2] terminals.

Connection: C1 – Red
C2 – Green

Is there continuity?

YES – GO TO STEP 4.

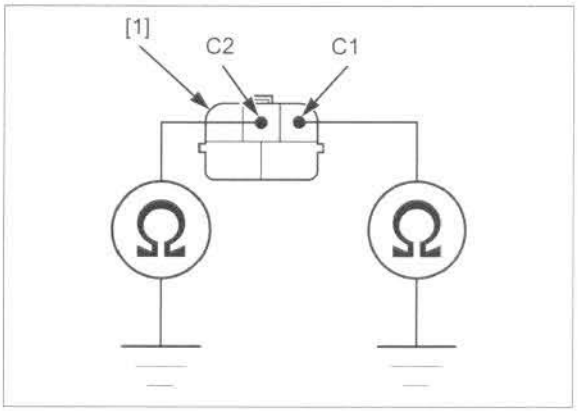
NO – • Open circuit in the Red wire.
• Open circuit in the Green wire.



4. **Control Motor Line Short Circuit Inspection**

Check for continuity between the wire harness side PCM 5P (Black) connector [1] terminals and ground.

Connection: C1 – Ground
C2 – Ground



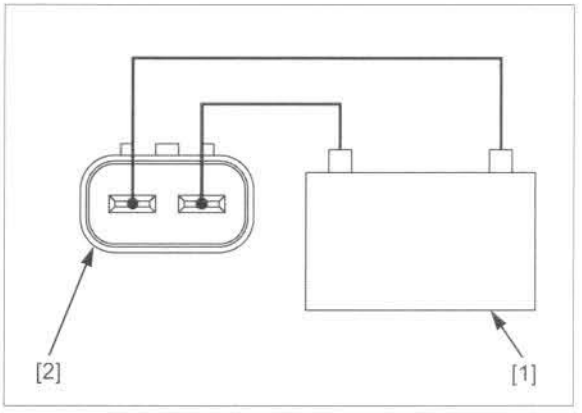
Is there continuity?

YES – • Short circuit in the Green wire.
• Short circuit in the Red wire.

NO – GO TO STEP 5.

5. **Control Motor Inspection**

Connect a fully charged 12 V battery [1] to the control motor side 2P connector [2] terminals.



Does the motor turn?

YES – GO TO STEP 6.

NO – Faulty control motor.

6. **Electric Shift Failure Checking**

Connect the PCM 5P (Black) and control motor 2P (Black) connectors.
Erase the DTC (page 23-12).
Turn the ignition switch OFF.
Turn the ignition switch ON and engine stop switch "○".
Recheck the gear shifting operation and DTC.

Is the DTC 24-1 indicated?

YES – Replace the PCM with a known good one (page 4-34), and recheck. If the DTC indicated again, replace the control motor (page 23-30).

NO – Intermittent failure.

DTC 32-1 (FAIL-SAFE RELAY CIRCUIT)

1. **Recheck DTC**

Erase the DTC (page 23-12).
Turn the ignition switch OFF.
Turn the ignition switch ON and engine stop switch "○".
Recheck the DTC.

Is the DTC 32-1 indicated?

YES – Replace the PCM with a known good one (page 4-34), and recheck.

NO – Intermittent failure.

DTC 41-1 (GEAR POSITION SWITCH CIRCUIT: SHORT)

NOTE:

- Before starting the troubleshooting, check for loose or poor contact of the following connectors, and recheck the DTC (page 23-14).
  - gear position switch 8P (Gray)
  - PCM 5P (Black)

1. **Gear Position Switch Inspection with HDS**

   Check the gear position switch status with the HDS data list menu.

   Is the gear position status normal?

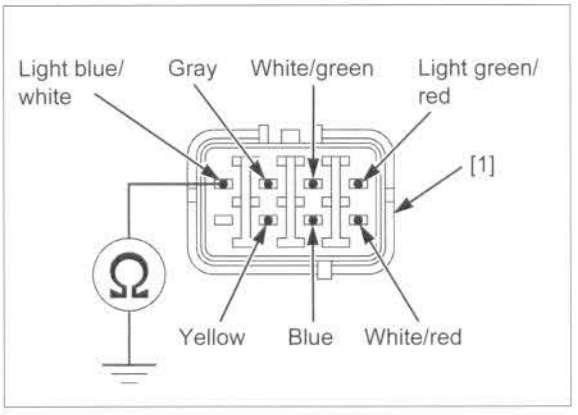
   YES – Intermittent failure.

   NO – GO TO STEP 2.

2. **Gear Position Switch Inspection**

   Turn the ignition switch OFF.
   Disconnect the gear position switch 8P (Gray) connector.
   Check for continuity between the gear position switch side 8P (Gray) connector [1] terminals and ground.
   There should be continuity in each gear position, and should be NO continuity in the other position.

Gear position	Connection
Reverse	Gray – Ground
Neutral	Light green/red – Ground
1st	White/green – Ground
2nd	White/red – Ground
3rd	Blue – Ground
4th	Yellow – Ground
5th	Light blue/white – Ground



Is the gear position switch normal?

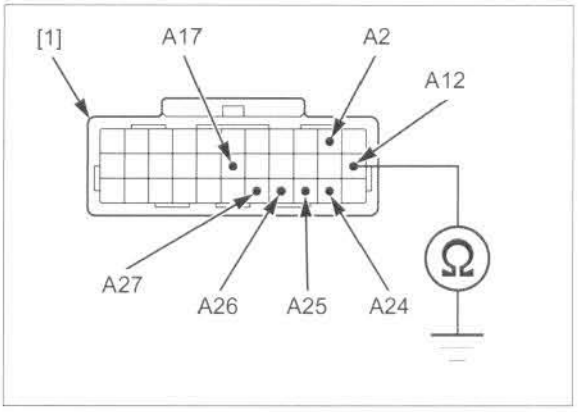
YES – GO TO STEP 3.

NO – Faulty gear position switch.

3. **Gear Position Switch Inspection at PCM Connector**

Connect the gear position switch 8P (Gray) connector and disconnect the PCM 33P (Black) connector [1].
Check for continuity between the wire harness side PCM 33P (Black) connector terminals and ground.
There should be continuity in each gear position, and should be NO continuity in the other position.

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



Gear position	Connection
Reverse	A25 – Ground
Neutral	A17 – Ground
1st	A24 – Ground
2nd	A27 – Ground
3rd	A26 – Ground
4th	A2 – Ground
5th	A12 – Ground

Is the continuity normal condition?

YES – GO TO STEP 4.

NO – Open or short circuit in the wire harness between the PCM and gear position switch.

4. **Recheck DTC**

Connect the PCM 33P (Black) connector.
Erase the DTC (page 23-12).
Turn the ignition switch OFF.
Turn the ignition switch ON and engine stop switch "○".
Shift the transmission into each gear and check the DTC.

Is the DTC 41-1 indicated?

YES – Replace the PCM with a known good one (page 4-34), and recheck.

NO – Intermittent failure.

DTC 41-2 (GEAR POSITION SWITCH CIRCUIT: OPEN)

NOTE:

- Before starting the troubleshooting, check for loose or poor contact of the following connectors, and recheck the DTC (page 23-14).
  - gear position switch 8P (Gray)
  - PCM 5P (Black)

1. **Gear Position Switch Inspection with HDS**

Check the gear position switch status with the HDS data list menu.

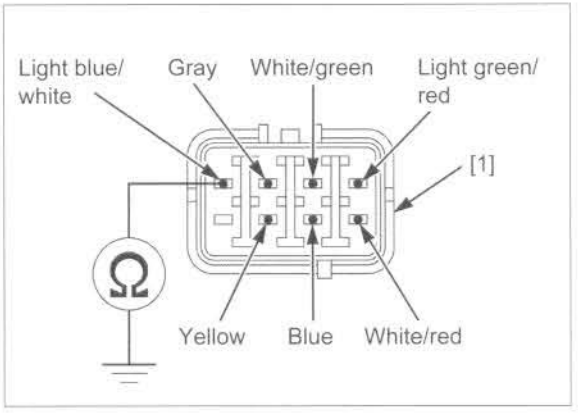
Is the gear position status normal?

YES – Intermittent failure.

NO – GO TO STEP 2.

2. **Gear Position Switch Inspection**

Turn the ignition switch OFF.
Disconnect the gear position switch 8P (Gray) connector.
Check for continuity between the gear position switch side 8P (Gray) connector [1] terminals and ground.
There should be continuity in each gear position.



Gear position	Connection
Reverse	Gray – Ground
Neutral	Light green/red – Ground
1st	White/green – Ground
2nd	White/red – Ground
3rd	Blue – Ground
4th	Yellow – Ground
5th	Light blue/white – Ground

Is there continuity?

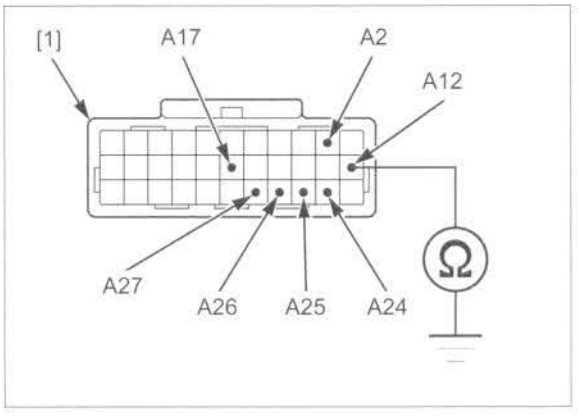
YES – GO TO STEP 3.

NO – Faulty gear position switch.

3. **Gear Position Switch Inspection at PCM Connector**

Connect the gear position switch 8P (Gray) connector and disconnect the PCM 33P (Black) connector [1].
Check for continuity between the wire harness side PCM 33P (Black) connector terminals and ground.
There should be continuity in each gear position.

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



Gear position	Connection
Reverse	A25 – Ground
Neutral	A17 – Ground
1st	A24 – Ground
2nd	A27 – Ground
3rd	A26 – Ground
4th	A2 – Ground
5th	A12 – Ground

Is there continuity?

YES – GO TO STEP 4.

NO – Open circuit in the wire harness between the PCM and gear position switch.

4. **Recheck DTC**

Connect the PCM 33P (Black) connector.
Erase the DTC (page 23-12).
Test-ride the vehicle and check the DTC.

Is the DTC 41-2 indicated?

YES – Replace the PCM with a known good one (page 4-34), and recheck.

NO – Intermittent failure.

DTC 42-1 (GEARSHIFT SWITCH CIRCUIT)

NOTE:

- Before starting the troubleshooting, check for loose or poor contact of the following connectors, and recheck the DTC (page 23-14).
  - handlebar switch 14P (Green)
  - PCM 5P (Black)

1. **Gearshift Switch Inspection**

   Check the gearshift switch status with the HDS data list menu.

	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 gearshift switch status normal?

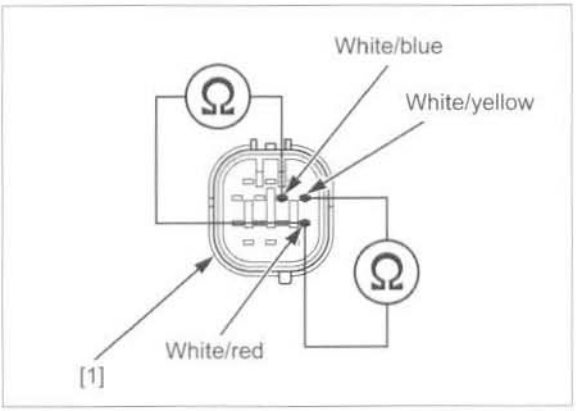
   YES – Intermittent failure

   NO – GO TO STEP 2.

2. **Gearshift Switch Inspection at Handlebar Switch Connector**

   Turn the ignition switch OFF.
   Disconnect the handlebar switch 14P (Green) connector [1].
   Check for continuity between the handlebar switch side 14P (Green) connector terminals while pushing the gearshift switch.

   Connection:
   With the upshift switch pushed:
   White/red – White/blue
   With the downshift switch pushed:
   White/red – White/yellow



   Is there continuity?

   YES – GO TO STEP 3.

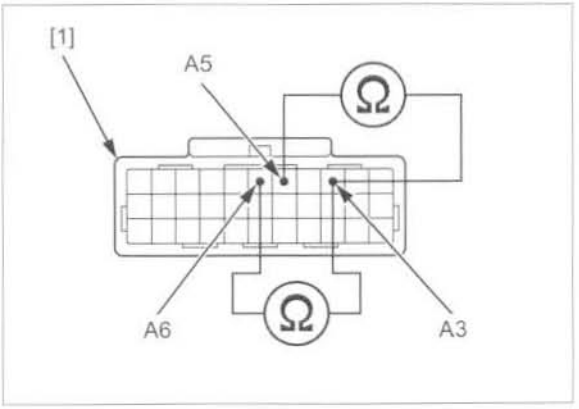
   NO – Faulty handlebar switch.

3. **Gearshift Switch Inspection at PCM Connector**

   Connect the handlebar switch 14P (Green) connector and disconnect the PCM 33P (Black) connector [1].
   Check for continuity between the wire harness side PCM 33P (Black) connector terminals while pushing the gearshift switch.

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

   Connection:
   With the upshift switch pushed:
   A3 (White/red) – A6 (White/blue)
   With the downshift switch pushed:
   A3 (White/red) – A5 (White/yellow)



   Is there continuity?

   YES – GO TO STEP 4.

   NO – Open circuit in the White/red, White/blue or White/yellow wire between the switch and PCM.

4. **Recheck DTC**

   Connect the handlebar switch 14P (Green) and PCM 33P (Black) connectors.
   Erase the DTC (page 23-12).
   Turn the ignition switch OFF.
   Turn the ignition switch ON and engine stop switch "○".
   Check the shift operation and the DTC.

   Is the DTC 42-1 indicated?

   YES – Replace the PCM with a known good one (page 4-34), and recheck.

   NO – Intermittent failure.

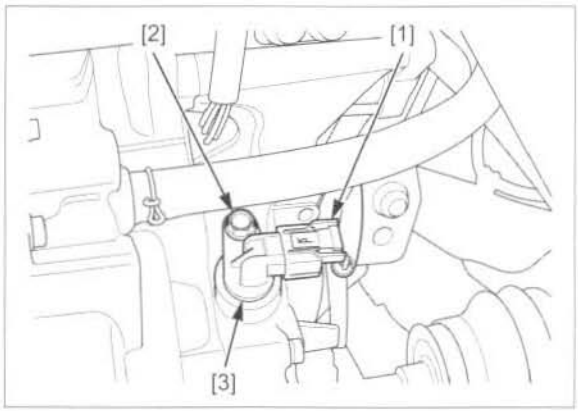
VS SENSOR

REMOVAL/INSTALLATION

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

Disconnect the VS sensor 3P (Black) connector [1].

Remove the bolt [2] and VS sensor [3] from the rear crankcase cover.

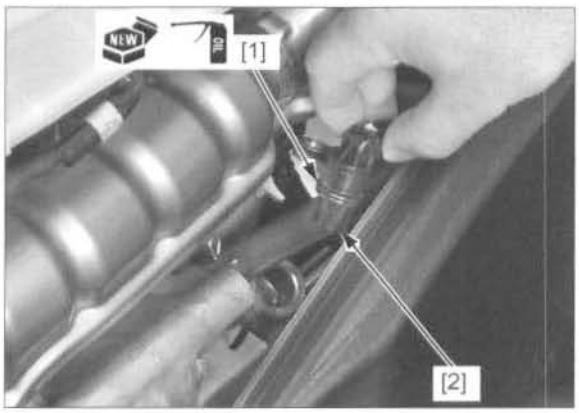


Coat a new O-ring [1] with engine oil and install it onto the VS sensor [2].

Install the VS sensor to the rear crankcase cover and tighten the bolt securely.

Connect the VS sensor 3P (Black) connector.

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



SHIFT ANGLE SENSOR

INSPECTION

Remove the left mudguard (page 2-6).

Disconnect the shift angle sensor 3P (Gray) connector [1].

SENSOR RESISTANCE

Measure the resistance at the shift angle sensor side connector [2] terminals.

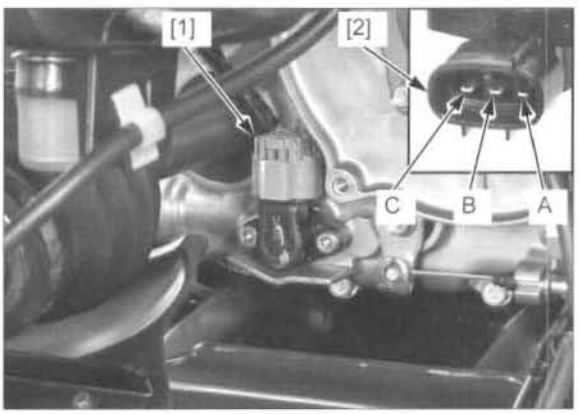
Connection: A – C

Standard: 4 – 6 kΩ (20°C/68°F)

Measure the resistance at the shift angle sensor side connector [1] terminals varies while shifting the gear manually with the emergency gear change tool (page 23-6).

Connection: A – B

When shifting up: Resistance increase
When shifting down: Resistance decreases



INPUT VOLTAGE

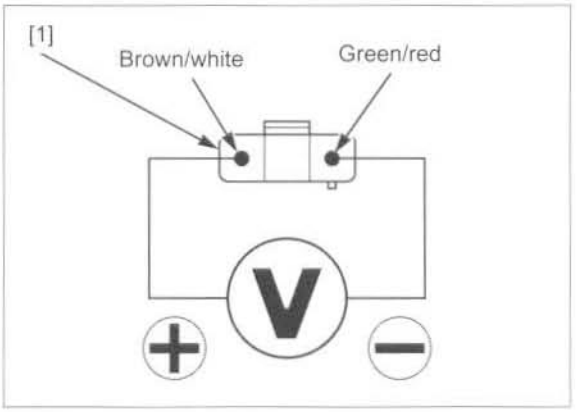
Turn the ignition switch ON and engine stop switch "○".

Measure the voltage between the wire harness side shift angle sensor 3P (Gray) connector [1] terminals.

Connection: Brown/white (+) – Green/red (–)

Standard: 4.75 – 5.25 V

If the input voltage is out of specification, check for open or short circuit in the Brown/white or Green/red wires between the shift angle sensor and PCM.



REMOVAL

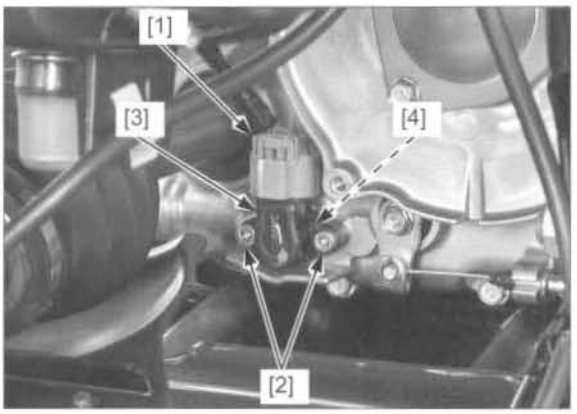
Remove the left mudguard (page 2-6).

Disconnect the shift angle sensor 3P (Gray) connector [1].

Remove the two socket bolts [2] and shift angle sensor [3].

Remove the O-ring [4] from the shift angle sensor.

Check the shift angle sensor for wear or damage.



INSTALLATION

Coat a new O-ring [1] with engine oil and install it into the shift angle sensor [2] groove.

Apply locking agent to the threads of the shift angle sensor socket bolts [3].

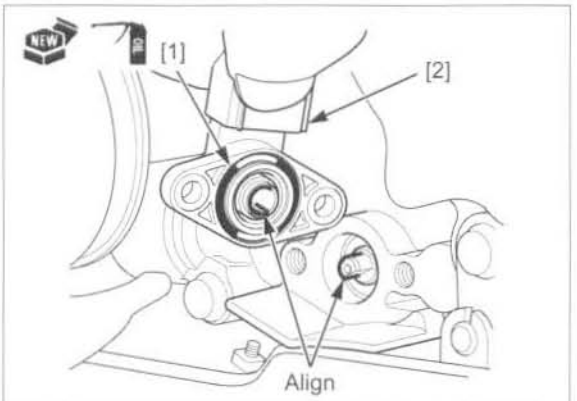
Carefully install the shift angle sensor by aligning the flat surfaces of the sensor shaft hole and gearshift spindle end.

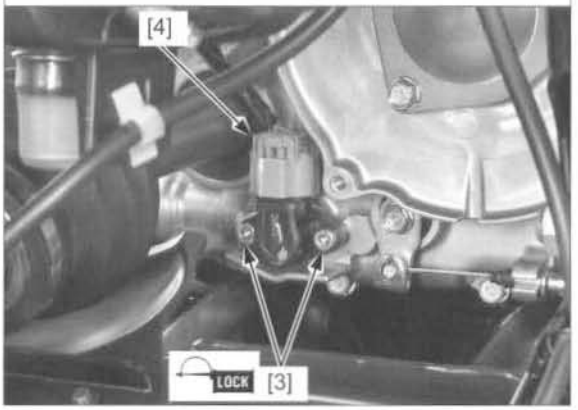
Install and tighten the two socket bolts to the specified torque.

TORQUE: 6.0 N·m (0.6 kgf·m, 4.4 lbf·ft)

Connect the shift angle sensor 3P (Gray) connector [4].

Install the mudguard (page 2-6).



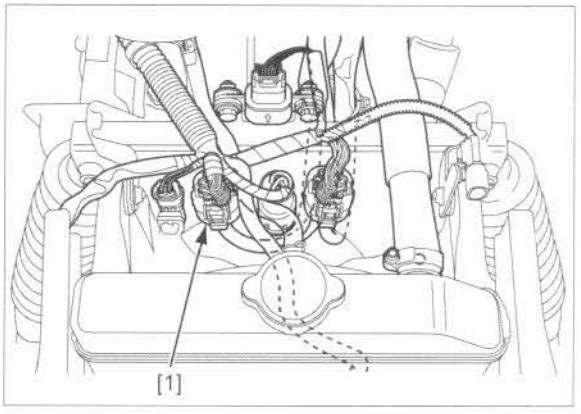


GEARSHIFT SWITCH

SYSTEM INSPECTION

Remove the front fender/carrier (page 2-8).

Remove the handlebar switch 14P (Green) connector [1] from the frame and disconnect it.

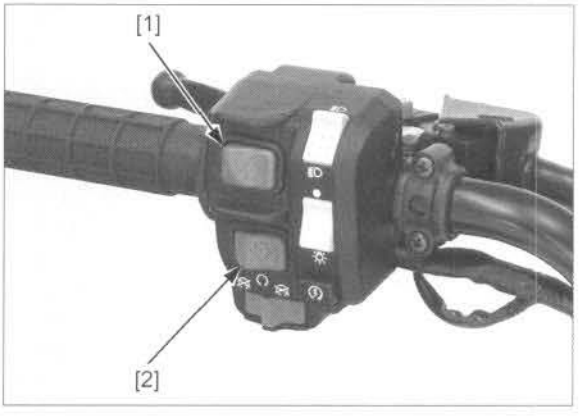


Check for continuity between the switch side connector terminals with each switch pushed.

Continuity should exist between the color coded wires as follows:

UPSHIFT SWITCH [1]/DOWNSHIFT SWITCH [2]

Color / Position	White/ red	White/ blue	White/ yellow
Upshift pushed	○	○	
Free			
Downshift pushed	○		○



INPUT VOLTAGE

Remove the handlebar switch 14P (Green) connector from the frame and disconnect it (page 23-29).

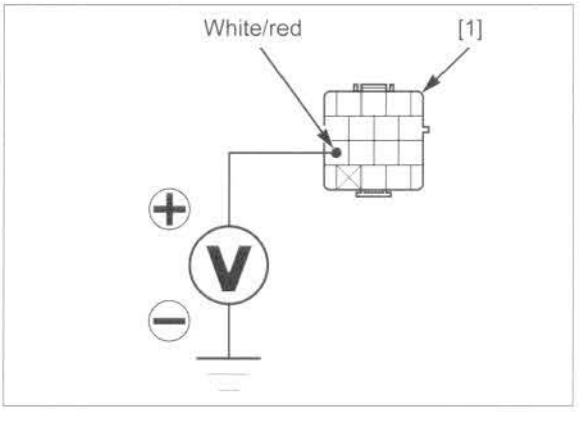
Turn the ignition switch ON and engine stop switch "○".

Measure the input voltage between the wire harness side handlebar switch 14P (Green) connector [1] terminal and ground.

Connection: White/red (+) – Ground (–)

Standard: 4.75 – 5.25 V

If the input voltage is out of specification, or if there is no input voltage, check for open or short circuit in the White/red wire, or loose or poor contact of the PCM 33P (Black) connector.



SHIFT CONTROL MOTOR/REDUCTION GEARS

REMOVAL

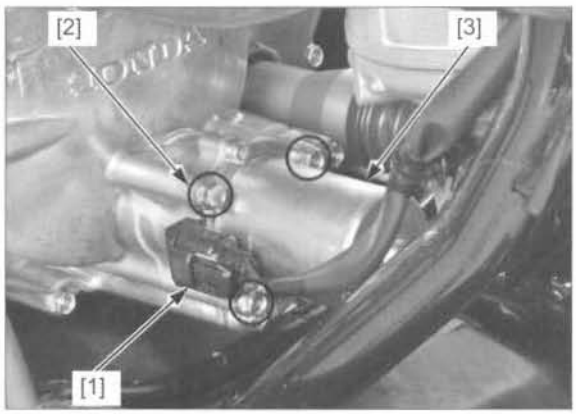
CONTROL MOTOR

Remove the following:

- left side cover (page 2-4)
- right mudguard (page 2-6)
- right front wheel (page 16-13)

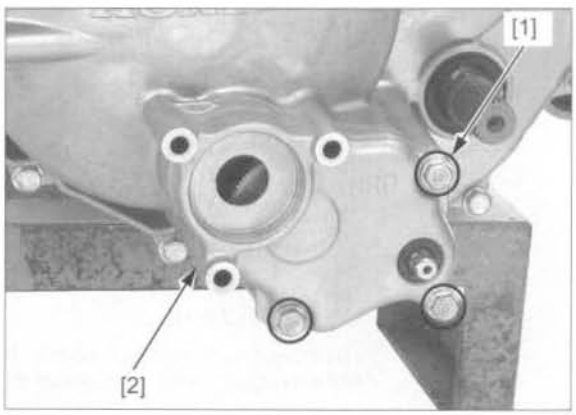
Disconnect the control motor 2P (Black) connector [1].

Remove the three bolts [2] and the control motor [3].



REDUCTION GEARS

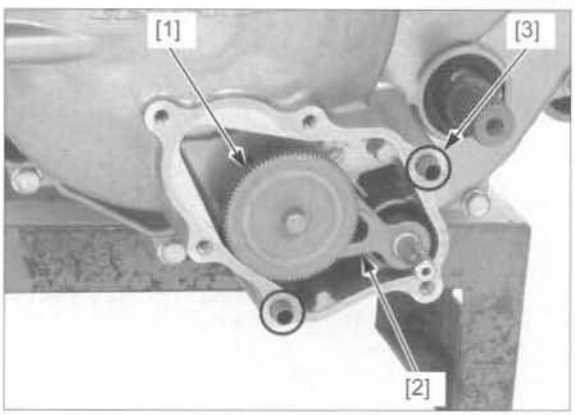
Remove the three bolts [1] and the gear cover [2].



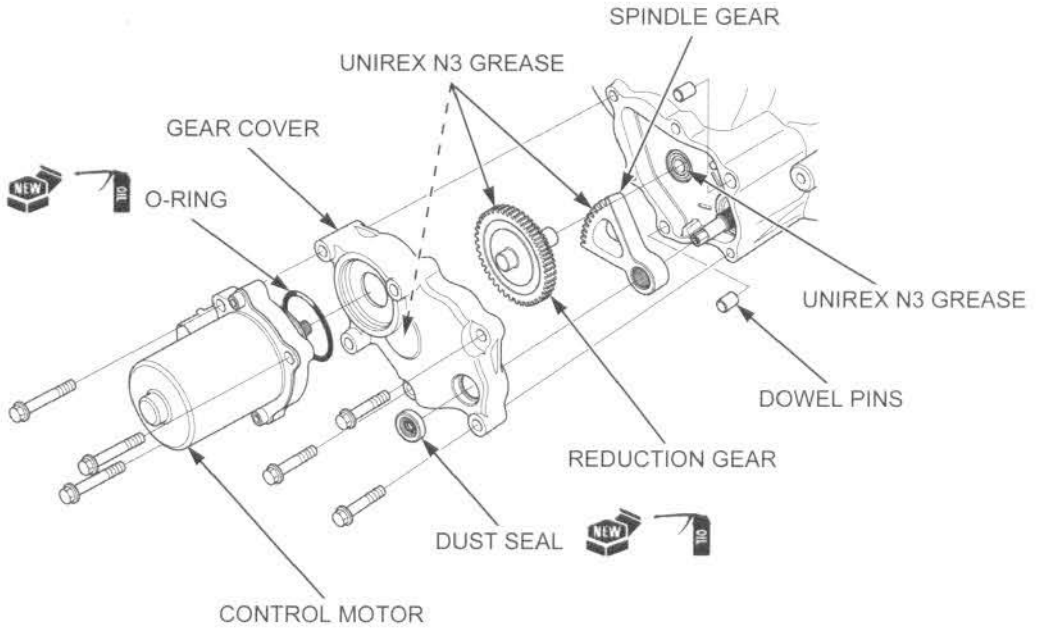
Remove the following:

- reduction gear [1]
- spindle gear [2]
- two dowel pins [3]

Check the gear teeth and splines for wear or damage.



INSTALLATION



Remove any grease from the gears, gear cover and crankcase cover.

Clean the mating surfaces of the covers thoroughly, being careful not to damage them.

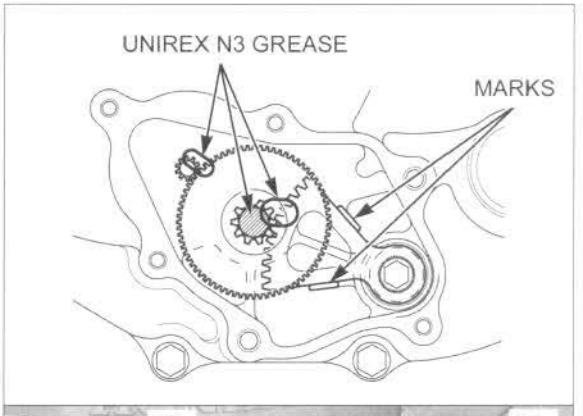
Install the spindle gear [1] by aligning with the reference marks on the crankcase cover.

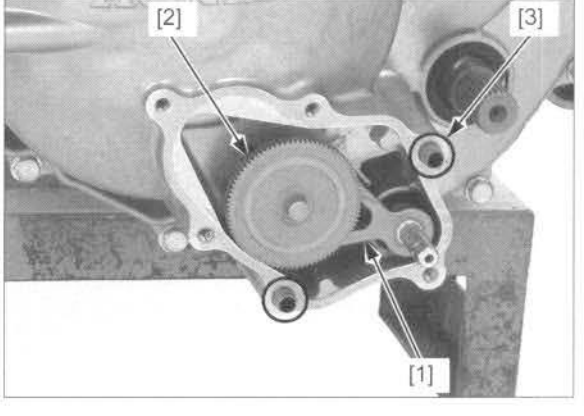
Apply 2 – 4 g (0.07 – 0.14 oz) of specified grease to the gear journals (both sides of the reduction gear) and gears teeth as shown.

Install the reduction gear [2].

SPECIFIED GREASE: UNIREX N3 grease (EXXON)

Install the dowel pins [3] into the crankcase cover.





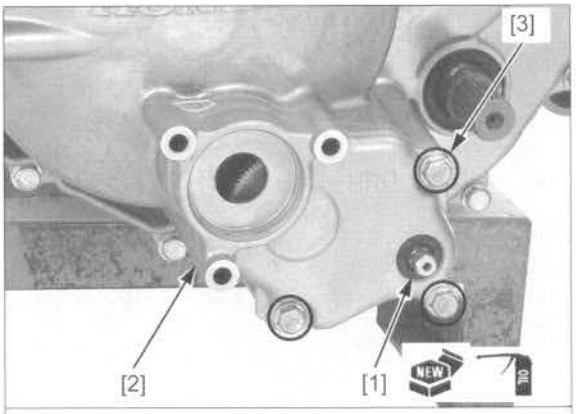
Apply engine oil to the seal lips of a new dust seal [1].

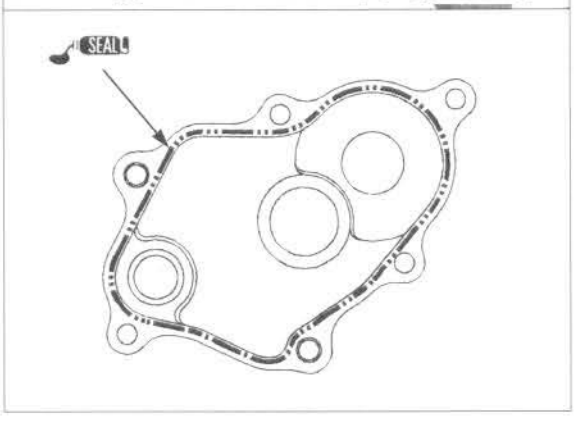
Install the dust seal into the gear cover [2] with the flat side facing out until it is fully seated.

Apply liquid sealant (ThreeBond 1215 or equivalent) to the mating surface of the gear cover as shown.

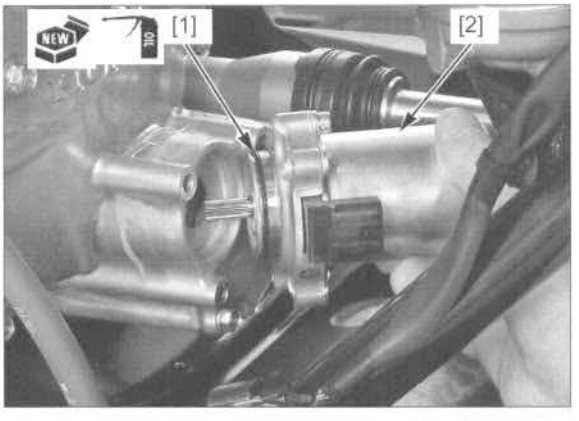
Tighten the bolts after installing the control motor.

Install the gear cover with the three bolts [3].





Coat a new O-ring [1] with engine oil and install it into the control motor [2] groove.



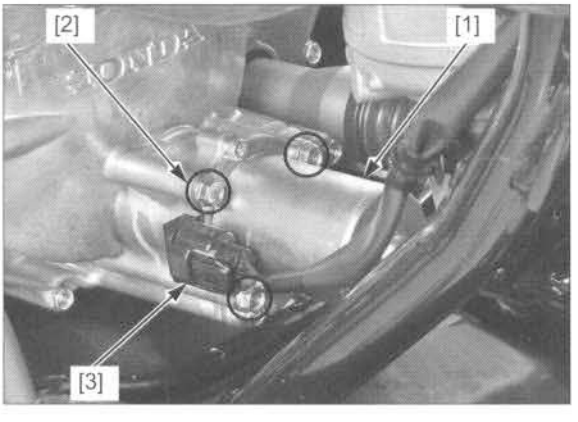
Install the control motor [1] with the three bolts [2].

Tighten the six bolts in a crisscross pattern in several steps.

Connect the control motor 2P (Black) connector [3].

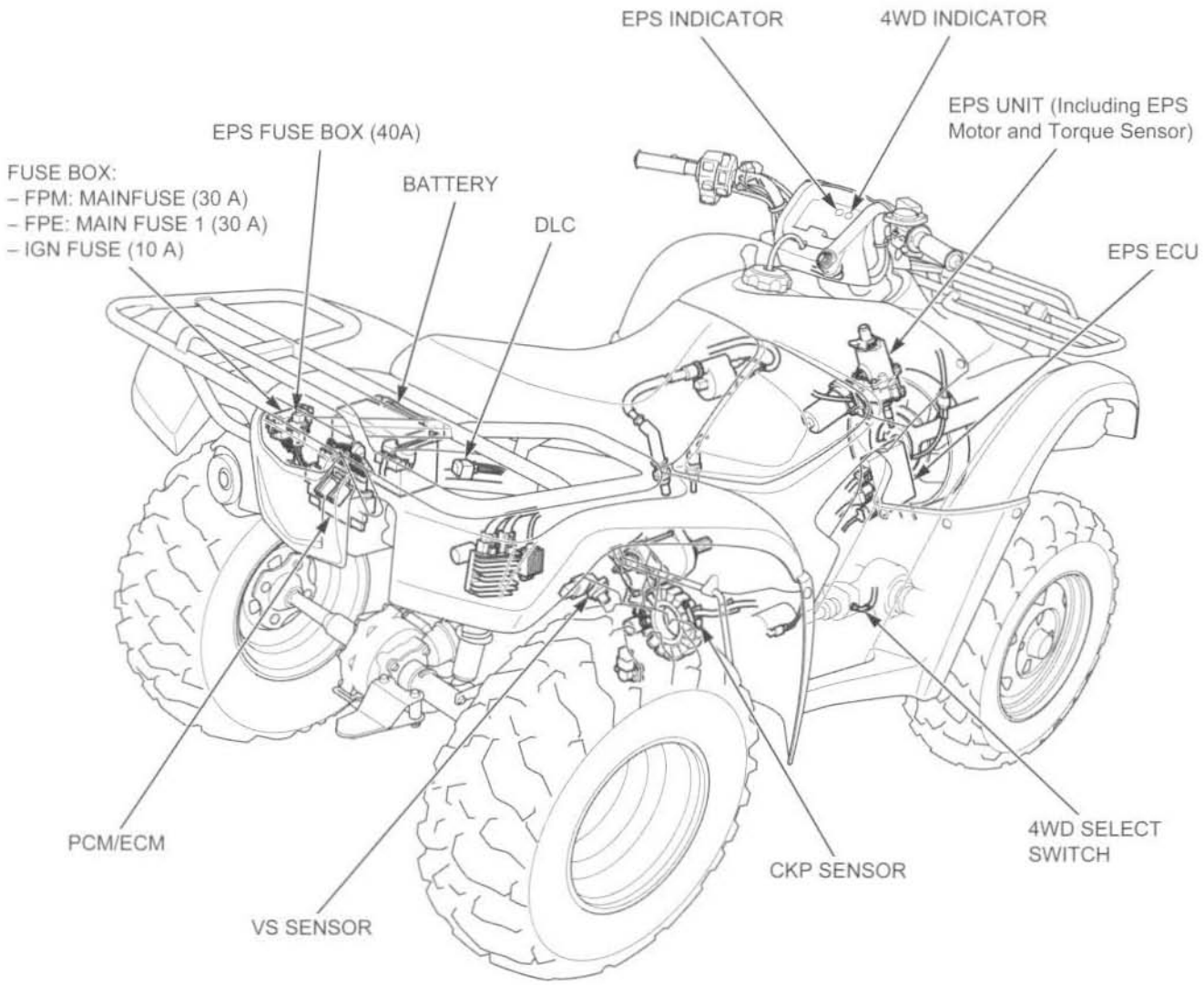
Install the following:

- right front wheel (page 16-13)
- right mudguard (page 2-6)
- left side cover (page 2-4)

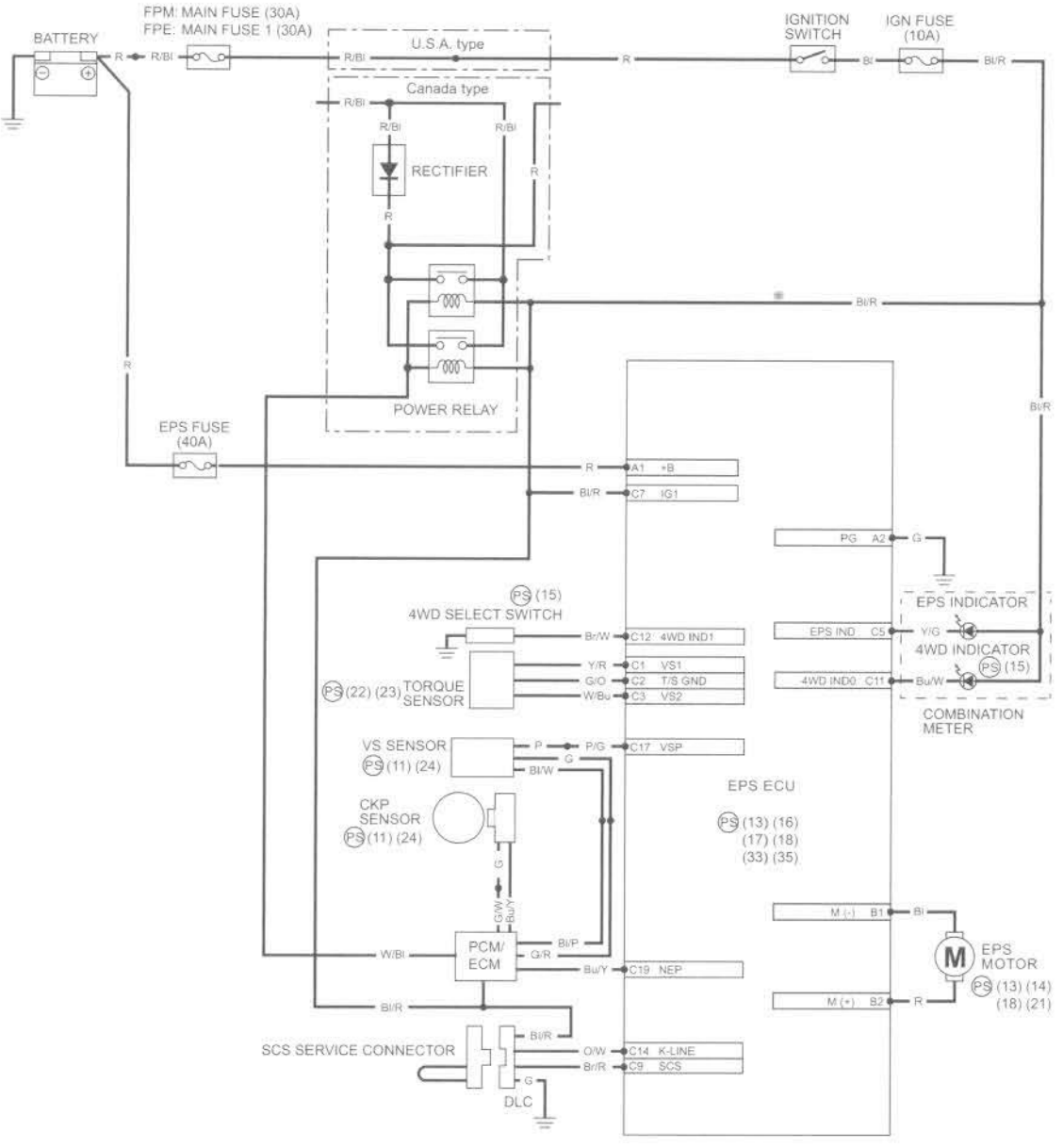


24. ELECTRIC POWER STEERING (EPS: FPM/FPE models)

EPS COMPONENT LOCATION



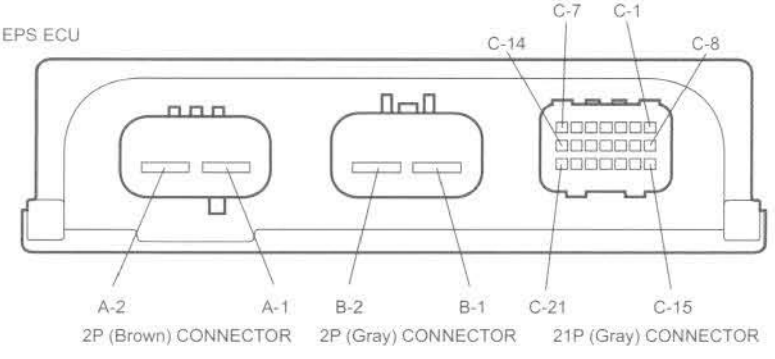
EPS SYSTEM DIAGRAM



Bl: Black
Br: Brown
Bu: Blue
G: Green
Gr: Gray
Lg: Light green
Lb: Light blue
O: Orange
P: Pink
R: Red
W: White
Y: Yellow

(PS) ( ): EPS indicator blink

: Short terminals for reading DTC

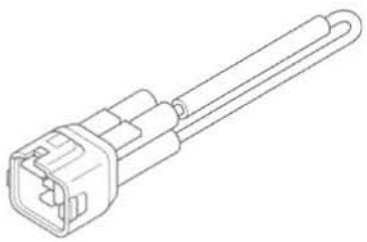
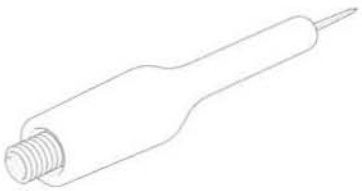


SERVICE INFORMATION

GENERAL

- This section covers electrical system service of the EPS (FPM/FPE models). For other service of the steering system, see Front Wheel/Suspension/Steering section (page 16-32).
- When performing the DTC troubleshooting, read "EPS Troubleshooting Information" carefully (page 24-9), and inspect and troubleshoot 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 EPS ECU may be damaged if dropped. Also, if the connector is disconnected when current is flowing, the excessive voltage may damage the EPS ECU. Always turn off the ignition switch before disconnecting or connecting the connectors.

TOOLS

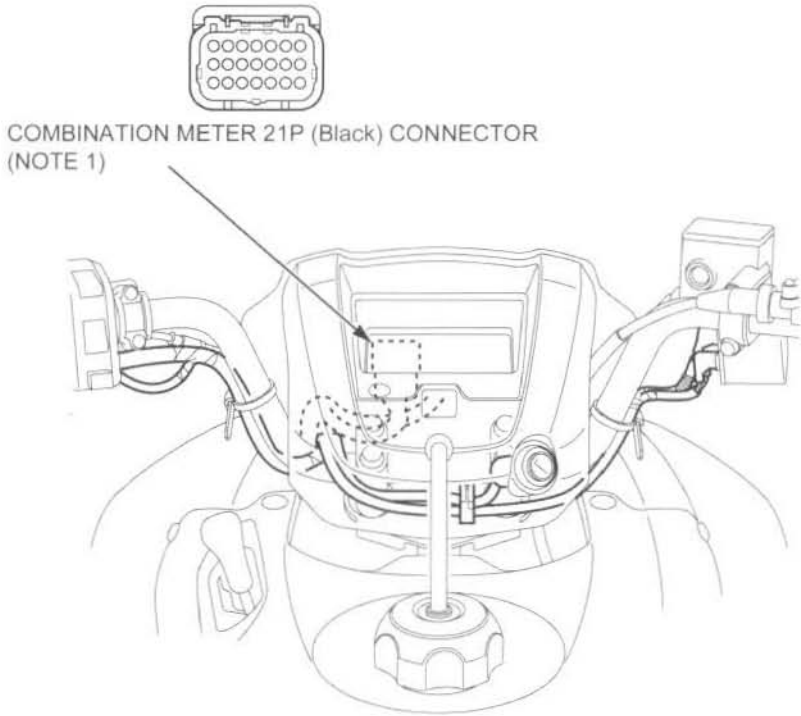
SCS service connector 070PZ-ZY30100	Test probe 07ZAJ-RDJA110	HDS pocket tester TDS 3557-0112-01 (U.S.A. Only)
		

SYMPTOM TROUBLESHOOTING

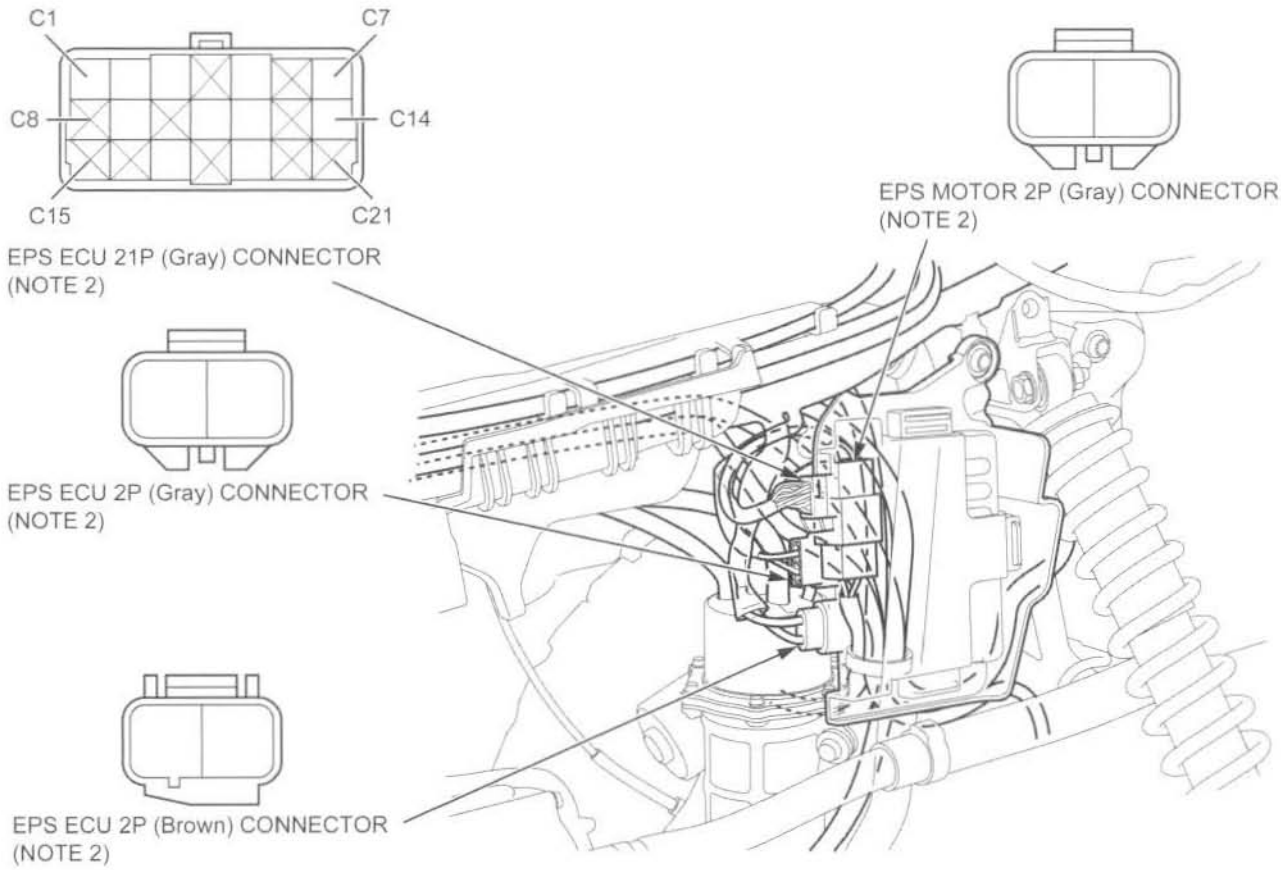
Symptom	Diagnosis	Also check for
EPS indicator does not come on	Inspect the EPS indicator circuit (page 24-32)	• Short circuit between the combination meter and EPS ECU • Faulty combination meter
EPS indicator does not go off, and no DTCs are stored	Inspect the EPS indicator circuit (page 24-33)	• Open circuit between the combination meter and EPS ECU • Short circuit in the DLC related wire • Open circuit in the EPS ECU line • Open circuit in the motor power input line • Open circuit in the power ground line

EPS CONNECTOR LOCATION

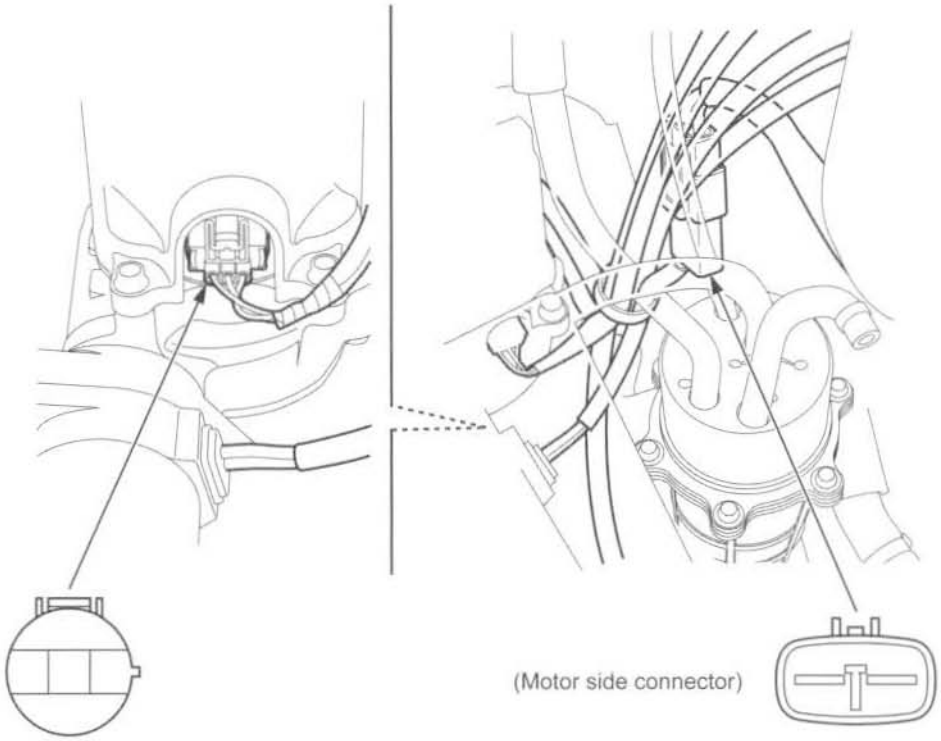
NOTE 1: Remove the assist headlight cover (page 22-4).



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



NOTE 1: Remove the right side cover (page 2-4).

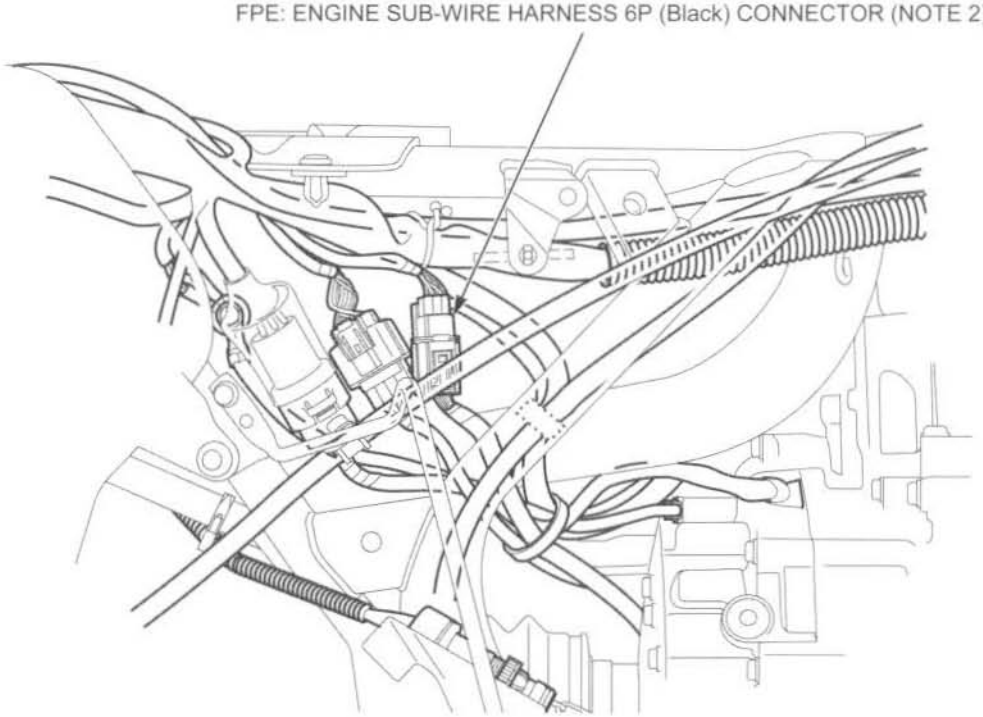


TORQUE SENSOR 3P (Gray) CONNECTOR
(NOTE 1)

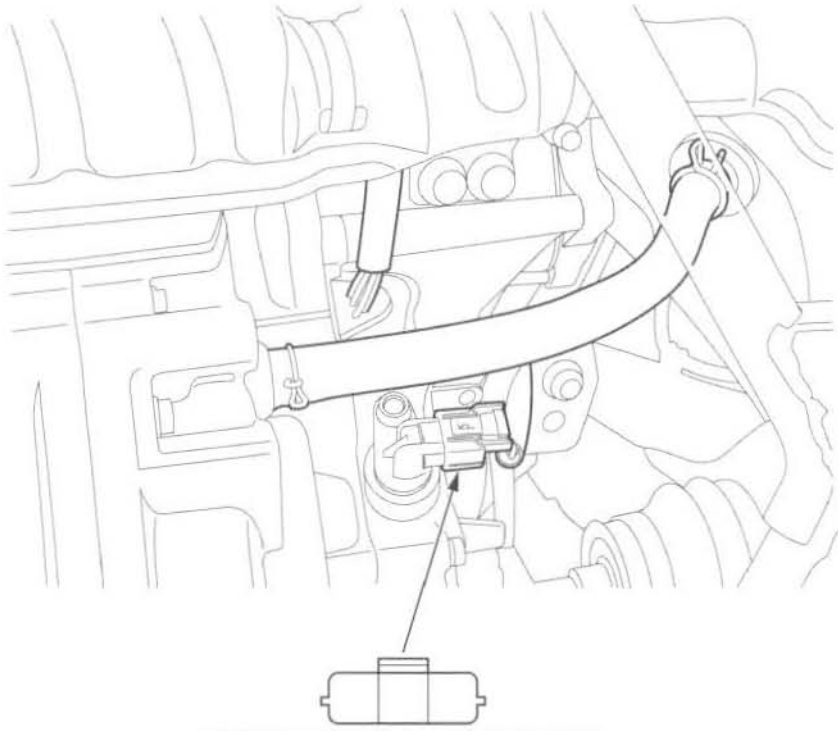
EPS MOTOR 2P (Gray) CONNECTOR
(NOTE 1)

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

FPM: ENGINE SUB-WIRE HARNESS 3P (Black) CONNECTOR (NOTE 2)
FPE: ENGINE SUB-WIRE HARNESS 6P (Black) CONNECTOR (NOTE 2)

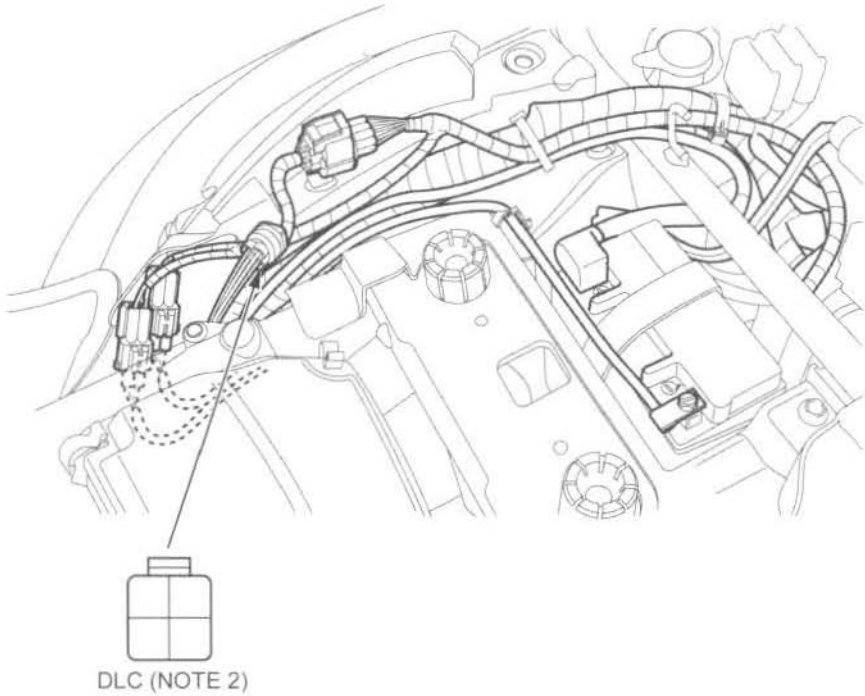


NOTE 1: Remove the left side cover (page 2-4).



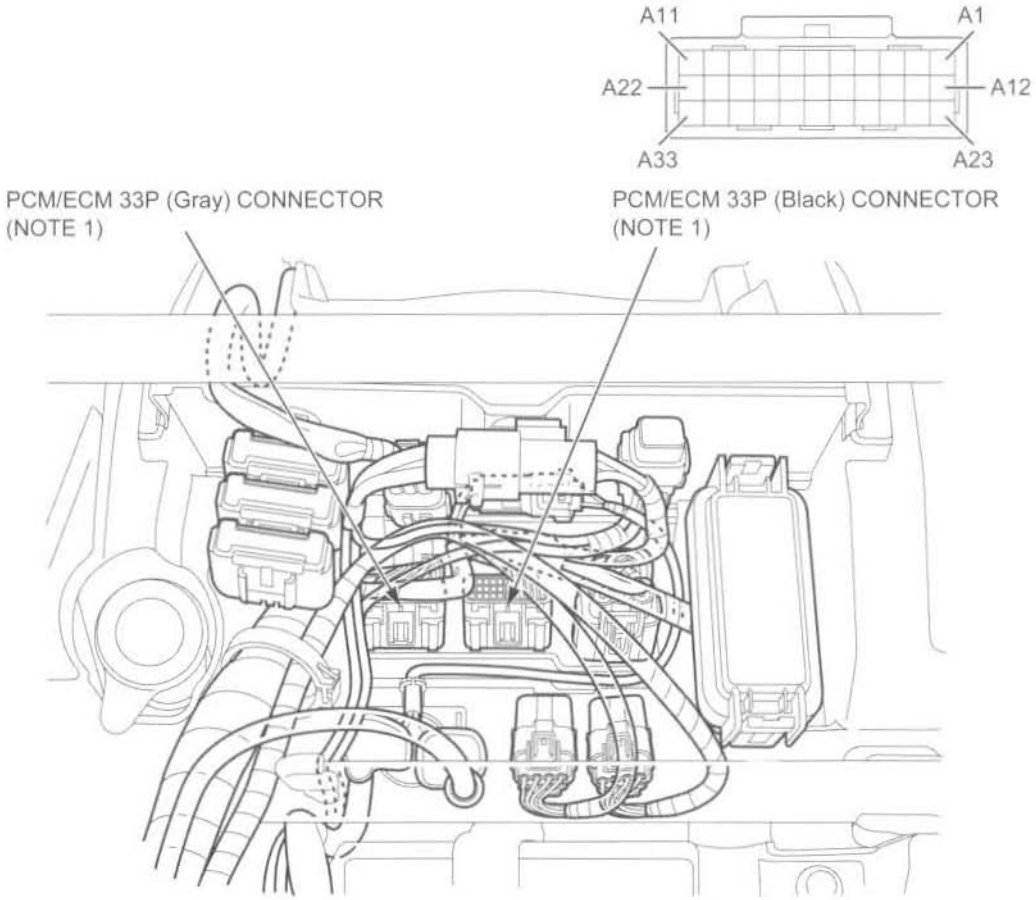
VS SENSOR 3P (Black) CONNECTOR
(NOTE 1)

NOTE 2: Remove the seat (page 2-4).



DLC (NOTE 2)

NOTE 1: Remove the rear fender cover (page 2-9).



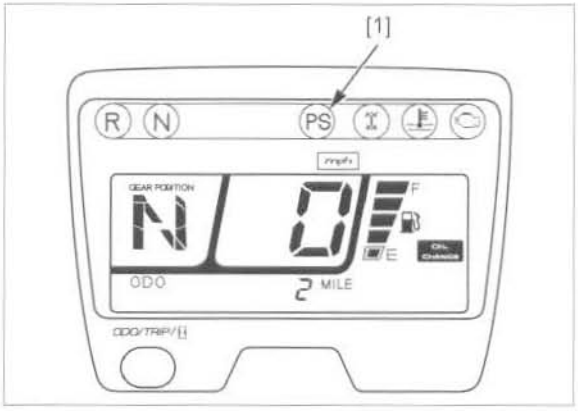
EPS TROUBLESHOOTING INFORMATION

SYSTEM DESCRIPTION

SELF-DIAGNOSIS SYSTEM

The EPS system is equipped with the self-diagnostic system. If the EPS ECU detects a system failure, it functions as follows:

1. Turns on the EPS indicator [1] to notify the rider of the problem.
2. Stores a DTC (Diagnostic Trouble Code) in its erasable memory.
3. Stops power assist (manual steering operation begins or reduces the assist power).



Self-diagnosis can be classified into three categories:

- Initial diagnosis: performed right after the engine starts and until the EPS indicator goes off.
- Regular diagnosis: performed right after the initial diagnosis until the ignition switch is turned OFF.
- Revest: The EPS indicator turns on when the DTC is set. The EPS indicator will turn off after the vehicle has recovered from the fail-safe condition, but the DTC will be stored in the EPS ECU. There was a temporary problem, but the system is now fully operational.

DTC (Diagnostic Trouble Code)

The DTC(s) is memorized in the EEPROM (nonvolatile memory) therefore the memorized DTC(s) cannot be erased by disconnecting the battery. Perform the specified procedures to erase the DTC(s) (page 24-11).

EPS INDICATOR

Under normal conditions, the EPS indicator comes on when the ignition switch is turned ON, then goes off after starting the engine. This indicates that the LED and its circuit are operating correctly.

If there is any trouble in the system after the engine is started, the EPS indicator will stay on and the EPS ECU memorizes the DTC. (When the DTC 22 is stored; No initializing the torque sensor neutral position, the EPS indicator will blink.)

When a problem is detected and the EPS indicator comes on, there are cases that the indicator stays on until the ignition switch is turned OFF, and the indicator goes off automatically when the system returns to normal.

If a problem is continuing after restarting the engine, the EPS indicator stays on and the EPS ECU stops the EPS function.

When the DTC 23 (torque sensor problem) is stored in the EPS ECU, the EPS indicator will stay on until the DTC is erased.

RESTRICTION ON POWER ASSIST OPERATION

Repeated extreme steering force, such as turning the handlebar continuously back-and-forth with the vehicle stopped, causes an increase of power consumption in the EPS motor. The increase of electric current causes the motor to heat up. Because this heat adversely affects the system, the EPS ECU monitors the electric current of the motor. When the EPS ECU detects heat build-up in the motor, it reduces the electric current to the motor gradually to protect the system (motor and EPS ECU), this restricts the power assist operation. The EPS indicator does not come on during this function. When steering torque is not applied to the handlebar, or when the ignition is turned off, and the system cools, the EPS ECU will gradually restore the power assist.

TORQUE SENSOR NEUTRAL POSITION (Torque Sensor Initialization)

The EPS ECU stores the torque sensor neutral position in the EEPROM. The torque sensor must be initialized whenever the EPS unit, the EPS ECU, etc is serviced (page 24-13).

Perform the Torque Sensor Initialization when you service the following components.

MAINTENANCE LOCATION	REPLACEMENT	REMOVAL/ INSTALLATION
Cables and harness around handlebar	INITIALIZE	INITIALIZE
Handlebar	INITIALIZE	INITIALIZE
Steering shaft and steering shaft bushing	INITIALIZE	INITIALIZE
Steering arm and end nut	INITIALIZE	INITIALIZE
EPS unit	INITIALIZE	INITIALIZE
EPS ECU	INITIALIZE	NO NEED

NOTE:

- The torque sensor neutral position is not effected when erasing the DTC.

HOW TO TROUBLESHOOT EPS DTC

1. Question the customer about the conditions when the problem occurred, and try to reproduce the same conditions for troubleshooting. Find out when the EPS indicator came on, such as during EPS control, after EPS control, when the vehicle was at a certain speed, etc.
2. When the EPS indicator does not come on during the test-ride, but troubleshooting is done based on the DTC, check for loose connectors, poor terminal contact, etc., in the affected circuit before you start troubleshooting.
3. After troubleshooting, erase the DTC(s) and test-ride the vehicle to be sure that the EPS indicator does not come on.

HDS POCKET TESTER INFORMATION

- The HDS can readout and erase the DTC (without the torque sensor neutral position).

How to connect the HDS Pocket Tester

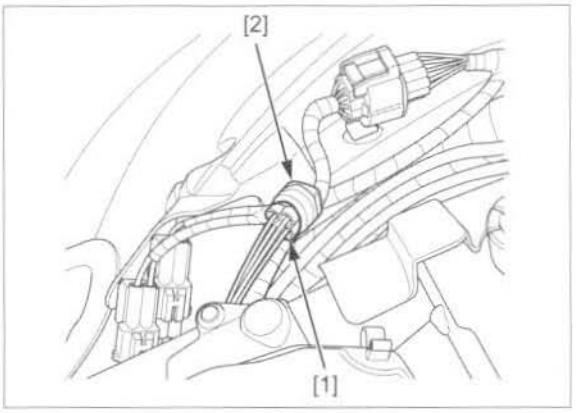
Turn the ignition switch OFF.

Remove the seat (page 2-4).

Remove the DLC [1] from the dummy connector [2].

Connect the HDS pocket tester to the DLC.

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



DTC READOUT

NOTE:

- If the HDS pocket tester is not available, DTC can be read from the EPS ECU memory by the EPS indicator blinking pattern (page 24-10).
- After performing diagnostic troubleshooting, erase the DTC(s) (page 24-11) and test-ride the vehicle to be sure that the problem(s) have been removed.

Start the engine and check the EPS indicator [1].

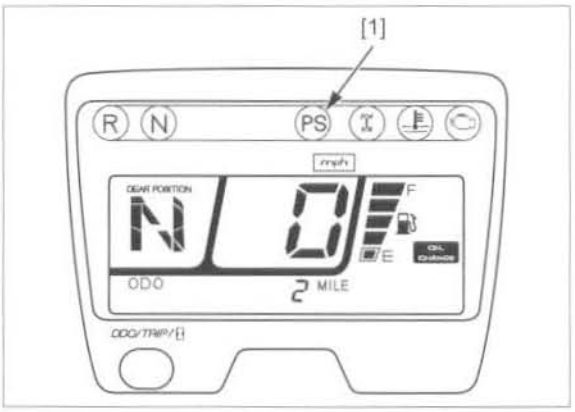
NOTE:

- Under normal conditions, the EPS indicator stays on with the ignition switch is turned ON until the engine starts, and it goes off after starting the engine.

If the EPS indicator stays on or blinks with the engine running, connect the HDS pocket tester to the DLC (page 24-10).

Read the DTC, stored data and follow the troubleshooting index (page 24-16).

To read the DTC without the HDS pocket tester, refer to the following procedure.



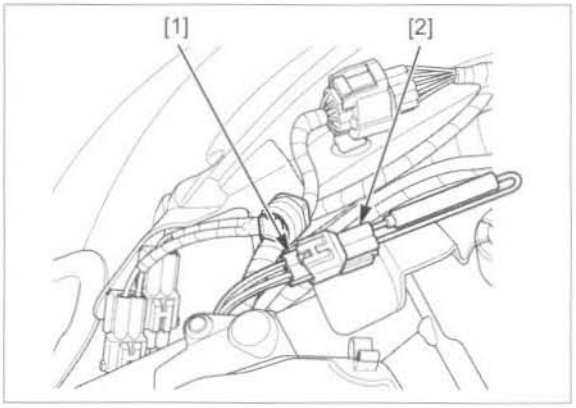
Reading DTC with the EPS indicator

1. Remove the DLC from the dummy connector (page 24-10).
2. Short the DLC [1] terminals using the special tool.

   TOOL:
   [2] SCS service connector 070PZ-ZY30100

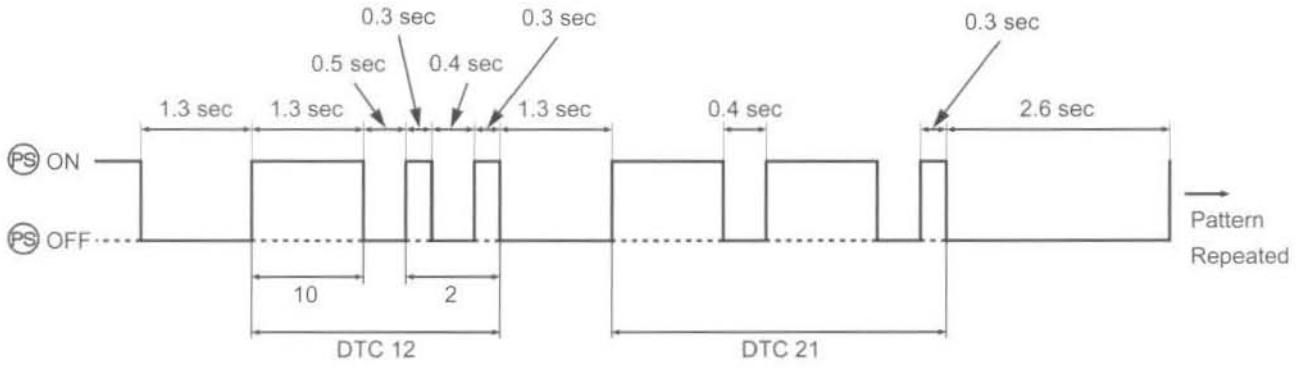
   Connection: Brown/red – Green

3. Turn the ignition switch ON and engine stop switch "○", read, note the EPS indicator blinks and refer to the troubleshooting index (page 24-16).



EPS Indicator Blinking Pattern

- The number of EPS indicator blinks is the equivalent to the main code of the DTC (the sub-code cannot be displayed by the 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 0.3 seconds. One long blink is the equivalent of ten short blinks. For example, when two long blinks are followed by one short blink, the DTC is 21 (two long blink = 20 blinks, plus one short blink).
- When the EPS ECU stores more than one DTC, the indicator blinks in the order from the lowest number to highest number.



ERASING DTC

NOTE:

- Perform this procedure using fully charged battery. The EPS indicator will stay lit and the EPS ECU will abort the process if you use a low or dead battery.

How to erase the DTC with HDS

Connect the HDS pocket tester to the DLC (page 24-10).

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

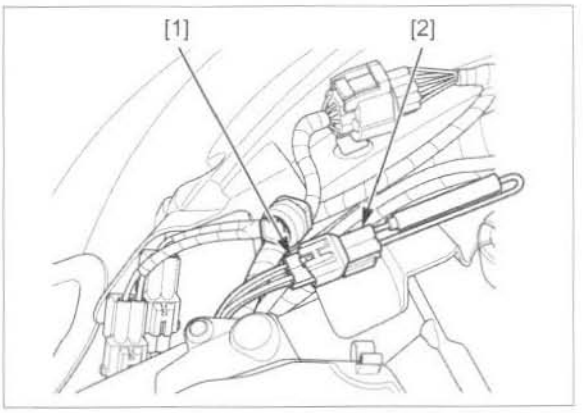
To erase the DTC without HDS, refer to the following procedure.

How to erase the DTC without HDS

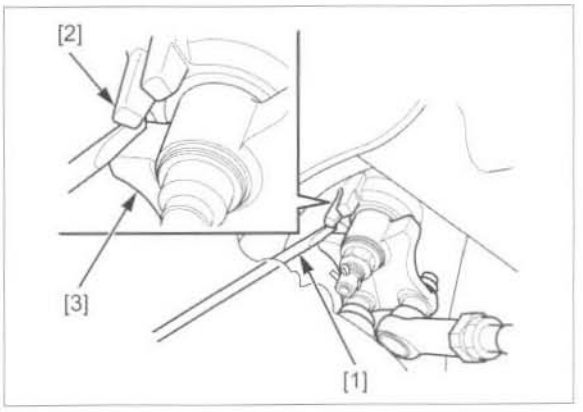
1. Raise the front wheels off the ground and support the vehicle securely.
2. Remove the DLC from the dummy connector (page 24-10).
3. Short the DLC [1] terminals using the special tool.

   TOOL:
   [2] SCS service connector 070PZ-ZY30100

   Connection: Brown/red – Green



4. Place a 6 mm width screwdriver [1] between the right side of the steering stopper [2] and steering arm [3] as shown.

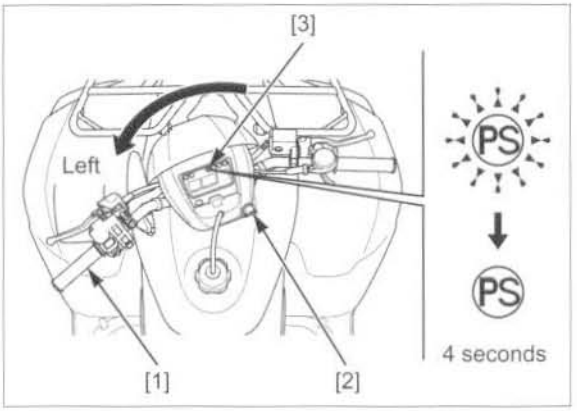


5. Make sure the engine stop switch is turned "○".

   Fully turn the handlebar [1] to the left to apply a load and hold it firmly.

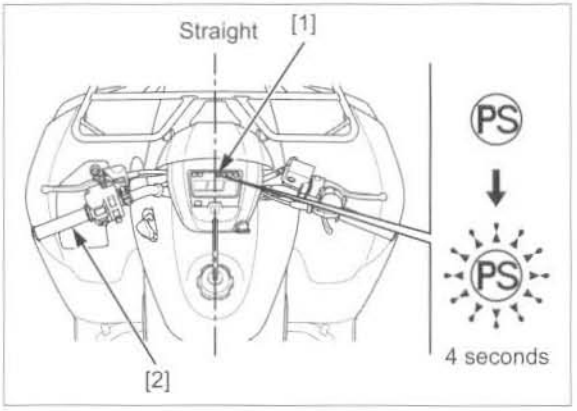
6. Turn the ignition switch [2] ON.

   The EPS indicator [3] comes on and it goes off after 4 seconds.



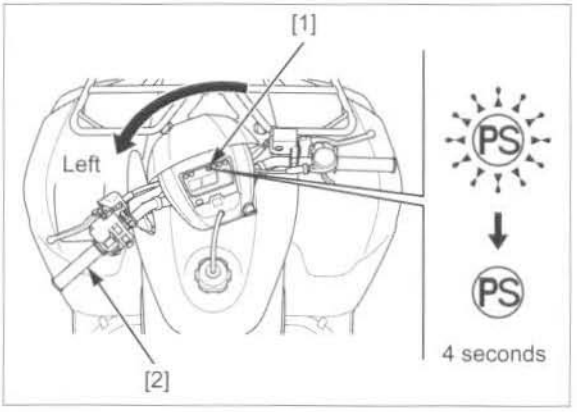
7. Within 4 seconds after the EPS indicator [1] goes off, turn the handlebar [2] in the straight ahead position and release it immediately.

   The EPS indicator comes on again 4 seconds.



8. Within 4 seconds after the EPS indicator [1] comes on, fully turn the handlebar [2] to the left and hold it immediately.

   The EPS indicator goes off after 4 seconds.



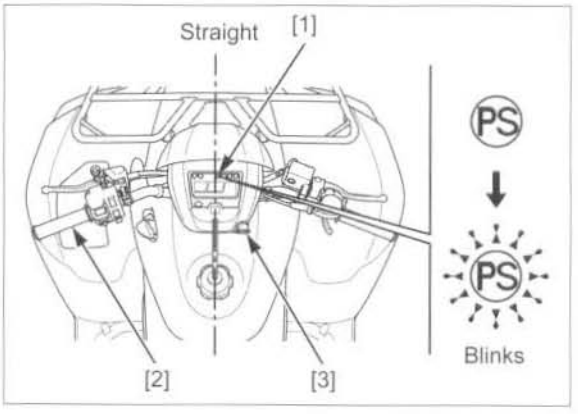
9. Within 4 seconds after the EPS indicator [1] goes off, turn the handlebar [2] in the straight ahead position and release it immediately.

   The EPS indicator blinks twice.

   Turn the ignition switch [3] OFF within 5 seconds after the EPS indicator blinks twice (DTC erasure is completed at this time).

NOTE:

- The ignition switch must be turned OFF at this time.
  If it is not, the system will be changed to the torque sensor initialization (page 24-14).
- If the EPS indicator does not blink twice, an error was made in the procedure and the DTC was not erased. Turn the ignition switch OFF, and repeat the operation from step 4.



10. Remove the special tool from the DLC and install the DLC to the dummy connector.

    Remove the screwdriver inserted in Step 4.

11. Install the seat (page 2-4).

TORQUE SENSOR INITIALIZATION

NOTE:

- Perform this procedure using a fully charged battery. The EPS indicator will stay lit and the EPS ECU will abort the process if you use a low or dead battery.
- The DTC will be erased when initializing the torque sensor.

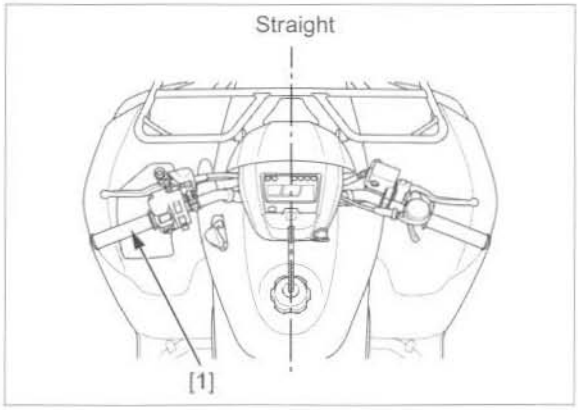
How to Initialize the Torque Sensor with HDS

1. Raise the front wheels off the ground and support the vehicle securely.
2. Connect the HDS Pocket Tester to the DLC (page 24-10).
3. Turn the ignition switch ON and engine stop switch "○".

   Turn the handlebar [1] straight ahead.

   Initialize the torque sensor with the HDS while the engine is stopped.

   Follow the instructions on the HDS display.

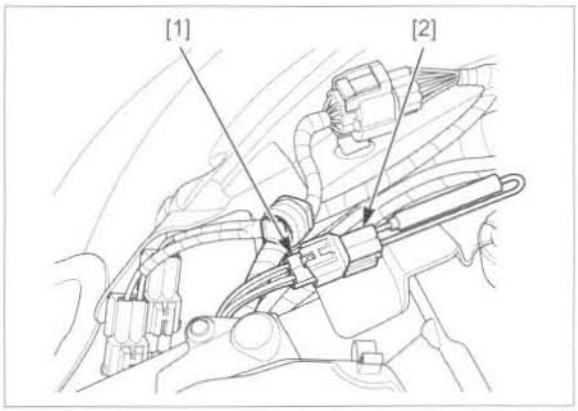


How to Initialize the Torque Sensor without HDS

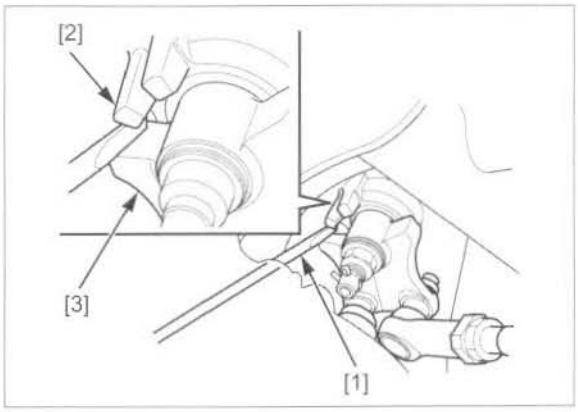
1. Raise the front wheels off the ground and support the vehicle securely.
2. Remove the DLC from the dummy connector (page 24-10).
3. Short the DLC [1] terminals using the special tool.

   TOOL:
   [2] SCS service connector 070PZ-ZY30100

   Connection: Brown/red – Green



4. Place a 6 mm width screwdriver [1] between the right side of the steering stopper [2] and steering arm [3] as shown.

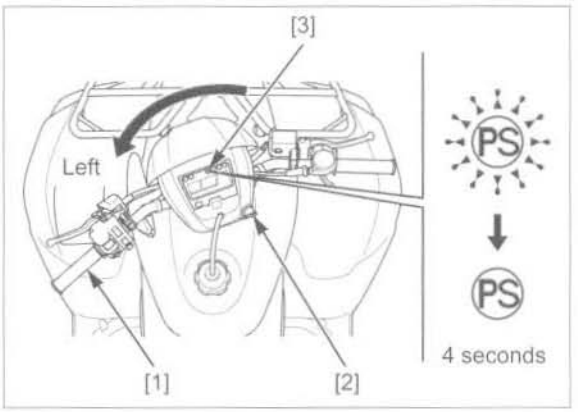


5. Make sure the engine stop switch is turned "○".

   Fully turn the handlebar [1] to the left to apply a load and hold it firmly.

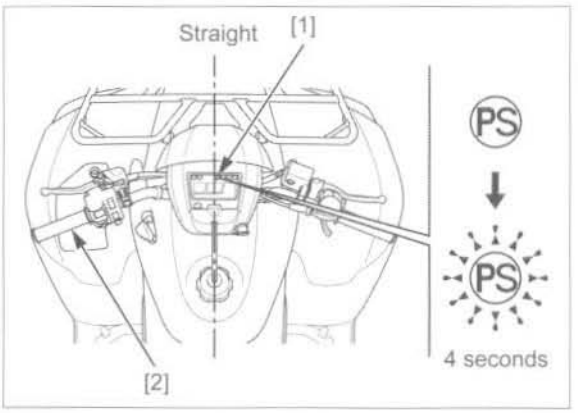
6. Turn the ignition switch [2] ON.

   The EPS indicator [3] comes on and it goes off after 4 seconds.



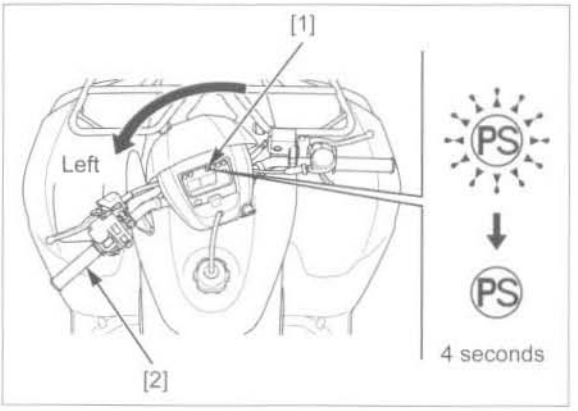
7. Within 4 seconds after the EPS indicator [1] goes off, turn the handlebar [2] in the straight ahead position and release it immediately.

   The EPS indicator comes on again 4 seconds.



8. Within 4 seconds after the EPS indicator [1] comes on, fully turn the handlebar [2] to the left and hold it immediately.

   The EPS indicator goes off after 4 seconds.



9. Turn the handlebar [1] in the straight ahead position (fully turn–to–straight ahead time; within 1 second) and release it immediately after the EPS indicator [2] goes off.

   The EPS indicator blinks twice. Wait for 5 seconds and the EPS indicator blinks 3 times.

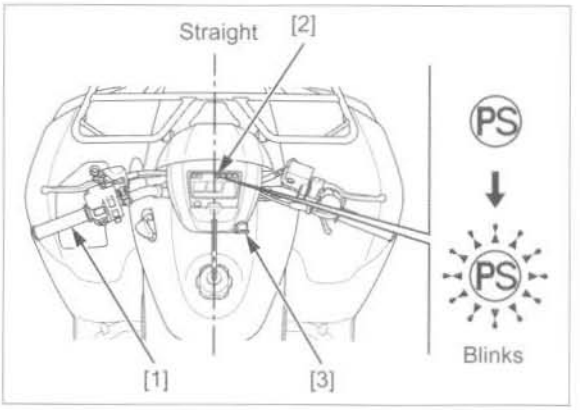
NOTE:

- Do not touch the handlebar after releasing the handlebar.

  Turn the ignition switch [3] OFF after the EPS indicator blinks 3 times (torque sensor initialization is completed at this time).

NOTE:

- If the EPS indicator does not blink 3 times, an error was made in the procedure and the torque sensor was not initialized. Turn the ignition switch OFF, and repeat the operation from step 4.



10. Remove the special tool from the DLC and install the DLC to the dummy connector.

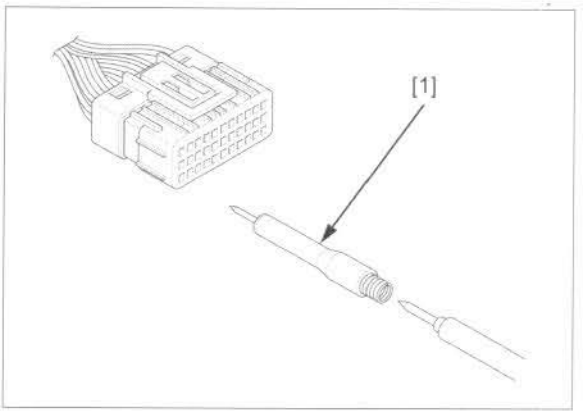
    Remove the screwdriver inserted in Step 4.

11. Install the seat (page 2-4).

CIRCUIT INSPECTION

INSPECTION AT EPS ECU AND PCM/ECM CONNECTOR

- Always clean around and keep any foreign material away from the EPS ECU and PCM/ECM connector before disconnecting it.
- A faulty EPS system is often related to poorly connected or corroded connections. Check those connections before proceeding.
- Do not pull the wire harness while disconnecting the EPS ECU and PCM/ECM connector.
- In testing at EPS ECU 21P (Gray) and PCM/ECM 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:

[1] Test probe **07ZAJ-RDJA110**

EPS DTC INDEX

DEFINITIONS

Latch: The EPS indicator turns on and stays on whenever the ignition switch is in the ON position, or until the DTC is erased.

Reset: The EPS indicator turns on when the DTC is set. The EPS indicator will not turn on after the ignition switch is cycled from ON to OFF, but the DTC will be stored in the EPS ECU.

Revest: The EPS indicator turns on when the DTC is set. The EPS indicator will turn off after vehicle has recovered from the fail-safe condition, but the DTC will be stored in the EPS ECU. There was a temporary problem, but the system is now fully operational.

Initial diagnosis: Performed right after the engine starts and until the EPS indicator goes off.

Regular diagnosis: Performed right after the initial diagnosis until the ignition switch is turned OFF.

DTC (EPS indicator blinks)	Function Failure	Symptom/Fail-safe function	Detection timing	Type	Refer to
11-01 (11)	Excessive change of vehicle speed signal	Indicator ON/Substitution control of the engine rpm	Regular	Revest	24-18
11-02 (11)	Comparison between vehicle speed and engine speed signal	Indicator ON/Substitution control of the engine rpm	Regular	Revest	24-19
13-01 (13)	EPS ECU internal circuit (Lower FET stuck ON)	Indicator ON/Disables steering assist immediately	Initial	Reset	24-19
13-02 (13)	EPS ECU internal circuit (Upper FET stuck ON)	Indicator ON/Disables steering assist immediately	Initial	Reset	24-20
13-03 (13)	EPS ECU internal circuit (FET stuck ON <over current>)	Indicator ON/Disables steering assist immediately	Regular	Reset	24-20
13-04 (13)	EPS ECU internal circuit (FET stuck ON (VM<Voltage Motor>))	Indicator ON/Disables steering assist immediately	Regular	Reset	24-20
13-05 (13)	EPS ECU internal circuit (FET stuck ON (over current<accumulated>))	Indicator ON/Disables steering assist immediately	Regular	Reset	24-20
14-01 (14)	EPS ECU internal circuit (Power relay stuck ON)	Indicator ON/Disables steering assist immediately	Regular	Reset	24-21
14-02 (14)	EPS ECU internal circuit (Fail-safe relay 1 stuck ON)	Indicator ON/Disables steering assist immediately	Initial	Reset	24-21
14-03 (14)	EPS ECU internal circuit (Fail-safe relay 2 stuck ON)	Indicator ON/Disables steering assist immediately	Initial	Reset	24-21
14-04 (14)	EPS ECU internal circuit (Power relay stuck open)	Indicator ON/Disables steering assist immediately	Regular	Reset	24-21
15-01 (15)	2WD/4WD select signal blinking	4WD indicator blink (EPS indicator will not come ON)/ 2WD assist power stabilized	Regular	Revest	24-21
15-02 (15)	2WD/4WD select signal input line	Indicator ON/2WD assist power stabilized or EPS operation is normally	Regular	Revest	24-22
16-01 (16)	EPS ECU internal circuit (Direction determine logic circuit)	Indicator ON/Disables steering assist immediately	Regular	Reset	24-23
16-02 (16)	EPS ECU internal circuit (INH output circuit)	Indicator ON/Disables steering assist immediately	Initial	Reset	24-23
17-01 (17)	EPS ECU internal circuit (Voltage raise transformation circuit)	Indicator ON/Disables steering assist immediately	Initial	Reset	24-23
17-02 (17)	EPS ECU internal circuit (Voltage raise transformation circuit)	Indicator ON/Disables steering assist under the Specified condition	Regular	Reset	24-23
18-01 (18)	EPS ECU internal circuit (Current sensor)	Indicator ON/Disables steering assist immediately	Initial	Reset	24-23
18-02 (18)	EPS ECU internal circuit (Current sensor off set)	Indicator ON/Disables steering assist immediately	Regular	Reset	24-23
18-03 (18)	EPS ECU internal circuit (Current sensor stuck low)	Indicator ON/Disables steering assist immediately	Initial	Reset	24-24
18-04 (18)	EPS ECU internal circuit (Current sensor stuck low)	Indicator ON/Disables steering assist immediately	Regular	Reset	24-25
18-05 (18)	EPS ECU internal circuit (Motor current deflection)	Indicator ON/Disables steering assist immediately	Regular	Reset	24-23
18-06 (18)	EPS ECU internal circuit (IM2)	Indicator ON/Disables steering assist immediately	Regular	Reset	24-23

DTC (EPS indicator blinks)	Function Failure	Symptom/Fail-safe function	Detection timing	Type	Refer to
21-01 (21)	Abnormal motor terminal voltage	Indicator ON/Disables steering assist immediately	Initial	Reset	24-25
21-02 (21)	Abnormal motor terminal voltage	Indicator ON/Disables steering assist immediately	Regular	Reset	24-25
21-03 (21)	Open in the motor harness	Indicator ON/Disables steering assist immediately	Regular	Reset	24-25
22-01 (22)	Failure to initialize the torque sensor	Indicator blink/Disables steering assist until the torque sensor is initialized	Regular	Latch*	24-25
23-01 (23)	Low/high voltage for the torque sensor (VT1 and VT2)	Indicator ON/Disables steering assist until the DTC is erased	Regular	Latch	24-26
23-02 (23)	Torque sensor (VT3 Differential-amplification Function)	Indicator ON/Disables steering assist until the DTC is erased	Regular	Latch	24-28
23-03 (23)	Torque sensor (VT1, VT2 rapid change)	Indicator ON/Disables steering assist until the DTC is erased	Regular	Latch	24-28
23-04 (23)	Torque sensor (Temperature sensor)	Indicator ON/Disables steering assist immediately	Regular	Reset	24-28
23-05 (23)	Torque sensor (Sensor Coil)	Indicator ON/Disables steering assist until the DTC is erased	Regular	Latch	24-29
24-01 (24)	Engine speed signal	Indicator ON/Disables steering assist under the Specified condition	Regular	Revest	24-29
31-01 (31)	Low/high IG1-terminal voltage	Indicator ON/Disables steering assist under the Specified condition	Initial	Revest	24-30
31-02 (31)	Low/high IG1-terminal voltage	Indicator ON/Disables steering assist under the Specified condition	Regular	Revest	24-30
32-01 (32)	Low/high VBU voltage	Indicator ON/Disables steering assist under the Specified condition	Regular	Reset	24-31
33-02 (33)	EPS ECU internal circuit (EEPROM)	Indicator ON/Disables steering assist immediately	Initial	Reset	24-23
35-01 (35)	EPS ECU internal circuit (CPU)	Indicator ON/Disables steering assist immediately	Initial and Regular	Reset	24-23
35-03 (35)	EPS ECU internal circuit (CPU communication)	Indicator ON/Disables steering assist immediately	Initial	Reset	24-23
35-04 (35)	EPS ECU internal circuit (CPU communication)	Indicator ON/Disables steering assist under the Specified condition	Regular	Reset	24-23

*The stored DTC is erased by performing the torque sensor initialization.

DTC TROUBLESHOOTING

NOTE:

- Refer to "EPS Connector Location" for the connector location and the necessary parts to disconnect the connector (page 24-5).
- After troubleshooting, erase the DTC(s) and test-ride the vehicle to be sure that the EPS indicator does not come on.

VERIFY PROPER CONNECTOR CONTACT

Many EPS problems and subsequent DTCs are caused by poor connector contacts. The first step in troubleshooting any DTC is to inspect the affected connectors.

CONNECTOR INSPECTION

- Check for moisture in the affected connector
- Check for corrosion
- Check for folded pins on the male side of the connector
- Check for loose pins and/or pins pushed out of the connector

DTC 11-01: EXCESSIVE CHANGE OF VEHICLE SPEED SIGNAL (REGULAR DIAGNOSIS)

NOTE:

- Before starting the troubleshooting, check for loose or poor contact of the following connectors, and recheck the EPS indicator (page 24-18).
  - engine sub-wire harness connector
    - 3P (Black): FPM
    - 6P (Black): FPE
  - EPS ECU 21P (Gray)
  - VS sensor 3P (Black)
- The system is reducing the assist power, the EPS indicator will come on when the EPS ECU detects conditions of DTC 11-01 and DTC 11-02.

1. VS Sensor Signal line Open Circuit Inspection

Turn the ignition switch OFF.
Disconnect the VS sensor 3P (Black) connector [1] and EPS ECU 21P (Gray) connector [2].
Check for continuity between the wire harness side VS sensor 3P (Black) connector and EPS ECU 21P (Gray) connector terminals.

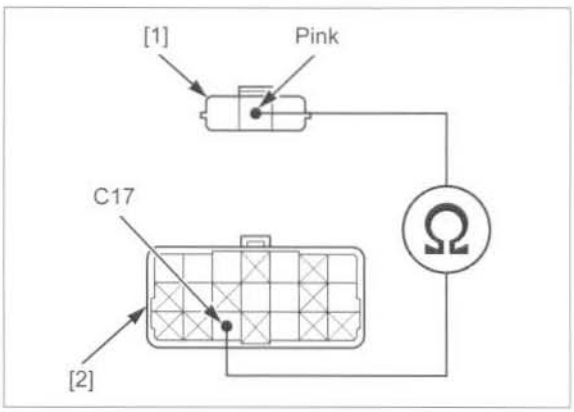
Connection: C17 – Pink

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

Is there continuity?

YES – GO TO STEP 2.

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



2. **VS Sensor Signal line Short Circuit Inspection**

Check for continuity between the wire harness side EPS ECU 21P (Gray) connector [1] terminal and ground.

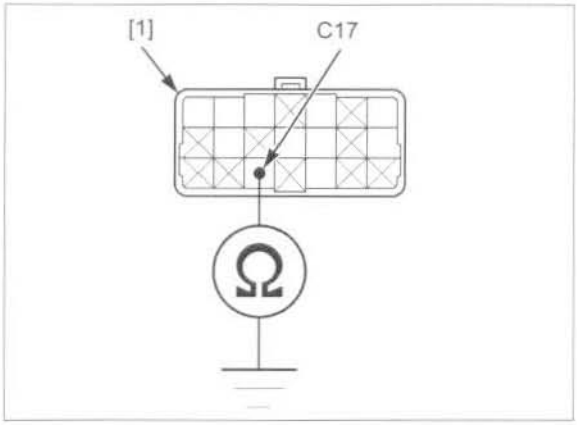
Connection: C17 – Ground

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

Is there continuity?

YES – Short circuit in the Pink/green or Pink wire.

NO – Replace the EPS ECU with a known good one (page 24-35), and recheck.



DTC 11-02: COMPARISON BETWEEN VEHICLE SPEED AND ENGINE SPEED SIGNAL (REGULAR DIAGNOSIS)

Refer to DTC 11-01 (page 24-18)

DTC 13-01: EPS ECU INTERNAL CIRCUIT (LOWER FET STUCK ON) (INITIAL DIAGNOSIS)

NOTE:

- Before starting the troubleshooting, check for loose or poor contact of the following connectors, and recheck the DTC (page 24-18).
  - EPS ECU 21P (Gray)
  - EPS motor 2P (Gray)

1. **EPS ECU System Inspection**

   1. Erase the DTC (page 24-11).
   2. Start the engine.
   3. Fully turn the handlebar to the left or right and hold it 10 seconds.
   4. Check the EPS indicator.

   Does the EPS indicator come on?

   YES – GO TO STEP 2.

   NO – Intermittent failure.

2. **Motor Line Short Circuit Inspection**

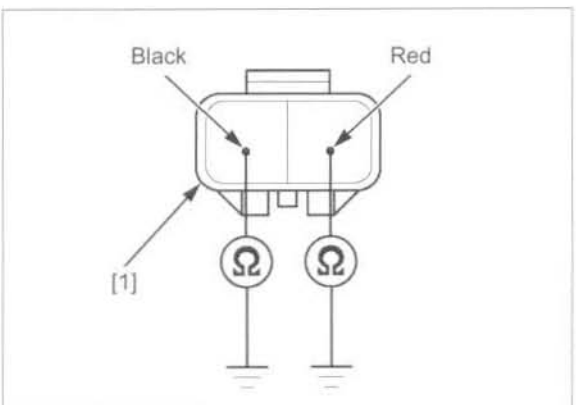
   Turn the ignition switch OFF.
   Disconnect the EPS ECU 2P (Gray) connector [1].
   Check for continuity between the wire harness side EPS ECU 2P (Gray) connector terminals and ground.

   Connection: Black – Ground
   Red – Ground

   Is there continuity?

   YES – GO TO STEP 3.

   NO – GO TO STEP 4.



3. **Motor Short Circuit Inspection**

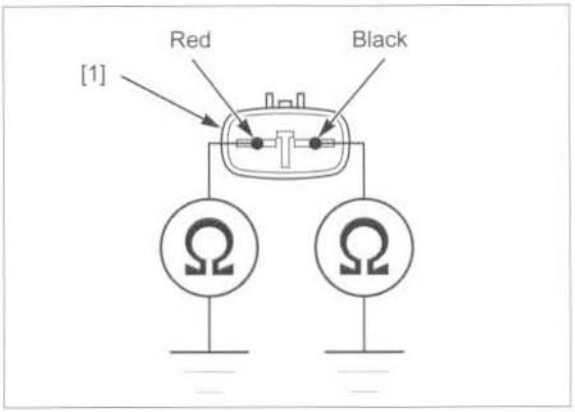
Disconnect the EPS motor 2P (Gray) connector. Check for continuity between the motor side 2P connector [1] terminals and ground.

Connection: Red – Ground
Black – Ground

Is there continuity?

YES – Replace the EPS unit with a new one (page 16-32), and recheck.

NO – Short circuit in the Red or Black wire.



4. **EPS sub-wire harness Short Circuit Inspection**

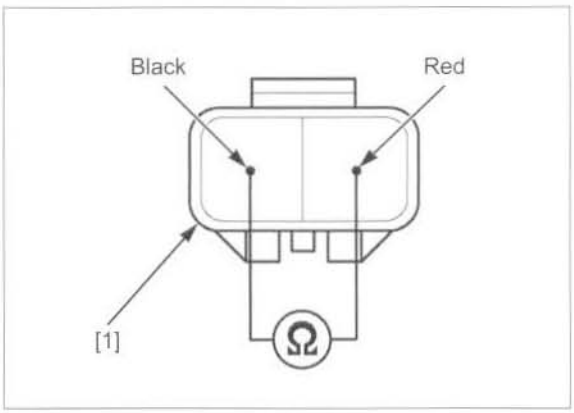
Check for continuity between the wire harness side EPS ECU 2P (Gray) connector [1] terminals.

Connection: Black – Red

Is there continuity?

YES – Short circuit in the EPS sub-wire harness.

NO – Recheck for loose or poor contact on the EPS ECU 2P (Gray) connector and EPS motor 2P (Gray) connector. If they are OK, replace the EPS ECU with a new one (page 24-35).



DTC 13-02: EPS ECU INTERNAL CIRCUIT (UPPER FET STUCK ON) (INITIAL DIAGNOSIS)

Refer to DTC 13-01 (page 24-19)

DTC 13-03: EPS ECU INTERNAL CIRCUIT (FET STUCK ON <OVER CURRENT>) (REGULAR DIAGNOSIS)

Refer to DTC 13-01 (page 24-19)

DTC 13-04: EPS ECU INTERNAL CIRCUIT (FET STUCK ON (VM<VOLTAGE MOTOR>) (REGULAR DIAGNOSIS)

Refer to DTC 13-01 (page 24-19)

DTC 13-05: EPS ECU INTERNAL CIRCUIT (FET STUCK ON (OVER CURRENT<ACCUMULATED>) (REGULAR DIAGNOSIS)

Refer to DTC 13-01 (page 24-19)

DTC 14-01: EPS ECU INTERNAL CIRCUIT (POWER RELAY STUCK ON) (REGULAR DIAGNOSIS)

Refer to DTC 13-01 (page 24-19)

DTC 14-02: EPS ECU INTERNAL CIRCUIT (FAIL-SAFE RELAY 1 STUCK ON) (INITIAL DIAGNOSIS)

Refer to DTC 13-01 (page 24-19)

DTC 14-03: EPS ECU INTERNAL CIRCUIT (FAIL-SAFE RELAY 2 STUCK ON) (INITIAL DIAGNOSIS)

Refer to DTC 13-01 (page 24-19)

DTC 14-04: EPS ECU INTERNAL CIRCUIT (POWER RELAY STUCK OPEN) (REGULAR DIAGNOSIS)

Refer to DTC 13-01 (page 24-19)

DTC 15-01: 2WD/4WD SELECT SIGNAL BLINKING (REGULAR DIAGNOSIS)

NOTE:

- Before starting the troubleshooting, check for loose or poor contact of the following connectors, and recheck the 4WD indicator (page 24-18).
  - 4WD select switch
  - EPS ECU 21P (Gray)
  - combination meter 21P (Black)
- When this problem occurs, there are some of problem of 2WD/4WD select system.
- Question the customer about the conditions when the problem occurred, and try to reproduce the same conditions for troubleshooting. Find out when the 4WD indicator blinked, such as during 4WD-to-2WD selecting, 2WD-to-4WD selecting, at what speed, etc.

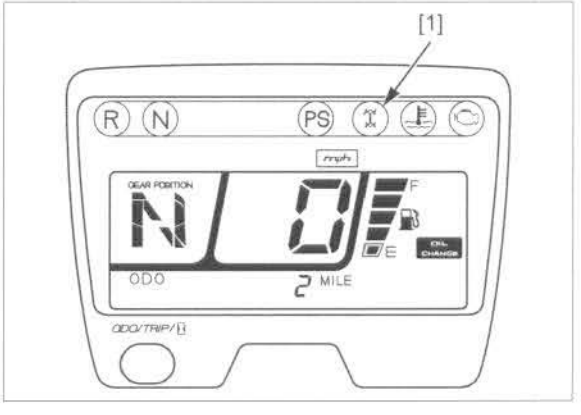
1. EPS ECU System Inspection

Erase the DTC (page 24-11).
Perform the test-ride and check the 4WD indicator [1].

Does the 4WD indicator blinking?

YES – Check the 4WD select switch (page 22-17). If it is OK, inspect the 2WD/4WD select system (front final clutch; page 19-16).

NO –
- Intermittent failure.
- Loose or poor contact of the following connectors:
  - 4WD select switch
  - EPS ECU 21P (Gray)
  - combination meter 21P (Black)



DTC 15-02: 2WD/4WD SELECT SIGNAL INPUT LINE (REGULAR DIAGNOSIS)

NOTE:

- Question the customer about the conditions when the problem occurred, and try to reproduce the same conditions for troubleshooting. Find out when the 4WD indicator blinked, such as during 4WD-to-2WD selecting, 2WD-to-4WD selecting, at what speed, etc.

1. EPS ECU System Inspection

Erase the DTC (page 24-11).
Start the engine and check the EPS indicator.

Does the indicator come on?

YES – GO TO STEP 2.

NO – Intermittent failure.

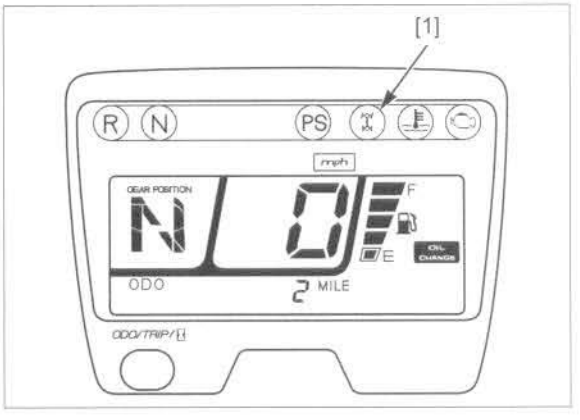
2. 4WD Indicator Inspection

Turn the ignition switch ON and engine stop switch "○".
Operate the 2WD/4WD select lever several times and check the 4WD indicator [1].

Is the 4WD indicator operated normally?

YES – Replace the EPS ECU with a known good one (page 24-35), and recheck.

NO – Check the 4WD select switch (page 22-17).



DTC 16-01, 16-02, 17-01, 17-02, 18-01, 18-02, 18-05, 18-06, 33-02, 35-01, 35-03, or 35-04: EPS ECU INTERNAL CIRCUIT

Perform the troubleshooting according to the DTC in the following table.

16-01	EPS ECU internal circuit (Direction determine logic circuit) (Regular diagnosis)
16-02	EPS ECU internal circuit (INH output circuit) (Initial diagnosis)
17-01	EPS ECU internal circuit (Voltage raise transformation circuit) (Initial diagnosis)
17-02	EPS ECU internal circuit (Voltage raise transformation circuit) (Regular diagnosis)
18-01	EPS ECU internal circuit (Current sensor) (Initial diagnosis)
18-02	EPS ECU internal circuit (Current sensor off set) (Regular diagnosis)
18-05	EPS ECU internal circuit (Motor current deflection) (Regular diagnosis)
18-06	EPS ECU internal circuit (IM2) (Regular diagnosis)
33-02	EPS ECU internal circuit (EEPROM) (Regular diagnosis)
35-01	EPS ECU internal circuit (CPU) (Initial and regular diagnosis)
35-03	EPS ECU internal circuit (CPU communication) (Initial diagnosis)
35-04	EPS ECU internal circuit (CPU communication) (Regular diagnosis)

1. **EPS ECU System Inspection**

   1. Erase the DTC (page 24-11).
   2. Start the engine.
   3. Fully turn the handlebar to the left or right and hold it 10 seconds.
   4. Check the EPS indicator.

   Does the EPS indicator come on?

   YES – GO TO STEP 2.

   NO – Intermittent failure.

2. **DTC Inspection**

   1. Check the DTC (page 24-10).

   Is DTC 16-01, 16-02, 17-01, 17-02, 18-01, 18-02, 18-05, 18-06, 33-02, 35-01, 35-03 or 35-04 indicated?

   YES – Replace the EPS ECU with a known good one (page 24-35), and recheck.

   NO – Perform the troubleshooting for the indicated DTC (page 24-16).

DTC 18-03: EPS ECU INTERNAL CIRCUIT (CURRENT SENSOR STUCK LOW) (INITIAL DIAGNOSIS)

NOTE:

- Before starting the troubleshooting, check for loose or poor contact of the following connectors, and recheck the DTC (page 24-18).
  - EPS ECU 2P (Gray)
  - EPS motor 2P (Gray)

1. EPS ECU System Inspection

1. Erase the DTC (page 24-11).
2. Start the engine.
3. Fully turn the handlebar to the left or right and hold it 10 seconds.
4. Check the EPS indicator.

Does the EPS indicator come on?

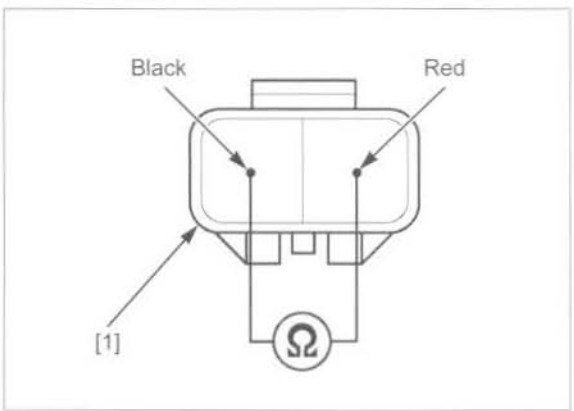
YES – GO TO STEP 2.

NO – Intermittent failure.

2. Motor Line Open Circuit Inspection

Turn the ignition switch OFF.
Disconnect the EPS ECU 2P (Gray) connector [1].
Check for continuity between the wire harness side EPS ECU 2P (Gray) connector terminals.

Connection: Black – Red



Is there continuity?

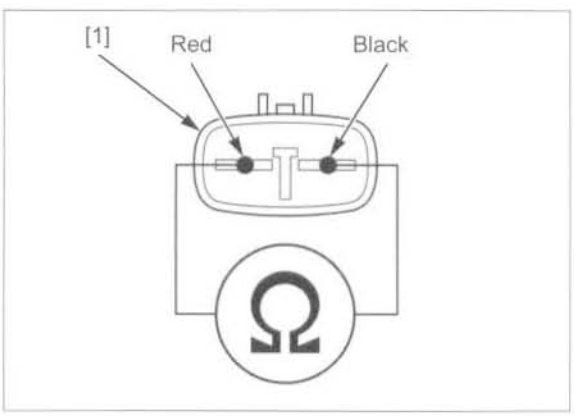
YES – Replace the EPS ECU with a known good one (page 24-35), and recheck.

NO – GO TO STEP 3.

3. Motor Open Circuit Inspection

Disconnect the EPS motor 2P (Gray) connector.
Check for continuity between the motor side 2P connector [1] terminals.

Connection: Red – Black



Is there continuity?

YES – Open circuit in the EPS sub-wire harness.

NO – Replace the EPS unit with a new one (page 16-32), and recheck.

DTC 18-04: EPS ECU INTERNAL CIRCUIT (CURRENT SENSOR STUCK LOW) (REGULAR DIAGNOSIS)

Refer to DTC 18-03 (page 24-24)

DTC 21-01: ABNORMAL MOTOR TERMINAL VOLTAGE (INITIAL DIAGNOSIS)

Refer to DTC 18-03 (page 24-24)

DTC 21-02: ABNORMAL MOTOR TERMINAL VOLTAGE (REGULAR DIAGNOSIS)

Refer to DTC 18-03 (page 24-24)

DTC 21-03: OPEN IN THE MOTOR HARNESS (REGULAR DIAGNOSIS)

Refer to DTC 18-03 (page 24-24)

DTC 22-01: FAILURE TO INITIALIZE THE TORQUE SENSOR (INITIAL DIAGNOSIS)

NOTE:

- The EPS ECU stores the torque sensor neutral position. The torque sensor must be initialized whenever the EPS unit, the EPS ECU, etc is serviced (page 24-13).
- Refer to torque sensor neutral position information for detail of the initialization parts (page 24-9).
- The DTC will not store in the EPS ECU. (The stored DTC is erased by performing the torque sensor initialization) (page 24-13)
- The torque sensor neutral position is not effected when erasing the DTC.

1. **Initializing Torque Sensor**

   Perform the torque sensor initialization (page 24-13) and check the EPS indicator.

   Does the EPS indicator come on?

   YES – Check the DTC (page 24-10) and perform the troubleshooting for the indicated DTC (page 24-16).

   NO – Intermittent failure.

DTC 23-01: LOW/HIGH VOLTAGE FOR THE TORQUE SENSOR (VT1 AND VT2) (REGULAR DIAGNOSIS)

NOTE:

- Before starting the troubleshooting, check for loose or poor contact of the following connectors, and recheck the DTC (page 24-18).
  - EPS ECU 21P (Gray)
  - torque sensor 3P (Gray)

1. EPS ECU System Inspection

1. Erase the DTC (page 24-11).
2. Start the engine.
3. Fully turn the handlebar to the left or right and hold it 10 seconds.
4. Check the EPS indicator.

Does the EPS indicator come on?

YES – GO TO STEP 2.

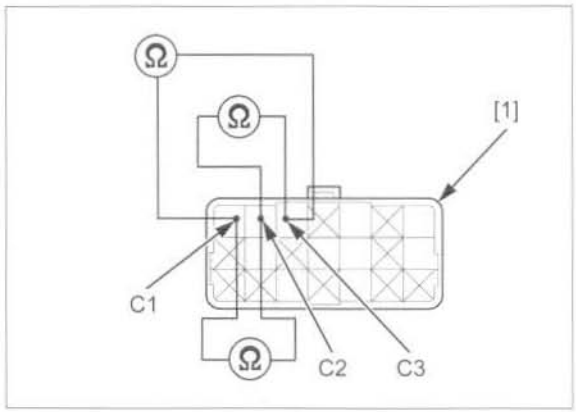
NO – Intermittent failure.

2. Torque Sensor Line Short Circuit Inspection

Turn the ignition switch OFF.
Disconnect the EPS ECU 21P (Gray) connector [1].
Measure the resistance between the wire harness side EPS ECU 21P (Gray) connector terminals.

Connection: C1 – C2
C1 – C3
C2 – C3

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



Is the resistance less than 10 Ω (at 20°C/68°F)?

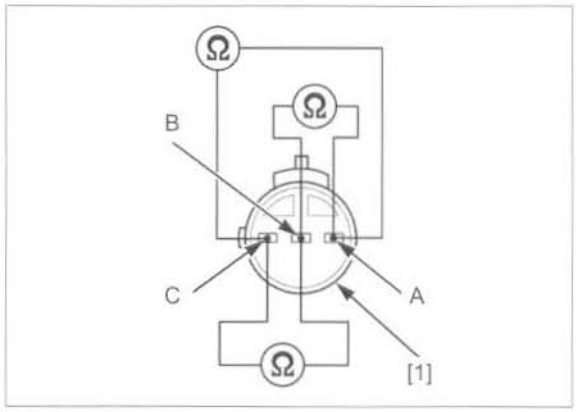
YES – GO TO STEP 3.

NO – GO TO STEP 4.

3. Torque Sensor Coil Short Circuit Inspection

Disconnect the torque sensor 3P (Gray) connector.
Measure the resistance between the torque sensor side connector [1] terminals in the EPS unit.

Connection: A – B
A – C
B – C



Is the resistance less than 10 Ω (at 20°C/68°F)?

YES – Replace the EPS unit with a new one (page 16-32), and recheck (short circuit in the torque sensor coil).

NO –
- Short circuit in the Yellow/red or Green/orange wire.
- Short circuit in the Yellow/red or White/blue wire.
- Short circuit in the Green/orange or White/blue wire.

4. **Torque Sensor Line and Ground Short Circuit Inspection**

Check for continuity between the wire harness side EPS ECU 21P (Gray) connector [1] terminals and ground.

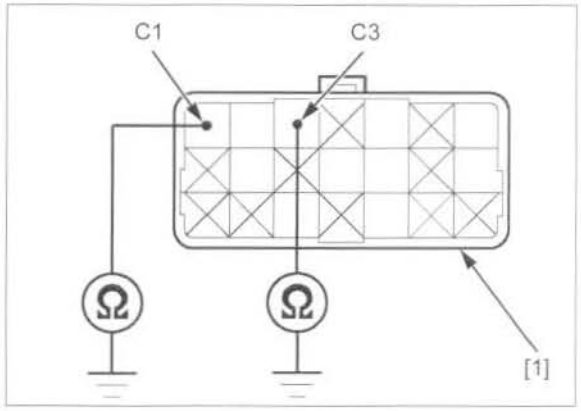
Connection: C1 – Ground
C3 – Ground

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

Is there continuity?

YES – GO TO STEP 5.

NO – GO TO STEP 6.



5. **Torque Sensor Coil Short Circuit Inspection**

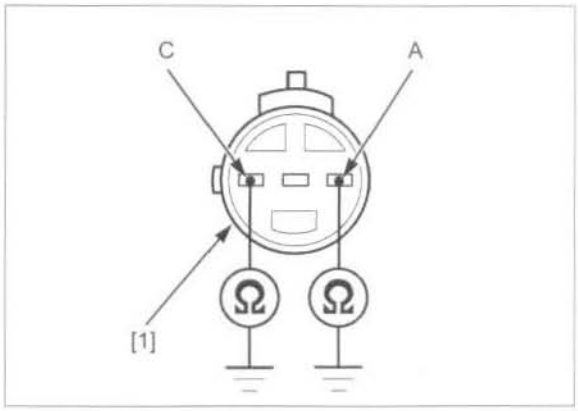
Check for continuity between the torque sensor side connector [1] terminals in the EPS unit and ground.

Connection: A – Ground
C – Ground

Is there continuity?

YES – Replace the EPS unit with a new one (page 16-32), and recheck (short circuit in the torque sensor coil).

NO – • Short circuit in the Yellow/red wire.
• Short circuit in the White/blue wire.



6. **Torque Sensor Line Open Circuit Inspection**

Check for continuity between the wire harness side EPS ECU 21P (Gray) connector [1] and torque sensor 3P (Gray) connector [2] terminals.

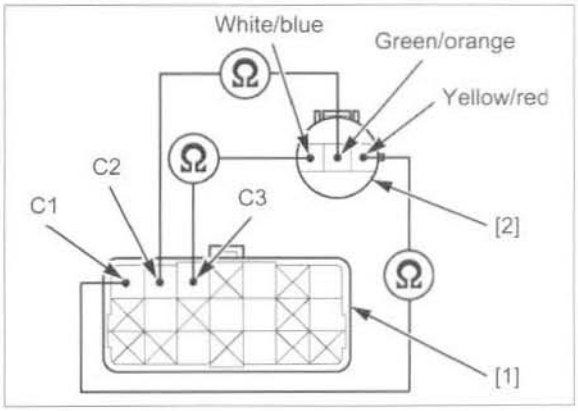
Connection: C1 – Yellow/red
C2 – Green/orange
C3 – White/blue

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

Is there continuity?

YES – GO TO STEP 7.

NO – • Open circuit in the Yellow/red wire.
• Open circuit in the Green/orange wire.
• Open circuit in the White/blue wire.



7. **Torque Sensor Open Circuit Inspection**

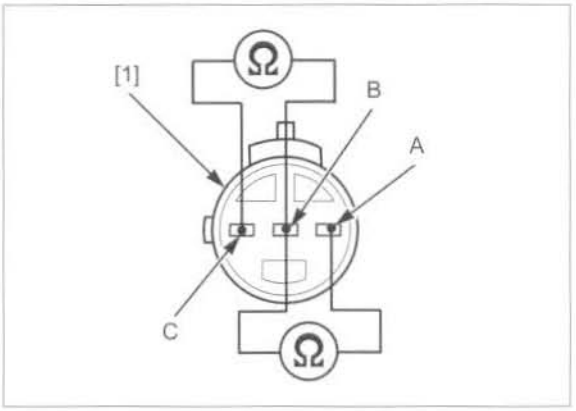
Measure the resistance between the torque sensor side connector [1] terminals in the EPS unit.

Connection: A – B
B – C

Is the resistance within 10 – 40 Ω (20°C/68°F)?

YES – Replace the EPS ECU with a known good one (page 24-35), and recheck.

NO – Replace the EPS unit with a new one (page 16-32), and recheck (short circuit in the torque sensor coil).



DTC 23-02: TORQUE SENSOR (VT3 DIFFERENTIAL AMPLIFICATION FUNCTION) (REGULAR DIAGNOSIS)

NOTE:

- Before starting the troubleshooting, check for loose or poor contact of the following connectors, and recheck the DTC (page 24-18).
  - EPS ECU 21P (Gray)
  - torque sensor 3P (Gray)

1. **EPS ECU System Inspection**

   1. Erase the DTC (page 24-11).
   2. Start the engine.
   3. Fully turn the handlebar to the left or right and hold it 10 seconds.
   4. Check the EPS indicator.

   Does the EPS indicator come on?

   YES – GO TO STEP 2.

   NO – Intermittent failure.

2. **Recheck DTC**

   Check the DTC (page 24-10).

   Is DTC 23-02 indicated?

   YES – Replace the EPS ECU with a known good one (page 24-35), and recheck.

   NO – Perform the troubleshooting for the indicated DTC (page 24-16).

DTC 23-03: TORQUE SENSOR (VT1, VT2 RAPID CHANGE) (REGULAR DIAGNOSIS)

Refer to DTC 23-01 (page 24-26).

DTC 23-04: TORQUE SENSOR (TEMPERATURE SENSOR) (REGULAR DIAGNOSIS)

Refer to DTC 23-01 (page 24-26).

DTC 23-05: TORQUE SENSOR (SENSOR COIL) (REGULAR DIAGNOSIS)

Refer to DTC 23-01 (page 24-26).

DTC 24-01: ENGINE SPEED SIGNAL (REGULAR DIAGNOSIS)

NOTE:

- Before starting the troubleshooting, check for loose or poor contact of the following connectors, and recheck the EPS indicator (page 24-18).
  - EPS ECU 21P (Gray)
  - PCM/ECM 33P (Black)

1. CKP Sensor Signal Line Open Circuit Inspection

Turn the ignition switch OFF.
Disconnect the EPS ECU 21P (Gray) connector [1] and PCM/ECM 33P (Black) connector [2].
Check for continuity between the wire harness side EPS ECU 21P (Gray) connector and PCM/ECM 33P (Black) connector terminals.

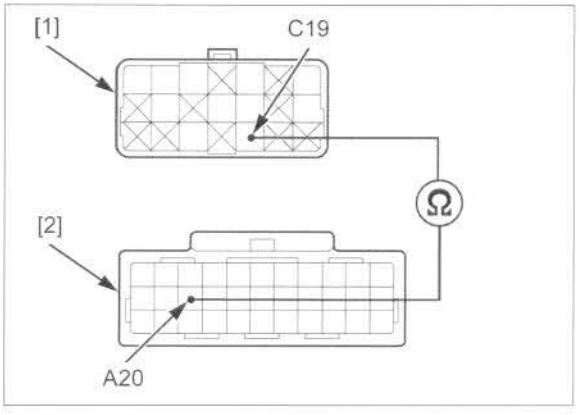
Connection: C19 (EPS ECU) – A20 (PCM/ECM)

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

Is there continuity?

YES – GO TO STEP 2.

NO – Open circuit in the Blue/yellow wire.



2. CKP Sensor Signal Line Short Circuit Inspection

Check for continuity between the wire harness side EPS ECU 21P (Gray) connector [1] terminal and ground.

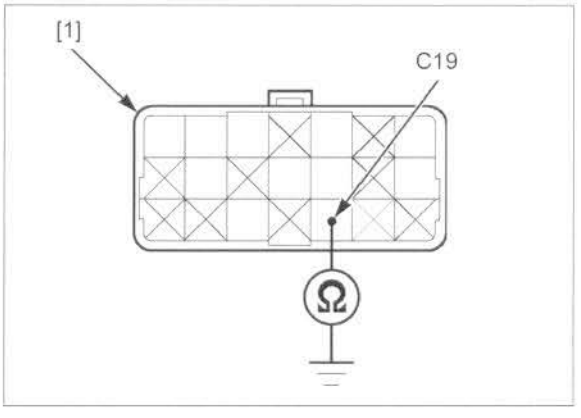
Connection: C19 – Ground

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

Is there continuity?

YES – Short circuit in the Blue/yellow wire.

NO – Replace the EPS ECU with a known good one (page 24-35), and recheck.



DTC 31-01: LOW/HIGH IG1-TERMINAL VOLTAGE (INITIAL DIAGNOSIS)

NOTE:

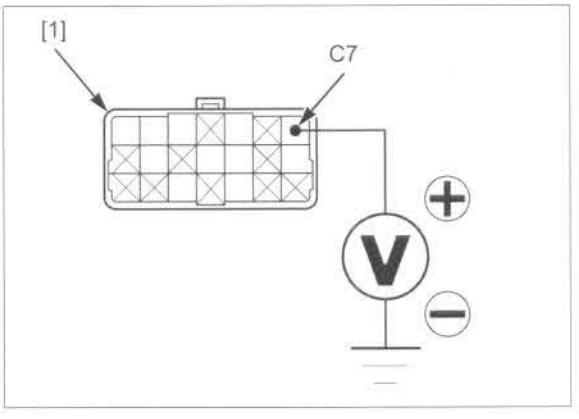
Before starting the troubleshooting, check the following items:

- check for loose or poor contact on the EPS ECU 21P (Gray) connector, and recheck the EPS indicator (page 24-18).
- check for blown IGN fuse (10A)
- battery condition (must use a fully charged battery) (page 21-8)

1. IG1 Line Open Circuit Inspection

Turn the ignition switch OFF.
Disconnect the EPS ECU 21P (Gray) connector [1].
Turn the ignition switch ON and engine stop switch "○".
Measure the voltage between the wire harness side EPS ECU 21P (Gray) connector terminal and ground.

Connection: C7 (+) – Ground (–)



TOOL:

Test probe	**07ZAJ-RDJA110**

Is there battery voltage?

YES – GO TO STEP 2.

NO – Open circuit in the Black/red wire.

2. Battery Inspection

Perform the Battery/Charging System troubleshooting (page 21-6).

Is the battery and charging system in good condition?

YES – Replace the EPS ECU with a known good one (page 24-35), and recheck.

NO – Repair the battery/charging system (page 21-8).

DTC 31-02: LOW/HIGH IG1-TERMINAL VOLTAGE (REGULAR DIAGNOSIS)

Refer to DTC 31-01 (page 24-30)

DTC 32-01: LOW/HIGH VBU VOLTAGE (REGULAR DIAGNOSIS)

NOTE:

Before starting the troubleshooting, check the following items:

- check for loose or poor contact on the EPS ECU 2P (Brown) connector, and recheck the EPS indicator (page 24-18).
- check for blown EPS fuse (40A) and IGN fuse (10A)
- battery condition (must use a fully charged battery) (page 21-8)

1. EPS ECU +B Line Open Circuit Inspection

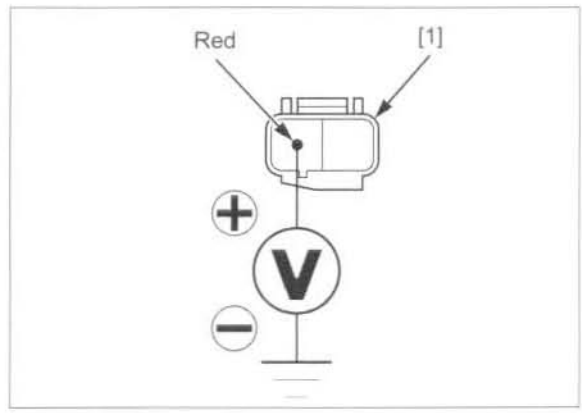
Turn the ignition switch OFF.
Disconnect the EPS ECU 2P (Brown) connector [1].
Turn the ignition switch ON and engine stop switch "○".
Measure the voltage between the wire harness side EPS ECU 2P (Brown) connector terminal and ground.

Connection: Red (+) – Ground (–)

Is there battery voltage?

YES – GO TO STEP 2.

NO – Open circuit in the Red wire.



2. Battery Inspection

Perform the Battery/Charging System troubleshooting (page 21-6).

Is the battery and charging system in good condition?

YES – Replace the EPS ECU with a known good one (page 24-35), and recheck.

NO – Repair the battery/charging system (page 21-8).

EPS INDICATOR CIRCUIT INSPECTION

- Refer to "EPS Connector Location" for the connector location and the necessary parts to disconnect the connector (page 24-5).

EPS INDICATOR DOES NOT COME ON

NOTE:

- Under normal conditions, the EPS indicator comes on when the ignition switch is turned ON, then goes off after starting the engine.
- Before starting the troubleshooting, check for loose or poor contact on the combination meter 21P (Black) connector and EPS ECU 21P (Gray) connector, and recheck the EPS indicator.

1. **Combination Meter Inspection**

   Check that the combination meter functions properly.

   Does the combination function properly?

   YES – GO TO STEP 2.

   NO – Perform the combination meter inspection (page 22-7).

2. **Indicator Operation Check (Short Circuit inspection)**

   Turn the ignition switch OFF.
   Disconnect the EPS ECU 21P (Gray) connector.
   Turn the ignition switch ON and engine stop switch "○".
   Check the EPS indicator.

   Does the indicator come on?

   YES – Recheck for loose or poor contact on the combination meter 21P (Black) connector and EPS ECU 21P (Gray) connector. If they are OK, replace the EPS ECU with a known good one (page 24-35), and recheck.

   NO – GO TO STEP 3.

3. **Indicator Line Short Circuit inspection**

   Turn the ignition switch OFF.
   Disconnect the combination meter 21P (Black) connector [1].
   Check the for continuity between the wire harness side combination meter 21P (Black) connector terminal and ground.

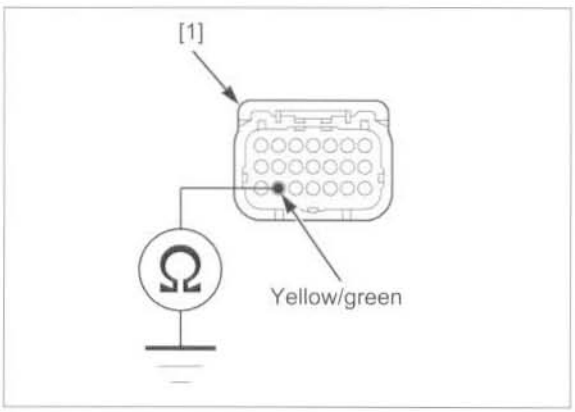
   Connection: Yellow/green – Ground

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

   Is there continuity?

   YES – Short circuit in the Yellow/green wire.

   NO – Recheck for loose or poor contact on the combination meter 21P (Black) connector and EPS ECU 21P (Gray) connector. If they are OK, replace the combination meter with a known good one (page 22-6).



EPS INDICATOR DOES NOT GO OFF, AND NO DTCs ARE STORED

NOTE:

- Under normal conditions, the EPS indicator comes on when the ignition switch is turned ON, then goes off after starting the engine.
- Before starting the troubleshooting check the following items:
  - check for loose or poor contact of the following connectors, and recheck the EPS indicator.
    - EPS ECU 21P (Gray)
    - EPS ECU 2P (Brown)
    - combination meter 21P (Black)
  - check for blown EPS fuse (40A) and IGN fuse (10A)
  - battery condition (must use a fully charged battery) (page 21-8)

1. **Fuse Inspection**

   Check the EPS fuse (40A) and IGN fuse (10A).

   Is the fuse OK?

   YES – GO TO STEP 2.

   NO – Replace the fuse and recheck. If the fuse is blown, check for short to ground in this fuse circuit.

2. **Recheck DTC**

   Check the DTC (page 24-10).

   Are there any DTCs?

   YES – Perform the troubleshooting for the indicated DTC (page 24-16).

   NO – GO TO STEP 3.

3. **Indicator Operation Check (Open Circuit Inspection)**

   Turn the ignition switch OFF.
   Disconnect the EPS ECU 21P (Gray) connector [1].
   Ground the wire harness side EPS ECU 21P (Gray) connector terminal with a jumper wire.

   Connection: C5 – Ground

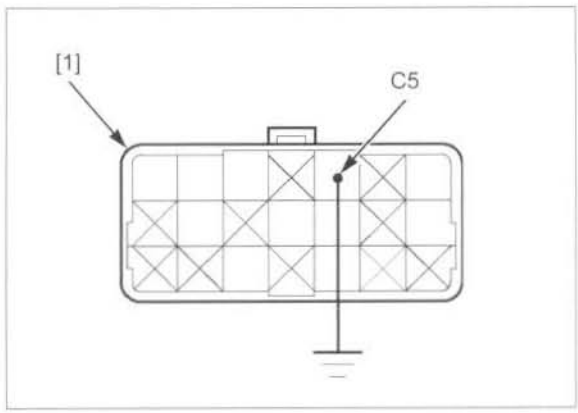
   TOOL:
   Test probe **07ZAJ-RDJA110**

   Turn the ignition switch ON and engine stop switch "○".
   Check the EPS indicator.

   Does the indicator go off?

   YES – Recheck for loose or poor contact on the EPS ECU 21P (Gray) connector. If they are OK, replace the EPS ECU with a known good one (page 24-35), and recheck.

   NO – GO TO STEP 4.



4. **Indicator Line Open Circuit Inspection**

Turn the ignition switch OFF.
Disconnect the combination meter 21P (Black) connector [1].
Check for continuity between the wire harness side combination meter 21P (Black) connector and EPS ECU 21P (Gray) connector [2] terminals.

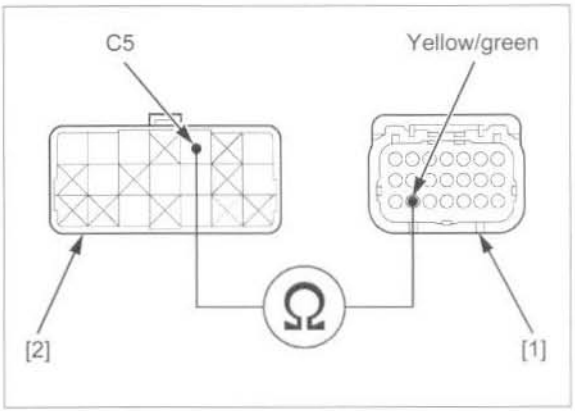
Connection: C5 – Yellow/green

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

Is there continuity?

YES – GO TO STEP 5.

NO – Open circuit in the Yellow/green wire.



5. **SCS Line Short Circuit Inspection**

Disconnect the PCM/ECM 33P (Gray) connector.
Check for continuity between the wire harness side EPS ECU 21P (Gray) connector [1] terminal and ground.

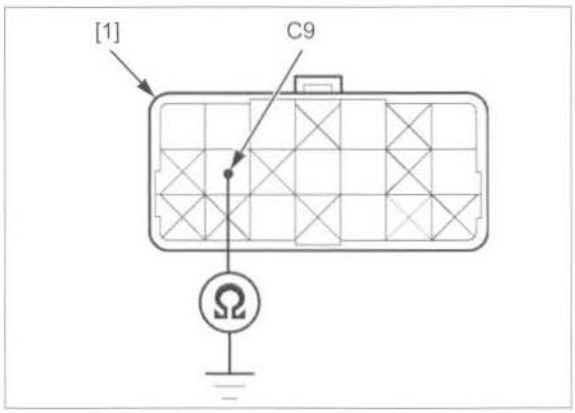
Connection: C9 – Ground

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

Is there continuity?

YES – Short circuit in the Brown/red wire between the EPS ECU and DLC.

NO – GO TO STEP 6.



6. **IG1 Line Open Circuit Inspection**

Turn the ignition switch ON and engine stop switch "○".
Measure the voltage between the wire harness side EPS ECU 21P (Gray) connector [1] terminal and ground.

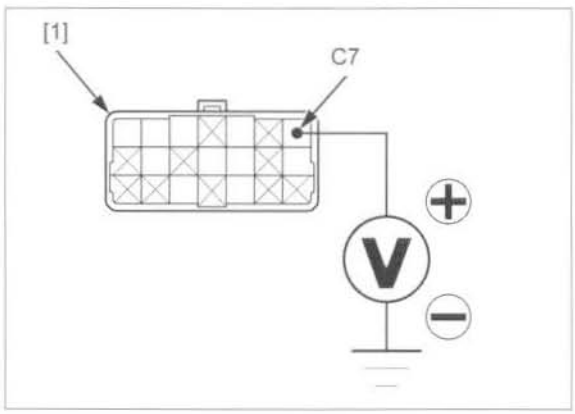
Connection: C7 – Ground (–)

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

Is there battery voltage?

YES – GO TO STEP 7.

NO – Open circuit in the Black/red wire.



7. **EPS ECU +B Line Open Circuit Inspection**

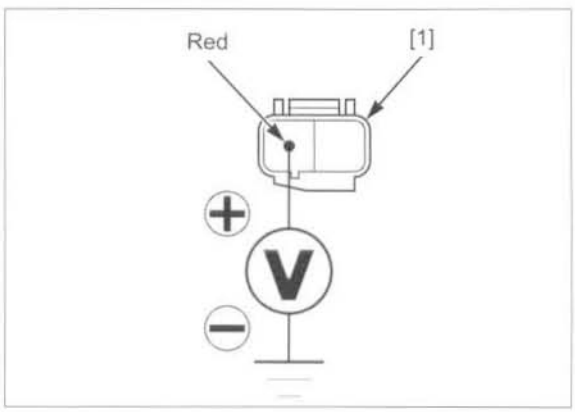
Turn the ignition switch OFF.
Disconnect the EPS ECU 2P (Brown) connector [1].
Measure the voltage between the wire harness side EPS ECU 2P (Brown) connector terminal and ground.

Connection: Red (+) – Ground (–)

Is there battery voltage?

YES – GO TO STEP 8.

NO – Open circuit in the Red wire.



8. **EPS ECU PG Line Open Circuit Inspection**

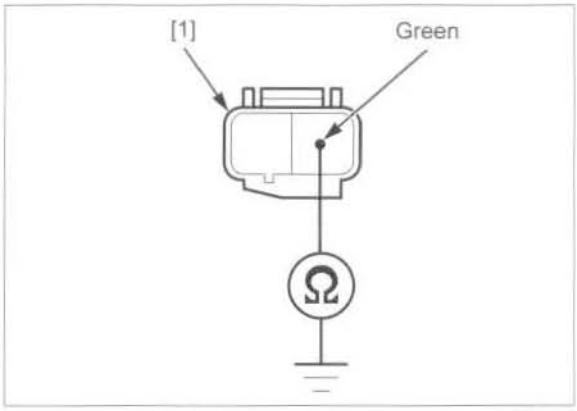
Check for continuity between the wire harness side EPS ECU 2P (Brown) connector [1] terminal and ground.

Connection: Green – Ground

Is there continuity?

YES – GO TO STEP 9.

NO – Open circuit in the Green wire.



9. **Battery Inspection**

Perform the Battery/Charging System troubleshooting (page 21-6).

Is the battery and charging system in good condition?

YES – Recheck for loose or poor contact on the combination meter 21P (Black) connector, EPS ECU 21P (Gray) connector and EPS ECU 2P (Brown). If they are OK, replace the EPS ECU with a known good one (page 24-35), and recheck.

NO – Repair the battery/charging system (page 21-8).

EPS ECU

REMOVAL/INSTALLATION

Remove the right mudguard (page 2-6).

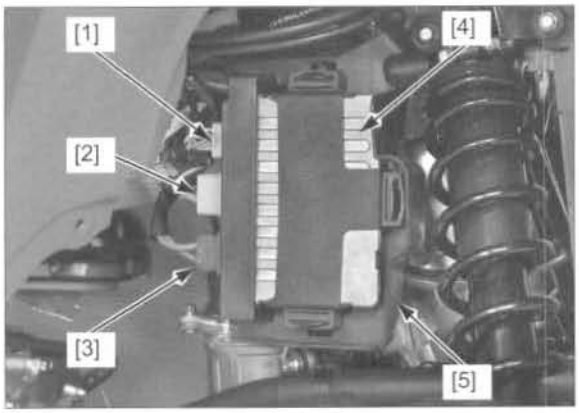
Disconnect the following connectors:

- EPS ECU 21P (Gray) [1]
- EPS ECU 2P (Gray) [2]
- EPS ECU 2P (Brown) [3]

Remove the EPS ECU [4] from the stays on the ECU holder [5].

Installation is in the reverse order of removal.

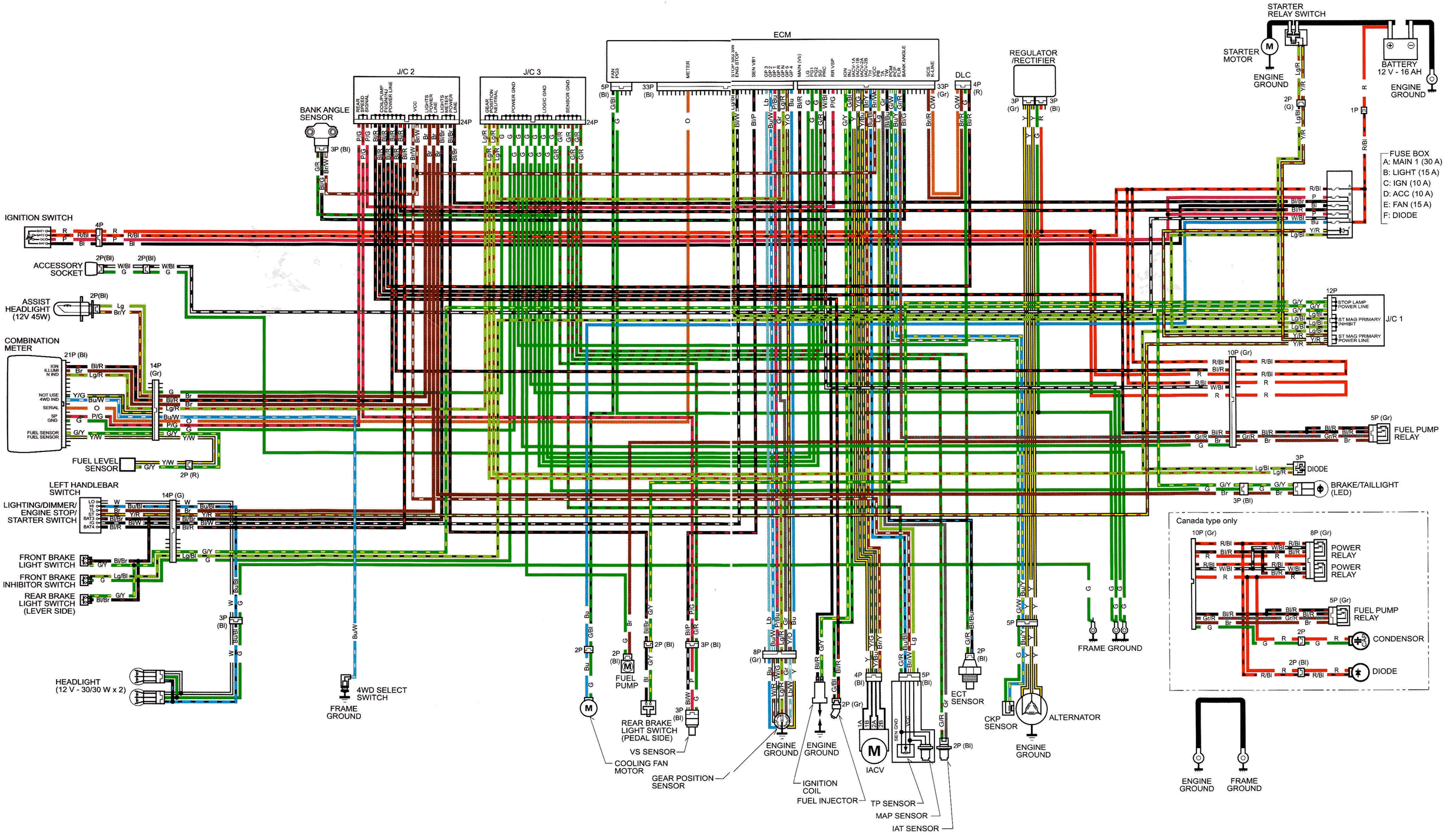
Perform the torque sensor initialization if the EPS ECU replaced (page 24-13).



MEMO

25. WIRING DIAGRAMS

FM model



SWITCH CONTINUITY

IGNITION SWITCH

	BAT2	DC	BAT1	BAT
ON	○		○	○
OFF				
COLOR	R/Bl	P	R	Bl

LIGHTING SWITCH

	BAT3	TL	(HL)
ON	○		○
OFF			
COLOR	Bl/Br	Br	

DIMMER SWITCH

	(HL)	LO	HI
LO	○		
(N)	○		○
HI			○
COLOR		W	Bu/Bl

ENGINE STOP SWITCH

	BAT4	IG
OFF		
RUN	○	
OFF		
COLOR	Bl/R	Bl/W

STARTER SWITCH

	IG	ST
FREE		
PUSH		○
COLOR	Bl/W	Y/R

REAR BRAKE LIGHT SWITCH (LEVER SIDE)

	12V	STOP LAMP
FREE	○	○
PUSH		
COLOR	Bl/Br	G/Y

FRONT BRAKE LIGHT SWITCH

	12V	STOP LAMP
FREE	○	○
PUSH		
COLOR	Bl/Br	G/Y

FRONT BRAKE INHIBITOR SWITCH

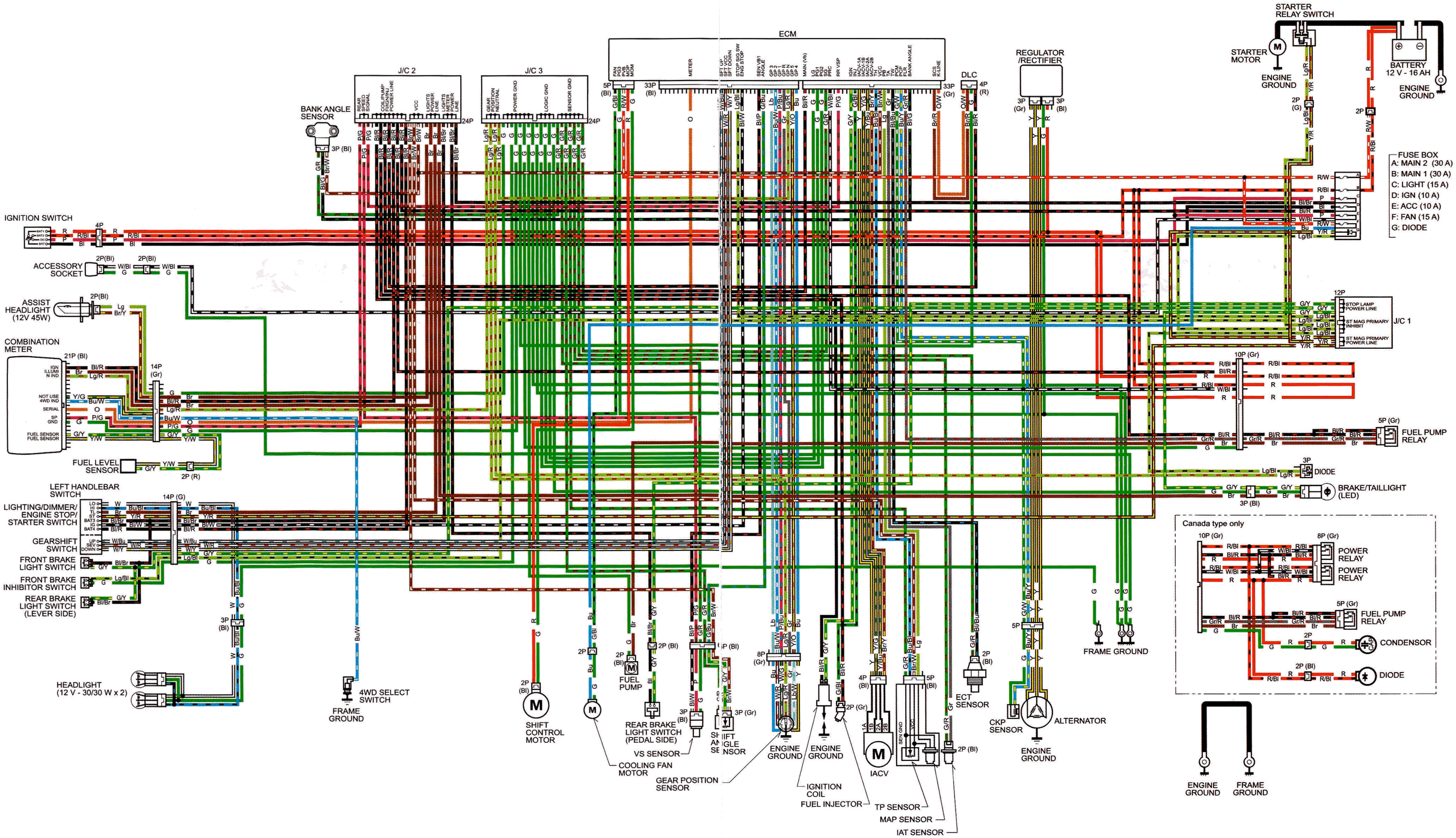
	12V	STOP SIG SW
FREE	○	○
PUSH		
COLOR	Lg/Bl	G

REAR BRAKE LIGHT SWITCH (PEDAL SIDE)

	12V	STOP LAMP
FREE		
PULL	○	○
COLOR	Bl	G/Y

Bl	BLACK	Br	BROWN
Y	YELLOW	O	ORANGE
Bu	BLUE	Lb	LIGHT BLUE
G	GREEN	Lg	LIGHT GREEN
R	RED	P	PINK
W	WHITE	Gr	GRAY

FE model



SWITCH CONTINUITY

IGNITION SWITCH

	BAT2	DC	BAT1	BAT
ON	○	○	○	
OFF				
COLOR	R/Bl	P	R	Bl

LIGHTING SWITCH

	BAT3	TL	(HL)
ON	○	○	
OFF			
COLOR	Bl/Br	Br	

DIMMER SWITCH

	(HL)	LO	HI
LO		○	
(N)	○	○	
HI		○	○
COLOR		W	Bu/Bl

ENGINE STOP SWITCH

	BAT4	IG
OFF		
RUN	○	○
OFF		
COLOR	Bl/R	Bl/W

STARTER SWITCH

	IG	ST
FREE		
PUSH	○	○
COLOR	Bl/W	Y/R

GEARSHIFT SWITCH

	UP	SEV	DOWN	SEV
UP	○	○		
FREE				
DOWN			○	○
COLOR	W/Bu	W/R	W/Y	W/R

REAR BRAKE LIGHT SWITCH (LEVER SIDE)

	12V	STOP LAMP
FREE	○	○
PUSH		
COLOR	Bl/Br	G/Y

FRONT BRAKE LIGHT SWITCH

	12V	STOP LAMP
FREE	○	○
PUSH		
COLOR	Bl/Br	G/Y

FRONT BRAKE INHIBITOR SWITCH

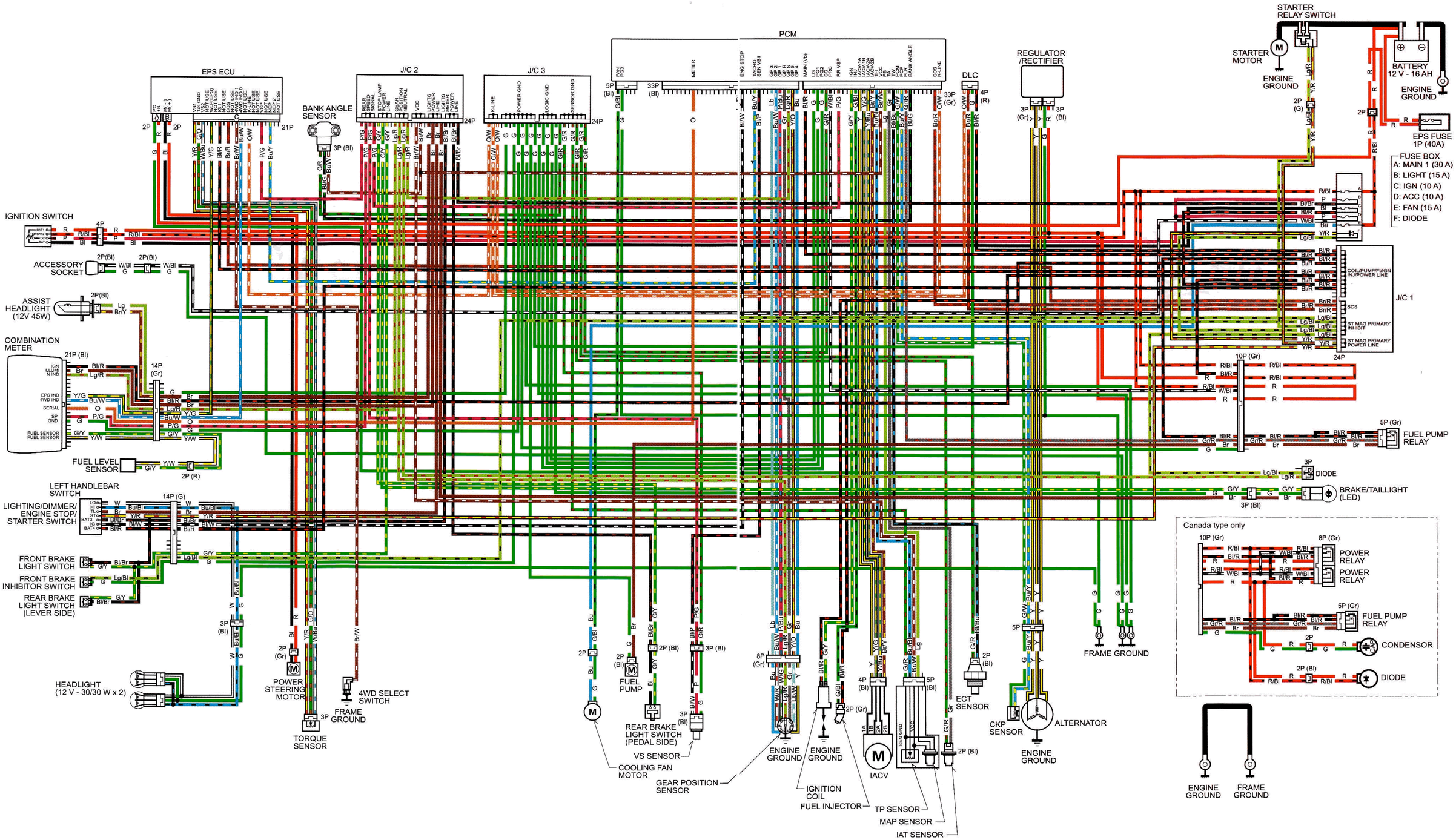
	12V	STOP SIG SW
FREE	○	○
PUSH		
COLOR	Lg/Bl	G

REAR BRAKE LIGHT SWITCH (PEDAL SIDE)

	12V	STOP LAMP
FREE		
PULL	○	○
COLOR	Bl	G/Y

Bl	BLACK	Br	BROWN
Y	YELLOW	O	ORANGE
Bu	BLUE	Lb	LIGHT BLUE
G	GREEN	Lg	LIGHT GREEN
R	RED	P	PINK
W	WHITE	Gr	GRAY

FPM model



SWITCH CONTINUITY

IGNITION SWITCH

	BAT2	DC	BAT1	BAT
ON	○		○	○
OFF				
COLOR	R/Bl	P	R	Bl

LIGHTING SWITCH

	BAT3	TL	(HL)
ON	○		○
OFF			
COLOR	Bl/Br	Br	

DIMMER SWITCH

	(HL)	LO	HI
LO	○		
(N)	○	○	
HI		○	○
COLOR		W	Bu/Bl

ENGINE STOP SWITCH

	BAT4	IG
OFF		
RUN	○	○
OFF		
COLOR	Bl/R	Bl/W

STARTER SWITCH

	IG	ST
FREE		
PUSH	○	○
COLOR	Bl/W	Y/R

REAR BRAKE LIGHT SWITCH (LEVER SIDE)

	12V	STOP LAMP
FREE	○	
PUSH		
COLOR	Bl/Br	G/Y

FRONT BRAKE LIGHT SWITCH

	12V	STOP LAMP
FREE	○	
PUSH		
COLOR	Bl/Br	G/Y

FRONT BRAKE INHIBITOR SWITCH

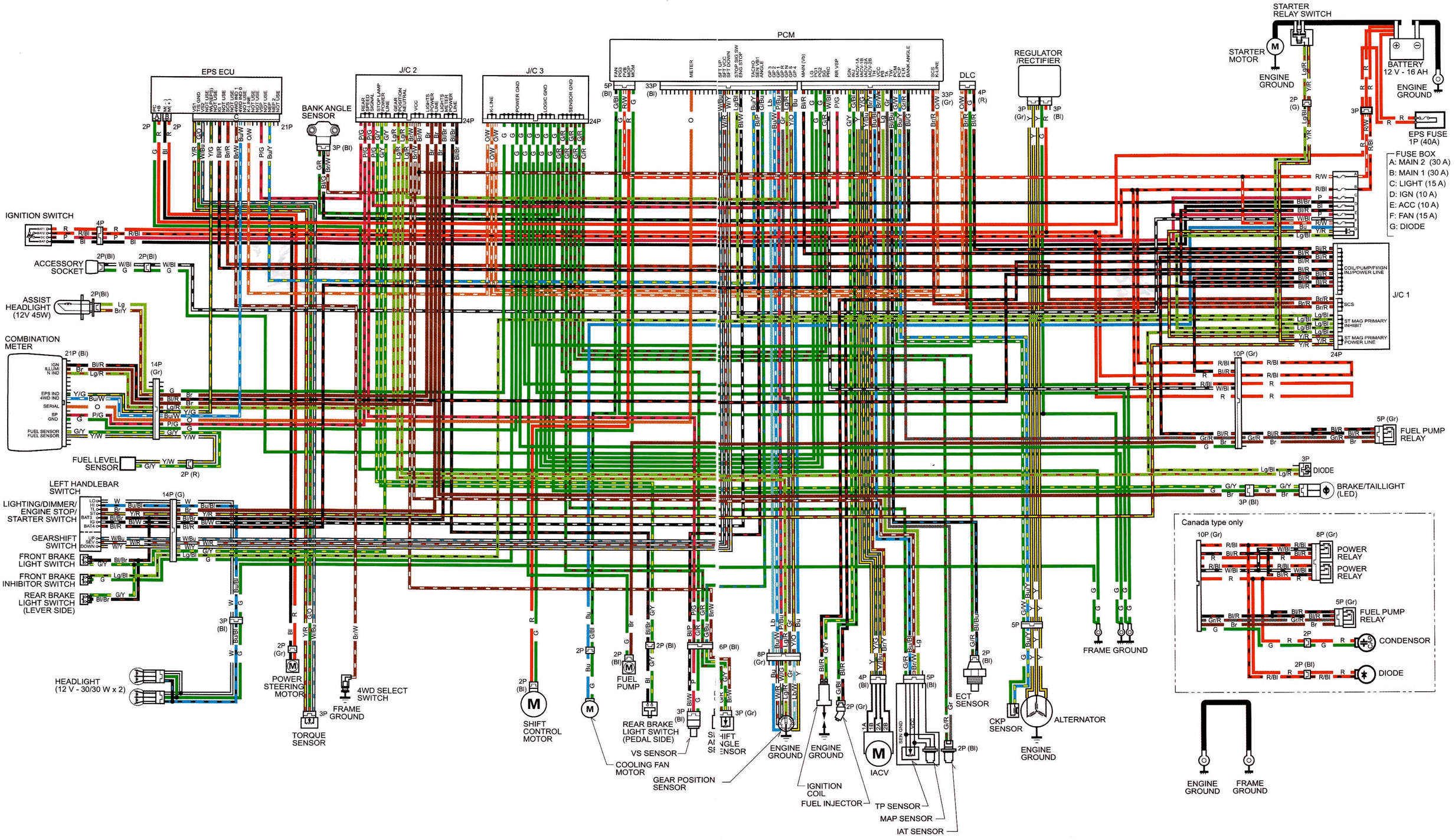
	12V	STOP LAMP SW
FREE	○	
PUSH		
COLOR	Lg/Bl	G

REAR BRAKE LIGHT SWITCH (PEDAL SIDE)

	12V	STOP LAMP
FREE	○	
PULL		○
COLOR	Bl	G/Y

Bl	BLACK	Br	BROWN
Y	YELLOW	O	ORANGE
Bu	BLUE	Lb	LIGHT BLUE
G	GREEN	Lg	LIGHT GREEN
R	RED	P	PINK
W	WHITE	Gr	GRAY

FPE model



SWITCH CONTINUITY

IGNITION SWITCH

	BAT2	DC	BAT1	BAT
ON	○		○	
OFF				
COLOR	R/Bl	P	R	Bl

LIGHTING SWITCH

	BAT3	TL	(HL)
ON	○	○	○
OFF			
COLOR	Bl/Br	Br	

DIMMER SWITCH

	(HL)	LO	HI
LO	○		
(N)	○		○
HI	○		
COLOR		W	Bu/Bl

ENGINE STOP SWITCH

	BAT4	IG
OFF		
RUN	○	
OFF		
COLOR	Bl/R	Bl/W

STARTER SWITCH

	IG	ST
FREE		
PUSH	○	○
COLOR	Bl/W	Y/R

GEARSHIFT SWITCH

	UP	SEV	DOWN	SEV
UP	○			
FREE				
DOWN			○	
COLOR	W/Bu	W/R	W/Y	W/R

REAR BRAKE LIGHT SWITCH (LEVER SIDE)

	12V	STOP LAMP
FREE		
PUSH	○	○
COLOR	Bl/Br	G/Y

FRONT BRAKE LIGHT SWITCH

	12V	STOP LAMP
FREE		
PUSH	○	○
COLOR	Bl/Br	G/Y

FRONT BRAKE INHIBITOR SWITCH

	12V	STOP SIG SW
FREE		
PUSH	○	○
COLOR	Lg/Bl	G

REAR BRAKE LIGHT SWITCH (PEDAL SIDE)

	12V	STOP LAMP
FREE		
PULL	○	○
COLOR	Bl	G/Y

Bl	BLACK	Br	BROWN
Y	YELLOW	O	ORANGE
Bu	BLUE	Lb	LIGHT BLUE
G	GREEN	Lg	LIGHT GREEN
R	RED	P	PINK
W	WHITE	Gr	GRAY

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