SERVICE MANUAL

2022 - 2024
PIONEER 1000

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 SXS1000M3P/M3D/M5P/M5D.

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 25 describe parts of the vehicle, grouped according to location.
If you are not familiar with this vehicle, read Technical Features in Section 1.

Follow the Maintenance Schedule (Section 3) 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, 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 judgment.
You will find important safety information in a variety of forms including:

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

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

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

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

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

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

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

© Honda Motor Co., Ltd.
SERVICE PUBLICATION OFFICE

Date of Issue: December, 2022

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 recommend 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.
	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. • Pro Honda M-77 assembly paste (Moly) (U.S.A. only) • Rocol ASP manufactured by Rocol Limited, U.K. • Moly Paste 500 manufactured by Sumico Lubricant, Japan
	Use silicone grease.
	Apply a locking agent. Use a medium strength locking agent unless otherwise specified.
	Apply sealant.
	Use only Honda DOT 4 brake fluid. Use the recommended brake fluid unless otherwise specified.
	Use fork or suspension fluid.

CONTENTS

	GENERAL INFORMATION	1
	FRAME/BODY PANELS/EXHAUST SYSTEM	2
	MAINTENANCE	3
ENGINE/DRIVE TRAIN ELECTRICAL	PGM-FI SYSTEM	4
	IGNITION SYSTEM	5
	ELECTRIC STARTER	6
	FUEL SYSTEM	7
	LUBRICATION SYSTEM	8
	COOLING SYSTEM	9
	CYLINDER HEAD/VALVE/CAMSHAFT	10
	DUAL CLUTCH TRANSMISSION (DCT)	11
	SUB-TRANSMISSION	12
	ALTERNATOR/STARTER CLUTCH	13
	CRANKCASE/TRANSMISSION/BALANCER	14
	CRANKSHAFT/PISTON/CYLINDER	15
	ENGINE REMOVAL/INSTALLATION	16
CHASSIS	STEERING SYSTEM	17
	FRONT DRIVING MECHANISM	18
	REAR DRIVING MECHANISM	19
	WHEEL/SUSPENSION	20
	BRAKE SYSTEM	21
FRAME ELECTRICAL	BATTERY/CHARGING SYSTEM	22
	LIGHTS/METERS/SWITCHES	23
	ELECTRIC POWER STEERING (EPS)	24
	I-4WD (Intelligent 4 Wheel Drive)	25
	WIRING DIAGRAM	26
	INDEX	

MEMO

1. GENERAL INFORMATION

1

SERVICE RULES 1-2

MODEL IDENTIFICATION 1-3

SPECIFICATIONS 1-7

TORQUE VALUES 1-15

LUBRICATION & SEAL POINTS 1-23

SPECIAL TOOL LIST 1-26

CABLE & HARNESS ROUTING 1-29

EMISSION CONTROL SYSTEMS 1-53

LIFT AND SUPPORT POINTS 1-55

SERVICE RULES

1. Use Honda Genuine or Honda-recommended parts and lubricants or their equivalents. Parts that do not meet Honda's design specifications may cause damage to the vehicle.
2. Use the special tools designed for this product to avoid damage and incorrect assembly.
3. Use only metric tools when servicing the vehicle. Metric bolts, nuts and screws are not interchangeable with English fasteners.
4. Install new gaskets, O-rings, cotter pins, and lock plates when reassembling.
5. When tightening bolts or nuts, begin with the larger diameter or inner bolt first. Then tighten to the specified torque diagonally in incremental steps unless a particular sequence is specified.
6. Clean parts in cleaning solvent upon disassembly. Lubricate any sliding surfaces before reassembly.
7. After reassembly, check all parts for proper installation and operation.
8. Route all electrical wires as show in the Cable and Harness Routing (page 1-29).
9. Do not bend or twist control cables. Damaged control cables will not operate smoothly and may stick or bind.
10. Do not tow your SxS behind a car or other vehicle.

ABBREVIATION

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

Abbrev. term	Full term
A/T	Automatic Transmission
CKP sensor	Crankshaft Position sensor
Clutch PC solenoid	Clutch Pressure Control solenoid
DCT	Dual Clutch Transmission
DLC	Data Link Connector
DTC	Diagnostic Trouble Code
EBD	Electronic Brake Force Distribution
ECT sensor	Engine Coolant Temperature sensor
ECU	Electric Control Unit
EEPROM	Electrically Erasable Programmable Read Only Memory
ELR	Emergency Locking Retractor
EPS	Electric Power Steering
EOT sensor	Engine Oil Temperature sensor
EVAP	Evaporative Emission
HSA	Hill Start Assist
IACV	Idle Air Control Valve
IAT sensor	Intake Air Temperature sensor
MAP sensor	Manifold Absolute Pressure sensor
MCS	Motorcycle Communication System
MIL	Malfunction Indicator Lamp
O_2 sensor	Oxygen sensor
OPS	Occupant Protective Structure
PCM (ECM/TCM)	Powertrain Control Module (Engine Control Module/Transmission Control Module)
PGM-FI	Programmed Fuel Injection
SCS connector	Service Check Short connector
TP sensor	Throttle Position sensor
TR sensor	Transmission Range Sensor
VS sensor	Vehicle Speed sensor
I-4WD	Intelligent 4 Wheel Drive
2WD, 4WD	2 Wheel Drive, 4 Wheel Drive

MODEL IDENTIFICATION

'22 model 5 person type shown:



TYPE CODE

This manual covers following types of SXS1000M:

'22 models

Seating capacity	Model	Type code	Equipment	Destination
5 persons	M5P	A	EPS, paddle shifters, transmission mode switch, 4WD differential lock	U.S.A. (49 states except California), Australia, New Zealand
	M5D	A	EPS, paddle shifters, transmission mode switch, 4WD differential lock, aluminum wheels	
		VI A	EPS, paddle shifters, transmission mode switch, HSA switch, rearview mirror, aluminum wheels, I-4WD	
		*VII A	EPS, paddle shifters, transmission mode switch, HSA switch, aluminum wheels, I-4WD	
3 persons	M3P	A	EPS, paddle shifters, transmission mode switch, 4WD differential lock	
	M3D	A	EPS, paddle shifters, transmission mode switch, 4WD differential lock, aluminum wheels	
		VI A	EPS, paddle shifters, transmission mode switch, HSA switch, rearview mirror, aluminum wheels, I-4WD	
		*VII A	EPS, paddle shifters, transmission mode switch, HSA switch, aluminum wheels, I-4WD	
5 persons	M5P	AC	EPS, paddle shifters, transmission mode switch, 4WD differential lock, EVAP	U.S.A. (50 states including California)
	M5D	AC	EPS, paddle shifters, transmission mode switch, 4WD differential lock, aluminum wheels, EVAP	
		VI AC	EPS, paddle shifters, transmission mode switch, HSA switch, rearview mirror, aluminum wheels, I-4WD, EVAP	
		*VII AC	EPS, paddle shifters, transmission mode switch, HSA switch, aluminum wheels, I-4WD, EVAP	
3 persons	M3P	AC	EPS, paddle shifters, transmission mode switch, 4WD differential lock, EVAP	
	M3D	AC	EPS, paddle shifters, transmission mode switch, 4WD differential lock, aluminum wheels, EVAP	
		VI AC	EPS, paddle shifters, transmission mode switch, HSA switch, rearview mirror, aluminum wheels, I-4WD, EVAP	
		*VII AC	EPS, paddle shifters, transmission mode switch, HSA switch, aluminum wheels, I-4WD, EVAP	
5 persons	M5D	CM	EPS, paddle shifters, transmission mode switch, 4WD differential lock, aluminum wheels	Canada
		VI CM	EPS, paddle shifters, transmission mode switch, HSA switch, rearview mirror, aluminum wheels, I-4WD	
		*VII CM	EPS, paddle shifters, transmission mode switch, HSA switch, aluminum wheels, I-4WD	
3 persons	M3P	CM	EPS, paddle shifters, transmission mode switch, 4WD differential lock	

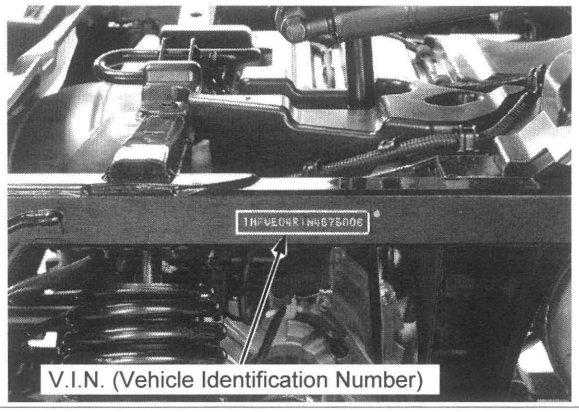
- *: Honda Phantom Camo®
- EPS: Electric Power Steering
- EVAP: Evaporative Emission
- HSA: Hill Start Assist
- I-4WD: Intelligent 4 Wheel Drive
- Be sure to refer to the appropriate procedure for the version of the SXS1000M.

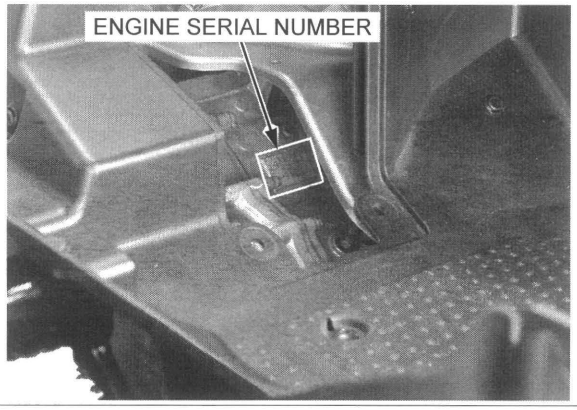
After '22 models

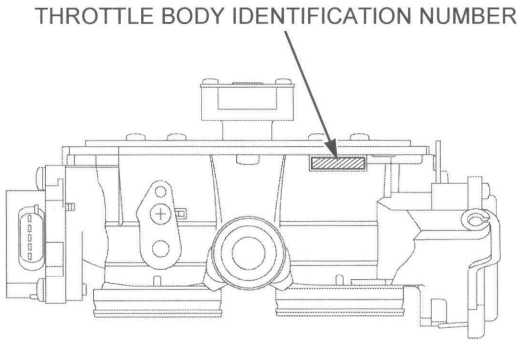
Seating capacity	Model	Type code	Equipment	Destination
5 persons	M5P	A III A	EPS, paddle shifters, transmission mode switch, 4WD differential lock	U.S.A. (49 states except California), Australia, New Zealand
	M5D	A III A	EPS, paddle shifters, transmission mode switch, 4WD differential lock, aluminum wheels	
		IV A VI A	EPS, paddle shifters, transmission mode switch, HSA switch, rearview mirror, aluminum wheels, I-4WD	
		*VII A *IX A	EPS, paddle shifters, transmission mode switch, HSA switch, aluminum wheels, I-4WD	
3 persons	M3P	A III A	EPS, paddle shifters, transmission mode switch, 4WD differential lock	
	M3D	A III A	EPS, paddle shifters, transmission mode switch, 4WD differential lock, aluminum wheels	
		IV A VI A	EPS, paddle shifters, transmission mode switch, HSA switch, rearview mirror, aluminum wheels, I-4WD	
		*VII A *IX A	EPS, paddle shifters, transmission mode switch, HSA switch, aluminum wheels, I-4WD	
5 persons	M5P	AC III AC	EPS, paddle shifters, transmission mode switch, 4WD differential lock, EVAP	U.S.A. (50 states including California)
	M5D	AC III AC	EPS, paddle shifters, transmission mode switch, 4WD differential lock, aluminum wheels, EVAP	
		IV AC VI AC	EPS, paddle shifters, transmission mode switch, HSA switch, rearview mirror, aluminum wheels, I-4WD, EVAP	
		*VII AC *IX AC	EPS, paddle shifters, transmission mode switch, HSA switch, aluminum wheels, I-4WD, EVAP	
3 persons	M3P	AC III AC	EPS, paddle shifters, transmission mode switch, 4WD differential lock, EVAP	
	M3D	AC III AC	EPS, paddle shifters, transmission mode switch, 4WD differential lock, aluminum wheels, EVAP	
		IV AC VI AC	EPS, paddle shifters, transmission mode switch, HSA switch, rearview mirror, aluminum wheels, I-4WD, EVAP	
		*VII AC *IX AC	EPS, paddle shifters, transmission mode switch, HSA switch, aluminum wheels, I-4WD, EVAP	
5 persons	M5D	CM	EPS, paddle shifters, transmission mode switch, 4WD differential lock, aluminum wheels	Canada
		VI CM	EPS, paddle shifters, transmission mode switch, HSA switch, rearview mirror, aluminum wheels, I-4WD	
		*VII CM	EPS, paddle shifters, transmission mode switch, HSA switch, aluminum wheels, I-4WD	
3 persons	M3P	CM	EPS, paddle shifters, transmission mode switch, 4WD differential lock	

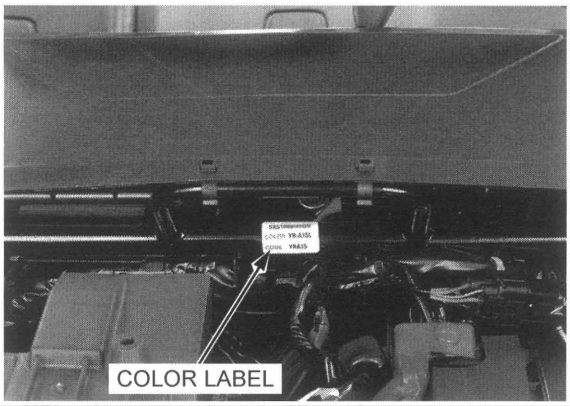
- *: Honda Phantom Camo®
- EPS: Electric Power Steering
- EVAP: Evaporative Emission
- HSA: Hill Start Assist
- I-4WD: Intelligent 4 Wheel Drive
- Be sure to refer to the appropriate procedure for the version of the SXS1000M.

SERIAL NUMBERS/LABELS

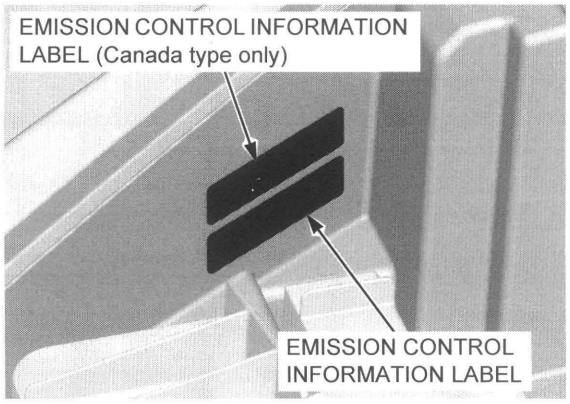












SPECIFICATIONS

GENERAL SPECIFICATIONS

ITEM				SPECIFICATIONS
DIMENSIONS	Overall length	M5P/ M5D	A, AC, III A, III AC	2,970 mm (116.9 in)
		M5D	IV A, IV AC, VI A, VI AC, VII A, VII AC, IX A, IX AC	3,028 mm (119.2 in)
			CM	3,037 mm (119.6 in)
			VI CM, VII CM	3,095 mm (121.9 in)
		M3P/ M3D	A, AC, IIIA, III AC	2,975 mm (117.1 in)
		M3P	CM	3,043 mm (119.8 in)
		M3D	IV A, IV AC, VI A, VI AC, VII A, VII AC, IX A, IX AC	3,059 mm (120.4 in)
	Overall width			1,599 mm (63.0 in)
	Overall height	M5P/M5D		1,940 mm (76.4 in)
		M3P/M3D		1,932 mm (76.1 in)
	Wheelbase			2,038 mm (80.2 in)
	Front tread			1,354 mm (53.3 in)
	Rear tread			1,306 mm (51.4 in)
	Seat height	M5P		870 mm (34.3 in)
		M5D	A, AC, CM, III A, III AC	858 mm (33.8 in)
			IV A, IV AC, VI A, VI AC, VI CM	841 mm (33.1 in)
			VII A, VII AC, VII CM, IX A, IX AC	853 mm (33.6 in)
		M3P		876 mm (34.5 in)
		M3D	A, AC, III A, III AC	876 mm (34.5 in)
			IV A, IV AC, VI A, VI AC	853 mm (33.6 in)
			VII A, VII AC, IX A, IX AC	869 mm (34.2 in)
	Floor height	M5P		437 mm (17.2 in)
		M5D	A, AC, CM, III A, III AC	431 mm (17.0 in)
			IV A, IV AC, VI A, VI AC, VI CM	406 mm (16.0 in)
			VII A, VII AC, VII CM, IX A, IX AC	423 mm (16.7 in)
		M3P		439 mm (17.3 in)
		M3D	A, AC, III A, III AC	439 mm (17.3 in)
			IV A, IV AC, VI A, VI AC	419 mm (16.5 in)
			VII A, VII AC, IX A, IX AC	430 mm (16.9 in)
	Ground clearance	M5P	A, AC, III A, III AC	335 mm (13.2 in)
		M5D	A, AC, CM, III A, III AC	312 mm (12.3 in)
			IV A, IV AC, VI A, VI AC, VI CM, VII A, VII AC, VII CM, IX A, IX AC	313 mm (12.3 in)
		M3P		345 mm (13.6 in)
		M3D	A, AC, III A, III AC	345 mm (13.6 in)
			IV A, IV AC, VI A, VI AC	325 mm (12.8 in)
			VII A, VII AC, IX A, IX AC	335 mm (13.2 in)

ITEM				SPECIFICATIONS
DIMENSIONS	Curb weight	M5P	A, III A	780 kg (1,720 lbs)
			AC, III AC	782 kg (1,724 lbs)
		M5D	A, III A	784 kg (1,728 lbs)
			AC, III AC	785 kg (1,731 lbs)
			CM	790 kg (1,742 lbs)
			IV A, VI A	806 kg (1,777 lbs)
			IV AC, VI AC	808 kg (1,781 lbs)
			VI CM	812 kg (1,790 lbs)
			VII A, IX A	813 kg (1,792 lbs)
			VII AC, IX AC	815 kg (1,797 lbs)
			VII CM	819 kg (1,806 lbs)
		M3P	A, III A	723 kg (1,594 lbs)
			AC, III AC	725 kg (1,598 lbs)
			CM	730 kg (1,609 lbs)
		M3D	A, III A	725 kg (1,598 lbs)
			AC, III AC	727 kg (1,603 lbs)
			IV A, VI A	750 kg (1,653 lbs)
			IV AC, VI AC	752 kg (1,658 lbs)
			VII A, IX A	760 kg (1,675 lbs)
			VII AC, IX AC	762 kg (1,680 lbs)
	Maximum weight capacity	Except AC, III AC, IV AC, VI AC, VII AC, IX AC		748 kg (1,649 lbs)
		AC, III AC, IV AC, VI AC, VII AC, IX AC		566 kg (1,248 lbs)
FRAME	Frame type			Semi-ladder space
	Front suspension			Double wishbone
	Front wheel travel			268 mm (10.6 in)
	Front damper	M5P		Monotube
		M5D	Except IV A, IV AC, VI A, VI AC, VI CM	Double tube
			IV A, IV AC, VI A, VI AC, VI CM	Mono tube
		M3P		Double tube
		M3D	Except IV A, IV AC, VI A, VI AC	Double tube
			IV A, IV AC, VI A, VI AC	Mono tube
	Rear suspension			Double wishbone
	Rear wheel travel			254 mm (10.0 in)
	Rear damper	M5P		Double tube
		M5D	Except IV A, IV AC, VI A, VI AC, VI CM	Double tube
			IV A, IV AC, VI A, VI AC, VI CM	Mono tube
		M3P		Double tube
		M3D	Except IV A, IV AC, VI A, VI AC	Double tube
			IV A, IV AC, VI A, VI AC	Mono tube
	Front tire size			27 x 9.00R14NHS 6PR
	Rear tire size			27 x 11.00R14NHS 6PR
	Front rim size			14 x 6.5 AT
	Rear rim size			14 x 8.0 AT
	Front tire brand		OTR	OTR DIRT MASTER
	Rear tire brand		OTR	OTR DIRT MASTER
	Front brake			Hydraulic disc brake
	Rear brake			Hydraulic disc brake
	Caster angle			3°
	Trail length			16 mm (0.6 in)
	Camber angle			0°
	Fuel tank capacity			30 liters (7.9 US gal, 6.6 Imp gal)
	Fuel tank reserve capacity			6.4 liters (1.7 US gal, 1.4 Imp gal)

ITEM			SPECIFICATIONS
ENGINE	Cylinder arrangement		2 cylinders, longitudinally installed
	Bore and stroke		92 x 75.148 mm (3.6 x 2.9586 in)
	Displacement		999 cm^3 (60.9 cu-in)
	Compression ratio		10.0 : 1
	Valve train		OHC with valve lifter and rocker arm
	Intake valve opens at 1 mm (0.04 in) lift		5° BTDC
	Intake valve closes at 1 mm (0.04 in) lift		30° ABDC
	Exhaust valve opens at 1 mm (0.04 in) lift		20° BBDC
	Exhaust valve closes at 1 mm (0.04 in) lift		–5° ATDC
	Lubrication system		Forced pressure (dry sump)
	Oil pump type		Trochoid
	Cooling system		Liquid cooled
	Air filtration		Viscous paper element
	Engine dry weight		98.7 kg (217.6 lbs)
FUEL DELIVERY SYSTEM	Type		PGM-FI (Programmed Fuel Injection)
	Throttle bore		44 mm (1.73 in)
DRIVETRAIN	Clutch system		2 multi-plate wet clutches
	Clutch operating system		Automatic
	Primary reduction		1.883 (81/43)
	Transmission		6-speeds
	Transmission gear ratio	1st	2.764 (47/17)
		2nd	2.047 (43/21)
		3rd	1.583 (38/24)
		4th	1.230 (32/26)
		5th	0.968 (31/32)
		6th	0.764 (26/34)
	Transmission gearshift pattern		1 - 2 - 3 - 4 - 5 - 6 Automatic and electric shift
	Sub-transmission gear ratio	Low	2.666 (48/18)
		High	1.960 (49/25)
		Reverse	2.640 (22/25 x 48/16)
	Sub-transmission gearshift pattern		P - R - N - H - L
	Final reduction	Front	3.384 (44/13)
		Rear	3.375 (54/16)
	Drive mode select pattern	Except I-4WD model:	2WD (Differential free) - 2WD (Rear differential lock) - 4WD (Rear differential lock) - 4WD (Front and rear differential lock)
		I-4WD model:	2WD (Differential free) - 2WD (Rear differential lock) - I-4WD (Rear differential lock)
ELECTRICAL	Ignition system		Full Transistorized Ignition
	Starting system		Electric starter motor
	Charging system		Triple phase output alternator
	Regulator/rectifier		FET shorted, triple phase full wave rectification
	Lighting system		Battery

PGM-FI SYSTEM SPECIFICATIONS

ITEM	SPECIFICATIONS
ECT sensor resistance (40°C/104°F)	1.0 – 1.3 kΩ
Fuel injector resistance (20°C/68°F)	11.4 – 12.6 Ω
O_2 sensor heater resistance (20°C/68°F)	13.0 – 18.5 Ω

IGNITION SYSTEM SPECIFICATIONS

ITEM	SPECIFICATIONS
Spark plug	LMAR7M-9S (NGK)
Spark plug gap	0.8 – 0.9 mm (0.03 – 0.04 in)
Ignition coil primary peak voltage	100 V minimum
CKP sensor peak voltage	0.7 V minimum
Ignition timing ("F" mark)	15° BTDC at idle

FUEL SYSTEM SPECIFICATIONS

ITEM		SPECIFICATIONS
Throttle body identification number	Except AC, III AC, IV AC, VI AC, VII AC, IX AC	GQA9A
	AC, III AC, IV AC, VI AC, VII AC, IX AC	GQA9B
Idle speed		1,350 ± 100 rpm
Accelerator pedal freeplay		5 – 10 mm (3/16 – 3/8 in)
Fuel pressure		331 – 367 kPa (3.4 – 3.7 kgf/cm^2, 48 – 53 psi)
Fuel pump flow (at 12 V)		356 cm^3 (12.0 US oz, 12.5 Imp oz) minimum/10 seconds
EVAP purge control solenoid valve resistance (20°C/68°F)	AC, III AC, IV AC, VI AC, VII AC, IX AC	30 – 34 Ω

LUBRICATION SYSTEM SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Engine oil capacity	After draining	5.5 liters (5.8 US qt, 4.8 Imp qt)	–
	After draining/engine oil filter change	5.75 liters (6.08 US qt, 5.06 Imp qt)	–
	After draining/engine oil filter and DCT oil filter change	5.8 liters (6.1 US qt, 5.1 Imp qt)	–
	After disassembly	7.2 liters (7.6 US qt, 6.3 Imp qt)	–
Recommended engine oil		Pro Honda GN4 4-stroke oil (U.S.A. & Canada) or equivalent motorcycle oil API service classification: SJ or higher JASO T903 standard: MA Viscosity: SAE 10W-30	–
Oil pressure at No.3 journal		490 – 588 kPa (5.0 – 6.0 kgf/cm^2, 71 – 85 psi) at 5,000 rpm/80°C (176°F)	–
Oil pump rotor	Tip clearance	0.15 (0.006)	0.20 (0.008)

COOLING SYSTEM SPECIFICATIONS

ITEM		SPECIFICATIONS
Coolant capacity	At replacement	3.1 liters (3.3 US qt, 2.7 Imp qt)
	After disassembly	3.4 liters (3.6 US qt, 3.0 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 corrosion protection inhibitors
Standard coolant concentration		1:1 mixture with distilled water

CYLINDER HEAD/VALVE/CAMSHAFT SPECIFICATIONS

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Cylinder compression at 400 rpm			951 kPa (9.7 kgf/cm^3, 137 psi)	–
Valve clearance	IN		0.16 ± 0.03 (0.006 ± 0.001)	–
	Roller side	EX	0.24 ± 0.02 (0.009 ± 0.001)	–
	Valve side	EX	0.30 ± 0.03 (0.012 ± 0.001)	–
Valve, valve guide	Valve stem O.D.	IN	5.475 – 5.490 (0.2156 – 0.2161)	5.465 (0.2152)
		EX	5.465 – 5.480 (0.2152 – 0.2157)	5.455 (0.2148)
	Valve guide I.D.	IN/EX	5.500 – 5.512 (0.2165 – 0.2170)	5.542 (0.2182)
	Valve guide projection above cylinder head	IN	17.7 – 18.0 (0.70 – 0.71)	–
		EX	17.8 – 18.1 (0.70 – 0.71)	–
	Valve seat width	IN	1.1 – 1.3 (0.04 – 0.05)	1.5 (0.06)
		EX	1.3 – 1.5 (0.05 – 0.06)	1.9 (0.07)
Valve spring	Free length		49.88 (1.964)	48.9 (1.93)
Valve lifter	Valve lifter O.D.	IN	28.978 – 28.993 (1.1409 – 1.1415)	28.97 (1.141)
	Valve lifter bore I.D.	IN	29.010 – 29.026 (1.1421 – 1.1428)	29.04 (1.143)
Rocker arm	Arm I.D.	EX	12.000 – 12.018 (0.4724 – 0.4731)	12.05 (0.474)
	Shaft O.D.	EX	11.977 – 11.990 (0.4715 – 0.4720)	–
Camshaft	Cam lobe height	IN	39.640 – 39.880 (1.5606 – 1.5701)	39.61 (1.559)
		EX	40.030 – 40.270 (1.5760 – 1.5854)	40.00 (1.575)
	Oil clearance		0.020 – 0.062 (0.0008 – 0.0024)	0.072 (0.0028)
Cylinder head warpage			–	0.10 (0.004)

DUAL CLUTCH TRANSMISSION (DCT) SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Shift clutch	Clutch clearance	1.4 – 1.6 (0.055 – 0.063)	–
EOT sensor resistance (20°C/68°F)		2.5 – 2.8 kΩ	–

SUB-TRANSMISSION SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Sub-transmission oil capacity	After draining	1.2 liters (1.3 US qt, 1.1 Imp qt)	–
	After disassembly	1.4 liters (1.5 US qt, 1.2 Imp qt)	–
Recommended sub-transmission oil		Pro Honda GN4 4-stroke oil (U.S.A. & Canada) or equivalent motorcycle oil API service classification: SJ or higher JASO T903 standard: MA Viscosity: SAE 10W-30	–
Shift fork	I.D.	14.000 – 14.018 (0.5512– 0.5519)	–
	Claw thickness	5.93 – 6.00 (0.233 – 0.236)	5.53 (0.218)
	Shaft O.D.	13.957 – 13.968 (0.5495 – 0.5499)	–

ALTERNATOR/STARTER CLUTCH SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Starter driven gear boss	O.D.	57.749 – 57.768 (2.2736 – 2.2743)	–
	I.D.	44.000 – 44.016 (1.7323 – 1.7329)	–

CRANKCASE/TRANSMISSION/BALANCER SPECIFICATIONS

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Transmission	Gear I.D.	M5	35.000 – 35.025 (1.3780 – 1.3789)	–
		M6	43.000 – 43.025 (1.6929 – 1.6939)	–
		C1	35.000 – 35.025 (1.3780 – 1.3789)	–
		C2	25.000 – 25.021 (0.9843 – 0.9851)	–
		C3, C4	33.000 – 33.025 (1.2992 – 1.3002)	–
	Gear bushing O.D.	M5	34.950 – 34.975 (1.3760 – 1.3770)	–
		M6	42.950 – 42.975 (1.6909 – 1.6919)	–
		C1	34.950 – 34.975 (1.3760 – 1.3770)	–
		C2	24.959 – 24.980 (0.9826 – 0.9835)	–
		C3, C4	32.950 – 32.975 (1.2972 – 1.2982)	–
	Gear bushing I.D.	M5	32.000 – 32.025 (1.2598 – 1.2608)	–
		M6	40.007 – 40.028 (1.5751 – 1.5759)	–
		C1	30.000 – 30.021 (1.1811 – 1.2067)	–
		C2	22.000 – 22.021 (1.8661 – 0.8670)	–
	Inner mainshaft O.D.	M5	31.957 – 31.970 (1.2581 – 1.2587)	–
	Outer mainshaft O.D.	M6	39.975 – 39.991 (1.5738 – 1.5744)	–
	Countershaft O.D.	C1	29.967 – 29.980 (1.1798 – 1.1803)	–
		C2	21.987 – 22.000 (0.8656 – 0.8661)	–
Shift fork	I.D.		12.000 – 12.018 (0.4724– 0.4731)	–
	Claw thickness		5.93 – 6.00 (0.233 – 0.236)	5.83 (0.230)
	Shaft O.D.		11.957 – 11.968 (0.4707 – 0.4712)	–

CRANKSHAFT/CYLINDER/PISTON SPECIFICATIONS

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Crankshaft	Connecting rod side clearance		0.05 – 0.25 (0.002 – 0.010)	0.28 (0.011)
	Runout		–	0.05 (0.002)
	Main journal bearing oil clearance		0.026 – 0.044 (0.0010 – 0.0017)	0.05 (0.002)
	Crankpin bearing oil clearance		0.030 – 0.048 (0.0012 – 0.0019)	0.068(0.0027)
Cylinder	I.D.		92.005 – 92.020 (3.6222 – 3.6228)	92.050 (3.6240)
Piston, piston pin, piston ring	Piston O.D. at 12 (0.5) from bottom		91.965 – 91.985 (3.6201 – 3.6214)	91.89 (3.618)
	Piston pin hole I.D.		22.002 – 22.008 (0.8662 – 0.8665)	22.02 (0.867)
	Piston pin O.D.		21.994 – 22.000 (0.8659 – 0.8661)	21.98 (0.865)
	Piston ring end gap	Top	0.15 – 0.30 (0.006 – 0.012)	0.40 (0.016)
		Second	0.30 – 0.45 (0.012 – 0.018)	0.55 (0.022)
		Oil (side rail)	0.20 – 0.70 (0.008 – 0.028)	0.90 (0.035)
	Piston ring-to-ring groove clearance	Top	0.030 – 0.060 (0.0012 – 0.0024)	–
		Second	0.030 – 0.060 (0.0012 – 0.0024)	–
Connecting rod small end I.D.			22.030 – 22.044 (0.8673 – 0.8679)	22.054 (0.8683)

STEERING SYSTEM SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Steering wheel	Rotational play	0 – 10 (0 – 3/8)	–
	Initial turning load	24.2 N (2.47 kgf, 5.4 lbf)	–
Wheel turning radius angle		Inward: 40°, Outward: 35° (reference)	–
Toe		Toe-in: 5 ± 10 (3/16 ± 2/5)	–

FRONT DRIVING MECHANISM SPECIFICATIONS

Unit: mm (in)

ITEM				STANDARD	SERVICE LIMIT
Front final drive	Oil capacity	At draining	Except I-4WD model	340 cm³ (11.5 US oz, 12.0 Imp oz)	–
			I-4WD model	390 cm³ (13.2 US oz, 13.7 Imp oz)	–
		At disassembly	Except I-4WD model	500 cm³ (16.9 US oz, 17.6 Imp oz)	–
			I-4WD model	535 cm³ (18.1 US oz, 18.8 Imp oz)	–
	Recommended oil			Hypoid gear oil, SAE 80W-90	–
	Gear backlash			0.05 – 0.25 (0.002 – 0.010)	0.4 (0.02)
	Backlash difference			–	0.2 (0.01)

REAR DRIVING MECHANISM SPECIFICATIONS

Unit: mm (in)

ITEM				STANDARD	SERVICE LIMIT
Rear final drive	Oil capacity	At draining	Except I-4WD model	470 cm³ (15.9 US oz, 16.5 Imp oz)	–
			I-4WD model	550 cm³ (18.6 US oz, 19.4 Imp oz)	–
		At disassembly	Except I-4WD model	550 cm³ (18.6 US oz, 19.4 Imp oz)	–
			I-4WD model	605 cm³ (20.5 US oz, 21.3 Imp oz)	–
	Recommended oil			Hypoid gear oil, SAE 80W-90	–
	Gear backlash			0.05 – 0.25 (0.002 – 0.010)	0.4 (0.02)
	Backlash difference			–	0.2 (0.01)

WHEEL/SUSPENSION SPECIFICATIONS

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Cold tire pressure	Front	M5P, M5D	140 kPa (1.4 kgf/cm², 20 psi)	–
		M3P, M3D	120 kPa (1.2 kgf/cm², 18 psi)	–
	Rear	M5P, M5D	140 kPa (1.4 kgf/cm², 20 psi)	–
		M3P, M3D	120 kPa (1.2 kgf/cm², 18 psi)	–

BRAKE SYSTEM SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Recommended brake fluid		Honda DOT 4 brake fluid	–
Brake disc thickness		4.3 – 4.7 (0.17 – 0.19)	3.5 (0.14)
Brake disc runout		–	0.30 (0.012)
Brake pedal height (from accelerator pedal)		35 (1.4)	–
Master cylinder I.D.		17.460 – 17.503 (0.6874 – 0.6891)	–
Master piston O.D.		17.417 – 17.444 (0.6857 – 0.6868)	–
Caliper cylinder I.D.	Front	33.960 – 34.010 (1.3770 – 1.3390)	–
	Rear	32.030 – 32.080 (1.2610 – 1.2630)	–
Caliper piston O.D.	Front	33.878 – 33.928 (1.3338 – 1.3357)	–
	Rear	31.948 – 31.998 (1.2578 – 1.2598)	–

BATTERY/CHARGING SYSTEM SPECIFICATIONS

ITEM			SPECIFICATIONS
Battery	Type		GYZ16H
	Capacity		12 V-16 Ah/10 HR
	Current leakage		0.04 mA max.
	Voltage (20°C/68°F)	Fully charging	12.8 V minimum
		Needs charging	Below 12.3 V
	Charging current	Normal	1.6 A/5 – 10 h
		Quick	8.0 A/1.0 h
Alternator	Capacity		0.6 kW/5,000 rpm
	Charging coil resistance (20°C/68°F)		0.05 – 0.5 Ω

LIGHTS/METERS/SWITCHES SPECIFICATIONS

ITEM			SPECIFICATIONS
Bulb	Headlight		12 V - 60/55 W x 2
	Brake/taillight		LED
	Neutral indicator		LED
	Reverse indicator		LED
	High coolant temperature indicator		LED
	Oil pressure indicator		LED
	Seat belt indicator		LED
	MIL		LED
	Clutch temperature indicator		LED
	EPS indicator		LED
	Differential lock indicator	Except I-4WD model:	LED
	I-4WD indicator	I-4WD model:	LED
	HSA indicator	I-4WD model:	LED
Fuse	Main fuse		50 A
	EPS fuse		40 A
	I-4WD fuse	I-4WD model:	40 A
	Sub-fuse	M3P/M5P:	30 A, 20 A, 15 A x 4, 10 A x 3
		M3D (Except I-4WD model):	30 A, 20 A, 15 A x 4, 10 A x 3
		M3D (I-4WD model):	30 A x 2, 20 A, 15 A x 4, 10 A x 3
		M5D (Except I-4WD model):	30 A, 20 A, 15 A x 4, 10 A x 4
		M5D (I-4WD model):	30 A x 2, 20 A, 15 A x 4, 10 A x 4
Fuel level sensor	Resistance	Full	19 – 21 Ω
		Empty	772 – 788 Ω

TORQUE VALUES

STANDARD TORQUE VALUES

FASTENER TYPE	N·m (kgf·m, lbf·ft)	FASTENER TYPE	N·m (kgf·m, lbf·ft)
5 mm hex bolt and nut	5.2 (0.5, 3.8)	5 mm screw	4.2 (0.4, 3.1)
6 mm hex bolt and nut	10 (1.0, 7)	6 mm screw	9.0 (0.9, 6.6)
8 mm hex bolt and nut	22 (2.2, 16)	6 mm flange bolt (8 mm head, small flange)	10 (1.0, 7)
10 mm hex bolt and nut	34 (3.5, 25)	6 mm flange bolt (8 mm head, large flange)	12 (1.2, 9)
12 mm hex bolt and nut	54 (5.5, 40)	6 mm flange bolt (10 mm head) and nut	12 (1.2, 9)
		8 mm flange bolt and nut	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
Seat under storage mounting screw (M3D/M5D type)	1	6	9.0 (0.9, 6.6)	
Rear seat back bolt (M5P/M5D type)	4	8	33 (3.4, 24)	
Rear side cover bolt	2	6	9.0 (0.9, 6.6)	
Rear side cover screw	8	6	8.0 (0.8, 5.9)	
Rear footwell socket screws	6	6	9.0 (0.9, 6.6)	
Rear mud guard screw (M3P/M3D type)	5	6	9.0 (0.9, 6.6)	
Floor protector mounting screw	2	6	9.0 (0.9, 6.6)	
Floor panel socket screw	2	6	8.0 (0.8, 5.9)	
Front bumper bolt/washer (A, AC, CM, III A, III AC)	2	10	34 (3.5, 25)	
Front bumper bolt/washer (IV A, IV AC, VI A, VI AC, VI CM, VII A, VII AC, VII CM, IX A, IX AC)	2	10	82.5 (8.4, 61)	
Front bumper flange bolt (A, AC, CM, III A, III AC)	4	8	36.5 (3.7, 27)	
Front bumper flange bolt (IV A, IV AC, VI A, VI AC, VI CM, VII A, VII AC, VII CM, IX A, IX AC)	4	8	34 (3.5, 25)	
Front side reflector mounting nut (Canada type)	2	6	3.4 (0.3, 2.5)	Self lock nut
Front fender screw	2	6	10 (1.0, 7)	
Snorkel duct connecting hose band screw	2	–	1.4 (0.1, 1.0)	
Rear door stopper bolt/washer (M5P/M5D type)	4	6	9.0 (0.9, 6.6)	
Front door latch cover socket screw	6	6	9.0 (0.9, 6.6)	
Front door latch plate bolt	6	6	9.0 (0.9, 6.6)	
Instrument panel mounting screw (M3D/M5D type)	2	5	4.2 (0.4, 3.1)	
	1	6	9.0 (0.9, 6.6)	
Instrument panel mounting screw (M3P/M5P type)	4	5	4.2 (0.4, 3.1)	
	1	6	9.0 (0.9, 6.6)	
Dash under storage mounting screw (M3D/M5D type)	2	5	4.2 (0.4, 3.1)	
Front floor lid socket screw	2	6	9.0 (0.9, 6.6)	
Front floor cover socket screw	7	6	10 (1.0, 7)	
Front seat belt anchor bolt	6	7/16"	32 (3.3, 24)	
Front seat belt retractor nut	3	7/16"	32 (3.3, 24)	
Rear seat belt anchor bolt (M5P/M5D type)	2	7/16"	32 (3.3, 24)	
Rear seat belt retractor nut (M5P/M5D type)	4	7/16"	32 (3.3, 24)	
Front seat belt buckle bolt	3	7/16"	32 (3.3, 24)	

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Rear seat belt buckle bolt (M5P/M5D type)	2	7/16"	32 (3.3, 24)	
Rear cross pipe mounting nut (M5P/M5D type)	4	10	30 (3.1, 22)	
Rear OPS mounting bolt (M5P/M5D type)	10	10	49 (5.0, 36)	
Rear OPS mounting nut (M5P/M5D type)	2	10	30 (3.1, 22)	
Front OPS mounting nut	4	10	30 (3.1, 22)	
	4	12	64 (6.5, 47)	
Middle OPS mounting nut	4	10	30 (3.1, 22)	
Back mirror mounting screw (IV A, IV AC, VI A, VI AC, VI CM)	2	4	3.0 (0.3, 2.2)	
Bed front panel screw	7	6	8.0 (0.8, 5.9)	
Stopper wire screw	4	6	12 (1.2, 9)	
Tailgate lock bracket bolt	4	6	12 (1.2, 9)	
Tailgate tapping screw	3	5	8.0 (0.8, 5.9)	
Bed side cover bolt (M3P/M3D type)	8	8	26 (2.7, 19)	
Rear side reflector mounting nut (M3P type)	2	6	3.4 (0.3, 2.5)	Self lock nut
Rear reflector mounting nut (M3P/M3D type)	1	5	3.4 (0.3, 2.5)	Self lock nut
Rear bed top cover screw (M3P/M3D type)	15	6	8.0 (0.8, 5.9)	
Rear bed top cover screw (M5P/M5D type)	13	6	8.0 (0.8, 5.9)	
Lock lever holder bolt	8	6	14 (1.4, 10)	
Muffler joint bolt	2	8	21.6 (2.2, 16)	
Muffler protector bolt	4	6	12 (1.2, 9)	
Fuel tank heat guard protector bolt	1	6	16 (1.6, 12)	
Exhaust pipe joint nut	4	8	26.5 (2.7, 20)	
Exhaust pipe stud bolt	4	8	–	See page 2-54
Step pipe bolt	4	12	64 (6.5, 47)	
Step pipe mounting nut	8	8	42.5 (4.3, 31)	
Seat frame mounting nut	2	8	42.5 (4.3, 31)	
Instrument panel frame mounting bolt	4	10	85 (8.7, 63)	
Buckle under cover mounting screw	3	6	9.0 (0.9, 6.6)	

MAINTENANCE

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Throttle cable adjuster lock nut	1	6	5.0 (0.5, 3.7)	
Air cleaner housing cover screw	10	5	5.2 (0.5, 3.8)	
Spark plug	2	10	22 (2.2, 16)	
Valve adjusting screw lock nut	4	5	10 (1.0, 7)	Apply engine oil to the threads and seating surface.
Timing hole cap	1	14	10 (1.0, 7)	Apply grease to the threads.
Crankshaft hole cap	1	36	12 (1.2, 9)	Apply grease to the threads.
Engine oil drain bolt	2	12	30 (3.1, 22)	
Sub-transmission oil drain bolt	1	14	29 (3.0, 21)	
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)	
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)	
Wheel nut (front/rear)	16	12	108 (11.0, 80)	
Rack guide screw	1	32	–	See page 3-23
Rack guide screw lock nut	1	32	24 (2.4, 18)	
Tie-rod lock nut (steering gear box side)	2	14	44 (4.5, 32)	
Tie-rod lock nut (tie-rod end side)	2	16	55 (5.6, 41)	

PGM-FI SYSTEM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Sensor unit screw	3	5	3.4 (0.3, 2.5)	
ECT sensor	1	10	12 (1.2, 9)	
O_2 sensor	1	12	27 (2.8, 20)	

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)	

FUEL SYSTEM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Air cleaner housing mounting bolt	2	6	12 (1.2, 9)	
Air cleaner connecting hose mounting screw	6	5	5.2 (0.5, 3.8)	
Snorkel duct B mounting bolt	2	6	12 (1.2, 9)	
Air cleaner connecting hose band screw	2	–	1.4 (0.1, 1.0)	
Snorkel duct connecting hose band screw	6	–	1.4 (0.1, 1.0)	
Accelerator pedal sealing bolt	1	12	23 (2.3, 17)	Apply locking agent to the threads.
Throttle body setting plate screw	5	5	4.2 (0.4, 3.1)	
Insulator band screw	4	5	–	See page 7-25
Throttle drum cover screw/washer	1	4	1.8 (0.2, 1.3)	
Fuel injector assembly bolt	4	–	5.1 (0.5, 3.8)	
IACV plate screw	2	4	2.1 (0.2, 1.5)	
IACV holder plate screw	3	5	3.4 (0.3, 2.5)	

LUBRICATION SYSTEM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
22 mm sealing bolt (for engine oil pressure relief valve)	1	22	30 (3.1, 22)	Apply locking agent to the threads.
24 mm sealing bolt (for DCT oil pressure relief valve)	1	24	31 (3.2, 23)	Apply locking agent to the threads.
Oil cooler bolt	1	20	59 (6.0, 43)	Apply engine oil to the threads and seating surface.

COOLING SYSTEM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Fan motor mounting bolt	3	5	2.7 (0.3, 2.0)	
Cooling fan mounting nut	1	5	2.6 (0.3, 1.9)	
Fan motor stay bolt	2	6	8.35 (0.9, 6.2)	
Radiator shroud mounting bolt	2	6	9.0 (0.9, 6.6)	
Reserve tank pan screw	1	6	10 (1.0, 7)	

CYLINDER HEAD/VALVE/CAMSHAFT

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Cylinder head cover bolt	3	6	10 (1.0, 7)	
Cylinder head cover breather plate bolt	4	6	13 (1.3, 10)	Apply locking agent to the threads.
Rocker arm shaft stopper bolt	1	14	18 (1.8, 13)	Apply engine oil to the threads and seating surface.
Rocker arm shaft bolt	2	6	12 (1.2, 9)	Apply engine oil to the threads and seating surface.
Cam sprocket bolt	2	7	20 (2.0, 15)	Apply locking agent to the threads.

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Camshaft holder bolt	6	6	12 (1.2, 9)	Apply engine oil to the threads and seating surface.
Cylinder head bolt	6	12	74 (7.5, 55)	Apply molybdenum oil solution to the threads and seating surface.
Cam chain tensioner bolt	1	8	23 (2.3, 17)	Apply locking agent to the threads. (*1)

DUAL CLUTCH TRANSMISSION (DCT)

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Shift spindle angle sensor bolt	1	6	12 (1.2, 9)	
TR sensor bolt	1	6	12 (1.2, 9)	
Clutch EOP sensor	3	10	20 (2.0, 15)	
Emergency valve stopper plate bolt	1	6	7.0 (0.7, 5.2)	
EOT sensor	1	10	15 (1.5, 11)	
Neutral switch	1	10	12 (1.2, 9)	
Primary drive gear lock nut	1	22	128 (13.1, 94)	Left hand threads Apply engine oil to the threads and seating surface.
Clutch control body bolt	7	6	14 (1.4, 10)	Apply engine oil to the threads and seating surface.
Shift drum center bolt	1	8	31 (3.2, 23)	Apply locking agent to the threads. (*1)
Front VS sensor bolt	1	6	10 (1.0, 7)	

SUB-TRANSMISSION/GEARSHIFT LINKAGE

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Sub-transmission mounting bolt (cover side)	2	8	27 (2.8, 20)	Apply engine oil to the threads and seating surface.
Sub-transmission mounting cap nut (cover side)	2	8	27 (2.8, 20)	Apply engine oil to the threads and seating surface.
Sub-transmission mounting bolt (case side)	3	8	29 (3.0, 21)	Apply engine oil to the threads and seating surface.
Sub-transmission stud bolt	2	8	–	See page 12-7
Shift drum stopper arm pivot bolt	1	6	12 (1.2, 9)	Apply locking agent to the threads. (*1)
Sub-transmission shift drum center bolt	1	8	27 (2.8, 20)	Apply locking agent to the threads. (*1)
Control shaft set screw	1	6	14 (1.4, 10)	
Shift select lever pivot nut	1	8	26 (2.7, 19)	
Shift change cable lock nut	2	14	26 (2.7, 19)	
Shift arm pinch bolt	1	6	16 (1.6, 12)	
Front final gear case mounting nut	3	10	54 (5.5, 40)	Self lock nut: replace with a new one.

ALTERNATOR/STARTER CLUTCH

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Starter clutch outer bolt	6	8	23 (2.3, 17)	Apply locking agent to the threads.
Flywheel bolt	1	12	110 (11.2, 81)	Apply engine oil to the threads and seating surface.
Alternator stator bolt	4	6	10 (1.0, 7)	Apply locking agent to the threads. (*1)
CKP sensor bolt	2	6	12 (1.2, 9)	Apply locking agent to the threads. (*1)
Alternator wire clamp bolt	1	6	12 (1.2, 9)	Apply locking agent to the threads. (*1)

CRANKCASE/TRANSMISSION/BALANCER

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Crankcase main journal bolt	6	10	22 (2.2, 16) + 40°	Apply molybdenum oil solution to the threads and seating surface. See page 14-16
Crankcase 8 mm flange bolt	4	8	24 (2.4, 18)	
Cam chain tensioner bolt	1	8	23 (2.3, 17)	Apply locking agent to the threads. (*1)
Mainshaft bearing set plate bolt	3	6	12 (1.2, 9)	Apply locking agent to the threads. (*1)
Shift drum setting bolt	2	6	12 (1.2, 9)	Apply locking agent to the threads. (*1)
Balancer driven gear bolt	1	10	75 (7.6, 55)	Left hand threads Apply engine oil to the threads and seating surface.
Balancer bearing set plate bolt	6	6	12 (1.2, 9)	Apply locking agent to the threads. (*1)

CRANKSHAFT/PISTON/CYLINDER

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Connecting rod nut	4	9	49 (5.0, 36)	Apply engine oil to the threads and seating surface.
Crankcase main journal bolt	6	10	22 (2.2, 16) + 40°	Apply molybdenum oil solution to the threads and seating surface. See page 14-16

ENGINE REMOVAL/INSTALLATION

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Left engine hanger bolt	2	10	59 (6.0, 44)	
Right engine hanger nut (engine case side)	2	10	57 (5.8, 42)	
Left engine hanger nut (engine hanger side)	1	10	49 (5.0, 36)	
Right engine hanger nut (engine hanger side)	2	10	49 (5.0, 36)	
Throttle drum cover screw/washer	1	4	1.8 (0.2, 1.3)	
Shift arm pinch bolt	1	6	16 (1.6, 12)	
Front final gear case mounting nut	3	10	54 (5.5, 40)	Self lock nut: replace with a new one.
Rear final gear case mounting nut	3	10	95 (9.7, 70)	Self lock nut: replace with a new one.

STEERING SYSTEM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Steering wheel nut	1	12	49 (5.0, 36)	Self lock nut: replace with a new one.
Upper paddle cover mounting screw	1	6	9.0 (0.9, 6.6)	
Shift change switch screw	2	3	0.6 (0.06, 0.4)	
Middle steering shaft pinch bolt	4	8	27 (2.8, 20)	Replace the bolt and lock washer with new ones. See page 17-8
Lower steering shaft pinch bolt	4	8	21 (2.1, 15)	Replace the bolt and self lock nut with new ones. See page 17-8
EPS unit mounting bolt	3	8	27 (2.8, 20)	
Steering gear box mounting nut	4	10	39 (4.0, 29)	Self lock nut: replace with a new one.

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Tie-rod ball joint nut	2	10	55 (5.6, 41)	
Rack end joint	2	12	54 (5.5, 40)	
Rack guide screw lock nut	1	32	24 (2.4, 18)	

FRONT DRIVING MECHANISM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Front final gear case mounting nut	3	10	54 (5.5, 40)	Self lock nut: replace with a new one.
Front wheel speed sensor bolt (I-4WD model)	4	6	10 (1.0, 7)	
4WD select switch	1	10	12 (1.2, 9)	
Final clutch shift fork bolt	1	6	10 (1.0, 7)	Replace with a new one.
Final clutch housing bolt	3	8	25 (2.5, 18)	
Differential lock shift fork bolt	1	6	10 (1.0, 7)	Replace with a new one.
Front final gear case cover bolt	2	10	47 (4.8, 35)	Apply locking agent to the threads. Coating width: 4 mm (0.12 in) minimum (3 – 5 threads)
	6	8	25 (2.5, 18)	
Differential ring gear bolt	10	10	100 (10.2, 74)	Replace with a new one.
Front pinion bearing lock nut	1	64	98 (10.0, 72)	Self lock nut: replace with a new one. Stake.
Final clutch cable stay bolt	1	8	25 (2.5, 18)	
Differential lock switch (Except I-4WD model)	1	10	12 (1.2, 9)	
Shift gate socket bolt	3	6	9.0 (0.9, 6.6)	
Drive mode select lever pivot bolt	1	8	26 (2.7, 19)	
Final clutch cable adjustment lock nut	1	6	5.0 (0.5, 3.7)	
Front differential lock cable lock nut	1	6	5.0 (0.5, 3.7)	

REAR DRIVING MECHANISM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Rear final gear case mounting nut	3	10	95 (9.7, 70)	Self lock nut: replace with a new one.
Rear wheel speed sensor bolt (I-4WD model)	4	6	10 (1.0, 7)	
Differential lock switch	1	10	12 (1.2, 9)	
Rear final gear case cover bolt	2	10	47 (4.8, 35)	Apply locking agent to the threads. Coating width: 4 mm (0.12 in) minimum (3 – 5 threads)
	6	8	25 (2.5, 18)	
Differential lock cable stay bolt	2	6	10 (1.0, 7)	
Differential ring gear bolt	10	10	100 (10.2, 74)	Replace with a new one.
Rear pinion bearing lock nut	1	72	98 (10.0, 72)	Self lock nut: replace with a new one. Stake.
Differential lock shift fork stopper bolt	1	6	12 (1.2, 9)	Replace with a new one.

WHEEL/SUSPENSION

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Wheel nut (front/rear)	16	12	108 (11.0, 80)	
Wheel hub nut (front/rear)	4	22	151(15.4, 111)	Apply locking agent to the threads. Castle nut: tighten to the specified torque and further tighten until its grooves aligns with the cotter pin hole.
Brake disc bolt (front/rear)	16	8	42 (4.3, 31)	Replace with a new one.

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Front brake disc cover bolt	2	6	11 (1.1, 8)	Replace with a new one.
Front brake caliper mounting bolt	4	12	108 (11.0, 80)	Replace with a new one.
Front outboard guard bolt	4	6	11 (1.1, 8)	Replace with a new one.
Front shock absorber mounting nut	4	12	64 (6.5, 47)	Self lock nut: replace with a new one.
Front upper arm pivot nut	2	12	100 (10.2, 74)	Self lock nut: replace with a new one.
Front lower arm pivot nut	4	12	100 (10.2, 74)	Self lock nut: replace with a new one.
Front upper arm ball joint nut	2	12	29 (3.0, 21)	Castle nut: tighten to the specified torque and further tighten until its grooves aligns with the cotter pin hole.
Front lower arm ball joint nut	2	14	49 (5.0, 36)	Castle nut: tighten to the specified torque and further tighten until its grooves aligns with the cotter pin hole.
Tie-rod ball joint nut	2	10	55 (5.6, 41)	
Brake hose clamp bolt	6	6	12 (1.2, 9)	Replace with a new one.
Rear brake disc splash guard socket screw	4	6	11 (1.1, 8)	Replace with a new one.
Rear brake caliper mounting bolt	4	10	59 (6.0, 44)	Replace with a new one.
Rear shock absorber mounting nut	4	12	64 (6.5, 47)	Self lock nut: replace with a new one.
Rear upper/lower arm pivot nut (frame side)	8	12	100 (10.2, 74)	Self lock nut: replace with a new one.
Rear upper/lower arm pivot nut (knuckle side)	4	10	44 (4.5, 32)	Self lock nut: replace with a new one.
Stabilizer arm mounting bolt	4	8	27 (2.8, 20)	
Stabilizer link nut	2	10	46 (4.7, 34)	
Damping adjust knob torx bolt (front/rear) (M5D IV A, IV AC, VI A, VI AC, VI CM/M3D IV A, IV AC, VI A, VI AC)	4	–	0.8 (0.1, 0.6)	

BRAKE SYSTEM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Brake hose oil bolt	4	10	34 (3.5, 25)	
Brake caliper bleed valve	4	8	5.4 (0.6, 4.0)	
Front outboard guard bolt	4	6	11 (1.1, 8)	Replace with a new one.
Brake pipe joint nut	8	10	15 (1.5, 11)	
Brake pipe joint nut	4	12	22 (2.2, 16)	
Master cylinder push rod joint nut	1	8	17.2 (1.8, 13)	
Brake hose clamper bolt	7	6	12 (1.2, 9)	
Front brake caliper mounting bolt	4	12	108 (11.0, 80)	Replace with a new one.
Front brake caliper slide pin bolt	4	8	22 (2.2, 16)	
Rear brake caliper mounting bolt	4	10	59 (6.0, 44)	Replace with a new one.
Rear brake caliper slide pin bolt	4	8	22 (2.2, 16)	
Master cylinder reservoir mounting bolt	1	6	12 (1.2, 9)	

LIGHTS/METERS/SWITCHES

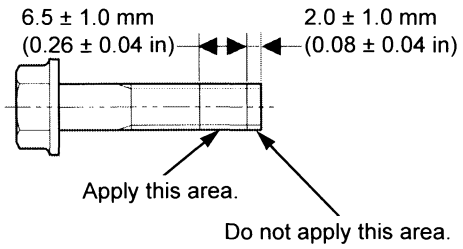
ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Front differential lock switch	1	10	12 (1.2, 9)	
Rear differential lock switch	1	10	12 (1.2, 9)	
4WD select switch	1	10	12 (1.2, 9)	

I-4WD (Intelligent 4 Wheel Drive)

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Modulator bracket mounting bolts	2	6	8.0 (0.8, 5.9)	
Modulator mounting bolts	3	6	9.5 (1.0, 7)	
Modulator cover bolt	1	6	12 (1.2, 9)	
Brake pipe joint nut	6	12	22 (2.2, 16)	
Front wheel speed sensor bolt	4	6	10 (1.0, 7)	
Rear wheel speed sensor bolt	4	6	10 (1.0, 7)	

*1: Apply locking agent to the threads as shown.

The bolt shown is typical.



LUBRICATION & SEAL POINTS

ENGINE

MATERIAL	LOCATION	REMARKS
Molybdenum oil solution (a mixture of engine oil and molybdenum disulfide grease in a ratio of 1:1)	Camshaft cam lobes, journals and thrust surfaces	
	Decompressor cam surfaces	
	Valve stem sliding surface and stem end	
	Rocker arm shaft whole surface	
	Rocker arm inner surface and roller surface	
	Water pump shaft and thrust washer sliding area	
	Primary driven gear teeth and friction springs	
	Sub-transmission shift fork outer surface	
	Sub-transmission shift fork shaft outer surface	
	Sub-transmission gear shifter grooves and splines	
	Sub-transmission gear needle bearing whole surface	
	Starter reduction gear shaft outer surface	
	Transmission shift fork outer surface	
	Transmission shift fork shaft outer surface	
	Transmission gear shifter grooves and splines	
	Transmission gear bushing inner and outer surfaces	
	Transmission gear spline bushing outer surface	
	Piston pin outer surface	
	Connecting rod small end inner surface	
	Crankpin bearing sliding surface	
	Main journal bearing sliding surface	
	Crankshaft thrust surface	
	Balancer driven gear sliding area and thrust surface	
	Primary drive gear sliding area	
Engine oil	Fuel injector seal ring	
	Oil strainer rubber seal outer surface	
	Spark plug tube seal inner surface	
	Piston outer surface and piston pin hole	
	Piston rings	
	Starter one-way clutch entire surface	
	Mainshaft seal ring whole surface	
	Each gear teeth and sliding surface	
	Each bearing rotating area	
	Each O-ring except water sealing	
	Other rotating and sliding areas	
Sealant (Threebond TB1207B or an equivalent)	Alternator wire grommet seating surface	
	Linear solenoid valve wire grommet seating surface	
	Alternator cover mating surface of crankcase	See page 13-6
	Sub-transmission case mating surface of crankcase	See page 12-8
	Rear cover spacer mating surface of crankcase	See page 8-7
	Crankcase mating surface	See page 14-16
Sealant (Threebond TB5211C, Shin-Etsu Silicone KE45T or an equivalent)	Cylinder head semi-circular area	See page 10-6
Locking agent	Drum shifter guide plate bolt threads	
Multi-purpose grease	Each oil seal lip	
UNIREX N3 grease (ExxonMobil)	Electric shift reduction gear teeth and journal	2 – 4 g See page 11-53

FRAME

MATERIAL	LOCATION	REMARKS
Multi-purpose grease	Cargo bed striker sliding area	
	Door latch	Apply 1 g
	Shift select lever pivot bolt sliding area	
	Shift plate pivot sliding area	
	Drive mode select lever pivot bolt sliding area	
	Drive mode selector arm pivot sliding area	
	Front differential lock link pivot sliding area	
	Rear differential lock link pivot sliding area	
	Accelerator pivot shaft sliding area	
	Accelerator pedal dust seal inner surfaces	
	Brake pedal pivot shaft sliding area	
	Steering column bush sliding surfaces	
	Steering column pivot collar sliding surfaces	
	Steering column pivot dust seal lips	
	Steering rack end bushing inner surface	Apply 1 g minimum
	Steering rack teeth	Apply 5 g minimum
	Steering pinion needle bearing rotating area	Apply 0.2 g minimum
	Steering pinion ball bearing rotating area	Apply 0.2 g minimum
	Steering pinion dust seal lips	Apply 0.2 g minimum
	Steering gear box housing (between pinion dust seal and dust cover)	Fill up 2 g minimum
	Steering rack guide sliding surface (rack side)	Apply 0.2 g minimum
	Steering rack end joint outer surface	Apply 1 g
	Front final clutch pinion joint oil seal lips	
	Front final gear case drive shaft oil seal lips	
	Front differential lock arm shaft oil seal lips	
	Front final clutch arm shaft oil seal lips	
	Front VS sensor O-ring	
	Front final clutch arm shaft O-ring	
	Front differential lock arm shaft O-ring	
	Front final clutch housing O-ring	
	Front final gear oil filler cap O-ring	
	Front final clutch arm shaft outer surface	
	Front differential lock arm shaft outer surface	
	Universal joint bearing	
	Rear final gear case pinion joint oil seal lips	
	Rear final gear case drive shaft oil seal lips	
	Rear differential lock arm shaft oil seal lips	
	Rear differential lock arm shaft O-ring	
	Rear VS sensor O-ring	
	Rear final gear pinion joint O-ring	
	Rear final gear oil filler cap O-ring	
	Shock absorber weather seal	
Molybdenum disulfide grease	Drive shaft splines (wheel side)	
	Drive shaft O-rings	
	Front propeller shaft O-rings	
	Universal joint splines (both sides)	
	Rear propeller shaft pinion joint splines (final gear side)	Fill up 5 – 8 g
	Rear propeller shaft joint splines (output shaft side)	Fill up 5 – 8 g
	Rear propeller shaft boot lips	
	Front final clutch pinion joint splines	
	Wheel hub dust seals	
	Front upper arm pivot bushing collar contacting surface	
	Front upper arm pivot dust seal lip	
	Rear knuckle pivot bushing collar contacting surface	
	Rear knuckle pivot dust seal lip	
NKG814 (Kyodo Yushi) (Except I-4WD model)	Front drive shaft outboard joint inside	Fill up 60 – 80 g
	Front drive shaft inboard joint inside	Fill up 130 – 150 g
NMS2002-G1 (I-4WD model)	Front drive shaft outboard joint inside	Fill up 55 – 65 g
	Front drive shaft inboard joint inside	Fill up 120 – 140 g

MATERIAL	LOCATION	REMARKS
NKG509 (Kyodo Yushi) (Except I-4WD model)	Rear drive shaft outboard joint inside	Fill up 60 – 80 g
	Rear drive shaft inboard joint inside	Right: Fill up 110 – 130 g Left: Fill up 105 – 125 g
NMS2002-G4 (I-4WD model)	Rear drive shaft outboard joint inside	Fill up 55 – 65 g
	Rear drive shaft inboard joint inside	Fill up 120 – 140 g
Silicone grease (Dow Corning Molykote EM30L or Kluber Noxlub SS4021)	Rack end tie-rod boot groove	Apply 0.5 g minimum
Silicone grease	Master cylinder body boot groove	Apply 0.1 g
	Master cylinder push rod boot groove	Apply 0.1 g
	Master cylinder push rod end (piston contact area)	Apply 0.3 – 0.5 g
	Front brake caliper slide pin sliding areas	Apply 0.4 g minimum
	Rear brake caliper slide pin sliding areas	Apply 0.4 g minimum
Honda DOT 4 brake fluid	Brake master cylinder pistons and cups	
	Brake caliper piston and piston seals	
Cable lubricant	Throttle inner cable	
	2WD/4WD selector inner cable	
	Front differential lock inner cable	
	Rear differential lock inner cable	
Sealant (Threebond TB1215 or Loctite LT5699 or an equivalent)	Front final gear case cover mating surface	
	Rear final gear case cover mating surface	
Locking agent (Threebond TB1305 or an equivalent)	Wheel hub nut mounting threads of drive shaft	Apply all threads
Sealant (Threebond TB1102 or an equivalent)	Rack guide screw threads	Apply 3 threads minimum

SPECIAL TOOL LIST

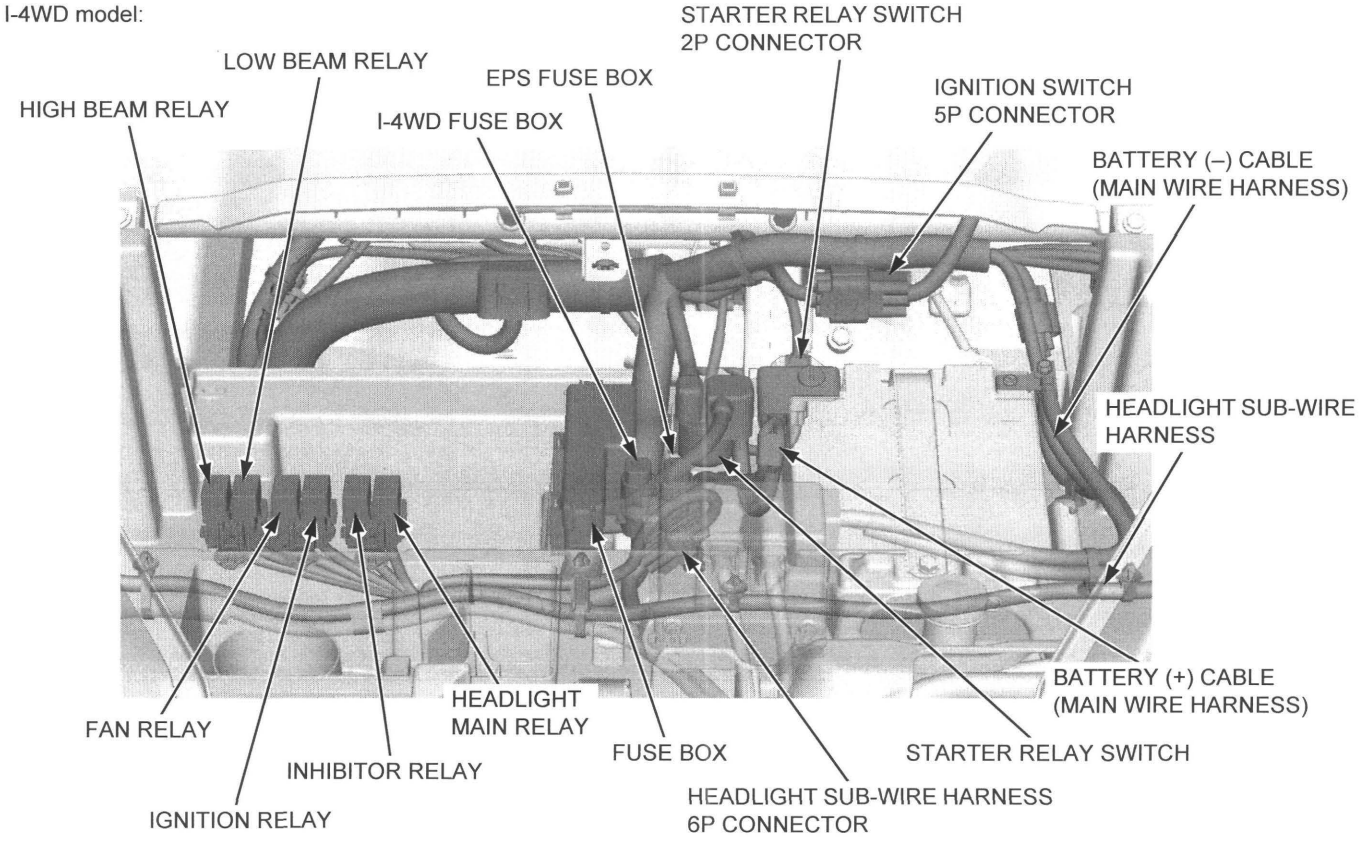
TOOL NAME	TOOL No	
	Except U.S.A.	U.S.A.
FRAME/BODY PANELS/EXHAUST SYSTEM		
Push pin pliers	–	07AAC-SJAA100
MAINTENANCE		
Lock nut wrench	070MA-HL40100	070MA-HL4A100
Valve adjusting wrench	07708-0030400	07908-KE90200
Lock nut wrench, 8 x 9 mm	07708-0030100	Equivalent commercially available in the U.S.A.
PGM-FI SYSTEM		
Test probe, 2 packs	07ZAJ-RDJA110	07ZAJ-RDJA110
SCS short connector	070MZ-0010300	070MZ-001A300
IGNITION SYSTEM		
IgnitionMate peak voltage tester	–	MTP07-0286 (U.S.A. only)
Peak voltage adaptor	07HGJ-0020100	Commercially available digital multimeter (Impedance 10 MΩ/DCV min)
Test probe, 2 packs	07ZAJ-RDJA110	07ZAJ-RDJA110
FUEL SYSTEM		
Fuel pressure gauge	07406-0040004	07406-004000C or 07406-004000B
Pressure gauge attachment set	070MJ-K260100	Not available in U.S.A.
Hose attachment, 6 mm/9 mm	07ZAJ-S5A0130	Not available in U.S.A.
Attachment joint, 9 mm/9 mm	07ZAJ-S5A0140	Not available in U.S.A.
Adaptor, male, A	–	07AMJ-HW3A300
Adaptor, female, A	–	07AMJ-HW3A200
Pressure manifold hose	–	07AMJ-HW3A100
Fuel connector remover	070MF-HP50200	07AMF-001A100
Fuel pump lock ring wrench	SPX OTC #6599	Equivalent commercially available in the U.S.A.
LUBRICATION SYSTEM		
Oil pressure gauge	07506-3000100	Not available in U.S.A.
Oil pressure hose	07MAJ-PY40110	Not available in U.S.A.
Hose joint attachment	07MAJ-PY40120	Not available in U.S.A.
Oil pressure gauge, 0 – 160 psi	–	07ZMJ-HN2A100
Oil pressure adapter	–	07AMJ-HP7A100
CYLINDER HEAD/VALVE/CAMSHAFT		
Tensioner holder B	070MG-0010100	07AMG-001A100 or 07AMG-MFJA100
Valve spring compressor	07757-0010000	07757-0010000
Tappet hole protector, 26 x 28 mm	07999-4220000	Not available in U.S.A.
Valve guide driver	07743-0020000	Not available in U.S.A.
Valve guide driver, 5.5 mm	07742-0010100	07742-0010100
Valve guide reamer, 5.5 mm	07984-2000001	07984-200000D
Valve seat cutter, 40 mm (45° IN)	07780-0010500	Equivalent commercially available in the U.S.A.
Valve seat cutter, 35 mm (45° EX)	07780-0010400	Equivalent commercially available in the U.S.A.
Flat cutter, 42 mm (32° IN/EX)	07780-0013000	Equivalent commercially available in the U.S.A.
Interior cutter, 34 mm (60° IN/EX)	07780-0014700	Equivalent commercially available in the U.S.A.
Cutter holder, 5.5 mm	07781-0010101	Equivalent commercially available in the U.S.A.
DUAL CLUTCH TRANSMISSION (DCT)		
SCS short connector	070MZ-0010300	070MZ-001A300
Test probe, 2 packs	07ZAJ-RDJA110	07ZAJ-RDJA110
Gear holder, 2.5	07724-0010100	07724-001A100
Bearing remover, 20 mm	07931-MA70000	Not available in U.S.A.
Remover handle	–	07936-3710100
Bearing remover, 20 mm	–	07936-3710600
Remover weight	–	07936-371020A
SUB-TRANSMISSION		
Remover weight	07741-0010201	07936-371020A

TOOL NAME	TOOL No	
	Except U.S.A.	U.S.A.
Remover handle	07936-3710100	07936-3710100
Bearing remover shaft set, 17 mm	07936-3710300	07936-3710300
Bearing remover, 22 mm	070MC-MFR0100	070MC-MFR0100
Driver	07749-0010000	07749-0010000
Attachment, 62 x 68 mm	07746-0010500	07746-0010500
Attachment, 62 x 64 mm	07947-6340400	07947-6340400
Attachment, 52 x 55 mm	07746-0010400	07746-0010400
Attachment, 37 x 40 mm	07746-0010200	07746-0010200
Attachment, 32 x 35 mm	07746-0010100	07746-0010100
Pilot, 30 mm	07746-0040700	07746-0040700
Pilot, 28 mm	07746-0041100	07746-0041100
Pilot, 25 mm	07746-0040600	07746-0040600
Pilot, 22 mm	07746-0041000	07746-0041000
Pilot, 17 mm	07746-0040400	07746-0040400
ALTERNATOR/STARTER CLUTCH		
Flywheel holder	07725-0040001	07725-0040001
Rotor puller	07733-0020001	07933-3950000
Remover weight	07741-0010201	07936-371020A
Bearing remover shaft, 10 mm	07936-GE00100	07936-GE0A000
Bearing remover head, 10 mm	07936-GE00200	07936-GE0A000
Driver	07749-0010000	07749-0010000
Attachment, 42 x 47 mm	07746-0010300	07746-0010300
Attachment, 24 x 26 mm	07746-0010700	07746-0010700
Pilot, 30 mm	07746-0040700	07746-0040700
Pilot, 10 mm	07746-0040100	07746-0040100
CRANKCASE/TRANSMISSION/BALANCER		
Gear holder, 2.5	07724-0010100	07724-001A100
Bearing remover, 22 mm	070MC-MFR0100	070MC-MFR0100
Remover handle	07936-3710100	07936-3710100
Remover weight	07741-0010201	07936-371020A
Driver, 15 x 280 mm	07949-3710001	07949-3710001
Attachment, 52 x 55 mm	07746-0010400	07746-0010400
Pilot, 22 mm	07746-0041000	07746-0041000
Pilot, 12 mm	07746-0040200	07746-0040200
Rotor puller	07733-0020001	07933-3950000
STEERING SYSTEM		
Steering Joint Gauge	07AMJ-HL4A100	07AMJ-HL4A100
Ball joint remover, 28 mm	07MAC-SL00201	07MAC-SL00202
Lock nut wrench	070MA-HL40100	070MA-HL4A100
Driver, 22 mm I.D.	07746-0020100	07746-0020100
Base collar	07GAJ-PG20120	07GAJ-PG20120
Lock washer clinch pilot	07NAZ-SR30100	a commercially available punch in the U.S.A.
FRONT DRIVING MECHANISM		
Half shaft disassembly mould	–	070MF-HR3A100
Driver	07749-0010000	07749-0010000
Attachment, 52 x 55 mm	07746-0010400	07746-0010400
Pilot, 32 mm	07MAD-PR90200	07MAD-PR90200
Fork seal driver weight	07747-0010100 or 07947-3710101	07747-0010100 or 07947-3710101
Fork seal driver attachment, 33 mm I.D.	07747-0010501 or 07HMD-MR70100	07747-0010501 or 07HMD-MR70100
Pinion puller base	07HMC-MM80110	07HMC-MM8011A
Puller shaft and nut	07965-VM00200	07931-ME4010B and 07931-HB3020A
Threaded adaptor	070MF-HP50100	070MF-HP5A100
Lock nut wrench, 30 x 64 mm	07916-MB00002	07916-MB00002
Attachment, 30 mm I.D.	07746-0030300	07746-0030300
Bearing remover head, 12 mm	07936-1660110	07936-1660110
Bearing remover shaft, 12 mm	07936-1660120	07936-166010A and 07936-3710100
Remover weight	07741-0010201 or 07936-3710200	07936-371020A
Attachment, 22 x 24 mm	07746-0010800	07746-0010800
Pilot, 12 mm	07746-0040200	07746-0040200

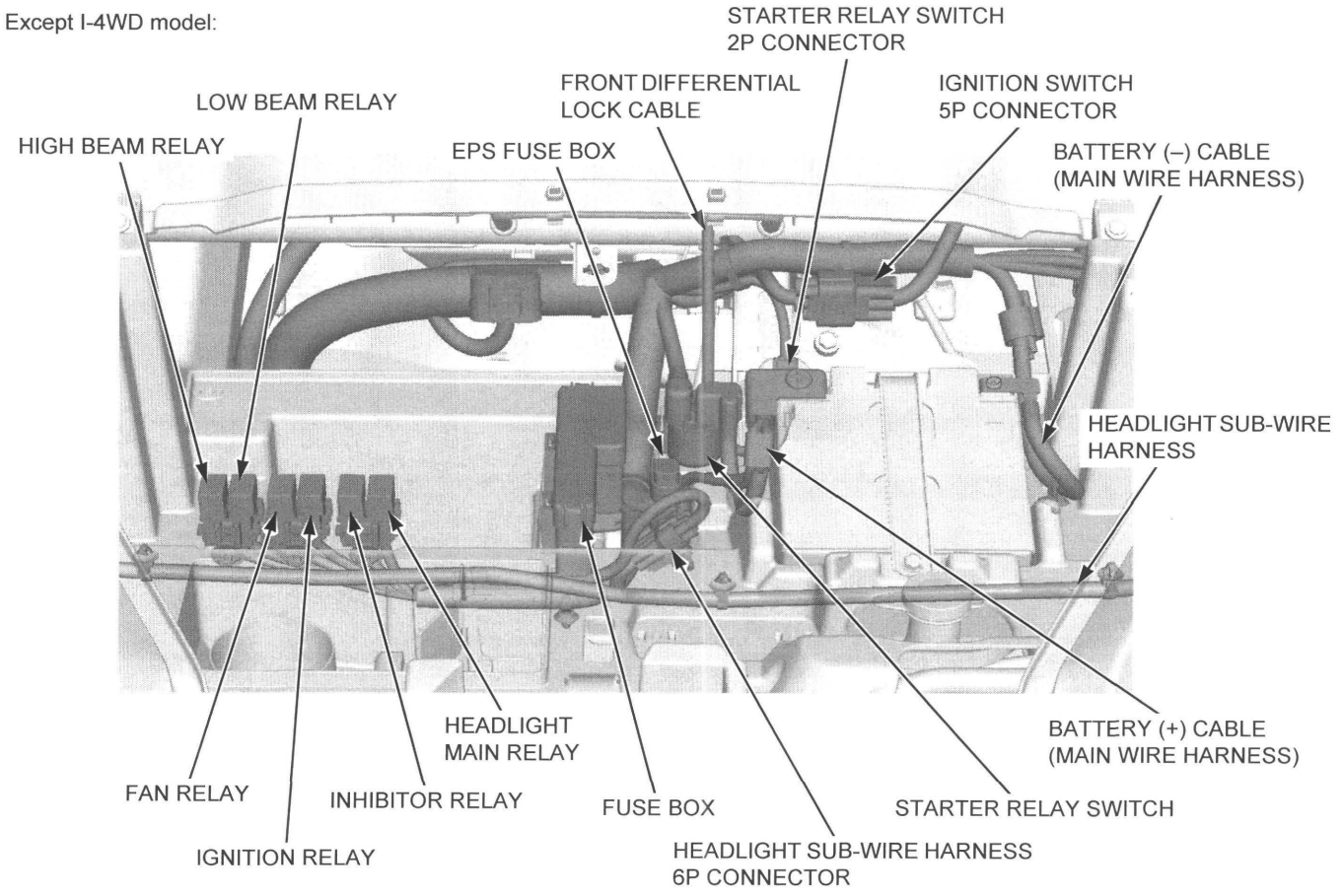
TOOL NAME	TOOL No	
	Except U.S.A.	U.S.A.
Attachment, 62 x 68 mm	07746-0010500	07746-0010500
Pilot, 35 mm	07746-0040800	07746-0040800
Oil seal driver attachment 56 mm	07LAD-PW50100	07LAD-PW50100
Oil seal driver, 46 mm	07HAD-PJ70100	07HAD-PJ70100
Bearing remover head, 15 mm	07936-KC10200 or 07936-KC10500	07936-KC10200 or 07936-KC10500
Bearing remover shaft, 15 mm	07936-KC10100 or 07936-KC10500	07936-KC10100 or 07936-KC10500
Bearing clip compressor, 25 mm	070ME-HN80100	070ME-HN8A100
Driver, 15 x 280 mm	07949-3710001	07949-3710001
Pilot, 15 mm	07746-0040300	07746-0040300
Attachment, 42 x 47 mm	07746-0010300 or 07JAD-PH80101	07746-0010300 or 07JAD-PH80101
REAR DRIVING MECHANISM		
Half shaft disassembly mould	–	070MF-HR3A100 (U.S.A. only)
Pinion puller base	07HMC-MM80110	07HMC-MM8011A
Puller shaft and nut	07965-GM00300	07965-GM00300
Holding tool	Snap-on YA6010A or equivalent	Snap-on YA6010A or equivalent
Attachment, 24 x 26 mm	07746-0010700	07746-0010700
Attachment, 30 mm I.D.	07746-0030300	07746-0030300
Driver	07749-0010000	07749-0010000
Attachment, 62 x 68 mm	07746-0010500	07746-0010500
Pilot, 40 mm	07746-0040900	07746-0040900
Attachment, 78 x 80 mm	07NAD-PX40100	07NAD-PX40100
Oil seal driver, 46 mm	07HAD-PJ70100	07HAD-PJ70100
Bearing remover, 20 mm	07936-3710600	07936-3710600
Remover handle	07936-3710100	07936-3710100
Remover weight	07741-0010201 or 07936-3710200	07936-371020A
Bearing clip compressor, 37 mm	07AME-HL4A100	07AME-HL4A100
Driver, 15 x 280 mm	07949-3710001	07949-3710001
Attachment, 32 x 35 mm	07746-0010100	07746-0010100
Pilot, 22 mm	07746-0041000	07746-0041000
Attachment, 52 x 55 mm	07746-0010400	07746-0010300
Fork seal driver weight	07947-KA50100	07947-KA50100
Driver attachment	07LAD-PW50500	07AMD-HL1A100
WHEEL/SUSPENSION		
ATV Bead Buster	–	KLS379024
Ball joint remover, 28 mm	07MAC-SL00201	07MAC-SL00202
Driver	07749-0010000	07749-0010000
Attachment, 72 x 75 mm	07746-0010600	07746-0010600
Pilot, 40 mm	07746-0040900	07746-0040900
Attachment, 32 x 35 mm	07746-0010100	07746-0010100
Fork seal driver 45.2 mm	07KMD-KZ30100	07KMD-KZ30100
Driver handle	07746-0030100	07746-0030100
Fork seal driver attachment	07947-KF00100	07947-KF00100
Fork seal driver	07947-KA20200	07947-KA20200
Collar 27.3/30.3	07964-MB00200	07964-MB00200
Base 48.4/56	07946-KM90600	07946-KM90600
Fork seal driver attachment	07947-KF00100	07947-KF00100
Pilot, 25 mm	07746-0040600	07746-0040600
BATTERY/CHARGING SYSTEM		
Motorcycle battery analyzer	–	Micro 404XL (U.S.A. only)
Christie battery charger	MC1012/2T	Tecmate PRO 4S (U.S.A. only)
LIGHTS/METERS/SWITCHES		
Test probe, 2 packs	07ZAJ-RDJA110	07ZAJ-RDJA110
ELECTRIC POWER STEERING (EPS)		
SCS short connector	070MZ-0010300	070MZ-001A300
Test probe, 2 packs	07ZAJ-RDJA110	07ZAJ-RDJA110
I-4WD (Intelligent 4 Wheel Drive)		
SCS short connector	070MZ-0010300	070MZ-001A300
Test probe, 2 packs	07ZAJ-RDJA110	07ZAJ-RDJA110

CABLE & HARNESS ROUTING

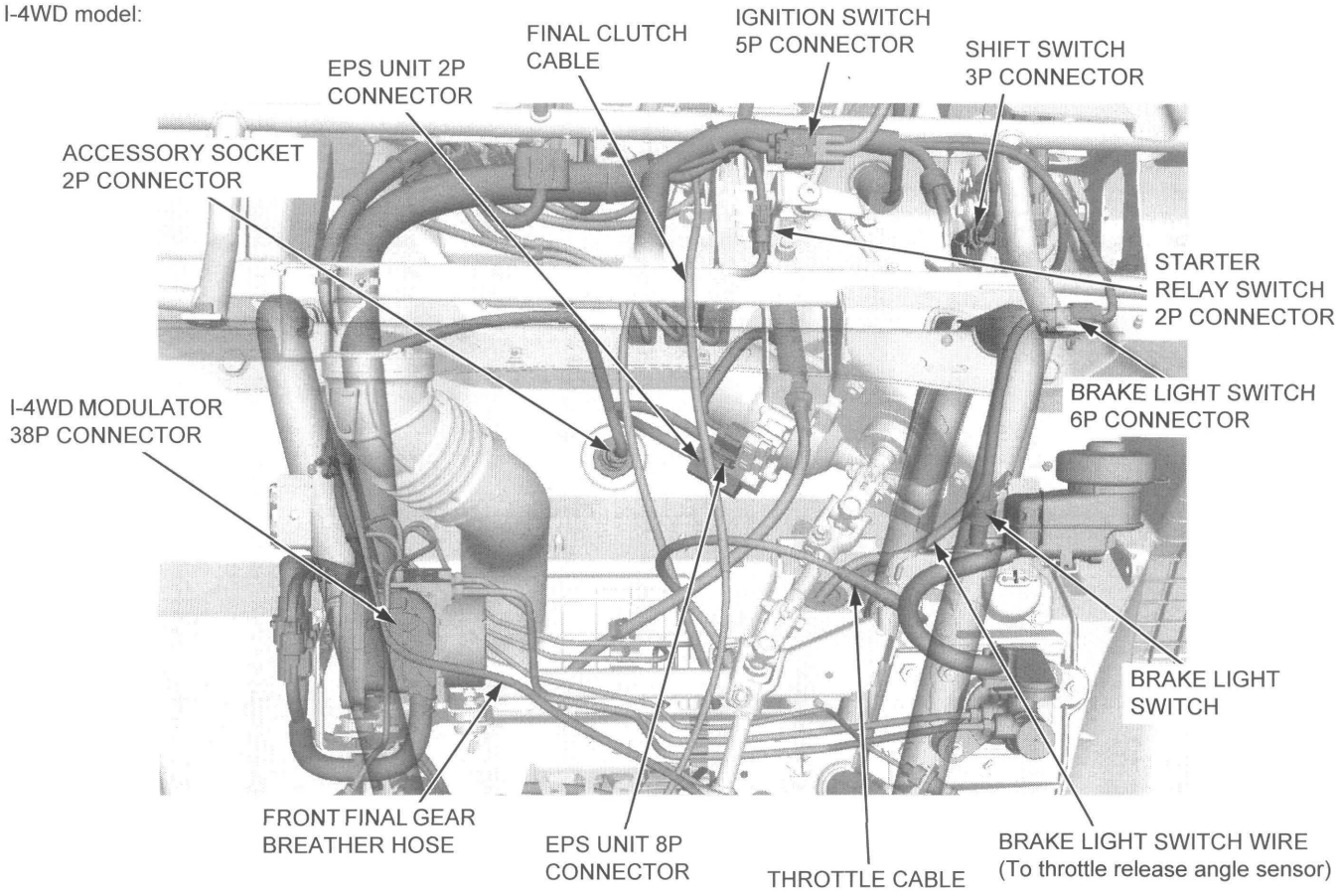
I-4WD model:



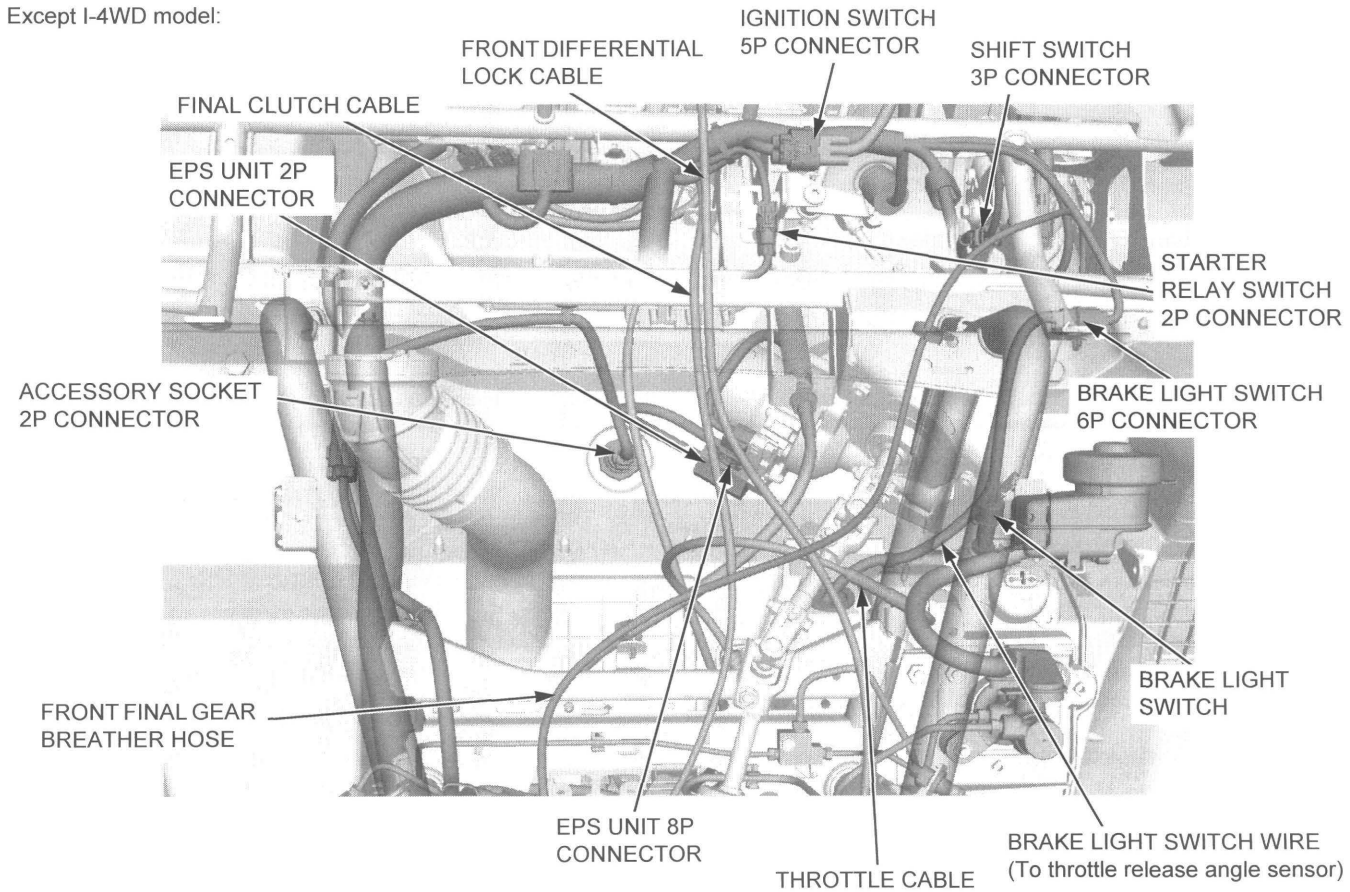
Except I-4WD model:



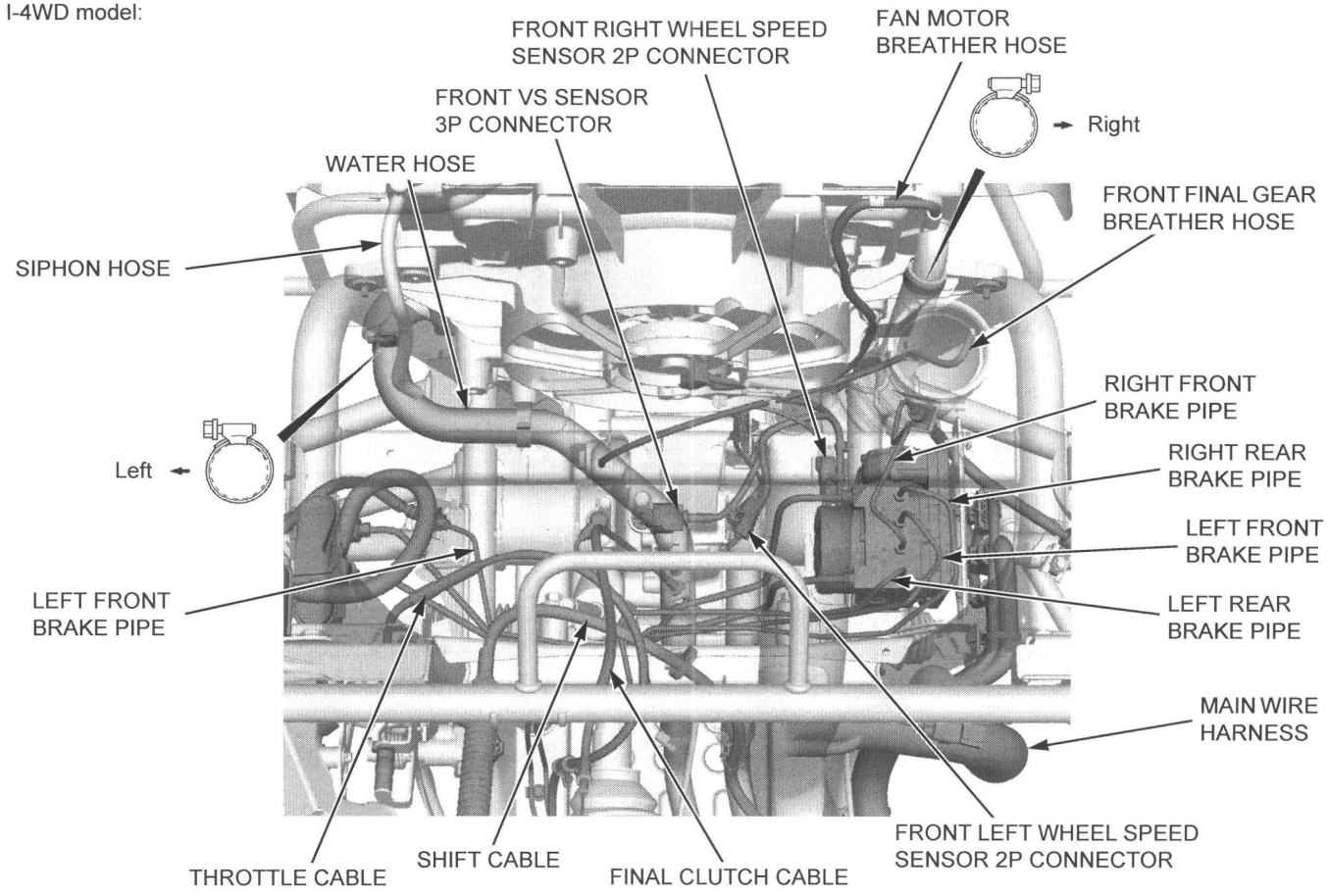
I-4WD model:



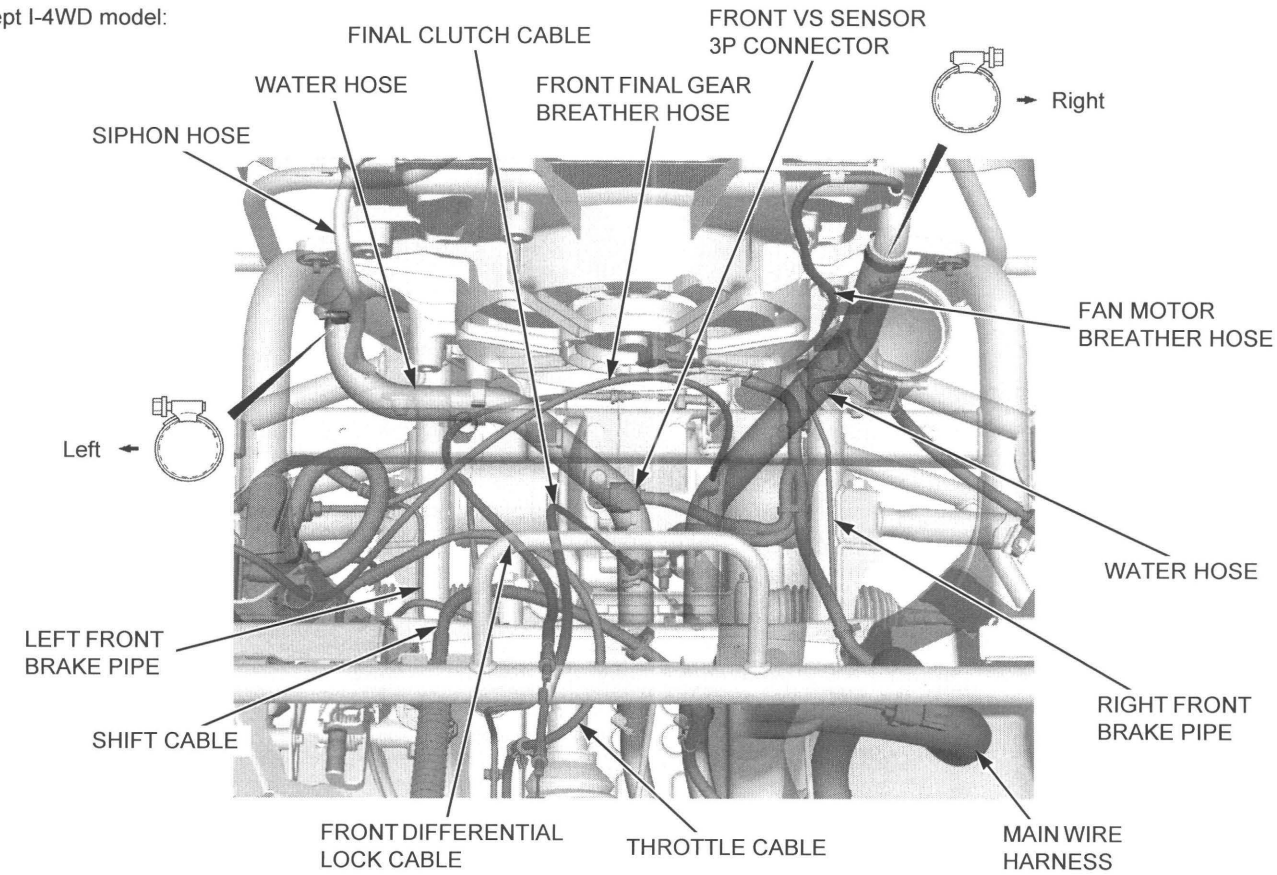
Except I-4WD model:



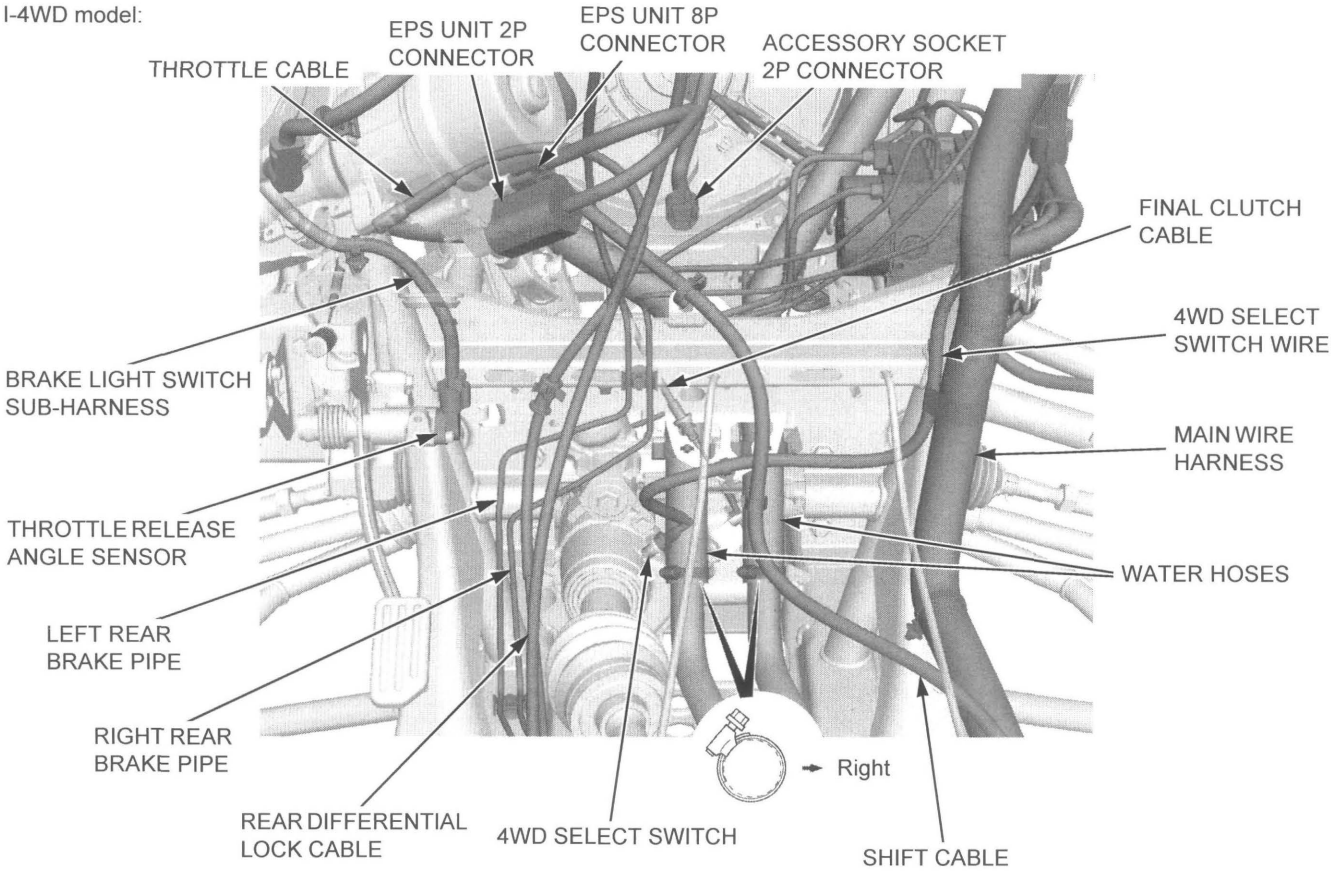
I-4WD model:



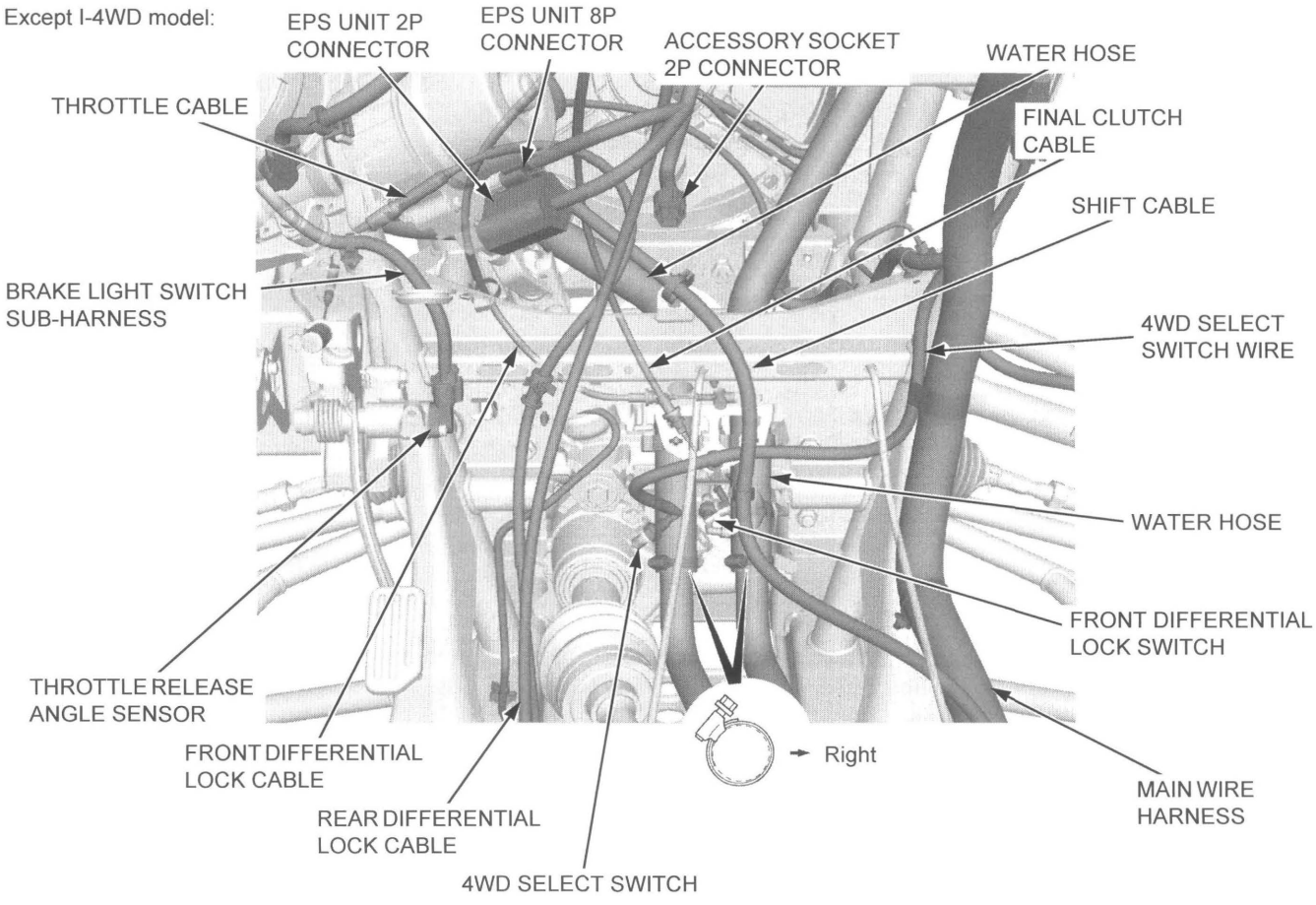
Except I-4WD model:



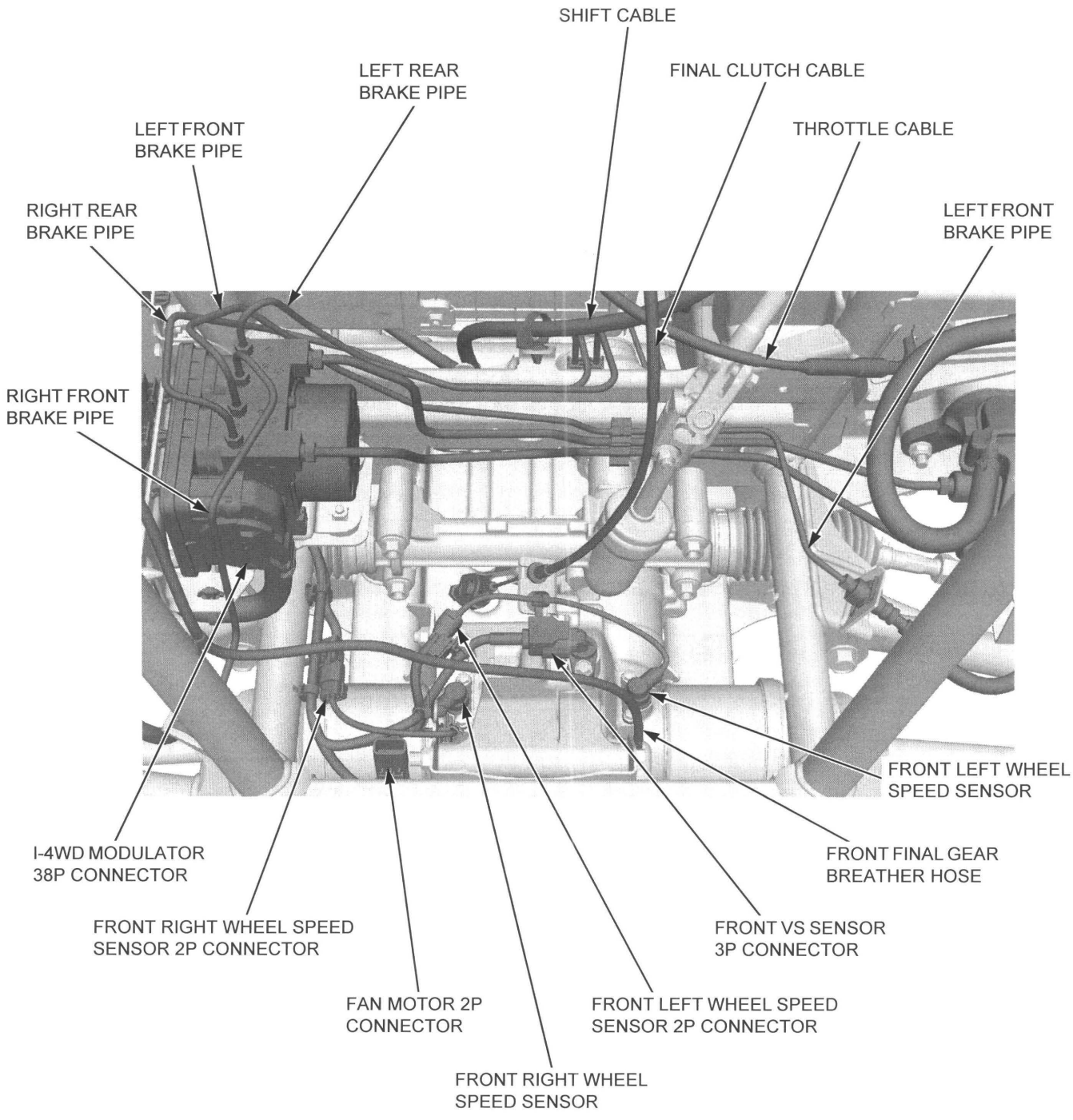
I-4WD model:



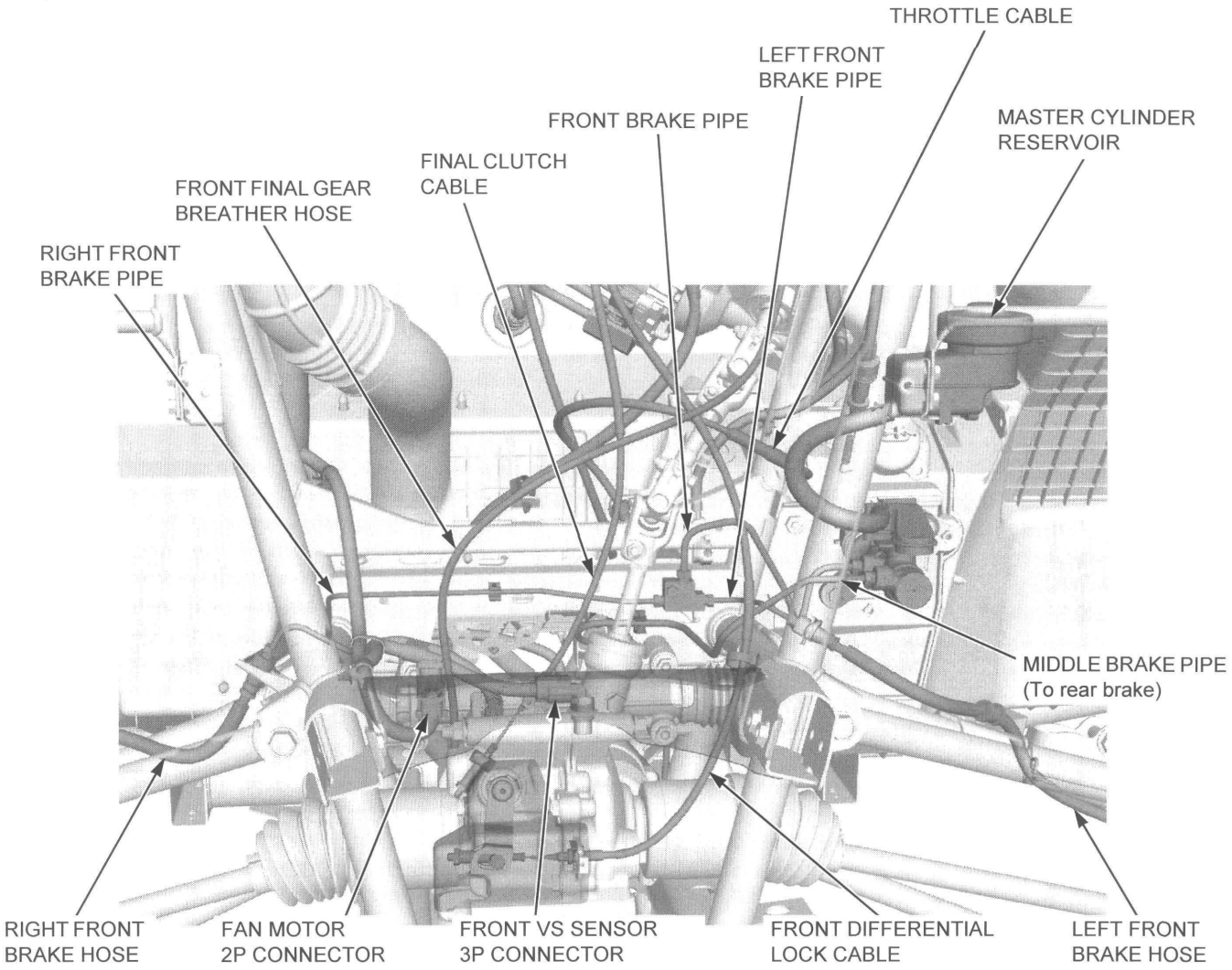
Except I-4WD model:

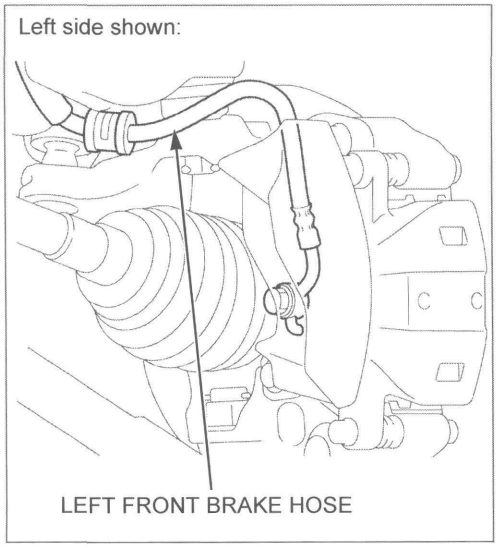


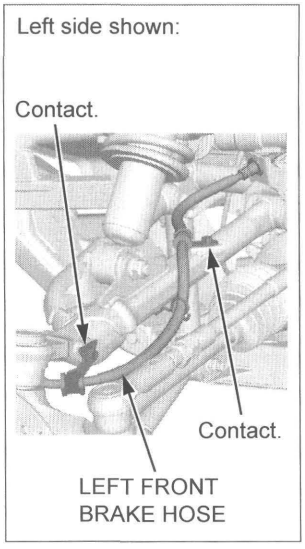
I-4WD model:

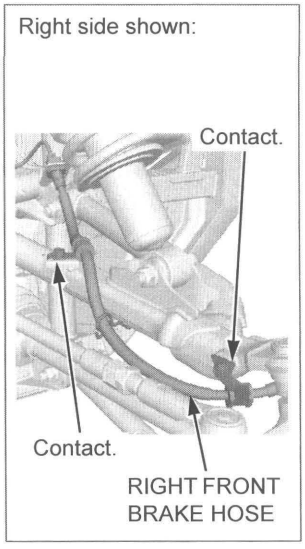

SHIFT CABLE
LEFT REAR BRAKE PIPE
FINAL CLUTCH CABLE
LEFT FRONT BRAKE PIPE
THROTTLE CABLE
RIGHT REAR BRAKE PIPE
LEFT FRONT BRAKE PIPE
RIGHT FRONT BRAKE PIPE
FRONT LEFT WHEEL SPEED SENSOR
I-4WD MODULATOR 38P CONNECTOR
FRONT FINAL GEAR BREATHER HOSE
FRONT RIGHT WHEEL SPEED SENSOR 2P CONNECTOR
FRONT VS SENSOR 3P CONNECTOR
FAN MOTOR 2P CONNECTOR
FRONT LEFT WHEEL SPEED SENSOR 2P CONNECTOR
FRONT RIGHT WHEEL SPEED SENSOR

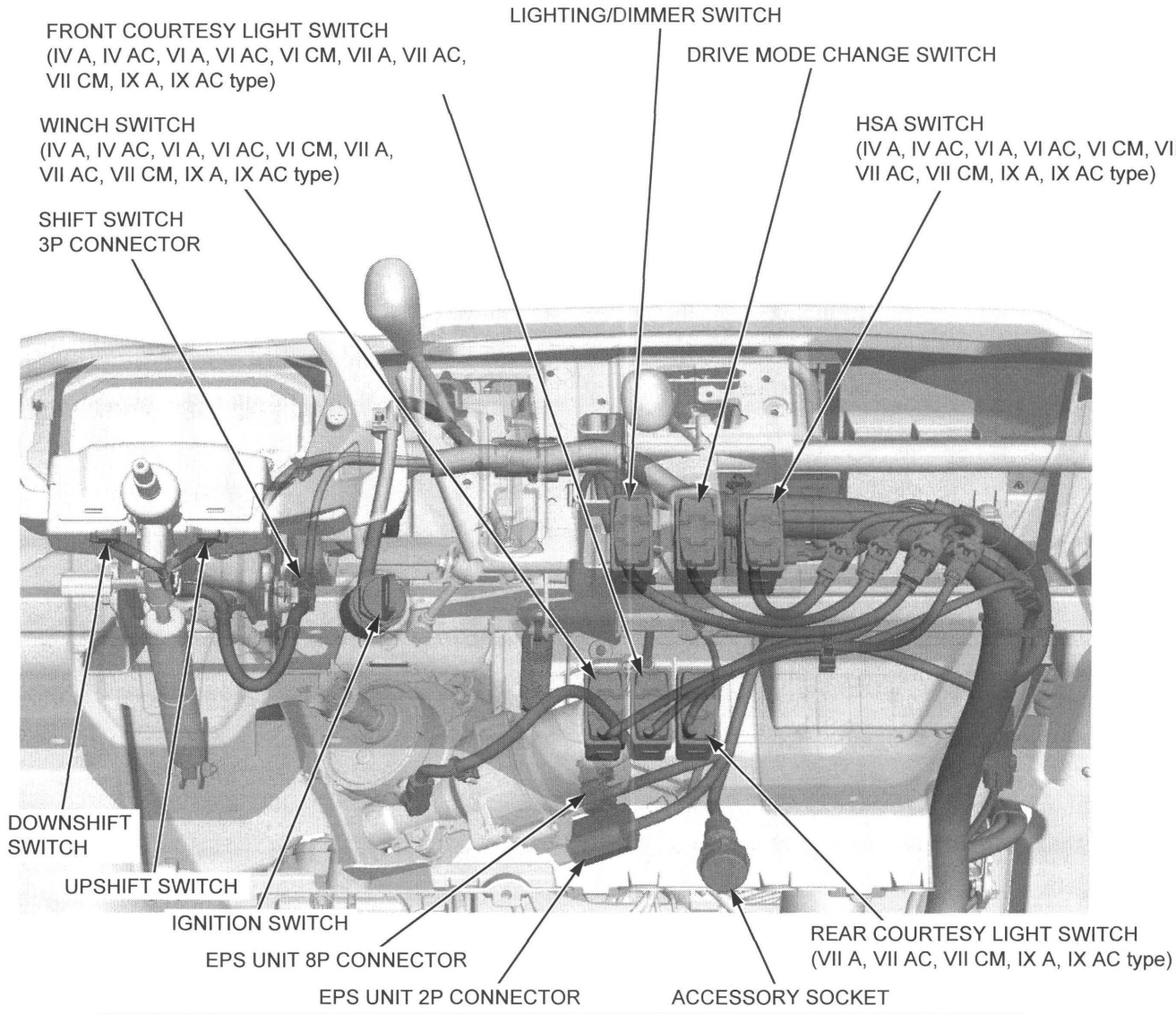
Except I-4WD model:

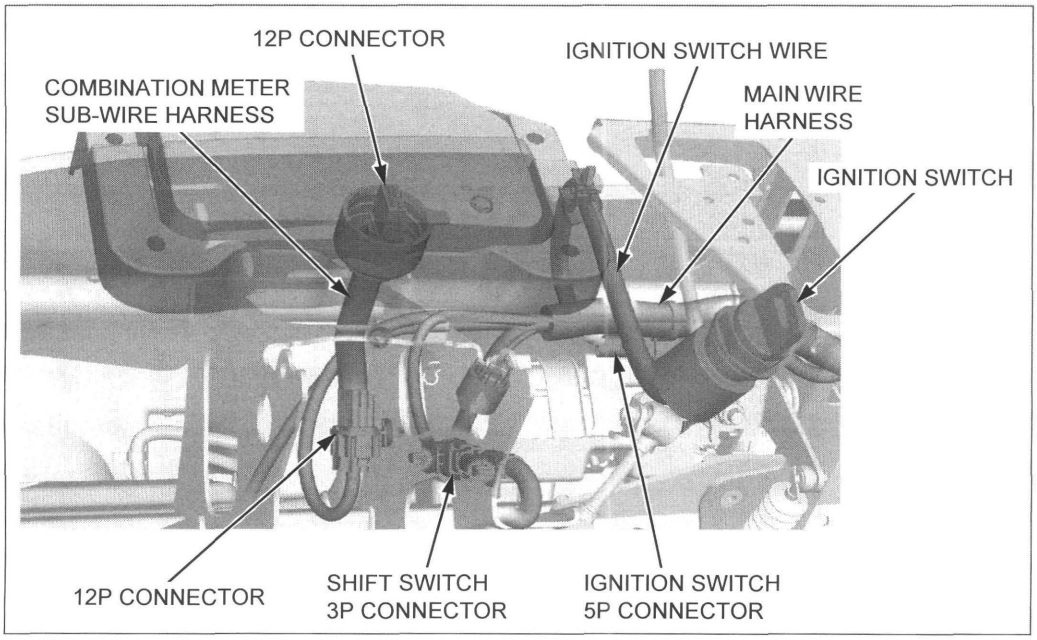




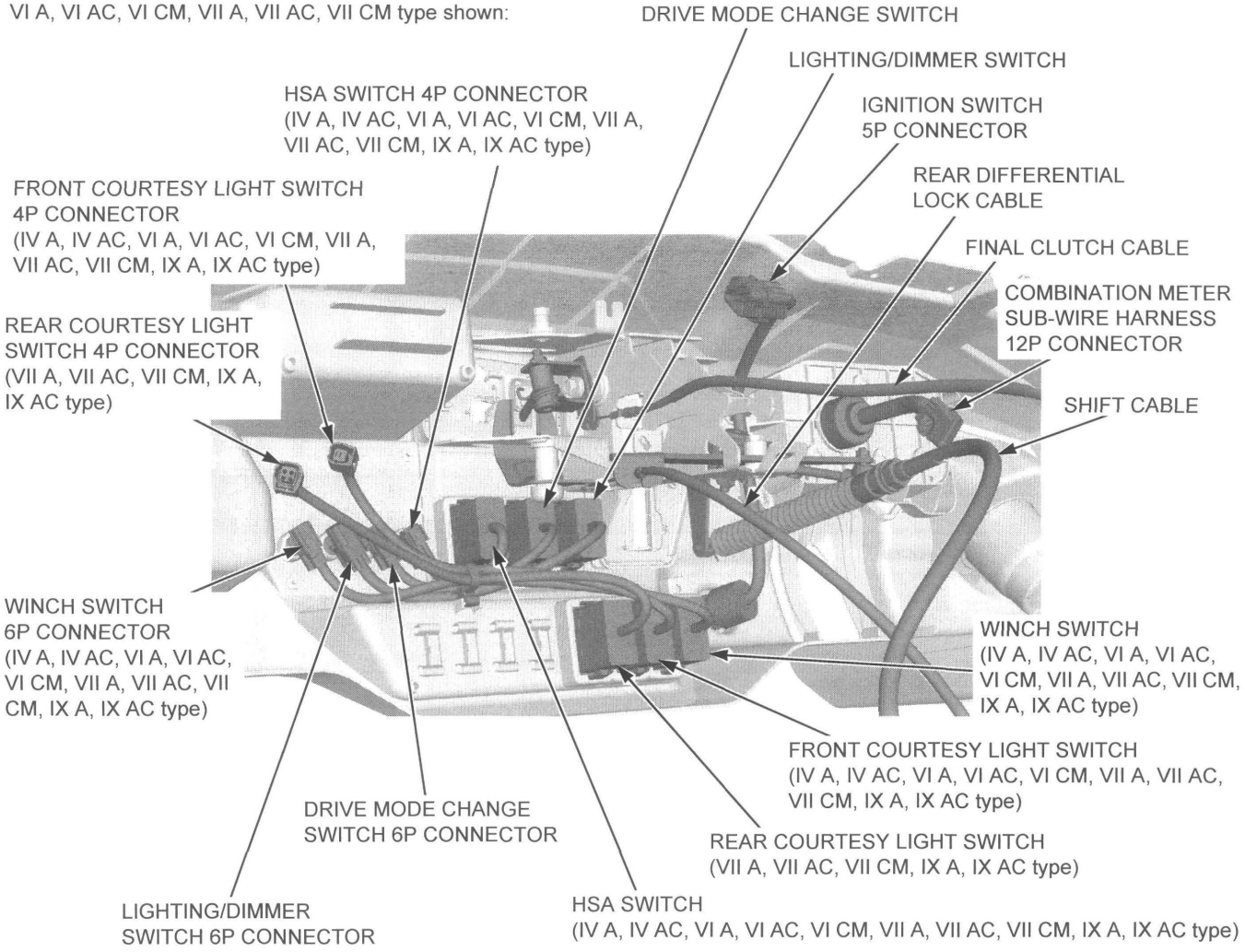


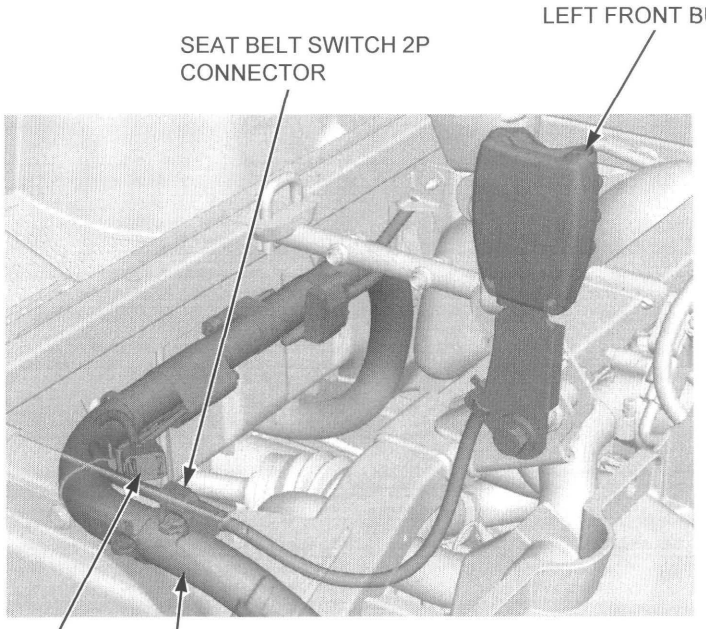



FRONT COURTESY LIGHT SWITCH
(IV A, IV AC, VI A, VI AC, VI CM, VII A, VII AC,
VII CM, IX A, IX AC type)
LIGHTING/DIMMER SWITCH
DRIVE MODE CHANGE SWITCH
WINCH SWITCH
(IV A, IV AC, VI A, VI AC, VI CM, VII A,
VII AC, VII CM, IX A, IX AC type)
HSA SWITCH
(IV A, IV AC, VI A, VI AC, VI CM, VII A,
VII AC, VII CM, IX A, IX AC type)
SHIFT SWITCH
3P CONNECTOR
DOWNSHIFT
SWITCH
UPSHIFT SWITCH
IGNITION SWITCH
EPS UNIT 8P CONNECTOR
EPS UNIT 2P CONNECTOR
ACCESSORY SOCKET
REAR COURTESY LIGHT SWITCH
(VII A, VII AC, VII CM, IX A, IX AC type)

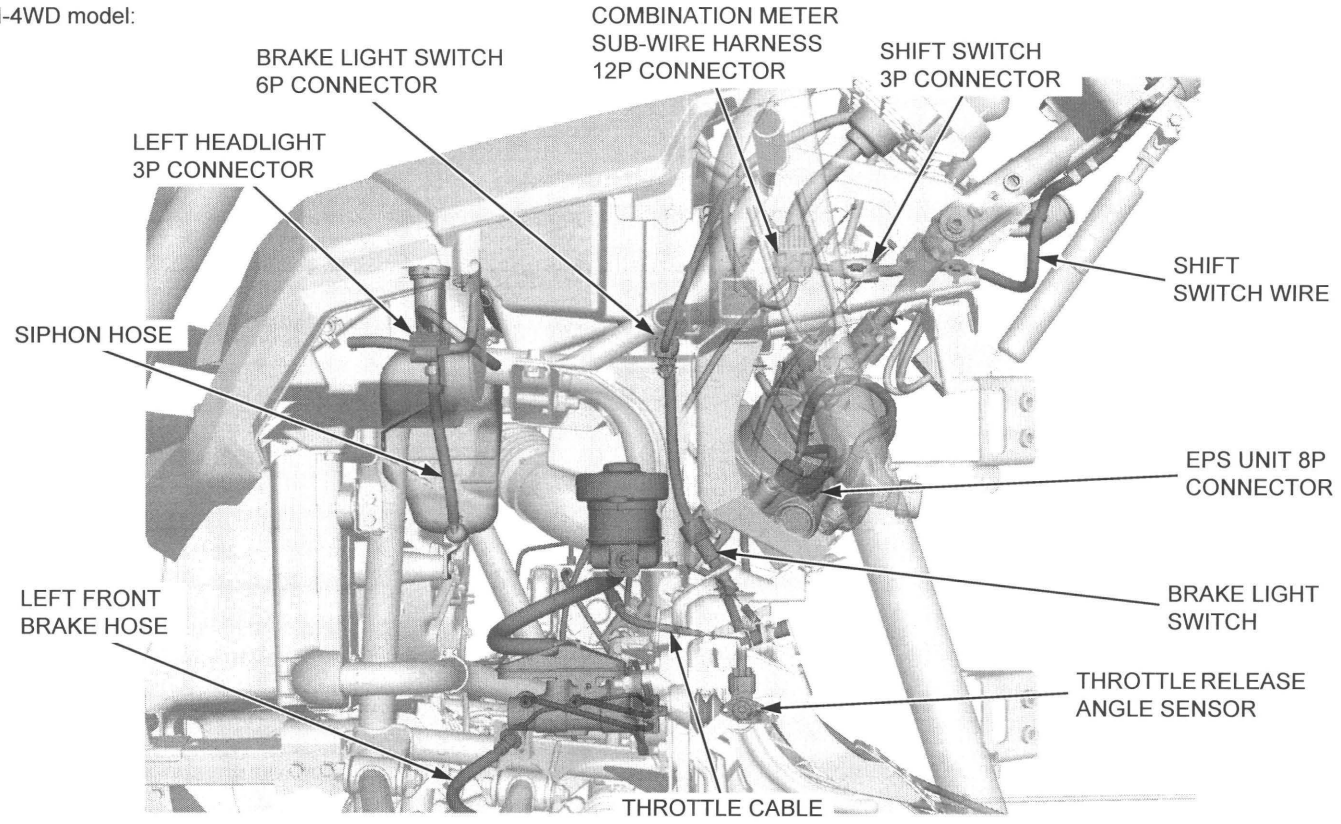

12P CONNECTOR
IGNITION SWITCH WIRE
COMBINATION METER
SUB-WIRE HARNESS
MAIN WIRE
HARNESS
IGNITION SWITCH
12P CONNECTOR
SHIFT SWITCH
3P CONNECTOR
IGNITION SWITCH
5P CONNECTOR

VI A, VI AC, VI CM, VII A, VII AC, VII CM type shown:

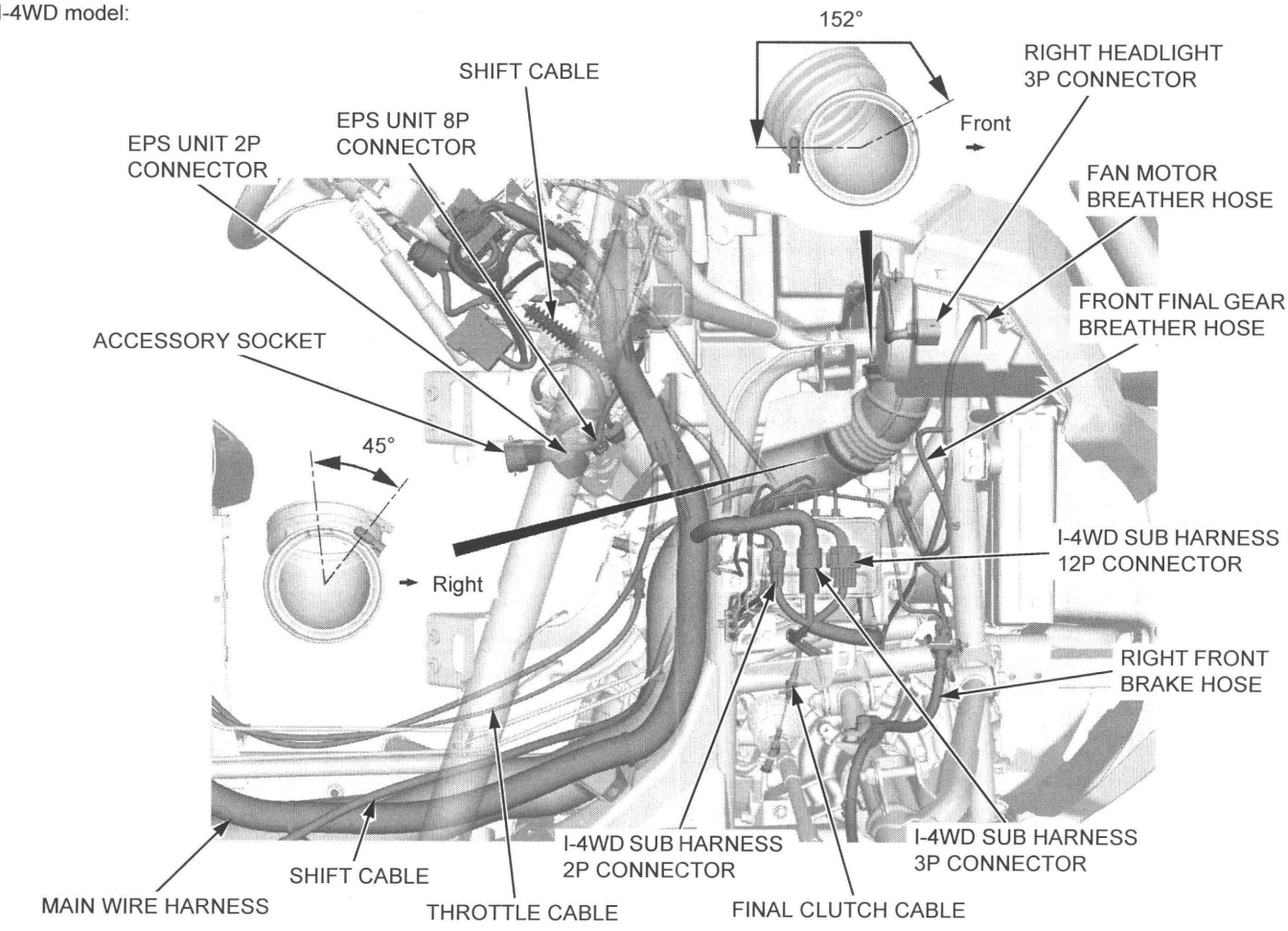




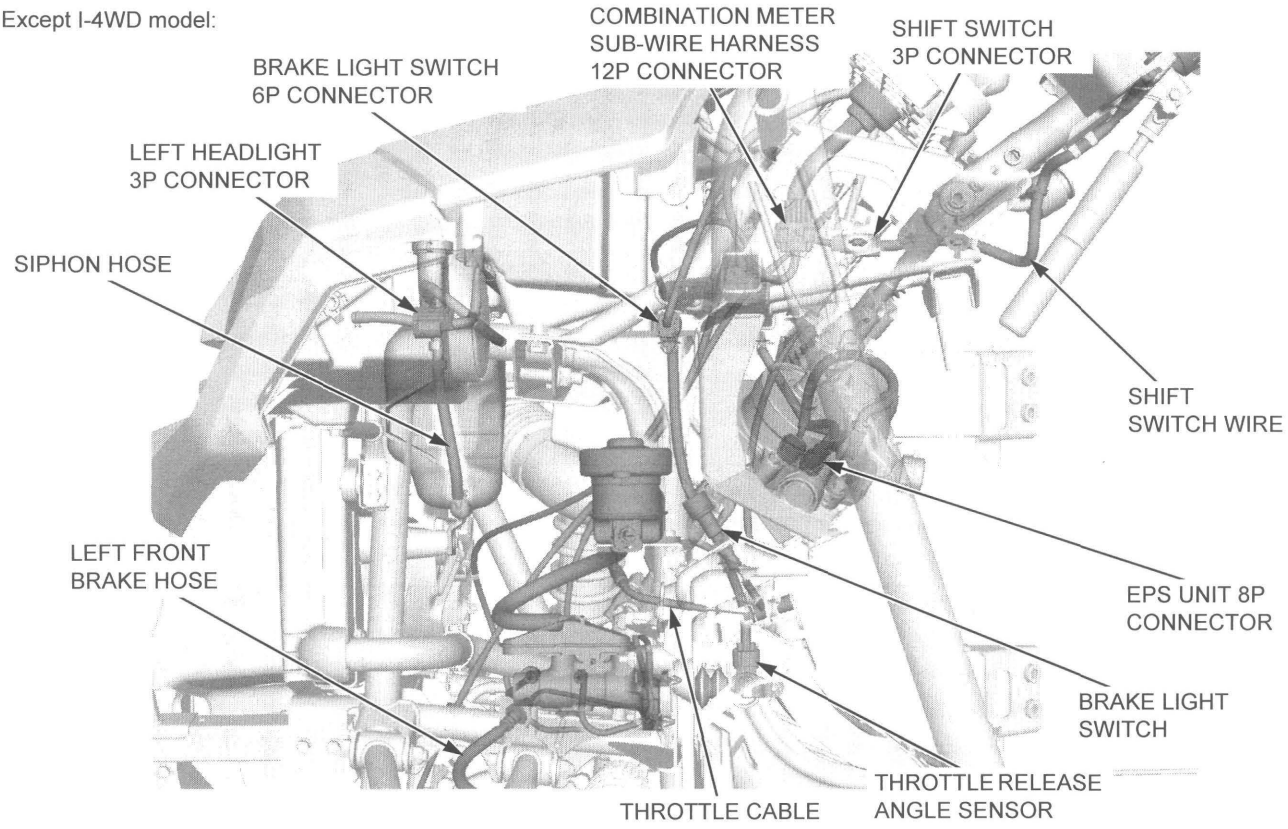
I-4WD model:



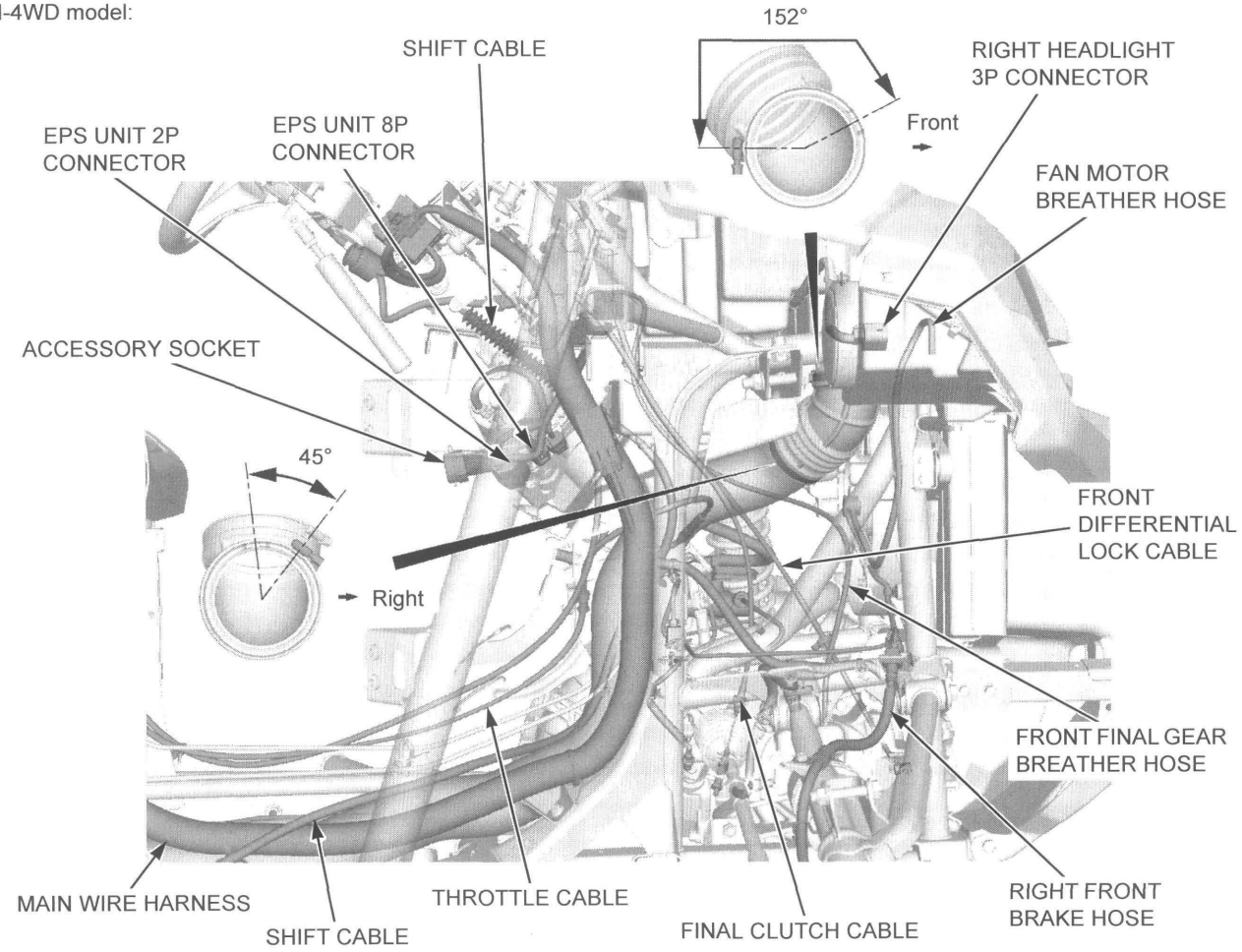
I-4WD model:



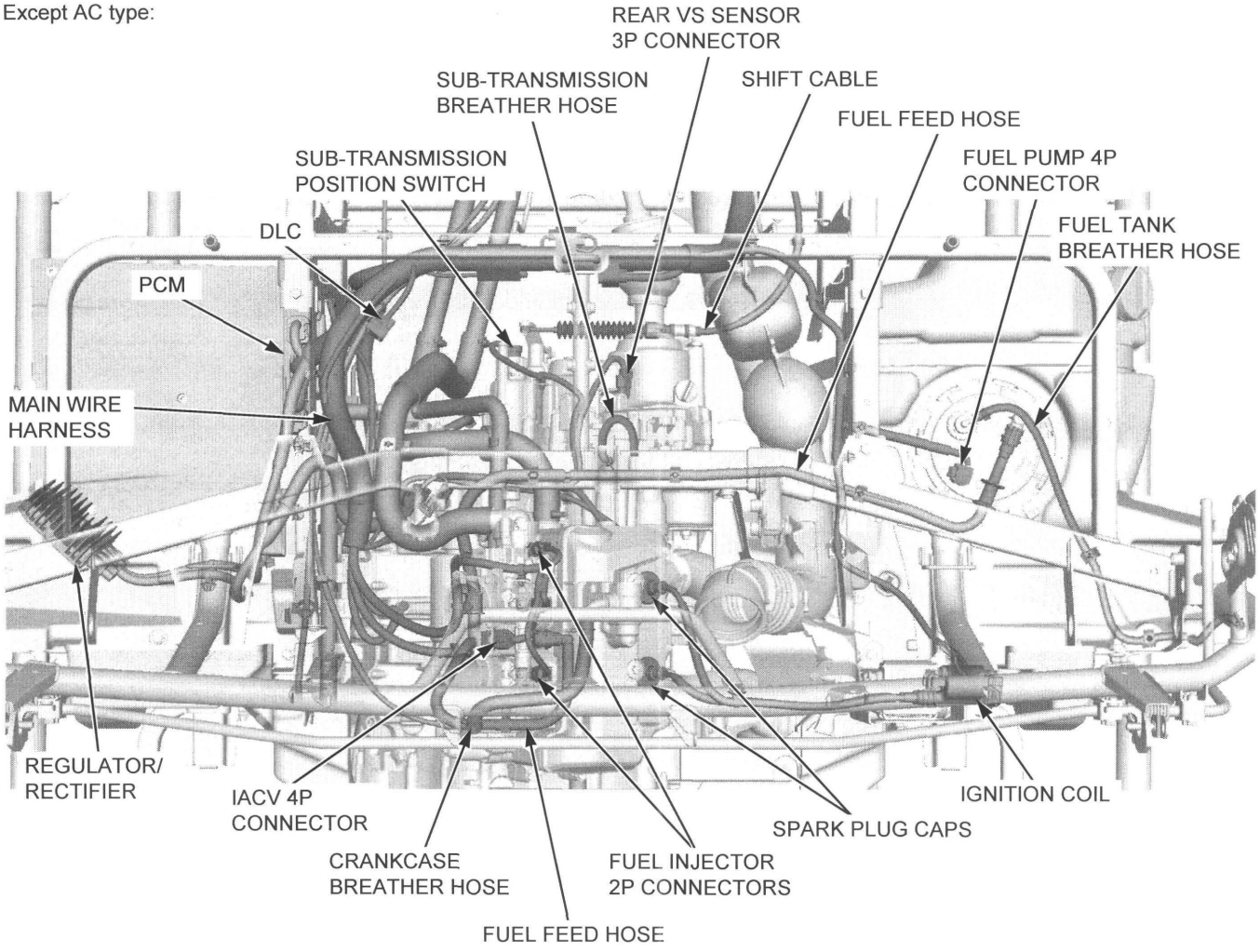
Except I-4WD model:



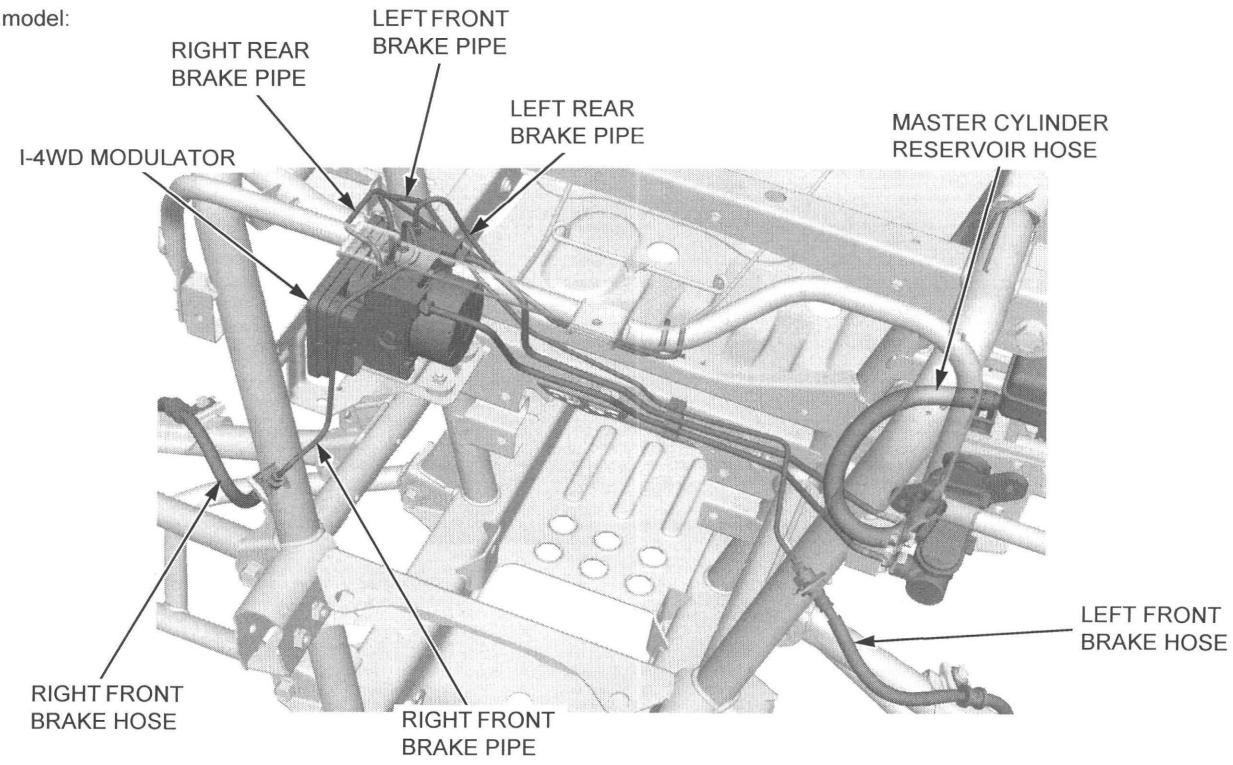
Except I-4WD model:



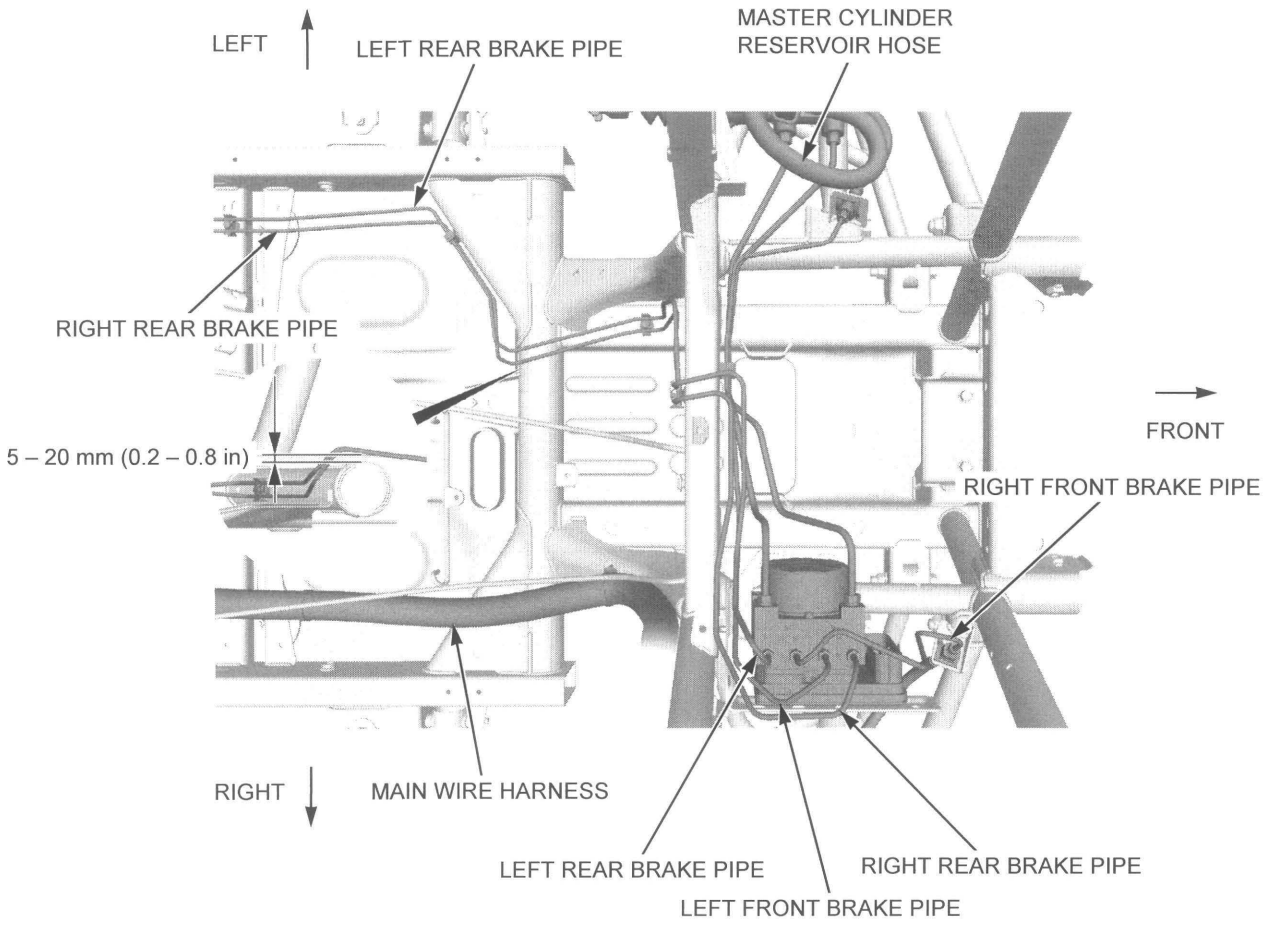
Except AC type:

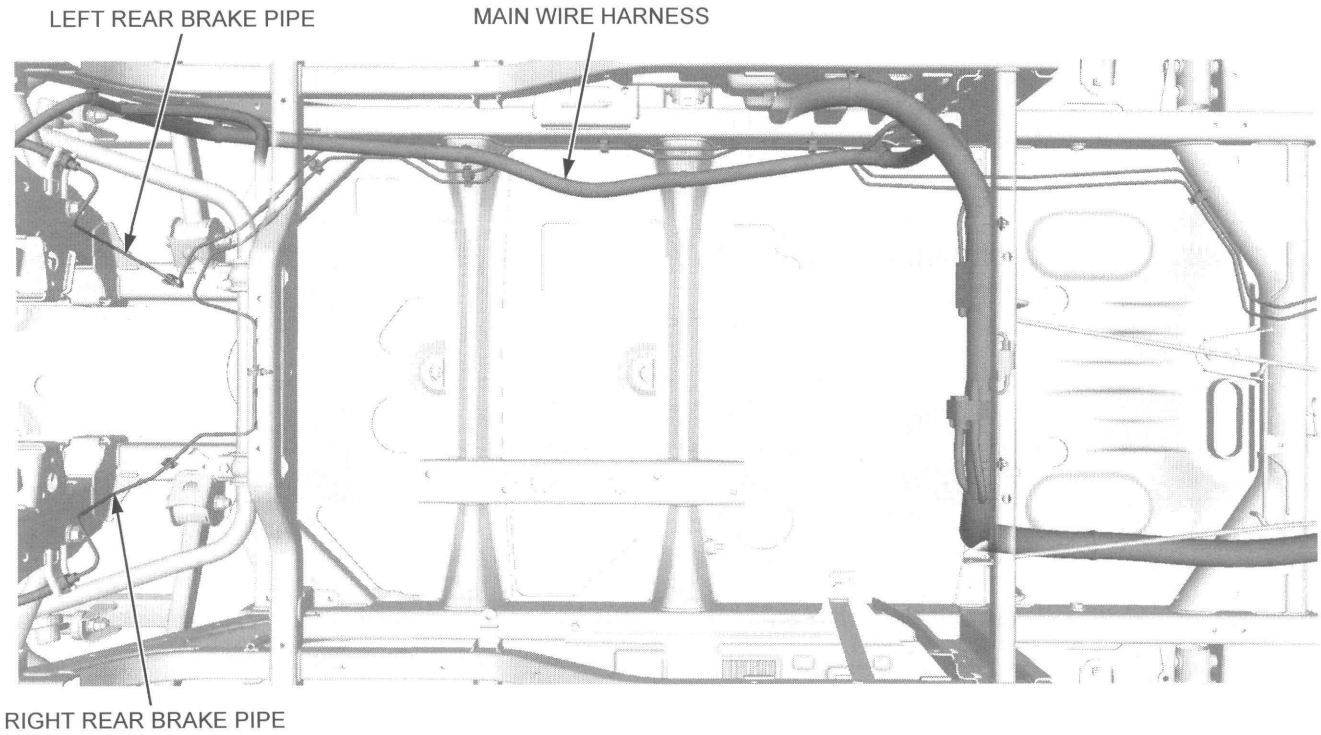


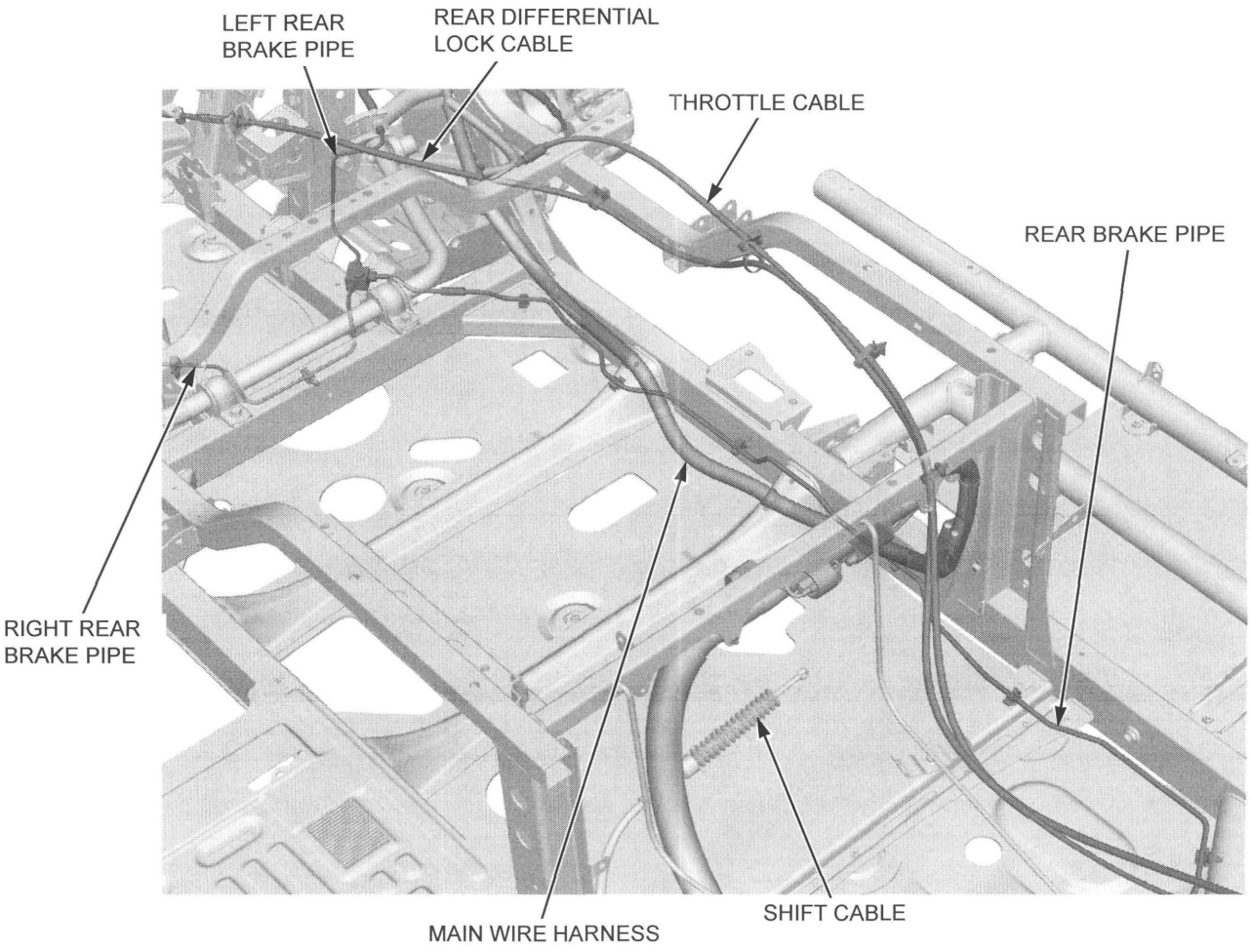
I-4WD model:

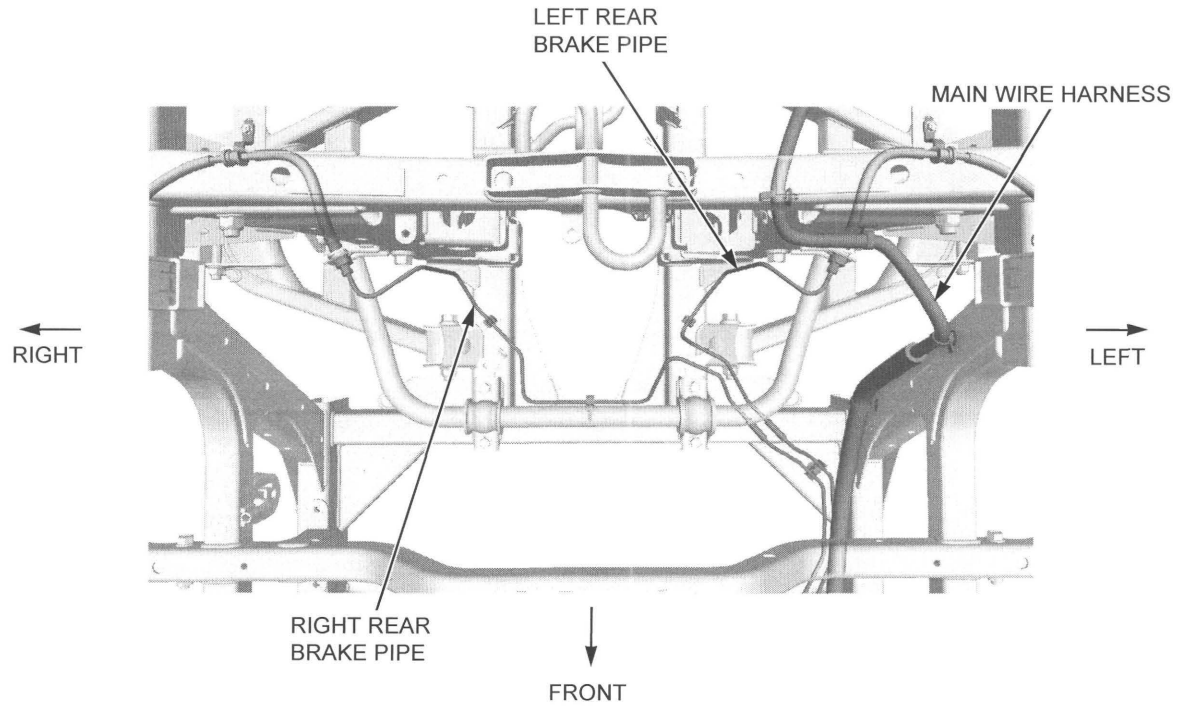


I-4WD model:

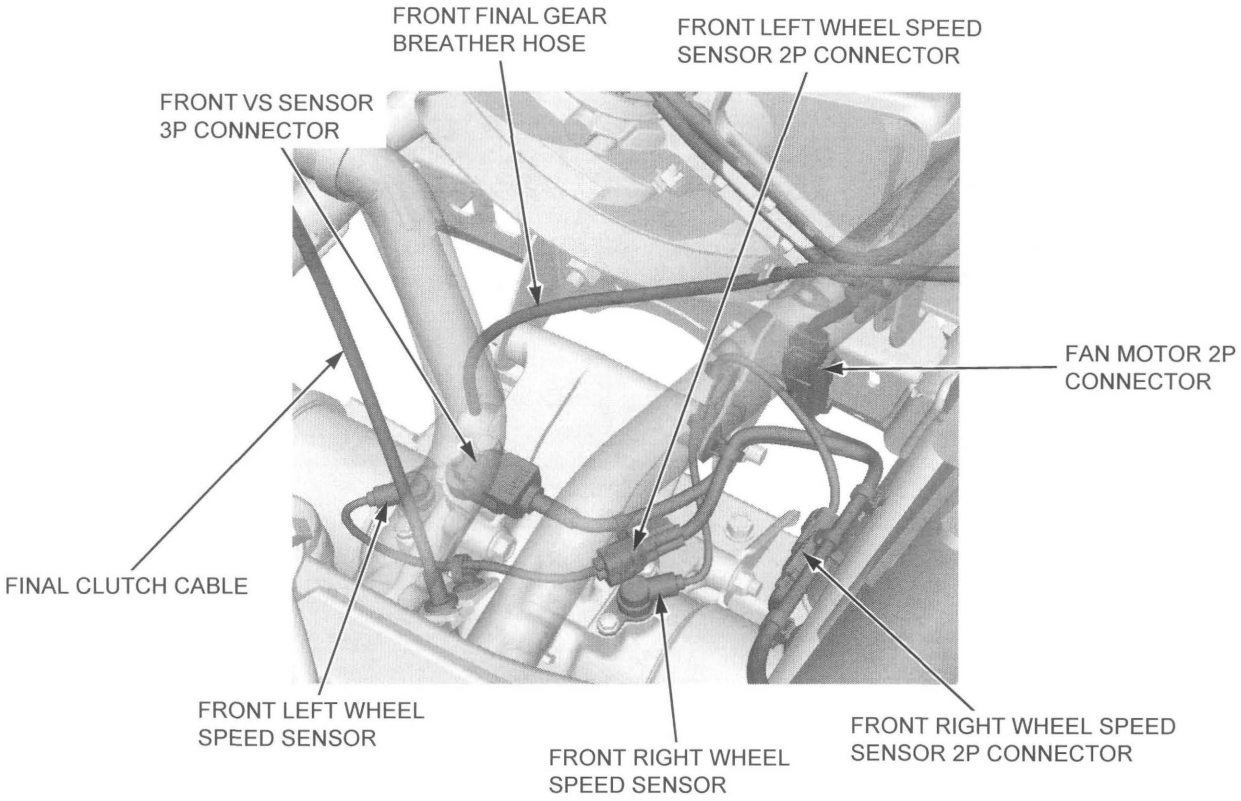

LEFT
LEFT REAR BRAKE PIPE
MASTER CYLINDER RESERVOIR HOSE
RIGHT REAR BRAKE PIPE
5 – 20 mm (0.2 – 0.8 in)
FRONT
RIGHT FRONT BRAKE PIPE
RIGHT
MAIN WIRE HARNESS
LEFT REAR BRAKE PIPE
RIGHT REAR BRAKE PIPE
LEFT FRONT BRAKE PIPE


LEFT REAR BRAKE PIPE
MAIN WIRE HARNESS
RIGHT REAR BRAKE PIPE

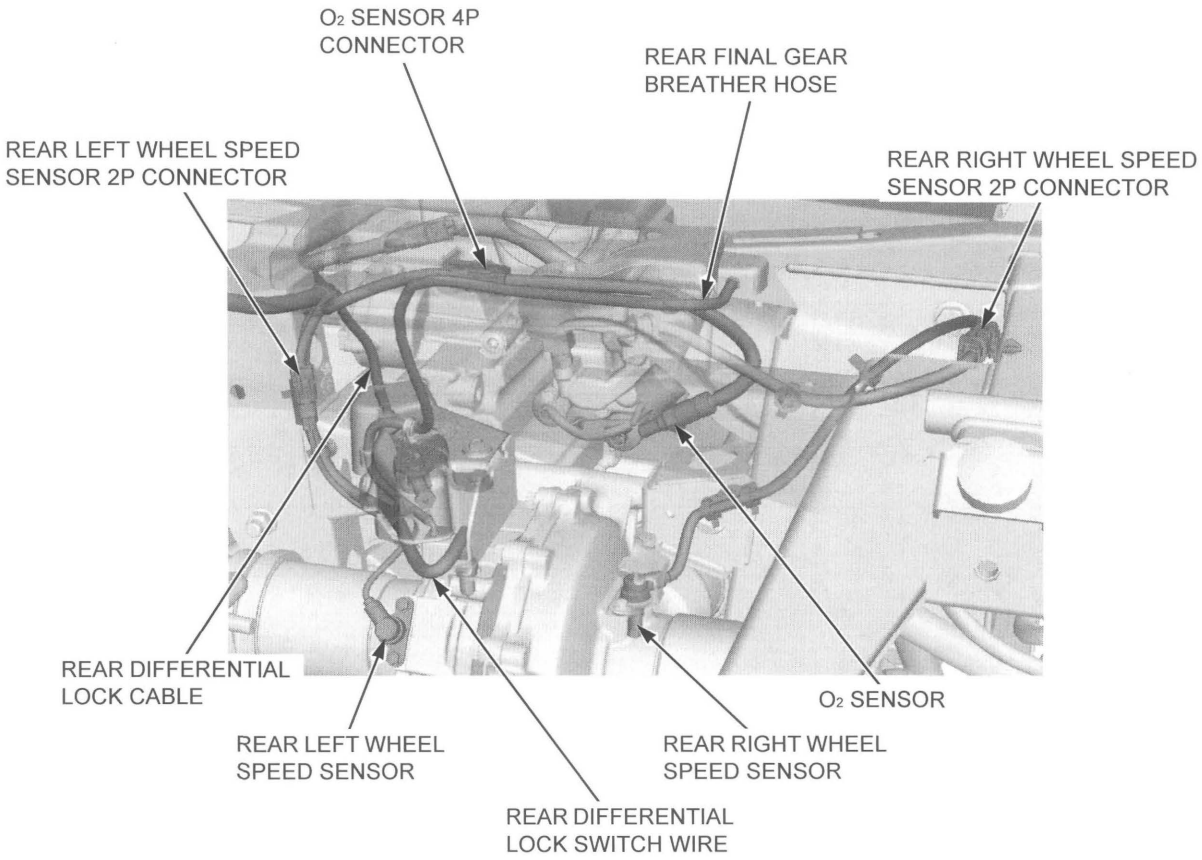

LEFT REAR
BRAKE PIPE
REAR DIFFERENTIAL
LOCK CABLE
THROTTLE CABLE
REAR BRAKE PIPE
RIGHT REAR
BRAKE PIPE
MAIN WIRE HARNESS
SHIFT CABLE


LEFT REAR
BRAKE PIPE
MAIN WIRE HARNESS
RIGHT
LEFT
RIGHT REAR
BRAKE PIPE
FRONT

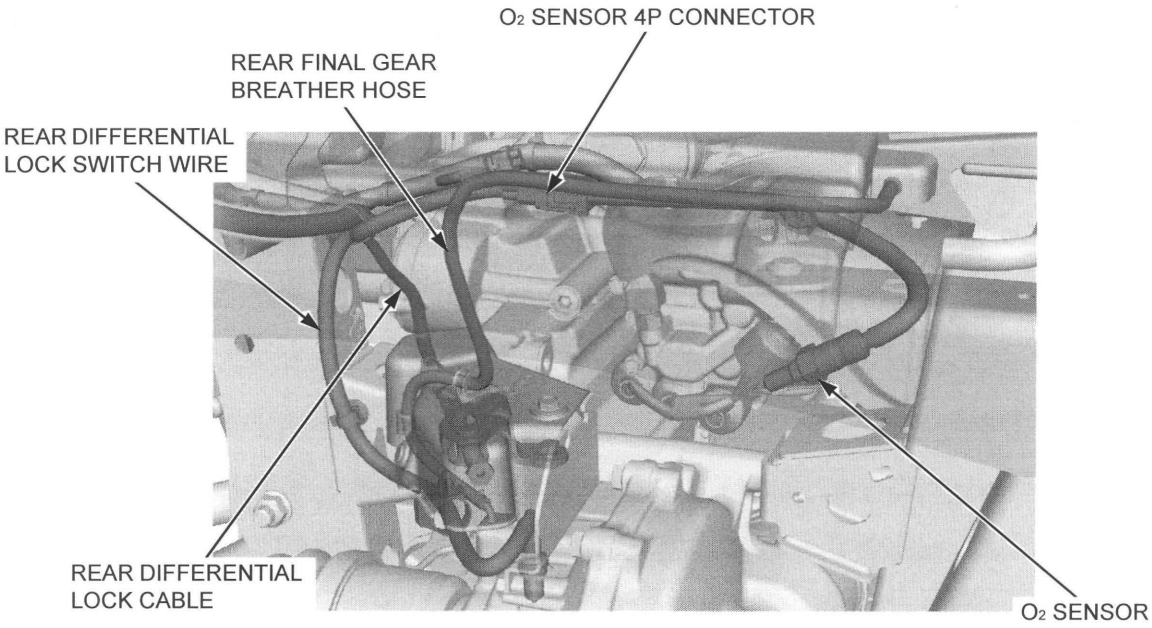
I-4WD model:

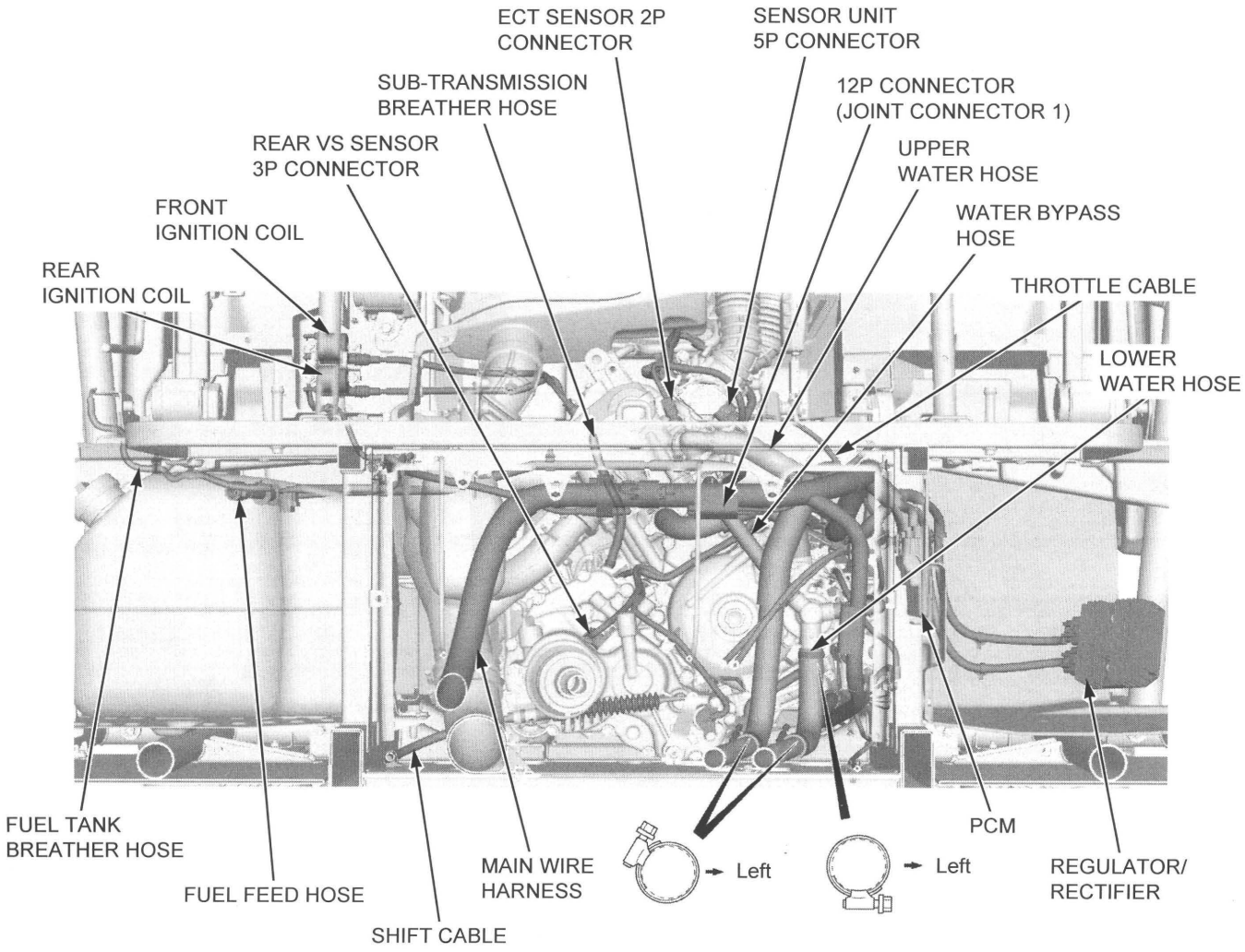


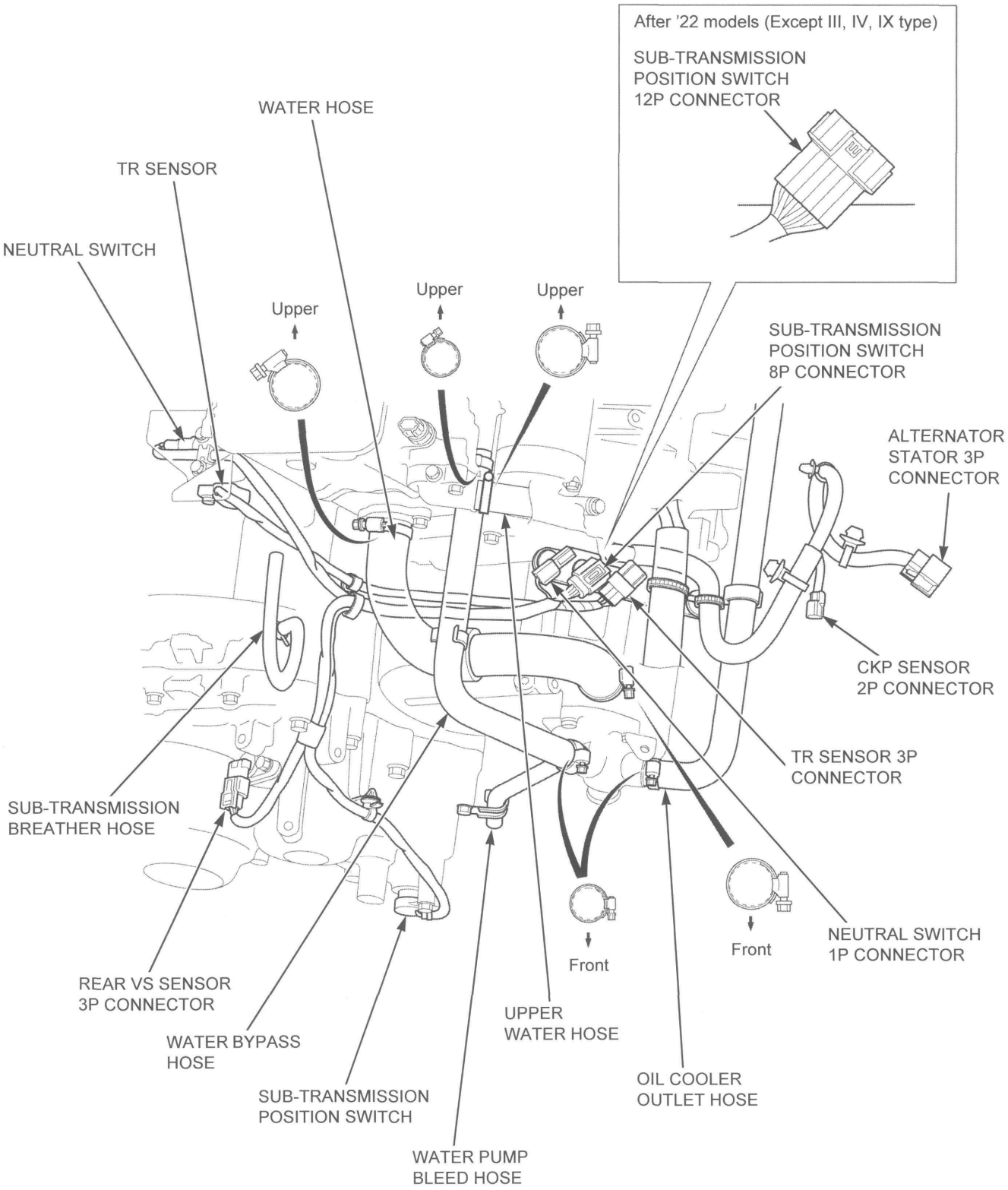
I-4WD model:

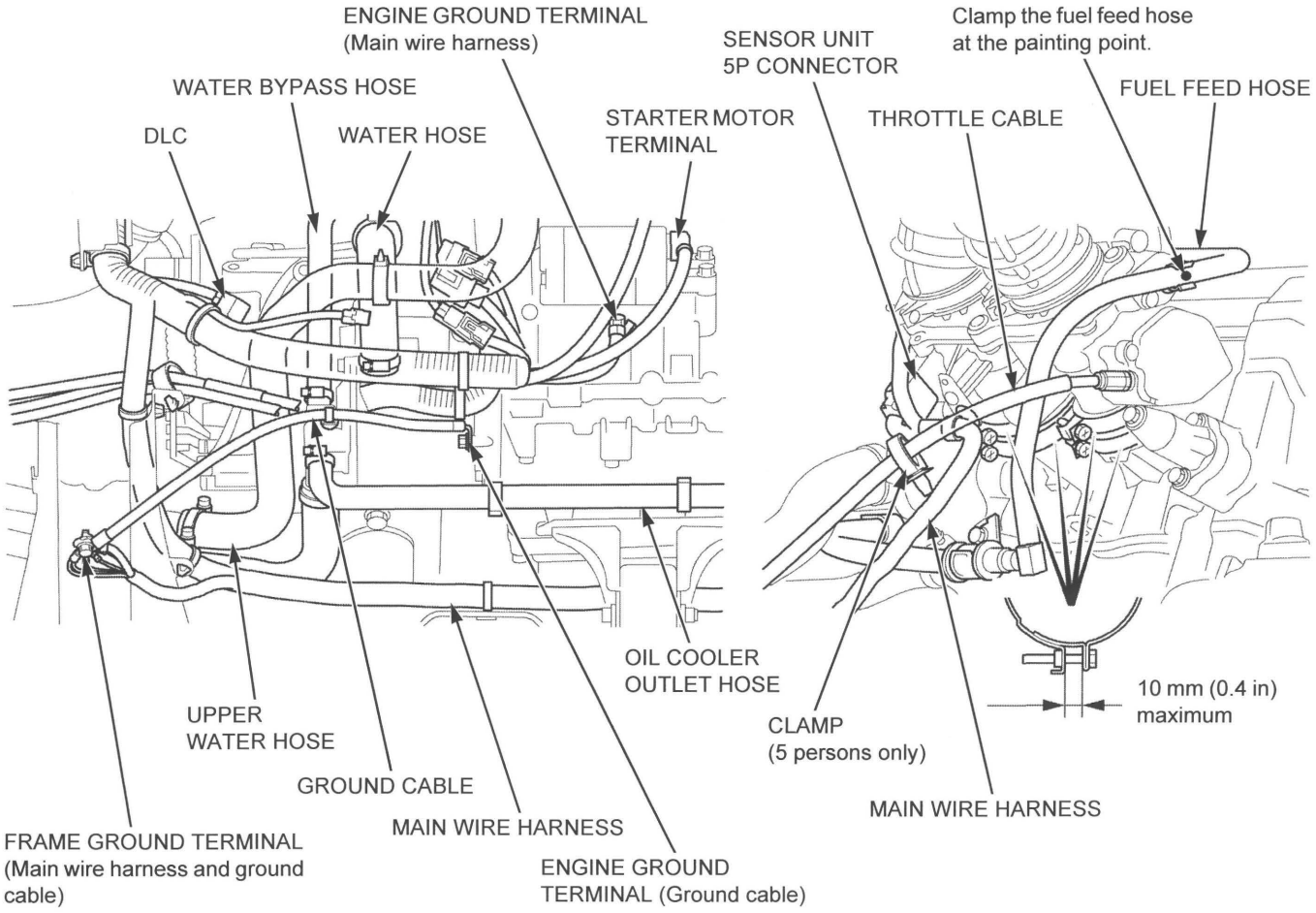


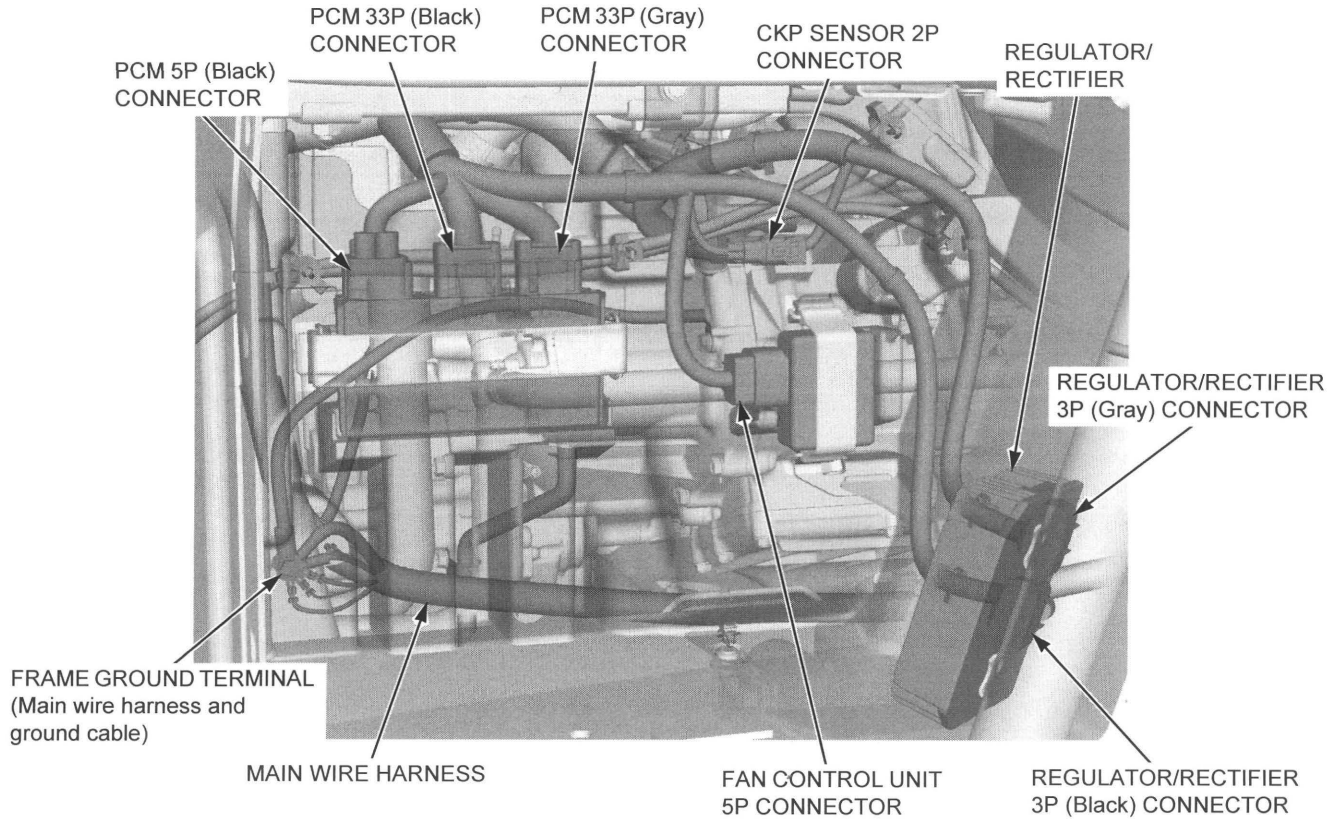
Except I-4WD model:

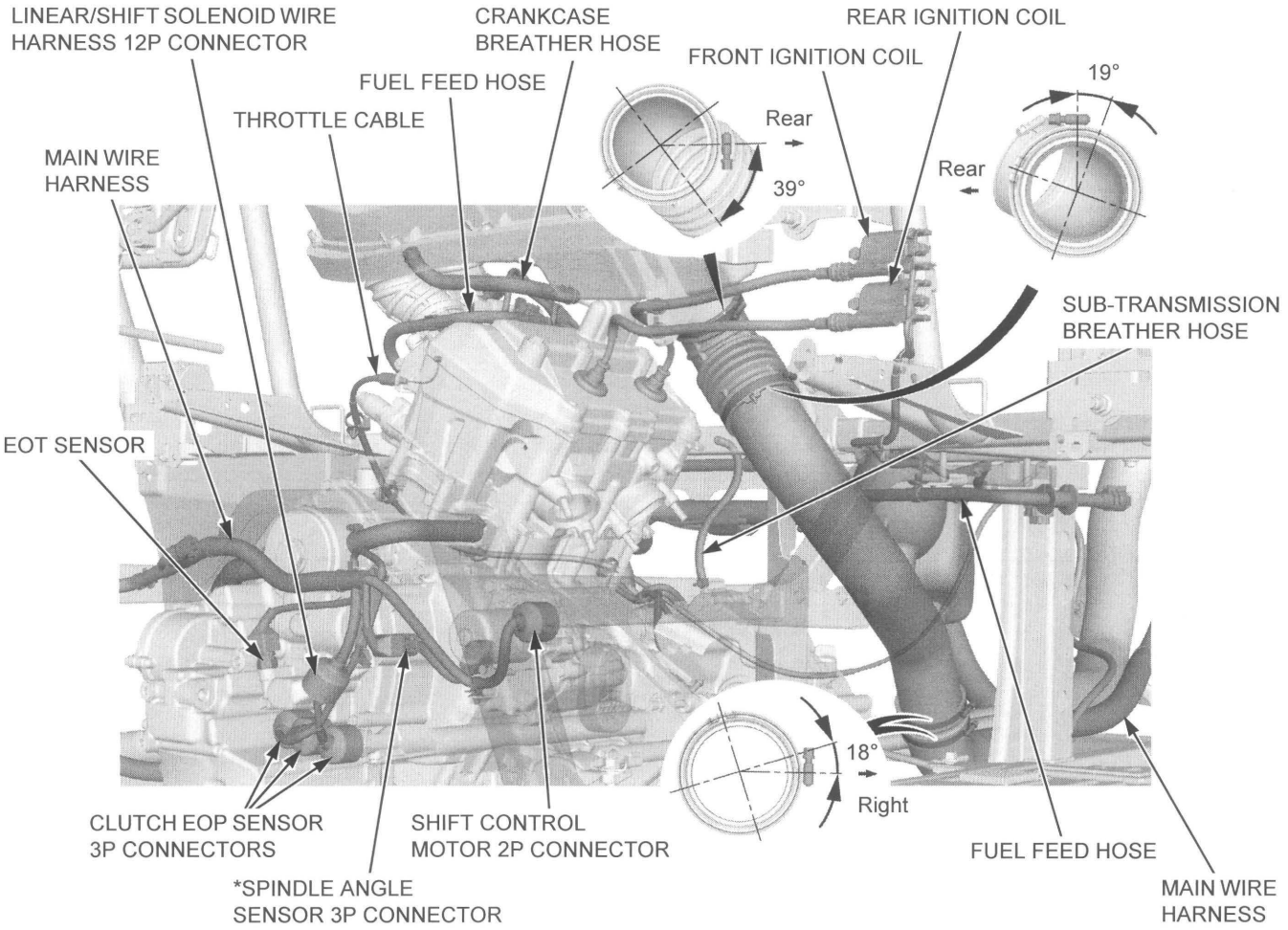


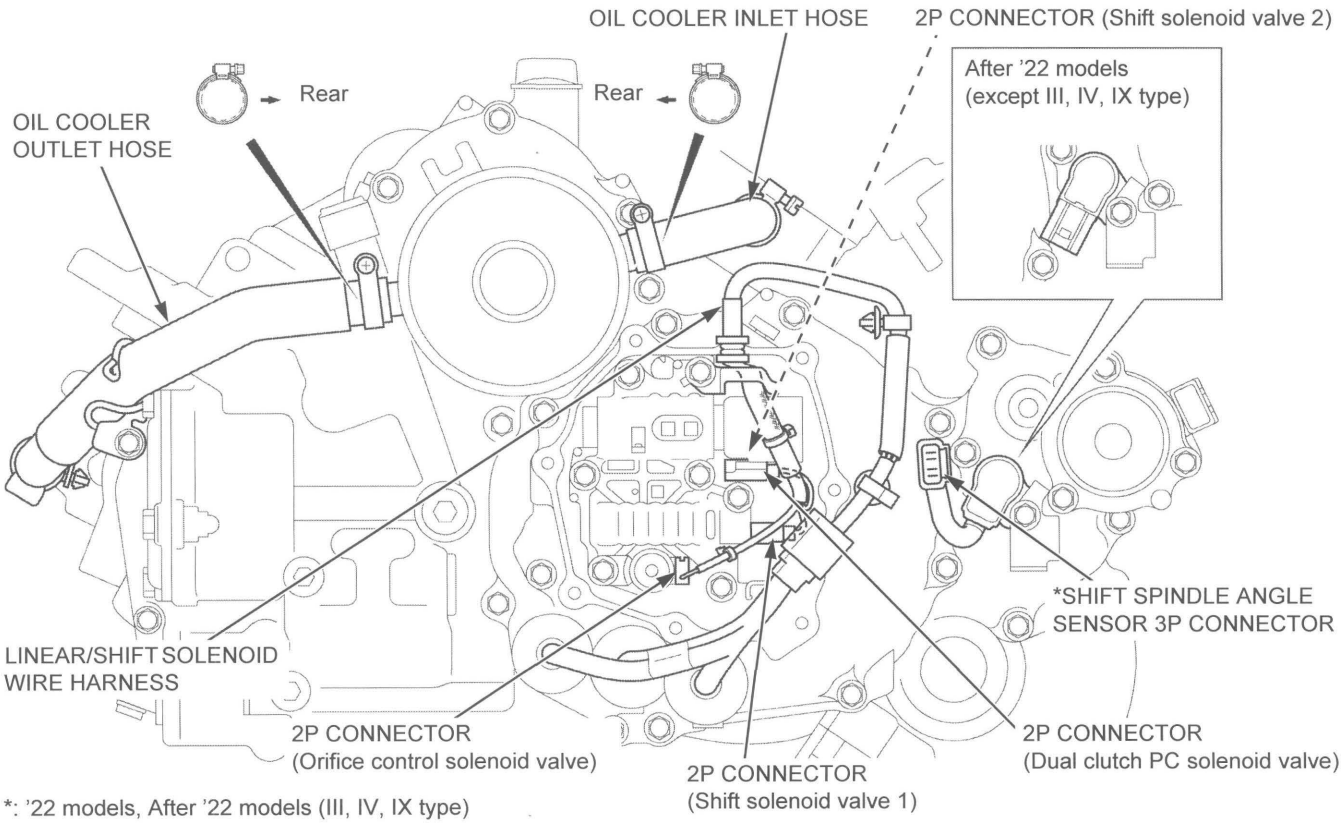



After '22 models (Except III, IV, IX type)
SUB-TRANSMISSION POSITION SWITCH 12P CONNECTOR
WATER HOSE
TR SENSOR
NEUTRAL SWITCH
Upper
Upper
Upper
SUB-TRANSMISSION POSITION SWITCH 8P CONNECTOR
ALTERNATOR STATOR 3P CONNECTOR
CKP SENSOR 2P CONNECTOR
TR SENSOR 3P CONNECTOR
SUB-TRANSMISSION BREATHER HOSE
REAR VS SENSOR 3P CONNECTOR
WATER BYPASS HOSE
SUB-TRANSMISSION POSITION SWITCH
WATER PUMP BLEED HOSE
UPPER WATER HOSE
Front
Front
NEUTRAL SWITCH 1P CONNECTOR
OIL COOLER OUTLET HOSE


ENGINE GROUND TERMINAL
(Main wire harness)
WATER BYPASS HOSE
DLC
WATER HOSE
STARTER MOTOR
TERMINAL
SENSOR UNIT
5P CONNECTOR
Clamp the fuel feed hose
at the painting point.
FUEL FEED HOSE
THROTTLE CABLE
OIL COOLER
OUTLET HOSE
10 mm (0.4 in)
maximum
CLAMP
(5 persons only)
UPPER
WATER HOSE
GROUND CABLE
MAIN WIRE HARNESS
MAIN WIRE HARNESS
FRAME GROUND TERMINAL
(Main wire harness and ground
cable)
ENGINE GROUND
TERMINAL (Ground cable)

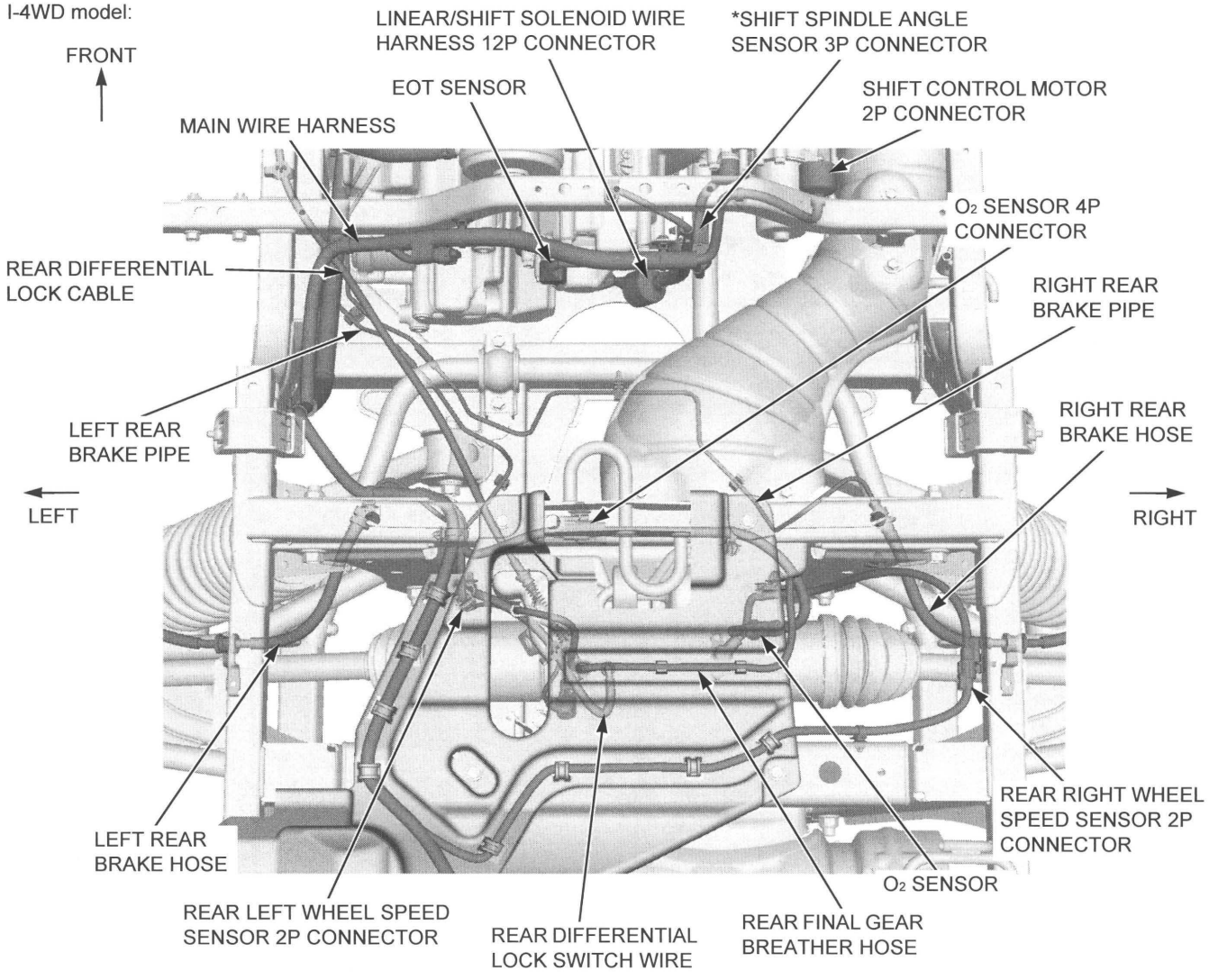

PCM 33P (Black)
CONNECTOR
PCM 33P (Gray)
CONNECTOR
CKP SENSOR 2P
CONNECTOR
REGULATOR/
RECTIFIER
PCM 5P (Black)
CONNECTOR
REGULATOR/RECTIFIER
3P (Gray) CONNECTOR
FRAME GROUND TERMINAL
(Main wire harness and
ground cable)
MAIN WIRE HARNESS
FAN CONTROL UNIT
5P CONNECTOR
REGULATOR/RECTIFIER
3P (Black) CONNECTOR

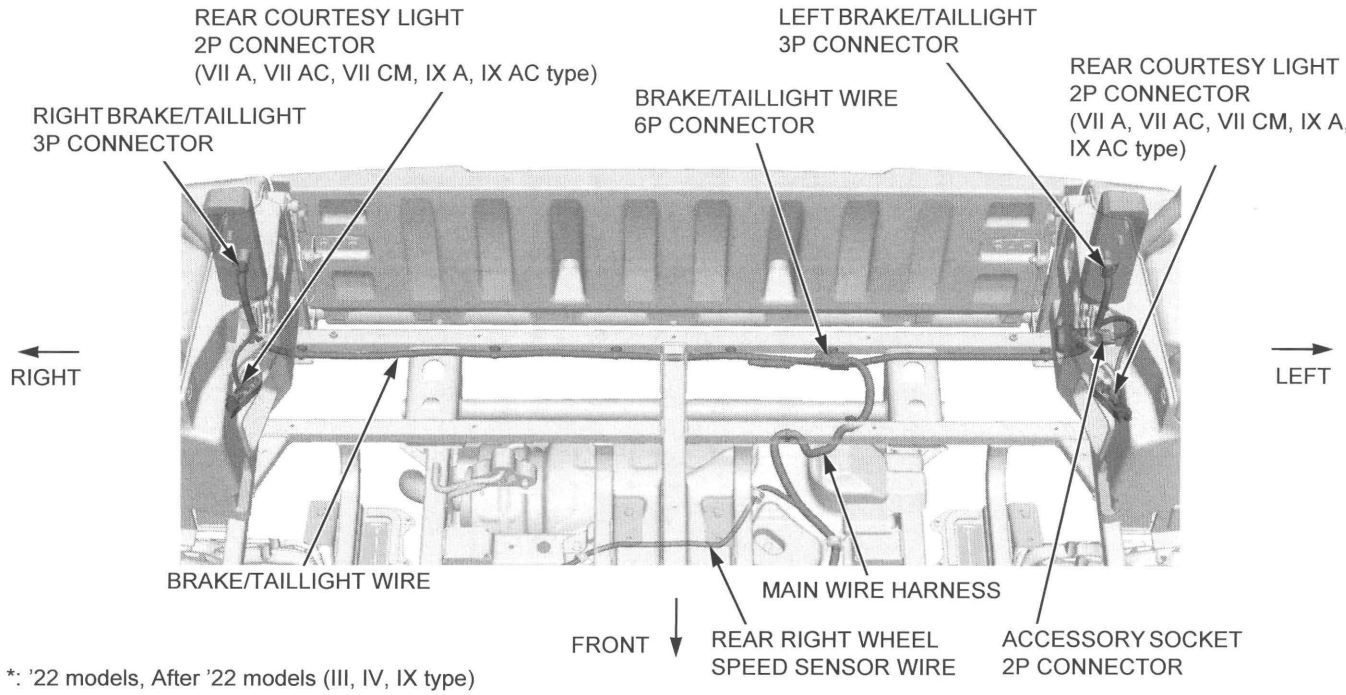




*: '22 models, After '22 models (III, IV, IX type)

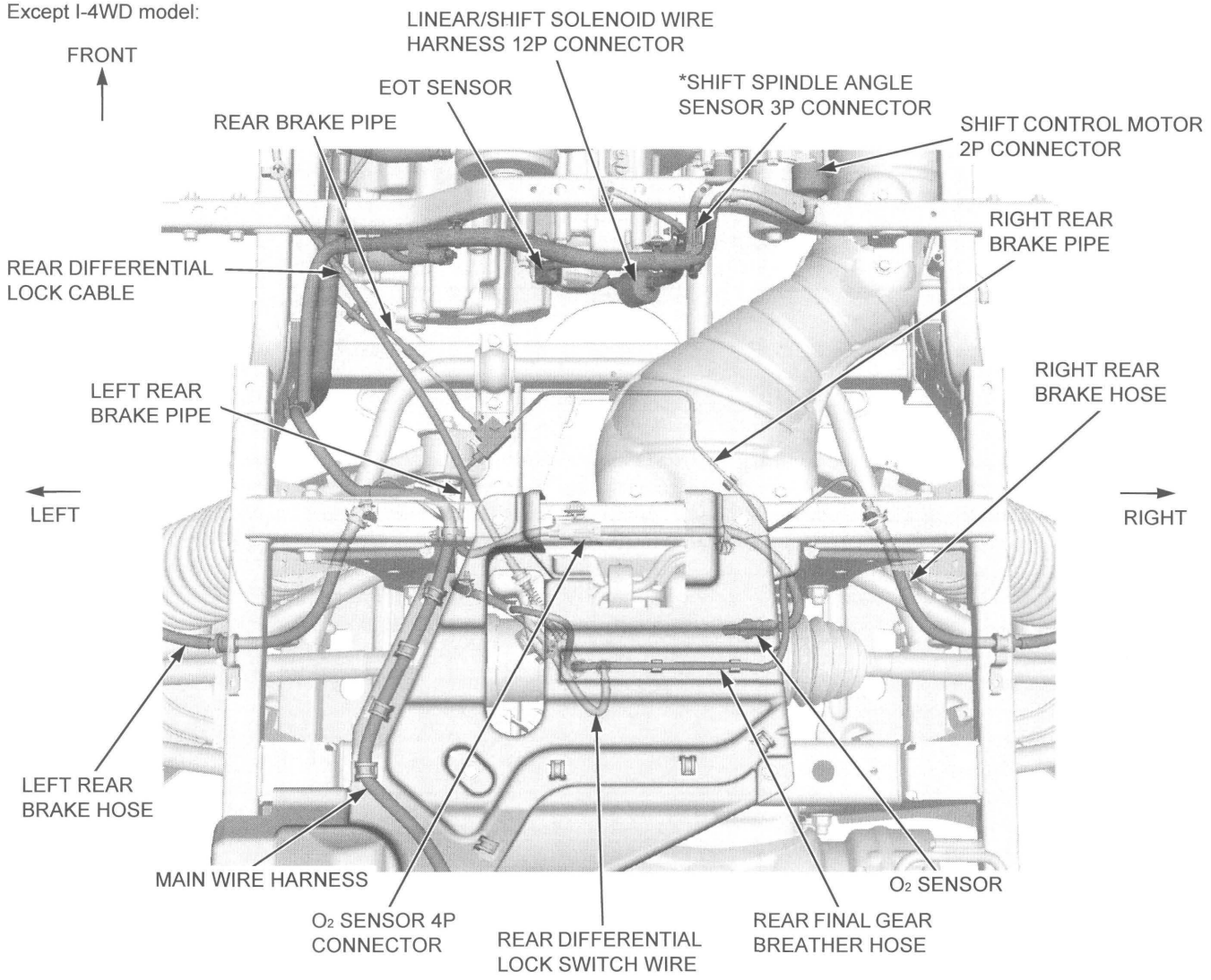
I-4WD model:

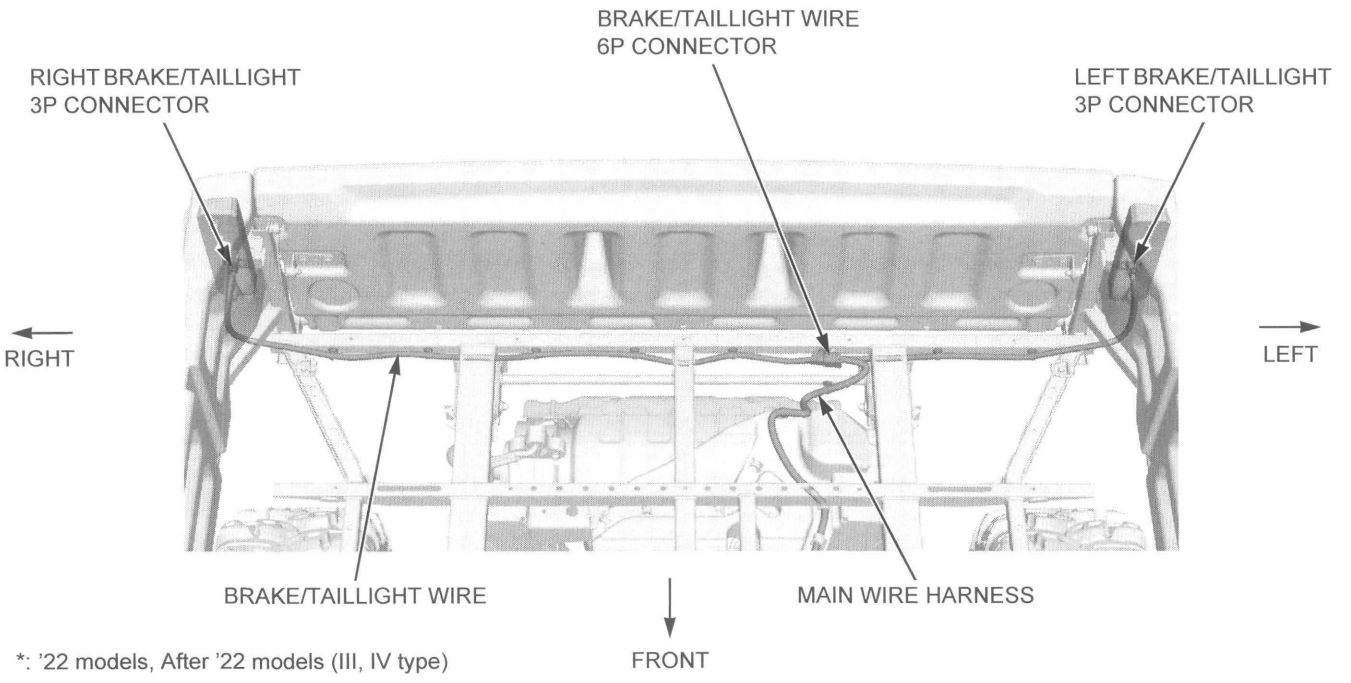




*: '22 models, After '22 models (III, IV, IX type)

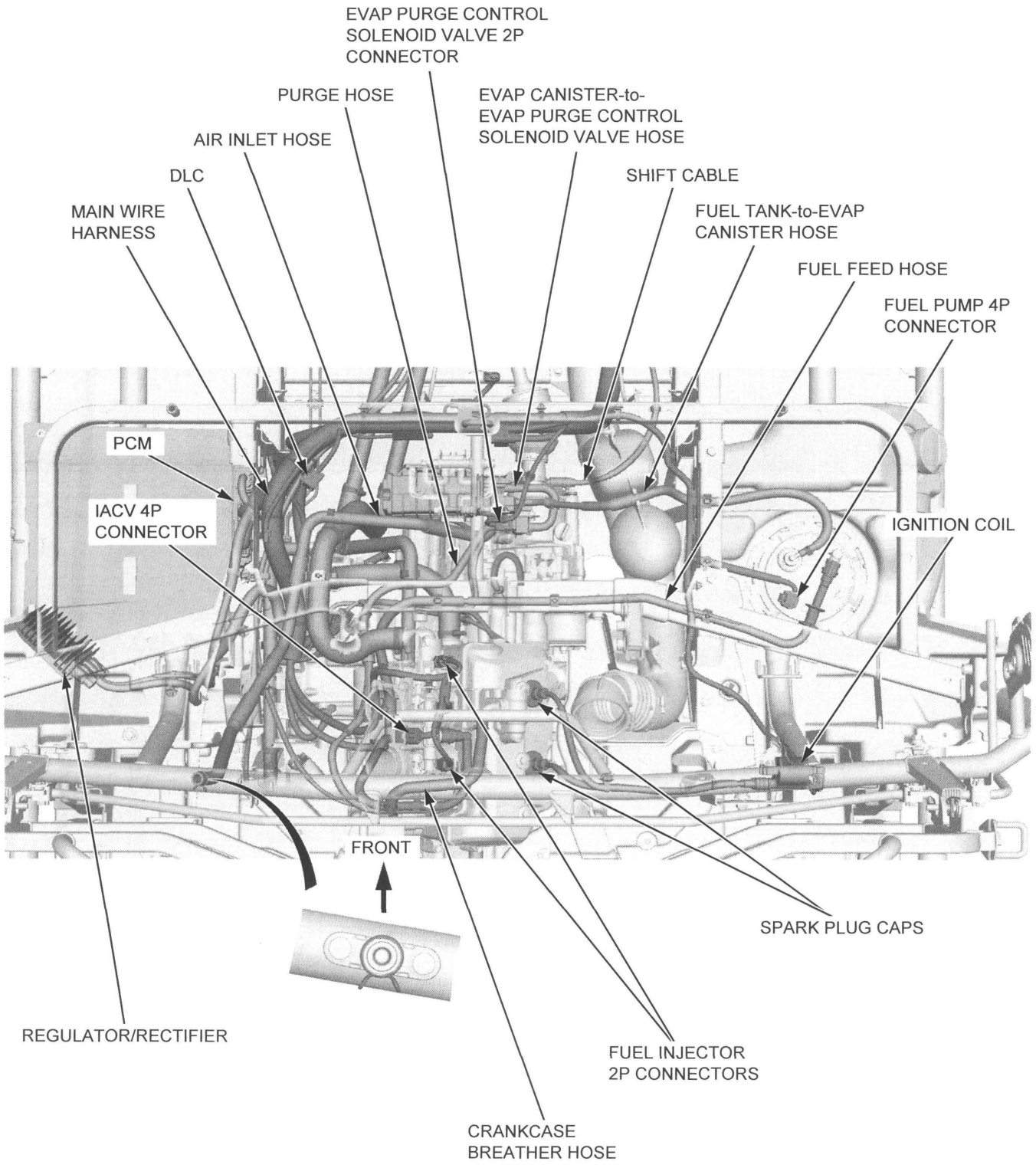
Except I-4WD model:



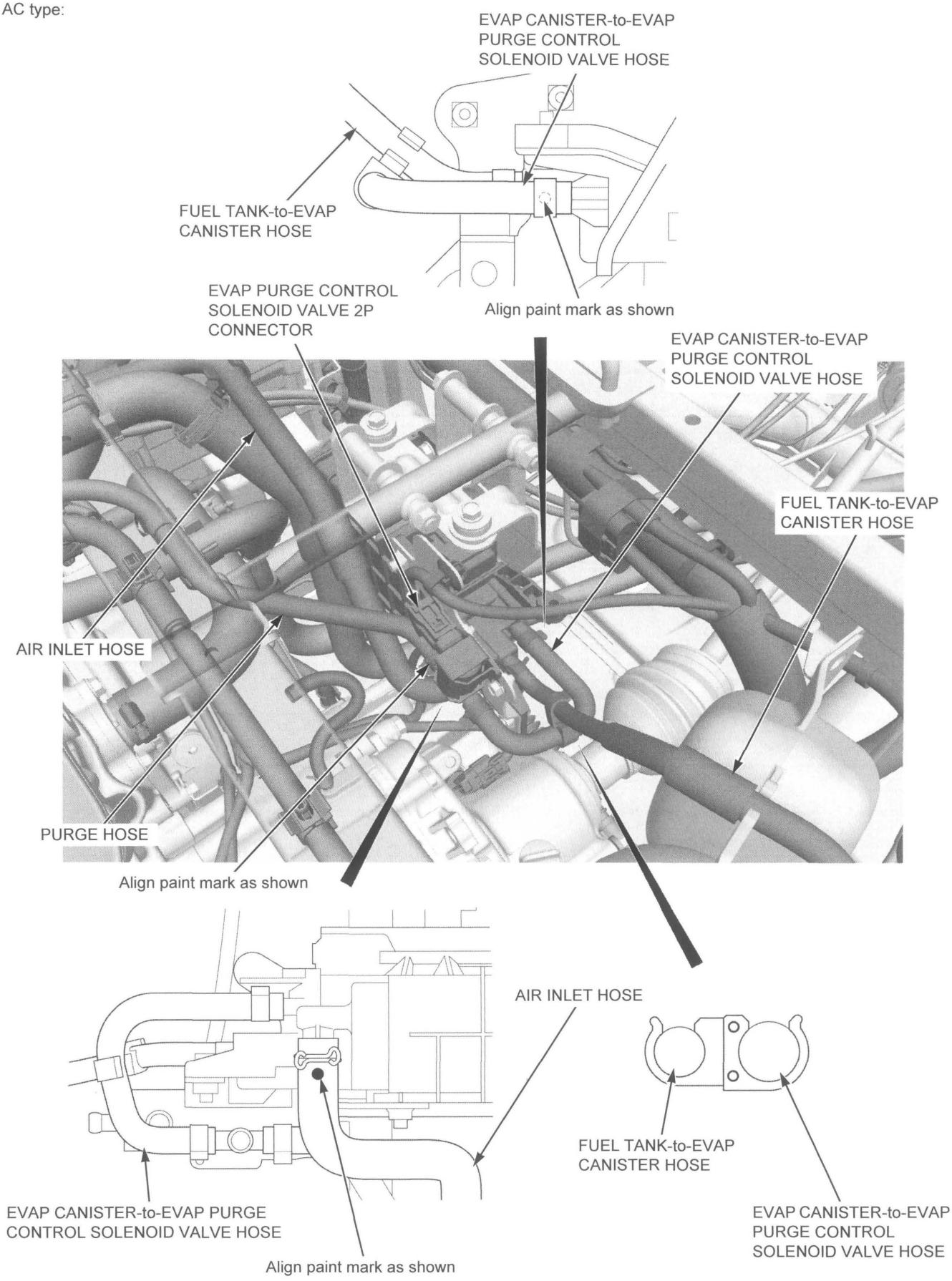


*: '22 models, After '22 models (III, IV type)

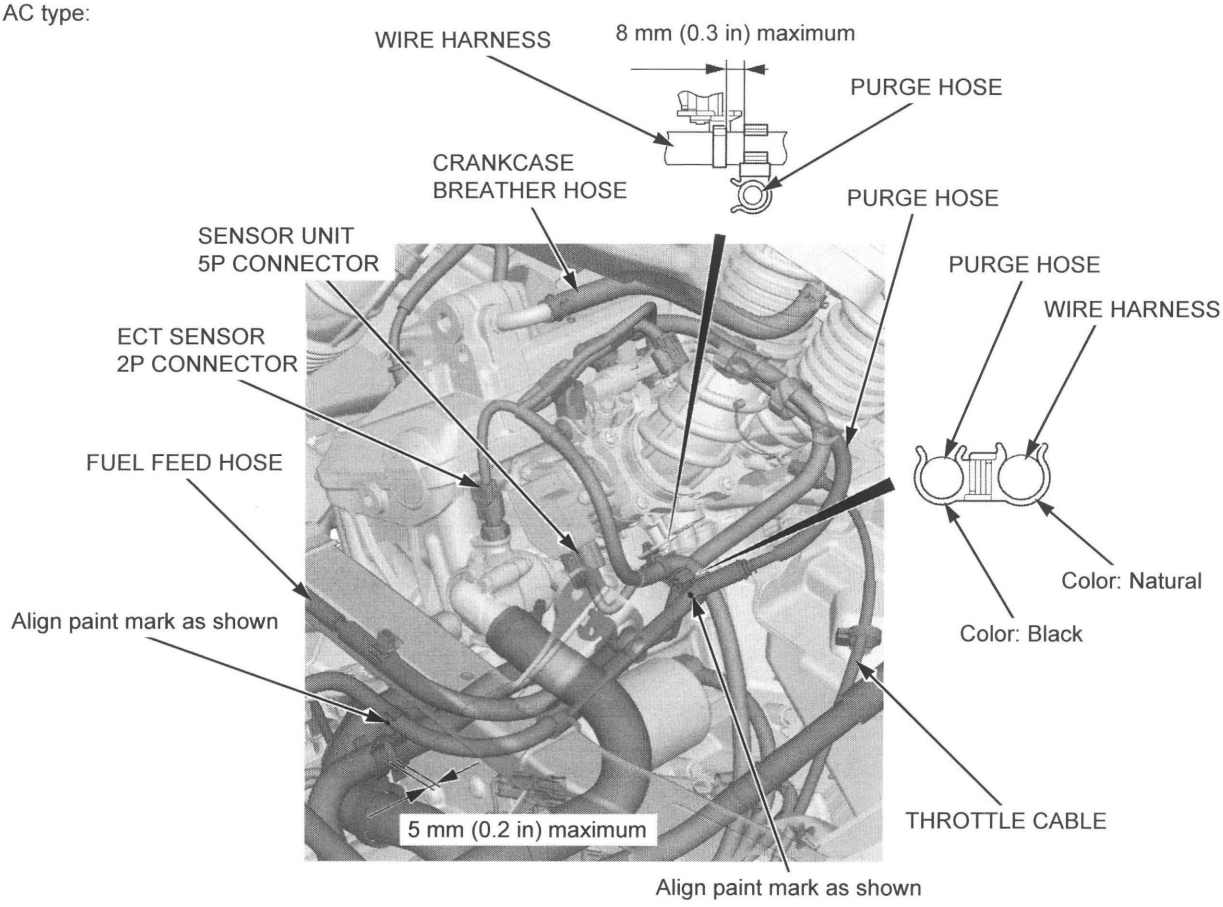
AC type:


EVAP PURGE CONTROL SOLENOID VALVE 2P CONNECTOR
PURGE HOSE
EVAP CANISTER-to-EVAP PURGE CONTROL SOLENOID VALVE HOSE
AIR INLET HOSE
DLC
SHIFT CABLE
MAIN WIRE HARNESS
FUEL TANK-to-EVAP CANISTER HOSE
FUEL FEED HOSE
FUEL PUMP 4P CONNECTOR
PCM
IACV 4P CONNECTOR
IGNITION COIL
FRONT
SPARK PLUG CAPS
REGULATOR/RECTIFIER
FUEL INJECTOR 2P CONNECTORS
CRANKCASE BREATHER HOSE

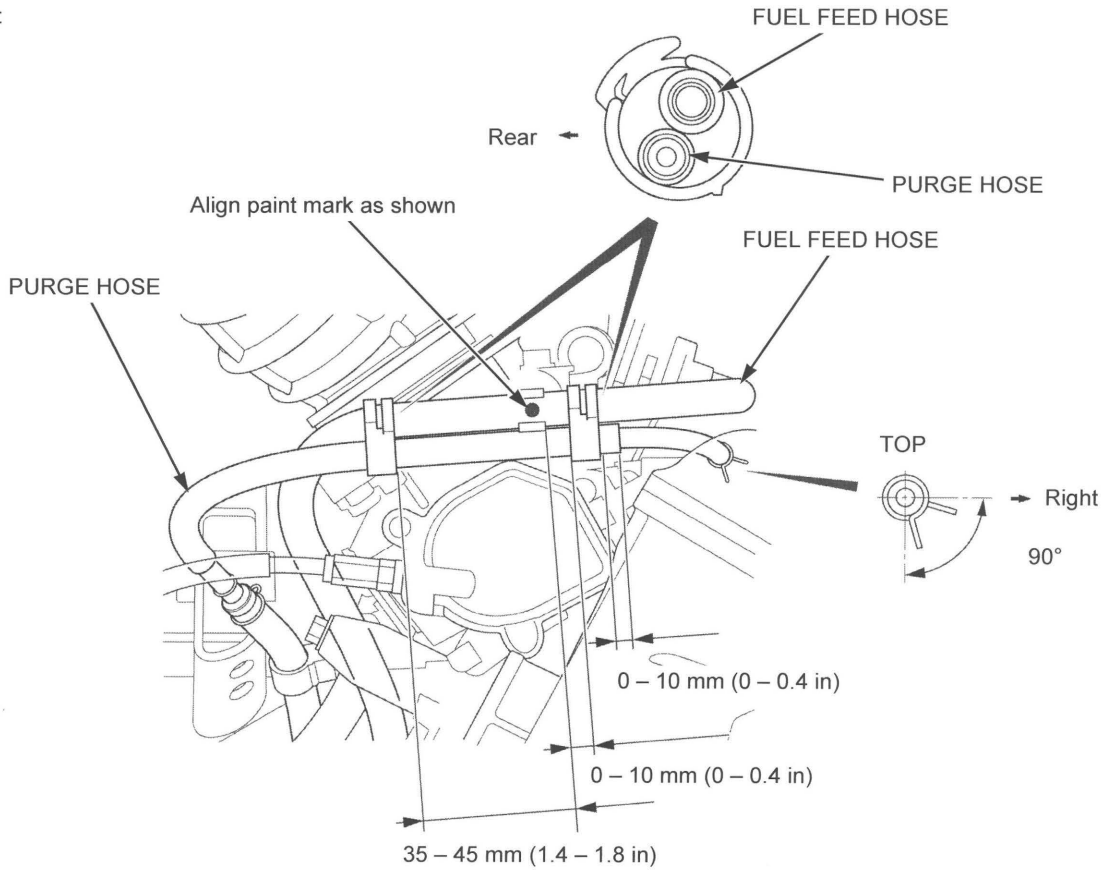
AC type:


EVAP CANISTER-to-EVAP PURGE CONTROL SOLENOID VALVE HOSE
FUEL TANK-to-EVAP CANISTER HOSE
EVAP PURGE CONTROL SOLENOID VALVE 2P CONNECTOR
Align paint mark as shown
EVAP CANISTER-to-EVAP PURGE CONTROL SOLENOID VALVE HOSE
FUEL TANK-to-EVAP CANISTER HOSE
AIR INLET HOSE
PURGE HOSE
Align paint mark as shown
AIR INLET HOSE
FUEL TANK-to-EVAP CANISTER HOSE
EVAP CANISTER-to-EVAP PURGE CONTROL SOLENOID VALVE HOSE
Align paint mark as shown
EVAP CANISTER-to-EVAP PURGE CONTROL SOLENOID VALVE HOSE

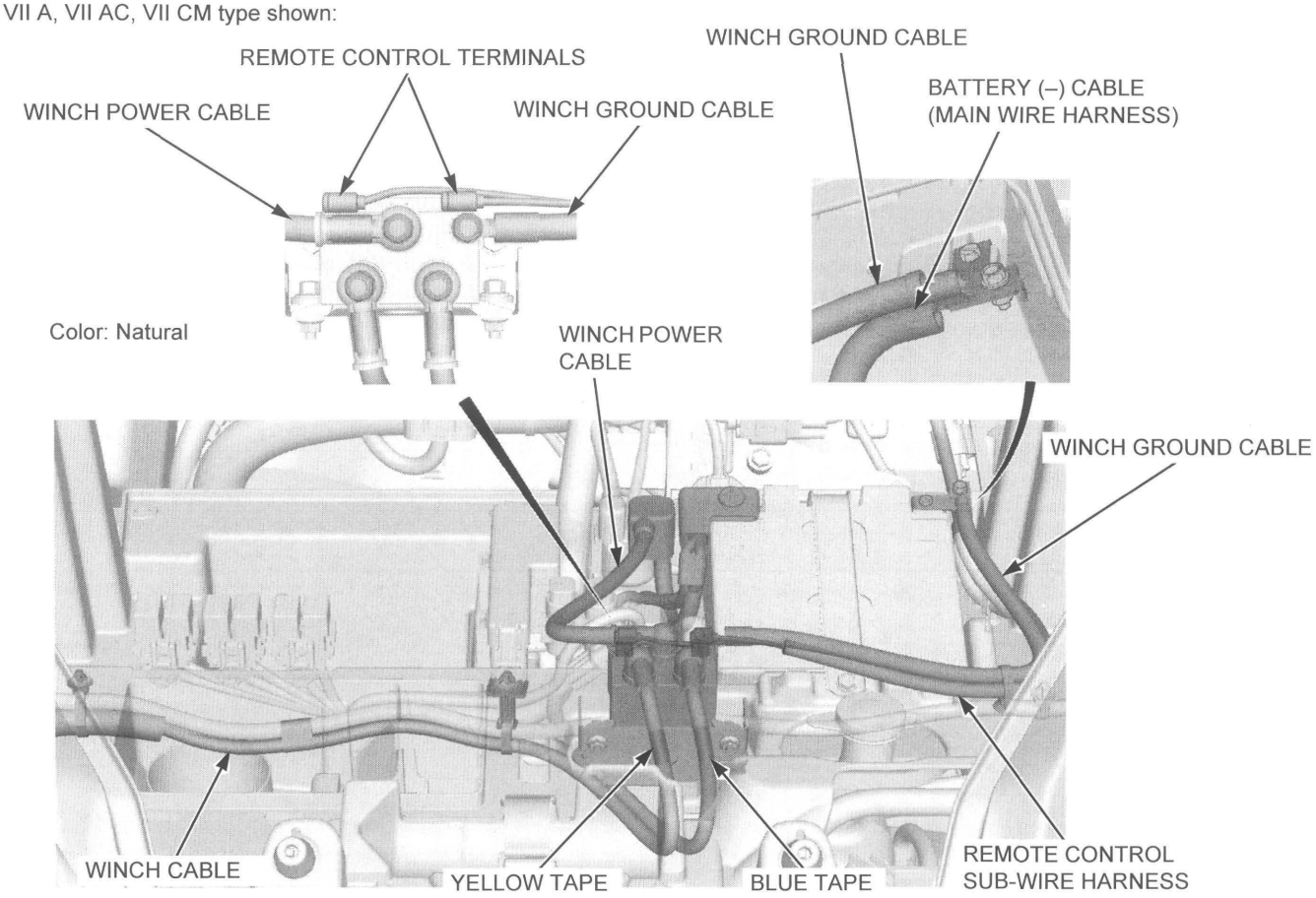
AC type:



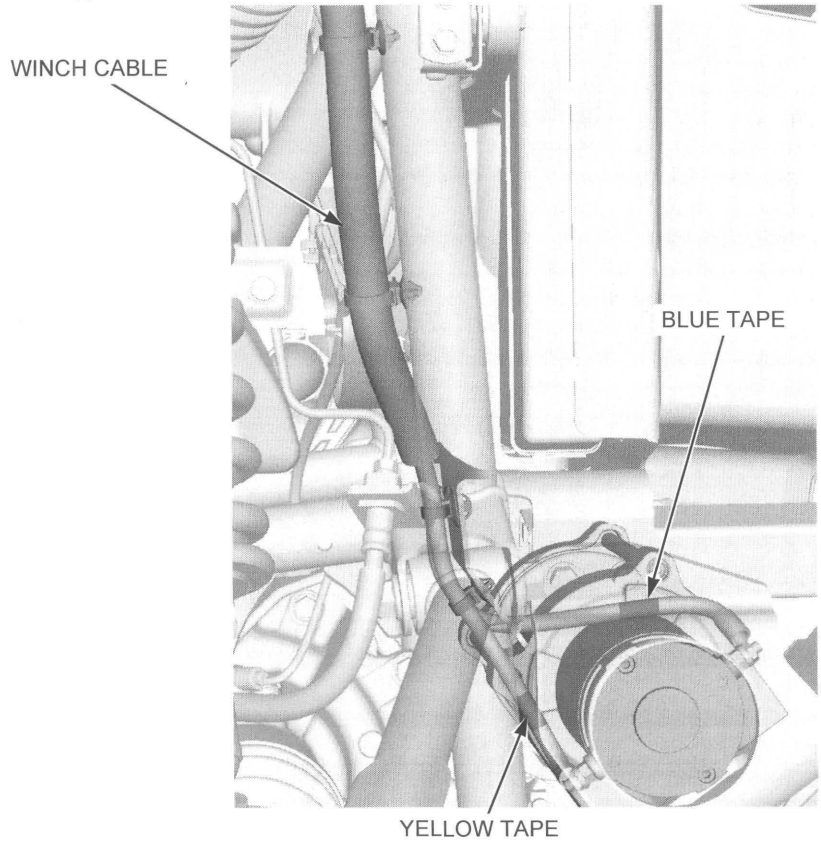
AC type:



VII A, VII AC, VII CM type shown:



VII A, VII AC, VII CM type shown:



EMISSION CONTROL SYSTEMS

The U.S. Environmental Protection Agency (EPA), the California Air Resources Board (CARB), and Environment and Climate Change Canada (ECCC) require that Recreational Utility Vehicles comply with applicable exhaust emissions standards during their useful life, when operated and maintained according to the instruction provided.

SOURCE OF EMISSIONS

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

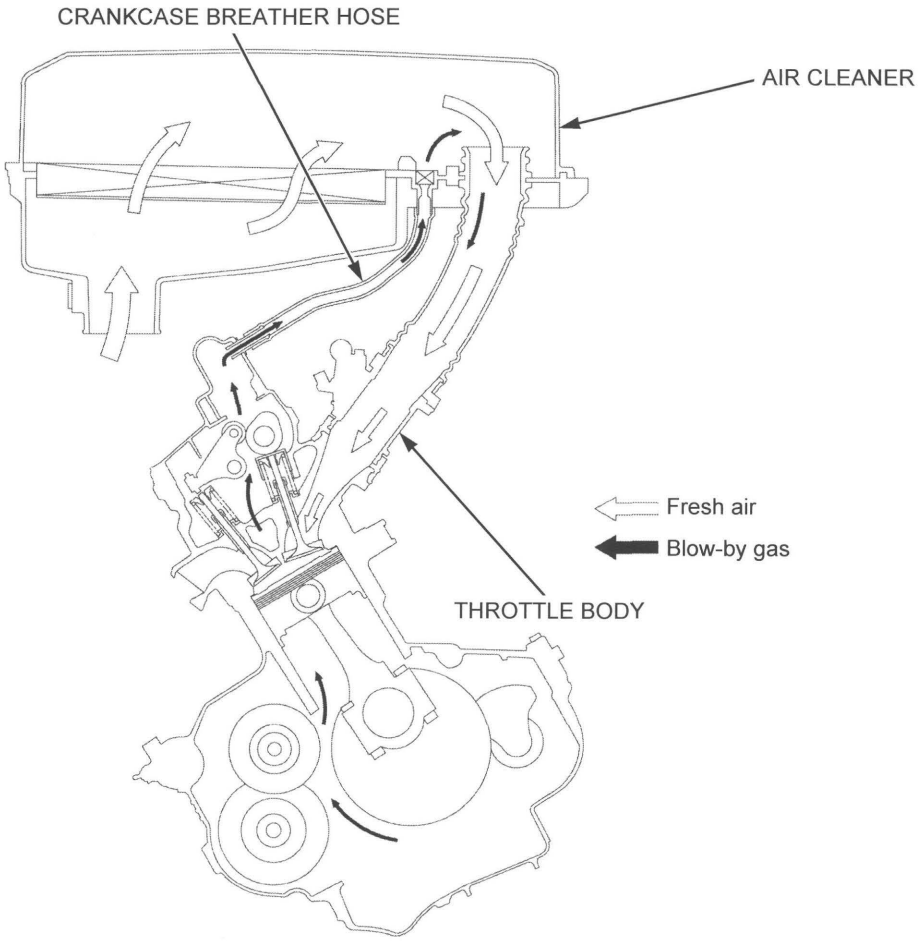
Honda Motor Co., Ltd. utilizes various system to reduce carbon monoxide, oxides of nitrogen and hydrocarbons.

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 Recreational Utility Vehicle repair establishment or individual using parts that are "certified" to EPA standards.

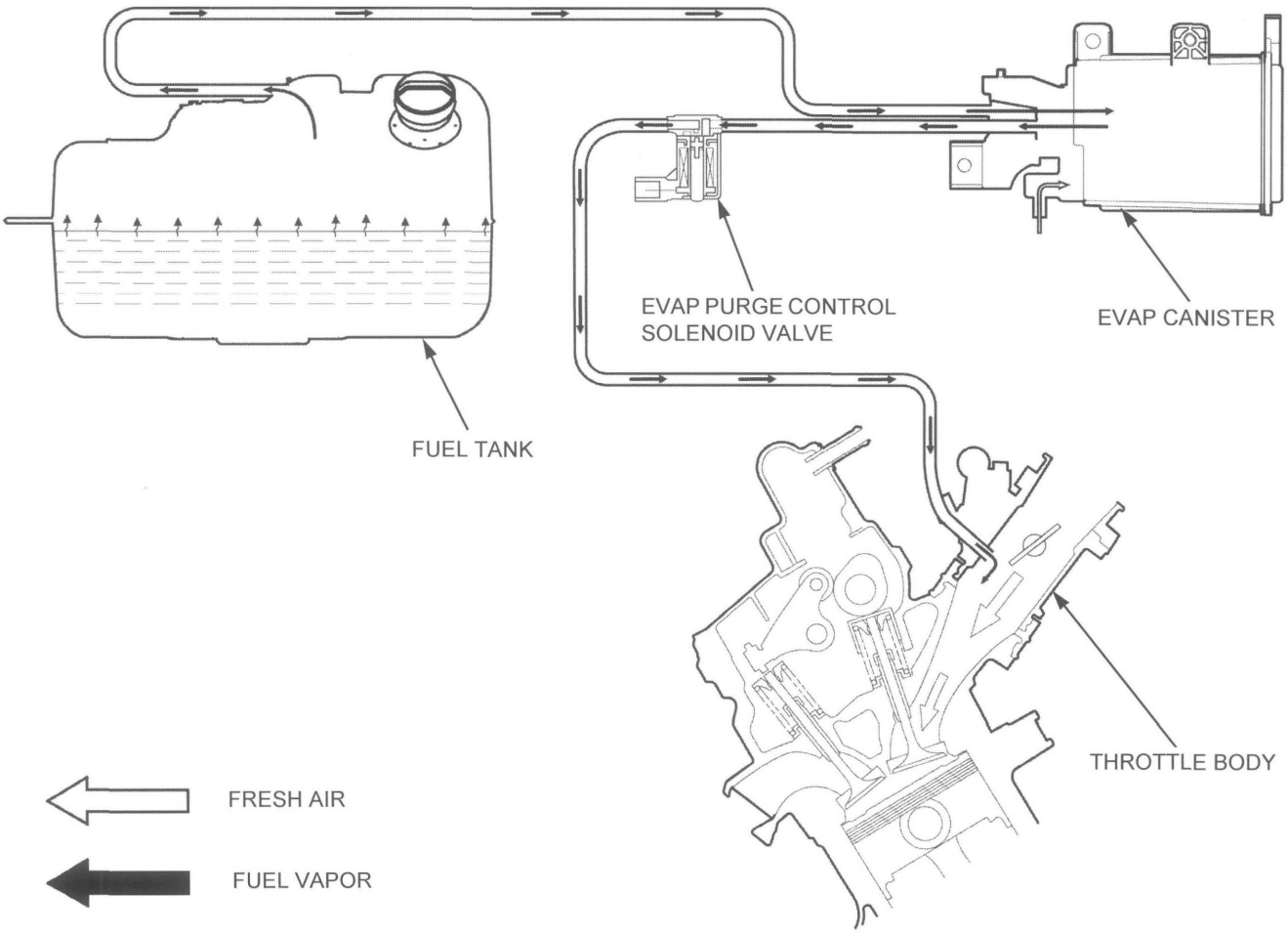
PROHIBITED ACTIONS

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.

EVAPORATIVE EMISSION CONTROL SYSTEM (AC type only)

This model complies with California Air Resources Board (CARB) evaporative emission requirements. Fuel vapor from the fuel tank is routed into the EVAP canister where it is absorbed and stored while the engine is stopped. When the engine is running and the EVAP purge control solenoid valve is open, fuel vapor in the EVAP canister is drawn into the intake port of the engine.



NOISE EMISSION CONTROL SYSTEM

TAMPERING WITH THE NOISE CONTROL SYSTEM IS PROHIBITED: State laws and 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 new vehicle for the purpose of noise control prior to its sale or delivery to the ultimate purchaser or while it is in use; or (2) the use of the vehicle after such device or element of design has been removed or rendered inoperative by any person.

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

1. Removal of, or puncturing the muffler, baffles, header pipes or any other component which conducts exhaust gases.
2. Removal of, or puncturing of any part of the intake system.
3. Lack of proper maintenance.
4. Removing of disabling any emissions compliance component, or replacing any compliance component with a non-compliant component.

FUEL PERMEATION EMISSION CONTROL SYSTEM

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

REBUILT ENGINE

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

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

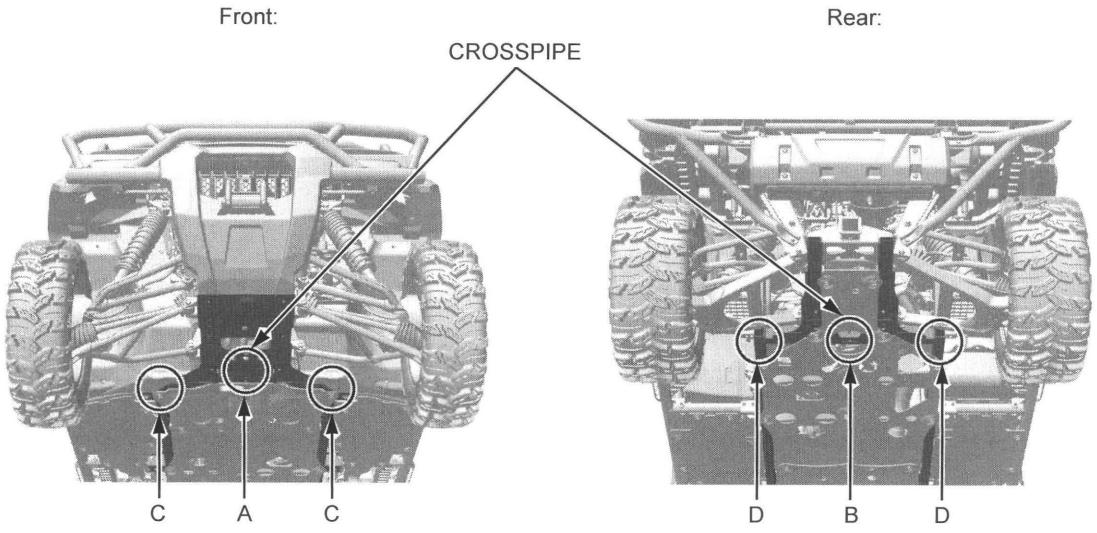
LIFT AND SUPPORT POINTS

Use the following lift and support points to support the vehicle and raise the wheels off the ground.

Block the wheels that are not being lifted. When lifting the front of the vehicle, set the parking brake.

Position the floor jack under the center of the front frame crosspipe [A] or the center of the rear end frame crosspipe [B] as shown, and jack up the vehicle high enough to fit the safety stands under it.

Position the safety stands under the support points [C or D] and adjust them so the vehicle is level. Lower the vehicle onto the stands.



MEMO

2. FRAME/BODY PANELS/EXHAUST SYSTEM

SERVICE INFORMATION 2-2

TROUBLESHOOTING 2-2

BODY PANEL LOCATIONS 2-3

FRONT SEAT 2-4

SEAT UNDER STORAGE (M3D/M5D ONLY) 2-6

REAR SEAT (M5P/M5D ONLY) 2-6

REAR CENTER COVER 2-9

REAR SIDE COVER 2-10

REAR FOOTWELL LID (M5P/M5D ONLY) 2-11

AIR CLEANER COVER 2-11

REAR FOOTWELL (M5P/M5D ONLY) 2-12

HEAT SHIELD PROTECTOR (M5P/M5D ONLY) 2-13

REAR MUD GUARD (M3P/M3D ONLY) 2-14

REAR FOOTWELL STAY 2-15

INNER FENDER 2-15

FRONT SIDE COVER 2-16

FLOOR PANEL 2-17

FRONT HOOD 2-17

FRONT BUMPER 2-18

FRONT FENDER 2-20

FRONT GRILLE 2-21

FRONT INNER FENDER 2-22

AIR GUIDE PLATE 2-22

DOOR 2-22

SUPPORT COVER 2-27

MIDDLE MUD GUARD 2-28

INSTRUMENT PANEL 2-28

DASH UNDER STORAGE (M3D/M5D ONLY) 2-30

FRONT FLOOR LID 2-30

FRONT FLOOR COVER 2-31

SIDE NET 2-32

SEAT BELT 2-33

SKID PLATE 2-36

SIDE SKID PLATE 2-37

OCCUPANT PROTECTIVE STRUCTURE (OPS) 2-38

CARGO BED 2-40

EXHAUST SYSTEM 2-51

FRAME 2-55

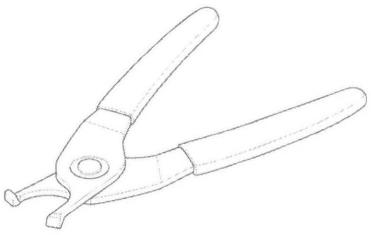
SERVICE INFORMATION

GENERAL

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

TOOL

Push pin pliers
07AAC-SJAA100 (U.S.A. only)

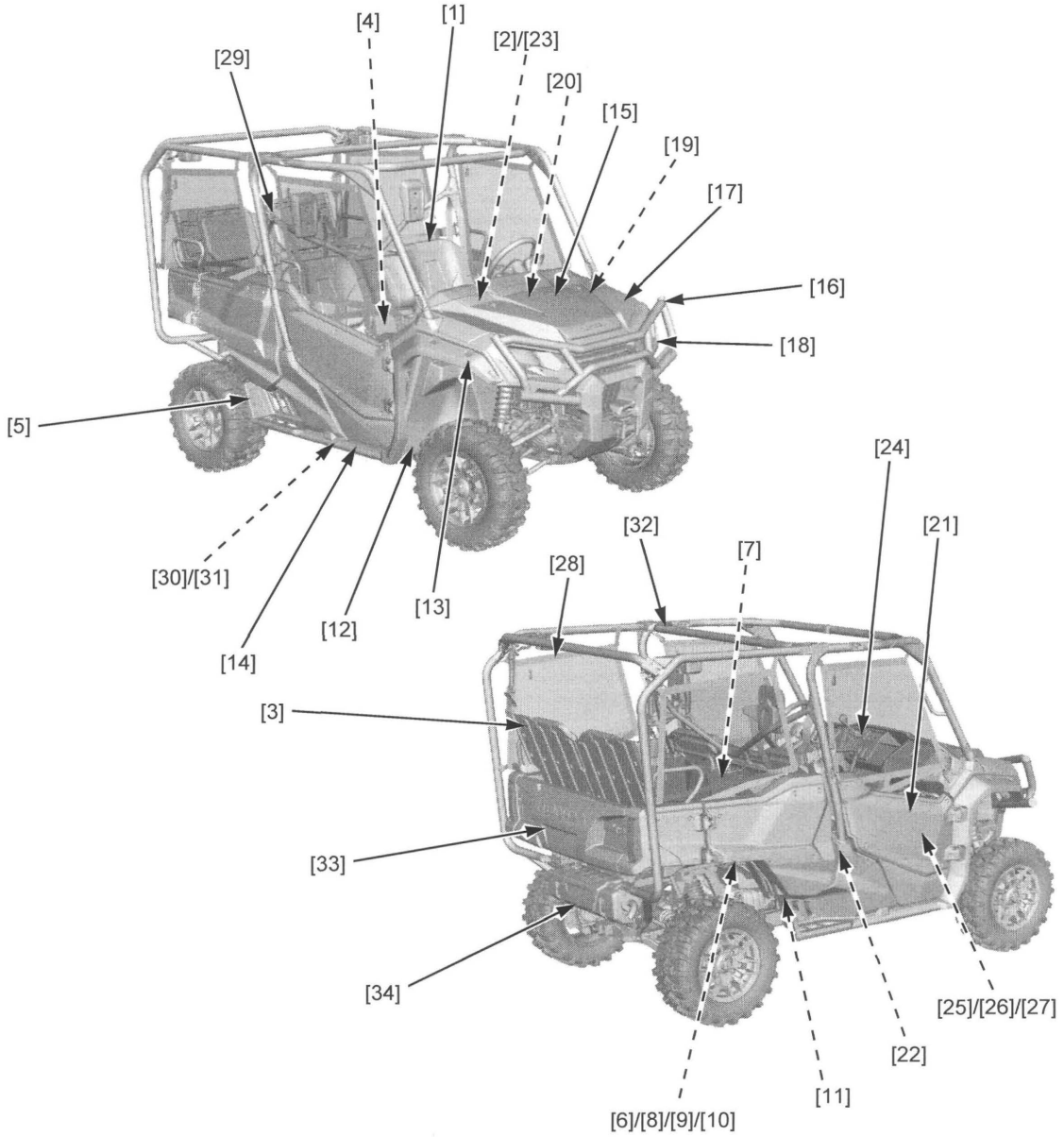


TROUBLESHOOTING

Excessive exhaust noise
- Broken exhaust system
- Exhaust gas leak

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

BODY PANEL LOCATIONS



[1] FRONT SEAT (page 2-4)
[2] SEAT UNDER STORAGE (page 2-6)
[3] REAR SEAT* (page 2-6)
[4] REAR CENTER COVER (page 2-9)
[5] REAR SIDE COVER (page 2-10)
[6] REAR FOOTWELL LID* (page 2-11)
[7] AIR CLEANER COVER (page 2-11)
[8] REAR FOOTWELL* (page 2-12)
[9] HEAT SHIELD PROTECTOR* (page 2-13)
[10] REAR MUD GUARD** (page 2-14)
[11] REAR FOOTWELL STAY (page 2-15)
[12] INNER FENDER (page 2-15)
[13] FRONT SIDE COVER (page 2-16)
[14] FLOOR PANEL (page 2-17)
[15] FRONT HOOD (page 2-17)
[16] FRONT BUMPER (page 2-18)
[17] FRONT FENDER (page 2-20)
[18] FRONT GRILLE (page 2-21)
[19] FRONT INNER FENDER (page 2-22)
[20] AIR GUIDE PLATE (page 2-22)
[21] DOOR (page 2-22)
[22] SUPPORT COVER (page 2-27)
[23] MIDDLE MUD GUARD (page 2-28)
[24] INSTRUMENT PANEL (page 2-28)
[25] DASH UNDER STORAGE (page 2-30)
[26] FRONT FLOOR LID (page 2-30)
[27] FRONT FLOOR COVER (page 2-31)
[28] SIDE NET (page 2-32)
[29] SEAT BELT (page 2-33)
[30] SKID PLATE (page 2-36)
[31] SIDE SKID PLATE (page 2-37)
[32] OCCUPANT PROTECTIVE STRUCTURE (page 2-38)
[33] CARGO BED (page 2-40)
[34] EXHAUST SYSTEM (page 2-51)

- *: M5P/M5D only
- **: M3P/M3D only

TRIM CLIP REMOVAL/ RETAINING PROCEDURE:

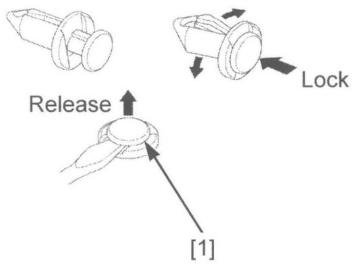
Release by pulling the center pin [1] up using the push pin pliers or a flat blade screwdriver and remove the trim clip.

TOOL:
Push pin pliers U.S.A.: 07AAC-SJAA100

Carefully align the clip holes in the covers (panels) to avoid damaging the clip.

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

Remove and install

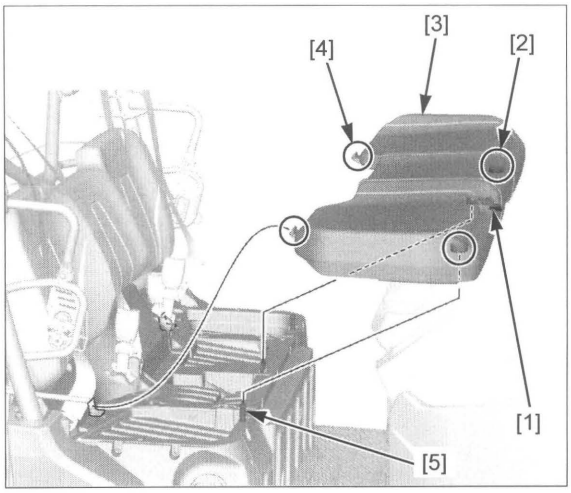


FRONT SEAT

SEAT CUSHION REMOVAL/ INSTALLATION

Unhook the latch [1], release the grommets [2] by pulling the front side of the seat cushion [3] upward, then slide it forward and remove it.

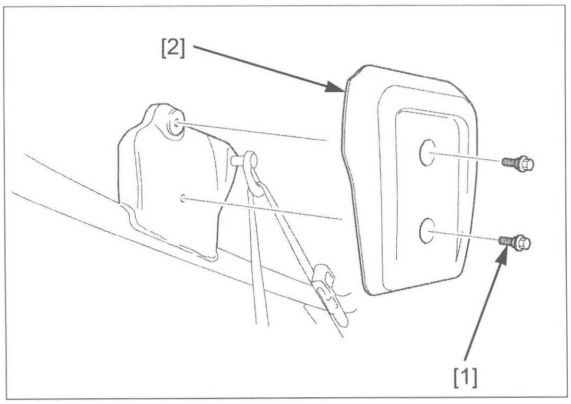
Install the seat cushion by aligning the prongs [4] with the frame hooks, then press it down while aligning the grommets with the frame bosses [5].



HEADREST REMOVAL/INSTALLATION

Remove the bolts [1] and the headrest [2].

Installation is in the reverse order of removal.



BACKREST REMOVAL/INSTALLATION

Lift the cargo bed.

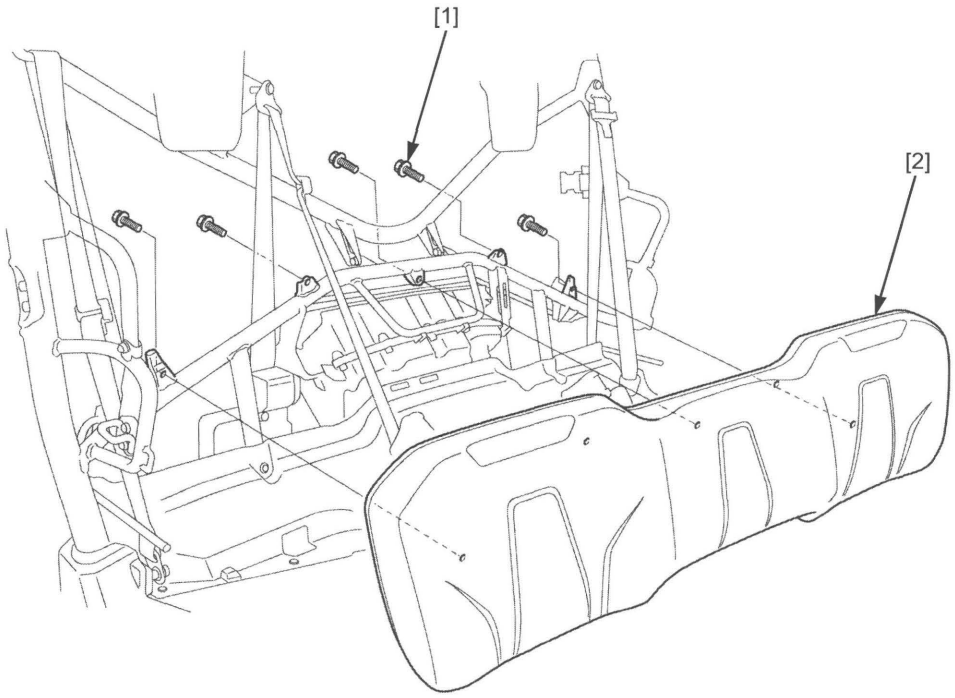
Remove the seat cushion (page 2-4).

Remove the five bolts [1] and the backrest [2].

Installation is in the reverse order of removal.

NOTE:

- Install the backrest through the center seat belt.

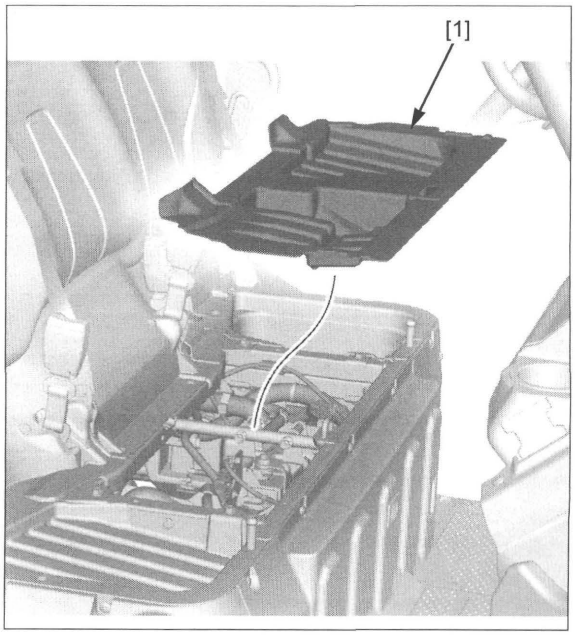


SEAT UNDER CENTER LID REMOVAL/ INSTALLATION

Remove the following:

- seat cushion (page 2-4)
- seat under center lid [1]

Installation is in the reverse order of removal.

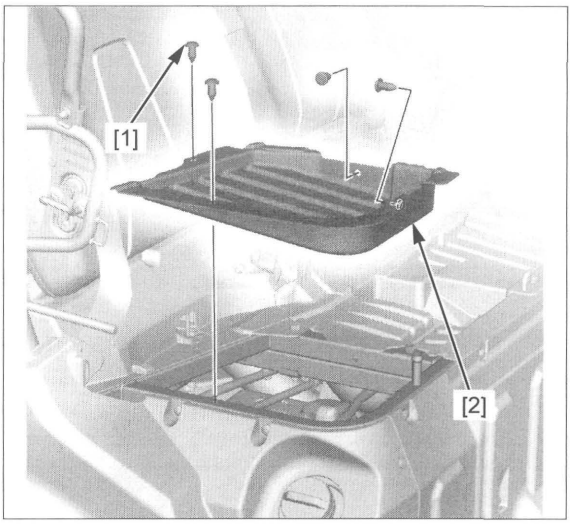


SEAT UNDER COVER REMOVAL/ INSTALLATION

Remove the following:

- seat cushion (page 2-4)
- four trim clips [1]
- seat under cover [2]

Installation is in the reverse order of removal.



SEAT UNDER STORAGE (M3D/M5D ONLY)

REMOVAL/INSTALLATION

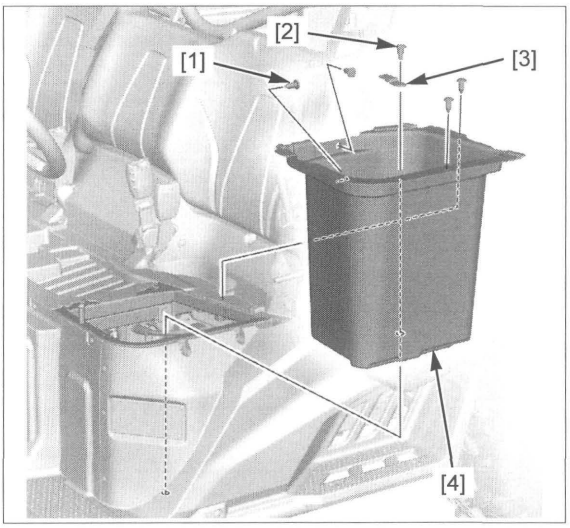
Remove the following:

- seat cushion (page 2-4)
- four trim clips [1]
- socket bolt [2]
- drain plug [3]
- seat under storage [4]

Installation is in the reverse order of removal.

TORQUE:

Seat under storage mounting screw:
9.0 N·m (0.9 kgf·m, 6.6 lbf·ft)



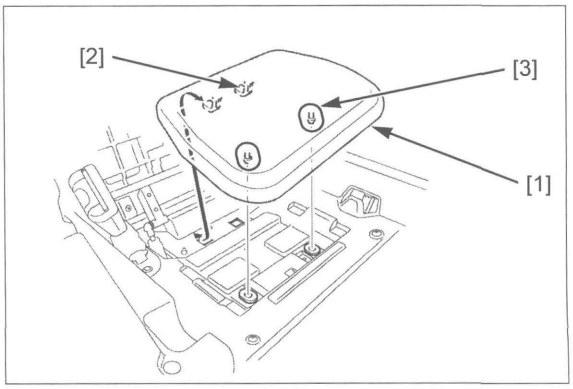
REAR SEAT (M5P/M5D ONLY)

SEAT CUSHION REMOVAL/ INSTALLATION

Unfold the rear seat.

Pull the seat belt buckle upward, then pull up the rear seat cushion [1] and remove it.

Install the seat cushion by aligning the prongs [2] with the holes, then press it down while aligning the bosses [3] with the grommets.



SEAT DAMPER REMOVAL/ INSTALLATION

Unfold the rear seat.

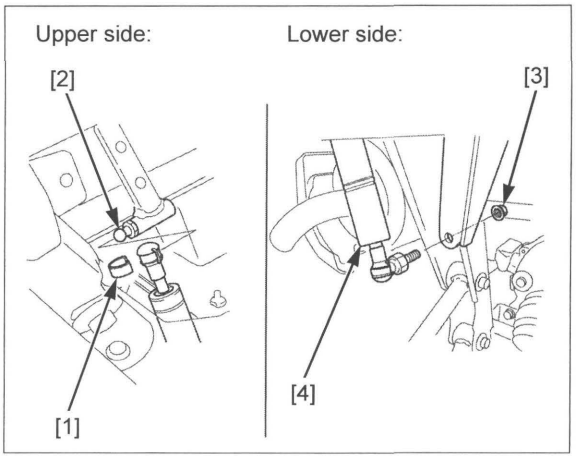
Upper side: Remove the clip [1] and upper joint from the stud [2].

Lower side: Remove the lower nut [3] and seat damper [4].

Installation is in the reverse order of removal.

NOTE:

- Refer to the cargo bed damper for the disposal procedure (page 2-40).

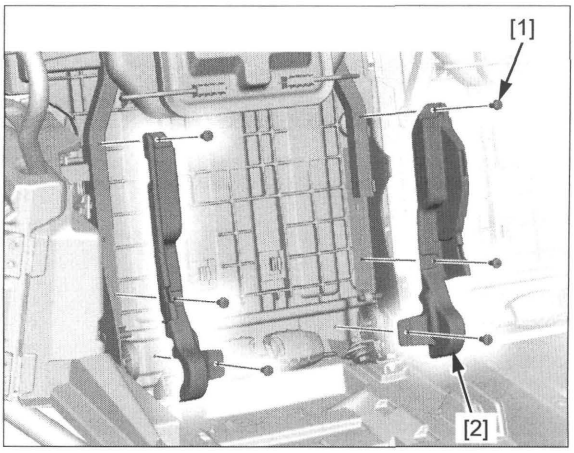


SEAT BACK REMOVAL/ INSTALLATION

Remove the rear seat cushion (page 2-6).

Disconnect the upper side of seat damper (page 2-7).

Remove the six screws [1] and spring covers [2].



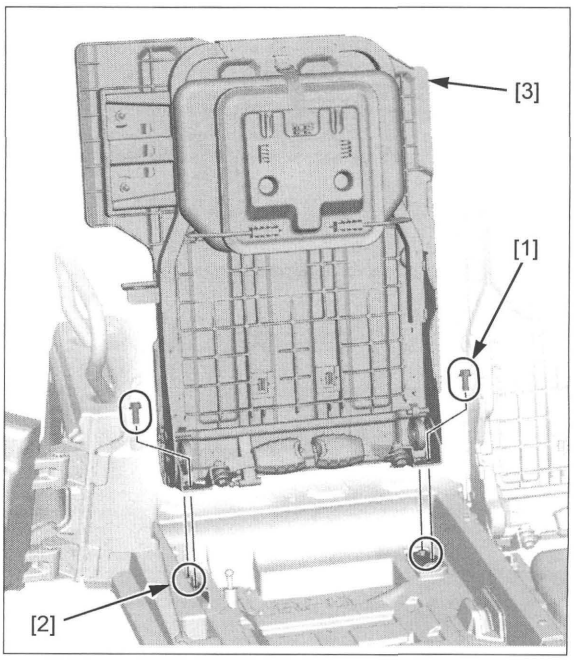
Unlock the rear seat latch.

Remove the two bolts [1] and release the grooves from the frame bosses [2] by pulling the rear seat back [3] forward, then remove the rear seat back assembly.

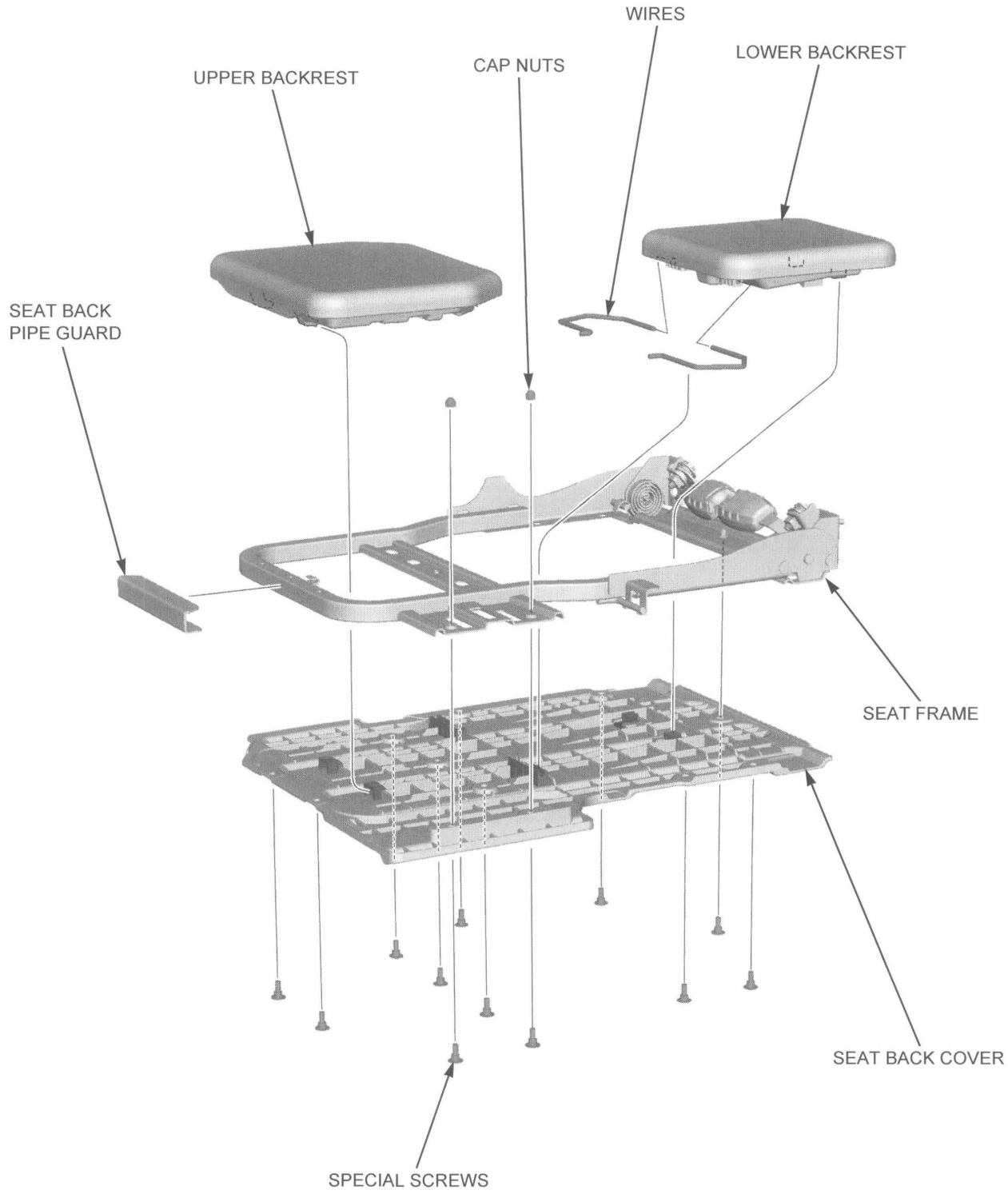
Installation is in the reverse order of removal.

TORQUE:

Rear seat back mounting bolt:
33 N·m (3.4 kgf·m, 24 lbf·ft)



SEAT BACK DISASSEMBLY/ ASSEMBLY



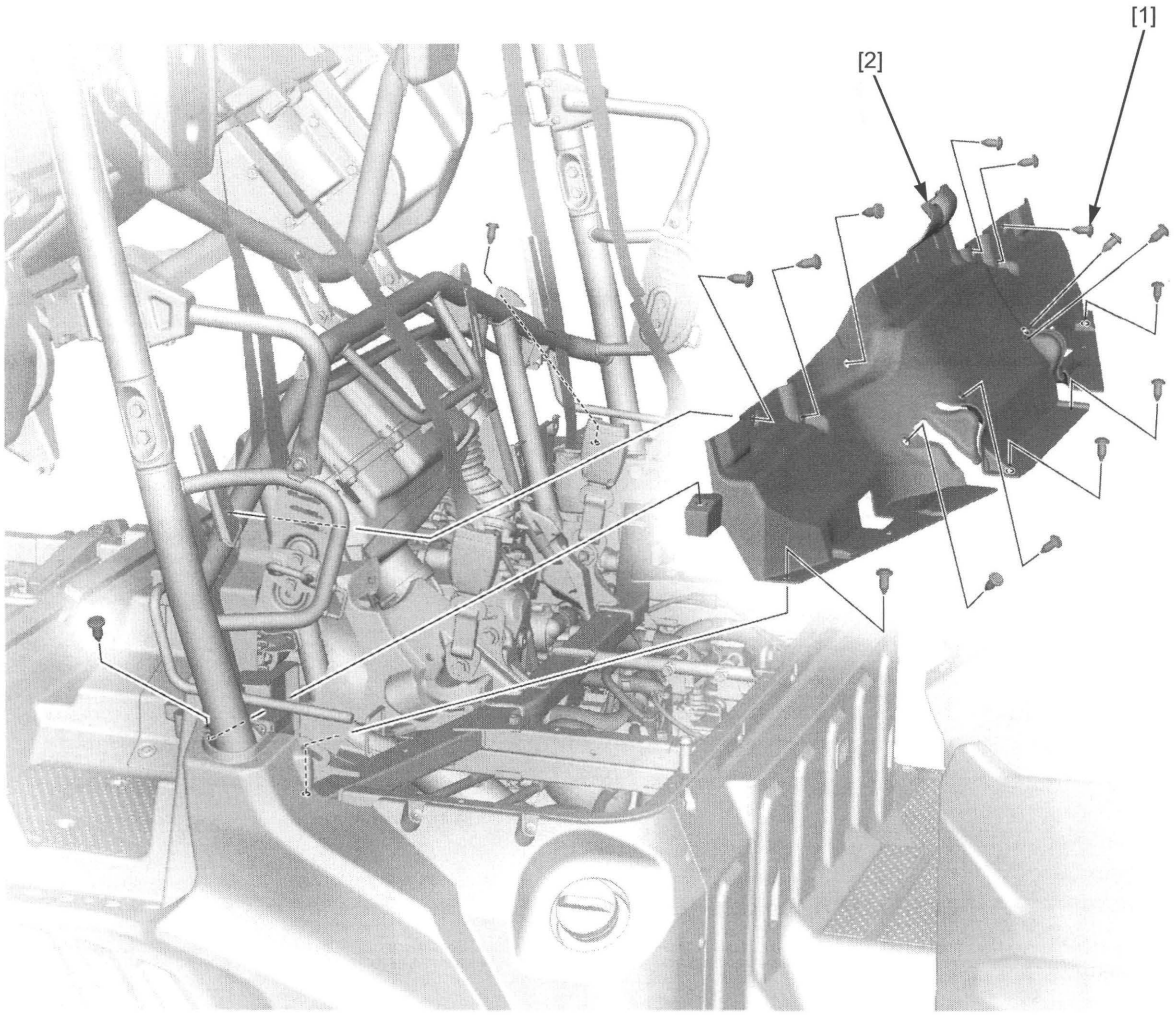
REAR CENTER COVER

REMOVAL/INSTALLATION

Remove the following:

- seat under center lid (page 2-5)
- seat under cover (page 2-6)
- seat under storage (page 2-6)
- backrest (page 2-5)
- sixteen trim clips [1]
- rear center cover [2]

Installation is in the reverse order of removal.



REAR SIDE COVER

REMOVAL/INSTALLATION

Lift up the cargo bed.

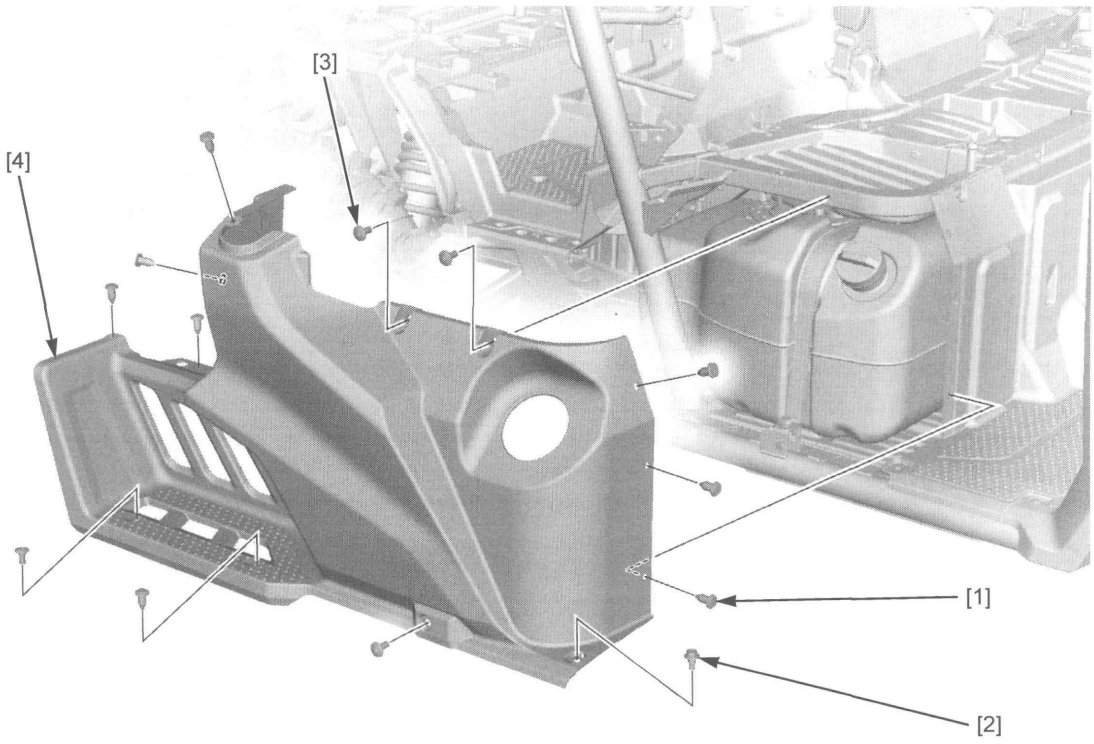
Remove the following:

- front seat cushion (page 2-4)
- eight trim clips [1]
- bolt [2]
- four socket screws [3]
- rear side cover [4]

Installation is in the reverse order of removal.

TORQUE:
Rear side cover bolt:
9.0 N·m (0.9 kgf·m, 6.6 lbf·ft)
Rear side cover screw:
8.0 N·m (0.8 kgf·m, 5.9 lbf·ft)

Right side shown:



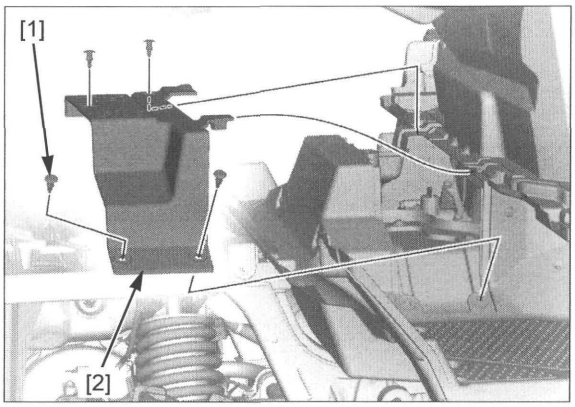
REAR FOOTWELL LID (M5P/M5D ONLY)

REMOVAL/INSTALLATION

Lift up the cargo bed.

Remove the four trim clips [1] and rear footwell lid [2].

Installation is in the reverse order of removal.



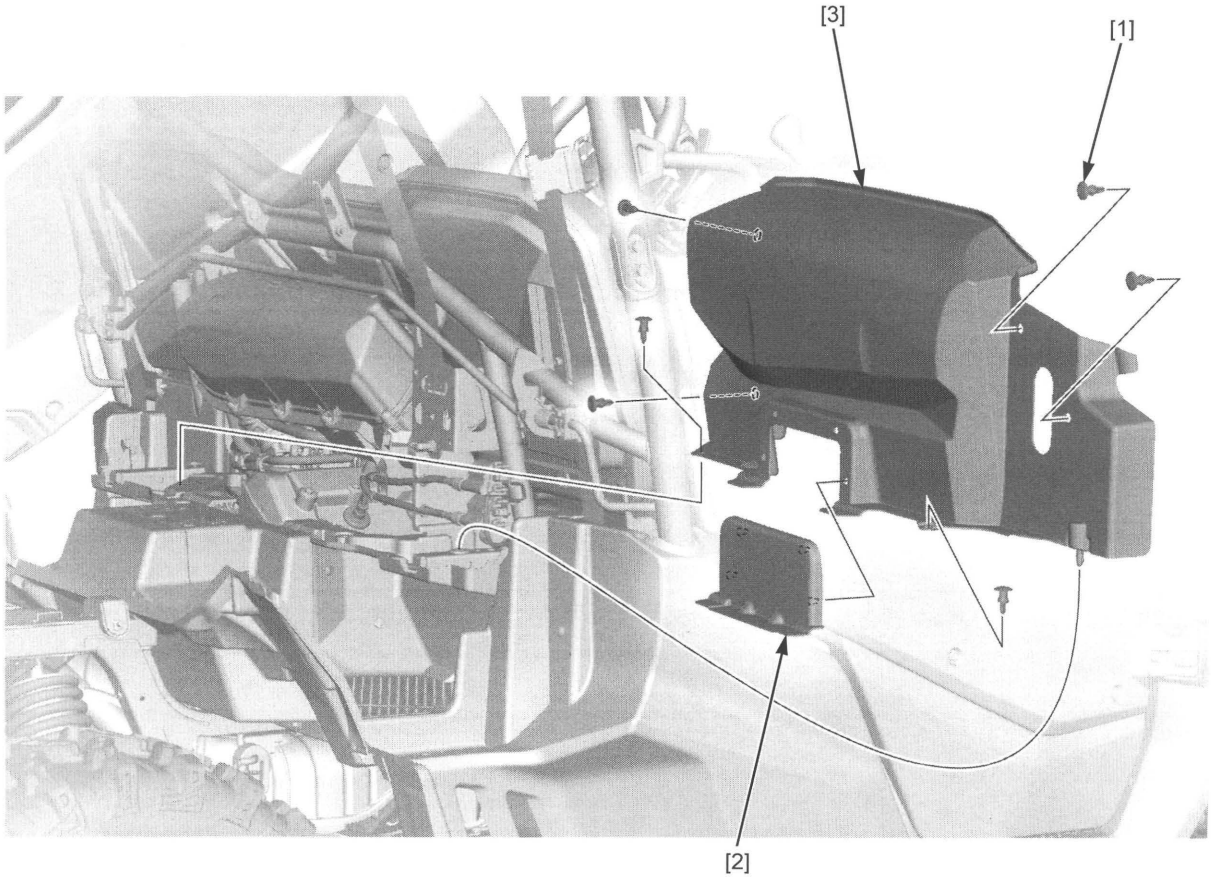
AIR CLEANER COVER

Lift up the cargo bed.

Remove the following:

- six trim clips [1]
- air cleaner rubber [2]
- air cleaner cover [3]

Installation is in the reverse order of removal.



REAR FOOTWELL (M5P/M5D ONLY)

REMOVAL/INSTALLATION

Lift the cargo bed.

Remove the following:

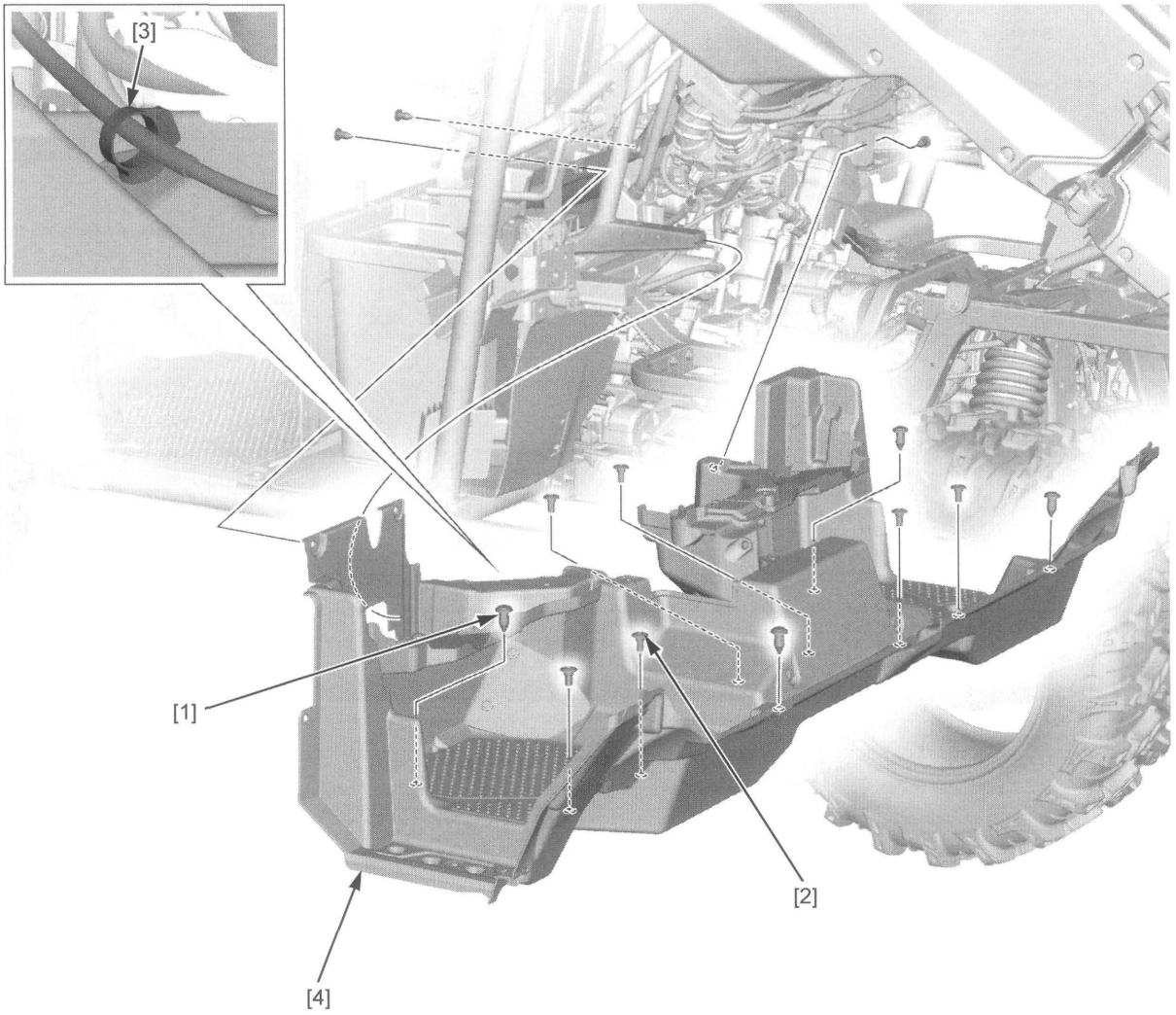
- air cleaner cover (page 2-11)
- rear side covers (page 2-10)
- rear footwell lid (page 2-11)
- seven trim clips [1]
- six socket screws [2]

Release the throttle cable (from the clamp [3]).

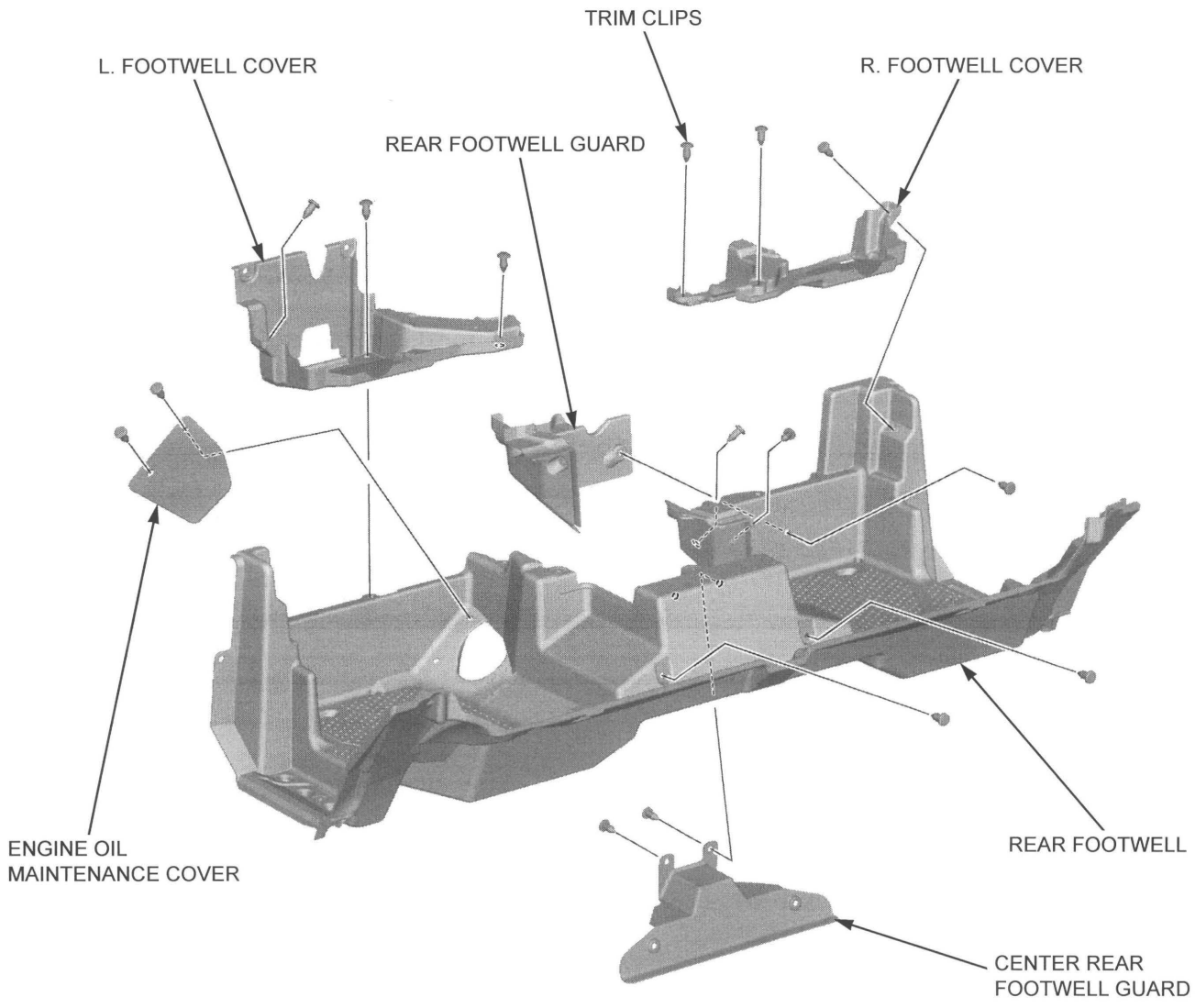
Remove the rear footwell [4].

Installation is in the reverse order of removal.

TORQUE:
Rear footwell socket screw:
9.0 N·m (0.9 kgf·m, 6.6 lbf·ft)



DISASSEMBLY/ASSEMBLY



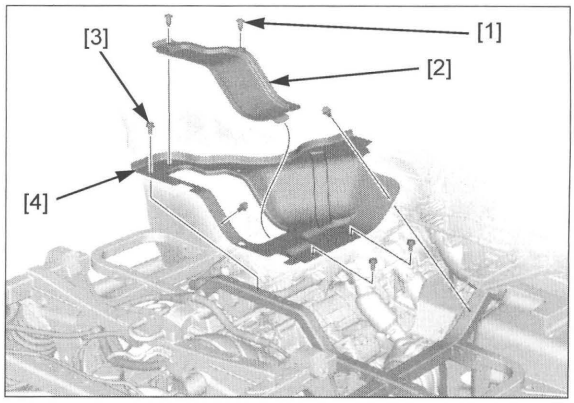
HEAT SHIELD PROTECTOR (M5P/M5D ONLY)

REMOVAL/INSTALLATION

Remove the following:

- rear footwell (page 2-12)
- two trim clips [1]
- heat shield cover [2]
- five bolts [3]
- heat shield protector [4]

Installation is in the reverse order of removal.



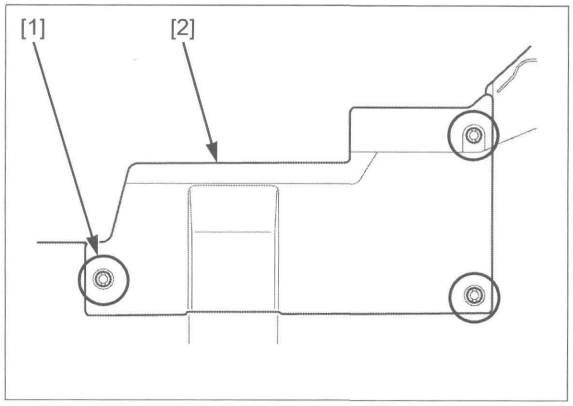
REAR MUD GUARD (M3P/M3D ONLY)

REMOVAL/INSTALLATION

Lift up the cargo bed.

Remove the following:

- three trim clips [1]
- mud guard lid [2]



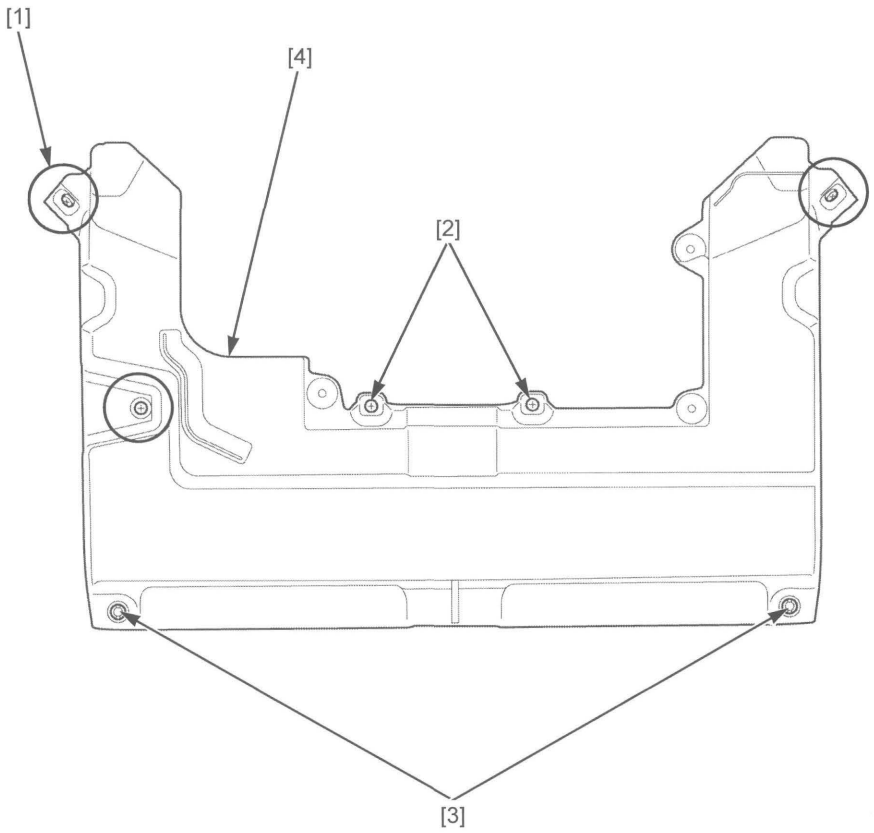
- three screws (short) [1]
- two screws (long) [2]
- two trim clips [3]
- rear mud guard [4]

Installation is in the reverse order of removal.

TORQUE:

Rear mud guard screw:

9.0 N·m (0.9 kgf·m, 6.6 lbf·ft)



REAR FOOTWELL STAY

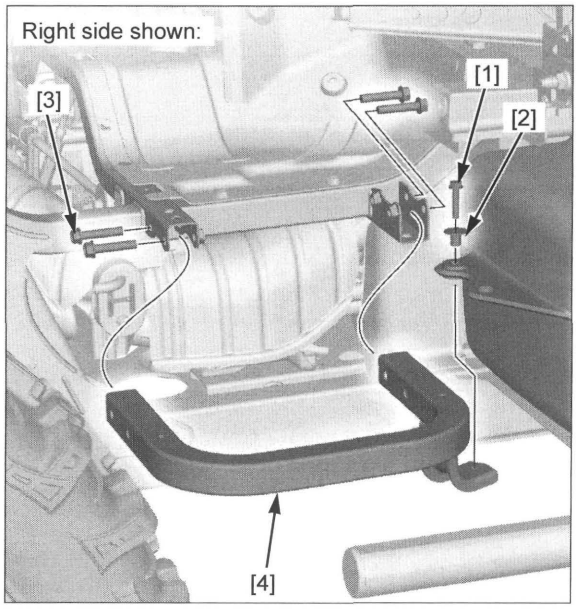
REMOVAL/INSTALLATION

M5P/M5D: Remove the rear footwell (page 2-12).

Right side: Remove the fuel tank mounting bolt [1], collar [2], four bolts [3] and right rear footwell stay [4].

Left side: Remove the four bolts and left rear footwell stay.

Installation is in the reverse order of removal.



INNER FENDER

REMOVAL/INSTALLATION

Right side: Remove the following:

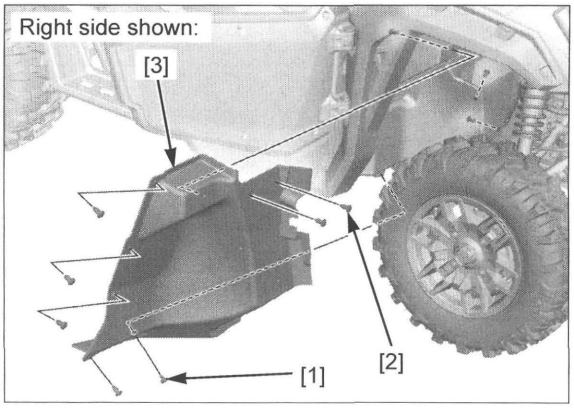
- socket screw [1]
- nine trim clips [2]
- right floor protector [3]

Left side: Remove the following:

- socket screw
- eight trim clips
- left floor protector

Installation is in the reverse order of removal.

TORQUE:
Floor protector mounting screw:
9.0 N·m (0.9 kgf·m, 6.6 lbf·ft)



FRONT SIDE COVER

REMOVAL/INSTALLATION

Remove the following:

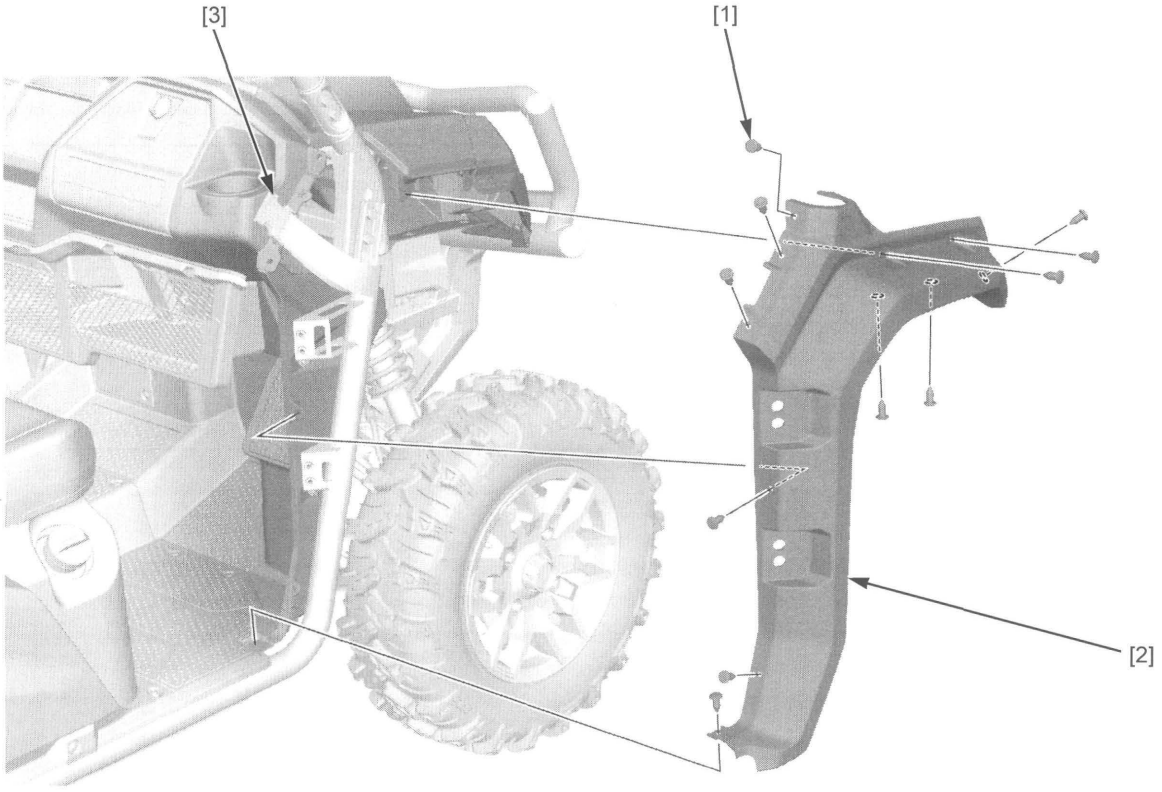
- inner fender (page 2-15)
- front door (page 2-23)
- eleven trim clips [1]
- front side cover [2]

Installation is in the reverse order of removal.

NOTE:

- Set the net buckle [3] as shown before installing the front side cover.

Right side shown:



FLOOR PANEL

REMOVAL/INSTALLATION

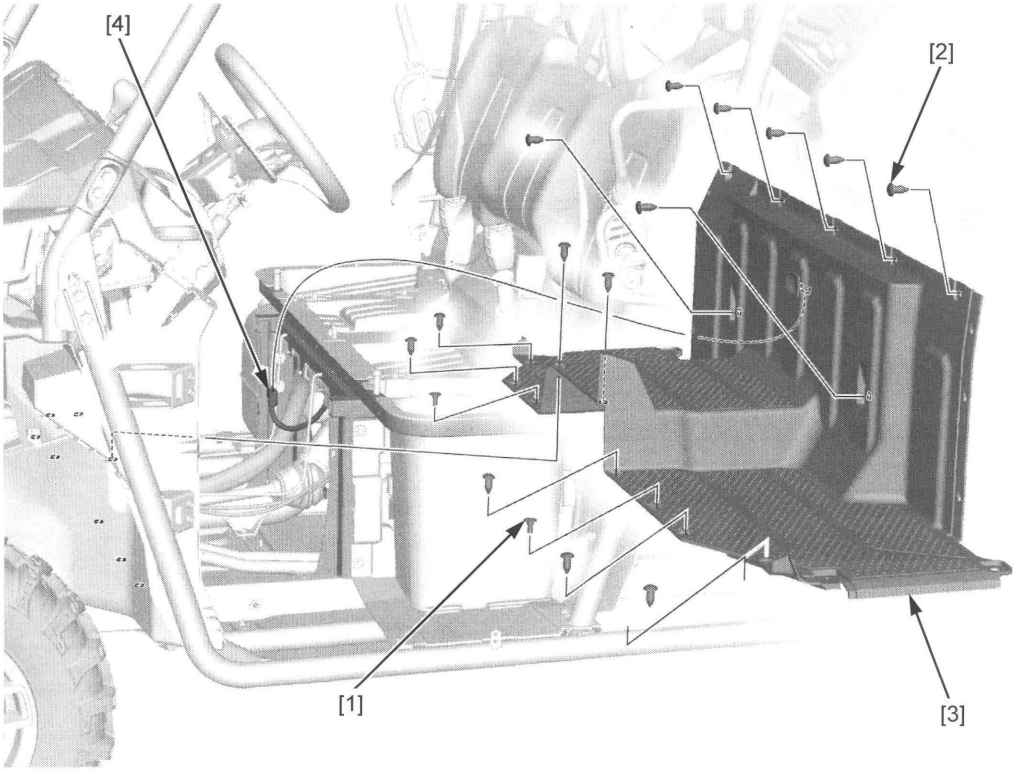
Remove the following:

- front side covers (page 2-16)
- rear side covers (page 2-10)
- two socket screws [1]
- fourteen trim clips [2]
- floor panel [3]

IV A, IV AC, VI A, VI AC, VI CM, VII A, VII AC, VII CM, IX A, IX AC type:
Disconnect the front courtesy light 2P connector [4].

Installation is in the reverse order of removal.

TORQUE:
Floor panel socket screw:
8.0 N·m (0.8 kgf·m, 5.9 lbf·ft)



FRONT HOOD

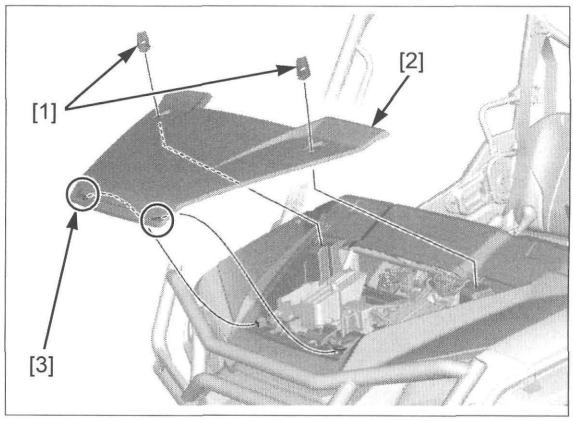
REMOVAL/INSTALLATION

Turn the lock knobs [1] and release them by pulling the front hood [2] upward.

Remove the front hood by releasing the hooks [3].

Release the lock knob tabs and remove the lock knobs from the front food.

Installation is in the reverse order of removal.



FRONT BUMPER

REMOVAL/INSTALLATION

Except VII A, VII AC, VII CM, IX A, IX AC type:

Remove the following:

- four flange bolts (8 mm) [1]
- two bolt/washers (10 mm) [2]
- front bumper [3]
- front side reflector mounting nuts (Canada model) [4]
- front side reflectors (Canada model) [5]

Installation is in the reverse order of removal.

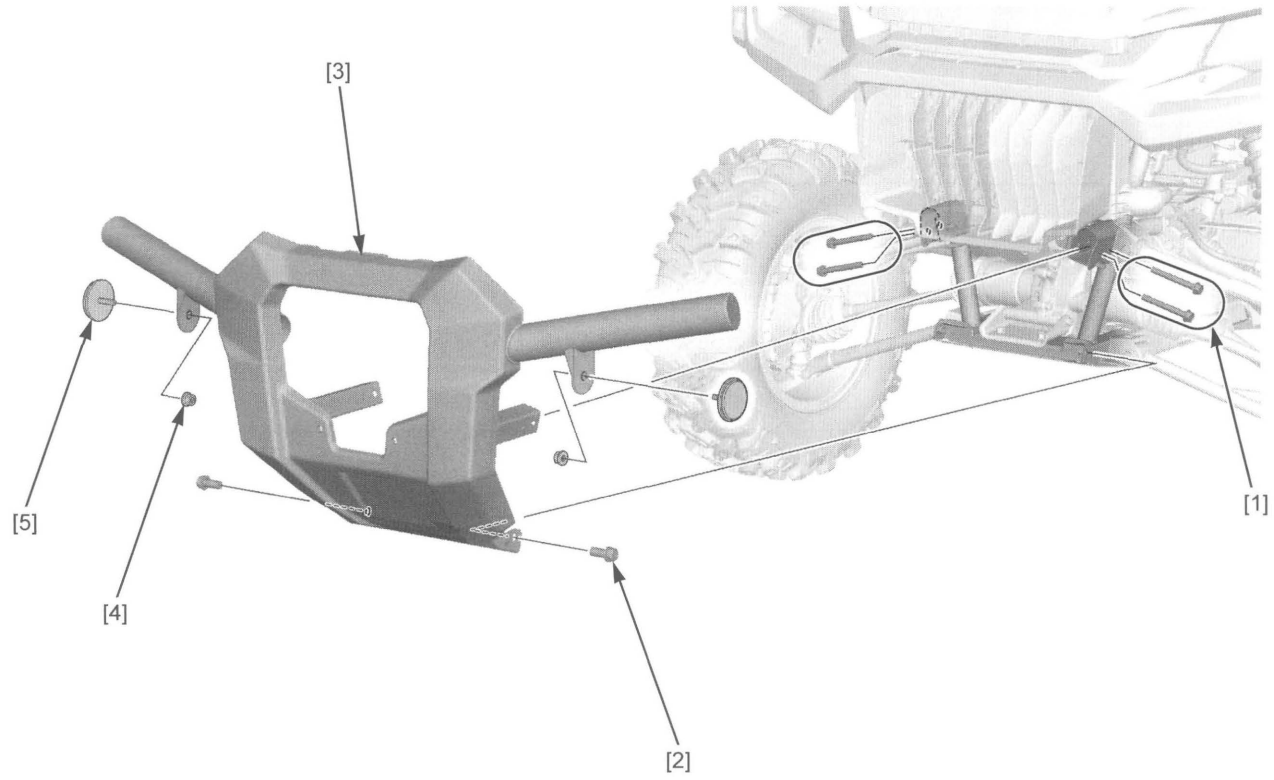
TORQUE:

Front bumper bolt/washer:
34 N·m (3.5 kgf·m, 25 lbf·ft)

Front bumper flange bolt:
36.5 N·m (3.7 kgf·m, 27 lbf·ft)

Front side reflector mounting nut (Canada model):
3.4 N·m (0.3 kgf·m, 2.5 lbf·ft)

CM type shown:



VII A, VII AC, VII CM, IX A, IX AC type:

Remove the following:

- winch cable nuts [1] and washers [2]
- four flange bolts (8 mm) [3]
- two bolt/washers (10 mm) [4]
- front bumper [5], winch [6] and winch bracket [7]
- four winch mounting bolts [8]
- two fairlead mounting bolts [9]
- fairlead assembly [10]
- two roller bracket bolts [11] and roller brackets [12]
- front side reflector mounting nuts (Canada model) [13]
- front side reflectors (Canada model)[14]

Installation is in the reverse order of removal.

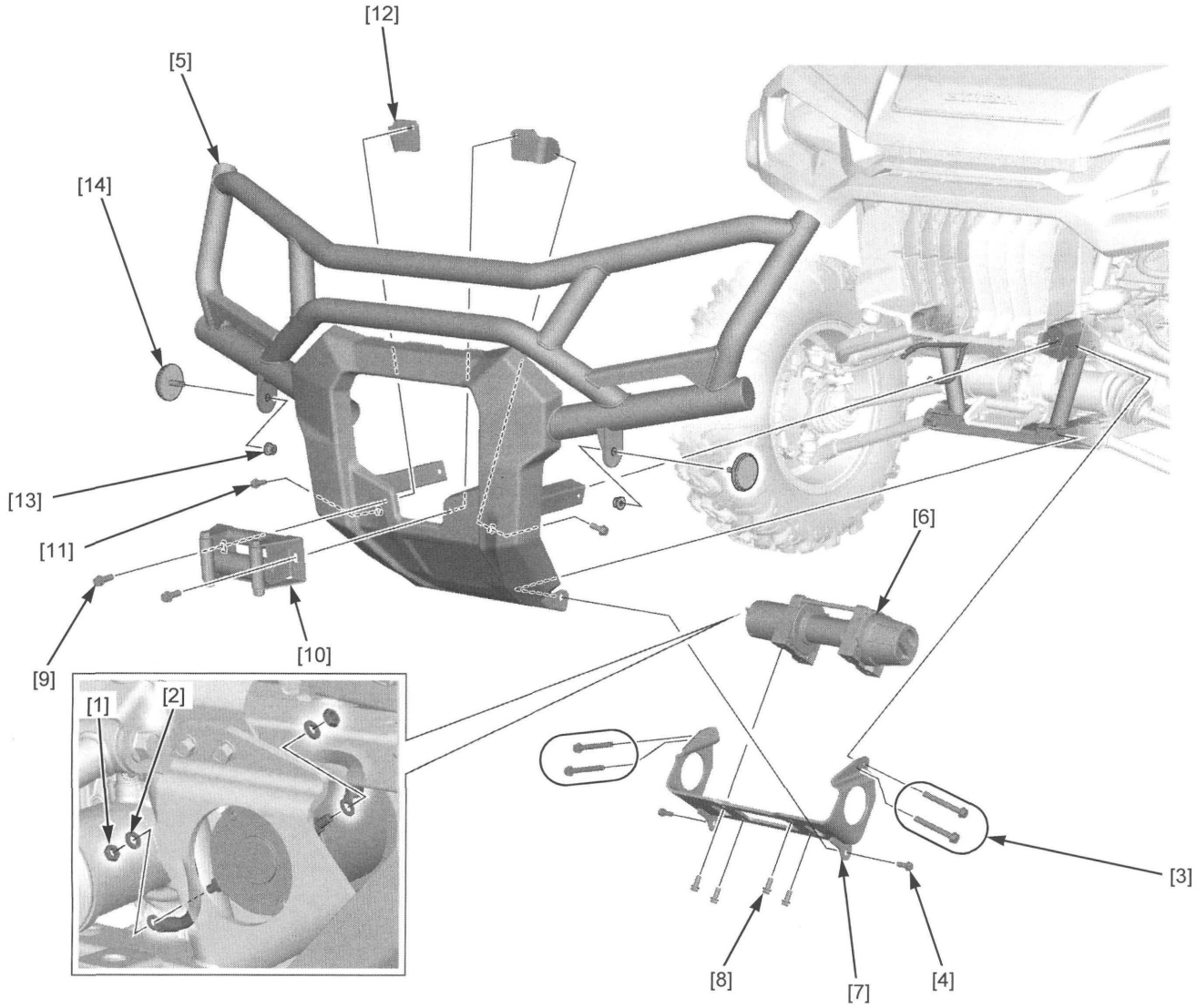
TORQUE:

Front bumper bolt/washer:
82.5 N·m (8.4 kgf·m, 61 lbf·ft)

Front bumper flange bolt:
34 N·m (3.5 kgf·m, 25 lbf·ft)

Front side reflector mounting nut (Canada model):
3.4 N·m (0.3 kgf·m, 2.5 lbf·ft)

VII CM type shown:



FRONT FENDER

REMOVAL/INSTALLATION

Remove the following:

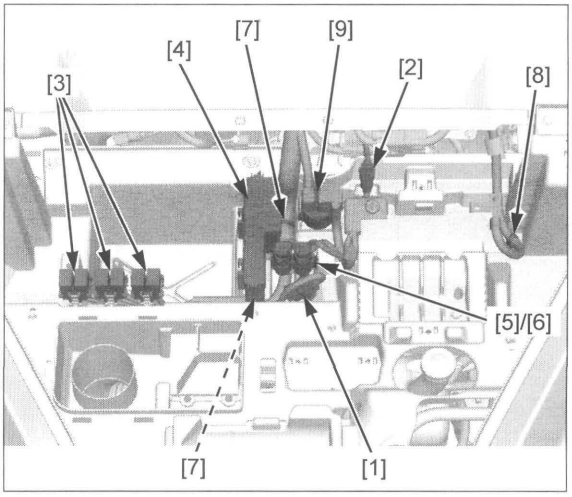
- sub air cleaner (page 3-6)
- front bumper (page 2-18)
- front side covers (page 2-16)
- battery (page 22-4)

Disconnect the following:

- headlight sub-wire harness 6P connector [1]
- starter relay switch 2P connector [2]

Release the following:

- relay connectors [3]
- fuse box [4]
- EPS fuse box [5]
- I-4WD model: I-4WD fuse box [6]
- wire harness clips [7]
- ground cable harness clip [8]
- starter relay [9]



Loosen the band screw and disconnect snorkel duct connecting hose [1] from the snorkel duct B [2].

Remove the following:

- eight trim clips [3]
- two front fender bolts [4]
- four bolts [5]
- two front fender screws [6]
- front fender [7]

Installation is in the reverse order of removal.

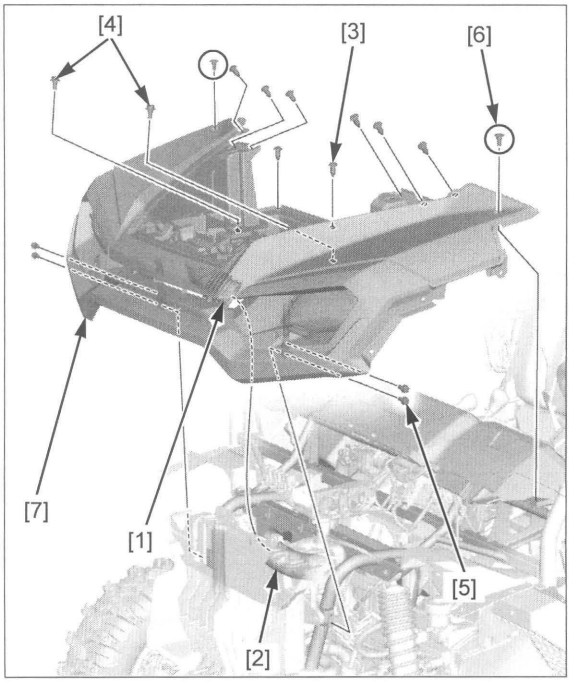
TORQUE:

Front fender screw:
10 N·m (1.0 kgf·m, 7 lbf·ft)

Snorkel duct connecting hose band screw:
1.4 N·m (0.1 kgf·m, 1.0 lbf·ft)

NOTE:

- Align the lug with the connecting hose groove when installing the fender.
- Route the wires properly (page 1-29).



FRONT GRILLE

REMOVAL/INSTALLATION

Remove the front fender (page 2-20).

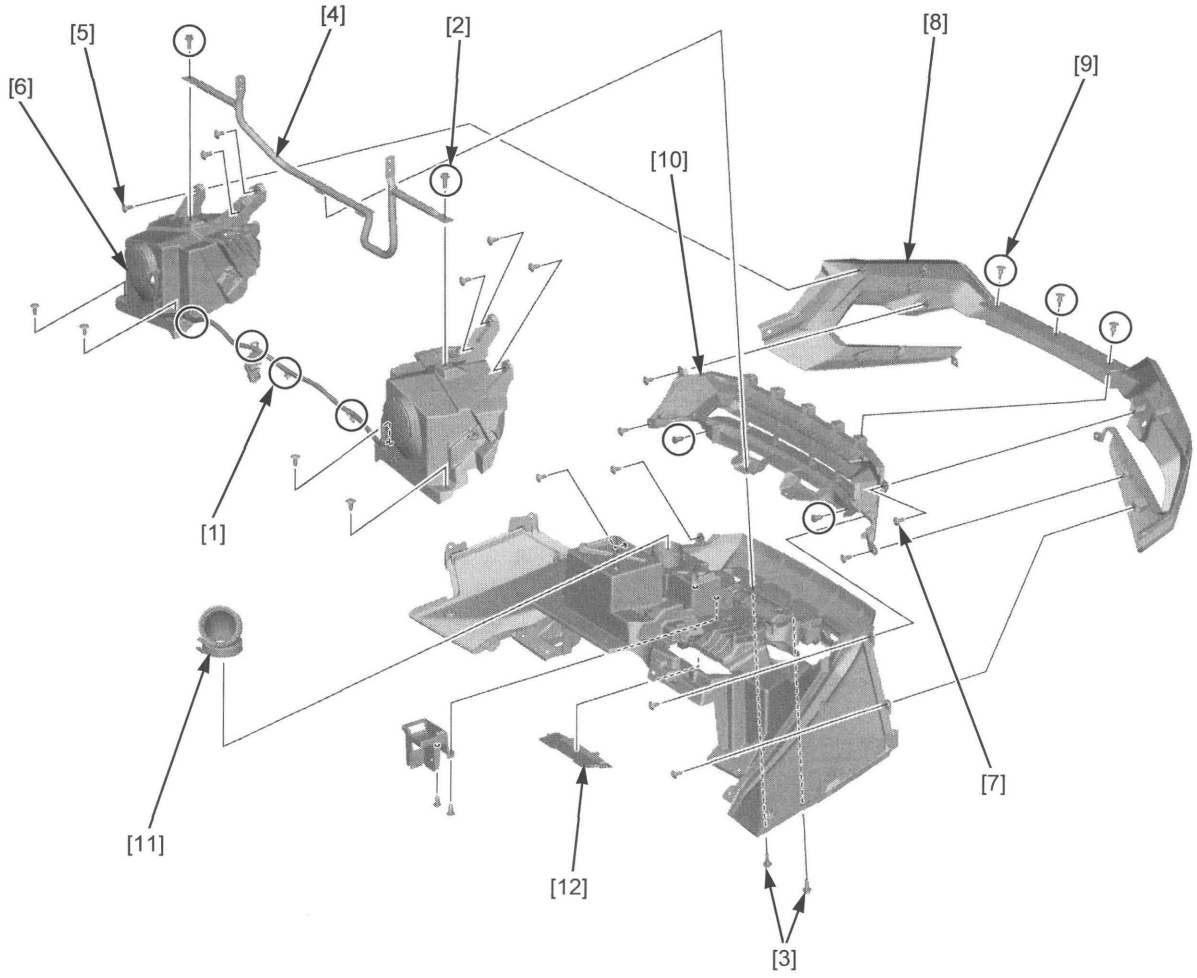
Remove the following:

- four wire clips [1]
- two bolts [2]
- two front fender bolts [3]
- front support frame [4]
- ten headlight mounting screws [5]
- headlight assemblies [6]
- eight front grille screws [7]
- front grille [8]
- five trim clips [9]
- front inner grille [10]
- snorkel duct connecting hose [11]
- front fender lid [12]

Installation is in the reverse order of removal.

TORQUE:

Snorkel duct connecting hose band screw:
1.4 N·m (0.1 kgf·m, 1.0 lbf·ft)



FRONT INNER FENDER

REMOVAL/INSTALLATION

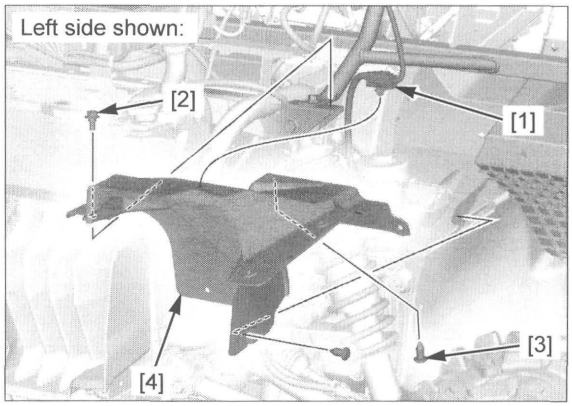
Remove the front fender (page 2-20).

Left side: Release the foot brake light switch 6P connector [1] and remove the front inner fender bolt [2], trim clips [3] and left front inner fender [4].

Right side: Remove the front inner fender bolt and two trim clips.

Remove the right front inner fender.

Installation is in the reverse order of removal.



AIR GUIDE PLATE

REMOVAL/INSTALLATION

Remove the front fender (page 2-20).

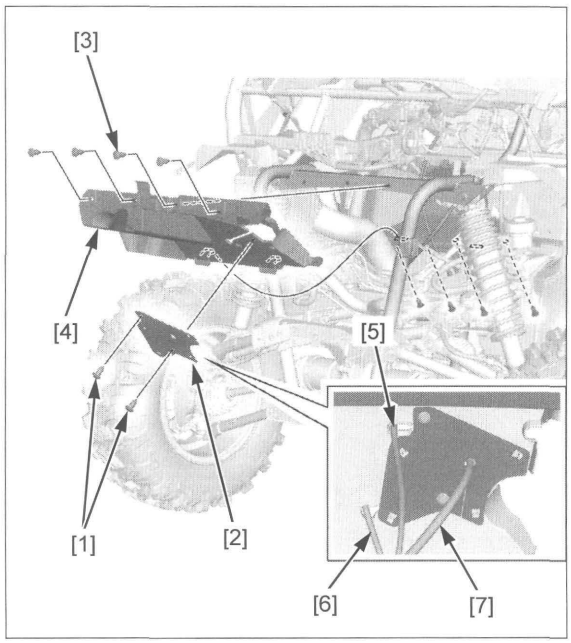
Remove the following:

- two trim clips [1]
- air guide rubber [2]
- eight trim clips [3]
- air guide plate [4]

Installation is in the reverse order of removal.

NOTE:

- Route the final clutch cable [5], rear differential lock cable [6] and shift cable [7] properly as shown.

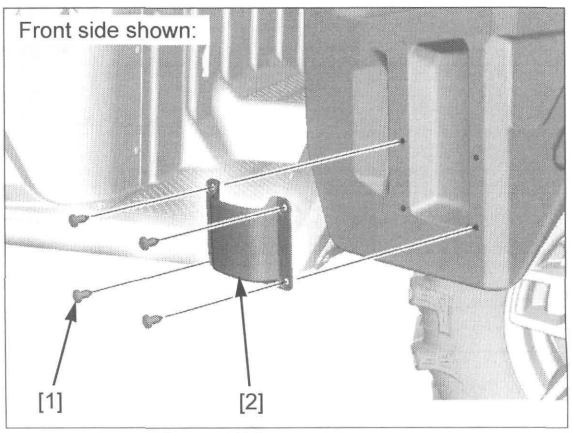


DOOR

DRINK HOLDER REMOVAL/ INSTALLATION

Remove the four trim clips [1] and drink holder [2].

Installation is in the reverse order of removal.



FRONT DOOR REMOVAL/ INSTALLATION

Open the door.

Support the bottom of the front door [1].

Remove the four bolts [2] and door.

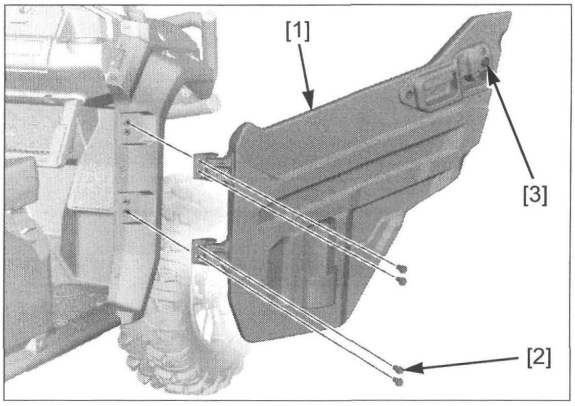
Close and latch the door before tightening the bolts.

Installation is in the reverse order of removal.

After installation, make sure the door latches securely without requiring excessive force and opens smoothly.

If necessary, loosen the bolts and adjust the door panel position.

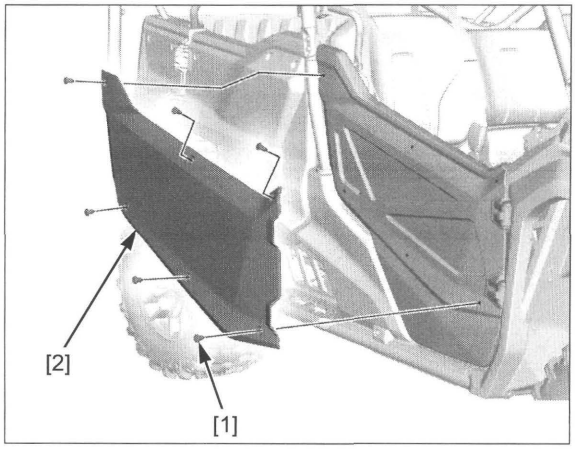
If the door rattles when closed, turn the door stopper rubber [3] so that the door latches on the second click.



FRONT DOOR PANEL REMOVAL/ INSTALLATION

Remove the six trim clips [1] and front door panel [2].

Installation is in the reverse order of removal.



REAR DOOR REMOVAL/ INSTALLATION (M5P/M5D only)

Open the door.

Support the bottom of the rear door [1].

Remove the four bolts [2] and door.

Remove the two bolt/washers [3], collars [4], and rear door stopper [5].

Close and latch the door before tightening the bolts.

Installation is in the reverse order of removal.

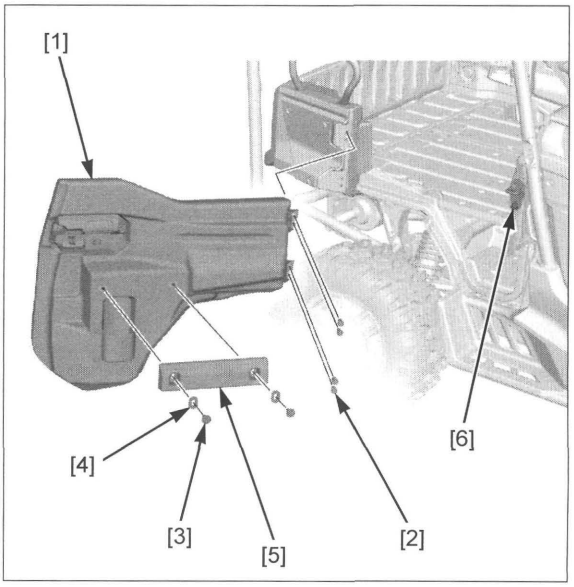
TORQUE:

Rear door stopper bolt/washer:
9.0 N·m (0.9 kgf·m, 6.6 lbf·ft)

After installation, make sure the door latches securely without requiring excessive force and opens smoothly.

If necessary, loosen the bolts and adjust the door panel position.

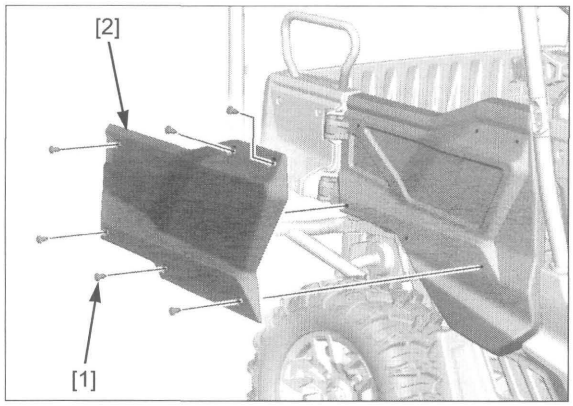
If the door rattles when closed, turn the door stopper rubber [6] so that the door latches on the second click.



REAR DOOR PANEL REMOVAL/ INSTALLATION (M5P/M5D only)

Remove the six clips [1] and rear door panel [2].

Installation is in the reverse order of removal.

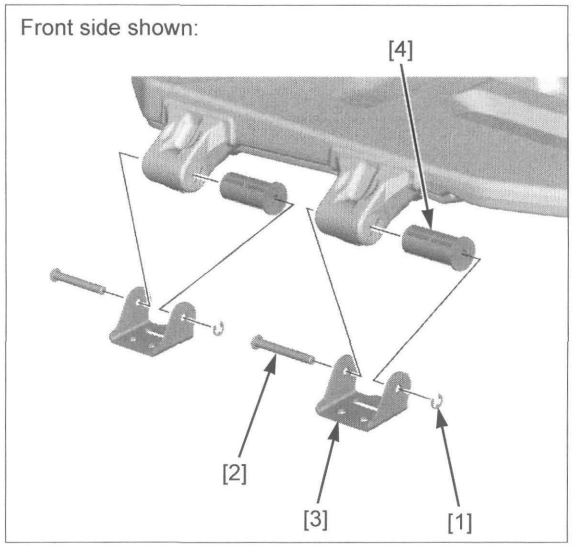


DOOR HINGE REMOVAL/ INSTALLATION

Remove the E-clips [1], pivot pins [2], and door hinges [3].

Remove the bushings [4] from the lower side.

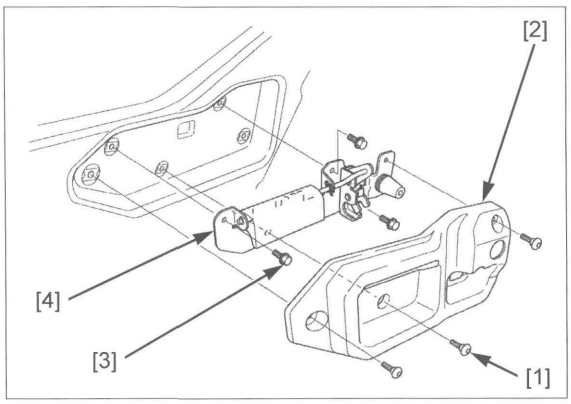
Installation is in the reverse order of removal.



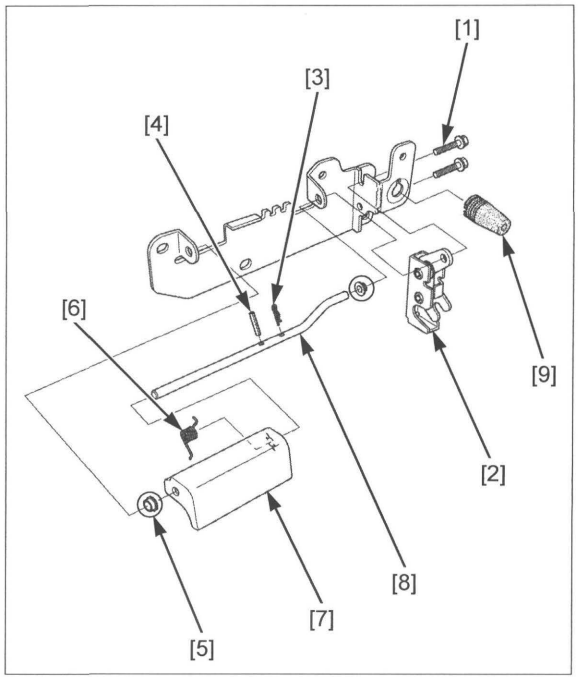
FRONT DOOR HANDLE AND LATCH REMOVAL/INSTALLATION

Remove the following:

- three socket screws [1]
- latch cover [2]
- three bolts [3]
- door latch plate assembly [4]



- two bolts [1]
- latch [2]
- lock pin [3]
- locating pin [4]
- collars [5]
- spring [6]
- handle [7]
- rod [8]
- stopper [9]



Installation is in the reverse order of removal.

TORQUE:

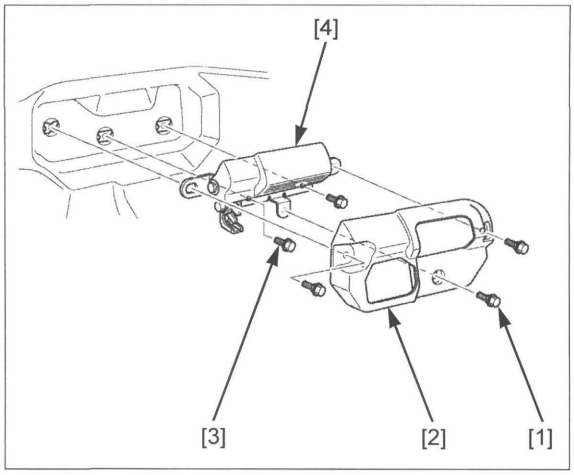
Front door latch cover socket screw:
9.0 N·m (0.9 kgf·m, 6.6 lbf·ft)

Front door latch plate bolt:
9.0 N·m (0.9 kgf·m, 6.6 lbf·ft)

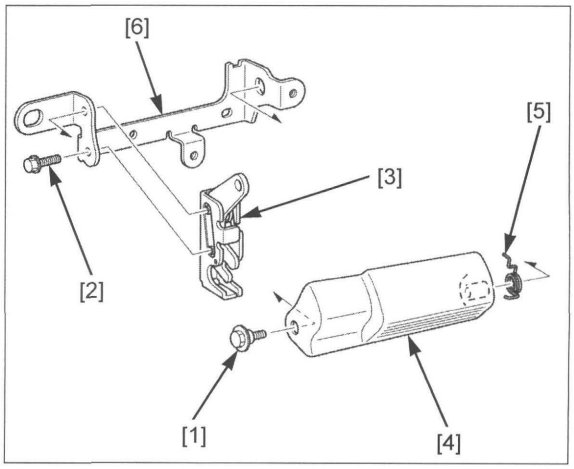
REAR DOOR HANDLE AND LATCH REMOVAL/INSTALLATION (M5P/M5D only)

Remove the following:

- three bolts [1]
- latch cover [2]
- two bolts [3]
- door latch plate assembly [4]



- pivot bolt [1]
- mounting bolt [2]
- latch [3]
- lever [4]
- spring [5] (by releasing the end off of the door latch plate [6].



Installation is in the reverse order of removal.

REAR SEAT LATCH COVER REMOVAL/INSTALLATION (M5P/M5D only)

Open the tailgate.

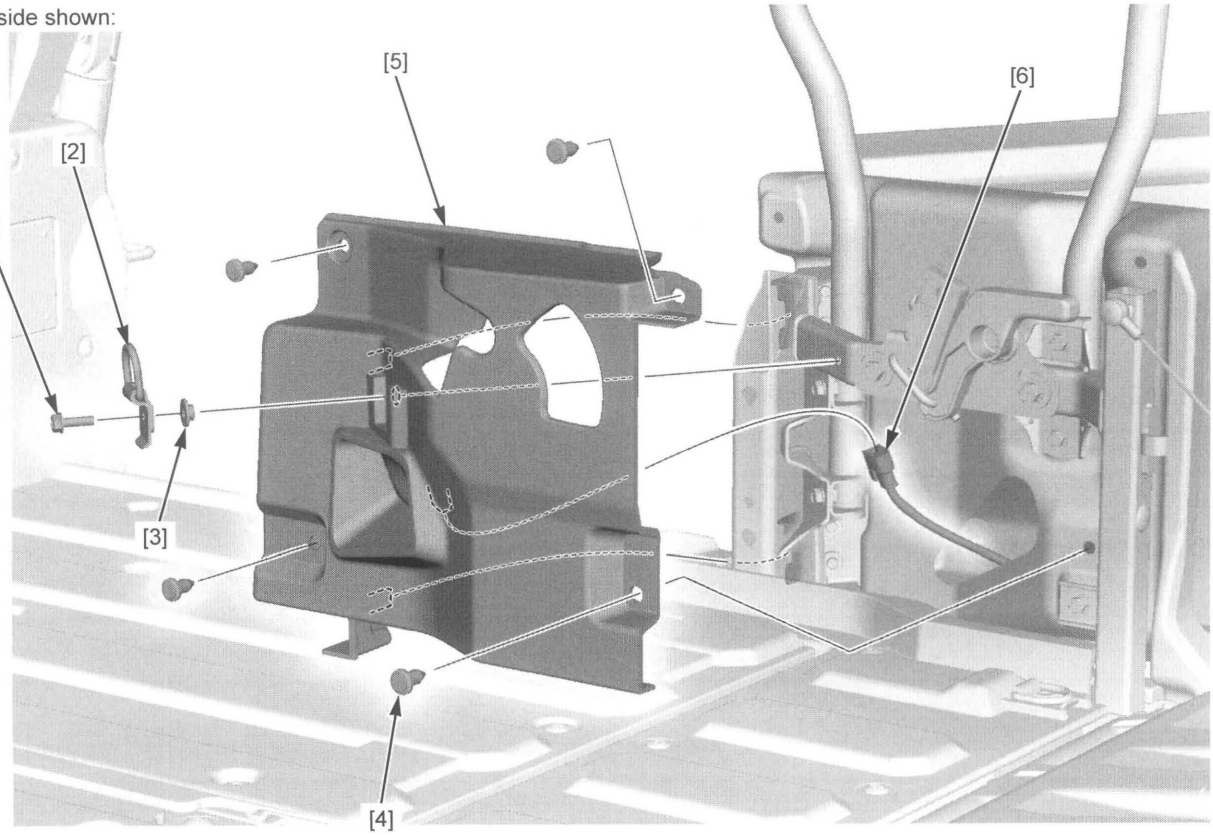
Remove the following:

- bolt [1]
- hook [2]
- collar [3]
- four trim clips [4]
- rear seat latch cover [5]

VII A, VII AC, VII CM, IX A, IX AC type:
Disconnect the courtesy light 2P connector [6] from the rear seat latch cover.

Installation is in the reverse order of removal.

Right side shown:



REAR SEAT LATCH REMOVAL/ INSTALLATION (M5P/M5D only)

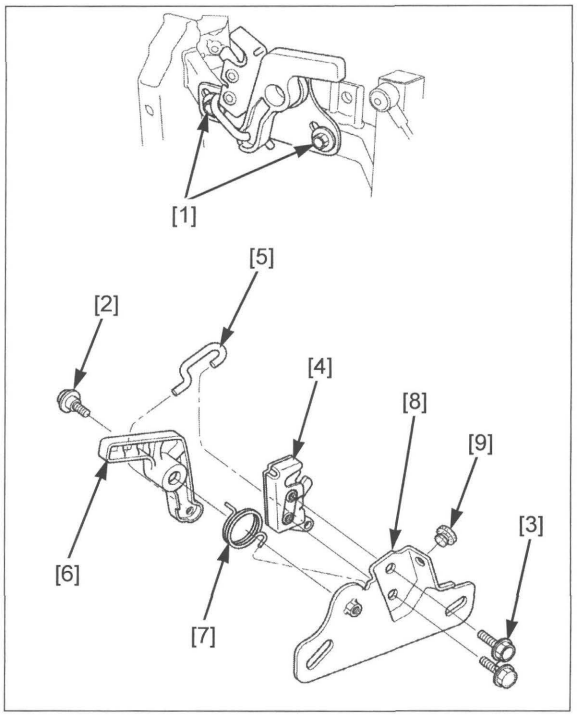
Remove the following:

- rear seat latch cover (page 2-26)
- two mounting bolts [1]
- pivot bolt [2]
- two bolts [3]
- rear seat latch [4]
- hook [5]
- lever [6]
- spring [7] (by releasing the end off of the door latch plate [8])
- rubber [9]

Installation is in the reverse order of removal.

NOTE:

- After installation, check the rear seat latch operation. Loosen the mounting bolts and adjust the latch position if necessary.



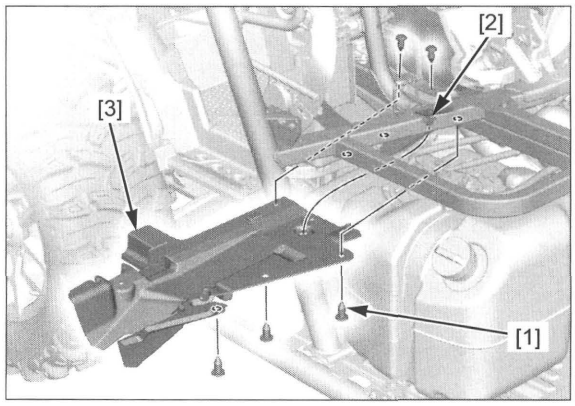
SUPPORT COVER

LEFT SUPPORT COVER REMOVAL/INSTALLATION

Remove the following:

- rear center cover (page 2-9)
- floor panel (page 2-17)
- five trim clips [1]
- wire harness clip [2]
- left support cover [3]

Installation is in the reverse order of removal.

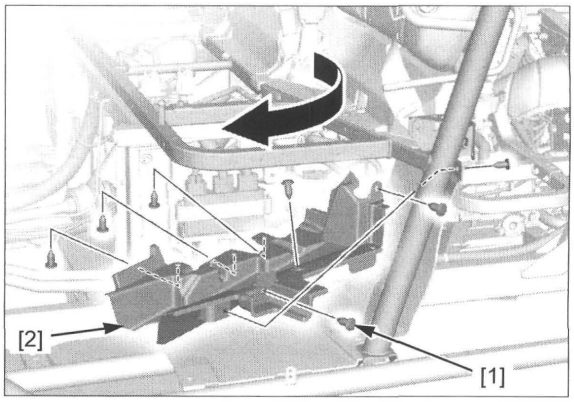


RIGHT SUPPORT COVER REMOVAL/INSTALLATION

Remove the following:

- M3P/M3D: rear mud guard (page 2-14)
- M5P/M5D: rear footwell (page 2-12)
- seat under storage (page 2-6)
- seven trim clips [1]
- right support cover [2]

Installation is in the reverse order of removal.



MIDDLE MUD GUARD

REMOVAL/INSTALLATION

Remove the following:

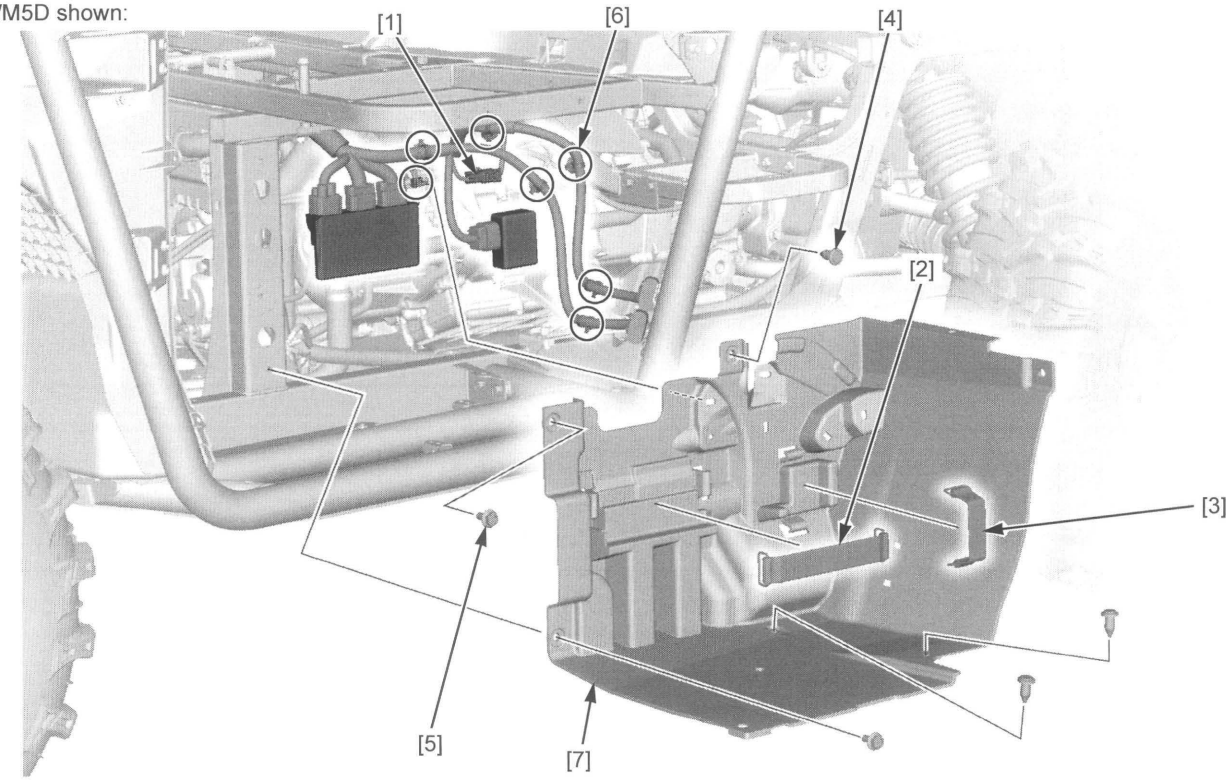
- right support cover (page 2-27)
- regulator/rectifier (page 22-6)
- CKP sensor 2P connector [1]
- PCM band [2]
- fan control unit band [3]
- three trim clips [4]
- two bolts [5]
- wire harness clips [6]
- middle mud guard [7]

Installation is in the reverse order of removal.

NOTE:

- Route the wires properly (page 1-29).

M5P/M5D shown:



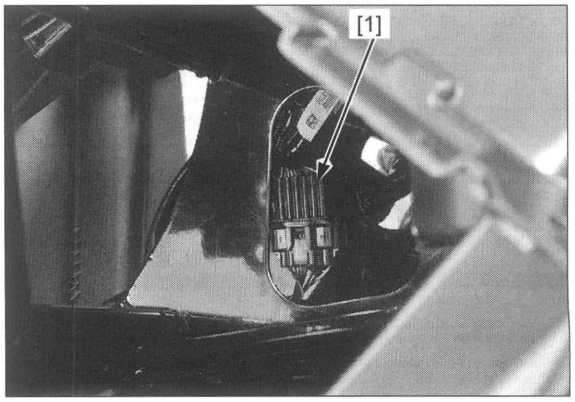
INSTRUMENT PANEL

REMOVAL/INSTALLATION

Remove the following:

- front side cover (page 2-16)
- front hood (page 2-17)
- M3D/M5D: dash under storage (page 2-30)
- steering rubber and cover (page 17-5)

Release and disconnect the sub-wire harness 12P connector [1].



Release and disconnect the ignition switch 5P connector [1] and other switch connectors [2].

Remove the following:

- gear selector lever knob [3]
- drive mode select lever knob [4]
- six trim clips [5]
- M3P/M5P: two socket screws [6]
- two front fender screws [7]
- two instrument panel mounting screws (5 mm) [8]
- instrument panel mounting screw (6 mm) [9]

Release the retaining clips [10] from the frame pipe [11] and remove the instrument panel [12].

When installing the lever knob, install with the tab [13] facing up.

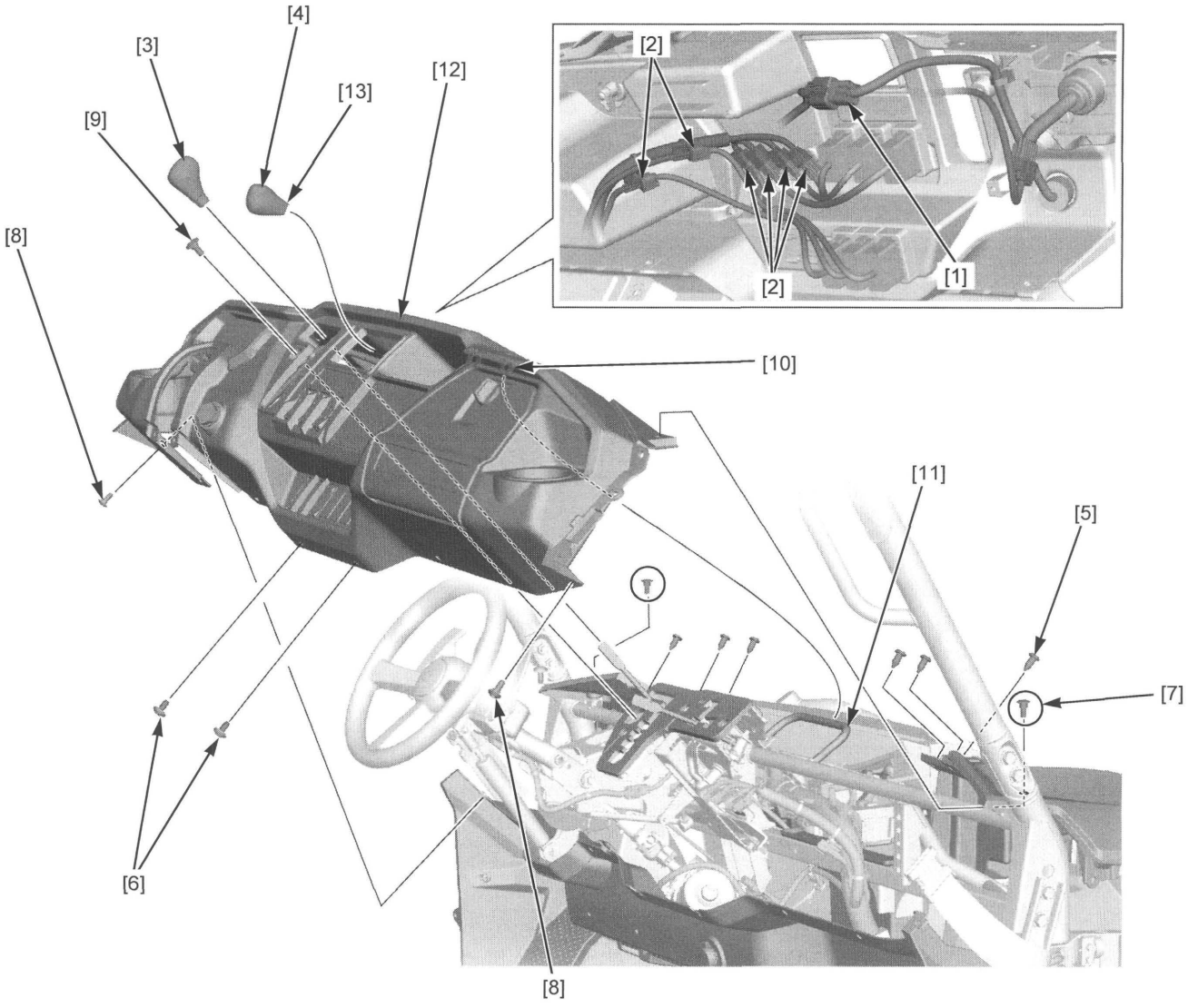
Installation is in the reverse order of removal.

TORQUE:

Instrument panel mounting screw (5 mm):
4.2 N·m (0.4 kgf·m, 3.1 lbf·ft)

Instrument panel mounting screw (6 mm):
9.0 N·m (0.9 kgf·m, 6.6 lbf·ft)

Front fender screw:
10 N·m (1.0 kgf·m, 7 lbf·ft)



DASH UNDER STORAGE (M3D/M5D ONLY)

REMOVAL/INSTALLATION

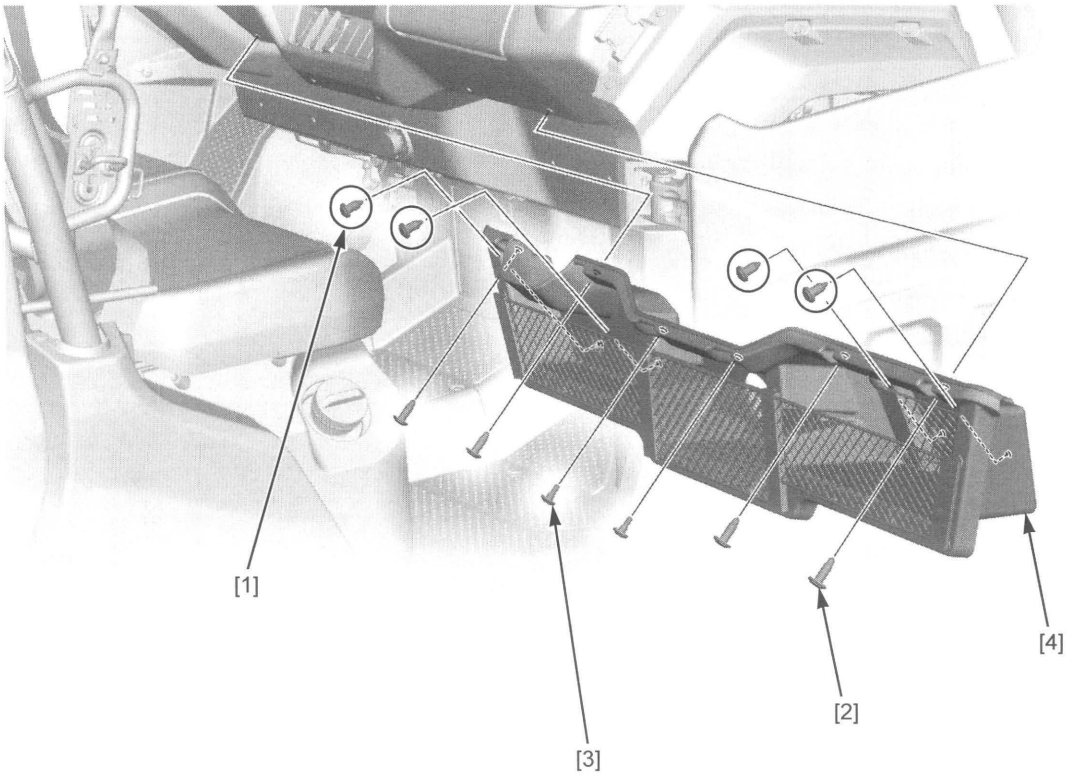
Remove the following:

- four trim clips A [1]
- four trim clips B [2]
- two socket screws [3]
- dash under storage [4]

Installation is in the reverse order of removal.

TORQUE:

Dash under storage mounting screw:
4.2 N·m (0.4 kgf·m, 3.1 lbf·ft)



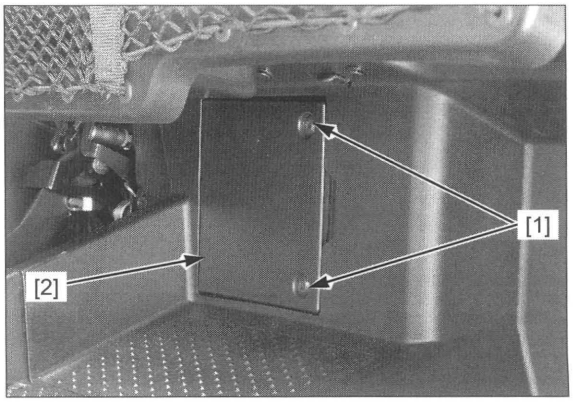
FRONT FLOOR LID

Remove the two socket screws [1] and the front floor lid [2].

Installation is in the reverse order of removal.

TORQUE:

Front floor lid socket screw:
9.0 N·m (0.9 kgf·m, 6.6 lbf·ft)



FRONT FLOOR COVER

Remove the following:

Disconnect the accessory socket 2P connector [1].

Take care not to allow the front floor cover to interfere with the springs, cable, and master cylinder.

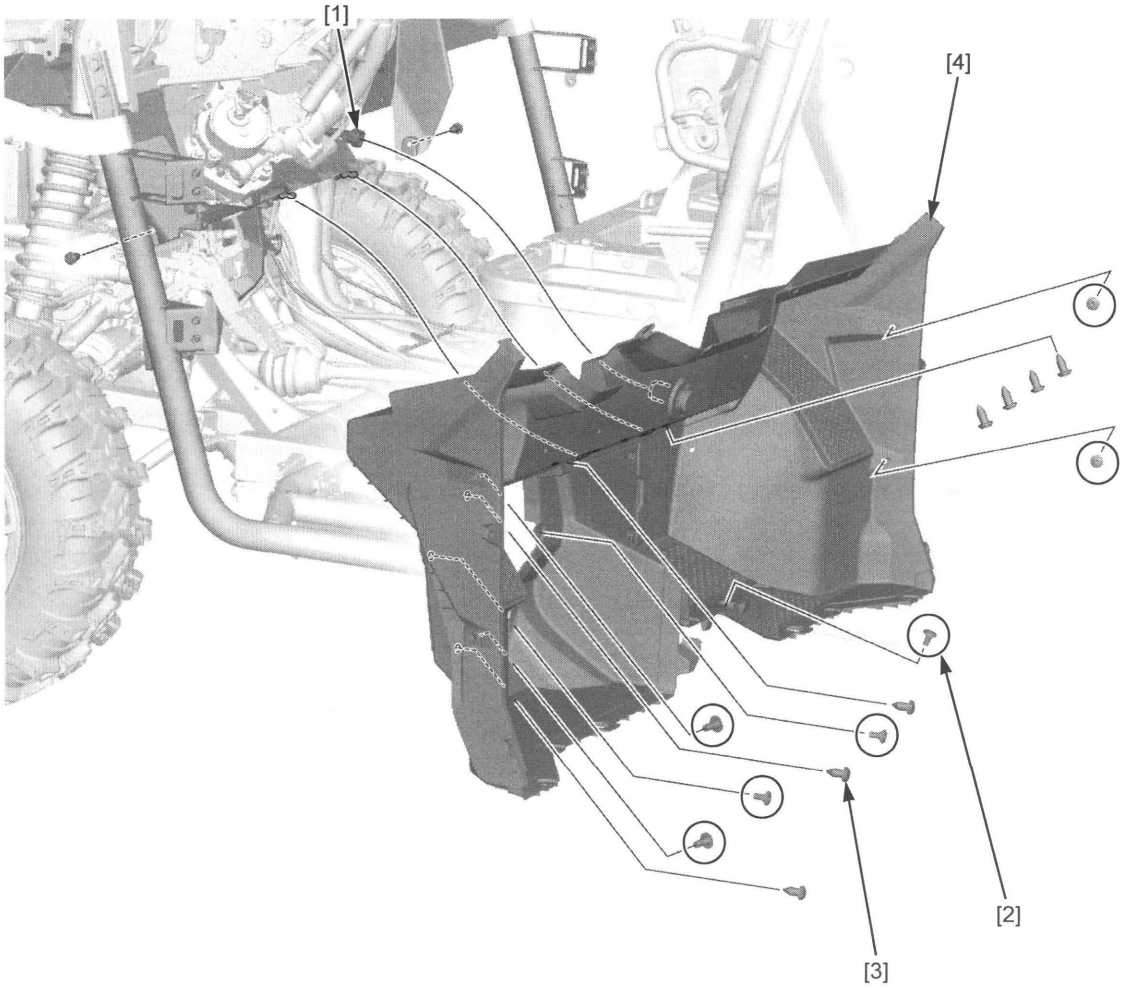
Remove the following:

- instrument panel (page 2-28)
- front inner fender (page 2-22)
- floor panel (page 2-17)
- seven socket screws [2]
- nine trim clips [3]
- front floor cover [4]

Installation is in the reverse order of removal.

TORQUE:

Front floor cover socket screw:
10 N·m (1.0 kgf·m, 7.0 lbf·ft)



SIDE NET

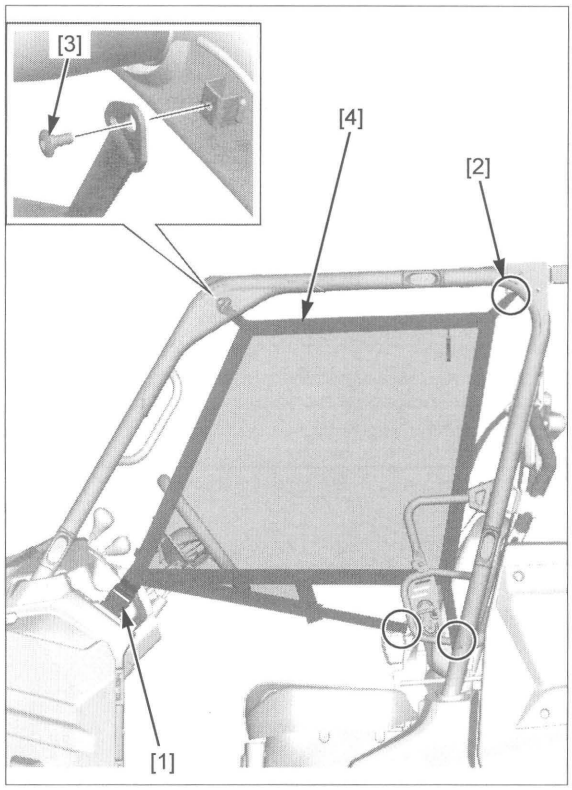
FRONT SIDE NET REMOVAL/ INSTALLATION

Release the net buckle [1] and front side net D-rings [2].

Remove the following:

- bolt [3]
- front side net [4]

Installation is in the reverse order of removal.



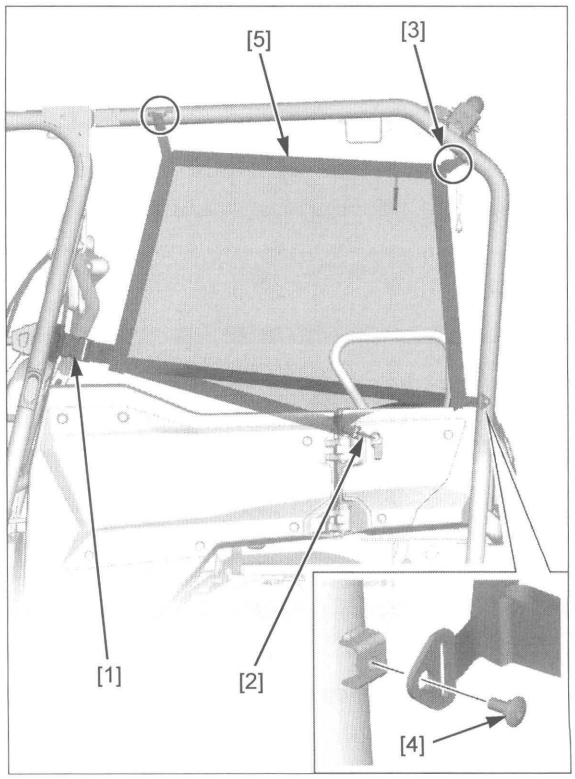
REAR SIDE NET REMOVAL/ INSTALLATION (M5P/M5D only)

Release the net buckle [1], snap hook [2] and rear side net D-rings [3].

Remove the following:

- bolt [4]
- rear side net [5]

Installation is in the reverse order of removal.



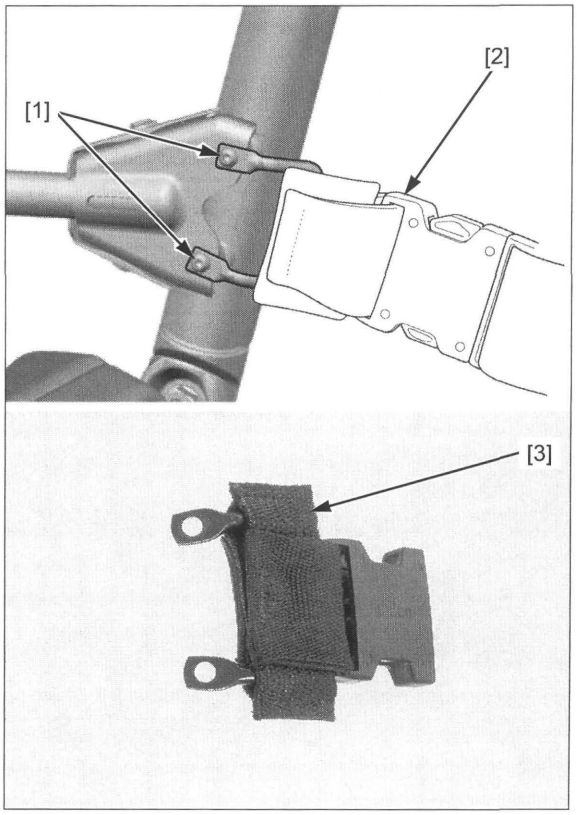
NET BUCKLE REMOVAL/ INSTALLATION (M5P/M5D only)

Remove the two socket bolts [1] and net buckle [2].

Installation is in the reverse order of removal.

NOTE:

- Make sure that the protector cover [3] is attached properly as shown.



SEAT BELT

SEAT BELT INSTRUCTIONS

NOTE:

- When storing the vehicle outdoors, cover the cabin area and keep the seat belt assemblies away from sunlight and rain.
- Do not apply grease to the seat belt components. To do so will cause dirt or sand to contaminate the components, resulting in a loss of seat belt function.
- If the seat belt gets wet, use a dry clean cloth and allow to air dry. Never use a dryer.
- If dirt or other foreign material enters the buckle, remove it by rinsing the buckle with clean water and allow to air dry. Make sure the buckle functions correctly by inserting the tongue several times.
- Replace the seat belt with a new assembly if any of the following conditions occur. Do not disassemble any part of the seat belt.
  - the belt is ragged, worn or broken
  - the vehicle is involved in a collision, overturns, is submerged, etc.

FRONT SEAT BELT/RETRACTOR

Remove the following:

- rear center cover (page 2-9)
- upper anchor torx bolt [1]
- lower anchor bolt [2]
- retractor nut [3]
- retractor bolt [4], spring washer [5], and collar [6]
- front seat belt assembly [7]

Installation is in the reverse order of removal.

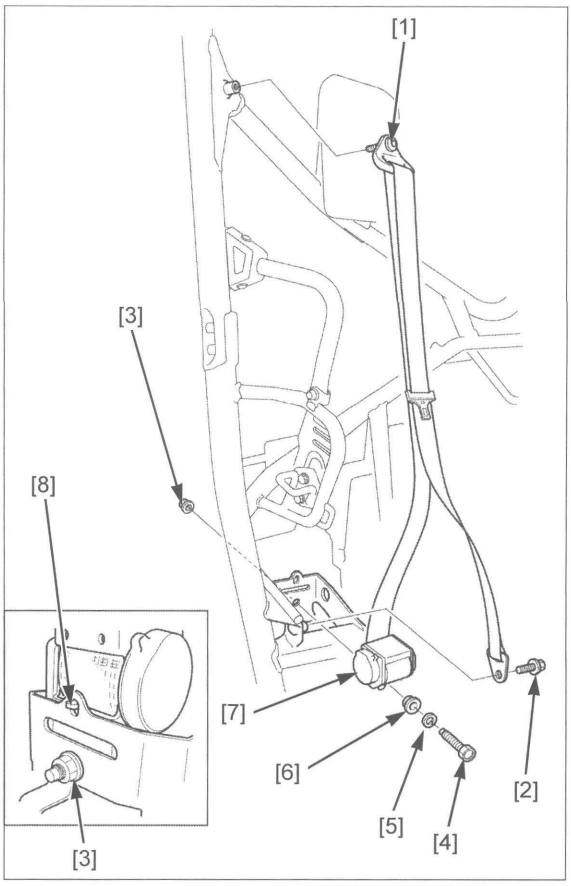
NOTE:

- Before installing, check that the retractor locking mechanism functions, see below.
- When installing the retractor, align the locating pin [8] with the hole in the frame.
- When installing the anchor bolts, make sure there no twists or kinks in the belt.

TORQUE:
Anchor bolts/retractor nut:
32 N·m (3.3 kgf·m, 24 lbf·ft)

After installing, check the following:

- the belt does not lock when pulled slowly and it will retract automatically when released. The seat belt is designed to lock only during a sudden stop.
- each anchor for free movement on the anchor bolt. If necessary, remove the anchor bolt and check that the washers and other parts are not damaged or improperly installed.



REAR SEAT BELT/RETRACTOR (M5P/M5D only)

Remove the following:

- two trim clips [1] and rear retractor cover [2]
- anchor torx bolt [3]
- retractor nuts [4]
- rear seat belt assembly [5]

Installation is in the reverse order of removal.

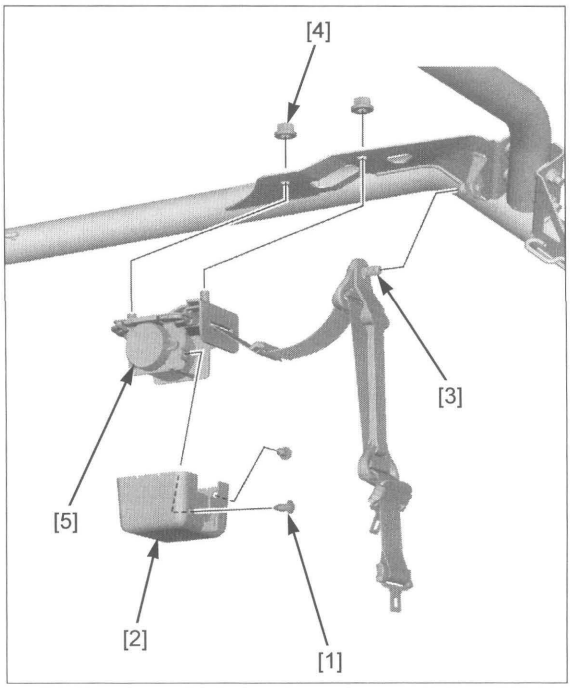
NOTE:

- Before installing, check that the retractor locking mechanism functions.
- When installing the anchor bolt, make sure there no twists or kinks in the belt.

TORQUE:
Anchor bolts/retractor nut:
32 N·m (3.3 kgf·m, 24 lbf·ft)

After installing, check the following:

- the belt does not lock when pulled slowly and it will retract automatically when released. The seat belt is designed to lock only during a sudden stop.
- each anchor for free movement on the anchor bolt. If necessary, remove the anchor bolt and check that the washers and other parts are not damaged or improperly installed.



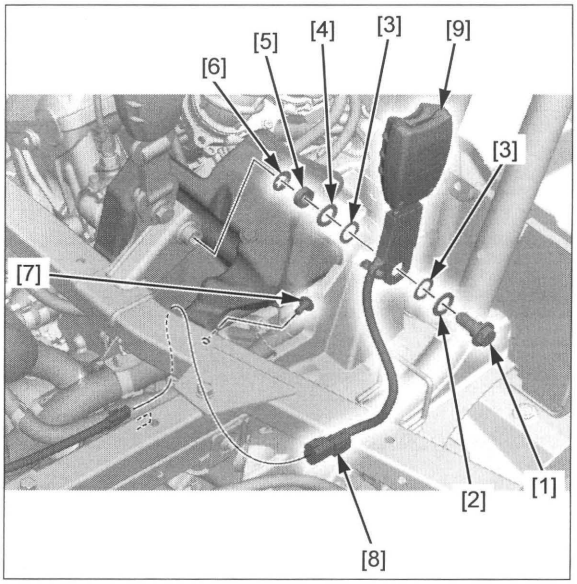
FRONT BUCKLE

Remove the following:

- rear center cover (page 2-9)
- buckle bolt [1]
- plastic washer [2]
- spring washers [3]
- plastic washer [4]
- collar [5]
- lock washer [6]
- bolt [7]
- seat belt switch 2P connector [8]
- seat belt buckle [9]

Installation is in the reverse order of removal.

TORQUE:
Seat belt buckle bolt:
32 N·m (3.3 kgf·m, 24 lbf·ft)



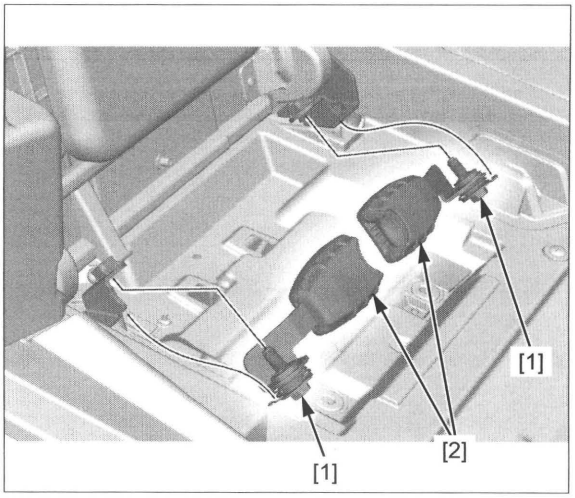
REAR BUCKLE (M5P/M5D only)

Remove the following:

- rear seat cushion (page 2-6)
- anchor bolt [1]
- seat belt buckle [2]

Installation is in the reverse order of removal.

TORQUE:
Seat belt buckle bolt:
32 N·m (3.3 kgf·m, 24 lbf·ft)



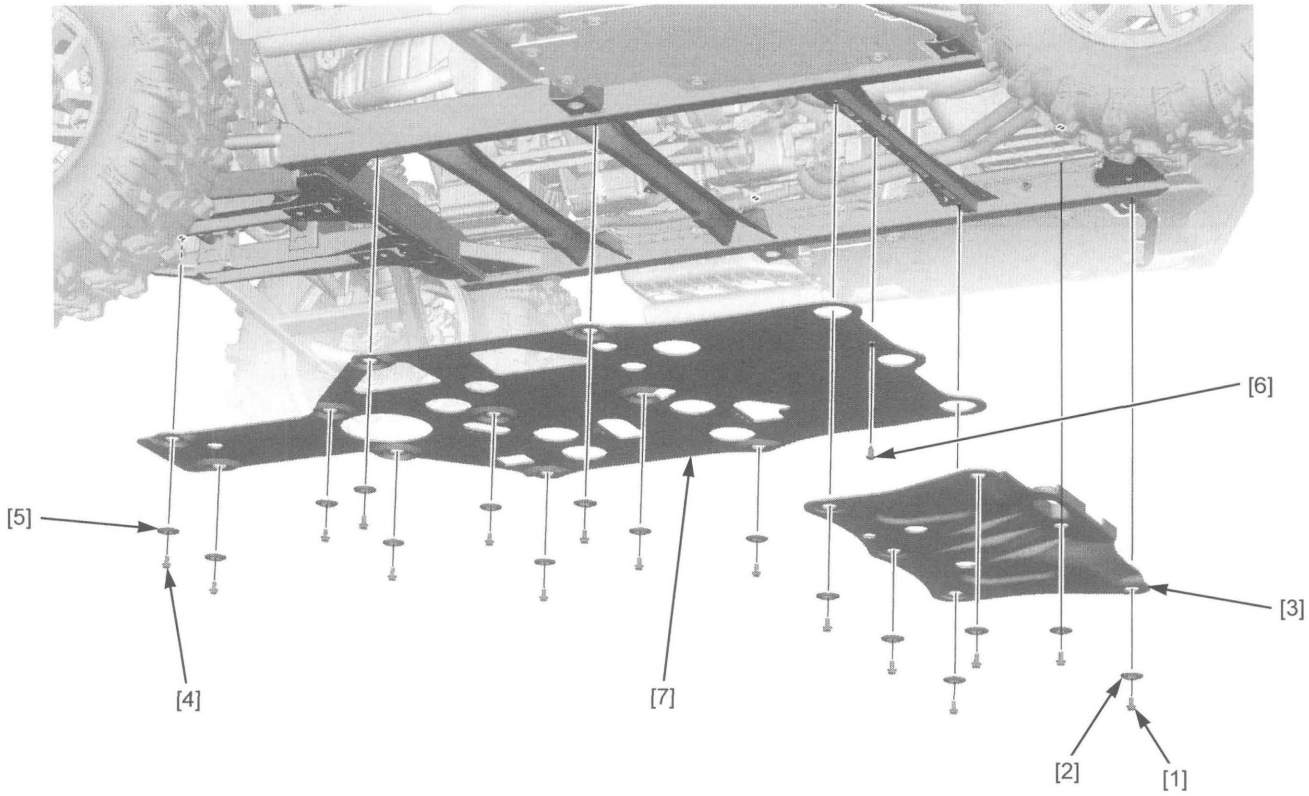
SKID PLATE

REMOVAL/INSTALLATION

Remove the following:

- six bolts [1] and special washers [2]
- front skid plate [3]
- ten bolts [4] and special washers [5]
- trim clip [6]
- rear skid plate [7]

Installation is in the reverse order of removal.



SIDE SKID PLATE

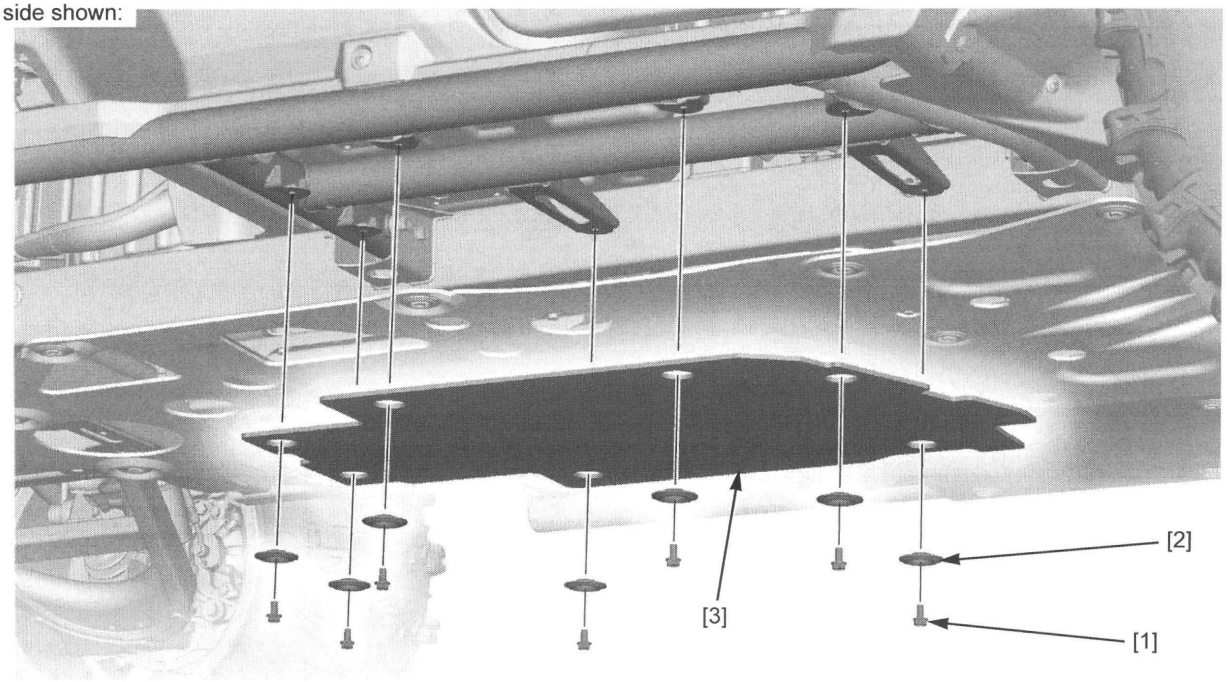
REMOVAL/INSTALLATION

Remove the following:

- seven bolts [1] and special washers [2]
- front skid plate [3]

Installation is in the reverse order of removal.

Right side shown:



OCCUPANT PROTECTIVE STRUCTURE (OPS)

REMOVAL/INSTALLATION

REAR OPS (M5P/M5D only)

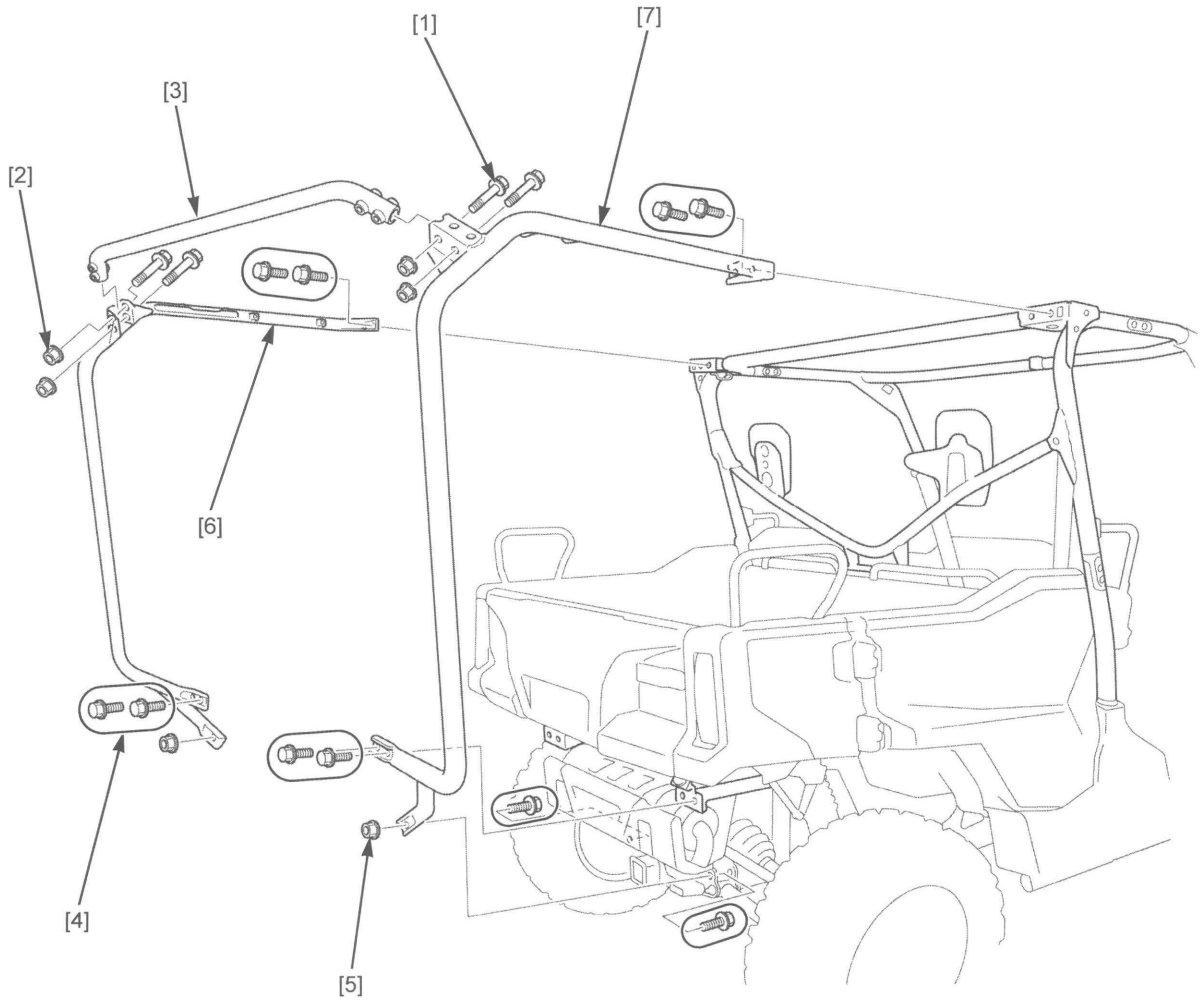
Remove the following:

- rear side nets (page 2-32)
- rear seat belts (page 2-34)
- four bolts (10 mm) [1], four nuts (10 mm) [2], and cross pipe [3]
- ten bolts (10 mm) [4], two nuts (10 mm) [5], left rear OPS [6], and right rear OPS [7]

Installation is in the reverse order of removal.

TORQUE:

Rear cross pipe mounting nut:
30 N·m (3.1 kgf·m, 22 lbf·ft)
Rear OPS mounting bolt:
49 N·m (5.0 kgf·m, 36 lbf·ft)
Rear OPS mounting nut:
30 N·m (3.1 kgf·m, 22 lbf·ft)



FRONT/MIDDLE OPS

Remove the following:

- rear OPS (M5P/M5D only) (page 2-38)
- front side nets (page 2-32)
- head rests (page 2-4)
- seat belt upper anchor holders (page 2-34)
- four bolts (10 mm) [1] and four nuts (10 mm) [2]
- four bolts (12 mm) [3] and four nuts (12 mm) [4]
- front OPS [5]
- four bolts (10 mm) [6] and four nuts (10 mm) [7]
- two bolts (8 mm) [8] and two nuts (8 mm) [9]
- bolts (8 mm) [10] and nuts (8 mm) [11]
- two trim clips [12]
- side bar cover [13]
- side bar [14]
- middle OPS [15]
- two screws [16] and back mirror [17]

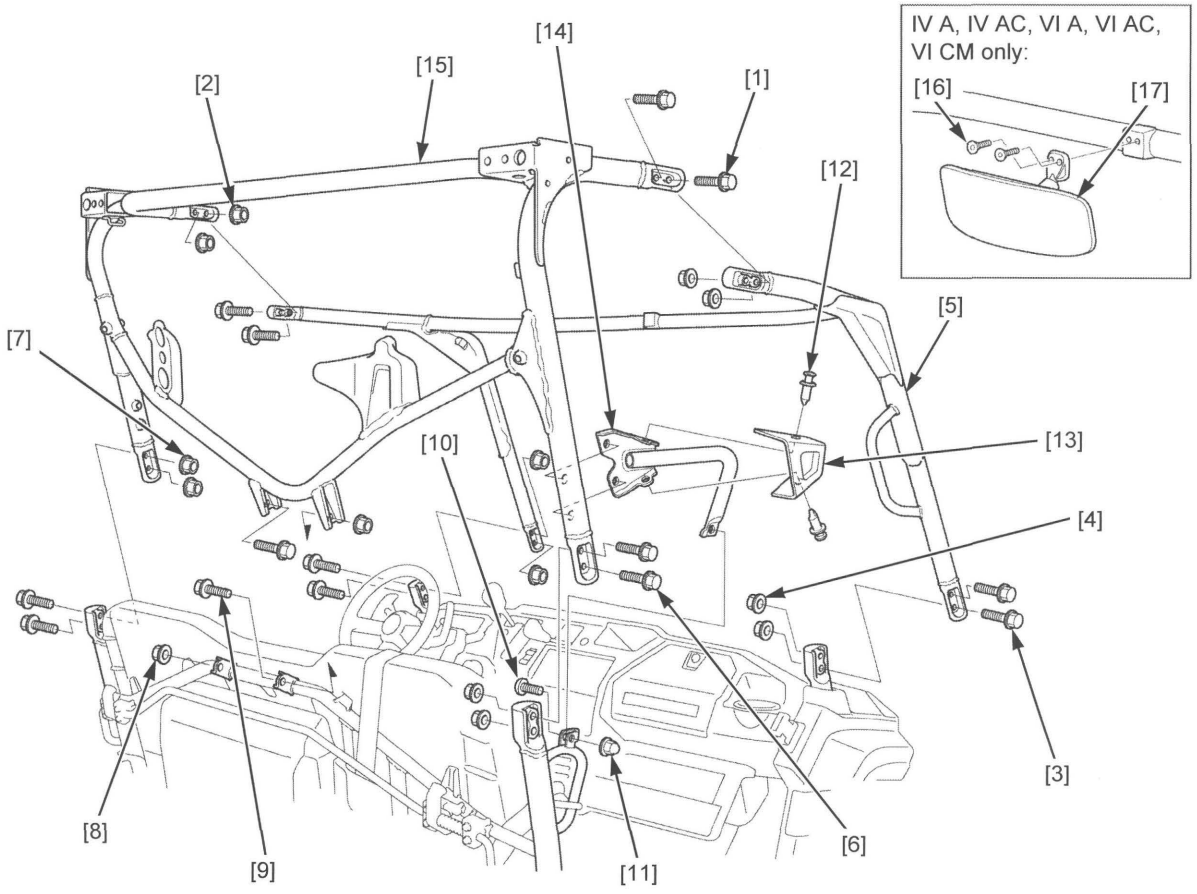
Installation is in the reverse order of removal.

TORQUE:

Front OPS mounting nut (12 mm):
64 N·m (6.5 kgf·m, 47 lbf·ft)
Front OPS mounting nut (10 mm):
30 N·m (3.1 kgf·m, 22 lbf·ft)
Middle OPS mounting nut (10 mm):
30 N·m (3.1 kgf·m, 22 lbf·ft)
Back mirror mounting screw:
3.0 N·m (0.3 kgf·m, 2.2 lbf·ft)

NOTE:

- Tighten the nuts twice in an alternating sequence.



CARGO BED

BED DAMPER REMOVAL/ INSTALLATION

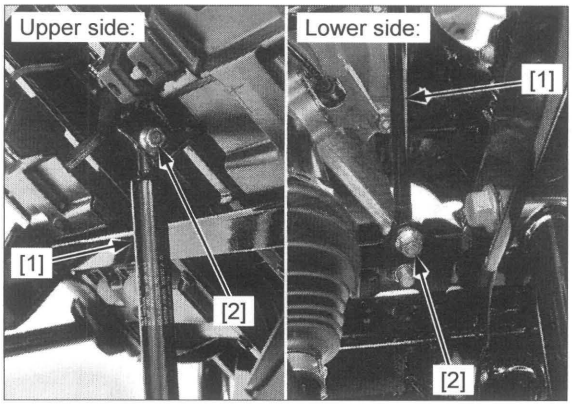
Lift up the cargo bed.

Securely support the cargo bed with wooden blocks or an equivalent to remove pressure from the damper [1].

Remove the nuts [2] and damper.

Remove the supports and lower the cargo bed.

Installation is in the reverse order of removal.



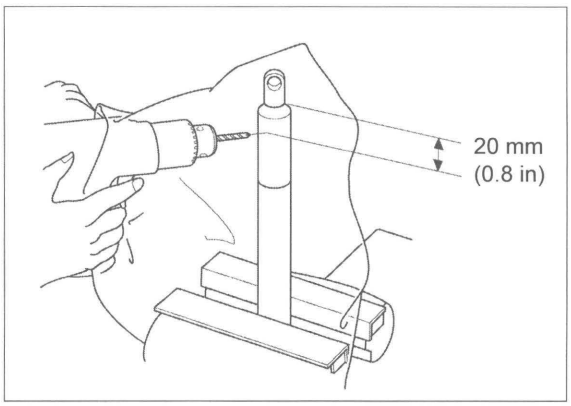
BED DAMPER DISPOSAL PROCEDURE

Center punch the damper to mark the drilling point.

Wrap the damper inside a plastic bag.

Support the damper in a vise as shown.

Through the open end of the bag, insert a drill with a sharp 2 – 3 mm (5/64 – 1/8 in) drill bit.



NOTICE

- *Do not use a dull drill bit which could cause a buildup of excessive heat and pressure inside the damper, leading to an explosion and severe injury.*
- *Always wear eye protection to avoid getting metal shavings in your eyes when the gas pressure is released. The plastic bag is only intended to shield you from the escaping gas.*

Hold the bag around the drill and briefly run the drill inside the bag; this will inflate the bag with air from the motor and help keep the bag from getting caught in the bit when you start.

BED FRONT PANEL REMOVAL/ INSTALLATION

M5P/M5D:

Unfold the rear seats.

Remove the following:

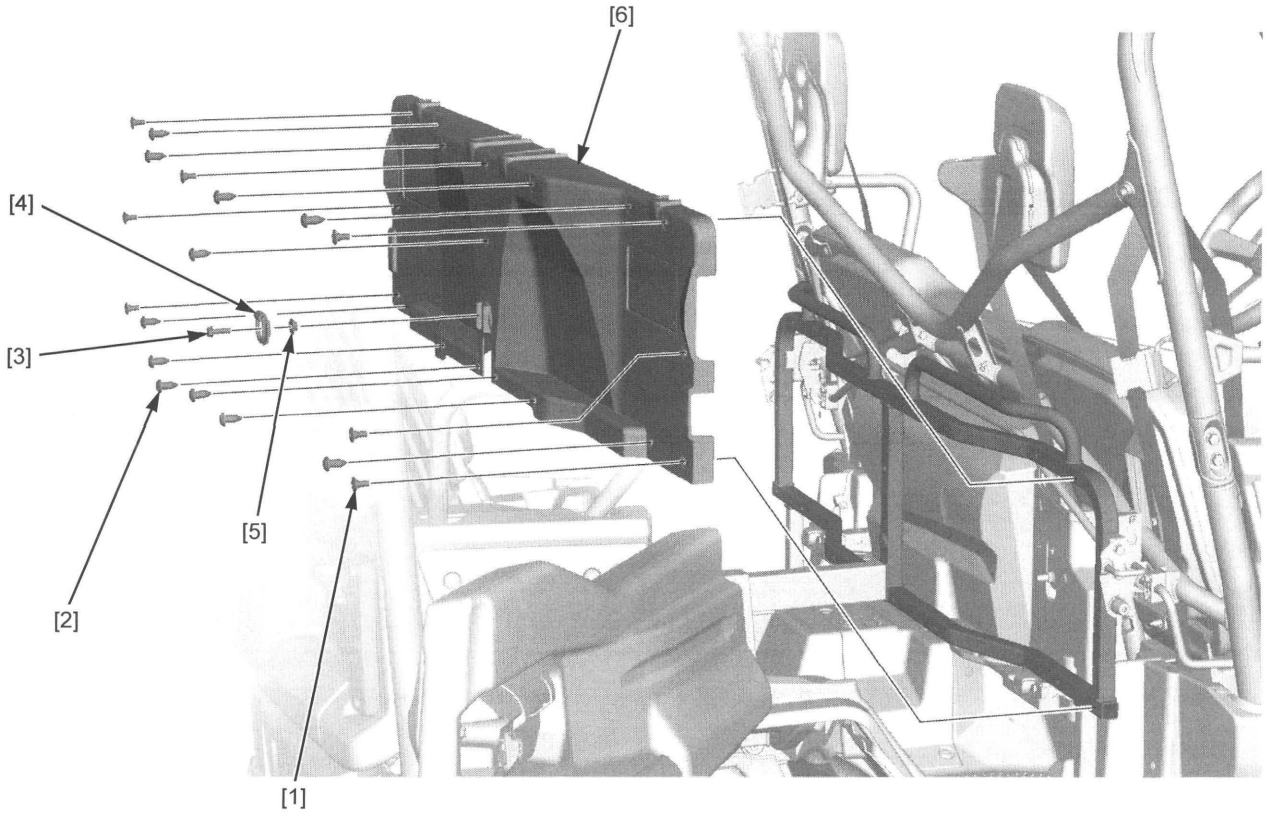
- seven socket screws [1]
- eleven trim clips [2]
- bolt [3]
- hook [4]
- collar [5]
- bed front panel [6]

Installation is in the reverse order of removal.

TORQUE:

Bed front panel screw:

8.0 N·m (0.8 kgf·m, 5.9 lbf·ft)



M3P/M3D:

Remove the following:

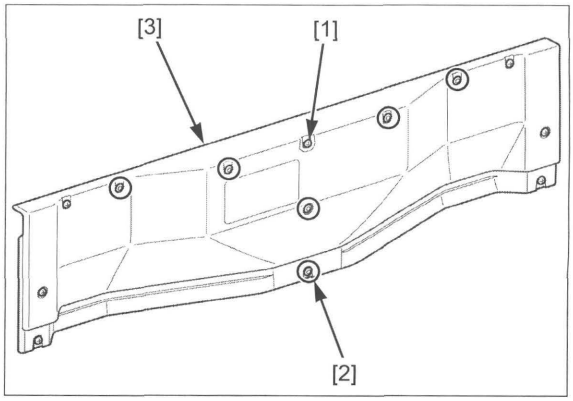
- bed top cover (page 2-46)
- seven screws [1]
- six clips [2]
- bed front panel [3]

Installation is in the reverse order of removal.

TORQUE:

Bed front panel screw:

8.0 N·m (0.8 kgf·m, 5.9 lbf·ft)



TAILGATE REMOVAL/INSTALLATION

Remove the bed side cover (page 2-44).

Canada model: Remove the rear bumper (page 2-45).

Open the tailgate [1].

While holding the tailgate, remove the two socket screws [2] to disconnect the stopper wires [3].

Remove the following:

- grommets (Except Canada model) [4]
- two flange bolts [5]
- two nuts (M5D Canada model) [6]
- two flange bolts (M5D Canada model) [7]
- two flange bolts (M3P/M5D Canada model) [8]
- two plate nuts (M3P/M5D Canada model) [9]
- hinge brackets [10]

Installation is in the reverse order of removal.

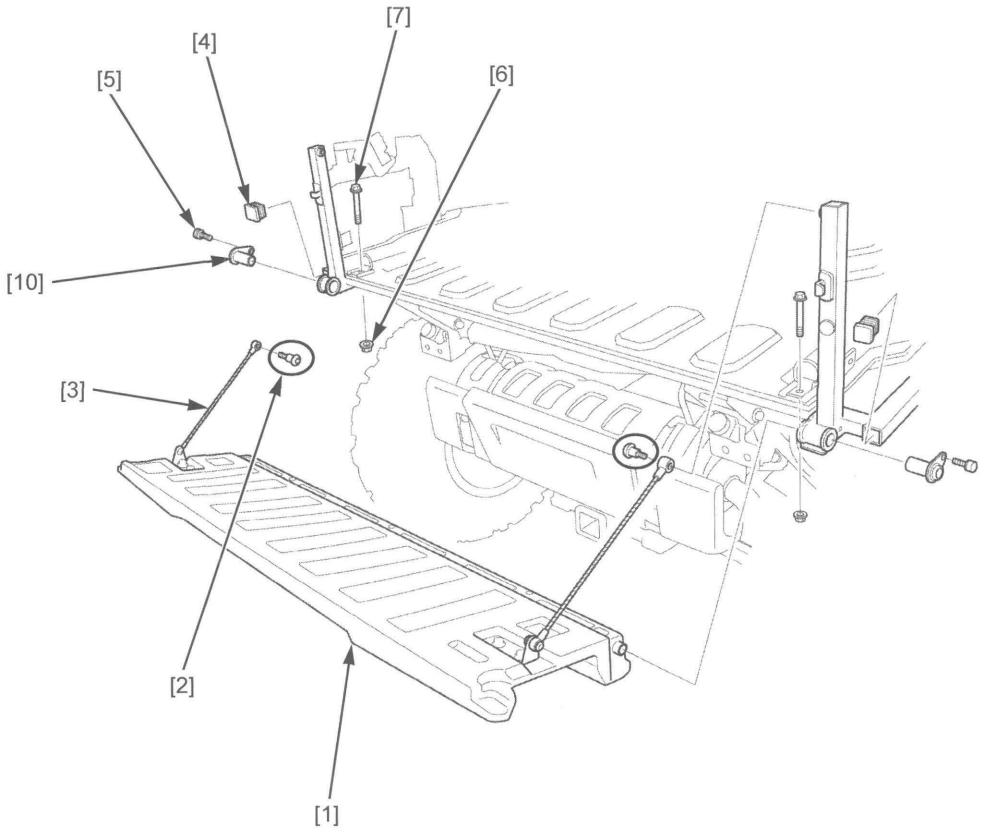
TORQUE:

Stopper wire screw:

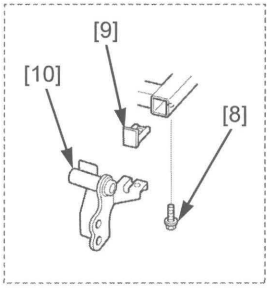
12 N·m (1.2 kgf·m, 9 lbf·ft)

NOTE:

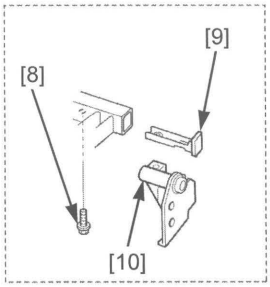
- The tailgate must be latched on the cargo bed securely. If it is not latched properly, loosen the lock lever bolts and adjust the lock lever to the suitable position.



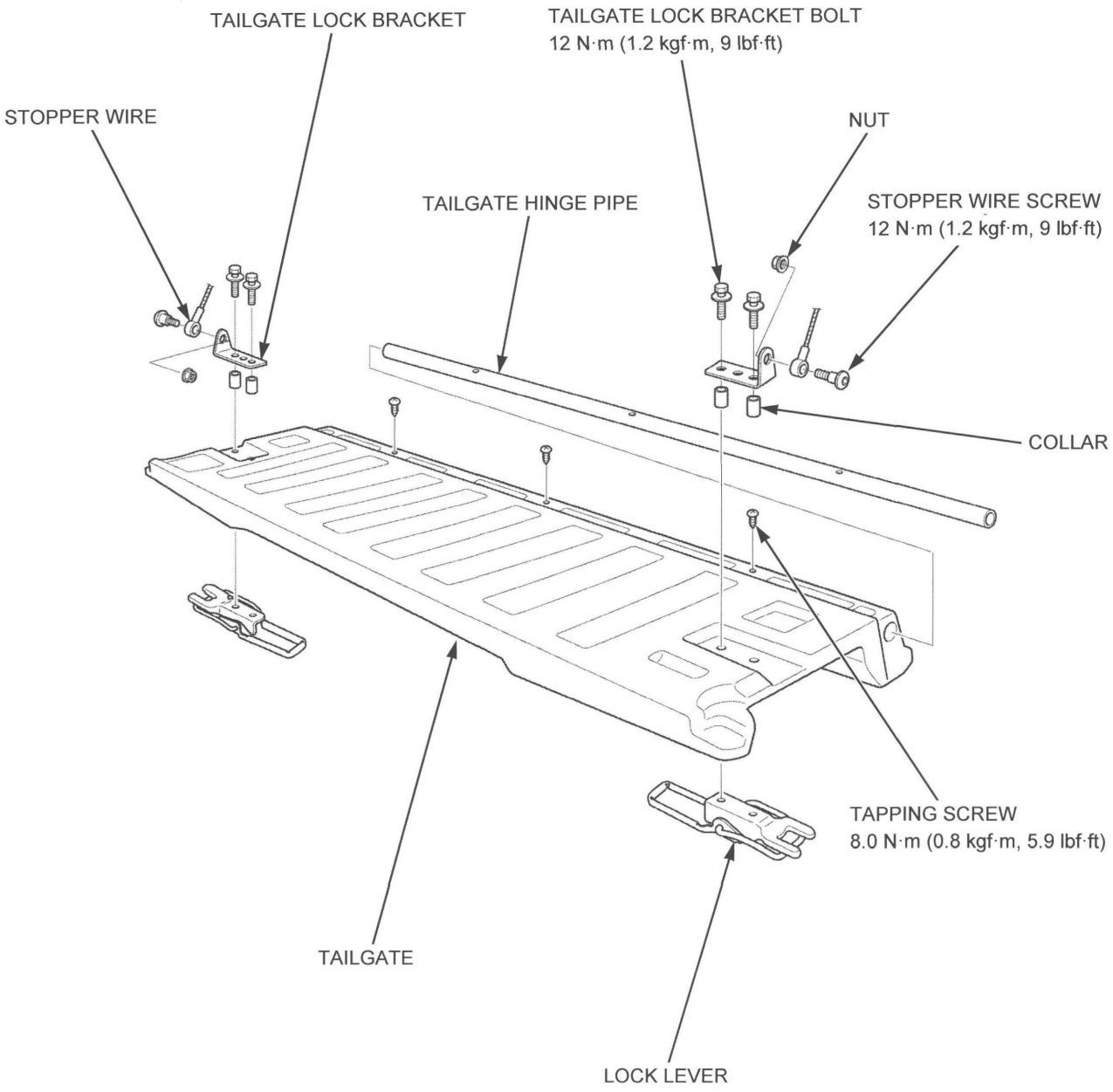
M5D (Canada model):



M3P (Canada model):



TAILGATE DISASSEMBLY/ASSEMBLY

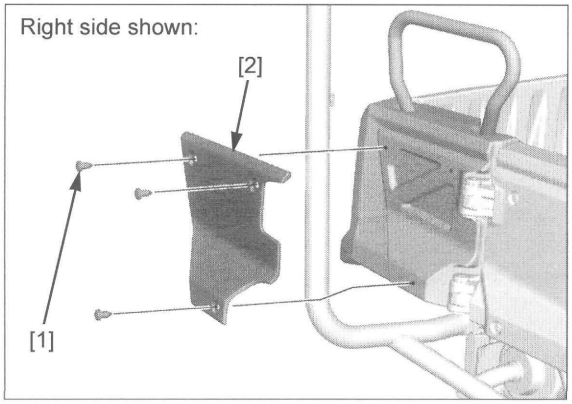


BED SIDE COVER PANEL REMOVAL/ INSTALLATION (M5D only)

Remove the three socket screws [1] and bed side cover panel [2].

Installation is in the reverse order of removal.

Bed side cover panel removal for M3P/M3D (page 2-44)



BED SIDE COVER REMOVAL/ INSTALLATION

M5P/M5D:

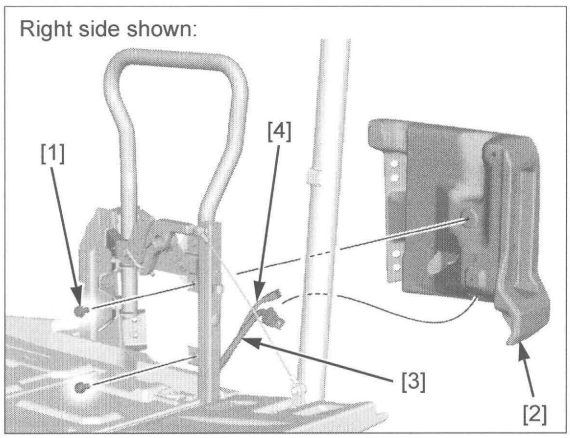
Remove the following:

- brake/taillight (page 23-6)
- rear seat latch cover (page 2-26)
- rear door (page 2-23)

Except VII A, VII AC, VII CM, IX A, IX AC type:
Remove the two bolts [1] and bed side cover [2] while pulling out the brake/taillight wire [3] from the hole.

VII A, VII AC, VII CM, IX A, IX AC type:
Disconnect the courtesy light 2P connector (page 2-26). Remove the two bolts [1] and bed side cover [2] while pulling out the brake/taillight wire [3] and courtesy light wire [4] from the hole.

Installation is in the reverse order of removal.



M3P/M3D:

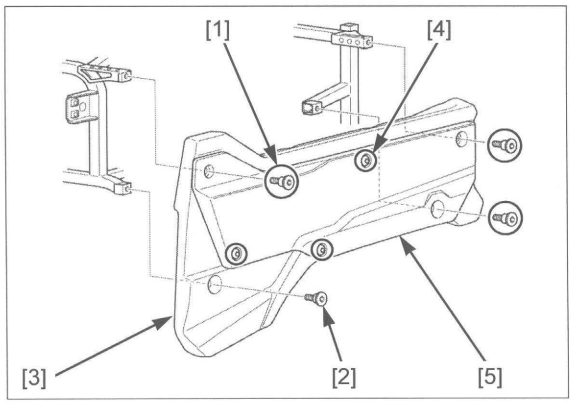
Remove the following:

- brake/taillight (page 23-6)
- four special bolts [1]/[2]
- bed side cover [3] (from the bed frame)

M3D only: Remove the three clips [4] and bed side cover panel [5] (from the bed side cover).

Installation is in the reverse order of removal.

TORQUE:
Bed side cover mounting bolt:
26 N·m (2.7 kgf·m, 19 lbf·ft)



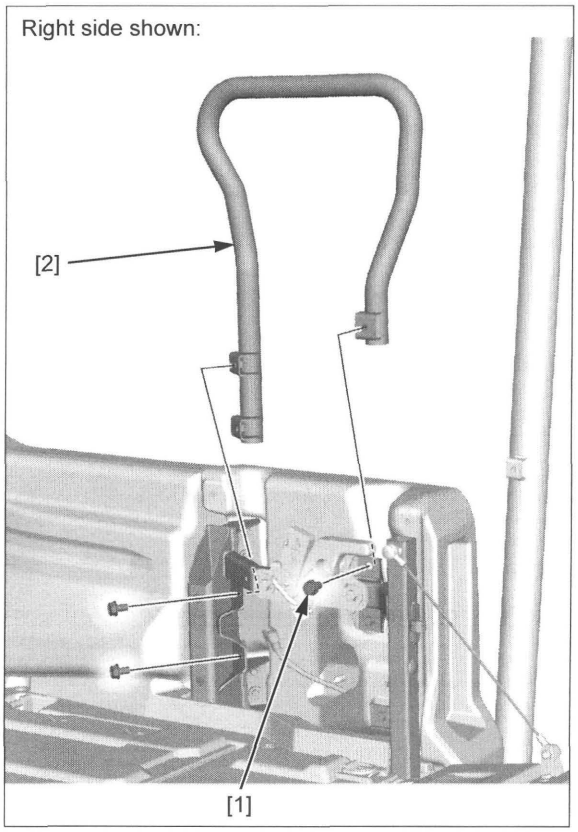
BED SIDE BAR REMOVAL/ INSTALLATION

M5P/M5D:

Remove the following:

- rear seat latch cover (page 2-26)
- three bolts [1]
- bed side bar [2]

Installation is in the reverse order of removal.



REAR BUMPER REMOVAL/ INSTALLATION (Canada model only)

Remove the bed side cover (page 2-44).

Remove the following:

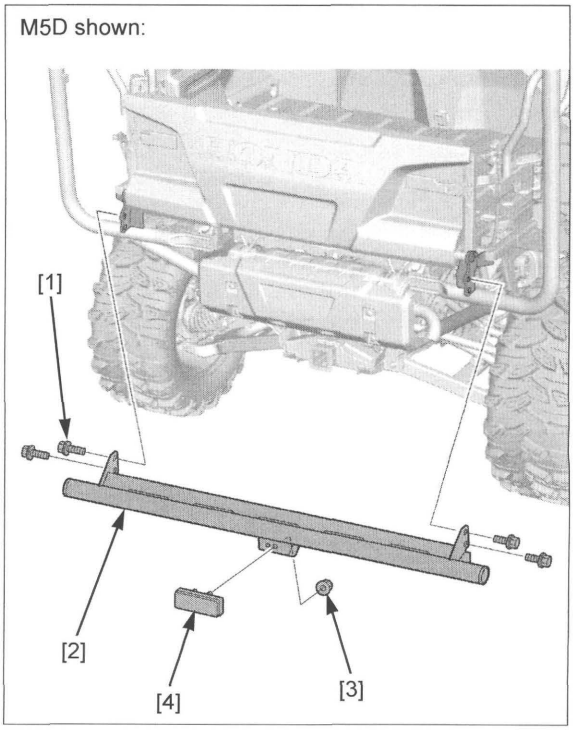
- four flange bolts [1]
- rear bumper [2]
- rear reflector mounting nut [3]
- rear reflector [4]
- rear side reflector mounting nuts (M3P only)
- rear side reflectors (M3P only)

Installation is in the reverse order of removal.

TORQUE:

Rear reflector mounting nut:
3.4 N·m (0.3 kgf·m, 2.5 lbf·ft)

Rear side reflector mounting nut:
3.4 N·m (0.3 kgf·m, 2.5 lbf·ft)



BED TOP COVER REMOVAL/ INSTALLATION

M3P/M3D:

Remove the following:

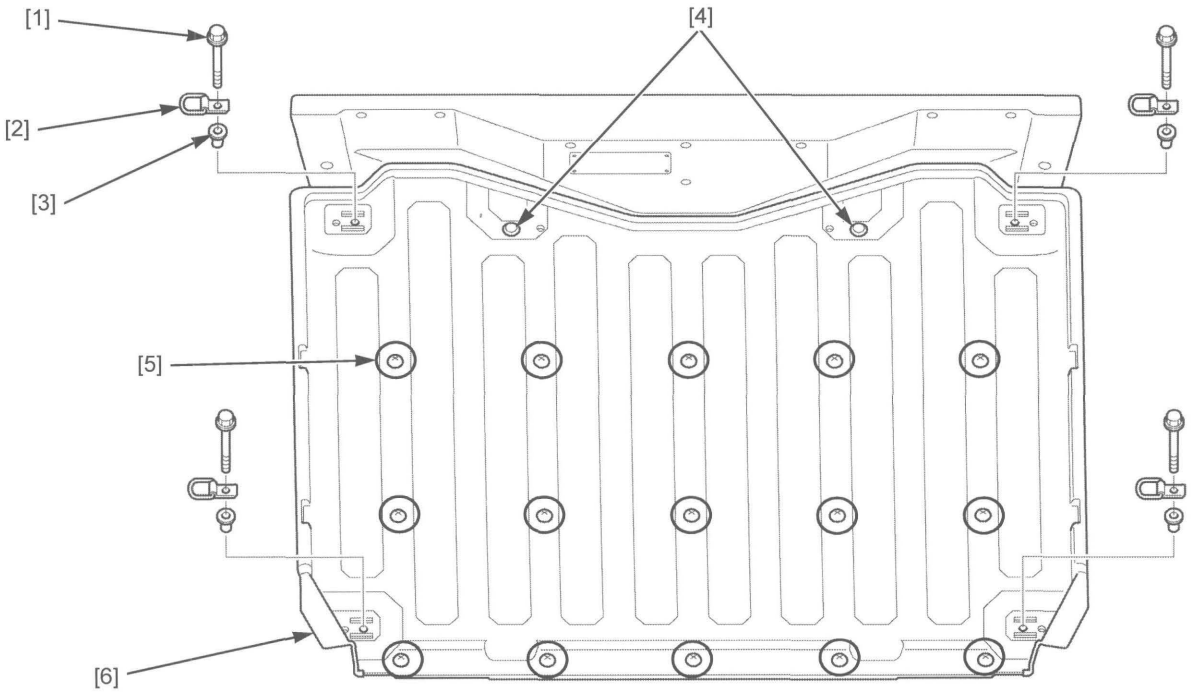
- bed side cover panel (page 2-44)
- bed side covers (page 2-44)
- four bolts [1]
- hooks [2]
- collars [3]
- two clips [4]
- fifteen screws [4]
- bed top cover [6]

Installation is in the reverse order of removal.

TORQUE:

Bed top cover screw:

8.0 N·m (0.8 kgf·m, 5.9 lbf·ft)



5 PERSON TYPE:

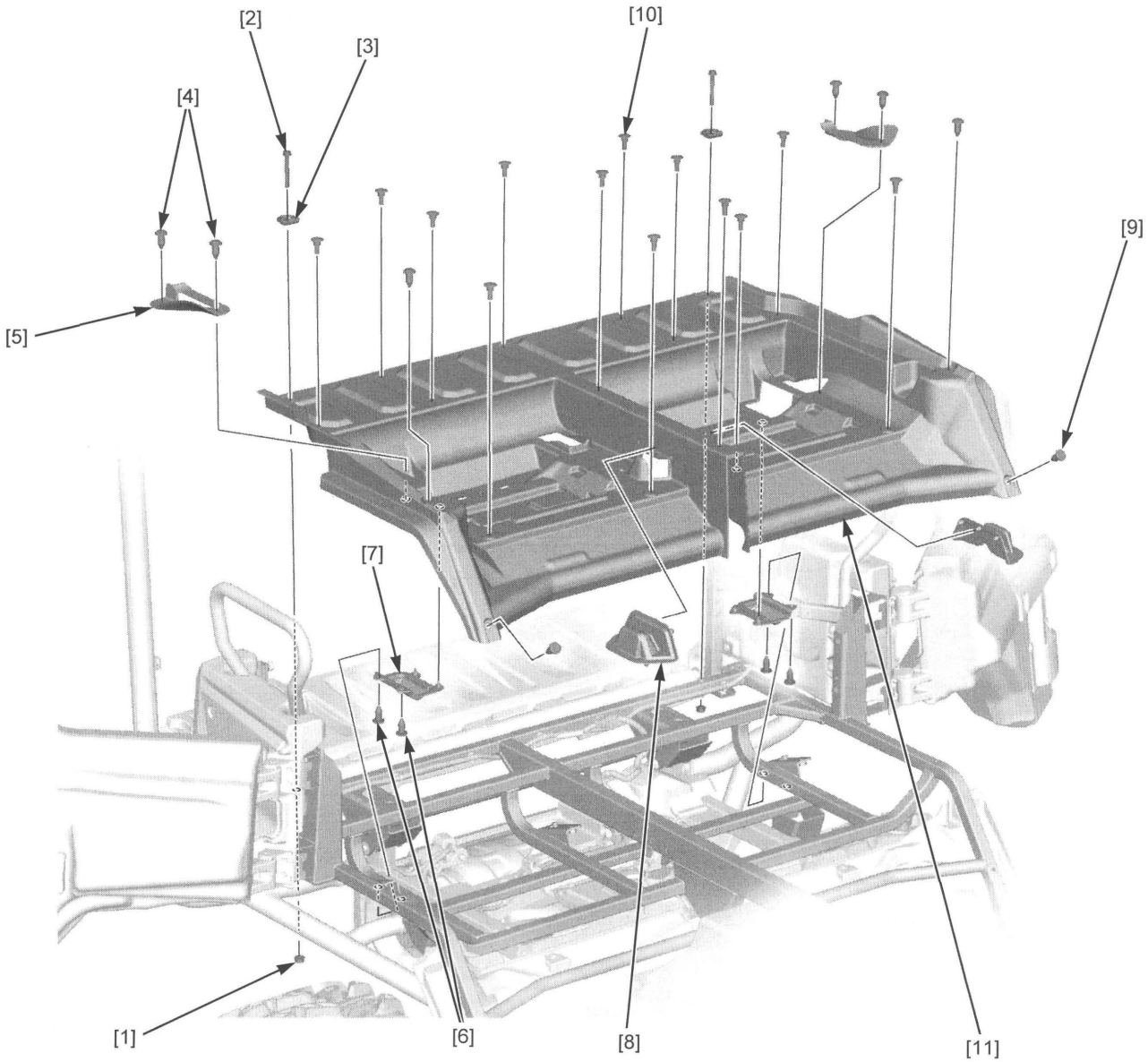
Remove the following:

- rear seats (page 2-7)
- two nuts [1]
- two bolts [2]
- hooks [3]
- four trim clips [4] and seat rubbers [5]
- four trim clips [6] and seat damper rubbers [7]
- bed tilt inhibitor rubber [8]
- four trim clips [9]
- thirteen screws [10]
- bed top cover [11]

Installation is in the reverse order of removal.

TORQUE:

Bed top cover screw:
8.0 N·m (0.8 kgf·m, 5.9 lbf·ft)



CARGO BED REMOVAL/ INSTALLATION

Release the wire clip [1] and disconnect the brake/ taillight 6P connector [2].

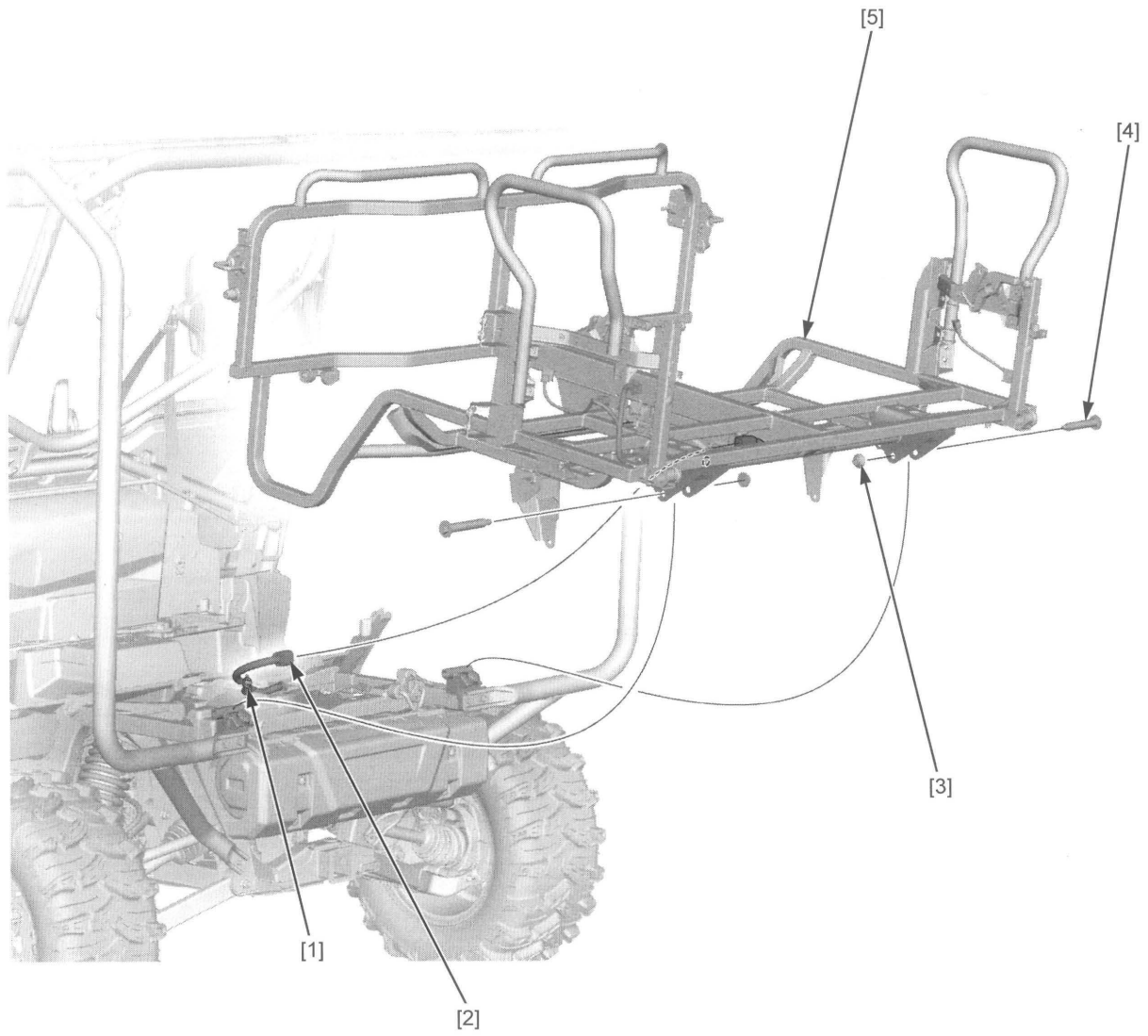
Remove the following:

- bed top cover (page 2-46)
- bed side cover (page 2-44)
- tailgate (page 2-42)
- 5 person type only: bed front panel (page 2-41)
- bed damper (page 2-40)
- two nuts [3] and two pivot bolts [4]

NOTE:

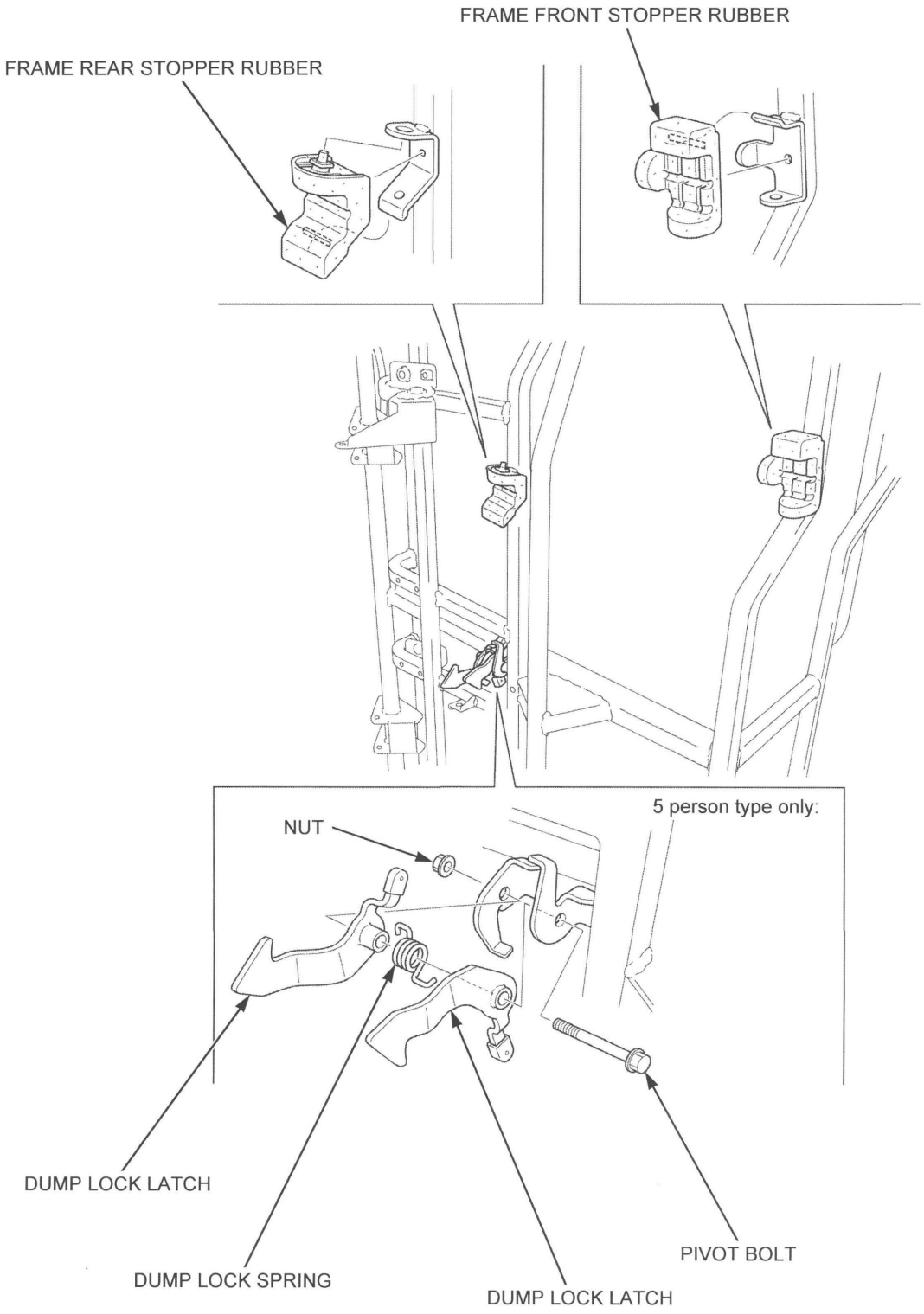
- When removing the cargo bed [5], be careful not to damage the release lever.

Installation is in the reverse order of removal.



CARGO BED DISASSEMBLY/ASSEMBLY

5 person type shown:



BED LOCK LEVER REMOVAL/ INSTALLATION

Lift the cargo bed.

Remove the following:

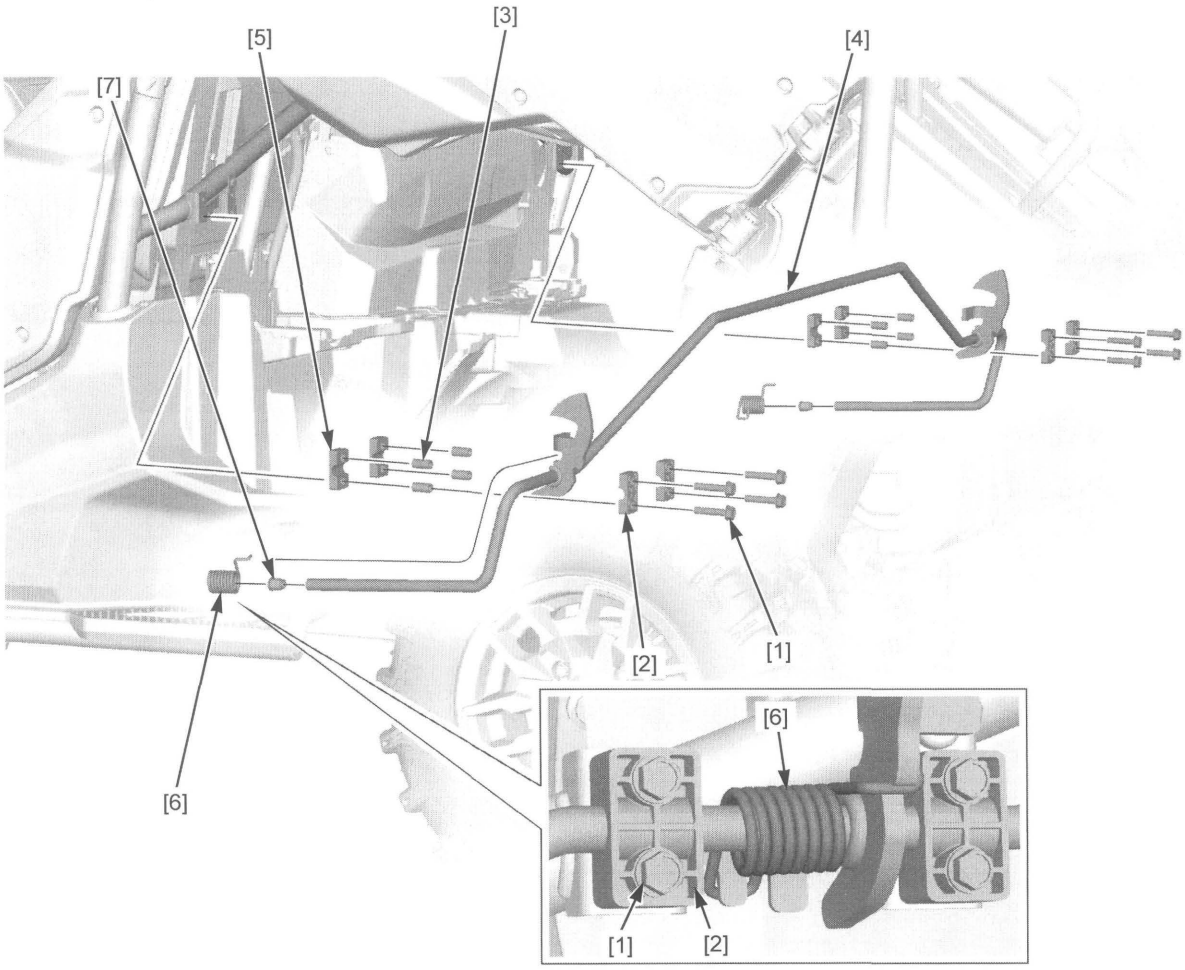
- eight flange bolts (6 mm) [1]
- four upper holders [2]
- eight collars [3]
- lock lever [4]
- four lower holders [5]
- two return springs [6]
- end caps [7]

When installing the return springs, set them in the correct direction as shown.

Installation is in the reverse order of removal.

TORQUE:

Lock lever holder bolt:
14 N·m (1.4 kgf·m, 10 lbf·ft)



EXHAUST SYSTEM

NOTE:

- Always replace the gaskets with new ones.
- Tighten the joint nuts first, then tighten the joint bolts.
- After installation, inspect the exhaust system for leaks.

HARNESS GUIDE COVER REMOVAL/ INSTALLATION

Lift the cargo bed.

Release the wire clips [1] and disconnect the brake/ taillight 6P connector [2].

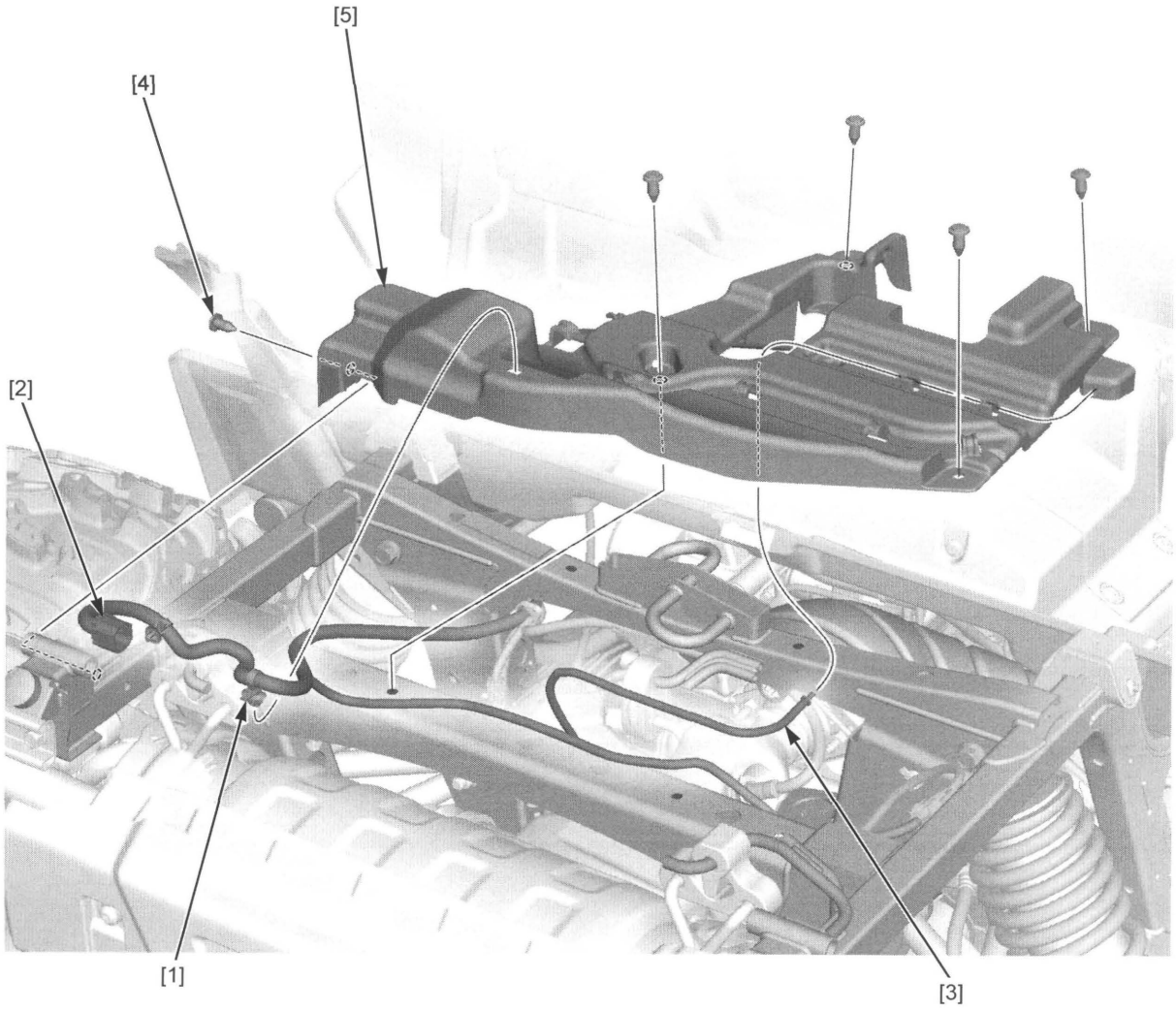
Remove the following:

– breather hose [3]
– five trim clips [4]
– harness guide cover [5]

Installation is in the reverse order of removal.

NOTE:

- Route the wires properly (page 1-29).



MUFFLER REMOVAL/INSTALLATION

Remove the harness guide cover (page 2-51).

Disconnect the O_2 sensor 4P connector [1] and release the wire clip [2].

Remove the following:

- two joint bolts [3]
- two springs [4]
- four muffler hangers [5]
- gasket [6]
- muffler [7]

TORQUE:

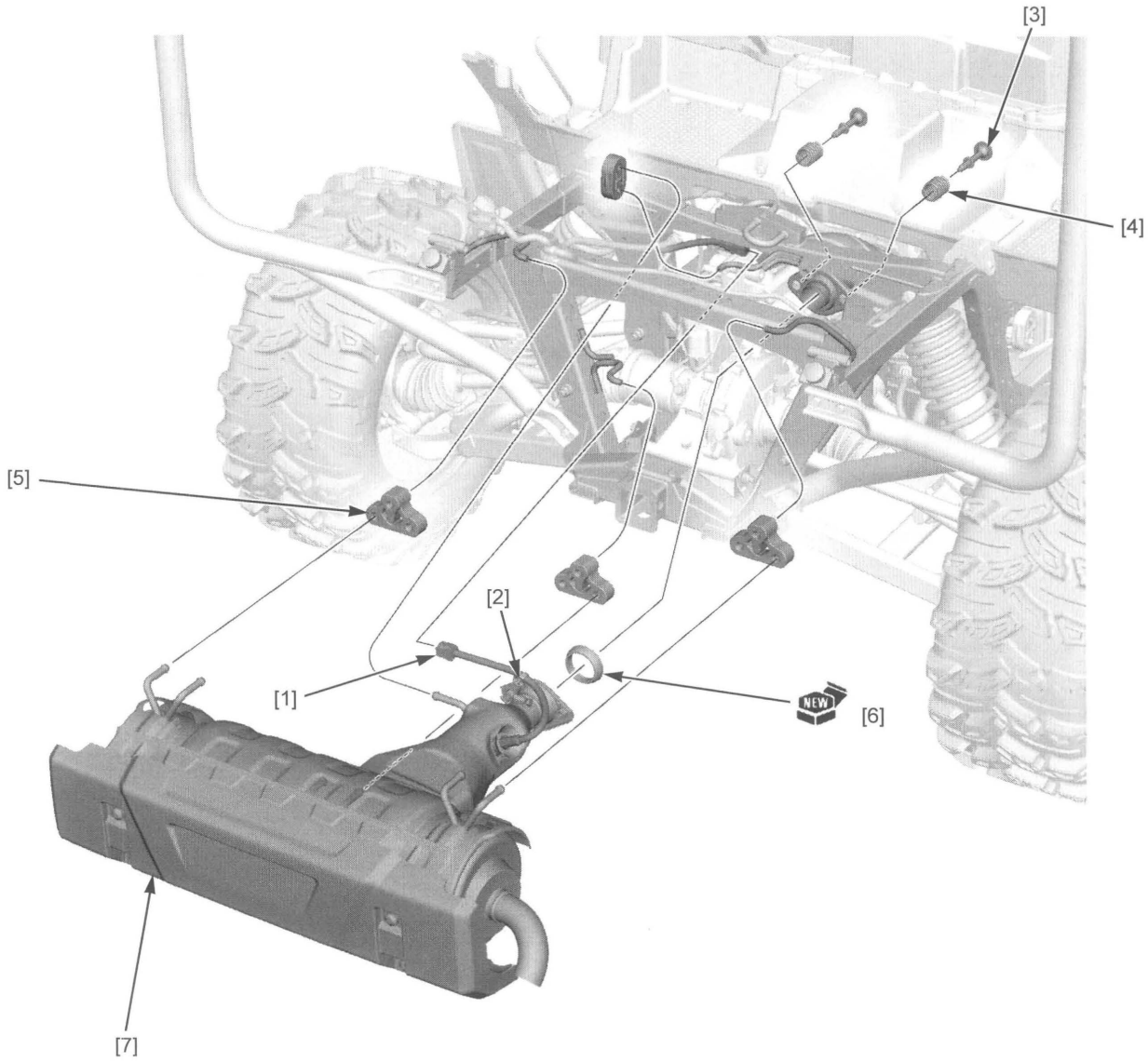
Muffler joint bolt:

21.6 N·m (2.2 kgf·m, 16 lbf·ft)

Installation is in the reverse order of removal.

NOTE:

- When installing the muffler hangers, apply soapy water for easy installation.
- Tighten the joint bolt one by one.



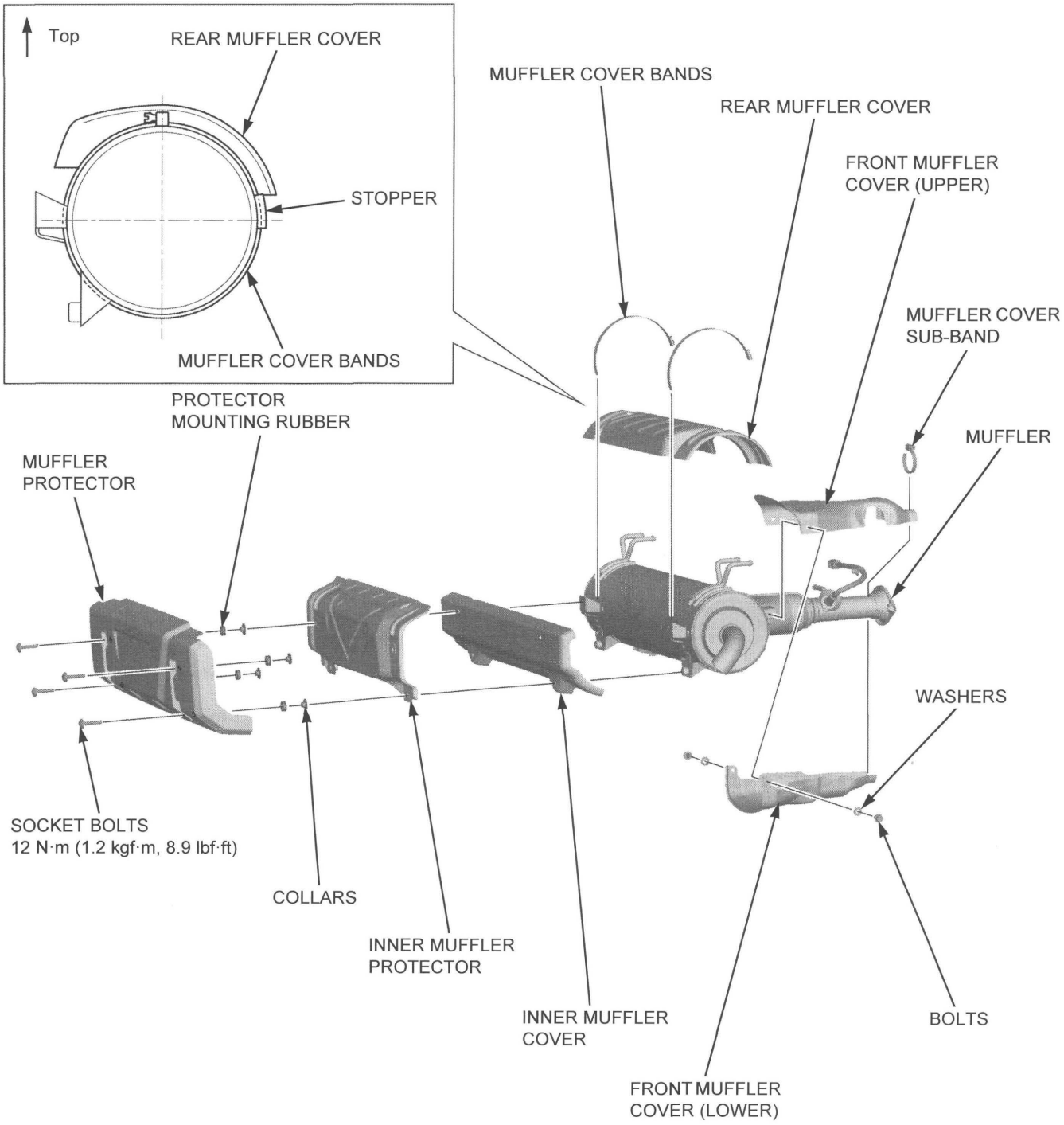
MUFFLER DISASSEMBLY/ASSEMBLY

Remove the following if necessary:

- O_2 sensor (page 4-34)
- spark arrester (page 3-21)

NOTE:

- Tighten the muffler cover band while pushing the rear muffler cover against the stopper on the muffler as shown.



EXHAUST PIPE REMOVAL/ INSTALLATION

Remove the following:

- rear mud guard (M3P/M3D only) (page 2-14)
- heat shield protector (M5P/M5D only) (page 2-13)
- muffler (page 2-52)
- six bolts [1]
- heat protectors D [2]/A [3]/B [4]
- bolt/washer [5]/bolt [6]/collar [7]/bushing [8]
- tank guard heat protector [9]
- four joint nuts [10]/washers [11]
- muffler hanger [12]
- exhaust pipe [13]/exhaust pipe gaskets [14]
- exhaust pipe cover bands [15]
- exhaust pipe cover A [16]/exhaust pipe cover B [17]

Installation is in the reverse order of removal.

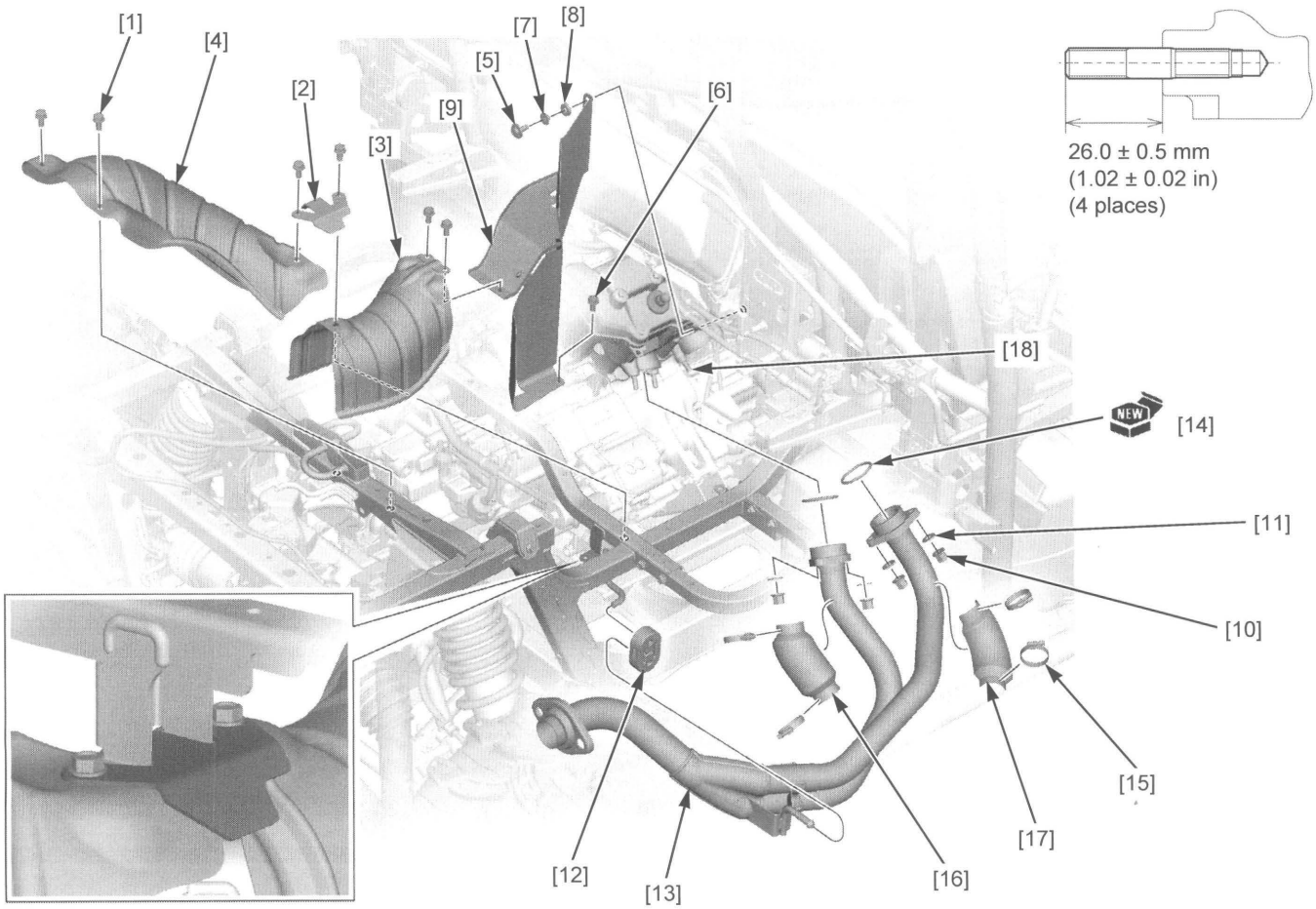
TORQUE:

Joint nut:
26.5 N·m (2.7 kgf·m, 20 lbf·ft)

Fuel tank heat guard protector bolt:
16 N·m (1.6 kgf·m, 12 lbf·ft)

NOTE:

- If the joint stud bolts [18] are loose, tighten them. Be sure to verify the distance from the top of the stud to the cylinder head as shown.



FRAME

STEP PIPE REMOVAL/INSTALLATION

Remove the following:

- front fender (page 2-20)
- floor panel (page 2-17)
- middle mud guard (page 2-28)
- fuel tank (page 7-16)
- two bolts (12 mm) [1]
- four flange bolts (8 mm) [2] and four flange nuts (8 mm) [3]
- two socket bolts [4]
- flange bolt (8 mm) [5] and flange nut (8 mm) [6]
- right side only: bolt (tank guard heat protector mounting bolt) [7]
- step pipe [8]
- net buckle [9]
- end cap [10]

Installation is in the reverse order of removal.

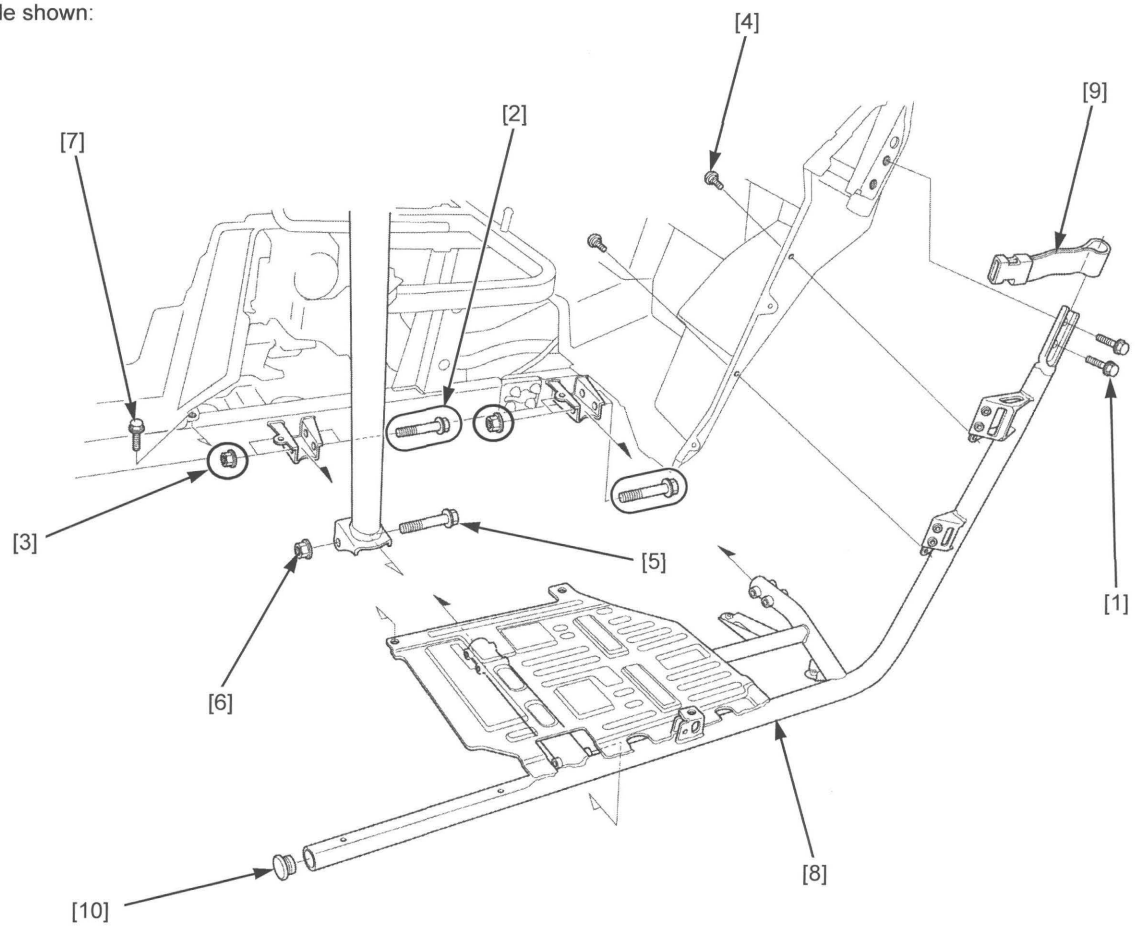
TORQUE:

Step pipe bolt (12 mm):
64 N·m (6.5 kgf·m, 47 lbf·ft)

Step pipe mounting nut:
42.5 N·m (4.3 kgf·m, 31 lbf·ft)

Seat frame mounting nut:
42.5 N·m (4.3 kgf·m, 31 lbf·ft)

Rear side shown:



SEAT FRAME REMOVAL/ INSTALLATION

Remove the following:

- rear mud guard (M3P/M3D only) (page 2-14)
- rear footwell (M5P/M5D only) (page 2-12)
- rear center cover (page 2-9)
- middle mud guard (page 2-28)
- front/middle OPS (page 2-38)
- snorkel duct A (page 7-18)
- fuel tank (page 7-16)
- air cleaner housing (page 7-17)
- seat under storage (page 2-6)
- AC type: EVAP canister (page 7-30)

Disconnect the seat belt switch 2P connector [1].

Release the following:

- ignition coil wires [2] and clamp [3]
- sub-transmission breather hose [4]
- fuel feed hose [5]
- water hose clamps [6] and wire clip [7]
- air inlet hose [8]

Remove the two nuts [9], six bolts [10], two mount plates [11], six mount plates nut [12], rear center cover plate [13] and seat frame [14].

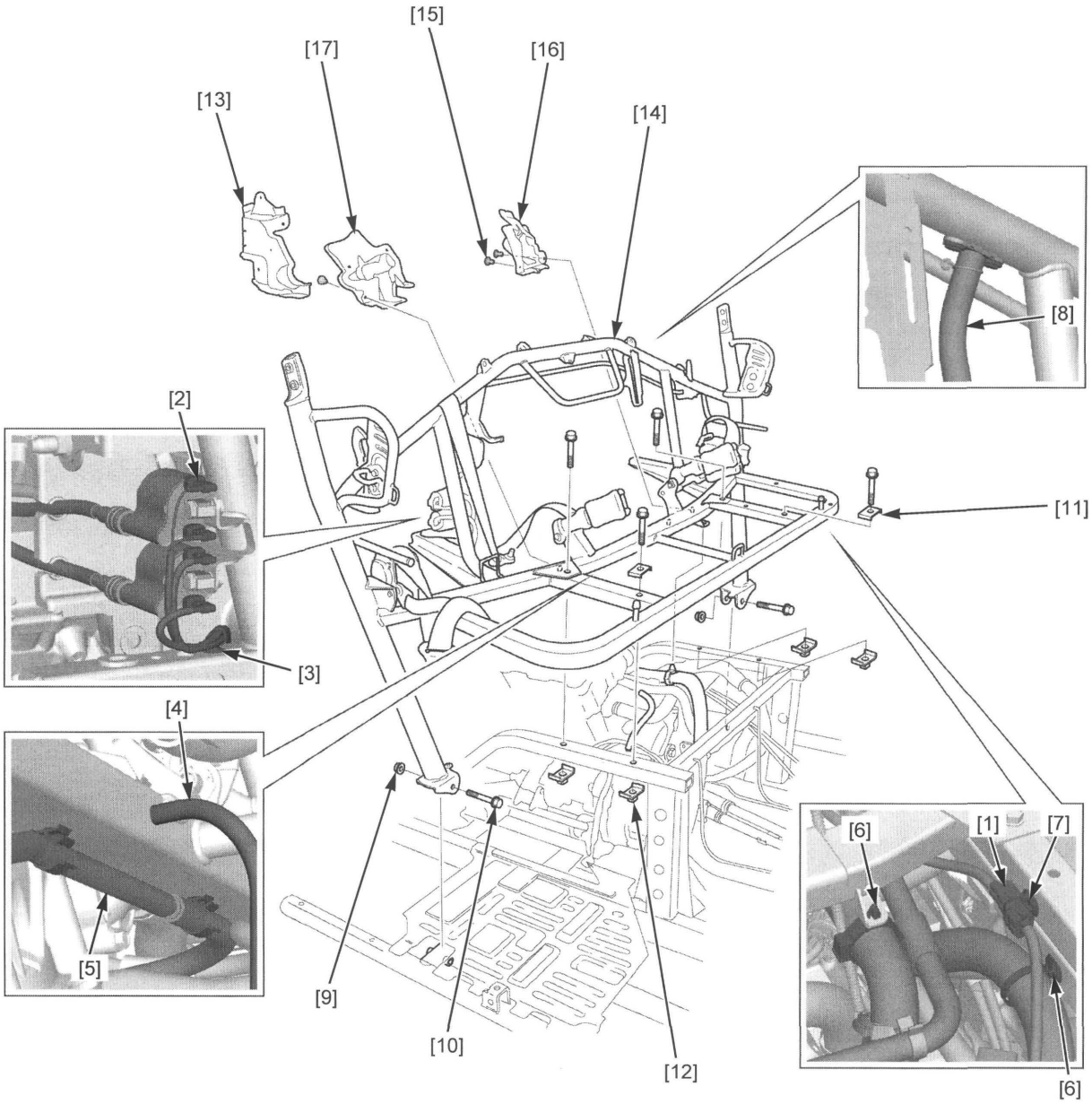
Remove the three screws [15], left buckle under cover [16] and right buckle under cover [17].

Installation is in the reverse order of removal.

TORQUE:

Seat frame mounting nut:
42.5 N·m (4.3 kgf·m, 31 lbf·ft)

Buckle under cover mounting screw:
9.0 N·m (0.9 kgf·m, 6.6 lbf·ft)


[15]
[17]
[16]
[13]
[14]
[8]
[2]
[11]
[3]
[4]
[5]
[9]
[10]
[12]
[6]
[1]
[7]
[6]

FRONT UPPER FRAME REMOVAL/ INSTALLATION

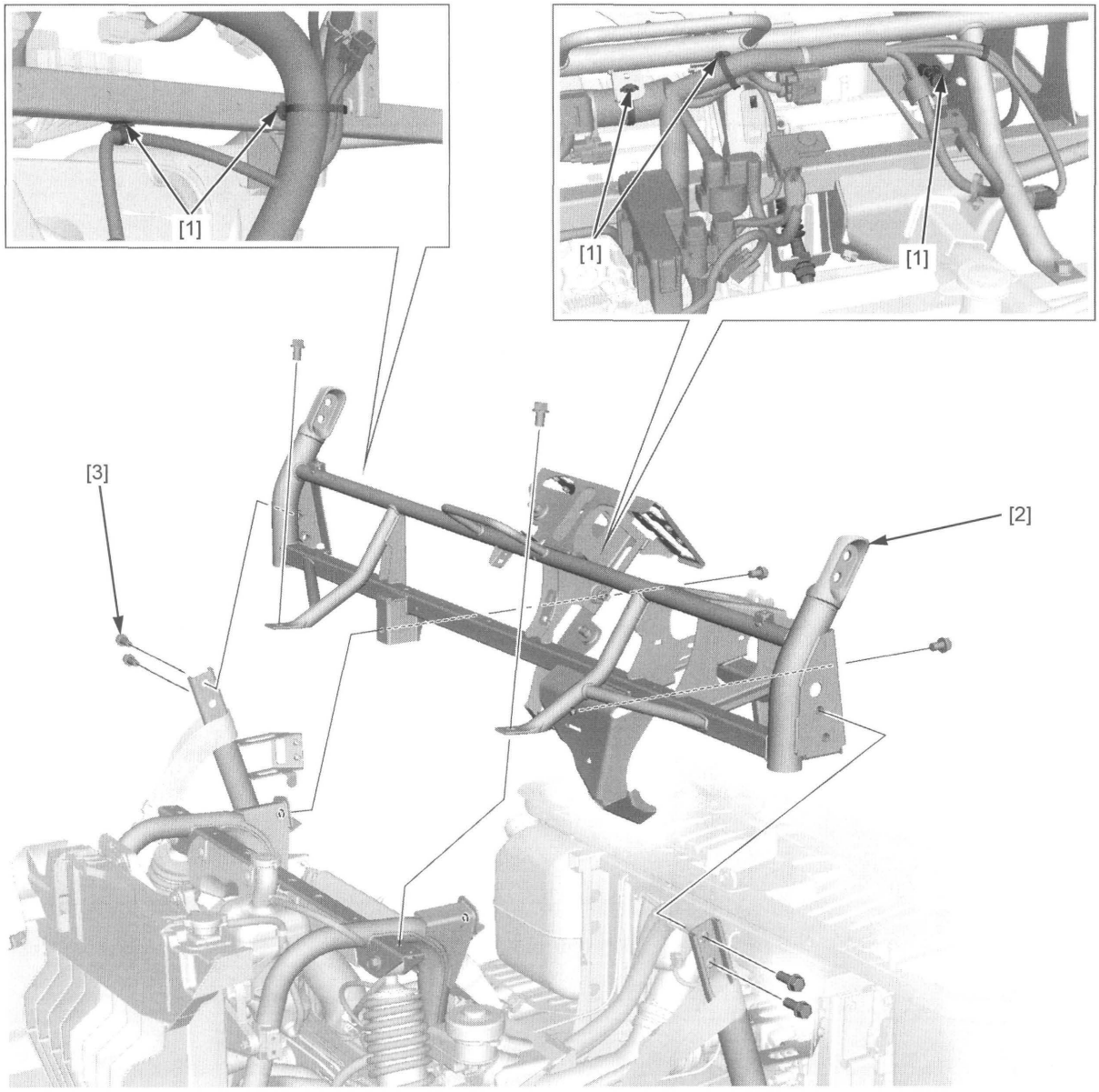
Remove the following:

- front OPS (page 2-38)
- steering column (page 17-6)
- steering shaft/EPS unit assembly (page 17-8)
- drive mode select lever linkage (page 18-46)
- shift select lever linkage (page 12-29)
- front inner fenders (page 2-22)

Release the wire clips [1] from the front upper frame [2].

Remove the eight bolts [3] and front upper frame.

Installation is in the reverse order of removal.



SERVICE INFORMATION 3-2
MAINTENANCE MINDER INDICATOR 3-3
MAINTENANCE SCHEDULE 3-4
FUEL LINE 3-5
THROTTLE OPERATION 3-5
AIR CLEANER 3-6
SUB AIR CLEANER 3-6
SPARK PLUG 3-7
BATTERY 3-8
VALVE CLEARANCE 3-8
ENGINE OIL 3-12
DCT OIL FILTER 3-14
SUB-TRANSMISSION OIL 3-14
ENGINE COOLANT 3-16
ENGINE IDLE SPEED 3-16
DRIVE SHAFT BOOTS 3-17
FINAL GEAR OIL 3-17
BRAKE FLUID 3-19
BRAKE PADS WEAR 3-19
BRAKE SYSTEM 3-20
BRAKE LIGHT SWITCH 3-20
PARKING LOCK SYSTEM 3-20
UNDERBODY 3-20
SUSPENSION 3-21
SPARK ARRESTER 3-21
EXHAUST SYSTEM 3-21
WHEELS/TIRES 3-21
TIE–ROD ENDS 3-22
STEERING SYSTEM 3-22
SIDE NET 3-25
CHASSIS LUBRICATION POINTS 3-26
EVAPORATIVE EMISSION CONTROL SYSTEM (AC type only) 3-27

SERVICE INFORMATION

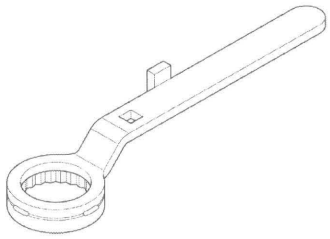
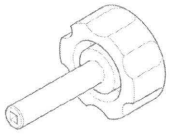
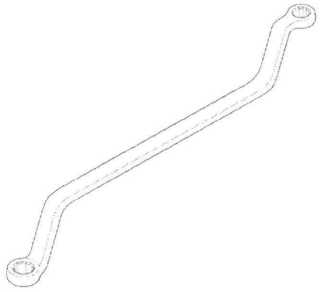
GENERAL

- Place the vehicle on a level ground before starting any work.
- Shift cable adjustment (page 12-30)
- Rear differential lock cable adjustment (page 19-35)

⚠WARNING

Be careful when performing service with a load in the cargo bed because the ground clearance can gradually reduce.
Use caution when working under the SXS1000 while it is parked on all 4 wheels.
Objects or people below the unit could be crushed as the ground clearance gradually reduces.
When the cargo bed is loaded and the SXS1000 is parked, the ground clearance can gradually reduce by up to 4.3 inches (110 mm).
Ground clearance of a loaded, unsupported SXS1000 may decrease unexpectedly.
You could be crushed or pinched if working underneath the SXS1000.
Unload the SXS1000 or support [chassis] with lift or stands before working underneath it.

TOOLS

Lock nut wrench 070MA-HL40100	Valve adjusting wrench 07708-0030400	Lock nut wrench, 8 x 9 mm 07708-0030100
		
or 070MA-HL4A100 (U.S.A. only)	or 07908-KE90200 (U.S.A. only)	or equivalent commercially available in U.S.A.

MAINTENANCE MINDER INDICATOR

The maintenance minder indicator [1] appears when the mileage [2] or operating hour [3] reaches the maintenance interval specified on the maintenance schedule (page 3-4).

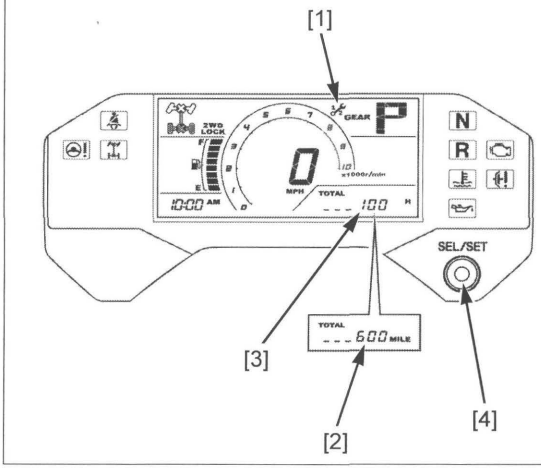
1. Initial maintenance
   – Appears at 100 miles (150 km) or 20 operating hours, whichever comes first.
   See initial maintenance on the maintenance schedule (page 3-4).
2. Regular maintenance interval 1
   – Appears at 600 miles (1,000 km) or 100 operating hours after the initial maintenance is performed and the maintenance minder is reset.
   See regular maintenance interval for 100, 300, and 500 operating hours (or corresponding mileage interval, whichever comes first) in the maintenance schedule (page 3-4).
3. Regular maintenance interval 2
   – Appears at 600 miles (1,000 km) or 100 operating hours after the regular maintenance interval 1 is performed and the maintenance minder is reset.
   See regular maintenance interval for 200, 400, and 600 operating hours (or corresponding mileage interval, whichever comes first) in the maintenance schedule (page 3-4).

NOTE:

- The initial maintenance indicator appears only once over the life of the vehicle. The regular maintenance interval 1 and 2 indicators will appear alternately.
- Reset the indicator after each scheduled maintenance is performed.

To reset the indicator, press and hold the SEL/SET switch [4] and turn the ignition switch ON (I). The indicator message will light up, and after 2 seconds will flash twice, the maintenance minder indicator is reset.

1. Initial maintenance
2. Regular maintenance interval 1
3. Regular maintenance interval 2



MAINTENANCE SCHEDULE

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

Each item on the maintenance schedule requires some mechanical knowledge. Certain items (particularly those marked * and **) *may require more technical information and tools. Consult a dealer.*

Service the listed items at the indicated distance (or time, if given)		Initial Maintenance	Regular Maintenance Interval					
Frequency	x 100 miles	1	6	12	18	24	30	36
(Whichever comes first)	x 100 km	1.5	10	20	30	40	50	60
Items	Hours	20	100	200	300	400	500	600
Check engine oil (page 3-12) and coolant (page 3-16)		Check oil and coolant at fuel stop						
Check tires (page 3-21)		Check inflation and condition once a month						
Check side net adjustment and snap hooks (page 3-25)		O	O	O	O	O	O	O
Check brake fluid (page 3-19)		Check fluid level once a month						
Replace engine oil and oil filter (page 3-13)		O		O		O		O
Check sub-transmission oil (page 3-14)		O		O		O		O
Replace sub-transmission oil (page 3-15)			Every 2 years (regardless of mileage)					
Replace the DCT oil filter (page 3-14)		O				O		
* Inspect valve clearance (page 3-8), NOTE 1		O			O			O
* Clean spark arrester (page 3-21)			O	O	O	O	O	O
Replace air cleaner element (page 3-6), NOTE 2								O
Clean sub air cleaner element (page 3-6), NOTE 2					O			O
Check spark plug (page 3-7)			O	O	O	O	O	O
* Inspect idle speed (page 3-16)		O			O			O
* Check fuel lines and connections (page 3-5)					O			O
Check front and rear brakes (page 3-19 and 3-20), NOTE 3		O			O			O
Check front and rear final gear oil (page 3-17)		O			O			O
Lubricate all hinges, latches, and pivots (page 3-26)					O			O
** Inspect the following items: Suspension components (page 3-21) Wheels (page 3-21) Drive shaft boots (page 3-17) Accelerator pedal (throttle operation; page 3-5) and brake pedal (page 3-20) Brake light switch (page 3-20) Exhaust system (page 3-21) Battery terminal condition (page 3-8)					O			O
* Check parking lock system adjustment (page 3-20)		O						O
* Check shift lever adjustment (page 12-30)		O						O
** Inspect the following items: Tie-rod ends (page 3-22) * Steering gear box and boots (page 3-22) * Brake hoses and lines (page 3-20) * SxS underbody (page 3-20), NOTE 4								O
* Inspect evaporative emission control system (USA - 50 states [meets California]) (page 3-27)			Every 2 years (regardless of mileage)					
Replace the following items: Front and rear final gear oil (page 3-17) * Engine coolant (page 9-4) * Brake fluid (page 21-5)			Every 2 years (regardless of mileage)					

* Should be serviced by a dealer, unless the owner has the 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. Inspect valve clearance per the maintenance interval and more frequently if the engine becomes noisy.
2. Service more frequently when operating in dusty areas, sand or snow.
3. Service more frequently when operated in muddy conditions.
4. Check the underbody whenever the skid plates have been hit.

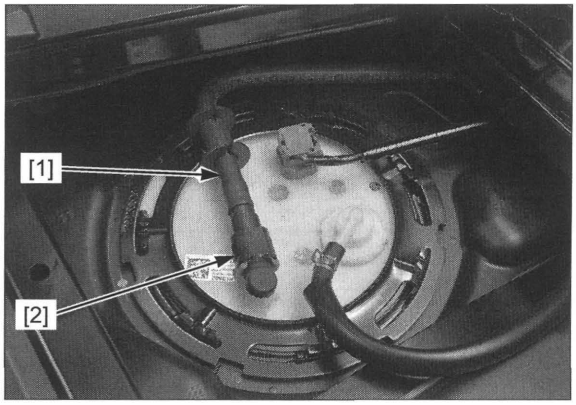
FUEL LINE

Remove the seat under cover (page 2-6).

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

Check the quick connect fittings [2] for looseness.

Replace the fuel feed hose if necessary.



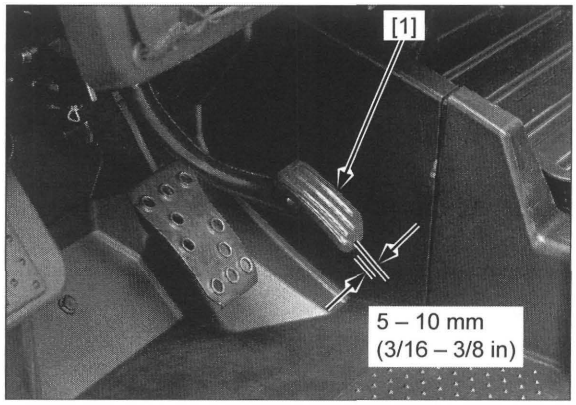
THROTTLE OPERATION

Operate the accelerator pedal [1] and check that the throttle cable operates smoothly with no binding or sticking. Replace if necessary.

Measure the accelerator pedal freeplay at the end of the pedal.

PEDAL FREEPLAY: 5 – 10 mm (3/16 – 3/8 in)

Accelerator pedal freeplay can be adjusted at either end of the throttle cable.

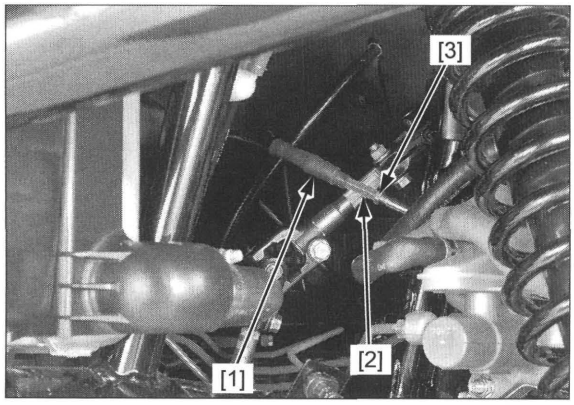


Slide the boot [1] off the adjuster [2].

Loosen the lock nut [3], turn the adjuster as required and tighten the lock nut.

TORQUE: 5.0 N·m (0.5 kgf·m, 3.7 lbf·ft)

Install the boot over the adjuster securely.



The pedal side adjuster should be centered before performing major adjustment at the throttle body.

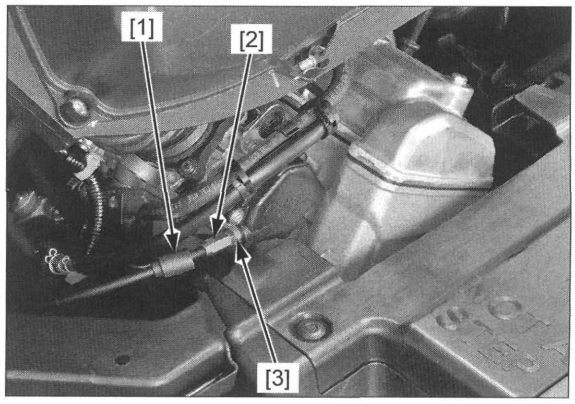
Major adjustments are made with the throttle body side adjuster.

Remove the air cleaner cover (page 2-11).

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

Recheck the throttle operation.

Install the air cleaner cover (page 2-11).



AIR CLEANER

NOTE:

- If the vehicle is used in dusty areas, sand or snow, more frequent inspections are required.
- The viscous paper element type air cleaner cannot be cleaned because the element contains a dust adhesive.
- Do not clean with compressed air.
- Prevent dirt and debris from entering the engine.

Remove the air cleaner cover (page 2-11).

Clean the air cleaner housing [1] prior to removal.

Remove the ten screws/collars [2] and air cleaner housing cover.

Remove the cover seal [3] from the air cleaner housing cover.

Remove the screw [4] and air cleaner element assembly [5] from the housing.

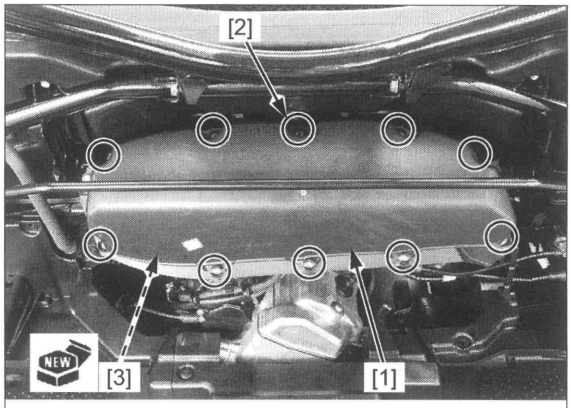
Remove the case seal [6] from the air cleaner housing.

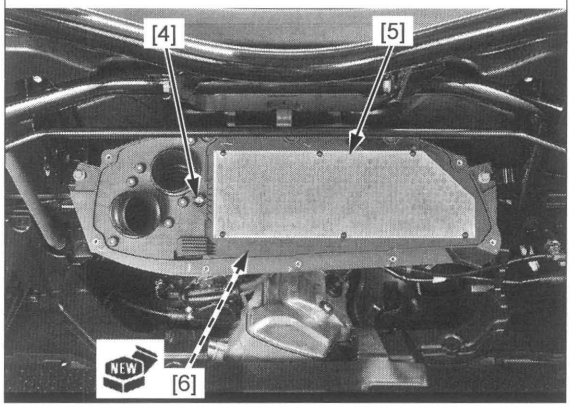
Replace the air cleaner element in accordance with the maintenance schedule (page 3-4) or any time it is excessively dirty or damaged.

Install the air cleaner element with new case and cover seals in the reverse order of removal.

TORQUE:

Air cleaner housing cover screw:
5.2 N·m (0.5 kgf·m, 3.8 lbf·ft)





SUB AIR CLEANER

NOTE:

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

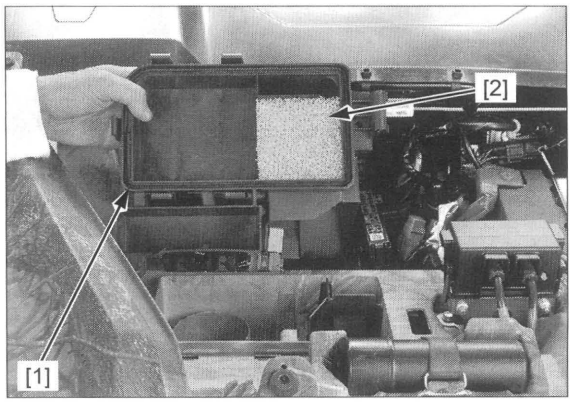
Remove the front hood (page 2-17).

Open the pre filter cover [1] and remove the sub air cleaner element [2].

Clean the sub air cleaner element by tapping it.

Check the sub air cleaner element and replace it if it is deteriorated or damaged.

Install the sub air cleaner element in the reverse order of removal.

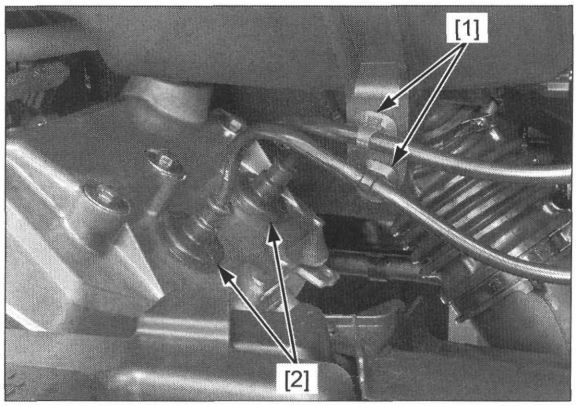


SPARK PLUG

REMOVAL/INSTALLATION

Remove the air cleaner cover (page 2-11).

Remove the wire clips [1] from the stay, disconnect the spark plug caps [2] and clean around the spark plug bases.



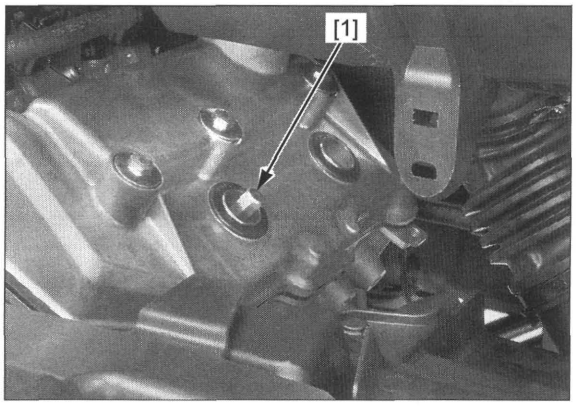
Clean around the spark plug base with compressed air before removing the spark plug, and be sure that no debris is allowed to enter the combustion chamber.

Remove the spark plugs using the equipped spark plug wrench [1].

Inspect the spark plug as described in the maintenance schedule (page 3-4).

Install the spark plug to the cylinder head and hand tighten it, then tighten it to the specified torque using the equipped spark plug wrench.

TORQUE: 22 N·m (2.2 kgf·m, 16 lbf·ft)



Connect the spark plug caps and install the wire clips onto the stay.

Install the air cleaner cover (page 2-11).

INSPECTION

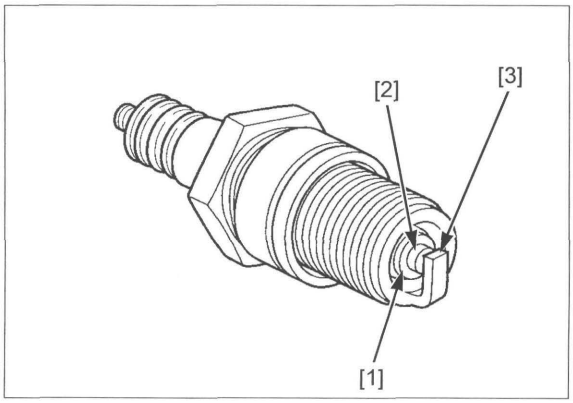
Check the following and replace if necessary.

- Insulator [1] for damage
- Center electrode [2] and side electrode [3] for wear
- Burning condition, coloration

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

Always use specified spark plugs on this SXS.

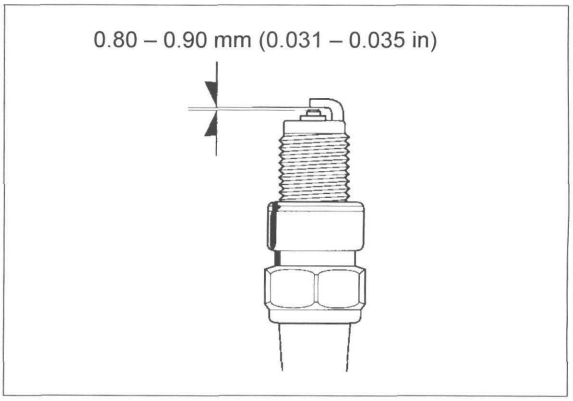
SPECIFIED SPARK PLUG: LMAR7M-9S (NGK)



Measure the gap between the center and side electrodes with a feeler gauge.

SPARK PLUG GAP: 0.80 – 0.90 mm (0.031 – 0.035 in)

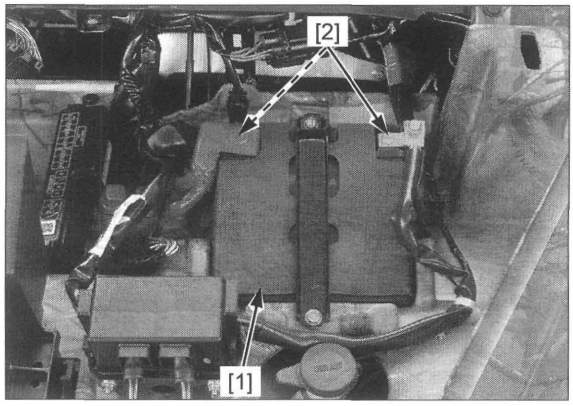
If necessary, adjust the gap by bending the side electrode carefully.



BATTERY

Remove the front hood (page 2-17).

Check the battery [1] for loose connections or corroded terminals [2].



VALVE CLEARANCE

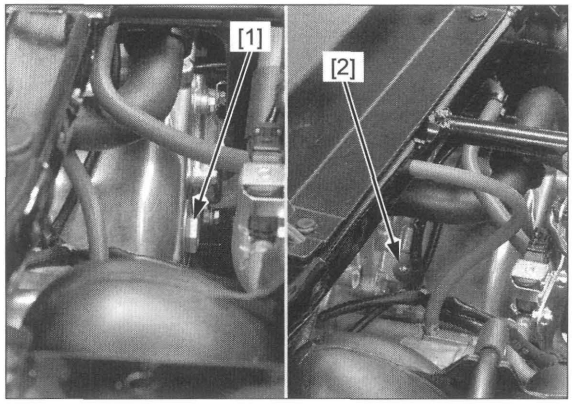
NOTE:

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

Remove the following:

– rear center cover (page 2-9)
– cylinder head cover (page 10-5)

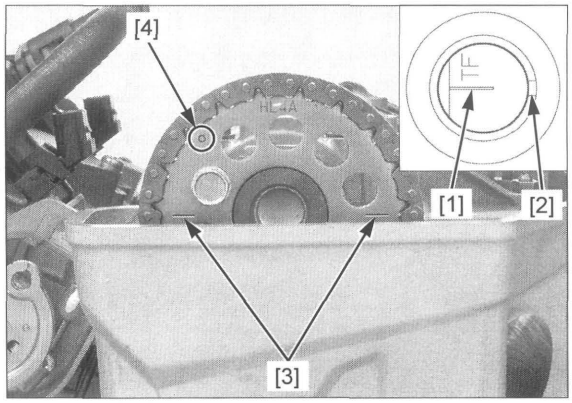
Remove the crankshaft hole cap [1] and the timing hole cap [2].



Rotate the crankshaft counterclockwise and align the "TF" mark [1] on the flywheel with the index mark [2] on the alternator cover.

Make sure the index lines [3] on the cam sprocket align with the upper surface of the cylinder head and the punch mark [4] on the sprocket is visible.

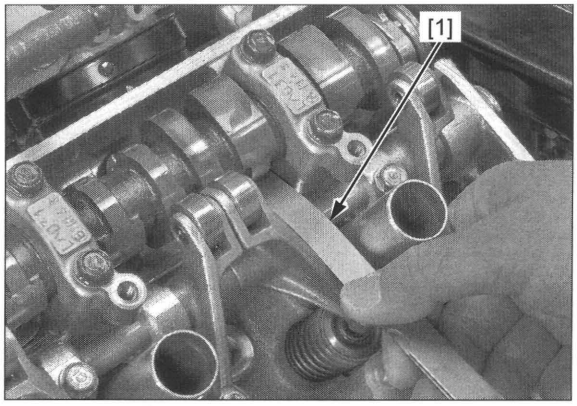
If the punch mark is not visible, rotate the crankshaft counterclockwise one full turn and align the "TF" mark with the index mark again.



Check the front cylinder intake valve clearances by inserting a feeler gauge [1] between the valve lifter and cam lobe.

Front cylinder intake valve clearance:
0.16 ± 0.03 mm (0.006 ± 0.001 in)

Adjust the valve clearance by changing the valve lifter shim (page 3-11).

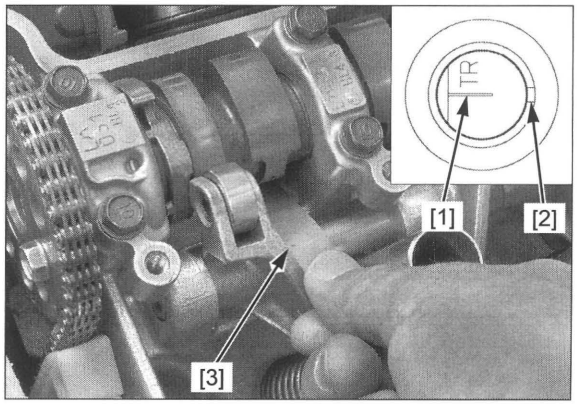


Rotate the crankshaft counterclockwise 270° and align the "TR" mark [1] with the index mark [2].

Check the rear cylinder intake valve clearances by inserting a feeler gauge [3] between the valve lifter and cam lobe.

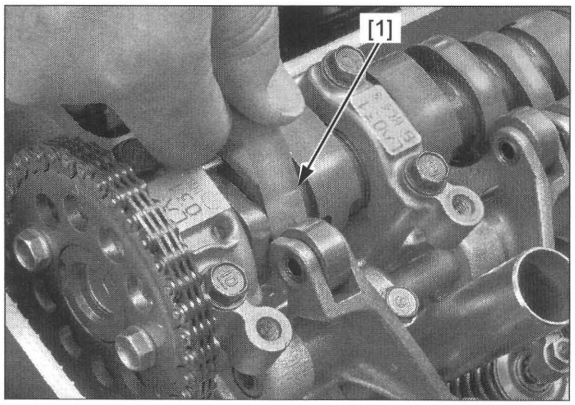
Rear cylinder intake valve clearance:
0.16 ± 0.03 mm (0.006 ± 0.001 in)

Adjust the valve clearance by changing the valve lifter shim (page 3-11).



Check the rear cylinder exhaust valve clearances by inserting a feeler gauge [1] between the rocker arm roller and cam lobe.

Rear cylinder exhaust valve clearance:
Roller side: 0.24 ± 0.02 mm (0.009 ± 0.001 in)
Valve side: 0.30 ± 0.03 mm (0.012 ± 0.001 in)



Adjust the valve clearance by loosening the lock nut [1] and turning the adjusting screw [2] until there is a slight drag on the feeler gauge [3].

TOOLS:

Valve adjusting wrench [4]	**07708-0030400 (U.S.A.: 07908-KE90200)**
Lock nut wrench, 8 x 9 mm [5]	**07708-0030100**

U.S.A. TOOL:

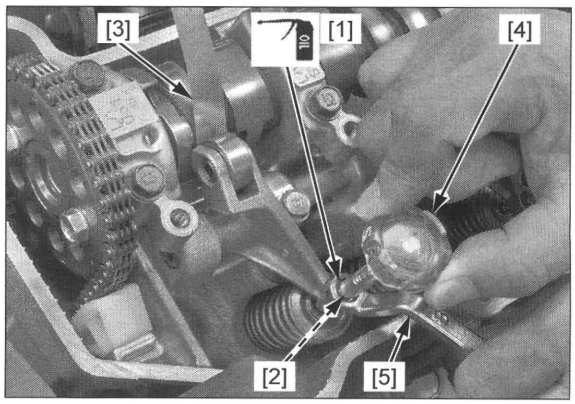
Tappet adjustment wrench, 3 mm and a commercially available of set box wrench	**07908-KE90200**

Apply engine oil to the lock nut threads and seating surface.

Hold the adjusting screw and tighten the lock nut.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

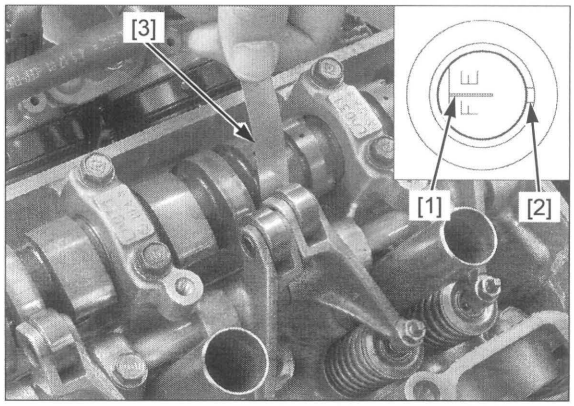
After tightening the lock nut, recheck the valve clearance.



Rotate the crankshaft counterclockwise 255° and align the "FE" mark [1] with the index mark [2].

Check the front cylinder exhaust valve clearances by inserting a feeler gauge [3] between the rocker arm roller and cam lobe.

Front cylinder exhaust valve clearance:
Roller side: 0.24 ± 0.02 mm (0.009 ± 0.001 in)
Valve side: 0.30 ± 0.03 mm (0.012 ± 0.001 in)



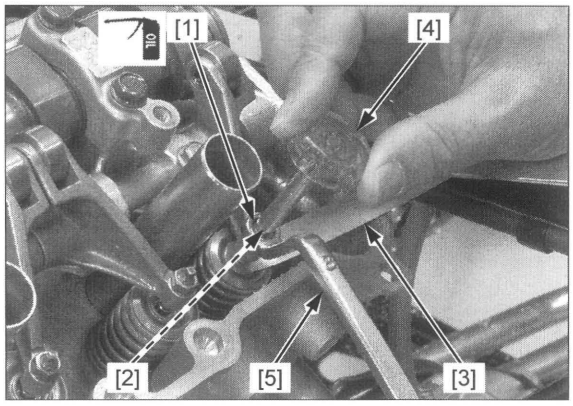
Adjust the valve clearance by loosening the lock nut [1] and turning the adjusting screw [2] until there is a slight drag on the feeler gauge [3].

TOOLS:

Valve adjusting wrench [4]	**07708-0030400 (U.S.A.: 07908-KE90200)**
Lock nut wrench, 8 x 9 mm [5]	**07708-0030100**

U.S.A. TOOL:

Tappet adjustment wrench, 3 mm and a commercially available of set box wrench	**07908-KE90200**



Apply engine oil to the lock nut threads and seating surface.

Hold the adjusting screw and tighten the lock nut.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

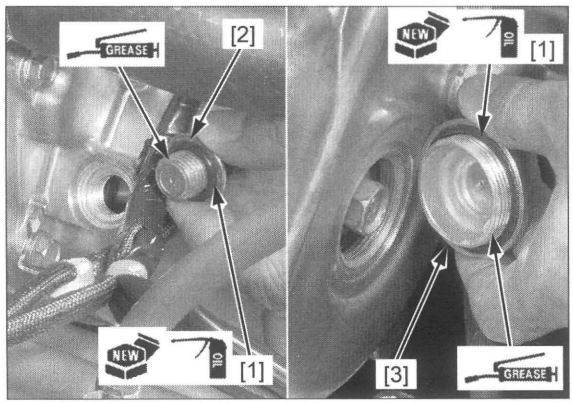
After tightening the lock nut, recheck the valve clearance.

Coat new O-rings [1] with oil and install them into the timing hole cap [2] and crankshaft hole cap [3].

Apply grease to the threads of the timing hole and crankshaft hole caps.

Install the timing hole and crankshaft hole caps, and tighten them.

TORQUE:
Timing hole cap: 10 N·m (1.0 kgf·m, 7 lbf·ft)
Crankshaft hole cap: 12 N·m (1.2 kgf·m, 9 lbf·ft)



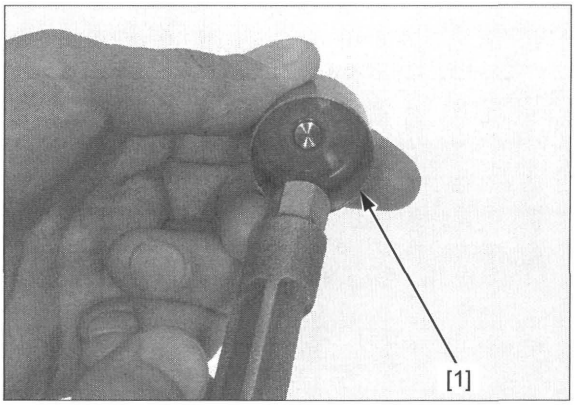
Install the following:

- rear center cover (page 2-9)
- cylinder head cover (page 10-6)

INTAKE VALVE CLEARANCE ADJUSTMENT

Remove the valve lifter [1] and shim (page 10-10).

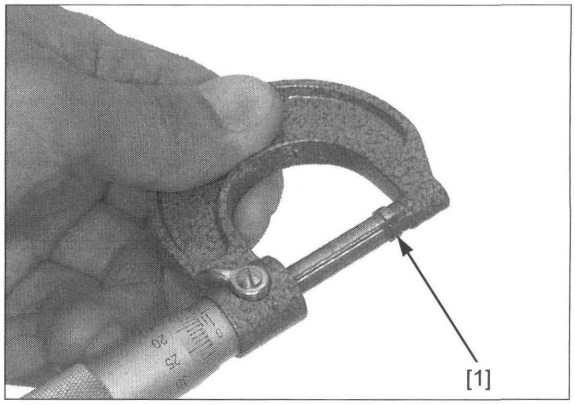
Clean the valve shim contact area in the valve lifter with compressed air.



Measure the shim [1] thickness and record it.

NOTE:

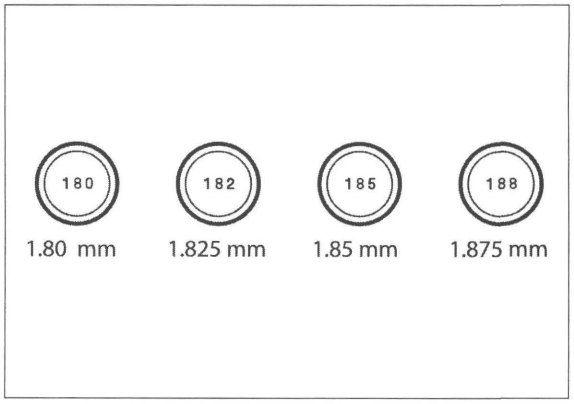
- Fifty-one different shim thicknesses are available in increments of 0.025 mm (from 1.200 mm to 2.450 mm).



Calculate the new shim thickness using the equation below.
A = (B – C) + D
A: New shim thickness
B: Recorded valve clearance
C: Specified valve clearance
D: Old shim thickness

NOTE:

- Make sure of the correct shim thickness by measuring the shim with the micrometer.
- Reface the valve seat if carbon deposits result in a calculated dimension of over 2.450 mm.



Install newly selected shims on the valve retainers.

Install the valve lifter and camshaft (page 10-12).

Rotate the crankshaft counterclockwise several times and recheck the valve clearances.

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.

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).

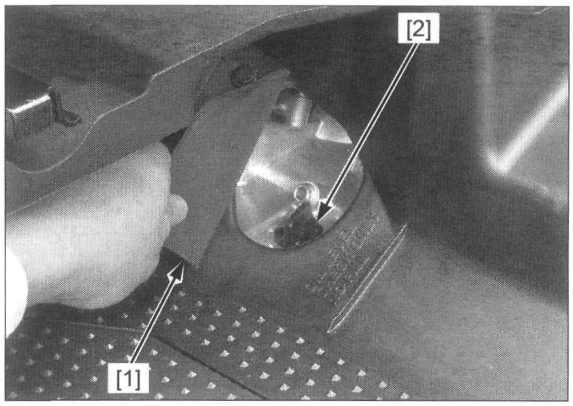
Stop the engine and wait for 2 – 3 minutes.

Clean around the dipstick to prevent mud and dirt from entering the engine before removing the dipstick.

Turn the rubber sheet [1] up, remove the dipstick [2] and wipe it clean.

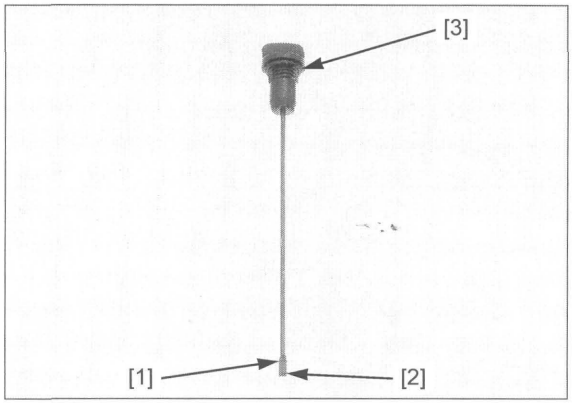
Insert the dipstick into the engine without screwing it in.

Remove the dipstick and check the oil level.



The engine contains a sufficient amount of oil if the oil level is between the upper level mark [1] and lower level mark [2] on the dipstick.

Check that the O-ring [3] on the dipstick is in good condition and replace it if necessary.



Clean around the oil filler cap to prevent mud and dirt from entering the engine before removing the oil filler cap.

If the oil level is near or below the lower level mark, add the recommended engine oil as follows:

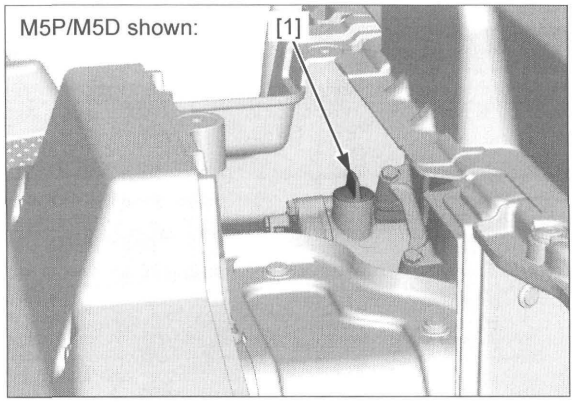
Remove the rear footwell lid (page 2-11) (M5P/M5D).

Remove the rear mud guard lid (page 2-14) (M3P/M3D).

Remove the oil filler cap [1] and add the recommended engine oil up to the upper level mark.

RECOMMENDED ENGINE OIL:

Pro Honda GN4 4-stroke oil (U.S.A. & Canada) or equivalent motorcycle oil
API service classification: SJ or higher
JASO T 903 standard: MA
Viscosity: SAE 10W-30



Reinstall the oil filler cap and dipstick.

Install the rear footwell lid (page 2-11) (M5P/M5D).

Install the rear mud guard lid (page 2-14) (M3P/M3D).

OIL CHANGE

NOTE:

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

Place the vehicle on level ground.

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

Stop the engine.

Remove the oil filler cap (page 3-12).

Place an oil pan under the engine to catch the engine oil.

Remove the drain bolts [1] and sealing washers [2] to drain the engine oil from the oil pan and oil tank.

After draining the oil completely, install the drain bolts with new sealing washers and tighten them.

TORQUE: 30 N·m (3.1 kgf·m, 22 lbf·ft)

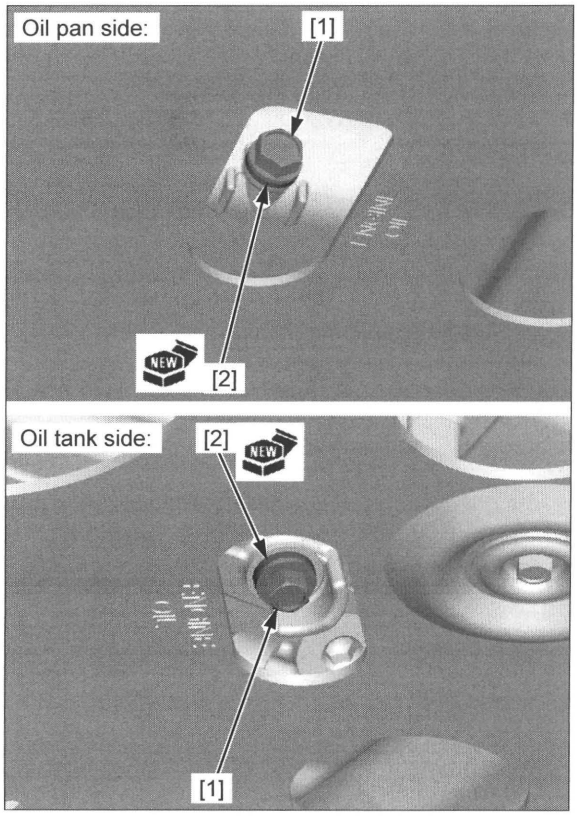
Pour the recommended oil into the engine through the filler hole.

ENGINE OIL CAPACITY:

5.5 liters (5.8 US qt, 4.8 Imp qt) after draining
5.75 liters (6.08 US qt, 5.06 Imp qt) after draining/ engine oil filter change
5.8 liters (6.1 US qt, 5.1 Imp qt) after draining/ engine oil filter change and DCT oil filter change
7.2 liters (7.6 US qt, 6.3 Imp qt) after disassembly

Install the oil filler cap.

Check the oil level (page 3-12).



OIL FILTER REPLACEMENT

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]
- setting spring [3]
- oil filter [4]

Remove the O-ring [5] from the oil filter cover.

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

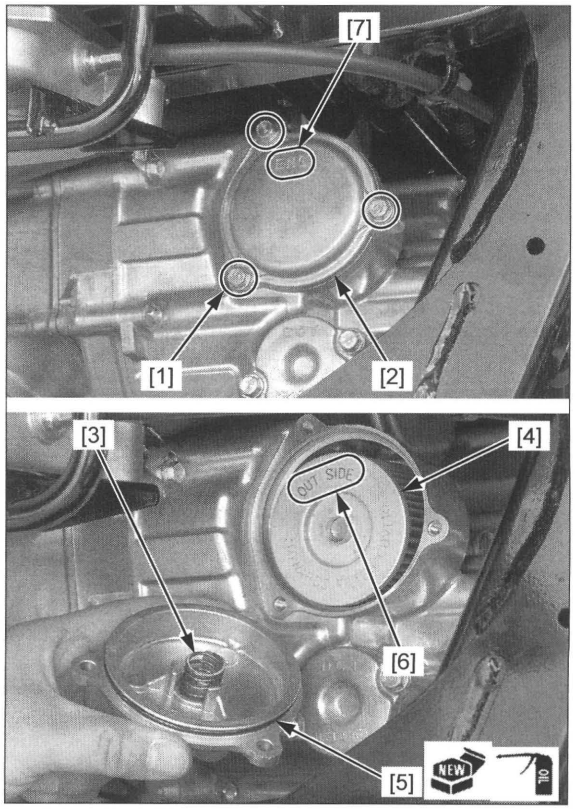
Installing the oil filter backwards will result in severe engine damage.

Install a new oil filter onto the engine boss with the "OUT SIDE" mark [6] facing out.

Install the setting spring and filter cover with the "ENG" mark [7] facing up.

Install the three bolts and tighten them securely.

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



DCT OIL FILTER

Drain the engine oil (page 3-13).

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

Remove the following:

- two bolts [1]
- filter cover [2]
- setting spring [3]
- oil filter [4]

Remove the O-ring [5] from the oil filter cover.

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

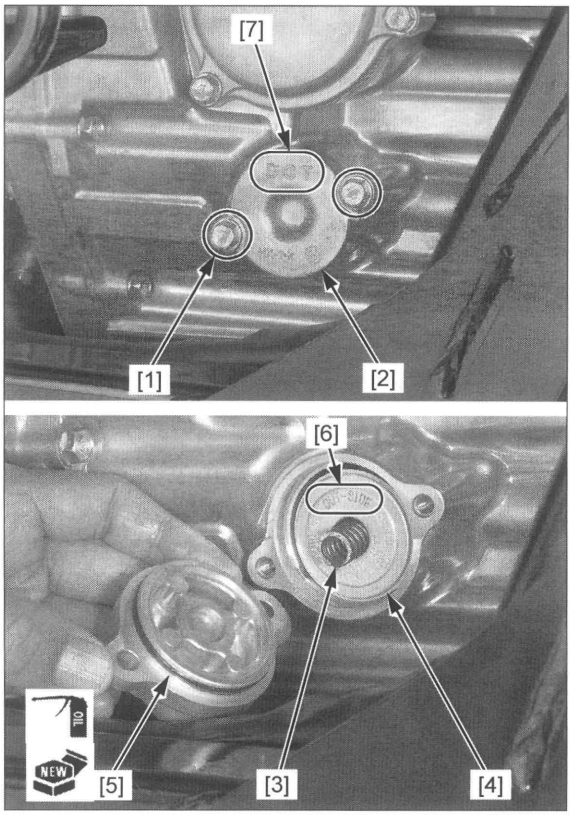
Installing the oil filter backwards will result in severe engine damage.

Install a new oil filter onto the engine boss with the "OUT-SIDE" mark [6] facing out.

Install the setting spring and filter cover with the "DCT" mark [7] facing up.

Install the two bolts and tighten them securely.

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



SUB-TRANSMISSION OIL

LEVEL CHECK

Place the vehicle on level ground.

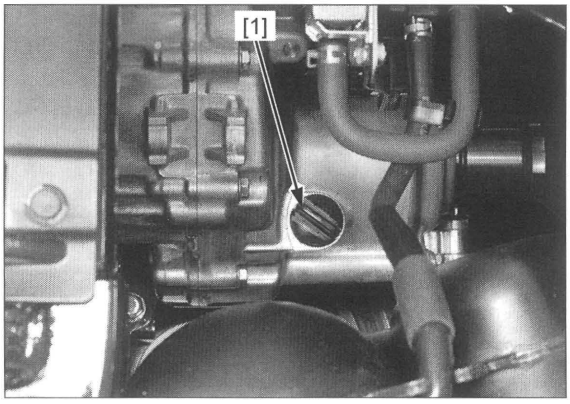
Remove the seat under center lid (page 2-5).

Clean around the oil filler cap/dipstick to prevent mud and dirt from entering the engine before removing the oil filler cap/dipstick.

Remove the oil filler cap/dipstick [1] and wipe it clean.

Insert the oil filler cap/dipstick into the sub-transmission without screwing it in.

Remove the oil filler cap/dipstick and check the oil level.

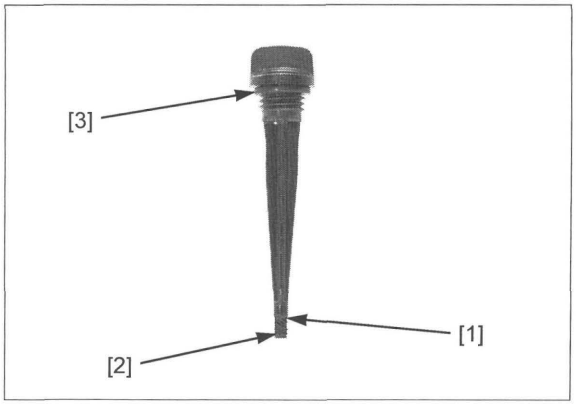


The sub-transmission contains a sufficient amount of oil if the oil level is between the upper level mark [1] and lower level mark [2].

If the oil level is near or below the lower level mark, add the recommended sub-transmission oil up to the upper level mark.

RECOMMENDED SUB-TRANSMISSION OIL:

Pro Honda GN4 4-stroke oil (U.S.A. & Canada) or equivalent motorcycle oil
API service classification: SJ or higher
JASO T 903 standard: MA
Viscosity: SAE 10W-30



Check that the O-ring [3] is in good condition and replace it if necessary.

Install the oil filler cap/dipstick.

Install the seat under center lid (page 2-5).

OIL CHANGE

NOTE:

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

Place the vehicle on level ground.

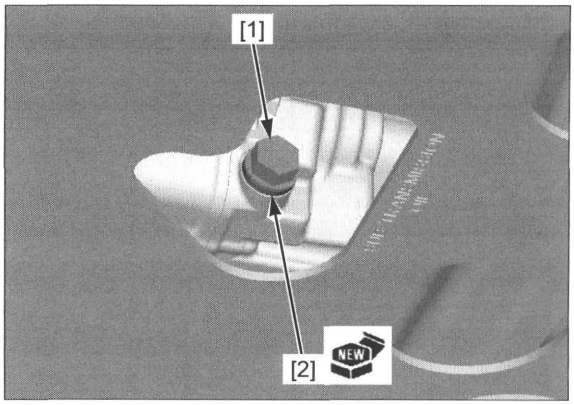
Remove the oil filler cap/dipstick (page 3-14).

Place an oil pan under the sub-transmission to catch the oil.

Remove the oil drain bolt [1] and sealing washer [2] to drain the oil.

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

TORQUE: 29 N·m (3.0 kgf·m, 21 lbf·ft)



Fill the sub-transmission with the recommended oil.

OIL CAPACITY

1.2 liters (1.3 US qt, 1.1 Imp qt) after draining
1.4 liters (1.5 US qt, 1.2 Imp qt) after disassembly

Check the oil level (page 3-14).

ENGINE COOLANT

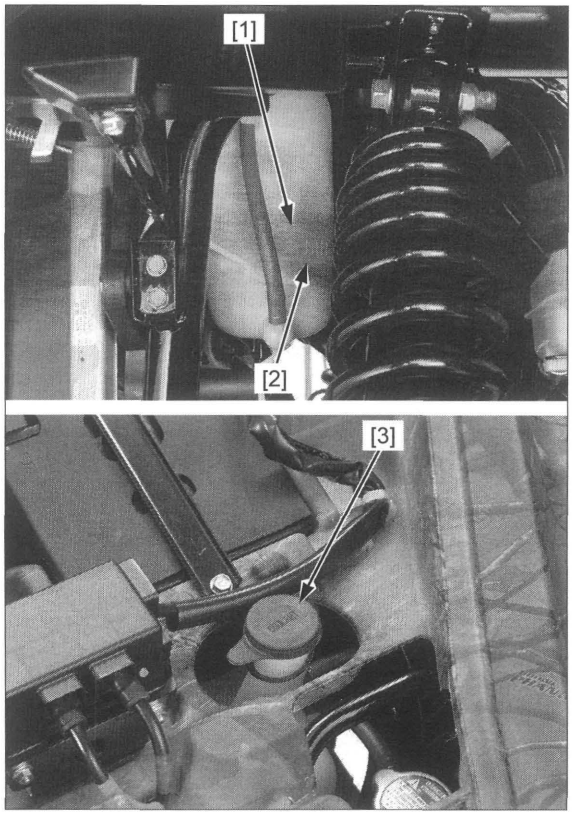
Check the coolant level of the reserve tank with the engine running at normal operating temperature.

The level should be between the "MAX" level line [1] and "MIN" level line [2] with the vehicle upright on a level surface.

If the level is low, remove the reserve tank cap [3] and fill the tank up to the "MAX" level line with a 1:1 mixture of distilled water and antifreeze.

RECOMMENDED ANTIFREEZE:

Pro Honda HP coolant or an equivalent high quality ethylene glycol antifreeze containing corrosion protection 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 9-4).

ENGINE IDLE SPEED

NOTE:

- Inspect the idle speed after all other engine maintenance items have been performed and are within specifications.
- Before checking the idle speed, inspect the following items.
  - No DTC and MIL blinking (page 4-7)
  - Spark plug condition (page 3-7)
  - Air cleaner condition (page 3-6)
- The engine must be warm for accurate idle speed inspection.
- Use a tachometer with graduations of 50 rpm or smaller that will accurately indicate a 50 rpm change.

Remove the air cleaner cover (page 2-11).

Start the engine and warm it up to coolant temperature 80°C (176°F).
Stop the engine and connect a tachometer according to the tachometer manufacturer's operating instructions.
Start the engine and let it idle. Check the idle speed.

ENGINE IDLE SPEED: 1,350 ± 100 rpm

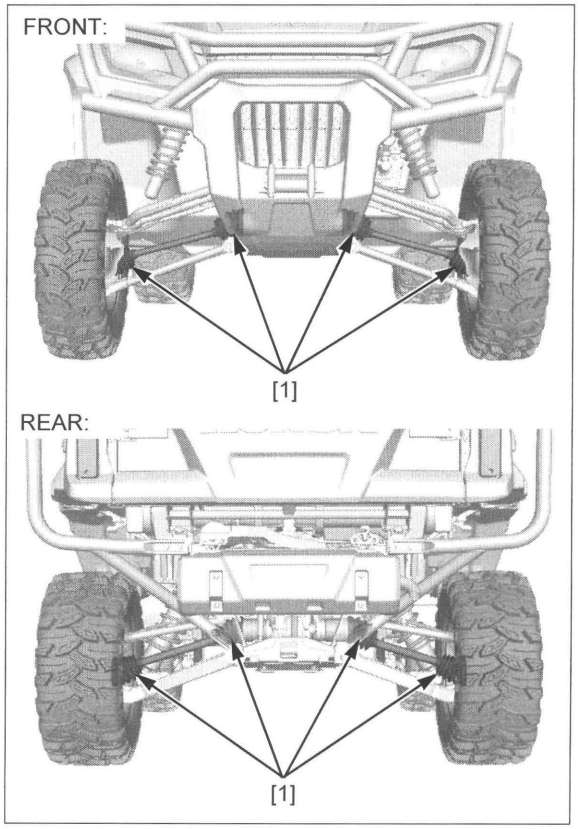
If the idle speed is out of the specification, check the following:

- Throttle operation and accelerator pedal freeplay (page 3-5)
- Intake air leak or engine top-end problem (page 10-3)
- IACV operation (page 7-27)

DRIVE SHAFT BOOTS

Check the drive shaft boots [1] for cuts or other damage.

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



FINAL GEAR OIL

FRONT FINAL GEAR

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 [2] of the oil filler hole.

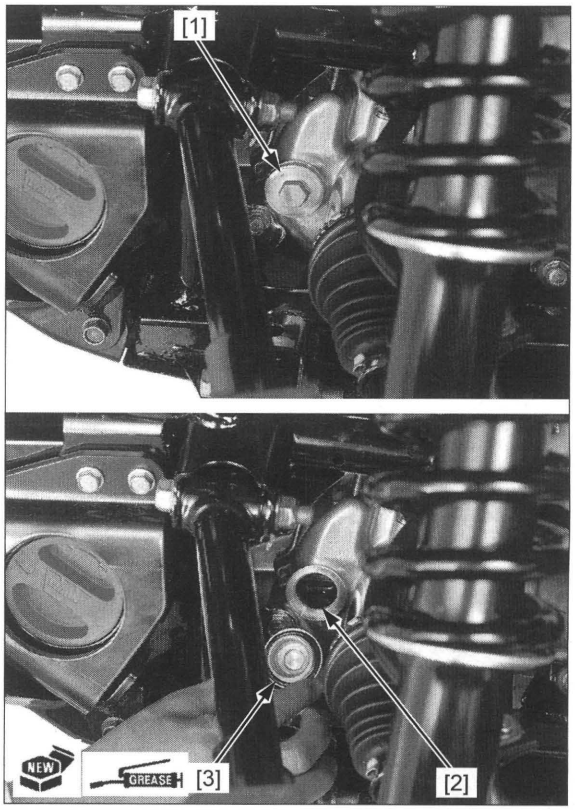
Check for leaks if the oil level is low.

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

RECOMMENDED OIL:
Hypoid gear oil, SAE 80W-90

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

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)



OIL CHANGE

Place the vehicle on a level surface.

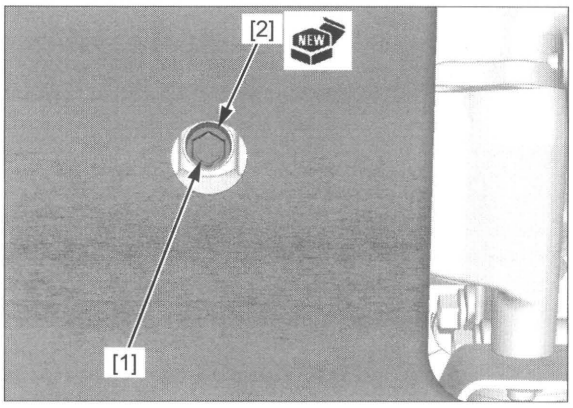
Remove the oil filler cap (page 3-17).

Remove the oil drain bolt [1] and sealing washer [2] to drain the oil.
After the oil is completely drained, install the drain bolt with a new sealing washer and tighten it.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

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

OIL CAPACITY:
Except I-4WD model:
340 cm³ (11.5 US oz, 12.0 Imp oz) at draining
500 cm³ (16.9 US oz, 17.6 Imp oz) at disassembly
I-4WD model:
390 cm³ (13.2 US oz, 13.7 Imp oz) at draining
535 cm³ (18.1 US oz, 18.8 Imp oz) at disassembly



REAR FINAL GEAR CASE

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 [2] of the oil filler hole.

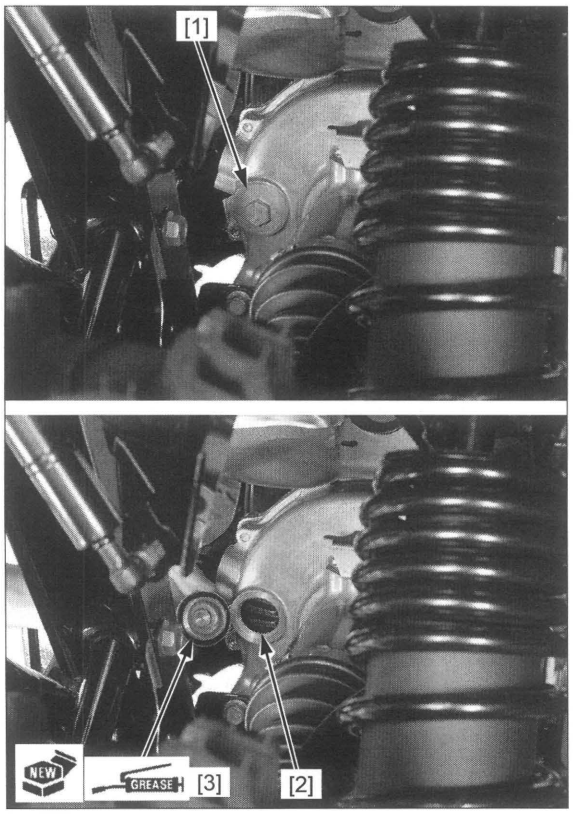
Check for leaks if the oil level is low.

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

RECOMMENDED OIL:
Hypoid gear oil, SAE 80W-90

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

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)



OIL CHANGE

Place the vehicle on a level surface.

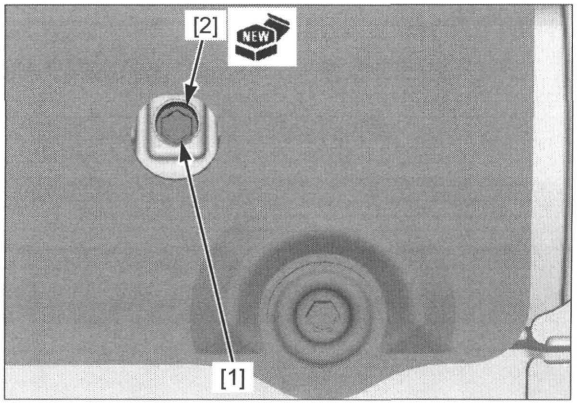
Remove the oil filler cap (page 3-18).

Remove the oil drain bolt [1] and sealing washer [2] to drain the oil.
After the oil is completely drained, install the drain bolt with a new sealing washer and tighten it.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

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

OIL CAPACITY:
Except I-4WD model:
470 cm³ (15.9 US oz, 16.5 Imp oz) at draining
550 cm³ (18.6 US oz, 19.4 Imp oz) at disassembly
I-4WD model:
550 cm³ (18.6 US oz, 19.4 Imp oz) at draining
605 cm³ (20.5 US oz, 21.3 Imp oz) at disassembly



BRAKE FLUID

NOTICE

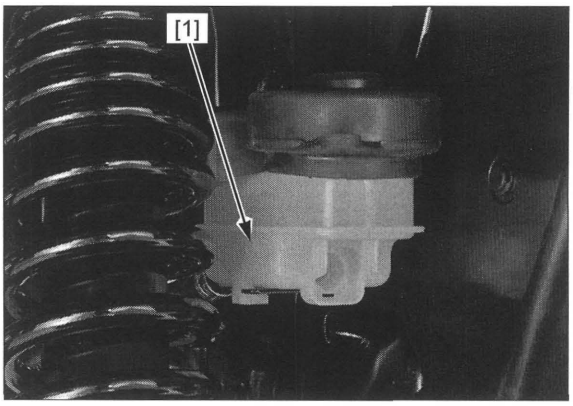
Spilled fluid can damage painted, plastic or rubber parts. Place a rag over these parts whenever the system is serviced.

Check the brake fluid level in the reservoir.

If the level is near the "MIN" level line [1], check the brake pads for wear (page 3-19).

NOTE:

- If the brake pads are worn, the caliper piston is pushed out, and this causes a low reservoir level. If the brake pads are not worn and the fluid level is low, check entire system for leaks (page 3-20).



BRAKE PADS WEAR

NOTE:

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

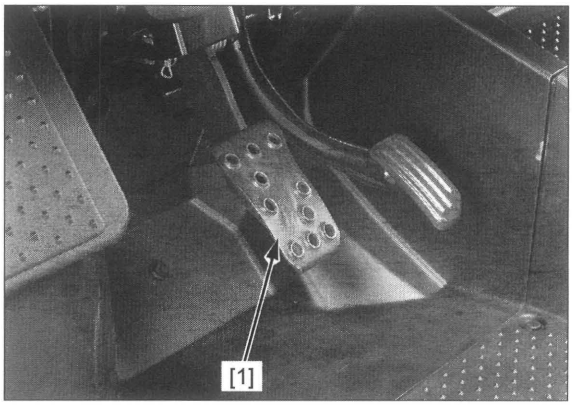
If you hear a continuous metallic friction sound from the brake wear indicators when applying the brake, replace the brake pads (page 21-8).

BRAKE SYSTEM

Check the brake pedal [1] for smooth operation.

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

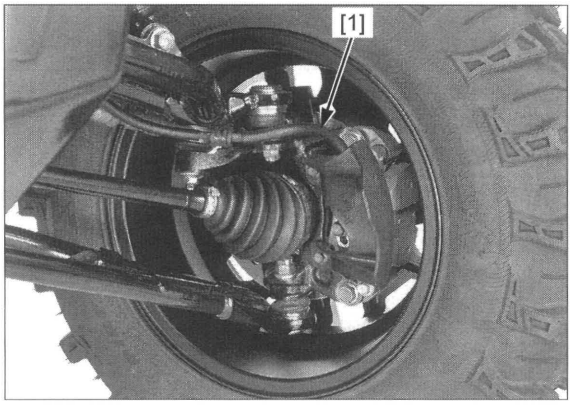
If the brake pedal feels soft or spongy when operated, bleed the system (page 21-6).



Inspect the brake hoses [1], pipes and fittings for deterioration, cracks, damage or signs of leakage.

Firmly apply the brake pedal and check that no air has entered the system.
If the brake pedal feels soft or spongy when operated, bleed the system (page 21-6).

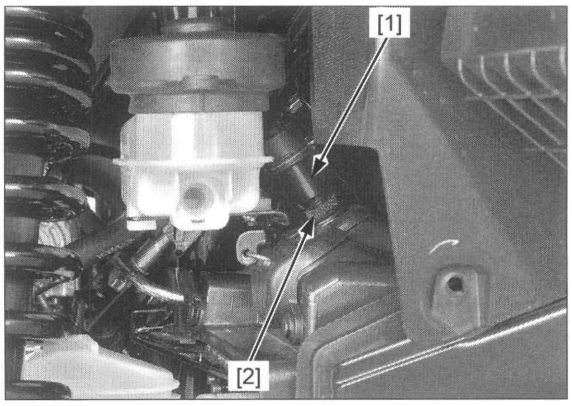
Tighten any loose fittings.
Replace hoses, pipes and fittings as required.



BRAKE LIGHT SWITCH

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

If the light fails to come on, adjust the 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.



PARKING LOCK SYSTEM

Set the shift select lever to "P" (parking) position and the drive mode select lever to "Turf" position.

Check that the transmission is locked (the vehicle cannot be moved) and the rear differential is locked (the rear differential lock arm is not pulled).

Adjust the shift and rear deferential lock cables if necessary:

- shift cable (page 12-30)
- rear differential lock cable (page 19-35)

UNDERBODY

Check the skid plates for cracks or damage.

Replace the skid plates (page 2-36) as required.

SUSPENSION

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

Check the action of the front and rear shock absorbers by compressing them several times.
Check the entire shock absorber assembly for signs of leaks, damage or loose fasteners.

Check the suspension arms for damage or deformation. Replace worn, loose or damaged components that cannot be repaired.

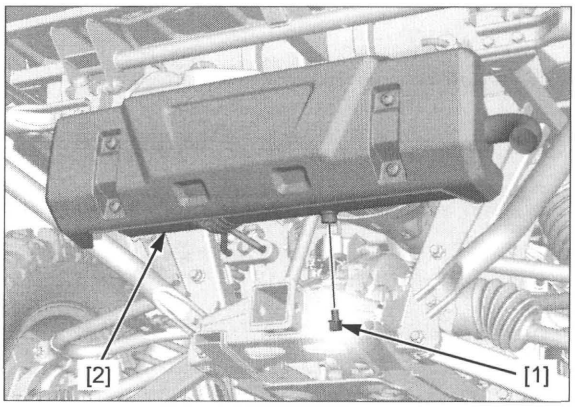
Tighten all nuts and bolts.

SPARK ARRESTER

Remove the bolt [1].

Start the engine and rev it up approximately twenty times while momentarily creating exhaust system back pressure by blocking the end of the muffler [2] with a shop towel.

Reinstall the bolt securely.



EXHAUST SYSTEM

Start the engine and inspect the exhaust system for leaks. Stop the engine and check for any sign of exhaust gas leakage.

WHEELS/TIRES

Check the tire pressure with the tire pressure gauge when the tires are cold.

RECOMMENDED TIRE PRESSURE
M5P/M5D:
FRONT: 140 kPa (1.4 kgf/cm^2, 20 psi)
REAR: 140 kPa (1.4 kgf/cm^2, 20 psi)
M3P/M3D:
FRONT: 120 kPa (1.2 kgf/cm^2, 18 psi)
REAR: 120 kPa (1.2 kgf/cm^2, 18 psi)

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

Measure the tread depth at the center of the tires in at least three locations, using a tire depth gauge.

Replace the tires when the tread depth reaches the following limit.

MINIMUM TREAD DEPTH (Front/Rear): 4 mm (0.2 in)

Raise the wheels off the ground and check the bearings in the hub for excessive play or abnormal noise.
Check the wheels for cracks, deformation or damage.
Check that the wheel nuts are tightened. Torque any loose nuts.

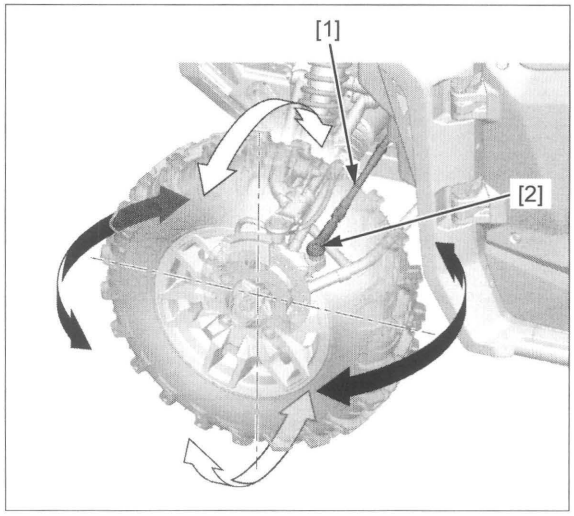
TORQUE: 108 N·m (11.0 kgf·m, 80 lbf·ft)

TIE–ROD ENDS

Raise the front wheel off the ground.

Check the tie-rod joint nuts for looseness.
Check the ball joint boot of each tie-rod [1] for tears or other damage.
Check each tie-rod ball joint [2] for looseness by holding and attempting to move the wheel at the top, bottom, front, and rear.

If any looseness is noted, inspect and replace the ball joint (page 17-13).



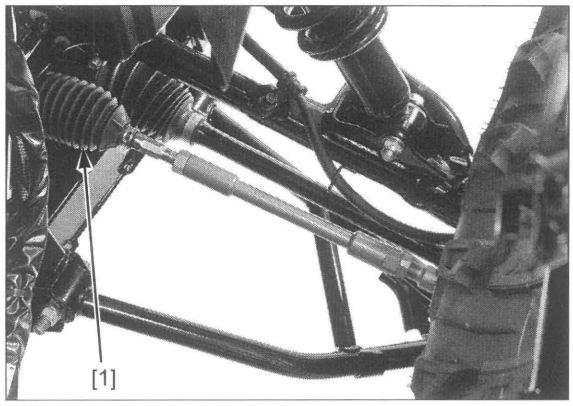
STEERING SYSTEM

GEAR BOX BOOT AND OPERATION CHECK

Raise the front wheels off the ground.

Check the gear box boots [1] for cuts or other damage.
If the boot is damaged, replace it (page 17-14).

Check that the steering wheel moves freely from lock to lock.
If the steering wheel moves unevenly, binds, makes a noise, or has horizontal or vertical movement, inspect the steering column and steering linkage joints for looseness (page 17-8).

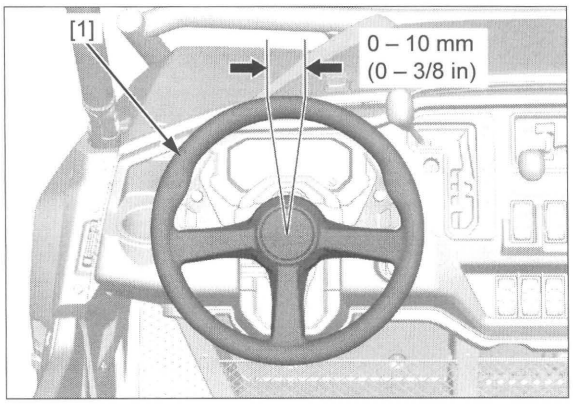


ROTATIONAL PLAY CHECK

Set the front wheels in the straight ahead position with all the wheels on the ground.
Measure how far you can turn the steering wheel [1] left and right without moving the front wheels.

ROTATIONAL PLAY: 0 – 10 mm (0 – 3/8 in)

If the play exceeds the specified range, adjust the rack guide (page 3-23).
If the play is still excessive after rack guide adjustment, inspect the steering linkage and steering gear box (page 17-14).



TURNING LOAD CHECK

NOTE:

- This test should be done with original equipment tires and wheels at the correct tire pressure.

Raise the front wheels off the ground.

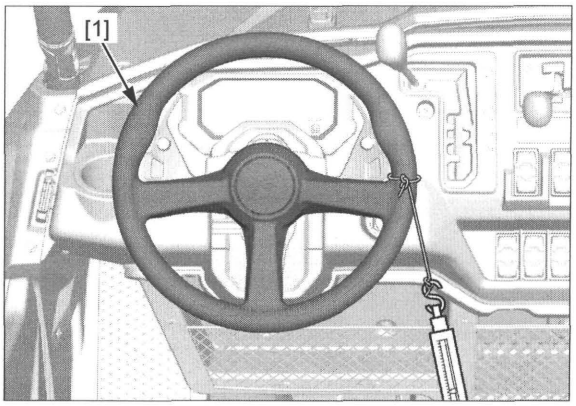
Set the mode select lever to the position other than "4WD Diff" to free the front differential lock.

Set the front wheels in the straight ahead position. Attach a spring scale to the steering wheel [1].

With the engine stopped, pull the scale as shown and read it as soon as the front tires begin to turn.

INITIAL TURNING LOAD:
24.2 N (2.47 kgf, 5.4 lbf)

If the scale reads more than the specification, inspect the steering linkage and steering gear box (page 17-14).



RACK GUIDE ADJUSTMENT

Remove the front floor lid (page 2-30).

Set the front wheels in the straight ahead position.

Loosen the screw lock nut [1] with the special tool, then loosen the rack guide screw [2].

TOOL:
Lock nut wrench [3] 070MA-HL40100
(U.S.A.: 070MA-HL4A100)

Tighten the rack guide screw until it stops, then loosen it.

Tighten the rack guide screw to 4.9 N·m (0.5 kgf·m, 3.6 lbf·ft), then back it off to the specified angle.

SPECIFIED RETURN ANGLE: Below 20°

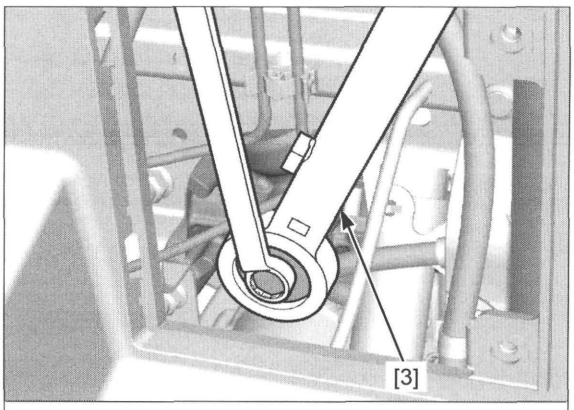
Tighten the lock nut using the same tool while holding the rack guide screw stationary.

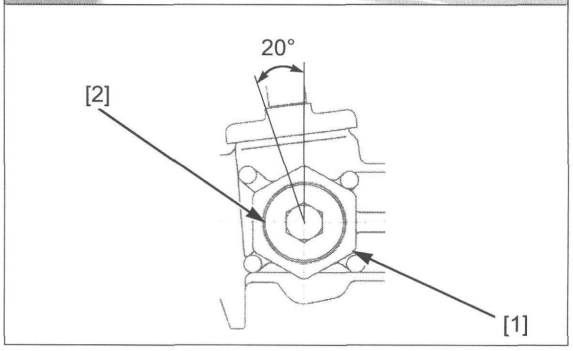
TORQUE: Actual: 24 N·m (2.4 kgf·m, 18 lbf·ft)

Check for unusual steering effort through the complete turning range.

Check the steering wheel rotational play (page 3-22).

Install the front floor lid in the reverse order of removal.





WHEEL ALIGNMENT

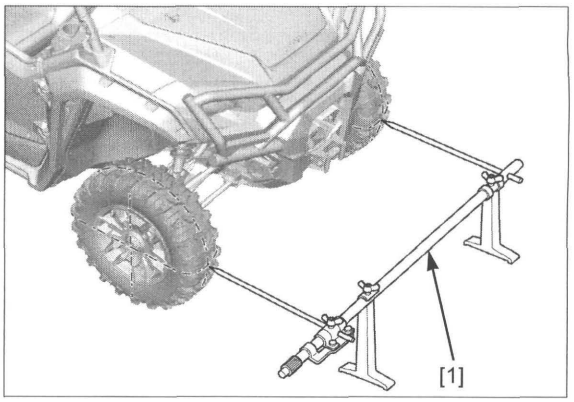
FRONT TOE INSPECTION

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.

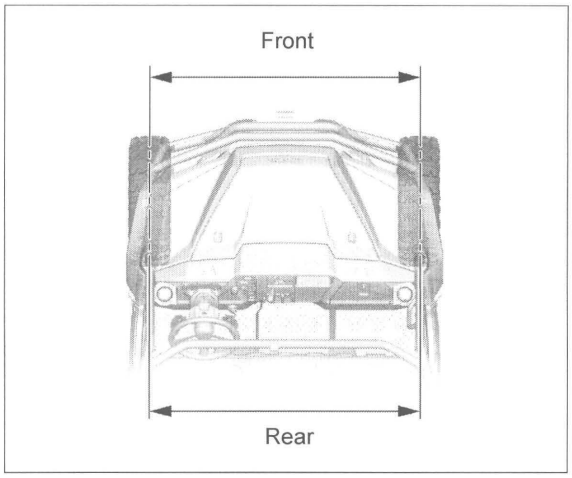
TOOL:
Toe Gauge, 8' SPC99511
commercially available in the U.S.A.



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

TOE-IN: 5 ± 10 mm (3/16 ± 2/5 in)

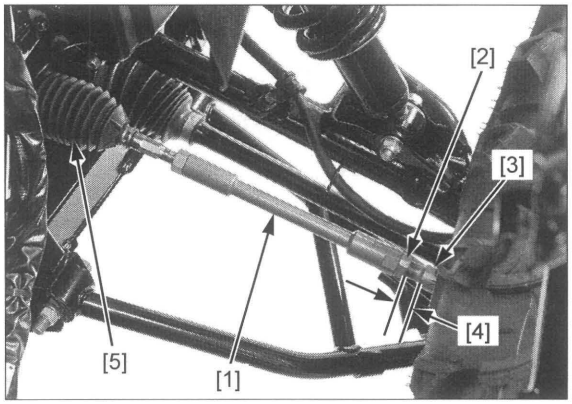
NOTE:
- Toe-in means the front measurement is smaller than the rear measurement.



When the toe is out of specification, adjust it by changing the length of both tie-rods [1] equally by loosening the lock nuts [2] and turning each tie-rod while holding the ball joint [3].

After adjusting the tie-rods, tighten each lock nut while holding the tie-rod.

TORQUE:
14 mm (steering gear box side):
44 N·m (4.5 kgf·m, 32 lbf·ft)
16 mm (tie-rod end side):
55 N·m (5.6 kgf·m, 41 lbf·ft)



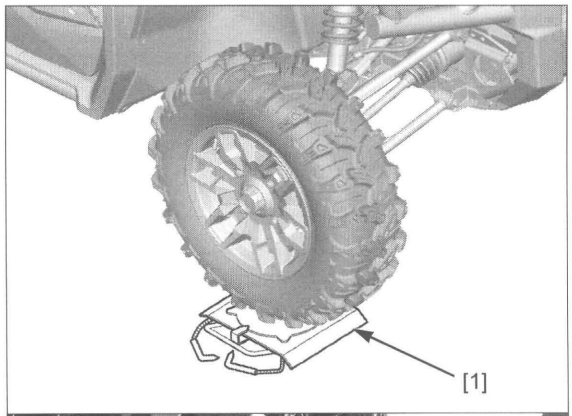
Make sure that the exposed thread length [4] is within 4.9 – 6.9 mm (0.2 – 0.3 in).

Make sure the gear box boots [5] are not twisted, damaged or displaced.

TURNING RADIUS INSPECTION

Be sure that the vehicle is level with the wheels on the radius gauges and boards.

Raise the vehicle off the ground, set the turning radius gauges [1] beneath the front wheels and place boards (that are the same height as the radius gauge) under the rear wheels, then lower the vehicle.



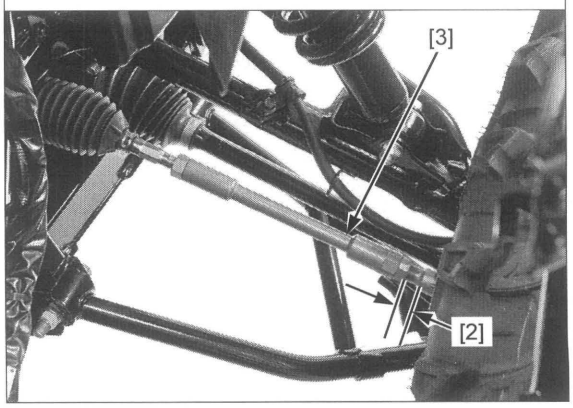
Set the shift select lever to "P" (parking) position.

Set the mode select lever to the position other than "4WD Diff" to free the front differential lock.

Turn the wheels left and right with no foot brake applied, and measure the turning radius angle of both wheels.

TURNING RADIUS ANGLE: Inward: 40°
Outward: 35° (reference)

If the measurements are not to specification, even up the exposed thread lengths [2] of both tie-rod [3] while adjusting the toe (page 3-23).



SIDE NET

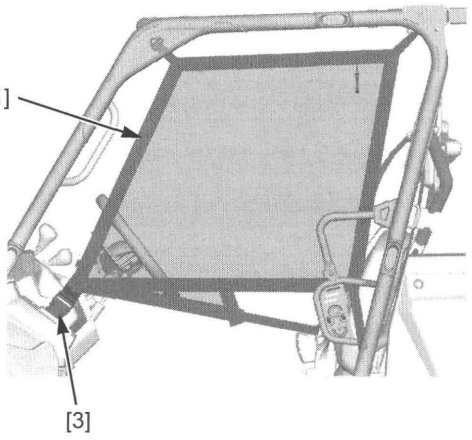
Check the side net [1] webbing for tears or damage. Visually inspect the snap hooks [2], buckle [3] and side net rings for wear or damage and replace the side net assembly if necessary.

Measure the snap hook thickness.

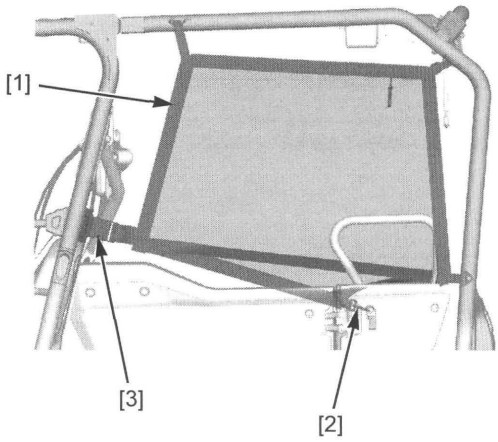
SERVICE LIMIT: 6.0 mm (0.24 in)

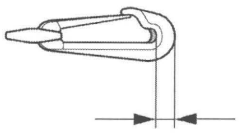
If it is less than the service limit, replace the side net assembly.

Front:



Rear (5 person type only):



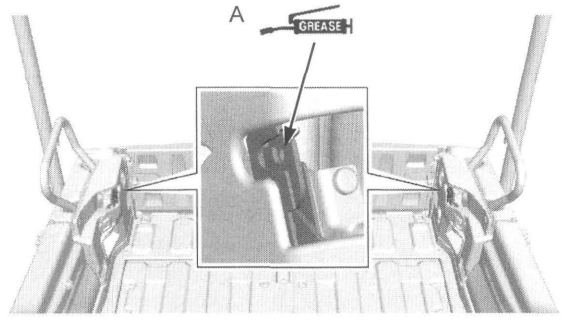


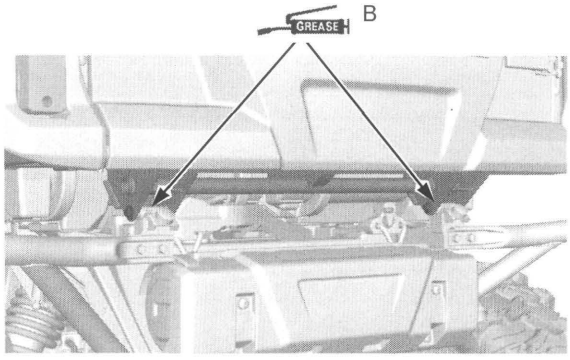
6 mm (0.24 in) minimum

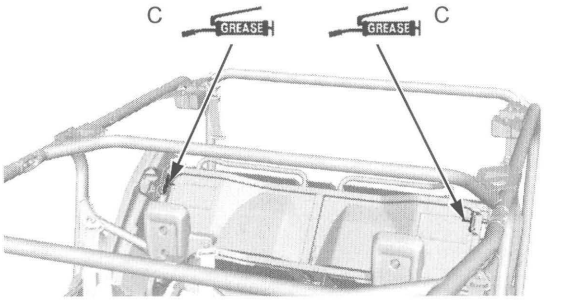
CHASSIS LUBRICATION POINTS

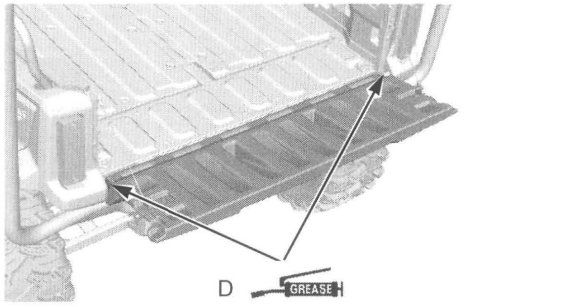
Lubricate the following components.
- A: rear seat latches (5 person type only)
- B: cargo bed pivots
- C: cargo bed strikers
- D: tailgate pivots (page 2-42)
- E: door latches
- F: brake pedal pivot (page 21-16)
- G: accelerator pedal pivot (page 7-20)
- H: front seat cushion latch
- drive mode select lever pivots (page 18-46)
- shift select lever pivots (page 12-29)

Check for smooth operation after lubrication.

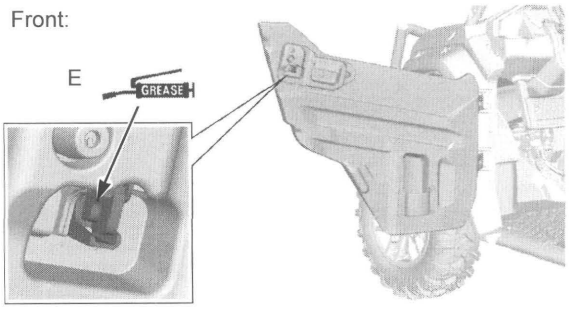


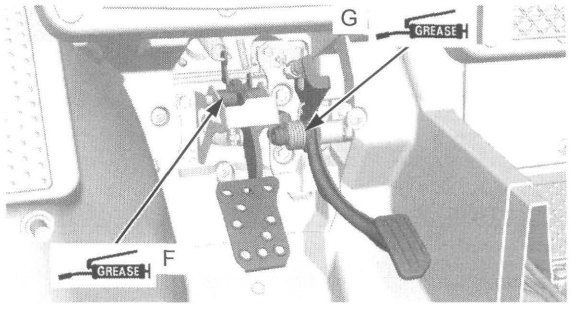




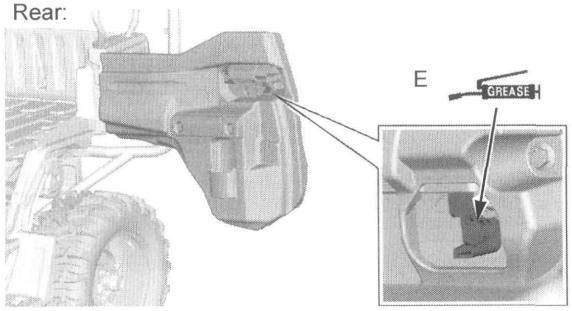


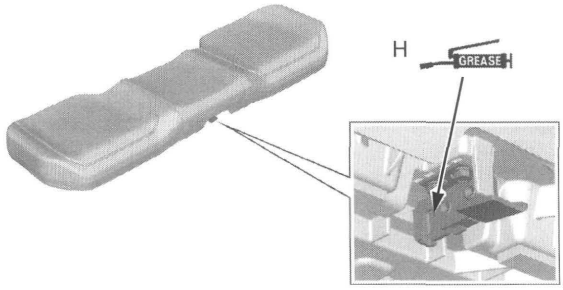
Front:





Rear:





EVAPORATIVE EMISSION CONTROL SYSTEM (AC type only)

Remove the following:

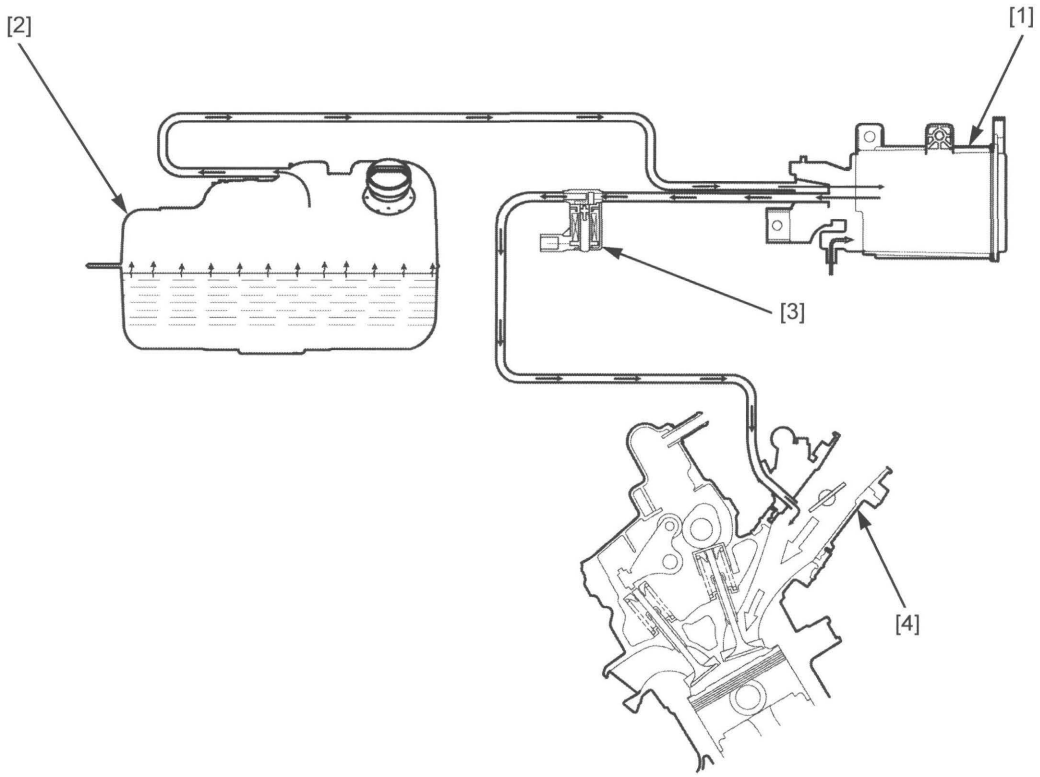
- seat under center lid (page 2-5)
- air cleaner cover (page 2-11)

Check the EVAP canister [1] for cracks or damage.

Check the hoses between the fuel tank [2], EVAP canister, EVAP purge control solenoid valve [3] and throttle body [4] for deterioration, damage or loose connections.

Also, check that the hoses are not kinked or pinched.

Refer to the Cable & Harness Routing for hose connections and routing (page 1-29).



MEMO

4. PGM-FI SYSTEM

SERVICE INFORMATION 4-2

PGM-FI SYSTEM LOCATION 4-3

PGM-FI SYSTEM DIAGRAM 4-4

PGM-FI SYMPTOM TROUBLESHOOTING 4-5

PGM-FI TROUBLESHOOTING INFORMATION 4-6

DTC INDEX 4-8

DTC TROUBLESHOOTING 4-10

MIL CIRCUIT INSPECTION 4-32

SENSOR UNIT (TP SENSOR/ MAP SENSOR/IAT SENSOR) 4-32

ECT SENSOR 4-34

O_2 SENSOR 4-34

PCM 4-35

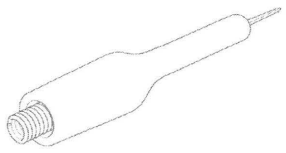
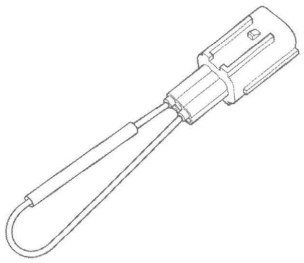
SERVICE INFORMATION

GENERAL

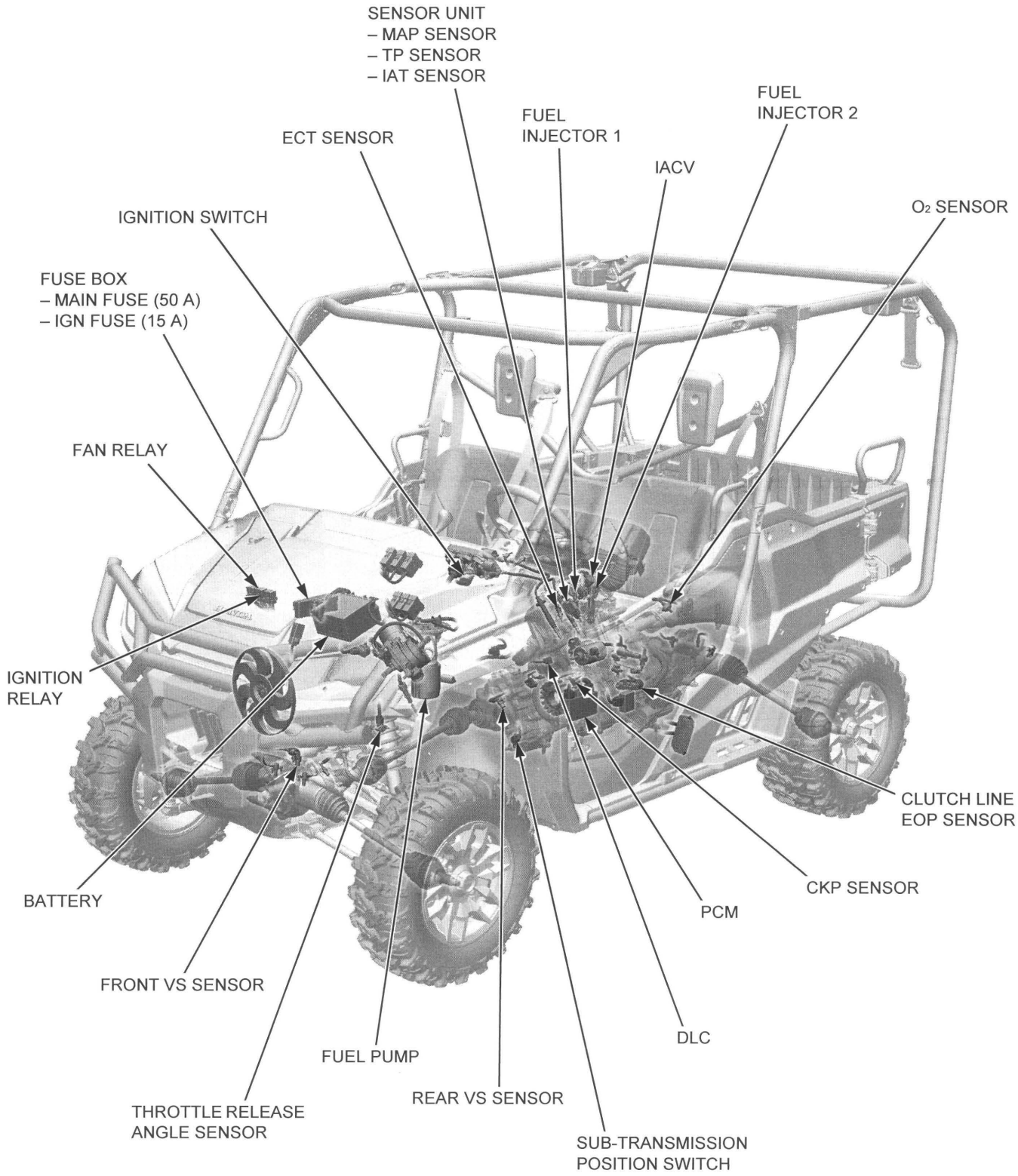
- The programmed fuel injection system is equipped with a Self-Diagnostic System (page 4-6). If the MIL blinks, follow the Self-Diagnostic Procedures to remedy the problem.
- When checking the PGM-FI system, always follow the steps in the troubleshooting flow chart.
- The PGM-FI system has a fail-safe function to secure a minimum running capability even when there is a malfunction in the system. When any abnormality is detected by the self-diagnosis function, running capability is secured by making use of the numerical values of a situation preset in advance in the simulated program map. It must be remembered, however, that when any abnormality is detected in fuel injector and/or the CKP sensor, the fail safe function stops the engine to protect it from damage.
- A faulty PGM-FI system is often related to poorly connected or corroded connectors. Check those connections before proceeding.
- Use a digital tester for PGM-FI system inspection.
- The following color codes are used throughout this section.

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

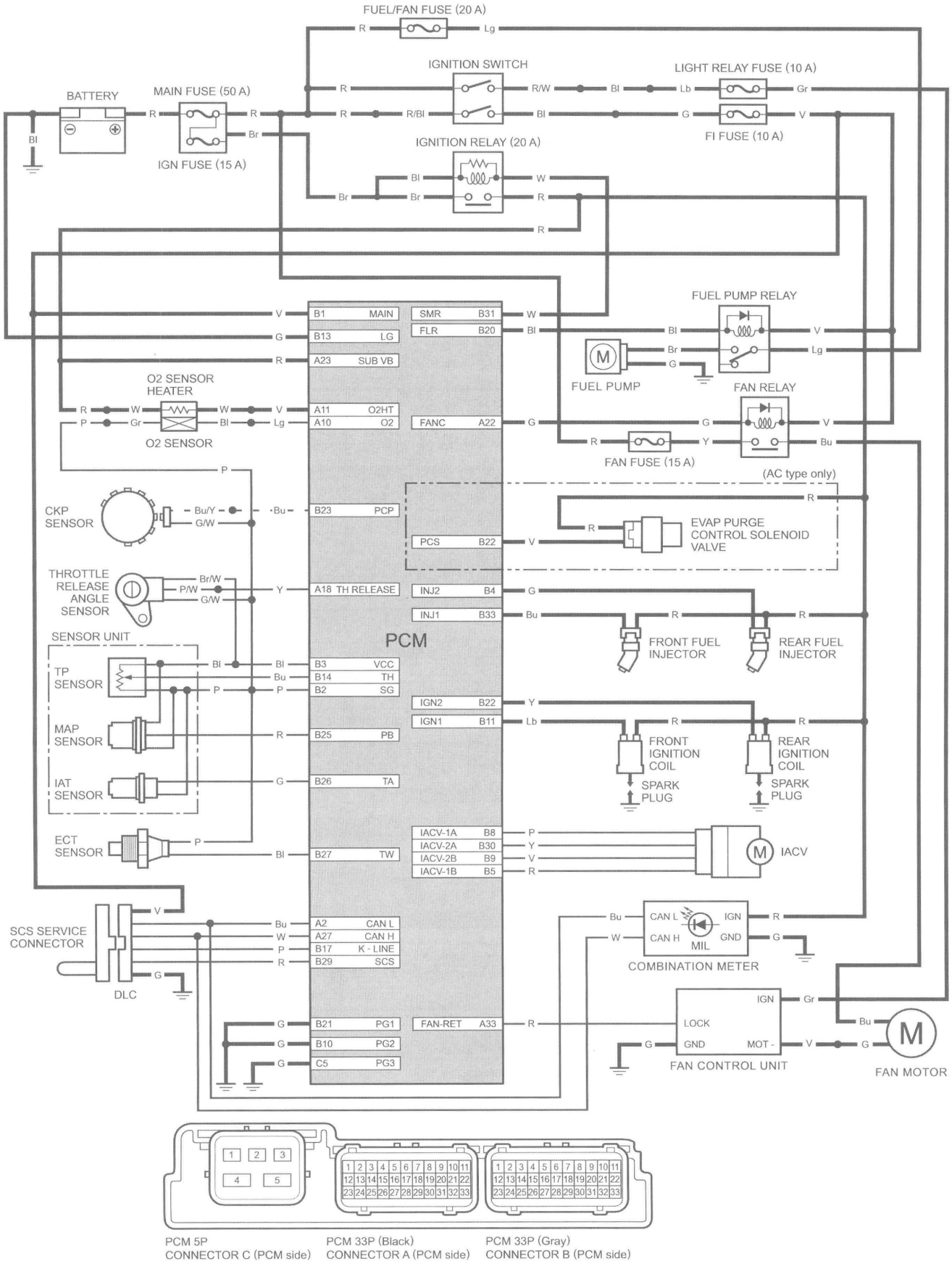
TOOLS

Test probe, 2 packs 07ZAJ-RDJA110 	SCS short connector 070MZ-0010300  or 070MZ-001A300 (U.S.A. only)

PGM-FI SYSTEM LOCATION



PGM-FI SYSTEM DIAGRAM



PGM-FI SYMPTOM TROUBLESHOOTING

When the vehicle has one of these symptoms, check the DTC or MIL blinking, refer to the DTC index (page 4-8)and begin the appropriate troubleshooting procedure. If there are no DTC stored in the PCM memory, do the diagnostic procedure for the symptom, in the sequence listed below, until you find the cause.

Symptom	Diagnosis procedure	Also check for
Engine cranks, but won't start (No DTC and MIL blinking)	1. Inspect the ignition system (page 5-5). 2. Inspect the fuel supply system (page 7-10).	• Intake air leak • Contaminated/deteriorated fuel • Faulty fuel injector • IACV stuck closed
Engine cranks, but won't start (No fuel pump operation sound when turning the ignition switch to ON (I))	1. PCM power/ground circuits malfunction (page 4-35). 2. Inspect the fuel pump system (page 7-10).	• Open circuit in the power input (Red/white) and/ or ground (Green) wire of the PCM • Faulty ignition relay or related circuit • Faulty ignition switch or related circuit • Blown FI fuse (10 A) • Blown IGN fuse (15 A)
Engine stalls, hard to start, rough idling	1. Check the idle speed (page 3-16). 2. Check the IACV (page 7-27). 3. Inspect the fuel supply system (page 7-6).	• Restricted fuel feed hose • Contaminated/deteriorated fuel • Intake air leak • Restricted fuel tank breather hose • Faulty ignition system
Backfiring or misfiring during acceleration	Check the ignition system.	• Faulty ignition system
Poor performance (driveability) and poor fuel economy	1. Inspect the fuel supply system (page 7-6). 2. Check the air cleaner for clogging (page 3-6).	• Pinched or clogged fuel feed hose • Faulty fuel injector • Faulty ignition system
Idle speed is below specifications or fast idle too low (No DTC and MIL blinking)	1. Inspect the fuel supply system (page 7-10). 2. Check the idle speed (page 3-16). 3. Check the IACV (page 7-27). 4. Check the ignition system (page 5-5).	• Valve clearance
Idle speed is above specifications or fast idle too high (No DTC and MIL blinking)	1. Check the idle speed (page 3-16) 2. Check the accelerator pedal operation and pedal freeplay (page 3-5). 3. Check the IACV (page 7-27). 4. Check the ignition system (page 5-5). 5. Check the air gleaner element (page 3-6).	• IACV stuck opened • Intake air leak • Engine top end problem • Valve clearance
MIL stays on, but no DTCs set, or MIL never comes ON at all	Troubleshoot the MIL circuit (page 4-32).	

PGM-FI TROUBLESHOOTING INFORMATION

GENERAL TROUBLESHOOTING

Intermittent Failure

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

Opens and Shorts

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

If the MIL has come on

Refer to DTC READOUT (page 4-7).

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 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, the fail-safe function stops the engine to protect it from damage.

MIL Blink Pattern

- If the MCS is not available, DTC can be read from the PCM memory by the MIL blink pattern.
- The number of MIL blinks is the equivalent the main code of the DTC (the sub code cannot be displayed by the MIL).
- The MIL will blink the current DTC, in case the PCM detects the problem at present, when the ignition switch ON (I) 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 1.3 seconds, the short blinking lasts for 0.5 seconds. One long blink is the equivalent of ten short blinks. For example, when two long blinks are followed by nine short blinks, the MIL is 29 (two long blinks = 20 blinks, plus nine short blinks).
- When the PCM stores more than one DTC, the MIL will indicate them by blinking in the order from the lowest number to highest number.

MIL Check

When the ignition switch is turned ON (I), the MIL will stay on for a few seconds, then go off. If the MIL does not come on, troubleshoot the MIL circuit (page 4-32).

CURRENT DTC/STORED DTC

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

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

MCS INFORMATION

- The MCS can readout the DTC, stored data, current data and other PCM condition.

How to connect the MCS

Turn the ignition switch OFF (O).

Remove the seat under center lid (page 2-5).

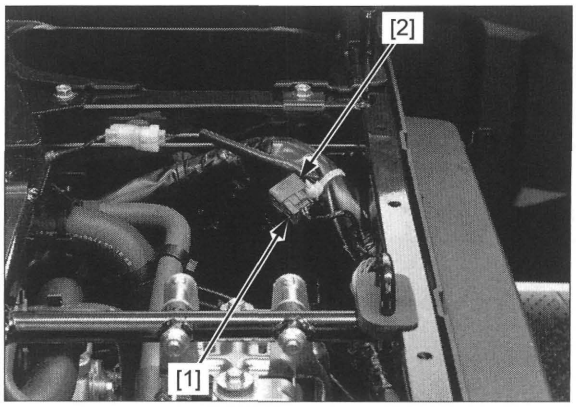
Remove the DLC [1] from the dummy connector [2].

Connect the MCS to the DLC.

Turn the ignition switch ON (I), and check the DTC and stored data.

NOTE:

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



DTC READOUT

- When the ignition switch is turned to ON (I), the MIL will stay on for a few seconds, then go off.
- After performing diagnostic troubleshooting, erase the DTC(s) (page 4-7)and test-drive the vehicle to be sure that the problem(s) have been removed.

If the MIL stays on or blinks, connect the MCS to the DLC (page 4-7).

Then read the DTC and follow the troubleshooting index:

– PGM FI system: page 4-8
– DCT system: page 11-11

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:

– PGM FI system: page 4-8
– DCT system: page 11-11

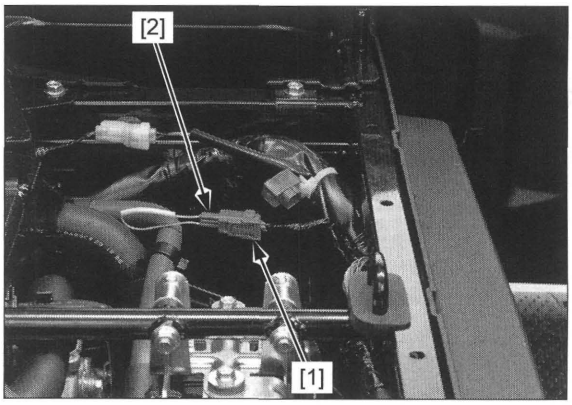
When retrieving the stored DTC, refer to the following procedure.

Remove the DLC from the dummy connector (page 4-7).

Short the DLC [1] using the special tool.

TOOL:
SCS short connector [2] **070MZ-0010300**
(U.S.A.: 070MZ-001A300)

CONNECTION: Red – Green



Turn the ignition switch ON (I), read and note the MIL blinks, and refer to the troubleshooting index:

– PGM FI system: page 4-8
– DCT system: page 11-11

NOTE:

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

ERASING DTC

NOTE:

- When erasing the PGM-FI DTC, the DCT DTC or ESP DTC would also be erased at the same time. Check the DCT or ESP system before erasing the PGM-FI DTC.

Connect the MCS to the DLC (page 4-7).

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

To erase the DTC without MCS, refer to the following procedure.

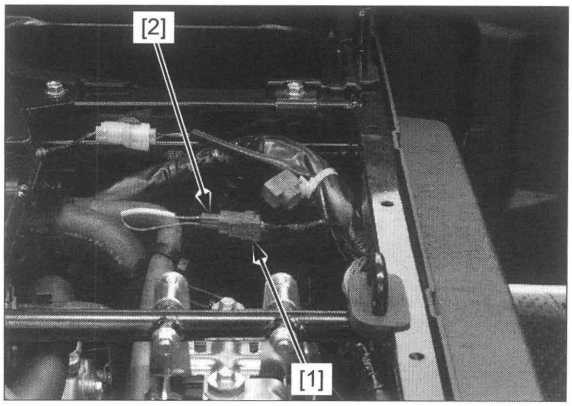
How to erase the DTC without MCS

1. Remove the DLC from the dummy connector (page 4-7).
2. Short the DLC [1] using the special tool.

   TOOL:
   SCS short connector [2] **070MZ-0010300**
   (U.S.A.: 070MZ-001A300)

   CONNECTION: Red – Green

3. Turn the ignition switch ON (I).
4. Remove the special tool from the DLC.
5. The MIL will light for approximately 5 seconds. While the MIL lights, short the DLC again with the special tool. The DTC is erased if the MIL goes off and starts blinking.



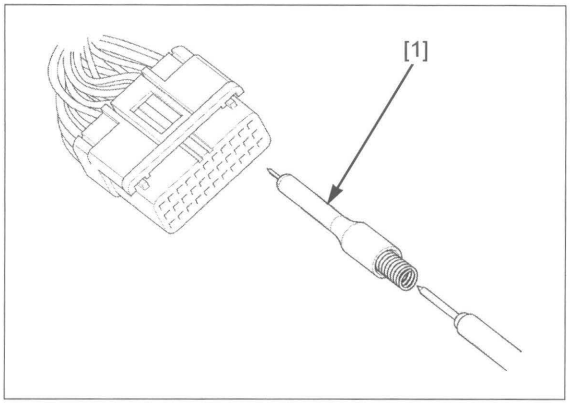
NOTE:
- The DLC must be shorted while the MIL lights. If not, the MIL will not start blinking.
- Note that the DTC cannot be erased if the ignition switch is turned to OFF (O) before the MIL starts blinking.

CIRCUIT INSPECTION

INSPECTION AT PCM CONNECTOR

- Always clean around and keep any foreign material away from the PCM connector before disconnecting it.
- A faulty PGM-FI system is often related to poorly connected or corroded connections. Check those connections before proceeding.
- Do not pull the wire harness while disconnecting the PCM connectors.
- In testing at PCM connector (wire harness side) terminal, always use the test probe [1]. Insert the test probe into the connector terminal, then attach the digital multimeter probe to the test probe.

TOOL:
Test probe, 2 packs **07ZAJ-RDJA110**



DTC INDEX

NOTE:
- If the MCS is not used, perform all of the inspection on the corresponding main code (digits in front of hyphen) of the DTC.

DTC	Function Failure	Symptom/Fail-safe function	Refer to page
1-1	MAP sensor circuit low voltage (less than 0.195 V) • MAP sensor or its circuit malfunction	• Engine operates normally	4-10
1-2	MAP sensor circuit high voltage (more than 3.804 V) • Loose or poor contact of the sensor unit connector • MAP sensor or its circuit malfunction	• Engine operates normally	4-12
7-1	ECT sensor circuit low voltage (less than 0.078 V) • ECT sensor or its circuit malfunction	• Hard start at a low temperature • Cooling fan turns on	4-13
7-2	ECT sensor circuit high voltage (more than 4.922 V) • Loose or poor contact of the ECT sensor connector • ECT sensor or its circuit malfunction	• Hard start at a low temperature • Cooling fan turns on	4-14
8-1	TP sensor circuit low voltage (less than 0.200 V) • Loose or poor contact of the sensor unit connector • TP sensor or its circuit malfunction	• Poor engine acceleration • Gearshift function does not work (1st gear only) • Gear position indicator blinks	4-15
8-2	TP sensor circuit high voltage (less than 4.902 V) • TP sensor or its circuit malfunction	• Poor engine acceleration • Gearshift function does not work (1st gear only) • Gear position indicator blinks	4-17
9-1	IAT sensor circuit low voltage (less than 0.078 V) • IAT sensor or its circuit malfunction	• Engine operates normally	4-18

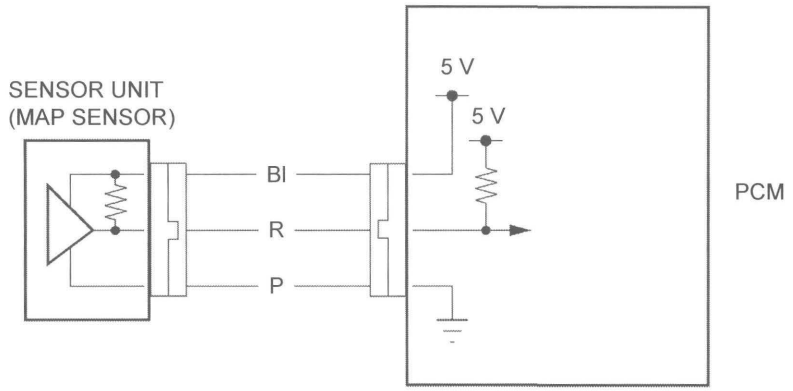
DTC	Function Failure	Symptom/Fail-safe function	Refer to page
9-2	IAT sensor circuit high voltage (more than 4.922 V) • Loose or poor contact of the IAT sensor connector • IAT sensor or its circuit malfunction	• Engine operates normally	4-19
12-1	Front fuel injector circuit malfunction • Loose or poor contact of the front fuel injector connector • Front fuel injector or its circuit malfunction	• Engine does not start • Fuel injector, fuel pump and ignition shut down	4-20
13-1	Rear fuel injector circuit malfunction • Loose or poor contact of the rear fuel injector connector • Rear fuel injector or its circuit malfunction	• Engine does not start • Fuel injector, fuel pump and ignition shut down	4-21
21-1	O_2 sensor malfunction • Loose or poor contact of the O_2 sensor connector • O_2 sensor or its circuit malfunction	• Engine operates normally	4-22
23-1	O_2 sensor heater circuit malfunction • Loose or poor contact of the O_2 sensor connector • O_2 sensor heater or its circuit malfunction	• Engine operates normally	4-24
29-1	IACV circuit malfunction • Loose or poor contact of the IACV connector • IACV or its circuit malfunction	• Rough idling	4-25
33-2 *	PCM EEPROM malfunction	• Engine operates normally	4-27
44-1	EOT sensor circuit low voltage (less than 0.059 V) • EOT sensor or its circuit malfunction	• Engine does not start • Gearshift function works normally • Gear position indicator blinks	11-31
44-2	EOT sensor circuit high voltage (more than 4.844 V) • Loose or poor contact of the EOT sensor connector • EOT sensor or its circuit malfunction	• Engine operates below 3,000 rpm • Gearshift function works normally • Gear position indicator blinks	11-31
64-1	Drive power circuit low voltage (less than 6.5 V when the ignition switch is ON (I)) • Blown IGN fuse (15 A) • Ignition relay stuck open or its circuit malfunction	• Engine does not start	4-27
64-2	Drive power circuit high voltage (more than 8.0 V when the ignition switch is OFF (O)) • Ignition relay stuck ON or its circuit malfunction	• Engine operates normally	4-28
66-1	Rear VS sensor no signal • Loose or poor contact of the rear VS sensor connector • Rear VS sensor or its circuit malfunction	• Engine operates normally • Gearshift function does not work (1st gear only)	11-39
67-1	Front VS sensor no signal • Loose or poor contact of the front VS sensor connector • Front VS sensor or its circuit malfunction	• Engine operates normally • Gearshift function does not work (1st gear only)	11-41
81-1	Sub-transmission position switch malfunction • Sub-transmission position switch or its circuit malfunction	• Gearshift function does not work	11-46
83-1	Clutch line EOP sensor low voltage • Clutch line EOP sensor or its circuit malfunction	• Engine operates normally	11-15
83-2	Clutch line EOP sensor high voltage • Loose or poor contact of the clutch line EOP sensor connector • Clutch line EOP sensor or its circuit malfunction	• Engine operates normally	11-17
101-1	Throttle release angle sensor circuit low voltage • Throttle release angle sensor or its circuit malfunction	• Engine speed is limited	4-29
101-2	Throttle release angle sensor circuit high voltage • Loose or poor contact of the throttle release angle sensor connector • Throttle release angle sensor or its circuit malfunction	• Engine speed is limited	4-30
102-1	Abnormal throttle valve position with the throttle pedal released • Sticking throttle valve	• Engine speed is limited	4-31

* The MIL does not blink (DTC can be readout/erased only by MCS).

DTC TROUBLESHOOTING

DTC 1 (MAP SENSOR)

- Before starting the inspection, check for loose or poor contact of the sensor unit 5P connector and PCM 33P connectors, and recheck the DTC.



Probable cause

- Open circuit in the Black wire between the MAP sensor and PCM
- Open or short circuit in the Red wire between the MAP sensor and PCM
- Open circuit in the Pink wire between the MAP sensor and PCM
- Faulty sensor unit (MAP sensor)
- Faulty PCM

DTC 1-1 (MAP SENSOR LOW VOLTAGE)

1. **MAP Sensor System Inspection**

   Check the MAP sensor with the MCS.

   Is about 0 V indicated?

   YES – GO TO STEP 2.

   NO – Intermittent failure

2. **MAP Sensor Input Voltage Inspection**

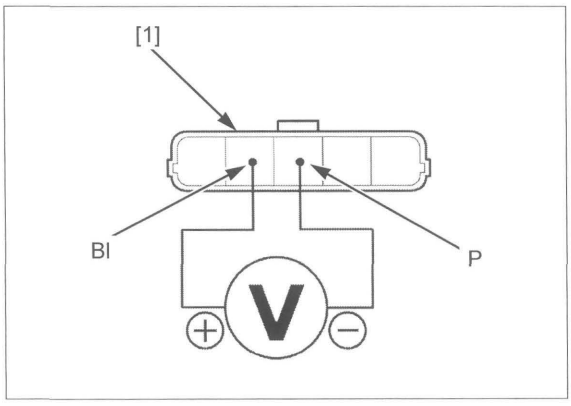
   Turn the ignition switch OFF (O).
   Disconnect the sensor unit 5P connector (page 4-32).
   Turn the ignition switch ON (I).
   Measure the voltage at the wire harness side 5P connector [1].

   Connection: Black (+) – Pink (–)

   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 (O).
Disconnect the PCM 33P (Gray) connector (page 4-35).
Check the wire for continuity between the wire harness side 33P (Gray) connector [1] and 5P connector [2].

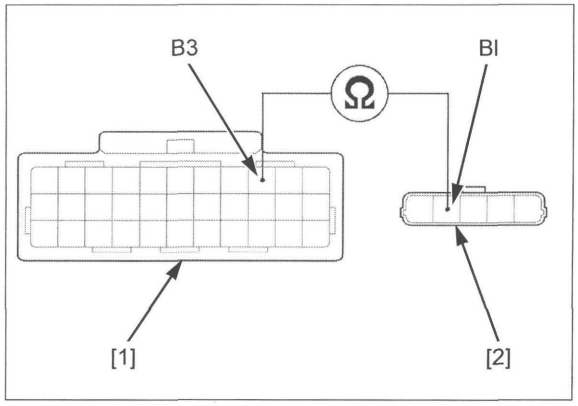
TOOL:
Test probe, 2 packs 07ZAJ-RDJA110

Connection: B3 – Black

Is there continuity?

YES – Replace the PCM with a known good one (page 4-35) and recheck.

NO – Open circuit in the Black wire



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

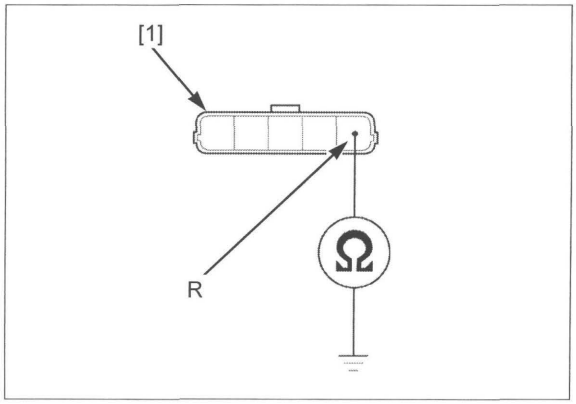
Turn the ignition switch OFF (O).
Check for continuity between the wire harness side 5P connector [1] and ground.

Connection: Red – ground

Is there continuity?

YES – Short circuit in Red wire

NO – GO TO STEP 5.



5. **MAP Sensor Inspection**

Replace the sensor unit (MAP sensor) with a known good one (page 4-32).
Erase the DTC (page 4-6).
Check the MAP sensor with the MCS.

Is DTC 1-1 indicated?

YES – Replace the PCM with a known good one (page 4-35) and recheck.

NO – Faulty original sensor unit (MAP sensor)

DTC 1-2 (MAP SENSOR HIGH VOLTAGE)

1. **MAP Sensor System Inspection**

   Check the MAP sensor with the MCS.

   Is about 5 V indicated?

   YES – GO TO STEP 2.

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

2. **MAP Sensor Inspection**

   Turn the ignition switch OFF (O).
   Disconnect the sensor unit 5P connector (page 4-32).
   Connect the wire harness side 5P connector [1] terminals with a jumper wire [2].

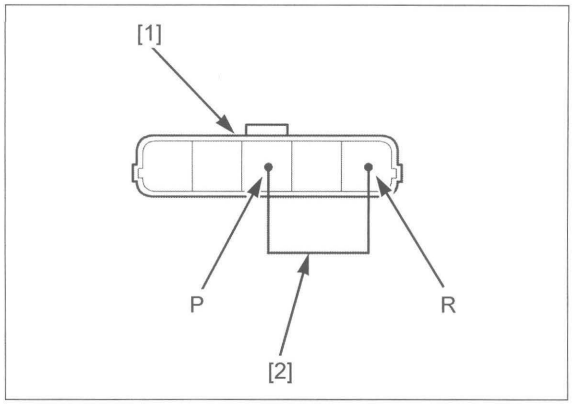
   Connection: Red – Pink

   Turn the ignition switch ON (I).
   Check the MAP sensor with the MCS.

   Is about 0 V indicated?

   YES – Faulty sensor unit (MAP sensor)

   NO – GO TO STEP 3.



3. **MAP Sensor Input Voltage Inspection**

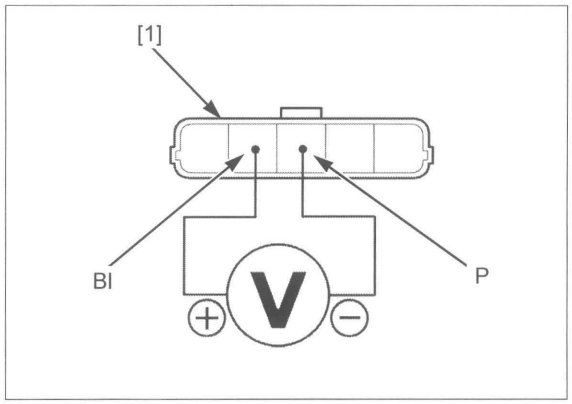
   Turn the ignition switch OFF (O).
   Remove the jumper wire.
   Turn the ignition switch ON (I).
   Measure the voltage at the wire harness side 5P connector [1].

   Connection: Black (+) – Pink (–)

   Is the voltage within 4.75 – 5.25 V?

   YES – GO TO STEP 4.

   NO – Open circuit in the Pink wire



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

   Turn the ignition switch OFF (O).
   Disconnect the PCM 33P (Gray) connector (page 4-35).
   Check the wire for continuity between the wire harness side 33P (Gray) connector [1] and 5P connector [2].

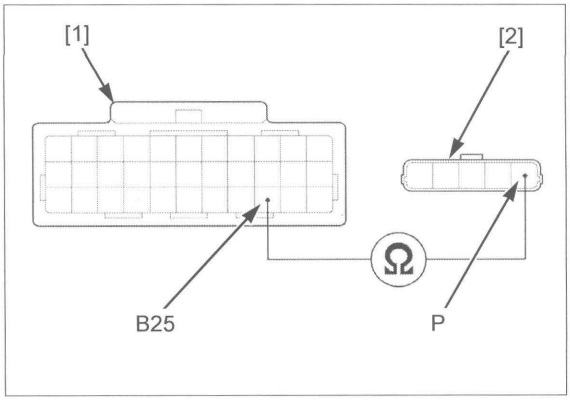
   TOOL:
   Test probe, 2 packs 07ZAJ-RDJA110

   Connection: B25 – Pink

   Is there continuity?

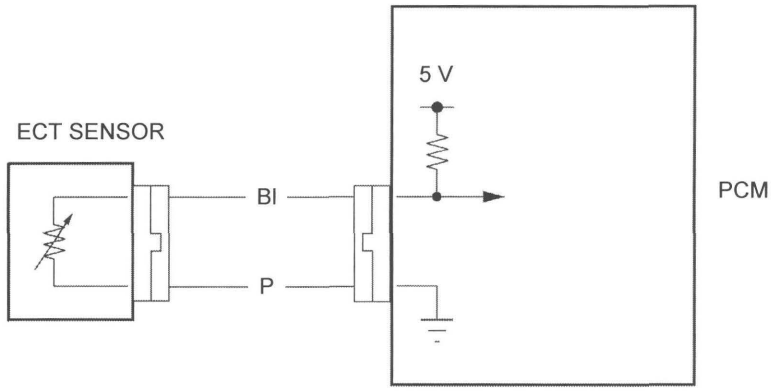
   YES – Replace the PCM with a known good one (page 4-35) and recheck.

   NO – Open circuit in the Pink wire



DTC 7 (ECT SENSOR)

- Before starting the inspection, check for loose or poor contact of the ECT sensor 2P connector and PCM 33P connectors, and recheck the DTC.



Probable cause

- Open or short circuit in the Black wire between the ECT sensor and PCM
- Open circuit in the Pink wire between the ECT sensor and PCM
- Faulty ECT sensor
- Faulty PCM

DTC 7-1 (ECT SENSOR LOW VOLTAGE)

1. **ECT Sensor System Inspection**

   Check the ECT sensor with the MCS.

   Is about 0 V indicated?

   YES – GO TO STEP 2.

   NO – Intermittent failure.

2. **ECT Sensor Inspection**

   Turn the ignition switch OFF (O).
   Disconnect the ECT sensor 2P connector (page 4-34).
   Turn the ignition switch ON (I).
   Check the ECT sensor with the MCS.

   Is about 0 V indicated?

   YES – GO TO STEP 3.

   NO – Faulty ECT sensor

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

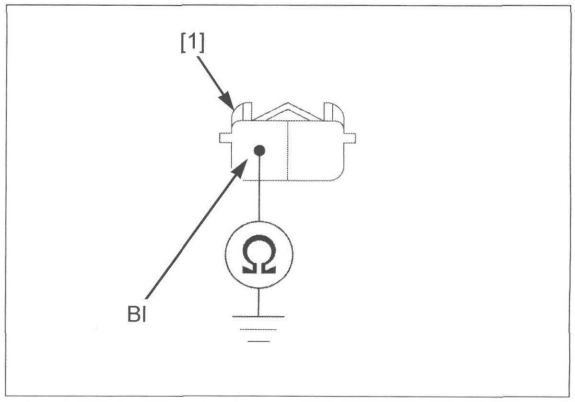
   Turn the ignition switch OFF (O).
   Disconnect the PCM 33P (Gray) connector (page 4-35).
   Check for continuity between the wire harness side 2P connector [1] and ground.

   Connection: Black – ground

   Is there continuity?

   YES – Short circuit in the Black wire

   NO – Replace the PCM with a known good one (page 4-35) and recheck.



DTC 7-2 (ECT SENSOR HIGH VOLTAGE)

1. **ECT Sensor System Inspection**

   Check the ECT sensor with the MCS.

   Is about 5 V indicated?

   YES – GO TO STEP 2.

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

2. **ECT Sensor Inspection**

   Turn the ignition switch OFF (O).
   Disconnect the ECT sensor 2P connector (page 4-34).
   Connect the wire harness side 2P connector [1] terminals with a jumper wire [2].

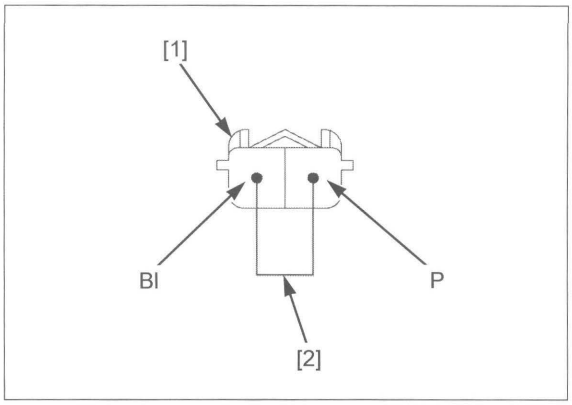
   Connection: Black – Pink

   Turn the ignition switch ON (I).
   Check the ECT sensor with the MCS.

   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 (O).
   Remove the jumper wire.
   Disconnect the PCM 33P (Gray) connector (page 4-35).
   Check the wires for continuity between the wire harness side 33P (Gray) connector [1] and 2P connector [2].

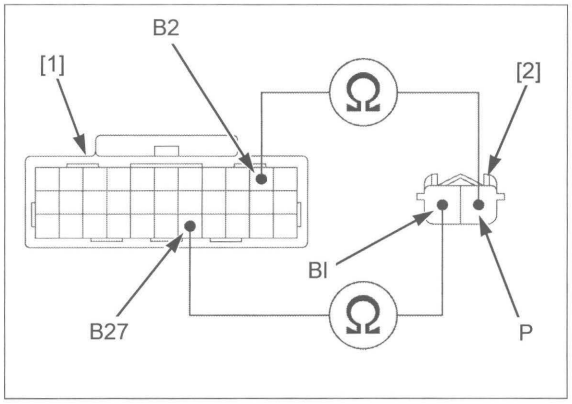
   TOOL:
   Test probe, 2 packs 07ZAJ-RDJA110

   Connection: B27 – Black
   B2 – Pink

   Is there continuity?

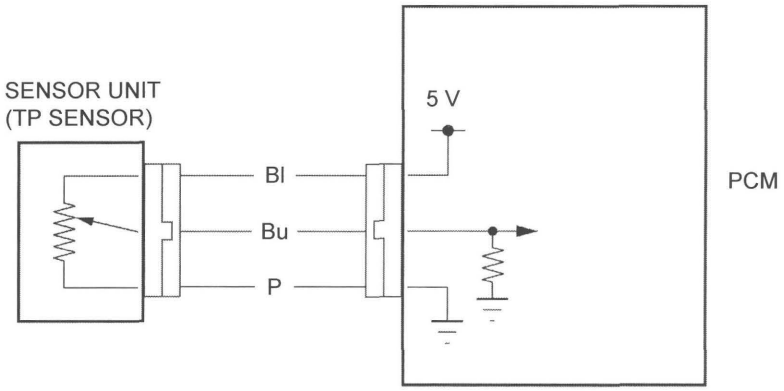
   YES – Replace the PCM with a known good one (page 4-35) and recheck.

   NO – • Open circuit in the Black wire
   • Open circuit in the Pink wire



DTC 8 (TP SENSOR)

- Before starting the inspection, check for loose or poor contact of the sensor unit 5P connector and PCM 33P connectors, and recheck the DTC.



Probable cause

- Open or short circuit in the Black wire between the TP sensor and PCM
- Open or short circuit in the Blue wire between the TP sensor and PCM
- Open circuit in the Pink wire between the TP sensor and PCM
- Faulty sensor unit (TP sensor)
- Faulty PCM

DTC 8-1 (TP SENSOR LOW VOLTAGE)

1. **TP Sensor System Inspection**

   Check the TP sensor with the MCS 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 from fully closed position to fully open position, using the data list menu of the MCS.

   Does the voltage increase continuously?

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

   NO – Faulty sensor unit (TP sensor)

3. **TP Sensor Input Voltage Inspection**

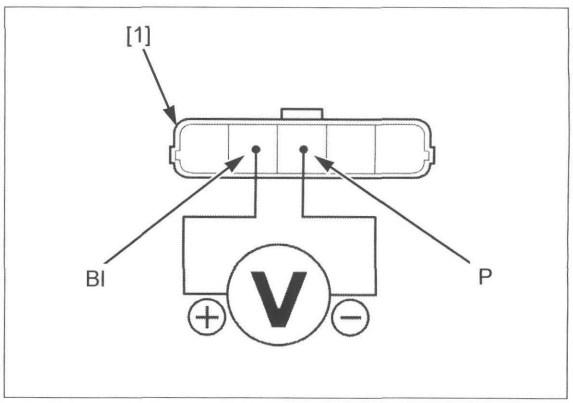
   Turn the ignition switch OFF (O).
   Disconnect the sensor unit 5P connector (page 4-32).
   Turn the ignition switch ON (I).
   Measure the voltage at the wire harness side 5P connector [1].

   Connection: Black (+) – Pink (–)

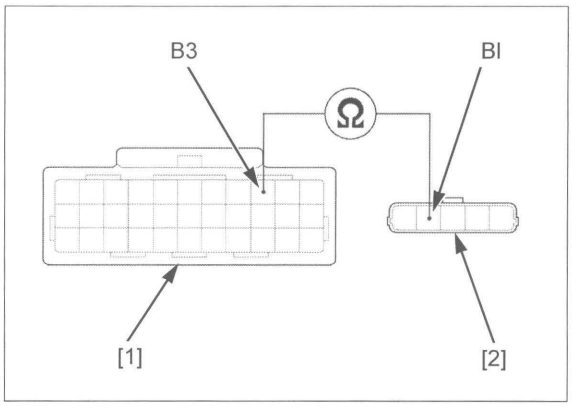
   Is the voltage within 4.75 – 5.25 V?

   YES – GO TO STEP 5.

   NO – GO TO STEP 4.



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



Turn the ignition switch OFF (O).
Disconnect the PCM 33P (Gray) connector (page 4-35).
Check the wire for continuity between the wire harness side 33P (Gray) connector [1] and 5P connector [2].

TOOL:
Test probe, 2 packs 07ZAJ-RDJA110

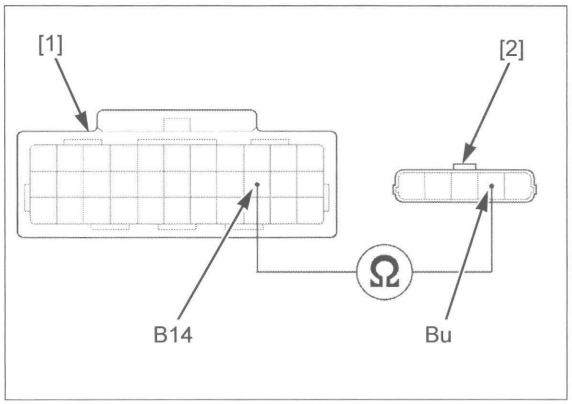
Connection: B3 – Black

Is there continuity?

YES – Replace the PCM with a known good one (page 4-35) and recheck.

NO – Open circuit in the Black wire

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



Turn the ignition switch OFF (O).
Disconnect the PCM 33P (Gray) connector (page 4-35).
Check the wire for continuity between the wire harness side 33P (Gray) connector [1] and 5P connector [2].

TOOL:
Test probe, 2 packs 07ZAJ-RDJA110

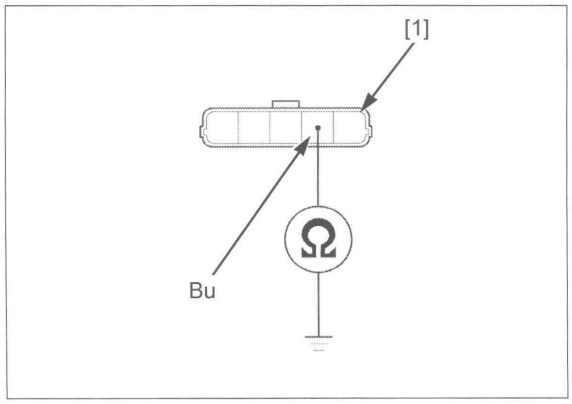
Connection: B14 – Blue

Is there continuity?

YES – GO TO STEP 6.

NO – Open circuit in the Blue wire

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



Check the wire for continuity between the wire harness side 5P connector [1] and ground.

Is there continuity?

YES – Short circuit in the Blue wire

NO – GO TO STEP 7.

7. **TP Sensor Inspection**

Replace the sensor unit (TP sensor) with a known good one (page 4-32).
Connect the 33P (Gray) connector (page 4-35).
Erase the DTC (page 4-6).
Check the TP sensor with the MCS.

Is DTC 8-1 indicated?

YES – Replace the PCM with a known good one (page 4-35) and recheck.

NO – Faulty original sensor unit (TP sensor)

DTC 8-2 (TP SENSOR HIGH VOLTAGE)

1. **TP Sensor System Inspection**

   Check the TP sensor with the MCS.

   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 from fully closed position to fully open position, using the data list menu of the MCS.

   Does the voltage increase continuously?

   YES – Intermittent failure

   NO – Faulty sensor unit (TP sensor)

3. **TP Sensor Input Voltage Inspection**

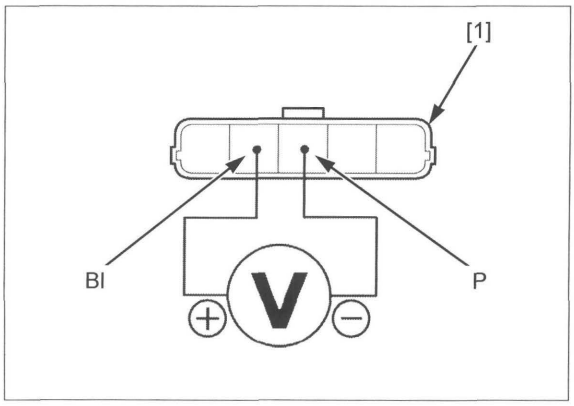
   Turn the ignition switch ON (I).
   Measure the voltage at the wire harness side 5P connector [1].

   Connection: Black (+) – Pink (–)

   Is the voltage within 4.75 – 5.25 V?

   YES – GO TO STEP 4.

   NO – Open circuit in the Pink wire



4. **TP Sensor Inspection**

   Replace the sensor unit (TP sensor) with a known good one (page 4-32).
   Reset the TP sensor (page 4-33).
   Check the TP sensor with the MCS.

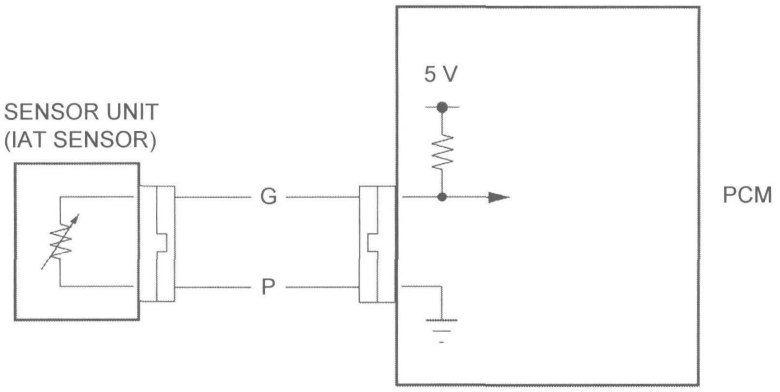
   Is DTC 8-2 indicated?

   YES – Replace the PCM with a known good one (page 4-35) and recheck.

   NO – Faulty original sensor unit (TP sensor)

DTC 9 (IAT SENSOR)

- Before starting the inspection, check for loose or poor contact of the sensor unit 5P connector and PCM 33P connectors, and recheck the DTC.



Probable cause
- Open or short circuit in the Green wire between the IAT sensor and PCM
- Open circuit in the Pink wire between the IAT sensor and PCM
- Faulty sensor unit (IAT sensor)
- Faulty PCM

DTC 9-1 (IAT SENSOR LOW VOLTAGE)

1. **IAT Sensor System Inspection**

   Check the IAT sensor with the MCS.

   Is about 0 V indicated?

   YES – GO TO STEP 2.

   NO – Intermittent failure

2. **IAT Sensor Inspection**

   Turn the ignition switch OFF (O).
   Disconnect the sensor unit 5P connector (page 4-32).
   Turn the ignition switch ON (I).
   Check the IAT sensor with the MCS.

   Is about 0 V indicated?

   YES – GO TO STEP 3.

   NO – Faulty original sensor unit (IAT sensor)

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

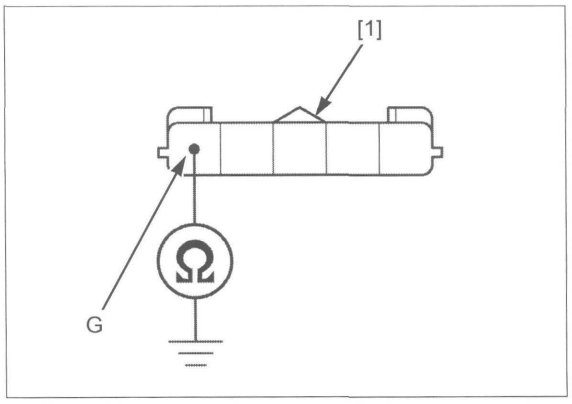
   Turn the ignition switch OFF (O).
   Disconnect the PCM 33P (Gray) connector (page 4-35).
   Check for continuity between the wire harness side 5P connector [1] and ground.

   Connection: Green – ground

   Is there continuity?

   YES – Short circuit in the Green wire

   NO – Replace the PCM with a known good one (page 4-35) and recheck.



DTC 9-2 (IAT SENSOR HIGH VOLTAGE)

1. **IAT Sensor System Inspection**

   Check the IAT sensor with the MCS.

   Is about 5 V indicated?

   YES – GO TO STEP 2.

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

2. **IAT Sensor Inspection**

   Turn the ignition switch OFF (O).
   Disconnect the sensor unit 5P connector (page 4-32).
   Connect the wire harness side 5P connector [1] terminals with a jumper wire [2].

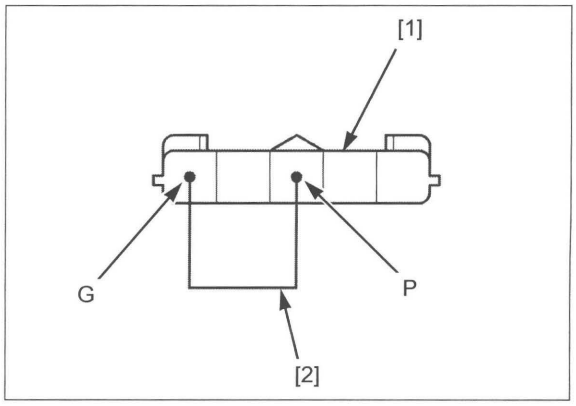
   Connection: Green – Pink

   Turn the ignition switch ON (I).
   Check the IAT sensor with the MCS.

   Is about 0 V indicated?

   YES – Faulty original sensor unit (IAT sensor)

   NO – GO TO STEP 3.



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

   Turn the ignition switch OFF (O).
   Remove the jumper wire.
   Disconnect the PCM 33P (Gray) connector (page 4-35).
   Check for continuity between the wire harness side 33P (Gray) connector [1] and 5P connector [2].

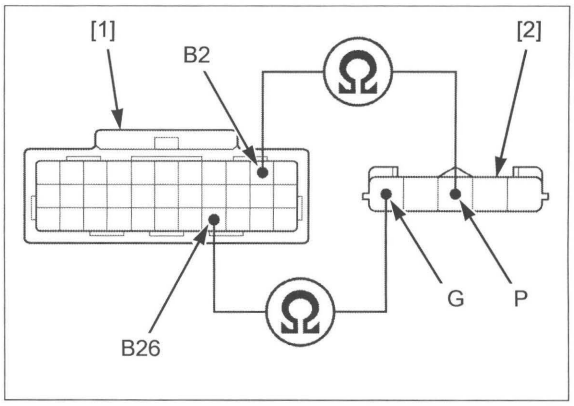
   TOOL:
   Test probe, 2 packs 07ZAJ-RDJA110

   Connection: B26 – Green
   B2 – Pink

   Is there continuity?

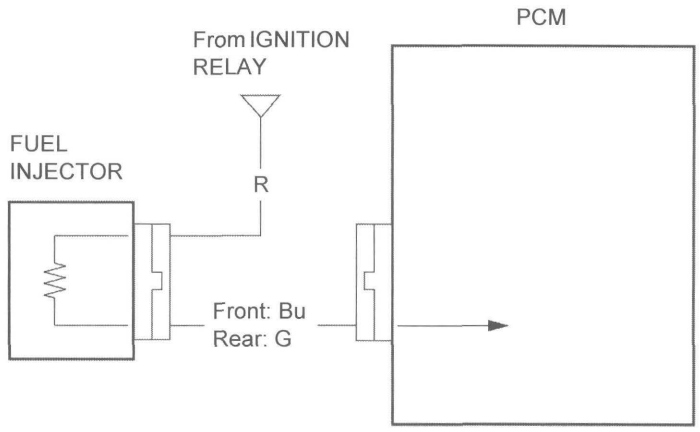
   YES – Replace the PCM with a known good one (page 4-35) and recheck.

   NO – • Open circuit in the Green wire
   • Open circuit in the Pink wire



DTC 12/13 (FUEL INJECTOR)

- Before starting the inspection, check for loose or poor contact of the fuel injector 2P connector and PCM 33P connectors, and recheck the DTC.



Probable cause

- Open circuit in the Red wire between the ignition relay and fuel injector
- Open or short circuit in the Blue (front) or Green (rear) wire between the fuel injector and PCM
- Faulty fuel injector
- Faulty PCM

DTC 12-1 (FRONT FUEL INJECTOR)

1. **DTC Recheck**

   Erase the DTC (page 4-7).
   Check the fuel injector with the MCS.

   Is DTC 12-1 indicated?

   NO – • Intermittent failure
   • Loose or poor contact of the fuel injector 2P connector

   YES – GO TO STEP 2.

2. **Fuel Injector Resistance Inspection**

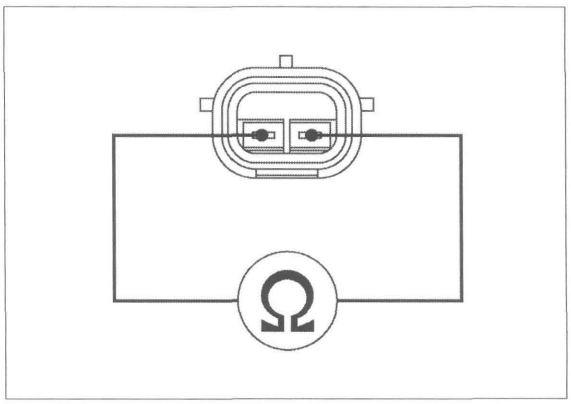
   Turn the ignition switch OFF (O).
   Disconnect the fuel injector 2P connector (page 7-28).
   Measure the resistance at the injector side connector.

   Standard: 11.4 – 12.6 Ω (20°C/68°F)

   Is the resistance within the standard values?

   NO – Faulty fuel injector

   YES – GO TO STEP 3.



3. **Fuel Injector Input Voltage Inspection**

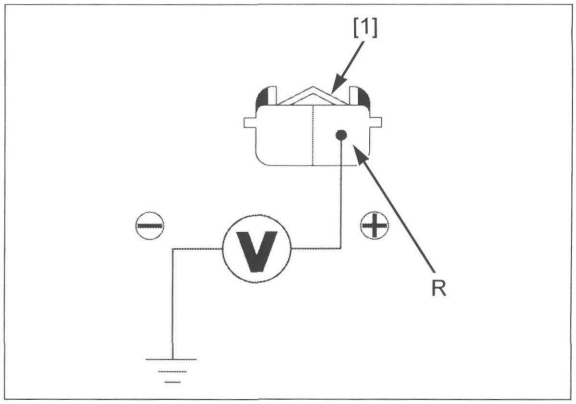
Turn the ignition switch ON (I).
Measure the voltage between the wire harness side 2P connector [1] and ground.

Connection: Red (+) – ground (–)

Is there battery voltage?

YES – GO TO STEP 4.

NO – Open circuit in the Red wire



4. **Fuel Injector Signal Line Open Circuit Inspection**

Turn the ignition switch OFF (O).
Disconnect the PCM 33P (Gray) connector (page 4-35).
Check for continuity between the wire harness side 33P (Gray) connector [1] and 2P connector [2].

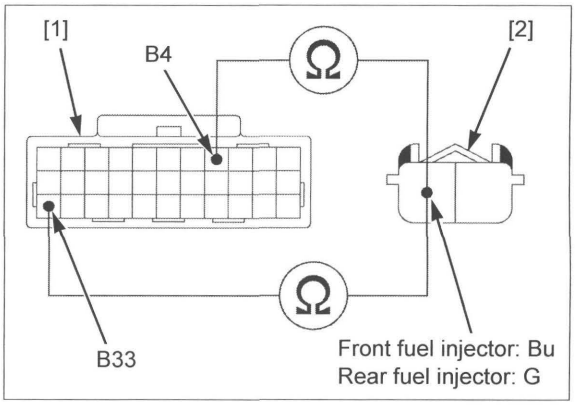
TOOL:
Test probe, 2 packs 07ZAJ-RDJA110

Connection:
Front fuel injector: B33 – Blue
Rear fuel injector: B4 – Green

Is there continuity?

YES – GO TO STEP 5.

NO – • Open circuit in the Blue wire
• Open circuit in the Green wire



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

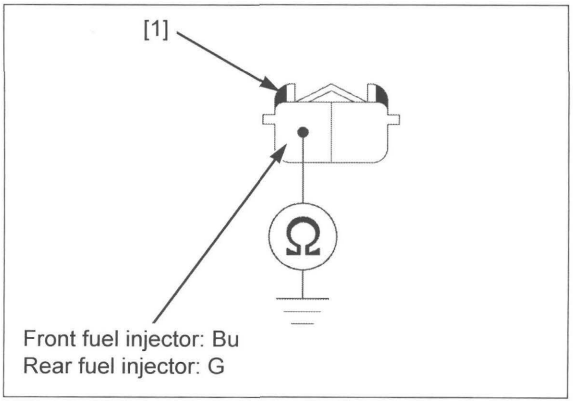
Check for continuity between the wire harness side 2P connector [1] and ground.

Connection:
Front fuel injector: Blue – ground
Rear fuel injector: Green – ground

Is there continuity?

YES – • Short circuit in the Blue wire
• Short circuit in the Green wire

NO – Replace the PCM with a known good one (page 4-35) and recheck.

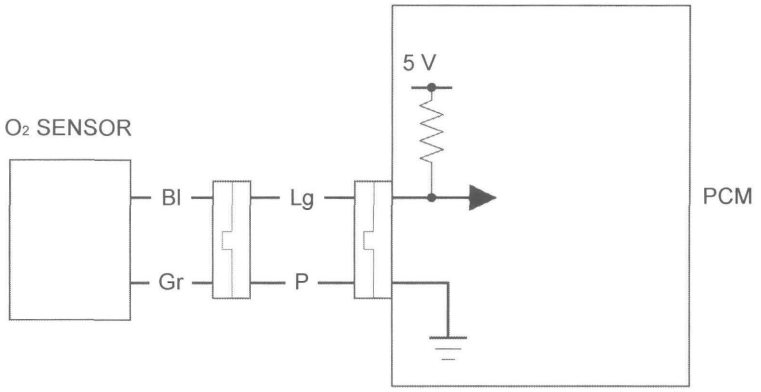


DTC 13-1 (No.2 FUEL INJECTOR)

See DTC 12-1 (page 4-20).

DTC 21 (O_2 SENSOR)

- Before starting the inspection, check for loose or poor contact of the O_2 sensor 4P connector and PCM 33P connectors, then recheck the DTC.



Probable cause
- Open circuit in the Pink wire between the O_2 sensor and PCM
- Open or short circuit in the Light green wire between the O_2 sensor and PCM
- Faulty O_2 sensor
- Faulty PCM

DTC 21-1 (O_2 SENSOR)

1. **O_2 Sensor System Inspection**

   Warm the engine until the coolant temperature is 80°C (176°F).
   Check the O_2 sensor with the MCS.
   Standard: 0.1 V – 1.2 V

   Is the voltage as specified?

   YES – Check the fuel pressure (page 7-9). If the system is correct, GO TO STEP 4.

   NO – GO TO STEP 2.

2. **O_2 Sensor Line Open Circuit Inspection**

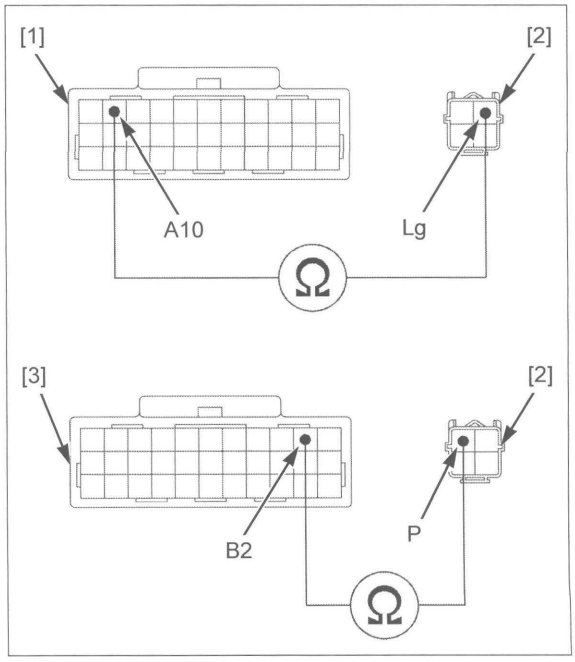
   Turn the ignition switch OFF (O).
   Disconnect the O_2 sensor 4P connector (page 4-34) and PCM 33P connectors (page 4-35).
   Check for continuity between the wire harness side 33P (Black) connector [1] and 4P connector [2], and between the 33P (Gray) connector [3] and 4P connector.
   TOOL:
   Test probe, 2 packs 07ZAJ-RDJA110

   Connection: A10 – Light green
   B2 – Pink

   Is there continuity?

   YES – GO TO STEP 3.

   NO – • Open circuit in the Light green wire
   • Open circuit in the Pink wire



3. **O_2 Sensor Output Line Short Circuit Inspection**

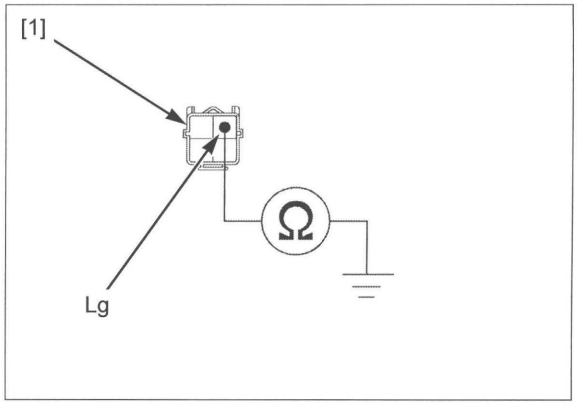
Connect the PCM 33P connectors.
Check for continuity between the wire harness side 4P connector [1] and ground.

Connection: Light green – ground

Is there continuity?

YES – Short circuit in the Light green wire

NO – GO TO STEP 4.



4. **O_2 Sensor Inspection**

Connect the PCM 33P (Black) connector.
Replace the O_2 sensor with a known good one (page 4-34).
Erase the DTCs (page 4-7).
Warm the engine until the coolant temperature is 80°C (176°F).
Check the O_2 sensor with the MCS.

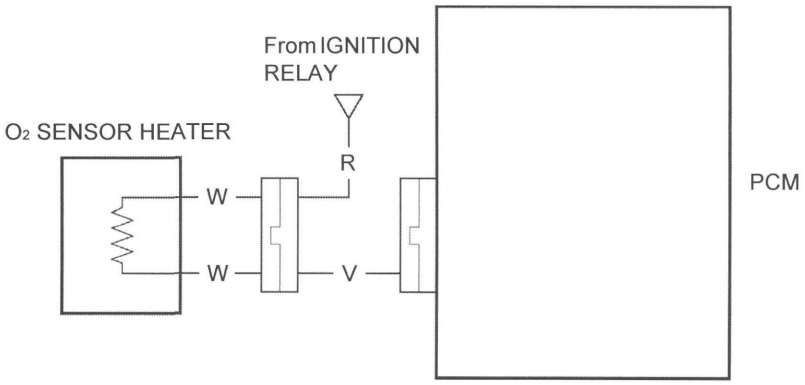
Is DTC 21 – 1 indicated?

YES – Replace the PCM with a known good one (page 4-35), and recheck.

NO – Faulty original O_2 sensor

DTC 23 (O_2 SENSOR HEATER)

- Before starting the inspection, check for loose or poor contact of the O_2 sensor 4P connector and PCM 33P connectors, then recheck the DTC.



Probable cause
- Open circuit in the Violet wire between the O_2 sensor heater and PCM
- Open circuit in the Red wire between the O_2 sensor heater and ignition relay
- Faulty O_2 sensor heater
- Faulty PCM

DTC 23-1 (O_2 SENSOR HEATER)

1. **O_2 Sensor System Inspection**

   Erase the DTCs (page 4-7).
   Connect the MCS and start the engine.
   Check the O_2 sensor heater with the MCS.

   Is DTC 23-1 indicated?

   YES – GO TO STEP 2.

   NO – Intermittent failure

2. **O_2 Sensor Heater Resistance Inspection**

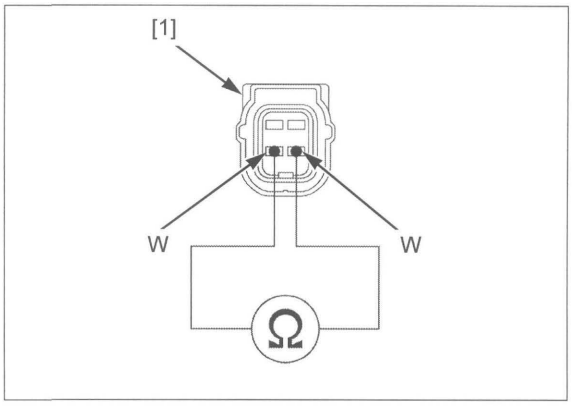
   Turn the ignition switch OFF (O).
   Disconnect the O_2 sensor 4P connector (page 4-34).
   Measure the resistance at the sensor side 4P connector [1].

   Connection: White – White

   Is the resistance within 13.0 – 18.5 Ω (20°C/ 68°F)?

   YES – GO TO STEP 3.

   NO – Faulty O_2 sensor



3. **O_2 Sensor Heater Input Voltage Inspection**

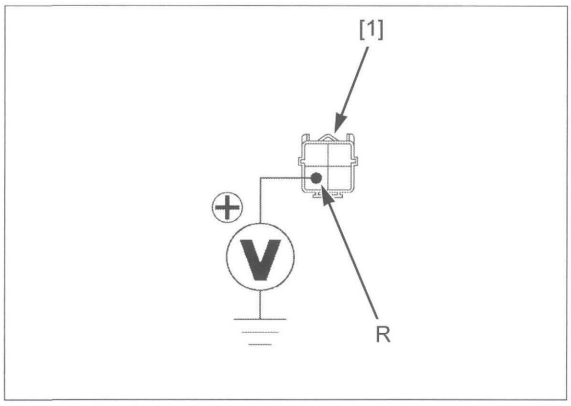
   Turn the ignition switch ON (I).
   Measure the voltage between the wire harness side 4P connector [1] and ground.

   Connection: Red (+) – ground (–)

   Dose the battery voltage exist?

   YES – GO TO STEP 4.

   NO – Open circuit in the Red wire



4. **O_2 Sensor Heater Line Open Circuit Inspection**

   Turn the ignition switch OFF (O).
   Disconnect the PCM 33P (Gray) connector (page 4-35).
   Check for continuity between the wire harness side 33P (Black) connector [1] and 4P connector [2].

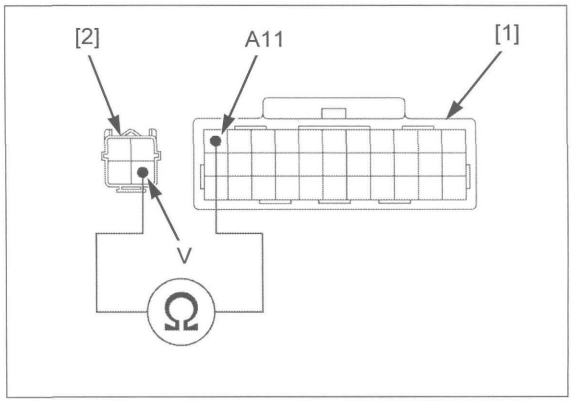
   TOOL:
   Test probe, 2 packs 07ZAJ-RDJA110

   Connection: A11 – Violet

   Is there continuity?

   YES – GO TO STEP 5.

   NO – Open circuit in the Violet wire



5. O_2 Sensor Heater Line Short Circuit Inspection

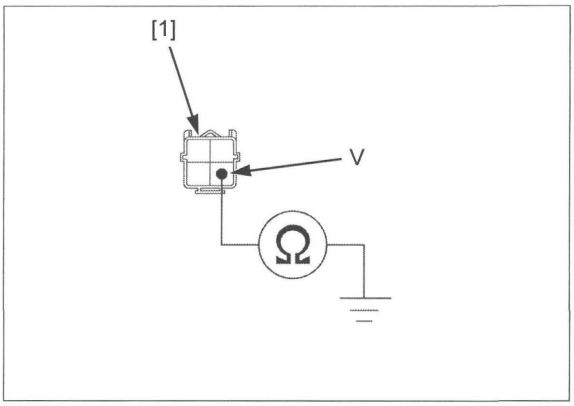
Check for continuity between the wire harness side 4P connector [1] and ground.

Connection: Violet – ground

Is there continuity?

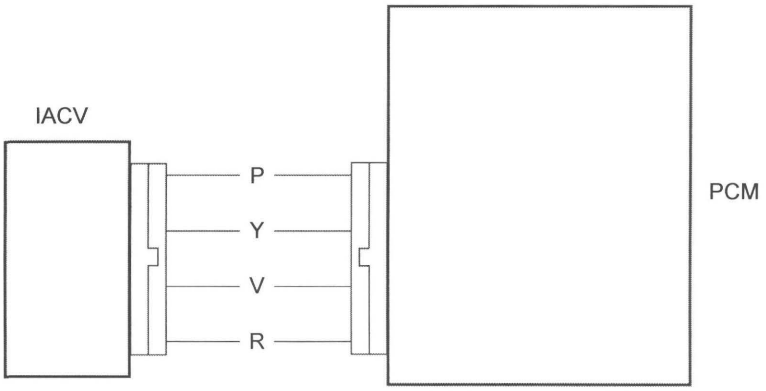
YES – Short circuit in the Violet wire

NO – Replace the PCM with a known good one (page 4-35), and recheck.



DTC 29 (IACV)

- Before starting the inspection, check for loose or poor contact of the IACV 4P connector and PCM 33P (Gray) connector, then recheck the DTC.



Probable cause
- Open or short circuit in the Pink wire, Red wire, Yellow wire and/or Violet wire between the IACV and PCM
- Faulty IACV
- Faulty PCM

DTC 29-1 (IACV)

1. DTC Recheck

Erase the DTC (page 4-7).
Start the engine and recheck the DTC with the MCS.

Is the DTC 29-1 indicated?

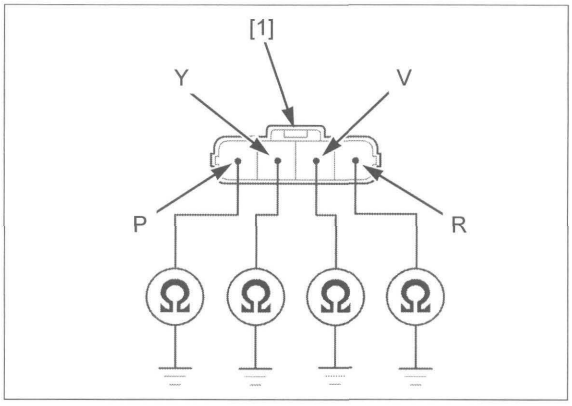
YES – GO TO STEP 2.

NO – • Intermittent failure
• Loose or poorly connected IACV 4P connector.

2. **IACV Line Short Circuit Inspection**

Turn the ignition switch OFF (O).
Disconnect the IACV 4P connector (page 7-27).
Check for continuity between the wire harness side 4P connector [1] and ground.

Connection: Pink – ground
Red – ground
Yellow – ground
Violet – ground



Is there continuity?

YES – Short circuit in the following:
- Short circuit in the Pink or Red wire
- Short circuit in the Yellow or Violet wire

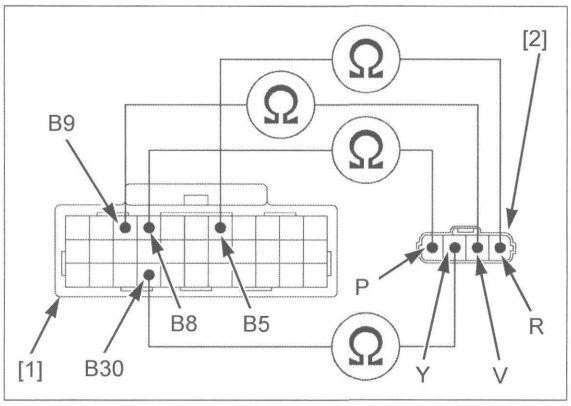
NO – GO TO STEP 3.

3. **IACV Line Open Circuit Inspection**

Disconnect the PCM 33P (Gray) connector (page 4-35).
Check for continuity between the wire harness side 33P (Gray) connector [1] and 4P connector [2].

TOOL:
Test probe, 2 packs 07ZAJ-RDJA110

Connection: B8 – Pink
B5 – Red
B30 – Yellow
B9 – Violet



Are there continuities?

YES – GO TO STEP 4.

NO – Open circuit in the following:
- Open circuit in the Pink or Red wire
- Open circuit in the Yellow or Violet wire

4. **IACV Resistance Inspection**

Measure the resistance between the wire harness side IACV 4P connector [1] terminals.

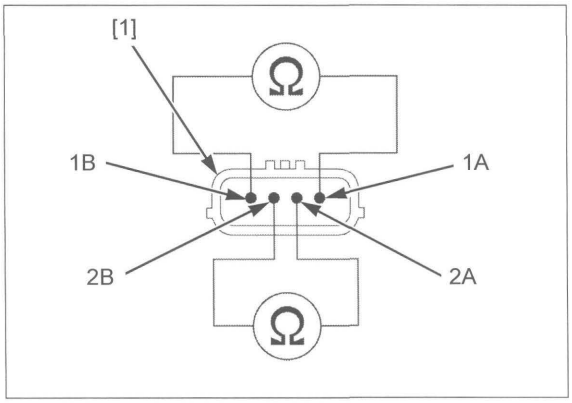
Connection: 1A – 1B
2A – 2B

Standard: 99 – 121 Ω (20°C/68°F)

Is the resistance within the standard values?

YES – Replace the PCM with a known good one (page 4-35), and recheck.

NO – Faulty IACV



DTC 33-2 (EEPROM)

1. **Recheck DTC**

   Erase the DTC (page 4-7).
   Recheck the PCM EEPROM with the MCS.

   Is DTC 33-2 indicated?

   YES – Replace the PCM with a known good one (page 4-35) and recheck.

   NO – Intermittent failure

DTC 64 (DRIVE POWER)

- Before starting the inspection, check that the battery and IGN fuse (15 A) are in good condition, check for loose or poor contact of the ignition relay connector and PCM 33P connectors, and recheck the DTC.

Probable cause
- Open circuit in the Red wire between the ignition relay and PCM
- Open circuit in the White wire between the ignition relay and PCM
- Faulty ignition relay
- Faulty PCM

DTC 64-1 (DRIVE POWER LOW VOLTAGE)

1. **Recheck DTC**

   Erase the DTC (page 4-7).
   Recheck the DTC with the MCS.

   Is DTC 64-1 indicated?

   YES – GO TO STEP 2.

   NO – Intermittent failure

2. **Drive Power Input Voltage Inspection**

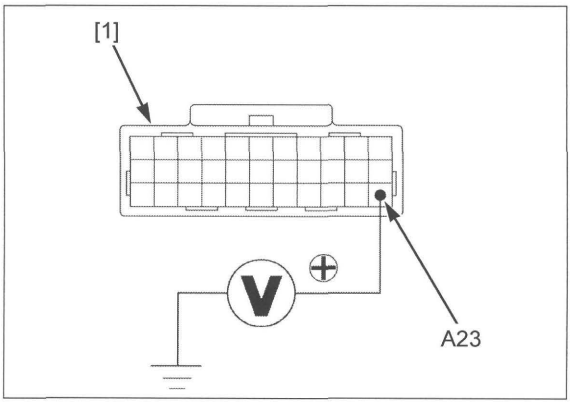
   Turn the ignition switch OFF (O).
   Disconnect the PCM 33P (Black) connector (page 4-35).
   Turn the ignition switch ON (I).
   Measure the voltage between the wire harness side 33P (Black) connector [1] and ground.

   Connection: A23 (+) – ground (–)

   Is there battery voltage?

   YES – Replace the PCM with a known good one (page 4-35) and recheck.

   NO – GO TO STEP 3.



3. **Ignition Relay Inspection**

   Check the ignition relay (page 5-8).

   Is the ignition relay normal?

   YES – GO TO STEP 4.

   NO – Faulty ignition relay

4. **Ignition Relay Circuit Inspection**

   Check the ignition relay circuits (page 5-8).

   Are the ignition relay circuits normal?

   YES – Open circuit in the Brown and/or Black wire(s)

   NO – Faulty ignition relay circuit(s)

DTC 64-2 (DRIVE POWER HIGH VOLTAGE)

- If the PCM outputs DTC 64-2, it maintains the ignition relay ON and the MIL will stay on when the ignition switch is turned to OFF. Therefore disconnect the battery (–) to turn off the system, then connect it and perform the troubleshooting.

1. **Recheck DTC**

   Erase the DTC (page 4-7).
   Recheck the DTC with the MCS.

   Is DTC 64-2 indicated?

   YES – GO TO STEP 2.

   NO – Intermittent failure

2. **Ignition Relay Inspection**

   Check the ignition relay (page 5-8).

   Is the ignition relay normal?

   YES – GO TO STEP 3.

   NO – Faulty ignition relay

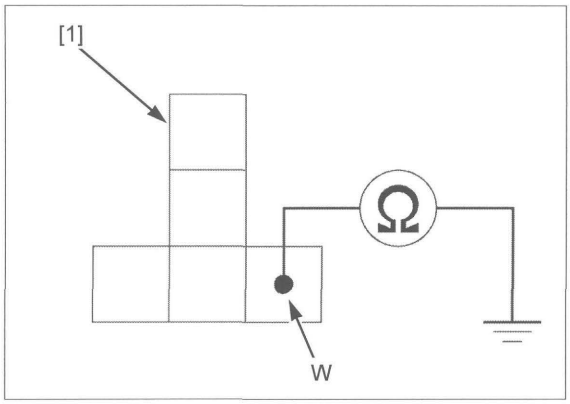
3. **Ignition Relay Coil Ground Line Short Circuit Inspection**

   Disconnect the PCM 33P (Gray) connector (page 4-35).
   Check for continuity between the ignition relay connector [1] and ground.
   Connection: White – ground

   Is there continuity?

   YES – Short circuit in the White wire

   NO – GO TO STEP 4.



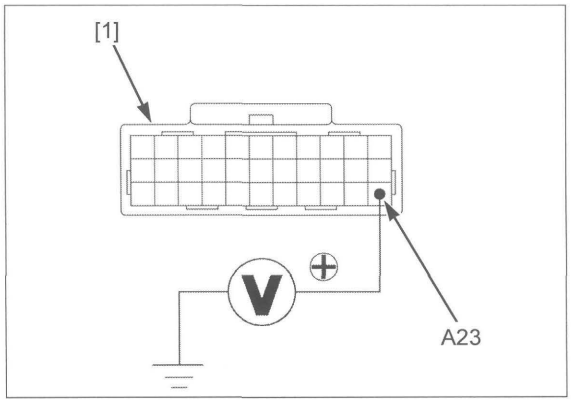
4. **Drive Power Input Voltage Inspection**

   Turn the ignition switch OFF (O).
   Disconnect the PCM 33P (Black) connector (page 4-35).
   Measure the voltage between the wire harness side 33P (Black) connector [1] and ground.
   Connection: A23 (+) – ground (–)

   Is there battery voltage?

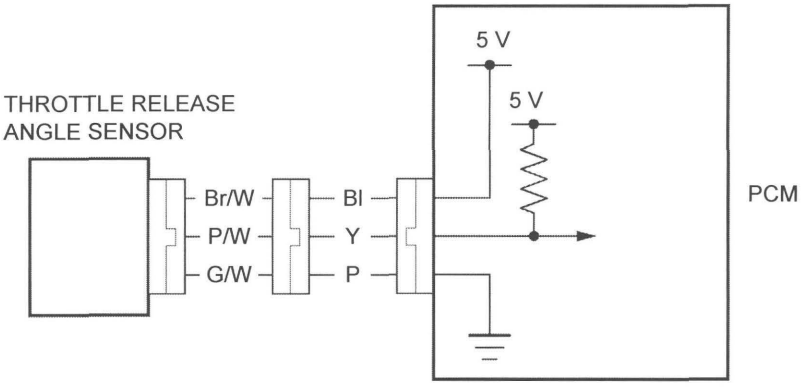
   YES – Short circuit to the power line in the Red wire

   NO – Replace the PCM with a known good one (page 4-35) and recheck.



DTC 101 (THROTTLE RELEASE ANGLE SENSOR)

- Before starting the inspection, check for loose or poor contact of the brake light switch 6P connector, throttle release sensor 3P (Gray) connector and PCM 33P connectors, and recheck the DTC.



Probable cause
- Open circuit in the Brown/white or Black wire between the throttle release angle sensor and PCM
- Open or short circuit in the Pink/white or Yellow wire between the throttle release angle sensor and PCM
- Open circuit in the Green/white or Pink wire between the throttle release angle sensor and PCM
- Faulty throttle release angle sensor
- Faulty PCM

DTC 101-1 (THROTTLE RELEASE ANGLE SENSOR LOW VOLTAGE)

1. **Throttle Release Angle Sensor System Inspection**

   Check the throttle release angle sensor with the MCS.

   Is about 0 V indicated?

   YES – GO TO STEP 2.

   NO – Intermittent failure

2. **Throttle Release Angle Sensor Output Line Short Circuit Inspection**

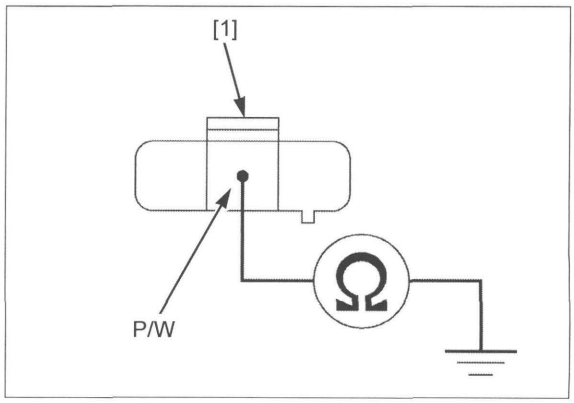
   Turn the ignition switch OFF (O).
   Disconnect the throttle release angle sensor 3P connector (page 7-20).
   Check for continuity between the wire harness side 3P connector [1] and ground.

   Connection: Pink/white – ground

   Is there continuity?

   YES – Short circuit in the Pink/white wire

   NO – GO TO STEP 3.



3. **Throttle Release Angle Sensor Inspection**

   Replace the throttle release angle sensor with a known good one (page 7-21).
   Check the throttle release angle sensor with the MCS.

   Is about 0 V indicated?

   YES – Replace the PCM with a known good one (page 4-35) and recheck.

   NO – Faulty original throttle release angle sensor

DTC 101-2 (THROTTLE RELEASE ANGLE SENSOR HIGH VOLTAGE)

1. **Throttle Release Angle Sensor System Inspection**

   Check the throttle release angle sensor with the MCS.

   Is about 5 V indicated?

   YES – GO TO STEP 2.

   NO – Intermittent failure

2. **Throttle Release Angle Sensor Input Voltage Inspection**

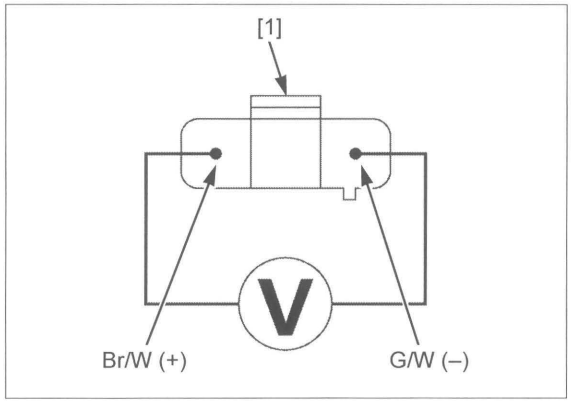
   Turn the ignition switch OFF (O).
   Disconnect the throttle release angle sensor 3P connector (page 7-20).
   Turn the ignition switch ON (I).
   Measure the voltage between the wire harness side 3P connector [1] terminals.

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

   Is the voltage within 4.75 – 5.25 V?

   YES – GO TO STEP 4.

   NO – GO TO STEP 3.



3. **Throttle Release Angle Sensor Input/Ground Line Open Circuit Inspection**

   Turn the ignition switch OFF (O).
   Disconnect the PCM 33P (Gray) connector (page 4-35).
   Check for continuity between the wire harness side 33P (Gray) connector [1] and 3P connector [2].

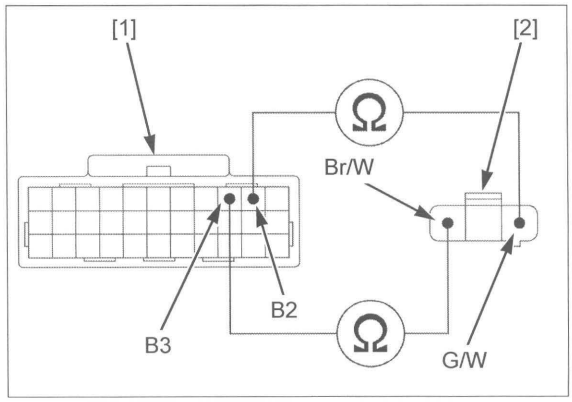
   TOOL:
   Test probe, 2 packs **07ZAJ-RDJA110**

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

   Is there continuity?

   YES – Replace the PCM with a known good one (page 4-35) and recheck.

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



4. **Throttle Release Angle Sensor Output Line Open Circuit Inspection**

   Disconnect the PCM 33P (Black) connector (page 4-35).
   Check for continuity between the wire harness side 33P (Black) connector [1] and 3P connector [2].

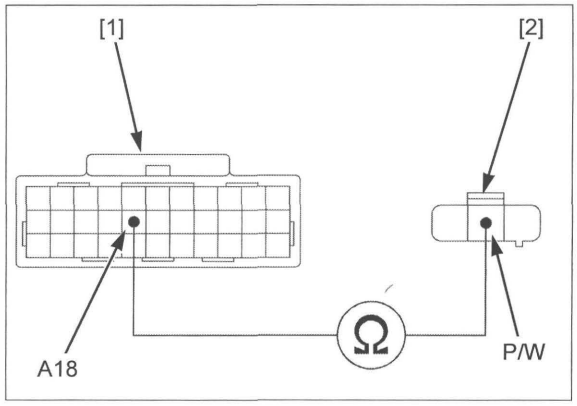
   TOOL:
   Test probe, 2 packs **07ZAJ-RDJA110**

   Connection: A18 – Pink/white

   Is there continuity?

   YES – GO TO STEP 5.

   NO – Open circuit in the Pink/white wire



5. **Throttle Release Angle Sensor Inspection**

   Replace the throttle release angle sensor with a known good one (page 7-21).
   Check the throttle release angle sensor with the MCS.

   Is about 5 V indicated?

   YES – Replace the PCM with a known good one (page 4-35) and recheck.

   NO – Faulty original throttle release angle sensor

DTC 102 (ABNORMAL THROTTLE VALVE POSITION)

Probable cause
- Incorrect accelerator pedal freeplay
- Faulty throttle release angle sensor

DTC 102-1 (INCORRECT ACCELERATOR PEDAL POSITION)

1. **Recheck DTC**

   Erase the DTC (page 4-7).
   Recheck the DTC with the MCS.

   Is DTC 102-1 indicated?

   YES – GO TO STEP 2.

   NO – Intermittent failure

2. **Accelerator Pedal Freeplay Check**

   Check the accelerator pedal freeplay (page 3-5).

   Is the freeplay within 5 – 10 mm (3/16 – 3/8 in)?

   YES – GO TO STEP 3.

   NO – Adjust the accelerator pedal freeplay (page 3-5).

3. **Throttle Release Angle Sensor Inspection**

   Replace the throttle release angle sensor with a known good one (page 7-21).
   Check the throttle release angle sensor with the MCS.

   Is about 0 V indicated?

   YES – Replace the PCM with a known good one (page 4-35) and recheck.

   NO – Faulty original throttle release angle sensor

MIL CIRCUIT INSPECTION

Check that the MIL comes on for a few seconds then goes off when the ignition switch is turned ON (I).

- If the MIL does not come on at all, check the combination meter initial operation (page 23-6).
- If the MIL stays on with the gear position indicator continuously blinking "–", check the serial communication line (page 23-8).

If the MIL stays on, check as follows:

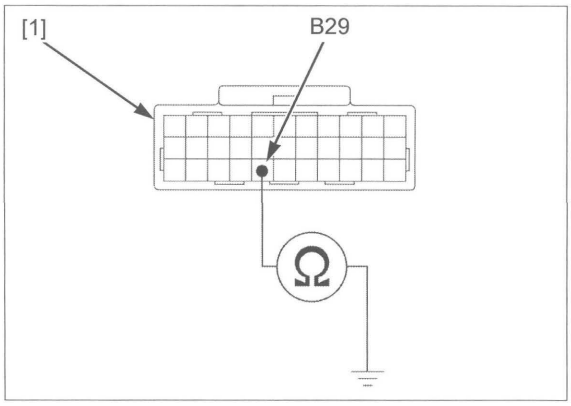
Turn the ignition switch OFF (O).

Disconnect the PCM 33P (Gray) connector (page 4-35).

Check for continuity between the wire harness side 33P (Gray) connector [1] and ground.

Connection: B29 – ground

TOOL:
Test probe, 2 packs 07ZAJ-RDJA110



There should be no continuity.

If there is continuity, check for short circuit in Brown/red wire between the DLC and PCM.

If there is no continuity, replace the PCM with a known good one (page 4-35) and recheck.

SENSOR UNIT (TP SENSOR/MAP SENSOR/IAT SENSOR)

REMOVAL/INSTALLATION

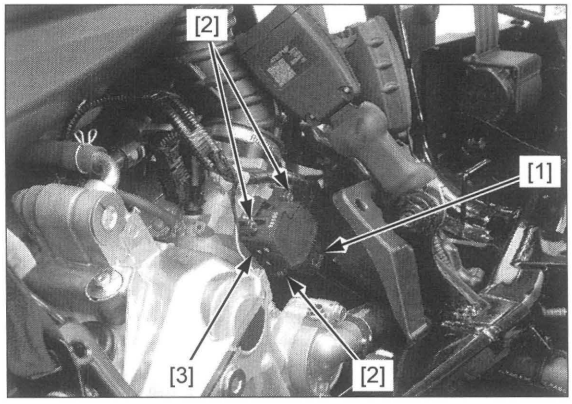
NOTE:

- Do not remove the sensor unit unless it is replaced.
- After replacing the sensor unit, the TP sensor reset procedure must be performed (page 4-33).

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

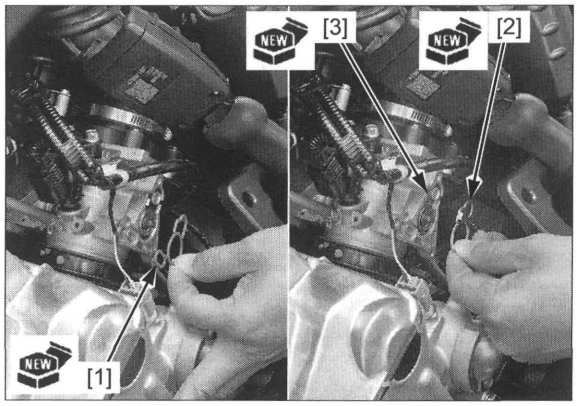
Disconnect the sensor unit 5P connector [1].

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



Remove sensor unit O-ring A [1], plate [2] and O-ring B [3].

Install new sensor unit O-ring B, plate and O-ring B into the throttle body groove.



Install the sensor unit [1] onto the throttle body by aligning the slot with the throttle shaft end.

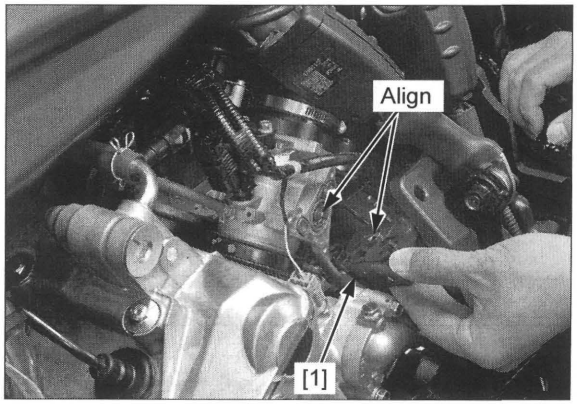
Install the torx screws and tighten them.

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

Connect the sensor unit 5P connector.

Perform the reset procedure (page 4-33).

Install the rear center cover (page 2-9).



TP SENSOR RESET PROCEDURE

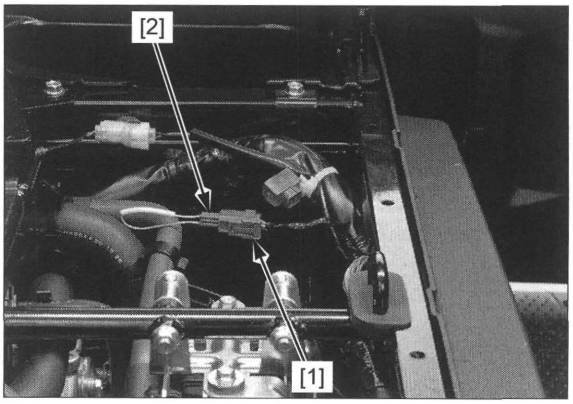
NOTE:

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

1. Remove the DLC from the dummy connector (page 4-7).
   Short the DLC [1] using the special tool.

   TOOL:
   SCS short connector [2] 070MZ-0010300 (U.S.A.: 070MZ-001A300)

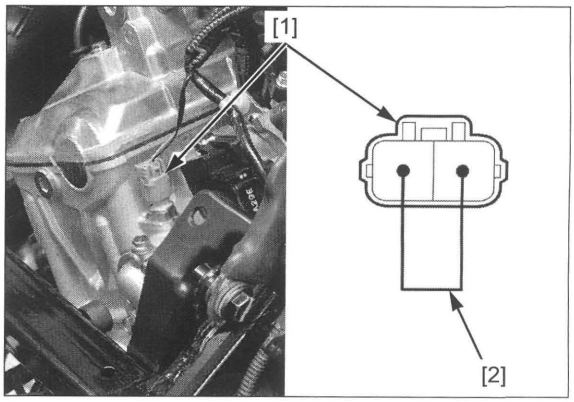
   CONNECTION: Red – Green



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

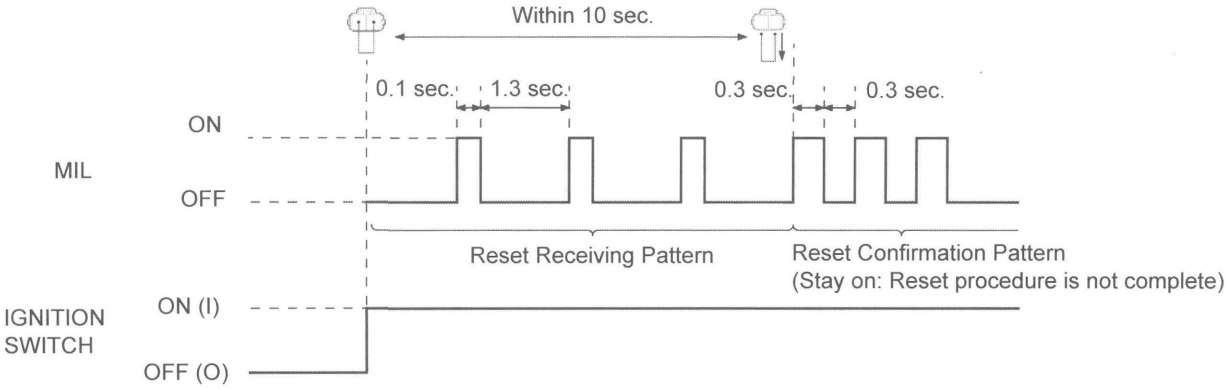
   Disconnect the ECT sensor 2P connector [1].
   Short the wire harness side connector terminals with a jumper wire [2].

3. Turn the ignition switch ON (I).
   The MIL starts blinking (reset receiving pattern).
   Within 10 seconds after the MIL starts blinking, disconnect the jumper wire from the 2P connector.



4. When the reset procedure is complete, the MIL blinking changes from Reset Receiving Pattern to Confirmation Pattern.
   Turn the ignition switch OFF (O).

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



ECT SENSOR

REMOVAL/INSTALLATION

Drain the coolant (page 9-4).

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

Disconnect the ECT sensor 2P connector [1].

Remove the ECT sensor [2] and O-ring [3].

Install a new O-ring onto the ECT sensor.

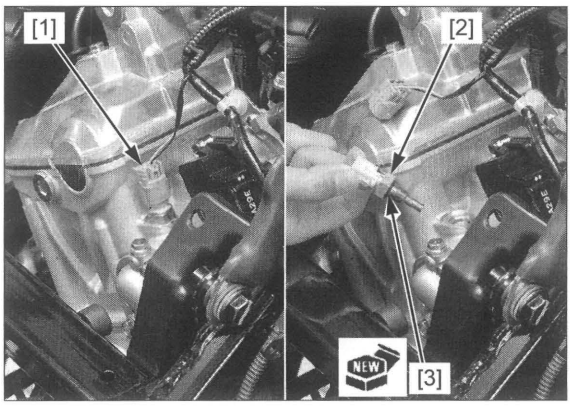
Install the ECT sensor and tighten it.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Connect the 2P connector to the ECT sensor.

Install the rear center cover (page 2-9).

Fill the cooling system with the recommended coolant (page 9-4).



O_2 SENSOR

REMOVAL/INSTALLATION

NOTICE

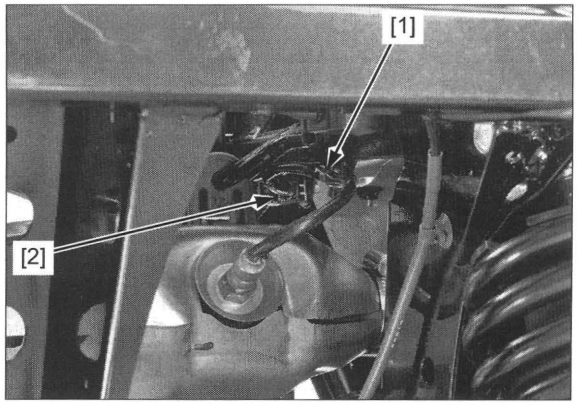
- *Do not get grease, oil or other materials in the O_2 sensor air hole.*
- *The O_2 sensor may be damaged if dropped. Replace it with a new one, if dropped.*

NOTE:

- Do not service the O_2 sensor while it is hot.
- Do not use an impact wrench while removing or installing the O_2 sensor, or it may be damaged.

Raise the cargo bed.

Remove the wire clip [1] and O_2 sensor 4P connector [2] from the frame, and disconnect 4P connector.



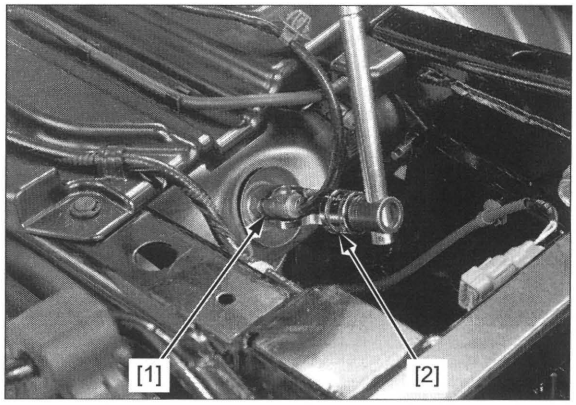
Remove the O_2 sensor [1] using the special tool.

TOOL:
FRXM17 (Snap on) or equivalent [2]

Installation is in the reverse order of removal.

TORQUE: 27 N·m (2.8 kgf·m, 20 lbf·ft)

Lower the cargo bed.



PCM

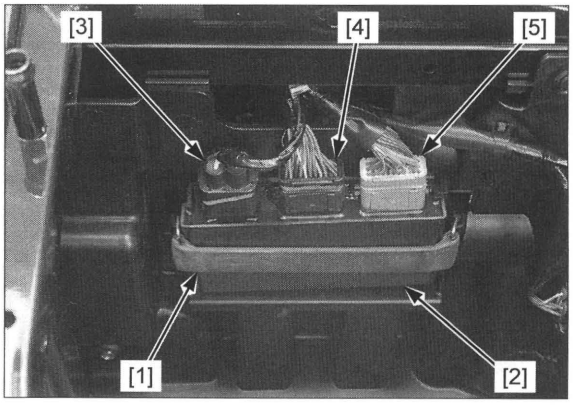
REMOVAL/INSTALLATION

M3D/M5D: Remove the seat under storage (page 2-6).
M3P/M5P: Remove the seat under cover (page 2-6).

Remove the rubber band [1] and PCM [2] from the middle mud guard.

Turn the ignition switch OFF (O).
Disconnect the 5P connector [3], 33P (Black) connector [4] and 33P (Gray) connector [5] from the PCM.

Installation is in the reverse order of removal.

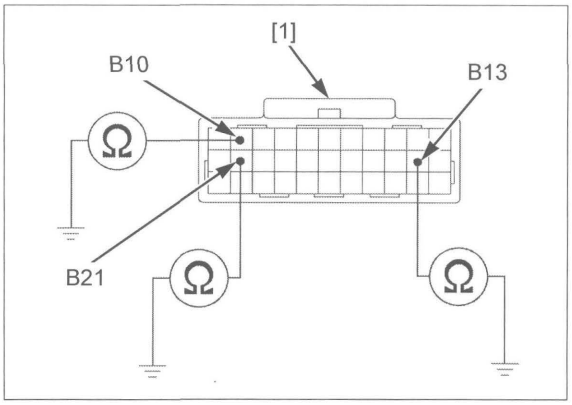


POWER/GROUND LINE INSPECTION

Disconnect the PCM 33P (Gray) connector [1] (page 4-35)

GROUND LINE

Check for continuity between the wire harness side 33P (Gray) connector [1] and ground.



TOOL:
Test probe, 2 packs 07ZAJ-RDJA110

Power ground:

Connection: B10 – ground
B21 – ground

Logic ground:

Connection: B13 – ground

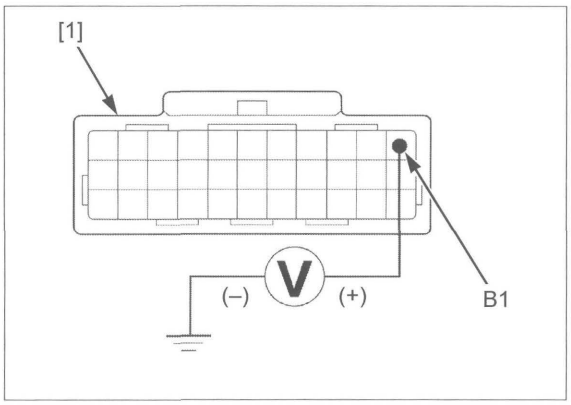
There should be continuity at all times.

If there is no continuity, check for an open circuit in the green wires.

POWER INPUT LINE

Turn the ignition switch ON (I).

Measure the voltage between the wire harness side 33P (Gray) connector [1] terminal and ground.



TOOL:
Test probe, 2 packs 07ZAJ-RDJA110

Connection: B1 (+) – ground (–)

There should be battery voltage.

If there is no voltage, check the following:
- Violet wire between the PCM and the fuse box for open circuit
- FI fuse (10 A)
- Green wire between the fuse box and ignition switch for open circuit
- ignition switch (page 23-14)
- Red wire between the ignition switch and fuse box for open circuit
- MAIN fuse (50 A)

5. IGNITION SYSTEM

SERVICE INFORMATION ····· 5-2
TROUBLESHOOTING ····· 5-3
SYSTEM LOCATION ····· 5-4
SYSTEM DIAGRAM ····· 5-4
IGNITION SYSTEM INSPECTION ····· 5-5
IGNITION COIL ····· 5-7
IGNITION RELAY ····· 5-7

SERVICE INFORMATION

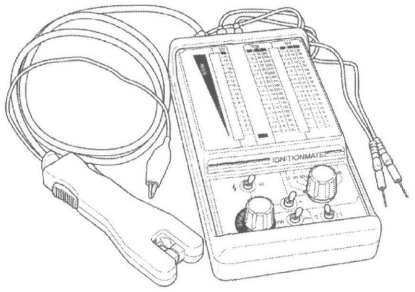
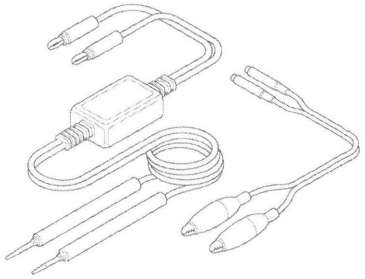
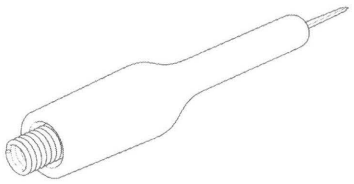
GENERAL

NOTICE

- *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 the ignition switch to 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 steps in the troubleshooting chart (page 5-3).
- This ignition system is controlled by PCM.
- 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.
- CKP sensor removal/installation (page 13-4).
- Ignition switch servicing (page 23-14).
- The following color codes are used throughout this section.

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

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, 2 packs 07ZAJ-RDJA110 

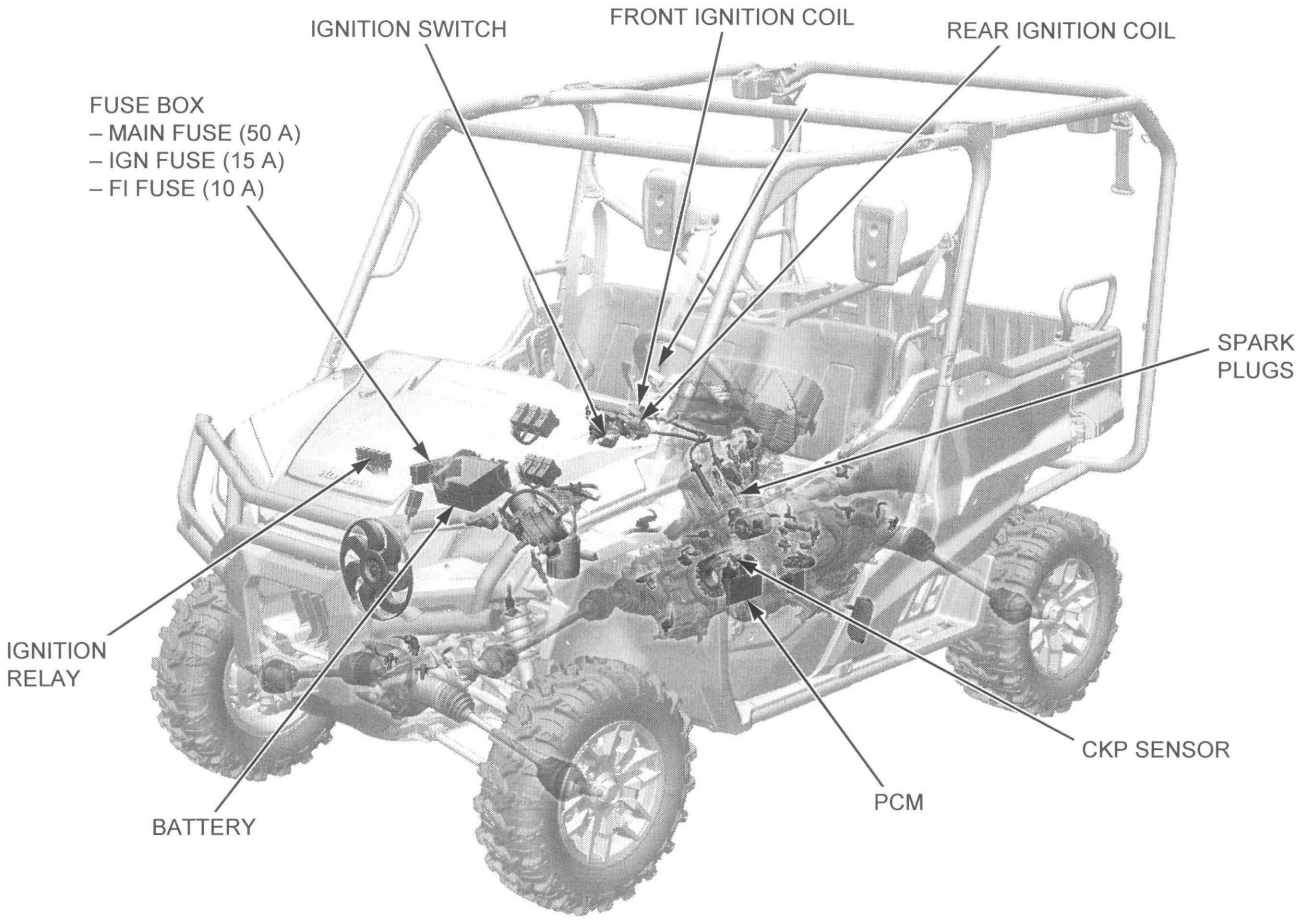
TROUBLESHOOTING

- 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 to ON (I). (The engine is not cranked by the starter motor.)

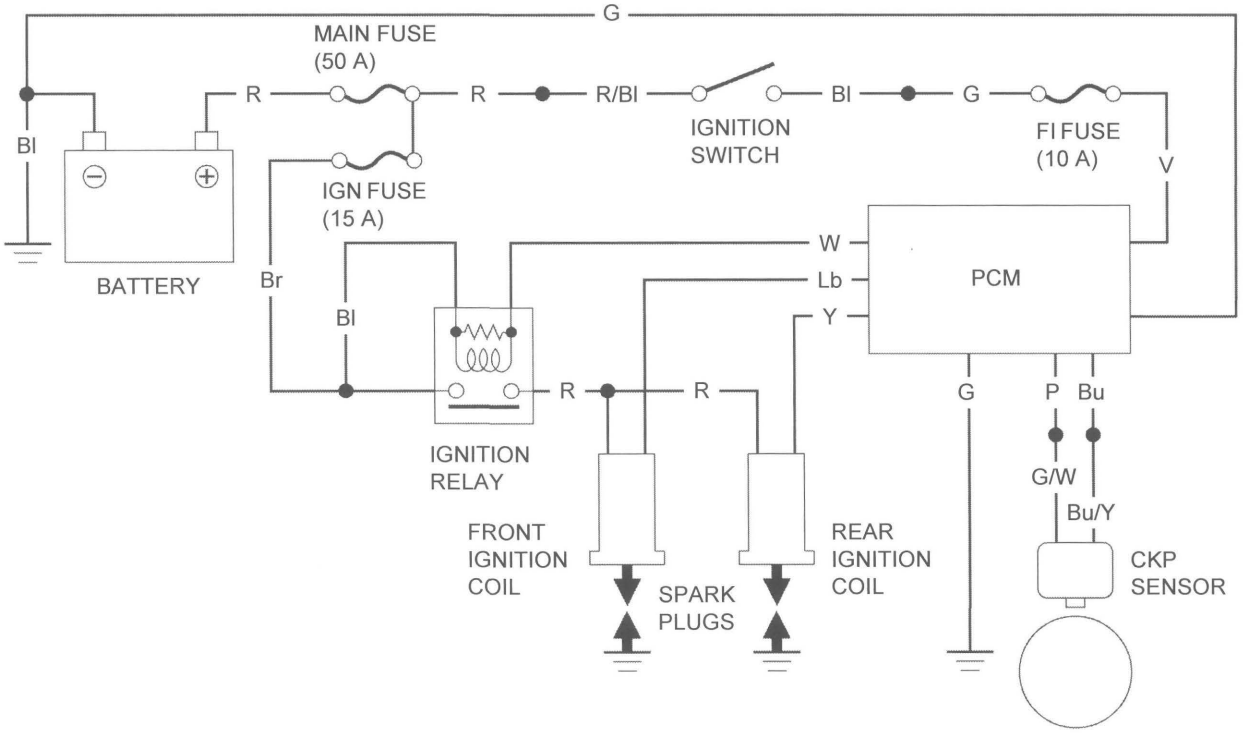
No spark at spark plug

UNUSUAL CONDITION		PROBABLE CAUSE (Check in numerical order)
Ignition coil primary voltage	No initial voltage with the ignition switch turned to ON (I). (Other electrical components are normal.)	1. Faulty ignition relay and/or related circuits (page 7-14). 2. An open circuit in the Red wire between the ignition coil and ignition relay. 3. Loose or poor connection of the primary terminal, or an open circuit in the ignition primary coil. 4. Faulty PCM (in case when the initial voltage is normal with the PCM 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 standard voltage with reverse connections.) 2. Battery is undercharged. (Voltage drops largely when the engine is started.) 3. No voltage at the Violet wire of the PCM 33P (Gray) connector, or loose or poorly connected PCM 33P (Gray) connector. 4. Loose or poor connection, or an open circuit in the Green wire of the PCM. 5. Loose or poor connection, or an open circuit in the Light blue or Yellow wire between the ignition coil and PCM. 6. A short circuit in the ignition primary coil. 7. Faulty CKP sensor. (Measure the peak voltage.) 8. Faulty PCM (in case when above No. 1 through 7 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 standard voltage with reverse connections.) 2. Faulty peak voltage adaptor. 3. Faulty CKP sensor. (Measure the peak voltage.) 4. Faulty PCM (in case when above No. 1 through 3 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 (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.

SYSTEM LOCATION



SYSTEM DIAGRAM



IGNITION SYSTEM INSPECTION

PEAK VOLTAGE ADAPTOR CONNECTION

NOTE:

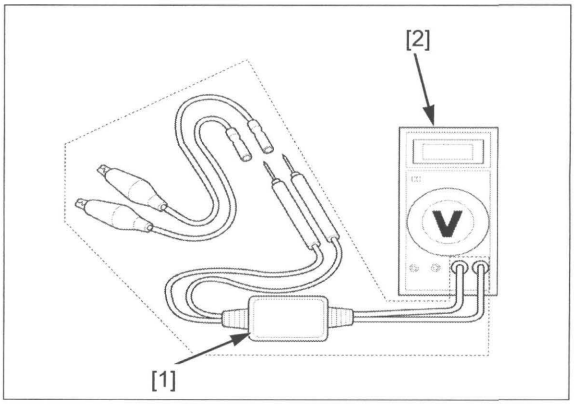
- If there is no spark at the plug, check all connections for loose or poor contact before measuring the peak voltage.
- Use a commercially available digital multimeter with an impedance of 10 MΩ/DCV minimum.
- The display value differs depending upon the internal impedance of the multimeter.
- If the peak voltage tester (U.S.A. only) is used, follow the manufacturer's instructions.

Use the peak voltage tester or connect the peak voltage adaptor [1] to the digital multimeter [2].

TOOLS:

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

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



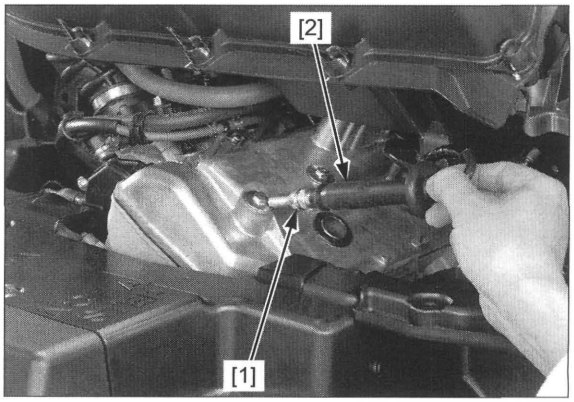
IGNITION COIL PRIMARY PEAK VOLTAGE

NOTE:

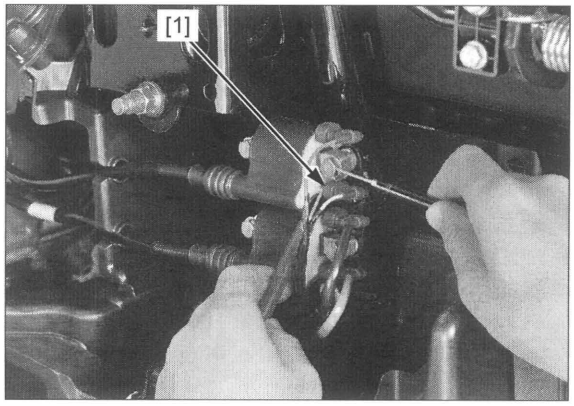
- Check all system connections before this inspection. Poorly connected connectors can cause incorrect readings.
- Check the cylinder compression and check that the spark plugs are installed correctly in the cylinder head.

Disconnect the spark plug caps from the spark plugs (page 3-7).

Connect a known-good spark plug [1] to the spark plug cap [2] and ground the spark plug to the cylinder head as done in a spark test.



With the connector connected, connect the peak voltage tester or adaptor probes to the ignition coil primary terminal [1] and body ground.



CONNECTION:
Front: Light blue (+) – Body ground (–)
Rear: Yellow (+) – Body ground (–)

Turn the ignition switch ON (I).
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 5-3).

Shift the sub-transmission to "P" (parking) or "N" (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 5-3).

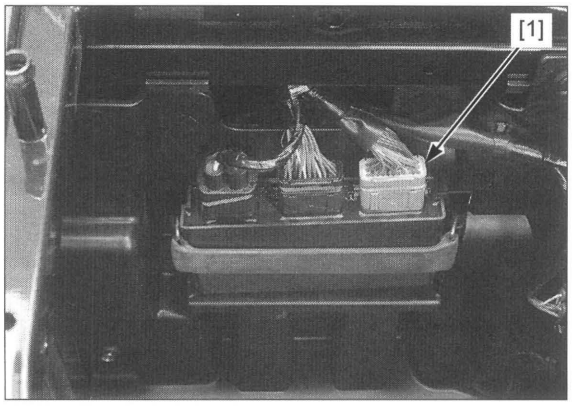
CKP SENSOR PEAK VOLTAGE

NOTE:
- Check that the cylinder compression is normal and the spark plugs are installed correctly in the cylinder head.

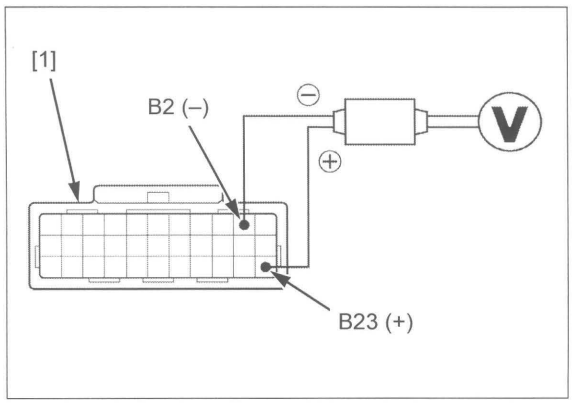
M3D/M5D: Remove the seat under storage (page 2-6).
M3P/M5P: Remove the seat under cover (page 2-6).

Turn the ignition switch OFF (O).

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



Connect the peak voltage tester or adaptor probes to the wire harness side 33P (Gray) connector [1] terminal and ground.



TOOL:
Test probe, 2 packs 07ZAJ-RDJA110

CONNECTION: B23 (+) – B2 (–)

Shift the sub-transmission to "P" (parking) or "N" (neutral).
Turn the ignition switch ON (I).
Crank the engine with the starter motor and read the CKP sensor peak voltage.

PEAK VOLTAGE: 0.7 V minimum

If the voltage measured at the PCM connector is abnormal, measure the peak voltage at the CKP sensor connector.

Turn the ignition switch OFF (O).

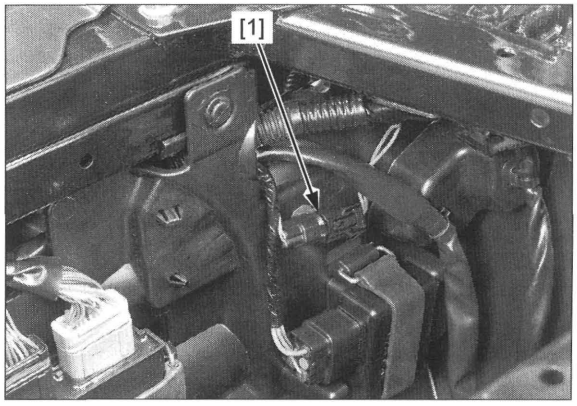
Remove the CKP sensor 2P connector [1] from the stay and disconnect it.
Connect the peak voltage tester or adaptor probes to the CKP sensor side connector and ground.

CONNECTION: Blue/yellow (+) – Green/white (–)

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

- If the peak voltage measured at the PCM connector is abnormal and the one measured at the CKP sensor connector is normal, the Blue or Pink 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 5-3).

If the CKP sensor is faulty, replace stator/CKP sensor (page 13-10).



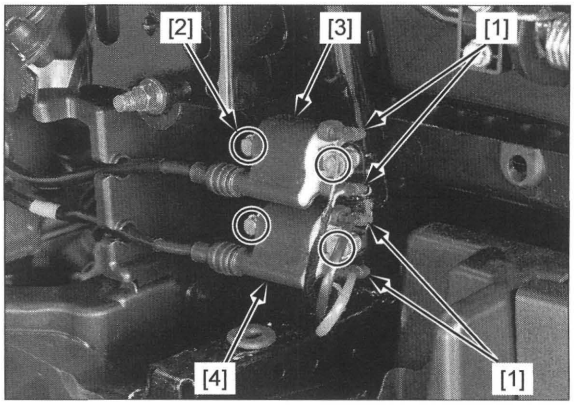
IGNITION COIL

REMOVAL/INSTALLATION

Disconnect the spark plug caps from the spark plugs (page 3-7).

Disconnect the primary wire connectors [1].
Remove the bolts [2], front ignition coil [3] and rear ignition coil [4].

Installation is in the reverse order of removal.

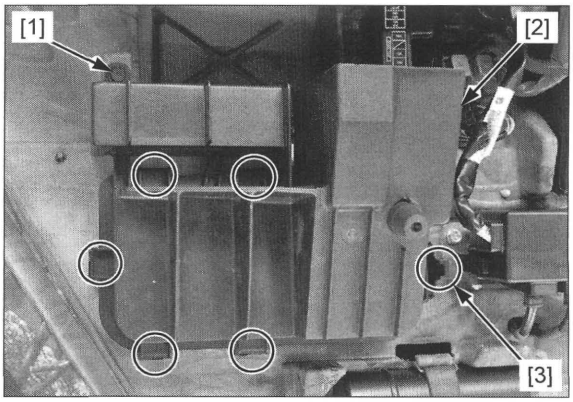


IGNITION RELAY

REMOVAL/INSTALLATION

Remove the front hood (page 2-17).

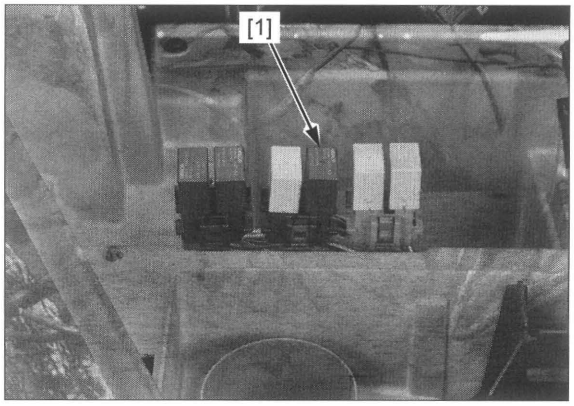
Remove the trim clip [1] and pre-filter cover [2] by releasing the tabs [3] from the front fender.



Turn the ignition switch OFF (O).

Remove the ignition relay [1] from the connector.

Installation is in the reverse order of removal.

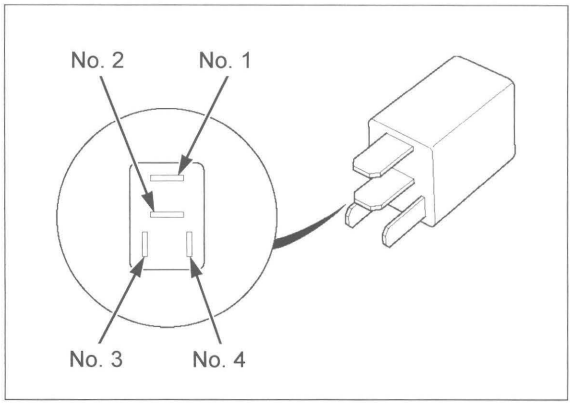


RELAY INSPECTION

Remove the ignition relay (page 5-7).

Check for continuity between the No. 1 and No. 2 terminals.
Connect a fully charged 12 V battery (+) terminal to the relay No. 4 terminal and the (–) terminal to the No. 3 terminal.

There should be continuity when the battery is connected, and no continuity when the battery is disconnected.



CIRCUIT INSPECTION

1. Power Input Line Inspection

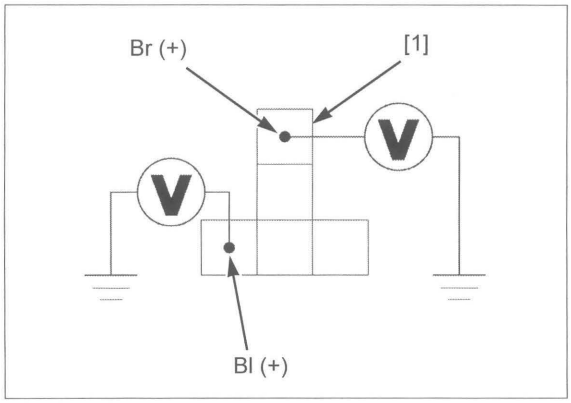
Remove the ignition relay (page 5-7).
Measure the voltage between the ignition relay connector [1] and body ground.

Connection: Brown (+) – Body ground (–)
Black (+) – Body ground (–)

Is there battery voltage?

YES – GO TO STEP 2.

NO – • Open circuit in the Brown wire between the relay connector and fuse box
• Open circuit in the Black wire of the relay connector
• Blown IGN fuse (15 A).



2. Relay Coil Ground Line Inspection

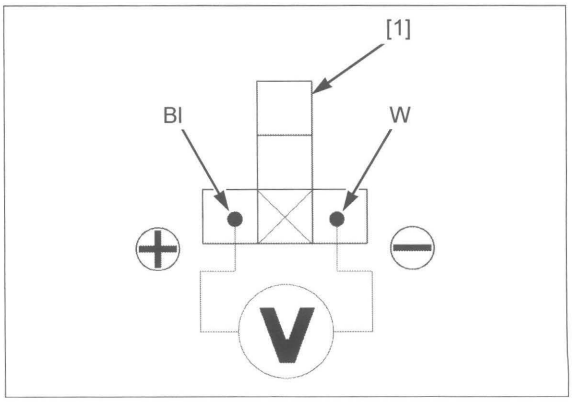
Turn the ignition switch ON (I).
Measure the voltage at the ignition relay connector [1].

Connection: Black (+) – White (–)

Is there battery voltage?

YES – The ignition relay circuits are normal.

NO – • Open circuit in the White wire between the relay connector and PCM
• Faulty power/ground line of the PCM (page 4-36)
• Faulty PCM



6. ELECTRIC STARTER

SERVICE INFORMATION 6-2
TROUBLESHOOTING 6-2
SYSTEM LOCATION 6-3
SYSTEM DIAGRAM 6-3
STARTER MOTOR 6-4
STARTER RELAY SWITCH 6-6
INHIBITOR RELAY 6-7
DIODE 6-9

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 6-2).
- A weak battery may be unable to turn the starter motor quickly enough, or supply adequate ignition current.
- Starter clutch servicing (page 13-4).
- Ignition switch servicing (page 23-14).
- Brake light switch inspection (page 23-22).
- The following color codes are used throughout this section.

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

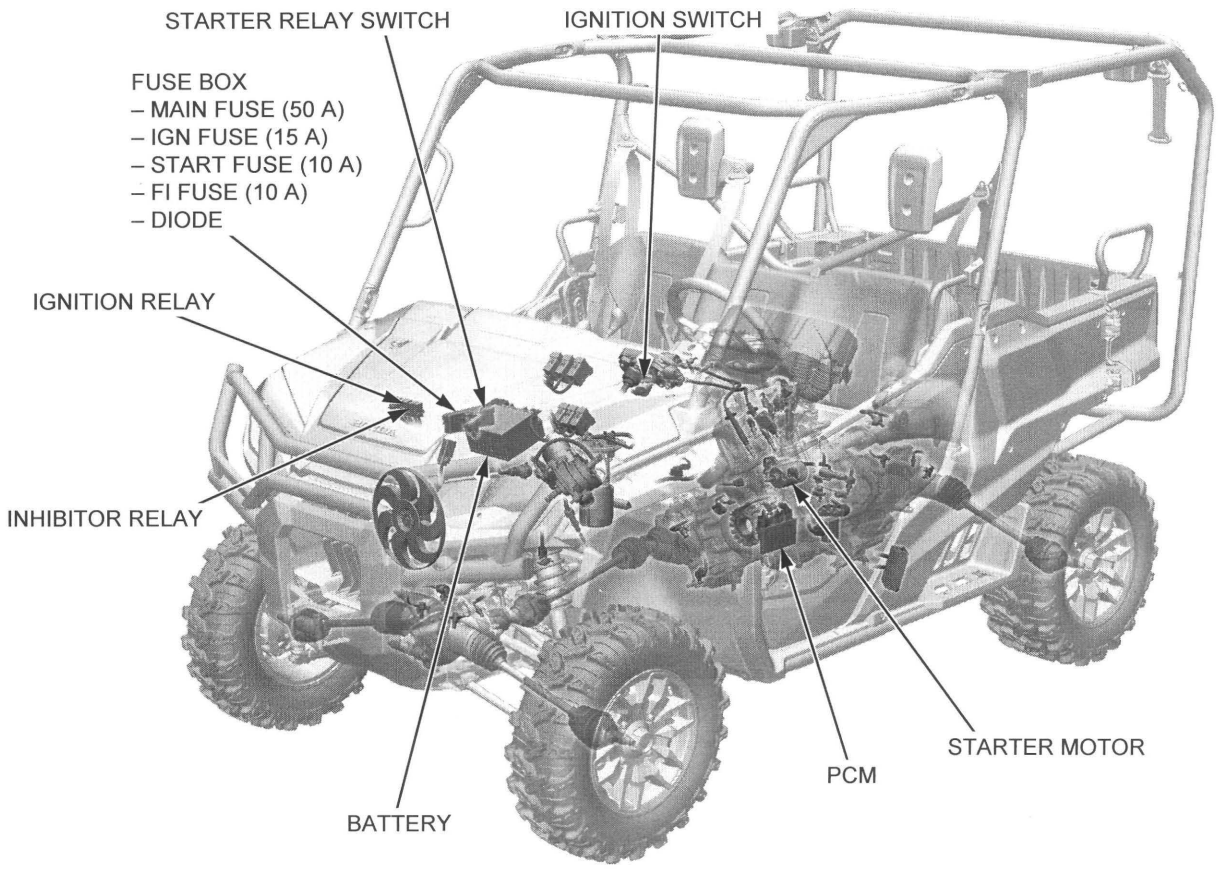
TROUBLESHOOTING

NOTE:

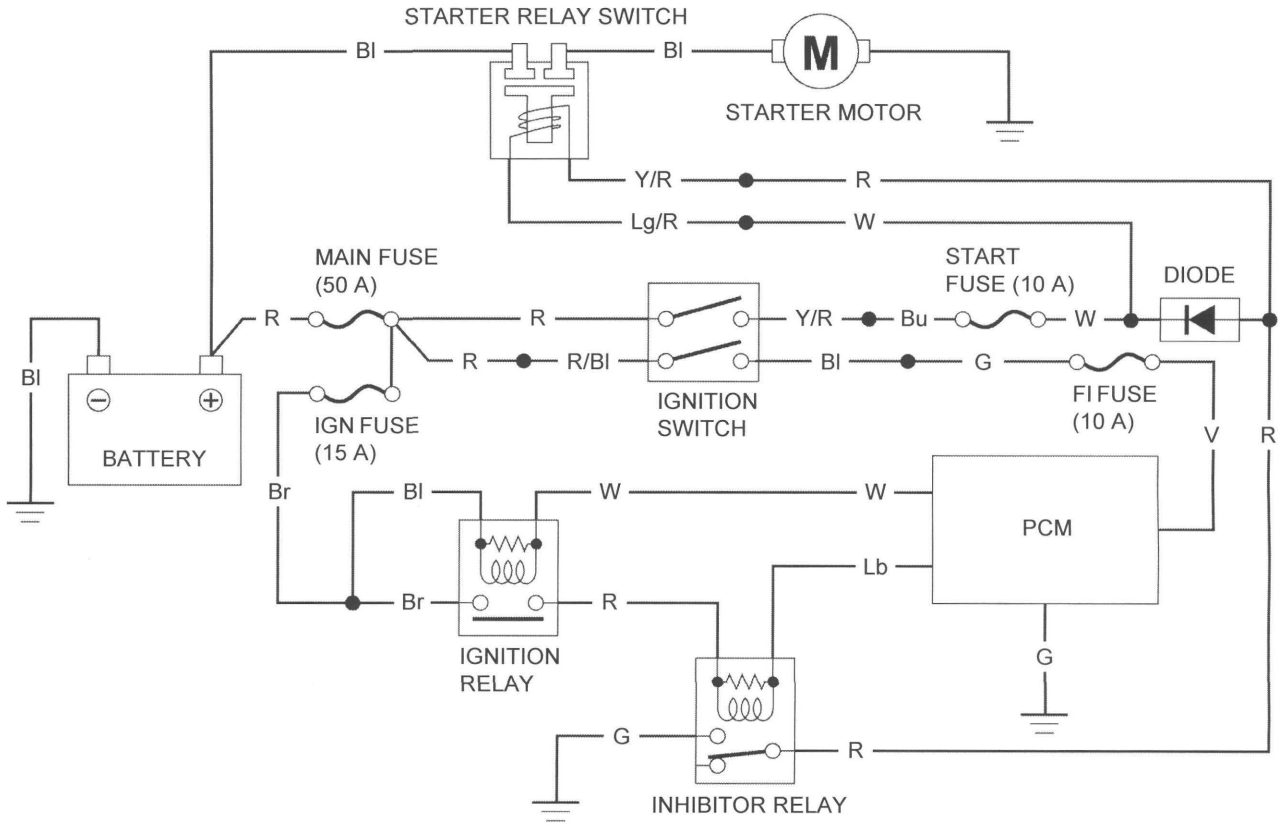
- The starter motor should operate when the transmission is in neutral or when the transmission is in drive and the foot brake is applied.

Unusual condition		Probable cause (Check in numerical order)
Starter motor	Starter motor does not turn	1. Loose or poor contact on related connectors and terminals 2. Blown fuse 3. Weak battery 4. Loose connection or open circuit in starter motor cable 5. Faulty starter relay switch 6. Faulty starter motor 7. Faulty neutral switch 8. Faulty inhibitor relay 9. Faulty brake light switch 10. Faulty ignition switch 11. Faulty diode 12. Open circuit in starter relay switch ground circuit 13. Open circuit in starter relay switch power circuit 14. Loose contact or open circuit in related wires 15. Faulty PCM
	Starter motor turns slowly	1. Low battery voltage 2. Poorly connected battery terminal cable 3. Poorly connected starter motor cable 4. Faulty starter motor 5. Poorly connected battery ground cable
	Starter motor turns, but engine does not turn	1. Faulty starter clutch 2. Damaged or faulty starter driven gear 3. Damaged or faulty starter reduction gear 4. Damaged or faulty starter motor pinion gear
	Starter relay switch "Clicks", but engine does not turn over	1. Crankshaft does not turn due to engine problems

SYSTEM LOCATION



SYSTEM DIAGRAM



STARTER MOTOR

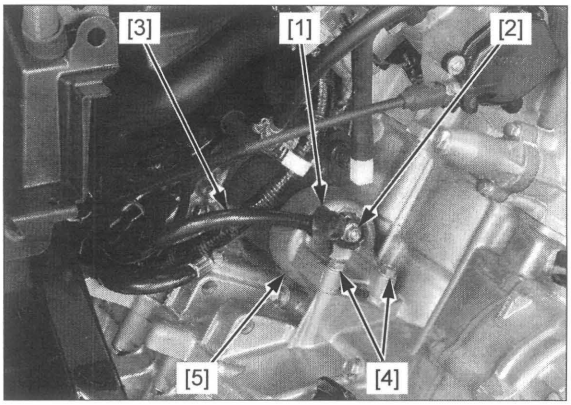
REMOVAL/INSTALLATION

Remove the rear footwell (page 2-12).

Disconnect the negative (–) cable from the battery (page 22-4).

Remove the following:

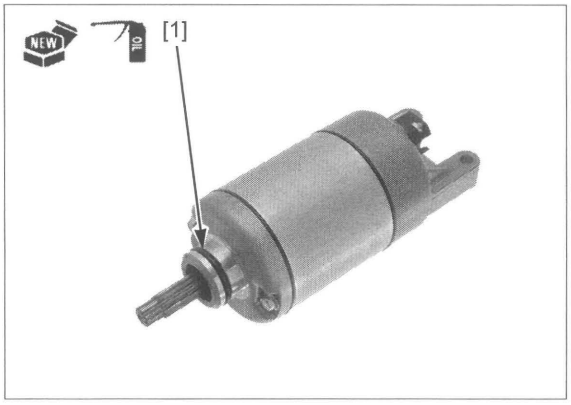
- rubber cap [1] (from the starter motor terminal)
- terminal nut [2]
- starter motor cable [3]
- two mounting bolts [4]
- starter motor [5]



Remove the O-ring [1] from the starter motor.

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

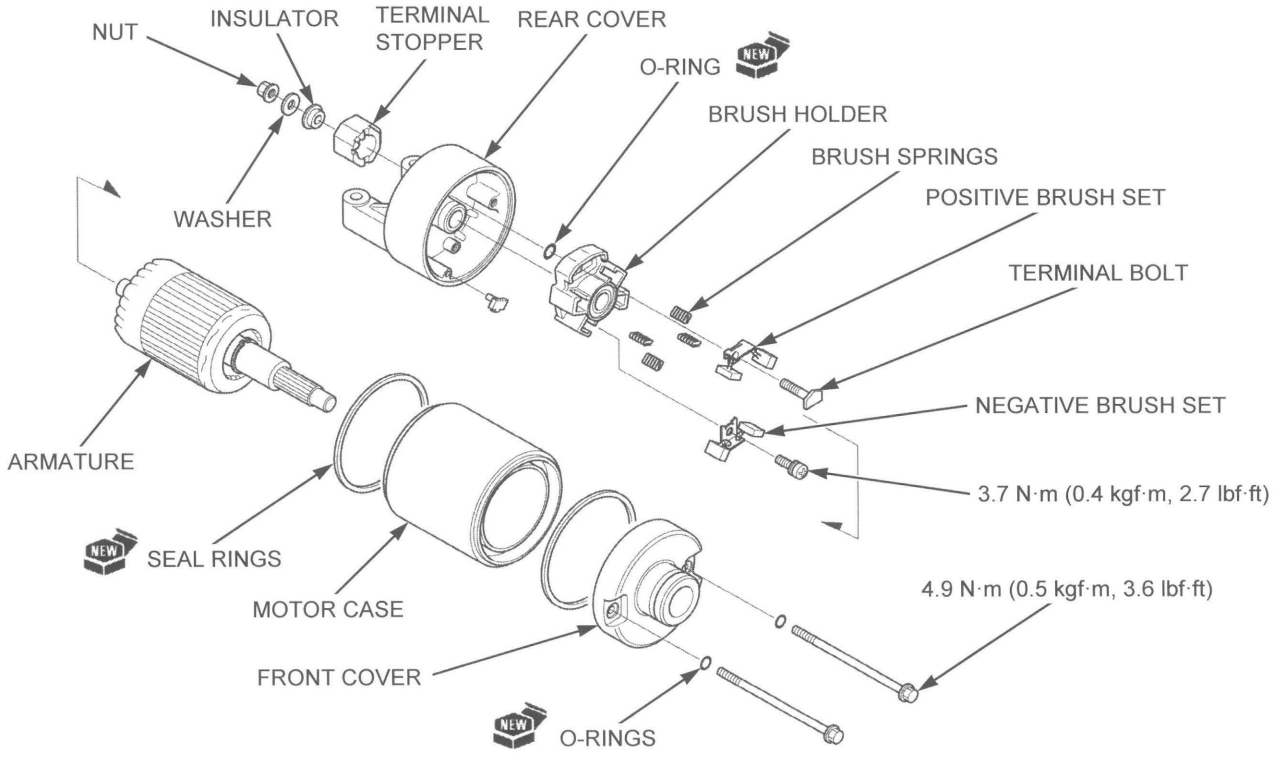
Install the removed parts in the reverse order of removal.



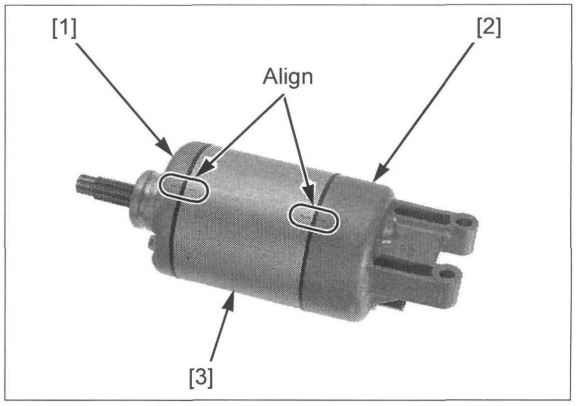
DISASSEMBLY/ASSEMBLY

NOTICE

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



When installing the front cover [1] and rear cover [2] onto the motor case [3], align the lines as shown.



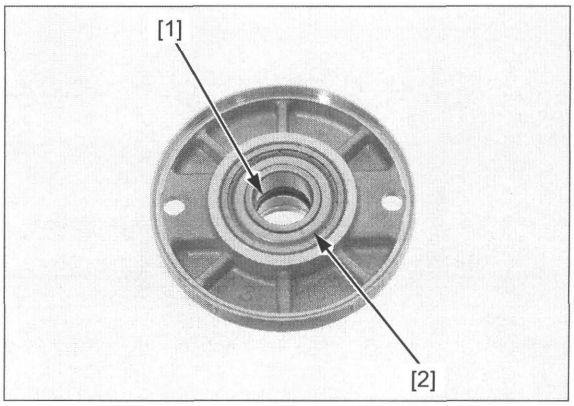
INSPECTION

Check the oil seal [1] in the front cover for deterioration, wear or damage.

Turn the inner race of bearing [2] in the front cover with your finger.

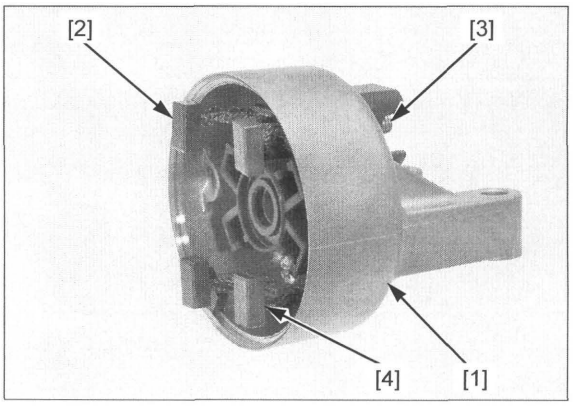
The bearings should turn smoothly and quietly.

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



Check for continuity on the rear cover [1] as follows:

- Between the positive brush [2] and cable terminal [3]: there should be continuity.
- Between the cable terminal and rear cover: there should be no continuity.
- Between negative brush [4] and rear cover: there should be continuity.

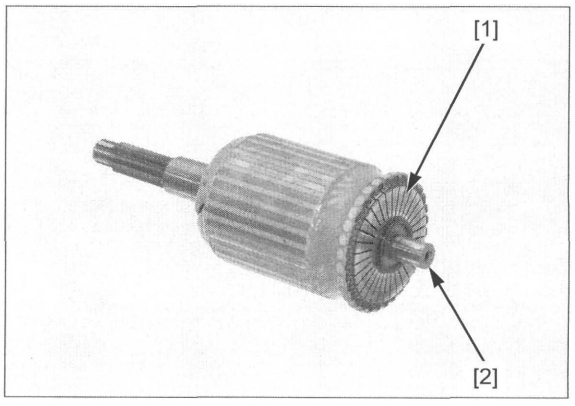


Clean the metallic debris off the commutator bars [1].

Check the commutator bars for discoloration.

Check for continuity on the armature as follows:

- Between pair of commutator bars: there should be continuity.
- Between each commutator bar and the armature shaft [2]: there should be no continuity.



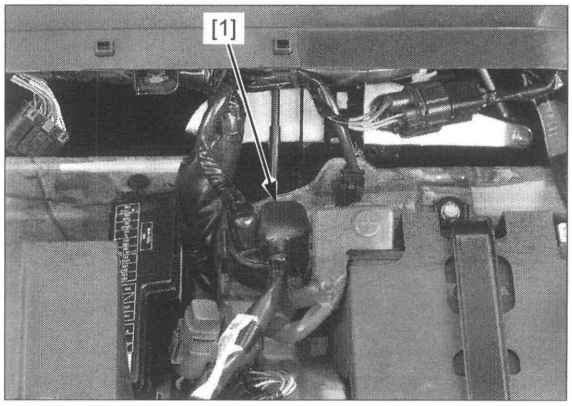
STARTER RELAY SWITCH

OPERATION INSPECTION

Remove the front hood (page 2-17).

Shift the sub-transmission to "P" (parking) or "N" (neutral).
Turn the ignition switch START (II).
The coil is normal if the starter relay switch [1] clicks.

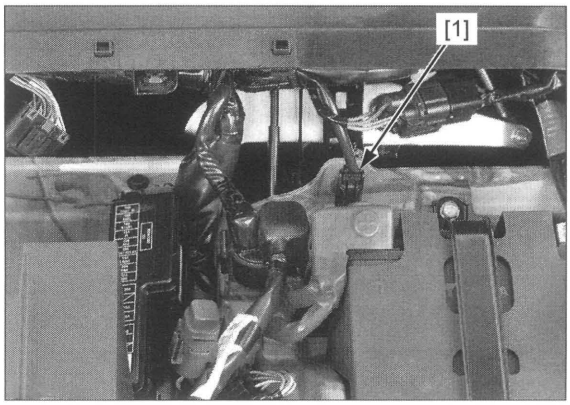
If you don't hear the switch click, inspect the relay switch circuits (page 6-6).



CIRCUIT INSPECTION

Remove the front hood (page 2-17).

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



GROUND LINE

Check for continuity between the wire harness side connector and ground.

Connection: Red – ground

If there is continuity with the ignition switch turned OFF (O), the ground circuit is normal.

If there is no continuity, check the inhibitor relay and its circuit (page 6-7).

POWER INPUT LINE

Measure the voltage between the wire harness side connector and ground.

Connection: White (+) – ground (–)

If the battery voltage appears only when the ignition switch is turned to START (II), the power input circuit is normal.

If there is no voltage, check the following:

- White wire for an open circuit between the starter relay switch and fuse box
- START fuse (10 A)
- Yellow/red or Blue wire for an open circuit between the fuse box and ignition switch
- ignition switch (page 23-14)
- Red wire for an open circuit between the ignition switch and fuse box
- MAIN fuse (50 A)

REMOVAL/INSTALLATION

Remove the front hood (page 2-17).

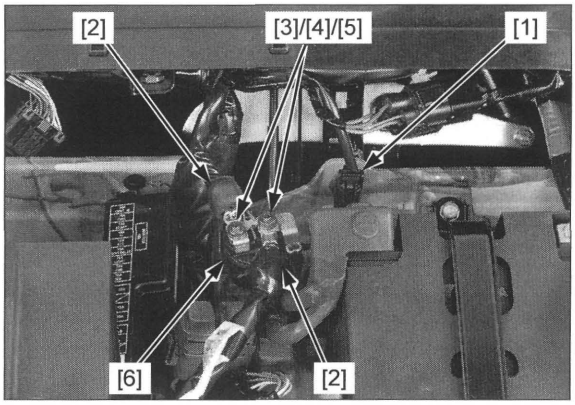
Disconnect the negative (–) cable from the battery (page 22-4).

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

Pull off the terminal covers [2].
Remove the terminal nuts [3], spring washers [4] and starter relay cables [5].

Remove the starter relay switch [6].

Installation is in the reverse order of removal.

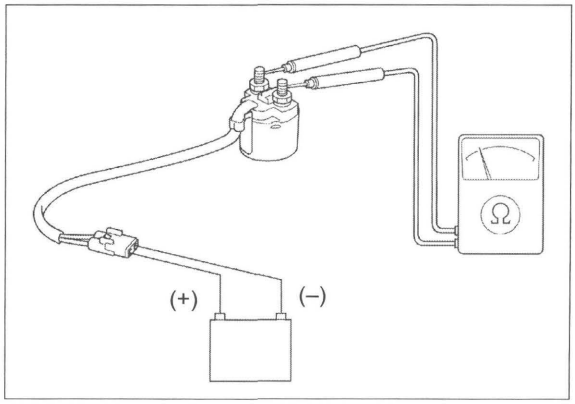


CONTINUITY INSPECTION

Remove the starter relay switch (page 22-4).

Connect a fully charged 12 V battery positive (+) terminal to the Green wire terminal and negative (–) terminal to the Yellow/red wire terminal of the 2P (Black) connector.

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



INHIBITOR RELAY

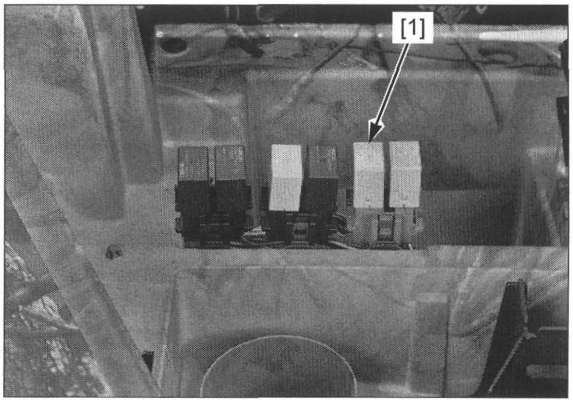
REMOVAL/INSTALLATION

Remove the pre-filter cover (page 5-7).

Turn the ignition switch OFF (O).

Remove the inhibitor relay [1] from the relay box.

Installation is in the reverse order of removal.



RELAY INSPECTION

Remove the inhibitor relay (page 6-7).

Check for continuity between the following terminals.

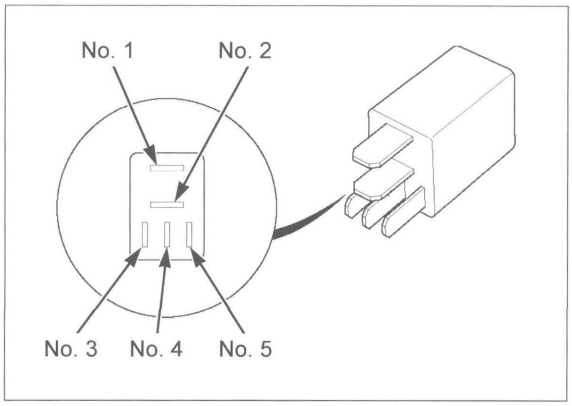
Connection	Result
No.1 – No.2	No continuity
No.1 – No.3	Continuity

Connect a fully charged 12 V battery to the following terminals.

Connection: No.5 (+) – No.3 (–)

Check for continuity between the following terminals.

Connection	Result
No.1 – No.2	Continuity
No.1 – No.3	No continuity



CIRCUIT INSPECTION

NOTE:

- Before this inspection, check that the followings are normal.
  - ignition switch (page 23-14)
  - starter relay switch and its power input line (page 6-6)
  - ignition relay and its circuits (page 5-7)

1. Relay Ground Line Inspection

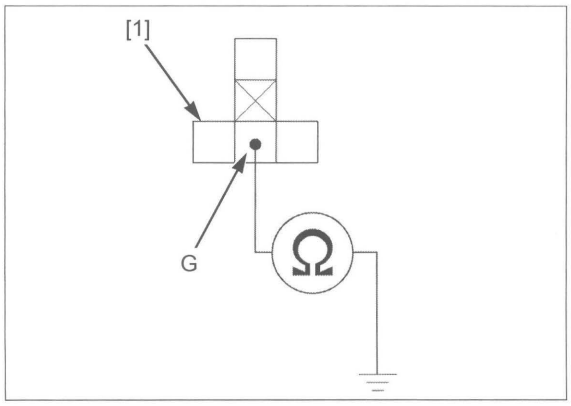
Remove the inhibitor relay (page 6-7).
Check for continuity between the inhibitor relay connector [1] and ground.

Connection: Green – ground

Is there continuity?

YES – GO TO STEP 2.

NO – Open circuit in the Green wire between the inhibitor relay connector and ground terminal



2. Relay Coil Power Input Line Inspection

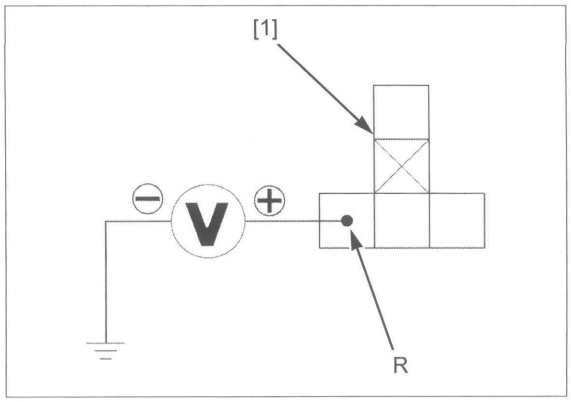
Turn the ignition switch ON (I).
Measure the voltage between the inhibitor relay connector [1] and ground

Connection: Red (+) – ground (–)

Is there battery voltage?

YES – GO TO STEP 3.

NO – Open circuit in the Red wire between the inhibitor relay connector and ignition relay connector



3. **Relay Coil Ground Line Inspection**

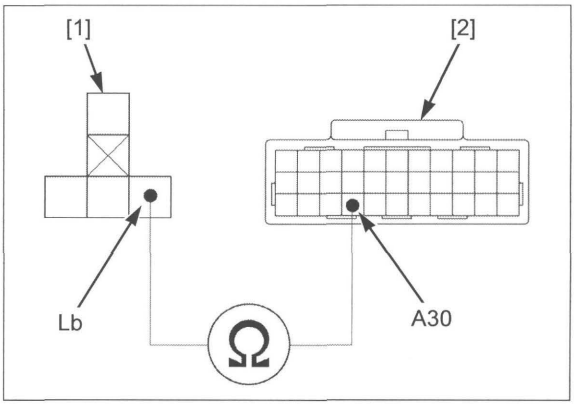
Turn the ignition switch OFF (O).
Disconnect the PCM 33P (Black) connector (page 4-35).
Check for continuity between the inhibitor relay connector [1] and 33P (Black) connector [2].

Connection: Light blue – A30

Is there continuity?

YES – GO TO STEP 4.

NO – Open circuit in the Light blue wire between the inhibitor relay connector and PCM 33P (Black) connector



4. **Starter Relay Switch Line Inspection**

Measure the voltage between the inhibitor relay connector [1] and ground.

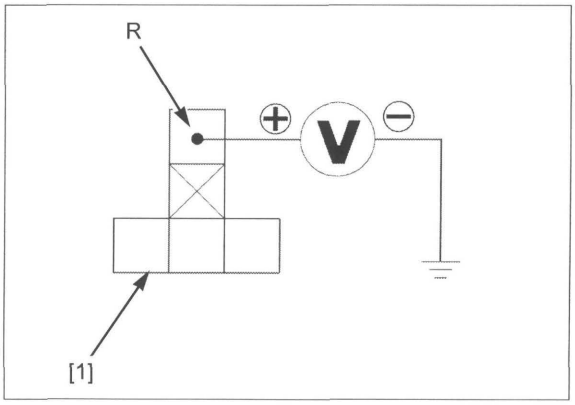
Connection: Red (+) – ground (–)

There should be battery voltage only when the ignition switch is turned to START (II).

Is there battery voltage?

YES – The inhibitor relay circuits are normal.

NO – Open circuit in the Red or Yellow/red wire between inhibitor relay connector and starter relay switch

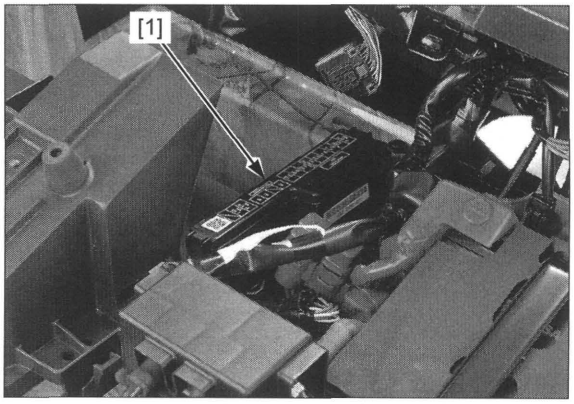


DIODE

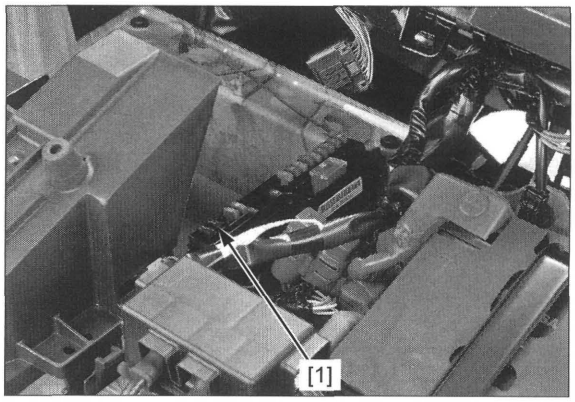
INSPECTION

Remove the front hood (page 2-17).

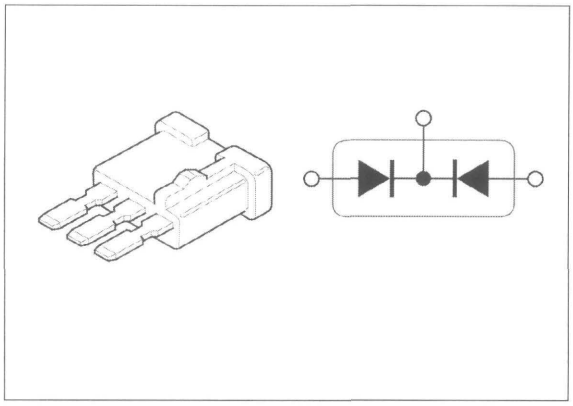
Remove the fuse box cover [1].



Remove the diode [1] from the fuse box.



Check for continuity between the diode terminals.
When there is continuity, a small resistance value will register.
If there is continuity in one direction, the diode is normal.



7. FUEL SYSTEM

SERVICE INFORMATION 7-2

COMPONENT LOCATION 7-3

FUEL LINE INSPECTION 7-6

FUEL PUMP 7-10

FUEL PUMP RELAY 7-14

FUEL TANK 7-16

AIR CLEANER HOUSING 7-17

SNORKEL DUCT 7-18

ACCELERATOR PEDAL 7-20

THROTTLE BODY 7-22

INSULATOR 7-26

IACV 7-27

FUEL INJECTOR 7-28

EVAP PURGE CONTROL SOLENOID VALVE (AC type only) 7-29

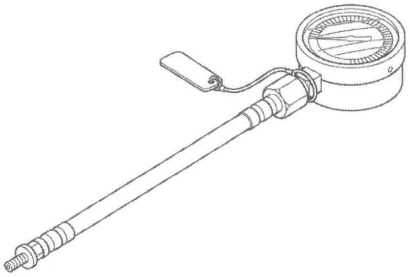
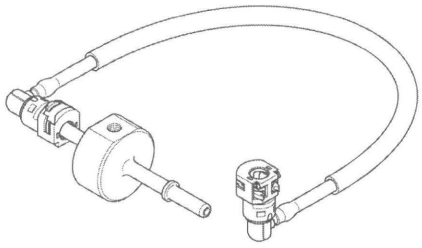
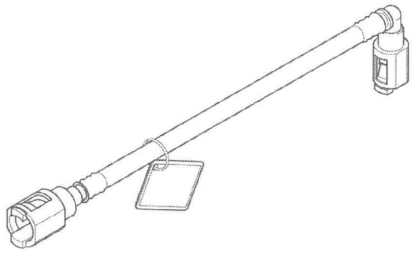
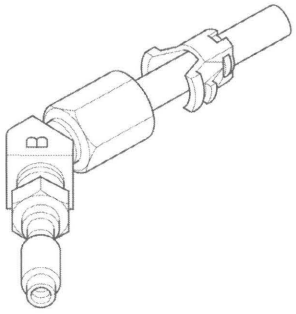
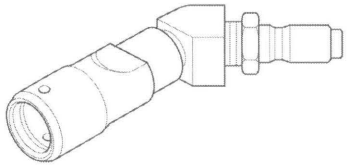
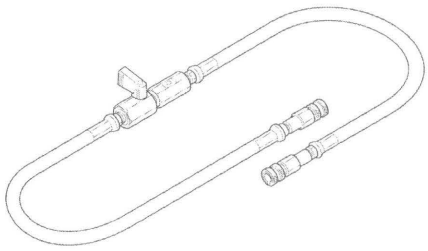
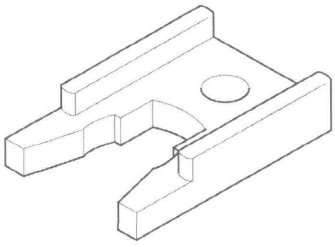
EVAP CANISTER (AC type only) 7-30

SERVICE INFORMATION

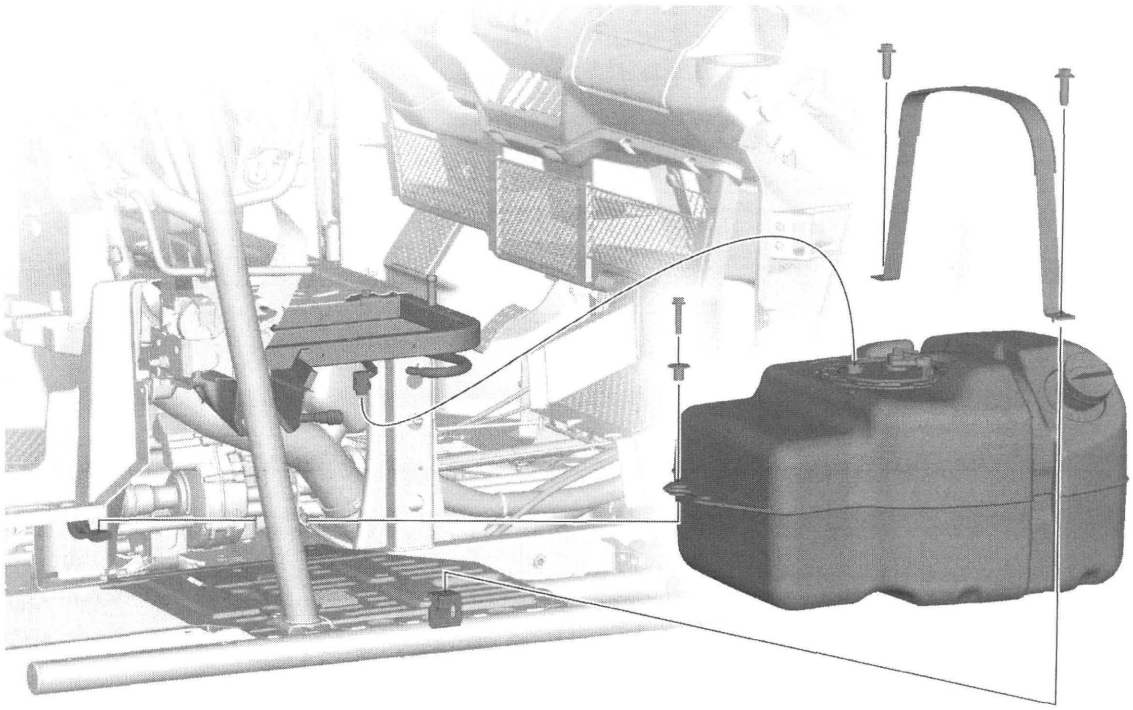
GENERAL

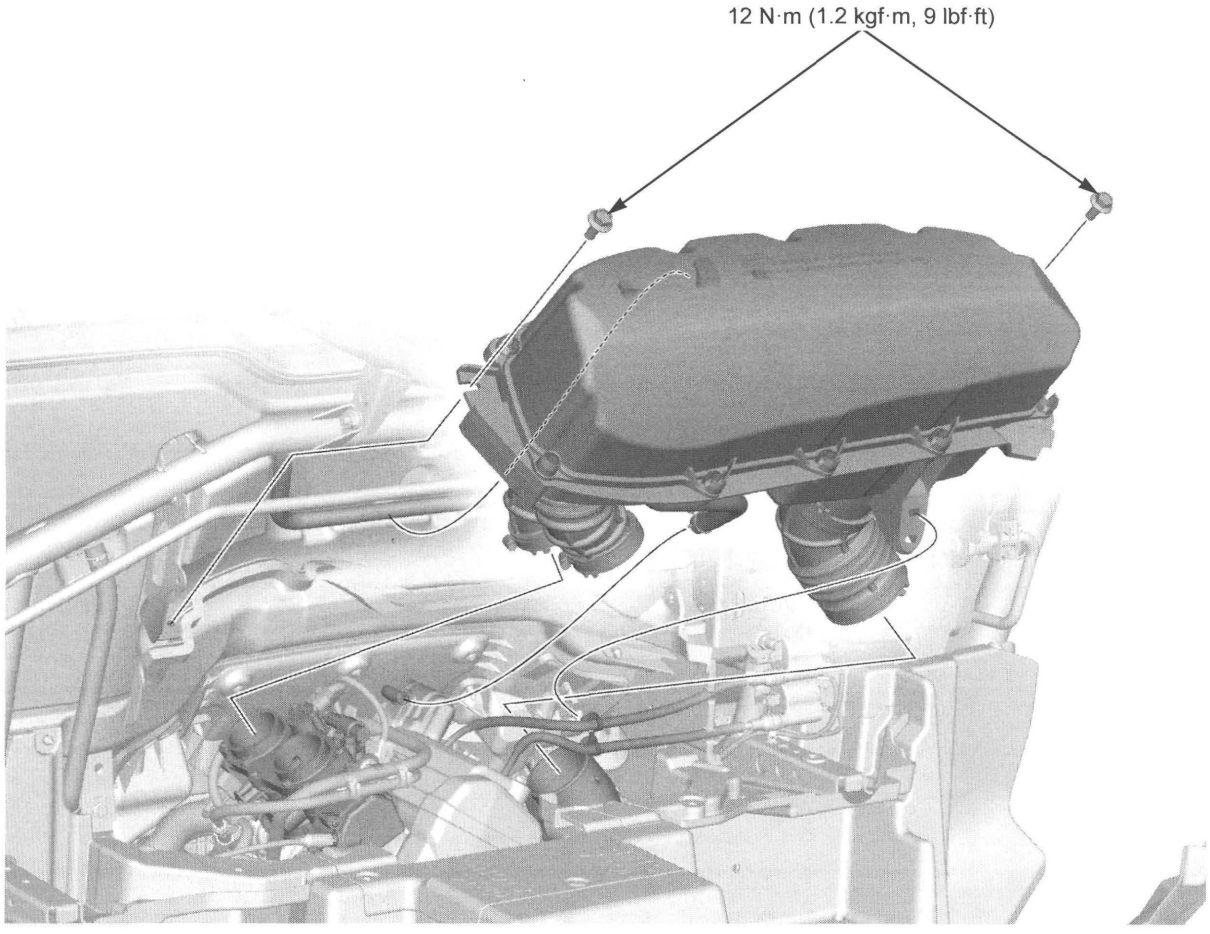
- Before disconnecting the fuel feed hose, relieve pressure from the system (page 7-6).
- Bending or twisting the control cable will impair smooth operation and could cause the cable to stick or bend, resulting in loss of vehicle control.
- Do not snap the throttle valve from full open to full close after the throttle cable has been removed. It may cause incorrect idle operation.
- Seal the cylinder head intake ports with tape or a clean cloth to keep dirt and debris from entering the engine 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 after the throttle body has been removed. Clean them using a compressed air if necessary.
- The parts of the throttle body not shown in this manual should not be disassembled.
- Do not loosen or tighten the white painted nuts of the throttle body. Loosening or tightening them can cause throttle valve and idle control failure.
- For fuel level sensor inspection (page 23-10).

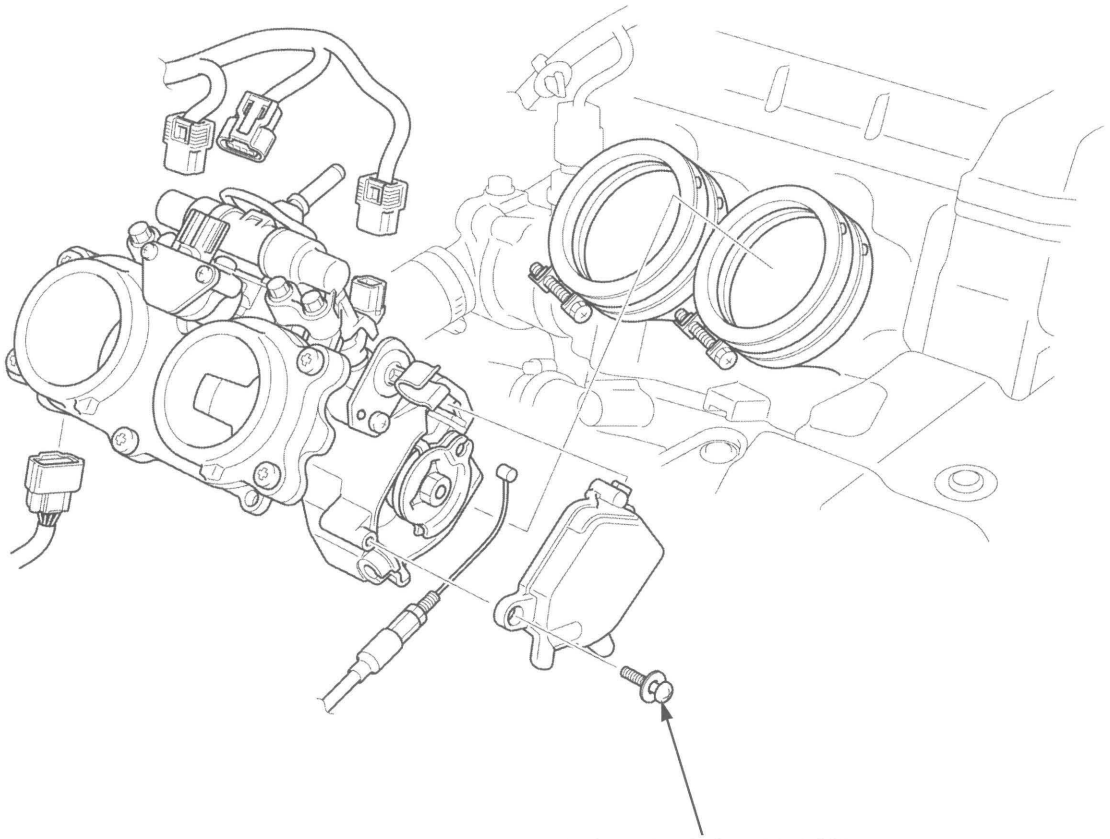
TOOLS

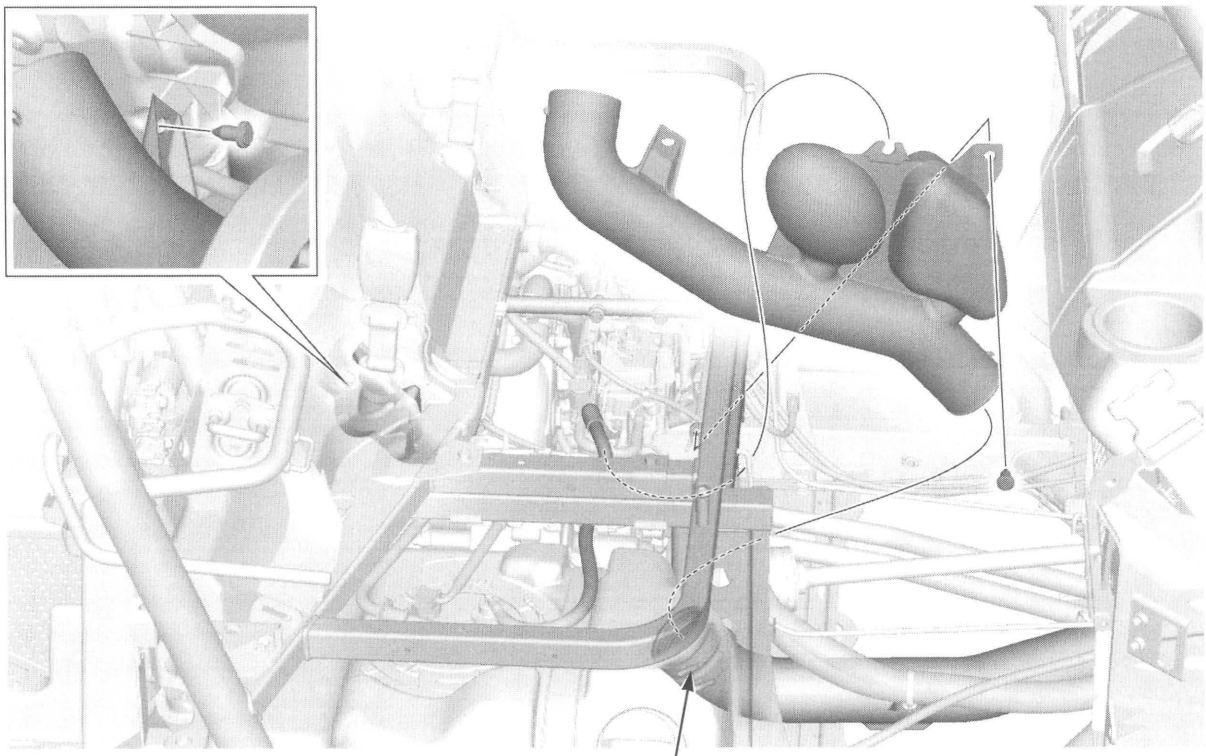
Fuel pressure gauge 07406-0040004  or 07406-004000C (U.S.A. only) or 07406-004000B (U.S.A. only)	Pressure gauge attachment set 070MJ-K260100 (not available in U.S.A.) 	Hose attachment, 6 mm/9 mm 07ZAJ-S5A0130 (not available in U.S.A.) 
Attachment joint, 9 mm/9 mm 07ZAJ-S5A0140 (not available in U.S.A.) 	Adaptor, male, A 07AMJ-HW3A300 (U.S.A. only) 	Adaptor, female, A 07AMJ-HW3A200 (U.S.A. only) 
Pressure manifold hose 07AMJ-HW3A100 (U.S.A. only) 	Fuel connector remover 070MF-HP50200  or 07AMF-001A100 (U.S.A. only)	

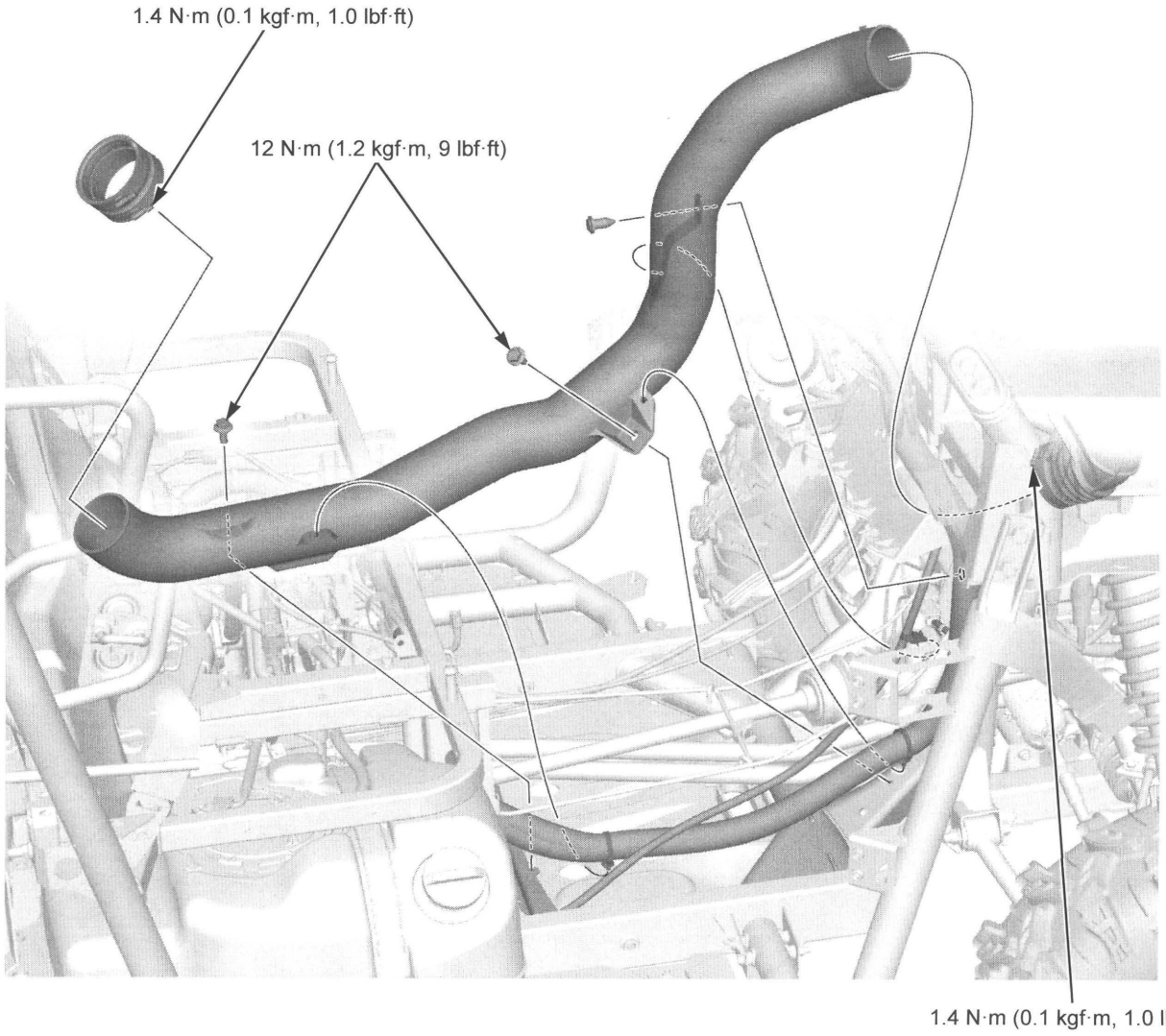
COMPONENT LOCATION






1.8 N·m (0.2 kgf·m, 1.3 lbf·ft)

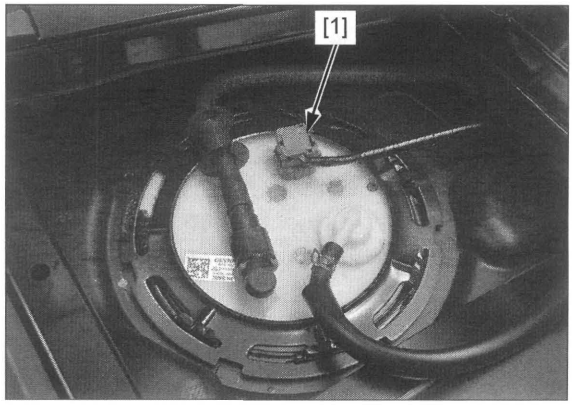

1.4 N·m (0.1 kgf·m, 1.0 lbf·ft)


1.4 N·m (0.1 kgf·m, 1.0 lbf·ft)
12 N·m (1.2 kgf·m, 9 lbf·ft)
1.4 N·m (0.1 kgf·m, 1.0 lbf·ft)

FUEL LINE INSPECTION

FUEL PRESSURE RELIEVING

1. Remove the seat under cover (page 2-6).
2. Turn the ignition switch OFF (O).
3. Disconnect the fuel pump 4P connector [1].
4. Start the engine, and let it idle until it stalls.
5. Turn the ignition switch OFF (O).



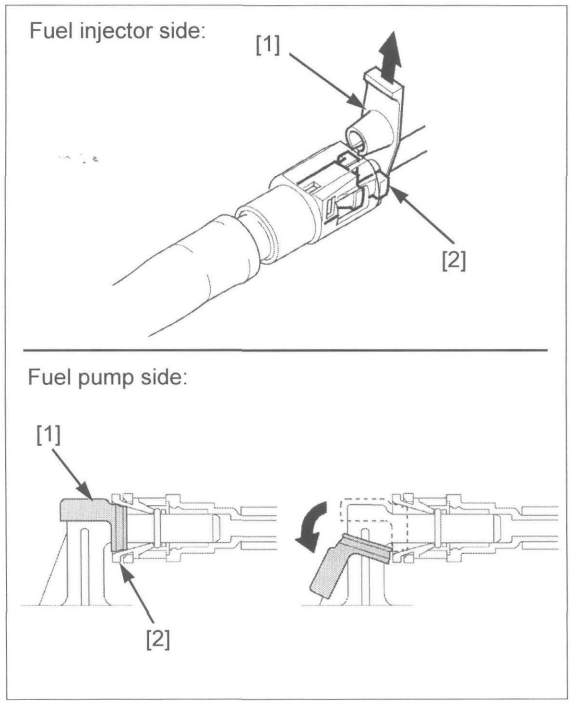
QUICK CONNECT FITTING REMOVAL

NOTE:

- Before disconnecting fuel feed hose, relieve the pressure from the system (page 7-6).
- Do not bend or twist fuel feed hose.

Fuel injector side:

1. Remove the air cleaner housing (page 7-17).
2. Clean the quick connect fitting if necessary, and place a shop towel over the quick connect fitting.
3. Pull and release the connector damper [1] from the retainer [2].



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

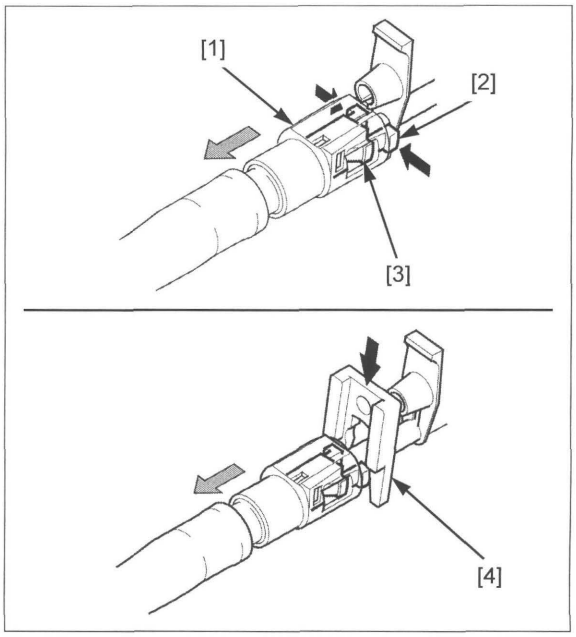
   If using the special tool:

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

   TOOL:

Fuel connector remover [4]	**070MF-HP50200 (U.S.A.: 07AMF-001A100)**

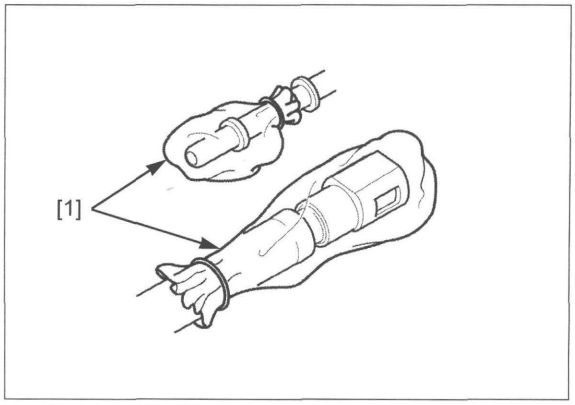
   Pull the connector off, then remove the retainer and connector damper from the pipe end.



NOTE:

- Absorb the remaining fuel in the fuel feed hose 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 plastic bags [1].



QUICK CONNECT FITTING INSTALLATION

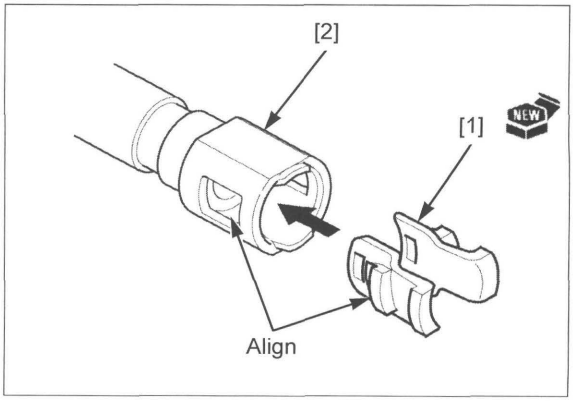
NOTE:

- Always replace the retainer and connector damper of the quick connect fitting when the fuel feed hose is disconnected.
- Use the same manufacturer's retainer as the removed one.
- Do not bend or kink the fuel feed hose.

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

NOTE:

- Align the retainer locking pawls with the connector grooves.



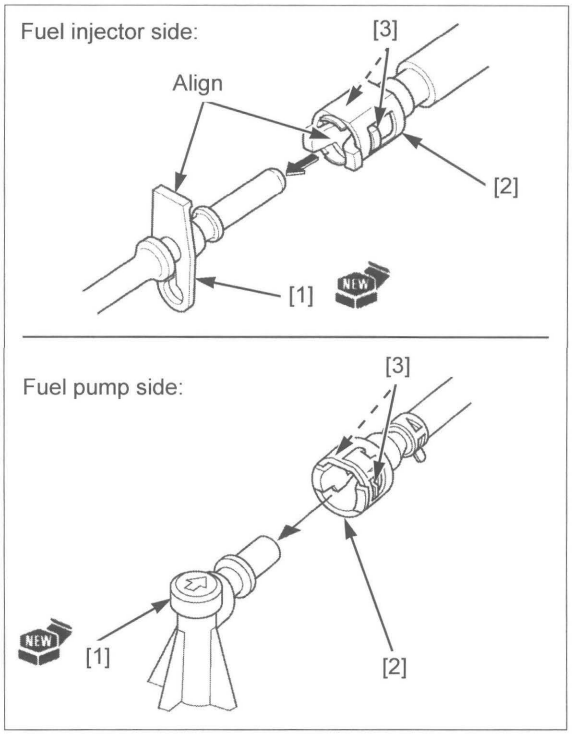
2. Set a new connector damper [1] to the joint as shown.

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

NOTE:

- For fuel injector side, align the retainer groove with the connector damper tabs.

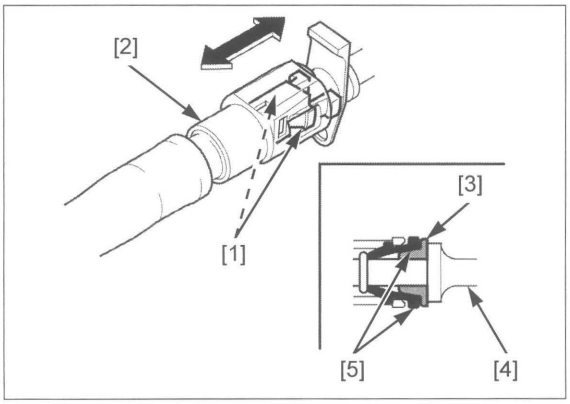
  If it is hard to connect, put a small amount of engine oil on the joint.



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]).

Fuel injector side:

5. Install the air cleaner housing (page 7-17).
6. Increase the fuel pressure (page 7-8).

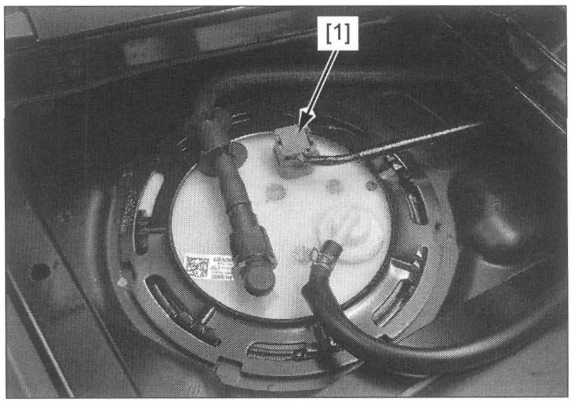


FUEL PRESSURE INCREASING

1. Connect the fuel pump 4P connector [1].

Do not start the engine.

2. Turn the ignition switch ON (I).
   The fuel pump will run for about 2 seconds, and fuel pressure will rise.
   Turn the ignition switch OFF (O).
3. Repeat step 2 several times, and check that there is no leakage in the fuel supply system.
4. Install the seat under cover (page 2-6).



FUEL PRESSURE INSPECTION

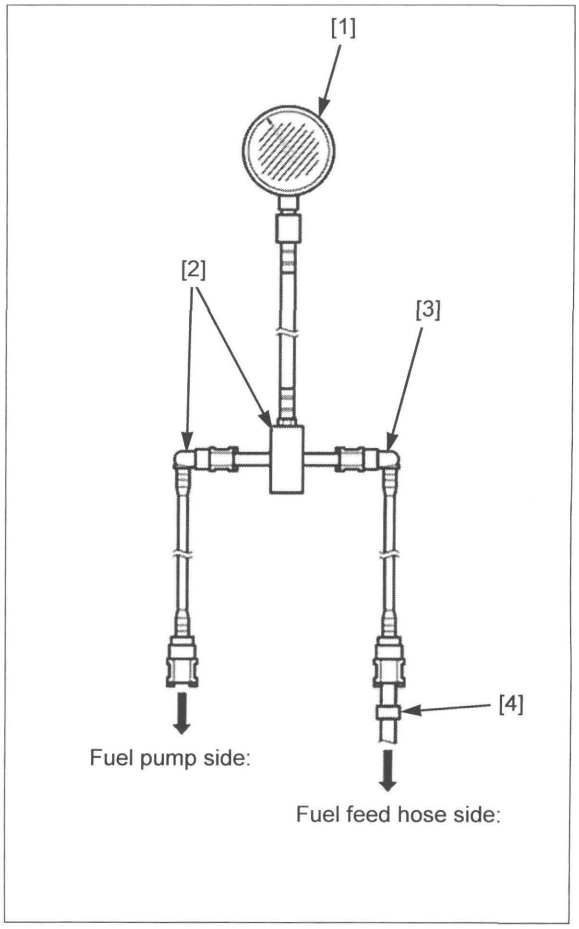
Relieve the fuel pressure (page 7-6).

Disconnect the quick connect fitting from the fuel pump (page 7-6).

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

TOOLS:

Fuel pressure gauge [1]	**07406-0040004 (U.S.A.: 07406-004000C or 07406-004000B)**
Pressure gauge attachment set [2]	**070MJ-K260100**
Hose attachment, 6 mm/9 mm [3]	**070ZAJ-S5A0130**
Attachment joint, 9 mm/9 mm [4]	**07ZAJ-S5A0140**
Pressure manifold hose	**(U.S.A.: 07AMJ-HW3A100)**
Adaptor, male, A	**(U.S.A.: 07AMJ-HW3A300)**
Adaptor, female, A	**(U.S.A.: 07AMJ-HW3A200)**



Connect the fuel pump 4P connector [4].

Start the engine and let it idle.
Read the fuel pressure.

Standard: 331 – 367 kPa (3.4 – 3.7 kgf/cm², 48 – 53 psi)

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

If the fuel pressure is lower than the specified pressure, inspect the following:
- fuel line for leakage
- pinched or clogged fuel feed hose
- fuel pump (page 7-10)

Disconnect the fuel pump 4P connector, start the engine and let it idle until it stalls to relieve the fuel pressure.

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

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

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

FUEL FLOW INSPECTION

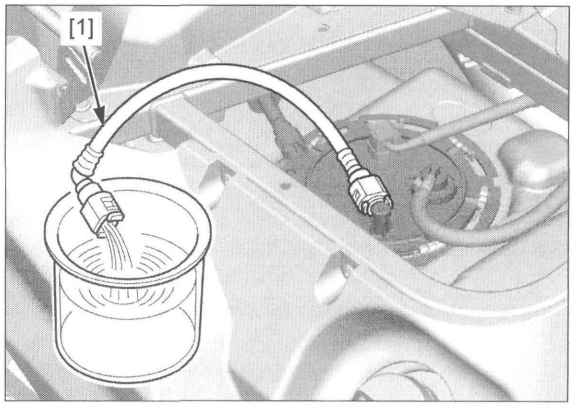
Disconnect the quick connect fitting from the fuel pump (page 7-6).

Connect the special tool to the fuel pump.

TOOL:
Hose Attachment, 6 mm/9 mm [1] 07ZAJ-S5A0130

Clean up any spilled fuel.

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



Temporarily connect the battery negative (–) cable to the battery (page 22-4).

Turn the ignition switch ON (I).
Measure the amount of fuel flow.

- The fuel pump operates for 2 seconds. Repeat 5 times to measure the amount of fuel.
- Return fuel to the fuel tank when the measurement is completed.

Amount of fuel flow:
356 cm³ (12.0 US oz, 12.5 Imp oz) minimum/ 10 seconds at 12 V

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

– pinched or clogged fuel hose or fuel pump breather hose
– fuel pump (page 7-10)

Turn the ignition switch OFF (O).

Remove the special tool from the fuel pump.

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

FUEL PUMP

INSPECTION

Turn the ignition switch ON (I).
Confirm that the fuel pump operates for a few seconds.
If the fuel pump does not operate, inspect as follows:

Remove the front seat cushion (page 2-4).

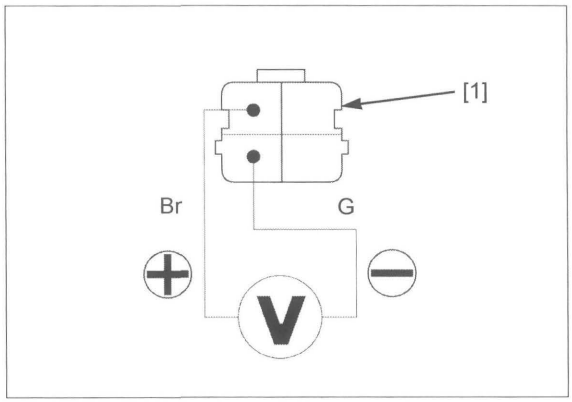
Turn the ignition switch OFF (O).

Disconnect the fuel pump 4P connector (page 7-11).

Turn the ignition switch ON (I).

Measure the voltage between the wire harness side 4P connector [1] terminals.

Connection: Brown (+) – Green (–)



There should be battery voltage for a few seconds.

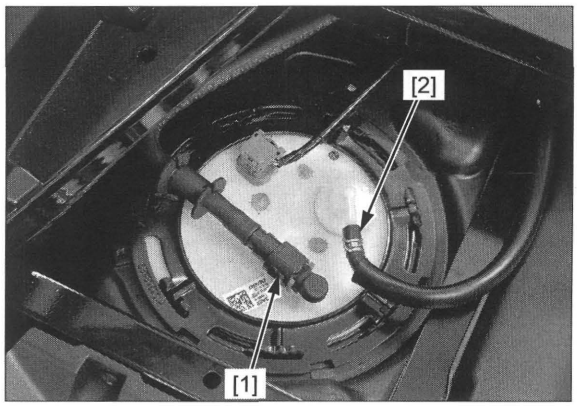
If there is battery voltage, replace the fuel pump assembly.

If there is no voltage, check the following:
– open circuit in the Brown wire between the fuel pump and fuel pump relay
– open circuit in the Green wire between the fuel pump and ground terminal
– fuel pump relay and its circuits (page 7-14)

REMOVAL

Disconnect the quick connect fitting [1] from the fuel pump (page 7-6).

Disconnect the fuel tank breather hose [2].



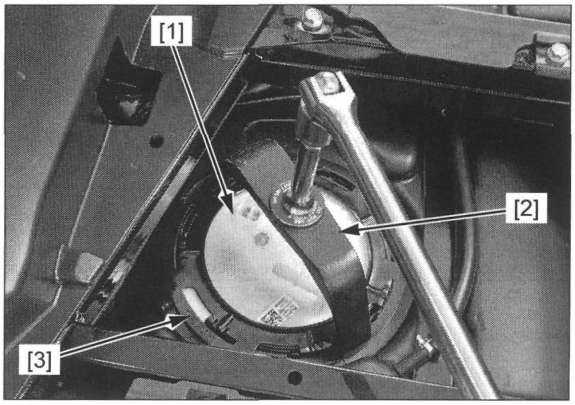
Remove the locking ring [1] by rotating it counterclockwise using the special tool.

TOOL:

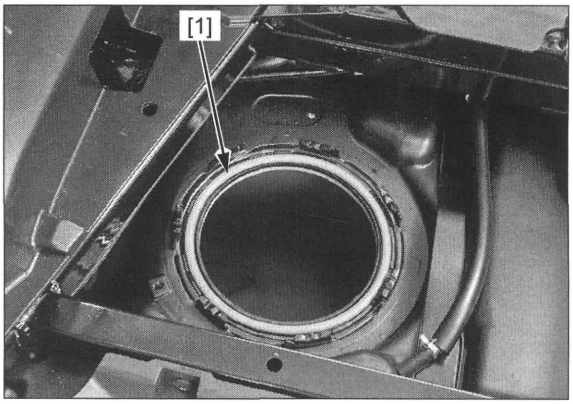
Fuel pump lock ring wrench [2]	**SPX OTC #6599 commercially available in the U.S.A.**

Be careful not to bend the float arm.

Remove the locking ring and fuel pump assembly [3] from the fuel tank.



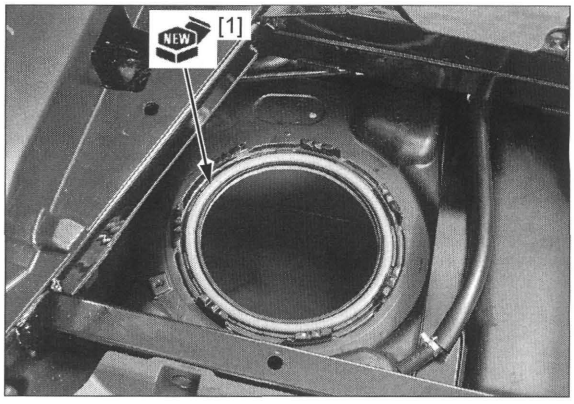
Remove the O-ring [1].



INSTALLATION

Install a new O-ring [1] onto the fuel tank.

- Clean the O-ring seating area of the fuel tank, and be sure that no foreign materials enter the tank.
- Always replace the O-ring with a new one.



Be careful not to damage or pinch the O-ring.

Install the fuel pump assembly [1] into the fuel tank by aligning its tab with the index mark on the fuel tank.



Install and tighten a new locking ring [1] by rotating it clockwise using the special tool.

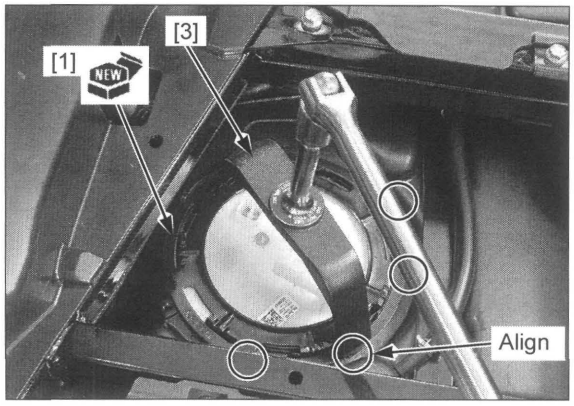
NOTE:

- Align the grooves of the locking ring with the marks of the fuel tank.

TOOL:

Fuel pump lock ring wrench [3]	**SPX OTC #6599 commercially available in the U.S.A.**

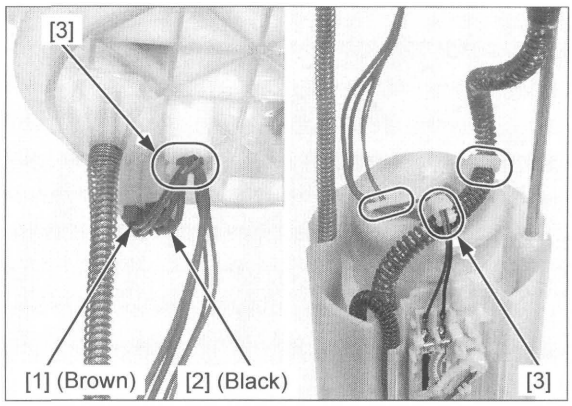
Install the removed parts in the reverse order of removal.



DISASSEMBLY/ASSEMBLY

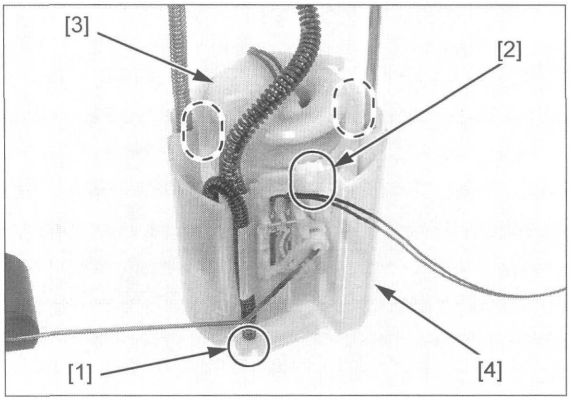
Disconnect the fuel level sensor connector [1] and fuel pump connector [2].

Release the wires from the hooks [3].



Release the hose joint [1] and disconnect it.

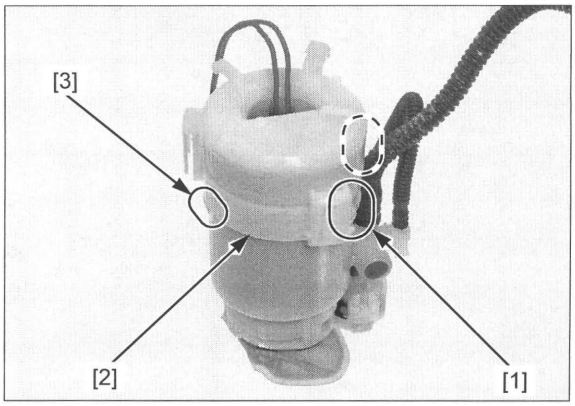
Release the hooks [2] and remove fuel pump body [3] from the reservoir [4].



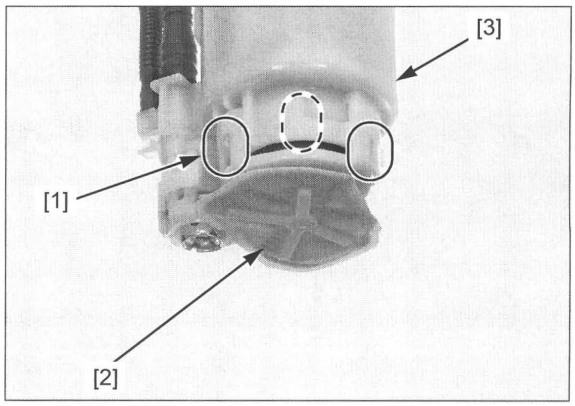
Release the hooks [1] and remove the pump retainer [2].

NOTE:

- When installing the retainer, align the tabs [3] of the retainer and pump body.



Release the hooks [1] and pull out the fuel filter assembly [2] from the fuel pump body [3].

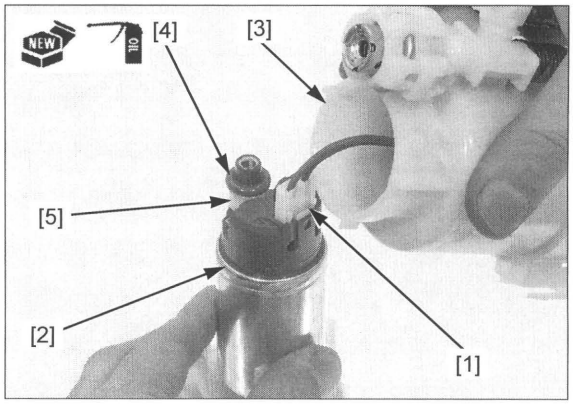


Disconnect the connector [1] and remove the fuel filter assembly [2] from the fuel pump body [3].

Remove the O-ring [4] and spacer [5].

NOTE:

- Apply small amount of engine oil to a new O-ring.



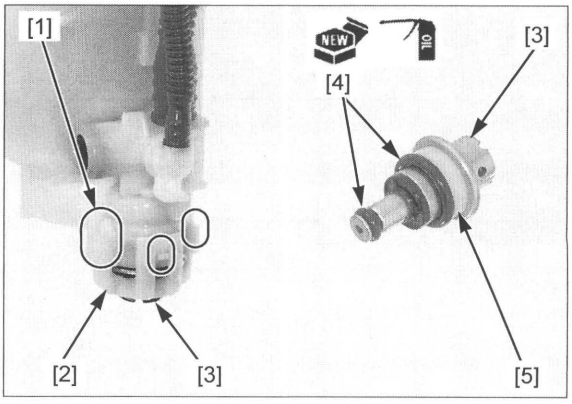
Release the hooks [1] and remove the retainer [2].

Remove the pressure regulator [3] from the pump body. Remove the O-rings [4] and spacer [5] from the pressure regulator.

Install the removed parts in the reverse order of removal.

NOTE:

- Apply small amount of engine oil to new O-rings.



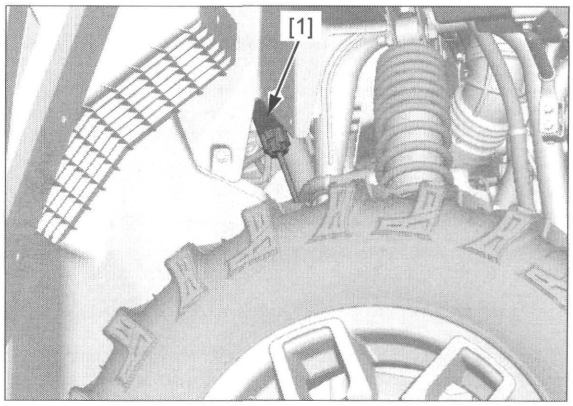
FUEL PUMP RELAY

REMOVAL/INSTALLATION

Remove the left floor protector (page 2-15).

Remove the fuel pump relay [1] from the connector.

Installation is in the reverse order of removal.

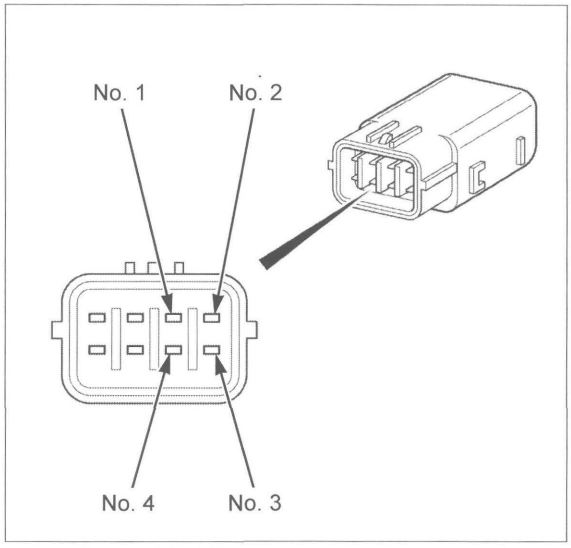


RELAY INSPECTION

Remove the fuel pump relay (page 7-14).

Check for continuity between the No. 1 and No. 2 terminals.
Connect a fully charged 12 V battery (+) terminal to the relay No. 4 terminal and the (–) terminal to the No. 3 terminal.

There should be continuity when the battery is connected, and no continuity when the battery is disconnected.



CIRCUIT INSPECTION

1. Power Input Line Inspection

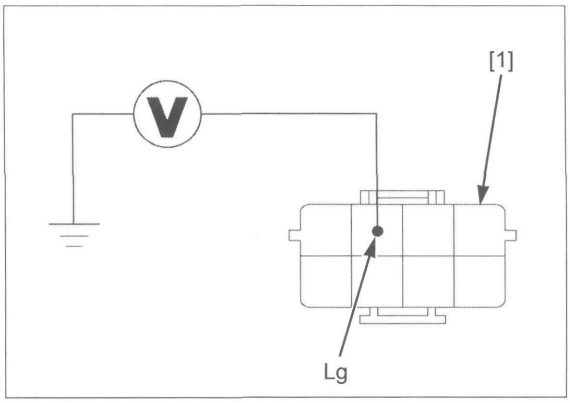
Remove the fuel pump relay (page 7-14).
Measure the voltage between the wire harness side relay connector [1] and ground.

Connection: Light green (+) – ground (–)

Is there battery voltage?

YES – GO TO STEP 2.

NO – • Open circuit in the Light green wire between the fuse box and relay connector
• Blown FUEL/FAN fuse (20 A)



2. Relay coil power Input Line Inspection

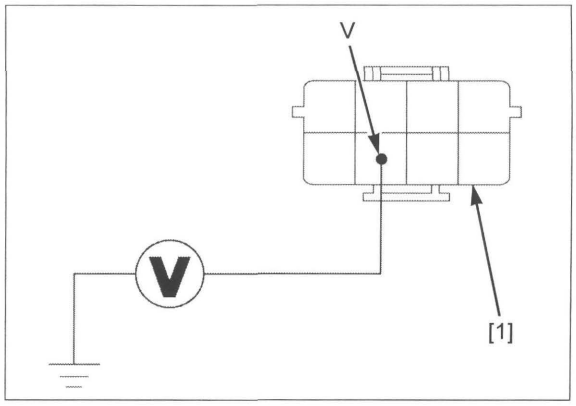
Turn the ignition switch ON (I).
Measure the voltage between the wire harness side relay connector [1] and ground.

Connection: Violet (+) – ground (–)

Is there battery voltage?

YES – GO TO STEP 3.

NO – • Open circuit in the Violet wire between the fuse box and relay connector
• Blown fuel pump relay (15 A)



3. Relay Coil Ground Line Inspection

Turn the ignition switch OFF (O).
Measure the voltage at the wire harness side relay connector [1].

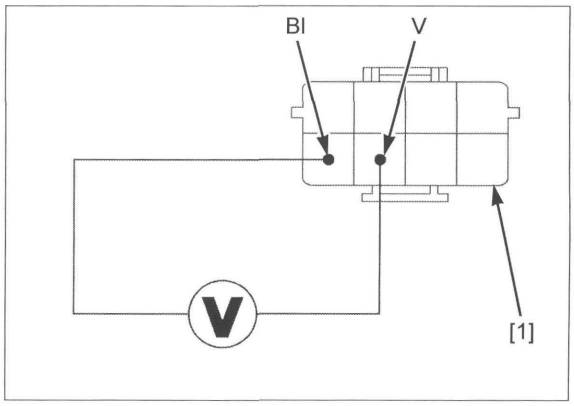
Connection: Violet (+) – Black (–)

Turn the ignition switch ON (I).

Is there battery voltage for about 2 seconds?

YES – The fuel pump relay circuits are normal.

NO – • Open circuit in the Black wire between the relay connector and PCM
• Faulty power/ground line of the PCM (page 4-36)
• Faulty PCM



FUEL TANK

REMOVAL/INSTALLATION

Remove the floor panel (page 2-17).

Relieve the fuel pressure (page 7-6).

Disconnect the quick connect fitting from the fuel tank (page 7-6).

Except AC type: Release the fuel tank breather hose [1].

AC type: Release the fuel tank charge hose (to EVAP canister) [1].

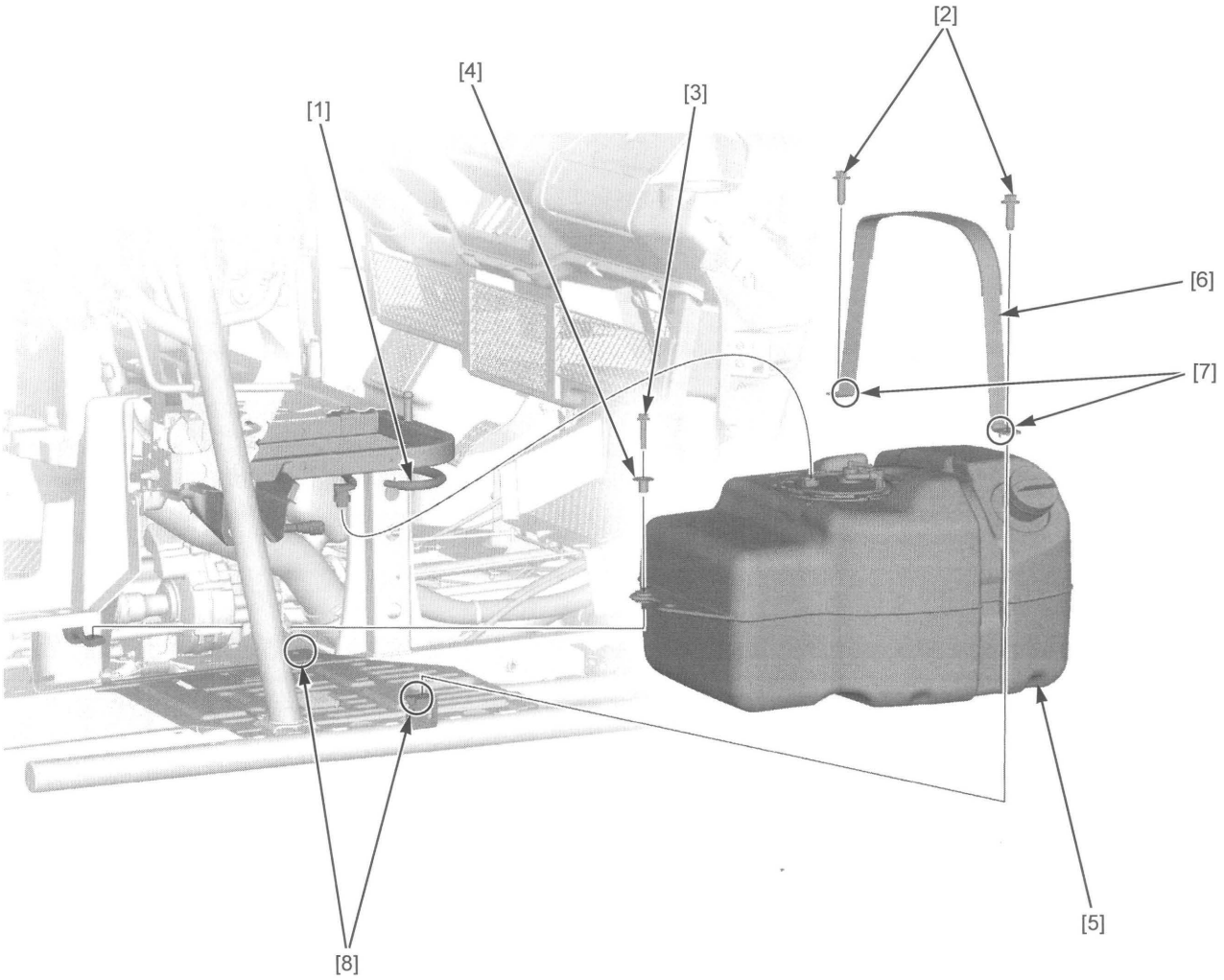
Remove the washer/bolts [2], bolt [3] and collar [4].

Remove the fuel tank [5] and tank band [6].

Installation is in the reverse order of removal.

NOTE:

- When tightening the washer/bolts, align each retainer tab [7] of the tank band with the holes [8] of the tank base plate.



AIR CLEANER HOUSING

REMOVAL/INSTALLATION

Remove the air cleaner cover (page 2-11).

Release the wire clips [1].

Loosen the air cleaner connecting hose band screws [2] and snorkel duct connecting hose band screw [3].

Remove the air cleaner housing mounting bolts [4] and air cleaner housing [5] by releasing retaining hooks [6].

Disconnect the crankcase breather hose [7].

Installation is in the reverse order of removal.

NOTE:

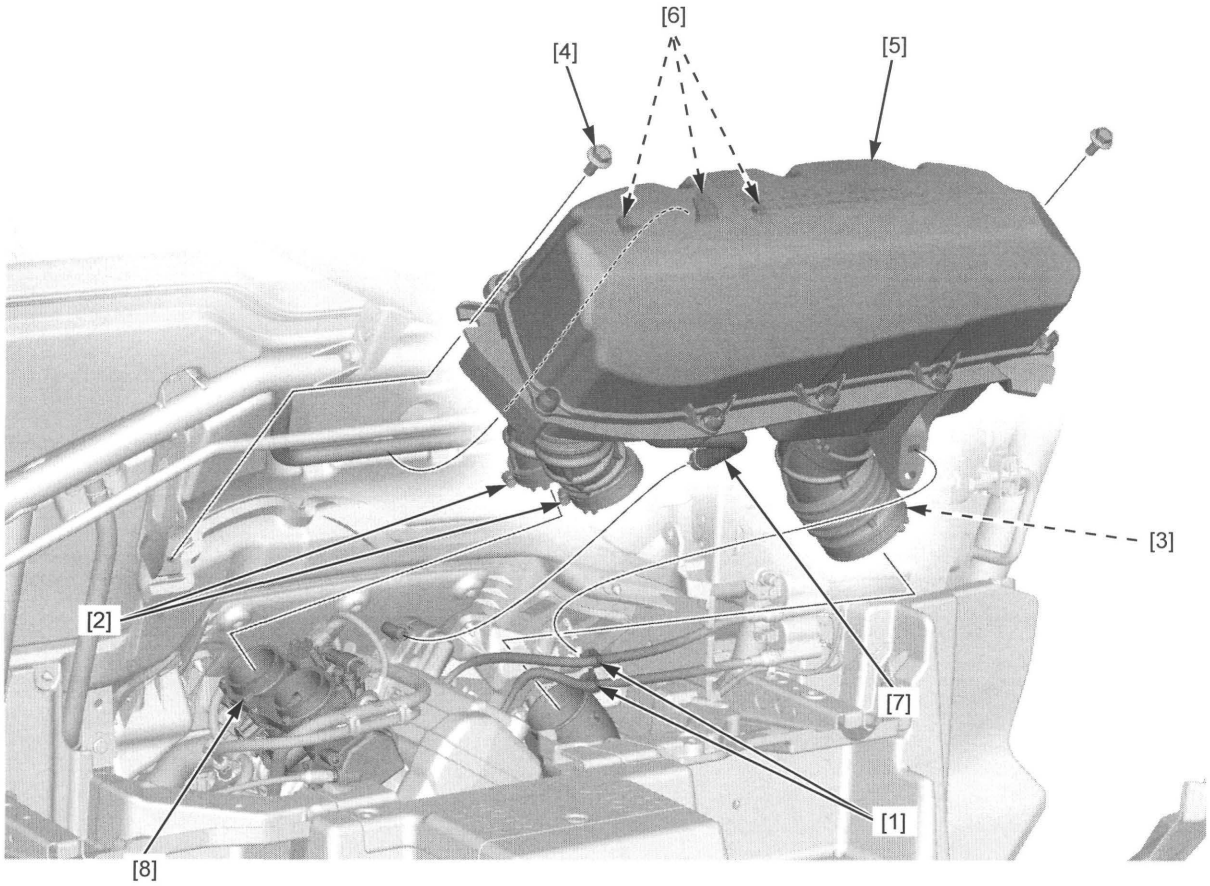
- Align the lug of the air cleaner housing with the groove in the snorkel duct connecting hose.
- Align the grooves in the air cleaner connecting hoses with the lugs of the throttle body setting plate [8].
- Tighten the air cleaner connecting hose band screws to the specified torque.

TORQUE:

Air cleaner housing mounting bolt:
12 N·m (1.2 kgf·m, 9 lbf·ft)

Snorkel duct connecting hose band screw:
1.4 N·m (0.1 kgf·m, 1.0 lbf·ft)

Insulator band screw:
1.4 N·m (0.1 kgf·m, 1.0 lbf·ft)



SNORKEL DUCT

REMOVAL/INSTALLATION

SNORKEL DUCT A

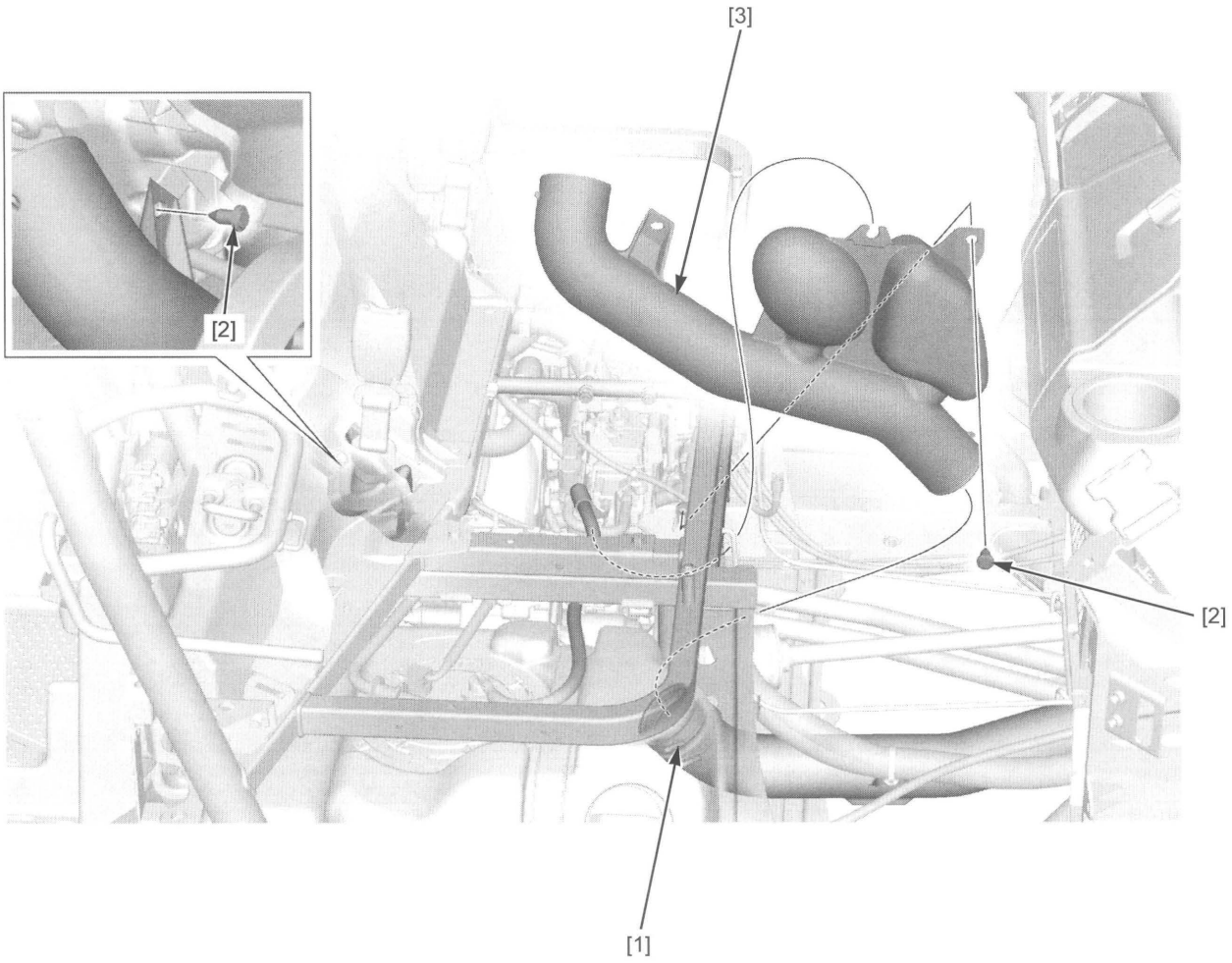
Remove the floor panel (page 2-17).
Remove the air cleaner (page 7-17).

Loosen the connecting hose band screw [1].

Remove the trim clips [2] and snorkel duct A [3].

Installation is in the reverse order of removal.

TORQUE:
Snorkel duct connecting hose band screw:
1.4 N·m (0.1 kgf·m, 1.0 lbf·ft)



SNORKEL DUCT B

Remove the front floor cover (page 2-31).

Remove the trim clip [1] and wire harness clips [2].

Loosen the connecting hose band screws [3].

Remove the snorkel duct B mounting bolts [4], snorkel duct B [5] and connecting hose B [6].

Installation is in the reverse order of removal.

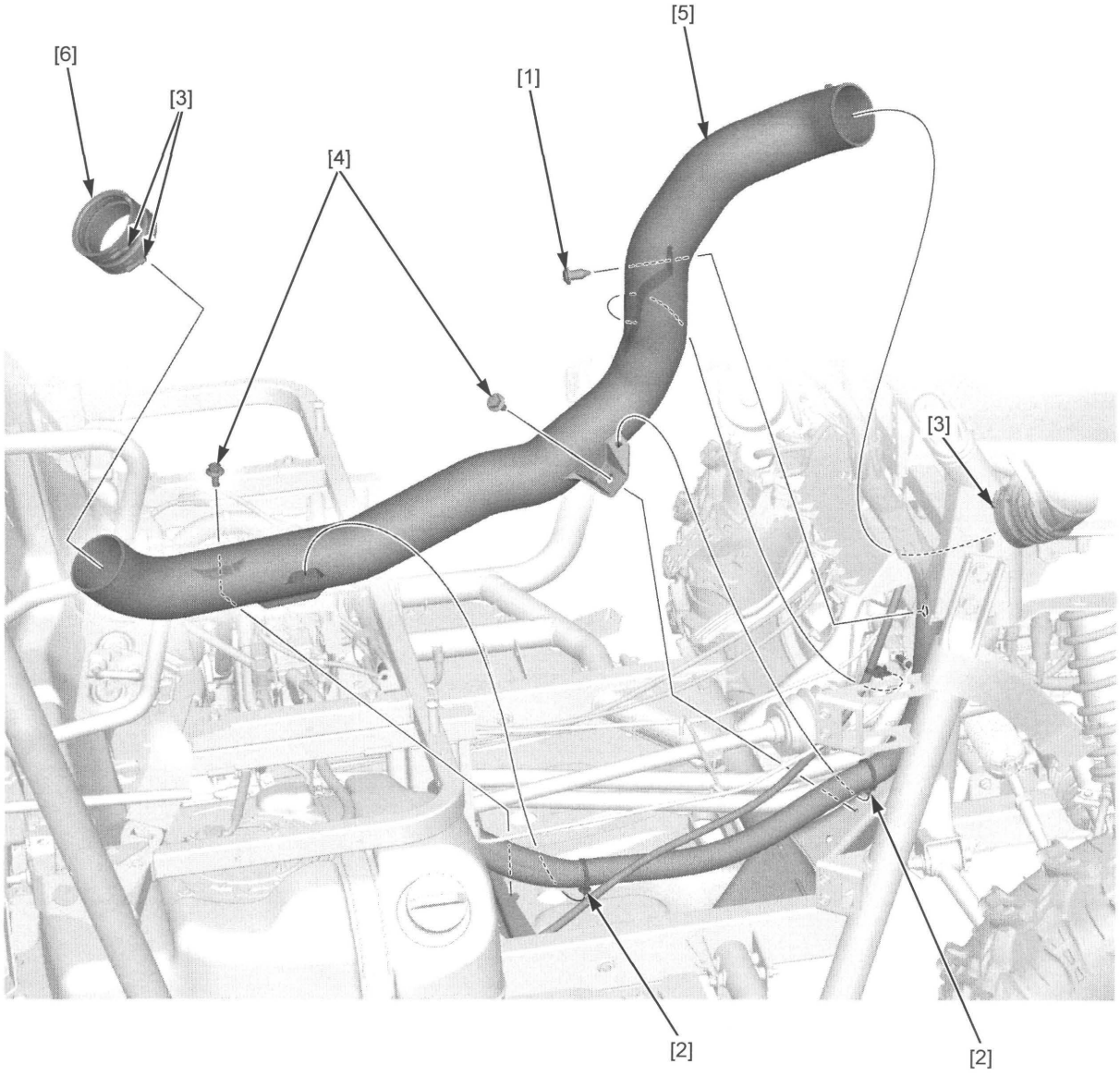
NOTE:

- Align the connecting hose grooves with the lugs of the snorkel ducts A/B and front fender.

TORQUE:

Snorkel duct B mounting bolt:
12 N·m (1.2 kgf·m, 9 lbf·ft)

Snorkel duct connecting hose band screw:
1.4 N·m (0.1 kgf·m, 1.0 lbf·ft)



ACCELERATOR PEDAL

REMOVAL/INSTALLATION

Release the cable retainer (Yellow) [1] and disconnect the inner cable.

Remove the bolt [2] and disconnect the outer cable [3] from the bracket.

Remove the socket bolt [4].

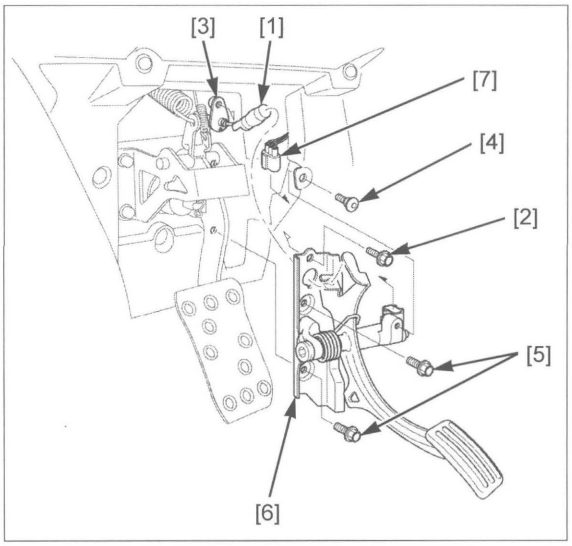
Remove the bolts [5] and accelerator pedal assembly [6].

Disconnect the throttle release angle sensor 3P connector [7].

Installation is in the reverse order of removal.

NOTE:

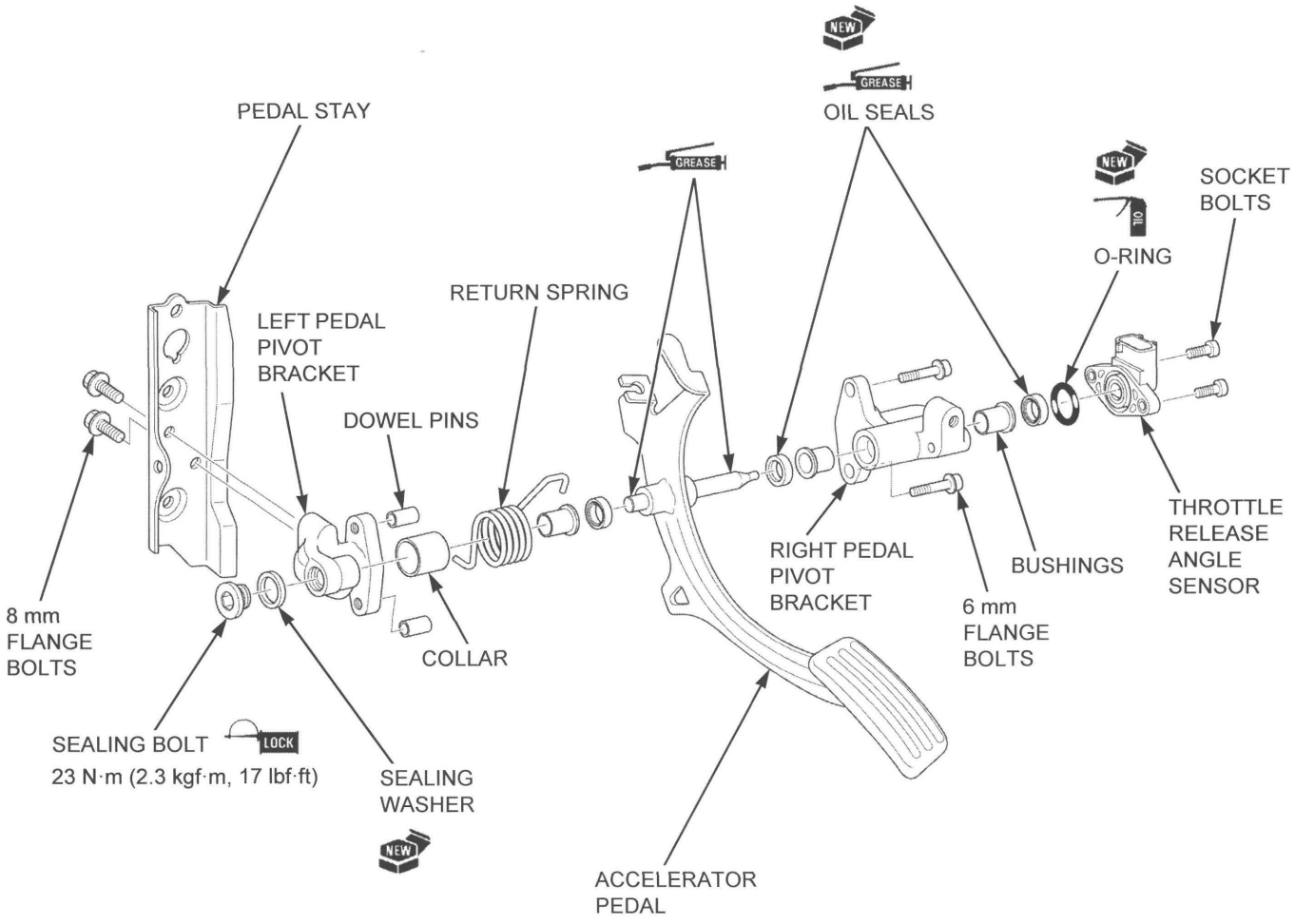
- After Installation, perform the accelerator pedal fully closed position reset procedure (page 7-20).



ACCELERATOR PEDAL FULLY CLOSED POSITION RESET PROCEDURE

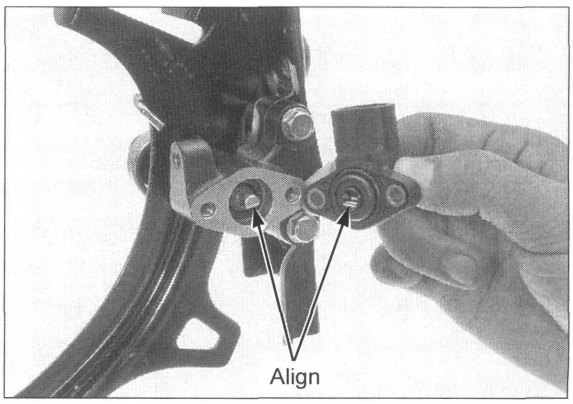
1. Adjust the pedal freeplay (page 3-5).
2. Check that the pedal is fully closed.
3. Turn the ignition switch ON (I).
   The accelerator pedal fully closed position will be reset.
4. Turn the ignition switch OFF (O).

DISASSEMBLY/ASSEMBLY



NOTE:

- Align the flat surfaces of the throttle release angle sensor hole and accelerator pedal shaft end.



THROTTLE BODY

REMOVAL

NOTE:

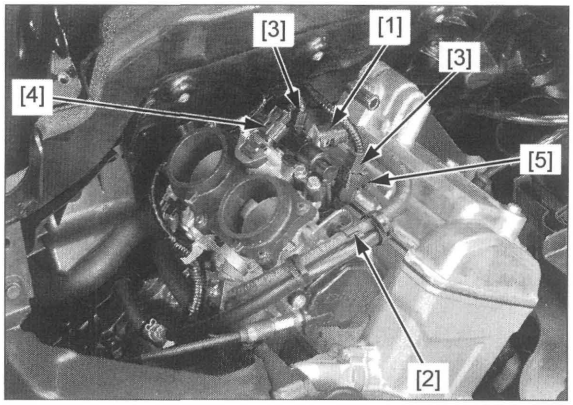
- If the TP sensor/MAP sensor/IAT sensor (sensor unit) is removed from the throttle body, the TP sensor reset procedure must be performed after installing the throttle body (page 4-33).

Relieve the fuel pressure (page 7-6).

Disconnect the quick connect fitting [1] (page 7-6).
Release the fuel feed hose from the hose clamp [2].

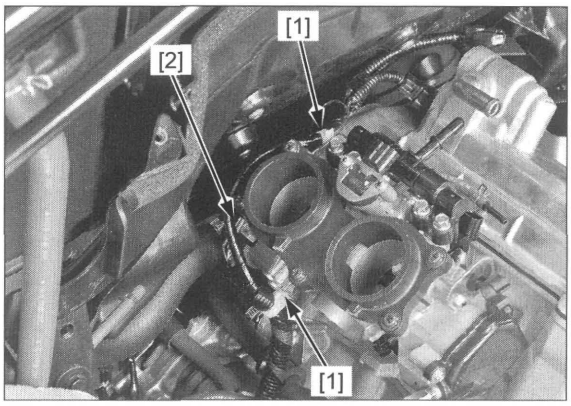
Disconnect the following:

– fuel injector 2P connectors [3]
– IACV 4P connector [4]
– EVAP purge hose (AC type only) [5]



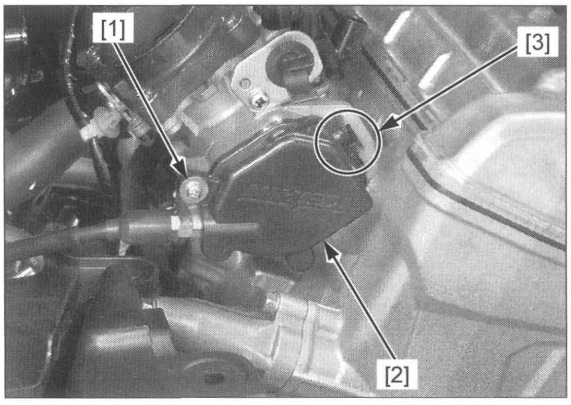
Release the wire harness clips [1].

Disconnect the sensor unit 5P connector [2].



Remove the screw/washer [1].

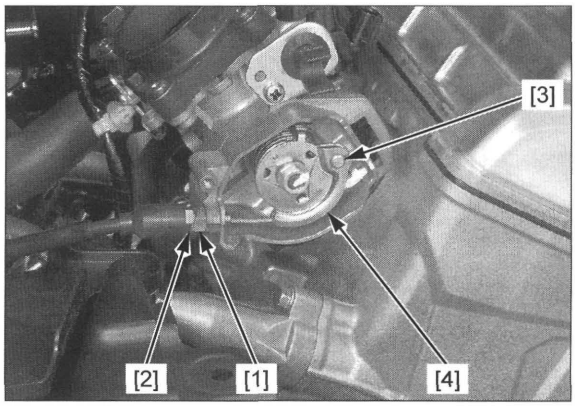
Remove the throttle drum cover [2] by releasing the locating tab [3].



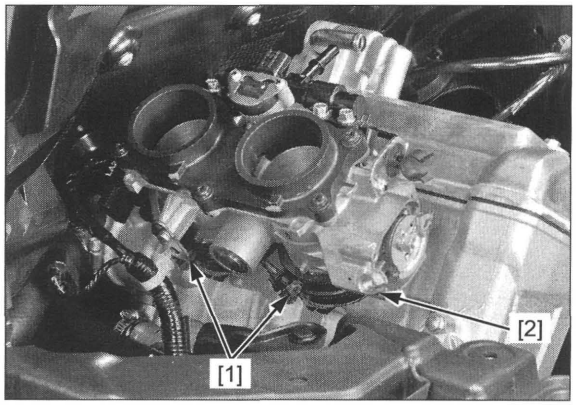
Loosen the throttle cable adjuster lock nut [1].

Remove the throttle cable adjuster [2].

Disconnect the throttle cable [3] from the throttle drum [4].



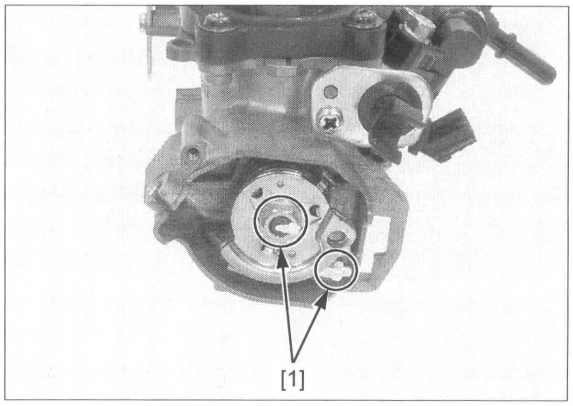
Loosen the insulator band screws [1] and remove the throttle body [2].



DISASSEMBLY/ASSEMBLY

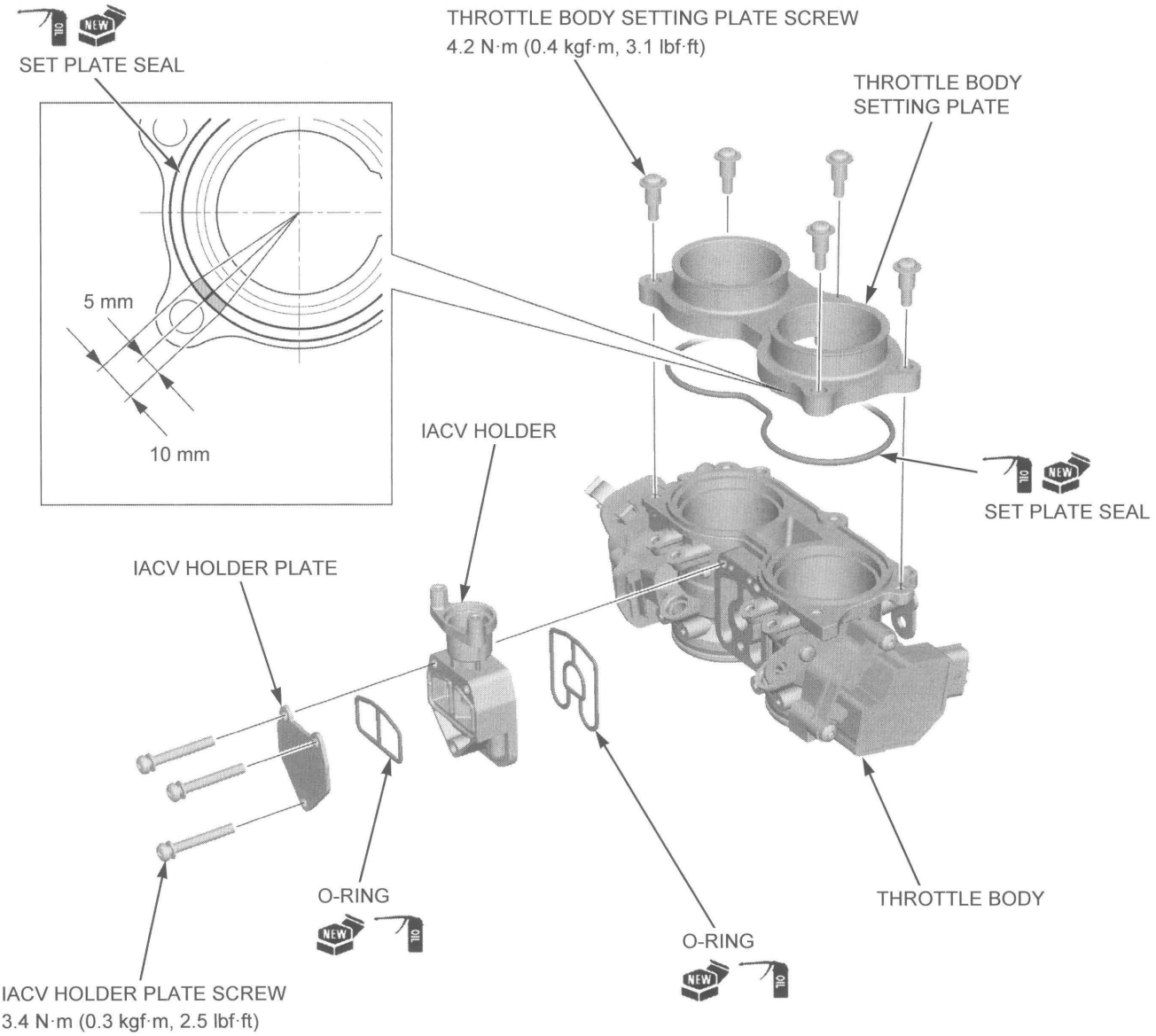
NOTICE

- *Do not remove the sensor unit unless it is replaced.*
- *Do not loosen or tighten the white painted nuts [1] of the throttle body. Loosening or tightening it can cause throttle valve and idle control failure.*
- *Always clean around the throttle body before each sensor removal to prevent dirt and debris from entering the air passage.*



NOTE:

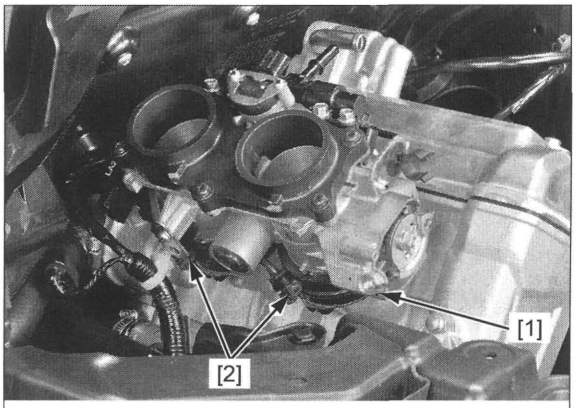
- IACV removal/installation (page 7-27)
- Fuel injector removal/installation (page 7-28)
- TP sensor/MAP sensor/IAT sensor (sensor unit) replacement (page 4-32)
- Set the plate seal connecting end as shown in the illustration.
- If the O-ring is not installed properly, the idle air will leak and engine idle speed will be unstable.

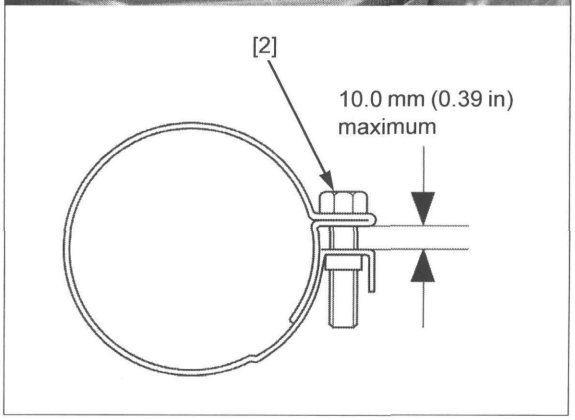


INSTALLATION

Install the throttle body [1].

Tighten the insulator band screws [2] to the specified range.



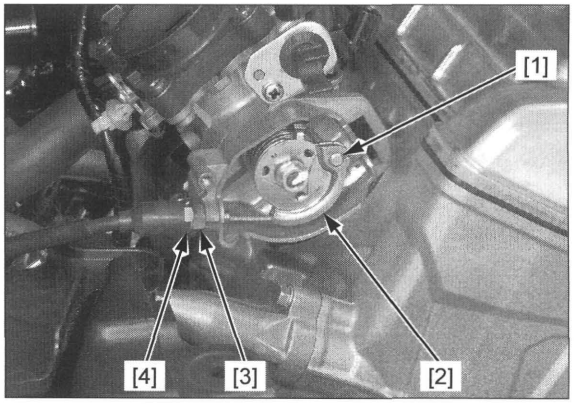


Connect the throttle cable [1] to the throttle drum [2].

Install the throttle cable adjuster [3].

Tighten the throttle cable adjuster lock nut [4].

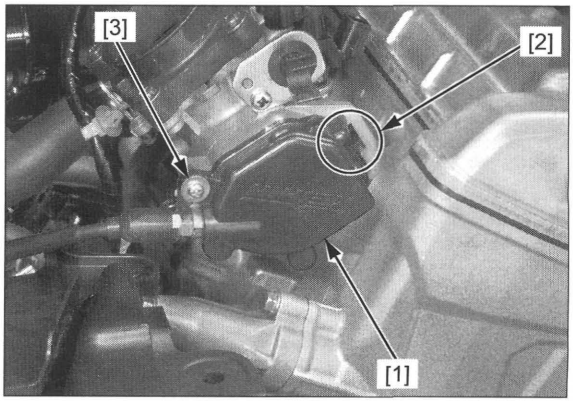
Adjust the accelerator pedal freeplay (page 3-5).



Install the throttle drum cover [1] by aligning the locating tab [2] with the slot of the throttle body.

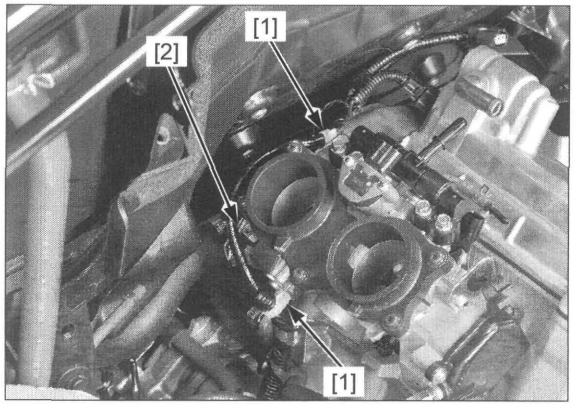
Install the screw/washer [3] and tighten it to the specified torque.

TORQUE: 1.8 N·m (0.2 kgf·m, 1.3 lbf·ft)



Install the wire harness clips [1].

Connect the sensor unit 5P connector [2].

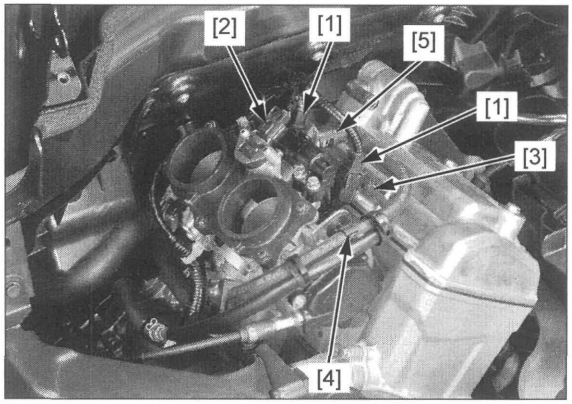


Connect the following:

- Fuel injector 2P connectors [1]
- IACV 4P connector [2]
- EVAP purge hose (AC type only) [3]

Install the fuel feed hose to the hose clamp [4]
Connect the quick connect fitting [5] (page 7-7).

Increase the fuel pressure (page 7-8).



INSULATOR

REMOVAL/INSTALLATION

Remove the throttle body (page 7-22).

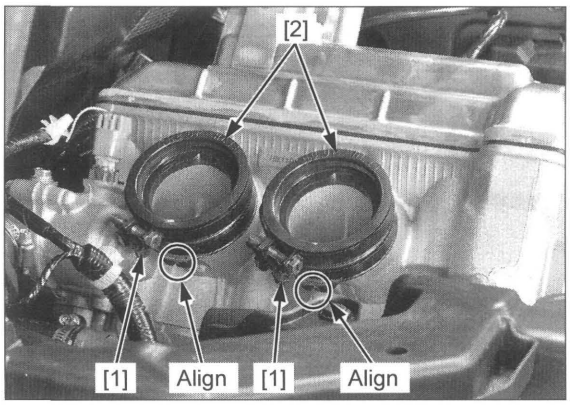
Loosen the insulator band screws [1].

Remove the insulators [2].

Installation is in the reverse order of removal.

NOTE:

- Align each groove of the insulators with the tabs of the cylinder head.
- Tighten the insulator band screws to the specified range (page 7-25).



IACV

INSPECTION

NOTE:

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

Remove the air cleaner housing (page 7-17).

Turn the ignition switch ON (I) and check the IACV.
If the step motor operating sound is heard, the IACV is normal.

If the IACV does not sound with no MIL blinking, inspect as follows:

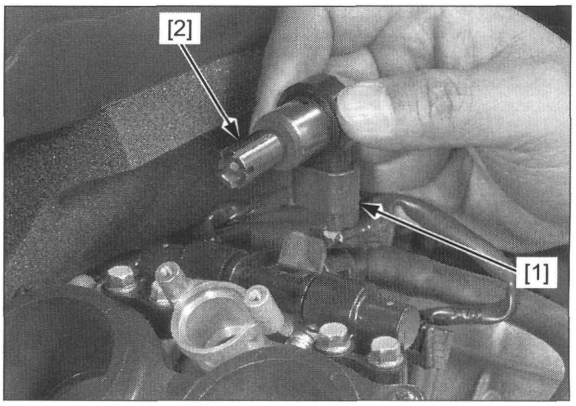
Remove the IACV (page 7-27).

If the idling is unstable, check the condition of the O-ring.

Temporarily connect the IACV 4P connector [1].

Turn the ignition switch ON (I), the slide valve [2] should move back and forth.

After inspection, install the IACV (page 7-27).



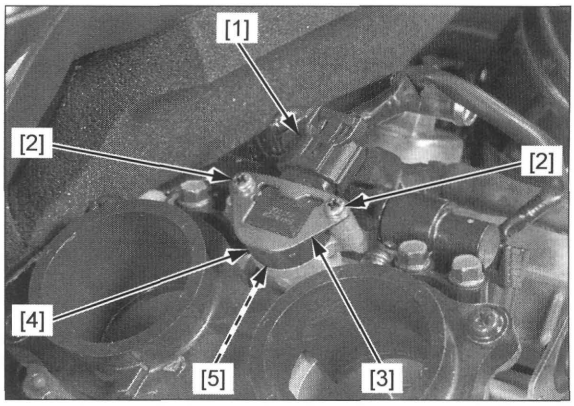
REMOVAL

Remove the air cleaner housing (page 7-17).

Clean the throttle body to prevent dirt and debris from entering the IACV passage.

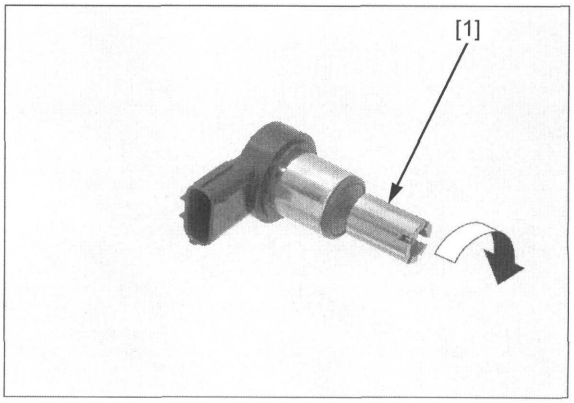
Disconnect the IACV 4P connector [1].

Remove the IACV plate screws [2], setting plate [3], IACV [4], and O-ring [5].



INSTALLATION

Turn the slide valve [1] clockwise until it is lightly seated on the 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.

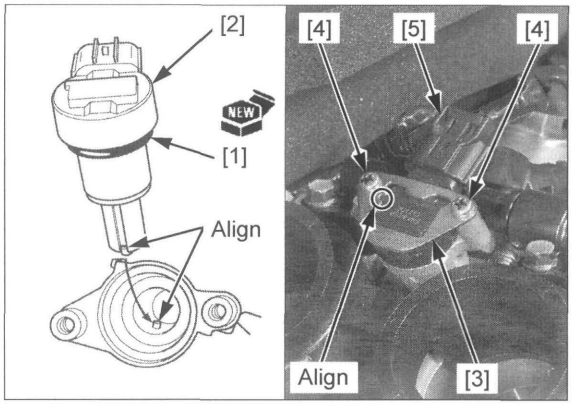
Install the setting plate [3] by aligning its cut-out with the tab of IACV.

Install and tighten the IACV plate screws [4] to the specified torque.

TORQUE: 2.1 N·m (0.2 kgf·m, 1.5 lbf·ft)

Connect the IACV 4P connector [5].

Install the air cleaner housing (page 7-17).



FUEL INJECTOR

REMOVAL/DISASSEMBLY

Remove the air cleaner housing (page 7-17).

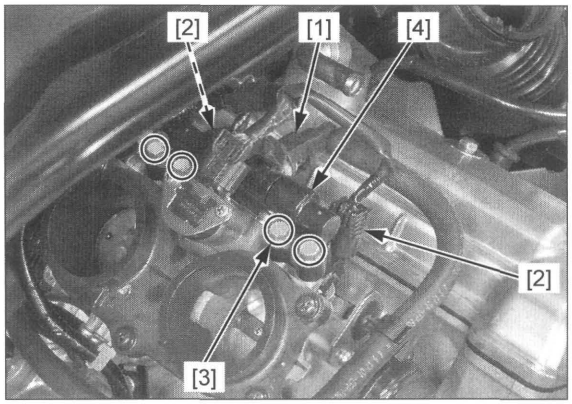
Relieve the fuel pressure (page 7-6).

Disconnect the quick connect fitting [1] (page 7-6).

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

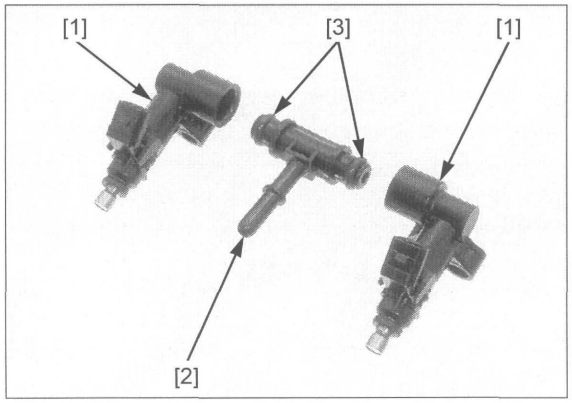
Disconnect the fuel injector 2P connectors [2].

Remove the fuel injector assembly bolts [3] and fuel injector assembly [4].



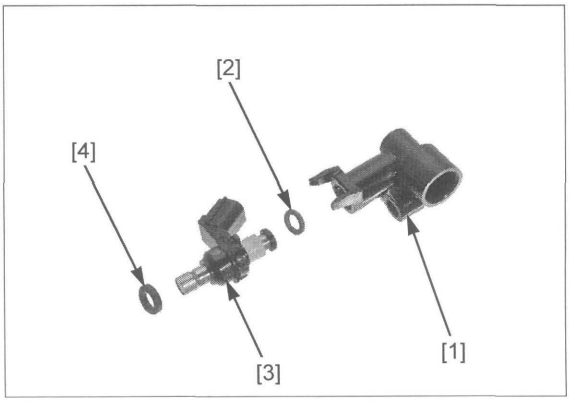
Disassemble the following:

- fuel injectors/injector joints [1]
- fuel rail [2]
- O-rings [3]



- injector joint [1]
- O-ring [2]
- fuel injector [3]
- seal ring [4]

Check each part for wear or damage and replace it if necessary.



ASSEMBLY/INSTALLATION

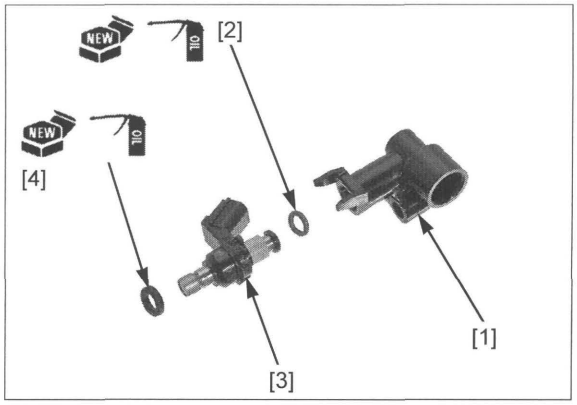
Apply engine oil to new O-rings and seal rings.

Assemble the following:

- injector joint [1]
- O-ring [2]
- fuel injector [3]
- seal ring [4]

NOTE:

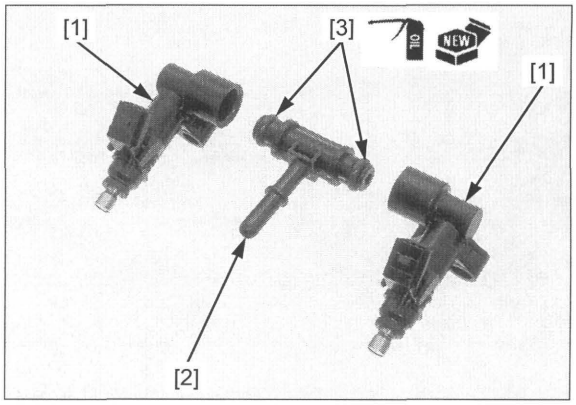
- Align the injector connectors with the fuel joint tabs to position them upright.



Apply engine oil to new O-rings.

Assemble the following:

- fuel injectors/injector joints [1]
- fuel rail [2]
- O-rings [3]



Install the fuel injector assembly [1].

NOTE:

- When installing the fuel injector, be careful not to damage the seal ring.

Install and tighten the fuel injector assembly bolts [2] to the specified torque.

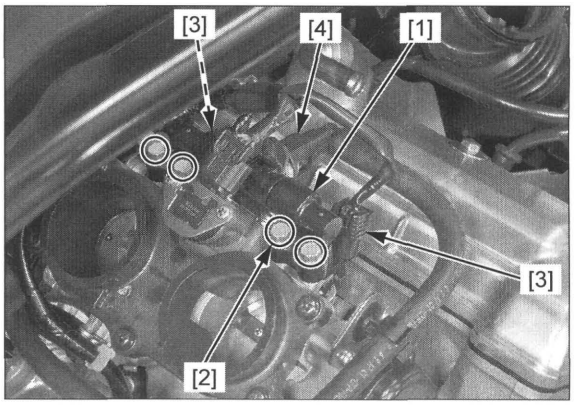
TORQUE: 5.1 N·m (0.5 kgf·m, 3.8 lbf·ft)

Connect the fuel injector 2P connectors [3].

Connect the quick connect fitting [4] (page 7-7).

Increase the fuel pressure (page 7-8).

Install the air cleaner housing (page 7-17).



EVAP PURGE CONTROL SOLENOID VALVE (AC type only)

REMOVAL/INSTALLATION

Remove the seat under center lid (page 2-5).

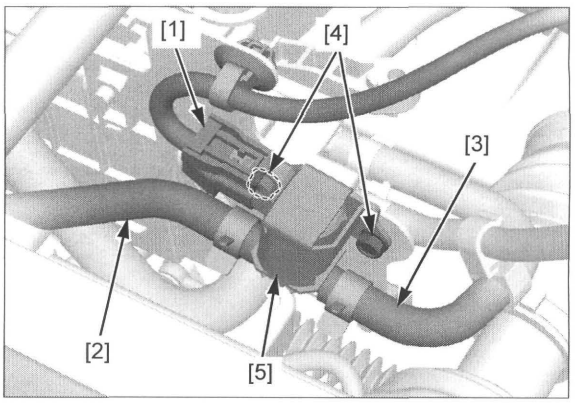
Disconnect the following:

- EVAP purge control solenoid valve 2P connector [1]
- Purge hose [2]
- Canister-to-EVAP purge control solenoid valve hose [3]

Remove the bolts [4] and the EVAP purge control solenoid valve [5].

Installation is in the reverse order of removal.

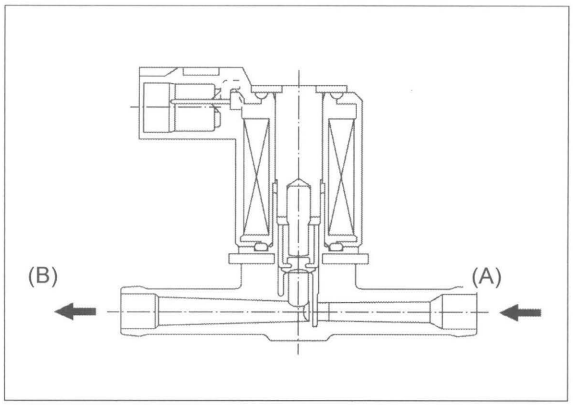
Route the hoses properly (page 1-29).



INSPECTION

Remove the EVAP purge control solenoid valve (page 7-29).

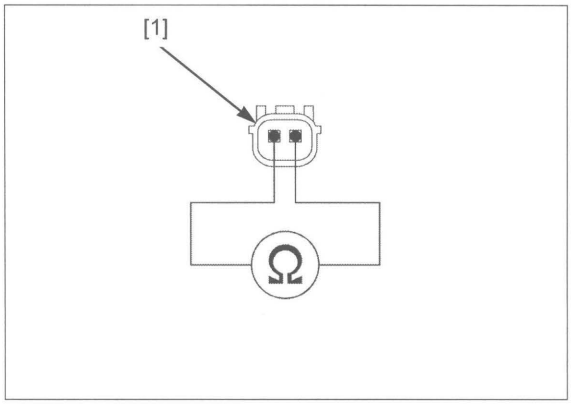
Check that air flows from (A) to (B) only when a 12 V battery is connected to the EVAP purge control solenoid valve terminals.



Check the resistance between the terminals of the EVAP purge control solenoid valve [1].

STANDARD: 30 – 34 Ω (20°C/68°F)

If the resistance is out of specification, replace the EVAP purge control solenoid valve.



EVAP CANISTER (AC type only)

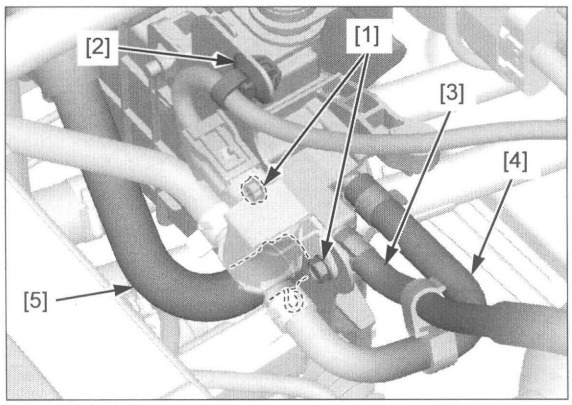
REMOVAL/INSTALLATION

Remove the seat under center lid (page 2-5).

Remove the bolt [1] and release the wire band clip [2].

Disconnect the following:

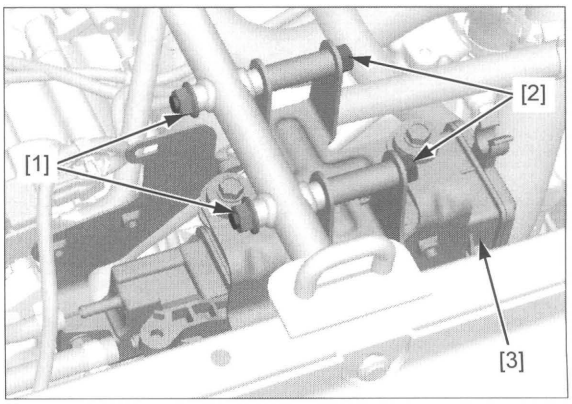
- Fuel tank charge hose (to fuel tank) [3]
- Canister-to-EVAP purge control solenoid valve hose [4]
- air inlet hose [5]



Remove the nuts [1], bolts [2] and EVAP canister [3].

Route the hoses properly (page 1-29).

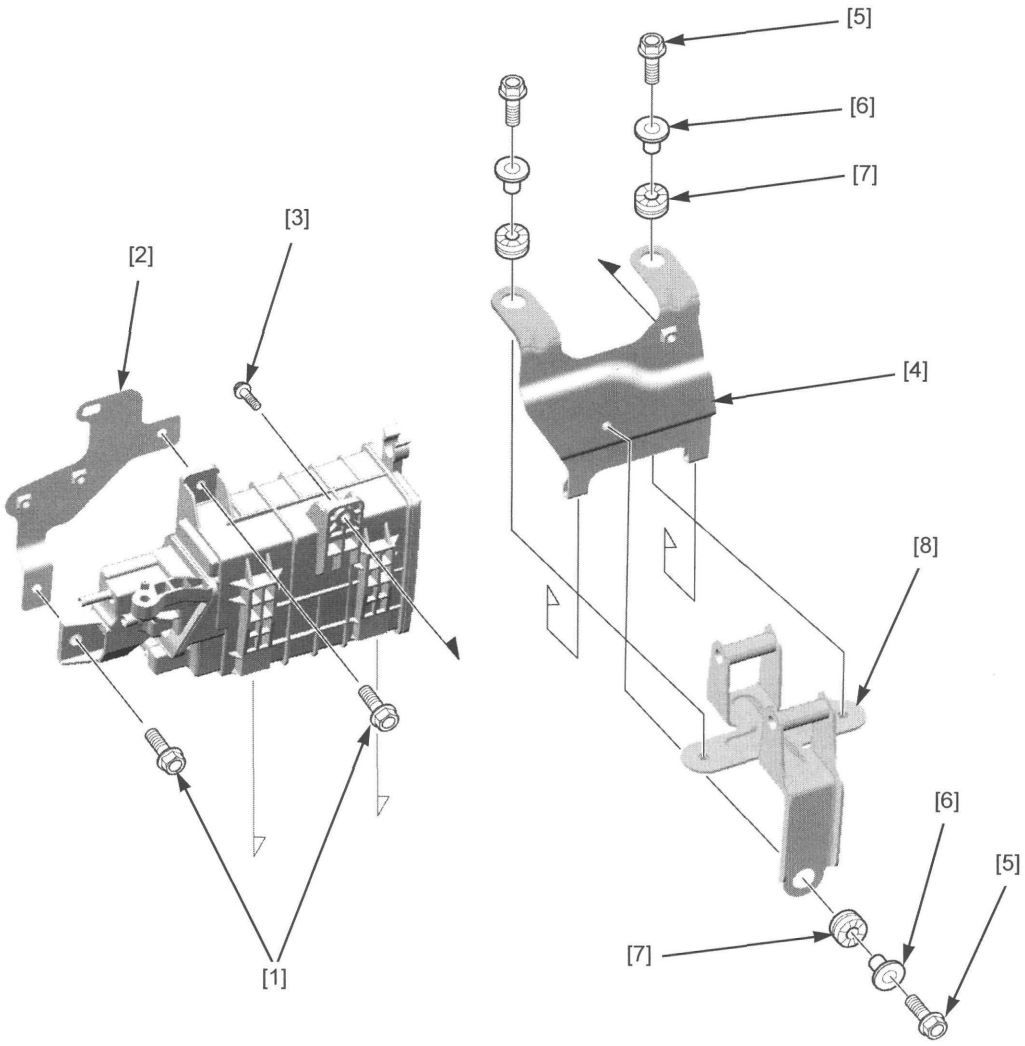
Installation is in the reverse order of removal.



DISASSEMBLY/ASSEMBLY

Remove the following:

- Two bolts [1] and stay [2].
- Bolt [3] and canister bracket [4].
- Bolts [5], collars [6] grommets [7] and frame mounting bracket [8].



Assembly is in the reverse order of disassembly.

- Install the canister bracket while aligning its tabs with the slots of the EVAP canister.

MEMO

8. LUBRICATION SYSTEM

SERVICE INFORMATION 8-2

TROUBLESHOOTING 8-3

LUBRICATION SYSTEM DIAGRAM 8-4

OIL PRESSURE INSPECTION 8-5

OIL TANK COVER 8-5

REAR COVER SPACER/OIL PUMP 8-7

PRESSURE RELIEF VALVE 8-10

OIL STRAINER 8-11

OIL COOLER 8-12

SERVICE INFORMATION

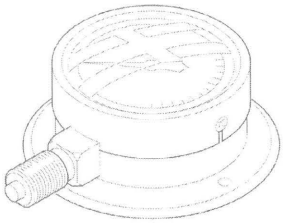
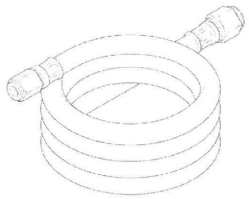
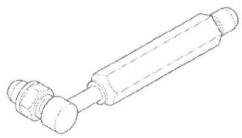
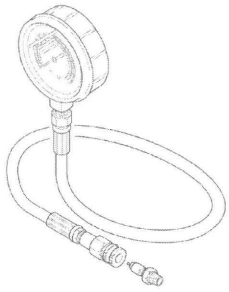
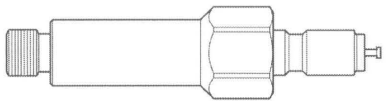
GENERAL

⚠CAUTION

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

- This section covers service of the oil pump, oil cooler, and oil strainer.
- The service procedures in this section can be performed with the engine installed in the frame.
- When removing and installing the oil pump, use care not to allow dust or dirt to enter the engine.
- If any portion of the oil pump is worn beyond the specified service limits, replace the oil pump as an assembly.
- After the oil pump, oil cooler and/or oil strainer have been installed, check for oil leaks.
- For oil level check, oil change and filter replacement, see Maintenance section (page 3-12).

TOOLS

Oil pressure gauge 07506-3000100 (not available in U.S.A.) 	Oil pressure hose 07MAJ-PY40110 (not available in U.S.A.) 	Hose joint attachment 07MAJ-PY40120 (not available in U.S.A.) 
Oil pressure gauge, 0 – 160 psi 07ZMJ-HN2A100 (U.S.A. only) 	Oil pressure adapter 07AMJ-HP7A100 (U.S.A. only) 	

TROUBLESHOOTING

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

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

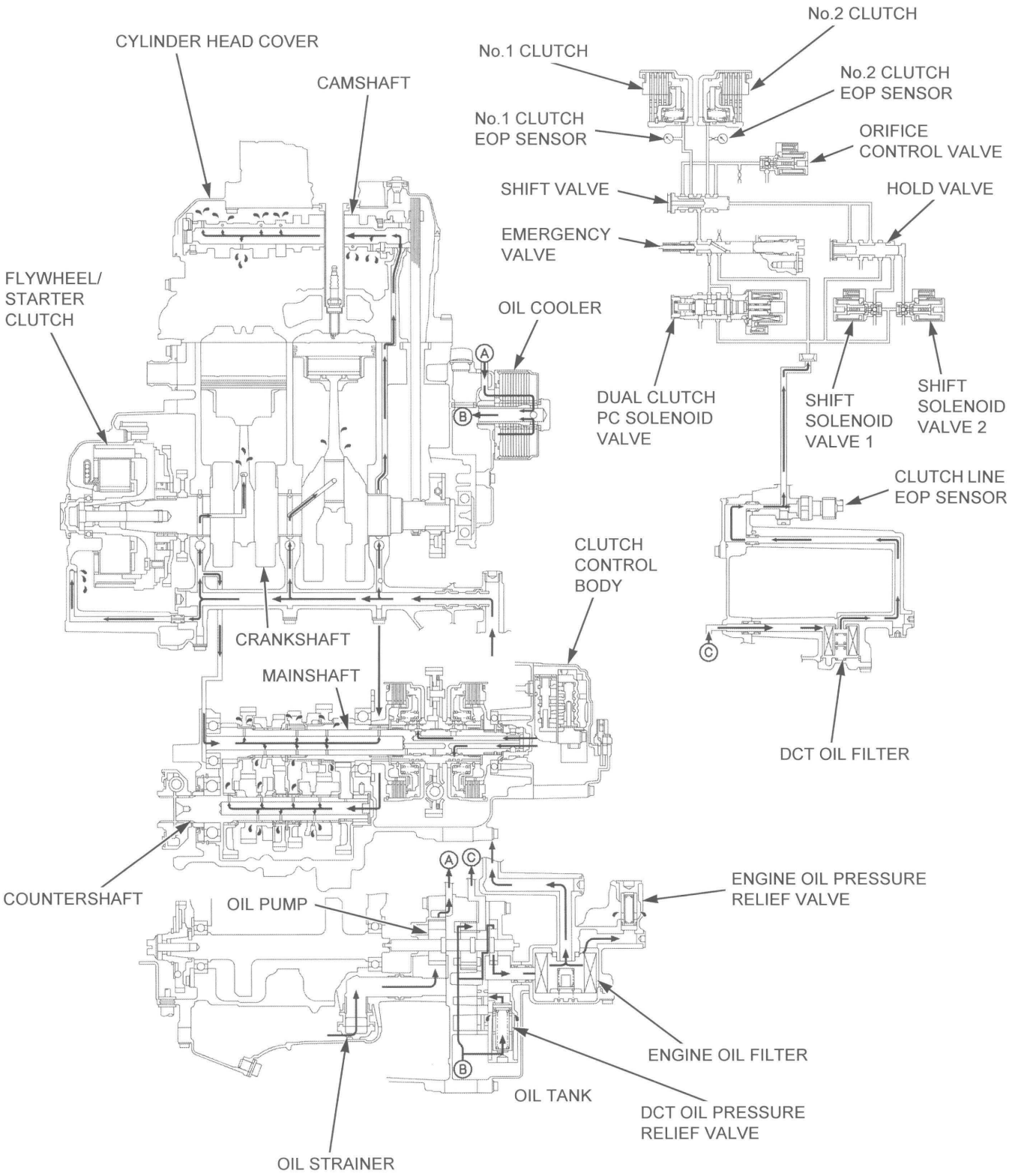
No oil pressure
- Oil level too low
- Oil pressure relief valve stuck open
- Damaged oil pump
- Internal oil leak

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

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

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

LUBRICATION SYSTEM DIAGRAM



OIL PRESSURE INSPECTION

M5P/M5D: Remove the rear footwell (page 2-12).

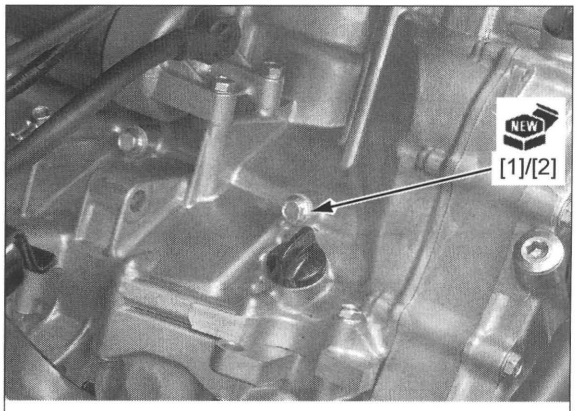
M3P/M3D: Remove the rear mud guard (page 2-14).

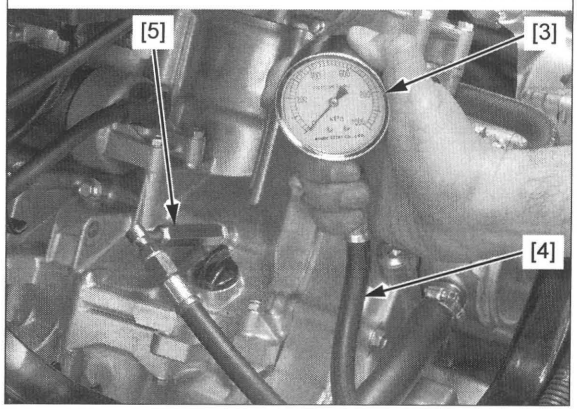
Remove the sealing bolt [1] and washer [2].

Install the special tools as shown.

TOOLS:

Oil pressure gauge [3]	**07506-3000100**
Oil pressure hose [4]	**07MAJ-PY40110**
Hose joint attachment [5]	**07MAJ-PY40120**
Oil pressure gauge, 0 – 160 psi	**(U.S.A.: 07ZMJ-HN2A100)**
Oil pressure adapter	**(U.S.A.: 07AMJ-HP7A100)**





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

Warm the engine to normal operating temperature (approximately 80°C/176°F) and increase the engine speed to 5,000 rpm and read the oil pressure.

STANDARD:
490 – 588 kPa (5.0 – 6.0 kgf/cm², 71 – 85 psi) at 5,000 rpm/80°C (176°F)

Stop the engine and remove the tools.

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

M5P/M5D: Install the rear footwell (page 2-12).

M3P/M3D: Install the rear mud guard (page 2-14).

OIL TANK COVER

REMOVAL/INSTALLATION

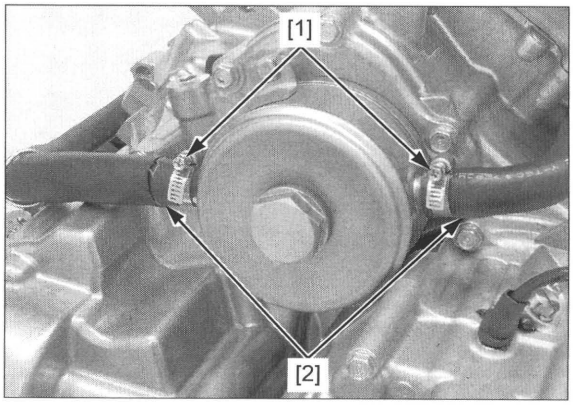
M5P/M5D: Remove the rear footwell (page 2-12).

M3P/M3D: Remove the rear mud guard (page 2-14).

Remove the skid plate (page 2-36).

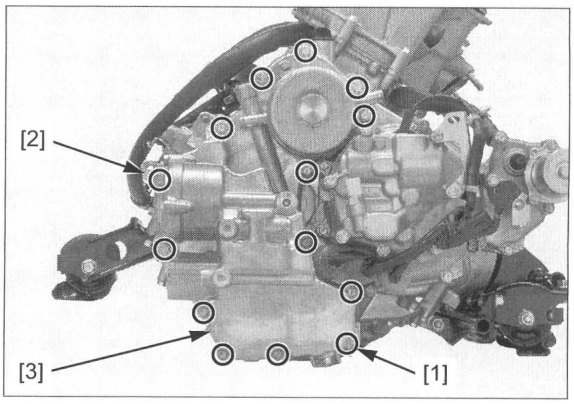
Drain the coolant (page 9-4).
Drain the engine oil (page 3-13).

Loosen the hose band screws [1] and disconnect the water hoses [2].



Remove the following:

- fourteen bolts [1] and hose clamp [2]
- oil tank cover [3]

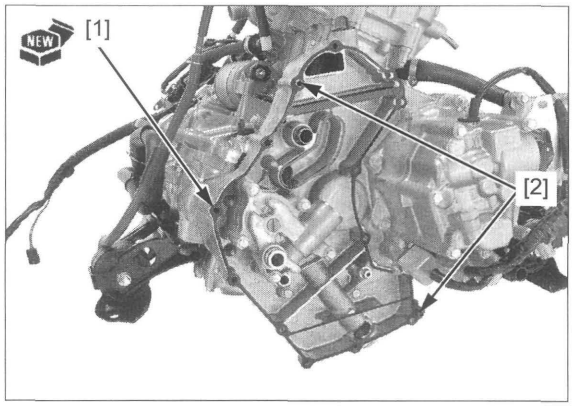


Remove the following:

– gasket [1]
– dowel pins [2]

NOTE:

• Always replace the gasket with a new one.

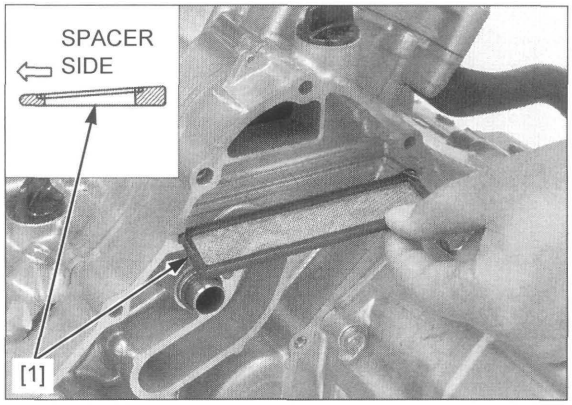


Remove the oil strainer [1].

Check the oil strainer for clogs or abnormal wear, replace if necessary.

NOTE:

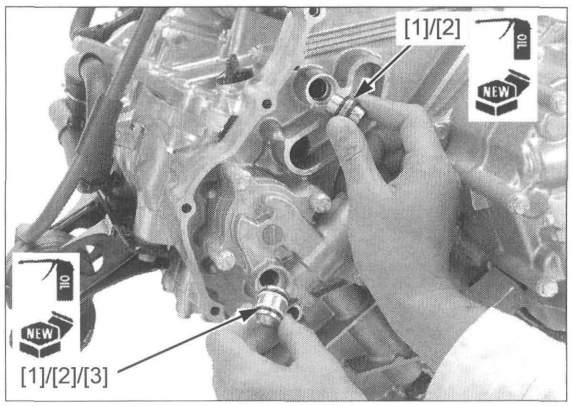
• Install the oil strainer into the rear cover spacer assembly as shown.



Remove the oil joints (engine oil line side) [1], O-rings [2] and back up rings [3].

NOTE:

• Replace the O-rings and back up rings with new ones.
• Coat the O-rings with engine oil when installing them.

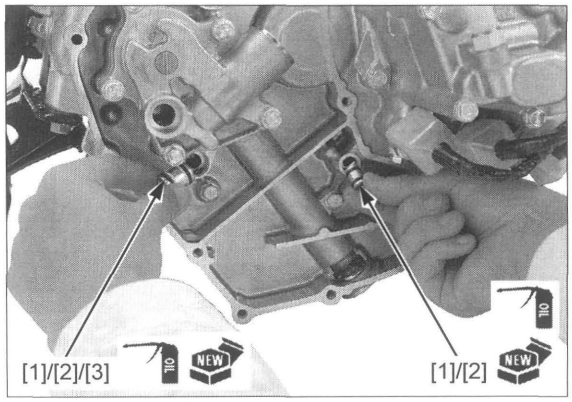


Remove the oil joints (DCT oil line side) [1], O-rings [2] and back up rings [3].

NOTE:

• Replace the O-rings and back up rings with new ones.
• Coat the O-rings with engine oil when installing them.

Installation is in the reverse order of removal.



REAR COVER SPACER/OIL PUMP

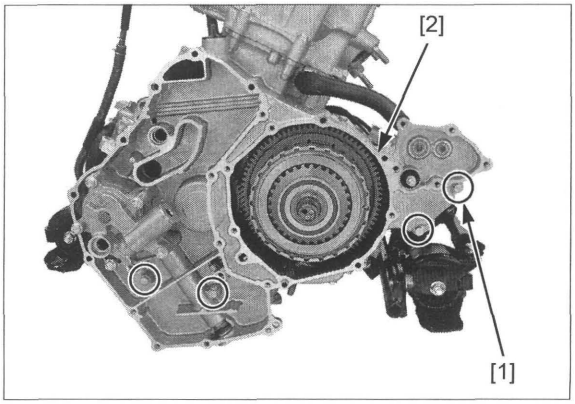
REMOVAL

Remove the following:

- Oil tank cover (page 8-5)
- Clutch cover (page 11-50)
- Shift control motor/reduction gears (page 11-51)

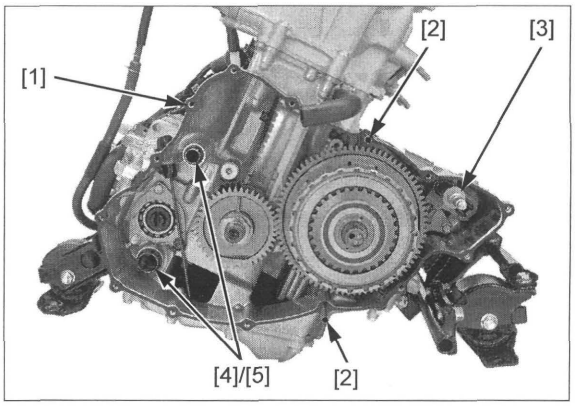
Remove the bolts [1] and rear cover spacer/oil pump assembly [2].

Remove the DCT oil pressure relief valve if necessary (page 8-10).



Remove the following:

- gasket [1]
- dowel pins [2]
- washer [3]
- oil joints [4] and O-rings [5]

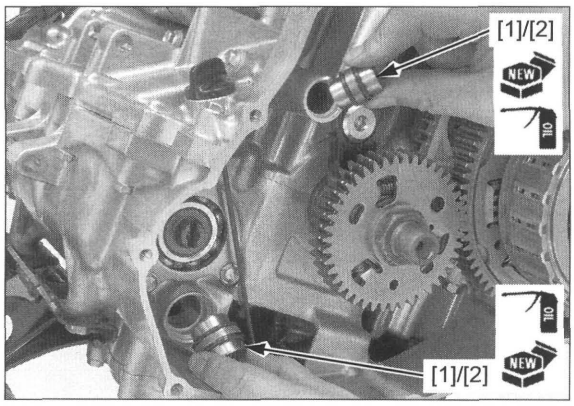


INSTALLATION

Apply engine oil to new O-rings [1].

Install the O-rings to the oil joints [2].

Install the oil joints to the crankcase.

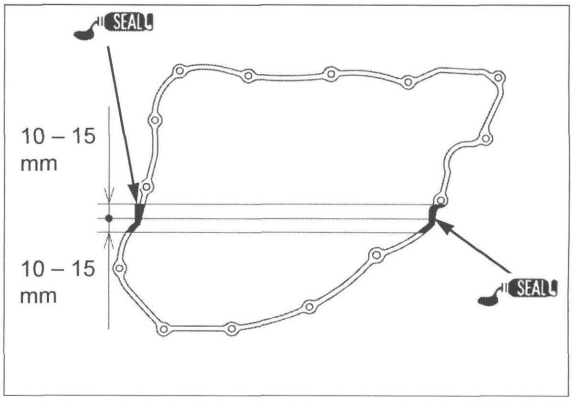


Clean the crankcase mating surface thoroughly.

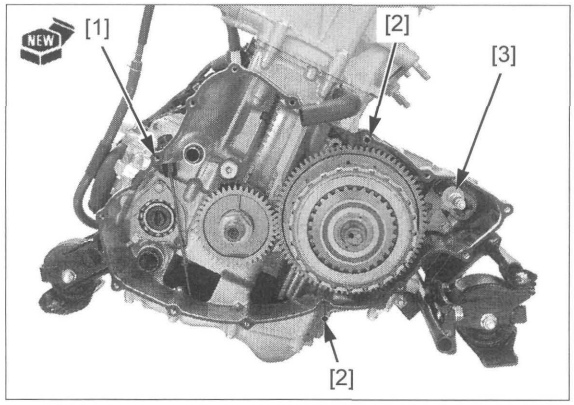
Apply liquid sealant (TB1207B manufactured by ThreeBond or equivalent) to the crankcase mating surface as shown.

NOTE:

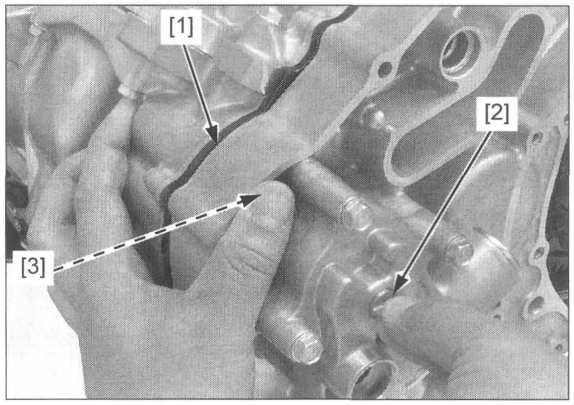
- Do not apply more liquid sealant than necessary.



Install a new gasket [1], dowel pins [2], and washer [3].



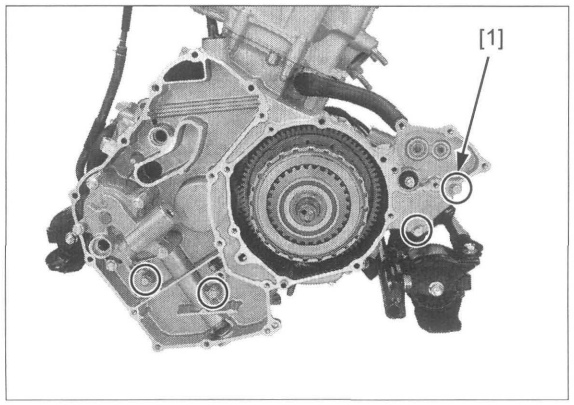
Install the rear cover spacer/oil pump assembly [1] by aligning the oil pump shaft end [2] with the balancer shaft groove [3].



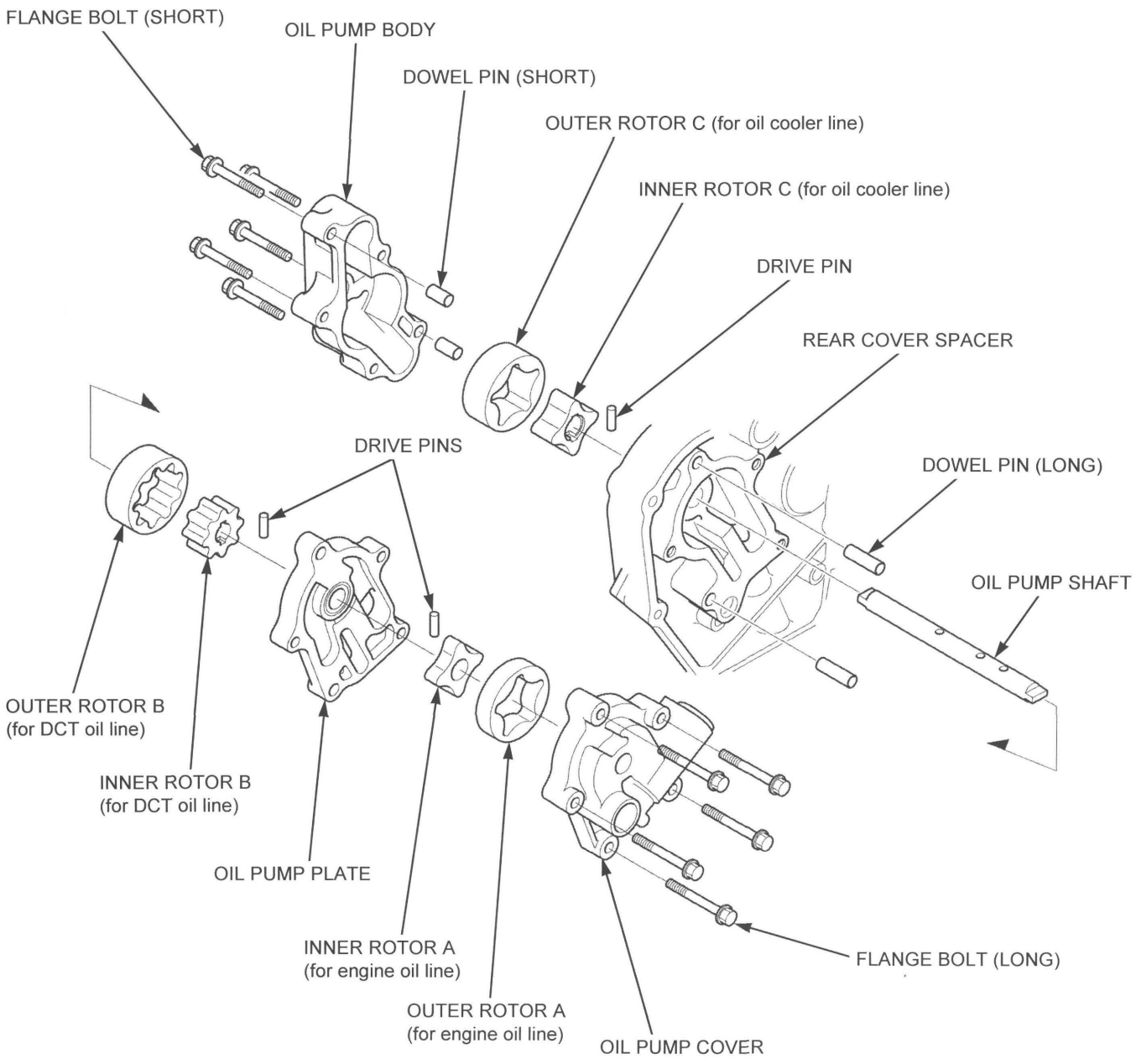
Install the bolts [1] and tighten them securely.

Install the following:

- oil tank cover (page 8-5)
- clutch cover (page 11-50)
- shift control motor/reduction gears (page 11-53)



OIL PUMP DISASSEMBLY/ASSEMBLY



INSPECTION

Inspect the following parts for damage, abnormal wear, deformation or burning.

- Pump shaft
- Inner rotor/outer rotor
- Oil pump cover, plate, body, rear cover spacer

Measure the tip clearance according to LUBRICATION SYSTEM SPECIFICATIONS (page 1-10).
If any of the measurement is out of the service limit, replace the oil pump as an assembly.

PRESSURE RELIEF VALVE

REMOVAL/INSTALLATION

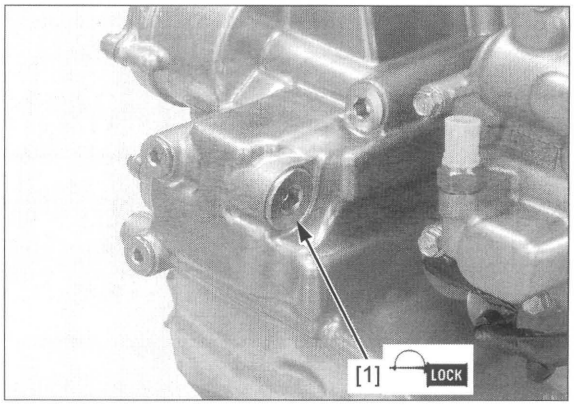
ENGINE OIL PRESSURE RELIEF VALVE

M5P/M5D: Remove the rear footwell (page 2-12).

M3P/M3D: Remove the rear mud guard (page 2-14).

Drain the engine oil (page 3-13).

Remove the 22 mm sealing bolt [1].



Remove the pressure relief valve [1] and O-ring [2].

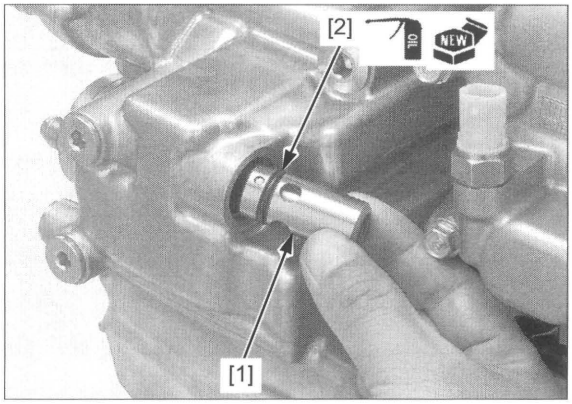
Installation is in the reverse order of removal.

NOTE:

- Apply locking agent to the sealing bolt threads.
- Apply engine oil to a new O-rings.

TORQUE:

22 mm sealing bolt:
30 N·m (3.1 kgf·m, 22 lbf·ft)

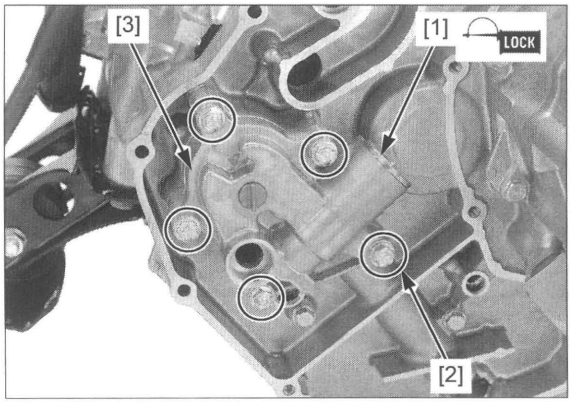


DCT OIL PRESSURE RELIEF VALVE

Remove the oil tank cover (page 8-5).

Remove the 24 mm sealing bolt [1].

Remove the bolts [2] and oil pump cover [3].



Remove the DCT oil pressure relief valve [1] and O-ring [2] from the oil pump cover [3].

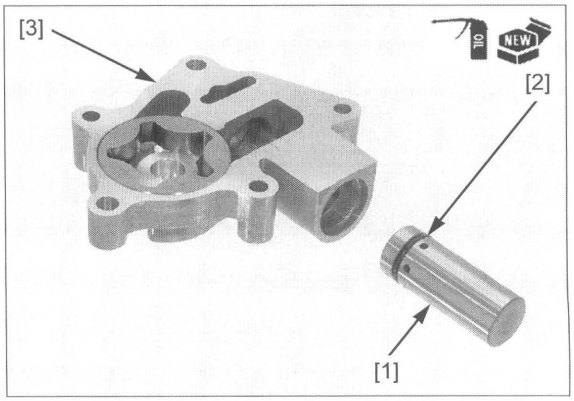
Installation is in the reverse order of removal.

NOTE:

- Apply locking agent to the sealing bolt threads.
- Apply engine oil to new O-rings.

TORQUE:

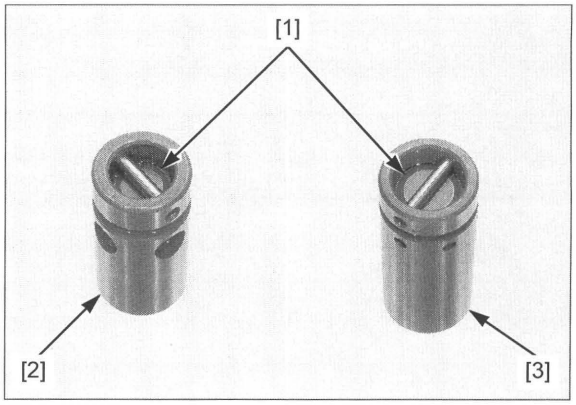
24 mm sealing bolt:
31 N·m (3.2 kgf·m, 23 lbf·ft)



INSPECTION

Check the operation of the valve by pushing on the piston [1].

- engine oil pressure relief valve [2]
- DCT oil pressure relief valve [3]



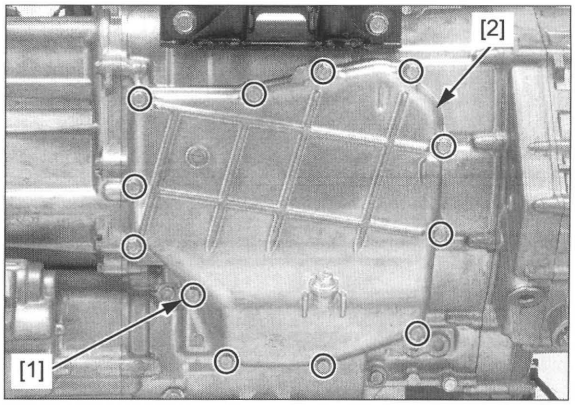
OIL STRAINER

REMOVAL

Remove the skid plate (page 2-36).

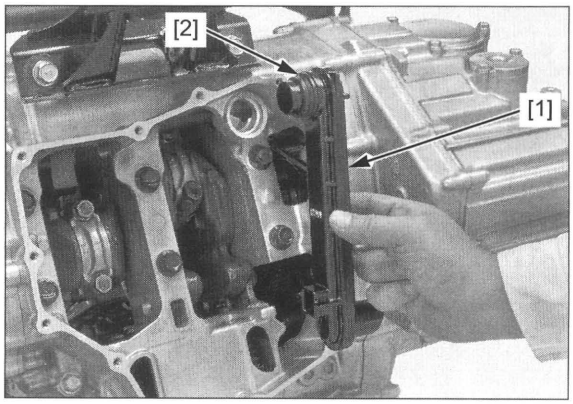
Drain the engine oil (page 3-13).

Loosen the bolts [1] in a crisscross pattern in 2 or 3 steps, and remove the bolts and oil pan [2].



Remove the oil strainer [1] and seal ring [2].

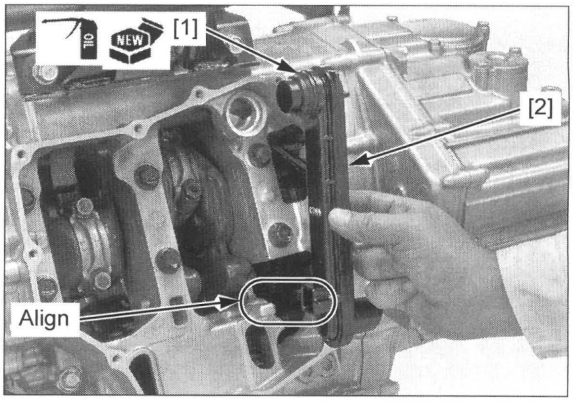
Clean the oil strainer screen, check it for damage, and replace it if necessary.



INSTALLATION

Apply engine oil to a new seal ring [1] and install it onto the oil strainer [2].

Install the oil strainer into the crankcase by aligning the oil strainer hole with the crankcase boss.

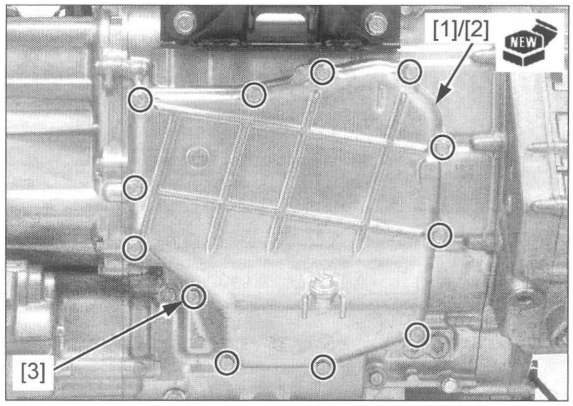


Clean the oil pan mating surface thoroughly.

Install the oil pan [1] with a new gasket [2].
Install the bolts [3] and tighten them in a crisscross pattern in 2 or 3 steps.

Install the skid plate (page 2-36).

Fill the engine with the recommended engine oil and check that there are no oil leaks (page 3-13).



OIL COOLER

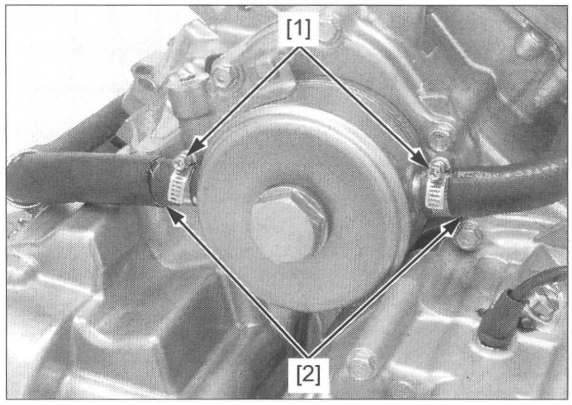
REMOVAL/INSTALLATION

M5P/M5D: Remove the rear footwell (page 2-12).

M3P/M3D: Remove the rear mud guard (page 2-14).

Drain the coolant (page 9-4).
Drain the engine oil (page 3-13).

Loosen the hose band screws [1] and disconnect the water hoses [2].



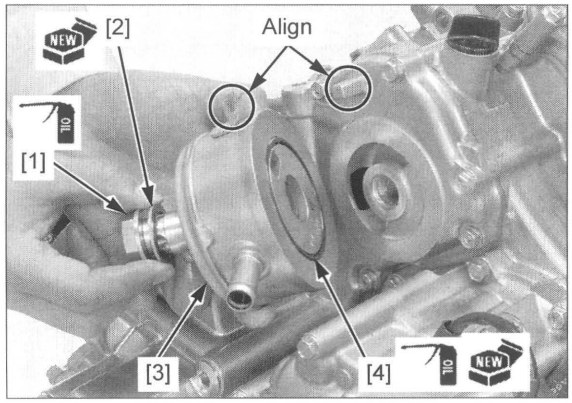
Remove the oil cooler bolt [1], sealing washer [2], oil cooler [3], and O-ring [4].

Installation is in the reverse order of removal.

NOTE:

- Replace the O-ring and sealing washer with new ones.
- Apply engine oil to new O-rings.
- Install the oil cooler by aligning the groove of the oil cooler with the boss of the oil tank cover.
- Apply engine oil to the oil cooler bolt threads and seating surface.

TORQUE:
Oil cooler bolt:
59 N·m (6.0 kgf·m, 43 lbf·ft)



9. COOLING SYSTEM

SERVICE INFORMATION 9-2

TROUBLESHOOTING 9-2

SYSTEM FLOW PATTERN 9-3

COOLING SYSTEM TESTING 9-4

COOLANT REPLACEMENT 9-4

THERMOSTAT 9-6

RADIATOR/COOLING FAN/SHROUD 9-7

RADIATOR RESERVE TANK 9-9

WATER PUMP 9-10

SERVICE INFORMATION

GENERAL

⚠WARNING

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

NOTICE

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

- All cooling system service can be done with the engine installed in the frame.
- Add coolant to the 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 (page 9-4).
- For the fan control unit service (page 23-19).

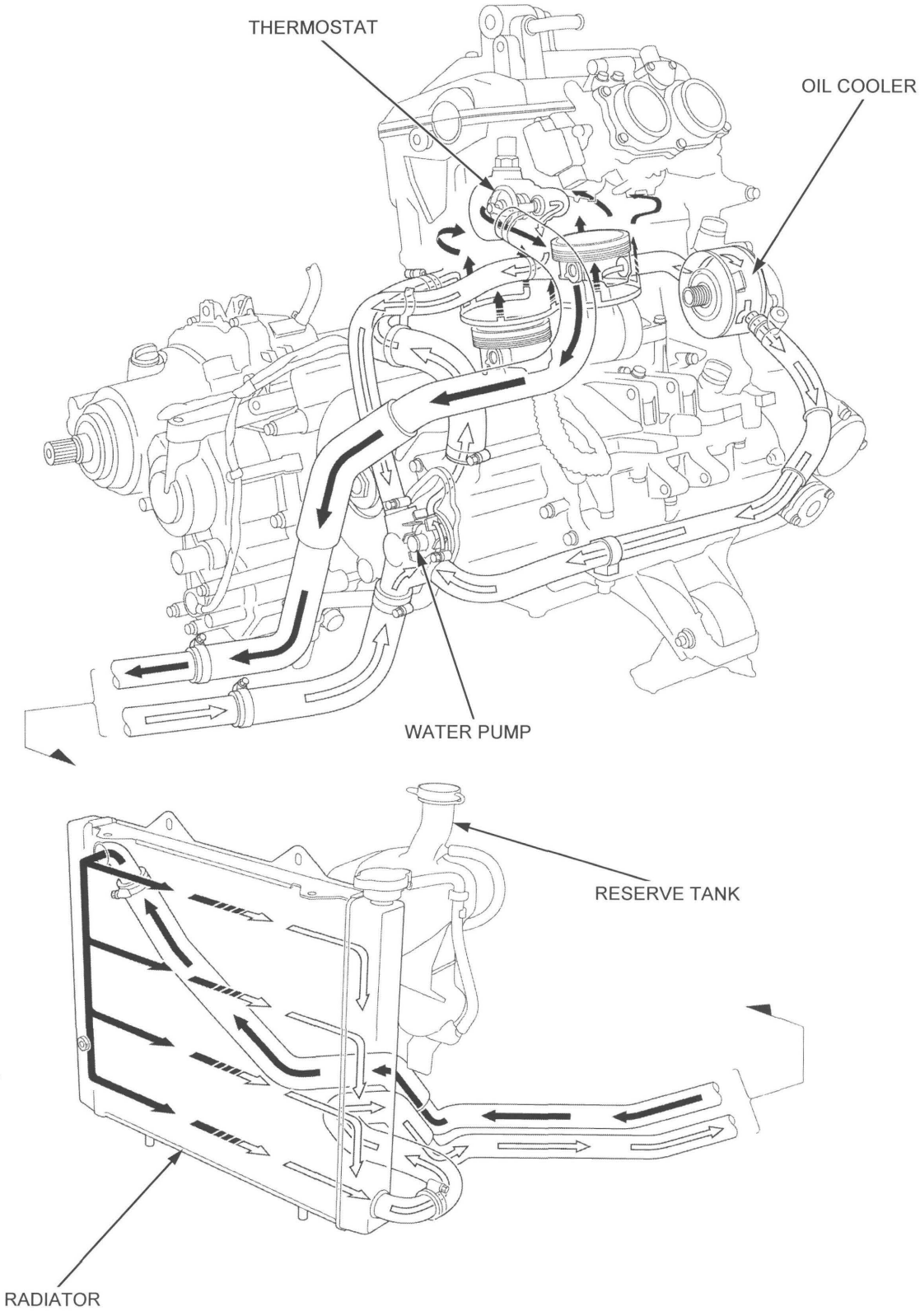
TROUBLESHOOTING

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
- Faulty ECT sensor
- Thermostat stuck open
- Faulty fan control unit

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 FLOW PATTERN

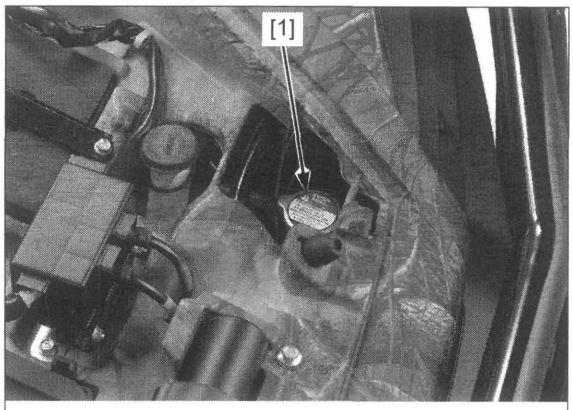


COOLING SYSTEM TESTING

RADIATOR CAP/SYSTEM PRESSURE INSPECTION

Remove the front hood (page 2-17).

Remove the radiator cap [1].



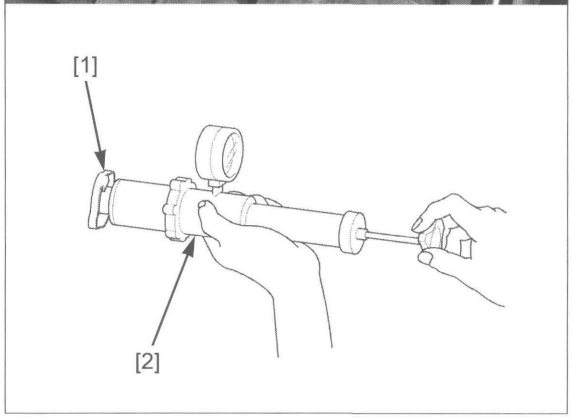
⚠ CAUTION

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

Wet the sealing surfaces of the radiator cap [1], then install the cap onto the tester [2].

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 specified pressure for at least 6 seconds.

RADIATOR CAP RELIEF PRESSURE:
108 – 137 kPa (1.1 – 1.4 kgf/cm², 16 – 20 psi)



Install the tester to the radiator.

Apply pressure to the radiator, engine, and hoses and check for leaks.

NOTICE

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

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

Remove the tester and install the radiator cap.

COOLANT REPLACEMENT

REPLACEMENT/AIR BLEEDING

NOTE:

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

Remove the following:

– front hood (page 2-17)
– rear center cover (page 2-9)
– skid plate (page 2-36)

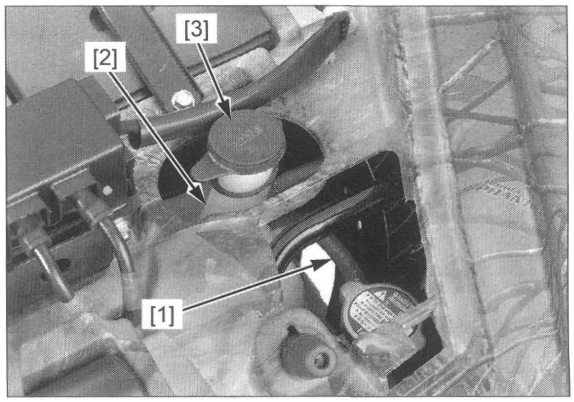
Disconnect the siphon hose [1].

Drain the coolant through the hose.

Empty the coolant by removing the reserve tank [2] (page 9-9).

Remove the tank cap [3] and rinse the inside of it with water.

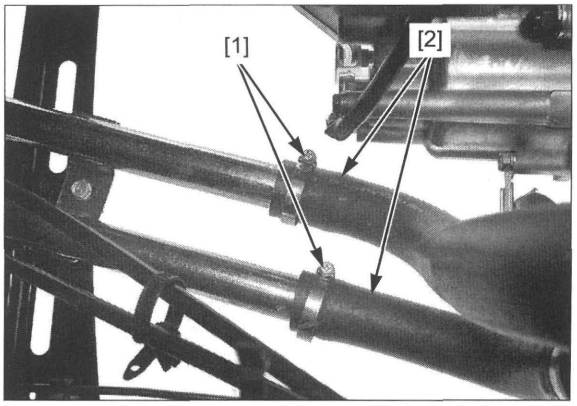
Install the reserve tank (page 9-9).



Loosen the hose clamp screws [1].

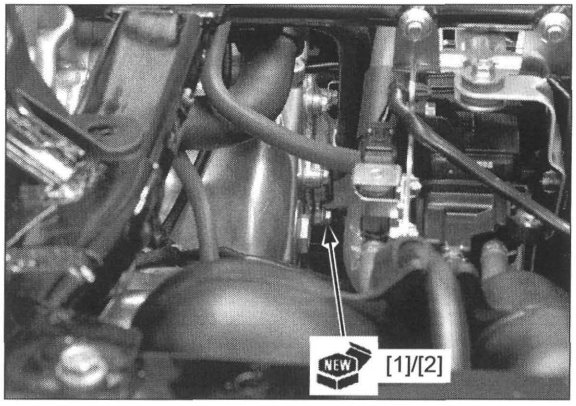
Drain the coolant from the system by disconnecting the water hoses [2].

Install the water hoses and tighten the hose clamp screws to the specified range (page 10-20).



Drain the coolant from the system by removing the drain bolt [1] and sealing washer [2].

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



Remove the bleed bolt [1] and sealing washer [2] from the thermostat cover, and loosely install the bolt with a new sealing washer.

Place shop towels around the bleed bolt.

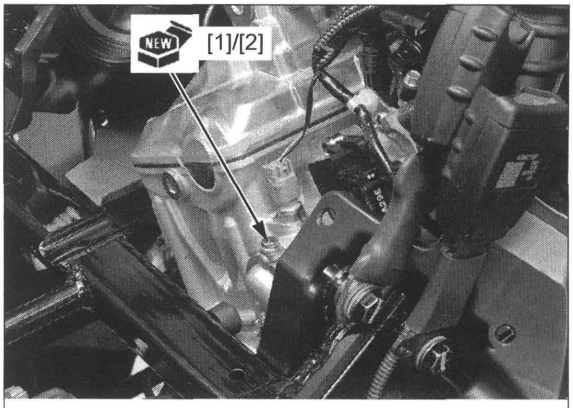
Remove the reserve tank cap [3] and fill the tank with the recommended coolant to the MAX level line.
Install the reserve tank cap.

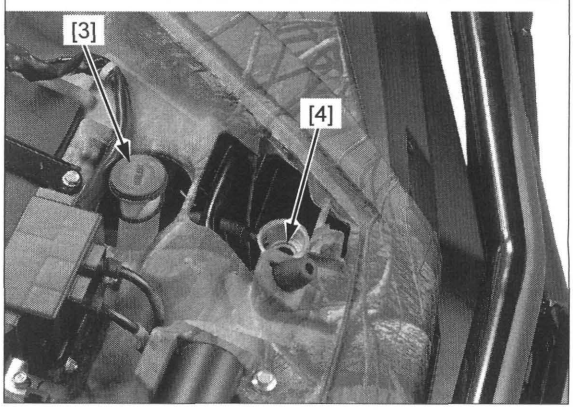
Fill the system with the recommended coolant up to the filler neck [4].
Tighten the bleed bolt as soon as coolant starts to run out in a steady stream without bubbles.

Bleed air from the system as follows:

1. Shift the sub-transmission into the parking position. Start the engine and let it idle for 2 – 3 minutes.
2. Snap the throttle 3 or 4 times to bleed air from the system.
3. Stop the engine and add coolant up to the filler neck if necessary.
4. Install the radiator cap.
5. Check the level of coolant in the reserve tank and fill to the MAX level line if it is low.

Install the removed parts in the reverse order of removal.



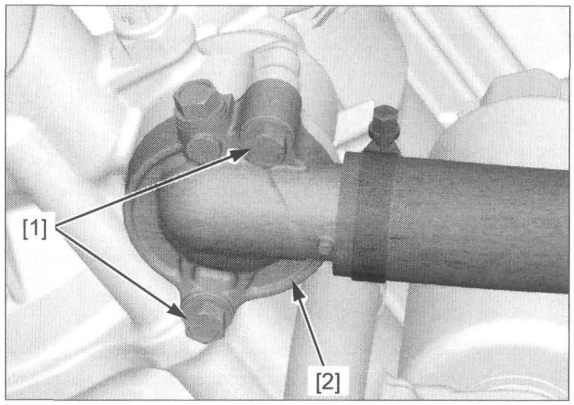


THERMOSTAT

REMOVAL/INSTALLATION

Drain the coolant from the system (page 9-4).

Remove the bolts [1] and thermostat cover [2].



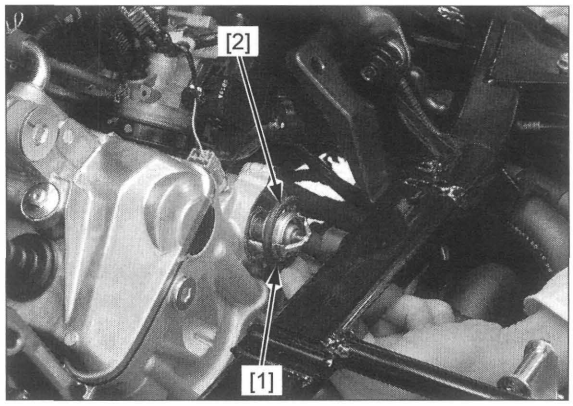
Remove the thermostat [1].

Make sure the rubber seal [2] on the thermostat is in good condition.

Apply coolant to the rubber seal and install the thermostat as shown.

Install the removed parts in the reverse order of removal.

Fill and bleed the cooling system (page 9-4).



INSPECTION

Visually inspect the thermostat [1] for damage.
Replace the thermostat if the valve stays open at room temperature.

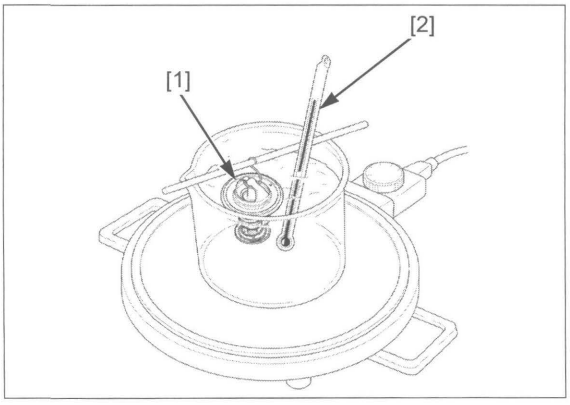
Do not let the thermostat or thermometer [2] touch the pan, or you will get a false reading.

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/SHROUD

REMOVAL/INSTALLATION

Drain the coolant (page 9-4).

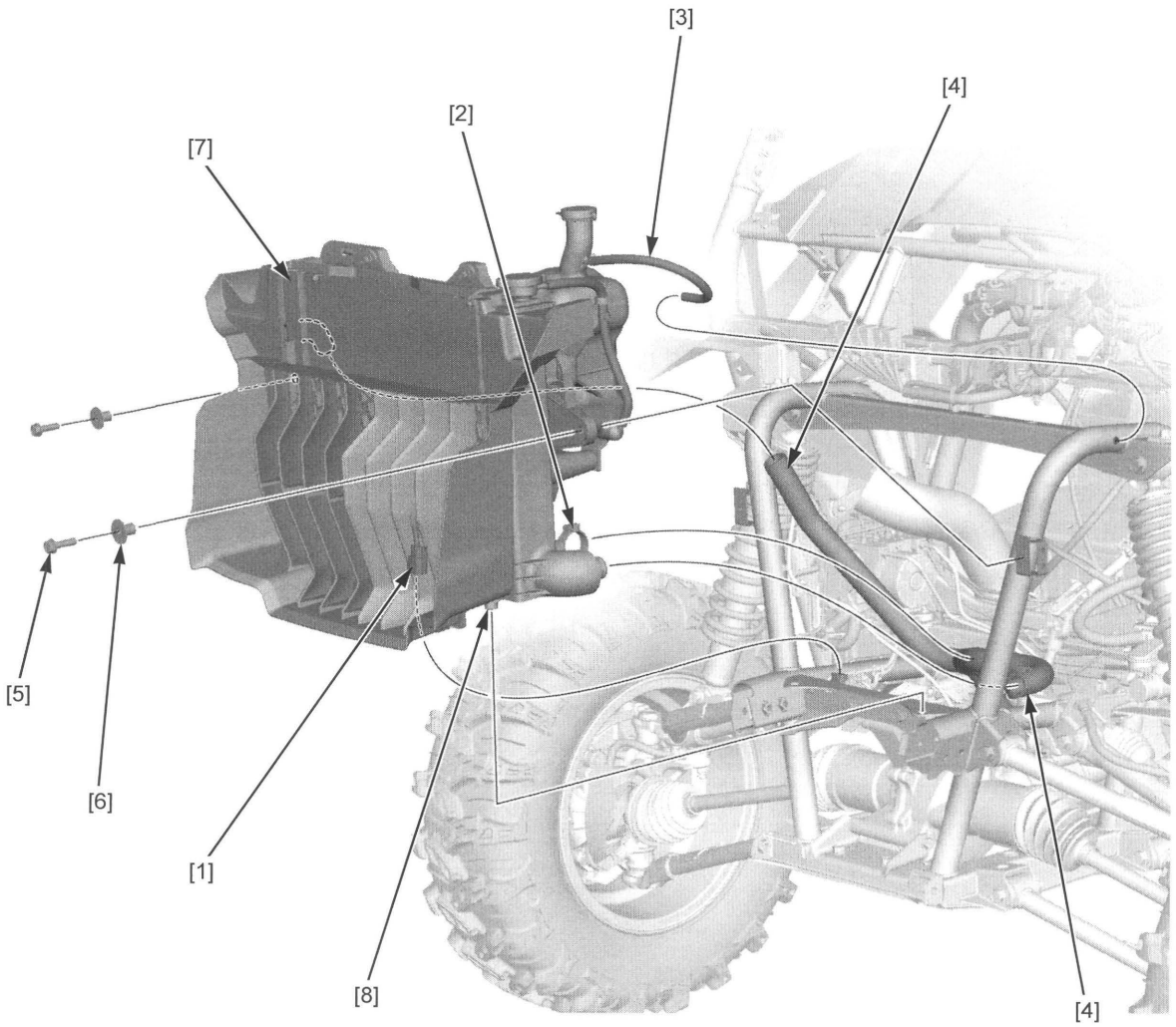
Remove the front fender (page 2-20).

Disconnect the fan motor 2P connector [1].
Release the water hose band [2] and coolant overflow hose [3].
Disconnect the water hoses [4].
Remove the bolts [5], collars [6], and radiator assembly [7].

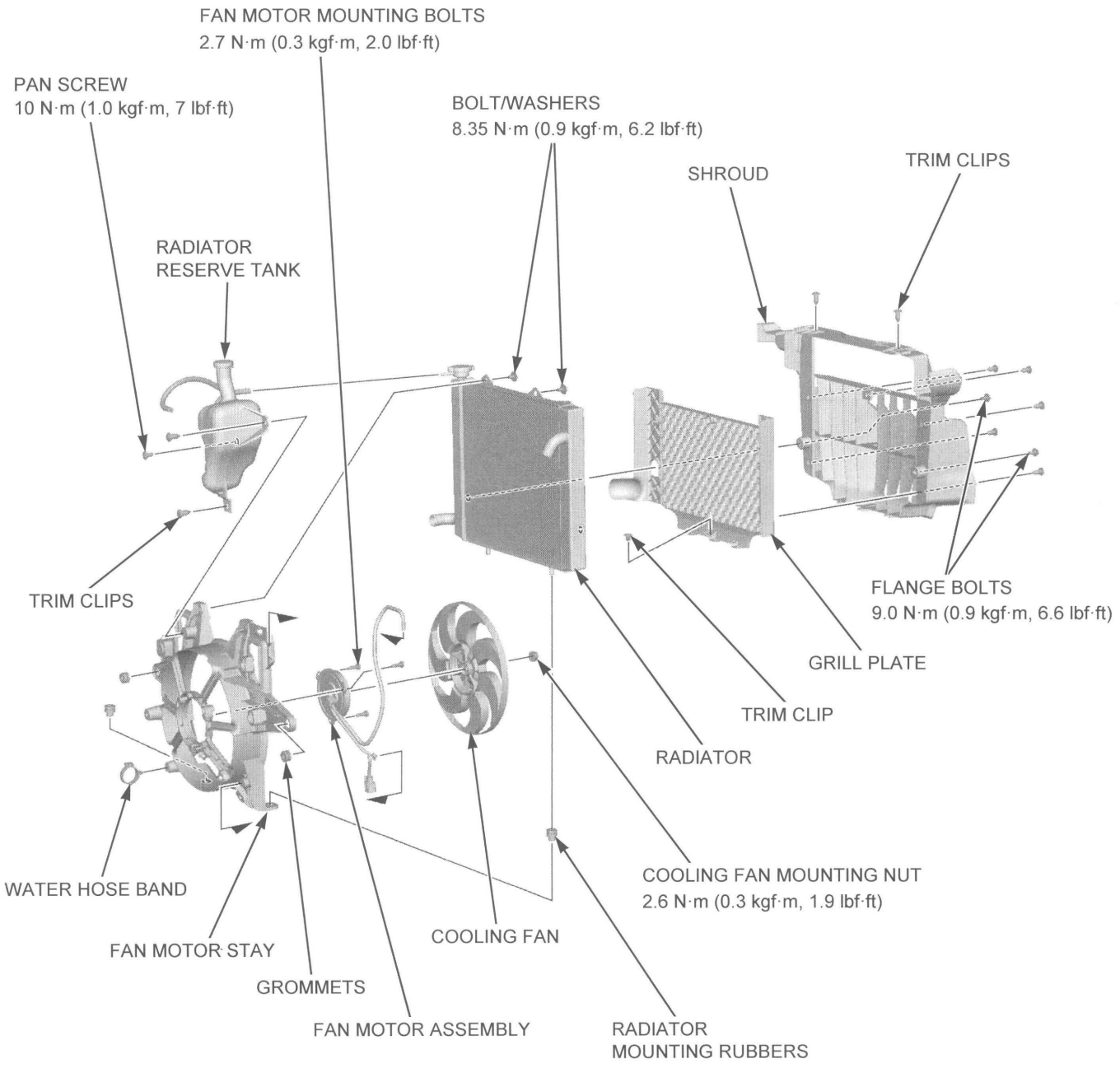
Installation is in the reverse order of removal.

NOTE:

- Take care not to damage the radiator fins while servicing the radiator.
- Align the radiator mounting rubbers [8] with the holes of front frame.
- Tighten the water hose band screws to the specified range (page 10-20).
- Route the cables and hoses properly (page 1-29).



DISASSEMBLY/ASSEMBLY

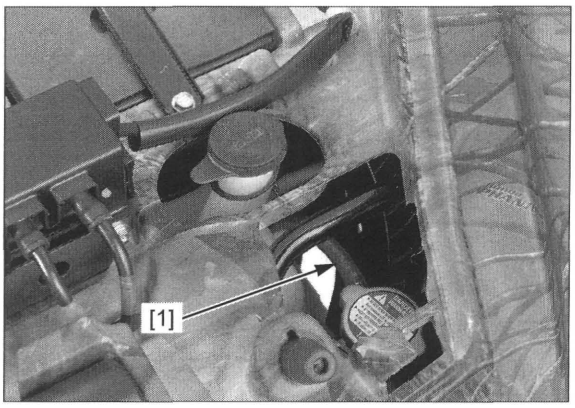


RADIATOR RESERVE TANK

REMOVAL

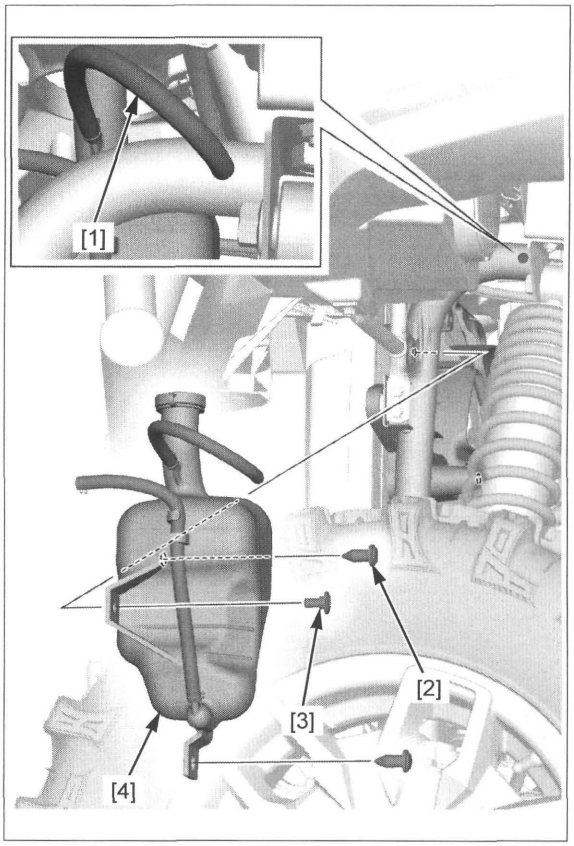
Remove the front hood (page 2-17).

Disconnect the siphon hose [1].
Drain the coolant through the hose.



Release the coolant overflow hose [1].

Remove the two trim clips [2], pan screw [3] and the reserve tank [4].

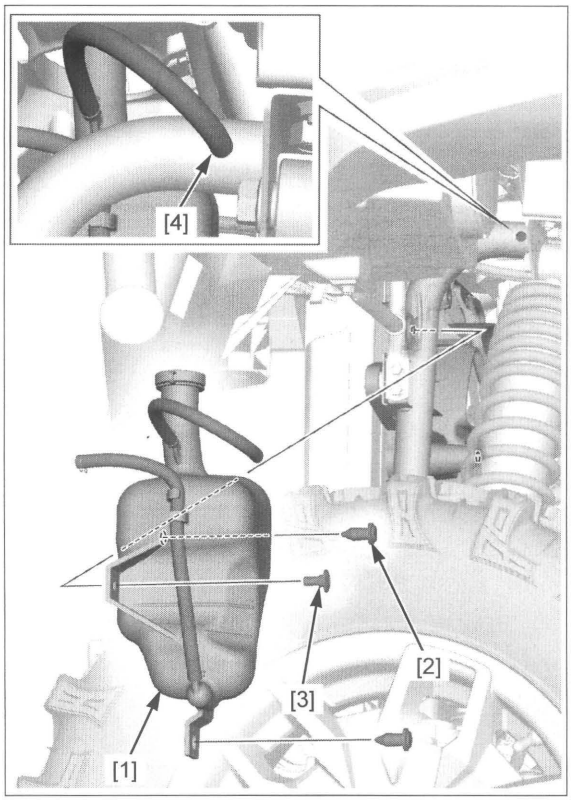


INSTALLATION

Install the reserve tank [1], trim clips [2] and pan screw [3].

Connect the coolant overflow hose [4].

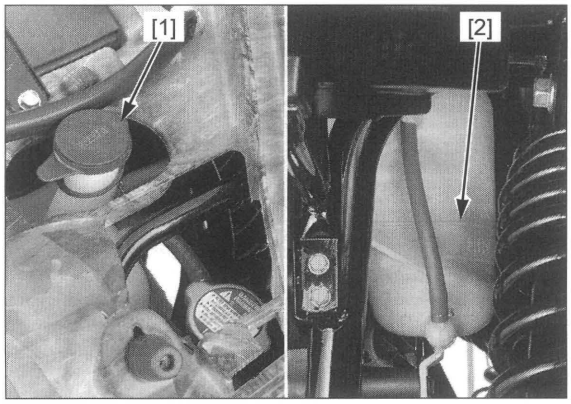
TORQUE:
Reserve tank pan screw:
10 N·m (1.0 kgf·m, 7 lbf·ft)



Remove the tank cap [1].

Fill the reserve tank with the recommended coolant to the MAX level line [2] and install the tank cap.

Install the front hood (page 2-17).



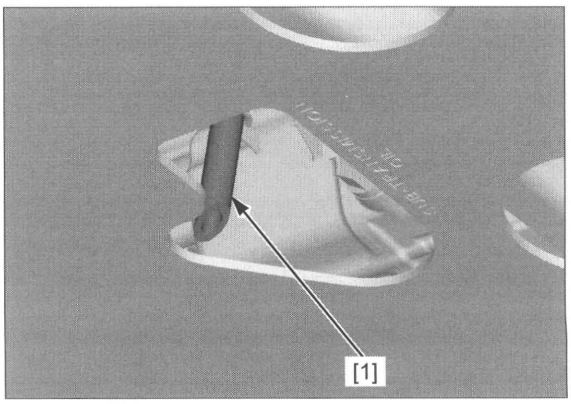
WATER PUMP

MECHANICAL SEAL INSPECTION

Check the water pump breather hose [1] for signs of coolant leakage.

NOTE:
- A small amount of coolant weeping from the bleed hose is normal.
- Make sure there is no continuous coolant leakage from the bleed hose while operating the engine.

Replace the alternator cover as an assembly if necessary (page 13-4).



10. CYLINDER HEAD/VALVE/CAMSHAFT

SERVICE INFORMATION 10-2

TROUBLESHOOTING 10-3

COMPONENT LOCATION 10-4

CYLINDER COMPRESSION 10-5

CYLINDER HEAD COVER 10-5

ROCKER ARM 10-7

CAM CHAIN TENSIONER LIFTER 10-9

CAMSHAFT 10-10

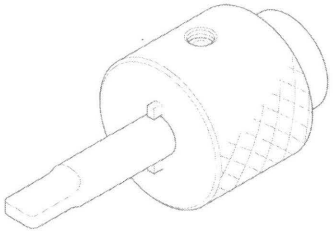
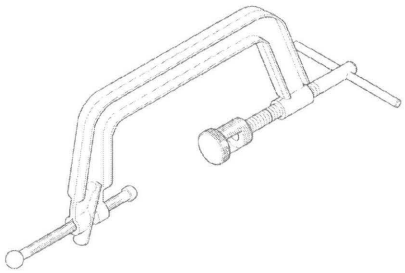
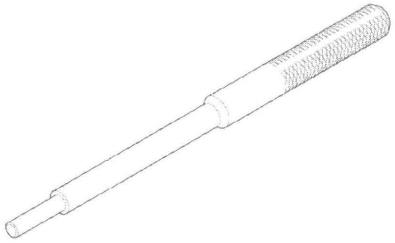
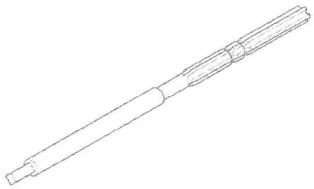
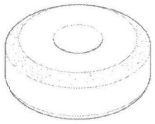
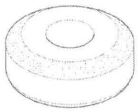
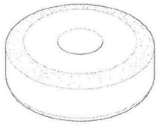
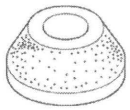
CYLINDER HEAD 10-14

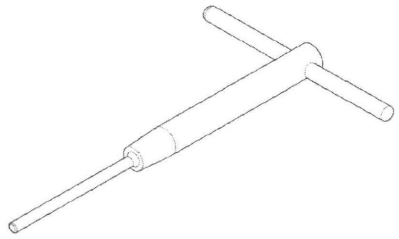
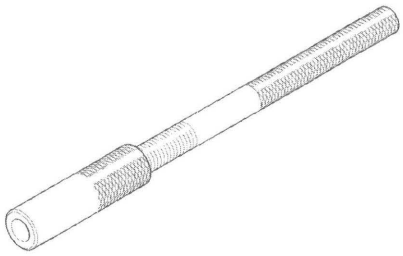
SERVICE INFORMATION

GENERAL

- This section covers service of the rocker arms, cylinder head, valves and camshaft. These services can be done with the engine installed in the frame.
- When disassembling, mark and store the disassembled parts to ensure that they are reinstalled in their original locations.
- Clean all disassembled parts with cleaning solvent and dry them by blowing them off with compressed air before inspection.
- Rocker arm, valve and camshaft lubricating oil is fed through oil passage in the cylinder head. 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.

TOOLS

Tensioner holder B 070MG-0010100  or 07AMG-001A100 (U.S.A. only) or 07AMG-MFJA100 (U.S.A. only)	Valve spring compressor 07757-0010000 	Tappet hole protector, 26 x 28 mm 07999-4220000 (not available in U.S.A.) 
Valve guide driver, 5.5 mm 07742-0010100 	Valve guide reamer, 5.5 mm 07984-2000001  or 07984-200000D (U.S.A. only)	Valve seat cutter, 40 mm (45° IN) 07780-0010500  or equivalent commercially available in U.S.A.
Valve seat cutter, 35 mm (45° EX) 07780-0010400  or equivalent commercially available in U.S.A.	Flat cutter, 42 mm (32° IN/EX) 07780-0013000  or equivalent commercially available in U.S.A.	Interior cutter, 34 mm (60° IN/EX) 07780-0014700  or equivalent commercially available in U.S.A.

Cutter holder, 5.5 mm 07781-0010101  or equivalent commercially available in U.S.A.	Valve guide driver 07743-0020000 (not available in U.S.A.) 

TROUBLESHOOTING

- Engine top-end problems usually affect engine performance. These can be diagnosed by a compression test, or by tracing noises to the top-end 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 15-12).

Compression too low, hard starting or poor performance at low speed
- Valves:
  - Incorrect valve adjustment
  - Burned or bent valve
  - Incorrect valve timing
  - Broken valve spring
  - Uneven valve seating
  - Valve stuck open
- Cylinder head:
  - Leaking or damaged cylinder head gasket
  - Loose spark plug
  - Warped or cracked cylinder head
- Cylinder/piston problem (page 15-2)

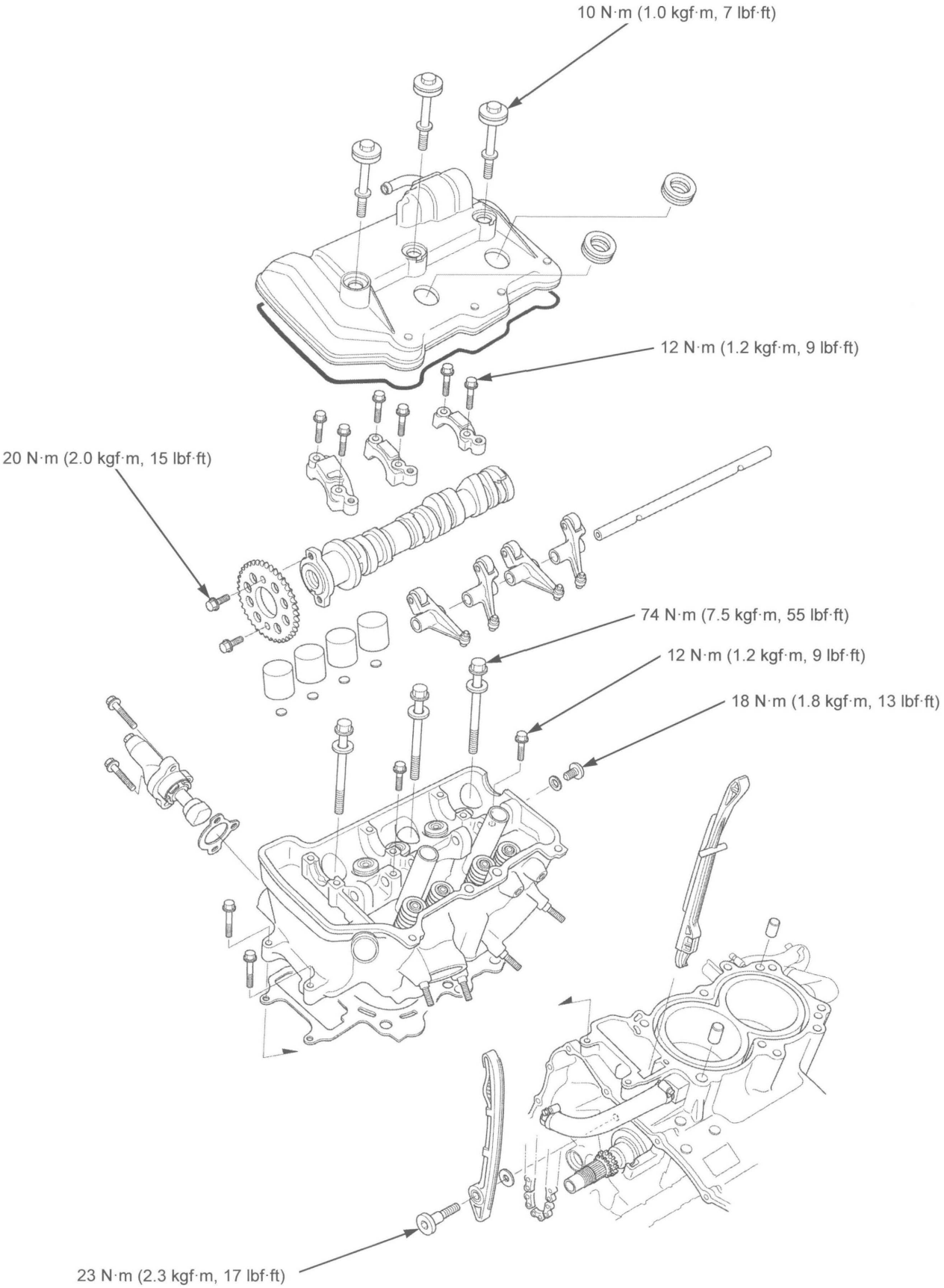
Compression too high, overheating or knocking
- Excessive carbon build-up on piston head or combustion chamber

Excessive smoke
- Worn valve stem or valve guide
- Damaged stem seal
- Cylinder/piston problem (page 15-2)

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
- Loose or worn cam chain
- Worn or damaged cam chain tensioner
- Worn cam sprocket teeth
- Cylinder/piston problem (page 15-2)

Rough idle
- Low cylinder compression

COMPONENT LOCATION



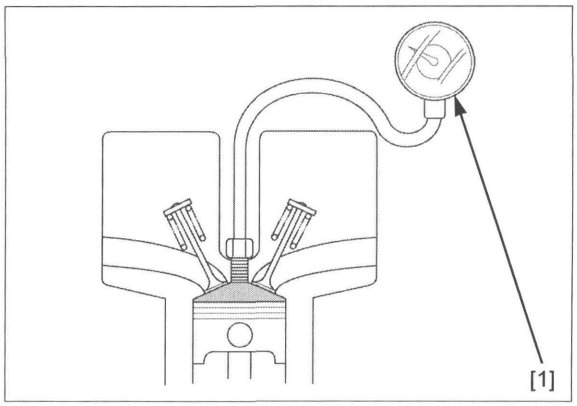
CYLINDER COMPRESSION

Remove the air cleaner cover (page 2-11).

Warm up the engine to normal operating temperature. Stop the engine, disconnect the spark plug caps and remove the spark plugs (page 3-7).

Install the compression gauge [1] into the spark plug hole.

Turn the ignition switch ON (I).
Shift the sub-transmission into the parking position.
Open the throttle all the way and crank the engine with the starter motor until the gauge reading stops rising. The maximum reading is usually reached within 4 – 7 seconds.



COMPRESSION PRESSURE:
951 kPa (9.7 kgf/cm^2, 137 psi) at 400 rpm

Low compression can be caused by:
- blown cylinder head gasket
- improper valve adjustment
- valve leakage
- worn piston ring or cylinder

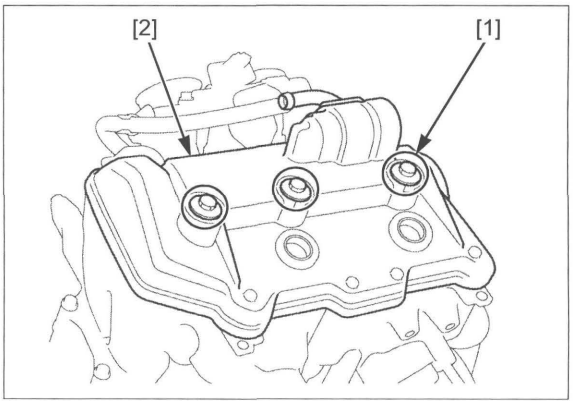
High compression can be caused by:
- carbon deposits in combustion chamber or on piston head

CYLINDER HEAD COVER

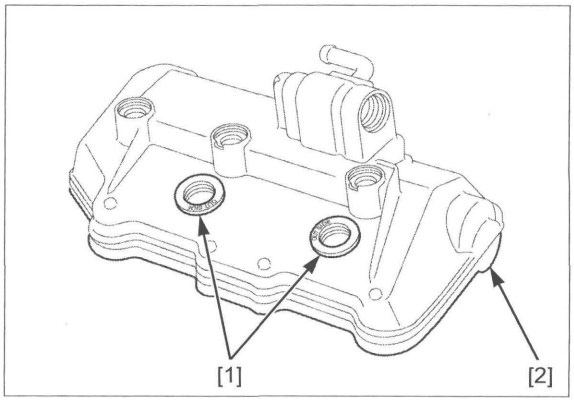
REMOVAL

Remove the air cleaner cover (page 2-11).
Disconnect the spark plug cap (page 3-7).
Disconnect the crankcase breather hose (page 7-17).

Remove the bolts [1] and cylinder head cover [2].



Remove the plug pipe seals [1] and cylinder head cover packing [2].

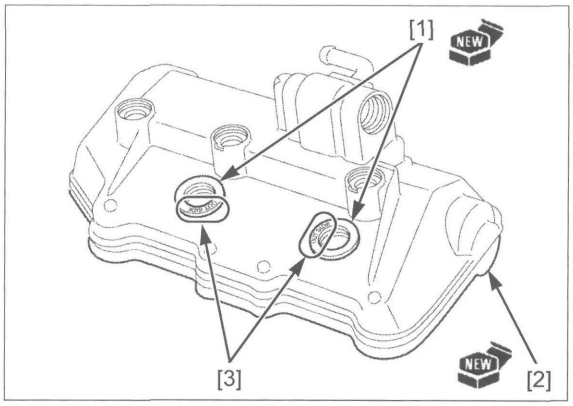


INSTALLATION

Install new plug pipe seals [1].
Install a new cylinder head cover packing [2].

NOTE:

- Install the plug pipe seals with their "OUT SIDE" marks [3] facing up.

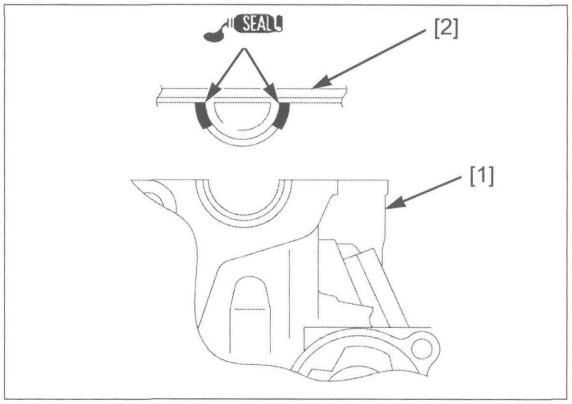


Clean the cylinder head [1] mating surface thoroughly.

Apply liquid sealant (TB5211 manufactured by ThreeBond, KE45 manufactured by Shin-Etsu Silicone or an equivalent) to the cylinder head cover packing [2] as shown.

NOTE:

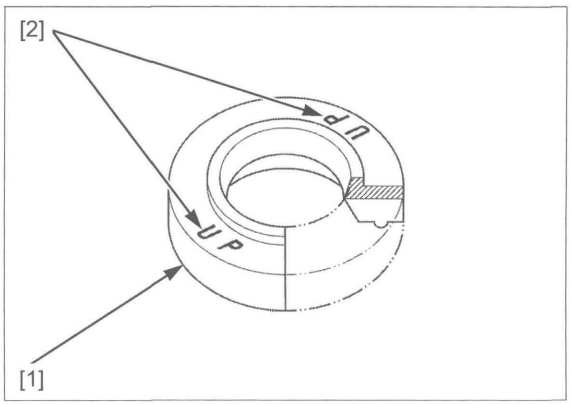
- Do not apply more liquid sealant than necessary.



Check that the mounting rubbers [1] are in good condition, and replace them if necessary.

NOTE:

- Install the mounting rubbers with their "UP" marks [2] facing up.



Install the cylinder head cover [1].

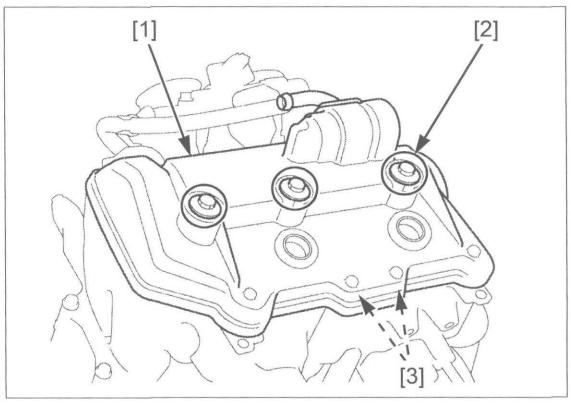
Be sure the cover is seated over the two alignment dowels [3] before tightening.

Install the bolts [2] and tighten them to the specified torque.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

Connect the spark plug caps (page 3-7).

Install the air cleaner housing (page 7-17).



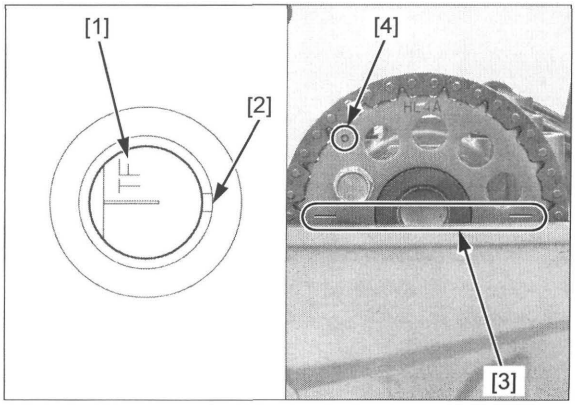
ROCKER ARM

REMOVAL

Remove the following:

- rear center cover (page 2-9)
- cylinder head cover (page 10-5)
- timing and crankshaft hole caps (page 3-8)

Turn the crankshaft counterclockwise and align the "TF" mark [1] on the flywheel with the index mark [2] of the alternator cover.

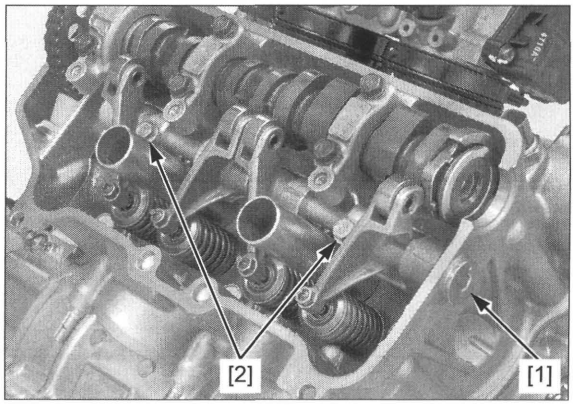


Check the following:

- the Index lines [3] aligns with cylinder head top surface
- the punch mark [4] is visible.

If the punch mark is not visible, rotate the crankshaft one full turn (360°) and align the "TF" mark with the index mark again.

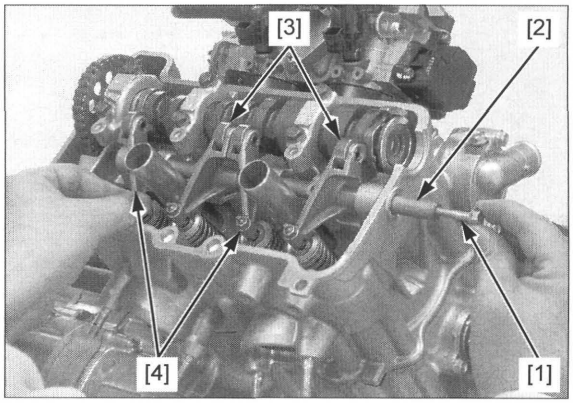
Remove the rocker arm shaft stopper bolt [1] and rocker arm shaft bolts [2].



Temporarily install a 6 mm bolt [1].

Remove the rocker arm shaft [2] by pulling it.
Remove the rocker arms A [3] and B [4].

Remove the 6 mm bolt.



INSPECTION

Inspect the following parts for damage, abnormal wear, deformation, burning.

- rocker arm
- rocker arm shaft

Measure each part according to CYLINDER HEAD/ VALVE/CAMSHAFT SPECIFICATIONS (page 1-11).

Replace any part if it is out of the service limit.

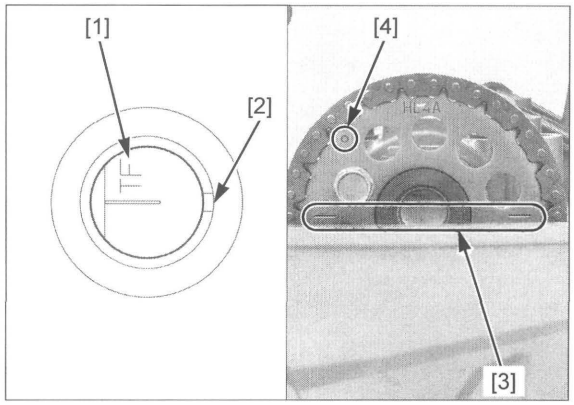
INSTALLATION

Turn the crankshaft counterclockwise and align the "TF" mark [1] on the flywheel with the index mark [2] of the alternator cover.

Check the following:

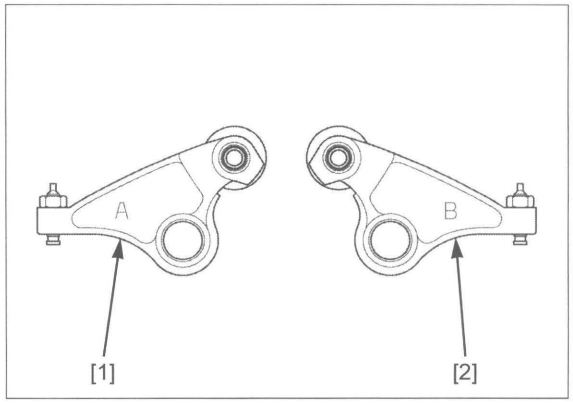
- the Index lines [3] aligns with cylinder head top surface
- the punch mark [4] is visible.

If the punch mark is not visible, rotate the crankshaft one full turn (360°) and align the "TF" mark with the index mark again.



The rocker arms have the following identification marks:

- "A" mark: rocker arm A [1]
- "B" mark: rocker arm B [2]



Apply molybdenum oil solution to the rocker arm sliding surface and rocker arm shaft outer surface.

Temporarily install a 6 mm bolt [1].

Install the rocker arms A [2] and B [3].

Install the rocker arm shaft [4].

NOTE:

- Install the rocker arm shaft by aligning its grooves with the bolt holes of the cylinder head.

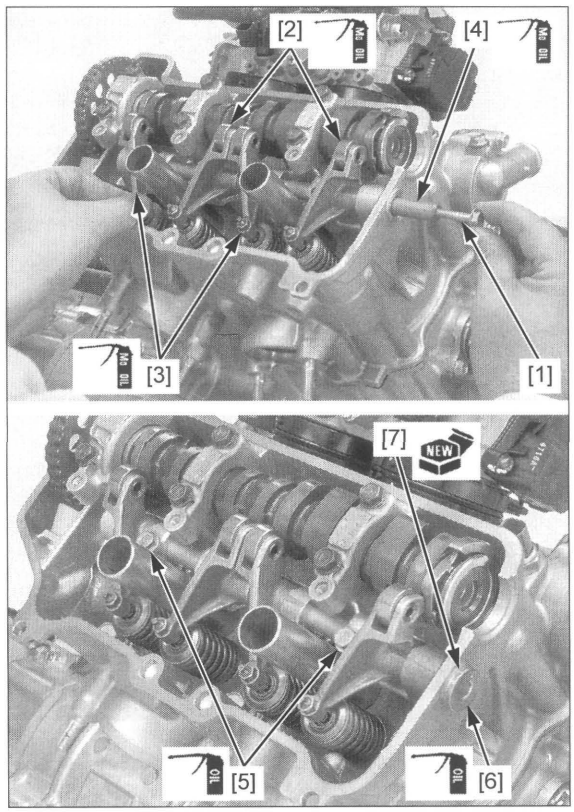
Apply engine oil to the rocker arm shaft bolts threads and seating surface.
Install and tighten shaft bolts [5] to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Remove the 6 mm bolt.

Apply engine oil to the rocker arm shaft stopper bolt threads and seating surface.
Install stopper bolt [6] with a new sealing washer [7] and tighten it to the specified torque.

TORQUE: 18 N·m (1.8 kgf·m, 13 lbf·ft)



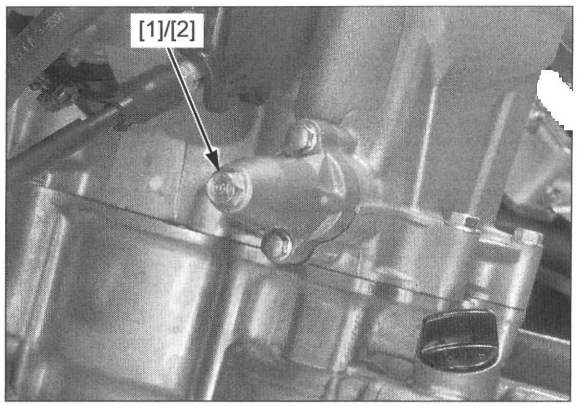
CAM CHAIN TENSIONER LIFTER

REMOVAL/INSTALLATION

M5P/M5D: Remove the rear footwell lid (page 2-11).

M3P/M3D: Remove the mud guard lid (page 2-14).

Remove the cam chain tensioner lifter plug [1] and sealing washer [2].



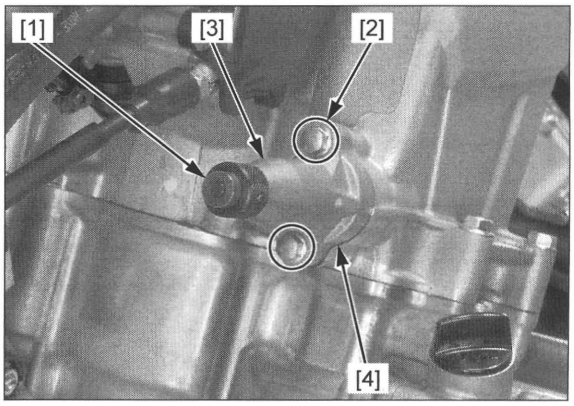
Turn the cam chain tensioner lifter shaft fully in (clockwise) and secure it using the special tool.

TOOL:

Tensioner holder B [1]	**070MG-0010100 (U.S.A.: 07AMG-001A100 or 07AMG-MFJA100)**

Remove the cam chain tensioner lifter mounting bolts [2].

Remove the cam chain tensioner lifter [3] and gasket [4].



Install a new gasket [1] on the cam chain tensioner lifter [2] and install them to the cylinder.

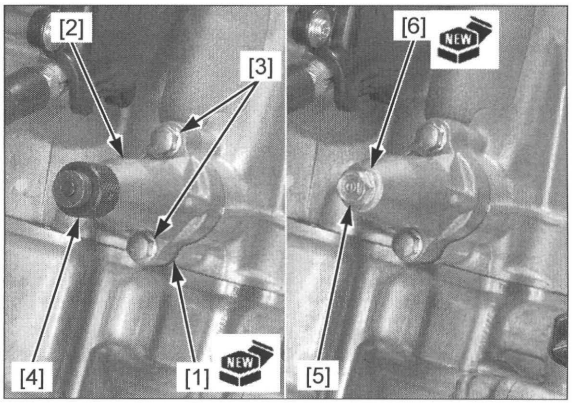
Install and tighten the mounting bolts [3].

Remove the tensioner holder [4].

Install and tighten the plug [5] with a new sealing washer [6].

M5P/M5D: Install the rear footwell lid (page 2-11).

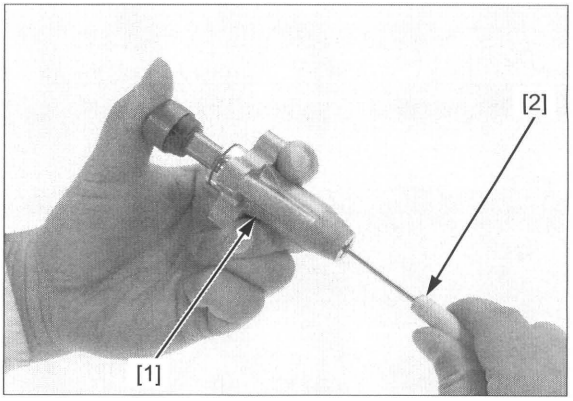
M3P/M3D: Install the mud guard lid (page 2-14).



INSPECTION

Check the cam chain tensioner lifter [1] operation:

- The cam chain tensioner lifter shaft should not go into the lifter body when it is pushed.
- When it is turned clockwise with the tensioner holder or a screwdriver [2], the shaft should be pulled into the lifter body. The shaft should spring out of the lifter body as soon as the tensioner holder is released.



CAMSHAFT

REMOVAL

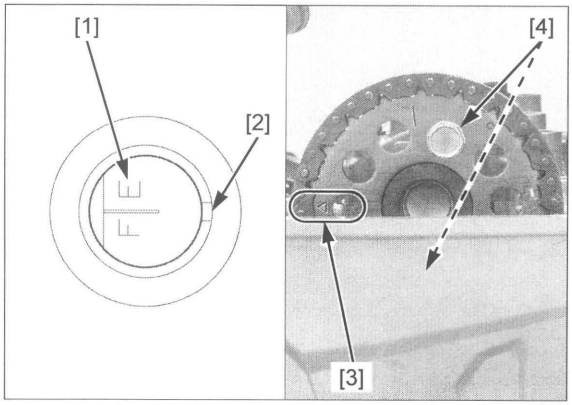
Remove the rocker arm (page 10-7).
Release the cam chain tension (page 10-9).

Turn the crankshaft counterclockwise and align the "FE" mark [1] on the flywheel with the index mark [2] of the alternator cover.

Make sure that the "△" mark [3] on the cam sprocket aligns with the left (intake side) upper surface of the cylinder head as shown.

If the "△" mark aligns with the right (exhaust side) upper surface of the cylinder head, rotate the crankshaft one full turn (360°) and align the "FE" mark with the index mark again.

Loosen the cam sprocket bolts [4] if you plan to remove the cam sprocket.



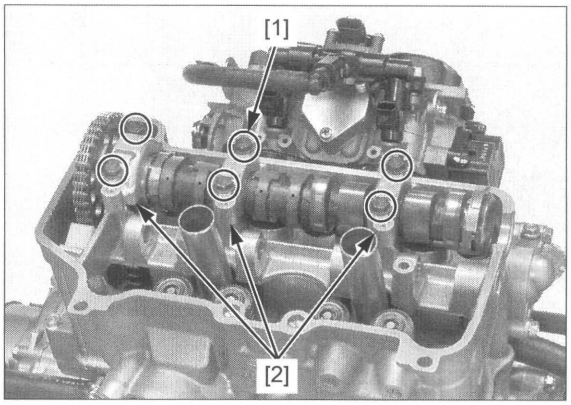
Be careful not to let the camshaft holder bolts fall into the crankcase.

Loosen the camshaft holder bolts [1] gradually in a crisscross pattern in 2 or 3 steps, and remove them.

Remove the camshaft holders [2] with the dowel pins.

NOTE:

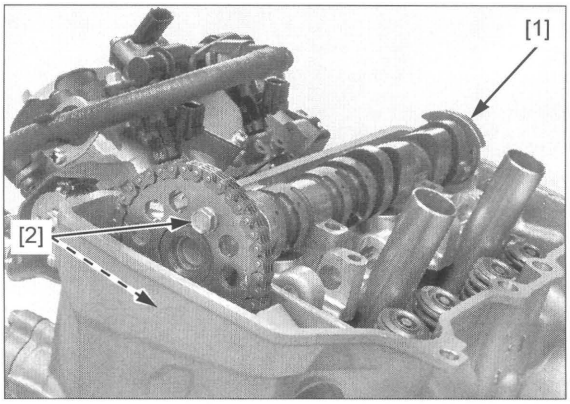
- Do not forcibly remove the dowel pins from the camshaft holders.



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

Remove the camshaft/cam sprocket assembly [1] by releasing from the cam chain.

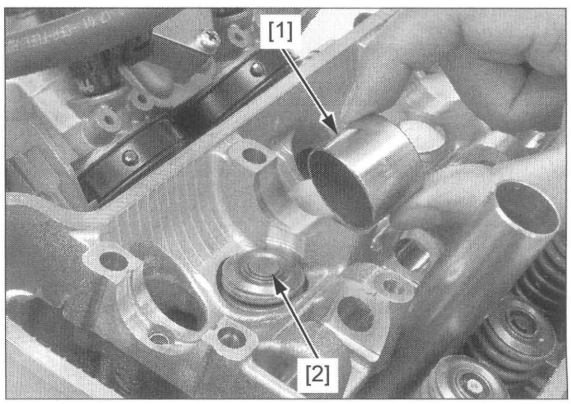
Remove the cam sprocket bolts [2] and cam sprocket from the camshaft if necessary.



Remove the valve lifters [1] and shims [2].

NOTE:

- Do not allow the shims to fall into the crankcase.
- Mark all valve lifters and shims to ensure correct reassembly in their original locations.
- The shims can be easily removed with tweezers or a magnet.



INSPECTION

Inspect the following parts for damage, abnormal wear, deformation, burning, or clogs in oil passages.

- cam sprocket
- camshaft
- camshaft holder/dowel pin
- valve lifter

Measure each part according to CYLINDER HEAD/VALVE/CAMSHAFT SPECIFICATIONS (page 1-11).

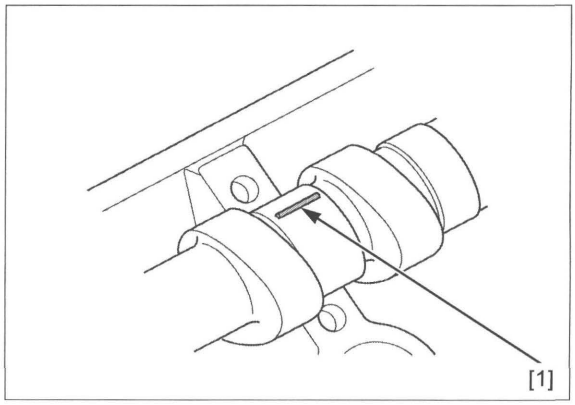
Replace any part if it is out of the service limit.

CAMSHAFT OIL CLEARANCE

Do not rotate the camshaft during inspection.

Wipe any oil from the journals of the cylinder head, camshaft and camshaft holder.
Install the cam chain onto the camshaft sprocket and install the camshaft into the cylinder head (page 10-13).

Lay a strip of plastigauge [1] lengthwise on each camshaft journal and be sure to avoid the oil passages.

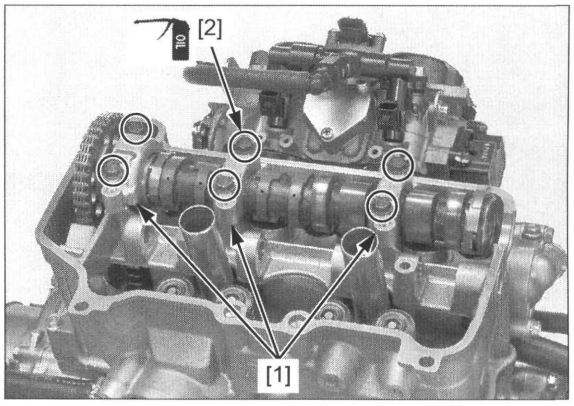


Install camshaft holders/dowel pins [1] in the correct locations, being careful not to drop the plastigauge.

Apply engine oil to the threads and seating surfaces of the camshaft holder bolts [2] and install them.

Tighten the bolts to the specified torque.

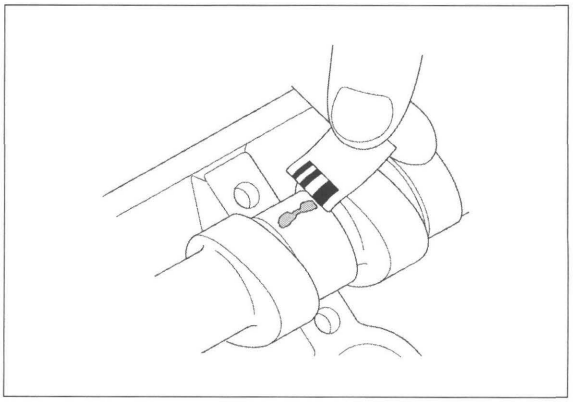
TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)



Remove the camshaft holder and measure the compressed plastigauge at its widest point on the camshaft to determine the oil clearance.

SERVICE LIMIT: 0.072 mm (0.0028 in)

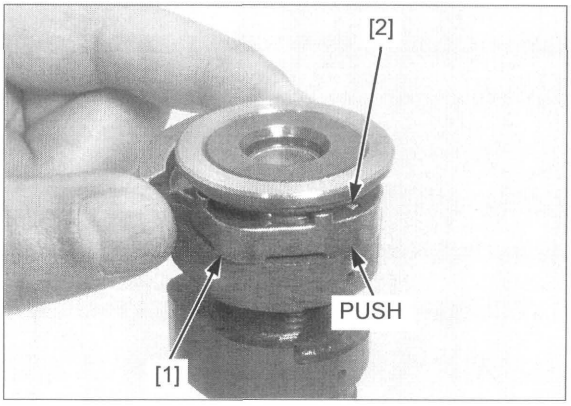
If the oil clearance exceeds the service limit, replace the camshaft and recheck the oil clearance.
Replace the cylinder head and camshaft holder as a set if the oil clearance still exceeds the service limit.



DECOMPRESSOR SYSTEM INSPECTION

Check the decompressor cam operation.

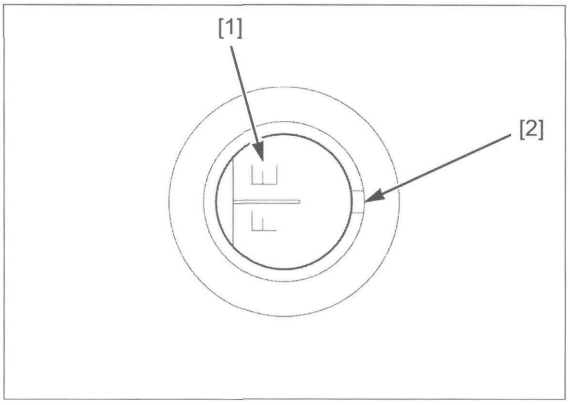
When you push on the cam plate [1] as shown, the guide pin [2] should set in the groove of the cam plate. When you release the cam plate, it will return again to the original position by spring.



INSTALLATION

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

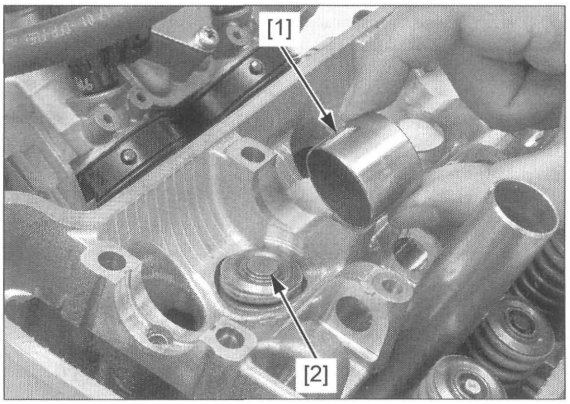
Turn the crankshaft counterclockwise and align the "FE" mark [1] on the flywheel with the index mark [2] on the alternator cover.



Install the valve lifters [1] and shims [2].

NOTE:

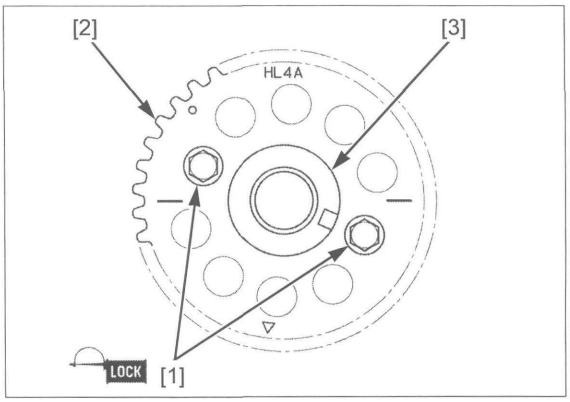
- Do not allow the shims to fall into the crankcase.
- Install all valve lifters and shims in their original locations.



If the cam sprocket is removed, install it as follows:

Apply locking agent to the threads of the cam sprocket bolts [1].

Install the cam sprocket [2] onto the camshaft [3] so that the timing marks and groove are arranged as shown and temporarily tighten the cam sprocket bolts.

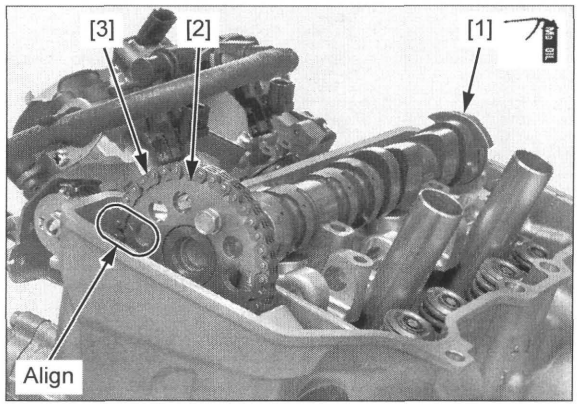


Apply molybdenum oil solution to the cam lobes and journal surfaces of the camshaft [1].

Place the camshaft onto the cylinder head.

Align the "△" mark on the cam sprocket [2] with the left (intake side) upper surface of the cylinder head as shown.

Install the cam chain [3] on the cam sprocket and set the camshaft in position.

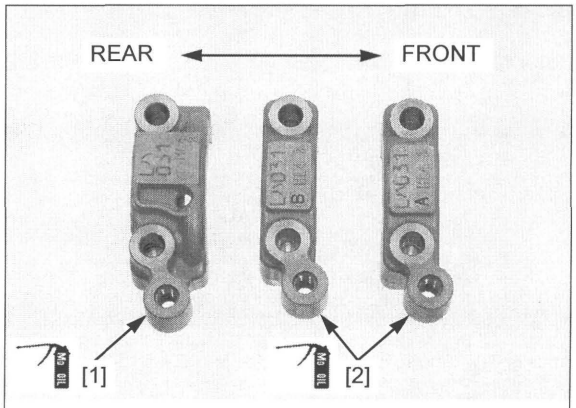


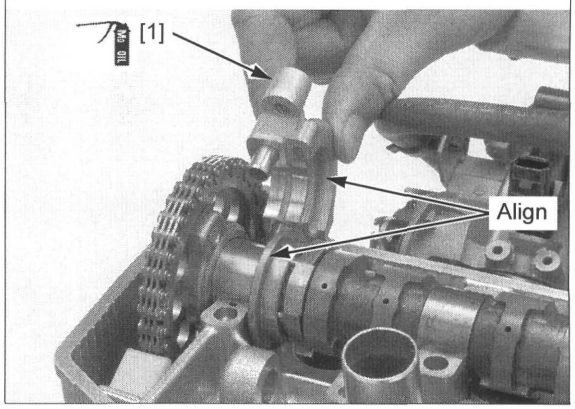
Apply molybdenum oil solution to the inner surfaces of the camshaft holders and install them in their original locations.

– camshaft holder A [1]
– camshaft holders B [2]

NOTE:

- Align the groove of the camshaft holder A with the tab of the decompressor A collar.





Apply engine oil to the camshaft holder bolts [1] threads and seating surfaces and install them.

Tighten the bolts to the specified torque.

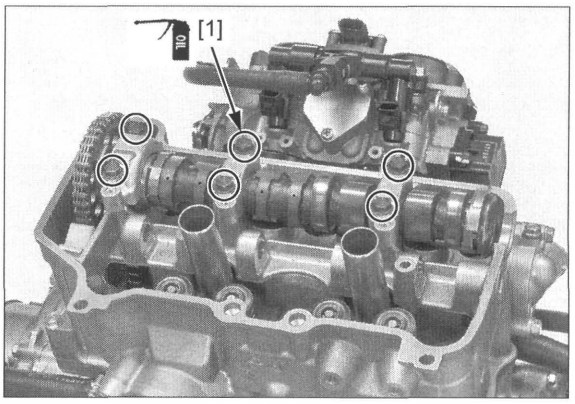
TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Apply the cam chain tension (page 10-9).

Tighten the cam sprocket bolts to the specified torque if they are loosened.

TORQUE: 20 N·m (2.0 kgf·m, 15 lbf·ft)

Install the removed parts in the reverse order of removal.



CYLINDER HEAD

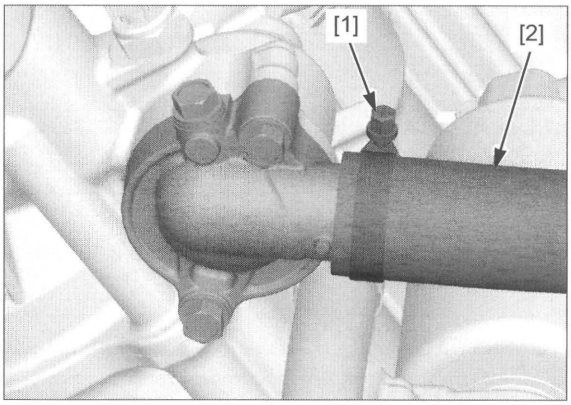
REMOVAL

Drain the coolant (page 9-4).

Remove the following:

- exhaust pipe (page 2-54)
- throttle body (page 7-22)
- rocker arms (page 10-7)
- camshaft (page 10-10)

Loosen the water hose band screw [1] and disconnect the water hose [2].



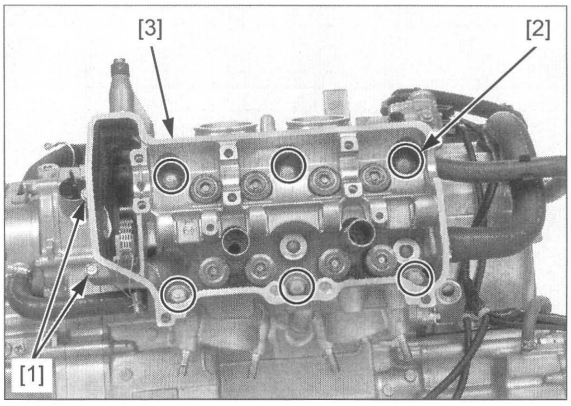
Remove the 6 mm bolts [1].
Remove the cylinder head bolts [2].

NOTE:

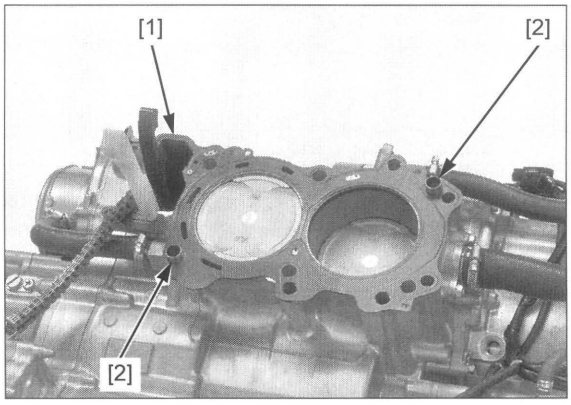
- Loosen the cylinder head bolts in a crisscross pattern in 2 or 3 steps.

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

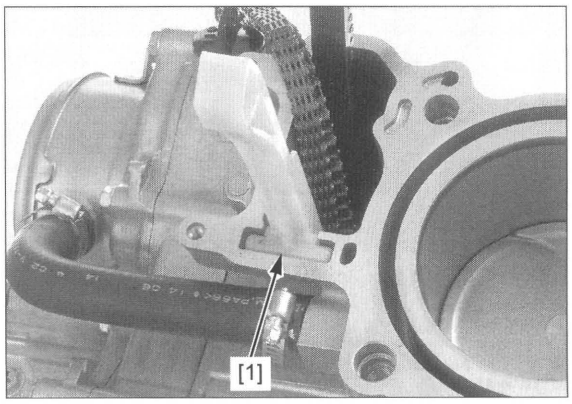
Remove the cylinder head [3].



Remove the gasket [1] and dowel pins [2].



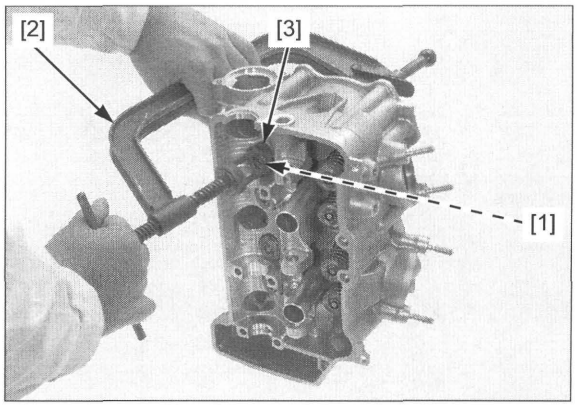
Remove the cam chain guide [1].



DISASSEMBLY

Remove the following:

- spark plugs (page 3-7)
- cam chain tensioner lifter (page 10-9)
- thermostat (page 9-6)



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

Remove the valve cotters [1] using the special tool as shown.

TOOLS:

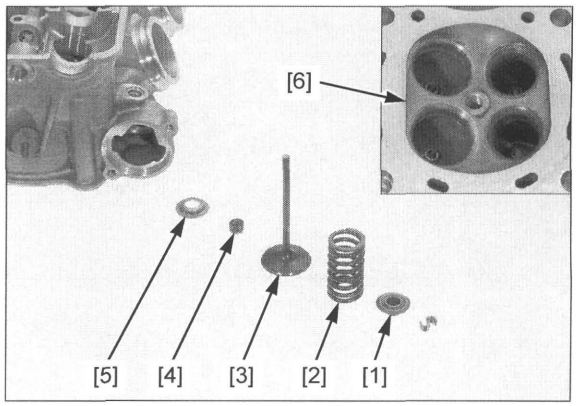
Valve spring compressor [2]	**07757-0010000**
Tappet hole protector, 26 x 28 mm [3]	**07999-4220000 (not available in U.S.A.)**

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

Remove the following:

- spring retainers [1]
- valve springs [2]
- valves [3]
- stem seals [4]
- spring seats [5]

Remove carbon deposits from the combustion chamber [6].



INSPECTION

Inspect the following parts for damage, abnormal wear, deformation, burning or clogs in oil passages.

- cylinder head
- valve springs
- valves
- valve guides

Measure each part according to CYLINDER HEAD/VALVE/CAMSHAFT SPECIFICATIONS (page 1-11).

Replace any part if it is out of the service limit.

NOTE:

- Ream the valve guide using the valve guide reamer to remove any carbon build up before measuring the guide (page 10-16).
- Refer to valve seat inspection (page 10-16).

VALVE GUIDE REPLACEMENT

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

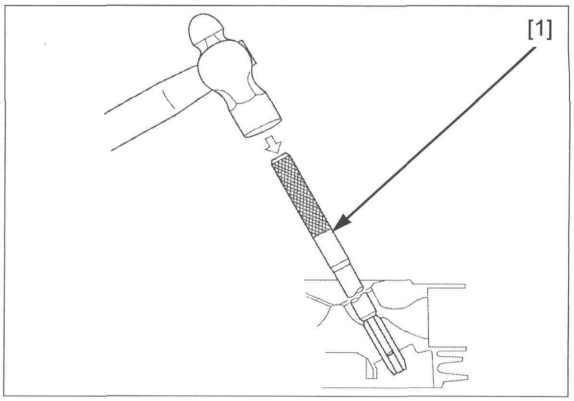
Do not use a torch to heat the cylinder head; it may cause warping.

Heat the cylinder head to 100 – 150°C (212 – 302°F) with a hot plate or oven.
To avoid burns, wear heavy gloves when handling the heated cylinder head.

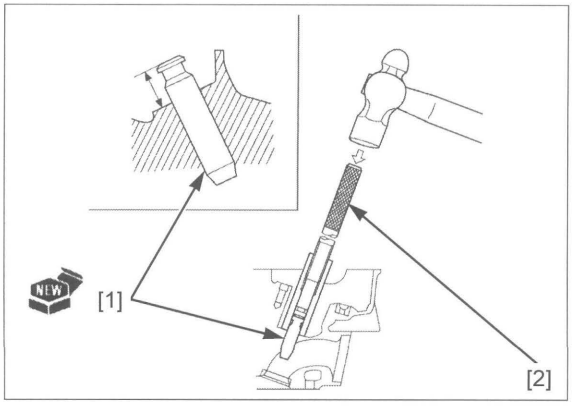
Support the cylinder head and drive out the valve guides from combustion chamber side of the cylinder head.

TOOL:

Valve guide driver 5.5 mm [1]	**07742-0010100**



While the cylinder head is still heated, drive new valve guides [1] from the camshaft side until the exposed height is specified value.



SPECIFIED DEPTH:
IN: 17.7 – 18.0 mm (0.70 – 0.71 in)
EX: 17.8 – 18.1 mm (0.70 – 0.71 in)

TOOL:

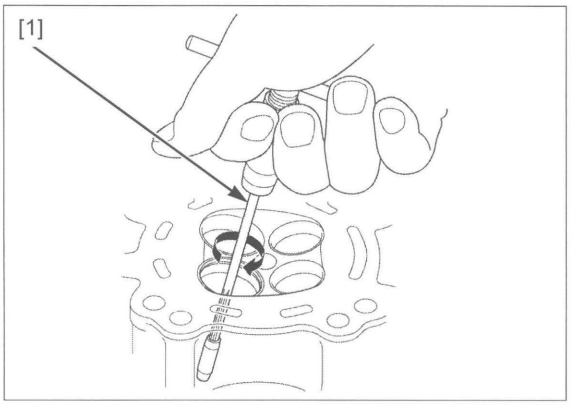
Valve guide driver [2]	**07743-0020000 (not available in U.S.A.)**

U.S.A. only installation:
Mark the depth of the valve guide using a marker.
Use the valve guide driver to correct the depth.

Let the cylinder head cool to room temperature.

Use cutting oil on the reamer during this operation.

Ream new valve guides after installation.
Insert the reamer [1] from the combustion chamber side of the cylinder head and always rotate the reamer clockwise.



TOOL:

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

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

Clean the cylinder head thoroughly to remove any metal particles.

Reface the valve seat (page 10-16).

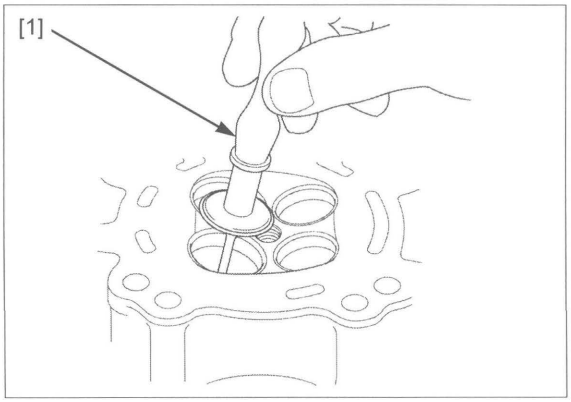
VALVE SEAT INSPECTION/REFACING

Disassemble the cylinder head (page 10-15).

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

Apply a light coating of Prussian Blue to the valve seats.

Tap the valves and seats using a rubber hose or other hand-lapping tool [1].



Measure the valve seat width according to CYLINDER HEAD/VALVE/CAMSHAFT SPECIFICATIONS (page 1-11).

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

Inspect the valve seat face for:

- uneven seat width:
  – replace the valve and reface the valve seat.
- damaged face:
  – replace the valve and reface the valve seat.
- contact area (too high or too low)
  – reface the valve seat.

REFACING

Reface the valve seat using the following tools.

TOOLS:

Cutter holder, 5.5 mm	**07781-0010101**
Seat cutter, 40 mm (45° IN)	**07780-0010500**
Seat cutter, 35 mm (45° EX)	**07780-0010400**
Flat cutter, 42 mm (32° IN/EX)	**07780-0013000**
Interior cutter, 34 mm (60° IN/EX)	**07780-0014700**

or equivalent commercially available in U.S.A.

STANDARD:

IN: 1.1 – 1.3 mm (0.04 – 0.05 in)
EX: 1.3 – 1.5 mm (0.05 – 0.06 in)

SERVICE LIMITS:

IN: 1.5 mm (0.06 in)
EX: 1.9 mm (0.07 in)

NOTE:

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

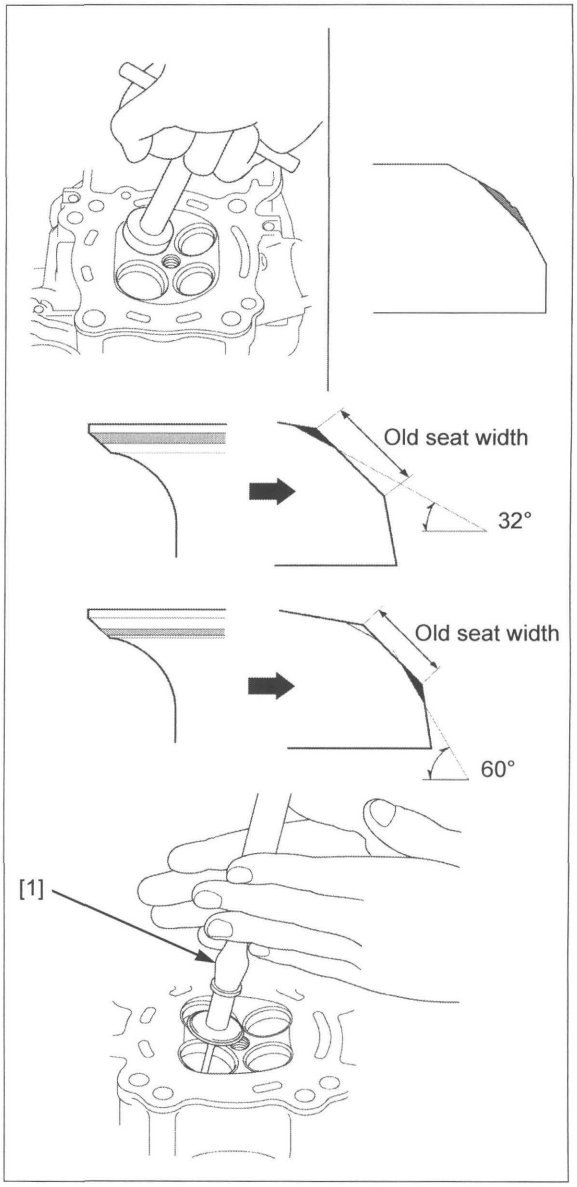
1. Use a 45° seat cutter, remove any roughness or irregularities from the seat.
2. Use a 32° flat cutter, remove the top 1/4 of the existing valve seat material.
3. Use a 60° interior cutter, remove the bottom 1/4 of the existing valve seat material.
4. Using a 45° seat cutter, cut the seat to the proper width.
   Make sure that all pitting and irregularities are removed.
5. After cutting the seat, apply lapping compound to the valve face, and lap the valve using light pressure.

NOTE:

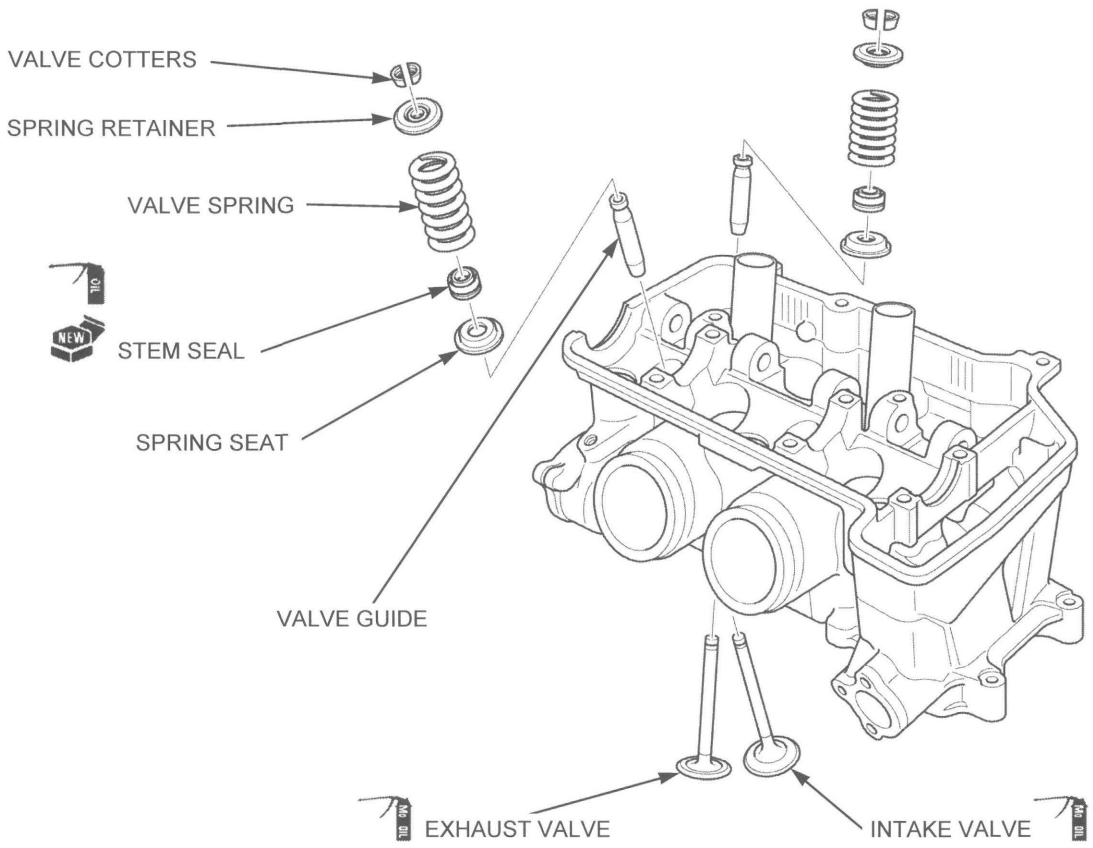
- Excessive lapping pressure may deform or damage the seat.
- Change the angle of lapping tool [1] frequently to prevent uneven seat wear.
- Do not allow lapping compound to enter the guides.

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

Assemble the cylinder head (page 10-18).



ASSEMBLY



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

Install the spring seats [1].

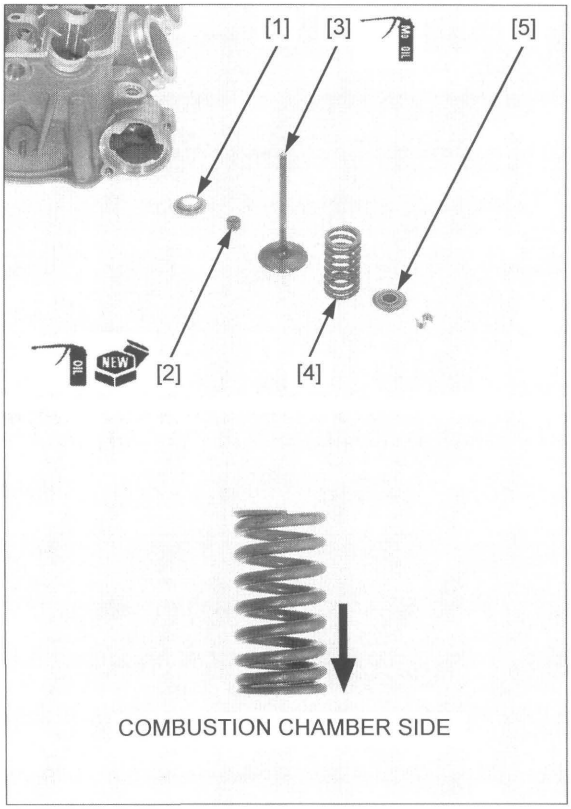
Apply engine oil to the inside of new stem seals [2] and install them.

Apply molybdenum oil solution to the valve stem sliding surface and stem end.

Insert the valve [3] into the valve guide while turning it slowly to avoid damage to the stem seal.

Install the valve springs [4] with the tightly wound coils facing the combustion chamber.

Install the valve spring retainer [5].

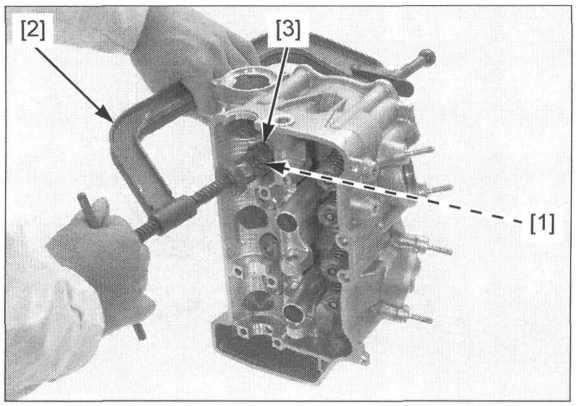


To prevent loss of tension, do not compress the valve springs more than necessary.

Install the valve cotters [1] using the special tool as shown.

TOOLS:

Valve spring compressor [2]	**07757-0010000**
Tappet hole protector, 26 x 28 mm [3]	**07999-4220000 (not available in U.S.A.)**



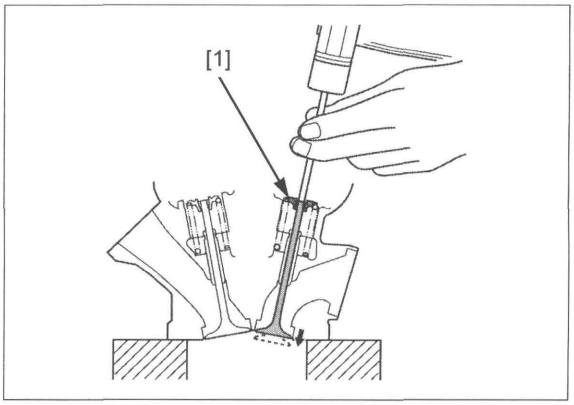
Tap the tool gently to seat the valve cotters [1] firmly using a hammer.

NOTE:

- Support the cylinder head above the work bench surface to prevent valve damage.

Install the following:

– spark plugs (page 3-7)
– cam chain tensioner lifter (page 10-9)
– thermostat (page 9-6)

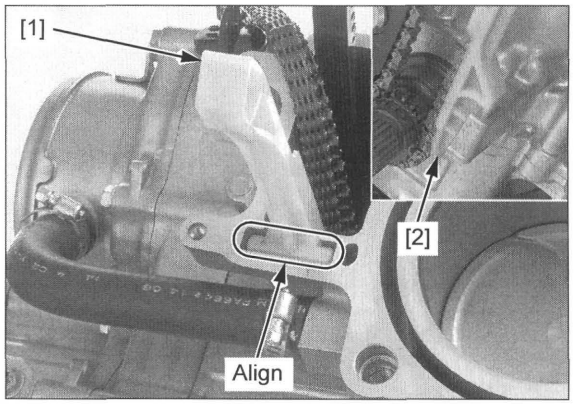


INSTALLATION

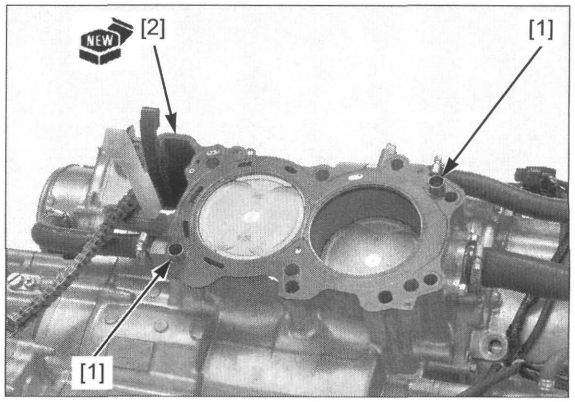
Install the cam chain guide [1].

NOTE:

- Align the cam chain guide end [2] with the groove in the crankcase.
- Align the cam chain guide tabs with the grooves in the crankcase.



Install the dowel pins [1] and a new gasket [2].



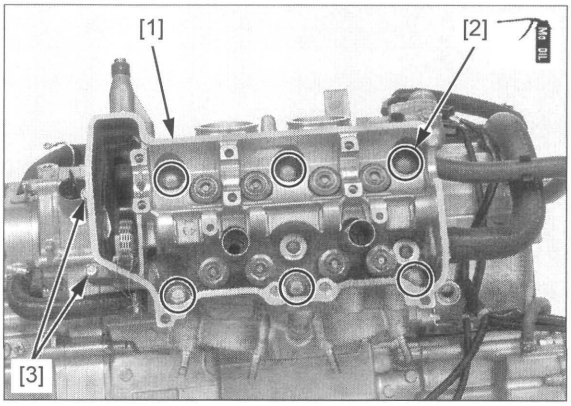
Route the cam chain through the cylinder head and install the cylinder head [1] onto the cylinder.

Apply molybdenum oil solution to the cylinder head bolts [2] threads and seating surface.

Install and tighten the cylinder head bolts in a crisscross pattern in 2 or 3 steps to the specified torque.

TORQUE: 74 N·m (7.5 kgf·m, 55 lbf·ft)

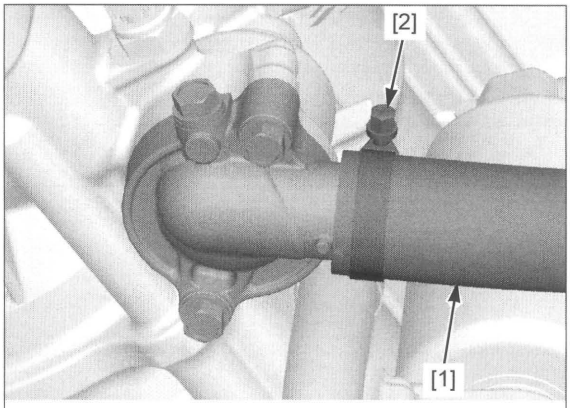
Install and tighten the 6 mm bolts [3] securely.

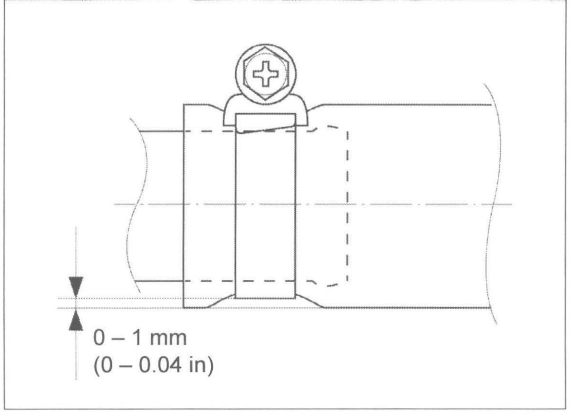


Connect the water hose [1] and tighten the water hose band screw [2] to the specified range.

Install the following:

- camshaft (page 10-12)
- rocker arms (page 10-8)
- throttle body (page 7-25)
- exhaust pipe (page 2-54)





11. DUAL CLUTCH TRANSMISSION (DCT)

SERVICE INFORMATION 11-2

DCT SYMPTOM TROUBLESHOOTING 11-3

COMPONENT LOCATION 11-4

DCT ELECTRICAL SYSTEM LOCATION 11-6

DCT SYSTEM DIAGRAM 11-7

DCT TROUBLESHOOTING INFORMATION 11-9

DTC INDEX 11-11

DTC TROUBLESHOOTING 11-14

CLUTCH COVER/ CLUTCH CONTROL BODY 11-47

SHIFT CONTROL MOTOR/ REDUCTION GEARS 11-51

DRIVE MODE CHANGE SWITCH 11-55

SHIFT SPINDLE ANGLE SENSOR 11-58

TR SENSOR 11-59

CLUTCH EOP SENSOR 11-60

EOT SENSOR 11-60

FRONT VS SENSOR 11-61

REAR VS SENSOR 11-61

SUB-TRANSMISSION POSITION SWITCH 11-62

NEUTRAL SWITCH 11-65

PRIMARY DRIVE GEAR 11-65

DUAL CLUTCH/ PRIMARY DRIVEN GEAR 11-66

GEARSHIFT LINKAGE 11-68

CLUTCH INITIALIZE LEARNING 11-72

SERVICE INFORMATION

GENERAL

- This section covers service of the electrical and mechanical systems of the Dual Clutch Transmission (DCT).
- A faulty DCT system is often related to poorly connected or corroded connectors. Check those connections before proceeding.
- Read the "DCT Troubleshooting Information" carefully, and inspect and troubleshoot the DCT system according to the DTC. Observe each step of the procedures one by one. Note the DTC and probable faulty part before starting diagnosis and troubleshooting.
- The PCM may be damaged if dropped. Also, if a connector is disconnected when current is flowing, the excessive voltage may damage the PCM. Always turn off the ignition switch before servicing.
- If the PCM and/or clutch assembly are replaced, perform the Clutch Initialize Learning Procedure (page 11-72).
- The drive mode (Automatic or ESP) is changed electrically with the drive mode change switch.
- For oil pump service (page 8-5).
- The following color codes are used throughout this section.

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

For DCT System Troubleshooting

The DCT system is controlled by the PCM. Therefore some detection items that are shared in the PGM-FI and DCT systems, and they may affect the operation of both systems.

Before starting any troubleshooting, check the following items and refer to the appropriate troubleshooting.

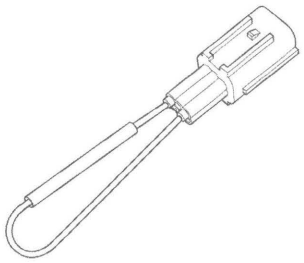
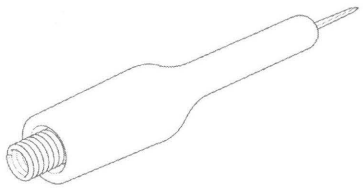
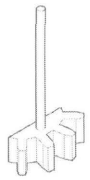
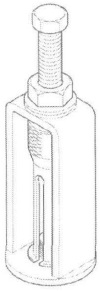
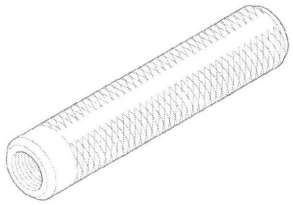
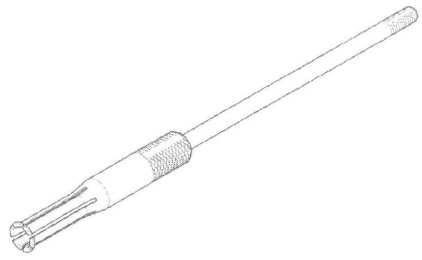
– MIL blinks DTC for the PGM-FI system (page 4-7).
– Gear position indicator blinks DTC for the DCT system (page 11-9).
– Symptom of the DCT system operation (page 11-3).

Refer to "PGM-FI Troubleshooting Information" for the general troubleshooting information (page 4-6).

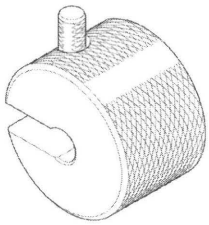
The gearshift mechanism includes the following items. If the gearshift mechanism is faulty, refer to each component service.

– Shift control motor/reduction gears (page 11-51).
– Gearshift linkage (page 11-68).
– Shift drum/shift fork (page 14-7).

TOOLS

SCS short connector 070MZ-0010300  or 070MZ-001A300 (U.S.A. only)	Test probe, 2 packs 07ZAJ-RDJA110 	Gear holder, 2.5 07724-0010100  or 07724-001A100 (U.S.A. only)
Bearing remover, 20 mm 07931-MA70000 (not available in U.S.A.) 	Remover handle 07936-3710100 (U.S.A. only) 	Bearing remover, 20 mm 07936-3710600 (U.S.A. only) 

Remover weight
07936-371020A (U.S.A. only)



DCT SYMPTOM TROUBLESHOOTING

Check the gear position indicator of the combination meter is blinking (page 11-9).

If the gear position indicator is blinking, refer to the DTC index (page 11-11) and begin the appropriate troubleshooting procedure.

If the gear position indicator is not blinking, inspect the engine oil condition and follow the symptom troubleshooting described below.

CLUTCH SLIPS AND VEHICLE DOES NOT ACCELERATE

Check the clutch clearance (page 11-68).

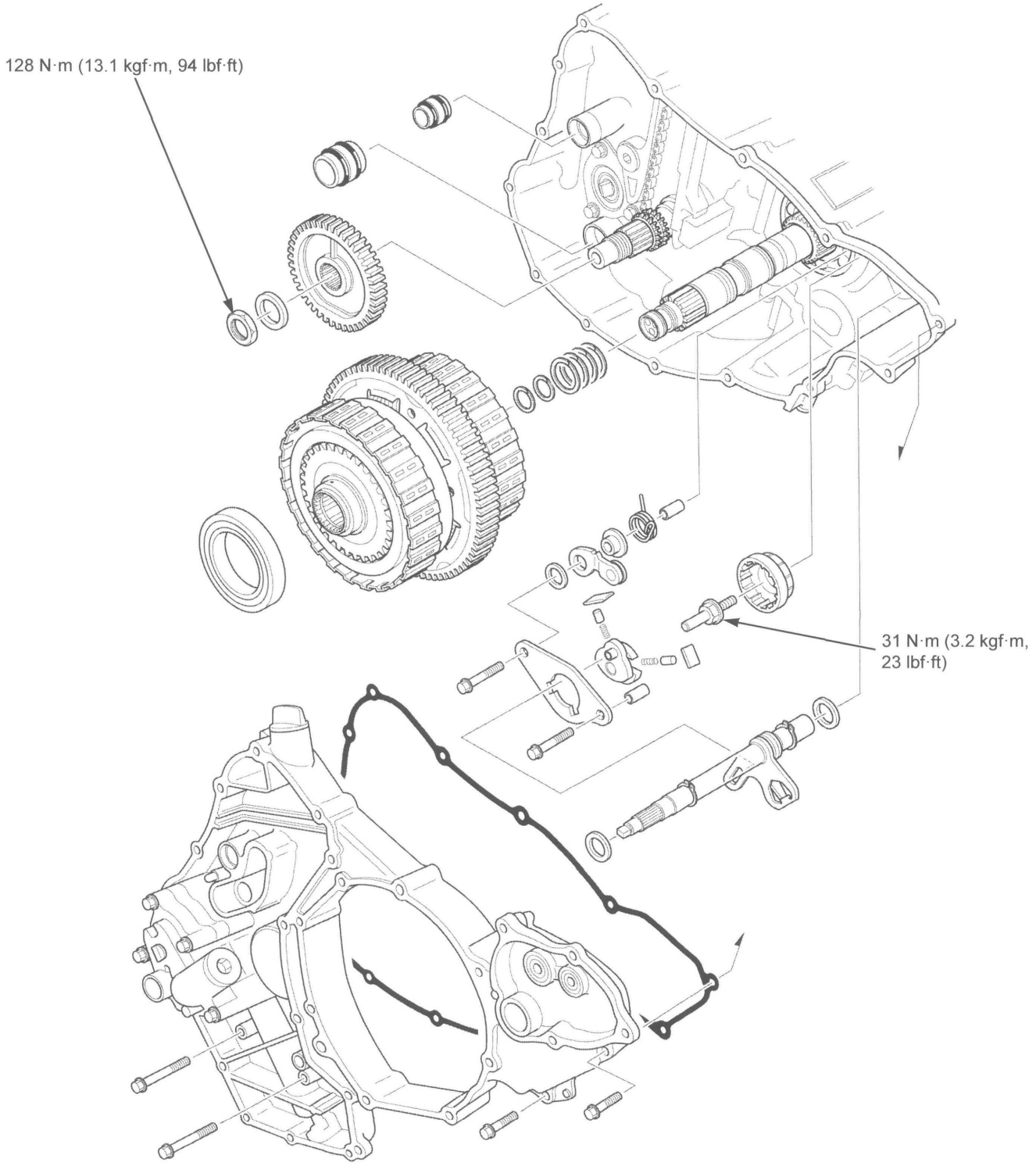
EXCESSIVE NOISE OR VIBRATION AROUND THE DCT SYSTEM

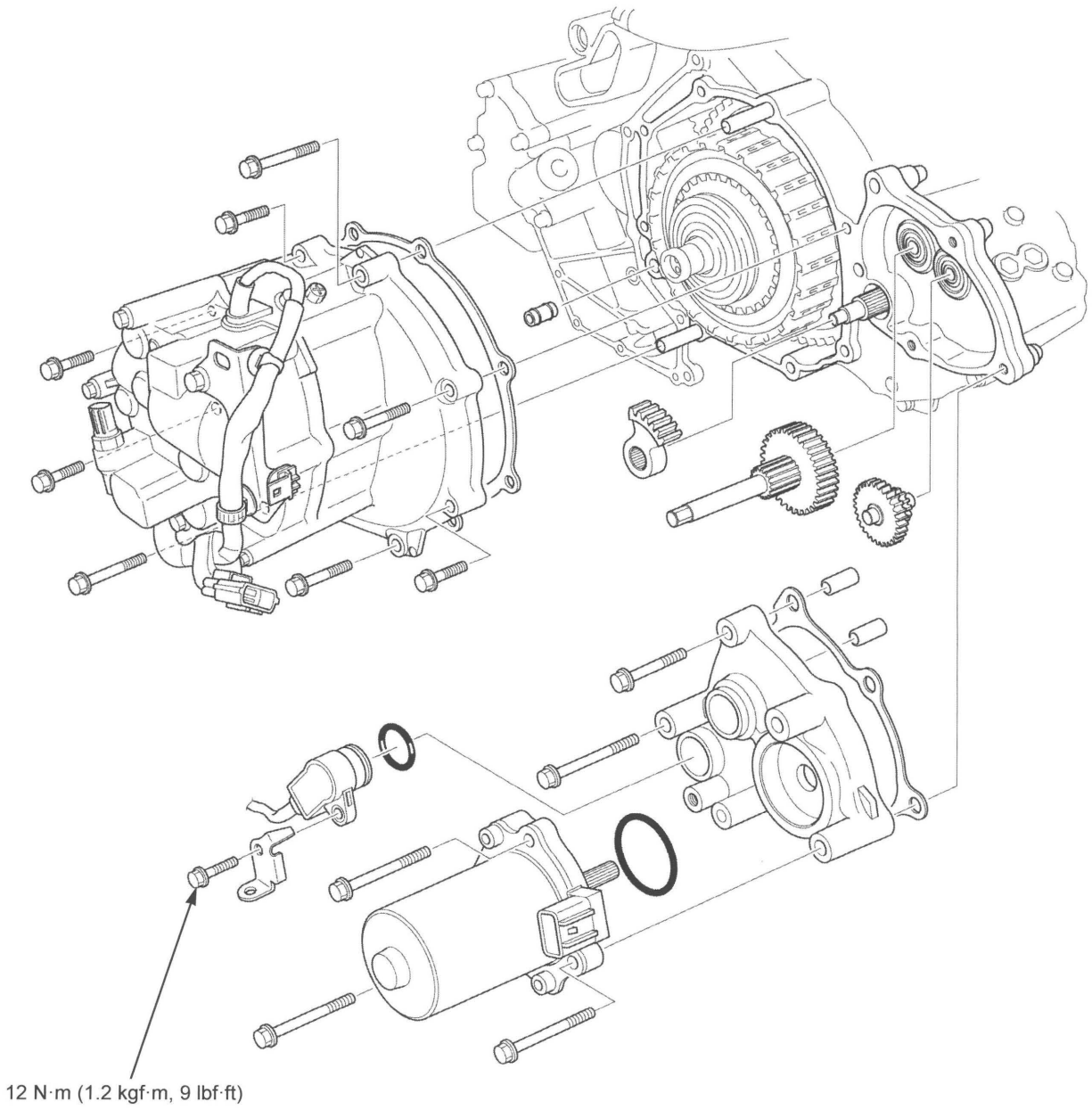
Inspect the following components:

- Clutch clearance
- Dual clutch needle bearings for wear or damage
- Primary drive/sub-gear for wear or damage
- Primary driven gear for wear or damage
- All fasteners are tightened to their correct torque values

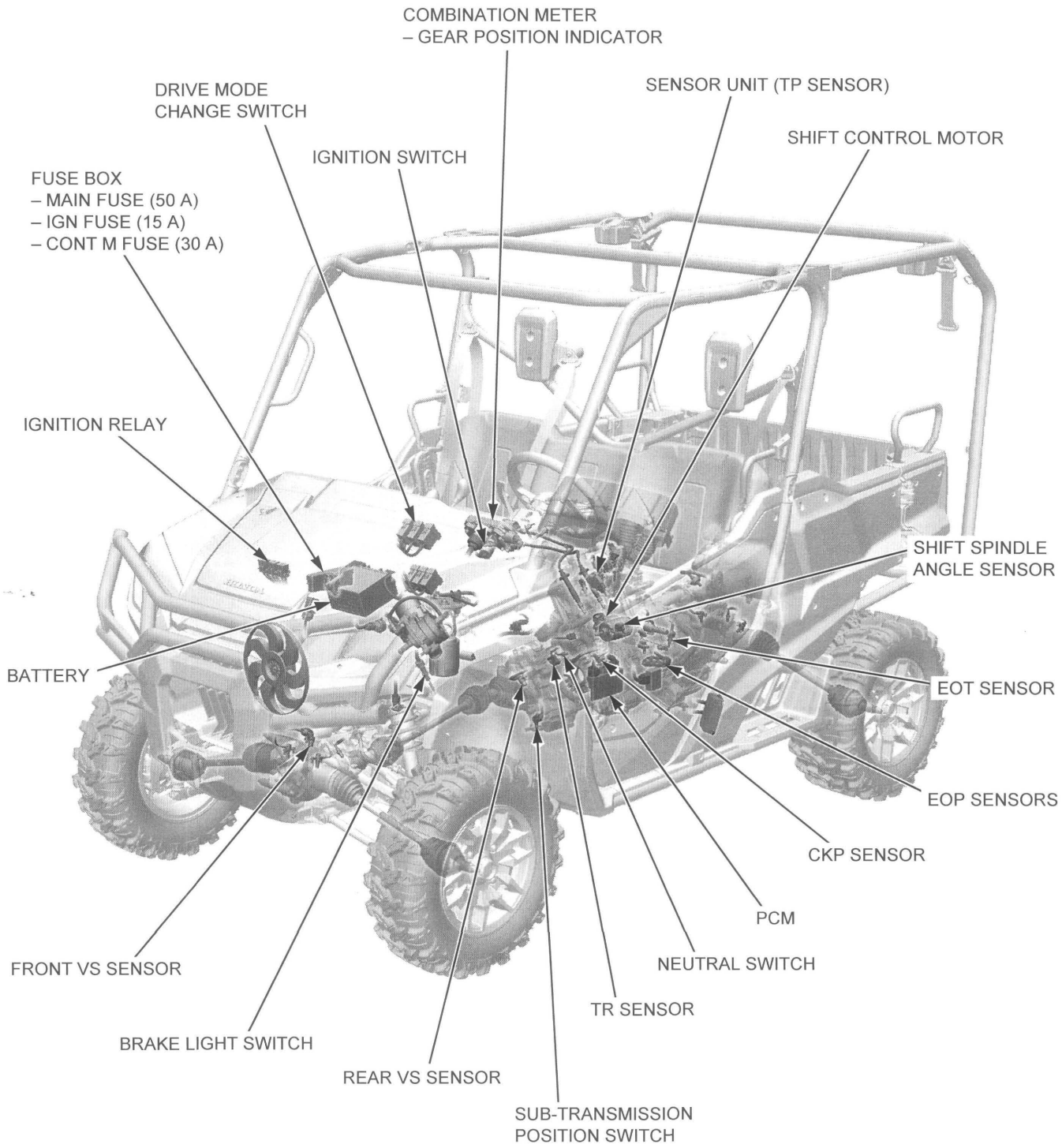
Replace the damaged components if necessary and tighten the loose fasteners to the specified torque.

COMPONENT LOCATION



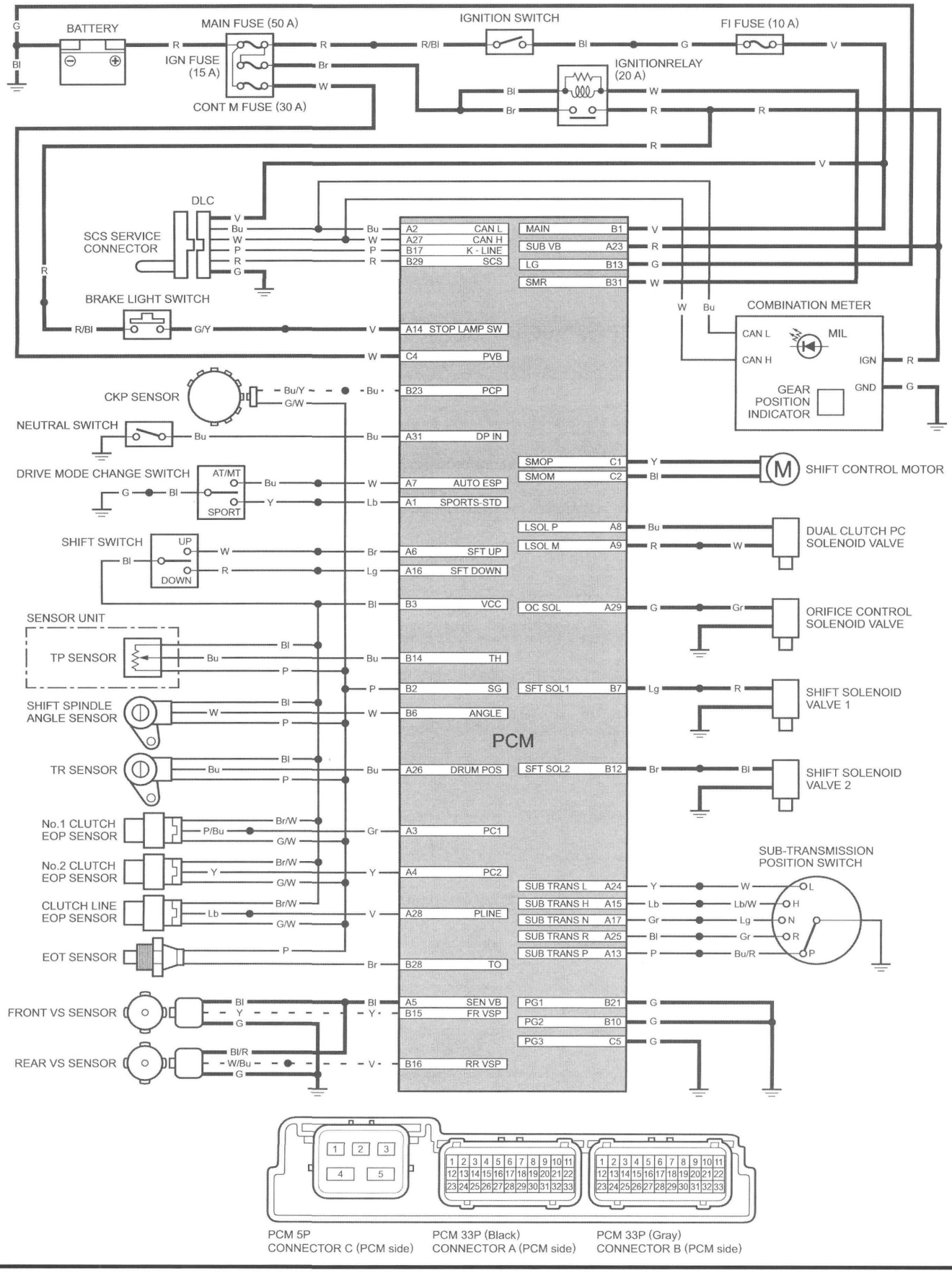

12 N·m (1.2 kgf·m, 9 lbf·ft)

DCT ELECTRICAL SYSTEM LOCATION

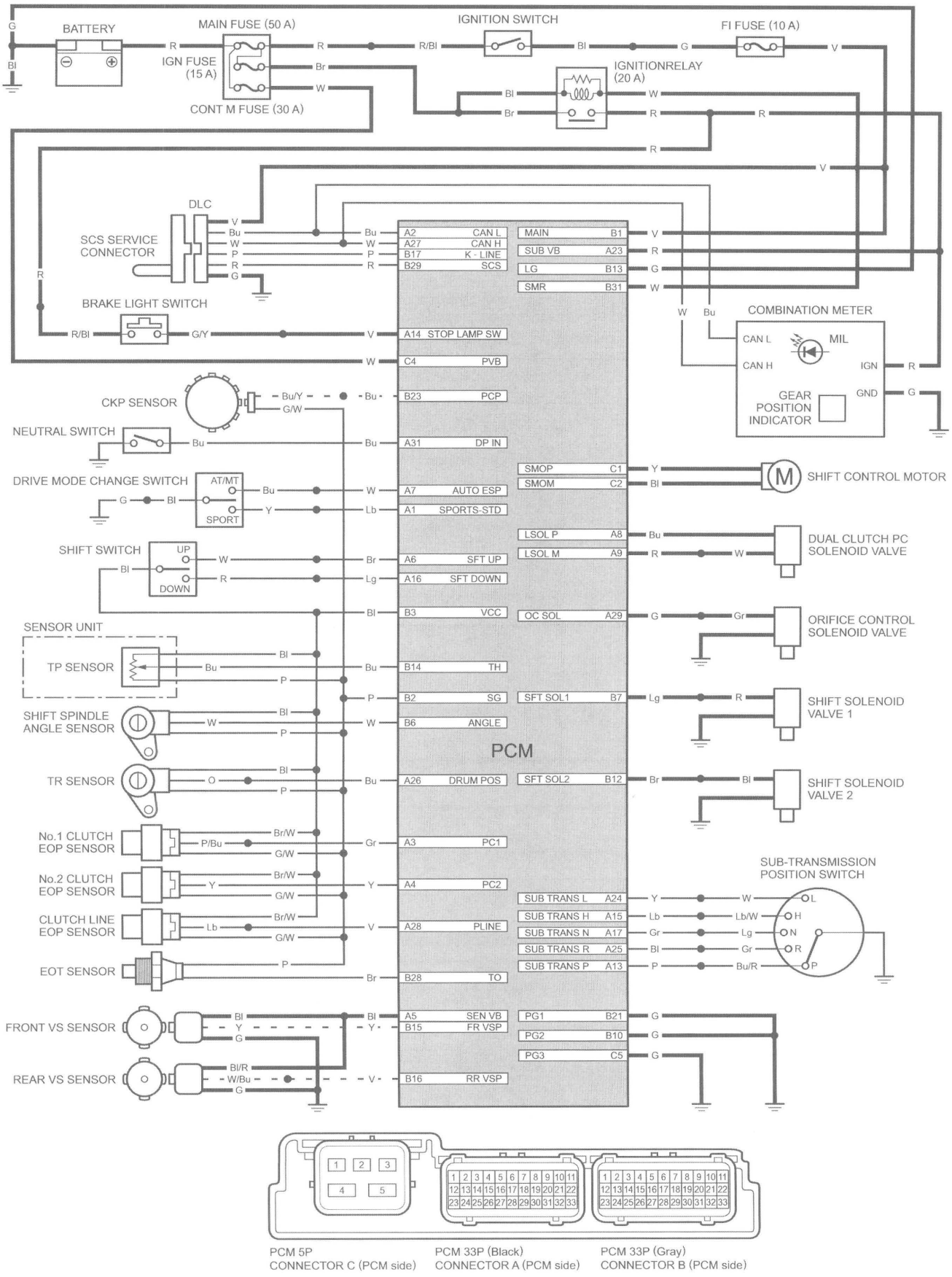


DCT SYSTEM DIAGRAM

'22 models, After '22 models (III, IV, IX type)



After '22 models (Except III, IV, IX type)



DCT TROUBLESHOOTING INFORMATION

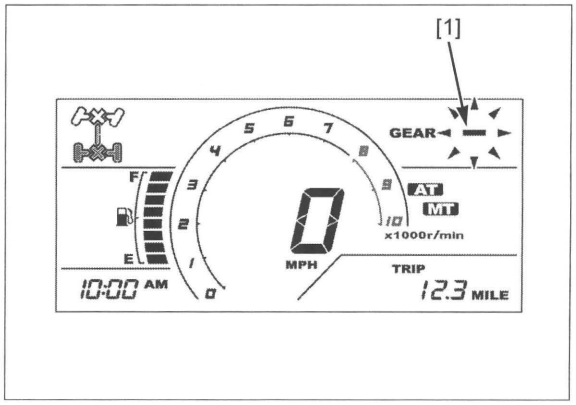
GENERAL TROUBLESHOOTING

Refer to the "GENERAL TROUBLESHOOTING" in "PGM-FI system" (page 4-6).

SYSTEM DESCRIPTION

SELF-DIAGNOSIS SYSTEM

The DCT system is equipped with the self-diagnostic system. When any abnormality occurs in the DCT system, the PCM have the gear position indicator [1] blinking the current sub-transmission position, current gear position or "–", and stores a DTC in its erasable memory for the relevant system failure.



FAIL-SAFE FUNCTION

The DCT system is provided with a fail-safe function to secure a minimum running capability even when there is trouble in the system.

When the PCM detects a problem in the DCT system, the PCM stops the gearshift function and holds the gear position. Also, the gear position indicator blinks to indicate the DTC.

INDICATOR BLINK PATTERN

- The number of indicator blinks is the equivalent the main code of the DTC (the sub code cannot be displayed by the indicator blinking).
- The indicator has two types of blinks, a long blink and short blink. The long blink lasts for 1.2 seconds, the short blink lasts for 0.4 seconds. One long blink is the equivalent of ten short blinks. For example, when one long blink is followed by five short blinks, the DTC is 15 (one long blink = 10 blinks, plus five short blinks).
- When the PCM stores more than one DTC, the indicator displays in the order from the lowest number to highest number.

CURRENT DTC/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.

MCS INFORMATION

Refer to the "MCS INFORMATION" in "PGM-FI system" (page 4-7).

DTC READOUT

NOTE:

- If the gear position indicator blinks, check the PGM-FI DTC (page 4-7). If there is any problem in the PGM-FI system, troubleshoot it first. Then recheck the DCT system after erasing the PGM-FI DTC.
- After performing diagnostic troubleshooting, erase the DTC(s) (page 11-10) and test-drive the vehicle to be sure that the problem(s) have been removed.

If the gear position indicator blinks, connect the MCS to the DLC (page 4-7).

Read the DTC and stored data, and follow the troubleshooting index (page 11-11).

To read the DTC with the gear position indicator, use the following procedure.

Reading DTC with the gear position indicator

Turn the ignition switch ON and read the blinks on the gear position indicator. The number of blinks indicates the current DTC.

Refer to the troubleshooting index (page 11-11).

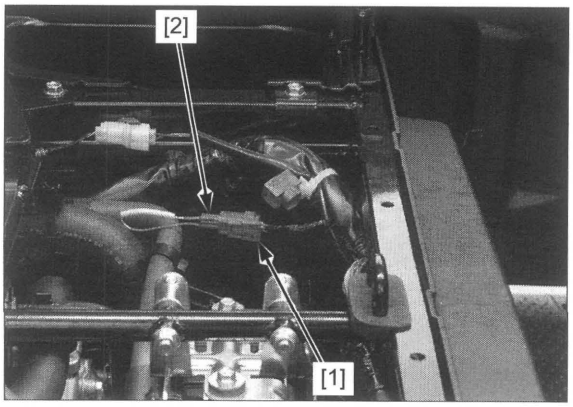
When retrieving the stored DTC, refer to the following procedures.

Remove the DLC from the dummy connector (page 4-7).

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

TOOL:
SCS Short Connector [2] **070MZ-0010300**
(U.S.A.: 070MZ-001A300)

CONNECTION: Red – Green



Turn the ignition switch ON and read the blinks on the gear position indicator. The number of blinks indicates the stored DTC.

Refer to the troubleshooting index (page 11-11).

ERASING DTC

Connect the MCS to the DLC (page 4-7).

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

To erase the DTC without MCS, refer to the following procedure.

How to erase the DTC without MCS

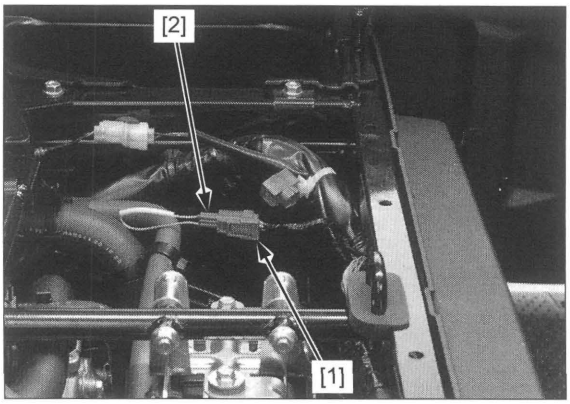
NOTE:

- When the DCT DTC is erased, the PGM-FI DTC or ESP DTC would also be erased at the same time. Check the PGM-FI or ESP system before erasing the DCT DTC.

1. Turn the ignition switch OFF (O).
2. Remove the DLC from the dummy connector (page 4-7).
3. Short the DLC [1] terminals using the special tool.

   TOOL:
   SCS Short Connector [2] **070MZ-0010300**
   (U.S.A.: 070MZ-001A300)

   Connection: Red – Green



4. Turn the ignition switch ON (I).
5. Remove the special tool from the DLC.
6. The gear position indicator will show "–" for approximately 5 seconds. While the indicator shows "–", short the DLC terminals again with the special tool. The self-diagnostic memory is erased if the indicator starts blinking "–".

NOTE:

- The DLC must be jumped while the indicator shows "–". 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

Refer to the "INSPECTION AT PCM CONNECTOR" information in "PGM-FI system" (page 4-8).

DTC INDEX

- If the MCS is not used, perform all of the inspection on the corresponding main code (digits in front of hyphen) of the DTC.

DTC	Function Failure	Symptom/Fail-safe Function	Refer to page
4-1	Dual clutch PC solenoid valve malfunction • Loose or poor contact of the dual clutch PC solenoid valve connector • Dual clutch PC solenoid valve or its circuit malfunction	• Gearshift function does not work	11-14
4-2	Dual clutch PC solenoid valve drive circuit malfunction • Dual clutch PC solenoid valve or its circuit malfunction • Faulty drive circuit in the PCM	• Gearshift function does not work	11-14
8-1	TP sensor circuit Low voltage (less than 0.122 V) • TP sensor or its circuit malfunction • Loose or poor contact of the TP sensor connector	• Poor engine acceleration • Gearshift function does not work (1st gear only)	4-15
8-2	TP sensor circuit High voltage (less than 4.966 V) • TP sensor or its circuit malfunction	• Poor engine acceleration • Gearshift function does not work (1st gear only)	4-17
9-1	Clutch line EOP sensor low voltage (less than 0.298 V) • Clutch line EOP sensor or its circuit malfunction	• Gearshift function works normally	11-15
9-2	Clutch line EOP sensor high voltage (less than 4.702 V) • Loose or poor contact of the clutch line EOP sensor connector • Clutch line EOP sensor or its circuit malfunction	• Gearshift function works normally	11-17
15-1	Shift solenoid valve 1 malfunction • Loose or poor contact of the linear/shift solenoid wire harness connector • Shift solenoid valve 1 or its circuit malfunction	• Gearshift function does not work (1st or 2nd gear only)	11-18
16-1	Shift solenoid valve 2 malfunction • Loose or poor contact of the solenoid valve connector • Shift solenoid valve 2 or its circuit malfunction	• Gearshift function does not work (1st or 2nd gear only)	11-20
21-1	Shift spindle angle sensor circuit low voltage (less than 0.293 V) • Loose or poor contact of the shift spindle angle sensor connector • Shift spindle angle sensor or its circuit malfunction	• Gearshift function does not work (1st gear only)	11-22
21-2	Shift spindle angle sensor circuit high voltage (less than 4.971 V) • Shift spindle angle sensor or its circuit malfunction	• Gearshift function does not work (1st gear only)	11-24
22-1	Shift spindle operation malfunction (after operating gearshift mechanism) • Control motor or its circuit malfunction • Shift spindle angle sensor or its circuit malfunction	• Gearshift function does not work (1st gear only)	11-24
23-1	Shift spindle operation malfunction (while operating gearshift mechanism) • Shift spindle angle sensor installation problem • Shift spindle angle sensor or its circuit malfunction	• Gearshift function does not work	11-25
24-1	Shift control motor drive circuit malfunction • Loose or poor contact of the shift control motor connector • Control motor or its circuit malfunction • Faulty drive circuit in the PCM	• Gearshift function does not work	11-25
27-1	Shift drum position malfunction • TR sensor or its circuit malfunction • Gearshift mechanism malfunction	• Gearshift function does not work (1st gear only)	11-27

DTC	Function Failure	Symptom/Fail-safe Function	Refer to page
31-1	Shift control input power low voltage (less than 10.67 V) • Faulty fail safe relay in the PCM • Blown CONT M fuse (30 A) • Loose or poor contact of the PCM 5P connector	• Gearshift function does not work	11-28
31-2	Drive power circuit low voltage (less than 6.5 V when the ignition switch is ON (I)) • Blown IGN fuse (15 A) • Ignition relay stuck open or its circuit malfunction	• Gearshift function does not work • Selectable 2WD-4WD system does not work (2WD mode only)	4-27
31-3	Drive power circuit high voltage (more than 8.0 V when the ignition switch is OFF (O)) • Ignition relay stuck ON or its circuit malfunction	• Gearshift function does not work • Selectable 2WD-4WD system does not work (2WD mode only)	4-28
32-1	Fail-safe relay circuit malfunction • Faulty fail safe relay circuit in the PCM	• Gearshift function does not work	11-29
42-1	Shift switch malfunction • Loose or poor contact of the shift switch connector • Shift switch or its circuit malfunction	• Gearshift function does not work (1st gear only)	11-29
44-1	EOT sensor circuit low voltage (less than 0.059 V) • EOT sensor or its circuit malfunction	• Gearshift function works normally	11-31
44-2	EOT sensor circuit high voltage (less than 4.922 V) • Loose or poor contact of the EOT sensor connector • EOT sensor or its circuit malfunction	• Gearshift function works normally	11-31
47-1	No.1 clutch EOP sensor low voltage • No.1 clutch EOP sensor or its circuit malfunction	• Gearshift function does not work (2nd gear only)	11-32
47-2	No.1 clutch EOP sensor high voltage • Loose or poor contact of the No.1 clutch EOP sensor connector • No.1 clutch EOP sensor or its circuit malfunction	• Gearshift function does not work (2nd gear only)	11-33
48-1	No.2 clutch EOP sensor low voltage • No.2 clutch EOP sensor or its circuit malfunction	• Gearshift function does not work (1st gear only)	11-32
48-2	No.2 clutch EOP sensor high voltage • Loose or poor contact of the No.2 clutch EOP sensor connector • No.2 clutch EOP sensor or its circuit malfunction	• Gearshift function does not work (1st gear only)	11-33
51-1	TR sensor low voltage • Loose or poor contact of the TR sensor connector • TR sensor or its circuit malfunction	• Gearshift function does not work (1st gear only)	11-35
51-2	TR sensor high voltage • TR sensor or its circuit malfunction	• Gearshift function does not work (1st gear only)	11-37
52-1	Neutral switch stuck OFF • Loose or poor contact of the neutral switch connector • Neutral switch or its circuit malfunction	• Gearshift function does not work (1st gear only)	11-37
52-2	Neutral switch stuck ON • Neutral switch or its circuit malfunction	• Gearshift function does not work (1st gear only)	11-38
57-1	Gearshift mechanism malfunction • Gearshift mechanism malfunction • TR sensor or its circuit malfunction	• Gearshift function does not work	11-38
57-2	Gear position malfunction (jumps out of gear) • Gearshift mechanism malfunction • TR sensor or its circuit malfunction	• Gearshift function does not work	11-38
62-1	No.1 or No.2 clutch oil pressure high • No.1 or No.2 clutch EOP sensor malfunction • Faulty clutch oil circuit	• Gearshift function does not work	11-38

DTC	Function Failure	Symptom/Fail-safe Function	Refer to page
66-1	Rear VS sensor no signal • Loose or poor contact of the Rear VS sensor connector • Rear VS sensor or its circuit malfunction	• Gearshift function does not work (1st gear only)	11-39
67-1	Front VS sensor no signal • Loose or poor contact of the Front VS sensor connector • Front VS sensor or its circuit malfunction	• Gearshift function does not work (1st gear only)	11-41
73-1	Orifice control solenoid valve malfunction • Loose or poor contact of the linear/shift solenoid wire harness connector • Orifice control solenoid valve or its circuit malfunction	• Gearshift function works normally	11-44
74-1	Shift solenoid valve oil pressure logic error • Faulty shift solenoid valve 1 and/or 2 • Faulty clutch control body	• Gearshift function does not work (1st or 2nd gear only)	11-45
81-1	Sub-transmission switches malfunction (Low and drive switches remain on simultaneously for more than 1.5 seconds) • Sub-transmission switch or its circuit malfunction	• Gearshift function does not work	11-46

DTC TROUBLESHOOTING

DTC 4-1 (DUAL CLUTCH PC SOLENOID MALFUNCTION), DTC 4-2 (DUAL CLUTCH PC SOLENOID DRIVE CIRCUIT MALFUNCTION)

- Before starting the inspection, check for loose or poor contact of the linear/shift solenoid wire harness 12P and PCM 33P (Black) connectors, and recheck the DTC.

1. **DTC Check**

   Check the current DTC with the MCS.

   Is DTC 4-1 or 4-2 indicated?

   YES – GO TO STEP 2.

   NO – Intermittent failure

2. **Dual Clutch PC Solenoid Inspection 1**

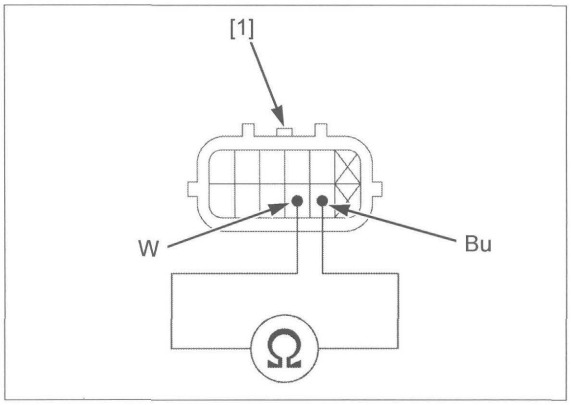
   Turn the ignition switch OFF (O).
   Disconnect the linear/shift solenoid wire harness 12P connector (page 11-50).
   Measure the resistance at the sub-wire harness side 12P connector [1].

   Connection: Blue – White

   Is the resistance within 5.0 – 5.6 Ω (20°C/68°F)?

   YES – GO TO STEP 4.

   NO – GO TO STEP 3.



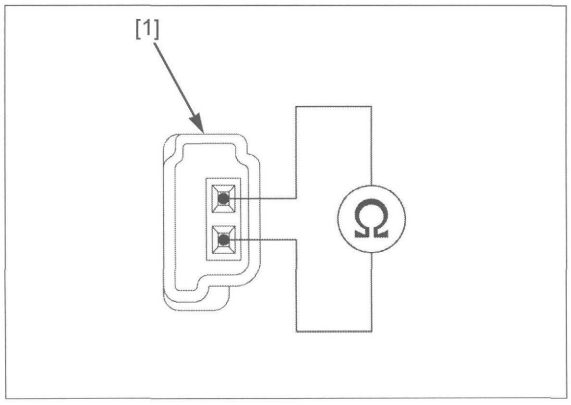
3. **Dual Clutch PC Solenoid Inspection 2**

   Disconnect the 2P connector from the dual clutch PC solenoid valve (page 11-48).
   Measure the resistance between the solenoid valve side connector [1] terminals.

   Is the resistance within 5.0 – 5.6 Ω (20°C/68°F)?

   YES – Open or short circuit in the Blue or White wire (linear/shift solenoid wire harness)

   NO – Faulty dual clutch PC solenoid valve



4. **Dual Clutch PC Solenoid Valve Line Open Circuit Inspection**

Disconnect the PCM 33P (Black) connector (page 4-35).
Check for continuity between the wire harness side 33P (Black) connector [1] and 12P connector [2].

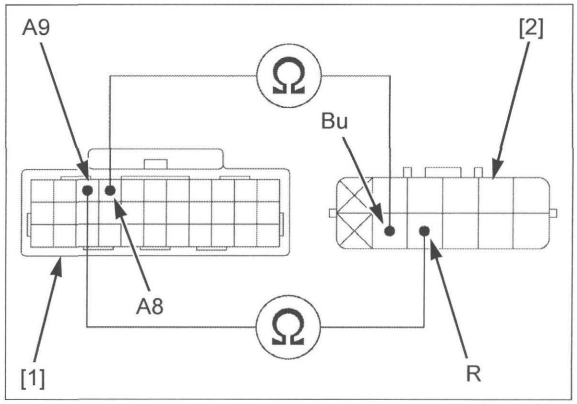
TOOL:
Test probe, 2 packs **07ZAJ-RDJA110**

Connection: A8 – Blue
A9 – Red

Is there continuity?

YES – GO TO STEP 5.

NO – • Open circuit in the Blue wire
• Open circuit in the Red wire



5. **Dual Clutch PC Solenoid Valve Line Short Circuit Inspection**

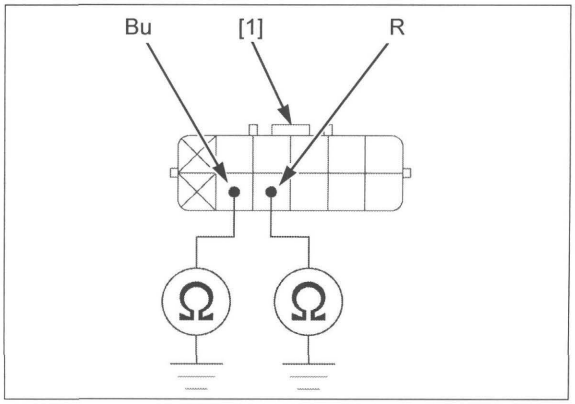
Check for continuity between the wire harness side 12P connector [1] terminal and ground.

Connection: Blue – ground
Red – ground

Is there continuity?

YES – • Short circuit in the Blue wire
• Short circuit in Red wire

NO – GO TO STEP 6.



6. **Recheck DTC**

Connect the 12P connector and 33P (Black) connector.
Recheck the current DTC with the MCS.

Is DTC 4-1 or 4-2 indicated?

YES – Replace the PCM with a known good one (page 4-35) and recheck.

NO – Intermittent failure

DTC 9-1 (CLUTCH LINE EOP SENSOR LOW VOLTAGE)

1. **Clutch Line EOP Sensor System Inspection**

Connect the MCS and start the engine.
Check the clutch line EOP sensor with the MCS.

Is about 0 V indicated?

YES – GO TO STEP 2.

NO – Intermittent failure

2. **Clutch Line EOP Sensor Inspection**

   Stop the engine.
   Disconnect the clutch line EOP sensor 3P (Green) connector (page 11-60).
   Check the clutch line EOP sensor with the MCS.

   Is about 0 V indicated?

   YES – GO TO STEP 3.

   NO – Faulty clutch line EOP sensor

3. **Clutch Line EOP Sensor Input Voltage Inspection**

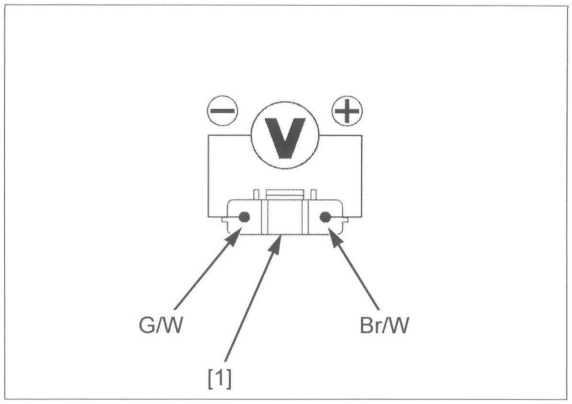
   Measure the voltage at the wire harness side 3P (Green) connector [1].

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

   Is the voltage within 4.75 – 5.25 V?

   YES – GO TO STEP 5.

   NO – GO TO STEP 4.



4. **Clutch Line EOP Sensor Input Line Open Circuit Inspection**

   Turn the ignition switch OFF (O).
   Disconnect the PCM 33P (Gray) connector (page 4-35).
   Check the wire for continuity between the wire harness side 33P (Gray) connector [1] and 3P (Green) connector [2].

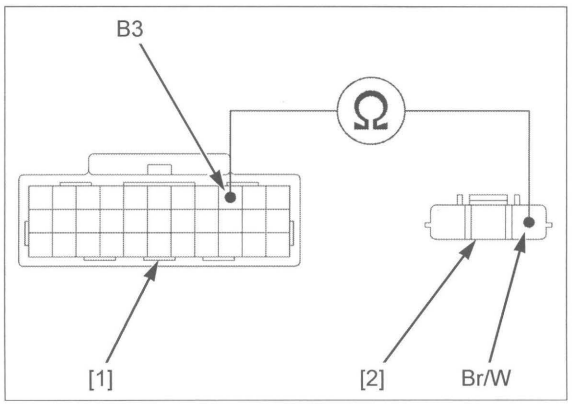
   TOOL:
   Test probe, 2 packs 07ZAJ-RDJA110

   Connection: B3 – Brown/white

   Is there continuity?

   YES – GO TO STEP 5.

   NO – • Open circuit in the Brown/white wire of the linear/shift solenoid wire harness
   • Open circuit in the Black wire of the main wire harness



5. **Clutch Line EOP Sensor Output Line Short Circuit Inspection**

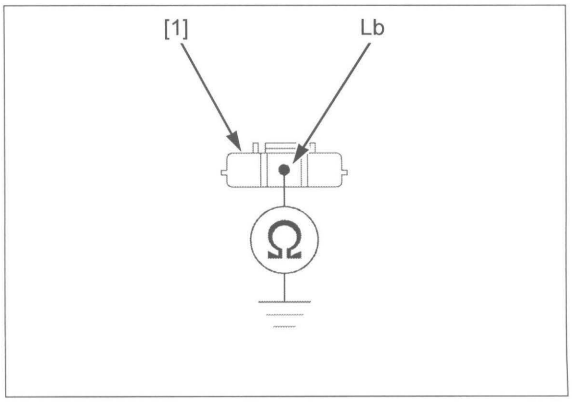
   Turn the ignition switch OFF (O).
   Disconnect the PCM 33P (Black) connector (page 4-35).
   Check for continuity between the wire harness 3P (Green) connector [1] and ground.

   Connection: Light blue – Ground

   Is there continuity?

   YES – • Short circuit in the Light blue wire of the linear/shift solenoid wire harness
   • Short circuit in the Violet wire of the main wire harness

   NO – Replace the PCM with a known good one (page 4-35) and recheck.



DTC 9-2 (CLUTCH LINE EOP SENSOR HIGH VOLTAGE)

- Before starting the inspection, check for loose or poor contact of the clutch line EOP sensor 3P (Green) and PCM 33P connectors, and recheck the DTC.

1. **Clutch Line EOP Sensor System Inspection**

   Check the clutch line EOP sensor with the MCS.

   Is about 5 V indicated?

   YES – GO TO STEP 2.

   NO – Intermittent failure

2. **Clutch Line EOP Sensor Inspection**

   Turn the ignition switch OFF (O).
   Disconnect the clutch line EOP sensor 3P (Green) connector (page 11-60).
   Connect the wire harness side 3P (Green) connector [1] terminals with a jumper wire [2].

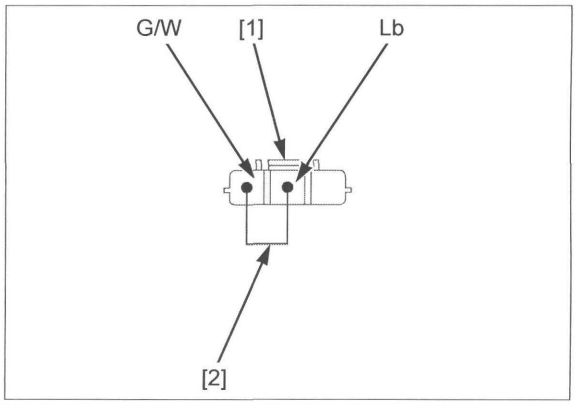
   Connection: Light blue – Green/white

   Check the clutch line EOP sensor with the MCS.

   Is the 0 V indicated?

   YES – Faulty clutch line EOP sensor

   NO – GO TO STEP 3.



3. **Clutch Line EOP Sensor Ground Line Open Circuit Inspection**

   Turn the ignition switch OFF (O).
   Disconnect the PCM 33P (Gray) connector (page 4-35).
   Check for continuity between the wire harness side 33P (Gray) connector [1] and 3P (Green) connector [2].

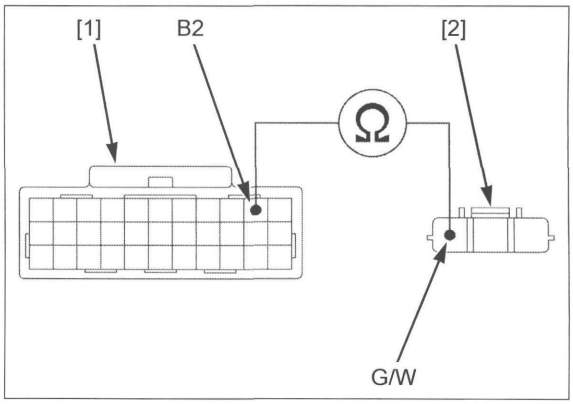
   Connection: B2 – Green/white

   TOOL:
   Test probe, 2 packs 07ZAJ-RDJA110

   Is there continuity?

   YES – GO TO STEP 4.

   NO – • Open circuit in the Green/white wire of the linear/shift solenoid wire harness
   • Open circuit in the Pink wire of the main wire harness



4. **Clutch Line EOP Sensor Output Line Open Circuit Inspection**

Disconnect the PCM 33P (Black) connector (page 4-35).
Check for continuity between the wire harness side 33P (Black) connector [1] and 3P (Green) connector [2].

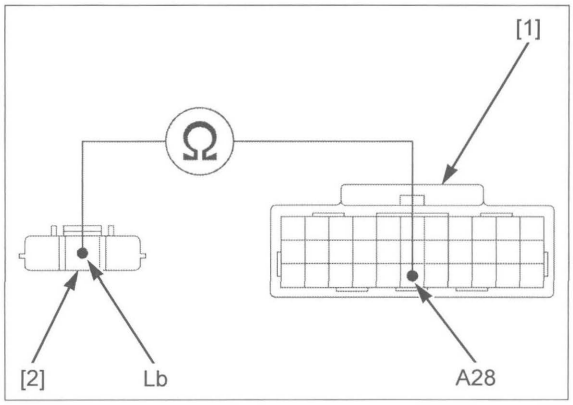
Connection: A28 – Light blue

TOOL:
Test probe, 2 packs 07ZAJ-RDJA110

Is there continuity?

YES – Replace the PCM with a known good one (page 4-35) and recheck.

NO – • Open circuit in the Light blue wire of the linear/shift solenoid wire harness
• Open circuit in the Violet wire of the main wire harness



DTC 15-1 (SHIFT SOLENOID VALVE 1 MALFUNCTION)

- Before starting the inspection, check for loose or poor contact of the linear/shift solenoid wire harness 12P and PCM 33P (Gray) connectors, and recheck the DTC.

1. **Recheck DTC**

Recheck the current DTC with the MCS.

Is DTC 15-1 indicated?

YES – GO TO STEP 2.

NO – Intermittent failure

2. **Shift Solenoid Valve 1 Inspection 1**

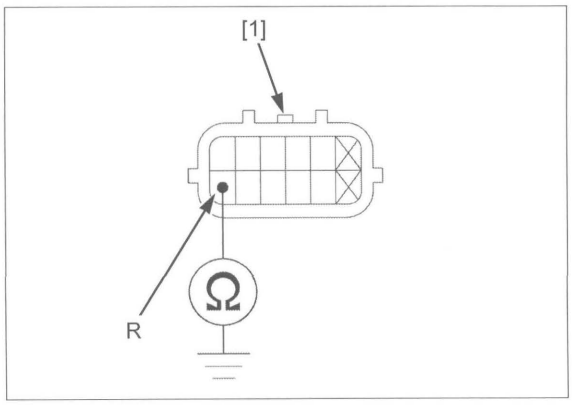
Turn the ignition switch OFF (O).
Disconnect the linear/shift solenoid wire harness 12P connector (page 11-50).
Measure the resistance between the solenoid side 12P connector [1] and engine ground.

Connection: Red – ground

Is the resistance within 11 – 15 Ω (20°C/68°F)?

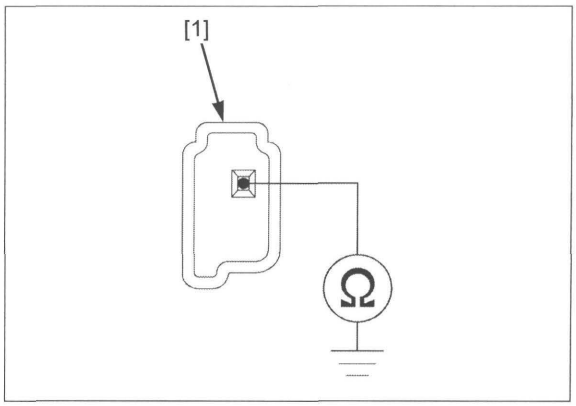
YES – GO TO STEP 4.

NO – GO TO STEP 3.



3. **Shift Solenoid Valve 1 Inspection 2**

Disconnect the 2P connector from shift solenoid valve 1 (page 11-48).
Measure the resistance between the solenoid valve side connector [1] terminal and engine ground.



Is the resistance within 11 – 15 Ω (20°C/68°F)?

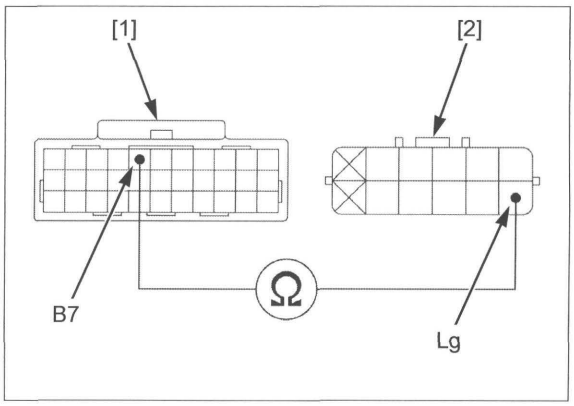
YES – Open or short circuit in the Red wire (linear/shift solenoid wire harness)

NO – Faulty shift solenoid valve 1

4. **Shift Solenoid Valve 1 Line Open Circuit Inspection**

Disconnect the PCM 33P (Gray) connector (page 4-35).
Check for continuity between the wire harness side 33P (Gray) connector [1] and 12P connector [2].

TOOL:
Test probe, 2 packs **07ZAJ-RDJA110**



Connection: B7 – Light green

Is there continuity?

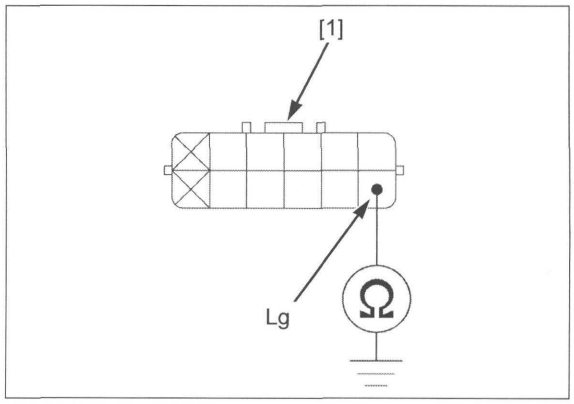
YES – GO TO STEP 5.

NO – Open circuit in the Light green wire

5. **Shift Solenoid Valve 1 Line Short Circuit Inspection**

Check for continuity between the wire harness side 12P connector [1] and ground.

Connection: Light green – ground



Is there continuity?

YES – Short circuit in the Light green wire

NO – GO TO STEP 6.

6. **Recheck DTC**

Connect the linear/shift solenoid wire harness 12P connector and PCM 33P (Gray) connector.
Recheck the current DTC with the MCS.

Is DTC 15-1 indicated?

YES – Replace the PCM with a known good one (page 4-35) and recheck.

NO – Intermittent failure

DTC 16-1 (SHIFT SOLENOID VALVE 2 MALFUNCTION)

- Before starting the inspection, check for loose or poor contact of the linear/shift solenoid wire harness 12P and PCM 33P (Gray) connectors, and recheck the DTC.

1. **Recheck DTC**

   Recheck the current DTC with the MCS.

   Is DTC 16-1 indicated?

   YES – GO TO STEP 2.

   NO – Intermittent failure

2. **Shift Solenoid Valve 2 Inspection 1**

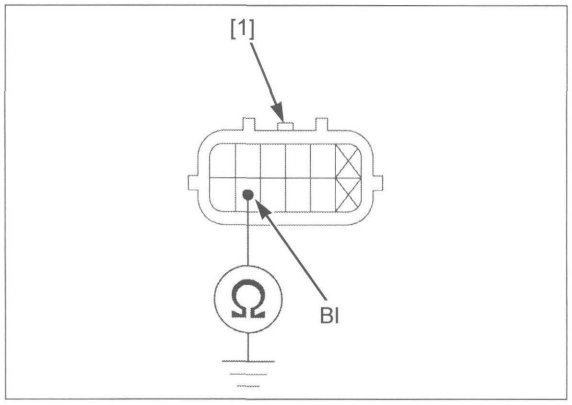
   Turn the ignition switch OFF (O).
   Disconnect the linear/shift solenoid wire harness 12P connector (page 11-50).
   Measure the resistance between the solenoid side 12P connector [1] and engine ground.

   Connection: Black – engine ground

   Is the resistance within 11 – 15 Ω (20°C/68°F)?

   YES – GO TO STEP 4.

   NO – GO TO STEP 3.



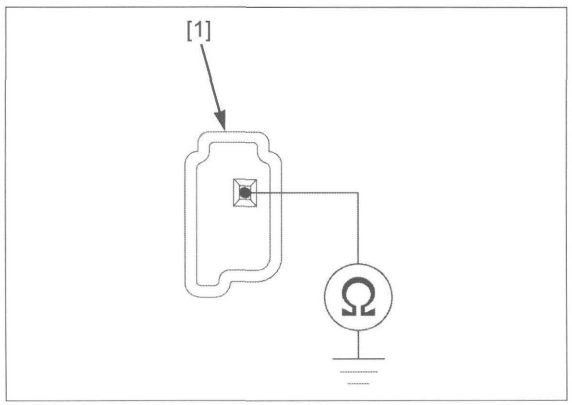
3. **Shift Solenoid Valve 2 Inspection 2**

   Disconnect the 2P connector from shift solenoid valve 2 (page 11-48).
   Measure the resistance between the solenoid valve side connector [1] terminal and engine ground.

   Is the resistance within 11 – 15 Ω (20°C/68°F)?

   YES – Open or short circuit in the Black wire (linear/shift solenoid wire harness)

   NO – Faulty shift solenoid valve 2



4. **Shift Solenoid Valve 2 Line Open Circuit Inspection**

   Disconnect the PCM 33P (Gray) connector (page 4-35).
   Check for continuity between the wire harness side 33P (Gray) connector [1] and 12P connector [2].

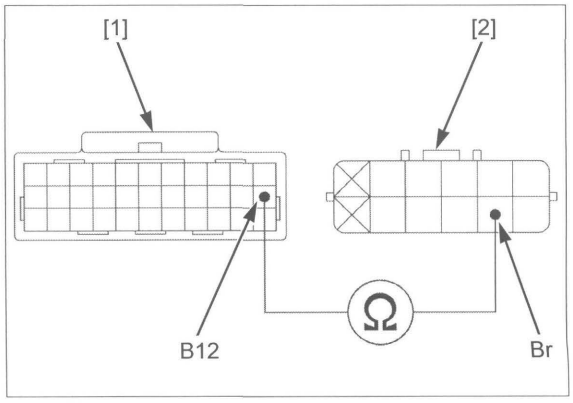
   TOOL:
   Test probe, 2 packs **07ZAJ-RDJA110**

   Connection: B12 – Brown

   Is there continuity?

   YES – GO TO STEP 5.

   NO – Open circuit in the Brown wire



5. Shift Solenoid Valve 2 Line Short Circuit Inspection

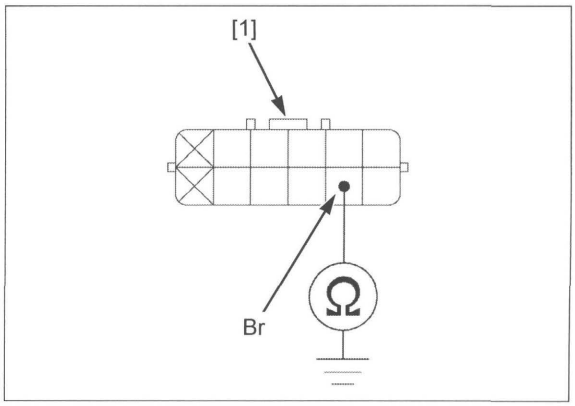
Check for continuity between the wire harness side 12P connector [1] and ground.

Connection: Brown – ground

Is there continuity?

YES – Short circuit in the Brown wire

NO – GO TO STEP 6.



6. Recheck DTC

Connect the linear/shift solenoid wire harness 12P connector and 33P (Gray) connector.
Recheck the current DTC with the MCS.

Is DTC 16-1 indicated?

YES – Replace the PCM with a known good one (page 4-35) and recheck.

NO – Intermittent failure

DTC 21-1 (SHIFT SPINDLE ANGLE SENSOR LOW VOLTAGE)

- Before starting the inspection, check for loose or poor contact of the shift spindle angle sensor 3P and PCM 33P (Gray) connectors, and recheck the DTC.

1. **Shift Spindle Angle Sensor System Inspection**

   Check the shift spindle angle sensor with the MCS.

   Is about 0 V indicated?

   YES – GO TO STEP 2.

   NO – Intermittent failure

2. **Shift Spindle Angle Sensor Input Voltage Inspection**

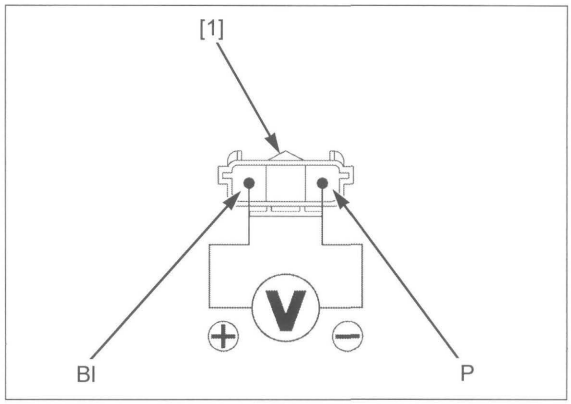
   Turn the ignition switch OFF (O).
   Disconnect the shift spindle angle sensor 3P connector (page 11-58).
   Turn the ignition switch ON (I).
   Measure the voltage at the wire harness side 3P connector [1].

   Connection: Black (+) – Pink (–)

   Is the voltage within 4.75 – 5.25 V?

   YES – GO TO STEP 5.

   NO – GO TO STEP 3.



3. **Shift Spindle Angle Sensor Input Line Open Circuit Inspection**

   Turn the ignition switch OFF (O).
   Disconnect the PCM 33P (Gray) connector (page 4-35).
   Check for continuity between the wire harness side 33P (Gray) connector [1] and 3P connector [2].

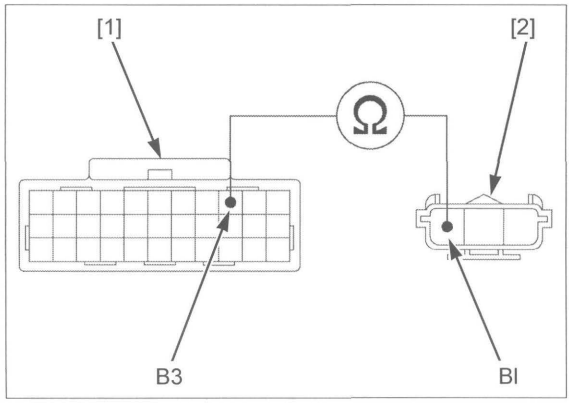
   TOOL:
   Test probe, 2 packs **07ZAJ-RDJA110**

   Connection: B3 – Black

   Is there continuity?

   YES – GO TO STEP 4.

   NO – Open circuit in the Black wire



4. **Shift Spindle Angle Sensor Ground Line Open Circuit Inspection**

   Check for continuity between the wire harness side 33P (Gray) connector [1] and 3P connector [2].

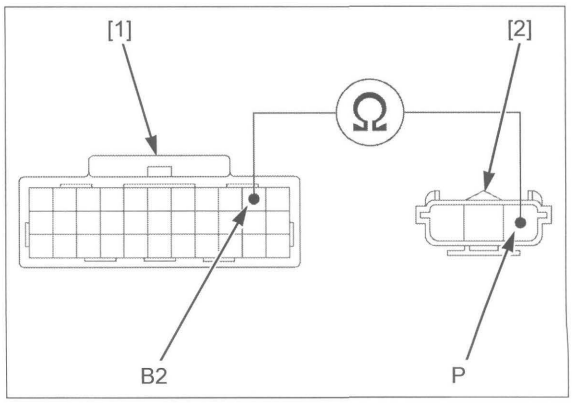
   TOOL:
   Test probe, 2 packs **07ZAJ-RDJA110**

   Connection: B2 – Pink

   Is there continuity?

   YES – Replace the PCM with a known good one (page 4-35) and recheck.

   NO – Open circuit in the Pink wire



5. **Shift Spindle Angle Sensor Output Line Open Circuit Inspection**

Turn the ignition switch OFF (O).
Disconnect the PCM 33P (Gray) connector (page 4-35).
Check for continuity between the wire harness side 33P (Gray) connector [1] and 3P connector [2].

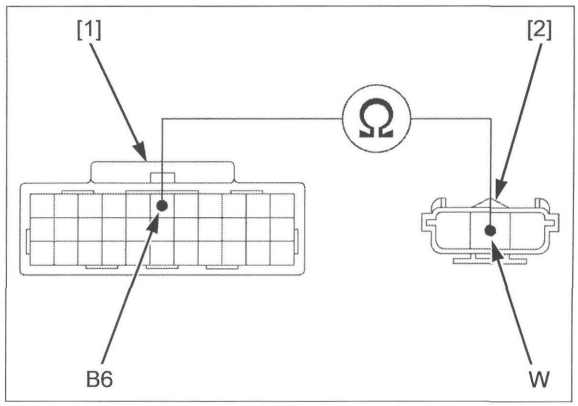
TOOL:
Test probe, 2 packs **07ZAJ-RDJA110**

Connection: B6 – White

Is there continuity?

YES – GO TO STEP 6.

NO – Open circuit in the White wire



6. **Shift Spindle Angle Sensor Output Line Short Circuit Inspection**

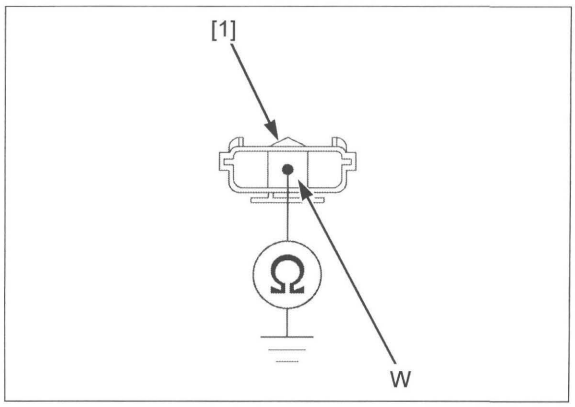
Check for continuity between the wire harness side 3P connector [1] and ground.

Connection: White – ground

Is there continuity?

YES – Short circuit in the White wire

NO – GO TO STEP 7.



7. **Shift Spindle Angle Sensor Inspection**

Replace the shift spindle angle sensor with a known good one (page 11-58).
Connect the shift spindle angle sensor 3P connector and PCM 33P (Gray) connector.
Check the shift spindle angle sensor with the MCS.

Is about 0 V indicated?

YES – Replace the PCM with a known good one (page 4-35) and recheck.

NO – Faulty original shift spindle angle sensor

DTC 21-2 (SHIFT SPINDLE ANGLE SENSOR HIGH VOLTAGE)

1. **Shift Spindle Angle Sensor System Inspection**

   Check the shift spindle angle sensor with the MCS.

   Is about 5 V indicated?

   YES – GO TO STEP 2.

   NO – Intermittent failure

2. **Shift Spindle Angle Sensor Inspection**

   Replace the shift spindle angle sensor with a known good one (page 11-58).
   Check the shift spindle angle sensor with the MCS.

   Is about 5 V indicated?

   YES – Replace the PCM with a known good one (page 4-35) and recheck.

   NO – Faulty original shift spindle angle sensor

DTC 22-1 (SHIFT SPINDLE ANGLE SENSOR MALFUNCTION: After operating gearshift mechanism)

1. **Shift Spindle Angle Sensor System Inspection**

   Check the shift spindle angle sensor with the MCS.

   Is Low voltage (about 0 V) or High voltage (about 5 V) indicated?

   YES – • About 0 V: See DTC 21-1 (page 11-22)
   • About 5 V: See DTC 21-2 (page 11-24)

   NO – GO TO STEP 2.

2. **Shift Control Motor/Reduction Gear Condition Inspection**

   Turn the ignition switch OFF (O).
   Check that the shift control motor and reduction gears are installed properly and are not damaged (page 11-51).

   Are the shift control motor and reduction gears in normal condition?

   YES – GO TO STEP 3.

   NO – Install the shift control motor and reduction gears properly or replace faulty parts.

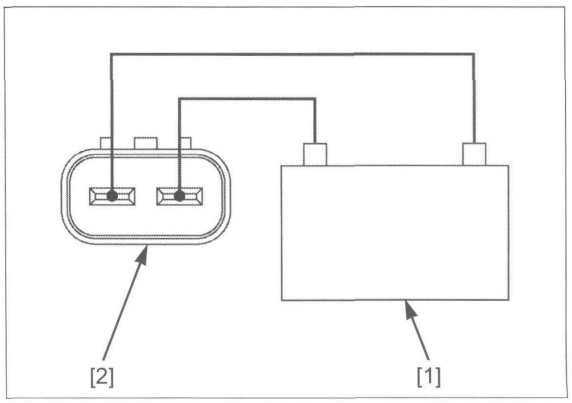
3. **Shift Control Motor Inspection**

   Remove the shift control motor (page 11-51).
   Connect a fully charged 12 V battery [1] to the control motor 2P connector [2] terminals to check the motor operation.
   Change the battery connection to check the reverse operation.

   Does the shift control motor turn in both direction?

   YES – GO TO STEP 4.

   NO – Faulty shift control motor



4. **Shift Spindle Angle Sensor System Inspection**

   Remove the shift spindle angle sensor with the connector connected (page 11-58).
   Turn the ignition switch ON (I).
   While turning the shift spindle angle sensor shaft, check the shift spindle angle sensor voltage with the MCS.

   When turning clockwise:
   Voltage increase
   When turning counterclockwise:
   Voltage decrease

   Does the voltage vary properly?

   YES – GO TO STEP 5.

   NO – Faulty shift spindle angle sensor

5. **Shift Spindle Angle Sensor Installation Condition Inspection**

   Check that the shift spindle angle sensor is installed properly (page 11-58).

   Is the shift spindle angle sensor installed properly?

   YES – GO TO STEP 6.

   NO – Install the shift spindle angle sensor properly.

6. **DTC Recheck**

   Recheck the DTC with the MCS.

   Is DTC 22-1 indicated?

   YES – Replace the PCM with a known good one (page 4-35) and recheck.

   NO – Intermittent failure

DTC 23-1 (SHIFT SPINDLE ANGLE SENSOR MALFUNCTION: While operating gearshift mechanism)

See DTC 22-1 (page 11-24).

DTC 24-1 (SHIFT CONTROL MOTOR DRIVE CIRCUIT MALFUNCTION)

- Before starting the inspection, check for loose or poor contact of the shift control motor 2P and PCM 5P connectors, and recheck the DTC.

1. **PCM Motor Power Input Line Open Circuit Inspection**

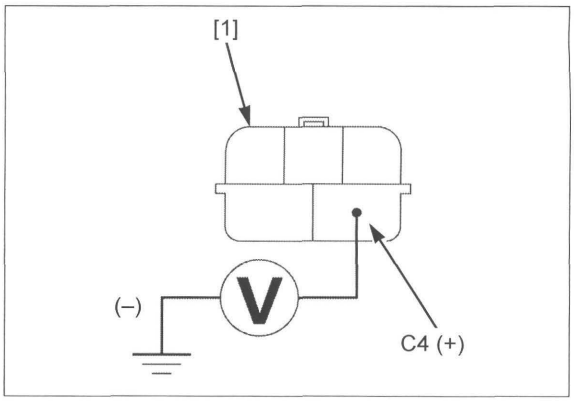
   Disconnect the PCM 5P connector (page 4-35).
   Measure the voltage between the wire harness side 5P connector [1] and ground.

   Connection: C4 (+) – ground (–)

   Is there battery voltage?

   YES – GO TO STEP 2.

   NO – • Brown CONT M fuse (30 A)
   • Open circuit in the White wire



2. PCM Motor Power Ground Line Open Circuit Inspection

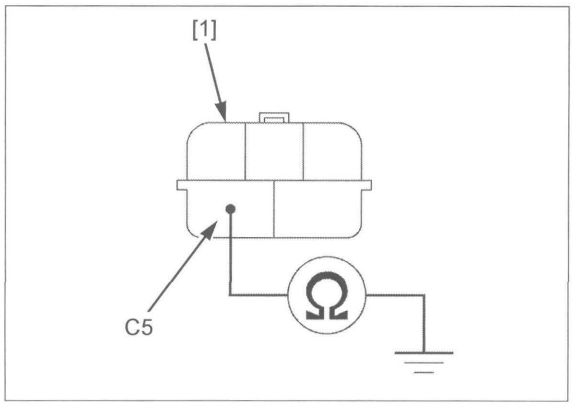
Check for continuity between the wire harness side 5P connector [1] and ground.

Connection: C5 – ground

Is there continuity?

YES – GO TO STEP 3.

NO – Open circuit in the Green wire



3. Shift Control Motor Line Open Circuit Inspection

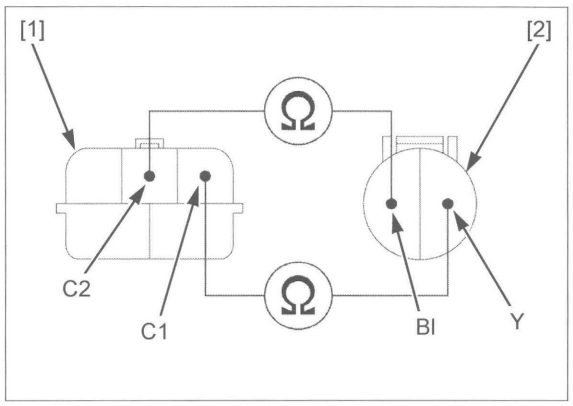
Disconnect the shift control motor 2P connector (page 11-51).
Check for continuity between the wire harness side 5P connector [1] and 2P connector [2] terminals.

Connection: C1 – Yellow
C2 – Black

Is there continuity?

YES – GO TO STEP 4.

NO – • Open circuit in the Yellow wire
• Open circuit in the Black wire



4. Shift Control Motor Line Short Circuit Inspection

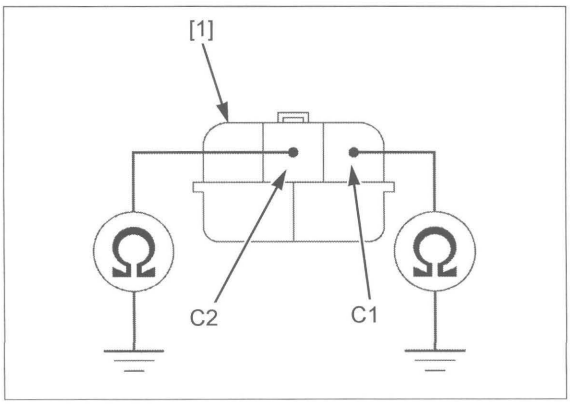
Check for continuity between the wire harness side 5P connector [1] terminals and ground.

Connection: C1 – ground
C2 – ground

Is there continuity?

YES – • Short circuit in the Yellow wire
• Short circuit in the Black wire

NO – GO TO STEP 5.



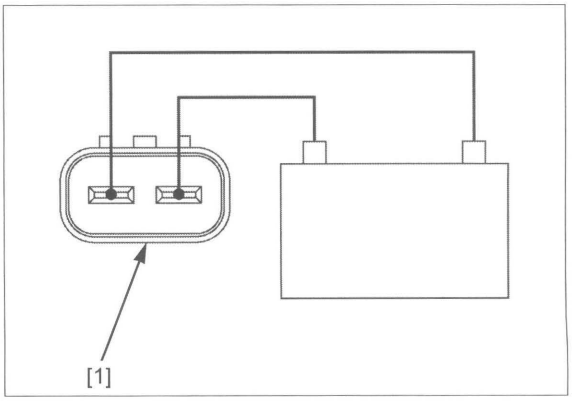
5. Shift Control Motor Inspection

Remove the shift control motor (page 11-51).
Apply between 6 – 8.5 V to the motor side 2P connector [1] terminals to check the motor operation.
Switch the power connection to check the reverse operation.

Does the shift control motor turn in both directions?

YES – GO TO STEP 6.

NO – Faulty shift control motor



6. **Recheck DTC**

   Connect the PCM 5P connector and shift control motor 2P connector.
   Recheck the current DTC with the MCS.

   Is DTC 24-1 indicated?

   YES – Replace the PCM with a known good one (page 4-35) and recheck. If DTC 24-1 is indicated again, replace the control motor.

   NO – Intermittent failure

DTC 27-1 (SHIFT DRUM POSITION MALFUNCTION)

1. **TR Sensor System Inspection**

   Check the TR sensor with the MCS.

   Is Low voltage (about 0 V) or High voltage (about 5 V) indicated?

   YES – • About 0 V: See DTC 51-1 (page 11-35).
   • About 5 V: See DTC 51-2 (page 11-37).

   NO – GO TO STEP 2.

2. **Shift Control Motor/Reduction gear condition**

   Check that the shift control motor and reduction gears are installed properly and are not damaged.

   Are the shift control motor and reduction gears in normal condition?

   YES – GO TO STEP 3.

   NO – Install the shift control motor and reduction gears properly or replace faulty parts.

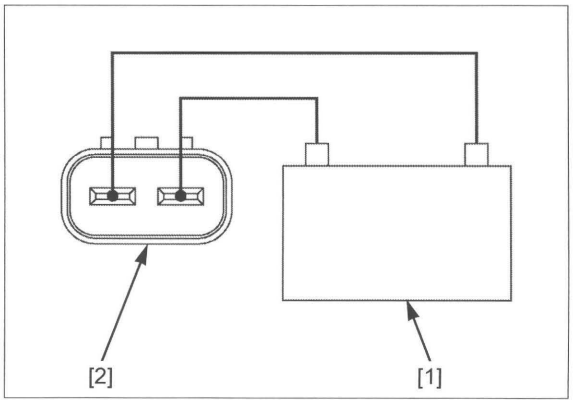
3. **Shift Control Motor Condition Inspection**

   Remove the shift control motor (page 11-51).
   Connect a fully charged 12 V battery [1] to the motor 2P connector [2] terminals to check the motor operation.
   Change the battery connection to check the reverse operation.

   Does the shift control motor turn in both directions?

   YES – GO TO STEP 4.

   NO – Faulty shift control motor



4. **TR Sensor System Inspection**

   Remove the TR sensor with the connector connected (page 11-59).
   Turn the ignition switch ON (I).
   While turning the TR sensor shaft, check the TR sensor voltage with the MCS.

   When turning the shaft clockwise:
   Voltage increase
   When turning the shaft counterclockwise:
   Voltage decrease

   Does the voltage vary properly?

   YES – GO TO STEP 5.

   NO – Faulty TR sensor

5. **TR Sensor Installation Condition Inspection**

   Check that the TR sensor is installed properly and is not damaged (page 11-59).

   Is the TR sensor installed properly?

   YES – GO TO STEP 6.

   NO – Install the TR sensor properly.

6. **DTC Recheck**

   Recheck the DTC with the MCS.

   Is DTC 27-1 indicated?

   YES – Replace the PCM with a known good one (page 4-35) and recheck.

   NO – Intermittent failure

DTC 31-1 (SHIFT CONTROL MOTOR LOW VOLTAGE)

- Before starting the inspection, check for loose or poor contact of the shift control motor 2P and PCM 5P connectors, and recheck the DTC.

1. **Recheck The DTC**

   Erase the DTC (page 11-10).
   Check the DTC with the MCS.

   Is DTC 32-1 indicated?

   YES – See DTC 32-1 (page 11-29).

   NO – GO TO STEP 2.

2. **Shift Control Motor Line Open Circuit Inspection**

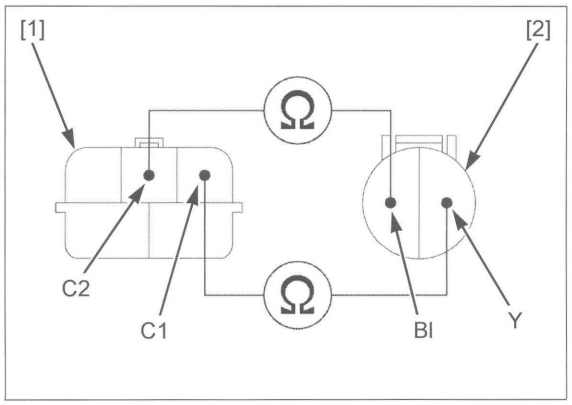
   Disconnect the shift control motor 2P connector (page 11-51).
   Check for continuity between the wire harness side 5P connector [1] and 2P connector [2] terminals.

   Connection: C1 – Yellow
   C2 – Black

   Is there continuity?

   YES – Replace the PCM with a known good one (page 4-35) and recheck.

   NO – • Open circuit in the Yellow wire
   • Open circuit in the Black wire



DTC 32-1 (FAIL SAFE RELAY CIRCUIT MALFUNCTION)

- Before starting the inspection, check for loose or poor contact of the PCM 5P connector, and recheck the DTC.

1. **Shift Control Motor Power Supply Voltage Inspection**

   Check the shift control motor power supply voltage with the MCS.

   Is there battery voltage?

   YES – GO TO STEP 2.

   NO – • Open circuit in the White wire between the PCM 5P connector and fuse box
   • Blown CONT M fuse (30 A)

2. **DTC Recheck**

   Erase the DTC (page 11-10).
   Recheck the DTC with the MCS.

   Is DTC 32-1 indicated?

   YES – Replace the PCM with a known good one (page 4-35) and recheck.

   NO – Intermittent failure

DTC 42-1 (SHIFT SWITCH MALFUNCTION)

- Before starting the inspection, check for loose or poor contact of the shift switch 3P and PCM 33P connectors, and recheck the DTC.

1. **Shift Switch Power Input Voltage Inspection**

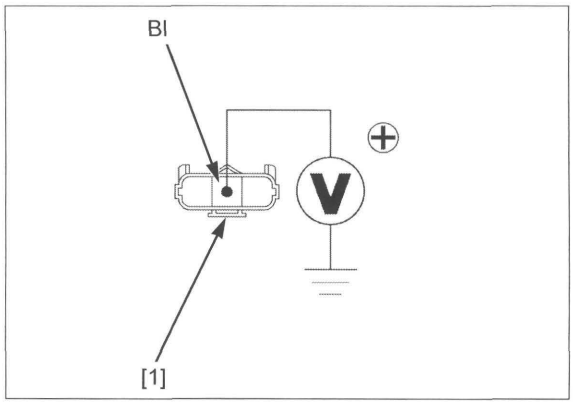
   Turn the ignition switch OFF (O).
   Disconnect the shift switch 3P connector (page 17-6).
   Turn the ignition switch ON (I).
   Measure the voltage between the wire harness side 3P connector [1] and ground.

   Connection: Black (+) – ground (–)

   Is the voltage within 4.75 – 5.25 V?

   YES – GO TO STEP 3.

   NO – GO TO STEP 2.



2. **Shift Switch Power Input Line Open Circuit Inspection**

   Turn the ignition switch OFF (O).
   Disconnect the PCM 33P (Gray) connector (page 4-35).
   Check for continuity between the wire harness side 33P (Gray) connector [1] and 3P connector [2].

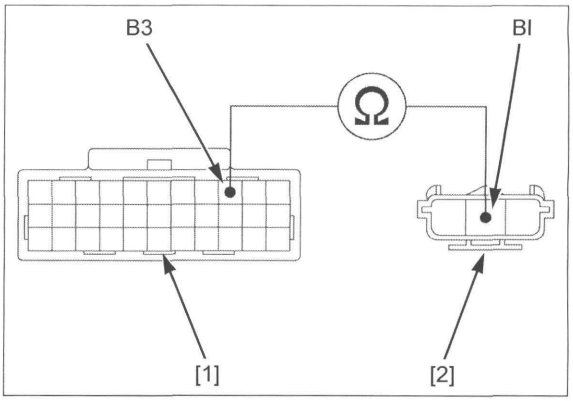
   TOOL:
   Test probe, 2 packs **07ZAJ-RDJA110**

   Connection: B3 – Black

   Is there continuity?

   YES – Replace the PCM with a known good one (page 4-35) and recheck.

   NO – Open circuit in the Black wire



3. Shift Switch Inspection

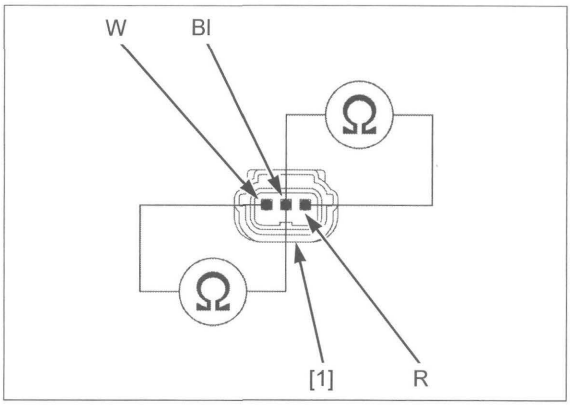
Turn the ignition switch OFF (O).
Check for continuity at the switch side 3P connector [1] in each switch position.

Connection:
"UP" switch: Black – White
"DOWN" switch: Black – Red

Is there continuity with the switch pushed and no continuity with the switch released?

YES – GO TO STEP 4.

NO – Faulty shift switch



4. Shift Switch Output Line Open Circuit Inspection

Disconnect the PCM 33P (Black) connector (page 4-35).
Check for continuity between the wire harness side 33P (Black) connector [1] and 3P connector [2].

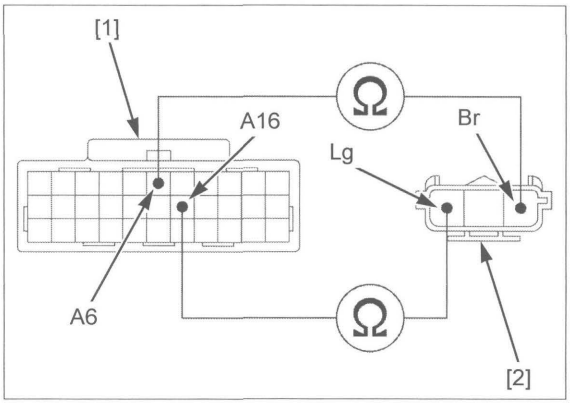
TOOL:
Test probe, 2 packs **07ZAJ-RDJA110**

Connection: A6 – Brown
A16 – Light green

Is there continuity?

YES – GO TO STEP 5.

NO – • Open circuit in the Brown wire
• Open circuit in the Light green wire



5. Shift Switch Output Line Short Circuit Inspection

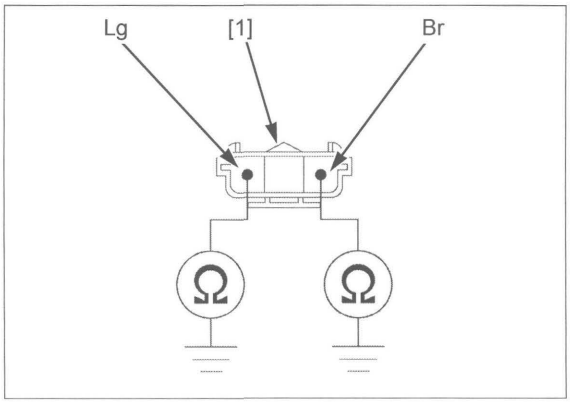
Check for continuity between the wire harness side 3P connector [1] and ground.

Connection: Brown – ground
Light green – ground

Is there continuity?

YES – • Short circuit in the Brown wire
• Short circuit in the Light green wire

NO – Replace the PCM with a known good one (page 4-35) and recheck.



DTC 44-1 (EOT SENSOR LOW VOLTAGE)

1. **EOT Sensor System Inspection**

   Check the EOT sensor with the MCS.

   Is about 0 V indicated?

   YES – GO TO STEP 2.

   NO – Intermittent failure

2. **EOT Sensor Inspection**

   Turn the ignition switch OFF (O).
   Disconnect the EOT sensor 2P connector (page 11-60).
   Turn the ignition switch ON (I).
   Check the EOT sensor with the MCS.

   Is about 0 V indicated?

   YES – GO TO STEP 3.

   NO – Faulty EOT sensor

3. **EOT Sensor Short Circuit Inspection**

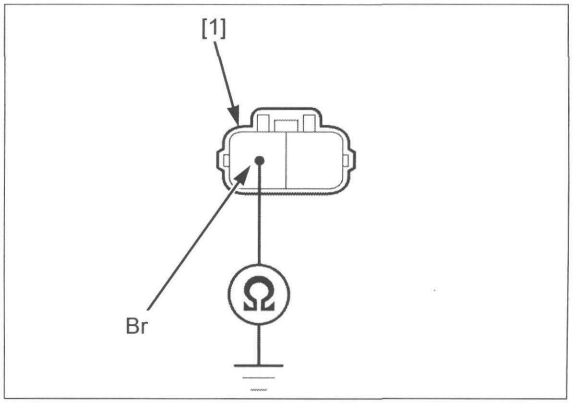
   Disconnect the PCM 33P (Gray) connector (page 4-35).
   Check for continuity between the wire harness side 2P connector [1] and ground.

   Connection: Brown – ground

   Is there continuity?

   YES – Short circuit in the Brown wire

   NO – Replace the PCM with a known good one (page 4-35) and recheck.



DTC 44-2 (EOT SENSOR HIGH VOLTAGE)

- Before starting the inspection, check for loose or poor contact of the EOT sensor 2P and PCM 33P (Gray) connectors, and recheck the DTC.

1. **EOT Sensor System Inspection**

   Check the EOT sensor with the MCS.

   Is about 5 V indicated?

   YES – GO TO STEP 2.

   NO – Intermittent failure

2. **EOT Sensor Inspection**

   Turn the ignition switch OFF (O).
   Disconnect the EOT sensor 2P connector (page 11-60).
   Connect the wire harness side 2P connector [1] terminals with a jumper wire [2].

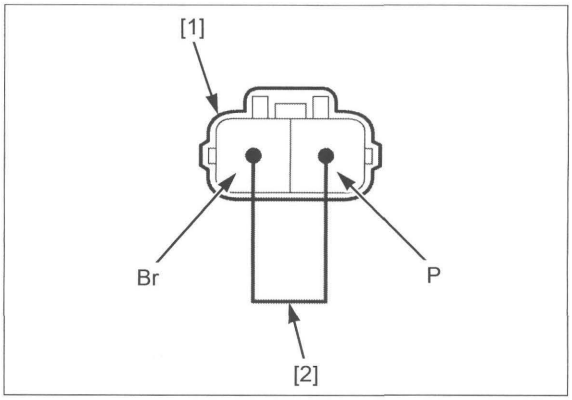
   Connection: Brown – Pink

   Turn the ignition switch ON (I).
   Check the EOT sensor with the MCS.

   Is about 0 V indicated?

   YES – Faulty EOT sensor

   NO – GO TO STEP 3.

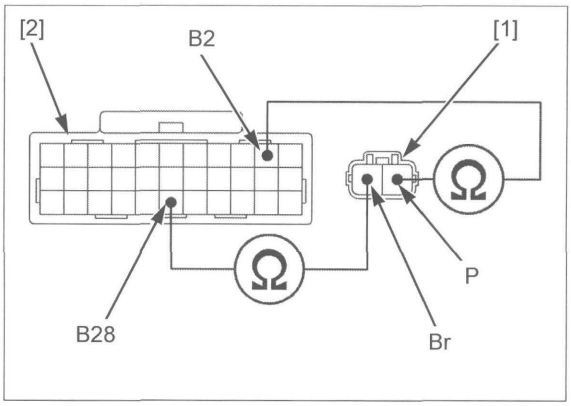


3. EOT Sensor Line Open Circuit Inspection

Turn the ignition switch OFF (O).
Remove the jumper wire.
Disconnect the PCM 33P (Gray) connector (page 4-35).
Check for continuity between the wire harness side 2P connector [1] and 33P (Gray) connector [2] terminals.

TOOL:
Test probe, 2 packs 07ZAJ-RDJA110

Connection: B28 – Brown
B2 – Pink



Is there continuity?

YES – Replace the PCM with a known good one (page 4-35) and recheck.

NO – • Open circuit in the Brown wire
• Open circuit in the Pink wire

DTC 47-1 or 48-1 (No.1 or No.2 CLUTCH EOP SENSOR LOW VOLTAGE)

1. Clutch EOP Sensor System Inspection

Connect the MCS and start the engine.
Check the clutch EOP sensor with the MCS.

Is about 0 V indicated?

YES – GO TO STEP 2.

NO – Intermittent failure

2. Clutch EOP Sensor Inspection

Stop the engine.
Disconnect the clutch EOP sensor 3P connector (page 11-60).
Turn the ignition switch ON.
Check the clutch EOP sensor with the MCS.

Is about 0 V indicated?

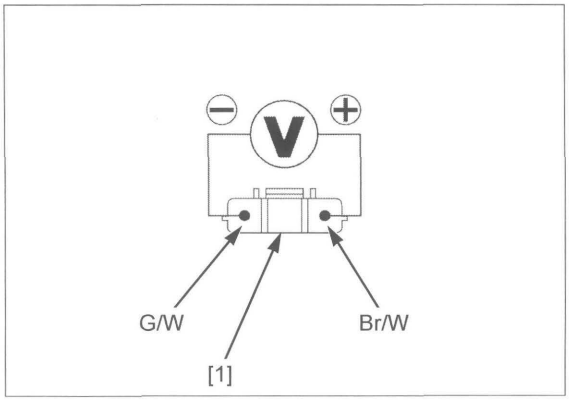
YES – GO TO STEP 3.

NO – Faulty clutch EOP sensor

3. Clutch EOP Sensor Input Voltage Inspection

Measure the voltage between the wire harness side 3P connector [1].

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



Is the voltage within 4.75 – 5.25 V?

YES – GO TO STEP 5.

NO – GO TO STEP 4.

4. **Clutch EOP Sensor Input Line Open Circuit Inspection**

Turn the ignition switch OFF (O).
Disconnect the PCM 33P (Gray) connector (page 4-35).
Check for continuity between the wire harness side 33P (Gray) connector [1] and 3P connector [2].

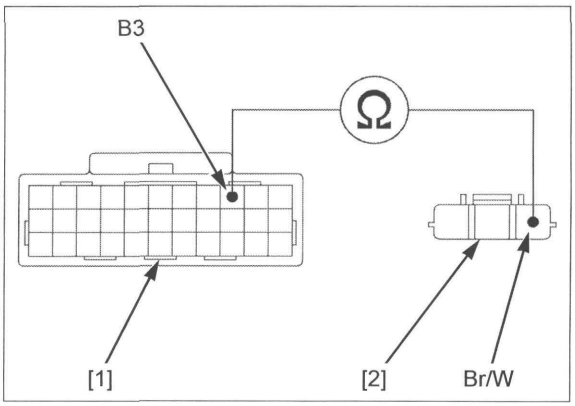
TOOL:
Test probe, 2 packs 07ZAJ-RDJA110

Connection: B3 – Brown/white

Is there continuity?

YES – Replace the PCM with a known good one (page 4-35) and recheck.

NO – • Open circuit in the Brown/white wire of the linear/shift solenoid wire harness
• Open circuit in the Black wire of the main wire harness



5. **Clutch EOP Sensor Output Line Short Circuit Inspection**

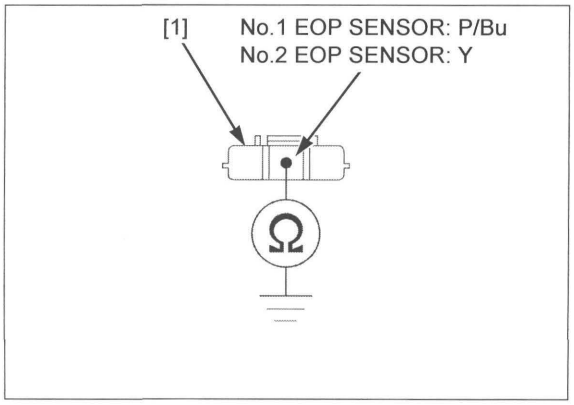
Turn the ignition switch OFF.
Check for continuity between the wire harness side clutch EOP sensor 3P connector [1] terminal and ground.

Connection:
No.1 clutch EOP sensor: Pink/blue – ground
No.2 clutch EOP sensor: Yellow – ground

Is there continuity?

YES – • No.1 EOP sensor:
– Short circuit in the Pink/blue wire of the linear/shift solenoid wire harness
– Short circuit in the Gray wire of the main wire harness
• No.2 EOP sensor: Short circuit in the Yellow wire

NO – Replace the PCM with a known good one (page 4-35) and recheck.



DTC 47-2 or 48-2 (No.1 or No.2 CLUTCH EOP SENSOR HIGH VOLTAGE)

• Before starting the inspection, check for loose or poor contact of the clutch EOP sensor 3P and PCM 33P connectors, and recheck the DTC.

1. **Clutch EOP Sensor System Inspection**

Check the clutch EOP sensor with the MCS.

Is about 5 V indicated?

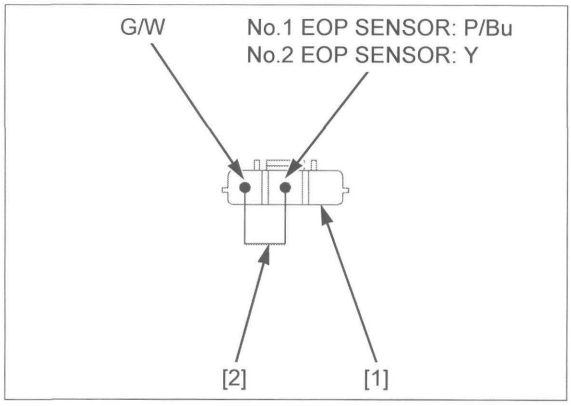
YES – GO TO STEP 2.

NO – Intermittent failure

2. Clutch EOP Sensor Inspection

Turn the ignition switch OFF (O).
Disconnect the clutch EOP sensor 3P connector (page 11-60).
Connect the wire harness side 3P connector [1] terminals with a jumper wire [2].

Connection:
No.1 clutch EOP sensor:
Pink/blue – Green/white
No.2 clutch EOP sensor:
Yellow – Green/white



Turn the ignition switch ON (I).
Check the clutch EOP sensor with the MCS.

Is about 0 V indicated?

YES – Faulty clutch EOP sensor

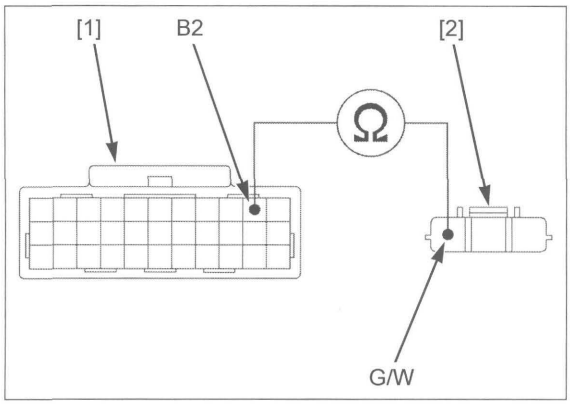
NO – GO TO STEP 3.

3. Clutch EOP Sensor Ground Line Open Circuit Inspection

Turn the ignition switch OFF (O).
Disconnect the PCM 33P (Gray) connector (page 4-35).
Check for continuity between the wire harness side 33P (Gray) connector [1] and 3P connector [2].

Connection: B2 – Green/white

TOOL:
Test probe, 2 packs 07ZAJ-RDJA110



Is there continuity?

YES – GO TO STEP 4.

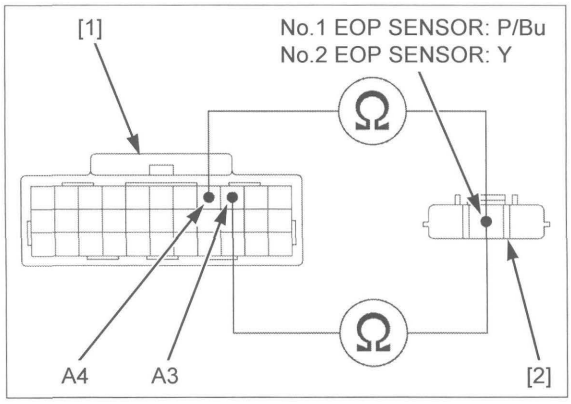
NO – • Open circuit in the Green/white wire of the linear/shift solenoid wire harness
• Open circuit in the Pink wire of the main wire harness

4. Clutch EOP Sensor Output Line Open Circuit Inspection

Disconnect the PCM 33P (Black) connector (page 4-35).
Check for continuity between the wire harness side 33P (Black) connector [1] and 3P connector [2].

Connection:
No.1 clutch EOP sensor: A3 – Pink/blue
No.2 clutch EOP sensor: A4 – Yellow

TOOL:
Test probe 07ZAJ-RDJA110



Is there continuity?

YES – Replace the PCM with a known good one (page 4-35) and recheck.

NO – • No.1 EOP sensor:
– Open circuit in the Pink/blue wire of the linear/shift solenoid wire harness
– Open circuit in the Gray wire of the main wire harness
• No.2 EOP sensor: Open circuit in the Yellow wire

DTC 51-1 (TR SENSOR LOW VOLTAGE)

- Before starting the inspection, check for loose or poor contact of the TR sensor 3P and PCM 33P connectors, and recheck the DTC.

1. **TR Sensor System Inspection**

   Check the TR sensor with the MCS.

   Is about 0 V indicated?

   YES – GO TO STEP 2.

   NO – Intermittent failure

2. **TR Sensor Input Voltage Inspection**

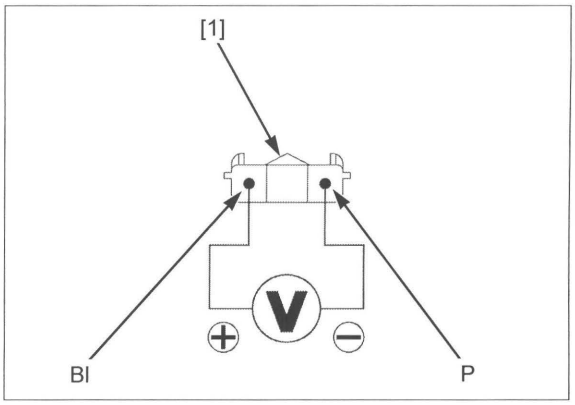
   Turn the ignition switch OFF (O).
   Disconnect the TR sensor 3P connector (page 11-59).
   Turn the ignition switch ON (I).
   Measure the voltage at the wire harness side 3P connector [1].

   Connection: Black (+) – Pink (–)

   Is the voltage within 4.75 – 5.25 V?

   YES – GO TO STEP 5.

   NO – GO TO STEP 3.



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

   Turn the ignition switch OFF (O).
   Disconnect the PCM 33P (Gray) connector (page 4-35).
   Check for continuity between the wire harness side 33P (Gray) connector [1] and 3P connector [2].

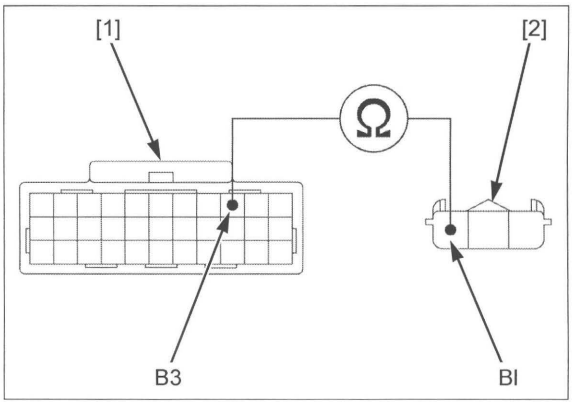
   TOOL:
   Test probe, 2 packs **07ZAJ-RDJA110**

   Connection: B3 – Black

   Is there continuity?

   YES – GO TO STEP 4.

   NO – Open circuit in the Black wire



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

   Check for continuity between the wire harness side 33P (Gray) connector [1] and 3P connector [2].

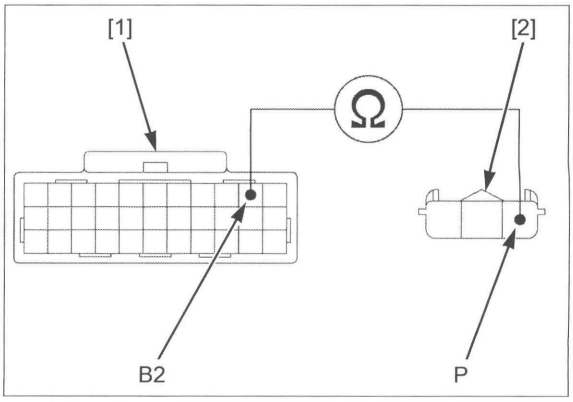
   TOOL:
   Test probe, 2 packs **07ZAJ-RDJA110**

   Connection: B2 – Pink

   Is there continuity?

   YES – Replace the PCM with a known good one (page 4-35) and recheck.

   NO – Open circuit in the Pink wire



5. TR Sensor Signal Line Open Circuit Inspection

Turn the ignition switch OFF (O).
Disconnect the PCM 33P (Black) connector (page 4-35).
Check for continuity between the wire harness side 33P (Black) connector [1] and 3P connector [2].

TOOL:
Test probe, 2 packs **07ZAJ-RDJA110**

'22 models, After '22 models (III, IV, IX type)
Connection: A26 – Blue

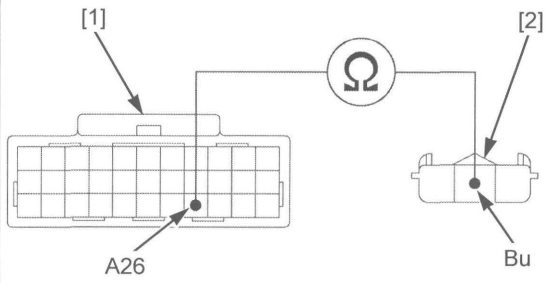
After '22 models (Except III, IV, IX type)
Connection: A26 – Orange

Is there continuity?

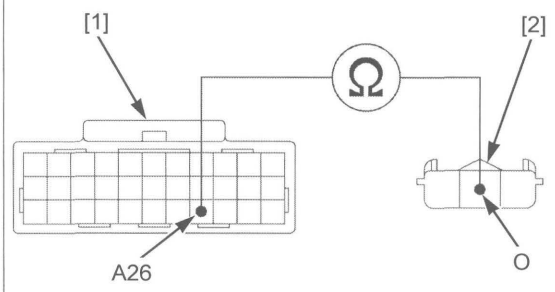
YES – GO TO STEP 6.

NO – Open circuit in the Blue wire

'22 models, After '22 models (III, IV, IX type)



After '22 models (Except III, IV, IX type)



6. TR Sensor Output Line Short Circuit Inspection

Check for continuity between the wire harness side 3P connector [1] and ground.

'22 models, After '22 models (III, IV, IX type)
Connection: Blue – ground

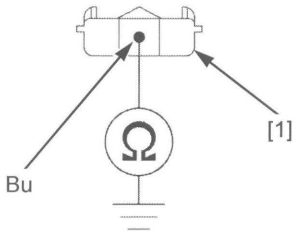
After '22 models (Except III, IV, IX type)
Connection: Orange – ground

Is there continuity?

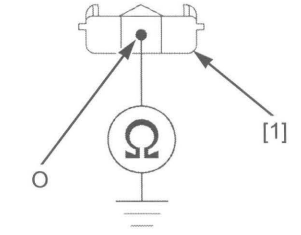
YES – Short circuit in the Blue wire

NO – GO TO STEP 7.

'22 models, After '22 models (III, IV, IX type)



After '22 models (Except III, IV, IX type)



7. TR Sensor Inspection

Replace the TR sensor with a known good one (page 11-59).
Connect the 3P connector and 33P (Black) connector.
Check the TR sensor with the MCS.

Is about 0 V indicated?

YES – Replace the PCM with a known good one (page 4-35) and recheck.

NO – Faulty original TR sensor

DTC 51-2 (TR SENSOR HIGH VOLTAGE)

1. **TR Sensor System Inspection**

   Check the TR sensor with the MCS.

   Is about 5 V indicated?

   YES – GO TO STEP 2.

   NO – Intermittent failure

2. **TR Sensor Inspection**

   Replace the TR sensor with a known good one (page 11-59).
   Turn the ignition switch ON (I).
   Check the TR sensor with the MCS.

   Is about 5 V indicated?

   YES – Replace the PCM with a known good one (page 4-35) and recheck.

   NO – Faulty original TR sensor

DTC 52-1 (NEUTRAL SWITCH STUCK OFF)

- Before starting the inspection, check for loose or poor contact of the neutral switch and PCM 33P (Black) connectors, and recheck the DTC.

1. **DTC Check**

   Check the current DTC with the MCS.

   Is DTC 52-1 indicated?

   YES – GO TO STEP 2.

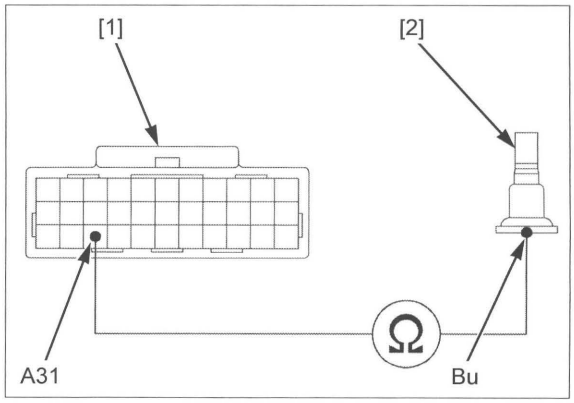
   NO – Intermittent failure

2. **Neutral Switch Line Open Circuit Inspection**

   Turn the ignition switch OFF (O).
   Disconnect the PCM 33P (Black) connector (page 4-35).
   Disconnect the neutral switch connector (page 11-65).
   Check for continuity between the wire harness side 33P (Black) connector [1] and neutral switch connector [2].

   TOOL:
   Test probe, 2 packs **07ZAJ-RDJA110**

   Connection: A31 – Blue

   Is there continuity?

   YES – GO TO STEP 3.

   NO – Open circuit in the Blue wire

3. **Neutral Switch Inspection**

   Replace the neutral switch with a known good one (page 11-65).
   Connect the PCM 33P (Black) connector and neutral switch connector.
   Check the current DTC with the MCS.

   Is DTC 52-1 indicated?

   YES – Replace the PCM with a known good one (page 4-35) and recheck.

   NO – Faulty original neutral switch

DTC 52-2 (NEUTRAL SWITCH STUCK ON)

1. **Neutral Switch Line Short Circuit Inspection**

   Disconnect the PCM 33P (Black) connector (page 4-35).
   Disconnect the neutral switch connector (page 11-65).
   Check for continuity between the neutral switch connector [1] and ground.

   Connection: Blue – ground

   Is there continuity?

   YES – Short circuit in the Blue wire

   NO – GO TO STEP 2.

2. **Neutral Switch Inspection**

   Replace the neutral switch with a known good one (page 11-65).
   Connect the 33P (Black) connector and neutral switch connector.
   Check the current DTC with the MCS.

   Is DTC 52-2 indicated?

   YES – Replace the PCM with a known good one (page 4-35) and recheck.

   NO – Faulty original neutral switch

DTC 57-1 (GEARSHIFT MECHANISM MALFUNCTION)

See DTC 27-1 (page 11-27).

DTC 57-2 (GEAR POSITION MALFUNCTION; JUMPS OUT OF GEAR)

See DTC 27-1 (page 11-27).

DTC 62-1 (No.1 or No.2 CLUTCH OIL PRESSURE HIGH)

1. **DTC Check**

   Check the DTC with the MCS.

   Is DTC 47-1, 47-2, 48-1 or 48-2 indicated?

   YES – • DTC 47-1 or DTC 48-1 is indicated (page 11-32).
   • DTC 47-2 or DTC 48-2 is indicated (page 11-33).

   NO – GO TO STEP 2.

2. **Clutch EOP Sensor Inspection**

   Replace the No.1 and No.2 EOP sensors with known good ones (page 11-60).
   Erase the DTCs (page 11-10).
   Test-ride the vehicle and stop the engine.
   Check the DTC with the MCS.

   Is DTC 62-1 indicated?

   YES – GO TO STEP 3.

   NO – Faulty original clutch EOP sensors

3. **PCM Inspection**

Replace the PCM with a known good one (page 4-35).
Test-ride the vehicle and stop the engine.
Check the DTC with the MCS.

Is DTC 62-1 indicated?

YES – • Faulty linear solenoid valve
• Clogged clutch oil lines

NO – Faulty original PCM

DTC 66-1 (REAR VS SENSOR NO SIGNAL)

• Before starting the inspection, check for loose or poor contact of the rear VS sensor 3P and PCM 33P connectors, and recheck the DTC.

1. **DTC Retrieval Check**

Erase the DTC (page 11-10).
Test-drive the vehicle and stop the engine.
Check the DTC with the MCS.

Is DTC 66-1 indicated?

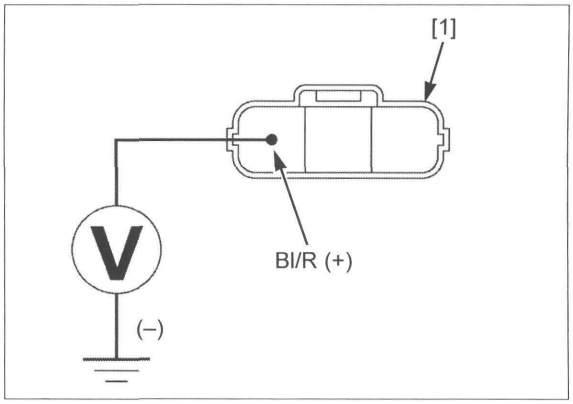
YES – GO TO STEP 2.

NO – Intermittent failure

2. **Rear VS Sensor Power Input Voltage Inspection**

Turn the ignition switch OFF (O).
Disconnect the rear VS sensor 3P connector (page 11-61).
Turn the ignition switch ON (I).
Measure the voltage between the wire harness side 3P connector [1] and ground.

Connection: Black/red (+) – ground (–)



Is the voltage more than 10 V?

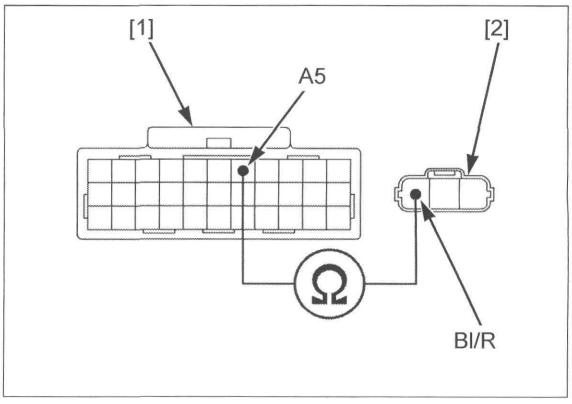
YES – GO TO STEP 4.

NO – GO TO STEP 3.

3. **Rear VS Sensor Power Input Line Open Circuit Inspection**

Turn the ignition switch OFF (O).
Disconnect the PCM 33P (Black) connector (page 4-35).
Check for continuity between the wire harness side 33P (Black) connector [1] and 3P connector [2].

TOOL:
Test probe, 2 packs **07ZAJ-RDJA110**



Connection: A5 – Black/red

Is there continuity?

YES – Replace the PCM with a known good one (page 4-35) and recheck.

NO – • Open circuit in the Black/red wire of the rear VS sensor harness (sub-drum position switch assembly)
• Open circuit in the Black wire of the main wire harness

4. **Rear VS Sensor Ground Line Inspection**

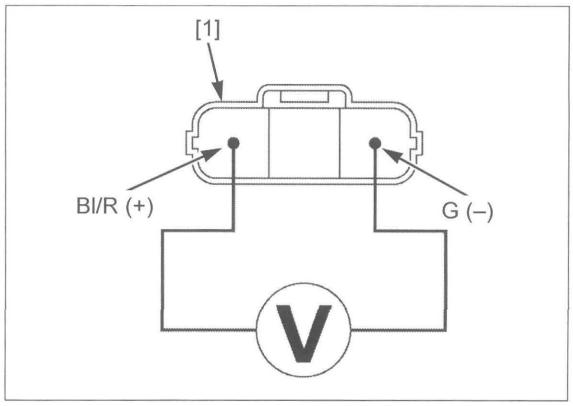
Measure the voltage at the wire harness side 3P connector [1].

Connection: Black/red (+) – Green (–)

Is the voltage more than 10 V?

YES – GO TO STEP 5.

NO – Open circuit in the Green wire



5. **Rear VS Sensor Output Line Voltage Inspection**

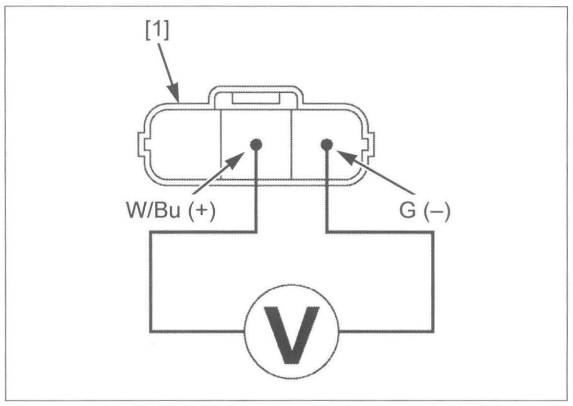
Measure the voltage at the wire harness side 3P connector [1].

Connection: White/blue (+) – Green (–)

Is the voltage about 5 V?

YES – GO TO STEP 8.

NO – GO TO STEP 6.



6. **Rear VS Sensor Output Line Open Circuit Inspection**

Turn the ignition switch OFF (O).
Disconnect the PCM 33P (Gray) connector (page 4-35).
Check for continuity between the wire harness side 33P (Gray) connector [1] and 3P connector [2].

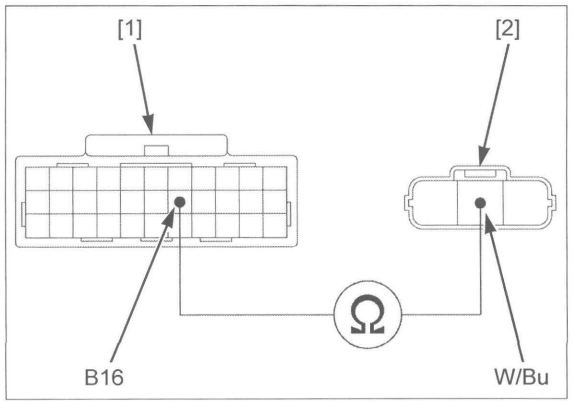
TOOL:
Test probe, 2 packs **07ZAJ-RDJA110**

Connection: B16 – White/blue

Is there continuity?

YES – GO TO STEP 7.

NO –
- Open circuit in the White/blue wire of the rear VS sensor harness (sub-drum position switch assembly)
- Open circuit in the Violet wire of the main wire harness



7. **Rear VS Sensor Output Line Short Circuit Inspection**

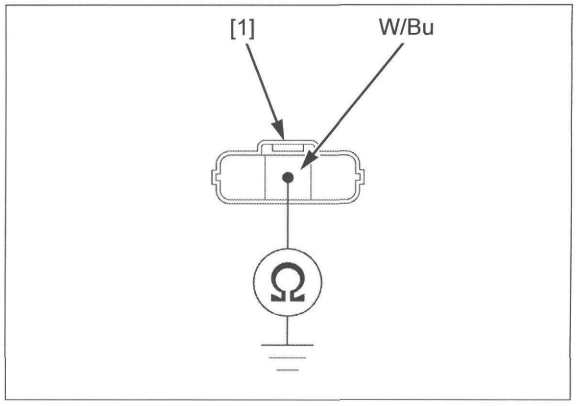
Check for continuity between the wire harness side 3P connector [1] and ground.

Connection: White/blue – ground

Is there continuity?

YES – • Short circuit in the White/blue wire of the rear VS sensor harness (sub-drum position switch assembly)
• Short circuit in the Violet wire of the main wire harness

NO – Replace the PCM with a known good one (page 4-35) and recheck.



8. **Rear VS Sensor Inspection**

Turn the ignition switch OFF (O).
Replace the rear VS sensor with a new one (page 11-61).
Erase the DTC (page 11-10).
Test-drive the vehicle and stop the engine.
Check the DTC with the MCS.

Is DTC 66-1 indicated?

YES – Replace the PCM with a known good one (page 4-35) and recheck.

NO – Faulty original rear VS sensor

DTC 67-1 (FRONT VS SENSOR NO SIGNAL)

• Before starting the inspection, check for loose or poor contact of the front VS sensor 3P and PCM 33P connectors, and recheck the DTC.

1. **DTC Retrieval Check**

Erase the DTC (page 11-10).
Test-drive the vehicle and stop the engine.
Check the DTC with the MCS.

Is DTC 67-1 indicated?

YES – GO TO STEP 2.

NO – Intermittent failure

2. **Front VS Sensor Power Input Voltage Inspection**

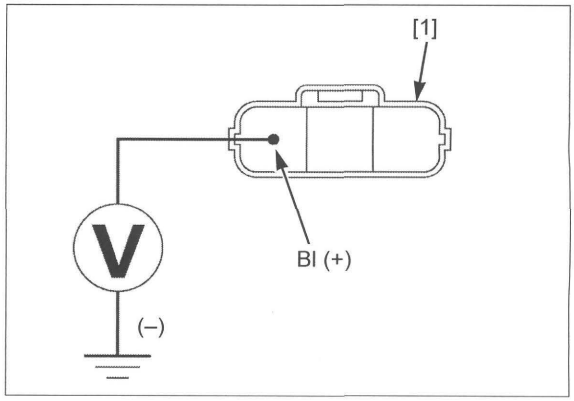
Turn the ignition switch OFF (O).
Disconnect the front VS sensor 3P connector (page 11-61).
Turn the ignition switch ON (I).
Measure the voltage between the wire harness side 3P connector [1] and ground.

Connection: Black (+) – ground (–)

Is the voltage more than 10 V?

YES – GO TO STEP 4.

NO – GO TO STEP 3.



3. **Front VS Sensor Power Input Line Open Circuit Inspection**

Turn the ignition switch OFF (O).
Disconnect the PCM 33P (Black) connector (page 4-35).
Check for continuity between the wire harness side 33P (Black) connector [1] and 3P connector [2].

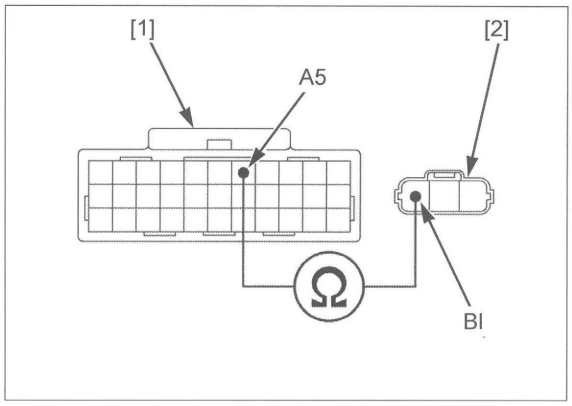
TOOL:
Test probe, 2 packs **07ZAJ-RDJA110**

Connection: A5 – Black

Is there continuity?

YES – Replace the PCM with a known good one (page 4-35) and recheck.

NO – Open circuit in the Black wire



4. **Front VS Sensor Ground Line Inspection**

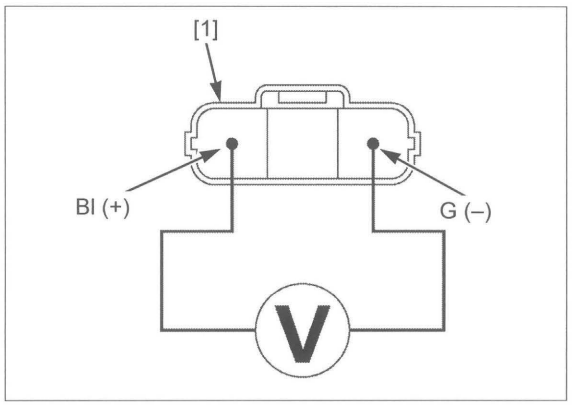
Measure the voltage at the wire harness side 3P connector [1].

Connection: Black (+) – Green (–)

Is the voltage more than 10 V?

YES – GO TO STEP 5.

NO – Open circuit in the Green wire



5. **Front VS Sensor Output Line Voltage Inspection**

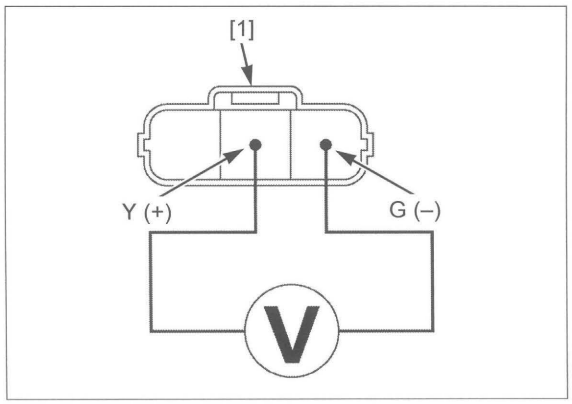
Measure the voltage at the wire harness side 3P connector [1].

Connection: Yellow (+) – Green (–)

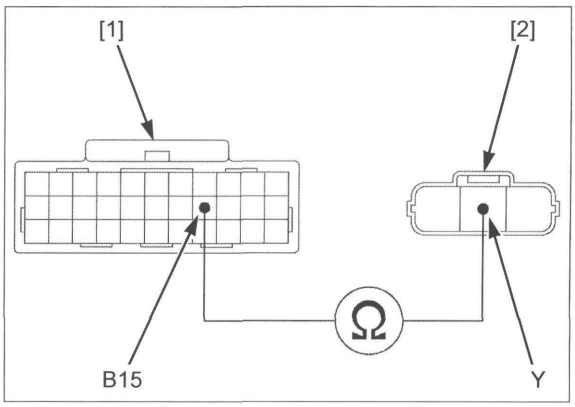
Is the voltage about 5 V?

YES – GO TO STEP 8.

NO – GO TO STEP 6.



6. **Front VS Sensor Output Line Open Circuit Inspection**



Turn the ignition switch OFF (O).
Disconnect the PCM 33P (Gray) connector (page 4-35).
Check for continuity between the wire harness side 33P (Gray) connector [1] and 3P connector [2].

TOOL:
Test probe, 2 packs **07ZAJ-RDJA110**

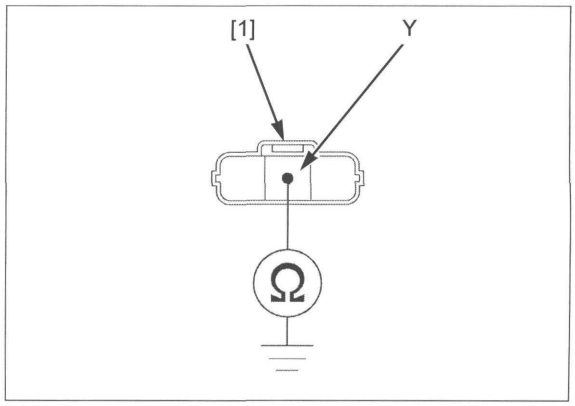
Connection: B15 – Yellow

Is there continuity?

YES – GO TO STEP 7.

NO – Open circuit in the Yellow wire

7. **Front VS Sensor Output Line Short Circuit Inspection**



Check for continuity between the wire harness side 3P connector [1] and ground.

Connection: Yellow – ground

Is there continuity?

YES – Short circuit in the Yellow wire

NO – Replace the PCM with a known good one (page 4-35) and recheck.

8. **Front VS Sensor Inspection**

Turn the ignition switch OFF (O).
Replace the front VS sensor with a new one (page 11-61).
Erase the DTC (page 11-10).
Test-drive the vehicle and stop the engine.
Check the DTC with the MCS.

Is DTC 67-1 indicated?

YES – Replace the PCM with a known good one (page 4-35) and recheck.

NO – Faulty original front VS sensor

DTC 73-1 (ORIFICE CONTROL SOLENOID VALVE MALFUNCTION)

- Before starting the inspection, check for loose or poor contact of the linear/shift solenoid wire harness 12P and PCM 33P (Black) connectors, and recheck the DTC.

1. **Recheck DTC**

   Recheck the current DTC with the MCS.

   Is DTC 73-1 indicated?

   YES – GO TO STEP 2.

   NO – Intermittent failure

2. **Orifice Control Solenoid Valve Inspection 1**

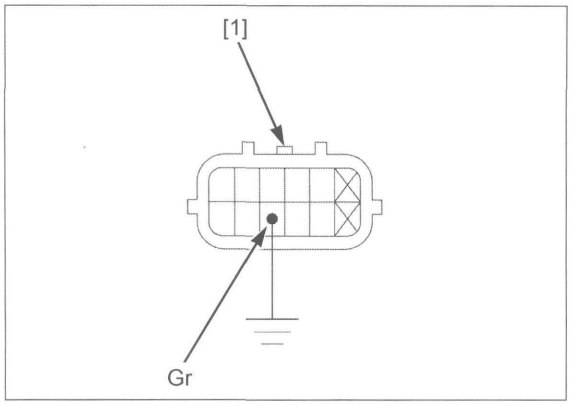
   Turn the ignition switch OFF (O).
   Disconnect the linear/shift solenoid wire harness 12P connector (page 11-50).
   Measure the resistance between the solenoid side 12P connector [1] and engine ground.

   Connection: Gray – engine ground

   Is the resistance within 11 – 15 Ω (20°C/68°F)?

   YES – GO TO STEP 4.

   NO – GO TO STEP 3.



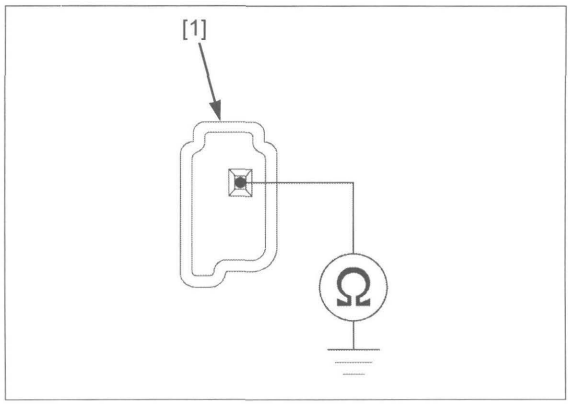
3. **Orifice Control Solenoid Valve Inspection 2**

   Disconnect the 2P connector from orifice control solenoid valve (page 11-48).
   Measure the resistance between the solenoid valve side connector [1] terminal and engine ground.

   Is the resistance within 11 – 15 Ω (20°C/68°F)?

   YES – Open or short circuit in the Gray wire (linear/shift solenoid wire harness)

   NO – Faulty orifice control solenoid valve



4. **Orifice Control Solenoid Valve Line Open Circuit Inspection**

   Disconnect the PCM 33P (Black) connector (page 4-35).
   Check for continuity between the wire harness side 33P (Black) connector [1] and 12P connector [2].

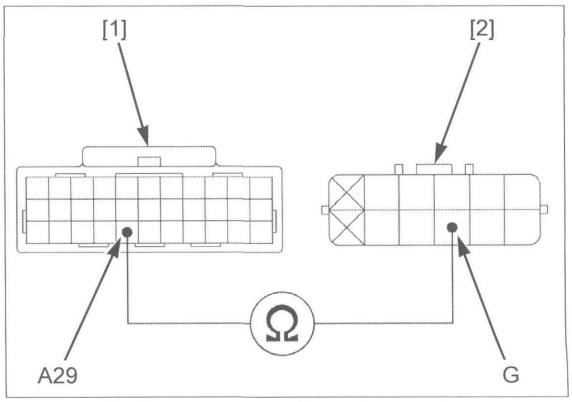
   TOOL:
   Test probe, 2 packs **07ZAJ-RDJA110**

   Connection: A29 – Green

   Is there continuity?

   YES – GO TO STEP 5.

   NO – Open circuit in the Green wire



5. **Orifice Control Solenoid Valve Line Short Circuit Inspection**

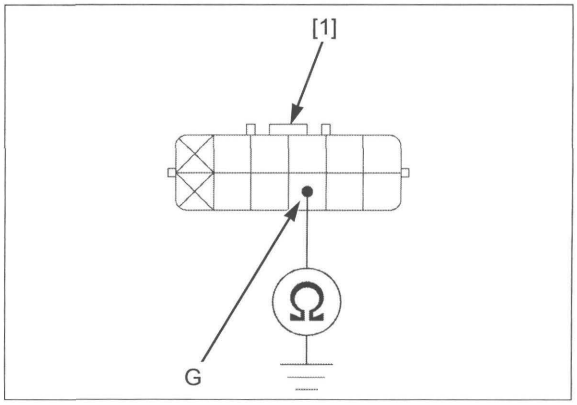
   Check for continuity between the wire harness side 12P connector [1] and ground.

   Connection: Green – ground

   Is there continuity?

   YES – Short circuit in the Green wire

   NO – GO TO STEP 6.



6. **Recheck DTC**

   Connect the linear/shift solenoid wire harness 12P connector and PCM 33P (Black) connector.
   Recheck the current DTC with the MCS.

   Is DTC 73-1 indicated?

   YES – Replace the PCM with a known good one (page 4-35) and recheck.

   NO – Intermittent failure

DTC 74-1 (SHIFT SOLENOID VALVE OIL PRESSURE LOGIC ERROR)

1. **DTC Check**

   Check the DTC with the MCS.

   Is DTC 15-1 OR 16-1 indicated?

   YES – • DTC 15-1 is indicated (page 11-18).
   • DTC 16-1 is indicated (page 11-20).

   NO – GO TO STEP 2.

2. **Shift Solenoid Valve Inspection**

   Replace the shift solenoid valves 1 and 2 with known good ones (page 11-48).
   Erase the DTCs (page 11-10).
   Test-ride the vehicle and stop the engine.
   Check the DTC with the MCS.

   Is DTC 74-1 indicated?

   YES – GO TO STEP 3.

   NO – Faulty original shift solenoid valves

3. **PCM Inspection**

   Replace the PCM with a known good one (page 4-35).
   Test-ride the vehicle and stop the engine.
   Check the DTC with the MCS.

   Is DTC 74-1 indicated?

   YES – Disassemble and check the valve body.

   NO – Faulty original PCM

DTC 81-1 (SUB-TRANSMISSION POSITION SWITCH MALFUNCTION)

- Before starting the inspection, check for loose or poor contact of the sub-transmission position switch connector and PCM 33P (Black) connector, and recheck the DTC.

1. **DTC Check**

   Test-drive the vehicle and stop the engine.
   Check the DTC with the MCS.

   Is DTC 81-1 indicated?

   YES – GO TO STEP 2.

   NO – Intermittent failure

2. **Sub-transmission Position Switch Inspection at PCM Connector**

   Check the sub-transmission switch at the PCM 33P (Black) connector (page 11-62).

   Are the test results normal?

   YES – GO TO STEP 4.

   NO – GO TO STEP 3.

3. **Sub-transmission Position Switch Inspection at Switch Connector**

   '22 models, After '22 models (III, IV, IX type):
   Check the sub-transmission position switch at the 8P connector (page 11-64).

   After '22 models (Except III, IV, IX type):
   Check the sub-transmission position switch at the 12P connector (page 11-64).

   Are the test results normal?

   YES –
   - Open or short circuit in the Pink wire
   - Open or short circuit in the Black wire
   - Open or short circuit in the Gray wire
   - Open or short circuit in the Light blue wire
   - Open or short circuit in the Yellow wire

   NO – Faulty sub-transmission position switch

4. **Failure Reproduction**

   '22 models, After '22 models (III, IV, IX type):
   Connect the PCM 33P (Black) connector and sub-transmission position switch 8P connector.

   After '22 models (Except III, IV, IX type):
   Connect the PCM 33P (Black) connector and sub-transmission position switch 12P connector.

   Erase the DTC (page 4-7).
   Test-drive the vehicle and stop the engine.
   Recheck the DTC with the MCS.

   Is DTC 81-1 indicated?

   YES – Replace the PCM with a known good one (page 4-35) and recheck.

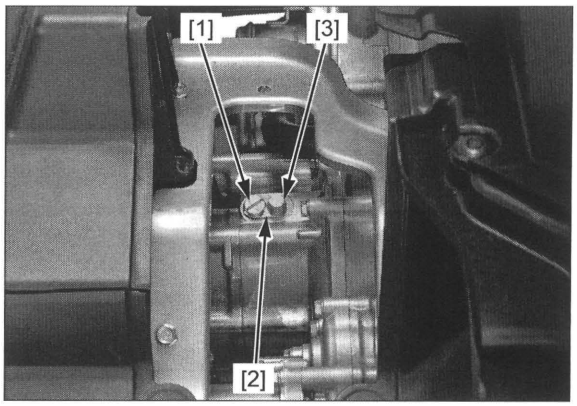
   NO – Intermittent failure

CLUTCH COVER/CLUTCH CONTROL BODY

EMERGENCY VALVE FUNCTION

NOTE:

- The emergency valve is used when the hydraulic pressure is shut off by the faulty dual clutch PC solenoid (stuck; mechanical lock), and the vehicle is prevented from running. Open the bypass oil circuit manually to supply hydraulic pressure.
- The emergency bolt [1] that operates the emergency valve is secured with the stopper plate [2]. When trouble occurs, loosen the stopper plate bolt [3] and turn the stopper bolt all the way in to activate the emergency valve.



TORQUE:

Emergency valve stopper plate bolt:
7.0 N·m (0.7 kgf·m, 5.2 lbf·ft)

SOLENOID COVER REMOVAL/ INSTALLATION

M5P/M5D: Remove the rear footwell (page 2-12).

M3P/M3D: Remove the rear mud guard lid (page 2-14).

Drain the engine oil (page 3-13).

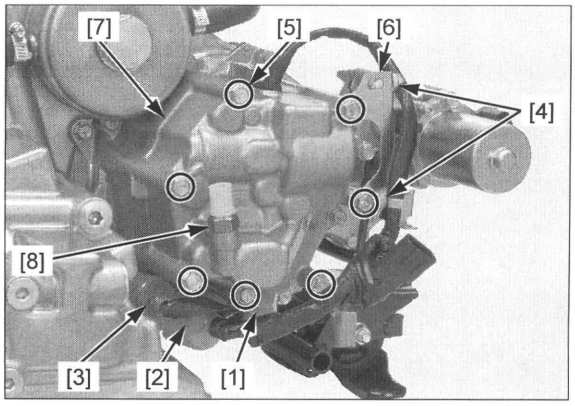
Disconnect the following:

- EOT sensor 2P connector (page 11-60)
- No.1 clutch EOP sensor 3P connector [1]
- No.2 clutch EOP sensor 3P connector [2]
- clutch line EOP sensor 3P connector [3]

Release the wire clips [4].

Remove the bolts [5], stay [6] and clutch cover [7].

Remove the EOT sensor [8] if necessary (page 11-60).

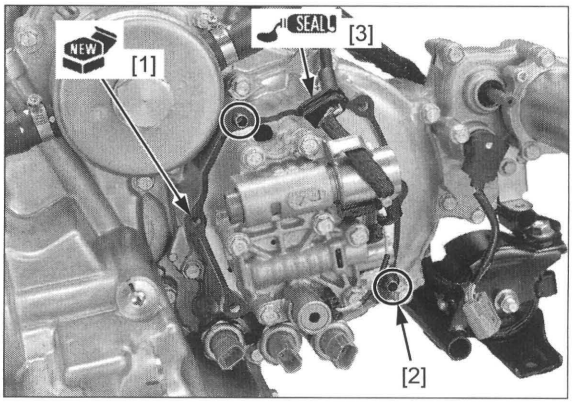


Remove the gasket [1] and dowel pins [2].

Installation is in the reverse order of removal.

NOTE:

- Replace the gasket with a new one.
- Apply liquid sealant (TB1207B manufactured by ThreeBond or an equivalent) to the grommet sealing surface [3].



CLUTCH CONTROL BODY DISASSEMBLY/ASSEMBLY

NOTE:

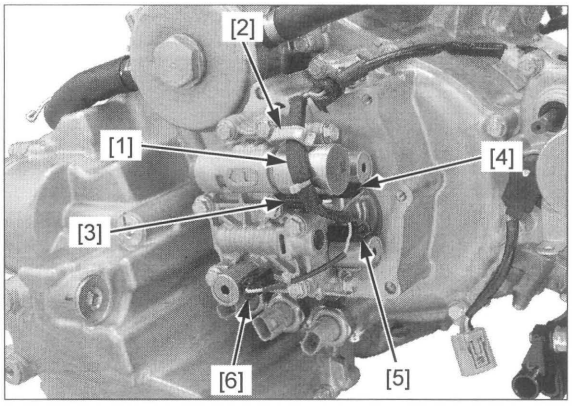
- Keep dust and dirt away from all the parts.
- Be careful not to damage the mating surfaces of the valve body components.
- Do not drop or strike the solenoid valves when servicing. Excessive shock may damage the solenoid valve.

Remove the solenoid cover (page 11-47).

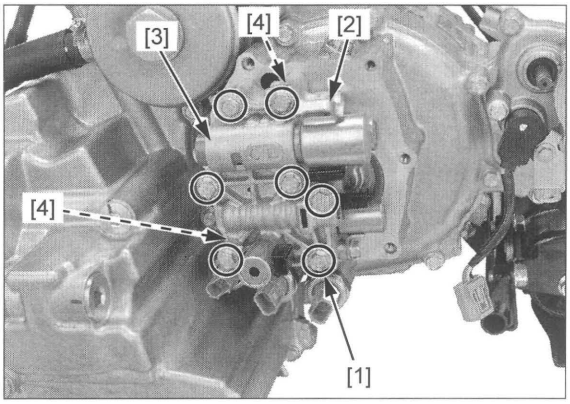
Release the linear/shift solenoid wire harness [1] from the clamp [2].

Remove the linear/shift solenoid wire harness by disconnecting the following:

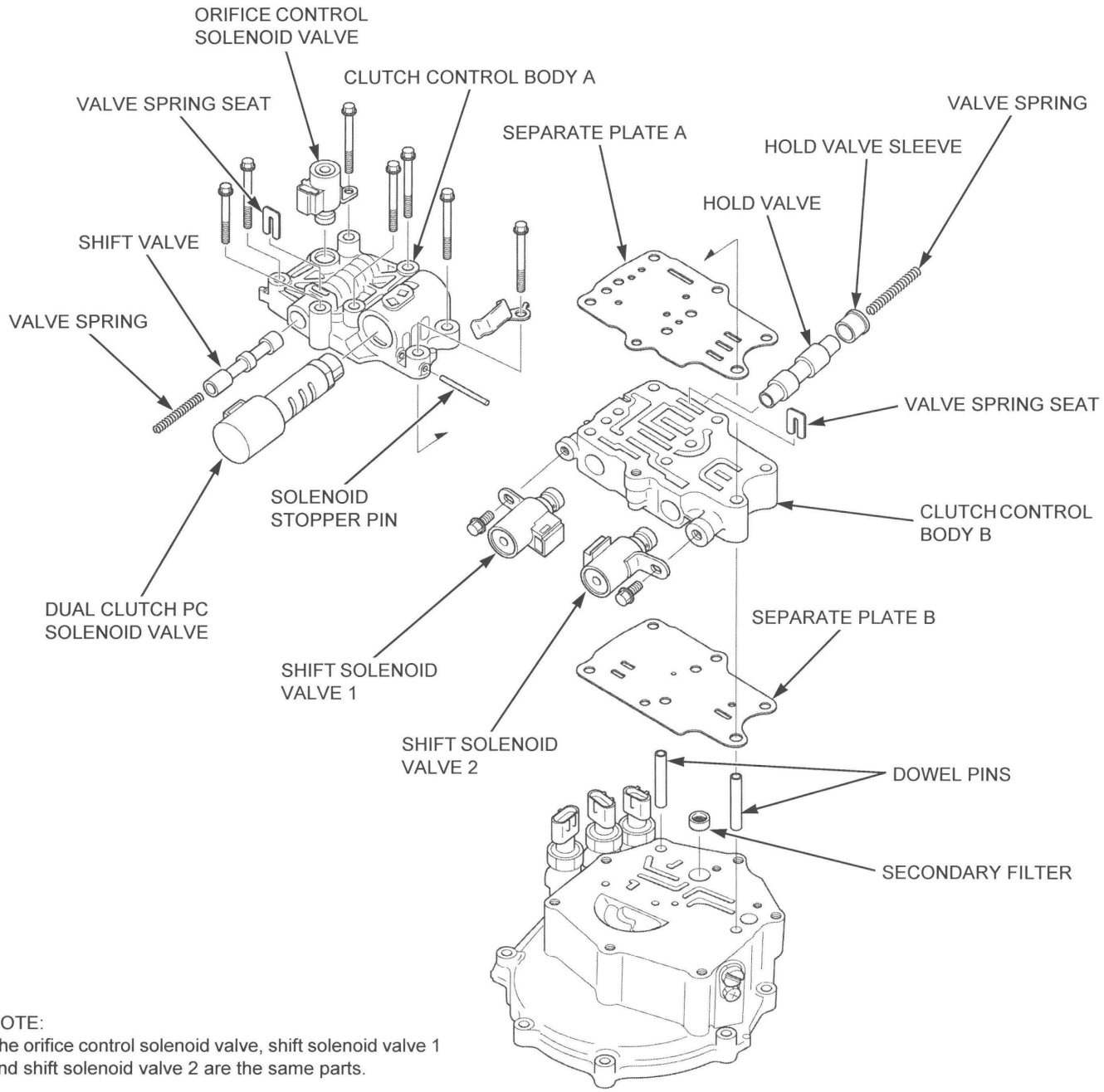
– 2P connector [3] from the dual clutch PC solenoid valve
– 2P connector (Red wire) [4] from shift solenoid valve 1
– 2P connector (Black wire) [5] from shift solenoid valve 2
– 2P connector [6] from the orifice control solenoid valve



Remove the bolts [1], clamp [2] and clutch control body assembly [3] with dowel pins [4].



Disassemble the valve body.



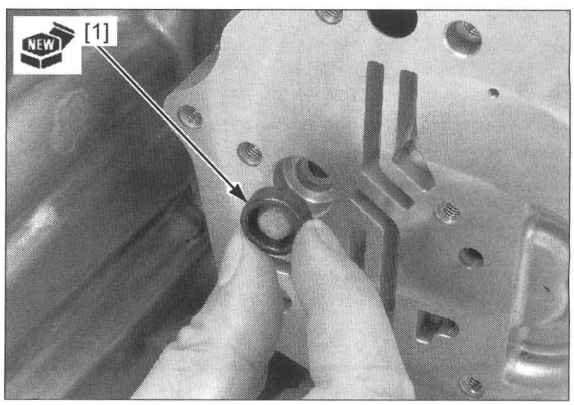
NOTE:
The orifice control solenoid valve, shift solenoid valve 1 and shift solenoid valve 2 are the same parts.

Assembly is in the reverse order of disassembly.

NOTE:

- Before assembly, clean all the parts with compressed air. Make sure that there is no dust or lint on any parts.
- Replace the secondary filter [1] with a new one and install it in the direction shown.
- Check each component and replace if necessary.

TORQUE:
Clutch control body bolt:
14 N·m (1.4 kgf·m, 10 lbf·ft)



CLUTCH COVER

REMOVAL/INSTALLATION

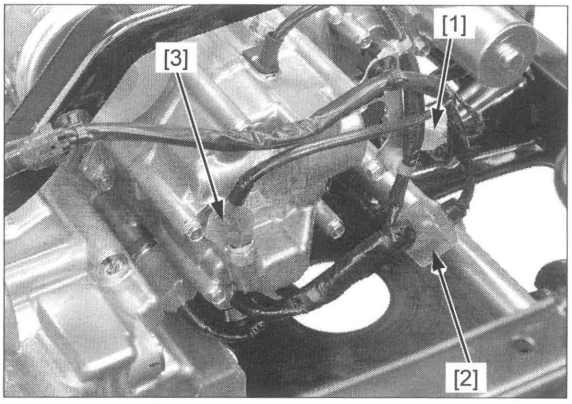
M5P/M5D: Remove the rear footwell (page 2-12).

M3P/M3D: Remove the rear mud guard (page 2-14).

Drain the engine oil (page 3-13).

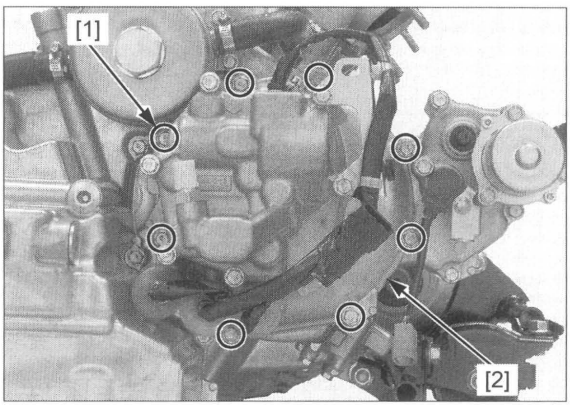
Disconnect the following:

- spindle angle sensor 3P connector [1] ('22 models, After '22 models (III, IV, IX type only))
- linear/shift solenoid wire harness 12P connector [2]
- EOT sensor 2P connector [3]



Remove the bolts [1].

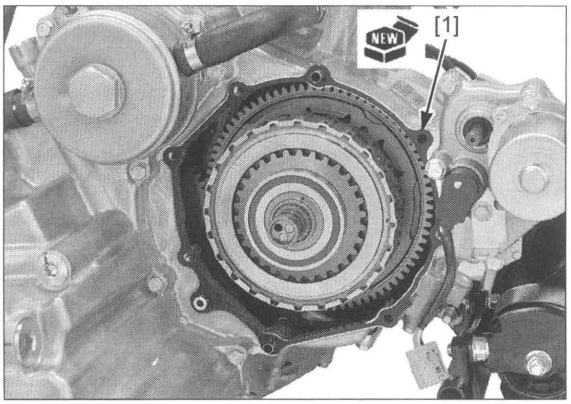
Remove the clutch cover assembly [2].



Remove the gasket [1].

NOTE:

- Always replace the gasket with a new one.



Remove the oil joint [1] and O-rings [2].

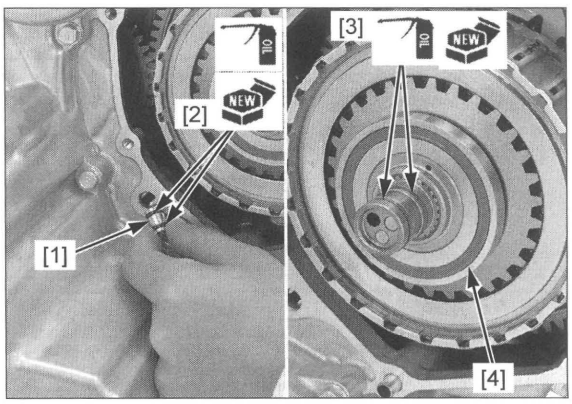
Remove the seal rings [3].

Remove the bearing [4].
Inspect the bearing and replace it if necessary.

Installation is in the reverse order of removal.

NOTE:

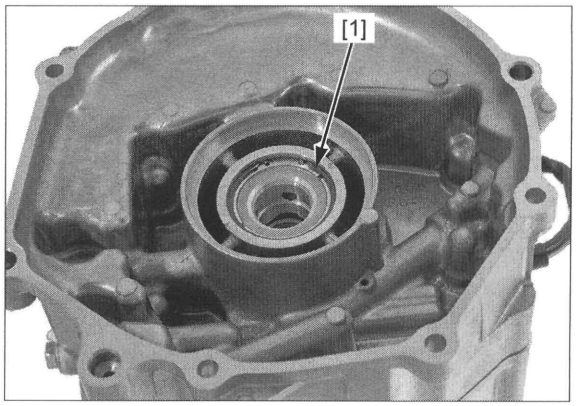
- Apply engine oil to new O-rings.
- Apply engine oil to new seal rings.
- Push in the seal rings to seat them into the grooves.



OIL GUIDE COLLAR REMOVAL/INSTALLATION

Remove the clutch cover (page 11-50).

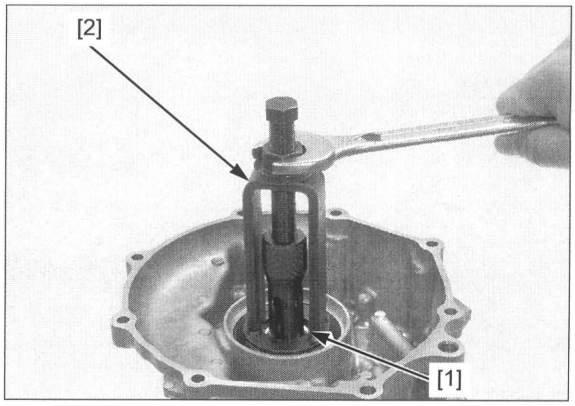
Remove the snap ring [1].



Remove the oil guide collar [1] with the special tool.

TOOL:

Bearing remover, 20 mm [2]	**07931-MA70000 (not available in U.S.A.)**
Bearing remover, 20 mm	**(U.S.A.: 07936-3710600)**
Remover handle	**(U.S.A.: 07936-3710100)**
Remover weight	**(U.S.A.: 07936-371020A)**



Remove the O-rings from the oil guide collar.

Coat new O-rings [1] with engine oil and install them into the grooves in the oil guide collar [2].

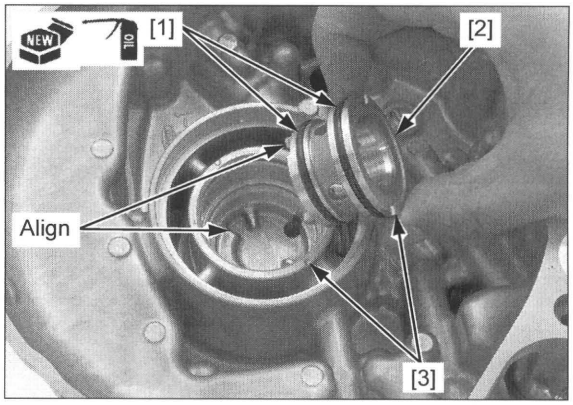
Install the oil guide collar into the clutch cover by aligning the bosses with the grooves until it is seated.

NOTE:

- The index notches [3] on the guide and cover align after installing.

Install the snap ring into the groove in the cover securely.

Install the clutch cover (page 11-50).



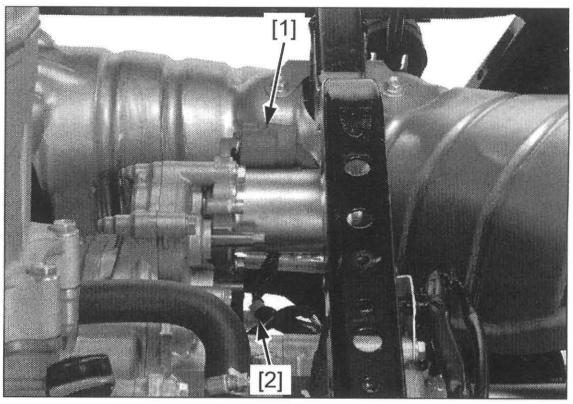
SHIFT CONTROL MOTOR/REDUCTION GEARS

REMOVAL

M5P/M5D: Remove the heat shield protector (page 2-13).

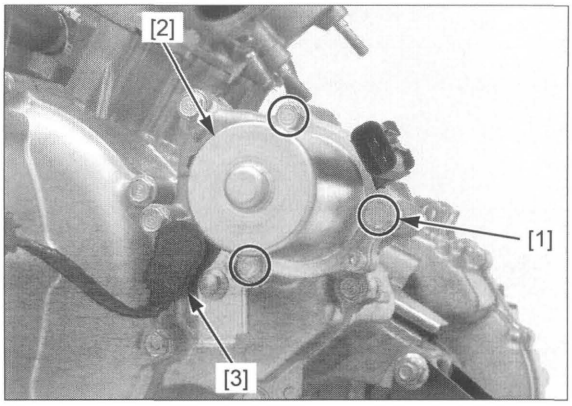
Disconnect the shift control motor 2P connector [1].

Remove the wire clip [2].

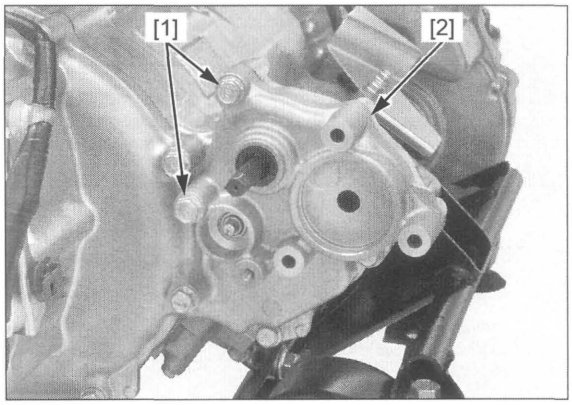


Remove the bolts [1] and shift control motor [2].

Remove the shift spindle angle sensor [3] from the reduction gear cover (page 11-58).

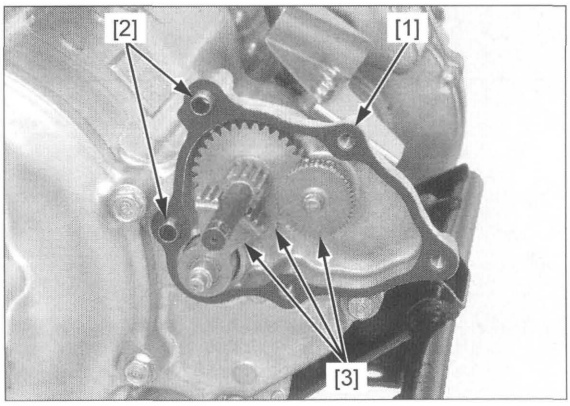


Remove the bolts [1] and reduction gear cover [2].

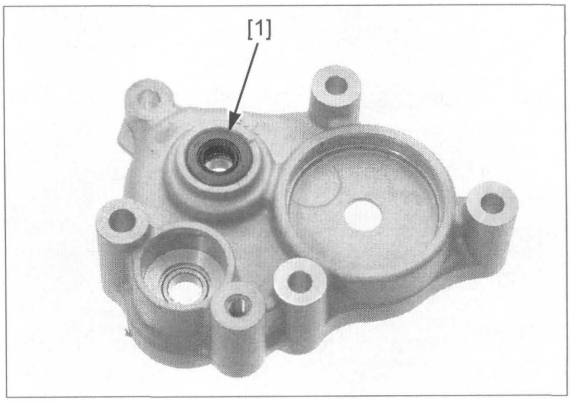


Remove the gasket [1] and dowel pins [2].

Remove the reduction gears [3].



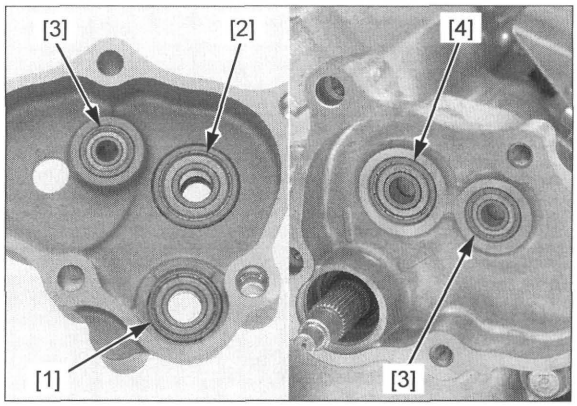
Remove the oil seal [1].



INSTALLATION

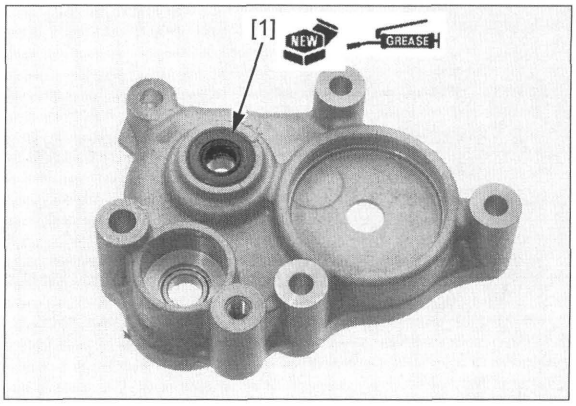
Check the bearings and replace if necessary.

- radial ball bearing (699ZZ) [1]
- radial ball bearing (609ZZ) [2]
- radial ball bearings (696ZZ) [3]
- radial ball bearing (607ZZ) [4]



Install a new oil seal [1] until it is fully seated.

Apply grease to the oil seal lip.



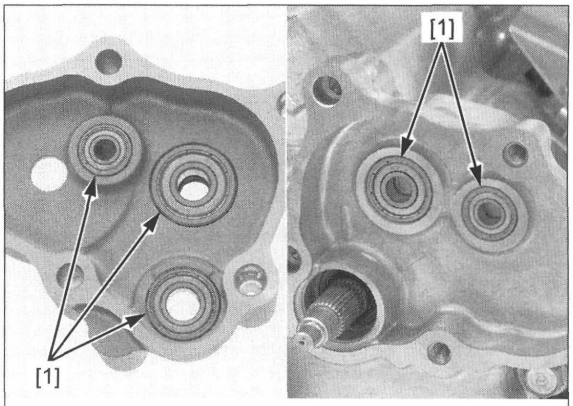
Apply 2 – 4 g (0.07 – 0.14 oz) of specified grease to the bearing journals [1] and reduction gear teeth.

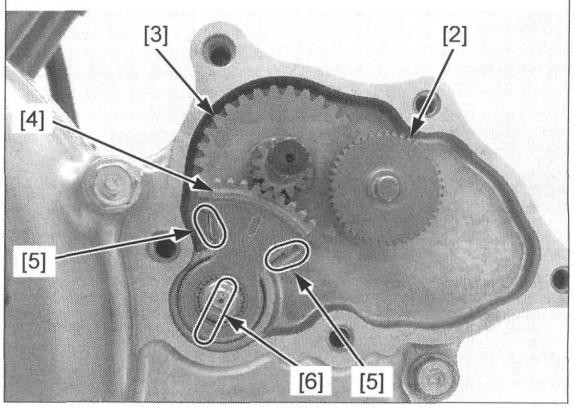
SPECIFIED GREASE:
UNIREX N3 manufactured by ExxonMobil or equivalent

Install reduction gears A [2] and B [3].

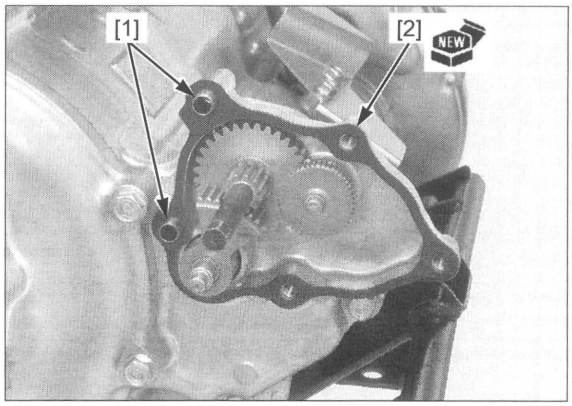
Install gear C [4] onto the shift spindle by aligning the wide groove with the wide tooth.

Make sure that the gear ends align with the lugs [5] on the rear cover spacer and the punch marks [6] on the gear and spindle line up.

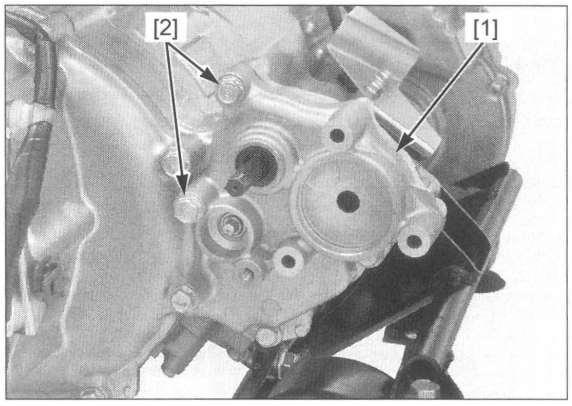




Install the dowel pins [1] and a new gasket [2].

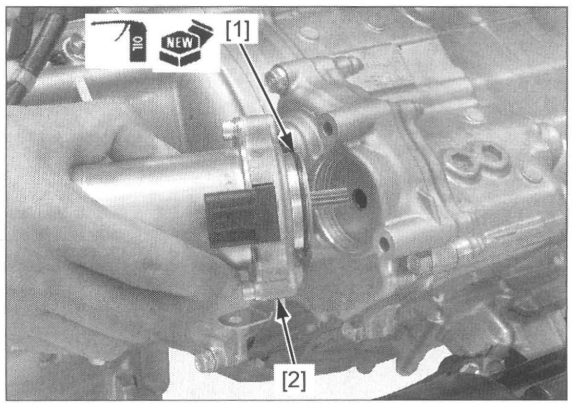


Install the reduction gear cover [1] and two bolts [2].



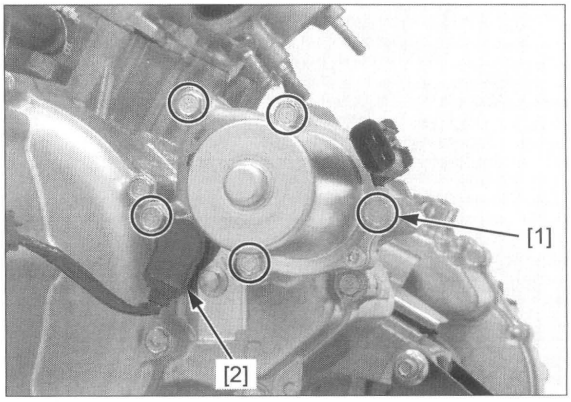
Coat a new O-ring [1] with engine oil and install it into the groove in the shift control motor [2].

Install the control motor with the three bolts.



Tighten the bolts [1] securely.

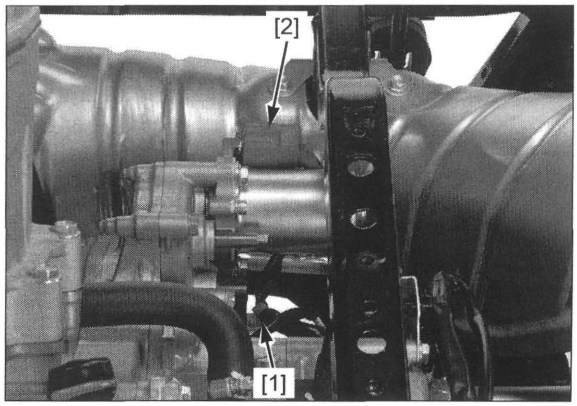
Install the shift spindle angle sensor [2] onto the reduction gear cover (page 11-58).



Install the wire clip [1].

Connect the shift control motor 2P connector [2].

M5P/M5D: Install the heat shield protector (page 2-13).

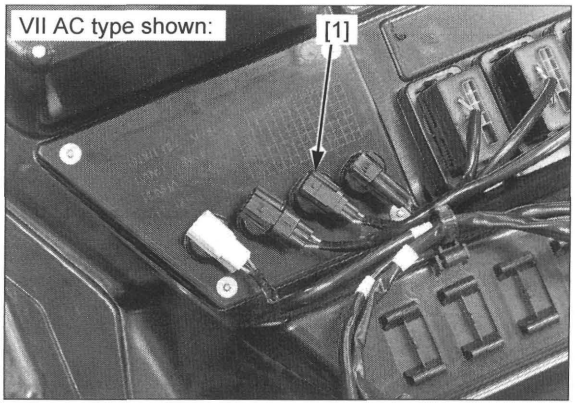


DRIVE MODE CHANGE SWITCH

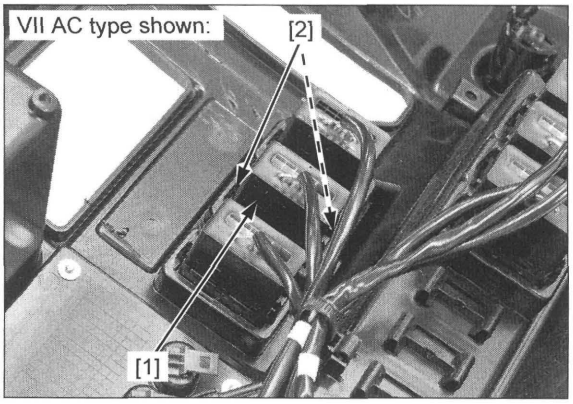
REMOVAL/INSTALLATION

Remove the instrument panel (page 2-28).

Release the drive mode change switch connector (4P or 6P) [1] from the instrument panel.



Remove the drive mode change switch [1] from the instrument panel by releasing the stopper tabs [2].



SYSTEM INSPECTION

If the engine can be started but AT/MT or SPORT mode cannot be changed, perform this troubleshooting.

NOTE:

- Before starting the inspection, check for loose or poor contact on the drive mode change switch connector (4P or 6P) and PCM 33P connectors, and recheck the drive mode change switch operation.
- If the PCM is replaced, perform the Clutch Initialize Learning Procedure (page 11-72).

1. Drive Mode Change Switch Inspection

Remove the front hood (page 2-17).
Turn the ignition switch OFF (O).
A, AC, CM, III A, III AC type:
Disconnect the drive mode change switch 4P connector [1].
Check for continuity at the switch side 4P connector in each switch position.

IV A, IV AC, VI A, VI AC, VI CM, VII A, VII AC, VII CM, IX A, IX AC type:
Disconnect the drive mode change switch 6P connector [1].
Check for continuity at the switch side 6P connector in each switch position.

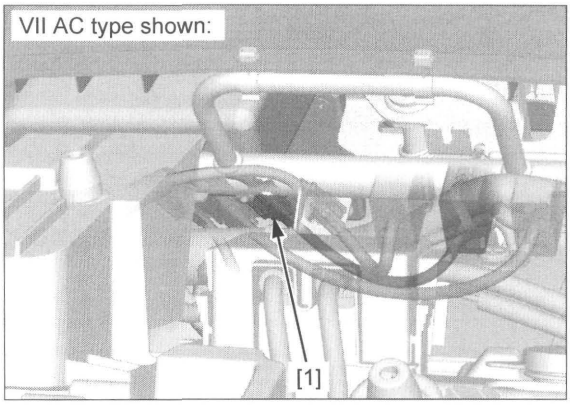
Refer to the wiring diagram for the terminals and switch status (page 26-2).

Is the switch normal?

YES – GO TO STEP 2.

NO – Faulty drive mode change switch

VII AC type shown:



2. Ground Line Open Circuit Inspection

A, AC, CM, III A, III AC type:
Check for continuity between the wire harness side 4P connector [1] and ground.

IV A, IV AC, VI A, VI AC, VI CM, VII A, VII AC, VII CM, IX A, IX AC type:
Check for continuity between the wire harness side 6P connector [2] and ground.

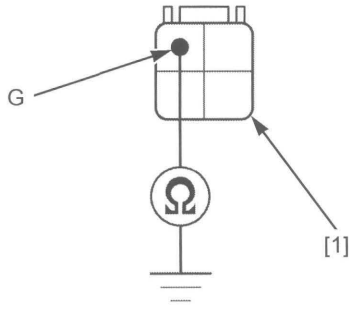
Connection: Green – Ground

Is there continuity?

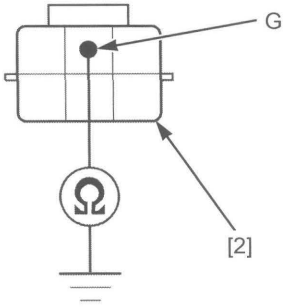
YES – GO TO STEP 3.

NO – Open circuit in the Green wire

A, AC, CM, III A, III AC type:



IV A, IV AC, VI A, VI AC, VI CM, VII A, VII AC, VII CM, IX A, IX AC type:



3. **Signal Line Open Circuit Inspection**

Disconnect the PCM 33P (Black) connector (page 4-35).

A, AC, CM, III A, III AC type:
Check for continuity between the wire harness side 4P connector [1] and 33P (Black) connector [2].

IV A, IV AC, VI A, VI AC, VI CM, VII A, VII AC, VII CM, IX A, IX AC type:
Check for continuity between the wire harness side 6P connector [1] and 33P (Black) connector [2].

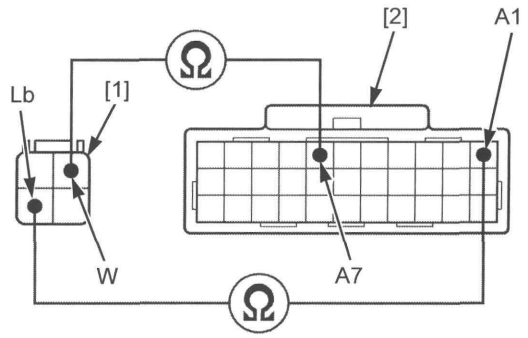
Connection:
SPORT switch side: Light blue – A1
AT/MT switch side: White – A7

Is there continuity?

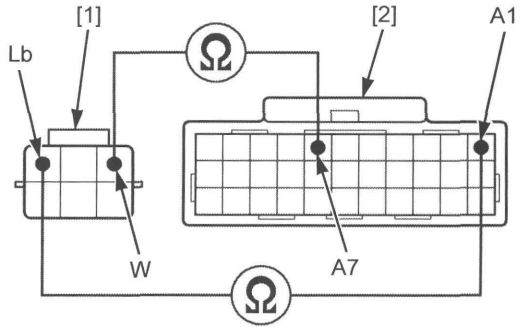
YES – GO TO STEP 4.

NO – • Open circuit in the Light blue wire
• Open circuit in the White wire

A, AC, CM, III A, III AC type:



IV A, IV AC, VI A, VI AC, VI CM, VII A, VII AC, VII CM, IX A, IX AC type:



4. **Signal Line Short Circuit Inspection**

A, AC, CM, III A, III AC type:
Check for continuity between the wire harness side 4P connector [1] and ground.

IV A, IV AC, VI A, VI AC, VI CM, VII A, VII AC, VII CM, IX A, IX AC type:
Check for continuity between the wire harness side 6P connector [1] and ground.

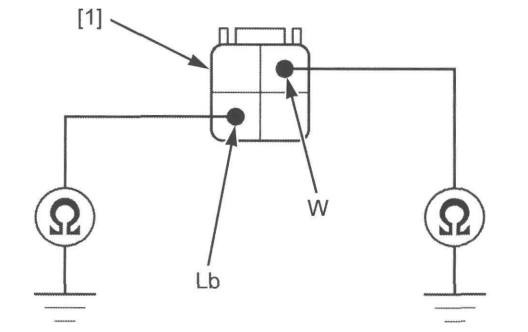
Connection:
SPORT switch side: Light blue – Ground
AT/MT switch side: White – Ground

Is there continuity?

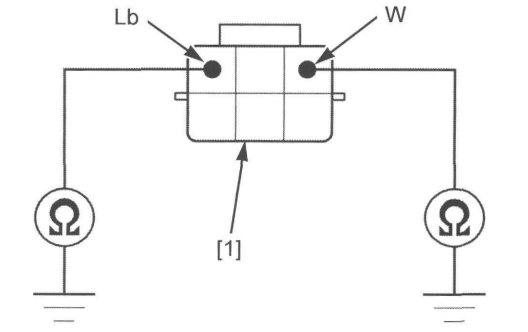
YES – • Short circuit in the Light blue wire
• Short circuit in the White wire

NO – Replace the PCM with a known good one (page 4-35) and recheck.

A, AC, CM, III A, III AC type:



IV A, IV AC, VI A, VI AC, VI CM, VII A, VII AC, VII CM, IX A, IX AC type:



SHIFT SPINDLE ANGLE SENSOR

REMOVAL/INSTALLATION

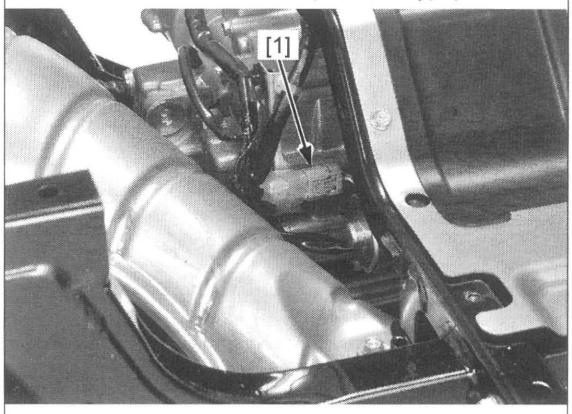
M5P/M5D: Remove the rear footwell (page 2-12).

M3P/M3D: Remove the rear mud guard (page 2-14).

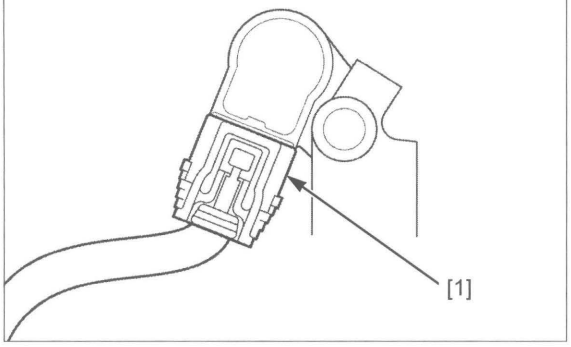
'22 models, After '22 models (III, IV, IX type):
Remove the spindle angle sensor 3P connector [1] from the stay and disconnect it.

After '22 models (Except III, IV, IX type):
Disconnect the spindle angle sensor 3P connector [1].

'22 models, After '22 models (III, IV, IX type)



After '22 models (Except III, IV, IX type)



Remove the bolt [1], stay [2] and shift spindle angle sensor [3] from the reduction gear cover.

Remove the O-ring [4] from the shift spindle angle sensor.

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

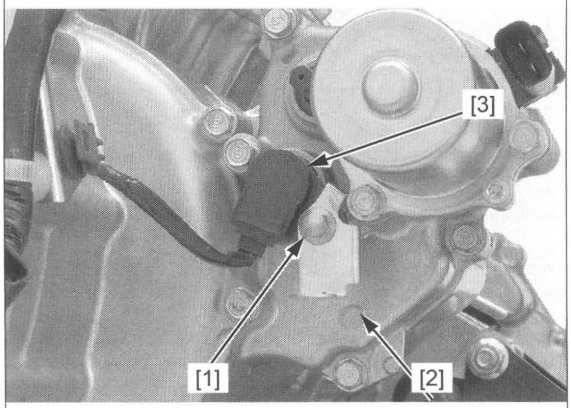
Install the sensor by aligning the flat surfaces of the sensor hole and gearshift spindle end.

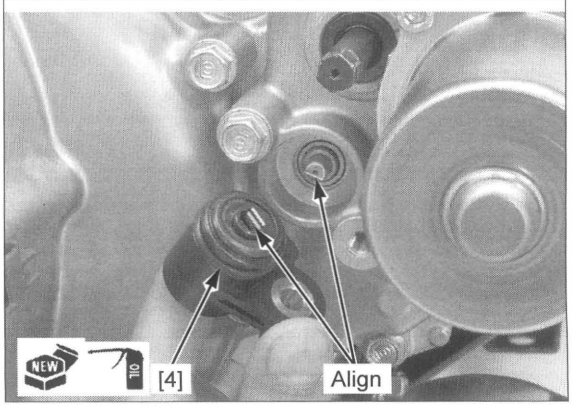
Install the stay and bolt, and tighten the bolt.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Install the removed parts in the reverse order of removal.

'22 models, After '22 models (III, IV, IX type) shown:





TR SENSOR

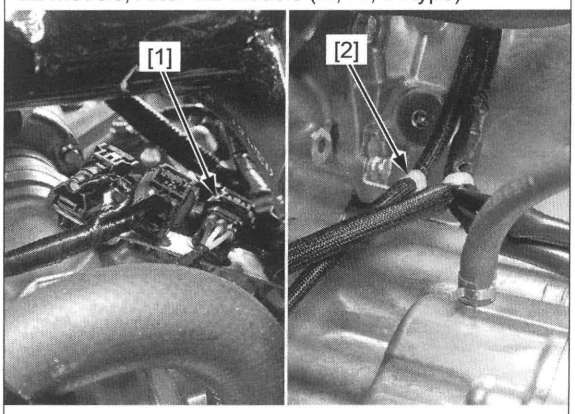
REMOVAL/INSTALLATION

Remove the seat under center lid (page 2-5).

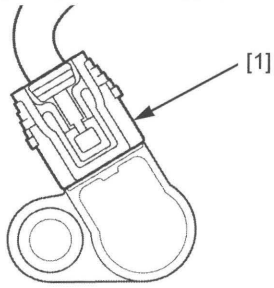
Disconnect the TR sensor 3P connector [1].

'22 models, After '22 models (III, IV, IX type):
Release the wire clip [2].

'22 models, After '22 models (III, IV, IX type)



After '22 models (Except III, IV, IX type)



Remove the bolt [1] and TR sensor [2] from the upper crankcase.

Remove the O-ring [3] from the TR sensor.

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

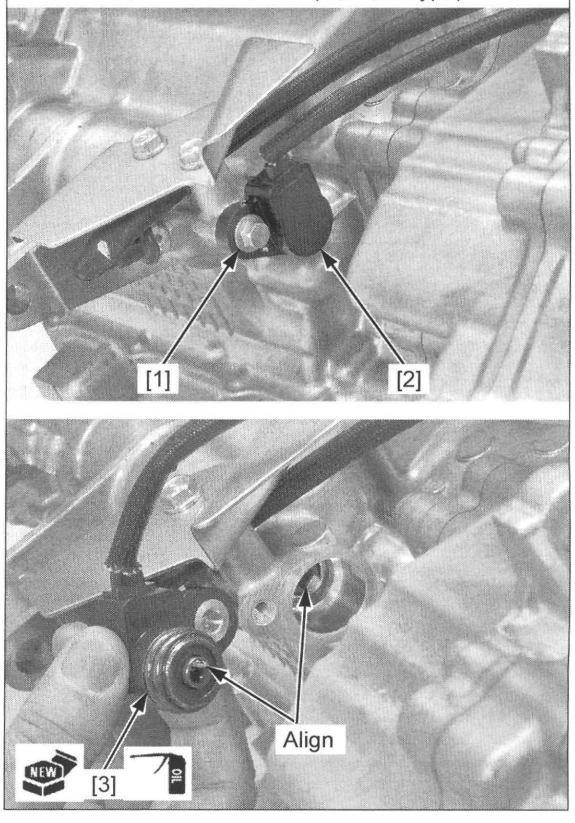
Install the sensor by aligning the flat surfaces of the sensor hole and shift drum end.

Install the bolt and tighten it.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Install the removed parts in the reverse order of removal.

'22 models, After '22 models (III, IV, IX type) shown:



CLUTCH EOP SENSOR

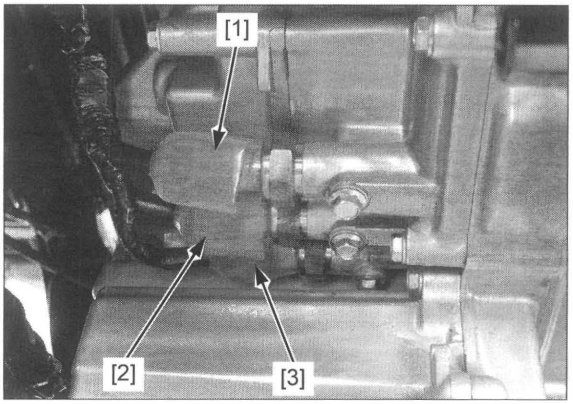
REMOVAL/INSTALLATION

Remove the skid plates (page 2-36).

Drain the engine oil (page 3-13).

Disconnect the following:

- No.1 clutch EOP sensor 3P (Green) connector [1]
- No.2 clutch EOP sensor 3P (Black) connector [2]
- clutch line EOP sensor 3P (Green) connector [3]



Remove the clutch EOP sensors [1] and O-rings [2] from the clutch cover.

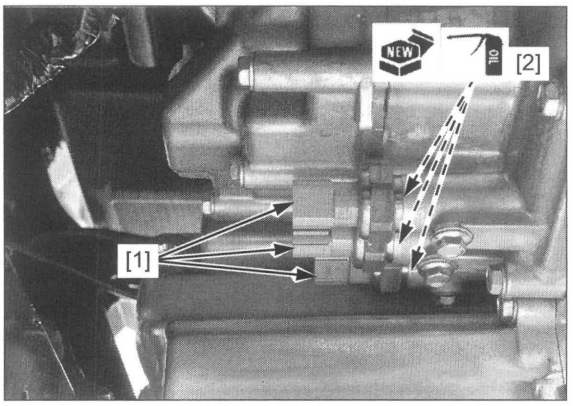
NOTE:

- These three clutch EOP sensors are the same parts.

Apply engine oil to new O-rings and install them into the clutch cover.

Install the clutch EOP sensors and tighten them.

TORQUE: 20 N·m (2.0 kgf·m, 14 lbf·ft)



Connect the 3P connectors properly.

Fill the engine with the recommended engine oil (page 3-13) and check that there are no oil leaks.

Install the skid plates (page 2-36).

EOT SENSOR

REMOVAL/INSTALLATION

M5P/M5D: Remove the rear footwell (page 2-12).

M3P/M3D: Remove the rear mud guard lid (page 2-14).

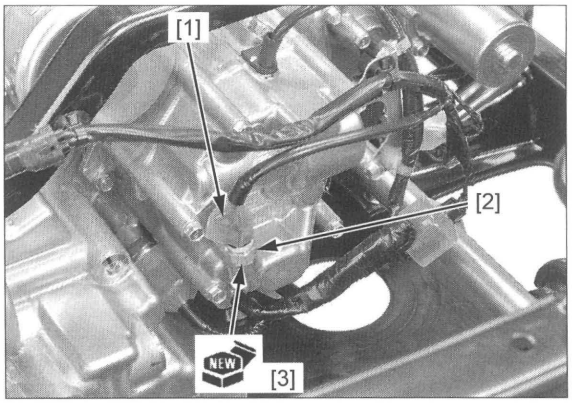
Drain the engine oil (page 3-13).

Disconnect the 2P connector [1].

Remove the EOT sensor [2] and sealing washer [3].

Install the EOT sensor with a new sealing washer and tighten it.

TORQUE: 15 N·m (1.5 kgf·m, 11 lbf·ft)



Connect the 2P connector.

Fill the recommended engine oil (page 3-13).

M5P/M5D: Install the rear footwell (page 2-12).

M3P/M3D: Install the rear mud guard lid (page 2-14).

FRONT VS SENSOR

REMOVAL/INSTALLATION

Disconnect the 3P connector [1] with the connector cover [2].

Remove the bolt [3] and front VS sensor [4].

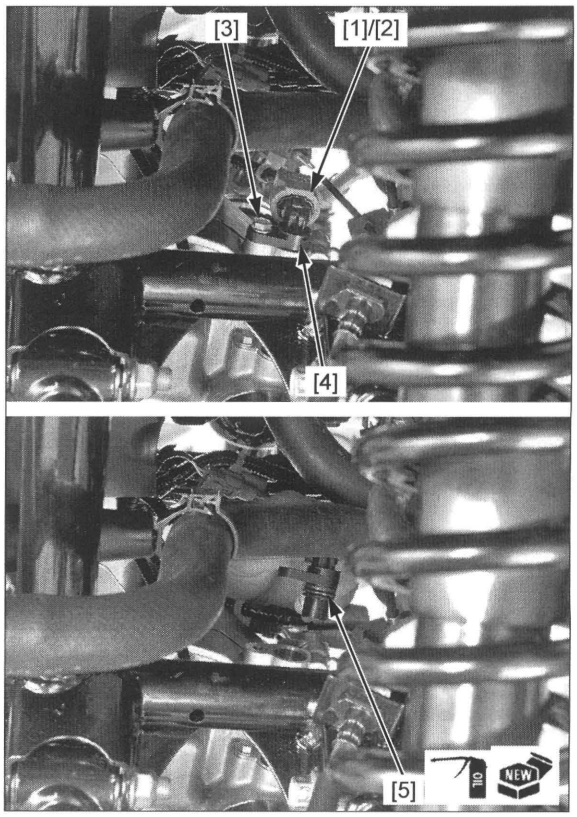
Remove the O-ring [5] from the sensor.

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

Install the VS sensor and bolt, and tighten the bolt.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

Install the removed parts in the reverse order of removal.



REAR VS SENSOR

REMOVAL/INSTALLATION

Remove the front seat cushion (page 2-4).

Disconnect the 3P connector [1].

Remove the bolt [2] and rear VS sensor [3].

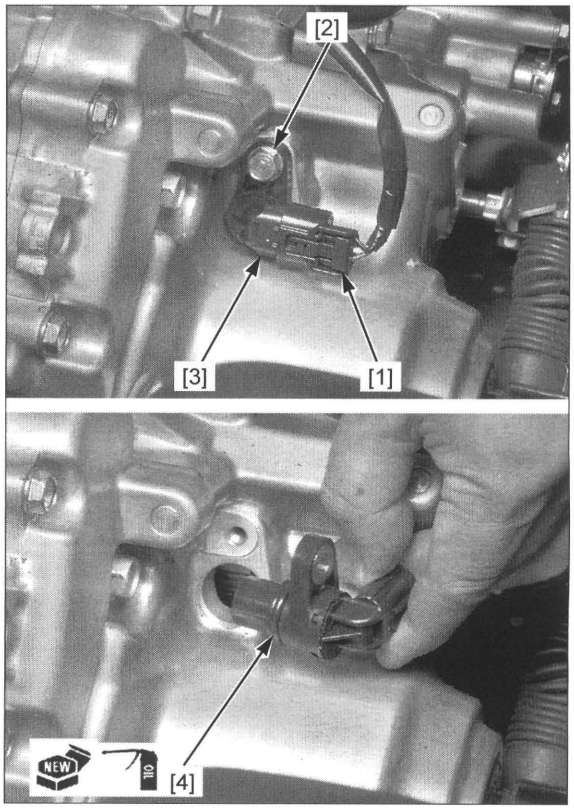
Remove the O-ring [4] from the sensor.

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

Install the rear VS sensor and bolt, and tighten the bolt.

Connect the 3P connector.

Install the front seat cushion (page 2-4).



SUB-TRANSMISSION POSITION SWITCH

SYSTEM INSPECTION

Turn the ignition switch OFF (O) and disconnect the PCM 33P (Black) connector (page 4-35).

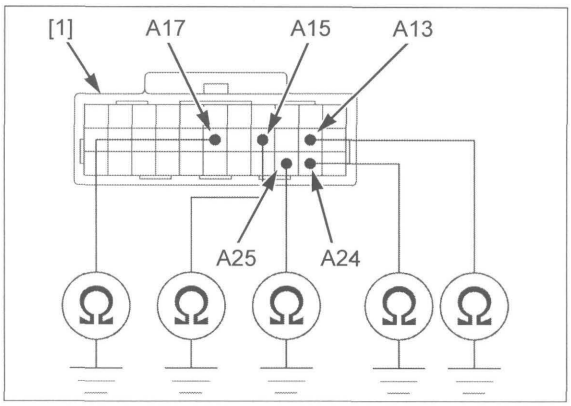
Check for continuity between wire harness side 33P (Black) connector [1] and ground.

There should be continuity only at the terminal that corresponds to the sub-transmission position (open circuit inspection).

There should be no continuity at the other terminals (short circuit inspection).

You must test at five terminals in each sub-transmission position.

TOOL:
Test probe, 2 packs 07ZAJ-RDJA110



Sub-transmission position	Connector terminal
P (parking)	A13
R (Reverse)	A25
N (Neutral)	A17
H (High)	A15
L (Low)	A24

REMOVAL/INSTALLATION

Move the shift select lever to "N" (neutral).

Remove the seat under center lid (page 2-5).

Disconnect the following:

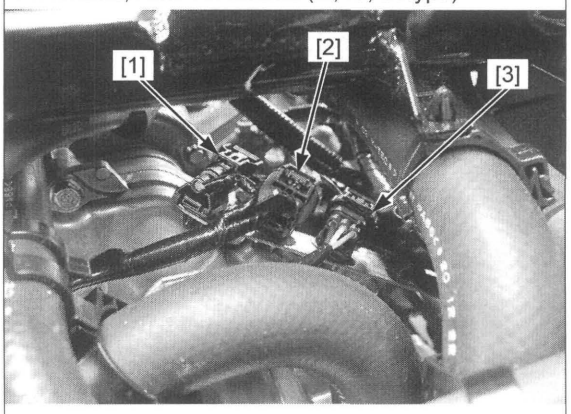
'22 models, After '22 models (III, IV, IX type):

- neutral switch 1P connector [1]
- sub-transmission position switch 8P connector [2]
- TR sensor 3P connector [3]

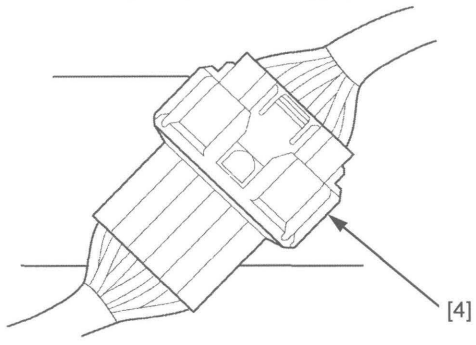
After '22 models (Except III, IV, IX type):

- sub-transmission position switch 12P connector [4]

'22 models, After '22 models (III, IV, IX type)

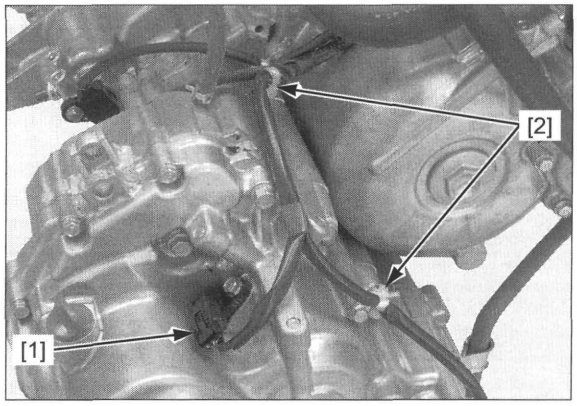


After '22 models (Except III, IV, IX type)



Disconnect the rear VS sensor 3P connector [1].

Remove the wire clips [2].



Remove the bolts [1] and sub-transmission position switch [2].

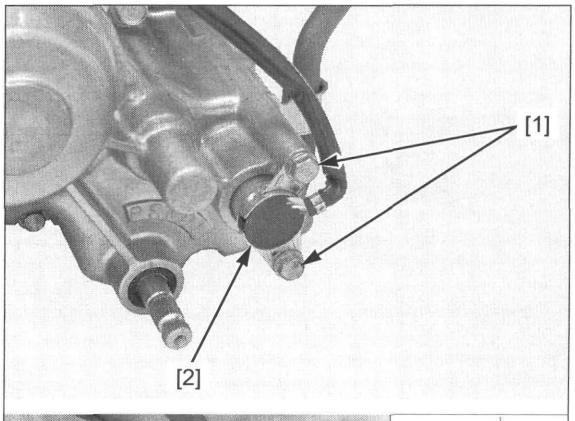
Remove the O-ring [3] from the switch.

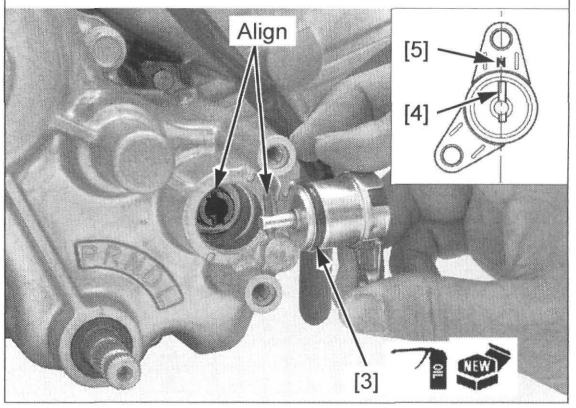
Coat a new O-ring with engine oil and install it into the switch groove.

Align the long end [4] of the switch pin with the "N" mark [5].

Install the switch by aligning the pin with the slot in the drum shaft.

Install the removed parts in the reverse order of removal.





SWITCH INSPECTION

'22 models, After '22 models (III, IV, IX type):
Disconnect the sub-transmission position switch 8P connector (page 11-62). Check for continuity between switch side 8P connector [1] and ground.

After '22 models (Except III, IV, IX type)
Disconnect the sub-transmission position switch 12P connector (page 11-62). Check for continuity between switch side 12P connector [1] and ground.

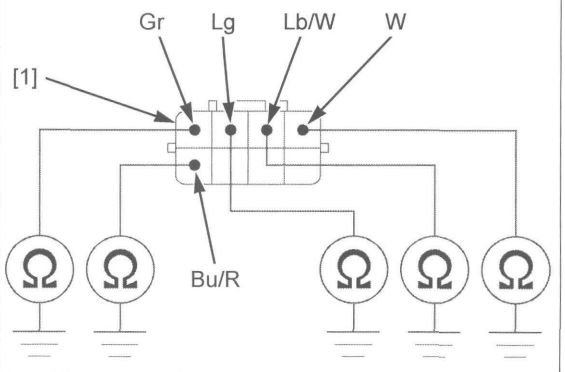
There should be continuity only at the terminal that corresponds to the sub-transmission position (open circuit inspection).

There should be no continuity at the other terminals (short circuit inspection).

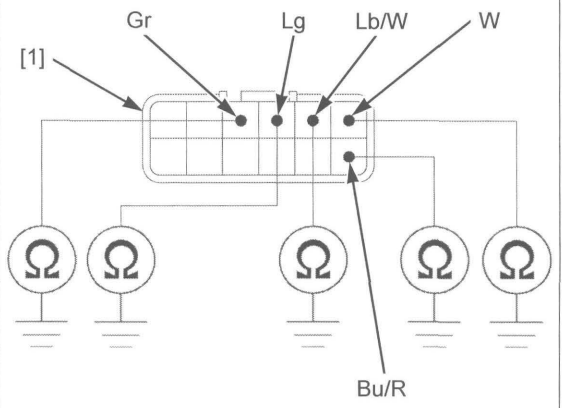
You must test at five terminals in each sub-transmission position.

Sub-transmission position	Connector terminal
P (parking)	Blue/red
R (Reverse)	Gray
N (Neutral)	Light green
H (High)	Light blue/white
L (Low)	White

'22 models, After '22 models (III, IV, IX type)



After '22 models (Except III, IV, IX type)

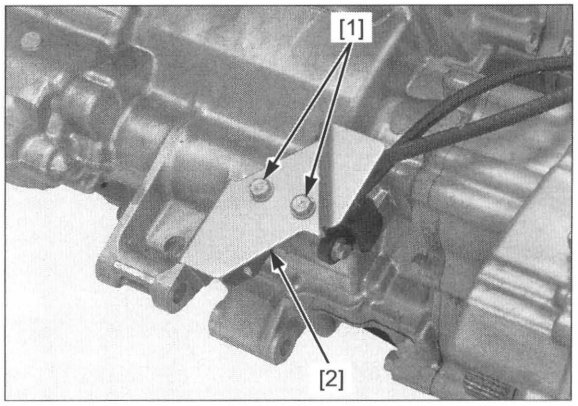


NEUTRAL SWITCH

REMOVAL/INSTALLATION

Remove the front seat cushion (page 2-4).

Remove the two bolts [1] and angle sensor cover [2].



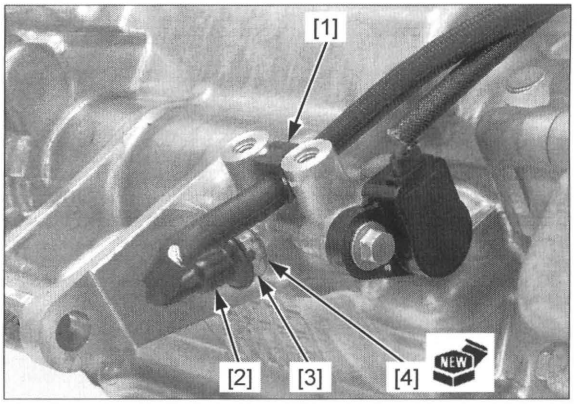
Remove the following:

- grommet [1]
- connector [2]
- neutral switch [3]
- sealing washer [4]

Install the neutral switch with a new sealing washer and tighten it.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Install the removed parts in the reverse order of removal.



PRIMARY DRIVE GEAR

REMOVAL

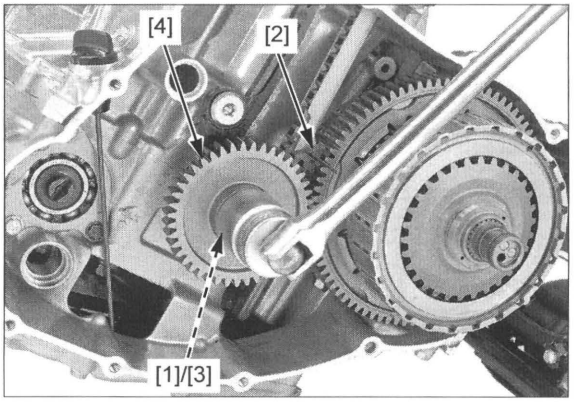
Remove the rear cover spacer (page 8-7).

Install the special tool between the primary drive and driven gears, and loosen the primary drive gear nut (left-hand thread) [1].

TOOL:

Gear holder, 2.5 [3]	**07724-0010100**
	(U.S.A.: 07724-001A100)

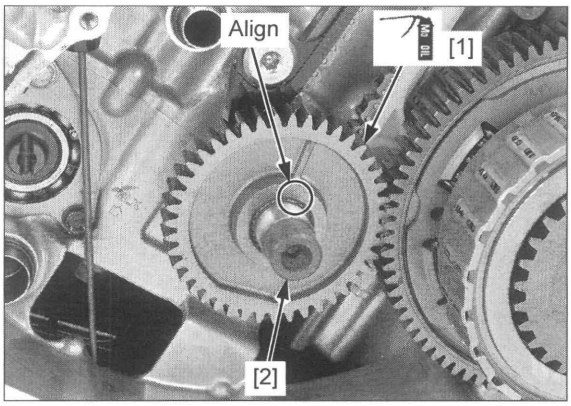
Remove the nut, washer [3], and primary drive gear [4].



INSTALLATION

Apply molybdenum oil solution to the primary drive gear sliding surface.

Install the primary drive gear [1] onto the crankshaft [2] by aligning the wide grooves with the wide tooth.



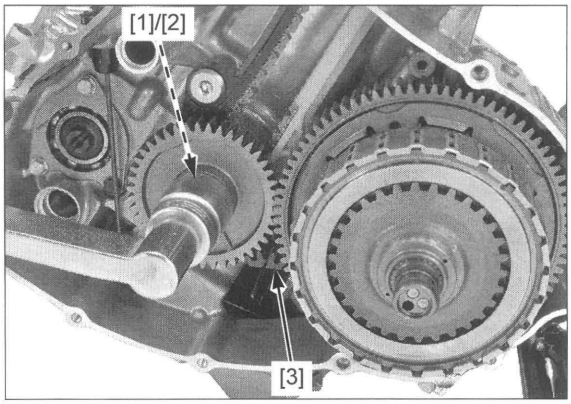
Apply engine oil to the primary drive gear nut threads and seating surface.
Install the primary drive gear nut [1] and washer [2].

Install the special tool between the primary drive and driven gears, and tighten the nut (left-hand thread).

TOOL:
Gear holder, 2.5 [3] 07724-0010100
(U.S.A.: 07724-001A100)

TORQUE: 128 N·m (13.1 kgf·m, 94 lbf·ft)

Install the rear cover spacer (page 8-7).

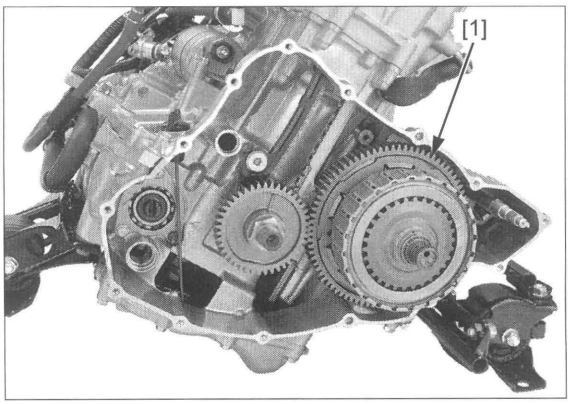


DUAL CLUTCH/PRIMARY DRIVEN GEAR

REMOVAL/INSTALLATION

Remove the rear cover spacer (page 8-7).

Remove the dual clutch/primary driven gear [1].



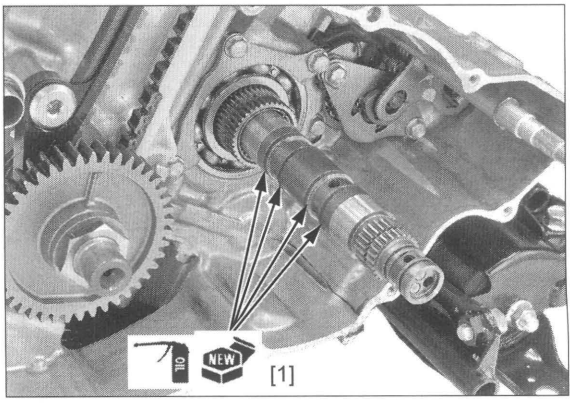
Remove the seal rings [1].

Apply engine oil to new seal rings and install them into the mainshaft grooves.

Push in the seal rings to seat them into the grooves.

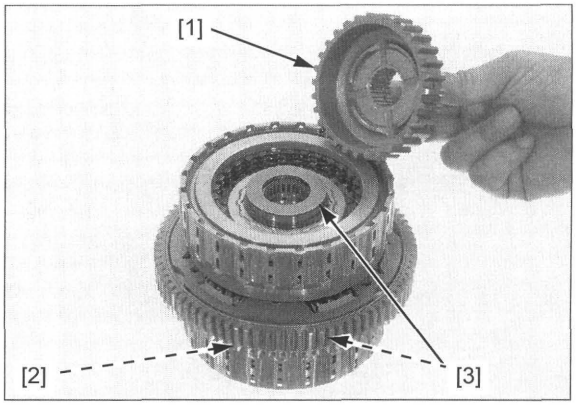
Install the dual clutch/primary driven gear.

Install the rear cover spacer (page 8-7).



DISASSEMBLY

Remove clutch guide 1 [1], clutch guide 2 [2], and washers [3] from the clutches.

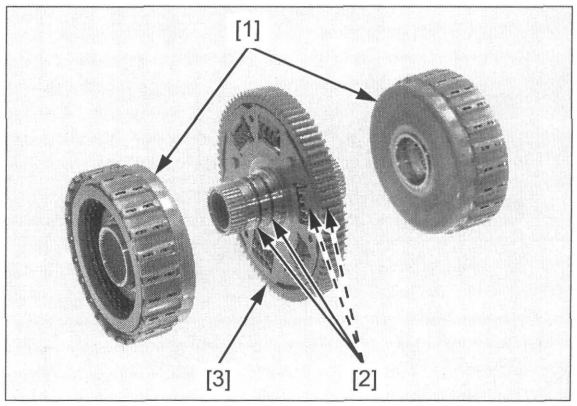


Remove the clutch assemblies [1] and O-rings [2] from the primary driven gear [3].

Check the primary driven gear and replace if necessary.

NOTE:

- The No.1 clutch assembly (for inner mainshaft) and No.2 clutch assembly (for outer mainshaft) are the same parts.

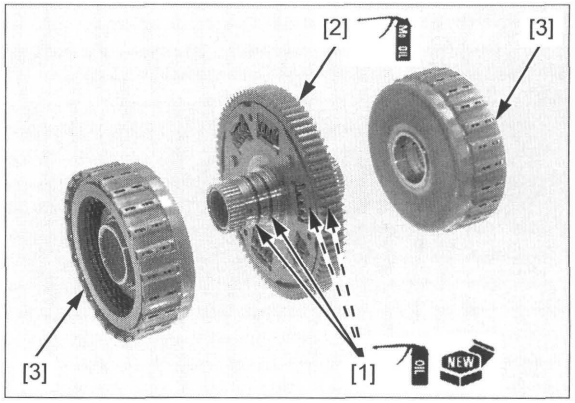


ASSEMBLY

Coat new O-rings [1] with engine oil and install them into the grooves in the primary driven gear [2].

Apply molybdenum oil solution to the primary driven gear teeth and friction springs.

Install the clutch assemblies [3] onto the primary driven gear.



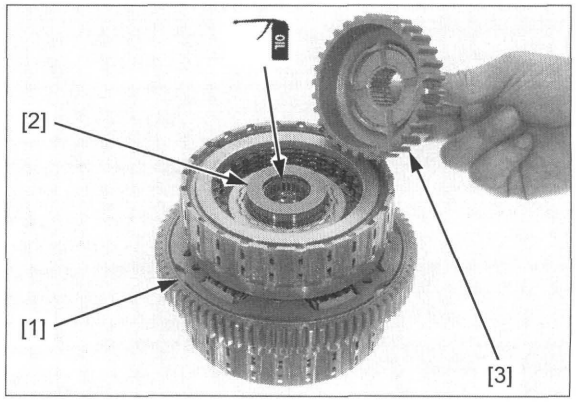
Apply engine oil to the needle bearings in the primary driven gear.

- The primary driven gear has the index line [1] on its flange for the installation direction. The dual clutch assembly should be installed with the index line facing the outside.

Line up the clutch disc tabs.

Install the washer [2] onto the clutch assembly.

Install clutch guide 1 [3] into the clutch on the index line side by aligning the gear teeth with the clutch disc tabs.



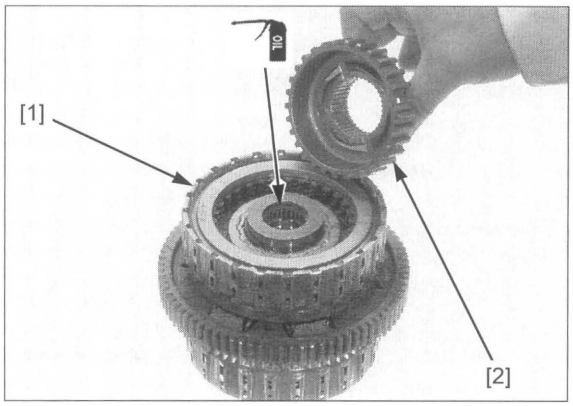
Turn over the dual clutch assembly while holding clutch guide 1.

Apply engine oil to the needle bearings in the primary driven gear.

Line up the clutch disc tabs.

Install the washer [1] onto the clutch assembly.

Install clutch guide 2 [2] into the clutch by aligning the gear teeth with the clutch disc tabs.



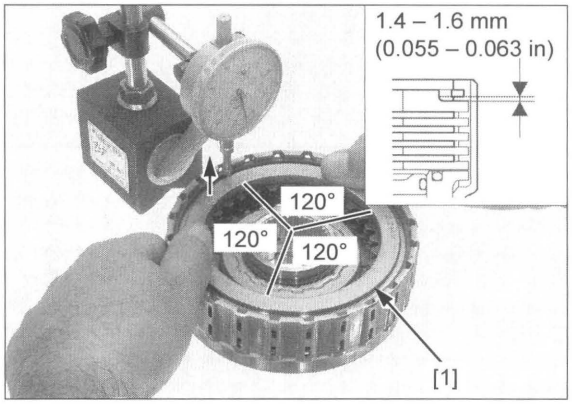
CLUTCH INITIAL CLEARANCE

Set a dial indicator on the end plate [1] with the plate lowered.
Lift the end plate against the snap ring and read the clearance, and record it.

Perform this inspection at the three points in 120° apart.

STANDARD: 1.4 – 1.6 mm (0.055 – 0.063 in)

If the measured valve exceeds the service limit, replace the clutch assembly.

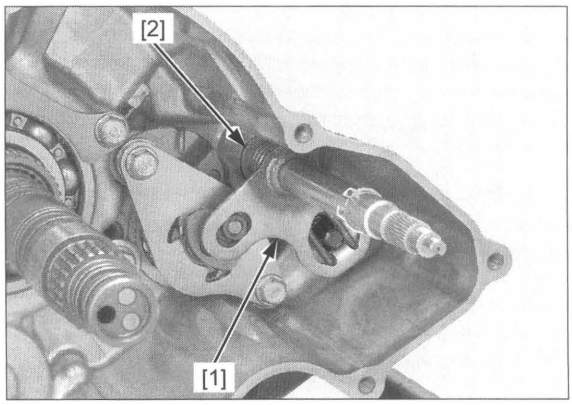


GEARSHIFT LINKAGE

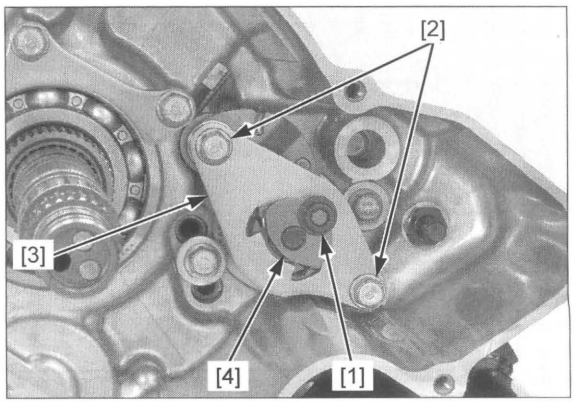
REMOVAL

Remove the following:

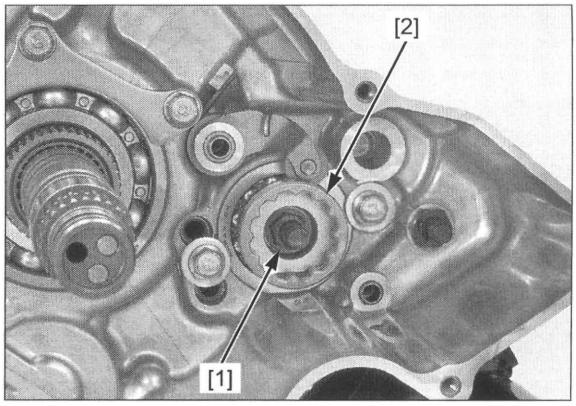
- dual clutch/primary driven gear (page 11-66)
- gearshift spindle assembly [1]
- washer [2]



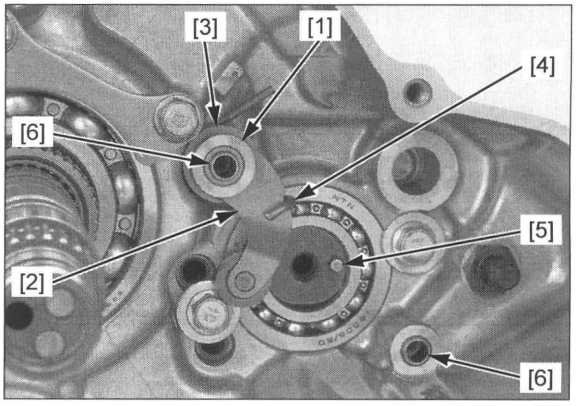
- collar [1]
- bolts [2]
- guide plate [3]/drum shifter assembly [4]



– center bolt [1]
– shift drum center [2]



– side collar [1]
– stopper arm [2]
– stopper arm collar [3]
– return spring [4]
– roller [5]
– dowel pins [6] (if necessary)



INSPECTION

Inspect the following parts for scratches, damage, abnormal wear, or deformation.

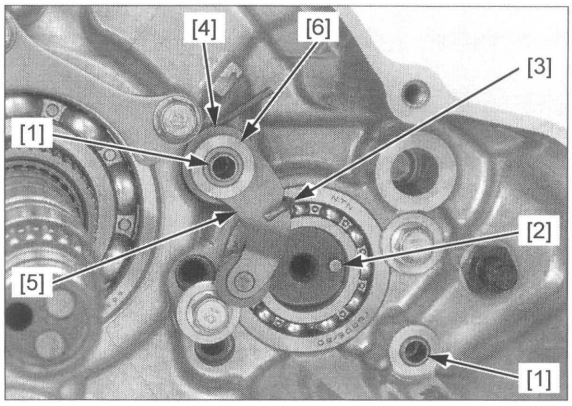
- gearshift spindle, spindle arm, return spring
- guide plate
- drum shifter, ratchet pawls, plungers, plunger springs
- stopper arm

Replace if necessary.

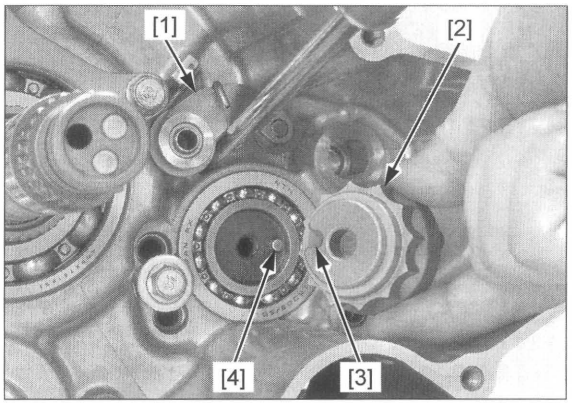
INSTALLATION

Install the following:

- dowel pins [1] (if removed)
- roller [2]
- return spring [3]
- stopper arm collar [4]
- stopper arm [5]
- side collar [6]

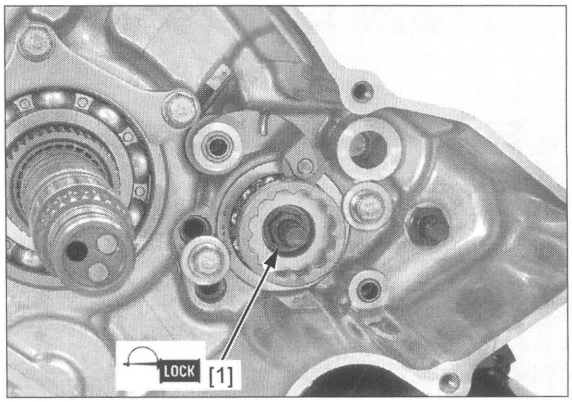


Hold the stopper arm [1] with a screwdriver and install the shift drum center [2] by aligning the groove [3] with the roller [4].

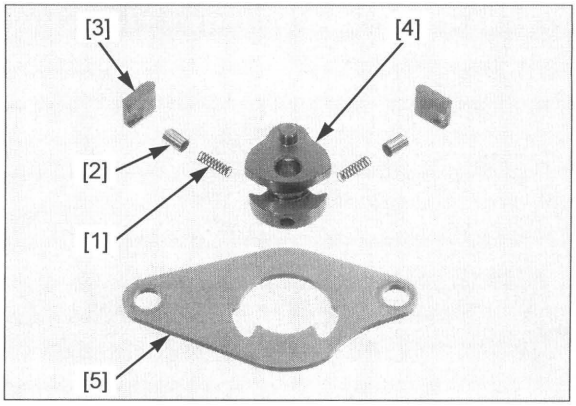


Apply locking agent to the center bolt [1] threads (page 1-22).
Install the bolt and tighten it.

TORQUE: 31 N·m (3.2 kgf·m, 23 lbf·ft)



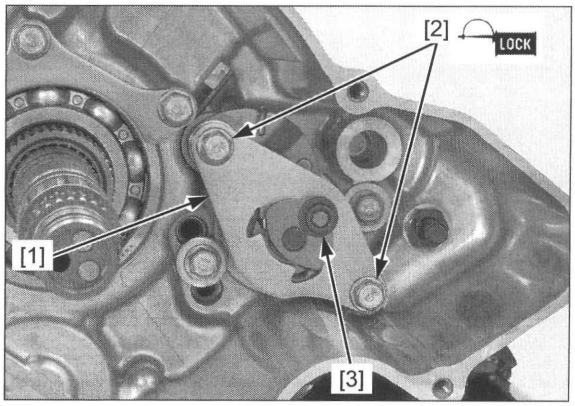
Install the plunger springs [1], plungers [2] and ratchet pawls [3] into the drum shifter [4] and set them in the drum shifter guide plate [5].



Install the drum shifter guide plate/drum shifter assembly [1].

Apply locking agent to the bolt threads [2] (page 1-22). Install the bolts and tighten them.

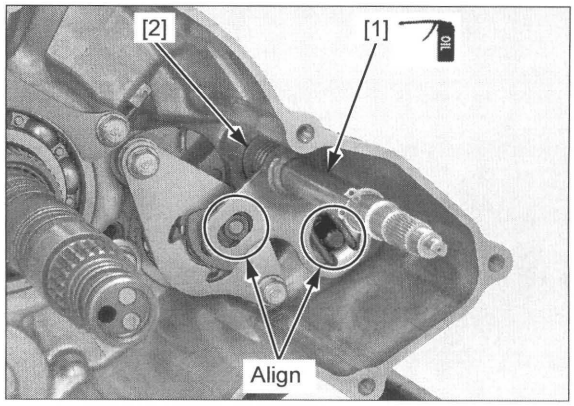
Install the collar [3] onto the drum shifter.



Apply engine oil to the gearshift spindle [1] journal.

Install the washer [2] onto the gearshift spindle and insert the spindle into the crankcase while aligning the return spring ends with the spring pin, and the spindle arm hole with the drum shifter collar.

Install the dual clutch/primary driven gear (page 11-66).



CLUTCH INITIALIZE LEARNING

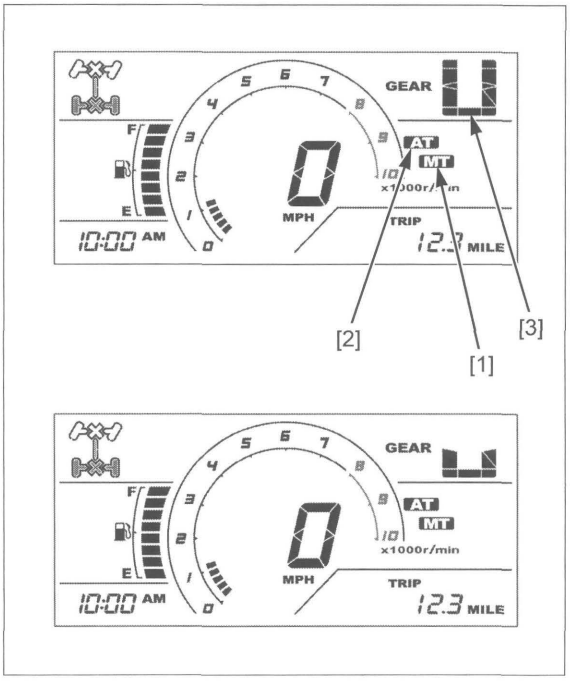
NOTE:

- If the PCM and/or clutch assembly are replaced, perform this procedure.
- Before starting this procedure, check the following:
  - PGM-FI system and DCT system have no DTC.
  - Engine idle speed is normal.
  - Sub-transmission is in "P" (parking) and the cooling fan stops.

1. Warm up the engine to the normal operating temperature (engine oil temperature: 50 – 110°C/ 122 – 230°F) and stop it.

NOTE:

- If the PCM is replaced with a new one, and the ignition switch is turned on, the MT indicator [1] and AT indicator [2] will be displayed to indicate that the clutch initialization learning procedure is necessary.
- If the large "U" (extremely low oil temperature indicator), or small "U" (low oil temperature indicator) is displayed on the gear position indicator [3], the engine must be warmed before proceeding.



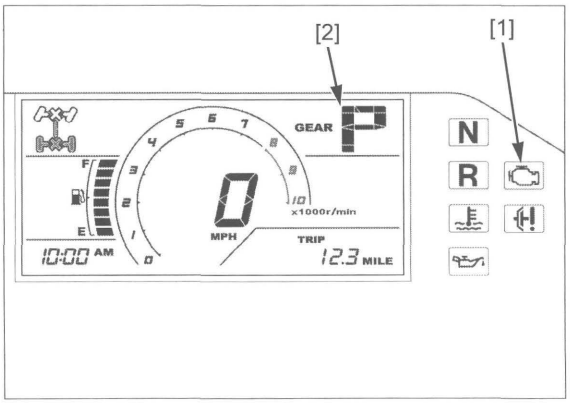
2. Turn the ignition switch ON (I). The MIL [1] will come on.

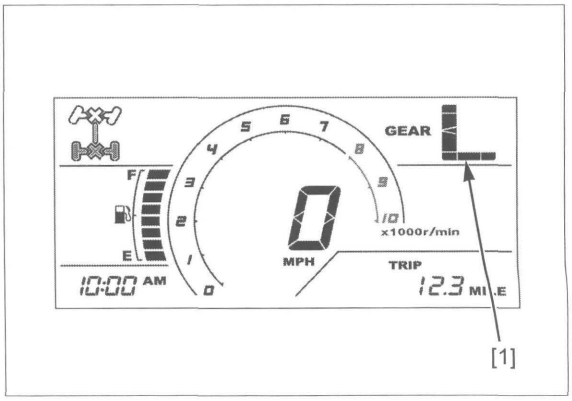
   Wait until the MIL goes off and the gear position indicator [2] displays "P".

NOTE:

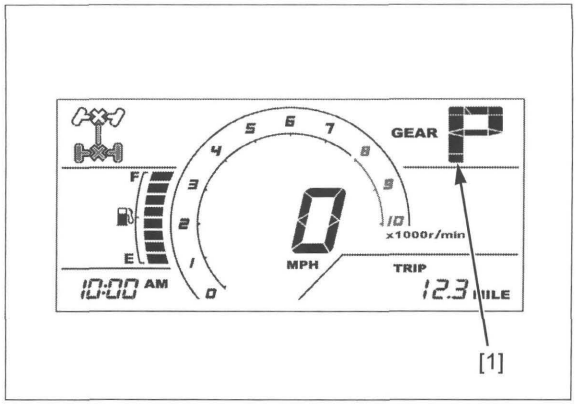
- Do not turn the ignition switch to START (II). If the starter motor is running, the learning procedure will be canceled.

3. Depress the accelerator pedal fully.
4. Release the accelerator pedal.
5. Depress the accelerator pedal fully.
6. Release the accelerator pedal.
7. Depress the accelerator pedal fully and hold it.
8. Move the shift select lever to "L" (low range) position. Check that the gear position indicator [1] displays "L".



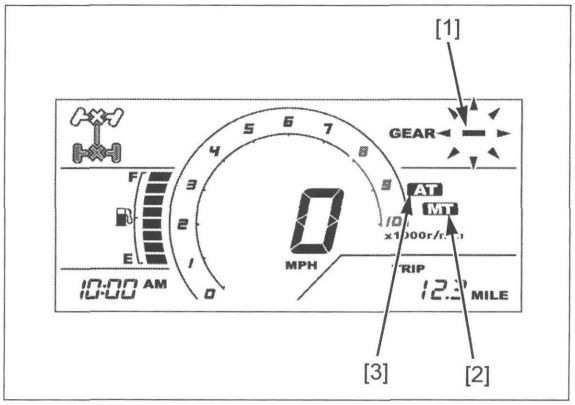


9. Move the shift select lever to "P" (parking) position. Check that the gear position indicator [1] displays "P".
10. Move the shift select lever to the "L" (low range) position. Check that the gear position indicator displays "L".
11. Move the shift select lever to the "P" (parking) position. Check that the gear position indicator displays "P".



12. Release the accelerator pedal. Check that "–" is displayed on the gear position indicator [1] and blinks at 2 second intervals, and the MT indicator [2] and AT indicator [3] are displayed.

NOTE:
- The PCM is ready for the clutch initialize learning when "–" is displayed and starts blinking at 2 second intervals.
- The PCM will not start the clutch initialize learning if the gear position indicator continues to display "P". Perform the initialize learning procedures from step 1 again.



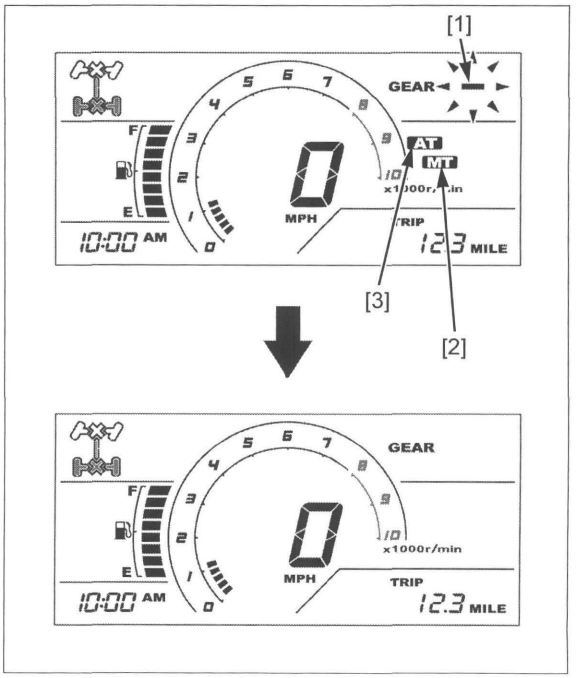
13. Start the engine and let it idle for approximately 60 seconds.

    The clutch initialize learning procedure is successful when "–" is displayed on the gear position indicator [1], and the MT indicator [2] and AT indicator [3] disappear

NOTE:
- If "–" starts blinking at interval of 0.5 second, the clutch initialize learning is unsuccessful. Perform the initialize learning procedure from step 1 again.
- If the large "U" (extremely low oil temperature) or small "U" (low oil temperature) is displayed on the gear position indicator, warm up the engine until the "U" on the gear position indicator goes off. Stop the engine and perform the procedure from step 2 again.

14. Stop the engine.
15. Turn the ignition switch to ON (I). Check that the gear position indicator displays "P" and the MT indicator or AT indicator comes on.

NOTE:
- If both MT indicator and AT indicator are displayed, the clutch initialize learning is not completed.



MEMO

12. SUB-TRANSMISSION

SERVICE INFORMATION 12-2

TROUBLESHOOTING 12-3

COMPONENT LOCATION 12-4

SUB-TRANSMISSION 12-5

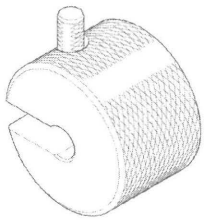
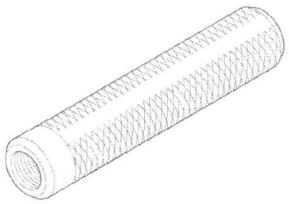
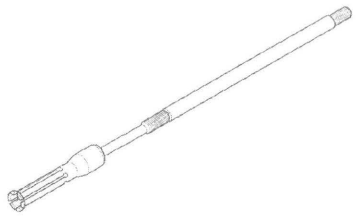
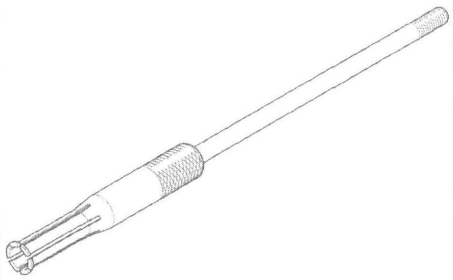
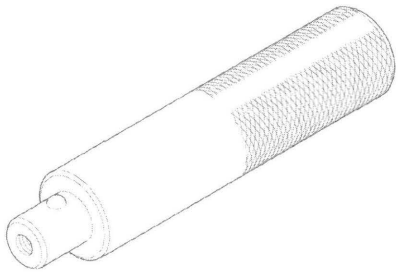
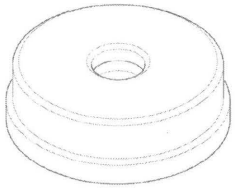
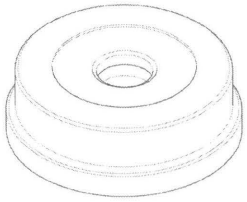
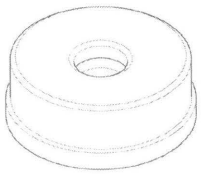
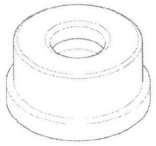
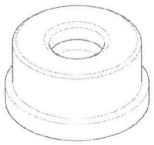
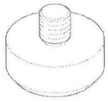
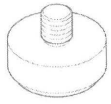
SHIFT SELECT LEVER/CABLE 12-29

SERVICE INFORMATION

GENERAL

- This section covers service of the sub-transmission. These parts can be serviced with the engine installed in the frame.
- Be careful not to damage the crankcase and sub-transmission case mating surfaces when servicing.

TOOLS

Remover weight 07741-0010201  or 07936-371020A (U.S.A. only)	Remover handle 07936-3710100 	Bearing remover shaft set, 17 mm 07936-3710300 
Bearing remover, 22 mm 070MC-MFR0100 	Driver 07749-0010000 	Attachment, 62 x 68 mm 07746-0010500 
Attachment, 62 x 64 mm 07947-6340400 	Attachment, 52 x 55 mm 07746-0010400 	Attachment, 37 x 40 mm 07746-0010200 
Attachment, 32 x 35 mm 07746-0010100 	Pilot, 30 mm 07746-0040700 	Pilot, 28 mm 07746-0041100 

Pilot, 25 mm 07746-0040600	Pilot, 22 mm 07746-0041000	Pilot, 17 mm 07746-0040400
		

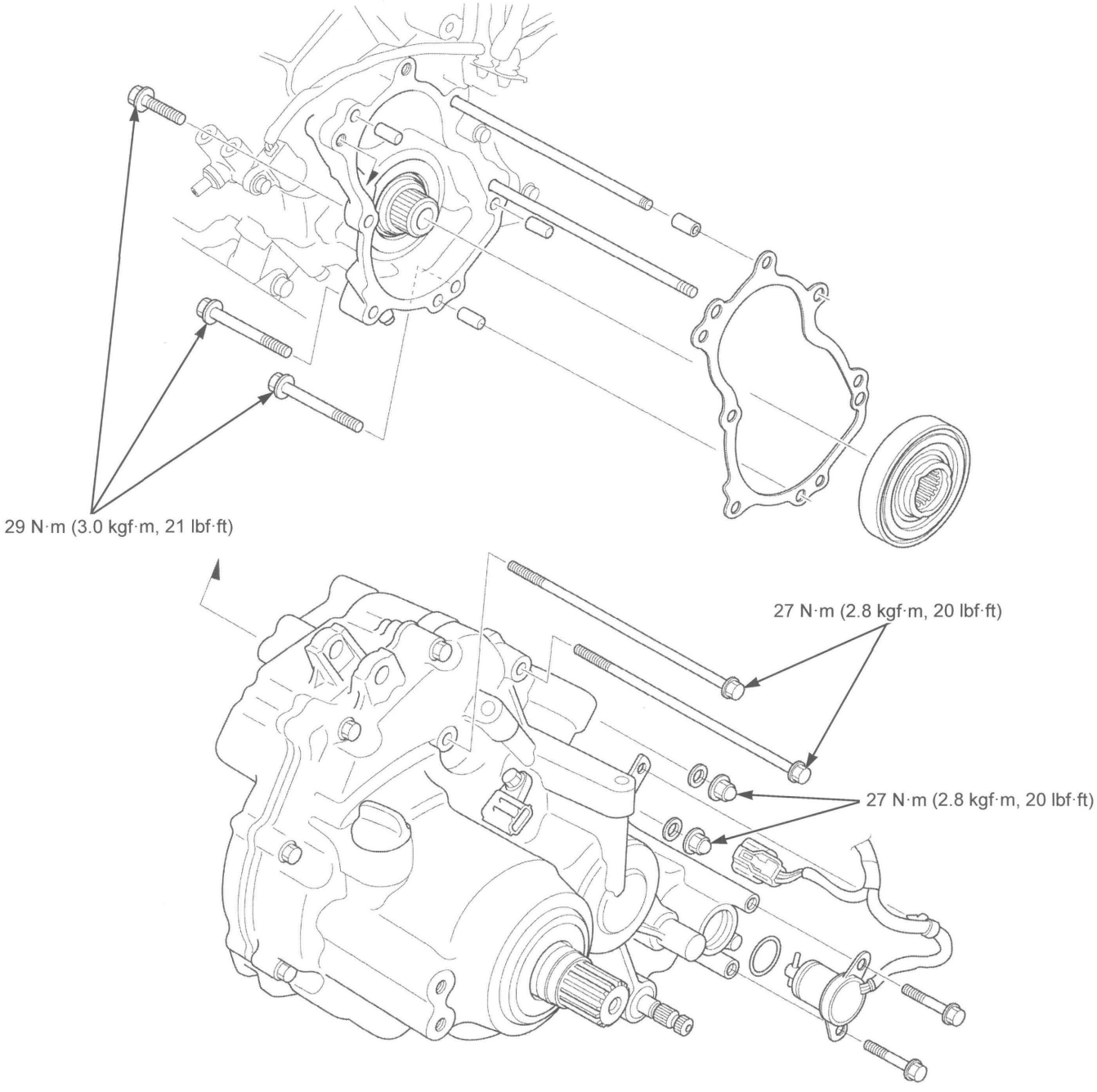
TROUBLESHOOTING

Hard to shift
- Improper shift select lever/cable operation
- Incorrect sub-transmission oil weight
- Bent shift fork
- Bent shift fork claw
- Bent shift fork shaft
- Broken shift fork spring
- Damaged shift drum groove
- Bent control shaft

Transmission jumps out of gear
- Worn gear dogs
- Worn gear shifter groove
- Bent shift fork shaft
- Worn or bent shift forks
- Broken shift drum stopper arm
- Broken shift drum stopper arm return spring
- Broken control shaft return spring

Excessive engine noise
- Worn or damaged sub-transmission gear
- Worn or damaged sub-transmission bearings

COMPONENT LOCATION



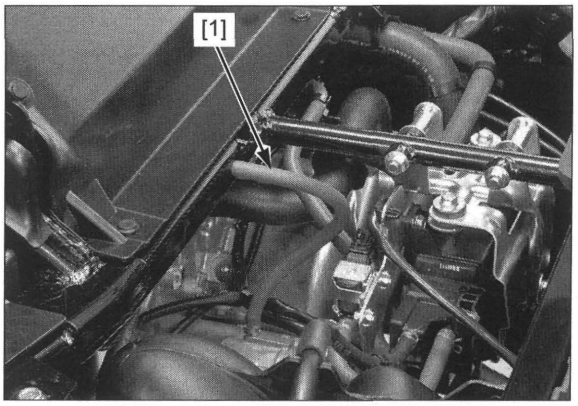
SUB-TRANSMISSION

REMOVAL

Remove the following:

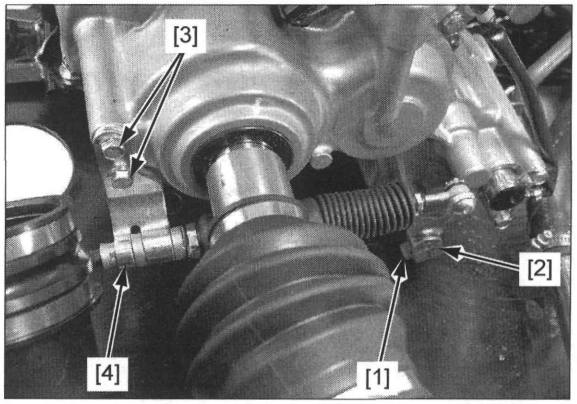
- front bumper (page 2-18)
- snorkel duct A (page 7-18)

Disconnect the sub-transmission breather hose [1].

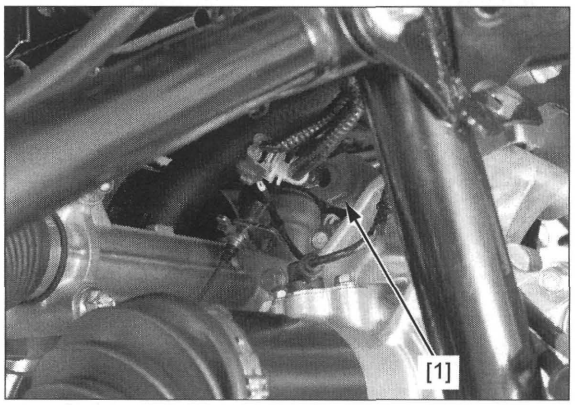


Remove the pinch bolt [1] and shift arm [2].

Remove the bolts [3] and stay [4].

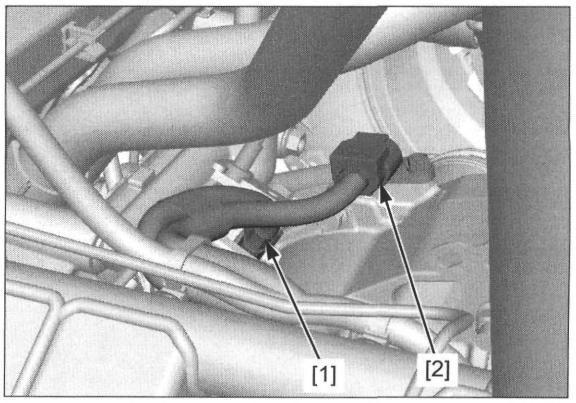


I-4WD model: Disconnect the front VS sensor 3P connector [1].



Except I-4WD model: Disconnect the following:

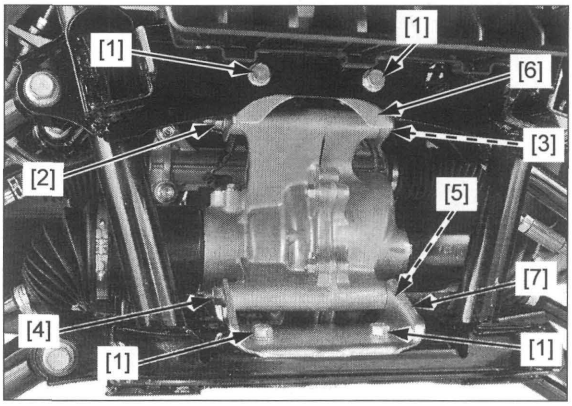
- front differential lock switch 1P connector [1]
- front VS sensor 3P connector [2]



Support the front final gear case assembly with wooden blocks.

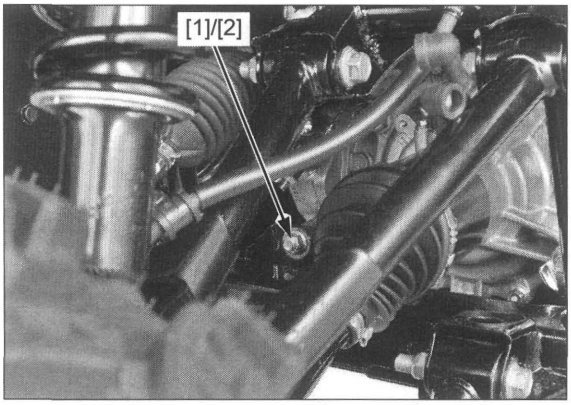
Remove the following:

- bracket bolts [1]
- upper mounting nut [2] and bolt [3]
- lower mounting nut [4] and bolt [5]
- upper bracket [6]
- lower bracket [7]



Remove the rear mounting nut [1] and bolt [2].

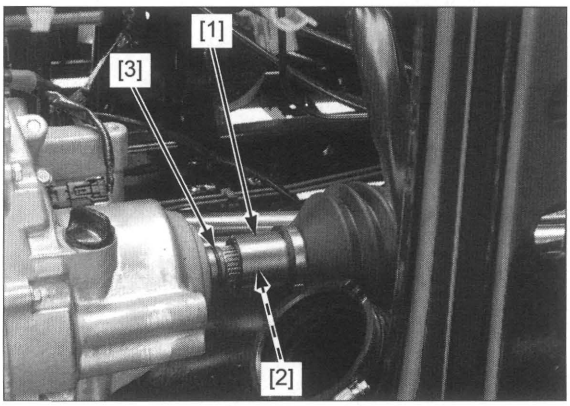
Move the front final gear case assembly forward fully.



Release the front propeller shaft joint [1].

Remove the joint spring [2].

Remove the O-ring [3].

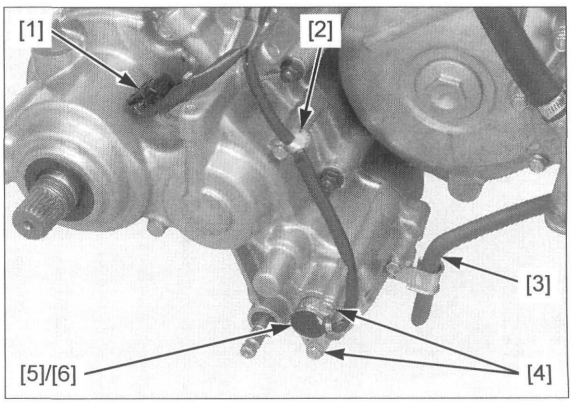


Disconnect the rear VS sensor 3P connector [1].

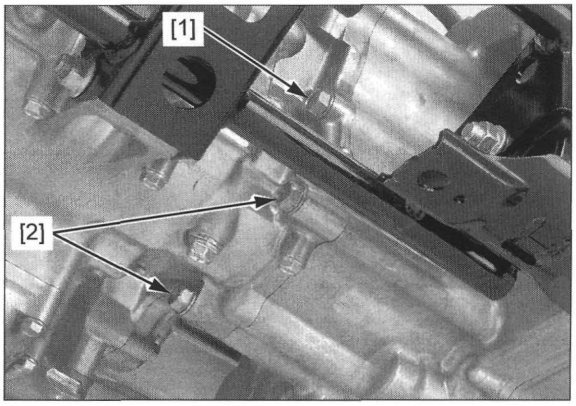
Release the wire clip [2].

Release the water pump breather hose [3].

Remove the bolts [4], sub-transmission position switch [5], and O-ring [6].

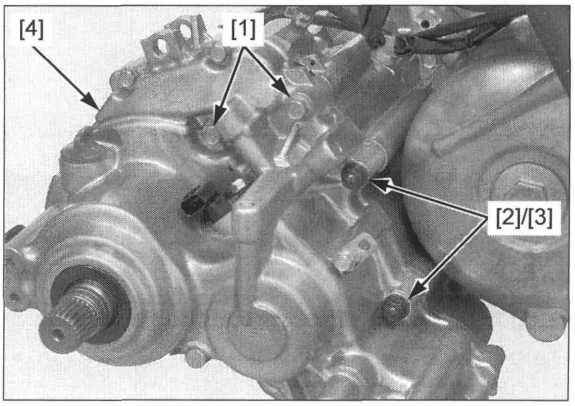


Remove the sub-transmission case bolt (8 x 28 mm) [1] and bolts (8 x 40 mm) [2].



Remove the sub-transmission cover bolts (8 x 165 mm) [1], cap nuts [2], and washers [3].

Remove the sub-transmission assembly [4].

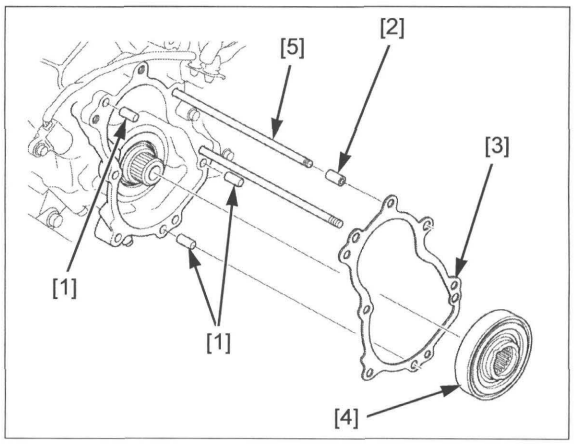


Remove the following:

- three dowel pins [1]
- dowel pin [2]
- gasket [3]
- final drive damper [4]

Check the final drive damper and replace if necessary.

Remove the stud bolts [5] if necessary (page 12-7).



STUD BOLT REPLACEMENT

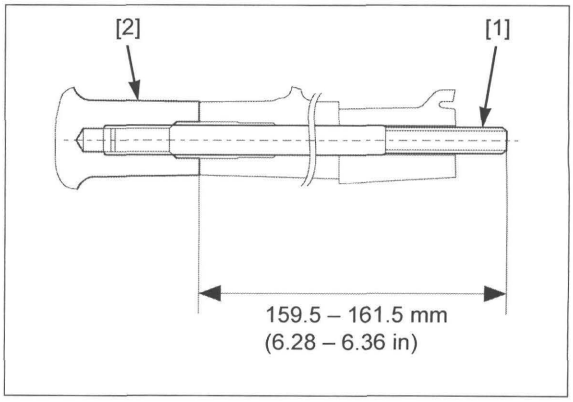
Remove the sub-transmission assembly (page 12-5).

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 [1] into the crankcase [2].

After installing the stud bolts, check that the length from the bolt head to the crankcase surface is within specification as shown.

Install the sub-transmission assembly (page 12-8).

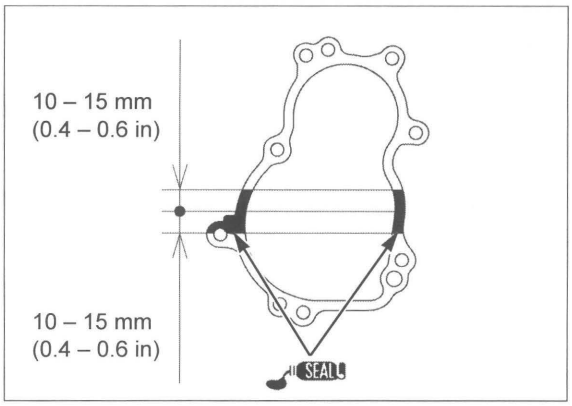


INSTALLATION

Install the stud bolts if removed (page 12-7).

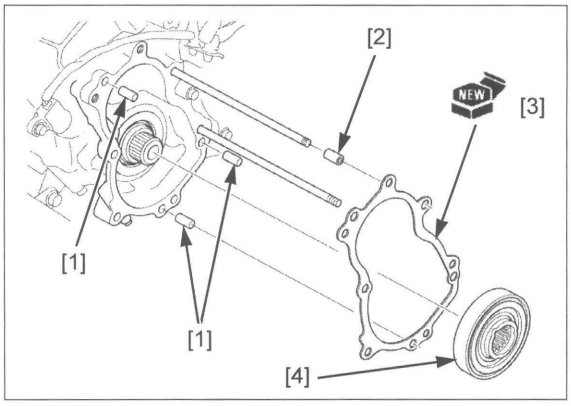
Clean the crankcase mating surfaces thoroughly.

Apply liquid sealant (TB1207B manufactured by ThreeBond or an equivalent) to the crankcase mating surface as shown.



Install the following:

- three dowel pins [1]
- dowel pin [2]
- new gasket [3]
- final drive damper [4]



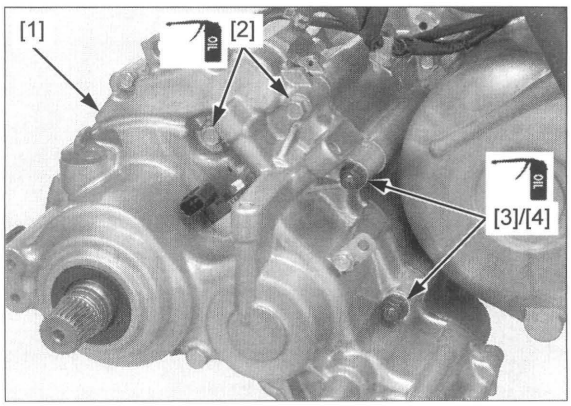
Install the sub-transmission assembly [1].

Apply engine oil to the bolts and nuts threads and seating surfaces.

Install the bolts [2], cap nuts [3], and washers [4].

Tighten the bolts and nuts to the specified torque.

TORQUE: 27 N·m (2.8 kgf·m, 20 lbf·ft)

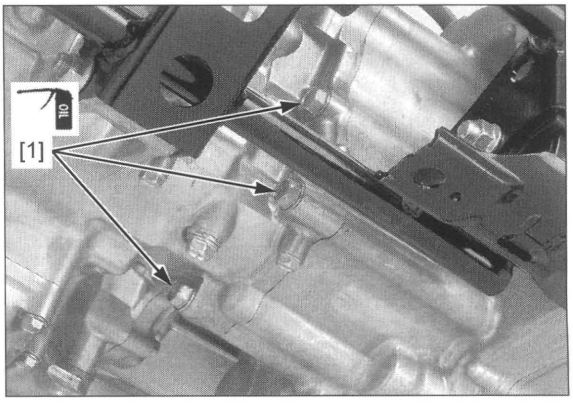


Apply engine oil to the bolts threads and seating surface.

Install the sub-transmission mounting bolts (case side) [1].

Tighten the bolts to the specified torque.

TORQUE: 29 N·m (3.0 kgf·m, 21 lbf·ft)



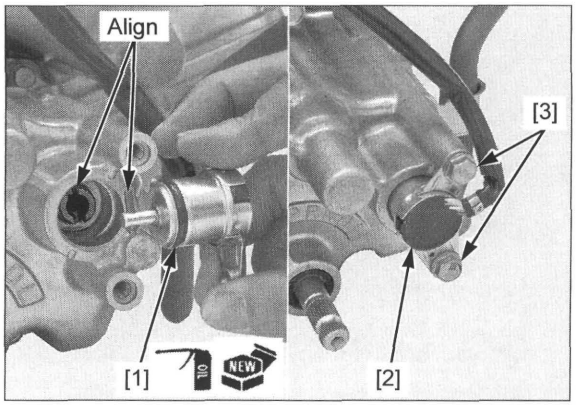
Apply engine oil to a new O-ring.
Install the O-ring [1] onto the sub-transmission position switch.

Install the sub-transmission position switch [2] and bolts [3].

NOTE:

- Align the pin of the switch with the slot of the drum shaft.

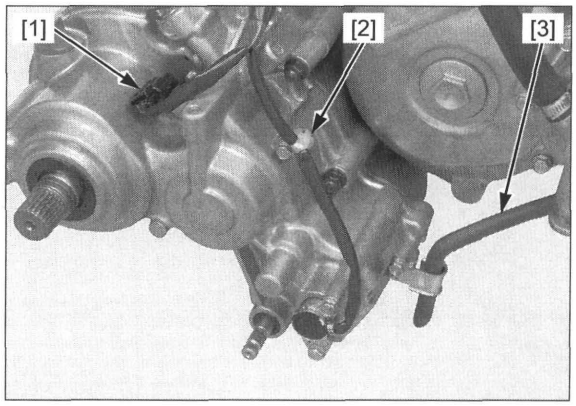
Tighten the bolts securely.



Connect the rear VS sensor 3P connector [1].

Install the wire clip [2].

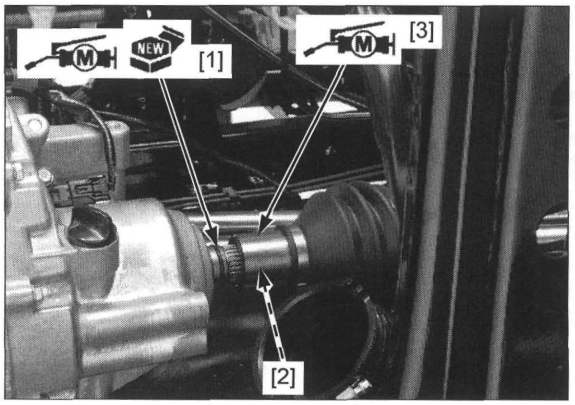
Install the water pump breather hose [3].



Move the front final gear case assembly forward fully.

Apply molybdenum disulfide grease to a new O-ring [1] and install it.

Apply molybdenum disulfide grease to the propeller shaft joint splines.
Install the joint spring [2].
Connect the propeller shaft joint [3] to the output shaft by moving the front final gear case assembly rearward until fully seated.



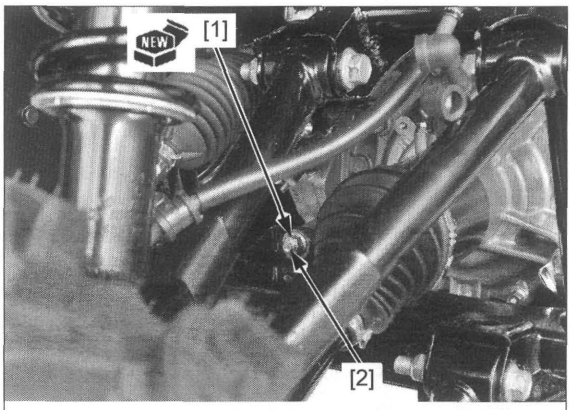
Install the following:

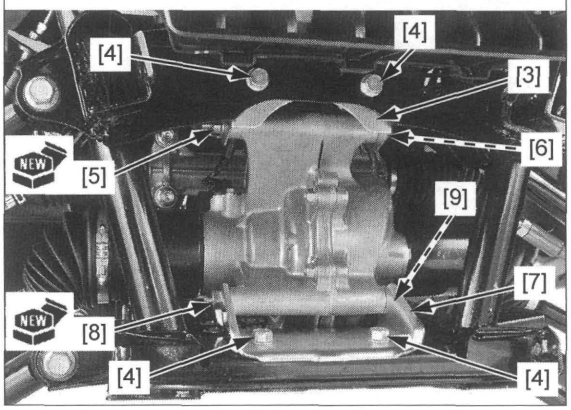
- new rear mounting nut [1] and bolt [2]
- upper bracket [3]
- bracket bolts [4]
- new upper mounting nut [5] and bolt [6]
- lower bracket [7]
- new lower mounting nut [8] and bolt [9]

Tighten the bracket bolts securely.

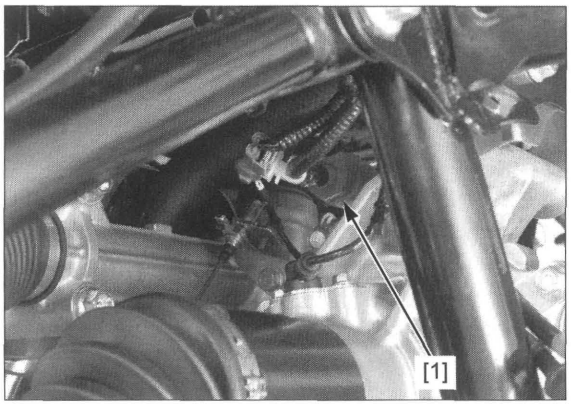
Tighten the mounting nuts to the specified torque.

TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)



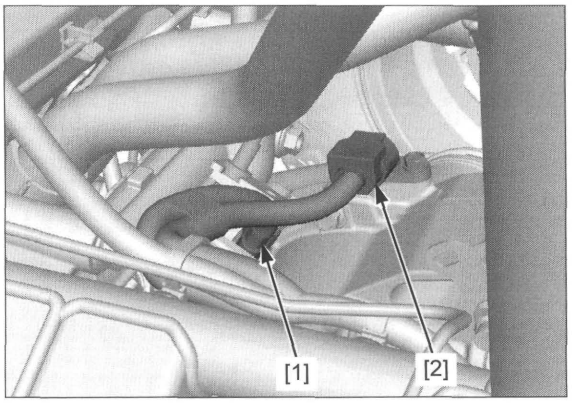


I-4WD model: Connect the front VS sensor 3P connector [1].



Except I-4WD model: Connect the following:

- front differential lock switch 1P connector [1]
- front VS sensor 3P connector [2]



Install the shift arm [1].

NOTE:

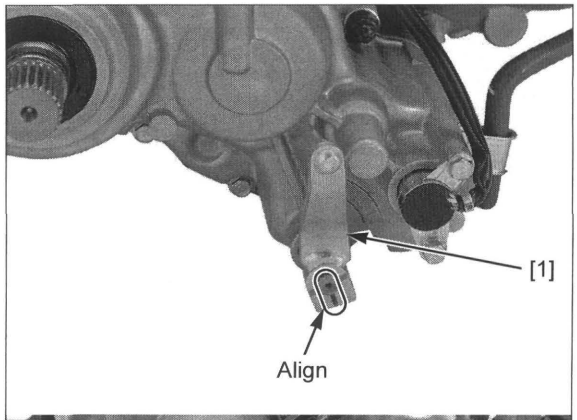
- Align the change arm slit with the clinched tooth of the control shaft as shown.

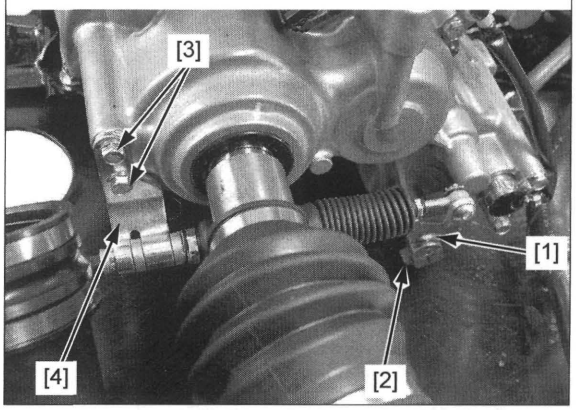
Install the pinch bolts [2] and tighten it to the specified torque.

TORQUE: 16 N·m (1.6 kgf·m, 12 lbf·ft)

Install the bolt [3] and stay [4] and tighten the bolts securely.

Adjust the shift select lever freeplay (page 12-30).



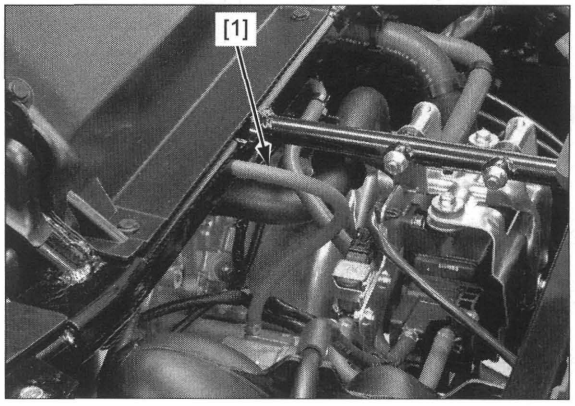


Connect the sub-transmission breather hose [1].

Fill the sub-transmission with the recommended engine oil and check that there are no oil leaks (page 3-15).

install the following:

- front bumper (page 2-18)
- snorkel duct A (page 7-18)



DISASSEMBLY

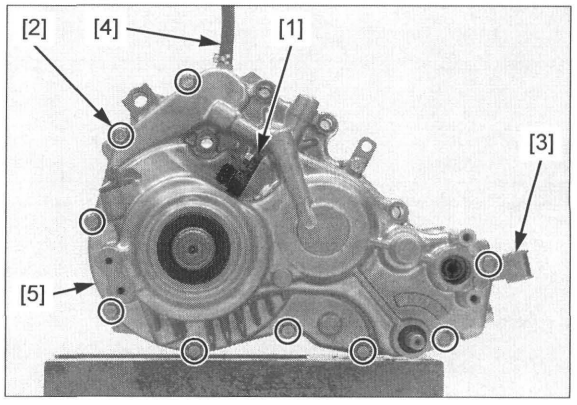
Remove the sub-transmission assembly (page 12-5).

Remove the following:

- rear VS sensor [1] (page 11-61)
- bolts [2]
- water pump breather hose stay [3]
- sub-transmission breather hose [4]

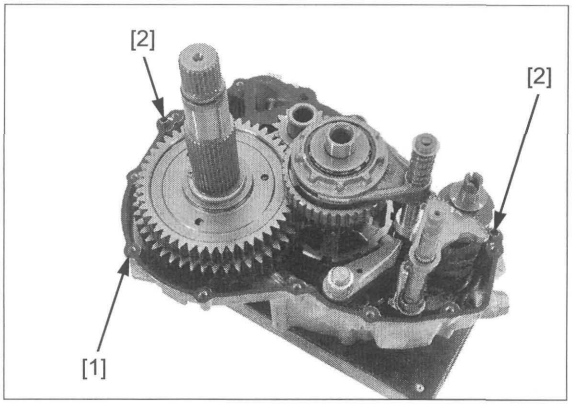
Place the sub-transmission assembly with the case side down.

Carefully separate the case cover [5] from the case while tapping them at several locations with a plastic hammer.

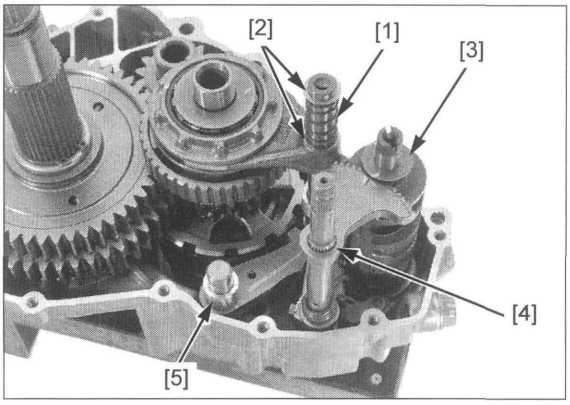


Remove the following:

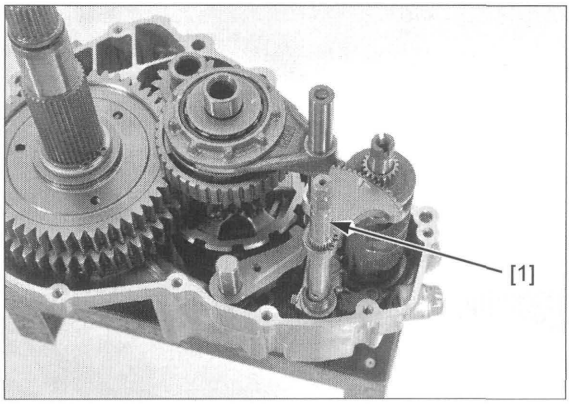
- gasket [1]
- dowel pins [2]



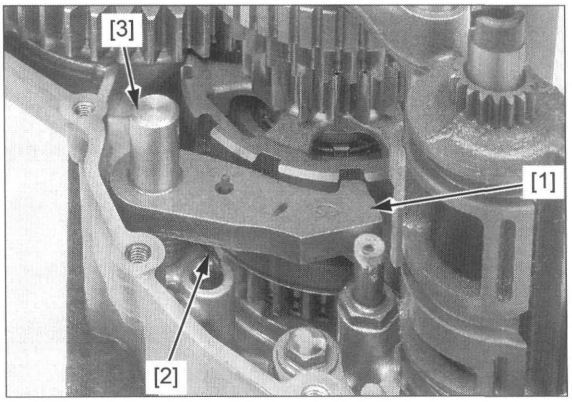
- spring [1], washers [2]
- washer [3]
- washer [4]
- collar [5] (Pattern A only, page 12-17)



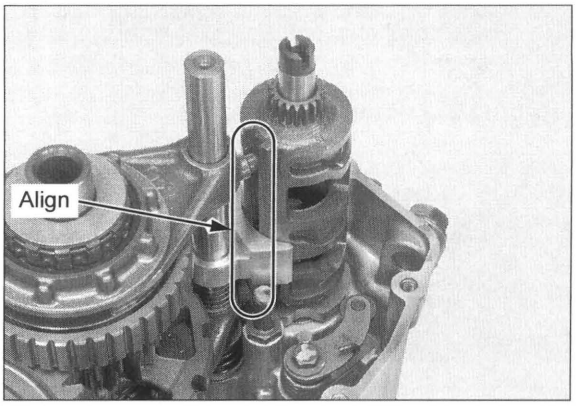
- control shaft assembly [1]



- parking lock lever [1]
- return spring [2]
- parking lock lever shaft [3]

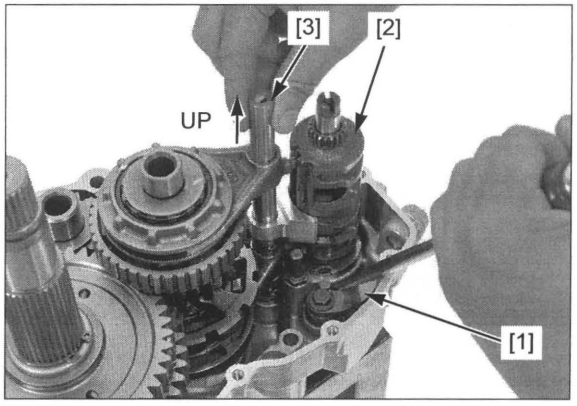


Align the shift fork bosses with the shift drum groove by rotating the shift drum.



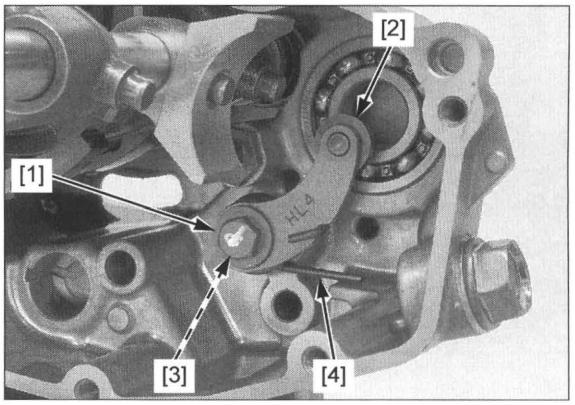
Hold the stopper arm [1] with a screwdriver.

Remove the shift drum [2] by pulling the shift fork shaft [3] up.



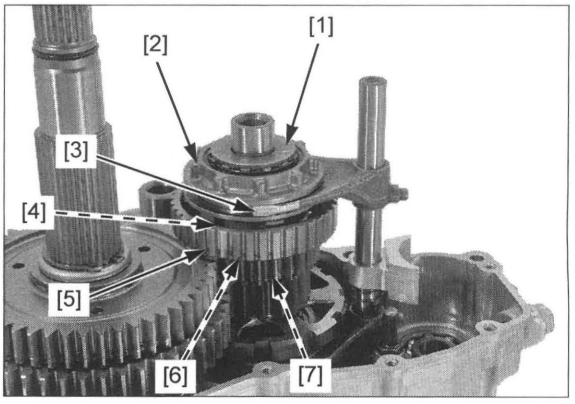
Remove the following:

- pivot bolt [1]
- stopper arm [2]
- washer [3]
- return spring [4]

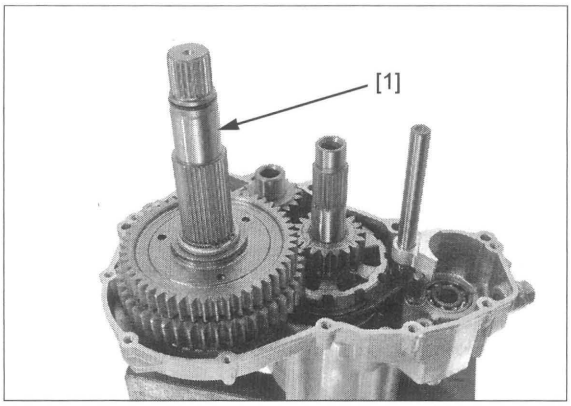


Remove the following (final drive high gear side) together:

- special washer [1]
- high shift assembly [2]
- front gearshift fork [3]
- washer (26 x 44 x 1 mm) [4]
- final drive high gear [5]
- needle bearing (26 x 30 x 17 mm) [6]
- washer (26 x 44 x 1 mm) [7]

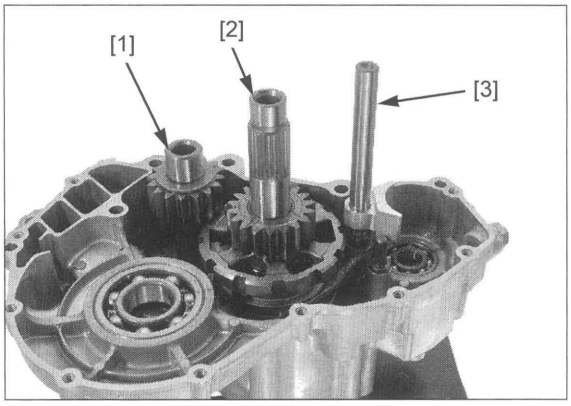


– final driven shaft assembly [1]



Remove the following together:

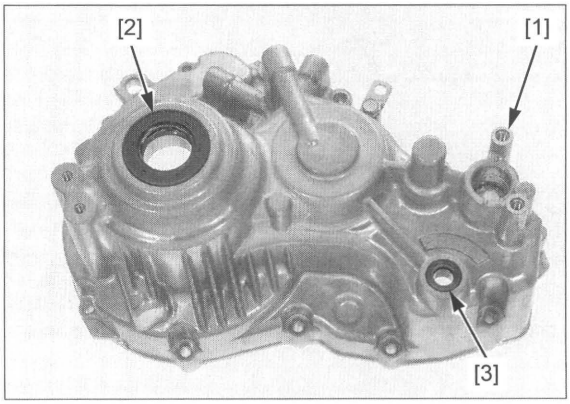
– reverse idle shaft assembly [1]
– final drive gear (low gear side)/shaft assembly [2]
– shift fork assembly [3]



Remove the following from the sub-transmission case cover [1]:

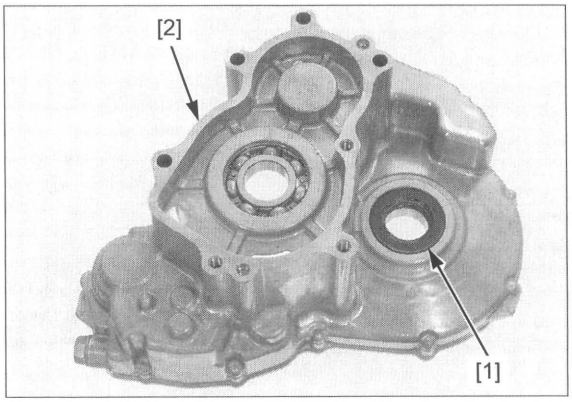
– oil seal (30 x 50 x 8 mm) [2]
– oil seal (12 x 20 x 5 mm) [3]

Check the cover side bearings and replace if necessary (page 12-15).



Remove the oil seal (30 x 50 x 8 mm) [1] from the sub-transmission case [2].

Check the case side bearings and replace if necessary (page 12-16).



BEARING REPLACEMENT

SUB-TRANSMISSION CASE COVER SIDE

Drive out the ball bearing 63/28 [1].
Remove the needle bearing (25 x 32 x 20) [2].

Remove the ball bearing 63/22U [3] using the special tools.

TOOLS:

Bearing remover, 22 mm	**070MC-MFR0100**
Remover handle	**07936-3710100**
Remover weight	**07741-0010201 (U.S.A.: 07936-371020A)**

Apply engine oil to new bearings.

Install the ball bearings with their marked side facing up until they are fully seated using the special tools.

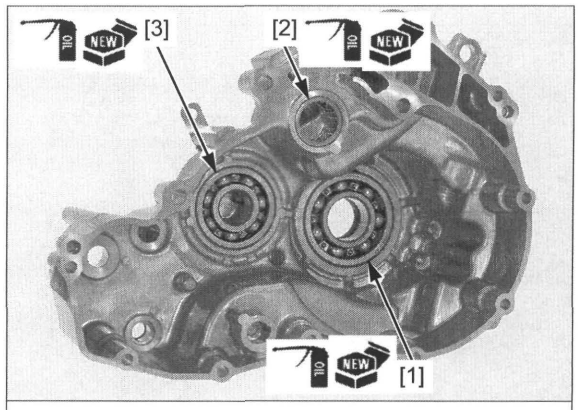
TOOLS:

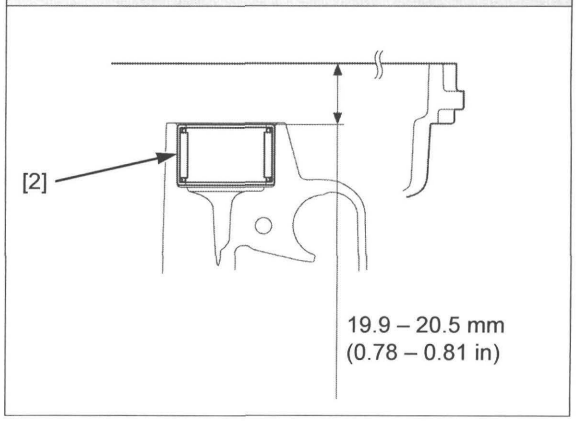
Driver	**07749-0010000**
Ball bearing 63/28	
Attachment, 62 x 68 mm	**07746-0010500**
Pilot, 28 mm	**07746-0041100**
Ball bearing 63/22U	
Attachment, 52 x 55 mm	**07746-0010400**
Pilot, 22 mm	**07746-0041000**

Install the needle bearing with its marked side facing up until it is in the position as shown using the special tools.

TOOLS:

Driver	**07749-0010000**
Attachment, 32 x 35 mm	**07746-0010100**
Pilot, 25 mm	**07746-0040600**





SUB-TRANSMISSION CASE SIDE

Drive out the following:

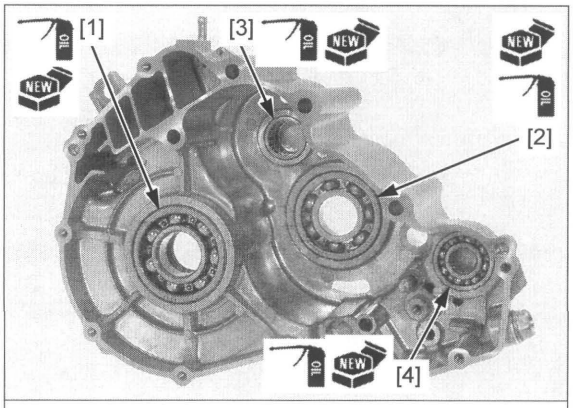
- ball bearing 63/28 [1]
- ball bearing (28 x 64 x 15 mm) [2]

Remove the needle bearing (25 x 32 x 20 mm) [3].

Remove the ball bearing (17 x 40 x 9 mm) [4] using the special tools.

TOOLS:

Bearing remover shaft set, 17 mm	**07936-3710300**
Remover handle	**07936-3710100**
Remover weight	**07741-0010201 (U.S.A.: 07936-371020A)**

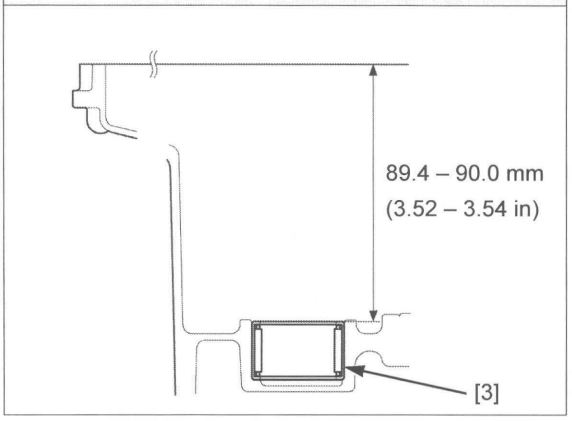


Apply engine oil to new bearings.

Install the ball bearings with their marked side facing up until they are fully seated using the special tools.

TOOLS:

Driver	**07749-0010000**
Ball bearing 63/28	
Attachment, 62 x 68 mm	**07746-0010500**
Pilot, 28 mm	**07746-0041100**
Ball bearing (28 x 64 x 15 mm)	
Attachment, 62 x 64 mm	**07947-6340400**
Pilot, 28 mm	**07746-0041100**
Ball bearing (17 x 40 x 9 mm)	
Attachment, 37 x 40 mm	**07746-0010200**
Pilot, 17 mm	**07746-0040400**

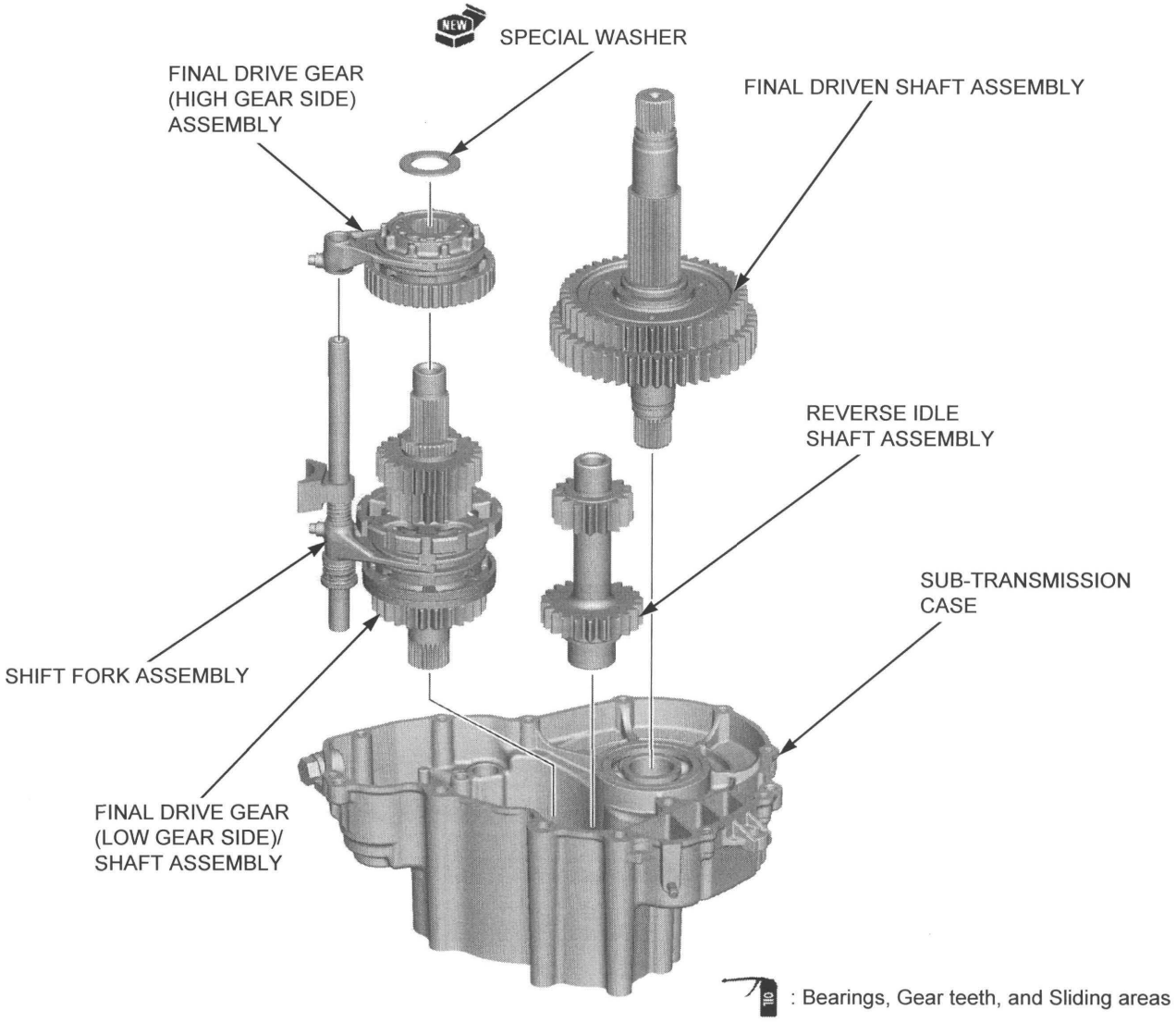


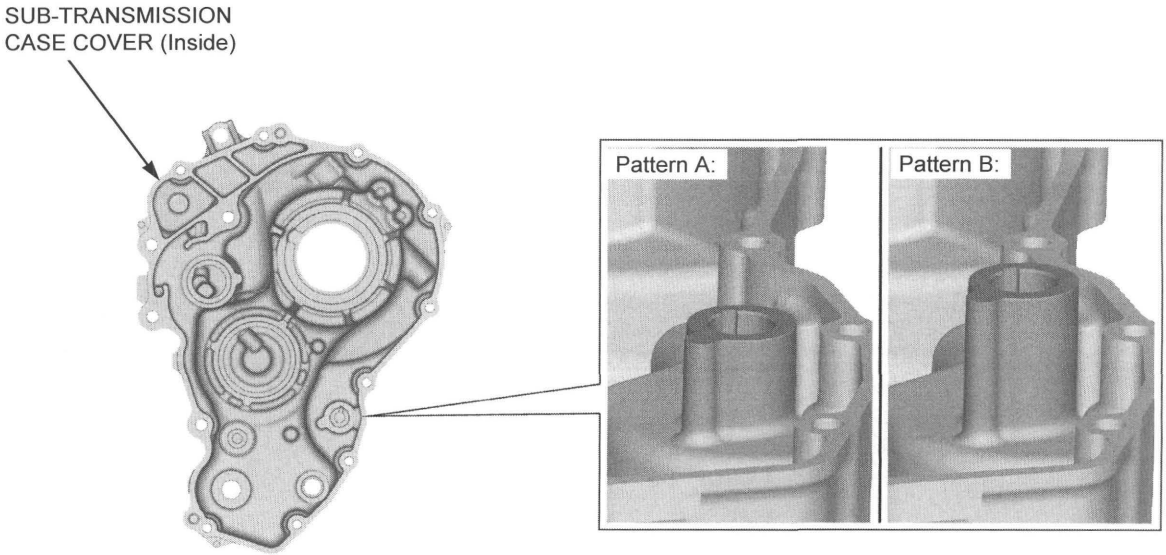
Install the needle bearing with its marked side facing up until it is in the position as shown using the special tools.

TOOLS:

Driver	**07749-0010000**
Attachment, 32 x 35 mm	**07746-0010100**
Pilot, 25 mm	**07746-0040600**

ASSEMBLY

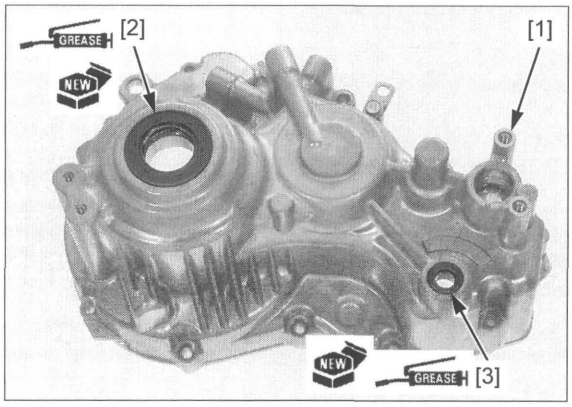

NEW
SPECIAL WASHER
FINAL DRIVE GEAR (HIGH GEAR SIDE) ASSEMBLY
FINAL DRIVEN SHAFT ASSEMBLY
REVERSE IDLE SHAFT ASSEMBLY
SUB-TRANSMISSION CASE
SHIFT FORK ASSEMBLY
FINAL DRIVE GEAR (LOW GEAR SIDE)/ SHAFT ASSEMBLY
OIL
: Bearings, Gear teeth, and Sliding areas


SUB-TRANSMISSION CASE COVER (Inside)
Pattern A:
Pattern B:

Install new oil seals into the sub-transmission case cover [1] until they are fully seated.

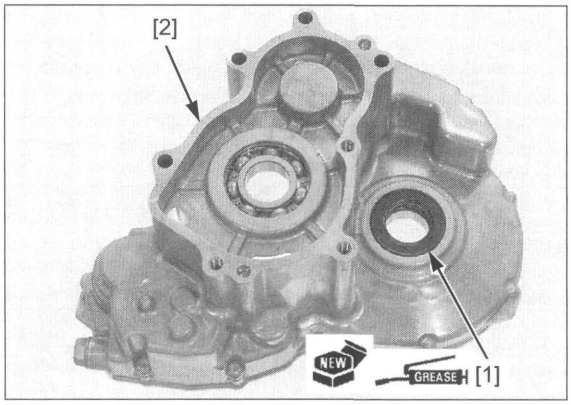
- oil seal (30 x 50 x 8 mm) [2]
- oil seal (12 x 20 x 5 mm) [3]

Apply grease to the oil seal lips.



Install a new oil seal (30 x 50 x 8 mm) [1] into the sub-transmission case [2] until it is fully seated.

Apply grease to the oil seal lips.

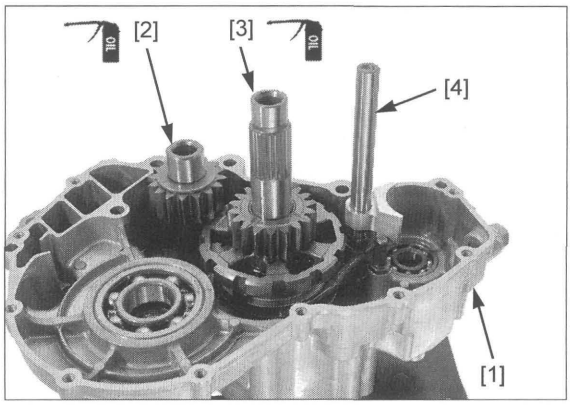


Place the sub-transmission case [1] side down.

Apply engine oil to the gear teeth and sliding areas.

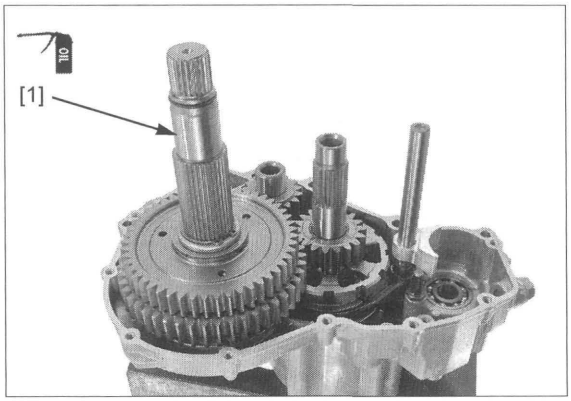
Install the following together:

- reverse idle shaft assembly [2]
- final drive gear (low gear side)/shaft assembly [3]
- shift fork assembly [4] without front gearshift fork



Apply engine oil to the gear teeth and rotating areas.

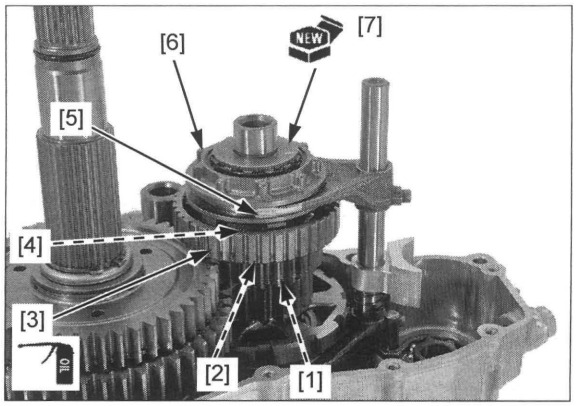
Install the final driven shaft assembly [1]



Apply engine oil to the final drive high gear teeth and sliding areas.

Install the following (final drive high gear side) together:

- washer (26 x 44 x 1 mm) [1]
- needle bearing (26 x 30 x 17 mm) [2]
- final drive high gear [3]
- washer (26 x 44 x 1 mm) [4]
- front gearshift fork [5]
- high shift assembly [6]
- new special washer [7]



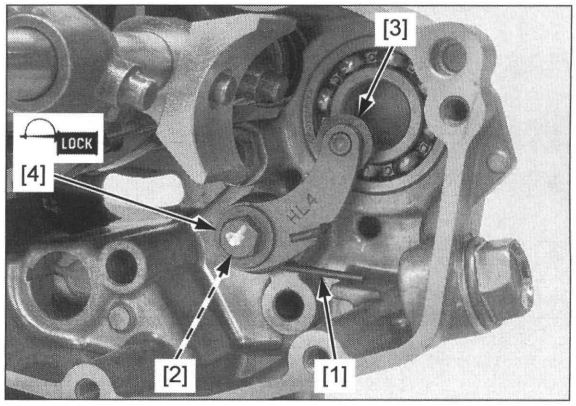
Install the following:

- return spring [1]
- washer [2]
- stopper arm [3]

Apply locking agent to the pivot bolt threads (page 1-22).

Install and tighten the pivot bolt [4] to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

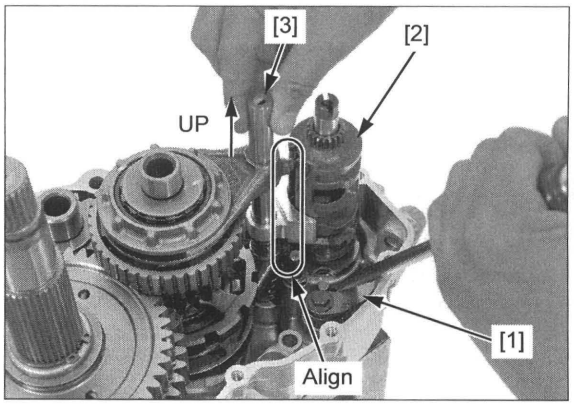


Hold the stopper arm [1] with a screwdriver.

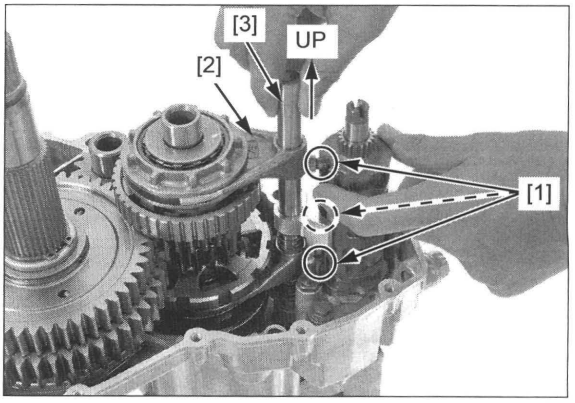
Install the shift drum [2] by pulling the shift fork shaft [3] up.

NOTE:

- Align the shift fork bosses with the shift drum groove.



Install the shift fork bosses [1] to the shift drum guide grooves by pulling the front shift fork [2] and shaft [3] up.

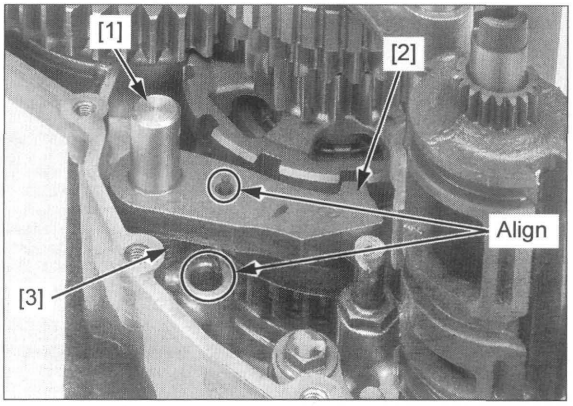


Install the following:

- parking lock lever shaft [1]
- parking lock lever [2]
- return spring [3]

NOTE:

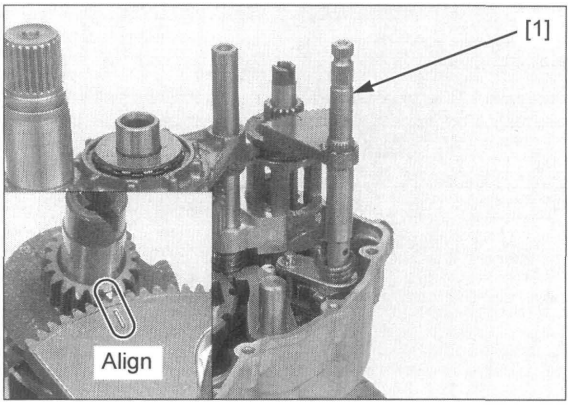
- Hook the spring ends into the holes of lever and sub-transmission case as shown.



Install the control shaft assembly [1].

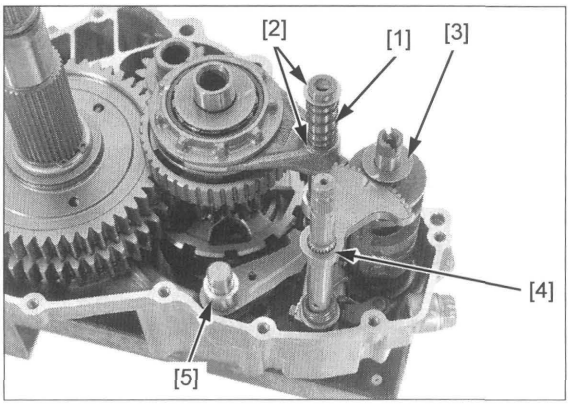
NOTE:

- Align the gearshift arm index line with the shift drum white paint gear.
- Make sure that the sub-transmission is in the "N" (neutral) position by rotating the output shaft.



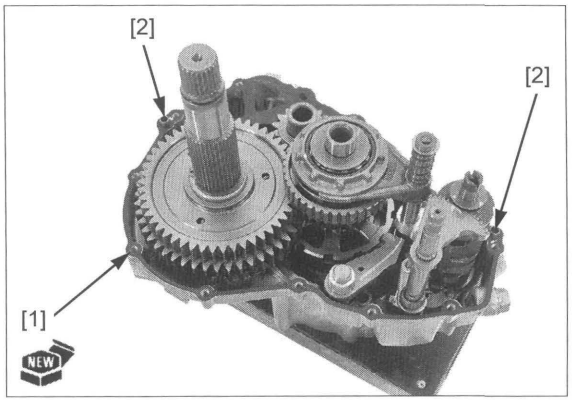
Install the following:

- spring [1], washers [2]
- washer [3]
- washer [4]
- collar [5] (Pattern A only, page 12-17)



Install the following:

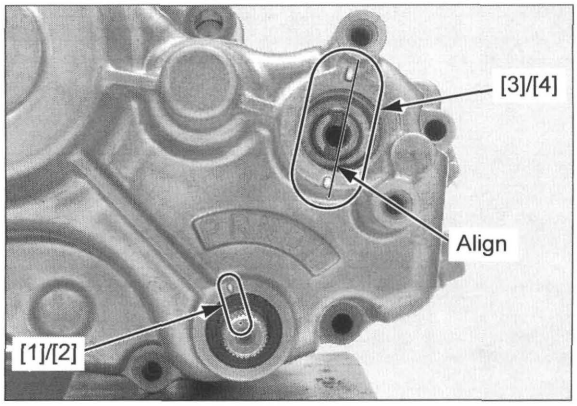
- new gasket [1]
- dowel pins [2]



Check the following:

- The punch mark [1] of the control shaft end aligns with the index mark [2] of the case cover.
- The slits [3] of the shift drum aligns with the index marks [4] of the case cover.

The sub-transmission is in the "P" (parking) position with the above conditions.



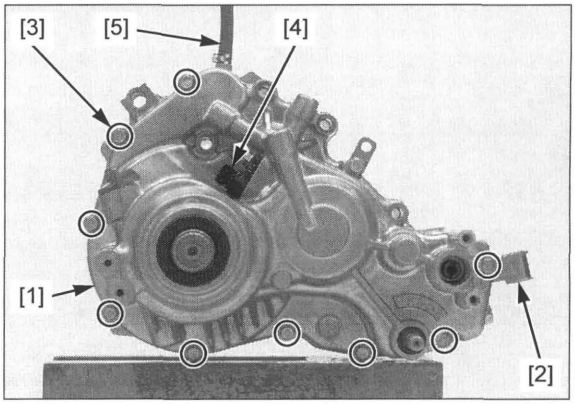
Install the case cover [1].

Install the following:

– water pump breather hose stay [2]
– bolts [3]
– rear VS sensor [4] (page 11-61)
– sub-transmission breather hose [5]

Tighten the bolts securely.

Install the sub-transmission assembly (page 12-8).

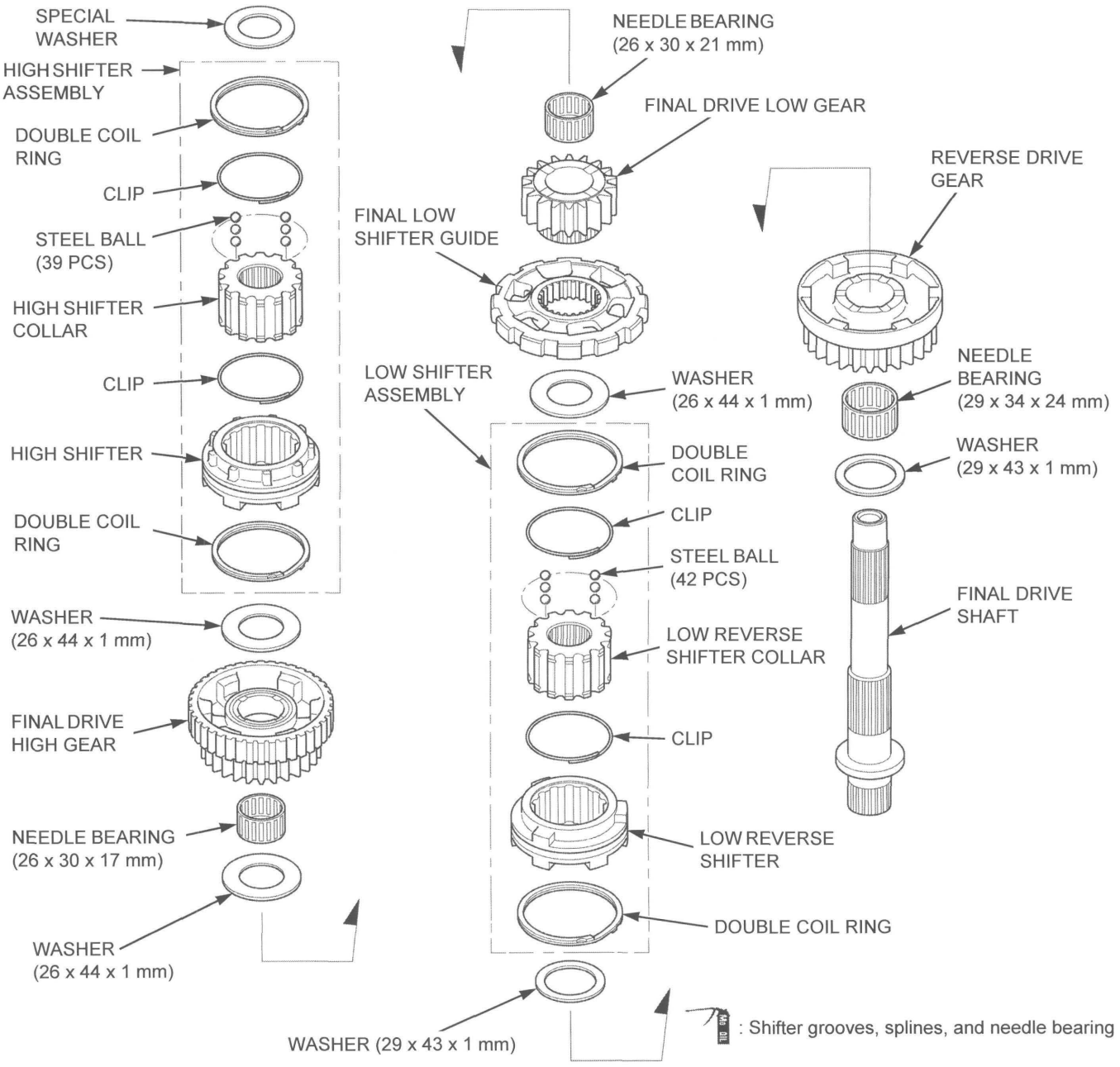


FINAL DRIVE SHAFT

NOTE:

- The final drive shaft assembly removal (page 12-11).
- The final drive shaft assembly installation (page 12-17).

DISASSEMBLY/ASSEMBLY



NOTE:

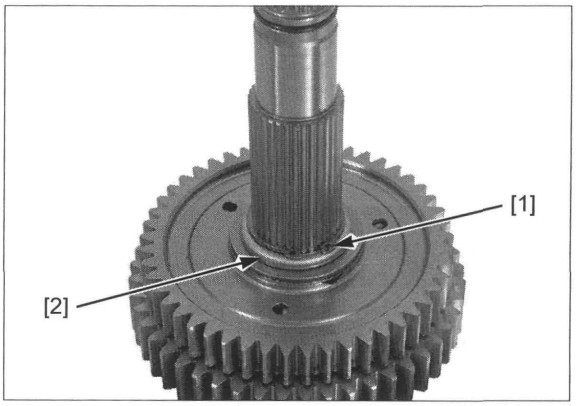
- After disassembly, clean all disassembled parts in solvent thoroughly.
- Keep track of the disassembled parts by sliding them onto a tool or a piece of wire.
- When assembling, coat each gear with clean engine oil and check for smooth movement.
- Final drive high gear needle bearing and final drive low gear needle bearing have one empty needle slot.

FINAL DRIVEN SHAFT

DISASSEMBLY

Remove the final driven shaft assembly (page 12-11).

Remove the snap ring [1] and cotter retainer [2].



Compress the friction springs [1] by pushing the final driven shaft assembly [2] with a hydraulic press as shown.

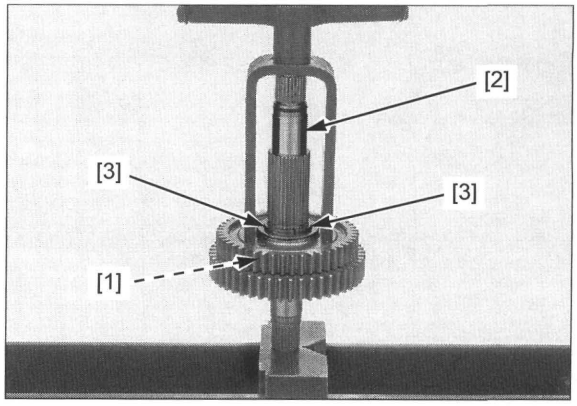
Remove the cotters [3].

Disassemble the final driven shaft assembly.

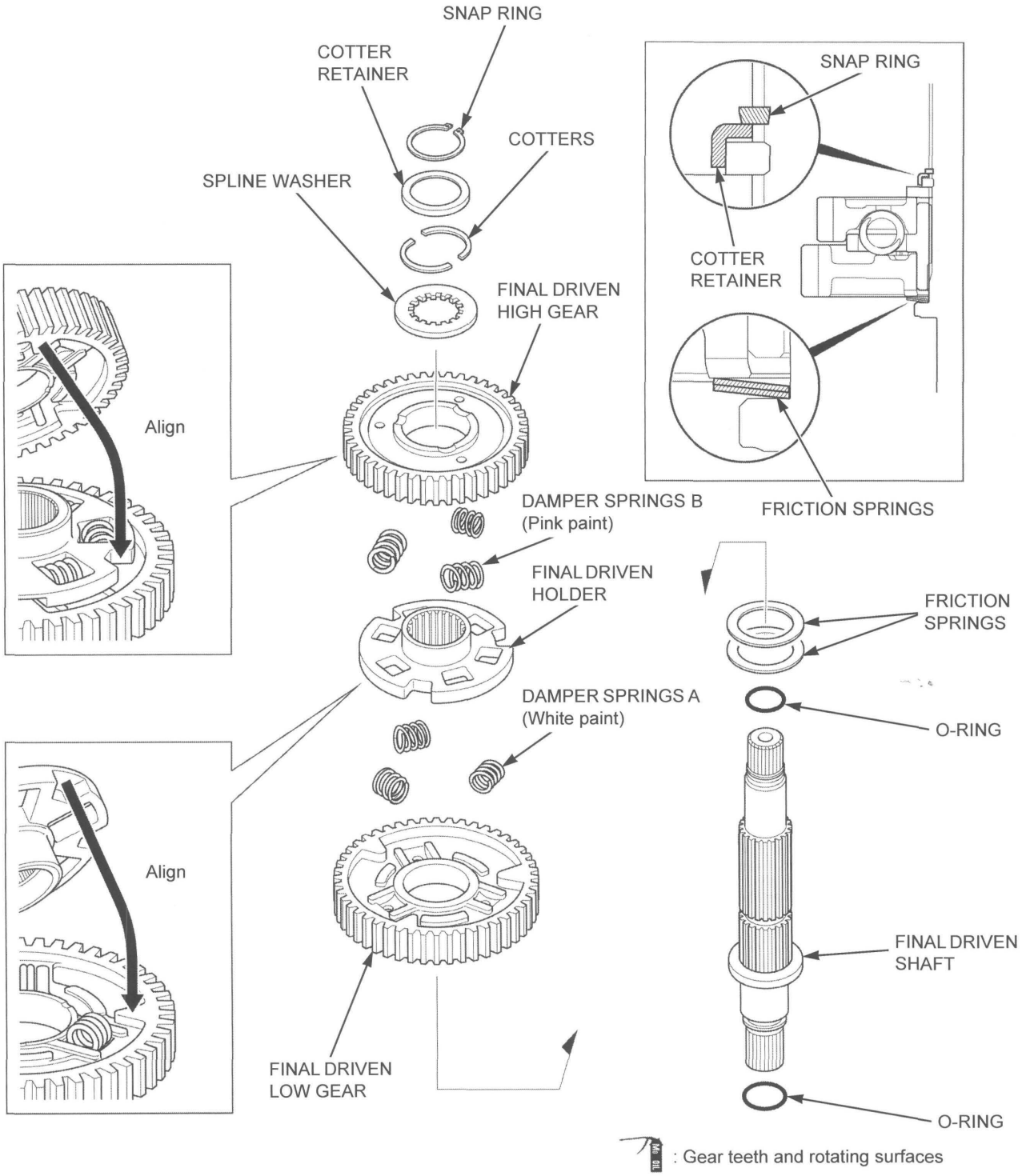
Clean all disassembled parts in solvent thoroughly.

NOTE:

- Keep track of the disassembled parts by sliding them onto a tool or a piece of wire.



ASSEMBLY



NOTE:

- Coat each gear with clean engine oil.
- Do not reuse the snap ring which could easily spin in the groove.
- Install a new snap ring with the chamfered edge facing opposite side of the retainer and be certain it is firmly seated in the groove.

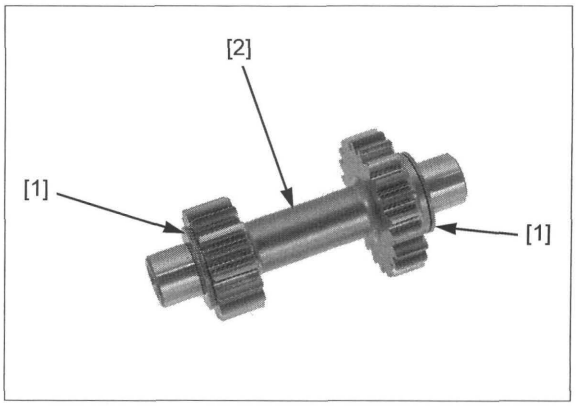
REVERSE IDLE SHAFT

DISASSEMBLY/ASSEMBLY

Remove the reverse idle shaft assembly (page 12-11).

Remove the special washers [1] from the reverse idle shaft [2].

Assembly is in the reverse order of disassembly.

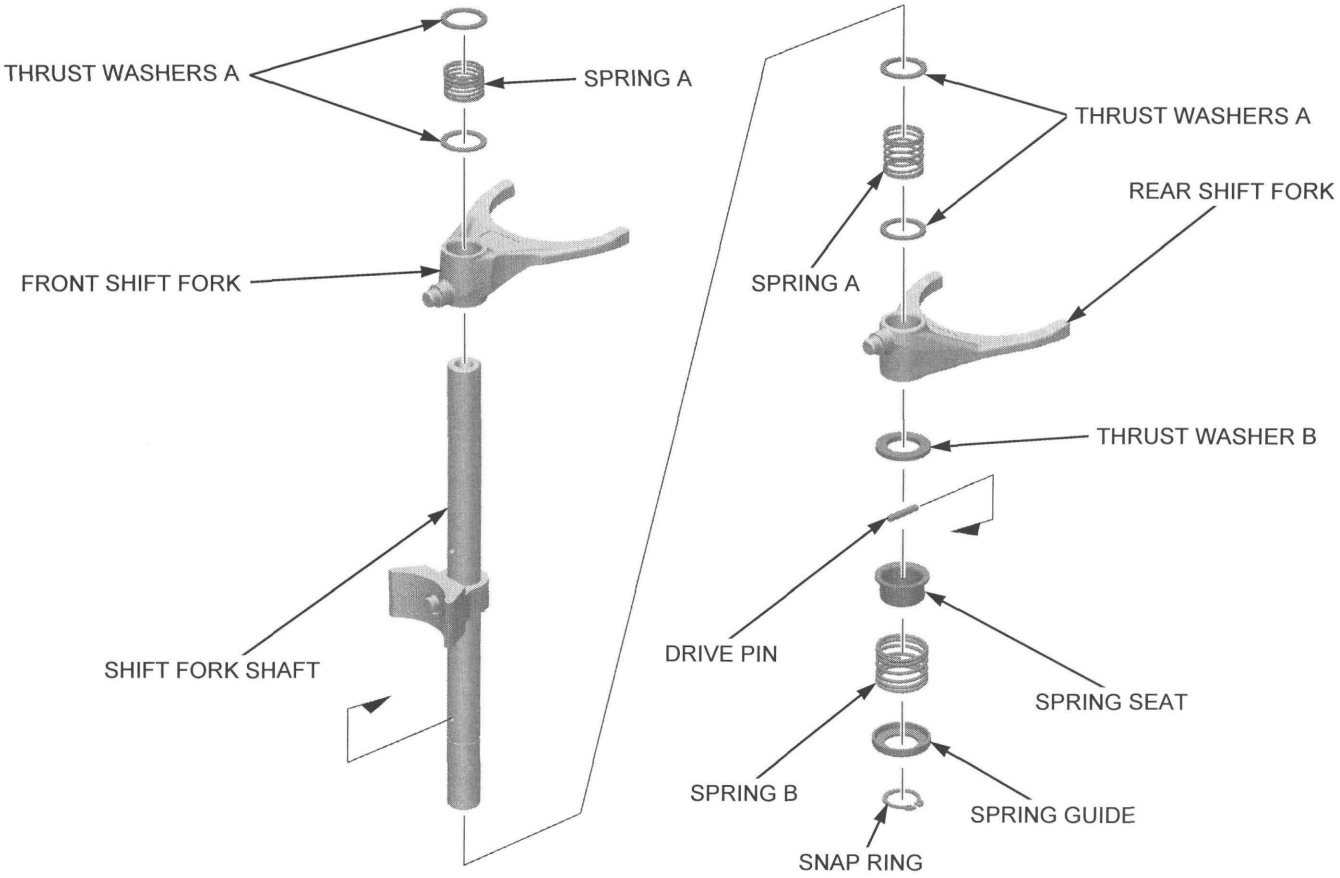


SHIFT FORK

NOTE:

- The shift fork removal (page 12-11)
- The shift fork installation (page 12-17)

DISASSEMBLY/ASSEMBLY

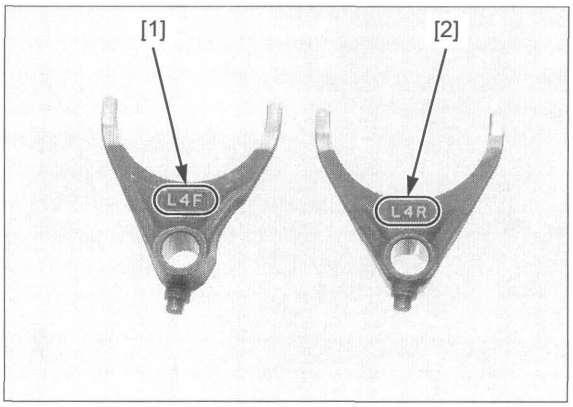


NOTE:

- Assemble the shift forks with their marks facing front.
- Do not reuse the snap ring which could easily spin in the groove.
- Install a new snap ring with the chamfered edge facing opposite side of the spring guide and be certain it is firmly seated in the groove.

The shift forks have the following identification marks:

- "L4F" mark [1]: front shift fork
- "L4R" mark [2]: rear shift fork



CONTROL SHAFT

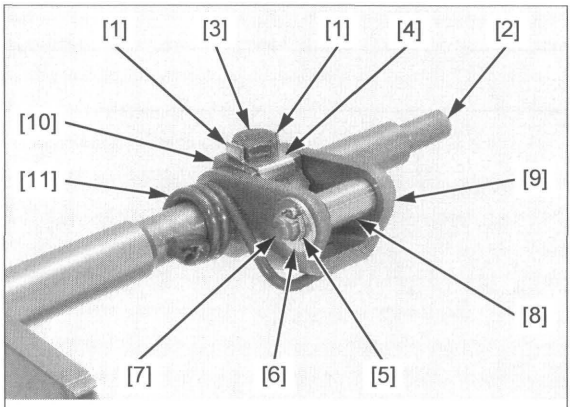
DISASSEMBLY

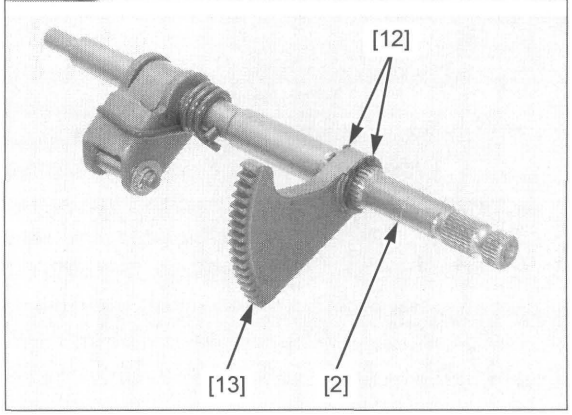
Remove the control shaft assembly (page 12-11).

Straighten the lock washer tabs [1] with a screwdriver or punch.

Disassemble the following from the control shaft [2]:

- set screw [3]
- lock washer [4]
- cotter pin [5]
- washer [6]
- roller pin [7]
- parking brake roller [8]
- parking brake lever [9]
- parking brake stopper [10]
- return spring [11]
- snap rings [12]
- gearshift arm [13]

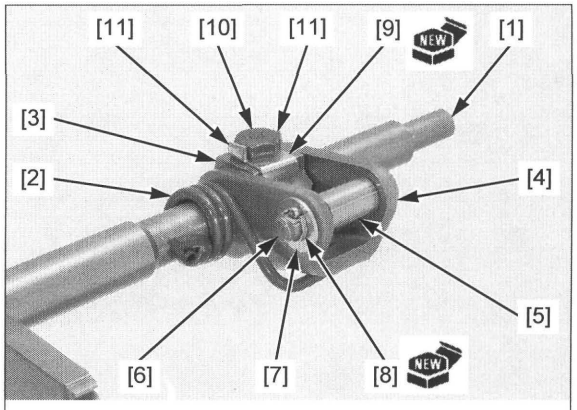




ASSEMBLY

Assemble the following to the control shaft [1]:

- return spring [2]
- parking brake stopper [3]
- parking brake lever [4]
- parking brake roller [5]
- roller pin [6]
- washer [7]
- new cotter pin [8]
- new lock washer [9]
- set screw [10]



Tighten the set screw to the specified torque.

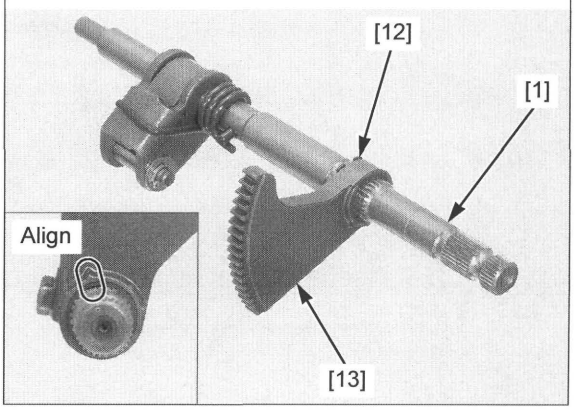
TORQUE: 14 N·m (1.4 kgf·m, 10 lbf·ft)

Bend the lock washer tabs [11] with a screwdriver or punch as shown.

Install the snap ring [12] and gearshift arm [13] to the control shaft.

NOTE:

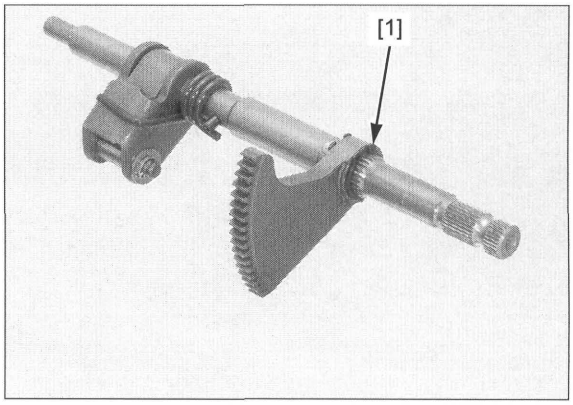
- Do not reuse the snap ring which could easily spin in the groove.
- Install the snap ring with the chamfered edge facing opposite side of the shift arm and be certain it is firmly seated in the groove.
- Align the mark of the shift arm with the clinched tooth of the control shaft.



Install the snap ring [1].

NOTE:

- Do not reuse the snap ring which could easily spin in the groove.
- Install the snap ring with the chamfered edge facing opposite side of the shift arm and be certain it is firmly seated in the groove.



SHIFT DRUM

DISASSEMBLY/ASSEMBLY

Remove the center bolt [1].

Disassemble the shift drum center gear [2] and shift drum [3].

Remove the dowel pin [4].

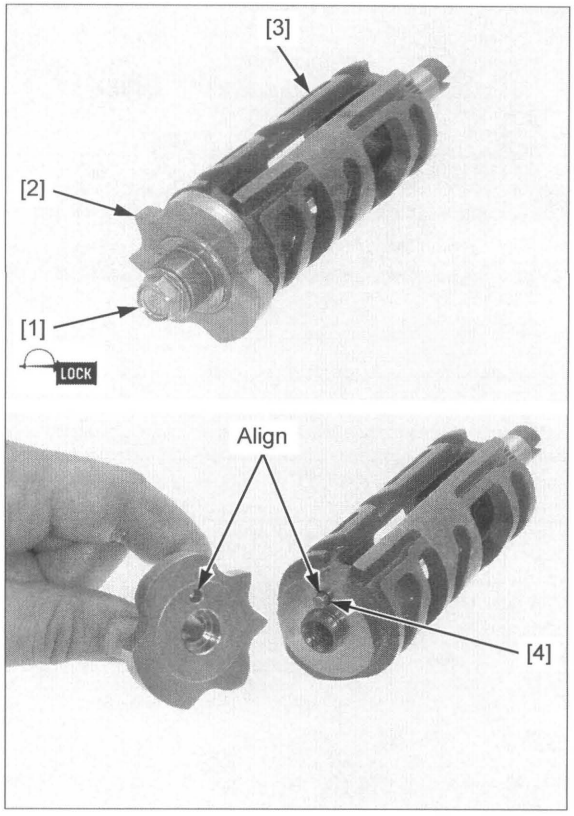
Assembly is in the reverse order of disassembly.

NOTE:

- Align the center gear hole with the dowel pin.
- Apply locking agent to the bolt threads (page 1-22).

TORQUE:

Sub-transmission shift drum center bolt:
27 N·m (2.8 kgf·m, 20 lbf·ft)



INSPECTION

Inspect the following parts for scratches, damage, abnormal wear, or deformation.

- final drive shaft, gears, high shifter, low shifter, bearings
- final driven shaft, gears, damper springs, friction springs
- reverse idle shaft, gear, bearings
- shift drum
- shift forks, shaft, springs
- control shaft, spring, gear

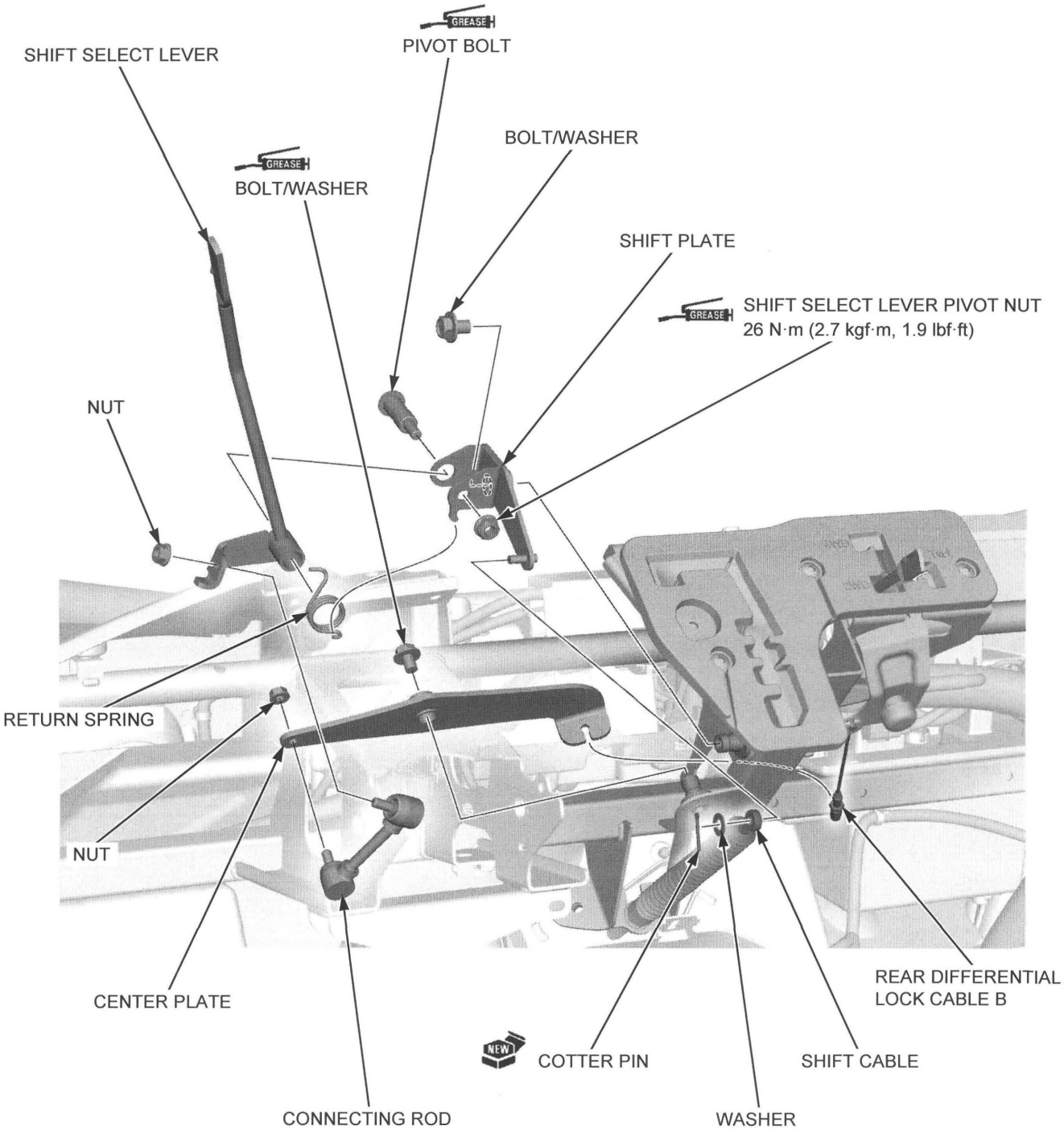
Measure each part according to SUB-TRANSMISSION SPECIFICATIONS (page 1-11).

Replace any part if it is out of the service limit.

SHIFT SELECT LEVER/CABLE

DISASSEMBLY/ASSEMBLY

Remove the instrument panel (page 2-28).



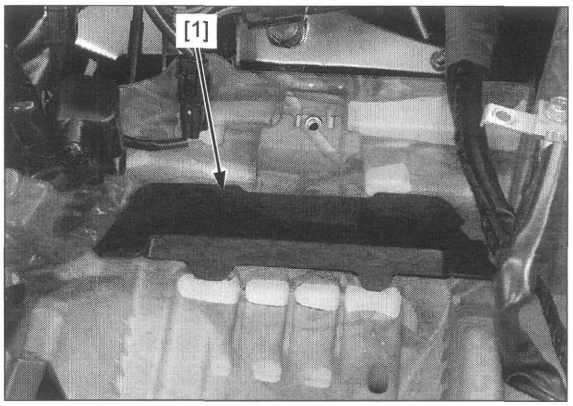
NOTE:

- Always replace the cotter pin with a new one.
- After installation, adjust the shift select lever freeplay (page 12-30).

SHIFT SELECT LEVER FREEPLAY ADJUSTMENT

Remove the battery (page 22-4).
Remove the seat under center lid (page 2-5).

Remove the front fender lid [1].



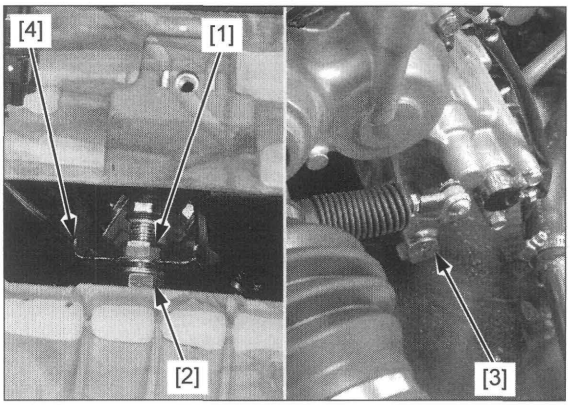
Move the shift select lever to the "N" (neutral) position.
Move the mode select lever to the "2WD" position.

Loosen the shift cable upper adjusting nut [1] and lower adjusting nut [2].

Temporarily install the battery (page 22-4).
Turn the ignition switch ON (I) and check that the gear position indicator indicates "N" (neutral).
If gear position indicator does not indicate "N" (neutral), operate the shift arm [3] by hand and shift the sub-transmission into the "N" (neutral) position.

Do not move the shift select lever from the neutral position.

Without applying force to move the cable, gradually screw the adjusting nuts together by hand until they touch the cable holder [4].



Adjust the shift select lever freeplay when the indicator indicates "N" (neutral) by turning the adjusting nuts [1].

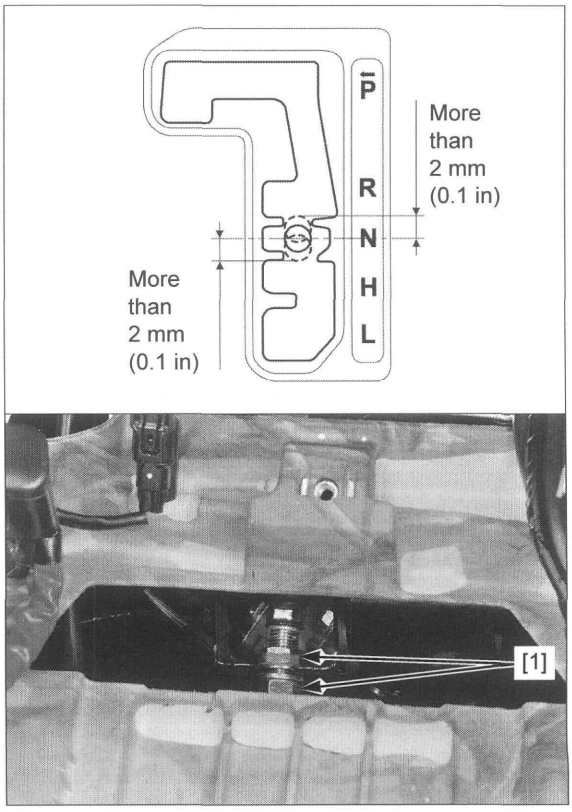
FREEPLAY: More than 2 mm (0.1 in)

Tighten the nut while holding the other nut to the specified torque.

TORQUE: 26 N·m (2.7 kgf·m, 19 lbf·ft)

After adjustment, check that the shift select lever operates properly.

Install the removed parts in the reverse order of removal.



MEMO

MEMO

13. ALTERNATOR/STARTER CLUTCH

SERVICE INFORMATION 13-2

TROUBLESHOOTING 13-3

COMPONENT LOCATION 13-3

ALTERNATOR COVER/STATOR 13-4

FLYWHEEL/REDUCTION GEARS 13-11

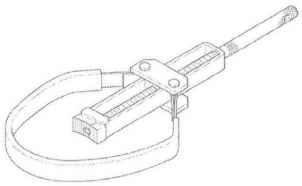
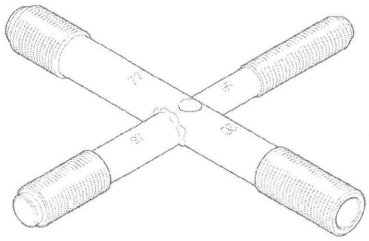
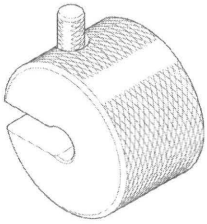
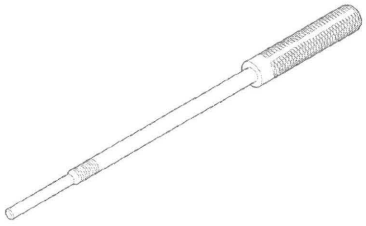
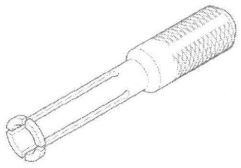
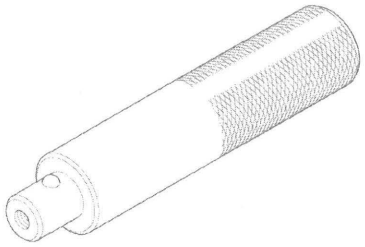
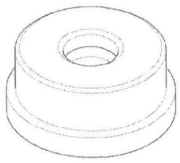
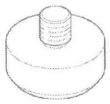
STARTER CLUTCH 13-13

SERVICE INFORMATION

GENERAL

- This section covers service of the alternator cover/stator, starter reduction gears and flywheel/starter clutch.
- Alternator cover/stator, starter reduction gears, and flywheel/starter clutch can be serviced with the engine installed in the frame.
- Alternator lubricating oil is fed through the oil passage in the alternator cover. Clean the oil passage before installing the alternator cover.
- Be careful not to damage the mating surfaces of the crankcase and alternator cover when servicing.
- For alternator inspection, see Battery/Charging System section (page 22-6).
- For starter motor service, see Electric Starter section (page 6-4).

TOOLS

Flywheel holder 07725-0040001 	Rotor puller 07733-0020001  or 07933-3950000 (U.S.A. only)	Remover weight 07741-0010201  or 07936-371020A (U.S.A. only)
Bearing remover shaft, 10 mm 07936-GE00100  or 07936-GE0A000 (U.S.A. only)	Bearing remover head, 10 mm 07936-GE00200  or 07936-GE0A000 (U.S.A. only)	Driver 07749-0010000 
Attachment, 42 x 47 mm 07746-0010300 	Attachment, 24 x 26 mm 07746-0010700 	Pilot, 30 mm 07746-0040700 

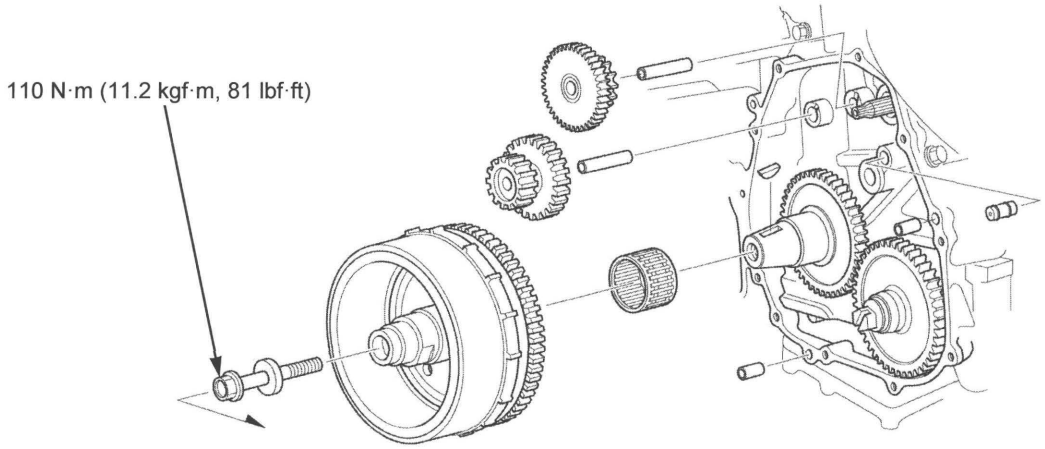
Pilot, 10 mm
07746-0040100

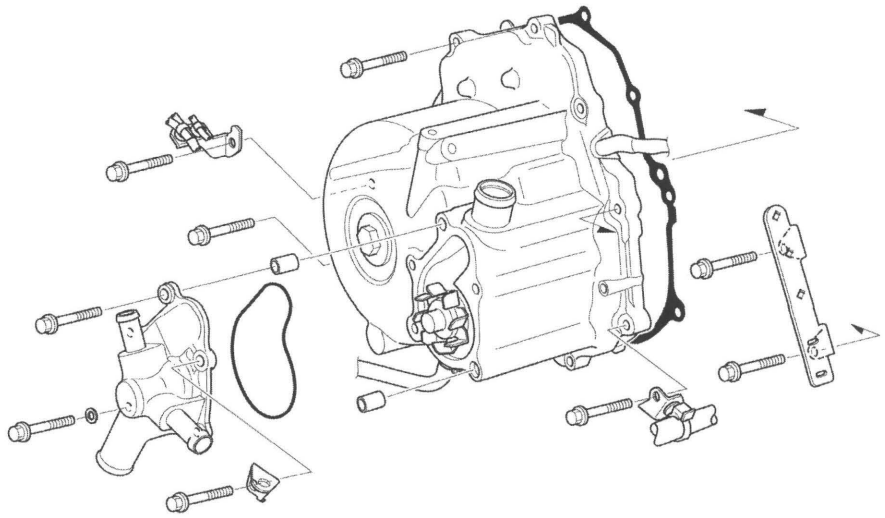


TROUBLESHOOTING

Starter motor turns, but engine does not turn
- Faulty starter clutch
- Damaged reduction gears

COMPONENT LOCATION



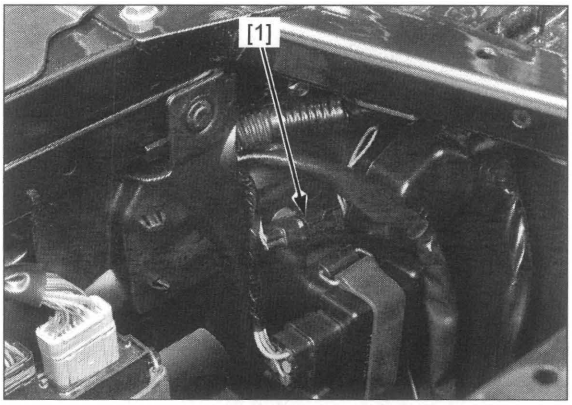


ALTERNATOR COVER/STATOR

ALTERNATOR COVER REMOVAL

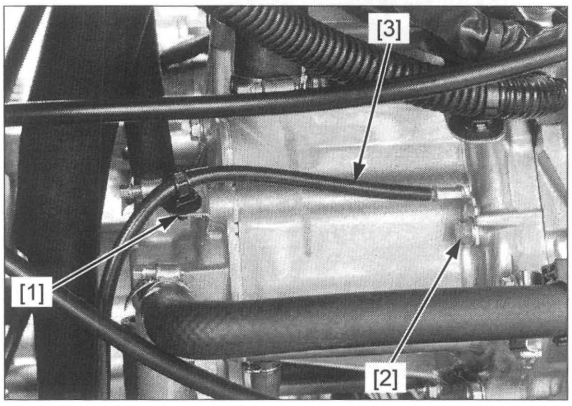
Remove the floor panel (page 2-17).
Remove the regulator/rectifier (page 22-6).
Drain the engine oil (page 3-13).
Drain the coolant (page 9-4).

Disconnect the CKP sensor 2P connector [1].

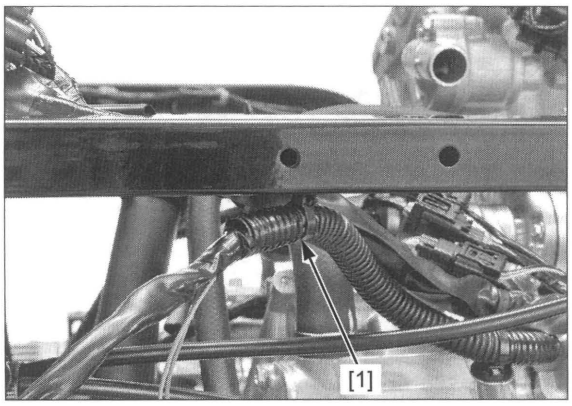


Release the cable clip [1].

Remove the bolt [2] and frame ground cable [3].



Release the cable clip [1].



Release the clips from the connector stay [1]:

'22 models, After '22 models (III, IV, IX type)

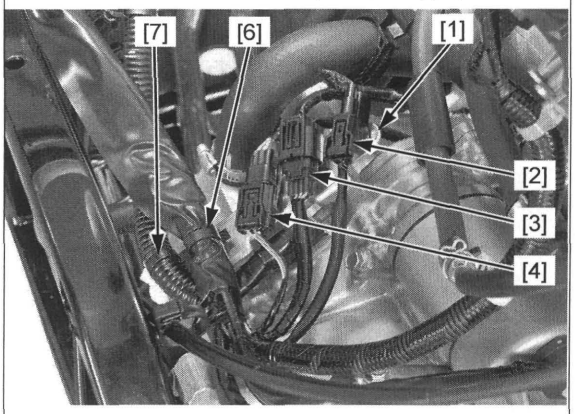
- neutral switch 1P connector [2]
- sub-transmission position switch 8P connector [3]
- TR sensor 3P connector [4]

After '22 models (Except III, IV, IX type)

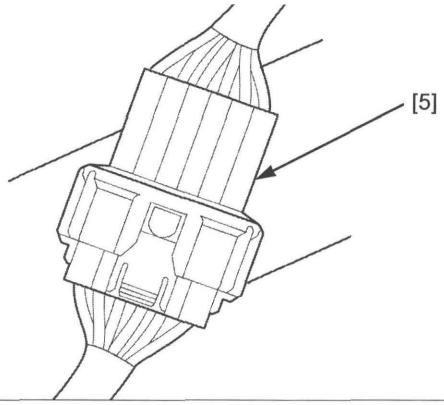
- sub-transmission position switch 12P connector [5]

- main wire harness [6]
- alternator wire [7]

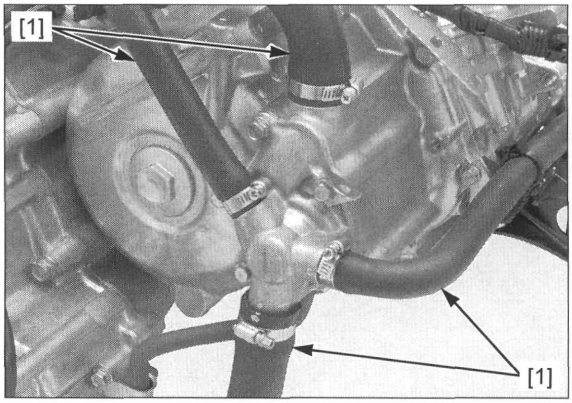
'22 models, After '22 models (III, IV, IX type)



After '22 models (Except III, IV, IX type)

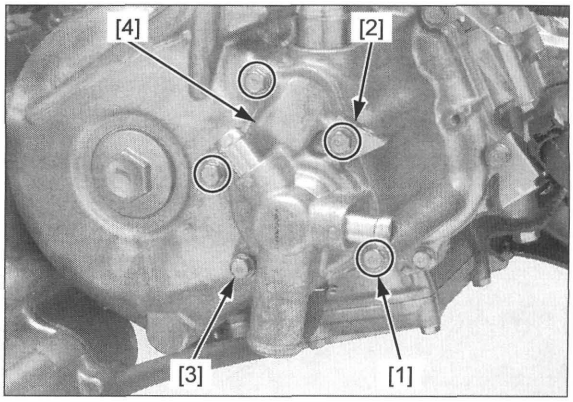


Disconnect the water hoses [1].



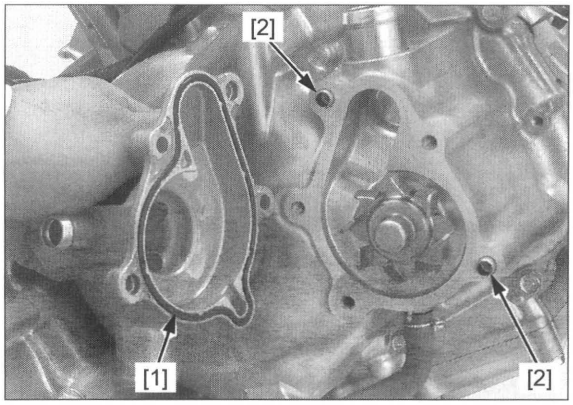
Remove the following:

- bolts [1]
- stay [2]
- sealing bolt and sealing washer [3]
- water pump cover [4]



Remove the following:

- O-ring [1]
- dowel pins [2]



Release the bleed hose [1].

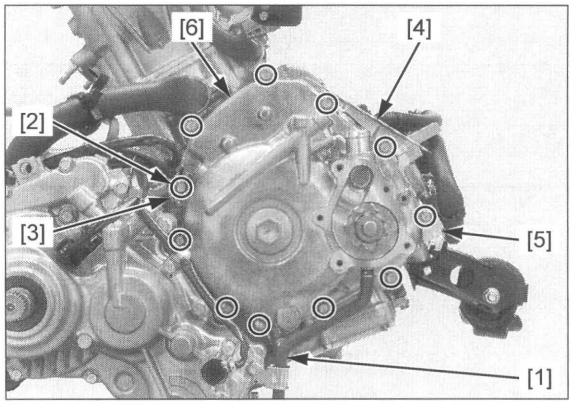
Remove the following:

- bolts [2]
- wire harness stay [3]
- connector stay [4]
- water hose stay [5]
- alternator cover [6]

NOTE:

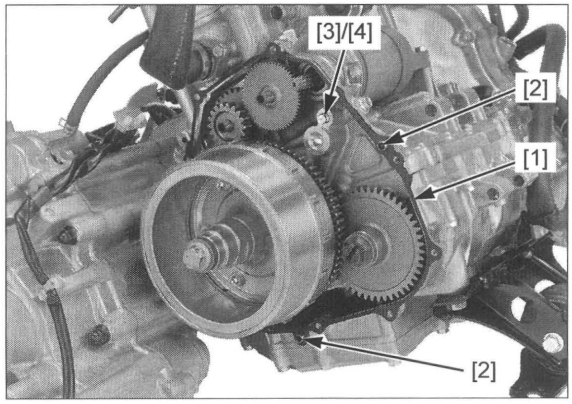
- The alternator cover (stator) is magnetically attracted to the flywheel, be careful during removal.

Check the alternator cover bearing and replace if necessary (page 13-10).



Remove the following:

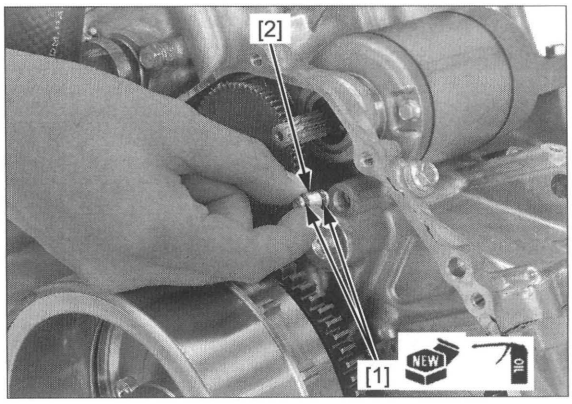
- gasket [1]
- dowel pins [2]
- oil joint [3]
- O-rings [4]



ALTERNATOR COVER INSTALLATION

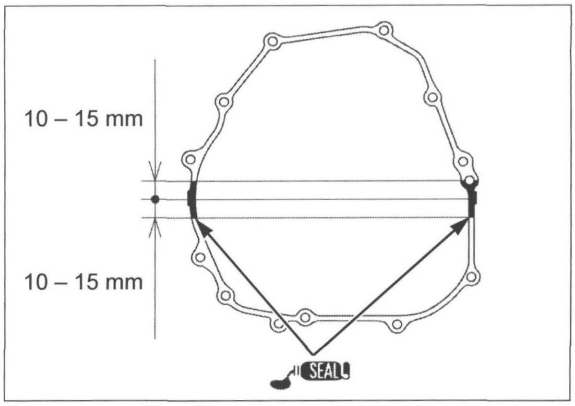
Apply engine oil to new O-rings [1] and install them onto the oil joint [2].

Install the oil joint.



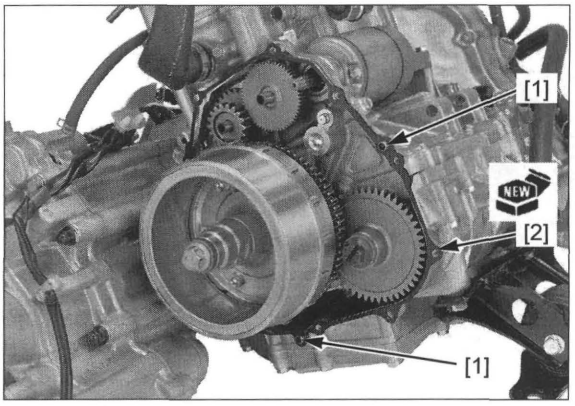
Clean the crankcase mating surfaces thoroughly.

Apply liquid sealant (TB1207B manufactured by ThreeBond or an equivalent) to the crankcase mating surface as shown.



Install the following:

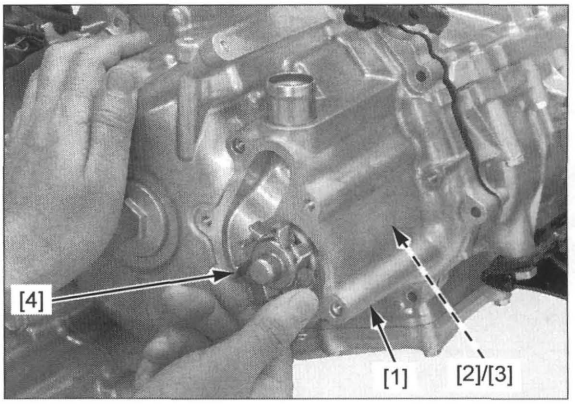
– dowel pins [1]
– new gasket [2]



Install the alternator cover [1].

NOTE:

- When installing the alternator cover, align the water pump shaft end [2] with the balancer shaft groove [3] by turning the impeller [4].
- The alternator cover (stator) is magnetically attracted to the flywheel, be careful during installation.

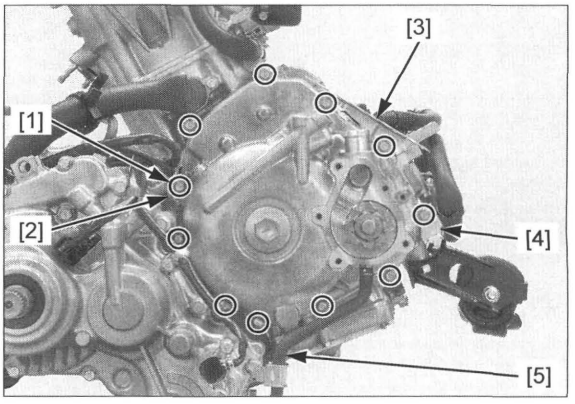


Install the following:

– alternator cover [1]
– bolts [1]
– wire harness stay [2]
– connector stay [3]
– water hose stay [4]

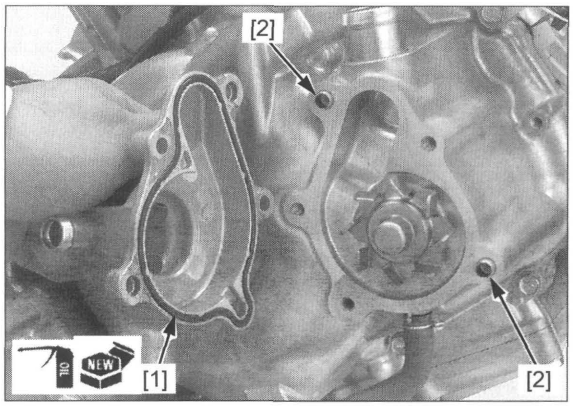
Tighten the bolts securely.

Install the bleed hose [5].



Apply engine oil to a new O-ring [1] and install it onto the water pump cover.

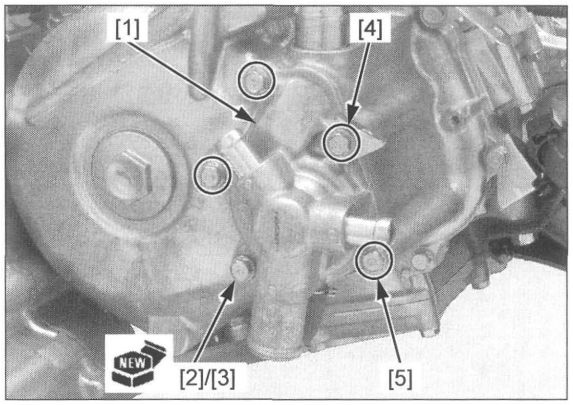
Install the dowel pins [2].



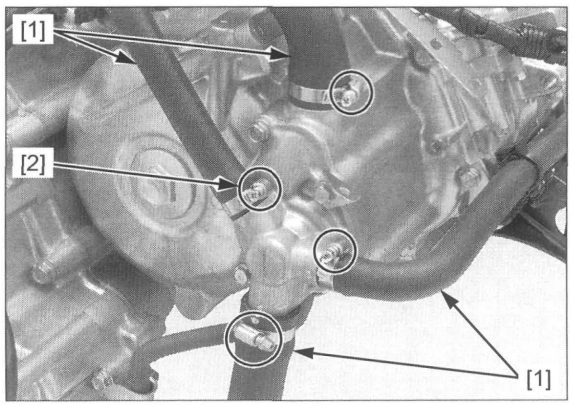
Install the following:

- water pump cover [1]
- sealing bolt [2] and new sealing washer [3]
- stay [4]
- bolts [5]

Tighten the bolts securely.



Connect the water hoses [1] and tighten the water hose band screws [2] to the specified range (page 10-20).



Install the clips to the connector stay [1]:

'22 models, After '22 models (III, IV, IX type)

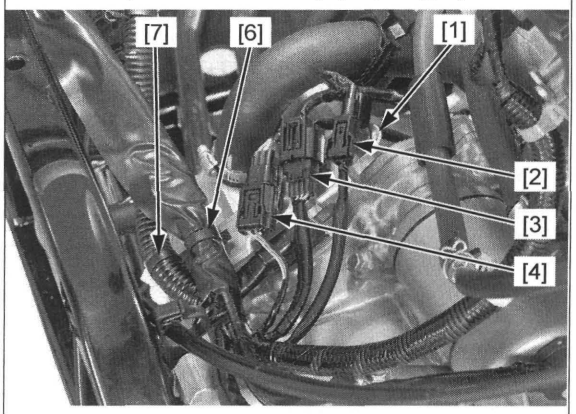
- neutral switch 1P connector [2]
- sub-transmission position switch 8P connector [3]
- TR sensor 3P connector [4]

After '22 models (Except III, IV, IX type)

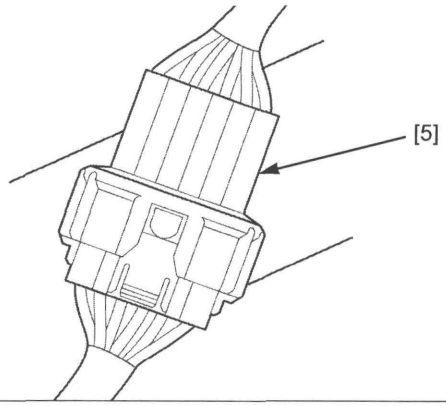
- sub-transmission position switch 12P connector [5]

- main wire harness [6]
- alternator wire [7]

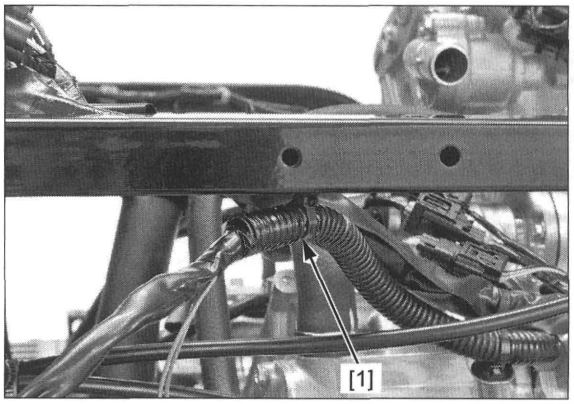
'22 models, After '22 models (III, IV, IX type)



After '22 models (Except III, IV, IX type)

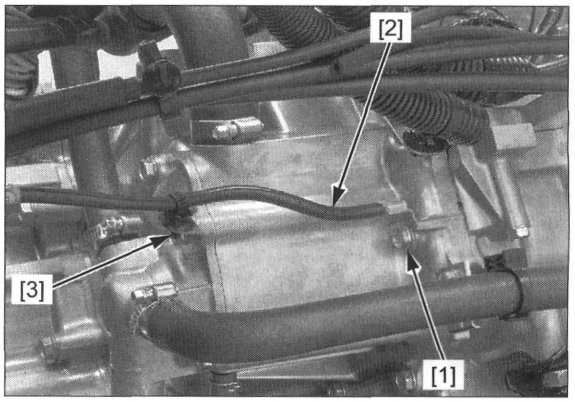


Install the cable clip [1].



Install the bolt [1] and frame ground cable [2] and tighten the bolt securely.

Install the cable clip [3].



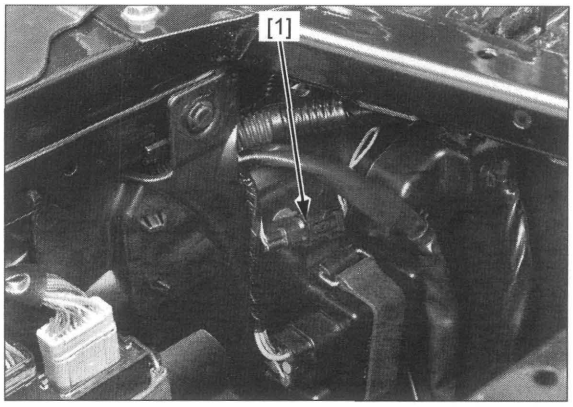
Connect the CKP sensor 2P connector [1].

Fill the system with the recommended coolant (page 9-4).

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

Install the regulator/rectifier (page 22-6).

Install the floor panel (page 2-17).



STATOR/CKP SENSOR REMOVAL/ INSTALLATION

Remove the alternator cover (page 13-4).

Remove the bolts [1] and CKP sensor [2].

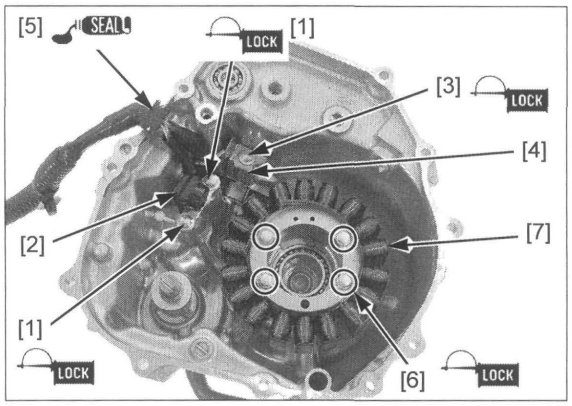
Remove the bolt [3] and wire clamp [4], and release the grommet [5] off the alternator cover.

Remove the bolts [6] and stator/CKP sensor assembly [7].

Installation is in the reverse order of removal.

NOTE:

- Apply locking agent to the bolt threads (page 1-15).
- Apply liquid sealant (TB1207B manufactured by ThreeBond or equivalent) to the grommet sealing surface.



TORQUE:

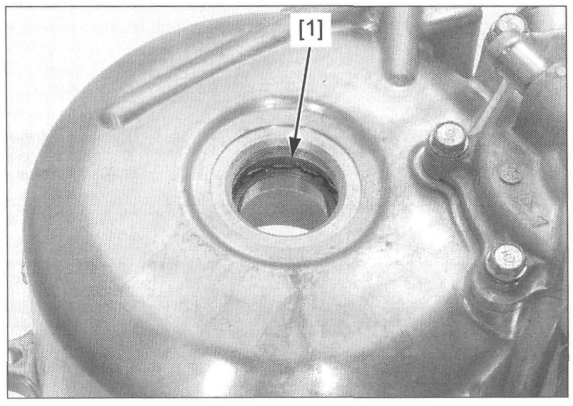
Alternator stator bolt:
10 N·m (1.0 kgf·m, 7 lbf·ft)

CKP sensor bolt:
12 N·m (1.2 kgf·m, 9 lbf·ft)

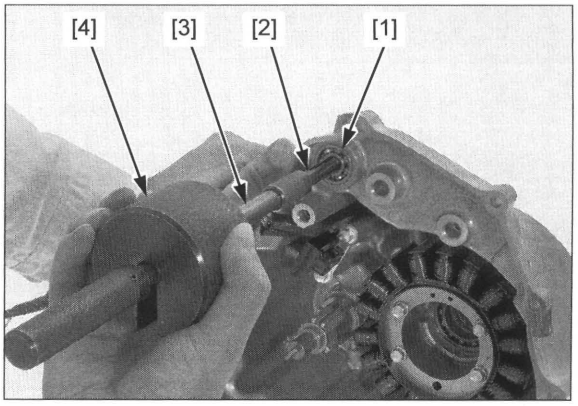
Alternator wire clamp bolt:
12 N·m (1.2 kgf·m, 9 lbf·ft)

BEARING REPLACEMENT

Drive out the ball bearing (6906) [1].



Remove the ball bearing (6000) [1] using the special tools.

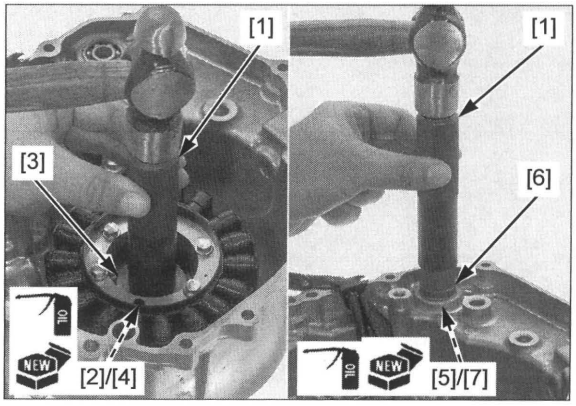


TOOLS:

Bearing remover head, 10 mm [2]	**07936-GE00200 (U.S.A.: 07936-GE0A000)**
Bearing remover shaft, 10 mm [3]	**07936-GE00100 (U.S.A.: 07936-GE0A000)**
Remover weight [4]	**07741-0010201 (U.S.A.: 07936-371020A)**
Remover handle	**(U.S.A.: 07936-3710100)**

Apply engine oil to new bearings.

Drive in the bearings with its marked side facing up until they are fully seated using the special tools.



TOOLS:

Driver [1]	**07749-0010000**
Ball bearing (6906) [2]	
Attachment, 42 x 47 mm [3]	**07746-0010300**
Pilot, 30 mm [4]	**07746-0040700**
Ball bearing (6000) [5]	
Attachment, 24 x 26 mm [6]	**07746-0010700**
Pilot, 10 mm [7]	**07746-0040100**

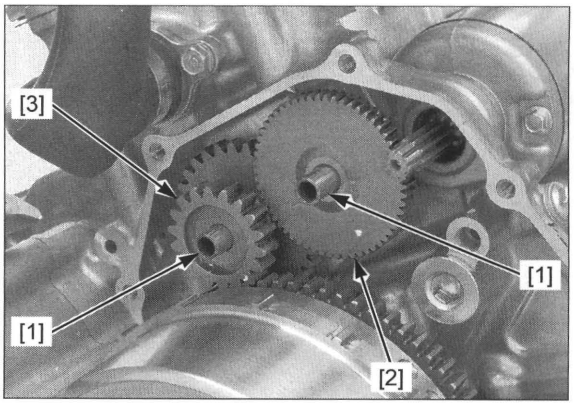
FLYWHEEL/REDUCTION GEARS

REMOVAL

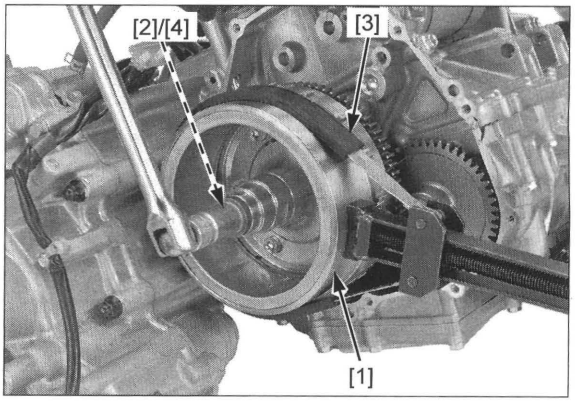
Remove the alternator cover (page 13-4).

Remove the following:

- starter reduction gear shafts [1]
- starter reduction gear B [2]
- starter reduction gear [3]



Hold the flywheel [1] with the special tool and loosen the flywheel bolt [2].



TOOL:

Flywheel holder [3]	**07725-0040001**

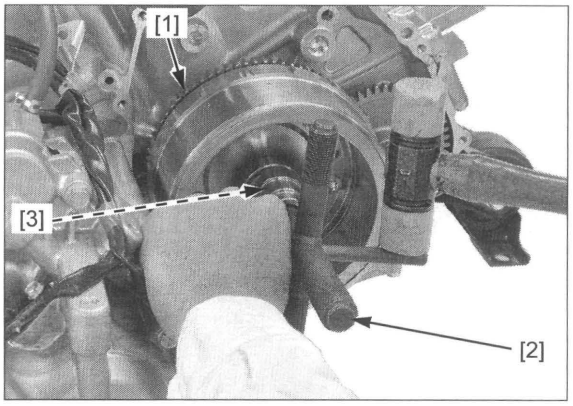
Remove the bolt and washer [4].

Remove the flywheel/starter driven gear [1] using the special tool.

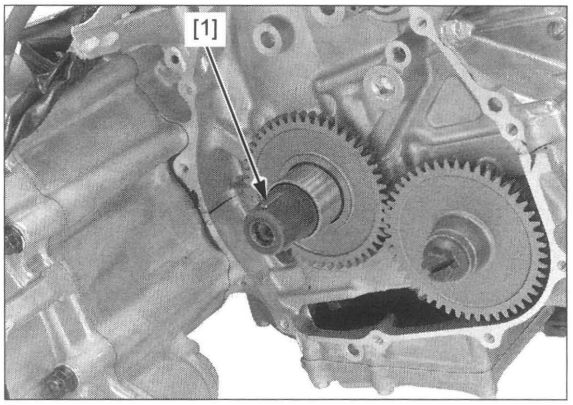
TOOL:

Rotor puller [2]	**07733-0020001**
	(U.S.A.: 07933-3950000)

Remove the needle bearing [3]



Remove the woodruff key [1].



INSPECTION

Inspect the following parts for scratches, damage, abnormal wear, or deformation.

- starter reduction gear shaft
- starter reduction gear
- woodruff key
- needle bearing

INSTALLATION

Be careful not to damage the key groove and crankshaft.

Install the woodruff key [1].

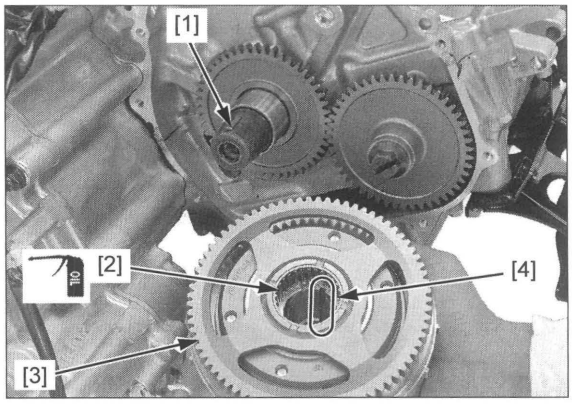
Apply engine oil to the needle bearing rotating area. Install the needle bearing [2].

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

Install the flywheel/starter driven gear [3] to the crankshaft.

NOTE:

- Align the flywheel keyway [4] with the woodruff key.

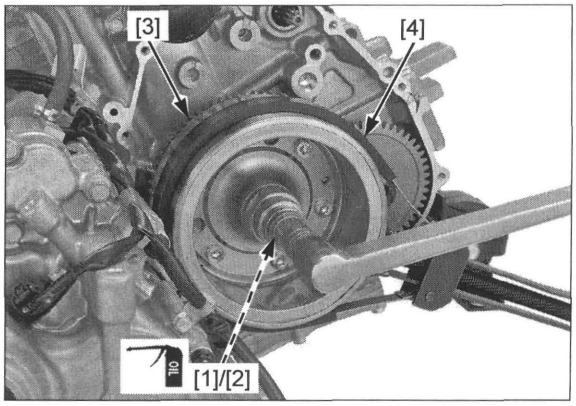


Apply engine oil to the flywheel bolt [1] threads and seating surface, and install the washer [2] and bolt.

Hold the flywheel [3] using the special tool and tighten the bolt to the specified torque.

TOOL:
Flywheel holder [4] **07725-0040001**

TORQUE: 110 N·m (11.2 kgf·m, 81 lbf·ft)

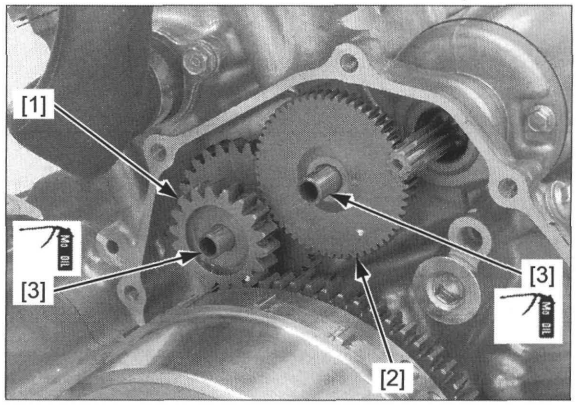


Apply molybdenum oil solution to the starter reduction gear shaft outer surfaces.

Install the following:

- starter reduction gear [1]
- starter reduction gear B [2]
- starter reduction gear shafts [3]

Install the alternator cover (page 13-6).



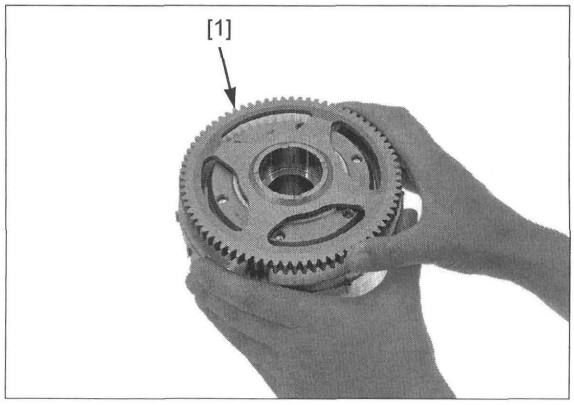
STARTER CLUTCH

STARTER CLUTCH DISASSEMBLY

Remove the flywheel (page 13-11).

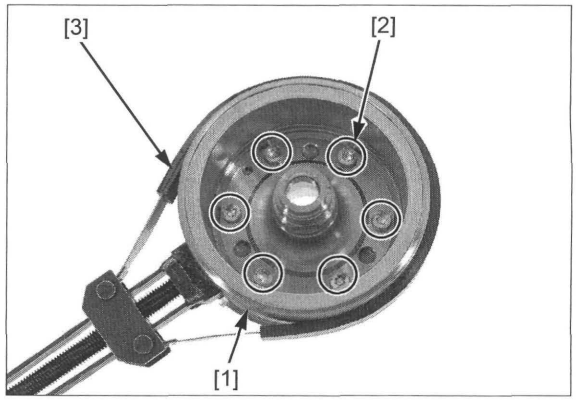
Make sure that the starter driven gear [1] turns counterclockwise smoothly and does not turn clockwise.

Remove the driven gear while turning it counterclockwise.



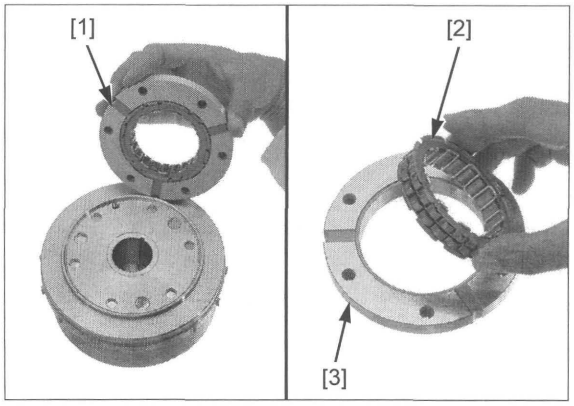
Hold the flywheel [1] with the special tool and remove the starter clutch outer bolts [2].

TOOL:
Flywheel holder [3] **07725-0040001**



Remove the starter clutch assembly [1].

Remove the starter one-way clutch [2] from the starter clutch outer [3].



INSPECTION

Inspect the following parts for scratches, damage, abnormal wear, or deformation.

- Starter driven gear
- Starter clutch outer
- Starter one-way clutch

Measure each part according to ALTERNATOR/ STARTER CLUTCH SPECIFICATIONS (page 1-11).

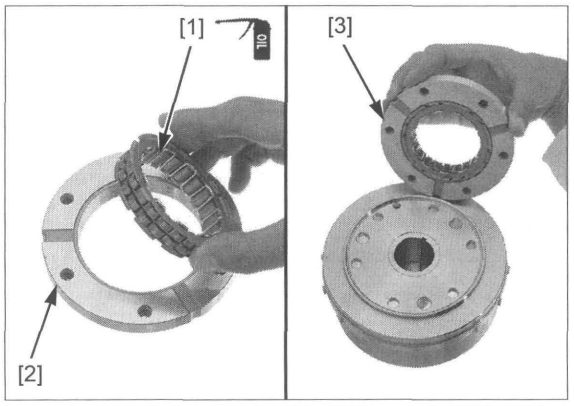
Replace any part if it is out of the service limit.

STARTER CLUTCH ASSEMBLY

Apply engine oil to the one-way clutch [1] sliding surface.

Install the one-way clutch to the clutch outer [2] with the flanged side facing the flywheel side.

Install the starter clutch assembly [3].



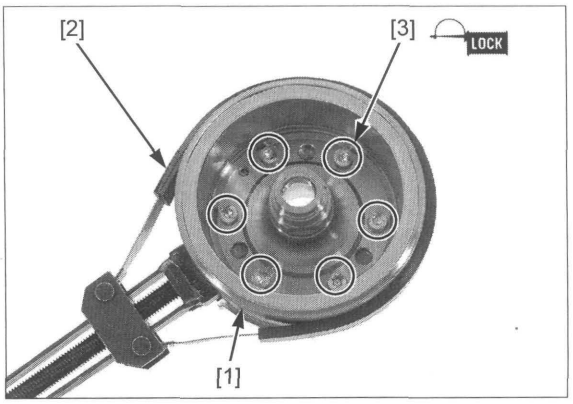
Hold the flywheel [1] with the special tool.

TOOL:
Flywheel holder [2] 07725-0040001

Apply locking agent to the starter clutch outer bolt threads (page 1-15).

Install and tighten the bolts [3] to the specified torque.

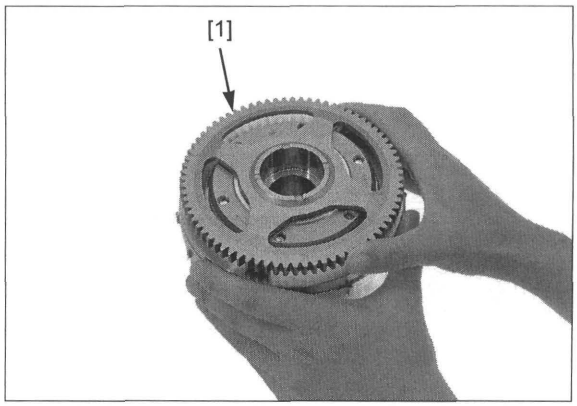
TORQUE: 23 N·m (2.3 kgf·m, 17 lbf·ft)



Install the starter driven gear [1] while turning it counterclockwise.

Recheck the one-way clutch operation (page 13-13).

Install the flywheel (page 13-12).



MEMO

14. CRANKCASE/TRANSMISSION/BALANCER

SERVICE INFORMATION 14-2

TROUBLESHOOTING 14-3

COMPONENT LOCATION 14-4

CRANKCASE SEPARATION 14-5

TRANSMISSION 14-7

BALANCER 14-14

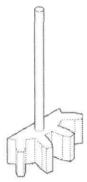
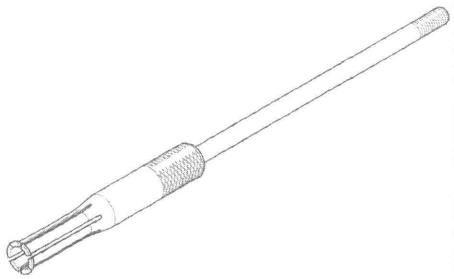
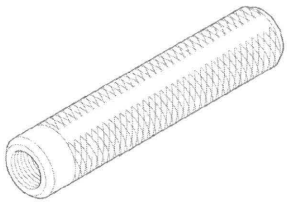
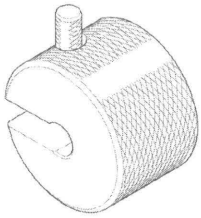
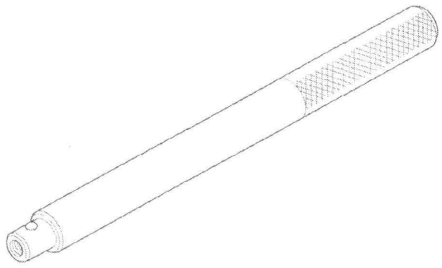
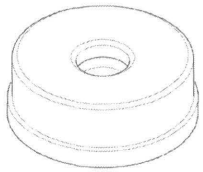
CRANKCASE ASSEMBLY 14-16

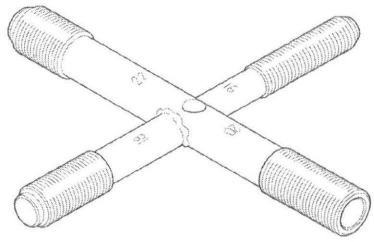
SERVICE INFORMATION

GENERAL

- The crankcase must be separated to service the following:
  - transmission
  - balancer
  - crankshaft (page 15-4)
  - piston/cylinder (page 15-12)
- The following components must be removed before separating the crankcase:
  - engine (page 16-4)
  - starter motor (page 6-4)
  - cylinder head (page 10-14)
  - flywheel (page 13-11)
  - dual clutch (page 11-66)
  - primary drive gear (page 11-65)
  - gearshift linkage (page 11-68)
  - sub-transmission (page 12-5)
  - TR sensor (page 11-59)
  - neutral switch (page 11-65)
  - oil strainer (page 8-11)
- Be careful not to damage the crankcase mating surfaces when servicing.
- Clean the oil passages before assembling the crankcase halves.
- Prior to assembling the crankcase halves, apply sealant to their mating surfaces. Wipe off excess sealant thoroughly.

TOOLS

Gear holder, 2.5 07724-0010100  or 07724-001A100 (U.S.A. only)	Bearing remover, 22 mm 070MC-MFR0100 	Remover handle 07936-3710100 
Remover weight 07741-0010201  or 07936-371020A (U.S.A. only)	Driver, 15 x 280 mm 07949-3710001 	Attachment, 52 x 55 mm 07746-0010400 

Pilot, 22 mm 07746-0041000	Pilot, 12 mm 07746-0040200	Rotor puller 07733-0020001
		 or 07933-3950000 (U.S.A. only)

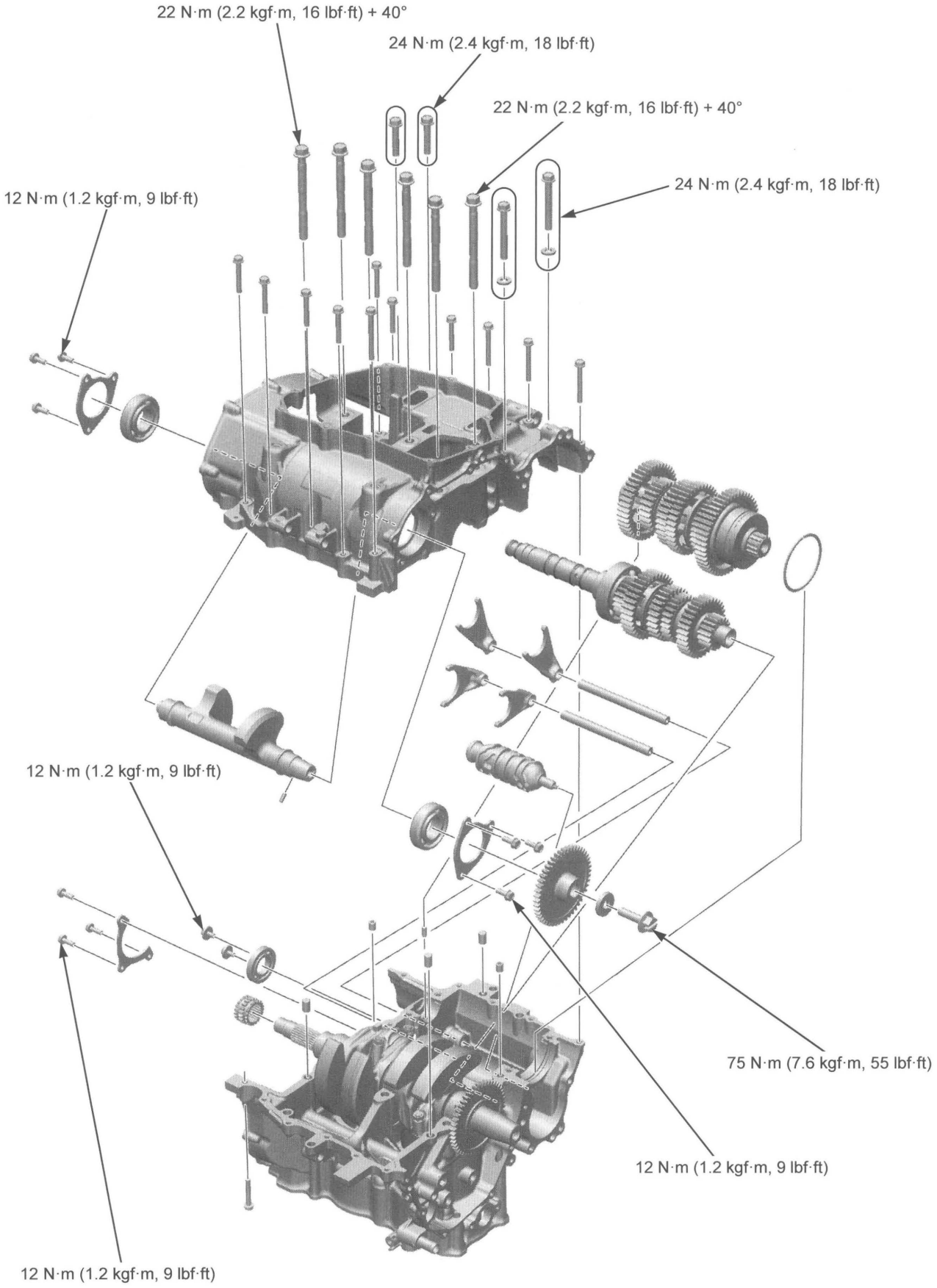
TROUBLESHOOTING

Hard to shift
- Improper clutch operation
- Incorrect engine oil weight
- Bent shift fork
- Bent shift fork shaft
- Bent shift fork claw
- Damaged shift drum groove
- Bent gearshift spindle (page 11-68)

Engine transmission jumps out of gear
- Worn gear dogs
- Worn gear shifter groove
- Bent shift fork shaft
- Worn or bent shift forks
- Broken shift drum stopper arm (page 11-68)
- Broken shift drum stopper arm return spring (page 11-68)
- Broken gearshift spindle return spring (page 11-68)

Excessive engine noise
- Worn or damaged transmission gear
- Worn or damaged transmission bearings
- Incorrect balancer installation

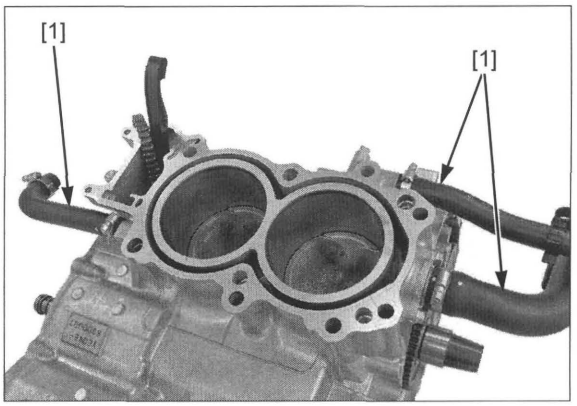
COMPONENT LOCATION



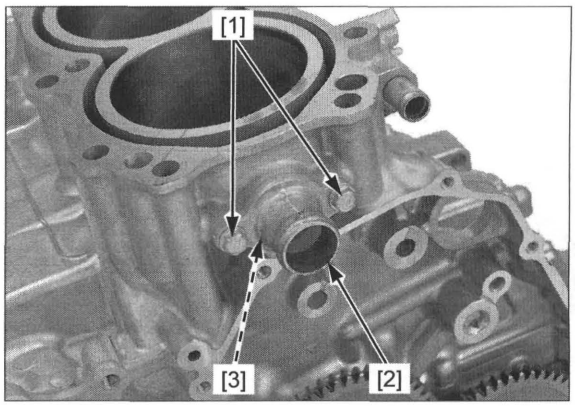
CRANKCASE SEPARATION

Refer to Service Information for removal of the necessary parts before separating the crankcase (page 14-2).

Remove the water hoses [1].

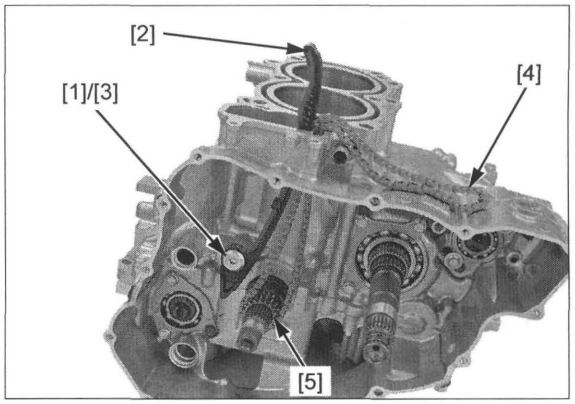


Remove the bolts [1], water hose flange [2], and O-ring [3].



Remove the cam chain tensioner bolt [1], cam chain tensioner [2], and washer [3].

Remove the cam chain [4] and timing sprocket [5].



If you plan to service the balancer shaft, perform the following procedure:

Install the special tool between the balancer drive gear and driven gear.

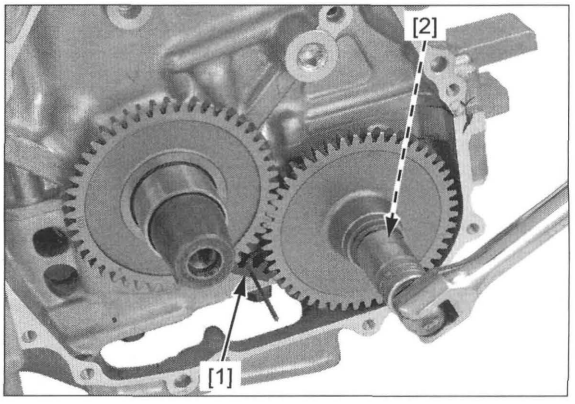
TOOL:

Gear holder, 2.5 [1]	**07724-0010100 (U.S.A.: 07724-001A100)**

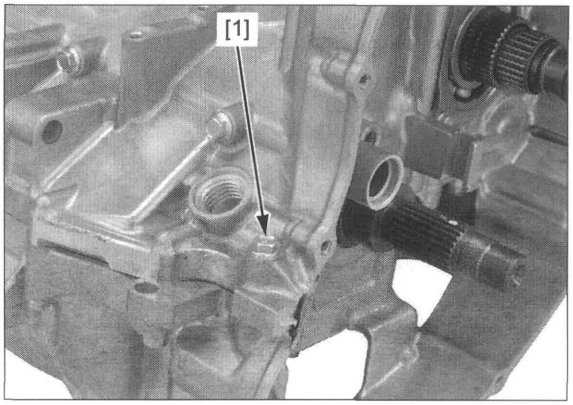
Loosen the balancer driven gear bolt [2].

NOTE:

- The balancer driven gear bolt has left hand threads.



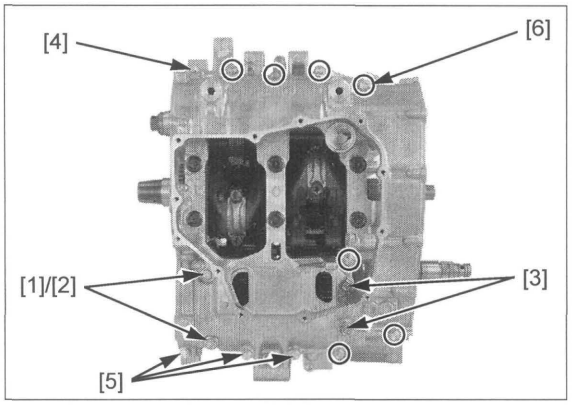
Remove the 6 x 40 mm flange bolt [1].



Place the engine upside down.

Loosen the bolts in a crisscross pattern in 2 or 3 steps, and remove the bolts and washers.

- 8 x 65 mm flange bolts [1]
- 8 mm sealing washers [2]
- 8 x 40 mm flange bolts [3]
- 6 x 60 mm flange bolt [4]
- 6 x 50 mm flange bolts [5]
- 6 x 40 mm flange bolts [6]

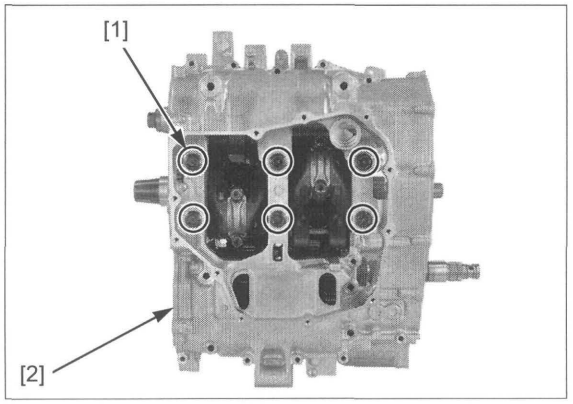


Loosen the crankcase main journal bolts [1] in a crisscross pattern in 2 or 3 steps and remove them.

Separate the lower crankcase [2] from the upper crankcase.

NOTE:

- Do not pry the crankcase halves with a screwdriver.

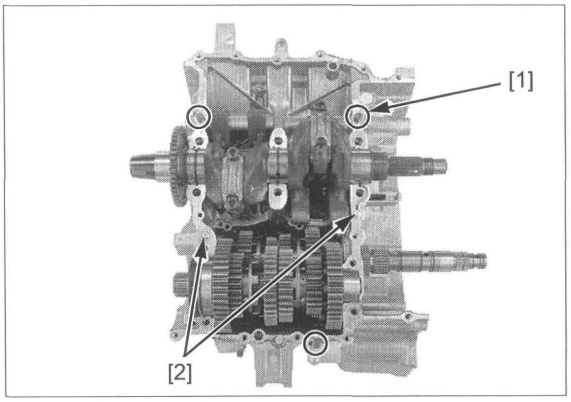


Remove the dowel pins [1] and oil joints [2].

Clean off any sealant from the crankcase mating surfaces.

Clean the oil joints in solvent thoroughly.

Check the oil joints for clogs and clean them with compressed air if necessary.



TRANSMISSION

REMOVAL/DISASSEMBLY

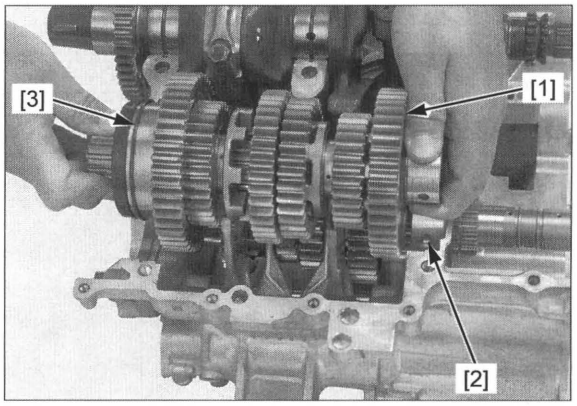
Separate the crankcase halves (page 14-5).

Remove the countershaft assembly [1].

Remove the dowel pin [2] and countershaft bearing set ring [3].

Disassemble the countershaft assembly.

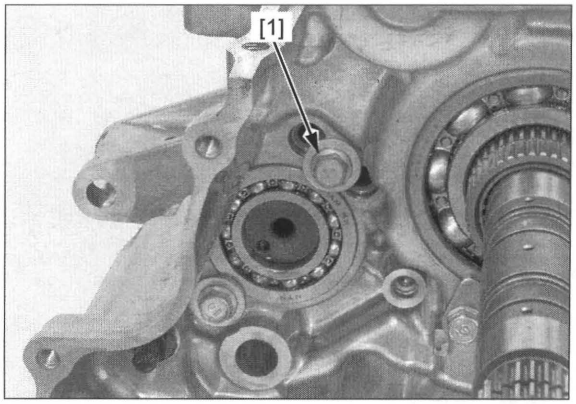
Clean all disassembled parts in solvent thoroughly.



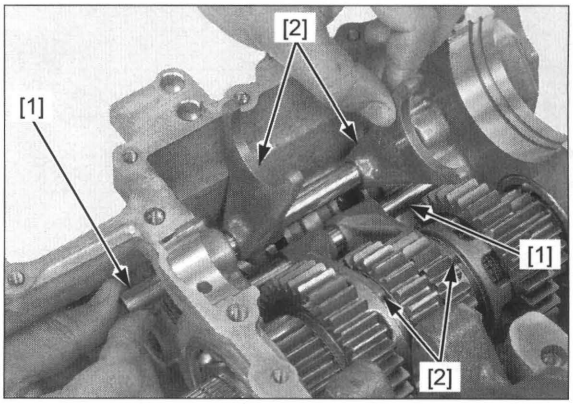
NOTE:

- Keep track of the disassembled parts by sliding them onto a tool or a piece of wire.
- Do not expand the snap ring more than necessary for removal. To remove a snap ring, expand the snap ring and pull it off using the gear behind it.

Remove the shift drum bearing set bolt/washer [1].

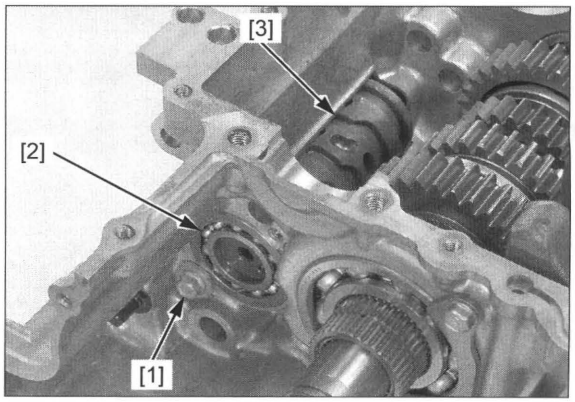


Remove the fork shafts [1] and shift forks [2]

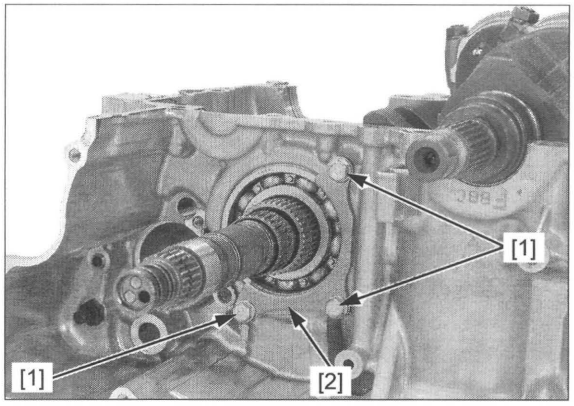


Remove the shift drum bearing set bolt/washer [1], bearing [2], and shift drum [3].

Check the bearing and replace if necessary.

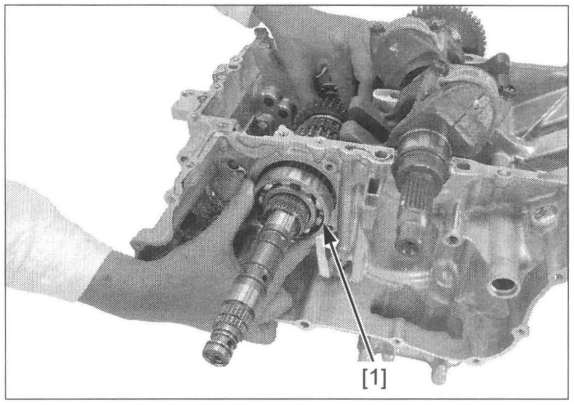


Remove the bolts [1] and mainshaft bearing set plate [2].



Remove the rear mainshaft bearing [1].

Check the bearing and replace if necessary.



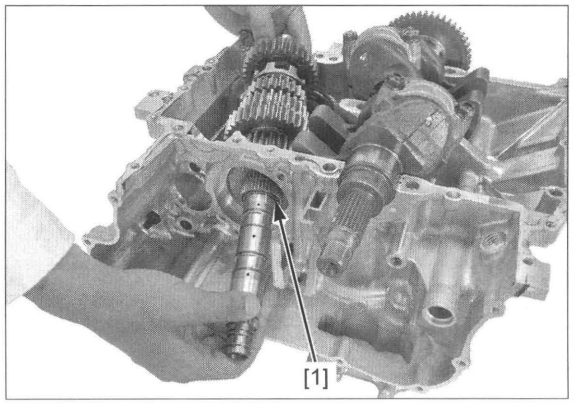
Remove the mainshaft assembly [1].

Disassemble the mainshaft assembly.

Clean all disassembled parts in solvent thoroughly.

NOTE:

- Keep track of the disassembled parts by sliding them onto a tool or a piece of wire.
- Do not expand the snap ring more than necessary for removal. To remove a snap ring, expand the snap ring and pull it off using the gear behind it.



INSPECTION

Inspect the following parts for scratches, damage, abnormal wear, or deformation.

- transmission gears
- transmission bushings
- transmission bearings
- shift drum/bearing
- shift forks
- shift fork shafts

Measure each part according to CRANKCASE/ TRANSMISSION/BALANCER SPECIFICATIONS (page 1-12).

Replace any part if it is out of the service limit.

BEARING REPLACEMENT

Remove the following:

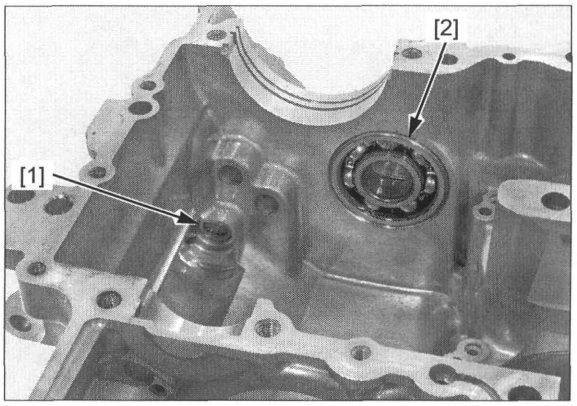
- mainshaft (page 14-7)
- crankshaft (page 15-4)
- pistons/connecting rods (page 15-12)

Remove the needle bearing [1].

Remove the front mainshaft bearing [2] using the special tools.

TOOLS:

Bearing remover, 22 mm	**070MC-MFR0100**
Bearing handle	**07936-3710100**
Remover weight	**07741-0010201 (U.S.A.: 07936-371020A)**

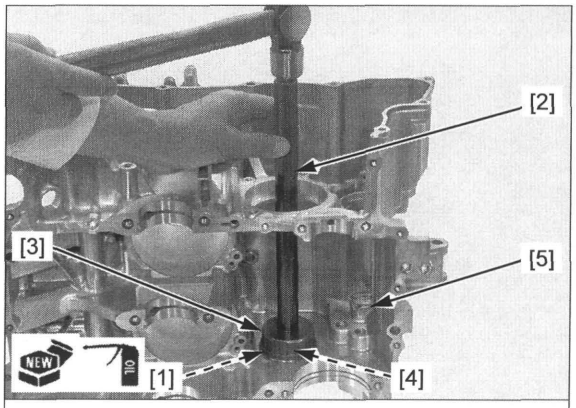


Apply engine oil to new bearings.

Drive in the front mainshaft bearing [1] with its marked side facing up until they are fully seated using the special tools.

TOOLS:

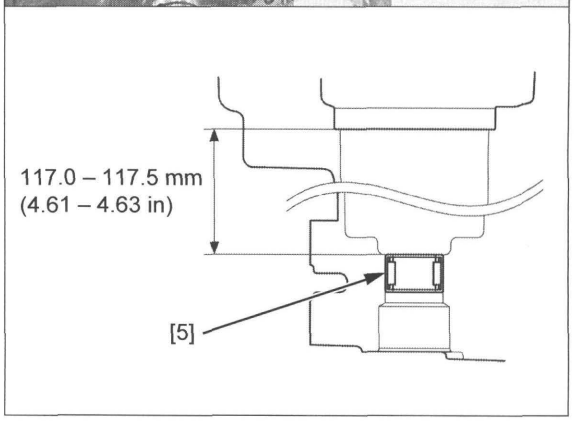
Driver, 15 x 280 mm [2]	**07949-3710001**
Attachment, 52 x 55 mm [3]	**07746-0010400**
Pilot, 22 mm [4]	**07746-0041000**



Install the needle bearing [5] with its marked side facing up until it is in the position as shown.

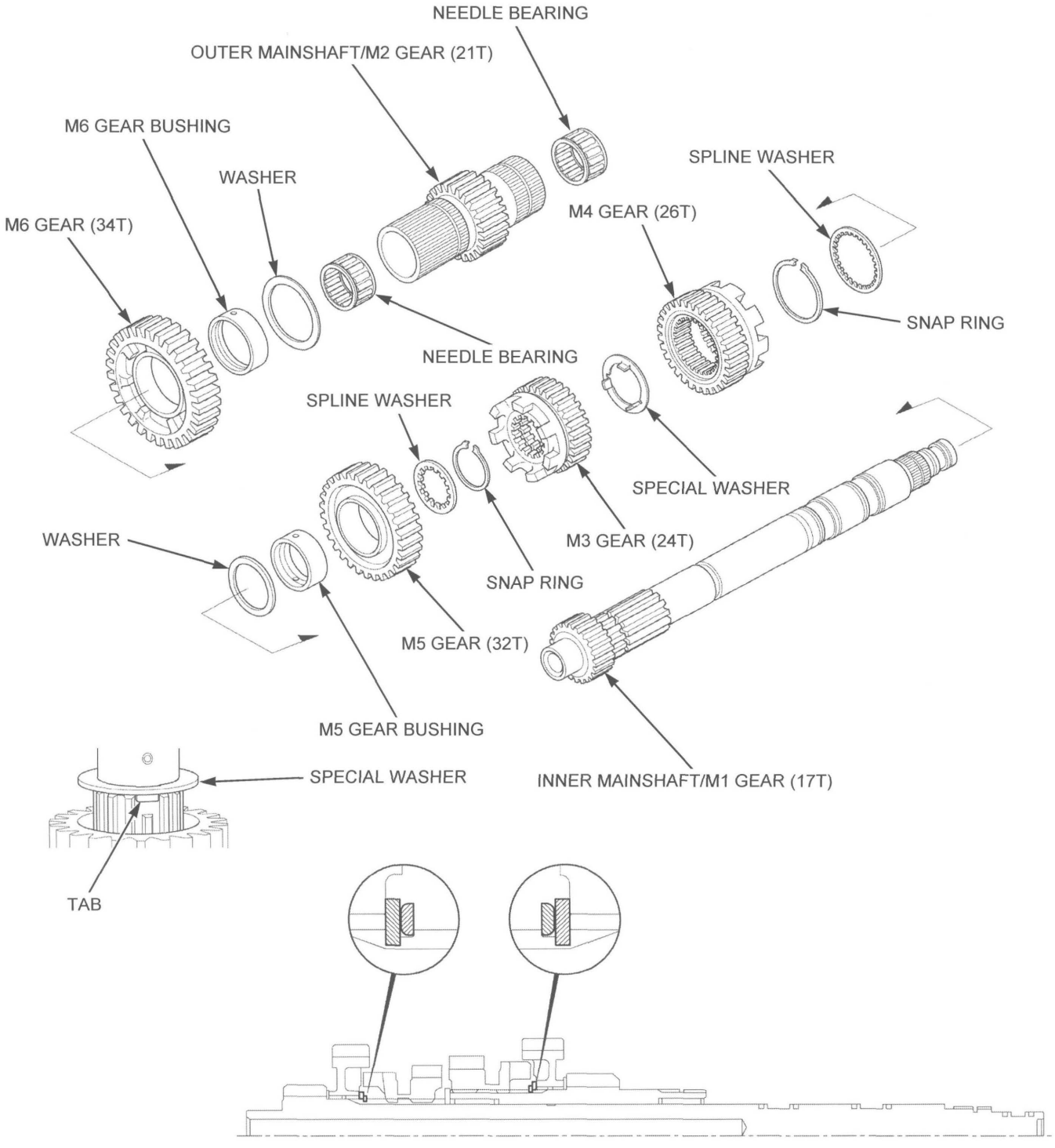
Install the following:

- pistons/connecting rods (page 15-14)
- crankshaft (page 15-5)
- mainshaft (page 14-10)



TRANSMISSION ASSEMBLY/ INSTALLATION

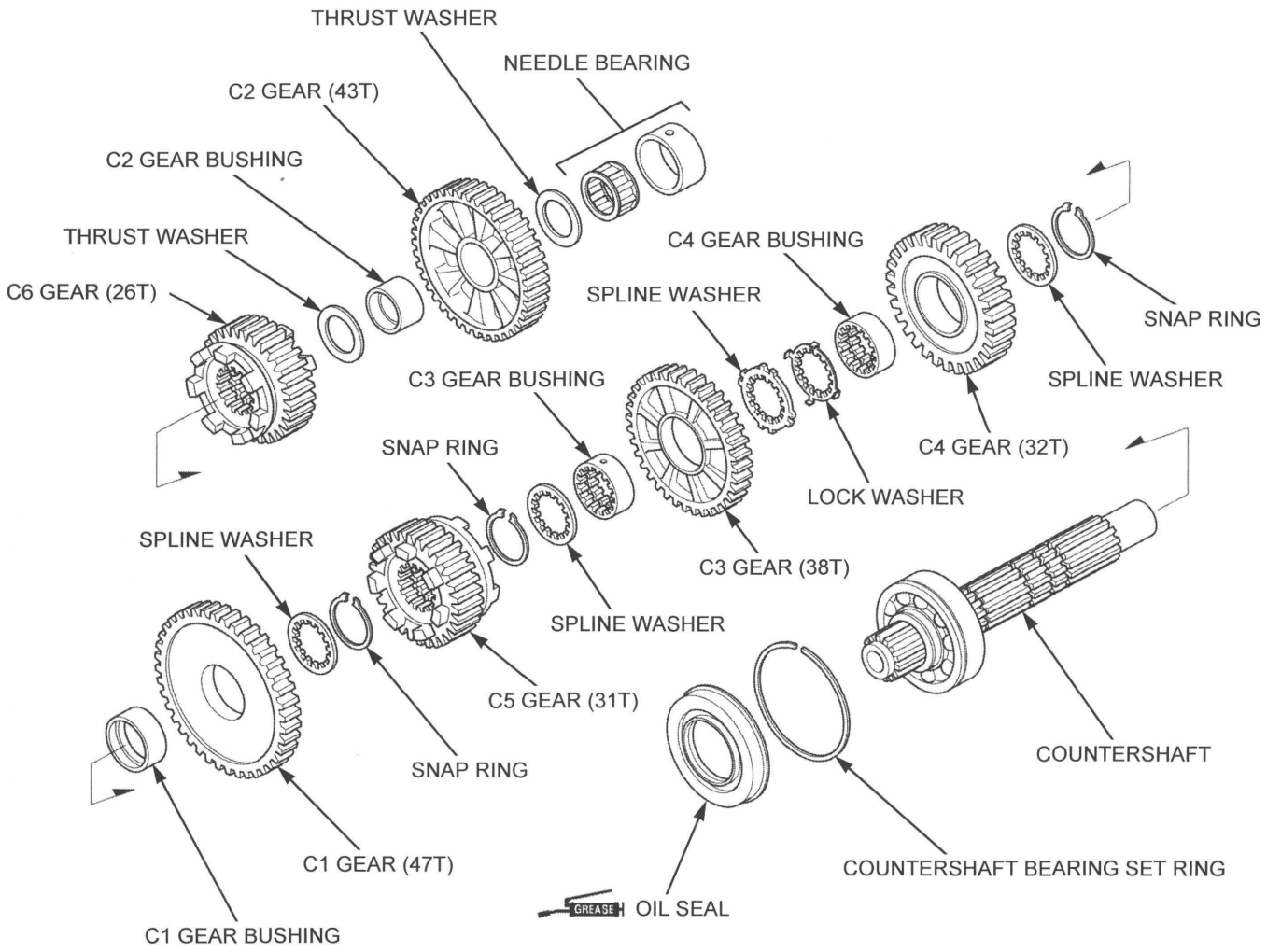
MAINSHAFT



: Gear teeth, rotating surfaces, and bearing

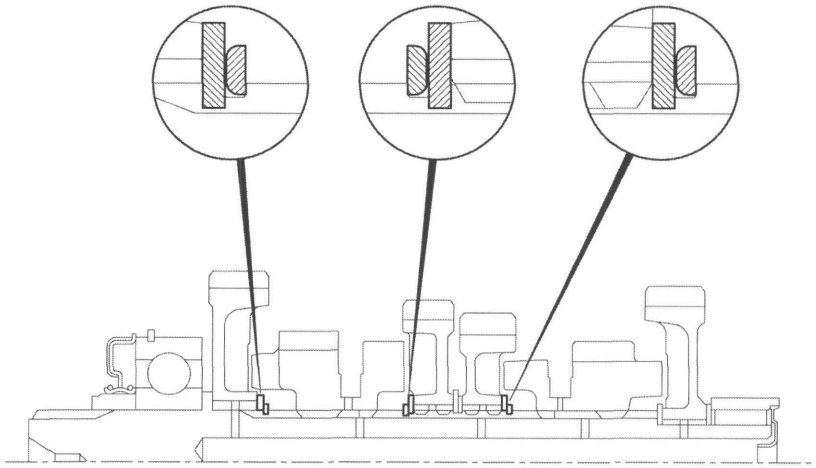
: Bushing surfaces, gear shifter grooves, and splines

COUNTERSHAFT



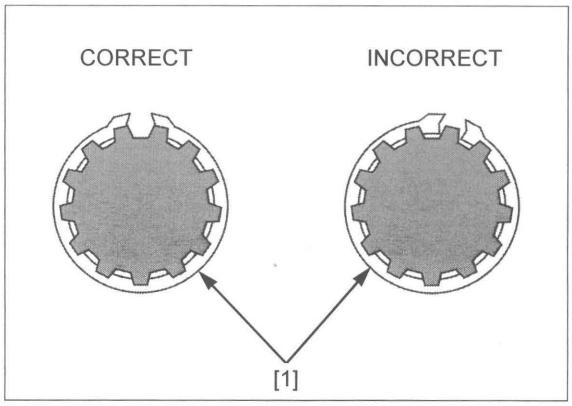
OIL : Gear teeth, rotating surfaces, and bearing

MOLY OIL : Bushing surfaces, gear shifter grooves, and splines

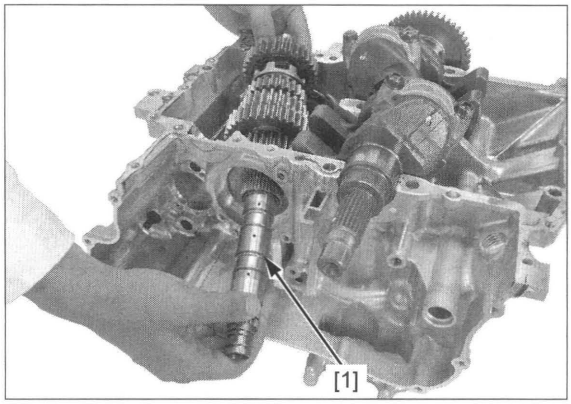


NOTE:

- Coat each gear with clean engine oil and check for smooth movement.
- Align the lock washer tabs with the spline washer grooves.
- Always install the thrust washers and snap rings with the chamfered (rolled) edge facing away from the thrust load.
- Install the snap rings [1] so that the end gap aligns with the groove of the splines as shown.
- Make sure that the snap rings are fully seated in the shaft groove after installing them.



Install the mainshaft assembly [1].

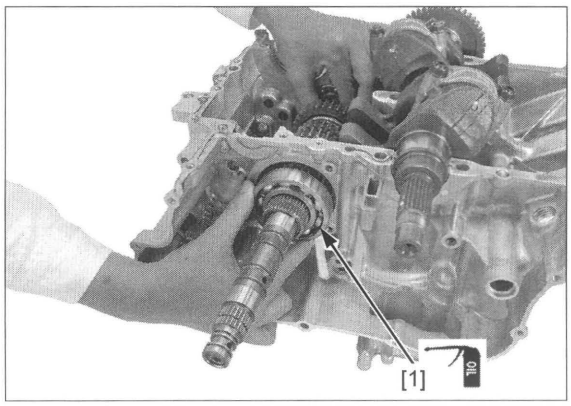


Apply engine oil to the rear mainshaft bearing.

Install the rear mainshaft bearing [1].

NOTE:

- Install the bearing into the crankcase with the marked side facing out.

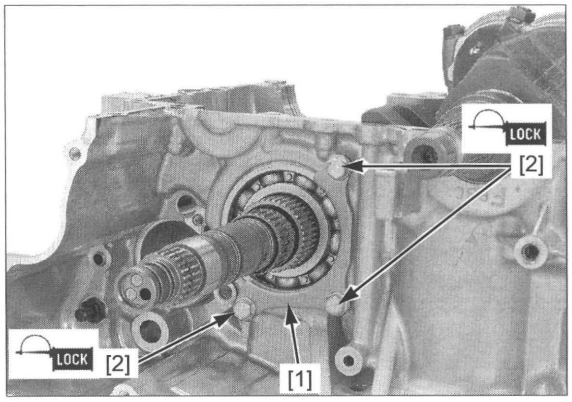


Apply locking agent to the mainshaft bearing set plate bolts threads.

Install the bearing set plate [1].

Install and tighten the bolts [2] to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)



Apply engine oil to the shift drum bearing.

Apply locking agent to the shift drum bearing set bolt/washer threads.

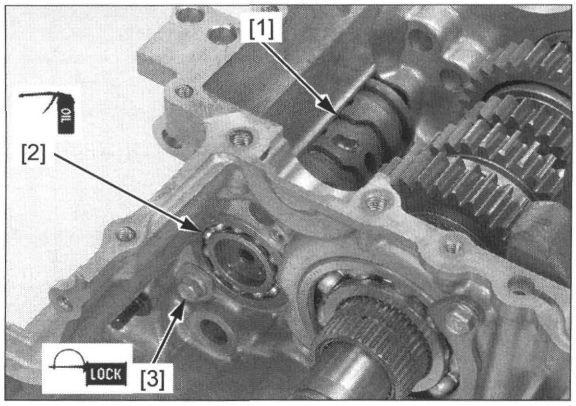
Install the shift drum [1], bearing [2] and shift drum bearing set bolt/washer [3].

NOTE:

- Install the bearing into the crankcase with the marked side facing out.

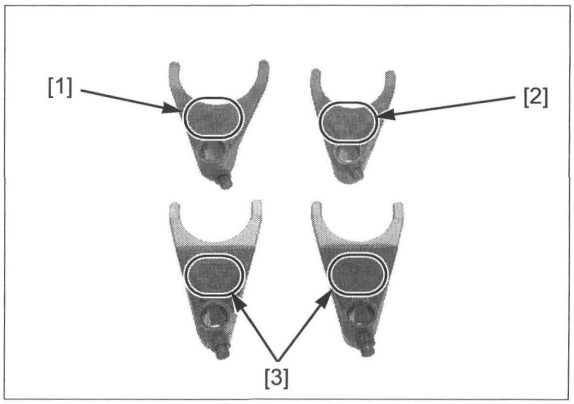
Tighten the bolt to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)



The shift forks have the following identification marks:

– "HL8 O" mark [1]: outer mainshaft shift fork
– "HL8 I" mark [2]: inner mainshaft shift fork
– "HL8 C" mark [3]: countershaft shift fork



Apply molybdenum oil solution to the shift fork shaft outer surfaces, shift fork claws, and guide pins.

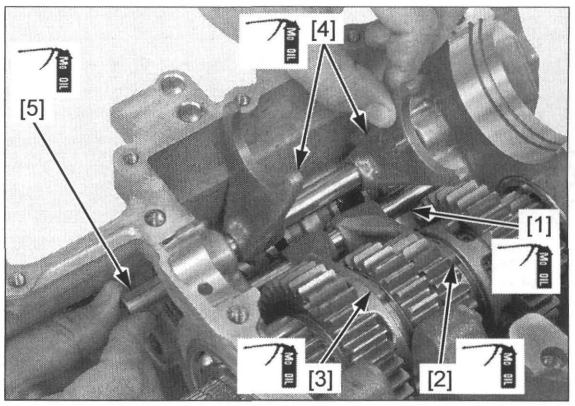
Install the mainshaft shift forks and shaft [1].

– inner shift fork [2] into the M3 gear
– outer shift fork [3] into the M4 gear

Install the countershaft shift forks [4] and shaft [5].

NOTE:

- Install each shift fork with their marks facing rearward.
- Make sure that each shift fork guide pin is positioned in the correct guide grooves of the shift drum.

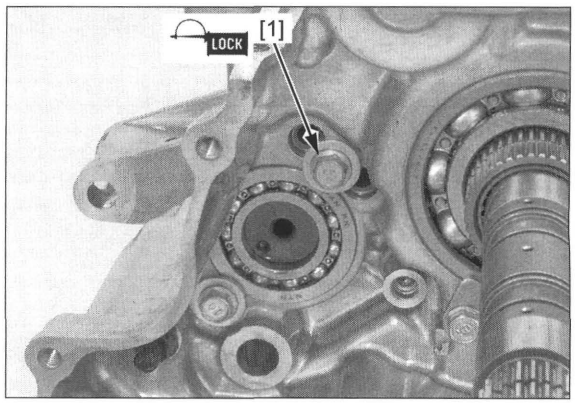


Apply locking agent to the shift drum bearing set bolt/washer threads.

Install the shift drum bearing set bolt/washer [1].

Tighten the bolt to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)



Install the dowel pin [1] onto the upper crankcase hole.

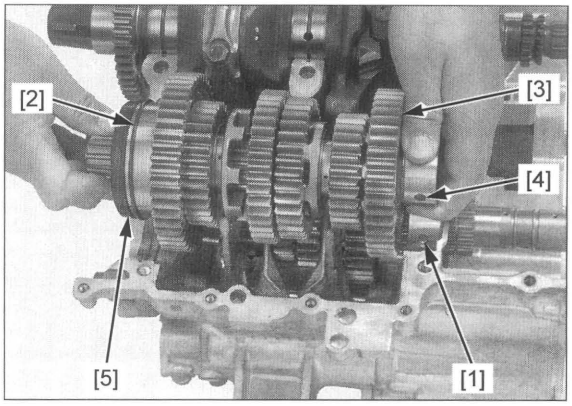
Install the countershaft bearing set ring [2] into the countershaft bearing groove.

Install the countershaft assembly [3].

NOTE:

- Align the needle bearing cap hole [4] with the dowel pin.
- Align the set ring with the upper crankcase groove.
- Align the oil seal [5] flange with the upper crankcase groove.

Assemble the crankcase (page 14-16).

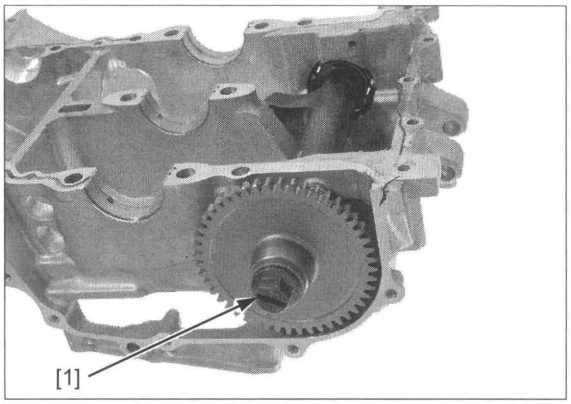


BALANCER

REMOVAL

Separate the crankcase halves (page 14-5).

Remove the balancer shaft bolt [1].

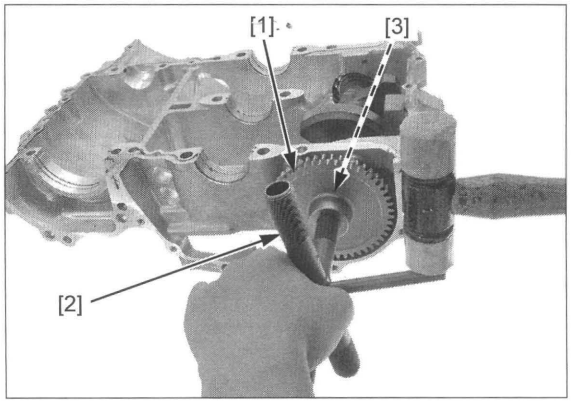


Remove the balancer driven gear [1] using the special tool.

TOOL:

Rotor puller [2]	**07733-0020001 (U.S.A.: 07933-3950000)**

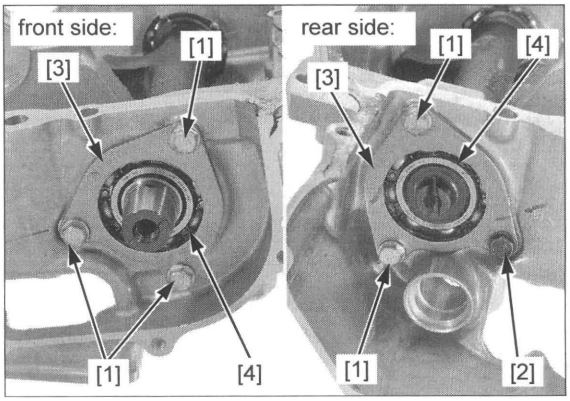
Remove the locating pin [3] from the balancer shaft.



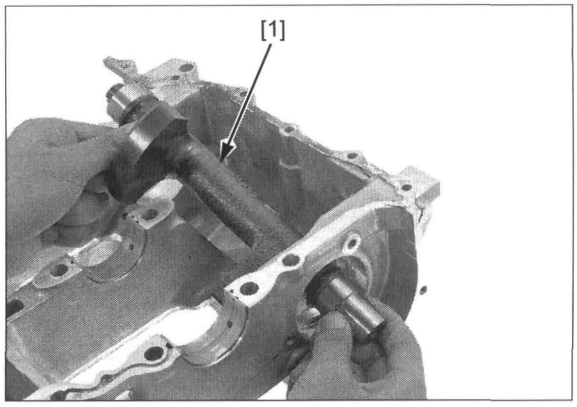
Remove the following from the lower crankcase:

- balancer shaft bearing set plate bolts [1]
- balancer shaft bearing set plate bolt (black) [2]
- balancer shaft bearing set plates [3]
- balancer shaft bearings [4]

Check the bearings and replace if necessary.



Remove the balancer shaft [1].



INSPECTION

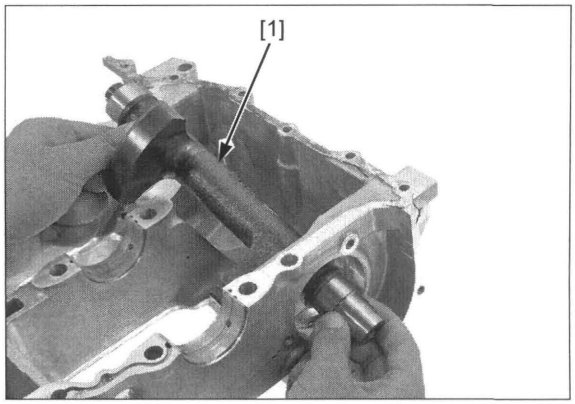
Inspect the following parts for scratches, damage, abnormal wear, or deformation.

- balancer driven gear
- balancer shaft
- balancer shaft bearings

Replace if necessary.

INSTALLATION

Install the balancer shaft [1].



Apply engine oil to the balancer shaft bearings.

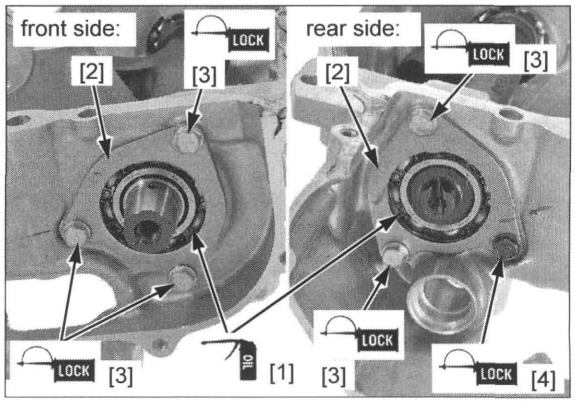
Install the balancer shaft bearings [1] with the marked side facing out.

Apply locking agent to the balancer shaft bearing set plate bolts threads.

Install the balancer shaft bearing set plate [2] with its "OUT SIDE" mark facing out.

Install and tighten the balancer shaft bearing set plate bolt [3]/[4] (black) to the specified torque.

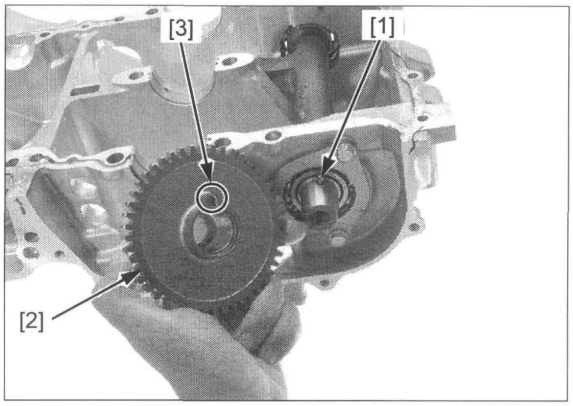
TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)



Clean any oil from the tapered areas of the balancer shaft and balancer driven gear thoroughly.

Install the locating pin [1] into the balancer shaft.

Install the balancer driven gear [2] by aligning the groove [3] with the locating pin.

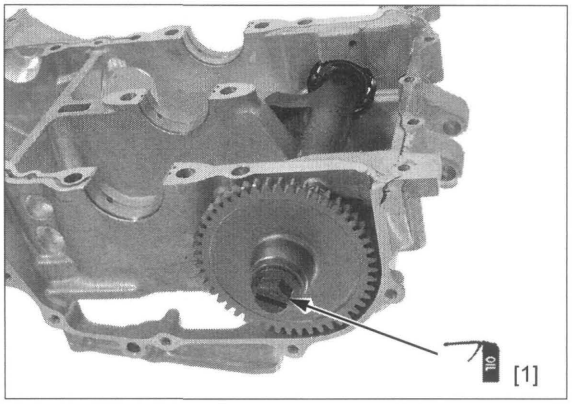


Apply engine oil to the balancer shaft bolt threads and seating surface.

Install the balancer shaft bolt [1].

Temporarily tighten the bolt.

Assemble the crankcase (page 14-16).

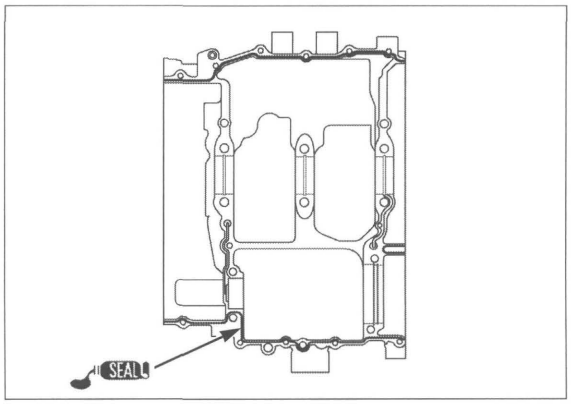


CRANKCASE ASSEMBLY

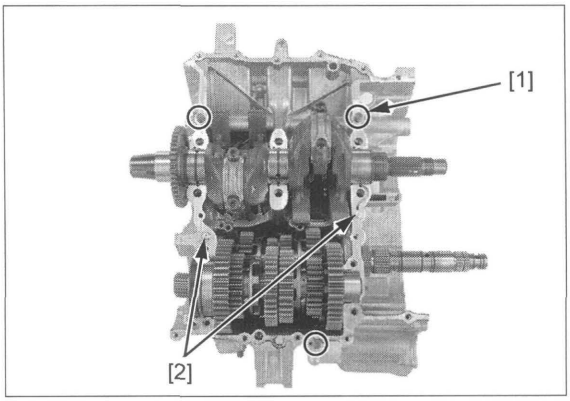
Apply liquid sealant (TB1207B manufactured by Three Bond or equivalent) to the crankcase mating surface as shown.

NOTE:

- Do not apply more liquid sealant than necessary.
- Do not apply liquid sealant to the crankcase main journal bolts areas and the oil passage areas.

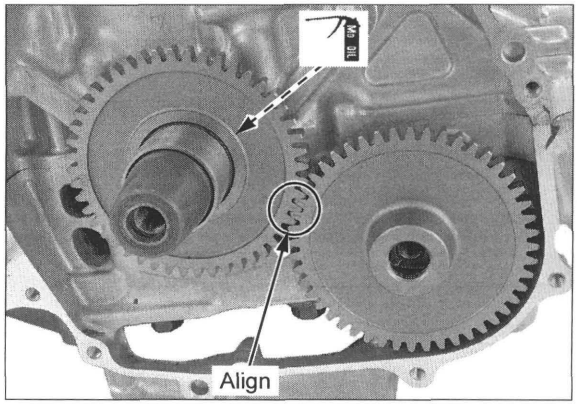


Install the dowel pins [1] and oil joints [2].



Apply molybdenum oil solution to the main journal bearing sliding surfaces on the lower crankcase.

Install the lower crankcase onto the upper crankcase while aligning the balancer marks on the balancer drive and driven gears as shown.



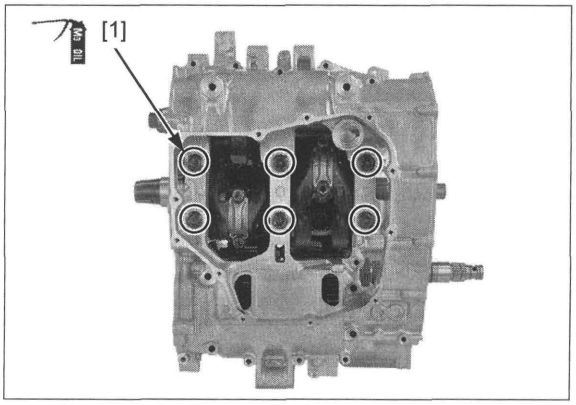
Apply molybdenum oil solution to the crankcase main journal bolt threads and seating surfaces.

Install the crankcase main journal bolts [1].

Make sure the upper and lower crankcases are seated securely.

Tighten the crankcase main journal bolts in a crisscross pattern in 2 or 3 steps to the specified torque.
Further tighten the crankcase main journal bolts 40°.

TORQUE: 22 N·m (2.2 kgf·m, 16 lbf·ft) + 40°

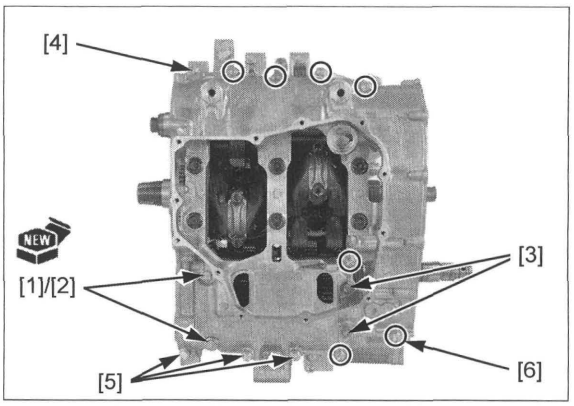


Install the following:

- 8 x 65 mm flange bolts [1]
- new 8 mm sealing washers [2]
- 8 x 40 mm flange bolts [3]
- 6 x 60 mm flange bolt [4]
- 6 x 50 mm flange bolts [5]
- 6 x 40 mm flange bolts [6]

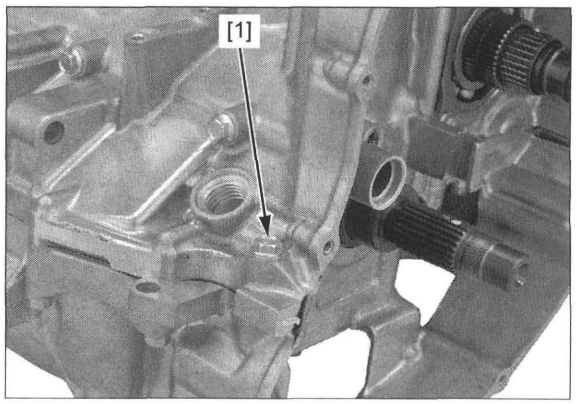
Tighten the crankcase bolts in a crisscross pattern in 2 or 3 steps.

TORQUE:
Crankcase 8 mm flange bolt:
24 N·m (2.4 kgf·m, 18 lbf·ft)



Place the engine with the lower side down.

Install and tighten the 6 x 40 mm flange bolt [1] securely.



If the balancer was removed, perform the following procedure:

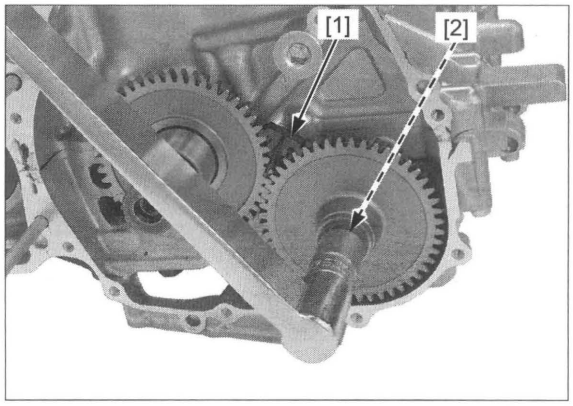
Install the special tool between the balancer drive gear and driven gear.

TOOL:
Gear holder, 2.5 [1] **07724-0010100**
(U.S.A.: 07724-001A100)

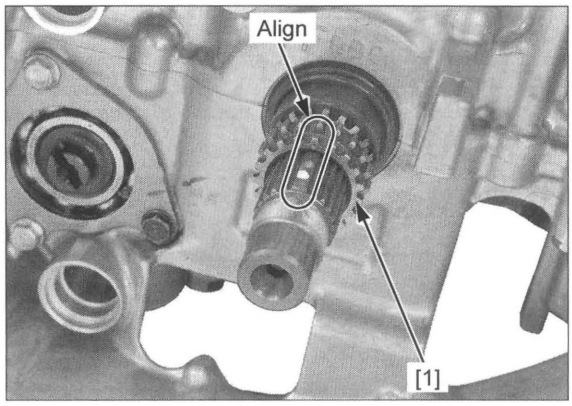
Tighten the balancer driven gear bolt [2] to the specified torque.

TORQUE: 75 N·m (7.6 kgf·m, 55 lbf·ft)

NOTE:
- The balancer driven gear bolt has left hand threads.



Install the timing sprocket [1] by aligning the wide groove with the wide tooth of the crankshaft.



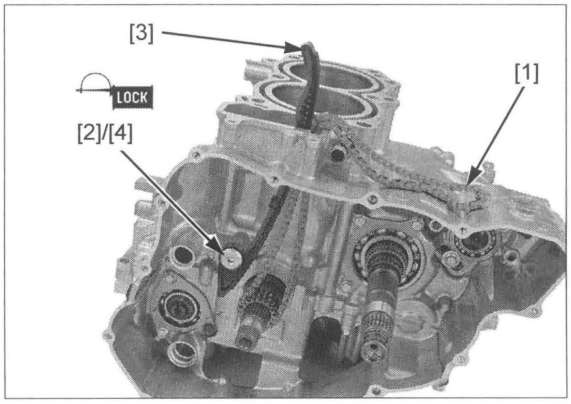
Install the cam chain [1].

Apply locking agent to the cam chain tensioner bolt threads.

Install the washer [2], cam chain tensioner [3], and bolt [4].

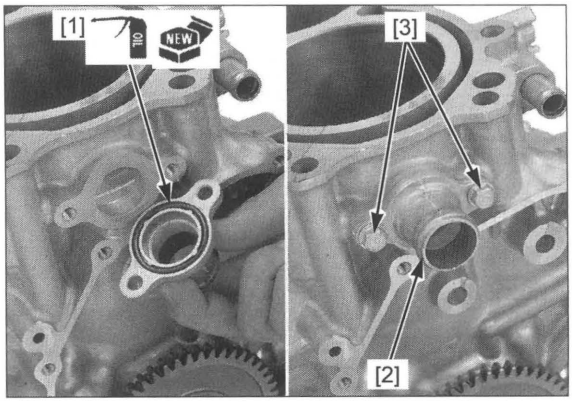
Tighten the bolt to the specified torque.

TORQUE: 23 N·m (2.3 kgf·m, 17 lbf·ft)

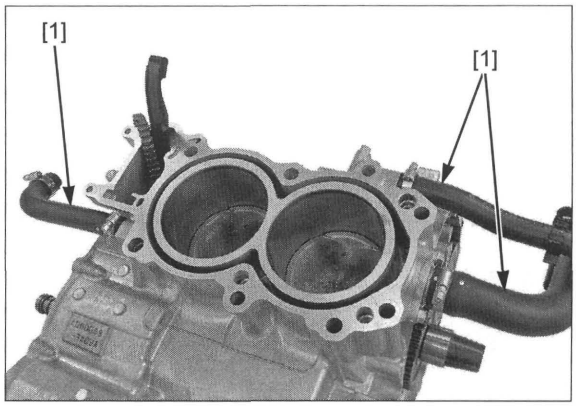


Coat a new O-ring [1] with engine oil and install it into the groove in the water hose flange [2].

Install the water hose flange and tighten the bolts [3] securely.



Connect the water hoses [1] and tighten the water hose band screws to the specified range (page 10-20).



Install the following:

- flywheel (page 13-11)
- primary drive gear (page 11-65)
- gearshift linkage (page 11-68)
- dual clutch (page 11-66)
- clutch cover/clutch control body (page 11-50)
- oil tank cover (page 8-5)
- oil strainer (page 8-11)
- cylinder head (page 10-14)
- TR sensor (page 11-59)
- neutral switch (page 11-65)
- starter motor (page 6-4)
- sub-transmission (page 12-5)
- engine (page 16-4)

MEMO

15. CRANKSHAFT/PISTON/CYLINDER

SERVICE INFORMATION 15-2

TROUBLESHOOTING 15-2

COMPONENT LOCATION 15-3

CRANKSHAFT 15-4

MAIN JOURNAL BEARING 15-6

CRANKPIN BEARING 15-9

PISTON/CYLINDER 15-12

SERVICE INFORMATION

GENERAL

- The crankcase must be separated to service the crankshaft, cylinder, pistons and connecting rods.
- Mark and store the bearing inserts to be sure of their correct locations for reassembly. If the inserts are improperly installed they will block the oil holes, causing insufficient lubrication and eventual engine seizure.
- The crankpin and main journal bearing inserts are select fit and are identified by color codes. Select replacement bearings from the code tables. After selecting new bearings, recheck the oil clearance with plastigauge. Incorrect oil clearance can cause major engine damage.
- Take care not to damage the cylinder wall and piston.
- Mark and store the pistons, piston rings, and piston pins in the same order they were installed so they can be reinstalled in the original positions.
- Clean the oil passages in the upper crankcase with compressed air before installing the pistons.

TROUBLESHOOTING

Cylinder compression is too low, hard to starting, or poor performance at low speed
- Leaking cylinder head gasket
- Loose spark plug
- Worn, stuck or broken piston ring
- Worn or damaged cylinder and piston

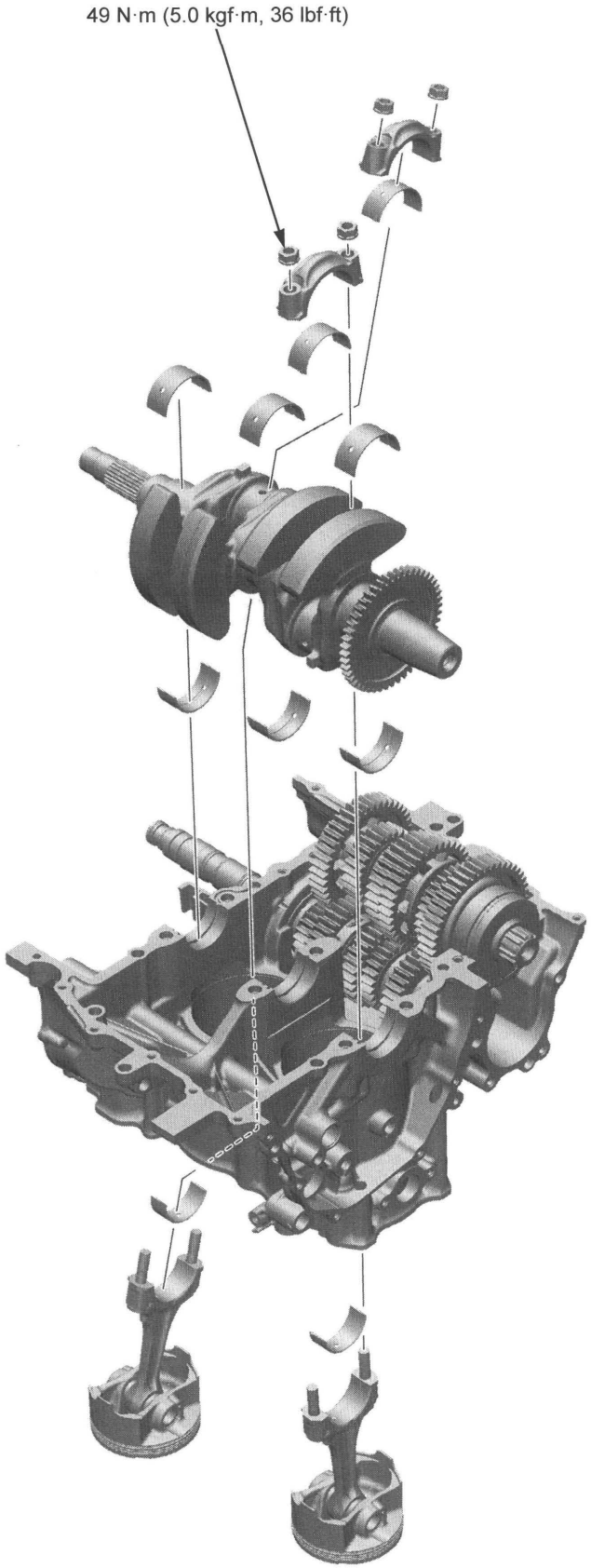
Cylinder compression too high, overheating, or knocking
- Excessive carbon built-up on piston head or combustion chamber

Excessive smoke
- Worn cylinder, piston, or piston ring
- 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
- Bent connecting rod
- Worn cylinder, piston, or piston rings
- Worn main journal bearings
- Worn crankpin bearings

Engine vibration
- Excessive crankshaft runout

COMPONENT LOCATION



CRANKSHAFT

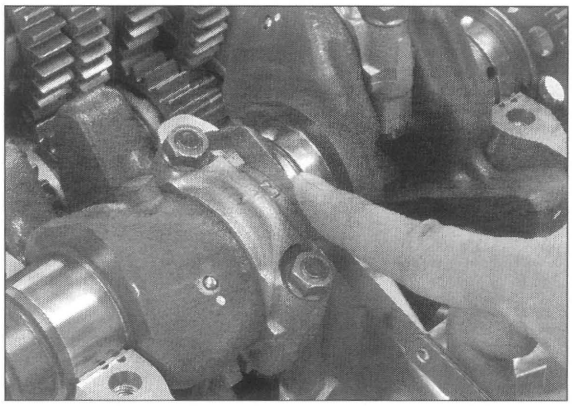
Separate the crankcase halves (page 14-5).

SIDE CLEARANCE INSPECTION

Measure the connecting rod side clearance.

SERVICE LIMIT: 0.28 mm (0.011 in)

If the clearance exceeds the service limit, replace the connecting rod.
Recheck and if still out of limit, replace the crankshaft.



REMOVAL

NOTICE

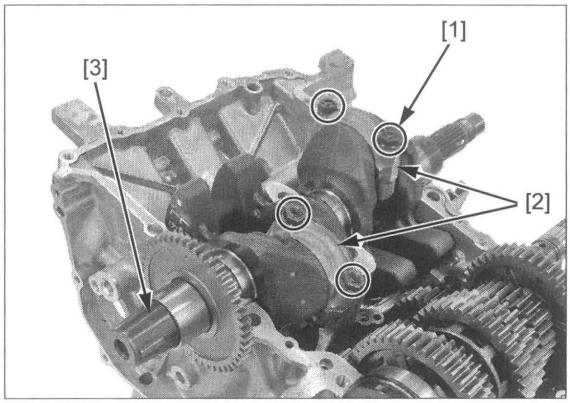
Mark the bearing caps and bearings as you remove them to indicate the correct cylinder for reassembly.

Remove the connecting rod nuts [1] and bearing caps [2].

Remove the crankshaft [3].

NOTICE

Before removal, position all the pistons at TDC (Top Dead Center) to prevent damaging the crankpin with the connecting rod bolt threads.



INSPECTION

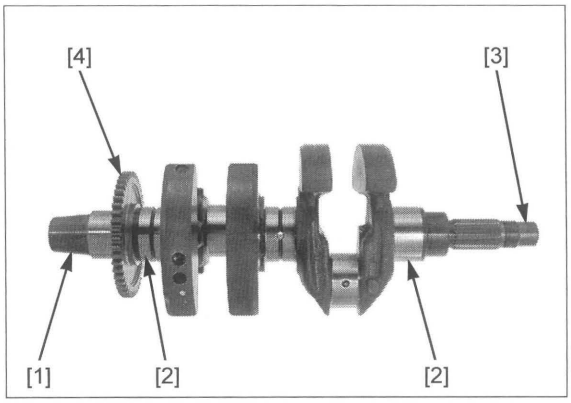
Support the crankshaft [1] on both end journals [2].

Set a dial gauge on the crankshaft.

Rotate the crankshaft two revolutions (720°) and read the runout at [3].

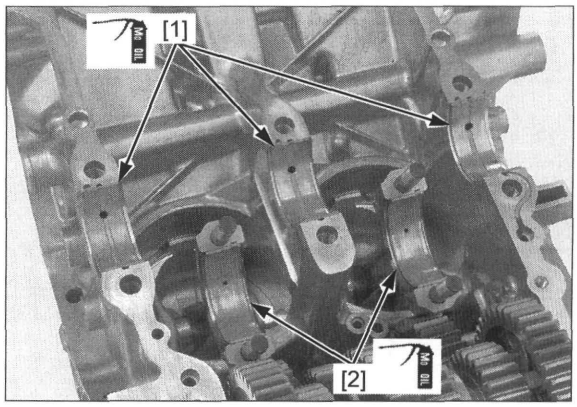
SERVICE LIMIT: 0.05 mm (0.002 in)

Check the balancer drive gear [4] teeth for abnormal wear or damage.

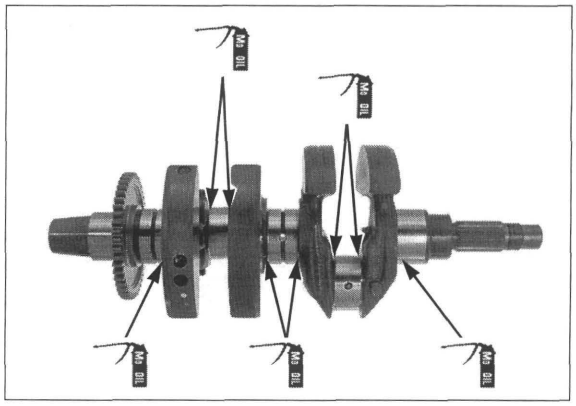


INSTALLATION

Apply molybdenum oil solution to the main journal bearing [1] sliding surfaces and crankpin bearing [2] sliding surfaces.



Apply molybdenum oil solution to the thrust surfaces of the crankshaft as shown.



Be careful not to damage the crankpin, main journal and bearing inserts.

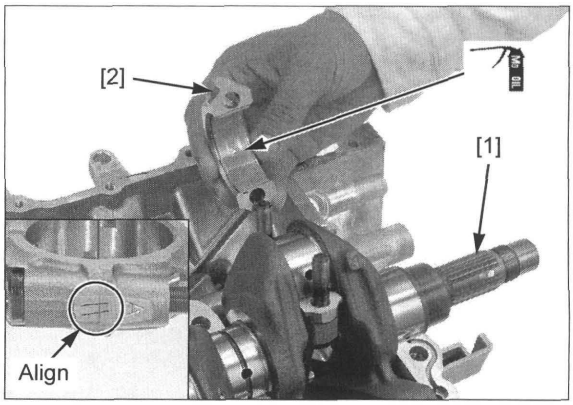
Install the crankshaft [1] onto the upper crankcase and set the connecting rods onto the crankpins.

Apply molybdenum oil solution to the crankpin bearing sliding surfaces on the crankpin bearing caps [2].

Install the crankpin bearing caps.

NOTE:

- Align the I.D. code number on the connecting rods.

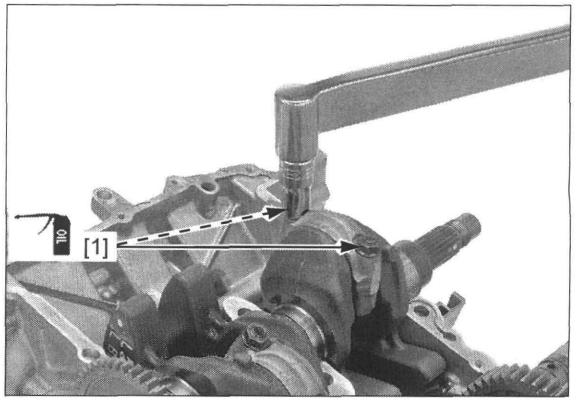


Apply engine oil to the connecting rod nut threads and seating surfaces.

Install and tighten the connecting rod nuts [1] to the specified torque in 2 or 3 steps alternately.

TORQUE: 49 N·m (5.0 kgf·m, 36 lbf·ft)

Assemble the crankcase halves (page 14-16).



MAIN JOURNAL BEARING

NOTICE

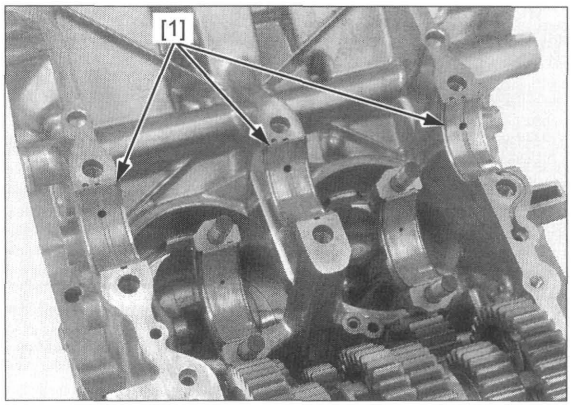
Do not interchange the bearing inserts. They must be installed in their original locations or the correct bearing oil clearance may not be obtained, resulting in engine damage.

Remove the crankshaft (page 15-4).

BEARING INSPECTION

Inspect the main journal bearing inserts [1] on the upper and lower crankcase halves for unusual wear or peeling.

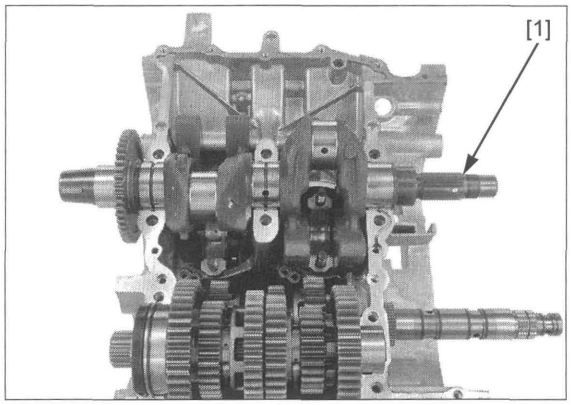
Check the bearing tabs for damage.



OIL CLEARANCE INSPECTION

Clean off any oil from the bearing inserts and main journals.

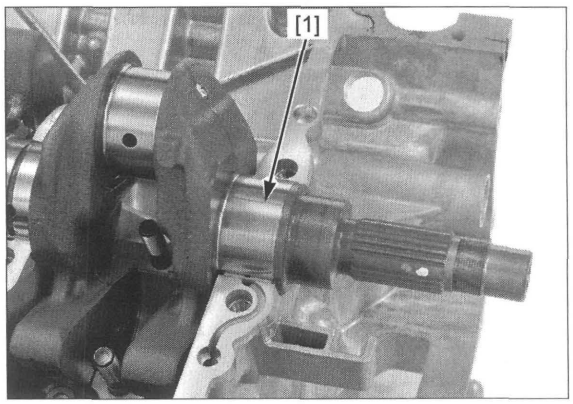
Install the crankshaft [1] onto the upper crankcase.



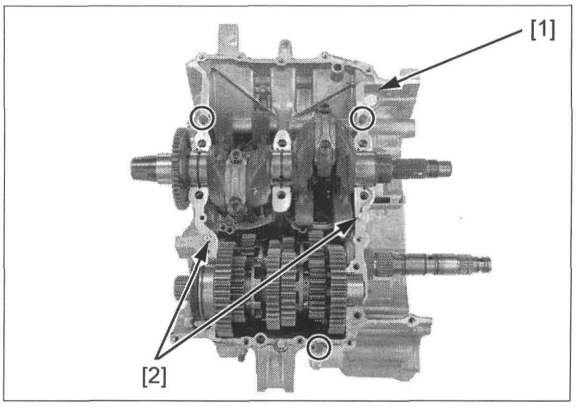
Put a strip of plastigauge [1] lengthwise on each main journal avoiding the oil hole.

NOTE:

- Do not rotate the crankshaft during inspection.



Install the dowel pins [1] and oil joints [2].



Install the lower crankcase [1] onto the upper crankcase.

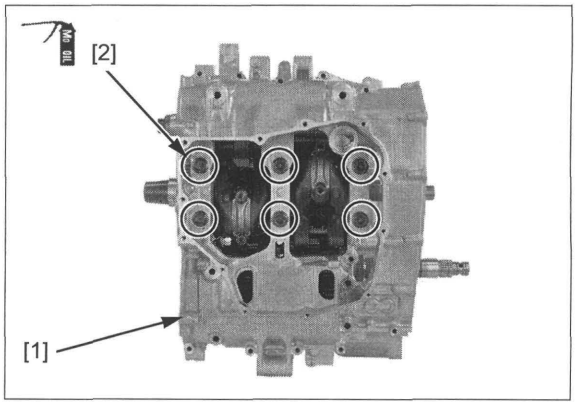
Apply molybdenum oil solution to the crankcase main journal bolt threads and seating surfaces.

Install the crankcase main journal bolts [2].

Make sure the upper and lower crankcase are seated securely.

Tighten the crankcase main journal bolts in a crisscross pattern in 2 or 3 steps to the specified torque.
Further tighten the crankcase main journal bolts 40°.

TORQUE: 22 N·m (2.2 kgf·m, 16 lbf·ft) + 40°

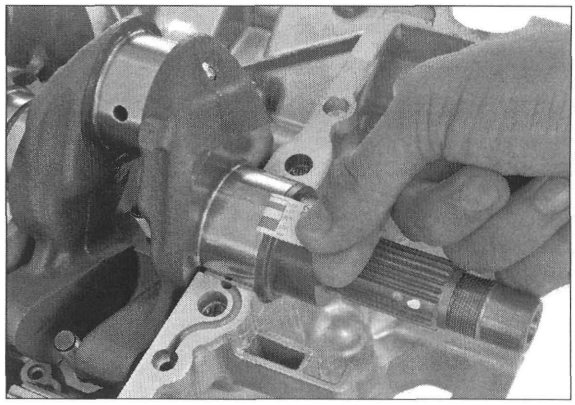


Remove the crankcase main journal bolt and lower crankcase.

Measure the compressed plastigauge at its widest point on each main journal to determine the oil clearance.

SERVICE LIMIT: 0.05 mm (0.002 in)

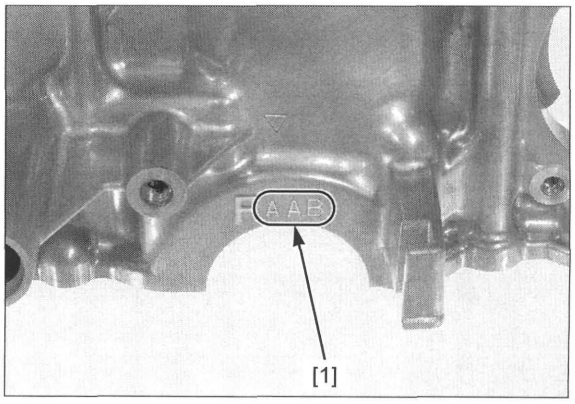
If the oil clearance exceeds the service limit, select a replacement bearing.



BEARING SELECTION

Letters (A, B or C) on the rear side of upper crankcase are bearing support I.D. codes from front to rear.

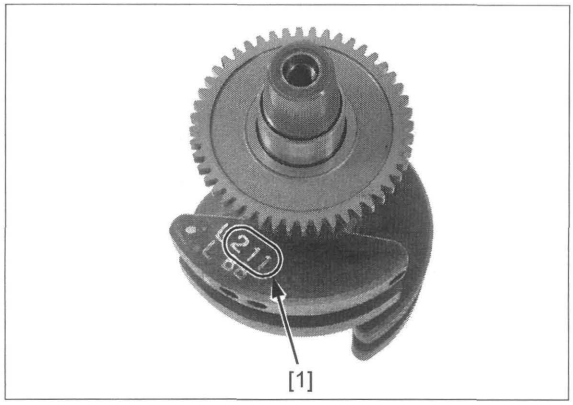
Record the crankcase bearing support I.D. code letters [1] from rear side of the upper crankcase as shown.



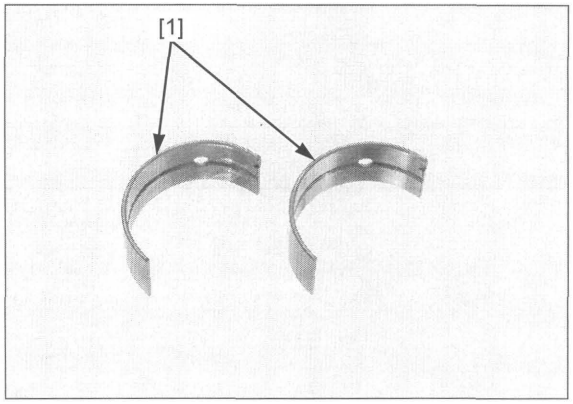
Numbers (1, 2 or 3) on the crank weight are main journal O.D. codes from front to rear.

If you are replacing the crankshaft, record the corresponding main journal O.D. code numbers [1] from the crank weight.

If you are reusing the crankshaft, measure the main journal O.D. with a micrometer.



Cross-reference the main journal and bearing support codes to determine the replacement bearing color code [1].



MAIN JOURNAL BEARING THICKNESS:

- **A: Brown: Thickest**
- **B: Green:**
- **C: Yellow:**
- **D: White:**
- **E: Purple: Thinnest**

MAIN JOURNAL BEARING SELECTION TABLE:

			BEARING SUPPORT I.D. CODE		
			A	B	C
			47.000 – 47.006 mm (1.8504 – 1.8506 in)	47.006 – 47.012 mm (1.8506 – 1.8509 in)	47.012 – 47.018 mm (1.8509 – 1.8511 in)
MAIN JOURNAL O.D. CODE	1	44.004 – 44.010 mm (1.7324 – 1.7327 in)	E (Purple)	D (White)	C (Yellow)
	2	43.998 – 44.004 mm (1.7322 – 1.7324 in)	D (White)	C (Yellow)	B (Green)
	3	43.992 – 43.998 mm (1.7320 – 1.7322 in)	C (Yellow)	B (Green)	A (Brown)

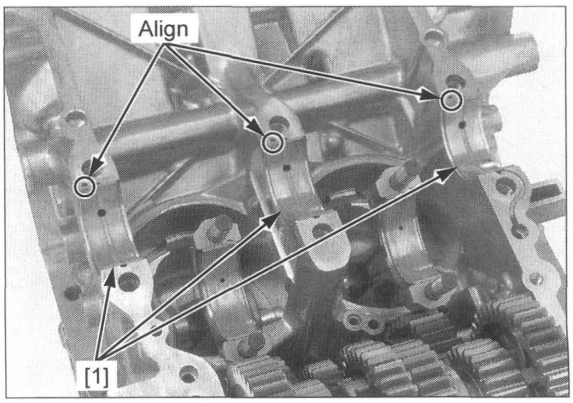
NOTICE

After selecting new bearings, recheck the clearance with a plastigauge. Incorrect clearance can cause severe engine damage.

BEARING INSTALLATION

Clean the bearing outer surfaces and crankcase bearing supports.

Install the main journal bearing inserts [1] onto the crankcase bearing supports, aligning each tab with each groove.



CRANKPIN BEARING

NOTICE

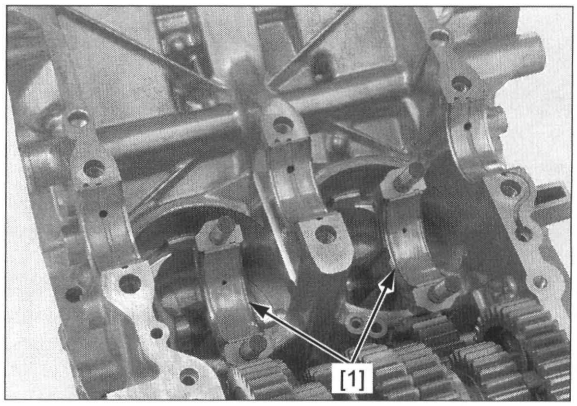
Do not interchange the bearing inserts. They must be installed in their original locations or the correct bearing oil clearance may not be obtained, resulting in engine damage.

Remove the crankshaft (page 15-4).

BEARING INSPECTION

Check the bearing inserts [1] for unusual wear or peeling.

Check the bearing tabs for damage.



OIL CLEARANCE INSPECTION

Clean off any oil from the bearing inserts and crankpins.

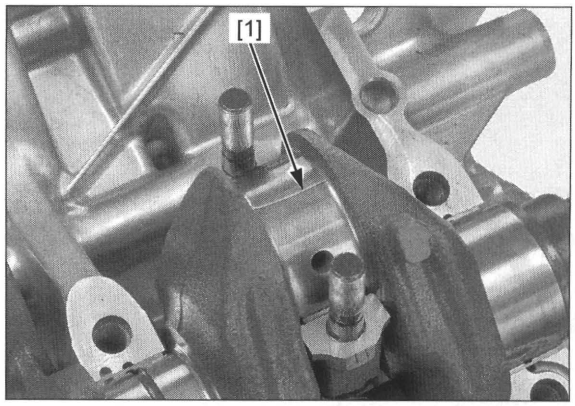
Carefully install the crankshaft onto the upper crankcase.

Set the connecting rods onto the crankpins.

Put a strip of plastigauge [1] lengthwise on each crankpin avoiding the oil hole.

NOTE:

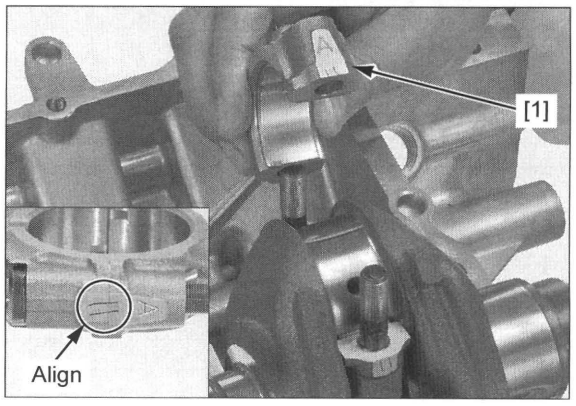
- Do not rotate the crankshaft during inspection.



Install the crankpin bearing caps [1].

NOTE:

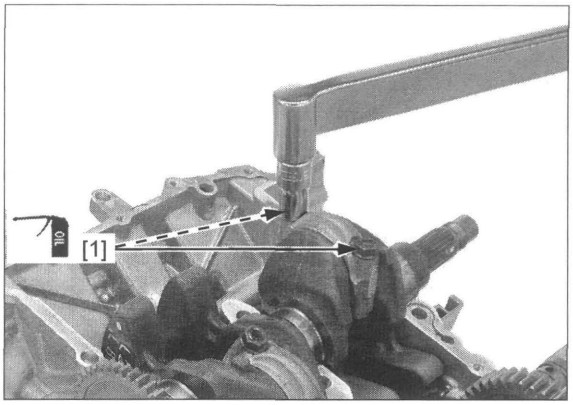
- Align the I.D. code number on the connecting rods.



Apply engine oil to the connecting rod nut threads and seating surfaces.

Install and tighten the connecting rod nuts [1] to the specified torque in 2 or 3 steps alternately.

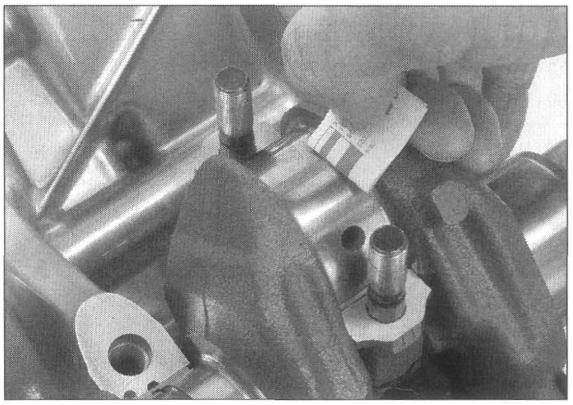
TORQUE: 49 N·m (5.0 kgf·m, 36 lbf·ft)



Remove the bearing caps and measure the compressed plastigauge at its widest point on the crankpin to determine the oil clearance.

SERVICE LIMIT: 0.068 mm (0.0027 in)

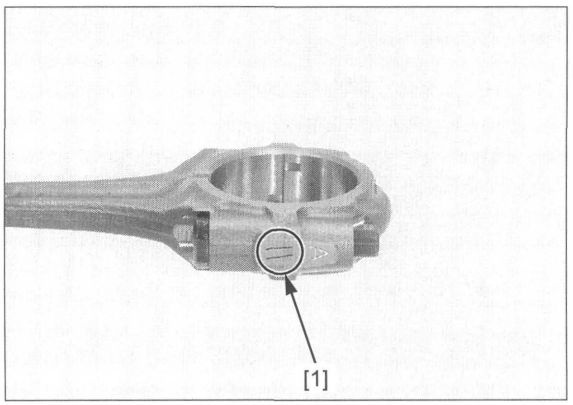
If the oil clearance exceeds the service limit, select the correct replacement bearings.



BEARING SELECTION

Numbers (1/I, 2/II, or 3/III) on the connecting rods are the connecting rod I.D. codes.

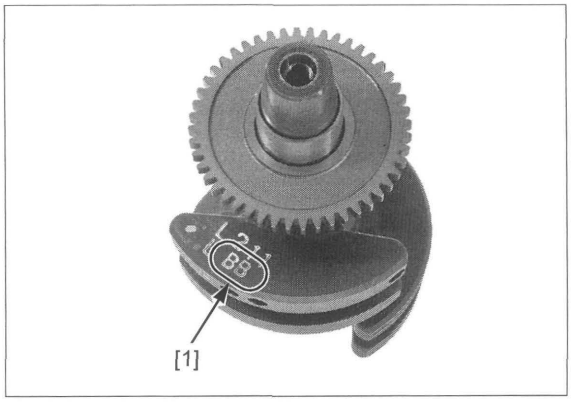
Record the connecting rod I.D. code number [1] or measure the I.D. with the crankpin bearing cap installed without bearing inserts.



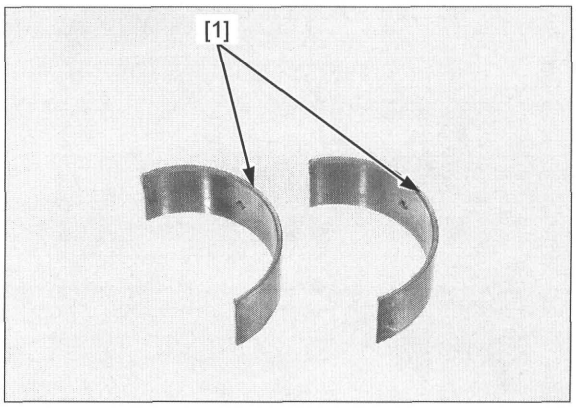
Letters (A, B, or C) on the crank weight are the crankpin O.D. codes from front to rear.

If you are replacing the crankshaft, record the corresponding crankpin O.D. code letter [1].

If you are reusing the crankshaft, measure the crankpin O.D. with a micrometer.



Cross-reference the connecting rod and crankpin codes to determine the replacement bearing color code [1].



CRANKPIN BEARING THICKNESS:

A: Black: Thickest
B: Brown:
C: Green: ↕
D: Yellow:
E: White: Thinnest

CRANKPIN BEARING SELECTION TABLE:

			CONNECTING ROD I.D. CODE		
			1 or I	2 or II	3 or III
			47.000 – 47.006 mm (1.8504 – 1.8506 in)	47.006 – 47.012 mm (1.8506 – 1.8509 in)	47.012 – 47.018 mm (1.8509 – 1.8511 in)
CRANKPIN O.D. CODE	A	43.992 – 43.998 mm (1.7320 – 1.7322 in)	E (White)	D (Yellow)	C (Green)
	B	43.986 – 43.992 mm (1.7317 – 1.7320 in)	D (Yellow)	C (Green)	B (Brown)
	C	43.980 – 43.986 mm (1.7315 – 1.7317 in)	C (Green)	B (Brown)	A (Black)

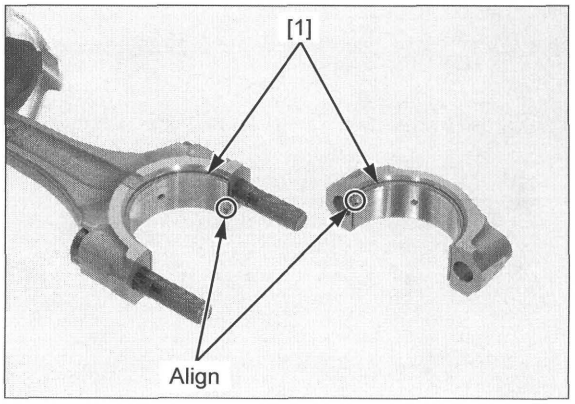
NOTICE

After selecting new bearings, recheck the clearance with a plastigauge. Incorrect clearance can cause severe engine damage.

BEARING INSTALLATION

Clean the bearing outer surfaces, crankpin bearing cap and connecting rod.

Install the crankpin bearings [1] onto the bearing cap and connecting rod, aligning each tab with each groove.



PISTON/CYLINDER

PISTON/CONNECTING ROD REMOVAL

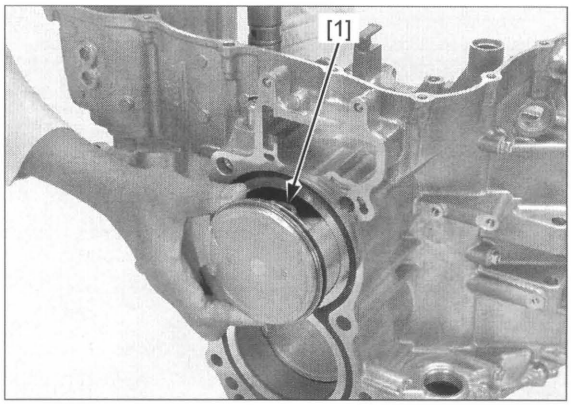
NOTICE

- *Before piston removal, place a clean shop towel around the connecting rod to prevent damaging the cylinder sleeve.*
- *Do not try to remove the piston/connecting rod assembly from bottom of the cylinder; the assembly will get stuck in the gap between the cylinder liner and the upper crankcase.*
- *Do not interchange the bearing inserts. They must be installed in their original locations or the correct bearing oil clearance may not be obtained, resulting in engine damage.*

Remove the following:

– transmission (page 14-7)
– crankshaft (page 15-4)

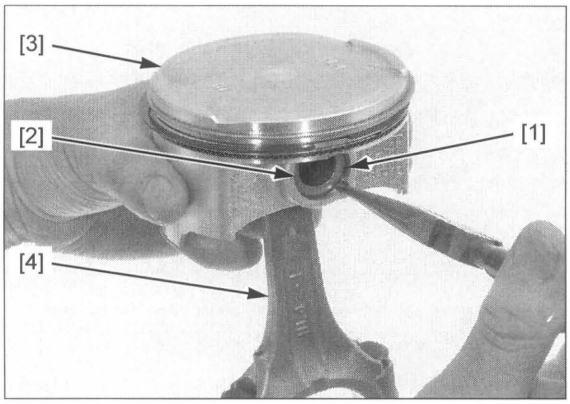
Remove the piston/connecting rod assembly [1] from the top of the cylinder.



PISTON REMOVAL

Remove the piston pin clips [1] with pliers.

Push the piston pin [2] out of the piston [3] and connecting rod [4], and remove the piston.



PISTON RING REMOVAL

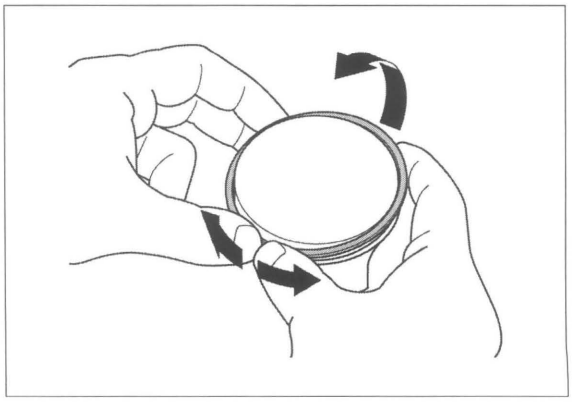
Be careful not to damage the piston ring by spreading the ends too far.

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

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

NOTE:

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



INSPECTION

Inspect the following parts for scratches, damage, abnormal wear, or deformation.

- cylinder
- piston
- piston rings
- piston pin
- connecting rod small end

Measure each part and calculate the clearance according to CRANKSHAFT/PISTON/CYLINDER SPECIFICATIONS (page 1-12).

Replace any part if it is out of the service limit.

PISTON RING INSTALLATION

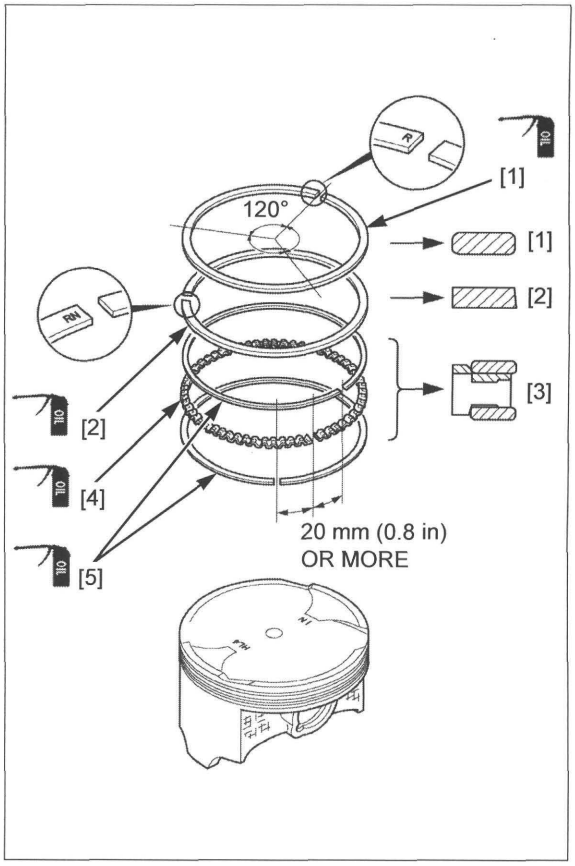
Clean the piston ring grooves thoroughly and install the piston rings.

NOTE:

- Apply engine oil to the entire surface of each piston ring and to the piston ring grooves.
- Avoid piston and piston ring damage during installation.
- Install the piston rings with the marked side facing up.
  - "R" mark: top ring [1]
  - "RN" mark: second ring [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° apart from each other.
Stagger the side rail end gaps as shown.

After installation, the rings should rotate freely in the ring groove.

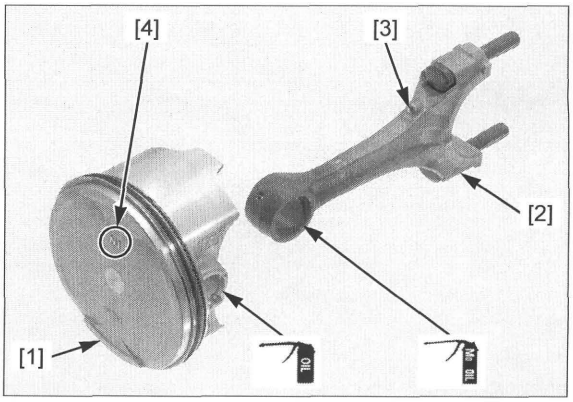


PISTON INSTALLATION

Apply engine oil to the piston pin hole inner surface.

Apply molybdenum oil solution to the connecting rod small end inner surface.

Assemble the piston [1] and connecting rod [2] with the connecting rod oil jet [3] facing to the piston "IN" mark [4] side.

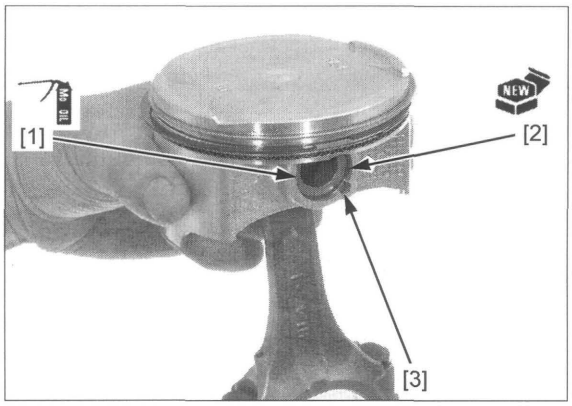


Apply molybdenum oil solution to the piston pin outer surface.

Install the piston pin [1] and secure it using new piston pin clips [2].

NOTE:

- Make sure that the piston pin clips are seated securely.
- Do not align the piston pin clip end gap with the piston cut-out [3].

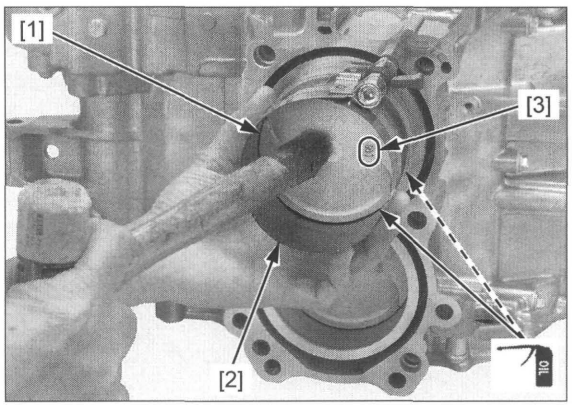


PISTON/CONNECTING ROD INSTALLATION

Apply engine oil to the piston and cylinder sliding surface.

Install the piston/connecting rod assembly with the "IN" mark [3] facing the intake side.

Install the piston/connecting rod assemblies [1] into the cylinders using a commercially available piston ring compressor tool [2].
When reusing the connecting rods, they must be installed in their original locations.



NOTICE

- *While installing the piston, be careful not to damage the top surface of the cylinder, especially around the cylinder bore.*
- *Be careful not to damage the cylinder sleeve with the connecting rod bolt threads.*

Make sure the piston ring compressor tool sits flush on the top surface of the cylinder.

Use the handle of a plastic hammer or equivalent tool to tap the piston into the cylinder.

Install the following:

– crankshaft (page 15-5)
– transmission (page 14-10)

16. ENGINE REMOVAL/INSTALLATION

SERVICE INFORMATION 16-2

COMPONENT LOCATION 16-3

ENGINE REMOVAL 16-4

ENGINE HANGER 16-11

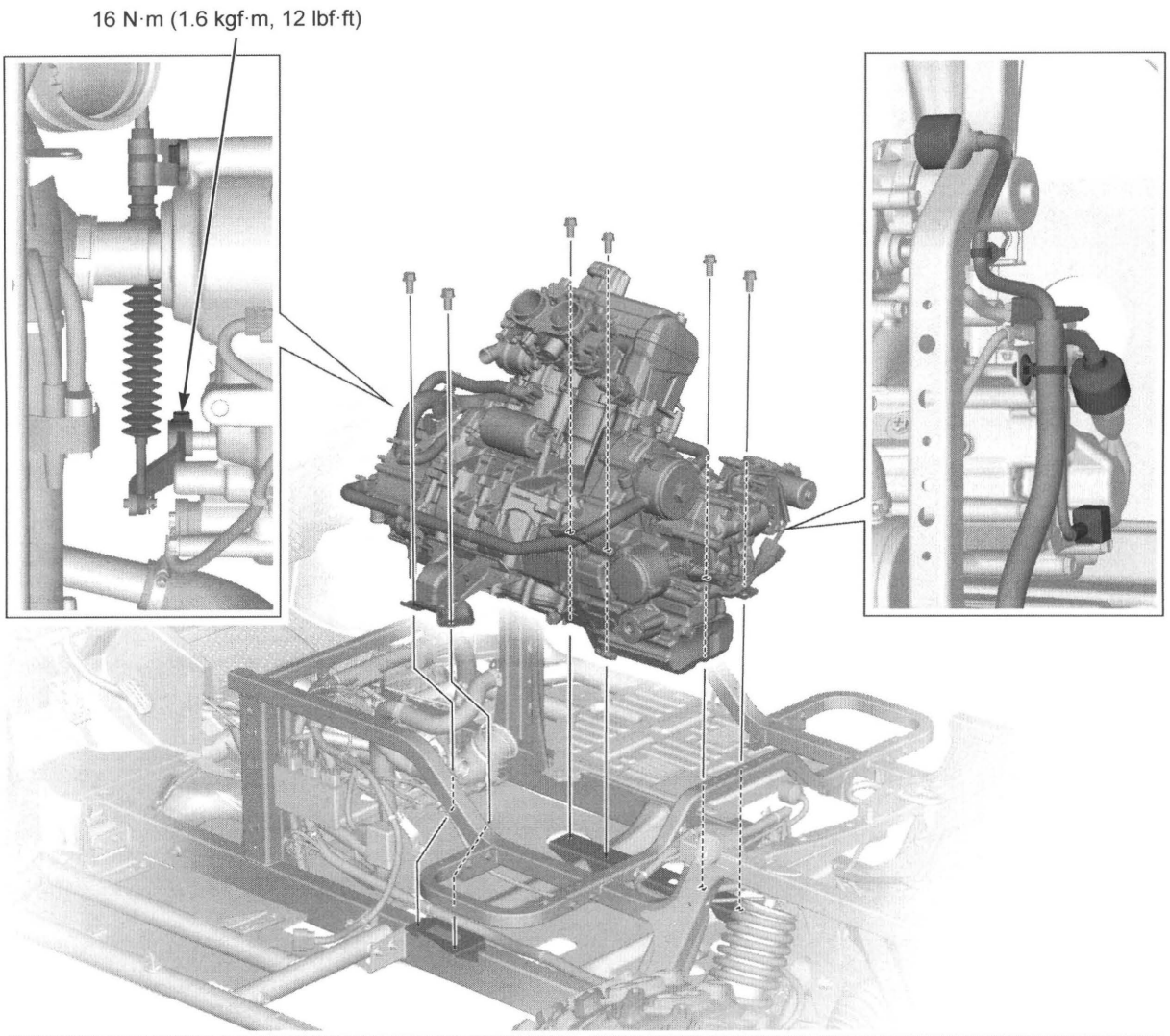
ENGINE INSTALLATION 16-13

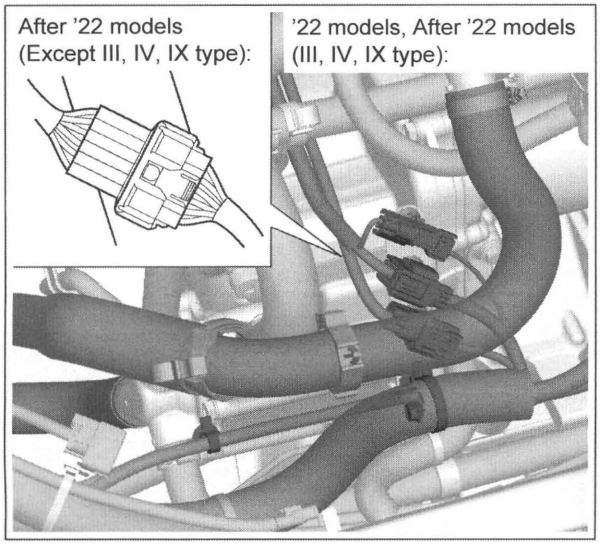
SERVICE INFORMATION

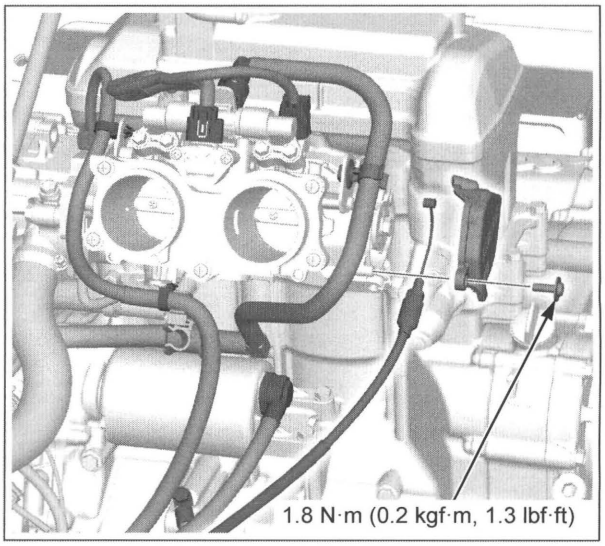
GENERAL

- When removing/installing the engine, tape the frame around the engine and sub-transmission case, and cover the body panels beforehand for frame and plastic components protection.
- The following components can be serviced with the engine installed in the frame.
  - starter motor (page 6-4)
  - throttle body (page 7-22)
  - oil cooler (page 8-12)
  - oil pump (page 8-7)
  - oil strainer (page 8-11)
  - pressure relief valve (page 8-10)
  - thermostat (page 9-6)
  - rocker arm (page 10-7)
  - camshaft/cam sprocket (page 10-10)
  - cylinder head/valves (page 10-14)
  - clutch control body (page 11-47)
  - shift control motor, reduction gear (page 11-51)
  - primary drive gear (page 11-65)
  - dual clutch (page 11-66)
  - gearshift linkage (page 11-68)
  - sub-transmission (page 12-5)
  - flywheel/stator (page 13-11)
- The following components require engine removal for service:
  - transmission (page 14-7)
  - balancer (page 14-14)
  - crankshaft (page 15-4)
  - piston/cylinder (page 15-12)

COMPONENT LOCATION







ENGINE REMOVAL

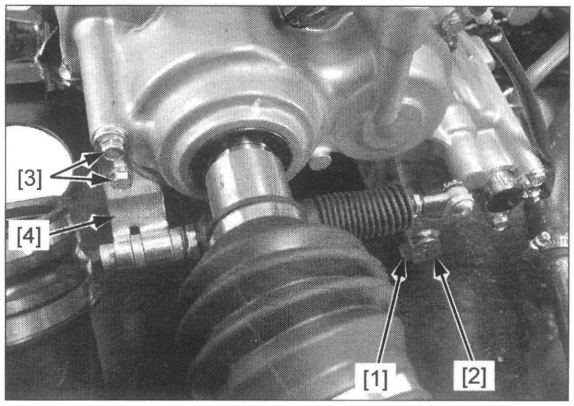
Drain the engine oil (page 3-13).
Drain the sub-transmission oil (page 3-15).
Drain the coolant (page 9-4).

Remove the following:

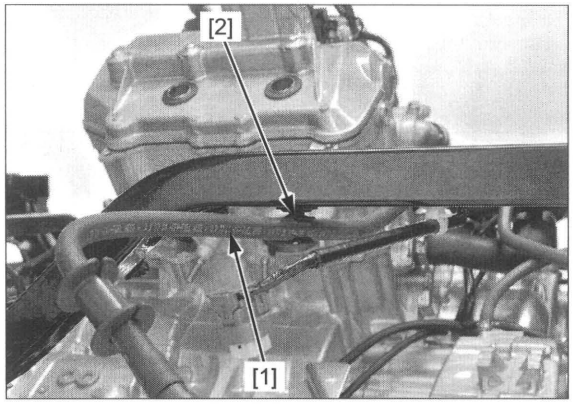
- cargo bed (page 2-40)
- exhaust pipe (page 2-54)
- seat frame (page 2-56)

Remove the shift arm pinch bolt [1] and shift arm [2].

Remove the bolts [3] and stay [4].

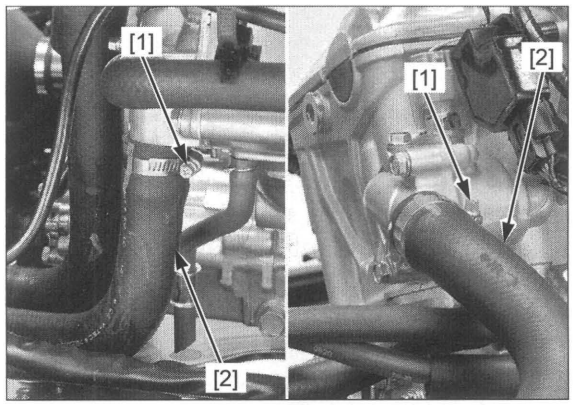


Release the fuel feed hose [1] from the hose clamp [2].



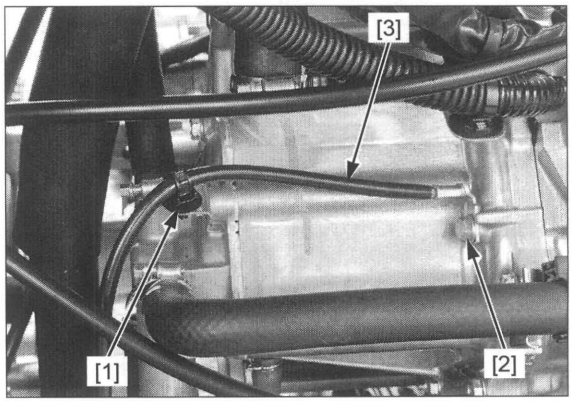
Loosen the hose clamp screws [1].

Disconnect the water hoses [2].

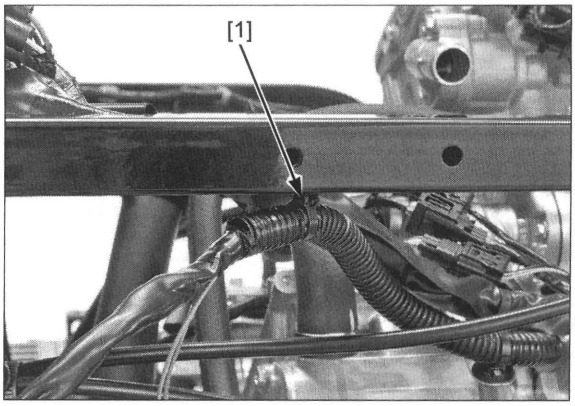


Release the frame ground cable clip [1].

Remove the bolt [2] and ground cable [3].



Release the alternator wire clip [1].



Disconnect the following:

'22 models, After '22 models (III, IV, IX type)

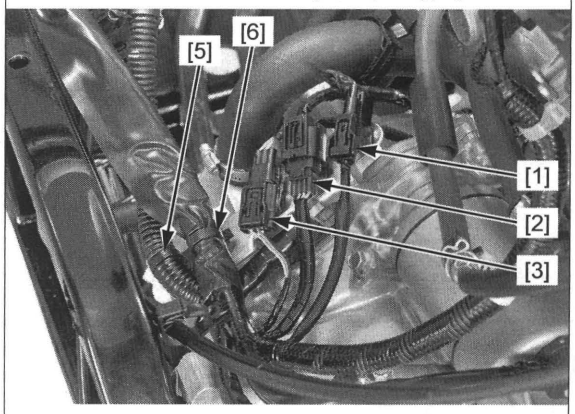
- neutral switch 1P connector [1]
- sub-transmission position switch 8P connector [2]
- TR sensor 3P connector [3]

After '22 models (Except III, IV, IX type)

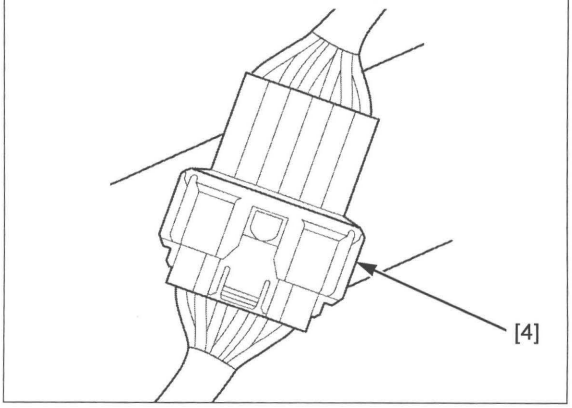
- sub-transmission position switch 12P connector [4]

Release the alternator wire clip [5] and main wire harness clip [6] from the connector stay.

'22 models, After '22 models (III, IV, IX type)



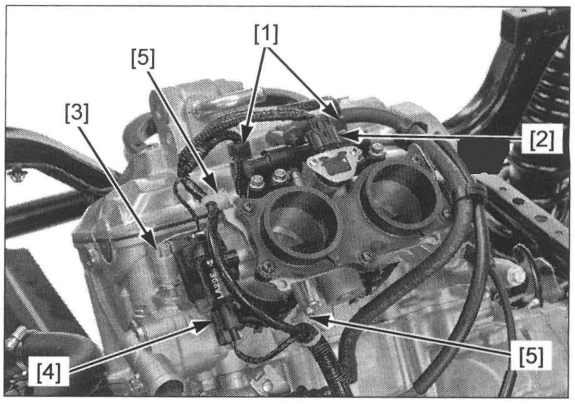
After '22 models (Except III, IV, IX type)



Disconnect the following:

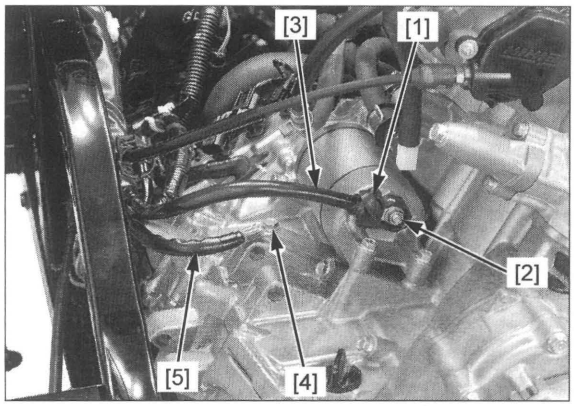
- fuel injector 2P connectors [1]
- IACV 4P connector [2]
- ECT sensor 2P connector [3]
- sensor unit 5P connector [4]

Release the main wire harness clips [5].



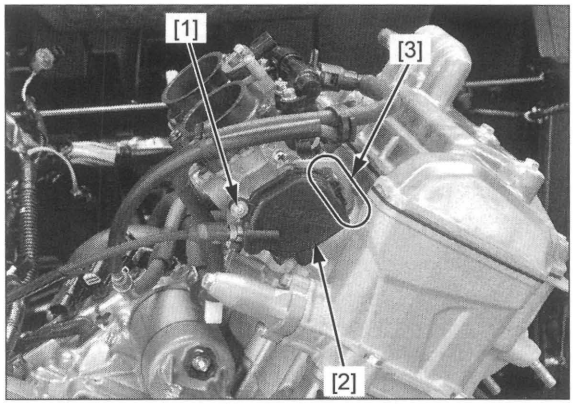
Remove the following:

- rubber cap [1] (from the starter motor terminal)
- terminal nut [2]
- starter motor cable [3]
- bolt [4]
- ground cable [5]



Remove the screw/washer [1].

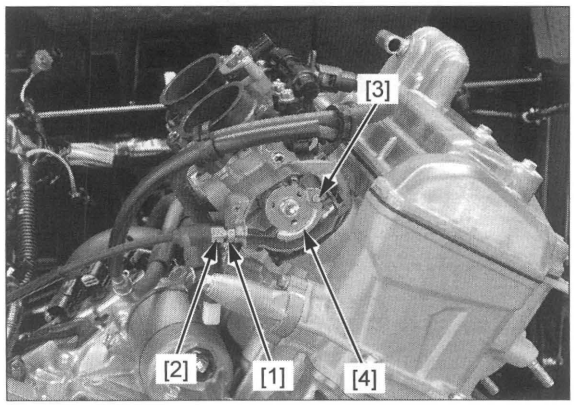
Remove the throttle drum cover [2] by releasing the locating tab [3].



Loosen the throttle cable adjuster lock nut [1].

Remove the throttle cable adjuster [2].

Disconnect the throttle cable [3] from the throttle drum [4].



Disconnect the following:

'22 models, After '22 models (III, IV, IX type)

– spindle angle sensor 3P connector [1]

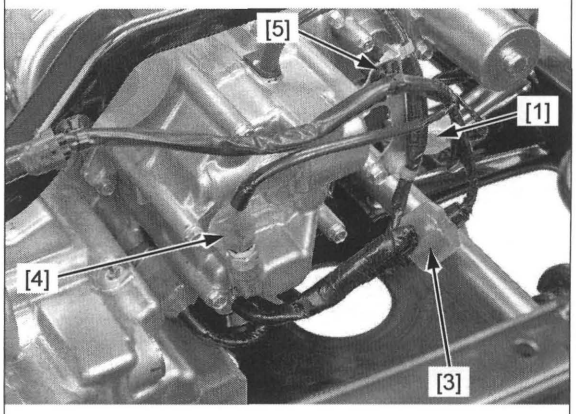
After '22 models (Except III, IV, IX type)

– spindle angle sensor 3P connector [2]

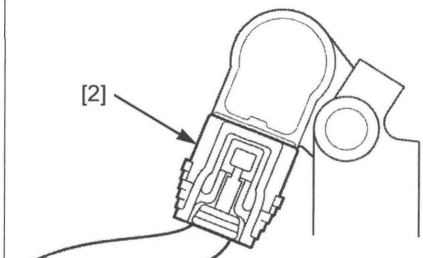
– linear/shift solenoid harness 12P connector [3]
– EOT sensor 2P connector [4]

Release the main wire harness clip [5].

'22 models, After '22 models (III, IV, IX type)

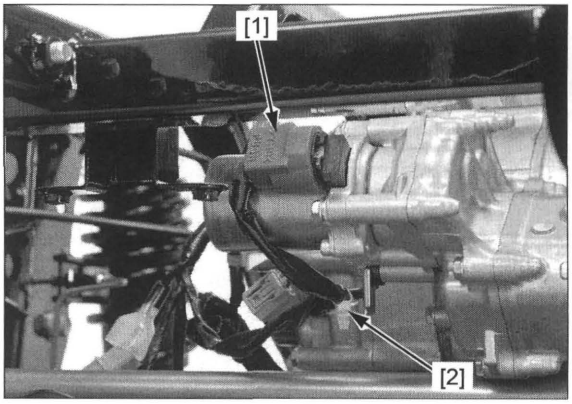


After '22 models (Except III, IV, IX type)



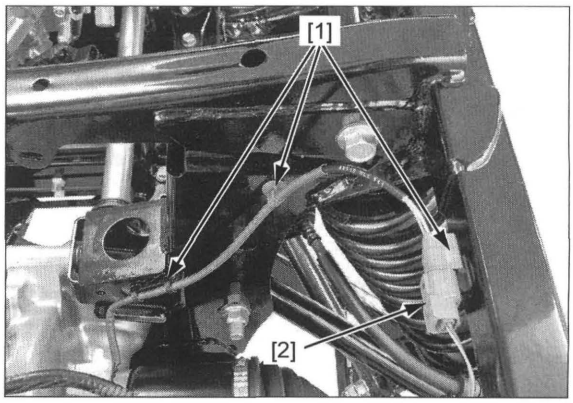
Disconnect the shift control motor 2P connector [1].

Release the main wire harness clip [2].



I-4WD model: Release the wire clips [1].

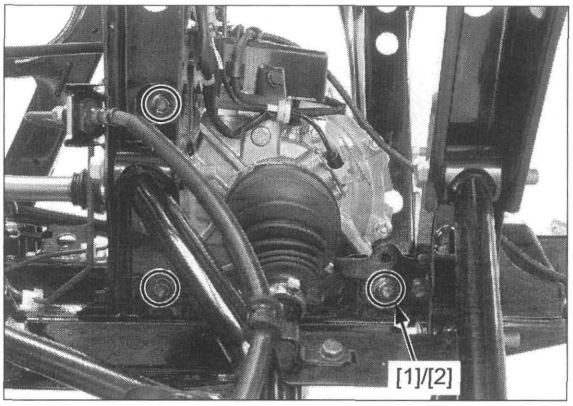
Disconnect the rear right wheel speed sensor 2P connector [2].



Support the rear final gear case assembly with wooden blocks.

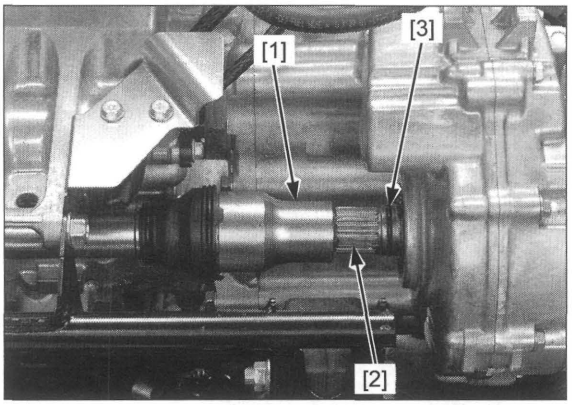
Remove the rear final gear case mounting nuts [1] and bolts [2].

Move the rear final gear case assembly rearward fully.



Pull the rear propeller shaft joint [1] out of the output shaft [2]

Remove the O-ring [3].

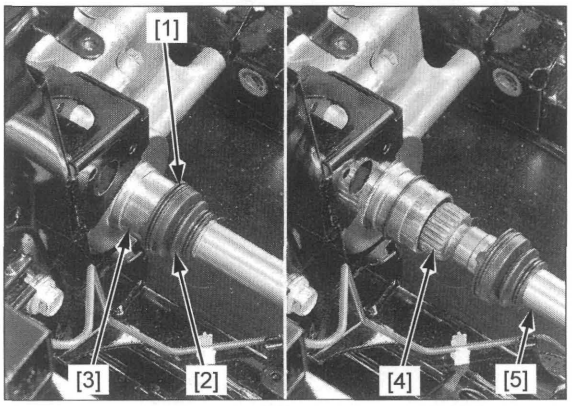


Remove the boot band [1].

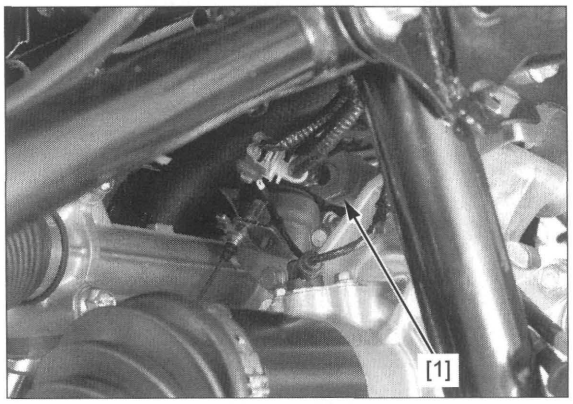
Release the propeller shaft boot [2] off the pinion joint [3] of the rear final gear case assembly.

Release the spline [4] of the rear propeller shaft [5] from the rear final gear case.

Remove the rear propeller shaft.



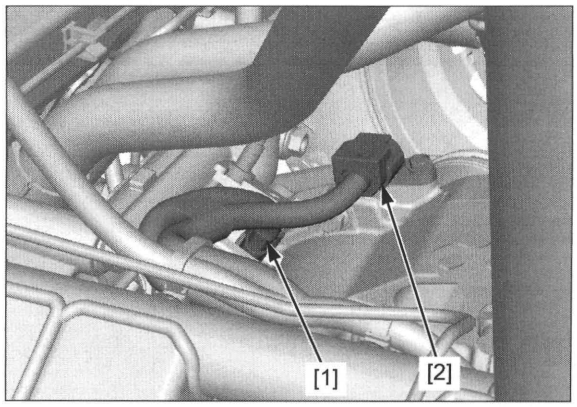
I-4WD model: Disconnect the front VS sensor 3P connector [1].



Except I-4WD model:

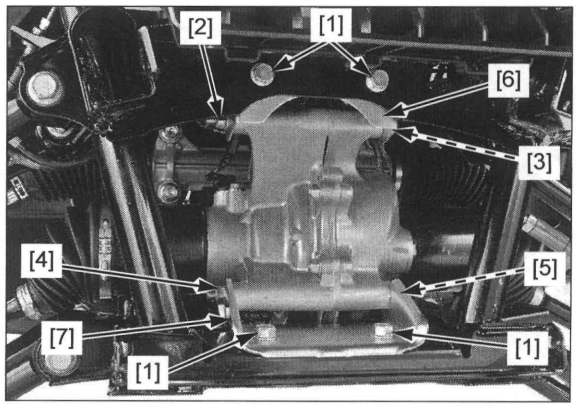
Disconnect the following:

- front differential lock switch 1P connector [1]
- front VS sensor 3P connector [2]



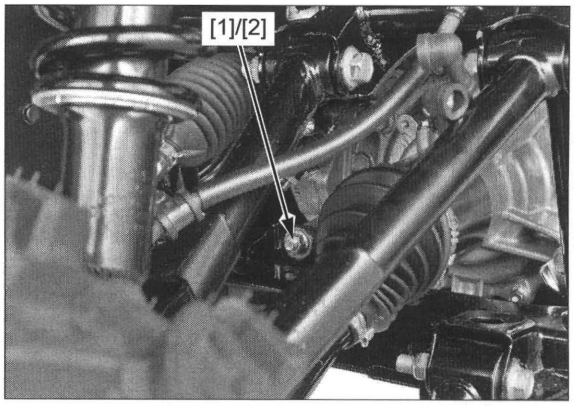
Remove the following:

- bracket bolts [1]
- upper mounting nut [2] and bolt [3]
- lower mounting nut [4] and bolt [5]
- upper bracket [6]
- lower bracket [7]



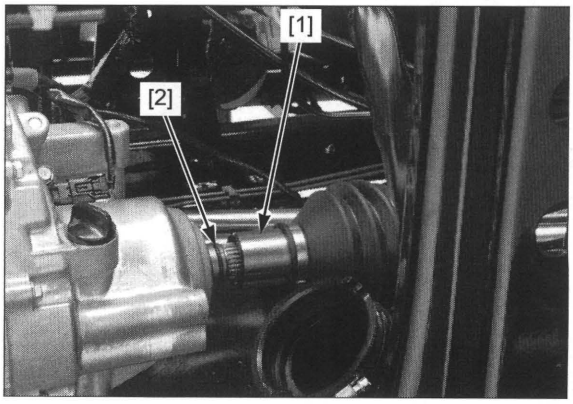
Remove the front final gear case rear mounting nut [1] and bolt [2].

Move the front final gear case assembly forward fully.

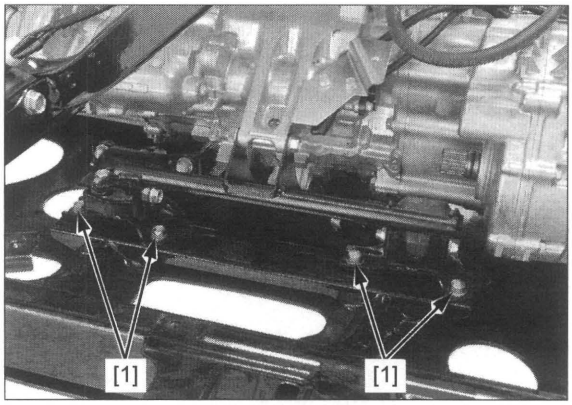


Pull the universal joint [1] out of the output shaft.

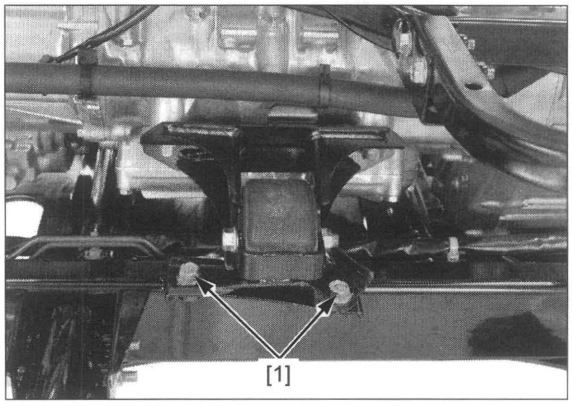
Remove the O-ring [2].



Remove the bolts [1].



Remove the bolts [1].



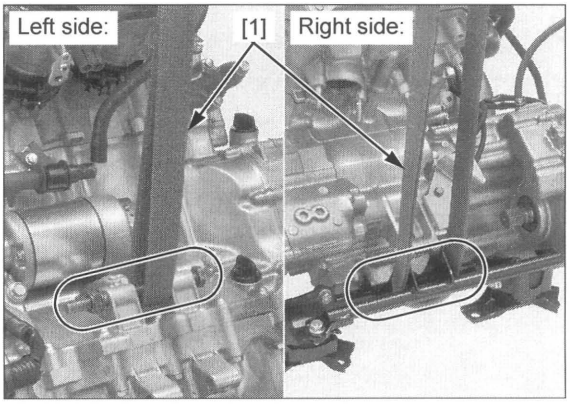
Make sure that the wires and cables do not interfere with the frame components.

Route the slings [1] as shown.

Remove the engine out of the frame using a hoist.

NOTE:

- Hold the engine securely and take care not to damage the frame or engine.



ENGINE HANGER

REMOVAL/INSTALLATION

RIGHT ENGINE HANGER

Remove the engine (page 16-4).

Remove the right engine hanger nuts [1] and bolts [2].

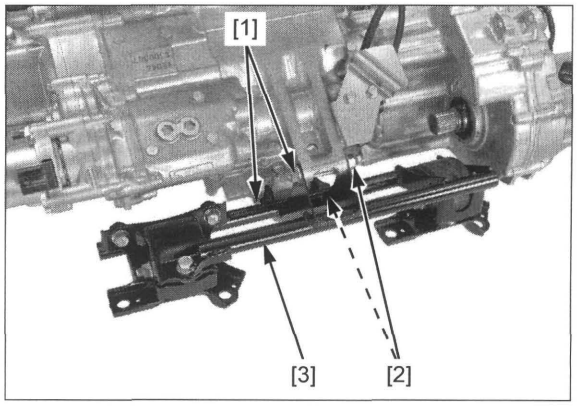
Remove the right engine hanger assembly [3].

Installation is in the reverse order of removal.

NOTE:

- Tighten the nut to the specified torque.

TORQUE: 57 N·m (5.8 kgf·m, 42 lbf·ft)



LEFT ENGINE HANGER

Remove the engine (page 16-4).

Remove the left engine hanger bolts [1].

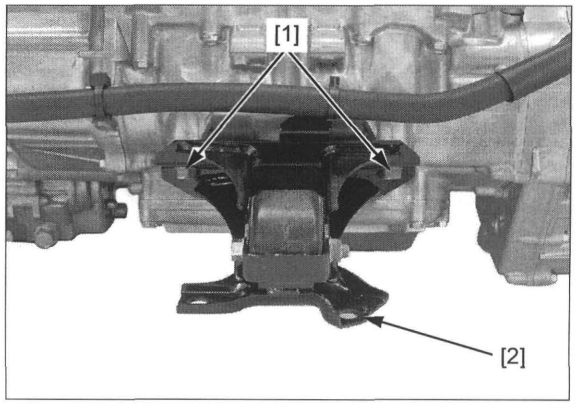
Remove the left engine hanger assembly [2].

Installation is in the reverse order of removal.

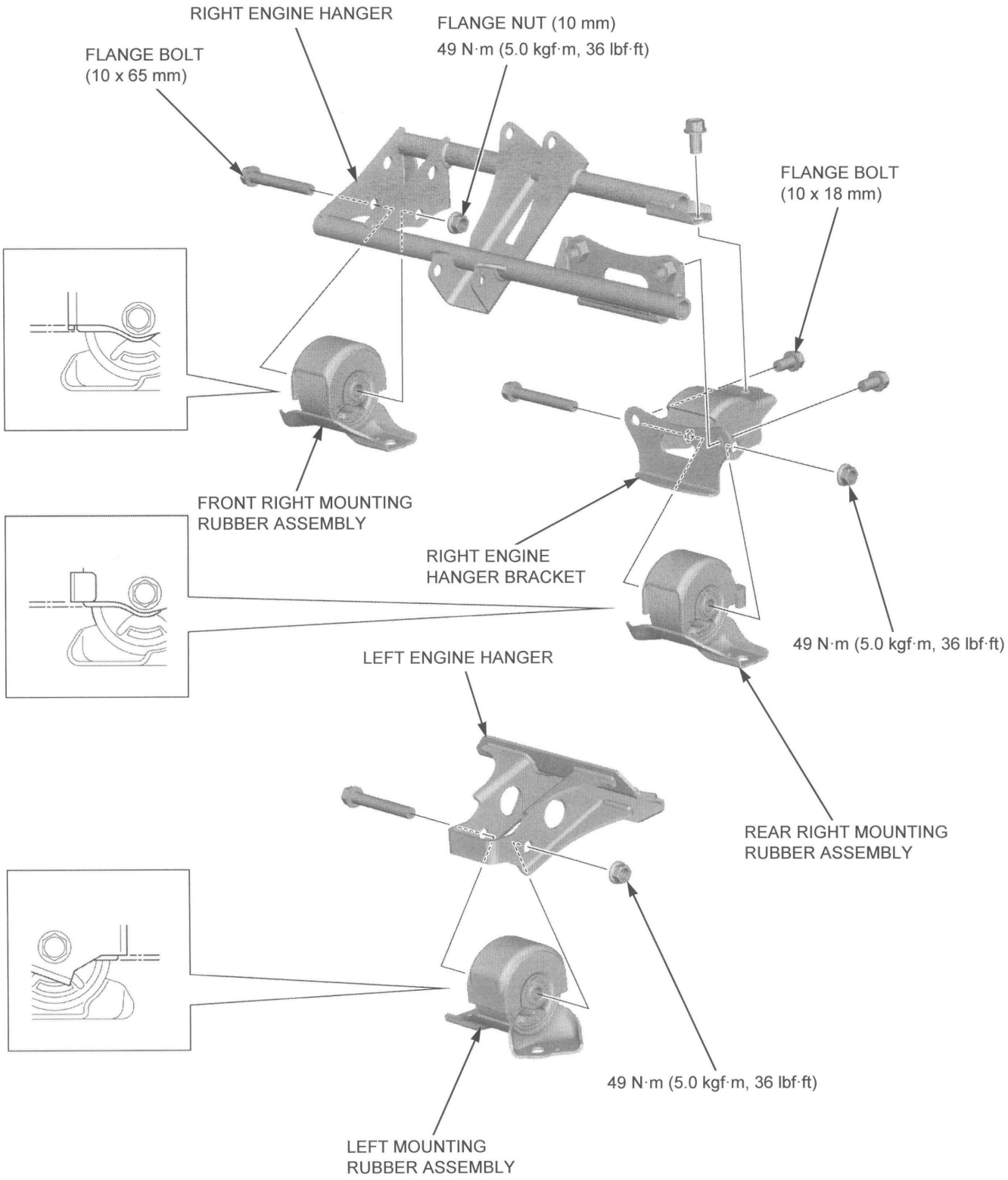
NOTE:

- Tighten the bolts to the specified torque.

TORQUE: 59 N·m (6.0 kgf·m, 44 lbf·ft)



DISASSEMBLY/ASSEMBLY



NOTE:

- Assemble the mounting rubbers so that the lower edges of the rubber and hanger/bracket are parallel.

ENGINE INSTALLATION

NOTE:
- Route the wires, cables and hoses properly (page 1-29).
- Refer to the engine hoisting point (page 16-10).

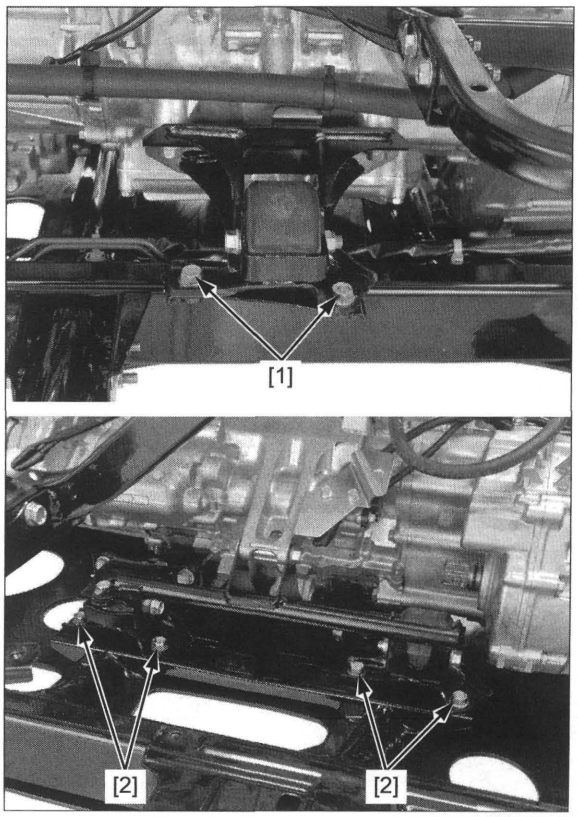
Carefully place the engine in the frame using a hoist.

NOTE:
- Hold the engine securely and take care not to damage the frame or engine.

Install the bolts:

– left side [1]
– right side [2]

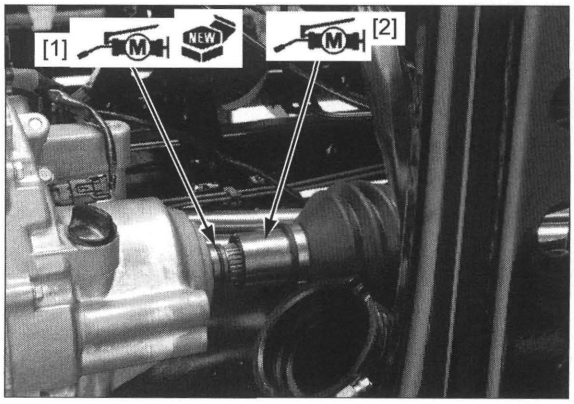
Tighten the bolts securely.



Move the front final gear case assembly forward fully.

Apply molybdenum disulfide grease to a new O-ring [1] and install it.

Apply molybdenum disulfide grease to the universal joint splines.
Connect the universal joint [2] to the output shaft by moving the front final gear case assembly rearward until fully seated.



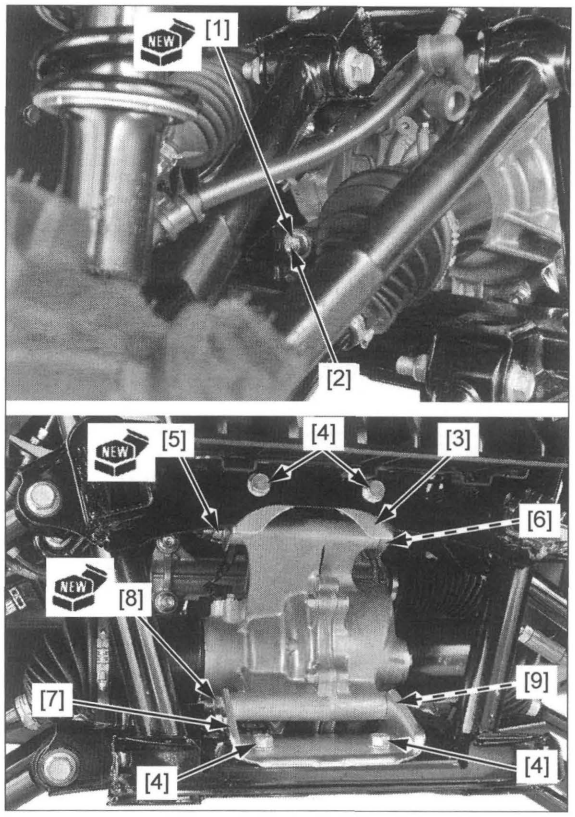
Install the following:

- new rear mounting nut [1] and bolt [2]
- upper bracket [3]
- bracket bolts [4]
- new upper mounting nut [5] and bolt [6]
- lower bracket [7]
- new lower mounting nut [8] and bolt [9]

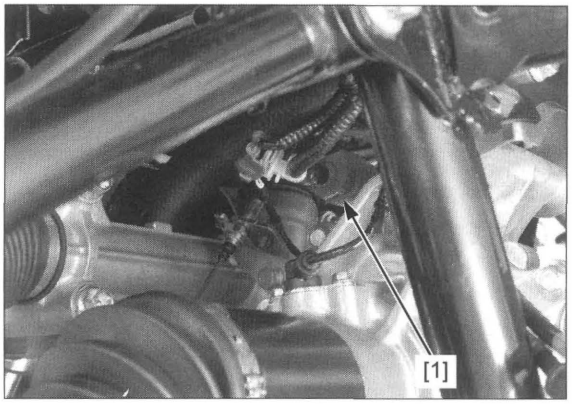
Tighten the bracket bolts securely.

Tighten the mounting nuts to the specified torque.

TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)

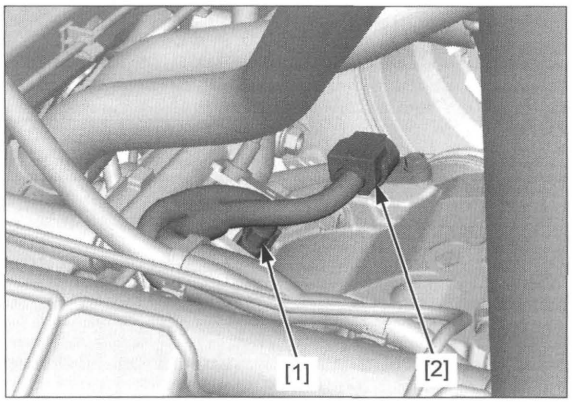


I-4WD model: Connect the front VS sensor 3P connector [1].



Except I-4WD model: Connect the following:

- front differential lock switch 1P connector [1]
- front VS sensor 3P connector [2]



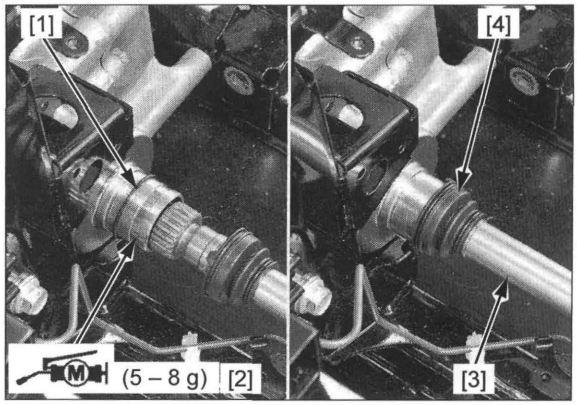
Move the rear final gear case assembly rearward fully.

Place the boot band [1] over the pinion joint [2] temporarily.

Apply 5 – 8 g of molybdenum disulfide grease to the propeller shaft joint splines.

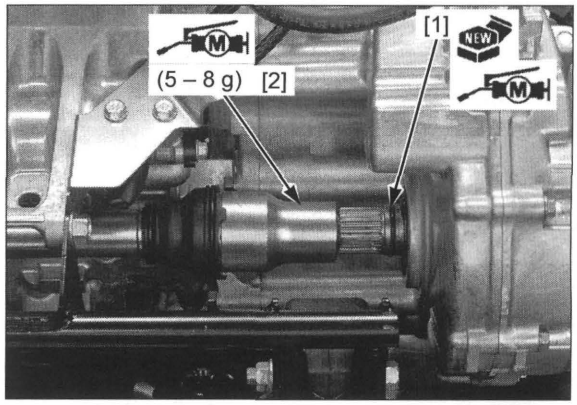
Install the propeller shaft [3] into the pinion joint.

Install the boot [4] over the pinion joint groove securely and the boot band into the boot groove.



Apply molybdenum disulfide grease to a new O-ring [1] and install it.

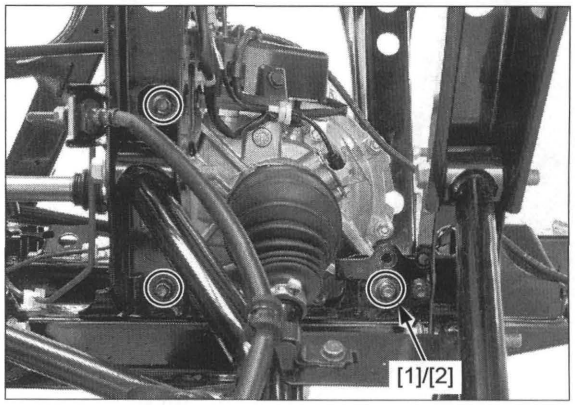
Apply 5 – 8 g molybdenum disulfide grease to the propeller shaft joint splines.
Install the propeller shaft joint [2] onto the output shaft by moving the rear final gear case assembly forward until fully seated.



Install the rear final gear case mounting bolts [1] and nuts [2].

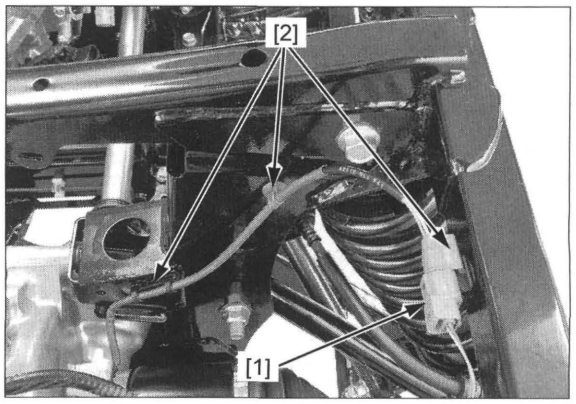
Tighten the nuts to the specified torque.

TORQUE: 95 N·m (9.7 kgf·m, 70 lbf·ft)



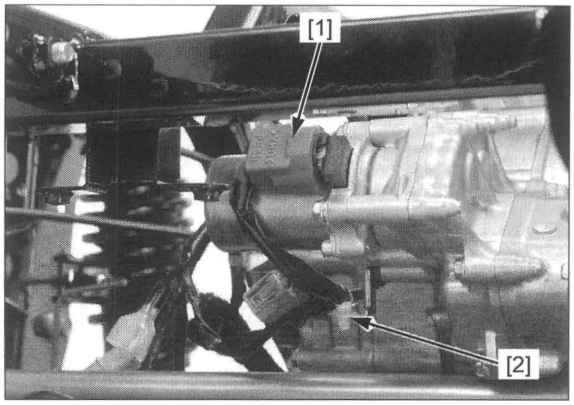
I-4WD model: Connect the rear right speed sensor 2P connector [1].

Install the wire clips [2].



Connect the shift control motor 2P connector [1].

Install the main wire harness clip [2].



Connect the following:

'22 models, After '22 models (III, IV, IX type)

– spindle angle sensor 3P connector [1]

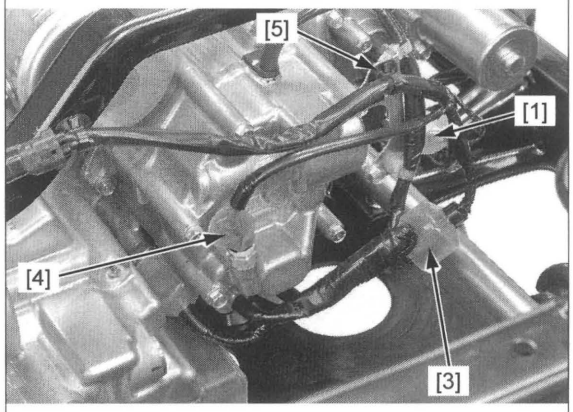
After '22 models (Except III, IV, IX type)

– spindle angle sensor 3P connector [2]

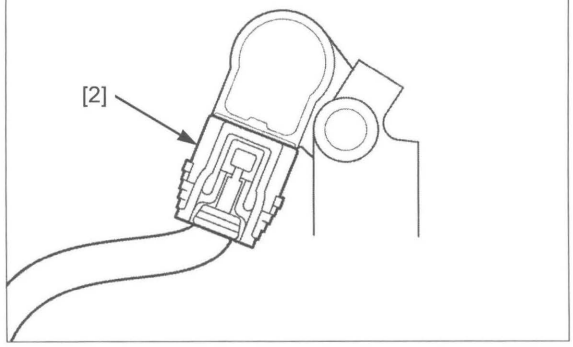
– linear/shift solenoid harness 12P connector [3]
– EOT sensor 2P connector [4]

Install the main wire harness clip [5].

'22 models, After '22 models (III, IV, IX type)



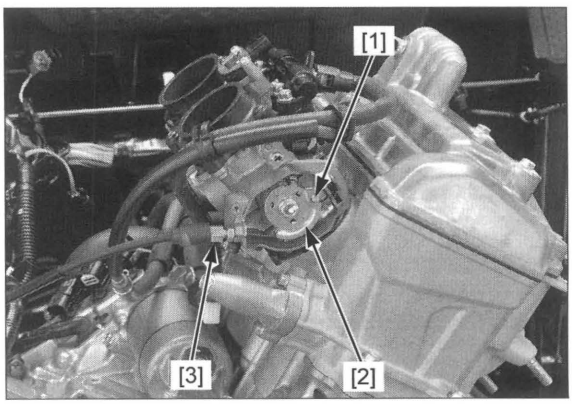
After '22 models (Except III, IV, IX type)



Connect the throttle cable [1] to the throttle drum [2].

Install the throttle cable adjuster [3].

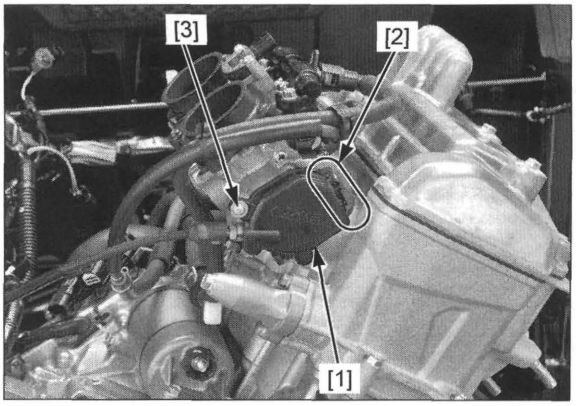
Adjust the accelerator pedal freeplay (page 3-5).



Install the throttle drum cover [1] by aligning the locating tab [2] with the slot of the throttle body.

Install the screw/washer [3] and tighten it to the specified torque.

TORQUE: 1.8 N·m (0.2 kgf·m, 1.3 lbf·ft)

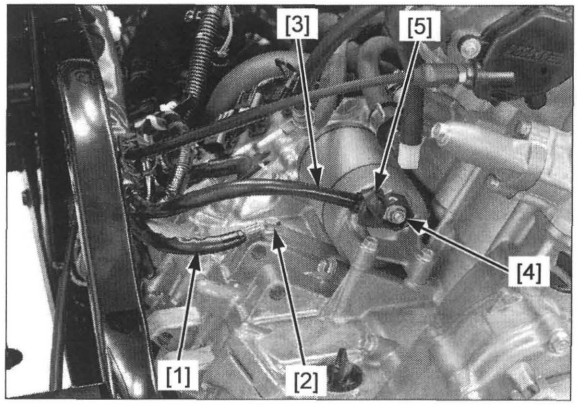


Install the ground cable [1] and bolt [2].

Tighten the bolt securely.

Install the starter motor cable [3] and terminal nut [4]. Tighten the nut securely.

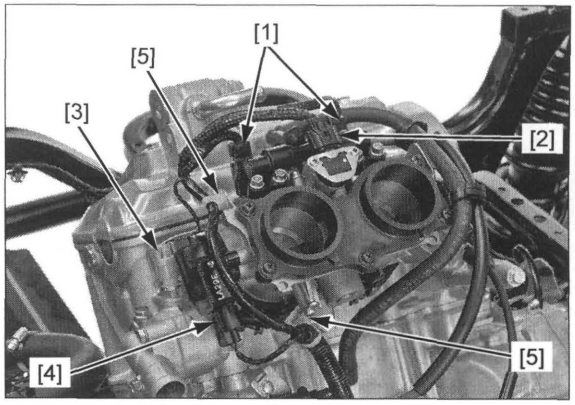
Install the rubber cap [5] (onto the starter motor terminal).



Connect the following:

- fuel injector 2P connectors [1]
- IACV 4P connector [2]
- ECT sensor 2P connector [3]
- sensor unit 5P connector [4]

Install the main wire harness clips [5].



Connect the following:

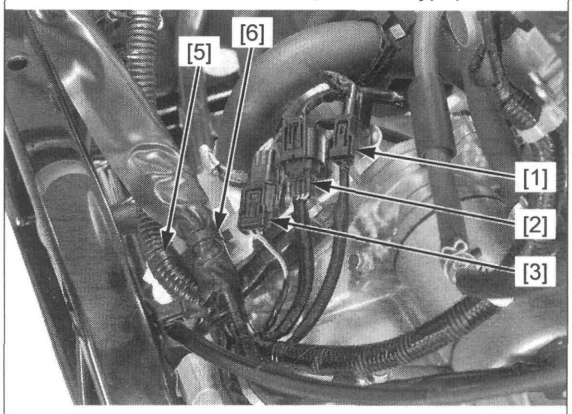
'22 models, After '22 models (III, IV, IX type)

- neutral switch 1P connector [1]
- sub-transmission position switch 8P connector [2]
- TR sensor 3P connector [3]

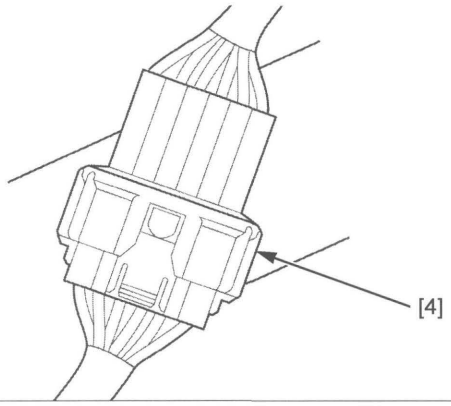
After '22 models (Except III, IV, IX type)

- sub-transmission position switch 12P connector [4]

'22 models, After '22 models (III, IV, IX type)

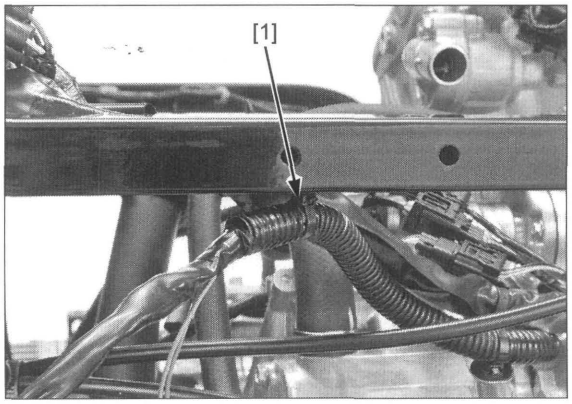


After '22 models (Except III, IV, IX type)



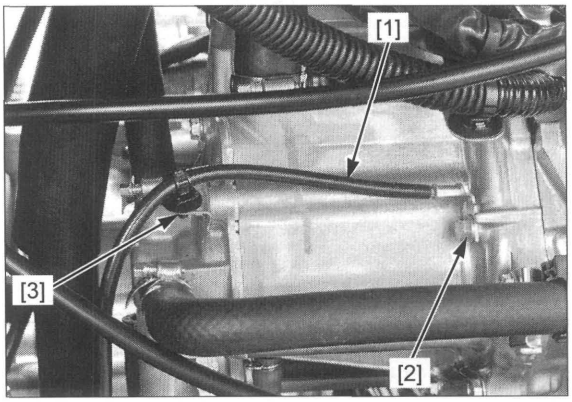
Install the alternator wire clip [5] and main wire harness clip [6] to the connector stay.

Install the alternator wire clip [1].

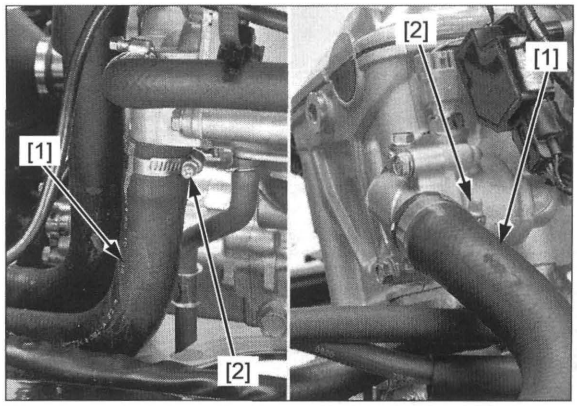


Install the frame ground cable [1] and bolt [2]. Tighten the bolt securely.

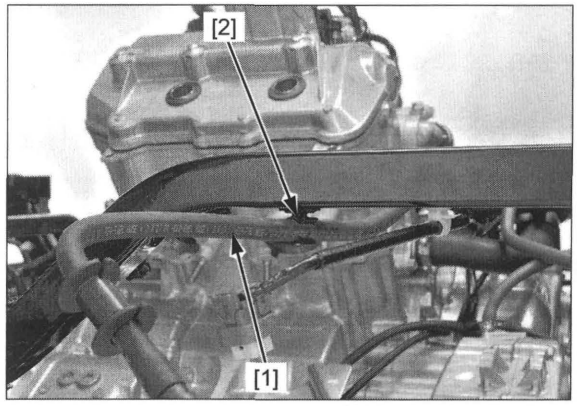
Install the cable clip [3].



Connect the water hoses [1] and tighten the band screws [2] to the specified range (page 10-20).



Install the fuel feed hose [1] to the hose clamp [2].



Move the shift select lever into the "N" (neutral) position.

Check that the sub-transmission is in the "N" (neutral) position (page 12-21).

Install the shift arm [1].

NOTE:

- Align the change arm slit with the clinched tooth of the control shaft as shown.

Install the pinch bolt [2] and tighten it to the specified torque.

TORQUE: 16 N·m (1.6 kgf·m, 12 lbf·ft)

Install the bolts [3] and stay [4], and tighten the bolts securely.

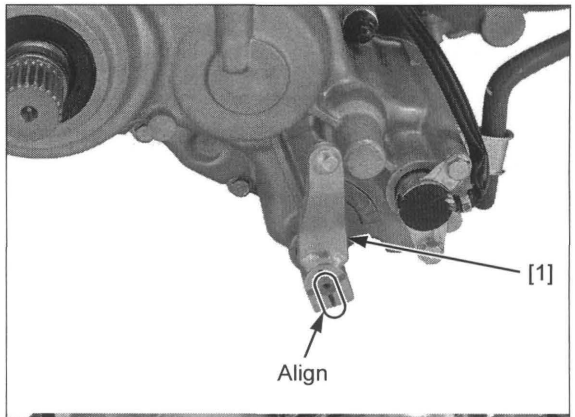
Check the shift select lever freeplay (page 12-30).

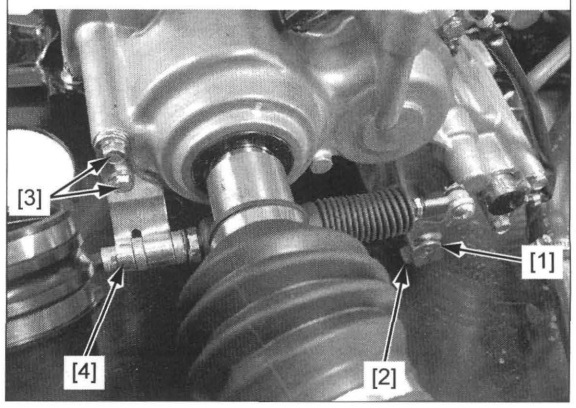
Install the removed parts in the reverse order of removal.

Install the following:

- seat frame (page 2-56)
- cargo bed (page 2-48)
- exhaust pipe (page 2-54)

Fill the engine with the recommended oil (page 3-13).
Fill the sub-transmission with the recommended oil (page 3-15).
Fill and bleed the cooling system (page 9-4).





MEMO

17. STEERING SYSTEM

SERVICE INFORMATION ····· 17-2

TROUBLESHOOTING ····· 17-3

COMPONENT LOCATION ····· 17-4

STEERING WHEEL ····· 17-5

COLUMN DAMPER ····· 17-5

STEERING COLUMN ····· 17-6

STEERING SHAFT/EPS UNIT ····· 17-8

TIE-ROD END ····· 17-12

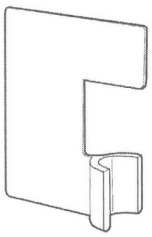
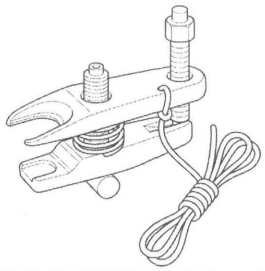
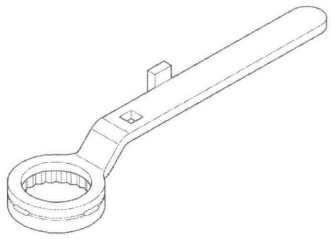
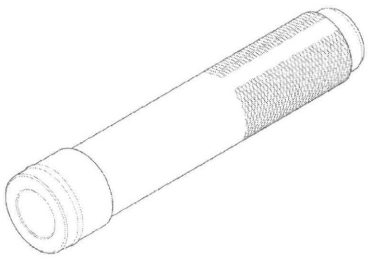
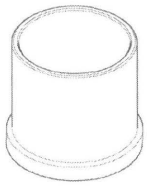
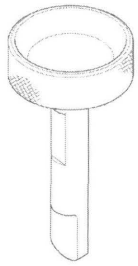
STEERING GEAR BOX ····· 17-14

SERVICE INFORMATION

GENERAL

- A jack or other support is required to support the vehicle (page 1-55).
- Use Honda Genuine replacement bolts and nuts for all joint and mounting points.
- Adjust toe whenever the knuckle or steering gear box components are replaced or removed (page 3-23).
- For knuckle and wheel hub service, see Wheel/Suspension section (page 20-4).

TOOLS

Steering Joint Gauge 07AMJ-HL4A100 	Ball joint remover, 28 mm 07MAC-SL00201  or 07MAC-SL00202 (U.S.A. only)	Lock nut wrench 070MA-HL40100  or 070MA-HL4A100 (U.S.A. only)
Driver, 22 mm I.D. 07746-0020100 	Base collar 07GAJ-PG20120 	Lock washer clinch pilot 07NAZ-SR30100  or a commercially available punch (U.S.A. only)

TROUBLESHOOTING

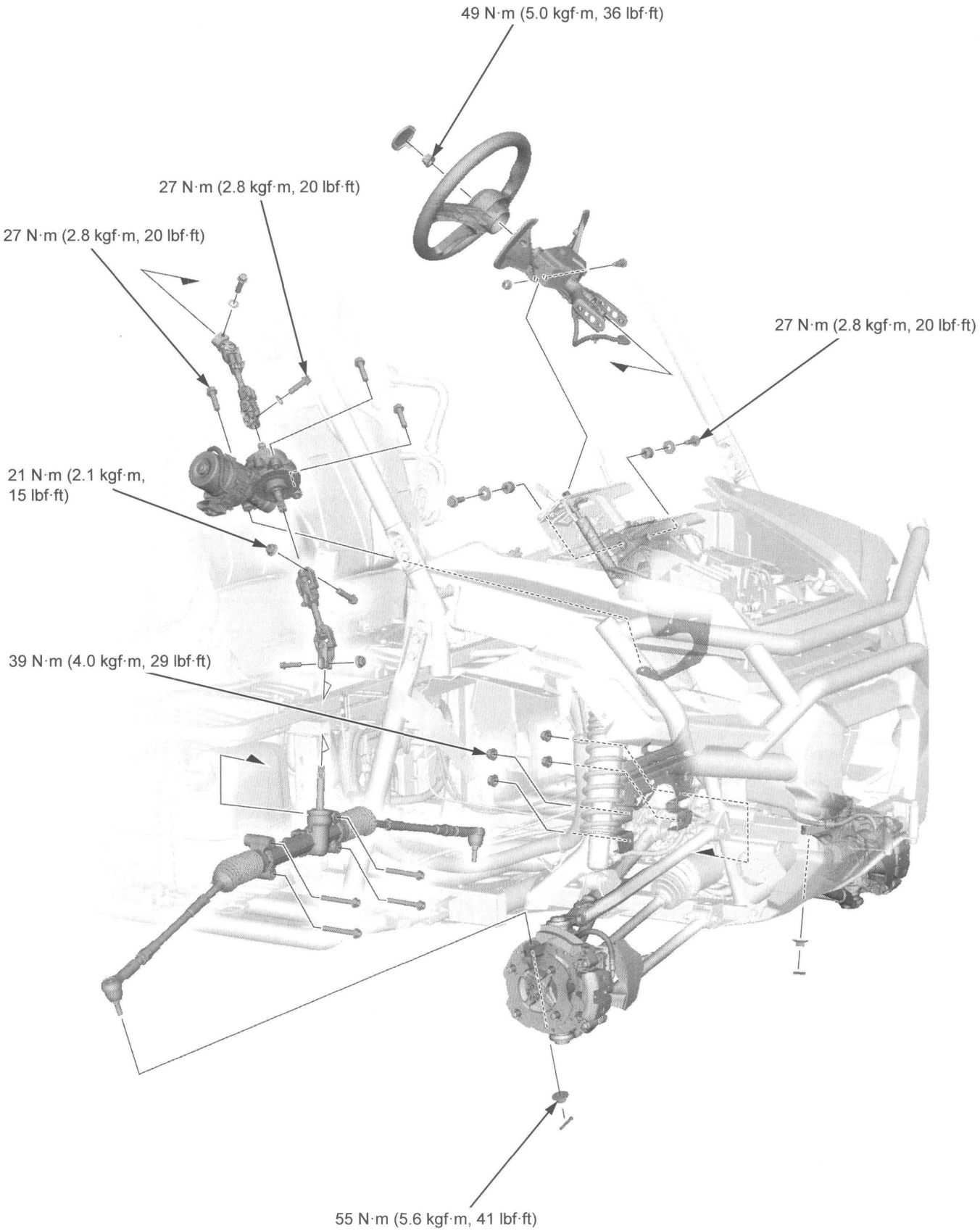
Hard steering
- Insufficient tire pressure
- Faulty front tire
- Incorrect rack guide adjustment
- Worn or damaged steering column bearing
- Damaged steering shaft
- Worn or damaged steering gear box components
- Damaged suspension components (page 20-2)
- Faulty EPS unit

Steers to one side or does not track straight
- Unequal tire pressure
- Damaged tie-rod, steering gear box or column components
- Incorrect wheel alignment (page 3-23)
- Faulty suspension or wheel components (page 20-2)

Steering wheel wobbles
- Loose steering wheel
- Worn steering shaft splines

Noise or vibration when turning the steering wheel
- Incorrect rack guide adjustment
- Worn or damaged steering column bearing
- Loose steering shaft joint fasteners
- Loose tie-rod joint fasteners
- Damaged tie-rod ball joint
- Damaged or deteriorated steering column mounting bushings
- Loose steering gear box mounting fasteners
- Worn or damaged steering gear box components
- Faulty EPS unit

COMPONENT LOCATION



STEERING WHEEL

REMOVAL/INSTALLATION

Remove the following:

- center cover [1] (by releasing the three hooks from the steering wheel)
- steering wheel nut [2]
- steering wheel [3]

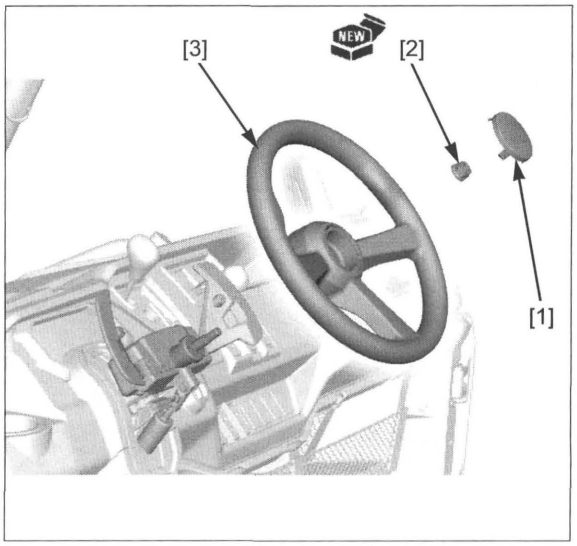
Set the front wheels in the straight ahead position.

Install the steering wheel onto the upper steering shaft in the horizontal (straight ahead) position.

Install a new steering wheel nut and tighten it to the specified torque.

TORQUE: 49 N·m (5.0 kgf·m, 36 lbf·ft)

Install the center cover onto the steering wheel by aligning the locating tab with the slot.

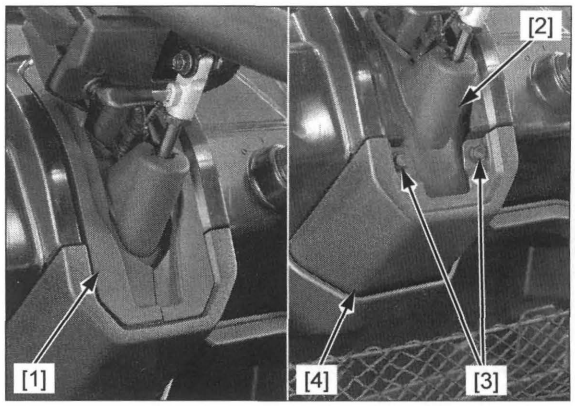


COLUMN DAMPER

REMOVAL/INSTALLATION

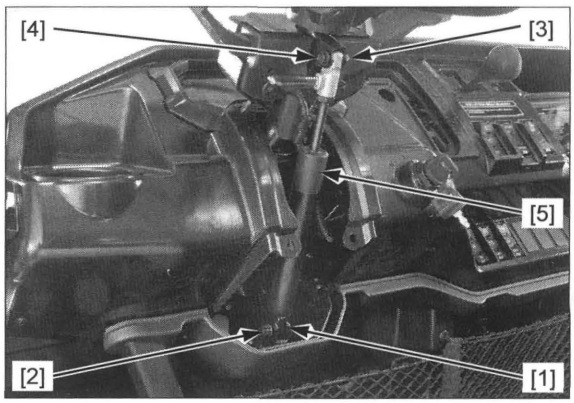
Remove the following:

- steering rubber A [1]
- steering rubber B [2]
- clips [3]
- steering cover [4]



- lower pivot nut [1] and bolt [2]
- upper pivot nut [3] and bolt [4]
- column damper [5]

Installation is in the reverse order of removal.



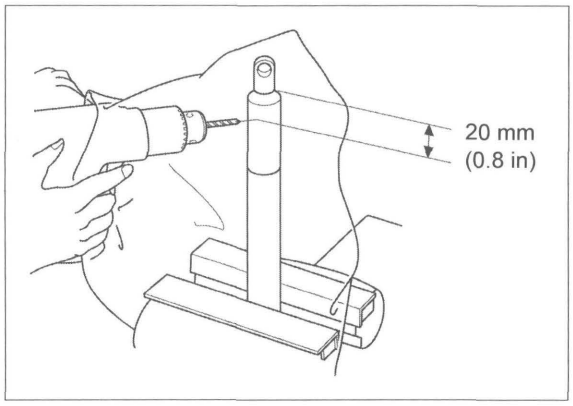
COLUMN DAMPER DISPOSAL PROCEDURE

Center punch the damper to mark the drilling point.

Wrap the damper inside a plastic bag.

Support the damper in a vise as shown.

Through the open end of the bag, insert a drill with a sharp 2 – 3 mm (5/64 – 1/8 in) drill bit.



NOTICE

- *Do not use a dull drill bit which could cause a buildup of excessive heat and pressure inside the damper, leading to an explosion and severe injury.*
- *Always wear eye protection to avoid getting metal shavings in your eyes when the gas pressure is released. The plastic bag is only intended to shield you from the escaping gas.*

Hold the bag around the drill and briefly run the drill inside the bag; this will inflate the bag with air from the motor and help keep the bag from getting caught in the bit when you start.

STEERING COLUMN

REMOVAL/INSTALLATION

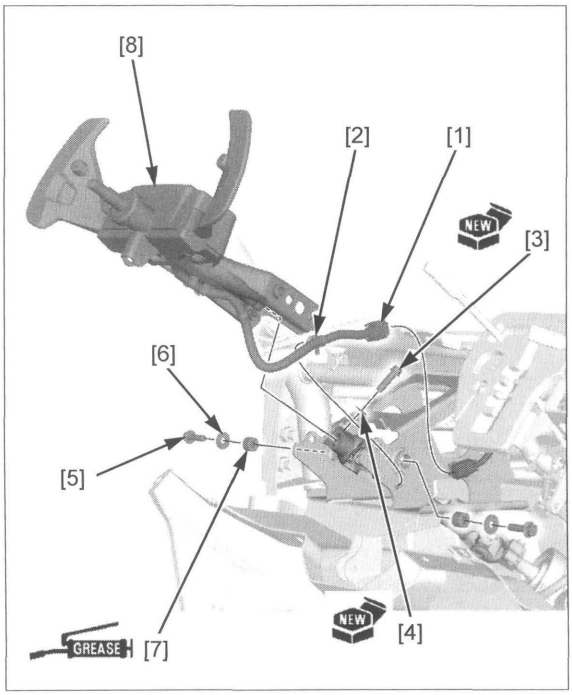
Remove the following:

– instrument panel (page 2-28)
– steering wheel (page 17-5)
– column damper (page 17-5)

Disconnect the shift switch 3P connector [1] and remove the wire clip [2].

Remove the following:

– pinch bolt [3]/lock washer [4]
– two mounting bolts [5]/washers [6]/collars [7]
– steering column assembly [8]



Install the steering column assembly by aligning the splines of the upper steering shaft and universal joint.

Apply grease to the sliding surface of the pivot collars. Install the two collars, washers and mounting bolts.

Install the two mounting bolts.

Install a new pinch bolt with a new lock washer and tighten it to the specified torque.

TORQUE: 27 N·m (2.8 kgf·m, 20 lbf·ft)

Tighten the mounting bolts securely.

Connect the shift switch 3P connector and install the wire clip.

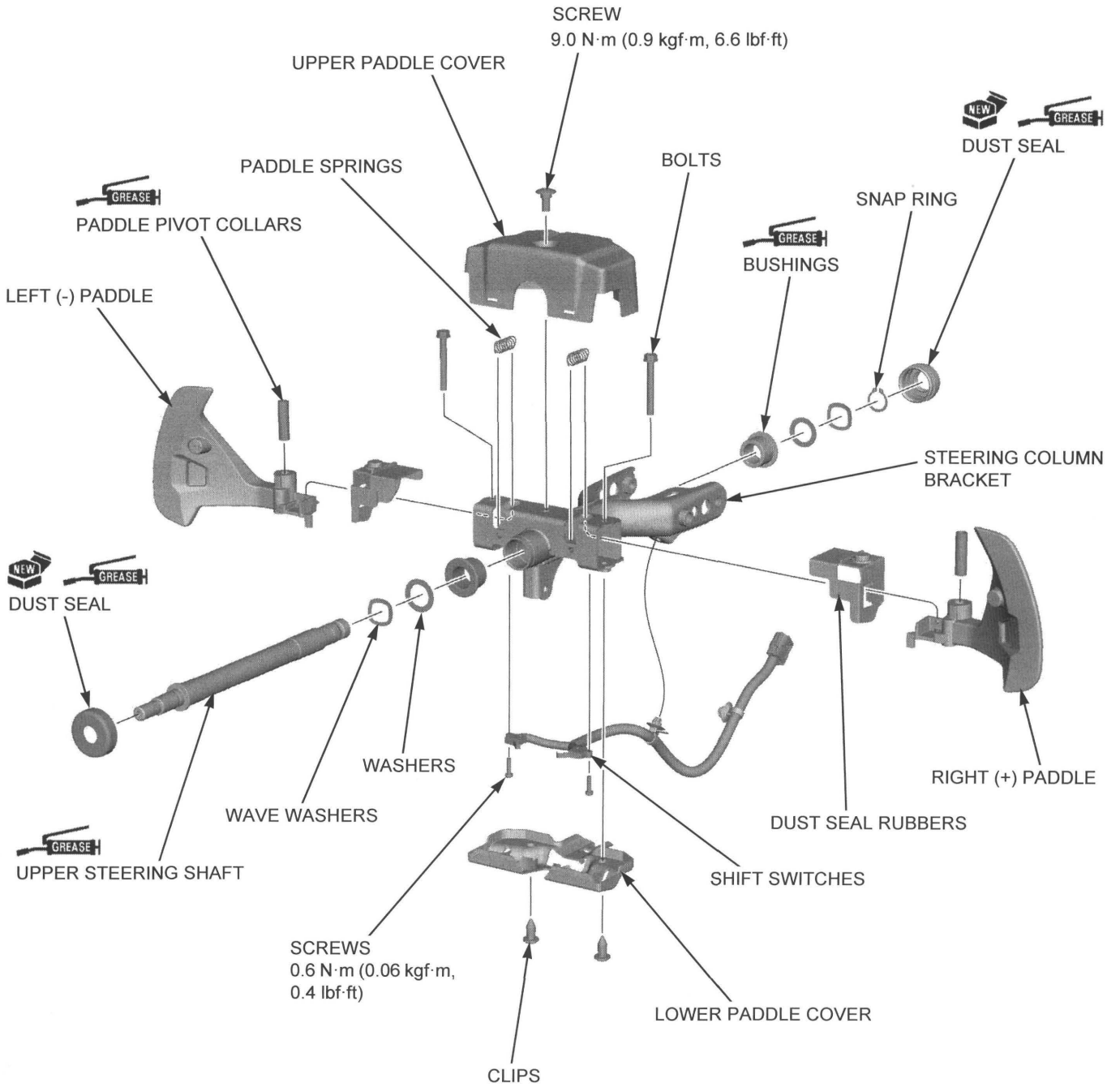
Install the following:

– column damper (page 17-5)
– steering wheel (page 17-5)
– instrument panel (page 2-28)

DISASSEMBLY/ASSEMBLY

NOTE:

- Check the shift switch operation after installing the steering system as follows:
  - Turn the ignition switch ON.
  - Move the shift select lever to "H" (high-range) or "L" (low-range) without starting the engine.
  - Operate the paddle and check that the gear position indicator indicates the appropriate gear position.



STEERING SHAFT/EPS UNIT

REMOVAL

NOTE:

- Perform the EPS Steering Angle Sensor Initialization procedure after installation (page 24-6).

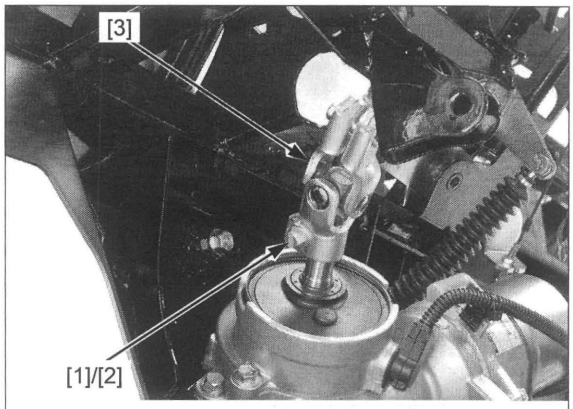
Remove the following:

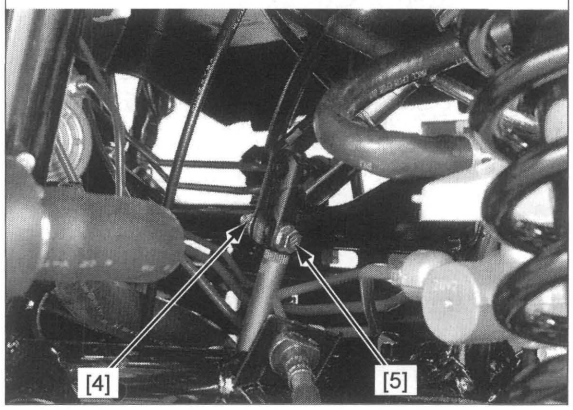
– steering column (page 17-6)
– front floor cover (page 2-31)

Raise the front wheels off the ground.

Remove the pinch bolt [1] and lock washer [2], then remove the middle steering shaft/universal joints [3] from the EPS unit.

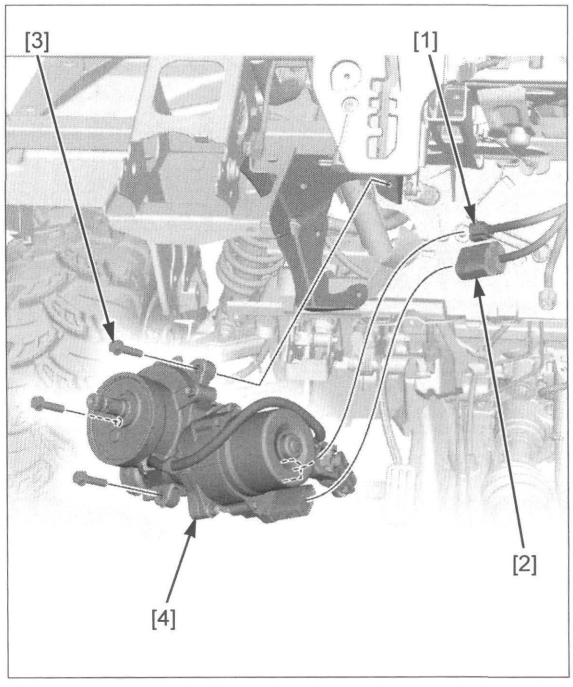
Remove the lock nut [4] and pinch bolt [5] from the steering pinion.



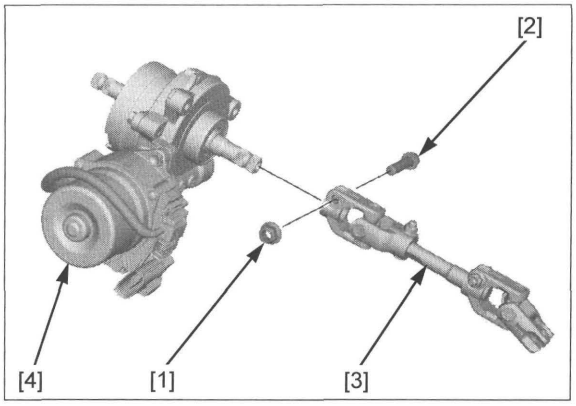


Disconnect the EPS unit 2P [1] and 8P [2] connectors.

Remove the three mounting bolts [3] and EPS unit/lower steering shaft assembly [4] from the frame.



Remove the lock nut [1], pinch bolt [2] and lower steering shaft/universal joints [3] from the EPS unit [4].



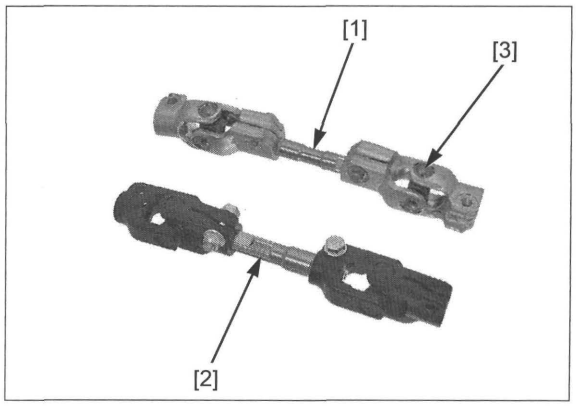
INSPECTION

Check the middle steering shaft [1], and lower steering shaft [2] for deformation or other damage.

Check that the universal joints [3] move smoothly without binding or noise.

Check the universal joint splines for wear or damage.

If they are damaged, check the upper steering shaft (steering column), EPS unit shaft and pinion splines.



INSTALLATION

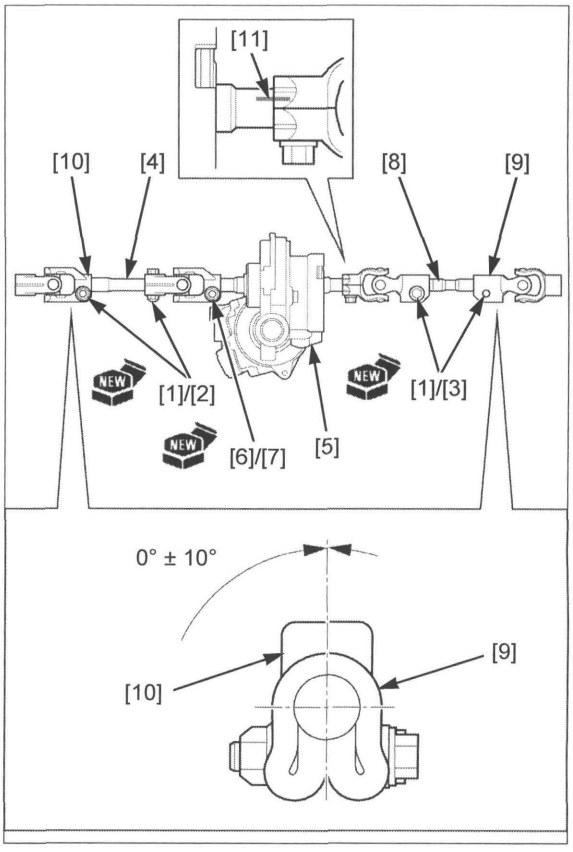
Replace the pinch bolts [1], lock nuts [2] and lock washers [3] which are loosened with new ones, and loosely install them.

Be careful not to damage the shaft and joint splines.

Install the lower steering shaft/universal joints [4] to the EPS unit [5] while connecting the universal joint onto the lower pinion by aligning the splines.
Align the bolt holes in the universal joint with the groove in the pinion and loosely install a new pinch bolt [6] and a new lock nut [7].

Temporarily install the middle steering shaft/universal joints [8] so that the installed angles between the yoke A [9] and B [10] of the universal joints are 0° ± 10° as shown.
Mark the installed position [11] on the middle steering shaft/universal joints and EPS unit shaft.

Remove the middle steering shaft/universal joints from the EPS unit.



Set the front wheels in the straight ahead position.
Check the steering gear box initial setting and tie-rod length (page 17-22).

Be careful not to damage the shaft and joint splines.

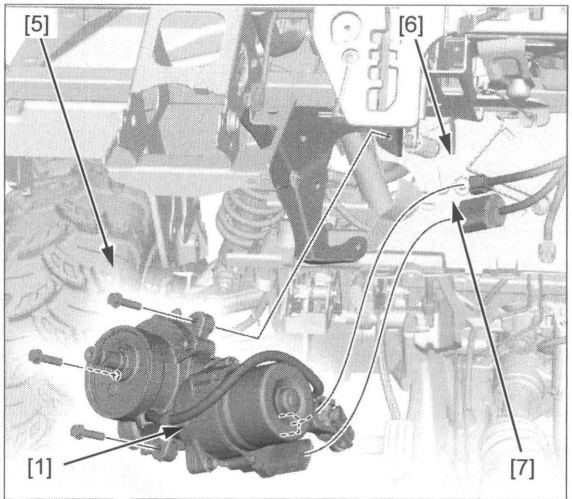
Install the EPS unit/lower steering shaft assembly [1] into the frame while connecting the lower universal joint onto the steering pinion [2] on the steering gear box by aligning the splines.

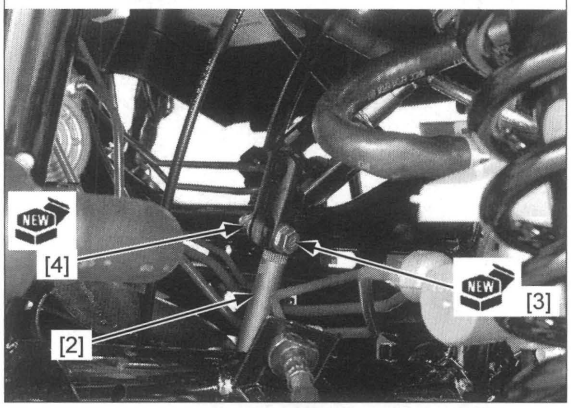
Align the bolt holes in the universal joint with the groove in the pinion and loosely install a new pinch bolt [3] and a new lock nut [4].

Install the three mounting bolts [5] and tighten them to the specified torque.

TORQUE: 27 N·m (2.8 kgf·m, 20 lbf·ft)

Connect the EPS unit 2P [6] and 8P [7] connectors.



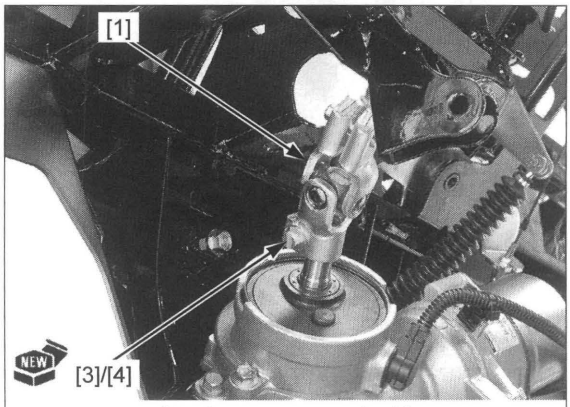


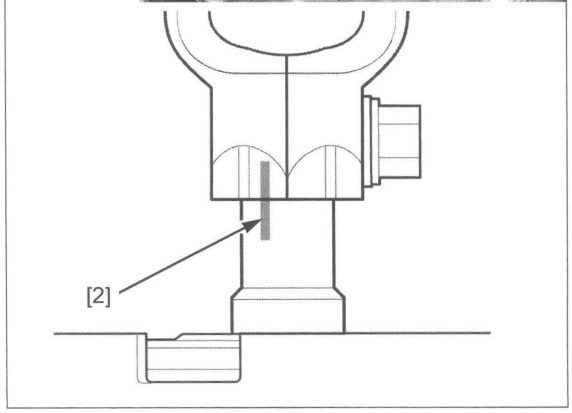
Be careful not to damage the shaft and joint splines.

Install the middle steering shaft/universal joints [1] onto the EPS unit by aligning the previously marked position [2] (page 17-9).

Align the bolt holes in the universal joint with the groove in the shaft and loosely install a new pinch bolt [3] with a new lock washer [4].

Check that yoke A and B of the universal joints are positioned at an angle of 90° ± 10° (page 17-9).





Tighten the following procedure.

1. Install the steering column (page 17-6) and tighten the steering column pinch bolt [1] to the specified torque.

   TORQUE: 27 N·m (2.8 kgf·m, 20 lbf·ft)

2. Tighten the middle steering shaft upper joint pinch bolt [2] to the specified torque.

   TORQUE: 27 N·m (2.8 kgf·m, 20 lbf·ft)

3. Tighten the EPS steering shaft upper joint pinch bolt [3] to the specified torque.

   TORQUE: 27 N·m (2.8 kgf·m, 20 lbf·ft)

4. Tighten the EPS steering shaft lower joint lock nut [4] to the specified torque.

   TORQUE: 21 N·m (2.1 kgf·m, 15 lbf·ft)

5. Tighten the lower steering shaft lower joint lock nut [5] to the specified torque.

   TORQUE: 21 N·m (2.1 kgf·m, 15 lbf·ft)

6. Tighten the steering gear pinion lock nut [6] to the specified torque.

   TORQUE: 21 N·m (2.1 kgf·m, 15 lbf·ft)

NOTE:

- The use of this special tool [7] is required during the lower steering joint B installation procedure to properly set the lower steering joint B onto the steering pinion shaft.
- The steering joint gauge should be positioned so it contacts the underside of the lower steering joint B when installed.
- Use the steering joint gauge to properly align the lower steering joint B with the steering pinion shaft as shown.
- Tighten the lock nut in a two-step process. Remove the steering joint gauge after the initial torque is applied prior to final torque.

TOOL:
Steering joint gauge [7]: 07AMJ-HL4A100

7. Tighten the middle steering shaft lower joint pinch bolt [8] to the specified torque.

   TORQUE: 27 N·m (2.8 kgf·m, 20 lbf·ft)

8. Tighten the lower steering shaft upper joint lock nut [9] to the specified torque.

   TORQUE: 21 N·m (2.1 kgf·m, 15 lbf·ft)

9. Install the following:

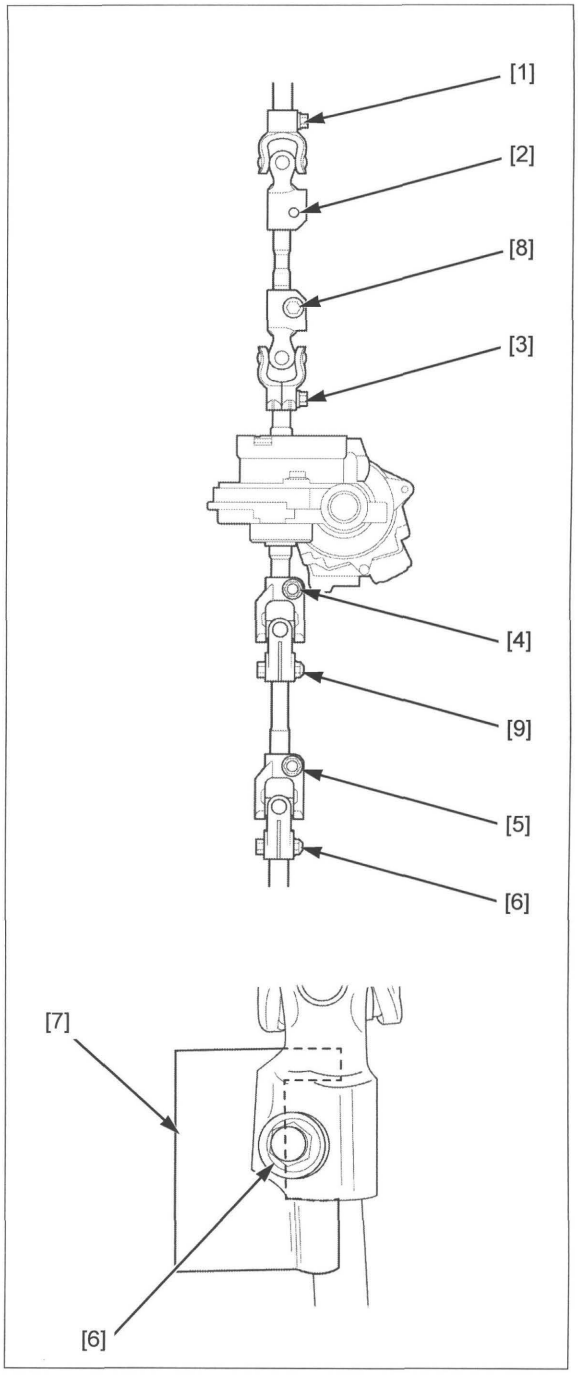
   – column damper (page 17-5)
   – instrument panel (page 2-28)
   – front floor cover (page 2-31)

   Check that the steering wheel rotates smoothly from lock-to-lock, without binding, and that from center to lock-left and lock-right is an equal number of turns.

   Lower the front wheels on the ground.

NOTE:

- Perform the EPS Steering Angle Sensor Initialization procedure after installation (page 24-6).



TIE-ROD END

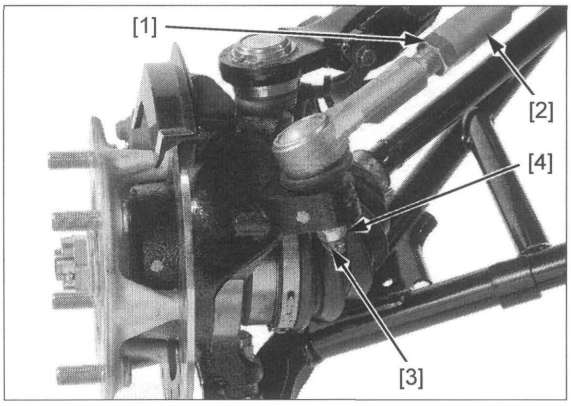
REMOVAL

Remove the front wheel (page 20-6).

Loosen the tie-rod end lock nut (left-hand thread) [1] while holding the tie-rod [2].

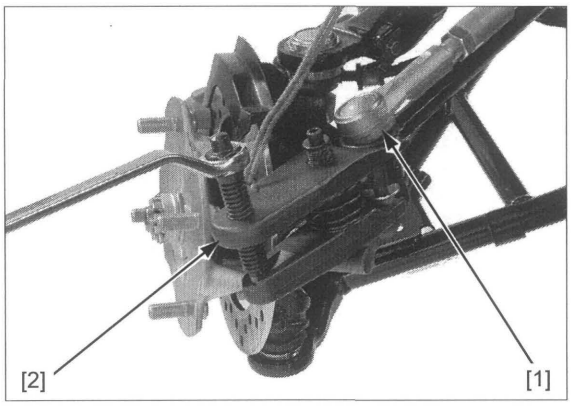
Remove the cotter pin [3].

Loosen the ball joint nut [4], but do not remove it yet.



Release the ball joint [1] using the special tool according to the following instructions.

TOOL:
Ball joint remover, 28 mm [2] **07MAC-SL00201 (U.S.A. : 07MAC-SL00202)**



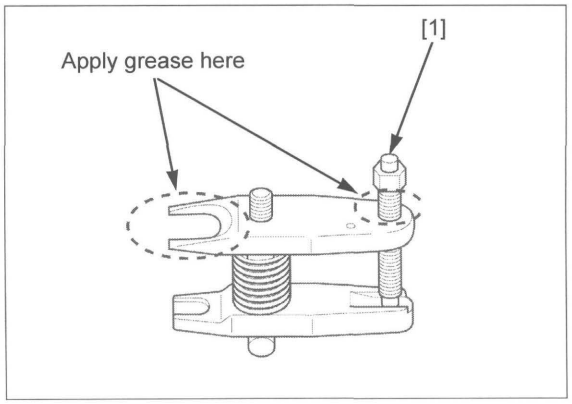
Apply grease to the ball joint remover at the point shown.

This will ease installation of the tool and prevent damage to the pressure bolt [1] threads.

Insert the jaws carefully, making sure not to damage the ball joint boot.

If necessary, apply penetrating type lubricant to loosen the ball joint.

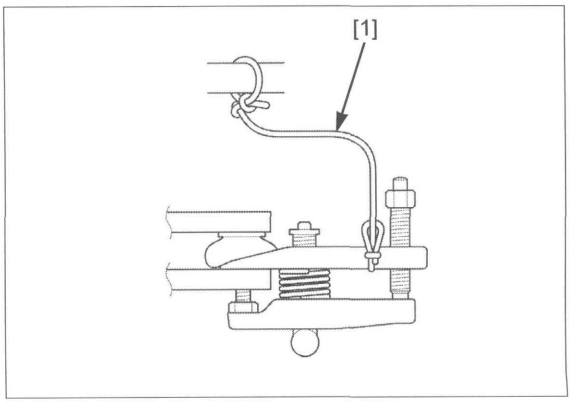
Adjust the jaw spacing by turning the pressure bolt.



To prevent the tool from dropping, tie the strap [1] on a neighboring solid part such as the upper arm, frame pipe, etc. before operation.

NOTE:

- Do not tie the strap on the brake hose, brake pipe, rubber boot, or other parts that can be damaged easily.



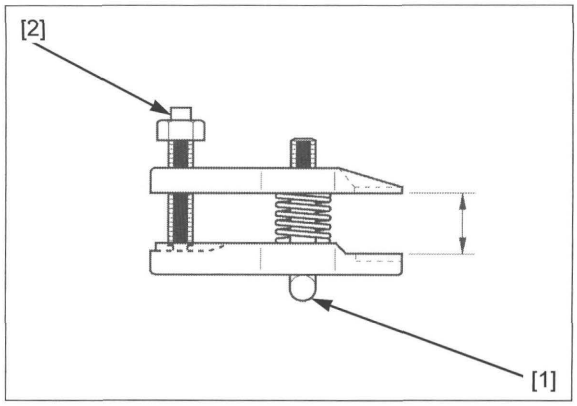
Once the tool is in place, turn the adjusting bolt [1] as necessary to make the jaws parallel.

Then hand-tighten the pressure bolt [2] and recheck the jaws to make sure they are still parallel.

Tighten the pressure bolt with a wrench until the ball joint stud pops loose.

Remove the ball joint nut and disconnect the tie-rod from the knuckle.

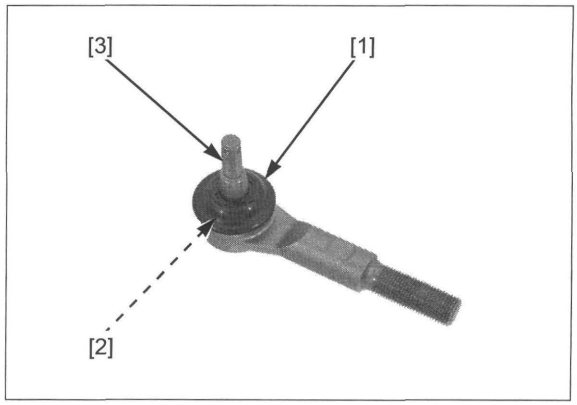
Remove the tie-rod end from the tie-rod.



INSPECTION

Inspect the ball joint boot [1] for tears or other damage and the ball joint [2] for looseness by moving the ball joint stud [3].

They should move freely and smoothly without binding.

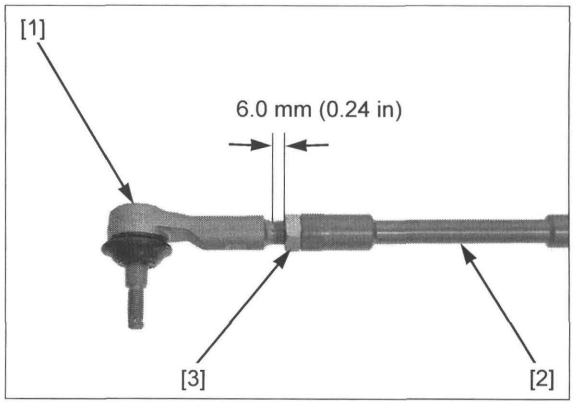


INSTALLATION

Install the tie-rod end [1] onto the tie-rod [2] and screw it against the lock nut [3] so that the thread length is 6.0 mm (0.24 in) for initial reference.

Tightening of this nut to the specified torque is performed when adjusting the wheel alignment.

Temporarily tighten the lock nut while holding the tie-rod end.



Connect the tie-rod end [1] to the knuckle with the joint nut [2].

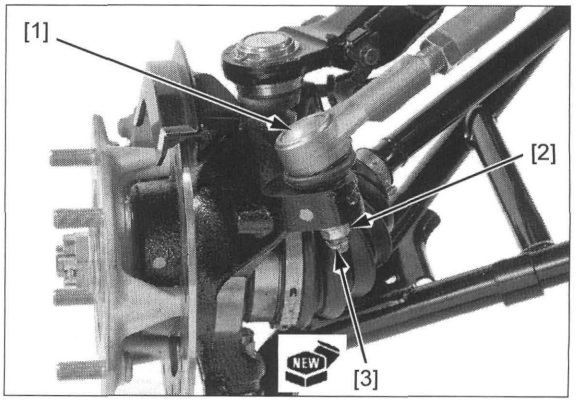
Tighten the joint nut to the specified torque.

TORQUE: 55 N·m (5.6 kgf·m, 41 lbf·ft)

Install the following:

- a new cotter pin [3]
- front wheel (page 20-6)

Adjust the wheel alignment (page 3-23).



STEERING GEAR BOX

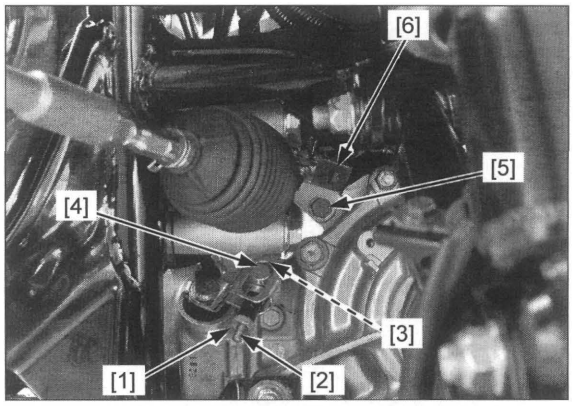
REMOVAL

NOTE:

- Perform the EPS Steering Angle Sensor Initialization procedure after installation (page 24-6).

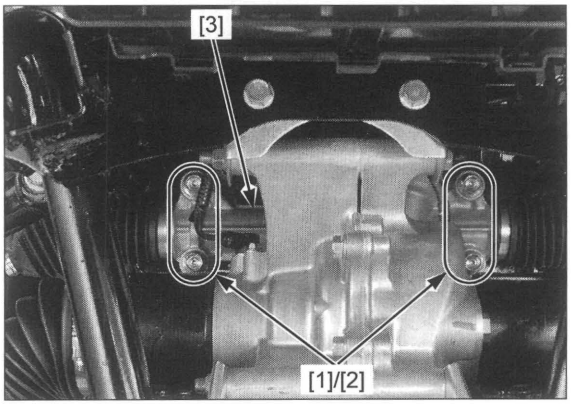
Remove the following:

- steering shaft/EPS unit assembly (page 17-8)
- differential lock cover (page 18-14)
- front floor lid (page 2-30)
- adjusting nut [1]
- final clutch cable [2]
- return spring [3]
- joint pin [4]
- stay bolt [5]
- clutch cable stay [6]



Be careful not to damage the tie-rod boots and shaft splines.

Support the steering gear box securely and remove the four mounting nuts [1], bolts [2], then remove the gear box assembly [3] to the left side.

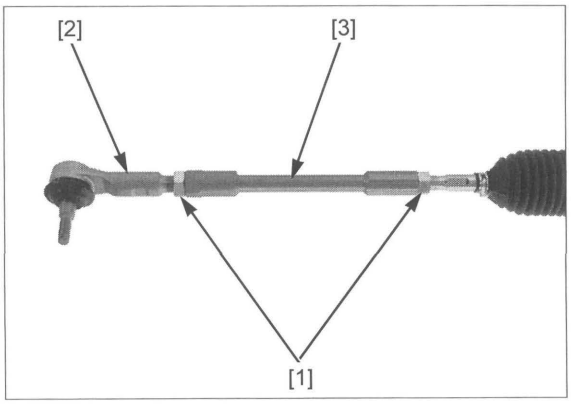


DISASSEMBLY

Loosen four lock nuts [1].

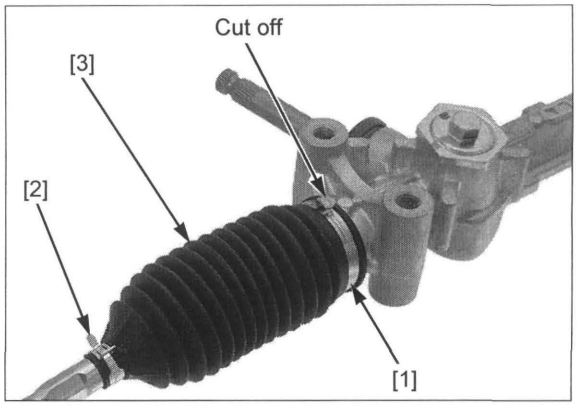
Remove the following:

- two tie-rod ends [2]
- two tie-rods [3]



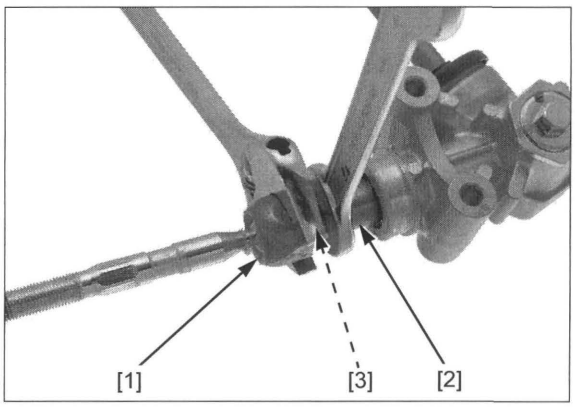
Cut off the boot band [1] in the position as shown and remove it.

Remove the boot clip [2] and the tie-rod boot [3].



Loosen the rack end joint [1] of the tie-rod while holding the steering rack [2] to remove the tie-rod.

Remove the lock washer [3].



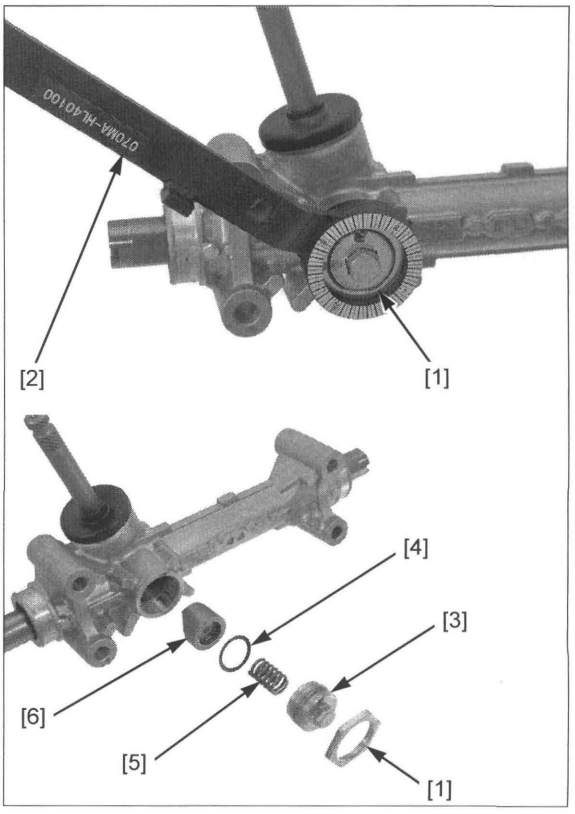
Loosen the lock nut [1] using the special tool:

TOOL:

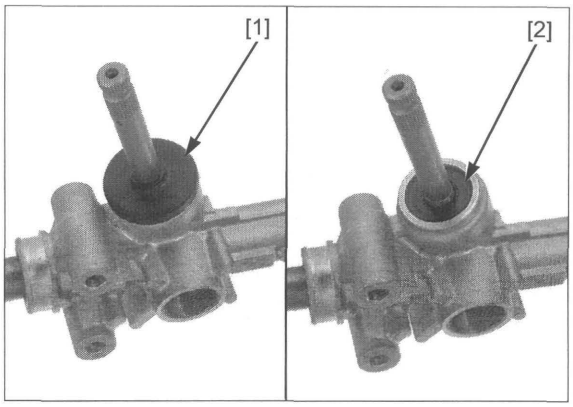
Lock nut wrench [2]	**070MA-HL40100**
	(U.S.A. : 070MA-HL4A100)

Remove the following:

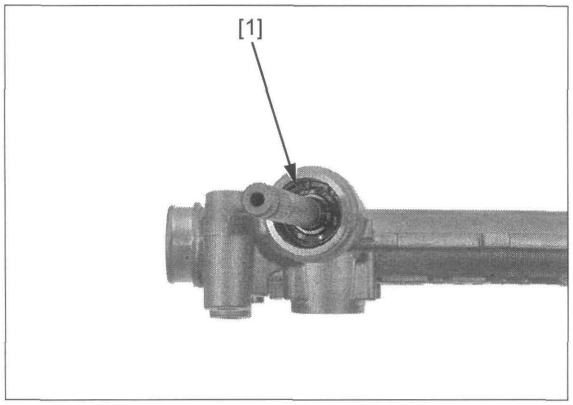
- lock nut
- rack guide screw [3]
- cone washer [4]
- pressure spring [5]
- rack guide [6]



– dust cover [1]
– dust seal [2]



– snap ring [1]



Hold the steering pinion in a vise with soft jaws or shop towels.

Take care not to damage the housing. Replace the pinion and bearing as an assembly.

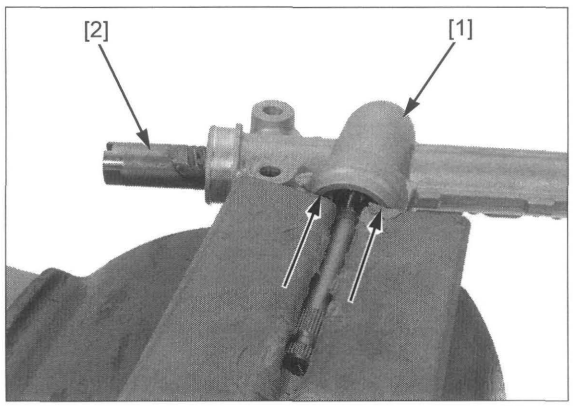
Remove the steering pinion/bearing assembly from the gear box housing [1] by evenly driving a wooden block at the contact points (arrows).

NOTE:

- Do not reuse the pinion and/or bearing.

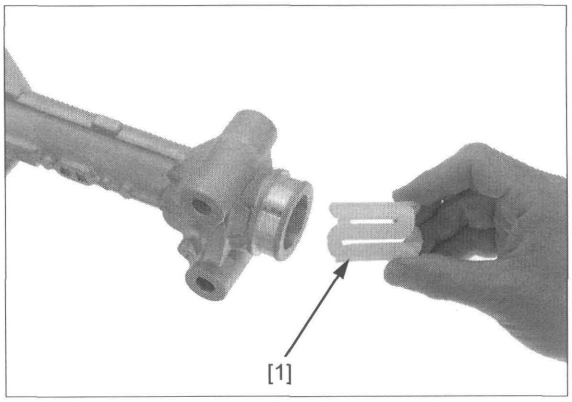
Be careful not to damage the sliding surface and teeth of the rack.

Remove the steering rack [2] from the gear box housing.



Remove the end bushing [1].

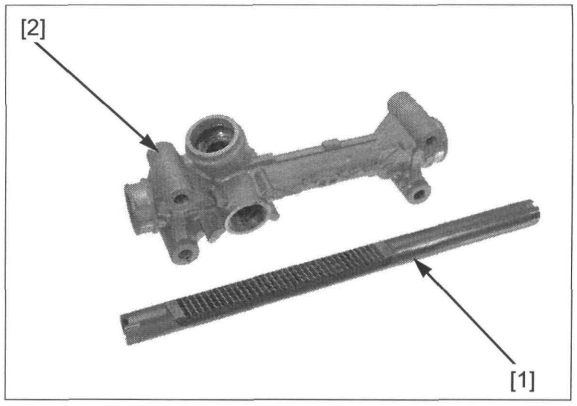
Clean the disassembled parts with a high flash point or non-flammable solvent and dry them with compressed air.



INSPECTION

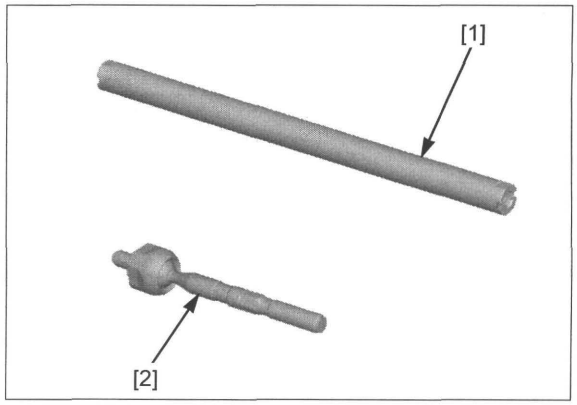
Check the rack teeth [1] for wear, chipping or damage.

Check the gear box housing [2] for damage.



Check the tie-rod [1] for distortion or damage.

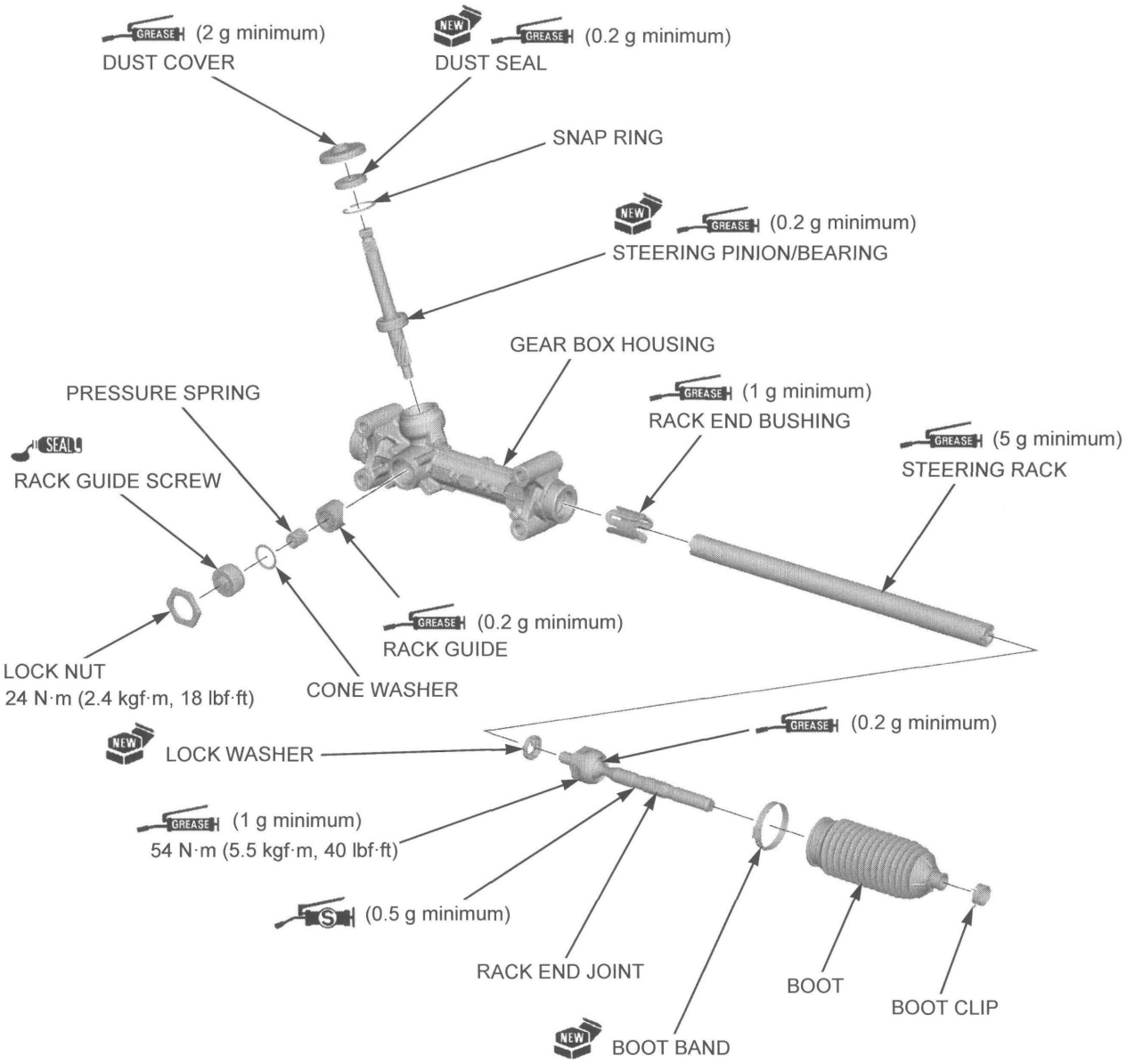
Check that the rack end joint (universal joint) [2] moves smoothly without binding or noise.



ASSEMBLY

NOTE:

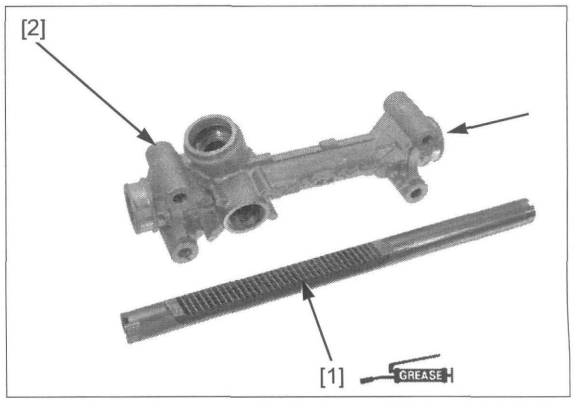
- Keep dust and dirt out of the gear box housing.



Apply 5 g minimum of grease to the teeth of the steering rack [1] evenly.

Be careful not to damage the bushing by the rack end edge.

Insert the rack into the gear box housing [2] slowly in the direction as shown.



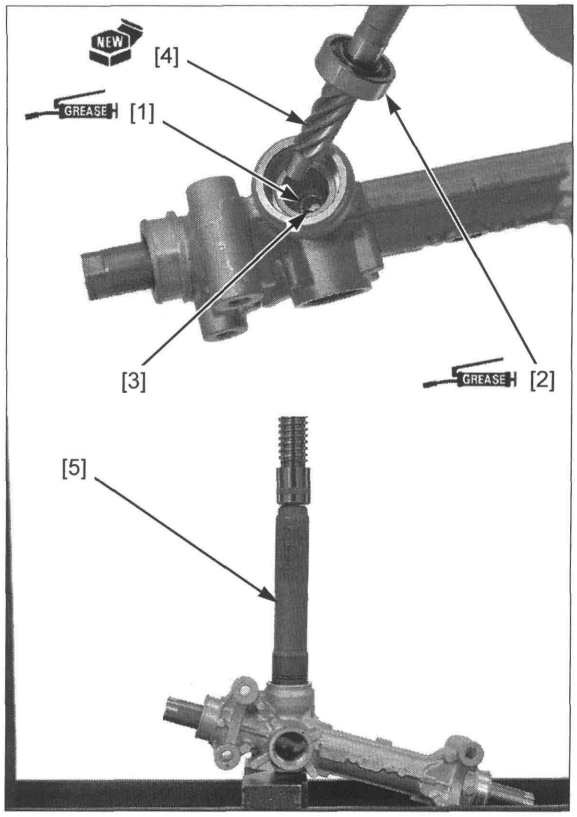
Apply 0.2 g minimum of grease to the needle bearing [1] in the gear box housing and the ball bearing [2] on the steering pinion.

Make sure the rack teeth [3] can be seen through the pinion hole and insert a new pinion/bearing assembly [4] into the housing.

Press the bearing in until it is fully seated, using the special tool.

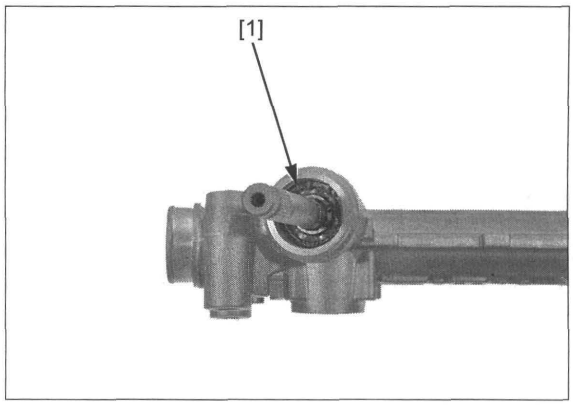
TOOL:

Driver, 22 mm I.D. [5]	**07746-0020100**



Make sure the snap ring is firmly seated in the groove.

Install the snap ring [1] into the groove in the housing with the chamfered side facing down.



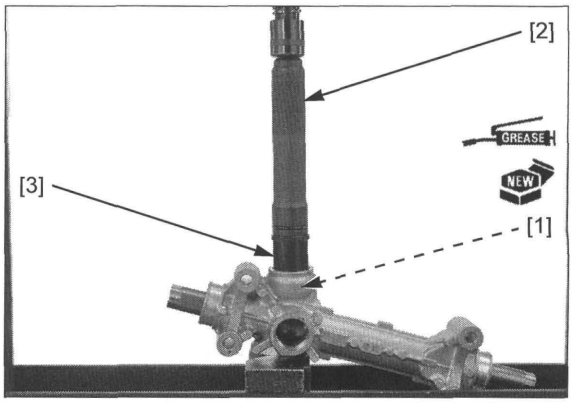
Wrap vinyl tape around the pinion splines and groove, and coat it with grease to avoid damaging the dust seal lip.

Apply 0.2 g minimum of grease to a new dust seal [1] lips. Install the dust seal with the flat side facing up until it is fully seated.

TOOLS:

Driver, 22 mm I.D. [2]	**07746-0020100**
Base collar [3]	**07GAJ-PG20120**

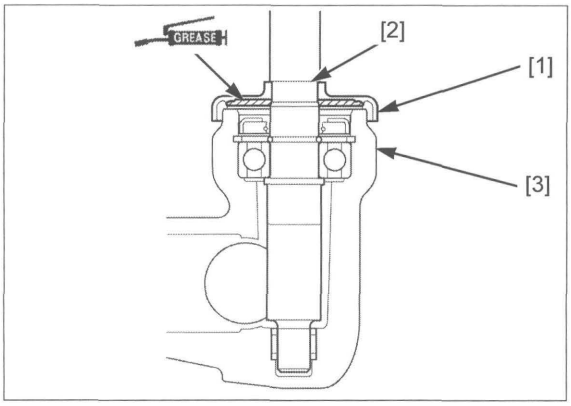
Remove the tape.



Pack 2 g minimum of grease in between the dust seal and dust cover [1] (shadowed area).

Be sure the dust cover does not contact the gear box housing [3].

Install the dust cover and fit it into the pinion groove [2].



Apply 0.2 g minimum of grease to the sliding surface (rack side) of the rack guide [1].

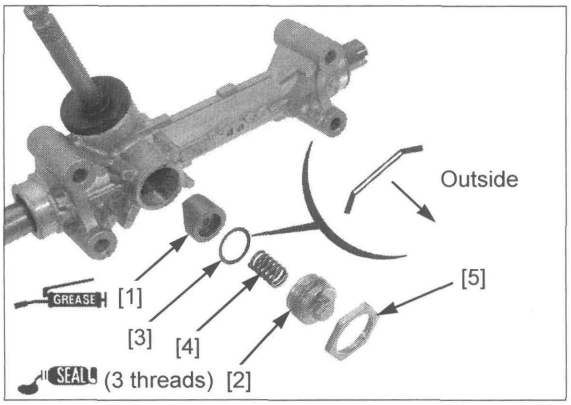
Apply sealant (Threebond TB1102 or equivalent) to the 3 threads of the rack guide screw [2].

Install the following:

- rack guide
- cone washer [3] (with the concave side facing out)
- pressure spring [4]
- rack guide screw
- lock nut [5]

Perform the rack guide adjustment (page 3-23).

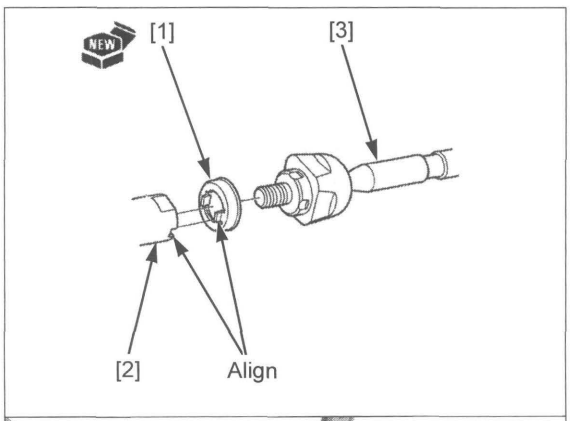
Check the rack and pinion for smooth movement.

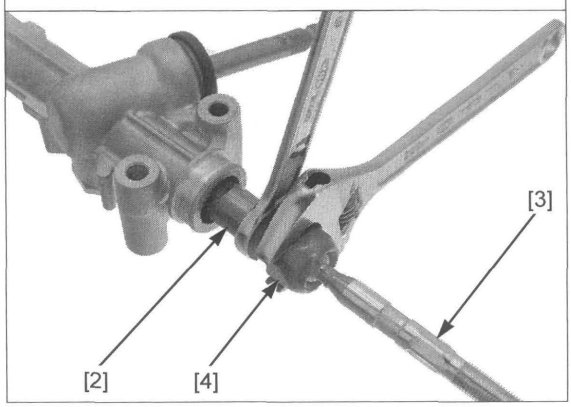


Install a new lock washer [1] onto the steering rack [2], aligning the tabs with the grooves, then install the tie-rod [3].

Hold the rack and tighten the rack end joint [4] of the tie-rod to the specified torque.

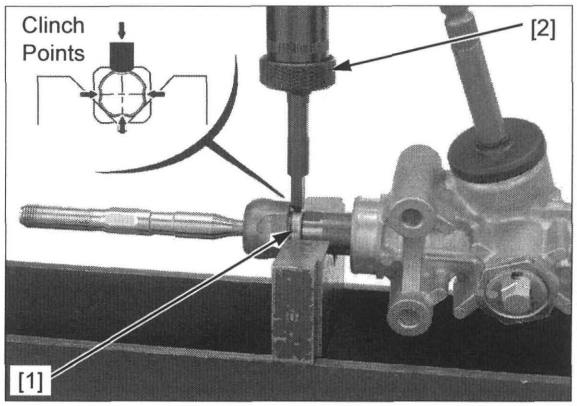
TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)





Use a V-block to hold the rack end.

Clinch the lock washer [1] onto the rack end joint notches in four places, using the special tool and a hydraulic press.



NOTICE

If the special tool is tilted or is misaligned from the center of the lock washer, it will cause the tool to pop out. Set the components in a hydraulic press properly and hold the special tool and gear box securely.

TOOL:

Lock washer clinch pilot [2] 07NAZ-SR30100 or a commercially available punch in the U.S.A.

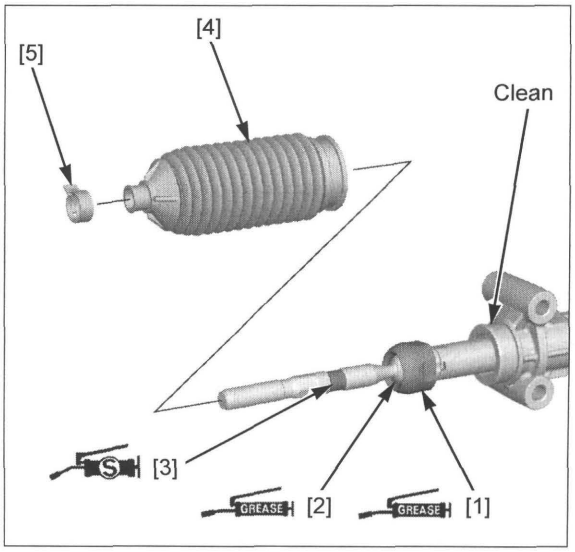
Install the other side tie-rod in the same procedure as above.

Clean off any grease or contamination from the boot groove in the housing end.

Apply 1 g minimum of grease to the outer surface of the rack end joint [1].

Apply 0.2 g minimum of silicone grease (SOMIC GA grease) to the inner surface [2] of the rack end joint.

Apply 0.5 g minimum of silicone grease (Dow Corning Molykote EM30L or Kluber Noxlub SS4021) to the boot groove [3] in the tie-rod.

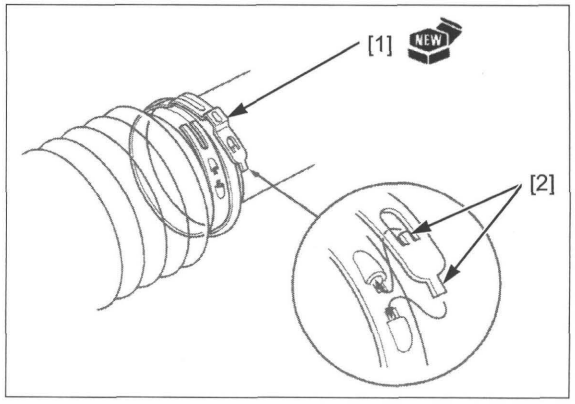


Do not get grease on the tie-rod threads.

Install the tie-rod boot [4] and fit it in the boot grooves in the housing and tie-rod.

Install the boot clip [5].

Install a new boot band [1] by setting the tabs [2] into the holes with the pinch point facing rearward.



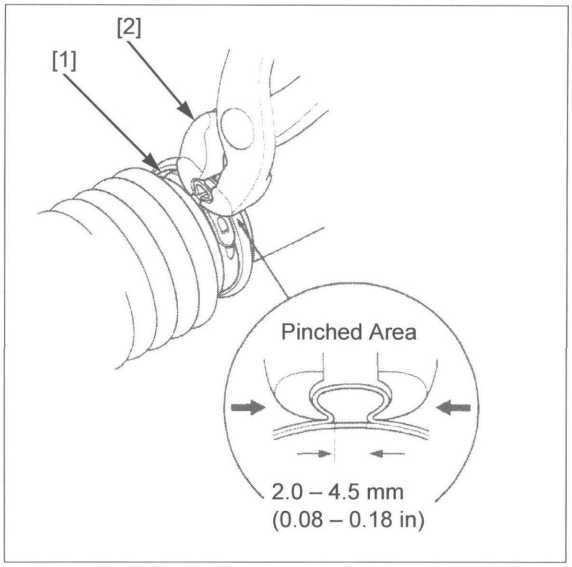
Pinch the ear portion of the boot band [1] with a pincher until the pinched area clearance is 2.0 – 4.5 mm (0.08 – 0.18 in) as shown to secure tie-rod boot.

TOOL:

Pincher [2]	**Oetiker 1098 or equivalent commercially available in the U.S.A.**

Install the other side boot in the same procedure as above.

Slide the rack right and left to be certain that the boots are not deformed or twisted.



Install the tie-rods [1], lock nuts [2] and tie-rod ends [3] to the steering gear box assembly [4].

Turn the pinion lock-to-lock and count the number of turns (α).

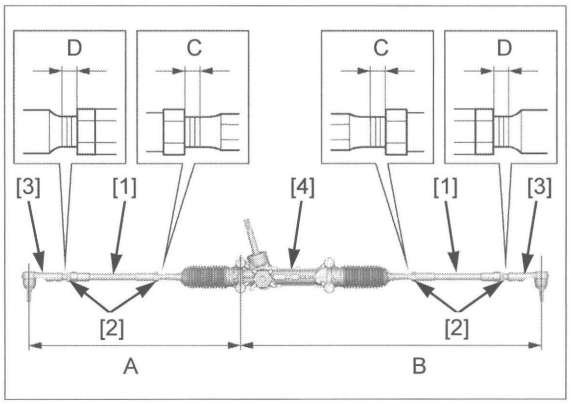
Return the pinion α/2 turns from the locked position.

Measure the length between the center of left stud bolt holes and the center of stud bolt on each tie-rod end.

Adjust the dimensions A and B by turning the tie rod.

Dimension A: 514.5 mm (20.26 in)
Dimension B: 731.2 mm (28.79 in)

Temporarily tighten each lock nut so that the difference in exposed thread length between points C and points D is within 3.0 mm (0.12 in).



INSTALLATION

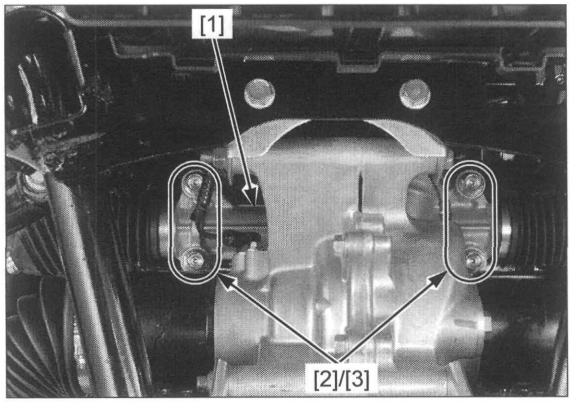
Be careful not to damage the tie-rod boots and shaft splines.

Place the gear box assembly [1] into the frame from the left side.

Hold the gear box securely. Align the bolt holes and install the four bolts [2] and nuts [3].

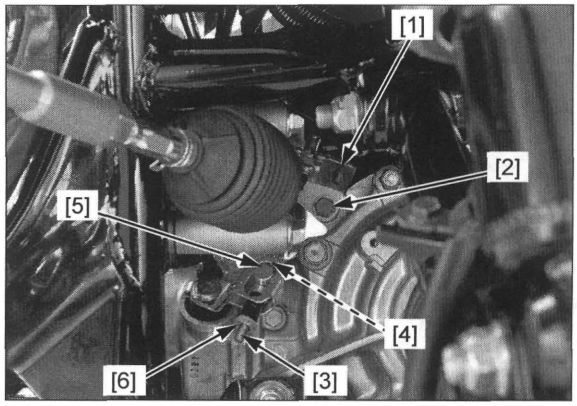
Be sure to touch each side of the housing onto the frame and tighten all the nuts to the specified torque.

TORQUE: 39 N·m (4.0 kgf·m, 29 lbf·ft)



Install the following:

- clutch cable stay [1]
- stay bolt [2]
- final clutch cable [3]
- return spring [4]
- joint pin [5]
- adjusting nut [6]
- front floor lid (page 2-30)
- differential lock cover (page 18-14)
- steering shaft/EPS unit assembly (page 17-8)



Adjust the following:

- final clutch cable (page 18-44)
- rack guide (page 3-23)
- wheel alignment (page 3-23)

NOTE:

- Perform the EPS Steering Angle Sensor Initialization procedure after installation (page 24-6).

MEMO

18. FRONT DRIVING MECHANISM

SERVICE INFORMATION 18-2

TROUBLESHOOTING 18-5

COMPONENT LOCATION 18-6

FRONT DRIVE SHAFT 18-7

FRONT FINAL DRIVE REMOVAL 18-14

FRONT PROPELLER SHAFT 18-17

FRONT FINAL CLUTCH 18-19

FRONT FINAL GEAR DISASSEMBLY/INSPECTION 18-25

GEAR CASE AND COVER BEARING REPLACEMENT 18-32

FRONT FINAL GEAR ASSEMBLY 18-34

FRONT FINAL DRIVE INSTALLATION 18-41

FINAL CLUTCH CABLE ADJUSTMENT 18-44

FRONT DIFFERENTIAL LOCK CABLE ADJUSTMENT (Except I-4WD model) 18-45

DRIVE MODE SELECT LEVER LINKAGE 18-46

SERVICE INFORMATION

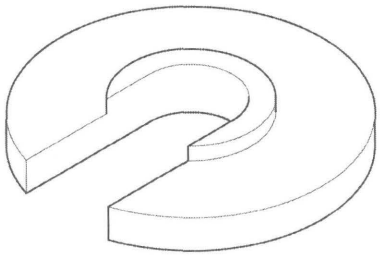
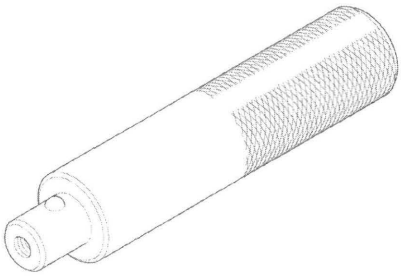
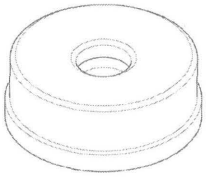
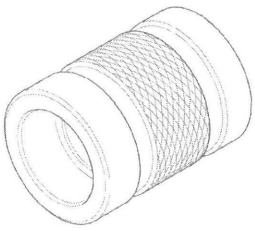
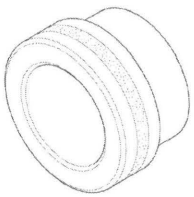
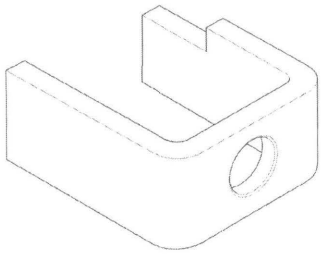
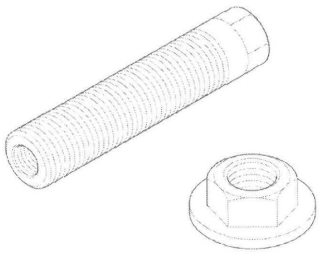
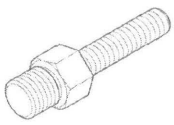
GENERAL

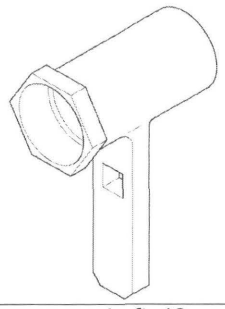
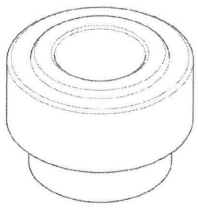
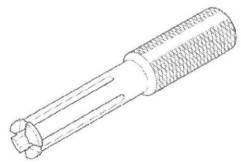
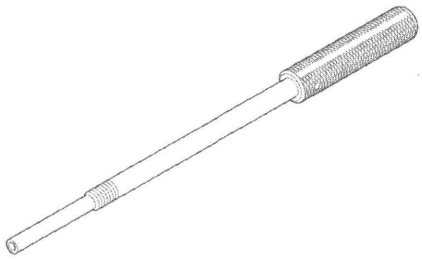
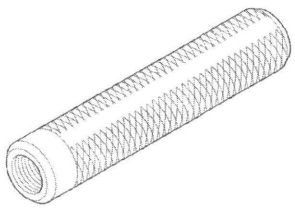
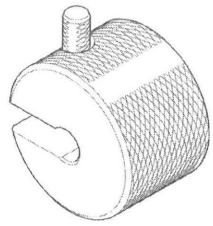
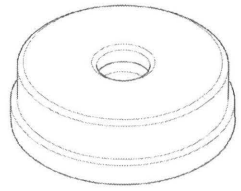
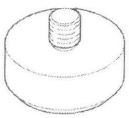
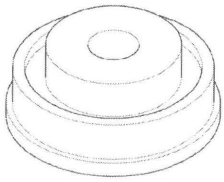
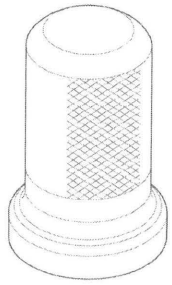
- Perform the gear contact pattern and backlash inspection whenever you replace the bearings, gears, differential or gear case. The extension lines from the gear engagement surfaces should intersect at one point.
- Protect the gear case with a shop towel or soft jaws while holding it in a vise. Do not clamp it too tight as it could damage the gear case.
- Replace the ring and pinion gears as a set.
- Do not confuse the left and right drive shaft parts.

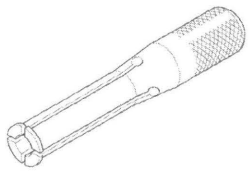
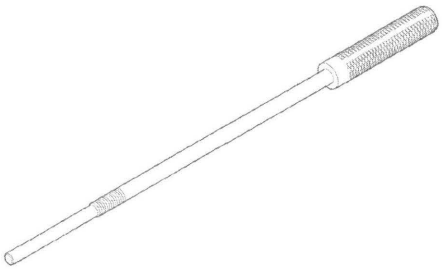
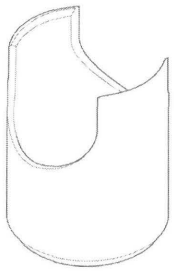
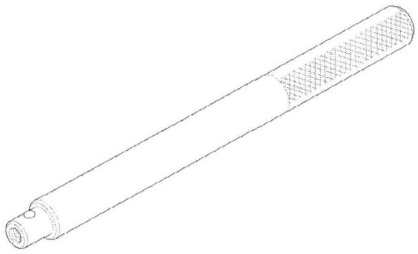
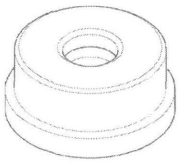
⚠ WARNING

Be careful when performing service with a load in the cargo bed because the ground clearance can gradually reduce.
Use caution when working under the SXS1000 while it is parked on all 4 wheels.
Objects or people below the unit could be crushed as the ground clearance gradually reduces.
When the cargo bed is loaded and the SXS1000 is parked, the ground clearance can gradually reduce by up to 3.4 inches (85 mm).
Ground clearance of a loaded, unsupported SXS1000 may decrease unexpectedly.
You could be crushed or pinched if working underneath the SXS1000.
Unload the SXS1000 or support [chassis] with lift or stands before working underneath it.

TOOLS

Half shaft disassembly mould 070MF-HR3A100 (U.S.A. only) 	Driver 07749-0010000 	Attachment, 52 x 55 mm 07746-0010400 
Pilot, 32 mm 07MAD-PR90200 	Fork seal driver weight 07747-0010100  or 07947-3710101	Fork seal driver attachment, 33 mm I.D. 07747-0010501  or 07HMD-MR70100
Pinion puller base 07HMC-MM80110  or 07HMC-MM8011A (U.S.A. only)	Puller shaft and nut 07965-VM00200  or 07931-ME4010B and 07931-HB3020A (U.S.A. only)	Threaded adaptor 070MF-HP50100  or 070MF-HP5A100 (U.S.A. only)

Lock nut wrench, 30 x 64 mm 07916-MB00002 	Attachment, 30 mm I.D. 07746-0030300 	Bearing remover head, 12 mm 07936-1660110 
Bearing remover shaft, 12 mm 07936-1660120  or 07936-166010A (U.S.A. only)	Remover handle 07936-3710100 	Remover weight 07741-0010201  or 07936-3710200 or 07936-371020A (U.S.A. only)
Attachment, 22 x 24 mm 07746-0010800  or 07746-001A800 (U.S.A. only)	Pilot, 12 mm 07746-0040200 	Attachment, 62 x 68 mm 07746-0010500 
Pilot, 35 mm 07746-0040800 	Oil seal driver attachment 56 mm 07LAD-PW50100 	Oil seal driver, 46 mm 07HAD-PJ70100 

Bearing remover head, 15 mm 07936-KC10200  or 07936-KC10500	Bearing remover shaft, 15 mm 07936-KC10100  or 07936-KC10500	Bearing clip compressor, 25 mm 070ME-HN80100  or 070ME-HN8A100 (U.S.A. only)
Driver, 15 x 280 mm 07949-3710001 	Pilot, 15 mm 07746-0040300 	Attachment, 42 x 47 mm 07746-0010300  or 07JAD-PH80101

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 noise while coasting
- Chipped or damaged gears

Abnormal noises when turning
- Worn or damaged ring gear bearing
- Worn or damaged face cams and cam followers
- Worn or damaged differential housing grooves
- Worn cone spring or shim
- Worn or damaged driveshaft joint

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

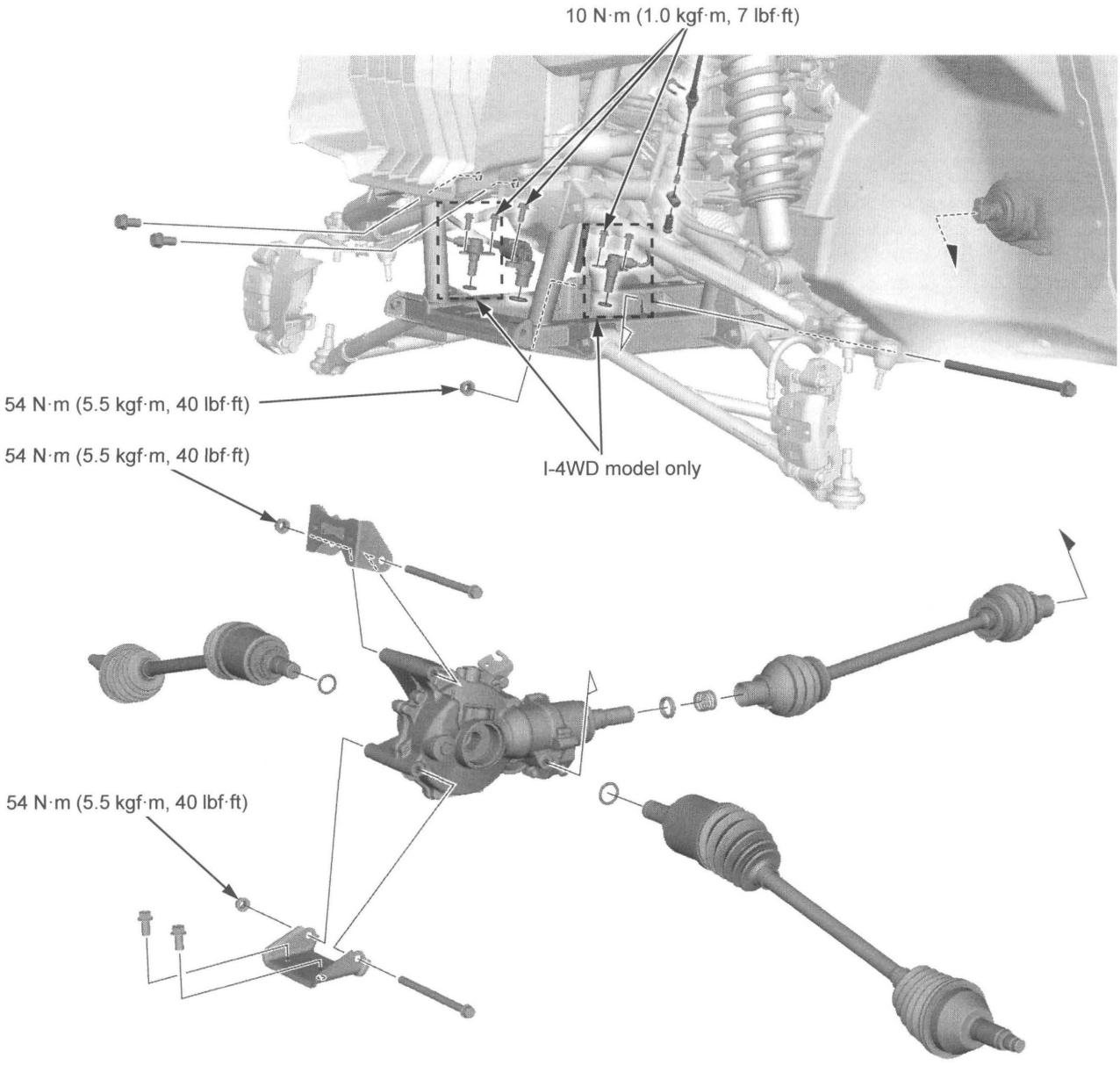
Oil leak
- Oil level too high
- Clogged breather
- Damaged seals
- Loose case cover bolt

Overheating
- Oil level too low
- Insufficient backlash between ring gear and pinion gear

Excessive vibration occurs or excessive yoke freeplay
- Damaged front propeller shaft

COMPONENT LOCATION

I-4WD model shown:



FRONT DRIVE SHAFT

REMOVAL

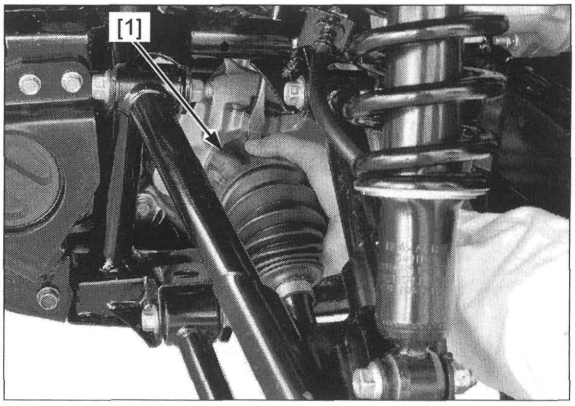
Remove the knuckle (page 20-10).

To prevent damage to the gear case oil seal, hold the inboard joint horizontal until the drive shaft is clear of the gear case.

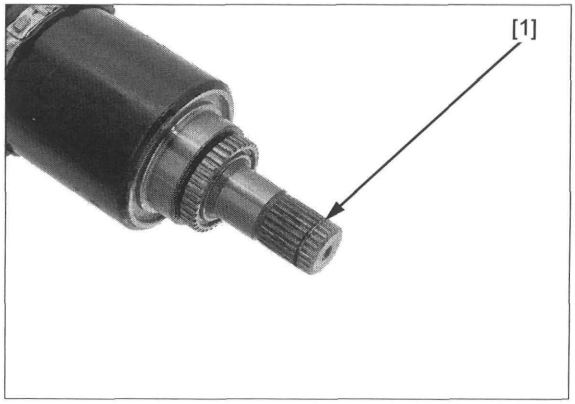
Hold the inboard joint [1] of the drive shaft and tug firmly to force the stopper ring on the inboard joint end past the groove while prying with a screwdriver.

NOTE:

- Be careful not to crack the case when using a screwdriver.



Remove the stopper ring [1] from the inboard joint.



DISASSEMBLY/INSPECTION

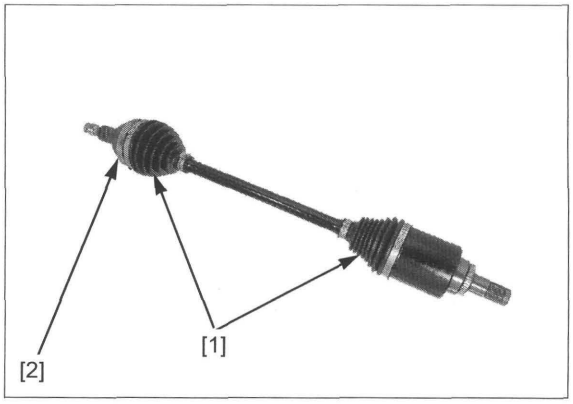
Check the boots [1] for cuts or other damage.

Check the drive shaft joints for excessive play or noise by moving the joints in a circular direction.

If the outboard joint [2] seems to be worn or damaged, the drive shaft must be replaced.

NOTE:

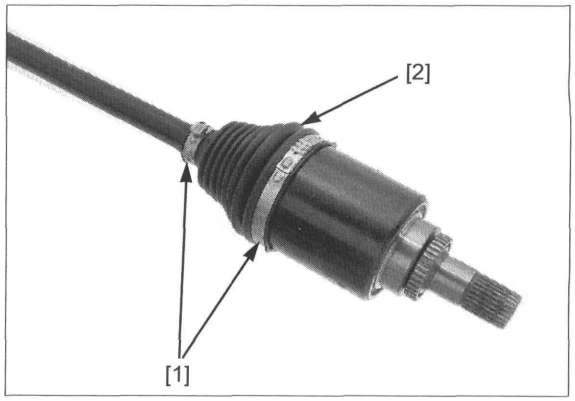
- Do not confuse the left and right drive shaft parts.
- To replace the outboard boot, first remove the inboard boot as described in the following steps. Then remove the bands and outboard boot from the inboard end of the shaft.
- The outboard joint cannot be disassembled.



Replace the bands with new ones whenever removing them.

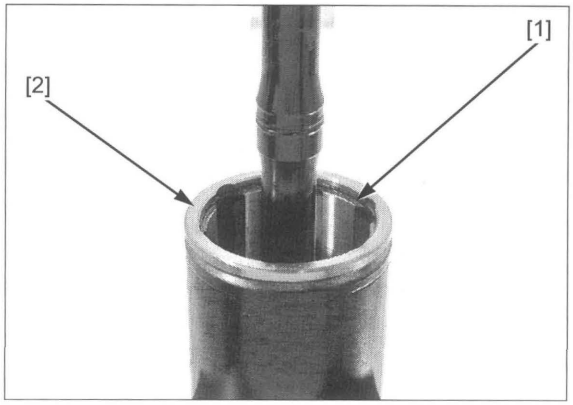
Cut off and remove the boot bands [1] from inboard boot [2].

Remove the boot from the inboard joint.



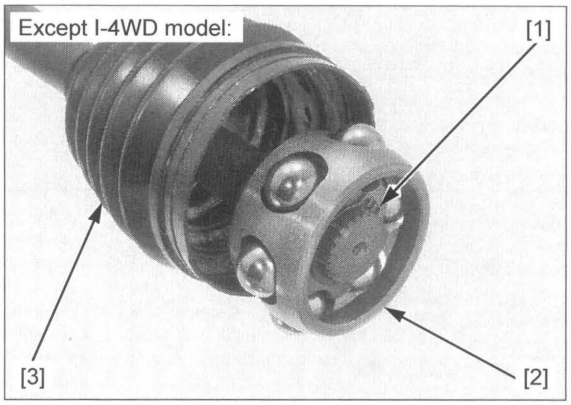
Remove the following:

- stopper ring [1]
- inboard joint [2]



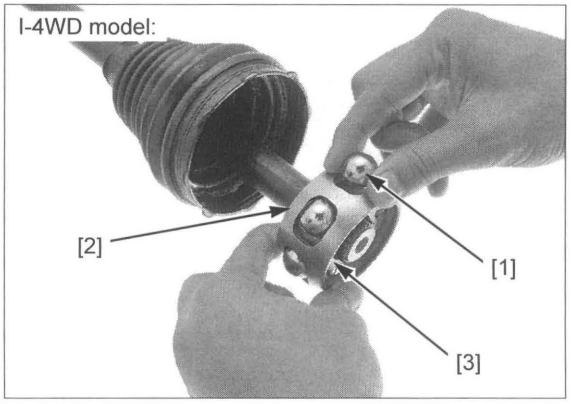
Except I-4WD model:

- snap ring [1]
- bearing [2]
- inboard boot [3]



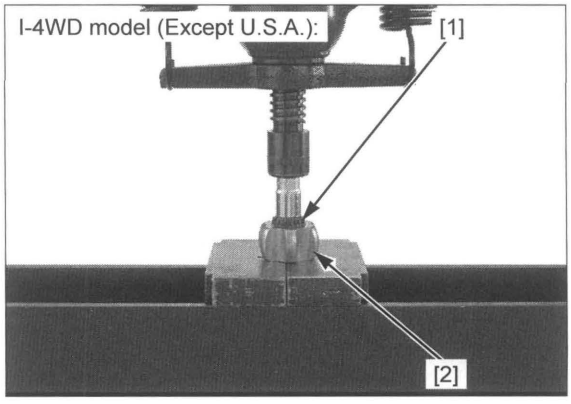
I-4WD model: Remove the balls [1] from the bearing cage [2] and inner race [3] by tilting the cage as shown.

Slide the bearing cage down into the inboard boot.



I-4WD model: Except U.S.A.:

While holding the drive shaft [1], press it out of the inner race [2] using a suitable tool as shown.



I-4WD model: U.S.A. only:

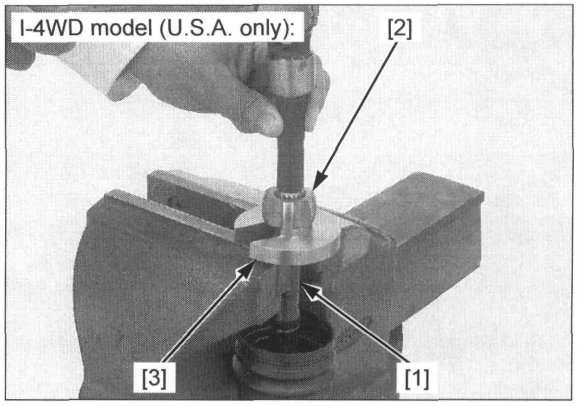
Support the drive shaft [1], by the inner race [2], on a vise using the special tool.

TOOL:
Half shaft disassembly mould [3] 070MF-HR3A100

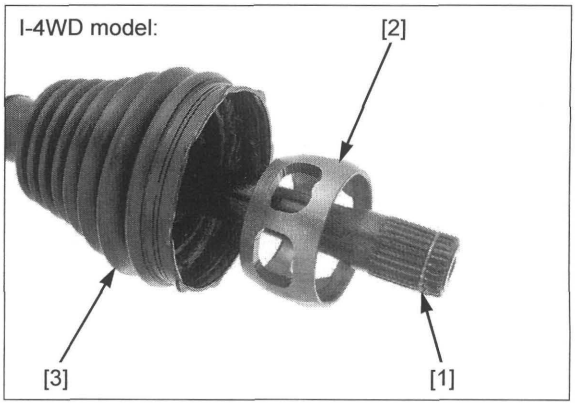
NOTICE

- *Do not tighten the vise onto the shaft.*

With a suitable soft material rod (i.e. aluminum or brass), drive out the shaft from the inner race.



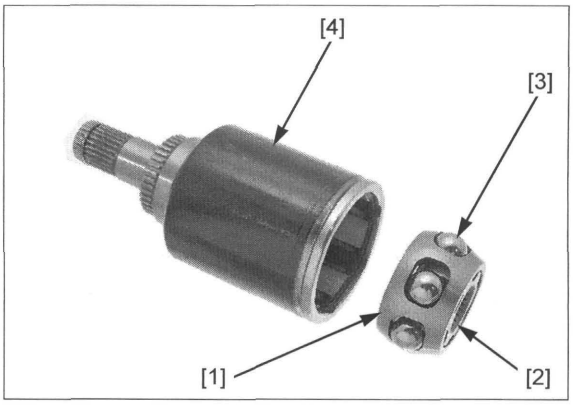
I-4WD model: Remove the stopper ring [1], inner race [2] and inboard boot [3] from the drive shaft.



Replace these components as an assembly.

Check the following for wear or damage:

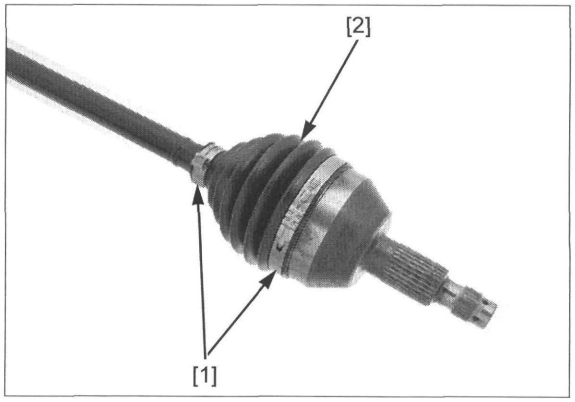
- bearing cage [1]
- race [2]
- steel balls [3]
- inboard joint [4]



Replace the bands with new ones whenever removing them.

Cut off and remove the boot bands [1] from outboard boot [2].

Remove the boot from the outboard joint.



ASSEMBLY

Each band has the following identification number [1].

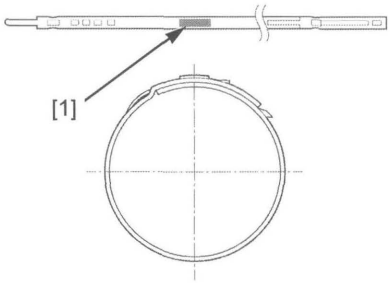
Do not interchange them.

FRONT DRIVE SHAFT BAND (Except I-4WD model)

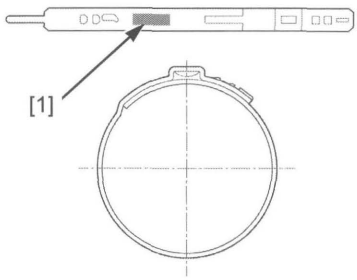
INBOARD BOOT BAND:	**82.1**
SHAFT BOOT BAND (INBOARD):	**31.4**
SHAFT BOOT BAND (OUTBOARD):	**35.6**
OUTBOARD BOOT BAND:	**80.1**

Except I-4WD model:

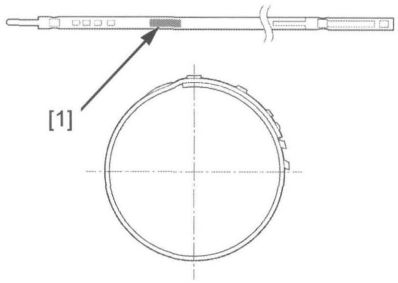
INBOARD/OUTBOARD BOOT BAND:



SHAFT BOOT BAND (INBOARD):



SHAFT BOOT BAND (OUTBOARD):

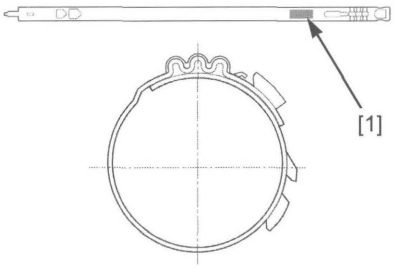


FRONT DRIVE SHAFT BAND (I-4WD model)

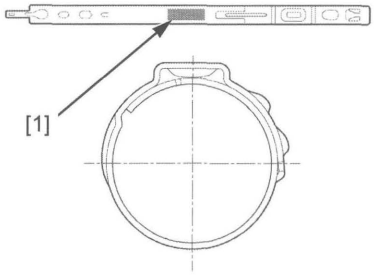
INBOARD BOOT BAND:	**83.5**
SHAFT BOOT BAND:	**31.5**
OUTBOARD BOOT BAND:	**86.6**

I-4WD model:

INBOARD/OUTBOARD BOOT BAND:

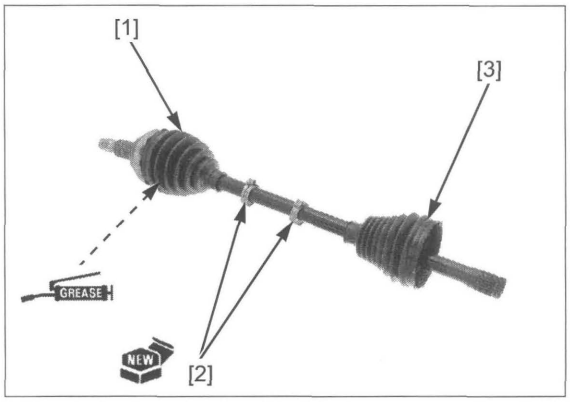


SHAFT BOOT BAND (INBOARD/OUTBOAD):



Pack the outboard joint with the specified grease.

SPECIFIED GREASE:
Left/right:
Except I-4WD model: NKG814 (Kyodo Yushi)
I-4WD model: NMS2002-G1
AMOUNT:
Except I-4WD model: Left/right: 60 – 80 g
I-4WD model: Left/right: 55 – 65 g



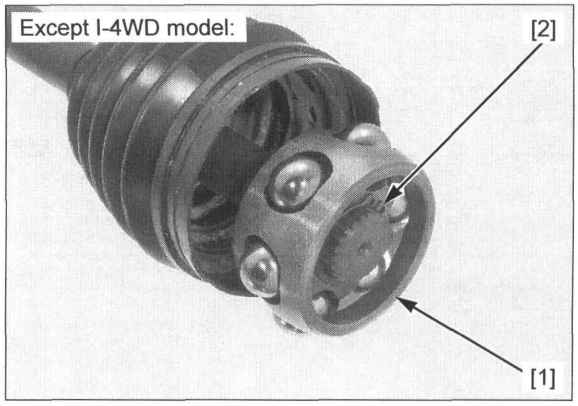
Install the following:

- outboard boot [1]
- new shaft boot bands [2]
- inboard boot [3]

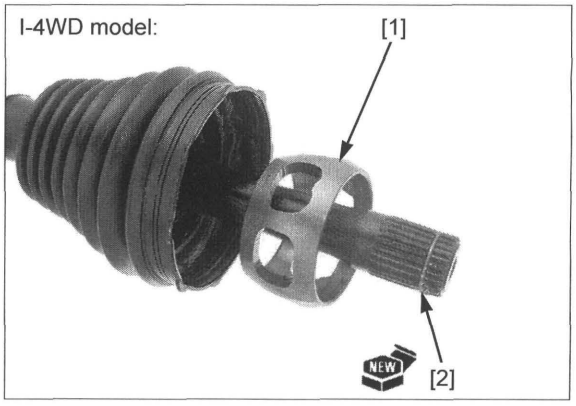
Do not tighten the bands at this time.

Except I-4WD model: Install the bearing [1] with the small O.D. facing the drive shaft.

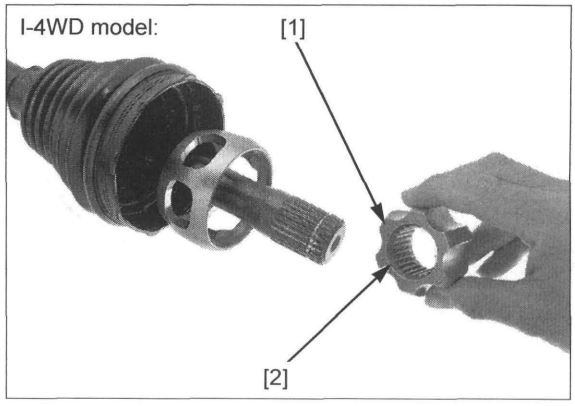
Install the snap ring [2] with the chamfered side facing the bearing.



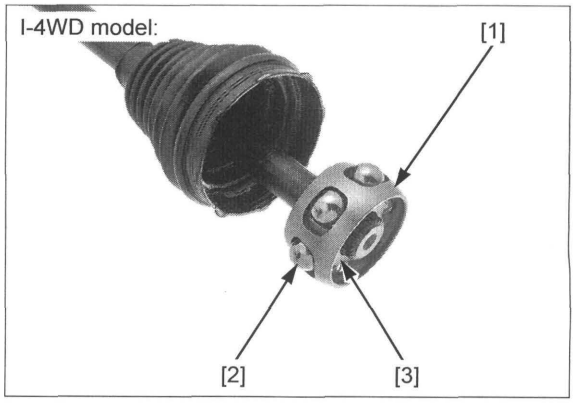
I-4WD model: Install the bearing cage [1] with the small O.D. facing the drive shaft.
Install a new stopper ring [2] into the drive shaft groove.



I-4WD model: Install the inner race [1] with the chamfered I.D. [2] facing the drive shaft.
Drive the shaft with a copper hammer until the stopper ring seats in the ring groove.

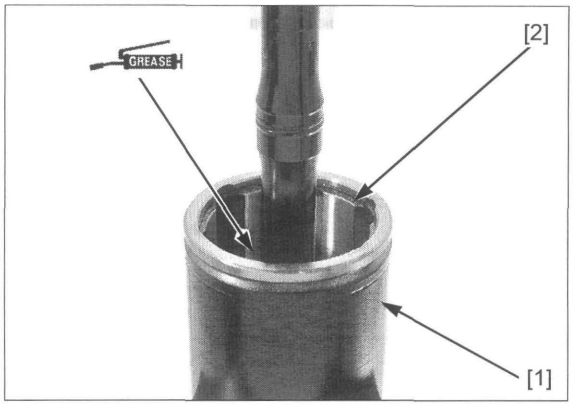


I-4WD model: Assemble the bearing cage [1] and six balls [2] onto the inner race [3].



Pack the inboard joint [1] with the specified grease.

SPECIFIED GREASE:
Left/right:
Except I-4WD model: NKG814 (Kyodo Yushi)
I-4WD model: NMS2002-G1
AMOUNT:
Except I-4WD model: Left/right: 130 – 150 g
I-4WD model: Left/right: 120 – 140 g



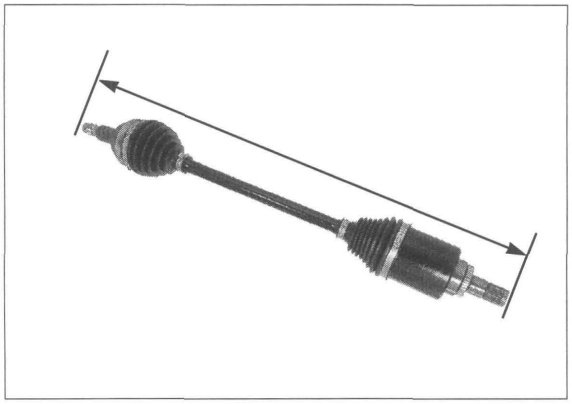
Install the inboard joint over the bearing.

Install the stopper ring [2] into the groove in the inboard joint properly.

Install the boot over the inboard joint securely.

Adjust the length of the drive shaft to the figure given below.

DRIVE SHAFT LENGTH:
Except I-4WD model: Left/right: 740.8 mm (29.17 in)
I-4WD model: Left: 745.3 mm (29.34 in)
Right: 750.6 mm (29.55 in)



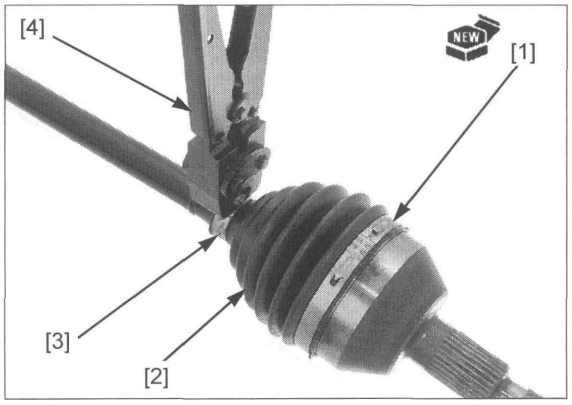
Install a new outboard boot band [1] onto the outboard boot [2].

Be careful not to overstretch outboard boot band. Apply only enough force to snap clasp over hook.

Lock the shaft boot band [3] and outboard boot band with commercially available pliers.

Shaft boot band:

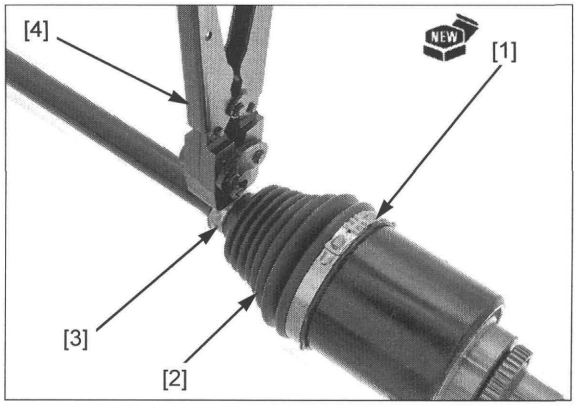
TOOL:
Pliers [4]
Except I-4WD model: Oetiker 14100513 or equivalent commercially available in the U.S.A.
I-4WD model: Oetiker 14100393 or equivalent commercially available in the U.S.A.



Outboard boot band:

TOOL:
Pliers
Except I-4WD model: Oetiker 14100513 or equivalent commercially available in the U.S.A.
I-4WD model: Oetiker 14100134 or equivalent commercially available in the U.S.A.

Install a new inboard boot band [1] onto the inboard boot [2].



Be careful not to overstretch outboard boot band. Apply only enough force to snap clasp over hook.

Lock the shaft boot band [3] and inboard boot band with pliers.

Shaft boot band:

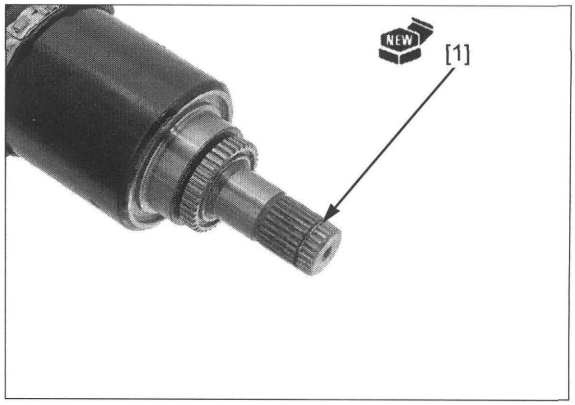
TOOL:
Pliers [4]
Except I-4WD model: Oetiker 14100115 or equivalent commercially available in the U.S.A.
I-4WD model: Oetiker 14100393 or equivalent commercially available in the U.S.A.

Inboard boot band:

TOOL:
Pliers
Except I-4WD model: Oetiker 14100115 or equivalent commercially available in the U.S.A.
I-4WD model: Oetiker 14100134 or equivalent commercially available in the U.S.A.

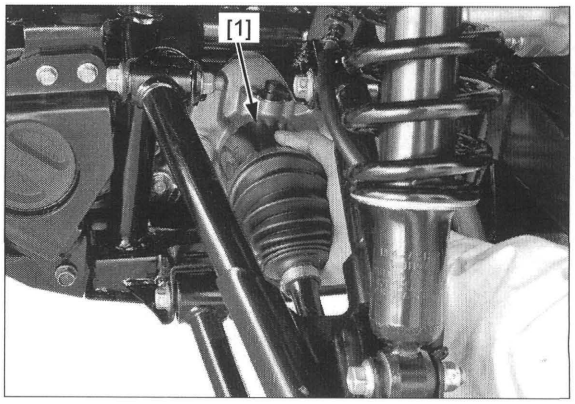
INSTALLATION

Install a new stopper ring [1] into the groove in the inboard joint splines.



Be careful not to damage the oil seal in the gear case.

Install the drive shaft by holding the inboard joint [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 20-10).

FRONT FINAL DRIVE REMOVAL

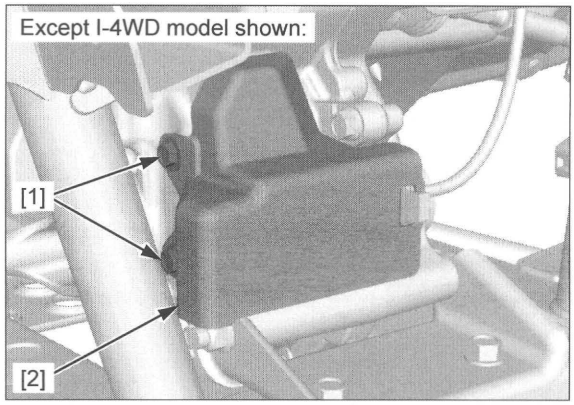
Drain the final gear oil (page 3-17).

Remove the following:

- front bumper (page 2-18)
- seat under center lid (page 2-5)
- both drive shafts (page 18-7)

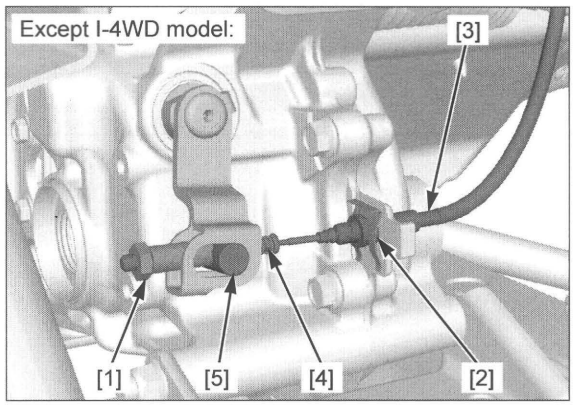
I-4WD model: Remove the front right and left wheel speed sensors (page 25-23).

Except I-4WD model: Remove the two bolts [1] and front differential lock cover [2].

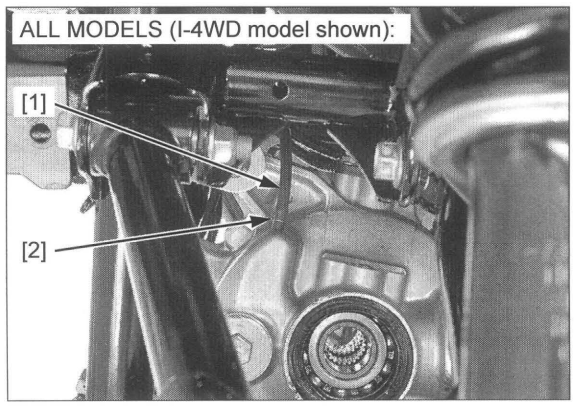


Except I-4WD model: Remove the following:

- adjusting nut [1]
- cable retaining plate [2]
- differential lock cable [3]
- return spring [4]
- joint pin [5]



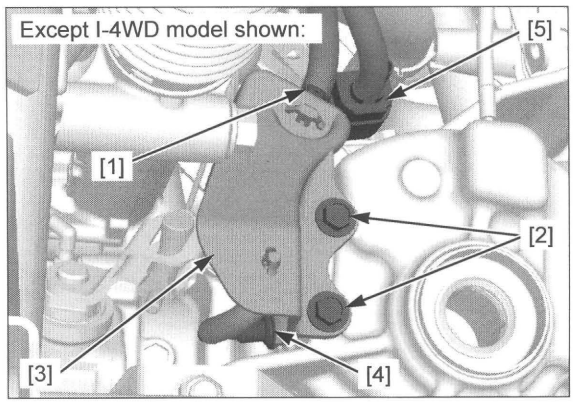
- breather hose [1]
- clip [2]



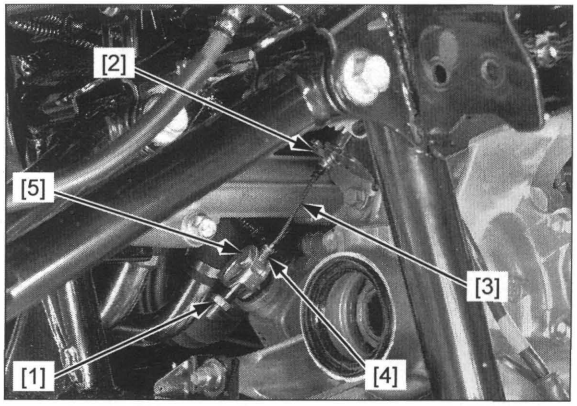
Except I-4WD model: Remove the following:

- sub-wire harness 1P connector [1]
- two bolts [2]
- front clutch cover [3]
- differential lock switch connector [4]

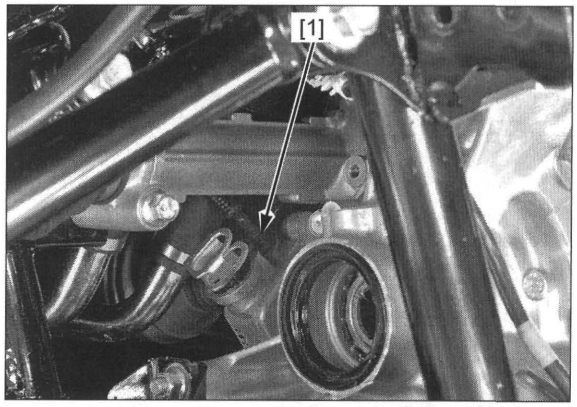
Disconnect the front VS sensor 3P connector [5].



– adjusting nut [1]
– cable retaining plate [2]
– final clutch cable [3]
– return spring [4]
– joint pin [5]



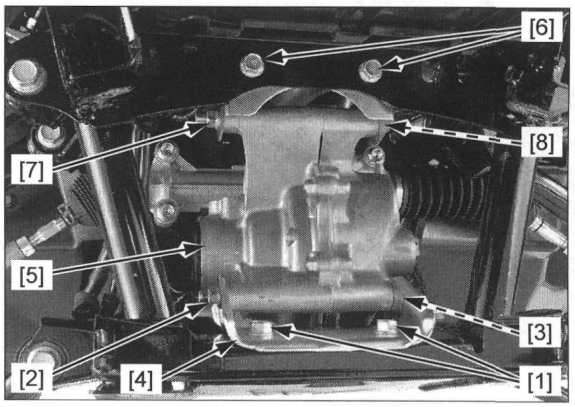
– 4WD select switch connector [1]



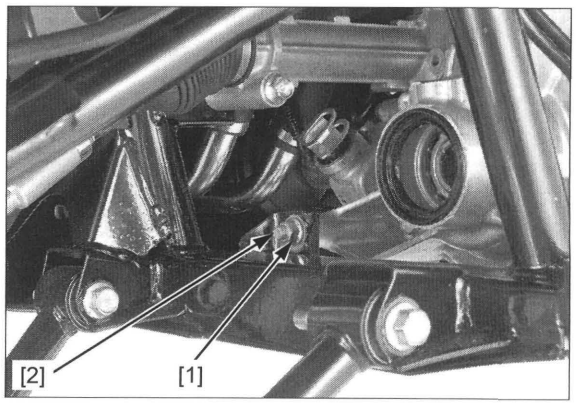
Loosen the two bracket bolts [1] and remove the lower mounting nut [2] and bolt [3].

Remove the bracket bolts and lower mounting bracket [4].

Support the gear case [5] with wooden blocks and loosen the two bracket bolts [6] and remove the upper mounting nut [7] and bolt [8].



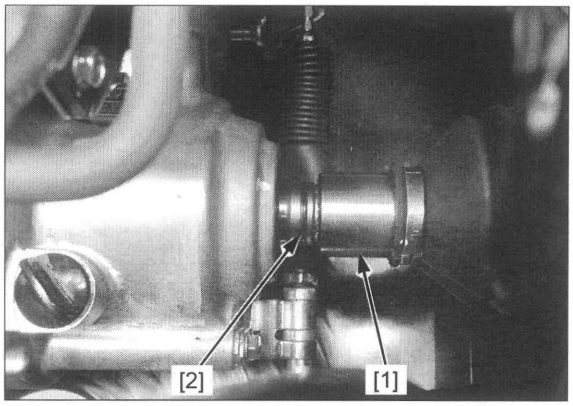
Remove the rear mounting nut [1] and bolt [2].



Move the gear case assembly forward.

Disconnect the universal joint [1] from the output shaft of the engine.

Remove the O-ring [2] from the output shaft.

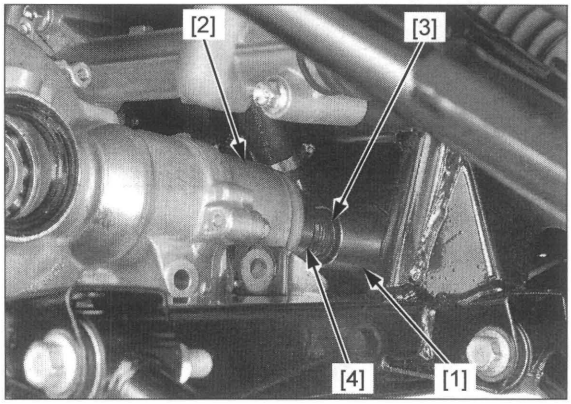


Disconnect the universal joint [1] from the pinion joint of the gear case [2] and remove the propeller shaft spring [3].

Remove the gear case assembly out of the frame.

Remove the special O-ring [4] from the pinion joint.

Remove the propeller shaft/universal joints from the frame.

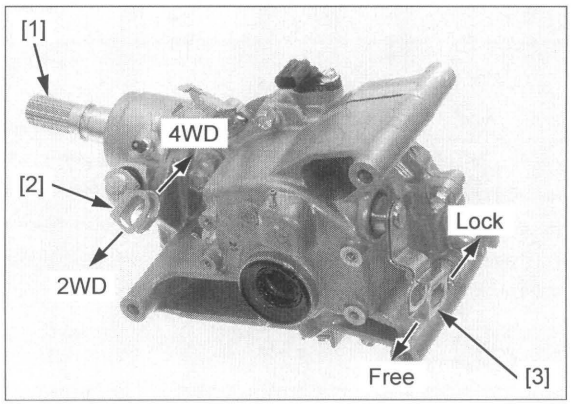


OPERATION CHECK

Turn the pinion joint [1] while the clutch arm [2] is set to the upper side (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.

Except I-4WD model: Operate the differential lock arm [3] while turning the pinion joint and check for smooth engagement/disengagement.



FRONT PROPELLER SHAFT

DISASSEMBLY/ASSEMBLY

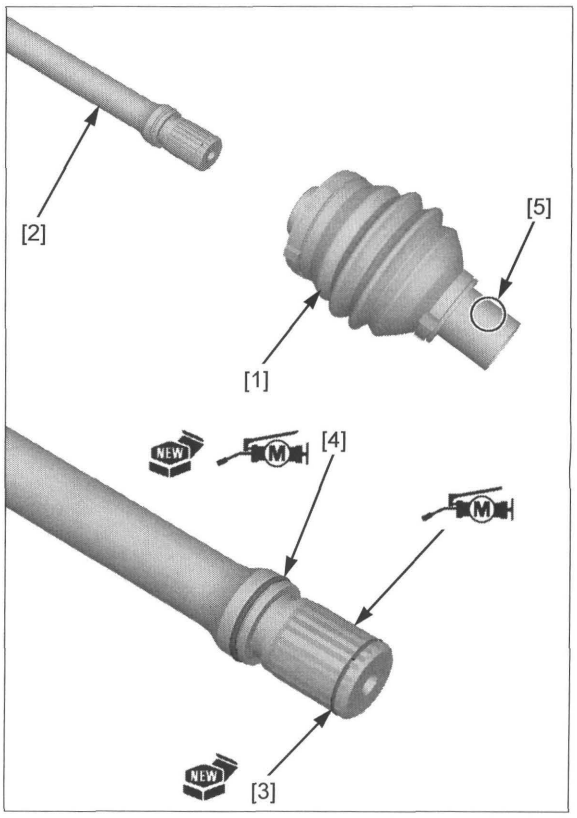
Remove the universal joints [1] from the propeller shaft [2].

Remove the stopper rings [3] and O-rings [4].

Assembly is in the reverse order of disassembly.

NOTE:

- Apply molybdenum disulfide grease to the O-rings and universal joint splines.
- Replace the O-rings and stopper rings with new ones.
- The universal joint has the identification mark [5].
  – final gear side: A
  – output shaft side: B
- Line up identification marks A and B when installing the universal joints onto the propeller shaft.

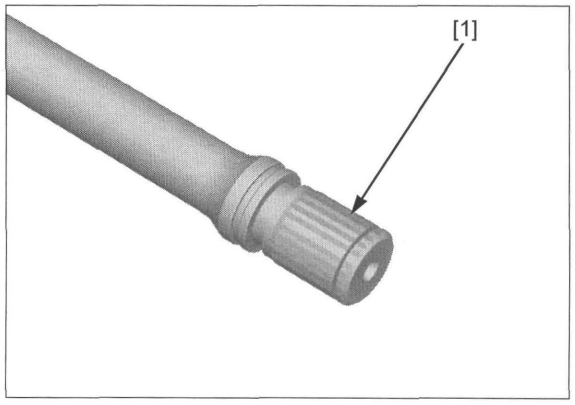


INSPECTION

PROPELLER SHAFT

Check the splines [1] of the propeller shaft for wear or damage.

If they are damaged, check the pinion and universal joint splines also.

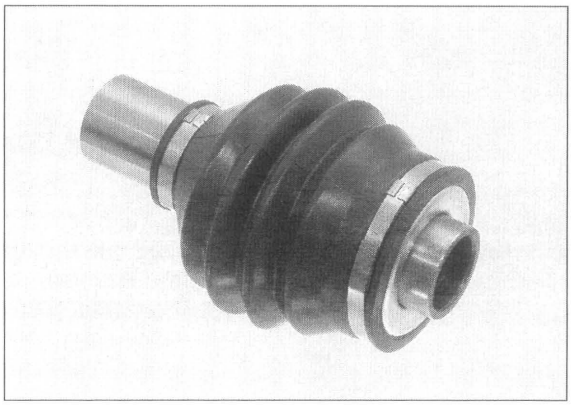


UNIVERSAL JOINT

Check the universal joint boot for cuts or other damage.

Check that the universal joint moves smoothly without binding or noise.

Check the splines of the universal joint for wear or damage.



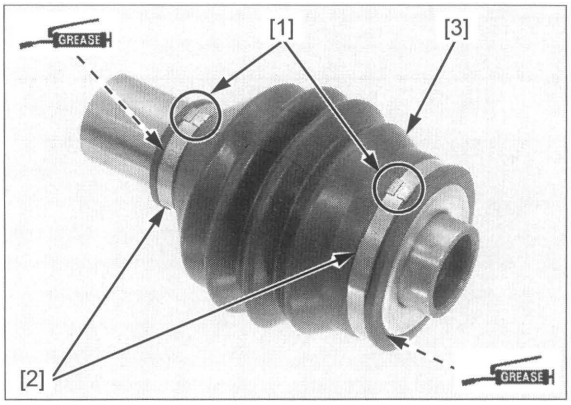
UNIVERSAL JOINT DISASSEMBLY/ ASSEMBLY

Bend up the lock tabs [1] and raise the band ends [2] to loosen the boot bands.

Remove the joint boot [3].

Apply grease to the joint bearing.

Install the boot and set it onto the universal joint properly.

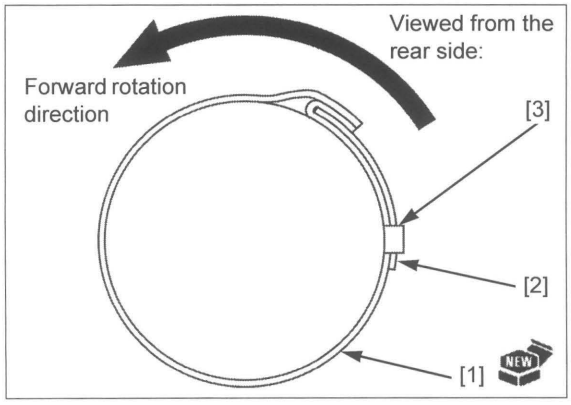


Install new boot bands [1] so the band ends [2] are facing opposite the forward rotation direction.

NOTE:

- The universal joint has the identification mark (page 18-17). Install the bands in the proper directions.

Bend down each band end and secure it with the lock tabs. Tap the lock tabs [3] with a plastic hammer.



FRONT FINAL CLUTCH

DISASSEMBLY

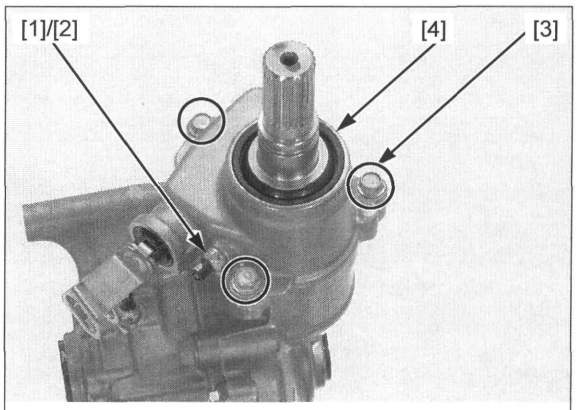
The housing is under spring pressure; hold the housing when loosening the bolt.

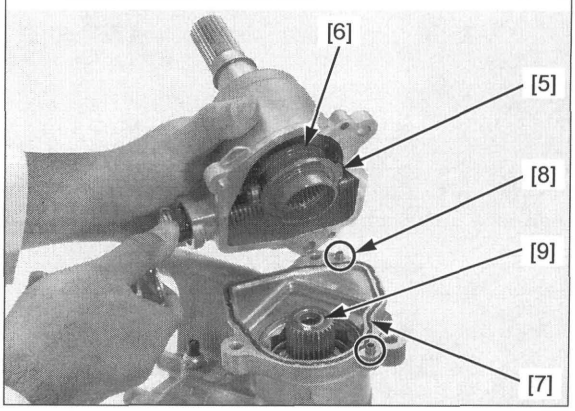
Remove the following:

- final gear case (page 18-14)
- 4WD select switch [1] and sealing washer [2]
- three bolts [3]
- final clutch housing [4] (by releasing the shift fork [5] from the sleeve [6])
- clutch sleeve
- O-ring [7]
- dowel pins [8]

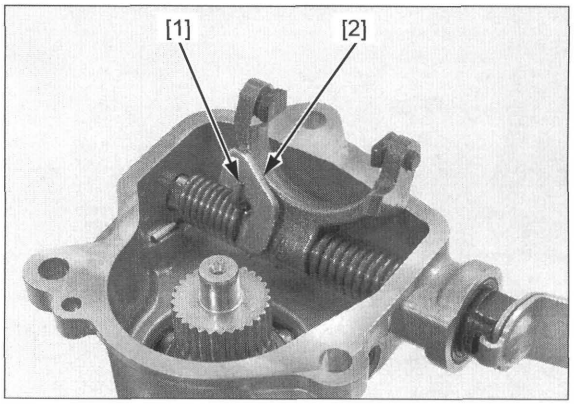
Check the splines of the pinion joint, clutch sleeve and pinion gear shaft for wear or damage.

Check the needle bearing [9] in the pinion gear shaft for wear or damage.



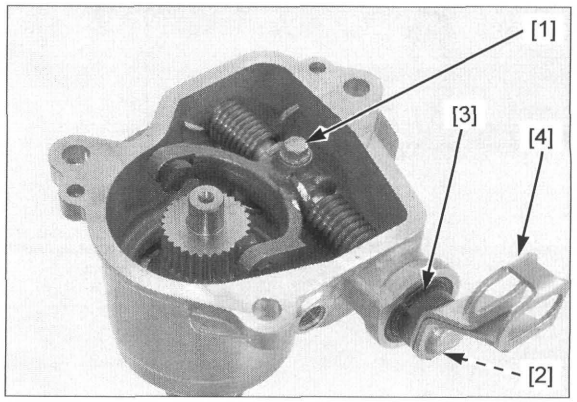


Release the clutch spring end [1] from the stopper plate [2] by pulling the arm shaft.



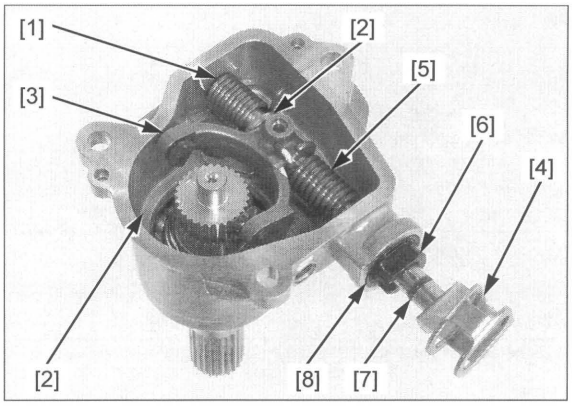
Remove the fork bolt [1].

Pry the clutch arm tab [2] to release it from the collar [3] and slide the 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]



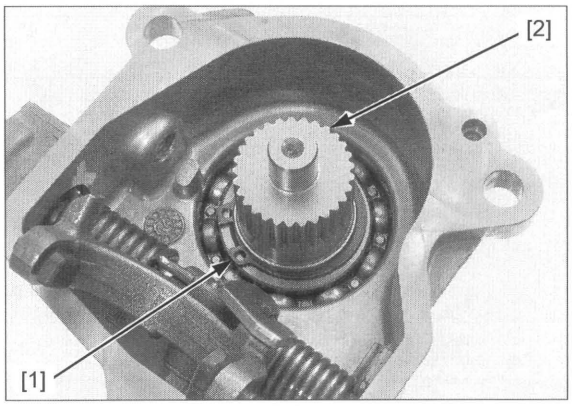
Check the shift fork claws for wear or damage.

Check the arm shaft and stopper plate for deformation or damage.

Check the each spring for fatigue or damage.

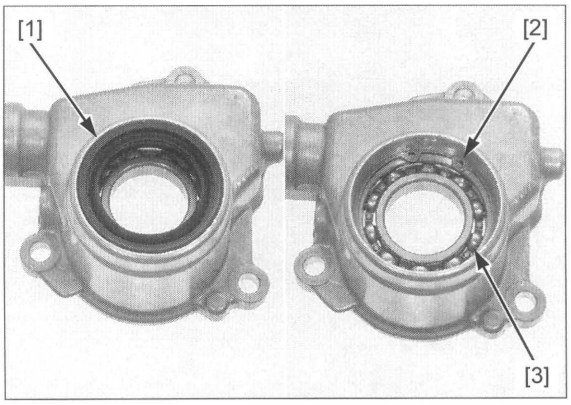
PINION JOINT BALL BEARING REPLACEMENT

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].

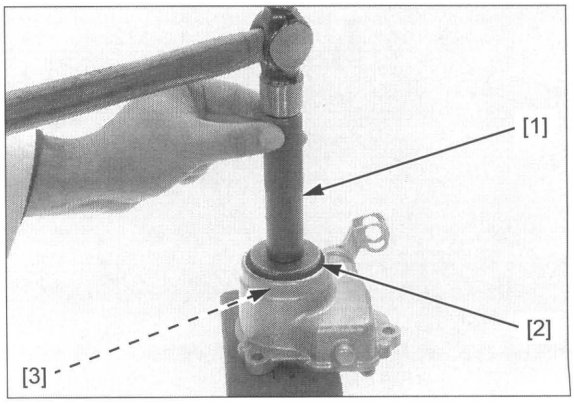
Drive the bearing [3] out of the housing.



Drive a new bearing into the housing.

TOOLS:

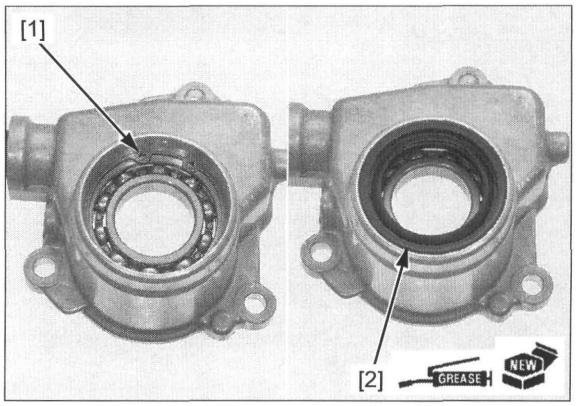
Driver [1]	**07749-0010000**
Attachment, 52 x 55 mm [2]	**07746-0010400**
Pilot, 32 mm [3]	**07MAD-PR90200**



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.

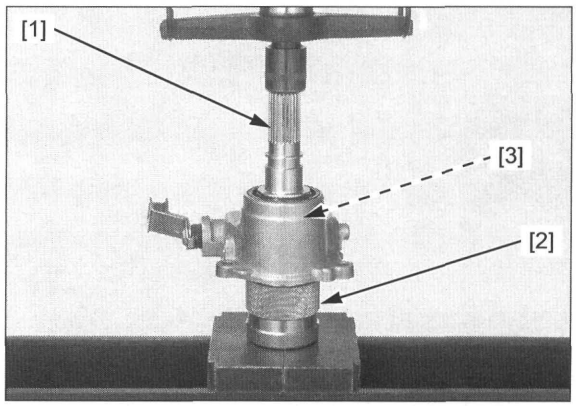


Be careful not to damage the oil seal lips.

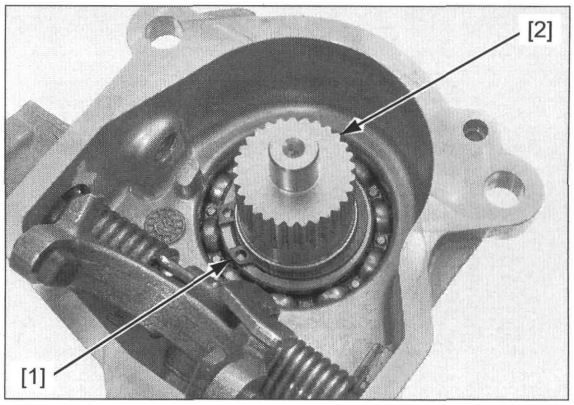
Hold the bearing inner race and press the pinion joint [1] into the bearing until it is fully seated.

TOOLS:

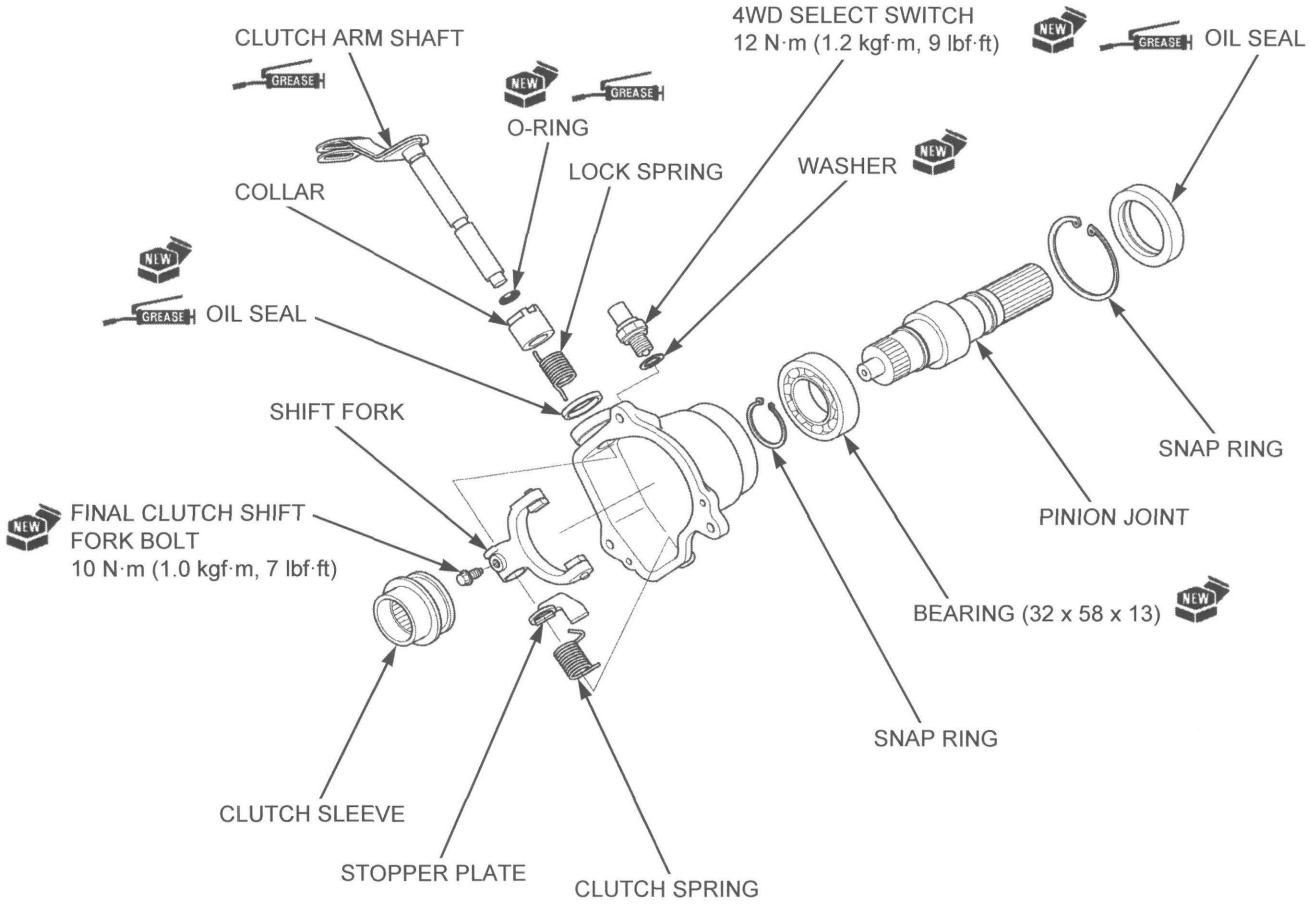
Fork seal driver weight [2]	**07747-0010100 or 07947-3710101**
Driver attachment, 33 mm I.D. [3]	**07747-0010501 or**
Driver attachment	**07HMD-MR70100**



Install the snap ring [1] into the pinion joint [2] groove securely with the chamfered edge facing the bearing.



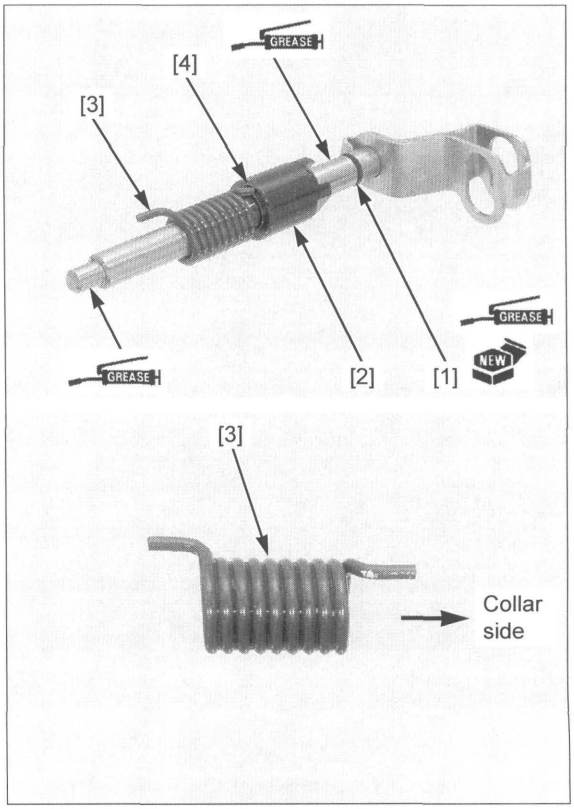
ASSEMBLY



Coat a new O-ring [1] with grease and install it into the arm shaft groove.

Apply grease to the arm shaft outer surface (collar, fork and housing contacting area).

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.

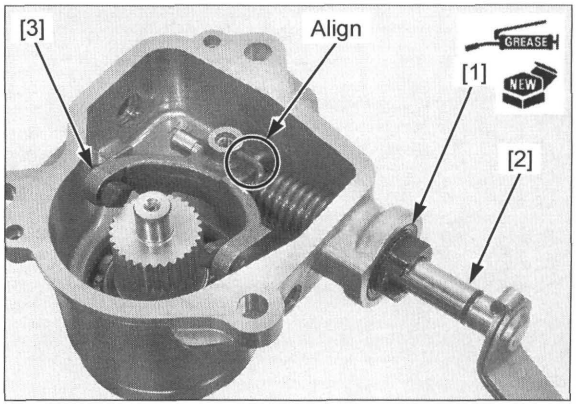


Apply grease to the lips of a new oil seal [1] and install it into the clutch housing until it is fully seated.

Take care not to let the lock spring come off the collar during assembly.

Install the arm shaft assembly [2], being careful not to damage the oil seal.

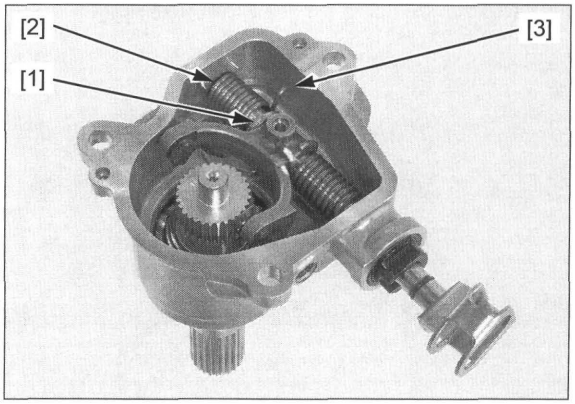
Install the shift fork [3] and align the groove with the lock spring end.



Install the stopper plate [1] by aligning the flat surfaces so the plate is attached onto the fork.

Install the clutch spring [2] with the bended end [3] toward the shift fork.

While holding the shift fork, push the arm shaft inward and insert its end into the pivot hole in the housing.

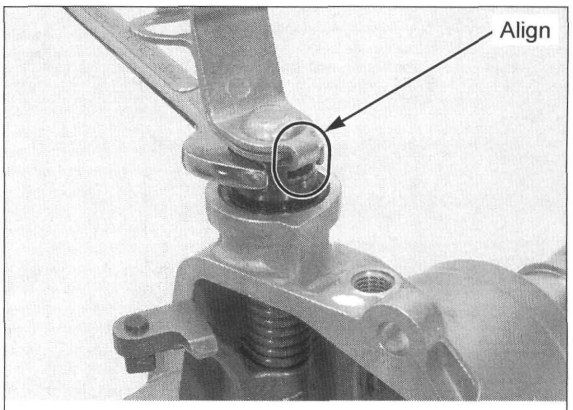


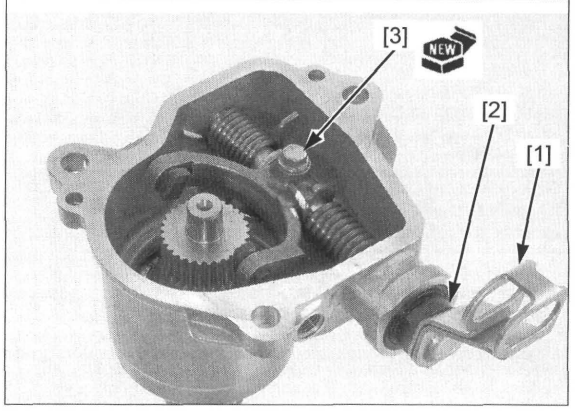
Turn the arm shaft [1] clockwise by holding the collar [2] with a open end wrench and align the arm tab with the collar groove, then tap the shaft to fit them securely.

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.

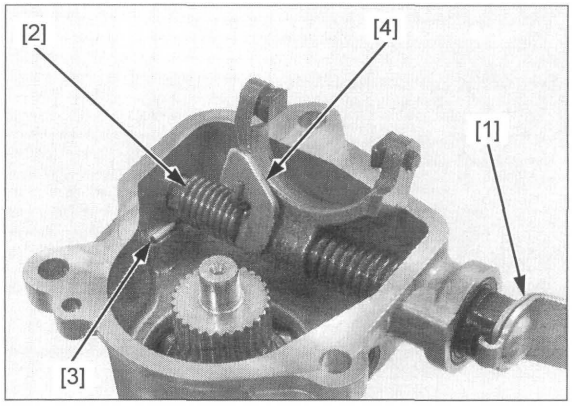
TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)





Turn the arm shaft [1] and set the clutch spring [2] ends onto the housing ledge [3] and the reverse side of the stopper plate [4] as shown.

Check the arm shaft for smooth operation.



Coat a new O-ring [1] with grease and install it into the case groove.

Install the two dowel pins [2].

Install the clutch sleeve [3] onto the clutch fork claws [4] with the small O.D. side facing the pinion joint.

Install the clutch housing [5] while aligning the splines of the sleeve and pinion shaft, and secure it with the bolts [6].

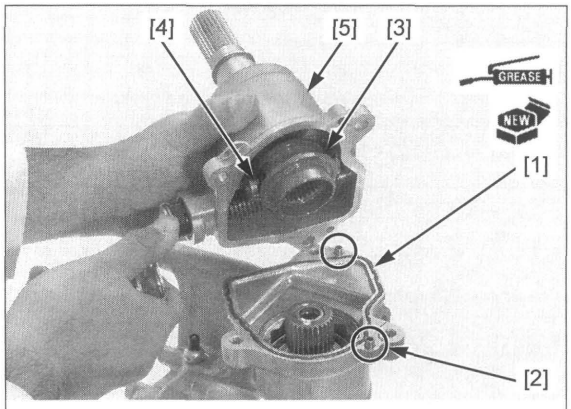
Tighten the three bolts to the specified torque.

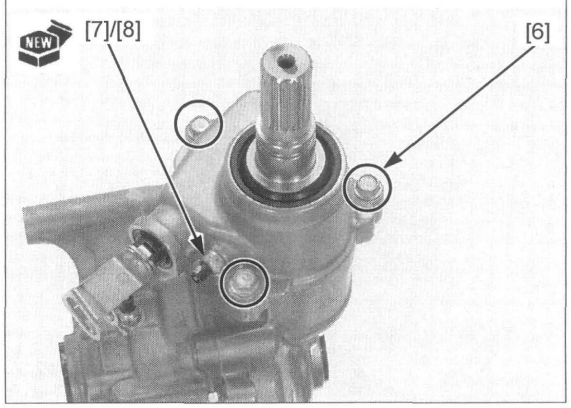
TORQUE: 25 N·m (2.5 kgf·m, 18 lbf·ft)

Install the 4WD select switch [7] with a new sealing washer [8] and tighten it.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Install the final gear case (page 18-41).





FRONT FINAL GEAR DISASSEMBLY/ INSPECTION

BACKLASH INSPECTION

Remove the following:

- final gear case (page 18-14)
- final clutch housing (page 18-19)

Set the final gear case into a jig or vise with soft jaws.

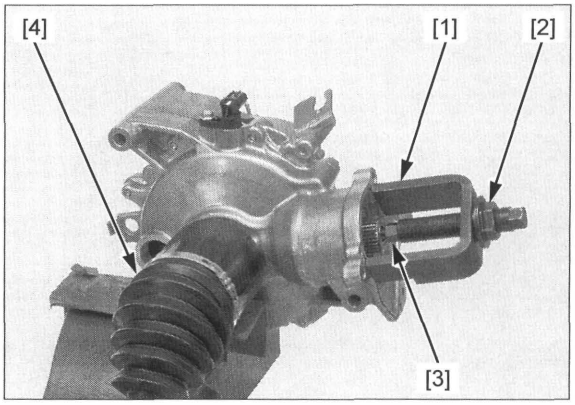
Remove the oil filler cap.

Hold the pinion gear with the special tools.

TOOLS:

Pinion puller base [1]	**07HMC-MM80110 (U.S.A. : 07HMC-MM8011A)**
Puller shaft and nut [2]	**07965-VM00200 (U.S.A. : 07931-ME4010B and 07931-HB3020A)**
Threaded adaptor [3]	**070MF-HP50100 (U.S.A. : 070MF-HP5A100)**

Install the drive shafts [4] into the final gear case.



Set a horizontal type dial indicator on the ring gear through the filler hole.

Turn the ring gear back and forth to read backlash.

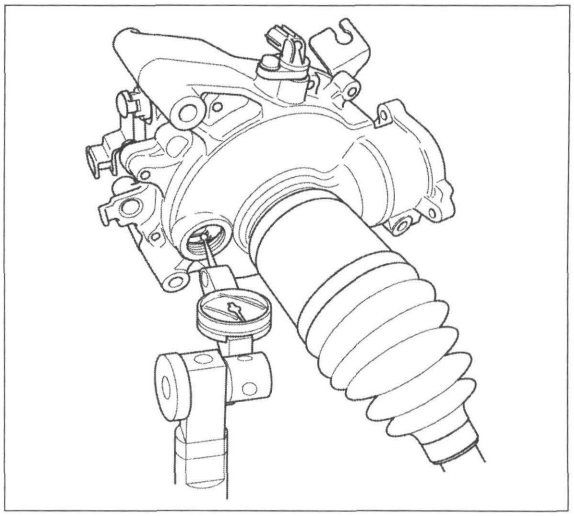
STANDARD: 0.05 – 0.25 mm (0.002 – 0.010 in)
SERVICE LIMIT: 0.4 mm (0.02 in)

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 shim [1] with a thinner one.

If the backlash is too small, replace the ring gear left shim with a thicker one.

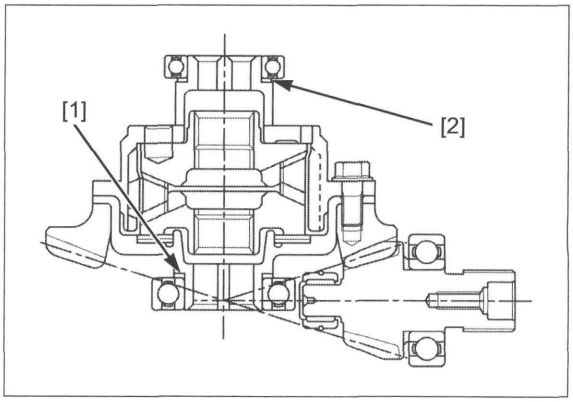
The backlash is changed by about 0.06 mm (0.002 in) when the thickness of the shim is changed by 0.12 mm (0.005 in).

NOTE:

- Seventeen different shims (X, Y, Z and from A to N) are available in thickness increments of 0.06 mm (0.002 in).

X: (thinnest): 1.64 mm (0.065 in)
D: (standard): 2.00 mm (0.079 in)
N: (thickest): 2.60 mm (0.102 in)

Change the right shim [2] as follows: If the left shim was replaced with a 0.06 mm (0.002 in) **thicker** shim, replace the right shim with one that is 0.06 mm (0.002 in) **thinner**.



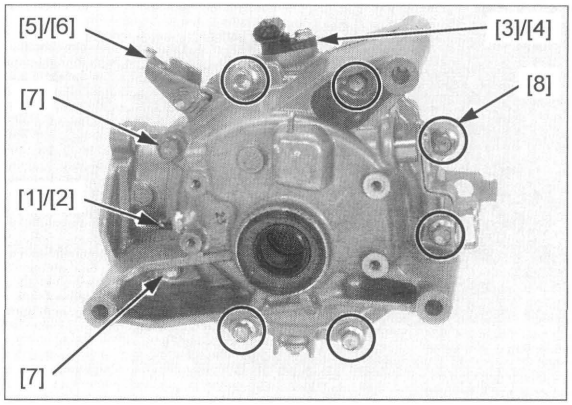
DIFFERENTIAL REMOVAL

Except I-4WD model: Remove the differential lock switch [1] and sealing washer [2]

Remove the following:

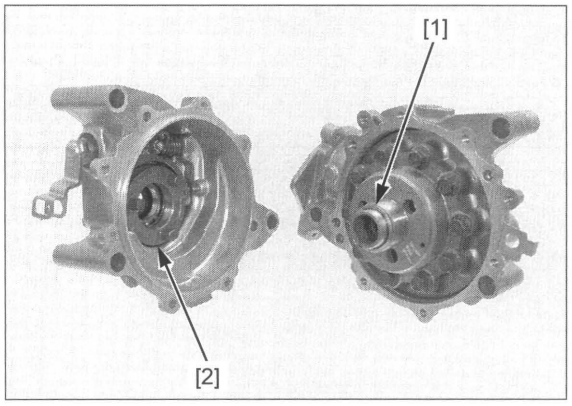
- bolt [3] and front VS sensor [4]
- bolt [5] and cable stay [6]
- two 10 mm bolts [7]
- six 8 mm bolts [8]

Pry the gear case cover being careful not to damage the mating surfaces and remove it.

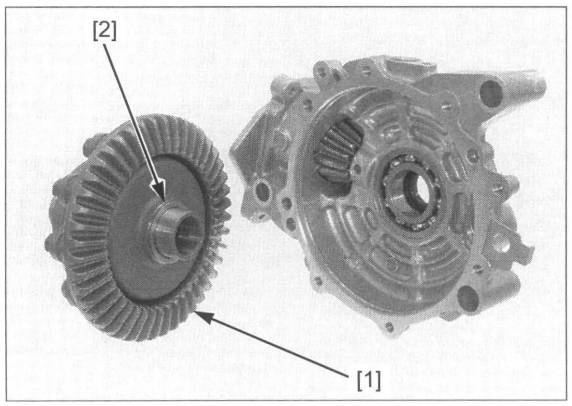


Remove the following:

- right shim [1]
- differential lock sleeve (Except I-4WD model) [2]



- differential assembly [1]
- left shim [2]



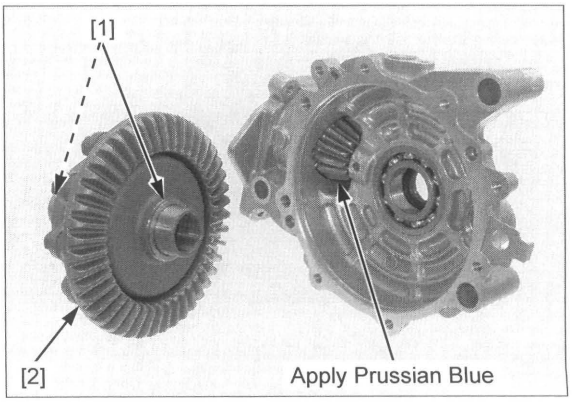
GEAR TOOTH CONTACT PATTERN CHECK

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 [2].

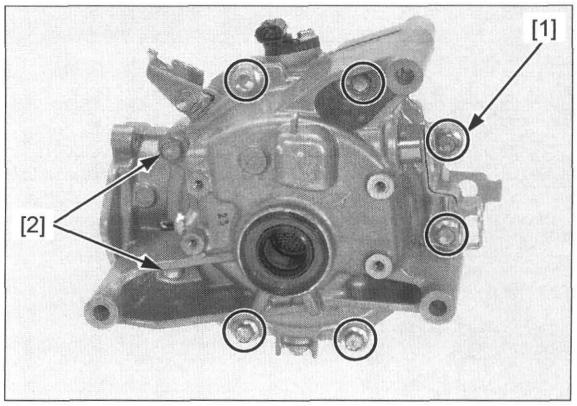
Install the differential assembly into the gear case.



It is important to turn the pinion gear while tightening the bolts. If the ring gear shim is too thick, the gears will lock after only light tightening.

Install the case cover and tighten bolts in several steps until the cover evenly touches the gear case. Then, while rotating the pinion gear, tighten the bolts to the specified torque in a crisscross pattern in several steps.

TORQUE:
8 mm bolt [1]: 25 N·m (2.5 kgf·m, 18 lbf·ft)
10 mm bolt [2]: 47 N·m (4.8 kgf·m, 35 lbf·ft)



Remove the oil filler cap.

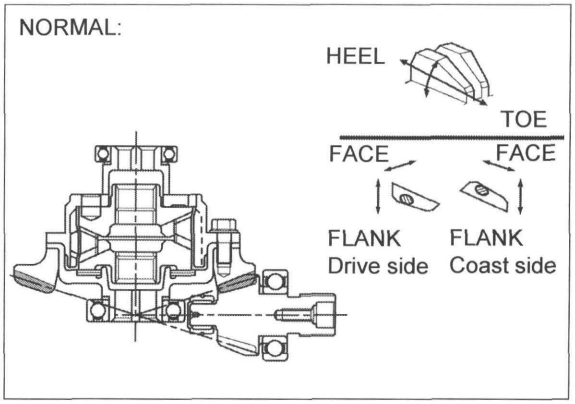
Rotate the ring gear several times in both directions of rotation.

Check the gear tooth contact pattern through the oil filler hole.

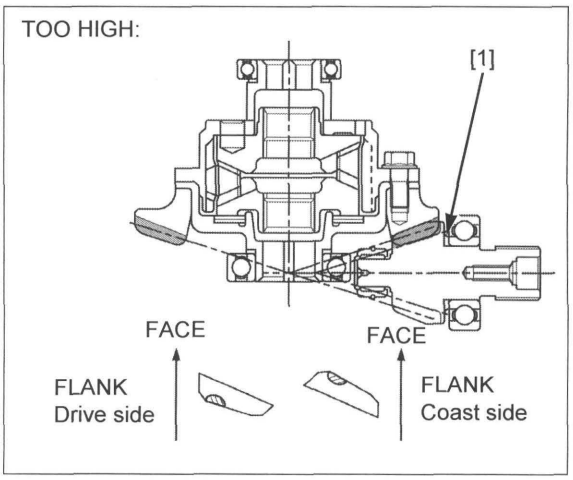
The pattern is indicated by the Prussian Blue applied to the pinion.

Contact is normal if the Prussian Blue is transferred to the approximate center of each tooth, but slightly to the heel side and to the flank side.

If the patterns are not correct, remove and change the pinion shim with one of an alternate thickness.



Replace the pinion shim [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.

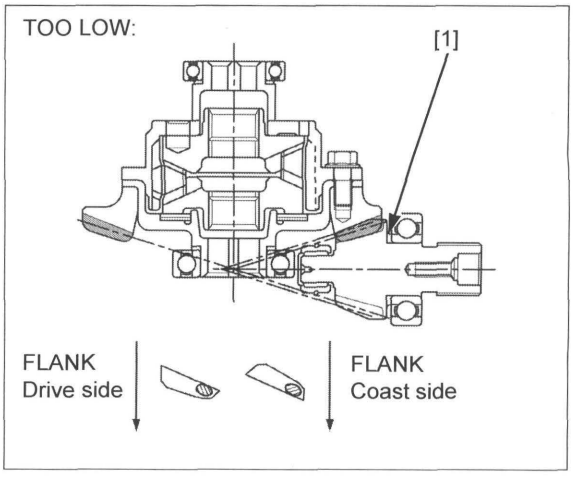
The pattern will shift about 0.5 – 1.0 mm (0.02 – 0.04 in) when the thickness of the shim is changed by 0.12 mm (0.005 in).

NOTE:

- Ten different thickness shims (from A to J) are available in thickness increments of 0.06 mm (0.002 in).

PINION GEAR SHIMS:
A: (thinnest): 1.64 mm (0.065 in)
G: (standard): 2.00 mm (0.079 in)
J: (thickest): 2.18 mm (0.086 in)

Pinion shim replacement (page 18-30).



FRONT DIFFERENTIAL LOCK CLUTCH DISASSEMBLY (Except I-4WD model)

Remove the fork bolt [1].

Pry the differential lock arm tab [2] to release it from the collar [3] and slide the arm shaft [4] outward.

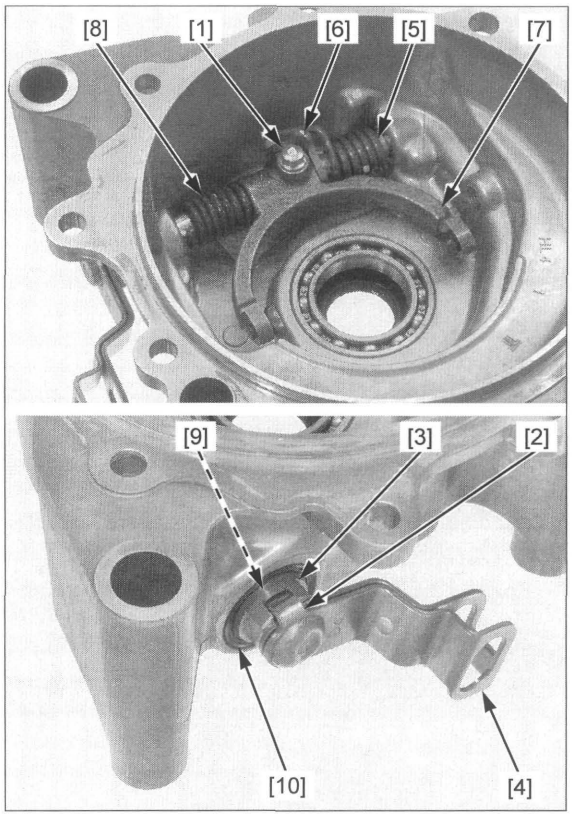
Remove the following:

- differential lock spring B [5]
- stopper plate [6]
- shift fork [7]
- differential lock spring A [8]
- O-ring [9]
- oil seal [10]

Check the shift fork craws for wear or damage.

Check the arm shaft and stopper plate for deformation or damage.

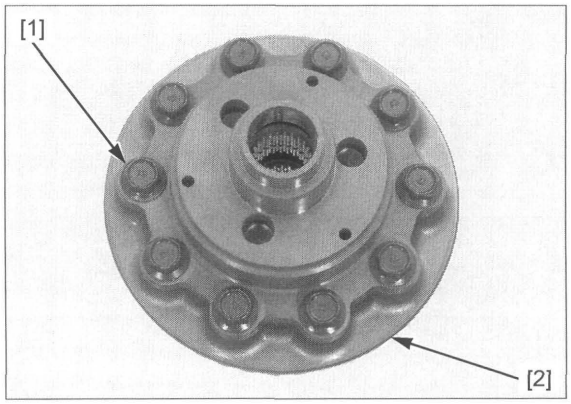
Check the springs for fatigue or damage.



DIFFERENTIAL DISASSEMBLY

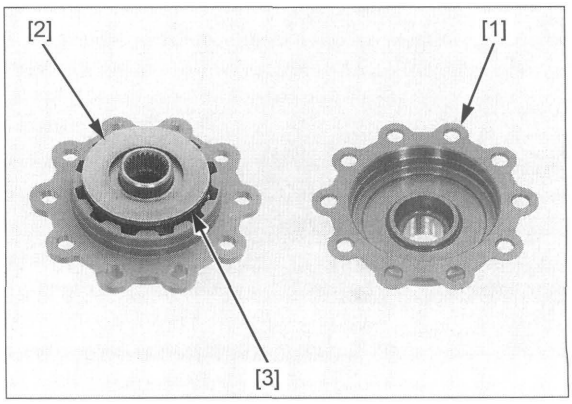
Remove the ten bolts [1] and ring gear [2].

Place the differential assembly with the housing side down.

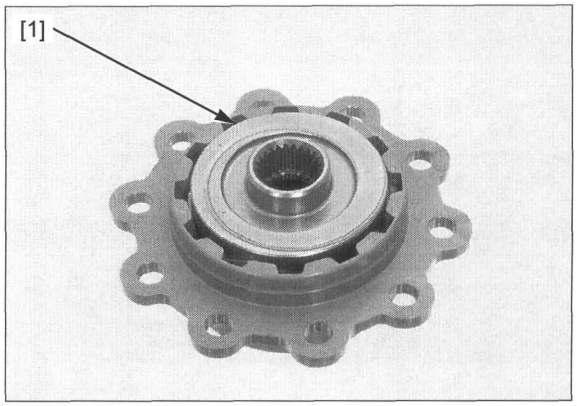


Remove the following:

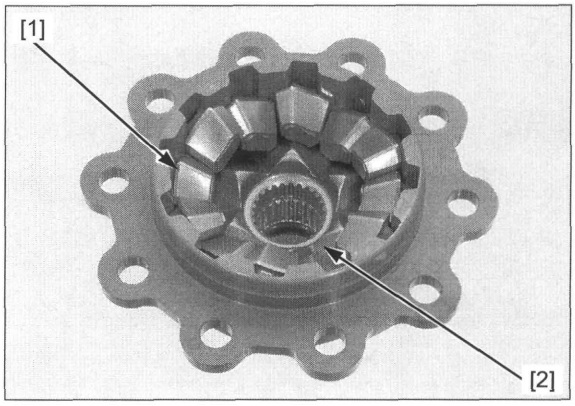
- housing cap [1]
- side cone spring [2]
- shim [3]



– face cam A [1]



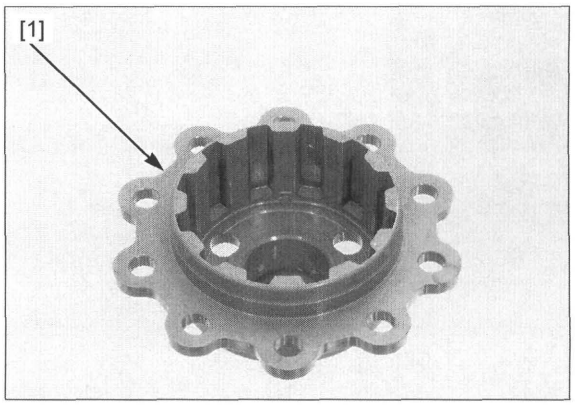
– six cam followers A and six cam followers B [1]
– face cam B [2]



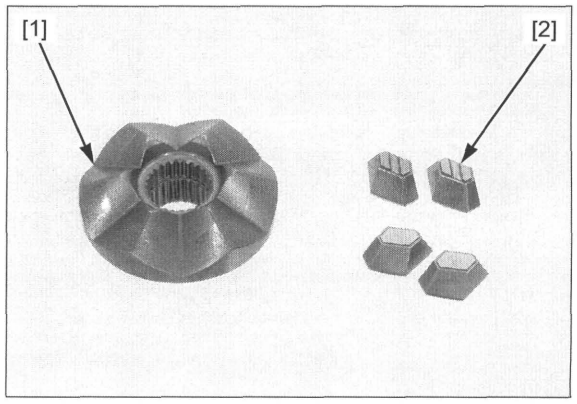
DIFFERENTIAL COMPONENTS INSPECTION

If the differential housing and/or cam face are faulty, replace the differential as an assembly.

Check the sliding surface and grooves of the housing [1] for damage or discoloration.



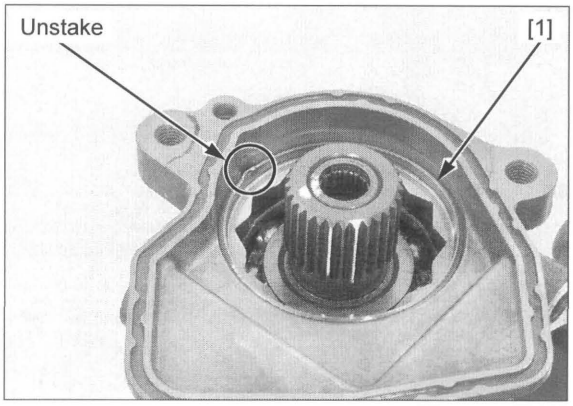
Check the shim, face cams [1] and followers [2] for damage.



PINION GEAR REMOVAL

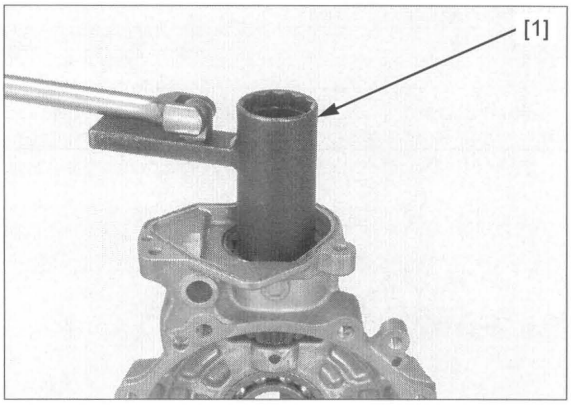
Be careful that metal particles do not enter the bearing and the threads of the case are not damaged.

Unstake the bearing lock nut [1] with a drill or grinder.



Remove the lock nut and discard it.

TOOL:
Lock nut wrench, 30 x 64 mm [1] 07916-MB00002

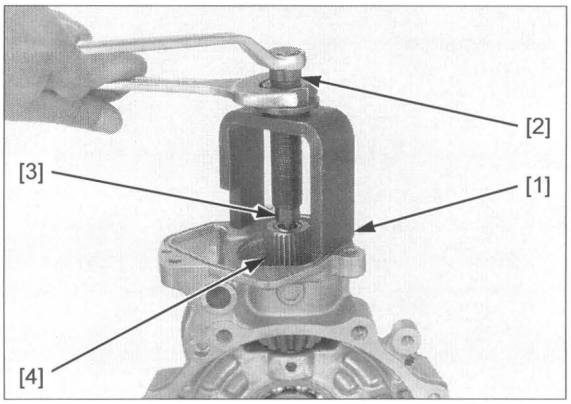


Cover the clutch housing mating surface with aluminum shims or an equivalent to prevent damaging it.

Install the special tools onto the pinion gear shaft and gear case. Using a heat gun, heat the case.

TOOLS:

Pinion puller base [1]	**07HMC-MM80110 (U.S.A. : 07HMC-MM8011A)**
Puller shaft and nut [2]	**07965-VM00200 (U.S.A. : 07931-ME4010B and 07931-HB3020A)**
Threaded adaptor [3]	**070MF-HP50100 (U.S.A. : 070MF-HP5A100)**



Pull the pinion assembly [4] out from the gear case.

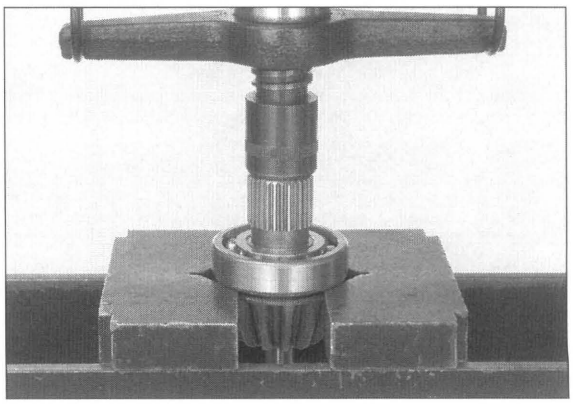
PINION BALL BEARING AND SHIM REPLACEMENT

Take care not to contact the support blocks against the gear teeth.

Press the pinion gear out of the bearing.

Remove the pinion shim.

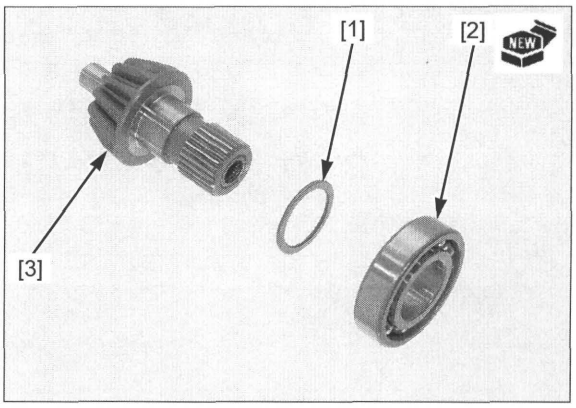
Replace the pinion joint needle bearing in the shaft end if necessary (page 18-31).



Install the shim [1] and a new bearing [2] onto the pinion gear [3].

NOTE:

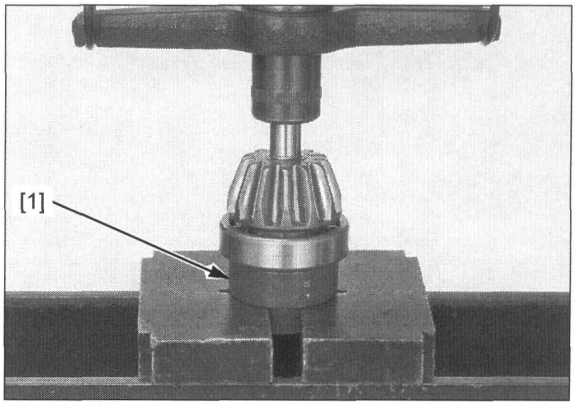
- When the gear set, differential bearing, differential and/or gear case has been replaced, use a 2.00 mm (0.079 in) thick shim for initial reference.



Press the pinion gear into a new bearing until it is fully seated by supporting the bearing inner race.

TOOL:

Attachment, 30 mm I.D. [1]	**07746-0030300**



PINION JOINT NEEDLE BEARING REPLACEMENT

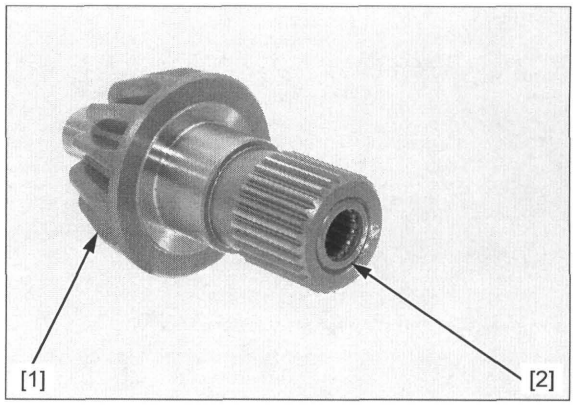
Remove the pinion ball bearing (page 18-30).

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 (U.S.A. : 07936-166010A and 07936-3710100)**
Remover weight	**07741-0010201 or 07936-3710200 (U.S.A. : 07936-371020A)**

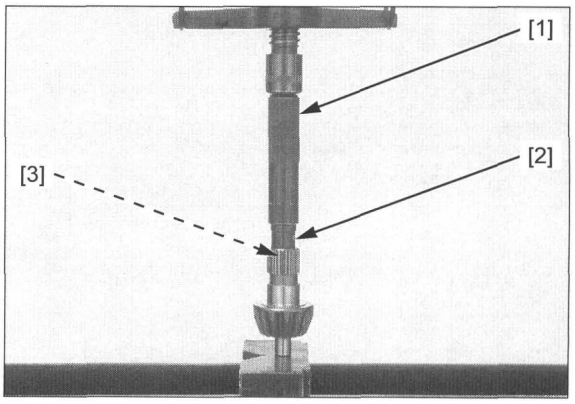


Press a new bearing into the pinion gear with the marking facing up so that it is flush with the shaft end.

TOOLS:

Driver [1]	**07749-0010000**
Attachment, 22 x 24 mm [2]	**07746-0010800**
Pilot, 12 mm [3]	**07746-0040200**

Install the pinion ball bearing (page 18-30).

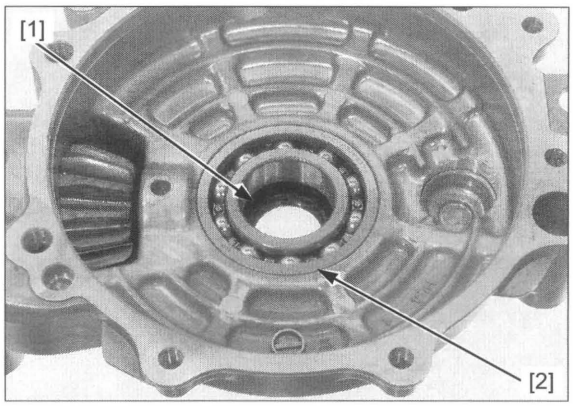


GEAR CASE AND COVER BEARING REPLACEMENT

DIFFERENTIAL BEARING

Remove the oil seals [1] from the gear case and cover.

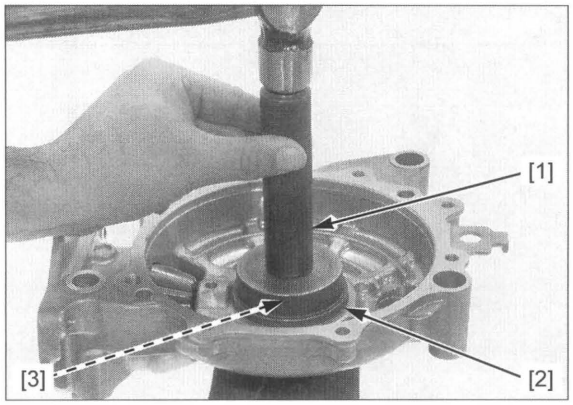
Drive the bearings [2] out of the case and cover.



Drive a new bearing into the gear case with the marking facing up.

TOOLS:

Driver [1]	**07749-0010000**
Attachment, 62 x 68 mm [2]	**07746-0010500**
Pilot, 35 mm [3]	**07746-0040800**



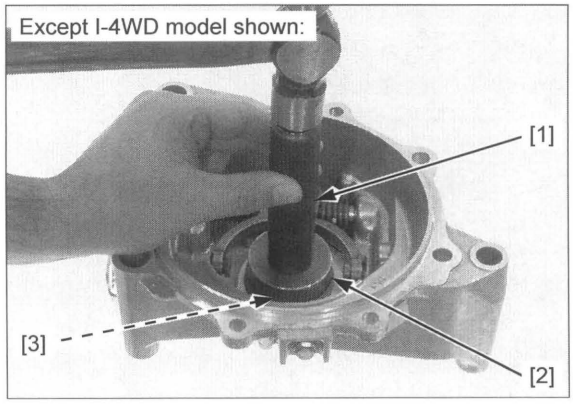
Drive a new bearing into the cover with the marking facing up.

TOOLS (Except I-4WD model):

Driver [1]	**07749-0010000**
Attachment, 52 x 55 mm [2]	**07746-0010400**
Pilot, 35 mm [3]	**07746-0040800**

TOOLS (I-4WD model):

Driver	**07749-0010000**
Oil seal driver attachment 56 mm	**07LAD-PW50100**
Pilot, 35 mm	**07746-0040800**



Apply grease to the seal lips of new dust seals [1].

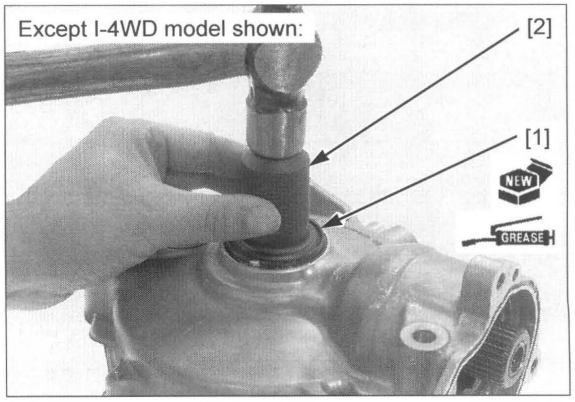
Install the dust seals into the case and cover with the metal side facing out.

TOOLS (Except I-4WD model):

Oil seal driver, 46 mm [2]	**07HAD-PJ70100**

TOOLS (I-4WD model):

Driver	**07749-0010000**
Attachment, 62 x 68 mm	**07746-0010500**

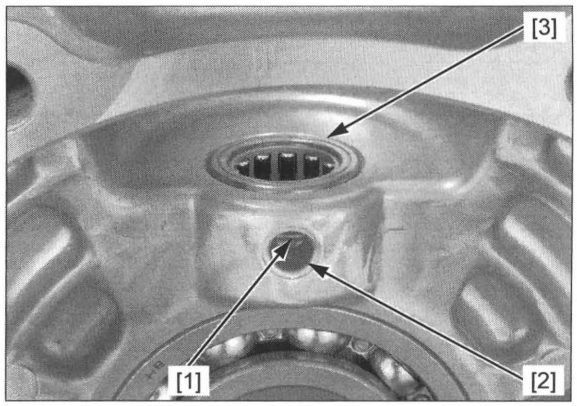


PINION NEEDLE BEARING

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-nosed pliers and pull the stopper ring out through the access hole.



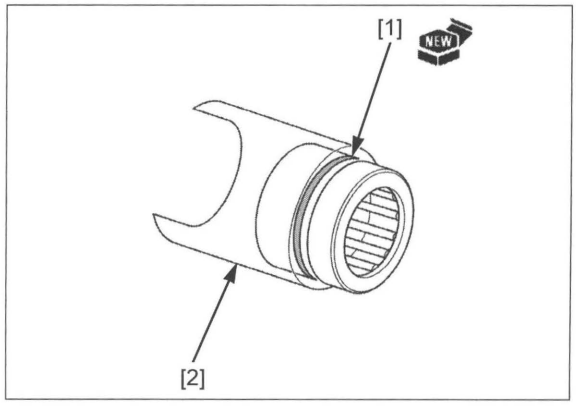
Be sure to wear heavy gloves to avoid burns when handling the heated gear case. Using a torch to heat the gear case may cause warpage.

Heat the gear case to about 80°C (176°F) and remove the needle bearing [3], using the special tools.

TOOLS:

Remover head, 15 mm	**07936-KC10200**
Remover shaft, 15 mm	**07936-KC10100 (U.S.A. : 07936-KC10500)**
Remover weight	**07741-0010201 or 07936-3710200 (U.S.A. : 07936-371020A)**

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 until the stopper ring is flush with the end of the tool.

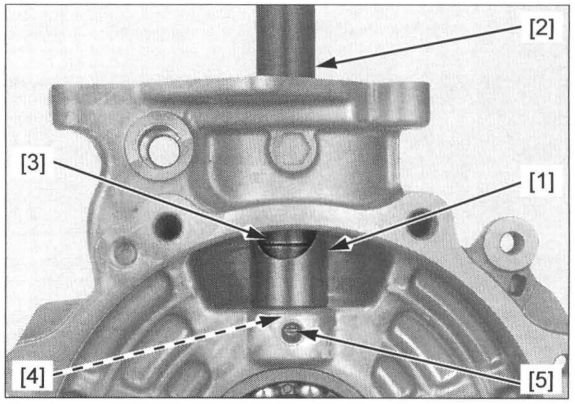
TOOL:

Bearing clip compressor, 25 mm [2]	**070ME-HN80100 (U.S.A. : 070ME-HN8A100)**

Place the driver, attachment and pilot on the top of the bearing and tape the driver to the compressor [1].

TOOLS:

Driver, 15 x 280 mm [2]	**07949-3710001**
Attachment, 22 x 24 mm [3]	**07746-0010800**
Pilot, 15 mm [4]	**07746-0040300**



Place the bearing and tool assembly into a freezer for at least 30 minutes.

Using a heat gun, heat the gear case to 80°C (176°F).

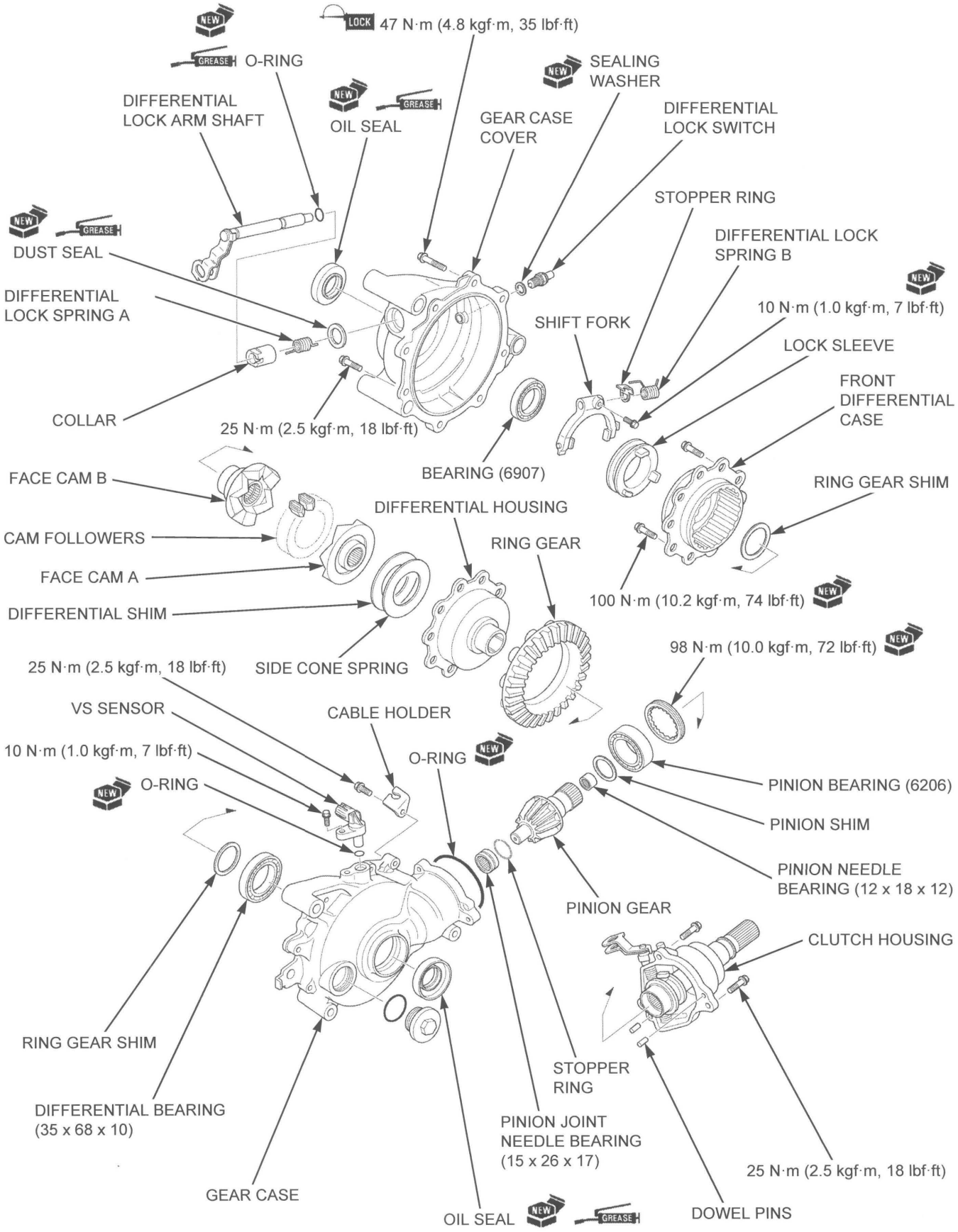
Remove the bearing and tool assembly from the freezer and drive the bearing into the gear case using the special tools.

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 ring and bearing, and install a new ring.

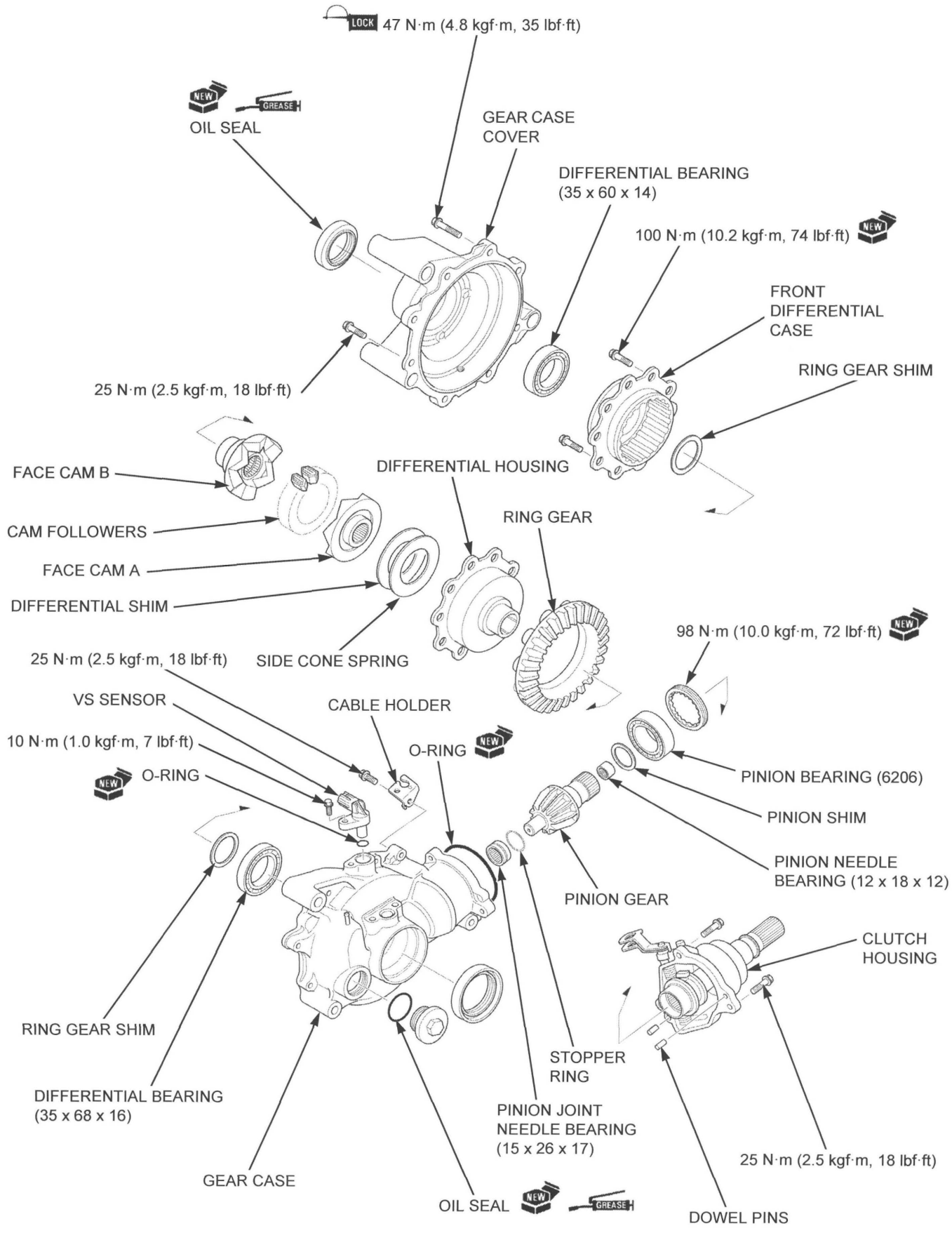
Make sure that the stopper ring is securely set in the groove of the gear case.

FRONT FINAL GEAR ASSEMBLY

Except I-4WD model:

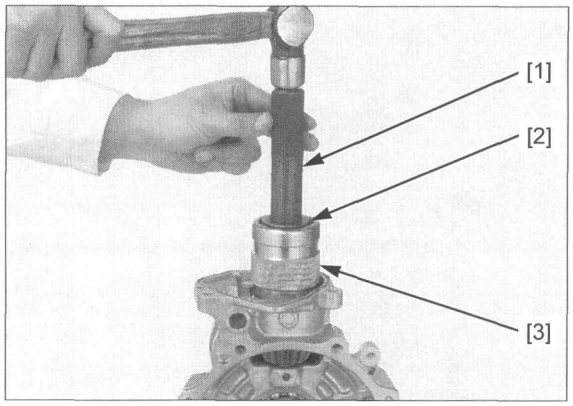


I-4WD model:


LOCK 47 N·m (4.8 kgf·m, 35 lbf·ft)
NEW GREASE
OIL SEAL
GEAR CASE COVER
DIFFERENTIAL BEARING (35 x 60 x 14)
100 N·m (10.2 kgf·m, 74 lbf·ft) NEW
FRONT DIFFERENTIAL CASE
RING GEAR SHIM
25 N·m (2.5 kgf·m, 18 lbf·ft)
FACE CAM B
DIFFERENTIAL HOUSING
CAM FOLLOWERS
RING GEAR
FACE CAM A
DIFFERENTIAL SHIM
SIDE CONE SPRING
98 N·m (10.0 kgf·m, 72 lbf·ft) NEW
25 N·m (2.5 kgf·m, 18 lbf·ft)
VS SENSOR
CABLE HOLDER
10 N·m (1.0 kgf·m, 7 lbf·ft)
O-RING NEW
O-RING NEW
PINION BEARING (6206)
PINION SHIM
PINION NEEDLE BEARING (12 x 18 x 12)
PINION GEAR
CLUTCH HOUSING
RING GEAR SHIM
STOPPER RING
DIFFERENTIAL BEARING (35 x 68 x 16)
PINION JOINT NEEDLE BEARING (15 x 26 x 17)
25 N·m (2.5 kgf·m, 18 lbf·ft)
GEAR CASE
OIL SEAL NEW GREASE
DOWEL PINS

PINION GEAR INSTALLATION

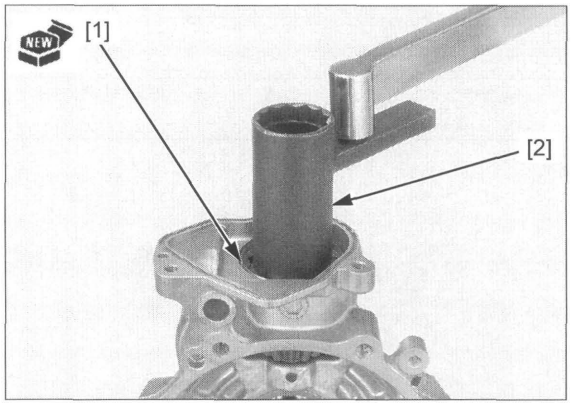
Drive the pinion gear assembly into the gear case.



TOOLS:

Driver [1]	**07749-0010000**
Attachment, 42 x 47 mm [2]	**07746-0010300 or**
Oil seal driver attachment	**07JAD-PH80101**
Fork seal driver weight [3]	**07747-0010100 or**
Fork seal driver, 37 mm	**07947-3710101**

Install a new lock nut [1] and tighten it.



TOOL:

Lock nut wrench, 30 x 64 mm [2] 07916-MB00002

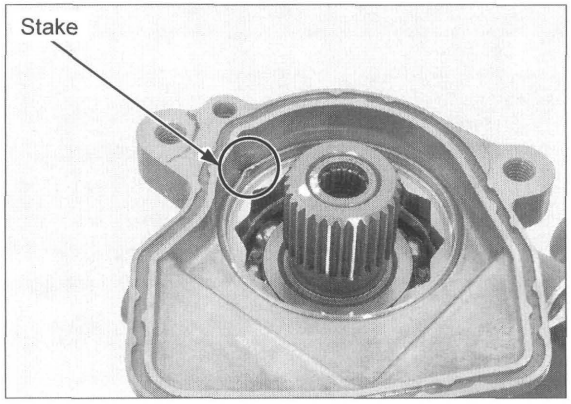
TORQUE: Actual: 98 N·m (10.0 kgf·m, 72 lbf·ft)

NOTE:

- Note that the effective torque value changes when using a special tool.

Be careful not to damage the threads of the case.

Stake the lock nut into the case groove.

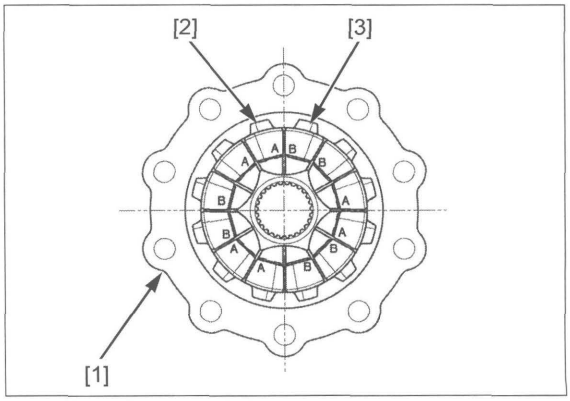


DIFFERENTIAL ASSEMBLY

Keep dust and dirt out of the differential housing.

Install face cam B into the differential housing [1].

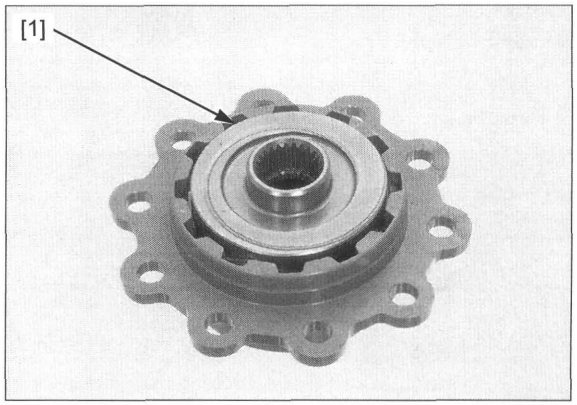
Install six cam followers A (rib) [2] and six followers B (flat) [3] into the specified grooves in the housing by two and two as shown.



NOTE:

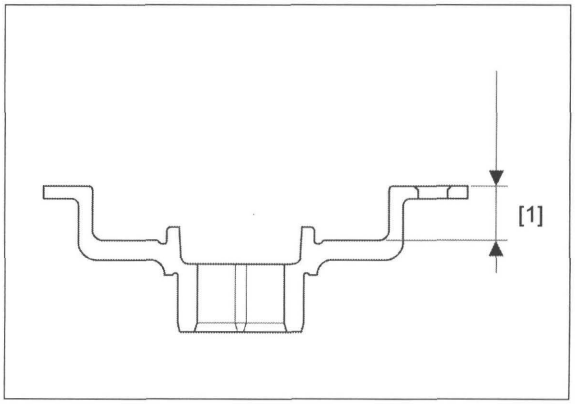
- The housing grooves are sized differently to accommodate the differently sized cam followers A and B. Make sure to install the followers correctly.

Install face cam A [1] onto the cam followers.



Check the sliding surface of the differential housing cap for damage or discoloration.

Measure the depth [1] of the housing cap from the mating surface as shown.



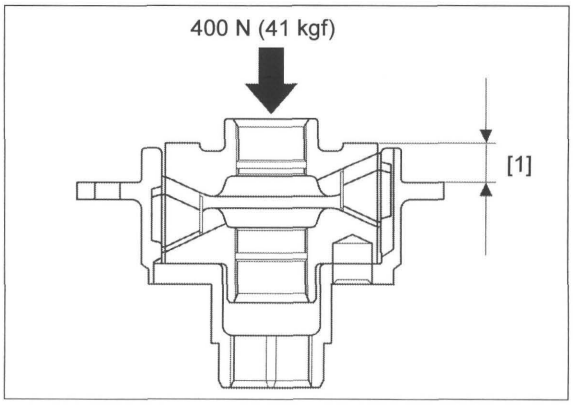
Measure the height [1] of face cam from the housing mating surface as shown while applying a load of 400 N (41 kgf) to the face cam boss using a hydraulic press.

Calculate the shim thickness using the equation below.

The correct shim is nearly this dimension.

A = B – C – 1.3 mm

A: New shim thickness
B: Recorded housing cap depth
C: Recorded cam height

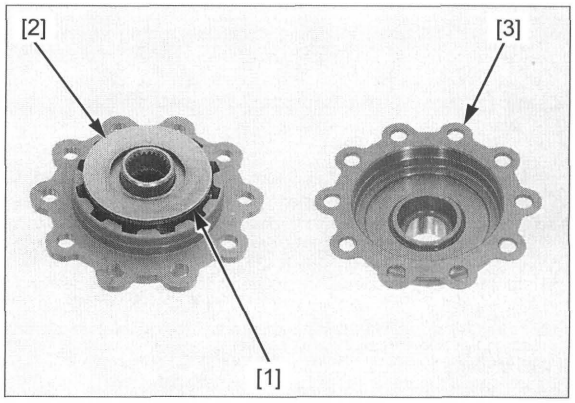


Select the shim [1] and install it onto the face cam.

Differential shims:
A: 1.3 mm (0.051 in) D: 1.6 mm (0.063 in)
B: 1.4 mm (0.055 in) E: 1.7 mm (0.067 in)
C: 1.5 mm (0.059 in)

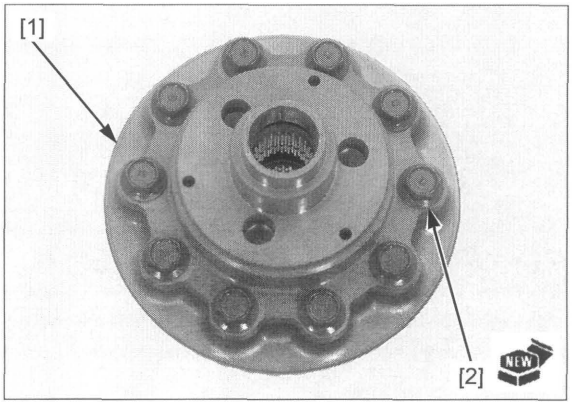
Install the cone spring [2] with the concave side facing up (ring gear side).

Install the housing cap [3].



Install the differential housing assembly onto the ring gear [1].

Align the bolt holes, install new ring gear bolts [2] and screw them until the seating surfaces of all the bolts touches the housing, but do not tighten them yet.

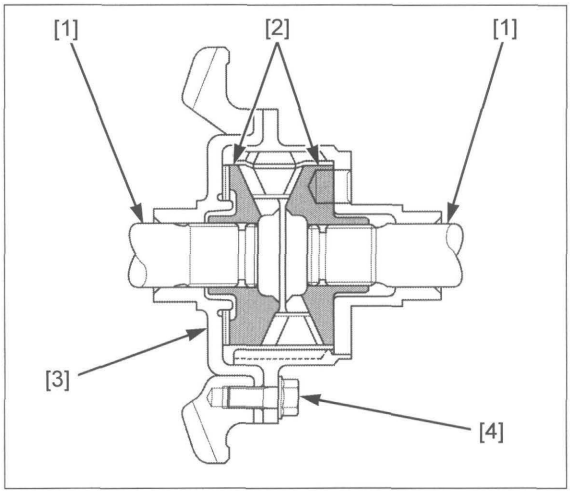


Temporarily install the drive shafts [1] into the differential assembly without the stopper rings until they are fully seated to align the face cams [2] with the differential housing [3].

Tighten the ring gear bolts [4] to the specified torque in a crisscross pattern in several steps.

TORQUE: 100 N·m (10.2 kgf·m, 74 lbf·ft)

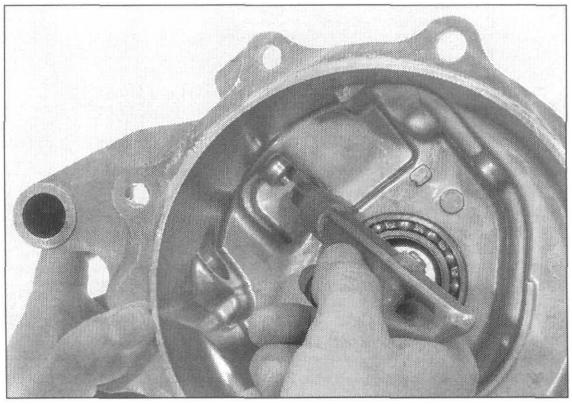
Remove the drive shafts.



FRONT DIFFERENTIAL LOCK CLUTCH ASSEMBLY (Except I-4WD model)

Keep dust and dirt out of the case and cover.

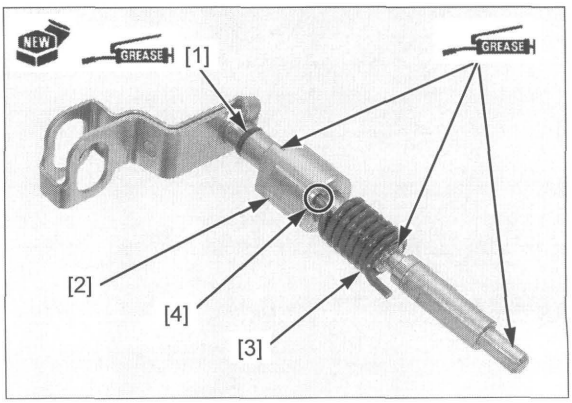
Blow compressed air through the breather hole in the gear case cover.



Coat a new O-ring [1] with grease and install it into the arm shaft groove.

Apply grease to the arm shaft outer surface (collar, fork and gear case cover contacting area).

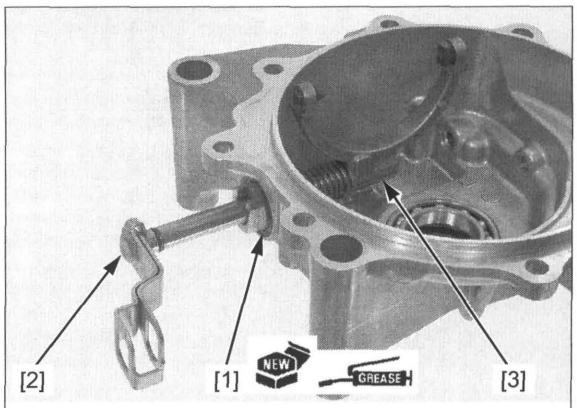
Install the collar [2] and the differential lock spring A [3] with the short end toward the collar, and set the spring end into the hole [4] in the collar.

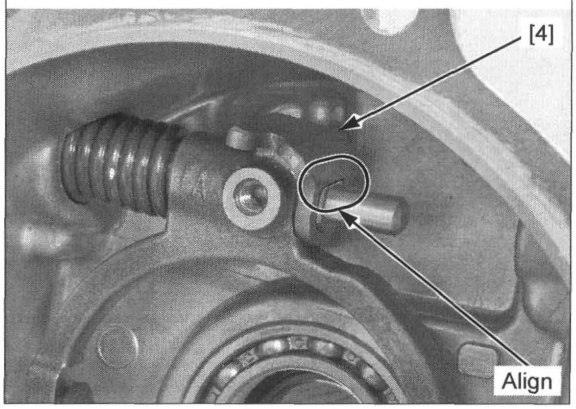


Apply grease to the lip of a new oil seal [1] and install it into the gear case cover until it is fully seated.

Install the arm shaft [2] being careful not to damage the oil seal and install the shift fork [3].

Install the stopper plate [4] onto the shaft by aligning the flat surfaces.

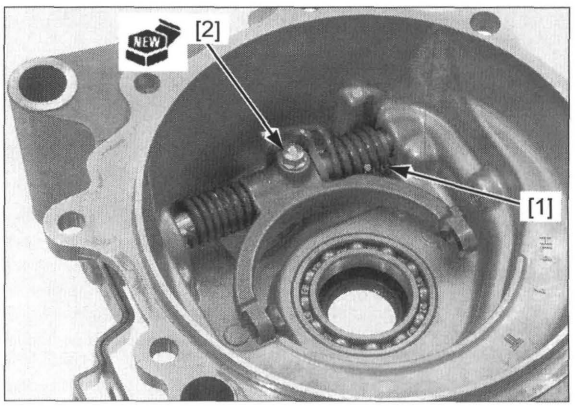




Install the differential lock spring B [1] as shown.

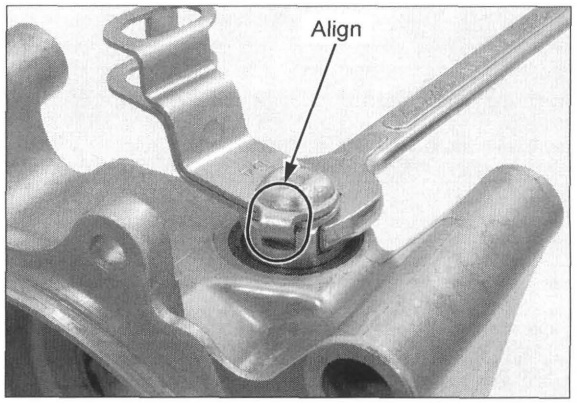
Align the bolt holes in the fork and shaft, install a new fork bolt [2] and tighten it to the specified torque.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)



Turn the arm shaft [1] counterclockwise 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.

Check the arm shaft for smooth operation.



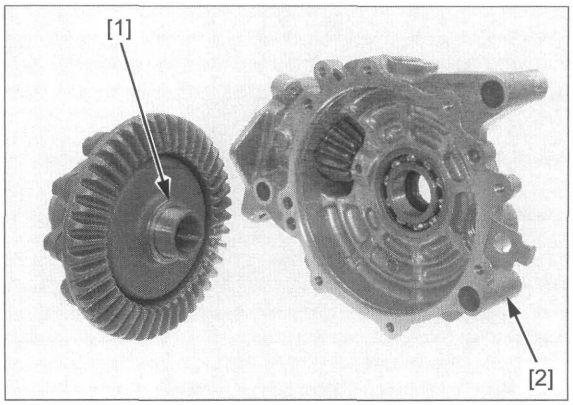
FINAL GEAR CASE ASSEMBLY

NOTE:

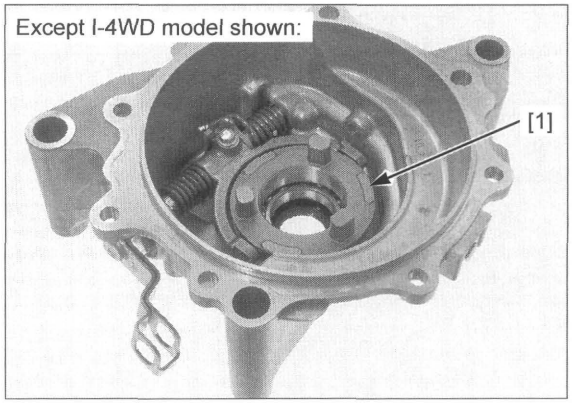
- When the gear set, bearing, differential housing and/or gear case has been replaced, check the tooth contact pattern (page 18-26) and gear backlash (page 18-25).

Install the proper left ring gear shim [1] onto the differential assembly.

Install the differential assembly into the gear case [2].



Except I-4WD model: Install the differential lock sleeve [1] onto the shift fork by aligning the groove with the fork legs.

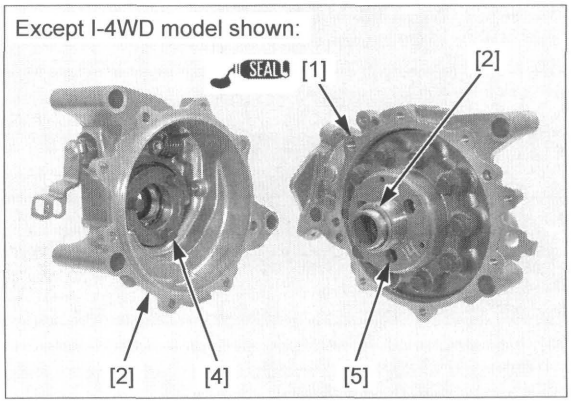


Apply sealant to mating surface of the gear case [1].

Install the proper right shim [2] onto the differential assembly.

Except I-4WD model: Install the case cover over [3] the gear case by aligning the sleeve bosses [4] with the differential holes [5].

I-4WD model: Install the case cover over the gear case.



Apply locking agent to the threads of the two 10 mm bolts [1] (page 1-22).

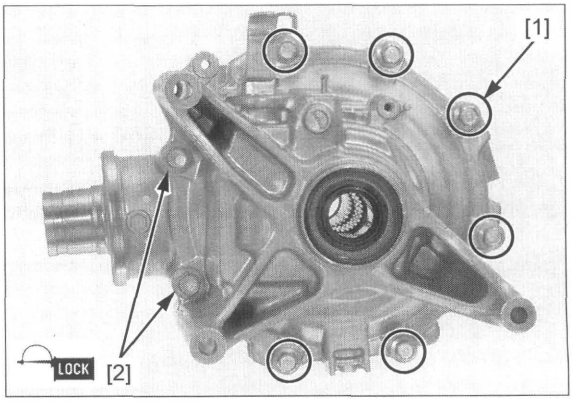
It is important to turn the pinion gear while tightening the bolts. If the ring gear shim is too thick, the gears will lock after only light tightening.

Install the two 10 mm bolts and four 8 mm bolts [2], and tighten them in several steps until the cover evenly touches the case. Then, while rotating the pinion gear, tighten the bolts to the specified torque in a crisscross pattern in several steps.

TORQUE:

8 mm bolt [1]: 25 N·m (2.5 kgf·m, 18 lbf·ft)
10 mm bolt [2]: 47 N·m (4.8 kgf·m, 35 lbf·ft)

Make sure that the gear assembly rotates smoothly without binding.



Install the cable stay [1] and tighten the bolt [2].

TORQUE: 25 N·m (2.5 kgf·m, 18 lbf·ft)

Coat a new O-ring [3] with engine oil and install it into the groove in the VS sensor [4].

Install the VS sensor and tighten the bolt [5].

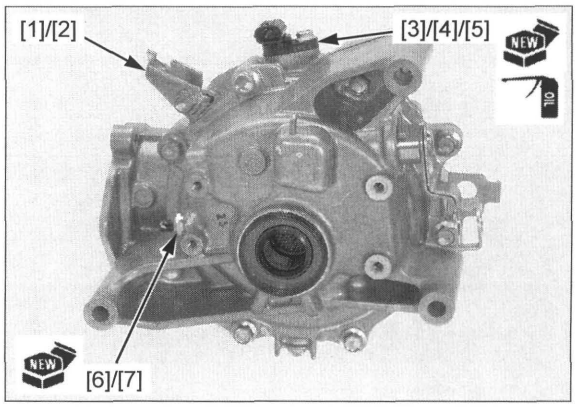
TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

Except I-4WD model: Install the differential lock switch [6] with a new sealing washer [7] and tighten the switch.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Install the following:

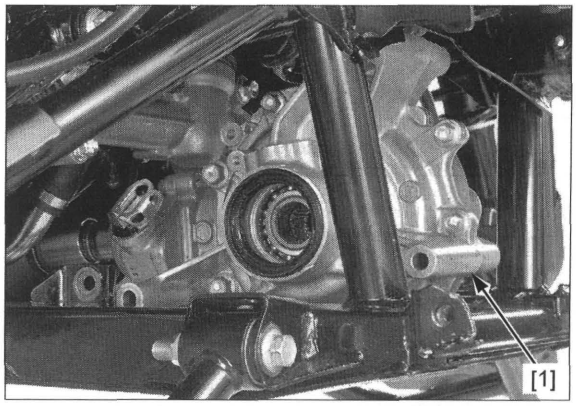
- final clutch housing (page 18-19)
- final gear case (page 18-41)



FRONT FINAL DRIVE INSTALLATION

Install the front propeller shaft/universal joints in the frame with the universal joint marked A toward the final gear side.

Place the gear case assembly [1] into the frame.

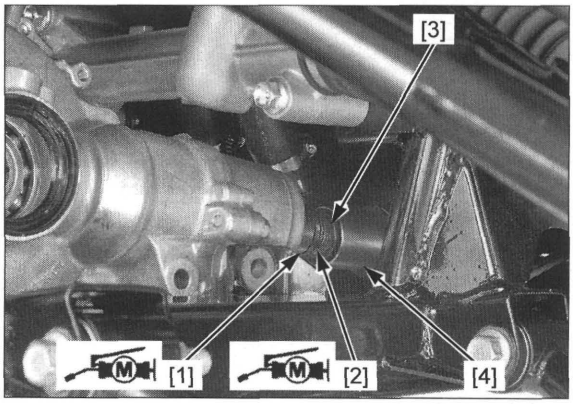


Coat a new special O-ring [1] with molybdenum disulfide grease and install it into groove in the pinion joint [2].

Apply molybdenum disulfide grease to the pinion joint splines.

Install the propeller shaft spring [3].

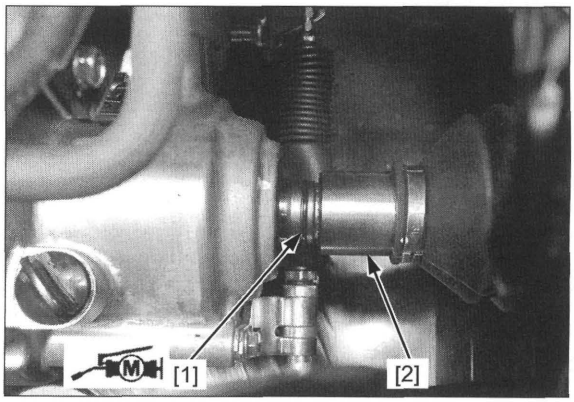
Connect the universal joint [4] to the pinion joint by aligning the splines.



Coat a new O-ring [1] with molybdenum disulfide grease and install it into the output shaft groove.

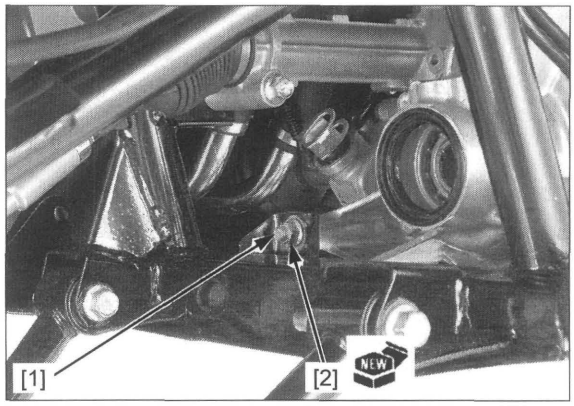
Connect the universal joint [2] to the output shaft by aligning the splines.

Move the final gear assembly rearward while compressing the propeller shaft spring and align the mounting bolt holes.



Install the following:

- rear mounting bolt [1]
- new mounting nut [2]



The mounting bolts are installed from the left side.

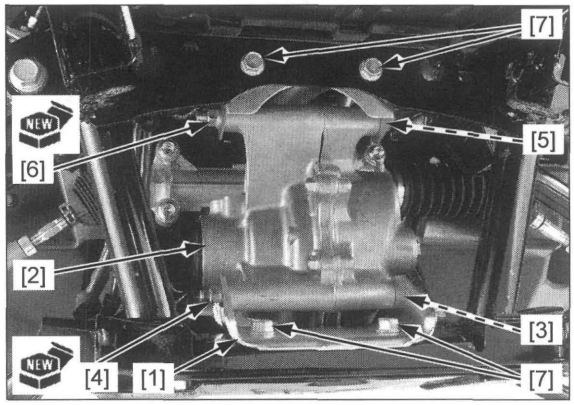
Install the lower mounting bracket [1] onto the gear case [2] with the lower mounting bolt [3] and a new mounting nut [4].

Align the upper mounting bolt holes in the gear case and frame, then install the upper mounting bolt [5] and a new mounting nut [6].

Install the bracket bolts [7] and tighten them.

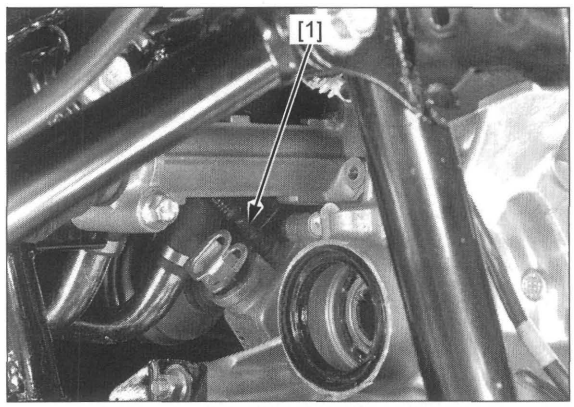
Tighten the gear case mounting nuts to the specified torque.

TORQUE: 54 N·m (5.5 kgf·m, 40 lbf·ft)



Install the following:

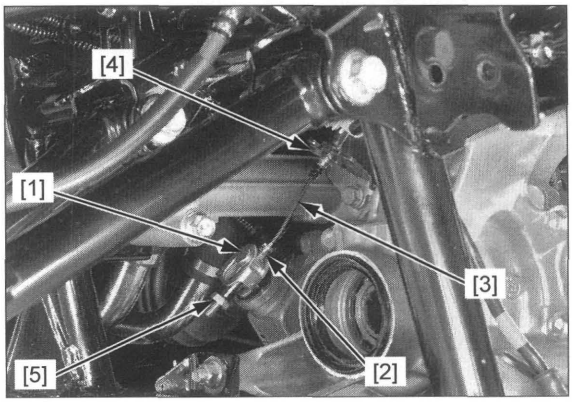
- 4WD select switch connector [1]



Install the following:

- joint pin [1]
- return spring [2]
- final clutch cable [3]
- cable retaining plate [4]
- adjust nut [5]

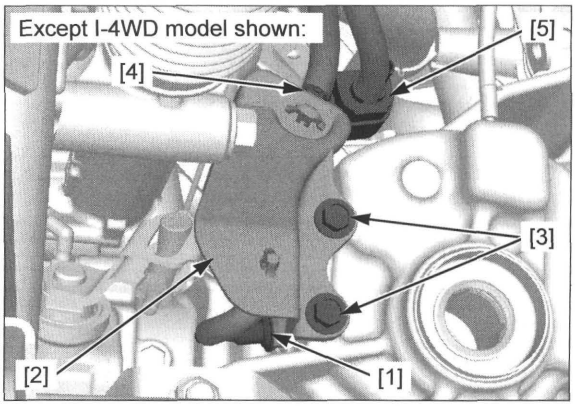
Adjust the final clutch cable (page 18-44).



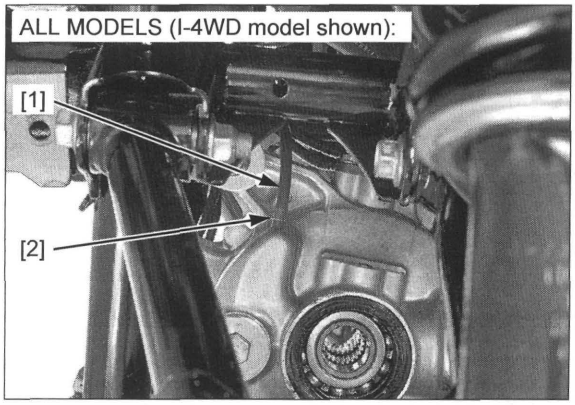
Except I-4WD model: Install the following:

- differential lock switch connector [1]
- front clutch cover [2]
- two bolts [3]
- sub-wire harness 1P connector [4]

Connect the front VS sensor 3P connector [5].



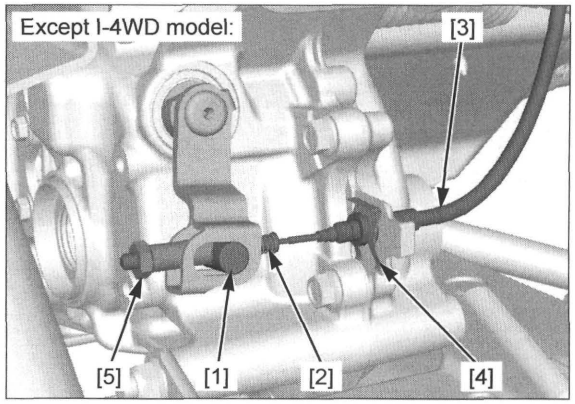
- breather hose [1]
- clip [2]



Except I-4WD model: Install the following:

- joint pin [1]
- return spring [2]
- differential lock cable [3]
- cable retaining plate [4]
- adjusting nut [5]

Adjust the front differential lock cable (page 18-45).



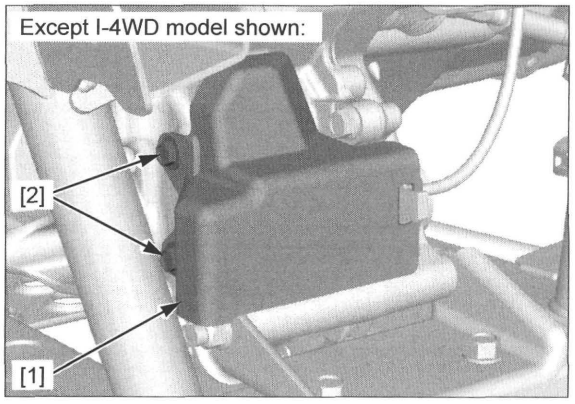
Except I-4WD model: Install the front differential lock cover [1] and two bolts [2].

I-4WD model: Install the front right and left wheel speed sensors (page 18-7).

Install the following:

- both drive shafts (page 18-13)
- seat under center lid (page 2-5)
- front bumper (page 2-18)

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

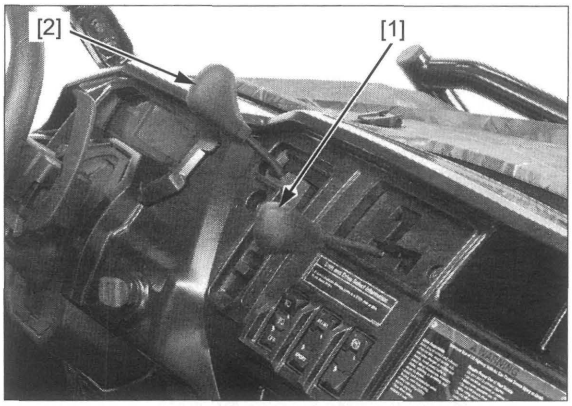


FINAL CLUTCH CABLE ADJUSTMENT

Set the drive mode select lever [1] to the 2WD position and the shift select lever [2] to the "P" (Parking) position.

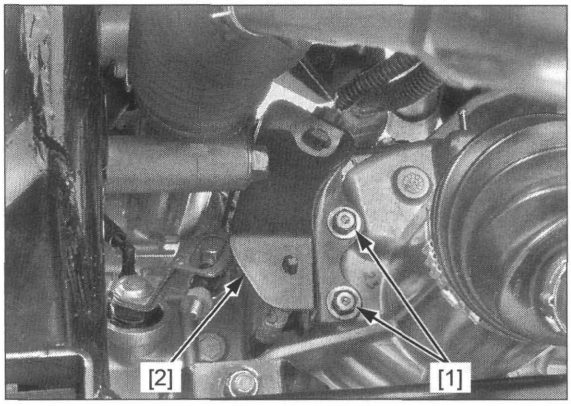
Check that the gear position indicator displays "2WD" indicator.

If the gear position indicator displays "4WD" indicator, turn the front wheel until the "2WD" indicator is displayed because the final clutch sleeve does not shifted completely.



Except I-4WD model:

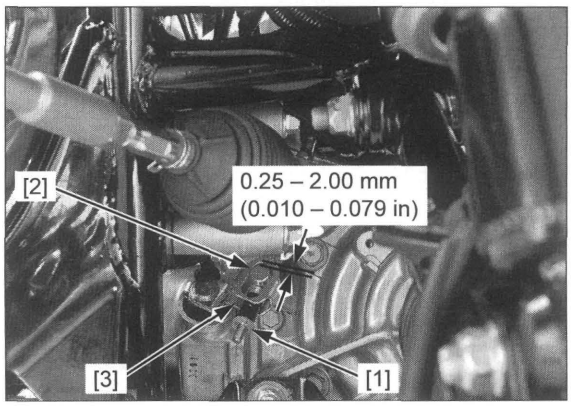
Remove the two bolts [1] and final clutch cover [2].



Turn the final clutch adjusting nut [1] clockwise until the joint pin [2] contacts with the slot end of the final clutch arm [3], then turn it back 1/2 turn.

Make sure that the clearance between the joint pin and slot end is 0.25 – 2.00 mm (0.010 – 0.079 in).

Install the removed parts in the reverse order of removal.



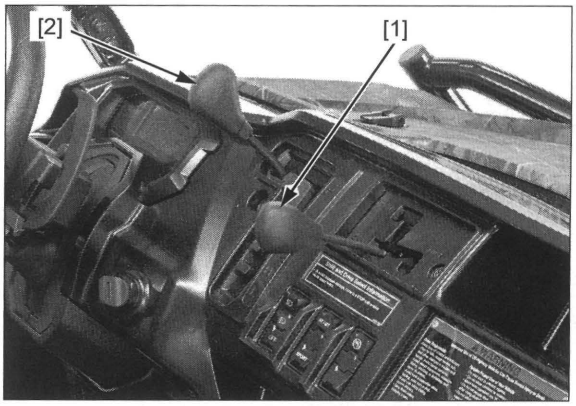
FRONT DIFFERENTIAL LOCK CABLE ADJUSTMENT (Except I-4WD model)

Set the drive mode select lever [1] to the 2WD position and the shift select lever [2] to the "P" (Parking) position.

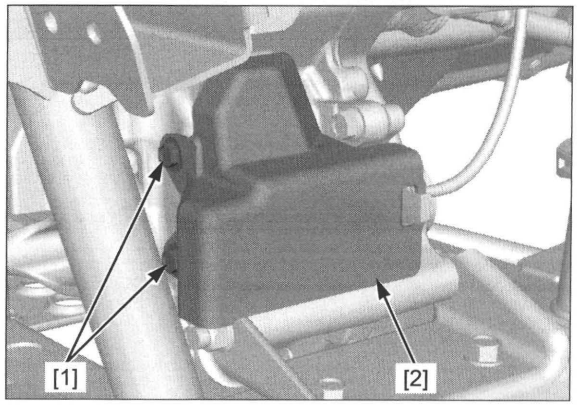
Check that the gear position indicator displays "2WD" indicator.

If the gear position indicator displays "4WD" or "4WD LOCK" indicator, turn the front wheel until the "2WD" indicator is displayed because the front differential lock sleeve has not shifted completely.

Remove the front bumper (page 2-18).



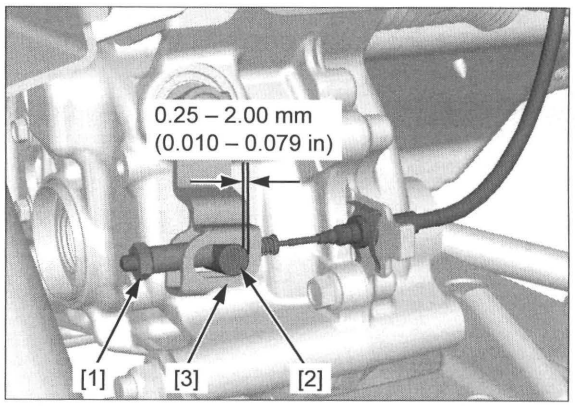
Remove the two bolts [1] and front differential lock cover [2].



Turn the front differential lock adjusting nut [1] clockwise until the joint pin [2] contacts with the slot end of the differential lock arm [3], then turn it back 1/2 turn.

Make sure that the clearance between the joint pin and slot end is 0.25 – 2.00 mm (0.010 – 0.079 in).

Install the removed parts in the reverse order of removal.

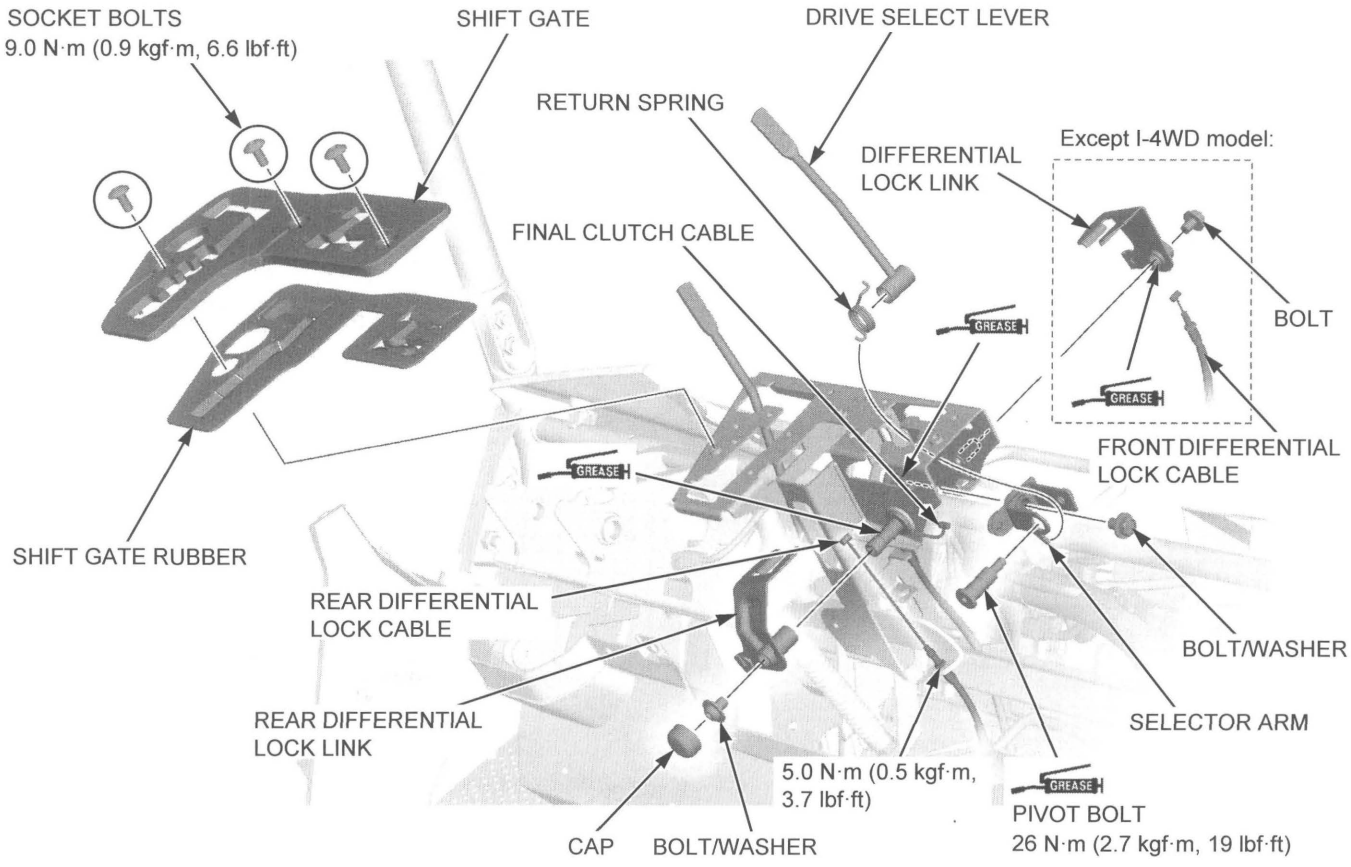


DRIVE MODE SELECT LEVER LINKAGE

REMOVAL/INSTALLATION

Set the drive mode select lever to the "2WD" position.

Remove the instrument panel (page 2-28).



NOTE:

- Apply grease to the sliding areas of the selector arm, pivot bolt and differential lock links when installing them.
- Route the cables properly (page 1-29)

19. REAR DRIVING MECHANISM

SERVICE INFORMATION 19-2

TROUBLESHOOTING 19-4

COMPONENT LOCATION 19-5

REAR DRIVE SHAFT 19-6

REAR FINAL DRIVE REMOVAL 19-13

REAR PROPELLER SHAFT 19-14

REAR FINAL GEAR DISASSEMBLY/INSPECTION 19-15

GEAR CASE AND COVER BEARING REPLACEMENT 19-23

REAR FINAL GEAR ASSEMBLY 19-26

REAR FINAL DRIVE INSTALLATION 19-33

REAR DIFFERENTIAL LOCK CABLE ADJUSTMENT 19-35

SERVICE INFORMATION

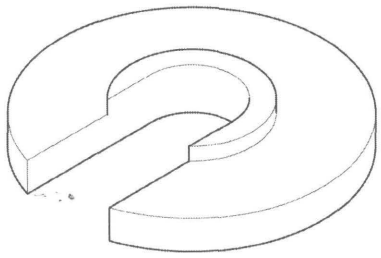
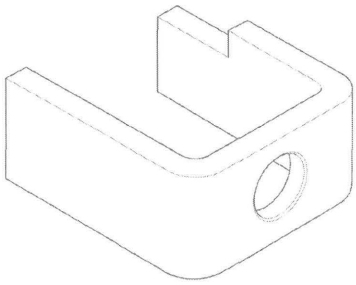
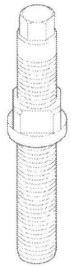
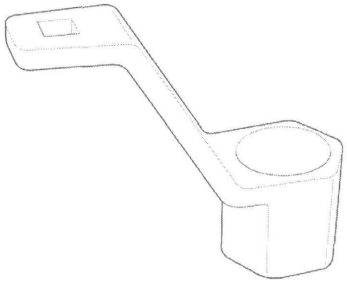
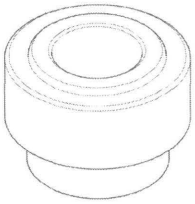
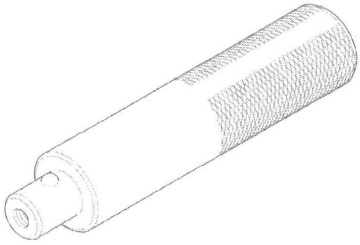
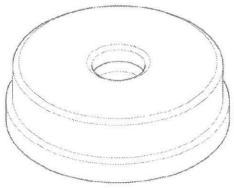
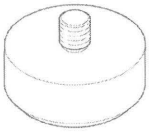
GENERAL

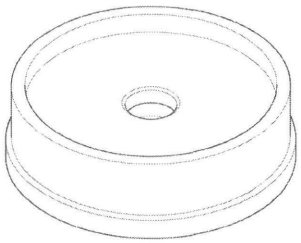
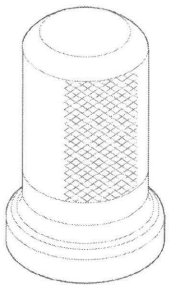
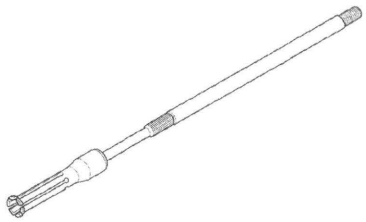
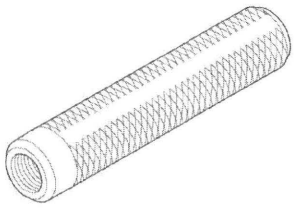
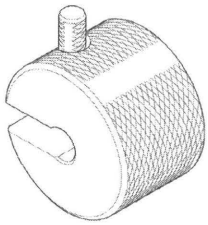
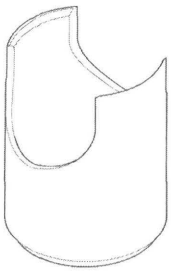
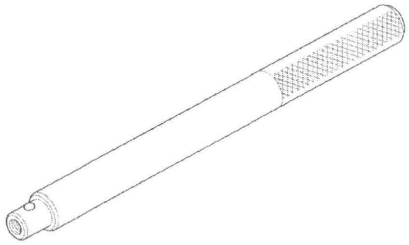
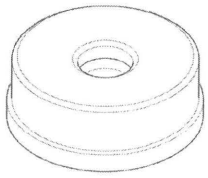
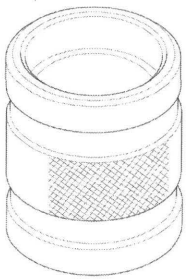
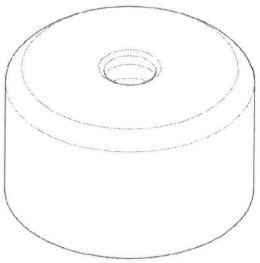
- Perform the gear contact pattern and backlash inspection whenever you replace the bearings, gears, differential or gear case. The extension lines from the gear engagement surfaces should intersect at one point.
- Protect the gear case with a shop towel or soft jaws while holding it in vise. Do not clamp it too tight as it could damage the gear case.
- Replace the ring and pinion gears as a set.
- Do not confuse the left and right drive shaft parts.
- For drive mode select lever service and adjustment, see Front Driving Mechanism section (page 18-46).

⚠WARNING

Be careful when performing service with a load in the cargo bed because the ground clearance can gradually reduce.
Use caution when working under the SXS1000 while it is parked on all 4 wheels.
Objects or people below the unit could be crushed as the ground clearance gradually reduces.
When the cargo bed is loaded and the SXS1000 is parked, the ground clearance can gradually reduce by up to 3.4 inches (85 mm).
Ground clearance of a loaded, unsupported SXS1000 may decrease unexpectedly.
You could be crushed or pinched if working underneath the SXS1000.
Unload the SXS1000 or support [chassis] with lift or stands before working underneath it.

TOOLS

Half shaft disassembly mould 070MF-HR3A100 (U.S.A. only) 	Pinion puller base 07HMC-MM80110  or 07HMC-MM8011A (U.S.A. only)	Puller shaft and nut 07965-GM00300 
Holding tool Snap-on YA6010A or equivalent 	Attachment, 24 x 26 mm 07746-0010700 	Attachment, 30 mm I.D. 07746-0030300 
Driver 07749-0010000 	Attachment, 62 x 68 mm 07746-0010500 	Pilot, 40 mm 07746-0040900 

Attachment, 78 x 80 mm 07NAD-PX40100 	Oil seal driver, 46 mm 07HAD-PJ70100 	Bearing remover, 20 mm 07936-3710600 
Remover handle 07936-3710100 	Remover weight 07741-0010201  or 07936-3710200 or 07936-371020A (U.S.A. only)	Bearing clip compressor, 37 mm 07AME-HL4A100 
Driver, 15 x 280 mm 07949-3710001 	Attachment, 32 x 35 mm 07746-0010100 	Pilot, 22 mm 07746-0041000 
Attachment, 52 x 55 mm 07746-0010400 	Fork seal driver weight 07947-KA50100 	Driver attachment 07LAD-PW50500  or 07AMD-HL1A100 (U.S.A. only)

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 noise while coasting
- Chipped or damaged gears

Abnormal noises when turning
- Worn or damaged ring gear bearing
- Worn or damaged face cams and cam followers
- Worn or damaged differential housing grooves
- Worn cone spring or shim

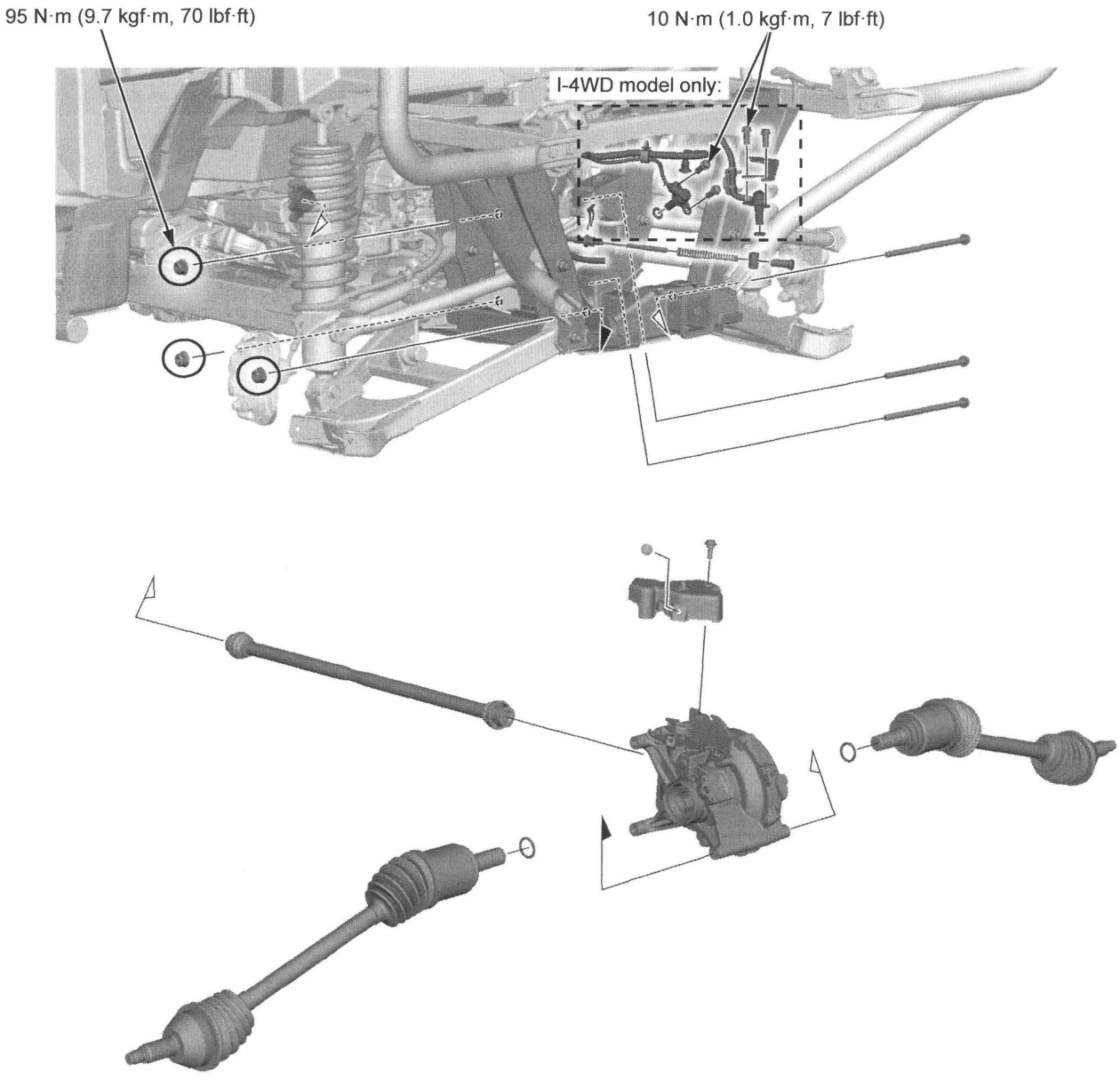
Abnormal noises at start or during acceleration
- Excessive backlash between ring gear and pinion gear
- Worn differential splines
- Loose fasteners
- Worn cone spring or shim

Oil leak
- Oil level too high
- Clogged breather
- Damaged seals
- Loose case cover bolt

Overheating
- Oil level too low
- Insufficient backlash between ring gear and pinion gear

COMPONENT LOCATION

I-4WD model shown:



REAR DRIVE SHAFT

REMOVAL

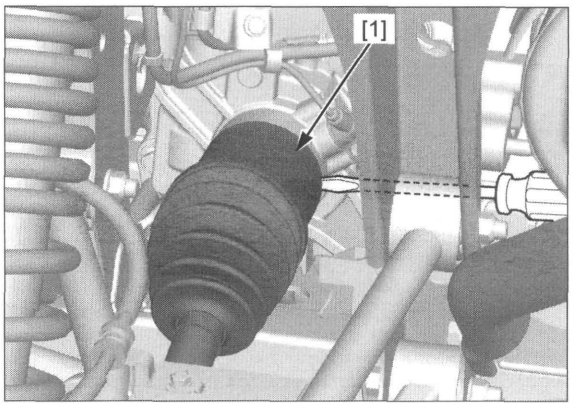
Remove the knuckle (page 20-21).

To prevent damage to the gear case oil seal, hold the inboard joint horizontal until the drive shaft is clear of the gear case.

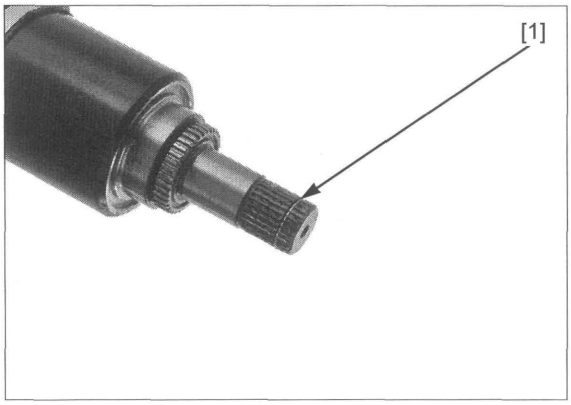
Hold the inboard joint [1] of the drive shaft and tug firmly to force the stopper ring on the inboard joint end past the groove while prying with a screwdriver.

NOTE:

- Be careful not to crack the case when using a screwdriver.



Remove the stopper ring [1] from the inboard joint.



DISASSEMBLY/INSPECTION

NOTE:

- Do not confuse the left and right drive shaft parts.

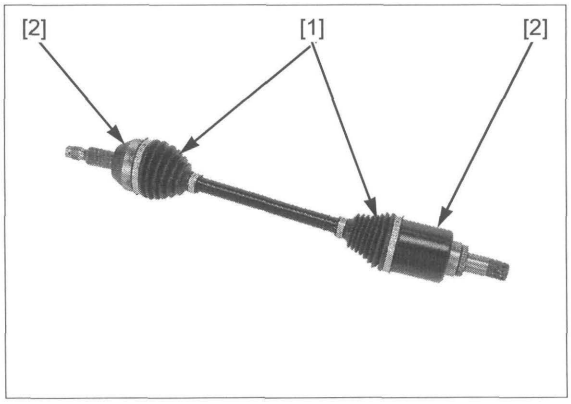
Check the boots [1] for cuts or other damage.

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:

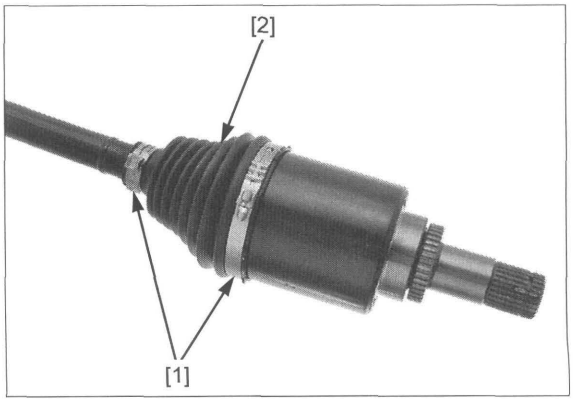
- To replace the outboard boot, first remove the inboard boot as described in the following steps. Then remove the bands and outboard boot from the inboard end of the shaft.
- The outboard joint cannot be disassembled.



Replace the bands with new ones whenever removing them.

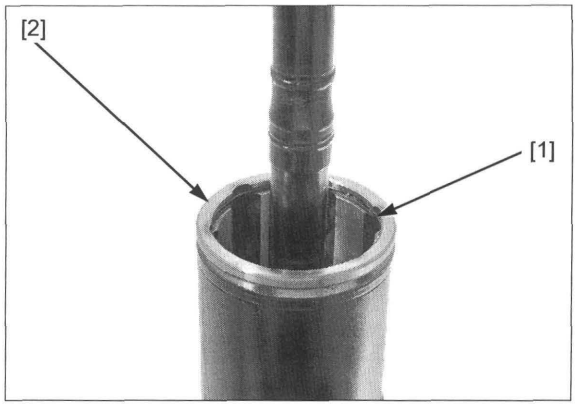
Cut off and remove the boot bands [1] from inboard boot [2].

Remove the boot from the inboard joint.



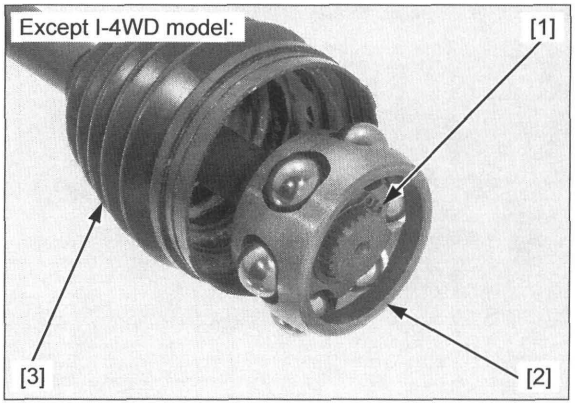
Remove the following:

- stopper ring [1]
- inboard joint [2]



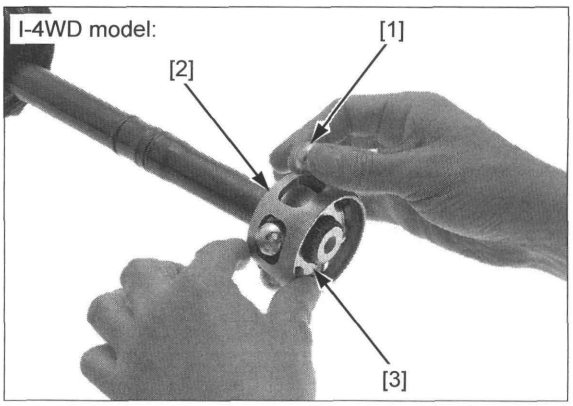
Except I-4WD model:

- snap ring [1]
- bearing [2]
- inboard boot [3]



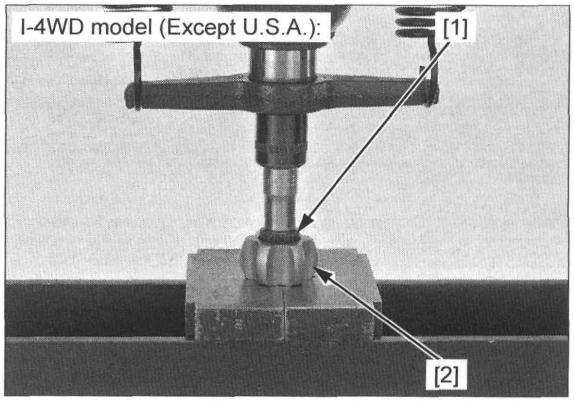
I-4WD model: Remove the balls [1] from the bearing cage [2] and inner race [3] by tilting the cage as shown.

Slide the bearing cage down into the inboard boot.



I-4WD model: Except U.S.A.:

While holding the drive shaft [1], press it out of the inner race [2] using a suitable tool as shown.



I-4WD model: U.S.A. only:

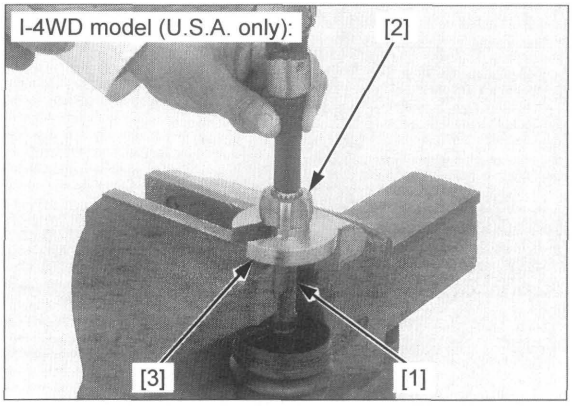
Support the drive shaft [1], by the inner race [2], on a vise using the special tool.

TOOL:
Half shaft disassembly mould [3] 070MF-HR3A100

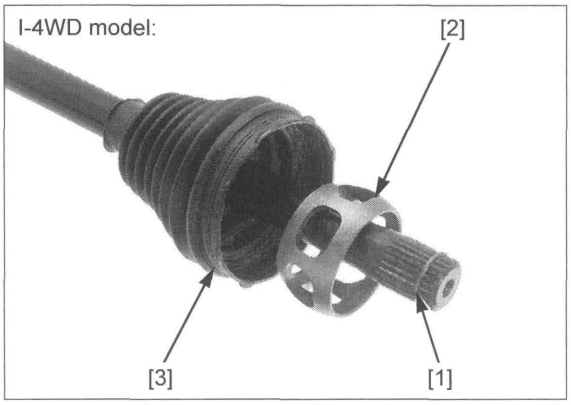
NOTICE

- *Do not tighten the vise onto the shaft.*

With a suitable soft material rod (i.e. aluminum or brass), drive out the shaft from the inner race.



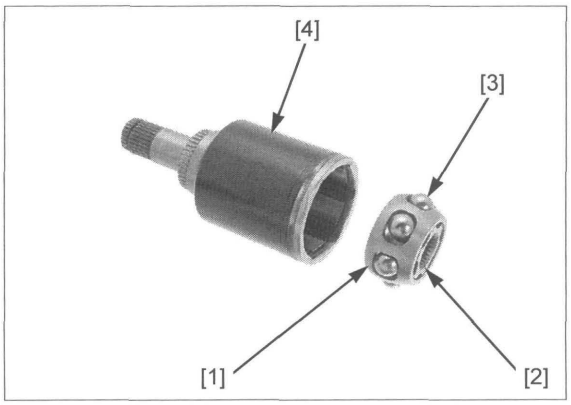
I-4WD model: Remove the stopper ring [1], inner race [2] and inboard boot [3] from the drive shaft.



Replace these components as an assembly.

Check the following for wear or damage:

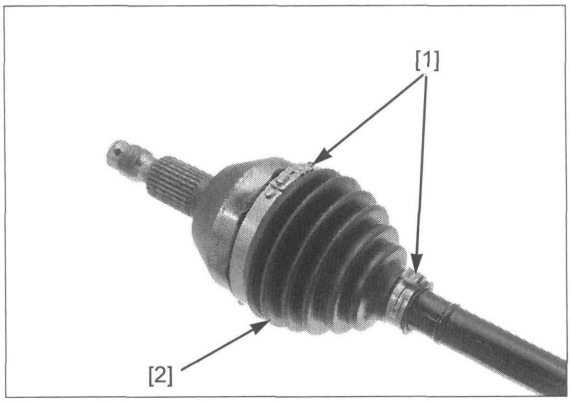
- bearing cage [1]
- race [2]
- steel balls [3]
- inboard joint [4]



Replace the bands with new ones whenever removing them.

Cut off and remove the boot bands [1] from outboard boot [2].

Remove the boot from the outboard joint.



ASSEMBLY

Each band has the following identification number [1].

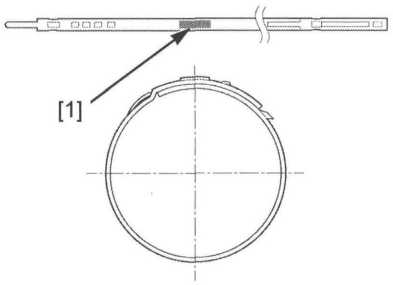
Do not interchange them.

REAR DRIVE SHAFT BAND (Except I-4WD model)

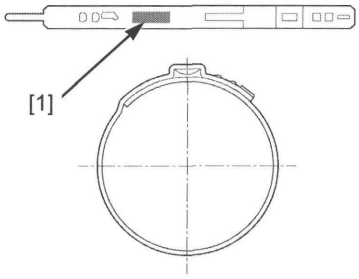
INBOARD BOOT BAND:	**82.1**
SHAFT BOOT BAND (INBOARD):	**31.4**
SHAFT BOOT BAND (OUTBOARD):	**31.2**
OUTBOARD BOOT BAND:	**80.1**

Except I-4WD model:

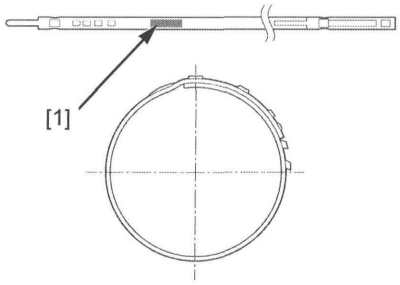
INBOARD/OUTBOARD BOOT BAND:



SHAFT BOOT BAND (INBOARD):



SHAFT BOOT BAND (OUTBOARD):

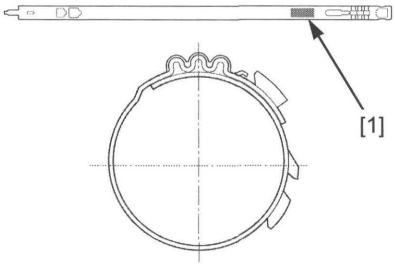


REAR DRIVE SHAFT BAND (I-4WD model)

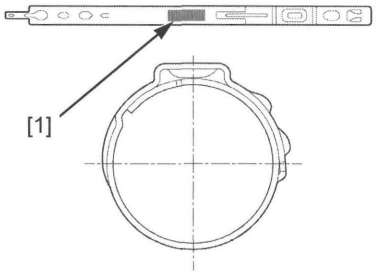
INBOARD BOOT BAND:	**83.5**
SHAFT BOOT BAND:	**31.5**
OUTBOARD BOOT BAND:	**86.6**

I-4WD model:

INBOARD/OUTBOARD BOOT BAND:



SHAFT BOOT BAND (INBOARD/OUTBOAD):



Pack the outboard joint with the specified grease.

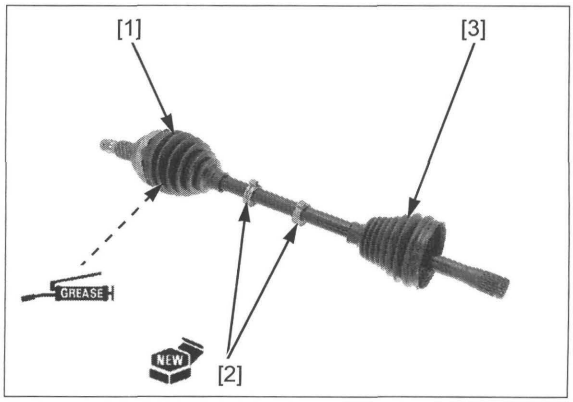
SPECIFIED GREASE:

Left/right:

Except I-4WD model:	**NKG509 (Kyodo Yushi)**
I-4WD model:	**NMS2002-G4**

AMOUNT:

Except I-4WD model:	**Left/right: 60 – 80 g**
I-4WD model:	**Left/right: 55 – 65 g**



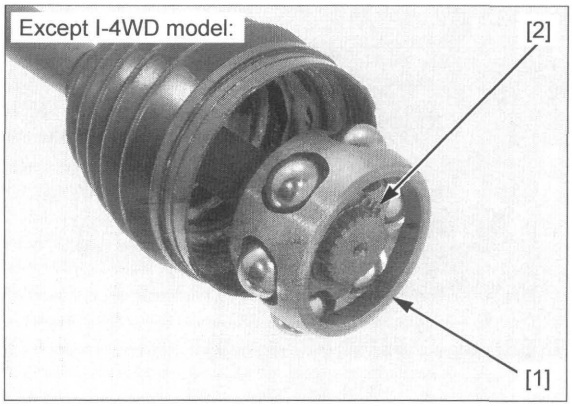
Install the following:

- outboard boot [1]
- new shaft boot bands [2]
- inboard boot [3]

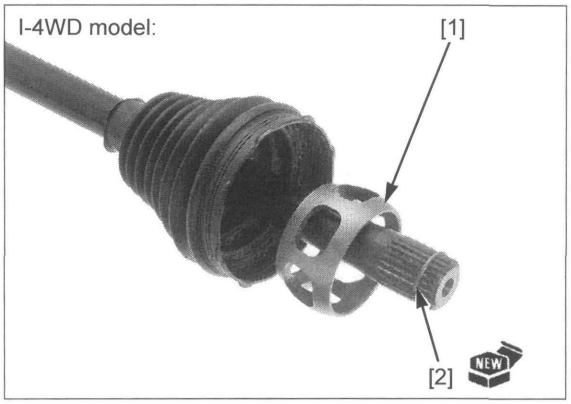
Do not tighten the bands at this time.

Except I-4WD model: Install the bearing [1] with the small O.D. facing the drive shaft.

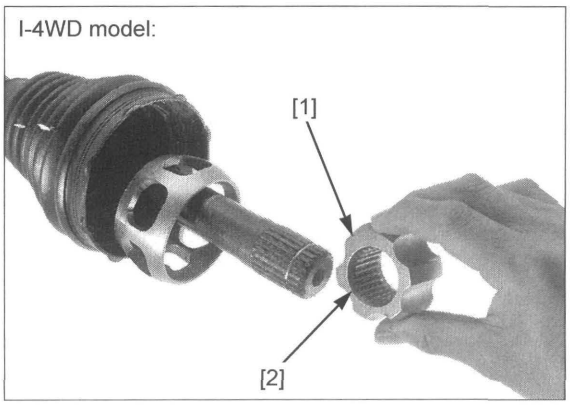
Install the snap ring [2] with the chamfered side facing the bearing.



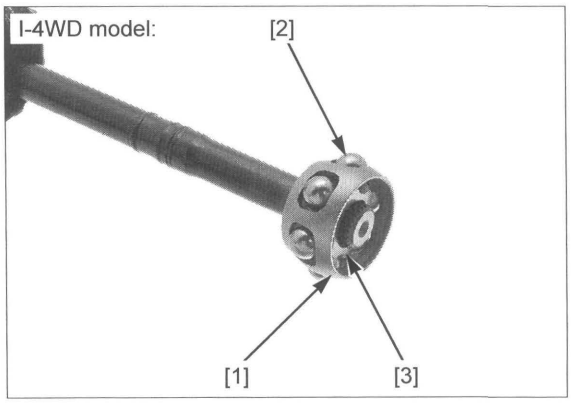
I-4WD model: Install the bearing cage [1] with the small O.D. facing the drive shaft.
Install a new stopper ring [2] into the drive shaft groove.



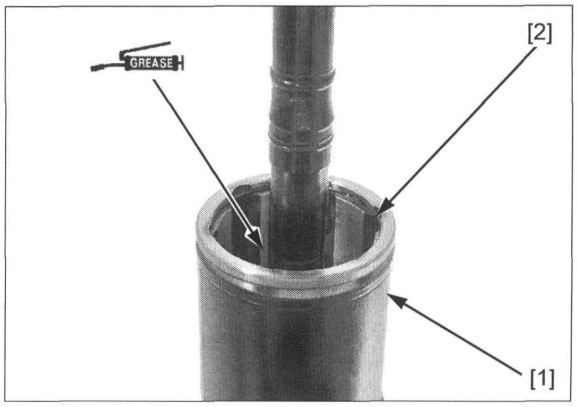
I-4WD model: Install the inner race [1] with the chamfered I.D. [2] facing the drive shaft.
Drive the shaft with a copper hammer until the stopper ring seats in the ring groove.



I-4WD model: Assemble the bearing cage [1] and six balls [2] onto the inner race [3].



Pack the inboard joint [1] with the specified grease.



SPECIFIED GREASE:
Left/right:
Except I-4WD model: NKG509 (Kyodo Yushi)
I-4WD model: NMS2002-G4
AMOUNT:
Except I-4WD model: Right: 110 – 130 g
Left: 105 – 125 g
I-4WD model: Left/right: 120 – 140 g

Install the inboard joint over the bearing.

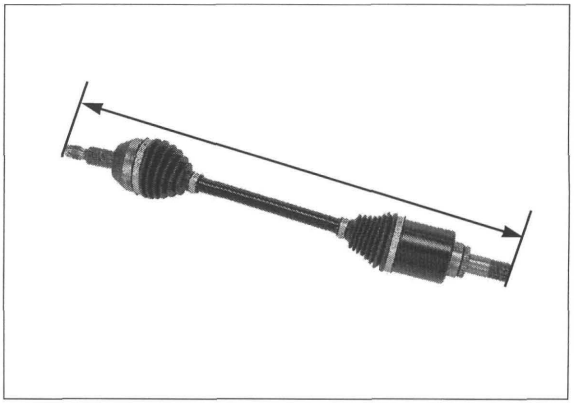
Install the stopper ring [2] into the groove in the inboard joint properly.

Install the boot over the inboard joint securely.

NOTE:

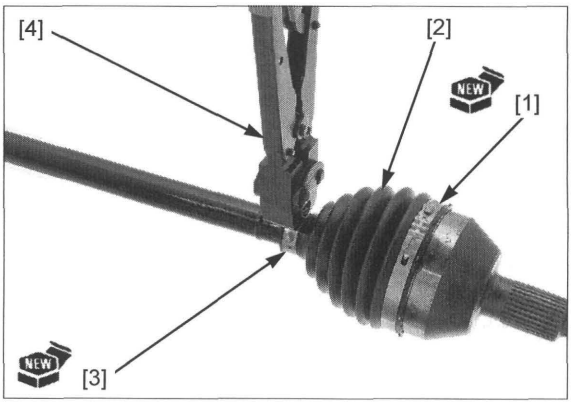
- Except I-4WD model: The shaft length of the left inboard joint is longer than the right inboard joint. Do not interchange them.

Adjust the length of the drive shaft to be set the figure given below.



DRIVE SHAFT LENGTH:
Except I-4WD model: Right: 701.6 mm (27.62 in)
Left 743.2 mm (29.26 in)
I-4WD model: Right: 709.3 mm (27.93 in)
Left 750.3 mm (29.54 in)

Install a new outboard boot band [1] onto the outboard boot [2].



Be careful not to overstretch outboard boot band. Apply only enough force to snap clasp over hook.

Lock the shaft boot band [3] and outboard boot band with commercially available pliers.

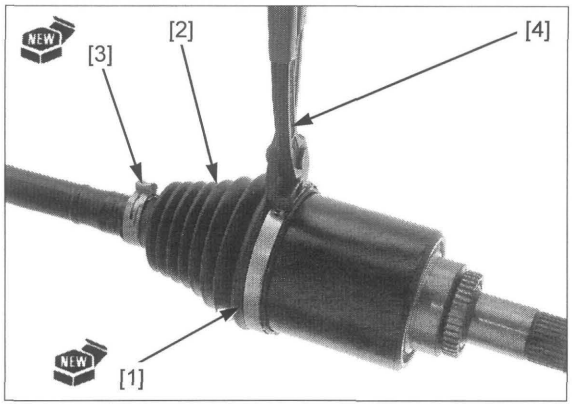
Shaft boot band:

TOOL:
Pliers [4]
Except I-4WD model: Oetiker 14100513 or equivalent commercially available in the U.S.A.
I-4WD model: Oetiker 14100393 or equivalent commercially available in the U.S.A.

Outboard boot band:

TOOL:
Pliers
Except I-4WD model: Oetiker 14100513 or equivalent commercially available in the U.S.A.
I-4WD model: Oetiker 14100134 or equivalent commercially available in the U.S.A.

Install a new inboard boot band [1] onto the inboard boot [2].



Be careful not to overstretch the outboard boot band. Apply only enough force to snap clasp over hook.

Lock the shaft boot band [3] and inboard boot band with pliers.

Shaft boot band:

TOOL:

Pliers [4]

Except I-4WD model:	**Oetiker 14100115 or equivalent commercially available in the U.S.A.**
I-4WD model:	**Oetiker 14100393 or equivalent commercially available in the U.S.A.**

Inboard boot band:

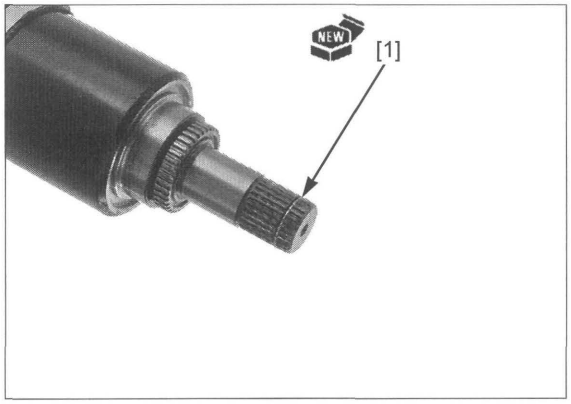
TOOL:

Pliers

Except I-4WD model:	**Oetiker 14100115 or equivalent commercially available in the U.S.A.**
I-4WD model:	**Oetiker 14100134 or equivalent commercially available in the U.S.A.**

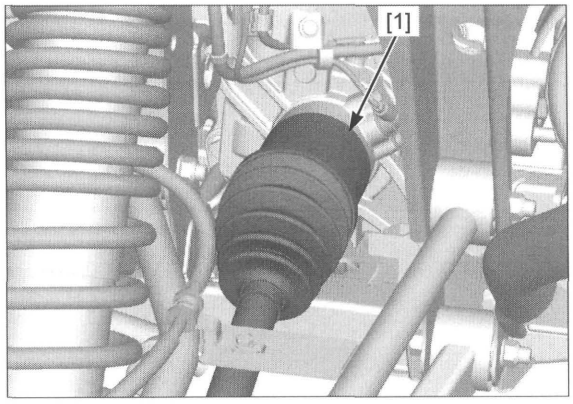
INSTALLATION

Install a new stopper ring [1] into the groove in the inboard joint splines.



The left drive shaft is longer than the right drive shaft. Do not interchange them.
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 20-21).

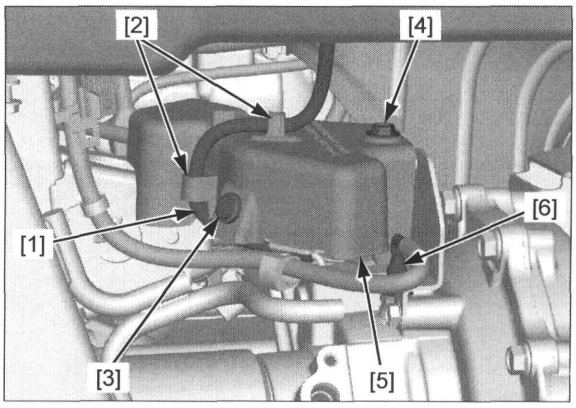
REAR FINAL DRIVE REMOVAL

Drain the differential oil (page 3-17).

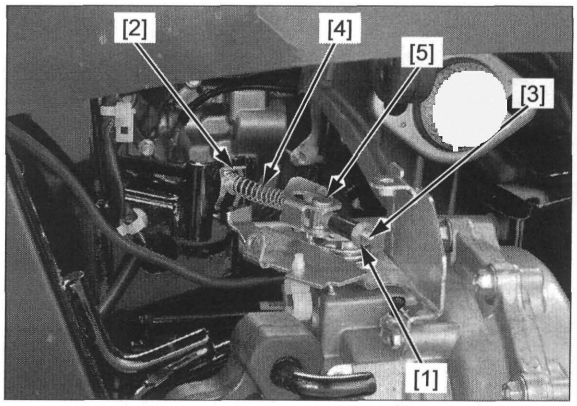
I-4WD model: Remove the following:

- muffler (page 2-52)
- rear right and left wheel speed sensors (page 25-23).

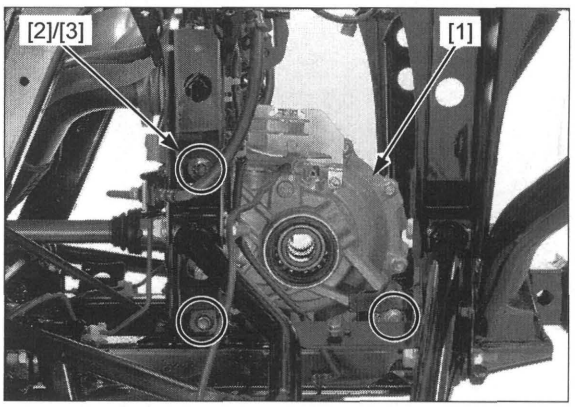
Remove the following:
- rear drive shafts (page 19-6)
- breather hose [1] (pull out the hose from two hose guide [2])
- clip [3]
- bolt [4]
- rear differential lock cover [5]
- differential lock switch connector [6]



- adjusting nut [1]
- cable retaining plate [2]
- final clutch cable [3]
- return spring [4]
- joint pin [5]

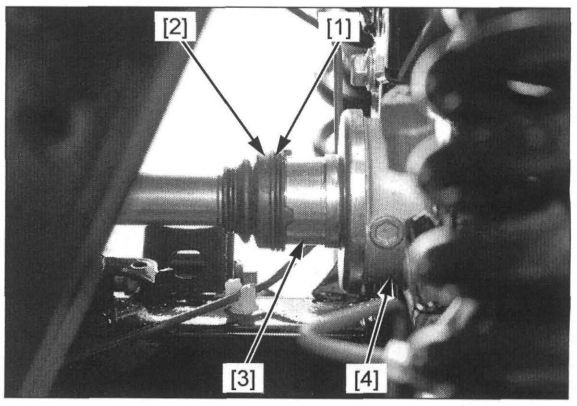


Support the gear case assembly [1] with wooden blocks to relieve stress for ease of bolts removal, and remove the gear case mounting nuts [2] and bolts [3].



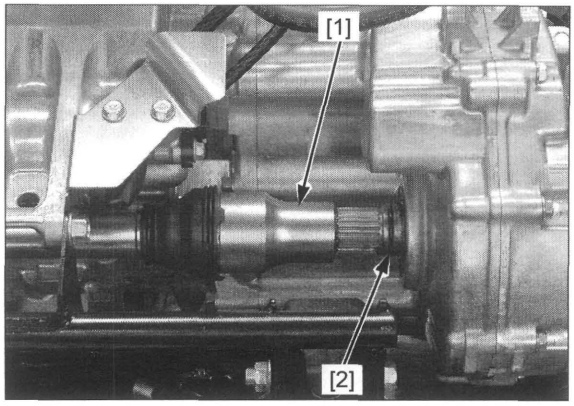
Remove the boot band [1] and release the propeller shaft boot [2] off the pinion joint [3] of the gear case assembly.

Remove the gear case assembly [4] from the frame.



Remove the propeller shaft/joint [1] from the engine.

Remove the O-ring [2] from the output shaft.



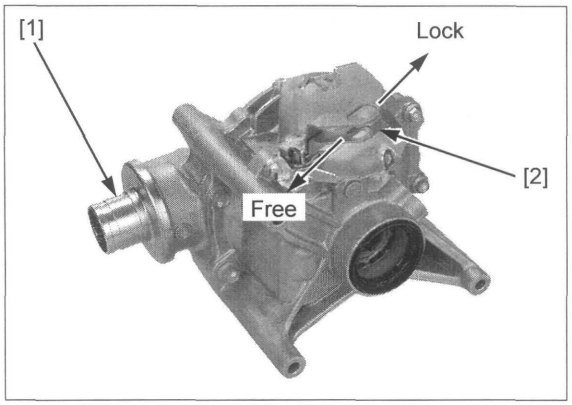
OPERATION CHECK

Turn the pinion joint [1] 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.

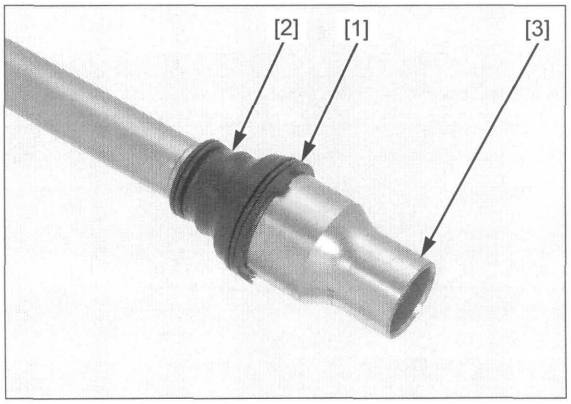
Operate the differential lock arm [2] while turning the pinion joint and check for smooth engagement/ disengagement.



REAR 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:

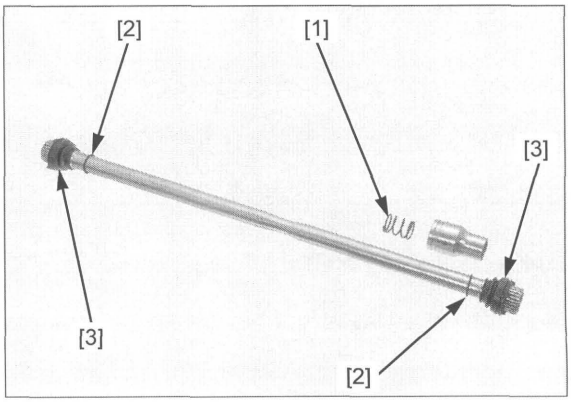
- joint spring [1]
- boot bands [2]
- shaft boots [3]

Check the propeller shaft for deformation or damage.

Check the splines of the propeller shaft and joint for wear or damage.

If they are damaged, check the splines of the output shaft and pinion joint.

Check the boots for cuts, deterioration or damage.



ASSEMBLY

Place the inner boot bands [1] on the propeller shaft [2].

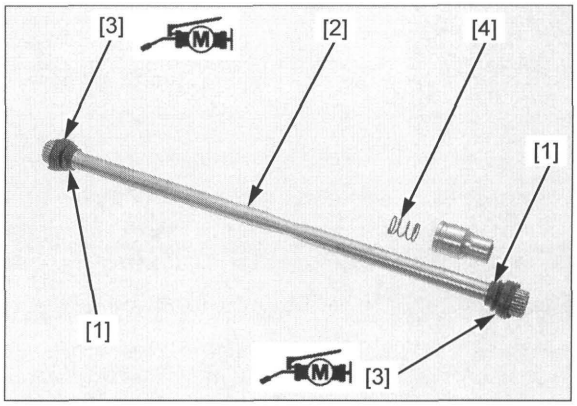
Do not allow the seal lip to turn outside in

Apply molybdenum disulfide grease to the seal lip of each boot.

Install the boots [3] onto the shaft grooves, being careful not to damage the seal lip.

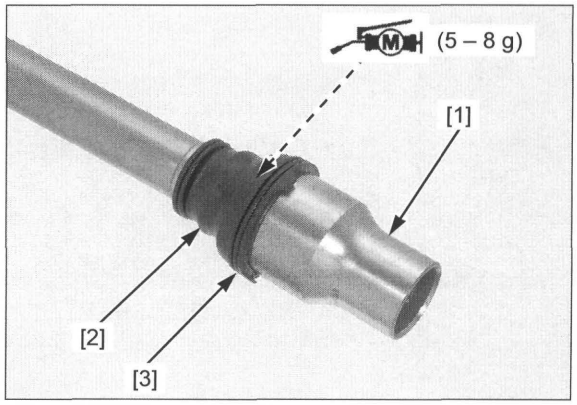
Install the inner boot bands into the boot grooves.

Install the joint spring [4] 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.



REAR FINAL GEAR DISASSEMBLY/ INSPECTION

BACKLASH INSPECTION

Remove the final gear case (page 19-13).

Set the final gear case into a jig or vise with soft jaws.

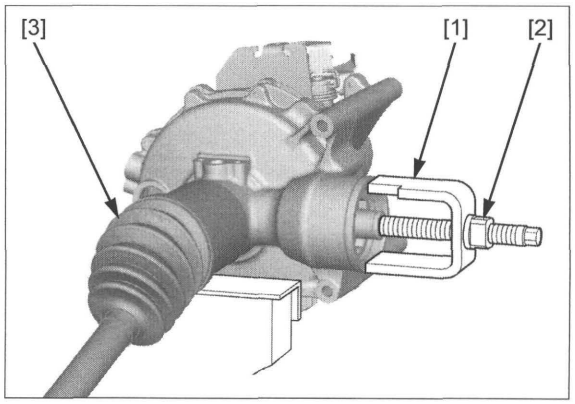
Remove the oil filler cap.

Hold the pinion gear with the special tools.

TOOLS:

Pinion puller base [1]	**07HMC-MM80110 (U.S.A.: 07HMC-MM8011A)**
Puller shaft and nut [2]	**07965-GM00300**

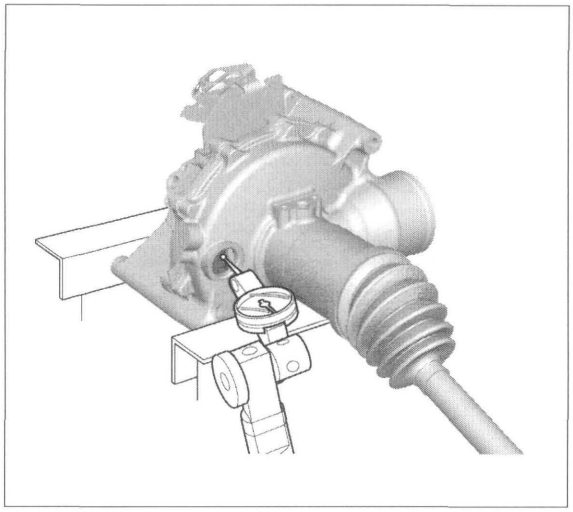
Install the drive shaft [3] into the final gear case.



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.

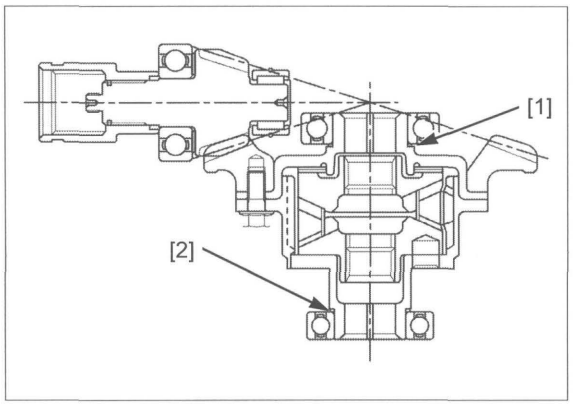
SERVICE LIMIT: 0.2 mm (0.01 in)

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 right shim [1] with a thinner one.

If the backlash is too small, replace the ring gear right shim with a thicker one.



Backlash is changed by about 0.06 mm (0.002 in) when thickness of the shim is changed by 0.12 mm (0.005 in).

NOTE:

- Seventeen different shims (from A to Q) are available in thickness increments of 0.06 mm (0.002 in).

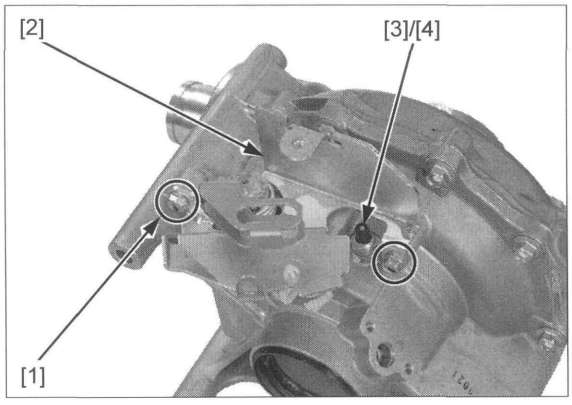
A: (thinnest): 0.64 mm (0.025 in)
G: (standard): 1.00 mm (0.039 in)
Q: (thickest): 1.68 mm (0.066 in)

Change the left shim [2] as follows: If the right shim was replaced with a 0.06 mm (0.002 in) **thicker** shim, replace the left shim with one that is 0.06 mm (0.002 in) **thinner**.

DIFFERENTIAL REMOVAL

Remove the following:

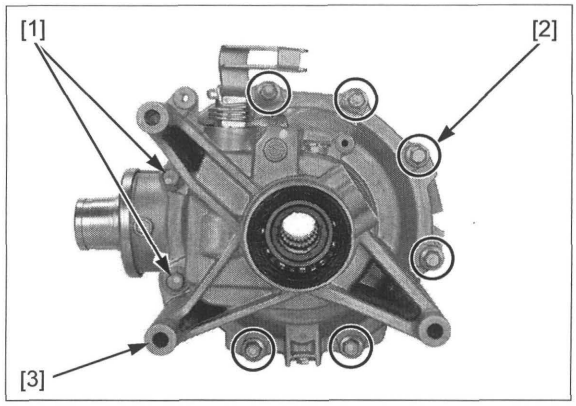
– two bolts [1] and cable stay [2]
– differential lock switch [3] and sealing washer [4]



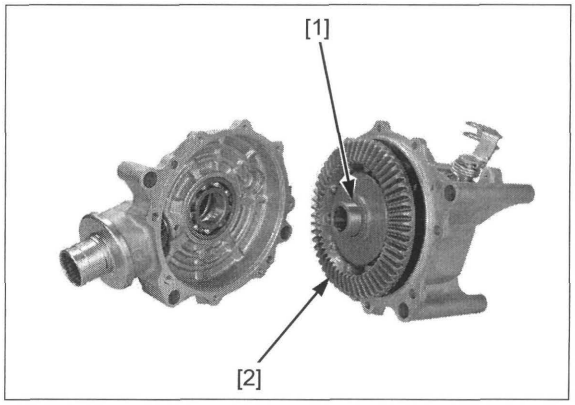
Remove the following:

– two 10 mm bolts [1]
– six 8 mm bolts [2]

Pry the final gear case cover [3] with a screwdriver being careful not to damage the mating surfaces, and remove it.

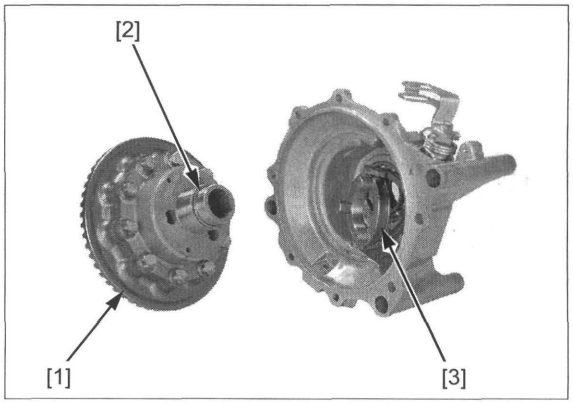


Remove the right shim [1] from the differential assembly [2].



Remove the differential assembly [1] and left shim [2].

Remove the differential lock sleeve [3] from the fork claws.

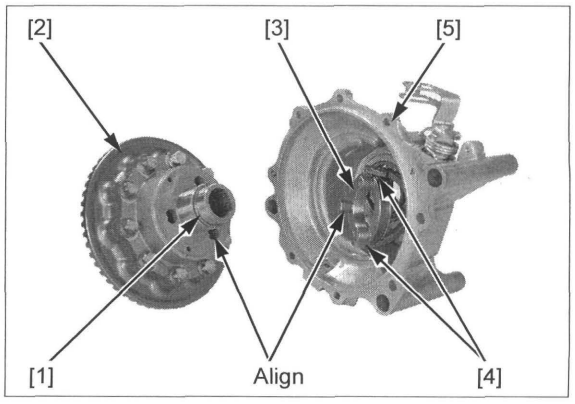


GEAR TOOTH CONTACT PATTERN CHECK

Install the left shim [1] onto the differential assembly [2].

Install the lock sleeve [3] while aligning the fork claws [4] with the sleeve groove.

Install the differential assembly onto the final gear case cover [5] by aligning the its holes with the bosses on the lock sleeve.

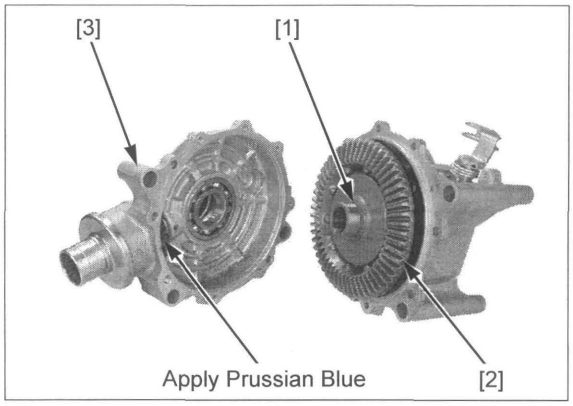


Keep dust and dirt out of the case and cover.

Apply thin coat of Prussian Blue to the pinion gear teeth for a tooth contact pattern check.

Install the right shim [1] onto the differential assembly [2].

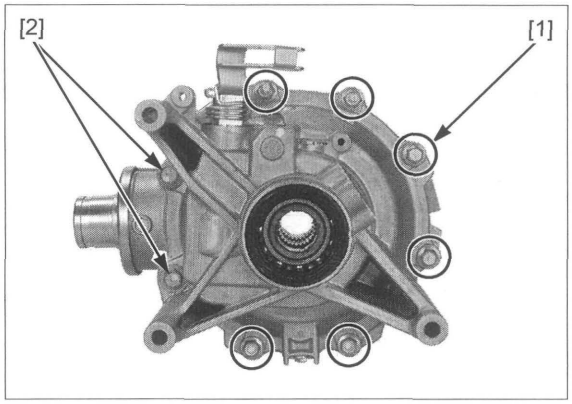
Install the final gear case [3] to the gear case cover.



It is important to turn the pinion while tightening the bolts. If the ring gear shims is too thick, the gears will lock after only light tightening.

Install the case cover bolts and tighten them in several steps until the cover evenly touches the gear case. Then, while rotating the pinion gear, tighten the bolts to the specified torque in a crisscross pattern in several steps.

TORQUE:
8 mm bolt [1]: 25 N·m (2.5 kgf·m, 18 lbf·ft)
10 mm bolt [2]: 47 N·m (4.8 kgf·m, 35 lbf·ft)



Remove the oil filler cap.

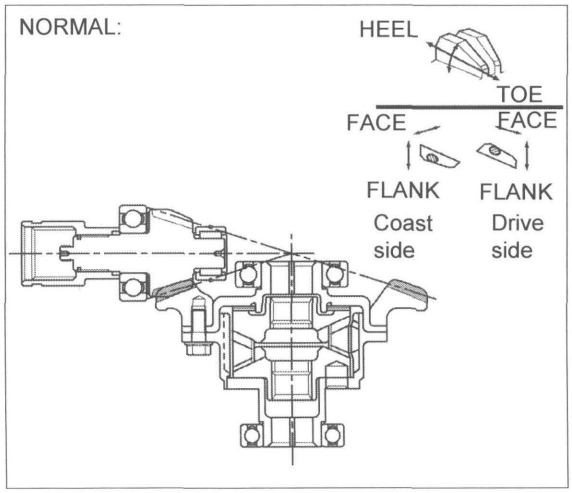
Rotate the ring gear several times in both directions of rotation.

Check the gear tooth contact pattern through the oil filler hole.

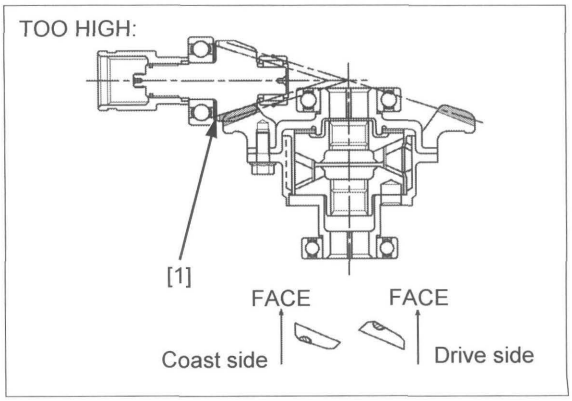
The pattern is indicated by the Prussian Blue applied to the pinion.

Contact is normal if the Prussian Blue is transferred to the approximate center of each tooth, but slightly to the heel side and to the flank side.

If the pattern are not correct, remove and change the pinion shim with one of an alternate thickness.



Replace the pinion shim [1] with a thicker one if the contact pattern is too high, toward the face.



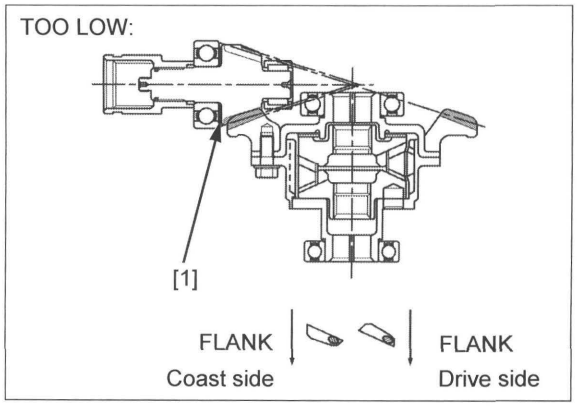
Replace the pinion shim [1] with a thinner one if the contact pattern is too low, toward the flank.

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:

- Seven different thickness shims (from A to G) are available in thickness increments of 0.06 mm (0.002 in).

Pinion gear shims:
A: (thinnest): 1.32 mm (0.051 in)
E: (standard): 1.50 mm (0.059 in)
G: (thickest): 1.68 mm (0.066 in)



Pinion shim replacement (page 19-22).

REAR DIFFERENTIAL LOCK CLUTCH DISASSEMBLY

Remove the stopper bolt [1].

Pry the differential lock fork tab [2] to release it from the collar [3] and slide the differential lock arm shaft [4] outward.

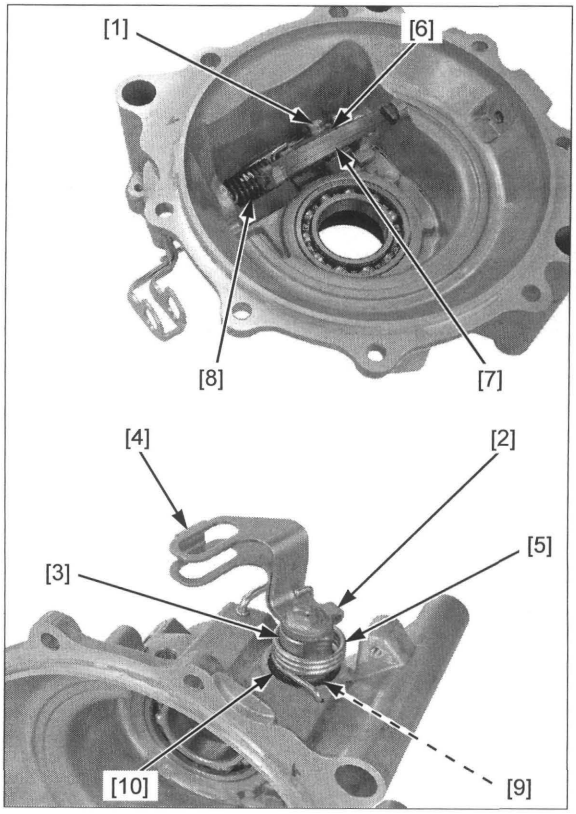
Remove the following:

- differential lock spring B [5]
- stopper [6]
- differential lock fork [7]
- differential lock arm shaft
- differential lock spring A [8]
- collar
- O-ring [9]
- oil seal [10]

Check the differential lock fork for wear or damage.

Check the arm shaft and stopper for deformation or damage.

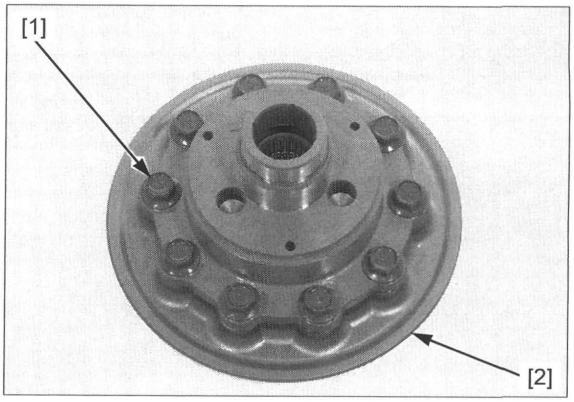
Check the springs for fatigue or damage.



DIFFERENTIAL DISASSEMBLY

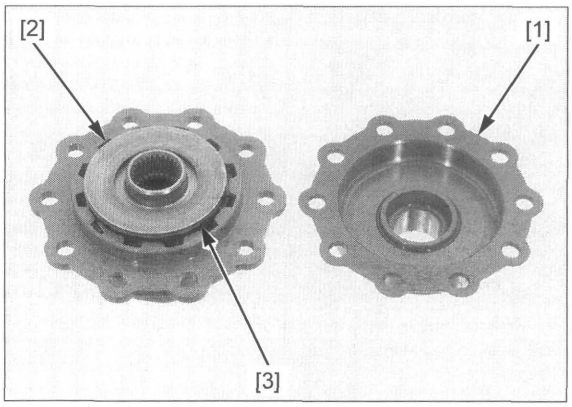
Remove the ten bolts [1] and the ring gear [2].

Place the differential assembly with the housing side down.

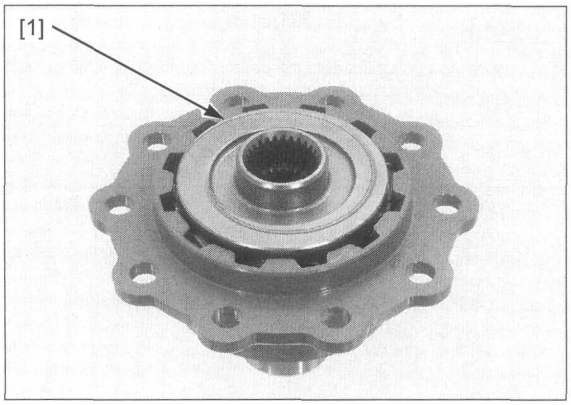


Remove the following:

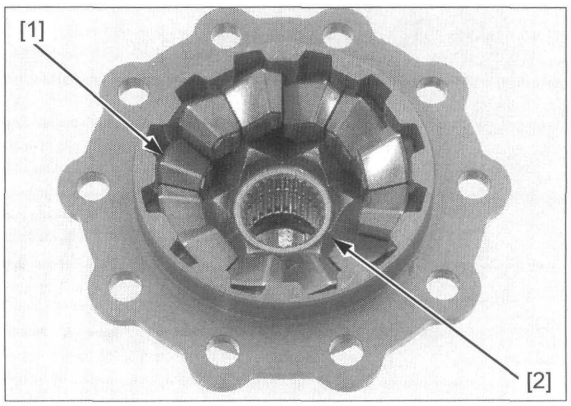
- differential housing cap [1]
- side cone spring [2]
- shim [3]



- face cam A [1]



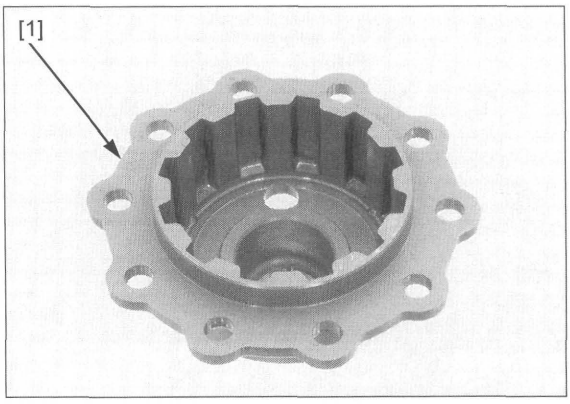
- six cam followers A and six cam followers B [1]
- face cam B [2]



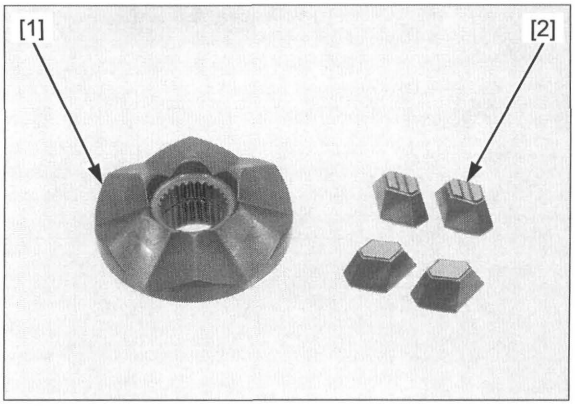
DIFFERENTIAL COMPONENTS INSPECTION

If the differential housing and/or cam face are faulty, replace the differential as an assembly.

Check the sliding surface and grooves of the housing [1] for damage or discoloration.

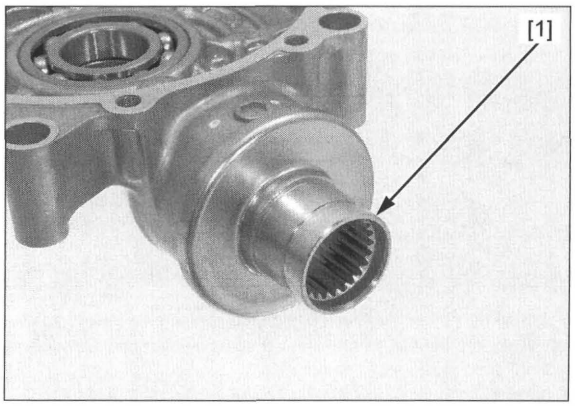


Check the shim, face cams [1] and followers [2] for damage.

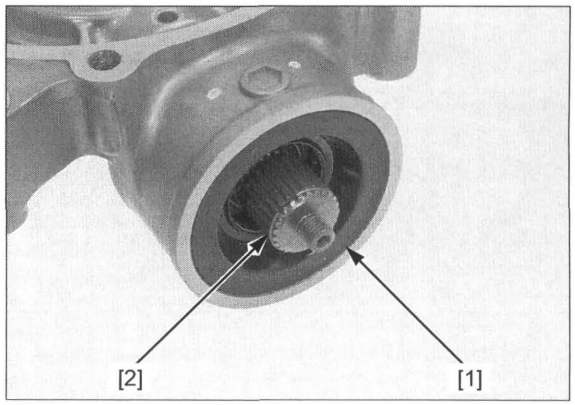


PINION GEAR REMOVAL

Remove the pinion joint [1].



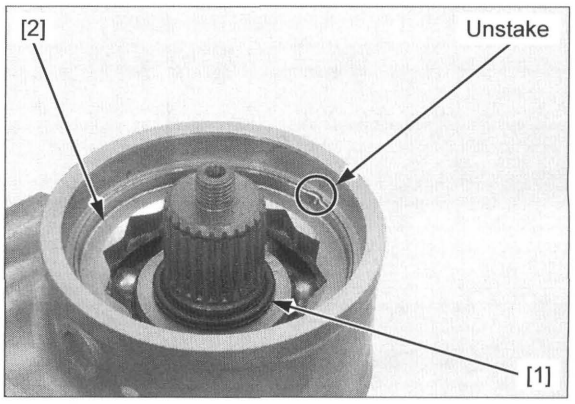
Remove the oil seal [1] and stopper ring [2].



Remove the O-ring [1].

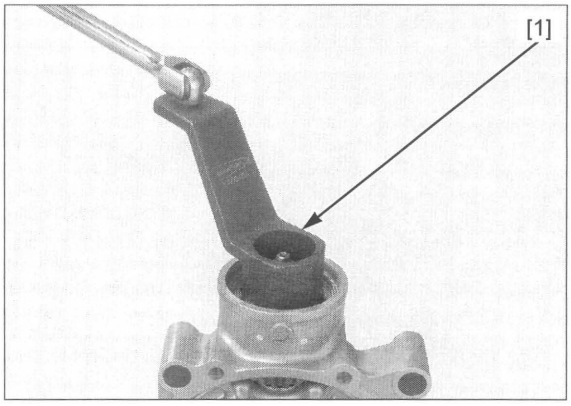
Be careful that metal particles do not enter the bearing and the threads of the case are not damaged.

Unstake the bearing lock nut [2] with a drill or grinder.



Remove the lock nut and discard it.

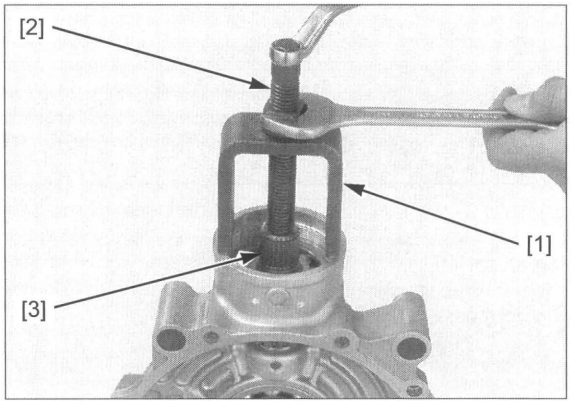
TOOL:
Holding tool [1] Snap-on YA6010A or equivalent



Install the special tools onto the pinion gear shaft and gear case.

TOOLS:
Pinion puller base [1] 07HMC-MM80110
(U.S.A.: 07HMC-MM8011A)
Puller shaft and nut [2] 07965-GM00300

Pull the pinion gear assembly [3] out from the gear case.



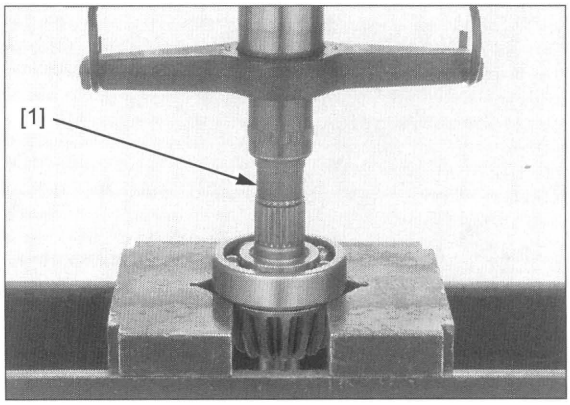
PINION GEAR BEARING AND SHIM REPLACEMENT

Take care not to contact the support blocks against the gear teeth.

Press the pinion gear out of the bearing.

Remove the pinion shim.

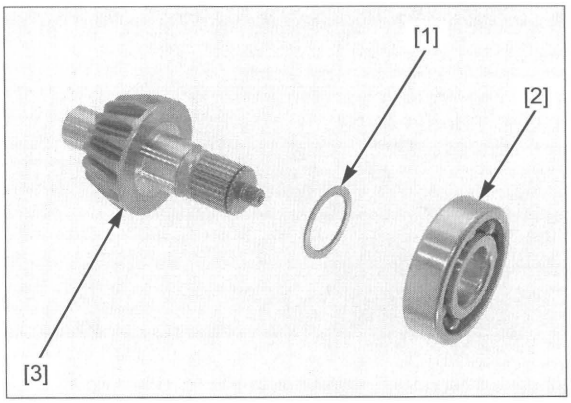
TOOL:
Attachment, 24 x 26 mm [1] 07746-0010700



Install the shim [1] and a new bearing [2] onto the pinion gear [3].

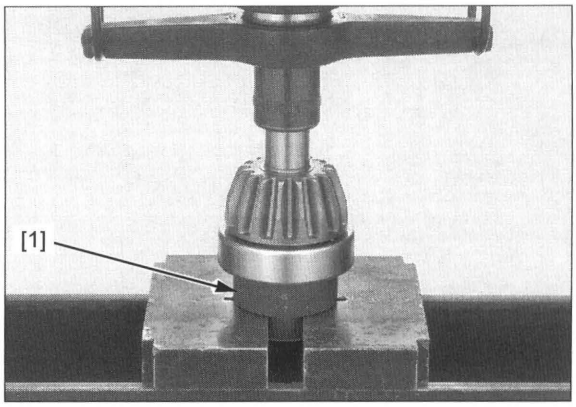
NOTE:

- When the gear set, differential bearing, differential and/or gear case has been replaced, use a 1.50 mm (0.059 in) thick shim for initial reference.



Press the pinion gear into the bearing until it is fully seated by supporting the bearing inner race.

TOOL:
Attachment, 30 mm I.D. [1] 07746-0030300

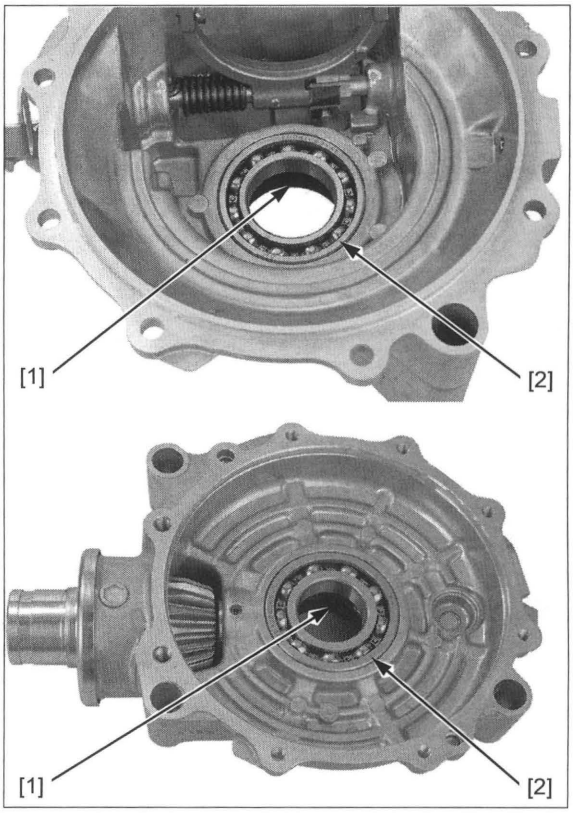


GEAR CASE AND COVER BEARING REPLACEMENT

DIFFERENTIAL BEARING

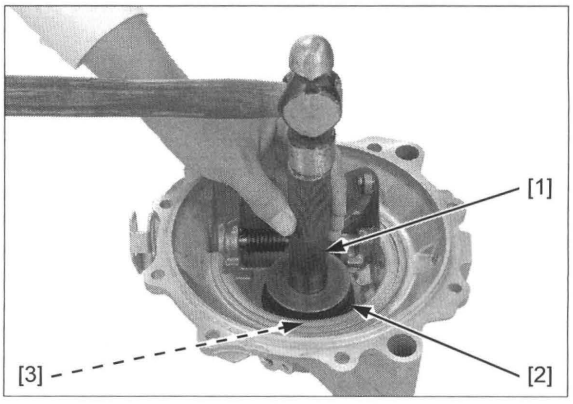
Remove the oil seals [1] from the case and cover.

Drive the bearings [2] out of the gear case and cover.



Drive new bearings into the gear case and cover.

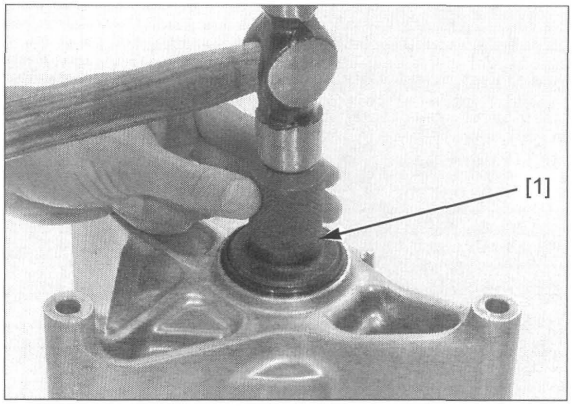
TOOLS:
Case cover side:
Driver [1] 07749-0010000
Attachment, 62 x 68 mm [2] 07746-0010500
Pilot, 40 mm [3] 07746-0040900
Gear case side:
Driver 07749-0010000
Attachment, 78 x 80 mm 07NAD-PX40100
Pilot, 40 mm [3] 07746-0040900



Except I-4WD model: Apply grease to the seal lips of new dust seals.

Install the dust seal into the case and cover until they are fully seated.

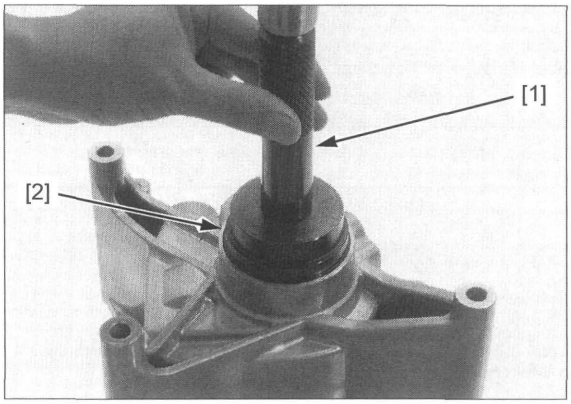
TOOL:
Oil seal driver, 46 mm [1] 07HAD-PJ70100



I-4WD model: Apply grease to the seal lips of new dust seals.

Install the dust seal into the case and cover until they are fully seated.

TOOL:
Driver [1] 07749-0010000
Attachment, 62 x 68 mm [2] 07746-0010500



PINION NEEDLE BEARING

Rotate the stopper ring [1] until its end appears in the access hole [2].

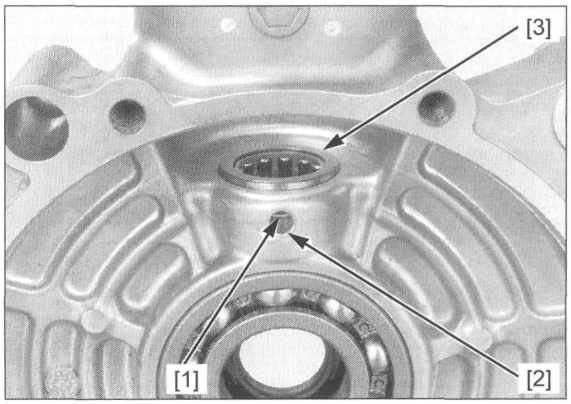
Strike gently near the end of the ring with a punch to bend the end upward.

Grasp the end of the ring with needle-nosed pliers and pull the stopper ring out through the access hole.

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

Heat the gear case to about 80°C (176°F) and remove the needle bearing [3], using the special tools.

TOOLS:
Bearing remover, 20 mm 07936-3710600
Remover handle 07936-3710100
Remover weight 07741-0010201 or 07936-3710200 (U.S.A. : 07936-371020A)

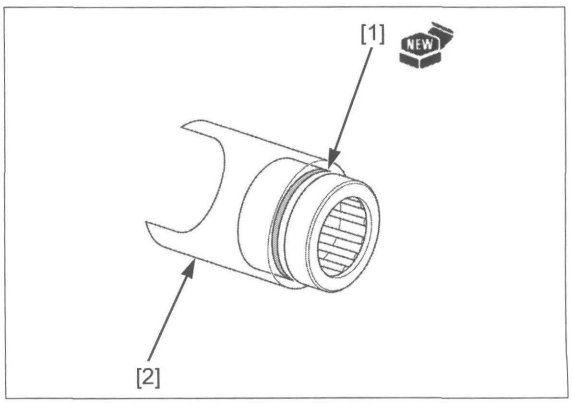


Install a new stopper ring [1] into the groove in a new bearing.

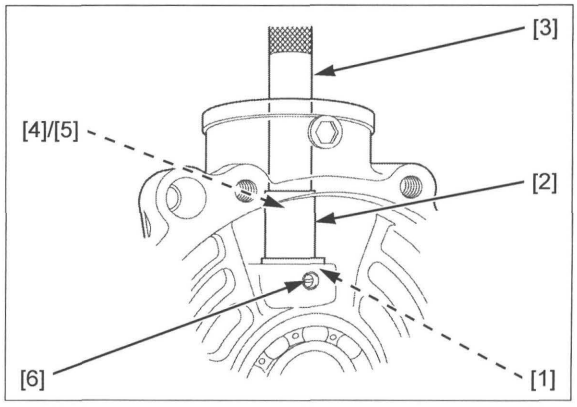
Make sure the stopper ring stays in the groove.

Install the bearing into the compressor until the bearing is flush with the end of the tool.

TOOL:
Bearing clip compressor, 37 mm [2] 07AME-HL4A100



Place the driver and attachment on the top of the bearing [1] and tape the driver to the compressor [2].



TOOLS:

Driver, 15 x 280 mm [3]	**07949-3710001**
Attachment, 32 x 35 mm [4]	**07746-0010100**
Pilot, 22 mm [5]	**07746-0041000**

Place the bearing and tool assembly into a freezer for at least 30 minutes.

Using a heat gun, heat the gear case to 80°C (176°F).

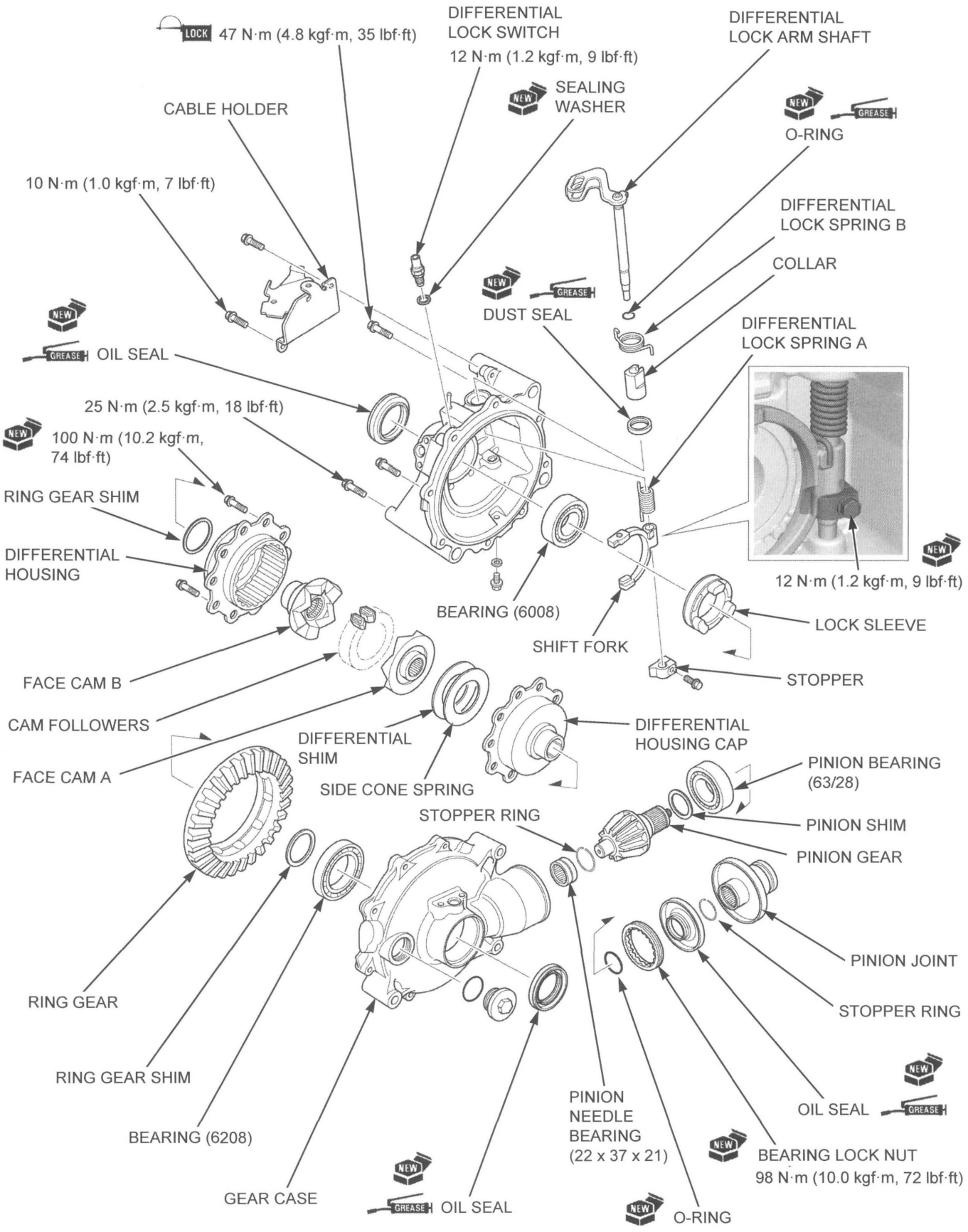
Remove the bearing and tool assembly from the freezer and drive the bearing into the gear case using the special tools.

Only strike the driver once. If you strike it more than once, the stopper ring [6] may slip out of the groove. If this happens, remove the ring and bearing, and install a new ring.

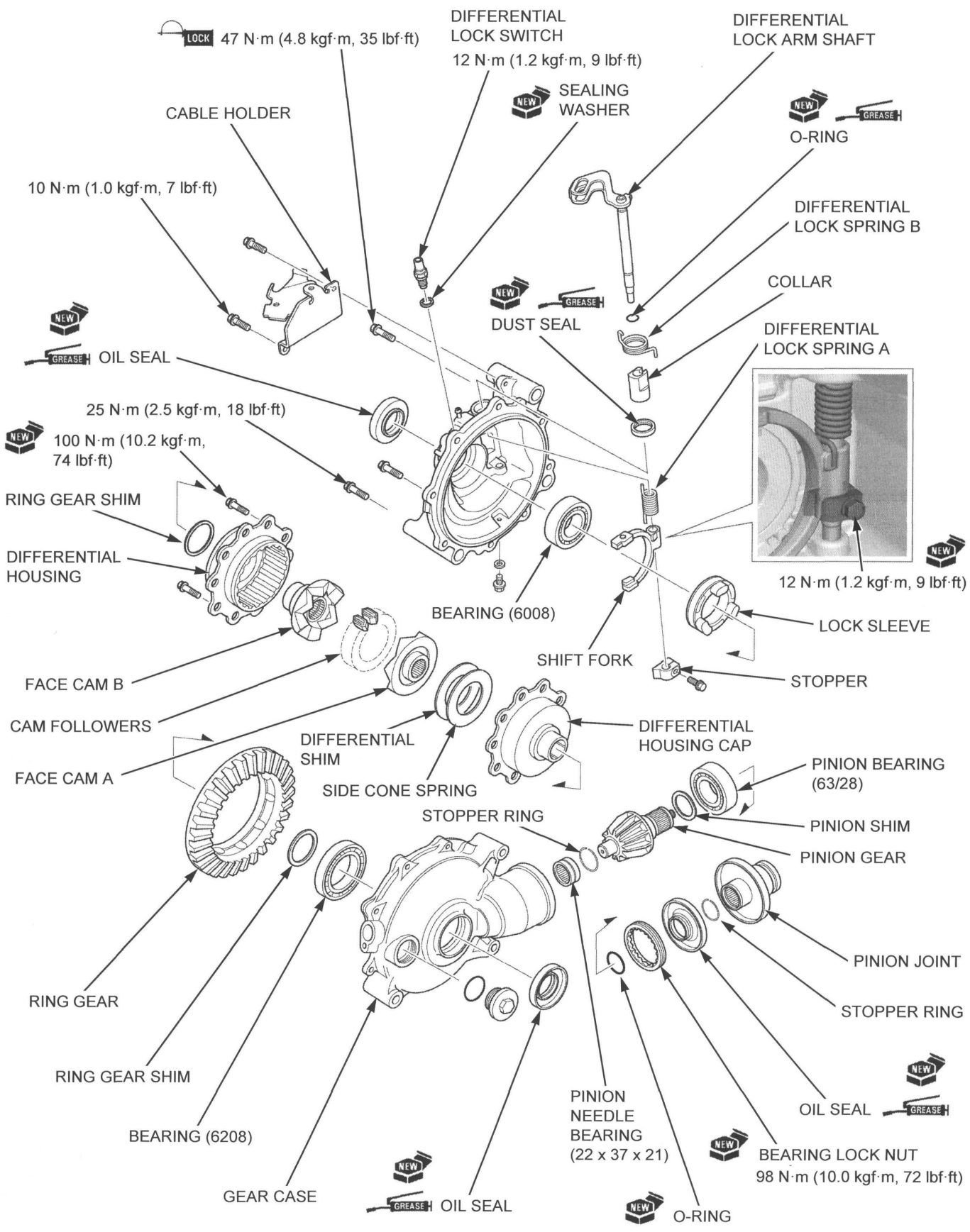
Make sure that the stopper ring is securely set in the groove of the gear case.

REAR FINAL GEAR ASSEMBLY

Except I-4WD model:



I-4WD model:

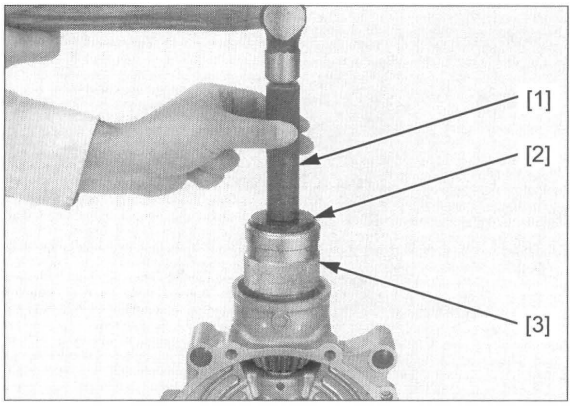

LOCK 47 N·m (4.8 kgf·m, 35 lbf·ft)
DIFFERENTIAL LOCK SWITCH
12 N·m (1.2 kgf·m, 9 lbf·ft)
DIFFERENTIAL LOCK ARM SHAFT
NEW SEALING WASHER
CABLE HOLDER
NEW GREASE O-RING
10 N·m (1.0 kgf·m, 7 lbf·ft)
DIFFERENTIAL LOCK SPRING B
COLLAR
NEW GREASE DUST SEAL
NEW GREASE OIL SEAL
DIFFERENTIAL LOCK SPRING A
25 N·m (2.5 kgf·m, 18 lbf·ft)
NEW 100 N·m (10.2 kgf·m, 74 lbf·ft)
RING GEAR SHIM
DIFFERENTIAL HOUSING
NEW 12 N·m (1.2 kgf·m, 9 lbf·ft)
BEARING (6008)
LOCK SLEEVE
SHIFT FORK
STOPPER
FACE CAM B
CAM FOLLOWERS
FACE CAM A
DIFFERENTIAL SHIM
SIDE CONE SPRING
DIFFERENTIAL HOUSING CAP
PINION BEARING (63/28)
STOPPER RING
PINION SHIM
PINION GEAR
PINION JOINT
STOPPER RING
NEW GREASE OIL SEAL
NEW BEARING LOCK NUT 98 N·m (10.0 kgf·m, 72 lbf·ft)
PINION NEEDLE BEARING (22 x 37 x 21)
NEW O-RING
NEW GREASE OIL SEAL
GEAR CASE
BEARING (6208)
RING GEAR SHIM
RING GEAR

PINION GEAR INSTALLATION

Drive the pinion gear assembly into the gear case.

TOOLS:

Driver [1]	**07749-0010000**
Attachment, 52 x 55 mm [2]	**07746-0010400**
Fork seal driver weight [3]	**07947-KA50100**



Install a new lock nut [1] and tighten it.

TOOL:

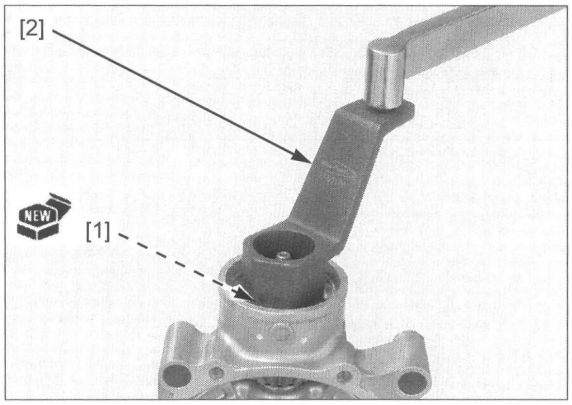
Holding tool [2] Snap-on YA6010A or equivalent

TORQUE:

Actual: 98 N·m (10.0 kgf·m, 72 lbf·ft)

NOTE:

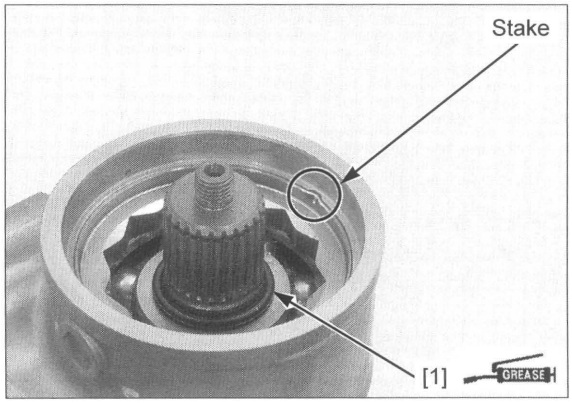
- Note that the effective torque value changes when using a special tool.



Be careful not to damage the threads of the case.

Stake the lock nut into the case groove.

Coat a new O-ring [1] with grease and install it onto the pinion.

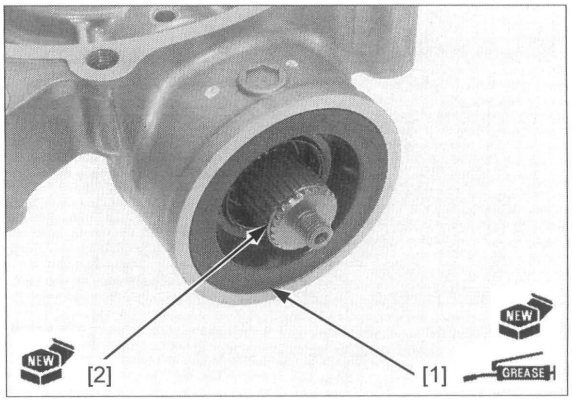


Apply grease to the lips of a new oil seal [1] and install it so that it is flush with the gear case.

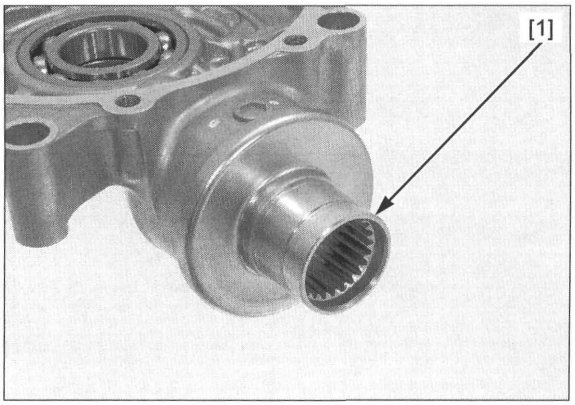
TOOLS:

Driver	**07749-0010000**
Driver attachment	**07LAD-PW50500**
	(U.S.A. : 07AMD-HL1A100)

Install a new stopper ring [2].



Install the pinion joint [1] until the stopper ring on the pinion seat in the groove of the joint.



DIFFERENTIAL ASSEMBLY

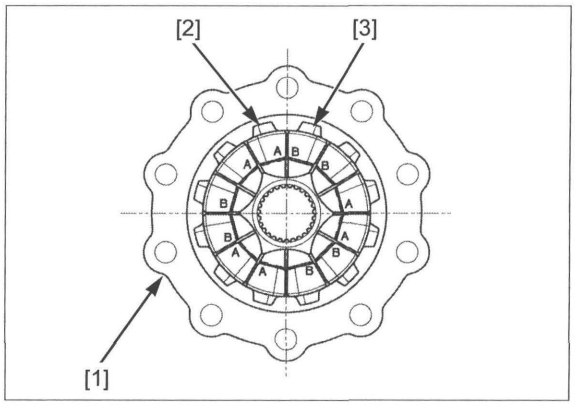
Keep dust and dirt out of the differential housing.

Install the face cam into the differential housing.

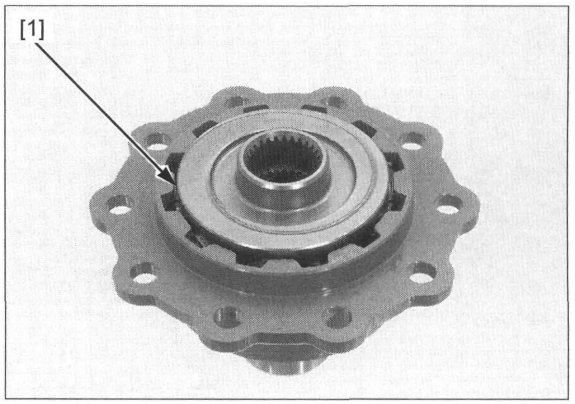
Install six cam followers A (rib) [1] and six followers B (flat) [2] into the specified grooves in the housing [3] by two and two as shown.

NOTE:

- The housing grooves are sized differently to accommodate the differently sized cam followers A and B. Make sure to install the followers correctly.

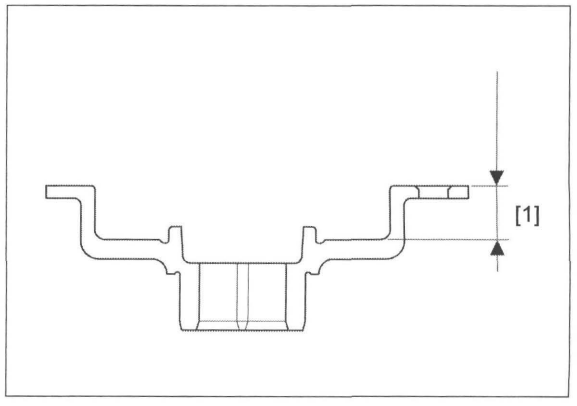


Install the face cam [1] onto the cam followers.



Check the sliding surface of the differential housing cap for damage or discoloration.

Measure the depth [1] of the housing cap from the mating surface as shown.



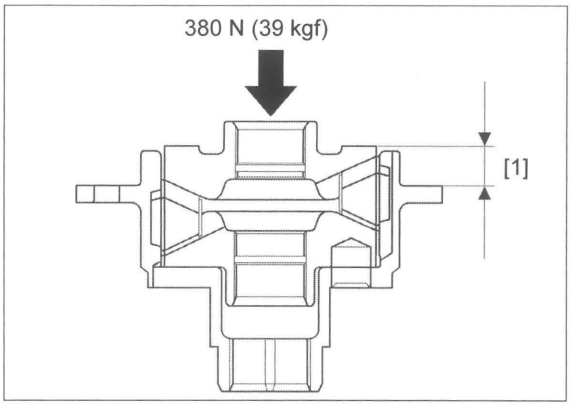
Measure the height [1] of face cam from the housing mating surface as shown while applying a load of 380 N (39 kgf) to the face cam boss using a hydraulic press.

Calculate the shim thickness using the equation below.

The correct shim is nearly this dimension.

A = B – C – 1.3 mm

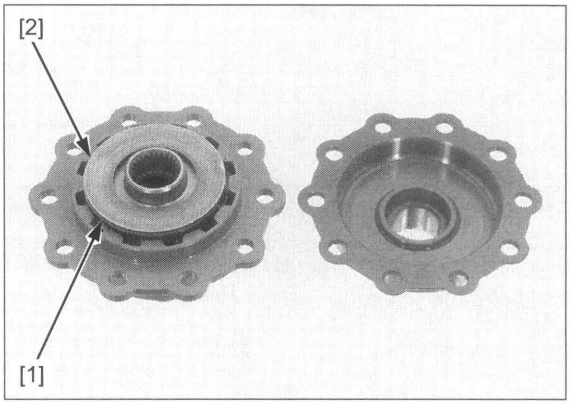
A: New shim thickness
B: Recorded housing cap depth
C: Recorded cam height



Select the shim [1] and install it onto the face cam.

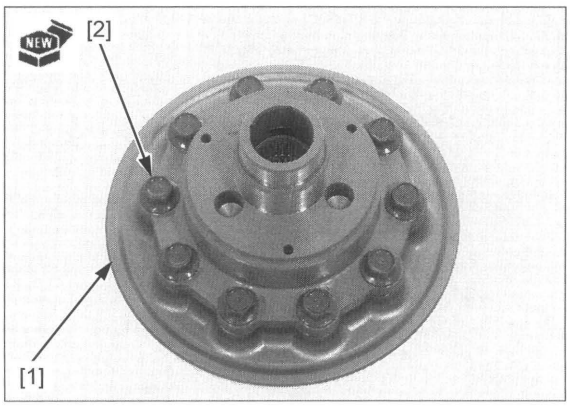
Differential shims:
A: 1.3 mm (0.051 in) D: 1.6 mm (0.063 in)
B: 1.4 mm (0.055 in) E: 1.7 mm (0.067 in)
C: 1.5 mm (0.059 in)

Install the cone spring [2] with the concave side facing up (ring gear side).



Install the differential housing assembly onto the ring gear [1].

Align the bolt holes, install new ring gear bolts [2] and screw them until the seating surfaces of all the bolts touches the housing, but do not tighten them yet.

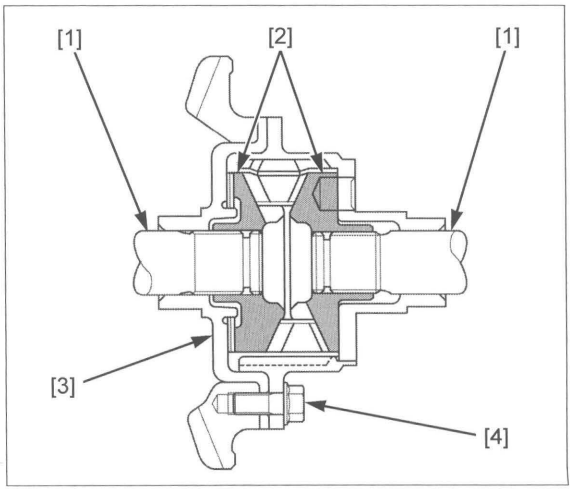


Temporarily install the drive shafts [1] into the differential assembly without the stopper rings until they are fully seated to align the face cams [2] with the differential housing [3].

Tighten the ring gear bolts [4] to the specified torque in a crisscross pattern in several steps.

TORQUE: 100 N·m (10.2 kgf·m, 74 lbf·ft)

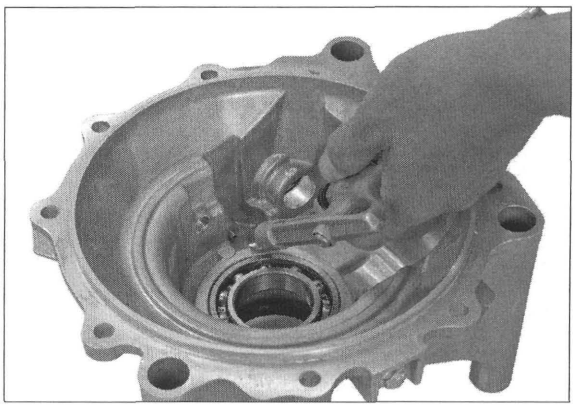
Remove the drive shafts.



REAR DIFFERENTIAL LOCK CLUTCH ASSEMBLY

Keep dust and dirt out of the case and cover.

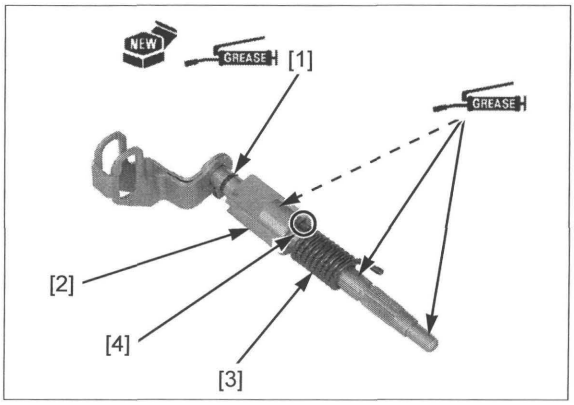
Blow compressed air through the breather hole in the case cover.



Coat a new O-ring [1] with grease and install it into the arm shaft groove.

Apply grease to the arm shaft outer surface (collar, fork and gear case cover contacting area).

Install the collar [2] and the differential lock spring A [3] with the short end toward the collar, and set the spring end into the hole [4] in the collar.



Apply grease to the lip of a new oil seal [1] and install it into the gear case cover until it is fully seated.

Be careful not to damage the oil seal.

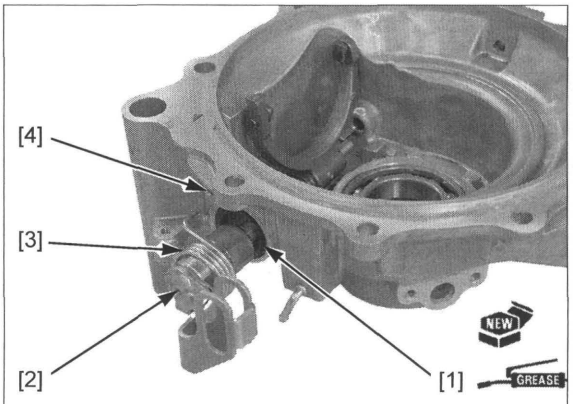
Install the arm shaft [2] and differential lock spring B [3] while inserting the spring end of differential lock spring B into the hole [4] on the case cover.

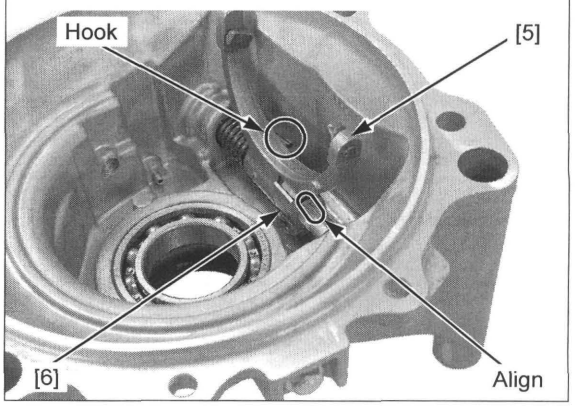
Install the shift fork [5] while hooking the long end of differential lock spring A against the shift fork.

Install the stopper [6] to the shaft by aligning the wide groove with the wide tooth.

NOTE:

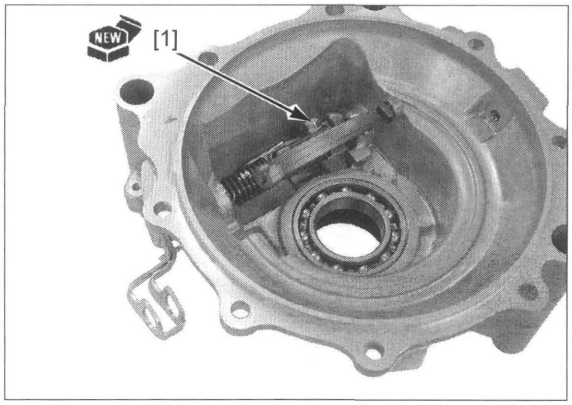
- If the wide tooth on the shaft are difficult to see, the bolt hole in the stopper can be a useful alignment aid.





Align the bolt hole in the stopper with the bolt groove of arm shaft, install a new stopper bolt [1] and tighten it to the specified torque.

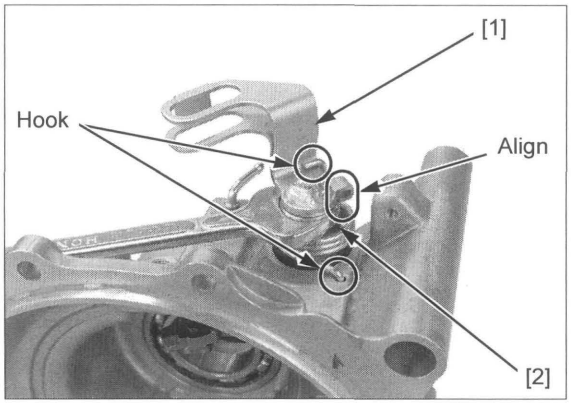
TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)



Turn the 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.

Make sure that both ends of the differential lock spring B are securely hooked to the cover hole and lever.

Check the arm shaft for smooth operation.



FINAL GEAR CASE ASSEMBLY

NOTE:

- When the gear set, bearing, differential and/or gear case has been replaced, check the tooth contact pattern (page 19-17) and check the gear backlash (page 19-15).

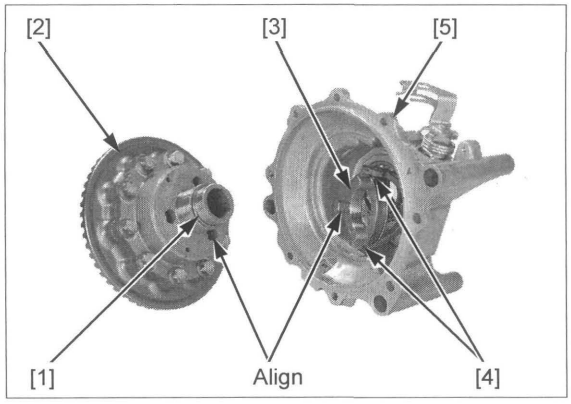
Keep dust and dirt out of the case and cover.

Clean the mating surface of the gear case and cover, being careful not to damage them.

Install the proper left ring gear shim [1] onto the differential assembly [2].

Install the differential lock sleeve [3] while aligning the fork claws [4] with the sleeve groove.

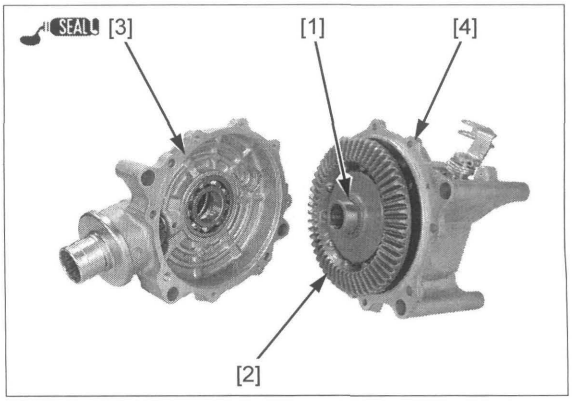
Install the differential assembly onto the final gear case cover [5] by aligning its holes with the bosses on the lock sleeve.



Install the proper right shim [1] onto the differential assembly [2].

Apply sealant to mating surface of the gear case [3].

Install the final gear case to the gear case cover [4].



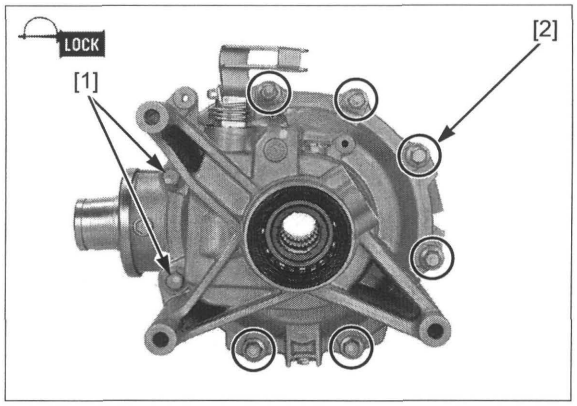
Apply locking agent to the threads of the 10 mm bolts [1] (page 1-22).

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 10 mm bolts and 8 mm bolts [2], and tighten them in several steps until the cover evenly touches the case. Then, while rotating the pinion gear, tighten the bolts to the specified torque in a crisscross pattern in several steps.

TORQUE:
8 mm bolt: 25 N·m (2.5 kgf·m, 18 lbf·ft)
10 mm bolt: 47 N·m (4.8 kgf·m, 35 lbf·ft)

Make sure that the gear assembly rotates smoothly without binding.



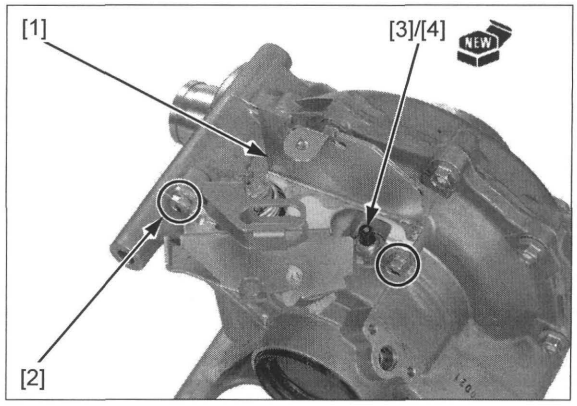
Install the cable stay [1] and two bolts [2], and tighten the bolts to the specified torque.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

Install the differential lock switch [3] with a new sealing washer [4] and tighten the switch.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

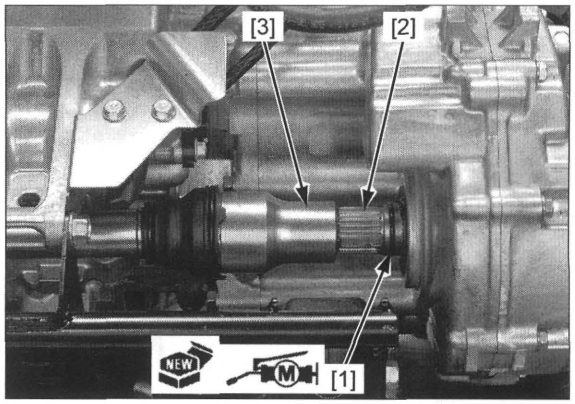
Install the final gear case (page 19-26).



REAR FINAL DRIVE INSTALLATION

Coat a new O-ring [1] with molybdenum disulfide grease and install it into the groove in the output shaft [2].

Install the propeller shaft/joint [3] onto the output shaft until it is fully seated.



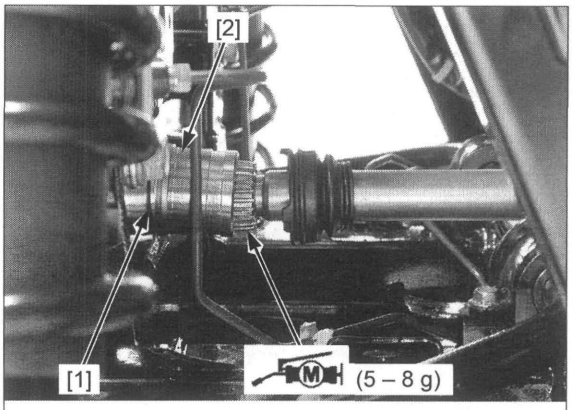
Place the gear case assembly into the frame.

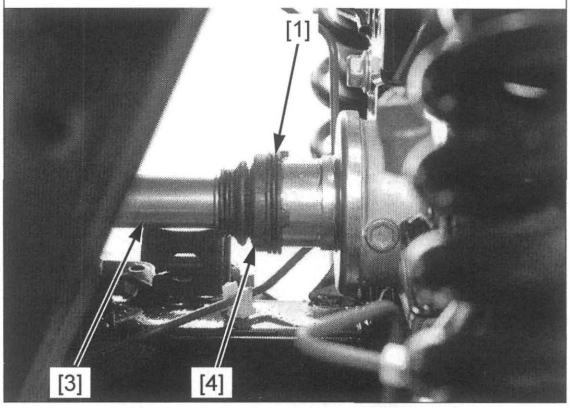
Place the boot band [1] over the pinion joint [2] temporarily.

Apply 5 – 8 g of molybdenum disulfide grease to the propeller shaft splines.

Install the propeller shaft [3] into the pinion joint by aligning the splines.

Install the boot [4] over the pinion joint groove securely and the boot band into the boot groove.



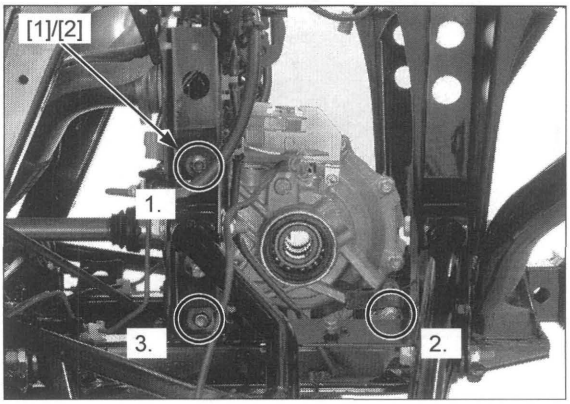


Install the mounting bolts [1] from the right side.

Temporarily install new mounting nuts [2].

Tighten the mounting nuts to the specified torque in the specified sequence as shown.

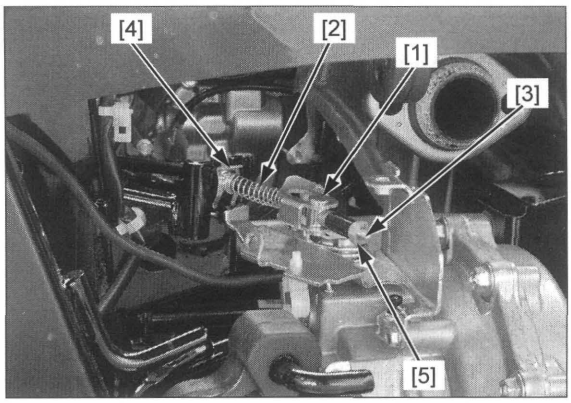
TORQUE: 95 N·m (9.7 kgf·m, 70 lbf·ft)



Install the following:

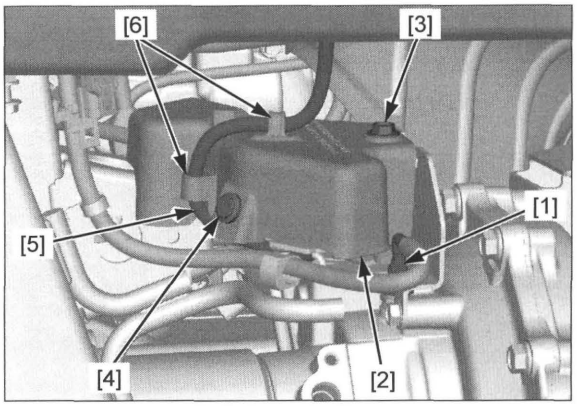
- joint pin [1]
- return spring [2]
- differential lock cable [3]
- cable retaining plate [4]
- adjusting nut [5]

Adjust the rear differential lock cable (page 19-35).



Install the following:

- differential lock switch connector [1]
- rear differential lock cover [2]
- bolt [3]
- clip [4]
- breather hose [5] (Pass the hose through two hose guide [6])
- rear drive shafts (page 19-6)



I-4WD model: Install the following:

- right and left rear wheel speed sensors (page 25-23)
- muffler (page 2-52).

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

REAR DIFFERENTIAL LOCK CABLE ADJUSTMENT

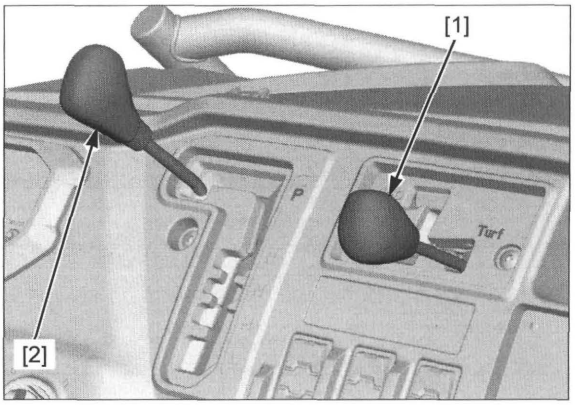
Lift the cargo bed.

Set the drive mode select lever [1] to the Turf position and the shift select lever [2] to the "P" (Parking) position.

Check that the drive mode indicator displays "2WD LOCK".

If the drive mode indicator does not display "2WD LOCK", the differential lock sleeve may have not shifted completely.

Turn the rear wheel until the drive mode is set to "2WD LOCK".

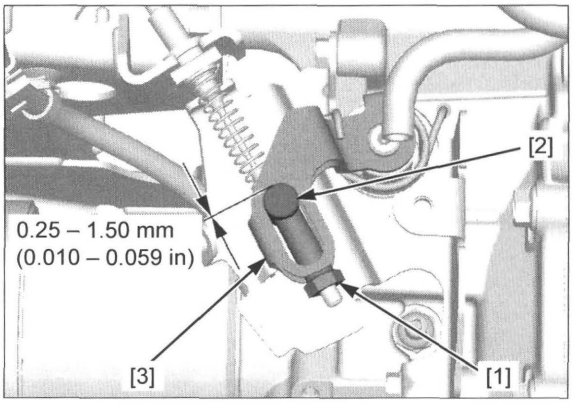


Remove the rear differential lock cover (page 19-13).

Turn the rear differential lock adjusting nut [1] clockwise until the joint pin [2] contacts with the slot end of the differential lock arm [3], then turn it back 1/2 turn.

Make sure that the clearance between the joint pin and slot end is 0.25 – 1.50 mm (0.010 – 0.059 in).

Install the removed parts in the reverse order of removal.



MEMO

20. WHEEL/SUSPENSION

SERVICE INFORMATION 20-2

TROUBLESHOOTING 20-3

COMPONENT LOCATION 20-4

WHEELS 20-6

TIRES 20-6

FRONT WHEEL HUB/KNUCKLE 20-10

FRONT SUSPENSION ARM 20-14

FRONT SHOCK ABSORBER 20-18

REAR WHEEL HUB/KNUCKLE 20-21

REAR SUSPENSION ARM 20-24

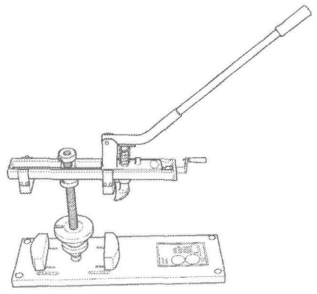
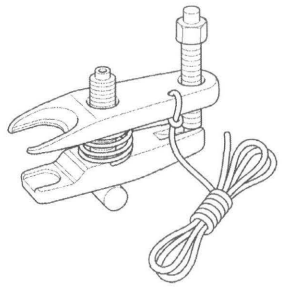
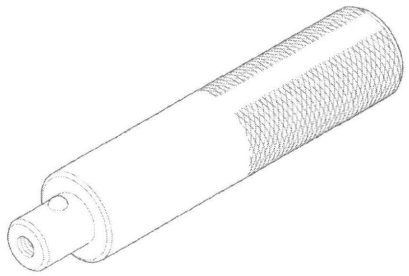
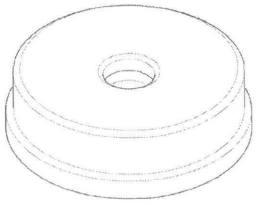
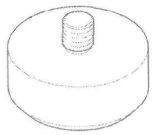
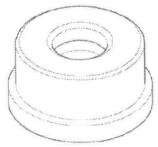
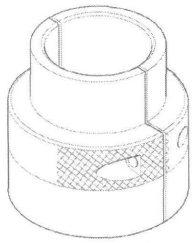
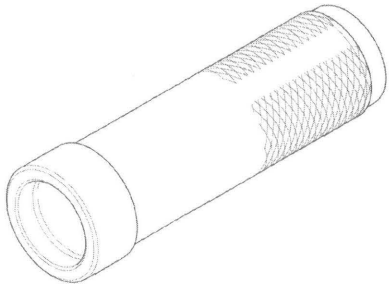
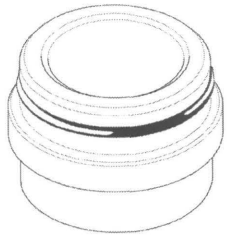
REAR SHOCK ABSORBER 20-28

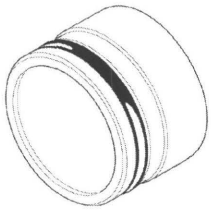
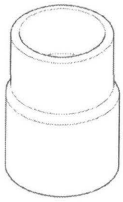
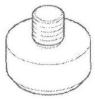
SERVICE INFORMATION

GENERAL

- A contaminated brake disc or pad reduces stopping power. Discard contaminated pads and clean a contaminated disc with a high quality brake degreasing agent.
- A jack or other support is required to support the vehicle (page 1-55).
- Do not twist or bend the brake hose and pipe when servicing.
- Use Honda Genuine replacement bolts and nuts for all suspension pivots and mounting points.
- Adjust toe whenever the knuckle or steering gear box components are replaced or removed (page 3-23).
- For brake system service, see Brake System section (page 21-2).
- For steering system service, see Steering System section (page 17-2).
- Ensure suspension is adequately supported by a temporary strap or other means during disassembly or installation of suspension components. Care should be given to support any components when they are disconnected from a temporary supporting structure of the when the cushion is removed.
- When removing the shock absorber, be sure to support the tire or knuckle so that the distance between the center of the upper and lower mounting holes for the shock absorber is maintained within the specified distance (Front: 500 mm [19.7 in] max., Rear: 511 mm [20.1 in] max.) to avoid damage to the driveshaft joints and suspension bearings due to an over-angulation.
- M5D IV A, IV AC, VI A, VI AC, VI CM/M3D IV A, IV AC, VI A, VI AC: If shock absorber service/repair is required, contact a FOX Service Center (U.S.A. only: refer to Service Letter #73 - Third Party Service Information).

TOOLS

ATV Bead Buster KLS379024 (U.S.A. only) 	Ball joint remover, 28 mm 07MAC-SL00201  07MAC-SL00202 (U.S.A. only)	Driver 07749-0010000 
Attachment, 72 x 75 mm 07746-0010600 	Pilot, 40 mm 07746-0040900 	Attachment, 32 x 35 mm 07746-0010100 
Fork seal driver 45.2 mm 07KMD-KZ30100 	Driver handle 07746-0030100 	Fork seal driver attachment 07947-KF00100 

Fork seal driver 07947-KA20200 	Collar 27.3/30.3 07964-MB00200 	Base 48.4/56 07946-KM90600 
Pilot, 25 mm 07746-0040600 		

TROUBLESHOOTING

Wheel wobbling
- Bent rim
- Worn or damaged knuckle bearing
- Faulty tire
- Loose wheel hub nut
- Loose suspension fasteners

Soft suspension
- Weak shock absorber spring
- Oil leakage from damper unit

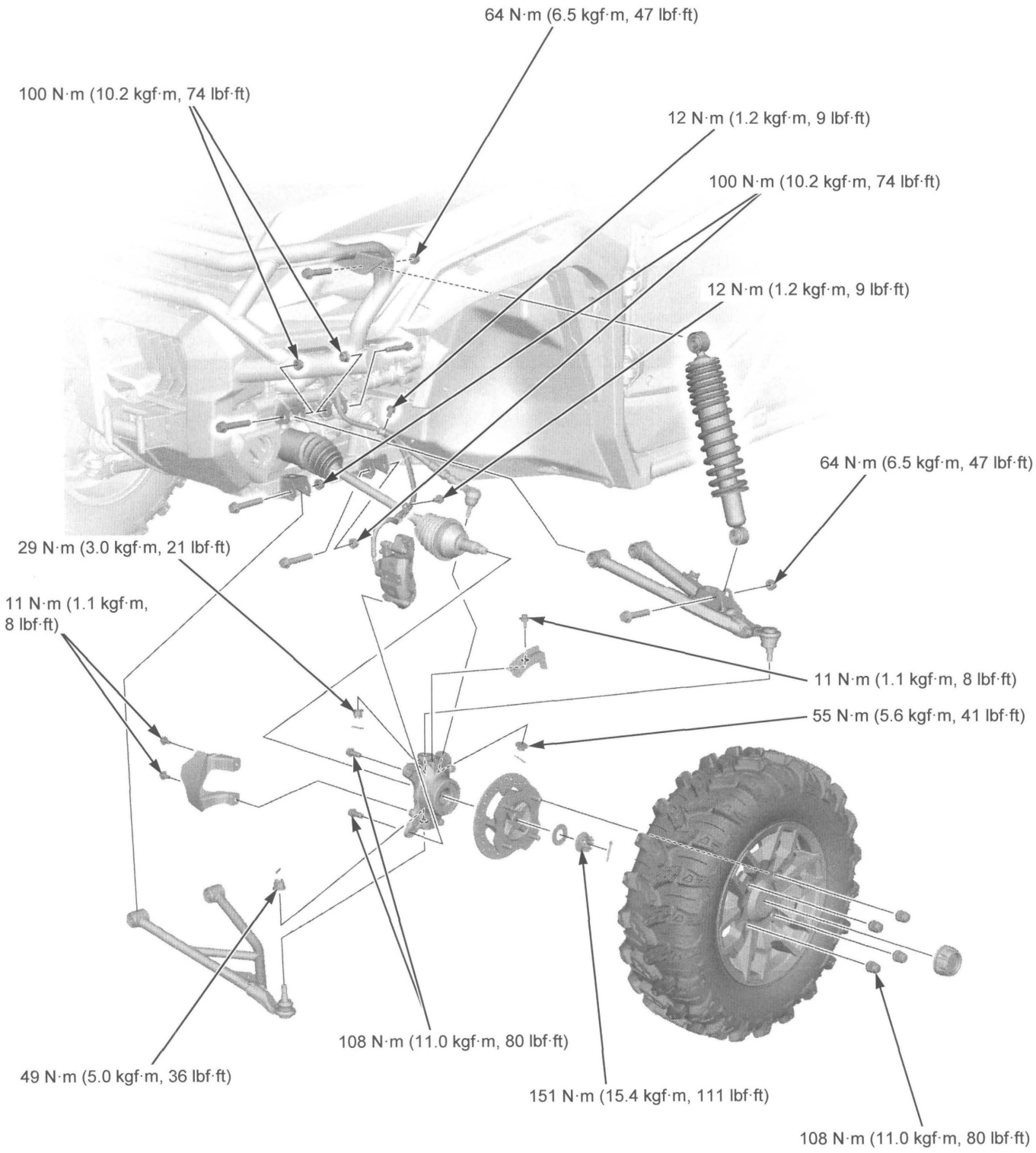
Stiff suspension
- Damaged shock absorber damper
- Faulty shock absorber pivot bushings
- Improperly installed suspension arms
- Faulty suspension arm bushings

Suspension noise
- Faulty shock absorber
- Loose suspension fasteners
- Worn suspension pivot bushings
- Damaged suspension components

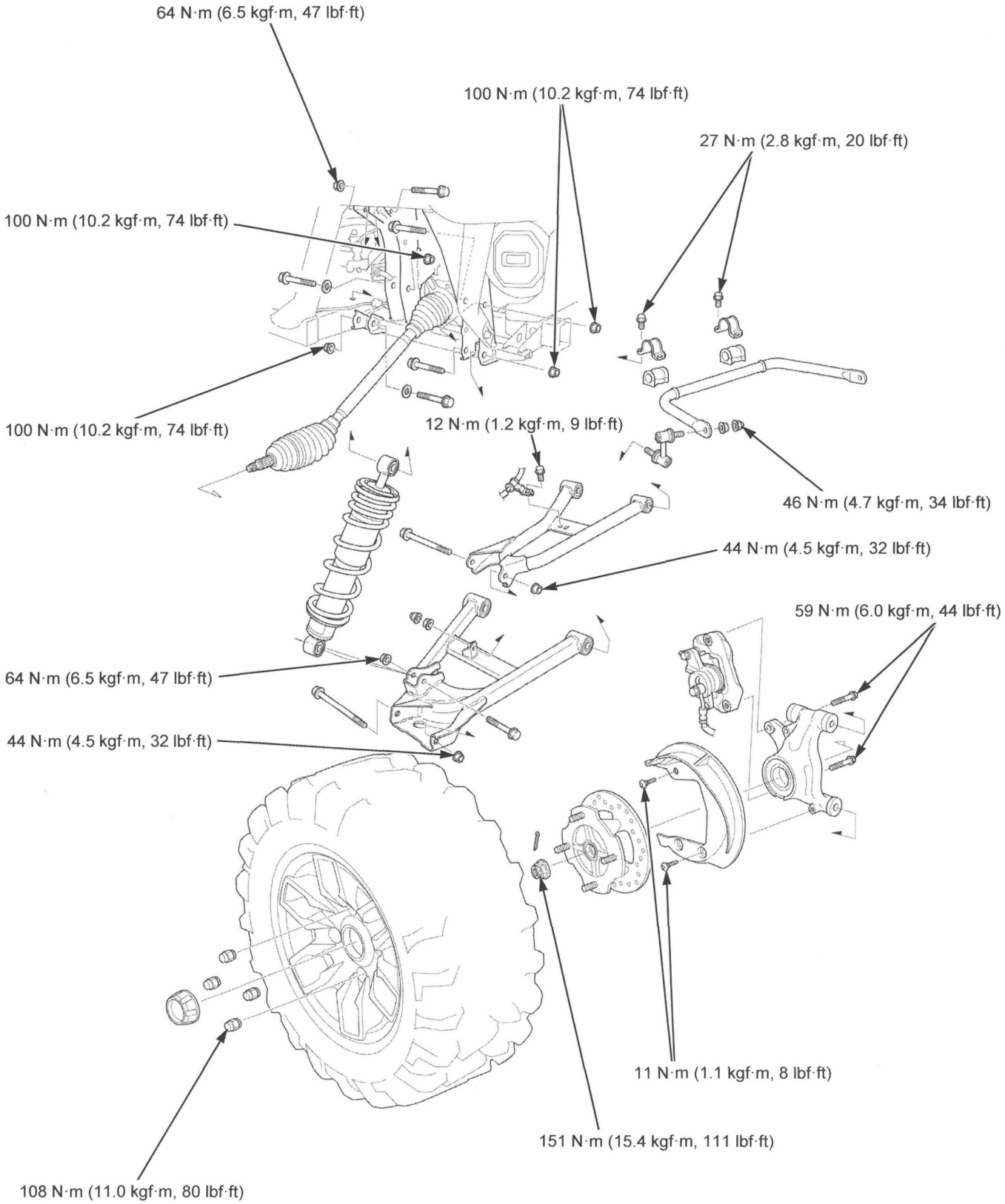
Steers to one side or does not track straight
- Unequal tire pressure
- Damaged suspension arm or frame
- Worn or damaged knuckle bearing
- Weak shock absorber
- Incorrect wheel alignment (page 3-23)
- Faulty steering system components (page 17-2)

COMPONENT LOCATION

FRONT: M5D VII A, VII AC, VII CM shown



REAR: M5D VII A, VII AC, VII CM shown



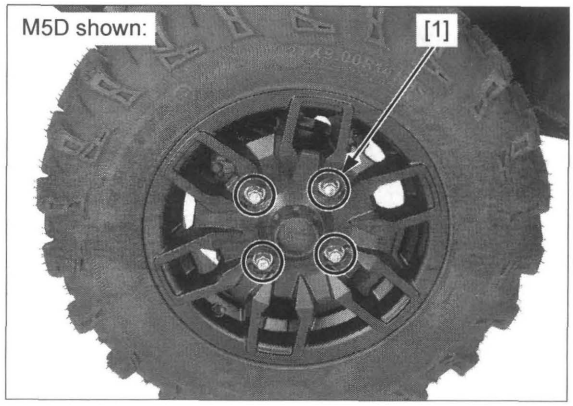
WHEELS

REMOVAL

Loosen the wheel nuts [1].

Raise the wheels off the ground.

Remove the nuts and wheel.



INSTALLATION

Clean the mating surfaces of the wheel and hub thoroughly.

Install the wheel and the nuts with the tapered side facing inward, and tighten them.

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

TIRES

REMOVAL

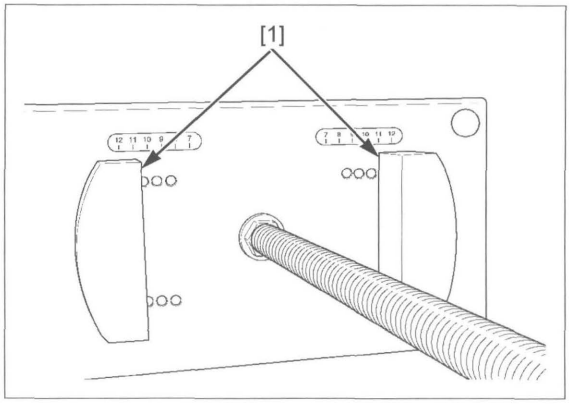
NOTE:

- 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.

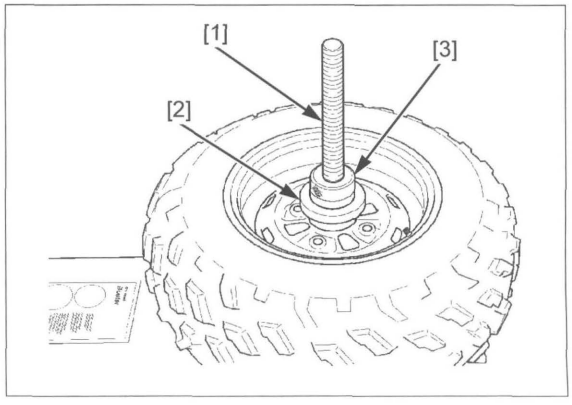


Use only water as a lubricant when removing or mounting tires. Soap or some mounting lubricants may leave a slippery residue which can cause the tire to shift on the rim and lose tire pressure during driving.

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.

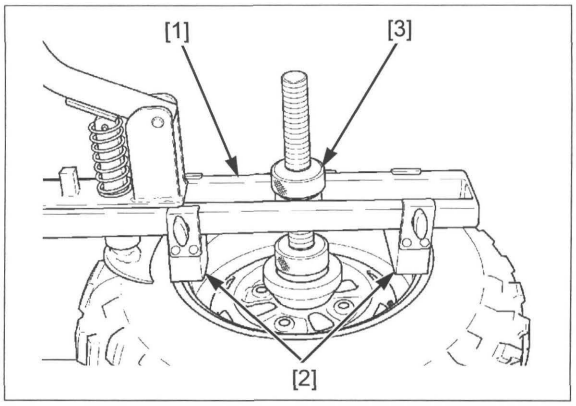
Place the wheel assembly over the center shaft [1] and use the correct size cone [2] to keep the wheel centered during operation.

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.

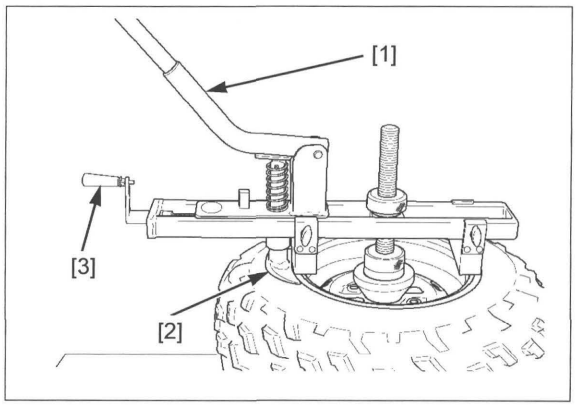


Failure to back out the breaker shoe two turns will cause the shoe to scratch the bead lock, which may cause the tire to leak.

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.

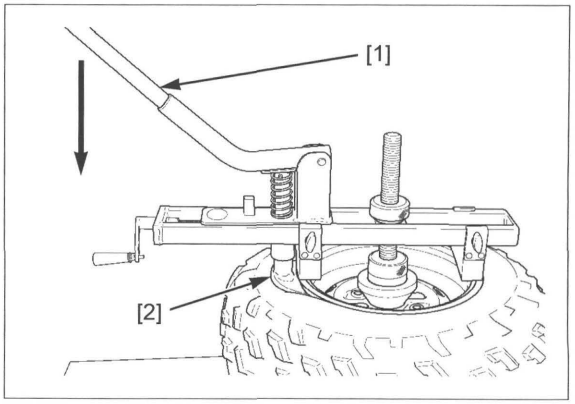


Push down on the leverage bar [1] to push the tire bead over the bead lock.

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 described below.

Check the tire for puncturing objects.

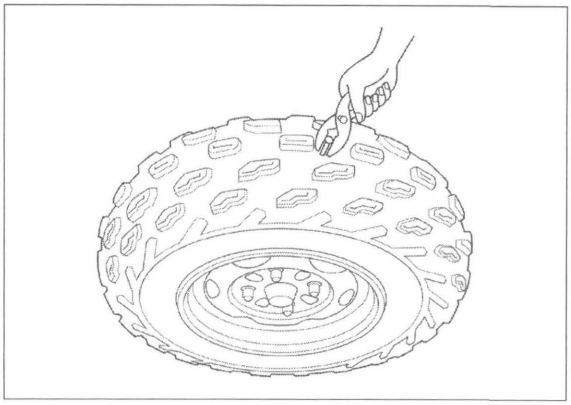
Chalk mark the punctured area and remove the puncturing object.

Inspect and measure the damaged area.

Tire repairs for damage larger than 15 mm (5/8 in) should be a section repair.

Section repairs should be done by a professional tire repair shop.

If the damage is smaller than 15 mm (5/8 in), proceed with the repair as described here.



Install a rubber plug into the damaged area as follows:

Apply cement to a plug inserting needle and work the needle into the damaged area to clean and lubricate it.

Do this three times.

Do not let the cement dry.

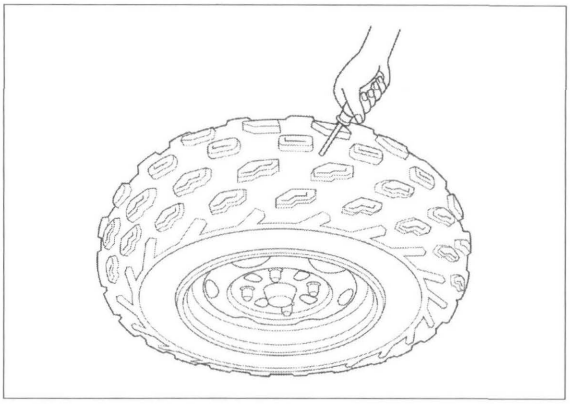
Insert and center a rubber plug through the eye of the inserting needle.

Apply cement to the rubber plug.

Push the inserting needle with plug into the damaged area until the plug is slightly above the tire.

Be careful not to push the plug all the way into the tire to prevent from falling inside.

Twist the needle and remove it from the tire; the plug will stay in the tire.



Trim the plug 6 mm (1/4 in) above the tire surface.

Repeat the above procedure if the puncture is large.

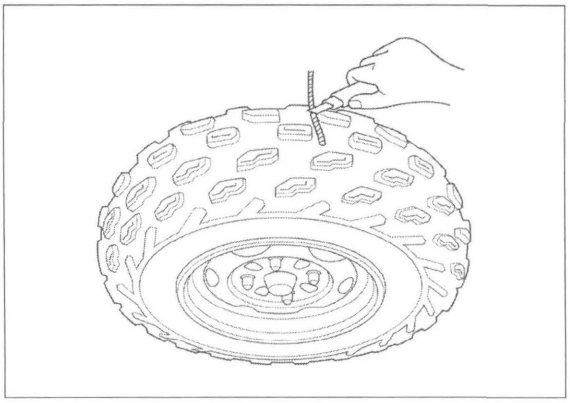
Do not use more than two plugs per puncture.

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 20-6)and apply a cold patch to the inside of the tire.



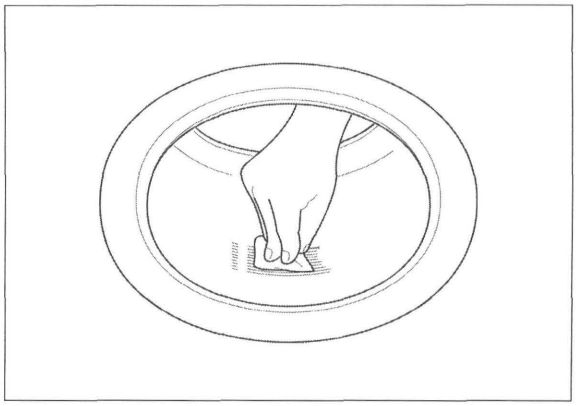
If a plug has been inserted, trim it even with the inner tire surface.

Temporarily place a rubber patch that is at least twice the size of the puncture over the damaged area.

Make a mark around the patch, slightly larger than the patch itself.

Rough the area marked inside the tire with a tire buffer or a wire brush.

Clean the rubber dust from the buffed area.

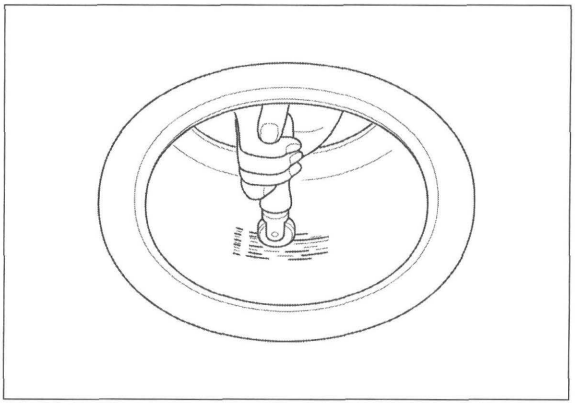


Apply cement over the area marked and allow it to dry until tacky.

Do not touch the cement with dirty or greasy hands.

Remove the lining from the patch and center over the damaged area.

Press the patch against the damaged area using a special roller.



ASSEMBLY

Install the tire onto the rim, noting the proper direction of rotation, 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 driving.

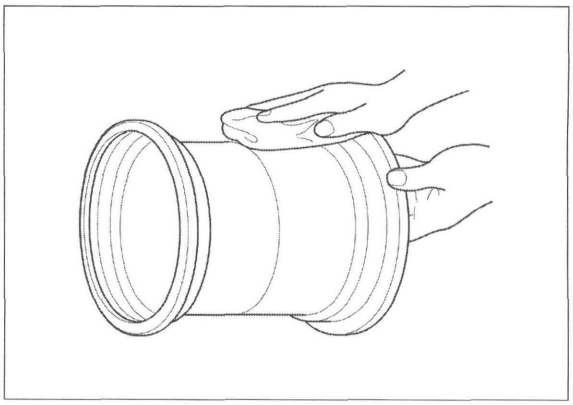
Apply clean water to the rim flanges, bead seat and base.

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:

M5P/M5D:

140 kPa (1.4 kg/cm^2, 20 psi)

M3P/M3D:

120 kPa (1.2 kg/cm^2, 18 psi)

REAR:

M5P/M5D:

140 kPa (1.4 kg/cm^2, 20 psi)

M3P/M3D:

120 kPa (1.2 kg/cm^2, 18 psi)

Check for air leaks and install the valve cap.

FRONT WHEEL HUB/KNUCKLE

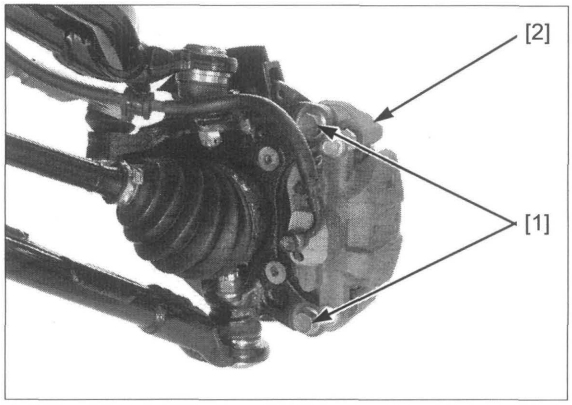
REMOVAL

Remove the outboard guard (page 21-8).

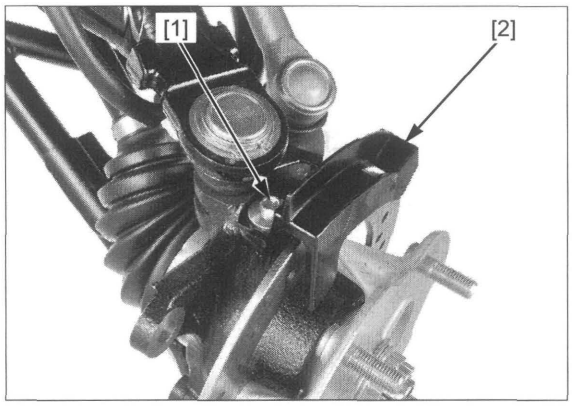
Remove the two mounting bolts [1] and brake caliper [2].

NOTE:

- Support the caliper so that it does not hang from the brake hose. Do not twist or bend the brake hose.

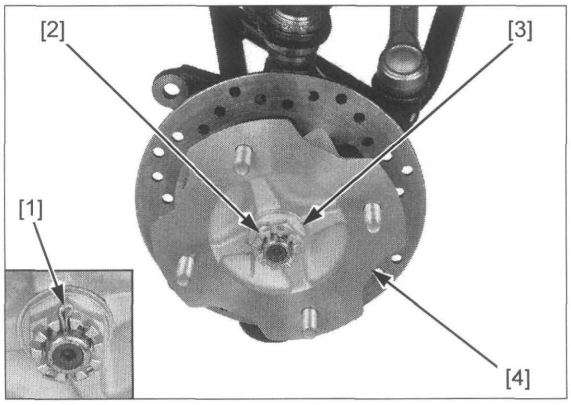


– bolt [1]
– disc cover [2]



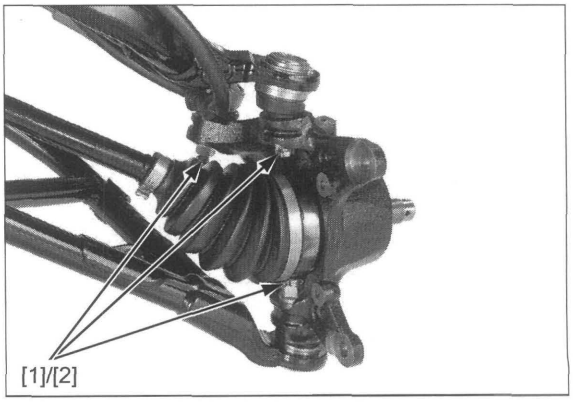
Remove the following:

– cotter pin [1]
– hub nut [2]
– washer [3]
– wheel hub [4]



Remove the cotter pins [1] from the ball joint studs of the upper arm, lower arm, and tie-rod end.

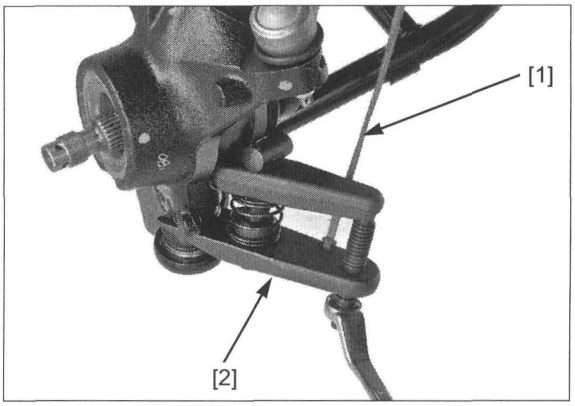
Loosen the ball joint nuts [2], but do not remove them yet.



To prevent the knuckle from falling, support it with a strap [1].

Release the three ball joints, using the special tool according to the following instructions.

TOOL:
Ball joint remover, 28 mm 07MAC-SL00201
[2] (U.S.A. : 07MAC-SL00202)



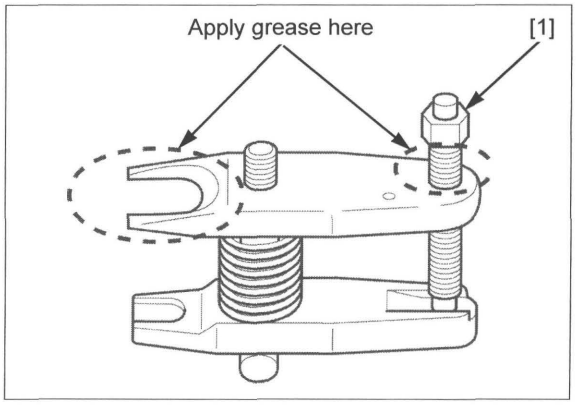
Apply grease to the ball joint remover at the point shown.

This will ease installation of the tool and prevent damage to the pressure bolt [1] threads.

Insert the jaws carefully, making sure not to damage the ball joint boot.

If necessary, apply penetrating type lubricant to loosen the ball joint.

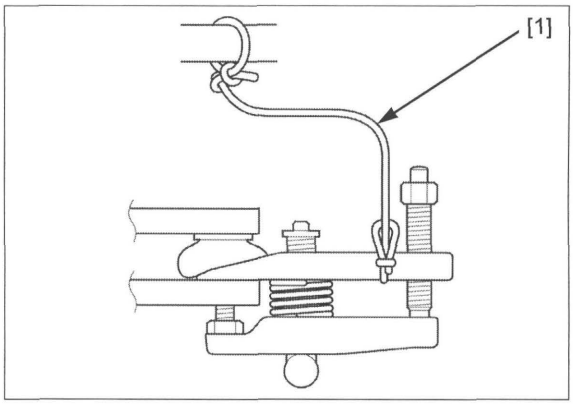
Adjust the jaw spacing by turning the pressure bolt.



To prevent the tool from dropping, tie the strap [1] on a neighboring solid part such as the frame pipe, shock absorber, 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.

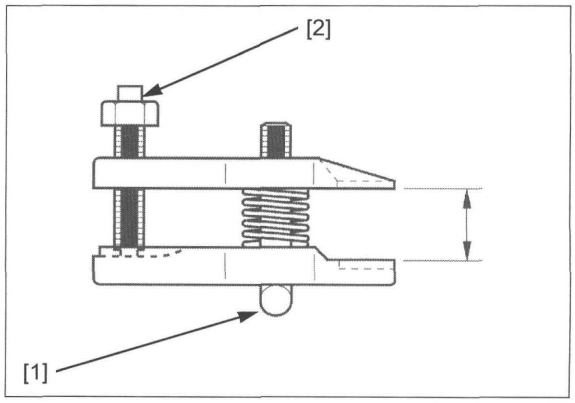


Once the tool is in place, turn the adjusting bolt [1] as necessary to make the jaws parallel.

Then hand-tighten the pressure bolt [2] and recheck the jaws to make sure they are still parallel.

Tighten the pressure bolt with a wrench until the ball joint stud pops loose.

Remove the ball joint nuts and the knuckle.



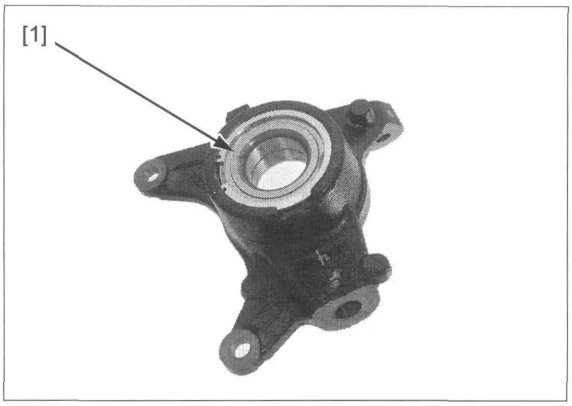
INSPECTION

Turn the inner race of the bearing [1] in the knuckle with your finger.

The bearings should turn smoothly and quietly.

Also check that the bearing outer race fits tightly in the knuckle.

Inspect the knuckle for damage or cracks.



BRAKE DISC REPLACEMENT

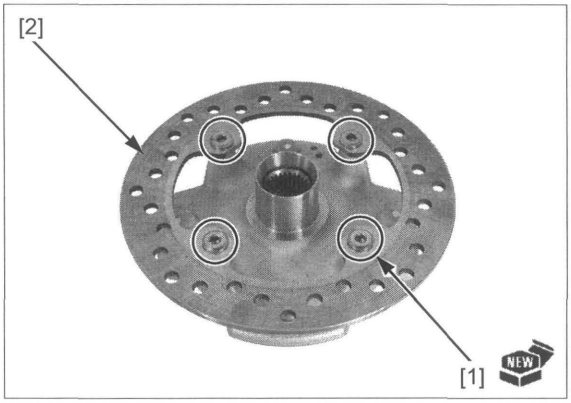
Remove the four bolts [1] and brake disc [2] from the wheel hub.

Do not get grease on the brake disc or stopping power will be reduced.

Install a new brake disc with the stamped side facing the hub.

Install new disc bolts and tighten them.

TORQUE: 42 N·m (4.3 kgf·m, 31 lbf·ft)



BEARING REPLACEMENT

Remove the snap ring [1].

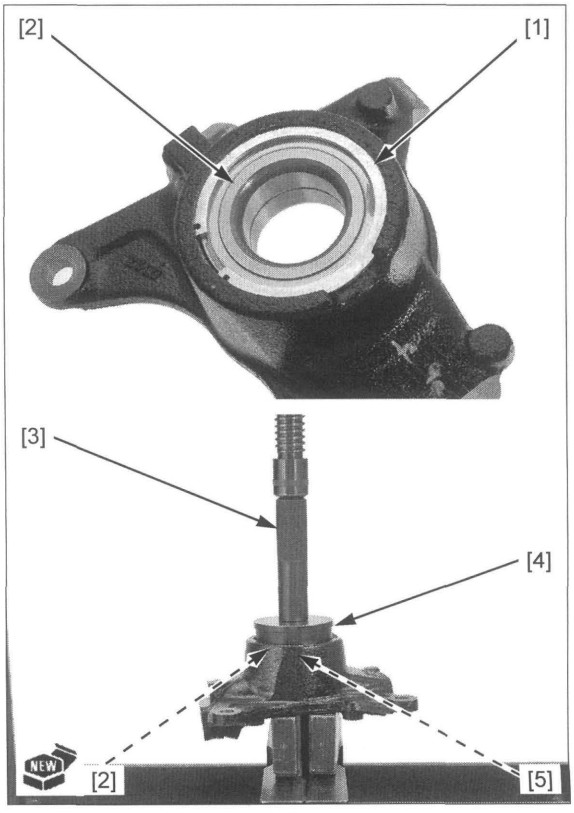
Press the bearing [2] out of the knuckle using a suitable collar.

Carefully press a new bearing in the knuckle with the marking side facing up until it is fully seated.

TOOLS:

Driver [3]	**07749-0010000**
Attachment, 72 x 75 mm [4]	**07746-0010600**
Pilot, 40 mm [5]	**07746-0040900**

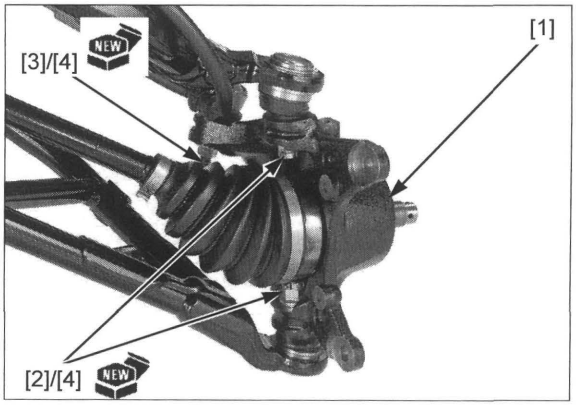
Install the snap ring into the knuckle groove with the chamfered side facing in.



INSTALLATION

Route the brake hose properly (page 1-29).

Install the knuckle [1] onto the drive shaft, lower arm and upper arm with the ball joint nuts [2].



Tighten each ball joint nut to the specified torque and further tighten until its grooves align with the cotter pin hole.

TORQUE:
Upper arm ball joint nut:
29 N·m (3.0 kgf·m, 21 lbf·ft)
Lower arm ball joint nut:
49 N·m (5.0 kgf·m, 36 lbf·ft)

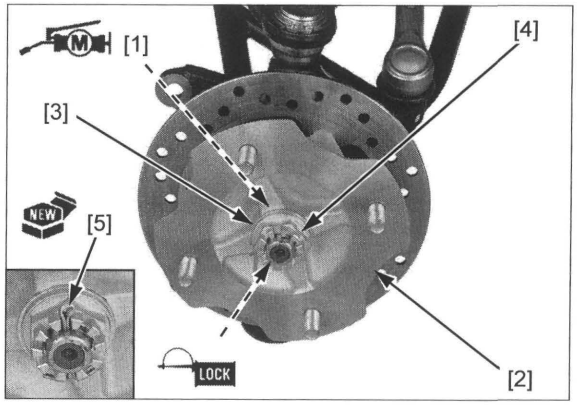
Install the tie-rod to the knuckle with the ball joint nut [3].

Tighten the ball joint nut to the specified torque.

TORQUE: 55 N·m (5.6 kgf·m, 41 lbf·ft)

Install a new cotter pins [4].

Apply molybdenum disulfide grease to the drive shaft splines [1].



Install the wheel hub [2] to the knuckle and drive shaft.

Install the washer [3].

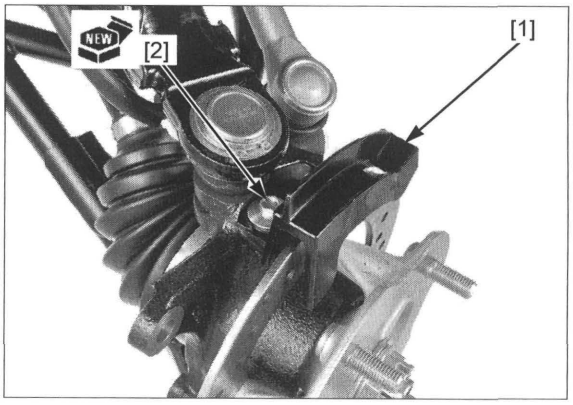
Thoroughly clean the drive shaft threads of any original sealant, grease or other debris.
Apply 5.0 mm (0.2 in) of sealant (Threebond TB1305 or an equivalent) across all of the drive shaft threads.

Install the hub nut [4], tighten it to the specified torque and further tighten it until its grooves align with the cotter pin hole.

TORQUE: 151 N·m (15.4 kgf·m, 111 lbf·ft)

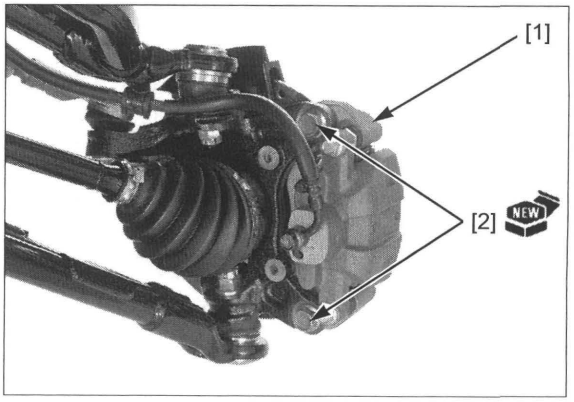
Install a new cotter pin [5].

Install the disc cover [1] and new bolt [2], and tighten the bolt to the specified torque.



TORQUE: 11 N·m (1.1 kgf·m, 8.1 lbf·ft)

Install the brake caliper [1] and new mounting bolts [2].



Tighten the mounting bolts to the specified torque.

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

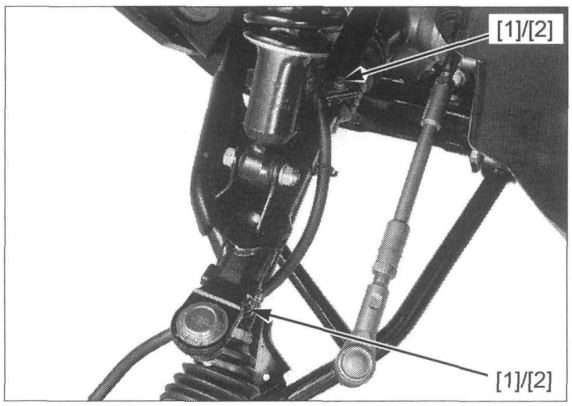
Install the outboard guard (page 21-8).

FRONT SUSPENSION ARM

REMOVAL

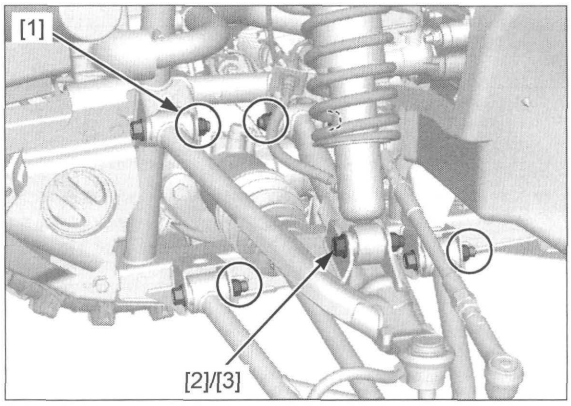
Remove the front wheel hub/knuckle (page 20-10).

Remove the two bolts [1] and brake hose clamps [2].



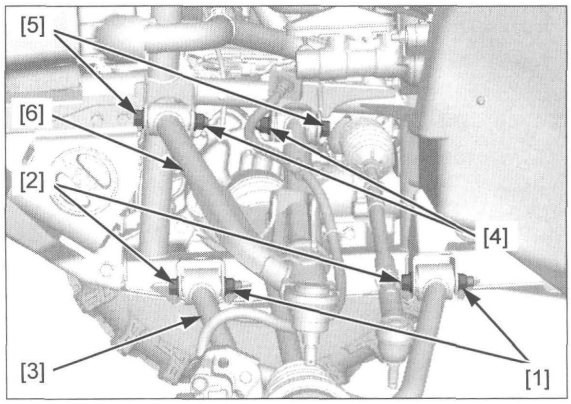
Loosen the lower and upper arm pivot nuts [1].

Remove the shock absorber lower mounting nut [2] and bolt [3].



Remove the following:

- lower pivot nuts [1]
- lower bolts [2]
- lower arm [3]
- upper pivot nuts [4]
- upper bolts [5]
- upper arm [6]

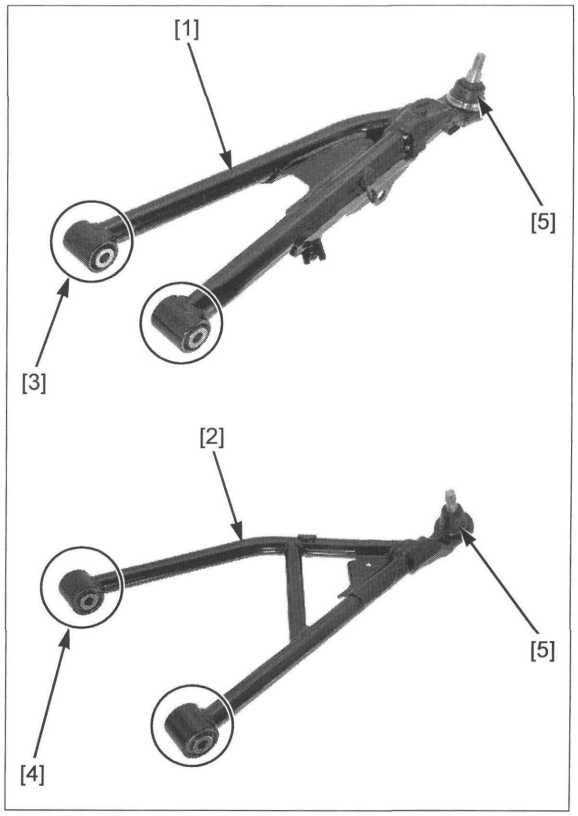


INSPECTION

Check the upper arm [1], lower arm [2], pivot bearings [3], pivot bushings [4] for bends, cracks or other damage.

Inspect the ball joint boots [5] for tears or other damage by moving the ball joint stud.

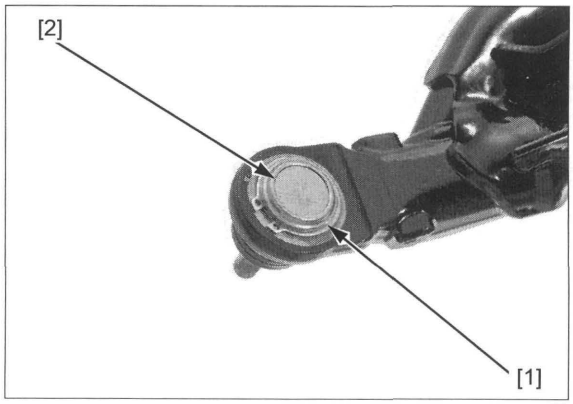
It should move freely and smoothly.



BALL JOINT REPLACEMENT

UPPER ARM

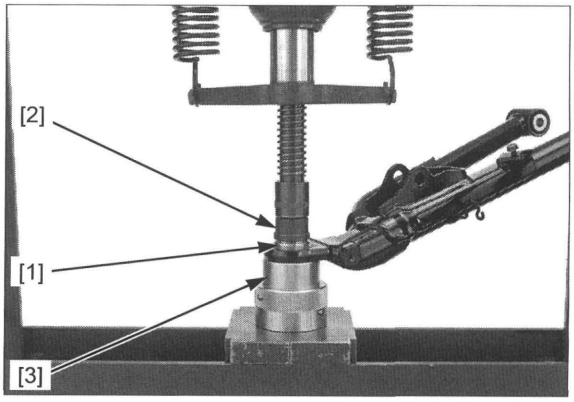
Remove the snap ring [1] from the ball joint [2].



Support the upper arm with the special tool and press the ball joint [1] out of the upper arm.

TOOLS:

Attachment, 32 x 35 mm [2]	**07746-0010100**
Fork seal driver 45.2 mm [3]	**07KMD-KZ30100**

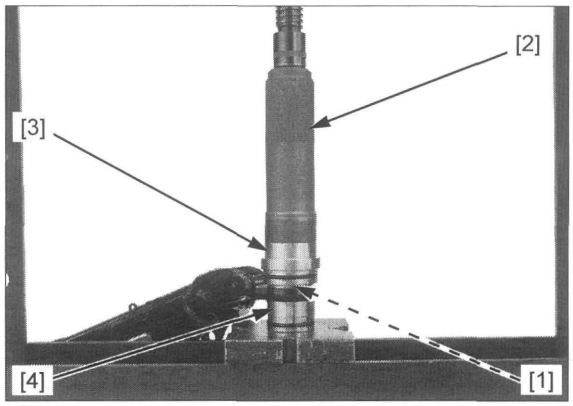


Support the upper arm using a special tool as shown.

Press the ball joint [1] into the upper arm until it is fully seated using special tools.

TOOLS:

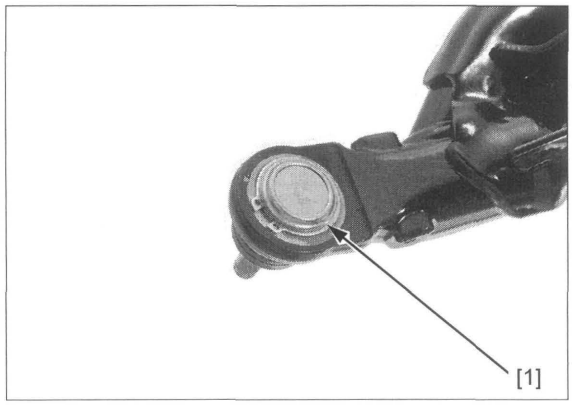
Driver handle [2]	**07746-0030100**
Fork seal driver attachment [3]	**07947-KF00100**
Fork seal driver [4]	**07947-KA20200**



NOTICE

If you feel strong resistance when lowering the press, stop. Reset the inner driver attachment so 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.



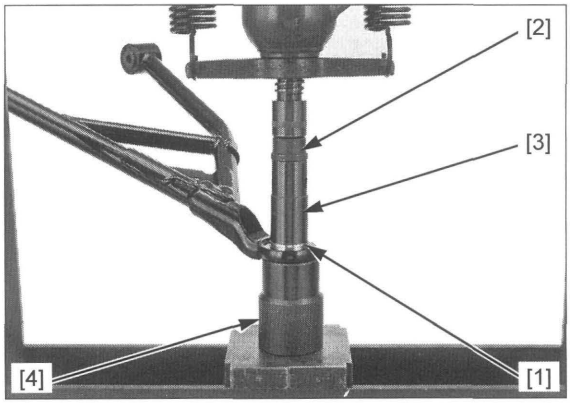
LOWER ARM

Remove the boot from the ball joint [1].

Support the lower arm with the special tool and press the ball joint out of the lower arm.

TOOLS:

Attachment, 32 x 35 mm [2]	**07746-0010100**
Collar 27.3/30.3 [3]	**07964-MB00200**
Base 48.4/56 [4]	**07946-KM90600**

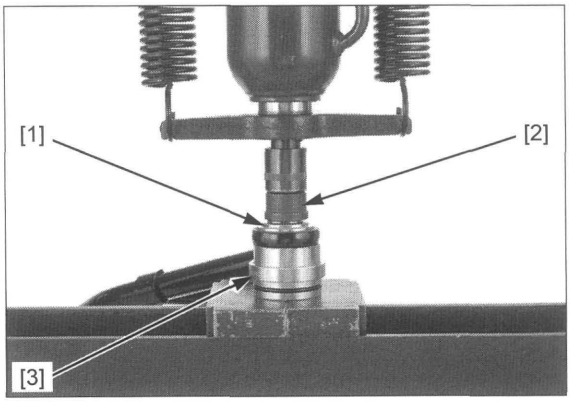


Support the lower arm with the special tool as shown.

Press the ball joint [1] into the lower arm until it is fully seated using special tools.

TOOLS:

Attachment, 32 x 35 mm [2]	**07746-0010100**
Fork seal driver attachment [3]	**07947-KF00100**



NOTICE

If you feel strong resistance when lowering the press, stop. Reset the fork seal driver so the ball joint head can go into the hollow of the seal driver and try again.

INSTALLATION

NOTE:

- The upper and lower arm pivot fastener tightening is performed after adjusting the suspension arm angle.

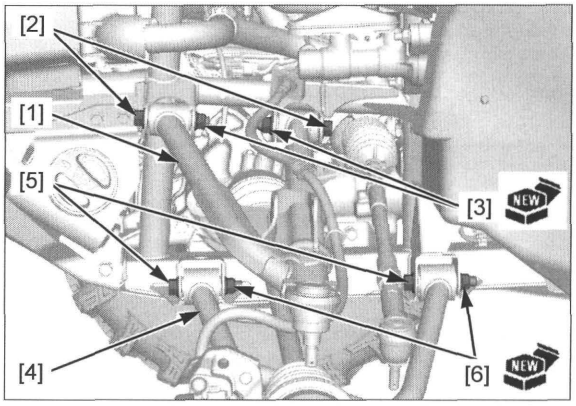
Insert the upper pivot bolts from the out side of the frame.

Install the upper arm [1] into the frame with the pivot bolts [2] and new nuts [3], and loosely tighten them.

Insert the lower pivot bolts from the front side.

Install the lower arm [4] into the frame with the pivot bolts [5] and new nuts [6], and loosely tighten them.

Install the front wheel hub/knuckle (page 20-13).

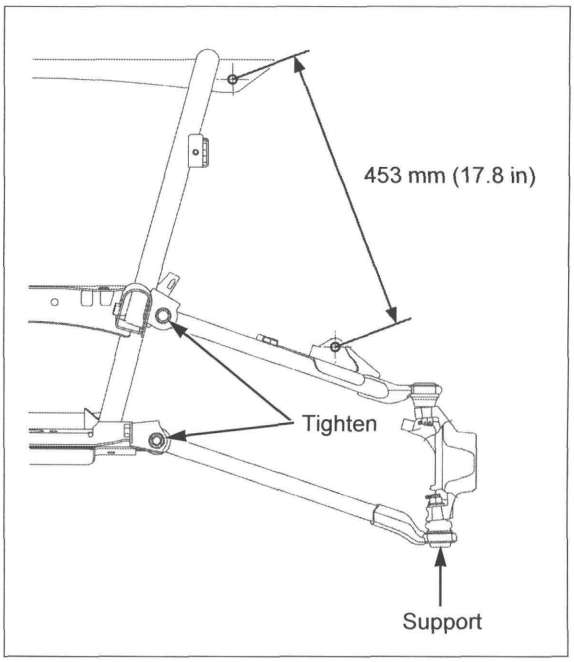


Adjust the suspension arm angle with a jack supporting the lower arm so that the distance between the centers of the shock absorber mounting bolt holes is specified one.

SPECIFIED DISTANCE: 453 mm (17.8 in)

After adjusting the angle, tighten all the upper and lower arm pivot fasteners to the specified torque.

TORQUE:
Front upper/lower arm pivot nut
100 N·m (10.2 kgf·m, 74 lbf·ft)



Insert the bolt from the front side.

Install the shock absorber lower mount with the bolt [1] and a new nut [2], and tighten it to the specified torque.

TORQUE: 64 N·m (6.5 kgf·m, 47 lbf·ft)

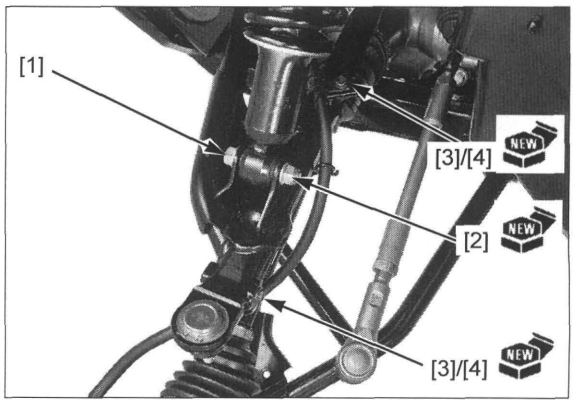
Route the brake hose properly (page 1-29).
Insert all the bolts from the front side.

Install the brake hose clamps [3] and two new bolts [4], and tighten them.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Install the following:

- outboard guard (page 21-8)
- front wheel (page 20-6)



FRONT SHOCK ABSORBER

REMOVAL/INSTALLATION

Raise the front wheels off the ground.

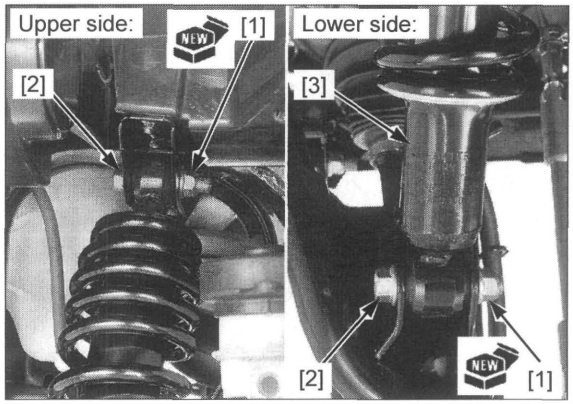
Support the lower arm.

Remove the mounting nuts [1], bolts [2], and shock absorber [3].

Insert the bolts from the front side.

Install the shock absorber with the mounting bolts and new nuts, and tighten them to specified torque.

TORQUE: 64 N·m (6.5 kgf·m, 47 lbf·ft)



FRONT CUSHION SPRING REMOVAL/ INSTALLATION (M5D IV A, IV AC, VI A, VI AC, VI CM/M3D IV A, IV AC, VI A, VI AC)

Remove the shock absorber (page 20-28).

When compressing the cushion spring using [1] the special tool.

TOOL:

[2] Strut spring compressor (Branick MST-580A or Model 7200, or equivalent)

Compress the cushion spring.

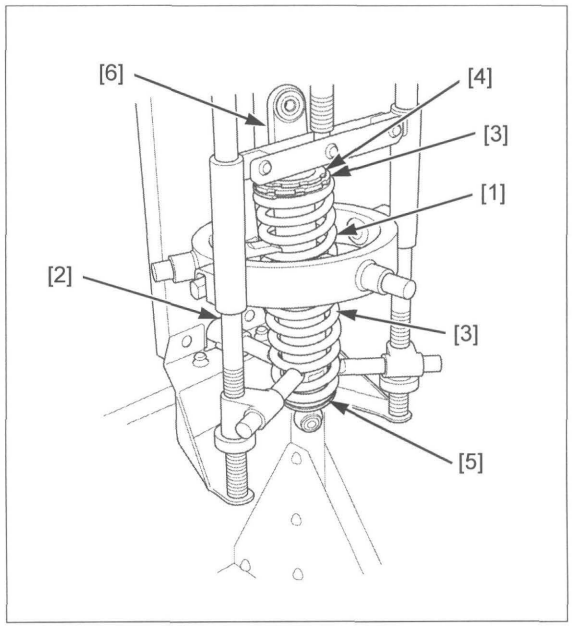
When remove the shock spring, turn the preload ring [3] and preload back up ring [4] counterclockwise to the softest position (be sure to record the number of turns from the starting position).

Remove the lower spring retainer [5] and cushion body [6].

Release the pressure from the strut spring compressor.

Remove the cushion spring.

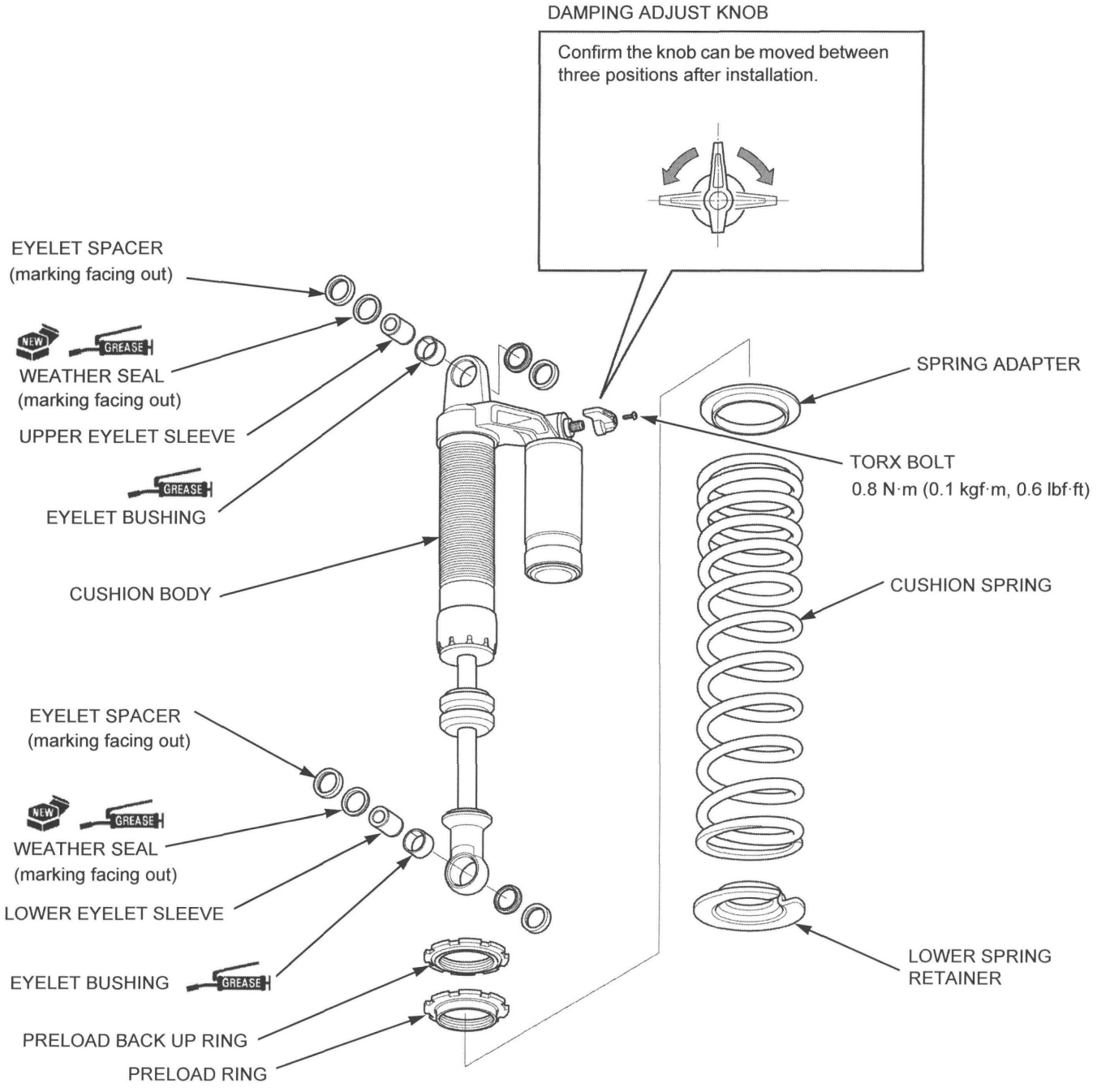
Installation is in the reverse order of removal.



DISASSEMBLY/ASSEMBLY (M5D IV A, IV AC, VI A, VI AC, VI CM/M3D IV A, IV AC, VI A, VI AC)

Remove the cushion spring (page 20-28).

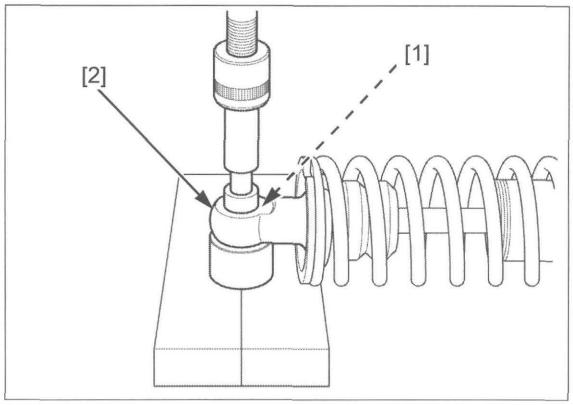
Disassemble and assemble the shock absorber according to the illustration.



EYELET BUSHING REPLACEMENT (M5D IV A, IV AC, VI A, VI AC, VI CM/ M3D IV A, IV AC, VI A, VI AC)

Press the eyelet bushing [1] out of the cushion body [2].

Press a new eyelet bushing into the cushion body so that it is flush with the eyelet.



INSPECTION

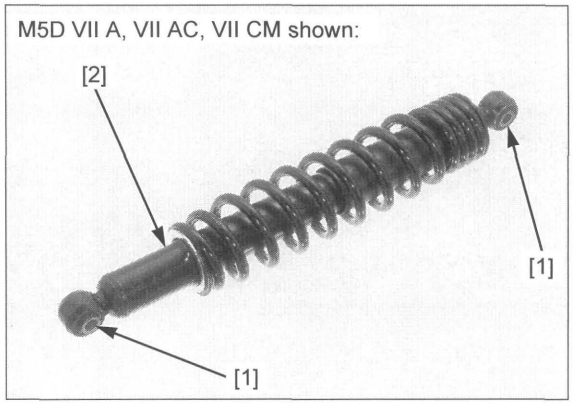
Check the bushings [1] for wear or damage.

Check the damper unit [2] for leaks or other damage.

Replace the shock absorber assembly if necessary.

M5D IV A, IV AC, VI A, VI AC, VI CM/M3D IV A, IV AC, VI A, VI AC:

If shock absorber service/repair is required, contact a FOX Service Center (U.S.A. only: refer to Service Letter #73 - Third Party Service Information).



SHOCK ABSORBER DISPOSAL PROCEDURE (Except M5D IV A, IV AC, VI A, VI AC, VI CM/M3D IV A, IV AC, VI A, VI AC)

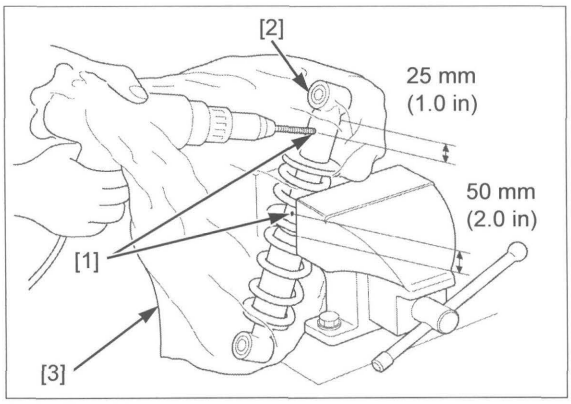
Center punch the damper to mark the drilling point [1].

Wrap the shock absorber [2] inside a plastic bag [3]. Support the shock absorber in a vise as shown. Through the open end of the bag, insert a drill motor with a sharp 5 mm (0.2 in) drill bit.

NOTE:

- Point the drill hole away from you to prevent debris getting in your eyes.

Hold the bag around the drill motor and briefly run the drill motor inside the bag; this will inflate the bag with air from the motor and help keep the bag from getting caught in the bit when you start.

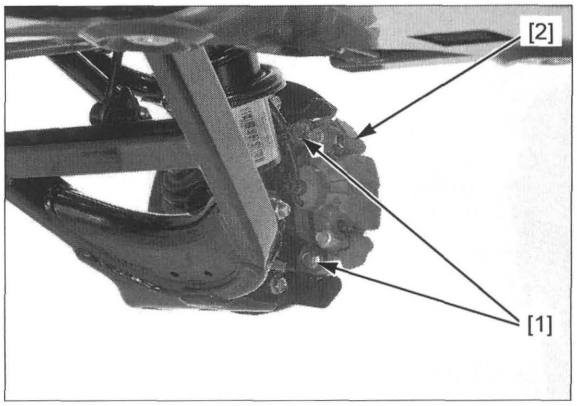


REAR WHEEL HUB/KNUCKLE

REMOVAL

Remove the rear wheel (page 20-6).

Remove the two mounting bolts [1] and brake caliper [2].

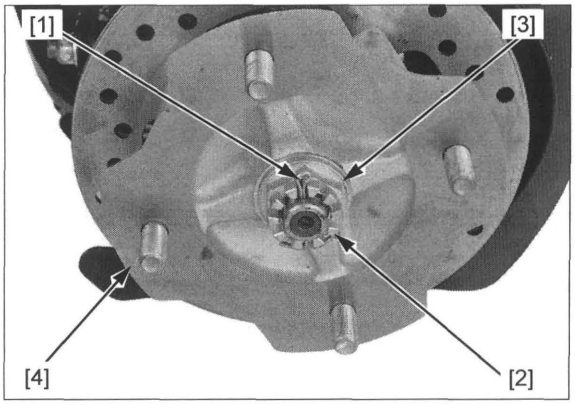


NOTE:

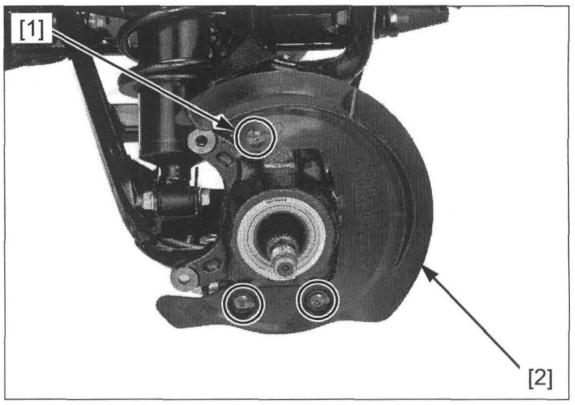
- Support the caliper so that it does not hang from the brake hose. Do not twist or bend the brake hose.

Remove the following:

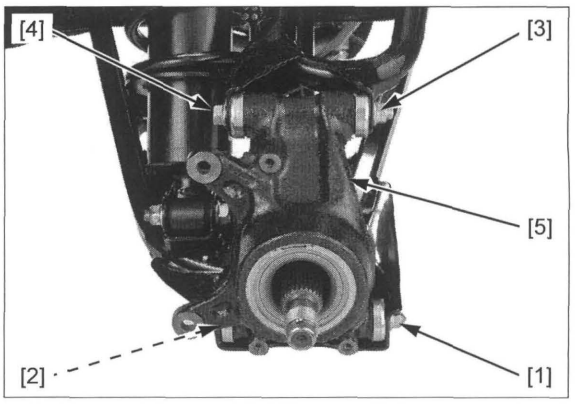
- cotter pin [1]
- hub nut [2]
- washer [3]
- wheel hub [4]



- three socket bolts [1]
- splash guard [2]



- lower arm pivot nut [1] and bolt [2]
- upper arm pivot nut [3] and bolt [4]
- knuckle [5]



INSPECTION

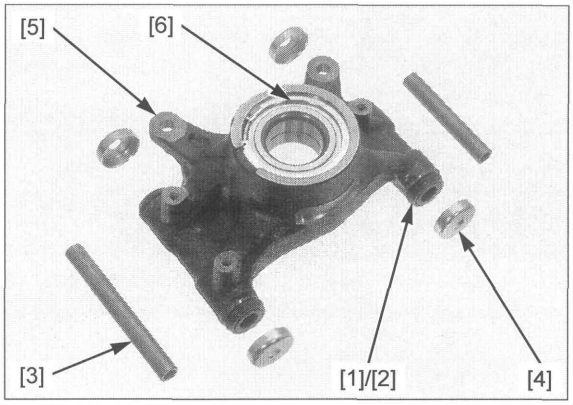
Check the dust seals [1], pivot bushings [2], collars [3], and pivot caps [4] for wear or damage.

Inspect the knuckle [5] for damage or cracks.

Turn the inner race of the bearing [6] in the knuckle with your finger.

The bearing should turn smoothly and quietly.

Also check that the bearing outer race fits tightly in the knuckle.



BRAKE DISC REPLACEMENT

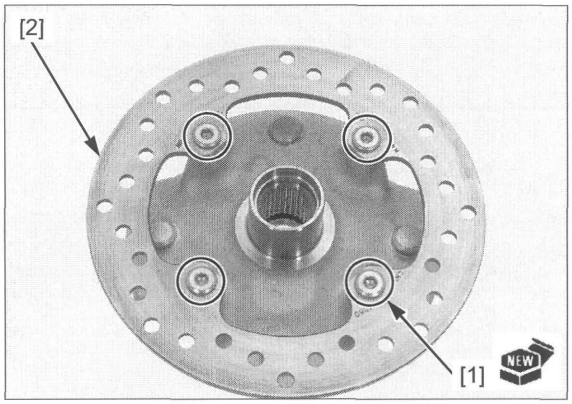
Remove the four bolts [1] and brake disc [2] from the wheel hub.

Do not get grease on the brake disc or stopping power will be reduced.

Install a new brake disc with the stamped side facing the hub.

Install new disc bolts and tighten them.

TORQUE: 42 N·m (4.3 kgf·m, 31 lbf·ft)



BEARING REPLACEMENT

Remove the snap ring [1].

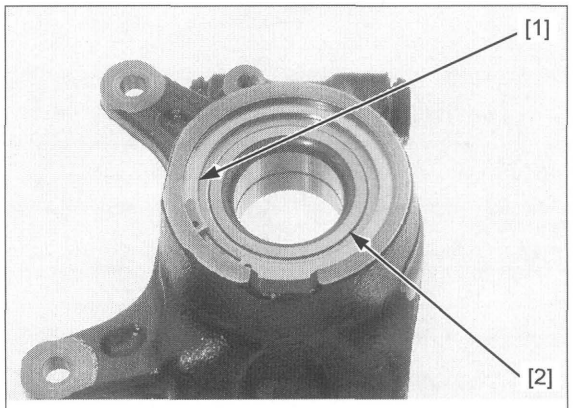
Press the bearing [2] out of the knuckle using a suitable collar.

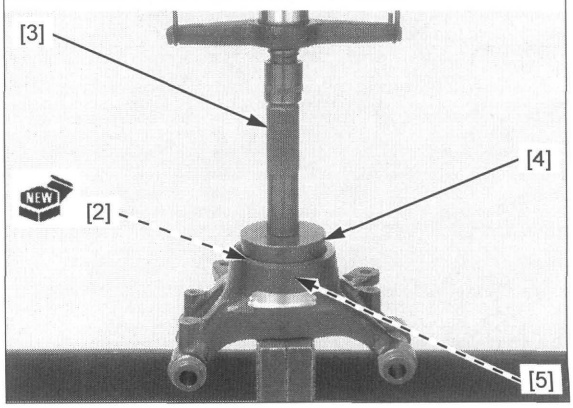
Carefully press a new bearing in the knuckle with the marking side facing up until it is fully seated.

TOOLS:

Driver [3]	**07749-0010000**
Attachment, 72 x 75 mm [4]	**07746-0010600**
Pilot, 40 mm [5]	**07746-0040900**

Install the snap ring into the knuckle groove with the chamfered edge facing in.





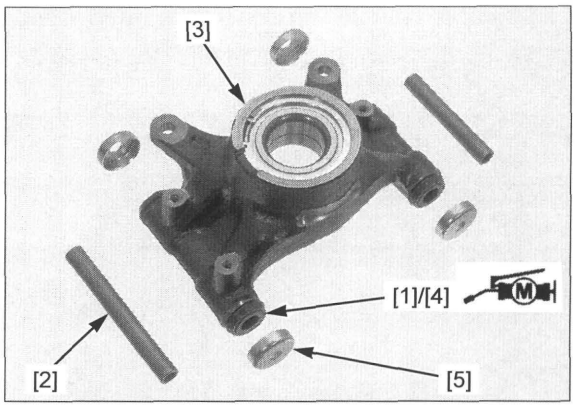
INSTALLATION

Apply 0.5 – 1.0 g of molybdenum disulfide grease to the collar contacting surfaces of the pivot bushings [1].

Install the collars [2] into the knuckle [3].

Apply 0.5 – 1.0 g of molybdenum disulfide grease to the lips of the dust seals [4].

Install the pivot caps [5].



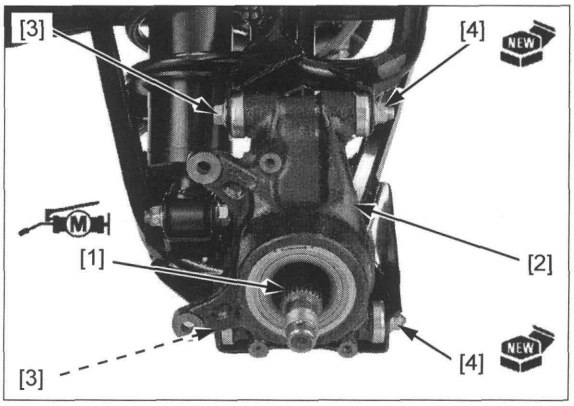
Apply molybdenum disulfide grease to the drive shaft splines [1].

Install the knuckle [2] to the upper and lower arms.

Insert the bolts from the front side.

Install the pivot bolts [3] and new nuts [4], then tighten them to the specified torque.

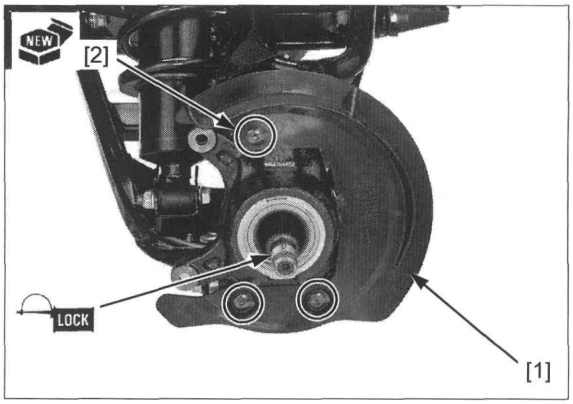
TORQUE: 44 N·m (4.5 kgf·m, 32 lbf·ft)



Install the splash guard [1] and three new socket screws [2], and tighten the screws to the specified torque.

TORQUE: 11 N·m (1.1 kgf·m, 8.1 lbf·ft)

Thoroughly clean the drive shaft threads of any original sealant, grease or other debris.
Apply 5.0 mm (0.2 in) of sealant (Threebond TB1305 or an equivalent) across all of the drive shaft threads.



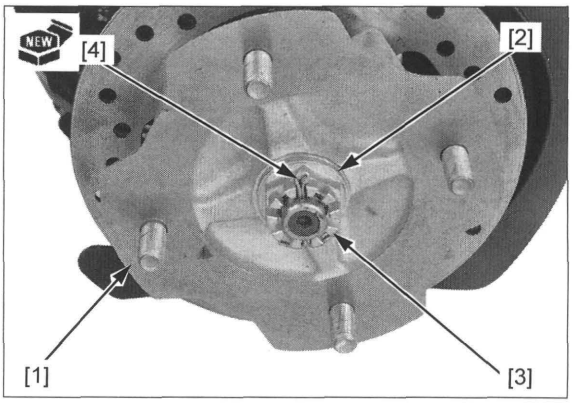
Install the wheel hub [1] to the knuckle and drive shaft.

Install the washer [2].

Install the hub nut [3], tighten it to the specified torque and further tighten it until its grooves align with the cotter pin hole.

TORQUE: 151 N·m (15.4 kgf·m, 111 lbf·ft)

Install a new cotter pin [4].

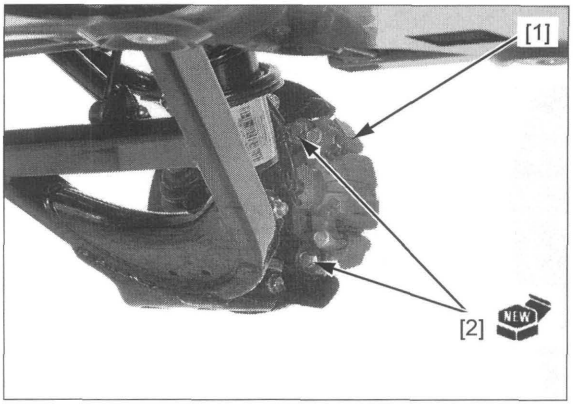


Install the brake caliper [1] and new mounting bolts [2].

Tighten the mounting bolts to the specified torque.

TORQUE: 49 N·m (5.0 kgf·m, 36 lbf·ft)

Install the rear wheel (page 20-6).



REAR SUSPENSION ARM

REMOVAL

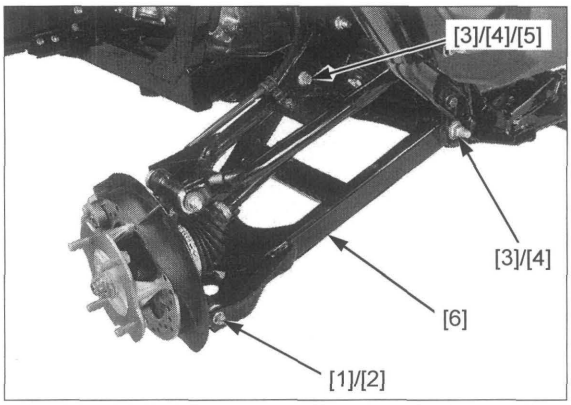
Remove the rear wheel (page 20-6).

Support the wheel hub/knuckle assembly securely.

LOWER ARM

Remove the following:

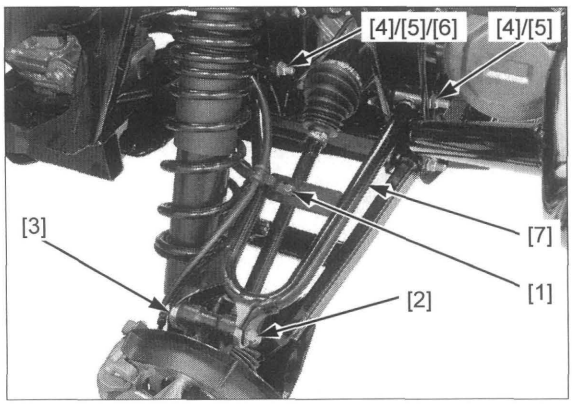
- stabilizer link (page 20-25)
- lower arm pivot nut [1] and bolt [2] (knuckle side)
- lower arm pivot nuts [3], bolts [4] and washer [5] (frame side)
- lower arm [6]



UPPER ARM

Remove the following:

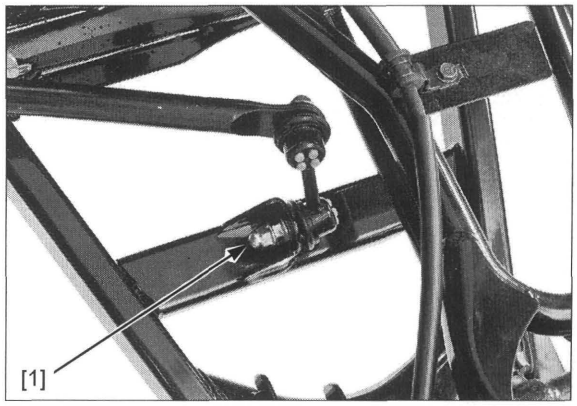
- brake hose mounting bolt [1]
- upper arm pivot nut [2] and bolt [3] (knuckle side)
- upper arm pivot nuts [4], bolts [5] and washer [6] (frame side)
- upper arm [7]



STABILIZER ARM AND LINK

Remove the rear shock absorber (page 20-18).

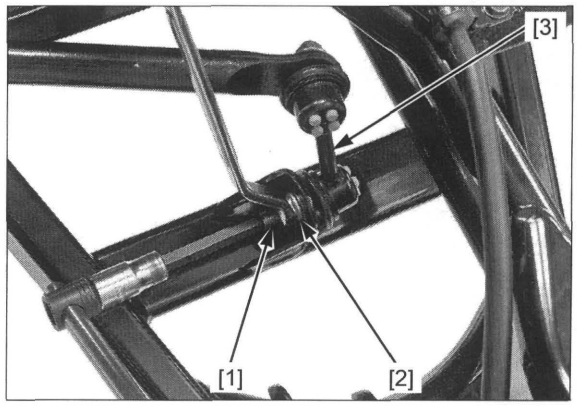
Remove the cap nut [1].



Hold the stabilizer stud end [1], and remove the nut [2] and stud from the lower arm.

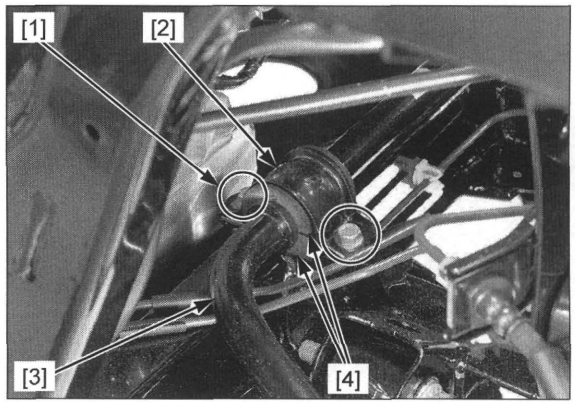
Remove the cap nut, flange nut, and stabilizer link [3] from the stabilizer arm.

Remove the other side stabilizer link.



Remove the following:

- four bolts [1]
- holders [2]
- stabilizer arm [3]
- stabilizer bushings [4]

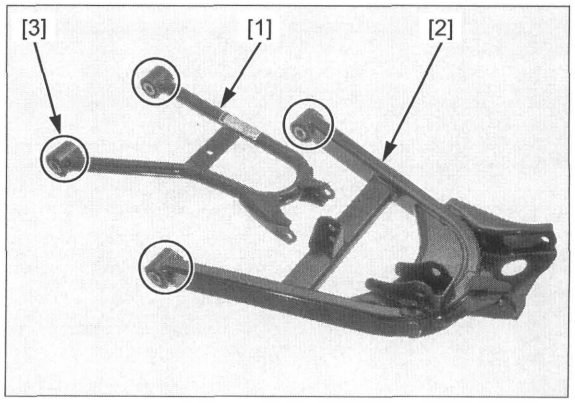


INSPECTION

Check the upper arm [1] and lower arm [2] for bends, cracks or other damage.

Check the pivot bushings [3] for wear or damage.

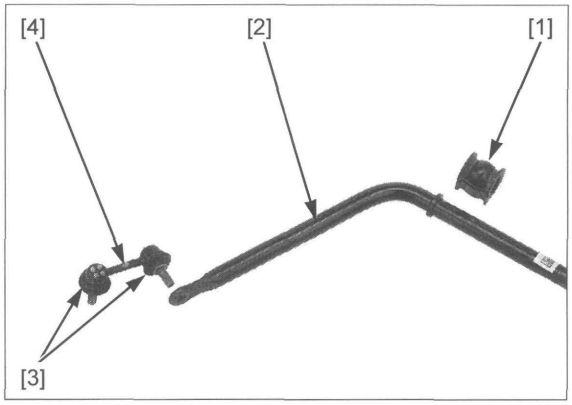
For pivot bushing inspection of the knuckle side, see Rear Wheel Hub/Knuckle (page 20-22).



Check the stabilizer bushings [1] for wear or damage.

Check the stabilizer arm [2] for distortion or damage.

Inspect the ball joint boots [3] of the stabilizer link [4] for tears or other damage by moving the ball joint stud.



INSTALLATION

NOTE:

- The lower arm pivot fastener tightening is performed after adjusting the suspension arm angle.

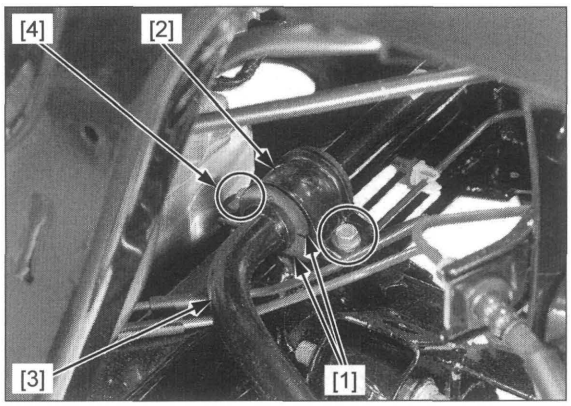
STABILIZER ARM AND LINK

Install the stabilizer bushings [1] and holders [2] onto the stabilizer arm [3].

Install the stabilizer arm onto the frame with bolts [4].

Tighten the bolts to the specified torque.

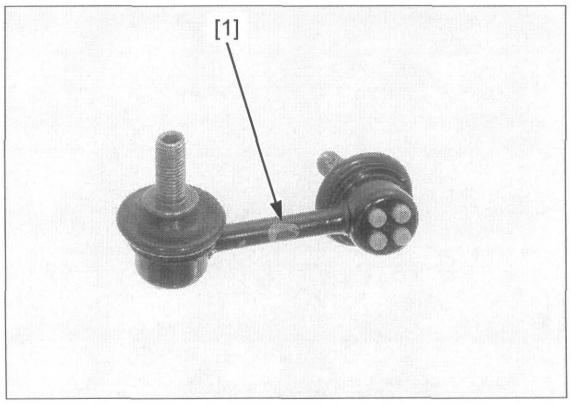
TORQUE: 27 N·m (2.8 kgf·m, 20 lbf·ft)



The stabilizer links have the identification mark [1]:

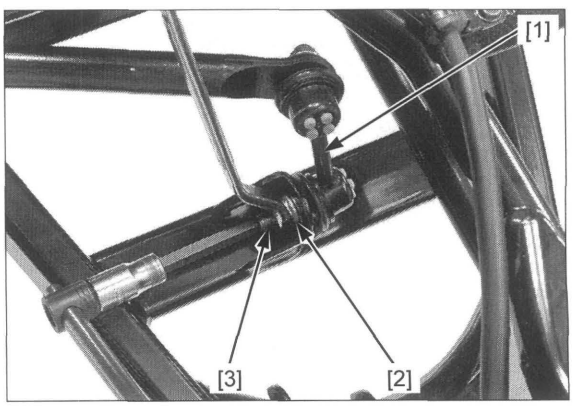
Left link: Yellow paint

Right link: White paint



Install the stabilizer links [1] with the link nuts [2] and tighten them while holding the stud bolt end [3].

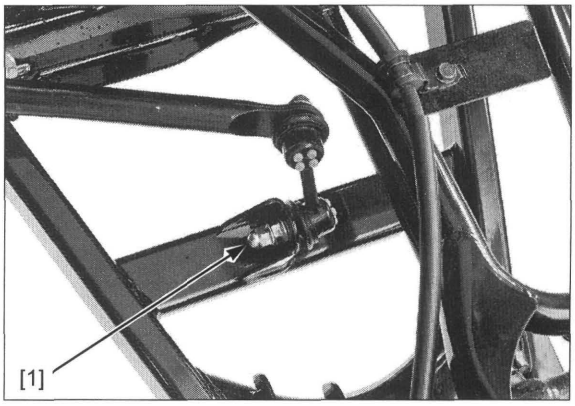
TORQUE: 46 N·m (4.7 kgf·m, 34 lbf·ft)



Install the cap nuts [1] and tighten them.

Install the following:

- rear shock absorber (page 20-28)
- rear wheel (page 20-6)



UPPER ARM

Insert the frame side pivot bolts from the front side.

Install the upper arm [1] into the frame with the pivot bolts [2], washer [3] and new nuts [4].

Insert the knuckle side pivot bolt from the front side.

Connect the upper arm to the knuckle with the pivot bolt [5] and a new nut [6].

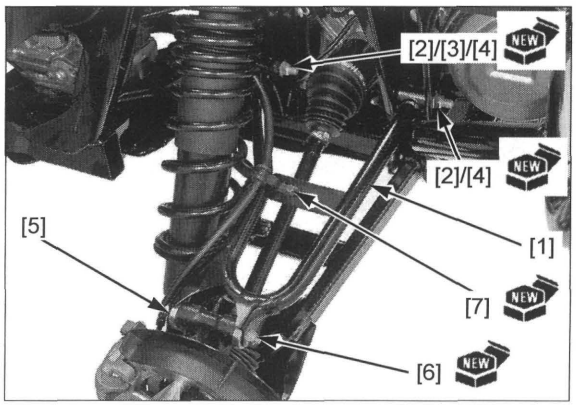
Tighten the nut to the specified torque.

TORQUE:
Pivot nut (frame side):
100 N·m (10.2 kgf·m, 74 lbf·ft)
Pivot nuts (knuckle side):
44 N·m (4.5 kgf·m, 32 lbf·ft)

Install the brake hose clamp with a new bolt [7] and tighten the bolt to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 8.9 lbf·ft)

Install the rear wheel (page 20-6).



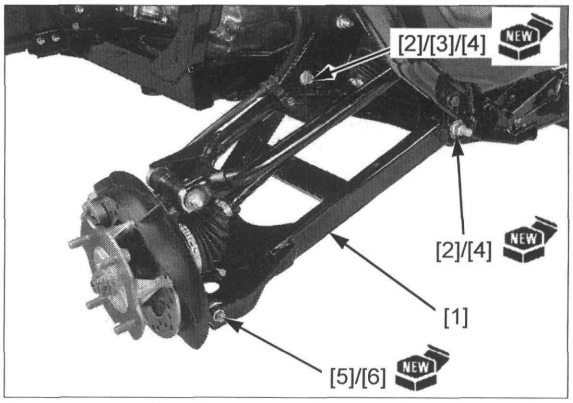
LOWER ARM

Insert the frame side pivot bolts from the inside of the arm.

Install the lower arm [1] into the frame with the pivot bolts [2], washer [3] and new nuts [4].

Insert the knuckle side pivot bolt from the front side.

Connect lower arm to the knuckle with the pivot bolt [5] and a new nut [6].



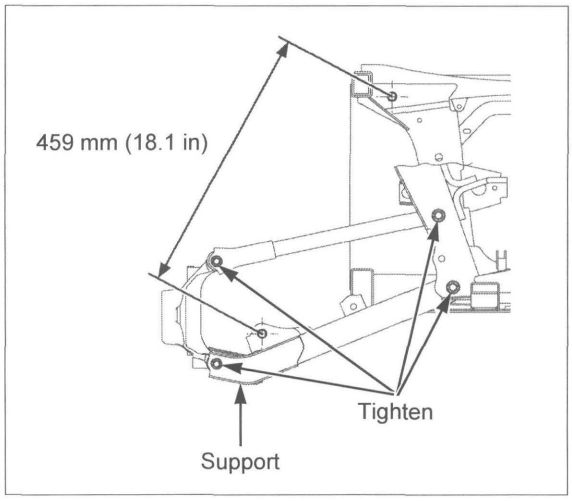
Adjust the suspension arm angle with a jack supporting the lower arm so that the distance between the centers of the shock absorber mounting bolt holes is specified one.

SPECIFIED DISTANCE: 459 mm (18.1 in)

After adjusting the angle, tighten all the upper and lower arm fasteners to the specified torque.

TORQUE:
Pivot nut (frame side):
100 N·m (10.2 kgf·m, 74 lbf·ft)
Pivot nuts (knuckle side):
44 N·m (4.5 kgf·m, 32 lbf·ft)

Install the stabilizer link (page 20-26).



REAR SHOCK ABSORBER

REMOVAL/INSTALLATION

Remove the following:

- rear wheel (page 20-6)
- mounting nuts [1]
- bolts [2]

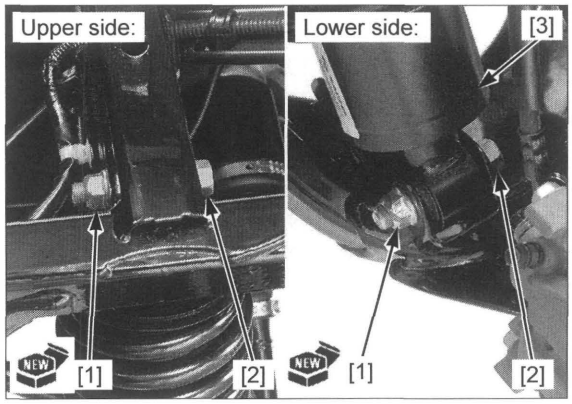
Push down the lower arm and remove the rear shock absorber [3].

Install the shock absorber in position while pushing down the lower arm.

Insert the bolts from the rear side.

Install the mounting bolts and new nuts, and tighten them.

TORQUE: 64 N·m (6.5 kgf·m, 47 lbf·ft)



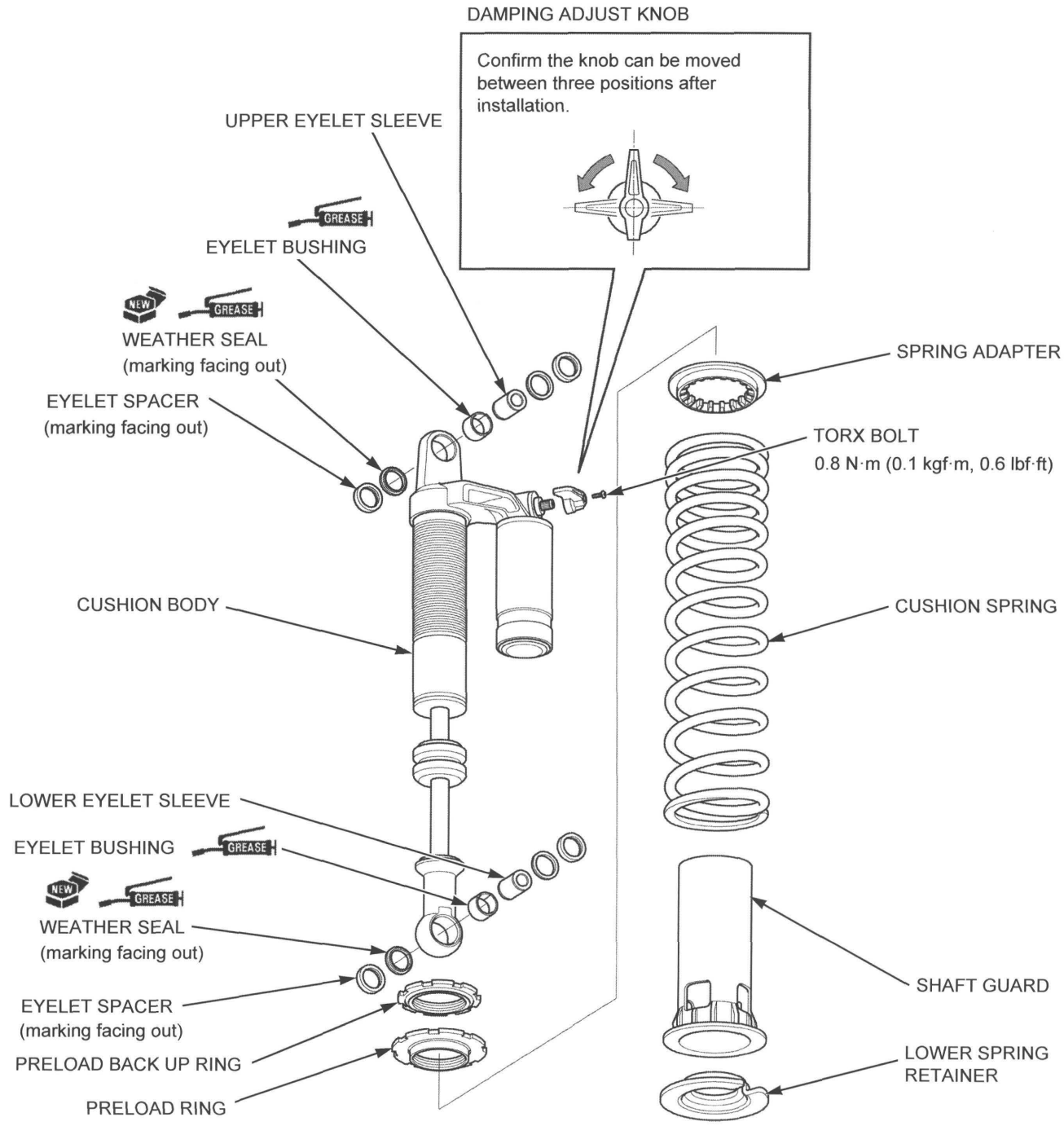
REAR CUSHION SPRING REMOVAL/ INSTALLATION (M5D IV A, IV AC, VI A, VI AC, VI CM/M3D IV A, IV AC, VI A, VI AC)

Refer to the front cushion spring removal/installation (page 20-18).

DISASSEMBLY/ASSEMBLY (M5D IV A, IV AC, VI A, VI AC, VI CM/M3D IV A, IV AC, VI A, VI AC)

Remove the cushion spring (page 20-28).

Disassemble and assemble the shock absorber according to the illustration.



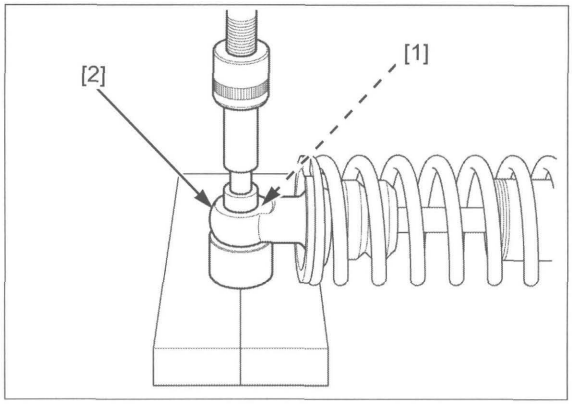
EYELET BUSHING REPLACEMENT (M5D IV A, IV AC, VI A, VI AC, VI CM/ M3D IV A, IV AC, VI A, VI AC)

Press the eyelet bushing [1] out of the cushion body [2].

Press a new eyelet bushing into the cushion body so that it is flush with the eyelet.

TOOLS:

Driver [1]	**07749-0010000**
Pilot, 25 mm [2]	**07746-0040600**



INSPECTION

Check the pivot bushings [1] for wear or damage.

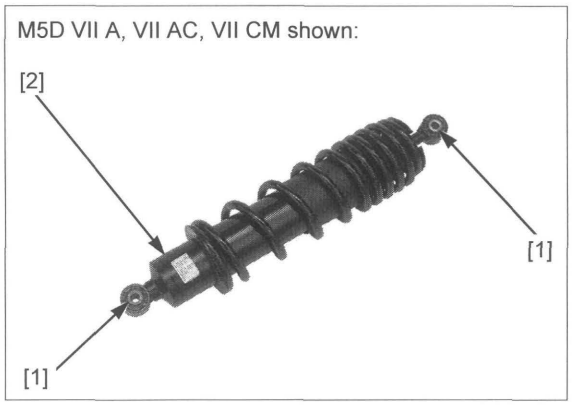
Check the damper unit [2] for leaks or other damage.

Replace the shock absorber assembly if necessary.

M5D IV A, IV AC, VI A, VI AC, VI CM/M3D IV A, IV AC, VI A, VI AC:

If shock absorber service/repair is required, contact a FOX Service Center (U.S.A. only: refer to Service Letter #73 - Third Party Service Information).

M5D VII A, VII AC, VII CM shown:



SHOCK ABSORBER DISPOSAL PROCEDURE (Except M5D IV A, IV AC, VI A, VI AC, VI CM/M3D IV A, IV AC, VI A, VI AC)

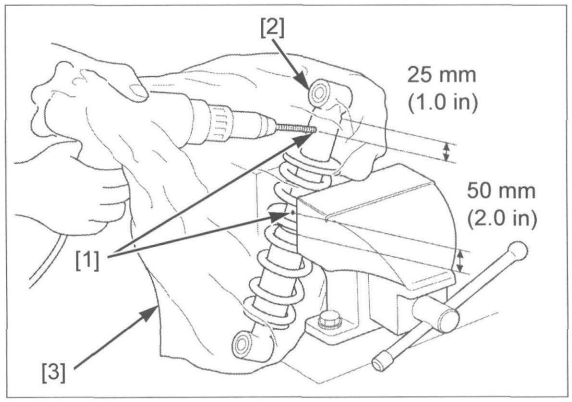
Center punch the damper to mark the drilling point [1].

Wrap the shock absorber [2] inside a plastic bag [3]. Support the shock absorber in a vise as shown. Through the open end of the bag, insert a drill motor with a sharp 5 mm (0.2 in) drill bit.

NOTE:

- Point the drill hole away from you to prevent debris getting in your eyes.

Hold the bag around the drill motor and briefly run the drill motor inside the bag; this will inflate the bag with air from the motor and help keep the bag from getting caught in the bit when you start.



21. BRAKE SYSTEM

SERVICE INFORMATION 21-2

TROUBLESHOOTING 21-2

COMPONENT LOCATION 21-3

BRAKE FLUID REPLACEMENT/
AIR BLEEDING 21-5

BRAKE PAD/DISC 21-8

MASTER CYLINDER 21-10

FRONT BRAKE CALIPER 21-12

REAR BRAKE CALIPER 21-14

BRAKE PEDAL 21-16

SERVICE INFORMATION

GENERAL

⚠ CAUTION

Frequent inhalation of brake pad dust, regardless of material composition could be hazardous to your health.
- Avoid breathing dust particles.
- Never use an air hose or brush to clean brake assemblies. Use an OSHA-approved vacuum cleaner.

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.

- A contaminated brake disc or pad reduces stopping power. Discard contaminated pads, and clean a contaminated disc with a high quality brake degreasing agent.
- Never allow contaminates (dirt, water, etc.) to get into an open reservoir.
- Once the hydraulic system has been opened, or if the brake feels spongy, the system must be bled.
- Always use fresh Honda 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 driving the vehicle.

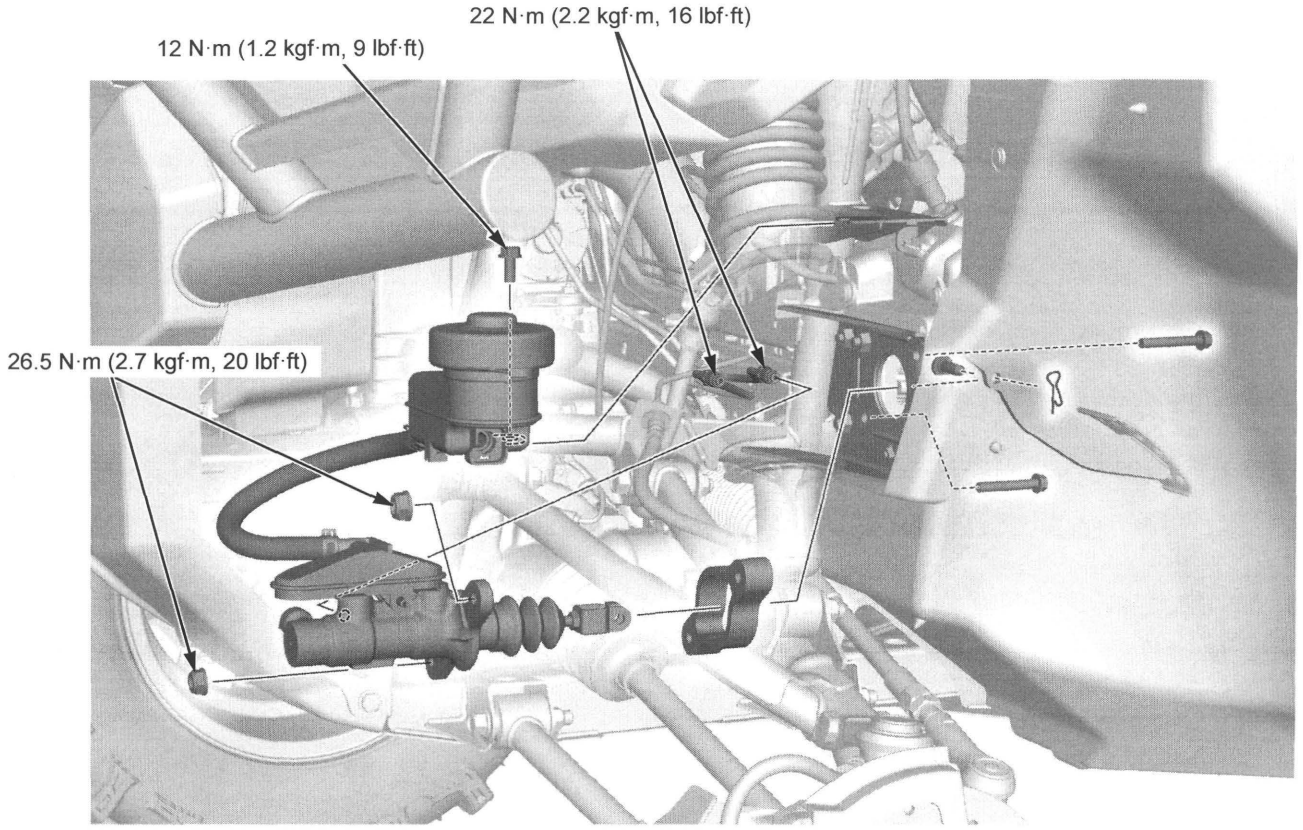
TROUBLESHOOTING

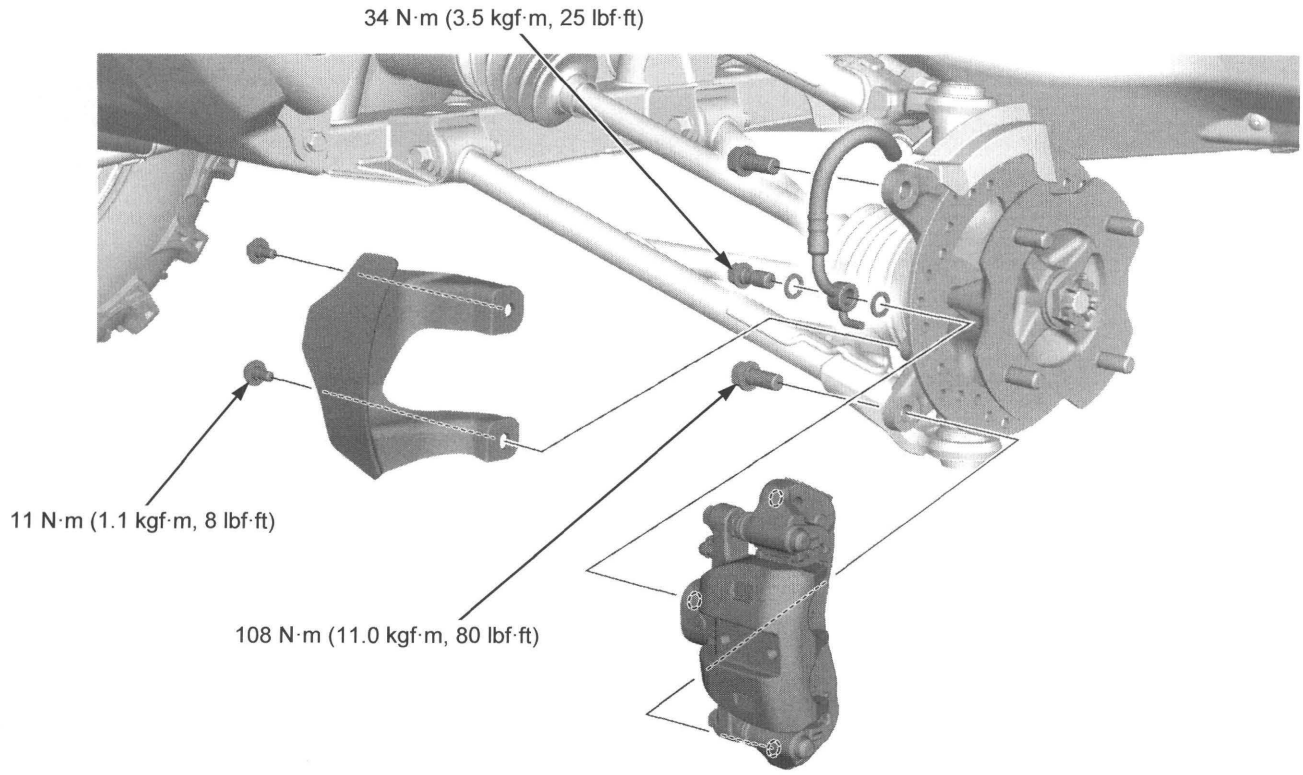
Brake pedal soft or spongy
- Air in hydraulic system
- Leaking hydraulic system
- Contaminated brake pad/disc
- Worn caliper piston seal
- Worn master cylinder piston cups
- Worn brake pad/disc
- Contaminated caliper
- Contaminated master cylinder
- Caliper not sliding properly
- Low brake fluid level
- Clogged fluid passage
- Warped/deformed brake disc
- Sticking/worn caliper piston
- Sticking/worn master cylinder piston

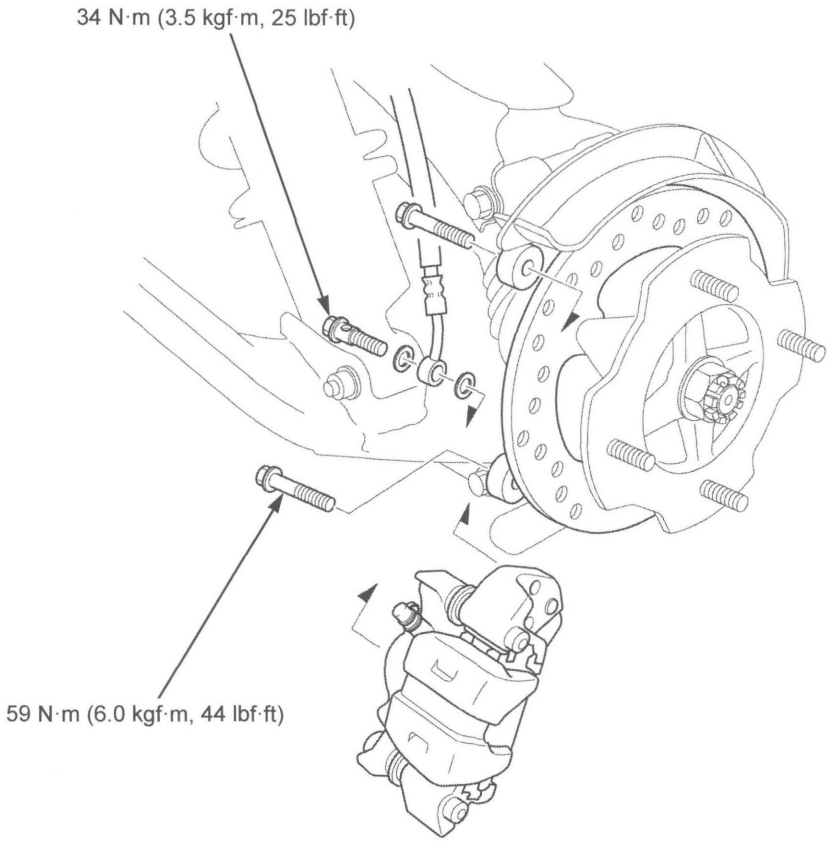
Brake pedal hard
- Clogged/restricted brake system
- Sticking/worn caliper piston
- Sticking/worn master cylinder piston
- Caliper not sliding properly
- Bent brake pedal

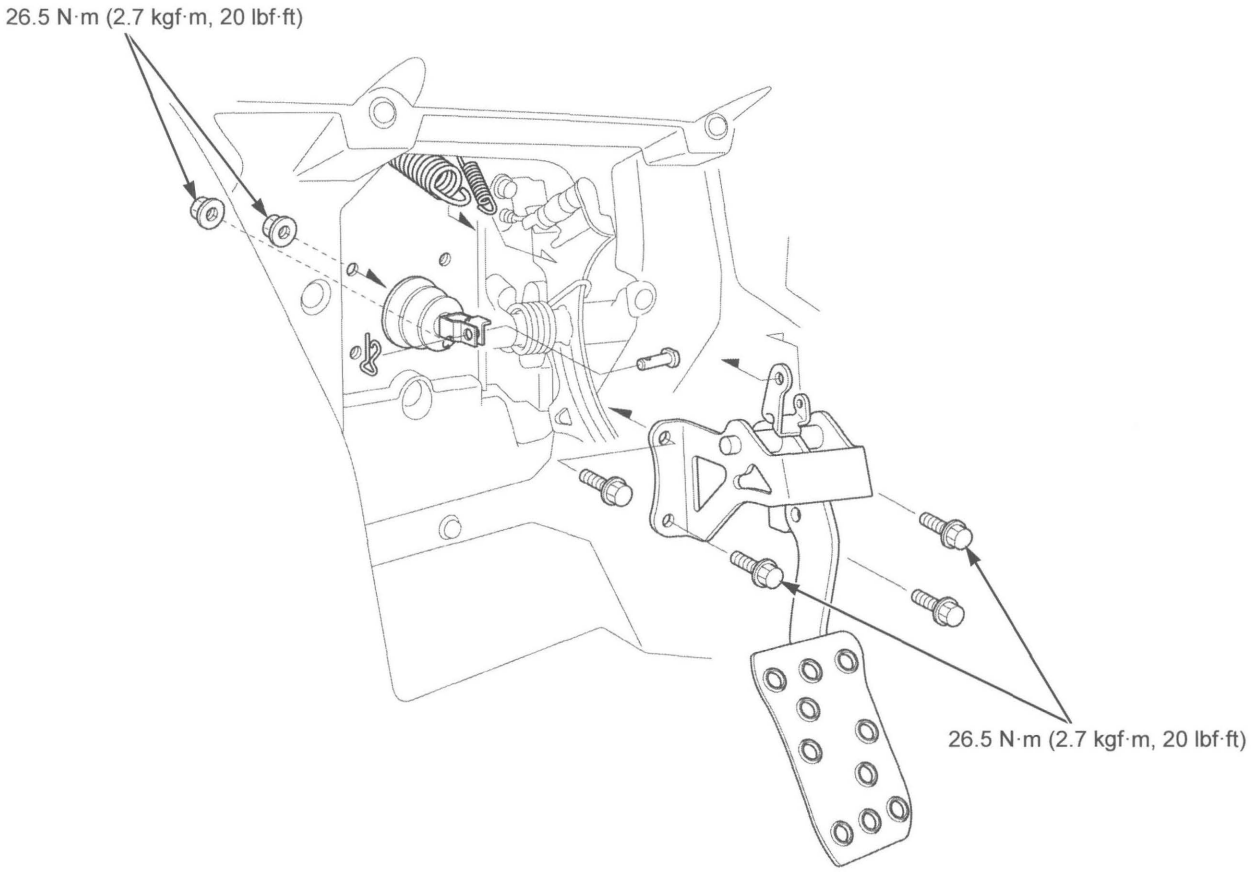
Brake drags
- Contaminated brake pad/disc
- Badly worn brake pad/disc
- Warped/deformed brake disc
- Caliper not sliding properly
- Clogged/restricted fluid passage
- Sticking caliper piston

COMPONENT LOCATION






34 N·m (3.5 kgf·m, 25 lbf·ft)
59 N·m (6.0 kgf·m, 44 lbf·ft)

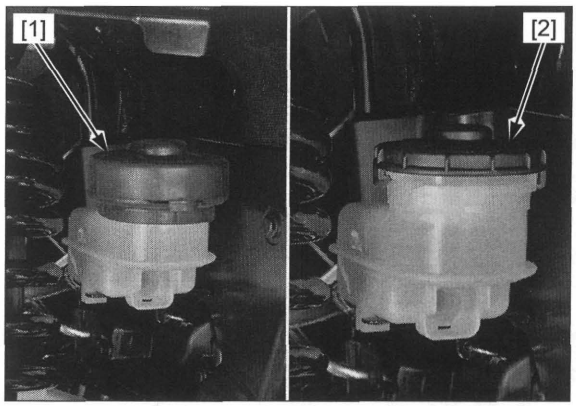

26.5 N·m (2.7 kgf·m, 20 lbf·ft)
26.5 N·m (2.7 kgf·m, 20 lbf·ft)

BRAKE FLUID REPLACEMENT/AIR BLEEDING

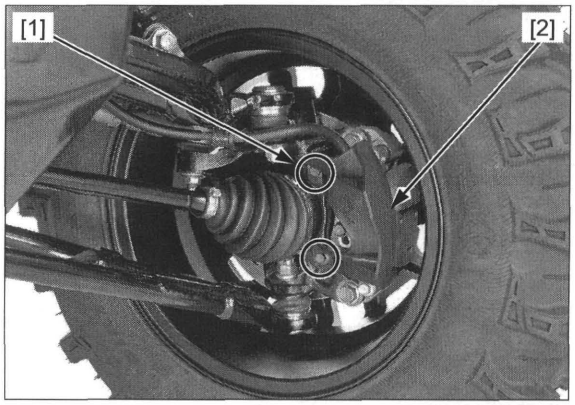
BRAKE FLUID DRAINING

Remove the cap cover [1] out of the reservoir tank.

Remove the reservoir cap [2] by turning it counterclockwise.



Remove the bolts [1] and outboard guard [2].



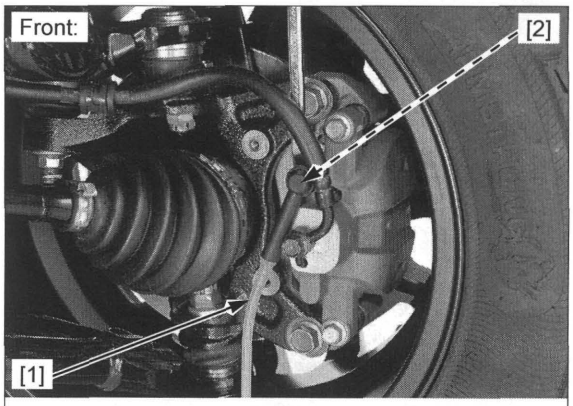
Remove the bleed valve cap.

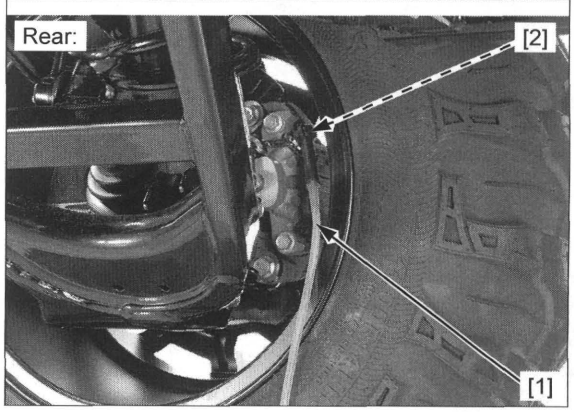
Connect the bleed hose [1] to the caliper bleed valve [2].

Loosen the bleed valve and pump the brake pedal until no more fluid flows out of the bleed valve.

Perform above procedure for each caliper bleed valve.

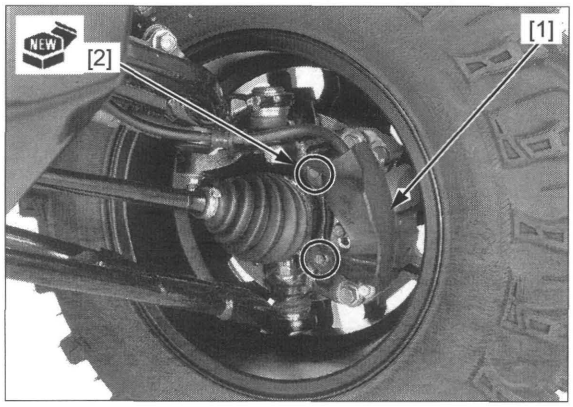
Close each caliper bleed valve.





Install the outboard guard [1] with new bolts [2], then tighten the bolts.

TORQUE: 11 N·m (1.1 kgf·m, 8 lbf·ft)



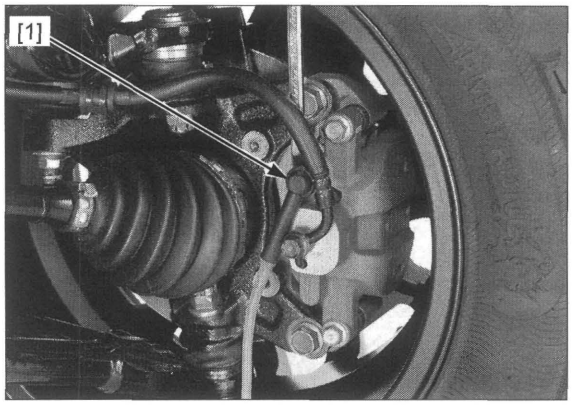
BRAKE FLUID FILLING/BLEEDING

Fill the reservoir with Honda 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.



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)

Install the valve cap.

Perform the above procedure at each remaining bleed valve.

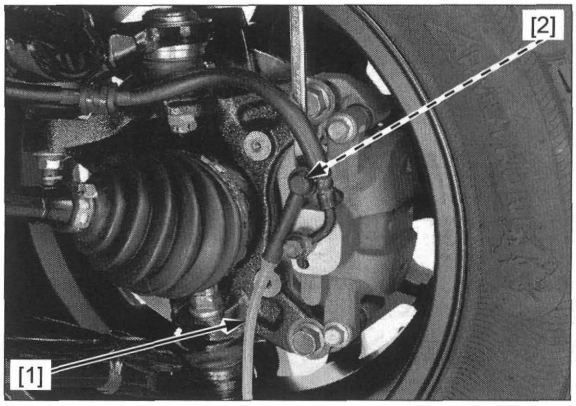
After bleeding air, operate the brake pedal.

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 brake pedal until the pedal resistance is felt.

Connect a bleed hose [1] to the caliper bleed valve [2] and bleed the system as follows:



Do not release the brake pedal until the bleed valve has been closed.

1. Depress the brake pedal 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 pedal 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)

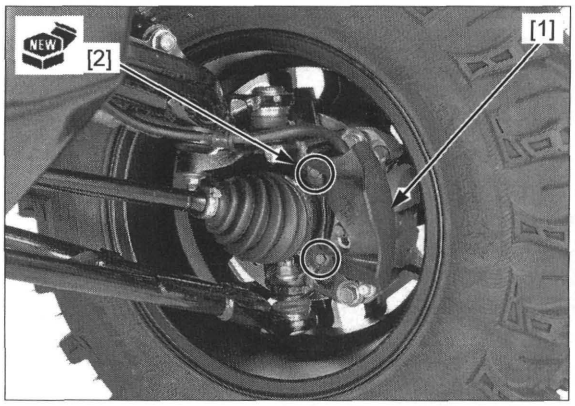
Install the valve cap.

Perform the above procedure at each remaining bleed valve.

After bleeding air, operate the brake pedal. If it still feels spongy, bleed the system again.

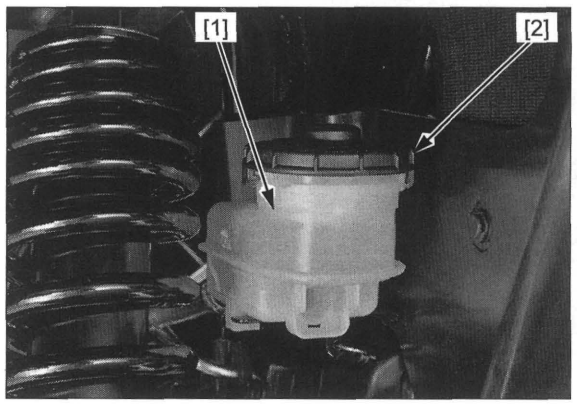
Install the outboard guard [1] with new bolts [2], then tighten the bolts.

TORQUE: 11 N·m (1.1 kgf·m, 8 lbf·ft)

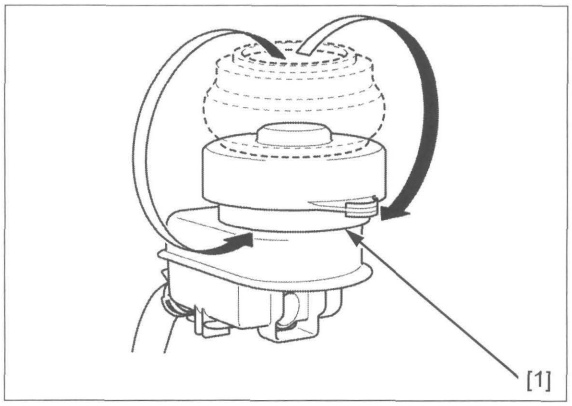


Fill the reservoir to the MAX line [1] with Honda DOT 4 brake fluid from a sealed container.

Install the reservoir cap [2].



Turn the cap cover [1] inside out and install it over the reservoir cap securely.

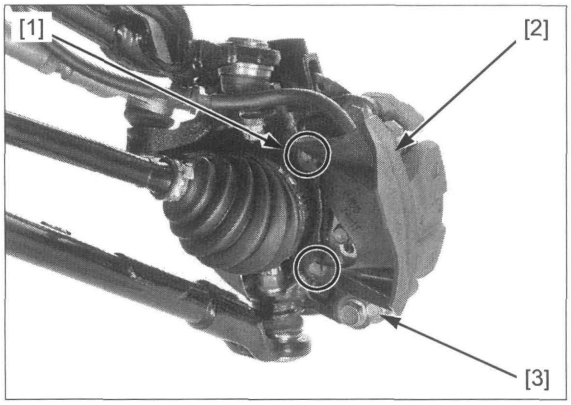


BRAKE PAD/DISC

FRONT BRAKE PAD REPLACEMENT

Remove the following:

- front wheel (page 20-6)
- bolts [1]
- outboard guard [2]
- lower slide pin bolt [3]



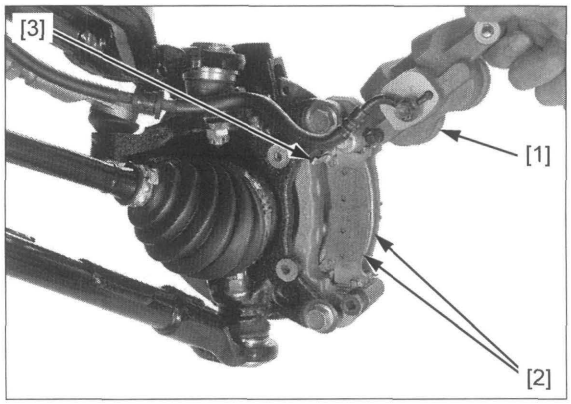
Pivot the caliper body [1] up and remove the brake pads [2] from the caliper bracket.

Clean the inside of the caliper especially around the caliper pistons.

Push the caliper pistons all the way.

Always replace the brake pads in pairs to ensure even disc pressure.

Install new pads onto the caliper bracket properly so the wear indicator [3] on the inner pad is facing the upper side.



Lower the caliper body, install the lower slide pin bolt [1] and tighten it.

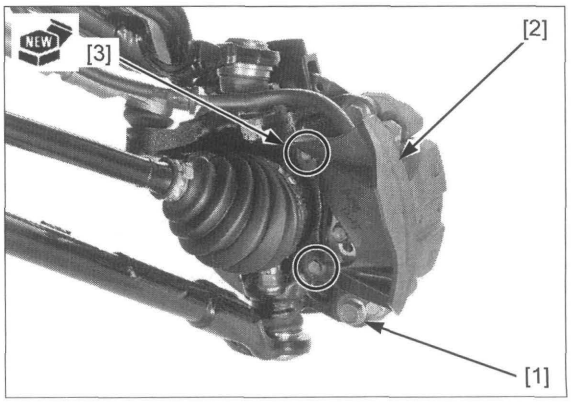
TORQUE: 22 N·m (2.2 kgf·m, 16 lbf·ft)

Install the outboard guard [2] with new bolts [3], then tighten the bolts.

TORQUE: 11 N·m (1.1 kgf·m, 8 lbf·ft)

Operate the brake pedal to seat the caliper pistons against the pad.

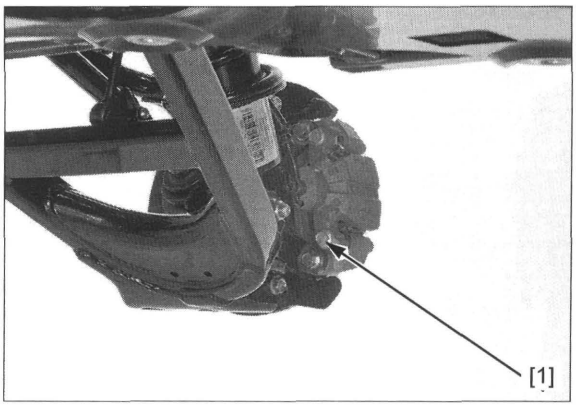
Install the front wheel (page 20-6).



REAR BRAKE PAD REPLACEMENT

Remove the following:

- rear wheel (page 20-6)
- lower slide pin bolts [1]



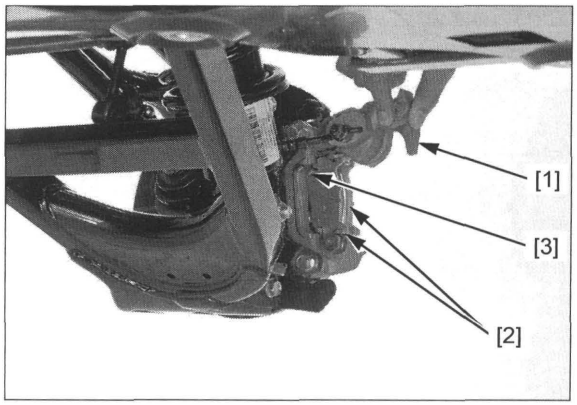
Pivot the caliper body [1] up and remove the brake pads [2] from the caliper bracket.

Clean the inside of the caliper especially around the caliper pistons.

Push the caliper pistons all the way.

Always replace the brake pads in pairs to ensure even disc pressure.

Install new pads onto the caliper bracket properly so the wear indicator [3] on the inner pad is facing the upper side.

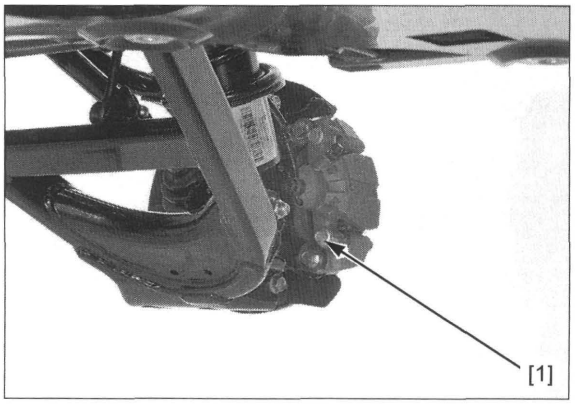


Lower the caliper body, install the lower slide pin bolt [1] and tighten it.

TORQUE: 22 N·m (2.2 kgf·m, 16 lbf·ft)

Operate the brake pedal to seat the caliper piston against the pad.

Install the rear wheel (page 20-6).



BRAKE DISC INSPECTION

Visually inspect the brake disc for damage or cracks.

Measure the brake disc according to BRAKE SYSTEM SPECIFICATIONS (page 1-13) and replace if necessary.

MASTER CYLINDER

REMOVAL/INSTALLATION

Drain the brake fluid (page 21-5).

Remove the inner fender (page 2-15).

Remove the clip [1] and joint pin [2] to disconnect the push rod [3].

When removing the joint nut, cover the ends of the brake pipes to prevent brake fluid leakage.

Loosen the joint nuts [4] to disconnect the brake pipes [5].

Remove the reservoir mounting bolt [6] and reservoir [7].

Remove the two mounting nuts [8], bolts [9], and master cylinder [10] from the frame.

Insert the bolts from the pedal side.

Install the master cylinder with the mounting bolts and nuts, aligning the push rod slit with the brake pedal.

Be careful not to cross-thread the joint nuts.

Connect the brake pipes to the master cylinder with the joint nuts.

Tighten the mounting nuts, then tighten the joint nuts.

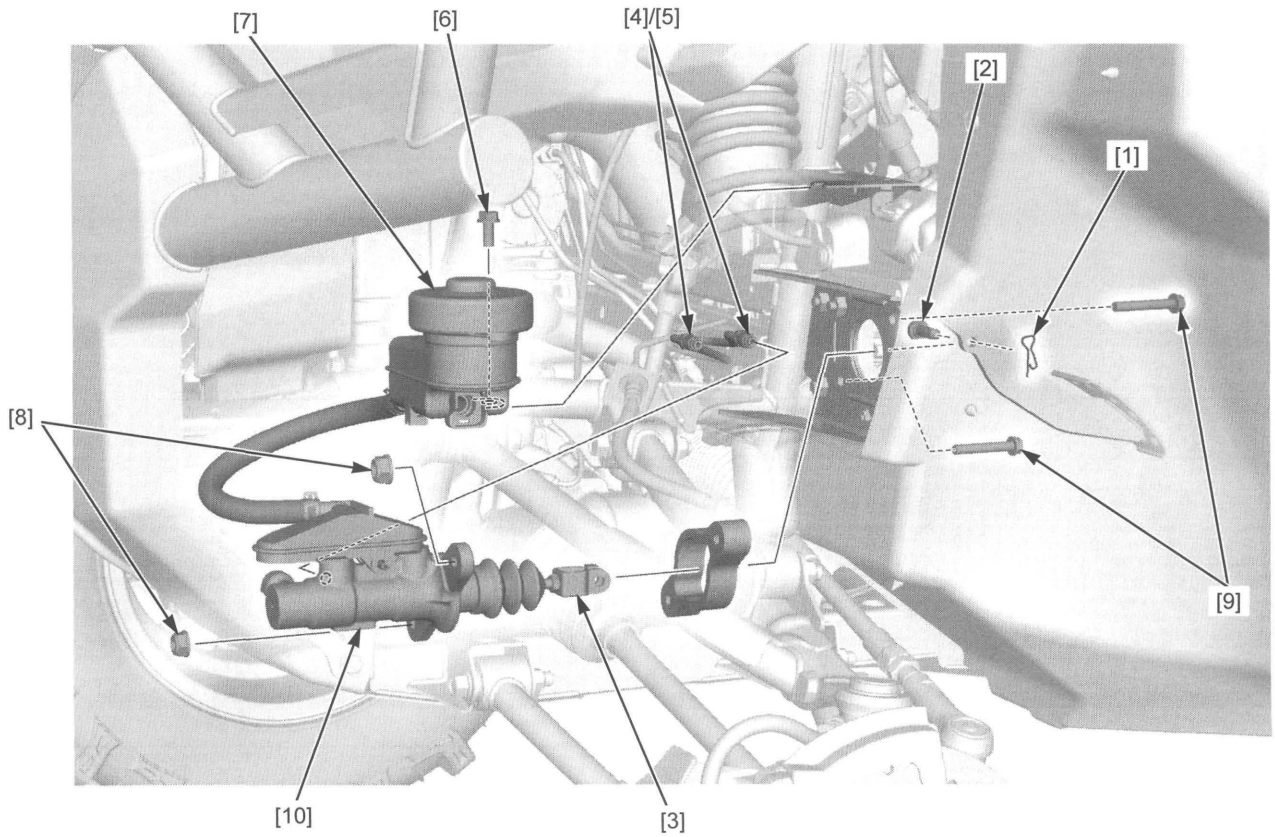
Install the reservoir and new reservoir mounting bolt.

Connect the push rod to the pedal with the joint pin and secure it with the clip.

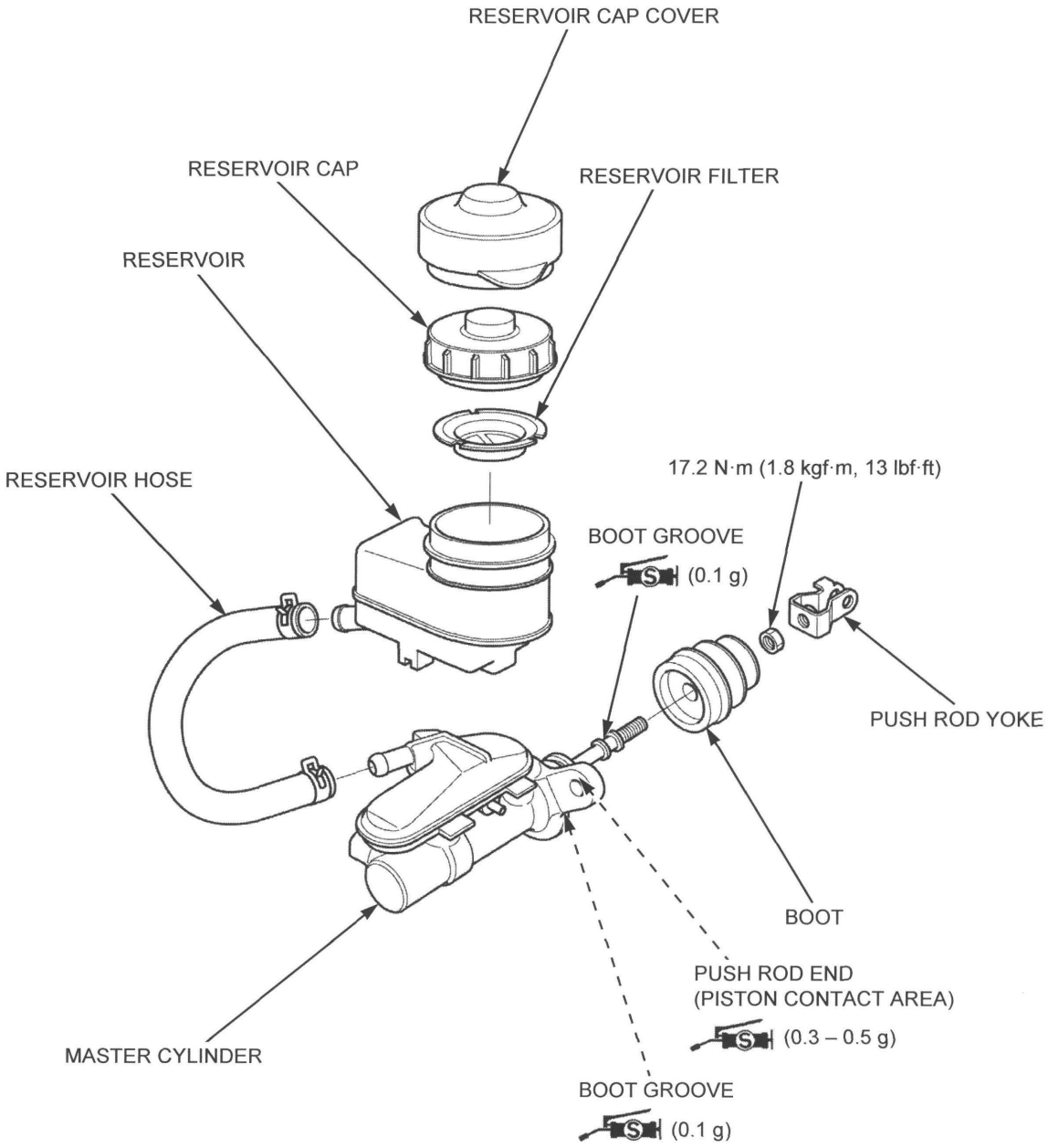
TORQUE:

Brake pipe joint nut
22 N·m (2.2 kgf·m, 16 lbf·ft)
Master cylinder mounting nut
26.5 N·m (2.7 kgf·m, 20 lbf·ft)
Master cylinder reservoir mounting bolt
12 N·m (1.2 kgf·m, 9 lbf·ft)

Fill and bleed the hydraulic system (page 21-6).

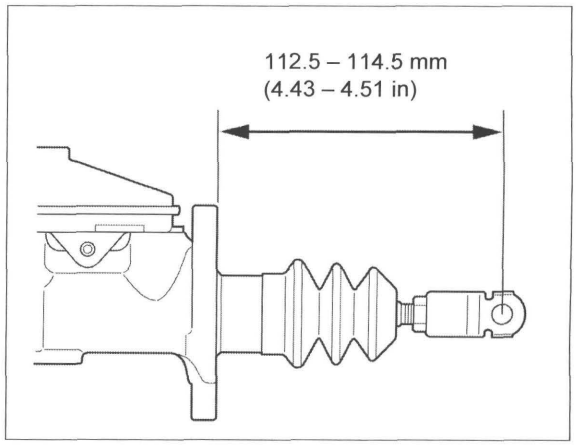


DISASSEMBLY/ASSEMBLY



If the rod joint of the push rod is reinstalled, adjust the push rod length as shown and tighten the joint to the specified torque.

TORQUE: 17.2 N·m (1.8 kgf·m, 13 lbf·ft)



INSPECTION

Inspect the following parts for scoring, scratches, deterioration and damage.

- master cylinder
- piston
- spring
- boot

Measure the parts according to BRAKE SYSTEM SPECIFICATIONS (page 1-13) and replace if necessary.

FRONT BRAKE CALIPER

REMOVAL/INSTALLATION

Remove the following:

- front wheel (page 20-6)
- outboard guard (page 21-8)

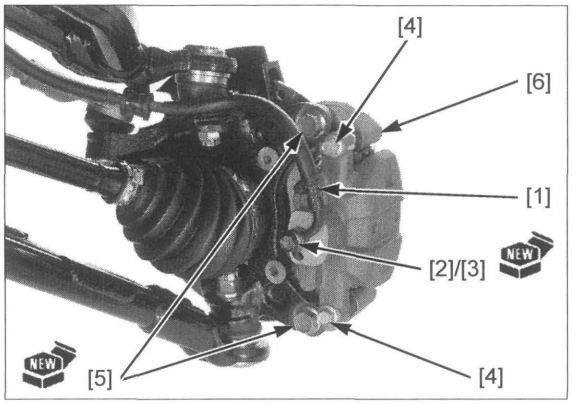
Drain the brake fluid (page 21-5).

When removing the oil bolt, cover the end of brake hose to prevent contamination.

Remove the brake hose [1] by removing the oil bolt [2] and sealing washers [3].

If the brake caliper will be disassembled, loosen the two slide pin bolts [4].

Remove the two mounting bolts [5] and brake caliper [6].



Installation is in the reverse order of removal.

NOTE:

- Always replace the brake caliper mounting bolts and sealing washers with new ones.
- Insert the brake hose joint pin into the hole in the caliper.

TORQUE:

Front brake caliper mounting bolt:
108 N·m (11.0 kgf·m, 80 lbf·ft)

Front brake caliper slide pin bolt:
22 N·m (2.2 kgf·m, 16 lbf·ft)

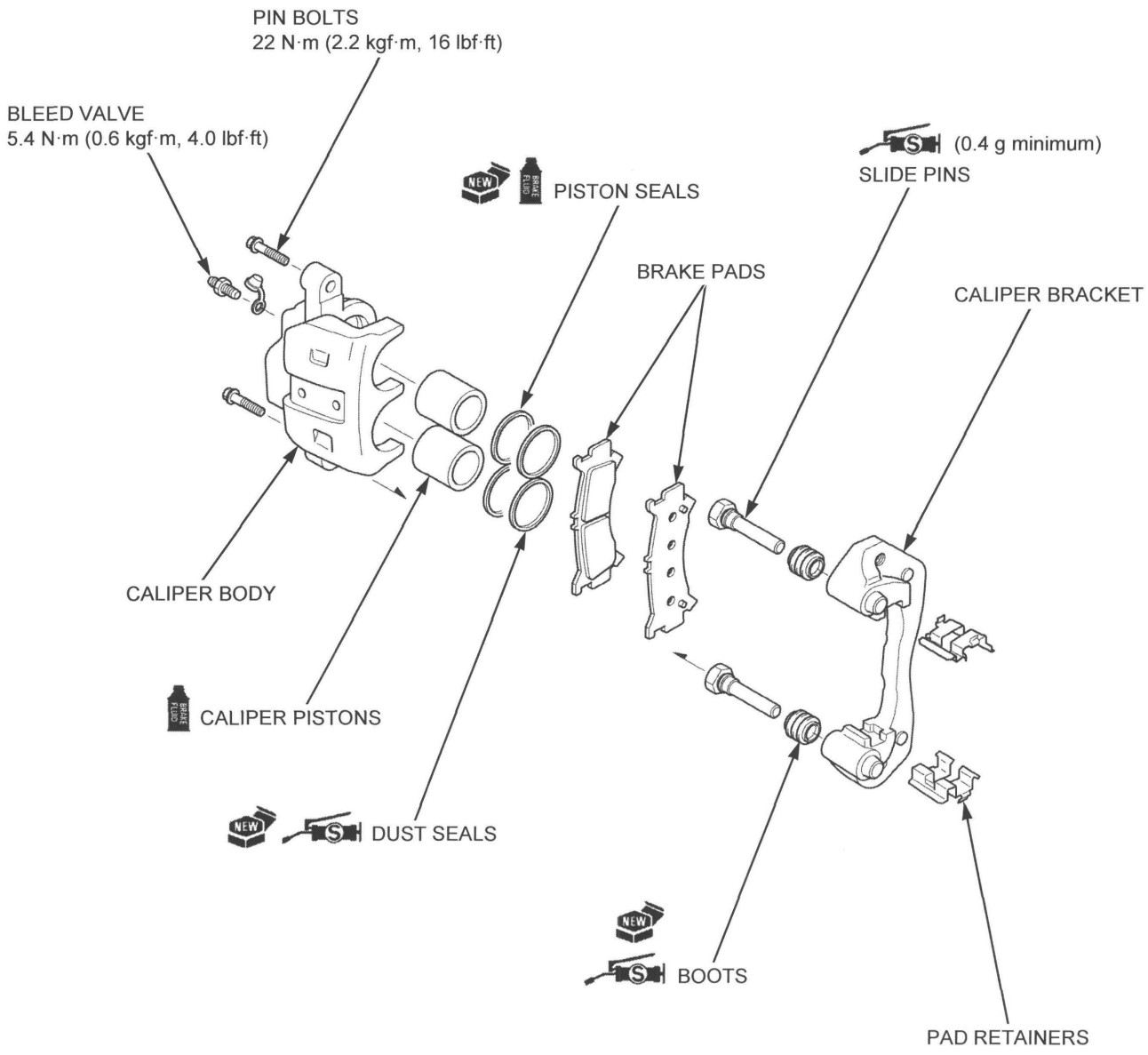
Brake hose oil bolt:
34 N·m (3.5 kgf·m, 25 lbf·ft)

Fill and bleed the hydraulic system (page 21-6).

Install the following:

- outboard guard (page 21-8)
- front wheel (page 20-6)

DISASSEMBLY/ASSEMBLY



INSPECTION

Inspect the following parts for scoring, scratches,? deterioration and damage.

- caliper cylinder
- caliper pistons

Measure the parts according to BRAKE SYSTEM SPECIFICATIONS (page 1-13) and replace if necessary.

REAR BRAKE CALIPER

REMOVAL/INSTALLATION

Remove the rear wheel (page 20-6).

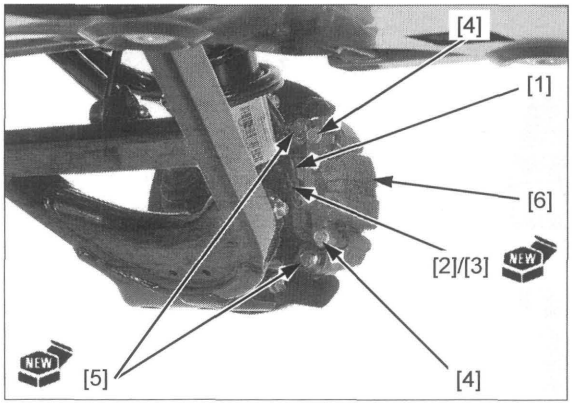
Drain the brake fluid (page 21-5).

When removing the oil bolt, cover the end of brake hose to prevent contamination.

Remove the brake hose [1] from the caliper body by removing the oil bolt [2] and sealing washers [3].

If the brake caliper will be disassembled, loosen the two slide pin bolts [4].

Remove the two mounting bolts [5] and brake caliper [6].



Installation is in the reverse order of removal.

NOTE:

- Always replace the brake caliper mounting bolts and sealing washers with new ones.
- Insert the brake hose joint pin into the hole in the caliper.

TORQUE:

Rear brake caliper mounting bolt:
59 N·m (6.0 kgf·m, 44 lbf·ft)

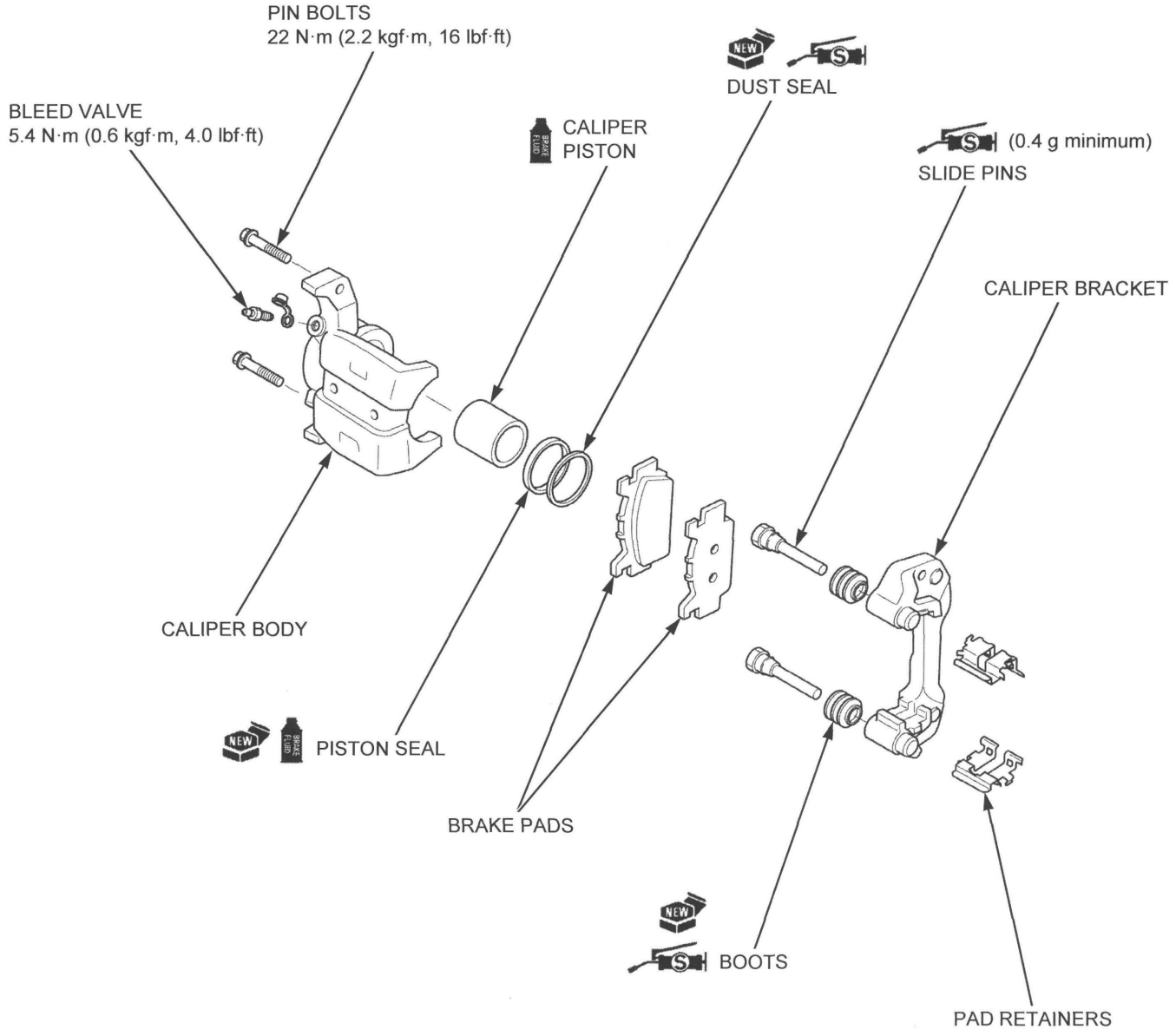
Rear brake caliper slide pin bolt:
22 N·m (2.2 kgf·m, 16 lbf·ft)

Brake hose oil bolt:
34 N·m (3.5 kgf·m, 25 lbf·ft)

Fill and bleed the hydraulic system (page 21-6).

Install the rear wheel (page 20-6).

DISASSEMBLY/ASSEMBLY



INSPECTION

Inspect the following parts for scoring, scratches, deterioration and damage.

- caliper cylinder
- caliper pistons

Measure the parts according to BRAKE SYSTEM SPECIFICATIONS (page 1-13) and replace if necessary.

BRAKE PEDAL

REMOVAL/INSTALLATION

Unhook the return spring [1] and switch spring [2] from the brake pedal [3].

Do not force the master cylinder after removing the brake pedal assembly or the brake pipes will be deformed.

Remove the two nuts [4], two bolts [5] (master cylinder mounting nuts/bolts), two bolts [6], and the brake pedal assembly.

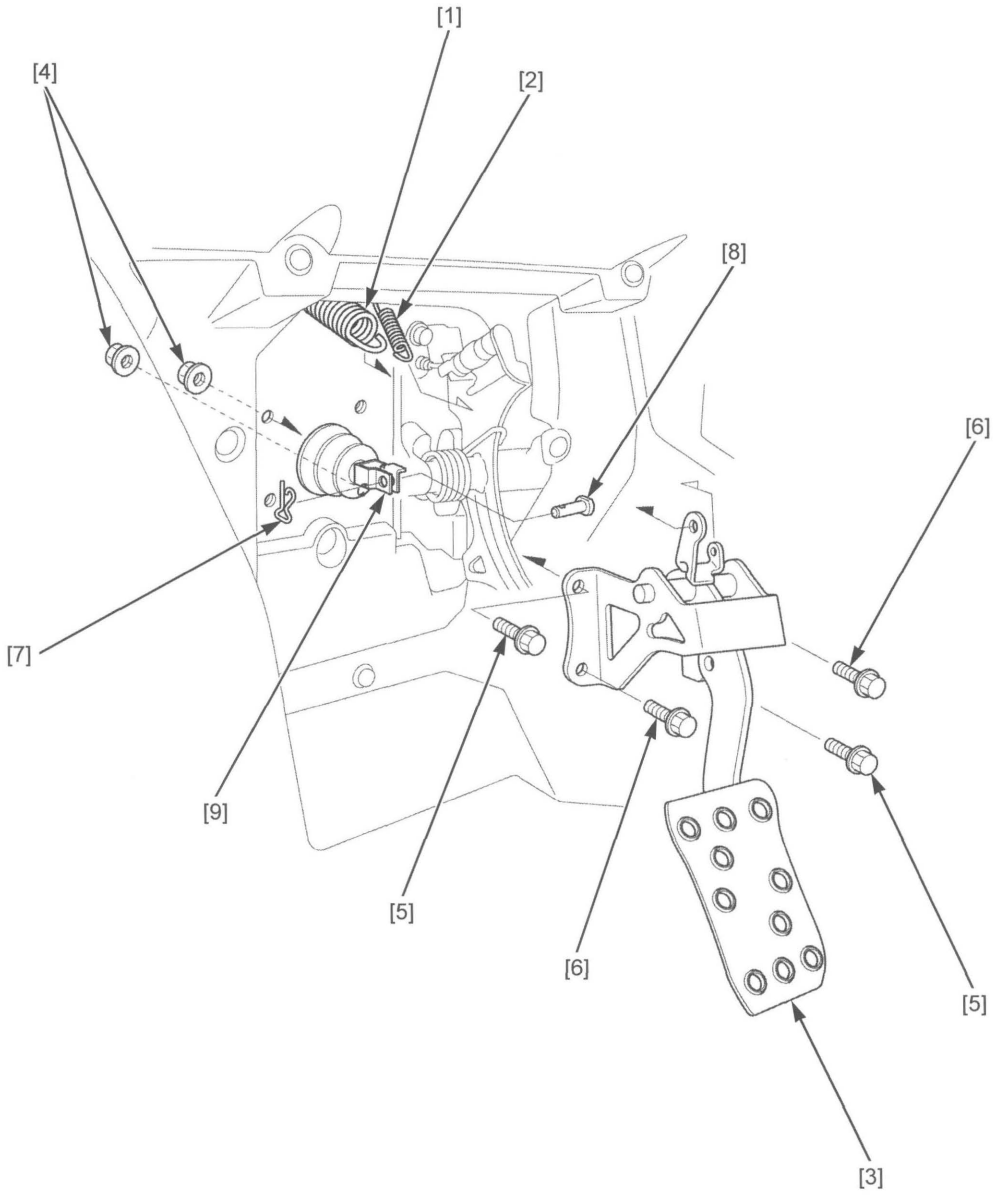
Remove the clip [7] and joint pin [8] to disconnect the push rod [9].

Installation is in the reverse order of removal.

TORQUE:

Master cylinder mounting nut
26.5 N·m (2.7 kgf·m, 20 lbf·ft)

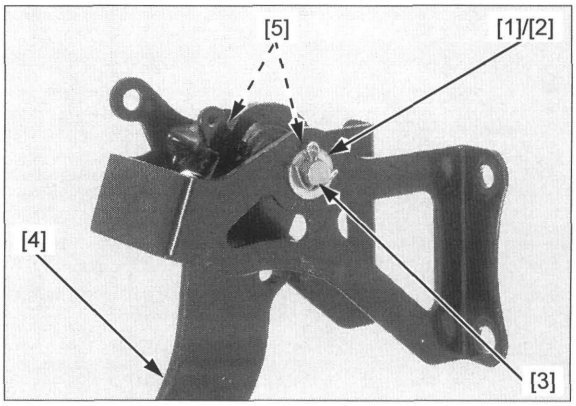
Brake pedal mounting bolt
26.5 N·m (2.7 kgf·m, 20 lbf·ft)



DISASSEMBLY

Remove the following:

- cotter pin [1] and washer [2]
- pivot shaft [3]
- brake pedal [4]
- dust seals [5]



ASSEMBLY

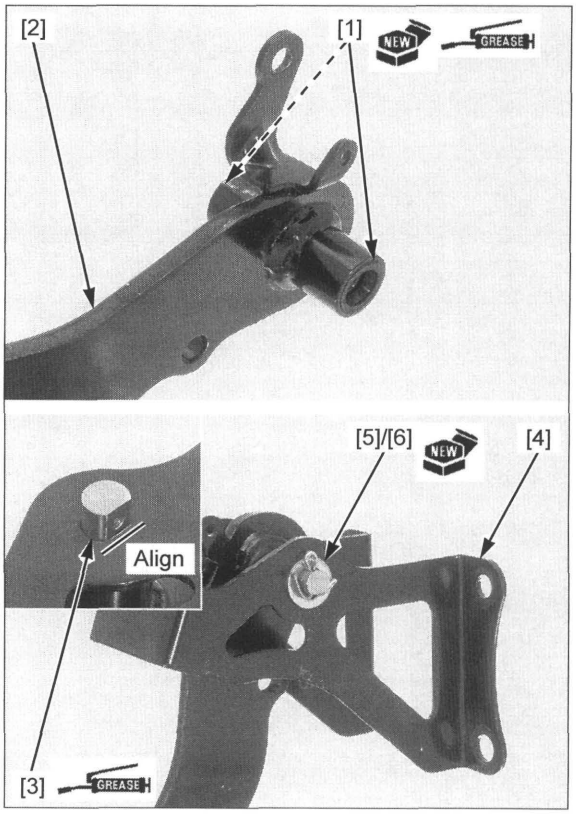
Coat the lips of new dust seals [1] with grease.

Install the dust seals into the brake pedal [2] with the flat side facing out until they are fully seated.

Apply grease to the groove in the pivot shaft [3].

Install the brake pedal into the bracket [4] by inserting the pivot shaft from the left side, and align the flat surfaces of the shaft and bracket.

Install the washer [5] and a new cotter pin [6].



MEMO

22. BATTERY/CHARGING SYSTEM

SERVICE INFORMATION 22-2

TROUBLESHOOTING 22-3

SYSTEM LOCATION 22-3

SYSTEM DIAGRAM 22-3

BATTERY 22-4

CHARGING SYSTEM INSPECTION 22-5

ALTERNATOR CHARGING COIL 22-6

REGULATOR/RECTIFIER 22-6

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.
- 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 driving the vehicle.
- The battery will self-discharge when the vehicle is not in use. For this reason, charge the battery every two weeks to prevent sulfation from occurring.
- Filling a new battery with electrolyte will produce some voltage, but in order to achieve its maximum performance, always charge the battery. Also, the battery life is lengthened when it is initially charged.
- When checking the charging system, always follow the steps in the troubleshooting (page 22-3).
- Alternator removal/installation (page 13-4).

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.

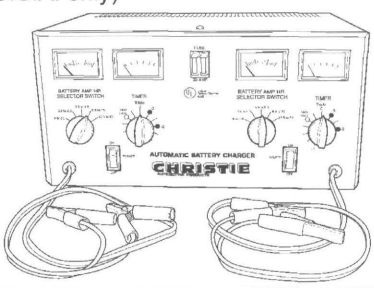
RECOMMENDED BATTERY TESTER: Micro 404XL (U.S.A. only)

TOOLS

Motorcycle battery analyzer
Micro 404XL (U.S.A. only)



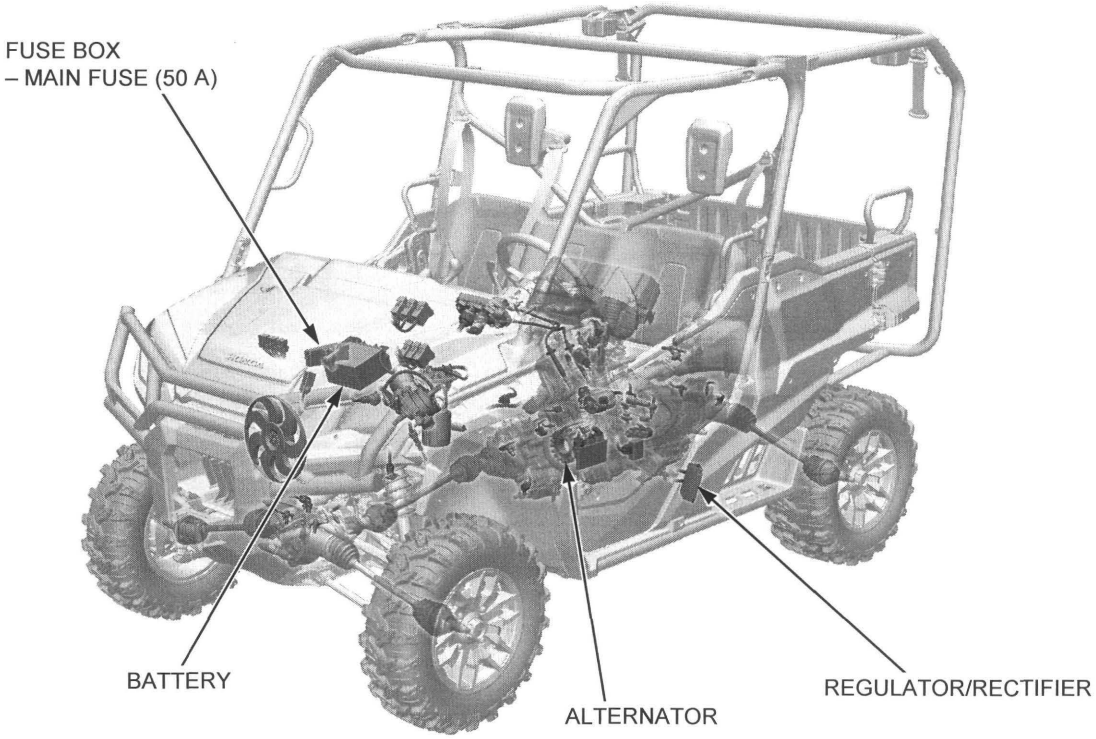
Christie battery charger
MC1012/2T or Tecmate PRO 4S
(U.S.A. only)



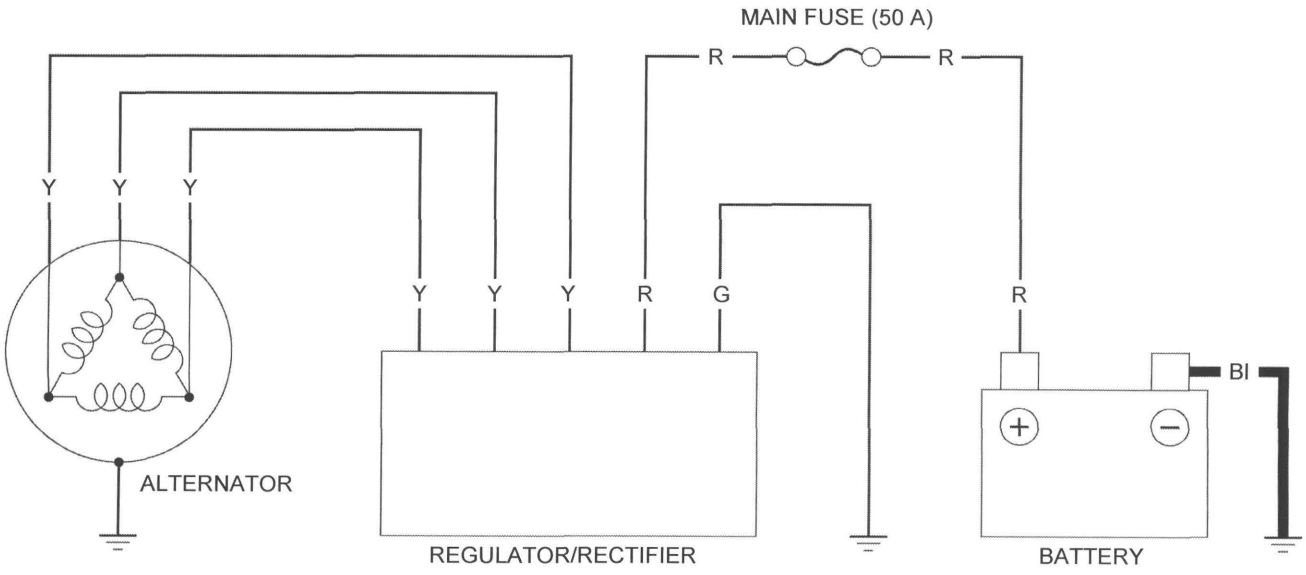
TROUBLESHOOTING

Unusual condition		Probable cause (Check in numerical order)
Battery	Battery is damaged or weak	1. Faulty battery 2. Current leakage higher than specified value – Faulty ignition switch – Shorted wire harness 3. Faulty alternator charging coil 4. Faulty regulator/rectifier 5. Open circuit or loose connection in the wire harness

SYSTEM LOCATION



SYSTEM DIAGRAM

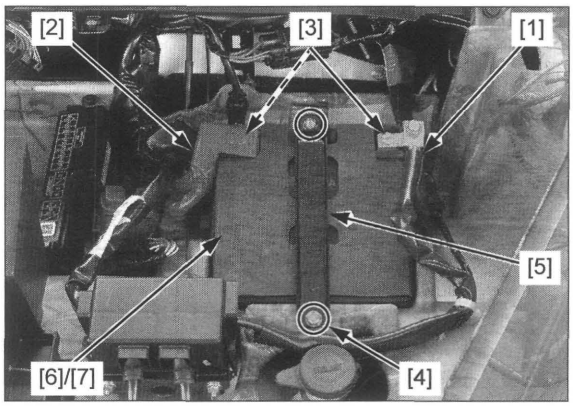


BATTERY

REMOVAL/INSTALLATION

Remove the front hood (page 2-17).

With the ignition switch turned OFF (O), disconnect the negative (–) cable [1] first, then disconnect the positive (+) cable [2] by removing each terminal bolt [3].
Remove the two bolts [4] and battery holder [5].
Remove the battery [6]/battery cover [7].
Remove the battery cover from the battery.



Connect the positive (+) cable first and then the negative (–) cable.

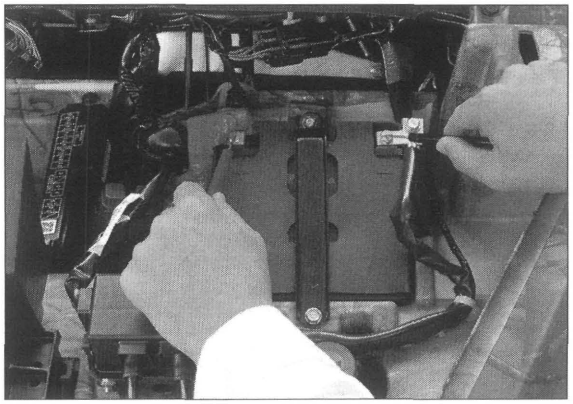
Installation is in the reverse order of removal.

VOLTAGE INSPECTION

Remove the front hood (page 2-17).

Measure the battery voltage using a commercially available digital multimeter.

VOLTAGE (20°C/68°F):
Fully charged: 13.0 – 13.2 V
Under charged: Below 12.3 V



BATTERY TESTING

Remove the battery (page 22-4).

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 22-4).

Refer to the instructions that are appropriate to the battery charging equipment available to you.

TOOL:

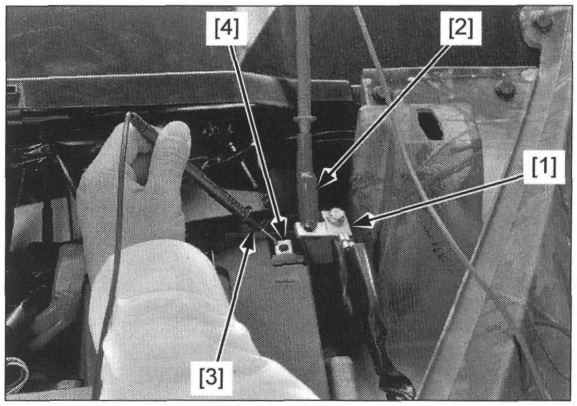
Christie battery charger	**MC1012/2T or Tecmate Pro 4S (U.S.A. only)**

CHARGING SYSTEM INSPECTION

CURRENT LEAKAGE INSPECTION

Remove the front hood (page 2-17).

With the ignition switch turned OFF (O), 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 (O), 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 the fuse in the tester.
- While measuring current, do not turn the ignition switch ON (I). A sudden surge of current may blow the fuse in the tester.

SPECIFIED CURRENT LEAKAGE: 0.04 mA maximum

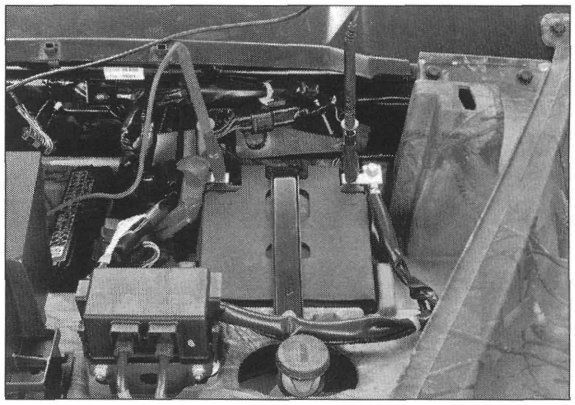
If current leakage exceeds the specified value, a shorted circuit is likely.
Locate the short by disconnecting connections one by one and measuring the current.

CHARGING VOLTAGE INSPECTION

Remove the front hood (page 2-17).

Be sure the battery is in good condition before performing this test.

Warm up the engine to normal operating temperature.
Connect the multimeter between the battery positive (+) and negative (–) terminals.



NOTE:

- To prevent a short, make absolutely certain which are the positive (+) and negative (–) terminals or cables.
- Do not disconnect the battery or any cable in the charging system without first switching off the ignition switch. Failure to follow this precaution can damage the tester or electrical components.

With the headlights on, 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 22-4)
CV = Charging voltage

ALTERNATOR CHARGING COIL

INSPECTION

M3D/M5D: Remove the seat under storage (page 2-6).
M3P/M5P: Remove the seat under cover (page 2-6).

Remove the mounting bolts [1] and disconnect the 3P (Gray) connector [2] from the regulator/rectifier.

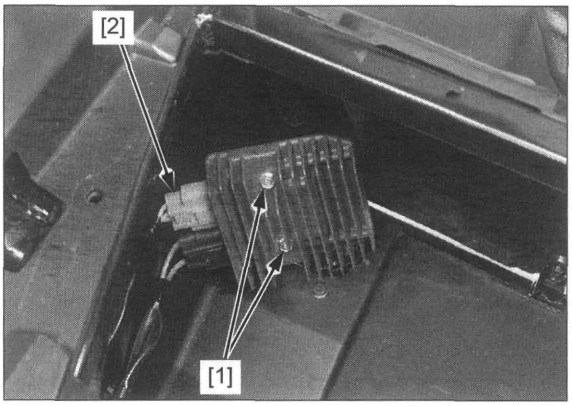
Check the connector for loose contacts or corroded terminals.

Measure the resistance between the Yellow wire terminals of the alternator side connector.

STANDARD: 0.05 – 0.5 Ω (20°C/68°F)

Check for continuity between each Yellow wire terminal and ground. There should be no continuity.

If resistance is out of specification, or if any wire has continuity to ground, replace the stator/CKP sensor (page 13-10).



REGULATOR/RECTIFIER

WIRE HARNESS INSPECTION

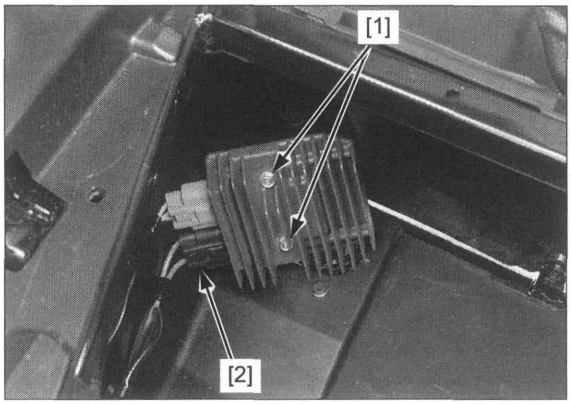
M3D/M5D: Remove the seat under storage (page 2-6).
M3P/M5P: Remove the seat under cover (page 2-6).

Remove the mounting bolts [1] and disconnect the 3P (Black) connector [2] from the regulator/rectifier.

Check the connector for loose contacts or corroded terminals.

Check the following at the wire harness side connector.

- Battery Line:
  Measure the voltage between the Red wire terminal and ground.
  There should be battery voltage at all times.
- Ground Line:
  Check for continuity between the Green wire terminal and ground.
  There should be continuity at all times.



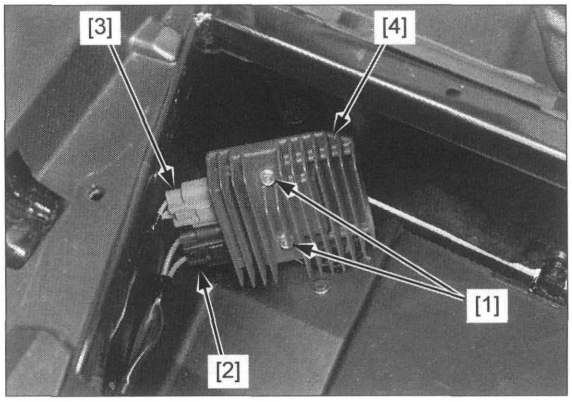
REMOVAL/INSTALLATION

M3D/M5D: Remove the seat under storage (page 2-6).
M3P/M5P: Remove the seat under cover (page 2-6).

Remove the mounting bolts [1].

Disconnect the 3P (Black) connector [2] and 3P (Gray) connector [3] from the regulator/rectifier [4].

Installation is in the reverse order of removal.



23. LIGHTS/METERS/SWITCHES

SERVICE INFORMATION 23-2

SYSTEM LOCATION 23-3

HEADLIGHT 23-4

BRAKE/TAILLIGHT 23-6

COMBINATION METER 23-6

FUEL GAUGE/
FUEL LEVEL SENSOR 23-10

ACCESSORY SOCKET 23-13

IGNITION SWITCH 23-14

LIGHTING/DIMMER SWITCH 23-15

HEADLIGHT RELAY 23-16

COOLING FAN MOTOR/
FAN CONTROL UNIT 23-19

BRAKE LIGHT SWITCH 23-22

FRONT DIFFERENTIAL
LOCK SWITCH (Except I-4WD model) ... 23-23

REAR DIFFERENTIAL
LOCK SWITCH 23-24

4WD SELECT SWITCH 23-25

SEAT BELT SWITCH 23-25

HEADLIGHT DIODE 23-26

SERVICE INFORMATION

GENERAL

NOTICE

Note the following when replacing the halogen headlight bulb.

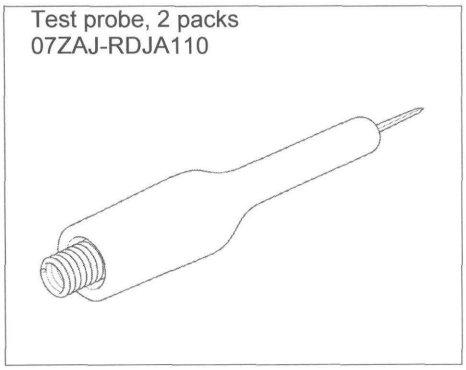
- *Wear clean gloves while replacing the bulb. Do not put fingerprints on the headlight bulb, as they may create hot spots on the bulb and cause it to fail.*
- *If you touch the bulb with your bare hands, clean it with a cloth moistened with alcohol to prevent its early failure.*

- A halogen headlight bulb becomes very hot while the headlight is on, and remains hot for a while after it is turned off. Be sure to let it cool down before servicing.
- 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.

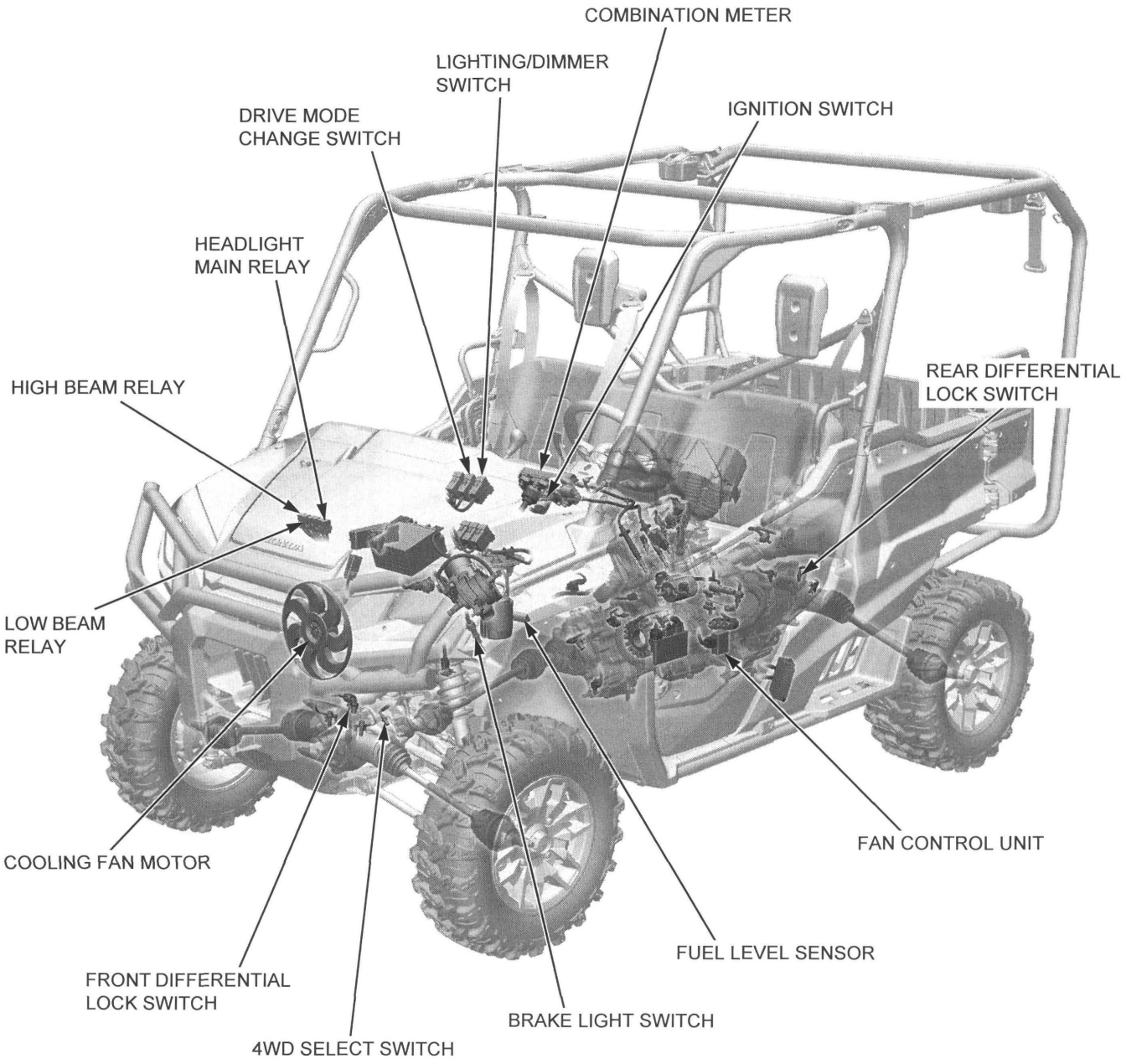
Bl: Black	Bu: Blue	Gr: Gray	Lg: Light green	P: Pink	V: Violet	Y: Yellow
Br: Brown	G: Green	Lb: Light blue	O: Orange	R: Red	W: White	

TOOL

Test probe, 2 packs
07ZAJ-RDJA110



SYSTEM LOCATION



HEADLIGHT

BULB REMOVAL/INSTALLATION

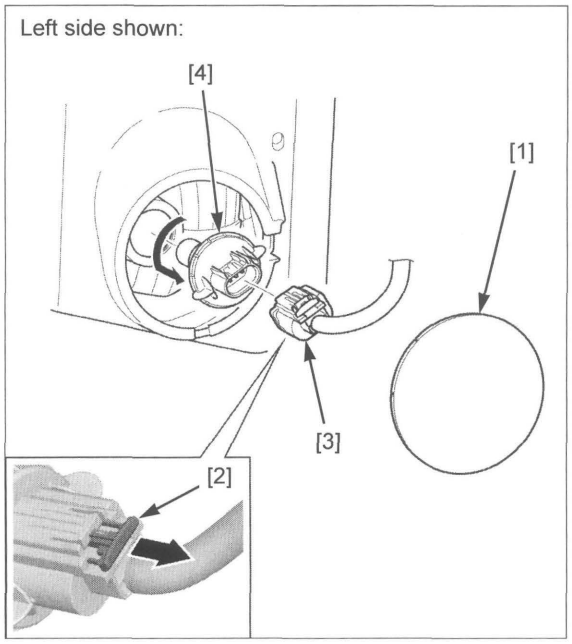
Remove the headlight cover cap [1].
Pull the lock tab [2] and disconnect the headlight 3P connector [3].
Remove the headlight bulb [4] by turning it counterclockwise.

NOTICE

Avoid touching the halogen headlight bulb. Fingerprints can create hot spots that cause a bulb to fail.

Align the bulb lug with the cutout of the headlight.

Installation is in the reverse order of removal.

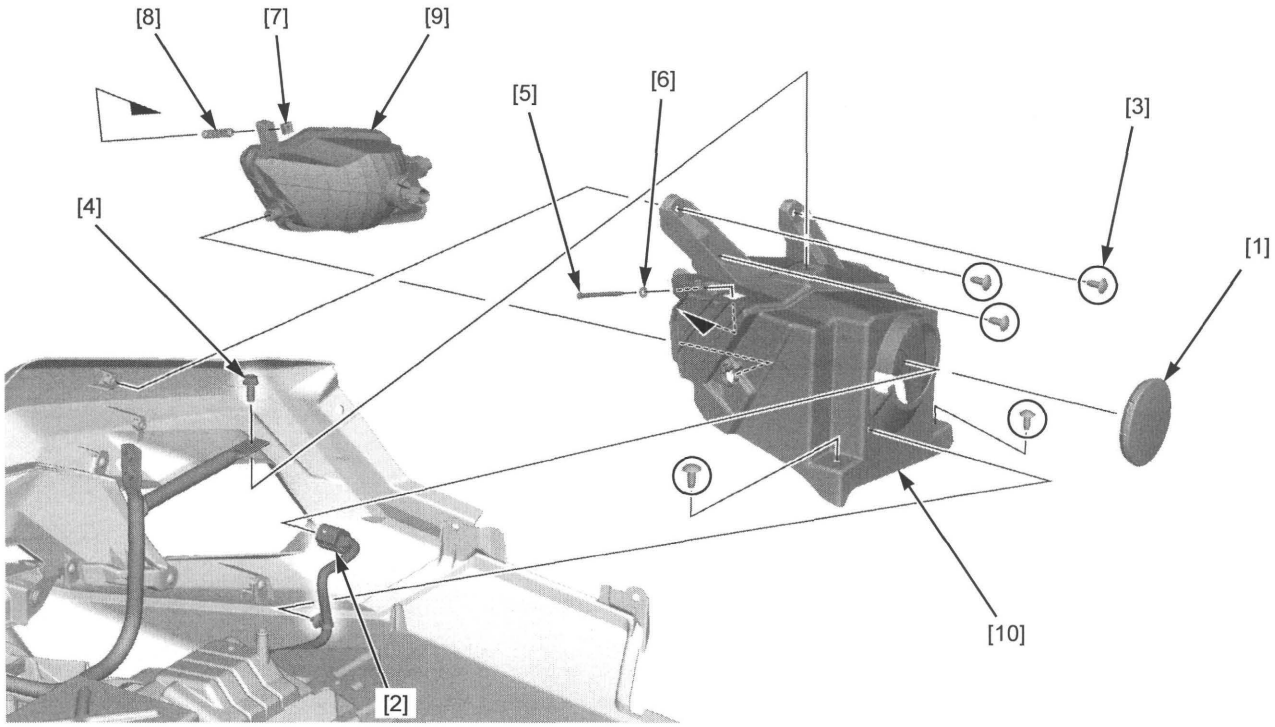


REMOVAL/INSTALLATION

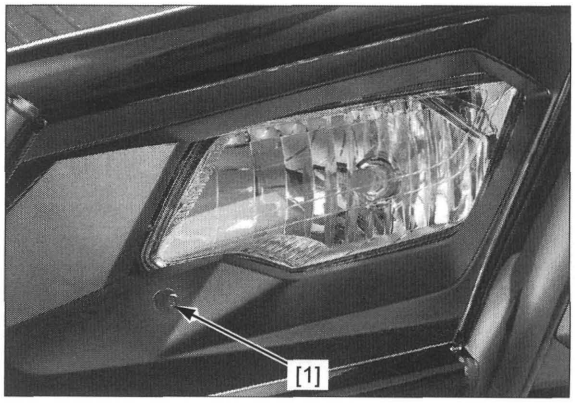
Remove the following:

- front fender (page 2-20)
- headlight cover cap [1] and 3P connector [2]
- five tapping screws [3]
- bolt [4]
- adjusting screw [5]
- washer [6]
- nut [7]
- spring [8]
- headlight unit [9] from the cover [10]

Install the headlight unit in the reverse order of removal.



After installing the headlight, adjust the headlight aim by turning the adjusting screw [1] as necessary.



BRAKE/TAILLIGHT

INSPECTION

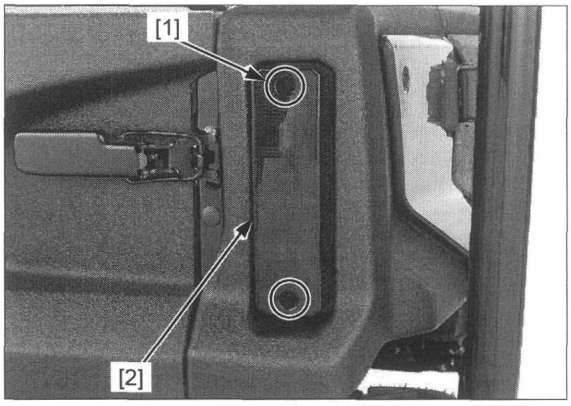
Turn the ignition switch ON and check the taillight [1] operation.

Check that all the LEDs in the brake/taillight unit illuminate with the brake pedal applied.

If any LED does not turn on, replace the rear combination light (page 23-6).

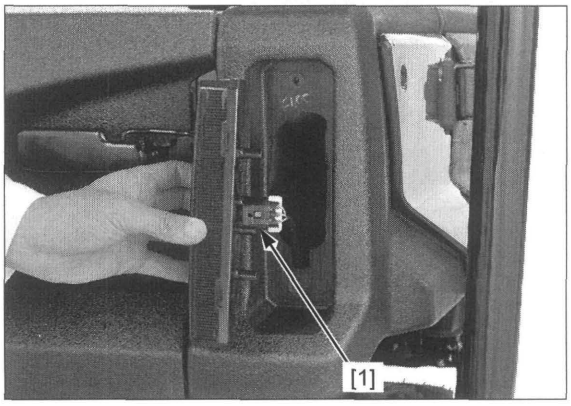
REMOVAL/INSTALLATION

Remove the screws [1] and brake/taillight unit [2].



Disconnect the 3P connector [1] from the brake/taillight unit.

Installation is in the reverse order of removal.



COMBINATION METER

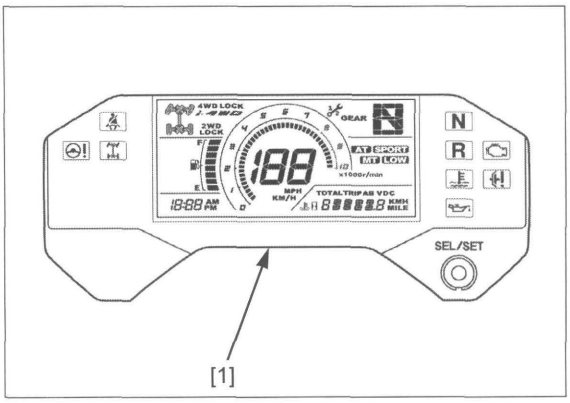
INITIAL OPERATION CHECK

When the ignition switch is turned ON (I), the combination meter [1] turns all the indicators on and shows all the LCD digital segments for a few moments, then shows initial message.

If the combination meter does not display the initial operation, check its power/ground lines (page 23-7).

If the power/ground lines are normal, check the combination meter sub-wire harness for an open circuit, and loose or poor contact of the 12P connector.

If the sub-wire harness is normal, replace the combination meter (page 23-9).

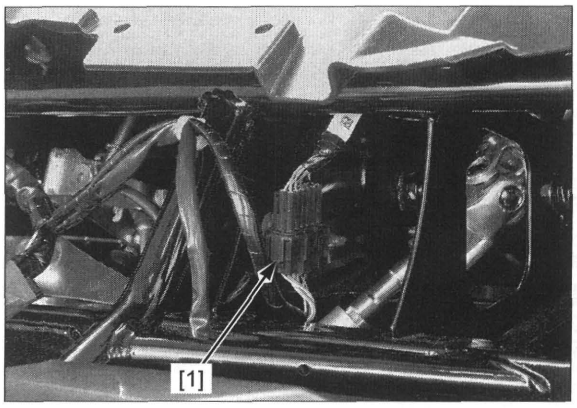


POWER/GROUND LINE INSPECTION

Remove the front fender (page 2-20).

Disconnect the combination meter sub-wire harness 12P connector [1].

Check the power and ground lines at the wire harness side connector.



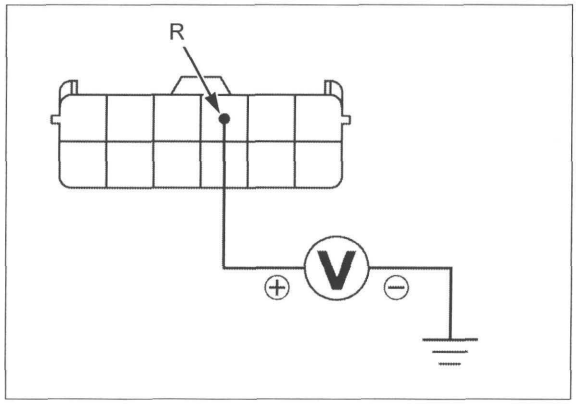
POWER INPUT LINE

Measure the voltage between the Red wire terminal (+) and ground (–).

There should be battery voltage with the ignition switch turned to ON (I).

If there is no voltage, check the following:

- Red wire between the combination meter and LIGHT RELAY fuse (15 A) for an open circuit
- blown LIGHT RELAY fuse (15 A)

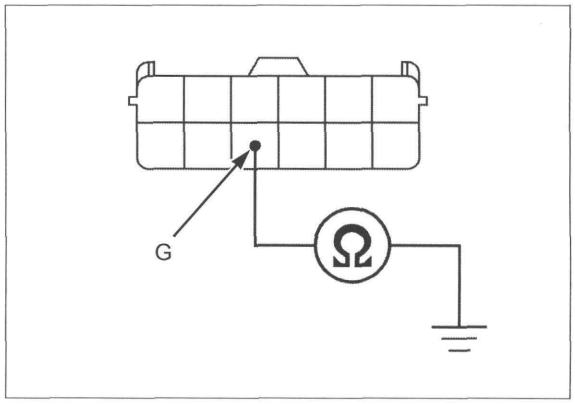


GROUND LINE

Check for continuity between the Green wire terminal and ground.

There should be continuity at all times.

If there is no continuity, check for an open circuit in the Green wire.

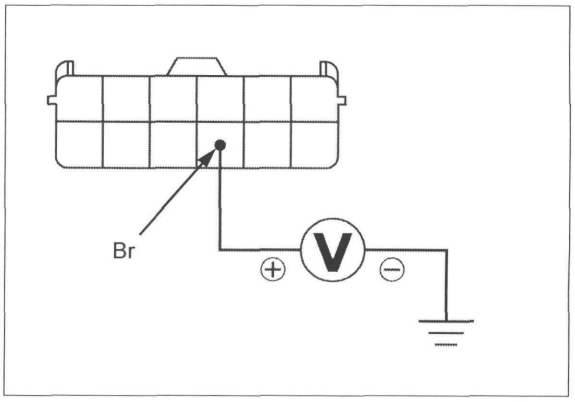


BACK-UP POWER LINE

Measure the voltage between the Brown wire terminal (+) and ground (–).

There should be battery voltage at all times.

If there is no voltage, check the Brown wire between the fuse box and combination meter.



COMBINATION METER TROUBLESHOOTING

When the combination meter shows the following symptoms on each indicator, check the items in the following diagnosis procedure:

Combination meter function	Symptoms	Diagnosis procedure
GEAR POSITION INDICATOR	"–" blinks	• Check the DTC – PGM-FI (page 4-6) – DCT (page 11-9) • Check the CAN communication line (page 23-8)
COOLANT TEMPERATURE DISPLAY	All segments blink	• Check the DTC – PGM-FI (page 4-6) • Check the CAN communication line (page 23-8) • Faulty ECT sensor
ODOMETER	"– – – – – –" displays	• Faulty combination meter
TRIPMETER	"– – – –.–" displays	
HOUR METER	"– – – –.–" displays	
MAINTENANCE TRIP METER/MAINTENANCE HOUR METER	"– – – – – –" displays	
SPEEDOMETER	"– –" displays	• Check the CAN communication line (page 23-8)
TACHOMETER	"0 r/min" displays	
VOLT METER	"– –.–" displays	
"LOW", "MT", "AT", "SPORT" INDICATORS	Does not display	
DRIVE MODE INDICATOR	Indicates last received data	
EACH INDICATOR LAMP	Indicator lamps come on	

CAN COMMUNICATION LINE INSPECTION

NOTE:

- The combination meter receives the following information from the PCM through the CAN communication line:
  - MIL signal
  - Engine speed signal
  - Coolant/oil temperature signal
  - Oil pressure signal
  - Transmission position signal
  - Sub-transmission position signal
  - Drive mode signal

1. PCM Power Input Check

Check that the engine can be started normally.

Can the engine be started?

YES – GO TO STEP 2.

NO – Check the PCM power/ground lines (page 4-35).

2. CAN Line (PCM-to-Combination meter) Open Circuit Inspection

Disconnect the following:

- PCM 33P (Black) connector (page 4-35)
- Combination meter 12P connector (page 23-6)

Check the continuity between the wire harness side PCM 33P (Black) connector [1] and combination meter 12P connector [2].

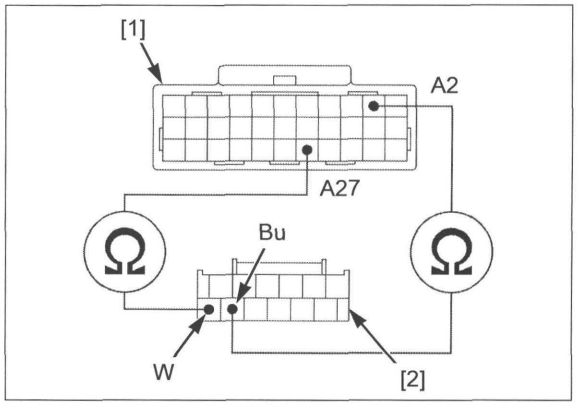
TOOL:
Test probe, 2 packs 07ZAJ-RDJA110

Connection: A2 – Blue
A27 – White

Is there continuity?

YES – Check the EPS DTC (page 24-5) and I-4WD DTC (page 25-5), and recheck the combination meter (page 23-7)

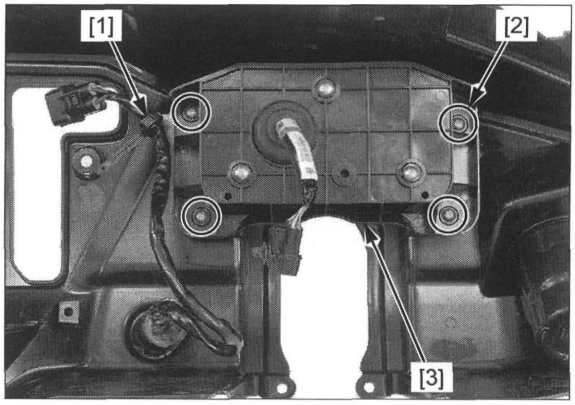
NO – Open circuit in the Blue or White wire



REMOVAL/INSTALLATION

Remove the instrument panel (page 2-28).

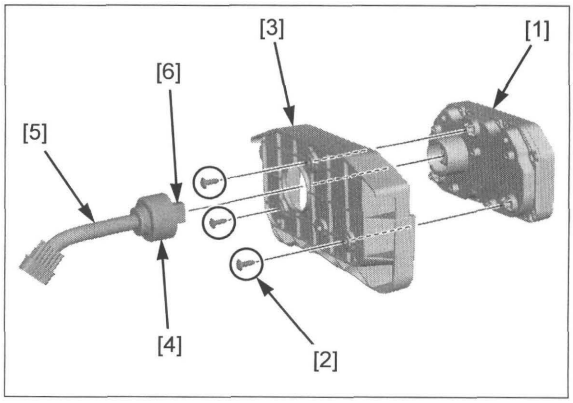
Remove the wire band [1] from the meter cover.
Remove the four screws [2] and combination meter assembly [3].



Remove the following from the combination meter [1]:

- three screws [2]
- meter cover [3]
- dust cover [4]
- meter sub-wire harness [5] (by disconnecting the 12P connector [6])

Installation is in the reverse order of removal.

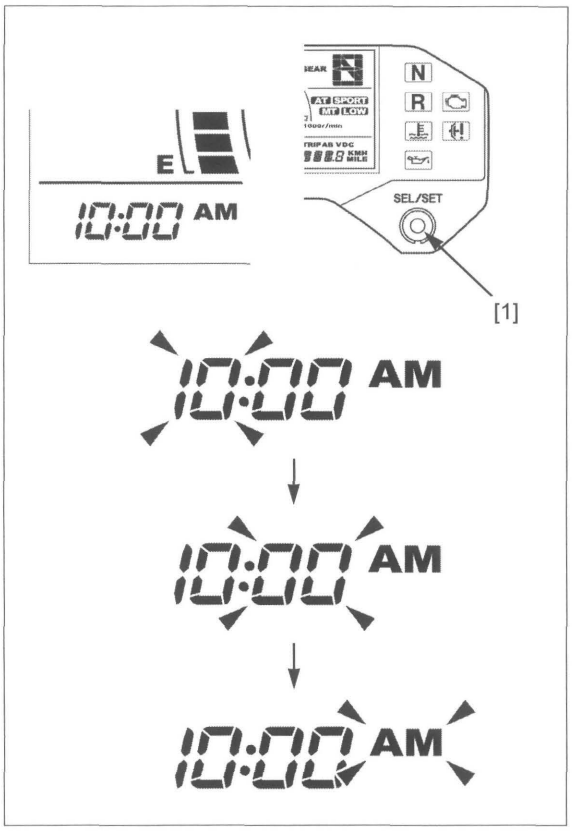


DIGITAL CLOCK ADJUSTMENT

1. Turn the ignition switch ON (I).

   Push the SEL/SET switch [1] until the odometer display is changed to the hourmeter display.

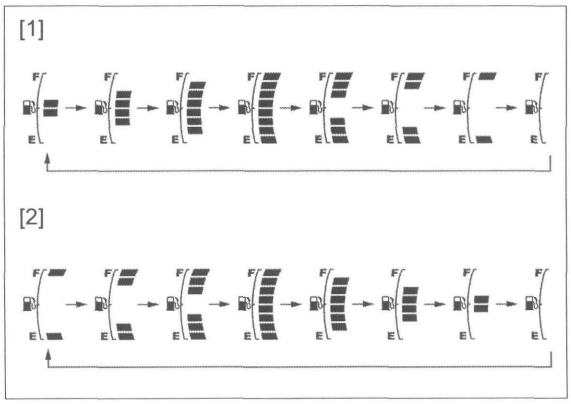
2. Press and hold SEL/SET switch for 2 seconds, and the hour digits will start blinking. Press SEL/SET switch until the desired hour is displayed.
3. Press and hold SEL/SET switch for 2 seconds, and the minute digits start blinking. Press SEL/SET switch until the desired minutes is displayed.
4. Press and hold SEL/SET switch for 2 seconds, and the "AM" or "PM" will start blinking. Press the SEL/SET switch to select "AM" or "PM".
5. To complete setting the clock, press and hold the SEL/SET switch, or turn the ignition switch to OFF.



FUEL GAUGE/FUEL LEVEL SENSOR

CIRCUIT INSPECTION

If the fuel gauge displays the open circuit pattern [1] or short circuit pattern [2] as shown with the ignition switch turned ON (I), check the fuel level sensor circuits.



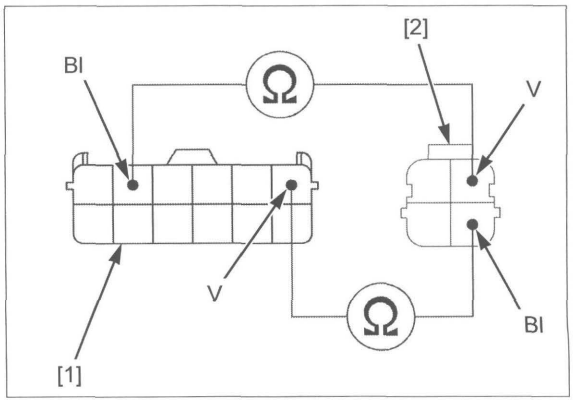
Disconnect the combination meter sub-wire harness 12P connector (page 23-7).

Disconnect the fuel pump 4P connector (page 7-6).

Check for continuity between the wire harness side 12P connector [1] and 4P connector [2].

Connection: Violet – Violet
Black – Black

If there is no continuity, repair the open circuit in the wire.



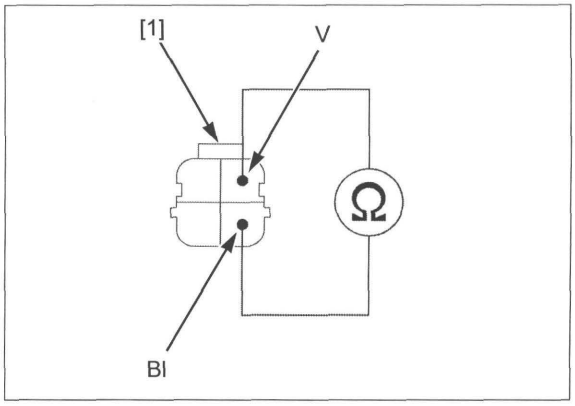
Check for continuity at the wire harness side 4P connector [1].

Connection: Violet – Black

If there is continuity, repair the short circuit in the wire.

If the wires are OK, check the fuel level sensor (page 23-12).

If the fuel level sensor is OK, replace the combination meter.



SYSTEM INSPECTION

Remove the fuel pump (page 7-11).

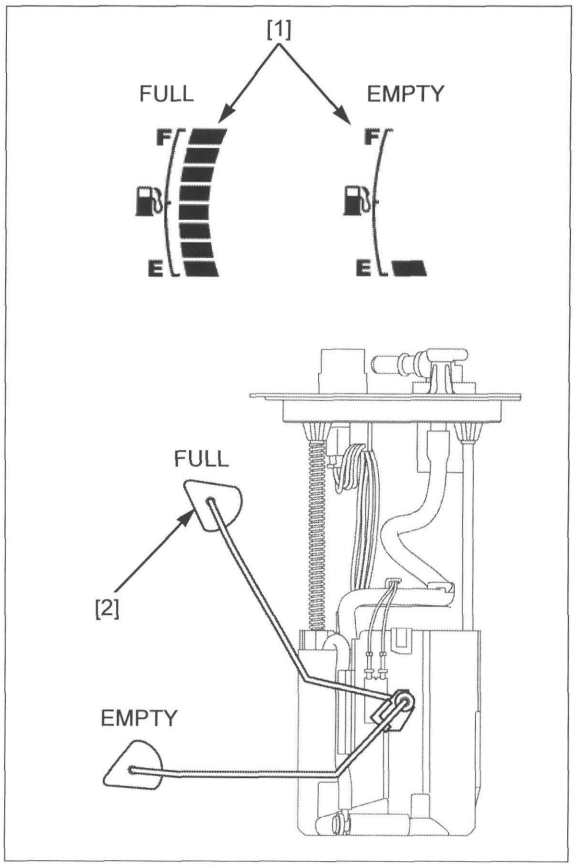
Connect the fuel pump unit 4P connector.

Turn the ignition switch ON (I) and check the fuel gauge [1].

- All segments should come on with the fuel level sensor float [2] at the top (FULL) position.
- The lowest segment should blink with the float at the bottom (EMPTY) position.

If the fuel gauge does not operate properly, check the fuel level sensor (page 23-12).

If the fuel level sensor is OK, replace the combination meter.



FUEL LEVEL SENSOR INSPECTION

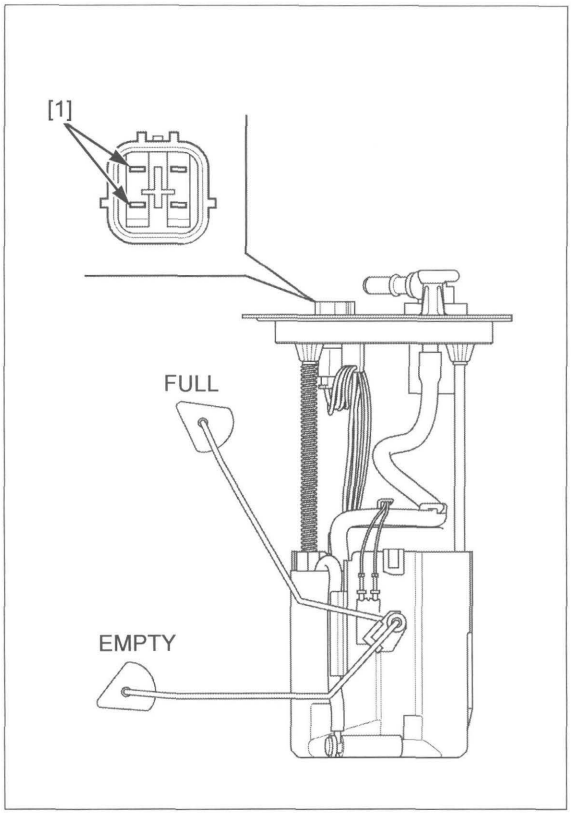
Remove the fuel pump (page 7-11).

Measure the resistance between the fuel pump connector terminals [1] with the float at the top (FULL) and bottom (EMPTY) positions.

(20°C/68°F)

Float position	FULL	EMPTY
Resistance	19 – 21 Ω	772 – 788 Ω

If the resistance is out of specification, replace the fuel level sensor (page 23-12).

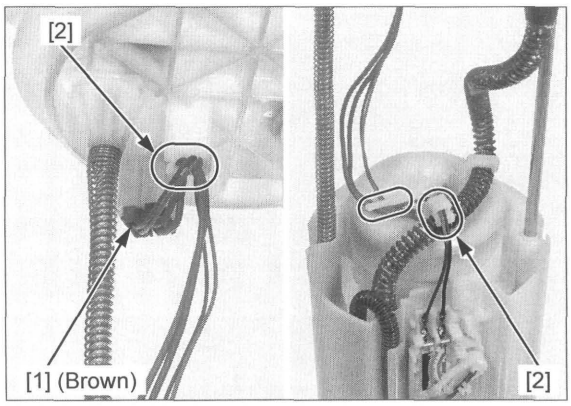


FUEL LEVEL SENSOR REMOVAL/ INSTALLATION

Remove the fuel pump (page 7-11).

Disconnect the fuel level sensor connector [1].

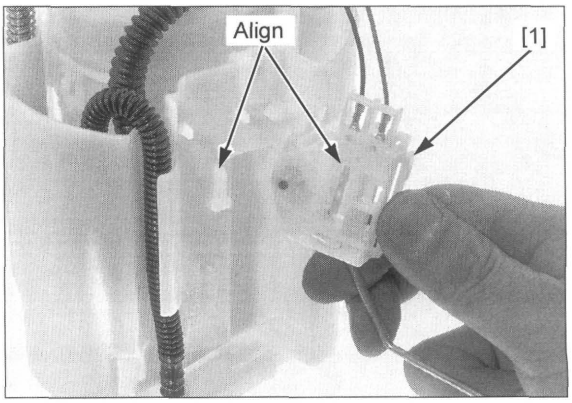
Release the wires from the hooks [2].



Unhook and remove the fuel level sensor [1] by sliding it upward.

Installation is in the reverse order of removal.

- Install the fuel level sensor by aligning its slot with the pump tab and slide it down until it is fully locked.



ACCESSORY SOCKET

INSPECTION

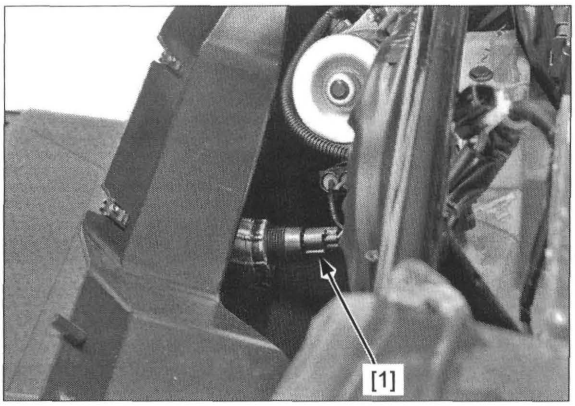
Remove the instrument panel (page 2-28).

Disconnect the accessory socket 2P connector [1].

Measure the voltage at the wire harness side 2P connector.

Connection: Pink (+) – Green (–)

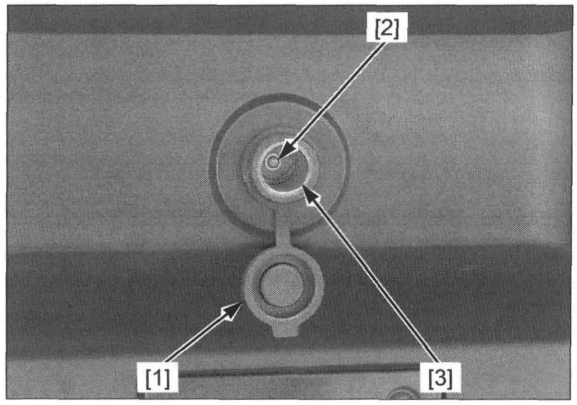
There should be battery voltage with the ignition switch turned to ON (I).
If there is no voltage, check for blown ACC fuse (15 A) and an open circuit in the wire harness.



Remove the accessory socket cap [1].

Check for continuity between the upper terminal of the connector and bottom center terminal [2] of the socket, and between the lower terminal and side wall terminal [3].
There should be continuity.

If there is no continuity, replace the accessory socket.

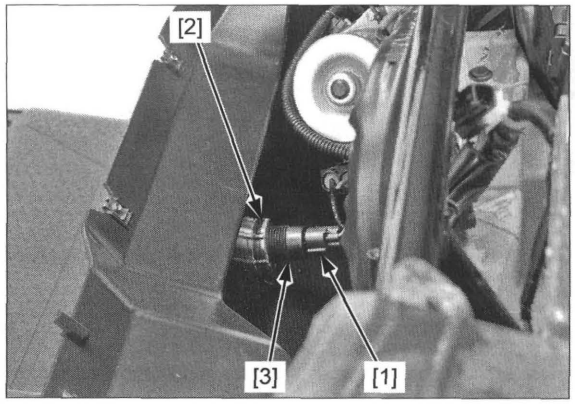


REMOVAL/INSTALLATION

Remove the instrument panel (page 2-28).

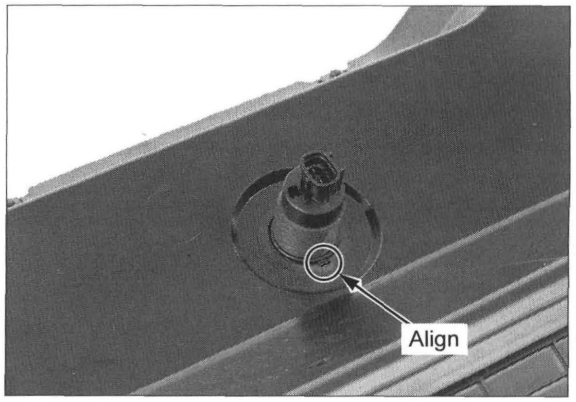
Disconnect the accessory socket 2P connector [1].

Remove the nut [2] and accessory socket [3] from the instrument panel.



Install the accessory socket by aligning the lug with the groove in the instrument panel.

Install the removed parts in the reverse order of removal.



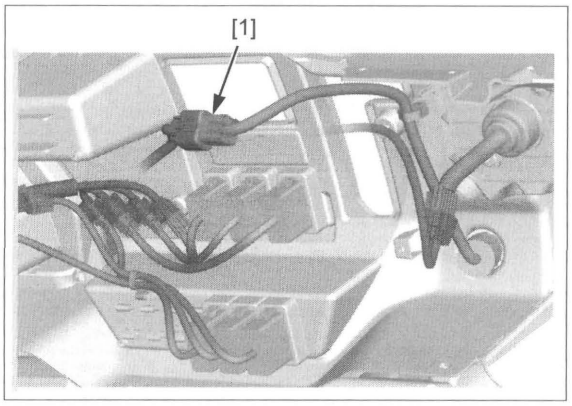
IGNITION SWITCH

INSPECTION

Remove the front hood (page 2-17).

Disconnect the ignition switch 5P connector [1].

Check for continuity at the switch side 5P connector in each switch position according to the continuity chart (page 26-2).

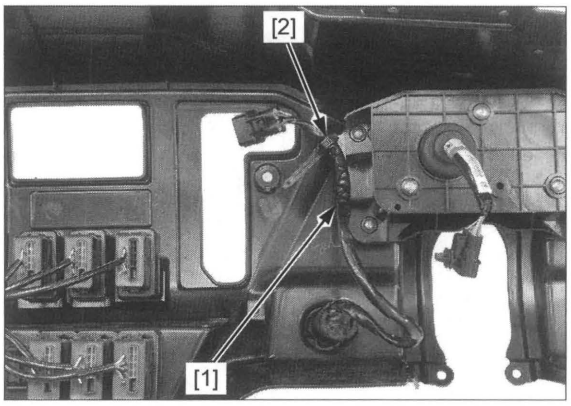


REMOVAL/INSTALLATION

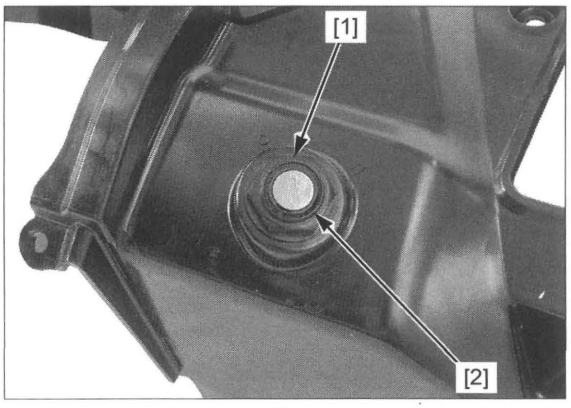
Remove the instrument panel (page 2-28).

Disconnect the ignition switch 5P connector (page 23-14)

Release the ignition switch wire [1] from the wire band [2].

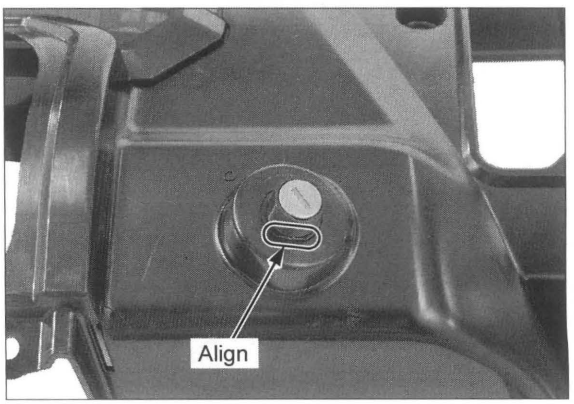


Remove the nut [1] and ignition switch [2] from the instrument panel.



Install the ignition switch into the instrument panel by aligning the flat surfaces.

Install the removed parts in the reverse order of removal.



LIGHTING/DIMMER SWITCH

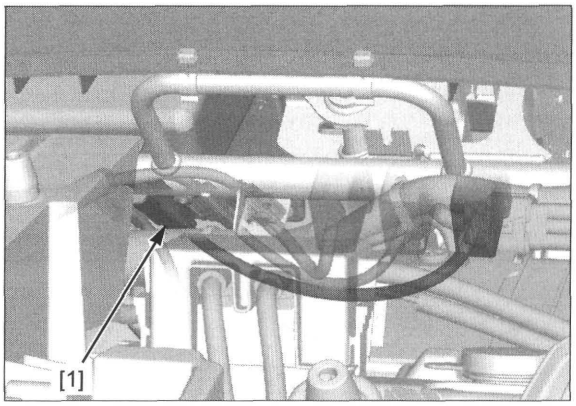
INSPECTION

Remove the front hood (page 2-17).

IV A, IV AC, VI A, VI AC, VI CM, VII A, VII AC, VII CM, IX A, IX AC type: Disconnect the lighting/dimmer switch 6P connector [1].

A, AC, CM, III A, III AC type: Disconnect the lighting/dimmer switch 4P connector [1].

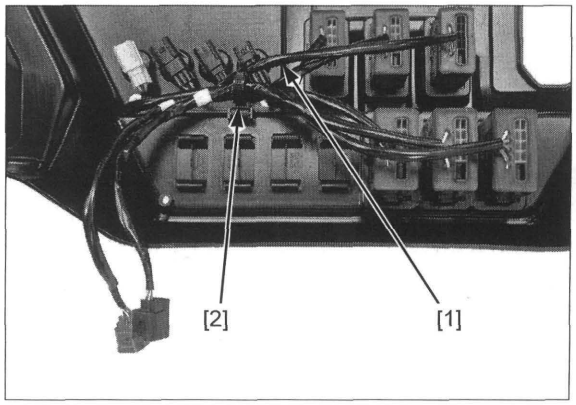
Check for continuity at the switch side connector in each switch position according to the continuity chart (page 26-2).



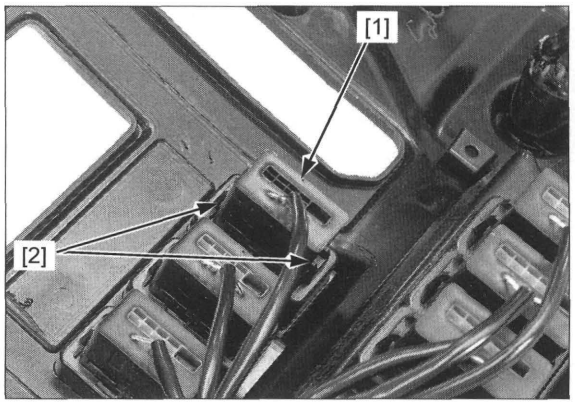
REMOVAL/INSTALLATION

Remove the instrument panel (page 2-28).

Release the lighting/dimmer switch wire [1] from the wire band [2].



Remove the lighting/dimmer switch [1] from the instrument panel by releasing the stopper tabs [2].



HEADLIGHT RELAY

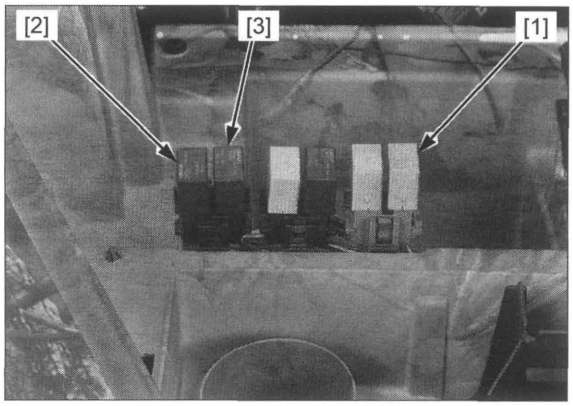
REMOVAL/INSTALLATION

Remove the pre-filter cover (page 5-7).

Turn the ignition switch OFF (O).

Remove the headlight main relay [1], high beam relay [2] and low beam relay [3] from the connectors.

Installation is in the reverse order of removal.



RELAY INSPECTION

Remove the headlight relays (page 23-16).

- Headlight main relay: Refer to the inhibitor relay inspection (page 6-8).
- Low beam relay and high beam relay: Refer to the ignition relay inspection (page 5-8).

HEADLIGHT MAIN RELAY CIRCUIT INSPECTION

NOTE:

- Before this inspection, check that the starter relay switch power input line circuit is normal (page 6-6).

1. Power Input Line Inspection

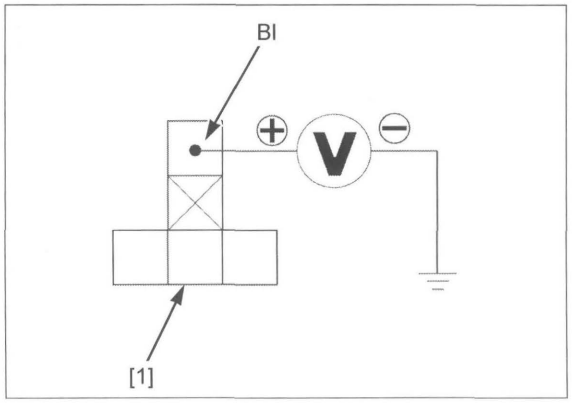
Remove the headlight main relay (page 23-16).
Turn the ignition switch ON (I).
Measure the voltage between the relay connector [1] and ground.

Connection: Black (+) – ground (–)

Is there battery voltage?

YES – GO TO STEP 2.

NO – • Open circuit in the Black wire between the relay connector and fuse box
• Blown LIGHT fuse (15 A)
• Open circuit in the Green wire between the fuse box and ignition switch



2. Relay Coil Ground Line Inspection

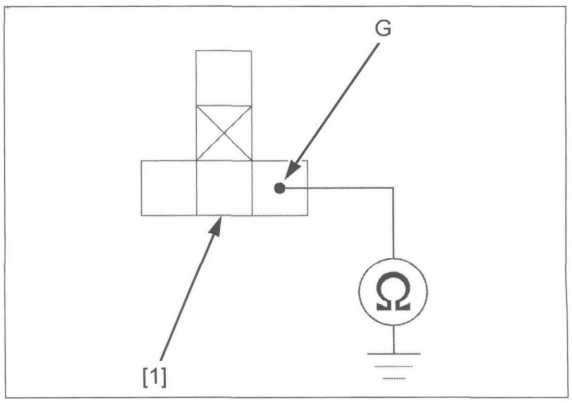
Turn the ignition switch OFF (O).
Check for continuity between the relay connector [1] and ground.

Connection: Green – ground

Is there continuity?

YES – GO TO STEP 3.

NO – Open circuit in the Green wire between the relay connector and ground terminal



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

Remove the inhibitor relay to prevent sudden operation of the starter motor (page 6-7).
Measure the voltage at the relay connector [1].

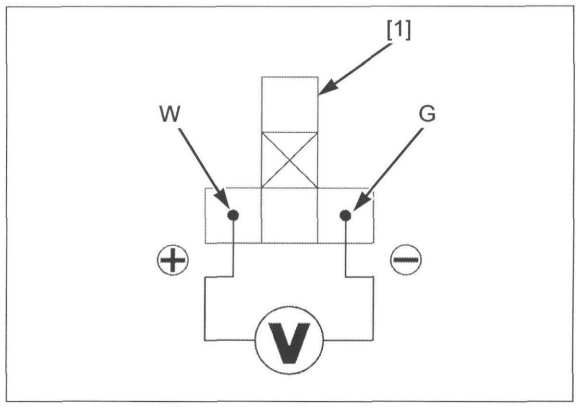
Connection: White (+) – Green (–)

There should be battery voltage only when the ignition switch is turned to START (II).

Is there battery voltage properly?

YES – The headlight main relay circuits are normal.

NO – Open circuit in the White wire between the fuse box and relay connector



LOW BEAM RELAY CIRCUIT INSPECTION

NOTE:

- Before this inspection, check that the headlight main relay and its circuits are normal (page 23-16).

1. **Power Input Line Inspection**

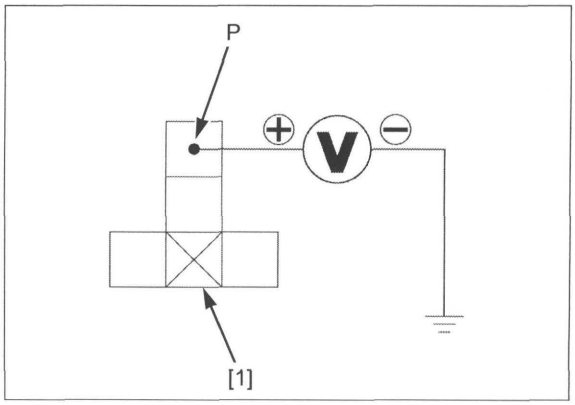
Remove the low beam relay (page 23-16).
Turn the ignition switch ON (I).
Measure the voltage between the relay connector [1] and ground.

Connection: Pink (+) – ground (–)

Is there battery voltage?

YES – GO TO STEP 2.

NO – Open circuit in the Pink wire between the headlight main relay connector and low beam relay connector



2. **Relay coil power Input Line Inspection**

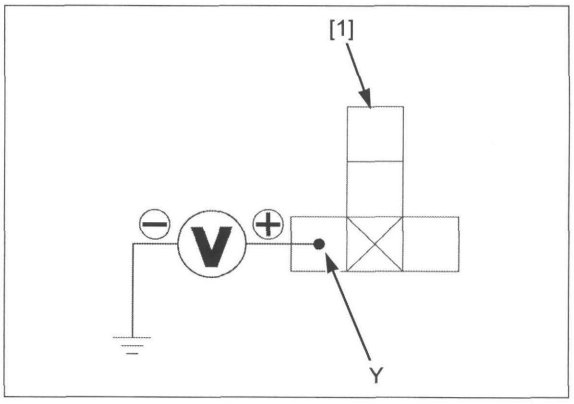
Turn the ignition switch ON (I) and the lighting/ dimmer switch to "≣D".
Measure the voltage between the relay connector [1] and ground.

Connection: Yellow (+) – ground (–)

Is there battery voltage?

YES – GO TO STEP 3.

NO –
- Open circuit in the Yellow wire between the lighting switch and relay connector
- Faulty lighting switch (page 23-15)
- Open circuit in the Gray wire between the fuse box and lighting switch
- Blown LIGHT RELAY fuse (10 A)
- Open circuit in the Black wire between the ignition switch and fuse box



3. **Relay Coil Ground Line Inspection**

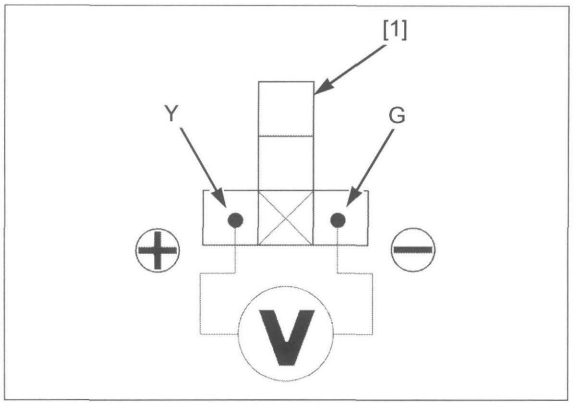
Measure the voltage at the relay connector [1].

Connection: Yellow (+) – Green (–)

Is there battery voltage?

YES – The low beam relay circuits are normal.

NO – Open circuit in the Green wire between the relay connector and ground terminal



HIGH BEAM RELAY CIRCUIT INSPECTION

NOTE:

- Before this inspection, check that the low beam relay circuits are normal (page 23-17).

1. **Power Input Line Inspection**

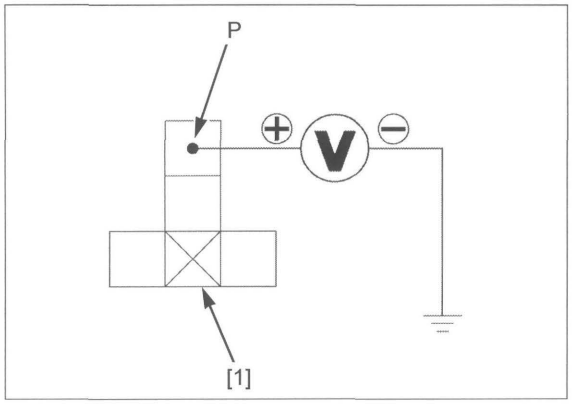
Remove the high beam relay (page 23-16).
Turn the ignition switch ON (I).
Measure the voltage between the relay connector [1] and ground.

Connection: Pink (+) – ground (–)

Is there battery voltage?

YES – GO TO STEP 2.

NO – Open circuit in the Pink wire between the headlight main relay connector and high beam relay connector



2. **Relay coil power Input Line Inspection**

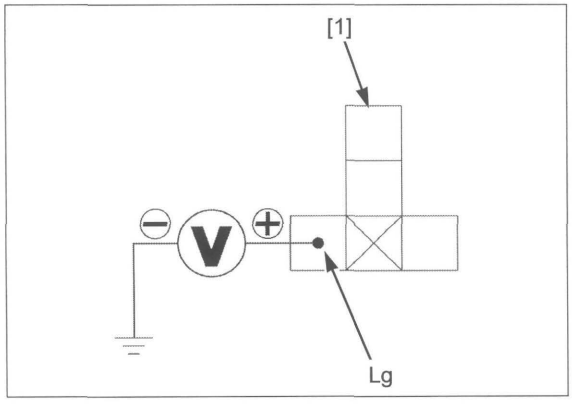
Turn the ignition switch ON (I) and the lighting/ dimmer switch to "≣D".
Measure the voltage between the relay connector [1] and ground.

Connection: Light green (+) – ground (–)

Is there battery voltage?

YES – GO TO STEP 3.

NO – • Open circuit in the Light green wire between the lighting switch and relay connector
• Faulty lighting switch (page 23-15)



3. Relay Coil Ground Line Inspection

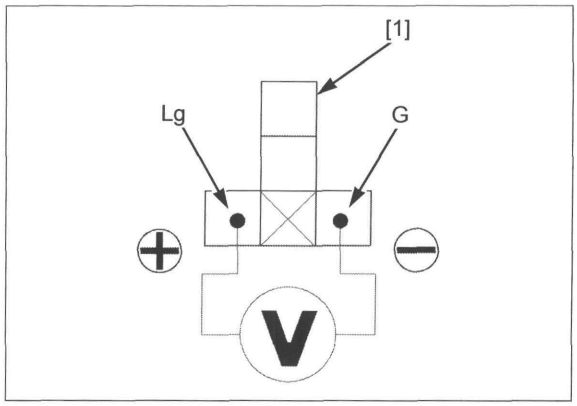
Measure the voltage at the relay connector [1].

Connection: Light green (+) – Green (–)

Is there battery voltage?

YES – The high beam relay circuits are normal.

NO – Open circuit in the Green wire between the relay connector and ground terminal



COOLING FAN MOTOR/FAN CONTROL UNIT

FAN CONTROL UNIT REMOVAL/ INSTALLATION

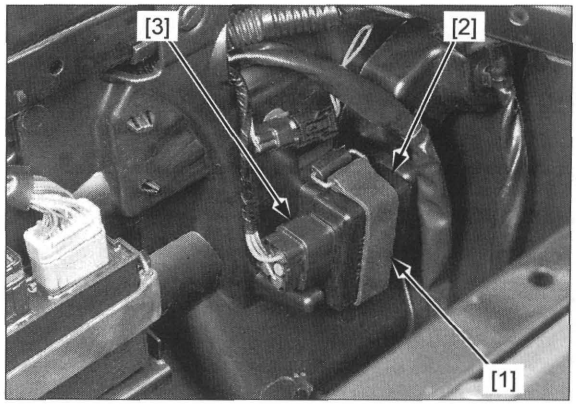
Remove the following:

- M3D/M5D: seat under storage (page 2-6)
- M3P/M5P: seat under cover (page 2-6)

Remove the holder band [1] and fan control unit [2] from the middle mud guard.

Disconnect the 5P connector [3] from the fan control unit.

Installation is in the reverse order of removal.



SYSTEM INSPECTION

NOTE:

- Before this inspection, check that the fan relay and its circuits are normal (page 7-14).

Cooling fan motor does not start

1. Fuse Inspection

Remove the fuse/relay box cover (page 6-9).
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 4-7).

Is DTC 7-1 and/or 7-2 indicated?

YES – • Perform the DTC 7-1 troubleshooting (page 4-13).
• Perform the DTC 7-2 troubleshooting (page 4-14).

NO – GO TO STEP 3.

3. Fan Control Unit Ground Line Inspection

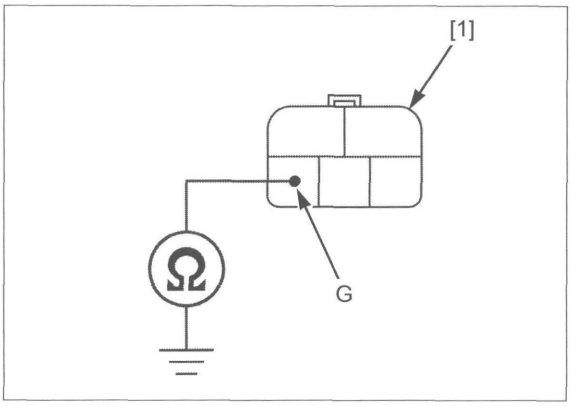
Disconnect the fan control unit 5P connector (page 23-19).
Check for continuity between the wire harness side 5P connector [1] and ground.

Connection: Green – ground

Is there continuity?

YES – GO TO STEP 4.

NO – Open circuit in the Green wire



4. Fan Control Unit Power Input Line Inspection

Measure the voltage between the wire harness side 5P connector [1] and ground.

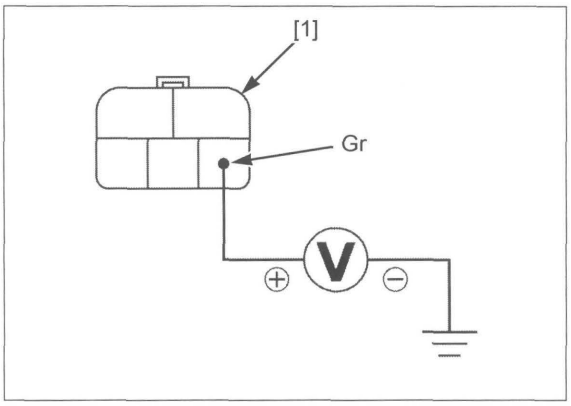
Connection: Gray (+) – ground (–)

Turn the ignition switch ON (I).

Is there battery voltage for about 2 seconds?

YES – GO TO STEP 5.

NO – Open circuit in the Gray wire



5. Fan Control Unit Relay Line Inspection 1

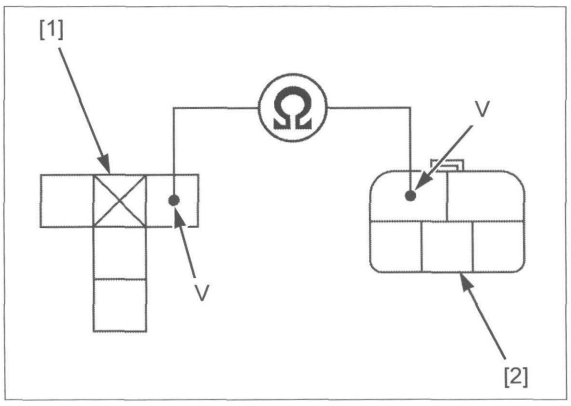
Turn the ignition switch OFF (O).
Disconnect the fan control relay connector.
Check for continuity between the wire harness side relay connector [1] and 5P connector [2].

Connection: Violet – Violet

Is there continuity?

YES – GO TO STEP 6.

NO – Open circuit in the Violet wire



6. Fan Control Unit Relay Line Inspection 2

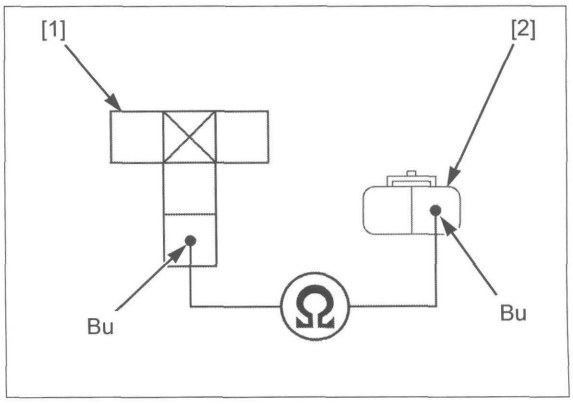
Disconnect the cooling fan motor 2P connector (page 23-19).
Check for continuity between the wire harness side relay connector [1] and 2P connector [2].

Connection: Blue – Blue

Is there continuity?

YES – GO TO STEP 7.

NO – Open circuit in the Blue wire



7. **Fan Control Unit Motor Lock Detection Line Open Circuit Inspection**

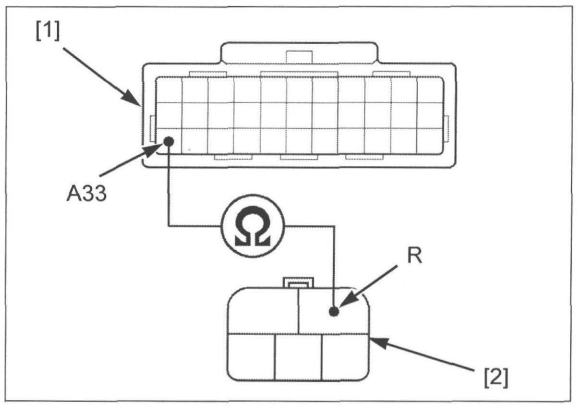
Check for continuity between the wire harness side 33P (Black) connector [1] and 5P connector [2].

Connection: A33 – Red

Is there continuity?

YES – GO TO STEP 8.

NO – Open circuit in the Red wire



8. **Fan Control Unit Motor Lock Detection Line Short Circuit Inspection**

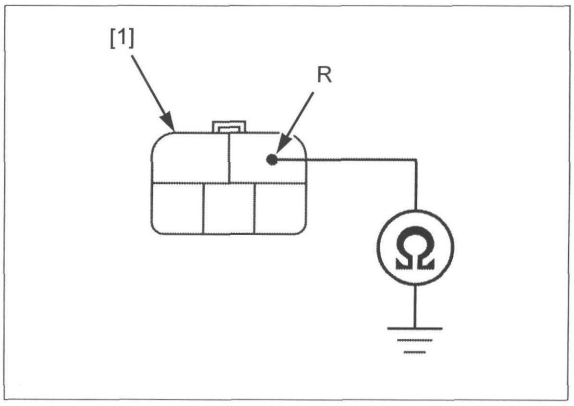
Check for continuity between the wire harness side 5P connector [1] and ground.

Connection: Red – ground

Is there continuity?

YES – GO TO STEP 9.

NO – Short circuit in the Red wire



9. **Cooling Fan Motor Operation Inspection**

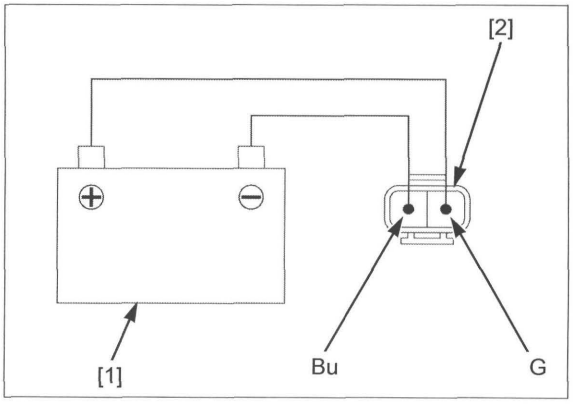
Disconnect the fan motor 2P connector (page 9-7). Connect a fully charged 12 V battery [1] to the motor side 2P connector [2] and check the cooling fan.

Connection: Blue (+) – Green (–)

Does the cooling fan start?

YES – GO TO STEP 10.

NO – Replace the cooling fan motor with a new one (page 9-8).



10. **Fan Control Unit Inspection**

Replace the fan control unit with a known good one (page 23-19).
Start the engine and warm it up enough to check the cooling fan operation.

Does the cooling fan start?

YES – Faulty original fan control unit

NO – Replace the PCM with a known good one (page 4-35) and recheck.

BRAKE LIGHT SWITCH

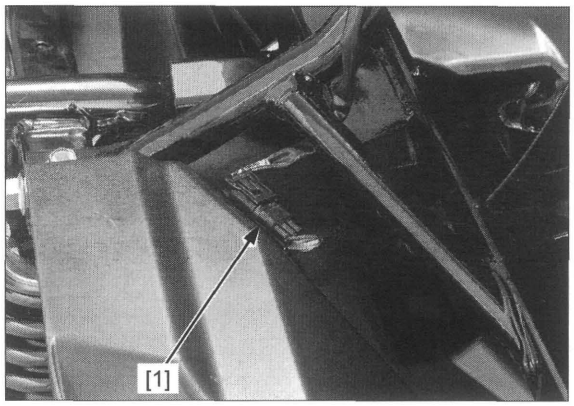
INSPECTION

Remove the front fender (page 2-20).

Disconnect the brake light switch 6P connector [1] and check for continuity at the switch side connector.

Connection: Red/black – Green/yellow

There should be continuity with the brake pedal depressed and no continuity with the pedal released.



REMOVAL/INSTALLATION

Remove the front fender (page 2-20).

Disconnect the following:

- brake light switch 6P connector [1]
- throttle release angle sensor 3P connector [2]

Remove the brake light switch spring [3] from the brake pedal and switch.

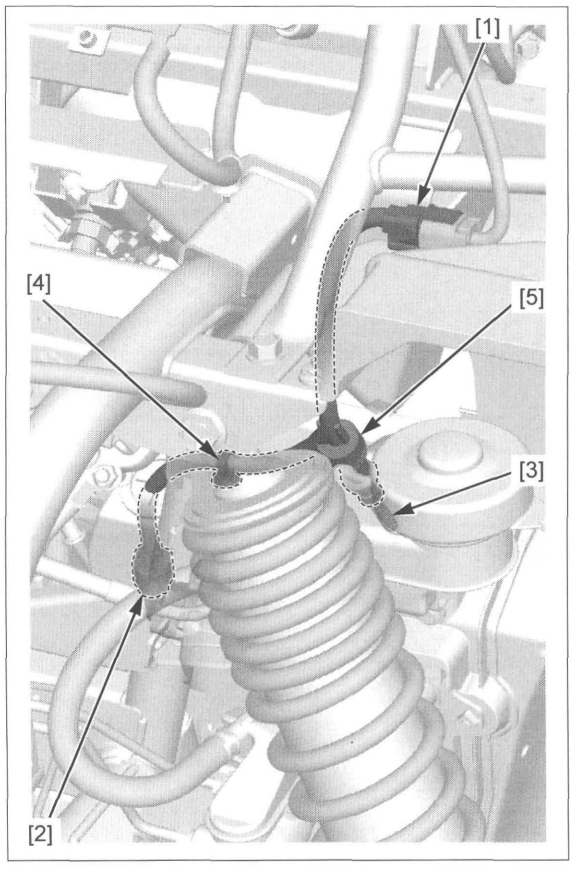
Remove the wire clip [4] from the pedal cover.

Remove the brake light switch [5] from the stay of the frame.

Installation is in the reverse order of removal.

Route the brake light switch wire properly (page 1-29).

Adjust the brake light switch (page 3-20).

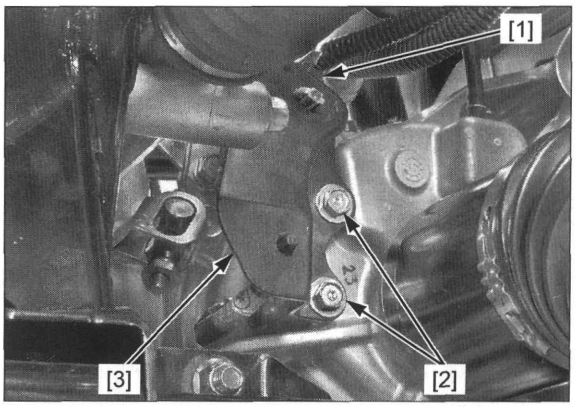


FRONT DIFFERENTIAL LOCK SWITCH (Except I-4WD model)

INSPECTION

Disconnect the front differential sub-wire harness connector [1].

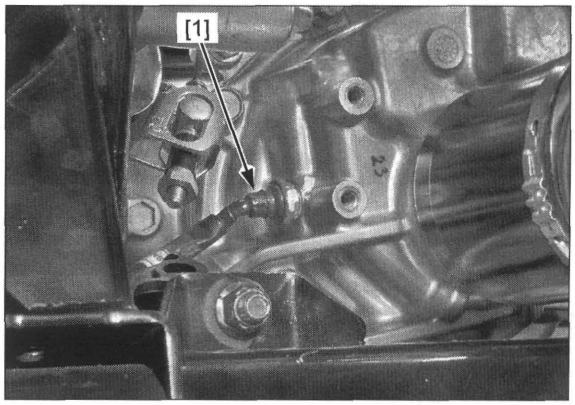
Remove the two bolts [2] and front clutch cover [3] from the front final gear case.



Disconnect the connector [1] from the front differential lock switch.

Check for continuity between the switch terminal and ground.

There should be continuity when the drive mode select lever is in "4WD Diff" position, and no continuity when the lever is in the other positions.



REMOVAL/INSTALLATION

Remove the front clutch cover from the front final gear case (page 23-23).

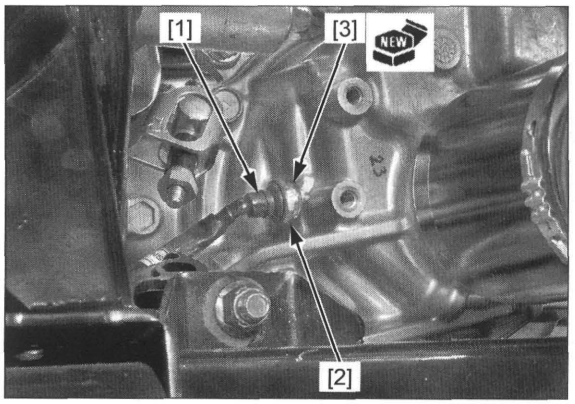
Disconnect the connector [1] from the front differential lock switch.

Remove the front differential lock switch [2] and sealing washer [3] from the front final gear case.

Install the front differential lock switch with a new sealing washer and tighten it.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Install the removed parts in the reverse order of removal.



REAR DIFFERENTIAL LOCK SWITCH

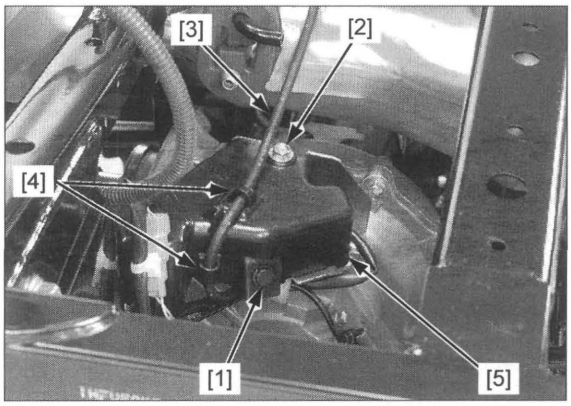
INSPECTION

Remove the trim [1] clip and bolt [2].

Pull the breather hose [3] from the hooks [4] and remove rear differential lock arm cover [5].

Check for continuity between the switch terminal and ground.

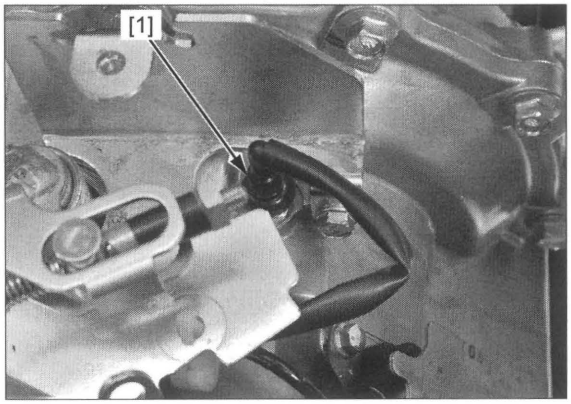
There should be continuity only when the drive mode select lever is in "Turf" position and the shift select lever is in the positions except "P" (Parking) position, and no continuity when the levers are in the other positions.



Disconnect the connector [1] from the rear differential lock switch.

Check for continuity between the switch terminal and ground.

There should be continuity only when the drive mode select lever is in "Turf" position and the shift select lever is in the positions except "P" (Parking) position, and no continuity when the levers are in the other positions.



REMOVAL/INSTALLATION

Remove the rear differential lock arm cover (page 23-24).

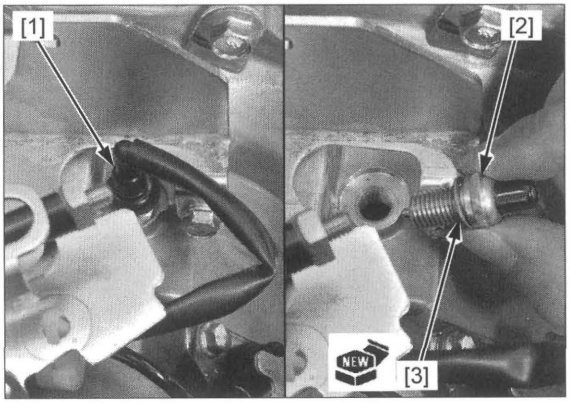
Disconnect the connector [1] from the rear differential lock switch.

Remove the rear differential lock switch [2] and sealing washer [3] from the rear final gear case.

Install the rear differential lock switch with a new sealing washer and tighten it.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Install the removed parts in the reverse order of removal.



4WD SELECT SWITCH

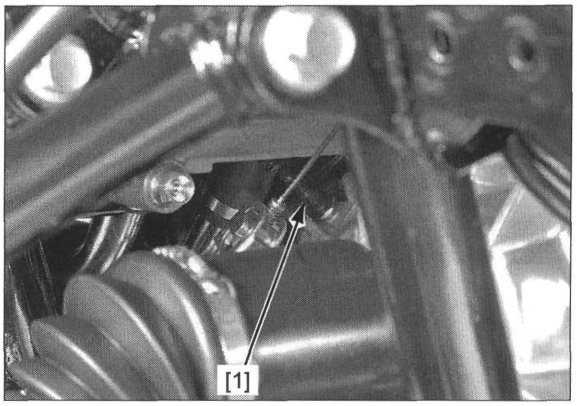
INSPECTION

Remove the front clutch cover from the front final gear case (page 23-23).

Disconnect the connector [1] from the 4WD select switch.

Check for continuity between the switch terminal and ground.

There should be no continuity when the drive mode select lever is in "Turf" position, and continuity when the lever is in the other positions.



REMOVAL/INSTALLATION

Remove the front clutch cover from the front final gear case (page 23-23).

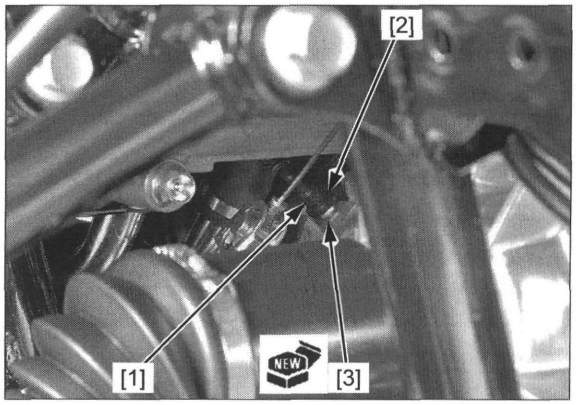
Disconnect the connector [1] from the 4WD select switch.

Remove the 4WD select switch [2] and sealing washer [3] from the front final gear case.

Install the 4WD select switch with a new sealing washer and tighten it.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Install the removed parts in the reverse order of removal.



SEAT BELT SWITCH

INSPECTION

Remove the seat under center lid (page 2-5).

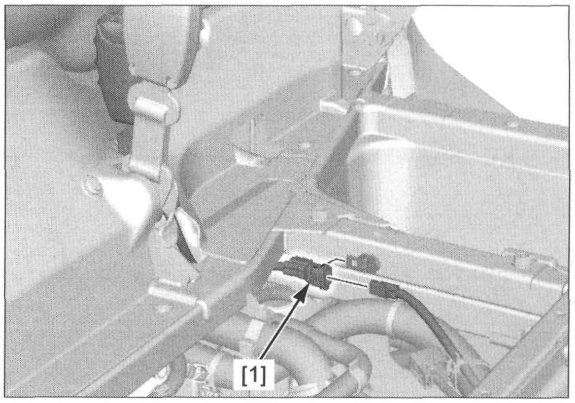
Disconnect the seat belt switch 2P connector [1].

Turn the ignition switch OFF (O).

Check for continuity between the switch side connector terminals.
There should be continuity when the seat belt is locked, and no continuity when the seat belt is released.

Turn the ignition switch ON (I).

Measure the voltage between the wire harness side connector terminals.
There should be voltage with the ignition switch turned to ON (I).
If there is no voltage, check for open or short circuit in wire harness between the seat belt switch and PCM or seat belt switch and ground.



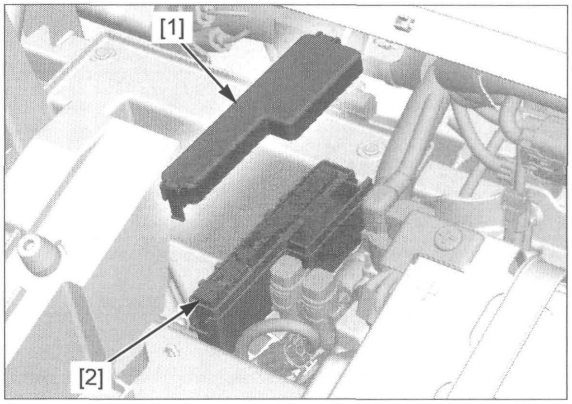
HEADLIGHT DIODE

INSPECTION

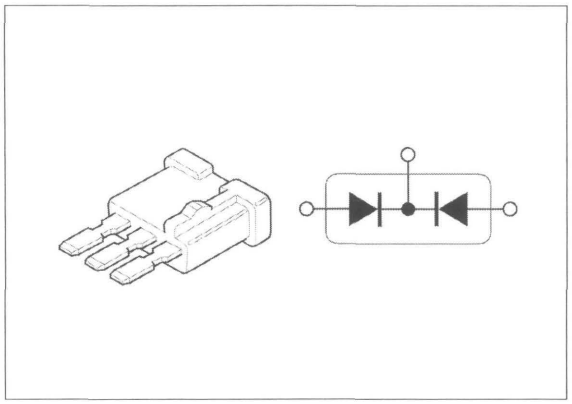
Remove the front hood (page 2-17).

Remove the fuse box cover [1].

Remove the diode [2] from the fuse box.



Check for continuity between the diode terminals.
When there is continuity, a small resistance value will register.
If there is continuity in one direction, the diode is normal.



24. ELECTRIC POWER STEERING (EPS)

SERVICE INFORMATION 24-2

SYSTEM LOCATION 24-3

SYSTEM DIAGRAM 24-4

EPS SYMPTOM TROUBLESHOOTING 24-5

EPS TROUBLESHOOTING INFORMATION 24-5

DTC INDEX 24-12

DTC TROUBLESHOOTING 24-14

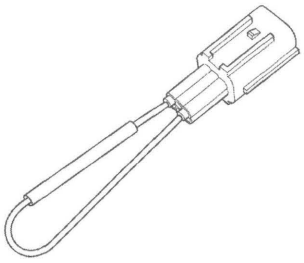
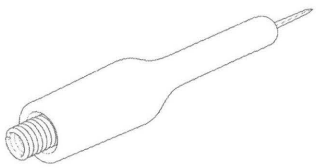
SERVICE INFORMATION

GENERAL

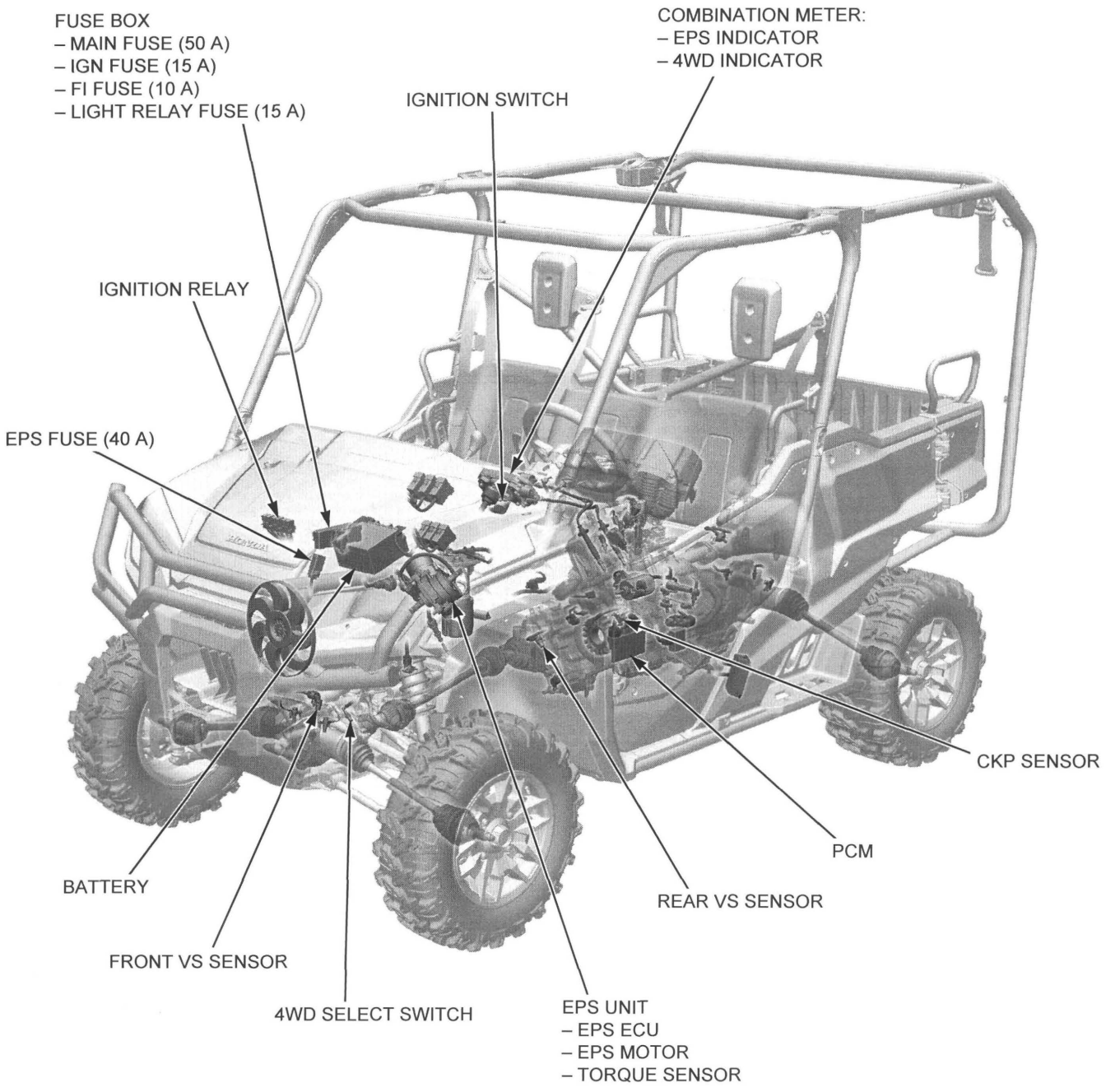
- This section covers electrical system service of the EPS. For other service of the steering system (page 17-4).
- The EPS ECU is integrated in the EPS unit. Do not disassemble the EPS unit. Replace the EPS unit as an assembly when it is faulty.
- When performing the DTC troubleshooting, read "EPS Troubleshooting Information" carefully (page 24-5), 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 (integrated in the EPS unit) 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.
- The following color codes are used throughout this section.

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

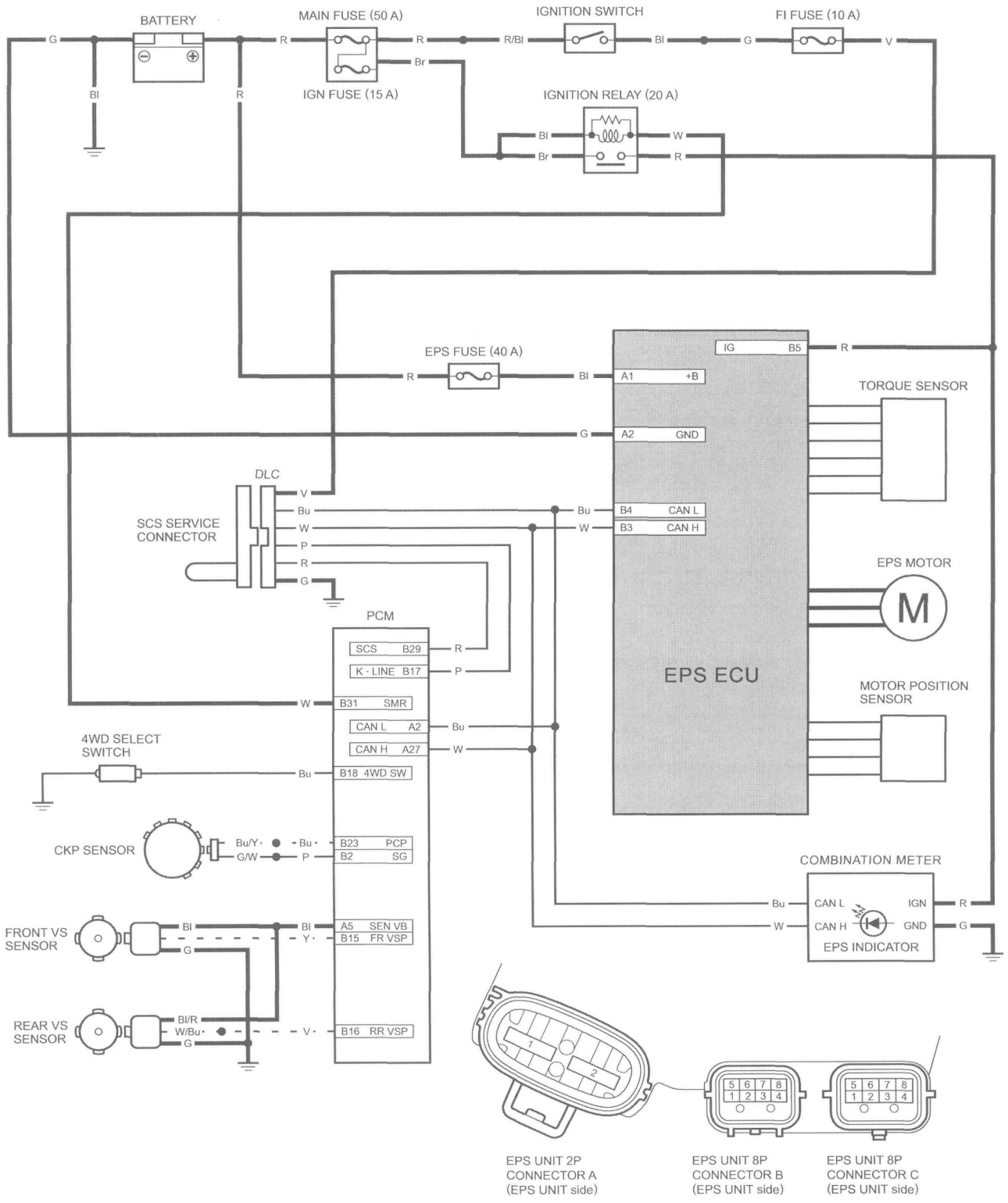
TOOLS

SCS service connector 070MZ-0010300  or 070MZ-001A300 (U.S.A. only)	Test probe, 2 packs 07ZAJ-RDJA110 

SYSTEM LOCATION



SYSTEM DIAGRAM



EPS SYMPTOM TROUBLESHOOTING

Symptom	Diagnosis	Also check for
EPS indicator never comes on at all	Inspect the CAN line circuit (page 23-8)	• Faulty combination meter (page 23-7)
EPS indicator does not go off, and no DTCs are stored	Inspect the CAN line circuit (page 23-8)	• Short circuit in the DLC related wire

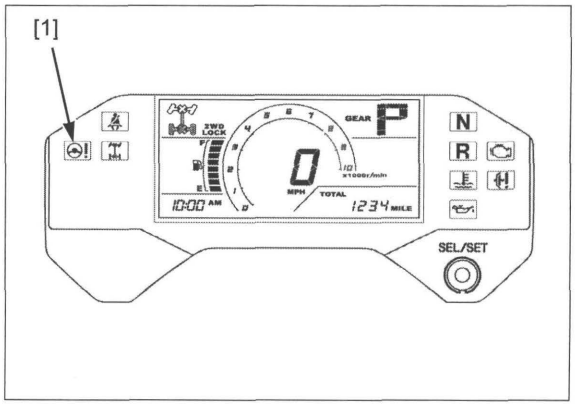
EPS TROUBLESHOOTING INFORMATION

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 driver 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 (O).
- 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 24-7).

EPS INDICATOR

Under normal conditions, the EPS indicator comes on when the ignition switch is turned ON (I), 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 C0608-00 is stored; angle sensor abnormal signal, 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 (O), and the indicator goes off automatically when the system returns to normal.

If a problem continues after restarting the engine, the EPS indicator stays on and the EPS ECU stops the EPS function.

When the DTC C1420-00 or C1423-00 (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 steering wheel continuously left and right 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 steering wheel, or when the ignition is turned off, and the system cools, the EPS ECU will gradually restore the power assist.

STEERING ANGLE SENSOR INITIALIZATION (Rack Center Learning/Vehicle Center Learning)

The EPS ECU stores the steering angle sensor neutral position in the EEPROM. The angle sensor must be initialized whenever the EPS unit, the steering gear box, etc is serviced.

Perform the Rack Center learning (page 24-9) and Vehicle Center learning (page 24-10) when you service the following components.

SERVICE DETAILS	RACK CENTER LEARNING	VEHICLE CENTER LEARNING
EPS unit is removed and installed, or replaced	O	O
Lower universal joint is removed and installed	O	O
Steering gear box is removed and installed, or replaced	O	O
Tie-rod is adjusted, removed and installed, or replaced	-	O
Vehicle has accident but cannot recognize deformation of frame body, suspension arm, shock absorber, tie-rod, hub, knuckle, wheel... etc.	O	O

NOTE:

- The angle sensor neutral position is not affected 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.

MCS INFORMATION

- Refer to PGM-FI System section for "MCS INFORMATION" (page 4-7).

GST (Generic Scan Tool) INFORMATION

- The GST can readout the DTC, stored data, current data and other conditions.

How to connect the GST

Turn the ignition switch OFF.

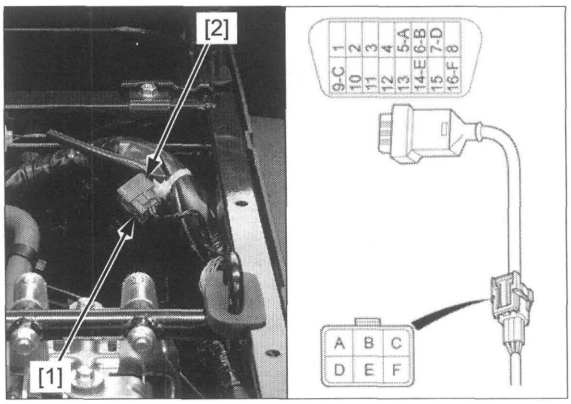
Remove the seat under center lid (page 2-5).

Remove the DLC [1] from the dummy connector [2].
Connect the special tool to the DLC.

Connect the GST to the special tool.
Turn the ignition switch ON.
Check the DTC and stored data.

OBD harness circuit connection (General allocation in ISO 15031-3)

	DLC 6P	16P
Signal ground	**A**	**5**
CAN_H	**B**	**6**
Discretionary (SCS line)	**C**	**9**
K-line	**D**	**7**
CAN_L	**E**	**14**
Permanent positive battery	**F**	**16**

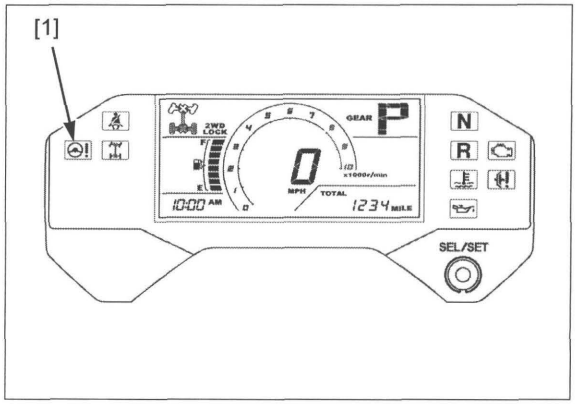


DTC READOUT

NOTE:

- If the MCS is not available, DTC can be read from the EPS ECU memory by the EPS indicator blinking pattern (page 24-7).
- After performing diagnostic troubleshooting, erase the DTC(s) (page 24-7)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 (I) 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 MCS or GST to the DLC (page 4-7).

Read the DTC, stored data and follow the troubleshooting index (page 24-12).

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

Reading DTC with the EPS indicator

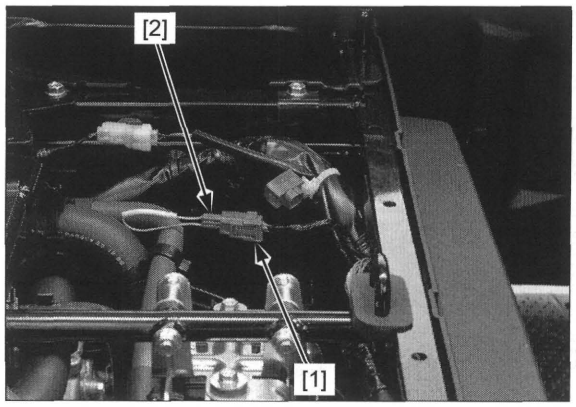
1. Remove the DLC from the dummy connector (page 24-6).
2. Turn the ignition switch ON (I). The EPS indicator turns ON.

   Wait 4 seconds then short the DLC [1] terminals using the special tool.

   TOOL:
   [2] SCS short connector **070MZ-0010300**
   (U.S.A.: 070MZ-001A300)

   Connection: Red – Green

3. Read and note the EPS indicator blinks and refer to the troubleshooting index (page 24-12).



EPS Indicator Blinking Pattern

- 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 blink, the number of indicator blinks is 23 (two long blinks = 20 blinks, plus three 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 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.

How to erase the DTC with MCS

Connect the MCS to the DLC (page 4-7).

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

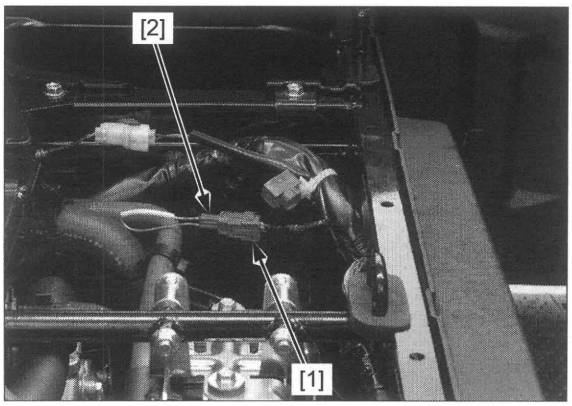
To erase the DTC without MCS, refer to the following procedure.

How to erase the DTC without MCS

1. Remove the DLC from the dummy connector (page 4-7).
2. Short the DLC [1] terminals using the special tool.

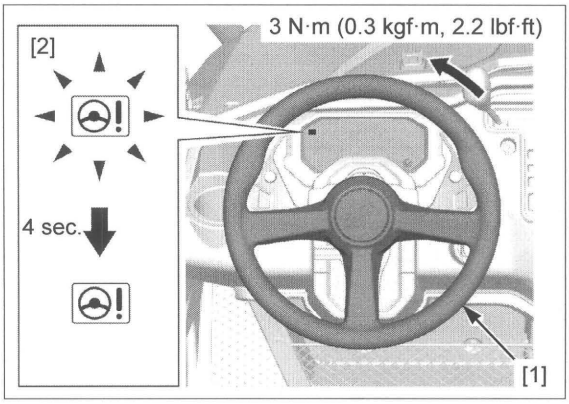
   TOOL:
   [2] SCS short connector **070MZ-0010300**
   (U.S.A.: 070MZ-001A300)

   Connection: Red – Green



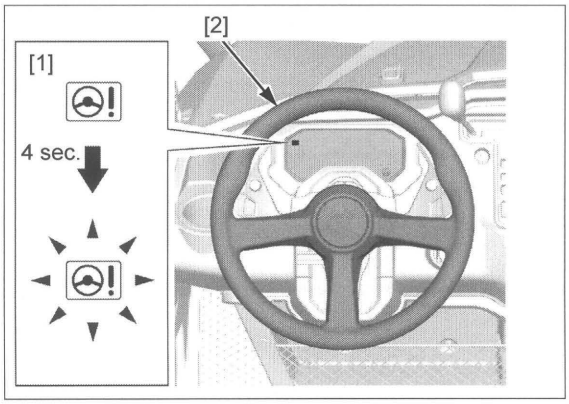
3. Apply more than 3 N·m (0.3 kgf·m, 2.2 lbf·ft) of torque to the steering wheel [1] by turning it counterclockwise (to apply load to the torque sensor) and hold it.
4. Turn the ignition switch ON (I).

   The EPS indicator will quickly flash for one half second, then the EPS indicator comes on and it goes off after 4 seconds.



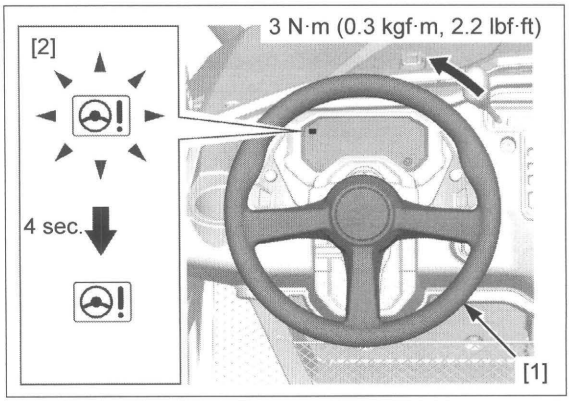
5. After the EPS indicator [1] goes off, release the steering wheel [2].

   The EPS indicator comes on again after 4 seconds.



6. After the EPS indicator [1] comes on, apply more than 3 N·m (0.3 kgf·m, 2.2 lbf·ft) of torque to the steering wheel [2] by turning it counterclockwise and hold it.

   The EPS indicator goes off after 4 seconds.



7. After the EPS indicator [1] goes off, release the steering wheel [2].

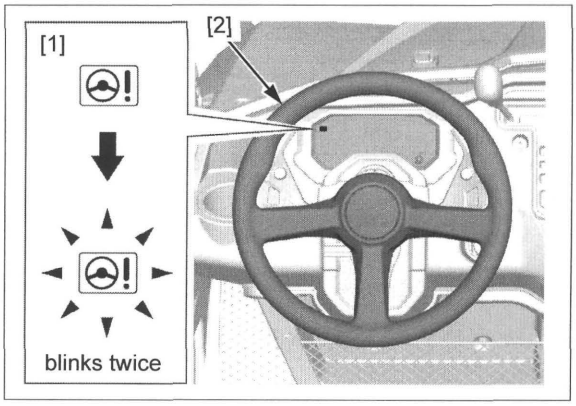
   The EPS indicator blinks twice.

8. Turn the ignition switch OFF (O) after the EPS indicator blinks twice (DTC erasure is completed at this time).

NOTE:

- If the EPS indicator does not blink twice, an error was made in the procedure and the DTC was not erased. Turn the ignition switch OFF (O), and repeat the operation from step 3.

9. Remove the special tool from the DLC and connect the DLC to the dummy connector.



RACK CENTER LEARNING

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.

Rack Center Learning with MCS

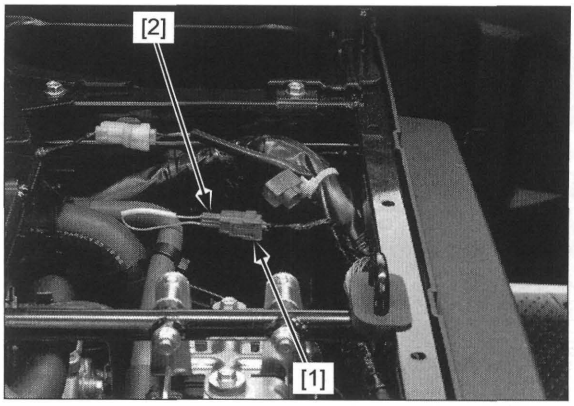
1. Raise the front wheels off the ground and support the vehicle securely.
2. Connect the MCS to the DLC (page 4-7).
3. Turn the ignition switch ON (I).
4. Perform the Rack Center Learning in accordance with the MCS instructions.

Rack Center Learning without MCS

1. Raise the front wheels off the ground and support the vehicle securely.
2. Turn the steering wheel counterclockwise fully to the left rack end position.
3. Remove the DLC from the dummy connector (page 4-7).
4. Short the DLC [1] terminals using the special tool.

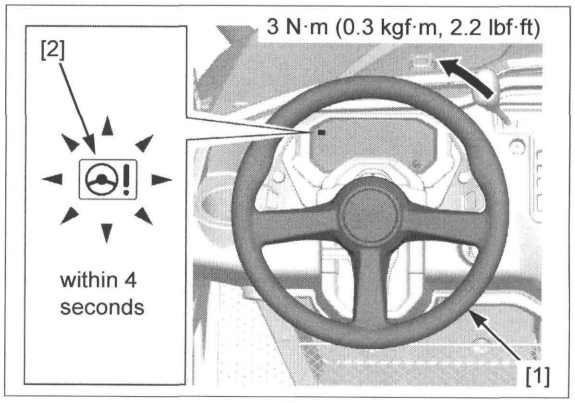
   TOOL:
   [2] SCS short connector **070MZ-0010300**
   (U.S.A.: 070MZ-001A300)

   Connection: Red – Green



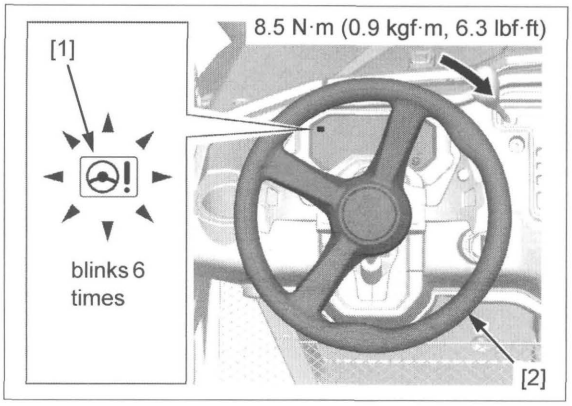
5. Apply more than 3 N·m (0.3 kgf·m, 2.2 lbf·ft) of torque to the steering wheel [1] by turning it counterclockwise (to apply load to the torque sensor) and hold it.
6. Turn the ignition switch ON (I).

   The EPS indicator [2] comes on for 0.5 second, then comes on for 4 seconds, this is when you should release the wheel torque.



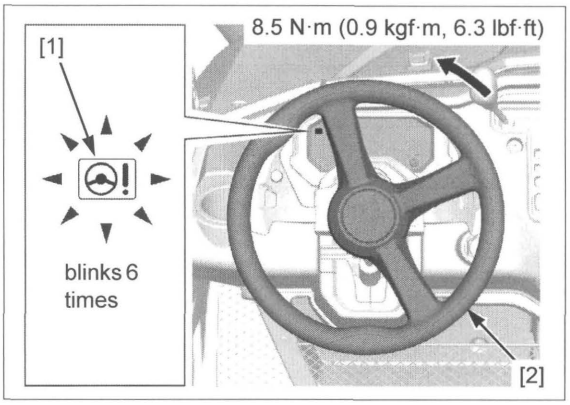
7. After the EPS indicator [1] starts to blink, steer wheel toward right until right Rack End. Apply more than 8.5 N·m (0.9 kgf·m, 6.3 lbf·ft) of torque at right Rack End for more than 1 second.

   The EPS indicator blinks 6 times and the 1st right rack end position is stored into the EPS unit.



8. After the EPS indicator [1] starts to blink, steer wheel toward left until left Rack End. Apply more than 8.5 N·m (0.9 kgf·m, 6.3 lbf·ft) of torque at left Rack End for more than 1 second.

   The EPS indicator blinks 6 times and the 1st left rack end position is stored into the EPS unit.



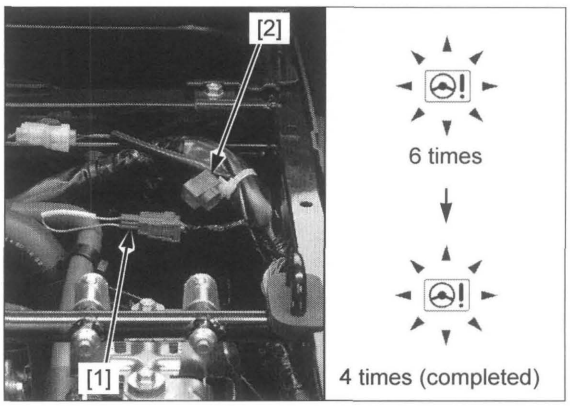
9. Repeat the step 7 to store the 2nd right rack end position into the EPS unit.
10. Repeat the step 8 to store the 2nd left rack end position into the EPS unit.
11. Remove the SCS short connector [1] from the DLC. The EPS indicator blinks 6 times and the rack center position is calculated.

    The EPS indicator blinks 4 times and the Rack Center learning is completed at this time.

NOTE:

- If the EPS indicator does not blink 4 times, an error was made in the procedure and the Rack Center learning was not completed. Turn the ignition switch OFF (O), and repeat the operation from step 2.

12. Turn the ignition switch OFF (O).
13. Connect the DLC to the dummy connector [2].



VEHICLE CENTER LEARNING

NOTE:

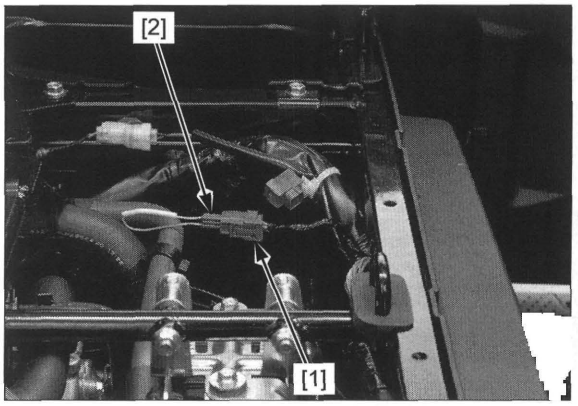
- Perform this procedure using a fully charged battery. The EPS indicator will stay lit and the EPS ECU will abort the process if you use a low or dead battery.

1. Move the steering wheel and settle it at rack center position. It is acceptable to settle by visual check of the steering wheel position.
   Settle suspension by pressing down on front bumper several times and moving vehicle forward and backward within 1 meter.
2. Adjust the toe within the standard position (page 3-23).
3. Move the vehicle to flat ground of the smooth pavement or asphalt.
4. Move the front wheel at straight ahead position and engage the shift lever into P-range.
5. Turn the ignition switch OFF (O) and wait for 5 seconds.

6. Remove the DLC from the dummy connector (page 4-7).
7. Short the DLC [1] terminals using the special tool.

   TOOL:
   [2] SCS short connector 070MZ-0010300

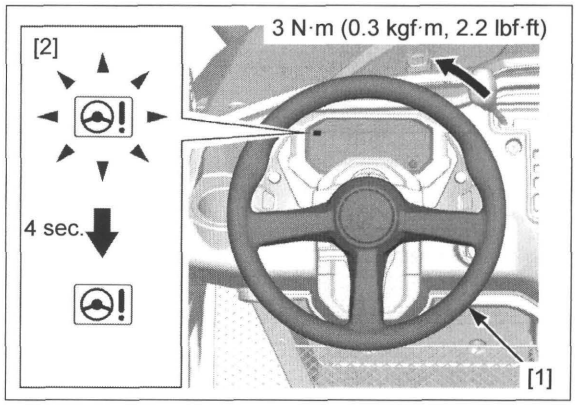
   Connection: Red – Green



8. Apply more than 3 N·m (0.3 kgf·m, 2.2 lbf·ft) of torque to the steering wheel by turning it counterclockwise (to apply load to the torque sensor) and hold it.

   It is not necessary to move the wheel so far as the torque is applied.
9. Turn the ignition switch ON (I).

   The EPS indicator [2] comes on for 0.5 second, then comes on for 4 seconds, this is when you should release the wheel torque.



10. Start the engine.

    After the Vehicle Center learning mode is triggered, the EPS indicator [1] blinks twice repeatedly.

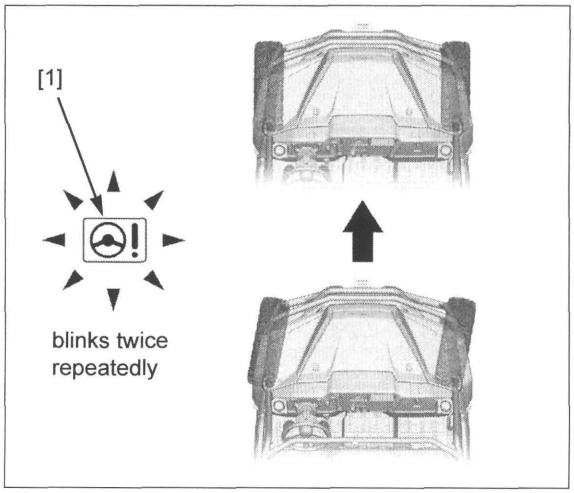
    Engage the shift lever into the H-range. Gently open the throttle and move the vehicle forward at the speed of 6 – 19 km/h (4 – 12 mph).

    Use self-aligning torque to find the Vehicle Center position.

NOTE:

- Do not operate the steering wheel.

  Keep running at least 50 ft and gently stop the vehicle. The front wheel is at the kinematic center position.



11. Disconnect the SCS short connector. The EPS indicator blinks 6 times and the Vehicle Center position is stored into the EPS unit.

    The EPS indicator blinks 6 times repeatedly when Vehicle Center learning is successfully completed.
12. Turn the ignition switch OFF (O).

CIRCUIT INSPECTION

- Refer to PGM-FI System section for "INSPECTION AT PCM CONNECTOR" information (page 4-8).

DTC INDEX

DEFINITIONS

Latch: The EPS indicator turns on and stays on whenever the ignition switch is in the ON (I), 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 (O).

NOTE:

- If the MCS is not used, perform all of the inspection on the corresponding main code (digits in front of hyphen) of the DTC.

DTC	EPS indicator blinks	Component	Description	Detection timing	Type	Refer to page
U1440-00	11	CAN communication (Vehicle speed)	Signal not received	0.5 s	Revest	24-14
U1440-00	11		Vehicle speed signal quality	0.5 s	Revest	
U1440-00	11		Vehicle speed signal quality corrupted	0.5 s	Revest	
U1440-00	11		Abnormal value (4WD select switch malfunction detected by PCM)	0.5 s	Revest	
U3000-00	13	EPS motor	FET/current sensor circuit fault detected by microcontroller	0.12 s	Latch	24-16
U1442-00	15	CAN communication (4WD select switch)	Signal not received	0.5 s	Revest	24-17
U1442-00	15		4WD actuator fault	0.5 s	Reset	
U1442-00	15		Abnormal value (4WD select switch malfunction detected by PCM)	0.5 s	Revest	
C1403-00	16	Motor position sensor	Motor position sensor abnormal signal	0.1 s	Reset	24-19
U3000-00	18	EPS motor	Current sensor malfunction	0.12 s	Reset	24-19
C1420-00	23	Torque sensor	Torque sensor abnormal signal	0.32 s	Latch	24-19
C1423-00	23		Torque sensor power supply out of range	0.32 s	Latch	
U1420-00	24	CAN communication (Engine speed)	Signal not received	0.5 s	Reset	24-20
U1420-00	24		Incoherent information	0.5 s	Reset	
C0608-00	25	Angle sensor	Angle sensor abnormal signal	0.1 s	Reset	24-21
C13F0-00	26		Angle "0" position unwritten (Rack Center learning)	1 time	Rack Center Learning Success and Reset	24-21
C13F1-00	26		Angle "0" position unwritten (Vehicle Center learning)	1 time	Vehicle Center Learning Success and Reset	
C13F2-00	27		Vehicle Center offset from Rack Center is detected out of range	1 time	Vehicle Center Learning Success and Reset	24-22
C13F3-00	28		Rack stroke angle value exceeds reference value	1 time	Rack Center Learning Success and Reset	24-22
C13F3-00	28		Rack stroke angle value is less than reference value	1 time	Rack Center Learning Success and Reset	
U3502-00	31	Battery	Over voltage (>16V DC)	48 ms	Revest	24-23
U3501-00	32		Under voltage (<10V DC)	15 s	Revest	24-24

DTC	EPS indicator blinks	Component	Description	Detection timing	Type	Refer to page
U0028-00	34	CAN communication (Bus)	Bus off	1 s	Revest	24-24
U3000-00	36	Controller	Microcontroller malfunction	200 ms	Reset	24-26
U3000-00	36		Software malfunction	1 time at initial	Reset	
U0100-00	99	CAN communication (SCS)	Signal not received	0.5 s	Revest	24-26

DTC TROUBLESHOOTING

NOTE:

- After troubleshooting, erase the DTC(s) (page 24-7)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 U1440-00 (EPS INDICATOR BLINKS 11): CAN COMMUNICATION (VEHICLE SPEED)

NOTE:

- Before starting the troubleshooting, check for loose or poor contact of the following connectors, and recheck the EPS indicator (page 24-7).
  - EPS unit 8P
  - Front VS sensor 3P
  - Rear VS sensor 3P

1. **EPS Indicator Inspection**

   Turn the ignition switch ON (I) and check the EPS indicator.

   Does the EPS indicator blink or light?

   YES – GO TO STEP 2.

   NO – GO TO STEP 3.

2. **PGM-FI DTC Check**

   Check the PGM-FI DTC (page 4-8).

   Is the PGM-FI DTC 66-1 or 67-1 indicated?

   YES – Follow the PGM-FI DTC troubleshooting (page 4-10)

   NO – GO TO STEP 4.

3. **CAN Communication Line Open Circuit Inspection (Between the EPS unit and combination meter)**

Turn the ignition switch OFF (O).
Remove the front fender (page 2-20)
Disconnect the following:

- Combination meter 12P connector
- EPS unit 8P connector B [1]

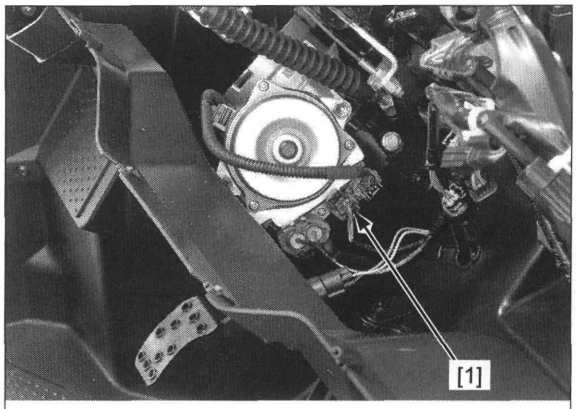
Check the wires for continuity between the wire harness side 8P connector B and combination meter 12P connector [2].

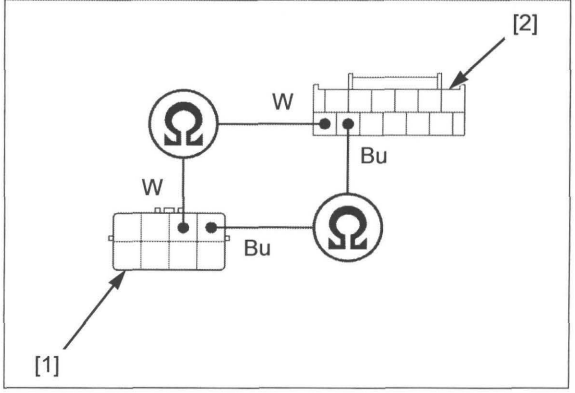
Connection: Blue – Blue
White – White

Is there continuity?

YES – GO TO STEP 4.

NO – Open circuit in the Blue or White wire





4. **CAN Communication Line Open Circuit Inspection (Between the EPS unit and PCM)**

Turn the ignition switch OFF (O).
Disconnect the PCM 33P (Black) connector (page 4-35)
Check the wires for continuity between the wire harness side 8P connector B [1] and PCM 33P (Black) connector [2].

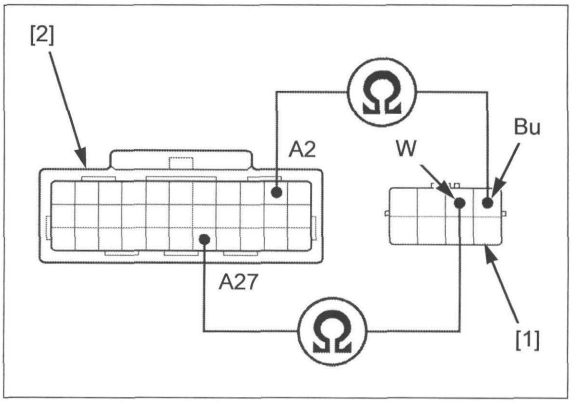
TOOL:
Test probe, 2 packs 07ZAJ-RDJA110

Connection: Blue – A2
White – A27

Is there continuity?

YES – Replace the EPS unit with a new one (page 17-8) and recheck.

NO – Open circuit in the Blue or White wire



DTC U3000-00 (EPS INDICATOR BLINKS 13): EPS MOTOR

NOTE:

- Before starting the troubleshooting, check for loose or poor contact of the EPS unit 2P connector, and recheck the EPS indicator (page 24-7).

1. EPS ECU System Inspection

Erase the DTC (page 24-7).
Start the engine.
Turn the steering wheel to left and right several times, and keep holding each direction for 10 seconds.
Check the DTC (page 24-7).

Is the same DTC indicated?

YES – GO TO STEP 2.

NO – Intermittent failure

2. Motor Line Input Voltage Inspection

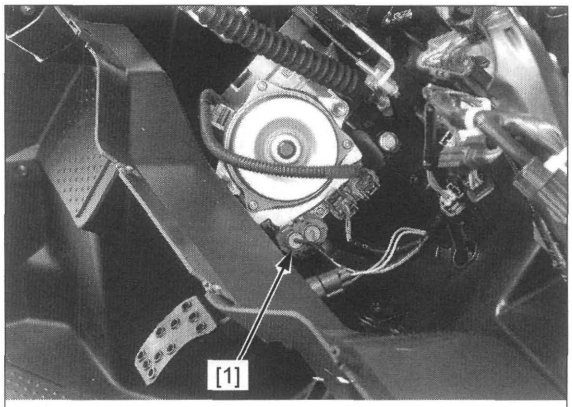
Turn the ignition switch OFF (O).
Remove the front fender (page 2-20)
Disconnect the EPS unit 2P connector [1].
Turn the ignition switch ON (I) and measure the voltage between the wire harness side 2P connector.

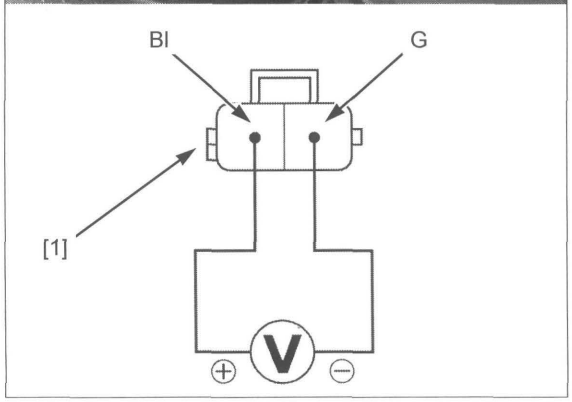
Connection: Black – Green

Is there battery voltage?

YES – GO TO STEP 3.

NO – Open circuit in the Black or Green wire





3. Motor Line Short Circuit Inspection

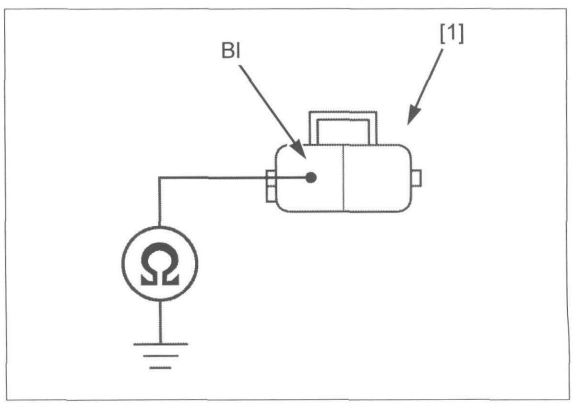
Turn the ignition switch OFF (O).
Check for continuity between the wire harness side 2P connector [1] and ground.

Connection: Black – ground

Is there continuity?

YES – Short circuit in the Black wire

NO – Recheck for loose or poor contact on the EPS unit connectors. If they are OK, replace the EPS unit with a new one (page 17-8).



DTC U1442-00 (EPS INDICATOR BLINKS 15): CAN COMMUNICATION (4WD SELECT SWITCH)

NOTE:

- Before starting the troubleshooting, check the following connectors for loose or poor contact.
  - PCM 33P (Black) and 33P (Gray)
  - EPS unit 8P
- When this problem occurs, there is a problem with differential lock 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 Indicator Inspection

Turn the ignition switch ON (I) and check the EPS indicator.

Does the EPS indicator blink or light?

YES – GO TO STEP 2.

NO – GO TO STEP 3.

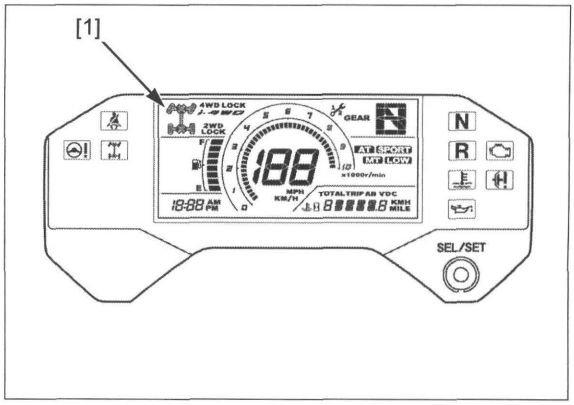
2. Drive mode Indicator Inspection

Stop the engine.
Turn the ignition switch ON (I).
Shift the drive mode from 2WD to 4WD and from 4WD to 2WD several times and check the drive mode indicator [1].

Is the drive mode indicator operated normally?

YES – GO TO STEP 4.

NO – Inspect the 4WD select switch (page 23-25).



3. CAN Communication Line Open Circuit Inspection (Between the EPS unit and combination meter)

Turn the ignition switch OFF (O).
Remove the front fender (page 2-20)
Disconnect the following:

- Combination meter 12P connector
- EPS unit 8P connector B [1]

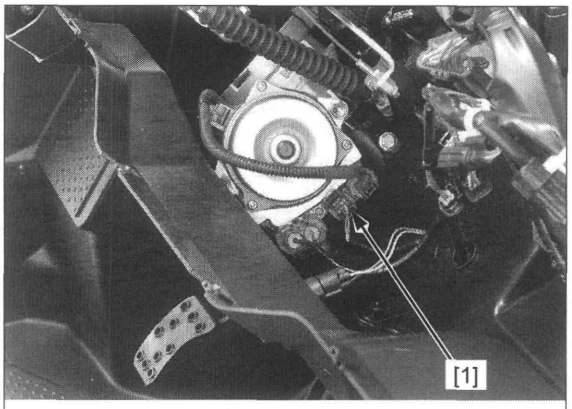
Check the wires for continuity between the wire harness side 8P connector B and combination meter 12P connector [2].

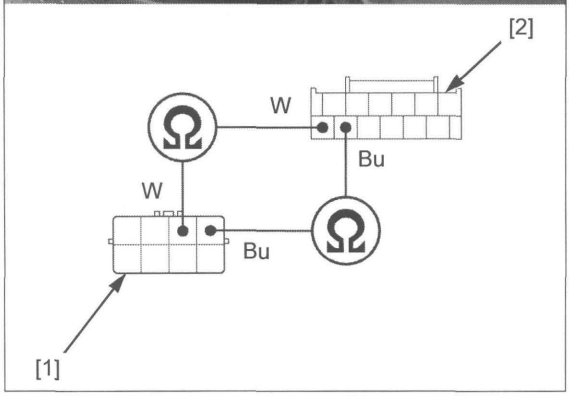
Connection: Blue – Blue
White – White

Is there continuity?

YES – GO TO STEP 3.

NO – Open circuit in the Blue or White wire





4. CAN Communication Line Open Circuit Inspection (Between the EPS unit and PCM)

Turn the ignition switch OFF (O).
Disconnect the PCM 33P (Black) connector (page 4-35)
Check the wires for continuity between the wire harness side 8P connector B [1] and PCM 33P (Black) connector [2].

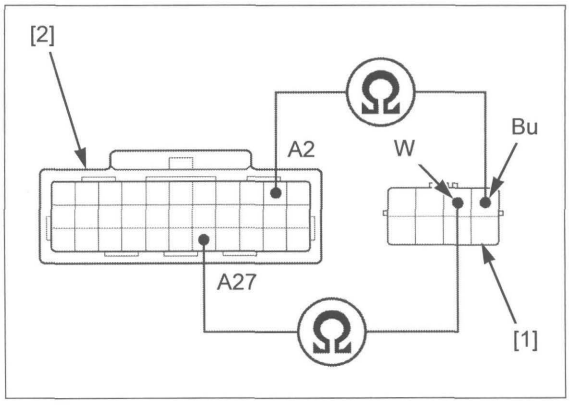
TOOL:
Test probe, 2 packs 07ZAJ-RDJA110

Connection: Blue – A2
White – A27

Is there continuity?

YES – Replace the EPS unit with a new one (page 17-8) and recheck.

NO – Open circuit in the Blue or White wire



DTC C1403-00 (EPS INDICATOR BLINKS 16): MOTOR POSITION SENSOR

NOTE:

- Before starting the troubleshooting, check for loose or poor contact of the EPS unit 2P connector A, 8P connector B and 8P connector C, and then recheck the EPS indicator (page 24-7).

1. **EPS ECU System Inspection**

   Erase the DTC (page 24-7).
   Start the engine.
   Turn the steering wheel to left and right several times, and keep holding each direction for 10 seconds.
   Check the DTC (page 24-7).

   Is the same DTC indicated?

   YES – Recheck for loose or poor contact on the EPS unit connectors. If they are OK, replace the EPS unit with a new one (page 17-8).

   NO – Intermittent failure

DTC U3000-00 (EPS INDICATOR BLINKS 18): EPS MOTOR

Refer to DTC U3000-00 (EPS INDICATOR BLINKS 13): EPS MOTOR (page 24-16).

DTC C1420-00/C1423-00 (EPS INDICATOR BLINKS 23): TORQUE SENSOR

NOTE:

- Check for loose or poor contact of the EPS unit sub-harness connectors. If the connector is disconnected from the EPS unit when the ignition switch is ON (I), the torque sensor fault will occur.

Refer to DTC C1403 (EPS INDICATOR BLINKS 16): MOTOR POSITION SENSOR (page 24-19).

DTC U1420-00 (EPS INDICATOR BLINKS 24): CAN COMMUNICATION (ENGINE SPEED)

NOTE:

- Before starting the troubleshooting, check for loose or poor contact of the following connectors, and recheck the EPS indicator (page 24-7).
  - EPS unit 8P
  - CKP sensor 2P

1. **EPS Indicator Inspection**

   Turn the ignition switch ON (I) and check the EPS indicator.

   Does the EPS indicator blink or light?

   YES – GO TO STEP 2.

   NO – GO TO STEP 3.

2. **CKP Sensor Inspection**

   Inspect the CKP sensor (page 5-6).

   Is the CKP sensor normal?

   YES – GO TO STEP 4.

   NO – Faulty CKP sensor

3. **CAN Communication Line Open Circuit Inspection (Between the EPS unit and combination meter)**

   Turn the ignition switch OFF (O).
   Remove the front fender (page 2-20)
   Disconnect the following:

   - Combination meter 12P connector
   - EPS unit 8P connector B [1]

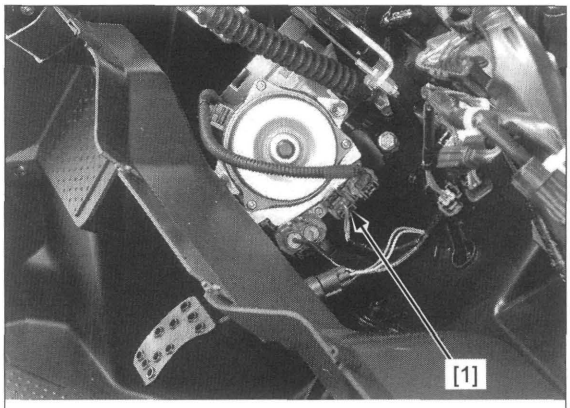
   Check the wires for continuity between the wire harness side 8P connector B and combination meter 12P connector [2].

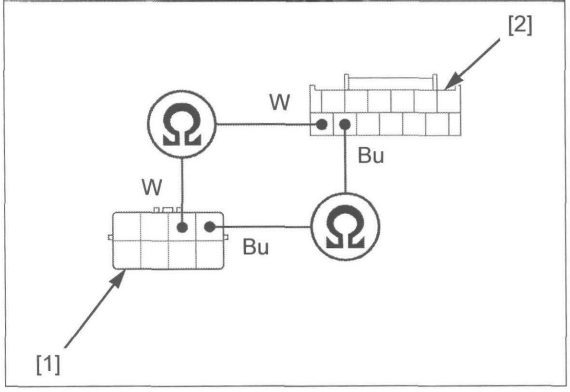
   Connection: Blue – Blue
   White – White

   Is there continuity?

   YES – GO TO STEP 4.

   NO – Open circuit in the Blue or White wire



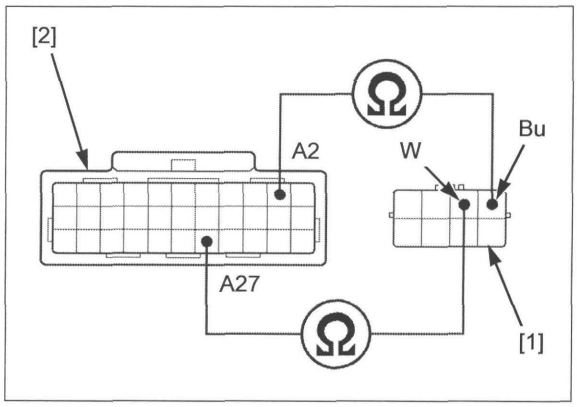


4. CAN Communication Line Open Circuit Inspection (Between the EPS unit and PCM)

Turn the ignition switch OFF (O).
Disconnect the PCM 33P (Black) connector (page 4-35)
Check the wires for continuity between the wire harness side 8P connector B [1] and PCM 33P (Black) connector [2].

TOOL:
Test probe, 2 packs 07ZAJ-RDJA110

Connection: Blue – A2
White – A27



Is there continuity?

YES – Replace the EPS unit with a new one (page 17-8) and recheck.

NO – Open circuit in the Blue or White wire

DTC C0608-00 (EPS INDICATOR BLINKS 25): ANGLE SENSOR

1. Steering Angle Sensor Initialization

Perform the Rack Center Learning and Vehicle Center Learning.

- Rack Center learning (page 24-9)
- Vehicle Center learning (page 24-10)

Erase the DTC (page 24-7).
Start the engine.
Check the DTC (page 24-7).

Is the same DTC indicated?

YES – The Rack Center and Vehicle Center Learning is unsuccessful. Perform the steering angle sensor initialization procedure again.

NO – Steering angle sensor initialization completed

DTC C13F0-00/C13F1-00 (EPS INDICATOR BLINKS 26): ANGLE SENSOR

NOTE:

- DTC C13F0-00/C13F1-00 only appear when EPS unit is replaced or angle sensor values have been erased. Do not replace the EPS unit because rack end values have not been learned.
- These DTC can only be erased from new EPS unit or EPS unit with erased angle values by successfully learning Rack Center.
- Steering rack and EPS unit must match (correct part number for this vehicle) for Rack Center to be learned. If not, Rack Center cannot be learned.

Refer to DTC C0608-00 (EPS INDICATOR BLINKS 25): ANGLE SENSOR (page 24-21).

DTC C13F2-00 (EPS INDICATOR BLINKS 27): ANGLE SENSOR

1. Toe Setting/Parts States Inspection

Check and adjust the toe setting (page 3-23), also check and replace the following:

- steering column (page 17-6)
- steering shaft (page 17-8)
- tie-rod (page 17-12)
- steering gear box (page 17-14)

Is the toe setting and parts states OK?

YES – GO TO STEP 2.

NO – Adjust toe setting within specification, repair or replace the faulty parts. Anytime the steering output linkage is removed/re-installed to the EPS unit, perform the steering angle sensor initialization (page 24-6)

2. Steering Angle Sensor Initialization

Perform the Vehicle Center Learning (page 24-10).

NOTE:

- This DTC can only be erased from new EPS unit or EPS unit with erased angle values by successfully learning Vehicle Center.

Erase the DTC (page 24-7).
Start the engine.
Check the DTC (page 24-7).

Is the same DTC indicated?

YES – Replace the EPS unit with a new one (page 17-8).

NO – Steering angle sensor initialization completed

DTC C13F3-00 (EPS INDICATOR BLINKS 28): ANGLE SENSOR

NOTE:

- This DTC indicates steering rack travel is not correct for model type. Confirm correct parts are installed.
- Inspect steering rack travel to ensure it travels rack end to rack end.
- EPS unit must be mated to correct steering rack for Rack Center to be learned. After-market steering rack, damaged steering rack or obstruction prevent full rack stroke.

Replace the faulty parts and perform the steering angle sensor initialization (page 24-6)

DTC U3502-00 (EPS INDICATOR BLINKS 31): BATTERY

NOTE:

This DTC indicates a over-voltage fault. Before starting the troubleshooting, check the following items:

- Check for loose or poor contact on the EPS unit 8P connector B, and recheck the EPS indicator (page 24-14).
- Check for blown IGN fuse (15 A).
- Check the ignition relay (page 5-7).
- Check the battery condition (page 22-4). (Use a fully charged battery.)
- Check the regulator/rectifier (page 22-6)
- Check any electrical accessories if installed on the vehicle.

1. IG Line Short Circuit Inspection

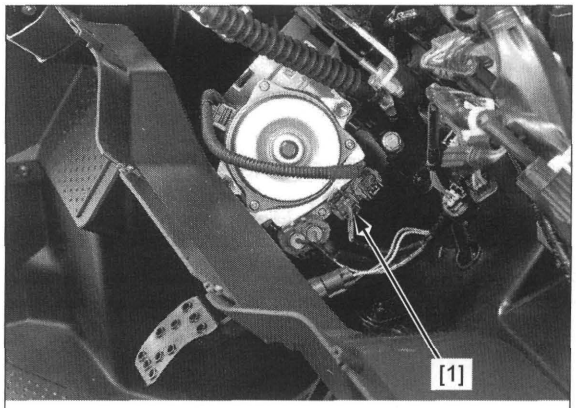
Turn the ignition switch OFF (O).
Remove the front fender (page 2-20)
Disconnect the EPS unit 8P connector B [1].
Check for continuity between the wire harness side EPS unit 8P connector B and ground.

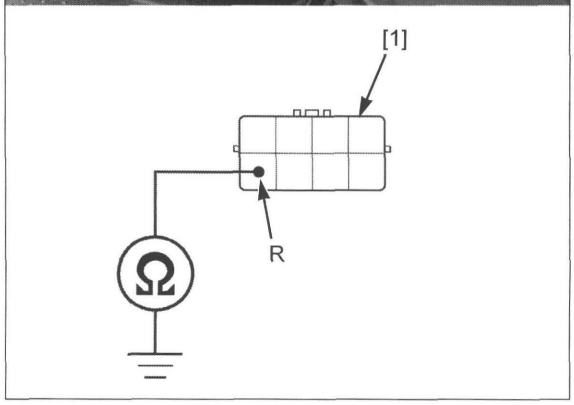
Connection: Red – ground

Is there continuity?

YES – GO TO STEP 2.

NO – Short circuit in the Red wire





2. IG Line Open Circuit Inspection

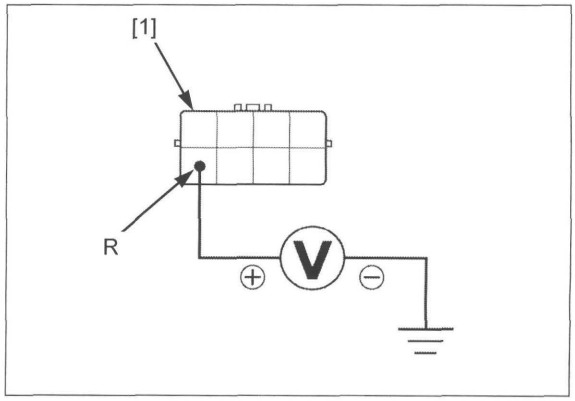
Turn the ignition switch ON (I).
Measure the voltage between the wire harness side 8P connector B [1] and ground.

Connection: Red – ground

Is there battery voltage?

YES – GO TO STEP 3.

NO – Open circuit in the Red wire



3. **Battery Inspection**

   Turn the ignition switch OFF (O).
   Perform the Battery/Charging System troubleshooting (page 22-3).

   Is the battery and charging system in good condition?

   YES – Replace the EPS unit with a known good one (page 17-8) and recheck.

   NO – Repair the battery/charging system.

DTC U3501-00 (EPS INDICATOR BLINKS 32): BATTERY

NOTE:
This DTC indicates a low-voltage fault (Low voltage condition exists for more than 15 seconds).

Check wiring grounds, condition of wire harness and EPS unit connectors. Also, check for any potential excessive current load from electrical accessories installed on the vehicle.

Refer to DTC U3502-00 (EPS INDICATOR BLINKS 31): BATTERY (page 24-23)

DTC U0028-00 (EPS INDICATOR BLINKS 34): CAN COMMUNICATION (BUS OFF)

NOTE:
- Before starting the troubleshooting, check for loose or poor contact of the connectors, and recheck the EPS indicator (page 24-7).

1. **EPS ECU System Inspection**

   Erase the DTC (page 24-7).
   Start the engine and wait 60 seconds or more.
   Check the DTC (page 24-7).

   Is the same DTC indicated?

   YES – GO TO STEP 2.

   NO – Intermittent failure

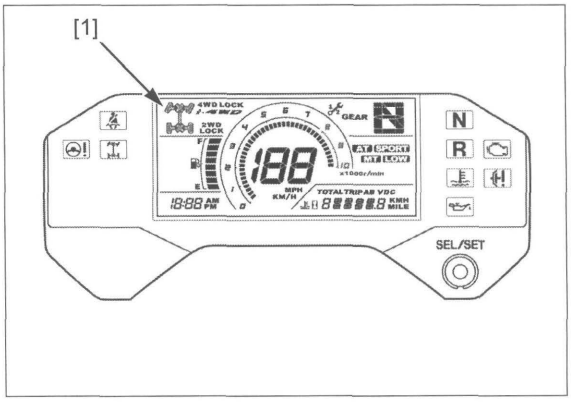
2. **Drive mode Indicator Inspection**

   Stop the engine.
   Turn the ignition switch ON (I).
   Shift the drive mode from 2WD to 4WD and from 4WD to 2WD several times and check the drive mode indicator [1].

   Is the drive mode indicator operated normally?

   YES – GO TO STEP 3.

   NO – Inspect the 4WD select switch (page 23-25).



3. CAN Line (PCM-to-EPS unit) Open Circuit Inspection

Remove the front fender (page 2-20)
Disconnect the following:

- PCM 33P (Black) connector (page 4-35)
- EPS unit 8P connector B [1]

Check the continuity between the wire harness side PCM 33P (Black) connector [2] and EPS unit 8P connector B.

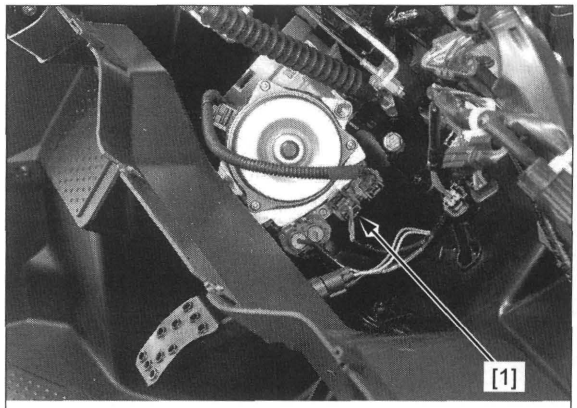
TOOL:
Test probe, 2 packs 07ZAJ-RDJA110

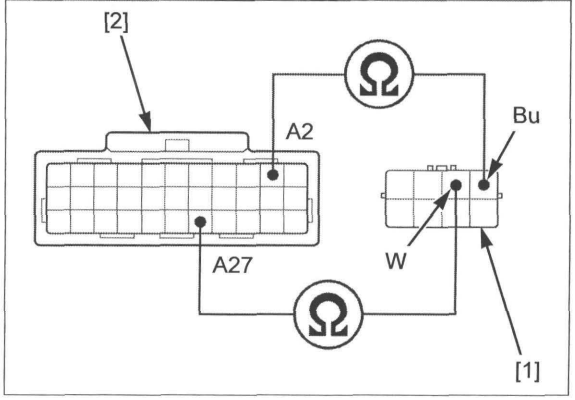
Connection: A2 – Blue
A27 – White

Is there continuity?

YES – GO TO STEP 4.

NO – Open circuit in the Blue or White wire





4. CAN Line (PCM-to-Combination meter) Open Circuit Inspection

Disconnect the following:

- PCM 33P (Black) connector (page 4-35)
- Combination meter 12P connector (page 23-6)

Check the continuity between the wire harness side PCM 33P (Black) connector [1] and combination meter 12P connector [2].

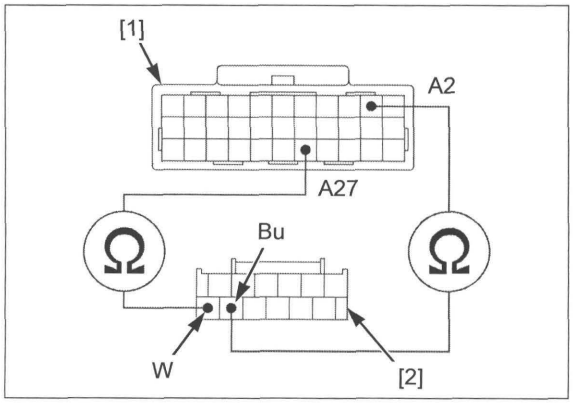
TOOL:
Test probe, 2 packs 07ZAJ-RDJA110

Connection: A2 – Blue
A27 – White

Is there continuity?

YES – • I-4WD model; GO TO STEP 5.
• Except I-4WD model; GO TO STEP 6.

NO – Open circuit in the Blue or White wire



5. **CAN Line (PCM-to-I-4WD Control Unit) Open Circuit Inspection**

   Disconnect the following:

   – PCM 33P (Black) connector (page 4-35)
   – I-4WD modulator 38P connector (page 25-7)

   Check the continuity between the wire harness side PCM 33P (Black) connector [1] and I-4WD modulator 38P connector [2].

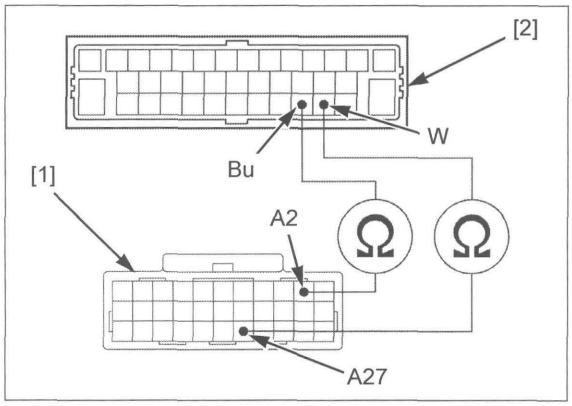
   TOOL:
   Test probe, 2 packs 07ZAJ-RDJA110

   Connection: A2 – Blue
   A27 – White

   Is there continuity?

   YES – GO TO STEP 6.

   NO – Open circuit in the Blue or White wire



6. **Communicated Part Inspection**

   Connect the disconnected connectors.
   Erase the DTC (page 24-7).
   Replace the EPS unit, I-4WD modulator (if equipped) and combination meter one by one in order with a new one.
   Turn the ignition switch ON and wait for 10 seconds.
   Check the DTC.

   Is the same DTC indicated?

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

   NO – Faulty original part

DTC U3000-00 (EPS INDICATOR BLINKS 36): MICRO CONTROLLER

NOTE:

- Before starting the troubleshooting, check for loose or poor contact of the EPS unit connectors, and recheck the EPS indicator (page 24-7).

1. **EPS ECU System Inspection**

   Erase the DTC (page 24-7).
   Start the engine.
   Check the DTC (page 24-7).

   Is the same DTC indicated?

   YES – Recheck for loose or poor contact on the EPS unit connectors. If they are OK, replace the EPS unit with a new one (page 17-8).

   NO – Intermittent failure

DTC U0100-00 (EPS INDICATOR BLINKS 99): CAN COMMUNICATION (SCS)

Refer to DTC U0028-00 (EPS INDICATOR BLINKS 34): CAN COMMUNICATION (BUS OFF) (page 24-24).

25. I-4WD (Intelligent 4 Wheel Drive)

SERVICE INFORMATION 25-2

SYSTEM LOCATION 25-3

SYSTEM DIAGRAM 25-4

I-4WD SYMPTOM TROUBLESHOOTING 25-5

I-4WD TROUBLESHOOTING INFORMATION 25-5

DTC INDEX 25-8

DTC TROUBLESHOOTING 25-9

WHEEL SPEED SENSOR 25-23

I-4WD MODULATOR/COVER 25-25

HSA SWITCH 25-27

SERVICE INFORMATION

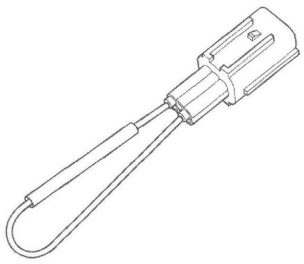
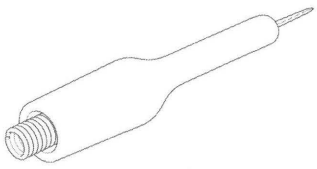
GENERAL

NOTICE

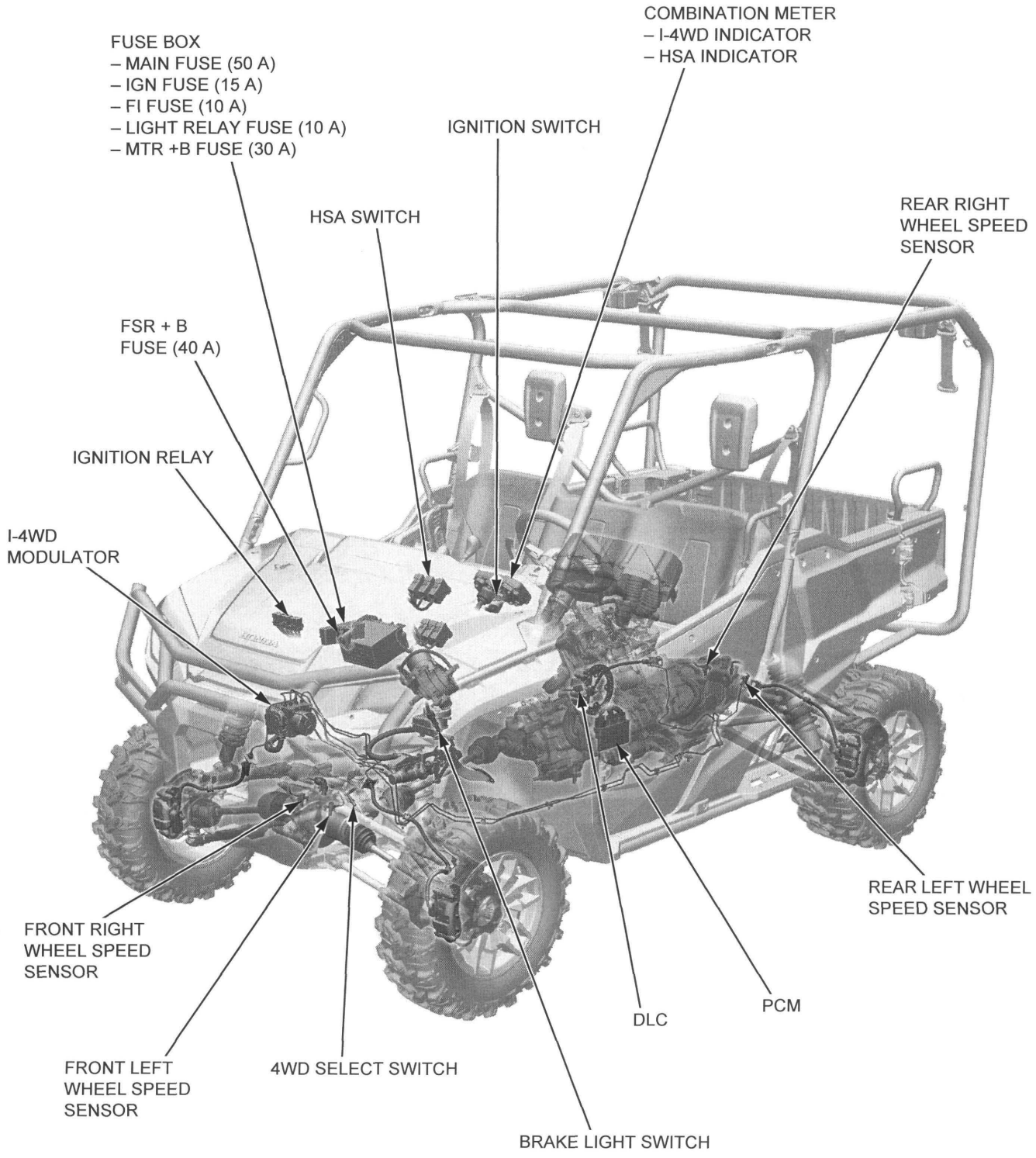
- *The I-4WD modulator may be damaged if dropped. Also if a connector is disconnected when current is flowing, the excessive voltage may damage the control unit. Always turn off the ignition switch before servicing.*
- *Spilling brake fluid will severely damage plastic parts and painted surfaces. It is also harmful to some rubber parts.*
- This section covers service of the Intelligent 4 Wheel Drive (I-4WD). For other service (conventional brake) of the brake system, see Brake system section (page 21-2).
- The I-4WD control unit is integrated in the modulator. Do not disassemble the I-4WD modulator. Replace the I-4WD modulator as an assembly when it is faulty.
- When the I-4WD control unit detects a problem, it stops the I-4WD function and switches back to the conventional brake operation, and the I-4WD indicator stays on. Take care during the test-ride.
- Read "I-4WD Troubleshooting Information" carefully, inspect and troubleshoot the I-4WD system according to the troubleshooting flow chart. Observe each step of the procedures one by one. Write down the DTC and probable faulty part before starting diagnosis and troubleshooting.
- Use a fully charged battery. Do not diagnose with a charger connected to the battery.
- After troubleshooting, erase the DTC and perform the test-ride the vehicle above 30 km/h (19 mph) and recheck the DTC (page 4-7).
- Troubles not resulting from a faulty I-4WD (e.g. brake disc squeak, unevenly worn brake pad) cannot be recognized by the I-4WD diagnosis system.
- The following color codes are used throughout this section.

Bl = Black	G = Green	P = Pink	W = White	O = Orange
Bu = Blue	Gr = Gray	R = Red	V = Violet	Br = Brown

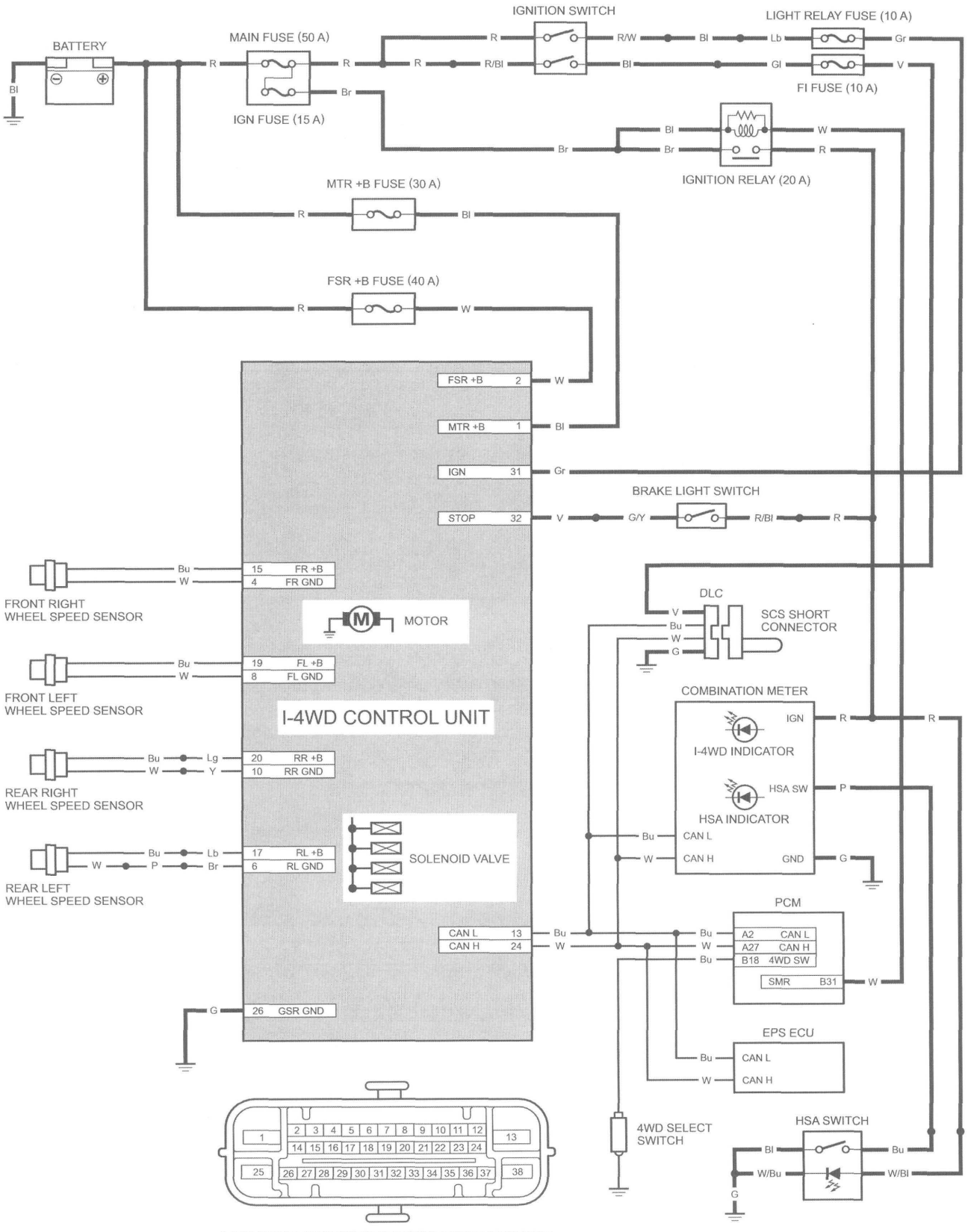
TOOLS

SCS service connector 070MZ-0010300  or 070MZ-001A300 (U.S.A. only)	Test probe, 2 packs 07ZAJ-RDJA110 

SYSTEM LOCATION



SYSTEM DIAGRAM



I-4WD MODULATOR 38P CONNECTOR (MODULATOR SIDE)

I-4WD SYMPTOM TROUBLESHOOTING

Symptom	Diagnosis	Also check for
I-4WD indicator never comes on at all	Inspect the CAN line circuit (page 23-8)	• Faulty combination meter (page 23-7)
I-4WD indicator does not go off, and no DTCs are stored	Inspect the CAN line circuit (page 23-8)	• Short circuit in the DLC related wire

I-4WD TROUBLESHOOTING INFORMATION

GENERAL TROUBLESHOOTING

Refer to the "GENERAL TROUBLESHOOTING" in "PGM-FI system" (page 4-6).

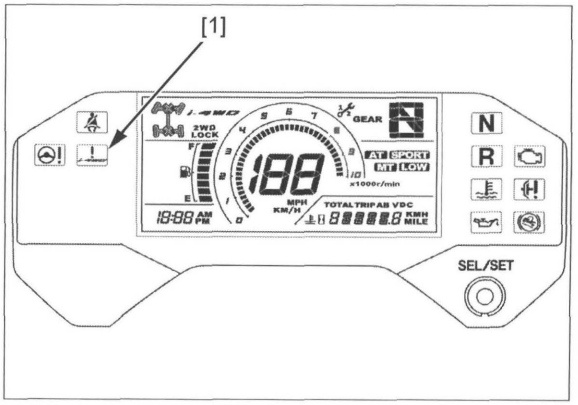
SYSTEM DESCRIPTION

SELF-DIAGNOSIS SYSTEM

The I-4WD system is equipped with the self-diagnostic system. When any abnormality occurs in the I-4WD system, the I-4WD control unit have the I-4WD indicator [1] stays on, and stores a DTC in its erasable memory for the relevant system failure.

FAIL-SAFE FUNCTION

When the I-4WD control unit detects a problem, it stops the I-4WD function and switches back to the conventional brake operation.



MCS INFORMATION

- Refer to PGM-FI System section for "MCS INFORMATION" (page 4-7).

GST (Generic Scan Tool) INFORMATION

- Refer to Electric Power Steering (EPS) section for "GST (Generic Scan Tool) INFORMATION" (page 24-6).

DTC READOUT

NOTE:

- The DTC is not erased by turning the ignition switch OFF while the DTC is being output. Note that turning the ignition switch ON again does not indicate the DTC. To show the DTC again, repeat the DTC readout procedures from the beginning.
- Be sure to record the indicated DTC(s).
- After diagnostic troubleshooting, erase the DTC and perform the pre-start self-diagnosis procedure to be sure that there is no problem in the I-4WD (page 25-5).
- Do not apply the brake during DTC readout.

Connect the MCS or GST to the DLC (page 25-5).

Read the DTC and follow the DTC index (page 25-8).

To read the DTC with the I-4WD indicator blinking, refer to the following procedure.

Reading DTC with the I-4WD indicator

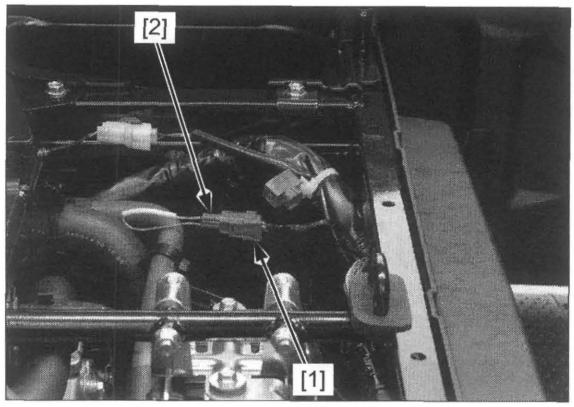
Turn the ignition switch OFF (O).

Remove the DLC from the dummy connector (page 24-6).

Short the DLC [1] using the special tool.

TOOL:

[2] SCS short connector **070MZ-0010300**
(U.S.A.: 070MZ-001A300)



CONNECTION: Red – Green

Turn the ignition switch ON (I).

The I-4WD indicator should come on 2 seconds (start signal) (then goes off 3.6 seconds) and starts DTC indication.

The DTC is indicated by the number of the times of the I-4WD indicator blinking.
If the DTC is not stored, the I-4WD indicator stays on.

I-4WD Indicator Blinking Pattern

- 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 one long blink is followed by two short blink, the number of indicator blinks is 12 (one long blink = 10 blinks, plus two short blink).
- When the I-4WD modulator stores more than one DTC, the indicator blinks in the order from the lowest number to highest number.

ERASING STORED DTC

NOTE:

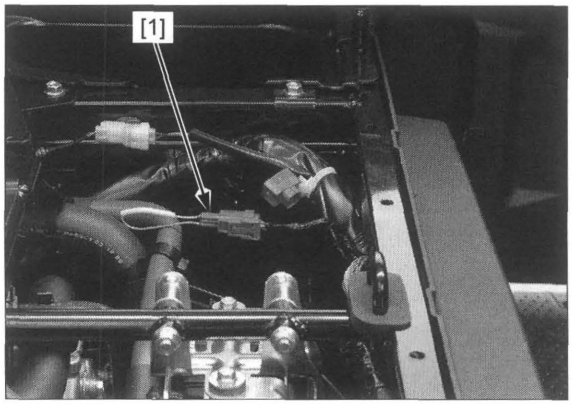
- The stored DTC can not be erased by simply disconnecting the battery negative cable.

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

How to erase the DTC without MCS

1. Connect the SCS short connector [1] to the DLC (page 25-6).
2. While pressing the brake pedal, turn the ignition switch ON (I).
   Hold the brake pedal down while the combination meter initialization is functioning.
3. Release the brake pedal immediately when the combination meter initialization is complete. The I-4WD indicator should come on.
4. Hold the brake pedal immediately after the I-4WD indicator comes on. The I-4WD indicator should go off.
5. Release the brake pedal immediately after the I-4WD indicator goes off.

   When the DTC is erased, the I-4WD indicator blinks 2 times and stays on.
   If the I-4WD indicator does not blink 2 times, the self-diagnostic memory has not been erased, so try again.



6. Turn the ignition switch OFF (O) and remove the SCS short connector from the DLC.

CIRCUIT INSPECTION

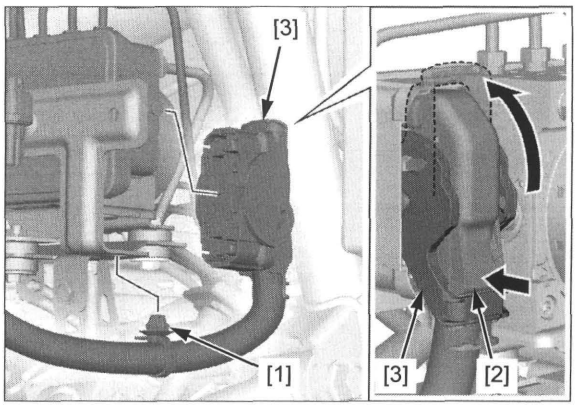
INSPECTION AT I-4WD MODULATOR CONNECTOR

Turn the ignition switch OFF (O).

Remove the I-4WD modulator cover (page 25-25).

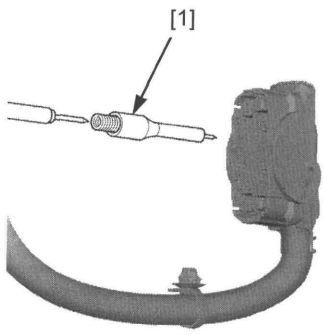
Disconnecting procedure:
Remove the harness clip [1] from the bracket.
Press the lock tab [2] and turn the lock lever [3] up fully to disconnect the I-4WD modulator 38P connector.

Connecting procedure:
Be sure to seat the lock lever against the I-4WD modulator 38P connector fully. Connect the 38P connector by pressing it straight and turning the lock lever down until it clicks.
Make sure the connector is locked securely.

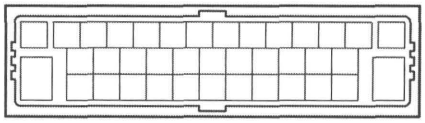


- Always clean around and keep any foreign material away from the connector before disconnecting it.
- A faulty I-4WD is often related to poorly connected or corroded connections. Check those connections before proceeding.
- In testing at I-4WD modulator 38P connector terminals (wire harness side: except No.1, No.2, No.25, No.26 terminals), always use the test probe [1]. Insert the test probe into the connector terminal, then connect the digital multimeter probe to the test probe.

TOOL:
Test probe (2 pack) **07ZAJ-RDJA110**



TERMINAL LAYOUT:



(Terminal side of the wire harness)

DTC INDEX

DTC	I-4WD Indicator blinks	Component	Function failure	Detection			Refer to
				A	B	C	
C0034-14	11	Wheel speed sensor	Front right wheel speed sensor abnormality			○	25-9
C0034-62	12		Front right wheel speed sensor input abnormality		○	○	
C0031-14	13		Front left wheel speed sensor abnormality			○	25-11
C0031-62	14		Front left wheel speed sensor input abnormality		○	○	
C003A-14	15		Rear right wheel speed sensor abnormality			○	25-12
C003A-62	16		Rear right wheel speed sensor input abnormality		○	○	
C0037-14	17		Rear left wheel speed sensor abnormality			○	25-14
C0037-62	18		Rear left wheel speed sensor input abnormality		○	○	
C0014-49	31	Solenoid valve	Front right IN solenoid valve failure			○	25-15
C0015-49	32		Front right OUT solenoid valve failure			○	
C0010-49	33		Front left IN solenoid valve failure			○	
C0011-49	34		Front left OUT solenoid valve failure			○	
C001C-49	35		Rear right IN solenoid valve failure			○	
C001D-49	36		Rear right OUT solenoid valve failure			○	
C0018-49	37		Rear left IN solenoid valve failure			○	
C0019-49	38		Rear left OUT solenoid valve failure			○	
C1020-49	121		TCS1 solenoid valve failure			○	
C1020-49	121		TCS2 solenoid valve failure			○	
C1021-49	123		ESV1 solenoid valve failure			○	
C1021-49	123		ESV2 solenoid valve failure			○	
C1022-14	51	Motor relay	Motor activation circuit failure			○	25-16
U3000-A2	61	Power supply	Supply voltage low			○	25-17
U3000-A3	62		Supply voltage high			○	
C0044-49	66	Pressure sensor	Master pressure sensor failure			○	25-18
C0040-62	68	Brake light switch	Brake light switch failure			○	25-18
U3000-49	54	Control unit	I-4WD control unit abnormality	○		○	25-19
U0029-00	86	CAN communication	Communication CAN bus off			○	25-19
U0100-00			Communication CAN data receiving error (Engine)			○	
U0101-00			Communication CAN data receiving error (I-4WD)			○	
U01B7-00			Communication CAN data receiving error (HSA switch)			○	
U0401-68	83	FI communication	Engine failure	○		○	25-21
U0402-68			Gear failure	○		○	
U3000-54	84	VSA sensor	VSA sensor calibration is not completed	○			25-21
C1C22-62	112	Neutral switch	Neutral switch failure			○	25-22
C0072-00	–	Brake pad	Brake pad temperature too high			○	25-22

(A) INITIAL: Performed once after ignition switch is turned ON.

(B) ORDINARY (1): Performed while the vehicle is driving above 30 km/h (19 mph).

(C) ORDINARY (2): Always performed while the ignition switch is ON.

DTC TROUBLESHOOTING

NOTE:

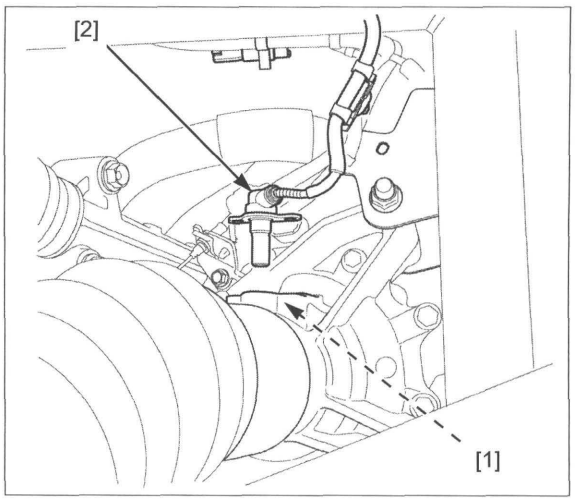
- Perform inspection with the ignition switch OFF, unless otherwise specified.
- All connector diagrams in the troubleshooting are viewed from the terminal side.
- Use a fully charged battery. Do not diagnose with a charger connected to the battery.
- When the I-4WD modulator assembly is detected to be faulty, recheck the wire harness and connector connections closely before replacing it.
- Check the following before troubleshooting:
  - Incorrect tire pressure
  - Tires not recommended for the vehicle were installed (incorrect tire size)
  - Deformation of the wheel or tire
- After diagnostic troubleshooting, erase the DTC (page 25-6). Then test-ride the vehicle and recheck the DTC (page 4-7).

DTC C0034-14 or C0034-62 (I-4WD INDICATOR BLINKS 11 or 12): Front Right Wheel Speed Sensor

1. Speed Sensor Condition Inspection

Turn the ignition switch OFF (O).
Remove the front right wheel speed sensor (page 25-23).

Inspect the area around the front right wheel speed sensor:
Check that there are no iron or other magnetic deposits between the drive shaft pulser gear [1] and wheel speed sensor [2], and the gear teeth for obstructions.
Check the installation condition of the wheel speed sensor for looseness.
Check the drive shaft pulser gear and sensor tip for deformation or damage (e.g., chipped pulser gear teeth).



Are the sensor and drive shaft pulser gear in good condition?

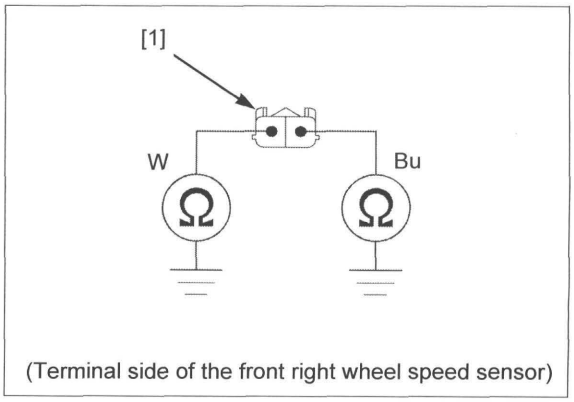
YES – GO TO STEP 2.

NO – Remove any deposits. Install properly or replace faulty part.

2. Front Right Wheel Speed Sensor Line Short Circuit Inspection (at sensor side)

Check for continuity between each terminal of the sensor side front right wheel speed sensor 2P connector [1] and ground.

CONNECTION: White – Ground
Blue – Ground



(Terminal side of the front right wheel speed sensor)

Is there continuity?

YES – Faulty front right wheel speed sensor

NO – GO TO STEP 3.

3. **Front Right Wheel Speed Sensor Line Short Circuit Inspection**

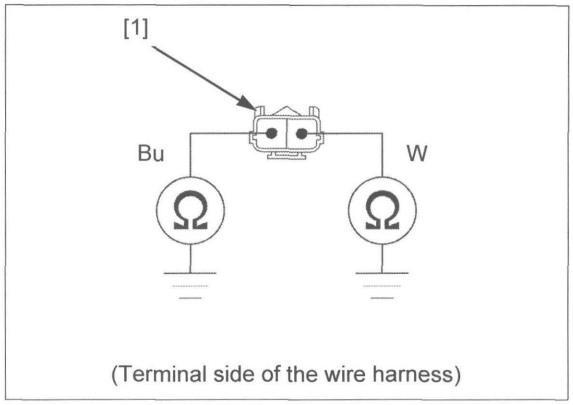
   Disconnect the I-4WD modulator 38P connector (page 25-7).
   Check for continuity between each terminal of the wire harness side front right wheel speed sensor 2P connector [1] and ground.

   CONNECTION: White – Ground
   Blue – Ground

   Is there continuity?

   YES – • Short circuit in the Blue wire
   • Short circuit in the White wire

   NO – GO TO STEP 4.



(Terminal side of the wire harness)

4. **Front Right Wheel Speed Sensor Line Open Circuit Inspection**

   Short the wire harness side I-4WD modulator 38P connector [1] terminals with a jumper wire [2].

   CONNECTION: 26 – 27

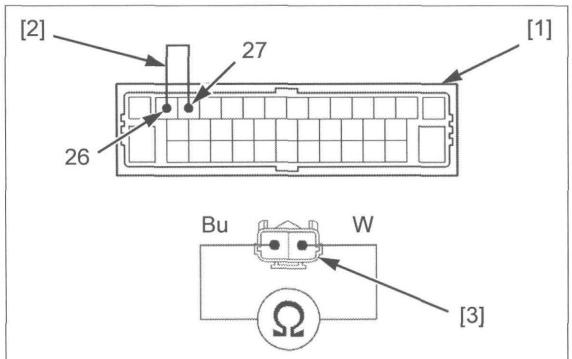
   Check for continuity between the wire harness side front right wheel speed sensor 2P connector [3] terminals.

   CONNECTION: White – Blue

   Is there continuity?

   YES – GO TO STEP 5.

   NO – Open circuit in the Blue or White wire



(Terminal side of the wire harness)

5. **Failure Reproduction with a New Speed Sensor**

   Replace the front right wheel speed sensor with a new one (page 25-23).
   Connect the I-4WD modulator 38P and front right wheel speed sensor 2P connectors.
   Erase the DTC (page 25-6).
   Test-ride the vehicle above 30 km/h (19 mph) in a straight line for more than 5 seconds.
   Recheck the DTC (page 25-5).

   Is the same DTC indicated?

   YES – Faulty I-4WD modulator

   NO – Faulty original wheel speed sensor

DTC C0031-14 or C0031-62 (I-4WD INDICATOR BLINKS 13 or 14): Front Left Wheel Speed Sensor

1. **Speed Sensor Condition Inspection**

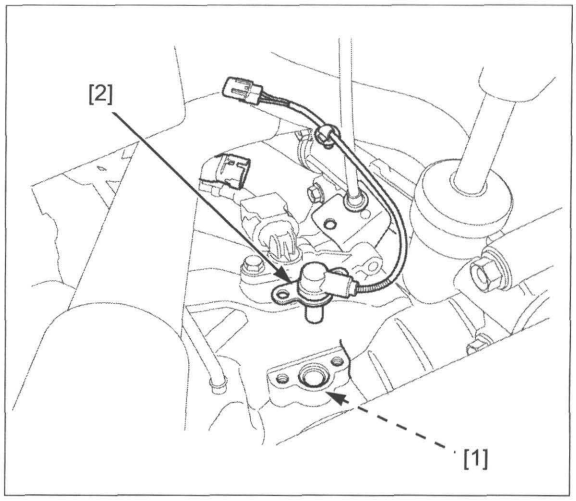
   Turn the ignition switch OFF (O).
   Remove the front left wheel speed sensor (page 25-23).

   Inspect the area around the front left wheel speed sensor:
   Check that there are no iron or other magnetic deposits between the drive shaft pulser gear [1] and wheel speed sensor [2], and the gear teeth for obstructions.
   Check the installation condition of the wheel speed sensor for looseness.
   Check the drive shaft pulser gear and sensor tip for deformation or damage (e.g., chipped pulser gear teeth).

   Are the sensor and drive shaft pulser gear in good condition?

   YES – GO TO STEP 2.

   NO – Remove any deposits. Install properly or replace faulty part.



2. **Front Left Wheel Speed Sensor Line Short Circuit Inspection (at sensor side)**

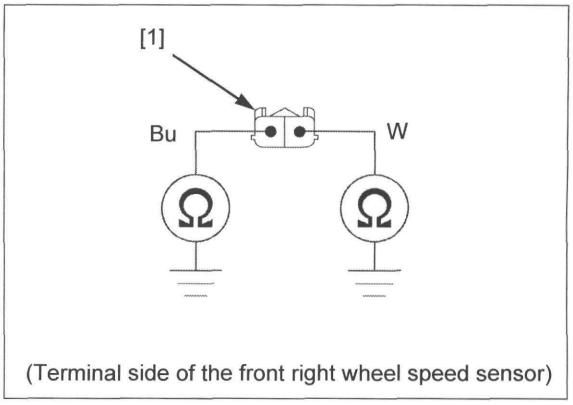
   Check for continuity between each terminal of the sensor side front left wheel speed sensor 2P connector [1] and ground.

   CONNECTION: White – Ground
   Blue – Ground

   Is there continuity?

   YES – Faulty front left wheel speed sensor

   NO – GO TO STEP 3.



(Terminal side of the front right wheel speed sensor)

3. **Front Left Wheel Speed Sensor Line Short Circuit Inspection**

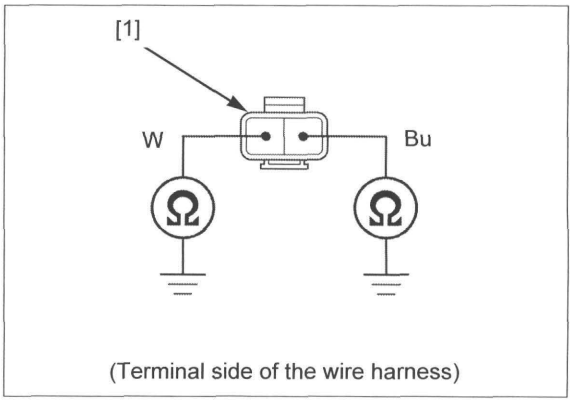
   Disconnect the I-4WD modulator 38P connector (page 25-7).
   Check for continuity between each terminal of the wire harness side front left wheel speed sensor 2P connector [1] and ground.

   CONNECTION: White – Ground
   Blue – Ground

   Is there continuity?

   YES – • Short circuit in the White wire
   • Short circuit in the Blue wire

   NO – GO TO STEP 4.



(Terminal side of the wire harness)

4. **Front Left Wheel Speed Sensor Line Open Circuit Inspection**

   Short the wire harness side I-4WD modulator 38P connector [1] terminals with a jumper wire [2].

   CONNECTION: 36 – 37

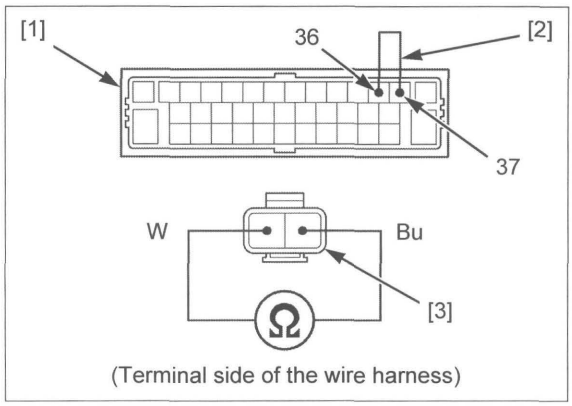
   Check for continuity between the wire harness side front left wheel speed sensor 2P (Blue) connector [3] terminals.

   CONNECTION: White – Blue

   Is there continuity?

   YES – GO TO STEP 5.

   NO – Open circuit in the White or Blue wire



(Terminal side of the wire harness)

5. **Failure Reproduction with a New Speed Sensor**

   Replace the front left wheel speed sensor with a new one (page 25-23).
   Connect the I-4WD modulator 38P and front left wheel speed sensor 2P (Blue) connectors.
   Erase the DTC (page 25-6).
   Test-ride the vehicle above 30 km/h (19 mph) in a straight line for more than 5 seconds.
   Recheck the DTC (page 25-5).

   Is the same DTC indicated?

   YES – Faulty I-4WD modulator

   NO – Faulty original wheel speed sensor

DTC C003A-14 or C003A-62 (I-4WD INDICATOR BLINKS 15 or 16): Rear Right Wheel Speed Sensor

1. **Speed Sensor Condition Inspection**

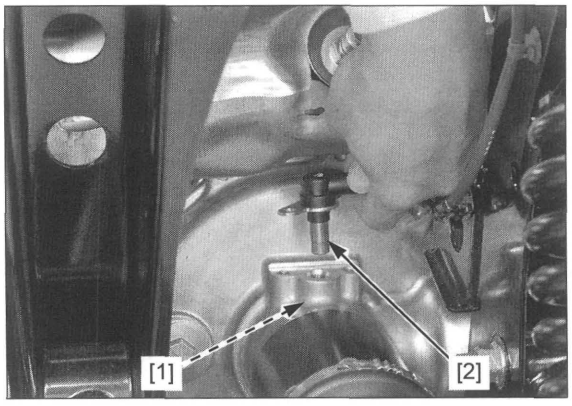
   Turn the ignition switch OFF (O).
   Remove the rear right wheel speed sensor (page 25-24).

   Inspect the area around the rear right wheel speed sensor:
   Check that there are no iron or other magnetic deposits between the drive shaft pulser gear [1] and wheel speed sensor [2], and the gear teeth for obstructions.
   Check the installation condition of the wheel speed sensor for looseness.
   Check the drive shaft pulser gear and sensor tip for deformation or damage (e.g., chipped pulser gear teeth).

   Are the sensor and drive shaft pulser gear in good condition?

   YES – GO TO STEP 2.

   NO – Remove any deposits. Install properly or replace faulty part.



2. **Rear Right Wheel Speed Sensor Line Short Circuit Inspection (at sensor side)**

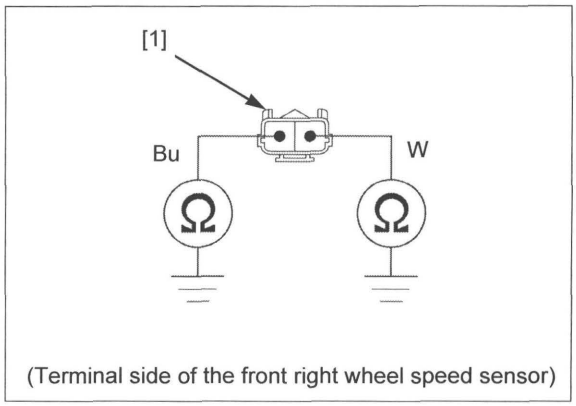
Check for continuity between each terminal of the sensor side rear right wheel speed sensor 2P connector [1] and ground.

CONNECTION: White – Ground
Blue – Ground

Is there continuity?

YES – Faulty rear right wheel speed sensor

NO – GO TO STEP 3.



(Terminal side of the front right wheel speed sensor)

3. **Rear Right Wheel Speed Sensor Line Short Circuit Inspection**

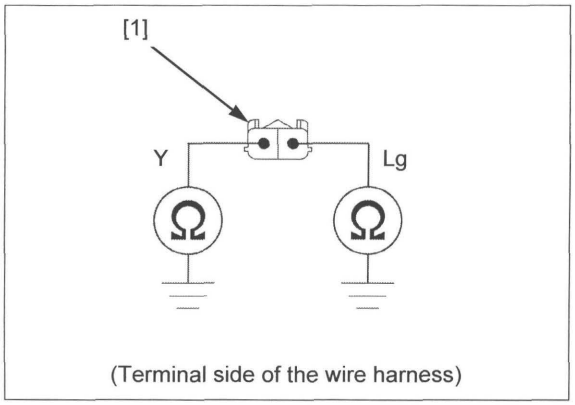
Disconnect the I-4WD modulator 38P connector (page 25-7).
Check for continuity between each terminal of the wire harness side rear right wheel speed sensor 2P connector [1] and ground.

CONNECTION: Yellow – Ground
Light green – Ground

Is there continuity?

YES – • Short circuit in the Yellow wire
• Short circuit in the Light green wire

NO – GO TO STEP 4.



(Terminal side of the wire harness)

4. **Rear Right Wheel Speed Sensor Line Open Circuit Inspection**

Short the wire harness side I-4WD modulator 38P connector [1] terminals with a jumper wire [2].

CONNECTION: 33 – 34

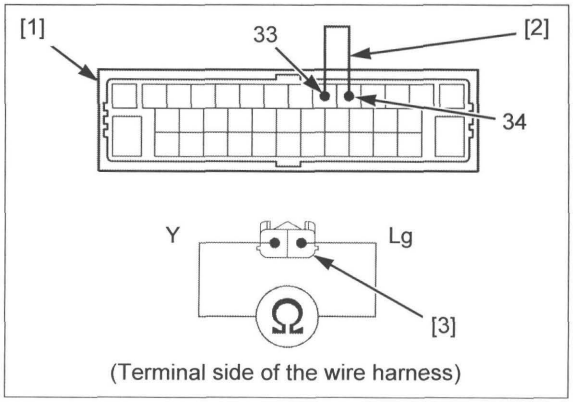
Check for continuity between the wire harness side rear right wheel speed sensor 2P connector [3] terminals.

CONNECTION: Yellow – Light green

Is there continuity?

YES – GO TO STEP 5.

NO – Open circuit in the Yellow or Light green wire



(Terminal side of the wire harness)

5. **Failure Reproduction with a New Speed Sensor**

Replace the rear right wheel speed sensor with a new one (page 25-24).
Connect the I-4WD modulator 38P and rear right wheel speed sensor 2P connectors.
Erase the DTC (page 25-6).
Test-ride the vehicle above 30 km/h (19 mph) in a straight line for more than 5 seconds.
Recheck the DTC (page 25-5).

Is the same DTC indicated?

YES – Faulty I-4WD modulator

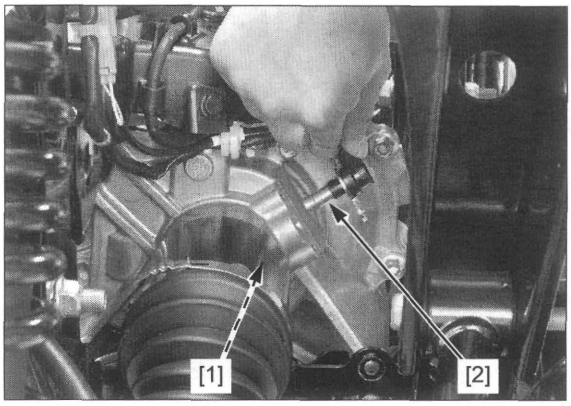
NO – Faulty original wheel speed sensor

DTC C0037-14 or C0037-62 (I-4WD INDICATOR BLINKS 17 or 18): Rear Left Wheel Speed Sensor

1. Speed Sensor Condition Inspection

Turn the ignition switch OFF (O).
Remove the rear left wheel speed sensor (page 25-24).

Inspect the area around the rear left wheel speed sensor:
Check that there are no iron or other magnetic deposits between the drive shaft pulser gear [1] and wheel speed sensor [2], and the gear teeth for obstructions.
Check the installation condition of the wheel speed sensor for looseness.
Check the drive shaft pulser gear and sensor tip for deformation or damage (e.g., chipped pulser gear teeth).



Are the sensor and drive shaft pulser gear in good condition?

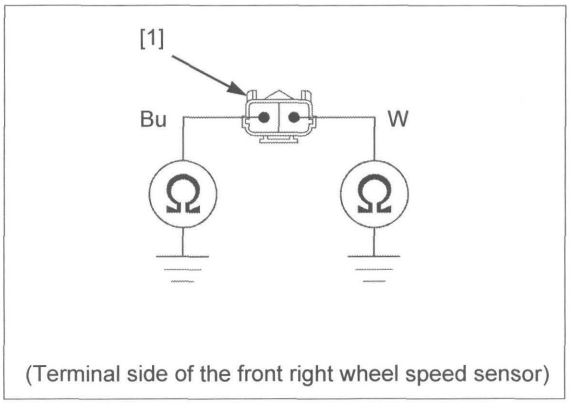
YES – GO TO STEP 2.

NO – Remove any deposits. Install properly or replace faulty part.

2. Rear Left Wheel Speed Sensor Line Short Circuit Inspection (at sensor side)

Check for continuity between each terminal of the sensor side rear left wheel speed sensor 2P connector [1] and ground.

CONNECTION: White – Ground
Blue – Ground



(Terminal side of the front right wheel speed sensor)

Is there continuity?

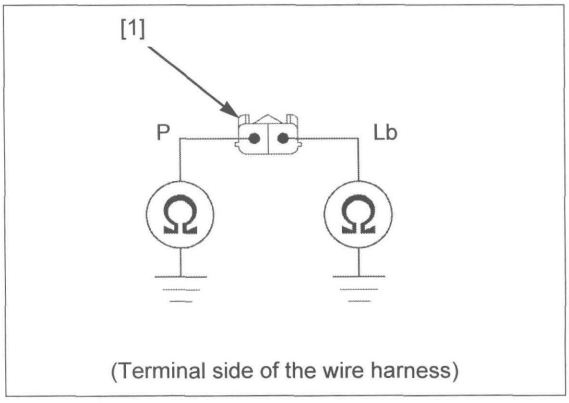
YES – Faulty rear left wheel speed sensor

NO – GO TO STEP 3.

3. Rear Left Wheel Speed Sensor Line Short Circuit Inspection

Disconnect the I-4WD modulator 38P connector (page 25-7).
Check for continuity between each terminal of the wire harness side rear left wheel speed sensor 2P connector [1] and ground.

CONNECTION: Pink – Ground
Light blue – Ground



(Terminal side of the wire harness)

Is there continuity?

YES – • Short circuit in the Pink wire
• Short circuit in the Light blue wire

NO – GO TO STEP 4.

4. **Rear Left Wheel Speed Sensor Line Open Circuit Inspection**

   Short the wire harness side I-4WD modulator 38P connector [1] terminals with a jumper wire [2].

   CONNECTION: 29 – 31

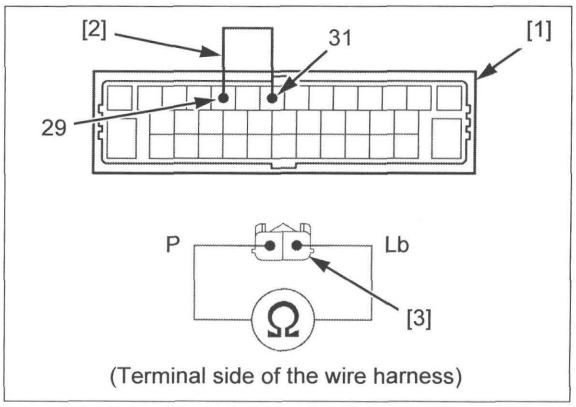
   Check for continuity between the wire harness side rear left wheel speed sensor 2P (Blue) connector [3] terminals.

   CONNECTION: Pink – Light blue

   Is there continuity?

   YES – GO TO STEP 5.

   NO – Open circuit in the Pink or Light blue wire



(Terminal side of the wire harness)

5. **Failure Reproduction with a New Speed Sensor**

   Replace the rear left wheel speed sensor with a new one (page 25-24).
   Connect the I-4WD modulator 38P and rear left wheel speed sensor 2P (Blue) connectors.
   Erase the DTC (page 25-6).
   Test-ride the vehicle above 30 km/h (19 mph) in a straight line for more than 5 seconds.
   Recheck the DTC (page 25-5).

   Is the same DTC indicated?

   YES – Faulty I-4WD modulator

   NO – Faulty original wheel speed sensor

DTC C0014-49, C0015-49, C0010-49, C0011-49, C001C-49, C001D-49, C0018-49, C0019-49, C1020-49 or C1021-49 (I-4WD INDICATOR BLINKS 31, 32, 33, 34, 35, 36, 37, 38, 121 or 123): Solenoid Valve

1. **Failure Reproduction**

   Erase the DTC (page 25-6).
   Test-ride the vehicle above 30 km/h (19 mph) in a straight line for more than 5 seconds.
   Recheck the DTC (page 25-5).

   Is the same DTC indicated?

   YES – Faulty I-4WD modulator

   NO – Solenoid valve is normal (intermittent failure).

DTC C1022-14 (I-4WD INDICATOR BLINKS 51): Motor Relay

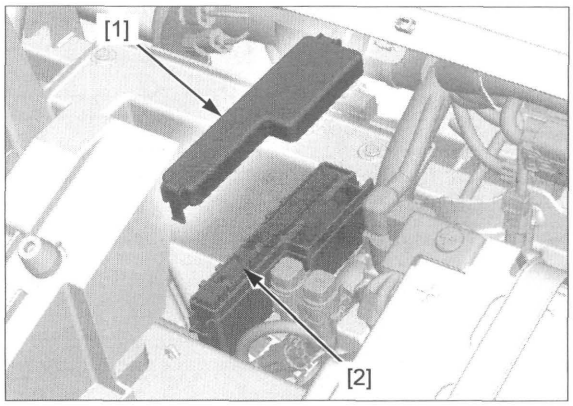
1. Fuse Inspection

Turn the ignition switch OFF (O).
Remove the fuse box cover [1].
Check the MTR +B (30 A) [2] for blown.

Is the fuse blown?

YES – GO TO STEP 2.

NO – GO TO STEP 3.



2. Motor Power Input Line Short Circuit Inspection

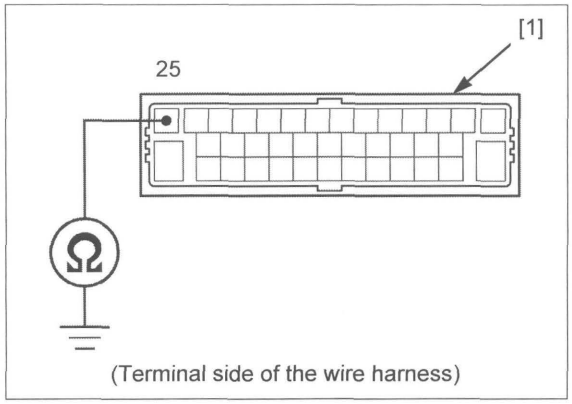
Disconnect the I-4WD modulator 38P connector (page 25-7).
With the MTR +B (30 A) removed, check for continuity between the wire harness side I-4WD modulator 38P connector [1] terminal and ground.

CONNECTION: 25 – Ground

Is there continuity?

YES – Short circuit in the Black wire between the fuse box and I-4WD modulator 38P connector

NO – Intermittent failure. Replace the MTR +B (30 A) with a new one, and recheck.



3. Motor Power Input Line Open Circuit Inspection

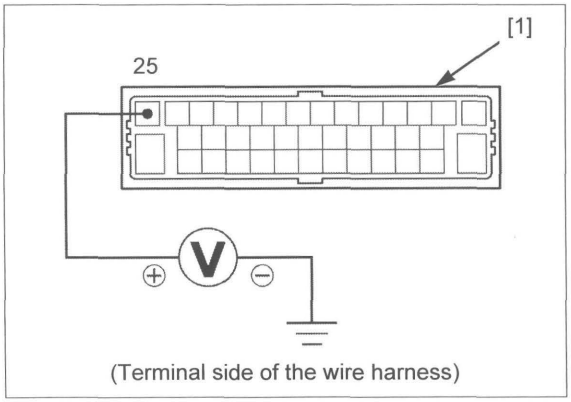
Install the MTR +B (30 A).
Disconnect the I-4WD modulator 38P connector (page 25-7).
Measure the voltage between the wire harness side I-4WD modulator 38P connector [1] terminal and ground.

CONNECTION: 25 (+) – Ground (–)

Is there battery voltage?

YES – GO TO STEP 4.

NO – Open circuit in the Red or Black wire between the battery and I-4WD modulator 38P connector



4. Failure Reproduction

Turn the ignition switch OFF (O).
Connect the I-4WD modulator 38P connector.
Erase the DTC (page 25-6).
Test-ride the vehicle above 30 km/h (19 mph) in a straight line for more than 5 seconds.
Recheck the DTC (page 25-5).

Is the same DTC indicated?

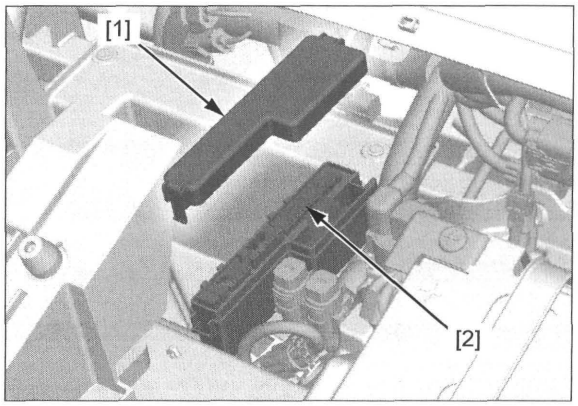
YES – Faulty I-4WD modulator

NO – Pump motor is normal (intermittent failure).

DTC U3000-A2 or U3000-A3 (I-4WD INDICATOR BLINKS 61 or 62): Supply Voltage

1. Fuse Inspection

Turn the ignition switch OFF (O).
Remove the fuse box cover [1].
Check the LIGHT RELAY fuse (10 A) [2] for blown.



Is the fuse blown?

YES – GO TO STEP 2.

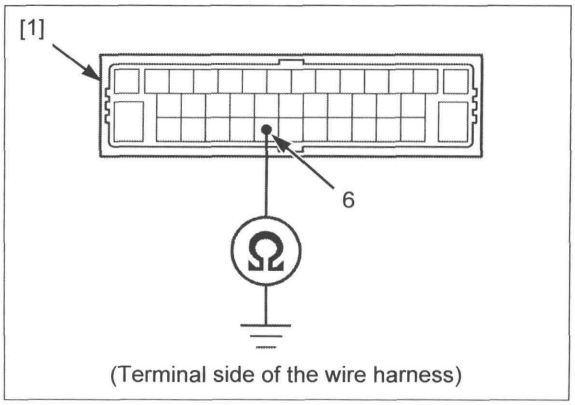
NO – GO TO STEP 3.

2. Power Supply Line Short Circuit Inspection

Disconnect the I-4WD modulator 38P connector (page 25-7).
With the LIGHT RELAY fuse (10 A) removed, check for continuity between the wire harness side I-4WD modulator 38P connector [1] and ground.

TOOL:
Test probe (2 pack) **07ZAJ-RDJA110**

CONNECTION: 6 – Ground



(Terminal side of the wire harness)

Is there continuity?

YES – Short circuit in Gray wire

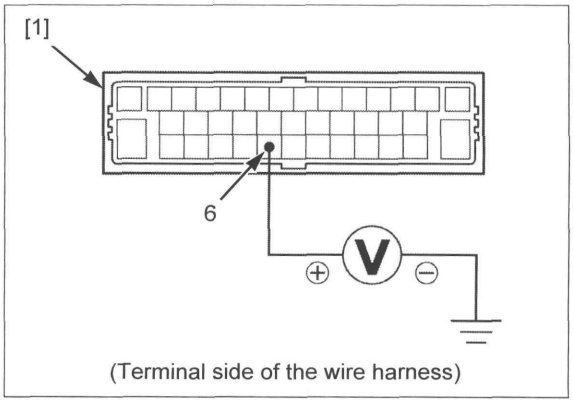
NO – Intermittent failure. Replace the LIGHT RELAY fuse (10 A) with a new one, and recheck.

3. Power Supply Line Open Circuit Inspection

Install the LIGHT RELAY fuse (10 A).
Turn the ignition switch ON (I).
Measure the voltage between the wire harness side I-4WD modulator 38P connector [1] terminal and ground.

TOOL:
Test probe (2 pack) **07ZAJ-RDJA110**

CONNECTION: 6 (+) – Ground (–)



(Terminal side of the wire harness)

Is there battery voltage?

YES – GO TO STEP 4.

NO – Open circuit in Gray wire

4. Failure Reproduction

Turn the ignition switch OFF (O).
Connect the I-4WD modulator 38P connector.
Erase the DTC (page 25-6).
Test-ride the vehicle above 30 km/h (19 mph) in a straight line for more than 5 seconds.
Recheck the DTC (page 25-5).

Is the same DTC indicated?

YES – Faulty I-4WD modulator

NO – Power supply circuit is normal (intermittent failure)

DTC C0044-49 (I-4WD INDICATOR BLINKS 66): Master pressure sensor

1. **Failure Reproduction**

   Erase the DTC (page 25-6).
   Test-ride the vehicle above 30 km/h (19 mph) in a straight line for more than 5 seconds.
   Recheck the DTC (page 25-5).

   Is the same DTC indicated?

   YES – Faulty I-4WD modulator

   NO – Master pressure sensor is normal (intermittent failure).

DTC C0040-62 (I-4WD INDICATOR BLINKS 68): Brake light switch

1. **Brake Light Switch Inspection**

   Remove the front fender (page 2-20).

   Disconnect the brake light switch 6P connector [1] and check for continuity at the switch side connector.

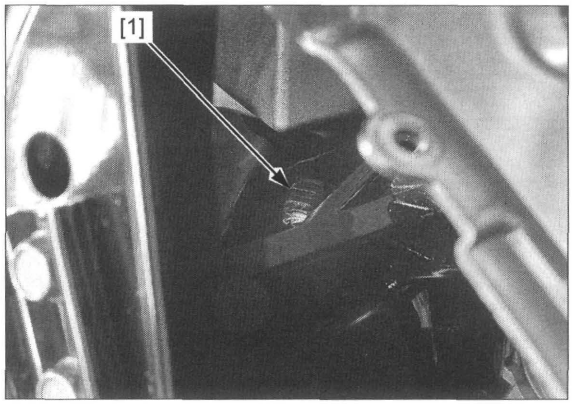
   CONNECTION: Red/black – Green/yellow

   There should be continuity with the brake pedal depressed and no continuity with the pedal released.

   Is the above inspection normal?

   YES – GO TO STEP 2.

   NO – Faulty brake light switch



2. **Brake Light Switch Input Voltage Line Open Circuit Inspection**

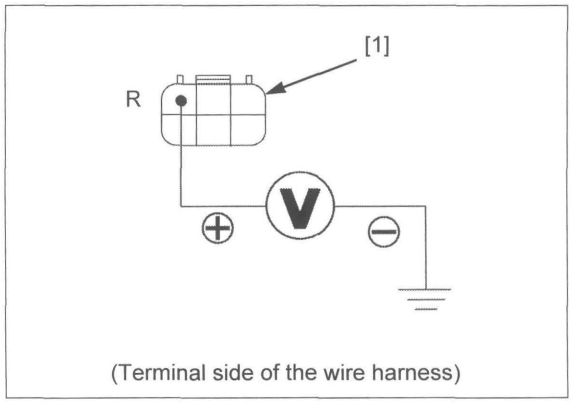
   Turn the ignition switch ON (I).
   Measure the voltage between the wire harness side brake light switch 6P connector [1] terminal and ground.

   CONNECTION: Red (+) – Ground (–)

   Is there battery voltage?

   YES – GO TO STEP 3.

   NO – Open circuit in Red wire



3. **Brake Light Switch Output Line Open Circuit Inspection**

Turn the ignition switch OFF (O).
Disconnect the I-4WD modulator 38P connector (page 25-7).
Check the wire for continuity between the wire harness side 38P connector [1] and brake light switch 6P connector [2].

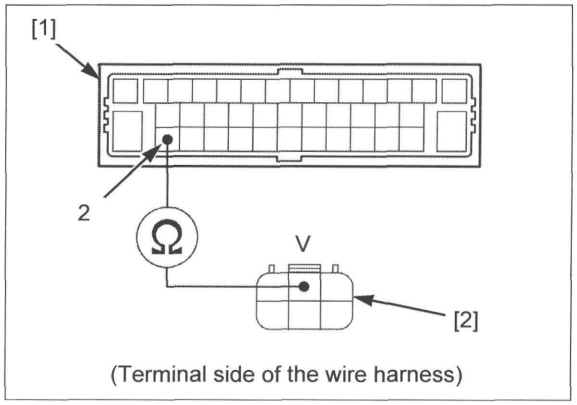
TOOL:
Test probe, 2 packs 07ZAJ-RDJA110

Connection: 2 – Violet

Is there continuity?

YES – GO TO STEP 4.

NO – Open circuit in the Violet wire



(Terminal side of the wire harness)

4. **Failure Reproduction**

Turn the ignition switch OFF (O).
Connect the I-4WD modulator 38P connector.
Erase the DTC (page 25-6).
Test-ride the vehicle above 30 km/h (19 mph) in a straight line for more than 5 seconds.
Recheck the DTC (page 25-5).

Is the same DTC indicated?

YES – Faulty I-4WD modulator

NO – Brake light switch is normal (intermittent failure)

DTC U3000-49 (I-4WD INDICATOR BLINKS 54): Control Unit

1. **Failure Reproduction**

Erase the DTC (page 25-6).
Test-ride the vehicle above 30 km/h (19 mph).
Recheck the DTC (page 25-5).

Is the same DTC indicated?

YES – Faulty I-4WD modulator

NO – I-4WD control unit is normal (intermittent failure)

DTC U0029-00, U0100-00, U0101-00, or U01B7-00 (I-4WD INDICATOR BLINKS 86): CAN Communication

1. **Failure Reproduction**

Erase the DTC (page 25-6).
Test-ride the vehicle above 30 km/h (19 mph) in a straight line for more than 5 seconds.
Recheck the DTC (page 25-5).

Is the same DTC indicated?

YES – GO TO STEP 2.

NO – I-4WD control unit is normal (intermittent failure)

2. **CAN Communication Line Open Circuit Inspection (Between the I-4WD modulator and PCM)**

Turn the ignition switch OFF (O).
Disconnect the following:

- PCM 33P (Black) connector (page 4-35)
- I-4WD modulator 38P connector (page 25-7)

Check the wire for continuity between the wire harness side 38P connector [1] and PCM 33P (Black) connector [2].

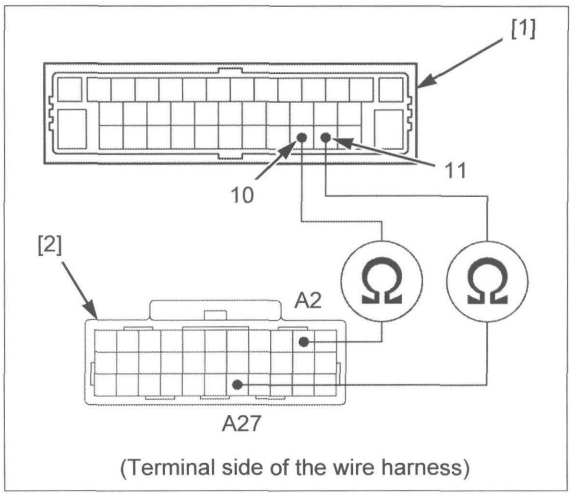
TOOL:
Test probe, 2 packs 07ZAJ-RDJA110

Connection: 10 – A2
11 – A27

Is there continuity?

YES – GO TO STEP 3.

NO – Open circuit in the Blue or White wire



(Terminal side of the wire harness)

3. **CAN Communication Line Open Circuit Inspection (Between the I-4WD modulator and combination meter)**

Disconnect the combination meter 12P connector.
Check the wire for continuity between the wire harness side 38P connector [1] and combination meter 12P connector [2].

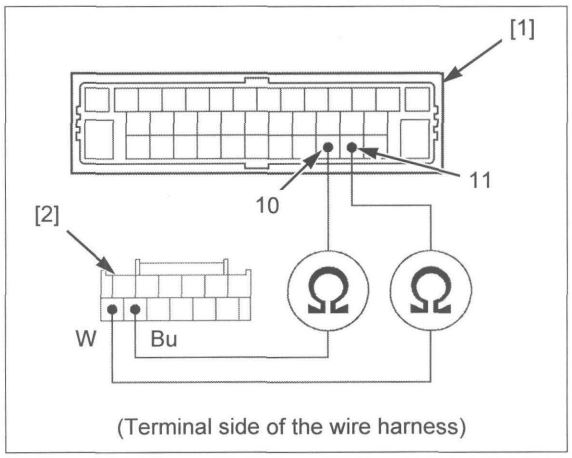
TOOL:
Test probe, 2 packs 07ZAJ-RDJA110

Connection: 10 – Blue
11 – White

Is there continuity?

YES – GO TO STEP 4.

NO – Open circuit in the Blue or White wire



(Terminal side of the wire harness)

4. **Failure Reproduction**

Turn the ignition switch OFF (O).
Connect the I-4WD modulator 38P connector and PCM 33P (Black) connector.
Replace the I-4WD modulator (page 25-25).
Erase the DTC (page 25-6).
Test-ride the vehicle above 30 km/h (19 mph) in a straight line for more than 5 seconds.
Recheck the DTC (page 25-5).

Is the same DTC indicated?

YES – Faulty PCM

NO – Faulty original I-4WD modulator

DTC U0401-68 or U0402-68 (I-4WD INDICATOR BLINKS 83): FI Communication

1. **Failure Reproduction**

   Erase the DTC (page 25-6).
   Test-ride the vehicle above 30 km/h (19 mph) in a straight line for more than 5 seconds.
   Recheck the DTC (page 25-5).

   Is the same DTC indicated?

   YES – GO TO STEP 2.

   NO – I-4WD control unit is normal (intermittent failure)

2. **PGM-FI DTC Check**

   Check the PGM-FI DTC (page 4-6).

   Does the PGM-FI system have any DTC?

   YES – Follow the PGM-FI DTC index (page 4-8)

   NO – Faulty I-4WD modulator

DTC U3000-54 (I-4WD INDICATOR BLINKS 84): VSA Sensor

1. **Failure Reproduction**

   Erase the DTC (page 25-6).
   Test-ride the vehicle above 30 km/h (19 mph) in a straight line for more than 5 seconds.
   Recheck the DTC (page 25-5).

   Is the same DTC indicated?

   YES – Perform the VSA sensor neutral position memorization procedure using the MCS

   NO – I-4WD control unit is normal (intermittent failure)

DTC C1C22-62 (I-4WD INDICATOR BLINKS 112): Neutral Switch

1. **Failure Reproduction 1**

   Erase the DTC (page 25-6).
   Test-ride the vehicle above 30 km/h (19 mph) in a straight line for more than 5 seconds.
   Recheck the DTC (page 25-5).

   Is any DTC indicated?

   YES – GO TO STEP 2.

   NO – I-4WD control unit is normal (intermittent failure)

2. **Failure Reproduction 2**

   Recheck the DTC (page 25-5).

   Is the DTC C1C22-62 also indicated with DTC U0029-00, U0100-00, U0101-00 or U01B7-00?

   YES – Perform the DTC U0029-00, U0100-00, U0101-00 or U01B7-00 troubleshooting (page 25-19) and recheck.

   NO – GO TO STEP 3.

3. **Neutral Switch Condition Inspection**

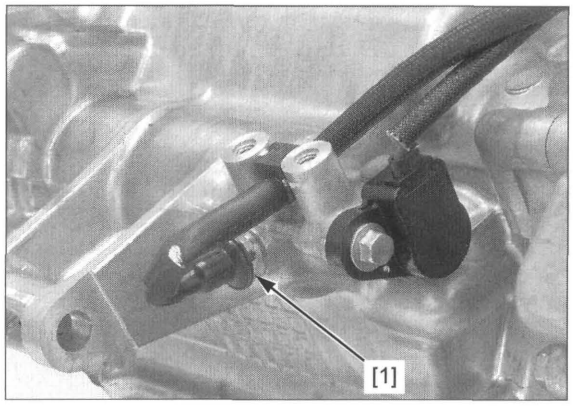
   Turn the ignition switch OFF (O).

   Inspect the area around the neutral switch (page 11-65):
   Check for loose connection or corroded terminal of the neutral switch [1].
   Check the installation condition of the neutral switch for looseness.

   Is the neutral switch in good condition?

   YES – Faulty I-4WD modulator

   NO – Install properly or replace faulty part.



DTC C0072-00: Brake Pad

1. **Failure Reproduction**

   Stop the vehicle and wait for 10 minutes.
   Erase the DTC (page 25-6).
   Check the brake pads for wear or damage (page 21-8).
   Test-ride the vehicle above 30 km/h (19 mph).
   Recheck the DTC (page 25-5).

   Is the same DTC indicated?

   YES – Check the brake system (page 21-2) and recheck the DTC.

   NO – I-4WD control unit is normal (intermittent failure)

WHEEL SPEED SENSOR

WHEEL SPEED SENSOR REPLACEMENT

NOTE:

Refer to procedure for the drive shaft pulser gear.

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

FRONT RIGHT WHEEL SPEED SENSOR REMOVAL/ INSTALLATION

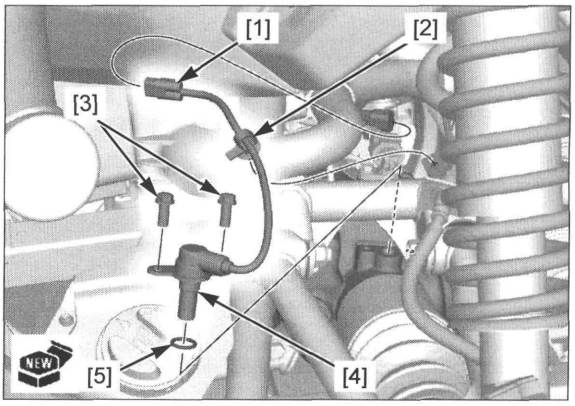
Disconnect the front right wheel speed sensor 2P connector [1] and release the harness clip [2] from the frame.

Remove the bolts [3] and the front right wheel speed sensor [4].
Remove the O-ring [5].

Installation is in the reverse order of removal.

TORQUE:

Wheel speed sensor bolt:
10 N·m (1.0 kgf·m, 7 lbf·ft)



NOTE:

- Clean around the mounting area of the gear case thoroughly, and be sure that no foreign material is allowed to enter the mounting hole.
- Replace the O-ring with a new one (do not apply oil).

FRONT LEFT WHEEL SPEED SENSOR REMOVAL/ INSTALLATION

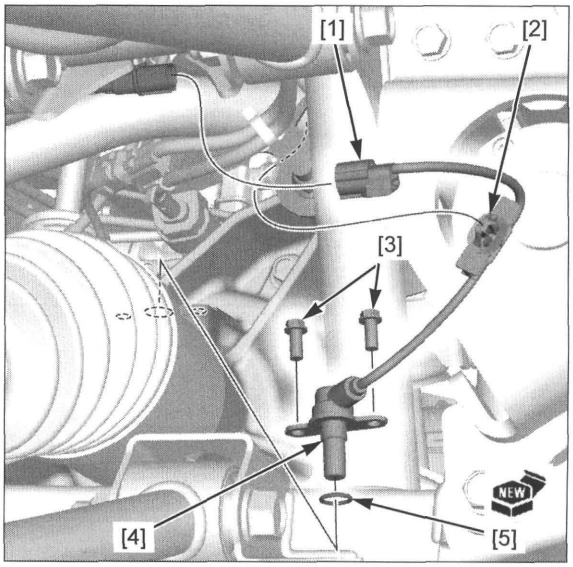
Disconnect the front left wheel speed sensor 2P connector [1] and release the wire band boss [2] from the final clutch cable stay.

Remove the bolts [3] and the front left wheel speed sensor [4].
Remove the O-ring [5].

Installation is in the reverse order of removal.

TORQUE:

Wheel speed sensor bolt:
10 N·m (1.0 kgf·m, 7 lbf·ft)

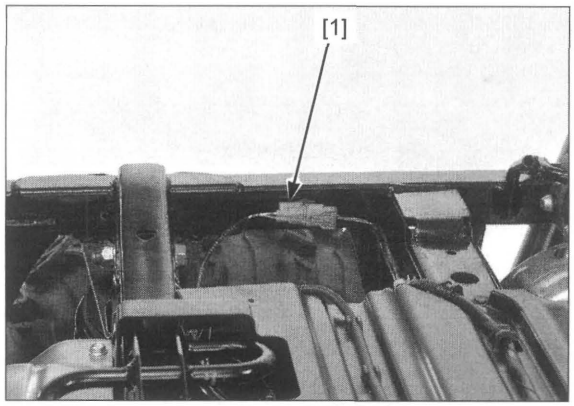


NOTE:

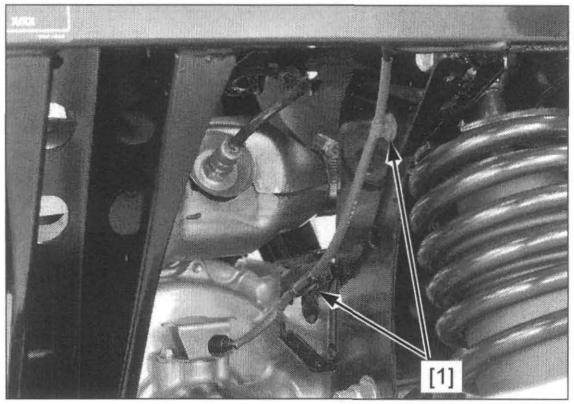
- Clean around the mounting area of the gear case thoroughly, and be sure that no foreign material is allowed to enter the mounting hole.
- Replace the O-ring with a new one (do not apply oil).

REAR RIGHT WHEEL SPEED SENSOR REMOVAL/ INSTALLATION

Disconnect the rear right wheel speed sensor 2P connector [1].



Remove the wire band bosses [1] from the frame.



Remove the bolts [1], sensor cover [2] and rear right wheel speed sensor [3].

Remove the O-ring [4].

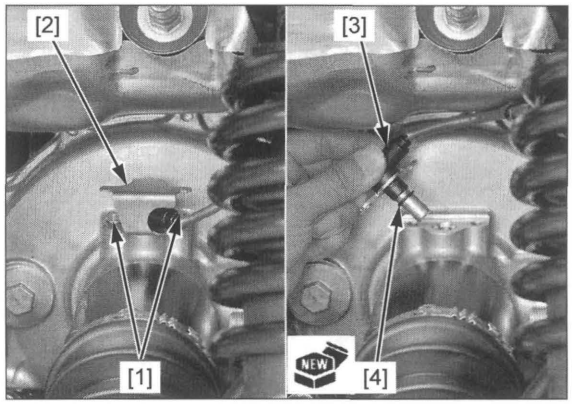
Installation is in the reverse order of removal.

TORQUE:

Wheel speed sensor bolt:
10 N·m (1.0 kgf·m, 7 lbf·ft)

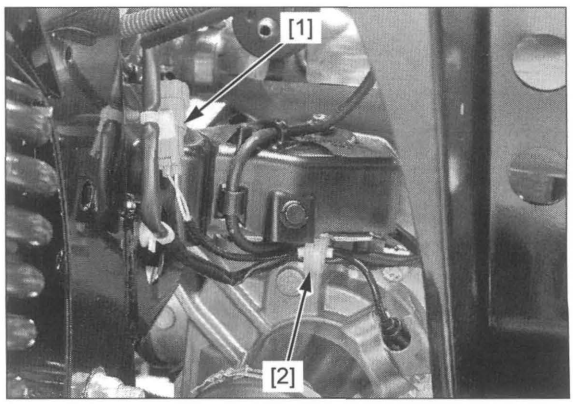
NOTE:

- Clean around the mounting area of the gear case thoroughly, and be sure that no foreign material is allowed to enter the mounting hole.
- Replace the O-ring with a new one (do not apply oil).



REAR LEFT WHEEL SPEED SENSOR REMOVAL/ INSTALLATION

Disconnect the rear left wheel speed sensor 2P connector [1] and remove the sensor wire from the wire clamp [2].



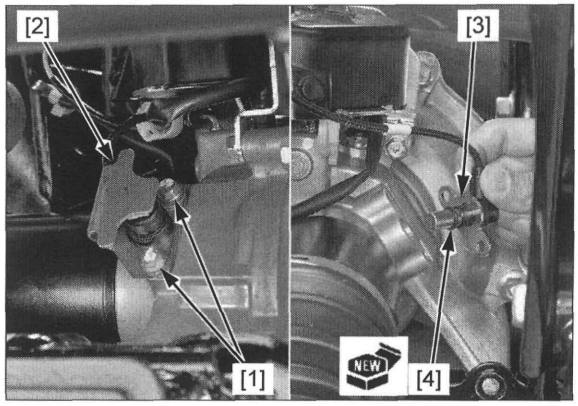
Remove the bolts [1], sensor guide [2] and rear left wheel speed sensor [3].

Remove the O-ring [4].

Installation is in the reverse order of removal.

TORQUE:
Wheel speed sensor bolt:
10 N·m (1.0 kgf·m, 7 lbf·ft)

NOTE:
- Clean around the mounting area of the gear case thoroughly, and be sure that no foreign material is allowed to enter the mounting hole.
- Replace the O-ring with a new one (do not apply oil).



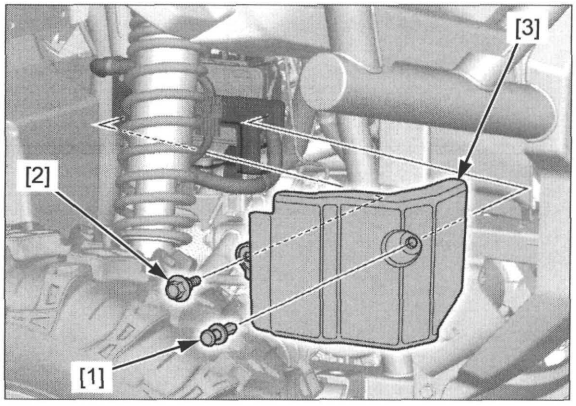
I-4WD MODULATOR/COVER

I-4WD MODULATOR COVER REMOVAL/INSTALLATION

Remove the trim clip [1] and bolt [2].
Remove the I-4WD modulator cover [3].

Installation is in the reverse order of removal.

TORQUE:
I-4WD modulator cover :
12 N·m (1.2 kgf·m, 9 lbf·ft)



I-4WD MODULATOR REMOVAL/ INSTALLATION

NOTE:
- Be careful not to bend or damage the brake pipes during assembly or removal.

Drain the brake fluid (page 21-5).

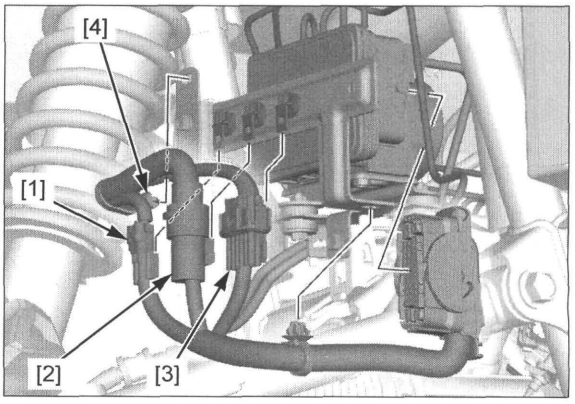
Remove the I-4WD modulator cover (page 25-25).

Pull up the lock lever and disconnect the I-4WD modulator 38P connector (page 25-7).

Remove the following (from the bracket):

– I-4WD sub harness 2P connector [1]
– I-4WD sub harness 3P connector [2]
– I-4WD sub harness 12P connector [3]

Release the harness clip [4] from the I-4WD modulator bracket.



Loosen the brake pipe joint nuts [1] and disconnect the following brake pipes:

- front right brake pipe [2]
- front left brake pipe [3]
- rear right brake pipe [4]
- rear left brake pipe [5]
- master cylinder [6]

Remove the following:

- bracket mounting bolts [7] from the frame
- mounting bolts [8] and I-4WD modulator [9]
- sub bracket mounting bolts [10] and sub bracket [11] from the modulator

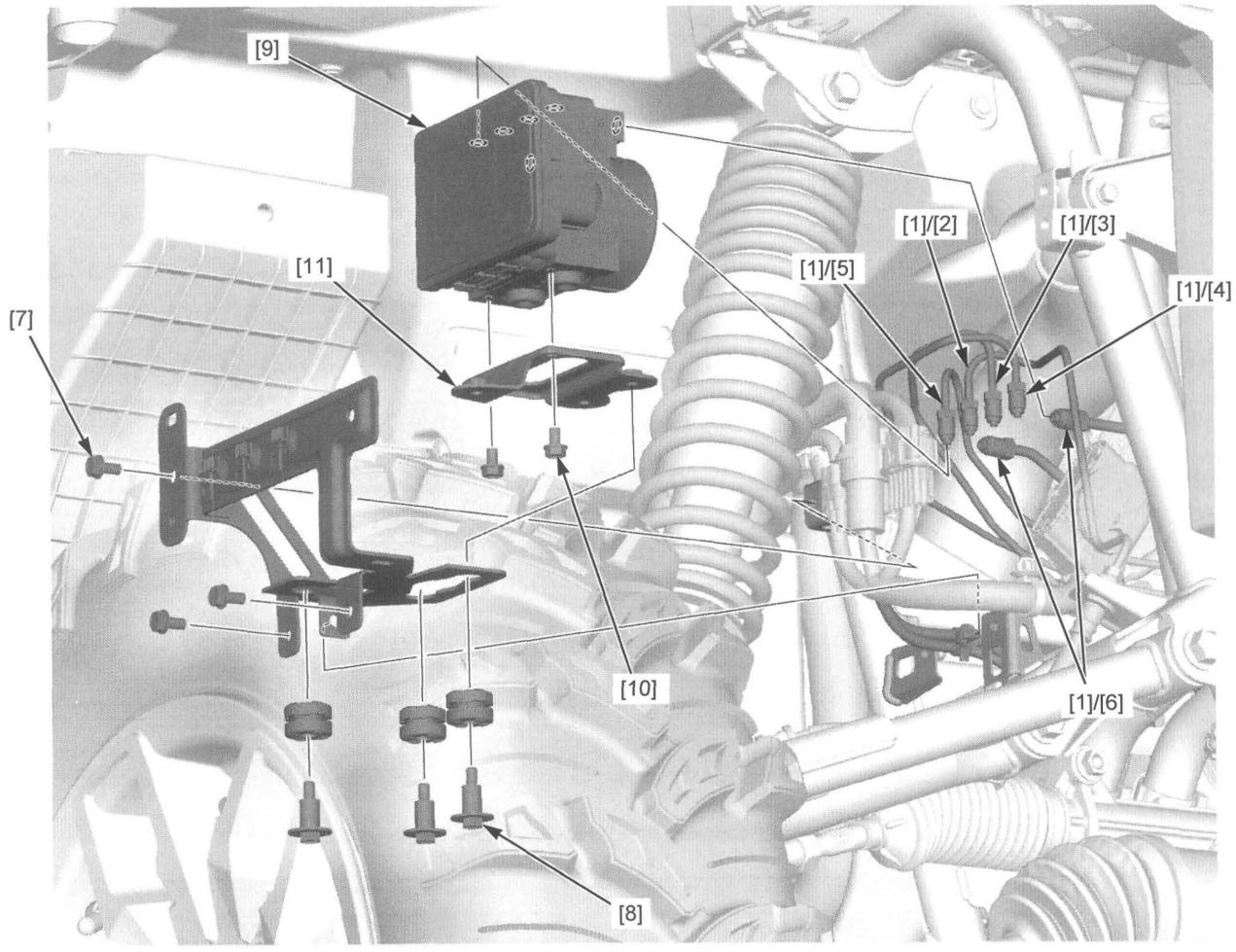
Installation is in the reverse order of removal.

NOTE:

Apply brake fluid to the brake pipe joint nut threads while connecting the brake pipes.

TORQUE:

Sub bracket mounting bolt:
8.0 N·m (0.8 kgf·m, 5.9 lbf·ft)
I-4WD modulator mounting bolt:
9.5 N·m (1.0 kgf·m, 7.0 lbf·ft)
Brake pipe joint nut (M10):
15 N·m (1.5 kgf·m, 11 lbf·ft)
Brake pipe joint nut (M12):
22 N·m (2.2 kgf·m, 16 lbf·ft)



HSA SWITCH

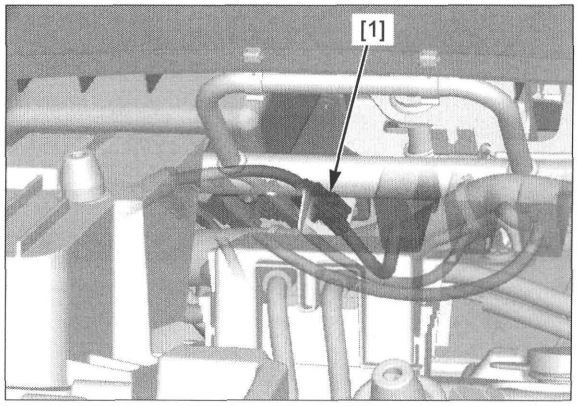
INSPECTION

Remove the front hood (page 2-17).

Disconnect the HSA switch 4P connector [1] and check for continuity at the switch side connector.

Connection: Pink – Black

There should be continuity with the HSA switch depressed and no continuity with the HSA switch released.

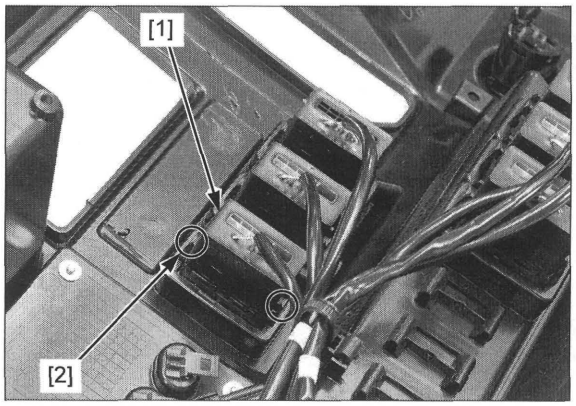


REMOVAL/INSTALLATION

Disconnect the HSA switch 4P connector (page 25-27).

Remove the HSA switch [1] from the instrument panel by releasing the stopper tabs [2].

Install the removed parts in the reverse order of removal.



MEMO

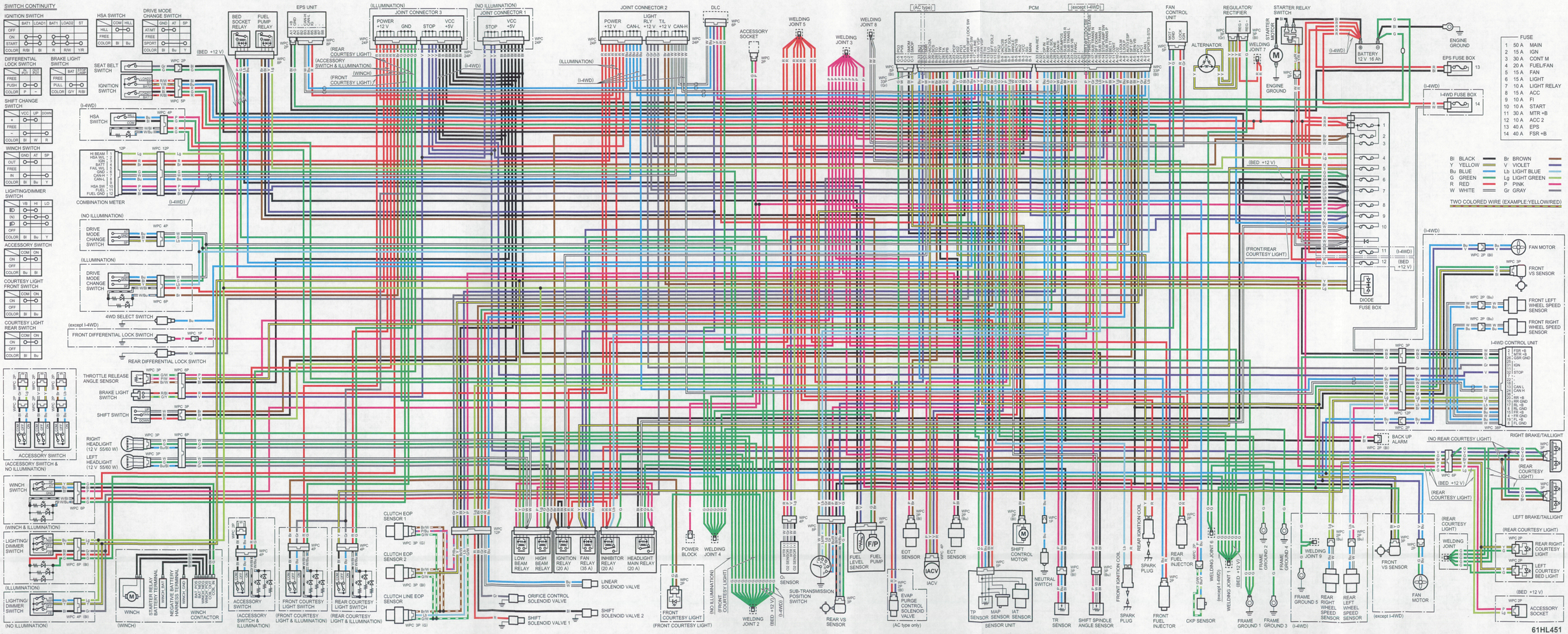
26. WIRING DIAGRAM

'22 models,
After '22 models (III, IV, IX type): ····· 26-2

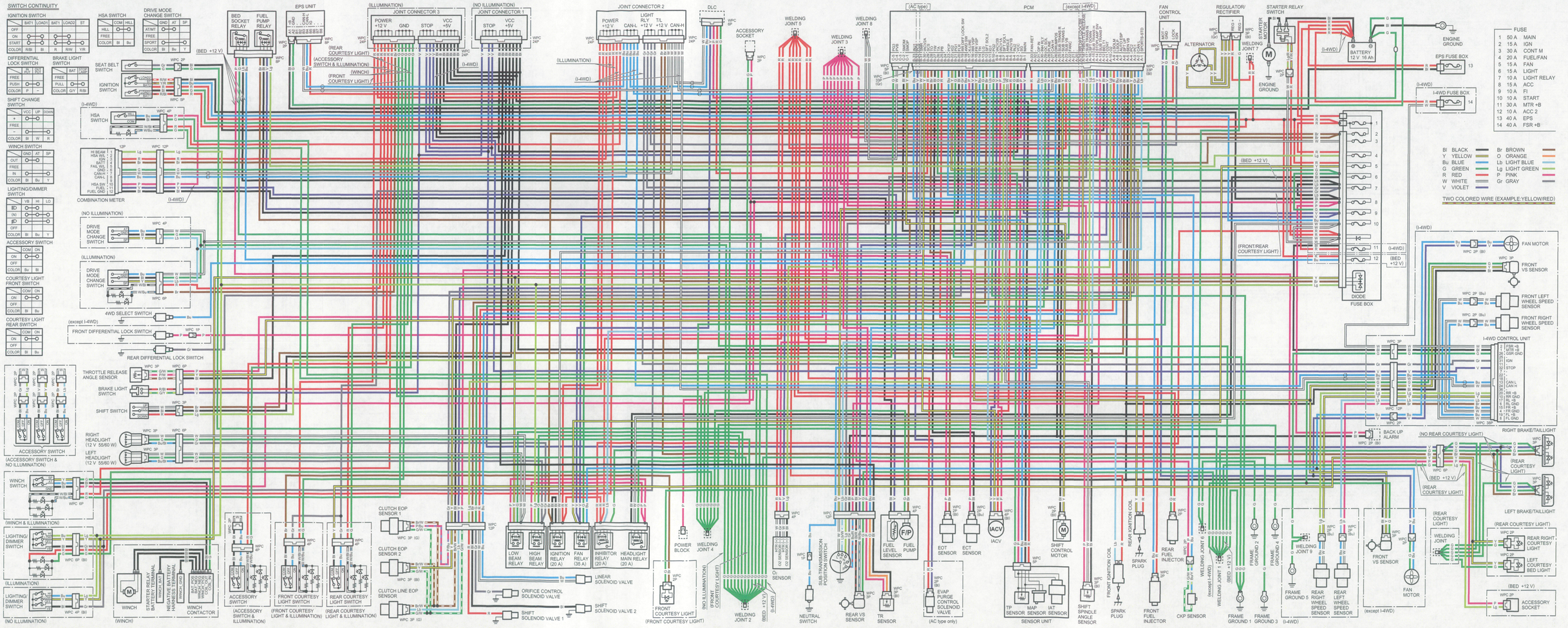
After '22 models
(Except III, IV, IX type):····· 26-3

MEMO

’22 models, After ’22 models (III, IV, IX type):



After ’22 models (Except III, IV, IX type):



INDEX

4WD SELECT SWITCH 23-25
ACCELERATOR PEDAL 7-20
ACCESSORY SOCKET 23-13
AIR CLEANER 3-6
AIR CLEANER COVER 2-11
AIR CLEANER HOUSING 7-17
AIR GUIDE PLATE 2-22
ALTERNATOR CHARGING COIL 22-6
ALTERNATOR COVER/STATOR 13-4
BALANCER 14-14
BATTERY
  BATTERY/CHARGING SYSTEM 22-4
  MAINTENANCE 3-8
BODY PANEL LOCATIONS 2-3
BRAKE FLUID 3-19
BRAKE FLUID REPLACEMENT/AIR BLEEDING 21-5
BRAKE LIGHT SWITCH
  LIGHTS/METERS/SWITCHES 23-22
  MAINTENANCE 3-20
BRAKE PAD/DISC 21-8
BRAKE PADS WEAR 3-19
BRAKE PEDAL 21-16
BRAKE SYSTEM 3-20
BRAKE/TAILLIGHT 23-6
CABLE & HARNESS ROUTING 1-29
CAM CHAIN TENSIONER LIFTER 10-9
CAMSHAFT 10-10
CARGO BED 2-40
CHARGING SYSTEM INSPECTION 22-5
CHASSIS LUBRICATION POINTS 3-26
CLUTCH COVER/CLUTCH CONTROL BODY 11-47
CLUTCH EOP SENSOR 11-60
CLUTCH INITIALIZE LEARNING 11-72
COLUMN DAMPER 17-5
COMBINATION METER 23-6
COMPONENT LOCATION
  ALTERNATOR/STARTER CLUTCH 13-3
  BRAKE SYSTEM 21-3
  CRANKCASE/TRANSMISSION/BALANCER 14-4
  CRANKSHAFT/PISTON/CYLINDER 15-3
  CYLINDER HEAD/VALVE/CAMSHAFT 10-4
  DUAL CLUTCH TRANSMISSION (DCT) 11-4
  ENGINE REMOVAL/INSTALLATION 16-3
  FRONT DRIVING MECHANISM 18-6
  FUEL SYSTEM 7-3
  REAR DRIVING MECHANISM 19-5
  STEERING SYSTEM 17-4
  SUB-TRANSMISSION 12-4
  WHEEL/SUSPENSION 20-4
COOLANT REPLACEMENT 9-4
COOLING FAN MOTOR/FAN CONTROL UNIT 23-19
COOLING SYSTEM TESTING 9-4
CRANKCASE ASSEMBLY 14-16
CRANKCASE SEPARATION 14-5
CRANKPIN BEARING 15-9
CRANKSHAFT 15-4
CYLINDER COMPRESSION 10-5
CYLINDER HEAD 10-14
CYLINDER HEAD COVER 10-5
DASH UNDER STORAGE 2-30
DCT ELECTRICAL SYSTEM LOCATION 11-6
DCT OIL FILTER 3-14
DCT SYMPTOM TROUBLESHOOTING 11-3
DCT SYSTEM DIAGRAM 11-7
DCT TROUBLESHOOTING INFORMATION 11-9
DIODE 6-9
DOOR 2-22
DRIVE MODE CHANGE SWITCH 11-55
DRIVE MODE SELECT LEVER LINKAGE 18-46
DRIVE SHAFT BOOTS 3-17
DTC INDEX
  DUAL CLUTCH TRANSMISSION (DCT) 11-11
  ELECTRIC POWER STEERING (EPS) 24-12
  I-4WD 25-8
  PGM-FI SYSTEM 4-8
DTC TROUBLESHOOTING
  DUAL CLUTCH TRANSMISSION (DCT) 11-14
  ELECTRIC POWER STEERING (EPS) 24-14
  I-4WD 25-9
  PGM-FI SYSTEM 4-10
DUAL CLUTCH/PRIMARY DRIVEN GEAR 11-66
ECT SENSOR 4-34
EMISSION CONTROL SYSTEMS 1-53
ENGINE COOLANT 3-16
ENGINE HANGER 16-11
ENGINE IDLE SPEED 3-16
ENGINE INSTALLATION 16-13
ENGINE OIL 3-12
ENGINE REMOVAL 16-4
EOT SENSOR 11-60
EPS SYMPTOM TROUBLESHOOTING 24-5
EPS TROUBLESHOOTING INFORMATION 24-5
EVAP CANISTER (AC type only) 7-30
EVAP PURGE CONTROL
SOLENOID VALVE (AC type only) 7-29
EVAPORATIVE EMISSION CONTROL
SYSTEM (AC type only) 3-27
EXHAUST SYSTEM
  FRAME/BODY PANELS/
  EXHAUST SYSTEM 2-51
  MAINTENANCE 3-21
FINAL CLUTCH CABLE ADJUSTMENT 18-44
FINAL GEAR OIL 3-17
FLOOR PANEL 2-17
FLYWHEEL/REDUCTION GEARS 13-11
FRAME 2-55
FRONT BRAKE CALIPER 21-12
FRONT BUMPER 2-18
FRONT DIFFERENTIAL LOCK CABLE
ADJUSTMENT (Except I-4WD model) 18-45
FRONT DIFFERENTIAL
LOCK SWITCH (Except I-4WD model) 23-23
FRONT DRIVE SHAFT 18-7
FRONT FENDER 2-20
FRONT FINAL CLUTCH 18-19
FRONT FINAL DRIVE INSTALLATION 18-41
FRONT FINAL DRIVE REMOVAL 18-14
FRONT FINAL GEAR ASSEMBLY 18-34
FRONT FINAL GEAR
DISASSEMBLY/INSPECTION 18-25
FRONT FLOOR COVER 2-31
FRONT FLOOR LID 2-30
FRONT GRILLE 2-21
FRONT HOOD 2-17
FRONT INNER FENDER 2-22
FRONT PROPELLER SHAFT 18-17
FRONT SEAT 2-4
FRONT SHOCK ABSORBER 20-18
FRONT SIDE COVER 2-16
FRONT SUSPENSION ARM 20-14
FRONT VS SENSOR 11-61
FRONT WHEEL HUB/KNUCKLE 20-10
FUEL GAUGE/FUEL LEVEL SENSOR 23-10
FUEL INJECTOR 7-28
FUEL LINE 3-5
FUEL LINE INSPECTION 7-6
FUEL PUMP 7-10
FUEL PUMP RELAY 7-14

INDEX

FUEL TANK 7-16
GEAR CASE AND COVER BEARING REPLACEMENT
  FRONT FINAL GEAR 18-32
  REAR FINAL GEAR 19-23
GEARSHIFT LINKAGE 11-68
HEADLIGHT 23-4
HEADLIGHT DIODE 23-26
HEADLIGHT RELAY 23-16
HEAT SHIELD PROTECTOR (M5P/M5D ONLY) 2-13
HSA SWITCH 25-27
I-4WD MODULATOR/COVER 25-25
I-4WD SYMPTOM TROUBLESHOOTING 25-5
I-4WD TROUBLESHOOTING INFORMATION 25-5
IACV 7-27
IGNITION COIL 5-7
IGNITION RELAY 5-7
IGNITION SWITCH 23-14
IGNITION SYSTEM INSPECTION 5-5
INHIBITOR RELAY 6-7
INNER FENDER 2-15
INSTRUMENT PANEL 2-28
INSULATOR 7-26
LIFT AND SUPPORT POINTS 1-55
LIGHTING/DIMMER SWITCH 23-15
LUBRICATION & SEAL POINTS 1-23
LUBRICATION SYSTEM DIAGRAM 8-4
MAIN JOURNAL BEARING 15-6
MAINTENANCE MINDER INDICATOR 3-3
MAINTENANCE SCHEDULE 3-4
MASTER CYLINDER 21-10
MIDDLE MUD GUARD 2-28
MIL CIRCUIT INSPECTION 4-32
MODEL IDENTIFICATION 1-3
NEUTRAL SWITCH 11-65
O2 SENSOR 4-34
OCCUPANT PROTECTIVE STRUCTURE (OPS) 2-38
OIL COOLER 8-12
OIL PRESSURE INSPECTION 8-5
OIL STRAINER 8-11
OIL TANK COVER 8-5
PARKING LOCK SYSTEM 3-20
PCM 4-35
PGM-FI SYMPTOM TROUBLESHOOTING 4-5
PGM-FI SYSTEM DIAGRAM 4-4
PGM-FI SYSTEM LOCATION 4-3
PGM-FI TROUBLESHOOTING INFORMATION 4-6
PISTON/CYLINDER 15-12
PRESSURE RELIEF VALVE 8-10
PRIMARY DRIVE GEAR 11-65
RADIATOR RESERVE TANK 9-9
RADIATOR/COOLING FAN/SHROUD 9-7
REAR BRAKE CALIPER 21-14
REAR CENTER COVER 2-9
REAR COVER SPACER/OIL PUMP 8-7
REAR DIFFERENTIAL LOCK CABLE ADJUSTMENT 19-35
REAR DIFFERENTIAL LOCK SWITCH 23-24
REAR DRIVE SHAFT 19-6
REAR FINAL DRIVE INSTALLATION 19-33
REAR FINAL DRIVE REMOVAL 19-13
REAR FINAL GEAR ASSEMBLY 19-26
REAR FINAL GEAR DISASSEMBLY/INSPECTION 19-15
REAR FOOT WELL STAY 2-15
REAR FOOTWELL (M5P/M5D ONLY) 2-12
REAR FOOTWELL LID (M5P/M5D ONLY) 2-11
REAR MUD GUARD (M3P/M3D ONLY) 2-14
REAR PROPELLER SHAFT 19-14
REAR SEAT (M5P/M5D ONLY) 2-6
REAR SHOCK ABSORBER 20-28
REAR SIDE COVER 2-10
REAR SUSPENSION ARM 20-24
REAR VS SENSOR 11-61
REAR WHEEL HUB/KNUCKLE 20-21
REGULATOR/RECTIFIER 22-6
ROCKER ARM 10-7
SEAT BELT 2-33
SEAT BELT SWITCH 23-25
SEAT UNDER STORAGE (M3D/M5D ONLY) 2-6
SENSOR UNIT (TP SENSOR/ MAP SENSOR/IAT SENSOR) 4-32
SERVICE INFORMATION
  ALTERNATOR/STARTER CLUTCH 13-2
  BATTERY/CHARGING SYSTEM 22-2
  BRAKE SYSTEM 21-2
  COOLING SYSTEM 9-2
  CRANKCASE/TRANSMISSION/BALANCER 14-2
  CRANKSHAFT/PISTON/CYLINDER 15-2
  CYLINDER HEAD/VALVE/CAMSHAFT 10-2
  DUAL CLUTCH TRANSMISSION (DCT) 11-2
  ELECTRIC POWER STEERING (EPS) 24-2
  ELECTRIC STARTER 6-2
  ENGINE REMOVAL/INSTALLATION 16-2
  FRAME/BODY PANELS/EXHAUST SYSTEM 2-2
  FRONT DRIVING MECHANISM 18-2
  FUEL SYSTEM 7-2
  I-4WD 25-2
  IGNITION SYSTEM 5-2
  LIGHTS/METERS/SWITCHES 23-2
  LUBRICATION SYSTEM 8-2
  MAINTENANCE 3-2
  PGM-FI SYSTEM 4-2
  REAR DRIVING MECHANISM 19-2
  STEERING SYSTEM 17-2
  SUB-TRANSMISSION 12-2
  WHEEL/SUSPENSION 20-2
SERVICE RULES 1-2
SHIFT CONTROL MOTOR/REDUCTION GEARS 11-51
SHIFT SELECT LEVER/CABLE 12-29
SHIFT SPINDLE ANGLE SENSOR 11-58
SIDE NET
  FRAME/BODY PANELS/EXHAUST SYSTEM 2-32
  MAINTENANCE 3-25
SIDE SKID PLATE 2-37
SKID PLATE 2-36
SNORKEL DUCT 7-18
SPARK ARRESTER 3-21
SPARK PLUG 3-7
SPECIAL TOOL LIST 1-26
SPECIFICATIONS 1-7
STARTER CLUTCH 13-13
STARTER MOTOR 6-4
STARTER RELAY SWITCH 6-6
STEERING COLUMN 17-6
STEERING GEAR BOX 17-14
STEERING SHAFT/EPS UNIT 17-8
STEERING SYSTEM 3-22
STEERING WHEEL 17-5
SUB AIR CLEANER 3-6
SUB-TRANSMISSION 12-5
SUB-TRANSMISSION OIL 3-14
SUB-TRANSMISSION POSITION SWITCH 11-62
SUPPORT COVER 2-27
SUSPENSION 3-21
SYSTEM DIAGRAM
  BATTERY/CHARGING SYSTEM 22-3
  ELECTRIC POWER STEERING (EPS) 24-4
  ELECTRIC STARTER 6-3

I-4WD 25-4
IGNITION SYSTEM 5-4
SYSTEM FLOW PATTERN 9-3
SYSTEM LOCATION
BATTERY/CHARGING SYSTEM 22-3
ELECTRIC POWER STEERING (EPS) 24-3
ELECTRIC STARTER 6-3
I-4WD 25-3
IGNITION SYSTEM 5-4
LIGHTS/METERS/SWITCHES 23-3
THERMOSTAT 9-6
THROTTLE BODY 7-22
THROTTLE OPERATION 3-5
TIE-ROD END 17-12
TIE–ROD ENDS 3-22
TIRES 20-6
TORQUE VALUES 1-15
TR SENSOR 11-59
TRANSMISSION 14-7
TROUBLESHOOTING
ALTERNATOR/STARTER CLUTCH 13-3
BATTERY/CHARGING SYSTEM 22-3
BRAKE SYSTEM 21-2
COOLING SYSTEM 9-2
CRANKCASE/TRANSMISSION/BALANCER 14-3
CRANKSHAFT/PISTON/CYLINDER 15-2
CYLINDER HEAD/VALVE/CAMSHAFT 10-3
ELECTRIC STARTER 6-2
FRAME/BODY PANELS/EXHAUST SYSTEM 2-2
FRONT DRIVING MECHANISM 18-5
IGNITION SYSTEM 5-3
LUBRICATION SYSTEM 8-3
REAR DRIVING MECHANISM 19-4
STEERING SYSTEM 17-3
SUB-TRANSMISSION 12-3
WHEEL/SUSPENSION 20-3
UNDERBODY 3-20
VALVE CLEARANCE 3-8
WATER PUMP 9-10
WHEEL SPEED SENSOR 25-23
WHEELS 20-6
WHEELS/TIRES 3-21
WIRING DIAGRAM
'21 models, After '22 models (III, IV, IX type) 26-2
After '22 models (Except III, IV, IX type) 26-3



© 2023 Honda Motor Co., Ltd.
All Rights Reserved

61HL451

Printed in the U.S.A.