

FOREWORD

This manual contains an introductory description on the SUZUKI LT-A450X and procedures for its inspection, service and overhaul of its main components.

Other information considered as generally known is not included.

Read the GENERAL INFORMATION section to familiarize yourself with the vehicle and its maintenance. Use this section as well as other sections to use as a guide for proper inspection and service.

This manual will help you know the vehicle better so that you can assure your customers of fast and reliable service.

** This manual has been prepared on the basis of the latest specifications at the time of publication. If modifications have been made since then, differences may exist between the content of this manual and the actual vehicle.*

** Illustrations in this manual are used to show the basic principles of operation and work procedures. They may not represent the actual vehicle exactly in detail.*

** This manual is written for persons who have enough knowledge, skills and tools, including special tools, for servicing SUZUKI vehicles. If you do not have the proper knowledge and tools, ask your authorized SUZUKI motorcycle dealer to help you.*

⚠ WARNING

Inexperienced mechanics or mechanics without the proper tools and equipment may not be able to properly perform the services described in this manual. Improper repair may result in injury to the mechanic and may render the vehicle unsafe for the rider.

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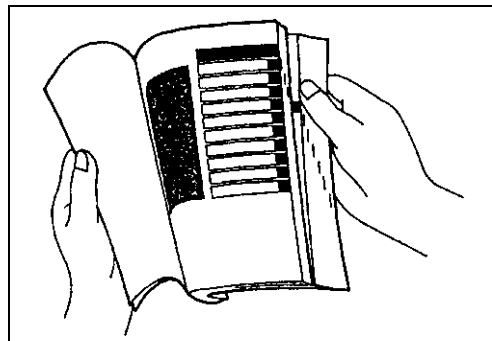
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HOW TO USE THIS MANUAL TO LOCATE WHAT YOU ARE LOOKING FOR:

1. The text of this manual is divided into sections.
2. The section titles are listed in the GROUP INDEX.
3. Holding the manual as shown at the right will allow you to find the first page of the section easily.
4. The contents are listed on the first page of each section to help you find the item and page you need.



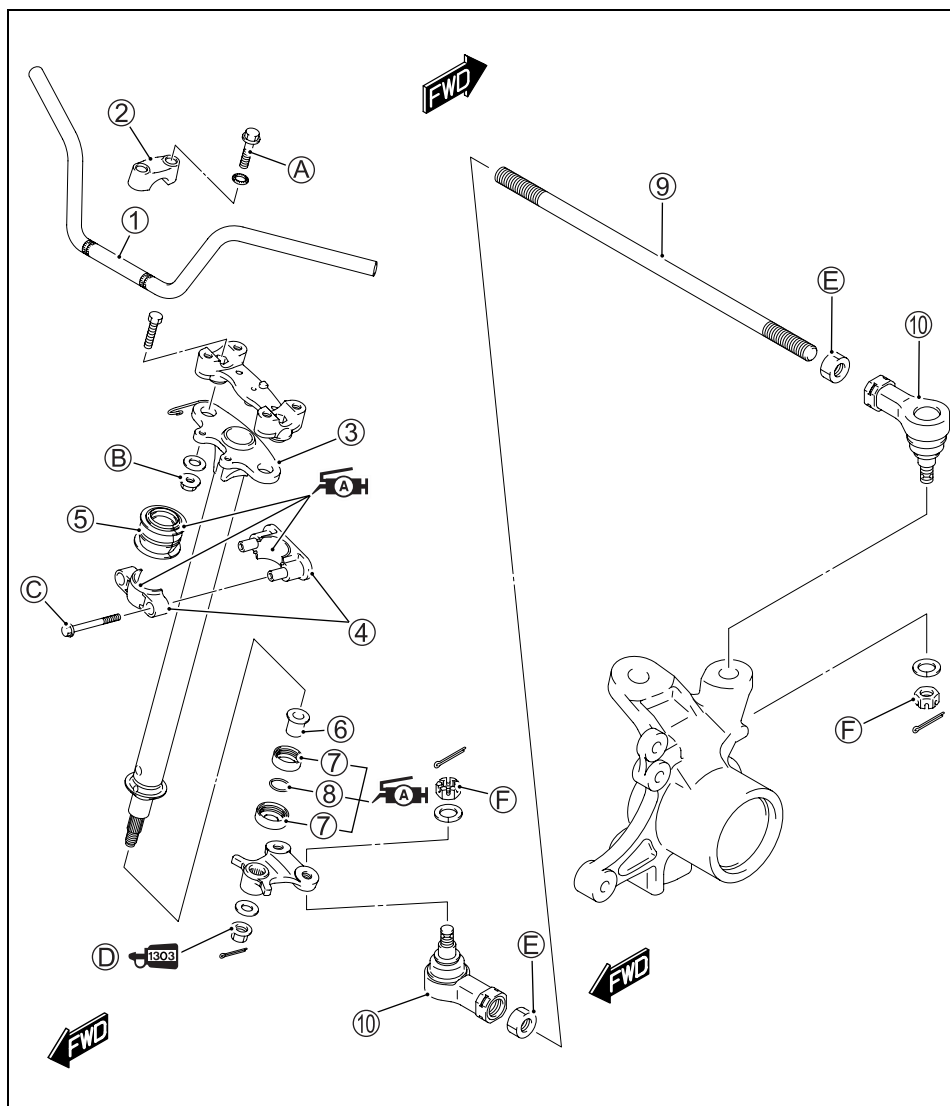
COMPONENT PARTS AND WORK TO BE DONE

Under the name of each system or unit, is its exploded view. Work instructions and other service information such as the tightening torque, lubricating points and locking agent points, are provided.

Example:

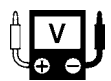
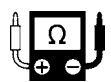
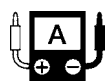
①	Handlebar
②	Handlebar upper clamp
③	Steering shaft
④	Steering shaft holder
⑤	Dust seal
⑥	Bush
⑦	Dust seal
⑧	O-ring
⑨	Tie rod
⑩	Tie rod end
A	Handlebar upper clamp bolt
B	Handlebar holder nut
C	Steering shaft holder bolt
D	Steering shaft lower nut
E	Tie rod lock-nut
F	Tie rod end nut

ITEM	N·m	kgf·m	lb·ft
A	26	2.6	19.0
B	60	6.0	43.5
C	23	2.3	16.5
D	170	17.0	123.0
E	45	4.5	32.5
F	29	2.9	21.0



SYMBOL

Listed in the table below are the symbols indicating instructions and other information necessary for servicing. The meaning of each symbol is also included in the table.

SYMBOL	DEFINITION	SYMBOL	DEFINITION
	Torque control required. Data beside it indicates specified torque.		Apply THREAD LOCK SUPER "1322" or equivalent thread lock. 99000-32110
	Indicates service data.		Apply THREAD LOCK "1342". 99000-32050
	Apply oil. Use engine oil unless otherwise specified.		Apply THREAD LOCK SUPER "1360". 99000-32130
	Apply hypoid gear oil.		Apply or use brake fluid.
	Apply molybdenum oil solution. (mixture of engine oil and SUZUKI MOLY PASTE in a ratio of 1 : 1)		Measure in voltage range.
	Apply SUZUKI SUPER GREASE "A" or equivalent grease. 99000-25010		Measure in resistance range.
	Apply SUZUKI SILICONE GREASE. 99000-25100		Measure in current range.
	Apply SUZUKI MOLY PASTE. 99000-25140		Measure in diode test range.
	Apply WATER RESISTANCE GREASE. 99000-25160		Measure in continuity test range.
	Apply SUZUKI BOND "1215" or equivalent bond. 99000-31110		Use special tool.
	Apply SUZUKI BOND "1216B". 99100-31230		Use engine coolant. 99000-99032-11X
	Apply THREAD LOCK SUPER "1303". 99000-32030		

ABBREVIATIONS USED IN THIS MANUAL

A

ABDC	: After Bottom Dead Center
AC	: Alternating Current
ACL	: Air Cleaner, Air Cleaner Box
API	: American Petroleum Institute
ATDC	: After Top Dead Center
ATM Pressure	: Atmospheric Pressure
	: Atmospheric Pressure sensor (APS, AP Sensor)
A/F	: Air Fuel Mixture

B

BBDC	: Before Bottom Dead Center
BTDC	: Before Top Dead Center
B+	: Battery Positive Voltage

C

CKP Sensor	: Crankshaft Position Sensor (CKPS)
CKT	: Circuit
CO	: Carbon Monoxide
CPU	: Central Processing Unit

D

DC	: Direct Current
DIFF-LOCK Relay	: Differential Lock Relay
DMC	: Dealer Mode Coupler
DOHC	: Double Over Head Camshaft
DRL	: Daytime Running Light
DTC	: Diagnostic Trouble Code

E

ECM	: Engine Control Module Engine Control Unit (ECU) (FI Control Unit)
ECT Sensor	: Engine Coolant Temperature Sensor (ECTS), Water Temp. Sensor (WTS)

F

FI	: Fuel Injection, Fuel Injector
FP	: Fuel Pump
FPR	: Fuel Pressure Regulator
FP Relay	: Fuel Pump Relay

G

GEN	: Generator
GND	: Ground
GP Switch	: Gear Position Switch

H

HC	: Hydrocarbons
----	----------------

I

IAP Sensor	: Intake Air Pressure Sensor (IAPS) (MAP sensor)
IAS	: Idle air screw
IAT Sensor	: Intake Air Temperature Sensor (IATS)
IG	: Ignition

L

LCD	: Liquid Crystal Display
LED	: Light Emitting Diode (Malfunction Indicator Lamp)
LH	: Left Hand

M

MAL-Code	: Malfunction Code (Diagnostic Code)
Max	: Maximum
MIL	: Malfunction Indicator Lamp (LED)
Min	: Minimum

N

NOX	: Nitrogen Oxides
-----	-------------------

O

OHC	: Over Head Camshaft
-----	----------------------

P

PCV	: Positive Crankcase Ventilation (Crankcase Breather)
-----	--

R

REC	: Rectifier
REG	: Regulator
RH	: Right Hand
ROM	: Read Only Memory

S

SAE	: Society of Automotive Engineers
SDS	: Suzuki Diagnosis System

T

TO Sensor	: Tip-Over Sensor (TOS)
TP Sensor	: Throttle Position Sensor (TPS)

SAE-TO-FORMER SUZUKI TERM

This table lists SAE (Society of Automotive Engineers) J1930 terms and abbreviations which may be used in this manual in compliance with SAE recommendations, as well as their former SUZUKI names.

SAE TERM		FORMER SUZUKI TERM
FULL TERM	ABBREVIATION	
A		
Air Cleaner	ACL	Air Cleaner, Air Cleaner Box
B		
Battery Positive Voltage	B+	Battery Voltage, +B
C		
Crankshaft Position Sensor	CKP Sensor	Crankshaft Position Sensor (CKPS), Crank Angle
D		
Data Link Connector	DLC	Dealer Mode Coupler
Diagnostic Test Mode	DTM	—
Diagnostic Trouble Code	DTC	Diagnostic Code, Malfunction Code
E		
Electronic Ignition	EI	—
Engine Control Module	ECM	Engine Control Module (ECM) FI Control Unit, Engine Control Unit (ECU)
Engine Coolant Level	ECL	Coolant Level
Engine Coolant Temperature	ECT	Coolant Temperature, Engine Coolant Temperature, Water Temperature
Engine Speed	RPM	Engine Speed (RPM)
F		
Fan Control	FC	—
Fuel Level Sensor	—	Fuel Level Sensor, Fuel Level Gauge
Fuel Pump	FP	Fuel Pump (FP)
G		
Generator	GEN	Generator
Ground	GND	Ground (GND, GRD)
I		
Idle Speed Control	IC	Electronic Spark Advance (ESA)
Ignition Control Module	ICM	—
Intake Air Temperature	IAT	Intake Air Temperature (IAT), Air Temperature
M		
Malfunction Indicator Lamp	MIL	LED Lamp Malfunction Indicator Lamp (MIL)
Manifold Absolute Pressure	MAP	Intake Air Pressure (IAP), Intake Vacuum

SAE TERM		FORMER SUZUKI TERM
FULL TERM	ABBREVIATION	
O		
On-Board Diagnostic	OBD	Self-Diagnosis Function Diagnostic
P		
Programmable Read Only Memory	PROM	—
R		
Random Access Memory	RAM	—
Read Only Memory	ROM	ROM
T		
Throttle Body	TB	Throttle Body (TB)
Throttle Body Fuel Injection	TBI	Throttle Body Fuel Injection (TBI)
Throttle Position Sensor	TP Sensor	TP Sensor (TPS)
V		
Voltage Regulator	VR	Voltage Regulator

GENERAL INFORMATION

1

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COUNTRY AND AREA CODES

The following codes stand for the applicable country (-ies) and area (-s).

CODE	COUNTRY or AREA	EFFECTIVE FRAME NO.
E-17	Sweden	5SAAL42A 77100001-
E-24	Australia	
E-28	Canada	
E-33	California (U.S.A.)	

WARNING/CAUTION/NOTE

Please read this manual and follow its instructions carefully. To emphasize special information, the symbol and the words WARNING, CAUTION and NOTE have special meanings. Pay special attention to the messages highlighted by these signal words.

WARNING

Indicates a potential hazard that could result in death or injury.

CAUTION

Indicates a potential hazard that could result in vehicle damage.

NOTE:

Indicates special information to make maintenance easier or instructions clearer.

Please note, however, that the warnings and cautions contained in this manual cannot possibly cover all potential hazards relating to the servicing, or lack of servicing, of the vehicle. In addition to the WARNINGS and CAUTIONS stated, you must use good judgement and basic mechanical safety principles. If you are unsure about how to perform a particular service operation, ask a more experienced mechanic for advice.

GENERAL PRECAUTIONS

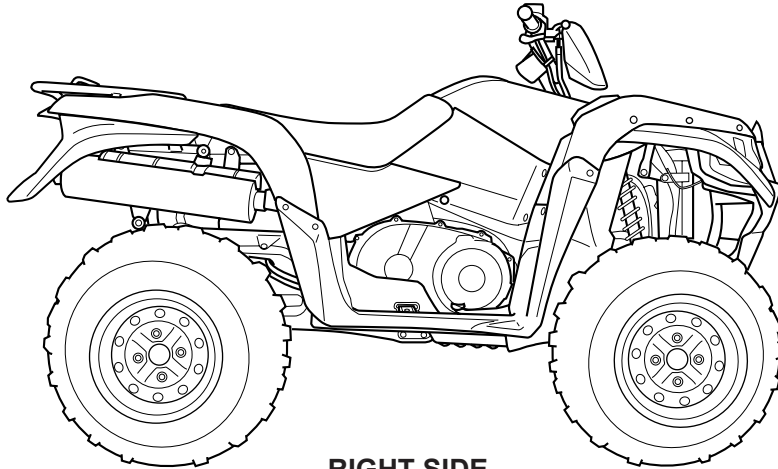
WARNING

- * Proper service and repair procedures are important for the safety of the service mechanic and the safety and reliability of the vehicle.
- * When 2 or more persons work together, pay attention to the safety of each other.
- * When it is necessary to run the engine indoors, make sure that exhaust gas is forced outdoors.
- * When working with toxic or flammable materials, make sure that the area you work in is well-ventilated and that you follow all of the material manufacturer's instructions.
- * Never use gasoline as a cleaning solvent.
- * To avoid getting burned, do not touch the engine, engine oil, radiator and exhaust system until they have cooled.
- * After servicing the fuel, oil, water, exhaust or brake systems, check all lines and fittings related to the system for leaks.

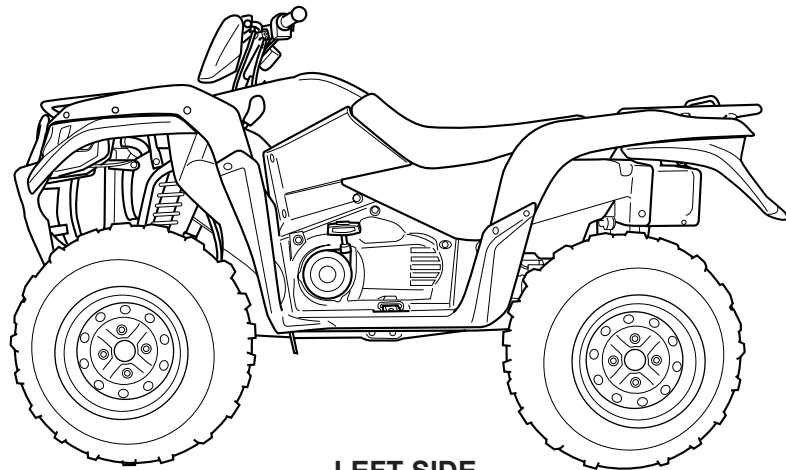
CAUTION

- * If parts replacement is necessary, replace the parts with Suzuki Genuine Parts or their equivalent.
 - * When removing parts that are to be reused, keep them arranged in an orderly manner so that they may be reinstalled in the proper order and orientation.
 - * Be sure to use special tools when instructed.
 - * Make sure that all parts used in reassembly are clean. Lubricate them when specified.
 - * Use the specified lubricant, bond, or sealant.
 - * When removing the battery, disconnect the negative cable first and then the positive cable.
 - * When reconnecting the battery, connect the positive cable first and then the negative cable, and replace the terminal cover on the positive terminal.
 - * When performing service to electrical parts, if the service procedures do not require use of battery power, disconnect the negative cable from the battery.
 - * When tightening the cylinder head or case bolts and nuts, tighten the larger sizes first. Always tighten the bolts and nuts diagonally from the inside toward outside and to the specified tightening torque.
 - * Whenever you remove oil seals, gaskets, packing, O-rings, locking washers, self-locking nuts, cotter pins, circlips and certain other parts as specified, be sure to replace them with new ones. Also, before installing these new parts, be sure to remove any left over material from the mating surfaces.
 - * Never reuse a circlip. When installing a new circlip, take care not to expand the end gap larger than required to slip the circlip over the shaft. After installing a circlip, always ensure that it is completely seated in its groove and securely fitted.
 - * Use a torque wrench to tighten fasteners to the specified torque. Wipe off grease and oil if a thread is smeared with them.
 - * After reassembling, check parts for tightness and proper operation.
-
- * To protect the environment, do not unlawfully dispose of used motor oil, engine coolant and other fluids: batteries and tires.
 - * To protect Earth's natural resources, properly dispose of used vehicle and parts.

SUZUKI LT-A450XK7 ('07-MODEL)



RIGHT SIDE

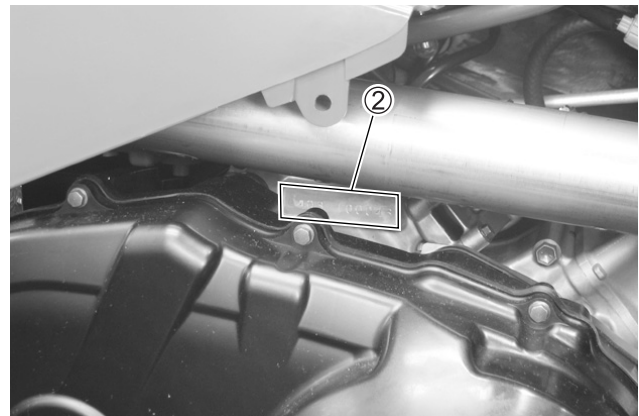


LEFT SIDE

- Difference between illustration and actual vehicle may exist depending on the markets.

SERIAL NUMBER LOCATION

The frame serial number or V.I.N. (Vehicle Identification Number) ① is stamped, on the left side of the front frame pipe. The engine serial number ② is located on the right side of the crankcase. These numbers are required especially for registering the machine and ordering spare parts.



FUEL, OIL AND ENGINE COOLANT RECOMMENDATION

FUEL (FOR USA AND CANADA)

Use only unleaded gasoline of at least 87 pump octane (R/2 + M/2) or 91 octane or higher rated by the Research Method.

Gasoline containing MTBE (Methyl Tertiary Butyl Ether), less than 10 % ethanol, or less than 5 % methanol with appropriate cosolvents and corrosion inhibitor is permissible.

FUEL (FOR OTHER COUNTRIES)

Gasoline used should be graded 91 octane (Research Method) or higher. An unleaded gasoline is recommended.

ENGINE OIL (FOR USA)

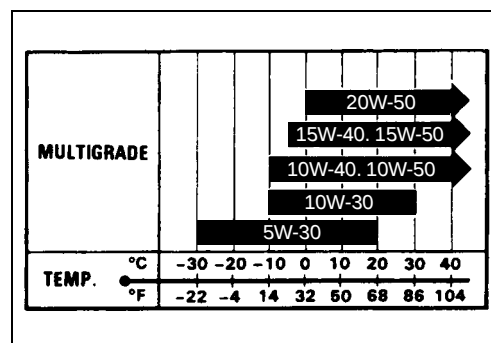
Oil quality is a major contributor to your engine's performance and life. Always select good quality engine oil. Suzuki recommends the use of SUZUKI PERFORMANCE 4 MOTOR OIL or equivalent engine oil. Use of SF/SG or SH/SJ in API with MA in JASO.

Suzuki recommends the use of SAE 10W-40 engine oil. If SAE 10W-40 engine oil is not available, select an alternative according to the following chart.

ENGINE OIL (FOR OTHER COUNTRIES)

Oil quality is a major contributor to your engine's performance and life. Always select good quality engine oil. Use of SF/SG or SH/SJ in API with MA in JASO.

Suzuki recommends the use of SAE 10W-40 engine oil. If SAE 10W-40 engine oil is not available, select an alternative according to the right chart.



FRONT DIFFERENTIAL GEAR OIL

Use hypoid gear oil that meets the API grade GL-5 or SAE 75W-90 and is rated SAE #90. Use a hypoid gear oil with a rating of SAE #80 if the vehicle is operated where the ambient temperature is below 0 °C (32 °F).

REAR DRIVE (FINAL) GEAR OIL

Use Mobil fluid 424 or equivalent gear oil.

BRAKE FLUID

Specification and classification: DOT 4

⚠ WARNING

Since the brake system of this vehicle is filled with a glycol-based brake fluid by the manufacturer, do not use or mix different types of fluid such as silicone-based and petroleum-based fluid for refilling the system, otherwise serious damage will result.

Do not use any brake fluid taken from old or used or unsealed containers.

Never re-use brake fluid left over from a previous servicing, which has been stored for a long period.

ENGINE COOLANT

Use an anti-freeze/engine coolant compatible with an aluminum radiator, mixed with distilled water only.

WATER FOR MIXING

Use distilled water only. Water other than distilled water can corrode and clog the aluminum radiator.

ANTI-FREEZE/ENGINE COOLANT

The engine coolant performs as a corrosion and rust inhibitor as well as anti-freeze. Therefore, the engine coolant should be used at all times even though the atmospheric temperature in your area does not go down to freezing point.

Suzuki recommends the use of SUZUKI COOLANT anti-freeze/engine coolant. If this is not available, use an equivalent which is compatible with an aluminum radiator.

LIQUID AMOUNT OF WATER/ENGINE COOLANT

Solution capacity (total): Approx. 2 450 ml (2.6/2.1 US/Imp qt)

For engine coolant mixture information, refer to cooling system section in page 7-2.

CAUTION

Mixing of anti-freeze/engine coolant should be limited to 60 %. Mixing beyond it would reduce its efficiency. If the anti-freeze/engine coolant mixing ratio is below 50 %, rust inhabiting performance is greatly reduced. Be sure to mix it above 50 % even though the atmospheric temperature does not go down to the freezing point.

BREAK-IN PROCEDURES

During manufacture only the best possible materials are used and all machined parts are finished to a very high standard but it is still necessary to allow the moving parts to "BREAK-IN" before subjecting the engine to maximum stresses. The future performance and reliability of the engine depends on the care and restraint exercised during its early life. The general rules are as follows.

- Keep to these break-in engine speed limits:

Brake-in engine speeds

Initial 500 km (300 miles): Less than 1/2 throttle

- Upon reaching an odometer reading of 500 km (300 miles) you can subject the vehicle to full throttle operation, for short periods of time.

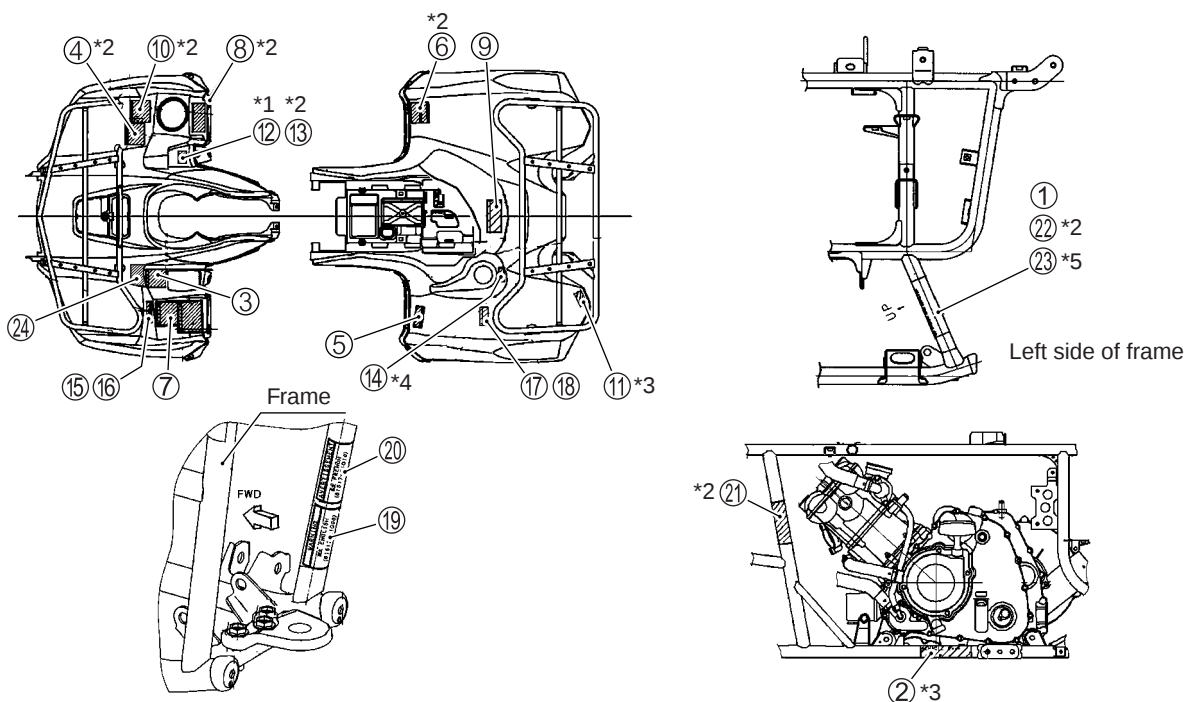
INFORMATION LABELS

① Certification plate	A (For E-24, 33)
② Information label	A (For E-33)
③ Gearshift label	A
④ Gearshift label	A (For E-28)
⑤ Tire air pressure label	A
⑥ Tire air pressure label and warning no-passenger label	A (For E-28)
⑦ General warning & AGE, 16 label	A
⑧ General warning label	A (For E-28)
⑨ Warning no-passenger label	A
⑩ AGE, 16 label	A (For E-28)
⑪ Manual notice label	A (For E-33)
⑫ Max AMP caution label	A (Except for E-28)
⑬ Max AMP caution label	A (For E-28)
⑭ Fuel caution label	A (For E-24)
⑮ Front carrier warning label	A (For E-24, 33)
⑯ Front carrier warning label	A (For E-17, 28)
⑰ Rear carrier warning label	A (For E-24, 33)
⑱ Rear carrier warning label	A (For E-17, 28)
⑲ Trailer to warning label	A
⑳ Trailer to warning label	A (For E-17 (CH), 28)
㉑ ICES Canada label	A (For E-28)
㉒ Compliance label	A (For E-28)
㉓ ID plate	A (For E-17)
㉔ Cooling fan label	A

A: Attached

*1: Except for E-28 *2: For E-28 *3: For E-33 *4: For E-24 *5: For E-17

*6: This label is attached on the seat. *5: This label is attached on the left side of frame.



SPECIFICATIONS

DIMENSIONS AND DRY MASS

Overall length	2 115 mm (83.3 in)	E-28, 33
	2 135 mm (84.1 in)	E-17, 24
Overall width	1 210 mm (47.6 in)	E-28, 33
	1 215 mm (47.8 in)	E-17, 24
Overall height	1 220 mm (48.0 in)	
Wheelbase	1 280 mm (50.4 in)	
Ground clearance.....	260 mm (10.2 in)	
Seat height	860 mm (33.9 in)	
Dry mass	273 kg (601 lbs).....	E-28, 33
	275 kg (606 lbs).....	E-17, 24
Front track	930 mm (36.6 in)	
Rear track.....	940 mm (37.0 in)	

ENGINE

Type	4 stroke, liquid-cooled, OHC
Number of cylinders	1
Bore.....	84.0 mm (3.307 in)
Stroke.....	82.0 mm (3.228 in)
Displacement	454 cm ³ (27.7 cu.in)
Compression ratio	10.0:1
Fuel system	Fuel injection
Air cleaner	Nonwoven fabric element
Starter system	Electric and recoil starter
Lubrication system	Wet sump
Idle speed.....	1 500 ± 100 r/min

DRIVE TRAIN

Clutch	Wet shoe, automatic, centrifugal type
Transmission	Automatic variable ratio (V-belt)
Transfer	2-speed forward with reverse
Gearshift pattern, Transmission	Automatic
Transfer	L-H-N-R (Hand operated)
Automatic transmission ratio	Variable change (2.902 – 0.779)
Secondary reduction ratio	2.733 (41/19 × 19/15)
Final reduction ratio (Front & Rear).....	3.600 (36/10)
Transfer gear ratio, Low	2.562 (41/16)
High	1.240 (31/25)
Reverse	2.000 (32/16)
Drive system	Shaft drive

CHASSIS

Front suspension	Independent, double wishbone, coil spring, oil damped
Rear suspension	Independent, double wishbone, coil spring, oil damped
Front wheel travel	180 mm (7.1 in)
Rear wheel travel	200 mm (7.9 in)
Caster	1.6 °
Trail	3.4 mm (0.13 in)
Toe	-12 mm (-0.47 in)
Camber	0.64 °
Steering angle	46 ° (right & left)
Turning radius	3.1 m (10.2 ft)
Front brake	Dual hydraulic disc
Rear brake	Sealed oil-bathed multi-disc
Front tire size	AT25 × 8 – 12☆☆, tubeless
Rear tire size	AT25 × 10 – 12☆☆, tubeless

ELECTRICAL

Ignition type	Electronic ignition (CDI)
Ignition timing	7 ° B.T.D.C.at 1 500 r/min
Spark plug	NGK CR6E or DENSO U20ESR-N
Battery	12 V 43.2 kC (12 Ah)/10 HR
Generator	Three-phase A.C. generator
Main fuse	30 A
Fuse	10/10/10/10/15/15 A
Headlight	12 V 35/35 W × 2
Brake light/Tailight	12 V 21/5 W
Reversing light	12 V 21 W ... E-17
Speedometer light	LED
Coolant temperature/FI warning light	LED
Neutral indicator light	LED
High beam indicator light	LED E-17
Reverse indicator light	LED
Diff-lock indicator light	LED

CAPACITIES

Fuel tank	17.5 L (4.6/3.8 US/Imp gal)
Engine oil,oil change	2 500 ml (2.6/2.2 US/Imp qt)
with filter change	2 700 ml (2.9/2.4 US/Imp qt)
overhaul	3 200 ml (3.4/2.8 US/Imp qt)
Differential gear oil	500 ml (16.9/17.6 US/Imp oz)
Final gear oil	770 ml (26.0/27.1 US/Imp oz)
Coolant	2.45 L (2.1/2.1 US/Imp qt)

These specifications are subject to change without notice.

PERIODIC MAINTENANCE

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PERIODIC MAINTENANCE SCHEDULE

The chart below lists the recommended intervals for all the required periodic service work necessary to keep the vehicle operating at peak performance and economy. Maintenance intervals are expressed in terms of kilometers, miles and months, and are dependent on whichever comes first.

NOTE:

More frequent servicing may be performed on vehicles that are used under severe conditions.

PERIODIC MAINTENANCE CHART

Item	Interval	km	Initial 200	Every 1 000	Every 2 000
		miles	Initial 100	Every 600	Every 1 200
		months	1	3	6
Air cleaner element			—	I	I
Exhaust pipe nuts and muffler mounting bolts			T	T	T
Valve clearance			I	—	I
Spark plug			—	—	I
			Replace every 6 000 km (4 000 miles).		
Spark arrester			—	—	C
Fuel line			—	I	I
			Replace every 4 years.		
Engine oil and oil filter			R	—	R
Front differential gear oil			—	—	I
			Replace every 2 years.		
Final gear oil			—	—	I
			Replace every year.		
Throttle cable play			I	I	I
Throttle body			—	I	I
Engine coolant			Replace every 2 years.		
Radiator			—	I	I
Radiator hose			—	—	I
Drive belt			—	I	I
Drive shaft boots			I	I	I
Brakes			I	I	I
Rear brake plates			Replace every 10 000 km (6 000 miles).		
Brake fluid			—	I	I
			Replace every 2 years.		
Brake hose			—	—	I
			Replace every 4 years.		
Tires			—	I	I
Steering			I	I	I
Suspensions			—	—	I
Chassis nuts and bolts			T	T	T
General lubrication			—	L	L

I = Inspect and clean, adjust, replace, or lubricate as necessary.

C = Clean

R = Replace

T = Tighten

L = Lubricate

MAINTENANCE AND TUNE-UP PROCEDURES

This section describes the servicing procedures for each item mentioned in the Periodic Maintenance chart.

Before performing the servicing procedures mentioned in the periodic maintenance chart, remove following parts to ease servicing work;

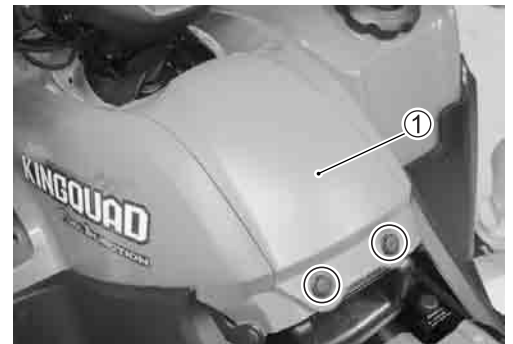
- Seat. (🔧 8-6)
- Left upper mud guard. (🔧 8-9)
- Left side cover. (🔧 8-9)
- Right side cover. (🔧 8-10)
- Left mud guard. (🔧 8-9)
- Right mud guard. (🔧 8-10)
- Left inner fender. (🔧 8-10)
- Right inner fender. (🔧 8-10)
- Front grill. (🔧 8-6)
- Front carrier. (🔧 8-6)
- Front fender. (🔧 8-9)
- Rear carrier. (🔧 8-14)
- Rear fender. (🔧 8-15)

AIR CLEANER ELEMENT

Inspect every 1 000 km (600 miles, 3 months).

If the air cleaner element is clogged with dust, intake resistance will be increased, with a resultant decrease in power output and increase in fuel consumption. Check and clean the air cleaner element in the following manner.

- Remove the seat. (🔧 8-6)
- Remove the air cleaner box cover ①.
- Remove the air cleaner box cap ②.
- Remove the air cleaner element.



- Using compressed air, blow the dust from the cleaner element.

CAUTION

Always apply compressed air to the inside of the air cleaner element. If compressed air is applied to the outside, dirt will be forced into the pores of the air cleaner element, restricting air flow through the air cleaner element.

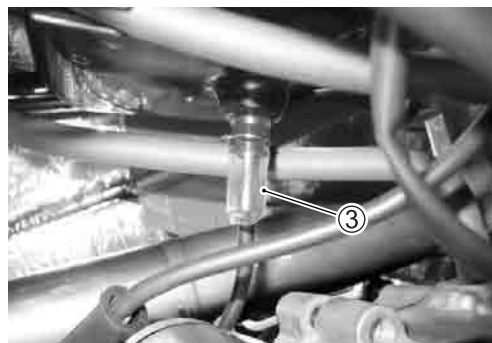


- Reinstall the cleaned or new air cleaner element in the reverse order of removal.

CAUTION

*** Inspect the air cleaner element for tears. A torn element must be replaced.**
*** In driving under dusty conditions, clean the air cleaner element more frequently. The surest way to accelerate engine wear is to operate the engine without the element or to use a torn element. Make sure that the air cleaner is in good condition at all times. The life of the engine depends largely on this component.**

- Remove the drain plug ③ from the air cleaner drain hose and air cleaner box to allow any water to drain out.

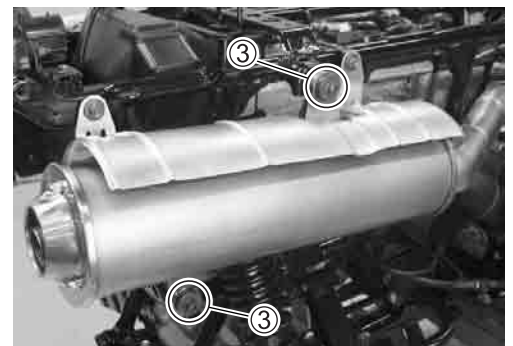
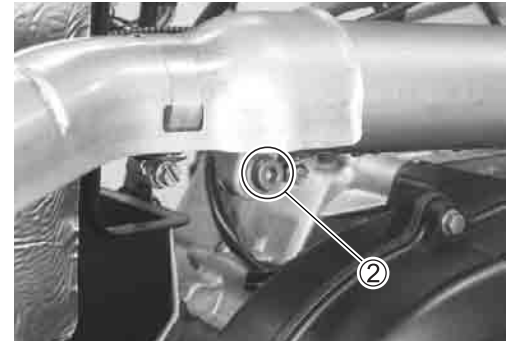
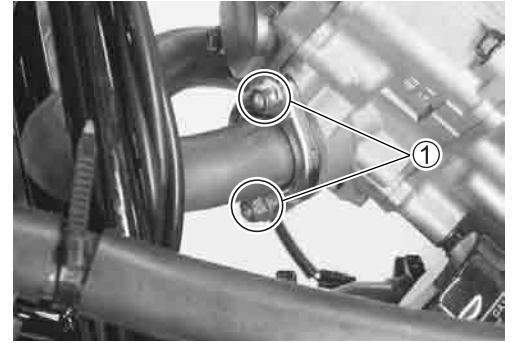


EXHAUST PIPE NUTS AND MUFFLER MOUNTING BOLTS

Tighten initially at 2 00 km (100 miles, 1 month) and every 1 000 km (600 miles, 3 months) thereafter.

- Remove the rear fender. (☞ 8-15)
- Remove the left inner fender. (☞ 8-10)
- Tighten the exhaust pipe nuts ①, muffler connect bolts ② and muffler mounting bolts ③ to the specified torque.

☐ Exhaust pipe nut: 23 N·m (2.3 kgf-m, 16.5 lb-ft)
Muffler connect bolt: 23 N·m (2.3 kgf-m, 16.5 lb-ft)
Muffler mounting bolt: 23 N·m (2.3 kgf-m, 16.5 lb-ft)



VALVE CLEARANCE

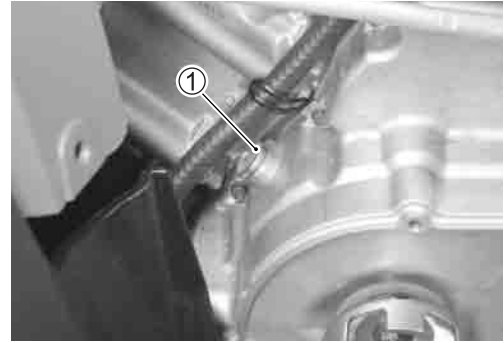
Inspect initially at 2 00 km (1 00 miles, 1 month) and every 2 000 km (1 200 miles, 6 months) thereafter.

Excessive valve clearance results in valve noise and insufficient valve clearance results in valve damage and reduced power. Check the intake and exhaust valve clearances at the distances indicated above and adjust the valve clearances to specification, if necessary.

REMOVAL

- Remove the right inner fender. (☞ 8-10)
- Remove the right side cover. (☞ 8-10)
- Remove the left upper mud guard. (☞ 8-9)
- Remove the valve clearance inspection caps. (☞ 3-12)
- Remove the spark plug. (☞ 2-7)

- Remove the recoil starter. (☞ 3-11)
- Remove the valve timing inspection plug ①.

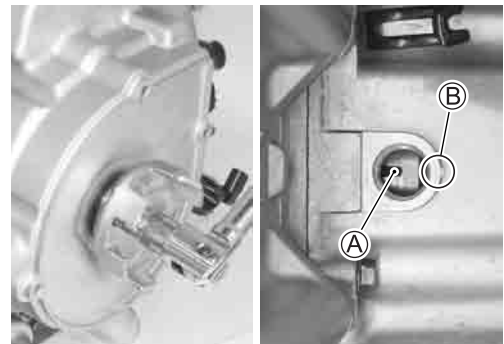


INSPECTION

The valve clearance specification is same for both valves. Valve clearance adjustment must be checked and adjusted, 1) at the time of periodic inspection, 2) when the valve mechanism is serviced, and 3) when the camshaft is disturbed by removing it for servicing.

NOTE:

- * The piston must be at (TDC) on the compression stroke in order to check the valve clearance or to adjust valve clearance.
- * The clearance specification is for COLD state.
- * To turn the crankshaft for clearance checking, rotate in the normal running direction. The spark plug should be removed.
- Turn the generator rotor until the "TDC" line ① on the generator rotor is aligned with the index mark ② of the generator cover.



- Insert a thickness gauge between the valve stem end and the adjusting screw on the rocker arm.
If the clearance is out of specification, bring it into the specified range with the special tool.

TOOL 09900-20803: Thickness gauge
09917-13210: Valve clearance adjusting driver

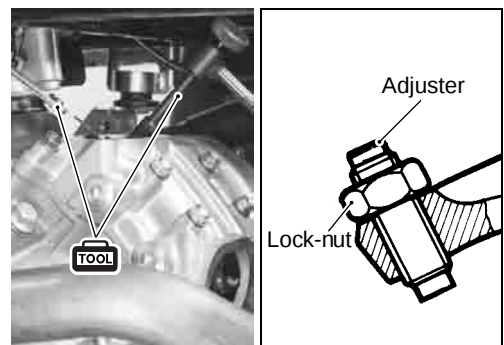
DATA Valve clearance (when cold):
IN: 0.05 – 0.10 mm (0.002 – 0.004 in)
EX: 0.17 – 0.22 mm (0.007 – 0.009 in)

CAUTION

Securely tighten the lock-nut after completing adjustment.

Valve clearance adjuster lock-nut:
10 N·m (1.0 kgf-m, 7.0 lb-ft)

- Install the valve clearance inspection caps. (☞ 3-112)
- Install the valve timing inspection plug. (☞ 3-113)
- Install the recoil starter. (☞ 3-113)
- Install the spark plug. (☞ 2-7)



SPARK PLUG

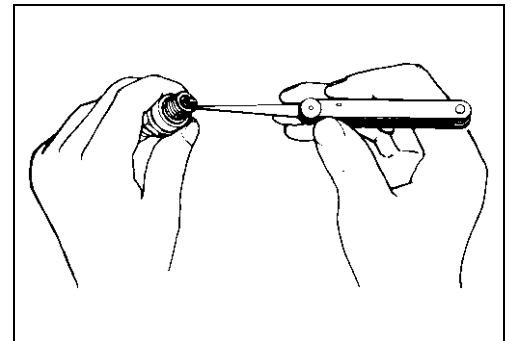
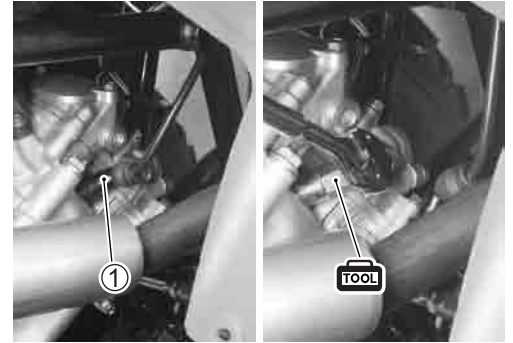
Replace every 6 000 km (4 000 miles).

- Remove the right side cover. (8-10)
- Disconnect the spark plug cap ① and remove the spark plug.

	Standard	Cold type
NGK	CR6E	CR7E
DENSO	U20ESR-N	U22ESR-N

CARBON DEPOSITS

Check to see if there are carbon deposits on the spark plug. If carbon is deposited, remove it with a spark plug cleaner machine or carefully use a tool with a pointed end.



SPARK PLUG GAP

Measure the spark plug gap with a thickness gauge. If the spark plug gap is out of specification, adjust the gap.

DATA Standard

Spark plug gap: 0.7 – 0.8 mm (0.028 – 0.031 in)

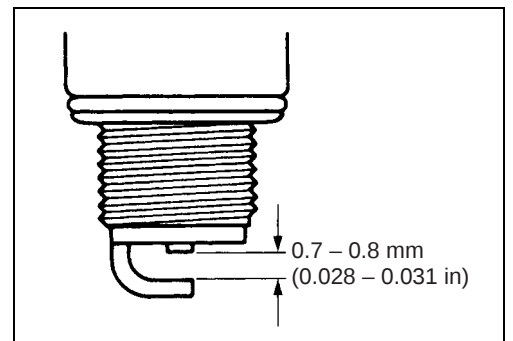
TOOL 09900-20803: Thickness gauge

ELECTRODE

Check the condition of the electrode.

If the electrode is extremely worn or burnt, replace the spark plug with a new one.

Also, replace the spark plug if it has a broken insulator, damaged threads, etc.



CAUTION

Check the thread size and reach when replacing the spark plug. If the reach is too short, carbon will be deposited on the screw portion of the spark plug hole and engine damage may result.

SPARK PLUG INSTALLATION

CAUTION

To avoid damaging the cylinder head threads; first, tighten the spark plug by hand, and then tighten it to the specified torque using the spark plug wrench.

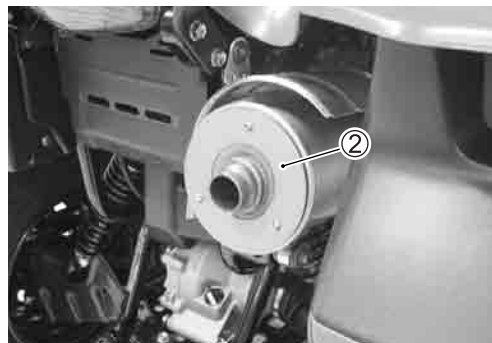
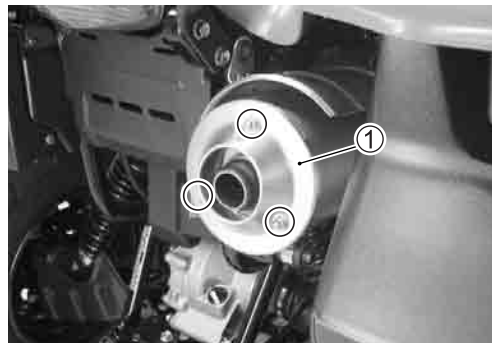
- Insert the spark plug and tighten it to the cylinder head by hand then tighten it to the specified torque.

Spark plug: 11 N·m (1.1 kgf-m, 8.0 lb-ft)

SPARK ARRESTER

Clean every 2 000 km (1 200 miles, 6 months).

- Remove the muffler end cover ①.
- Extract the spark arrester pipe ② from the muffler.
- Clean the spark arrester pipe ② by brush.
- Reinstall the spark arrester pipe ②.



FUEL LINE

**Inspect every 1 000 km (600 miles, 3 months).
Replace every 4 years.**

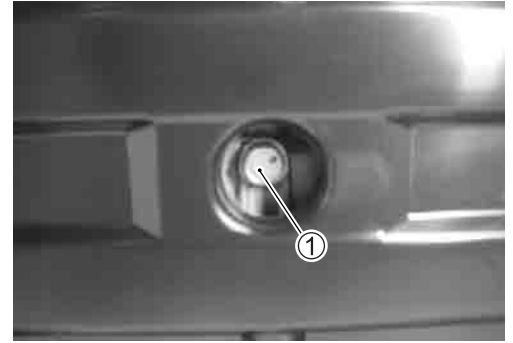
- Remove the front fender. (☞ 8-9)
 - Remove the rear fender. (☞ 8-15)
 - Remove the air cleaner box. (☞ 6-10)
- Inspect the fuel feed hose for damage and fuel leakage. If any damages are found, replace it with a new one.



ENGINE OIL AND OIL FILTER

Replace initially at 200 km (100 miles, 1 month) and every 2 000 km (1 200 miles, 6 months) thereafter.

The oil should be changed while the engine is warm. Oil filter replacement at the above intervals should be done together with the engine oil change.



ENGINE OIL REPLACEMENT

- Remove the left upper mud guard. (☞ 8-9)
- Place an oil pan below the drain plug ①, and then drain out the engine oil by removing the engine oil drain plug ① and engine oil filler cap ②.
- Tighten the drain plug, with the new washer, to the specified torque, and then pour the new oil through the oil filler hole. When performing an oil change (without oil filter replacement), the engine will hold about 2.5 L (2.6 US qt, 2.2 Imp qt) of oil. Use an engine oil that meets the API service classifications SF or SG and that has a viscosity rating of SAE 10W/40.

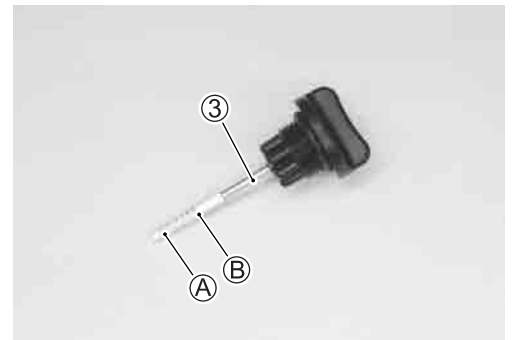


Engine oil drain plug: 20.5 N·m (2.05 kgf-m, 15.0 lb-ft)

- Make sure that the engine is cooled.
- Place the vehicle on level ground and hold it vertically.
- Install the oil filler cap ②.
- Start the engine and allow it to run for three minutes at idling speed.
- Turn off the engine and wait about three minutes, and then check the oil level on the dipstick ③. The oil level should be between the "L" (low) ④ and "F" (full) ⑤ level lines. If the oil level is lower than the "L" ④ level line, add oil to the "F" ⑤ level line.

NOTE:

Engine oil expands and oil level increase when the engine oil is hot.



OIL FILTER REPLACEMENT

- Drain the engine oil. (☞ 2-9)
- Remove the left inner fender. (☞ 8-10)
- Remove the oil filter ① with the special tool.

TOOL 09915-40610: Oil filter wrench

- Apply engine oil lightly to the gasket of the new oil filter, before installation.



- Install the new oil filter to the engine. Turn it by hand until you feel that the oil filter gasket contacts the oil filter mounting surface. Then, tighten the oil filter two full turns (or to specified torque) with the special tool.

NOTE:

To tighten properly the oil filter, use the special tool. Never tighten the oil filter by hand only.

TOOL Oil filter: 2 N·m (0.2 kgf-m, 1.5 lb-ft)

- Pour the new engine oil through the oil filler hole. When performing the oil filter change, the engine will hold about 2.7 L (2.9 US qt, 2.4 Imp qt) of oil.
- Check the oil level. (☞ 2-9)
- Add new engine oil and check the oil level. (☞ 2-9)

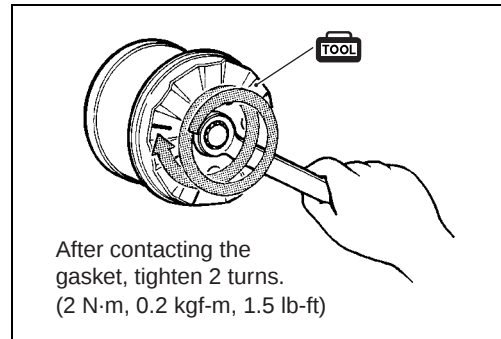
DATA Engine oil capacity

Oil change:	2.5 L (2.6 US qt, 2.2 Imp qt)
Oil and filter change:	2.7 L (2.9 US qt, 2.4 Imp qt)
Engine overhaul:	3.2 L (3.4 US qt, 2.8 Imp qt)

CAUTION

ONLY USE A GENUINE SUZUKI MOTORCYCLE OIL FILTER.

Other manufacture's oil filters may differ in thread specifications (thread diameter and pitch), filtering performance and durability which may lead to engine damage or oil leaks. Also, do not use a GENUINE SUZUKI AUTOMOBILE OIL FILTER on this vehicle.



FRONT DIFFERENTIAL GEAR OIL

Inspect every 2 000 km (1 200 miles, 6 months).
Replace every 2 years.

FRONT DIFFERENTIAL GEAR OIL INSPECTION

- Place the vehicle on level ground.
- Remove the oil level plug ① and oil filler plug ②, and inspect the oil level. If the oil level is below the level hole, add fresh oil until oil flows from the level hole.
- Tighten the oil level plug ① and oil filler plug ② to the specified torque.

Front differential gear oil level plug:

8 N·m (0.8 kgf-m, 5.7 lb-ft)

Front differential gear oil filler plug:

34.5 N·m (3.45 kgf-m, 25.0 lb-ft)

FRONT DIFFERENTIAL GEAR OIL REPLACEMENT

- Place the vehicle on level ground.
- Remove the front under cover.
- Place an oil pan below the front differential gear case.
- Drain the front differential gear oil by removing the oil drain plug ①, oil filler plug and oil level plug.
- Tighten the oil drain plug ① to the specified torque and pour fresh oil through the oil filler hole until it overflows from the oil level hole.
- Tighten the oil level plug and oil filler plug to the specified torque.
- Install the front under cover.

Differential gear oil specification:

Hypoid gear oil SAE #90, API grade GL-5

NOTE:

Use hypoid gear oil SAE #80, API grade GL-5, if the vehicle is ridden where the ambient temperature is below 0 °C (32 °F)

Front differential gear oil capacity:

500 ml (16.9 US oz, 17.6 Imp oz)

Front differential gear oil level plug:

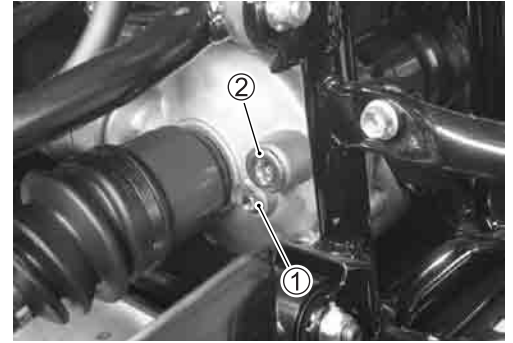
8 N·m (0.8 kgf-m, 5.7 lb-ft)

Front differential gear oil filler plug:

34.5 N·m (3.45 kgf-m, 25.0 lb-ft)

Front differential gear oil drain plug:

32 N·m (3.2 kgf-m, 23.0 lb-ft)

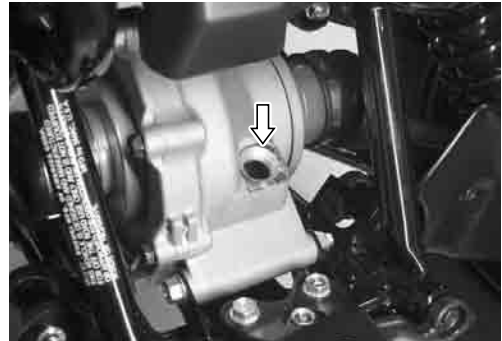
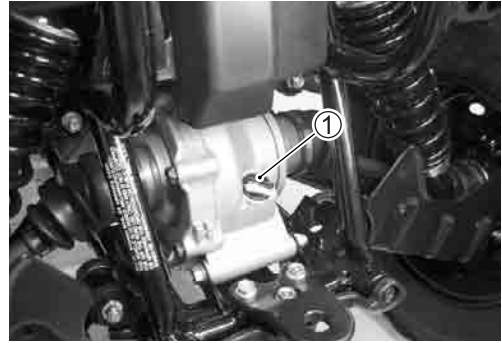


FINAL GEAR OIL

**Inspect every 2 000 km (1 200 miles, 6 months).
Replace every year.**

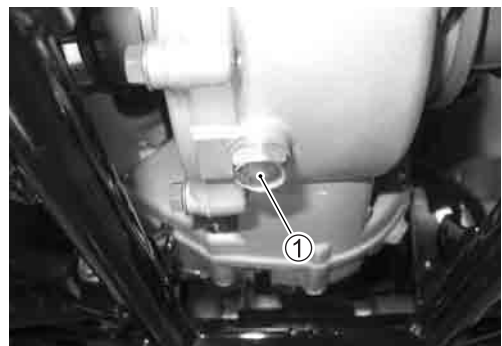
FINAL GEAR OIL INSPECTION

- Place the vehicle on level position.
- Remove the filler plug ①, and inspect the oil level. If the oil level is below, add fresh oil until the oil level reaches the bottom tip of the thread.
- Tighten the oil filler plug ① securely.



FINAL GEAR OIL REPLACEMENT

- Place the vehicle on level position.
- Remove the rear under cover.
- Place an oil pan below the final gear case.
- Drain the final gear oil by removing the oil drain plug ① and oil filler plug.
- Tighten the oil drain plug ① to the specified torque, and pour fresh oil through the oil filler hole until the oil level reaches the bottom tip of the thread.
- Tighten the oil filler plug securely.
- Install the rear under cover.



 **Final gear oil specification: Mobil fluid 424
(or equivalent gear oil)**

 **Final gear oil capacity:**
770 ml (26.0 US oz, 27.1 Imp oz)

 **Final gear oil drain plug: 23 N·m (2.3 kgf-m, 16.5 lb-ft)**

THROTTLE CABLE PLAY

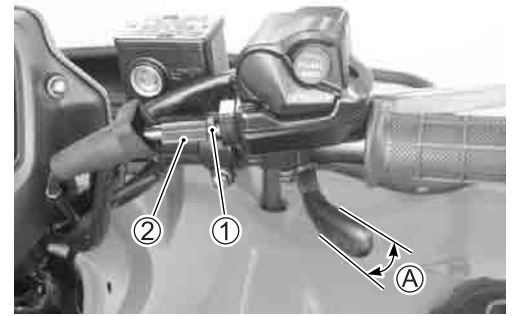
Inspect initially at 2 00 km (1 00 miles, 1 month) and every 1 000 km (600 miles, 3 months) thereafter.

Adjust the throttle cable play (A) as follows.

- Loosen the lock-nut ① of the throttle cable.
- Turn the adjuster ② in or out to obtain the correct play.

DATA Throttle cable play: 3 – 5 mm (0.12 – 0.20 in)

- After adjusting the throttle cable play, tighten the lock-nut ①.



THROTTLE BODY

Inspect every 1 000 km (600 miles, 3 months) and every 2 000 km (1 200 miles, 6 months) thereafter.

- Remove the right and left side cover. (8-9)

Inspect the throttle body for dirt or mud.

If any dirt or mud is found, clean it.

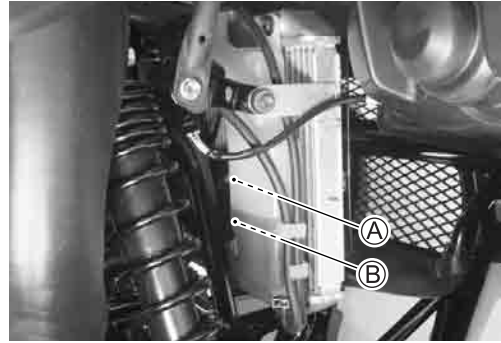


ENGINE COOLANT

Replace the engine coolant every 2 years.

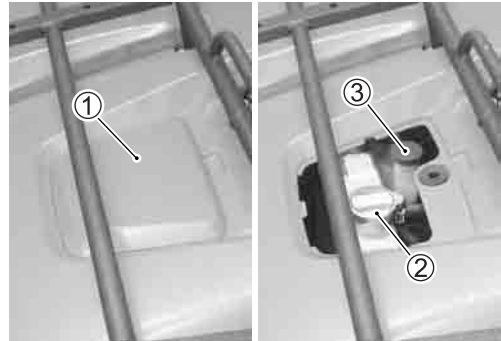
ENGINE COOLANT LEVEL CHECK

- Inspect the engine coolant level by observing the upper (A) and lower (B) lines on the engine coolant reservoir tank.
- If the level is below the lower line, add engine coolant until the level reaches the upper line.



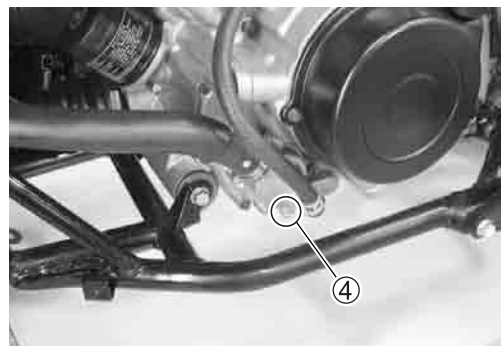
ENGINE COOLANT REPLACEMENT

- Remove the radiator cap lid (1).
- Remove the radiator cap (2) and engine coolant reservoir tank cap (3).
- Remove the left inner fender and left mud guard. (→ 8-9)
- Remove the front under cover.
- Place a pan below the water pump, and then drain the engine coolant by removing the drain plug (4).



⚠ WARNING

- * Do not open the radiator cap when the engine is hot, as you may be injured by escaping hot liquid or vapor.
- * Engine coolant may be harmful if swallowed or if it comes in contact with the skin or eyes. If engine coolant gets into the eyes or contacts the skin, flush the eyes or wash the skin thoroughly, with plenty of water. If engine coolant is swallowed, induce vomiting and call a physician immediately.



- Flush the radiator with fresh water, if necessary.
- Tighten the drain plug (4) to the specified torque.



Engine coolant drain plug:

12.5 N·m (1.25 kgf-m, 9.0 lb-ft)

- Pour the specified engine coolant into the reservoir tank.



Engine coolant:

Use and antifreeze designed for aluminum radiators mixed with distilled water only.

Water/antifreeze mixture ratio: 50:50 – 40:60



NOTE:

For engine coolant information, refer to page 7-2.

- Install the radiator cap securely.
- After warming up and cooling down the engine, add the specified engine coolant until the level is between the upper and lower lines on the engine coolant reservoir tank.

CAUTION

Repeat the above procedure several times and make sure the radiator is filled with engine coolant to the upper line of the engine coolant reservoir tank.

DATA Engine coolant capacity:
(including reservoir) 2 450 ml (2.6 US qt, 2.2 Imp qt)

RADIATOR

Inspect every 1 000 km (600 miles, 3 months).

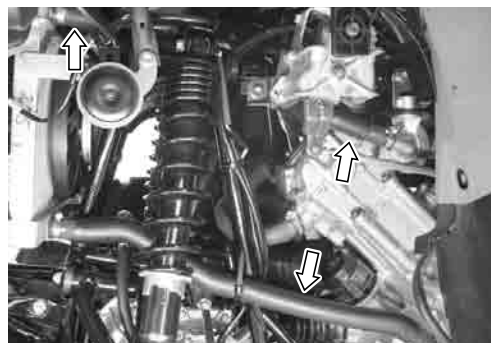
Inspect the radiator for damage and engine coolant leakage. If any damages are found, replace it with a new one.



RADIATOR HOSES

Inspect every 2 000 km (1 200 miles, 6 months).

Inspect the radiator hoses for damage and engine coolant leakage. If any damages are found, replace them with new ones.

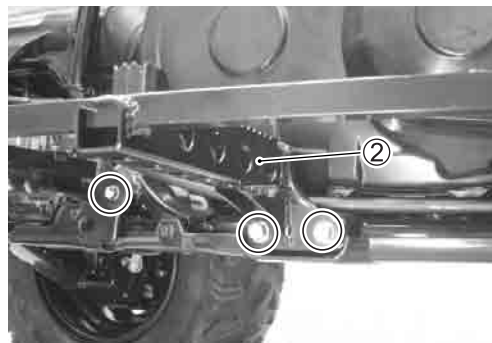
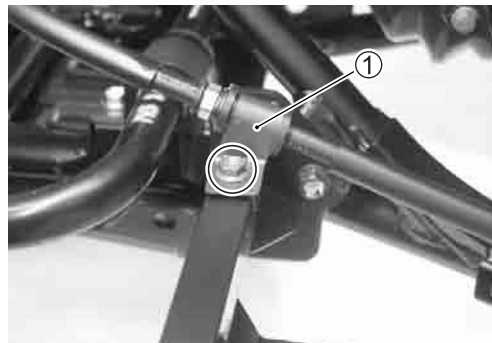


DRIVE BELT

Inspect every 2 000 km (1 200 miles, 6 months).

REMOVAL

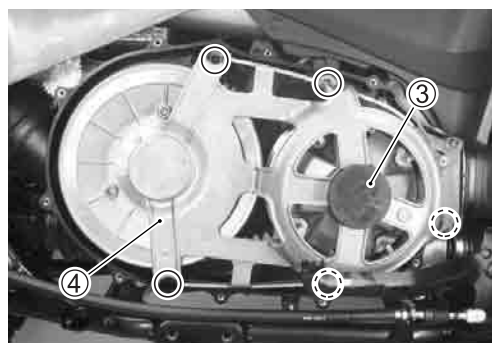
- Remove the right inner fender. (→ 8-10)
- Remove the right mud guard. (→ 8-10)
- Remove the rear brake cable clamp ①.
- Remove the right footrest ②.



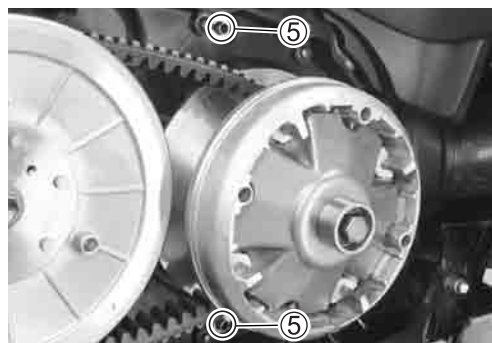
- Remove the clutch cover and clutch cover gasket.



- Remove the cap ③.
- Remove the movable drive face cover ④.



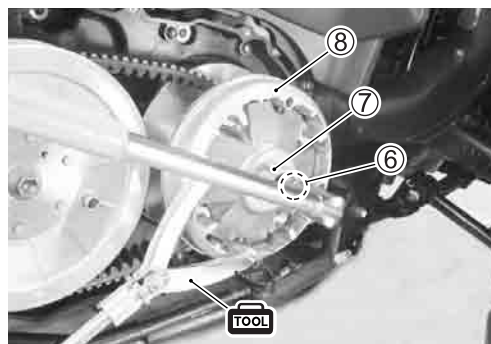
- Remove the dowel pins ⑤.



- Remove the movable drive face bolt ⑥ and collar ⑦ with the special tool.

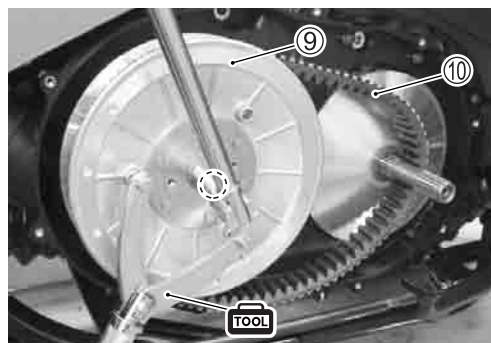
 **09930-40113: Rotor holder**

- Remove the movable drive face ⑧.



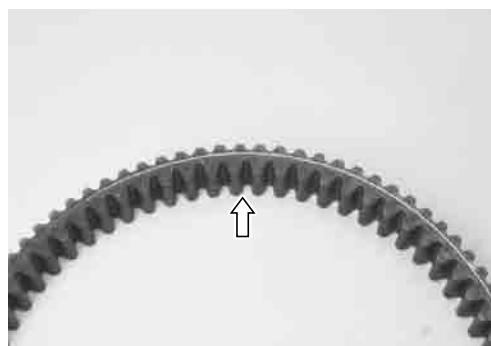
- Remove the movable driven face bolt with the special tool.
- Remove the movable driven face assembly ⑨ and drive belt ⑩.

 **09930-40113: Rotor holder**



INSPECTION

Inspect the drive belt for wear and damage. If any defects are found, replace it with a new one.



INSTALLATION

Install the drive belt in reverse order of removal. Pay attention to the following points:

- Install the drive belt, as low as possible, between the movable driven face and fixed driven face by tapping with a plastic mallet.

CAUTION

- * The drive belt should be installed so that the arrows on the drive belt periphery point in the normal turning direction.
- * The drive belt contact surface of the driven face should be thoroughly cleaned.

- Install the movable driven face assembly ①.

CAUTION

Pull the center area ① of upper and lower belt lines to be close to each other to prevent the belt from expanding.

- Tighten the movable driven face bolt ② to the specified torque with the special tool.

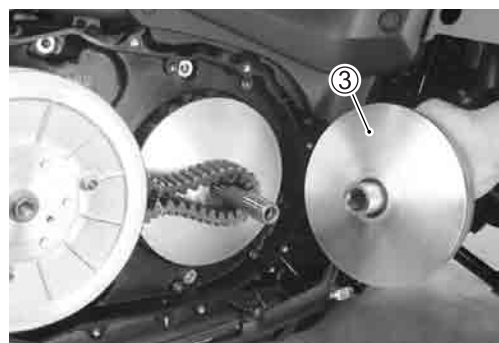
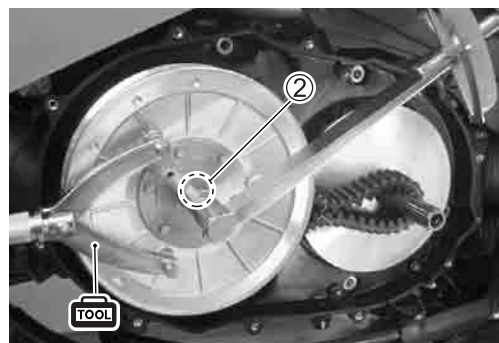
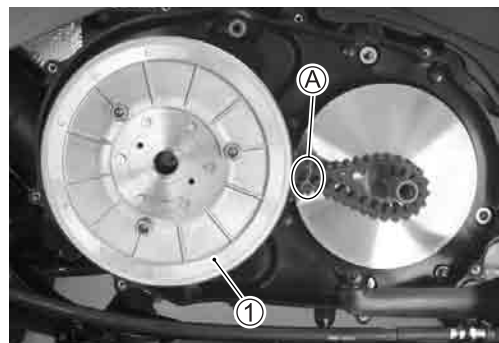
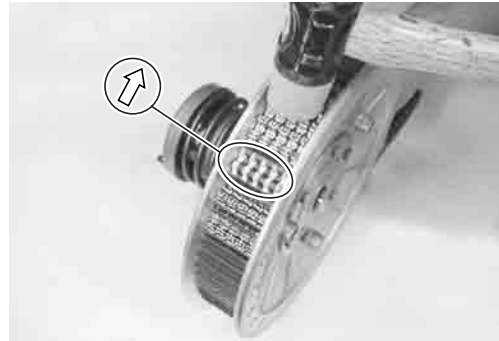
 **Movable driven face bolt: 110 N·m (11.0 kgf-m, 79.5 lb-ft)**

 **09930-40113: Rotor holder**

- Install the movable drive face assembly ③.

CAUTION

Degrease the movable drive face assembly. Use non-flammable cleaning solvent to wipe off oily or greasy matter and make its surfaces completely dry.



Install the collar ④ and movable drive face bolt ⑤.

NOTE:

Be careful direction of the collar ④.

- Tighten the movable drive face bolt to the specified torque with the special tool.

 **Movable drive face bolt: 110 N·m (11.0 kgf-m, 79.5 lb-ft)**

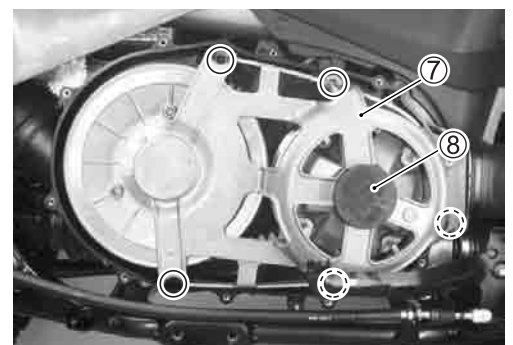
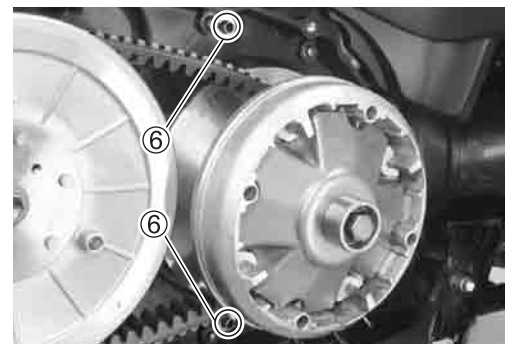
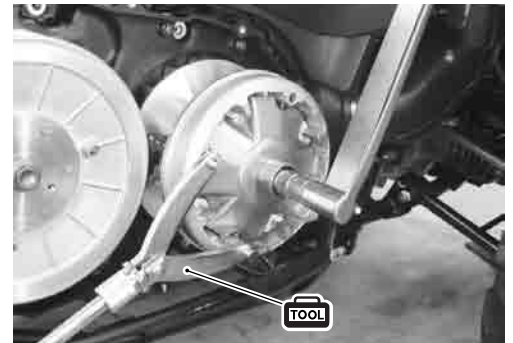
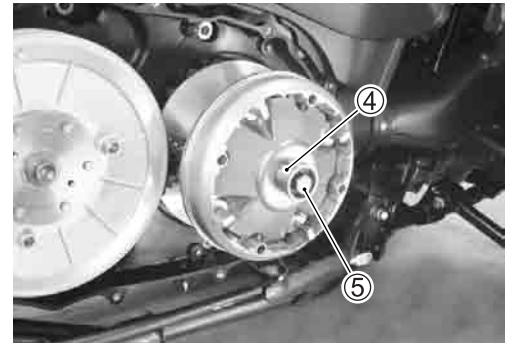
 **09930-40113: Rotor holder**

NOTE:

Turn the fixed drive face until the belt is seated in and both the drive and driven faces will move together smoothly without slip.

- Install the dowel pins ⑥.

- Install the movable drive face cover ⑦ and tighten the bolts securely.
- Install the cap ⑧.



- Install the clutch cover gasket and clutch cover.

CAUTION

The removed clutch cover gasket must be replaced with a new one.

- Tighten the clutch cover bolts to the specified torque.

 Clutch cover bolt: 8 N·m (0.8 kgf-m, 5.7 lb-ft)

CAUTION

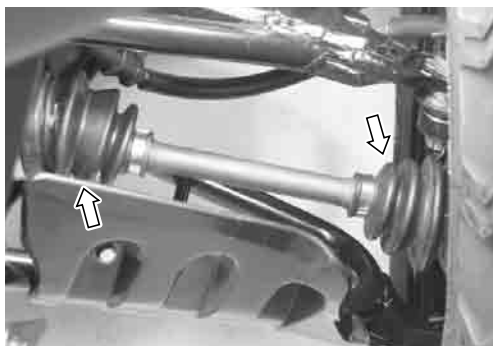
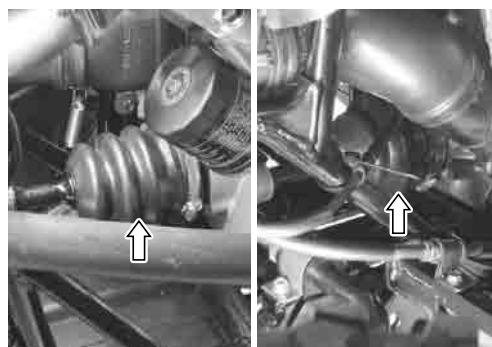
Tighten the clutch cover bolts  first and then other ones diagonally.



DRIVE SHAFT BOOTS

Inspect initially at 200 km (100 miles, 1 month) and every 1 000 km (600 miles, 3 months) thereafter.

Inspect the drive shaft boots for wear or damage. If any defects are found, replace it with a new one.



BRAKES

Inspect initially at 2 00 km (1 00 miles, 1 month) and every 1 000 km (600 miles, 3 months) thereafter.

FRONT BRAKE PADS

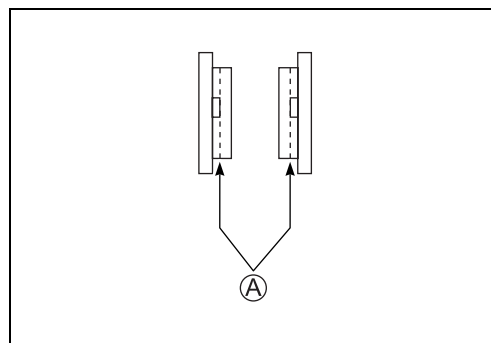
- Remove the front wheels. (☞ 8-18)

The extent of front brake pad wear can be checked by observing the limit line ① on the brake pads. When the wear reaches the limit line, replace the pads with new ones. (☞ 8-28)

CAUTION

Replace the brake pads as a set, otherwise braking performance will be adversely affected.

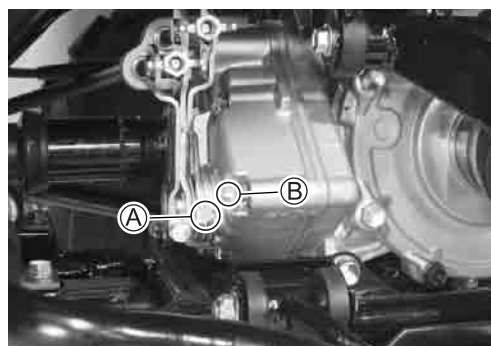
-  Front brake caliper mounting bolt:
26 N·m (2.6 kgf-m, 19 lb-ft)



REAR BRAKE FRICTION PLATE WEAR LIMIT

While fully applying the brake, check to see that the index mark ① is within the limit ②.

If the extension line is out of the limit, replace the friction plate as a set. (☞ 8-73)



REAR BRAKE PEDAL AND LEVER

The procedure for adjusting the rear brake pedal and brake lever is as follows:

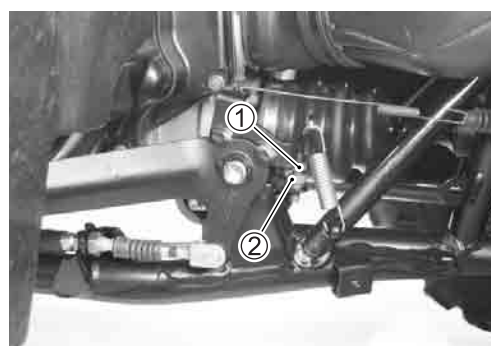
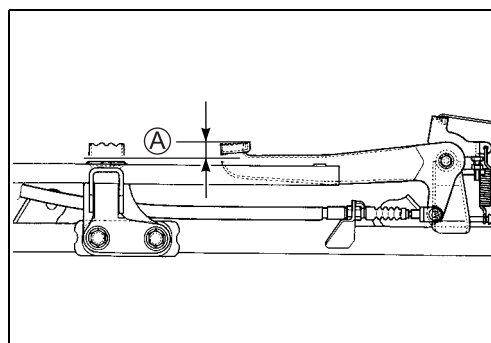
NOTE:

First adjust the brake pedal, and then adjust the brake lever.

REAR BRAKE PEDAL HEIGHT

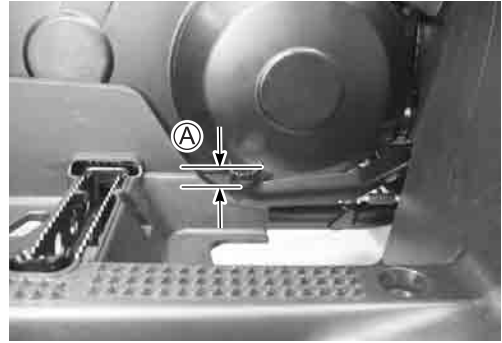
- Turn the adjuster ① in or out until the pedal height ① to the specification, after loosening the lock-nut ②.
- Make sure to tighten the lock-nut ② securely.

DATA Rear brake pedal height: 12.5 – 22.5 mm (0.5 – 0.9 in)



REAR BRAKE PEDAL FREE TRAVEL

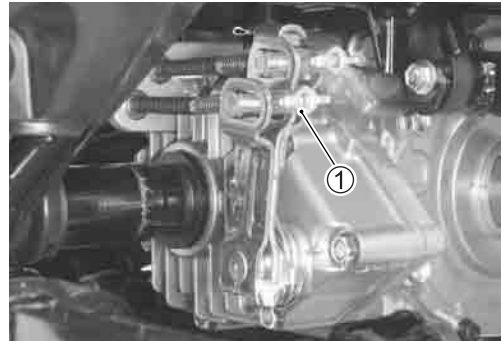
Adjust the rear brake pedal free travel as follows:

**MAJOR ADJUSTMENT**

- Turn the adjuster nut ① so the rear brake pedal has 20 – 30 mm (0.8 – 1.2 in) free travel at the rear brake pedal end before pressure is felt.

DATA Rear brake pedal free travel ①:

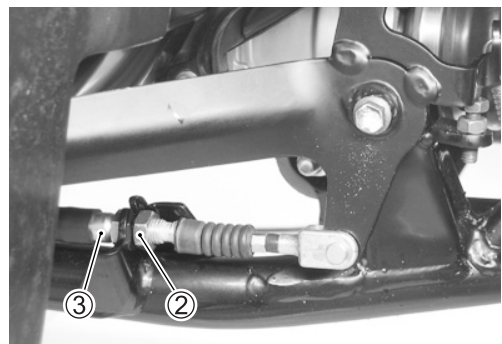
20 – 30 mm (0.8 – 1.2 in)

**MINOR ADJUSTMENT**

- Loosen the lock-nut ②.
- Turn adjuster nut ③ so the rear brake pedal has 20 – 30 mm (0.8 – 1.2 in) free travel at the rear brake pedal end before pressure is felt.
- Tighten the lock-nut ②.

DATA Rear brake pedal Free travel ①:

20 – 30 mm (0.8 – 1.2 in)

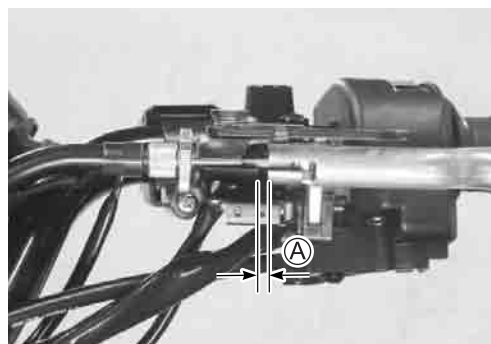


- Adjust the rear brake light switch so that the brake light will come on just before pressure is felt when the brake pedal is depressed.



REAR BRAKE LEVER PLAY

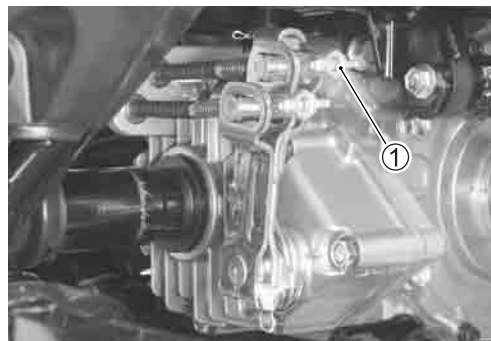
Adjust the rear brake lever play as follows:



MAJOR ADJUSTMENT

- Turn the adjust nut ① so the rear brake lever has 6 – 8 mm (0.2 – 0.3 in) play at the rear brake lever end before pressure is felt.

DATA Rear brake lever play ①: 6 – 8 mm (0.2 – 0.3 in)

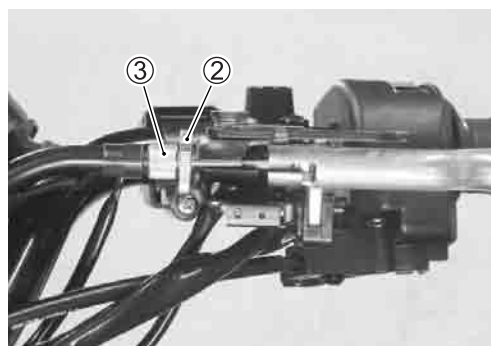


MINOR ADJUSTMENT

- Loosen the lock-nut ②.
- Turn adjuster ③ so the rear brake lever has 6 – 8 mm (0.2 – 0.3 in) play at the rear brake lever end before pressure is felt.
- Tighten the lock-nut ②.

DATA Rear brake lever play ①: 6 – 8 mm (0.2 – 0.3 in)

- After adjusting the play, check that the rear wheels roll freely without applying the brake, the transfer in neutral and the rear wheels off the ground. Readjust the rear brake lever if the rear wheels could not roll freely.



REAR BRAKE PLATES

Replace every 10 000 km (6 000 miles).

(8-73)

BRAKE FLUID

Inspect every 1 000 km (600 miles, 3 months).
Replace every 2 years.

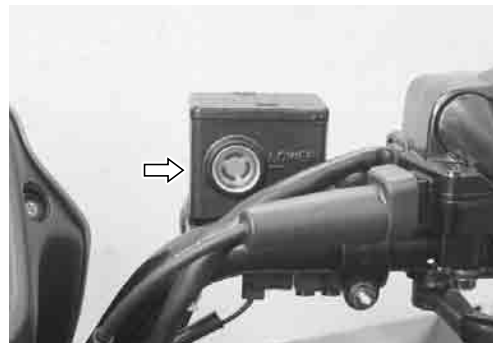
BRAKE FLUID LEVEL

- Place the handlebar straight.
- Inspect the brake fluid level by observing the lower limit line on the front brake fluid reservoir.
- When the brake fluid level is below the lower limit line, replenish with brake fluid that meets the following specification.

 **Specification and classification: DOT 4**

WARNING

- * The brake system of this vehicle is filled with a glycol-based brake fluid. Do not use or mix different types of fluids such as silicone-based and petroleum-based fluids. Do not use any brake fluid taken from old, used or unsealed containers. Never re-use brake fluid left over from the last servicing or stored for a long period of time.
- * Brake fluid, if it leaks, will interfere with safe running and immediately discolor painted surfaces. Check the brake hoses and hose joints for cracks and fluid leakage before riding.



AIR BLEEDING THE BRAKE FLUID CIRCUIT

Air trapped in the brake fluid circuit acts like a cushion absorb a large proportion of the pressure developed by the master cylinder and thus interferes with the full braking performance of the brake caliper. The presence of air is indicated by “sponginess” of the brake lever and also by lack of braking force. Considering the danger to which such trapped air exposes the machine and rider, it is essential that, after installing the brake and restoring the brake system to the normal condition, the brake fluid circuit be purged of air in the following manner:

- Fill the front or rear brake reservoir with the specified brake fluid to the top of the inspection window or the upper limit line. Replace the reservoir cap to prevent dirt from entering.
- Attach a hose to the air bleeder valve, and insert the free end of the hose into a receptacle.
- Squeeze and release the brake lever several times in rapid succession and squeeze the lever fully without releasing it. Loosen the air bleeder valve by turning it a quarter of a turn so that the brake fluid runs into the receptacle, this will remove the tension of the brake lever causing it to touch the handlebar grip reaching bottom of the stroke. Then, close the air bleeder valve, pump and squeeze the lever and open the valve. Repeat this process until the fluid flowing into the receptacle no longer contains air bubbles.

NOTE:

While bleeding the brake system, replenish the brake fluid in the reservoir as necessary. Make sure that there is always some fluid visible in the reservoir.

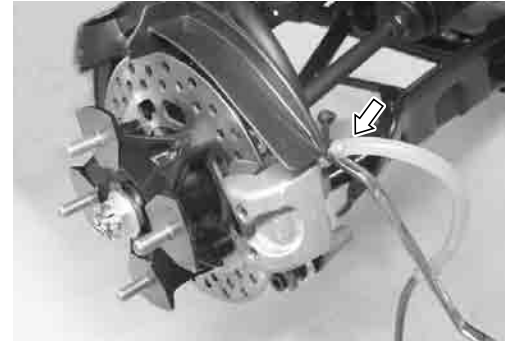
- Close the air bleeder valve, and disconnect the hose. Fill the reservoir with brake fluid to the top of the inspection window or the upper limit line.

Front brake air bleeder valve:

6.0 N·m (0.6 kgf-m, 4.3 lb-ft)

CAUTION

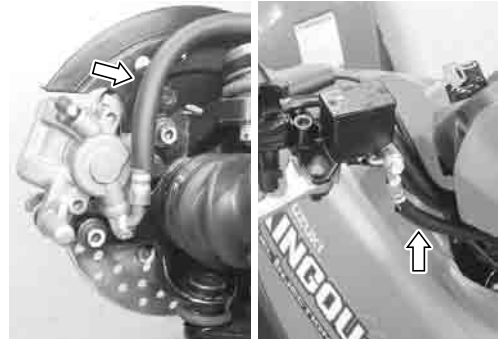
Handle brake fluid with care: the fluid reacts chemically with paint, plastics, rubber materials, etc.



BRAKE HOSES

**Inspect every 2 000 km (1 200 miles, 6 months).
Replace every 4 years.**

- Inspect the brake hoses for leakage, cracks, wear and damage. If any damages are found, replace the brake hoses with new ones.



TIRES

Inspect every 1 000 km (600 miles, 3 months).

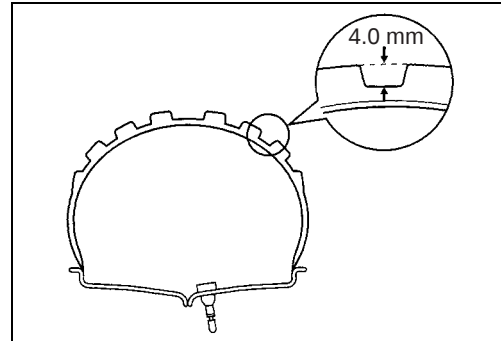
TIRE TREAD CONDITION

Operating the vehicle with excessively worn tires will decrease riding stability and consequently invite a dangerous situation. It is highly recommended to replace a tire when the remaining depth of the tire tread reaches the following specification.

TOOL 09900-20805: Tire depth gauge

DATA Service Limit

**Tire tread depth: Front 4.0 mm (0.16 in)
Rear 4.0 mm (0.16 in)**



TIRE PRESSURE

If the tire pressure is too high or too low, steering will be adversely affected and tire wear will increase. Therefore, maintain the correct tire pressure for good roadability and a longer tire life. Cold inflation tire pressure is as follows.

DATA Cold inflation tire pressure

**Front: 35 kPa (0.35 kgf/cm², 5.1 psi)
Rear: 30 kPa (0.3 kgf/cm², 4.4 psi)**

VEHICLE LOAD CAPACITY LIMIT: 172 kg (380 lbs)

CAUTION

To minimize the possibility of tire damage from over-inflation, we strongly recommend that a manual type air pump be used rather than a high pressure air compressor as found in service stations. When filling air into the tires, never exceed 70 kPa (0.7 kgf/cm², 10 psi).

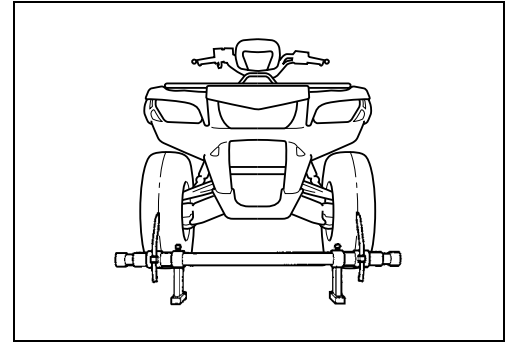
CAUTION

The standard tire fitted on this vehicle is an AT25×8-12☆☆ for the front and a AT 25×10-12☆☆ for the rear. The use of tires other than those specified may cause instability. It is highly recommended to use the specified tires.

STEERING

Inspect initially at 2 00 km (1 00 miles, 1 month) and every 1 000 km (600 miles, 3 months) thereafter.

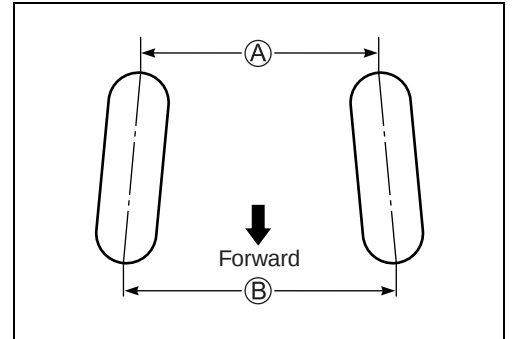
Steering system should be adjusted properly for smooth manipulation of the handlebars and safe running.



TOE

- Place the vehicle on level ground.
- Make sure the tire pressure for right and left tires is the same and set to the proper specification.
- Set the front wheels in the straight position.
- Place a load of 75 kg (165 lbs) on the seat.
- Measure the distances (A) and (B) between the front wheels. Subtract the measurement of (A) from that of (B) to find the toe-out. If the toe-out is not within specification, adjust the tie rod to the right or left until the toe-out is within the specified range.

$$\textcircled{B} - \textcircled{A} = \text{Toe-out}$$



DATA Toe-out: $10 \pm 4 \text{ mm}$ ($0.39 \pm 0.16 \text{ in}$)

- If the toe-out is out of specification, bring it into the specified valve. (8-65)

SUSPENSIONS

Inspect every 2 000 km (1 200 miles, 6 months).

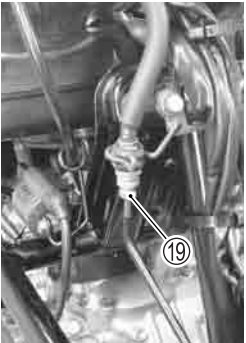
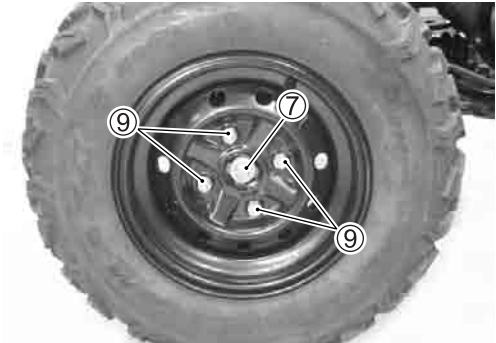
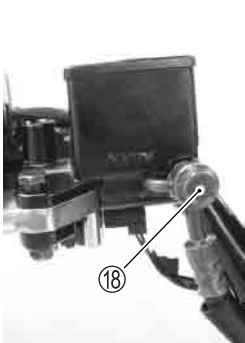
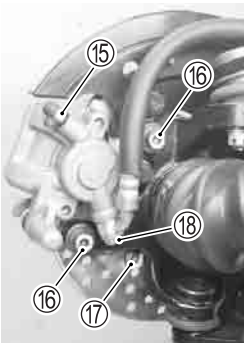
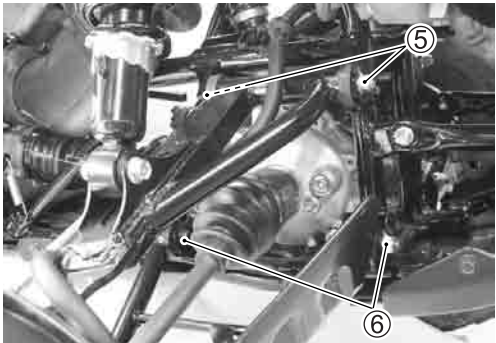
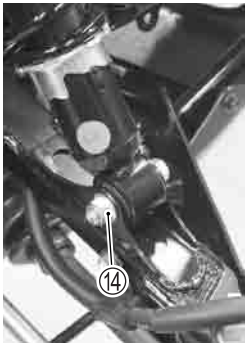
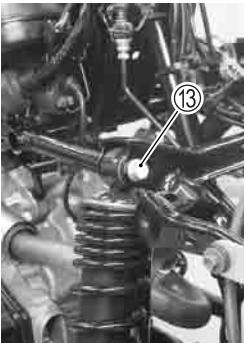
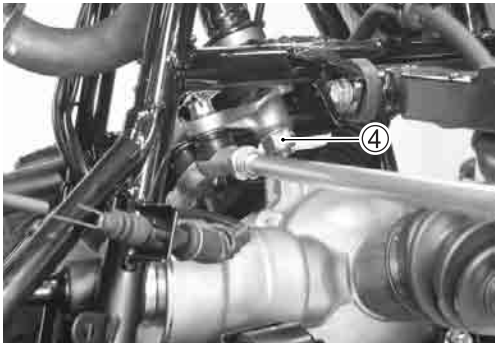
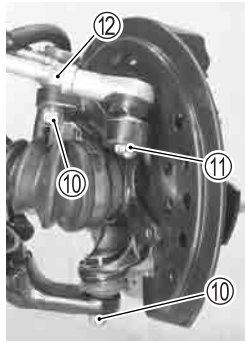
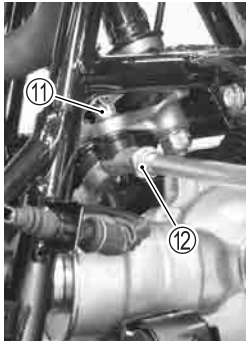
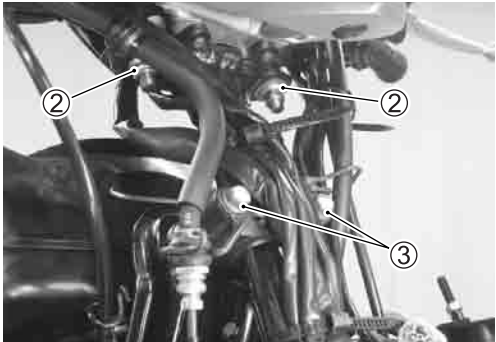
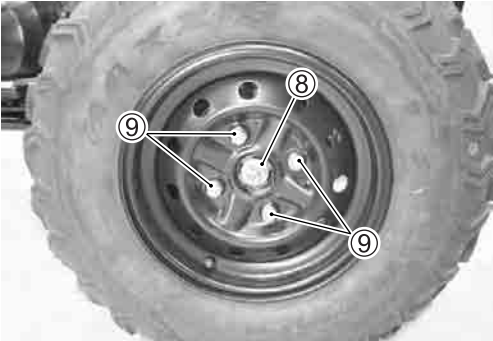
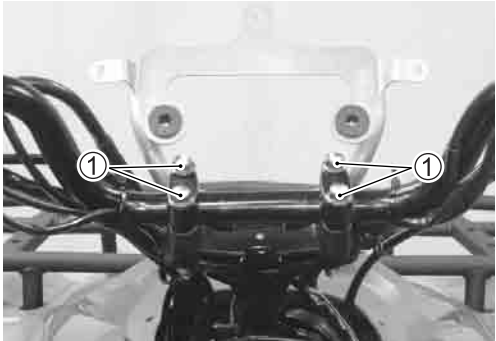
- Support the vehicle with a jack and wooden blocks.
- Remove the front and rear wheels. (8-18)
- Inspect the wishbone arm and bearing for scratches, wear, or damage. If any defects are found, replace them with new ones. (8-41 and 8-84)
- Inspect the front and rear shock absorbers for oil leakage or damage. If any defects are found, replace them with new ones. (8-41 and 8-84)

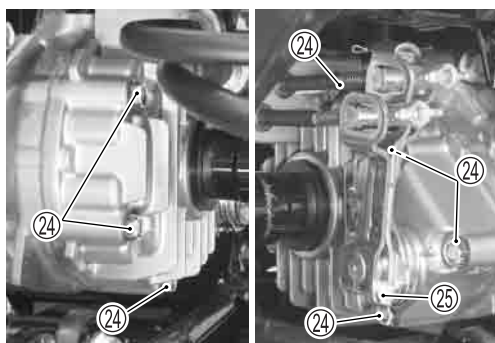
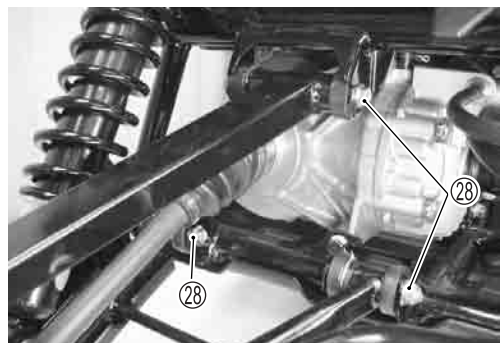
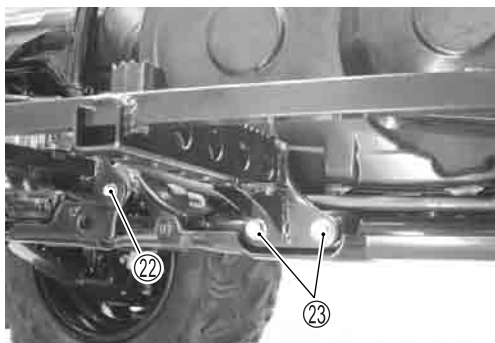
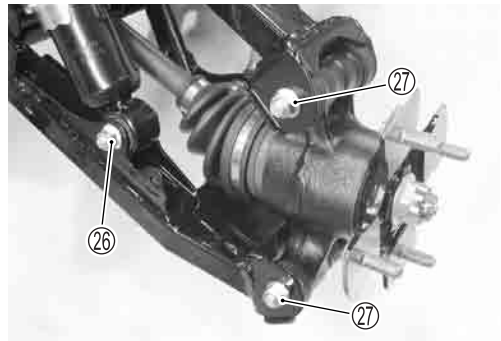
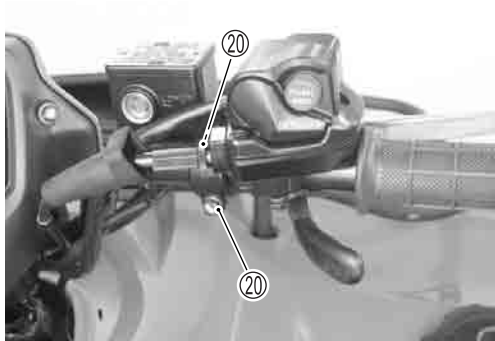
CHASSIS NUTS AND BOLTS

Tighten initially at 200 km (100 miles, 1 month) and every 1 000 km (600 miles, 3 months) thereafter.

Check that all chassis nuts and bolts are tightened to their specified torque. (Refer to page 2-29 for the locations of the following nuts and bolts.)

Item	N·m	kgf-m	lb-ft
① Handlebar upper clamp bolt	26	2.6	19.0
② Handlebar holder nut	60	6.0	43.5
③ Steering shaft holder bolt	23	2.3	16.5
④ Steering shaft lower nut	170	17.0	123.0
⑤ Front wishbone arm pivot nut (upper)	60	6.0	43.5
⑥ Front wishbone arm pivot nut (lower)	65	6.5	47.0
⑦ Front hub nut	110	11.0	79.5
⑧ Rear hub nut	130	13.0	94.0
⑨ Wheel set nut (front and rear)	60	6.0	43.5
⑩ Steering knuckle end nut (upper and lower)	29	2.9	21.0
⑪ Tie rod end nut	29	2.9	21.0
⑫ Tie rod lock-nut	45	4.5	32.5
⑬ Front shock absorber mounting bolt (upper)	55	5.5	40.0
⑭ Front shock absorber mounting nut (lower)	60	6.0	43.5
⑮ Front brake air bleeder valve	6.0	0.6	4.3
⑯ Front brake caliper mounting bolt	26	2.6	19.0
⑰ Brake disk plate mounting bolt	23	2.3	16.5
⑱ Front brake hose union bolt	25	2.5	18.0
⑲ Brake pipe nut	16	1.6	11.5
⑳ Brake master cylinder clamp bolt	11	1.1	8.0
㉑ Rear brake pedal pivot bolt	11	1.1	8.0
㉒ Footrest mounting bolt (M8)	26	2.6	19.0
㉓ Footrest mounting bolt (M10)	55	5.5	40.0
㉔ Rear brake case bolt	26	2.6	19.0
㉕ Rear brake cam lever nut	11	1.1	8.0
㉖ Rear shock absorber mounting nut (upper and lower)	60	6.0	43.5
㉗ Rear knuckle end nut (upper and lower)	60	6.0	43.5
㉘ Rear wishbone arm pivot nut (upper and lower)	60	6.0	43.5

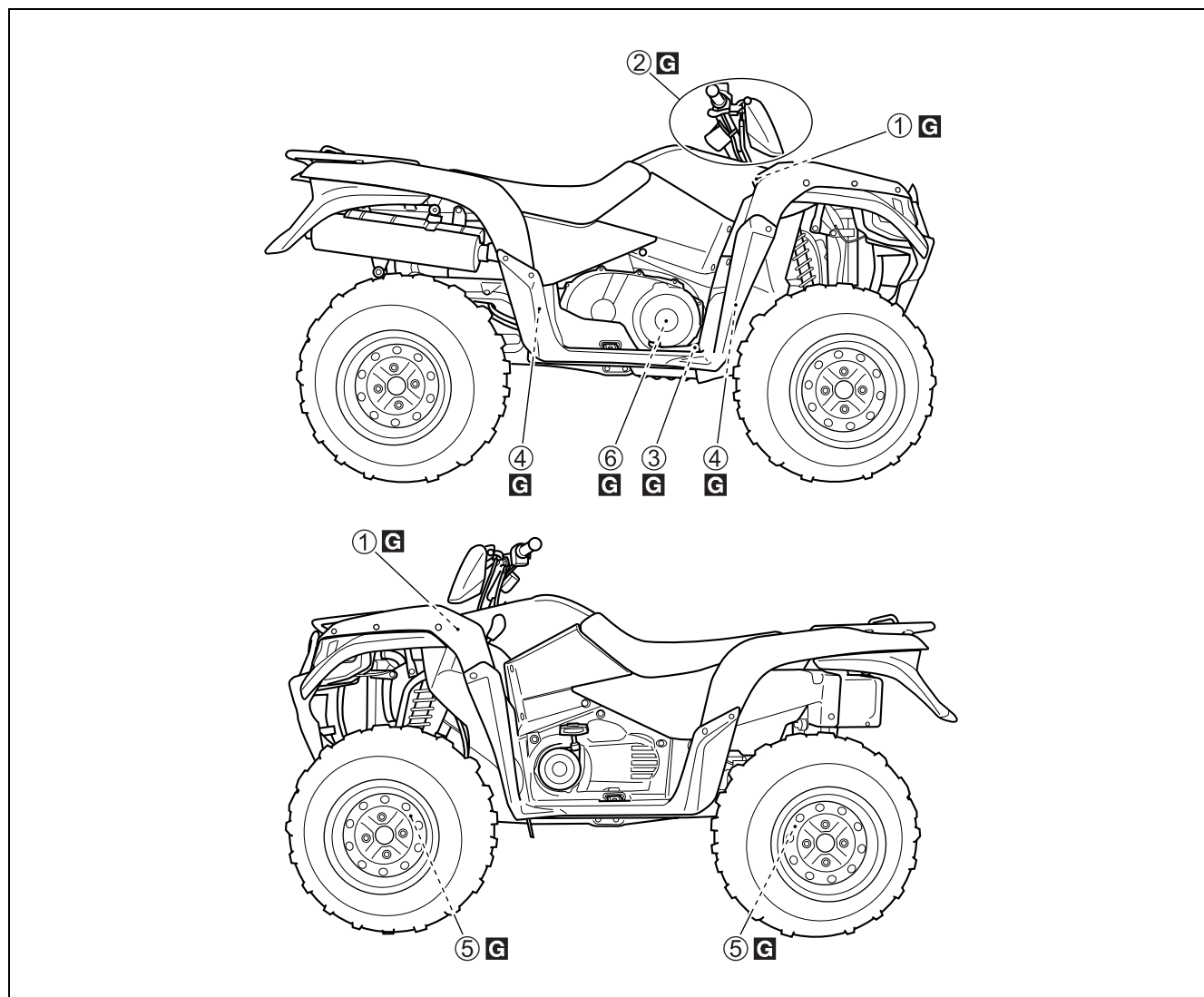




GENERAL LUBRICATION

Lubricate every 1000 km (600 miles, 3 months).

Proper lubrication is important for smooth operation and long life of each working part of the vehicle. Major lubrication points are indicated below.



- ① Steering shaft holder
- ② Brake lever holder and throttle lever
- ③ Brake pedal
- ④ Propeller shaft joint spline

- ⑤ Drive shaft joint spline
- ⑥ Drive belt cover bearing (inner race)

G Grease

NOTE:

* Before lubricating each part, clean off any rusty spots and wipe off any grease, oil, dirt, or grime.

* Lubricate exposed parts which are subject to rust, with a rust preventative spray, especially whenever the vehicle has been operated under wet or rainy conditions.

COMPRESSION PRESSURE CHECK

The compression pressure reading of a cylinder is a good indicator of its internal condition.

The decision to overhaul the cylinder is often based on the results of a compression test. Periodic maintenance records kept at your dealership should include compression readings for each maintenance service.

DATA Compression pressure:

Standard: 1 000 kPa (10.0 kgf/cm², 142 psi)

(Automatic decompression actuated)

Low compression pressure can indicate any of the following conditions:

- * Excessively worn cylinder walls
- * Worn piston or piston rings
- * Piston rings stuck in grooves
- * Poor valve seating
- * Ruptured or otherwise defective cylinder head gasket

NOTE:

When the compression pressure goes below specification, check the engine for conditions listed above.

COMPRESSION TEST PROCEDURE

NOTE:

- * Before testing the engine for compression pressure, make sure that the cylinder head nuts are tightened to the specified torque and the valves are properly adjusted.
- * Warm up the engine before testing.
- * Make sure that the battery is fully charged.

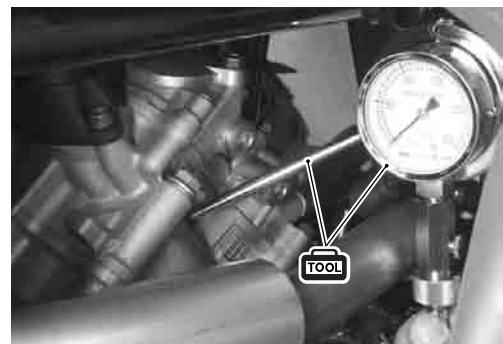
Remove the related parts and test the compression pressure in the following manner.

- Remove the seat. (☞ 8-6)
- Remove the fuel pump relay coupler ①.
- Remove the spark plug. (☞ 2-7)
- Install the compression gauge and adaptor in the spark plug hole. Make sure that the connection is tight.
- Keep the throttle lever in the fully open position.
- Push the starter button and crank the engine for a few seconds. Record the maximum gauge reading as the cylinder compression.

TOOL 09915-64512: Compression gauge set
09913-10750: Adaptor

NOTE:

After checking the compression test, clear the DTC using SDS tool. (☞ 5-23)



OIL PRESSURE CHECK

Check the engine oil pressure periodically. This will give a good indication of the condition of the moving parts.

DATA Oil pressure:

Above 80 kPa (0.8 kgf/cm², 11.5 psi)

Below 120 kPa (1.2 kgf/cm², 17.0 psi)

If the oil pressure lower or higher than the specification, the following causes may be considered.

LOW OIL PRESSURE

- * Clogged oil filter
- * Oil leakage from the oil passage
- * Damaged O-ring
- * Defective oil pump
- * Combination of the above items

HIGH OIL PRESSURE

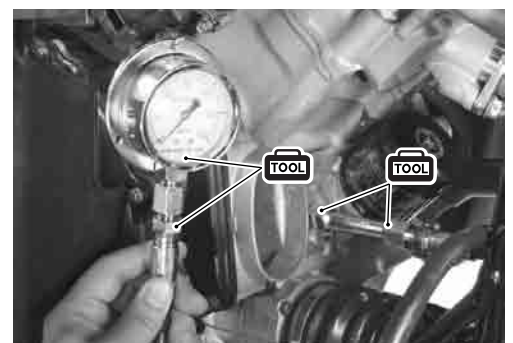
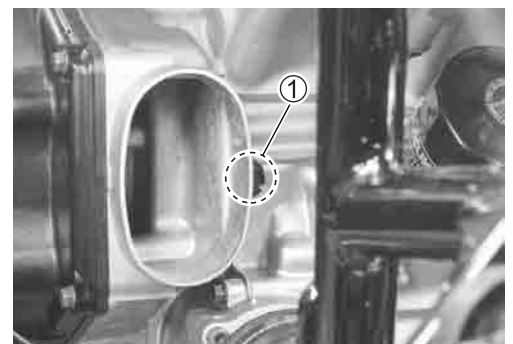
- * Engine oil viscosity is too high
- * Clogged oil passage
- * Combination of the above items

OIL PRESSURE TEST PROCEDURE

- Connect the tachometer onto the spark plug high-tension cord.
- Remove the right inner fender. (☞ 8-10)
- Remove the cooling duct.
- Remove the main oil gallery plug ①.
- Install the oil pressure gauge and adaptor into the main oil gallery.
- Warm up the engine as follows:
Summer: 10 minutes at 2 000 r/min
Winter: 20 minutes at 2 000 r/min
- After warming up the engine, increase the engine speed to 3 000 r/min (observe the tachometer), and read the oil pressure gauge.

- TOOL** 09915-74511: Oil pressure gauge set
 09915-72410: Oil pressure gauge attachment
 09915-74521: Oil pressure gauge hose
 09915-70610: Oil pressure gauge attachment
 09900-26006: Tachometer

U Main oil gallery plug: 23 N·m (2.3 kgf-m, 16.5 lb-ft)



INITIAL ENGAGEMENT AND CLUTCH LOCK-UP INSPECTION

The LT-A450X is equipped with a centrifugal type automatic clutch.

To insure proper performance and longevity of the clutch assemblies it is essential that the clutches engage smoothly and gradually. Before checking the initial engagement and clutch lock-up two inspection checks must be performed to thoroughly check the operation of the drive train. Perform the following:

- Warm up the engine.

INITIAL ENGAGEMENT INSPECTION

- Connect the tachometer or the multi circuit tester onto the spark plug high-tension cord.
- Start the engine.
- Shift the range lever to the "High" position.
- Slowly open the throttle and note the engine speed (r/min) when the vehicle begins to move forward.



09900-26006: Tachometer, or

09900-25008: Multi circuit tester set



Engagement speed: 1 700 – 2 200 r/min

If the engagement speed does not coincide with the standard range, inspect the following items for any abnormalities.

- * Clutch shoe 3-57
- * Clutch housing 3-57
- * Movable drive and driven face 3-52 and 3-55

CLUTCH LOCK-UP INSPECTION

Perform this inspection to determine if the clutch is engaging fully and not slipping.

- Connect a tachometer onto the spark plug high-tension code.
- Start the engine.
- Shift the range lever to the “High” position.
- Apply the front and rear brakes as firmly as possible.
- Fully open the throttle for a brief period and note the maximum engine speed sustained during the test cycle.

DATA Lock-up speed: 3 750 – 4 250 r/min

CAUTION

Do not apply full power for more than 5 seconds or damage to the clutch or engine may occur.

If the lock-up speed (r/min) does not coincide with the standard range, inspect the following items for any abnormalities.

- * Clutch shoe  3-57
- * Clutch housing.  3-57
- * Movable drive and driven face  3-52 and 3-55

SDS CHECK

Using SDS, sample the data at the time of new and periodic vehicle inspections.

After saving the sampled data in the computer, file them by model and by user.

The periodically filed data help improve the accuracy of troubleshooting since they can indicate the condition of vehicle functions that has changed with time.

For example, when a vehicle is brought in for service but the troubleshooting of a failure is not easy, comparing the current data value to the past filed data value at time of normal condition can allow the specific engine failure to be determined.

Also, in the case of a customer vehicle which is not periodically brought in for service with no past data value having been saved, if the data value of a good vehicle condition have been already saved as a master (STD), comparison between the same models helps facilitate the troubleshooting.

- Set up the SDS tool. (🔧 5-22)

TOOL 09904-41010: SDS set tool
99565-01010-009: CD-ROM Ver. 9

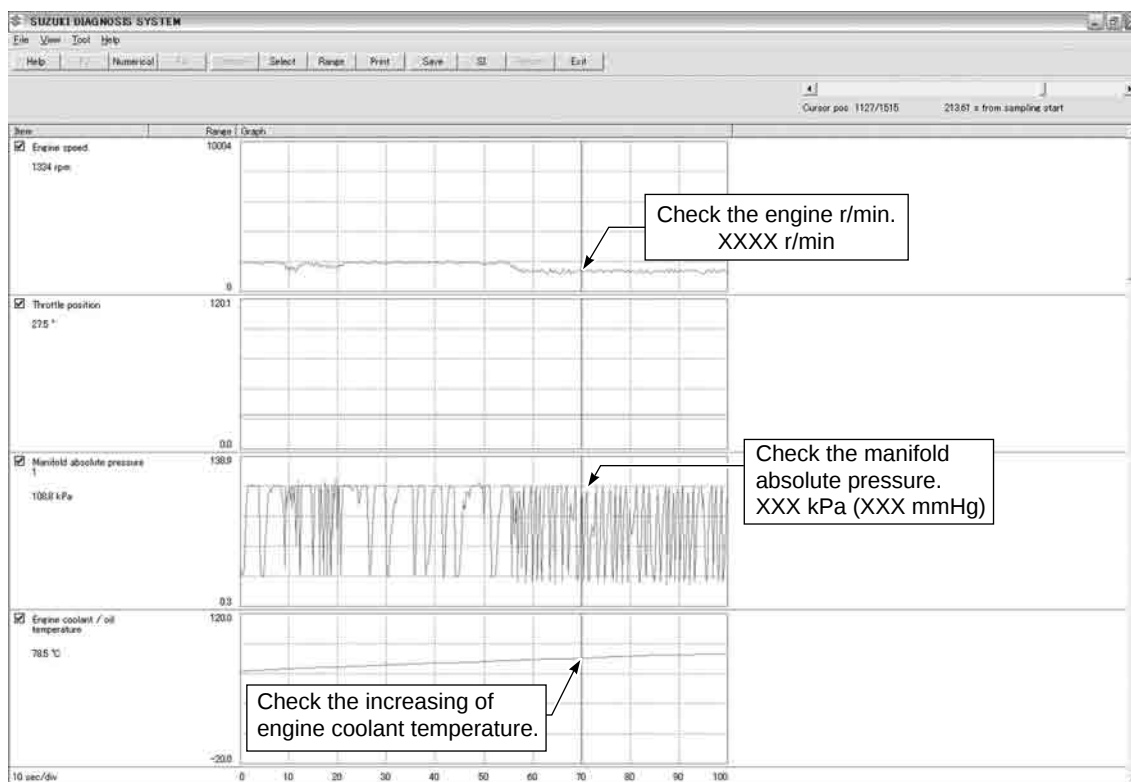
NOTE:

* Before taking the sample of data, check and clear the Past DTC. (🔧 4-23)

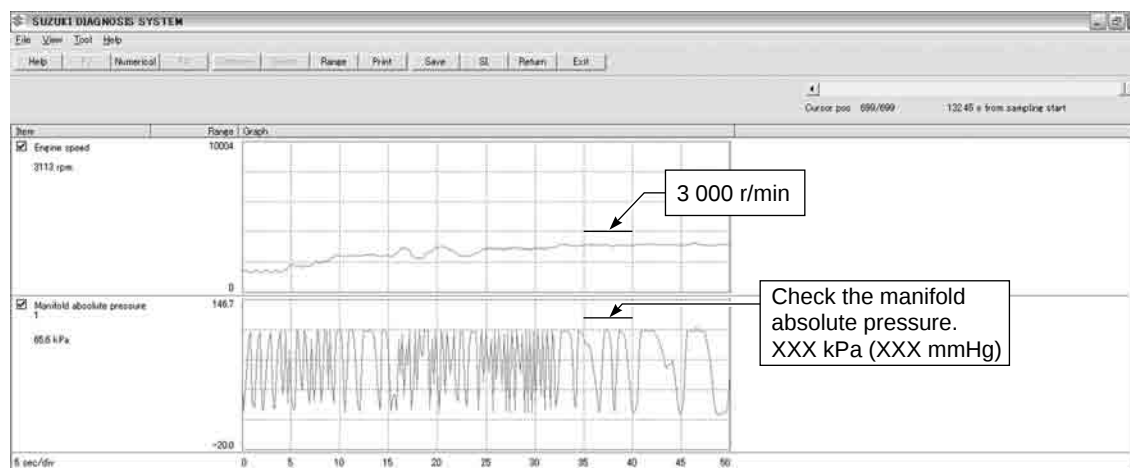
* A number of different data under a fixed condition as shown below should be saved or filed as sample.

SAMPLE:

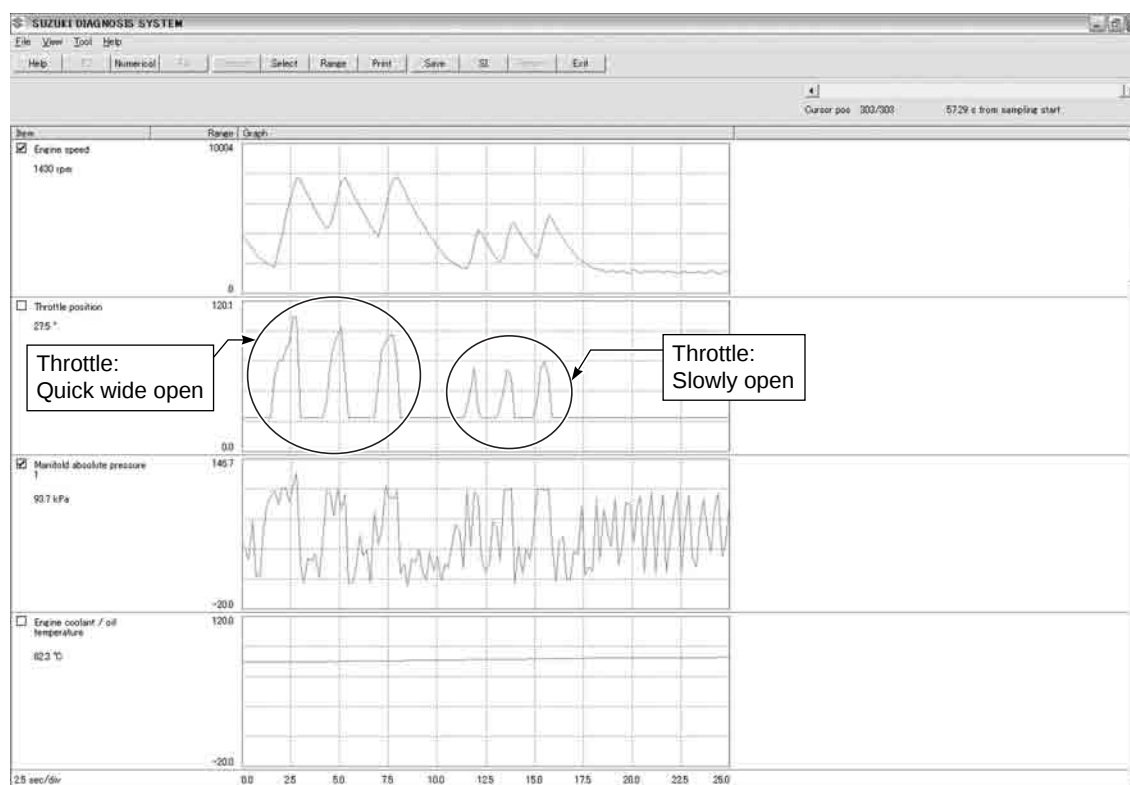
Data sampled from cold starting through warm-up



Data at 3 000 r/min under no load



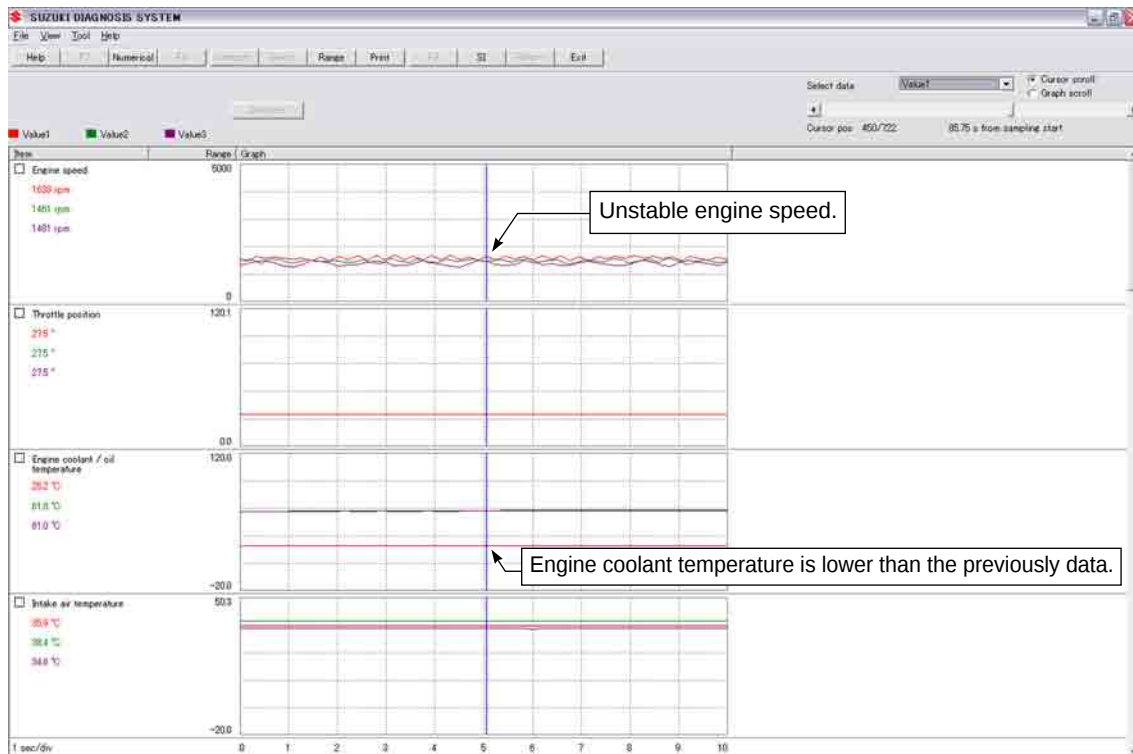
Data at the time of racing



Example of trouble

Three data; value 1 (current data 1), value 2 (past data 2) and value 3 (past data 3); can be made in comparison by showing them in the graph. Read the change of value by comparing the current data to the past data that have been saved under the same condition, then you may determine how changes have occurred with the pass of time and identify what problem is currently occurring.

With DTC not output, if the value of engine coolant temperature is found to be lower than the data saved previously, the possible cause may probably lie in a sensor circuit shorted to ground or influence of internal resistance value, etc.



ENGINE

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ENGINE COMPONENTS REMOVABLE WITH ENGINE IN PLACE

The parts listed below can be removed and installed without removing the engine from the frame. Refer to the page listed in each section for removal and installation instructions.

ENGINE LEFT SIDE

PARTS	REMOVAL	INSTALLATION
Recoil starter	3-11	3-113
Water pump	3-16	3-106
Starter cup	3-16	3-106
Speed sensor	3-82	3-84

ENGINE RIGHT SIDE

PARTS	REMOVAL	INSTALLATION
Clutch cover	3-21	3-100
Movable drive/driven face	3-21	3-99
Movable drive face	3-22	3-98
Drive belt	3-22	3-98
Fixed drive face	3-22	3-98
Gear position switch	3-23	3-97

ENGINE CENTER

PARTS	REMOVAL	INSTALLATION
Starter motor	3-3	3-114
Cam chain tensioner	3-31	3-39
Cylinder head cover	3-12	3-112
Camshaft	3-13	3-110
Cylinder head	3-14	3-109
Cylinder	3-14	3-108
Piston	3-17	3-107
Oil filter	3-14	3-113

ENGINE REMOVAL AND REMOUNTING

ENGINE REMOVAL

Before taking the engine out of the frame, wash the engine using a steam cleaner. Engine removal is sequentially explained in the following steps.

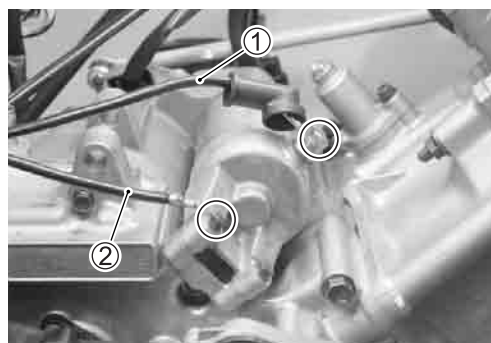
- Drain engine oil. (☞ 2-9)
- Drain engine coolant. (☞ 2-14)
- Remove the seat. (☞ 8-6)

- Disconnect the battery lead wires.

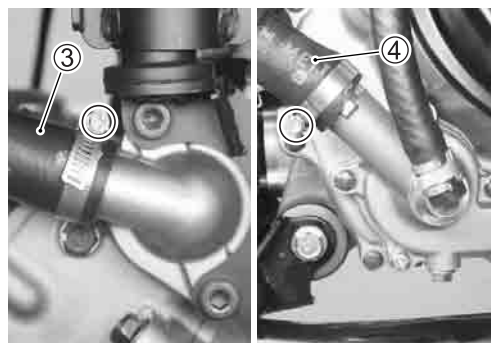
CAUTION

When disconnecting the battery lead wires, be sure to disconnect the $\ominus$ battery lead wire first.

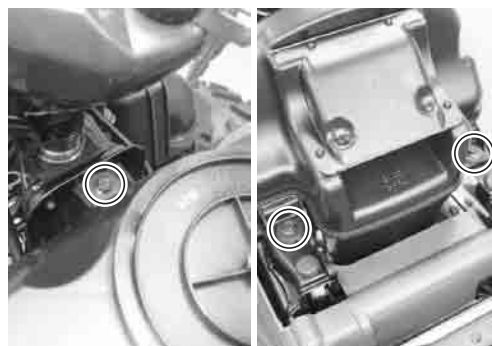
- Remove the front fender. (☞ 8-9)
- Remove the rear fender. (☞ 8-15)
- Remove the right and left mud guard. (☞ 8-9 and 8-10)
- Remove the right and left inner fenders. (☞ 8-10)
- Remove the speak plug cap (☞ 2-7)
- Remove the rear propeller shaft. (☞ 4-40)
- Disconnect the starter motor lead wire ① and ground lead wire ②.



- Disconnect the inlet hose ③ and outlet hose ④.



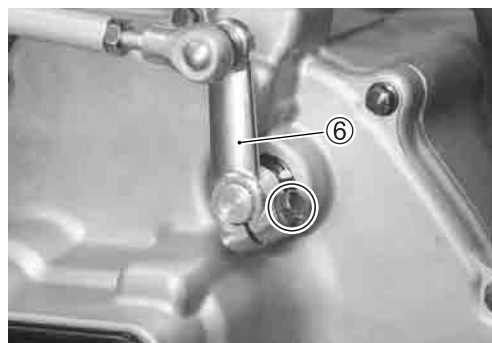
- Remove the air cleaner box. (6-10)



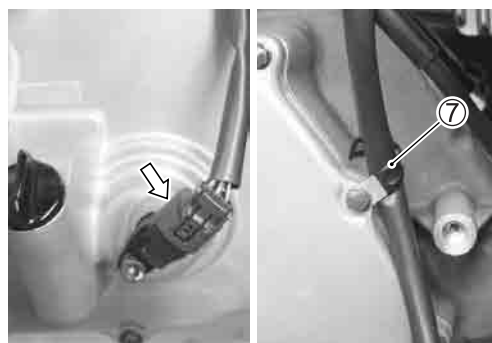
- Disconnect the ECT sensor coupler ⑤.
- Remove the throttle body assembly. (6-11)



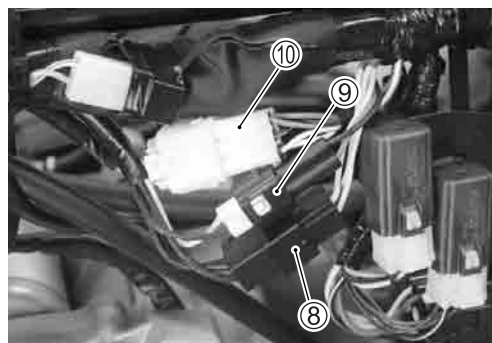
- Remove the transfer gear shift lever assembly. (8-97)
- Remove the transfer gear shift shaft lever ⑥.



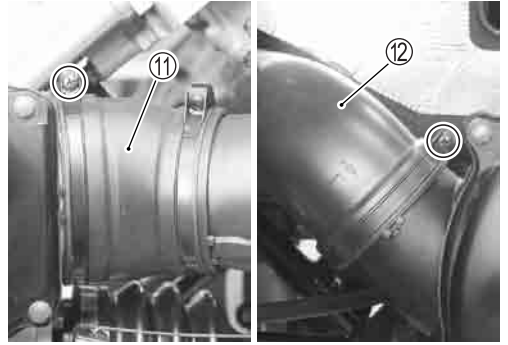
- Disconnect the speed sensor coupler and clamp ⑦.



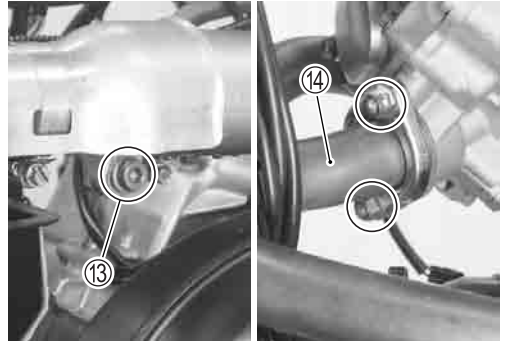
- Disconnect the generator coupler ⑧, CKP sensor coupler ⑨ and gear position sensor coupler ⑩.



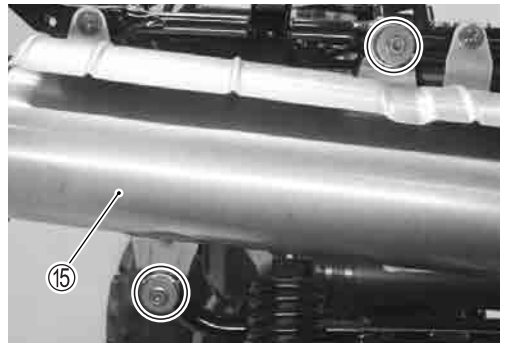
- Remove the belt cooling ducts. (Intake ⑪ and outlet ⑫)



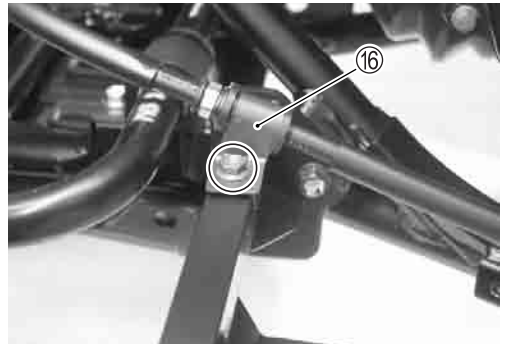
- Loosen the muffler connect bolt ⑬.
- Remove the exhaust pipe ⑭.



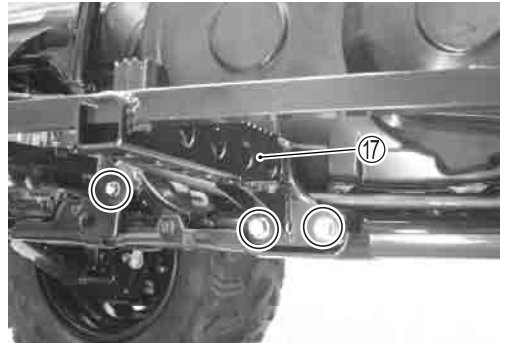
- Remove the muffler ⑮.



- Remove the rear brake cable clamp ⑯.



- Remove the right footrest ⑰.



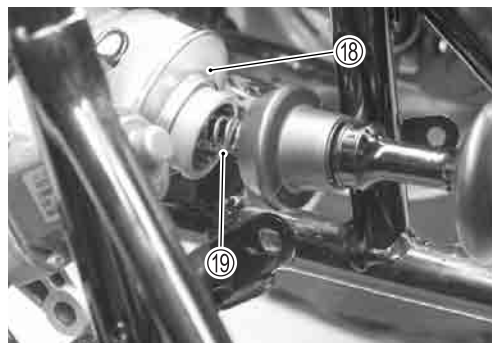
- Remove the rear brake pedal assembly. (🔧 10-29)



- Remove the front drive train (differential) gear case mounting bolts/nuts.



- Slide the front differential assembly ⑱ forward.
- Remove the front propeller shaft spring ⑲.



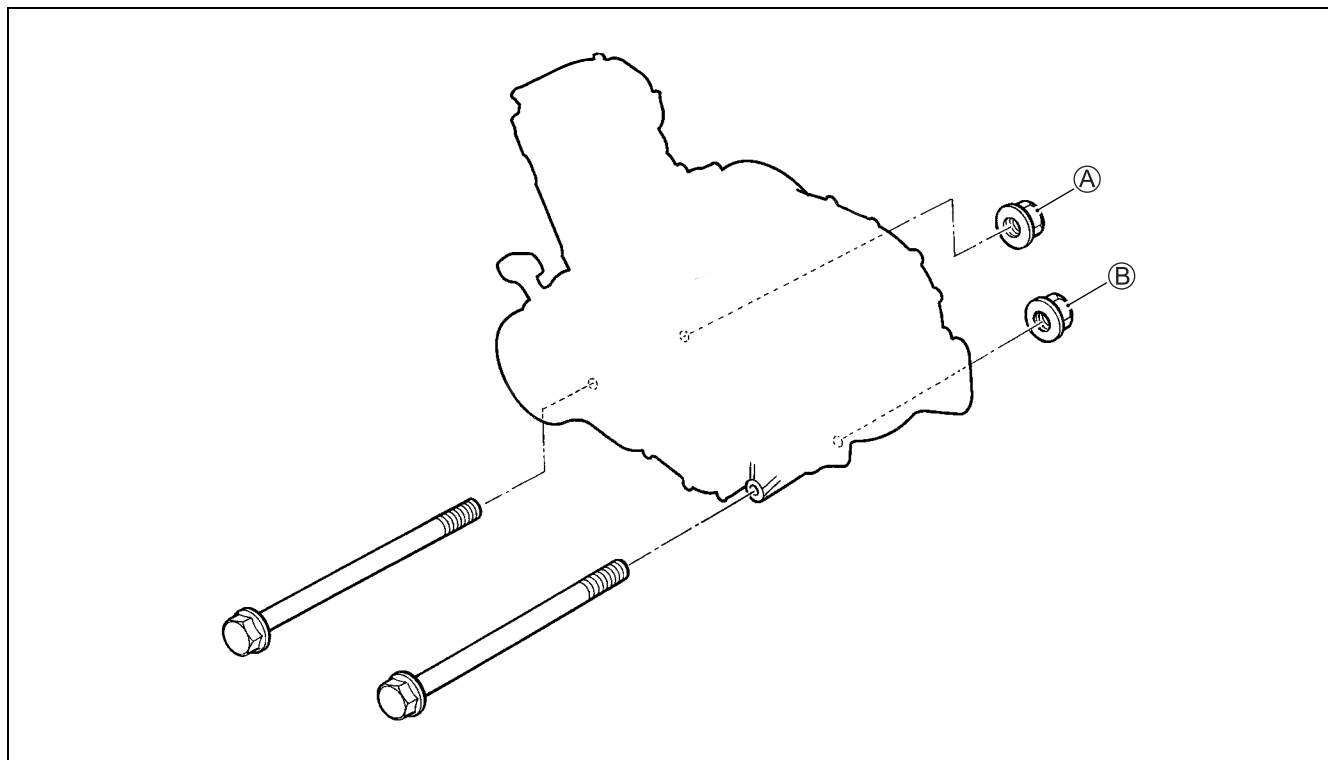
- Remove the engine mounting nuts.
- Remove the engine from the right side.



ENGINE REMOUNTING

Remount the engine in the reverse order of engine removal.

Pay attention to the following points:



ITEM	N·m	kgf-m	lb-ft
(A)	60	6.0	43.5
(B)	60	6.0	43.5

- Tighten the engine mounting nuts to the specified torque.

 **Engine mounting nut: 60 N·m (6.0 kgf-m, 43.5 lb-ft)**



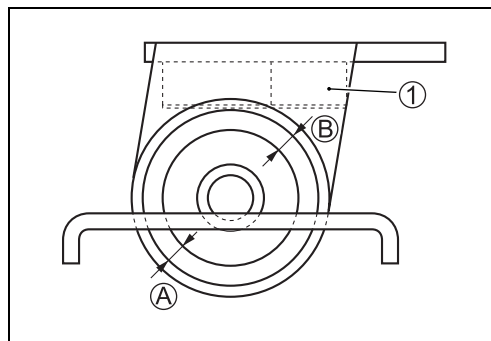
- Tighten the engine mounting damper stopper bolts to the specified torque.

 **Engine mounting damper stopper bolt:**
23 N·m (2.3 kgf-m, 16.5 lb-ft)



NOTE:

When installing the engine mounting damper stopper ①, keep that the clearance (A) and (B) are equal.



- Apply a small quantity of THREAD LOCK SUPER “1303” to the front differential gear mounting nuts.
- Tighten the front differential gear mounting nuts to the specified torque.

 **99000-32030: THREAD LOCK SUPER “1303”**

 **Front drive train (differential) gear case mounting nut:**
50 N·m (5.0 kgf-m, 36.0 lb-ft)



- When installing the gearshift shaft lever, align the both serrations.



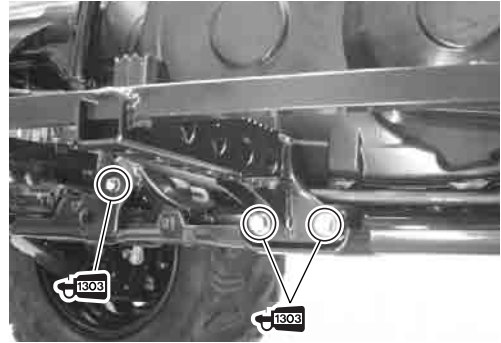
- Apply a small quantity THREAD LOCK SUPER “1303” to the footrest mounting bolts, and tighten them to the specified torque.

 **99000-32030: THREAD LOCK SUPER “1303”**

 **Footrest mounting bolt (M8):**

26 N·m (2.6 kgf-m, 19.0 lb-ft)

(M10): 55 N·m (5.0 kgf-m, 40.0 lb-ft)

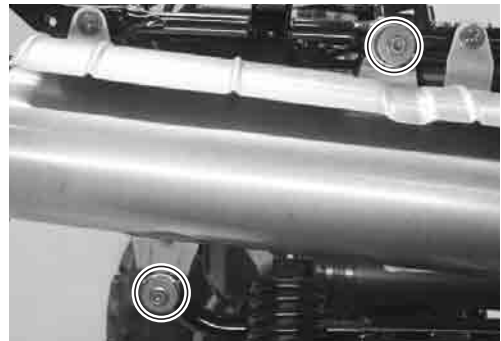


- Install the rear brake cable clamp .



- Tighten the muffler mounting bolts to the specified torque.

 **Muffler mounting bolt: 23 N·m (2.3 kgf-m, 16.5 lb-ft)**



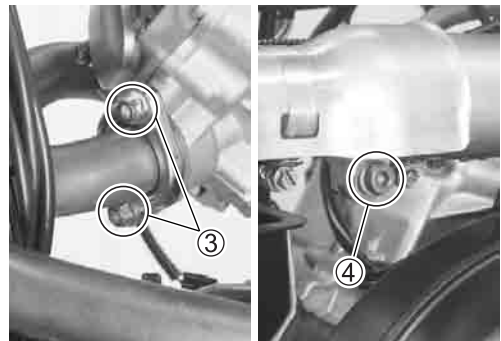
- Install the exhaust pipe gasket and tighten the exhaust pipe nuts  and muffler connect bolt  to the specified torque.

 **Exhaust pipe nut: 23 N·m (2.3 kgf-m, 16.5 lb-ft)**

Muffler connect bolt: 23 N·m (2.3 kgf-m, 16.5 lb-ft)

CAUTION

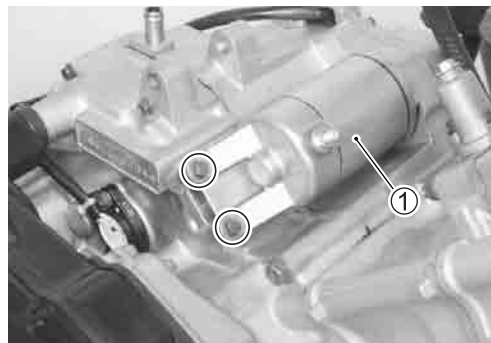
The removed gasket must be replaced with a new one.



ENGINE DISASSEMBLY

STARTER MOTOR

- Remove the starter motor ①.



SPARK PLUG

- Remove the spark plug.

 09930-10121: Spark plug wrench set



WATER HOSE

- Remove the water bypass hose.



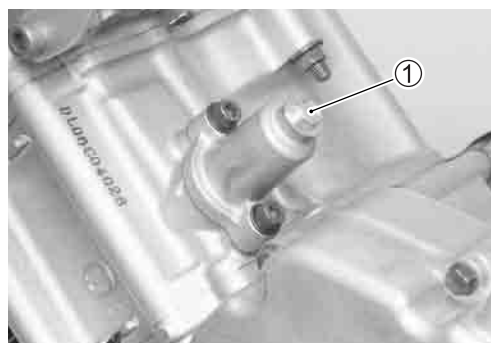
RECOIL STARTER

- Remove the recoil starter ①.

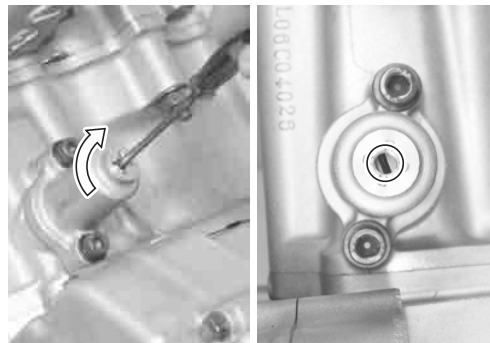


CAM CHAIN TENSION ADJUSTER

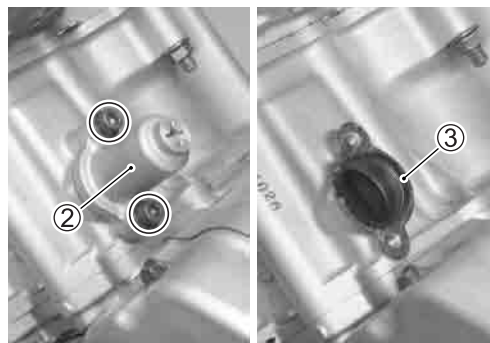
- Remove the cam chain tension adjuster cap bolt ① and gasket.



- Turn the adjusting screw clockwise with a $\ominus$ screwdriver until the push rod locked.

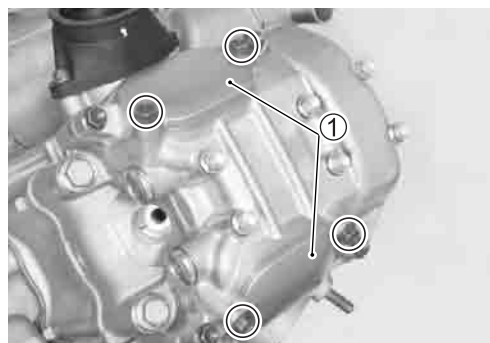


- Remove the cam chain tension adjuster ② and gasket ③.

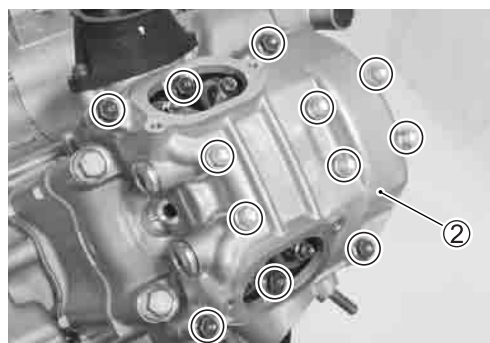


CYLINDER HEAD COVER

- Remove the valve clearance inspection caps ①.



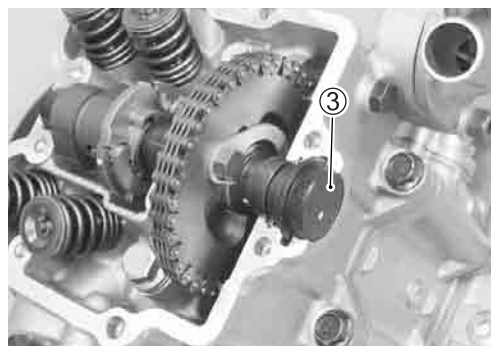
- Remove the cylinder head cover bolts and washers.
- Remove the cylinder head cover ②.



- Remove the dowel pins.

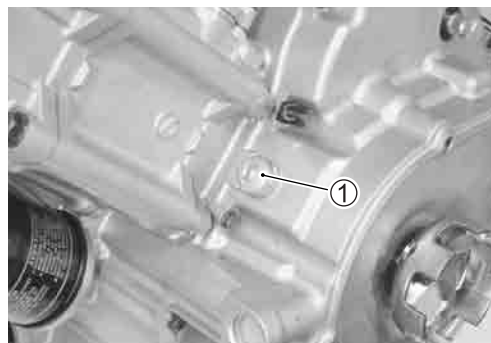


- Remove the cylinder head cover plug ③.

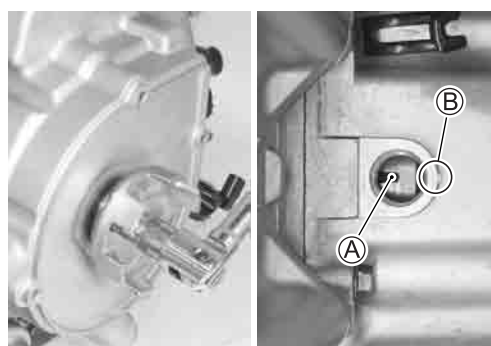


CAMSHAFT AND CAMSHAFT SPROCKET

- Remove the valve timing inspection plug ①.

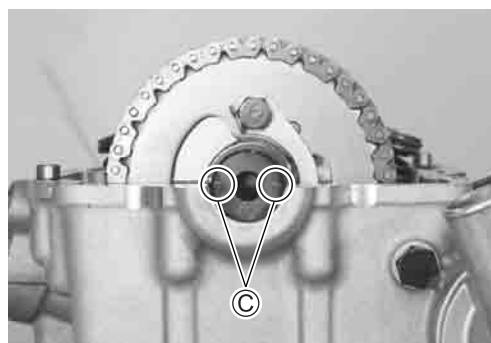


- Turn the generator rotor until the “TDC” line ① on the generator rotor is aligned with the index mark ② of the generator cover.

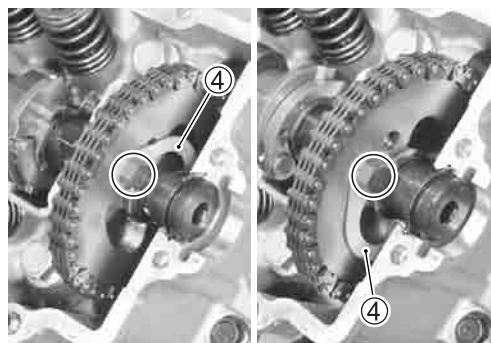


NOTE:

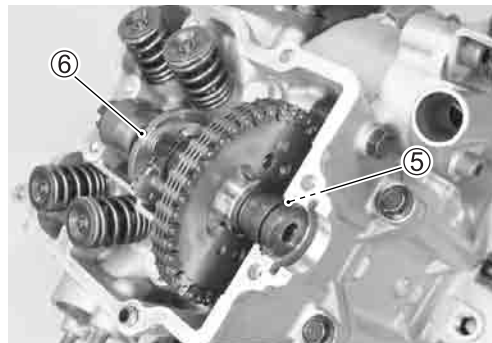
At the above condition, the piston is at TDC of compression stroke and also the engraved lines ③ on the camshaft is parallel with the mating surface of the cylinder head cover.



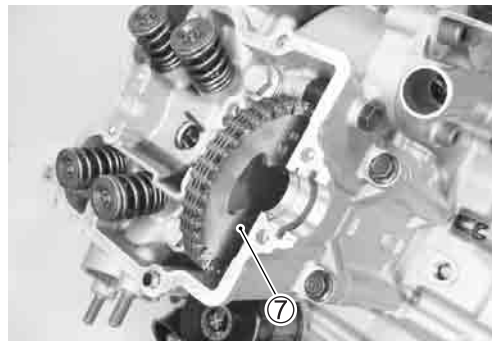
- Flatten the lock washer tongues ④ and remove the camshaft sprocket bolts.



- Remove the C-ring ⑤ and draw out the camshaft ⑥ from the camshaft sprocket.



- Remove the camshaft sprocket ⑦.



OIL FILTER

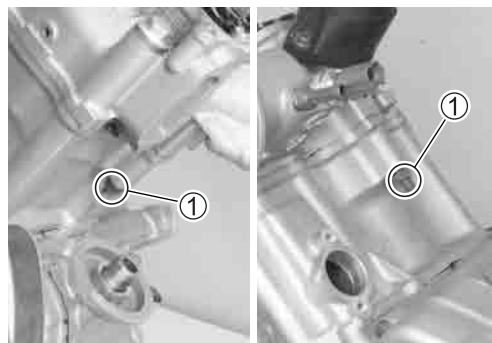
- Remove the oil filter with special tool.

 09915-40610: Oil filter wrench



CYLINDER HEAD

- Remove the cylinder head base nuts ①.



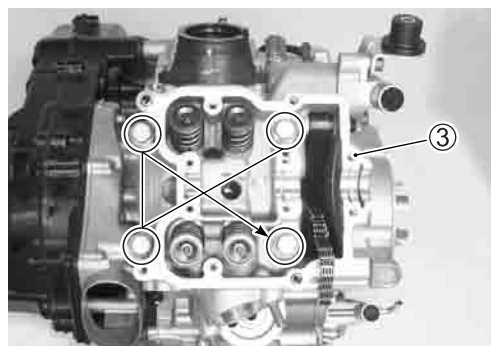
- Remove the cylinder head bolts (M8) ②.



- Remove the cylinder head bolts (M10) in diagonal stages, and then remove the cylinder head ③.

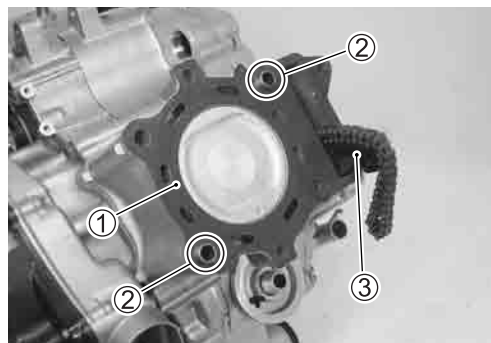
NOTE:

If the cylinder head dose not come off easily, lightly tap it using a plastic mallet.



CYLINDER

- Remove the cylinder head gasket ① and dowel pins ②.
- Remove the cam chain guide ③.



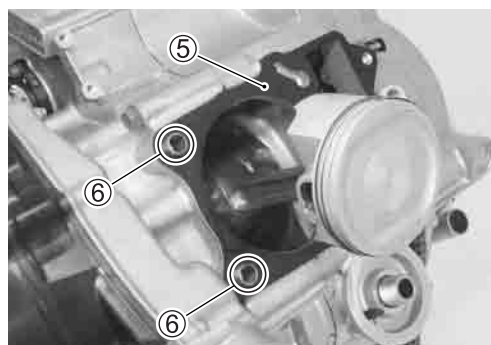
- Remove the cylinder ④.

NOTE:

If the cylinder dose not come off easily, lightly tap it using a plastic mallet.

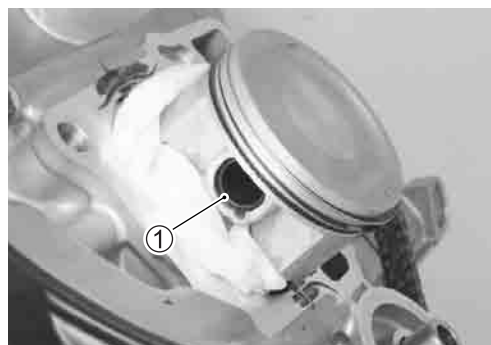


- Remove the cylinder gasket ⑤ and dowel pins ⑥.

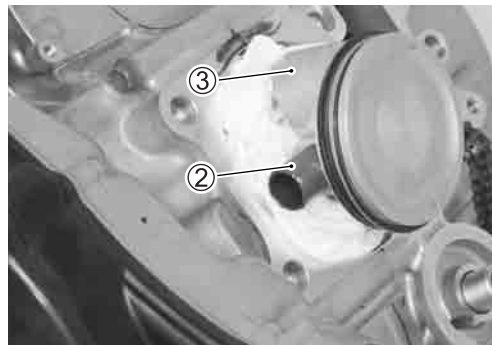


PISTON

- Place a clean rag over the cylinder base to prevent the piston pin circlip from dropping in to the crankcase.
- Remove the piston pin circlip ①.

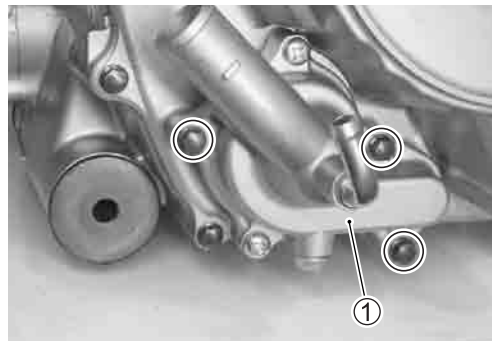


- Draw out the piston pin ② and remove the piston ③.



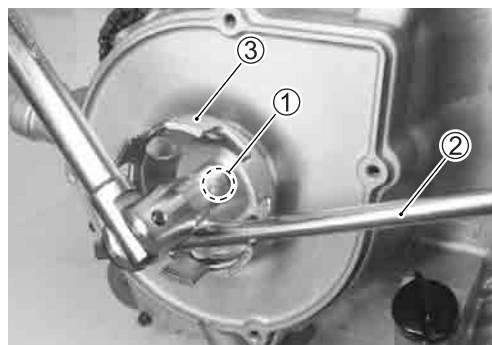
WATER PUMP

- Remove the water pump ①.

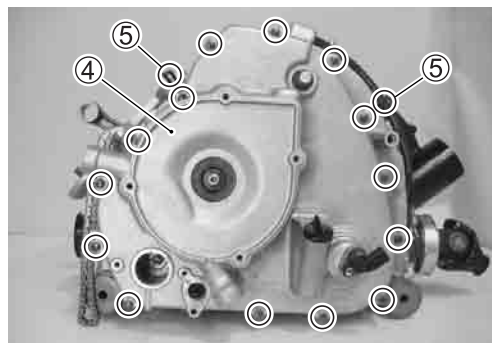


GENERATOR COVER

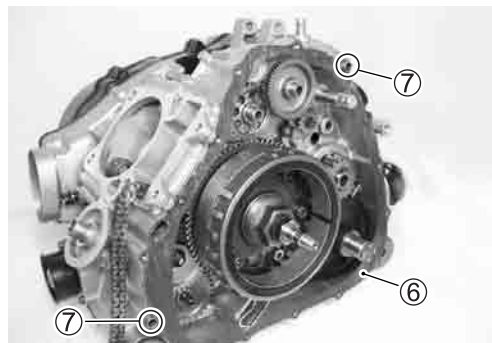
- Remove the starter cup nut ① with a suitable bar ②.
- Remove the starter cup ③.



- Remove the generator cover ④ and clamps ⑤.

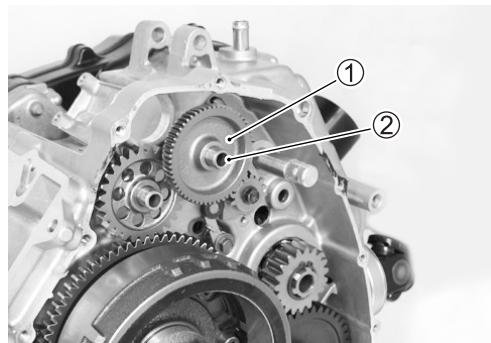


- Remove the generator cover gasket ⑥ and dowel pins ⑦.

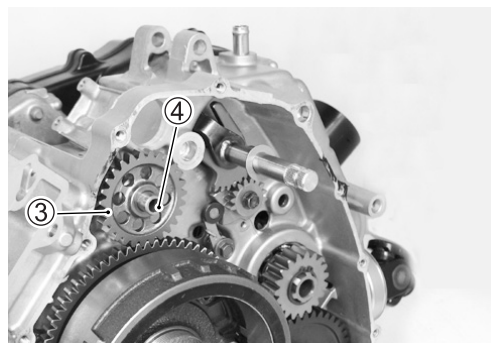


STARTER IDLE GEAR NO.1 AND NO.2

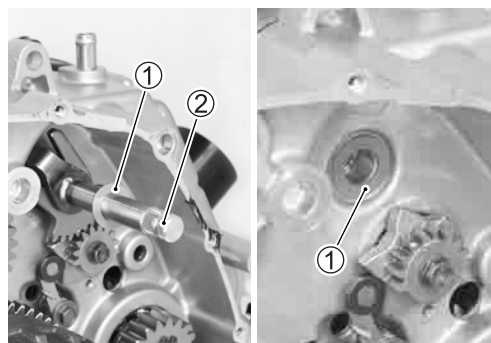
- Remove the starter idle gear No.1 ① and shaft ②.



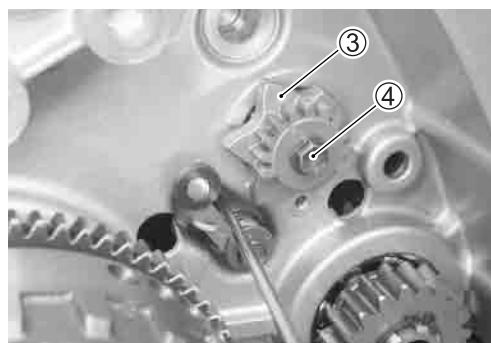
- Remove starter idle gear No.2 ③ and shaft ④.

**GEARSHIFT SHAFT**

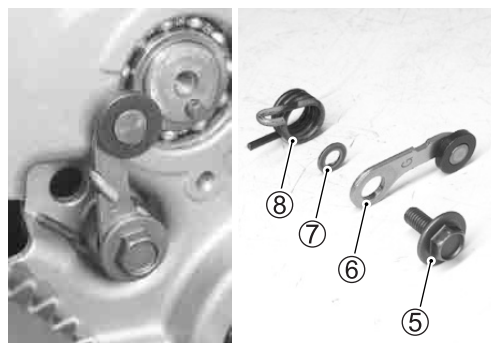
- Remove the and washers ① and gearshift shaft ②.



- Remove the gearshift cam stopper plate ③ by removing its bolt ④.

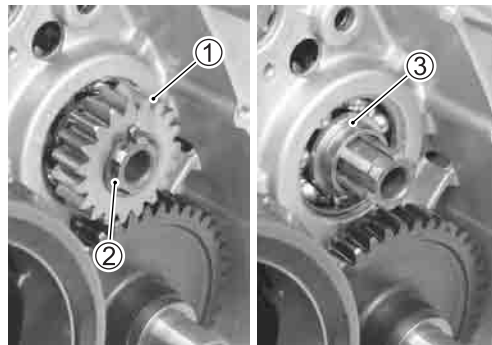


- Remove the gearshift cam stopper bolt ⑤, gearshift cam stopper ⑥, washer ⑦ and return spring ⑧.

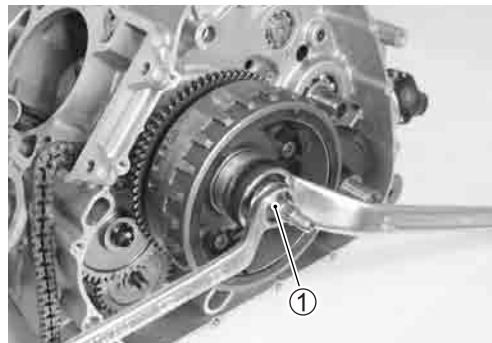


TRANSFER OUTPUT DRIVE GEAR

- Remove the transfer output drive gear ① by removing the snap ring ②.
- Remove the spacer ③.

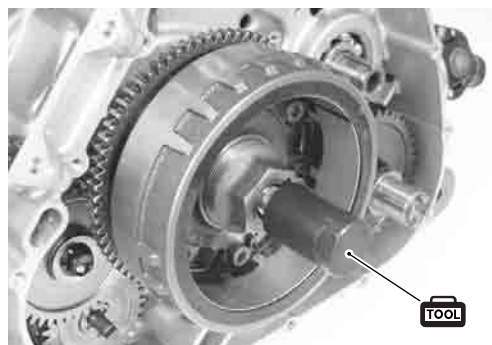
**STARTER CLUTCH AND GENERATOR ROTOR**

- Remove the generator rotor nut ①.



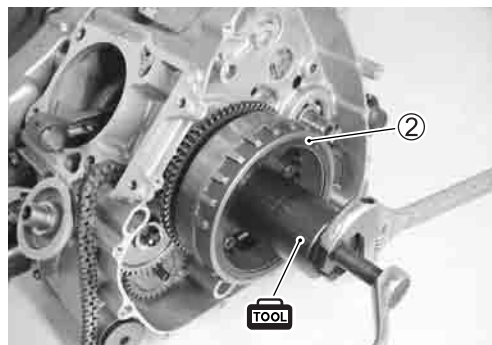
- Install the special tool to the crankshaft end.

TOOL 09930-31921: Rotor remover attachment

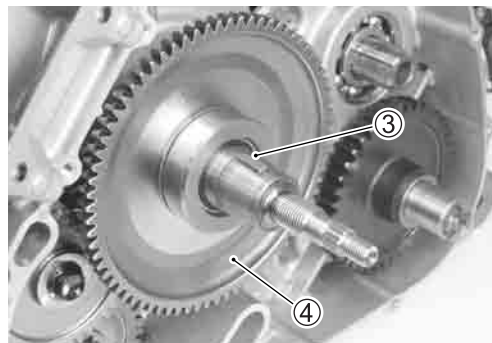


- Remove the generator rotor ② with the special tool.

TOOL 09930-30721: Rotor remover

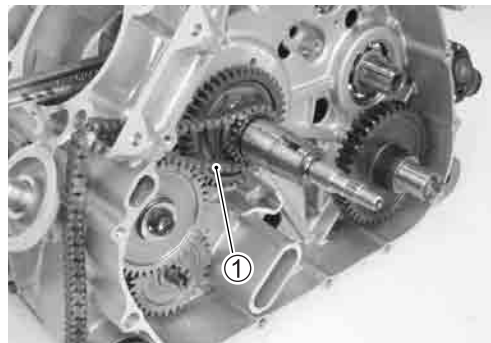


- Remove the key ③ and starter driven gear ④.



CAM CHAIN

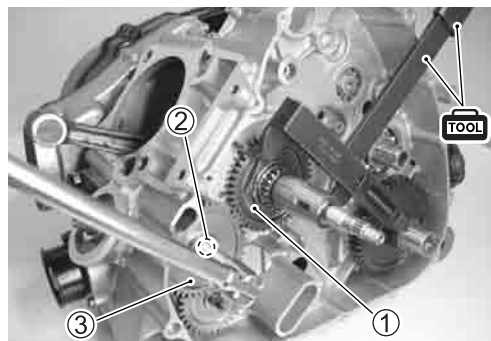
- Remove the cam chain ①.

**CRANK BALANCER SHAFT DRIVE/DRIVEN GEAR AND OIL PUMP DRIVE GEAR**

- Install the special tools to the crank balancer drive gear ①.

TOOL 09920-53740: Clutch sleeve hub holder
09920-31020: Extension handle

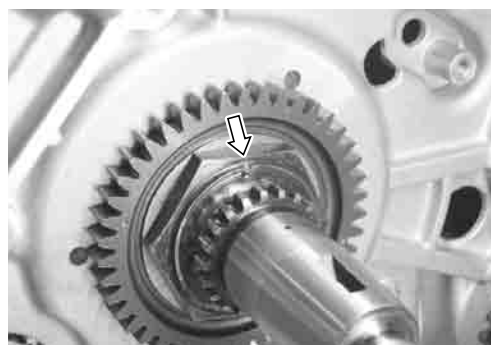
- Remove the crank balancer driven gear bolt ② and crank balancer drive gear ③.



- Remove the oil pump drive gear ④ and key ⑤.

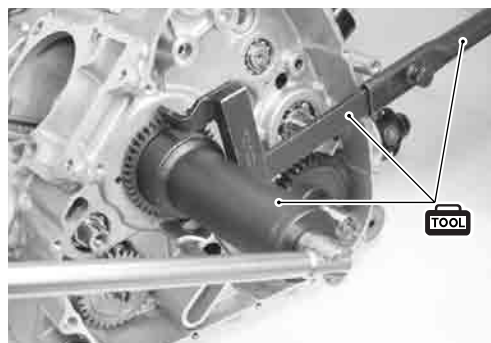


- Unlock the crank balancer drive gear nut with a chisel.

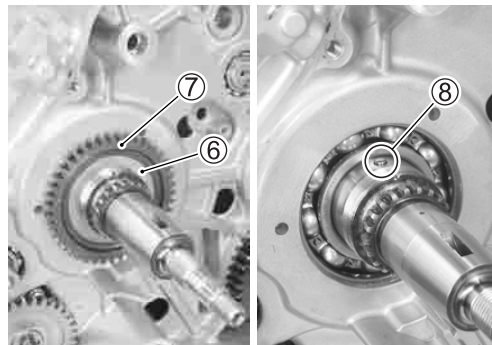


- Remove the crank balancer drive gear nut with the special tools.

TOOL 09920-53740: Clutch sleeve hub holder
09924-52460: Socket wrench 52 mm
09920-31020: Extension handle



- Remove the washer ⑥ and crank balancer drive gear ⑦.
- Remove the pin ⑧.

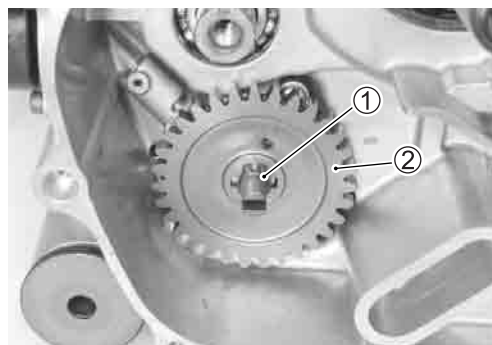


- Remove the spacer ⑨.

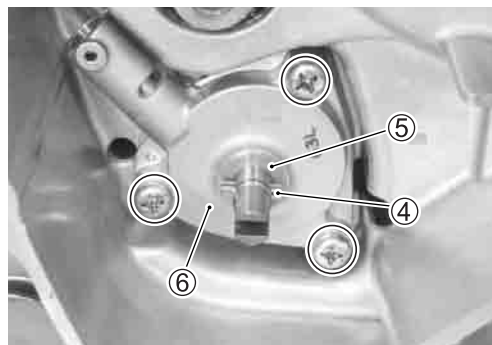


OIL PUMP

- Remove the snap ring ①.
- Remove the oil pump driven gear ②.



- Remove the pin ④ and washer ⑤.
- Remove the oil pump ⑥.

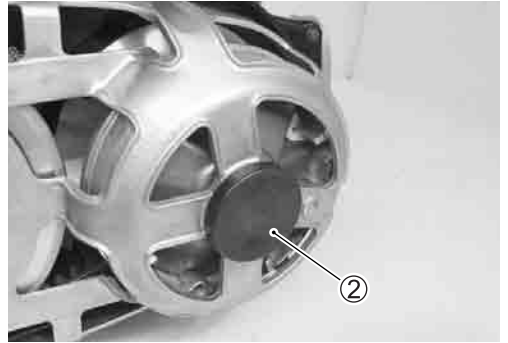


CLUTCH COVER

- Remove the clutch cover ① and clutch cover gasket.

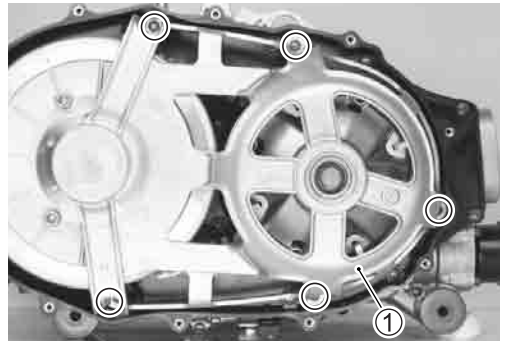


- Remove the cap ②.

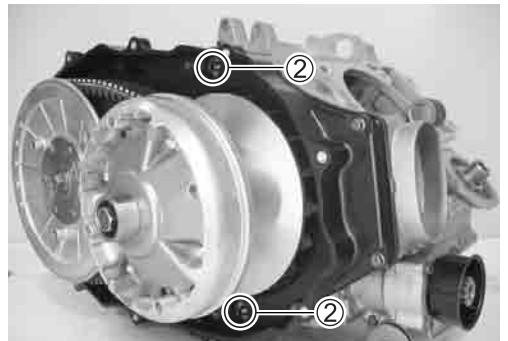


MOVABLE DRIVE FACE

- Remove the movable drive face cover ①.

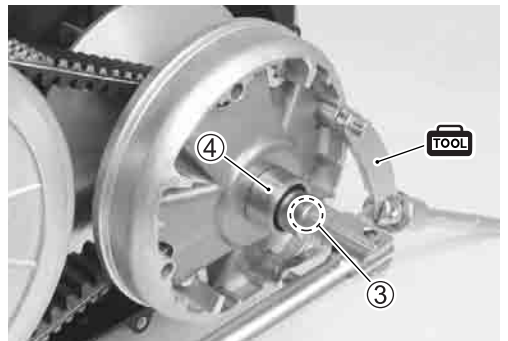


- Remove the dowel pins ②.

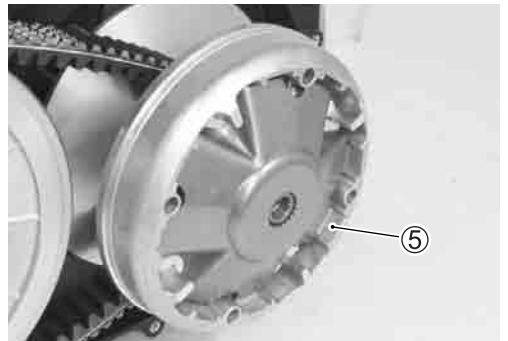


- Remove the movable drive face bolt ③ and collar ④ with the special tool.

 **09930-40113: Rotor holder**



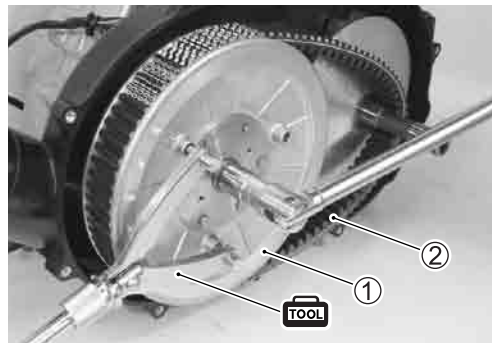
- Remove the movable drive face ⑤.



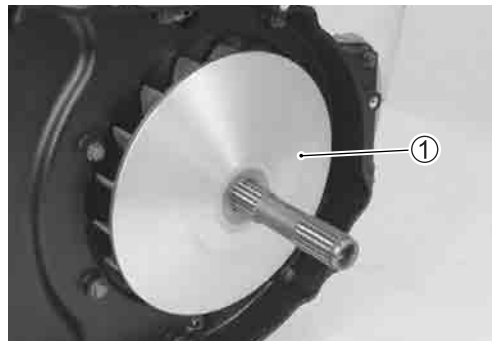
MOVABLE DRIVEN FACE AND DRIVE BELT

- Remove the movable driven face bolt with the special tool.
- Remove the movable driven face assembly ① and drive belt ②.

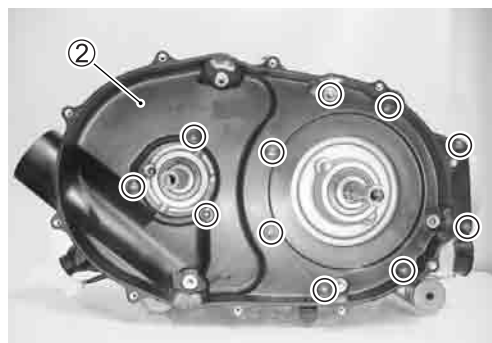
 **09930-40113: Rotor holder**

**FIXED DRIVE FACE**

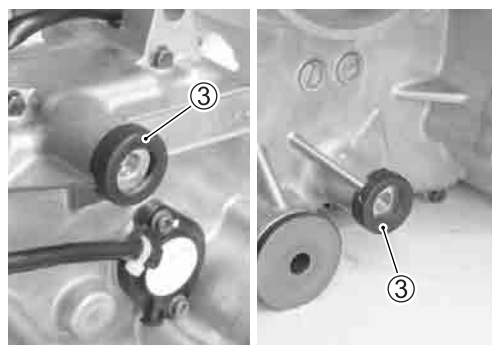
- Remove the fixed drive face ①.



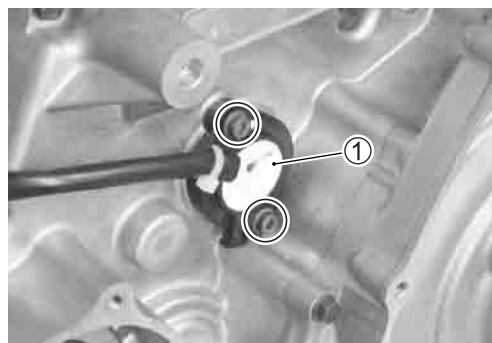
- Remove the clutch inner cover ② and clutch inner cover gasket.



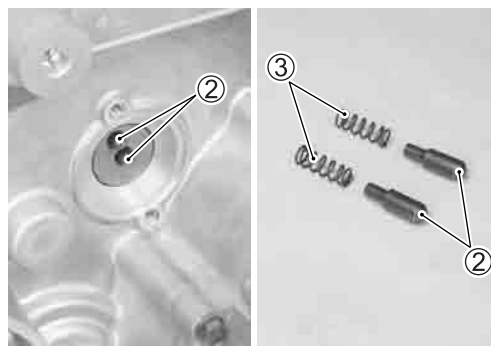
- Remove the cushions ③.

**GEAR POSITION SWITCH**

- Remove the gear position switch ①.

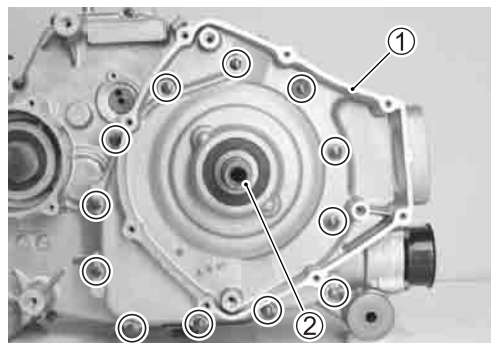


- Remove the switch contacts ② and springs ③.

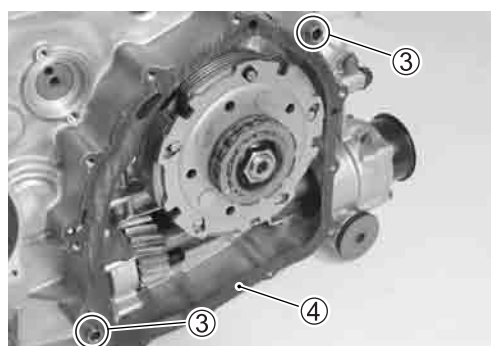


CLUTCH HOUSING CASE

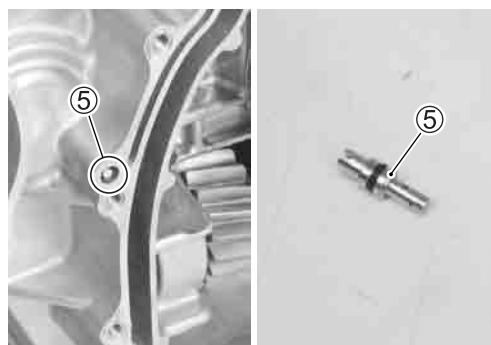
- Remove the clutch housing case ① together with the clutch housing ②.



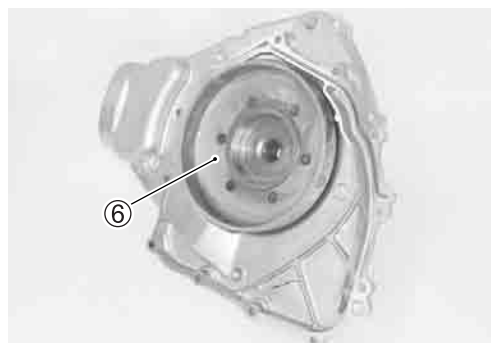
- Remove the dowel pins ③ and clutch housing case gasket ④.



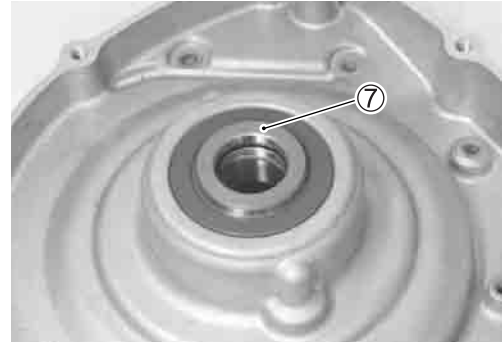
- Remove the oil jet ⑤.



- Remove the clutch housing ⑥ from the clutch housing case.

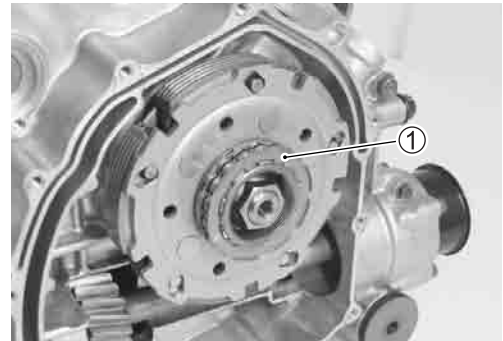


- Remove the spacer ⑦ from the clutch housing case.



CLUTCH SHOE

- Remove the one way clutch ①.



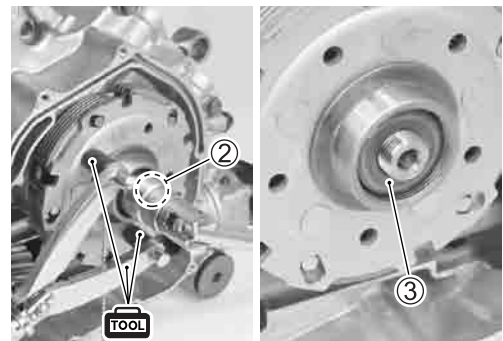
- Remove the clutch shoe nut ② with the special tool.

NOTE:

The clutch shoe nut has left-hand thread.

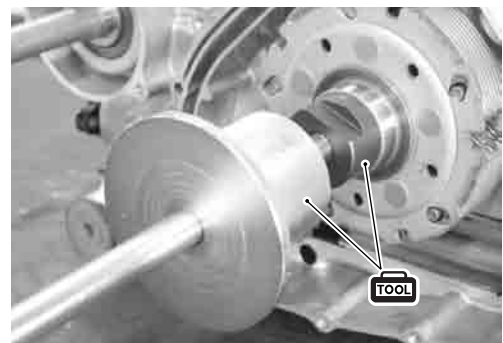
TOOL 09930-40113: Rotor holder
09930-40120: Rotor holder attachment A

- Remove the washer ③.



- Remove the clutch shoe with the special tool.

TOOL 09930-30104: Sliding shaft
09920-33540: Clutch shoe remover

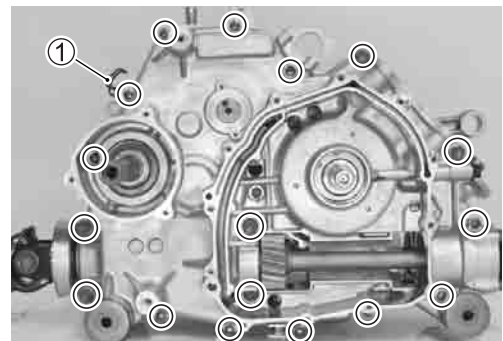


CRANKCASE

- Remove the right crankcase bolts (M6) and clamp ①.
- Remove the right crankcase bolts (M8).

NOTE:

Loosen the crankcase bolts diagonally with the smaller sizes first.



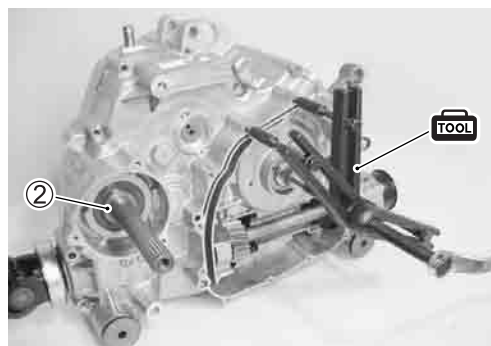
- Separate the crankcase with the special tool.

NOTE:

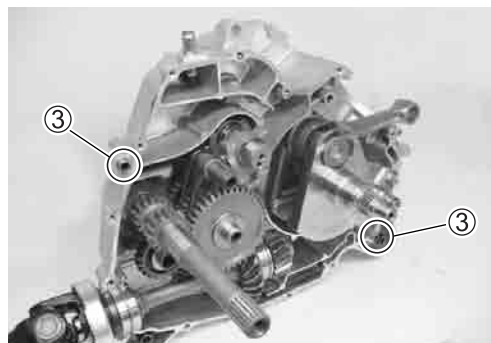
Fit the crank case separating tool to the right crankcase, so that the tool plate is paralleled with the end of the crankcase.

 **09920-13120: Crankcase and shaft remover**

- Remove the collar ②.

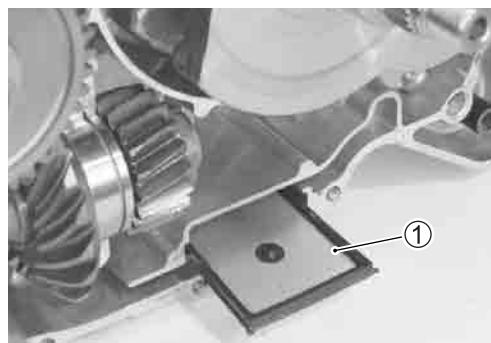


- Remove the dowel pins ③.



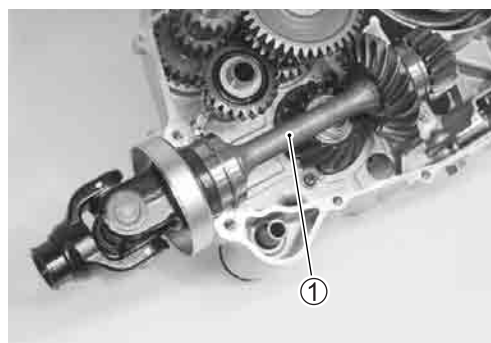
OIL SUMP FILTER

- Remove the oil sump filter ①.



REAR OUTPUT SHAFT

- Remove the rear output shaft ①.

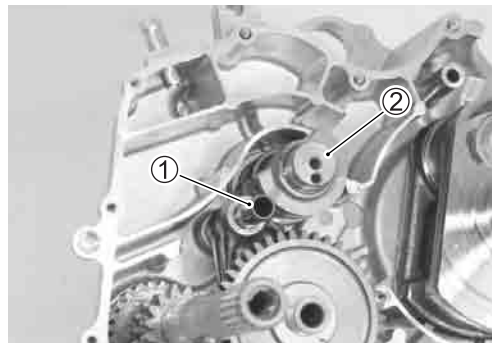


- Remove the C-ring ②.

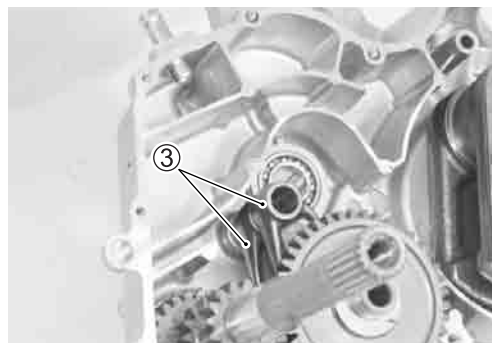


TRANSFER

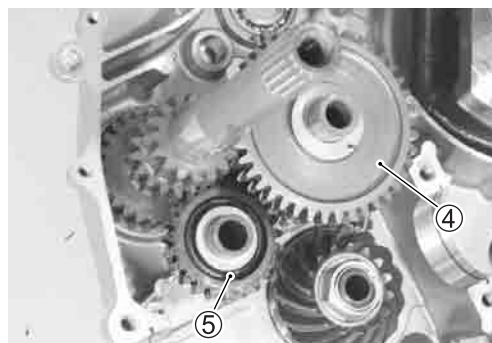
- Remove the gearshift fork shaft ① and gearshift cam ②.



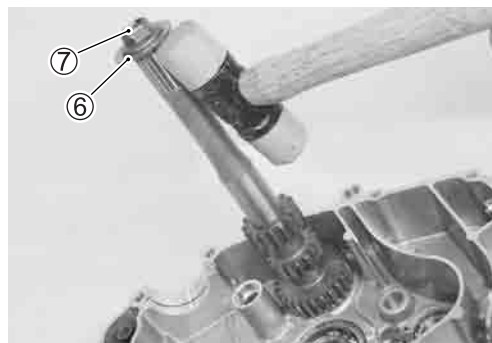
- Remove the gearshift forks ③.



- Remove the transfer output shaft assembly ④ and reverse idle gear ⑤.



- Install a suitable washer ⑥ and the removed movable drive face bolt ⑦ to the transfer input shaft.
- Remove the transfer input shaft with a plastic mallet.

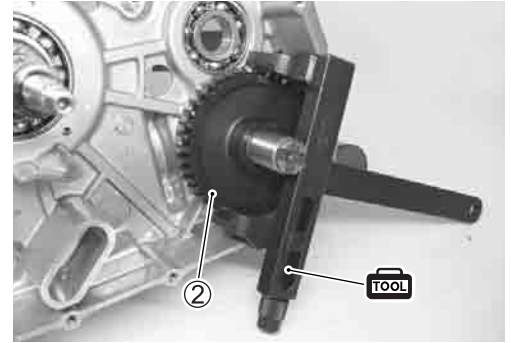
**REAR OUTPUT SHAFT DRIVE BEVEL GEAR**

- Unlock the drive bevel gear nut ① with a chisel.

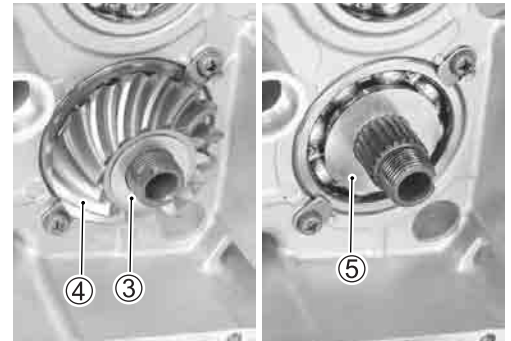


- Hold the transfer output driven gear ② with the special tool.
- Remove the drive bevel gear nut.

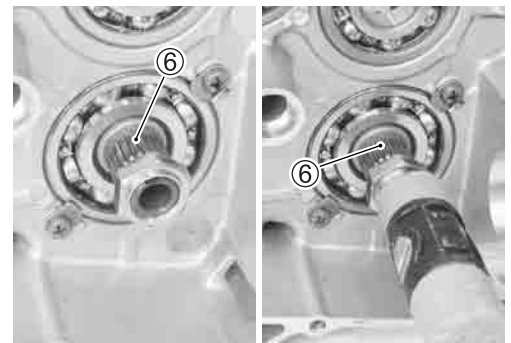
TOOL 09920-53740: Clutch sleeve hub holder



- Remove the washer ③ and rear output shaft drive bevel gear ④.
- Remove the shim ⑤.



- Install the removed drive bevel gear nut to the transfer output driven gear ⑥.
- Remove the transfer output driven gear with a plastic mallet.



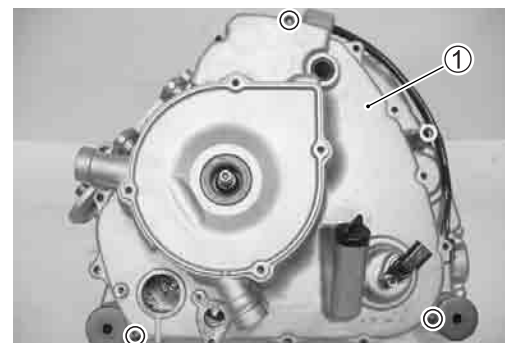
CRANK BALANCER

- Remove the crank balancer ①.



CRANKSHAFT

- Install the removed generator cover ① and tighten the bolts.

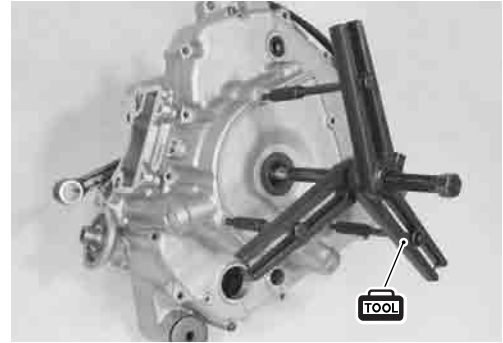


- Remove the crankshaft with the special tool.



09920-13120: Crankcase and shaft remover

- Remove the generator cover.



ENGINE COMPONENTS INSPECTION AND SERVICE

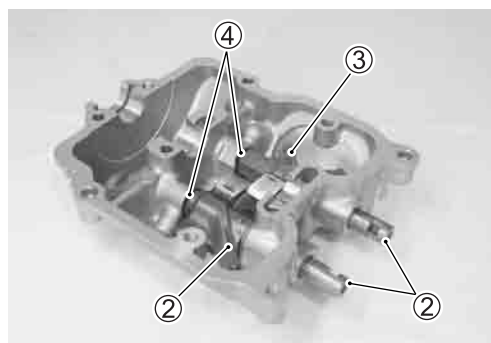
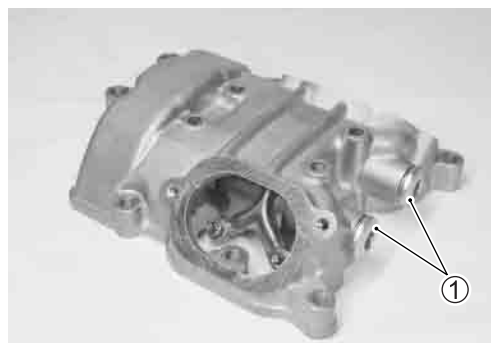
CYLINDER HEAD COVER

CAUTION

Identify the position of each removed part. Organize the parts in their respective groups (i.e., intake or exhaust) so that they can be installed in their original locations.

DISASSEMBLY

- Remove the rocker arm shaft bolts ①.
- Remove the rocker arm shafts ②.
- Remove the rocker arms ③ and wave washers ④.



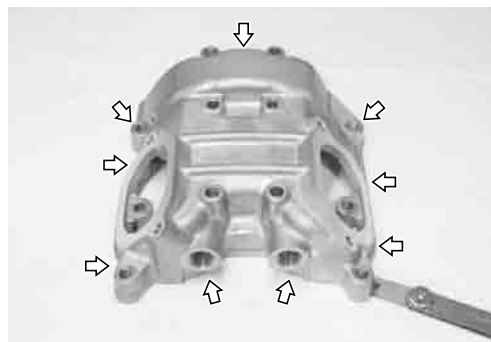
CYLINDER HEAD COVER DISTORTION

After removing sealant from the fitting surface of the cylinder head cover, place the cylinder head cover on a surface plate and check for distortion with a thickness gauge. Check points are shown in Fig.

DATA Cylinder head cover distortion
Service Limit: 0.05 mm (0.0027 in)

TOOL 09900-20803: Thickness gauge

If the distortion exceeds the limit, replace the cylinder head cover.

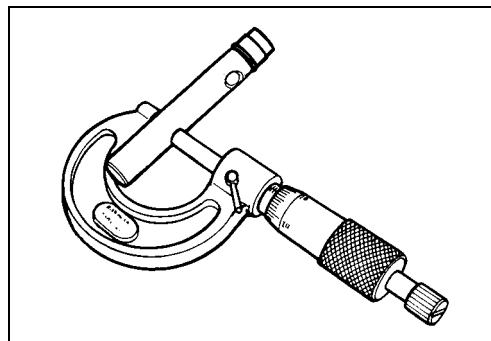


ROCKER ARM SHAFT O.D.

Measure the diameter of the rocker arm shafts.

DATA Rocker arm shaft O.D.
Standard (IN & EX): 11.973 – 11.984 mm
(0.4713 – 0.4718 in)

TOOL 09900-20205: Micrometer (0 – 25 mm)



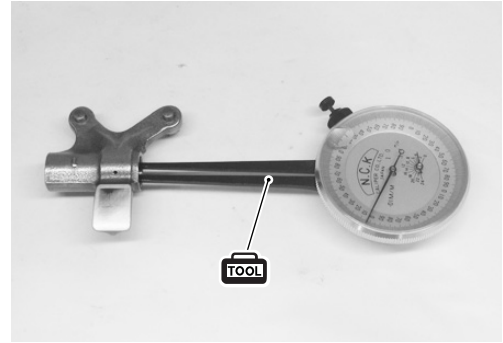
ROCKER ARM I.D.

Measure the inside diameter of the rocker arm and check the wear of the camshaft contacting surface.

DATA **Rocker arm I.D.**

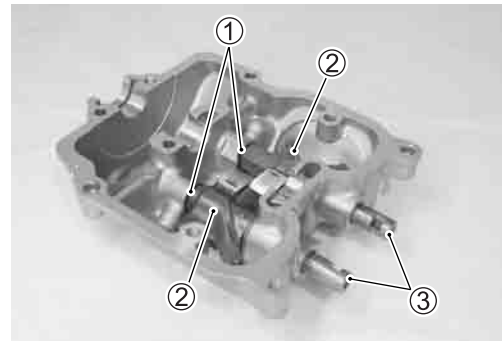
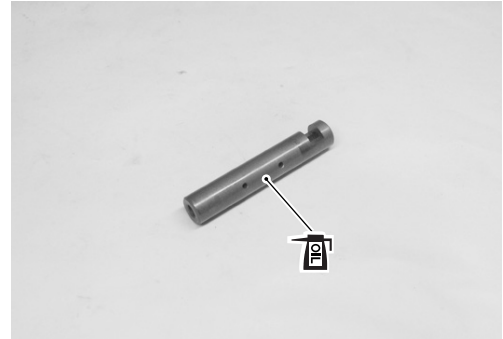
Standard (IN & EX): 12.000 – 12.018 mm
(0.4724 – 0.4731 in)

TOOL 09900-20605: Dial calipers (1/100 mm, 10 – 34 mm)

**REASSEMBLY**

Reassemble the cylinder head cover in the reverse order of disassembly. Pay attention to the following points:

- Apply engine oil to the rocker arm shafts.
- Install the wave washers ①, rocker arms ② and shafts ③.

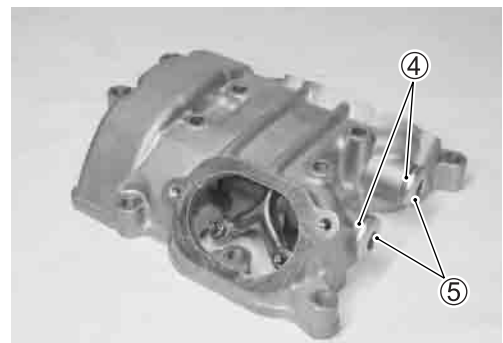


- Install the gaskets ④ and rocker arm shaft bolts ⑤.
- Tighten the rocker arm shaft bolts ⑤ to the specified torque.

ROCKER ARM SHAFT BOLT **Rocker arm shaft bolt: 27.5 N·m (2.75 kgf-m, 20.0 lb-ft)**

CAUTION

The removed gaskets must be replaced with new ones.



CYLINDER HEAD DISASSEMBLY

CAUTION

Identify the position of each removed part. Organize the parts in their respective groups (i.e., intake or exhaust) so that they can be installed in their original locations.

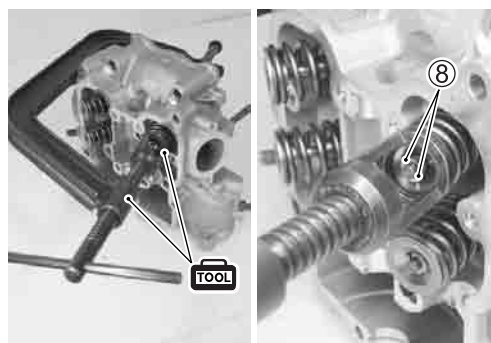
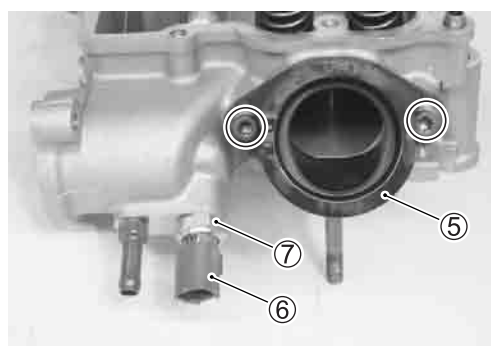
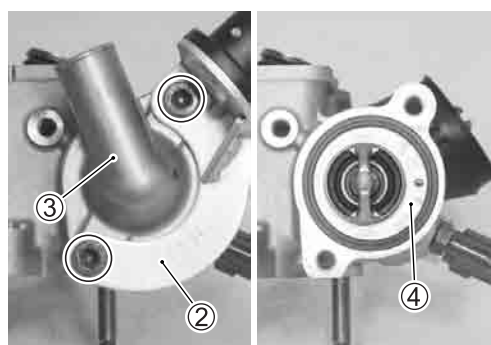
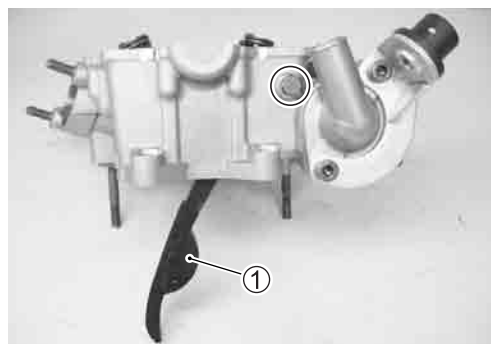
- Remove the cam chain tensioner ①.
- Remove the engine mounting dumper plate ②, thermostat case ③ and thermostat ④.
- Remove the intake pipe ⑤.
- Remove the ECT sensor ⑥ and gasket ⑦ from the cylinder head.
- Using the special tools, compress the valve spring and remove the two cotter halves ⑧ from the valve stem.



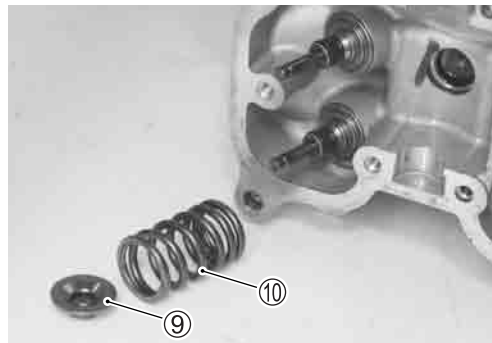
09916-14510: Valve lifter

09916-14910: Valve lifter attachment

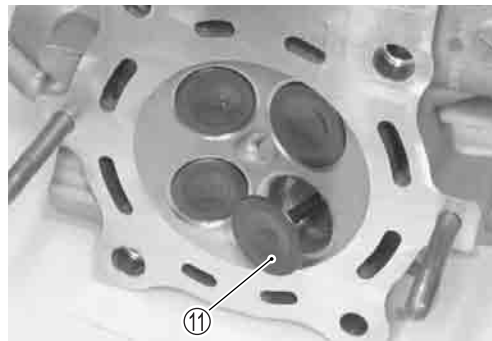
09916-84511: Tweezers



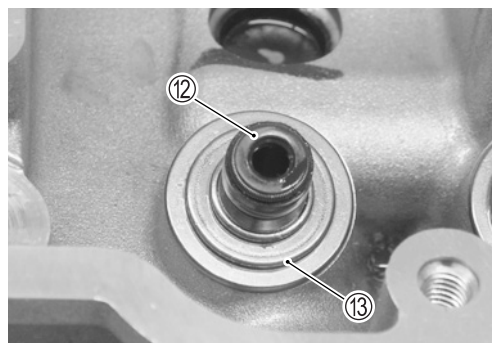
- Remove the valve spring retainer ⑨ and valve spring ⑩.



- Pull out the valve ⑪ from the combustion chamber side.



- Remove the oil seal ⑫ and valve spring seat ⑬.
- Remove the other valves in the same manner as described previously.



CYLINDER HEAD DISTORTION

Decarbonize the combustion chambers.

Inspect the gasket surface of the cylinder head for distortion with a straightedge and thickness gauge, taking a clearance reading at several places indicated. If the largest reading at any position of the straightedge exceeds the limit, replace the cylinder head.

DATA Cylinder head distortion:
Service Limit: 0.05 mm (0.002 in)

TOOL 09900-20803: Thickness gauge

VALVE STEM RUNOUT

Support the valve with a V-blocks and inspect its runout using the dial gauge as shown. If the runout exceeds the service limit, replace the valve.

DATA Valve stem runout:
Service Limit: 0.05 mm (0.002 in)

TOOL 09900-20607: Dial gauge (1/100 mm)
09900-20701: Magnetic stand
09900-21304: V-block set (100 mm)

CAUTION

Be careful not to damage the valve and valve stem when handling it.

VALVE HEAD RADIAL RUNOUT

Place the dial gauge at a right angle to the valve head face and measure the valve head radial runout. If it measures more than the service limit, replace the valve.

DATA Valve head radial runout:
Service Limit: 0.03 mm (0.001 in)

TOOL 09900-20607: Dial gauge (1/100 mm)
09900-20701: Magnetic stand
09900-21304: V-block set (100 mm)

CAUTION

Be careful not to damage the valve and valve stem when handling it.

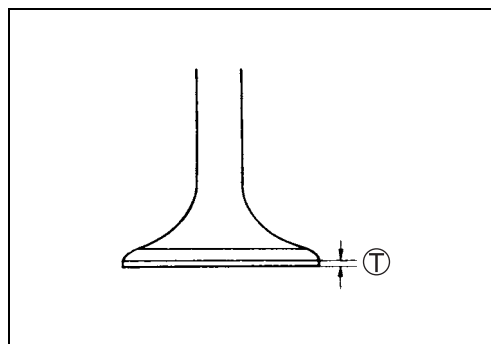
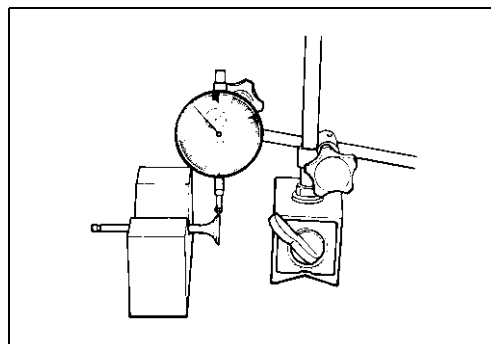
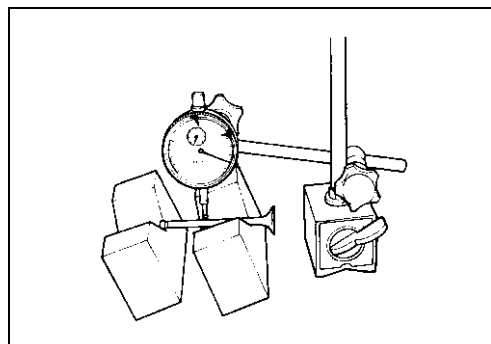
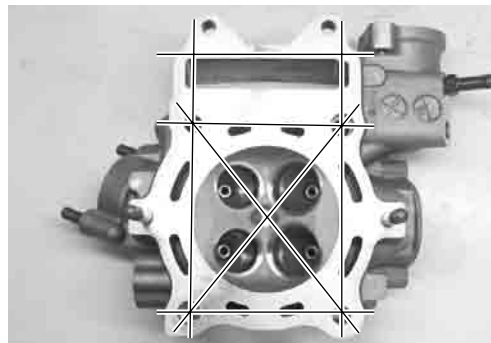
VALVE FACE WEAR

The thickness of the valve face decreases as the face wears.

Visually inspect each valve face for wear and replace any valve with an abnormally worn face. Measure the valve face thickness $\textcircled{T}$, if it is out of specification, replace the valve with a new one.

DATA Valve head thickness $\textcircled{T}$:
Service Limit: 0.5 mm (0.02 in)

TOOL 09900-20101: Vernier calipers

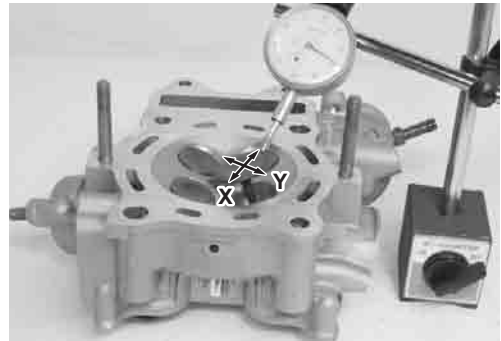


VALVE STEM AND VALVE FACE WEAR CONDITION

Visually inspect each valve stem and valve face for wear and pitting. If it is worn or damaged, replace the valve with a new one.

**VALVE STEM DEFLECTION**

Lift the valve about 10 mm (0.39 in) from the valve seat. Measure the valve stem deflection in two directions, perpendicular to each other, by positioning the dial gauge as shown. If the deflection measured exceeds the limit, then determine whether the valve or the guide should be replaced with a new one.



DATA Valve stem deflection (IN & EX):
Service Limit: 0.35 mm (0.014 in)

TOOL 09900-20607: Dial gauge (1/100 mm)
09900-20701: Magnetic stand

VALVE STEM WEAR

If the valve stem is worn down to the limit, as measured with a micrometer, replace the valve.

If the stem is within the limit, then replace the guide.

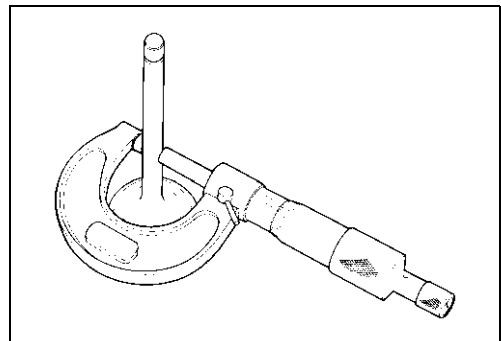
After replacing valve or guide, be sure to recheck the deflection.

DATA Valve stem O.D.:
Standard (IN) : 4.975 – 4.990 mm (0.1958 – 0.1964 in)
(EX): 4.955 – 4.970 mm (0.1950 – 0.1956 in)

TOOL 09900-20205: Micrometer (0 – 25 mm)

NOTE:

If valve guides have to be removed for replacement after inspecting related parts, carry out the steps shown in valve guide servicing. (↗ 3-35)



VALVE GUIDE SERVICING

- Using the valve guide remover, drive the valve guide out toward the intake or exhaust camshaft side.

TOOL 09916-44310: Valve guide remover/installer

NOTE:

- * Discard the removed valve guide subassemblies.
- * Only oversized valve guides are available as replacement parts. (Part No. 11115-14D71)

- Re-finish the valve guide holes in cylinder head with the reamer and handle.

TOOL 09916-34580: Valve guide reamer (10.8 mm)

09916-34542: Reamer handle

CAUTION

When refinishing or removing the reamer from the valve guide hole, always turn it clockwise.

- Cool down the new valve guides in a freezer for about one hour and heat the cylinder head to 100 – 150 °C (212 – 302 °F) with a hot plate.

CAUTION

Do not use a burner to heat the valve guide hole to prevent cylinder head distortion.

- Apply engine oil to the valve guide hole.
- Drive the valve guide into the hole using the valve guide installer ① and attachment ②.

TOOL 09916-44310: Valve guide remover/installer ①

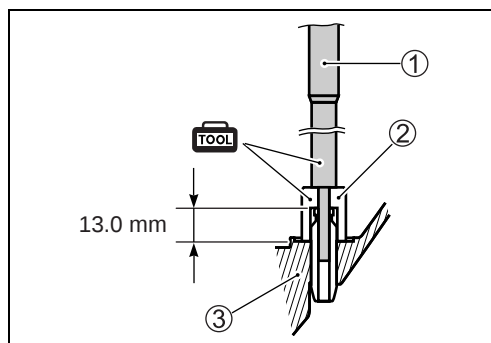
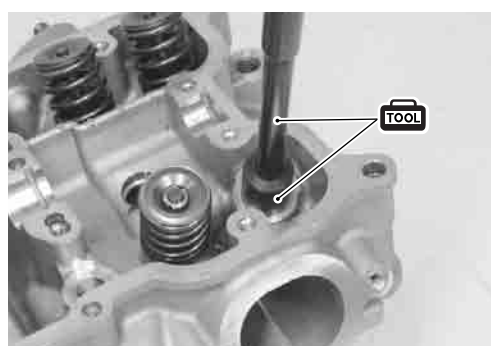
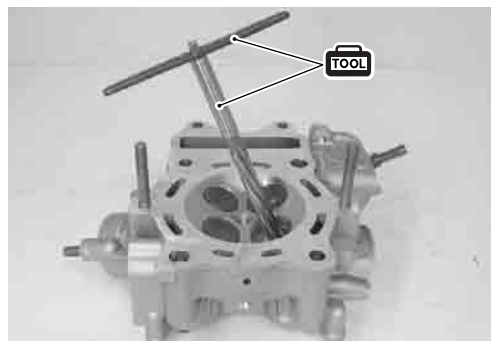
09916-53370: Attachment ②

NOTE:

Install the valve guide until the attachment contacts with the cylinder head ③.

CAUTION

Failure to oil the valve guide hole before driving the new guide into place may result in a damaged guide or head.

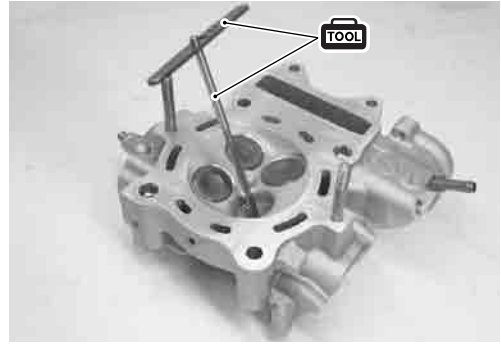


- After installing the valve guides, re-finish their guiding bores using the reamer.
- Clean and engine oil the guides after reaming.

TOOL 09916-34570: Valve guide reamer (5.0 mm)
09916-34542: Reamer handle

NOTE:

- * Be sure to cool down the cylinder head to ambient air temperature.
- * Insert the reamer from the combustion chamber and always turn the reamer handle clockwise.



VALVE SEAT WIDTH INSPECTION

- Visually inspect for valve seat width on each valve face.
- If the valve face has worn abnormally, replace the valve.
- Coat the valve seat with a red lead (Prussian Blue) and set the valve in place. Rotate the valve with light pressure.
- Inspect that the transferred red lead (Prussian Blue) on the valve face is uniform all around and in center of the valve face.

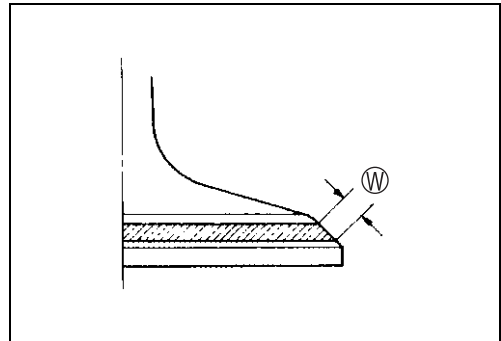
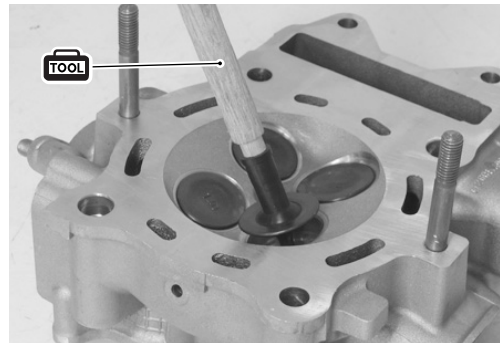
TOOL 09916-10911: Valve lapper set

- If the seat width $\textcircled{W}$ measured exceeds the standard value or seat width is not uniform, refuse the seat using the seat cutter.

DATA Valve seat width $\textcircled{W}$:

Standard: 0.9 – 1.1 mm (0.035 – 0.043 in)

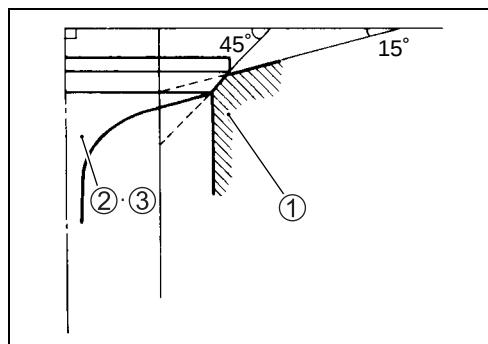
If the valve seat is out of specification, correct the seat by servicing it as follows:



VALVE SEAT SERVICING

- The valve seats ① for both the intake valve ② and exhaust valve ③ are machined to three different angles. The seat contact surface is cut at 45°.

	INTAKE	EXHAUST
seat angle	15°, 45°	15°, 45°
seat width	0.9 – 1.1 mm (0.035 – 0.043 in)	0.9 – 1.1 mm (0.035 – 0.043 in)
valve diameter	30.6 mm (1.20 in)	27 mm (1.06 in)
valve guide I.D.	5.000 – 5.012 mm (0.1968 – 0.1973 in)	5.000 – 5.012 mm (0.1968 – 0.1973 in)



CAUTION

- * The valve seat contact area must be inspected after each cut.
- * Do not use lapping compound after the final cut is made. The finished valve seat should have a velvety smooth finish but not a highly polished or shiny finish. This will provide a soft surface for the final seating of the valve which will occur during the first few seconds of engine operation.

NOTE:

After servicing the valve seats, be sure to check the valve clearance after the cylinder head has been reinstalled. (☞ 2-5)

- Clean and assemble the head and valve components. Fill the intake and exhaust ports with gasoline to check for leaks.
- If any leaks occur, inspect the valve seat and face for burrs or other things that could prevent the valve from sealing.

⚠ WARNING

Always use extreme caution when handling gasoline.



VALVE SPRING

The force of the coil spring keeps the valve seat tight. Weakened spring results in reduced engine power output, and often accounts for the chattering noise coming from the valve mechanism.

Inspect the valve spring for proper strength by measuring its free length and also by the force required to compress it.

If the spring length is less than the service limit, or if the force required to compress the spring does not fall within the range specified, replace the spring.

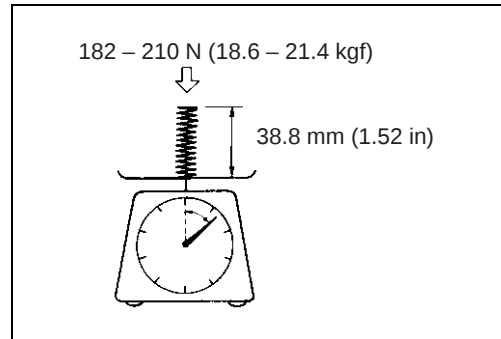
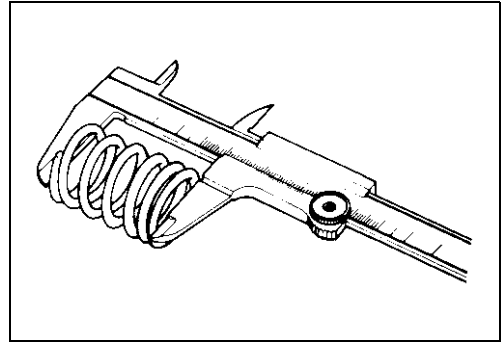
DATA Valve spring free length:

Service limit: (IN & EX) 38.8 mm (1.52 in)

TOOL 09900-20102: Vernier calipers**DATA** Valve spring tension:

Standard:

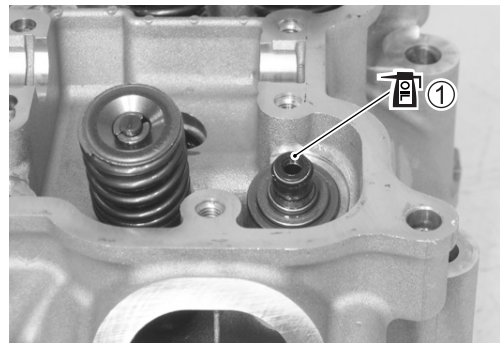
**(IN & EX) 182 – 210 N, 18.6 – 21.4 kgf/ 31.5 mm
(41.0 – 47.2 lbs/ 1.24 in)**

**REASSEMBLY**

- Install the valve spring seat.
- Apply a small quantity of engine oil to the oil seal ①, and press-fit it into position.

CAUTION

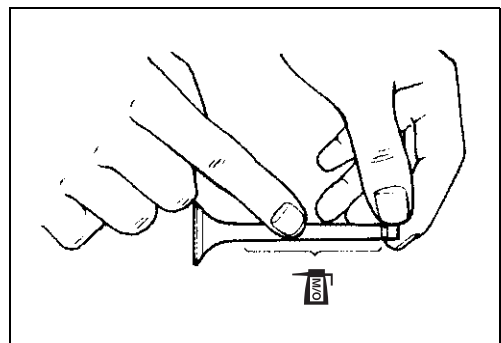
The removed oil seal must be replaced with a new one.



- Insert the valve, with its stem coated with MOLYBDENUM OIL SOLUTION all around and along the full stem length without any break.

CAUTION

When inserting the valve, take care not to damage the lip of the oil seal.

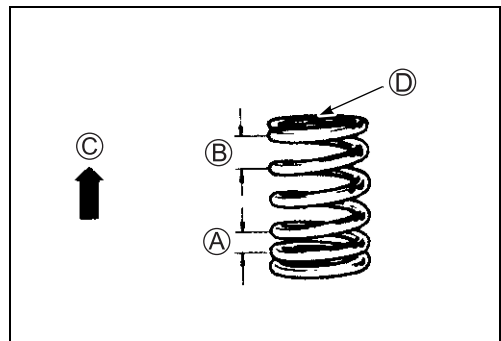
**MO** MOLYBDENUM OIL SOLUTION

- Install the valve spring with the small-pitch portion ④ facing cylinder head.

④ Large-pitch portion

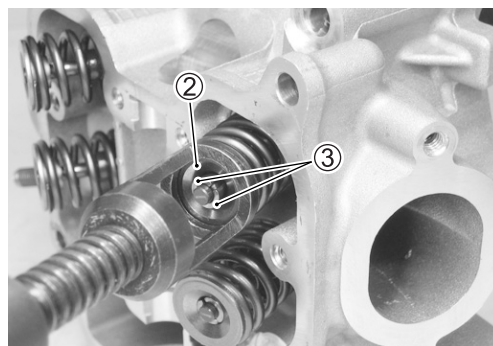
③ UPWARD

② Paint



- Put on the valve spring retainer ②, and using the valve lifter, press down the spring, fit the valve cotter halves to the stem end, and release the lifter to allow the valve cotter ③ to wedge in between retainer and stem.

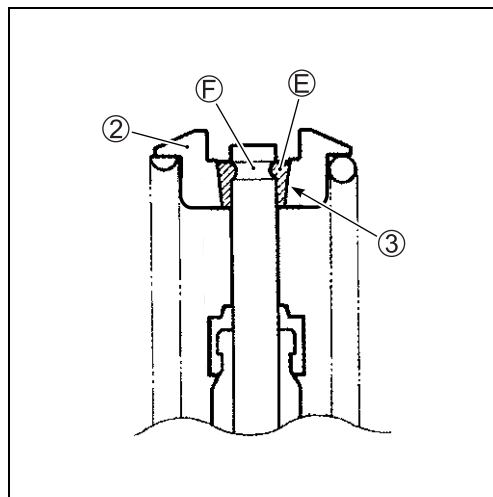
TOOL 09916-14510: Valve lifter
 09916-14910: Valve lifter attachment
 09916-84511: Tweezers



- Be sure that the rounded lip ⑤ of the cotter fits snugly into the groove ⑥ in the stem end.
- Install the other valves and springs in the same manner as described previously.

CAUTION

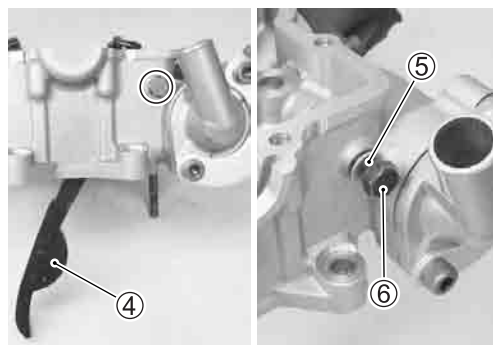
- * Be sure to restore each spring and valve to their original positions.
- * Be careful not to damage the valve and valve stem when handling it.



- ② Valve spring retainer
- ③ Valve cotter

- Install the thermostat, thermostat case and engine mounting damper plate. (7-14)
- Install the cam chain tensioner ④, washer ⑤ and cam chain tensioner bolt ⑥.
- Tighten the cam chain tensioner bolt to the specified torque.

U Cam chain tensioner bolt: 13 N·m (1.3 kgf-m, 9.5 lb-ft)



- Install the ECT sensor. (7-12)
- Apply SUZUKI SUPER GREASE "A" to the O-ring.

FAH 99000-25010: SUZUKI SUPER GREASE "A"
 (or equivalent grease)

CAUTION

The removed O-ring must be replaced with a new one.



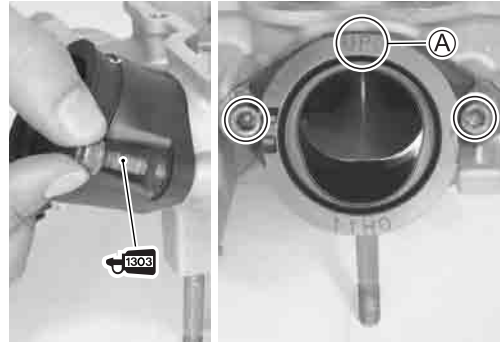
- Apply THREAD LOCK SUPER “1303” to the intake pipe bolts.
- Install the intake pipe and tighten the bolts to the specified torque.

NOTE:

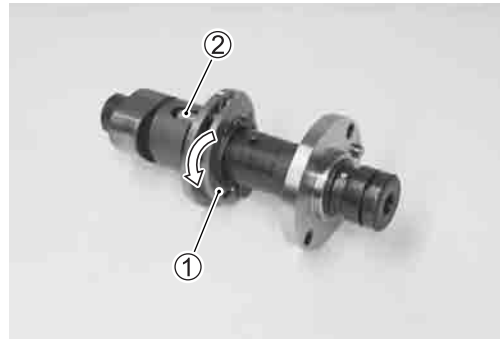
Make sure that the “up mark” Ⓐ comes to the upper side.

 **99000-32030: THREAD LOCK SUPER “1303”**

 **Intake pipe bolt: 9 N·m (0.9 kgf-m, 6.5 lb-ft)**

**AUTOMATIC DECOMP.**

Inspect the decomp. control arm ① moves smoothly and decomp. cam ② rotates together. If any abnormal condition are found, replace the camshaft assembly.

**CAMSHAFT****CAUTION**

Do not attempt to disassemble the camshaft/automatic decomp. assembly. It is not serviceable.

**CAM WEAR**

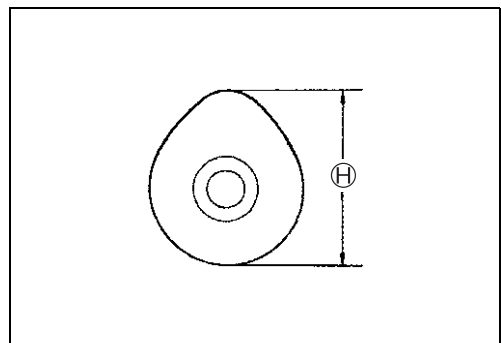
- Inspect the camshaft for wear or damage.
- Measure the cam height Ⓜ with a micrometer.

 **Cam height Ⓜ**

Service Limit (IN) 33.15 mm (1.3051 in)

(EX) 33.17 mm (1.3059 in)

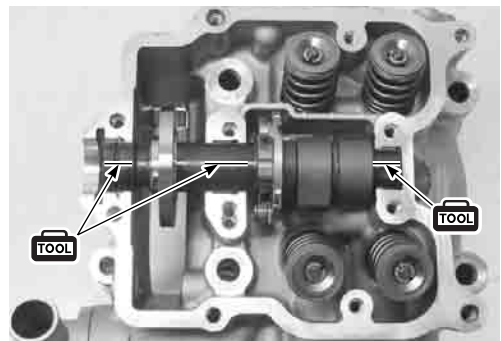
 **09900-20202: Micrometer (25 – 50 mm)**

**CAMSHAFT JOURNAL WEAR**

- Determine whether or not each journal is worn down to the limit by measuring the oil clearance with the camshaft installed in place.
- Use the plastigauge to read the clearance at the widest portion, which is specified as follows:

 **09900-22301: Plastigauge**

09900-22302: Plastigauge



NOTE:

Install the cylinder head cover to its original position.

- Tighten the cylinder head cover bolts to the specified torque and in the proper tightening sequence.

Cylinder head cover bolt: 10 N·m (1.0 kgf-m, 7.0 lb-ft)

NOTE:

Do not rotate the camshaft with the plastigauge in place.

- Remove the cylinder head cover and read the width of the compressed plastigauge with envelope scale. This measurement should be taken at the widest part.

DATA Camshaft journal oil clearance:
Service Limit: 0.150 mm (0.006 in)

- If the camshaft journal oil clearance measured exceeds the limit, measure the inside diameter of the camshaft journal holder and outside diameter of the camshaft journal.
- Replace the camshaft or the cylinder head depending upon which one exceeds the specification.

DATA Camshaft journal holder I.D.:
Standard: 17.512 – 17.525 mm
(0.6894 – 0.6899 in)
22.012 – 22.025 mm
(0.8666 – 0.8671 in)

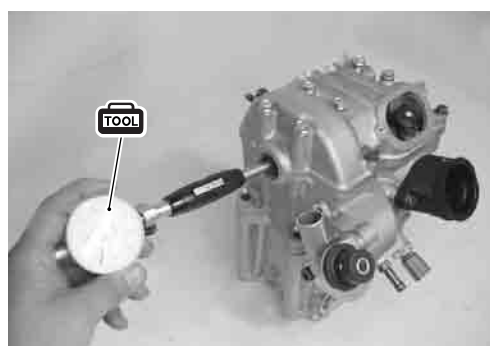
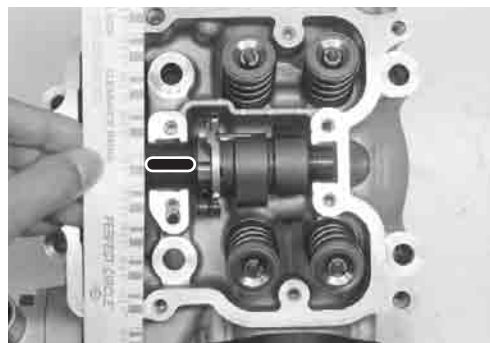
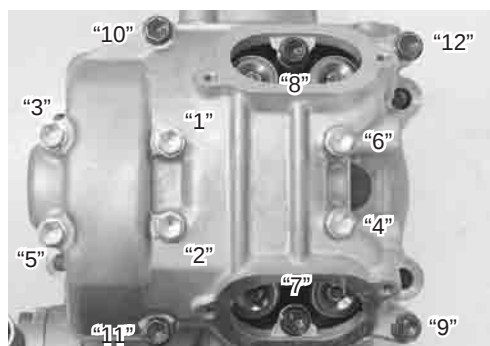
TOOL 09900-20602: Dial gauge (1/1000, 1 mm)
09900-22403: Small bore gauge (18 – 35 mm)

DATA Camshaft journal O.D.:
Standard: 17.466 – 17.484 mm
(0.6876 – 0.6883 in)
21.959 – 21.980 mm
(0.8645 – 0.8653 in)

TOOL 09900-20205: Micrometer (0 – 25 mm)

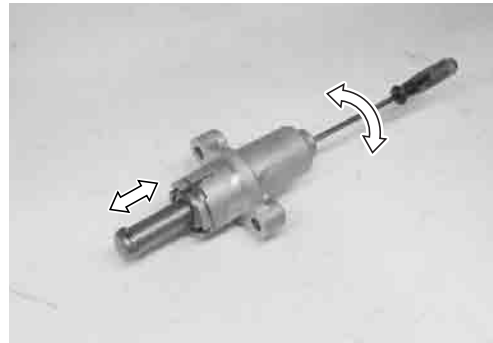
CAM SPROCKET

Inspect the sprocket teeth for wear. If they are worn, replace the cam sprocket, and cam chain as a set.



CAM CHAIN TENSION ADJUSTER

Insert the $\ominus$ screwdriver into the slotted end of cam chain tension adjuster and turn it clockwise to lessen the tension and release the $\ominus$ screwdriver. Then check the push rod movement. If the push rod is stuck or spring mechanism failed, replace the cam chain tension adjuster assembly with a new one.



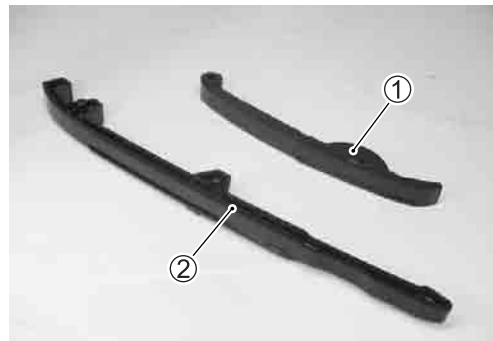
CAM CHAIN TENSIONER/GUIDE

- Remove the cam chain tensioner. (🔧 3-31)

Visually inspect the contacting surface of the cam chain tensioner ① and cam chain guide ②.

If any defects are found, replace it with a new one.

- Install the cam chain tensioner. (🔧 3-39)



CYLINDER

CYLINDER DISTORTION

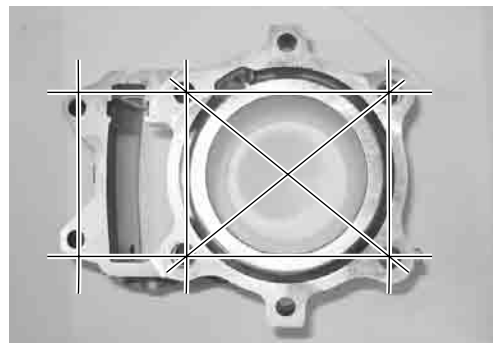
Inspect the gasket surface of the cylinder for distortion with a straightedge and thickness gauge, taking a clearance reading at several places indicated.

If the largest reading at any position of the straightedge exceeds the limit, replace the cylinder head.

DATA Cylinder distortion:

Service Limit: 0.05 mm (0.002 in)

TOOL 09900-20803: Thickness gauge



CYLINDER BORE

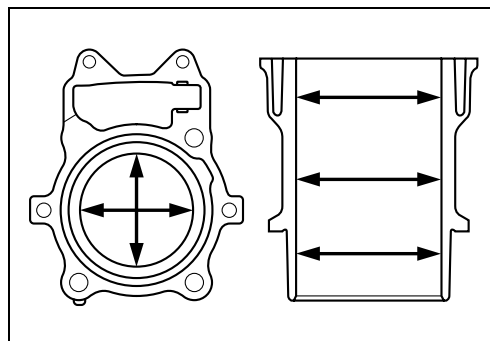
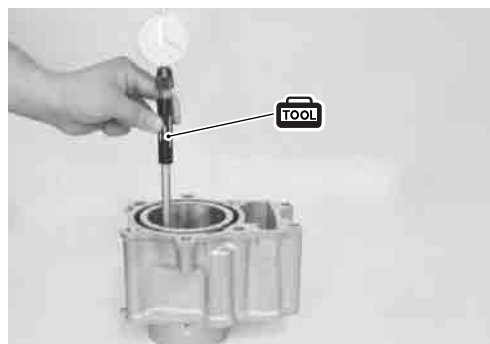
Inspect the cylinder wall for any scratches, nicks or other damage. Measure the cylinder bore diameter at six places.

If any one of the measurements exceed the limit, replace the cylinder.

DATA Cylinder bore

Standard: 84.000 – 84.015 mm (3.3070 – 3.3076 in)

TOOL 09900-20530: Cylinder gauge set



PISTON AND PISTON RING

PISTON DIAMETER

Using a micrometer, measure the piston outside diameter at 15 mm (0.6 in) (A) from the piston skirt end.

If the measurement is less than the limit, replace the piston.

DATA Piston diameter:

Service Limit: 83.880 mm (3.3023 in)

at 15 mm (0.6 in) from the skirt end

TOOL 09900-20204: Micrometer (75 – 100 mm)



PISTON-TO-CYLINDER CLEARANCE

Subtract the piston diameter from the cylinder bore diameter. (above)

If the piston-to-cylinder clearance exceeds the service limit, replace the cylinder or the piston, or both.

DATA Piston-to-cylinder clearance:

Service Limit: 0.120 mm (0.0047 in)

PISTON PIN AND PIN BORE

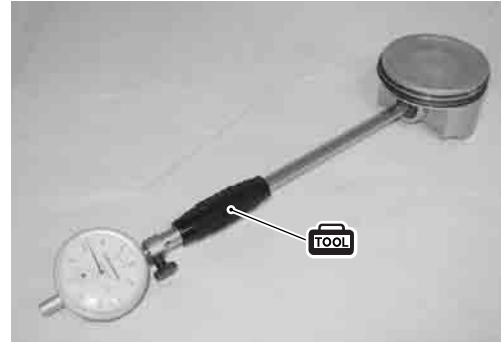
Measure the piston pin bore diameter using the small bore gauge. If the measurement is out of specifications replace the piston.

DATA Piston pin bore I.D.:

Service Limit: 20.030 mm (0.7885 in)

TOOL 09900-20602: Dial gauge (1/1000 mm, 1 mm)

09900-22403: Small bore gauge (18 – 35 mm)

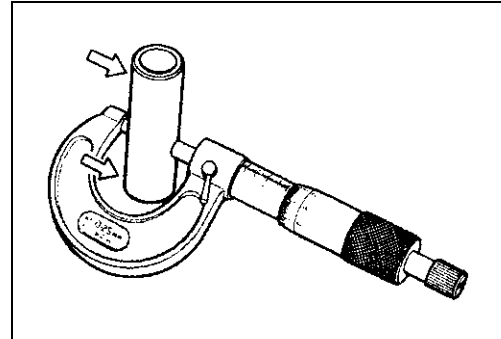


Measure the piston pin outside diameter at three positions using the micrometer. If any of the measurements are out of specification, replace the piston pin.

DATA Piston pin O.D.:

Service Limit: 18.980 mm (0.7472 in)

TOOL 09900-20205: Micrometer (0 – 25 mm)

**PISTON-RING-TO-GROOVE CLEARANCE**

Measure the side clearances of the 1st and 2nd piston rings using the thickness gauge. If any of the clearances exceeds the limit, replace both the piston and piston rings.

DATA Piston-ring-to-groove clearance

Service Limit:

1st: 0.180 mm (0.007 in)

2nd: 0.150 mm (0.006 in)

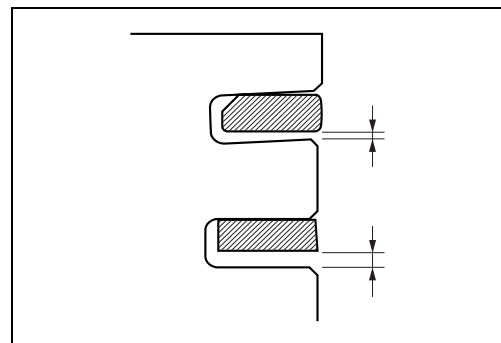
DATA Piston ring groove width

Standard:

1st: 1.21 – 1.23 mm (0.0476 – 0.0484 in)

2nd: 1.01 – 1.03 mm (0.0397 – 0.0405 in)

Oil: 2.51 – 2.53 mm (0.0988 – 0.0996 in)

**DATA** Piston ring thickness

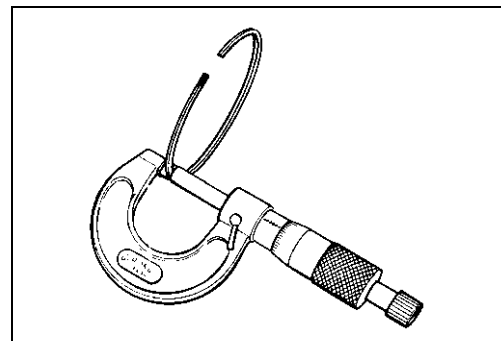
Standard:

1st: 1.17 – 1.19 mm (0.0460 – 0.0468 in)

2nd: 0.97 – 0.99 mm (0.0381 – 0.0389 in)

TOOL 09900-20803: Thickness gauge

09900-20205: Micrometer (0 – 25 mm)



PISTON RING END GAP

Fit the piston ring squarely into the cylinder and measure the piston ring end gap using the thickness gauge.

If any of the measurements exceeds the service limit, replace the piston ring with a new one.

DATA Piston ring end gap:

Service Limit:

1st: 0.50 mm (0.020 in)

2nd: 0.50 mm (0.020 in)

TOOL 09900-20803: Thickness gauge



CONROD

CONROD SMALL END I.D.

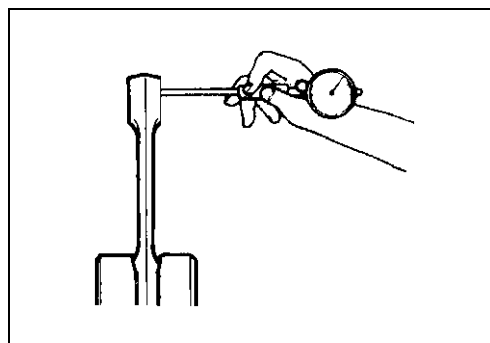
Using a small bore gauge, measure the inside diameter of the conrod small end. If the inside diameter of the conrod small end exceeds the limit, replace the conrod.

DATA Conrod small end I.D.:

Service Limit: 20.040 mm (0.7889 in)

TOOL 09900-20602: Dial gauge (1/1 000 mm, 1 mm)

09900-22403: Small bore gauge (18 – 35 mm)



CONROD DEFLECTION AND BIG END SIDE CLEARANCE

Wear on the big end of the conrod can be estimated by checking the movement of the small end of the rod. This method can also be used to check the extent of wear on the parts of the conrod big end.

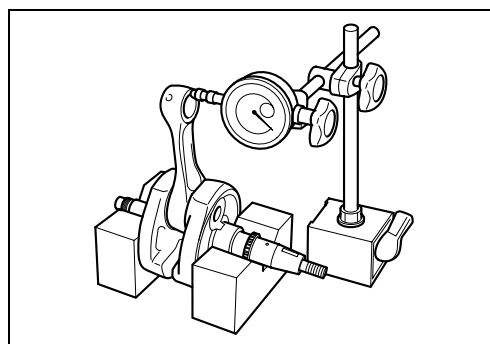
DATA Conrod deflection

Service Limit: 3.0 mm (0.12 in)

TOOL 09900-20701: Magnetic stand

09900-20607: Dial gauge (1/100 mm)

09900-21304: V-block set (100 mm)

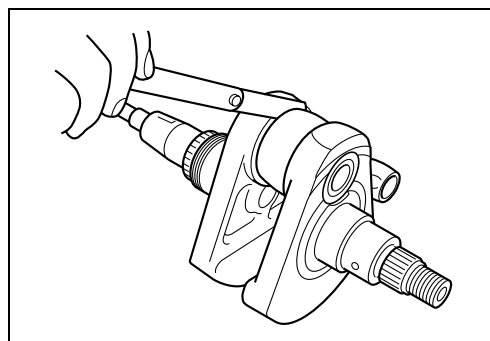


Push the big end of the conrod to one side and measure the side clearance using a thickness gauge. If the clearance exceeds the service limit, replace the crankshaft assembly with a new one or bring the deflection and the side clearance within the service limit by replacing the worn parts (conrod, big end bearing, crank pin, etc.) with new ones.

DATA Conrod big end side clearance

Service Limit: 1.0 mm (0.039 in)

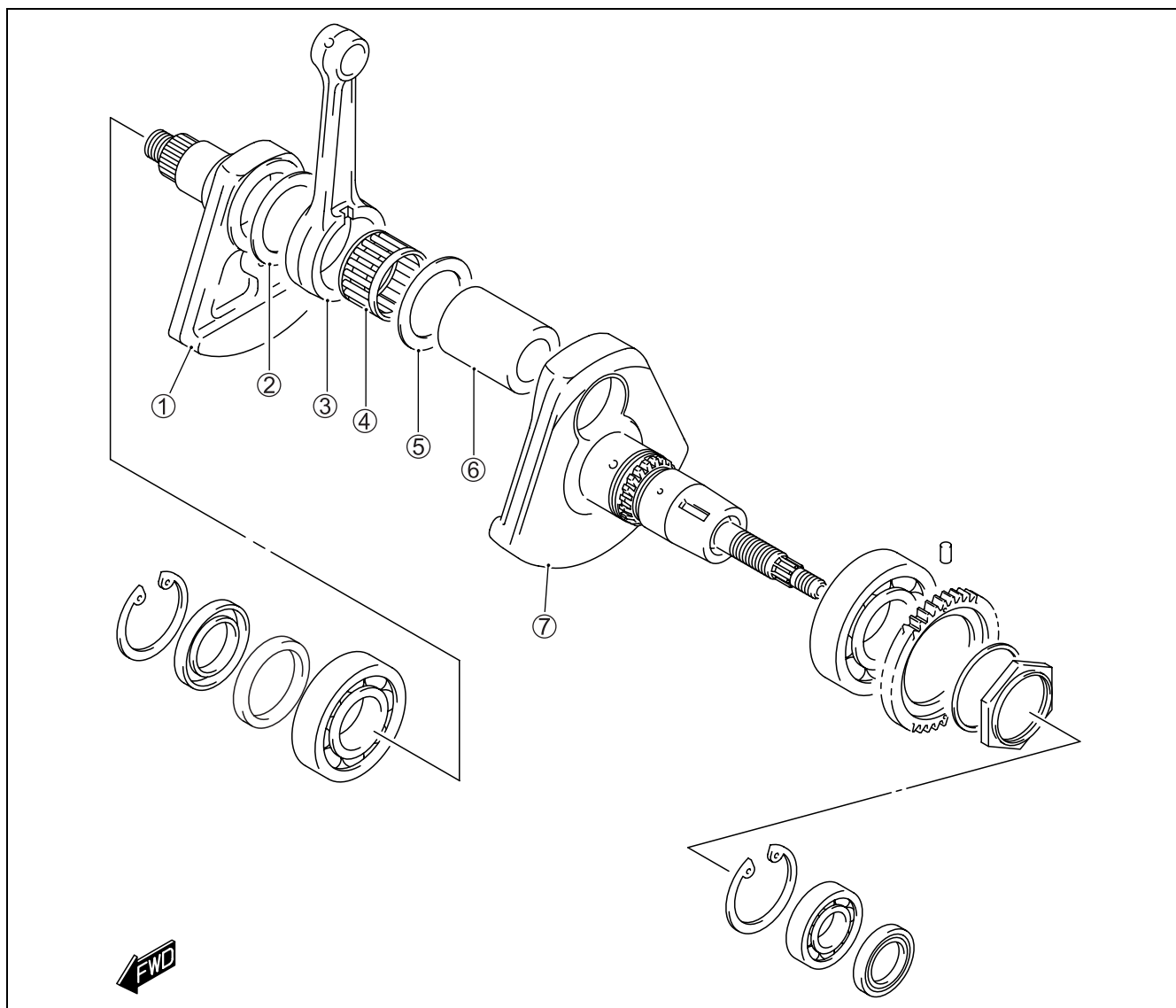
TOOL 09900-20803: Thickness gauge



CRANKSHAFT

DISASSEMBLY

- Disassemble the crankshaft as shown.



① Crankshaft (R)	⑤ Washer
② Washer	⑥ Crank pin
③ Conrod	⑦ Crankshaft (L)
④ Bearing	

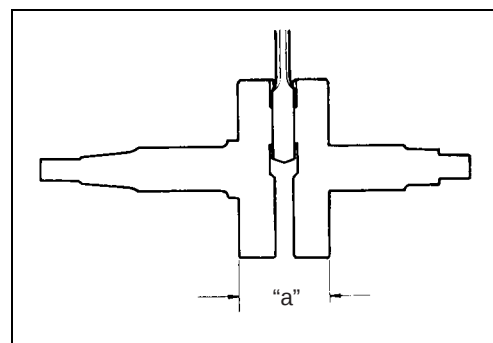
REASSEMBLY

- Measure the width between the crankshaft webs "a" referring to the figure when rebuilding the crankshaft.



Crank web to web width:

Standard: 70.9 – 71.1 mm (2.79 – 2.78 in)



CRANKSHAFT RUNOUT

Support the crankshaft using V-blocks and measure the crankshaft runout using the dial gauge, as shown. If the runout exceeds the service limit, replace the crankshaft with a new one.

NOTE:

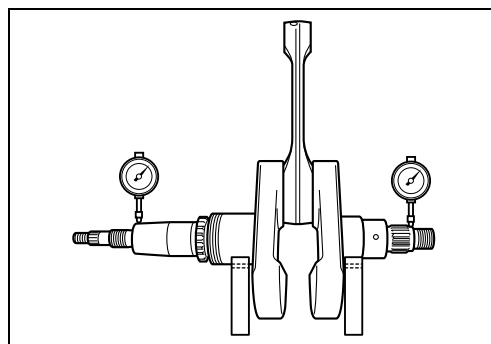
* Place the crankshaft onto the V-blocks so that it becomes horizontally.

* Measure the runout from the tips of the crankshaft.

DATA Crankshaft runout

Service Limit: 0.08 mm (0.003 in)

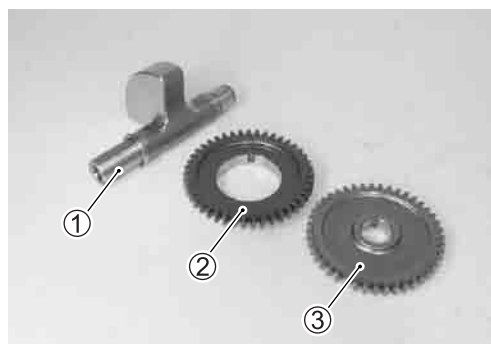
TOOL 09900-20607: Dial gauge (1/100 mm, 10 mm)
09900-20701: Magnetic stand
09910-21304: V-block set (100 mm)



CRANK BALANCER, BALANCER DRIVEN GEAR AND DRIVE GEAR

INSPECTION

Inspect the crank balancer ①, crank balancer drive gear ② and crank balancer driven gear ③ for wear or damage. If any defects are found, replace the defective part.

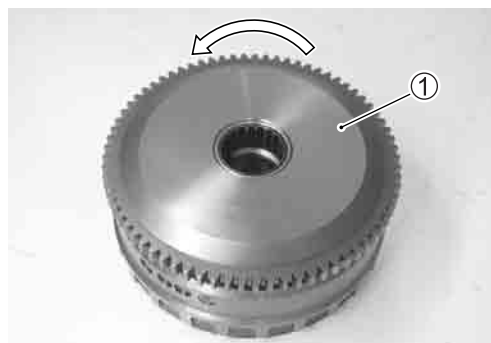


STARTER CLUTCH

INSPECTION

Install the starter driven gear ① onto the starter clutch and turn the starter driven gear by hand to inspect the starter clutch for a smooth movement. The gear turns one direction only. If a large resistance is felt to rotation, inspect the starter clutch for damage or inspect the starter clutch contacting surface of the starter driven gear for wear or damage.

If they are found to be damaged, replace them with new ones.



DISASSEMBLY

- Hold the rotor and remove the bolts.



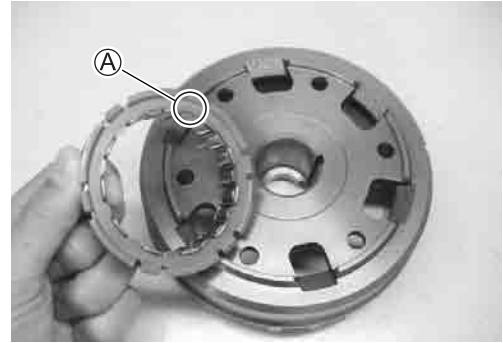
REASSEMBLY

- Install the starter clutch in the proper direction as shown.

NOTE:

When installing the starter clutch onto the rotor, make sure that the arrow mark Ⓐ in the bearing faces to the rotor.

- Apply engine oil to the starter clutch.



- Apply a small quantity of THREAD LOCK SUPER "1303" to the starter clutch bolt.

 **99000-32030: THREAD LOCK SUPER "1303"**



- Hold the rotor and tighten the bolts.

 **Starter clutch bolt: 25.5 N·m (2.55 kgf-m, 18.5 lb-ft)**

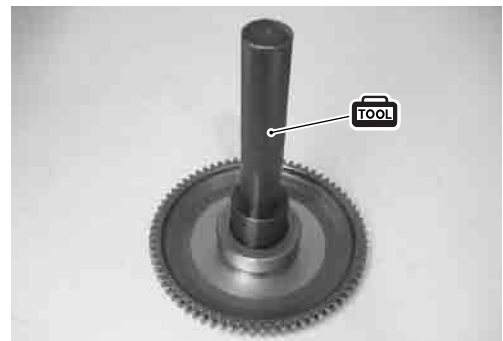
**STARTER DRIVEN GEAR BEARING INSPECTION**

Inspect the starter driven gear bearing for any damages. If any defects are found, replace the starter drive gear bearing with a new one.

**STARTER DRIVEN GEAR BEARING REPLACEMENT**

- Remove the bearing with the special tool.

 **09913-70210: Bearing installer set (φ37)**



- Install the bearing with the special tool.

 **09913-70210: Bearing installer set ($\phi 37$)**

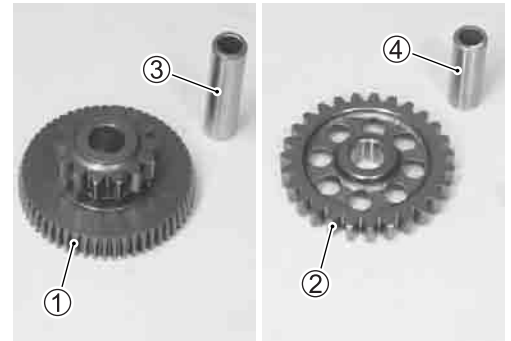
CAUTION

The removed bearing must be replaced with a new one.

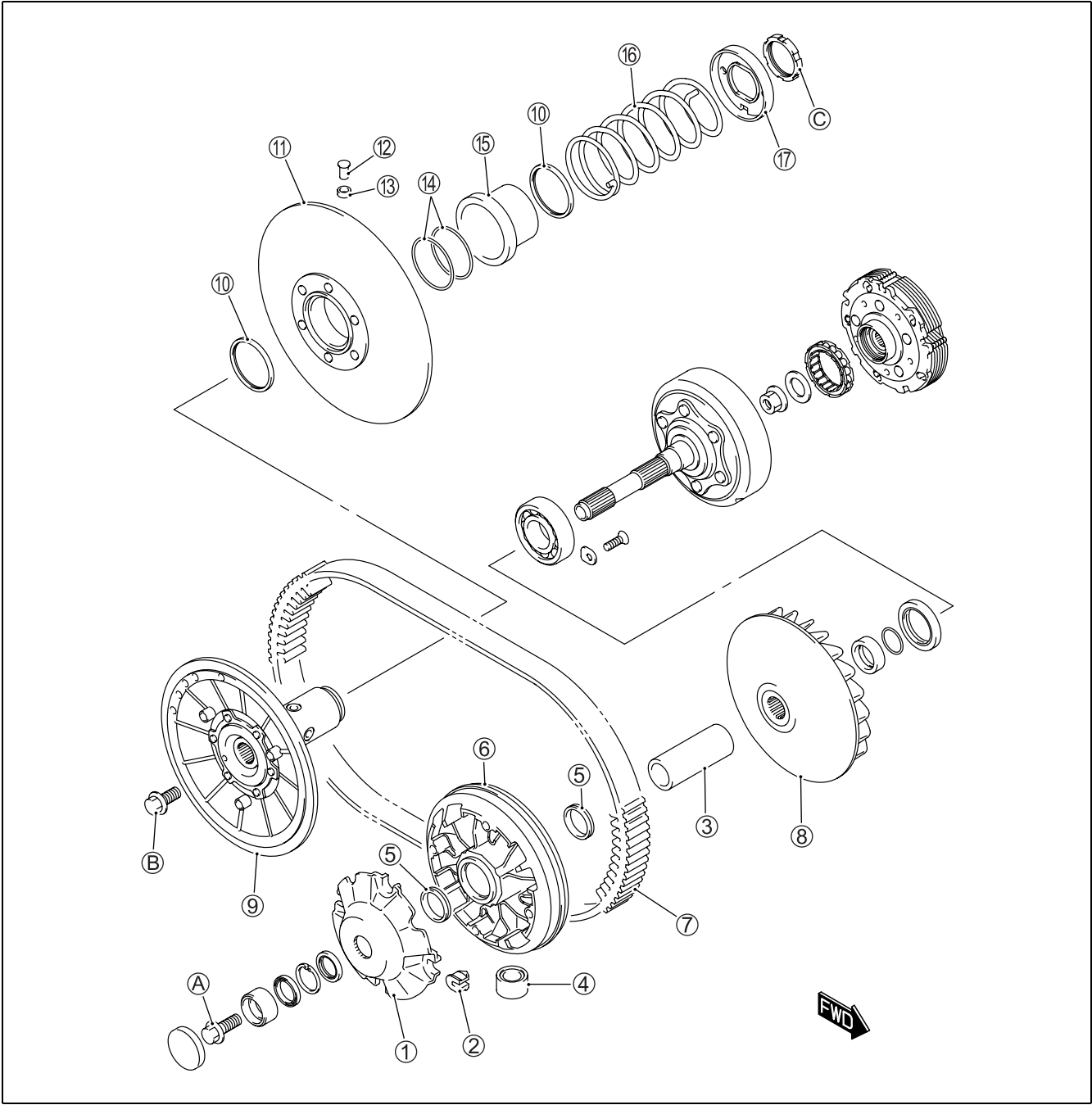


STARTER IDLE GEAR NO.1 AND NO.2 INSPECTION

Inspect the starter idle gear No.1 ①, No.2 ②, starter idle gear shafts ③ and ④ for wear or damage. If any defects are found, replace the defective part.



MOVABLE DRIVE FACE AND DRIVEN FACE



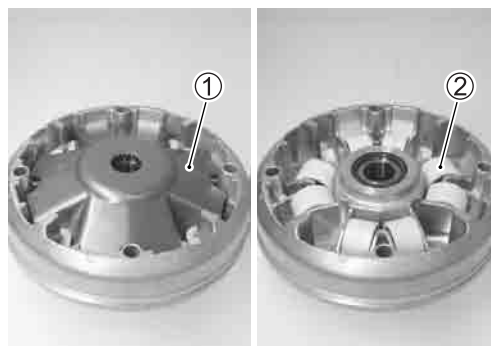
①	Movable drive plate	⑪	Movable driven face
②	Damper (4 pcs)	⑫	Pin (4 pcs)
③	Spacer	⑬	Spacer (4 pcs)
④	Roller (8 pcs)	⑭	O-ring (2 pcs)
⑤	Oil seal (2 pcs)	⑮	Spring seat
⑥	Movable drive face	⑯	Spring
⑦	Drive belt	⑰	Spring plate
⑧	Fixed drive face	A	Movable drive face bolt
⑨	Fixed driven face	B	Movable driven face bolt
⑩	Oil seal (2 pcs)	C	Movable driven face ring nut



ITEM	N-m	kgf-m	lb-ft
A	110	11.0	79.5
B	110	11.0	79.5
C	110	11.0	79.5

MOVABLE DRIVE FACE DISASSEMBLY

- Remove the movable drive face plate ① and rollers ②.



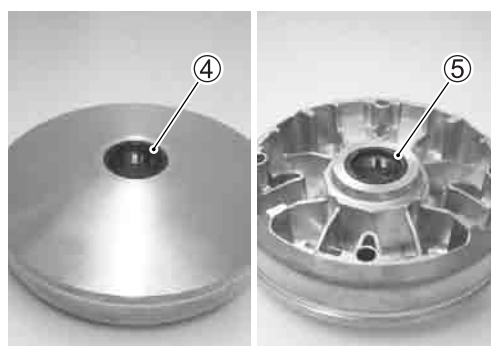
- Remove the spacer ③.



- Remove the oil seals ④ and ⑤.

NOTE:

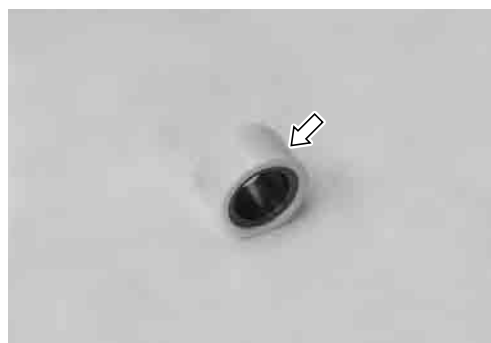
If there are abnormal conditions, the oil seals removal are not necessary.

**ROLLER INSPECTION**

Inspect each roller and their sliding surface for wear or damage. If any defects are found, replace the rollers as a set.

NOTE:

The rollers must always be changed as a set.

**DAMPER INSPECTION**

Inspect the dampers for wear or damage.

If any defects are found, replace the dampers with new ones.



MOVABLE AND FIXED DRIVE FACE INSPECTION

Inspect the drive faces for any abnormal conditions, such as stepped wear or discoloration caused by burning.

If any defects are found, replace them with new ones.

**MOVABLE DRIVE FACE REASSEMBLY**

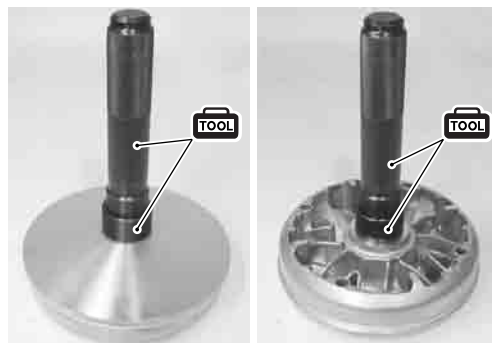
Reassemble the movable drive face in the reverse order of disassembly. Pay attention to the following points:

- Install the oil seals with the special tool.

 **09913-70210: Bearing installer set ($\phi 42$)**

CAUTION

The removed oil seals must be replaced with new ones.

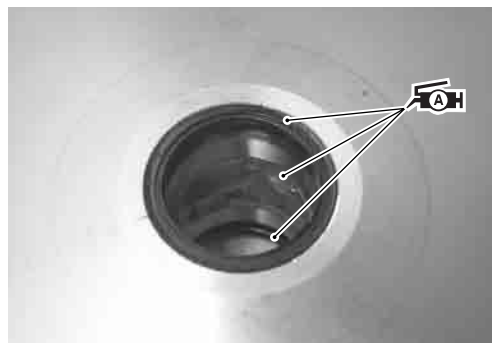


- Apply SUZUKI SUPER GREASE "A" to the lip of oil seals and inside grease groove of the movable drive face.

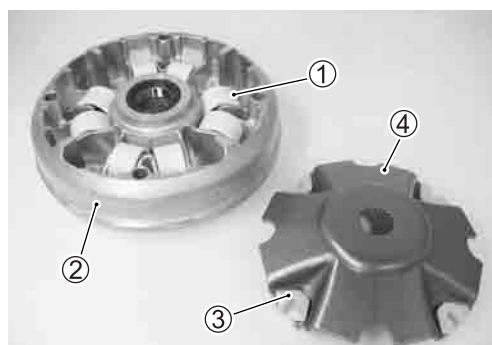
 **99000-25010: SUZUKI SUPER GREASE "A"**
(or equivalent grease)

CAUTION

- * Wipe off any excess grease thoroughly.
- * Take care not to apply grease to the contact surface of the drive belt.



- Position the eight rollers ① on the movable drive face ②.
- Mount the dampers ③ on the movable drive face plate ④.
- Position the movable drive face plate on the movable drive face.



- Install the spacer ⑤.

NOTE:

When inserting the spacer, press down the movable drive face plate so as not to cause the rollers to come out of position.



MOVABLE DRIVEN FACE DISASSEMBLY

- Hold the movable driven face assembly with the special tools and vise, loosen the movable driven face ring nut with the special tools.

⚠ WARNING

Do not remove the movable driven face ring nut before attaching the clutch spring compressor.

TOOL 09917-23711: Ring nut socket wrench
09924-52450: Fixed driven face holder

- Attach the special tool to the movable driven face assembly and compress the movable driven face assembly by turning in the special tool handle.

NOTE:

Make sure to insert the spring end **(A)** into the slot **(B)** of the special tool as shown.

TOOL 09922-31430: Movable driven face spring compressor

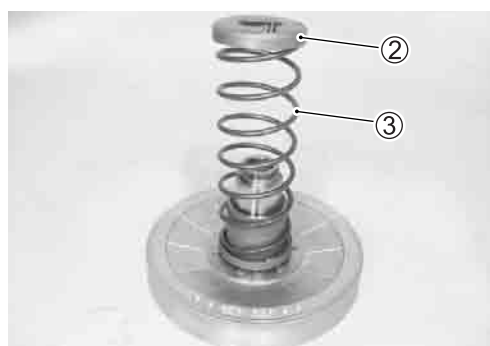
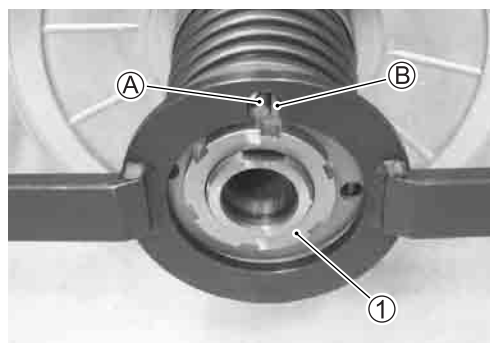
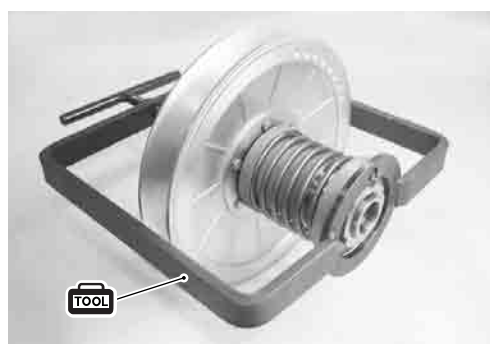
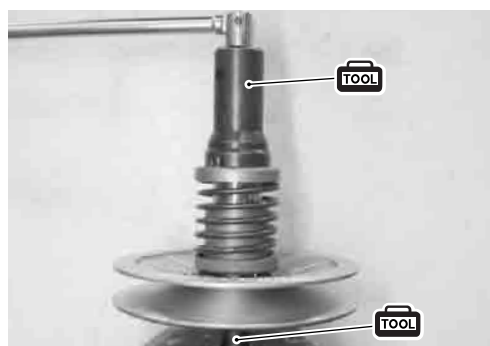
- Remove the movable driven face ring nut **(1)**.

⚠ WARNING

Since a high spring force applies to the movable driven face, care must be used so as not to cause the movable driven face to come off abruptly.

- Loosen the special tool handle slowly and remove the special tool.

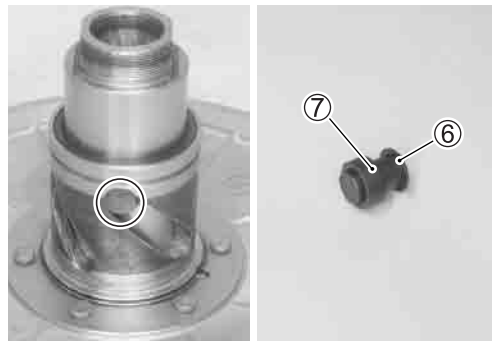
- Remove the spring plate **(2)** and spring **(3)**.



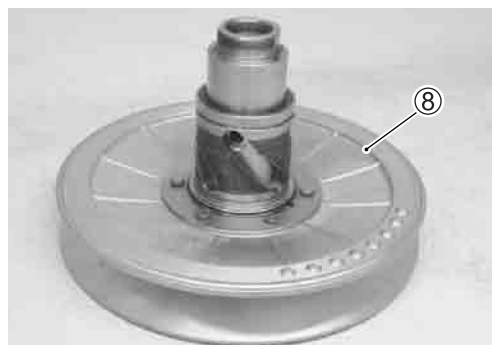
- Remove the spring seat ④ and O-rings ⑤.



- Remove the pins ⑥ and rollers ⑦.



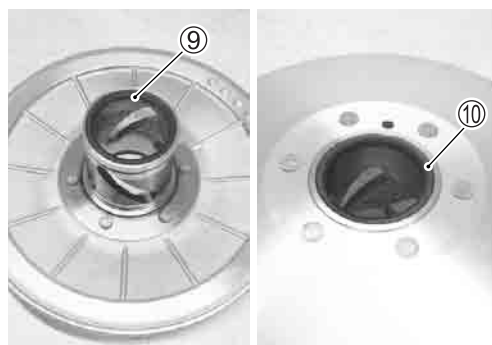
- Remove the movable driven face ⑧.



- Remove the oil seals ⑨ and ⑩ from the movable driven face.

NOTE:

If there are abnormal conditions, the oil seals removal are not necessary.



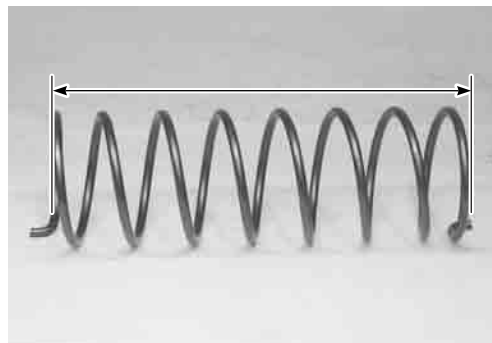
MOVABLE DRIVEN FACE SPRING INSPECTION

- Measure the spring free length with the vernier calipers.
- If the length is shorter than the service limit, replace the spring with a new one.



Movable driven face spring free length:

Service Limit: 204.3 mm (8.04 in)



MOVABLE AND FIXED DRIVEN FACE INSPECTION

Inspect the driven face for any abnormal conditions, such as stepped wear or discoloration caused by burning.

If any defects are found, replace them with new ones.



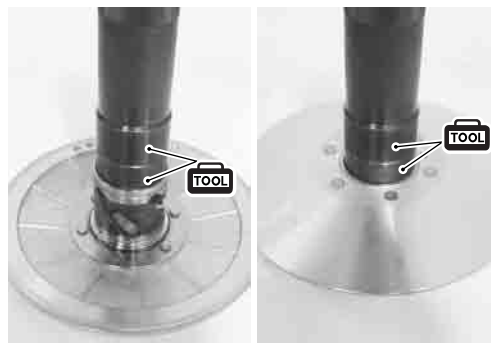
MOVABLE DRIVEN FACE REASSEMBLY

- Install the oil seals with the special tool.

TOOL 09913-70210: Bearing installer set ($\phi 52$)

CAUTION

The removed oil seals must be replaced with new ones.

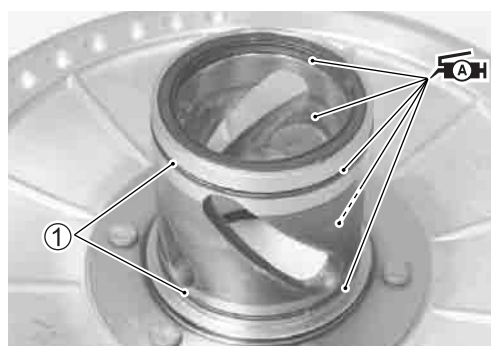


- Install the O-rings ① to the movable driven face.
- Apply SUZUKI SUPER GREASE "A" to the oil seal lips and movable driven face inside grease groove.

HA 99000-25010: SUZUKI SUPER GREASE "A"
(or equivalent grease)

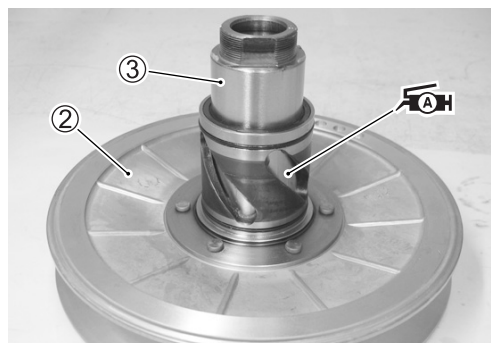
CAUTION

- * Wipe off any excess grease thoroughly.
- * Take care not to apply grease to the contact surface of the drive belt.



- Install the movable driven face ② to the fixed driven face ③.
- Apply SUZUKI SUPER GREASE "A" to the O-rings and pin grooves of the movable driven face.

HA 99000-25010: SUZUKI SUPER GREASE "A"
(or equivalent grease)



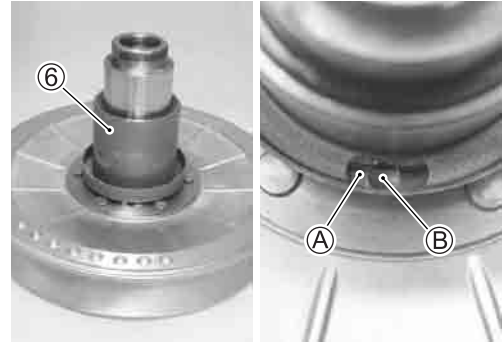
- Install the rollers ④ and pins ⑤.

CAUTION

To prevent damaging the oil seal lip from during installation, slide the lip using a 0.1-mm steel sheet as a guide.



- Install the spring seat ⑥ by aligning the hole ① with the hole ②.

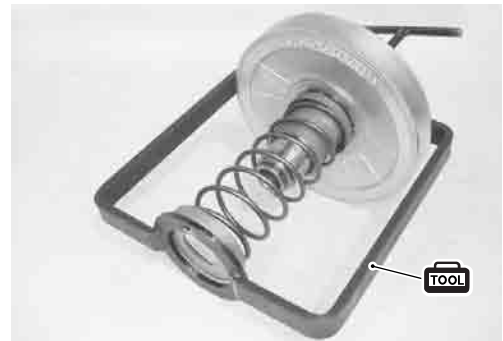


- Install the spring ⑦ and spring plate ⑧ by aligning the spring ends with the holes.

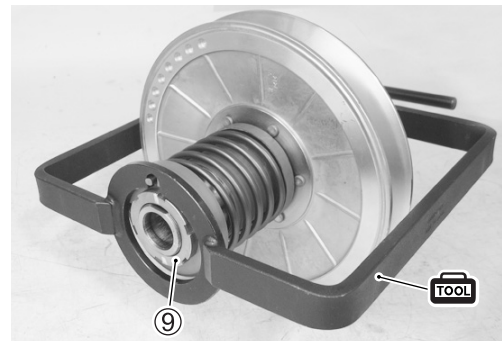


- Compress the spring with the special tool.

TOOL 09922-31430: Movable driven face spring compressor



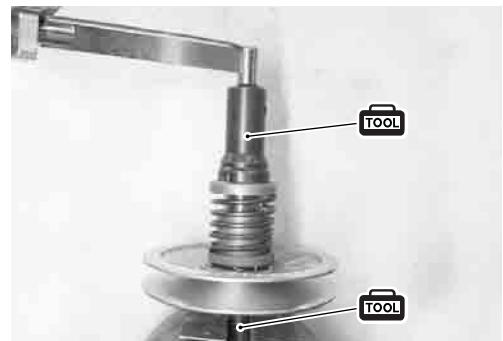
- Tighten the movable driven face ring nut ⑨ temporarily.
- Remove the special tool from the movable driven face assembly.



- Tighten the movable driven face ring nut to the specified torque with the special tool.

TOOL Movable driven face ring nut:
110 N·m (11.0 kgf-m, 79.5 lb-ft)

TOOL 09917-23711: Ring nut socket wrench
09924-52450: Fixed driven face holder



DRIVE BELT

INSPECTION

Inspect that the drive belt is free from any greasy substance. Inspect the contact surface of the drive belt for cracks or damage and measure the width of the drive belt with the vernier calipers.

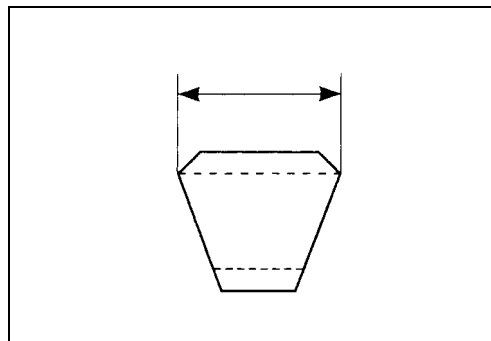
If any defects are found or the measurement exceeds the service limit, replace the drive belt with a new one.

CAUTION

If grease or oil is present on the surface of the drive belt, degrease the belt thoroughly.

DATA Drive belt width:
Service Limit: 30.1 mm (1.18 in)

TOOL 09900-20101: Vernier calipers



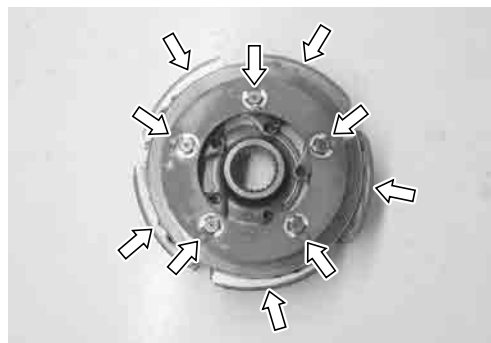
CLUTCH SHOE

INSPECTION

Inspect the boss and centrifugal weight fulcrum sections for looseness, damage and operation.

Inspect the clutch shoe for damage and fouling with oil on the surface.

If any defects are found, replace the clutch shoe assembly with a new one.



Measure the thickness of the clutch shoe at the center position. If the thickness is less than the service limit, replace the clutch shoe assembly with a new one.

DATA Clutch shoe thickness:
Service Limit: No groove at any part



CLUTCH HOUSING

INSPECTION

Inspect the clutch housing for any abnormal surface damage.

Measure the inside diameter of the clutch housing.

If the measurement exceeds the service limit, replace the clutch housing with a new one.

DATA Clutch housing I.D.:
Service Limit: 140.5 mm (5.53 in)

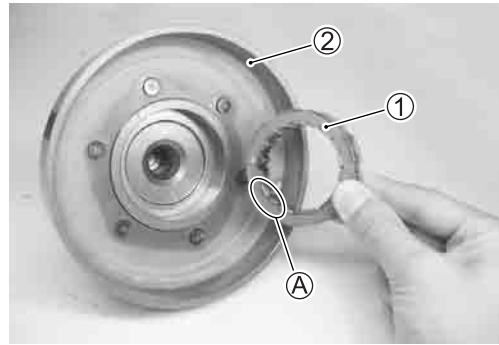


ONE WAY CLUTCH INSPECTION

- Install the one way clutch ① onto the proper direction as shown.

NOTE:

When installing the one way clutch ① onto the clutch housing ②, make sure that the "OUTSIDE" mark Ⓐ in the one way clutch faces to the clutch housing.



- Install the clutch shoe ③ onto the clutch housing and turn the clutch shoe by hand to inspect the one way clutch for a smooth movement. The clutch shoe turns one direction only. If a large resistance is felt to rotation, inspect the one way clutch for damage or inspect the one way clutch contacting surface of the clutch shoe for wear or damage. If any defects are found, replace them with new ones.



OIL PUMP INSPECTION

- Rotate the oil pump by hand and inspect that it moves smoothly. If it does not move smoothly, replace the oil pump assembly.

CAUTION

- * Do not attempt to disassemble the oil pump assembly.
- * The oil pump is available only as an assembly.

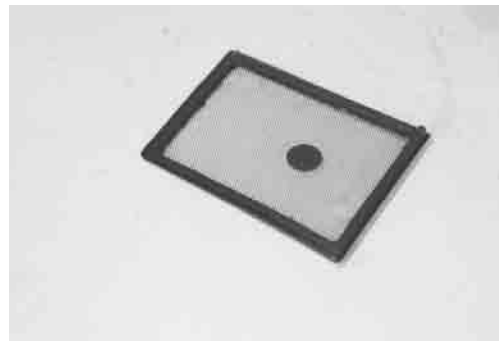


- Inspect the oil pump driven gear for wear and damage. If any defects are found, replace the oil pump driven gear with a new one.



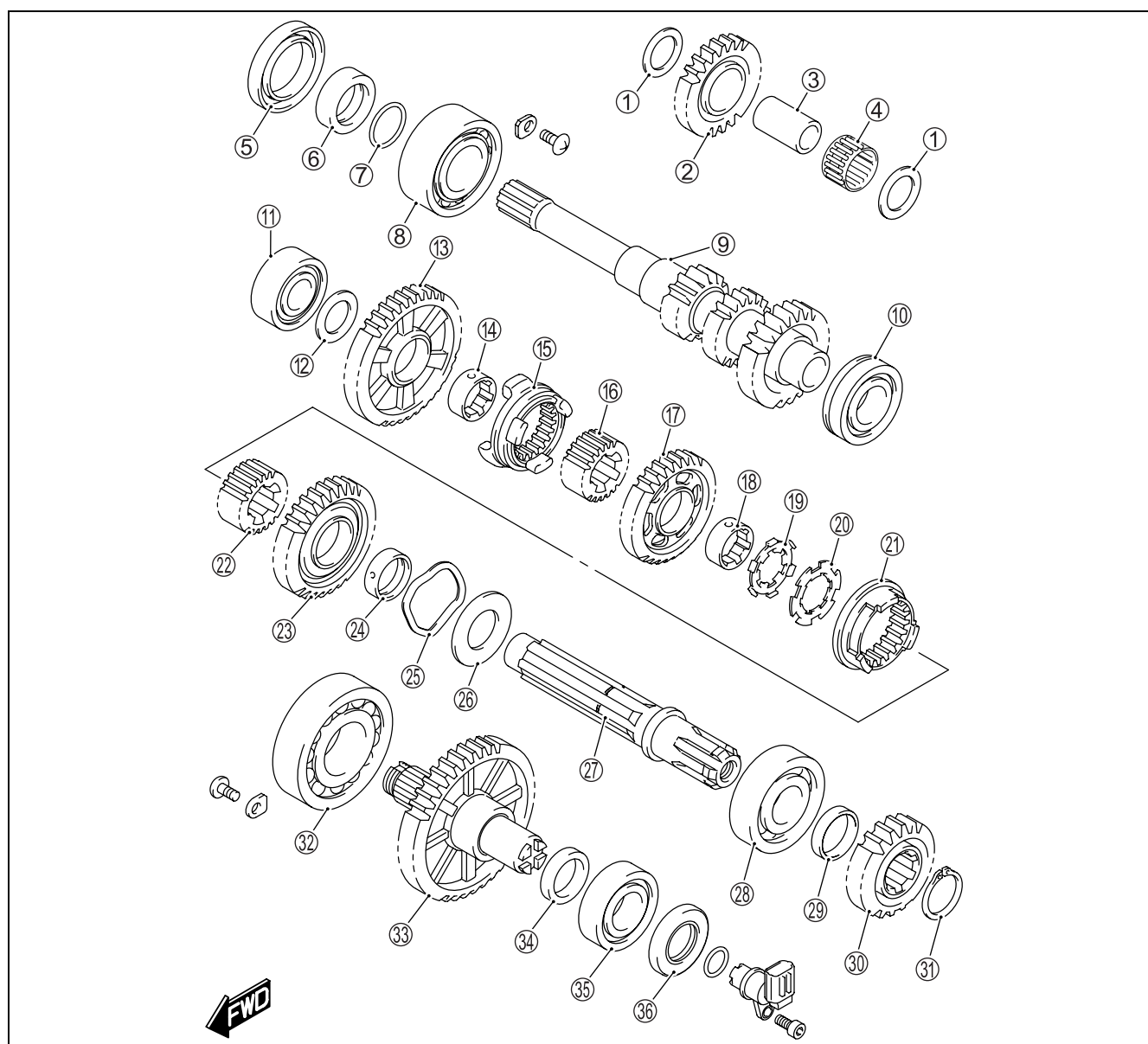
OIL SUMP FILTER

- Clean the oil sump filter with the compressed air.



TRANSFER DISASSEMBLY

- Disassemble the transfer as shown.



① Washer	⑬ Low driven gear	②⑤ Wave washer
② Reverse idle gear	⑭ Low driven gear bush	②⑥ Washer
③ Reverse idle gear shaft	⑮ Dog	②⑦ Counter shaft
④ Spacer	⑯ Spacer	②⑧ Bearing
⑤ Oil seal	⑰ Reverse driven gear	②⑨ Spacer
⑥ Spacer	⑱ Reverse drive gear bush	③① Transfer drive gear
⑦ O-ring	⑲ Lock washer	③① Snap ring
⑧ Bearing	⑲ Washer	③② Bearing
⑨ Transfer input shaft	⑲ Dog	③③ Transfer output drive gear
⑩ Bearing	⑲ Spacer	③④ Spacer
⑪ Bearing	⑲ High driven gear	③⑤ Bearing
⑫ Washer	⑲ High driven gear bush	③⑥ Oil seal

REASSEMBLY

Reassemble the transfer in the reverse order of disassembly. Pay attention to the following points:

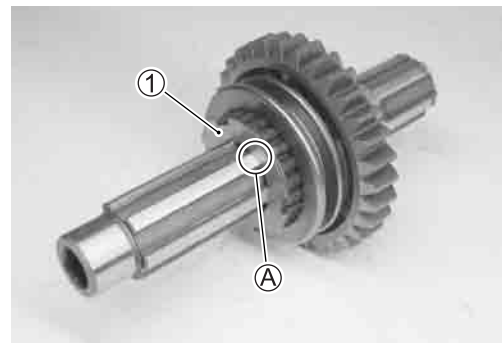
CAUTION

- * **Never reuse a snap ring. After a snap ring has been removed from a shaft, it should be discarded and a new snap ring must be installed.**
- * **When installing a new snap ring, do not expand the end gap larger than required to slip the snap ring over the shaft.**
- * **After installing a snap ring, make sure that it is completely seated in its groove and securely fitted.**

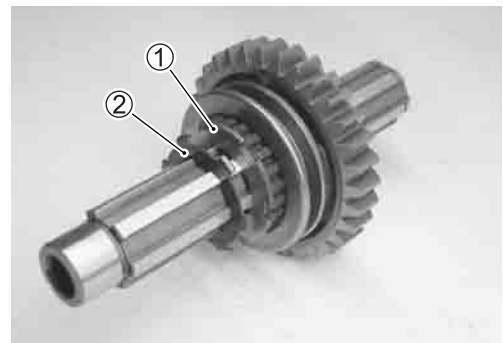
NOTE:

Before installing the gears, coat lightly engine oil to the transfer input/output shaft.

- Install the washer ① onto the transfer output shaft and position it so it fits into the groove ④.



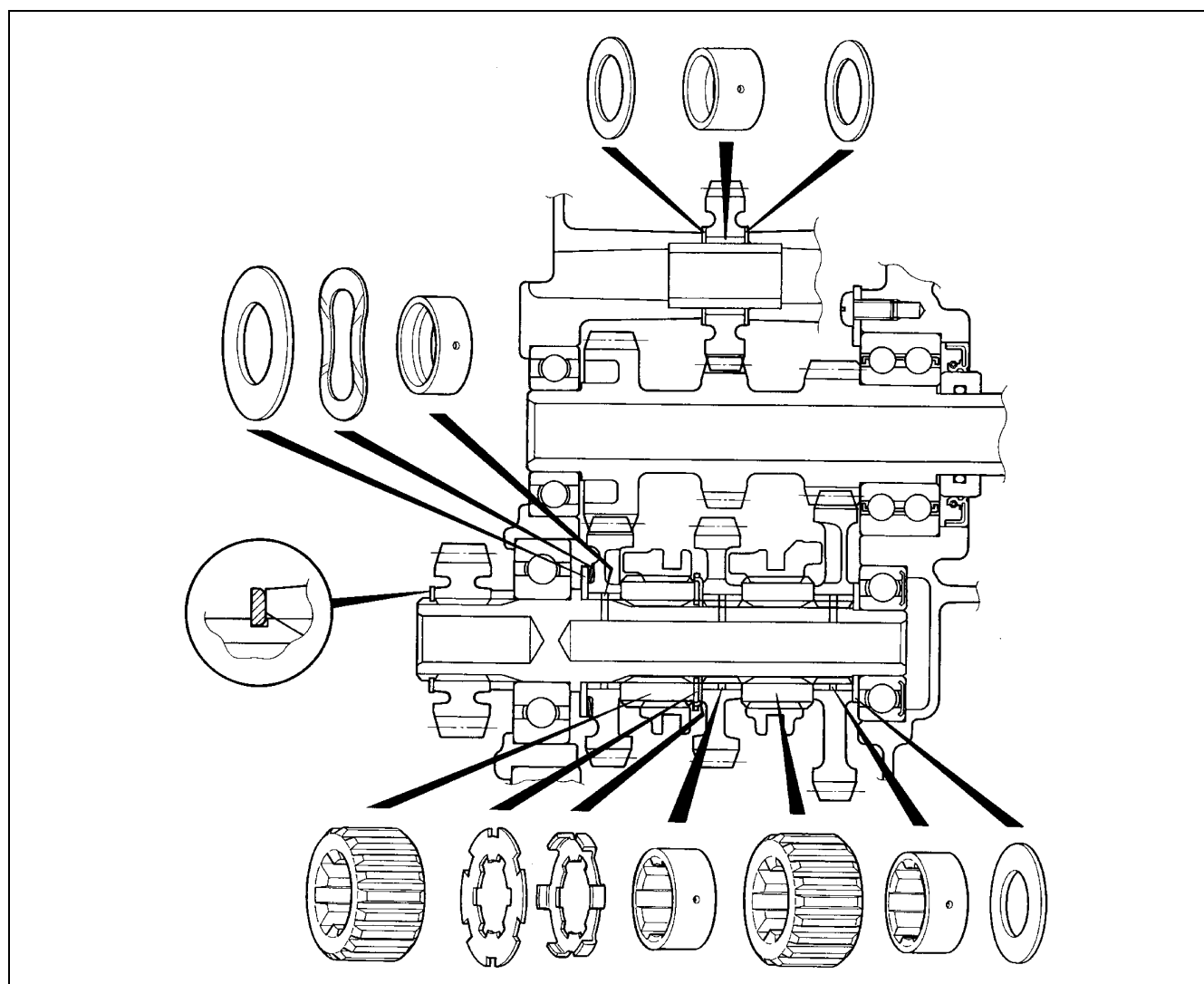
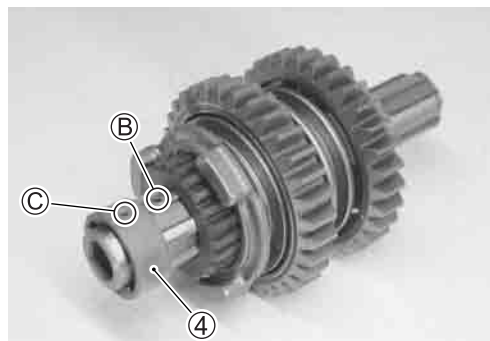
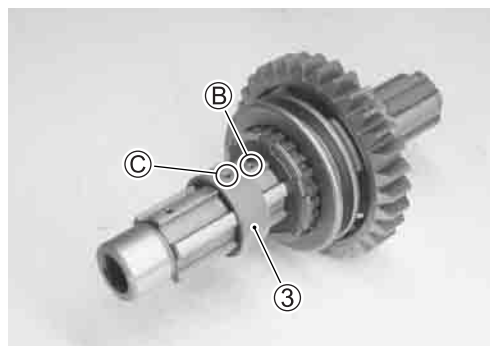
- Fit the lock washer ② onto the washer ①.



- Install the reverse drive gear bush ③ and low driven gear bush ④.

CAUTION

When installing the bush onto the transfer output shaft, align the shaft oil hole ⑥ with the bush oil hole ⑦.



GEARSHIFT FORK AND GEAR

GEARSHIFT FORK-TO-GROOVE CLEARANCE

Using a thickness gauge, inspect the shifting fork clearance in the groove of its gear.

The clearance for each gearshift fork plays an important role in the smoothness and positiveness of shifting action.

If the clearance exceeds the limit, replace the fork or its gear, or both.

DATA Shift fork to groove clearance:

Standard: 0.10 – 0.30 mm (0.004 – 0.012 in)

Service Limit: 0.50 mm (0.020 in)

TOOL 09900-20803: Thickness gauge



GEARSHIFT FORK GROOVE WIDTH

- Measure the gearshift fork groove width using the vernier calipers.

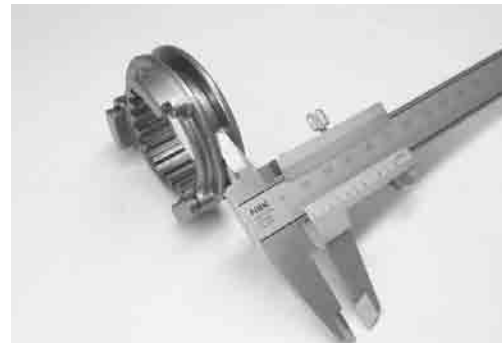
DATA Shift fork groove width:

Standard (Reverse):

5.50 – 5.60 mm (0.217 – 0.220 in)

(High): 5.50 – 5.60 mm (0.217 – 0.220 in)

TOOL 09900-20101: Vernier calipers



GEARSHIFT FORK THICKNESS

- Measure the gearshift fork thickness using the vernier calipers.

DATA Shift fork thickness:

Standard (Reverse):

5.30 – 5.40 mm (0.209 – 0.213 in)

(High): 5.30 – 5.40 mm (0.209 – 0.213 in)

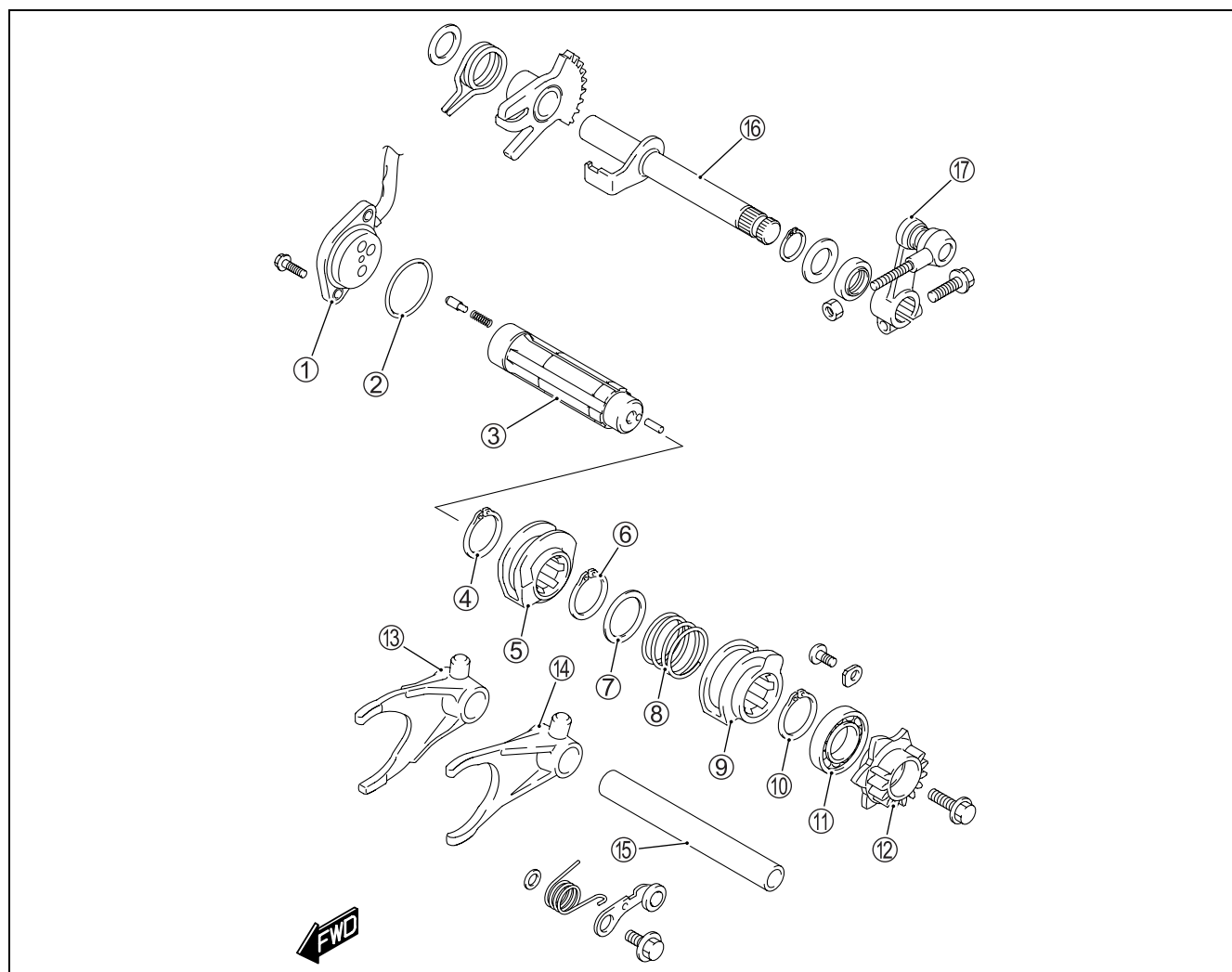
TOOL 09900-20101: Vernier calipers



GEARSHIFT CAM

DISASSEMBLY

- Disassemble the gearshift cam as shown.



①	Gear position switch	⑦	Washer	⑬	Gearshift fork (for Reverse)
②	O-ring	⑧	Spring	⑭	Gearshift fork (for High/Low)
③	Gearshift shaft	⑨	Dog (for High/Low)	⑮	Gearshift fork shaft
④	Snap ring	⑩	Snap ring	⑯	Gearshift shaft
⑤	Dog (for Reverse)	⑪	Bearing	⑰	Gearshift lever
⑥	Snap ring	⑫	Gearshift cam		

INSPECTION

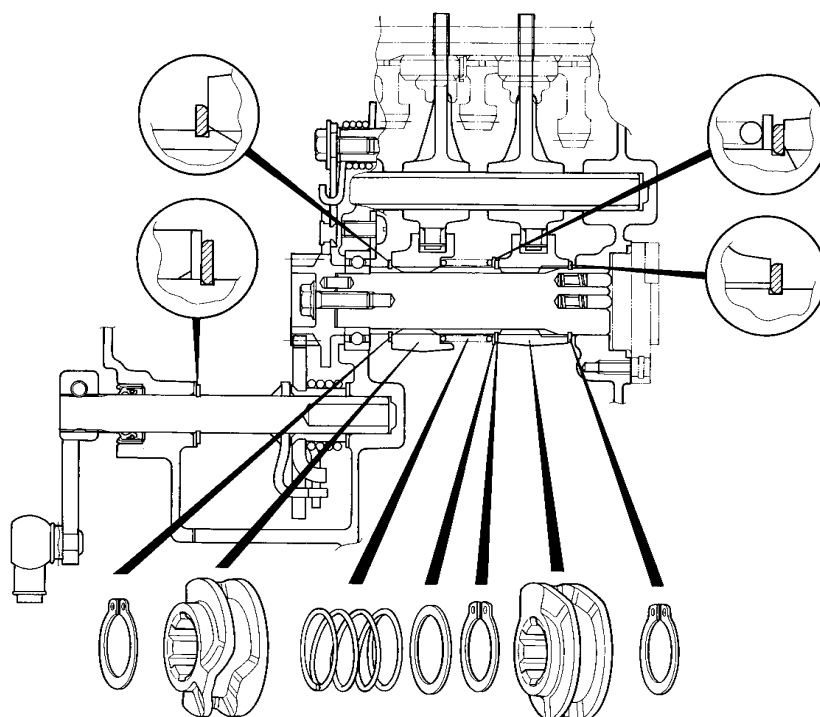
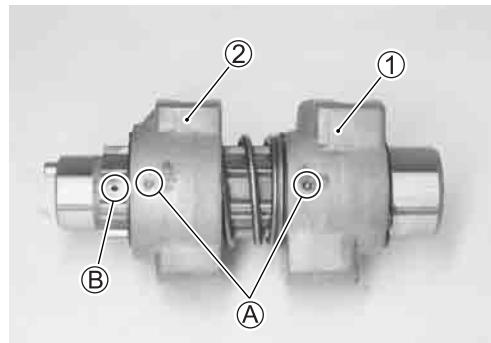
- Inspect the gearshift cam groove for abnormal wear or damage. If any defects are found, replace the defective part with a new one.

REASSEMBLY

- Install the dogs ① and ② as shown.

NOTE:

Align the punched marks **A** of the dog with the punched mark **B** on the shaft.

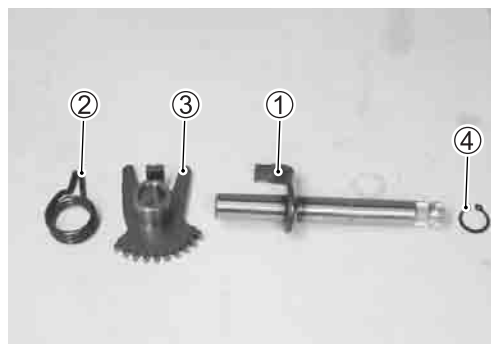


GEARSHIFT SHAFT

DISASSEMBLY

- Disassemble the following parts from the gearshift shaft ①.

- ② Return spring
- ③ Gearshift arm
- ④ Snap ring



INSPECTION

Inspect the gearshift shaft for bend or damage.

Inspect the return spring for damage or fatigue.

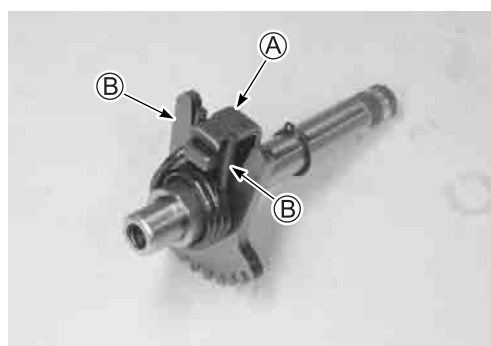
Replace the defective parts with a new one if necessary.

REASSEMBLY

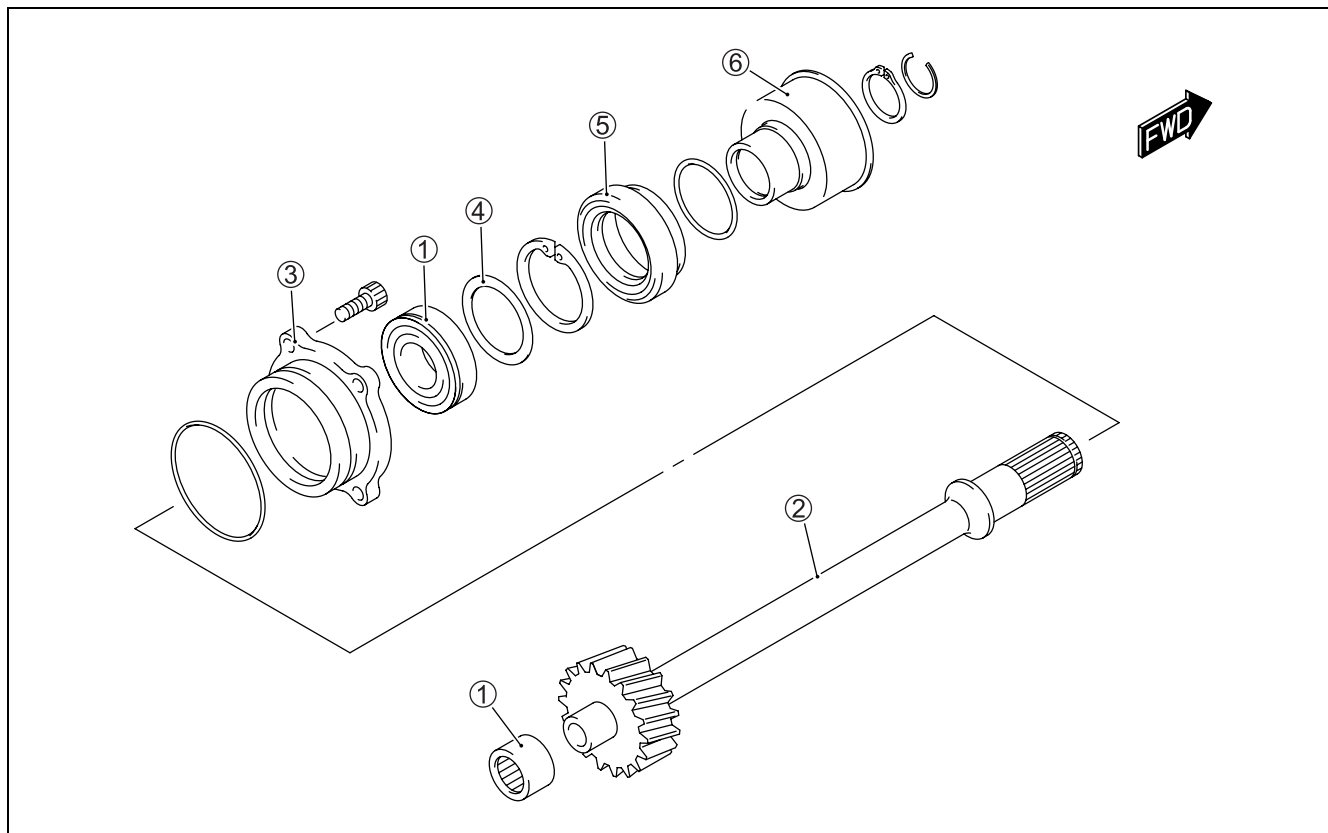
Reassemble the gearshift shaft in the reverse order of disassembly. Pay attention to the following points:

NOTE:

When installing the gearshift shaft return spring, position the stopper ① of the gearshift shaft between the shaft return spring ends ②.



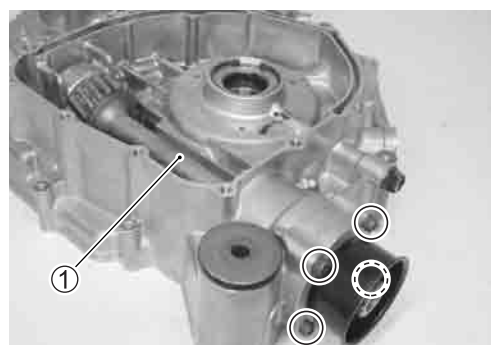
FRONT OUTPUT SHAFT CONSTRUCTION



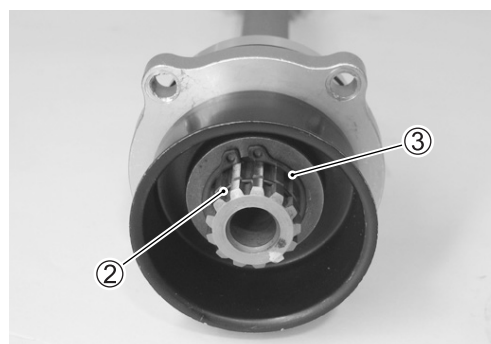
① Bearing	④ Shim (S)
② Front output shaft	⑤ Oil seal
③ Front output shaft housing	⑥ Front drive collar assembly

REMOVAL AND DISASSEMBLY

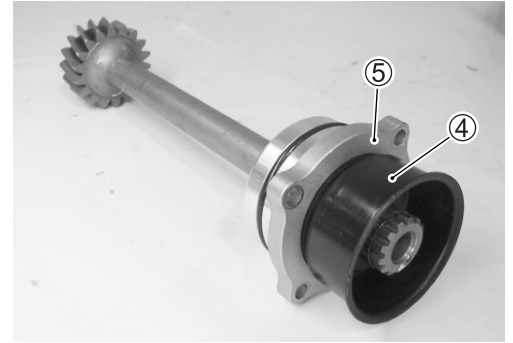
- Remove the front output shaft ① from the right case.



- Remove the C-ring ② and snap ring ③.



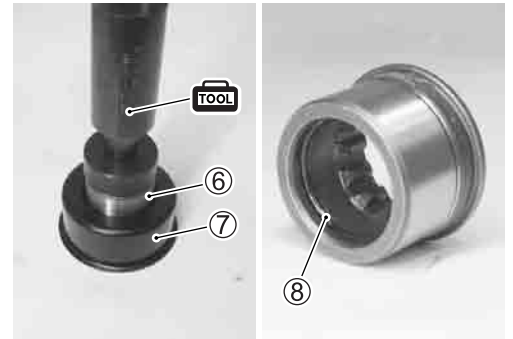
- Remove the front drive collar assembly ④ and front output shaft housing ⑤.



- Remove the front drive collar ⑥ from the output oil seal plate ⑦ with special tool.

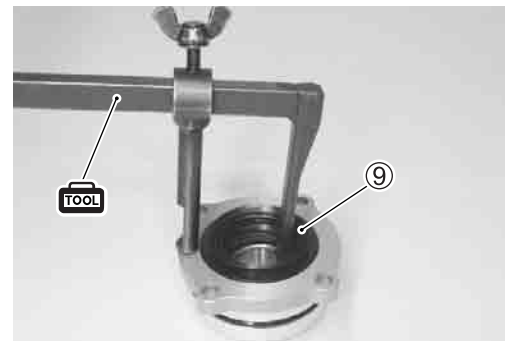
TOOL 09913-70210: Bearing installer set

- Remove the O-ring ⑧.

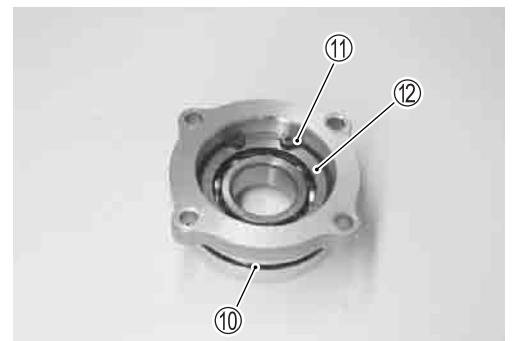


- Remove the oil seal ⑨ with the special tool.

TOOL 09913-50121: Oil seal remover



- Remove the O-ring ⑩.
- Remove the snap ring ⑪ and washer ⑫.



- Remove the bearing with the special tool.

TOOL 09921-20240: Bearing remover set

NOTE:

If there is no abnormal noise, the bearing removed is not necessary.



FRONT OUTPUT SHAFT INSPECTION

Inspect the front output shaft for distortion.

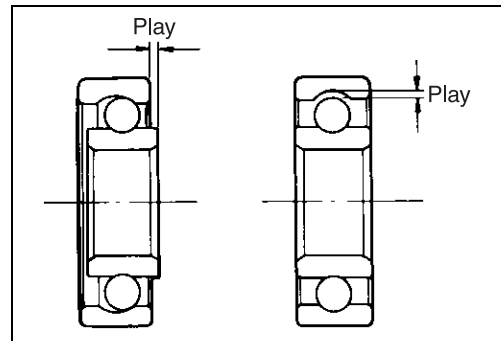
If distortion is found, replace the rear output shaft with a new one.

Inspect the gear of the front output shaft for wear or damage.

If any defects are found, replace the drive and driven bevel gears as a set.

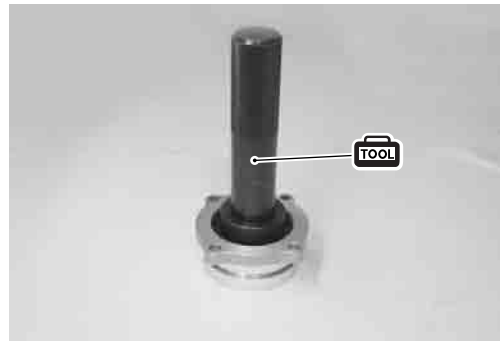
**BEARING INSPECTION**

Rotate the inner race by finger to inspect for abnormal play, noise and smooth rotation. If there is anything unusual, replace the bearing with a new one.

**REASSEMBLY AND INSTALLATION**

- Install the bearing to the front output shaft housing with the special tool.

 **09913-70210: Bearing installer set**



- Install the washer ① and snap ring ②.

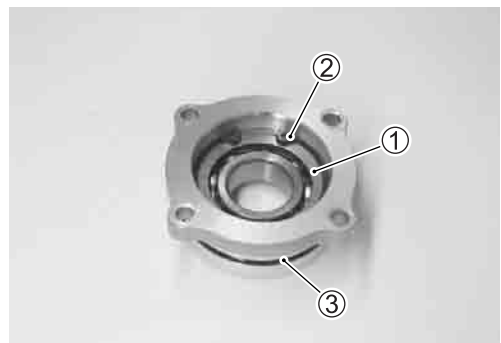
CAUTION

The removed snap ring must be replaced with a new one.

- Install the O-ring ③.

CAUTION

The removed O-ring must be replaced with a new one.



- Install the oil seal ④ with the special tool.

 **09913-70210: Bearing installer set**

CAUTION

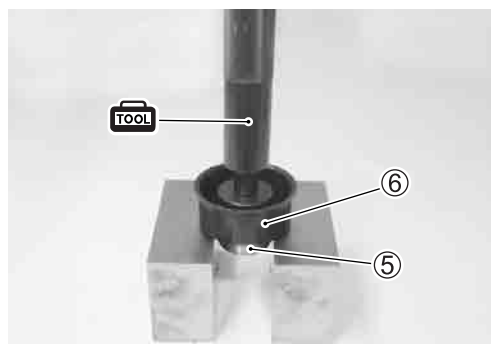
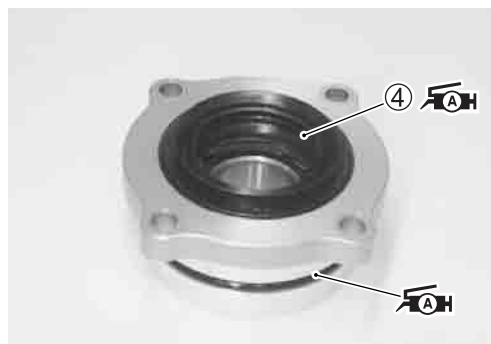
The removed oil seal must be replaced with a new one.

- Apply SUZUKI SUPER GREASE “A” to the O-ring and lip of the oil seal.

 **9900-25010: SUZUKI SUPER GREASE “A”**
(or equivalent grease)

- Install the front drive collar ⑤ to the output oil seal plate ⑥ with the special tool.

 **09913-70210: Bearing installer set**



- Install the O-ring ⑦ to the front drive collar.

CAUTION

The removed O-ring must be replaced with a new one.

- Apply SUZUKI SUPER GREASE “A” to the O-ring.

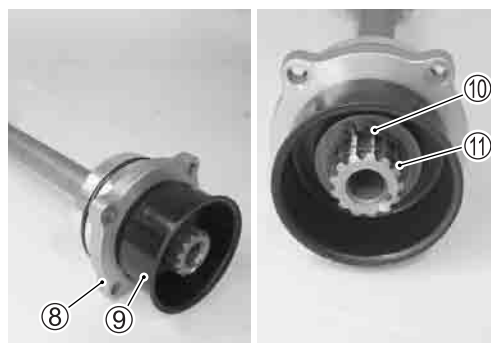
 **9900-25010: SUZUKI SUPER GREASE “A”**
(or equivalent grease)



- Install the output shaft housing ⑧ and front drive collar assembly ⑨ to the front output shaft.
- Install the snap ring ⑩ and C-ring ⑪.

CAUTION

The removed snap ring and C-ring must be replaced with new ones.

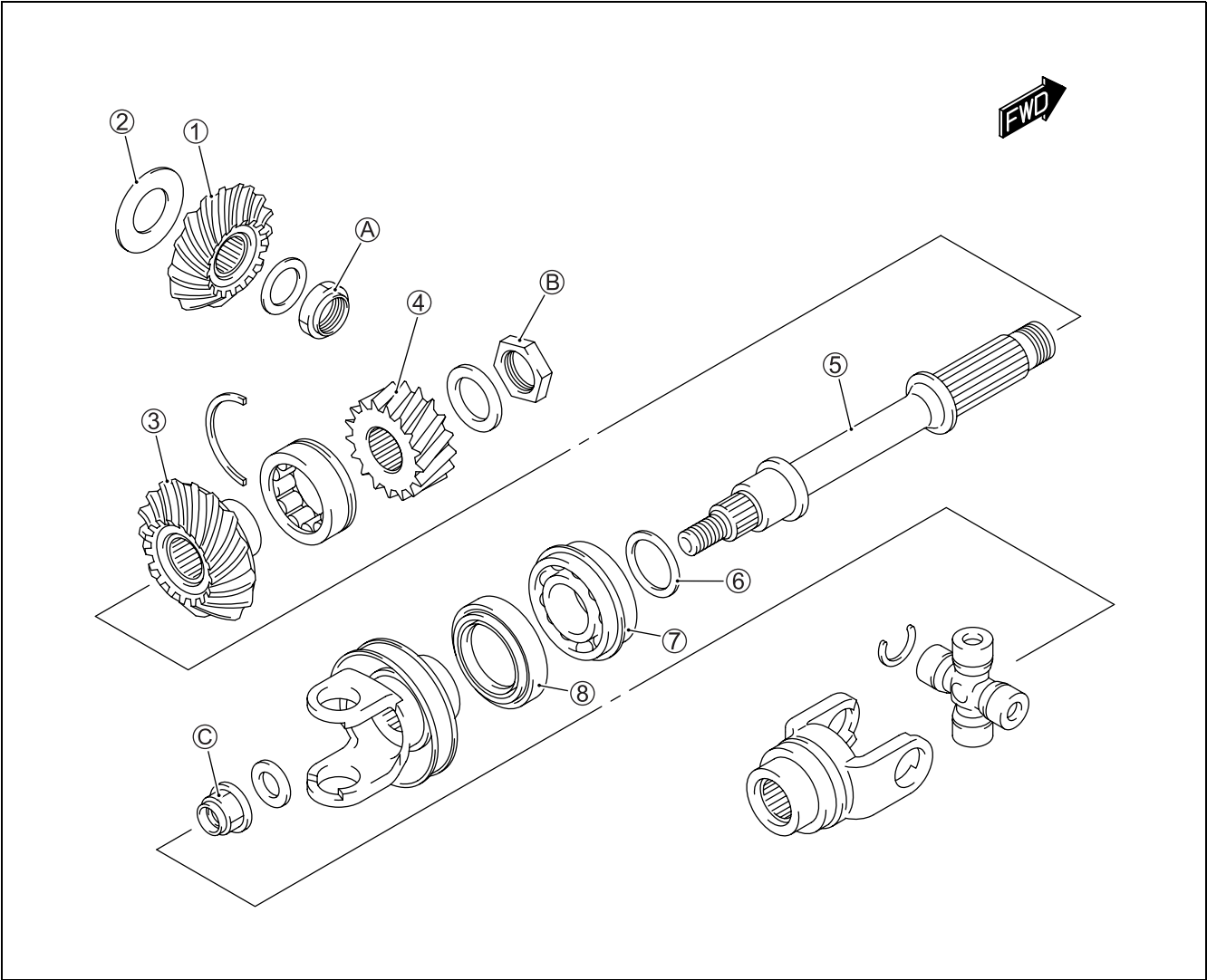


- Install the front output shaft to the right case.
- Tighten the front output shaft bolts to the specified torque.

 **Front output shaft bolt: 10 N·m (1.0 kgf-m, 7.0 lb-ft)**



REAR OUTPUT SHAFT
CONSTRUCTION

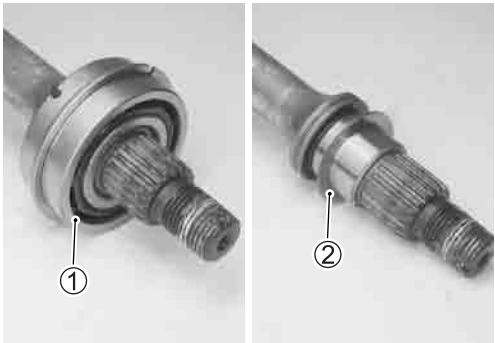


①	Rear output shaft drive bevel gear	⑦	Bearing
②	Shim (s)	⑧	Oil seal
③	Rear output shaft driven bevel gear	A	Drive bevel gear nut
④	Front output shaft drive gear	B	Rear output shaft nut
⑤	Rear output shaft	C	Output shaft nut
⑥	Shim (s)		

ITEM	N-m	kgf-m	lb-ft
A	100	10.0	72.5
B	100	10.0	72.5
C	100	10.0	72.5

DISASSEMBLY

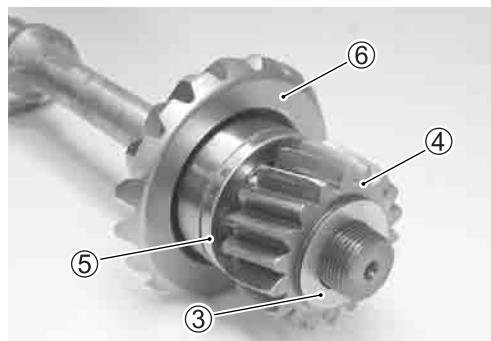
- Remove the universal joint. (☞ 4-41)
- Remove the bearing ① and shim (s) ②.



- Unlock the nut with a chisel.
- Remove the rear output shaft nut.



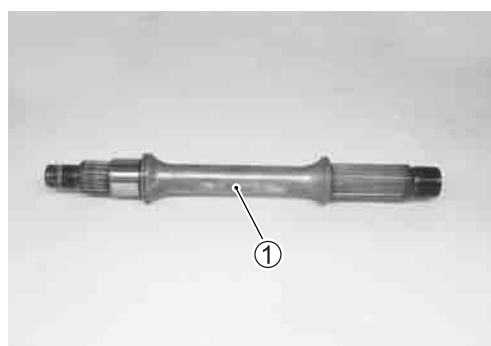
- Remove the washer ③, front output shaft drive gear ④, bearing ⑤ and rear output shaft driven bevel gear ⑥.



REAR OUTPUT SHAFT INSPECTION

Inspect the rear output shaft ① for distortion.

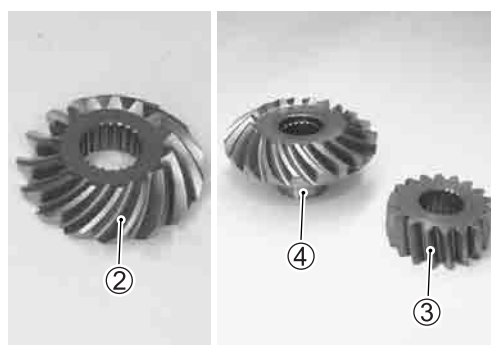
If distortion is found, replace the rear output shaft with a new one.



GEAR INSPECTION

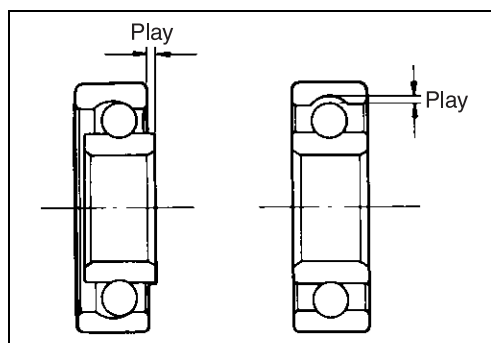
Inspect the rear output shaft drive bevel gear ②, front output shaft drive gear ③ and rear output shaft driven bevel gear ④ for wear or damage.

If any defects are found, replace the drive and driven bevel gears as a set.



BEARING INSPECTION

Rotate the inner race by finger to inspect for abnormal play, noise and smooth rotation. If there is anything unusual, replace the bearing with a new one.



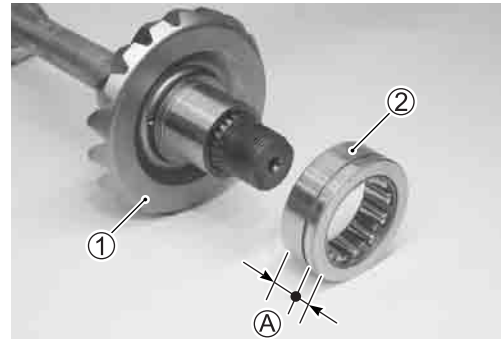
REASSEMBLY

Reassemble the rear output shaft in the reverse order of disassembly. Pay attention to the following points:

- Install the rear output shaft driven bevel gear ① and bearing ②.

NOTE:

The wider side ① of the bearing should be positioned bevel gear side.

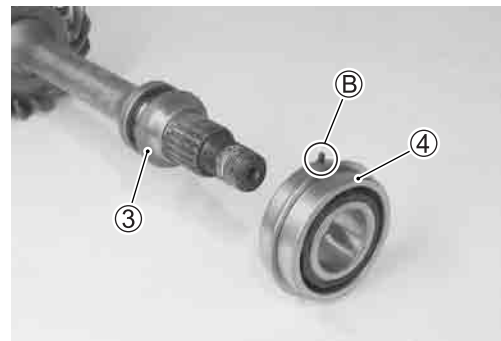


- Install the shim(s) ③ and bearing ④.

NOTE:

The bearing knock-pin ⑤ should be positioned inside.

- Install the universal joint. (☞ 4-43)



- With the rear output shaft held immovable with a vise, tighten the rear output shaft nut to the specified torque.

CAUTION

The removed nut must be replaced with a new one.

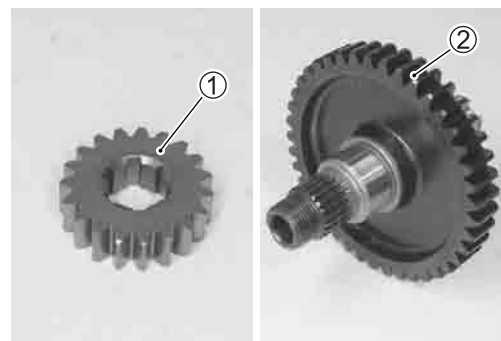
 Rear output shaft nut: 100 N·m (10.0 kgf-m, 72.5 lb-ft)

- Stake the collar of the rear output shaft nut into the notch in the shaft.

**TRANSFER OUTPUT DRIVE/DRIVEN GEAR INSPECTION**

Inspect the transfer output drive ①/driven ② gear for wear or damage.

If any defects are found, replace the defective parts with a new one.



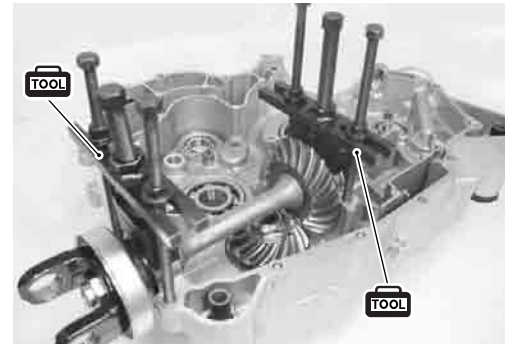
SHIM ADJUSTMENT

BACKLASH

- Install the rear output shaft drive bevel gear. (☞ 3-93)
- Place the rear output shaft on the left crankcase half and hold bearings with the special tool.

TOOL 09921-21910: Bearing holder

- Set a dial gauge on the rear output shaft drive bevel gear as shown.



Measure the backlash by turning the drive bevel gear shaft in each direction, reading the total backlash with the dial gauge. If the backlash is not within specification, the shim must be changed and the backlash should be re-checked until correct. Refer to the chart at the right for appropriate shim thickness.

Bevel gear backlash

Standard: 0.03 – 0.15 mm (0.001 – 0.006 in)

NOTE:

Adjust the backlash by referring to the chart at the right and using the thickness of the removed shims as a guide.

Backlash	Shim adjustment
Under 0.03 mm (0.001 in)	Increase shim thickness
0.03 – 0.15 mm (0.001 – 0.006 in)	Correct
Over 0.15 mm (0.006 in)	Decrease shim thickness

For rear output shaft driven bevel gear (3-72)

Part No.	Shim thickness
24945-03G50-055	0.550 mm (0.022 in)
24945-03G50-058	0.575 mm (0.023 in)
24945-03G50-060	0.600 mm (0.024 in)
24945-03G50-063	0.625 mm (0.025 in)
24945-03G50-065	0.650 mm (0.026 in)
24945-03G50-068	0.675 mm (0.027 in)
24945-03G50-070	0.700 mm (0.028 in)
24945-03G50-073	0.725 mm (0.029 in)
24945-03G50-075	0.750 mm (0.030 in)
24945-03G50-078	0.775 mm (0.031 in)
24945-03G50-080	0.800 mm (0.031 in)
24945-03G50-083	0.825 mm (0.032 in)
24945-03G50-085	0.850 mm (0.033 in)
24945-03G50-088	0.875 mm (0.034 in)
24945-03G50-090	0.900 mm (0.035 in)
24945-03G50-093	0.925 mm (0.036 in)
24945-03G50-095	0.950 mm (0.037 in)
24945-03G50-098	0.975 mm (0.038 in)
24945-03G50-100	1.000 mm (0.039 in)
24945-03G50-103	1.025 mm (0.040 in)
24945-03G50-105	1.050 mm (0.041 in)
24945-03G50-108	1.075 mm (0.042 in)
24945-03G50-110	1.100 mm (0.043 in)
24945-03G50-113	1.125 mm (0.044 in)
24945-03G50-115	1.150 mm (0.045 in)
24945-03G50-118	1.175 mm (0.046 in)
24945-03G50-120	1.200 mm (0.047 in)
24945-03G50-123	1.225 mm (0.048 in)
24945-03G50-125	1.250 mm (0.049 in)
24945-03G50-128	1.275 mm (0.050 in)
24945-03G50-130	1.300 mm (0.051 in)
24945-03G50-133	1.330 mm (0.052 in)
24945-03G50-135	1.350 mm (0.053 in)
24945-03G50-138	1.380 mm (0.054 in)
24945-03G50-140	1.400 mm (0.055 in)

TOOTH CONTACT

After backlash adjustment is carried out, the tooth contact must be checked. Pay attention to the following procedures:

- Remove the rear output shaft from the left crankcase.
- Clean and degrease several teeth of the drive and driven bevel gears.
- Apply a coating of machinist's layout dye or paste to several teeth of the rear output shaft driven bevel gear.
- Install the rear output shaft.
- Rotate the rear output shaft driven bevel gear several turns in both directions.
- Remove the output shaft and inspect the coated teeth of the rear output shaft drive bevel gear. The tooth contact pattern should be as shown in ①, ② and ③.
- If tooth contact is found to be correct (example ②), go to the FINAL ASSEMBLY section on page 3-76 to complete installation.

① Incorrect (contact at tooth top)

② Correct

③ Incorrect (contact at tooth root)

- If tooth contact is found to be incorrect (examples ① and ③), the shim thickness between the rear output shaft drive bevel gear and bearing must be changed and the tooth contact re-checked until correct.

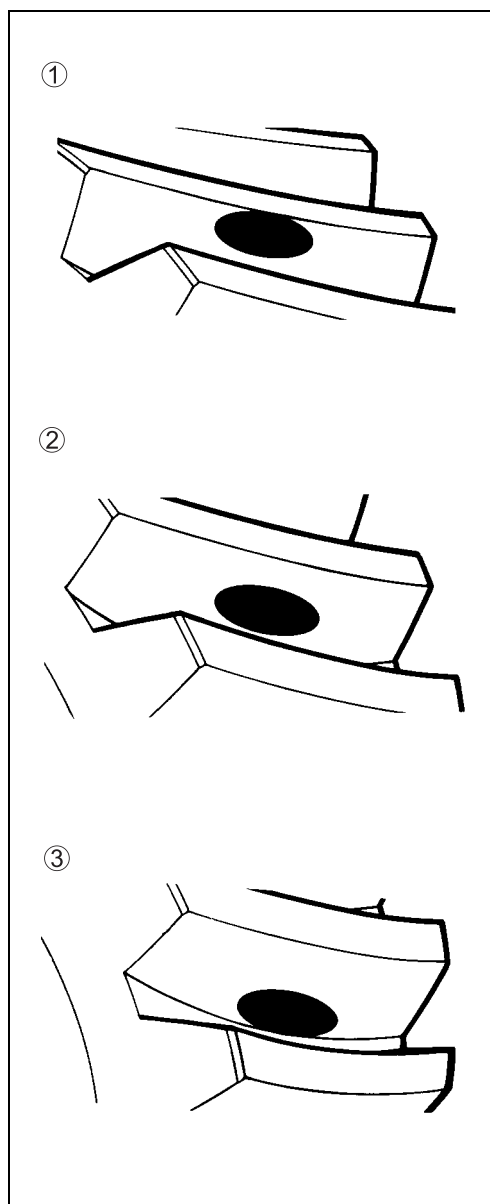
CAUTION

Make sure to check the backlash after the tooth contact has been adjusted, since it may have changed. Adjust the tooth contact and backlash until they are both within specification. If the correct tooth contact cannot be maintained when adjusting the backlash, replace the rear output shaft drive and driven bevel gears.

Tooth contact	Shim adjustment
Contact at tooth top ①	Increase shim thickness
Contact at tooth root ③	Decrease shim thickness

For rear output shaft drive bevel gear (☞ 3-92)

Part No.	Shim thickness	
24935-19B00-025: 0.25 mm (0.0098 in)	Combined shim	0.25+0.25=0.50 mm (0.0197 in)
		0.25+0.30=0.55 mm (0.0217 in)
		0.30+0.30=0.60 mm (0.0236 in)
		0.30+0.35=0.65 mm (0.0256 in)
24935-19B00-030: 0.30 mm (0.0118 in)		0.35+0.35=0.70 mm (0.0276 in)
0.25+0.25+0.25=0.75 mm (0.0295 in)		
24935-19B00-035: 0.35 mm (0.0138 in)		0.25+0.25+0.30=0.80 mm (0.0315 in)
		0.25+0.25+0.35=0.85 mm (0.0335 in)



Part No.	Shim thickness
24935-03G50-055	0.550 mm (0.0217 in)
24935-03G50-058	0.575 mm (0.0226 in)
24935-03G50-060	0.600 mm (0.0236 in)
24935-03G50-063	0.625 mm (0.0246 in)
24935-03G50-065	0.650 mm (0.0256 in)
24935-03G50-068	0.675 mm (0.0266 in)
24935-03G50-070	0.700 mm (0.0276 in)
24935-03G50-073	0.725 mm (0.0285 in)
24935-03G50-075	0.750 mm (0.0295 in)
24935-03G50-078	0.775 mm (0.0305 in)
24935-03G50-080	0.800 mm (0.0315 in)
24935-03G50-083	0.825 mm (0.0325 in)
24935-03G50-085	0.850 mm (0.0335 in)
24935-03G50-088	0.875 mm (0.0344 in)
24935-03G50-090	0.900 mm (0.0354 in)
24935-03G50-093	0.925 mm (0.0364 in)
24935-03G50-095	0.950 mm (0.0374 in)
24935-03G50-098	0.975 mm (0.0384 in)
24935-03G50-100	1.000 mm (0.0394 in)
24935-03G50-103	1.025 mm (0.0404 in)
24935-03G50-105	1.050 mm (0.0413 in)
24935-03G50-108	1.075 mm (0.0423 in)
24935-03G50-110	1.100 mm (0.0433 in)
24935-03G50-113	1.125 mm (0.0443 in)
24935-03G50-115	1.150 mm (0.0453 in)
24935-03G50-118	1.175 mm (0.0463 in)
24935-03G50-120	1.200 mm (0.0472 in)
24935-03G50-123	1.225 mm (0.0482 in)
24935-03G50-125	1.250 mm (0.0492 in)
24935-03G50-128	1.275 mm (0.0502 in)
24935-03G50-130	1.300 mm (0.0512 in)

FINAL ASSEMBLY

- After adjusting the gear backlash and tooth contact correctly, remove the output shaft and rear output shaft drive bevel gear.
- Clean off any machinist's dye or paste from the gear teeth, and lubricate the teeth with engine oil.
- Tighten the output shaft nut and drive bevel gear nut to the specified torque.

 **Output shaft nut: 100 N·m (10.0 kgf-m, 72.5 lb-ft)**
Drive bevel gear nut: 100 N·m (10.0 kgf-m, 72.5 lb-ft)

 **09920-53740: Clutch sleeve hub holder**

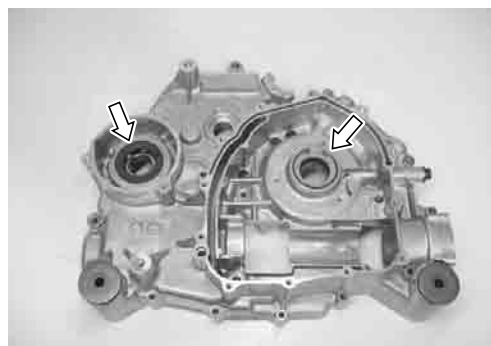
- Stake the collar of the nut into the notch in the shaft.



CRANKCASE

OIL SEAL INSPECTION

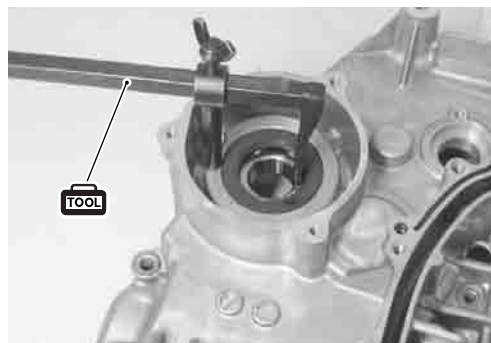
Inspect the oil seal lips for wear or damage. If any defects are found, replace the oil seal with new ones.



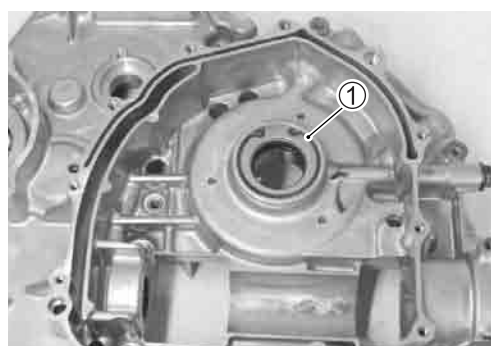
OIL SEAL REMOVAL

- Remove the oil seal with the special tool.

 **09913-50121: Oil seal remover**

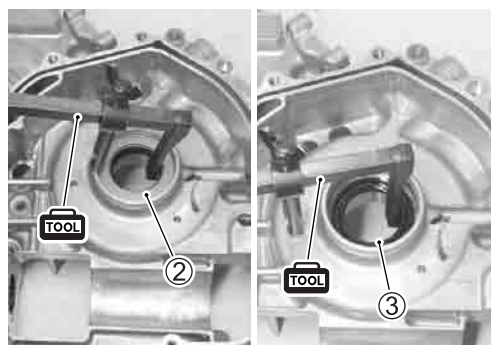


- Remove the snap ring ①.



- Remove the oil seals ② and ③ with the special tool.

 **09913-50121: Oil seal remover**



OIL SEAL INSTALLATION

- Install the oil seal ① with the special tool.

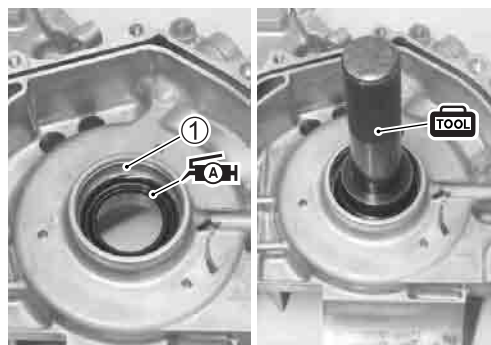
CAUTION

The removed oil seal must be replaced with a new one.

NOTE:

The plate side of the oil seal faces to the inside.

 **09913-70210: Bearing installer set (φ47)**



- Install the oil seal ② with the special tool.

CAUTION

The removed oil seal must be replaced with a new one.

NOTE:

The plate side of the oil seal faces to the outside.

 **09913-70210: Bearing installer set ($\phi 52$)**

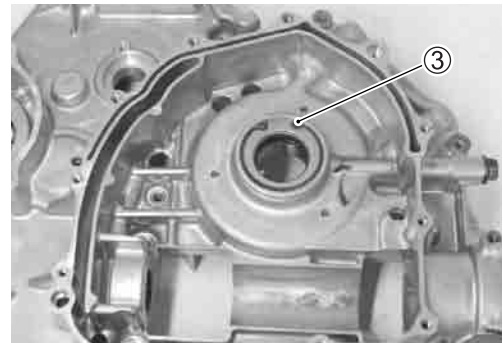
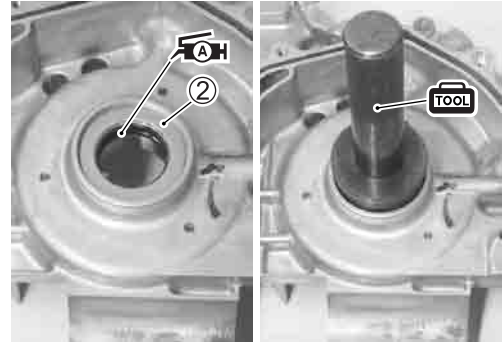
- Apply SUZUKI SUPER GREASE "A" to the lip of the oil seals.

 **9900-25010: SUZUKI SUPER GREASE "A"**
(or equivalent grease)

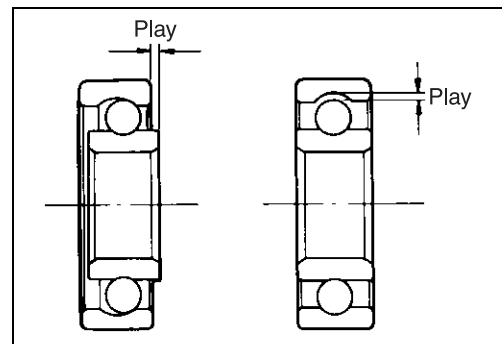
- Install the snap ring ③.

CAUTION

The removed snap ring must be replaced with a new one.

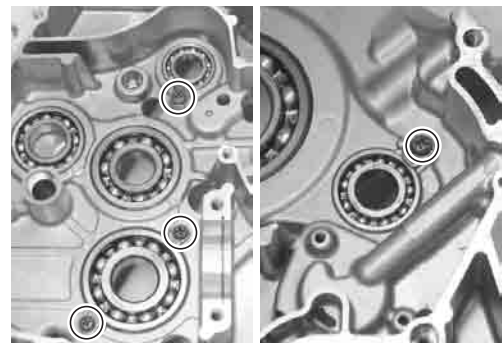
**BEARING INSPECTION**

Rotate the bearing inner race by finger to inspect for abnormal play, noise and smooth rotation while the bearings are in the crankcase. If there is anything unusual, replace the bearing with a new one.

**LEFT CRANKCASE BEARING REMOVAL****NOTE:**

If there is no abnormal noise, the bearing removal is not necessary.

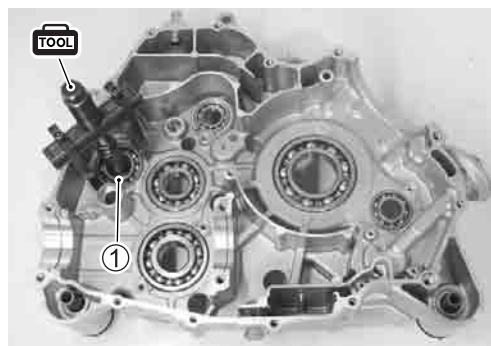
- Remove the bearing retainers.



- Remove the bearing ① with the special tool.

 **09921-20240: Bearing remover set**

Bearing ①: Remover $\phi 25$



- Remove the bearings with the special tool.

 **09913-70210: Bearing installer set**

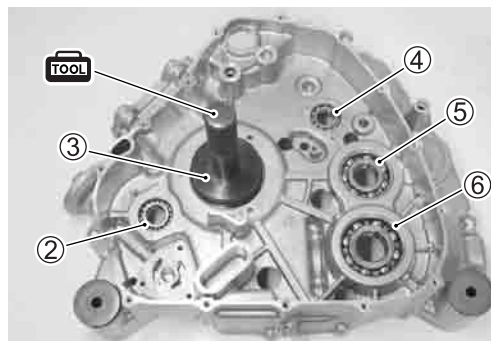
Bearing ②: $\phi 35$ Attachment

Bearing ③: $\phi 75$ Attachment

Bearing ④: $\phi 32$ Attachment

Bearing ⑤: $\phi 52$ Attachment

Bearing ⑥: $\phi 68$ Attachment



LEFT CRANKCASE BEARING INSTALLATION

- Press the bearings with the special tool.

 **09913-70210: Bearing installer set**

Bearing ①: $\phi 52$ Attachment

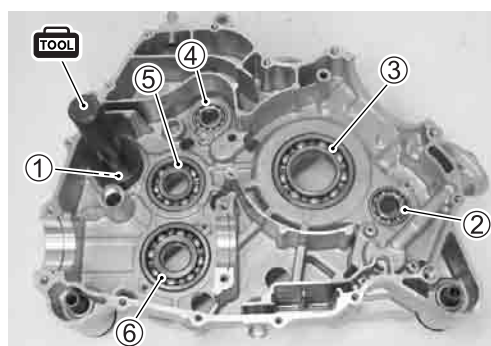
Bearing ②: $\phi 42$ Attachment

Bearing ③: $\phi 80$ Attachment

Bearing ④: $\phi 40$ Attachment

Bearing ⑤: $\phi 62$ Attachment

Bearing ⑥: $\phi 68$ Attachment

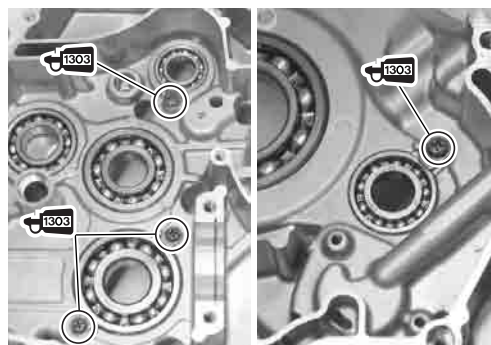


CAUTION

The removed bearings must be replaced with new ones.

- Apply a small quantity of THREAD LOCK SUPER "1303" to the bearing retainer screws, and tighten them securely.

 **09900-32030: THREAD LOCK SUPER "1303"**

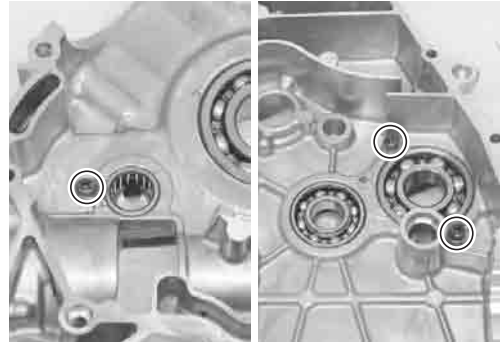


RIGHT CRANKCASE BEARING REMOVAL

NOTE:

If there is no abnormal noise, the bearing removal is not necessary.

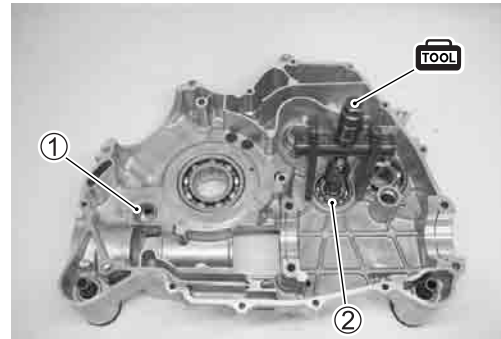
- Remove the bearing retainers.



- Remove the bearings with the special tool.

TOOL 09921-20240: Bearing remover set

Bearing ①, ②: Remover $\phi 20$

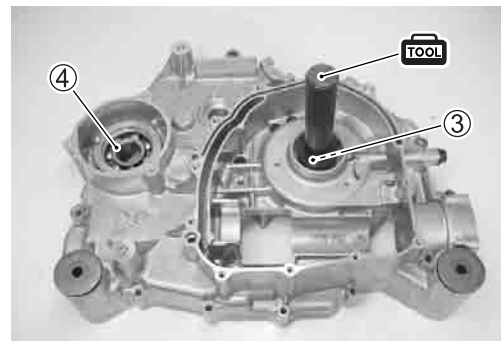


- Remove the oil seals. (3-77)
- Remove the bearings with the special tool.

TOOL 09913-70210: Bearing installer set

Bearing ③: $\phi 42$ Attachment

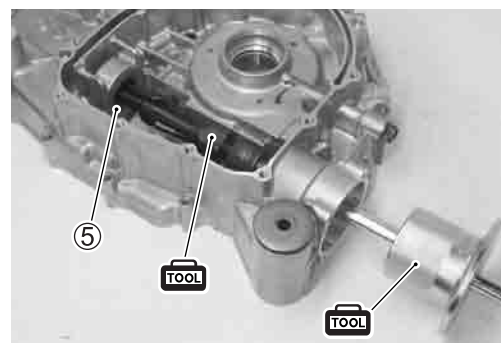
Bearing ④: $\phi 55$ Attachment



- Remove the bearing ⑤ with the special tools.

TOOL 09923-74511: Bearing remover

09930-30104: Sliding shaft



RIGHT CRANKCASE BEARING INSTALLATION

- Press the bearings with the special tool.

 **09913-70210: Bearing installer set**

Bearing ①: $\phi 30$ Attachment

Bearing ②: $\phi 42$ Attachment

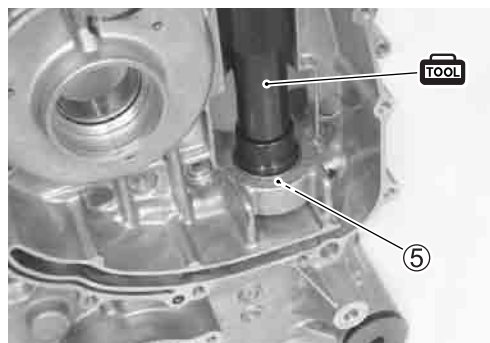
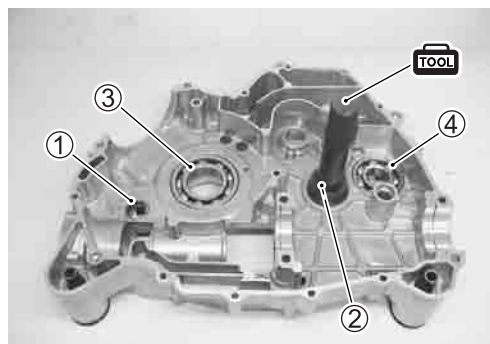
Bearing ③: $\phi 75$ Attachment

Bearing ④: $\phi 55$ Attachment

Bearing ⑤: $\phi 35$ Attachment

CAUTION

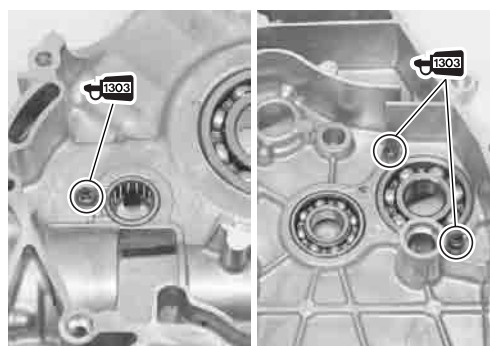
The removed bearings must be replaced with new ones.



- Apply a small quantity of THREAD LOCK SUPER "1303" to the bearing retainer screws, and tighten them securely.

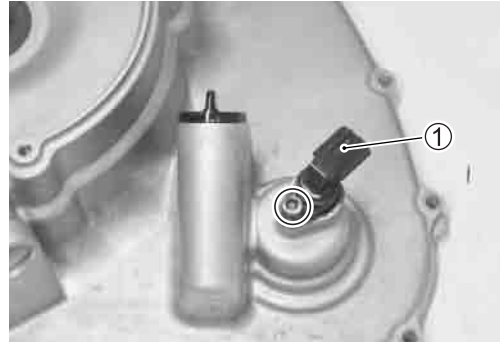
 **09900-32030: THREAD LOCK SUPER "1303"**

- Install the oil seals. (➡ 3-77)



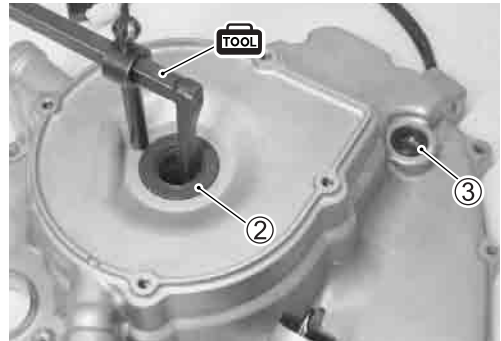
GENERATOR COVER DISASSEMBLY

- Remove the speed sensor ①.

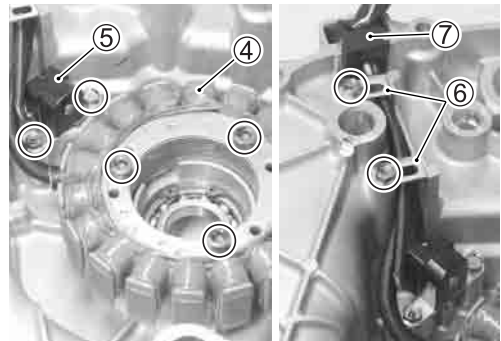


- Remove the oil seals ② and ③ with the special tool.

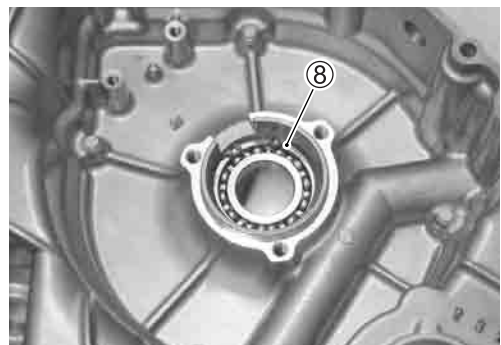
 **09913-50121: Oil seal remover**



- Remove the generator stator ④, CKP sensor ⑤, bracket ⑥ and grommet ⑦.



- Remove the snap ring ⑧.

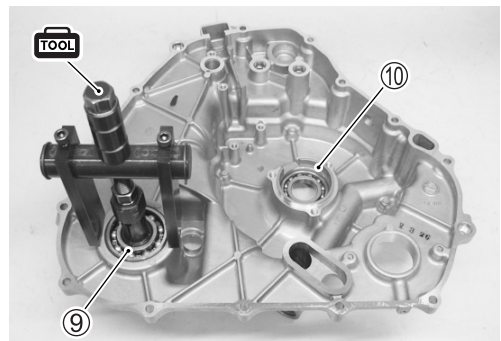


- Remove the bearings ⑨ and ⑩ with the special tool.

 **09921-20240: Bearing remover set ($\phi 25$)**

NOTE:

If there is no abnormal noise, the bearing removal is not necessary.



REASSEMBLY

- Press the bearings ① and ② with the special tool.

CAUTION

The removed bearings must be replaced with new ones.

 **09913-70210: Bearing installer set**

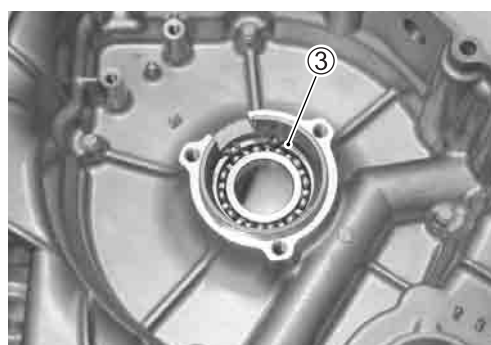
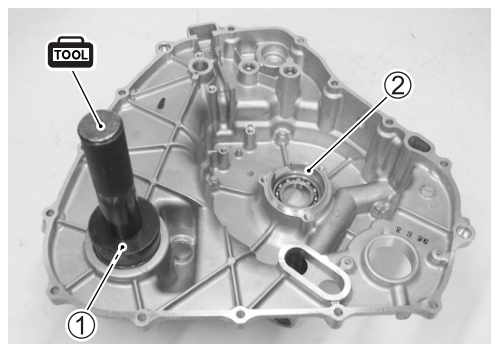
Bearing ①: $\phi 52$ Attachment

Bearing ②: $\phi 47$ Attachment

- Install the snap ring ③.

CAUTION

The removed snap ring must be replaced with a new one.



- Install the generator stator ④, CKP sensor ⑤, bracket ⑥ and grommet ⑦ and tighten them to the specified torque.

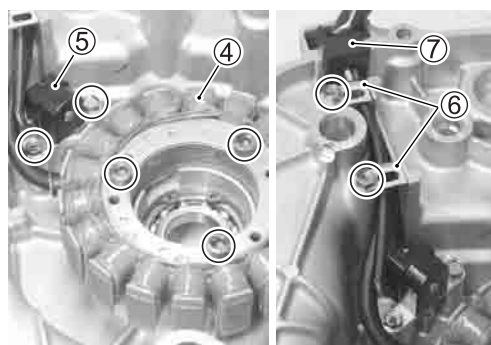
NOTE:

When installing the generator stator and CUP sensor, route the wire properly.

 **Generator starter bolt: 11 N·m (1.1 kgf-m, 8.0 lb-ft)**

CKP sensor mount bolt: 6 N·m (0.6 kgf-m, 4.3 lb-ft)

Bracket bolt: 6 N·m (0.6 kgf-m, 4.3 lb-ft)



- Install the oil seals ④ and ⑤ with the special tool.

CAUTION

The removed oil seals must be replaced with new ones.

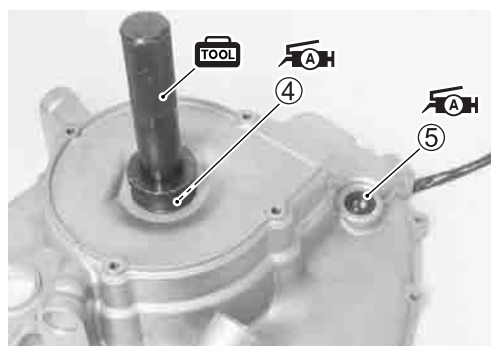
 **09913-70210: Bearing installer set**

Oil seal ④: $\phi 42$ Attachment

Oil seal ⑤: $\phi 20$ Attachment

- Apply SUZUKI SUPER GREASE "A" to the lip of the oil seals.

 **09900-25010: SUZUKI SUPER GREASE "A"**
(or equivalent grease)



- Apply SUZUKI SUPER GREASE “A” to the O-ring.

CAUTION

The removed O-ring must be replaced with a new one.

-  **99000-25010: SUZUKI SUPER GREASE “A”**
(or equivalent grease)

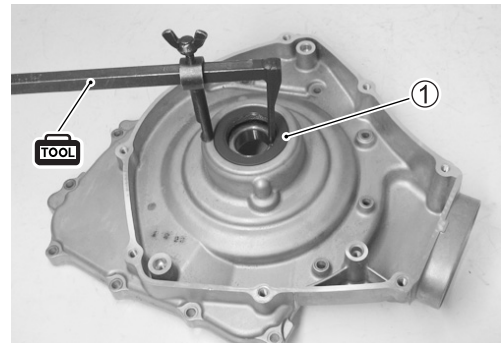
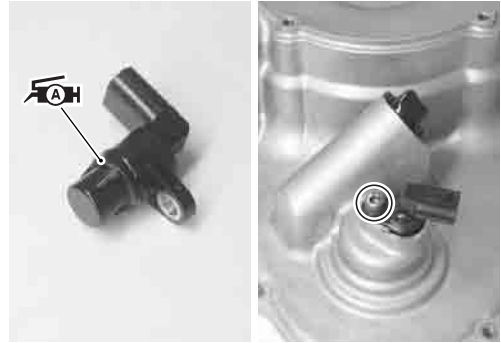
- Install the speed sensor and tighten the speed sensor bolt to the specified torque.

 **Speed sensor bolt: 10 N·m (1.0 kgf-m, 7.0 lb-ft)**

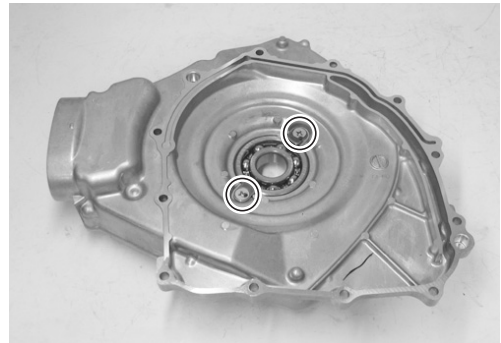
CLUTCH HOUSING CASE DISASSEMBLY

- Remove the oil seal ① with the special tool.

 **09913-50121: Oil seal remover**



- Remove the bearing retainers.

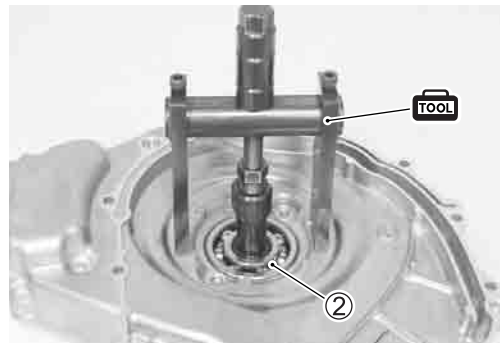


- Remove the bearing ② with the special tool.

 **09921-20240: Bearing remover set ($\phi 25$)**

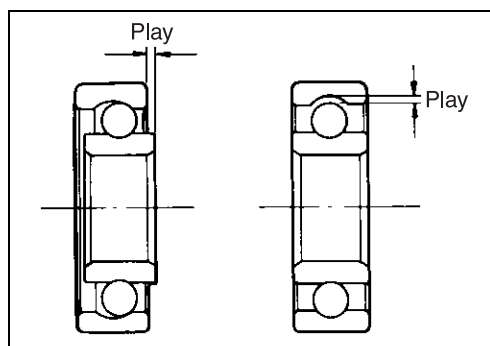
NOTE:

If there is no abnormal noise, the bearing removal is not necessary.



INSPECTION

Rotate the inner race by finger to inspect for abnormal play, noise and smooth rotation. If there is anything unusual, replace the bearing with a new one.

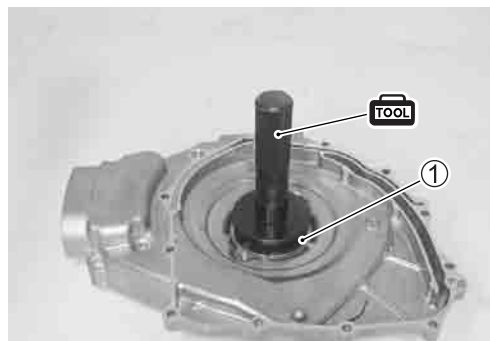
**REASSEMBLY**

- Install the bearing ① with the special tool.

TOOL 09913-70210: Bearing installer set ($\phi 62$)

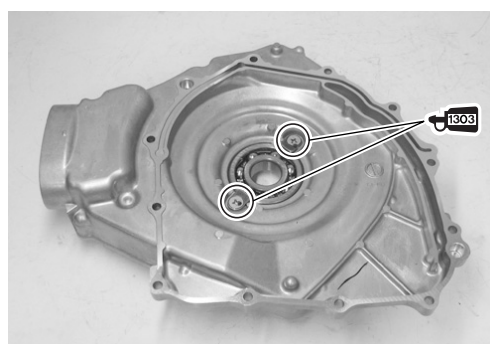
CAUTION

The removed bearing must be replaced with a new one.



- Apply a small quantity of THREAD LOCK SUPER "1303" to the bearing retainer screws, and tighten them securely.

1303 09900-32030: THREAD LOCK SUPER "1303"



- Install the oil seal ② with the special tool.

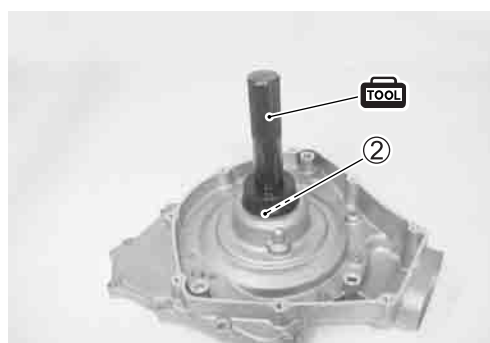
TOOL 09913-70210: Bearing installer set ($\phi 55$)

CAUTION

The removed oil seal must be replaced with a new one.

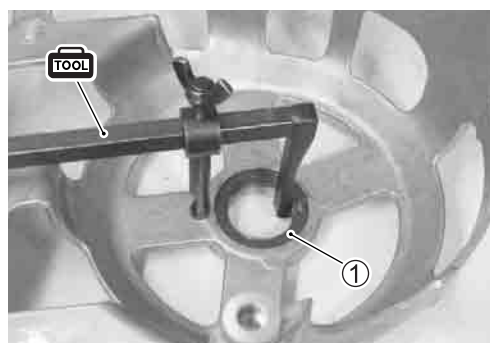
- Apply SUZUKI SUPER GREASE "A" to the lip of the oil seal.

A 99000-25010: SUZUKI SUPER GREASE "A"
(or equivalent grease)

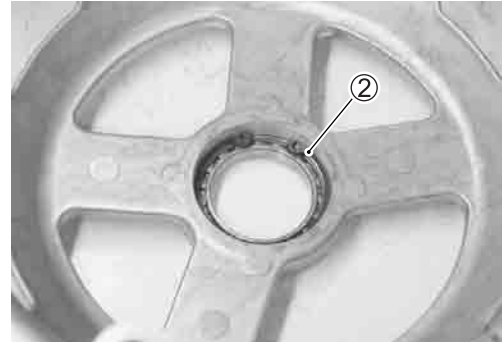
**MOVABLE DRIVE FACE COVER
DISASSEMBLY**

- Remove the oil seal ① with the special tool.

TOOL 09913-50121: Oil seal remover



- Remove the snap ring ②.

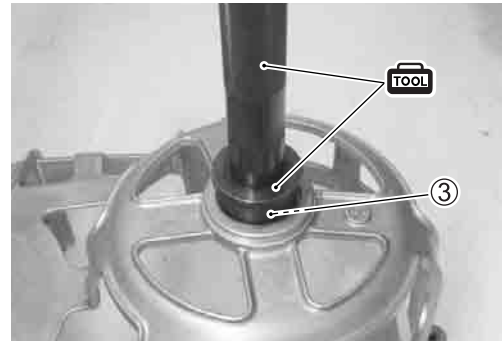


- Remove the bearing ③ with the special tool.

NOTE:

If there is no abnormal noise, the bearing removal is not necessary.

 **09913-70210: Bearing installer set ($\phi 42$)**

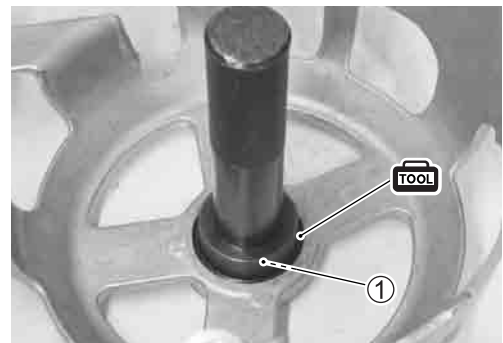
**REASSEMBLY**

- Press the bearing ① with the special tool.

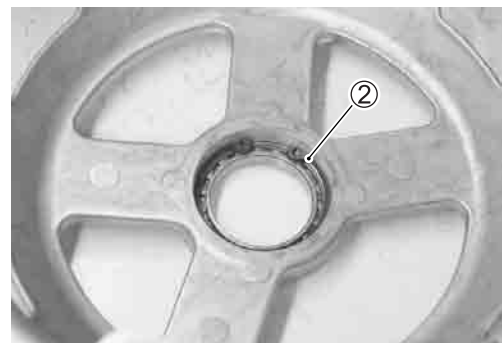
CAUTION

The removed bearing must be replaced with a new one.

 **09913-70210: Bearing installer set ($\phi 42$)**



- Install the snap ring ②.



- Install the oil seal ③ with the special tool.

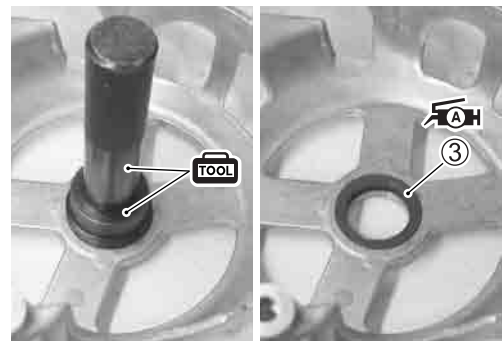
 **09913-70210: Bearing installer set ($\phi 47$)**

CAUTION

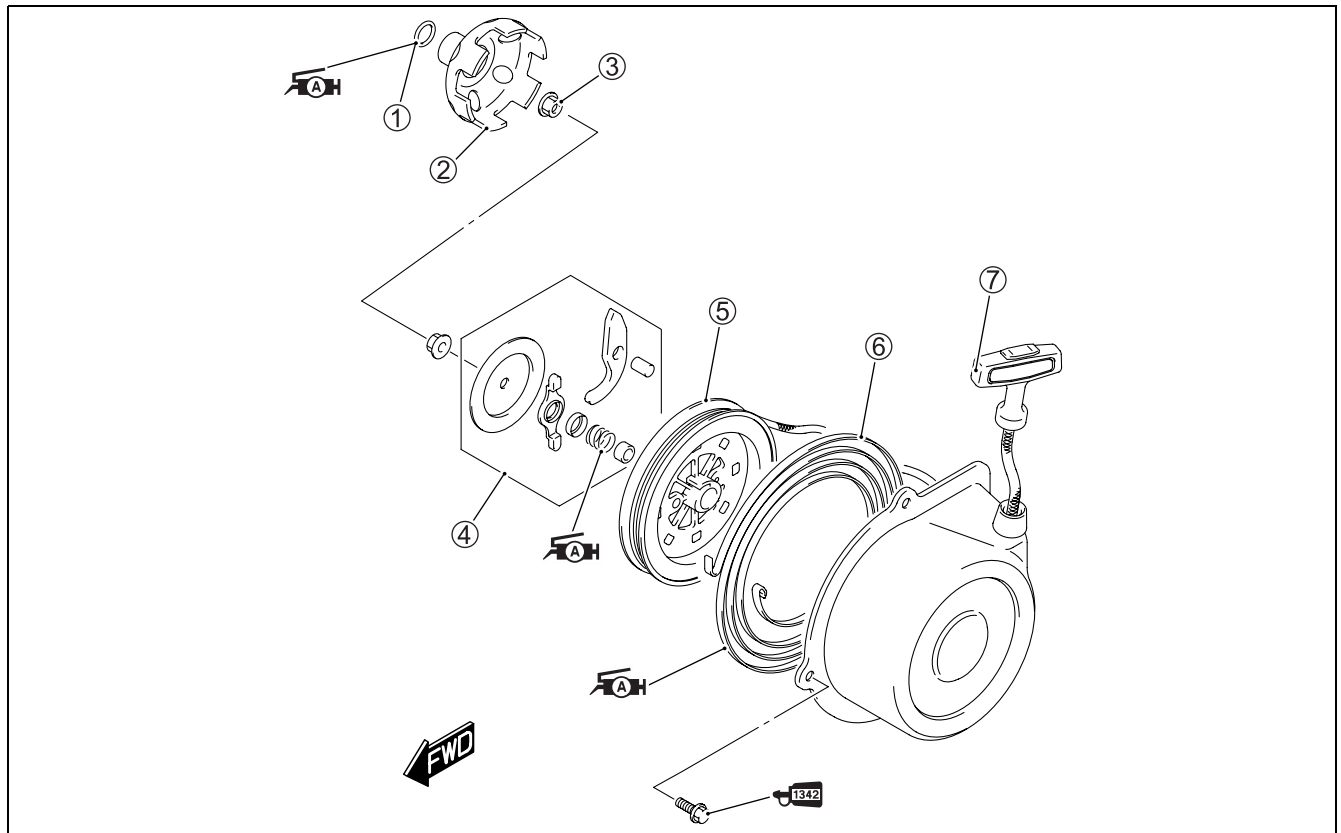
The removed oil seal must be replaced with a new one.

- Apply SUZUKI SUPER GREASE "A" to the lip of oil seal.

 **99000-25010: SUZUKI SUPER GREASE "A"**
(or equivalent grease)



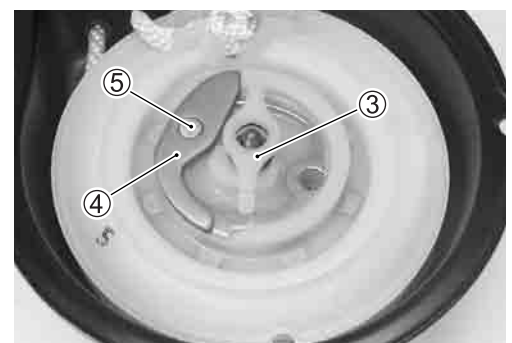
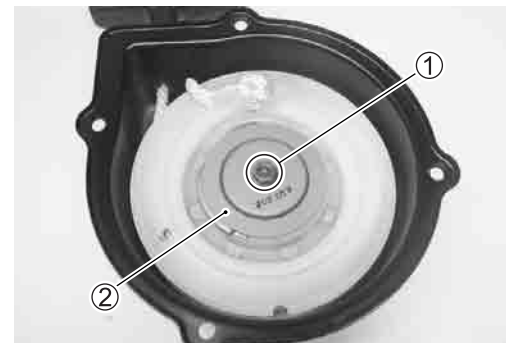
RECOIL STARTER



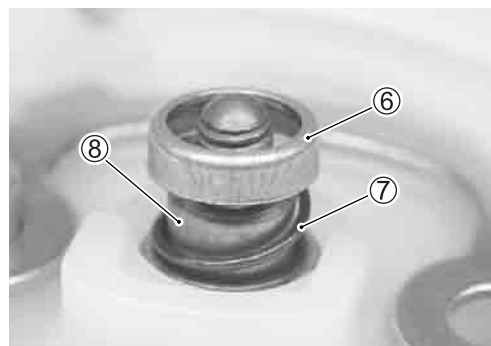
① O-ring	⑤ Reel
② Starter cup	⑥ Spiral spring
③ Starter cup nut	⑦ Rope assembly
④ Ratchet set	

DISASSEMBLY

- Remove the nut ① and friction plate ②.
- Remove the ratchet guide ③, ratchet ④ and ratchet pin ⑤.



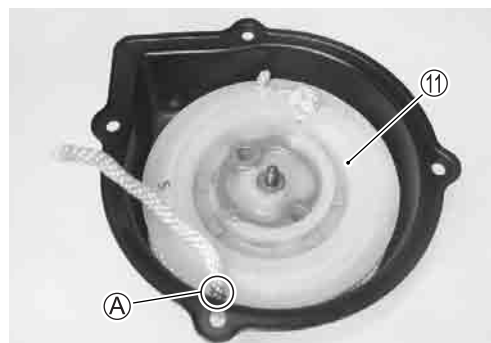
- Remove the spring cover ⑥, spring ⑦ and spacer ⑧.



- Remove the cap ⑨ from the knob ⑩.
- Untie a knot at the rope.



- Hook the rope to groove A of the reel ⑪.
- Turn the rope on the reel ⑪ properly.
- Remove the reel ⑪.



- Remove the spiral spring ⑫.



RATCHET SET INSPECTION

Inspect the ratchet set for wear or damage.

If any defects are found, replace the ratchet set with a new one.



REEL INSPECTION

Inspect the reel for wear or damage.

If any defects are found, replace the reel with a new one.



ROPE INSPECTION

Inspect the rope for wear or damage.

If any defects are found, replace the rope with a new one.



REASSEMBLY

Reassemble the recoil starter in the reverse order of disassembly. Pay attention to the following points:

- When installing the spiral spring, hook the spiral spring end ① with the recoil starter case ②.

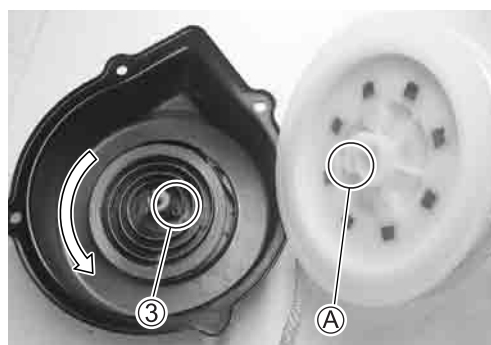
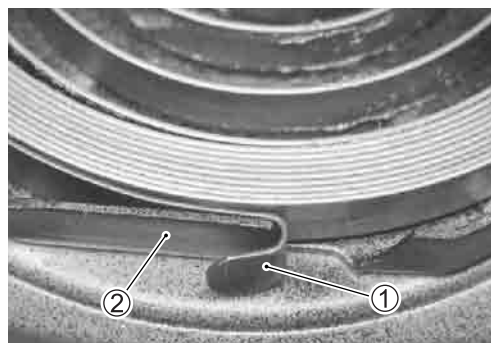
⚠ WARNING

Wear hand and eye protection when installing the reel, since the spring may quickly unwind and cause an injury.

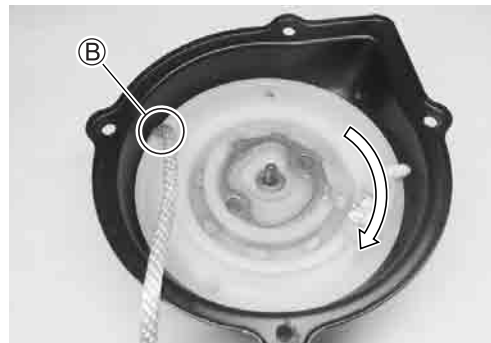
- Apply SUZUKI SUPER GREASE "A" to the spiral spring.

 **99000-25010: SUZUKI SUPER GREASE "A"**
(or equivalent grease)

- Turn the rope on the reel properly.
- After installing the spiral spring, engage the part ① of the reel with the spiral spring end ③.



- Hook the rope onto the hook part ⑥ of the reel, turn the reel clockwise five or six times with the rope.

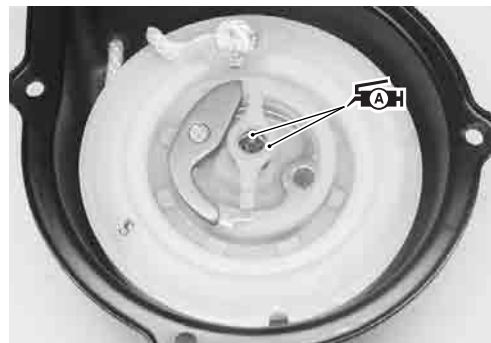


- Install the ratchet pin, spacer, spring cover, ratchet and ratchet guide.

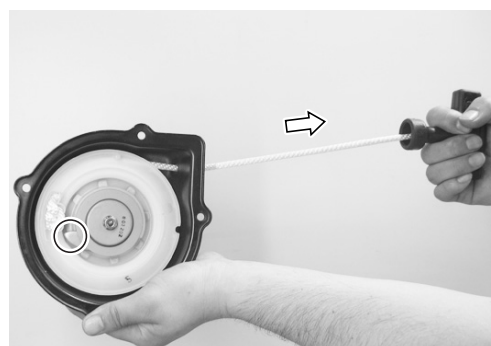
NOTE:

- Apply SUZUKI SUPER GREASE “A” to the shaft and ratchet guide.

 **99000-25010: SUZUKI SUPER GREASE “A”**
(or equivalent grease)



- Pull the rope and check that the ratchet is pushed out.



ENGINE REASSEMBLY

Reassemble the engine in the reverse order of disassembly.
The following steps require special attention or precautionary measures should be taken.

CAUTION

Always keep the drive belt, drive face and driven face away from any greasy matter.

NOTE:

Apply engine oil to each running and sliding part before reassembling.

CRANKSHAFT

- When mounting the crankshaft into the crankcase, it is necessary to pull its left end into the crankcase with the special tool.



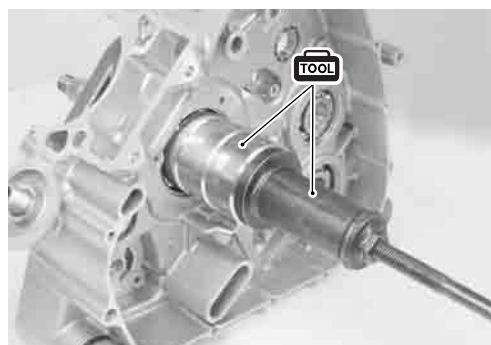
09910-32812: Crankshaft installer

09940-52861: Front fork oil seal installer

CAUTION

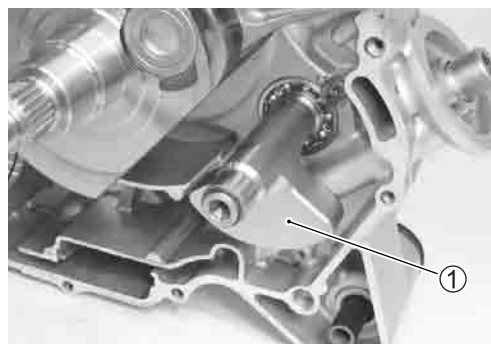
Never fit the crankshaft into the crankcase by striking it with a plastic mallet.

Always use the special tool, otherwise the accuracy of the crankshaft alignment will be affected.



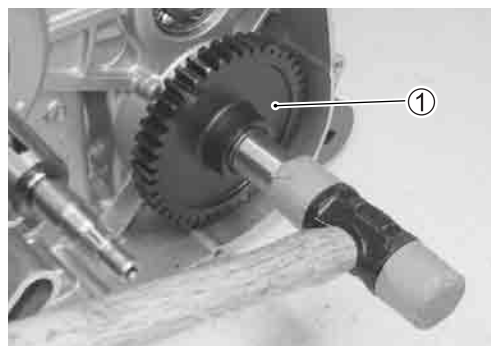
CRANK BALANCER

- Install the crank balancer shaft ①.

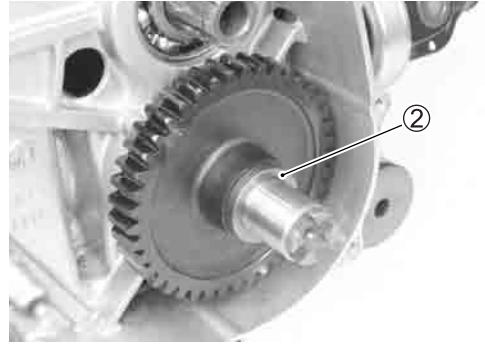


REAR OUTPUT SHAFT DRIVE BEVEL GEAR

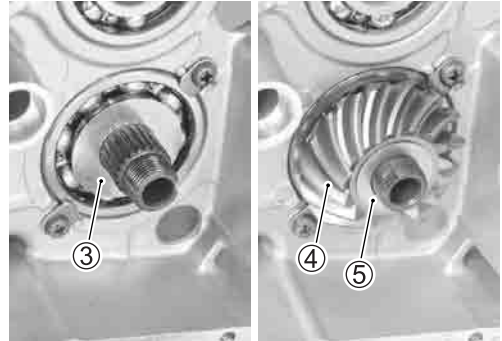
- Install the transfer output driven gear ① with a plastic mallet.



- Install the spacer ②.

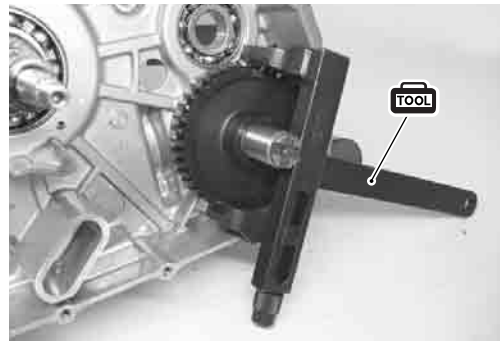


- Install the shim ③.
- Install the rear output shaft drive bevel gear ④ and washer ⑤.



- Hold the transfer output gear with the special tool.

TOOL 09920-53740: Clutch sleeve hub holder



- Tighten the rear output shaft drive bevel gear nut to the specified torque.

Drive bevel gear nut: 100 N·m (10.0 kgf-m, 72.5 lb-ft)

- Stake the collar of the drive bevel gear nut into the notch in the shaft of the transfer output gear.

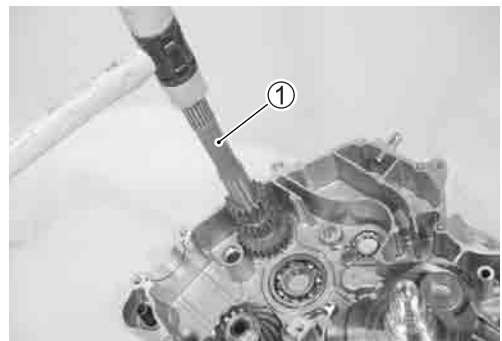
CAUTION

The removed drive bevel gear nut must be replaced with a new one.

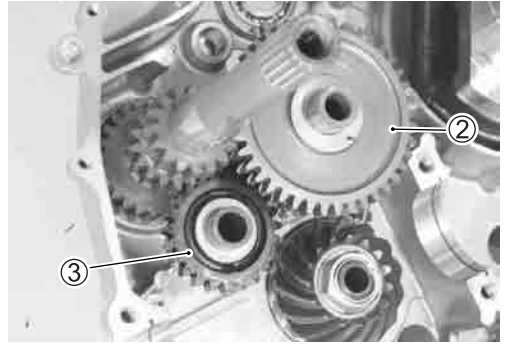


TRANSFER

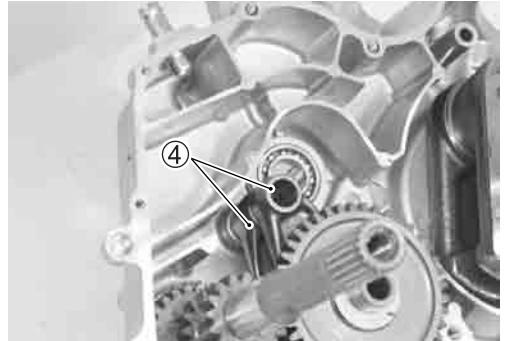
- Install the transfer input shaft ① with a plastic mallet.



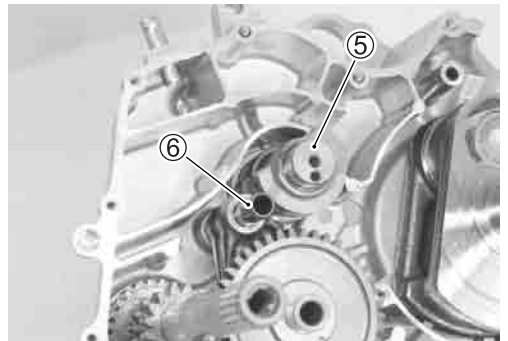
- Install the transfer output shaft assembly ② and reverse idle gear ③.



- Install the gearshift forks ④.

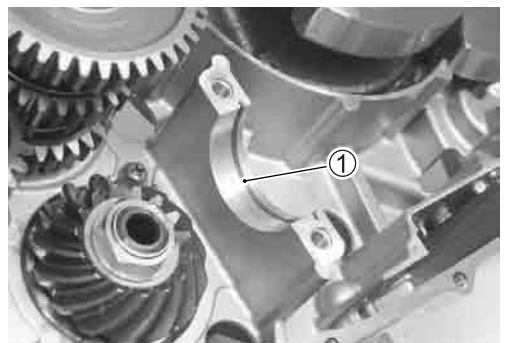


- Install the gearshift cam ⑤ and gearshift fork shaft ⑥.



REAR OUTPUT SHAFT

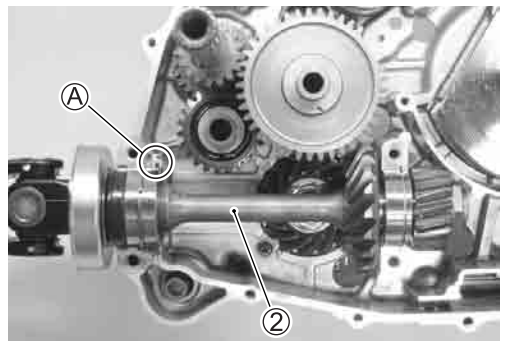
- Install the C-ring ①.



- Install the rear output shaft ②.

NOTE:

Be sure to fit the bearing knock-pin ① on the bearing into the groove of the crankcase.

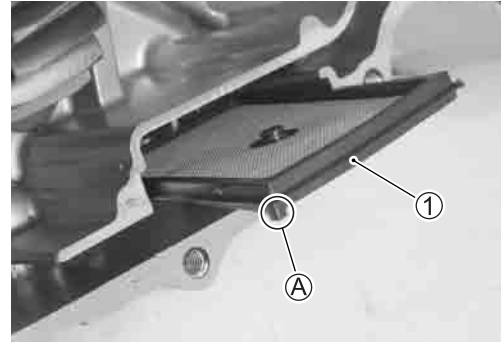


OIL SUMP FILTER

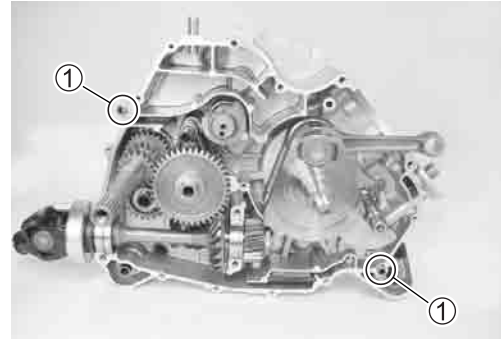
- Install the oil sump filter ①.

NOTE:

Fit the projection (A) of the oil sump filter in the concave portion of the crankcase.

**CRANKCASE**

- Thoroughly remove the sealant material and oil stains on the mating surface of the right and left crankcase.
- Install the dowel pins ① to the left crankcase.
- Apply engine oil to the conrod big end and each gear.

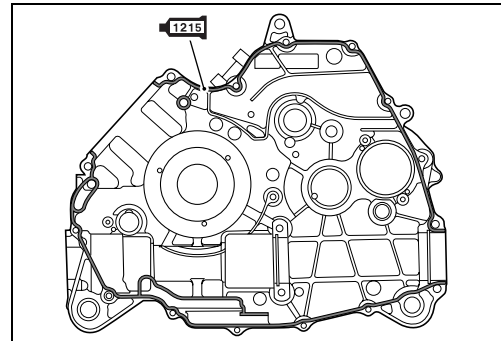


- Apply SUZUKI BOND "1215" to the mating surface of the right crankcase as shown.

1215 99000-31110: SUZUKI BOND "1215"
(or equivalent bond)

NOTE:

- * Use of SUZUKI BOND "1215" is as follows: Make surfaces free from moisture, oil, dust and other foreign materials.
- * Spread on surfaces thinly to form an even layer, and assemble the crankcases within few minutes.
- * Take extreme care not to apply any BOND "1215" to the oil hole, oil groove and bearing.
- * Apply to distorted surfaces as it forms a comparatively thick film.



- Tighten the crankcase bolts to the specified torque.

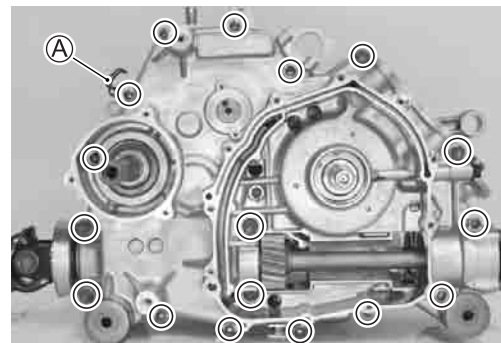
Crankcase bolt: (M6) 10 N·m (1.0 kgf-m, 7.0 lb-ft)
(M8) 26 N·m (2.6 kgf-m, 19.0 lb-ft)

CAUTION

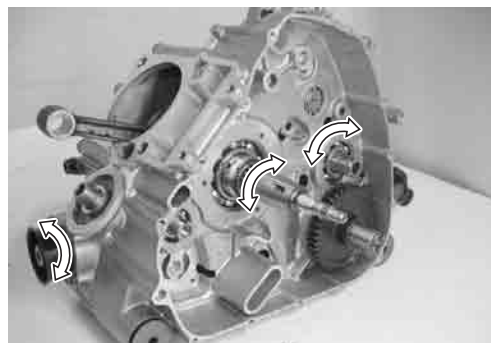
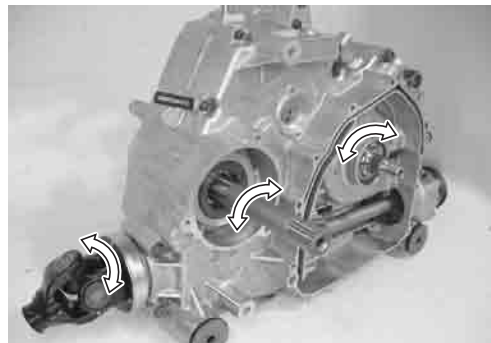
Tighten the larger diameter crankcase bolts first and then smaller ones diagonally and evenly.

NOTE:

Fit the clamp to the bolt (A).



- After the crankcase bolts have been tightened, check if the each shaft rotates smoothly.



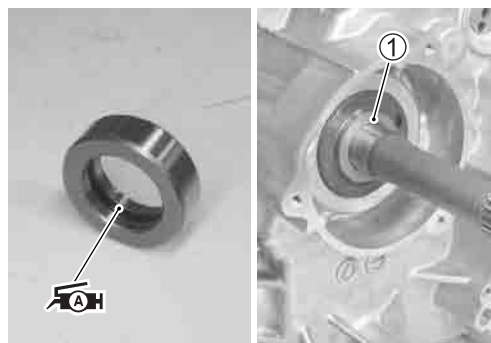
- Apply SUZUKI SUPER GREASE "A" to the O-ring.

 **99000-25010: SUZUKI SUPER GREASE "A"**
(or equivalent grease)

CAUTION

The removed O-ring must be replaced with a new one to prevent oil leakage.

- Install the collar ①.



CLUTCH SHOE

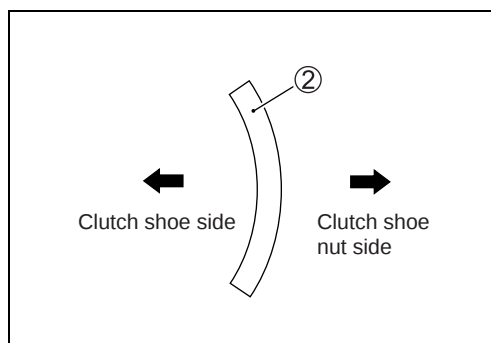
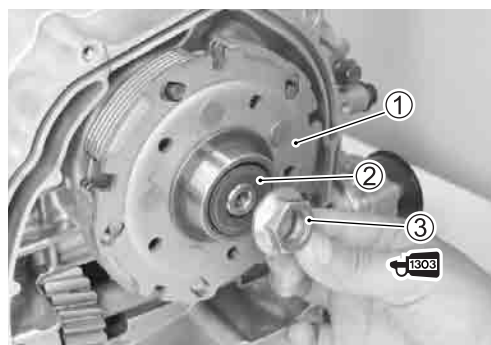
- Install the clutch shoe ① and washer ②.
- Apply a small quantity of THREAD LOCK SUPER "1303" to the clutch shoe nut ③.

 **99000-32030: THREAD LOCK SUPER "1303"**

NOTE:

Install the washer ② as shown.

- Install the clutch shoe nut ③.



- Tighten the clutch shoe nut to the specified torque with the special tool.

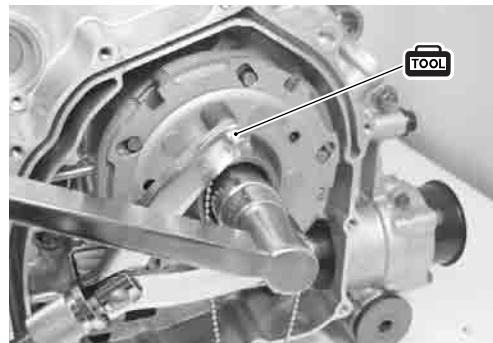
NOTE:

The clutch shoe nut has left-hand thread.

 **Clutch shoe nut: 150 N·m (15.0 kgf-m, 108.5 lb-ft)**

 **09930-40113: Rotor holder**

09930-40120: Rotor holder attachment A



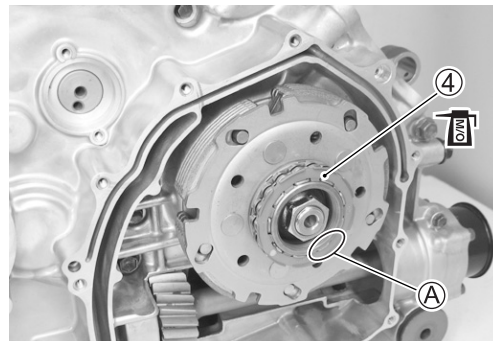
- Apply MOLYBDENUM OIL SOLUTION to the one way clutch ④.

 MOLYBDENUM OIL SOLUTION

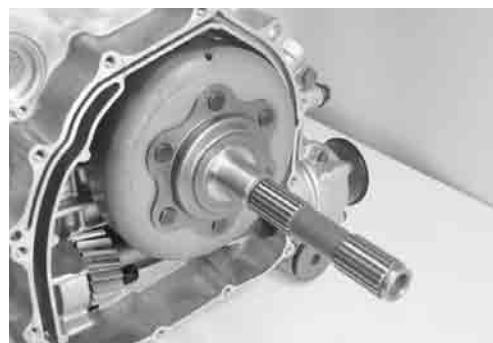
- Install the one way clutch in the proper direction as shown.

NOTE:

When installing the one way clutch onto the clutch shoe, make sure that the "OUTSIDE" mark  in the one way clutch faces to the clutch housing.



- Install the clutch housing.

**CLUTCH HOUSING CASE**

- Apply SUZUKI SUPER GREASE "A" to the O-ring.
- Install the oil jet ① as shown.

 **99000-25010: SUZUKI SUPER GREASE "A"**
(or equivalent grease)

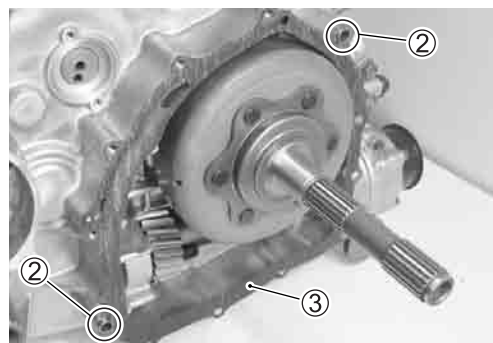
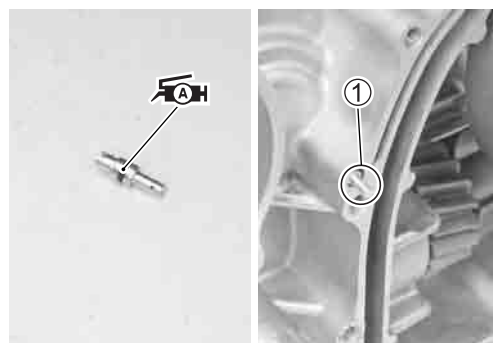
CAUTION

The removed O-ring must be replaced with a new one to prevent oil pressure leakage.

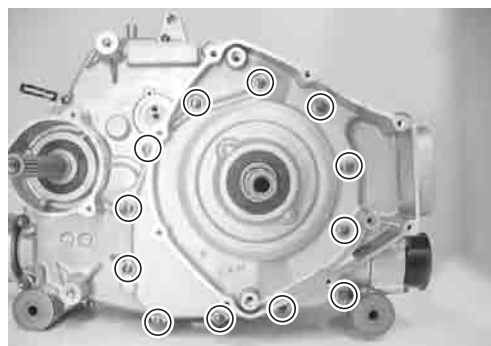
- Install the dowel pins ② and clutch housing case gasket ③.

CAUTION

The removed clutch housing case gasket must be replaced with a new one to prevent oil leakage.



- Install the clutch housing case and tighten the clutch housing case bolts in diagonal stages.



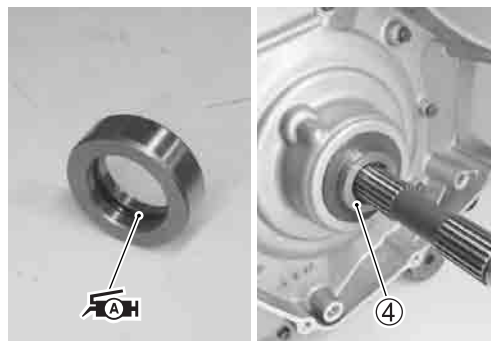
- Apply SUZUKI SUPER GREASE "A" to the O-ring.

 99000-25010: SUZUKI SUPER GREASE "A"
(or equivalent grease)

CAUTION

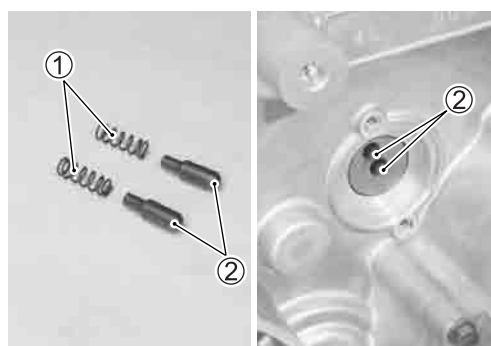
Removed O-ring must be replaced with a new one to prevent oil leakage.

- Install the collar ④.



GEAR POSITION SWITCH

- Install the springs ① and switch contacts ②.



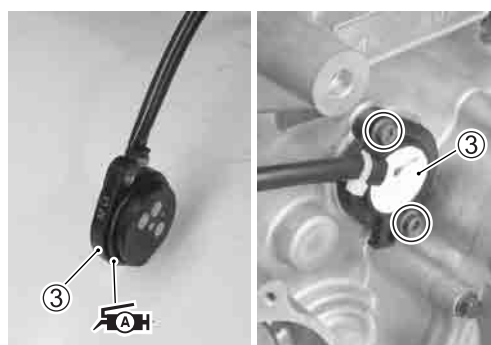
- Apply SUZUKI SUPER GREASE "A" to the O-ring ③.

 99000-25010: SUZUKI SUPER GREASE "A"
(or equivalent grease)

CAUTION

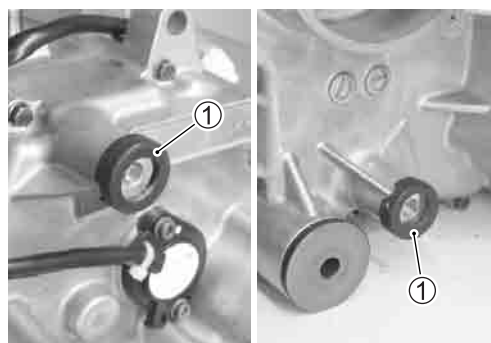
Removed O-ring must be replaced with a new one to prevent oil leakage.

- Install the gear position switch and tighten the gear position switch bolts.



CLUTCH INNER COVER

- Install the cushions ①.



- Install the clutch inner cover gasket and clutch inner cover ②.

CAUTION

The removed clutch inner cover gasket must be replaced with a new one.

- Tighten the clutch inner cover bolts to the specified torque.

CAUTION

Tighten the clutch inner cover bolts ① first and then other ones diagonally.

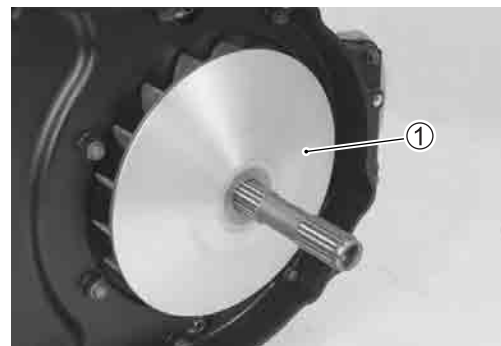
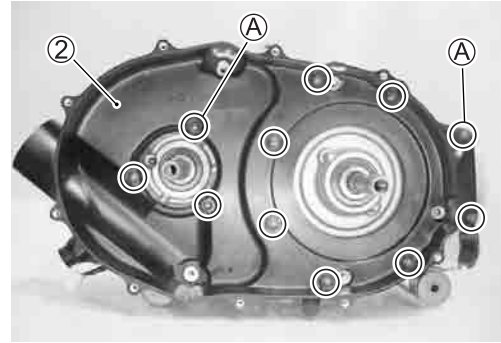
 Clutch inner cover bolt: 9 N·m (0.9 kgf-m, 6.5 lb-ft)

FIXED DRIVE FACE

- Install the fixed drive face ①.

CAUTION

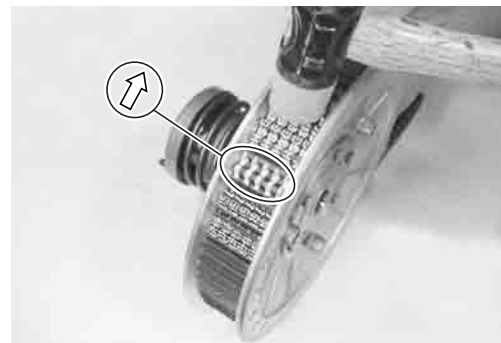
Degrease the fixed drive face. Use nonflammable cleaning solvent to wipe off oily or greasy matter and make its surfaces completely dry.

**MOVABLE DRIVEN FACE AND DRIVE BELT**

- Install the drive belt, as low as possible, between the movable driven face and fixed driven face by tapping with a plastic mallet.

CAUTION

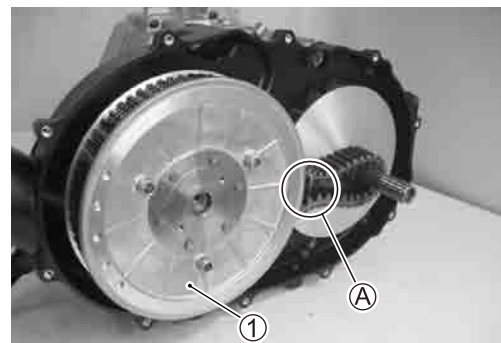
- * The drive belt should be installed so that the arrows on the drive belt periphery point in the normal turning direction.
- * The drive belt contact surface of the driven face should be thoroughly cleaned.



- Install the movable driven face assembly ①.

CAUTION

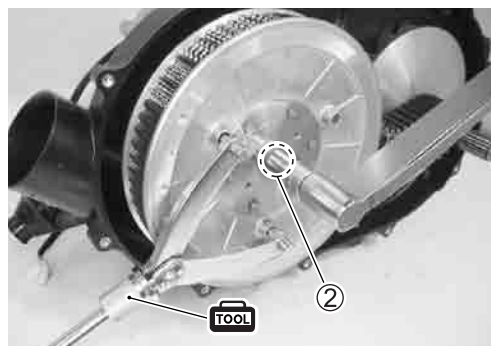
Pull the center area ① of upper and lower belt lines to be close to each other to prevent the belt from expanding.



- Tighten the movable driven face bolt ② to the specified torque with the special tool.

 **Movable driven face bolt: 110 N·m (11.0 kgf-m, 79.5 lb-ft)**

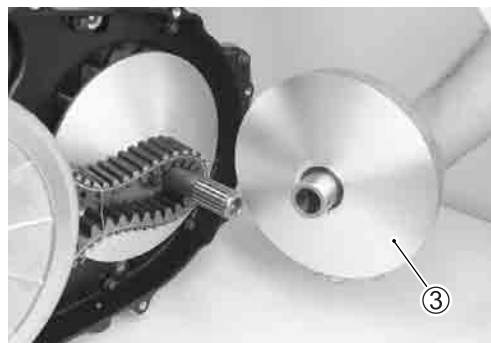
 **09930-40113: Rotor holder**



- Install the movable drive face assembly ③.

CAUTION

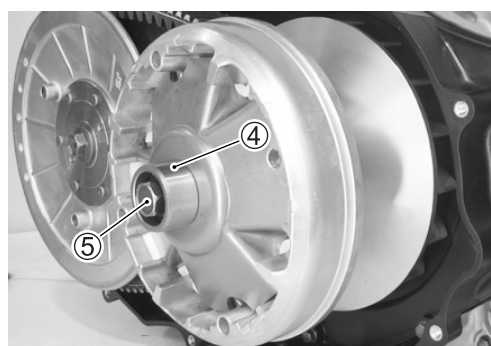
Degrease the movable drive face assembly. Use non-flammable cleaning solvent to wipe off oily or greasy matter and make its surfaces completely dry.



Install the collar ④ and movable drive face bolt ⑤.

NOTE:

Be careful direction of the collar ④.



- Tighten the movable drive face bolt to the specified torque with the special tool.

 **Movable drive face bolt: 110 N·m (11.0 kgf-m, 79.5 lb-ft)**

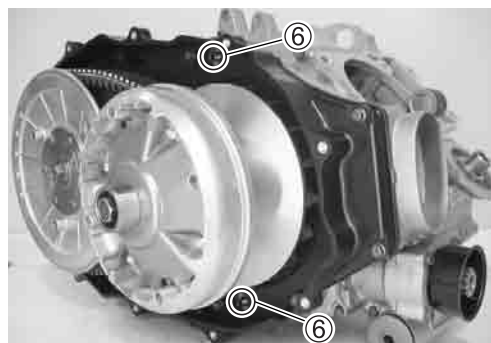
 **09930-40113: Rotor holder**

NOTE:

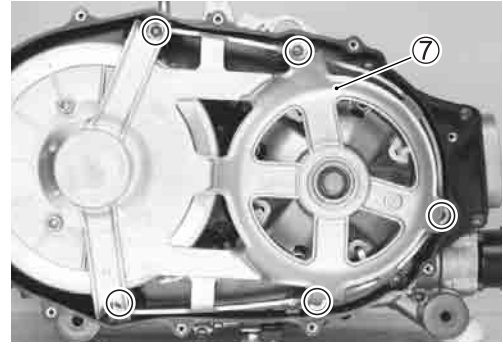
Turn the fixed drive face until the belt is seated in and both the drive and driven faces will move together smoothly without slip.



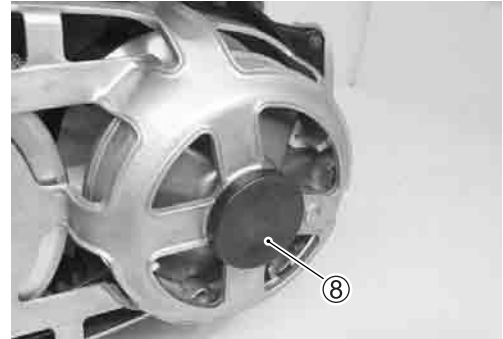
- Install the dowel pins ⑥.



- Install the movable drive face cover ⑦ and tighten the bolts securely.



- Install the cap ⑧.



CLUTCH COVER

- Install the clutch cover gasket and clutch cover ①.

CAUTION

The removed clutch cover gasket must be replaced with a new one.

- Tighten the clutch cover bolts to the specified torque.

 Clutch cover bolt: 8 N·m (0.8 kgf-m, 5.7 lb-ft)

CAUTION

Tighten the clutch cover bolts ① first and then other ones diagonally.



OIL PUMP

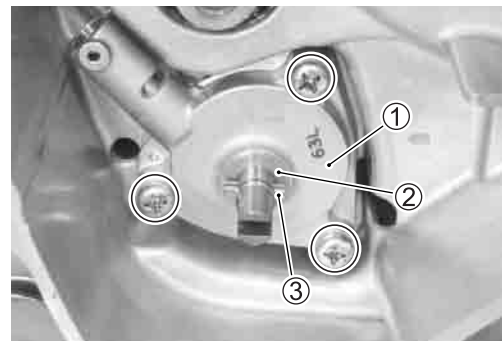
- Apply a small quantity of THREAD LOCK SUPER “1303” to the oil pump mounting screws.

 99000-32030: THREAD LOCK SUPER “1303”

- Install the oil pump ① and tighten the oil pump mounting screws.
- Install the washer ② and pin ③.

NOTE:

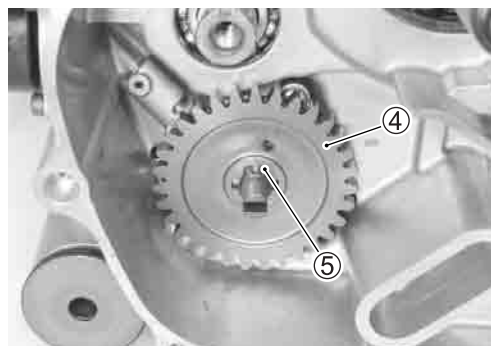
Be careful not to drop the washer ② and pin ③ into the crank-case.



- Install the oil pump driven gear ④.
- Install the snap ring ⑤.

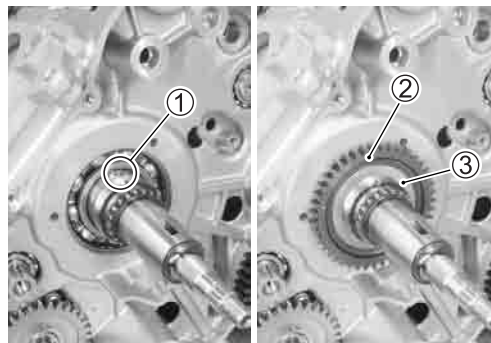
NOTE:

Be careful not to drop the snap ring into the crankcase.



CRANK BALANCER SHAFT DRIVE/DRIVEN GEAR AND OIL PUMP DRIVE GEAR

- Install the pin ①.
- Install the crank balancer drive gear ② and washer ③.



- Hold the crank balancer drive gear with the special tool.



09920-53740: Clutch sleeve hub holder

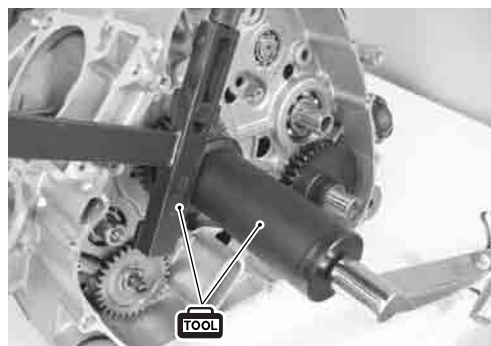
09924-52460: Socket wrench 52 mm

- Tighten the crank balancer drive gear nut to the specified torque.



Crank balancer drive gear nut:

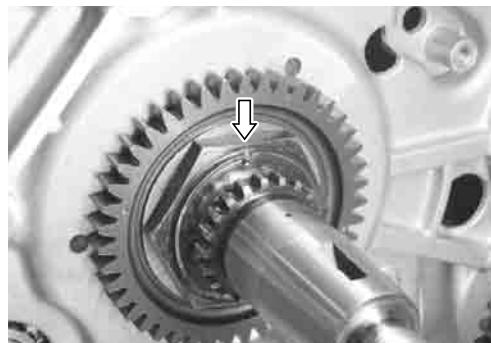
150 N·m (15.0 kgf-m, 108.5 lb-ft)



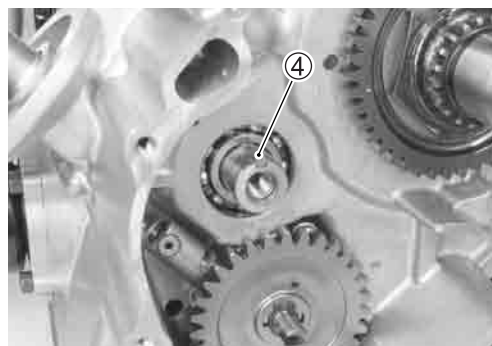
CAUTION

The removed crank balancer drive gear nut must be replaced with a new one.

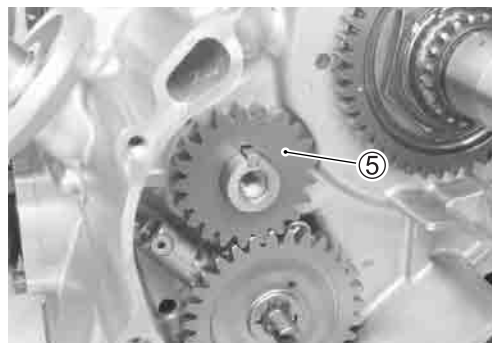
- Lock the crank balancer drive gear nut with a center punch.



- Install the key ④.

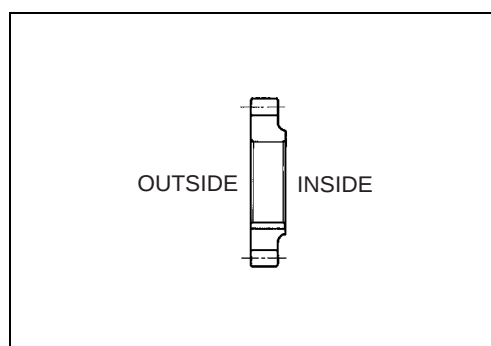


- Install the oil pump drive gear ⑤.



NOTE:

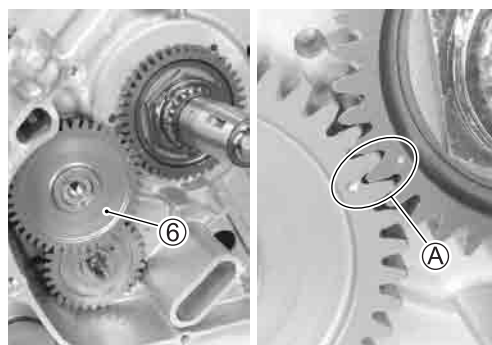
Be careful direction of the oil pump drive gear.



- Install the crank balancer driven gear ⑥.

NOTE:

Align the matching marks Ⓐ as shown.



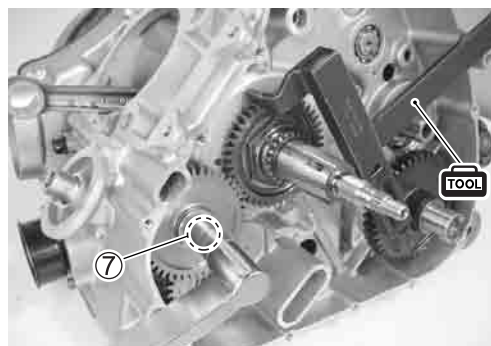
- Apply a small quantity of THREAD LOCK SUPER “1303” to the balancer driven gear bolts.

1303 99000-32030: THREAD LOCK SUPER “1303”

- Hold the crank balancer drive gear with the special tool and tighten the crank balancer driven gear bolt ⑦ to the specified torque.

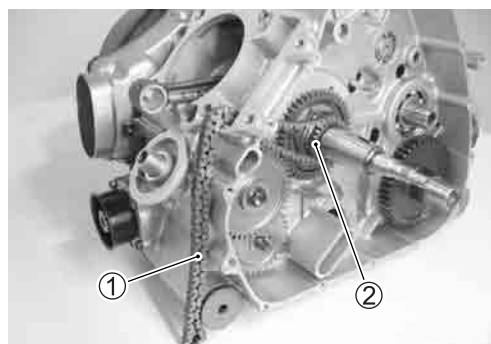
TOOL 09920-53740: Clutch sleeve hub holder

- 🔧 Crank balancer driven gear bolt:**
50 N·m (5.0 kgf-m, 36.0 lb-ft)



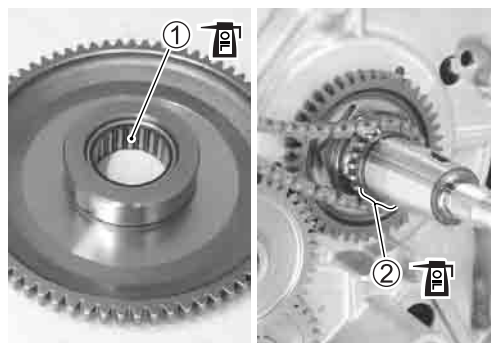
CAM CHAIN

- Install the cam chain ① onto the crankshaft sprocket ②.

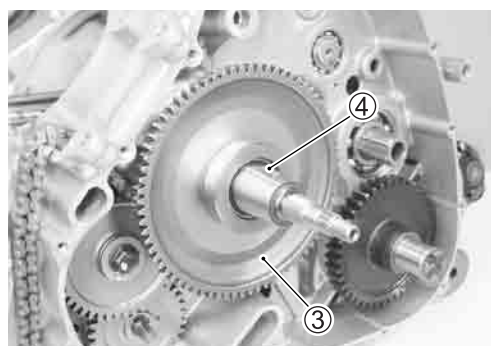


STARTER CLUTCH AND GENERATOR ROTOR

- Apply engine oil to the starter driven gear bearing ① and crankshaft ②.



- Install the starter driven gear ③.
- Degrease the tapered portion of the generator rotor assembly and also the crankshaft. Use nonflammable cleaning solvent to wipe off oily or greasy matter to make these surfaces completely dry.
- Install the key ④.



- Install the generator rotor.

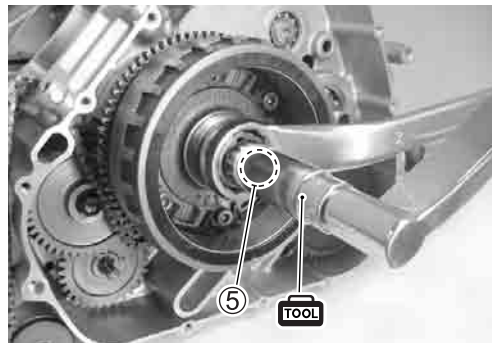
CAUTION

Make sure that the starter clutch on the crankshaft rotor is fitted into the generator rotor properly.

- Hold the generator rotor and tighten the generator rotor nut ⑤ to the specified torque with the special tool.

 **Generator rotor nut: 140 N·m (14.0 kgf-m, 101.5 lb-ft)**

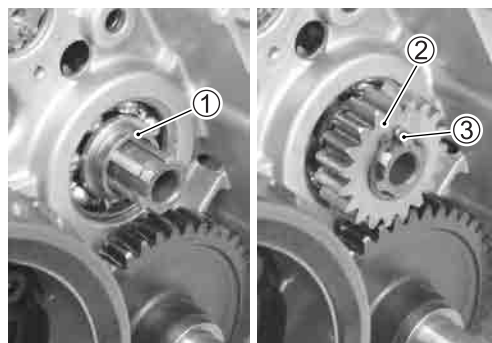
 **09924-62430: Long socket (22 mm)**

**TRANSFER OUTPUT DRIVE GEAR**

- Install the spacer ①.
- Install the transfer output drive gear ② and snap ring ③.

CAUTION

The removed snap ring must be replaced with a new one.

**GEAR SHIFT**

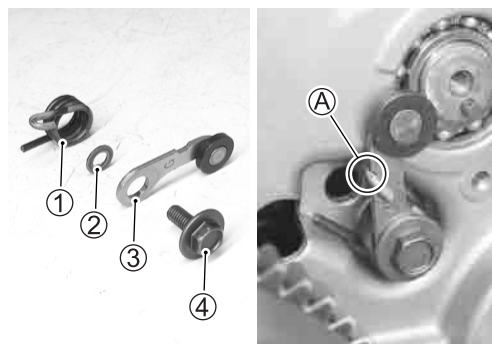
- Install the return spring ①, washer ②, gearshift cam stopper ③, gearshift cam stopper bolt ④.

NOTE:

Hook the return spring end (A) to the gearshift cam stopper.

CAUTION

Make sure that the gearshift cam stopper moves smoothly.



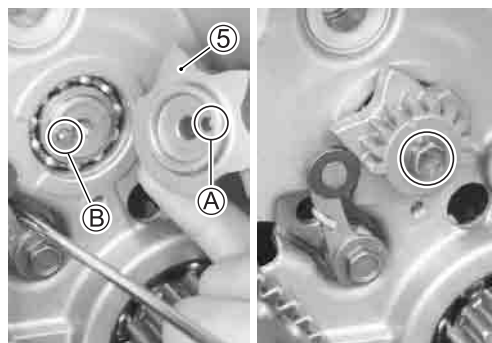
- Tighten the gearshift stopper bolt securely.

- Install the gearshift cam stopper plate ⑤.

NOTE:

Align the pin groove (A) of the gearshift cam stopper plate with the pin of the gearshift cam.

- Tighten the gearshift cam stopper bolt securely.



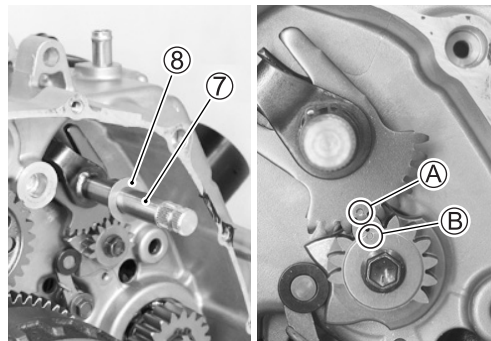
- Install the washer ⑥.



- Install the gearshift shaft ⑦ and washer ⑧.

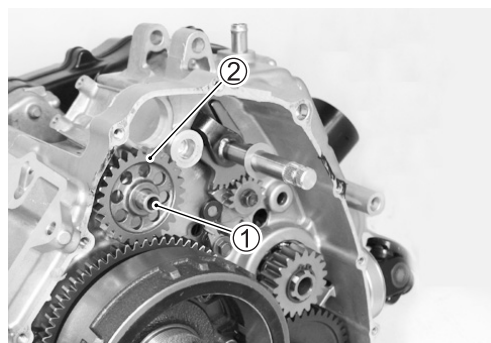
NOTE:

Align the matching mark ① of the gear shift shaft with matching mark ② of the gearshift cam stopper plate.

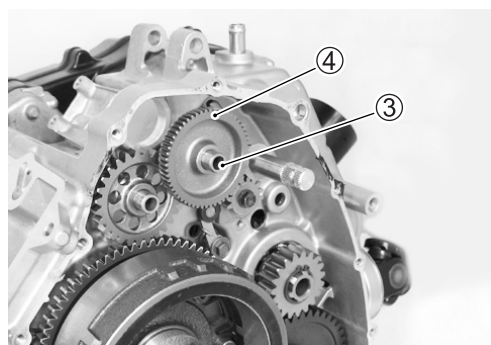


STARTER IDLE GEAR NO.1 AND NO.2

- Install the starter idle gear shaft ① and starter idle gear No.2 ②.



- Install the starter idle gear shaft ③ and starter idle gear No.1 ④.

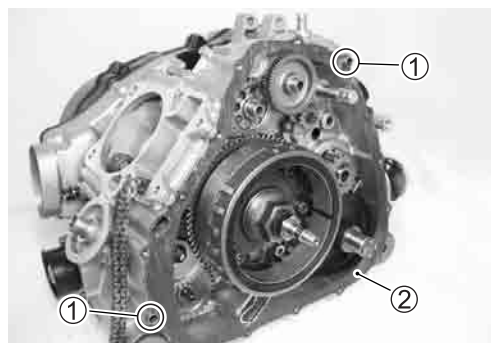


GENERATOR COVER

- Install the dowel pins ① and generator cover gasket ②.

CAUTION

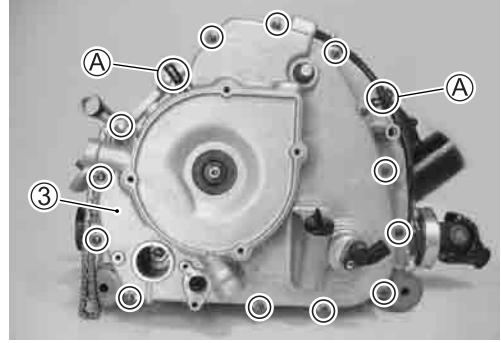
The removed generator cover gasket must be replaced with a new one to prevent oil leakage.



- Install the generator cover ③ and tighten the bolts securely.

NOTE:

Fit the clamp to the bolt ①.

**STARTER CUP**

- Apply SUZUKI SUPER GREASE "A" to the O-ring and lip of the oil seal.

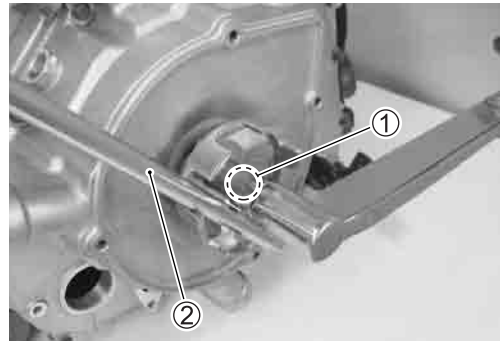
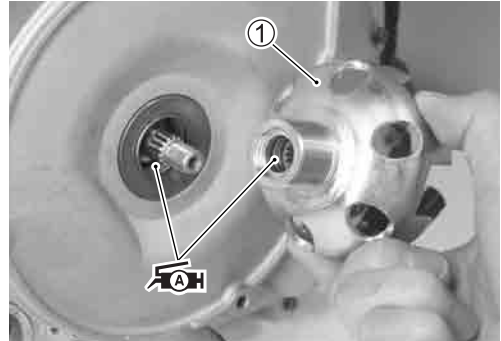
 99000-25010: SUZUKI SUPER GREASE "A"
(or equivalent grease)

CAUTION

The removed O-ring must be replaced with a new one.

- Install the starter cup ①.
- Tighten the starter cup nut ① to the specified torque with a suitable bar ②.

 Starter cup nut: 37.5 N·m (3.75 kgf-m, 27.0 lb-ft)

**WATER PUMP**

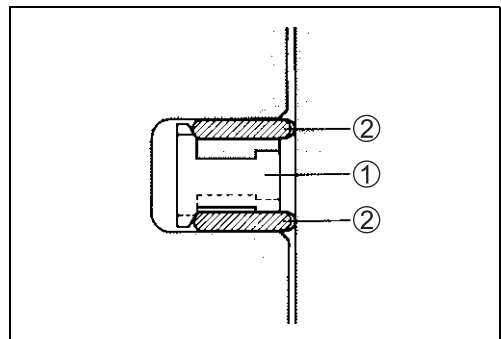
- Install the water pump. ( 7-14)

PISTON RING

- Install the piston rings in the order of oil ring, 2nd ring and 1st ring.
- The first member to go into the oil ring groove is a spacer ①. After placing the spacer, fit the two side rails ②.

NOTE:

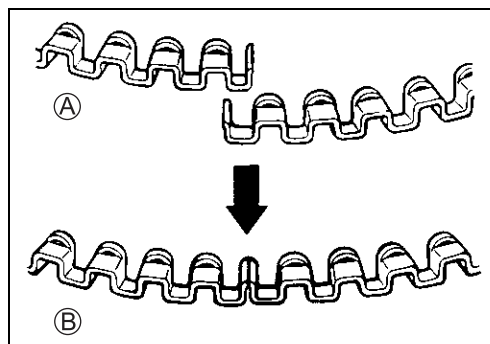
Side designations, top and bottom, are not applied to the spacer and side rails: you can position each either way.



CAUTION

When installing the spacer, be careful not to allow its two ends to overlap in the groove.

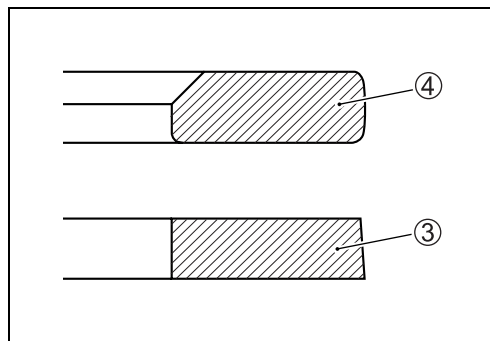
- Ⓐ INCORRECT
Ⓑ CORRECT



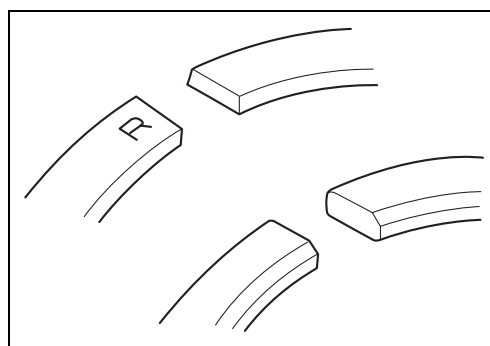
- Install the 2nd ring ③ and the 1st ring ④ to the piston.

NOTE:

1st ring and 2nd ring differ in shape.

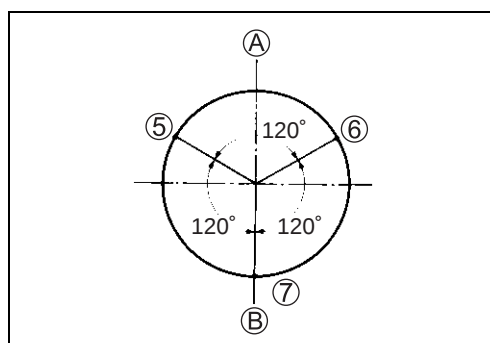


- Be sure to bring the concave side of 1st ring to the top when fitting it to the piston.
- 2nd ring has letter "R" marked on the side. Be sure to bring the marked side ring to the top when fitting it to the piston.



- Position the gaps of the three ring as shown. Before inserting each piston into the cylinder, check that the gaps are so located.

- Ⓐ Exhaust side
Ⓑ Intake side
⑤ 2nd ring and lower side rail
⑥ Upper side rail
⑦ 1st ring and spacer

**PISTON AND CYLINDER**

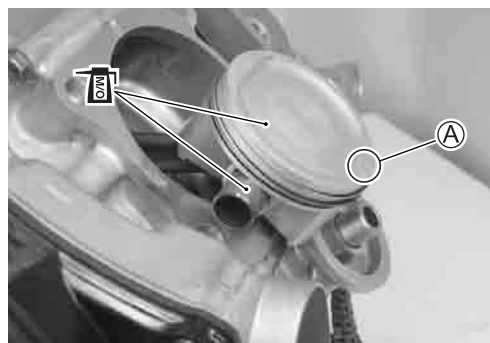
- Apply molybdenum oil solution onto the piston pin and small end of the conrod.

NOTE:

Install the piston with the punch mark Ⓐ on the piston head facing toward the exhaust side.



MOLYBDENUM OIL SOLUTION



- Place a clean rag over the cylinder base to prevent the piston pin circlip from dropping into the crankcase, and then fit the piston pin circlip with long-nose pliers.

CAUTION

The removed piston pin circlip must be replaced with a new one to prevent circlip failure.

NOTE:

End gap of the circlip should not be aligned with the cutaway in the piston pin bore.

- Thoroughly wipe off oil from the fitting surface of the crankcase.
- Apply SUZUKI BOND "1215" to the crankcase (B) as shown.

 **99000-31110: SUZUKI BOND "1215"**
(or equivalent bond)

- Apply molybdenum oil solution to the sliding surface of the piston and piston rings.
- Install the dowel pins (1) and cylinder gasket (2) onto the crankcase.

CAUTION

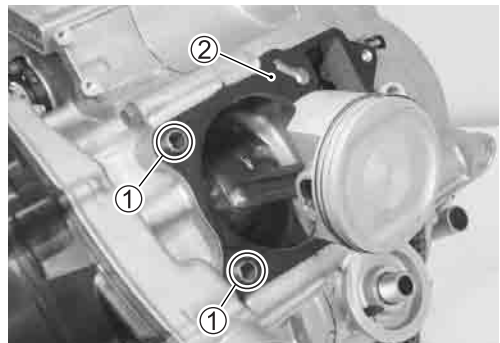
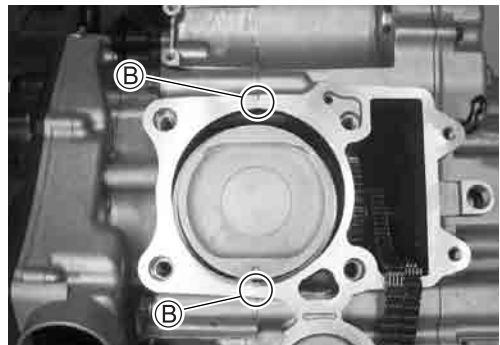
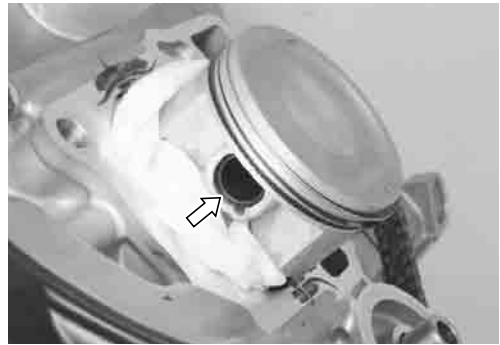
The removed gasket must be replaced with a new one to prevent oil leakage.

 MOLYBDENUM OIL SOLUTION

- Hold each piston ring with the piston ring sections positioned correctly and put it into the cylinder. Make sure that the piston rings are caught by the cylinder skirt.

NOTE:

When mounting the cylinder, after attaching the camshaft drive chain, keep the camshaft drive chain taut. The camshaft drive chain must not be caught between the cam drive chain sprocket and crankcase when the crankshaft is rotated.



- Install the cam chain guide ③.

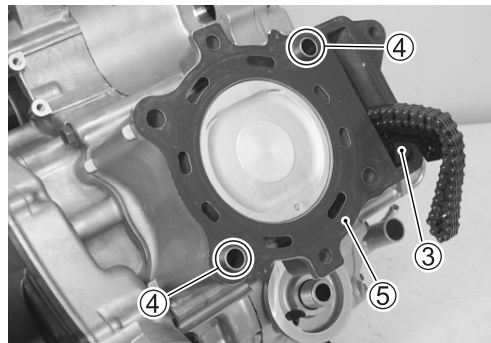
NOTE:

Make sure that the cam chain guide ③ is inserted properly or binding of the cam chain and guide may result.

- Install the dowel pins ④ and cylinder head gasket ⑤.

CAUTION

The removed gasket must be replaced with a new one to prevent gas leakage.



CYLINDER HEAD

- With the head snugly seated on the cylinder, secure it by tightening the bolts in diagonal stages. Tighten the cylinder head bolts (M10) diagonally to the specified torque.

🔧 Cylinder head bolt (M10)

Initial: 25 N·m (2.5 kgf-m, 18.0 lb-ft)

Final: 37 N·m (3.7 kgf-m, 27.0 lb-ft)

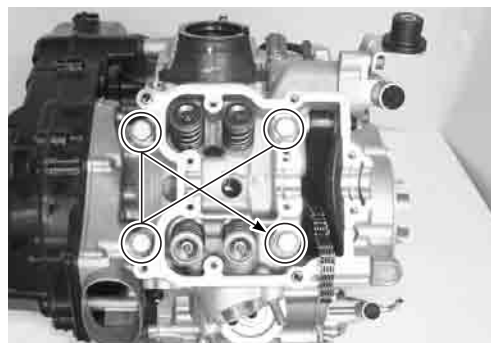
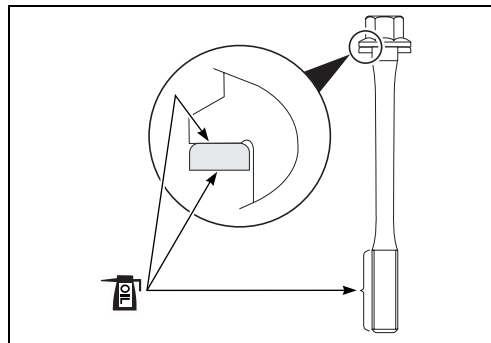
NOTE:

** Apply engine oil to the threaded parts of the cylinder head bolts (M10) and both sides of its washers.*

** Be sure to install the washer with rounded side facing up.*

CAUTION

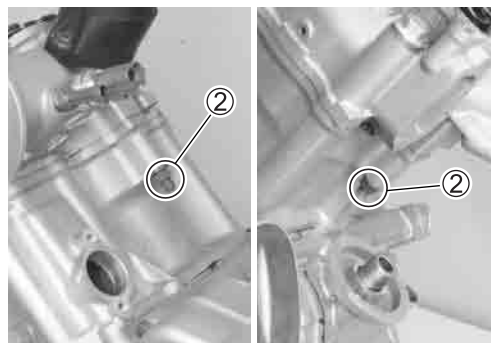
The removed copper washers must be replaced to prevent oil leakage.



- After tightening the cylinder head bolts (M10) to specification, tighten the cylinder head bolts (M8) ① and cylinder base nuts ② to the specified torque.

🔧 Cylinder head bolt (M8): 25 N·m (2.5 kgf-m, 18.0 lb-ft)

Cylinder base nut: 25 N·m (2.5 kgf-m, 18.0 lb-ft)



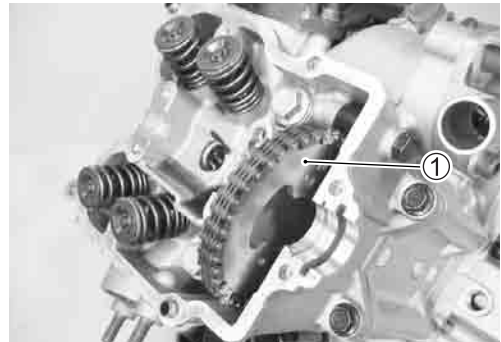
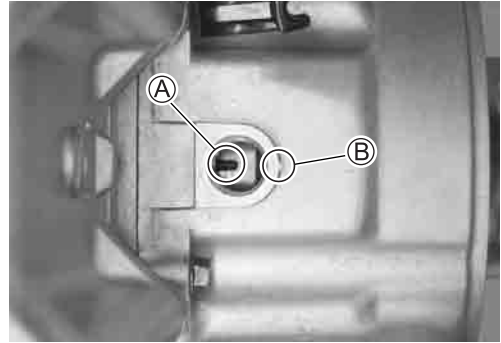
CAMSHAFT AND CAMSHAFT SPROCKET

- Turn the generator rotor until the "TDC" line ① on the generator rotor is aligned with the index mark ② of the generator cover.

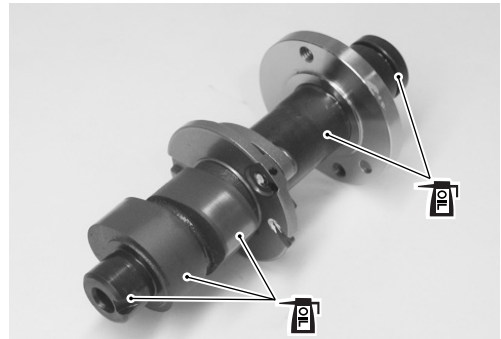
CAUTION

If the crankshaft is turned without drawing the cam chain upward, the cam chain will catch between crankcase and camshaft sprocket.

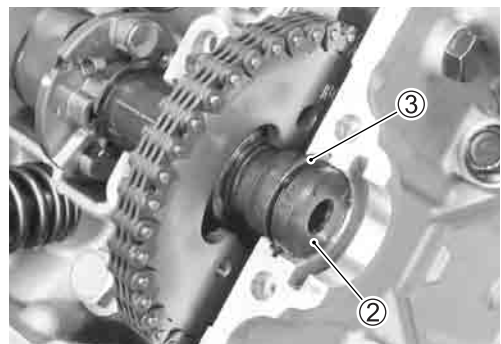
- Install the camshaft sprocket ①.



- Just before installing the camshaft into the cylinder head, apply engine oil to the camshaft journals, and cam faces.



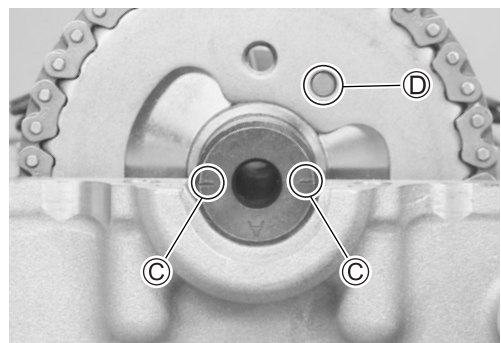
- Install the camshaft ② onto the cylinder head.
- Install the C-ring ③ onto the ring groove of the cylinder head.



- Align the engraved lines ④ on the camshaft is parallel with the mating surface of the cylinder head cover.
- Set the locating pin ⑤ of camshaft to the camshaft sprocket.

NOTE:

Do not rotate the crankshaft while installing the camshaft or cam chain.

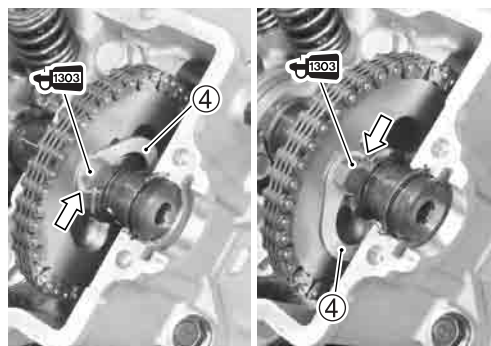


- Fit the lock washer ④.
- Apply a small quantity of THREAD LOCK SUPER "1303" to the camshaft sprocket bolts and tighten them to the specified torque.

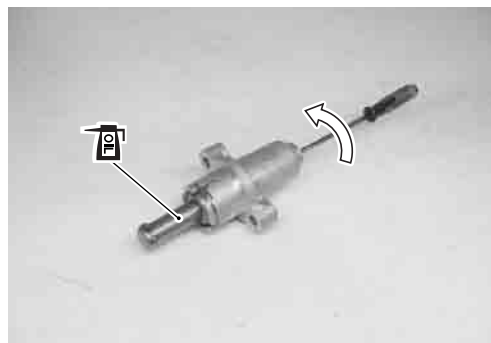
 **Camshaft sprocket bolt: 15 N·m (1.5 kgf-m, 11.0 lb-ft)**

 **99000-32030: THREAD LOCK SUPER "1303"**

- Bend up the lock washer tongues positively to lock the bolts.



- Apply engine oil to the push rod of the cam chain tension adjuster.
- Turn the adjusting screw clockwise with a ⊖ screwdriver until the push rod locked.



- Install the gasket ⑤ and cam chain tension adjuster to the cylinder.

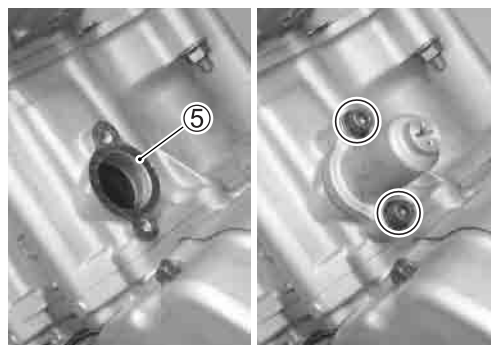
CAUTION

The removed gasket must be replaced with a new one.

- Tighten the cam chain tension adjuster mounting bolts to the specified torque.

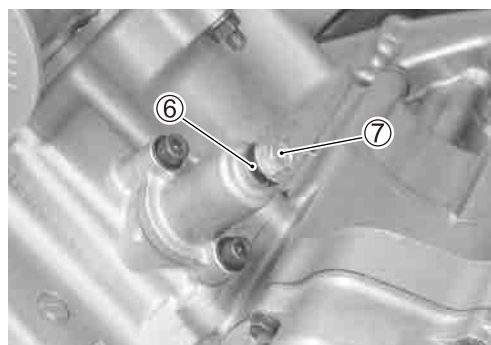
 **Cam chain tension adjuster mounting bolt:**
10 N·m (1.0 kgf-m, 7.0 lb-ft)

- Turn the adjusting screw counterclockwise with a ⊖ screwdriver until the push rod unlocked.



- Install the gasket ⑥ and cam chain tension adjuster cap bolt ⑦.
- Tighten the cam chain tension adjuster cap bolt to the specified torque.

 **Cam chain tension adjuster cap bolt:**
8 N·m (0.8 kgf-m, 5.7 lb-ft)

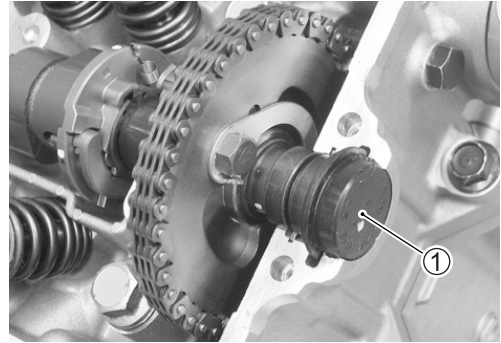


CYLINDER HEAD COVER

- Install the cylinder head cover plug ①.

CAUTION

The removed cylinder head cover plug must be replaced with a new one to prevent oil leakage.



- Install the dowel pins.

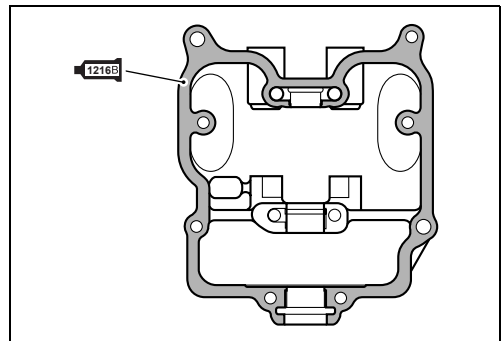


- Thoroughly wipe off oil from the fitting surfaces of the cylinder head and cover.
- Apply SUZUKI BOND uniformly to the mating surface of the cylinder head cover and install it within a few minutes.

1216B 99000-31230: SUZUKI BOND "1216B"

NOTE:

When installing the cylinder head cover, the piston must be at the top dead center on the compression stroke.



- Apply engine oil to both sides of the washer.

CAUTION

The removed washers must be replaced with new ones to prevent oil leakage.

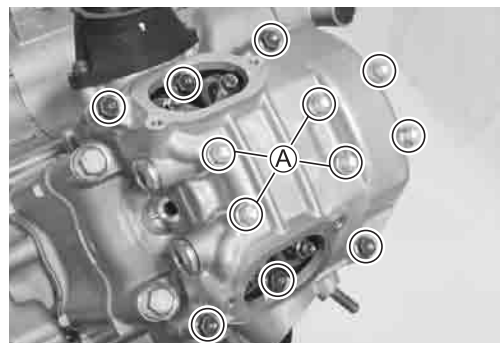
- Tighten the cylinder head cover bolts to the specified torque diagonally.

Cylinder head cover bolt: 10 N·m (1.0 kgf-m, 7.0 lb-ft)

CAUTION

Install the washer to the bolts ①.

- Be sure to check the valve clearance. (2-6)



- Apply the SUZUKI SUPER GREASE “A” to the O-rings.
- Install the valve clearance inspection caps and tighten the valve clearance inspection cap bolts to the specified torque.



Valve clearance inspection cap bolt:

10 N·m (1.0 kgf-m, 7.0 lb-ft)



9900-25010: SUZUKI SUPER GREASE “A”

(or equivalent grease)

CAUTION

The remove O-rings must be replaced with new ones.

- Install the spark plug. (☞ 2-7)

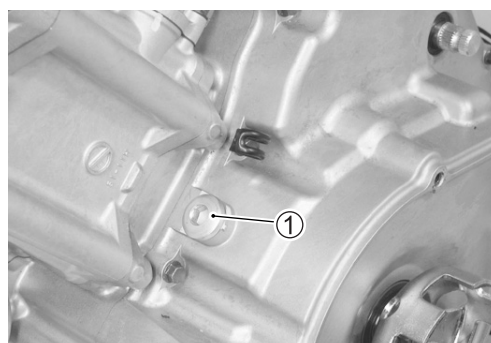
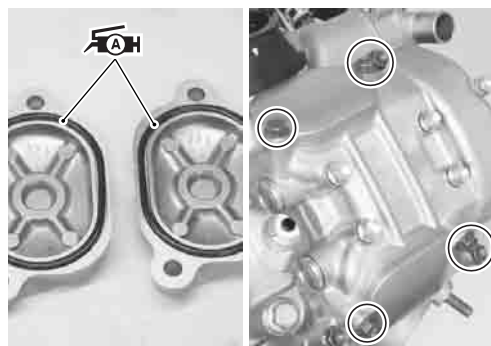
VALVE TIMING INSPECTION PLUG

- Install the valve timing inspection plug ① and tighten the valve timing inspection plug to the specified torque.



Valve timing inspection plug:

22.5 N·m (2.25 kgf-m, 16.5 lb-ft)



OIL FILTER

- Install the oil filter.

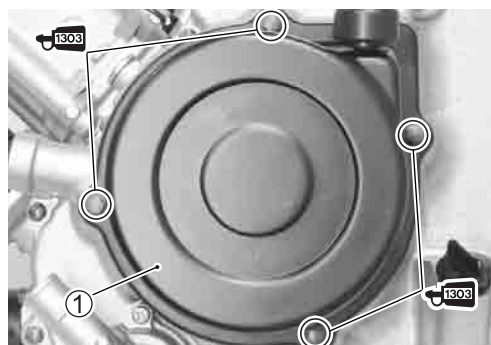


RECOIL STARTER

- Apply a small quantity of THREAD LOCK SUPER “1303” to the recoil starter bolts.
- Install the recoil starter ①.

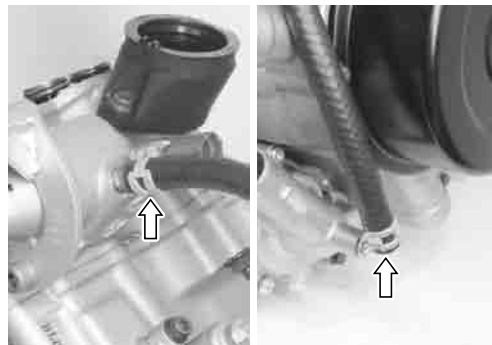


99000-32030: THREAD LOCK SUPER “1303”



WATER HOSE

- Install the water bypass hose.

**STARTER MOTOR**

- Apply SUZUKI SUPER GREASE "A" to the O-ring.

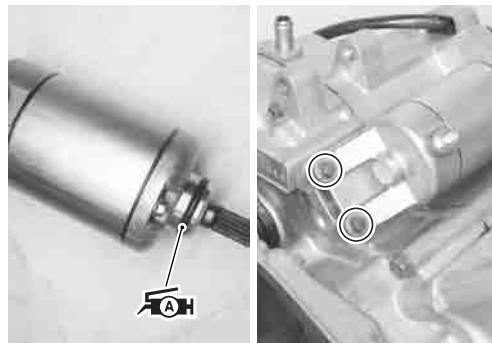
 **99000-25010: SUZUKI SUPER GREASE "A"**
(or equivalent grease)

CAUTION

The removed O-ring must be replaced with a new one.

- Install the starter motor and tighten the starter motor mounting bolts to the specified torque.

 **Starter motor mounting bolt: 10 N·m (1.0 kgf-m, 7.0 lb-ft)**

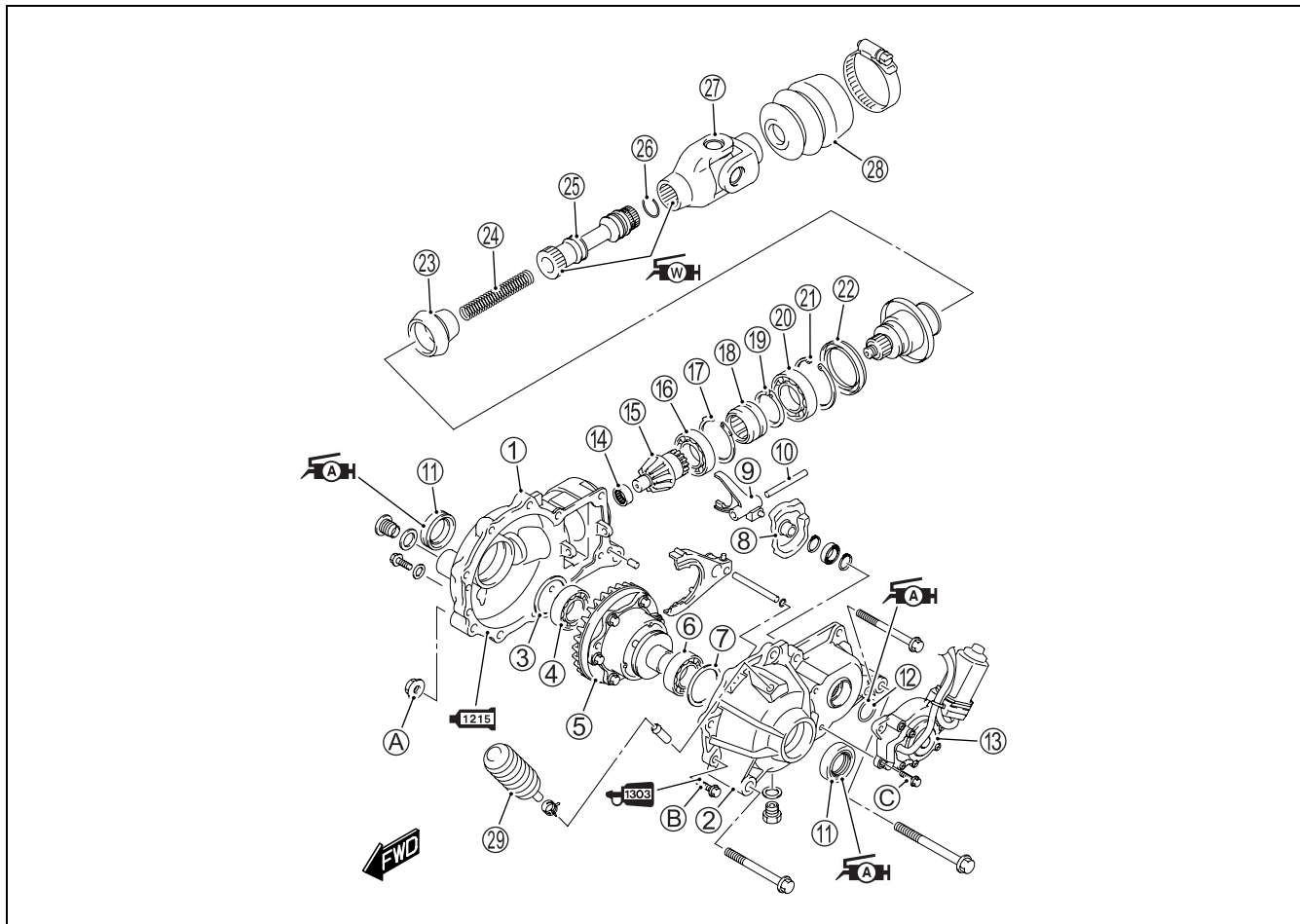


DRIVE TRAIN

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FRONT DRIVE TRAIN (DIFFERENTIAL) CONSTRUCTION



①	Front drive train (differential) gear case	①⑦	Snap ring
②	Front drive train (differential) gear case cover	①⑧	2WD/4WD shifting sleeve
③	Shim (right side)	①⑨	Snap ring
④	Bearing	②⑩	Bearing
⑤	Front drive train (differential) gear	②①	Snap ring
⑥	Bearing	②②	Oil seal
⑦	Shim (left side)	②③	Boot
⑧	2WD/4WD shifting cam	②④	Front propeller shaft spring
⑨	2WD/4WD shifting fork	②⑤	Front propeller shaft
⑩	2WD/4WD shifting fork shaft	②⑥	Circlip
⑪	Oil seal	②⑦	Universal joint
⑫	O-ring	②⑧	Boot
⑬	4WD/diff-lock actuator	②⑨	Breather rubber case
⑭	Bearing	A	Front drive train (differential) gear case mounting nut
⑮	Drive bevel gear	B	Front drive train (differential) gear case bolt
⑯	Bearing	C	4WD/diff-lock actuator mounting bolt



ITEM	N·m	kgf-m	lb-ft
A	50	5.0	36.0
B	22	2.2	16.0
C	22	2.2	16.0

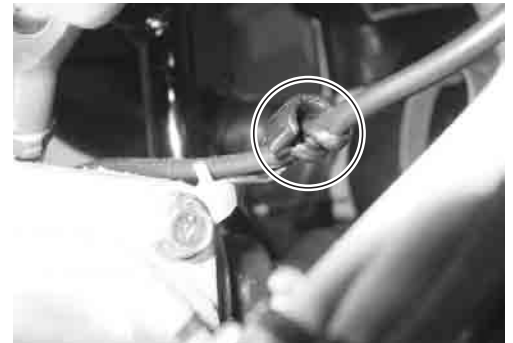
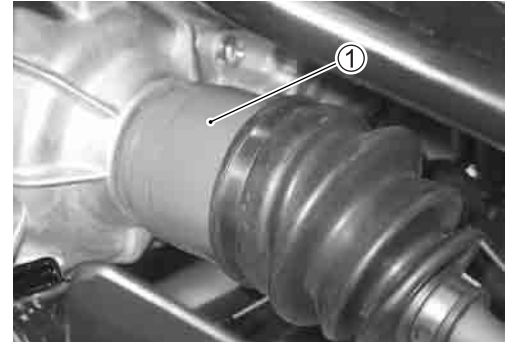
REMOVAL

- Remove the front wheels. (☞ 8-18)
- Drain the front differential gear oil. (☞ 2-11)
- Remove the front brake caliper. (☞ 8-29)
- Remove the front suspension. (☞ 8-41)
- Hold the inboard joint ① of the front drive shaft and tug the drive shaft horizontally.

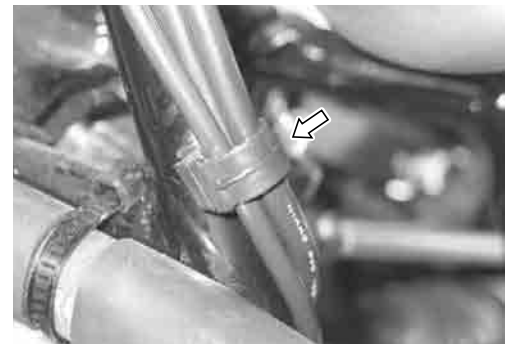
NOTE:

If it is difficult to remove the front drive shaft from the front differential gear case, using the suitable tool.

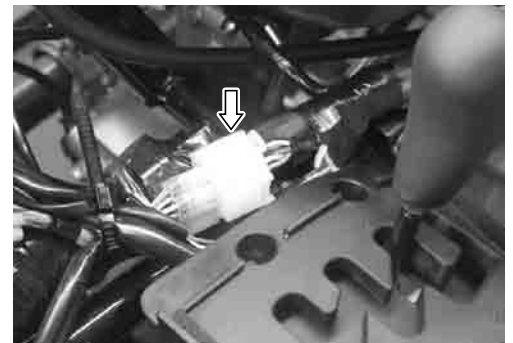
- Remove the foot brake switch lead wire clamp.



- Remove the 4WD/diff-lock actuator lead wire and foot brake switch lead wire band.



- Disconnect the 4WD/diff-lock actuator lead wire coupler.



- Remove the front drive train (differential) gear case mounting bolts/nuts.
- Remove the front drive train (differential) gear case assembly out of the frame.



DISASSEMBLY

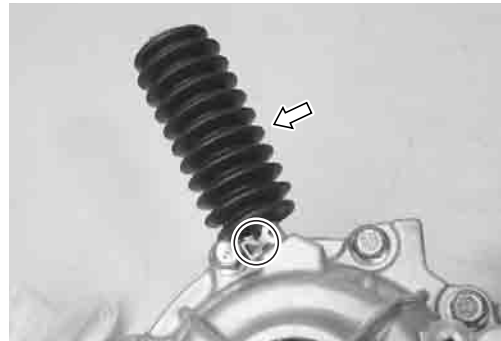
4WD/DIFF-LOCK ACTUATOR

- Remove the 4WD/diff-lock actuator assembly.



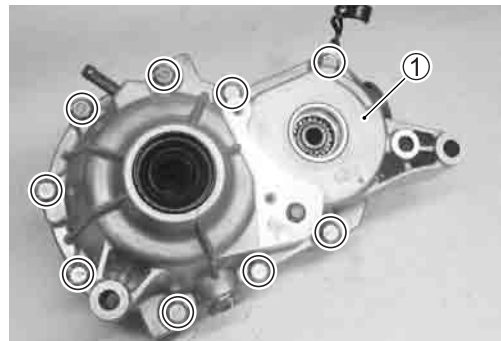
BREATHER CASE

- Remove the breather case.



FRONT DRIVE TRAIN (DIFFERENTIAL) GEAR

- Remove the front drive train (differential) gear case bolts diagonally and evenly.

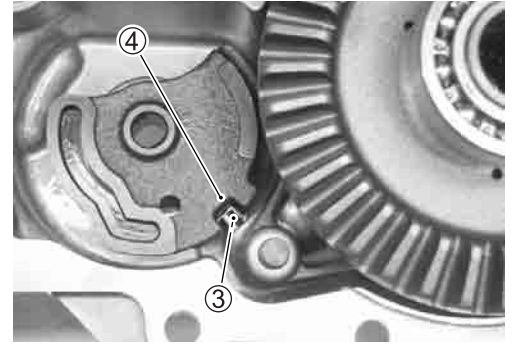


- Remove the front drive train (differential) gear case cover ① with the special tool.

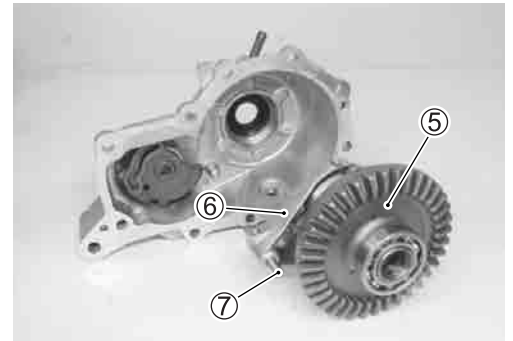
 **09912-34510: Cylinder disassembling tool**



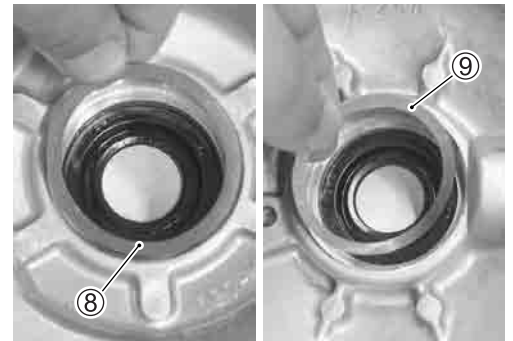
- Align the shifting fork pin ③ with the groove of the shifting cam ④.



- Remove the front drive train (differential) gear assembly ⑤, diff-lock shifting fork ⑥ and shifting fork shaft ⑦.

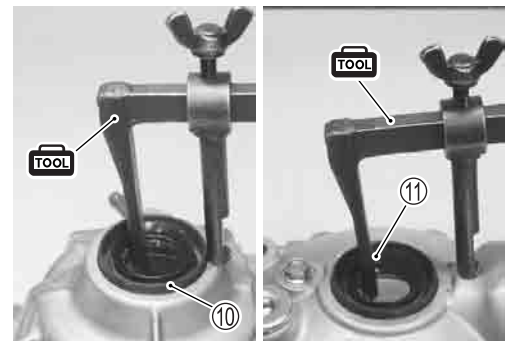


- Remove the right side shim ⑧ and left side shim ⑨.



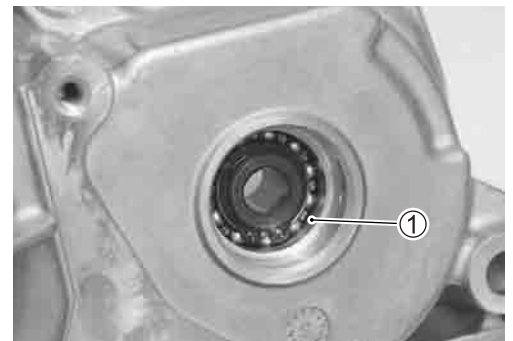
- Remove the oil seals ⑩ and ⑪.

TOOL 09913-50121: Oil seal remover

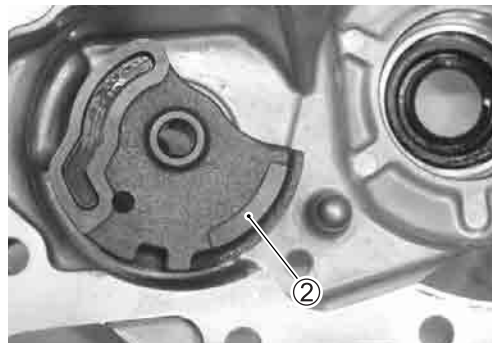


2WD/4WD SHIFTING CAM

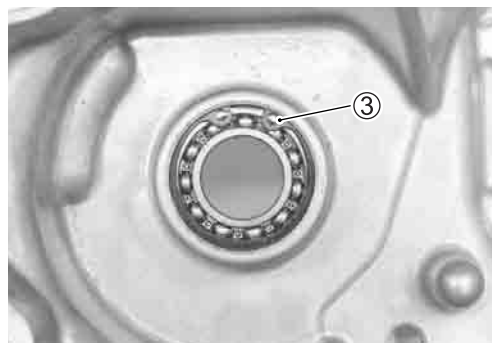
- Remove the snap ring ①.



- Remove the 2WD/4WD shifting cam ②.



- Remove the snap ring ③.

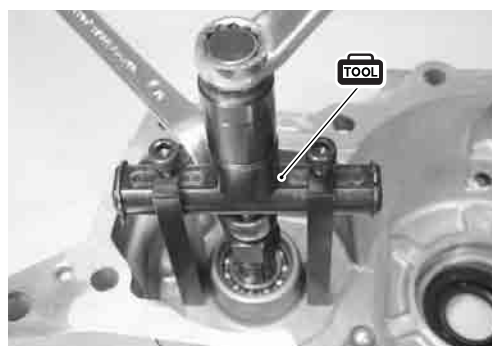


- Remove the 2WD/4WD shifting cam bearing with the special tool.

TOOL 09921-20240: Bearing remover set ($\phi 17$)

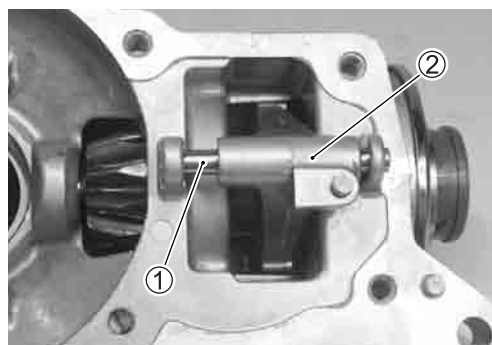
NOTE:

If there is no abnormal noise, the bearing removal is not necessary.



2WD/4WD SHIFTING DEVICE

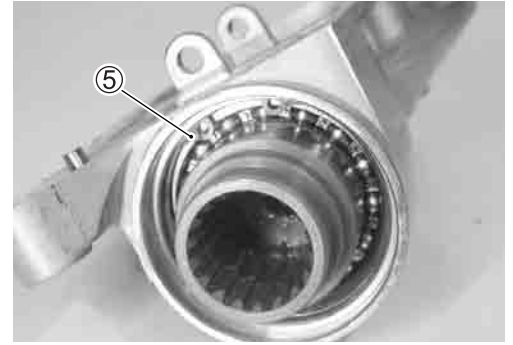
- Remove 2WD/4WD gear shifting fork shaft ① and 2WD/4WD shifting fork ②.



- Remove the oil seal cap ③ and oil seal ④.



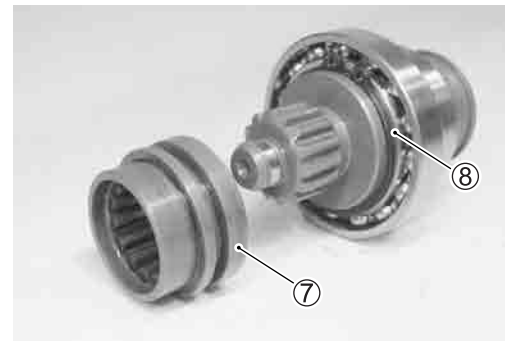
- Remove the snap ring ⑤.



- Remove the input shaft ⑥.



- Remove the 2WD/4WD shifting sleeve ⑦.
- Remove the snap ring ⑧.

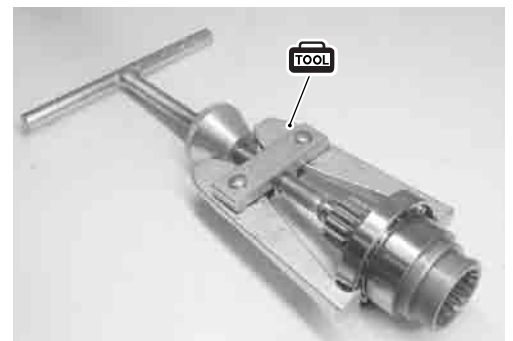


- Remove the input shaft bearing with the special tool.

TOOL 09913-60910: Bearing and gear puller

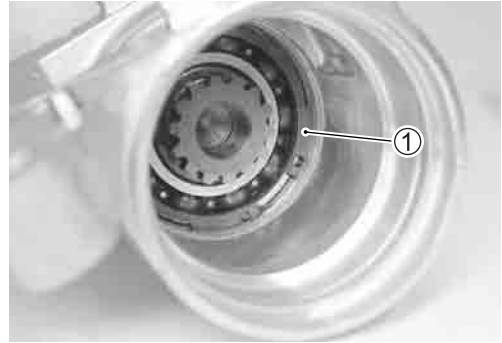
NOTE:

If there is no abnormal noise, the bearing removal is not necessary.

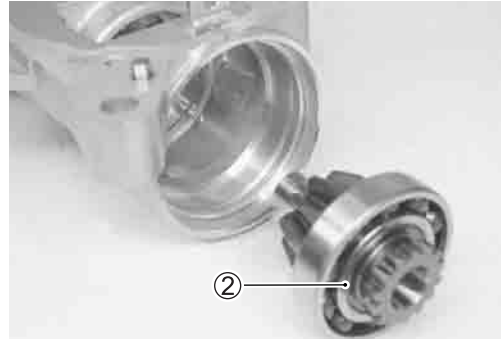


DRIVE BEVEL GEAR

- Remove the snap ring ①.



- Remove the drive bevel gear ②.



- Remove the drive bevel gear bearing with the special tool.

TOOL 09913-60910: Bearing and gear puller

NOTE:

If there is no abnormal noise, the bearing removal is not necessary.



- Remove the drive bevel gear pilot bearing with the special tools.

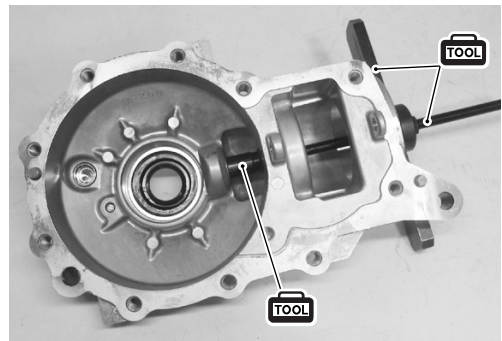
TOOL 09921-20240: Bearing remover set ($\phi 15$)

09917-50410: Bearing remover

09924-84521: Bearing installer set

NOTE:

If there is no abnormal noise, the bearing removal is not necessary.

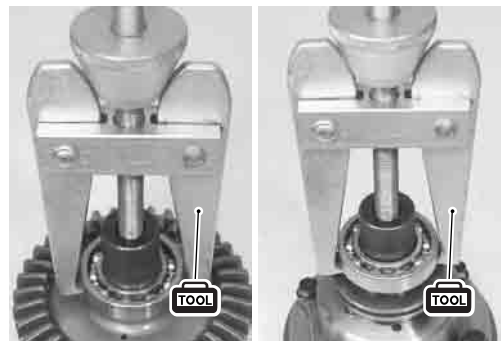
**FRONT DRIVE TRAIN (DIFFERENTIAL) GEAR**

- Remove the front drive train (differential) gear bearing with the special tool.

TOOL 09913-60910: Bearing and gear puller

NOTE:

If there is no abnormal noise, the bearing removal is not necessary.

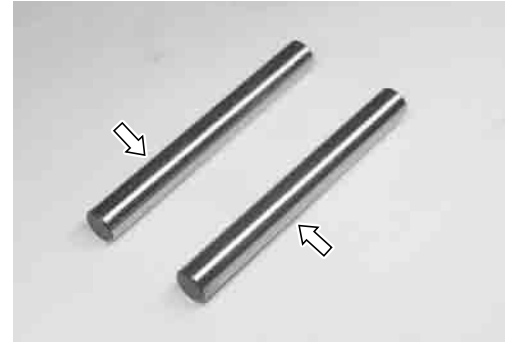


INSPECTION

SHIFTING FORK SHAFT

Inspect the shifting fork shafts for wear or damage.

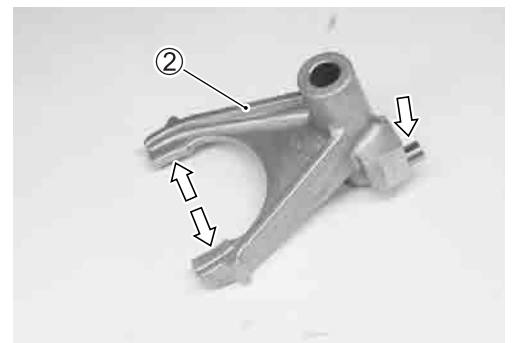
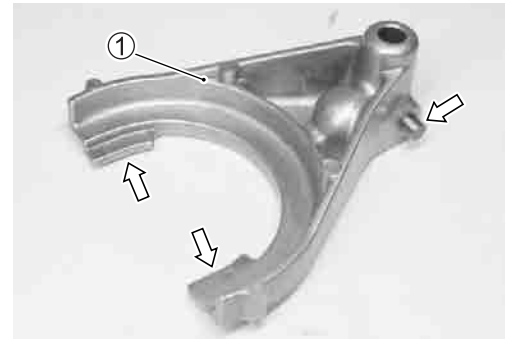
If any defects are found, replace the shifting fork shafts with new ones.



DIFF-LOCK SHIFTING FORK AND 2WD/4WD SHIFTING FORK

Inspect the diff-lock shifting fork ① and 2WD/4WD shifting fork ② for wear or damage.

If any defects are found, replace the shifting forks with new ones.



2WD/4WD SHIFTING CAM

Inspect the 2WD/4WD shifting cam for wear or damage.

If any defects are found, replace the 2WD/4WD shifting cam with a new one.



2WD/4WD SHIFTING SLEEVE

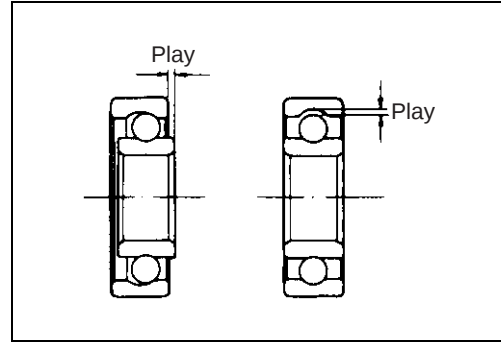
Inspect the 2WD/4WD shifting sleeve for wear or damage.

If any defects are found, replace the 2WD/4WD shifting sleeve with a new one.



BEARING INSPECTION

Rotate the bearing inner race by finger to inspect for abnormal play, noise and smooth rotation. If there is anything unusual, replace the bearing with a new one.

**DRIVE BEVEL GEAR**

Inspect the drive bevel gear for wear or damage. If any defects are found, replace the drive bevel gear with a new one.

**INPUT SHAFT**

Inspect the input shaft for wear or damage. If any defects are found, replace the input shaft with a new one.

**FRONT DRIVE TRAIN (DIFFERENTIAL) GEAR**

Inspect the front drive train (differential) gear for stick or damage. If any defects are found, replace the front drive train (differential) gear with a new one.

**BREATHER CASE**

Inspect the breather case for wear or damage. If any defects are found, replace the breather case with a new one.



REASSEMBLY

- Reassemble the front drive train (differential) in the reverse order of removal and disassembly. Pay attention to the following points:

NOTE:

Before reassembly, thoroughly clean all the parts with cleaning solvent.

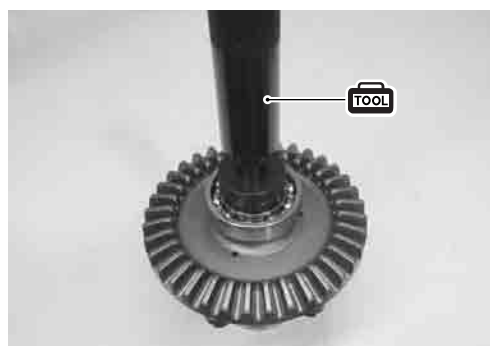
FRONT DRIVE TRAIN (DIFFERENTIAL) GEAR

- Install the bearings to the front drive train (differential) gear assembly with the special tool.

 **09913-70210: Bearing installer set ($\phi 35$)**

CAUTION

The removed bearings must be replaced with new ones.



FRONT DRIVE TRAIN (DIFFERENTIAL) GEAR CASE/COVER

- Install the oil seal into the front drive train (differential) gear case with the special tool.

 **09913-70210: Bearing installer set ($\phi 47$)**

CAUTION

The removed oil seal must be replaced with a new one.

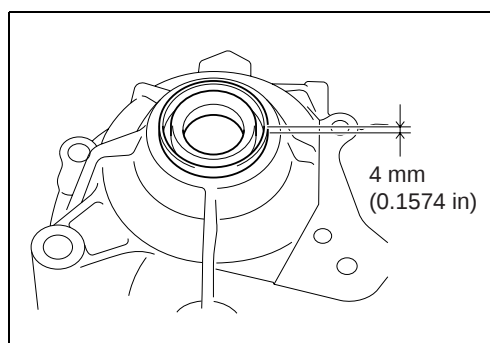


NOTE:

Insert the oil seal until the specified value as shown.

- Apply SUZUKI SUPER GREASE "A" to the lip of oil seal.

 **99000-25010: SUZUKI SUPER GREASE "A"**
(or equivalent)

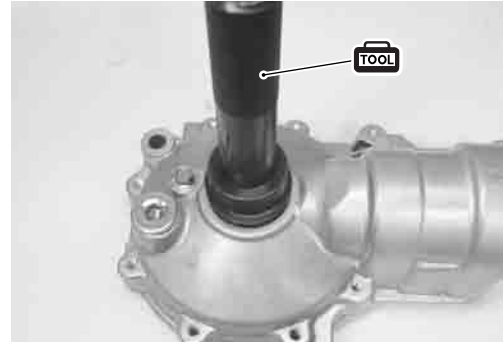


- Install the oil seal into the front drive train (differential) gear case cover with the special tool.

TOOL 09913-70210: Bearing installer set ($\phi 47$)

CAUTION

The removed oil seal must be replaced with a new one.

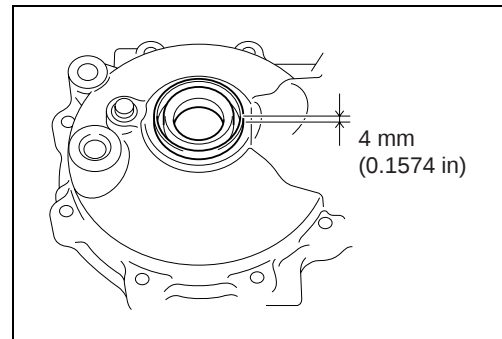


NOTE:

Insert the oil seal until the specified value as shown.

- Apply SUZUKI SUPER GREASE “A” to the lip of oil seal.

TOOL 99000-25010: SUZUKI SUPER GREASE “A”
(or equivalent)



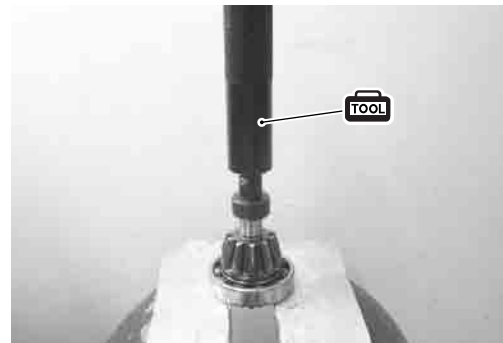
DRIVE BEVEL GEAR

- Install the bearing onto the drive bevel gear shaft with the special tool.

TOOL 09913-70210: Bearing installer set ($\phi 25$)

CAUTION

The remove bearing must be replaced with a new one.

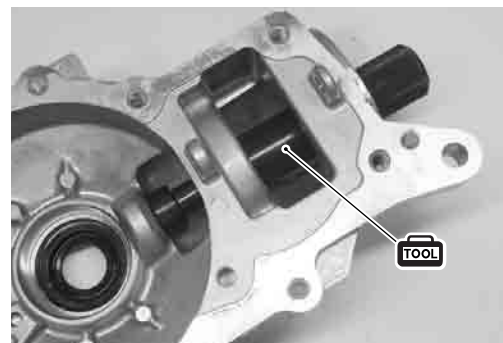


- Install the bearing into the front drive train (differential) gear case with the special tool.

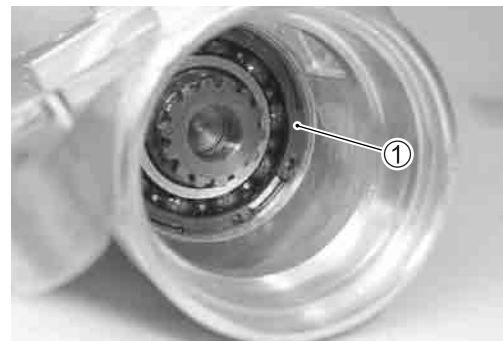
TOOL 09913-70210: Bearing installer set ($\phi 25$)

CAUTION

The remove bearing must be replaced with a new one.



- Install the drive bevel gear into the front drive train (differential) gear case and fix the snap ring ①.



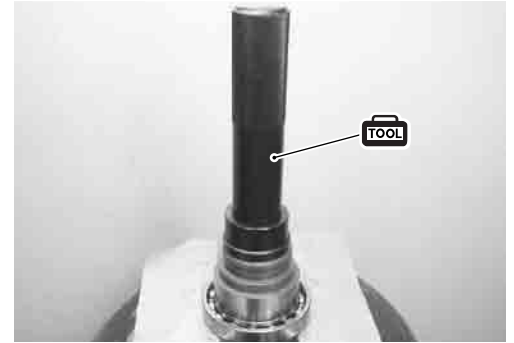
INPUT SHAFT

- Install the bearing onto the input shaft with the special tool.

CAUTION

The remove bearing must be replaced with a new one.

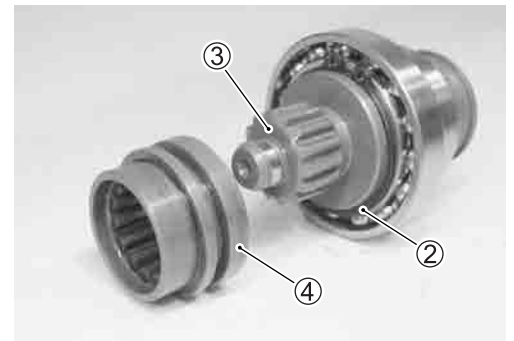
 **09913-70210: Bearing installer set ($\phi 40$)**



- Install the snap ring ①.



- Install the snap ring ② to the input shaft ③.
- Install the 2WD/4WD shifting sleeve ④ to the input shaft ③.



- Install the input shaft into the front drive train (differential) gear case.



- Install the oil seal ⑤ with a suitable tool.

CAUTION

The removed oil seal must be replaced with a new one.

- Apply SUZUKI SUPER GREASE "A" to the lip of oil seal.

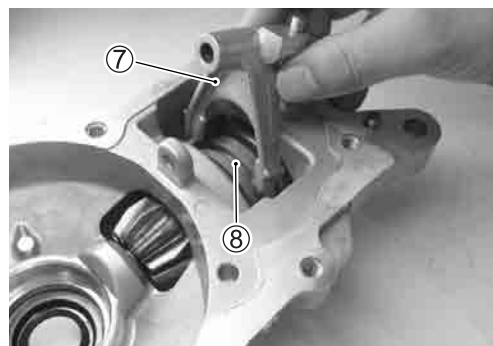
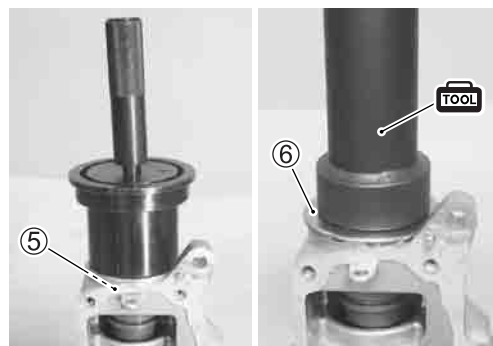
 **99000-25010: SUZUKI SUPER GREASE "A"**
(or equivalent)

- Install the oil seal cap ⑥ with the special tool.

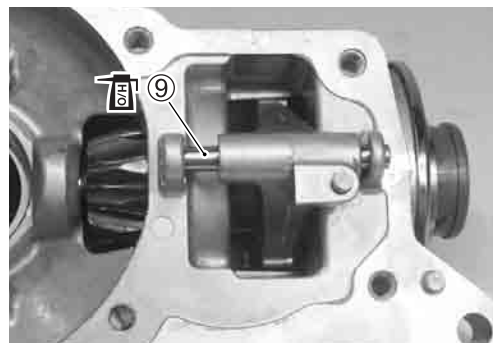
 **09924-52460: Long socket (52 mm)**

2WD/4WD SHIFTING DEVICE

- Install the 2WD/4WD shifting fork ⑦, onto the groove of the 2WD/4WD shifting sleeve ⑧.



- Apply front differential gear oil to the 2WD/4WD shifting fork shaft ⑨.
- Install the 2WD/4WD shifting fork shaft ⑨.



- Install the shim(s) to the case and cover.



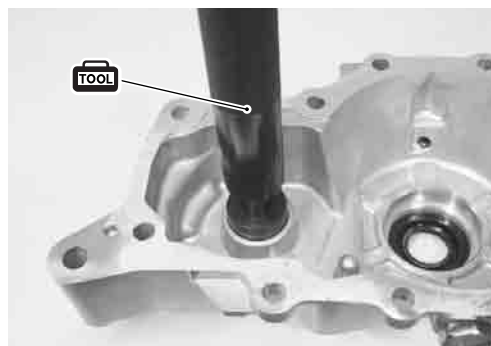
- Install the 2WD/4WD shifting cam bearing with special tool.

CAUTION

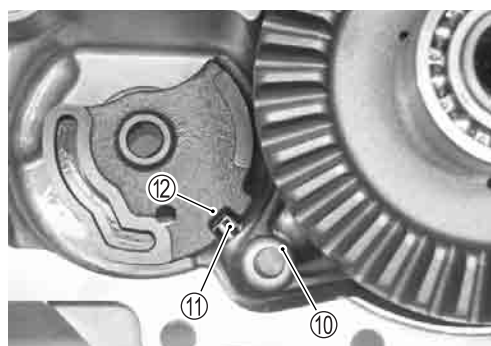
The removed bearing must be replaced with a new one.

 **09913-70210: Bearing installer set**

- Install the snap ring.



- Install the diff-lock shifting fork ⑩ to the shifting sleeve.
- Install the front drive train (differential) gear assembly, diff-lock shifting fork and shifting fork shaft.
- Align the shifting fork pin ⑪ with the groove of the shifting cam ⑫.

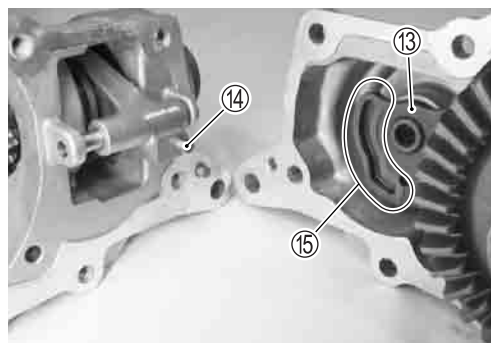


- After the backlash and tooth contact have been checked or adjusted, apply SUZUKI BOND "1215" to the mating surface of the case.

 **99000-31110: SUZUKI BOND "1215"**
(or equivalent bond)



- Turn the shifting cam ⑬ clockwise, and install the 2WD/4WD shifting fork pin to the bottom.
- Align the 2WD/4WD shifting fork pin ⑭ with the groove of the 2WD/4WD shifting cam ⑮ when reassembling.



- Apply a small quantity of THREAD LOCK SUPER “1303” to the front drive train (differential) gear case bolts and tighten them to the specified torque diagonally.

 **99000-32030: THREAD LOCK SUPER “1303”**

 **Front drive train (differential) gear case bolt:**
22 N·m (2.2 kgf-m, 16.0 lb-ft)

NOTE:

After the backlash and tooth contact have been checked or adjusted, apply thread lock to the case cover bolts.

4WD/DIFF-LOCK ACTUATOR

- Apply SUZUKI SUPER GREASE “A” to the O-rings.

 **99000-25010: SUZUKI SUPER GREASE “A”**
(or equivalent grease)

CAUTION

The removed O-rings must be replaced with new ones to prevent front differential gear oil leakage.

- Apply a small quantity of THREAD LOCK SUPER “1303” to the 4WD/diff-lock actuator mounting bolts.

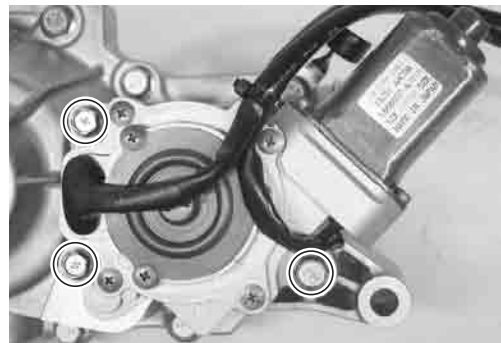
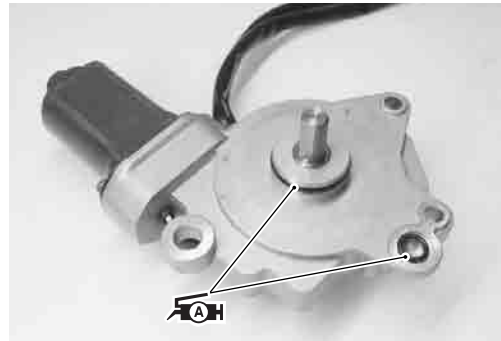
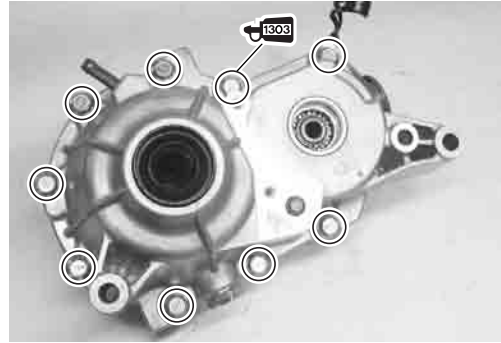
 **99000-32030: THREAD LOCK SUPER “1303”**

- Install the 4WD/diff-lock actuator assembly and tighten its mounting bolts to the specified torque.

 **4WD/diff-lock actuator mounting bolt:**
22 N·m (2.2 kgf-m, 16.0 lb-ft)

BREATHER CASE

- Install the breather case.



REMOUNTING

Remount the front drive train (differential) gear case assembly in the reverse order of removal. Pay attention to the following points:

- Install the front propeller shaft spring ①.
- Apply a small quantity of WATER RESISTANCE GREASE to the front propeller shaft spring ① and spline of the front propeller shaft ②.

99000-25160: WATER RESISTANCE GREASE

- Apply a small quantity of THREAD LOCK SUPER "1303" to the front drive train (differential) gear case mounting nuts.

99000-32030: THREAD LOCK SUPER "1303"

- Tighten the front drive train (differential) gear case mounting nuts to the specified torque.

Front drive train (differential) gear case mounting bolt/nut: 50 N·m (5.0 kgf-m, 36.0 lb-ft)

- Install the stopper ring ③ into the groove of front drive shaft spline.

CAUTION

The removed stopper ring must be replaced with a new one.

- Apply SUZUKI SUPER GREASE "A" to the spline.

99000-25010: SUZUKI SUPER GREASE "A" (or equivalent grease)

CAUTION

Be careful not to damage the front drive train (differential) gear case oil seals.

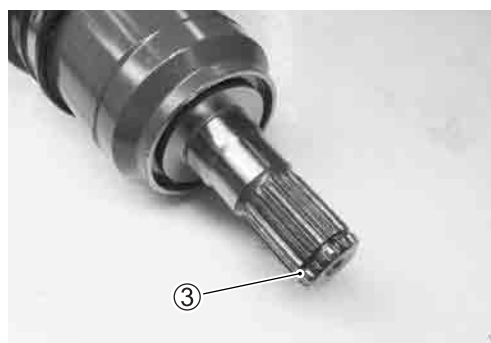
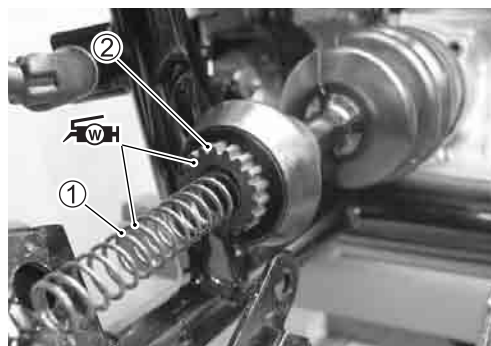
NOTE:

After installing both drive shafts, make sure the stopper rings are seated properly by pulling both inboard joints lightly.

- Pour the specified hypoid gear oil (SAE #90) through the filler hole. (☞ 2-11)

Front differential gear oil capacity: 500 ml (16.9 US oz, 17.6 Imp oz)

- Install the front suspension. (☞ 8-47)
- Install the front brake caliper. (☞ 8-33)
- Install the front wheels. (☞ 8-18)



SHIM ADJUSTMENT

BACKLASH

- Install the removed left and right side shim(s) and front drive train (differential) gear assembly.
- Assemble the gear case cover. (☞ 4-15)

NOTE:

At this time, it is not necessary to apply a sealant to the mating surface of the gear case.

Remove the oil filler cap and measure the backlash of the front drive train (differential) ring gear with the horizontal type dial gauge ① and drive shaft ②, as shown. Take backlash readings at three places while turning the front drive train (differential) ring gear slightly in each direction and securely holding the drive bevel gear. Read the total backlash on the dial gauge.

Remove the dial gauge and turn the drive train (differential) ring gear to 120°, then measure the backlash. Repeat this procedure once more and compare the difference of the three measurements.

If the backlash is not within specification, the shim must be changed and the backlash should be re-checked until the backlash is within specification. Refer to the chart at the right for the appropriate shim thickness.

DATA Backlash

Standard: 0.05 – 0.10 mm (0.0020 – 0.0040 in)

NOTE:

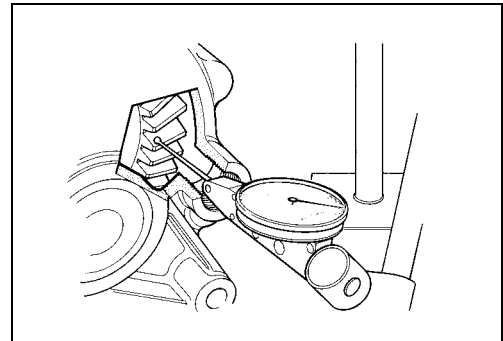
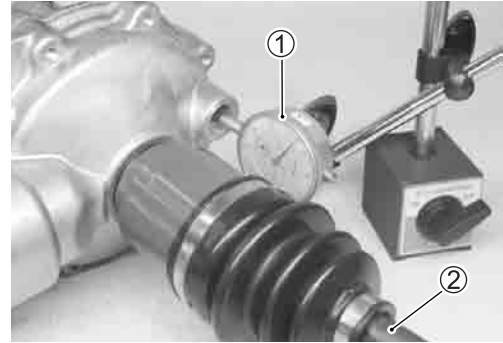
Adjust the backlash by referring to the chart at the right and using the thickness of the removed shims as a guide.

Backlash	Shim adjustment
Under 0.05 mm (0.0020 in)	Increase shim thickness
0.05 – 0.10 mm (0.0020 – 0.0040 in)	Correct
Over 0.10 mm (0.0040 in)	Decrease shim thickness

If the backlash is too small, replace the right side shim(s) with a thicker one.

If the backlash is too large, replace the right side shim(s) with a thinner one.

If the right side shim was changed with a 0.10 mm thicker shim, replace the left side shim with one that is 0.10 mm thinner.



List of shims (for light side)

Part No.	Shim thickness
27445-38FA0 (Shim set: 15 pcs)	0.75 mm (0.0295 in)
	0.80 mm (0.0315 in)
	0.85 mm (0.0335 in)
	0.90 mm (0.0354 in)
	0.95 mm (0.0374 in)
	1.00 mm (0.0394 in)
	1.05 mm (0.0413 in)
	1.10 mm (0.0433 in)
	1.15 mm (0.0453 in)
	1.20 mm (0.0472 in)
	1.25 mm (0.0492 in)
	1.30 mm (0.0512 in)
	1.35 mm (0.0531 in)
	1.40 mm (0.0551 in)
	1.45 mm (0.0571 in)

LEFT SIDE SHIM SELECTION

- Install the removed right side shim(s) and front drive train (differential) assembly.
- Put a few pieces of solder (O.D.: 1.2 – 1.5 mm × L: 6 mm) on the bearing outer race, as shown.

NOTE:

- * Do not install the left side shim(s) at this time.
- * Apply a small quantity of grease to the solders to prevent them from falling.



- Assemble the gear case cover and tighten its bolts to the specified torque diagonally. (☞ 4-15)

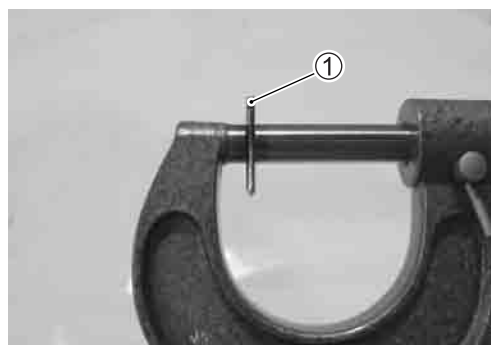
NOTE:

- * Do not apply a sealant to the mating surface of the gear case.
- * Do not apply a thread lock to the case bolts.

 **Front drive train (differential) gear case bolt:**
22 N·m (2.2 kgf-m, 16.0 lb-ft)

- Remove the gear case cover. (☞ 4-4)
- Measure the thickness of compressed solders ① with the micrometer.

 **09900-20205: Micrometer**



- Select the proper size of shim(s) from the right chart, according as the compressed solder thickness.
- After selecting the proper size of shim(s), check or adjust the backlash and tooth contact.

List of shims (for left side)

Part No.	Shim thickness
27445-38FA0 (Shim set: 15 pcs)	0.75 mm (0.0295 in)
	0.80 mm (0.0315 in)
	0.85 mm (0.0335 in)
	0.90 mm (0.0354 in)
	0.95 mm (0.0374 in)
	1.00 mm (0.0394 in)
	1.05 mm (0.0413 in)
	1.10 mm (0.0433 in)
	1.15 mm (0.0453 in)
	1.20 mm (0.0472 in)
	1.25 mm (0.0492 in)
	1.30 mm (0.0512 in)
	1.35 mm (0.0531 in)
	1.40 mm (0.0551 in)
	1.45 mm (0.0571 in)

TOOTH CONTACT

After backlash adjustment and left side shim selection are carried out, the tooth contact must be checked. Pay attention to the following points:

- Remove the front drive train (differential) gear assembly.
- Clean and degrease several teeth on the ring gear and drive bevel gear, and then apply a coating of machinist's layout dye or paste to several teeth of the drive bevel gear.
- Install the removed left and right side shim(s) and front drive train (differential) gear assembly.
- Assemble the gear case cover. (☞ 4-15)

NOTE:

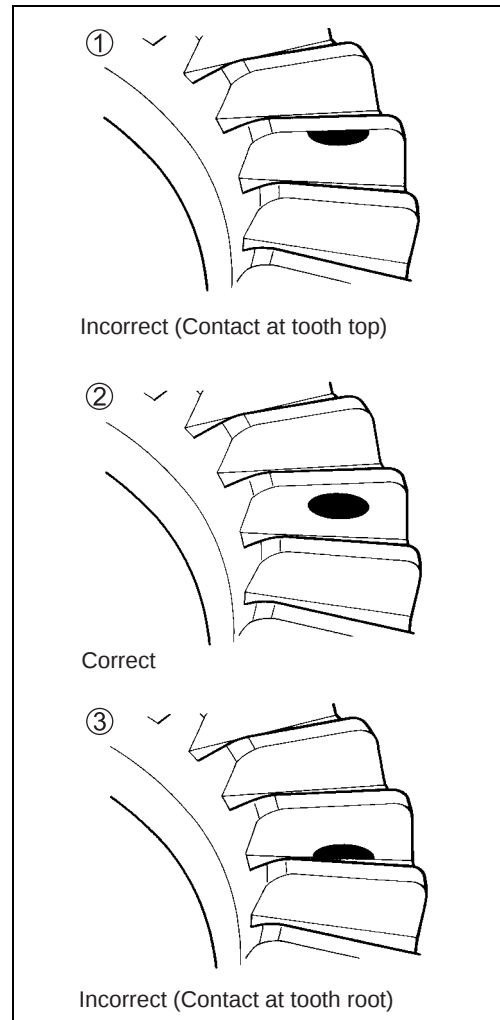
- * Do not apply a sealant to the mating surface of the gear case.
- * Do not apply a thread lock to the case bolts.

Front drive train (differential) gear case bolt: 22 N·m (2.2 kgf-m, 16.0 lb-ft)

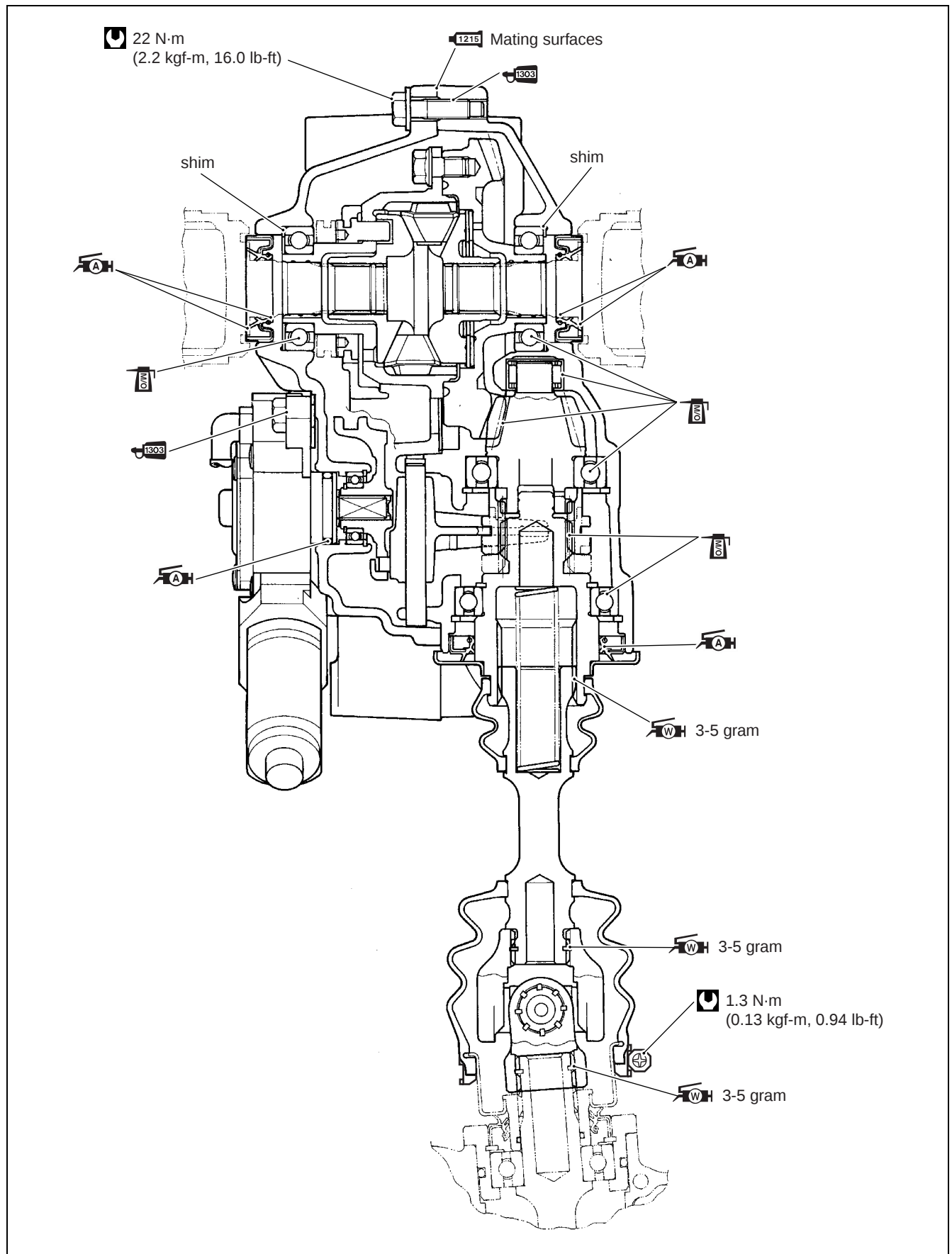
- Rotate the front drive train (differential) gear several turns in each direction. This will provide a contact pattern on the coated teeth of ring gear.
- Remove the front drive train (differential) gear and compare the coated teeth to the examples shown in ①, ② and ③.
- If tooth contact is found to be correct (example ②), go to page 4-12 to complete installation.
- If tooth contact is found to be incorrect (example ① and ③), the shim must be changed and the tooth contact should be re-checked until correct (example ②).

CAUTION

Make sure to check the backlash after the tooth contact has been adjusted, since it may have changed. Adjust the tooth contact and backlash until they are both within specification. If the correct tooth contact cannot be maintained when adjusting the backlash, replace the drive bevel gear and front drive train (differential) gear as a set.



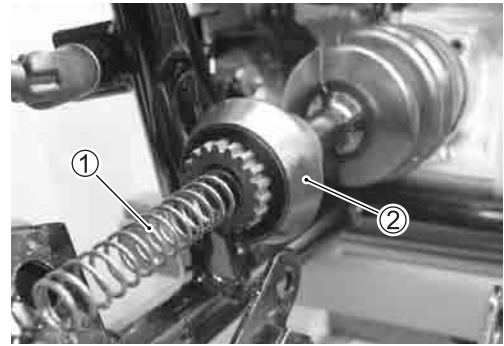
REASSEMBLY INFORMATION



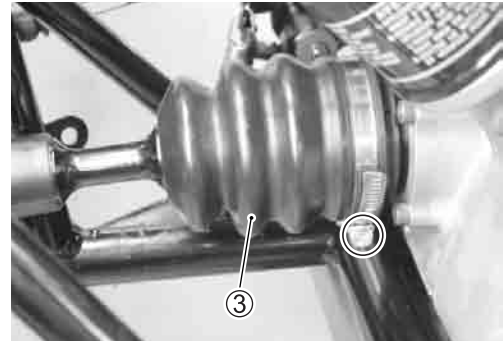
FRONT PROPELLER SHAFT

REMOVAL

- Remove the front drive train (differential) gear case assembly. (☞ 4-3)
- Remove the front propeller shaft spring ① and front propeller shaft boot ②.



- Loosen the boot clamp screw and remove the universal joint boot ③.



NOTE:

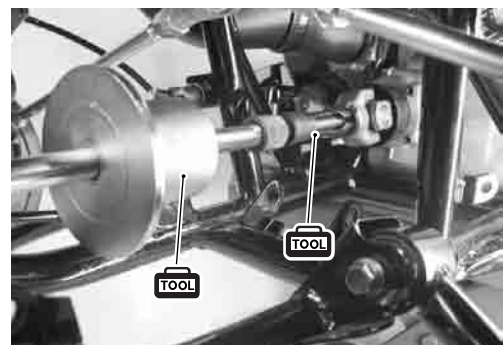
Apply oil to the removing direction of the universal joint boot before removing.

- Using a ⊖ screwdriver or the like into a notch of the universal joint and remove the front propeller shaft.



- Remove the universal joint from the joint portion (at the engine side) with special tools.

TOOL 09923-74511: Bearing remover (ϕ 20 – 38)
09930-30104: Sliding shaft



INSPECTION

FRONT PROPELLER SHAFT

Inspect the front propeller shaft for wear or damage.

If any defects are found, replace front propeller shaft with a new one.



UNIVERSAL JOINT

- Inspect the play by turning the universal joint. If excessive play is noted, replace it with a new one.

CAUTION

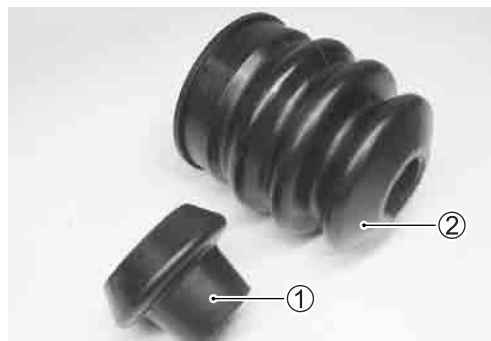
Do not attempt to disassemble the universal joint.



BOOTS

Inspect the front propeller shaft boot ① and universal joint boot ② for crack or damage.

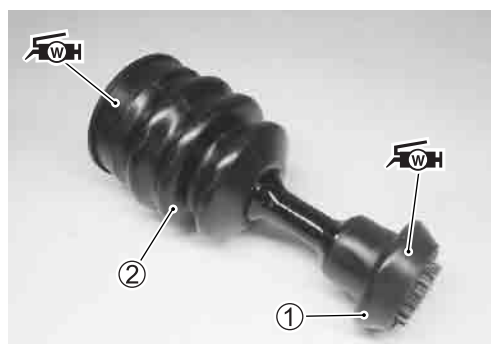
If any defects are found, replace the defective part with a new one.



REASSEMBLY

- Install the front propeller shaft boot ① and universal joint boot ② to the front propeller shaft.
- Apply WATER RESISTANCE GREASE to the hole inside of the boots.

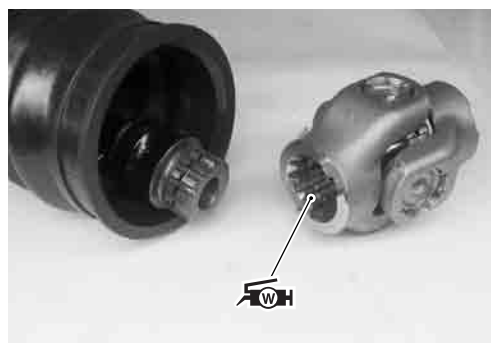
 **99000-25160: WATER RESISTANCE GREASE**



- Apply a small quantity of WATER RESISTANCE GREASE to the spline of universal joint.

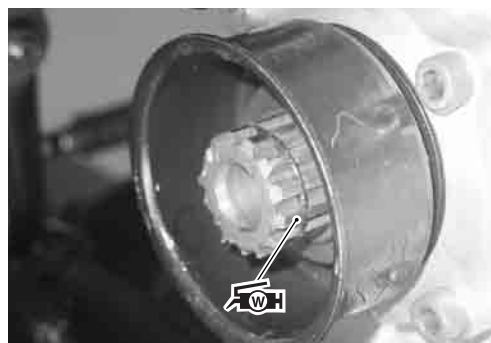
 **99000-25160: WATER RESISTANCE GREASE**

- Connect the propeller shaft to the universal joint.



- Apply a small quantity of WATER RESISTANCE GREASE to the spline.

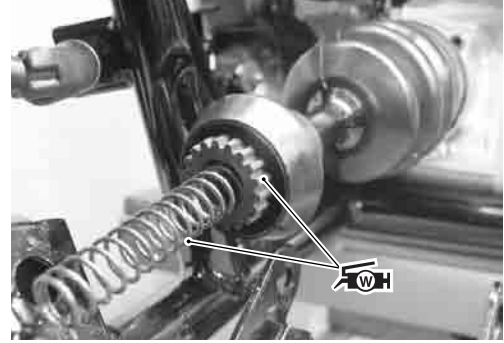
 **99000-25160: WATER RESISTANCE GREASE**



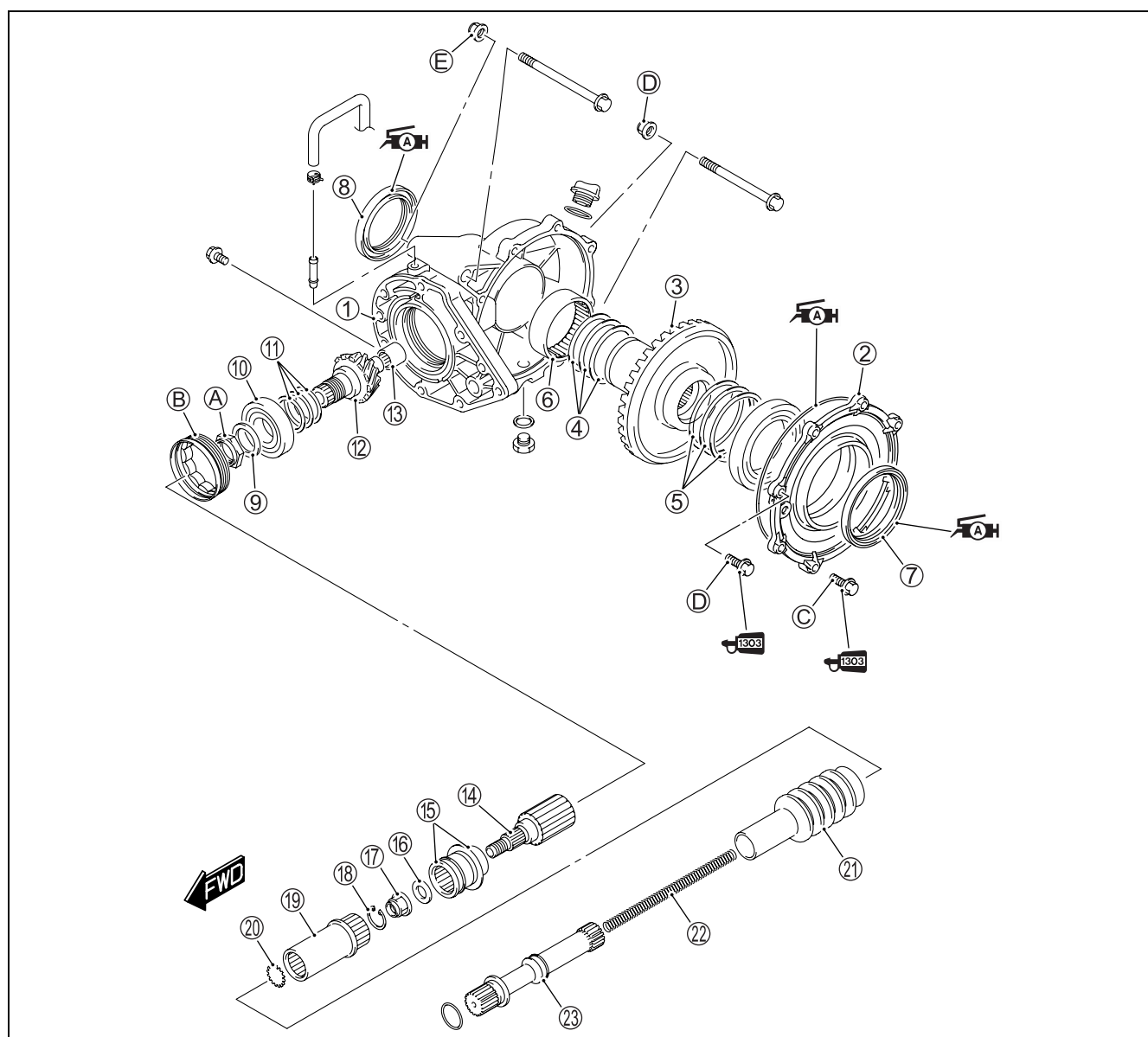
- Connect the universal joint to the joint portion (at the engine side).
- Tighten the boot clamp screw.
- Install the front propeller shaft spring.
- Apply small quantity of WATER RESISTANCE GREASE to the spline of the front propeller shaft and front propeller shaft spring.

 99000-25160: WATER RESISTANCE GREASE

- Install the front drive train (differential) gear case assembly.
( 4-17)



REAR DRIVE TRAIN CONSTRUCTION



①	Final gear case	⑮	Rear propeller shaft coupling
②	Final gear case cover	⑯	Washer
③	Ring gear	⑰	Lock-nut
④	Shim (right side)	⑱	Snap ring
⑤	Shim (left side)	⑲	Propeller shaft joint
⑥	Bearing	⑳	Spring plate
⑦	Oil seal	㉑	Rear propeller shaft joint boot
⑧	Oil seal	㉒	Spring
⑨	Washer	㉓	Rear propeller shaft
⑩	Bearing	Ⓐ	Rear pinion gear lock-nut
⑪	Shim	Ⓑ	Rear drive bearing lock-nut
⑫	Rear pinion gear	Ⓒ	Final gear case bolt (M8)
⑬	Bearing	Ⓓ	Final gear case bolt (M10)
⑭	Input shaft	Ⓔ	Final gear case mounting nut



ITEM	N·m	kgf-m	lb-ft
Ⓐ	100	10.0	72.5
Ⓑ	100	10.0	72.5
Ⓒ	26	2.6	19.0
Ⓓ	55	5.5	40.0
Ⓔ	65	6.5	47.0

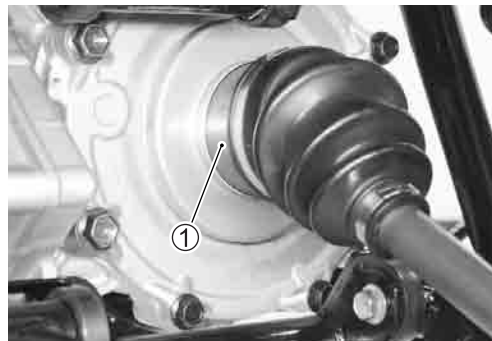
REMOVAL

- Remove the rear wheels. (🔧 8-18)
- Drain the final gear oil. (🔧 2-12)
- Remove the rear brake cable. (🔧 8-73)
- Remove the rear suspension. (🔧 8-84)

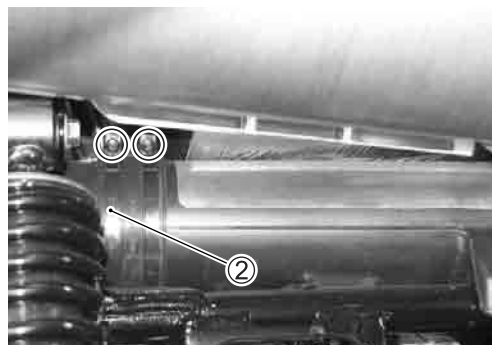
- Hold the inboard joint ① of the rear drive shaft and tug the rear drive shaft horizontally.

NOTE:

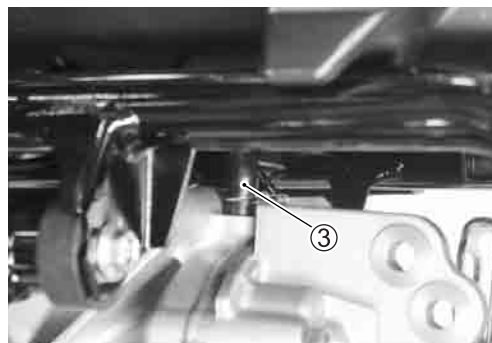
If it is difficult to remove the rear drive shaft from the rear differential gear case, using the suitable tool.



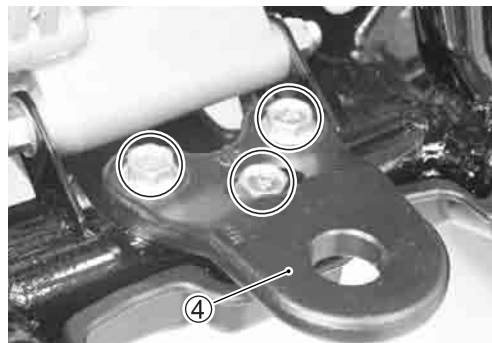
- Remove the outlet pipe ②.



- Remove the breather hose ③.



- Remove the trailer towing ④.



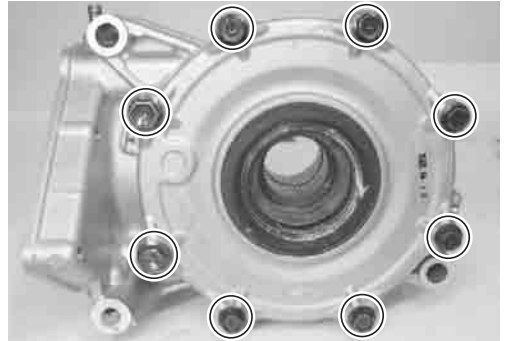
- Remove the final gear case mounting bolt/nuts.
- Remove the final gear case assembly out of the frame.



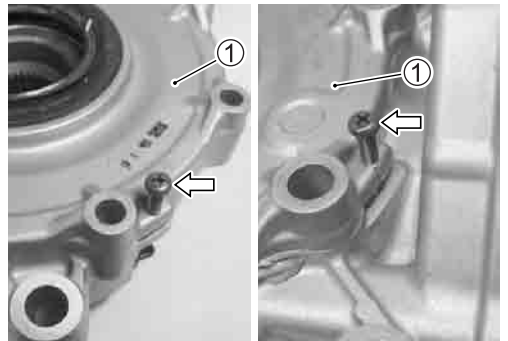
DISASSEMBLY

FINAL GEAR AND FINAL GEAR CASE

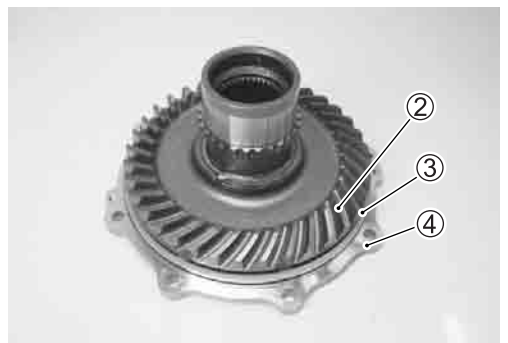
- Remove the rear brake. (☞ 8-73)
- Remove the final gear case bolts diagonally and evenly.



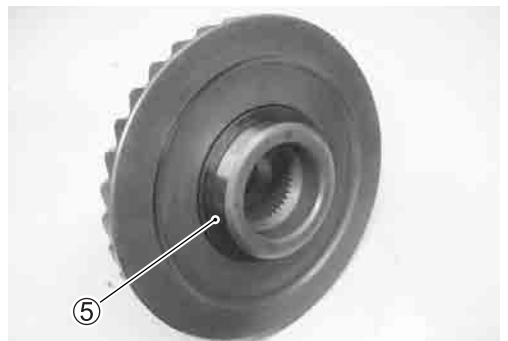
- Pry the final gear case cover ① with 5 mm screw as shown.
- Remove the final gear case cover ①.



- Remove the ring gear ② and O-ring ③ from the final gear case cover ④.

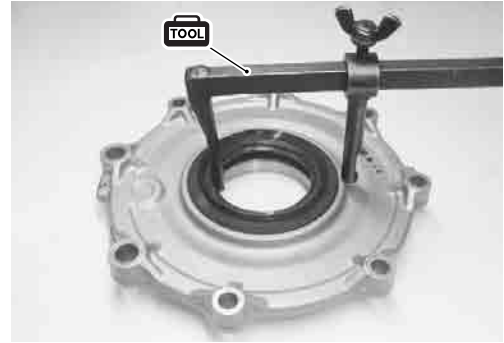


- Remove the shim(s) ⑤ from the ring gear.



- Remove the oil seal with the special tool.

 **09913-50121: Oil seal remover**

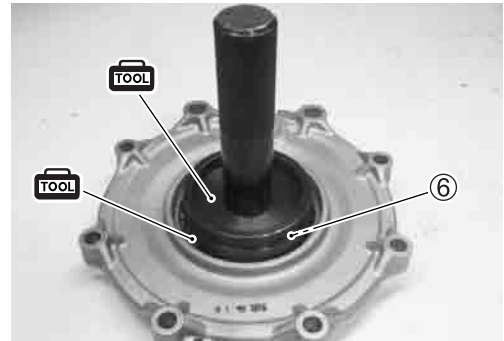


- Remove the final gear case cover bearing ⑥ with the special tool.

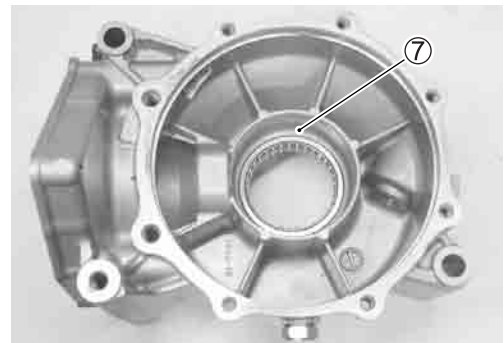
 **09913-70210: Bearing installer set**
09944-66010: Bearing installer

NOTE:

If there is no abnormal condition, the bearing removal is not necessary.

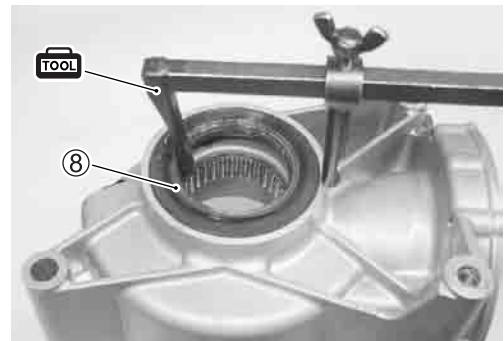


- Remove the shim(s) ⑦.



- Remove the oil seal ⑧ with the special tool.

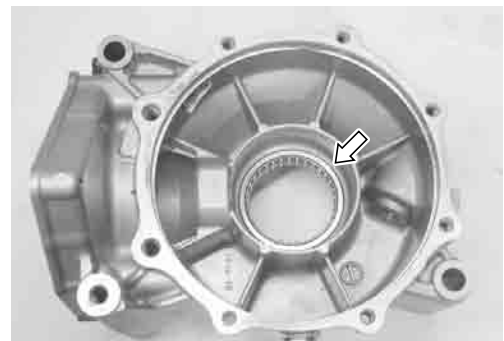
 **09913-50121: Oil seal remover**



- Remove the gear final case bearing with a suitable tool.

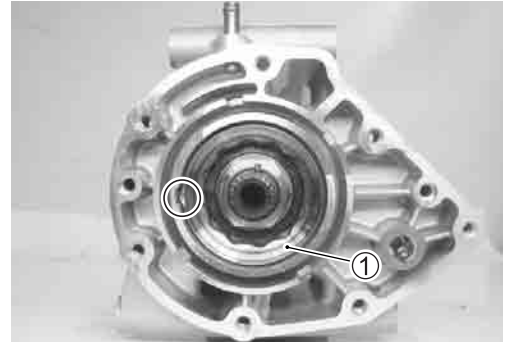
NOTE:

If there is no abnormal condition, the bearing removal is not necessary.



REAR PINION GEAR

- Unlock the rear drive bearing lock-nut ① with a chisel.

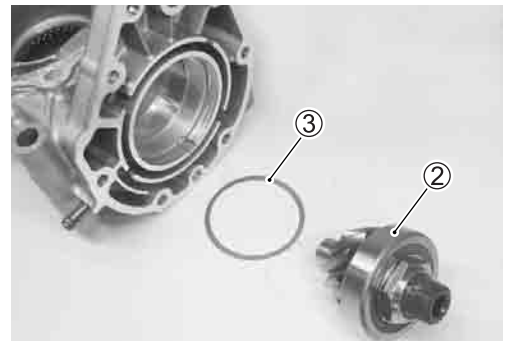


- Remove the rear drive bearing lock-nut with the special tool.

 **09924-41830: Bearing lock-nut wrench**



- Remove the rear pinion gear ② and shim ③.

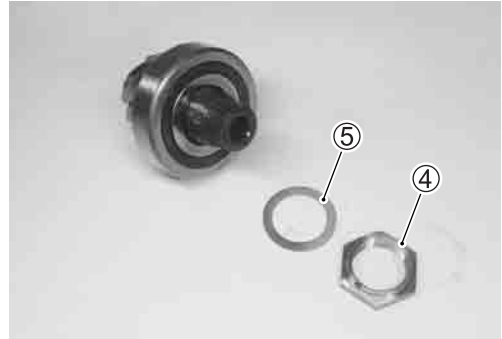
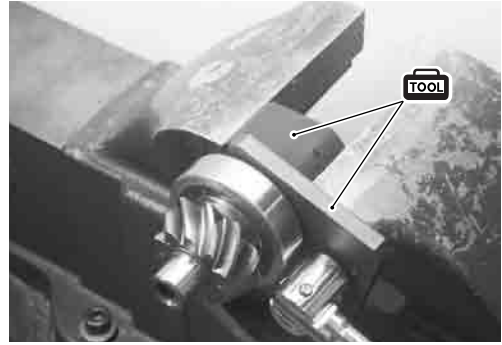


- Unlock the rear pinion gear lock-nut ④ with a chisel.



- Remove the rear pinion gear lock-nut ④ and washer ⑤ with the special tools.

TOOL 09924-52470: Fixed final drive gear holder
09940-92430: Rear axle wrench A

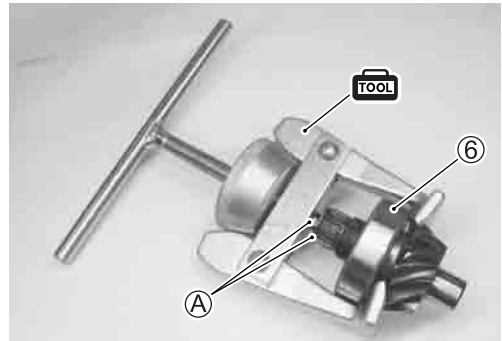


- Remove the rear pinion gear bearing outer race ⑥ with the special tool and suitable tool A.

TOOL 09917-50410: Bearing remover

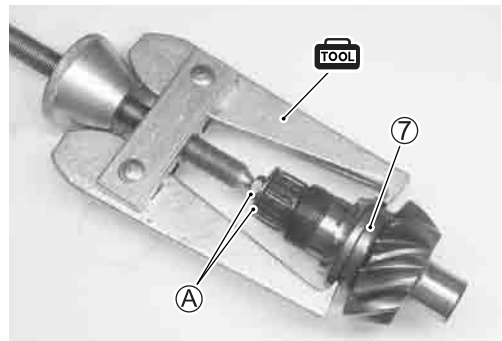
NOTE:

If there is no abnormal condition, the bearing removal is not necessary.



- Remove the rear pinion gear bearing inner race ⑦ with the special tool and suitable tool A.

TOOL 09913-60910: Bearing and gear puller puller

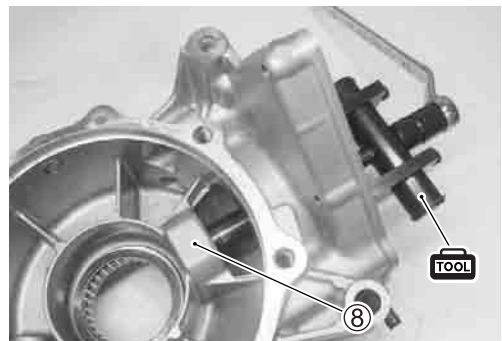


- Remove the rear pinion gear pilot bearing ⑧ with the special tool.

TOOL 09921-20240: Bearing remover set ($\phi 20$)

NOTE:

If there is no abnormal condition, the bearing removal is not necessary.



INSPECTION

RING GEAR

Inspect the ring gear for wear or damage.

If any defects are found, replace right gear with a new one.



REAR PINION GEAR

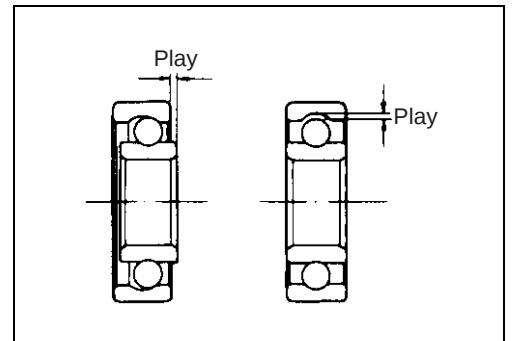
Inspect the rear pinion gear for wear or damage.

If any defects are found, replace the pinion gear with a new one.



BEARING INSPECTION

Rotate the bearing inner race by finger to inspect for abnormal play, noise and smooth rotation. If there is anything unusual, replace the bearing with a new one.



REASSEMBLY

- Reassemble the rear drive train in the reverse order of disassembly. Pay attention to the following points:

NOTE:

Before reassembly, thoroughly clean all parts in cleaning solvent.

FINAL GEAR CASE

- Install the pinion gear pilot bearing to the final gear case with the special tool.

 **09913-70210: Bearing installer set ($\phi 35$)**

CAUTION

The remove bearing must be replaced with a new one.

- Install the oil seal to the final gear case with the special tool.

 **09951-15810: Bearing installer**

- Apply SUZUKI SUPER GREASE "A" to the lip of the oil seal.

 **99000-25010: SUZUKI SUPER GREASE "A"**
(or equivalent grease)

CAUTION

The removed oil seal must be replaced with a new one.

REAR PINION GEAR

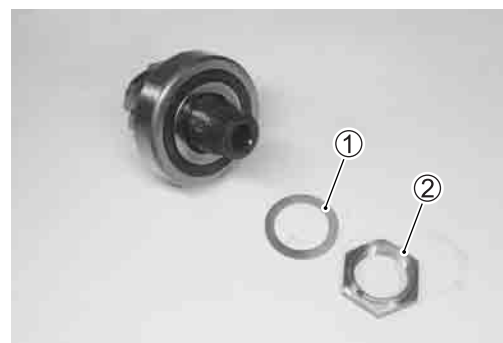
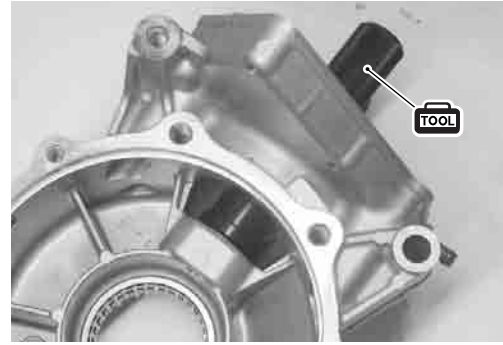
- Install the pinion bearing to the rear pinion gear with the special tool.

 **09913-70210: Bearing installer set ($\phi 47$)**

CAUTION

The remove bearing must be replaced with a new one.

- Install the washer ① and rear pinion gear lock-nut ② to the rear pinion gear.



- Tighten the rear pinion gear lock-nut with the special tools to the specified torque.

CAUTION

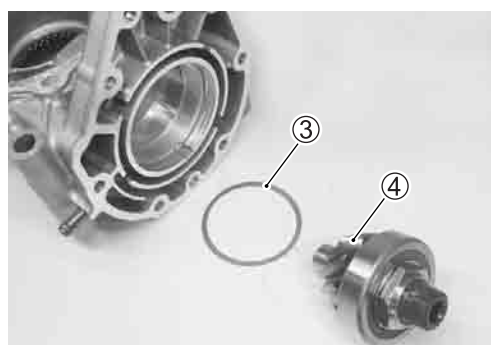
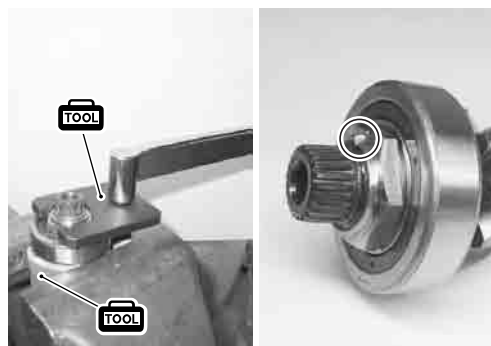
The removed rear pinion gear lock-nut must be replaced with a new one.

 **09924-52470: Fixed final drive gear holder**

09940-92430: Rear axle wrench A

 **Rear pinion gear lock-nut: 100 N·m**
(10.0 kgf-m, 72.5 lb-ft)

- Stake the collar of the locknut into the notch in the shaft.
- Install the shim(s) ③ and rear pinion gear ④ to the final gear case.



- Tighten the bearing lock-nut with the special tool to the specified torque.

CAUTION

The removed bearing lock-nut must be replaced with a new one.

 **09924-41830: Bearing lock-nut wrench**

 **Rear drive bearing lock-nut: 100 N·m**
(10.0 kgf-m, 72.5 lb-ft)

**NOTE:**

After the backlash and tooth contact have been checked or adjusted, stake the collar of the bearing lock-nut into the notch in the shaft.



FINAL GEAR CASE COVER

- Install the final gear case cover bearing cover the special tool.

 **09951-15810: Bearing installer**

CAUTION

The remove bearing must be replaced with a new one.



- Install the oil seal with the special tool.

 **09951-15810: Bearing installer**

- Apply SUZUKI SUPER GREASE "A" to the lip of the oil seal.

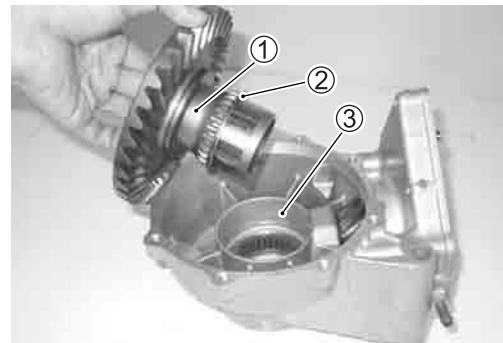
 **99000-25010: SUZUKI SUPER GREASE "A"**
(or equivalent grease)

CAUTION

The remove bearing must be with a new one.

**FINAL GEAR AND FINAL GEAR CASE**

- Install the ring gear ① and shim(s) ② into the final gear case ③.



- Install the O-ring ④ to the final gear case cover ⑤.
- Apply SUZUKI SUPER GREASE "A" to the O-ring ④.

 **99000-25010: SUZUKI SUPER GREASE "A"**
(or equivalent grease)

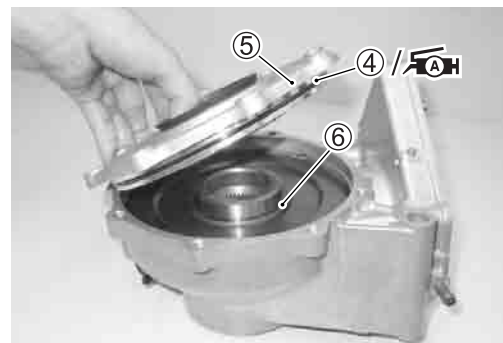
NOTE:

After the backlash and tooth contact have been checked or adjusted, install the O-ring ④ and apply grease.

CAUTION

The removed O-ring must be replaced with a new one.

- Install the shim(s) ⑥ and final gear case cover ⑤.



- Apply a small quantity of THREAD LOCK SUPER “1303” to the final gear case bolts and tighten them to the specified torque diagonally.

 **99000-32030: THREAD LOCK SUPER “1303”**

 **Final gear case bolt (M8): 26 N·m (2.6 kgf-m, 19.0 lb-ft)**

Final gear case bolt (M10): 55 N·m (5.5 kgf-m, 40.0 lb-ft)

NOTE:

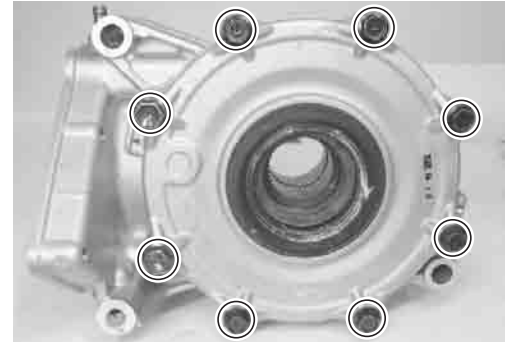
After the backlash and tooth contact have been checked or adjusted, apply THREAD LOCK SUPER “1303” to the case cover bolts.

- Install the rear brake. ( 8-81)

REMOUNTING

Remount the final gear case assembly in the reverse order of removal. Pay attention to the following points:

- Install the final gear case assembly. ( 8-81)



SHIM ADJUSTMENT

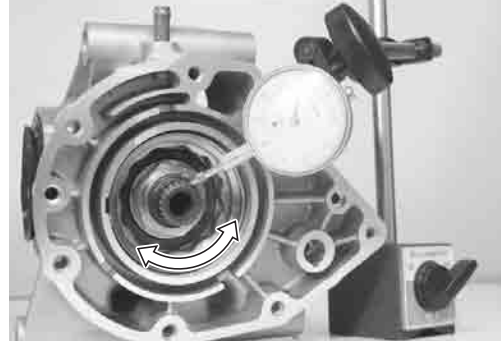
BACKLASH

- Install the removed shim(s), pinion gear and new bearing lock-nut. (☞ 4-33)
- Tighten the bearing lock-nut to the specified torque. (☞ 4-33)

NOTE:

At this time, it is not necessary to bend the bearing lock-nut collar.

- Install the removed left side shim(s) and ring gear. (☞ 4-34)
Measure the backlash with the dial gauge, as shown. Take backlash readings at several places while turning the pinion gear shaft in each direction and securely holding the ring gear. If the backlash is not within specification, the shim must be changed and the backlash should be re-checked until the backlash is within specification. Refer to the chart for the appropriate shim thickness.



DATA Backlash

Standard: 0.02 – 0.06 mm (0.0008 – 0.0024 in)

..... **Without gear case cover
specification**

0.08 – 0.15 mm (0.0031 – 0.0059 in)

..... **Gear case cover assembled
specification**

NOTE:

Adjust the backlash by referring to the chart at the right and using the thickness of the removed shims as a guide.

Backlash	Shim adjustment
Under 0.02 mm (0.0008 in)	Increase shim thickness
0.02 – 0.06 mm (0.0008 – 0.0024 in)	Correct
Over 0.06 mm (0.0024 in)	Decrease shim thickness

List of shims (for right side) (☞ 4-34)

Part No.	Shim thickness
27327-31G00-030	0.30 mm (0.0118 in)
27327-31G00-035	0.35 mm (0.0138 in)
27327-31G00-040	0.40 mm (0.0157 in)
27327-31G00-050	0.50 mm (0.0197 in)
27327-31G00-060	0.60 mm (0.0236 in)

LEFT SIDE SHIM SELECTION

- After the backlash has been checked or adjusted, put a few pieces of solder (O.D.: 1.2 – 1.5 mm × L: 6 mm) on the back side of ring gear, as shown.

NOTE:

- Do not install the left side shim(s) at this time.*
- Apply a small quantity of grease to the solders to prevent them from falling.*



- Install the final gear case cover and tighten its bolts to the specified torque diagonally. (☞ 4-35)

NOTE:

- Do not install the new O-ring to the gear case cover.*
- Do not apply a thread lock to the case bolts.*

 **Final gear case bolt (M8): 26 N·m (2.6 kgf-m, 19.0 lb-ft)**
Final gear case bolt (M10): 55 N·m (5.5 kgf-m, 40.0 lb-ft)



- Remove the final gear case cover. (☞ 4-27)
- Measure the thickness of compressed solder with the micrometer.

 **09900-20205: Micrometer (0 – 25 mm)**



Decide the proper shim thickness by the following formula.

① - 0.10 mm = Shim thickness

0.10 mm: Proper clearance

①: Compressed solder thickness

②: Proper shim thickness

- Select the proper size of shim(s) from the right chart, according as the compressed solder thickness.
- After selecting the proper size of shim(s), install it on the ring gear back side.

List of shims (for left side) (☞ 4-34)

Part No.	Shim thickness
27326-31G00-030	0.30 mm (0.0118 in)
27326-31G00-035	0.35 mm (0.0138 in)
27326-31G00-040	0.40 mm (0.0157 in)
27326-31G00-050	0.50 mm (0.0197 in)
27326-31G00-060	0.60 mm (0.0236 in)

TOOTH CONTACT

After backlash adjustment and left shim selection are carried out, the tooth contact must be checked. Pay attention to the following procedures:

- Remove the ring gear.
- Clean and degrease several teeth on the ring gear and pinion gear, and then apply a coating of machinist's layout dye or paste to several teeth of the pinion gear.
- Install the ring gear with the shim(s) in place.
- Install the final gear case cover, and then tighten the bolts to the specified torque diagonally. (☞ 4-35)

Final gear case bolt (M8): 26 N·m (2.6 kgf-m, 19.0 lb-ft)
Final gear case bolt (M10): 55 N·m (5.5 kgf-m, 40.0 lb-ft)

NOTE:

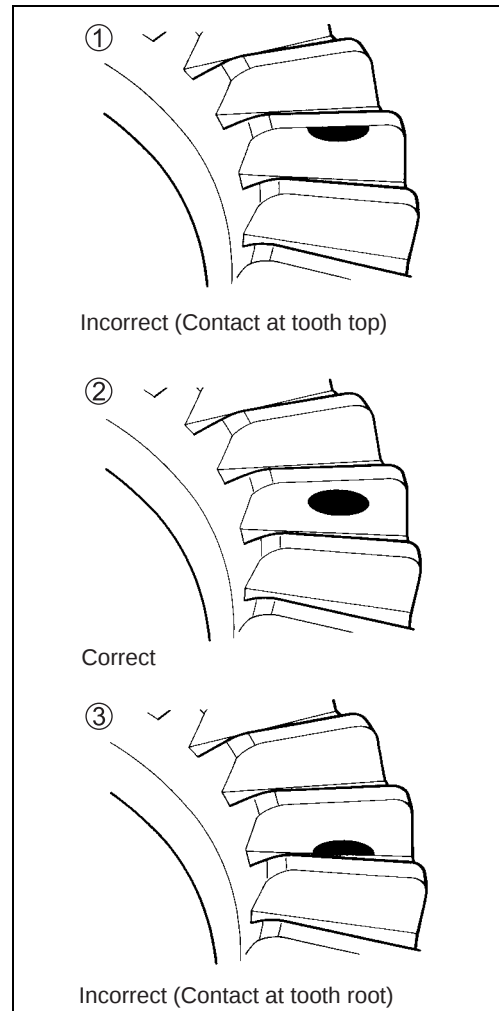
At this time, it is not necessary to install the gear case cover's O-ring.

- Rotate the pinion gear several turns in each direction. This will provide a contact pattern on the coated teeth of the ring gear.
- Remove the ring gear and compare the coated teeth to the examples shown in ①, ② and ③.
- If tooth contact is found to be correct (example ②), go to page 4-30 to complete installation.
- If tooth contact is found to be incorrect (examples ① and ③), the shim between the pinion gear bearing and final gear case must be changed and the tooth contact should be re-checked until the tooth contact is found to be correct (example ②).

Tooth contact	Shim adjustment
Contact at tooth top ①	Decrease shim thickness
Contact at tooth root ③	Increase shim thickness

CAUTION

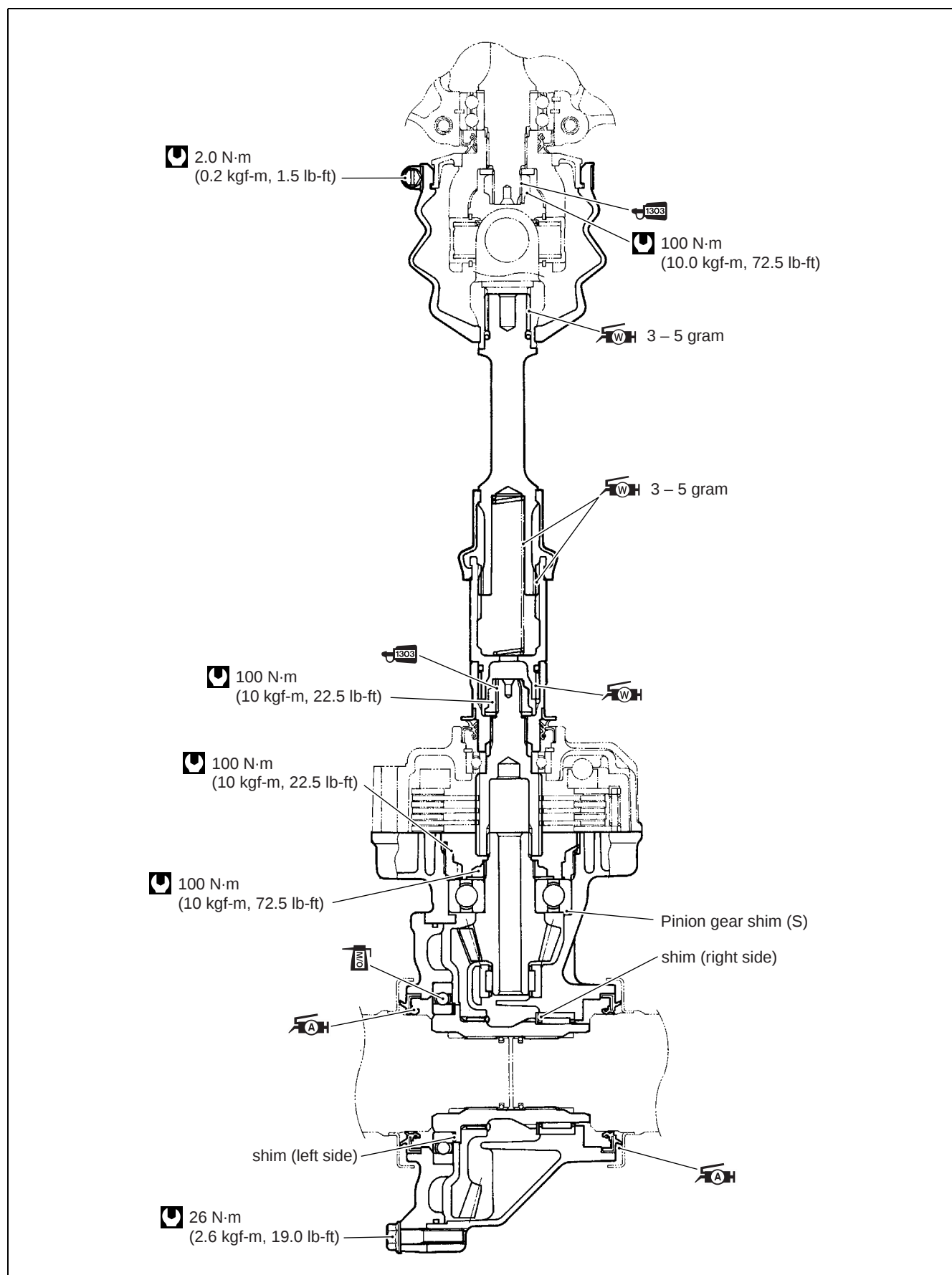
Make sure to check the backlash and shim thickness after the tooth contact has been adjusted, since it may have changed. Adjust the tooth contact and backlash until they are both within specification. If the correct tooth contact cannot be maintained when adjusting the backlash, replace the pinion gear and ring gear as a set.



List of shims (for pinion gear) (☞ 4-34)

Part No.	Shim thickness
27445-24A01-030	0.30 mm (0.0118 in)
27445-24A01-035	0.35 mm (0.0138 in)
27445-24A01-040	0.40 mm (0.0157 in)
27445-24A01-050	0.50 mm (0.0197 in)
27445-24A01-060	0.60 mm (0.0236 in)

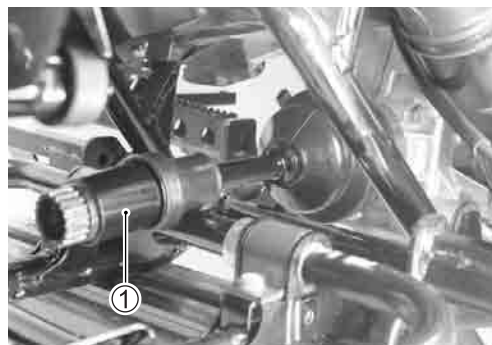
REASSEMBLY INFORMATION



REAR PROPELLER SHAFT

REMOVAL AND DISASSEMBLY

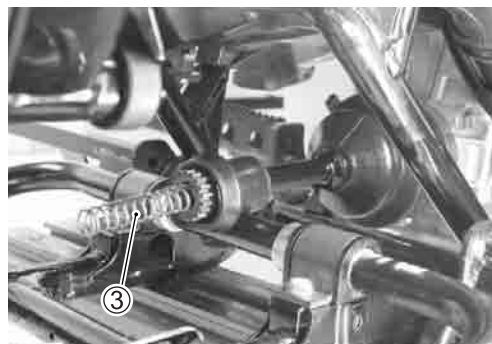
- Remove the rear final gear case assembly. (☞ 4-26)
- Remove the rear propeller shaft joint ①.



- Remove the O-ring ②.



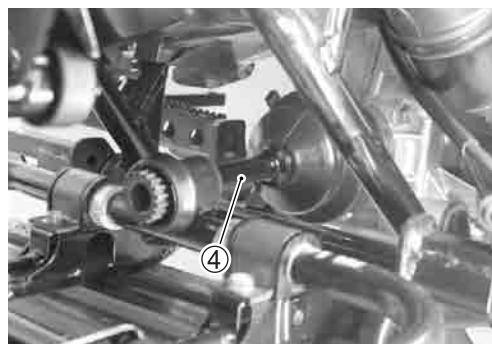
- Remove the rear propeller shaft spring ③.



- Loosen the boot clamp screw.



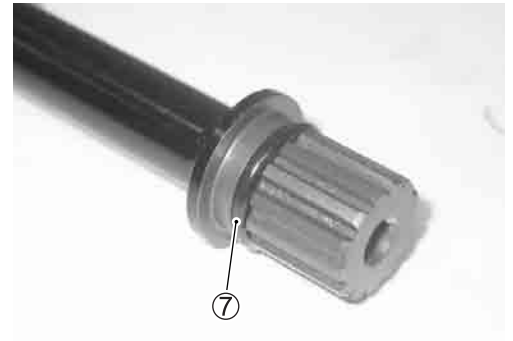
- Draw out the rear propeller shaft ④ horizontally.



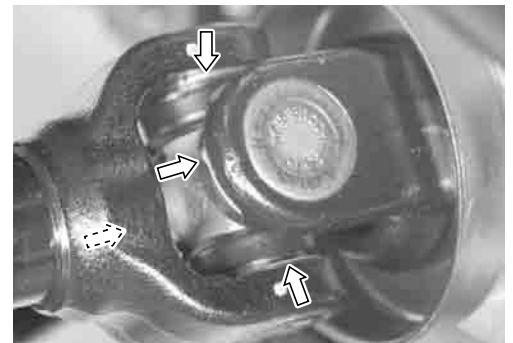
- Remove the rear propeller shaft joint boot ⑤ and universal joint boot ⑥.



- Remove the O-ring ⑦.

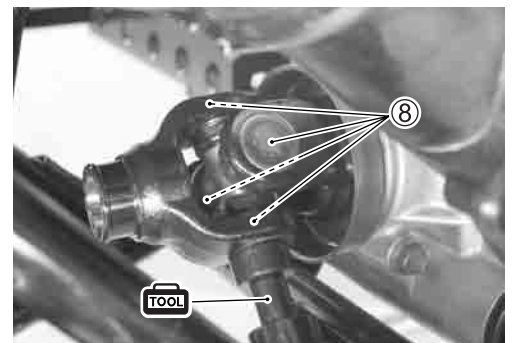


- Remove the circlips from the universal joint.

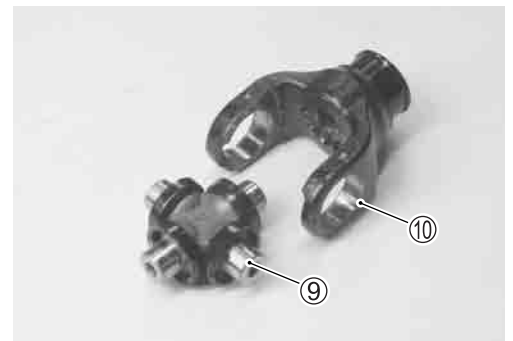


- Remove the bearings ⑧ by tapping with the special tool.

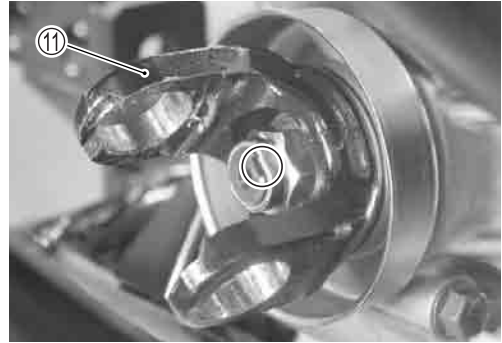
TOOL 09913-70210: Bearing installer set ($\phi 20$)



- Remove the universal joint ⑨ and yoke ⑩.



- Unlock the rear output shaft nut with a chisel.
- Remove the rear output shaft yoke ⑪.

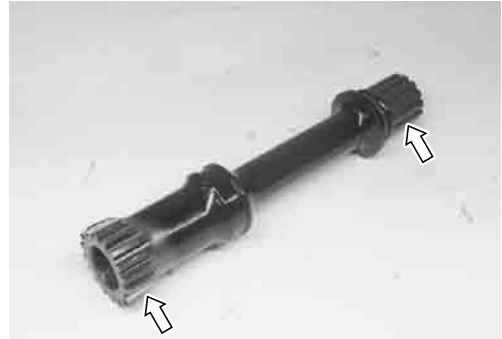


INSPECTION

REAR PROPELLER SHAFT

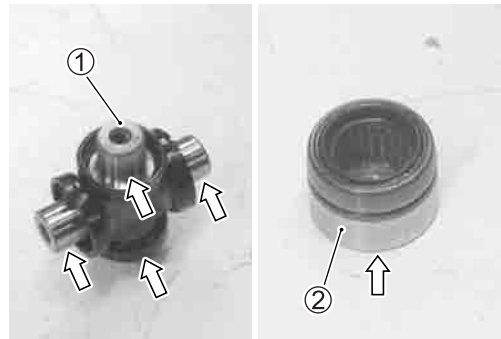
Inspect the rear propeller shaft for wear or damage.

If any defects are found, replace rear propeller shaft with a new one.

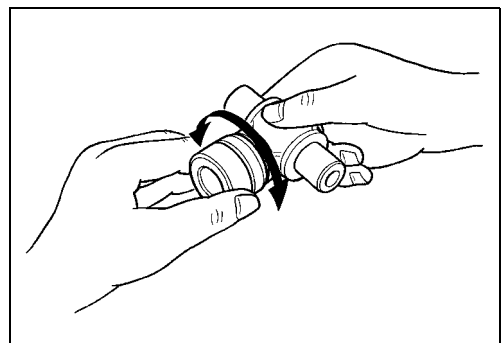


UNIVERSAL JOINT

Inspect the universal joint ① and outer surface of the bearing ② for scuffing, wear and damage. If any defects are found, replace the bearings and universal joint as a set.



Insert the universal joint to the bearing and check the play by turning the universal joint, as shown. If excessive play is found, replace the bearings and universal joint as a set.



SHAFT BOOT

Inspect the rear propeller shaft joint boot ① and universal joint boot ② for crack or damage.

If any defects are found, replace the defective part with a new one.



REASSEMBLY AND INSTALLATION

- Reassemble and install the rear propeller shaft assembly in the reverse order of removal and disassembly.
- Install the rear output shaft yoke ① and rear output shaft nut ②.

CAUTION

The removed rear output shaft nut must be replaced with a new one.

- Tighten the rear output shaft nut ② to the specified torque.

Output shaft nut: 100 N·m (10.0 kgf-m, 72.5 lb-ft)

- Stake the collar of the rear output shaft nut into the notch in the shaft.
- Install the universal joint ③ and yoke ④.
- Install the bearing ⑤ by tapping with the special tool.

09913-70210: Bearing installer set ($\phi 20$)

- Install the circlips to the universal joint.

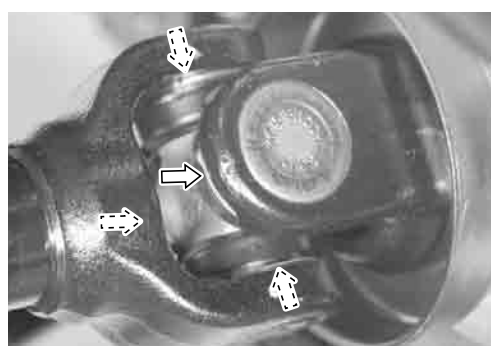
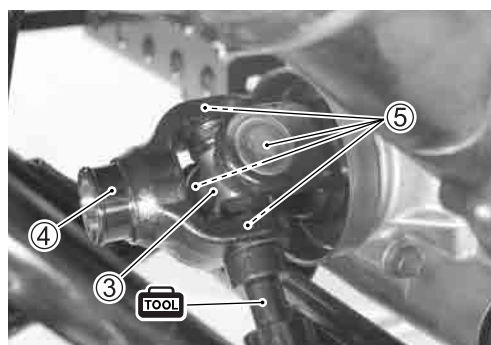
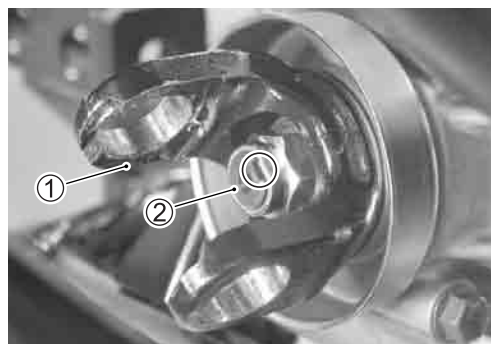
CAUTION

The removed circlips must be replaced with new ones.

- Install the O-ring to the rear propeller shaft.

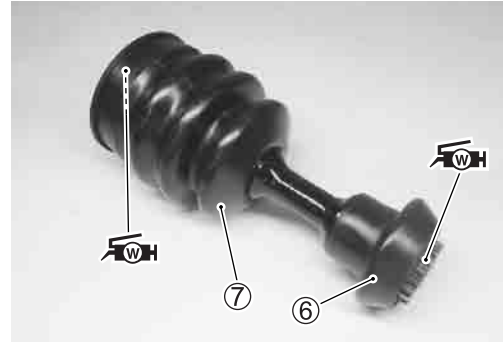
CAUTION

The removed O-ring must be replaced with a new one.

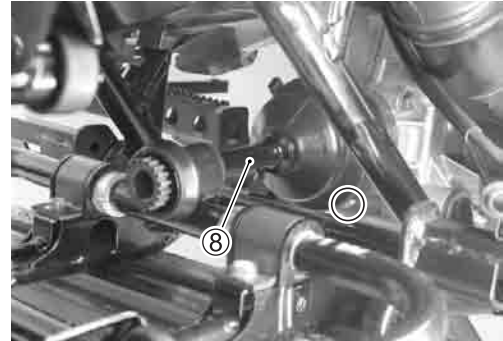


- Install the rear propeller shaft joint boot ⑥ and universal joint boot ⑦ to the rear propeller shaft.
- Apply WATER RESISTANCE GREASE to the hole inside of the boots and spline of rear propeller shaft.

 **99000-25160: WATER RESISTANCE GREASE**

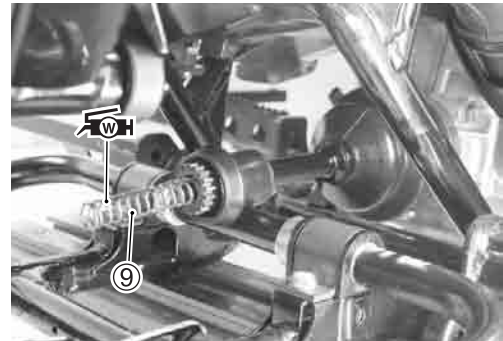


- Install the rear propeller shaft ⑧ and tighten the boot clamp screw.



- Install the rear propeller shaft spring ⑨.
- Apply WATER RESISTANCE GREASE to the rear propeller shaft spring.

 **99000-25160: WATER RESISTANCE GREASE**



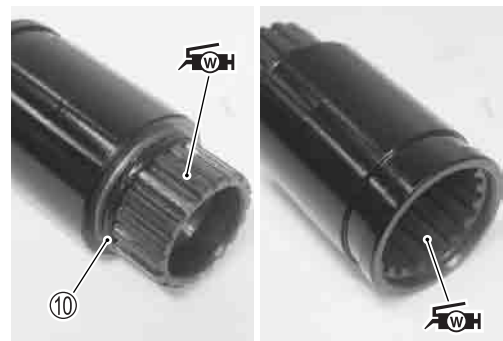
- Install the O-ring ⑩ to the rear propeller shaft joint.

CAUTION

The removed O-ring must be replaced with a new one.

- Apply WATER RESISTANCE GREASE to the spline of rear propeller shaft joint.

 **99000-25160: WATER RESISTANCE GREASE**



- Install the rear propeller shaft joint ⑪.
- Install the rear final gear case assembly. (☞ 8-81)



FI SYSTEM DIAGNOSIS

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PRECAUTIONS IN SERVICING

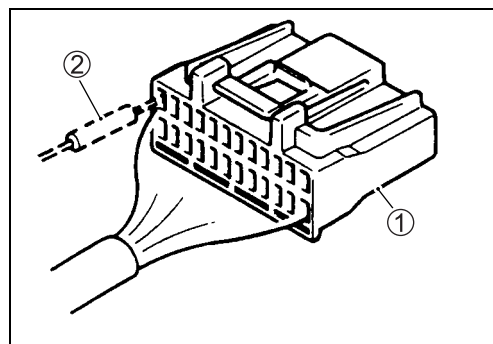
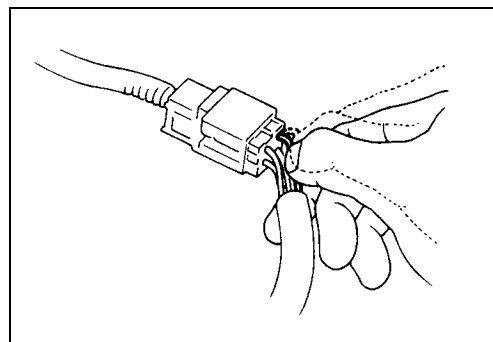
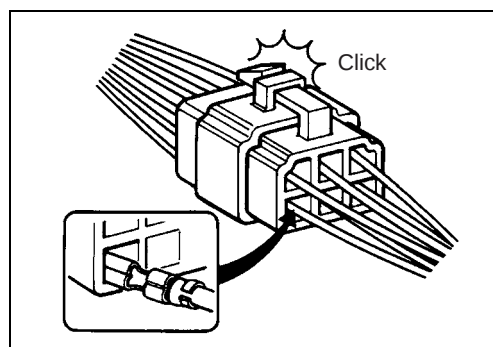
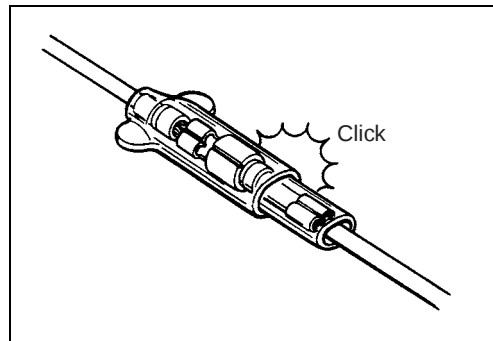
When handling the component parts or servicing the FI system, observe the following points for the safety of the system.

ELECTRICAL PARTS

CONNECTOR/COUPLER

- When connecting a connector, be sure to push it in until a click is felt.
- With a lock type coupler, be sure to release the lock when disconnecting, and push it in fully to engage the lock when connecting.
- When disconnecting the coupler, be sure to hold the coupler body and do not pull the lead wires.
- Inspect each terminal on the connector/coupler for looseness or bending.
- Inspect each terminal for corrosion and contamination.
The terminals must be clean and free of any foreign material which could impede proper terminal contact.
- Inspect each lead wire circuit for poor connection by shaking it by hand lightly. If any abnormal condition is found, repair or replace.
- When taking measurements at electrical connectors using a tester probe, be sure to insert the probe from the wire harness side (backside) of the connector/coupler.

- ① Coupler
② Probe



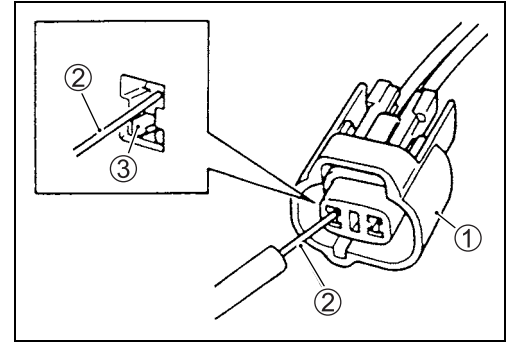
- When connecting meter probe from the terminal side of the coupler (where connection from harness side not being possible), use extra care not to force and cause the male terminal to bend or the female terminal to open.

Connect the probe as shown to avoid opening of female terminal.

Never push in the probe where male terminal is supposed to fit.

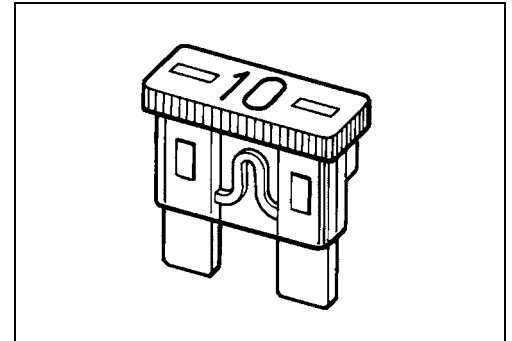
- Check the male connector for bend and female connector for excessive opening. Also check the coupler for locking (looseness), corrosion, dust, etc.

- ① Coupler
- ② Probe
- ③ Where male terminal fits



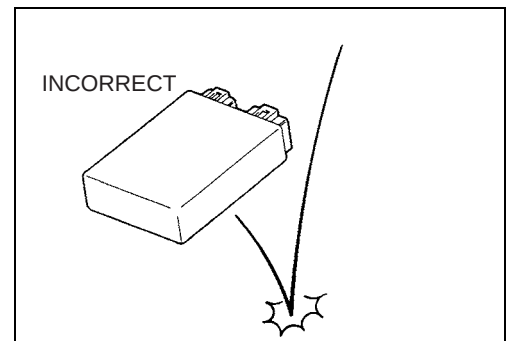
FUSE

- When a fuse blows, always investigate the cause to correct it and then replace the fuse.
- Do not use a fuse of a different capacity.
- Do not use wire or any other substitute for the fuse.

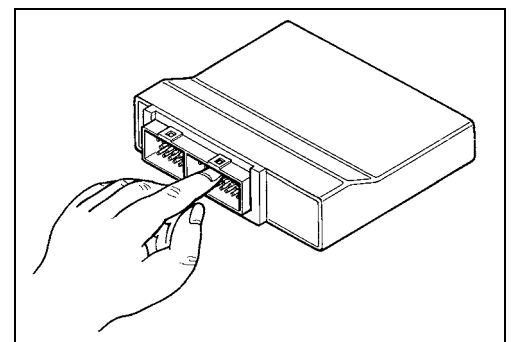


ECM/VARIOUS SENSORS

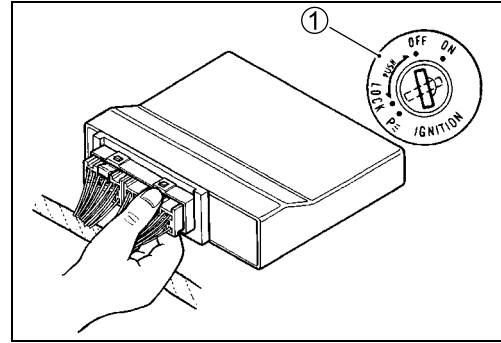
- Since each component is a high-precision part, great care should be taken not to apply any sharp impacts during removal and installation.



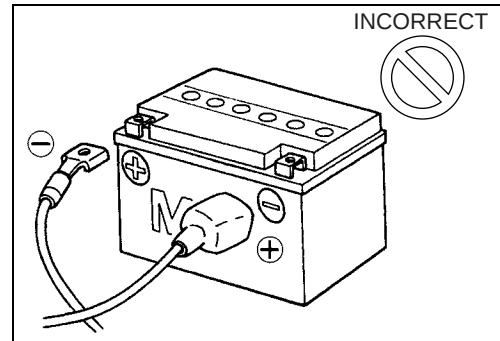
- Be careful not to touch the electrical terminals of the ECM. The static electricity from your body may damage this part.



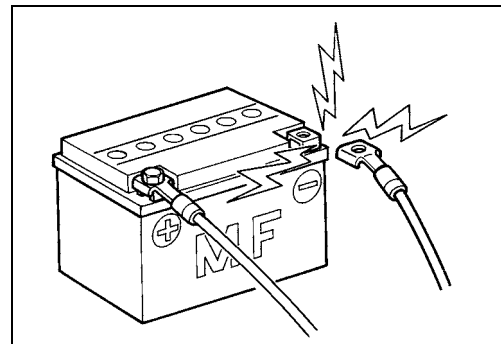
- When disconnecting and connecting the ECM, make sure to turn OFF the ignition switch ①, or electronic parts may get damaged.
- Do not disconnect the ECM coupler within 3 seconds, after turning OFF the ignition switch.



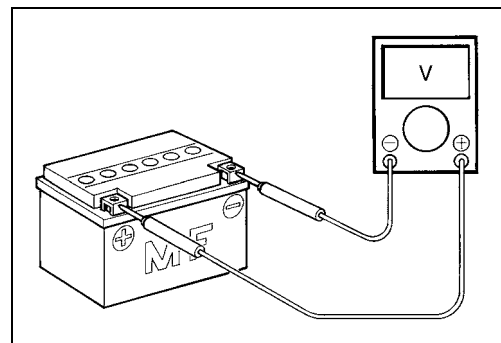
- Battery connection in reverse polarity is strictly prohibited. Such a wrong connection will damage the components of the FI system instantly when reverse power is applied.



- Removing any battery terminal of a running engine is strictly prohibited. The moment such removal is made, damaging counter electromotive force will be applied to the ECM which may result in serious damage.



- Before measuring voltage at each terminal, check to make sure that battery voltage is 11 V or higher. Terminal voltage check with a low voltage battery will lead to erroneous diagnosis.



- Never connect any tester (voltmeter, ohmmeter, or whatever) to the ECM when its coupler is disconnected. Otherwise, damage to ECM may result.
- Never connect an ohmmeter to the ECM with its coupler connected. If attempted, damage to ECM or sensors may result.
- Be sure to use a specified voltmeter/ohmmeter. Otherwise, accurate measurements may not be obtained and personal injury may result.

ELECTRICAL CIRCUIT INSPECTION PROCEDURE

While there are various methods for electrical circuit inspection, described here is a general method to check for open and short circuit using an ohmmeter and a voltmeter.

OPEN CIRCUIT CHECK

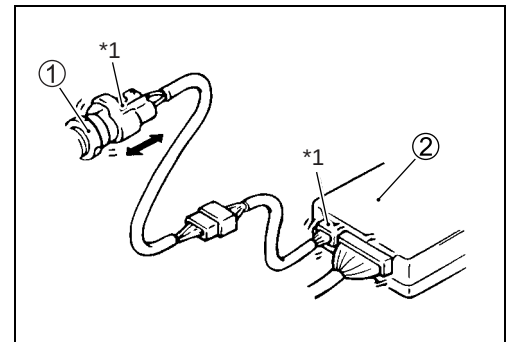
Possible causes for the open circuits are as follows. As the cause can exist in the connector/coupler or terminal, they need to be checked carefully.

- Loose connection of connector/coupler.
- Poor contact of terminal (due to dirt, corrosion or rust, poor contact tension, entry of foreign object etc.)
- Wire harness being open.
- Poor terminal-to-wire connection.
- Disconnect the negative cable from the battery.
- Check each connector/coupler at both ends of the circuit being checked for loose connection. Also check for condition of the coupler lock if equipped.

① Sensor

② ECM

*1 Check for loose connection.



- Using a test male terminal, check the female terminals of the circuit being checked for contact tension.

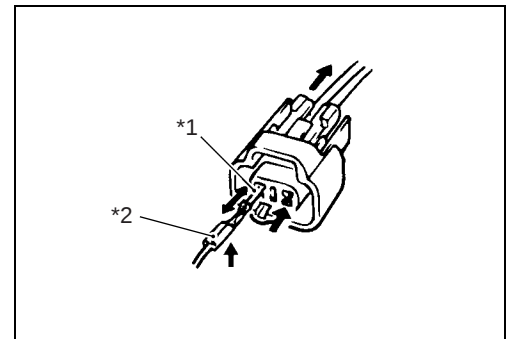
Check each terminal visually for poor contact (possibly caused by dirt, corrosion, rust, entry of foreign object, etc.). At the same time, check to make sure that each terminal is fully inserted in the coupler and locked.

If contact tension is not enough, rectify the contact to increase tension or replace.

The terminals must be clean and free of any foreign material which could impede proper terminal contact.

*1 Check contact tension by inserting and removing.

*2 Check each terminal for bend and proper alignment.

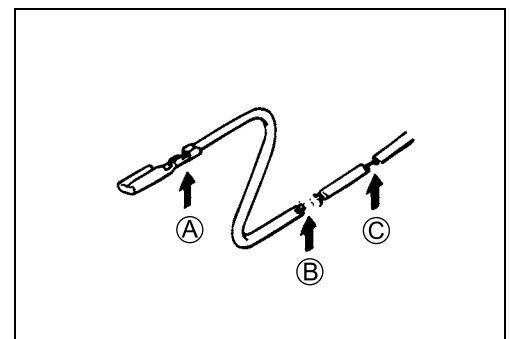


- Using continuity inspect or voltage check procedure as described below, inspect the wire harness terminals for open circuit and poor connection. Locate abnormality, if any.

Ⓐ Looseness of crimping

Ⓑ Open

Ⓒ Thin wire (a few strands left)

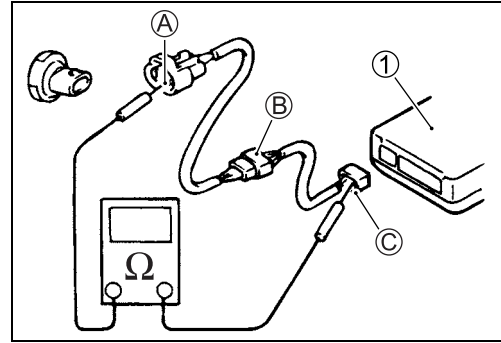


Continuity check

- Measure resistance across coupler (B) (between (A) and (C) in the figure).

If no continuity is indicated (infinity or over limit), the circuit is open between terminals (A) and (C).

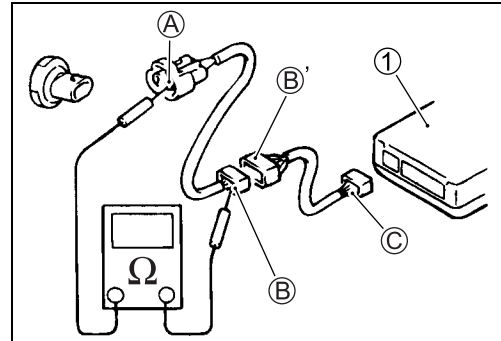
① ECM



- Disconnect the coupler (B) and measure resistance between couplers (A) and (B).

If no continuity is indicated, the circuit is open between couplers (A) and (B). If continuity is indicated, there is an open circuit between couplers (B') and (C) or an abnormality in coupler (B') or coupler (C).

① ECM

**VOLTAGE CHECK**

If voltage is supplied to the circuit being checked, voltage check can be used as circuit check.

- With all connectors/couplers connected and voltage applied to the circuit being checked, measure voltage between each terminal and body ground.

If measurements were taken as shown in the figure at the right and results are as listed below, it means that the circuit is open between terminals (A) and (B).

Voltage Between:

(C) and body ground: Approx. 5 V

(B) and body ground: Approx. 5 V

(A) and body ground: 0 V

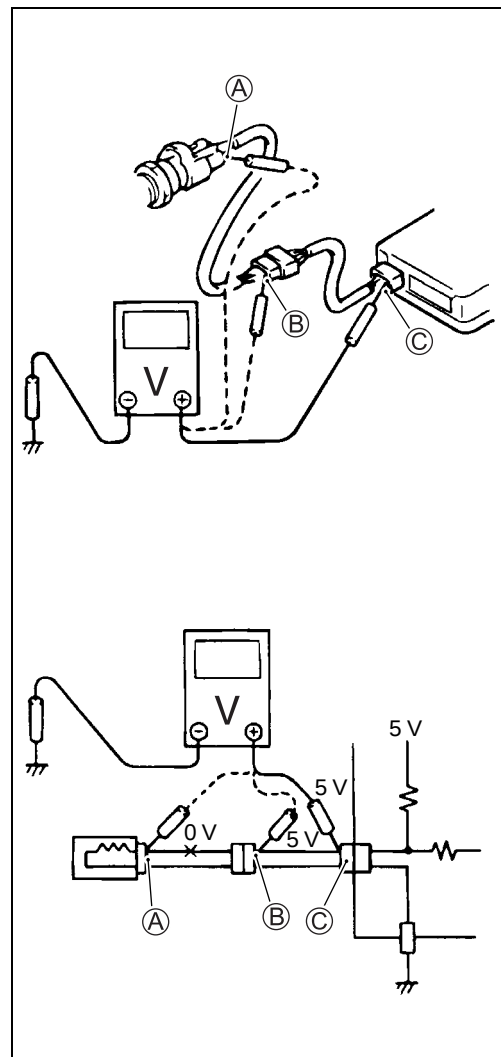
Also, if measured values are as listed below, a resistance (abnormality) exists which causes the voltage drop in the circuit between terminals (A) and (B).

Voltage Between:

(C) and body ground: Approx. 5 V

(B) and body ground: Approx. 5 V — 2 V voltage drop

(A) and body ground: 3 V



SHORT CIRCUIT CHECK (WIRE HARNESS TO GROUND)

- Disconnect the negative cable from the battery.
- Disconnect the connectors/couplers at both ends of the circuit to be checked.

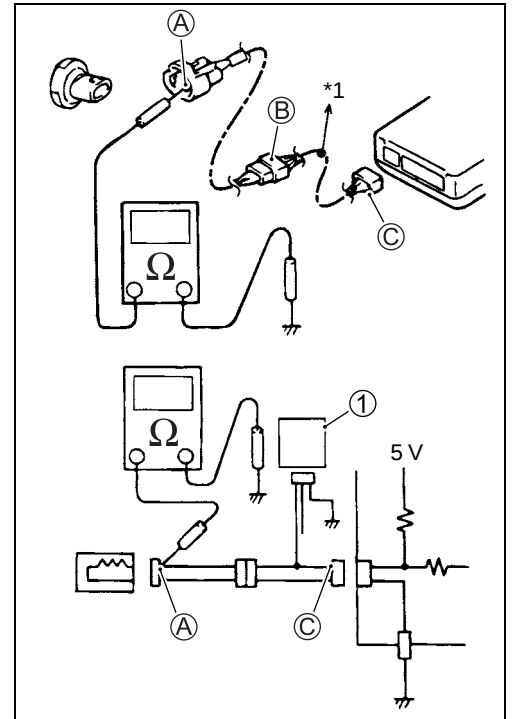
NOTE:

If the circuit to be checked branches to other parts as shown, disconnect all connectors/couplers of those parts. Otherwise, diagnosis will be misled.

- Measure resistance between terminal at one end of circuit (A terminal in figure) and body ground. If continuity is indicated, there is a short circuit to ground between terminals A and C.

① Other parts

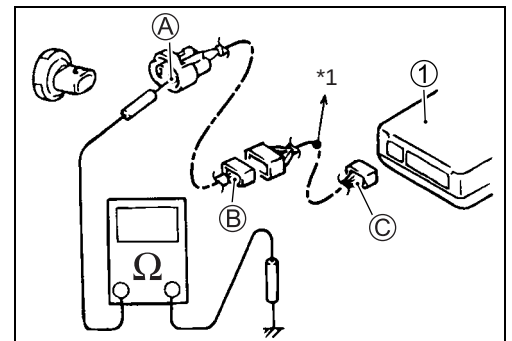
*1 To other parts



- Disconnect the connector/coupler included in circuit (coupler B) and measure resistance between terminal A and body ground. If continuity is indicated, the circuit is shorted to the ground between terminals A and B.

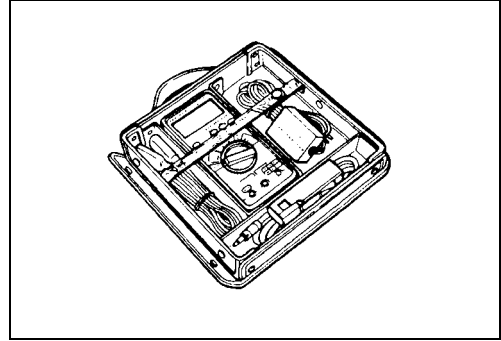
① ECM

*1 To other parts



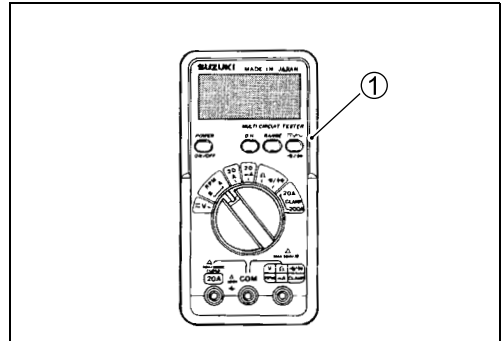
USING THE MULTI-CIRCUIT TESTER

- Use the Suzuki multi-circuit tester set (09900-25008).
- Use well-charged batteries in the tester.
- Be sure to set the tester to the correct testing range.



USING THE TESTER

- Incorrectly connecting the $\oplus$ and $\ominus$ probes may cause the inside of the tester to burnout.
- If the voltage and current are not known, make measurements using the highest range.
- When measuring the resistance with the multi-circuit tester ①, ∞ will be shown as 10.00 M Ω and "1" flashes in the display.
- Check that no voltage is applied before making the measurement. If voltage is applied the tester may be damaged.
- After using the tester, turn the power off.



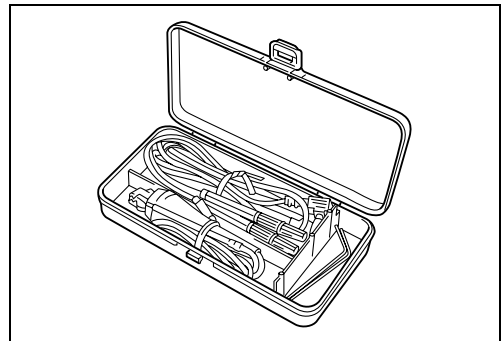
09900-25008: Multi-circuit tester set

NOTE:

- * When connecting the multi-circuit tester, use the needle pointed probe to the back side of the lead wire coupler and connect the probes of tester to them.
- * Use the needle pointed probe to prevent the rubber of the water proof coupler from damage.



09900-25009: Needle pointed probe set

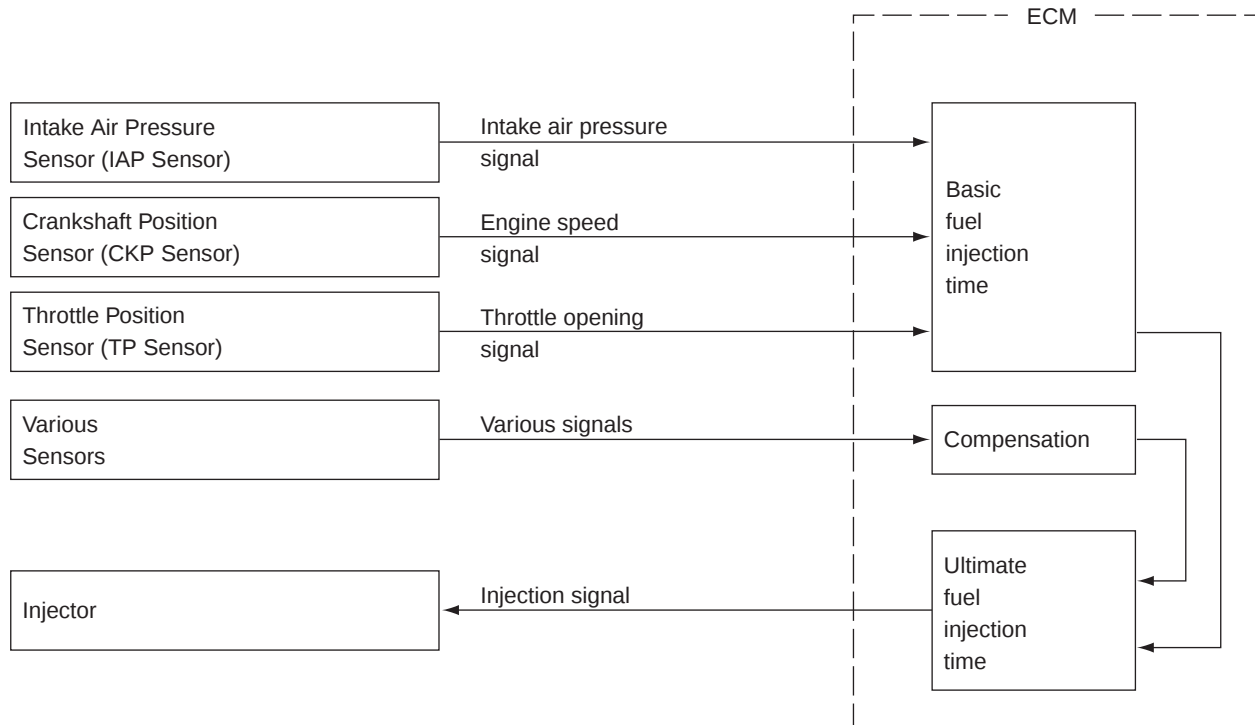


FI SYSTEM TECHNICAL FEATURES

INJECTION TIME (INJECTION VOLUME)

The factors to determine the injection time include the basic fuel injection time, which is calculated on the basis of intake air pressure, engine speed and throttle opening angle, and various compensations.

These compensations are determined according to the signals from various sensors that detect the engine and driving conditions.



COMPENSATION OF INJECTION TIME (VOLUME)

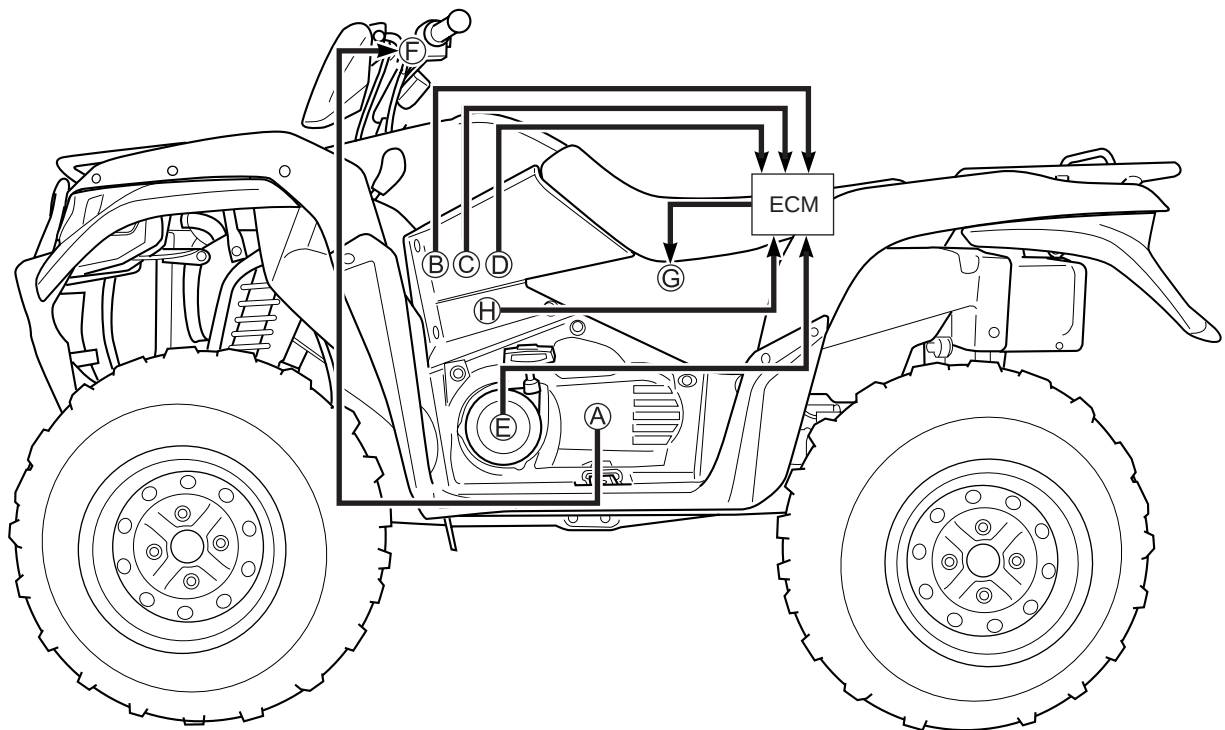
The following different signals are output from the respective sensors for compensation of the fuel injection time (volume).

SIGNAL	DESCRIPTION
ENGINE COOLANT TEMPERATURE SENSOR SIGNAL	When engine coolant temperature is low, injection time (volume) is increased.
INTAKE AIR TEMPERATURE SENSOR SIGNAL	When intake air temperature is low, injection time (volume) is increased.
BATTERY VOLTAGE SIGNAL	ECM operates on the battery voltage and at the same time, it monitors the voltage signal for compensation of the fuel injection time (volume). A longer injection time is needed to adjust injection volume in the case of low voltage.
ENGINE RPM SIGNAL	At high speed, the injection time (volume) is increased.
STARTING SIGNAL	When starting engine, additional fuel is injected during cranking engine.
ACCELERATION SIGNAL/ DECELERATION SIGNAL	During acceleration, the fuel injection time (volume) is increased in accordance with the throttle opening speed and engine rpm. During deceleration, the fuel injection time (volume) is decreased.

INJECTION STOP CONTROL

SIGNAL	DESCRIPTION
TIP-OVER SENSOR SIGNAL (FUEL SHUT-OFF)	When the vehicle tips over, the tip-over sensor sends a signal to the ECM. Then, this signal cuts OFF current supplied to the fuel pump, fuel injector and ignition coil.
OVER-REV. LIMITER SIGNAL	The fuel injector stop operation when engine rpm reaches rev. limit rpm.

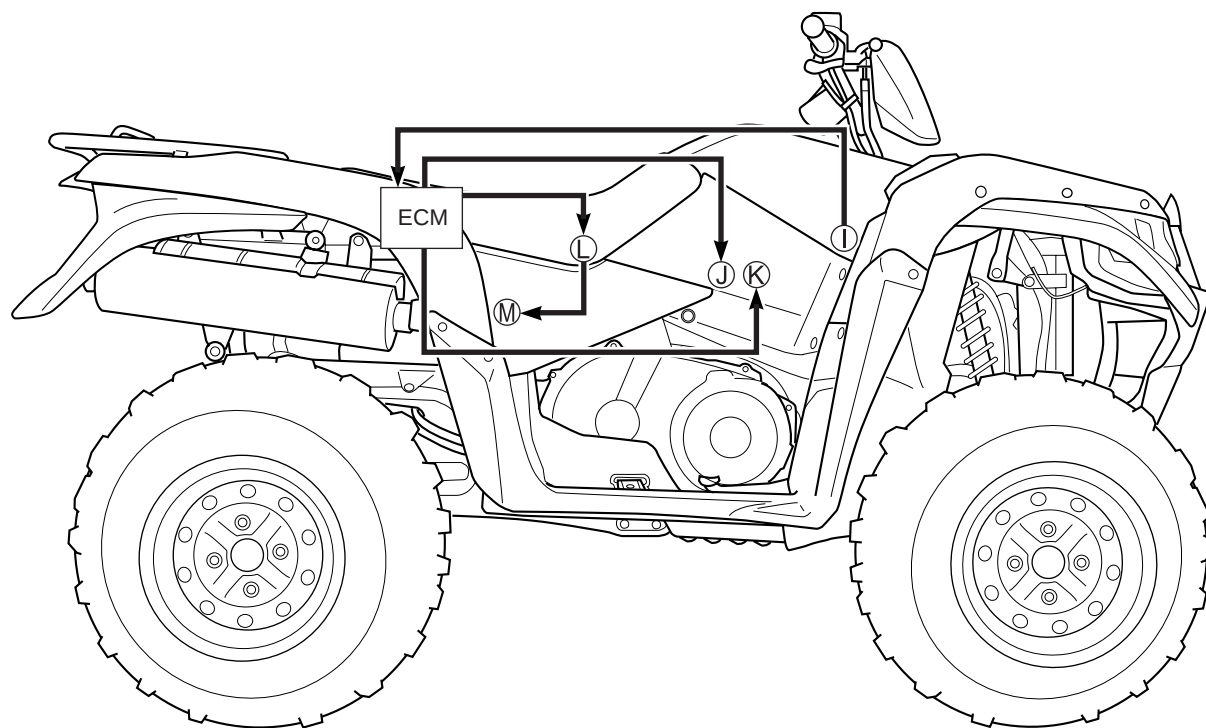
FI SYSTEM PARTS LOCATION



- | | |
|--|--|
| Ⓐ Speed sensor | Ⓔ Crankshaft position sensor (CKPS) |
| Ⓑ Throttle position sensor (TPS) | Ⓕ Combination meter |
| Ⓒ Intake air pressure sensor (IAPS) | Ⓖ Diff-lock relay |
| Ⓓ Intake air temperature sensor (IATS) | Ⓗ Engine coolant temperature sensor (ECTS) |

NOTE:

Ⓑ, Ⓒ and Ⓓ devices are combined into one.



① Tip-over sensor (TOS)

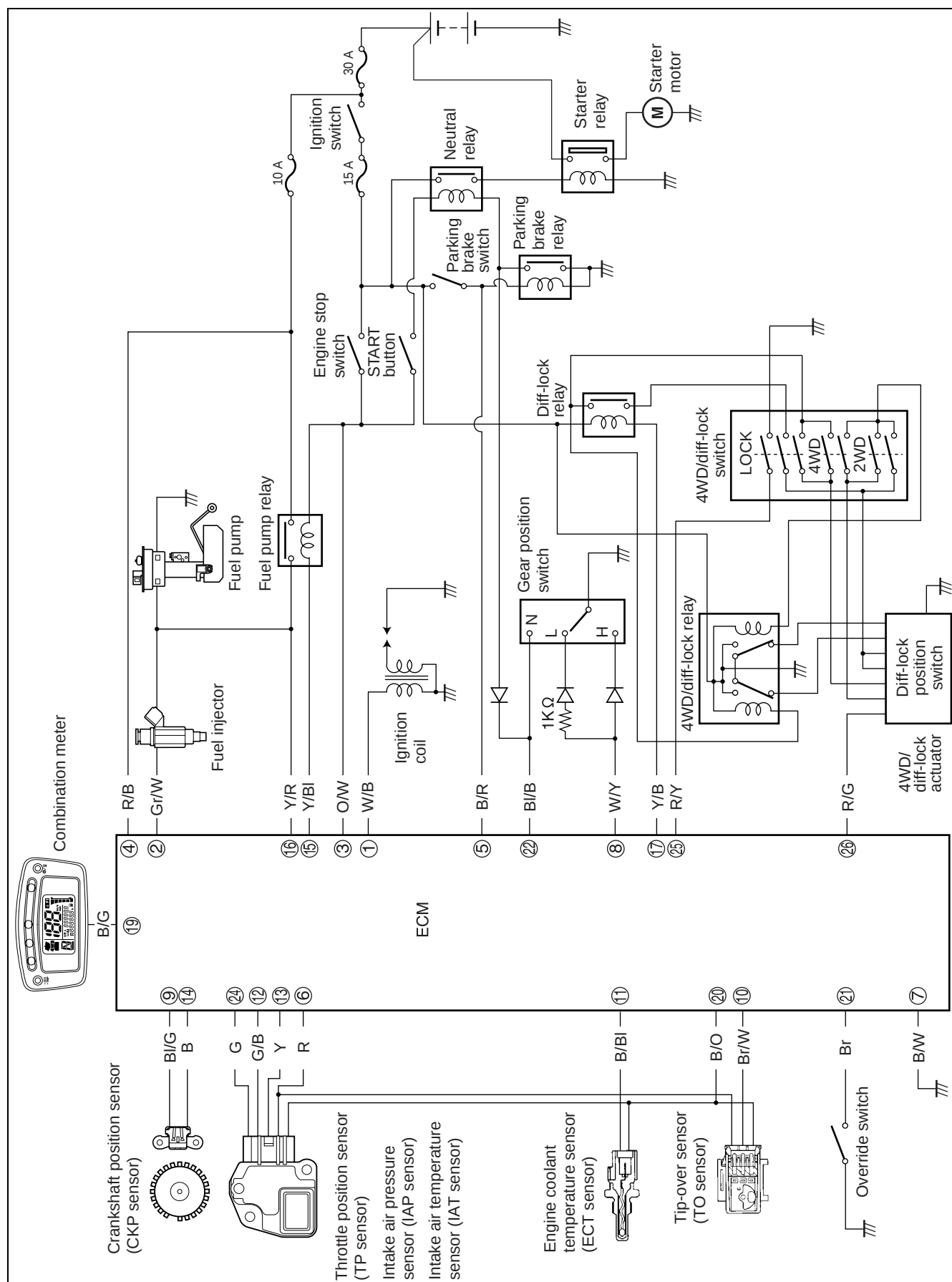
② Fuel injector

③ Ignition coil

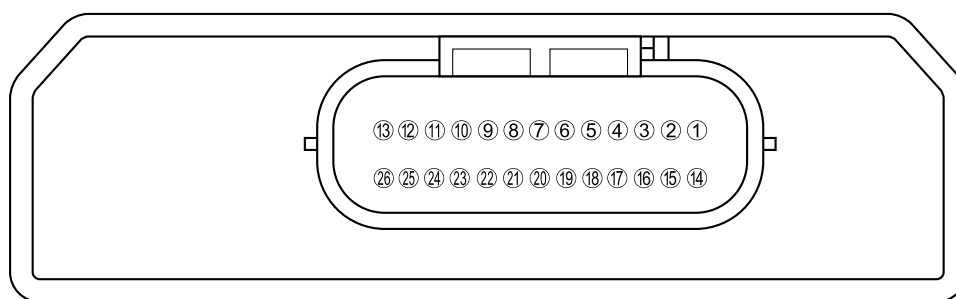
④ Fuel pump relay (FP RELAY)

⑤ Fuel pump (FP)

FI SYSTEM WIRING DIAGRAM



ECM TERMINAL



TERMINAL NO.	CIRCUIT	TERMINAL NO.	CIRCUIT
①	Ignition coil (IG1)	⑭	CKP sensor signal (CKP-)
②	Fuel injector (#11)	⑮	Fuel pump relay (FP Relay)
③	Power source (+B)	⑯	Injector power voltage (VM)
④	Back up power (BATT)	⑰	Diff-lock relay (DL Relay)
⑤	Brake switch (BRK)	⑱	Serial data for self-diagnosis (SDL)
⑥	Power source for sensors (VCC)	⑲	Serial data for combination meter (TECH)
⑦	ECM ground (E1)	⑳	Sensor ground (E2)
⑧	Forward sensor signal (FOW)	㉑	Override switch (OVR)
⑨	CKP sensor signal (CKP+)	㉒	Neutral switch (NT)
⑩	TO sensor signal (TO)	㉓	Test switch (TS)
⑪	ECT sensor signal (ECT)	㉔	IAT sensor signal (IAT)
⑫	IAP sensor signal (IAP)	㉕	Diff-lock switch (DL)
⑬	TP sensor signal (TP)	㉖	Diff-lock position sensor signal (DLP)

SELF-DIAGNOSIS FUNCTION

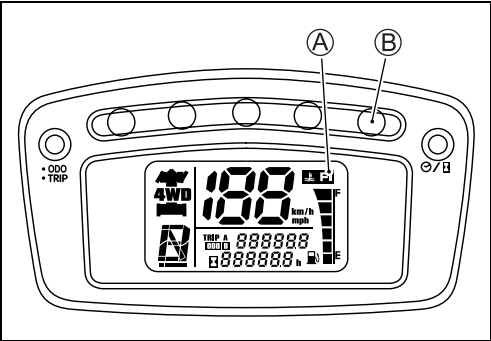
The self-diagnosis function is incorporated in the ECM. The function has two modes, “User mode” and “Dealer mode”. The user can only be notified by the LCD (FI) panel and LED (FI light). To check the function of the individual FI system devices, the dealer mode is prepared. In this check, the special tool is necessary to read the code of the malfunction items.

USER MODE

MALFUNCTION	LCD (FI) ① INDICATION	FI LIGHT ② INDICATION
Engine can start	“FI” letter. *1	FI light turns ON.
Engine can not start	“FI” letter indicates and flickers. *2	FI light turns ON and blinks.

*1
When one of the signals is not received by ECM, the fail-safe circuit works and injection is not stopped. In this case, “FI” is indicated in the LCD panel and vehicle can run.

*2
The injection signal is stopped, when the crankshaft position sensor signal, tip-over sensor signal, ignition signal, injector signal, fuel pump relay signal or ignition switch signal is not sent to ECM. In this case, “FI” is indicated in the LCD panel. Vehicle does not run.



“CHEC”: The LCD panel indicates “CHEC” when no communication signal from the ECM is received for 3 seconds.

For Example

- : The ignition switch is turned ON, and the engine stop switch is turned OFF. In this case, the combination meter does not receive any signal from ECM, and the panel indicates “CHEC”.
If CHEC is indicated, the LCD does not indicate the trouble code. It is necessary to check the wiring harness between ECM and combination meter couplers.
The possible cause of this indication is as follows;
Engine stop switch is in OFF position. Ignition fuse is burnt.

NOTE:

Until starting the engine, the FI light turns ON.

The FI light is also turned ON when engine temperature is high.

DEALER MODE

The defective function is memorized in the computer. Use the special tool's coupler to connect to the dealer mode coupler. The memorized malfunction code is displayed on LCD (DISPLAY) panel. Malfunction means that the ECM does not receive signal from the devices. These affected devices are indicated in the code form.

 **09930-82720: Mode select switch**



CAUTION

Before checking the malfunction code, do not disconnect the ECM lead wire couplers. If the couplers from the ECM are disconnected, the malfunction code memory is erased and the malfunction code can not be checked.

MALFUNCTION	LCD (DISPLAY) INDICATION	FI LIGHT INDICATION	INDICATION MODE
"NO"	C00	—	—
"YES"	C**code is indicated from small numeral to large one.	FI light turns OFF.	For each 2 sec., code is indicated.

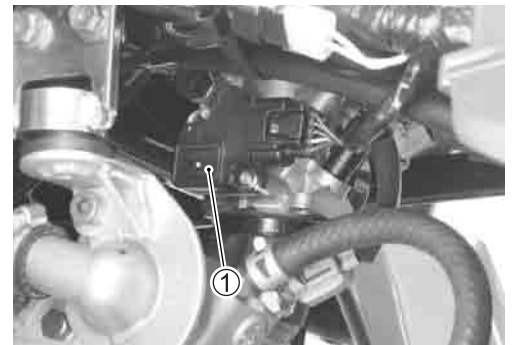
CODE	MALFUNCTION PART	REMARKS
C00	None	No defective part
C12	Crankshaft position sensor (CKPS)	Pick-up coil signal, signal generator
C13	Intake air pressure sensor (IAPS)	
C14	Throttle position sensor (TPS)	
C15	Engine coolant temperature sensor (ECTS)	
C20	Diff-lock relay	
C21	Intake air temperature sensor (IATS)	
C23	Tip-over sensor (TOS)	
C24	Ignition signal (IG coil)	
C32	Fuel injector signal (FI)	
C41	Fuel pump control system (FP control system)	Fuel pump, Fuel pump relay

In the LCD (DISPLAY) panel, the malfunction code is indicated from small code to large code.

TPS ADJUSTMENT

CAUTION

The TP sensor is preset at the factory, therefore never remove the TP/IAP/ITP sensor ①.



FAIL-SAFE FUNCTION

FI system is provided with fail-safe function to allow the engine to start and the vehicle to run in a minimum performance necessary even under malfunction condition.

ITEM	FAIL-SAFE MODE	STARTING ABILITY	RUNNING ABILITY
IAP sensor	Intake air pressure is fixed to 760 mmHg.	"YES"	"YES"
TP sensor	The throttle opening is fixed to full open position. Ignition timing is also fixed.	"YES"	"YES"
ECT sensor	Engine coolant temperature value is fixed to 80 °C (176 °F).	"YES"	"YES"
IAT sensor	Intake air temperature value is fixed to 40 °C (104 °F).	"YES"	"YES"
Diff-lock relay	Differential position signal is fixed to neutral gear.	"YES"	"YES"

The engine can start and can run even if the above signal is not received from each sensor. But, the engine running condition is not complete, providing only emergency help (by fail-safe circuit). In this case, it is necessary to bring the vehicle to the workshop for complete repair.

FI SYSTEM TROUBLESHOOTING

CUSTOMER COMPLAINT ANALYSIS

Record details of the problem (failure, complaint) and how it occurred as described by the customer. For this purpose, use of an inspection form such as below will facilitate collecting information required for proper analysis and diagnosis.

EXAMPLE: CUSTOMER PROBLEM INSPECTION FORM

User name:	Model:	VIN:	
Date of issue:	Date Reg.	Date of problem:	Mileage:

Malfunction indicator lamp condition (LED)	☐ Always ON ☐ Sometimes ON ☐ Always OFF ☐ Good condition
Malfunction display/code (LCD)	User mode: ☐ No display ☐ Malfunction display ()
	Dealer mode: ☐ No code ☐ Malfunction code ()

PROBLEM SYMPTOMS	
☐ Difficult Starting ☐ No cranking ☐ No initial combustion ☐ No combustion ☐ Poor starting at (☐ cold ☐ warm ☐ always) ☐ Other _____	☐ Poor Driveability ☐ Hesitation on acceleration ☐ Back fire/ ☐ After fire ☐ Lack of power ☐ Surging ☐ Abnormal knocking ☐ Engine rpm jumps briefly ☐ Other _____
☐ Poor Idling ☐ Poor fast idle ☐ Abnormal idling speed (☐ High ☐ Low) (r/min) ☐ Unstable ☐ Hunting (r/min. to r/min) ☐ Other _____	☐ Engine Stall when ☐ Immediately after start ☐ Throttle valve is opened ☐ Throttle valve is closed ☐ Load is applied ☐ Other _____
☐ OTHERS:	

VEHICLE/ENVIRONMENTAL CONDITION WHEN PROBLEM OCCURS	
Environmental condition	
Weather	☐ Fair ☐ Cloudy ☐ Rain ☐ Snow ☐ Always ☐ Other
Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold (°F/ °C) ☐ Always
Frequency	☐ Always ☐ Sometimes (times/ day, month) ☐ Only once
	☐ Under certain condition
Road	☐ Mountainous (☐ Uphill ☐ Downhill) ☐ Gravel ☐ Other
Vehicle condition	
Engine condition	☐ Cold ☐ Warming up phase ☐ Warmed up ☐ Always ☐ Other at starting ☐ Immediately after start ☐ Racing without load ☐ Engine speed (r/min)
Vehicle condition	During driving: ☐ Constant speed ☐ Accelerating ☐ Decelerating ☐ Right hand corner ☐ Left hand corner ☐ At stop ☐ Vehicle speed when problem occurs (km/h, Mile/h) ☐ Other _____

NOTE:

The above form is a standard sample. The form should be modified according to condition and characteristics of each market.

VISUAL INSPECTION

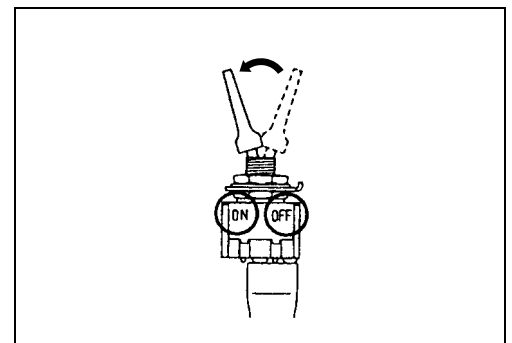
- Prior to diagnosis using the mode select switch or SDS, perform the following visual inspections. The reason for visual inspection is that mechanical failures (such as oil leakage) cannot be displayed on the screen with the use of mode select switch or SDS.
- * Engine oil level and leakage. (☞ 2-9)
- * Engine coolant level and leakage. (☞ 2-14)
- * Fuel level and leakage. (☞ 2-8)
- * Clogged air cleaner element. (☞ 2-3)
- * Battery condition. (☞ 9-40)
- * Throttle cable play. (☞ 2-13)
- * Burnt LCD (FI) panel and LED (FI light) operation (☞ 5-15 and 9-30).
- * Each warning light operation. (☞ 9-30)
- * Exhaust gas leakage and noise. (☞ 2-5)
- * Each coupler disconnection.
- * Clogged radiator core. (☞ 7-5)

SELF-DIAGNOSTIC PROCEDURES

NOTE:

- * Don't disconnect the coupler from ECM, the battery cable from the battery, or main fuse from the fuse box before confirming the malfunction code (self-diagnostic trouble code) stored in the memory. Such disconnection will erase the memorized information in ECM memory.
- * Malfunction code stored in ECM memory can be checked by the special tool.
- * Before checking malfunction code, read SELF-DIAGNOSIS FUNCTION "USER MODE and DEALER MODE" (☞ 5-15) carefully to have good understanding as to what functions are available and how to use it.
- * Be sure to read "PRECAUTIONS IN SERVICING" (☞ 5-2) before inspection and observe what is written there.
- Remove the seat. (☞ 8-6)
- Connect the special tool to the dealer mode coupler at the wiring harness, and start the engine or crank the engine for more than 4 seconds.
- Turn the special tool's switch to ON and check the malfunction code to determine the malfunction part.

 **09930-82720: Mode select switch**



SELF-DIAGNOSIS RESET PROCEDURE

- After repairing the trouble, turn the ignition switch to OFF and turn to ON again.
- If the malfunction code indicates (C00), the malfunction is cleared.
- Disconnect the special tool from the dealer mode coupler.

NOTE:

- * Even though the malfunction code (C00) is indicated, the previous malfunction history code still remains stored in the ECM. Therefore, erase the history code memorized in the ECM using SDS.
- * The malfunction code is memorized in the ECM also when the wire coupler of any sensor is disconnected. Therefore, when a wire coupler has been disconnected at the time of diagnosis, erase the stored malfunction history code using SDS.



USE OF SDS DIAGNOSTIC PROCEDURES

NOTE:

- * Don't disconnect the coupler from ECM, the battery cable from the battery, or main fuse from the fuse box before confirming the malfunction code (self-diagnostic trouble code) stored in memory. Such disconnection will erase the memorized information in ECM memory.
- * Malfunction code stored in ECM memory can be checked by the SDS.
- * Be sure to read "PRECAUTIONS IN SERVICING" (⌘ 5-2) before inspection and observe what is written there.

- Remove the seat. (⌘ 8-6)
- Set up the SDS tool. (Refer to the SDS operation manual for further details)
- Read the DTC (Diagnostic Trouble Code) and "Show data when trouble" (displayed data at the time of DTC) according to instructions displayed on SDS.

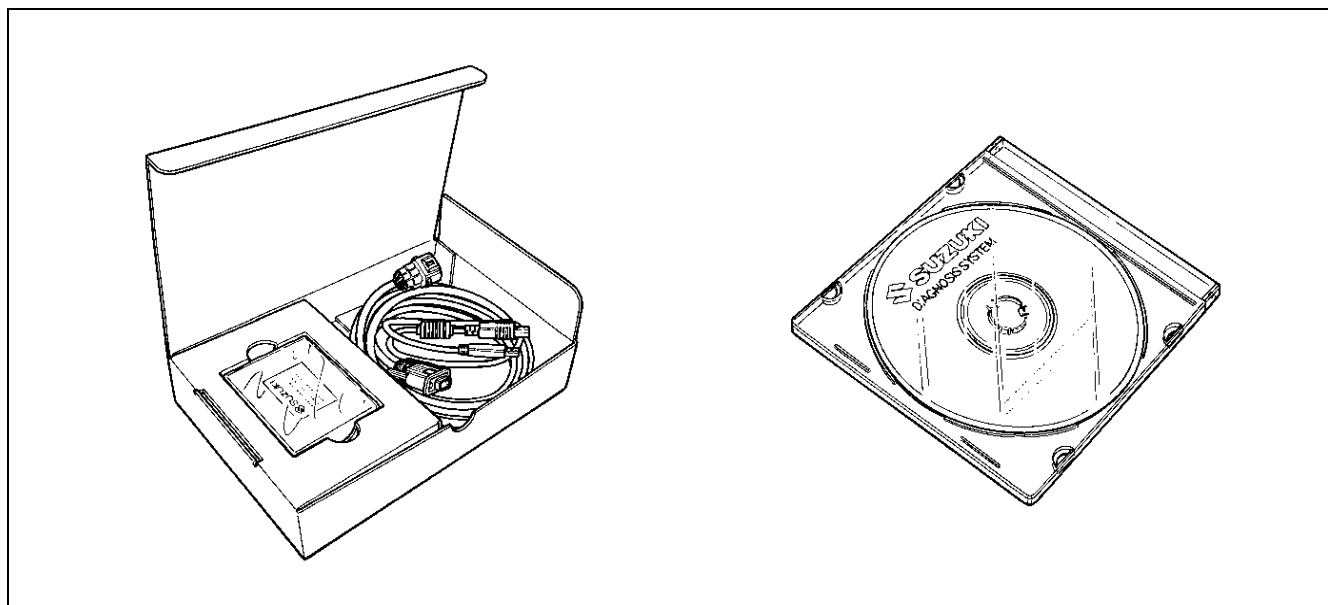


- Not only is SDS used for detecting Diagnostic Trouble Codes but also for reproducing and checking on screen the failure condition as described by customers using the trigger.
- How to use trigger. (Refer to the SDS operation manual for further details)



09904-41010: SDS Set

99565-01010-009: CD-ROM Ver.9

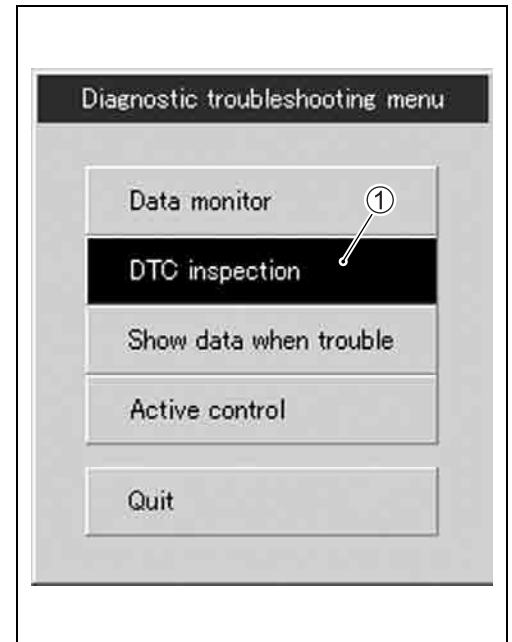


USE OF SDS DIAGNOSIS RESET PROCEDURE

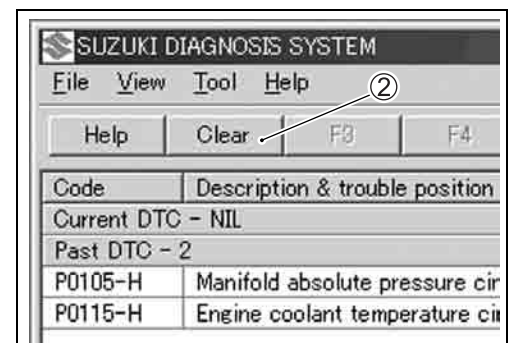
- After repairing the trouble, turn the ignition switch to OFF and turn to ON again.
- Click the “DTC inspection” button ①.
- Check the DTC.
- The previous malfunction history code (Past DTC) still remains stored in the ECM. Therefore, erase the history code memorized in the ECM using SDS tool.

NOTE:

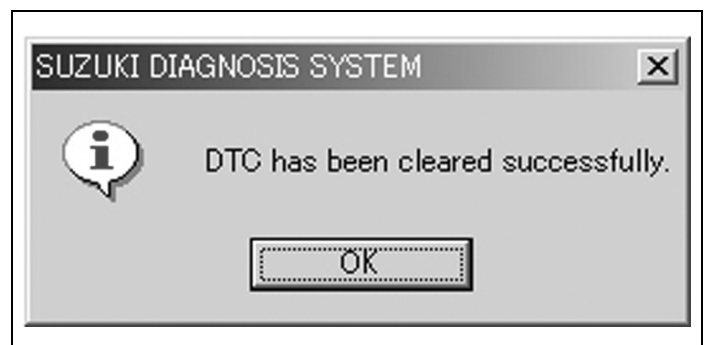
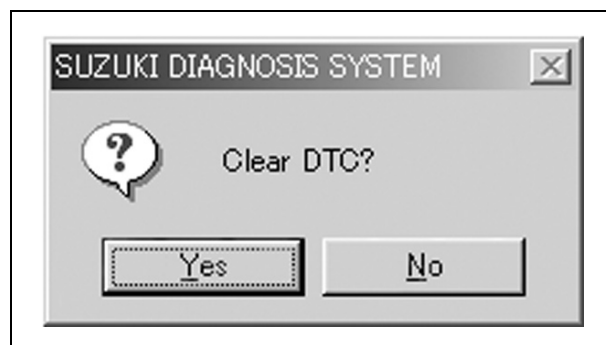
The malfunction code is memorized in the ECM also when the wire coupler of any sensor is disconnected. Therefore, when a wire coupler has been disconnected at the time of diagnosis, erase the stored malfunction history code using SDS.



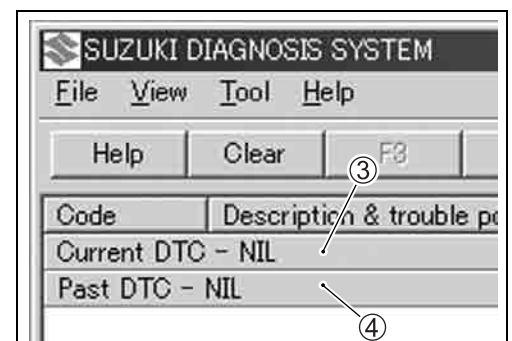
- Click “Clear” ② to delete history code (Past DTC).



- Follow the displayed instructions.



- Check that both “Current DTC” ③ and “Past DTC” ④ are deleted (NIL).



SHOW DATA WHEN TROUBLE (DISPLAYING DATA AT THE TIME OF DTC)

ECM stores the engine and driving conditions (in the form of data as shown in the figure) at the moment of the detection of a malfunction in its memory. This data is called “Show data when trouble”.

Therefore, it is possible to know engine and driving conditions (e.g., whether the engine was warm or not, where the vehicle was running or stopped) when a malfunction was detected by checking the “Show data when trouble”. This “Show data when trouble” function can record the maximum of two Diagnostic Trouble Codes in the ECM.

Also, ECM has a function to store each “Show data when trouble” for two different malfunctions in the order as the malfunction is detected. Utilizing this function, it is possible to know the order of malfunctions that have been detected. Its use is helpful when rechecking or diagnosing a trouble.

Failure #1

P0110-H Intake air temperature circuit malfunction

Item	Pre-detect	Detect poi...	Post-dete...
Engine speed	1082	1327	1175
Throttle position	32.4	32.4	32.4
Manifold absolute pressure	98.1	93.5	98.1
Engine coolant / oil temperature	37.8	37.8	37.8
Gear position	N	N	N

- Click “Show data when trouble” ① to display the data. By clicking the drop down button ②, either “Failure #1” or “Failure #2” can be selected.

Diagnostic troubleshooting menu

- Data monitor
- DTC inspection
- Show data when trouble** ①
- Active control
- Quit

Failure #2

P0115-H Engine coolant temperature circuit malfu

Item	Pre-
Engine speed	
Throttle position	
Manifold absolute pressure	
Engine coolant / oil temperature	
Gear position	

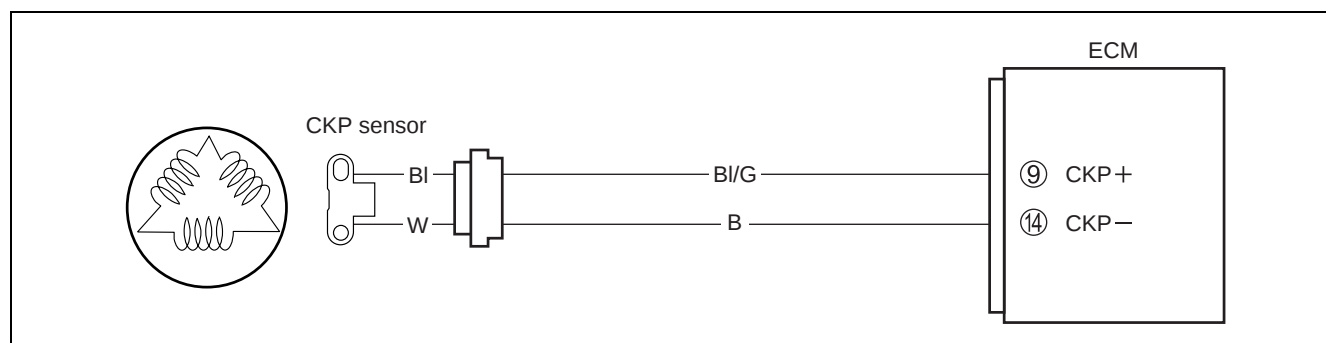
MALFUNCTION CODE AND DEFECTIVE CONDITION

DTC No.		DETECTED ITEM	DETECTED FAILURE CONDITION	CHECK FOR
C00		NO FAULT	—————	—————
C12		CKP sensor	The signal does not reach ECM for 3 sec. or more, after receiving the starter signal.	CKP sensor lead wire/coupler and mechanical parts. CKP sensor, lead wire/coupler connection
P0335				
C13		IAP sensor	The sensor should produce following voltage. 0.5 V < sensor voltage ≤ 4.85 V In other than the above value, C13 (P0105) is indicated.	IAP sensor, lead wire/coupler connection.
P0105	H		Sensor voltage is higher than specified value.	IAP sensor circuit open or shorted to VCC or ground circuit open.
	L		Sensor voltage is lower than specified value.	IAP sensor circuit shorted to ground or VCC circuit open.
C14		TP sensor	The sensor should produce following voltage. 0.2 V < sensor voltage ≤ 4.8 V In other than the above value, C14 (P0120) is indicated.	TP sensor, lead wire/coupler connection.
P0120	H		Sensor voltage is higher than specified value.	TP sensor circuit shorted to VCC or ground circuit open.
	L		Sensor voltage is lower than specified value.	TP sensor circuit open or shorted to ground or VCC circuit open.
C15		ECT sensor	The sensor voltage should be the following. 0.15 V < sensor voltage ≤ 4.85 V In other than the above value, C15 (P0115) is indicated.	ECT sensor, lead wire/coupler connection.
P0115	H		Sensor voltage is higher than specified value.	ECT sensor circuit open or ground circuit open.
	L		Sensor voltage is lower than specified value.	ECT sensor circuit shorted to ground.
C20		Diff-lock relay	No voltage is applied to 4WD/diff-lock actuator, although ignition switch is turned ON, or voltage is applied to 4WD/diff-lock actuator, although ignition switch is turned OFF. In this case, the code C20 (P1752) is indicated.	Diff-lock relay circuit open or shorted to ground.
P1752				

DTC No.		DETECTED ITEM	DETECTED FAILURE CONDITION	CHECK FOR
C21		IAT sensor	The sensor voltage should be the following. 0.15 V < sensor voltage ≤ 4.85 V In other than the above value, C21 (P0110) is indicated.	IAT sensor, lead wire/coupler connection.
P0110	H		Sensor voltage is higher than specified value.	IAT sensor circuit open or ground circuit open.
	L		Sensor voltage is lower than specified value.	IAT sensor circuit shorted to ground.
C23		TO sensor	The sensor voltage should be the following for 2 sec. and more, after ignition switch is turned ON. 0.2 V < sensor voltage ≤ 4.8 V In other than the above value, C23 (P1651) is indicated.	TO sensor, lead wire/coupler connection.
P1651	H		Sensor voltage is higher than specified value.	TO sensor circuit shorted to VCC or ground circuit open.
	L		Sensor voltage is lower than specified value.	TO sensor circuit open or shorted to ground or VCC circuit open.
C24		Ignition signal	CKP sensor signal is produced, but signal from ignition coil is interrupted 8 times or more continuously. In this case, the code C24 (P0351) is indicated.	Ignition coil, lead wire/coupler connection, power supply from the battery.
P0351				
C32		Fuel injector	CKP sensor signal is produced, but fuel injector signal is interrupted 4 times or more continuously. In this case, the code C32 (P0201) is indicated.	Fuel injector, lead wire/coupler connection, power supply to the injector.
P0201				
C41		Fuel pump relay	No voltage is applied to the fuel pump, although fuel pump relay is turned ON, or voltage is applied to fuel pump, although fuel pump relay is turned OFF. In this case, the code C41 (P0230) is indicated.	Fuel pump relay, lead wire/coupler connection, power source to the fuel pump relay and fuel injector.
P0230	H		More than 8 V is applied to the injector and fuel pump relay is turned OFF.	Fuel pump relay switch circuit shorted to power source. Fuel pump relay (switch side).
	L		Less than 0.3 V is applied to the injector and fuel pump relay is turned ON.	Fuel pump relay circuit open or short. Fuel pump relay (coil side).

“C12” (P0335) CKP SENSOR CIRCUIT MALFUNCTION

DETECTED CONDITION	POSSIBLE CAUSE
The signal does not reach ECM for 3 sec. or more, after receiving the starter signal.	• Metal particles or foreign material being stuck on the CKP sensor and rotor tip. • CKP sensor circuit open or short. • CKP sensor malfunction. • ECM malfunction.

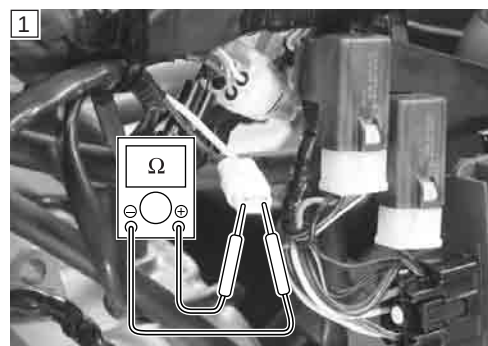
**INSPECTION****Step 1**

- 1) Remove the rear fender. (8-15)
- 2) Check the CKP sensor coupler ① for loose or poor contacts.
If OK, then measure the CKP sensor resistance.



- 3) Disconnect the CKP sensor coupler and measure the resistance.

DATA CKP sensor resistance: 200 – 250 Ω
(Blue – White)



4) If OK, then check the continuity between each terminal and ground.

DATA CKP sensor continuity: $\infty \Omega$ (Infinity)
(Blue – Ground)
(White – Ground)

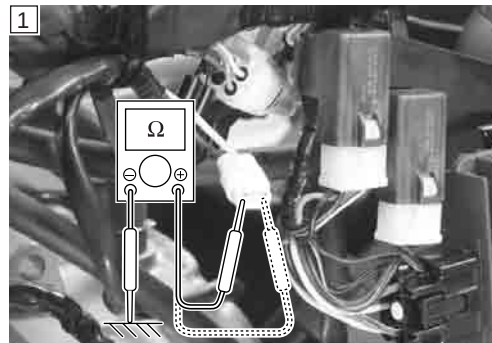
TOOL 09900-25008: Multi-circuit tester set

Tester knob indication: Resistance (Ω)

Are the resistance and continuity OK?

YES	Go to step 2.
NO	Replace the CKP sensor with a new one.

5) After repairing the trouble, clear the DTC using SDS tool.
( 5-23)



Step 2

- 1) Crank the engine a few seconds with the starter motor, and measure the CKP sensor peak voltage at the coupler.
- 2) Repeat the above test procedure a few times and measure the highest peak voltage.

DATA CKP sensor peak voltage: **5.0 V and more**
(+ Blue – – White)

① Peak volt adaptor

TOOL 09900-25008: Multi-circuit tester set

Tester knob indication: Voltage (---)

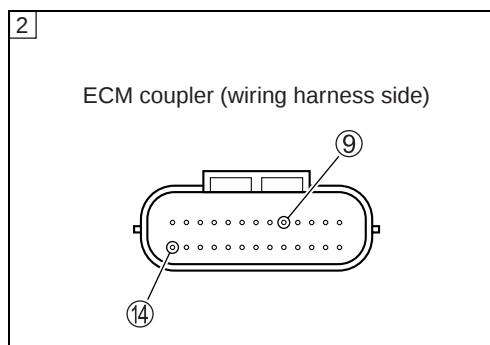
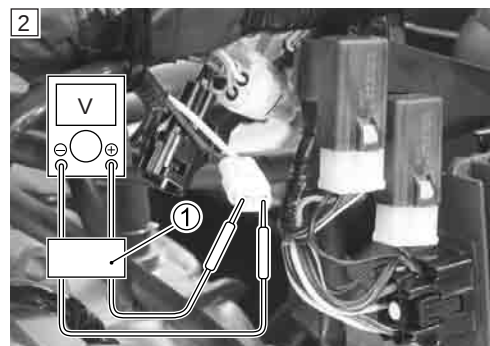
Is the voltage OK?

YES	• Bl/G or B wire open or shorted to ground. • Loose or poor contacts on the CKP sensor coupler or ECM coupler. (terminal ⑨ or ⑭) • If wire and connection are OK, intermittent trouble or faulty ECM. • Recheck each terminal and wire harness for open circuit and poor connection. • Replace the ECM with a known good one, and inspect it again.
NO	• Inspect that metal particles or foreign material stuck on the CKP sensor and rotor tip. • If there are no metal particles and foreign material, then replace the CKP sensor with a new one.

CAUTION

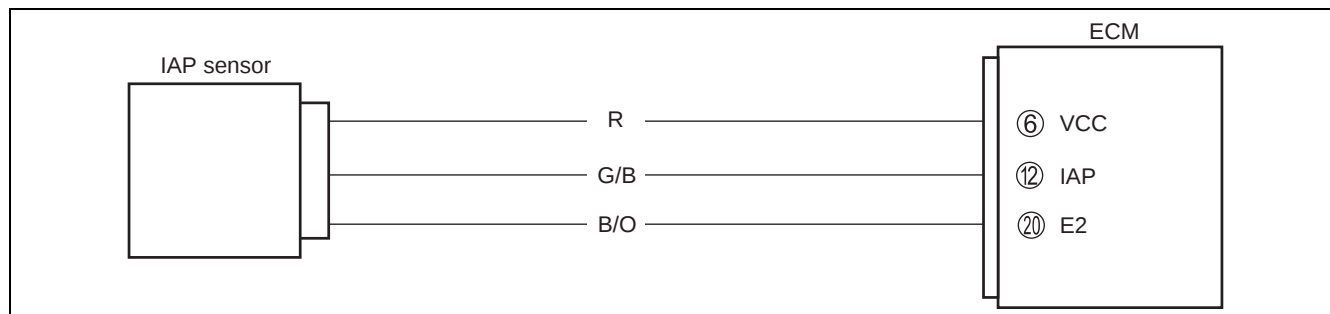
When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

- 3) After repairing the trouble, clear the DTC using SDS tool.
( 5-23)



“C13” (P0105-H/L) IAP SENSOR CIRCUIT MALFUNCTION

DETECTED CONDITION		POSSIBLE CAUSE
C13	IAP sensor voltage is not within the following value. $0.5\text{ V} < \text{Sensor voltage} \leq 4.85\text{ V}$ NOTE: <i>Note that atmospheric pressure varies depending on weather conditions as well as altitude.</i> <i>Take that into consideration when inspecting voltage.</i>	• Clogged vacuum passage between throttle body and IAP sensor. • Air being drawn from vacuum passage between throttle body and IAP sensor. • IAP sensor circuit open or shorted to ground. • IAP sensor malfunction. • ECM malfunction.
P0105	H	Sensor voltage is higher than specified value.
	L	Sensor voltage is lower than specified value.

**NOTE:**

IAP sensor is incorporated in the TP sensor/IAT sensor.

INSPECTION**Step 1 (When indicating C13:)**

- 1) Remove the left side cover. (☞ 8-9)
- 2) Turn the ignition switch to OFF.
- 3) Check the IAP sensor coupler for loose or poor contacts.
If OK, then measure the IAP sensor input voltage.



- 4) Disconnect the IAP sensor coupler.
- 5) Turn the ignition switch to ON.
- 6) Measure the voltage at the Red wire (A) and ground.
- 7) If OK, then measure the voltage at the Red wire (A) and B/O wire (C).

DATA IAP sensor input voltage: 4.5 – 5.5 V
(+ Red – – Ground)
(+ Red – – B/O)

TOOL 09900-25008: Multi-circuit tester set

Tester knob indication: Voltage (---)

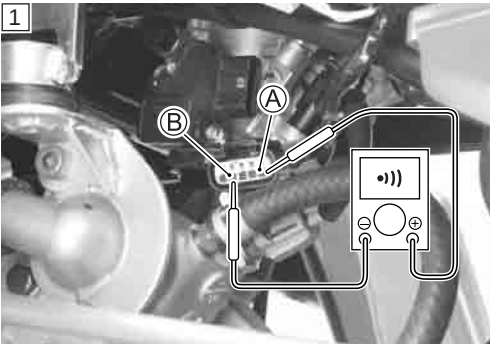
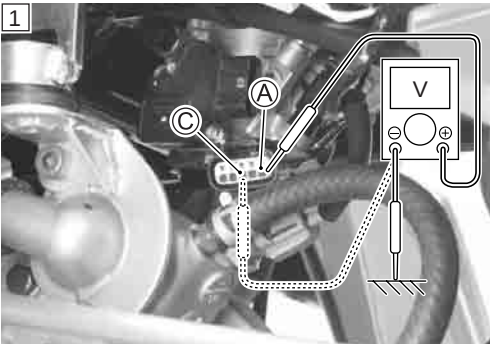
Is the voltage OK?

YES	Go to Step 2.
NO	• Loose or poor contacts on the ECM coupler. (terminal ⑥ or ⑳) • Open or short circuit in the Red wire or B/O wire.

Step 1 (When indicating P0105-H:)

- 1) Remove the left side cover. (➡ 8-9)
- 2) Turn the ignition switch to OFF.
- 3) Check the IAP sensor coupler for loose or poor contacts.
If OK, then check the IAP sensor lead wire continuity.

- 4) Disconnect the IAP sensor coupler.
- 5) Check the continuity between Red wire (A) and G/B wire (B).
If the sound is not heard from the tester, the circuit condition is OK.



- 6) Disconnect the ECM coupler.
- 7) Check the continuity between G/B wire (B) and terminal (12).
- 8) Also, then check the continuity between B/O wire (C) and terminal (20).

DATA IAPS lead wire continuity: Continuity (•••)

TOOL 09900-25008: Multi-circuit tester set
09900-25009: Needle pointed probe set

Tester knob indication: Continuity test (•••)

CAUTION

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

Is the continuity OK?

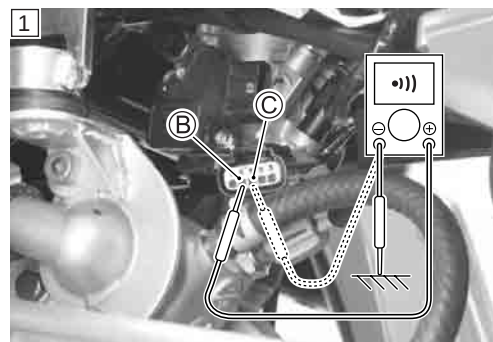
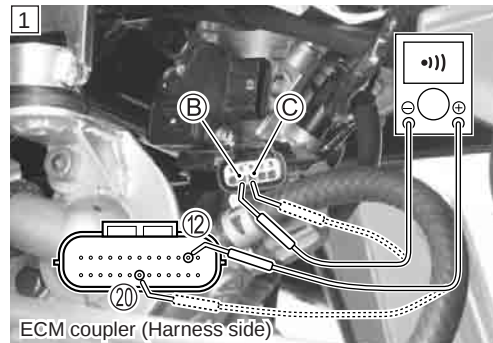
YES	Go to Step 2.
NO	G/B wire open or shorted to VCC or B/O wire open.

- 9) After repairing the trouble, clear the DTC using SDS tool.
( 5-23)

Step 1 (When indicating P0105-L:)

- 1) Remove the left side cover. ( 8-9)
- 2) Turn the ignition switch to OFF.
- 3) Check the IAP sensor coupler for loose or poor contacts.
If OK, then check the IAP sensor lead wire continuity.

- 4) Disconnect the IAP sensor coupler.
- 5) Check the continuity between G/B wire (B) and ground.
- 6) Also, check the continuity between G/B wire (B) and B/O wire (C). If the sound is not heard from the tester, the circuit condition is OK.



- 7) Disconnect the ECM coupler.
 8) Check the continuity between Red wire (A) and terminal (6).

DATA IAPS lead wire continuity: Continuity (••••)

TOOL 09900-25008: Multi-circuit tester set
 09900-25009: Needle pointed probe set

Tester knob indication: Continuity test (••••)

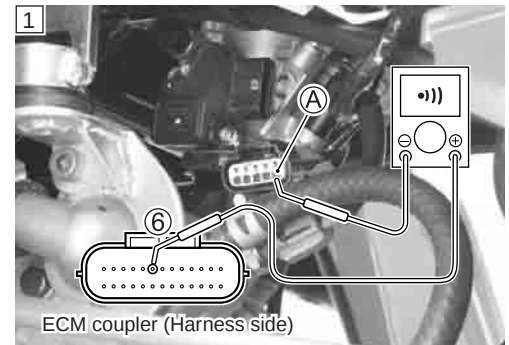
CAUTION

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

Is the continuity OK?

YES	Go to Step 1 (4-31) and go to Step 2.
NO	Red wire open or G/B wire shorted to ground

- 9) After repairing the trouble, clear the DTC using SDS tool.
 (5-23)



Step 2

- 1) Connect the IAP sensor coupler and ECM coupler.
- 2) Insert the needle pointed probes to the lead wire coupler.
- 3) Start the engine at idle speed and measure the IAP sensor output voltage at the wire side coupler (between G/B wire ⑥ and B/O wire ②).

DATA IAP sensor output voltage: 2.17 – 3.15 V at idle speed
(+ G/B – - B/O)

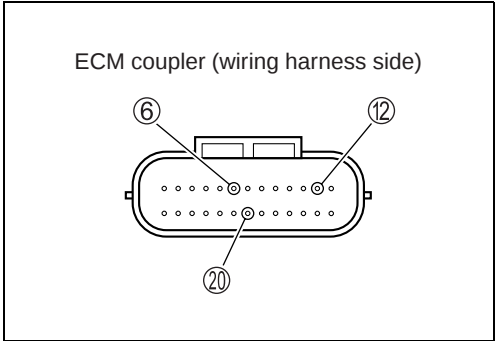
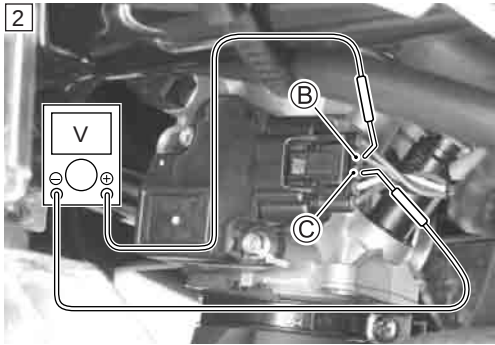
- TOOL** 09900-25008: Multi-circuit tester set
- 09900-25009: Needle pointed probe set

Tester knob indication: Voltage (V)

Is the voltage OK?

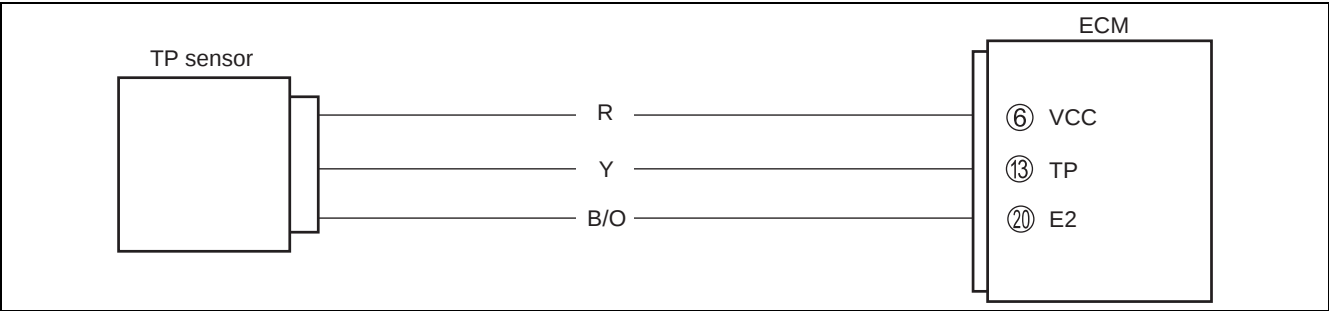
YES	• R, G/B or B/O wire open or shorted to ground, or poor ⑥, ⑫ or ⑳ connection. • If wire and connection are OK, intermittent trouble or faulty ECM. • Recheck each terminal and wire harness for open circuit and poor connection. • Replace the ECM with a known good one, and inspect it again. • Replace IAP sensor (throttle body assembly) with a new one.
NO	• Open or short circuit in the G/B wire. • If wire is OK, replace the IAP sensor (throttle body assembly) with a new one.

- 4) After repairing the trouble, clear the DTC using SDS tool.
(5-23)



“C14” (P0120-H/L) TP SENSOR CIRCUIT MALFUNCTION

DETECTED CONDITION		POSSIBLE CAUSE
C14	Output voltage is not within the following value. Difference between actual throttle opening and opening calculated by ECM is larger than specified value. $0.2\text{ V} < \text{Sensor voltage} \leq 4.8\text{ V}$	• TP sensor circuit open or short. • TP sensor malfunction. • ECM malfunction.
P0120	H	• TP sensor circuit shorted to VCC or ground circuit open. • TP sensor circuit open or shorted to ground or VCC circuit open.
	L	

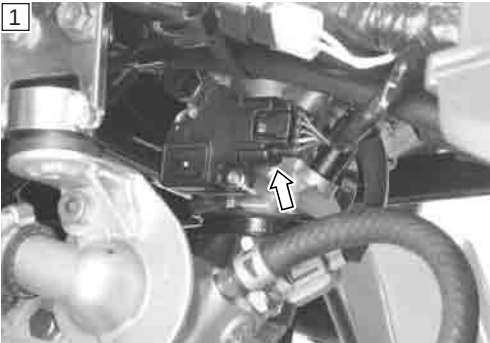


NOTE:
TP sensor is incorporated in the IAP sensor/IAT sensor.

INSPECTION

Step 1 (When indicating C14:)

- 1) Remove the left side cover. (👉 8-9)
- 2) Turn the ignition switch to OFF.
- 3) Check the TP sensor coupler for loose or poor contacts.
If OK, then measure the TP sensor input voltage.



- 4) Disconnect the TP sensor coupler.
- 5) Turn the ignition switch to ON.
- 6) Measure the voltage at the Red wire (A) and ground.
- 7) If OK, then measure the voltage at the Red wire (A) and B/O wire (C).

DATA TP sensor input voltage: 4.5 – 5.5 V
(+ Red – (–) Ground)
(+ Red – (–) B/O)

TOOL 09900-25008: Multi-circuit tester set

Tester knob indication: Voltage (V)

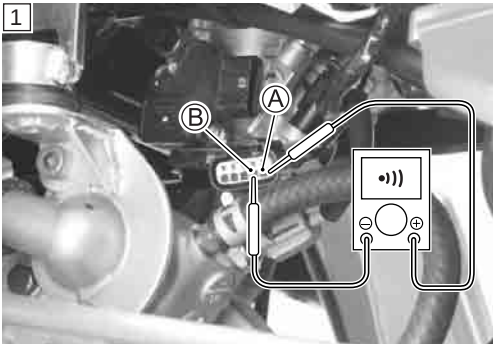
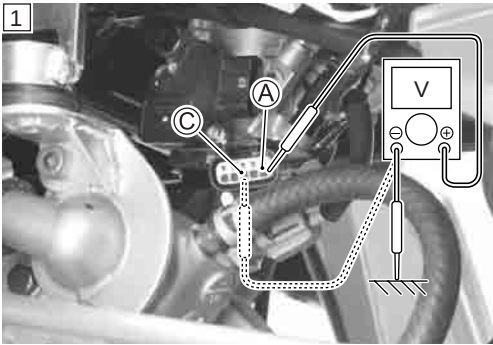
Is the voltage OK?

YES	Go to Step 2.
NO	• Loose or poor contacts on the ECM coupler. (terminal (6) or (20)) • Open or short circuit in the Red wire or B/O wire.

Step 1 (When indicating P0120-H:)

- 1) Remove the left side cover. (8-9)
- 2) Turn the ignition switch to OFF.
- 3) Check the TP sensor coupler for loose or poor contacts.
If OK, then check the TP sensor lead wire continuity.

- 4) Disconnect the TP sensor coupler.
- 5) Check the continuity between Red wire (A) and Yellow wire (B). If sound is not heard from the tester, the circuit condition is OK.



- 6) Disconnect the ECM coupler.
- 7) Check the continuity between B/O wire ③ and terminal ⑳.

DATA TPS lead wire continuity: Continuity (•••)

TOOL 09900-25008: Multi-circuit tester set
09900-25009: Needle pointed probe set

Tester knob indication: Continuity test (•••)

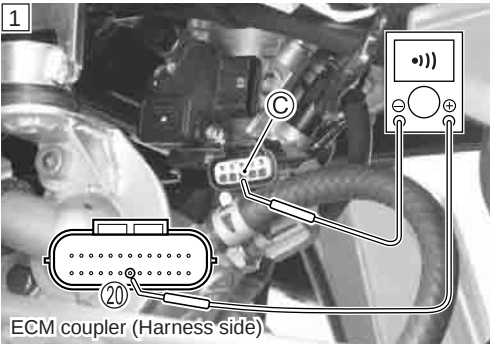
CAUTION

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

Is the continuity OK?

YES	Go to Step 2.
NO	Yellow wire shorted to VCC or B/O wire open.

- 8) After repairing the trouble, clear the DTC using SDS tool.
(☞ 5-23)

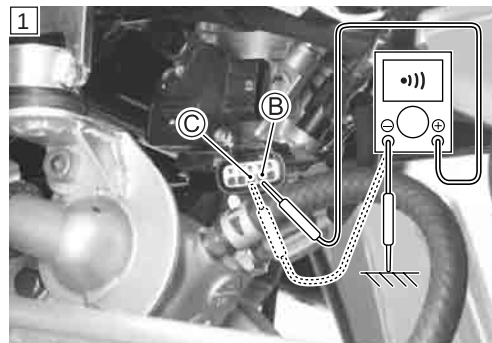


Step 1 (When indicating P0120-L:)

- 1) Remove the left side cover. (☞ 8-9)
- 2) Turn the ignition switch to OFF.
- 3) Check the TP sensor coupler for loose or poor contacts.
If OK, then check the TP sensor lead wire continuity.



- 4) Disconnect the TP sensor coupler.
- 5) Check the continuity between Yellow wire (B) and ground.
- 6) Also, check the continuity between Yellow wire (B) and B/O wire (C). If sound is not heard from the tester, the circuit condition is OK.



- 7) Disconnect the ECM coupler.
- 8) Check the continuity between Red wire (A) and terminal (6).
- 9) Also, check the continuity between Yellow wire (B) and terminal (13).

DATA TPS lead wire continuity: Continuity (•••)

TOOL 09900-25008: Multi-circuit tester set
09900-25009: Needle pointed probe set

Tester knob indication: Continuity test (•••)

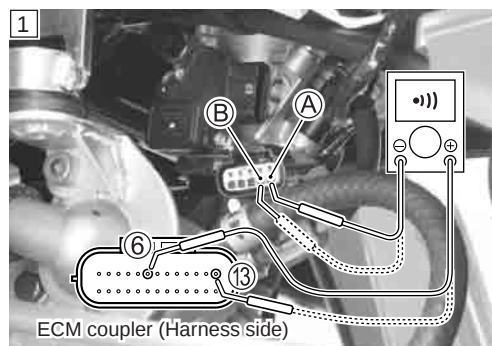
CAUTION

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

Is the continuity OK?

YES	Go to Step 2.
NO	Red wire or Yellow wire open, or Yellow wire shorted to ground.

- 10) After repairing the trouble, clear the DTC using SDS tool.
(☞ 5-23)



Step 2

- 1) Connect the TP sensor coupler and ECM coupler.
- 2) Insert the needle pointed probes to the lead wire coupler.
- 3) Turn the ignition switch to ON.
- 4) Measure the TP sensor output voltage at the coupler (between ⊕ Yellow wire ⑥ and ⊖ B/O wire ⑬) by pushing the throttle lever.

DATA TP sensor output voltage (⊕ Yellow – ⊖ B/O)
Throttle valve is closed : 0.93 – 1.31 V
Throttle valve is opened: 3.64 – 4.82 V

TOOL 09900-25008: Multi-circuit tester set
09900-25009: Needle pointed probe set

Tester knob indication: Voltage (---)

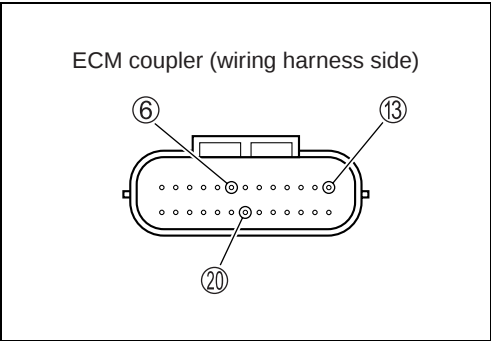
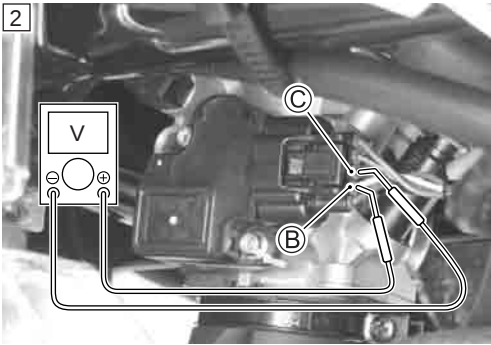
CAUTION

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

Is the voltage OK?

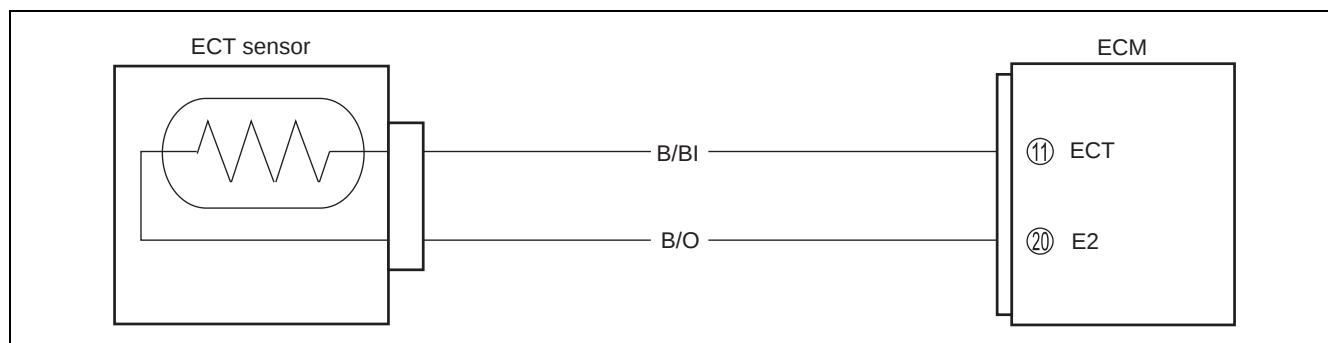
YES	• Red, Yellow or B/O wire open or shorted to ground, or poor ⑥, ⑬ or ⑳ connection. • If wire and connection are OK, intermittent trouble or faulty ECM. • Recheck each terminal and wire harness for open circuit and poor connection. • Replace the ECM with a known good one, and inspect it again.
NO	If check result is not satisfactory, replace TP sensor (throttle body assembly) with a new one.

- 5) After repairing the trouble, clear the DTC using SDS tool.
(➡ 5-23)

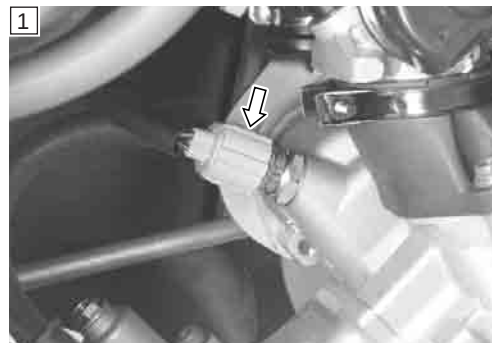


“C15” (P0115-H/L) ECT SENSOR CIRCUIT MALFUNCTION

DETECTED CONDITION		POSSIBLE CAUSE
C15	Output voltage is not within the following value. $0.15 < \text{Sensor voltage} \leq 4.85 \text{ V}$	- ECT sensor circuit open or short. - ECT sensor malfunction. - ECM malfunction.
P0115	H	- ECT sensor circuit open or ground circuit open. - ECT sensor circuit shorted to ground.
	L	

**INSPECTION****Step 1 (When indicating C15:)**

- 1) Remove the right side cover. (👉 8-10)
- 2) Turn the ignition switch to OFF.
- 3) Check the ECT sensor coupler for loose or poor contacts.
If OK, then measure the ECT sensor voltage at the wire side coupler.



- 4) Disconnect the coupler and turn the ignition switch to ON.
- 5) Measure the voltage between B/BI wire terminal (A) and ground.
- 6) Also, then measure the voltage between B/BI wire terminal (A) and B/O wire terminal (B).

DATA ECT sensor voltage: 4.5 – 5.5 V

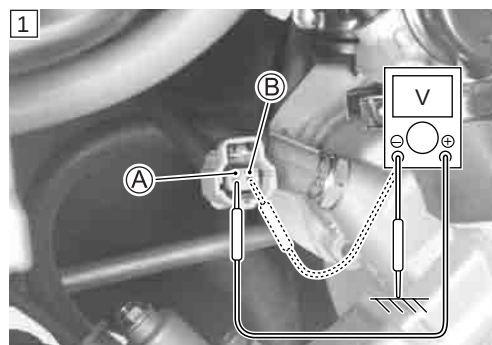
(⊕ B/BI – ⊖ Ground)

(⊕ B/BI – ⊖ B/O)

TOOL 09900-25008: Multi-circuit tester set

Tester knob indication: Voltage (V)

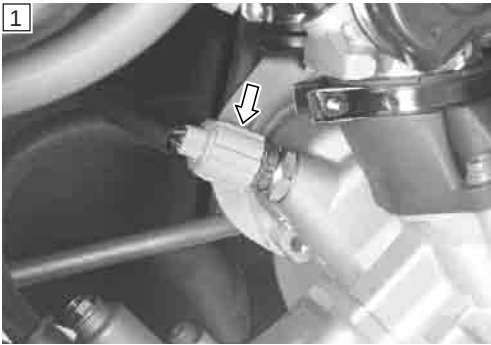
Is the voltage OK?



YES	Go to Step 2.
NO	- Loose or poor contacts on the ECM coupler. (terminal 11 or 20) - Open or short circuit in the B/BI wire or B/O wire.

Step 1 (When indicating P0115-H:)

- 1) Remove the right side cover. (8-10)
- 2) Turn the ignition switch to OFF.
- 3) Check the ECT sensor coupler for loose or poor contacts.
If OK, then check the ECT sensor lead wire continuity.



- 4) Disconnect the ECT sensor coupler and ECM coupler.
- 5) Check the continuity between B/BI wire (A) and terminal 11.
- 6) Also, then check the continuity between B/O wire (B) and terminal 20.

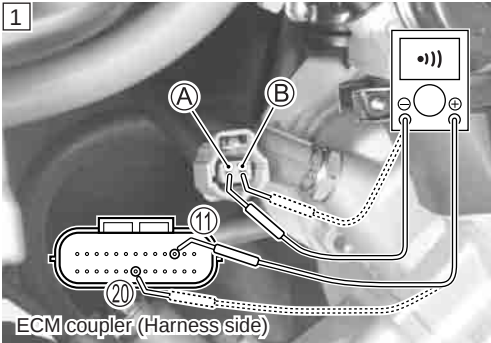
DATA ECTS lead wire continuity: Continuity (•))

TOOL 09900-25008: Multi-circuit tester set
09900-25009: Needle pointed probe set

Tester knob indication: Continuity test (•))

CAUTION

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.



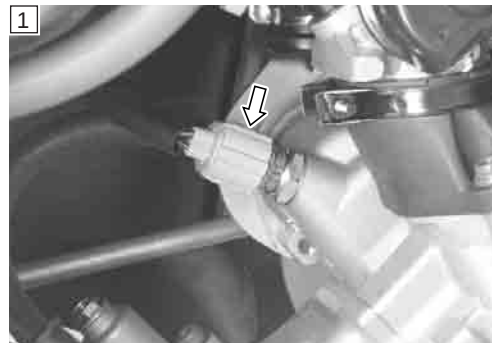
Is the continuity OK?

YES	Go to Step 2.
NO	B/BI or B/O wire open.

- 7) After repairing the trouble, clear the DTC using SDS tool. (5-23)

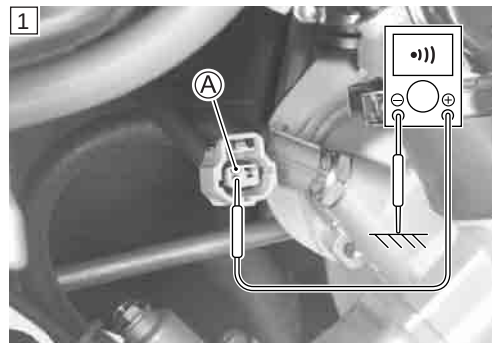
Step 1 (When indicating P0115-L:)

- 1) Remove the right side cover. (☞ 8-10)
- 2) Turn the ignition switch to OFF.
- 3) Check the ECT sensor coupler for loose or poor contacts.
If OK, then check the ECT sensor lead wire continuity.



- 4) Disconnect the ECT sensor coupler.
- 5) Check the continuity between B/BI wire (A) and ground. If sound is not heard from the tester, the circuit condition is OK.

 **Tester knob indication: Continuity test (•••)**



- 6) Connect the ECT sensor coupler.
- 7) Insert the needle pointed probes to the lead wire coupler.
- 8) Turn the ignition switch to ON.
- 9) Measure the voltage between B/BI wire (A) and ground.

DATA ECT sensor output voltage:

0.1 – 4.6 V (+ B/BI – – Ground)

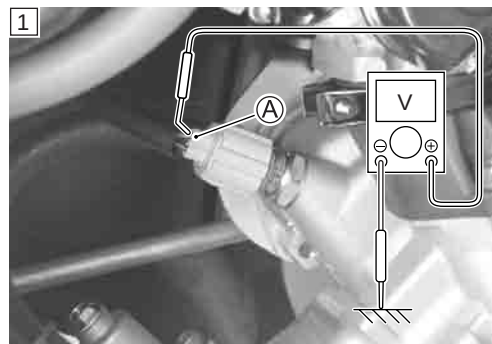
TOOL 09900-25008: Multi-circuit tester set
09900-25009: Needle pointed probe set

 **Tester knob indication: Voltage (---)**

Are the continuity and voltage OK?

YES	Go to Step 2.
NO	B/BI wire shorted to ground.

- 10) After repairing the trouble, clear the DTC using SDS tool.
(☞ 5-23)



Step 2

- 1) Turn the ignition switch to OFF.
- 2) Disconnect the ECT sensor coupler.
- 3) Measure the ECT sensor resistance.

DATA ECT sensor resistance:

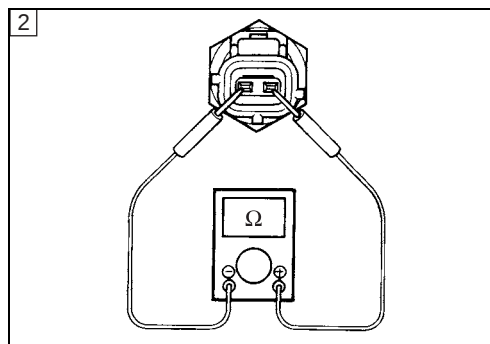
Approx. 2.45 kΩ at 20 °C (68 °F)
(Terminal – Terminal)

TOOL 09900-25008: Multi-circuit tester set**Tester knob indication: Resistance (Ω)**

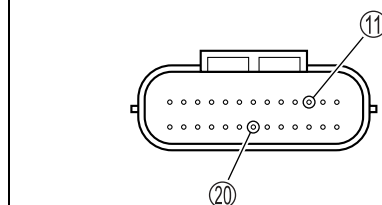
Refer to page 7-11 for details.

Is the resistance OK?

YES	- B/BI or B/O wire open or shorted to ground, or poor ⑪ or ⑳ connection. - If wire and connection are OK, intermittent trouble or faulty ECM. - Recheck each terminal and wire harness for open circuit and poor connection. - Replace the ECM with a known good one, and inspect it again.
NO	Replace the ECT sensor with a new one.



ECM coupler (wiring harness side)

**CAUTION**

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

DATA ECT sensor specification

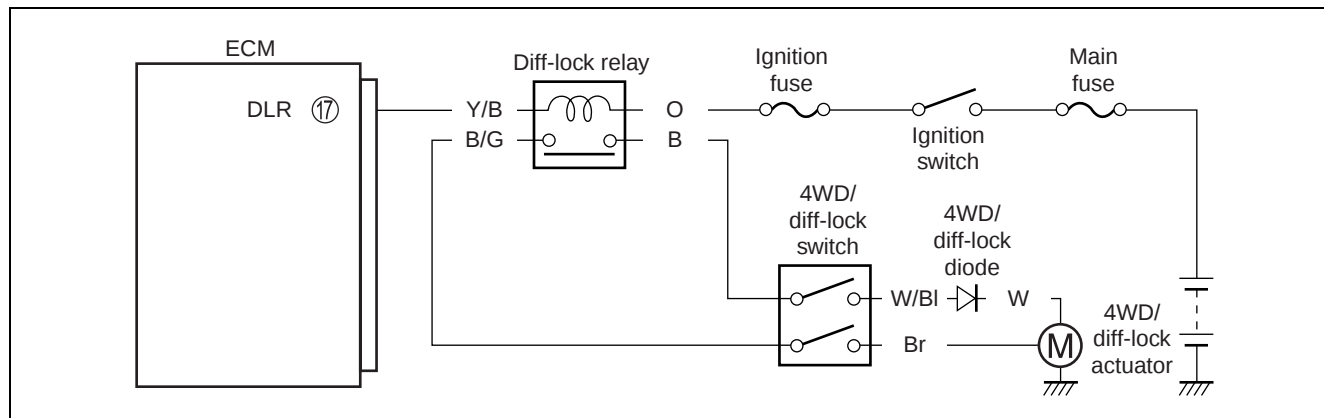
Engine Coolant Temp	Resistance
20 °C (68 °F)	Approx. 2.45 kΩ
40 °C (104 °F)	Approx. 1.15 kΩ
80 °C (176 °F)	Approx. 0.31 kΩ
100 °C (182 °F)	Approx. 0.18 kΩ

- 4) After repairing the trouble, clear the DTC using SDS tool.

(☞ 5-23)

“C20” (P1752) DIFF-LOCK RELAY CIRCUIT MALFUNCTION

DETECTED CONDITION	POSSIBLE CAUSE
No voltage is applied to diff-lock motor, although ignition switch is turned ON, or voltage is applied to diff-lock motor, although ignition switch is turned OFF.	- Diff-lock relay circuit open or short. - Diff-lock relay malfunction. - ECM malfunction.

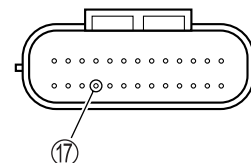
**INSPECTION****Step 1**

- 1) Remove the rear fender. (☞ 8-15)
- 2) Connect the disconnected couplers and battery.
- 3) Turn the ignition switch to OFF.
- 4) Check the diff-lock relay coupler for loose or poor contacts.
If OK, then check the diff-lock relay. (☞ 9-25)
Is the diff-lock relay OK?

YES	- Inspect the 4WD/diff-lock switch. (☞ 9-37) - Y/B wire open or shorted to ground, or poor ⑰ connection. - If wire and connection are OK, intermittent trouble or faulty ECM. - Recheck each terminal and wire harness for open circuit and poor connection. - Replace the ECM with a known good one, and inspect it again.
NO	Replace the diff-lock relay with a new one.



ECM coupler (wiring harness side)

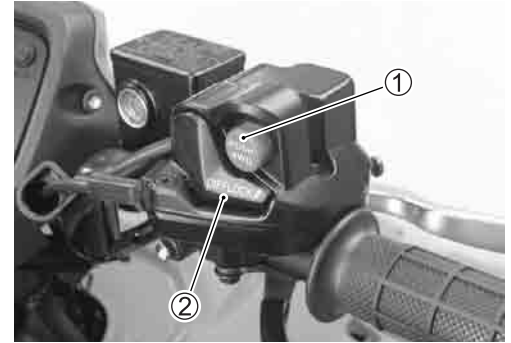
**CAUTION**

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

- 5) After repairing the trouble, clear the DTC using SDS tool. (☞ 5-23)

SDS operation check (4WD/diff-lock switch)

- 1) Check that the 4WD/diff-lock switch (4WD switch ① and diff-lock switch ②) is turned OFF.
- 2) Set up the SDS tool. (Refer to the SDS operation manual for further details.)



- 3) Open the "Data monitor".



- 4) Check that both "Differential lock position switch signal" ③ and "Differential lock switch signal" ④ are "Open".

☐ Differential lock relay	Off	
☐ Fuel pump relay	On	
☐ Starter signal	Off	
☐ Neutral switch signal	GND	
☐ Brake switch signal	Off	
☐ Override switch signal	Open	
☐ Ignition switch signal	On	
☐ Differential lock position switch signal	Open	③
☐ Differential lock switch signal	Open	④

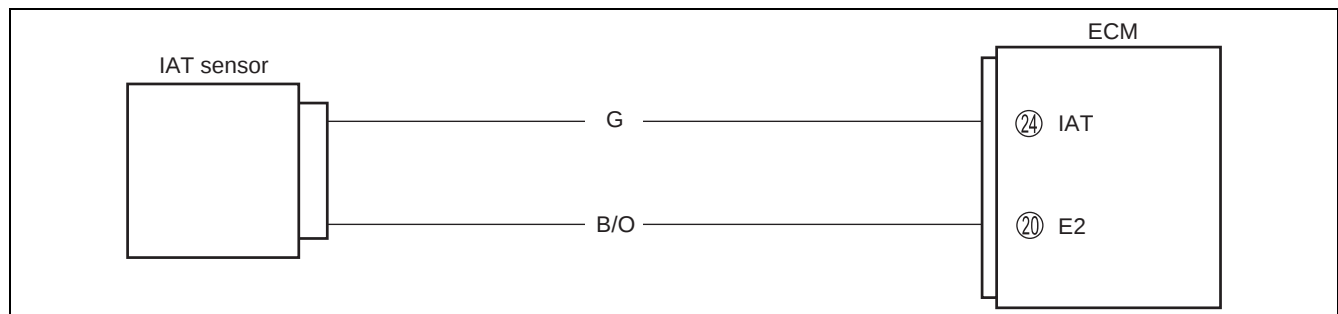
- 5) Turn the 4WD/diff-lock switch (4WD switch and diff-lock switch) to ON position.
- 6) Check that both "Differential lock position switch signal" ⑤ and "Differential lock switch signal" ⑥ are "GND".

☐ Differential lock relay	On	
☐ Fuel pump relay	On	
☐ Starter signal	Off	
☐ Neutral switch signal	GND	
☐ Brake switch signal	Off	
☐ Override switch signal	Open	
☐ Ignition switch signal	On	
☐ Differential lock position switch signal	GND	⑤
☐ Differential lock switch signal	GND	⑥

If the 4WD/diff-lock switch dose not function properly, inspect the 4WD/diff-lock switch for details. (📖 9-37)

“C21” (P0110-H/L) IAT SENSOR CIRCUIT MALFUNCTION

DETECTED CONDITION		POSSIBLE CAUSE
C21	Output voltage is not within the following value. $0.15 < \text{Sensor voltage} \leq 4.85 \text{ V}$	- IAT sensor circuit open or short. - IAT sensor malfunction. - ECM malfunction.
P0110	H	- IAT sensor circuit open or ground circuit open. - IAT sensor circuit shorted to ground.
	L	



NOTE:

IAT sensor is incorporated in the IAP sensor/TP sensor.

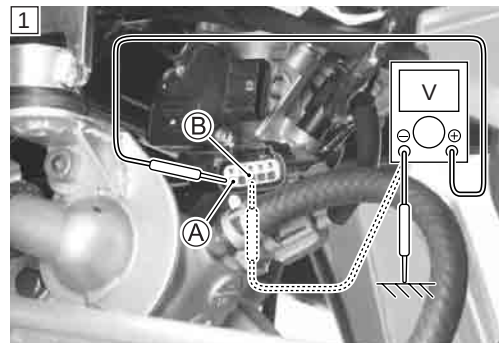
INSPECTION

Step 1 (When indicating C21:)

- Remove the left side cover. (8-9)
- Turn the ignition switch to OFF.
- Check the IAT sensor coupler for loose or poor contacts.
If OK, then measure the IAT sensor voltage at the wire side coupler.



- Disconnect the coupler and turn the ignition switch ON.
- Measure the voltage between Green wire terminal (A) and ground.
- Also, measure the voltage between Green wire terminal (A) and B/O wire terminal (B).



DATA IAT sensor voltage: 4.5 – 5.5 V

(+ Green – – Ground)

(+ Green – – B/O)

TOOL 09900-25008: Multi-circuit tester set

Tester knob indication: Voltage (V)

Is the voltage OK?

YES	Go to Step 2.
NO	- Loose or poor contacts on the ECM coupler. (terminal 20 or 24) - Open or short circuit in the Green wire or B/O wire.

Step 1 (When indicating P0110-H:)

- 1) Remove the left side cover. (☞ 8-9)
- 2) Turn the ignition switch to OFF.
- 3) Check the IAT sensor coupler for loose or poor contacts.
If OK, then check the IAT sensor lead wire continuity.



- 4) Disconnect the IAT sensor coupler and ECM coupler.
- 5) Check the continuity between Green wire (A) and terminal 24.
- 6) Also, check the continuity between B/O wire (B) and terminal 20.

DATA IATS lead wire continuity: Continuity (••••)

TOOL 09900-25008: Multi-circuit tester set
09900-25009: Needle pointed probe set

Tester knob indication: Continuity test (••••)

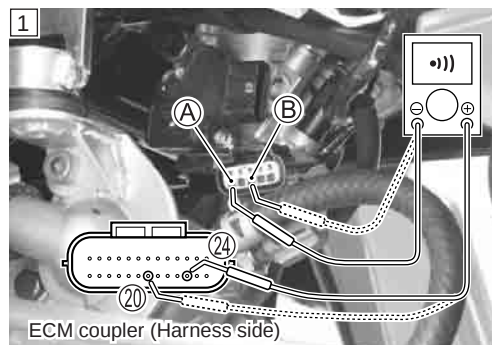
CAUTION

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

Is the continuity OK?

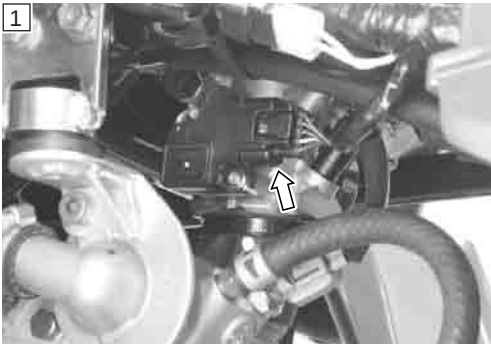
YES	Go to Step 2.
NO	Green or B/O wire open.

- 7) After repairing the trouble, clear the DTC using SDS tool.
(☞ 5-23)



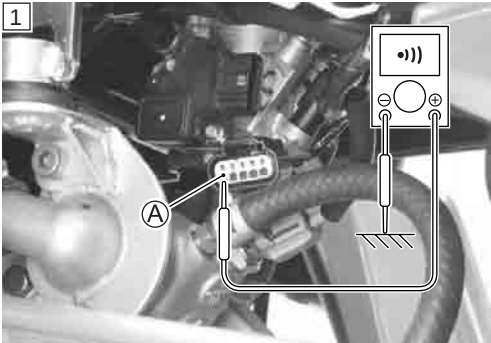
Step 1 (When indicating P0110-L:)

- 1) Remove the left side cover. (☞ 8-9)
- 2) Turn the ignition switch to OFF.
- 3) Check the IAT sensor coupler for loose or poor contacts.
If OK, then check the IAT sensor lead wire continuity.



- 4) Disconnect the IAT sensor coupler.
- 5) Check the continuity between Green wire (A) and ground. If sound is not heard from the tester, the circuit condition is OK.

Tester knob indication: Continuity test (••••)



- 6) Connect the IAT sensor coupler.
- 7) Insert the needle pointed probes to the lead wire coupler.
- 8) Turn the ignition switch to ON.
- 9) Measure the voltage between Green wire (A) and ground.

DATA Output voltage: 1.88 – 3.06 V at 20 °C (68 °F)
(+ Green – – Ground)

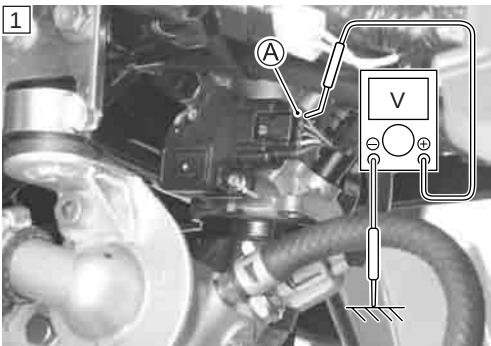
TOOL 09900-25008: Multi-circuit tester set
09900-25009: Needle pointed probe set

Tester knob indication: Voltage (---)

Are the continuity and voltage OK?

YES	Go to Step 2.
NO	Green wire shorted to ground.

- 10) After repairing the trouble, clear the DTC using SDS tool.
(☞ 5-23)



Step 2

- 1) Turn the ignition switch to OFF.
- 2) Disconnect the IAT sensor coupler.
- 3) Measure the IAT sensor resistance.

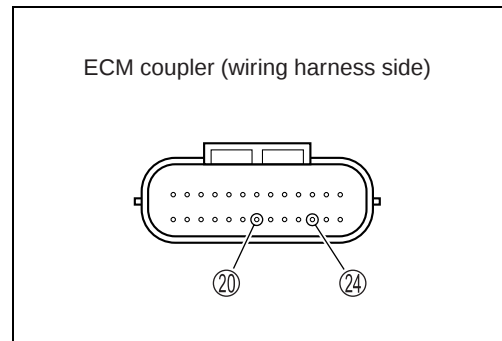
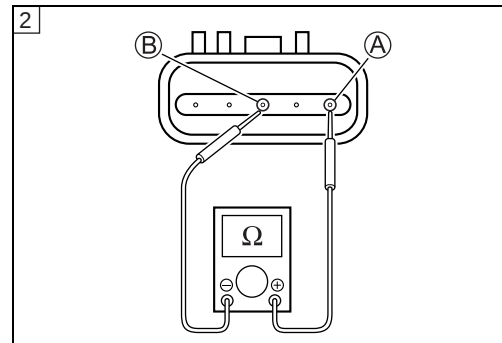
DATA IAT sensor resistance: 2.22 – 3.11 kΩ at 20 °C (68 °F)
(A Terminal – B Terminal)

TOOL 09900-25008: Multi-circuit tester set

Tester knob indication: Resistance (Ω)

Is the resistance OK?

YES	- Green or B/O wire open or shorted to ground, or poor ⑳ or ㉔ connection. - If wire and connection are OK, intermittent trouble or faulty ECM. - Recheck each terminal and wire harness for open circuit and poor connection. - Replace the ECM with a known good one, and inspect it again.
NO	Replace the IAT sensor (throttle body assembly) with a new one.

**CAUTION**

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

DATA IAT sensor specification

Intake Air Temp	Resistance
20 °C (68 °F)	2.22 – 3.11 kΩ
40 °C (104 °F)	1.00 – 1.56 kΩ

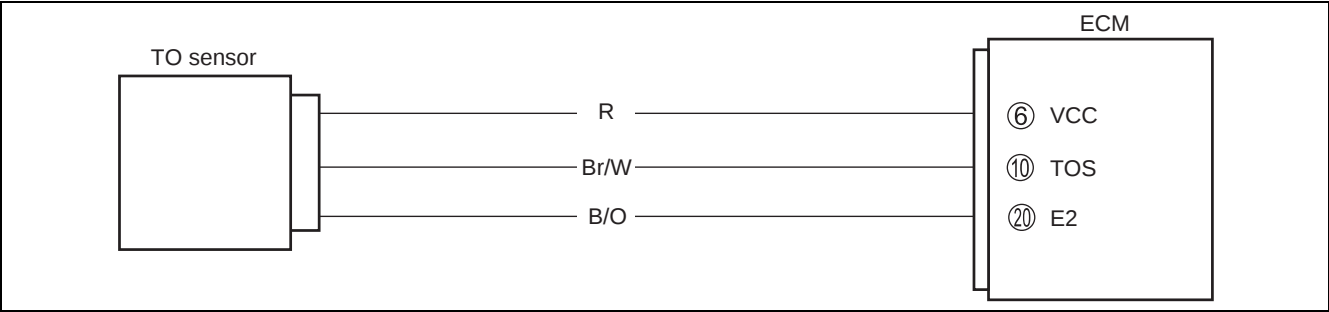
NOTE:

IAT sensor resistance measurement method is the same way as that of the ECT sensor. Refer to page 7-11 for details.

- 4) After repairing the trouble, clear the DTC using SDS tool.
(5-23)

“C23” (P1651-H/L) TO SENSOR CIRCUIT MALFUNCTION

DETECTED CONDITION			POSSIBLE CAUSE
C23		The sensor voltage should be the following for 2 sec. and more, after ignition switch is turned ON. $0.2 < \text{Sensor voltage} \leq 4.8 \text{ V}$	• TO sensor circuit open or short. • TO sensor malfunction. • ECM malfunction.
P1651	H	Sensor voltage is higher than specified value.	
	L	Sensor voltage is lower than specified value.	



INSPECTION

Step 1 (When indicating C23:)

- 1) Remove the air cleaner box. (6-10)
- 2) Turn the ignition switch to OFF.
- 3) Check the TO sensor coupler for loose or poor contacts.
If OK, then measure the TO sensor resistance.



- 4) Remove the TO sensor.
- 5) Disconnect the TO sensor coupler.
- 6) Measure the resistance between terminal ① and terminal ②.

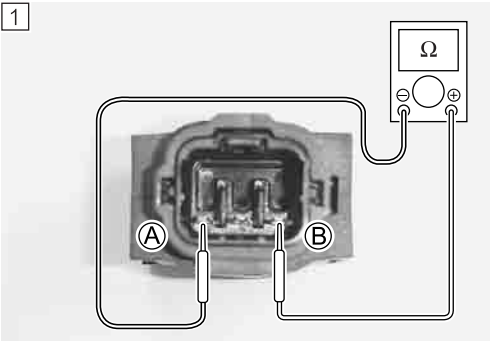
DATA TO sensor resistance: 19.0 – 20.0 kΩ
(Terminal ① – Terminal ②)

TOOL 09900-25008: Multi-circuit tester set

Tester knob indication: Resistance (Ω)

Is the resistance OK?

YES	Go to Step 2.
NO	Replace the TO sensor with a new one.

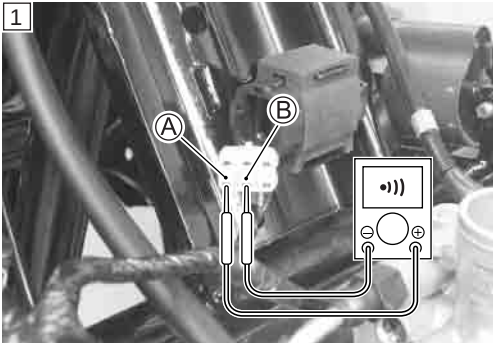


Step 1 (When indicating P1651-H:)

- 1) Remove the air cleaner box. (🔧 6-10)
- 2) Turn the ignition switch to OFF.
- 3) Check the TO sensor coupler for loose or poor contacts.
If OK, then check the TO sensor lead wire continuity.



- 4) Disconnect the TO sensor coupler.
- 5) Check the continuity between Red wire (A) and Br/W wire (B).
If sound is not heard from the tester, the circuit condition is OK.



- 6) Disconnect the ECM coupler.
- 7) Check the continuity between B/O wire (C) and terminal (20).

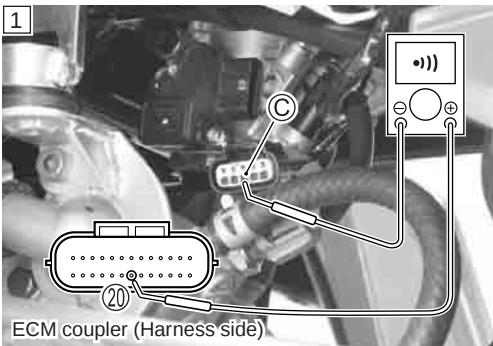
DATA TOS lead wire continuity: Coninuty (•))

TOOL 09900-25008: Multi-circuit tester set
09900-25009: Needle pointed probe set

Tester knob indication: Continuity test (•))

CAUTION

When us ing the multi-circuit te ster, do no t strongly touch the terminal of the ECM coupler with a ne edle pointed tester probe t o pre vent the terminal da mage or terminal bend.



Is the continuity OK?

YES	Go to Step 2.
NO	Br/W wire shorted to VCC or B/O wire open.

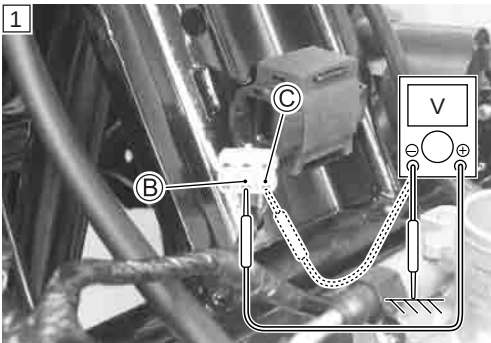
- 8) After repairing the trouble, clear the DTC using SDS tool.
(🔧 5-23)

Step 1 (When indicating P1651-L:)

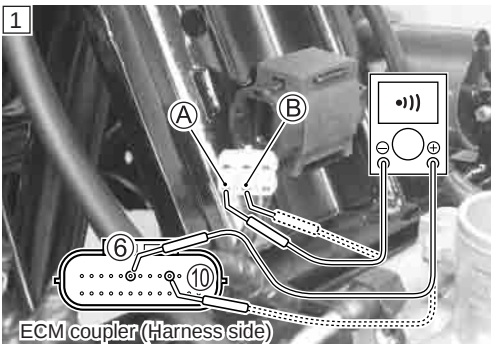
- 1) Remove the air cleaner box. (☞ 6-10)
- 2) Turn the ignition switch to OFF.
- 3) Check the TO sensor coupler for loose or poor contacts.
If OK, then check the TO sensor lead wire continuity.



- 4) Disconnect the TO sensor coupler.
- 5) Check the continuity between Br/W wire (B) and ground.
- 6) Also, check the continuity between Br/W wire (B) and B/O wire (C). If sound is not heard from the tester, the circuit condition is OK.



- 7) Disconnect the ECM coupler.
- 8) Check the continuity between Red wire (A) and terminal (6).
- 9) Also, check the continuity between Br/W wire (B) and terminal (10).



DATA TOS lead wire continuity: Coninuity (••••)

TOOL 09900-25008: Multi-circuit tester set
09900-25009: Needle pointed probe set

Tester knob indication: Continuity test (••••)

CAUTION

When us ing the m ulti-circuit te ster, do no t s trongly touch the terminal of the ECM coupler with a needle pointed te ster probe to prevent t he terminal damage or terminal bend.

Is the continuity OK?

YES	Go to Step 2.
NO	Red wire open, or Br/W wire shorted to ground.

- 10) After repairing the trouble, clear the DTC using SDS tool. (☞ 5-23)

Step 2

- 1) Connect the TO sensor coupler and ECM coupler.
- 2) Insert the needle pointed probes to the lead wire coupler.
- 3) Turn the ignition switch to ON.
- 4) Measure the voltage at the wire side coupler (between Br/W wire (B) and B/O wire (C)).

DATA TO sensor voltage (Normal): 0.4 – 1.4 V
(+ Br/W – – B/O)

Also, measure the voltage when leaning the vehicle.

- 5) Dismount the TO sensor from its bracket and measure the voltage when it is leaned 65 ° and more, left and right, from the horizontal level.

DATA TO sensor voltage (Leaning): 3.7 – 4.4 V
(+ Br/W – – B/O)

TOOL 09900-25008: Multi-circuit tester set
09900-25009: Needle pointed probe set

Tester knob indication: Voltage (V)

Is the voltage OK?

YES	- Red, B/Br or B/O wire open or shorted to ground, or poor (6), (10) or (20) connection. - If wire and connection are OK, intermittent trouble or faulty ECM. - Recheck each terminal and wire harness for open circuit and poor connection. - Replace the ECM with a known good one, and inspect it again.
NO	- Loose or poor contacts on the ECM coupler. - Open or short circuit. - Replace the TO sensor with a new one.

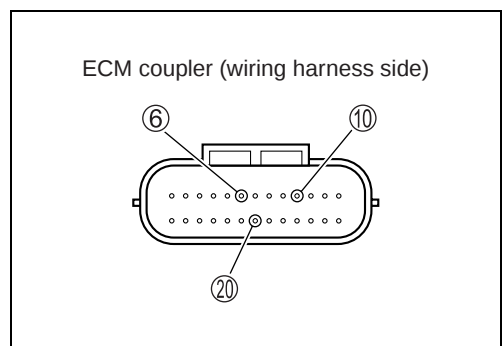
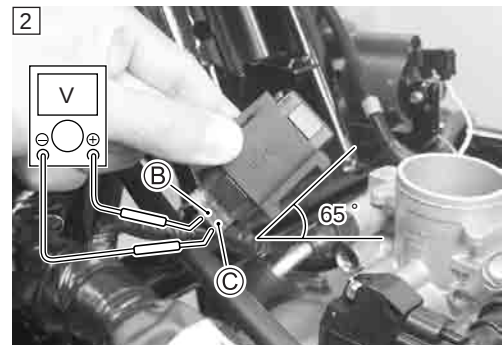
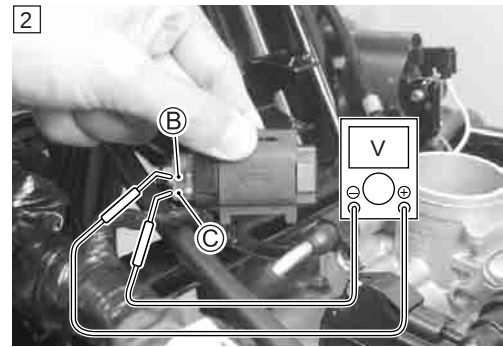
CAUTION

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

- 6) After repairing the trouble, clear the DTC using SDS tool.
(5-23)

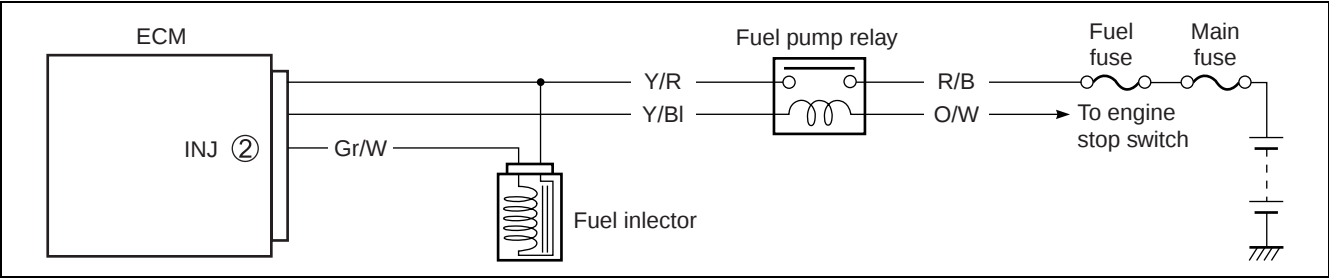
“C24” (P0351) IGNITION COIL CIRCUIT MALFUNCTION

* Refer to the IGNITION SYSTEM for details. (8-18)



“C32” (P0201) FUEL INJECTOR CIRCUIT MALFUNCTION

DETECTED CONDITION	POSSIBLE CAUSE
CKP signal is produced but fuel injector signal is interrupted 4 times or more continuously.	• Injector circuit open or short. • Injector malfunction. • ECM malfunction.



INSPECTION

Step 1

- 1) Remove the right side cover. (8-10)
- 2) Turn the ignition switch to OFF.
- 3) Check the injector coupler for loose or poor contacts.
If OK, then measure the injector resistance.



- 4) Disconnect the injector coupler and measure the resistance between terminals.

DATA Injector resistance: $12 \pm 1 \Omega$ at 20 °C (68 °F)
(Terminal – Terminal)



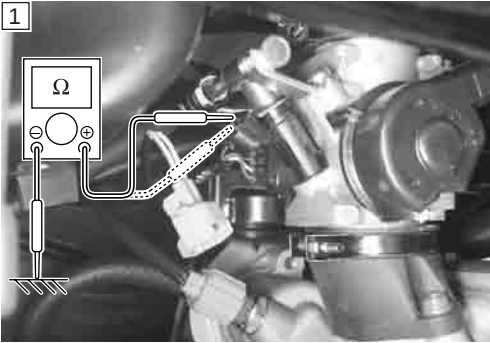
- 5) If OK, then check the continuity between each terminal and ground.

DATA Injector continuity: $\infty \Omega$ (Infinity)
(Terminal – Ground)

TOOL 09900-25008: Multi-circuit tester set

Tester knob indication: Resistance (Ω)

Are the resistance and continuity OK?



YES	Go to Step 2.
NO	Replace the Injector with a new one. (6-14)

- 6) After repairing the trouble, clear the DTC using SDS tool.
(5-23)

Step 2

- 1) Turn the ignition switch to ON.
- 2) Measure the injector voltage between Y/R wire ① and ground.

DATA **Injector voltage: Battery voltage**
(+ Y/R – – Ground)

NOTE:
Injector voltage can be detected only 3 for seconds after ignition switch is turned ON.

TOOL 09900-25008: Multi-circuit tester set

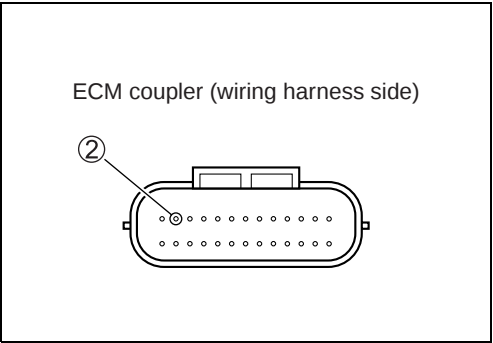
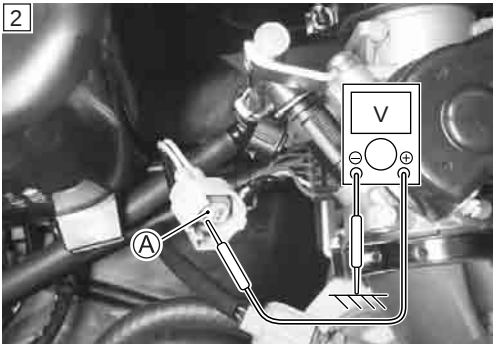
Tester knob indication: Voltage (---)

CAUTION

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

Is the voltage OK?	
YES	• Gr/W wire open or shorted to ground, or poor ② connection. • If wire and connection are OK, intermittent trouble or faulty ECM. • Recheck each terminal and wire harness for open circuit and poor connection. • Replace the ECM with a known good one, and inspect it again.
NO	Open circuit in the Y/R wire.

- 3) After repairing the trouble, clear the DTC using SDS tool.
(5-23)



Step 1 (When indicating P0230-H:)

- 1) Remove the seat. (🔧 8-6)
- 2) Turn the ignition switch to OFF.
- 3) Check the FP relay coupler for loose or poor contacts.
If OK, then check the FP relay. (🔧 5-6)

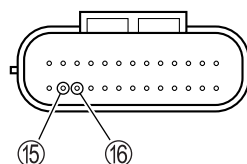
Is the FP relay OK?

YES	• Y/R wire shorted to power source. • Y/BI wire shorted to ground. • If wire and connection are OK, intermittent trouble or faulty ECM. • Recheck each terminal and wire harness for open circuit and poor connection. • Replace the ECM with a known good one, and inspect it again.
NO	Replace the FP relay with a new one.

- 4) After repairing the trouble, clear the DTC using SDS tool. (🔧 5-23)



ECM coupler (wiring harness side)

**Step 1 (When indicating P0230-L:)**

- 1) Turn the ignition switch to OFF.
- 2) Remove the seat. (🔧 8-6)
- 3) Check the FP relay coupler for loose or poor contacts.
If OK, then check the FP relay. (🔧 6-6)

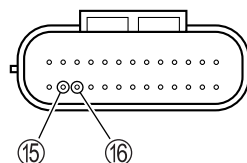
Is the FP relay OK?

YES	• Y/BI wire open or poor ⑮ connection. • O/W wire open or shorted to ground. • R/B or Y/R wire open or shorted to ground or poor ⑯ connection. • If wire and connection are OK, intermittent trouble or faulty ECM. • Recheck each terminal and wire harness for open circuit and poor connection. • Replace the ECM with a known good one, and inspect it again.
NO	Replace the FP relay with a new one.

- 4) After repairing the trouble, clear the DTC using SDS tool. (🔧 5-23)



ECM coupler (wiring harness side)



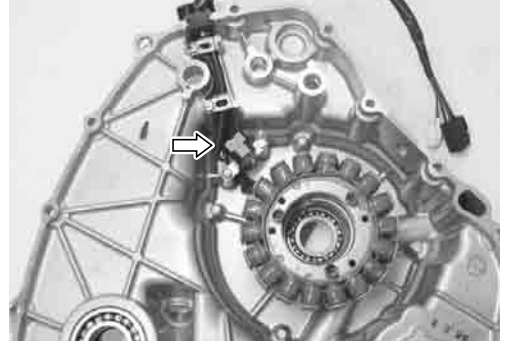
SENSORS

CKP SENSOR INSPECTION

The crankshaft position sensor is installed on the generator cover. (🔧 3-82)

CKP SENSOR REMOVAL AND INSTALLATION

- Remove the generator cover. (🔧 3-16)
- Remove the CKP sensor. (🔧 3-82)
- Install the generator cover in the reverse order of removal.



IAP SENSOR INSPECTION

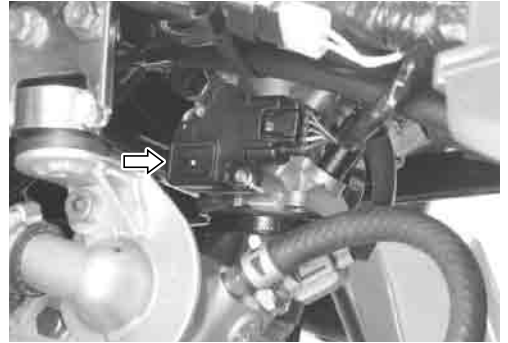
The intake air pressure sensor is installed at the left side of the throttle body. (🔧 6-11)

TP SENSOR INSPECTION

The throttle position sensor is installed at the left side of the throttle body. (🔧 6-11)

IAT SENSOR INSPECTION

The intake air temperature sensor is installed at the left side of the throttle body. (🔧 6-11)



CAUTION

Never remove the IAP sensor/TP sensor/IAT sensor.

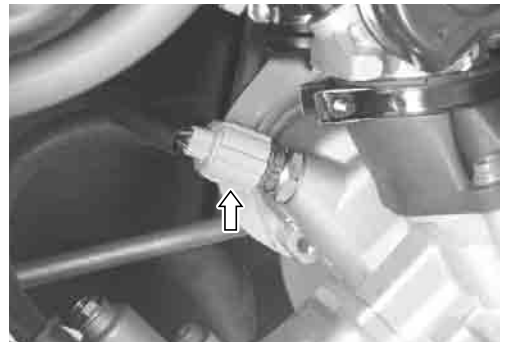
ECT SENSOR INSPECTION

The engine coolant temperature sensor is installed on the cylinder head. (🔧 7-11)

ECT SENSOR REMOVAL AND INSTALLATION

- Remove the right side cover. (🔧 8-10)
- Remove the ECT sensor. (🔧 7-11)
- Install the ECT sensor in the reverse order of removal.

 ECT sensor: 12 N·m (1.2 kgf-m, 8.5 lb-ft)



TO SENSOR INSPECTION

The tip-over sensor is located in front of the throttle body.
( 5-51)



TO SENSOR REMOVAL AND INSTALLATION

- Remove the air cleaner box. ( 6-10)
- Remove the TO sensor from its bracket. ( 5-51)
- Install the TO sensor in the reverse order of removal.

NOTE:

When installing the TO sensor, the arrow mark Ⓐ must be pointed upward.



FUEL SYSTEM AND THROTTLE BODY

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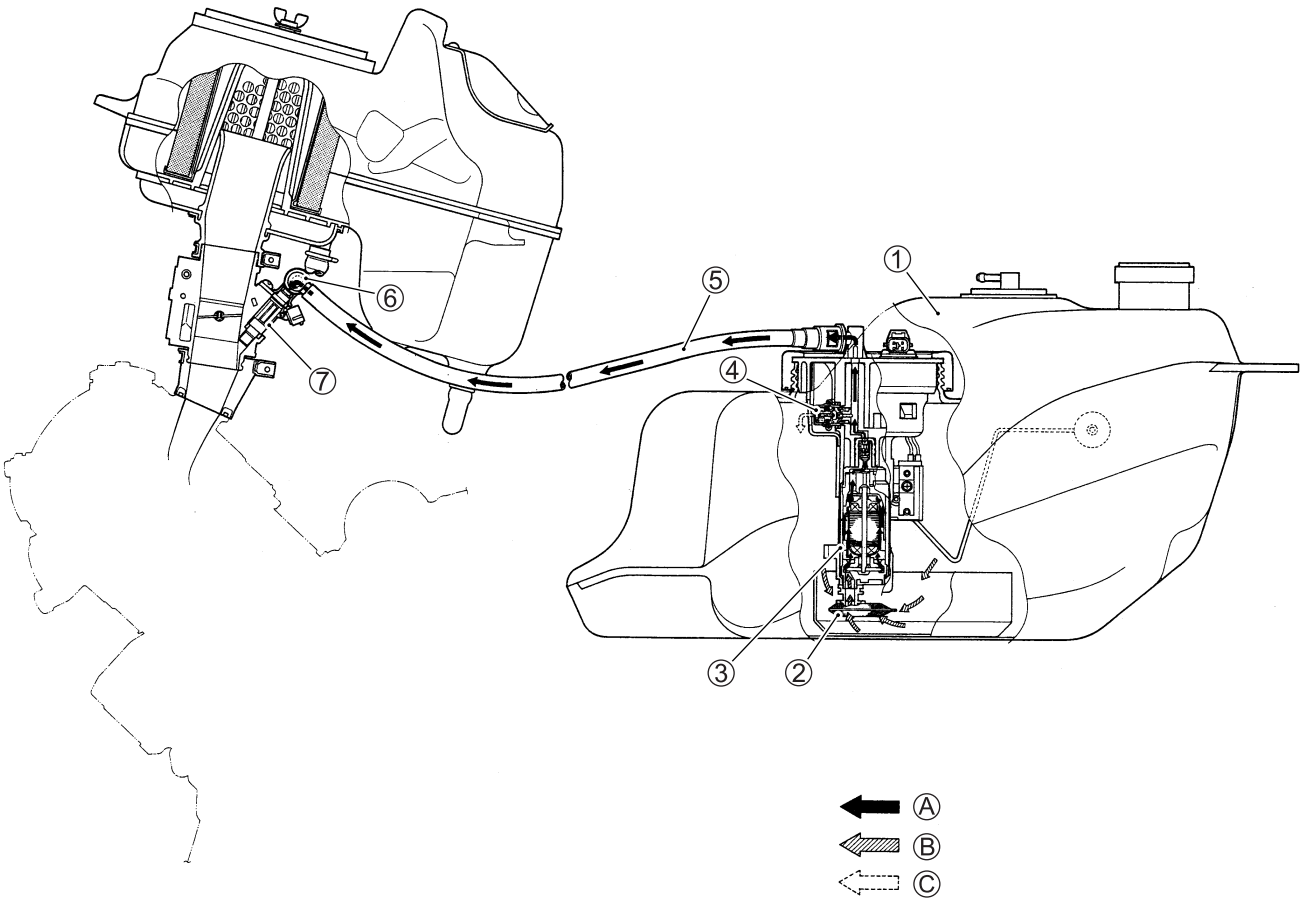
⚠ WARNING

Gasoline must be handled carefully in an area well ventilated and away from fire or sparks.

FUEL DELIVERY SYSTEM

The fuel delivery system consists of the fuel tank, fuel pump, fuel filter, fuel feed hose, fuel delivery pipe (including fuel injector) and fuel pressure regulator. There is no fuel return hose. The fuel in the fuel tank is pumped up by the fuel pump and pressurized fuel flows into the injector installed in the fuel delivery pipe. Fuel pressure is regulated by the fuel pressure regulator. As the fuel pressure applied to the fuel injector (the fuel pressure in the fuel delivery pipe) is always kept at absolute fuel pressure of 2.94 kgf/cm² (294 kPa, 41.81 psi), the fuel is injected into the throttle body in conic dispersion when the injector opens according to the injection signal from the ECM.

The fuel relieved by the fuel pressure regulator flows back to the fuel tank.



①	Fuel tank	⑤	Fuel feed hose	Ⓐ	Pressurized fuel
②	Fuel mesh filter	⑥	Fuel delivery pipe	Ⓑ	Before-pressurized fuel
③	Fuel pump	⑦	Fuel injector	Ⓒ	Relived fuel
④	Fuel pressure regulator				

FUEL SYSTEM

FUEL TANK REMOVAL

- Remove the rear fender. (➡ 8-15)
- Remove the fuel tank cover. (➡ 8-15)
- Place a rag under the fuel feed hose ① and disconnect the fuel feed hose ① from the fuel pump ②.

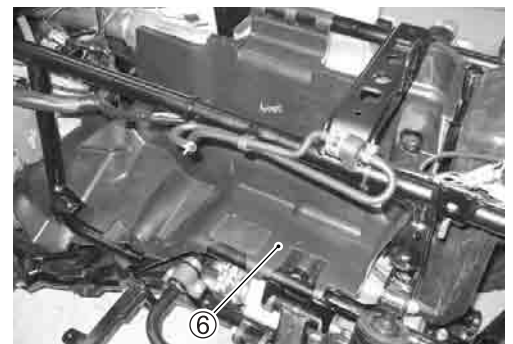
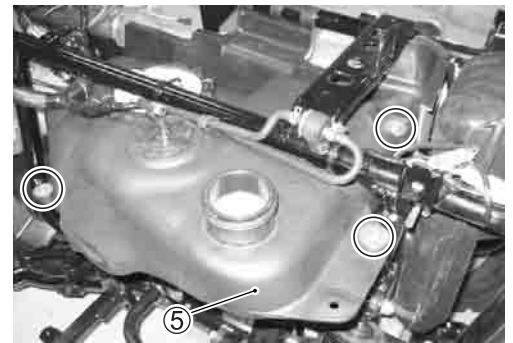
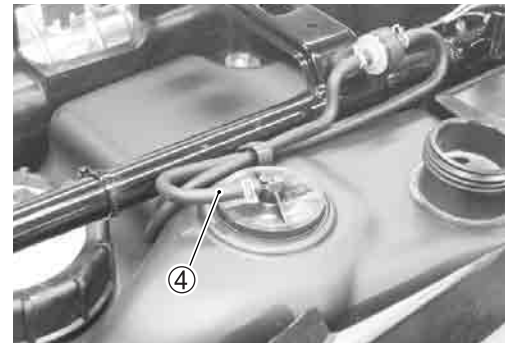
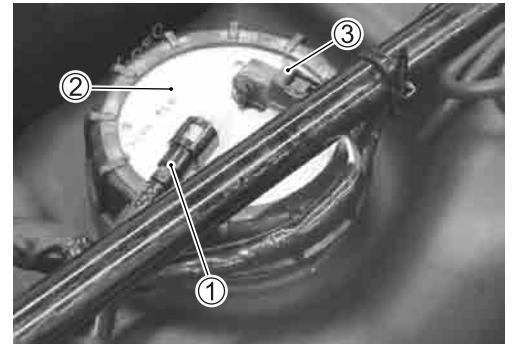
⚠ WARNING

**Gasoline is highly flammable and explosive.
Keep heat, spark and flame away.**

- Disconnect the fuel pump coupler ③ from the fuel pump.
- Disconnect the fuel tank breather hose ④ from the fuel tank.

- Remove the fuel tank mounting bolts.
- Remove the fuel tank ⑤.

- Remove the fuel tank lower cover ⑥.

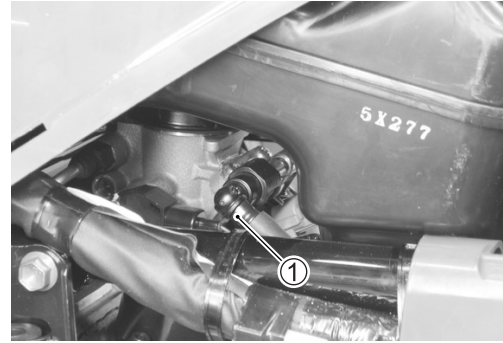


FUEL TANK INSTALLATION

Install the fuel tank in the reverse order of removal.

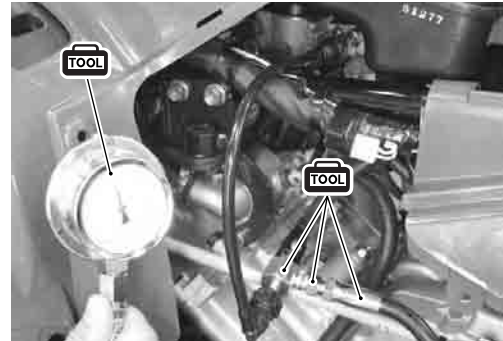
FUEL PRESSURE INSPECTION

- Remove the left side cover. (☞ 8-9)
- Place a rag under the fuel feed hose ① and remove the fuel feed hose ① from the fuel delivery pipe.



- Install the special tools between the fuel feed hose and fuel delivery pipe.

- TOOL** 09940-40211: Fuel pressure gauge adaptor
 09940-40221: Fuel pressure gauge hose attachment
 09915-77331: Oil pressure gauge
 09915-74521: Oil pressure gauge hose



Turn the ignition switch ON and check the fuel pressure.

DATA Fuel pressure: Approx. 294 kPa (2.94 kgf/cm², 41.81 psi)

If the fuel pressure is lower than the specification, inspect the following items:

- * Fuel feed hose leakage
- * Clogged fuel filter
- * Pressure regulator
- * Fuel pump

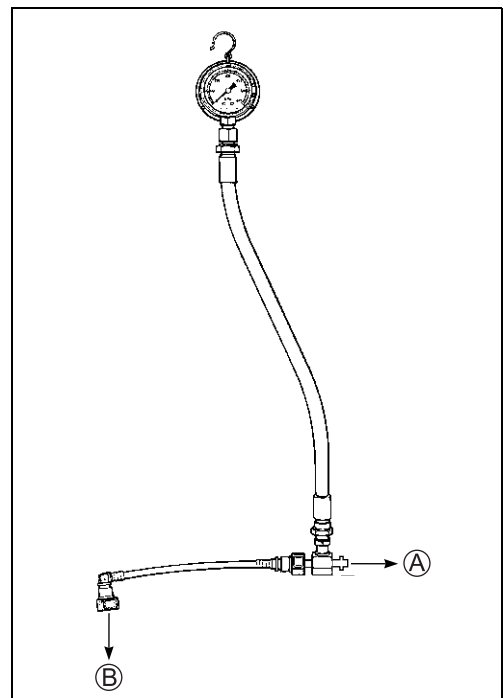
If the fuel pressure is higher than the specification, inspect the following items:

- * Fuel pump
- * Pressure regulator

⚠ WARNING

- * Before removing the special tools, turn the ignition switch to OFF position and release the fuel pressure slowly.
- * Gasoline is highly flammable and explosive. Keep heat, sparks and flame away.

- Ⓐ To fuel pump
 Ⓑ To fuel delivery pipe



FUEL PUMP INSPECTION

Turn the ignition switch ON and check that the fuel pump operates for few seconds.

If the fuel pump motor does not make operating sound, inspect the fuel pump circuit connections or inspect the fuel pump relay and tip-over sensor.

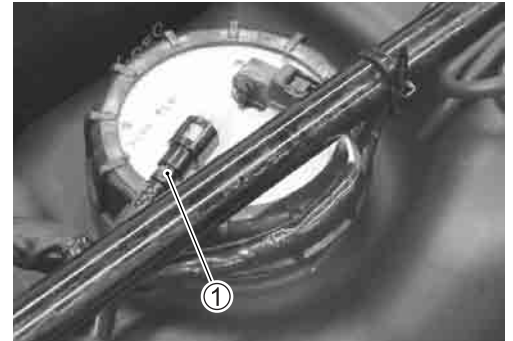
If the fuel pump relay, tip-over sensor and fuel pump circuit connections are OK, the fuel pump may be faulty, replace the fuel pump with a new one.

FUEL DISCHARGE AMOUNT INSPECTION

⚠ WARNING

**Gasoline is highly flammable and explosive.
Keep heat, spark and flame away.**

- Remove the rear fender. (👉 8-15)
- Place a rag under the fuel feed hose ① and disconnect the fuel feed hose ① from the fuel pump.
- Connect a proper fuel hose ② to the fuel pump.
- Place the measuring cylinder and insert the fuel hose end into the measuring cylinder.
- Disconnect the fuel pump coupler ③.



- Connect a proper lead wire into the fuel pump lead wire coupler (fuel pump side) ④ and apply 12 volts to the fuel pump (between terminal ① and terminal ②) for 10 seconds and measure the amount of fuel discharged.

Battery ⊕ Terminal ——— terminal ① (Y/R wire)

Battery ⊖ Terminal ——— terminal ② (B/W wire)

If the pump does not discharge the amount specified, it means that the fuel pump is defective or that the fuel filter is clogged.

DATA Fuel discharge amount:

Approx. 55.5 ml (1.8/1.9 US/lmp oz) and more/10 sec.

NOTE:

The battery must be in fully charged condition.

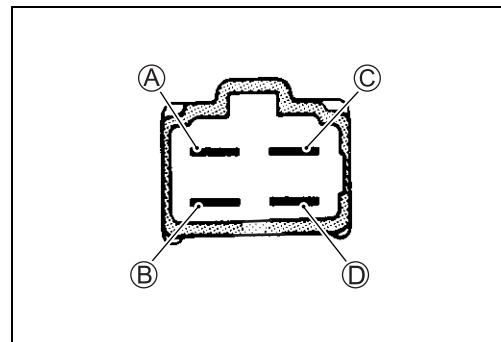
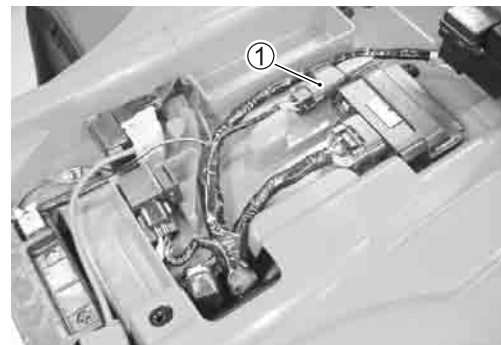
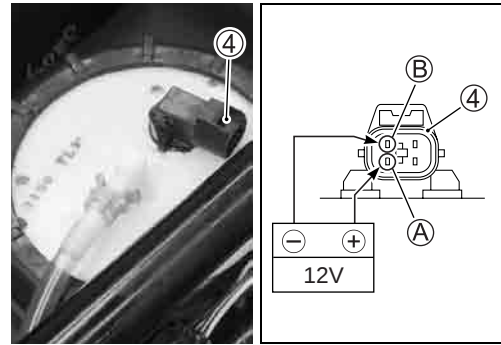
FUEL PUMP RELAY INSPECTION

Fuel pump relay is located in light side of the ECM.

- Remove the seat. (👉 8-6)
- Remove the fuel pump relay ①.

First, check the insulation between ① and ② terminals with pocket tester. Then apply 12 volts to ③ and ④ terminals, ⊕ to ③ and ⊖ to ④, and check the continuity between ① and ②.

If there is no continuity, replace it with a new one.



FUEL PUMP AND FUEL MESH FILTER

FUEL PUMP REMOVAL AND DISASSEMBLY

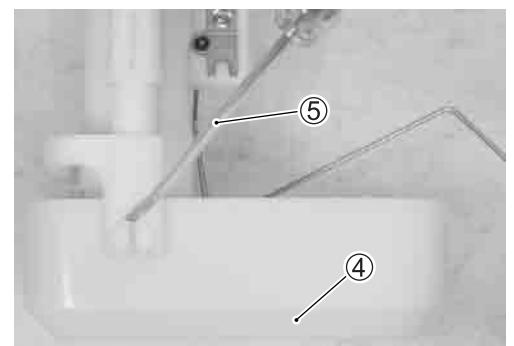
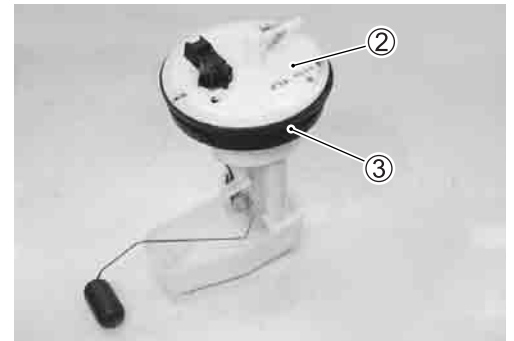
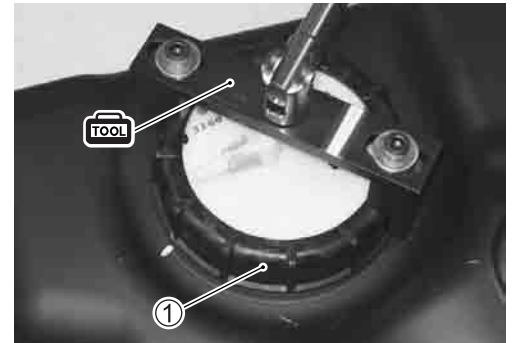
- Remove the fuel tank. (➡ 6-3)
- Loosen the fuel pump retainer ① with the special tool.

 **09942-51011: Ring locknut wrench**

WARNING

**Gasoline is highly flammable and explosive.
Keep heat, spark and flame away.**

- Remove the fuel pump ②.
- Remove the fuel pump gasket ③.
- Remove the fuel cup holder ④ with a  screwdriver ⑤.

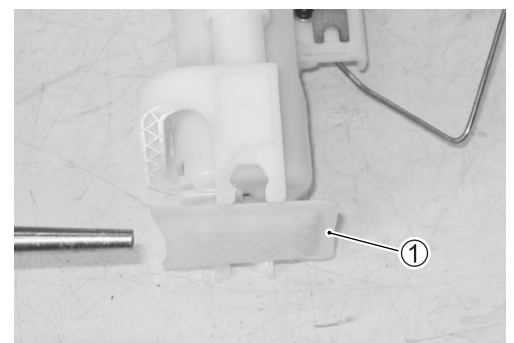


FUEL MESH FILTER INSPECTION AND CLEANING

If the fuel mesh filter ① is clogged with sediment or rust, fuel will not flow smoothly and loss in engine power may result. Blow the fuel mesh filter with compressed air.

NOTE:

If the fuel mesh filter is clogged with many sediment or rust, replace the fuel mesh pump assembly with a new one.



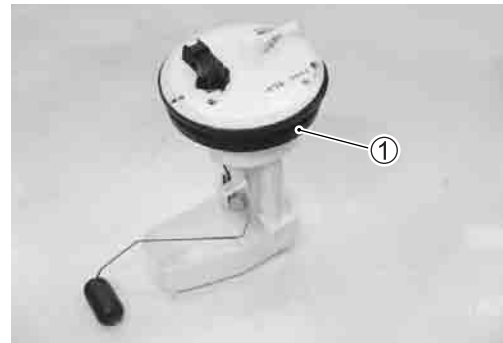
FUEL PUMP REASSEMBLY AND INSTALLATION

Reassemble and install the fuel pump in the reverse order of removal and disassembly. Pay attention to the following points:

- Install the fuel pump gasket ① to the fuel pump.

⚠ WARNING

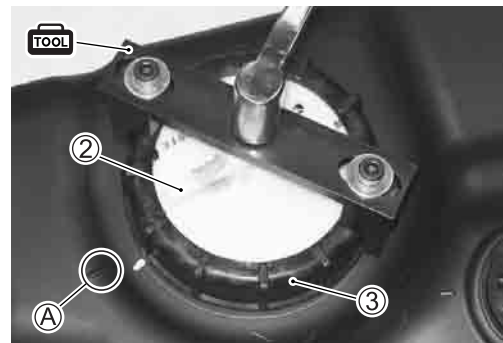
The removed fuel pump gasket must be replaced with a new one to prevent fuel leakage.



- Align the fuel pump nipple ② with the alignment mark (A) on the fuel tank.
- Tighten the fuel pump retainer ③ to the specified torque with the special tool.

TOOL 09941-51012: Riug lock-nut wrench

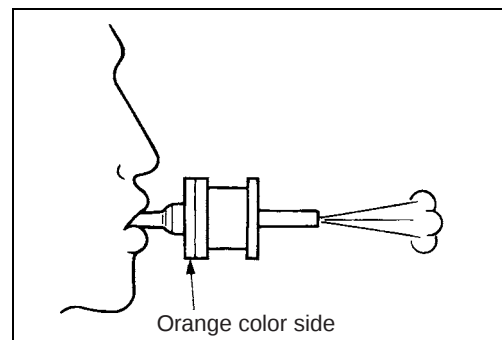
DATA Fuel pump retainer: 35 N·m (3.5 kgf/m, 25.5 lb-ft)

**FUEL TANK PRESSURE CONTROL (FTPC) VALVE INSPECTION**

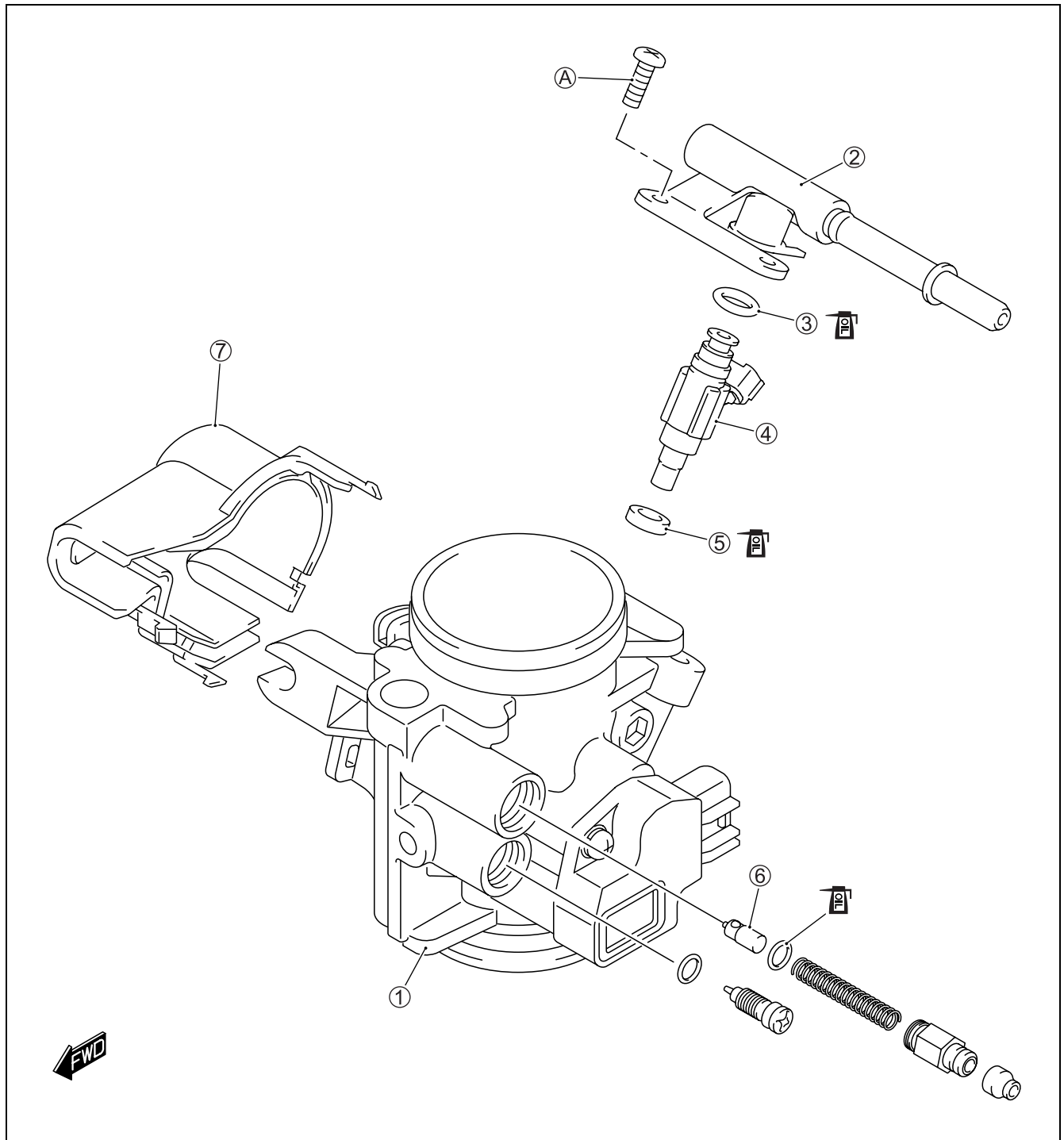
- Remove the FTPC valve.



- Check the FTPC valve if air can pass through smoothly when blown from the orange color side and not from the other side. If abnormal condition is found, replace the FTPC valve with a new one.



THROTTLE BODY CONSTRUCTION



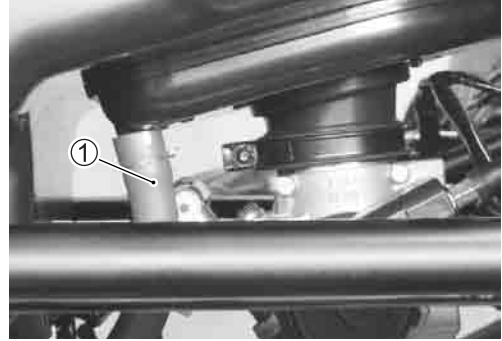
①	Throttle body	⑤	Injector seal
②	Fuel delivery pipe	⑥	Starter valve
③	O-ring	⑦	Throttle cable cover
④	Fuel injector	A	Fuel delivery pipe mounting screw



ITEM	N·m	kgf-m	lb-ft
A	5.0	0.5	3.7

AIR CLEANER BOX REMOVAL

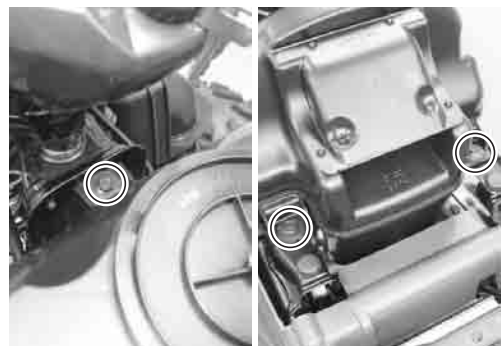
- Remove the front fender. (☞ 8-9)
- Disconnect the PCV hose ①.



- Loosen the throttle body clamp screw.



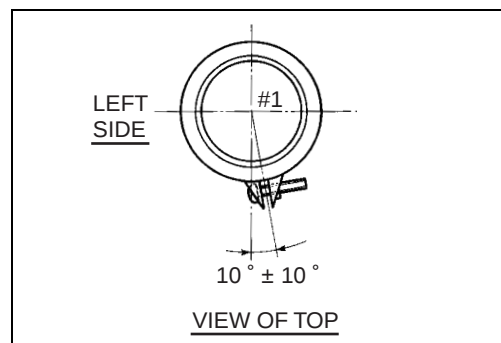
- Remove the air cleaner box mounting bolts.
- Remove the air cleaner box.



AIR CLEANER BOX INSTALLATION

Install the air cleaner box in the reverse order of removal. Pay attention to the following points:

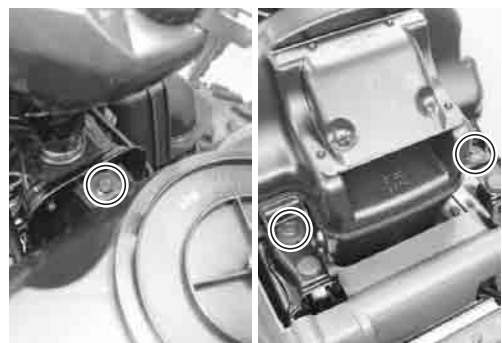
- Install the air cleaner box and tighten the throttle body clamp screw as shown in the illustration.



- Tighten the air cleaner box mounting bolts to the specified torque.

 **Air cleaner box mounting bolt:**

4.5 N·m (0.45 kgf-m, 3.3 lb-ft)



THROTTLE BODY REMOVAL

- Remove the air cleaner box. (→ 6-10)
- Place a rug under the fuel feed hose ① and disconnect the fuel feed hose ① from the fuel delivery pipe.

⚠ WARNING

**Gasoline is highly flammable and explosive.
Keep heat, spark and flame away.**

- Disconnect the fuel injector coupler ② and TP/IAP/IAT sensor coupler ③.

CAUTION

Be careful not to touch the electrical terminal of the TP/IAP/IAT sensor.

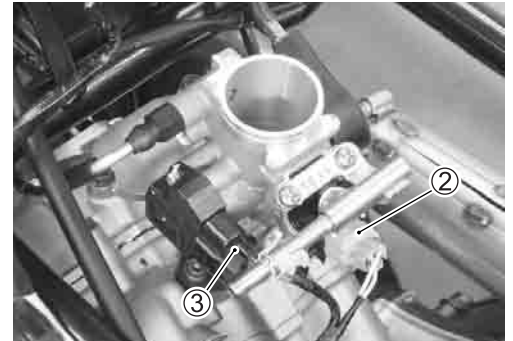
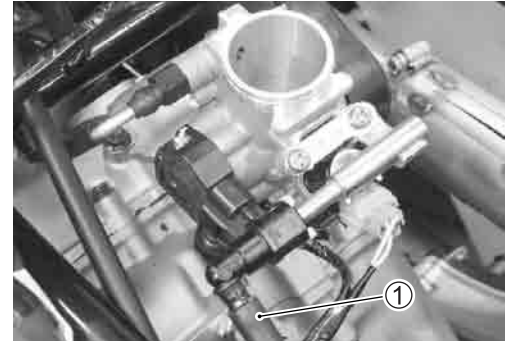
- Remove the throttle cable cover ④.

- Disconnect the throttle cable from drum.

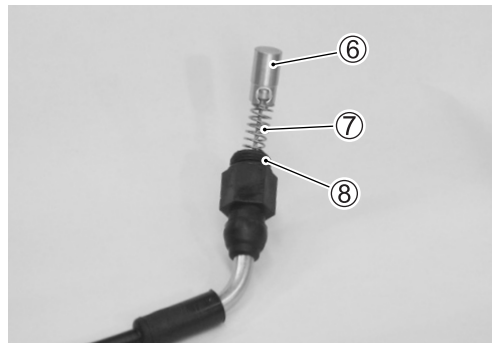
CAUTION

After disconnecting the throttle cables, do not snap the throttle valve from full open to full close. It may cause damage to the throttle valve and throttle body.

- Disconnect the starter cable ⑤ from the throttle body assembly.



- Remove the starter valve ⑥, spring ⑦ and O-ring ⑧ from the starter cable.

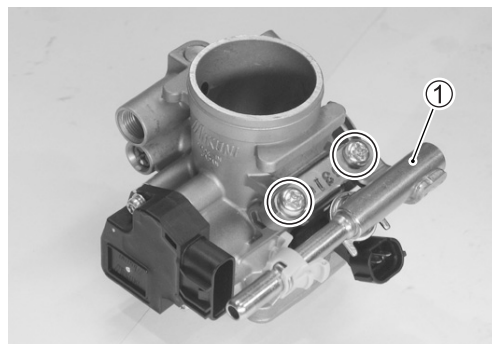


- Loosen the throttle body clamp screw and remove the throttle body assembly.



THROTTLE BODY DISASSEMBLY

- Remove the fuel delivery pipe ①.



- Remove the fuel injector ② from the fuel delivery pipe.

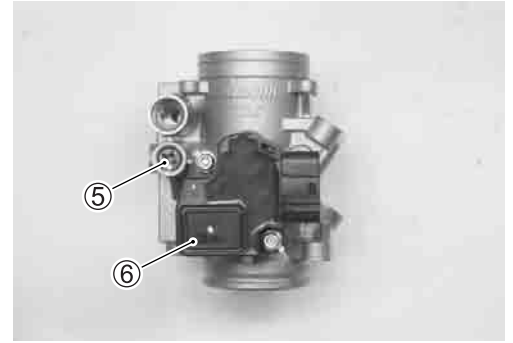


- Remove the O-ring ③ and injector seal ④ from the fuel injector.

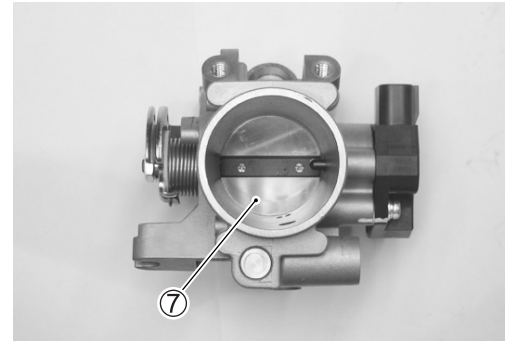


CAUTION

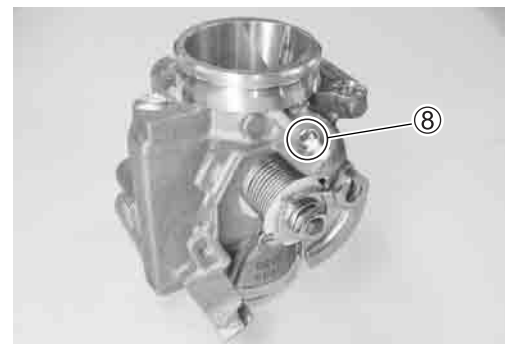
- * Avoid removing the idle air screw ⑤.
- * Never remove the TP/IAP/IAT sensor ⑥.

**CAUTION**

- * Never remove the throttle valve ⑦.
- * Never use carburetor cleaning chemicals on the throttle body assembly.
- * Never use compressed air to passageways.

**CAUTION**

- * Avoid removing the throttle lever stopper screw ⑧.



THROTTLE BODY INSPECTION

Check following items for any damage or clogging.

- * O-ring
- * Throttle valve
- * Idle air screw

THROTTLE BODY REASSEMBLY

Reassemble the throttle body in the reverse order of disassembly. Pay attention to the following points:

- Apply thin coat of the engine oil to the injector seal ① and O-ring ②.
- Install the fuel injector ③ by pushing it straight to throttle body.

⚠ WARNING

The removed injector seal and O-ring must be replaced with new ones to prevent fuel pressure leak.

CAUTION

Never turn the injector while pushing it.

- Install the fuel delivery pipe ④ to the injector.

CAUTION

Never turn the fuel delivery pipe while pushing it.

- Tighten the fuel delivery pipe mounting screws to the specified torque.

 Fuel delivery pipe mounting screw:
5.0 N·m (0.5 kgf-m, 3.7 lb-ft)

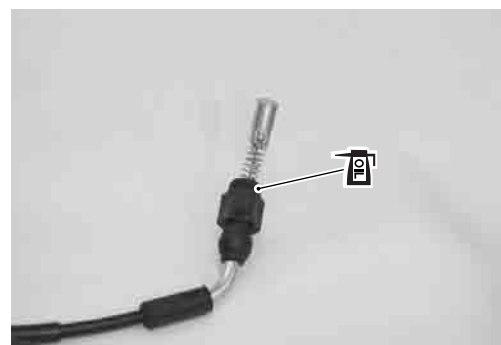
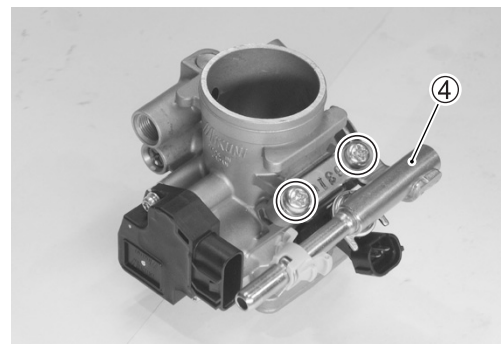
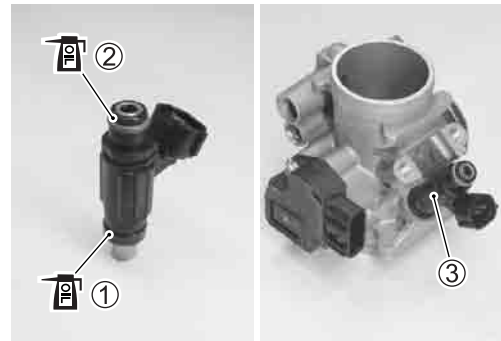
THROTTLE BODY INSTALLATION

Install the throttle body assembly in the reverse order of removal. Pay attention to the following points:

- Align the groove of starter valve with the starter cable end.
- Apply thin coat of the engine oil to the O-ring.

CAUTION

The removed O-ring must be replaced with a new one.



- Align the lug on the throttle body with the intake pipe's cutout.
- Adjust the throttle cable play. (🔧 2-13)



FUEL INJECTOR REMOVAL

- Remove the air cleaner box. (🔧 6-10)
- With battery negative cable disconnected, disconnect the injector coupler.
- Remove the fuel delivery pipe. (🔧 6-12)
- Remove the fuel injector. (🔧 6-12)

FUEL INJECTOR INSPECTION

Check fuel injector filter for evidence of dirt and contamination. If present, clean and check for presence of dirt in the fuel lines and fuel tank.

The fuel injector can be checked without removing it from the throttle body.

Refer to page 5-55 for details.



FUEL INJECTOR INSTALLATION

- Apply thin coat of the engine oil to injector seal and O-ring.

CAUTION

The removed injector seal and O-ring must be replaced with new ones to prevent fuel pressure leak.

- Install the injector by pushing it straight to the throttle body. Never turn the injector while pushing it. (🔧 6-14)
- Install the fuel delivery pipe. (🔧 6-14)
- Install the air cleaner box. (🔧 6-10)

COOLING AND LUBRICATION SYSTEM

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ENGINE COOLANT

At the time of manufacture, the cooling system is filled with a 50:50 mixture of distilled water and ethylene glycol anti-freeze. This 50:50 mixture will provide the optimum corrosion protection and excellent heat protection, and will protect the cooling system from freezing at temperatures above -31 °C (-24 °F).

If the vehicle is to be exposed to temperatures below -31 °C (-24 °F), this mixing ratio should be increased up to 55% or 60% according to the figure.

Anti-freeze density	Freezing point
50%	-30 °C (-22 °F)
55%	-40 °C (-40 °F)
60%	-55 °C (-67 °F)

CAUTION

- * Use a high quality ethylene glycol base anti-freeze, mixed with distilled water. Do not mix an alcohol base anti-freeze and different brands of anti-freeze.
- * Do not put in 60% and more anti-freeze or 50% and less. (Refer to below figure.)
- * Do not use a radiator anti-leak additive.

50% Engine coolant including reserve tank capacity

Anti-freeze	1 225 ml (1.3/1.1 US/lim. pt)
Water	1 225 ml (1.3/1.1 US/lim. pt)

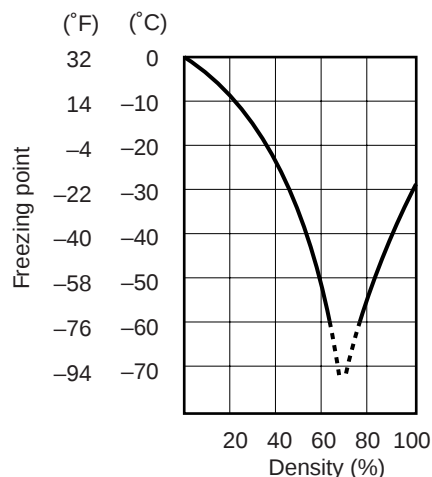


Fig.1 Engine coolant density-freezing point curve.

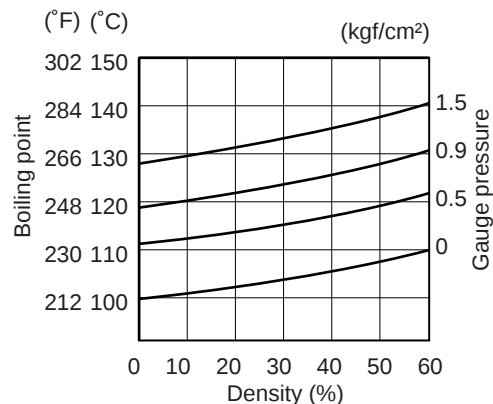
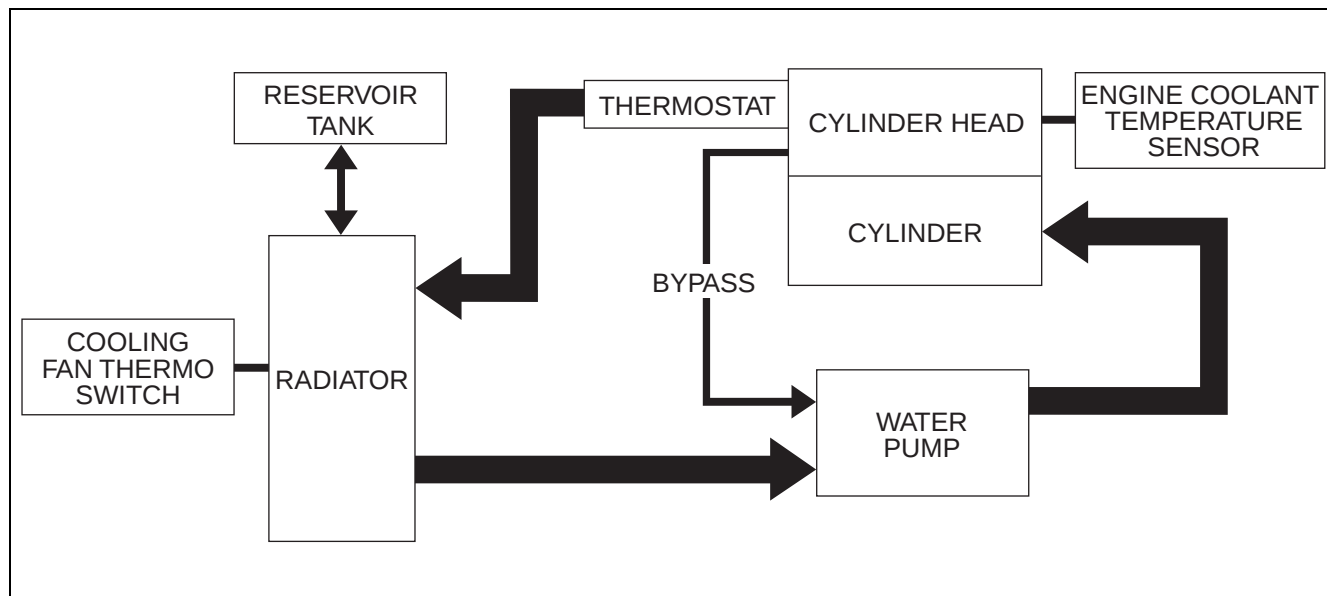


Fig.2 Engine coolant density-boiling point curve.

⚠ WARNING

- * You can be injured by scalding fluid or steam if you open the radiator cap when the engine is hot. After the engine cools, wrap a thick cloth around cap and carefully remove the cap by turning it a quarter turn to allow pressure to escape and then turn the cap all the way off.
- * The engine must be cool before servicing the cooling system.
- * Coolant is harmful;
 - If it comes in contact with skin or eyes, flush with water.
 - If swallowed accidentally, induce vomiting and call physician immediately.
 - Keep it away from children.

COOLING CIRCUIT



COOLING CIRCUIT INSPECTION

Before removing the radiator and draining the engine coolant, inspect the cooling circuit for tightness.

- Remove the radiator cap lid. (☞ 2-14)
- Remove the radiator cap ① and connect the tester ② to the filler.

⚠ WARNING

Do not remove the radiator cap when the engine is hot.

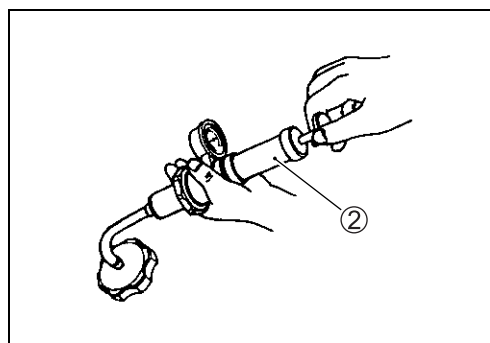
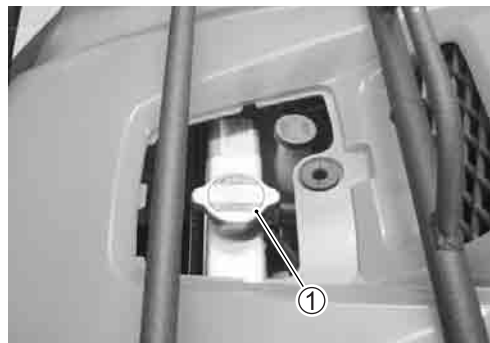
- Give a pressure of about 120 kPa (1.2 kgf/cm², 17 psi) and see if the system holds this pressure for 10 seconds.
- If the pressure should fall during this 10-second interval, it means that there is a leaking point in the system. In such a case, inspect the entire system and replace the leaking component or part.

⚠ WARNING

When removing the radiator cap tester, put a rag on the filler to prevent spouting of engine coolant.

CAUTION

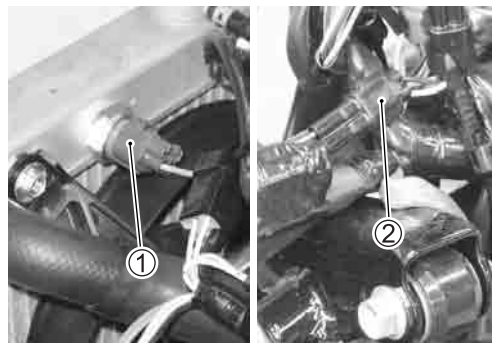
Do not allow the pressure to exceed the radiator cap release pressure, or the radiator can be damaged.



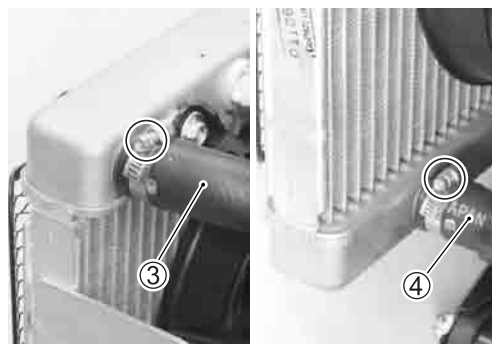
RADIATOR AND WATER HOSE

RADIATOR REMOVAL

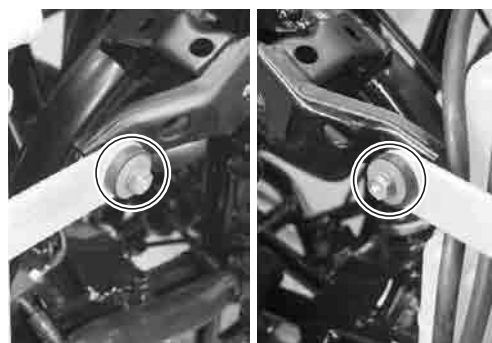
- Remove the front fender. (☞ 8-15)
- Drain engine coolant. (☞ 2-14)
- Disconnect the cooling fan thermo-switch coupler ① and cooling fan motor lead wire coupler ②.



- Disconnect the inlet hose ③.
- Disconnect the outlet hose ④.



- Remove the radiator mounting bolts.



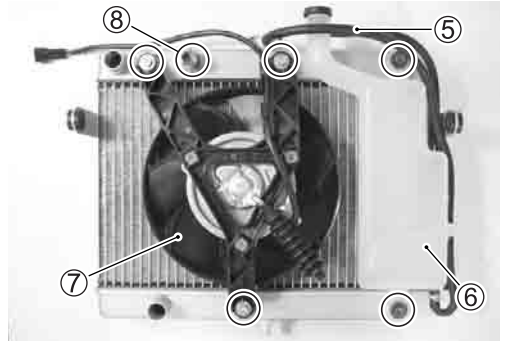
- Remove the radiator.

CAUTION

Be careful not bent the radiator fin.



- Disconnect the siphon hose ⑤ and remove the reservoir tank ⑥.
- Remove the cooling fan ⑦.
- Remove the cooling fan thermo-switch ⑧.

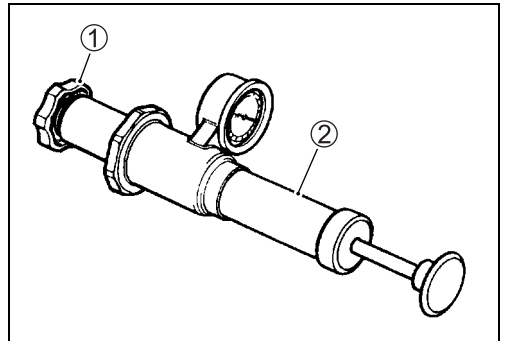


- Remove the radiator cover ⑨.



RADIATOR CAP INSPECTION

- Remove the radiator cap ① from the radiator.
- Fit the cap ① to the radiator cap tester ②.
- Build up pressure slowly by operating the tester. Make sure that the pressure build-up stops at 108 – 137 kPa (1.08 – 1.37 kgf/cm², 15.4 – 19.5 psi) and that, with the tester held stand-still, the cap is capable of holding that pressure for at least 10 seconds.
- Replace the cap if it is found not to satisfy either of these two requirements.



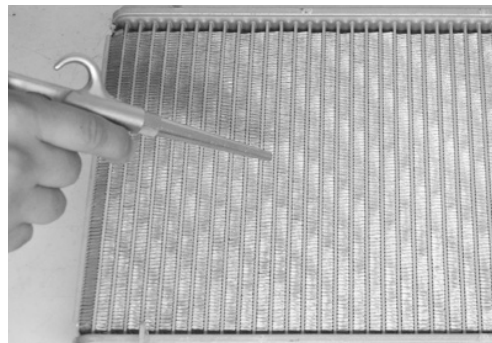
Radiator cap valve opening pressure

Standard: 108 – 137 kPa

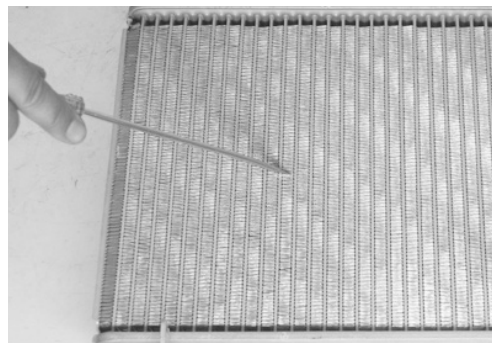
(1.08 – 1.37 kgf/cm², 15.4 – 19.5 psi)

RADIATOR INSPECTION AND CLEANING

- Road dirt or trash stuck on the fins must be removed.
- Use of compressed air is recommended for this cleaning.



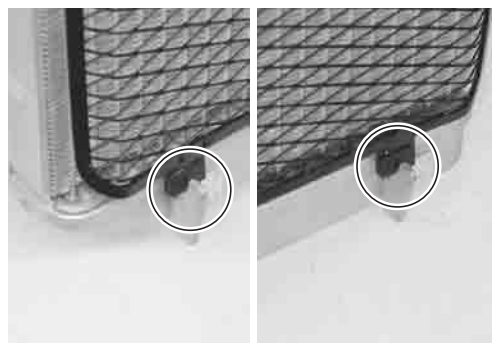
- Fins bent down or dented can be repaired by straightening them with the blade of a small ⊖ screwdriver.



RADIATOR INSTALLATION

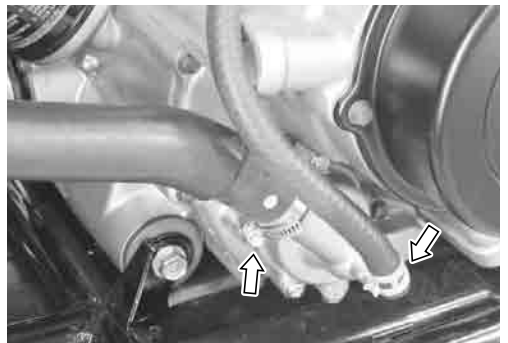
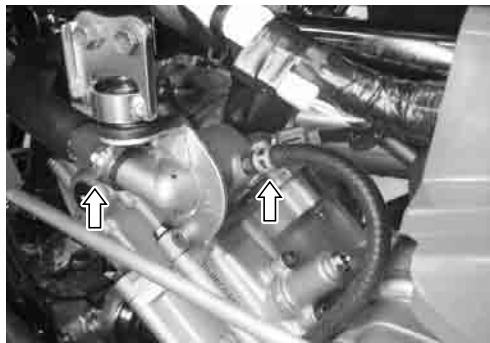
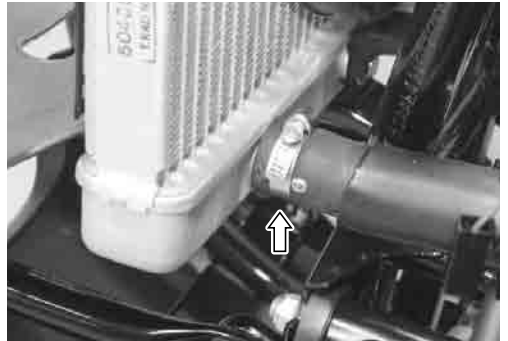
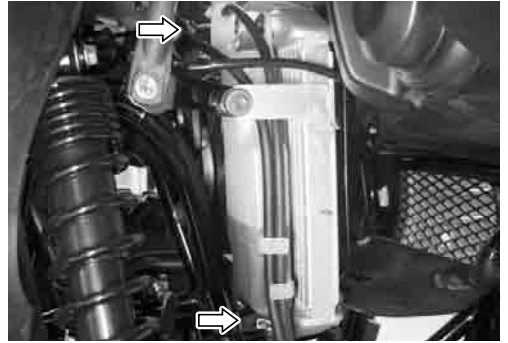
Install the radiator in the reverse order of removal. Pay attention to the following points:

- Install the cooling fan thermo-switch. (☞ 7-10)
- Align the grooves on the radiator covers with the boss on the radiator.
- Install the siphon hose and radiator hoses. (☞ 10-22)
- Pour engine coolant. (☞ 2-14)



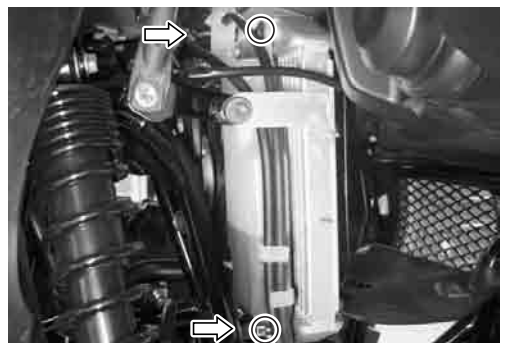
WATER HOSE INSPECTION

- Remove the front fender. (☞ 8-15)
- Any water hose found in a cracked condition or flattened must be replaced.
- Any leakage from the connecting section should be corrected by proper tightening.



RADIATOR RESERVOIR TANK REMOVAL AND REMOUNTING

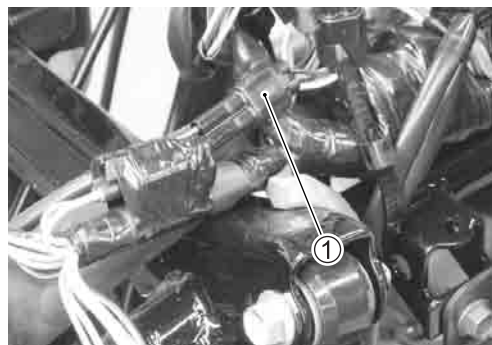
- Remove the right inner fender. (☞ 8-10)
- Remove the reservoir tank mounting bolts and disconnect the siphon hose from the reservoir tank and drain engine coolant.
- Install the reservoir tank in the reverse order of removal.
- Pour engine coolant. (☞ 2-14)



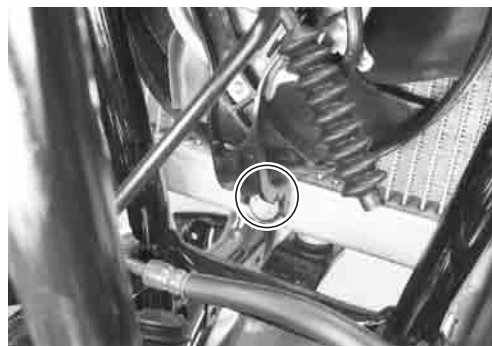
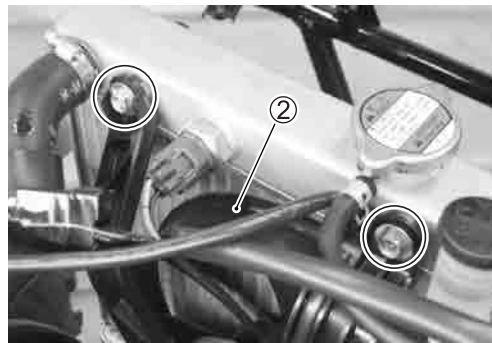
COOLING FAN

REMOVAL

- Remove the front fender. (☞ 8-15)
- Disconnect the cooling fan motor lead wire coupler ①.



- Remove the cooling fan unit ②.



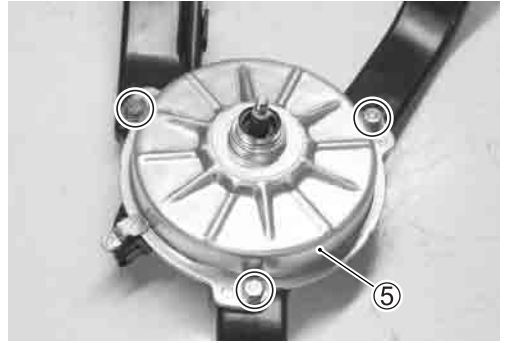
- Remove the cushion ③.



- Remove the cooling fan ④.



- Remove the cooling fan motor ⑤.



INSTALLATION

Install the cooling fan unit in the reverse order of removal. Pay attention to the following points:

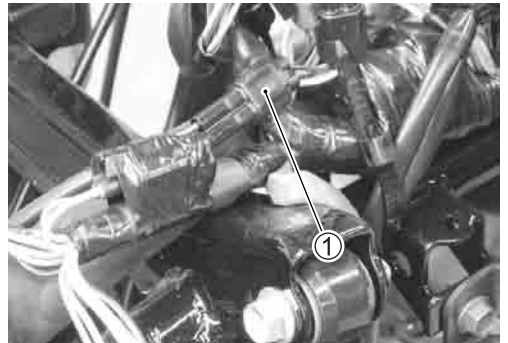
- Apply a small quantity of the THREAD LOCK SUPER “1303” on the cooling fan motor shaft.
- Tighten the cooling fan nut.

 **99000-32030: THREAD LOCK SUPER “1303”**



INSPECTION

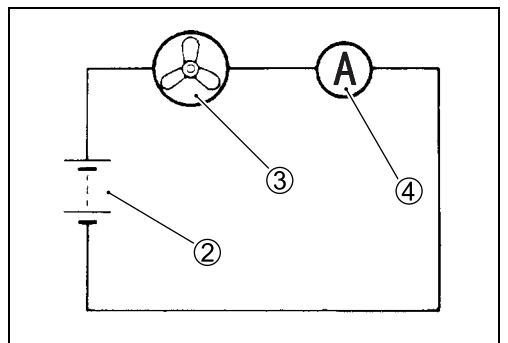
- Remove the front fender. (8-15)
- Disconnect the cooling fan lead wire coupler ①.
- Test the cooling fan motor for load current with an ammeter connected as shown in the illustration.



- The voltmeter is for making sure that the battery ② applies 12 volts to the cooling fan motor ③. With the cooling fan motor with electric motor fan running at full speed, the ammeter ④ should be indicating not 5 amperes and more.
- If the fan motor does not turn, replace the motor assembly with a new one.

NOTE:

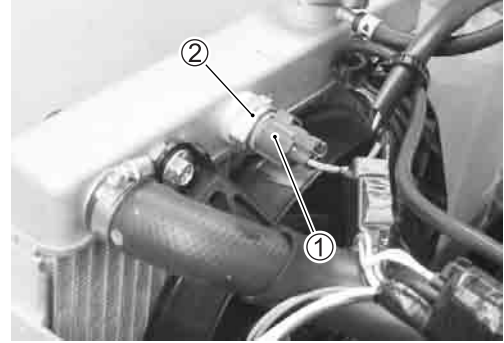
When making above test, it is not necessary to remove the cooling fan unit.



COOLING FAN THERMO-SWITCH

REMOVAL

- Remove the front fender. (☞ 8-15)
- Drain engine coolant. (☞ 2-14)
- Disconnect the cooling fan thermo-switch coupler ①.
- Remove the cooling fan thermo-switch ②.



INSPECTION

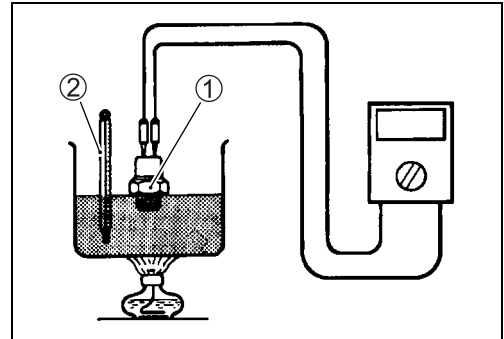
Check the thermo-switch closing or opening temperatures by testing it at the bench as shown in the figure. Connect the thermo-switch ① to a circuit tester and place it in the water contained in a pan, which is placed on a stove.

Heat the water to raise its temperature slowly and read the column thermometer ② when the switch closes or opens.

TOOL 09900-25008: Multi-circuit tester set

Tester knob indication: Continuity test (•••••)

DATA Cooling fan thermo-switch operating temperature
 Standard (OFF→ON): Approx. 93°C (199°F)
 (ON→OFF): Approx. 87°C (189°F)



CAUTION

- * Take special care when handling the cooling fan thermo-switch. It may cause damage if it gets a sharp impact.
- * Do not contact the cooling fan thermo-switch and the column thermometer with a pan.

INSTALLATION

Install the cooling fan thermo-switch in the reverse order of removal. Pay attention to the following points:

- Apply engine coolant to the O-ring ①.

CAUTION

The removed O-ring must be replaced with a new one to prevent engine coolant leakage.

- Tighten the cooling fan thermo-switch to the specified torque.

🔧 Cooling fan thermo-switch: 17 N·m (1.7 kgf-m, 12.5 lb-ft)

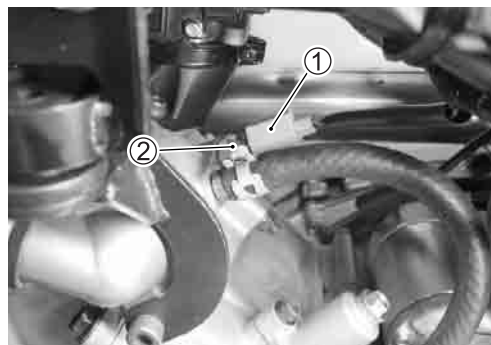
- Connect the cooling fan thermo-switch coupler.
- Pour engine coolant. (☞ 2-14)



ECT SENSOR

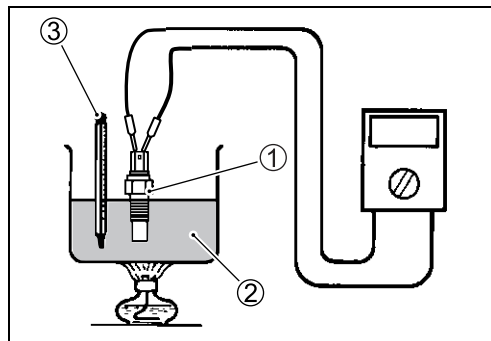
REMOVAL

- Remove the left side cover. (☞ 8-4)
- Disconnect the ECT sensor coupler ①.
- Place a rag under the ECT sensor ②.
- Remove the ECT sensor ②.



INSPECTION

- Check the ECT sensor by testing it at the bench as shown in the figure. Connect the ECT sensor ① to a circuit tester and place it in the oil ② contained in a pan, which is placed on a stove.
- Heat the oil to raise its temperature slowly and read the column thermometer ③ and the ohmmeter.
- If the ECT sensor ohmic value does not change in the proportion indicated, replace the ECT sensor with a new one.



DATA Temperature sensor specification

Temperature	Standard resistance
20 °C (68 °F)	Approx. 2.45 kΩ
40 °C (104 °F)	Approx. 1.15 kΩ
80 °C (176 °F)	Approx. 0.31 kΩ
100 °C (182 °F)	Approx. 0.18 kΩ

- If the resistance is noted to show infinity or too much different resistance value, replace the ECT sensor with a new one.

CAUTION

- * Take special care when handling the ECT sensor. It may cause damage if it gets a sharp impact.
- * Do not contact the ECT sensor and the column thermometer with a pan.

INSTALLATION

Install the ECT sensor in the reverse order of removal.

Pay attention to the following points:

- Apply engine coolant to the gasket ①.

CAUTION

The removed gasket must be replaced with a new one to prevent engine coolant leakage.

- Tighten the ECT sensor to the specified torque.

 **ECT sensor: 12 N·m (1.2 kgf-m, 8.5 lb-ft)**

CAUTION

Take special care when handling the ECT sensor. It may cause damage if it gets a sharp impact.

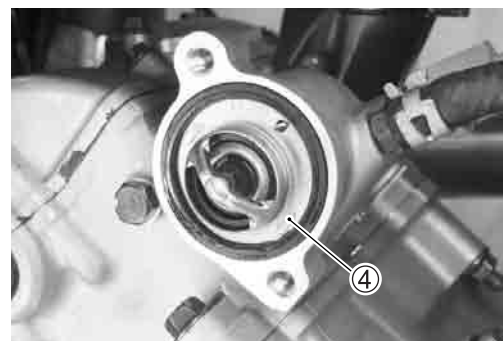
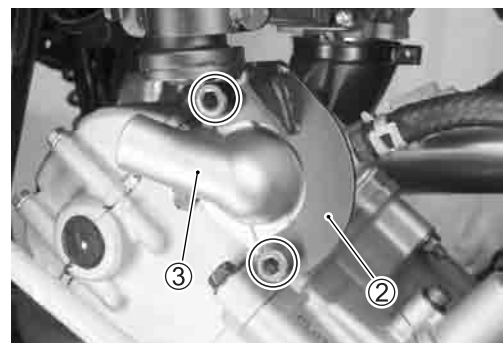
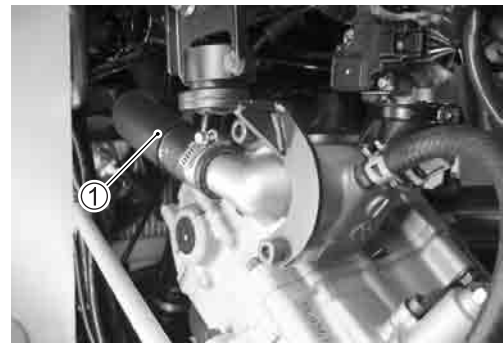
- Connect the ECT sensor coupler.
- Check the engine coolant level. ( 2-14)



THERMOSTAT

REMOVAL

- Remove the left side cover. ( 8-9)
- Remove the gear shift arm. ( 8-97)
- Drain the engine coolant. ( 2-14)
- Place a rag under the thermostat case.
- Disconnect the inlet hose ①.
- Remove the engine mounting damper plate ② and thermostat case ③.
- Remove the thermostat ④.

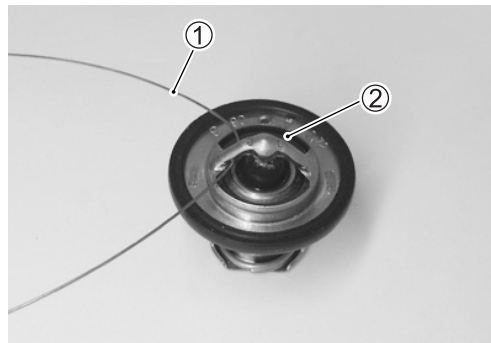


INSPECTION

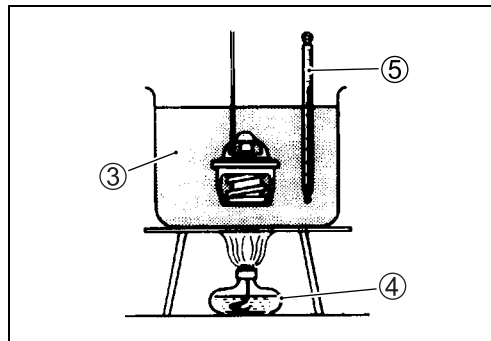
Inspect the thermostat pellet for signs of cracking.

Test the thermostat at the bench for control action, in the following manner.

- Pass a string ① between flange ② of thermostat, as shown.



- Immerse the thermostat in the water contained in a beaker, as shown in the illustration. Note that the immersed thermostat is in suspension. Heat the water ③ by placing the beaker on a stove ④ and observe the rising temperature on a thermometer ⑤.
- Read the thermometer just when opening the thermostat. This reading, which is the temperature level at which the thermostat valve begins to open, should satisfy the standard value.



DATA Thermostat valve opening temperature

Standard: 80.5 – 83.5 °C (177 – 182 °F)

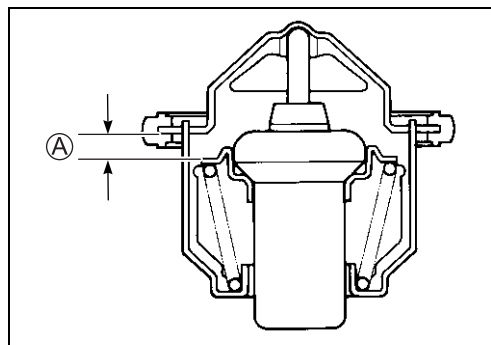
- Keep on heating the water to raise its temperature.
- Just when the water temperature reaches specified value, the thermostat valve should have lifted by at least 4.5 mm (0.18 in).

DATA Thermostat valve lift (A)

Standard:

8 mm and over at 95 °C (0.31 in and over at 203 °F)

- A thermostat failing to satisfy either of the two requirements (start-to-open temperature and valve lift) must be replaced.



INSTALLATION

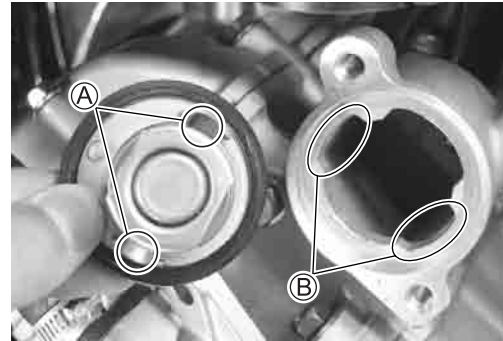
Install the thermostat in the reverse order of removal.

Pay attention to the following points:

- Apply engine coolant to the rubber seal on the thermostat.
- Install the thermostat.

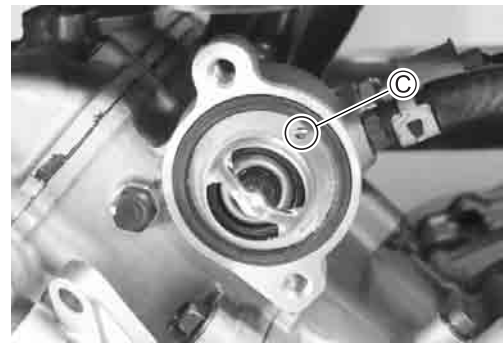
NOTE:

Align the lug on the thermostat (A) with the groove on the cylinder head (B).



NOTE:

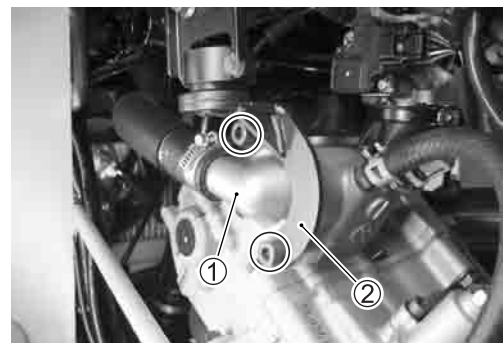
The jiggle valve (C) of the thermostat faces upside.



- Install the thermostat case (1) and engine mounting damper plate (2).
- Tighten the thermostat case bolts to the specified torque.

 **Thermostat case bolt: 23 N·m (2.3 kgf-m, 16.5 lb-ft)**

- After installing the thermostat, thermostat case and engine mounting damper plate, be sure to add engine coolant.
- Install the gear shift arm. ( 8-98)



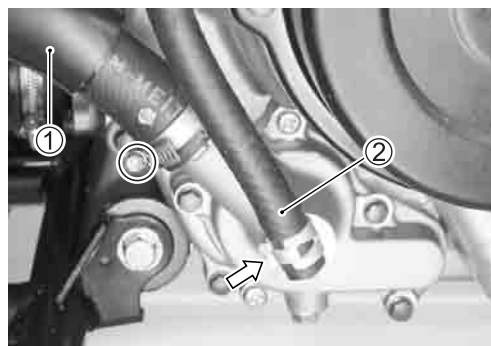
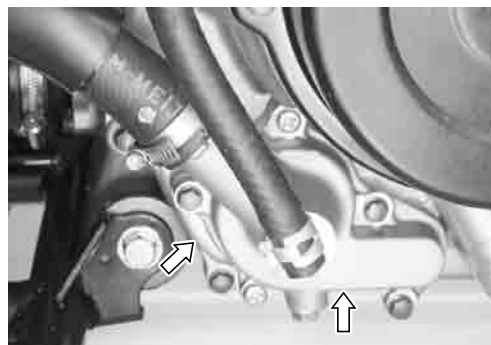
WATER PUMP

REMOVAL AND DISASSEMBLY

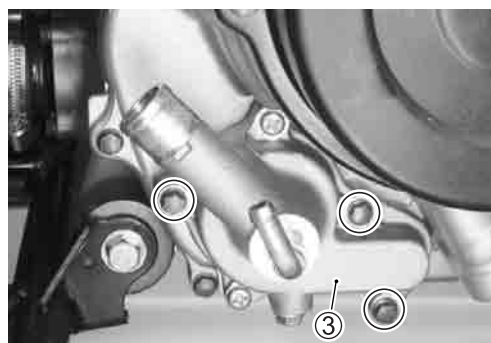
NOTE:

Before draining engine oil and engine coolant, inspect engine oil and coolant leakage between the water pump and crankcase. If engine oil is leaking, visually inspect the oil seal and O-ring. If engine coolant is leaking, visually inspect the mechanical seal and seal ring. (☞ 7-17)

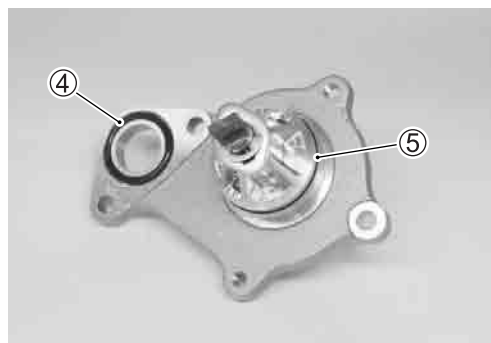
- Remove the left upper mud guard. (☞ 8-9)
- Remove the left mud guard. (☞ 8-9)
- Drain engine coolant. (☞ 2-14)
- Drain engine oil. (☞ 2-9)
- Disconnect the outlet hose ① and water bypass hose ②.



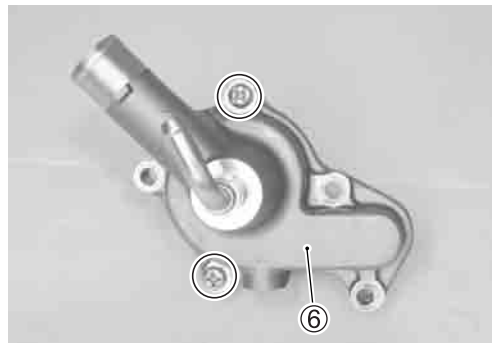
- Remove the water pump ③.



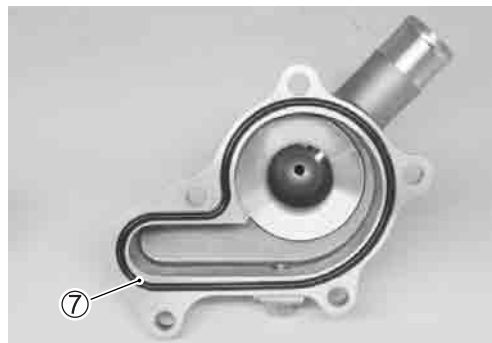
- Remove the O-rings ④ and ⑤.



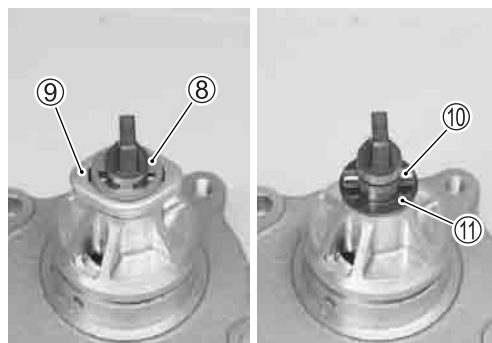
- Remove the water pump cover ⑥.



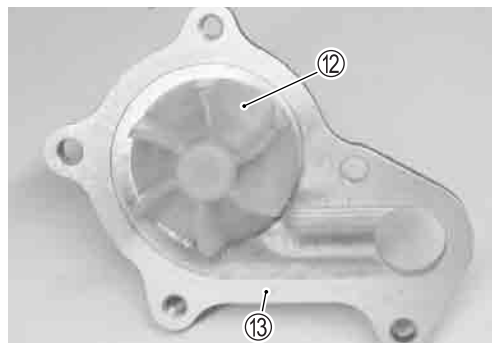
- Remove the O-ring ⑦.



- Remove the E-ring ⑧, pin holder ⑨, pin ⑩ and washer ⑪.



- Remove the impeller ⑫ from the water pump body ⑬.

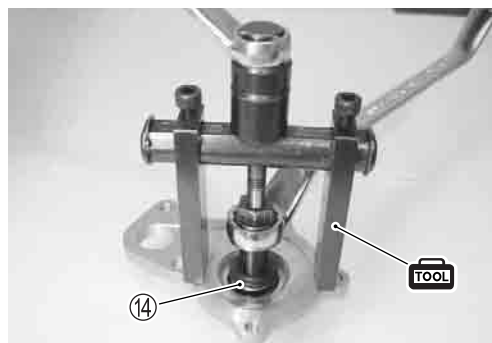


- Remove the mechanical seal ⑭ with the special tool.

TOOL 09921-20240: Bearing remover set (12 mm)

NOTE:

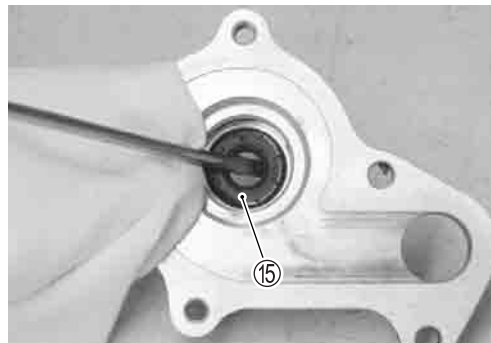
If there is no abnormal condition, the mechanical seal removal is not necessary.



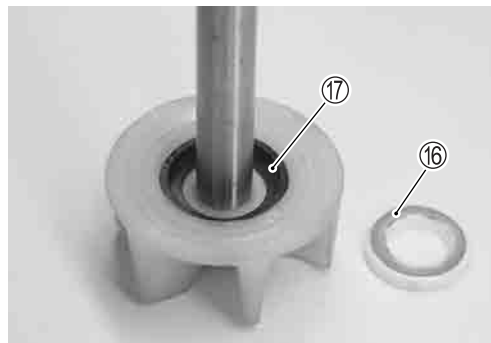
- Place a rag over the water pump body.
- Remove the oil seal ⑮ with a suitable bar.

NOTE:

If there is no abnormal condition, the oil seal removal is not necessary.



- Remove the mechanical seal ring ⑯ and rubber seal ⑰ from the impeller.



INSPECTION

MECHANICAL SEAL

- Visually inspect the mechanical seal for damage, with particular attention given to the sealing face.
- Replace the mechanical seal that shows indications of leakage.



OIL SEAL

- Visually inspect the oil seal for damage, with particular attention given to the lip.
- Replace the oil seal that shows indications of leakage.



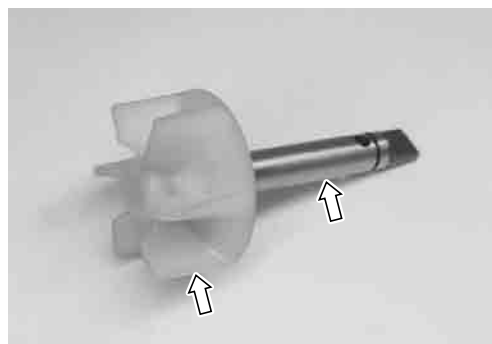
IMPELLER SHAFT JOURNAL

- Visually inspect the journal for damage or scratch.
- Replace the water pump body if necessary.



IMPELLER

- Visually inspect the impeller and its shaft for damage.

**REASSEMBLY AND INSTALLATION**

- Install the oil seal with the special tool.

TOOL 09913-70210: Bearing installer set

CAUTION

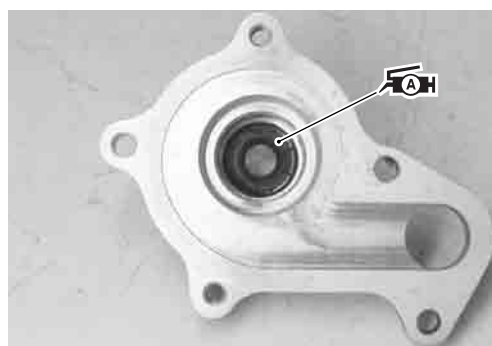
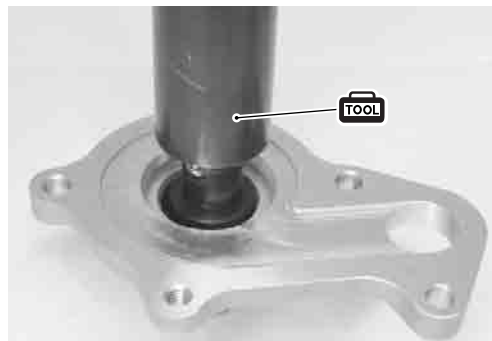
The removed oil seal must be replaced with a new one.

NOTE:

The stamped mark on the oil seal faces outside.

- Apply a small quantity of the SUZUKI SUPER GREASE “A” to the oil seal lip.

TOOL 99000-25010: SUZUKI SUPER GREASE “A”
(or equivalent grease)



- Install the mechanical seal with a suitable size socket wrench.

NOTE:

On the mechanical seal, the sealer ① has been applied.

CAUTION

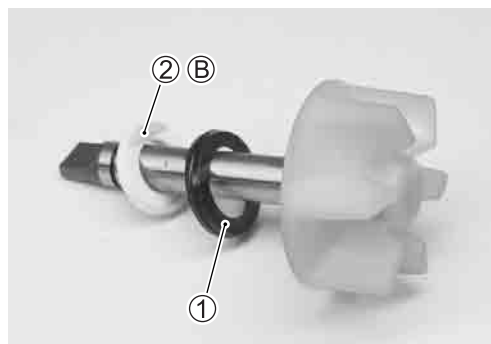
The removed mechanical seal must be replaced with a new one.



- Install the rubber seal ① into the impeller.
- After wiping off the oily or greasy matter from the mechanical seal ring ②, install it into the impeller.

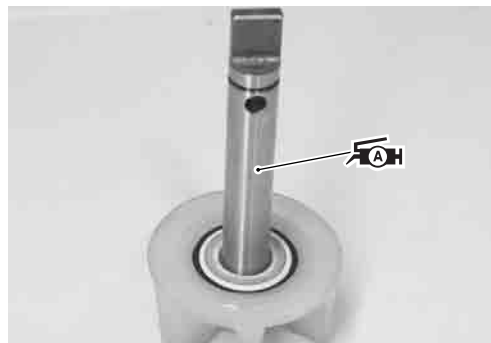
NOTE:

The paint marked side ⑥ of the mechanical seal ring faces the impeller.

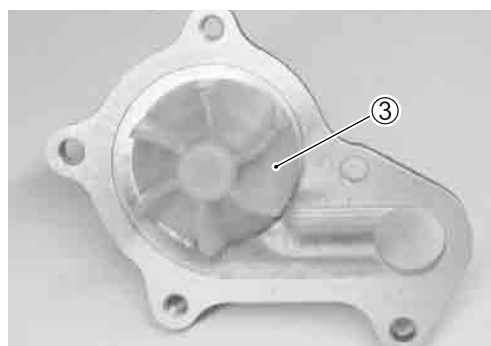


- Apply SUZUKI SUPER GREASE "A" to the impeller shaft.

 99000-25010: SUZUKI SUPER GREASE "A"
(or equivalent grease)



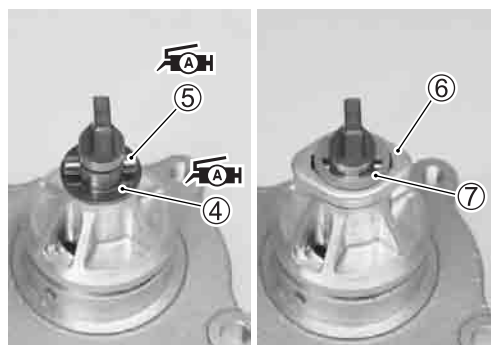
- Install the impeller shaft ③ to the water pump body.



- Apply SUZUKI SUPER GREASE "A" to the washer and pin holder.

 99000-25010: SUZUKI SUPER GREASE "A"
(or equivalent grease)

- Install the washer ④, pin ⑤, pin holder ⑥ and E-ring ⑦.



- Apply engine coolant to the O-ring ⑧.
- Apply SUZUKI SUPER GREASE "A" to the O-ring ⑨.

 **99000-25010: SUZUKI SUPER GREASE "A"**
(or equivalent grease)

CAUTION

The removed O-rings must be replaced with new ones.

- Install the O-rings ⑧ and ⑨ to the water pump body.

- Apply engine coolant to the O-ring ⑩.
- Install the O-ring ⑩ to the water pump cover ⑪.

CAUTION

The removed O-ring must be replaced with a new one.

- Install the water pump cover to the water pump body ⑫.

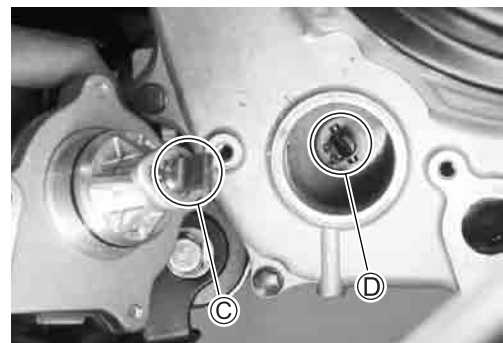
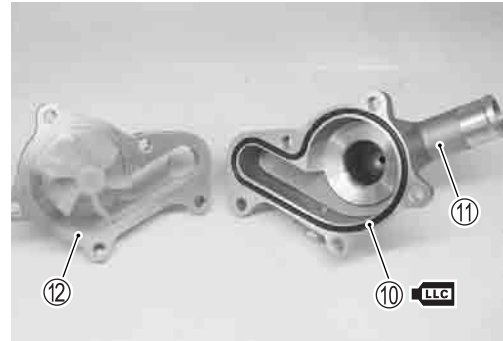
- Tighten the water pump cover screws to the specified torque.

 **Water pump cover screw: 5.5 N·m (0.55 kgf-m, 4.0 lb-ft)**

- Install the water pump to the generator cover.

NOTE:

Set the water pump shaft end ③ to the oil pump shaft ④ as shown.



- Tighten the water pump mounting bolts to the specified torque.

 **Water pump mounting bolt: 10 N·m (1.0 kgf-m, 7.0 lb-ft)**



- Connect the outlet hose and water bypass hose.
- Pour engine coolant. ( 2-14)
- Pour engine oil. ( 2-10)

LUBRICATION SYSTEM

OIL FILTER

 2-10

OIL PRESSURE

 2-33

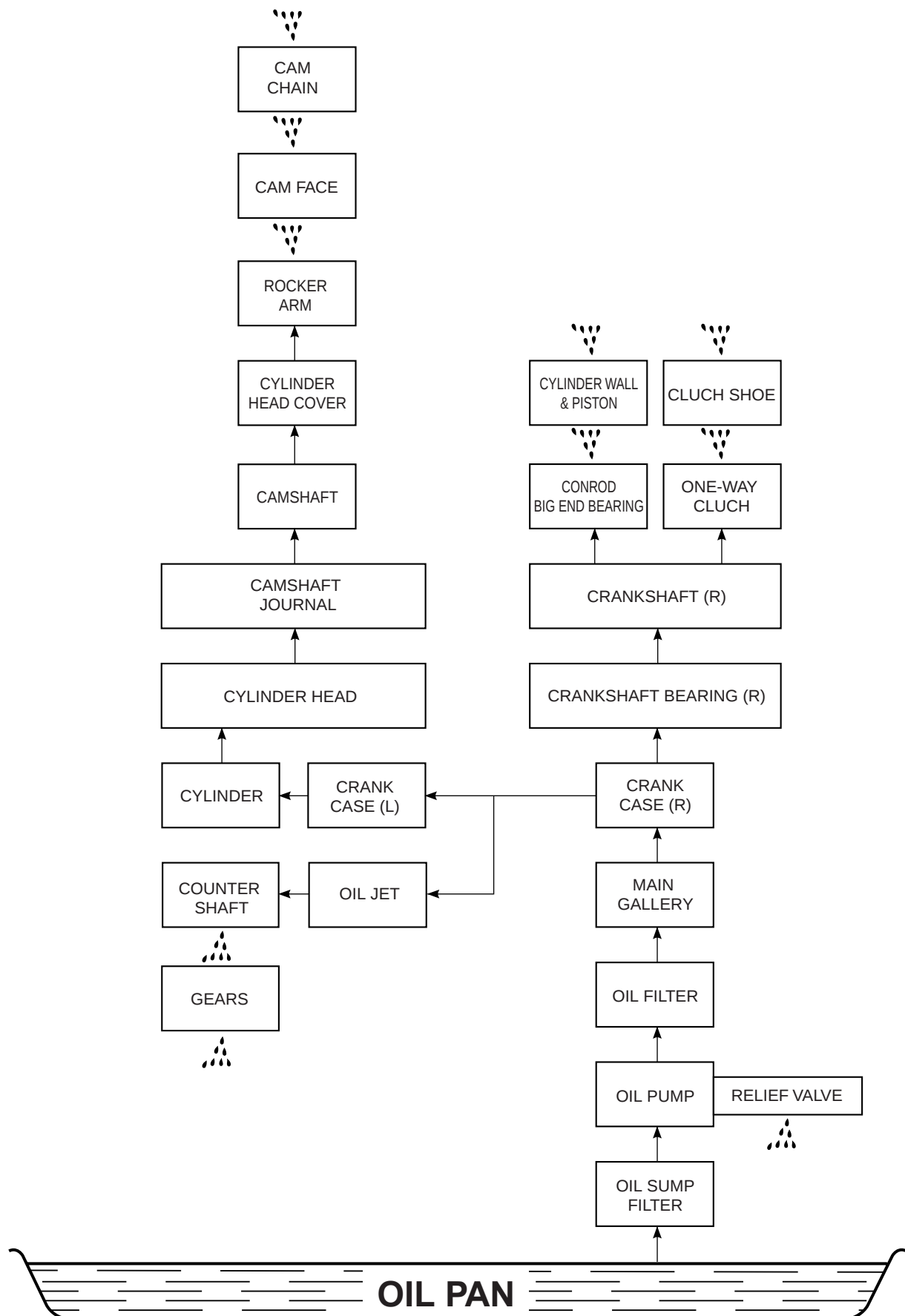
OIL PUMP

 3-58

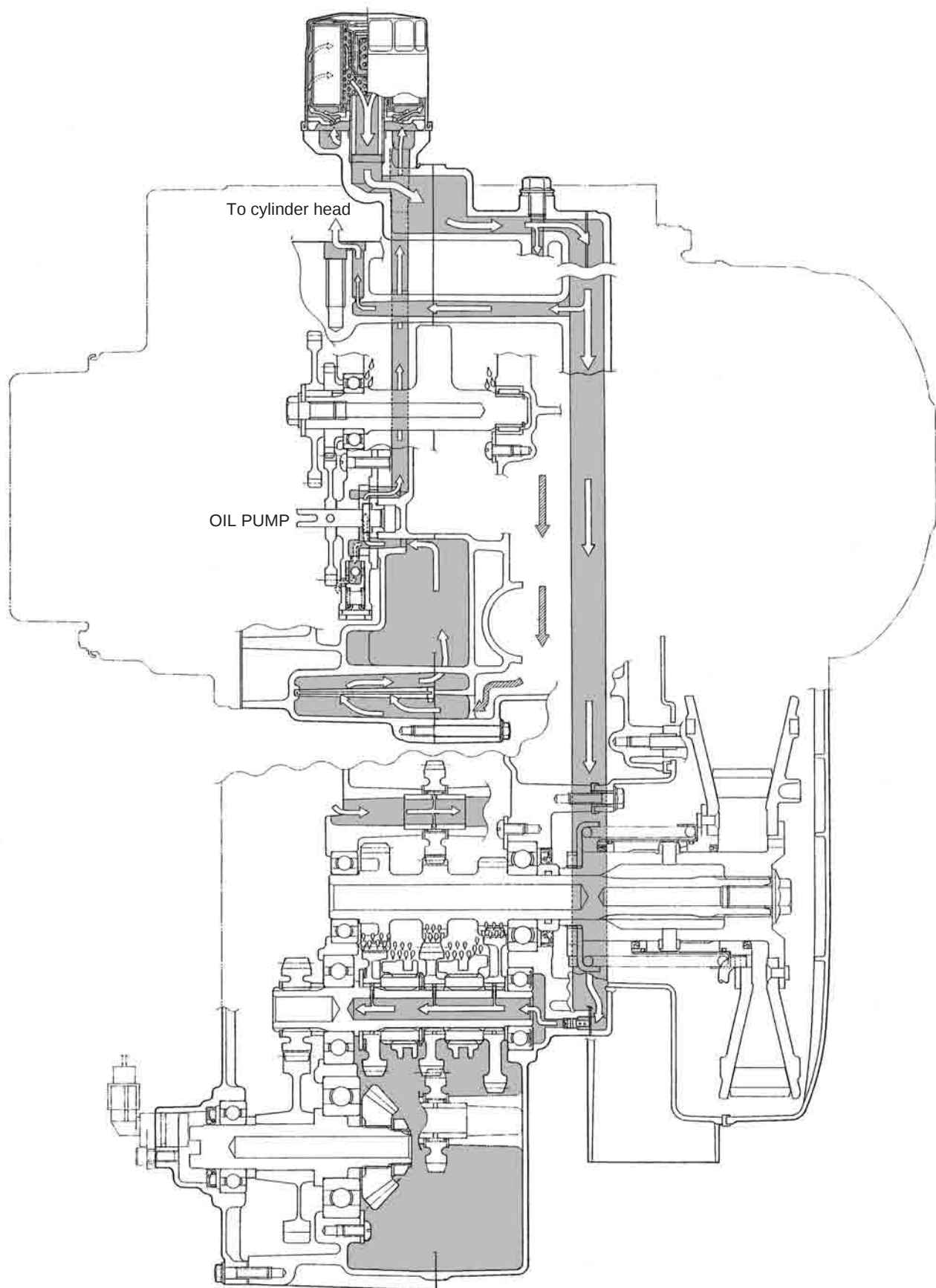
OIL SUMP FILTER

 3-58

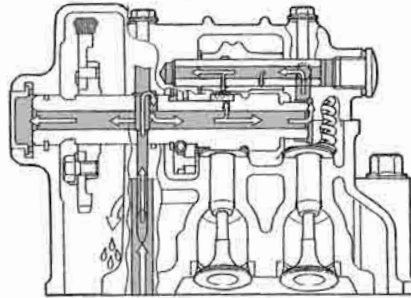
ENGINE LUBRICATION SYSTEM CHART



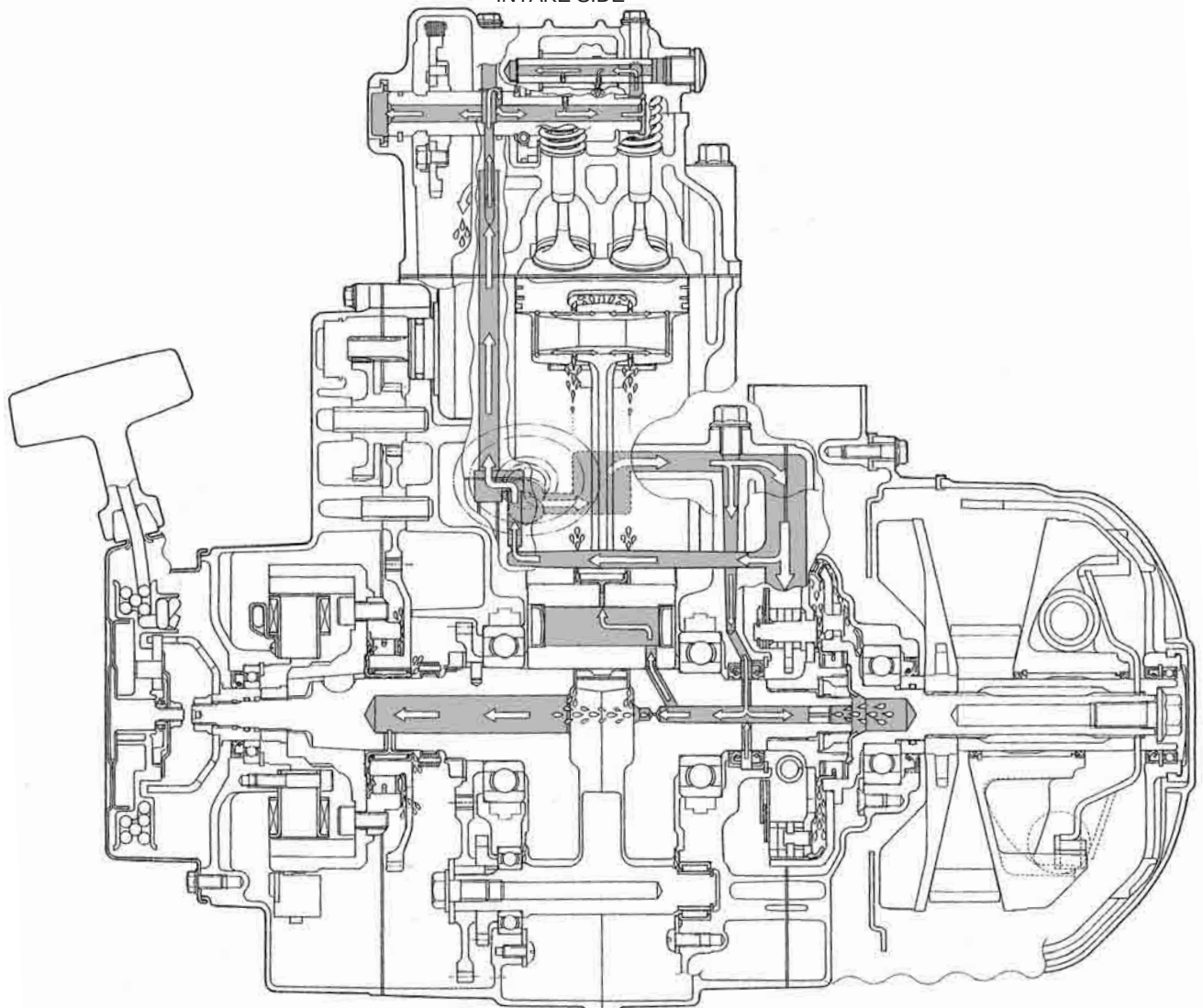
ENGINE LUBRICATION SYSTEM



EXHAUST SIDE



INTAKE SIDE



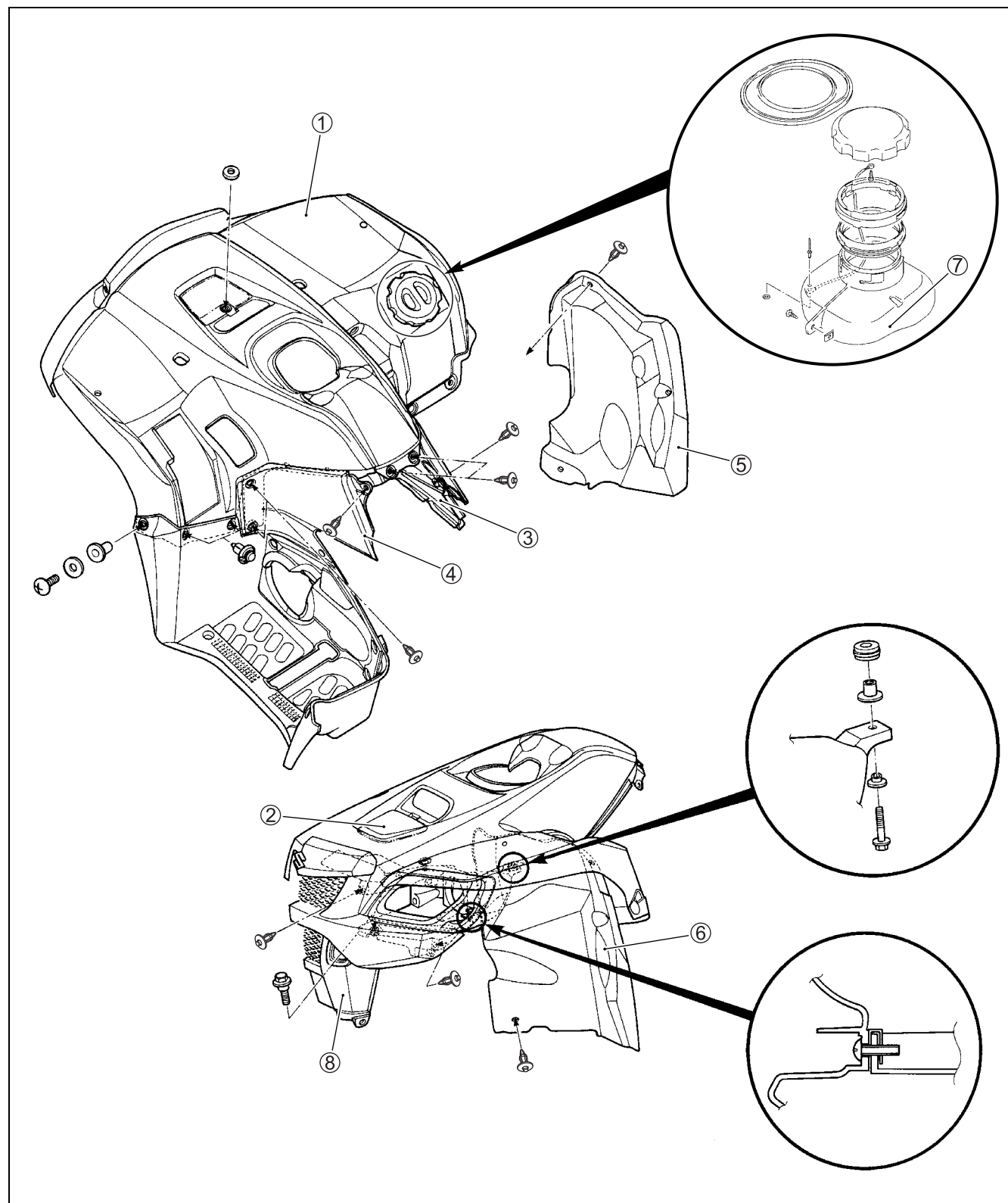
CHASSIS

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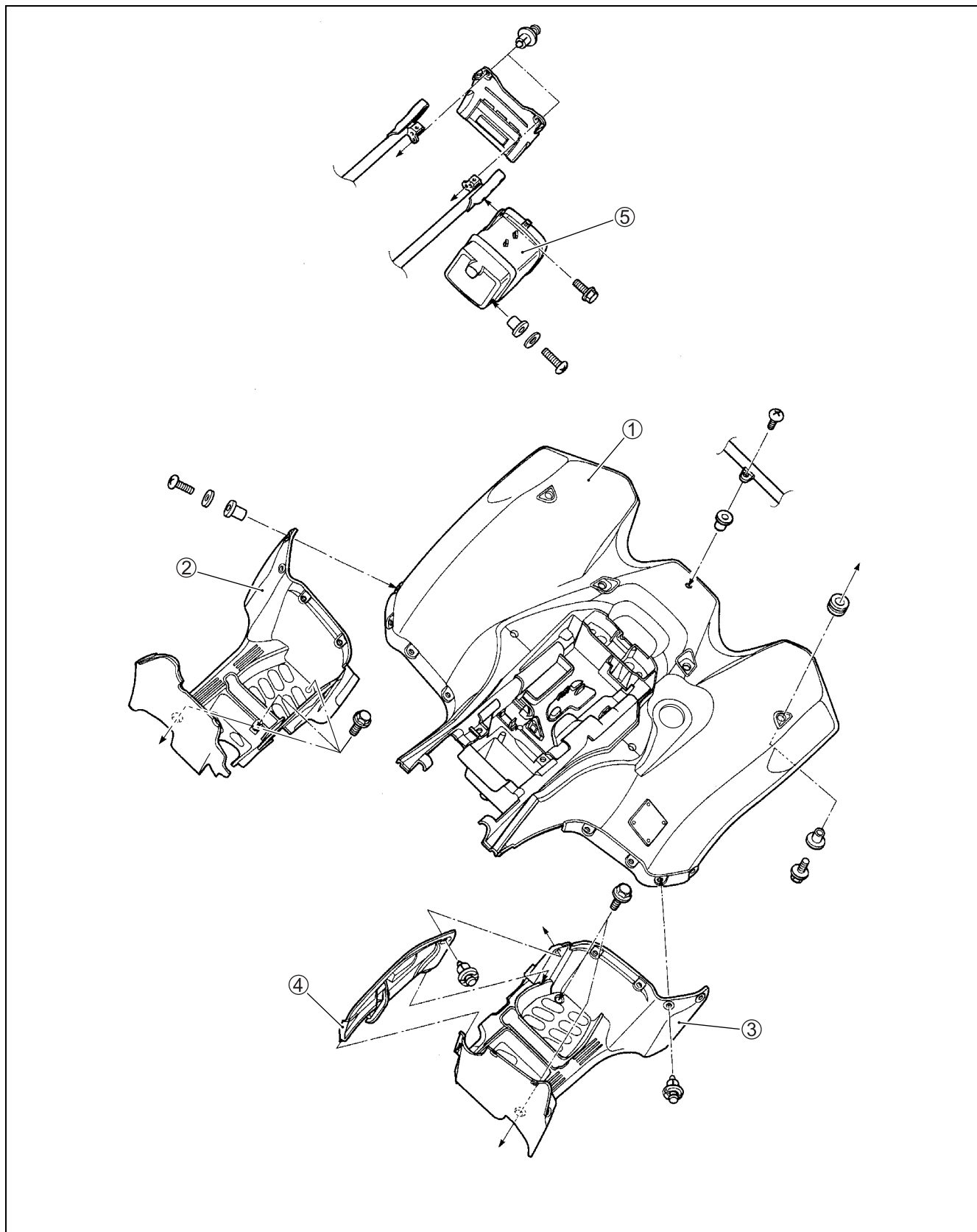
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EXTERIOR PARTS CONSTRUCTION



①	Front fender	⑤	Right inner fender
②	Radiator cap lid	⑥	Left inner fender
③	Right side cover	⑦	Front box
④	Left side cover	⑧	Front grill upper cover



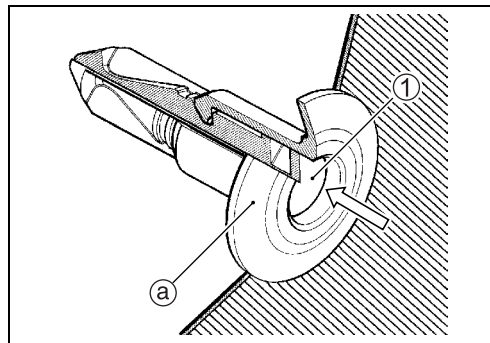
①	Rear fender	④	Left upper mud guard
②	Right mud guard	⑤	Rear box
③	Left lower mud guard		

FASTENER REMOVAL AND INSTALLATION

FASTENER (Type A)

Removal

- Depress the head of fastener center piece ①.
- Pull out the fastener ②.

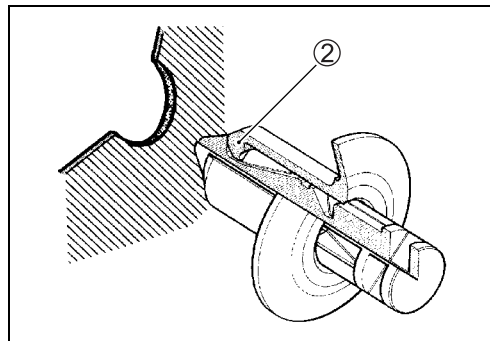


Installation

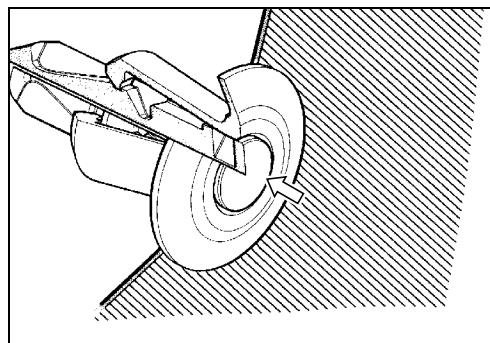
- Let the center piece stick out toward the head so that the pawls ② close.
- Insert the fastener into the installation hole.

NOTE:

To prevent the pawl ② from damage, insert the fastener all the way into the installation hole.

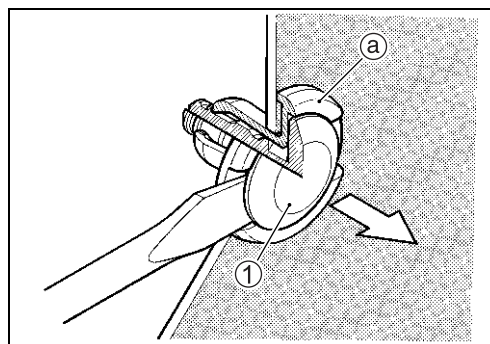


- Push in the head of center piece until it becomes flush with the fastener outside face.



FASTENER (Type B)**Removal**

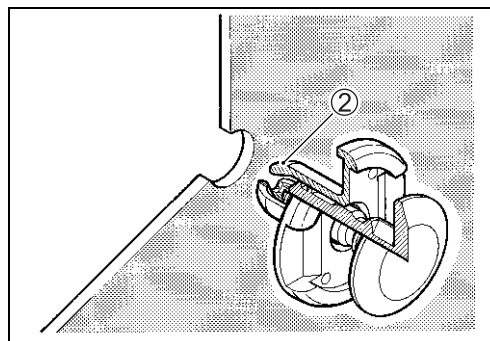
- Pry up the head of fastener center piece ① with a screw driver.
- Pull out the fastener ②.

**Installation**

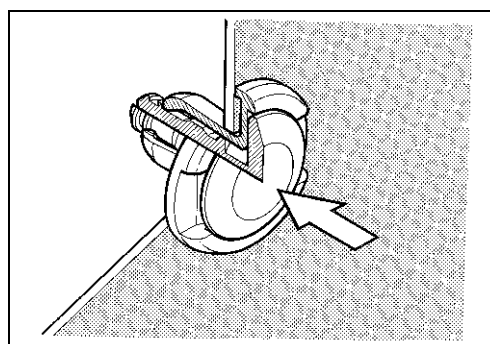
- Insert the fastener into the installation hole.

NOTE:

To prevent the pawl ② from damage, insert the fastener all the way into the installation hole.



- Push in the head of center piece.



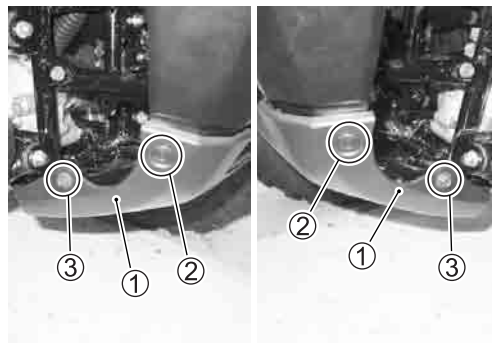
REMOVAL SEAT

- Move the seat lock ① upward, and remove the seat.



FRONT GRILL AND FRONT CARRIER

- Remove the front grill lower cover ① by removing the right and left clips ② and bolts ③.



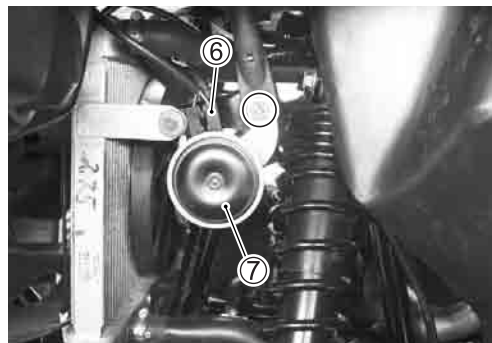
- Remove the front grill upper cover clips ④, left and right.



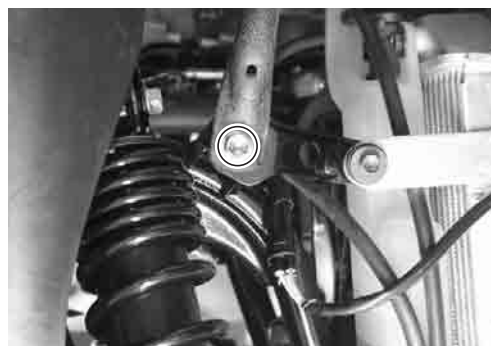
- Remove the front grill upper cover ⑤.



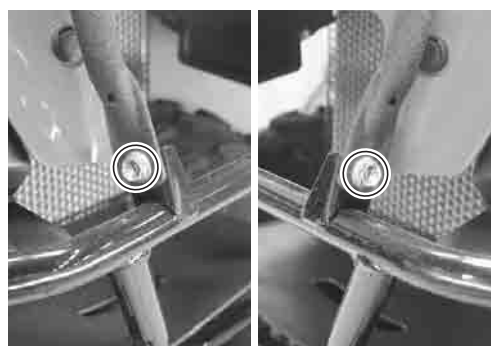
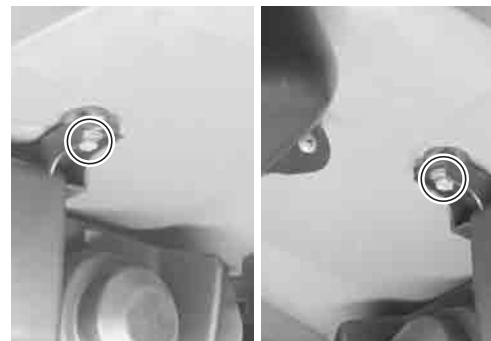
- Disconnect the horn coupler ⑥.
- Remove the left front carrier mounting bolt with horn ⑦ (for E-17, E-24.)



- Remove the right front carrier mounting bolt.



- Remove the front carrier mounting bolts, left and right.



- Remove the front carrier ⑫.

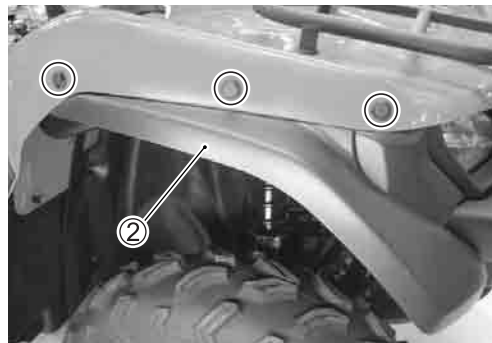


FRONT FENDER MUD GUARD (For E-17, E-24)

- Remove the front fender mud guard clips ①, left and right.



- Remove the front fender mud guard ② left and right.

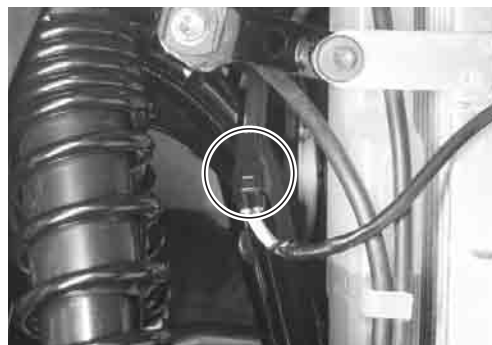


HEADLIGHT

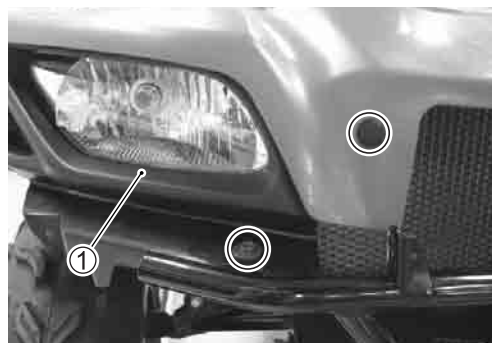
- Remove the front grill. (☞ 8-6)
- Remove the headlight housing screws, left and right.



- Disconnect the headlight couplers, left and right.



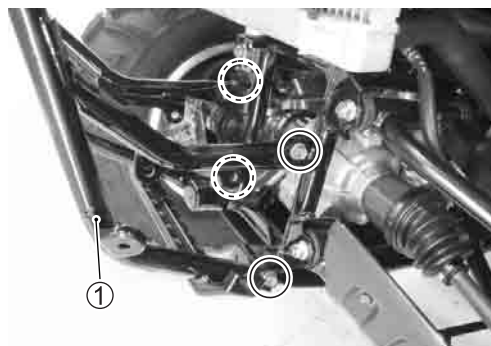
- Remove the headlight ①, left and right.



FRONT GRIP BAR

- Remove the front carrier. (☞ 8-6)
- Remove the headlight. (☞ above)

- Remove the front grip bar ①.



FRONT FENDER

- Remove the seat. (☞ 8-6)
- Remove the front carrier. (☞ 8-6)
- Remove the air cleaner box cover ①.



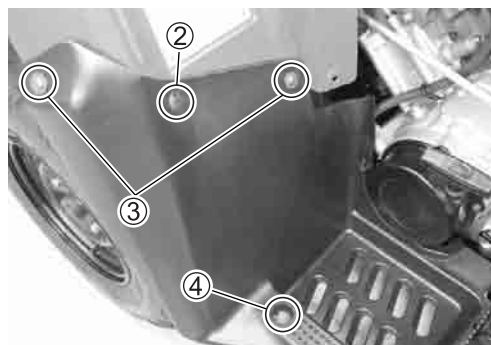
- Remove the left upper mud guard.



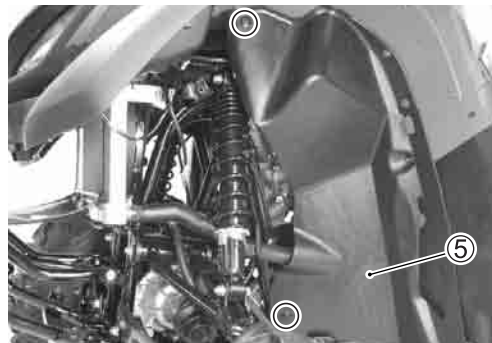
- Remove the left side cover.



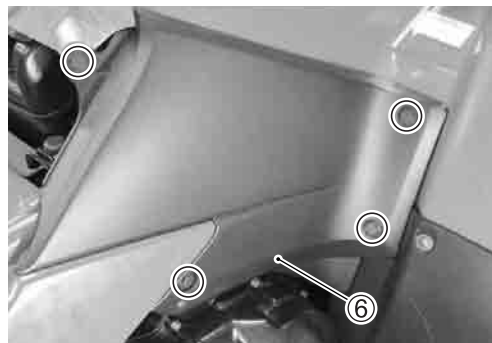
- Remove the left mud guard clip ②, screws ③ and bolt ④.



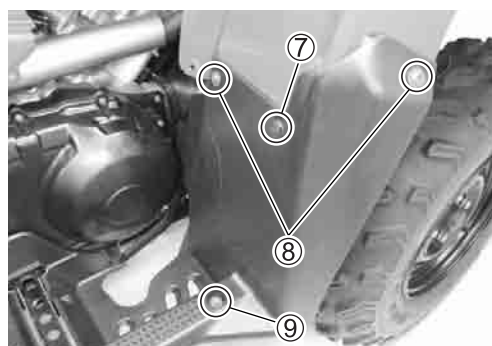
- Remove the left inner fender ⑤.



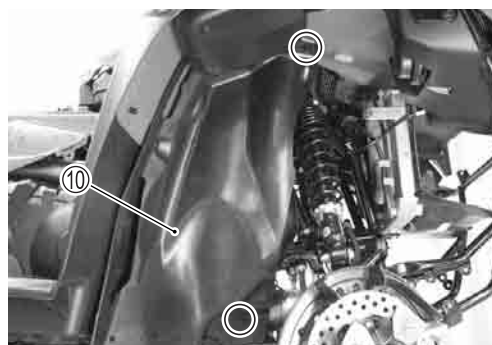
- Remove the right side cover ⑥.



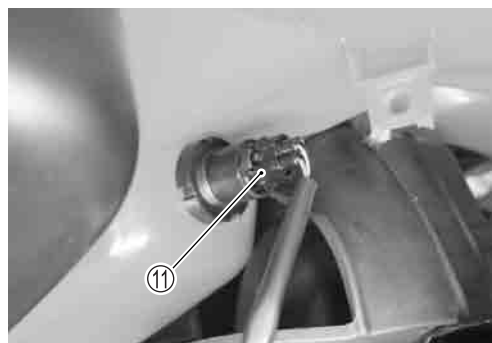
- Remove the right mud guard clips ⑦, screws ⑧ and bolt ⑨.



- Remove the right inner fender ⑩.



- Disconnect the power source socket coupler ⑪.



- Remove the front fender.

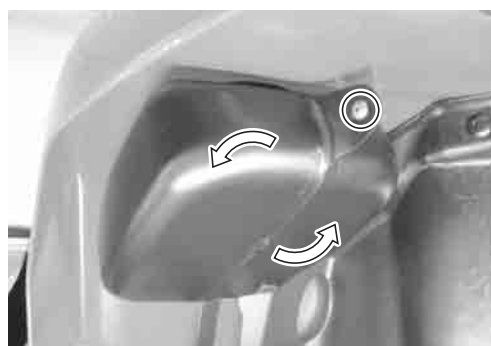


FRONT BOX

- Remove the front box cap ①.
- Disconnect the front box cap wire.



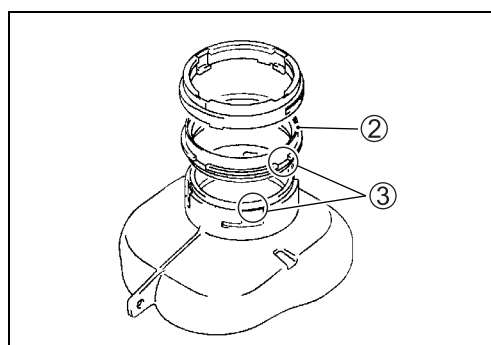
- Remove the front box mounting screw.
- Turn the front box counterclockwise and remove it.



- Remove the cushion ② from the front box as shown in the illustration.

NOTE:

Installing the cushion to the front box, align the cutout ③.



SIDE COVER

- Remove the left upper mud guard ①.



- Remove the left side cover ②.

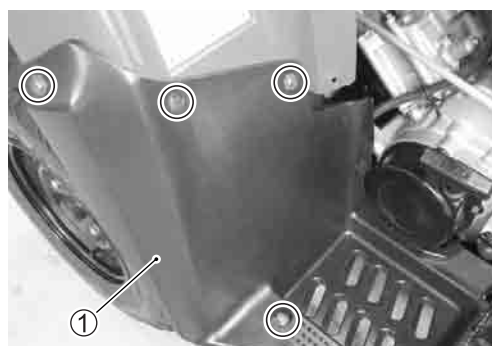


- Remove the right side cover ③.

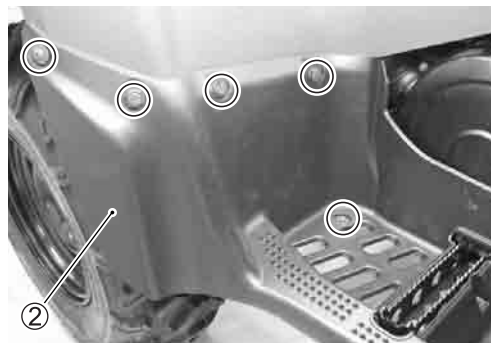


MUD GUARD

- Remove the left side cover. (☞ above)
- Remove the left mud guard ①.

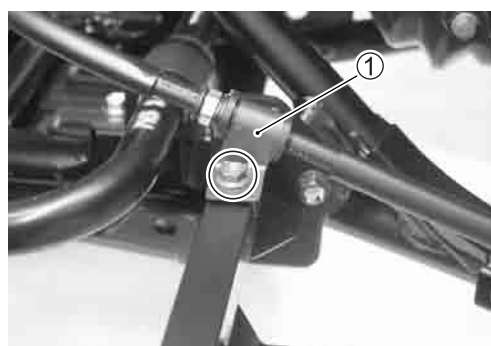


- Remove the right side cover. (☞ 8-12)
- Remove the right mud guard ②.

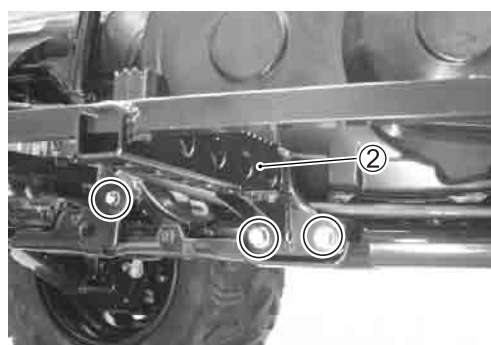


FOOTREST

- Remove the side cover. (☞ 8-12)
- Remove the mud guard. (☞ above)
- Remove the rear brake cable clamp ①.



- Remove the right footrest ②.



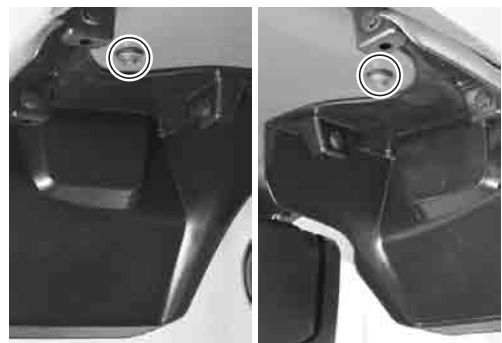
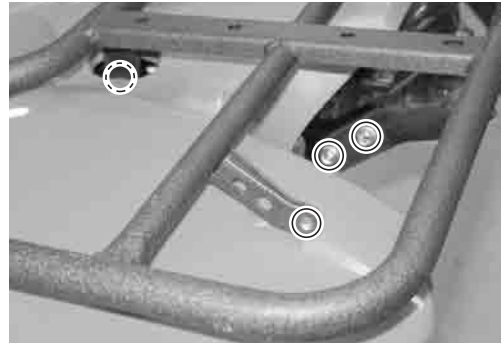
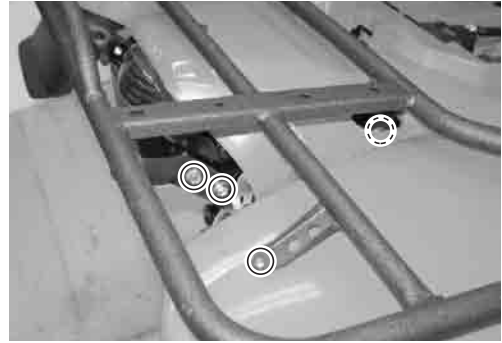
REAR FENDER MUD GUARD (For E-17, E-24)

- Remove the rear fender mud guard, left and right.



REAR CARRIER

- Remove the rear carrier.



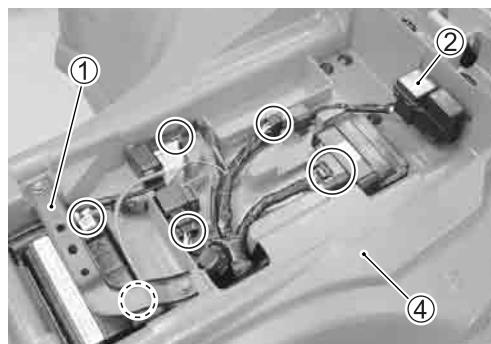
REAR BOX

- Remove the rear box ①.

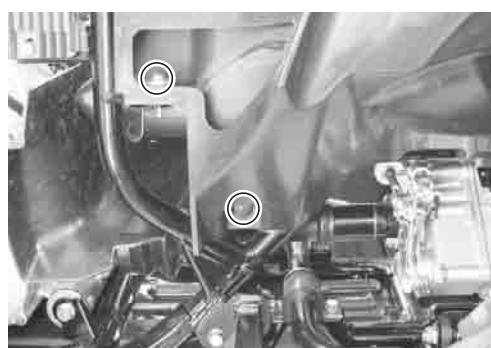


REAR FENDER AND FUEL TANK COVER

- Remove the seat. (☞ 8-6)
- Remove the rear carrier. (☞ 8-14)
- Remove the mud guard, left and right.
- Remove the side cover, left and right.
- Disconnect the $\ominus$ battery cable first, and then $\oplus$ battery cable.
- Remove the battery stay ① and the battery.
- Remove the fuse box ②.
- Disconnect the couplers.
- Remove the fuel tank cap ③.
- Remove the rear fender ④.

**FUEL TANK COVER**

- Remove the fuel tank cover.



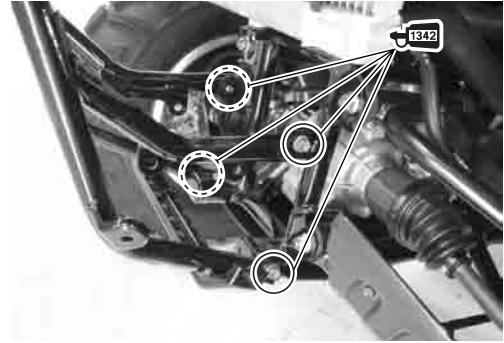
INSTALLATION

Install the exterior parts in the reverse order of removal.

Pay attention the to following points.

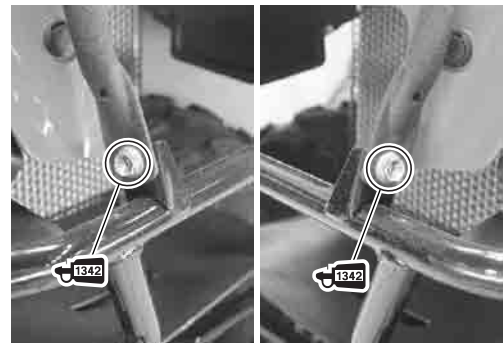
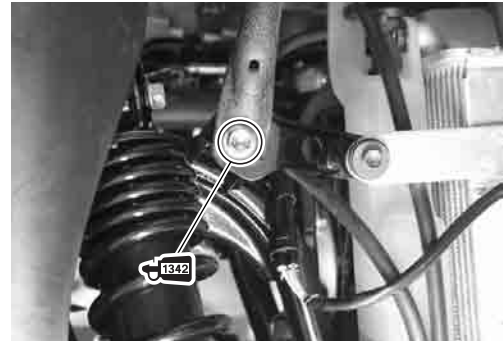
- Apply a small quantity of THREAD LOCK “1342” to the front grip bar mounting bolts.

 **99000-32050: THREAD LOCK “1342”**



- Apply a small quantity of THREAD LOCK “1342” to the front carrier mounting bolts.

 **99000-32050: THREAD LOCK “1342”**

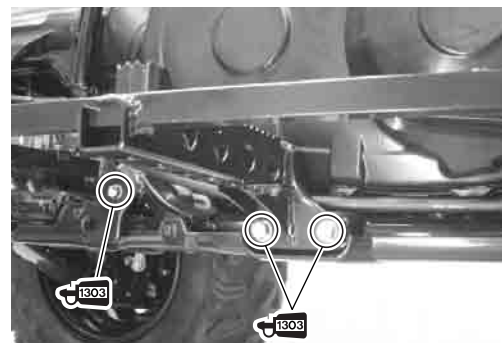


- Apply a small quantity THREAD LOCK SUPER “1303” to the footrest mounting bolts, and tighten them to the specified torque.

 **99000-32030: THREAD LOCK SUPER “1303”**

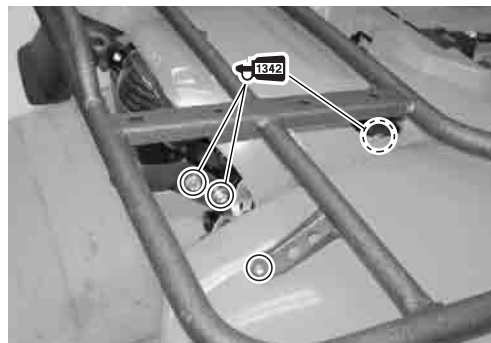
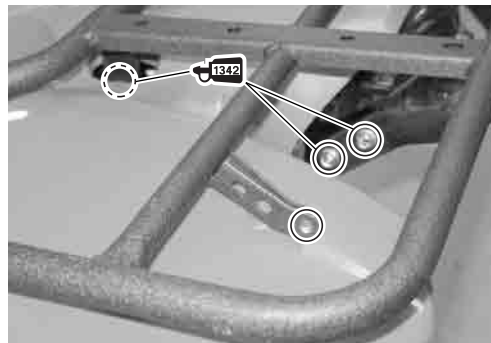
 **Footrest mounting bolt (M8):**

26 N·m (2.6 kgf-m, 19.0 lb-ft)
(M10): 55 N·m (5.0 kgf-m, 40.0 lb-ft)

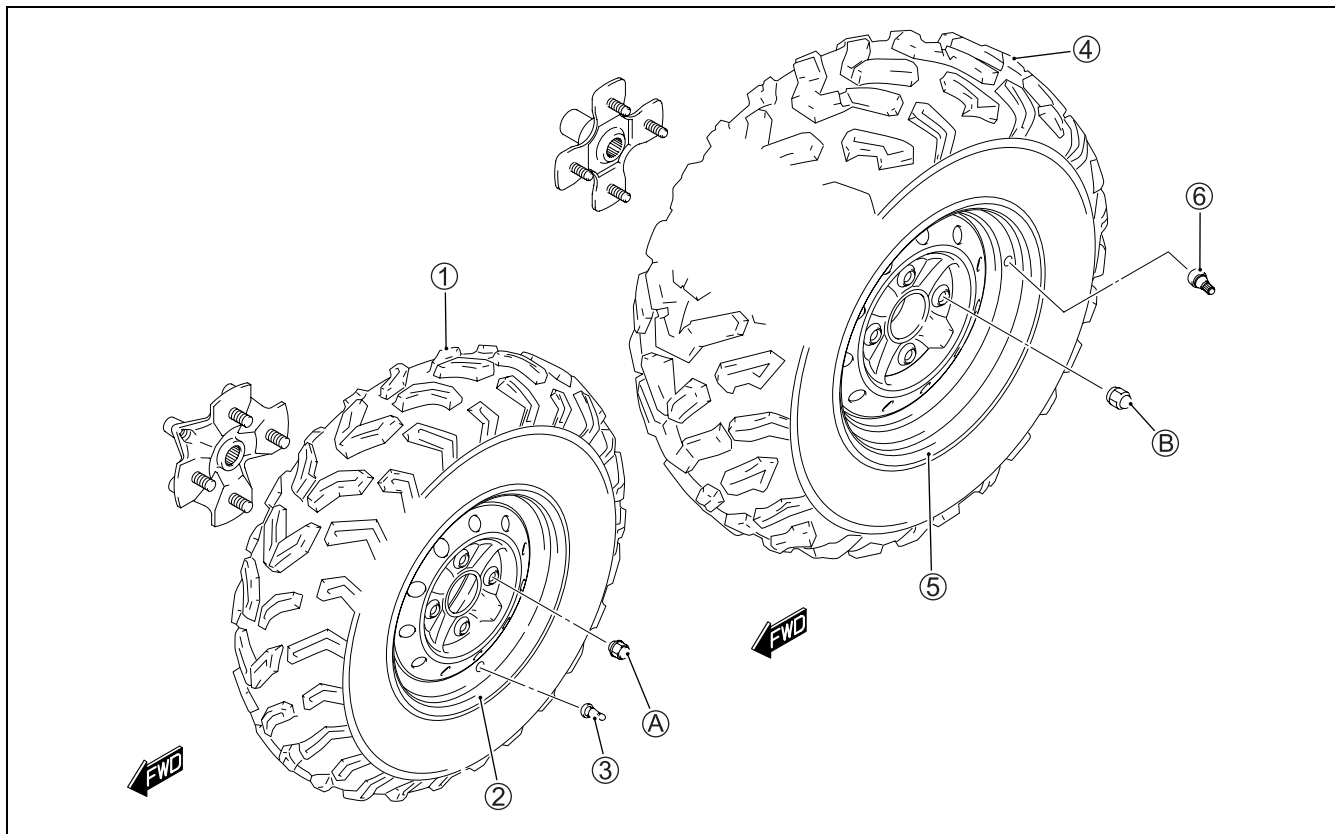


- Apply a small quantity of THREAD LOCK “1342” to the rear carrier mounting bolts.

 **99000-32050: THREAD LOCK “1342”**



FRONT AND REAR WHEELS CONSTRUCTION



①	Front tire	⑤	Rear wheel
②	Front wheel	⑥	Rear wheel air valve
③	Front wheel air valve	Ⓐ	Front wheel set nut
④	Rear tire	Ⓑ	Rear wheel set nut



ITEM	N·m	kgf-m	lb-ft
Ⓐ	60	6.0	43.5
Ⓑ	60	6.0	43.5

REMOVAL

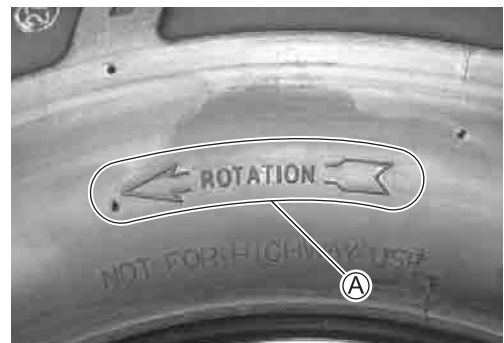
- Place the vehicle on level ground.
- Support the vehicle with a jack or wooden block and remove the front and rear wheel set nuts.
- Remove the front and rear wheels.



INSTALLATION

- Install the wheels in the reverse order of removal. Pay attention to the following points:
- Installing each wheel, make sure the arrow Ⓐ on the tire points in the direction of rotation.
- Tighten the wheel set nuts to the specified torque.

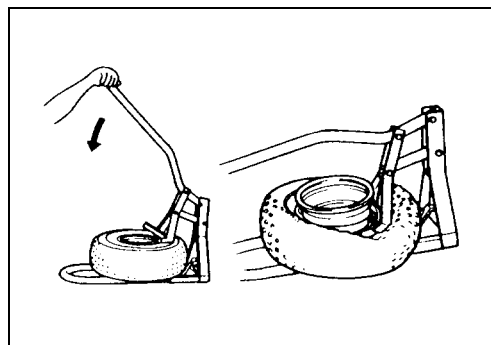
 **Front and rear wheel set nut: 60 N·m (6.0 kgf-m, 43.5 lb-ft)**



TIRES

TIRE REPLACEMENT

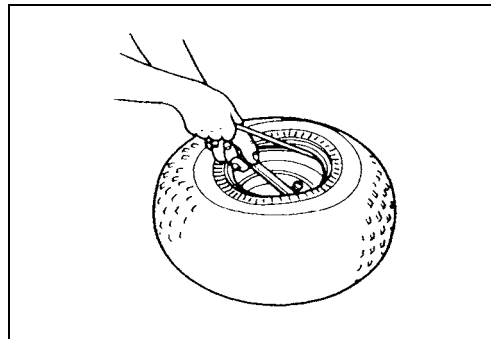
- Remove the front and rear wheels. (☞ 8-18)
- After removing the air valve caps, release the tire pressure by depressing the valves.
- Dismount the bead from the rim completely as shown.



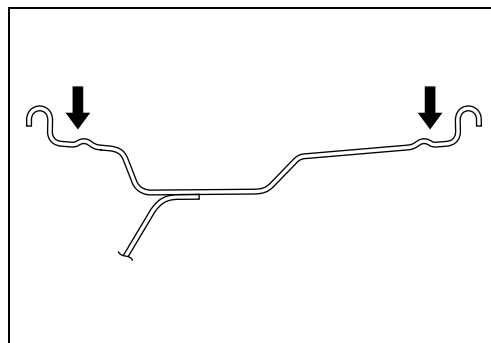
- Separate the tire from the rim using a set of tire levers and rim protectors.

CAUTION

When using the tire levers, do not scratch or hit the sealing portion (hump) of the wheel or it may cause air-leakage.



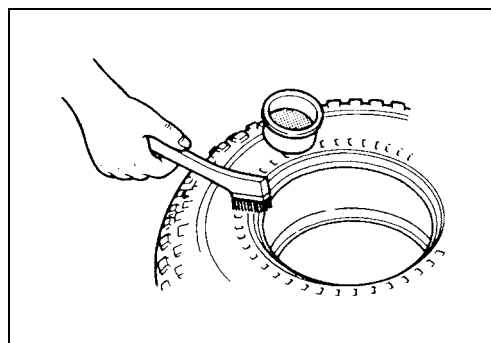
- Inspect the sealing portion of the rim for contamination and distortion. If any damages are found, replace the rim with a new one.
- Clear up the sealing portion of the rim.



- Apply tire lubricant to the tire bead and the flange of the rim.

CAUTION

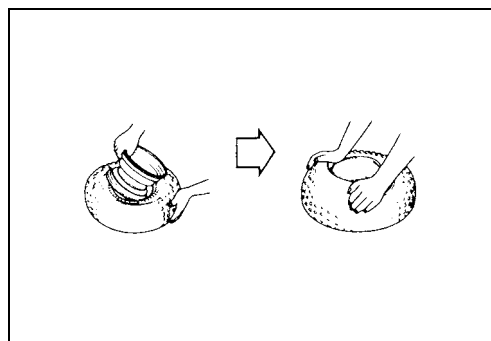
Never apply grease, oil, or gasoline to the tire bead because they will deteriorate the tire.



CAUTION

The standard tire fitted on this vehicle is AT25 × 8-12☆☆ for the front and AT25 × 10-12☆☆ for the rear. The use of tires other than the standard may cause instability. It is highly recommended to use the specified tire.

- Mount the tire on the rim by hand as shown.

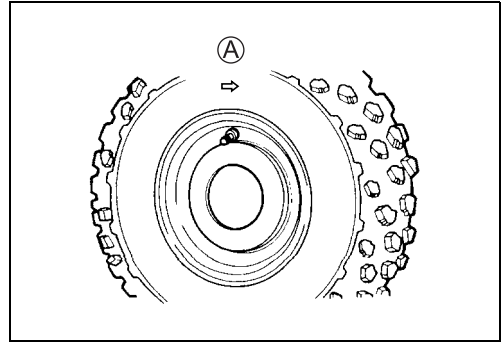


- When installing each tire, make sure the arrow **A** on the tire points in the direction of rotation. Also, make sure the outer side of the wheel rim is facing outward.

NOTE:

For inspecting the tires, refer to page 2-26.

Inspect the valve cores, before installing.



- Inflate the tire to seat the tire bead.

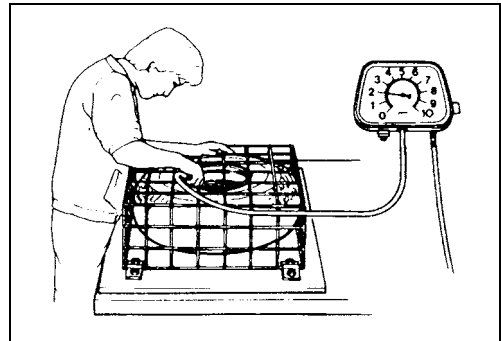
DATA Maximum tire bead seat pressure

Front : 250 kPa (2.5 kgf/cm², 36 psi)

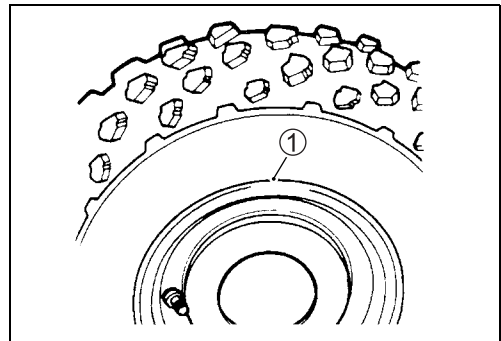
Rear : 250 kPa (2.5 kgf/cm², 36 psi)

CAUTION

Place the tire under a protective tire cage or similar protective covering device before inflating the tire. To minimize the possibility of tire damage when seating the tire bead, never exceed the **MAXIMUM TIRE BEAD SEAT PRESSURE** rating shown on the tire.

**NOTE:**

Check the "rim line" ① cast on the tire sidewalls. It must be equidistant from the wheel rim all the way around. If the distance between the rim line and the wheel rim varies, this indicates that the bead is not properly seated. If this is so, deflate the tire completely, and unseat the tire bead on both sides. Then, coat the bead with clean water, and re-seat the tire.



- Adjust the tire pressure to the specified pressure.

DATA Cold inflation tire pressure

Front : 35 kPa (0.35 kgf/cm², 5.1 psi)

Rear : 30 kPa (0.30 kgf/cm², 4.4 psi)

DATA Vehicle load capacity: 172 kg (380 lbs)**CAUTION**

Before inflating the tire, check the **MAXIMUM OPERATING PRESSURE** rating of the tire. This is indicated by a "☆" following the tire size shown on the sidewall. The number of "☆" on the tire indicates the maximum operating pressure.

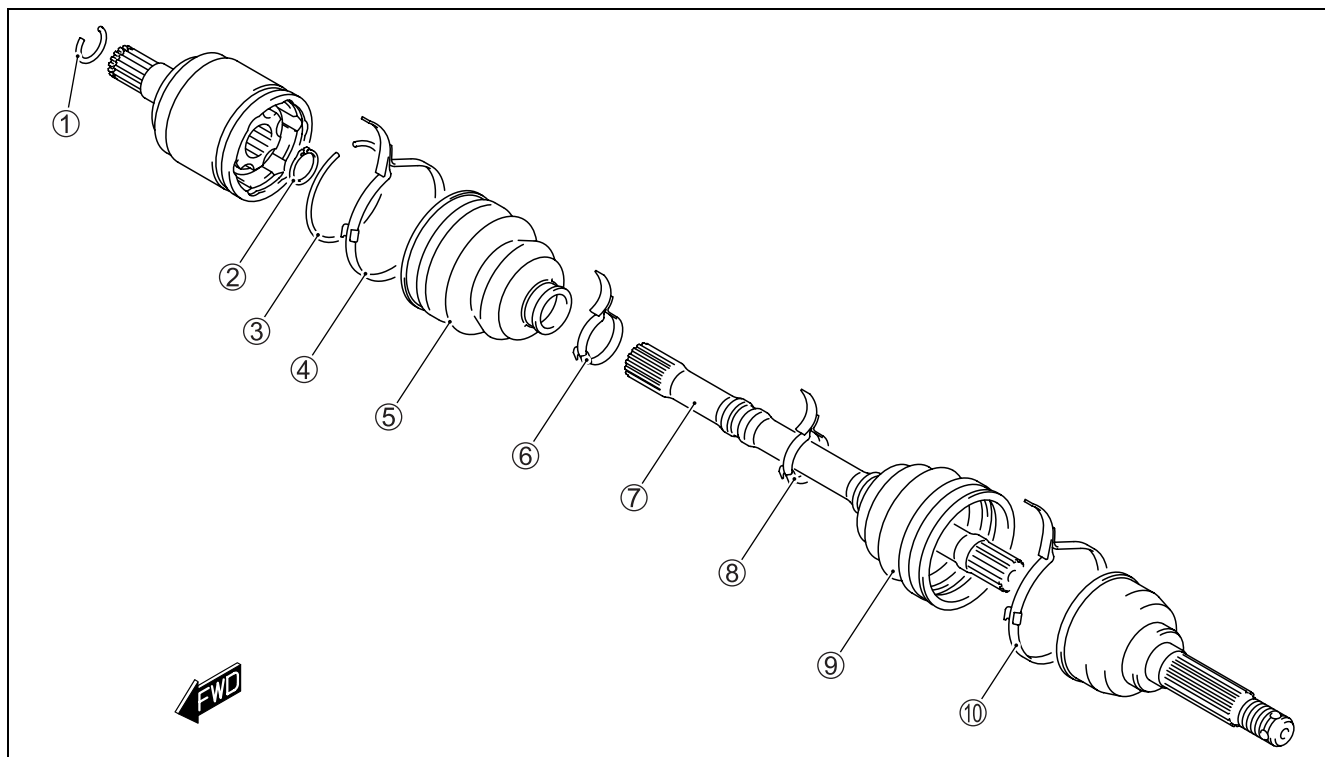
DATA Maximum operating pressure

☆: 25 kPa (0.25 kgf/cm², 3.6 psi)

☆☆: 35 kPa (0.35 kgf/cm², 5.1 psi)

☆☆☆: 45 kPa (0.45 kgf/cm², 6.5 psi)

FRONT DRIVE SHAFT CONSTRUCTION



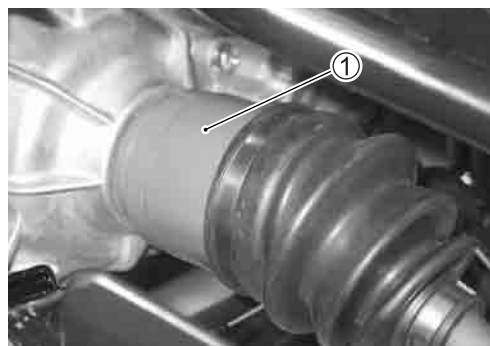
①	Circlip	⑥	Inner boot band (small)
②	Snap ring	⑦	Drive shaft
③	Stopper ring	⑧	Outer boot band (small)
④	Inner boot band (large)	⑨	Outer boot
⑤	Inner boot	⑩	Outer boot band (large)

REMOVAL AND DISASSEMBLY

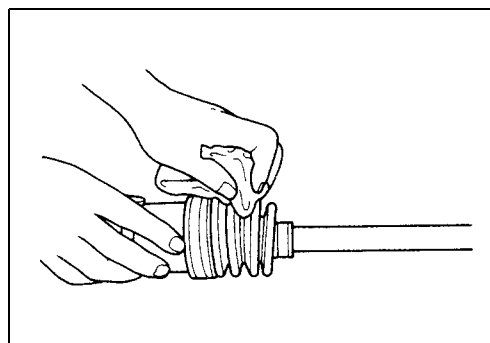
- Remove the front wheel. (🔧 8-18)
- Drain the front differential gear oil. (🔧 2-11)
- Remove the front suspension. (🔧 8-41)
- Hold the inboard joint ① of the front drive shaft and tug the drive shaft horizontally.

NOTE:

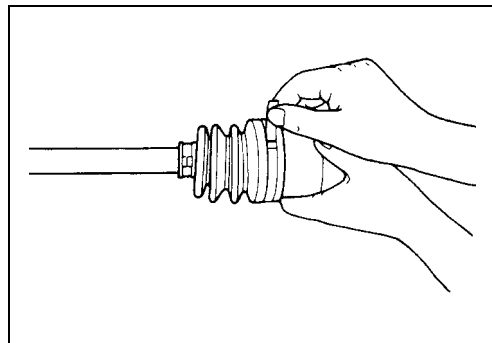
If it is difficult to remove the front drive shaft from the front differential gear case, using the suitable tool.



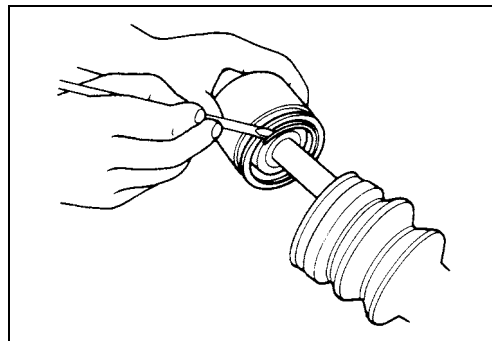
- 09924-21940: Wheel hub remover**
- 09924-21920: Drive shaft remover**
- 09930-30104: Sliding hammer**
- 09924-21950: Front drive shaft remover**



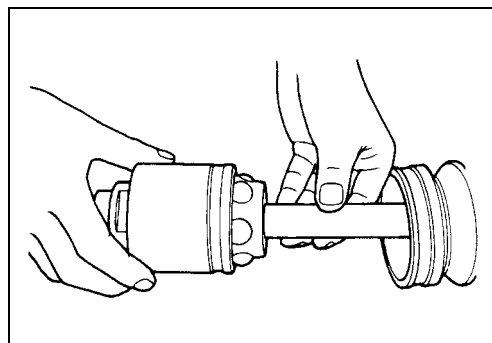
- Remove the boot bands of the differential side joint.



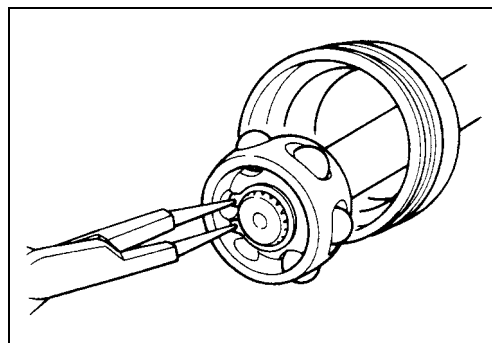
- Slide the boot toward the center of the front drive shaft and remove the stopper ring from the outer race.



- Separate the outer race from the front drive shaft.



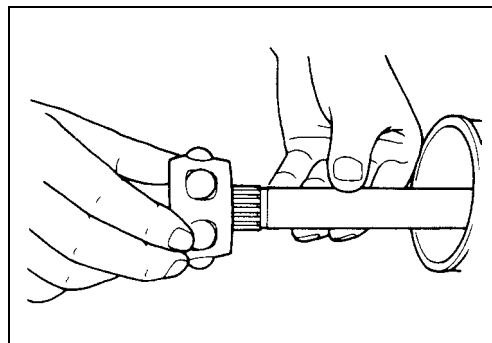
- Wipe off any grease and remove the snap ring.



- Remove the cage and boot from the front drive shaft.

CAUTION

Do not disassemble the wheel side joint. If any damages are found, replace it with a new one.



INSPECTION AND REASSEMBLY

Inspect the boots for wear or damage. If any defects are found, replace them with new ones.

Inspect the axle play by using a push-and-pull motion as shown.



NOTE:

- * Clean the disassembled parts (except for the boots). After cleaning, completely dry the parts using compressed air.
- * Clean the boots with a cloth.

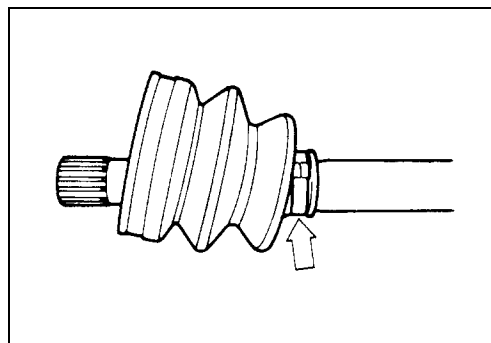
CAUTION

- * Clean all parts before installation, clean the inside and outside of the boots with a cloth.
- * Do not wash the boots in any commercially available degreaser, such as gasoline or kerosene. Washing in a degreaser causes deterioration of the boots.

- Fit a boot on the drive shaft end, fitting the small diameter side of the boot to the shaft groove, fix its end with the boot band.

CAUTION

The removed boot band must be replaced with a new one.

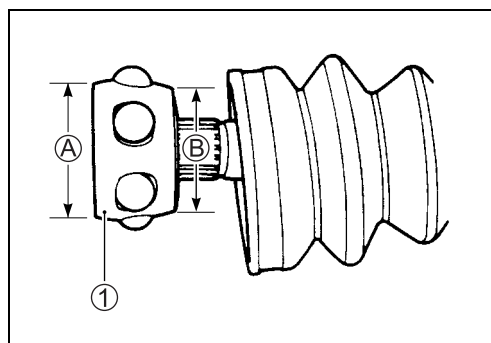


- Install the cage ① on the shaft.

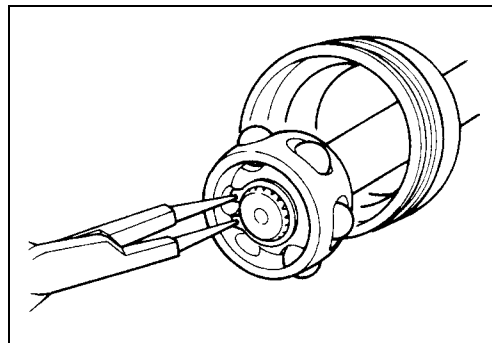
CAUTION

Install the cage with the large diameter side facing the shaft end.

- Ⓐ Large diameter
- Ⓑ Small diameter



- Install the snap ring.

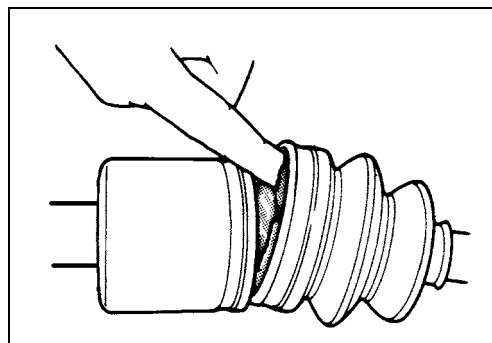
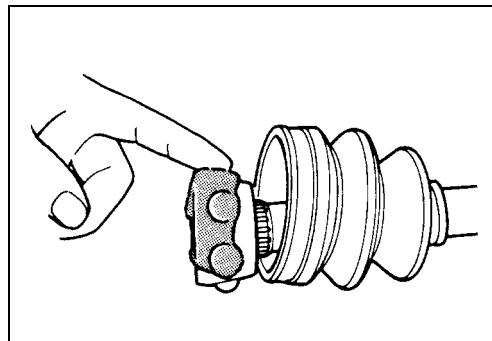


- Apply grease to the entire surface of the cage and the inside of the outer race.

Grease	Position	Wheel side	Differential side
	Quantity	40 g	70 g

NOTE:

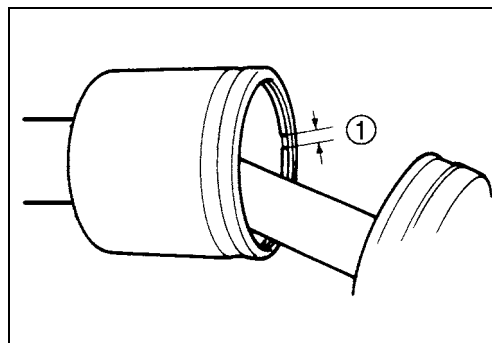
The tube of joint grease is included in the wheel side boot set or differential side joint set of spare parts.



- Insert the cage into the outer race and install the new stopper ring to the groove of the outer race.

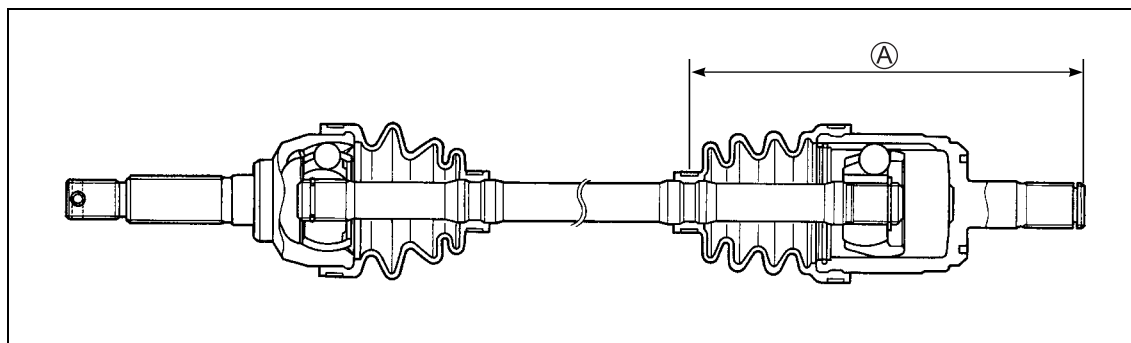
CAUTION

Locate the opening of the stopper ring ① so that the opening is not lined up with a ball.



- After installing the boot on the outer race, insert a screw driver into the boot on the outer race side and allow air to enter the boot so that the air pressure in the boot becomes the same as the atmospheric pressure at the positions indicated in the illustration.

Ⓐ 189 – 199 mm (7.4 – 7.8 in)



CAUTION

The removed boot band must be replaced with a new one.

INSTALLATION

Install the front drive shaft in the reverse order of removal.

Pay attention to the following points.

- Install the stopper ring ③ into the groove of front drive shaft spline.

CAUTION

The removed stopper ring must be replaced with a new one.

- Apply SUZUKI SUPER GREASE "A" to the spline.

 99000-25010: SUZUKI SUPER GREASE "A"
(or equivalent grease)

CAUTION

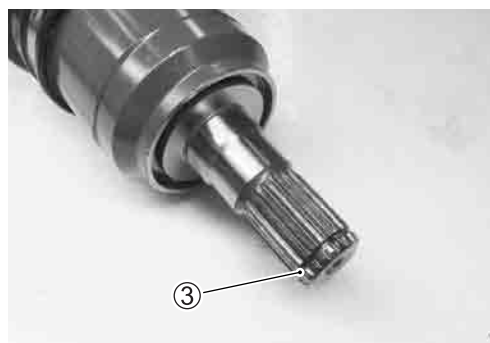
Be careful not to damage the front drive train (differential) gear case oil seal.

NOTE:

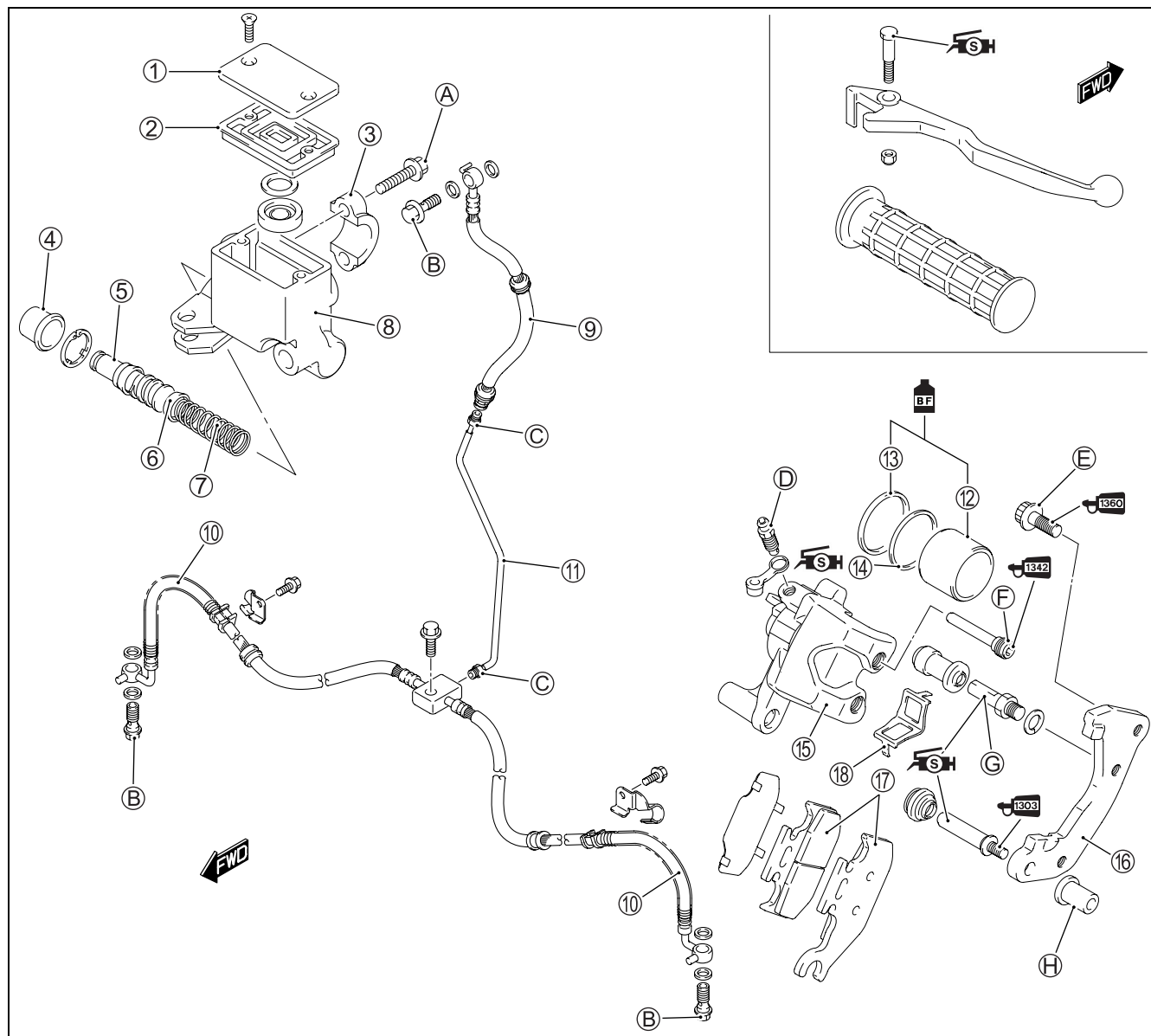
After installing both drive shafts, make sure the stopper rings are seated properly by pulling both inboard joints lightly.

- Pour the specified hypoid gear oil (SAE #90) through the filler hole. (☞ 2-11)

DATA Gear oil capacity: 500 ml (16.9/17.6 US/Imp oz)



FRONT BRAKE CONSTRUCTION



①	Brake master cylinder reservoir cap	⑭	Dust seal
②	Diaphragm	⑮	Front brake caliper
③	Brake master cylinder clamp	⑯	Brake caliper holder
④	Boot	⑰	Front brake pad
⑤	Piston/cup set	⑱	Pad spring
⑥	Cup	A	Brake master cylinder clamp bolt
⑦	Spring	B	Front brake hose union bolt
⑧	Brake master cylinder	C	Brake pipe nut
⑨	Front brake hose No.1	D	Front brake air bleeder valve
⑩	Front brake hose No.2	E	Front brake caliper mounting bolt
⑪	Front brake pipe	F	Front brake pad mounting pin
⑫	Piston	G	Caliper holder pin
⑬	Piston seal	H	Caliper holder slide pin



ITEM	N·m	kgf·m	lb·ft
A	11	1.1	8.0
B	25	2.5	18.0
C	16	1.6	11.5
D	6.0	0.6	4.3
E	26	2.6	19.0
F	17	1.7	12.5
G	17	1.7	12.5
H	22	2.2	16.0

⚠ WARNING

- * This brake system is filled with an ethylene glycol-based DOT 4 brake fluid. Do not use or mix different types of fluid, such as silicone-based or petroleum-based brake fluids.
- * Do not use any brake fluid taken from old, used or unsealed containers. Never reuse brake fluid left over from the last servicing or which has been stored for a long periods of time.
- * When storing brake fluid, seal the container completely and keep it away from children.
- * When replenishing brake fluid, take care not to get dust into the fluid.
- * When washing brake components, use new brake fluid. Never use cleaning solvent.
- * A contaminated brake disc or brake pad reduces braking performance. Discard contaminated pads and clean the brake disc with high quality brake cleaner or a neutral detergent.

CAUTION

Handle brake fluid with care: the fluid reacts chemically with paint, plastics, rubber materials etc. and will damage them severely.

BRAKE PAD REPLACEMENT

- Place the vehicle on level ground.
- Support the vehicle with a jack or wooden block.
- Remove the front wheel. (8-18)
- Remove the brake caliper mounting bolts ① and brake pad mounting pins ②.

NOTE:

Before installing the brake pads, inspect the pad mounting pins for wear. If excessive wear is found, replace the pad mounting pins with new ones.

- Remove the brake pads.

CAUTION

- * Do not operate the brake lever during or after brake pads removal.
- * Replace the brake pads as a set, otherwise braking performance will be adversely affected.

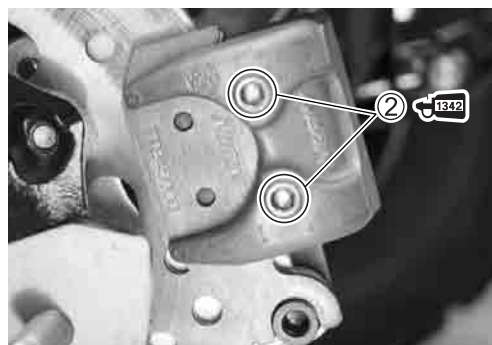
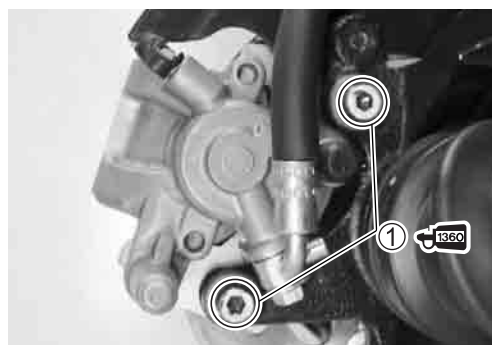
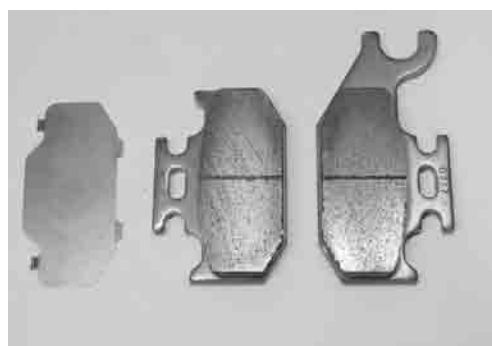
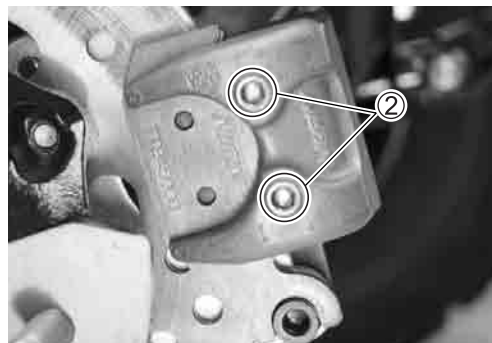
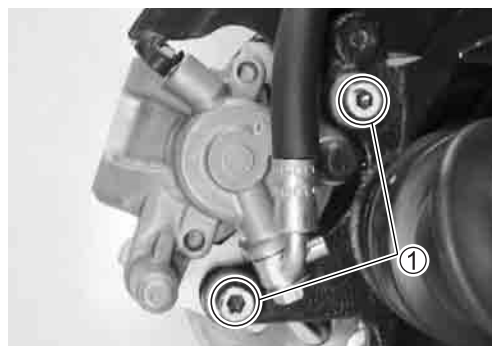
- Install the brake pads.
- Apply a small quantity of THREAD LOCK SUPER "1360" to the front brake caliper mounting bolts ①.
- 🔧 **99000-32130: THREAD LOCK SUPER "1360"**
- Tighten the front brake caliper mounting bolts ① to the specified torque.
- 🔧 **Front brake caliper mounting bolt:**
26 N·m (2.6 kgf-m, 19.0 lb-ft)
- Apply THREAD LOCK "1342" to the brake pad mounting pins ②.
- 🔧 **99000-32050: THREAD LOCK "1342"**
- Tighten the front brake pad mounting pins ② to the specified torque.

🔧 Front brake pad mounting pin:

17 N·m (1.7 kgf-m, 12.5 lb-ft)

NOTE:

After replacing the brake pads, pump the brake lever a few times to check for proper brake operation and then check the brake fluid level.



BRAKE FLUID REPLACEMENT

- Place the vehicle on level ground and keep the handlebar straight.
- Remove the brake master cylinder reservoir cap and diaphragm.
- Suck up the old brake fluid as much as possible.
- Fill the reservoir with new brake fluid.



Specification and classification: DOT 4

- Connect a clear hose to the air bleeder valve and insert the other end of the hose into a receptacle.
- Loosen the air bleeder valve and pump the brake lever until the old brake fluid is completely out of the brake system.
- Close the air bleeder valve and disconnect the clear hose. Fill the reservoir with new brake fluid to the upper end of the inspection window.



Front brake air bleeder valve:

6.0 N·m (0.6 kgf-m, 4.3 lb-ft)

CAUTION

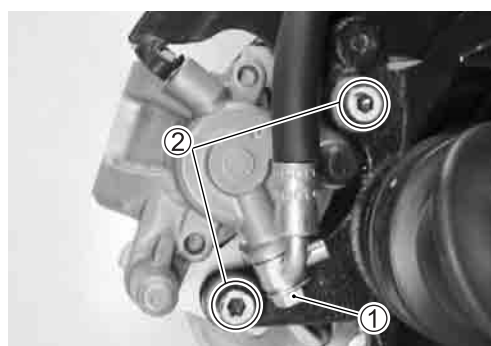
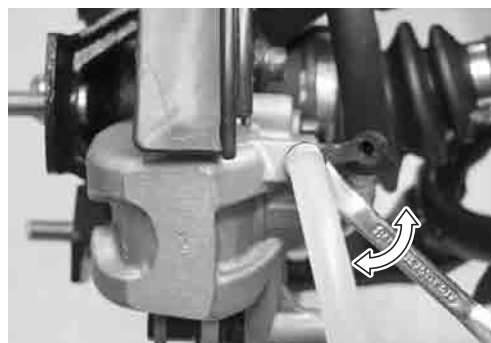
- * **Never reuse the brake fluid left over from previous servicing or which has been stored for long periods of time.**
- * **Bleed air from the brake system. (☞ 2-24)**

BRAKE CALIPER REMOVAL AND DISASSEMBLY

- Remove the front wheel. (☞ 8-18)
- Disconnect the brake hose from the front brake caliper by removing the brake hose union bolt ① and allow the brake fluid to drain into a suitable receptacle.
- Remove the brake caliper by removing the brake caliper mounting bolts ②.
- Remove the brake pads. (☞ 8-28)

⚠ WARNING

Brake fluid, if it leaks, will interfere with safe running and discolor painted surfaces. Check the brake hose, brake pipe and hose joints for cracks and leakage of brake fluid.



- Remove the caliper holder ①.



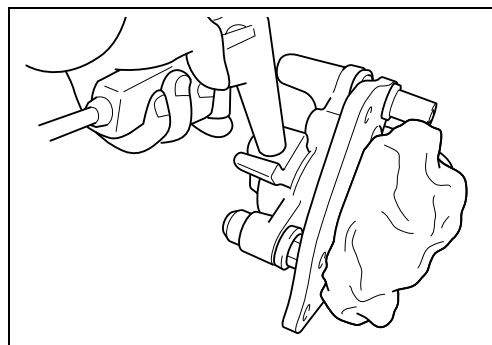
- Remove the pad spring ②.



- Place a rag over the brake caliper piston to prevent it from popping out and then force out the piston using compressed air.

CAUTION

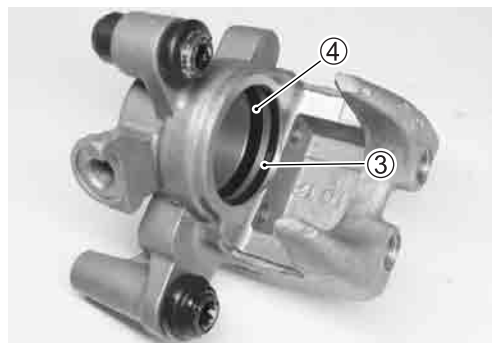
Do not use high pressure air to prevent brake caliper piston damage.



- Remove the dust seal ③ and piston seal ④.

CAUTION

Do not reuse the dust seal and piston seal to prevent fluid leakage.



BRAKE CALIPER INSPECTION

BRAKE CALIPER

Inspect the brake caliper cylinder wall for nicks, scratches or other damage. If any defects are found, replace the brake caliper with a new one.



BRAKE CALIPER PISTON

Inspect the brake caliper piston for any scratches or damage. If any defects are found, replace the piston with a new one.



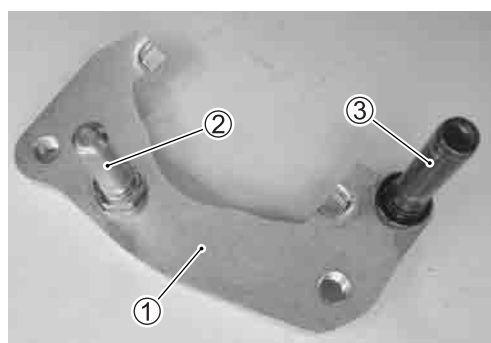
RUBBER PARTS

Replace the removed rubber parts with new ones.



CALIPER HOLDER

Inspect the caliper holder ① and caliper holder pin ② and caliper holder slide pin ③ for damage. If any defects are found, replace them with new ones.



BRAKE CALIPER REASSEMBLY AND INSTALLATION

Reassemble and install the front brake caliper in the reverse order of disassembly. Pay attention to the following points:

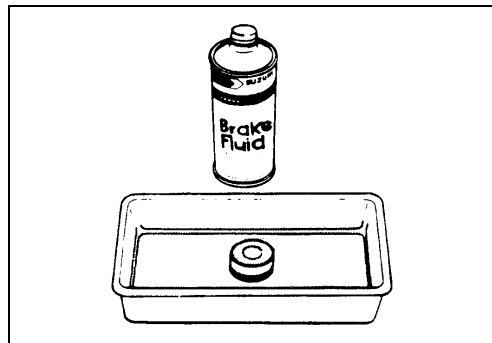
- Clean the caliper bore and piston with specified brake fluid, especially the dust seal groove and piston seal groove.



Specification and Classification: DOT 4

CAUTION

- * Clean the brake caliper components with fresh brake fluid before reassembly. Never use cleaning solvent or gasoline to clean them.
- * Do not wipe the brake fluid off after cleaning the components.
- * When cleaning the components, use the specified brake fluid. Never use different types of fluid or cleaning solvents such as gasoline, kerosene or others.
- * Replace the piston seal and dust seal with a new one.
- * Apply brake fluid to the dust seal, brake caliper bore and piston before reassembly.



PISTON SEAL

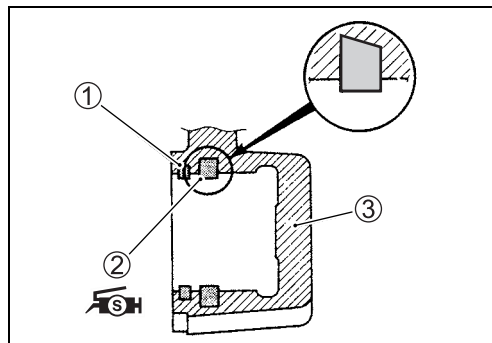
- Apply SUZUKI SILICONE GREASE to the piston seal.



99000-25100: SUZUKI SILICONE GREASE

- Install the piston seal as shown.

- ① Dust seal
- ② Piston seal
- ③ Caliper body



BRAKE CALIPER PISTON

- Install the brake caliper piston.



BRAKE CALIPER HOLDER

- Apply a small quantity of THREAD LOCK SUPER "1303" to the caliper holder slide pin ①.

99000-32030: THREAD LOCK SUPER "1303"

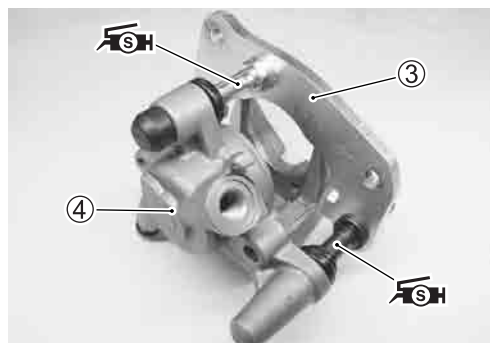
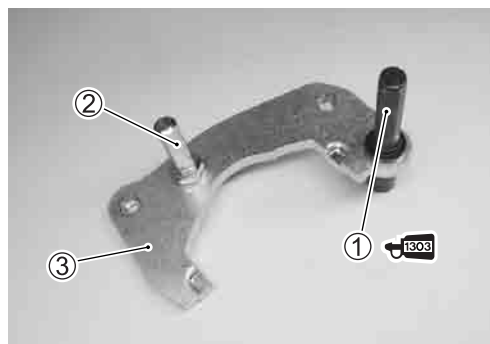
- Tighten the caliper holder side pin ① and caliper holder pin ② to the brake caliper holder ③ to the specified torque.

Caliper holder pin: 17 N·m (1.7 kgf-m, 12.5 lb-ft) **Caliper holder slide pin: 22 N·m (2.2 kgf-m, 16.0 lb-ft)**

- Apply SUZUKI SILICON GREASE to the brake caliper holder pin and brake caliper holder slide pin.

99000-25100: SUZUKI SILICONE GREASE

- Install the brake caliper holder ③ to the brake caliper ④.



- Install the brake pad spring ⑤.
- Install the brake pads to the brake caliper ④.
- Apply a small quantity of THREAD LOCK SUPER "1360" to the front brake caliper mounting bolts ⑥.

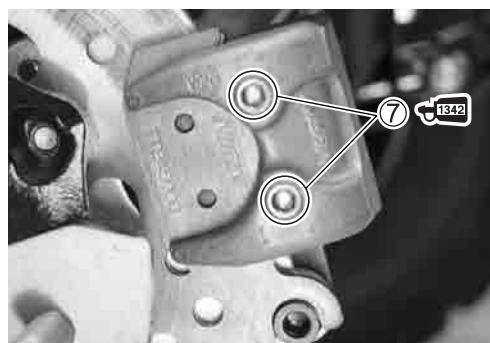
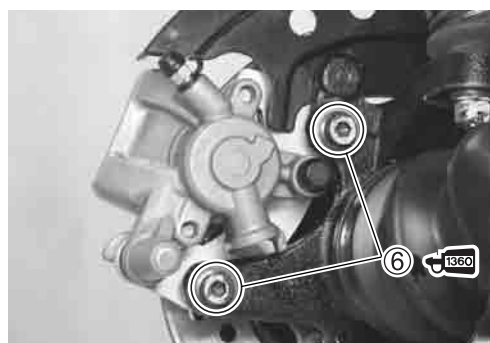
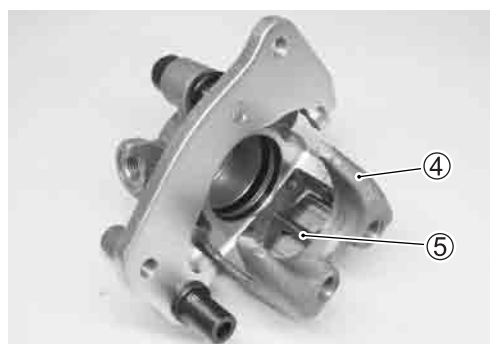
99000-32130: THREAD LOCK SUPER "1360"

- Apply a small quantity of THREAD LOCK SUPER "1303" to the brake pad mounting pins ⑦.

99000-32050: THREAD LOCK "1342"

- Tighten the brake caliper mounting bolts ⑥ and brake pad mounting pins ⑦ to the specified torque.

Brake pad mounting pin: 17 N·m (1.7 kgf-m, 12.5 lb-ft) **Brake caliper mounting bolt: 26 N·m (2.6 kgf-m, 19.0 lb-ft)**



NOTE:

Before installing the brake caliper, push the brake caliper piston all the way into the brake caliper.

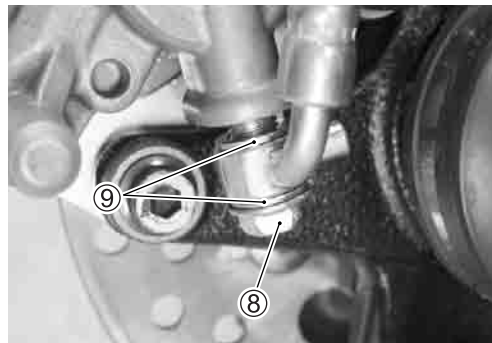
- Install the front brake hose union bolt ⑧ with the front brake hose washers ⑨.
- Tighten the front brake hose union bolt ⑧ to the specified torque.

 **Front brake hose union bolt:**

25 N·m (2.5 kgf-m, 18.0 lb-ft)

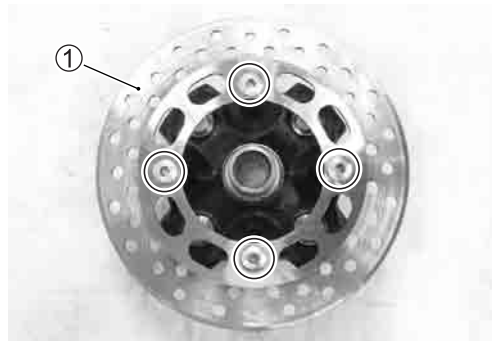
CAUTION

- * The removed front brake hose washers must be replaced with new ones to prevent brake fluid leakage.
- * Bleed air from the system after reassembling the front brake caliper. ( 2-24)



BRAKE DISC REMOVAL AND DISASSEMBLY

- Remove the front wheel. ( 8-18)
- Remove the front wheel hub. ( 8-41)
- Remove the brake disc ①.



BRAKE DISC INSPECTION

- Remove the front wheel. (☞ 8-18)
- Remove the brake caliper. (☞ 8-29)

Inspect the brake disc for cracks or damage and measure the thickness with the micrometer. If any defects are found, if the thickness is less than the service limit, replace the brake disc with a new one.

TOOL 09900-20205: Micrometer (0 – 25 mm, 10 mm)

DATA Brake disc thickness

Service Limit: 3.0 mm (0.12 in)

Measure the runout with the dial gauge. If the runout exceeds the service limit, replace the brake disc with a new one.

TOOL 09900-20607: Dial gauge (1/100 mm)

09900-20701: Magnetic stand

DATA Brake disc runout

Service Limit: 0.3 mm (0.012 in)

- If either measurement exceeds the service limit, replace the brake disc with a new one.
- Install the brake caliper. (☞ 8-33)
- Install the front wheel. (☞ 8-18)



BRAKE DISC REASSEMBLY AND INSTALLATION

Reassemble and install the brake disc in the reverse order of removal and disassembly.

Pay attention to the following points:

- Install the brake disc to the wheel hub with the punching letter showed.
- Apply a small quantity THREAD LOCK SUPER "1360" to the brake disc plate mounting bolts and tighten them to the specified torque.

NOTE:

Make sure that the brake disk is clean and free of any greasy matter.

1360 99000-32130: THREAD LOCK SUPER "1360"

U Brake disc plate mounting bolt:

23 N·m (2.3 kgf·m, 16.5 lb-ft)

- Install the front wheel hub. (☞ 8-50)
- Install the front brake caliper. (☞ 8-33)
- Install the front wheel. (☞ 8-18)



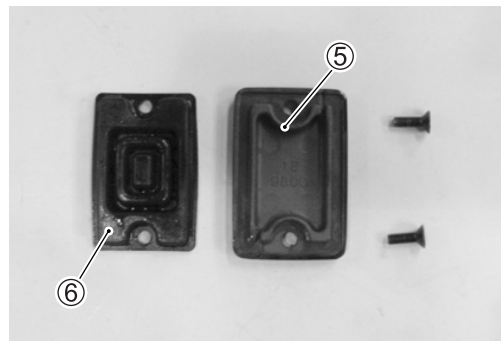
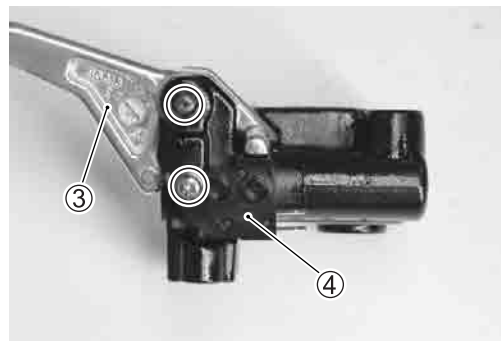
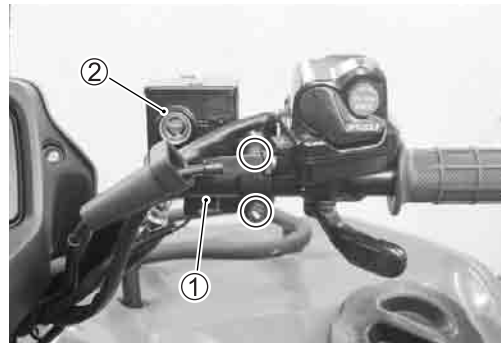
MASTER CYLINDER REMOVAL AND DISASSEMBLY

- Place a rag underneath the front brake hose union bolt on the brake master cylinder to catch any spilled brake fluid. Remove the front brake hose union bolt and disconnect the front brake hose.

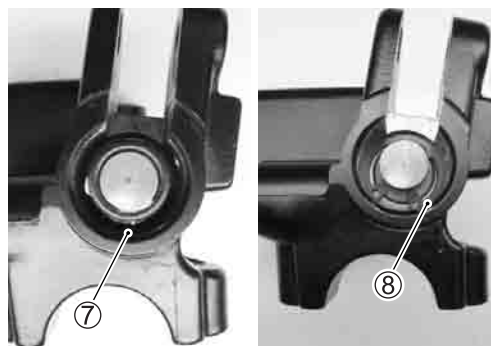
CAUTION

Immediately and completely wipe off any brake fluid contacting any part of the vehicle. The brake fluid reacts chemically with paint, plastics, rubber materials, etc., and will damage them severely.

- Disconnect the front brake switch coupler ①.
- Remove the brake master cylinder assembly ②.
- Remove the front brake lever ③ and front brake switch ④.
- Remove the reservoir cap ⑤ and diaphragm ⑥.

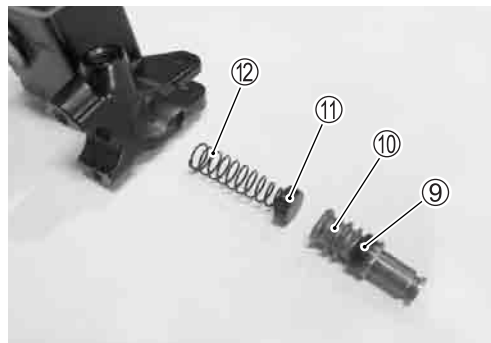


- Remove the dust boot ⑦ and circlip ⑧.



- Remove the piston/secondary cup, primary cup and spring.

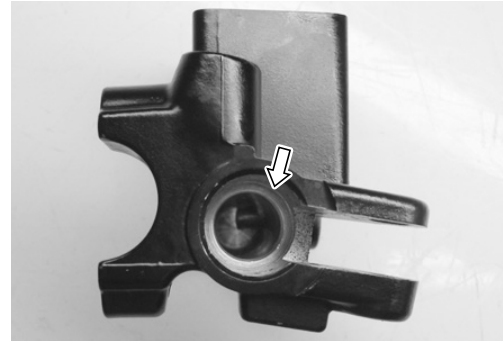
- ⑨ Secondary cup
- ⑩ Piston
- ⑪ Primary cup
- ⑫ Spring



BRAKE MASTER CYLINDER INSPECTION

BRAKE MASTER CYLINDER

Inspect the brake master cylinder bore for any scratches or damage. If any defects are found, replace the brake master cylinder with a new one.



PISTON AND RUBBER PARTS

Inspect the piston surface, primary cup, secondary cup and dust boot for any scratches, wear or damage. If any defects are found, replace them with new ones.

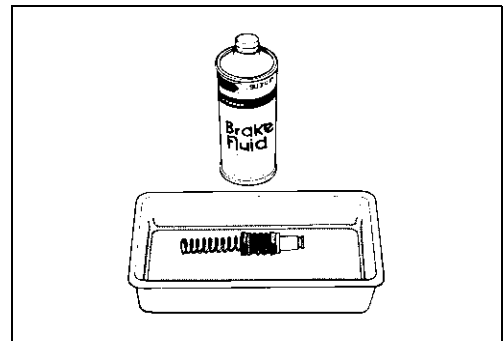


BRAKE MASTER CYLINDER REASSEMBLY AND INSTALLATION

Reassemble and install the brake master cylinder in the reverse order of removal and disassembly. Pay attention to the following points:

CAUTION

- * Clean the brake master cylinder components with fresh brake fluid before reassembly.
- * Do not wipe the brake fluid off after cleaning the components.
- * When cleaning the components, use the specified brake fluid. Never use different types of fluid or cleaning solvents such as gasoline, kerosene or others.
- * Apply brake fluid to the brake master cylinder bore and all the component to be inserted into the bore.

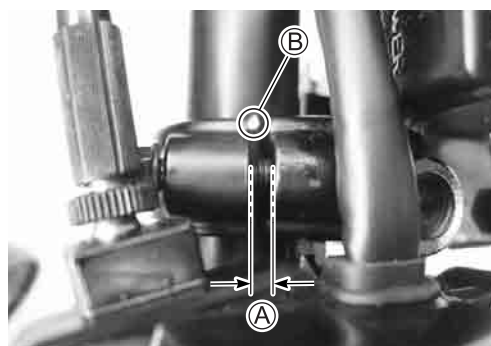


Specification and classification: DOT 4

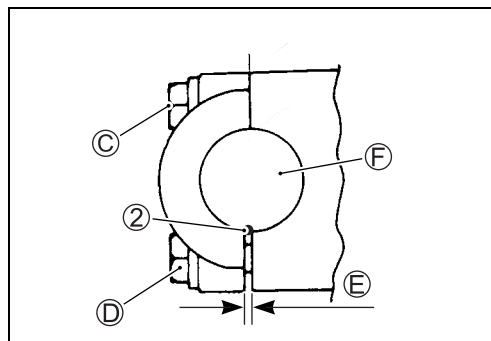
- Align the brake master cylinder holder mating surface (A) with the punched mark (B) on the handlebars and tighten the upper clamp bolt (C) first and lower clamp bolt (D).


Brake master cylinder clamp bolt:

11 N·m (1.1 kgf-m, 8.0 lb-ft)



- © Upper clamp bolt
- © Lower clamp bolt
- © Clearance
- © Handlebars



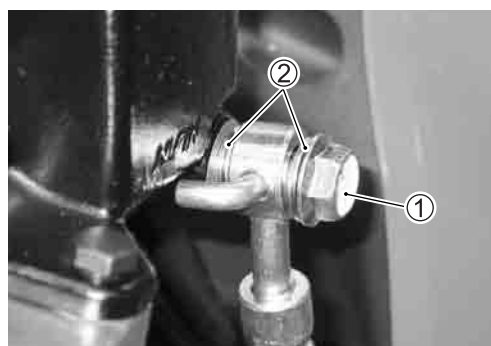
- Install the front brake hose union bolt (1) with the front brake hose washers (2).
- Tighten the front brake hose union bolt to the specified torque.


Front brake hose union bolt:

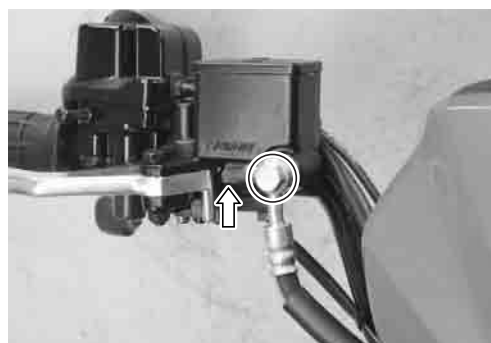
25 N·m (2.5 kgf-m, 18.0 lb-ft)

CAUTION

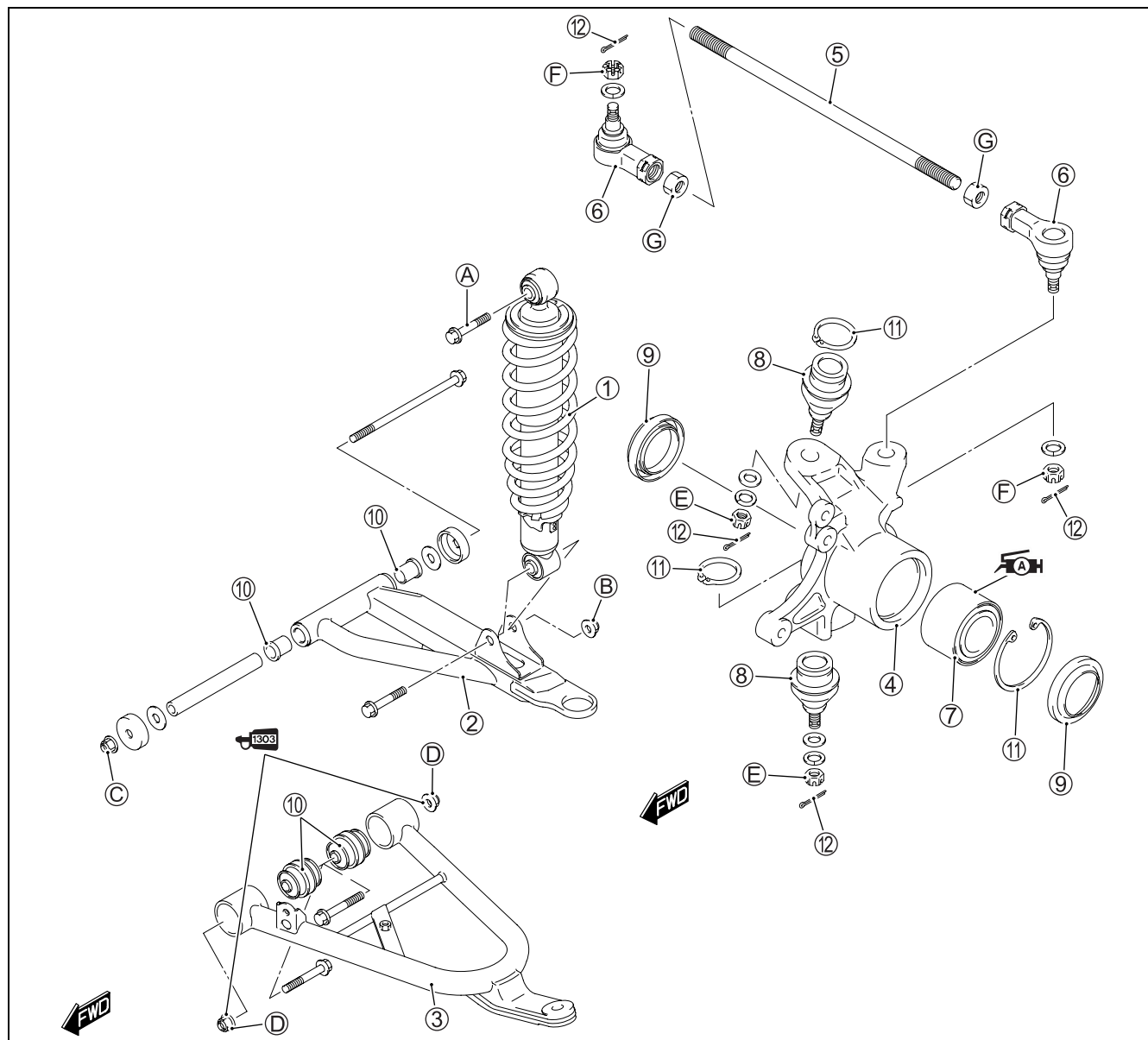
- * The removed front brake hose washer must be replaced with new ones in order to prevent leakage of brake fluid.
- * Bleed air from the brake system after reassembling the master cylinder. (➡ 2-24)


NOTE:

After contacting the front brake hose union to the stopper, tighten the union bolt.



FRONT SUSPENSION CONSTRUCTION



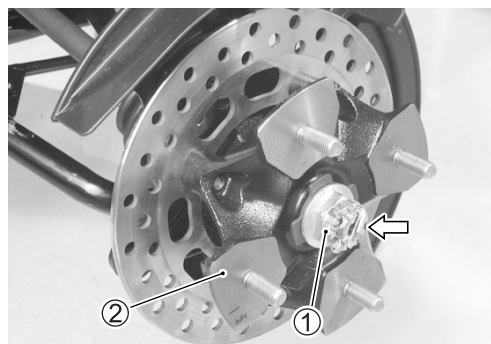
①	Front shock absorber	⑪	Snap ring
②	Front upper wishbone arm	⑫	Cotter pin
③	Front lower wishbone arm	Ⓐ	Front shock absorber mounting upper bolt
④	Steering knuckle	Ⓑ	Front shock absorber mounting lower nut
⑤	Tie rod	Ⓒ	Front wishbone arm pivot nut (upper)
⑥	Tie rod end	Ⓓ	Front wishbone arm pivot nut (lower)
⑦	Front hub bearing	Ⓔ	Steering knuckle end nut (upper and lower)
⑧	Front knuckle end	Ⓕ	Tie rod end nut
⑨	Dust seal	Ⓖ	Tie rod lock-nut
⑩	Bush		



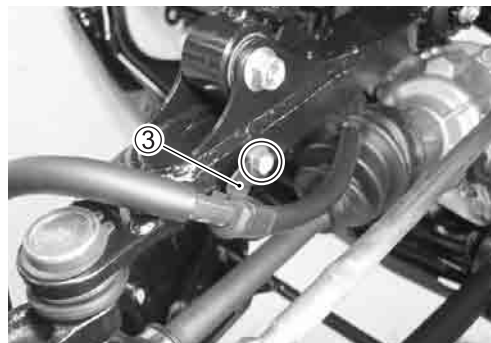
ITEM	N·m	kgf·m	lb·ft
Ⓐ	55	5.5	40.0
Ⓑ	60	6.0	43.5
Ⓒ	60	6.0	43.5
Ⓓ	65	6.5	47.0
Ⓔ	29	2.9	21.0
Ⓕ	29	2.9	21.0
Ⓖ	45	4.5	32.5

REMOVAL

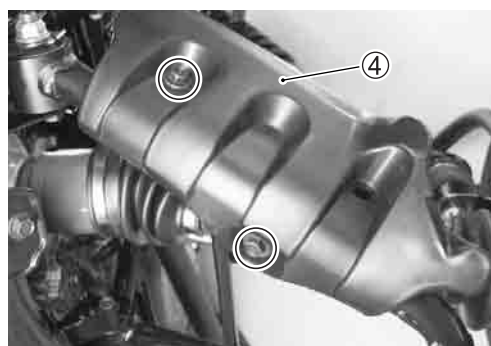
- Remove the front grill lower cover. (☞ 8-6)
- Remove the front wheel. (☞ 8-18)
- Remove the cotter pin.
- Loosen the hub nut ①.
- Remove the front brake caliper. (☞ 8-29)
- Remove the front hub nut ①.
- Remove the front wheel hub ②.



- Remove the front brake hose clamp ③.



- Remove the front drive shaft cover ④.



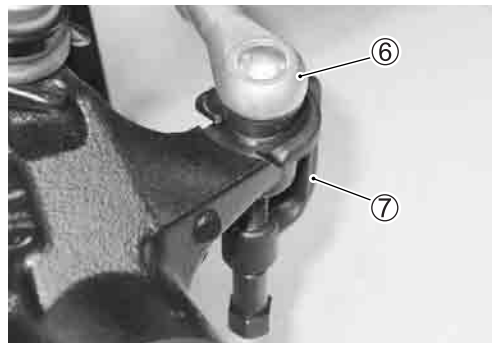
- Remove the front brake disc cover ⑤.



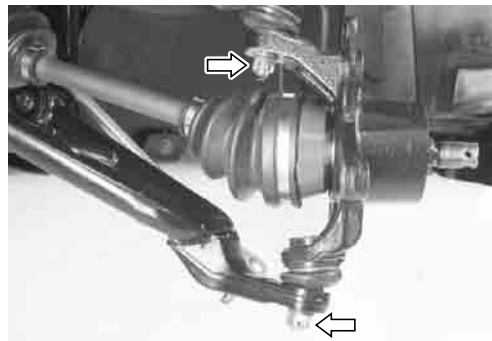
- Remove the cotter pin and tie rod end nut.



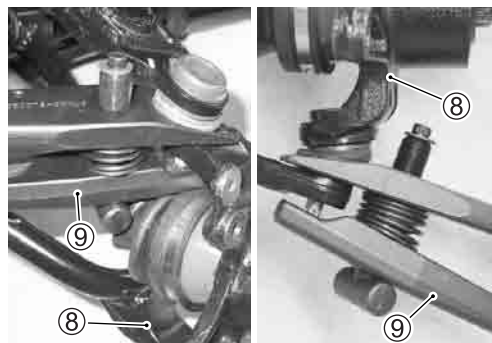
- Remove the tie rod end ⑥ with a commercially available bearing joint remover ⑦.



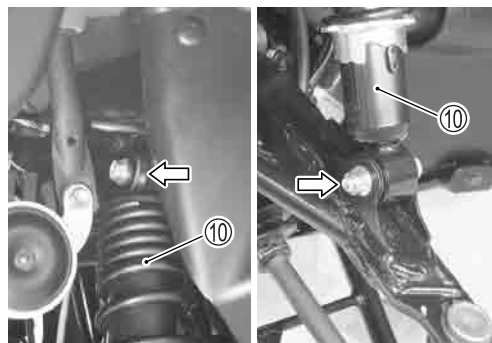
- Remove the cotter pins and steering knuckle end nuts.



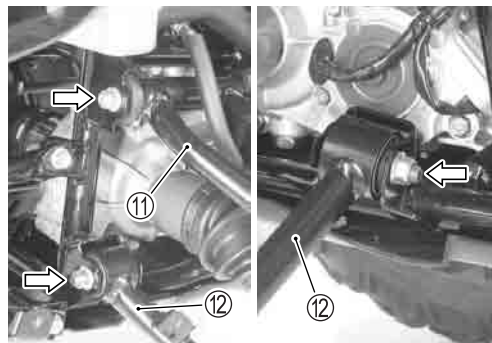
- Remove the steering knuckle ⑧ with a commercially available bearing joint remover ⑨.



- Remove the front shock absorber ⑩.



- Remove the front upper wishbone arms ⑪.
- Remove the front lower wishbone arms ⑫.



INSPECTION AND DISASSEMBLY

FRONT DRIVE SHAFT COVER

Inspect the front drive shaft cover for wear or damage. If any defects are found, replace the front drive shaft cover with a new one.



BRAKE DISC COVER

Inspect the brake disc cover for damage. If any defects are found, replace the brake disc cover with a new one.



FRONT SHOCK ABSORBER

Inspect the shock absorber for oil leakage or damage. If any defects are found, replace the shock absorber with a new one.

CAUTION

Do not attempt to disassemble the front shock absorber. It is unserviceable.



FRONT UPPER WISHBONE ARM

Inspect the front upper wishbone arm for wear or damage. If any defects are found, replace the front upper wishbone arm with a new one.



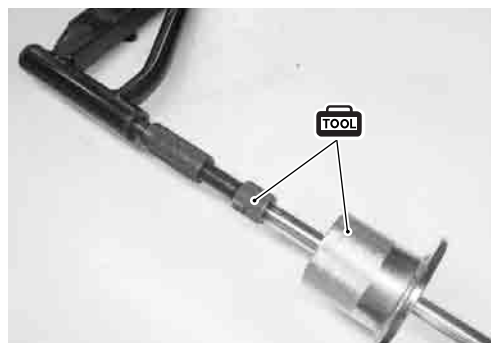
FRONT UPPER WISHBONE ARM BUSH

- Remove the front upper wishbone arm bush with the special tools.



09923-73210: Bearing puller

09930-30144: Sliding hammer



Inspect the front upper wishbone arm bush for wear or damage. If any defects are found, replace the front upper wishbone arm bush with new ones.



FRONT UPPER WISHBONE ARM DUST SEAL

Inspect the front upper wishbone arm dust seal for wear or damage. If any defects are found, replace the front upper wishbone arm dust seal with a new one.



SPACER

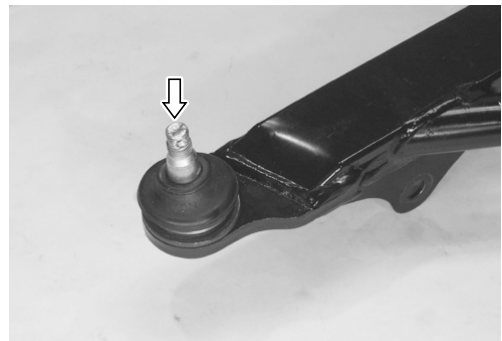
Inspect the spacer for wear or damage. If any defects are found, replace the spacer with a new one.



FRONT UPPER WISHBONE ARM KNUCKLE END

Inspect the front upper wishbone arm knuckle end for wear or damage. If any defects are found, replace the front upper wishbone arm knuckle end with a new one.

Inspect the front upper wishbone arm knuckle end for smooth movement. If there are any abnormalities, replace the front upper wishbone arm with a new one.

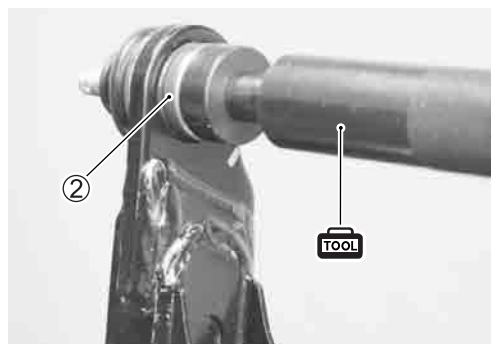


- Remove the snap ring ①.



- Remove the front upper wishbone arm knuckle end ② with the special tool.

TOOL 09913-70210: Bearing installer set ($\phi 30$)



FRONT LOWER WISHBONE ARM

Inspect the front lower wishbone arm for bend or damage. If any defects are found, replace the front lower wishbone arm with new one.



FRONT LOWER WISHBONE ARM BUSH

Inspect the front lower wishbone arm bush wear or damage. If any defects are found, replace the front lower wishbone arm bush with new ones.



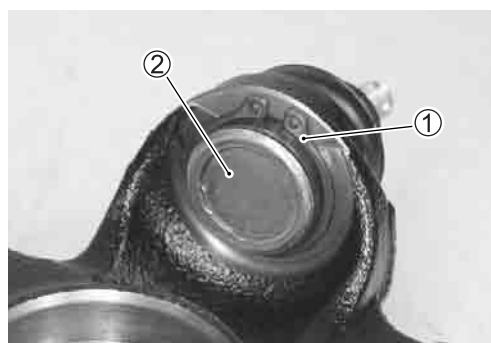
STEERING KNUCKLE

Inspect the front lower knuckle end for wear or damage. If any defects are found, replace the front lower knuckle end with a new one.

Inspect front lower knuckle end for smooth movement. If there are any abnormalities, replace the front lower knuckle end with a new one.

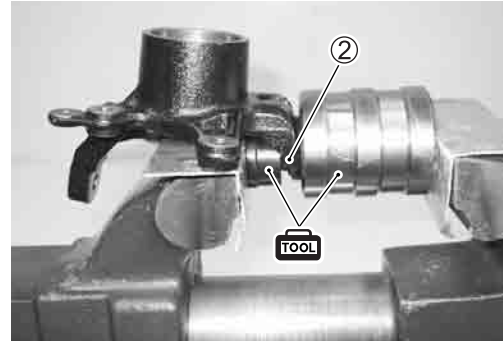


- Remove the snap ring ①.



- Remove the front lower knuckle end ② with the special tools and vise as shown.

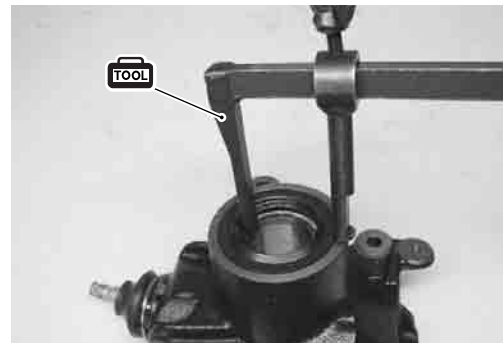
TOOL 09913-70210: Bearing installer set $\phi 30$
09941-53610: Front fork installer hammer



STEERING KNUCKLE DUST SEAL

- Remove the steering knuckle dust seals with the special tool.

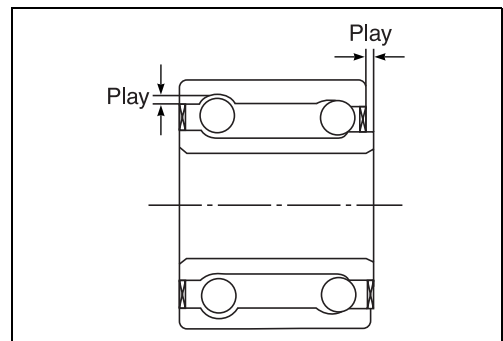
TOOL 09913-50121: Oil seal remover



FRONT HUB BEARING

Inspect the inner race play of the front hub bearing by hand while they are in the steering knuckle.

Rotate the inner races by hand to inspect for abnormal noise and smooth rotation. If there is anything unusual, replace the front hub bearing with a new one.

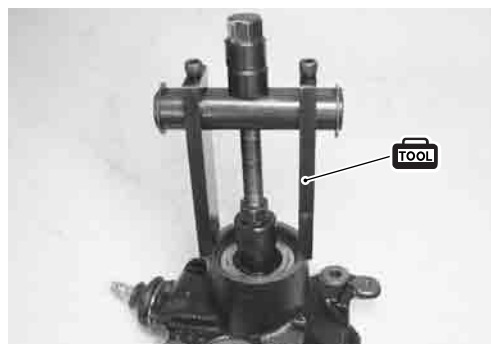


- Remove the snap ring ①.



- Remove the hub bearing with the special tool.

TOOL 09921-20240: Bearing remover set ($\phi 30$)



REASSEMBLY AND INSTALLATION

Reassemble and install the front suspension in the reverse order of removal and disassembly. Pay attention to the following points:

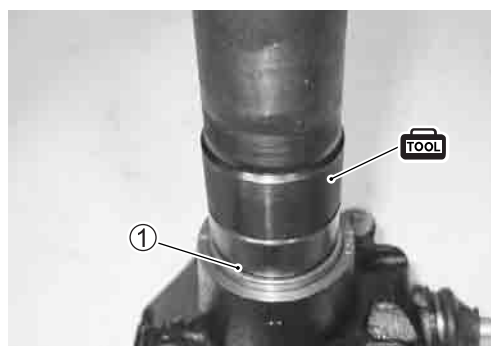
STEERING KNUCKLE

- Install the front hub bearing ① with the special tool.

TOOL 09913-70210: Bearing installer set ($\phi 47$)

CAUTION

The removed bearing must be replaced with a new one.



- Install the snap ring ②.

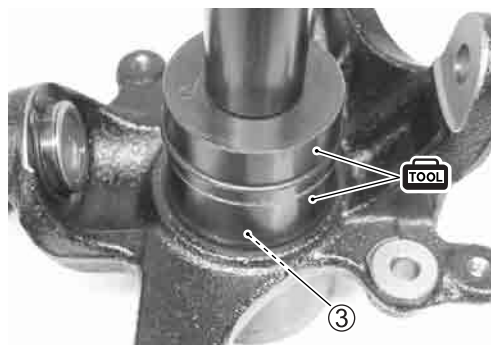


- Install the steering knuckle dust seal ③ with the special tool.

TOOL 09913-70210: Bearing installer set

CAUTION

The removed dust seal must be replaced with a new one.

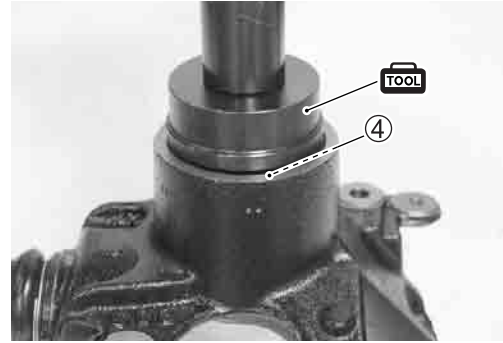


- Install the steering knuckle dust seal ④ with the special tool.

 **09913-70210: Bearing installer set ($\phi 55$)**

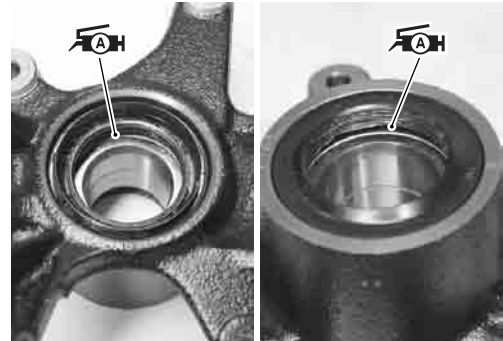
CAUTION

The removed dust seal must be replaced with a new one.



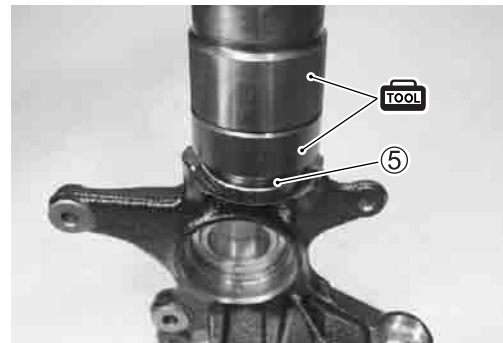
- Apply SUZUKI SUPER GREASE “A” to the lip of the dust seals.

 **99000-25010: SUZUKI SUPER GREASE “A”**
(or equivalent grease)

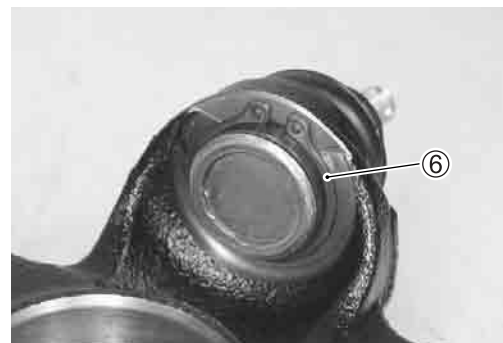


- Install the steering knuckle end ⑤ with the special tool.

 **09913-70210: Bearing installer set ($\phi 35$)**



- Install the snap ring ⑥.



FRONT UPPER WISHBONE ARM

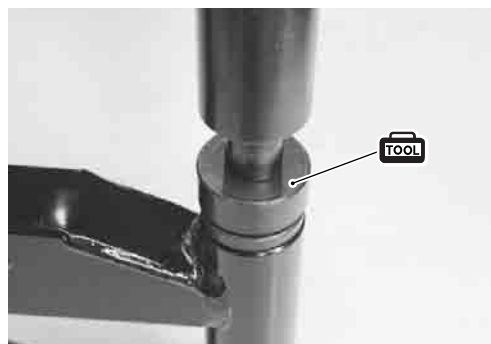
- Install the front upper wishbone arm knuckle end with the special tool.

 **09913-70210: Bearing installer set ($\phi 35$)**



- Install the front upper wishbone arm bush with the special tool.

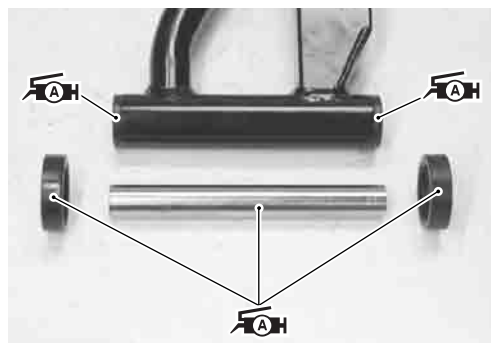
 **09913-70210: Bearing installer set ($\phi 30$)**



- Apply SUZUKI SUPER GREASE "A" to the inside of the front upper wishbone arm bush, lip of dust seals and spacer.

 **99000-25010: SUZUKI SUPER GREASE "A"**
(or equivalent grease)

- Install the dust seals and spacer to the front upper wishbone arm.



FRONT SUSPENSION

- Apply THREAD LOCK SUPER "1303" to the front lower wishbone arm pivot nuts.
- Tighten the front wishbone arm pivot nuts (upper and lower) to the specified torque.

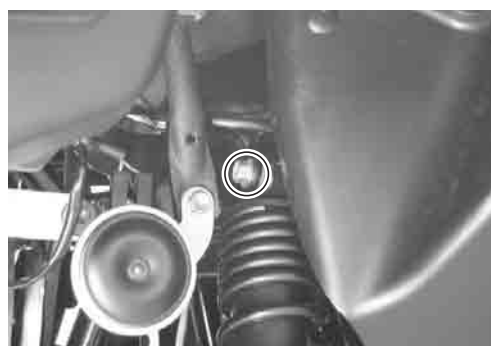
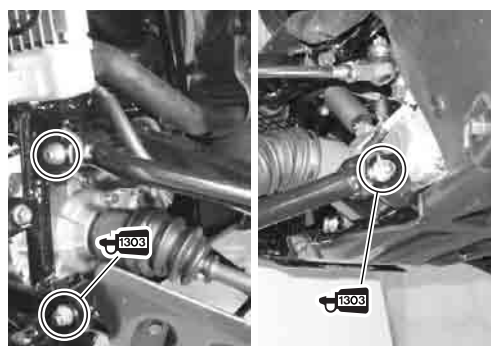
 **99000-32030: THREAD LOCK SUPER "1303"**

 **Front wishbone arm pivot nut (upper):**
60 N·m (6.0 kgf-m, 43.5 lb-ft)

Front wishbone arm pivot nut (lower):
65 N·m (6.5 kgf-m, 47.0 lb-ft)

- Tighten the front shock absorber mounting upper bolt to the specified torque.

 **Front shock absorber mounting upper bolt:**
55 N·m (5.5 kgf-m, 40.0 lb-ft)



- Tighten the front shock absorber mounting lower nut to the specified torque.

 **Front shock absorber mounting lower nut:**
60 N·m (6.0 kgf-m, 43.5 lb-ft)

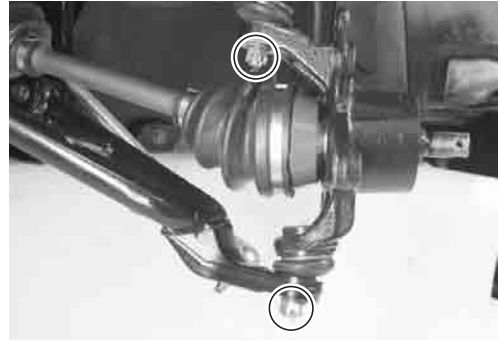


- Tighten the steering knuckle end nut (upper and lower) to the specified torque.

 **Steering knuckle end nut (upper and lower):**
29 N·m (2.9 kgf-m, 21.0 lb-ft)

CAUTION

The removed cotter pins must be replaced with new ones.



- Tighten the tie rod end nut to the specified torque.

 **Tie rod end nut: 29 N·m (2.9 kgf-m, 21.0 lb-ft)**

CAUTION

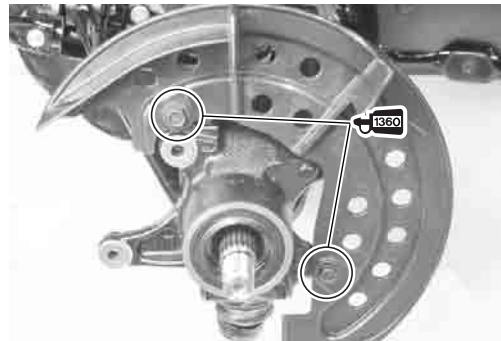
The removed cotter pin must be replaced with a new one.



- Apply THREAD LOCK SUPER "1360" to the front brake disk cover mounting bolts, and then tighten them securely.

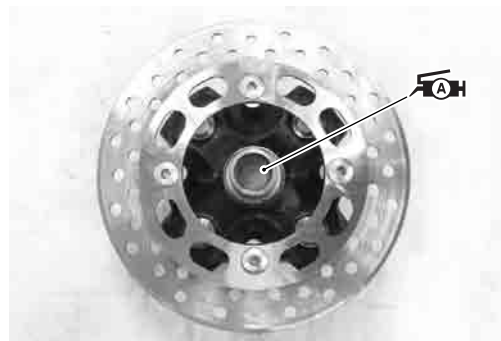
 **99000-32130: THREAD LOCK SUPER "1360"**

 **Front brake disk cover mounting bolt:**
10 N·m (1.0 kgf-m, 7.0 lb-ft)



- Apply SUZUKI SUPER GREASE "A" to the wheel hub spline.

 **99000-25010: SUZUKI SUPER GREASE "A"**
(or equivalent grease)

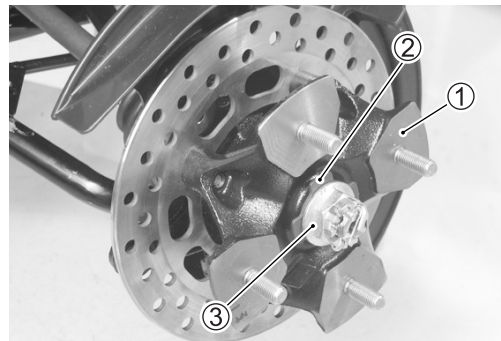


- Install the wheel hub ①, washer ② and front hub nut ③.
- Tighten the front hub nut to the specified torque.

 **Front hub nut: 110 N·m (11.0 kgf-m, 79.5 lb-ft)**

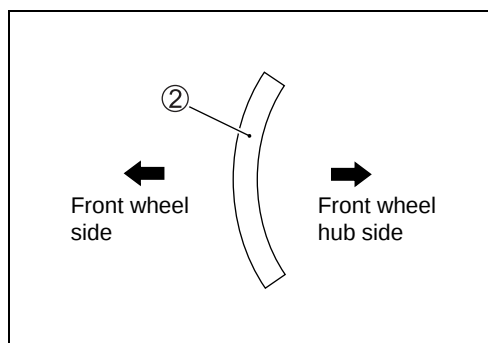
CAUTION

The removed cotter pin must be replaced with a new one.



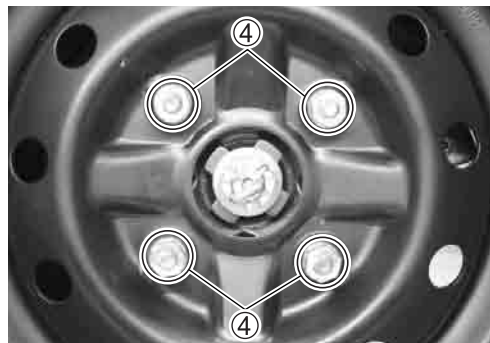
NOTE:

Install the washer ② as shown in the illustration.



- Install the front brake caliper. (8-33)
- Tighten the front wheel set nuts ④ to the specified torque.

 **Front wheel set nut: 60 N·m (6.0 kgf-m, 43.5 lb-ft)**

**SPRING PRE-LOAD ADJUSTMENT**

After installing the front shock absorbers, adjust the spring pre-load.

Position "1" provides the minimum spring pre-load.

Position "5" provides the maximum spring pre-load.

 **STD POSITION: 2/5**



POSITION "1"

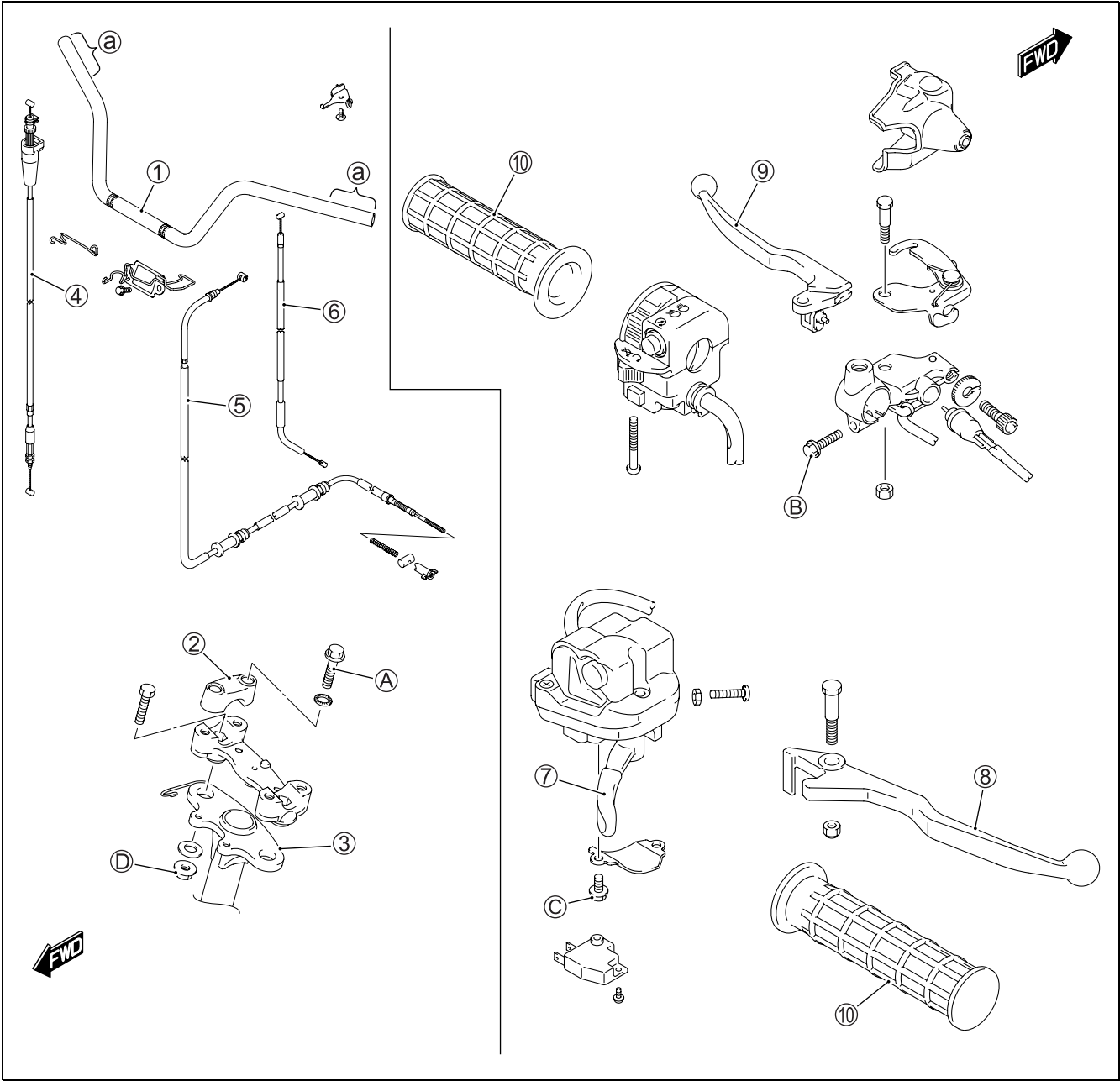


POSITION "5"

⚠ WARNING

Be sure to adjust the spring pre-load on the both shock absorbers equally.

HANDLEBARS CONSTRUCTION



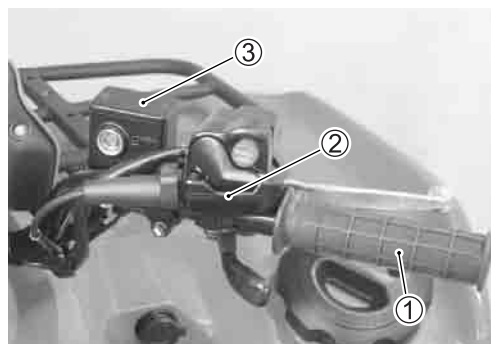
①	Handlebar	⑨	Rear brake lever
②	Handlebar upper clamp	⑩	Grip
③	Steering shaft	Ⓐ	Handlebar upper clamp bolt
④	Throttle cable	Ⓑ	Rear brake lever holder clamp bolt
⑤	Rear brake cable	Ⓒ	Throttle lever case bolt
⑥	Starter cable	Ⓓ	Handlebar holder nut
⑦	Throttle lever	Ⓐ	Apply handle grip bond.
⑧	Front brake lever		



ITEM	N·m	kgf-m	lb-ft
Ⓐ	26	2.6	19.0
Ⓑ	10	1.0	7.5
Ⓒ	5	0.5	3.5
Ⓓ	60	6.0	43.5

REMOVAL

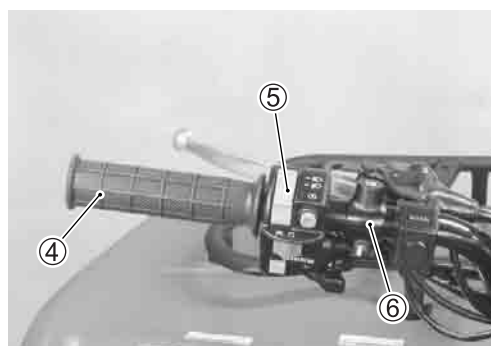
- Remove the right grip ①.
- Remove the throttle lever case ②.
- Remove the brake master cylinder ③ from the handlebars.
(☞ 8-36)



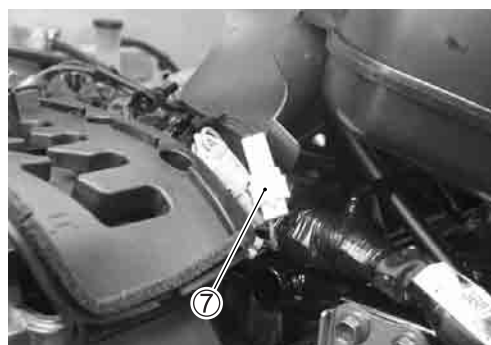
- Disconnect the brake hose clamp.



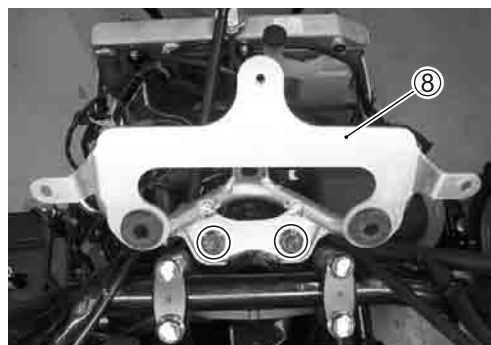
- Remove the left grip ④.
- Remove the left handlebar switch box ⑤.
- Remove the rear brake lever assembly ⑥.



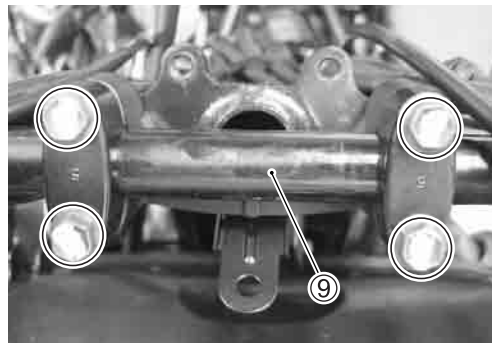
- Disconnect the brake lever switch coupler ⑦.



- Remove the handle cover and combination meter. (☞ 9-28)
- Remove the cover brace ⑧.

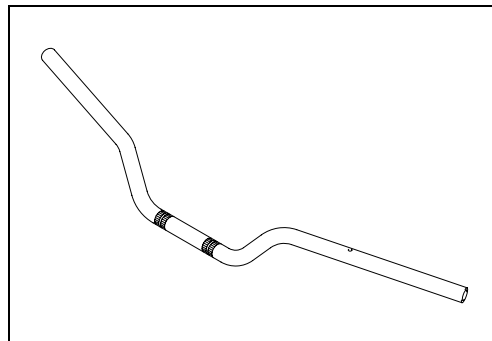


- Remove the handlebars ⑨.



INSPECTION

Inspect the handlebars for distortion or damage. If any defects are found, replace the handlebars with a new one.

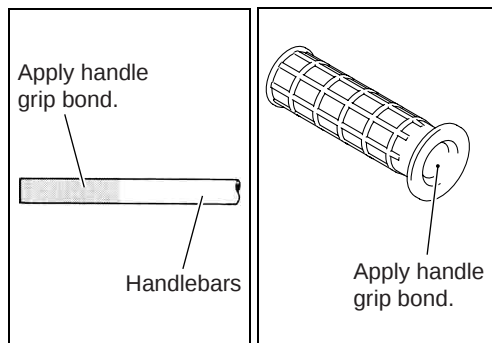


INSTALLATION

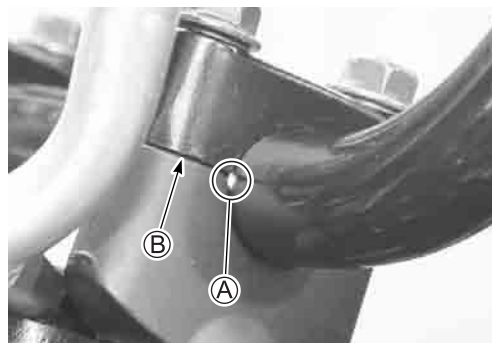
Install the handlebars in the reverse order of removal. Pay attention to the following points:

- Apply adhesive agent to the handlebar right and left end and right and left grip inner wall.

HANDLE GRIP BOND (commercial available)



- Align the punched mark ① on the handlebars with the mating surface ② of handlebar holder.

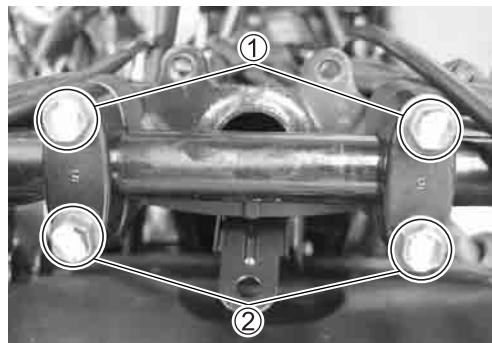


- First tighten the handlebar upper clamp bolts ① to the specified torque, and then tighten the handlebar upper clamp bolts ② to the specified torque.



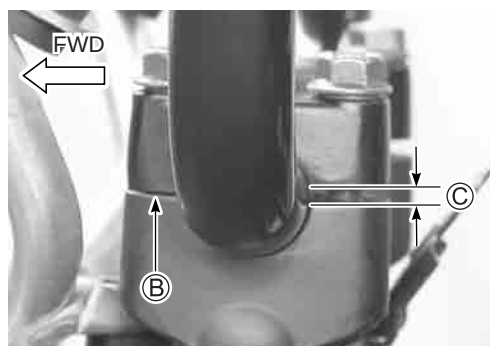
Handlebar upper clamp bolt:

26 N·m (2.6 kgf-m, 19.0 lb-ft)



NOTE:

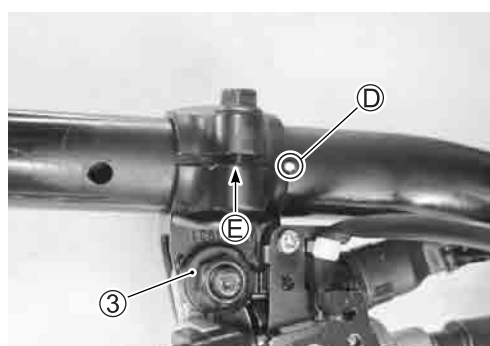
The higher portion of handlebar holder must face forward, so that the clearance ③ of holder is in back of the handlebars.



- Install the hone switch ②.



- Install the rear brake lever assembly ③.
- Align the punch mark ④ on the handlebars with the mating surface ⑤ of rear brake lever assembly.



- Tighten the rear brake lever holder clamp bolts to the specified torque.



Rear brake lever holder clamp bolt:

10 N·m (1.0 kgf-m, 7.5 lb-ft)

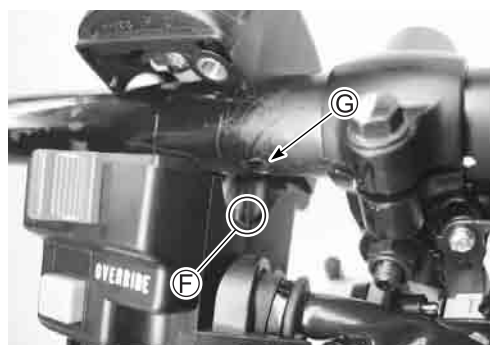


- Apply the grease to the end of starter cable.



99000-25010: SUZUKI SUPER GREASE "A"
(or equivalent grease)

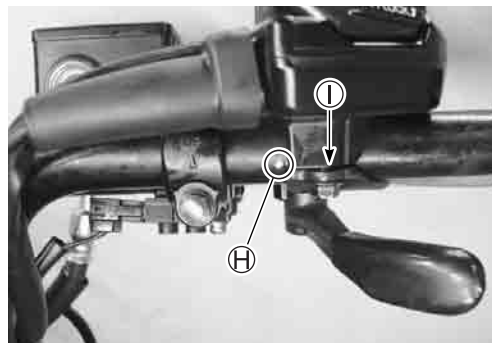
- When installing the left handle switch, engage the stopper ⑥ with the handlebar hole ⑦.



- Tighten the left handle switch screw.



- Install the brake master cylinder. (8-38)
- Align the punch mark (H) on the handlebars with the mating surface (I) of throttle lever case.

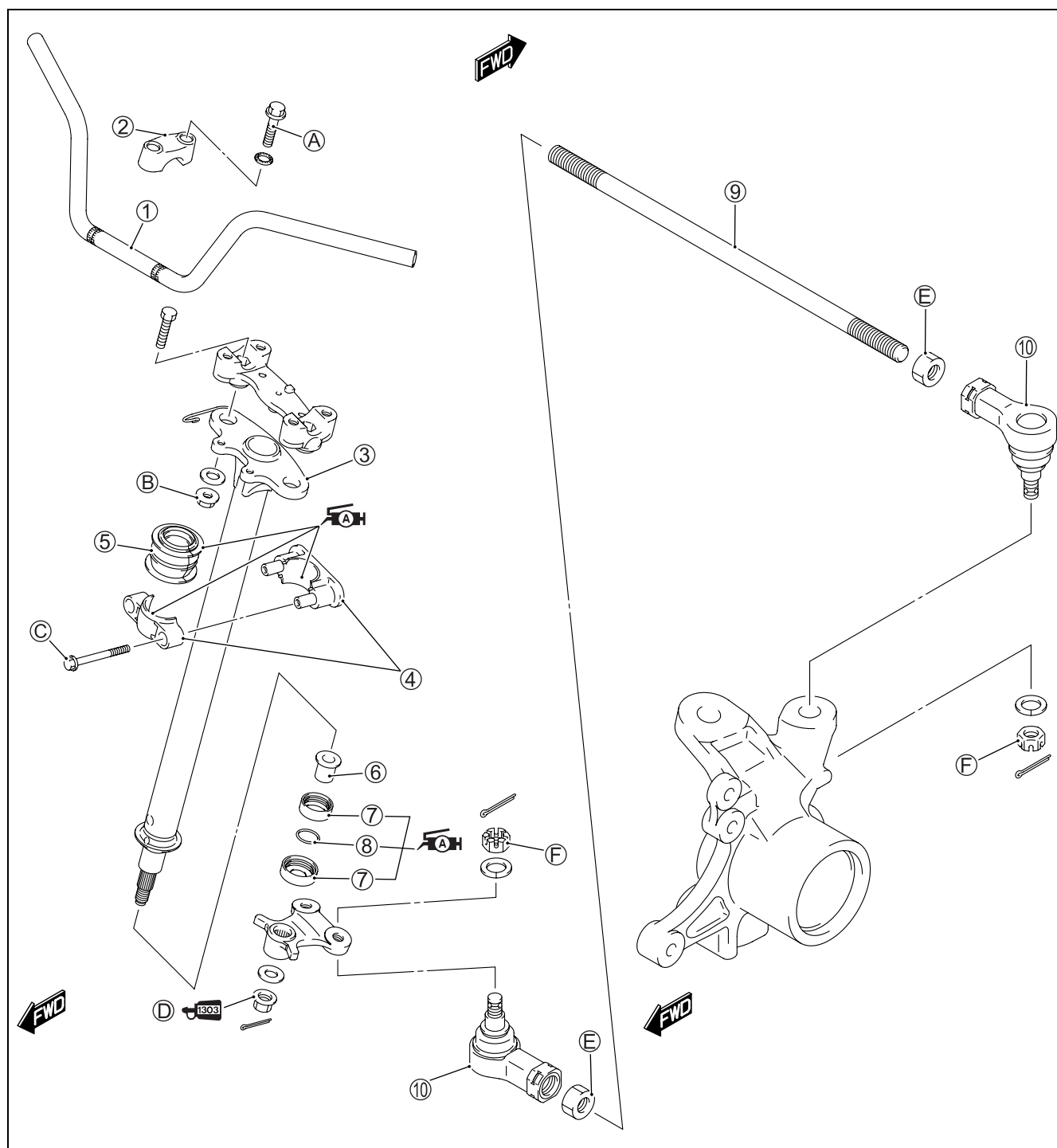


- Tighten the throttle lever case bolts to the specified torque.

 **Throttle lever case bolt: 5 N·m (0.5 kgf-m, 3.5 lb-ft)**



STEERING CONSTRUCTION



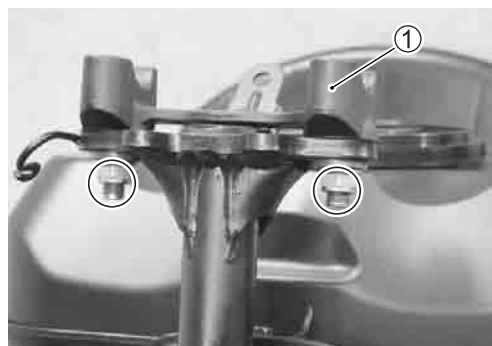
①	Handlebar	⑨	Tie rod
②	Handlebar upper clamp	⑩	Tie rod end
③	Steering shaft	A	Handleber upper clamp bolt
④	Steering shaft holder	B	Handleber holder nut
⑤	Dust seal	C	Steering shaft holder bolt
⑥	Bush	D	Steering shaft lower nut
⑦	Dust seal	E	Tie rod lock-nut
⑧	O-ring	F	Tie rod end nut



ITEM	N·m	kgf·m	lb·ft
A	26	2.6	19.0
B	60	6.0	43.5
C	23	2.3	16.5
D	170	17.0	123.0
E	45	4.5	32.5
F	29	2.9	21.0

REMOVAL

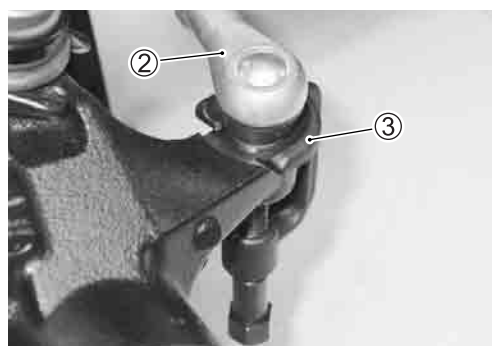
- Remove the front wheels. (☞ 8-18)
- Remove the front fender. (☞ 8-9)
- Remove the handlebars. (☞ 8-53)
- Remove the handlebar holder nuts, washers and handlebar holder ①.



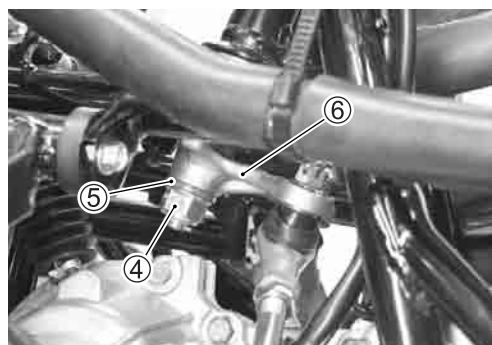
- Remove the cotter pins, tie rod end nuts and spring washers.



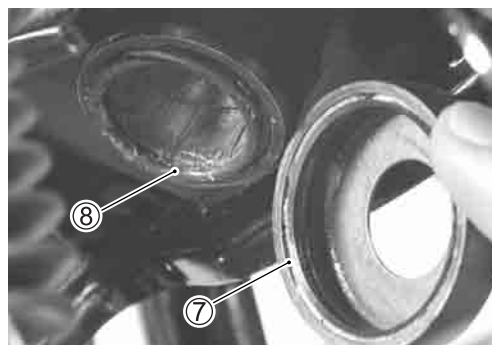
- Remove the tie rod end ② with a commercially available ball bearing joint remover ③.



- Remove the cotter pin and steering shaft lower nut ④, washer ⑤, steering arm plate ⑥.



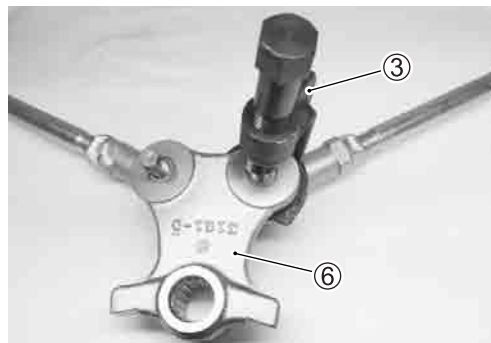
- Remove the dust seal ⑦ and O-ring ⑧.



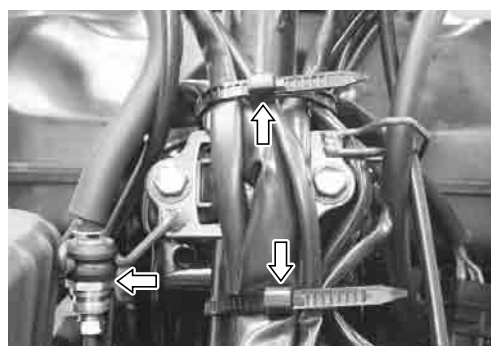
- Remove the cotter pins, tie rod end nuts and spring washers.



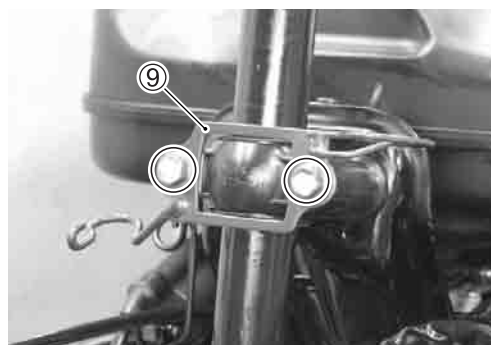
- Remove the steering arm plate ⑥ with a commercially available ball bearing joint remover ③.



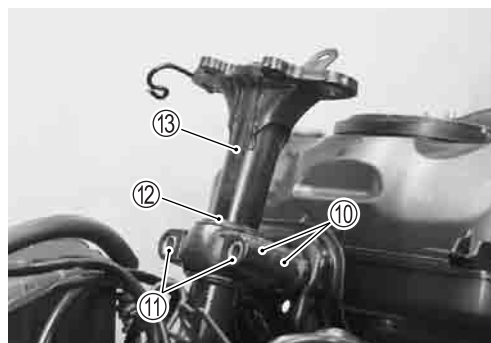
- Disconnect the brake hose clamp.
- Remove the cable clamp.



- Remove the steering shaft plate ⑨.



- Remove the steering shaft holder ⑩ and collars ⑪.
- Remove the steering shaft holder bush ⑫ from the steering shaft.
- Remove the steering shaft ⑬.



INSPECTION AND DISASSEMBLY

STEERING SHAFT HOLDER BUSH

Inspect the bush for wear or damage. If any defects are found, replace the bushing with a new one.



TIE ROD

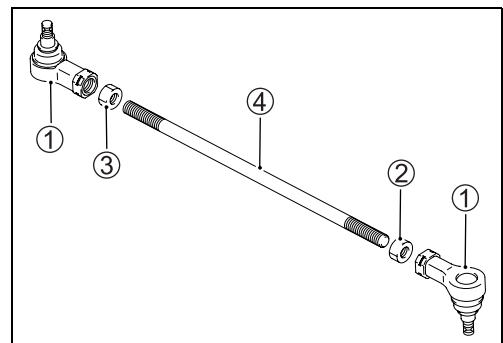
Inspect the tie rod for distortion or damage. If any defects are found, replace the tie rod with a new one.



- ① Tie rod end
- ② Lock-nut
- ③ Lock-nut
- ④ Tie rod

CAUTION

The lock-nuts ② have left-hand threads.



TIE ROD END

Inspect the tie rod ends for smooth movement. If there are any abnormalities, replace the tie rod ends with new ones.

Inspect the tie rod end boots for wear or damage.

If any defects are found, replace the tie rod ends with new ones.



STEERING SHAFT

Inspect the steering shaft for distortion or bend. If any defects are found, replace the steering shaft with a new one.



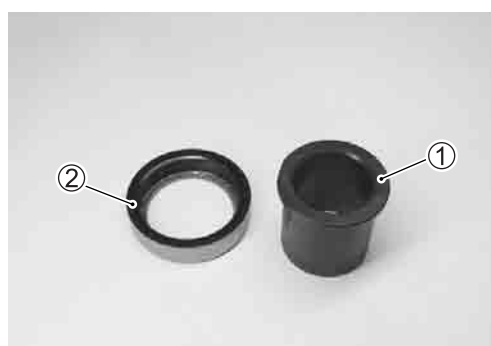
STEERING SHAFT HOLDER

Inspect the steering shaft holders for wear or damage. If any defects are found, replace the steering shaft holders with new ones.



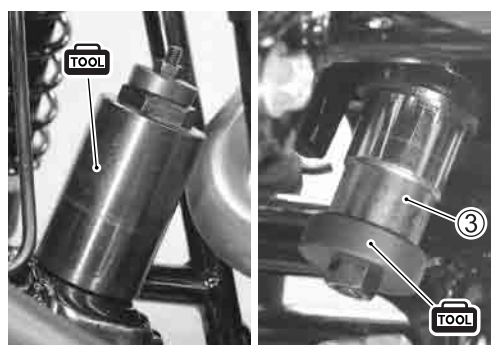
STEERING SHAFT BUSH AND DUST SEAL

Inspect the steering shaft bush ① and dust seal ② for wear and damage. If any defects are found, replace them with new ones.



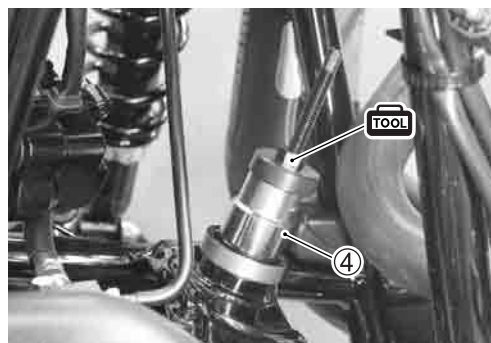
- Remove the steering shaft bush and dust seal with the special tools and a suitable size socket wrench ③.

TOOL 09924-84510: Bearing installer set
09930-30721: Rotor remover



- Install the steering shaft bush and dust seal with the special tool and a suitable size socket wrench ④.

TOOL 09924-84521: Bearing installer set



REASSEMBLY AND INSTALLATION

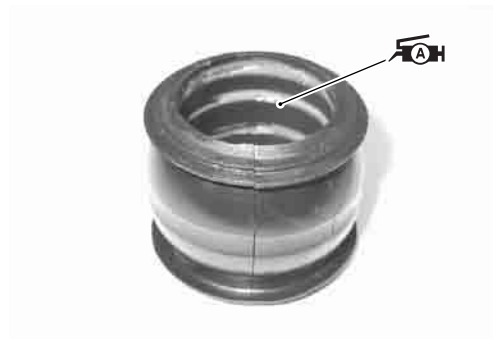
Reassemble and install the steering shaft in the reverse order of removal and disassembly. Pay attention to the following points:

STEERING SHAFT

- Apply SUZUKI SUPER GREASE "A" to the steering shaft holder bush.

 **99000-25010: SUZUKI SUPER GREASE "A"**
(or equivalent grease)

- Install the steering shaft holder bush to the steering shaft.



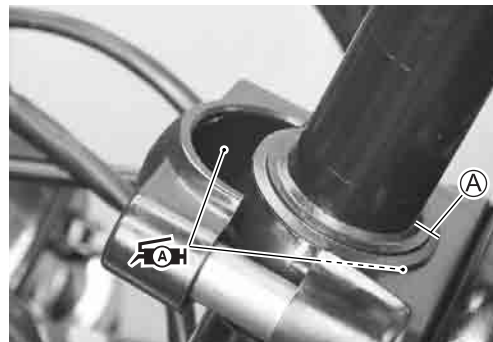
- Apply SUZUKI SUPER GREASE "A" to the bush and dust seal.

 **99000-25010: SUZUKI SUPER GREASE "A"**
(or equivalent grease)



- Apply SUZUKI SUPER GREASE "A" to the steering shaft holders before installing the steering shaft holders.

 **99000-25010: SUZUKI SUPER GREASE "A"**
(or equivalent grease)



CAUTION

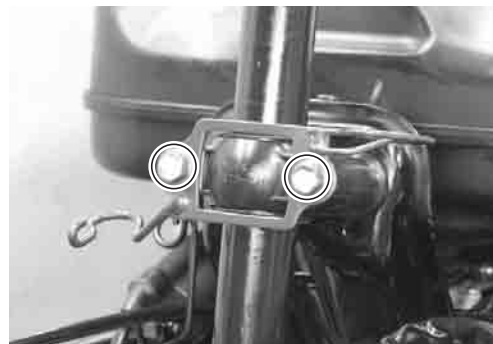
To prevent the entry of dirt, the dust seal end **A** must face rearward when installing the dust seal to the steering shaft.

- Tighten the steering shaft holder bolts to the specified torque.

 **Steering shaft holder bolt: 23 N·m (2.3 kgf-m, 16.5 lb-ft)**

NOTE:

Make sure that the wiring harness, cables and brake hose routing are properly. (☞ 10-16, 17 and 24)



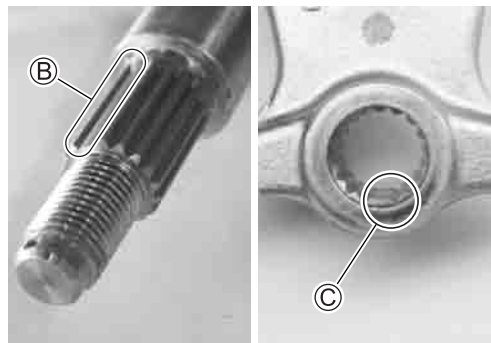
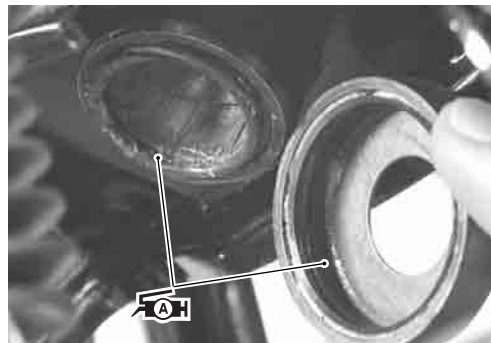
- Apply SUZUKI SUPER GREASE “A” to the dust seal and O-ring.

CAUTION

The removed O-ring must be replaced with a new one.

 **99000-25010: SUZUKI SUPER GREASE “A”**
(or equivalent grease)

- Install the dust seal and O-ring to the steering shaft.
- When installing the steering arm plate, align the wide spline **Ⓑ** of steering shaft with slit **Ⓒ** of steering arm plate.



- Apply a small quantity THREAD LOCK SUPER “1303” to the thread part of steering shaft.

 **99000-32030: THREAD LOCK SUPER “1303”**
(or equivalent thread lock)

- Tighten the steering shaft lower nut **①** to the specified torque.

 **Steering lower shaft nut: 170 N·m (17.0 kgf-m, 123.0 lb-ft)**

- Install the cotter pin.

CAUTION

The removed cotter pin must be replaced with a new one.



TIE ROD

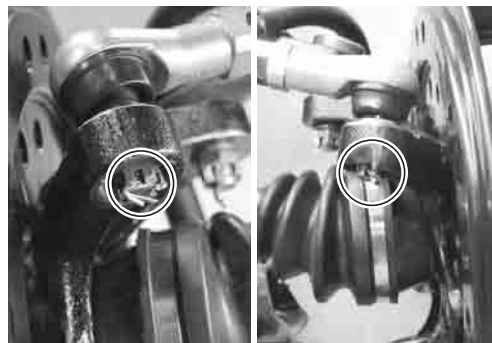
- Tighten the tie rod end nuts to the specified torque.

 **Tie rod end nut: 29 N·m (2.9 kgf-m, 21.0 lb-ft)**

- Install the cotter pins.

CAUTION

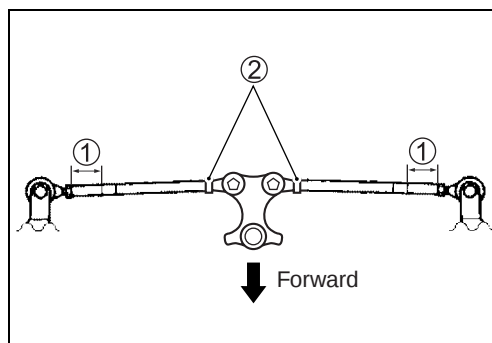
The removed cotter pins must be replaced with new ones.

**NOTE:**

When installing the tie rod, make sure the narrow end ① of the tie rod comes out.

CAUTION

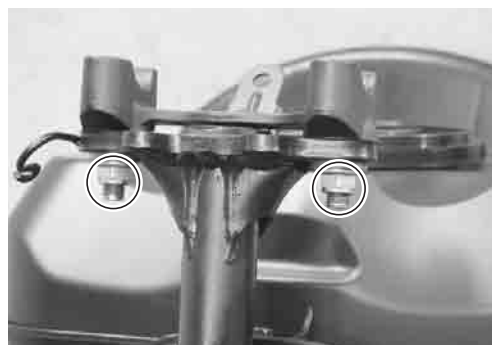
The lock-nuts ② have left-hand threads.

**HANDLEBAR HOLDER**

- Tighten the handlebar holder nut to the specified torque.

 **Handlebar holder nut: 60 N·m (6.0 kgf-m, 43.5 lb-ft)**

- Install the handlebars. ( 8-54)
- Install the front fender.
- Install the front wheels. ( 8-18)



TOE ADJUSTMENT

Adjust the toe-out as follows:

- Place the vehicle on level ground and set the handlebars straight.
- Make sure all the tires are inflated to the standard pressure. (2-26)
- Place 75 kg (165 lbs) weight on the seat.
- Loosen the lock-nuts (①, ②) on each tie rod.

NOTE:

Hold the concave part ③ of tie rod with a wrench.

CAUTION

The lock-nuts ② have left-hand threads.

- Measure the distances (A) and (B) between the front wheels. Subtract the measurement of (A) from that of (B) to find the toe-out. If the toe-out is not within specification, adjust the tie rod to the right or left until the toe-out is within the specified range.

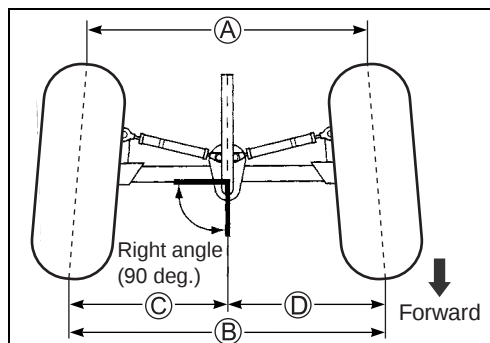
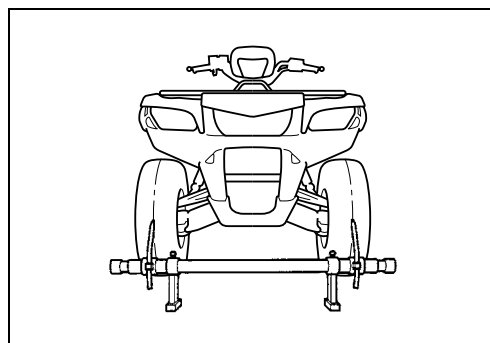
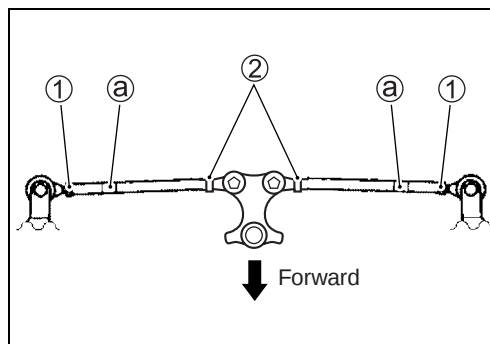
$$B - A = \text{Toe-out}$$

DATA Toe-out

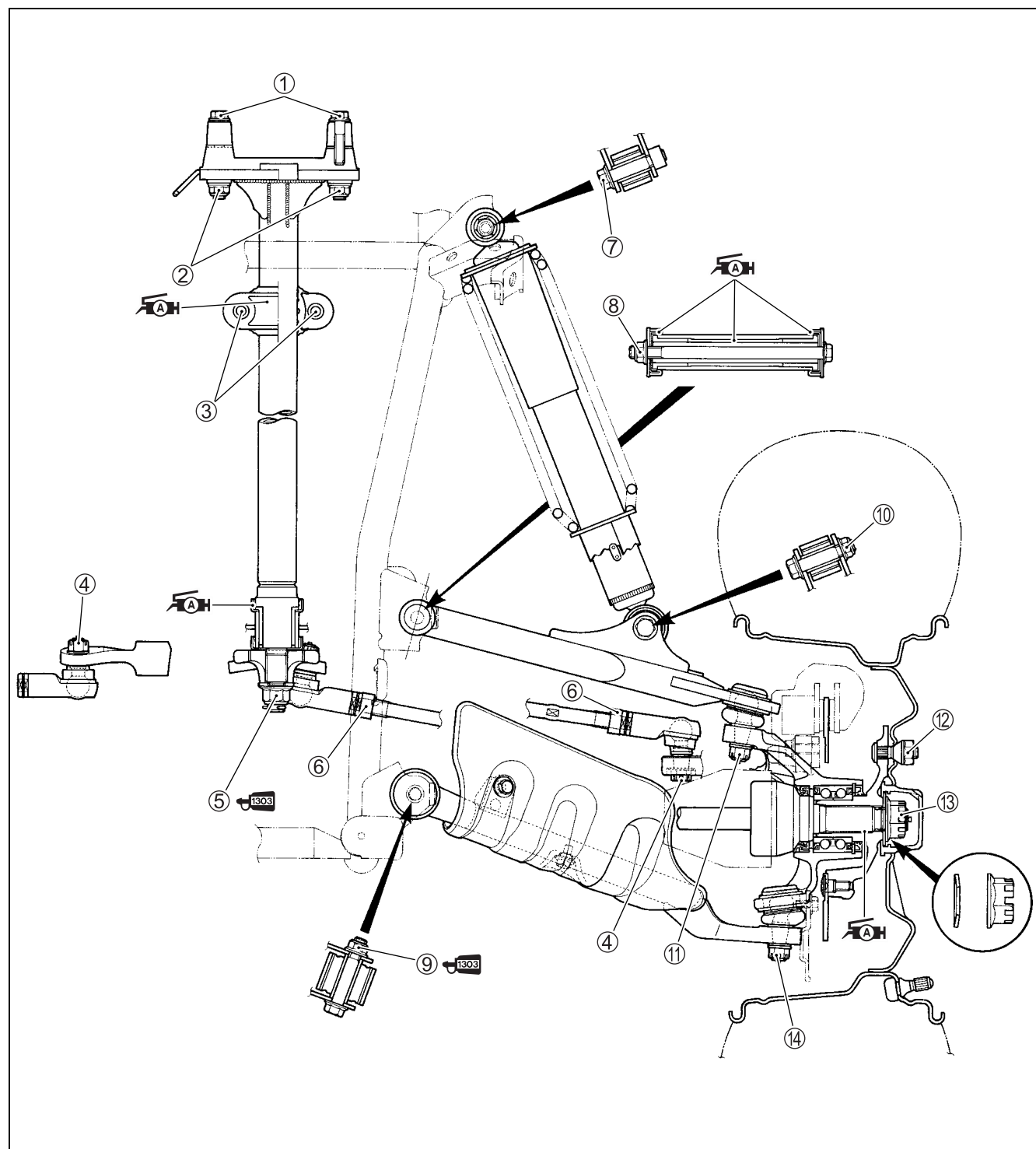
Standard: $10 \pm 4 \text{ mm}$ ($0.39 \pm 0.16 \text{ in}$)

- Temporarily tighten the four lock-nuts.
- Check that the distances (C) and (D) are equal, as shown. If the distances are not equal, adjust the tie rod to the right or left until the toe-out is within specification. Check the toe-out again by measuring distances (A) and (B).
- If the toe-out is not within specification, repeat the adjustment as above until the proper toe-out is obtained and distances (C) and (D) become equal.
- After adjustment has been made, tighten the four lock-nuts ① to the specified torque.

Tie rod lock-nut: 45 N·m (4.5 kgf-m, 32.5 lb-ft)



FRONT WHEEL, FRONT BRAKE, FRONT SUSPENSION FRONT DRIVE SHAFT AND STEERING REASSEMBLING INFORMATION

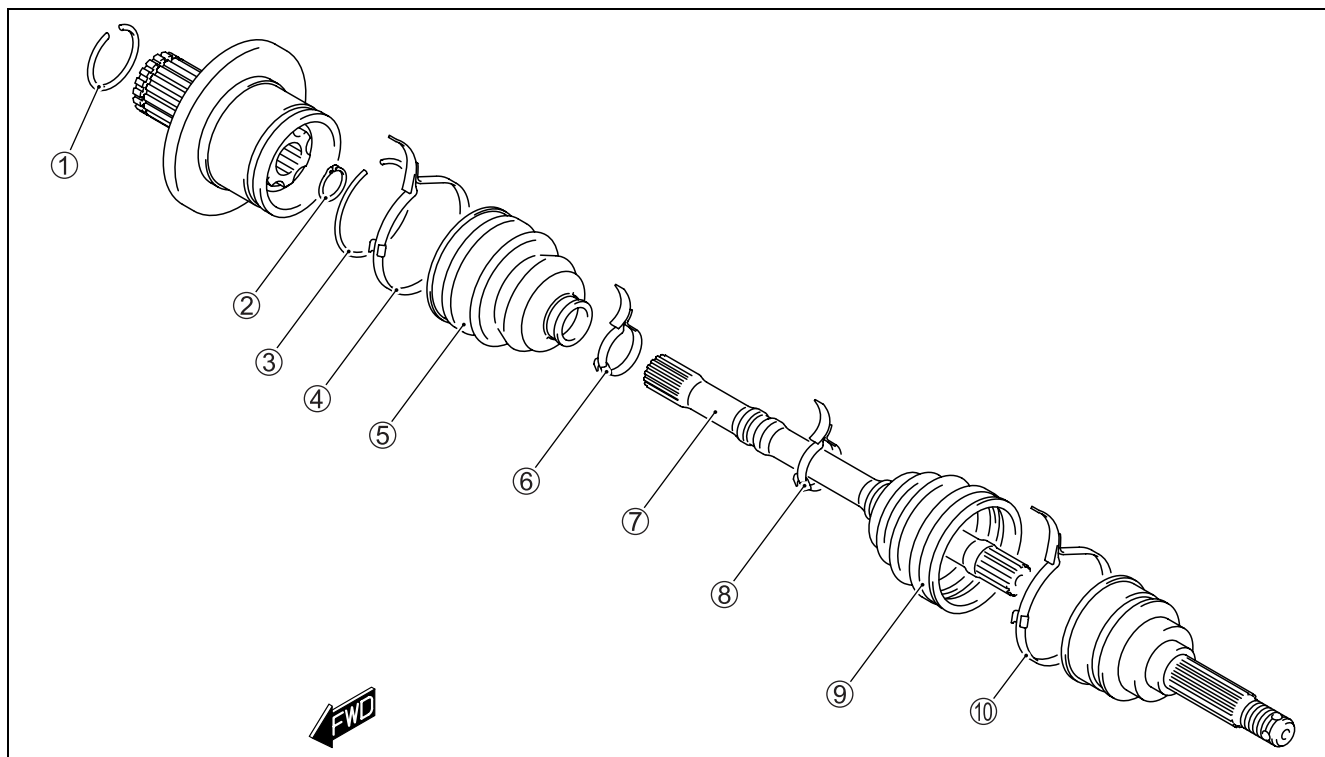


ITEM	N·m	kgf-m	lb-ft
①	26	2.6	19.0
②	60	6.0	43.5
③	23	2.3	16.5
④	29	2.9	21.0
⑤	170	17.0	123.0

ITEM	N·m	kgf-m	lb-ft
⑥	45	4.5	32.5
⑦	55	5.5	40.0
⑧	60	6.0	43.5
⑨	65	6.5	47.0
⑩	60	6.0	43.5

ITEM	N·m	kgf-m	lb-ft
⑪	29	2.9	21.0
⑫	60	6.0	43.5
⑬	110	11.0	49.5
⑭	29	2.9	21.0

REAR DRIVE SHAFT CONSTRUCTION



①	Circlip	⑥	Inner boot band (small)
②	Snap ring	⑦	Drive shaft
③	Stopper ring	⑧	Outer boot band (small)
④	Inner boot band (large)	⑨	Outer boot
⑤	Inner boot	⑩	Outer boot band (large)

REMOVAL

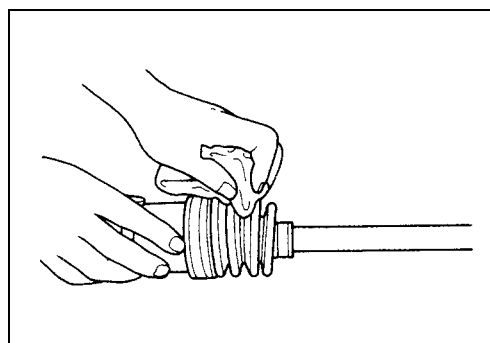
- Remove the rear wheel. (☞ 8-18)
- Drain the rear final gear oil. (☞ 2-12)
- Remove the rear suspension. (☞ 8-84)
- Hold the inboard joint ① of the rear drive shaft and tug the drive shaft horizontally.



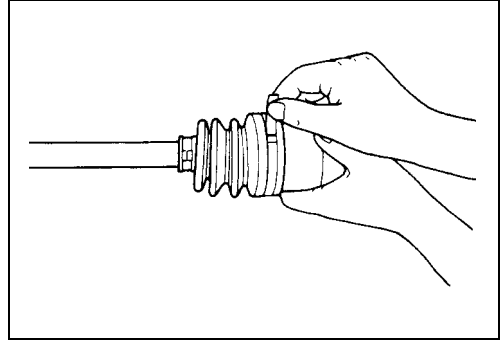
NOTE:

If it is difficult to remove the rear drive shaft from the front differential gear case, using the suitable tool.

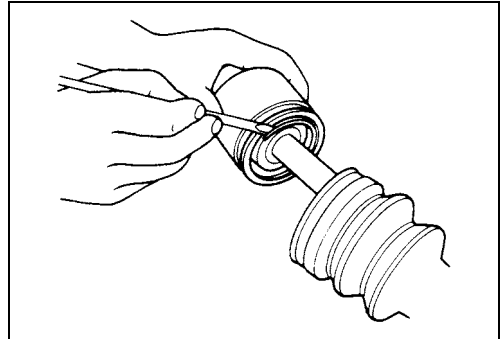
- TOOL** 09924-21940: Wheel hub remover
 09924-21920: Drive shaft remover
 09930-30104: Sliding hammer
 09924-21950: Front drive shaft remover



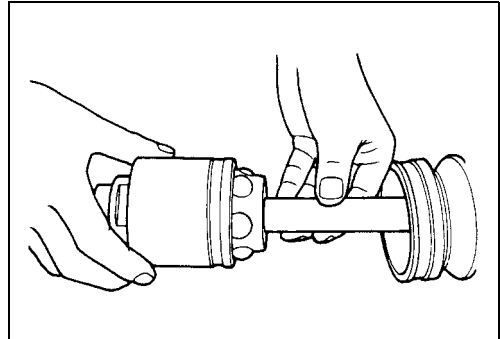
- Remove the boot bands of the final gear side joint.



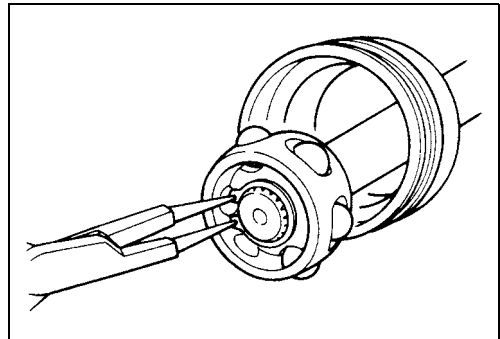
- Slide the boot toward the center of the rear drive shaft and remove the stopper ring from the outer race.



- Separate the outer race from the rear drive shaft.



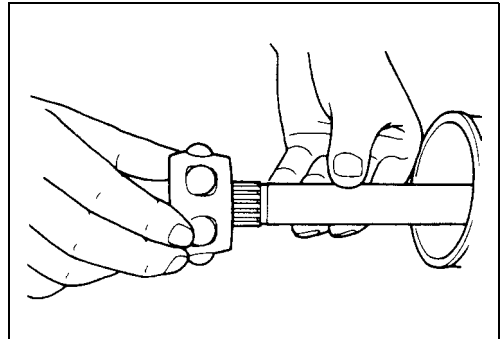
- Wipe off any grease and remove the snap ring.



- Remove the cage and boot from the rear drive shaft.

CAUTION

Do not disassemble the wheel side joint. If any damages are found, replace it with a new one.



INSPECTION AND REASSEMBLY

Inspect the boots for wear or damage. If any defects are found, replace them with new ones.

Inspect the axle play by using a push-and-pull motion as shown.



NOTE:

- * Clean the disassembled parts (except for the boot). After cleaning, completely dry the parts using compressed air.
- * Clean the boots with a cloth.

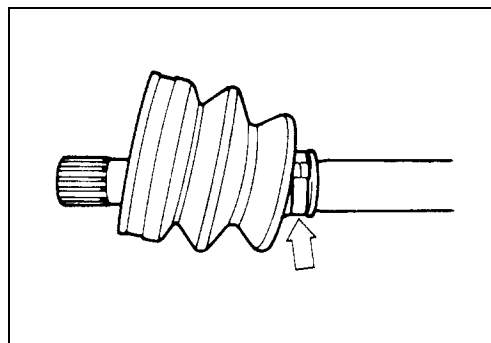
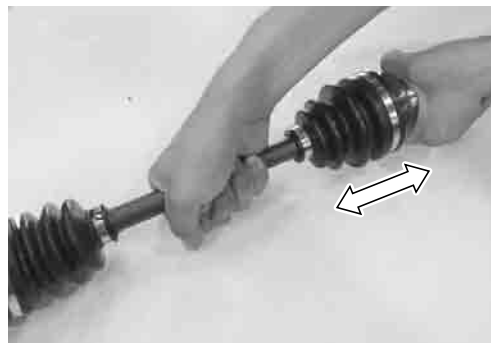
CAUTION

- * Clean all parts before installation, clean the inside and outside of the boot with a cloth.
- * Do not wash the boots in any commercially available degreaser, such as gasoline or kerosene. Washing in a degreaser causes deterioration of the boot.

- Fit a boot on the drive shaft end, fitting the small diameter side of the boot to the shaft groove, fix its end with the boot band.

CAUTION

The removed boot band must be replaced with a new one.

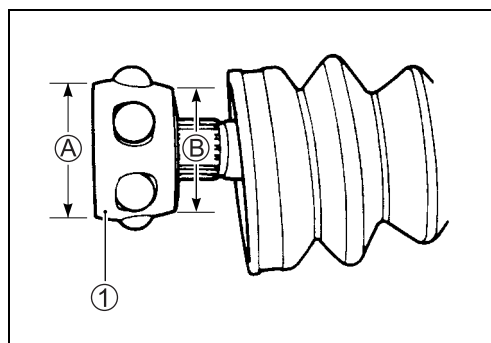


- Install the cage ① on the shaft.

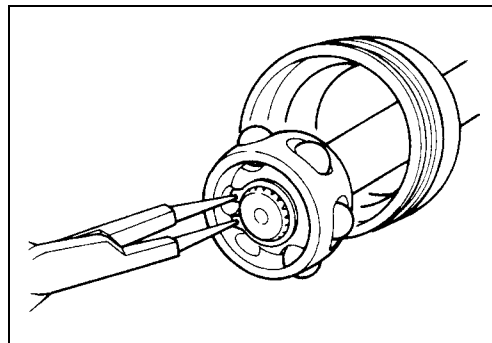
CAUTION

Install the cage with the large diameter side facing the shaft end.

- Ⓐ Large diameter
- Ⓑ Small diameter



- Install the snap ring.

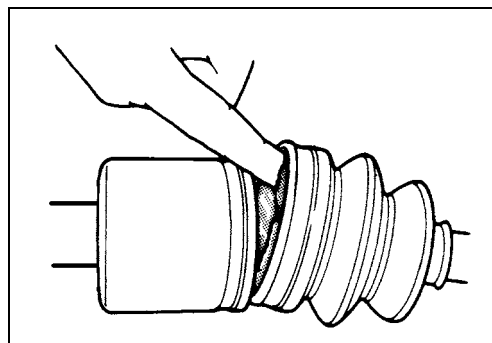
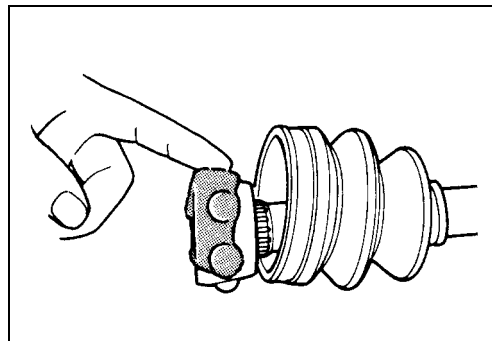


- Apply grease to the entire surface of the cage and the inside of the outer race.

Grease	Position	Wheel side	Final gear side
	Quantity	40 g	65 g

NOTE:

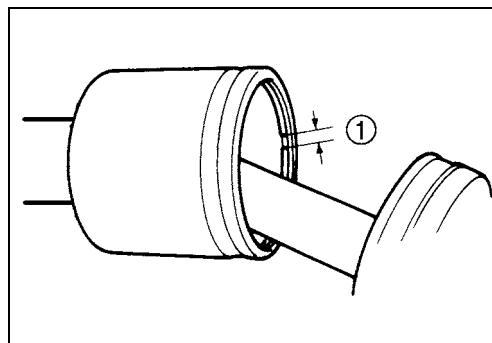
The tube of joint grease is included in the wheel side boot set or final gear side joint set of spare parts.



- Insert the cage into the outer race and fit a stopper ring in the groove of the outer race.

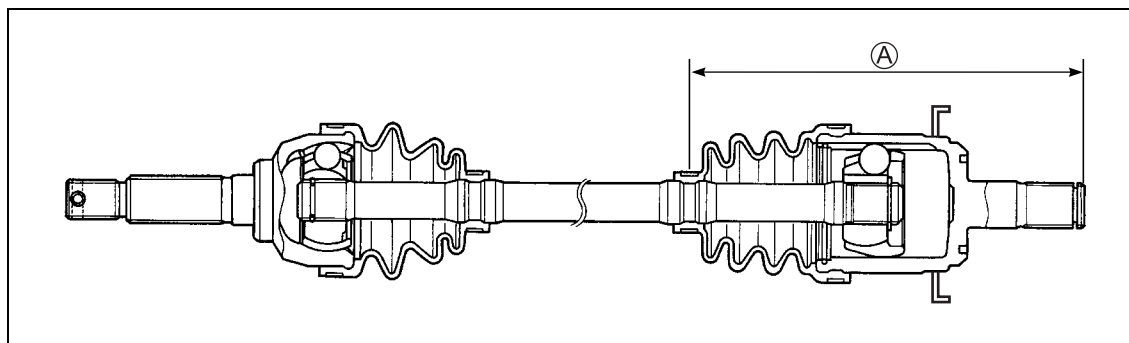
CAUTION

Locate the opening of the stopper ring ① so that the opening is not lined up with a ball.



- After fitting the boot on the outer race, insert a screw driver into the boot on the outer race side and allow air to enter the boot so that the air pressure in the boot becomes the same as the atmospheric pressure at the positions indicated in the illustration.

Ⓐ 173 – 183 mm (6.8 – 7.2 in)



CAUTION

The removed boot band must be replaced with a new one.

INSTALLATION

Install the rear drive shaft in the reverse order of removal. Pay attention to the following points:

- Install the stopper ring ③ into the groove of drive shaft spline.

CAUTION

The removed stopper ring must be replaced with a new one.

- Apply SUZUKI SUPER GREASE "A" to the spline.

 99000-25010: SUZUKI SUPER GREASE "A"
(or equivalent grease)

CAUTION

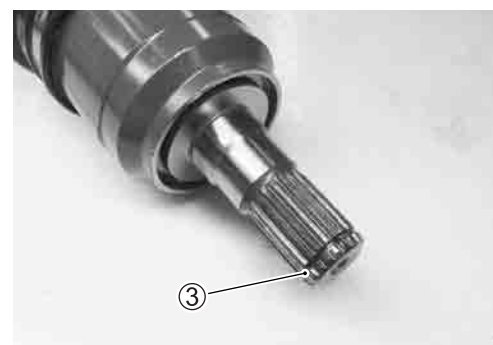
Be careful not to damage the front drive case oil seal.

NOTE:

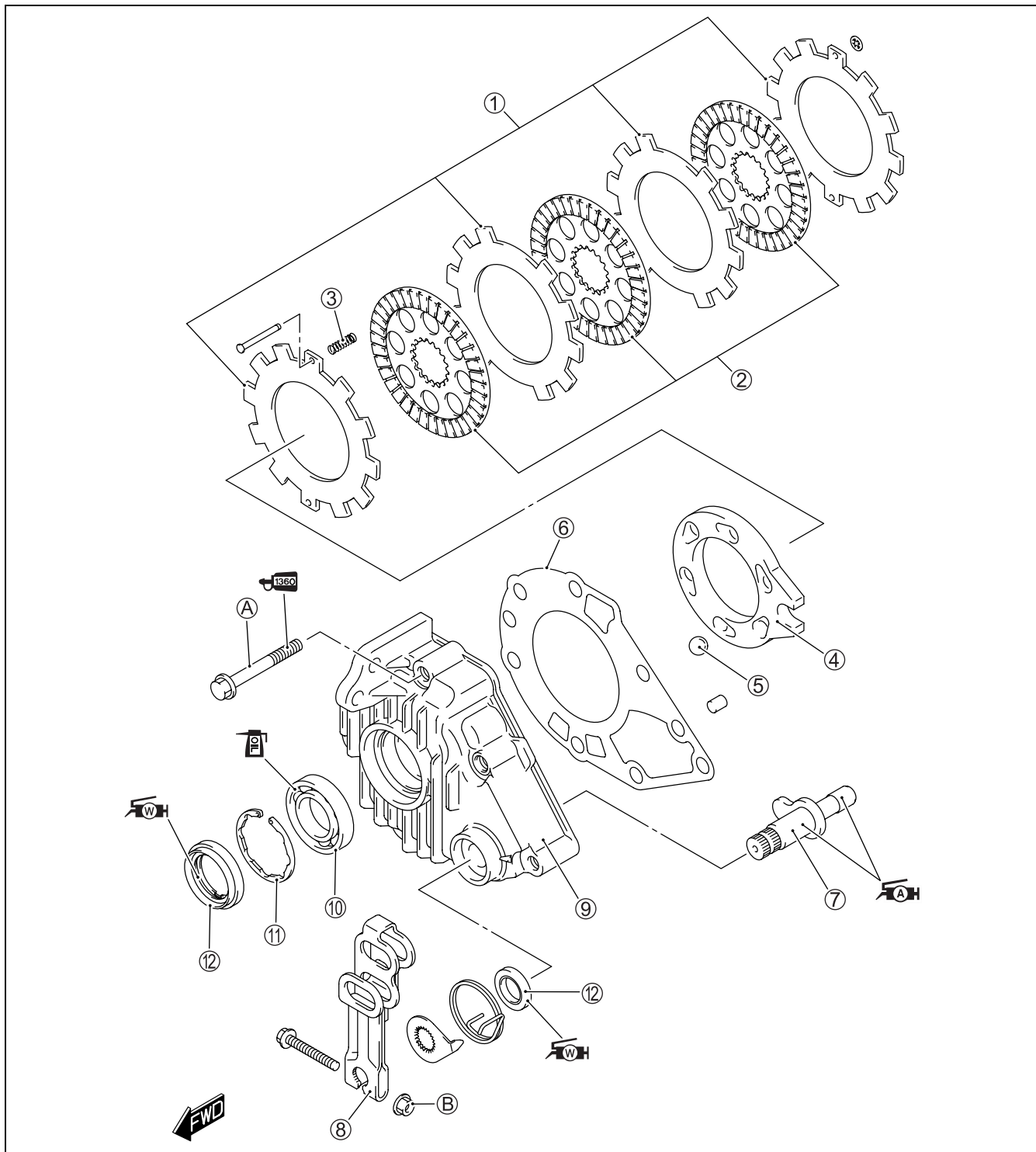
After installing both drive shafts, make sure the stopper rings are seated properly by pulling both inboard joints lightly.

- Pour the specified mobil fluid 424 gear oil (or equivalent) through the filler hole. (➡ 2-12)

 **Gear oil capacity: 770 ml (26.0/27.1 US/Imp oz)**



REAR BRAKE CONSTRUCTION



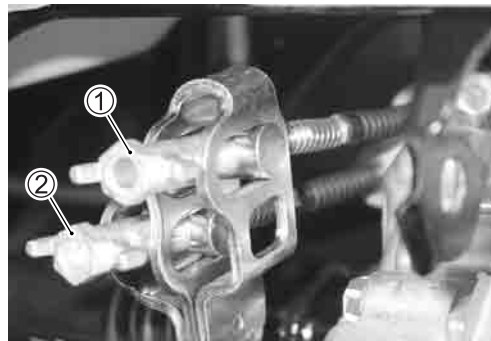
① Steel plates	⑧ Rear brake cam lever
② Friction plates	⑨ Rear brake case
③ Rear brake return spring	⑩ Bearing
④ Rear brake pressure plate	⑪ Snap ring
⑤ Ball	⑫ Oil seal
⑥ Gasket	(A) Rear brake case bolts
⑦ Rear brake cam shaft	(B) Rear brake cam lever nut



ITEM	N·m	kgf-m	lb-ft
(A)	26	2.6	19.0
(B)	11	1.1	8.0

REMOVAL AND DISASSEMBLY

- Drain the final gear oil. (🔧 2-12)
 - Remove the rear suspension. (🔧 8-84)
 - Remove the rear drive shaft. (🔧 8-67)
-
- Remove the rear brake adjust nuts ① and ②.
 - Remove the rear brake cables



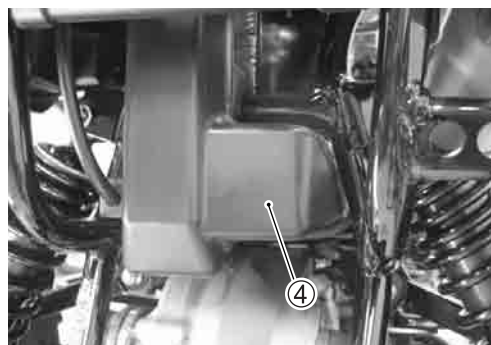
- Remove the breather hose ③.



- Loosen the outlet pipe connecting screws.



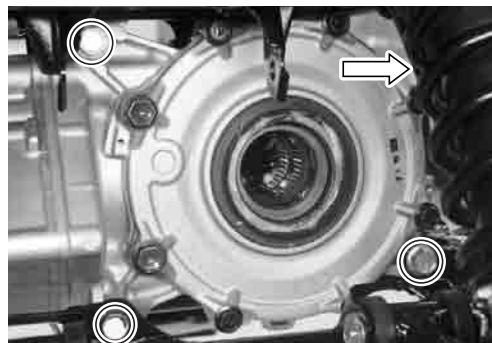
- Remove the outlet pipe ④.



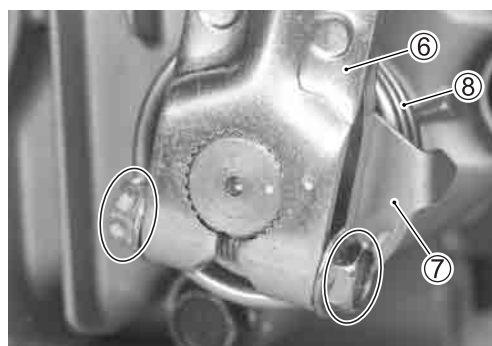
- Remove the trailer towing ⑤.



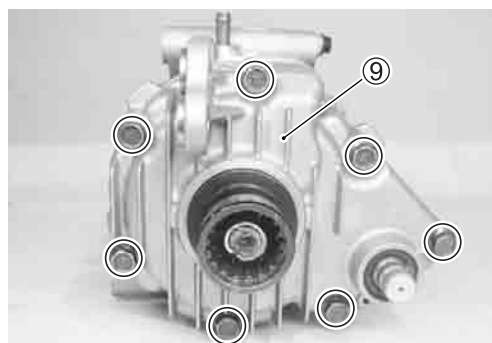
- Remove the rear final gear case assembly mounting bolts.
- Remove the final gear case assembly for a while back.



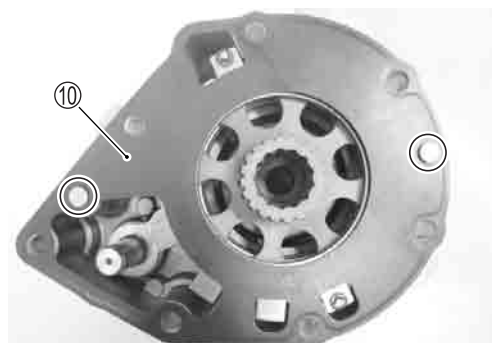
- Remove the rear brake cam lever ⑥, limit indicator ⑦ and return spring ⑧.



- Remove the rear brake case ⑨.



- Remove the gasket ⑩ and dowel pins.



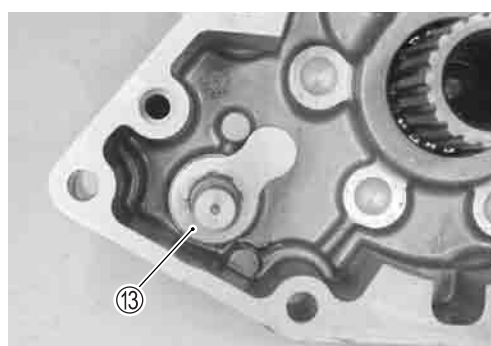
- Remove the rear brake friction plate and steel plate ⑪.



- Remove the rear brake pressure plate ⑫ and balls.

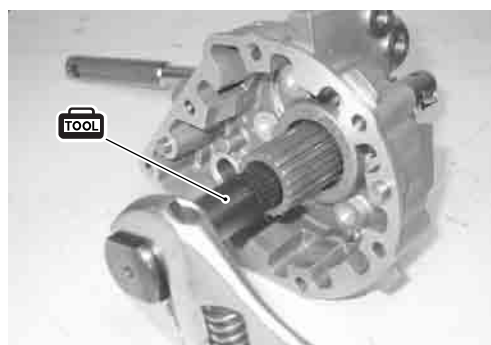
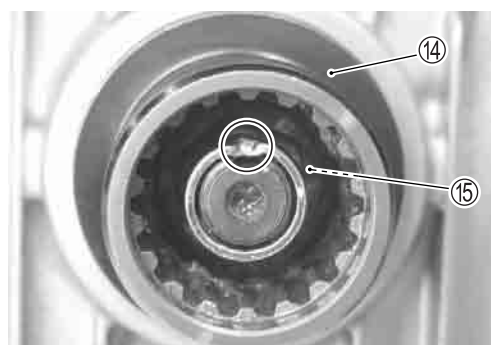


- Remove the rear brake cam shaft ⑬.

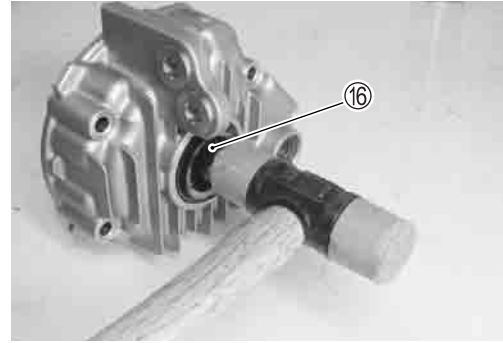


- Unlock the rear drive gear shaft lock-nut with a chisel.
- Remove the rear drive gear shaft lock-nut, rear propeller shaft coupling ⑭ and washer ⑮, with the special tool.

 **09924-52450: Output shaft holder**

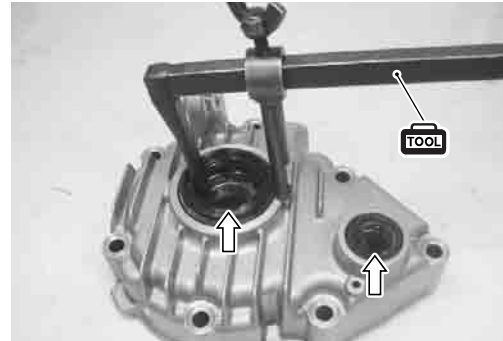


- Remove the rear drive gear shaft ⑯, with plastic mallet.



- Remove the oil seals with the special tool.

TOOL 09913-50121: Oil seal remover



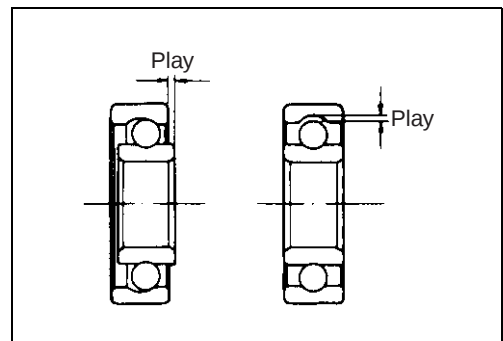
- Remove the snap ring.



BEARING INSPECTION

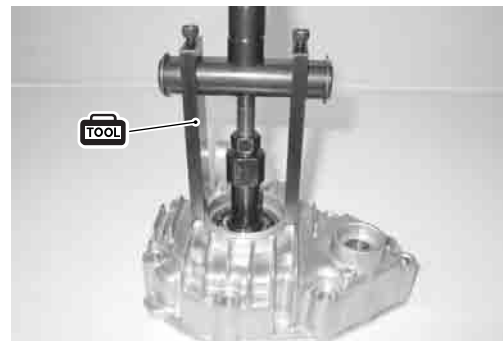
Rotate the bearing inner race by finger to inspect for abnormal play, noise and smooth rotation while the bearing is in the rear brake case.

Replace the bearing in the following procedure if there is anything unusual.



- Remove the bearing with the special tool.

TOOL 09921-20240: Bearing remover set ($\phi 20$)



INSPECTION

REAR BRAKE CAM LEVER

Inspect the rear brake cam lever for wear or damage.

If any defects are found, replace rear brake came lever with a new one.



REAR BRAKE CAM SHAFT

Inspect the rear brake cam shaft for wear or damage.

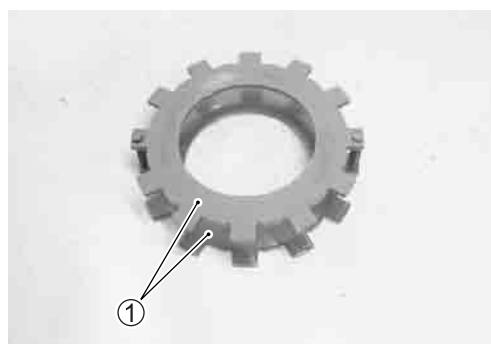
If any defects are found, replace rear brake cam shaft with a new one.



REAR BRAKE SIDE PLATE, REAR BRAKE FRICTION PLATE AND STEEL PLATE

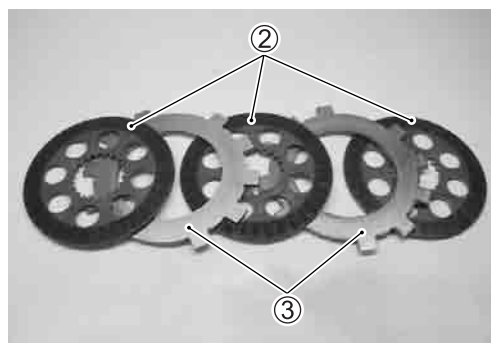
Inspect the rear brake side plates ①, rear brake friction plates ② and steel plates ③ for wear or damage.

If any defects are found, replace them as a set.



Inspect the rear brake friction plates ② and steel plates ③ for wear or distortion.

If any wear or distortion is found, replace them as a set.

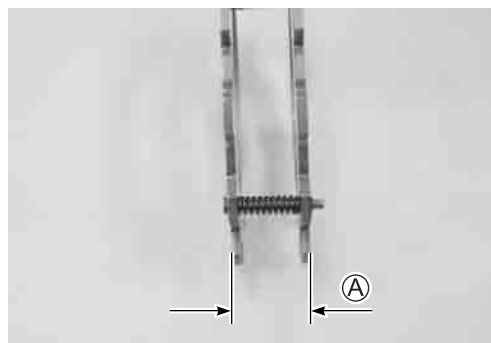


Measure the outer distance ④ between the side plates as shown.

If the distance ④ is less than the specification, reassemble the rear brake plates.

DATA Outer distance ④

Standard: 26.0 – 27.0 mm (1.02 – 1.06 in)



BRAKE PLATE RETURN SPRING

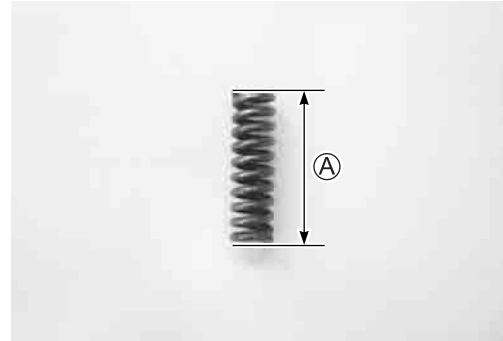
Measure the free length ①.

If the free length ① is shorter than the limit, replace the spring with a new one.

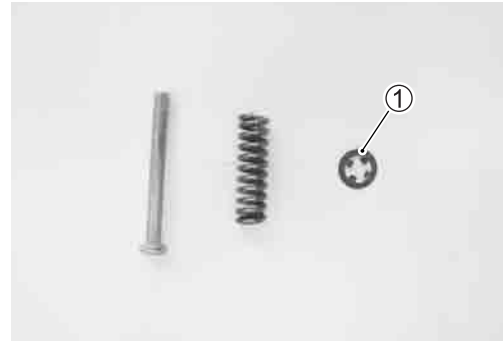


DATA Brake plate return spring:

Service Limit: 20.2 mm (0.80 in)

**CAUTION**

Replace the removed plate stopper ① with a new one.

**REAR BRAKE PRESSURE PLATE**

Inspect the rear brake pressure plate for wear or damage.

If any defects are found, replace brake pressure plate with a new one.

Inspect the balls for wear or damage.

If any defects are found, replace them with new ones.

**REAR DRIVE GEAR SHAFT**

Inspect the rear drive gear shaft for wear or damage.

If any defects are found, replace rear final drive gear shaft with a new one.



REASSEMBLY

Reassemble the rear brake in the reverse order of removal and disassembly. Pay attention to the following points.

- Install the bearing with the special tool.

TOOL 09913-70210: Bearing installer set

- Apply oil to the bearing before installing it.

**TEST Specification and classification: MOBIL FLUID 424
(or equivalent gear oil)**

- Install the snap ring.
- Install the rear drive gear shaft ①.

NOTE:

If the rear final drive gear shaft install easily, lightly top it using a plastic mallet.

- Install the oil seals ③ and ④ with the special tool.

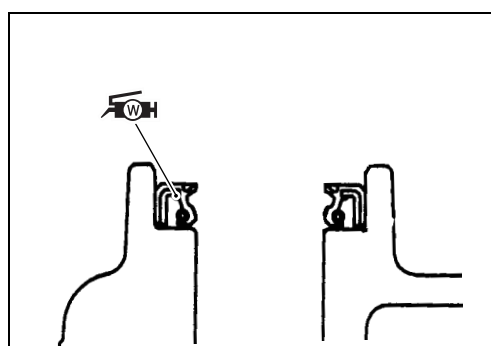
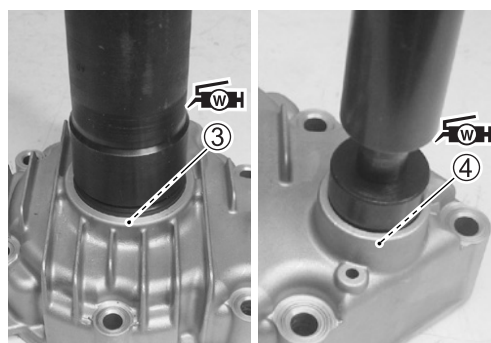
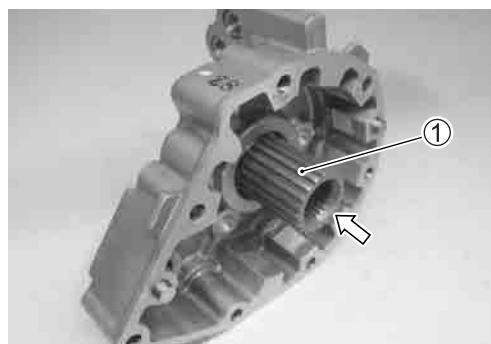
TOOL 09913-70210: Bearing installer set

Oil seal ③: $\phi 55$ Attachment

Oil seal ④: $\phi 35$ Attachment

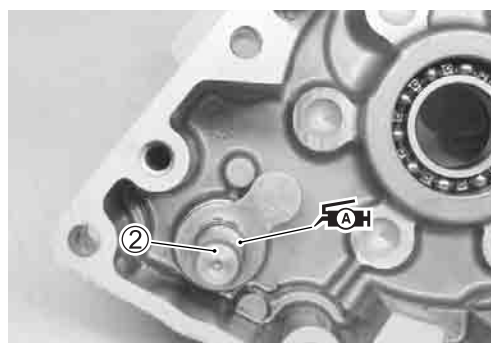
- Apply WATER RESISTANCE GREASE to the oil seals.

WATER RESISTANCE GREASE 99000-25160



- Install the rear brake cam shaft ②.
- Apply SUZUKI SUPER GREASE "A" to the rear brake cam shaft.

SUZUKI SUPER GREASE "A" 99000-25010
(or equivalent grease)



- Install the rear propeller shaft coupling ⑤.
- Install the washer and rear drive gear shaft lock-nut ⑥.
- Tighten the rear drive gear shaft lock-nut ⑥ to the specified torque with the special tool.

TOOL 09924-52480: Fixed propeller shaft holder

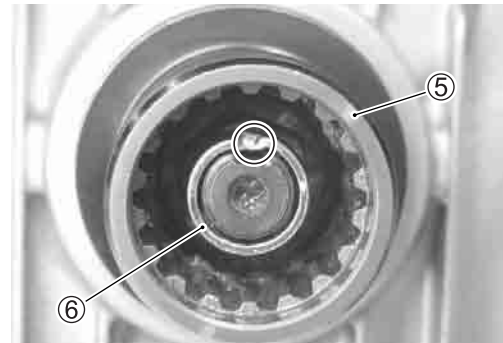
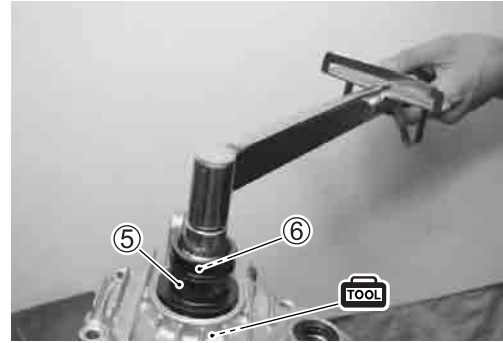
Rear drive gear shaft lock-nut:

100 N·m (10.0 kgf-m, 72.5 lb-ft)

- Stake the collar of the lock-nut into the notch in the shaft of the rear propeller shaft coupling.

CAUTION

The removed lock-nut must be replaced with a new one.



- Install the balls and rear brake pressure plate ⑦.

NOTE:

When installing the rear brake pressure plate ⑦, align its groove to the rear brake cam shaft ②.



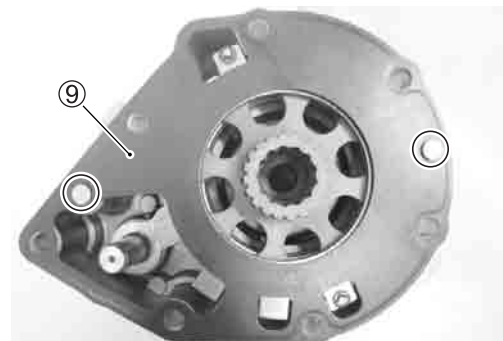
- Install the rear brake plates ⑧, aligning the grooves of the case.



- Install the dowel pins and gasket ⑨.

CAUTION

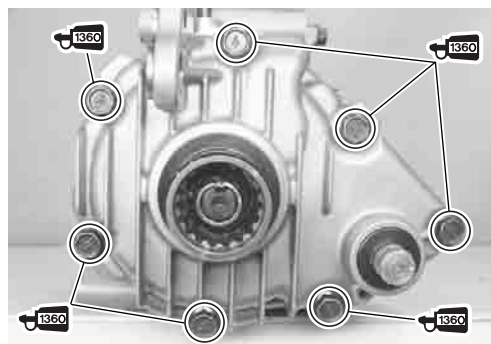
The removed gasket must be replaced with a new one.



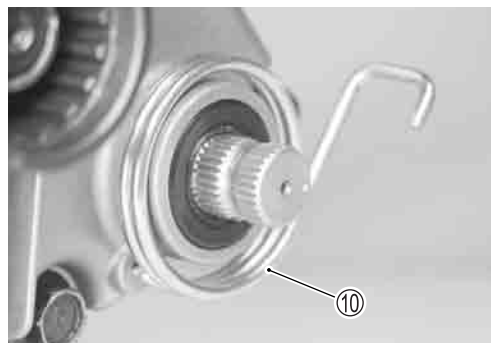
- Install the rear brake case.
- Apply a small quantity THREAD LOCK SUPER “1360” to the rear brake case bolts.
- Tighten the bolts diagonally to the specified torque.

 **Rear brake case bolt: 26 N·m (2.6 kgf-m, 19.0 lb-ft)**

 **99000-32130: THREAD LOCK SUPER “1360”**



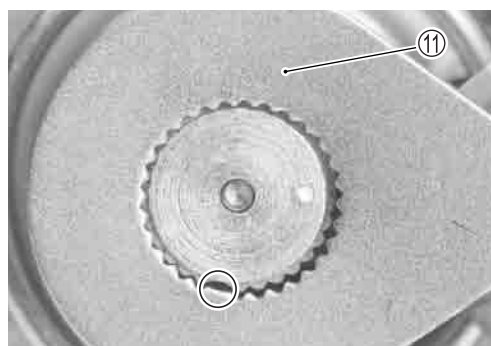
- Install the return spring ⑩.



- Install the limit indicator ⑪.

NOTE:

When installing the limit indicator ⑪, align the wide spline.



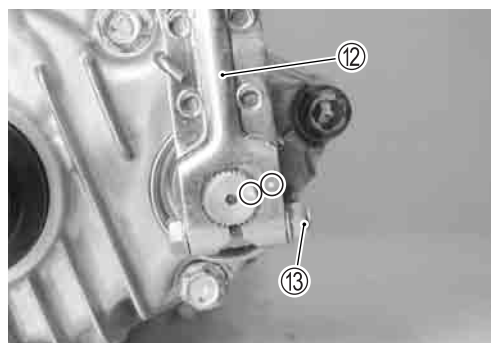
- Install the rear brake cam lever ⑫ to the rear brake cam shaft.

NOTE:

When installing the brake cam lever, align the punched mark.

- Tighten the cam lever nut ⑬ to the specified torque.

 **Rear brake cam lever nut: 11 N·m (1.1 kgf-m, 8.0 lb-ft)**



REMOUNTING

Remount the final gear case assembly in the reverse order of removal. Pay attention to the following points:

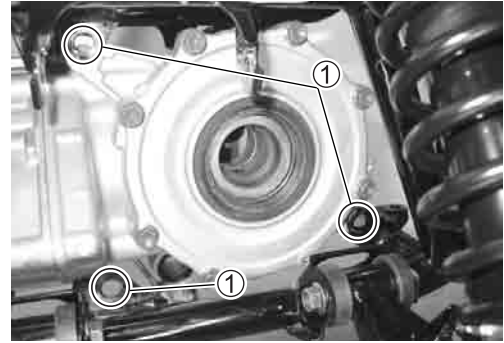
- Apply WATER RESISTANCE GREASE to the rear propeller shaft joint spline.

 **99000-25160: WATER RESISTANCE GREASE**



- Install the final gear case assembly to the frame.
- Tighten the rear final gear case mounting nut ① to the specified torque.

 **Final gear case mounting nut:**
65 N·m (6.5 kgf-m, 47.0 lb-ft)

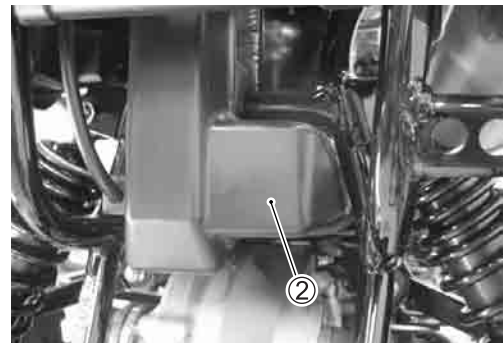


- Tighten the trailer towing bolts to the specified torque.

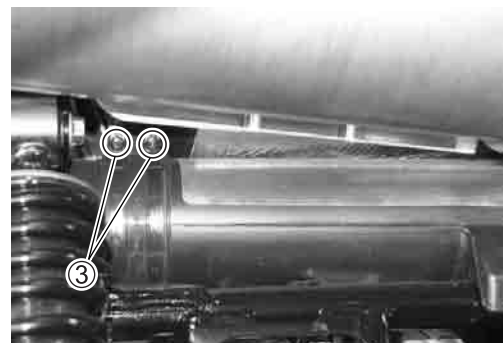
 **Trailer towing bolt: 60 N·m (6.0 kgf-m, 43.5 lb-ft)**



- Install the outlet pipe ②.



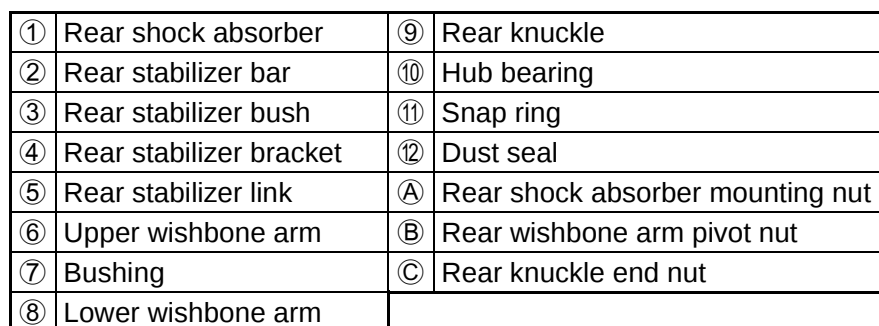
- Tighten the outlet pipe connecting screws ③.



- Install the rear brake cables.
- Adjust the rear brake lever play and brake pedal free travel. (☞ 2-21)
- Install the rear drive shaft. (☞ 8-71)
- Install the rear suspension. (☞ 8-90)
- Pour the specified mobil fluid 424 gear oil (or equivalent) through the filler hole. (☞ 2-12)

 **Gear oil capacity: 770 ml (26.0/27.1 us/lmp oz)**

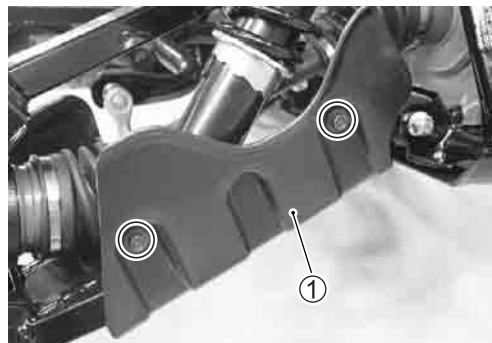
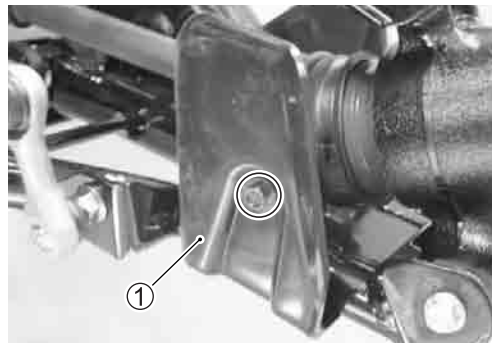




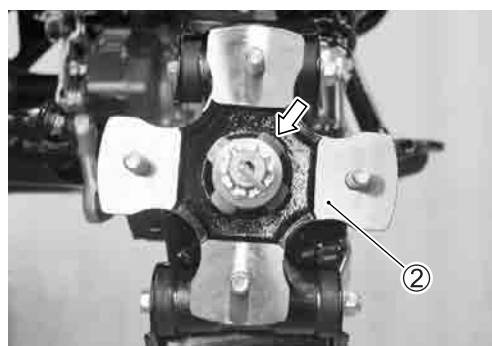
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REMOVAL

- Remove the rear wheel. (➡ 8-18)
- Remove the rear drive shaft cover ①.



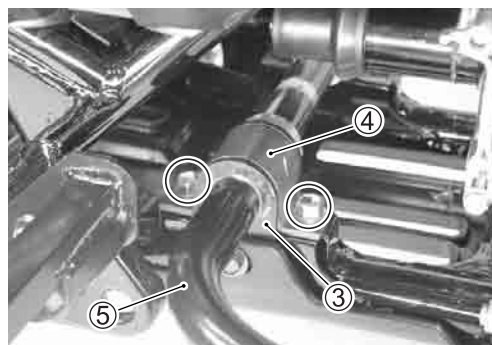
- Remove the cotter pin and rear hub nut.
- Remove the rear wheel hub ②.



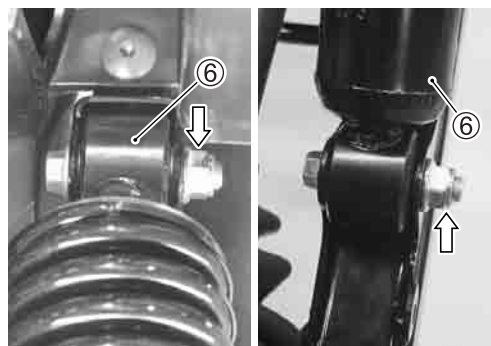
- Remove the rear stabilizer link nuts.



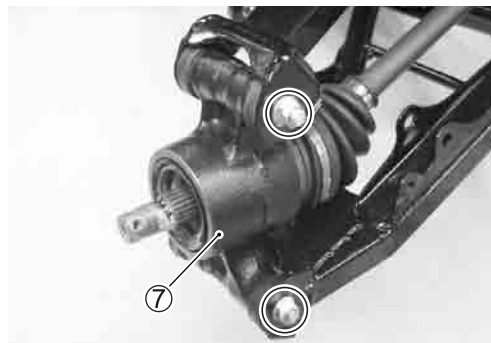
- Remove the rear stabilizer bushes ③ and rear stabilizer brackets ④.
- Remove the rear stabilizer ⑤.



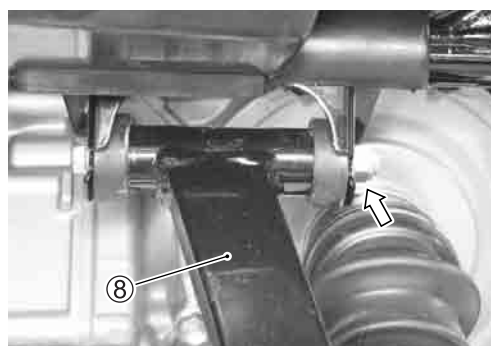
- Remove the rear shock absorber ⑥.



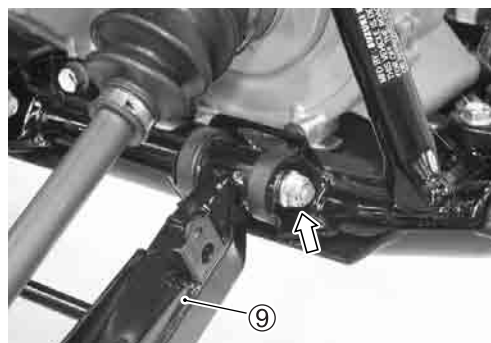
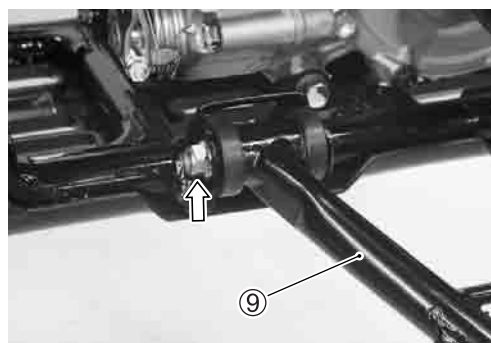
- Remove the rear knuckle ⑦.



- Remove the rear upper wishbone arm ⑧.



- Remove the rear lower wishbone arm ⑨.



INSPECTION AND DISASSEMBLY

REAR DRIVE SHAFT COVER

Inspect the rear drive shaft cover for wear or damage. If any defects are found, replace the rear drive shaft cover with a new one.



REAR SHOCK ABSORBER

Inspect the rear shock absorber for oil leakage or damage. If any defects are found, replace the rear shock absorber with a new one.

CAUTION

Do not attempt to disassemble the rear shock absorber. It is unserviceable.



REAR STABILIZER BAR

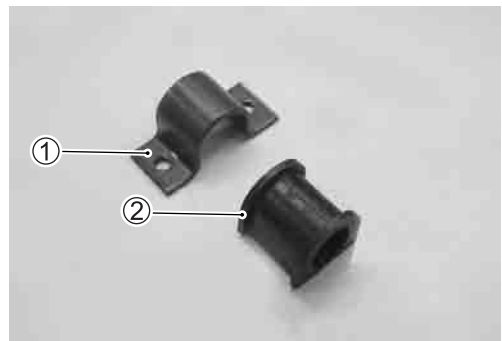
Inspect the rear stabilizer for wear or damage. If any defects are found, replace the rear stabilizer bar with a new one.



STABILIZER BRACKET/BUSH

Inspect the stabilizer bracket ① for damage. If any defects are found, replace the stabilizer bracket with a new one.

Inspect the stabilizer bush for wear or damage. If any defects are found, replace the stabilizer bush with a new one.



STABILIZER LINK

Inspect the stabilizer link for wear or damage. If any defects are found, replace the stabilizer link with a new one.

Inspect the stabilizer link for smooth movement. If there are any abnormalities, replace the stabilizer link with a new one.



REAR UPPER WISHBONE ARM

Inspect the rear upper wishbone arm wear or damage. If any defects are found, replace the rear upper wishbone arm with a new one.

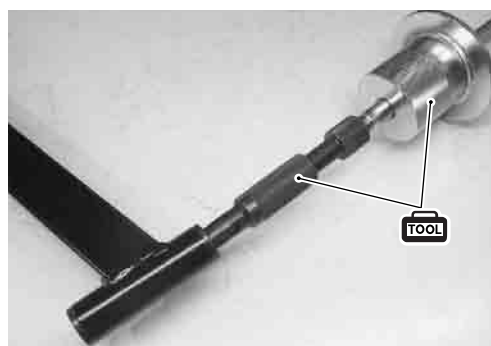
**REAR UPPER WISHBONE ARM BUSH**

Inspect the rear upper wishbone arm bush for wear or damage. If any defects are found, replace the rear upper wishbone arm bush with new ones.



- Remove the rear upper wishbone arm bush with the special tools.

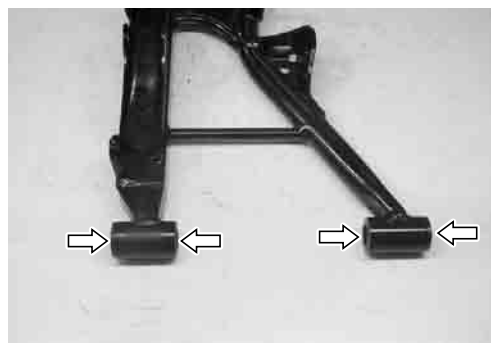
 **09923-73210: Bearing remover**
09930-30104: Sliding hammer

**REAR LOWER WISHBONE ARM**

Inspect the rear lower wishbone arm for wear or damage. If any defects are found, replace the rear lower wishbone arm with a new one.

**REAR LOWER WISHBONE ARM BUSH**

Inspect the rear lower wishbone arm bush for wear or damage. If any defects are found, rear lower wishbone arm bush with new ones.



REAR WISHBONE ARM DUST SEAL

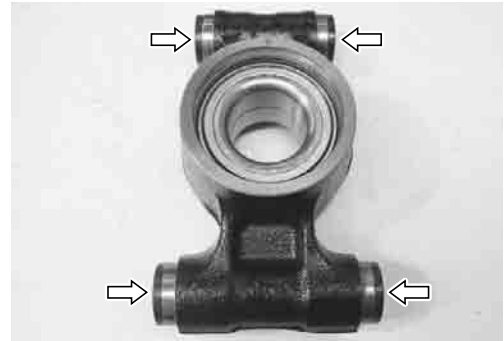
Inspect the rear wishbone arm dust seal for wear or damage. If any defects are found, replace the rear wishbone arm dust seal with a new one.

**REAR KNUCKLE**

Inspect the rear knuckle for wear or damage. If any defects are found, rear knuckle with a new one.

REAR KNUCKLE BUSH

Inspect the rear knuckle bushes for wear or damage. If any defects are found, replace rear knuckle bushes with new ones.

**STEERING KNUCKLE DUST SEAL**

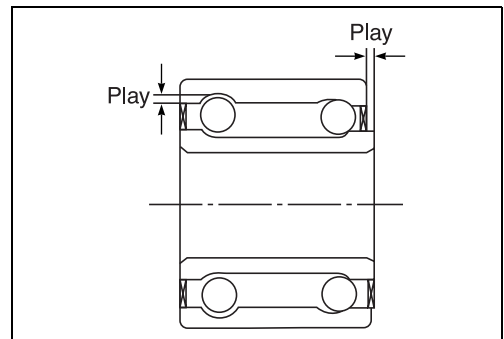
- Remove the rear knuckle dust seals with the special tool.

 **09913-50121: Oil seal remover**

**REAR HUB BEARING**

Inspect the inner race play of the rear hub bearing by hand while it is in the rear knuckle.

Rotate the inner race by hand to inspect for abnormal noise and smooth rotation. If there is anything unusual, replace the rear hub bearing with a new one.

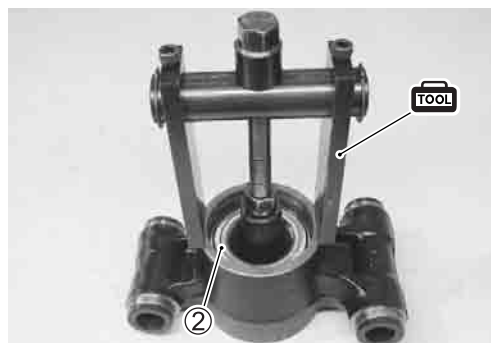


- Remove the snap ring ①.



- Remove the rear hub bearing ② with the special tool.

 **09921-20240: Bearing remover set**



REAR KNUCKLE DUST SEAL

Inspect the rear knuckle dust seal for wear or damage. If any defects are found, replace the rear knuckle dust seal with a new one.



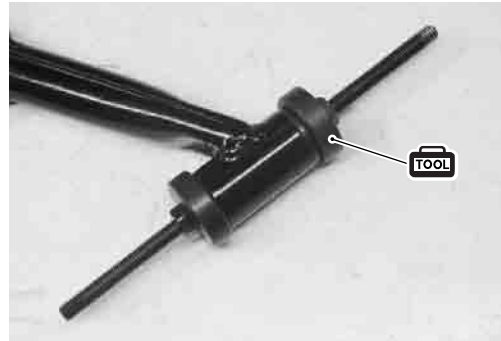
REASSEMBLY AND INSTALLATION

Reassemble and install the rear suspension in the reverse order of removal and disassembly. Pay attention to the following points:

REAR UPPER WISHBONE ARM

Press fit the rear upper wishbone arm bush with the special tool.

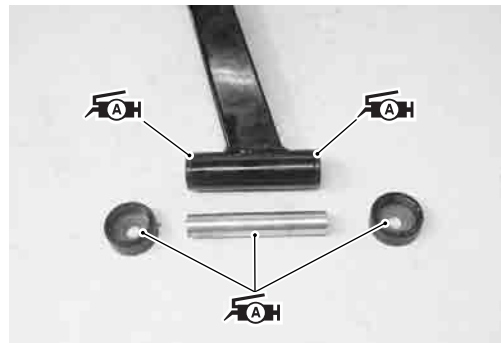
 **09924-84521: Bearing installer set**



- Apply SUZUKI SUPER GREASE “A” to the inside of rear upper wishbone arm bush, lip of the dust seals and spacer.

 **99000-25010: SUZUKI SUPER GREASE “A”**
(or equivalent grease)

- Install the dust seals and spacer to the rear upper wishbone arm.

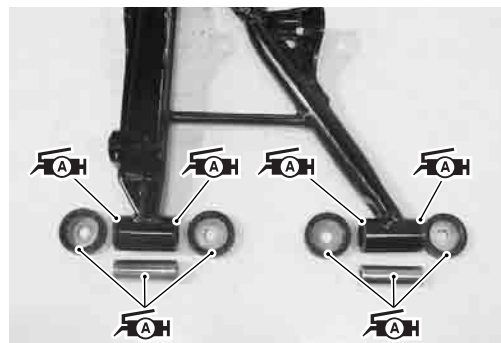


REAR LOWER WISHBONE ARM

- Apply SUZUKI SUPER GREASE “A” to the inside of rear lower wishbone arm bush, lip of the dust seals and spacer.

 **99000-25010: SUZUKI SUPER GREASE “A”**
(or equivalent grease)

- Install the dust seals and spacer to the rear lower wishbone arm.



REAR KNUCKLE

- Install the hub bearing with the special tool.

 **09913-70210: Bearing installer set ($\phi 62$)**

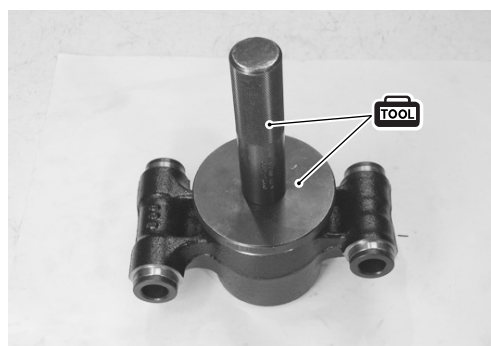
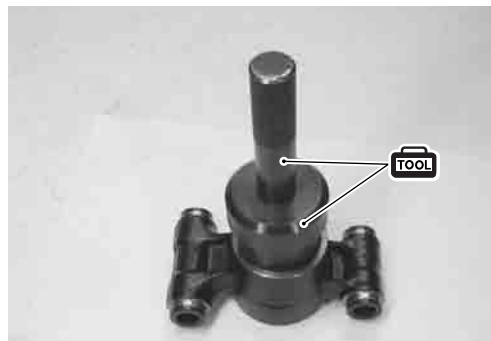


- Install the snap ring.



- Install the dust seals with the special tools.

TOOL 09924-74510: Bearing and oil seal instaler handle
 09926-27610: Oil seal installer
 09944-66030: Oil seal installer



- Apply SUZUKI SUPER GREASE "A" to the lip of oil seals.

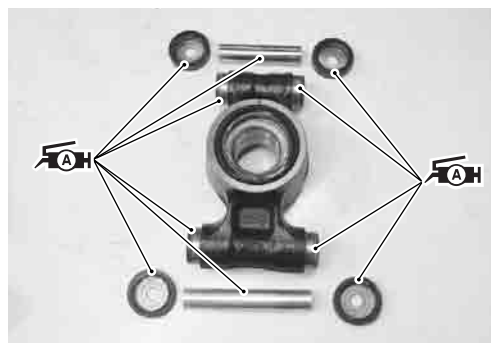
AH 99000-25010: SUZUKI SUPER GREASE "A"
 (or equivalent grease)



- Apply SUZUKI SUPER GREASE "A" to the inside of rear knuckle bush, lip of the dust seals and spacer.

AH 99000-25010: SUZUKI SUPER GREASE "A"
 (or equivalent grease)

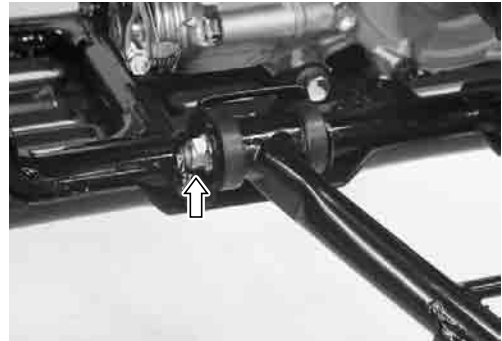
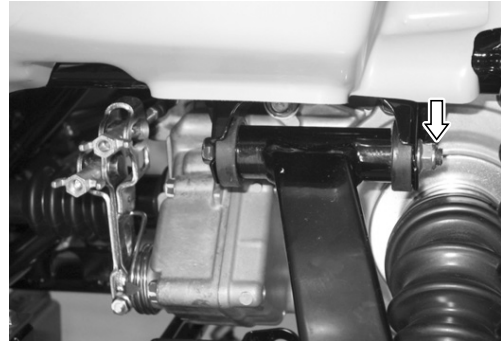
- Install the dust seals and spacer to the rear knuckle.



REAR SUSPENSION

- Install the rear wishbone arm (upper and lower) and tighten the rear wishbone arm pivot nut (upper and lower) to the specified torque.

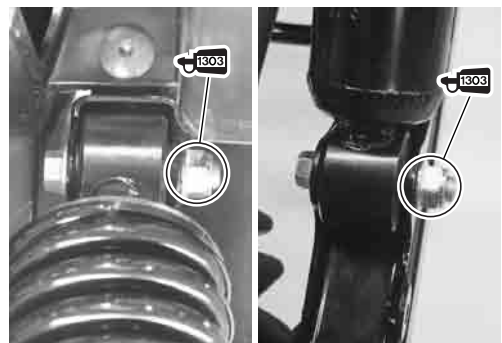
 **Rear wishbone arm pivot nut (upper and lower):**
60 N·m (6.0 kgf-m, 43.5 lb-ft)



- Apply a small quantity THREAD LOCK SUPER “1303” to the rear shock absorber mounting bolts.
- Install the rear shock absorber and tighten the shock absorber mounting nuts to the specified torque.

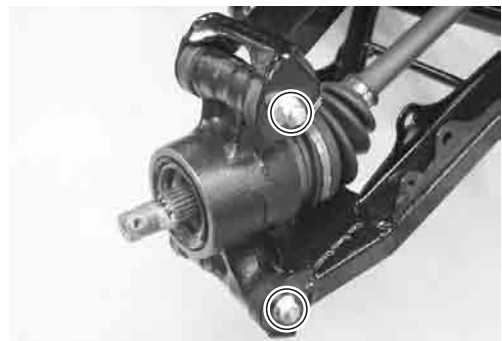
 **99000-32030: THREAD LOCK SUPER “1303”**

 **Rear shock absorber mounting nut (upper and lower):**
60 N·m (6.0 kgf-m, 43.5 lb-ft)



- Tighten the rear knuckle end nut to the specified torque.

 **Rear knuckle end nut: 60 N·m (6.0 kgf-m, 43.5 lb-ft)**



- Apply WATER RESISTANCE GREASE to the inside of the stabilizer bush ①.

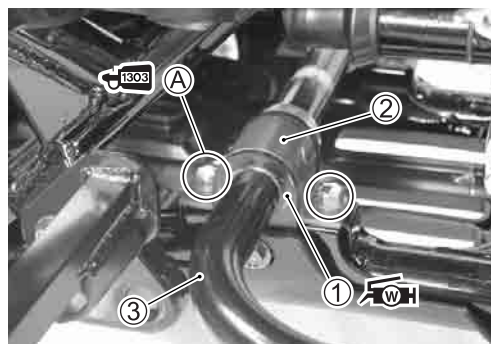
 99000-25160: WATER RESISTANCE GREASE

- Install the stabilizer bush ①, stabilizer bracket ② and rear stabilizer bar ③.
- Apply THREAD LOCK SUPER “1303” to the stabilizer bracket mounting bolt ④.

 99000-32030: THREAD LOCK SUPER “1303”

- Tighten the rear stabilizer link nuts to the specified torque.

 Rear stabilizer link nut: 34 N·m (3.4 kgf-m, 24.5 lb-ft)



- Apply SUZUKI SUPER GREASE “A” to the wheel hub spline.

 99000-25010: SUZUKI SUPER GREASE “A”
(or equivalent grease)

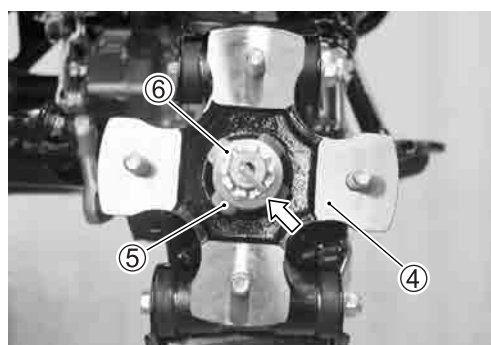


- Install the wheel hub ④, washer ⑤ and rear hub nut ⑥.
- Tighten the rear hub nut to the specified torque.

 Rear hub nut: 130 N·m (13.0 kgf-m, 94.0 lb-ft)

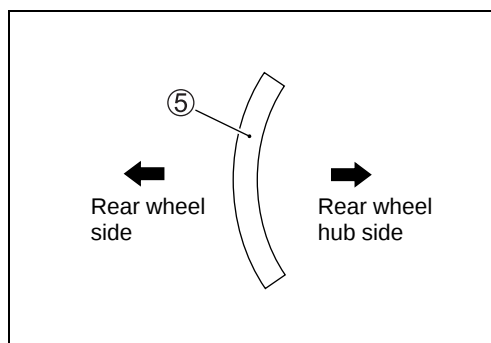
CAUTION

The removed cotter pin must be replaced with a new one.



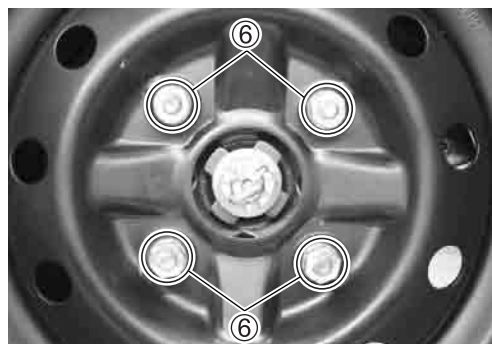
NOTE:

Install the washer ⑤ as shown in the illustration.



- Tighten the rear wheel set nuts ⑥ to the specified torque.

 **Rear wheel set nut: 60 N·m (6.0 kgf-m, 43.5 lb-ft)**



SPRING PRE-LOAD ADJUSTMENT

After installing the rear shock absorber, adjust the spring pre-load.

Position "1" provides the minimum spring pre-load.

Position "5" provides the maximum spring pre-load.

 **STD POSITION: 2/5**



POSITION "1"

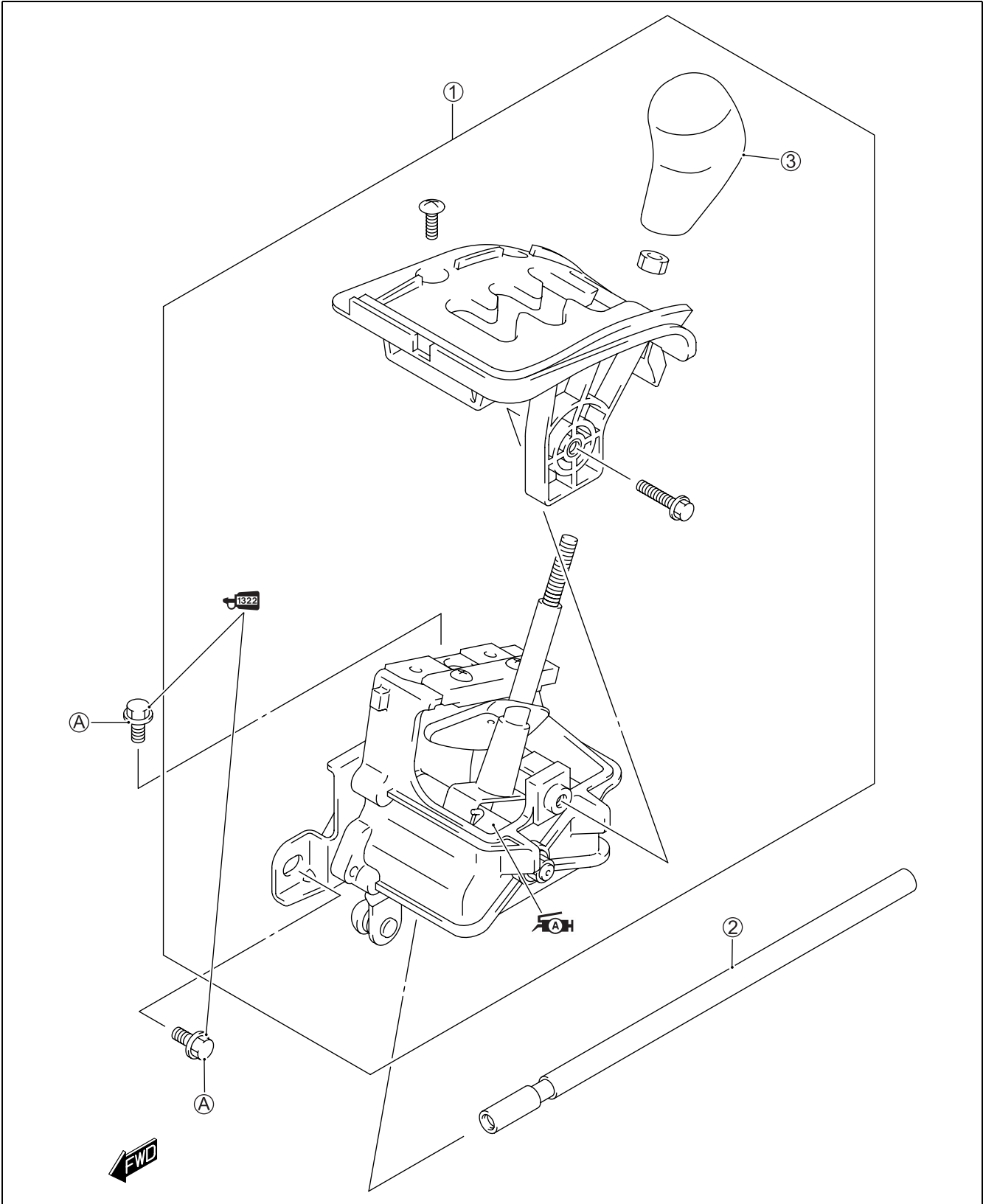


POSITION "5"

WARNING

Be sure to adjust the spring pre-load on the both suspensions equally.

TRANSFER GEAR SHIFT LEVER CONSTRUCTION

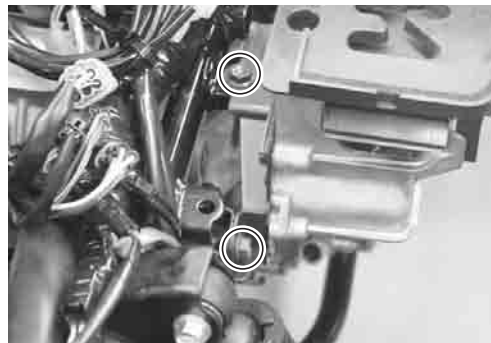


①	Transfer gear shift lever assembly	③	Knob
②	Rod	④	Mounting bolt

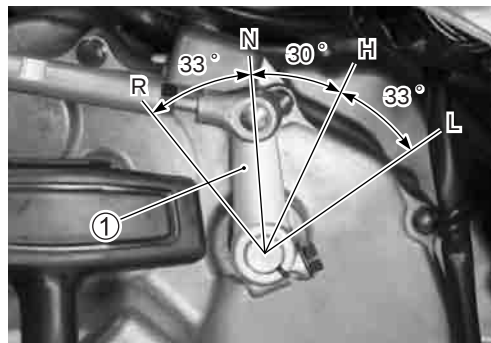
ITEM	N·m	kgf-m	lb-ft
④	10	1.0	7.0

REMOVAL

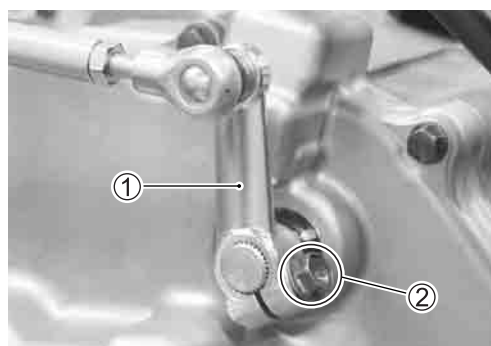
- Remove the front fender. (☞ 8-9)
- Remove the transfer gear shift lever mounting bolts.



- Keep the gear shift arm ① in the "N" position.



- Loosen the bolt ② and remove the gear shift arm ①.
- Remove the shift lever assembly.



INSPECTION

Inspect the shift lever assembly for wear or damage. If any defects are found, replace it with a new one.



INSTALLATION

Install the transfer gearshift lever in the reverse order of removal. Pay attention to the following points:

- Apply SUZUKI SUPER GREASE to the pivot of the shift lever assembly.

 **99000-25010: SUZUKI SUPER GREASE "A"**
(or equivalent grease)

- Install the transfer gear shift lever assembly to the frame bracket.
- Apply a small quantity of THREAD LOCK SUPER "1322" to the transfer gear shift lever assembly mounting bolts.

 **99000-32110: THREAD LOCK SUPER "1322"**
(or equivalent thread lock)

 **Transfer gear shift lever assembly mounting bolt:**
10 N·m (1.0 kgf-m, 7.0 lb-ft)

- Install the gear shift arm ① on its shaft.

NOTE:

When installing the gear shift arm ①, align the grooves of arm with the spline of the shaft.

- Tighten the bolt ② securely.

CAUTION

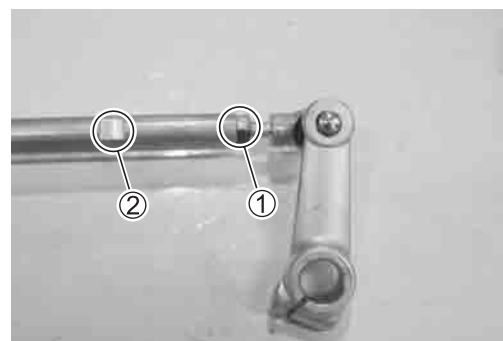
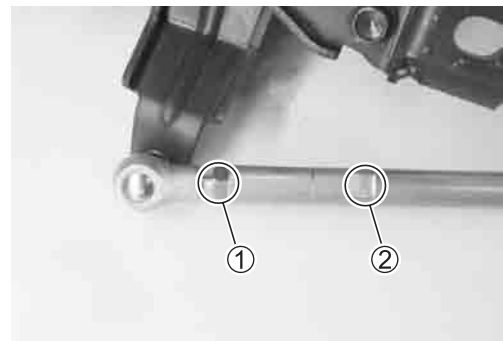
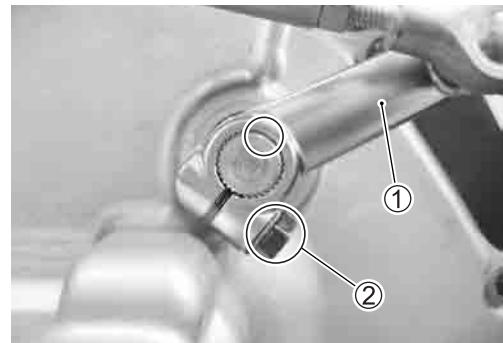
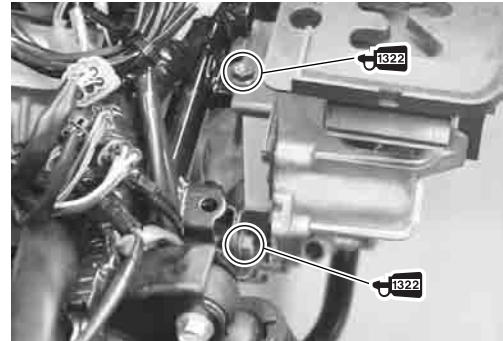
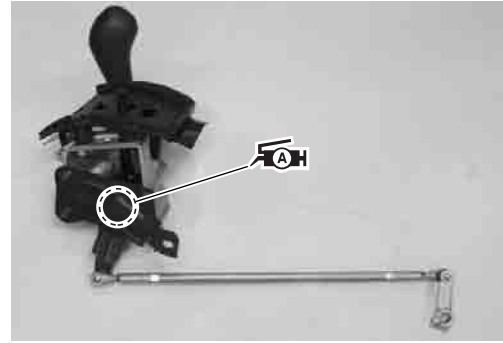
Make sure the installation angle of the gear selection arm is accurate.

SHIFT ROD ADJUSTMENT

- Hold the rod ②, loosen the lock-nuts ①.
- Turn the rod ②, adjust the length of the rod.

NOTE:

Be careful not to separate the rod from the joint by turning the rod too much.



ELECTRICAL SYSTEM

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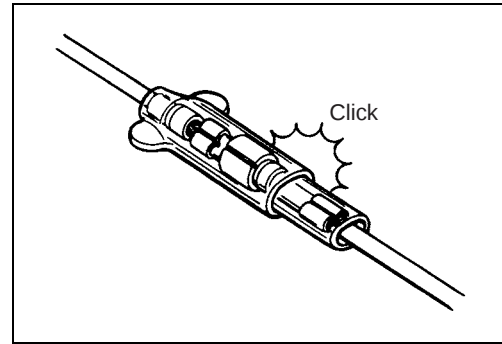
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CAUTIONS IN SERVICING

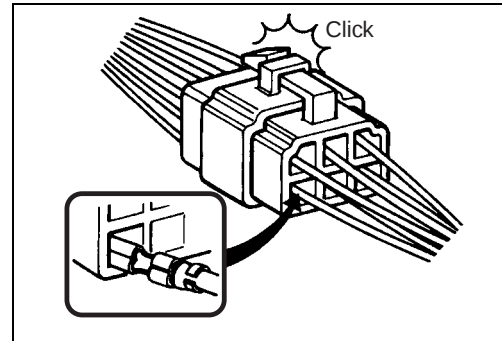
CONNECTOR

- When connecting a connector, be sure to push it in until a click is felt.
- Inspect the connector for corrosion, contamination and breakage in its cover.



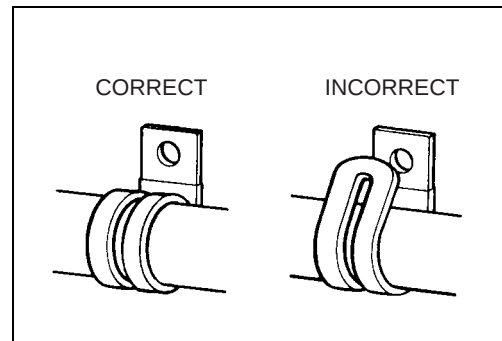
COUPLER

- With a lock type coupler, be sure to release the lock when disconnecting, and push it in fully till the lock works when connecting.
- When disconnecting the coupler, be sure to hold the coupler itself and do not pull the lead wires.
- Inspect each terminal on the coupler for being loose or bent.
- Inspect each terminal for corrosion and contamination.



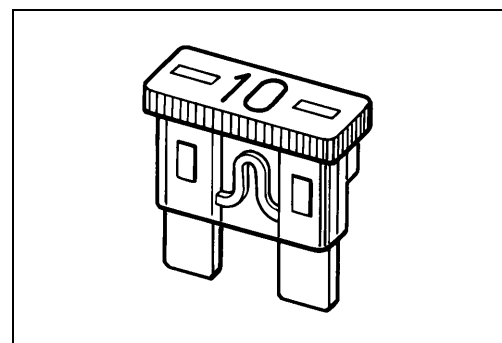
CLAMP

- Clamp the wire harness at such positions as indicated in "WIRING HARNESS ROUTING". (☞ 10-16)
- Bend the clamp properly so that the wire harness is clamped securely.
- In clamping the wire harness, use care not to allow it to hang down.
- Do not use wire or any other substitute for the band type clamp.



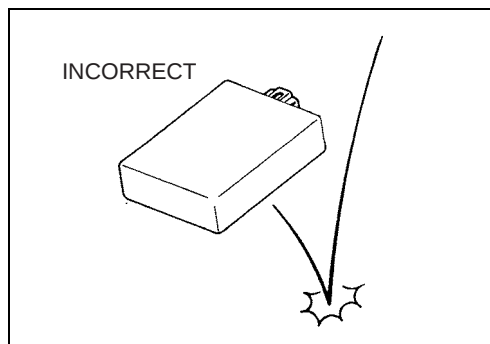
FUSE

- When a fuse blows, always investigate the cause to correct it and then replace the fuse.
- Do not use a fuse of a different capacity.
- Do not use wire or any other substitute for the fuse.



SEMI-CONDUCTOR EQUIPPED PART

- Be careful not to drop the part with a semi-conductor built in such as a ECM.
- When inspecting this part, follow inspection instruction strictly. Neglecting proper procedure may cause damage to this part.

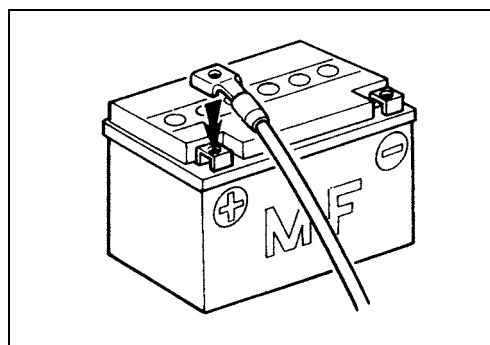
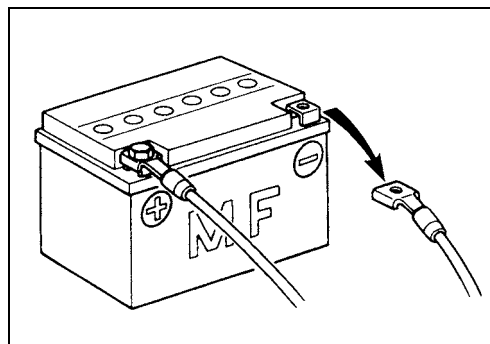


BATTERY

- The MF battery used in this vehicle does not require maintenance (e.g., electrolyte level inspection, distilled water replenishment).
- During normal charging, no hydrogen gas is produced. However, if the battery is overcharged, hydrogen gas may be produced. Therefore, be sure there are no fire or spark sources (e.g., short circuit) nearby when charging the battery.
- Be sure to recharge the battery in a well-ventilated and open area.
- Note that the charging system for the MF battery is different from that of a conventional battery. Do not replace the MF battery with a conventional battery.

CONNECTING THE BATTERY

- When disconnecting terminals from the battery for disassembly or servicing, be sure to disconnect the $\ominus$ battery lead wire, first.
- When connecting the battery lead wires, be sure to connect the $\oplus$ battery lead wire, first.
- If the terminal is corroded, remove the battery, pour warm water over it and clean it with a wire brush.
- After connecting the battery, apply a light coat of grease to the battery terminals.
- Install the cover over the $\oplus$ battery terminal.



WIRING PROCEDURE

- Properly route the wire harness according to the "WIRING HARNESS ROUTING" section. (10-16)

USING THE MULTI-CIRCUIT TESTER

- Properly use the multi-circuit tester $\oplus$ and $\ominus$ probes. Improper use can cause damage to the vehicle and tester.
- If the voltage and current values are not known, begin measuring in the highest range.
- When measuring the resistance, make sure that no voltage is applied. If voltage is applied, the tester will be damaged.
- After using the tester, be sure to turn the switch to the OFF position.

 **09900-25008: Multi-circuit tester set**

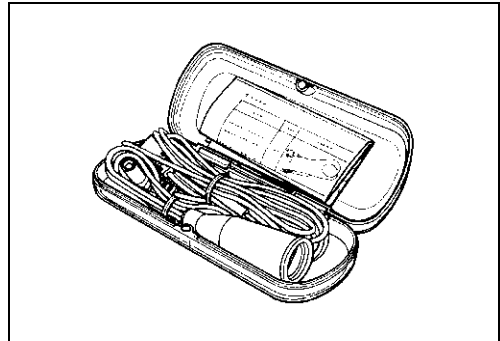
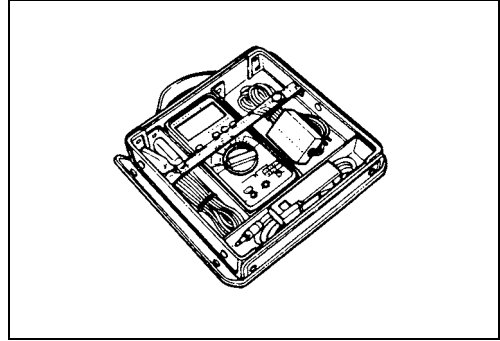
CAUTION

Before using the multi-circuit tester, read its instruction manual.

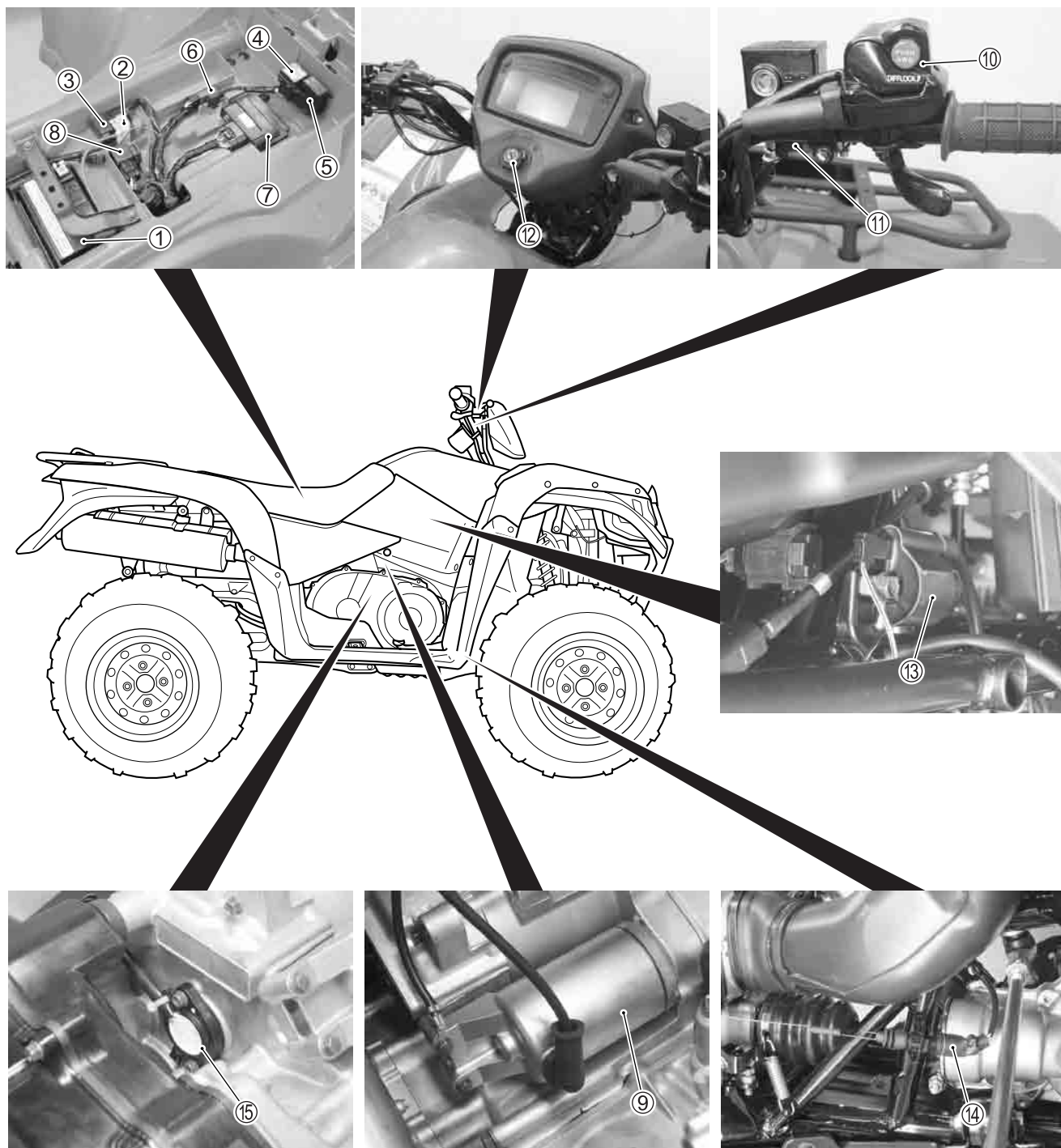
NOTE:

- * When connecting the multi-circuit tester, use the needle pointed probe to the back side of the lead wire coupler and connect the probes of tester to them.
- * Use the needle pointed probe to prevent the rubber of the water proof coupler from damage.

 **09900-25009: Needle pointed probe set**

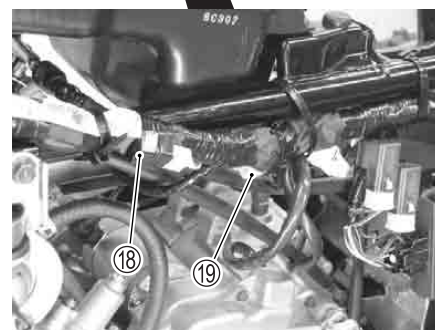
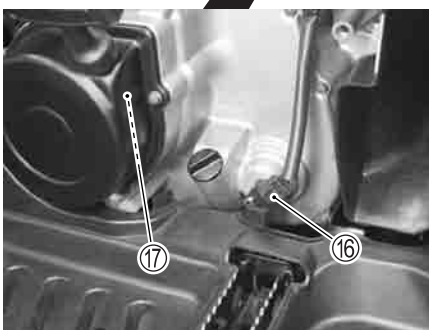
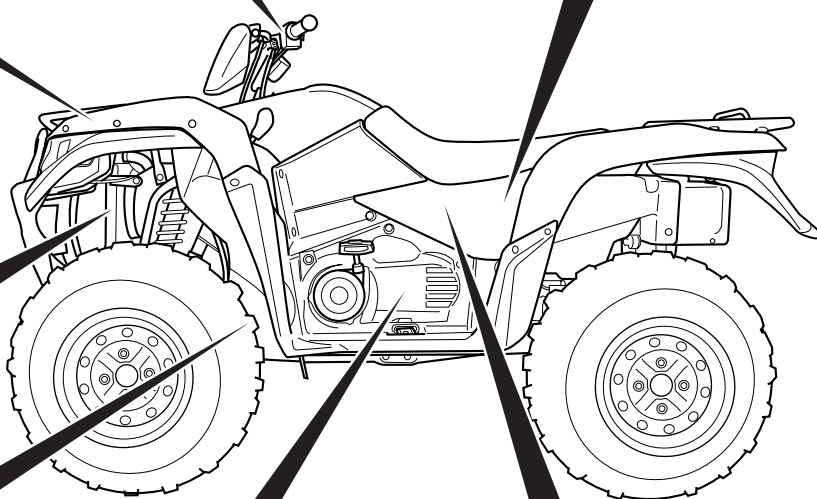
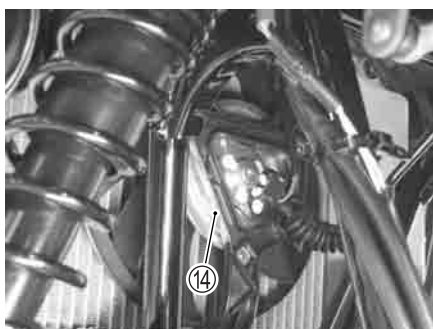
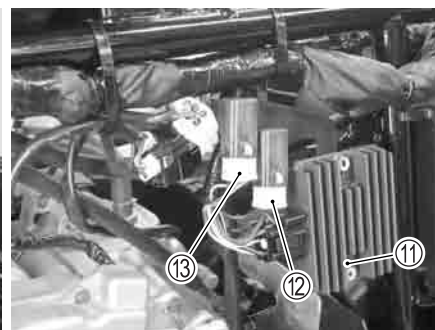
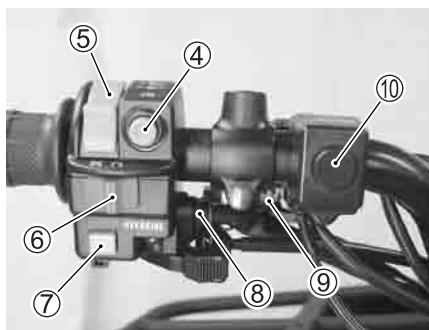
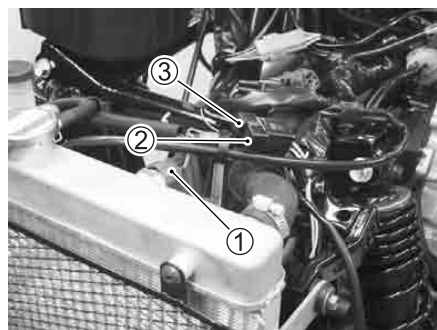


LOCATION OF ELECTRICAL COMPONENTS



- ① Battery
- ② Main fuse
- ③ Starter relay
- ④ Fuse box
- ⑤ Neutral relay
- ⑥ Fuel pump relay
- ⑦ ECM
- ⑧ 4WD/diff-lock relay

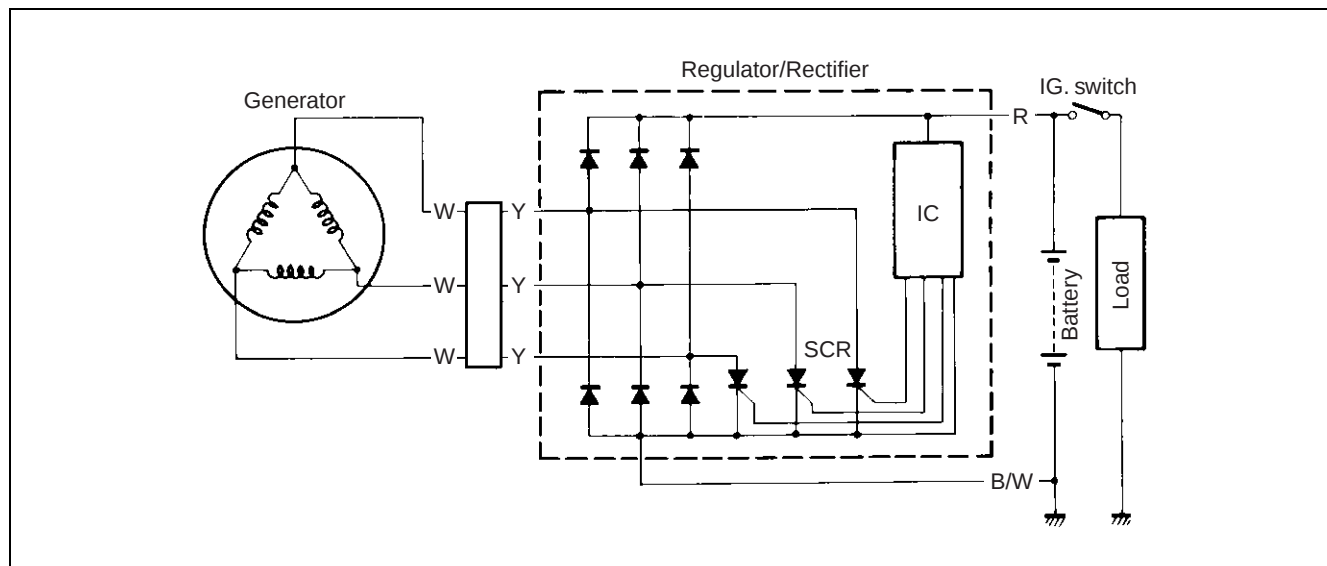
- ⑨ Starter motor
- ⑩ 4WD/diff-lock switch
- ⑪ Brake lever switch (R)
- ⑫ Ignition switch
- ⑬ Ignition coil
- ⑭ Rear brake switch
- ⑮ Gear position switch



- ① Cooling fan thermo-switch
- ② 4WD/diff-lock actuator diode
- ③ Neutral relay diode
- ④ Starter button
- ⑤ Dimmer switch
- ⑥ Engine stop switch
- ⑦ Over ride switch
- ⑧ Brake lever switch (L)
- ⑨ Parking brake switch
- ⑩ Horn button (For E-17, E-24)

- ⑪ Regulator/rectifier
- ⑫ Parking brake relay
- ⑬ Diff-lock relay
- ⑭ Cooling fan
- ⑮ 4WD/diff-lock actuator
- ⑯ Speed sensor
- ⑰ Generator
- ⑱ High position diode
- ⑲ Low position diode

CHARGING SYSTEM



TROUBLESHOOTING

Battery runs down quickly

Step 1

- 1) Check accessories which use excessive amounts of electricity.

Are accessories being installed?

YES	Remove accessories.
NO	Go to Step 2.

Step 2

- 1) Check the battery for current leaks. (☞ 9-8)

Is the battery current leakage OK?

YES	Go to Step 3.
NO	• Short circuit of wire harness. • Faulty electrical equipment.

Step 3

- 1) Measure the regulated voltage between the battery terminals. (☞ 9-9)

Is the regulated voltage OK?

YES	• Faulty battery. • Abnormal driving condition.
NO	Go to Step 4.

Step 4

- 1) Measure the resistance of the generator coil. (☞ 9-9)

Is the resistance of generator coil OK?

YES	Go to Step 5.
NO	• Faulty generator coil. • Disconnected lead wires.

Step 5

1) Measure the generator no-load performance. (☞ 9-10)

Is the generator no-load performance OK?

YES	Go to Step 6.
NO	Faulty generator.

Step 6

1) Inspect the regulator/rectifier. (☞ 9-10)

Is the regulator/rectifier OK?

YES	Go to Step 7.
NO	Faulty regulator/rectifier.

Step 7

1) Inspect wirings.

Is the wirings OK?

YES	Faulty battery.
NO	• Short circuit of wire harness. • Poor contact of couplers.

Battery overcharges

- Faulty regulator/rectifier.
- Faulty battery.
- Poor contact of generator lead wire coupler.

INSPECTION**BATTERY CURRENT LEAKAGE**

- Remove the seat. (☞ 8-6)
- Turn the ignition switch to the OFF position.
- Disconnect the battery $\ominus$ lead wire ①.

Measure the current between $\ominus$ battery terminal and the $\ominus$ battery lead wire with the multi-circuit tester. If the reading exceeds the specified value, leakage is evident.

TOOL 09900-25008: Multi-circuit tester set

TESTER Tester knob indication: Current ($\overline{\text{---}}$, 20 mA)

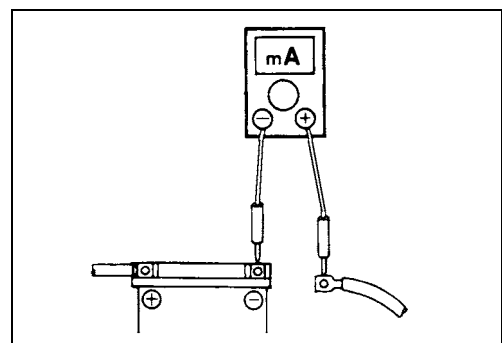
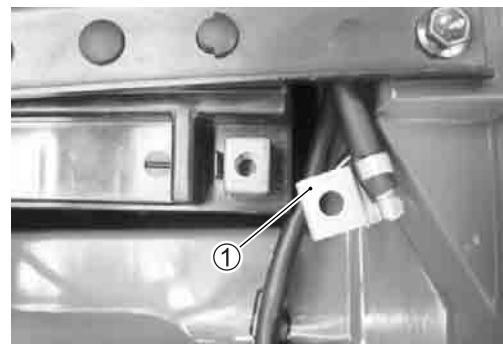
DATA Battery current (leak): Under 2.6 mA

CAUTION

- * In case of a large current leak, turn the tester to high range first to avoid tester damage.
- * Do not turn the ignition switch to the "ON" position when measuring current.

NOTE:

When checking for find the excessive current leakage, remove the couplers and connectors, one by one, checking each part.



REGULATED VOLTAGE

- Remove the seat. (☞ 8-6)
- Remove the battery stay ①.
- Start the engine, turn the ignition switch to LIGHT (☞) and the dimmer switch to HI and run the engine at 5 000 r/min.

Measure the DC voltage between the $\oplus$ and $\ominus$ battery terminals with the multi-circuit tester. If the voltage is not within the specified value, inspect the generator and regulator/rectifier. (☞ below and 9-10)

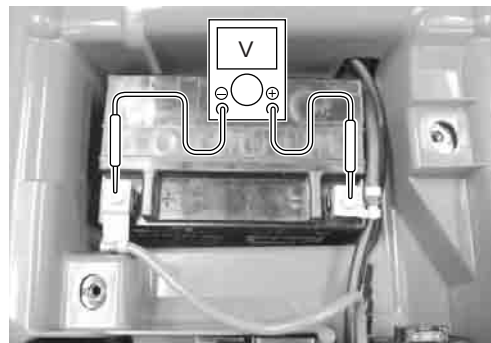
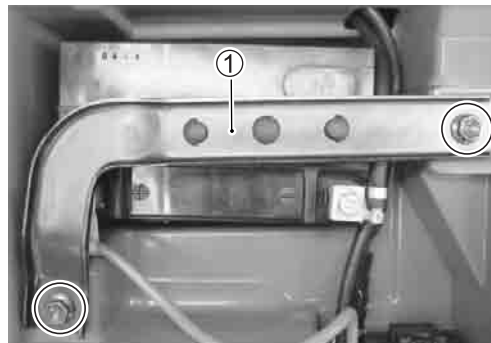
NOTE:

When making this test, be sure that the battery is in fully-charged condition.

TOOL 09900-25008: Multi-circuit tester set

Tester knob indication: Voltage (V)

DATA Regulated voltage (Charging output):
13.5 – 15.5 V at 5 000 r/min.



GENERATOR COIL RESISTANCE

- Remove the rear fender. (☞ 8-15)
- Disconnect the generator coupler ①.

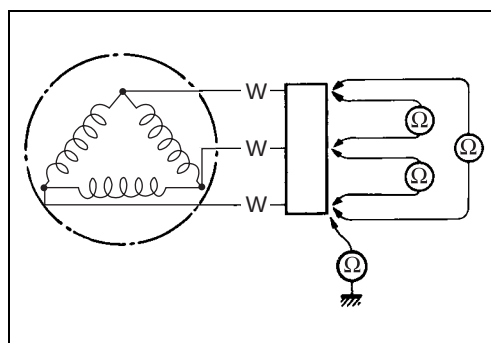
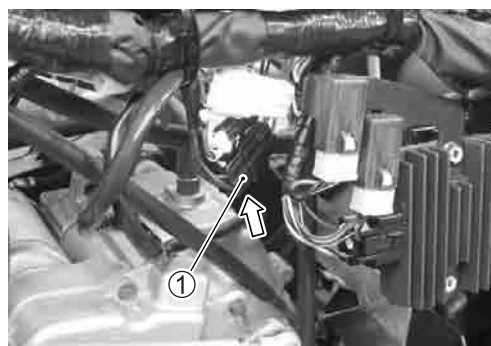
Measure the resistance between the three lead wires with the multi-circuit tester.

If the resistance is out of specified value, replace the stator with a new one. Also, check that the generator core is insulated properly.

TOOL 09900-25008: Multi-circuit tester set

Tester knob indication: Resistance (Ω)

DATA Generator coil resistance: 0.1 – 1.0 Ω (White – White)
 ∞ Ω (White – Ground)



NOTE:

When making above test, it is not necessary to remove the generator.

GENERATOR NO-LOAD PERFORMANCE

- Remove the rear fender. (☞8-15)
- Disconnect the generator coupler.
- Start the engine and keep it running at 5 000 r/min.

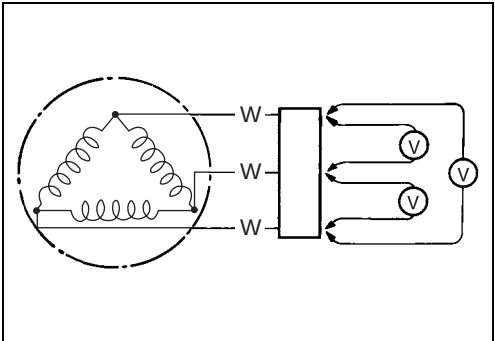
Measure the voltage between three lead wires with the multi-circuit tester.

If the tester indicates under the specified value, replace the generator with a new one.

TOOL 09900-25008: Multi-circuit tester set

Tester knob indication: Voltage (~)

DATA Generator no-load performance:
65 V and more at 5 000 r/min (When engine is cold)



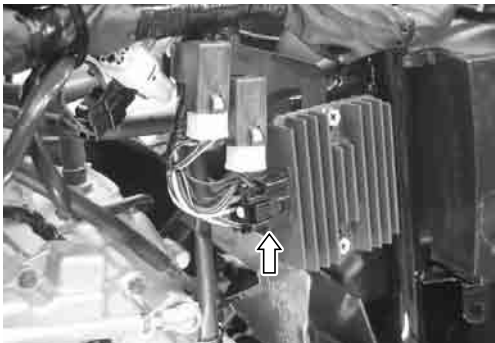
REGULATOR/RECTIFIER

- Remove the rear fender. (☞8-15)
- Disconnect the regulator/rectifier coupler.

Measure the voltage between the lead wires with the multi-circuit tester as indicated in the table below. If the voltage is not within the specified value, replace the regulator/rectifier with a new one.

TOOL 09900-25008: Multi-circuit tester set

Tester knob indication: Diode test (→←)



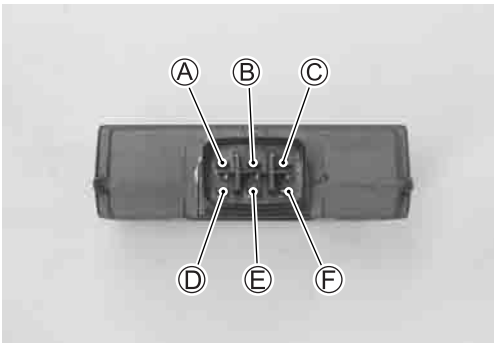
Unit: V

		⊕ Tester probe					
Tester probe ⊖		Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ	Ⓕ
	Ⓐ		*	0.4 – 1.2	0.3 – 0.7	0.3 – 0.7	0.3 – 0.7
	Ⓑ	*		*	*	*	*
	Ⓒ	*	*		*	*	*
	Ⓓ	*	*	0.3 – 0.7		*	*
	Ⓔ	*	*	0.3 – 0.7	*		*
	Ⓕ	*	*	0.3 – 0.7	*	*	

* More than 1.4 V (tester's battery voltage)

NOTE:

If the tester reads 1.4 V and below when the tester probes are not connected, replace its battery.



Step 3

- 1) Measure the starter relay voltage at the starter relay connectors (between Y/B ⊕ and B/W ⊖) when the starter button is pushed.

Is a voltage OK?

YES	Go to Step 4.
NO	• Faulty engine stop switch. • Faulty neutral relay. • Faulty starter button. • Faulty ignition switch. • Poor contact of connector. • Open circuit in wire harness.

Step 4

- 1) Check the starter relay. (🔧 9-16)

Is the starter relay OK?

YES	Poor contact of the starter relay.
NO	Faulty starter relay.

Starter motor runs but does not crank the engine**Step 1**

- 1) The starter motor runs when the transfer is in neutral, but does not run when the transfer is in any position other than neutral, with the parking brake lever grasped firmly.

- 2) Check the parking brake switch.

Is the parking brake switch OK?

YES	Go to Step 2.
NO	Faulty parking brake switch.

Step 2

- 1) Check the parking brake relay.

Is the parking brake relay OK?

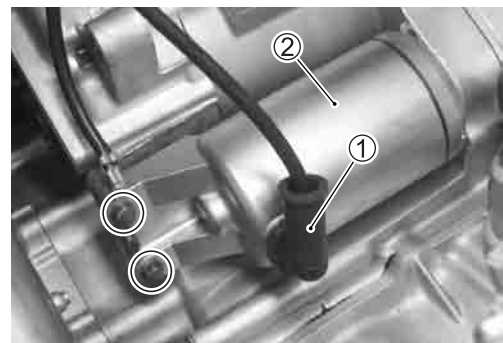
YES	• Open circuit in wire harness. • Poor contact of connector.
NO	• Faulty parking brake relay.

Engine does not turn though the starter motor runs.

- Faulty stater clutch. (🔧 3-47)

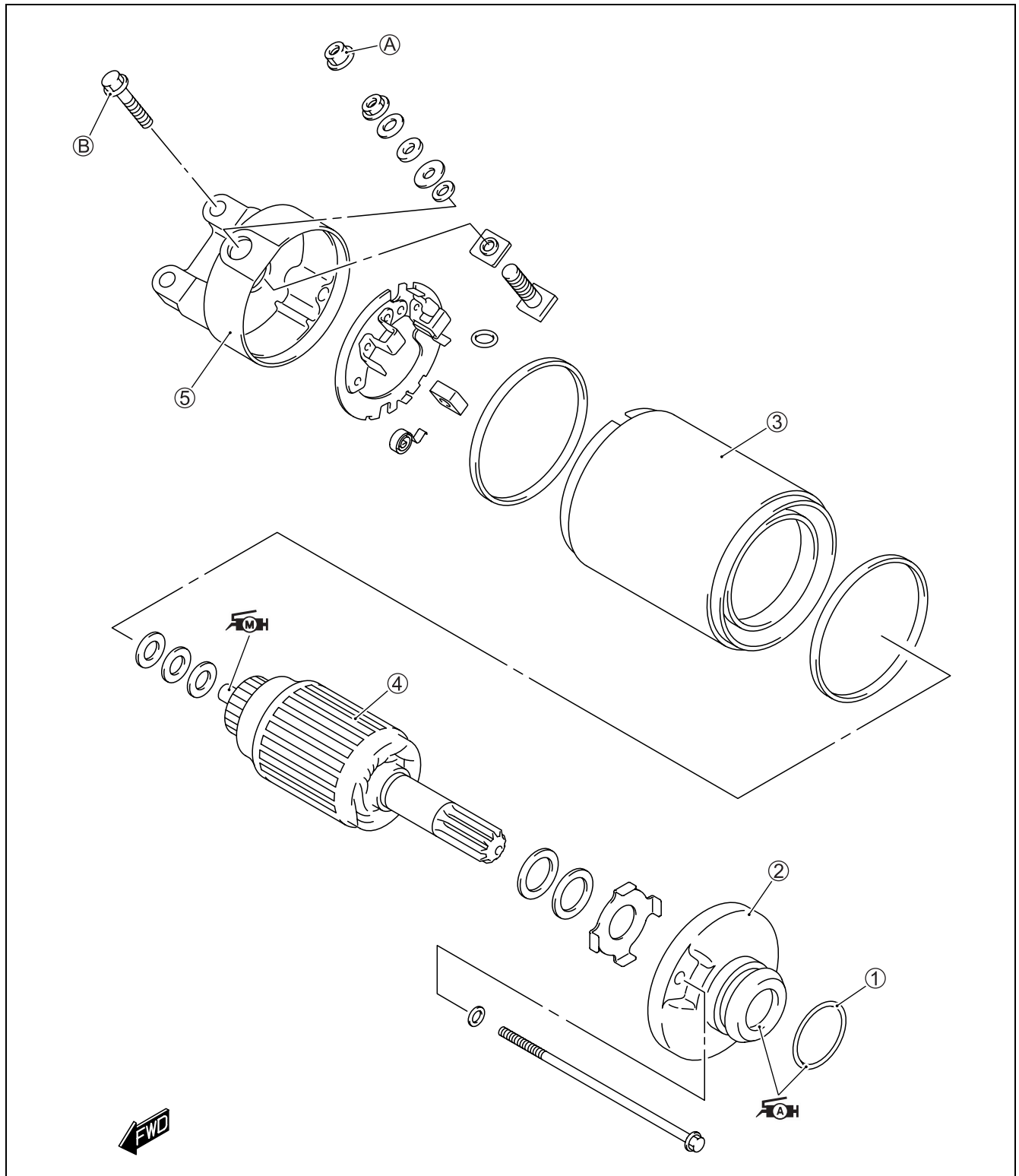
STARTER MOTOR REMOVAL

- Disconnect the battery ⊖ lead wire.
- Remove the right side cover. (🔧 8-10)
- Disconnect the starter motor lead wire ①.
- Remove the starter motor ②.



STARTER MOTOR DISASSEMBLY

- Disassemble the starter motor as shown in the illustration.



①	O-ring	⑤	Housing end (outside)
②	Housing end (inside)	A	Lead wire connecting nut
③	Starter motor case	B	Mounting bolt
④	Armature		



ITEM	N·m	kgf-m	lb-ft
A	6	0.6	4.5
B	10	1.0	7.0

STARTER MOTOR INSPECTION

CARBON BRUSH

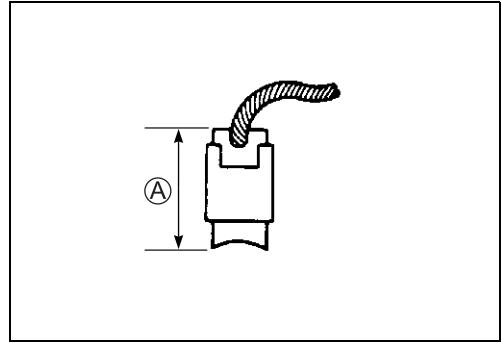
Inspect the brushes for abnormal wear, cracks, or smoothness in the brush holder.

If any damages are found, replace the brush assembly with a new one.

Measure the length (A) of the carbon brushes using a vernier calipers. If the measurement is less than the service limit, replace the brush holder set with a new one.

TOOL 09900-20102: Vernier calipers

DATA Standard: 10.0 mm (0.39 in)
Service Limit: 6.5 mm (0.26 in)



COMMUTATOR

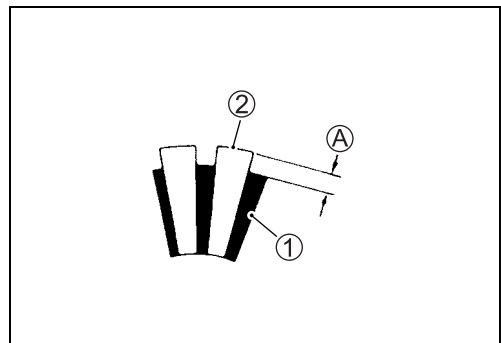
Inspect the commutator for discoloration, abnormal wear or undercut (A).

If abnormal wear is found, replace the armature with a new one.

If the commutator surface is discolored, polish it with #400 sand paper and wipe it with a clean dry cloth.

If there is no undercut, scrape out the insulator with a saw blade.

- ① Insulator
- ② Segment



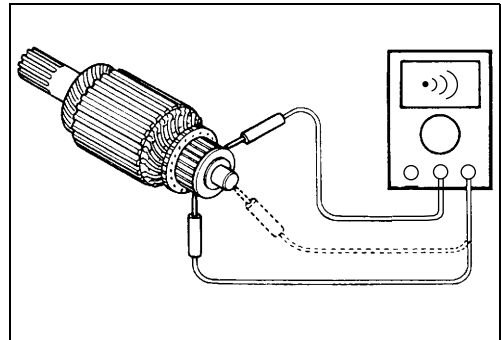
ARMATURE COIL

Check for continuity between each segments and the armature shaft with the multi-circuit tester.

If there is no continuity between the segments or there is continuity between the segments and shaft, replace the armature with a new one.

TOOL 09900-25008: Multi-circuit tester set

Tester knob indication: Continuity test (••••)



OIL SEAL

Check the oil seal lip for damage or leakage.

If any damage is found, replace the housing end with a new one.

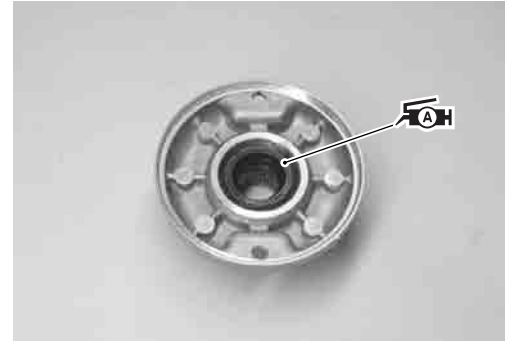


STARTER MOTOR REASSEMBLY

Reassemble the starter motor in the reverse order of disassembly. Pay attention to the following points:

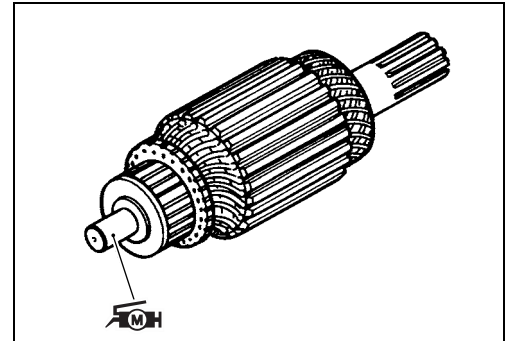
- Apply SUZUKI SUPER GREASE "A" to the lip of the oil seal.

 **99000-25010: SUZUKI SUPER GREASE "A"**
(or equivalent grease)



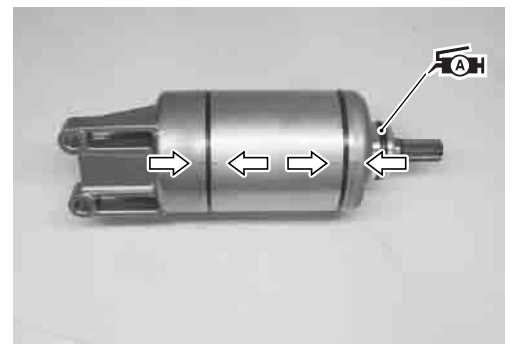
- Apply a small quantity of SUZUKI MOLY PASTE to the armature shaft.

 **99000-25140: SUZUKI MOLY PASTE**



- Align the marks on the housing ends with the marks on the starter motor case.
- Apply SUZUKI SUPER GREASE "A" to the O-ring.

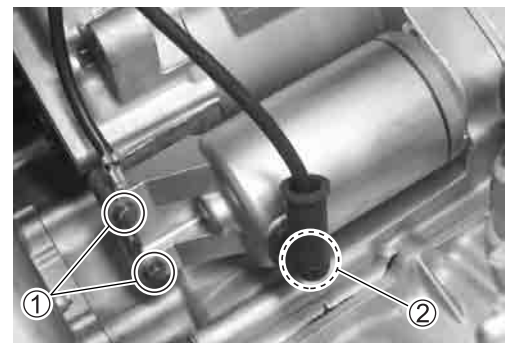
 **99000-25010: SUZUKI SUPER GREASE "A"**
(or equivalent grease)



STARTER MOTOR INSTALLATION

- Tighten the starter motor mounting bolts ① and starter motor lead wire connecting nut ② to the specified torque.

 **Starter motor mounting bolt: 10 N·m (1.0 kgf-m, 7.0 lb-ft)**
Starter motor lead wire connecting nut:
6.0 N·m (0.6 kgf-m, 4.5 lb-ft)



STARTER RELAY INSPECTION

- Remove the seat. (👉 8-6)
- Disconnect the battery $\ominus$ lead wire from the battery.
- Remove the starter relay cover ①.
- Disconnect the starter motor lead wire, battery lead wire and starter relay coupler ②.
- Remove the starter relay ③.
- Apply 12 V to A and B terminals and check for continuity between the positive and negative terminals with the multi-circuit tester. If the starter relay clicks and continuity is found, the relay is ok.

TOOL 09900-25008: Multi-circuit tester set

Tester knob indication: Continuity test (•••••)

CAUTION

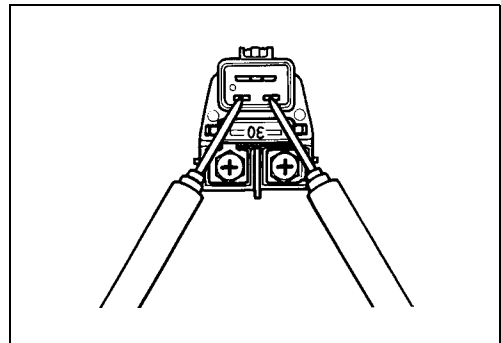
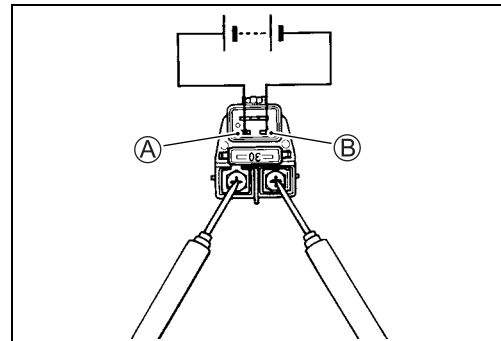
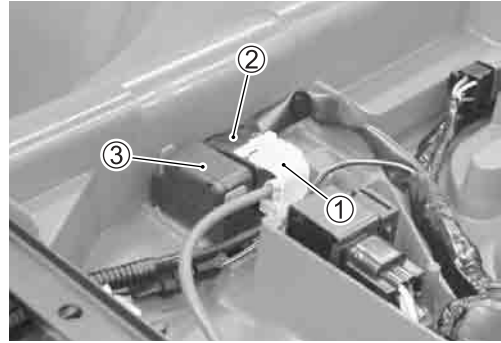
Do not apply battery voltage to the starter relay for five seconds and more, since the relay coil may overheat and get damaged.

Measure the relay coil resistance between the terminals with the multi-circuit tester. If the resistance is not within the specified value, replace the starter relay with a new one.

TOOL 09900-25008: Multi-circuit tester set

Tester knob indication: Resistance (Ω)

DATA Starter relay resistance: 3 – 5 Ω



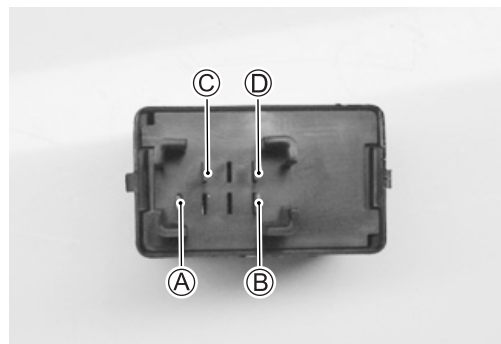
NEUTRAL RELAY INSPECTION

- Remove the seat. (👉 8-6)
- Disconnect the neutral relay.

Apply 12 V to terminals A and B (+ to A and $\ominus$ to B) and check the continuity between C and D with the multi-circuit tester. If there is no continuity found, replace the neutral relay with a new one.

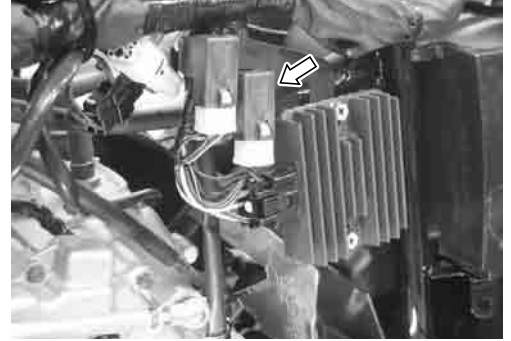
TOOL 09900-25008: Multi-circuit tester set

Tester knob indication: Continuity set (•••••)



PARKING BRAKE RELAY INSPECTION

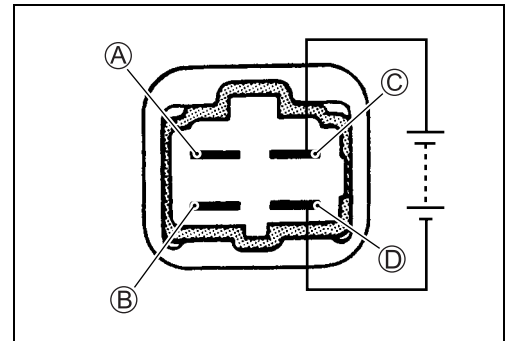
- Remove the rear fender. (👉 8-15)



First, check the insulation between (A) and (B) terminals with the multi-circuit tester. Then apply 12 V to terminals (C) and (D) (+ to (C) and - to (D)) and check the continuity between (A) and (B). If there is no continuity, replace the parking brake relay with a new one.

TOOL 09900-25008: Multi-circuit tester set

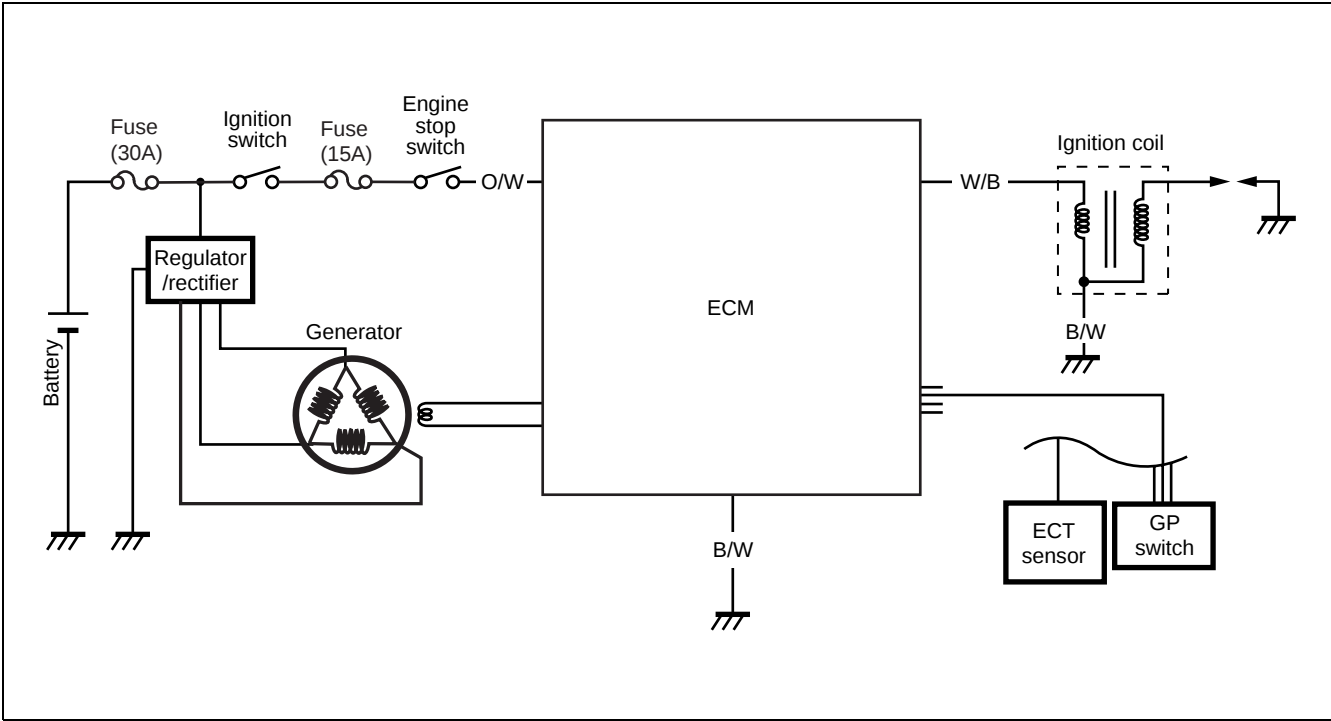
Tester knob indication: Continuity set (•••••)



PARKING BRAKE SWITCH

(👉 9-37)

IGNITION SYSTEM



NOTE:

The fuel cut-off circuit is incorporated in this ECM in order to prevent over-running of engine. When engine speed reaches 8 000 r/min, or engine speed reaches 5 000 r/min at diff-lock switch is in ON and transfer is in low, or engine speed reaches 4 000 r/min at diff-lock switch is in ON and transfer is in high, this circuit cuts off fuel at the fuel injector.

TROUBLESHOOTING

No spark or poor spark

NOTE:

Check that the transfer is in neutral and the engine stop switch is in the “RUN” position. Check that the fuse is not blown and the battery is fully-charged before diagnosing.

Step 1

1) Check the ignition system couplers for poor connections.

Is there connection in the ignition system couplers?

YES	Go to Step 2.
NO	Poor connection of couplers.

Step 2

- 1) Measure the battery voltage between input lead wires (O/W and B/W) at the ECM with the ignition switch in the "ON" position.

Is the voltage OK?

YES	Go to Step 3.
NO	- Faulty ignition switch. - Faulty engine stop switch. - Broken wire harness or poor connection of related circuit couplers.

Step 3

- 1) Measure the ignition coil primary peak voltage. (🔧 9-20)

NOTE:

This inspection method is applicable only with the multi-circuit tester and the peak volt adaptor.

Is the peak voltage OK?

YES	Go to Step 4.
NO	Go to Step 5.

Step 4

- 1) Inspect the spark plug. (🔧 2-7)

Is the spark plug OK?

YES	Go to Step 5.
NO	Faulty spark plug.

Step 5

- 1) Inspect the ignition coil. (🔧 9-21)

Is the ignition coil OK?

YES	Go to Step 6.
NO	- Poor connection of the ignition coil. - Faulty ignition coil.

Step 6

- 1) Measure the CKP sensor peak voltage and its resistance. (🔧 9-22 and 9-23)

NOTE:

The CKP sensor peak voltage inspection is applicable only with the multi-circuit tester and peak volt adaptor.

Is the peak voltage and resistance OK?

YES	- Faulty ECM. - Poor connection of ignition couplers. - Open circuit in wiring harness.
NO	- Faulty CKP sensor. - Metal particles or foreign material being stuck on the CKP sensor and rotor tip.

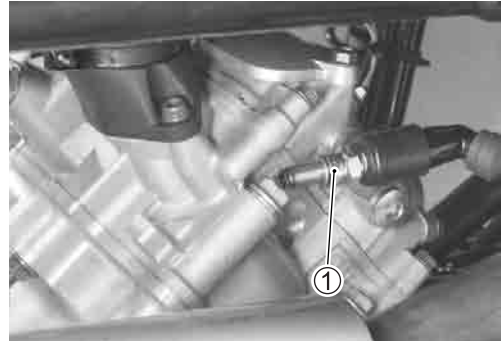
INSPECTION

IGNITION COIL PRIMARY PEAK VOLTAGE

- Remove the right side cover. (☞ 8-10)
- Remove the spark plug cap.
- Connect a new spark plug ① to spark plug cap and ground it to the cylinder head bolt.

NOTE:

Make sure that the spark plug cap and spark plug are connected properly and the battery is fully-charged.



Measure ignition coil primary peak voltage with the multi-circuit tester in the following procedure.

- Connect the multi-circuit tester with the peak voltage adaptor as follows.

⊕ Probe: Black/White lead wire

⊖ Probe: White/Blue lead wire

NOTE:

Do not disconnect the ignition coil lead wire coupler.

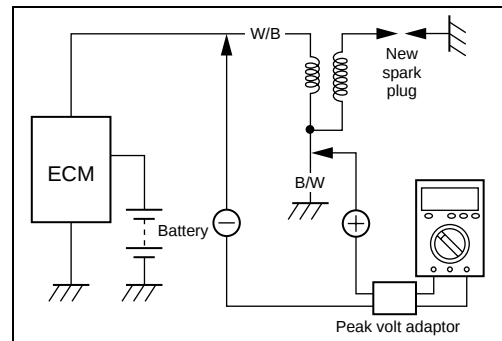


TOOL 09900-25008: Multi-circuit tester set

CAUTION

When using the multi-circuit tester and peak voltage adaptor, refer to the appropriate instruction manual.

- Shift the transfer to the neutral position and turn the ignition switch to the "ON" position.
- Push the starter button and allow the engine to crank for a few seconds, and then measure the ignition coil primary peak voltage.



Repeat the above procedure a few times and measure the highest ignition coil primary peak voltage. If the voltage is lower than the standard values, inspect the ignition coil. (☞ 9-21)

TESTER Tester knob indication: Voltage (V)

DATA Ignition coil primary peak voltage: More than 80 V

WARNING

While testing, do not touch the tester probes and spark plug to prevent receiving an electric shock.

NOTE:

After checking the ignition coil primary peak voltage, clear the DTC using SDS tool. (☞ 5-23)

IGNITION COIL RESISTANCE

- Remove the right side cover. (☞ 8-10)
- Disconnect the ignition coil lead wire and spark plug cap.

Measure the ignition coil resistance in both the primary and secondary windings with the multi-circuit tester. If the resistance in both the primary and secondary windings is close to the specified values, the windings are in sound condition.



09900-25008: Multi-circuit tester set



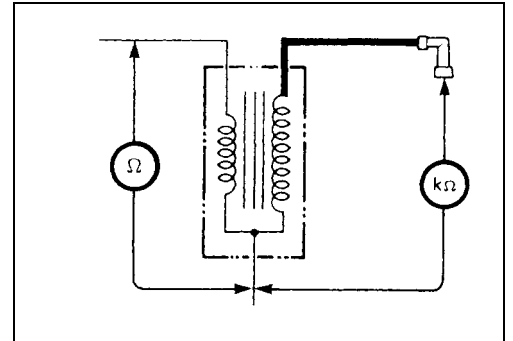
Tester knob indication: Resistance (Ω)



Ignition coil resistance

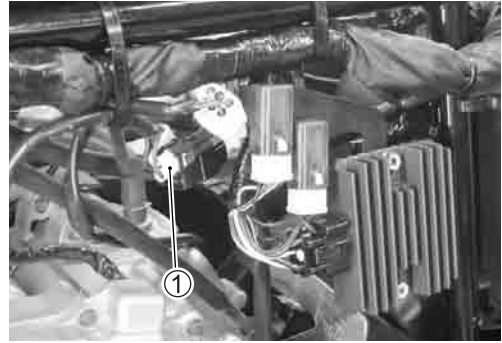
Primary : 0.1 – 0.6 Ω (Terminal – Ground)

Secondary : 12 – 19 k Ω (spark plug cap – terminal)



CKP SENSOR PEAK VOLTAGE

- Disconnect the CKP sensor coupler ①.



- Connect the multi-circuit tester with the peak volt adaptor as follows.

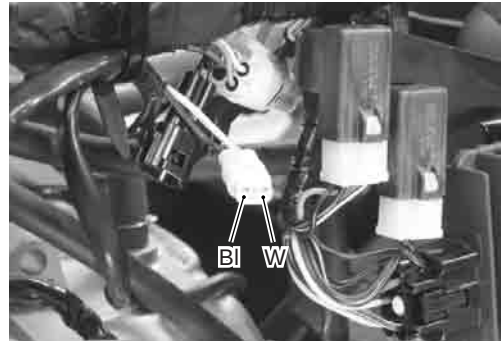
⊕ probe: White

⊖ probe: Blue

 **09900-25008: multi-circuit tester set**

CAUTION

When using the multi-circuit tester and peak volt adaptor, refer to the appropriate instruction manual.



- Shift the transfer to the neutral position, turn the ignition switch to the "ON" position.
- Push the starter button and allow the engine to turn for a few seconds, and then measure the CKP sensor peak voltage.
- Repeat the above procedure a few times and measure the highest CKP sensor peak voltage.

 **Tester knob indication: Voltage (---)**

 **CKP sensor peak voltage: 5.0 V and more**

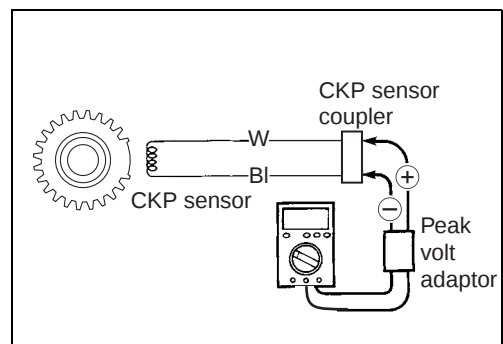
NOTE:

After checking the CKP sensor peak voltage, clear the DTC using SDS tool.

If the peak voltage is lower than the specified value, check the continuity between the CKP sensor coupler and ECM coupler.

CAUTION

Normally, use the needle pointed probe to the backside of the lead wire coupler to prevent the terminal bend and terminal alignment.



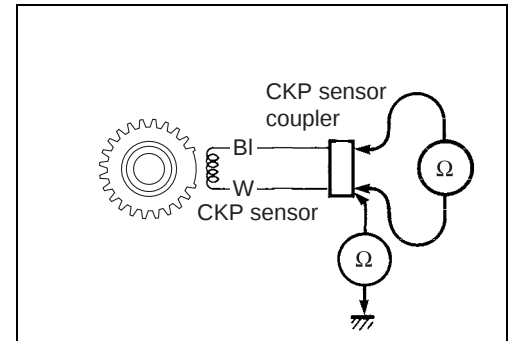
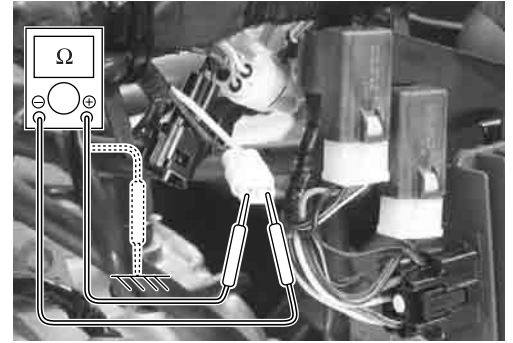
CKP SENSOR RESISTANCE

- Disconnect the CKP sensor coupler.
- Measure the resistance between the lead wires and ground. If the resistance is not as specified, the CKP sensor must be replaced.

TOOL 09900-25008: Multi-circuit tester set

TESTER Tester knob indication: Resistance (Ω)

DATA CKP sensor resistance: 200 – 250 Ω (White – Blue)
 ∞ Ω (White – Ground)



4WD/DIFF-LOCK SYSTEM

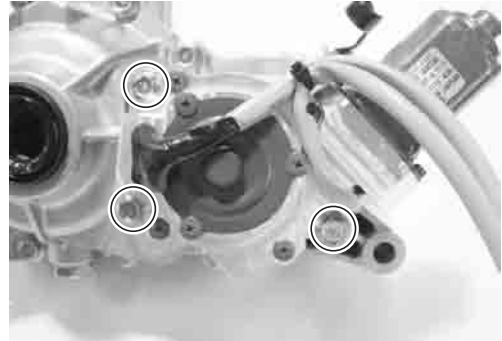
INSPECTION

When the diff-lock light blinks and the diff-lock indicator flickers, inspect the following items for any abnormalities.

- Short circuit of wire harness.
- Poor contact of couplers.
- Faulty 4WD/diff-lock switch. (👉 9-37)
- Faulty 4WD/diff-lock relay. (👉 9-25)
- Faulty 4WD/diff-lock actuator. (👉 below)
- Faulty 4WD/diff-lock diode. (👉 9-36)

4WD/DIFF-LOCK ACTUATOR

- Remove the front fender. (👉 8-9)
- Remove the front drive train (differential) gear case assembly. (👉 4-4)
- Remove the 4WD/diff-lock actuator assembly.



- Connect the 12 V battery to the actuator lead wires (Blue wire and Yellow wire). If the motor does not run, replace the diff-lock/transfer actuator assembly with a new one.
- Install the diff-lock/transfer actuator assembly and tighten its bolts to the specified torque. (👉 4-16)



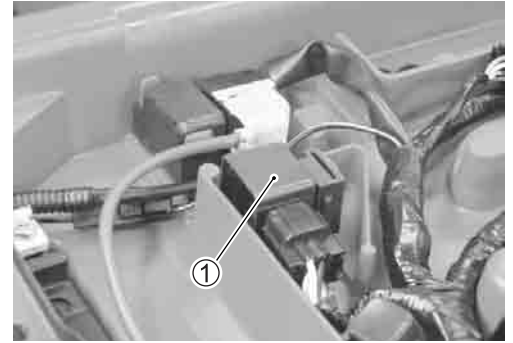
4WD/DIFF-LOCK SWITCH

(👉 9-37)



4WD/DIFF-LOCK RELAY

- Remove the seat. (☞ 8-6)
- Remove the 4WD/diff-lock relay ①.



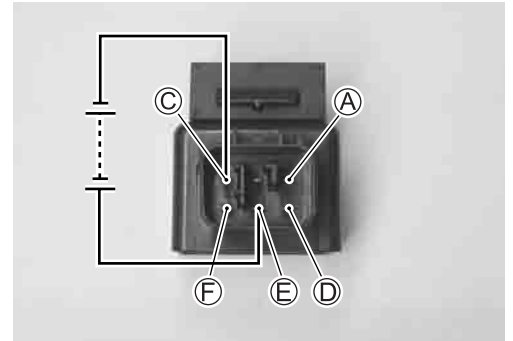
First, check the continuity between ① and ④, between ④ and ⑥ terminals with the multi-circuit tester.

Check the insulation between ① and ⑤, between ⑤ and ⑥.

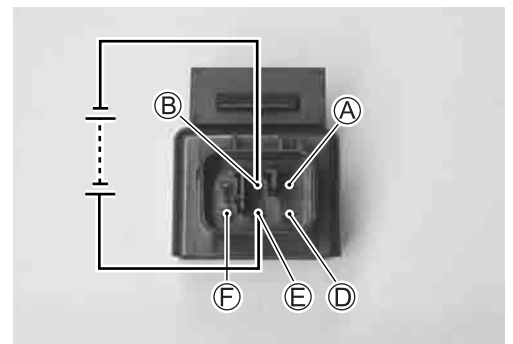
Apply 12 V to the terminals ③ and ⑤ (+ to ⑤ and - to ③), check the insulation between ④ and ⑥.

Apply 12 V to the terminals ② and ⑤ (+ to ⑤ and - to ②), check the insulation between ① and ④.

If any abnormality is found, replace the 4WD/diff-lock relay with a new one.

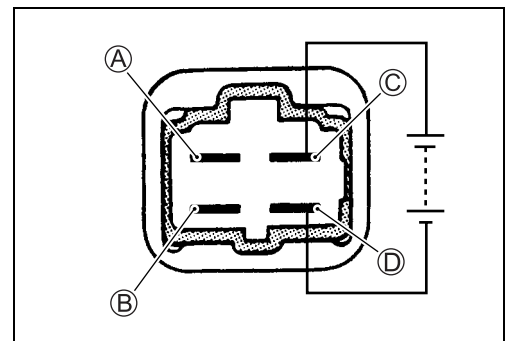


TOOL 09900-25008: multi-circuit tester set

**DIFF-LOCK RELAY**

First, check the insulation between ① and ② terminals with the multi-circuit tester. Then apply 12 V to terminals ③ and ④ (+ to ③ and - to ④) and check the continuity between ① and ②. If there is no continuity, replace the diff-lock relay with a new one.

TOOL 09900-25008: multi-circuit tester set



COMBINATION METER

DESCRIPTION

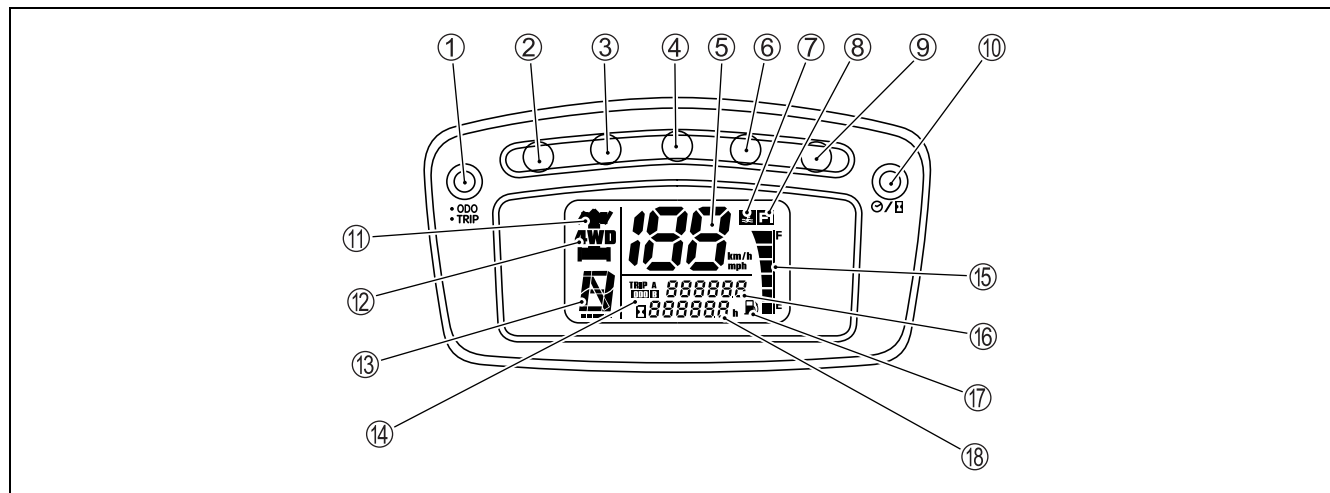
This combination meter mainly consists of LCD (Liquid Crystal Display) and LED (Light Emitting Diode). This combination meter is light, thin and of high response compared to those currently in use because of this composition.

The LCD indicates diff-lock, 4WD, gear position, speed, ECT, FI, ODO/TRIP A/TRIP B, clock/hour and fuel level.

LED (Light Emitting Diode)

LED is used for the illumination light and each indicator light.

LED is maintenance free. LED is less electric-power consuming and stronger to vibration resistance compared to the bulb.



①	ODO/TRIP A/TRIP B button	⑩	Clock/hour button
②	LED (diff-lock)	⑪	Diff-lock indicator
③	LED (reverse)	⑫	4WD indicator
④	LED (neutral)	⑬	Gear position indicator
⑤	Speedometer	⑭	ODO/TRIP A/TRIP B indicator
⑥	LED (high beam) For E-17	⑮	Fuel level indicator
⑦	ECT indicator	⑯	ODO/TRIP A/TRIP B indicator
⑧	FI indicator	⑰	Fuel indicator
⑨	LED (ECT/FI)	⑱	Clock/hour indicator

OPERATING PROCEDURE

INITIAL DISPLAY

When the ignition switch is set to ON, all LCD, ECT/FI, neutral indicator, reverse indicator and diff-lock indicator light. light up for two seconds.

NOTE:

If the power supply is cut (e.g., when the battery is replaced);

** The odometer, tripmeter and clock are displayed after the initial display appears.*

** Since the clock resets to "1:00", it will need to be readjusted.*

CHANGE THE DISPLAY MODE

With each press of the ODO/TRIP button, the display changes between odometer, tripmeter A and tripmeter B as shown.



Hold down the ODO/TRIP button over two seconds while pressing the  (CLOCK/HOUR) button, the display changes between "mph" and "km/h", when displaying odometer as shown.



With each press of the  (CLOCK/HOUR) button, the display changes between clock and hour as shown.



⚠ WARNING

To avoid riding with only one hand, do not operate the buttons while riding.

ODOMETER

Displays the total distance travelled.

TRIPMETER

Displays the distance travelled since the tripmeter was last reset.

NOTE:

The tripmeters A and B can be used independently.

Hold down the ODO/TRIP button over two seconds to reset the tripmeter.

CLOCK

Displays the time (hour and minutes) on a 12-hour clock.

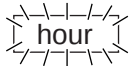
Setting the time

Hold down the  button over two seconds and then flashing the minute display.



⇒ Select the correct minutes by pressing the  button.

Decide the minutes by pressing the ODO/TRIP button, and then flashing the hour display.



⇒ Select the correct hour by pressing the  button.

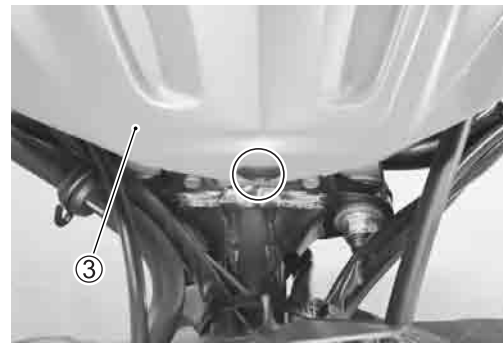
Decide the hours by pressing the ODO/TRIP button.

REMOVAL AND DISASSEMBLY

- Remove the ignition switch holder ①.
- Remove the combination meter cover ②.



- Remove the holder cover ③.



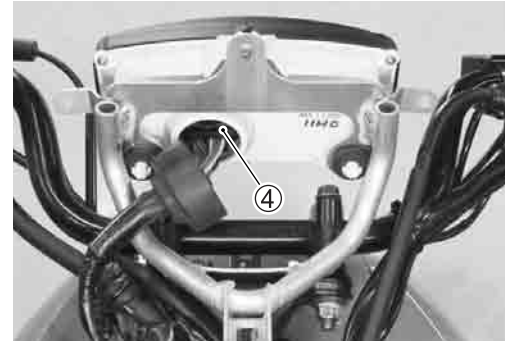
- Loosen the combination meter bolt.



- Disconnect combination meter coupler ④ and remove the combination meter assembly.

CAUTION

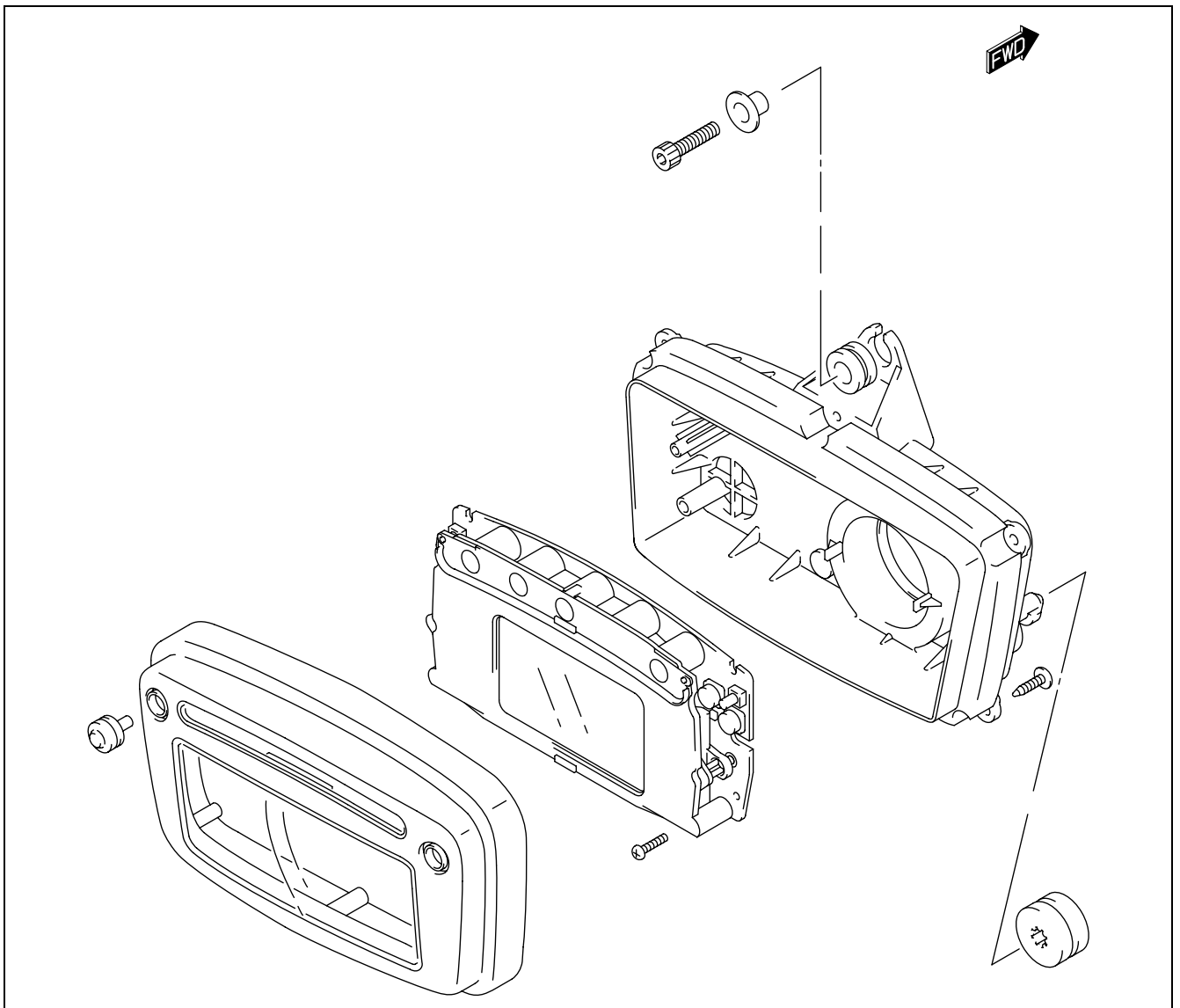
- * When disconnecting and reconnecting the combination meter coupler, make sure to turn OFF the ignition switch, or electronic parts may get damaged.
- * Make sure that the combination meter coupler boots is positioned properly.



- Disassemble the combination meter as follows.

CAUTION

Do not attempt to disassemble the combination meter unit.

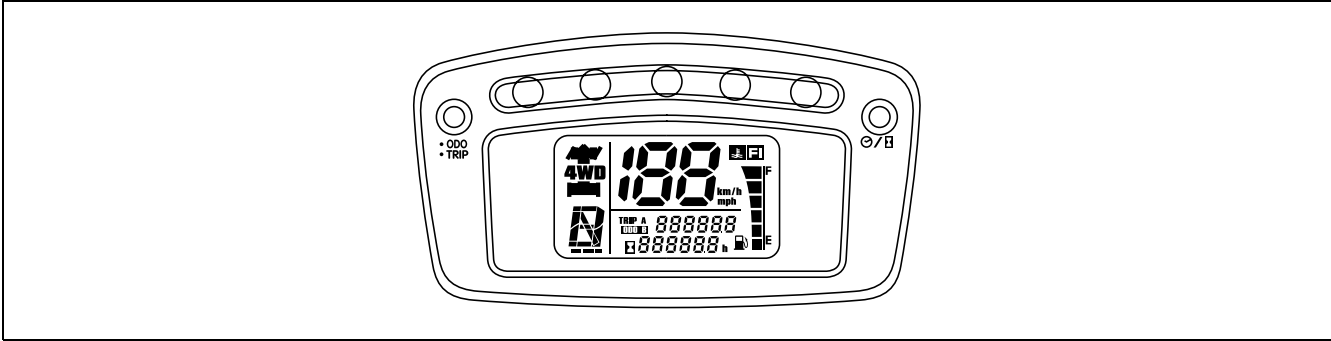


INSPECTION

LED (LIGHT EMITTING DIODE)

Check that the LED lights (diff-lock, reverse, neutral and ECT/FI) immediately after turning the ignition switch ON. Also, check them for lighting in accordance with their switch positions.

If the LED fails in operation, replace the combination meter unit with a new one after checking its wire harness/coupler.



ENGINE COOLANT TEMPERATURE METER AND INDICATOR

ECT sensor inspection. (↗ 7-11)

- Remove the right side cover. (↗ 8-10)
- Disconnect the ECT sensor coupler ①.

CAUTION

When connecting and disconnecting the engine coolant temperature sensor lead wire coupler, make sure to turn OFF the ignition switch, or electronic parts may get damaged.

- Connect the variable resistor ① between the terminals.
- Turn the ignition switch ON.
- Check the LCD and LED operations when the resistance is adjusted to the specified values.

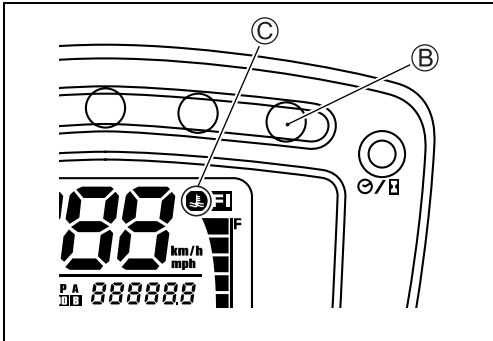
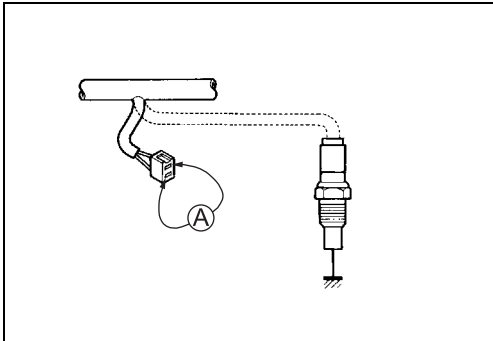
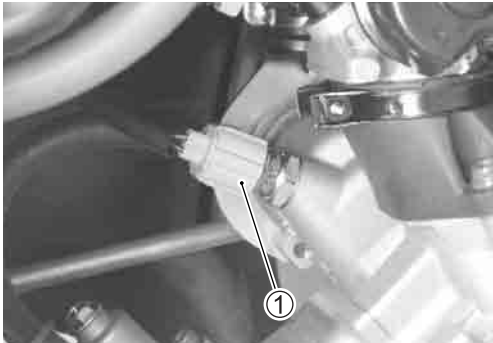
Resistance ①	LED ②	LCD ③	Water temperature
Approx. 0.14 kΩ	OFF	OFF	Approx. 110 °C
0 Ω (Jumper wire)	ON	ON	120 °C and over

If either one or all indications are abnormal, replace the combination meter with a new one.

NOTE:

If the engine stop switch is turned OFF while the ignition switch is ON, the LCD displays “CHEC”. But it is not a malfunction. This condition implies that combination meter receives no signal from the ECM.

In that case, they are restored to normal indication by turning the engine stop switch to “Q” (RUN) position.



FUEL METER

- Remove the rear fender. (👉8-15)
- Connect each resistor between the terminals as shown.
- Turn the ignition switch to “ON” position and wait for approx. 13 seconds.

Check the display of fuel meter as shown below, If any abnormality is found, replace the combination meter with a new one.

Resistance	Less than 16 Ω	16.5 – 21.5 Ω	23.5 – 30.5 Ω	33 – 41 Ω	53 – 65 Ω	82 – 100 Ω	164 – 208 Ω
Fuel level meter							

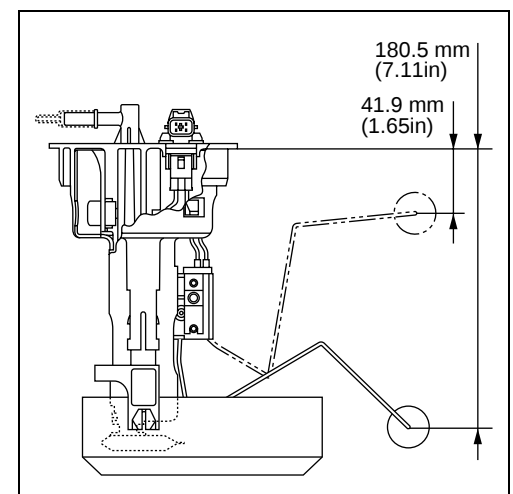
FUEL LEVEL GAUGE

- Remove the fuel pump assembly. (👉6-7)
- Measure the resistance at each fuel level gauge float position. If the resistance is incorrect, replace the fuel pump assembly with a new one.

Float position	Resistance
41.9 mm (1.65 in)	6.4 – 8.4 Ω
180.5 mm (7.11 in)	216 – 222 Ω

09900-25008: Multi circuit tester set

Tester knob indication: Resistance (Ω)



SPEEDOMETER

If the speedometer, odometer or trip meter does not function properly, inspect the speed sensor and connection of coupler.

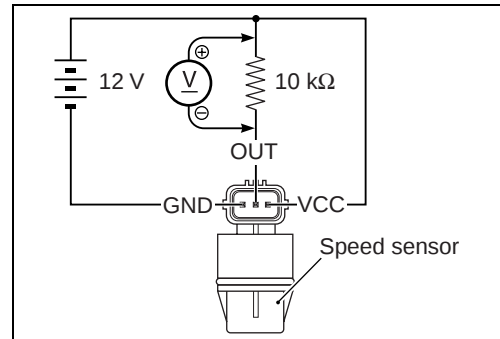
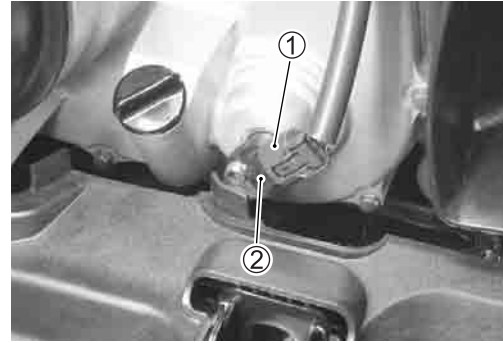
If the speed sensor and connection are functioning properly, replace the combination meter with a new one.

SPEED SENSOR

- Remove the left mud guard. (☞ 8-9)
- Disconnect the speed sensor coupler ①.
- Remove the speed sensor ② by removing its mounting bolt.
- Connect 12 V battery, 10 k Ω resistor and the multi-circuit tester as shown.

TOOL 09900-25008: Multi-circuit tester set

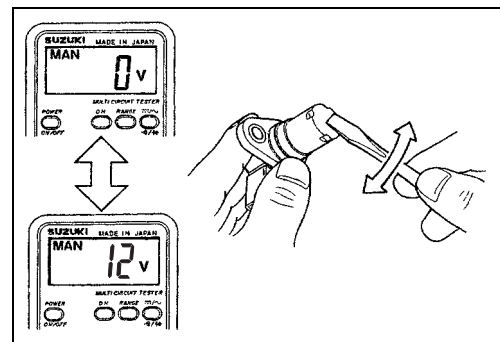
Tester knob indication: Voltage (---)



- Above condition, if a suitable screwdriver touching the pick-up surface of the speed sensor is moved, the tester reading voltage changes (0 V→12 V or 12 V→0 V). If the tester reading voltage does not change, replace the speed sensor with a new one.

NOTE:

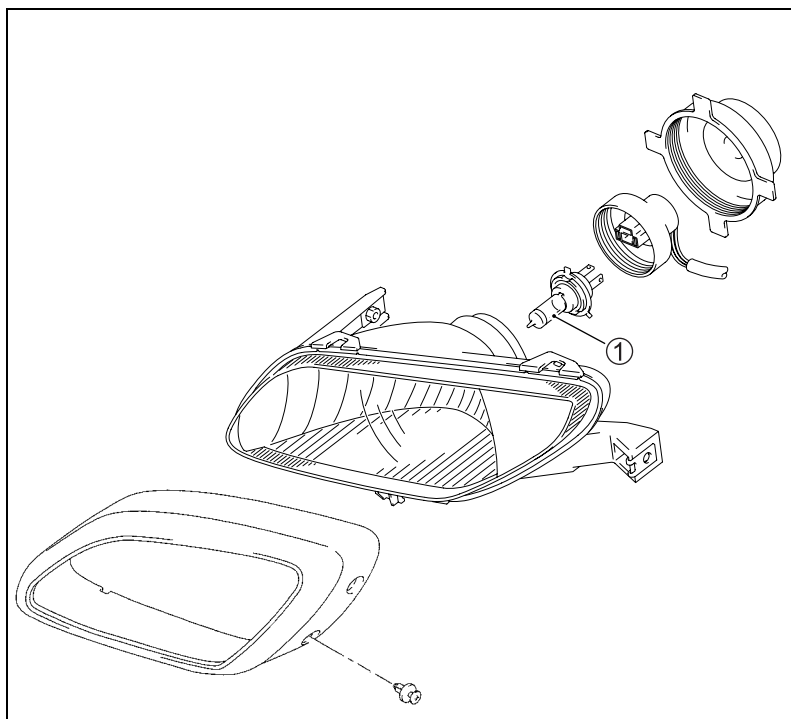
The highest voltage reading in this test will be the same as that of battery (12 V).



LAMPS HEADLIGHT

HEADLIGHT BULB

12 V 35/35 W × 2 ①



CAUTION

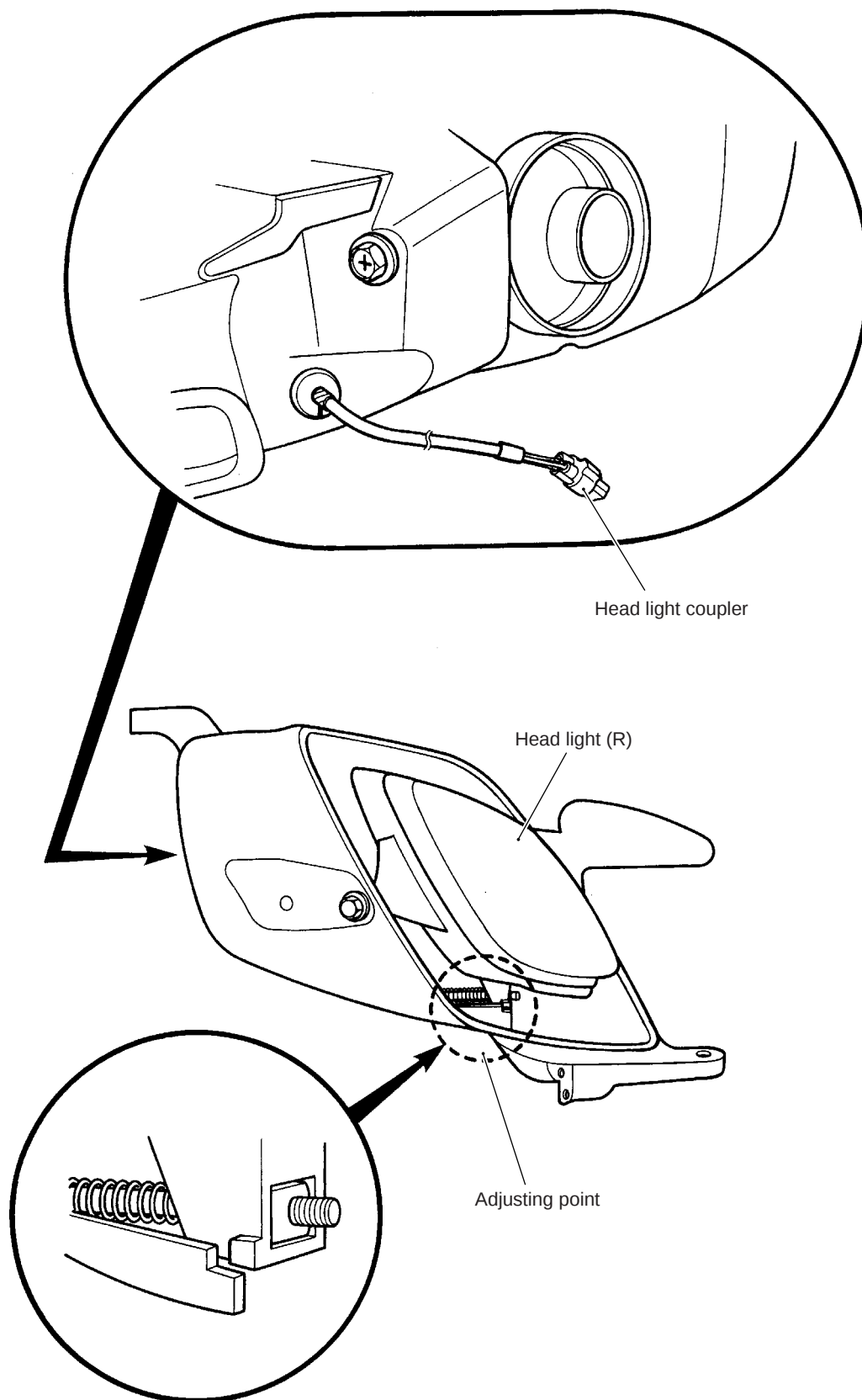
If you have touched and the bulb with your bare hands, clean it w ith a cloth moistened with alcohol or soapy water to maintain lens clarity.

HEADLIGHT BEAM ADJUSTMENT (Vertical)

- Adjust the headlight vertical beam.



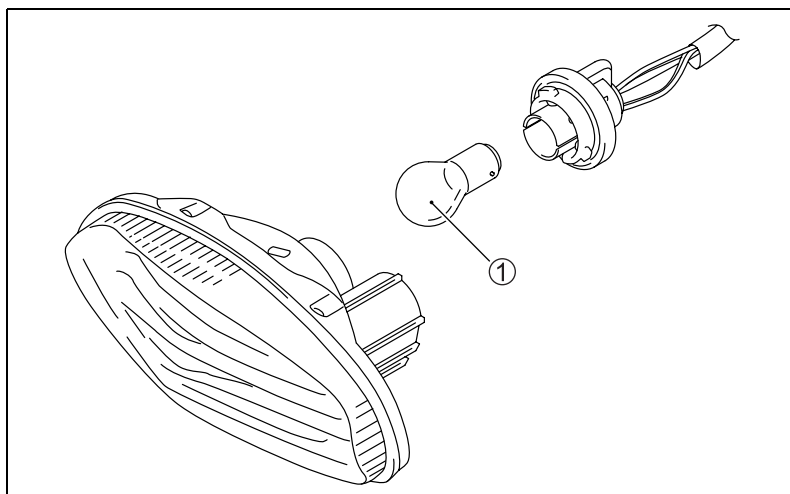
HEADLIGHT INSTALLATION



BRAKE LIGHT/TAILLIGHT

BRAKE LIGHT/TAILLIGHT BULB

12 V 21/5 W ①



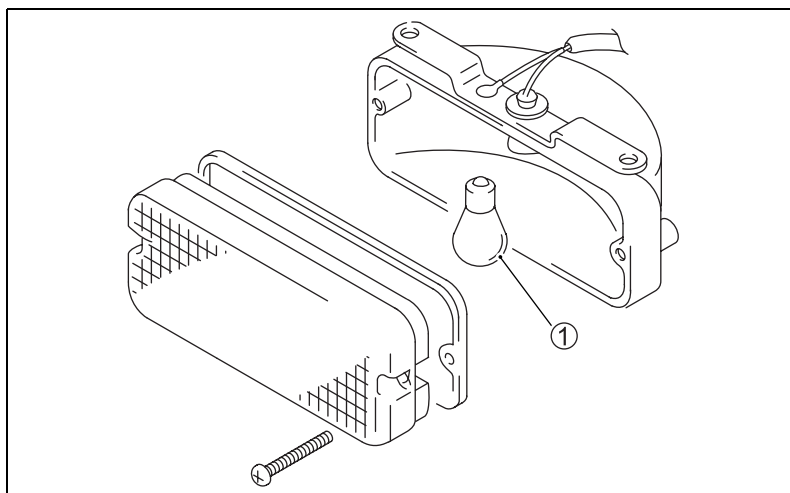
CAUTION

If you have touched and the bulb with your bare hands, clean it with a cloth moistened with alcohol or soapy water to maintain lens clarity.

REVERSING LIGHT (FOR E-17)

REVERSING LIGHT BULB

12V 21 W ①

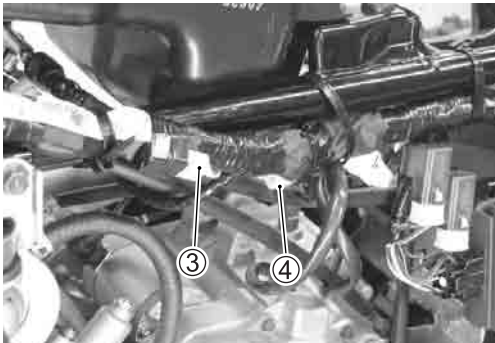
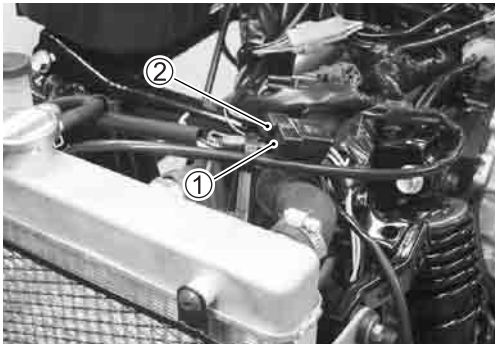


CAUTION

If you have touched and the bulb with your bare hands, clean it with a cloth moistened with alcohol or soapy water to maintain lens clarity.

DIODE

- The 4WD/diff-lock actuator diode ① and neutral relay diode ② are located near the radiator.
- The high position diode ③ and low position ④ diode are located above the generator cover.



Measure the voltage between ① and ② terminals using the multi-circuit tester as indicated in the table below.

-  **09900-25008: Multi-circuit tester set**
-  **Tester knob indication: Diode test (↔)**

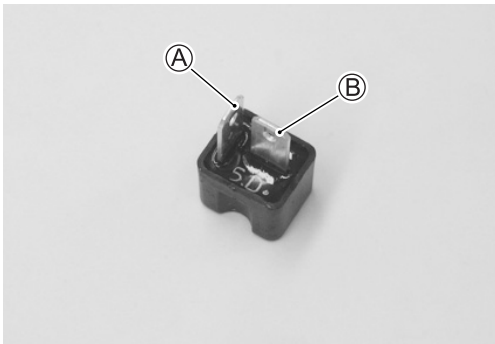
Unit: V

		⊕ Tester probe	
		①	②
Tester probe	①		0.3 – 0.6
	②	*	

* More than 1.4 V (tester's battery voltage)

NOTE:

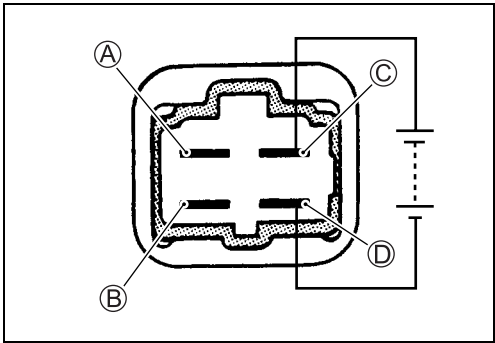
If the tester reads under 1.4 V when the tester probes are not connected, replace the battery of multi circuit tester.



REVERSING LIGHT RELAY (FOR E-17)

First, check the insulation between ① and ② terminals with the multi-circuit tester. Then apply 12 V to terminals ③ and ④ (⊕ to ③ and ⊖ to ④) and check the continuity between ① and ②. If there is no continuity, replace the reversing light relay with a new one.

-  **09900-25008: Multi-circuit tester set**



SWITCHES

Inspect each switch for continuity with a multi-circuit tester. If any abnormality is found, replace the respective switch assemblies with new ones.

 **09900-25008: Multi-circuit tester set**

IGNITION SWITCH

Position \ Color	Gr	R	O	B/Y	B/W
	○	○	○		
ON		○	○		
OFF				○	○

REAR BRAKE SWITCH

Position \ Color	O	W/B
ON	○	○
OFF		

DIMMER SWITCH

Position \ Color	Y	W	Gr
HI	○		○
LO		○	○

PARKING BRAKE SWITCH

Position \ Color	W	Bl
ON	○	○
OFF		

ENGINE STOP SWITCH

Position \ Color	O	O/W
"O" (RUN)	○	○
"X" (OFF)		

HORN BUTTON (For E-17,E-24)

Position \ Color	G	B/W
•		
PUSH	○	○

STARTER BUTTON

Position \ Color	O/W	Y/G
•		
PUSH	○	○

EMERGENCY SWITCH (For E-17)

Position \ Color	O	O/G
SET	○	○
SECEDE		

OVER RIDE SWITCH

Position \ Color	B/W	Bl/B
•		
PUSH	○	○

GEAR POSITION SWITCH

Position \ Color	W	B/W	Bl	G	R
H	○	○			
L		○		○	
N		○	○		
R		○			○

4WD/DIFF-LOCK SWITCH

Position \ Color	Bl/R	O	B	W	Br	B/R	B/Y	B/W
2WD	○	○			○			
4WD	○	○	○	○				
Diff-lock			○	○	○	○	○	○

BRAKE LEVER SWITCH (R)

Position \ Color	B	B
ON	○	○
OFF		

BRAKE LEVER SWITCH (L)

Position \ Color	B	B
ON	○	○
OFF		

WIRE COLOR

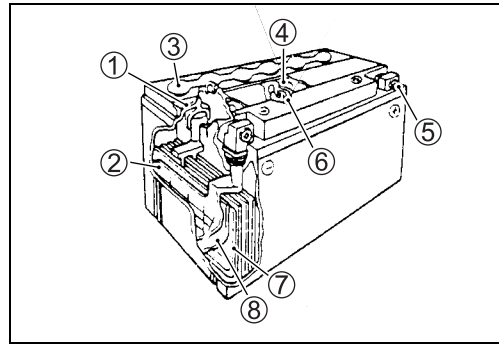
B : Black	B/W : Black with White tracer
Bl : Blue	B/R : Black with Red tracer
Br : Brown	B/Y : Black with Yellow tracer
G : Green	Bl/B : Blue with Black tracer
Gr : Gray	Bl/R : Blue with Red tracer
O : Orange	O/W : Orange with White tracer
R : Red	O/G : Orange with Green tracer
W : White	W/B : White with Black tracer
Y : Yellow	Y/G : Yellow with Green tracer

BATTERY

SPECIFICATIONS

Type designation	YTX14-BS
Capacity	12 V, 43.2 kC (12 Ah)/10 HR

- | | |
|------------------------|--------------------------------|
| ① Upper cover breather | ⑤ Terminal |
| ② Cathode plates | ⑥ Safety valve |
| ③ Stopper | ⑦ Anode plates |
| ④ Filter | ⑧ Separator (Fiberglass plate) |



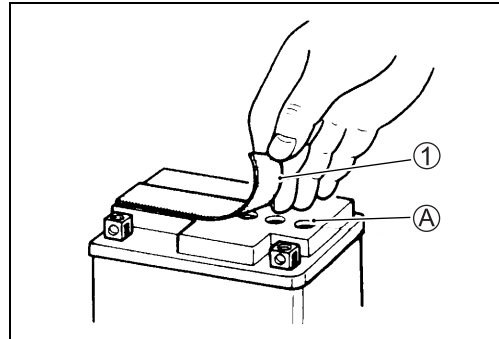
INITIAL CHARGING

Filling electrolyte

- Remove the aluminum tape ① sealing the battery electrolyte filler holes A.

NOTE:

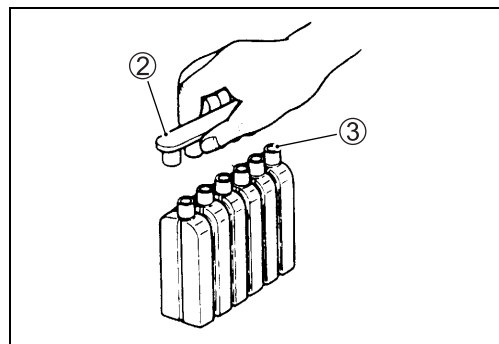
When filling electrolyte, the battery must be removed from the vehicle and must be put on the level ground.



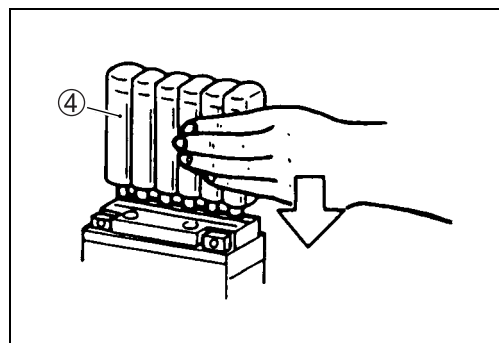
- Remove the caps ②.

NOTE:

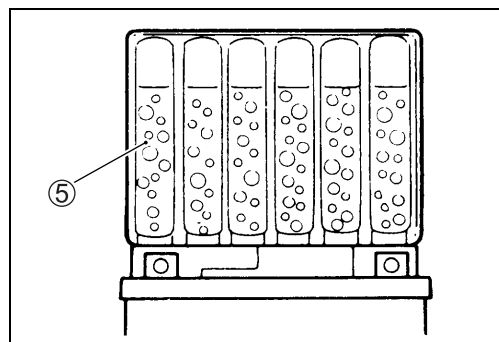
- * After filling the electrolyte completely, use the removed cap ② as sealing caps of battery-filler holes.
- * Do not remove or pierce the sealed areas ③ of the electrolyte container.



- Insert the nozzles of the electrolyte container ④ into the battery's electrolyte filler holes, holding the container firmly so that it does not fall. Take precaution not to allow any of the fluid to spill.



- Make sure air bubbles ⑤ are coming up in each electrolyte container, and leave in this position for about more than 20 minutes.

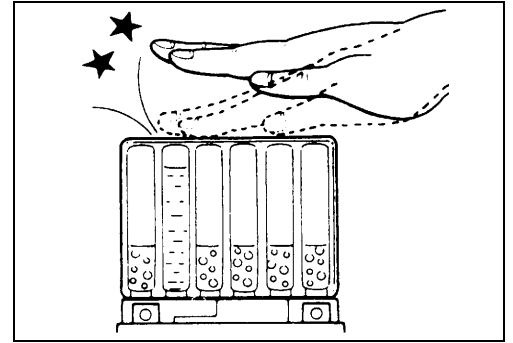


NOTE:

If no air bubbles are coming up from a filler port, tap the bottom of the electrolyte container two or three times.

Never remove the container from the battery.

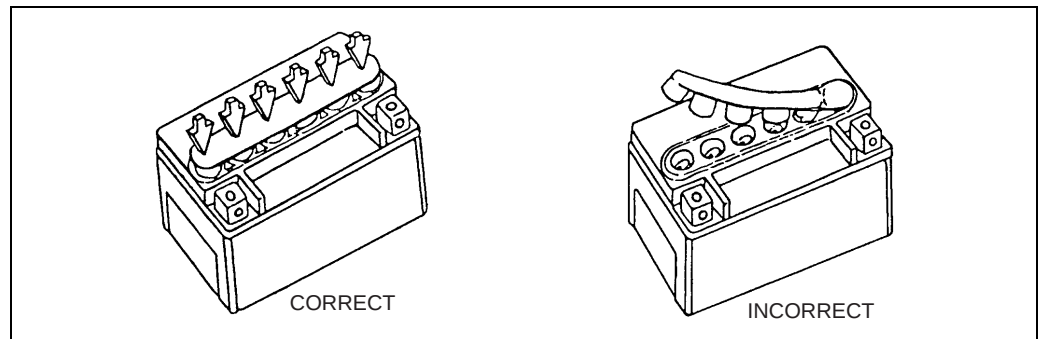
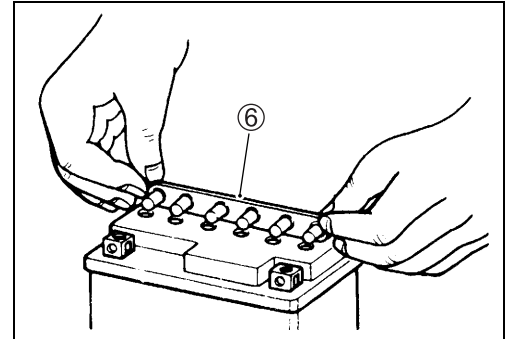
- After confirming that the electrolyte has entered the battery completely, remove the electrolyte containers from the battery. Wait for about 20 minutes.



- Insert the caps ⑥ into the filler holes, pressing in firmly so that the top of the caps do not protrude above the upper surface of the battery's top cover.

CAUTION

- * **Never use anything except the specified battery.**
- * **Once the caps have been installed to the battery, do not remove the caps.**
- * **Do not tap the caps with a tool such as a hammer when installing them.**



For initial charging, use the charger specially designed for MF battery.

CAUTION

- * **For charging the battery, make sure to use the charger specially designed for MF battery. Otherwise, the battery may be overcharged resulting in shortened service life.**
- * **Do not remove the cap during charging.**
- * **Position the battery with the cap facing upward during charging.**

Measure the battery voltage using multi circuit tester. The tester should indicate more than 12.5 – 12.6 V (DC) as shown in the Fig. If the battery voltage is lower than the specification, charge the battery with a battery charger. (Refer to the recharging operation)

CAUTION

Do not remove the caps on the battery to prevent charging.

NOTE:

Initial charging for a new battery is recommended if two years have elapsed since the date of manufacture.

SERVICING

Visually inspect the surface of the battery container. If any signs of cracking or electrolyte leakage from the sides of the battery have occurred, replace the battery with a new one. If the battery terminals are found to be coated with rust or an acidic white powdery substance, clean the battery terminals with sandpaper.

RECHARGING OPERATION

- Using the multi-circuit tester, check the battery voltage. If the voltage reading is 12.0 V (DC) and less, recharge the battery with a battery charger.

Ⓐ Charging period

Ⓑ Stop charging

CAUTION

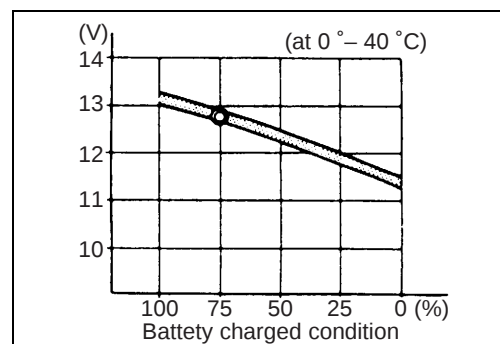
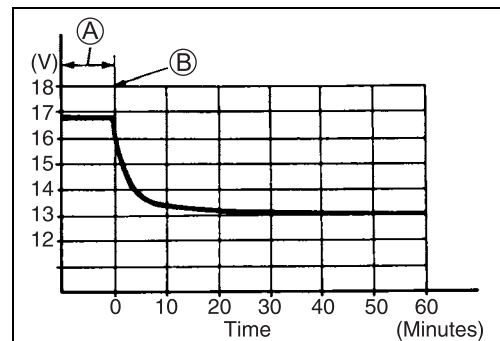
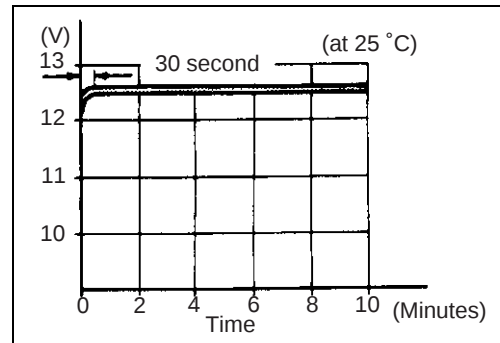
- * When recharging the battery, remove the battery from the vehicle.
- * Do not remove the caps on the battery top while recharging.

Recharging time: 6 A for 1 hour or 1.2 A for 5 to 10 hours

CAUTION

Be careful not to permit the charging current to exceed 9 A at any time.

- After recharging, wait for 30 minutes and more and check the battery voltage with a multi-circuit tester.
- If the battery voltage is 12.5 V and less, recharge the battery again.
- If battery voltage is still 12.5 V and less, after recharging, replace the battery with a new one.
- When the vehicle is not used for a long period (especially during the winter season), check the battery every 1 month to prevent the battery discharge.



SERVICING INFORMATION

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TROUBLESHOOTING

FI SYSTEM MALFUNCTION CODE AND DEFECTIVE CONDITION

DTC No.		DETECTED ITEM	DETECTED FAILURE CONDITION	CHECK FOR
C00		NO FAULT	—————	—————
C12		CKP sensor	The signal does not reach ECM for 3 sec. or more, after receiving the starter signal.	CKP sensor lead wire/coupler and mechanical parts. CKP sensor, lead wire/coupler connection
P0335				
C13		IAP sensor	The sensor should produce following voltage. 0.5 V < sensor voltage ≤ 4.85 V In other than the above value, C13 (P0105) is indicated.	IAP sensor, lead wire/coupler connection.
P0105	H		Sensor voltage is higher than specified value.	IAP sensor circuit open or shorted to VCC or ground circuit open.
	L		Sensor voltage is lower than specified value.	IAP sensor circuit shorted to ground or VCC circuit open.
C14		TP sensor	The sensor should produce following voltage. 0.2 V < sensor voltage ≤ 4.8 V In other than the above value, C14 (P0120) is indicated.	TP sensor, lead wire/coupler connection.
P0120	H		Sensor voltage is higher than specified value.	TP sensor circuit shorted to VCC or ground circuit open.
	L		Sensor voltage is lower than specified value.	TP sensor circuit open or shorted to ground or VCC circuit open.
C15		ECT sensor	The sensor voltage should be the following. 0.15 V < sensor voltage ≤ 4.85 V In other than the above value, C15 (P0115) is indicated.	ECT sensor, lead wire/coupler connection.
P0115	H		Sensor voltage is higher than specified value.	ECT sensor circuit open or ground circuit open.
	L		Sensor voltage is lower than specified value.	ECT sensor circuit shorted to ground.
C20		Diff-lock relay	No voltage is applied to 4WD/diff-lock actuator, although ignition switch is turned ON, or voltage is applied to 4WD/diff-lock actuator, although ignition switch is turned OFF. In this case, the code C20 (P1752) is indicated.	Diff-lock relay circuit open or shorted to ground.
P1752				

DTC No.		DETECTED ITEM	DETECTED FAILURE CONDITION	CHECK FOR
C21		IAT sensor	The sensor voltage should be the following. 0.15 V < sensor voltage ≤ 4.85 V In other than the above value, C21 (P0110) is indicated.	IAT sensor, lead wire/coupler connection.
P0110	H		Sensor voltage is higher than specified value.	IAT sensor circuit open or ground circuit open.
	L		Sensor voltage is lower than specified value.	IAT sensor circuit shorted to ground.
C23		TO sensor	The sensor voltage should be the following for 2 sec. and more, after ignition switch is turned ON. 0.2 V < sensor voltage ≤ 4.8 V In other than the above value, C23 (P1651) is indicated.	TO sensor, lead wire/coupler connection.
P1651	H		Sensor voltage is higher than specified value.	TO sensor circuit shorted to VCC or ground circuit open.
	L		Sensor voltage is lower than specified value.	TO sensor circuit open or shorted to ground or VCC circuit open.
C24		Ignition signal	CKP sensor (pick-up coil) signal is produced, but signal from ignition coil is interrupted 8 times or more continuously. In this case, the code C24 (P0351) is indicated.	Ignition coil, lead wire/coupler connection, power supply from the battery.
P0351				
C32		Fuel injector	CKP sensor (pick-up coil) signal is produced, but fuel injector signal is interrupted 4 times or more continuously. In this case, the code C32 (P0201) is indicated.	Fuel injector, lead wire/coupler connection, power supply to the injector.
P0201				
C41		Fuel pump relay	No voltage is applied to the fuel pump, although fuel pump relay is turned ON, or voltage is applied to fuel pump, although fuel pump relay is turned OFF. In this case, the code C41 (P0230) is indicated.	Fuel pump relay, lead wire/coupler connection, power source to the fuel pump relay and fuel injector.
P0230	H		More than 8 V is applied to the injector and fuel pump relay is turned OFF.	Fuel pump relay switch circuit shorted to power source Fuel pump relay (switch side)
	L		Less than 0.3 V is applied to the injector and fuel pump relay is turned ON.	Fuel pimp relay circuit open or short Fuel pump relay (coil side).

ENGINE

Complaint	Symptom and possible causes	Remedy
Engine will not start or is hard to start.	Compression too low	
	1. Valve clearance out of adjustment	Adjust.
	2. Worn valve guides or poor seating of valves	Repair or replace.
	3. Mistiming valves	Adjust.
	4. Excessively worn piston rings	Replace.
	5. Worn-down cylinder bore	Replace.
	6. Too slowly starter motor cranks	See electrical section.
	7. Poor seating of spark plug	Retighten.
	8. Broken, cracked or damaged piston	Replace.
	Plug not sparking	
	1. Fouled spark plug	Clean.
	2. Wet spark plug	Clean and dry.
	3. Defective ignition coil	Replace.
	4. Defective CKP sensor	Replace.
	5. Defective ECM	Replace.
	6. Open-circuited wiring connections	Repair or replace.
	No fuel reaching the intake manifold	
	1. Clogged fuel mesh filter or fuel feed hose	Clean or replace.
	2. Defective fuel pump	Replace.
	3. Defective fuel pressure regulator	Replace.
	4. Defective fuel injector	Replace.
	5. Defective fuel pump relay	Replace.
	6. Defective ECM	Replace.
	7. Open-circuited wiring connections	Check and repair.
	Incorrect fuel/air mixture	
	1. Defective fuel pump	Replace.
	2. Defective fuel pressure regulator	Replace.
	3. Defective TP sensor	Replace.
	4. Defective CKP sensor	Replace.
	5. Defective IAP sensor	Replace.
	6. Defective ECM	Replace.
	7. Defective ECT sensor	Replace.
	8. Defective IAT sensor	Replace.

Complaint	Symptom and possible causes	Remedy
Engine idles poorly.	1. Valve clearance out of adjustment 2. Poor seating of valves 3. Defective valve guides 4. Worn down camshaft 5. Too wide spark plug gap 6. Defective ignition coil/plug cap 7. Defective CKP sensor 8. Defective ECM 9. Defective TP sensor 10. Defective fuel pump	Adjust. Replace or repair. Replace. Replace. Adjust or replace. Replace. Replace. Replace. Replace. Replace.
Engine stalls often.	Incorrect fuel/air mixture 1. Defective IAP sensor or circuit 2. Clogged fuel mesh filter 3. Defective fuel pump 4. Defective fuel pressure regulator 5. Defective ECT sensor 6. Defective thermostat 7. Defective IAT sensor Fuel injector improperly operating 1. Defective fuel injector 2. No injection signal from ECM 3. Open or short circuited wiring connection 4. Defective battery or low battery voltage Control circuit or sensor improperly operating 1. Defective ECM 2. Defective fuel pressure regulator 3. Defective TP sensor 4. Defective IAT sensor 5. Defective CKP sensor 6. Defective ECT sensor 7. Defective fuel pump relay Engine internal parts improperly operating 1. Fouled spark plug 2. Defective CKP sensor or ECM 3. Clogged fuel feed hose 4. Out of adjustment valve clearance	Repair or replace. Clean or replace. Replace. Replace. Replace. Replace. Replace. Replace. Repair or replace. Repair or replace. Replace or recharge. Replace. Replace. Replace. Replace. Replace. Replace. Replace. Clean. Replace. Clean. Adjust.

Complaint	Symptom and possible causes	Remedy
Noisy engine	Excessive valve chatter 1. Too large valve clearance 2. Weakened or broken valve springs 3. Worn rocker arm and rocker arm shaft 4. Worn and burnt camshaft journal	Adjust. Replace. Replace. Replace.
	Noise seems to come from piston 1. Worn down piston or cylinder 2. Carbon combustion chamber fouled with carbon 3. Worn piston pins or piston pin bore 4. Worn piston rings or ring grooves	Replace. Clean. Replace. Replace.
	Noise seems to come from cam chain 1. Stretched chain 2. Worn sprockets 3. Tension adjuster not working	Replace. Replace. Repair or replace.
	Noise seems to come from crankshaft 1. Rattling bearings due to wear 2. Worn and burnt big-end bearings 3. Worn and burnt journal bearings 4. Too large thrust clearance	Replace. Replace. Replace. Replace crankshaft or con-rod.
	Noise seems to come from water pump 1. Too much play on pump shaft bearing 2. Worn or damaged impeller shaft 3. Worn or damaged mechanical seal 4. Contact between pump case and impeller	Replace. Replace. Replace. Replace.
	Noise seem to came from the movable drive and driven face 1. Worn or slipping drive belt 2. Worn rollers in movable drive face	Replace. Replace.
	Noise seem to came from the transfer 1. Worn or rubbing gear 2. Worn transfer input/output shaft 3. Worn bearing 4. Worn splines	Replace. Replace shaft. Replace. Replace.
	Noise seems to came from front/rear output shaft bevel gear, front drive (differential) bevel gear and rear drive bevel gear 1. Worn or damage drive and driven bevel gears 2. Excessive backlash 3. Improper tooth contact 4. Damage bearing 5. Worn or rubbing gears 6. Worn output shaft spline 7. Too large front drive gear thrust clearance 8. Too large rear drive gear thrust clearance	Replace. Adjust. Adjust. Replace. Replace. Replace output shaft. Adjust or replace. Adjust or replace.

Complaint	Symptom and possible causes	Remedy
Engine runs poorly in high speed range.	Defective engine internal/electrical parts	
	1. Weakened valve springs	Replace.
	2. Worn camshaft	Replace.
	3. Valve timing out of adjustment	Adjust.
	4. Too narrow spark plug gap	Adjust.
	5. Ignition not advanced sufficiently due to poorly working timing advance circuit	Replace ECM.
	6. Defective ignition coil	Replace.
	7. Defective CKP sensor	Replace.
	8. Defective ECM	Replace.
	9. Clogged air cleaner element	Clean.
	10. Clogged fuel feed hose, resulting in inadequate fuel supply to injector	Clean and prime.
	11. Defective fuel pump	Replace.
	12. Defective TP sensor	Replace.
	Defective air flow system	
	1. Clogged air cleaner element	Replace.
	2. Sucking air from throttle body joint	Repair or replace.
	3. Defective ECM	Replace.
	Defective control circuit or sensor	
	1. Low fuel pressure	Repair or replace.
	2. Defective TP sensor	Replace.
	3. Defective IAT sensor	Replace.
	4. Defective CKP sensor	Replace.
	5. Defective IAP sensor	Replace.
	6. Defective ECM	Replace.

Complaint	Symptom and possible causes	Remedy
Engine lacks power.	Defective engine internal/electrical parts	
	1. Loss of valve clearance	Adjust.
	2. Weakened valve springs	Replace.
	3. Valve timing out of adjustment	Adjust.
	4. Worn piston rings or cylinder	Replace.
	5. Poor seating of valves	Repair.
	6. Fouled spark plug	Clean or replace.
	7. Incorrect spark plug	Adjust or replace.
	8. Clogged fuel injector	Replace.
	9. TP sensor out of adjustment	Adjust.
	10. Clogged air cleaner element	Replace.
	11. Sucking air from throttle valve	Retighten or replace.
	12. Too much engine oil	Drain out excess oil.
	13. Defective fuel pump or ECM	Replace.
	14. Defective CKP sensor and ignition coil	Replace.
	Defective control circuit or sensor	
	1. Low fuel pressure	Repair or replace.
	2. Defective TP sensor	Replace.
	3. Defective IAT sensor	Replace.
	4. Defective CKP sensor	Replace.
	5. Defective IAP sensor	Replace.
	6. Defective ECM	Replace.

Complaint	Symptom and possible causes	Remedy
Engine overheats	Defective engine internal parts 1. Heavy carbon deposit on piston crowns 2. Not enough oil in the engine 3. Defective oil pump or clogged oil circuit 4. Sucking air from intake pipe 5. Use incorrect engine oil 6. Defective cooling system Lean fuel/air mixture 1. Short-circuited IAP sensor/lead wire 2. Short-circuited IAT sensor/lead wire 3. Defective fuel injector 4. Defective ECT sensor Other factors 1. Ignition timing is too advanced due to defective timing advance system (ECT sensor, CKP sensor and ECM).	Clean. Add oil. Replace or clean. Retighten or replace. Change. See radiator section. Repair or replace. Repair or replace. Replace. Replace. Replace.
Dirty or heavy exhaust smoke	1. Too much engine oil in the engine 2. Worn piston rings or cylinder 3. Worn valve guides 4. Scored or scuffed cylinder wall 5. Worn valves stems 6. Defective stem seal 7. Worn oil ring side rails	Check engine oil level, drain out excess oil. Replace. Replace. Replace. Replace. Replace. Replace.

DRIVE TRAIN

Complaint	Symptom and possible causes	Remedy
Power will not transmit from the engine	To the rear wheel	
	1. Broken drive and driven bevel gear teeth.	Replace.
	2. Broken rear output shaft.	Replace.
	3. Worn or broken rear drive shaft serration.	Replace.
	4. Worn or damaged coupling joint serration.	Replace.
	5. Broken or damaged rear drive and driven bevel gears.	Replace.
	6. Worn or damage universal joint.	Replace.
	To the front wheel	
	1. Broken drive and driven bevel gear teeth.	Replace.
	2. Worn or broken propeller shaft serration.	Replace.
	3. Broken or damaged front drive (differential) gear or pinion.	Replace.
	4. Improperly operated front differential shifting motor.	Repair or replace.
	5. Worn or damaged shifting sleeve, shaft and fork of the 2WD/4WD and diff-lock shifting.	Replace.
	6. Worn or damaged universal joint.	Replace.
	7. Worn or damaged front drive shaft or universal joint serration.	Replace.
	Transfer will not shift back	
	1. Broken return spring on shift shaft.	Replace.
	2. Rubbing or sticky shift shaft.	Repair or replace.
	3. Distorted or worn gearshift forks.	Replace.
	Transfer jumps out of gear	
	1. Worn shifting gears on driveshaft or countershaft.	Replace.
	2. Distorted or worn gearshift forks.	Replace.
	3. Weakened stopper spring on gearshift stopper.	Replace.
	4. Worn gearshift cam plate.	Replace.

RADIATOR (COOLING SYSTEM)

Complaint	Symptom and possible causes	Remedy
Engine overheats	1. Not enough engine coolant 2. Radiator core clogged with dirt or scale 3. Faulty cooling fan 4. Defective cooling fan thermo-switch 5. Clogged water passage 6. Air trapped in the cooling circuit 7. Defective water pump 8. Use incorrect coolant 9. Defective thermostat	Add coolant. Clean. Repair or replace. Replace. Clean. Bleed air. Replace. Replace. Replace.
Engine overcools	1. Defective cooling fan thermo-switch 2. Extremely cold weather 3. Defective thermostat	Replace. Put on the radiator cover. Replace.

CHASSIS

Complaint	Symptom and possible causes	Remedy
Handling is too heavy or stiff.	1. Improper front wheel alignment 2. Insufficiently lubricated 3. Low air pressure in front tires 4. Tie rod ends tending to seize 5. Linkage connections tending to seize 6. Distorted steering shaft	Adjust. Lubricate. Adjust. Replace. Repair or replace. Replace.
Steering wobbles.	1. Unequally inflated tires 2. Loose front wheel hub nuts 3. Damaged or worn front wheel hub bearings 4. Worn or loose tie rod ends 5. Defective or incorrect front tires 6. Damaged or worn wishbone arms and related bushes 7. Distorted front wheels 8. Loose chassis nuts and bolts.	Regulate. Tighten. Replace. Replace or tighten. Replace. Replace. Replace. Tighten.
Steering pulls to one side.	1. Unequally inflated tires 2. Improper front wheel alignment 3. Worn front wheel hub bearings 4. Distorted frame or wishbone arms 5. Defective shock absorber	Regulate. Adjust. Replace. Repair or replace. Replace.
Shocks felt in the steering.	1. High tire pressure 2. Worn steering linkage connections 3. Loose suspension system bolts	Regulate. Replace. Tighten.

Complaint	Symptom and possible causes	Remedy
Tires rapidly or unevenly wear.	1. Worn or loose front wheel hub bearings 2. Improper front wheel alignment	Replace. Adjust.
Steering too noisy.	1. Loose nuts and bolts 2. Damaged or worn front wheel hub bearings 3. Insufficiently lubricated	Tighten. Replace. Lubricate.
Front suspension too soft.	1. Weakened spring of shock absorber 2. Leakage oil of shock absorber 3. Improperly set front shock absorber	Replace. Replace. Adjust.
Front suspension too stiff.	1. Worn upper or lower wishbone arms and related bushes 2. Bent shock absorber rod 3. Improperly set front shock absorber	Tighten. Replace. Adjust.
Front wheels wobble.	1. Distorted front wheel rims 2. Damage or worn front wheel hub bearings 3. Defective or incorrect front tires 4. Loose front wheel hub nuts 5. Damaged or worn wishbone arms and related bushes 6. Front shock absorber leaks oil 7. Loose chassis nuts and bolts	Replace. Replace. Replace. Tighten. Replace. Replace. Tighten.
Suspension too noisy.	1. Loose suspension system bolts 2. Worn wishbone arms and related bushes	Tighten. Replace.
Rear suspension too soft.	1. Weakened spring of shock absorber 2. Leakage oil of shock absorber 3. Improperly set rear shock absorber	Replace. Replace. Adjust.
Rear suspension too stiff.	1. Worn upper or lower wishbone arms and related bushes 2. Bent shock absorber rod 3. Improperly set rear shock absorber	Tighten. Replace. Adjust.
Rear wheels wobble.	1. Distorted rear wheel rims 2. Damage or worn rear wheel hub bearings 3. Defective or incorrect rear tires 4. Loose rear wheel hub nuts 5. Improper rear brake adjustment 6. Damaged or worn wishbone arm and related bearings 7. Rear shock absorber leaks oil 8. Loose chassis nuts and bolts	Replace. Replace. Replace. Tighten. Adjust. Replace. Replace. Tighten.

BRAKES

Complaint	Symptom and possible causes	Remedy
Insufficient brake power	Front 1. Leakage of brake fluid from hydraulic system 2. Worn pads 3. Oil adhesion of engaging surface of pads/shoe 4. Worn disc 5. Air in hydraulic system 6. Not enough brake fluid in the reservoir Rear 1. Improper parking brake adjustment	Repair or replace. Replace. Clean disc and pads. Replace. Bleed air. Replenish. Adjust.
Brake squeaking	1. Carbon adhesion on pad surface 2. Tilted pad 3. Damage wheel hub bearings 4. Worn pads 5. Foreign material in brake fluid 6. Clogged return port of master cylinder	Repair surface with sand-paper. Correct pad fitting or replace. Replace. Replace. Replace brake fluid. Disassemble and clean master cylinder.
Excessive brake lever stroke	1. Air in hydraulic system 2. Insufficient brake fluid 3. Improper quality of brake fluid	Bleed air. Replenish fluid to specified level; bleed air. Replace with correct fluid.
Leakage of brake fluid	1. Insufficient tightening of connection joints 2. Cracked hose 3. Worn piston and/or cup	Tighten to specified torque. Replace. Replace piston and/or cup.
Brake drags	1. Rusty part 2. Insufficient brake lever or brake pedal pivot lubrication 3. Improper parking brake adjustment	Clean and lubricate. Lubricate. Adjust.
Rear brake slipping	1. Weakened brake spring	Replace.

ELECTRICAL

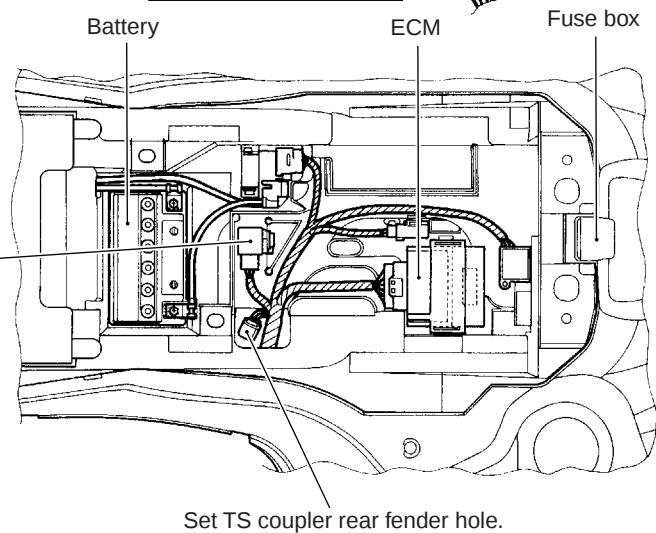
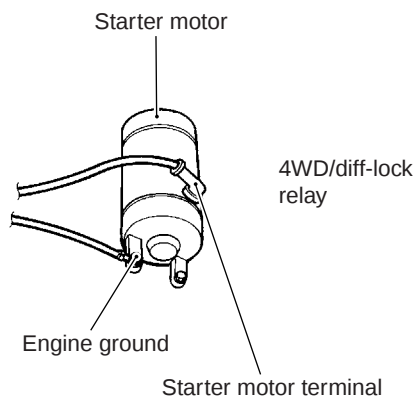
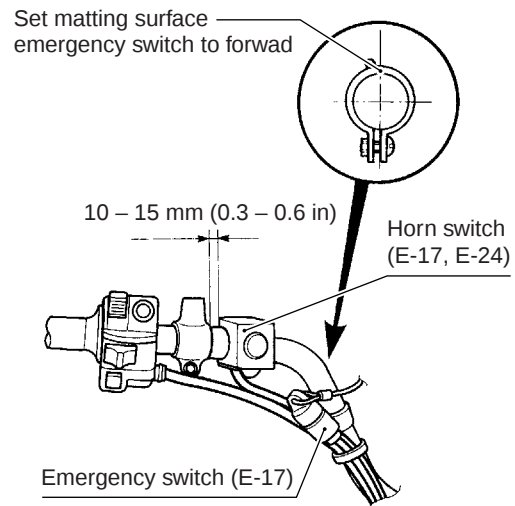
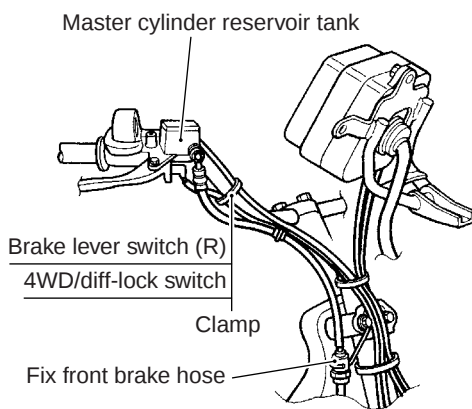
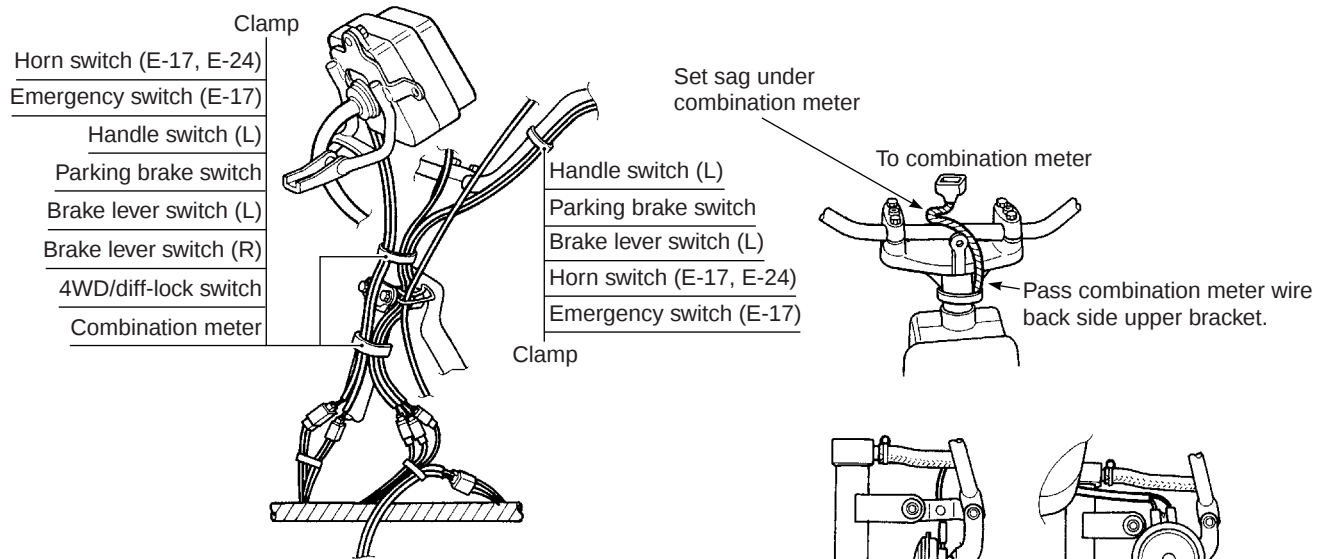
Complaint	Symptom and possible causes	Remedy
No sparking or poor sparking	1. Defective ignition coil 2. Defective spark plug 3. Defective CKP sensor 4. Defective ECM 5. Defective TO sensor 6. Open-circuited wiring connections	Replace. Replace. Replace. Replace. Replace. Check and repair.
Spark plug soon become fouled with carbon.	1. Mixture too rich 2. Incorrect gasoline 3. Dirty air cleaner element 4. Too cold spark plug	Inspect FI system. Change. Replace. Replace with hot type plug.
Spark plug become fouled too soon.	1. Worn piston rings 2. Worn piston or cylinder 3. Excessive clearance of valve stems in valve guides 4. Worn stem oil seal	Replace. Replace. Replace. Replace.
Spark plug electrodes overheat or burn	1. Too hot spark plug 2. Overheated the engine 3. Loose spark plug 4. Too lean mixture	Replace with cold type plug. Tune up. Retighten. Inspect FI system.
Generator does not charge.	1. Open- or short-circuited lead wires, or loose lead connections 2. Short-circuited, grounded or open generator coil 3. Short-circuited or punctured regulator/rectifier	Repair or replace or retighten. Replace. Replace.
Generator does charge, but charging rate is below the specification.	1. Lead wires tend to get shorted or open-circuited or loosely connected at terminals. 2. Grounded or open-circuited generator coil 3. Defective regulator/rectifier 4. Defective cell plates in the battery	Repair or retighten. Replace. Replace. Replace the battery.
Generator over-charges	1. Internal short-circuit in the battery 2. Damaged or defective regulator/rectifier 3. Poorly grounded regulator/rectifier	Replace the battery. Replace. Clean and tighten ground connection.
Unstable charging	1. Lead wire insulation frayed due to vibration, resulting in intermittent short-circuiting. 2. Internally shorted generator 3. Defective regulator/rectifier	Repair or replace. Replace. Replace.
Starter button is not effective.	1. Run down battery 2. Defective switch contacts 3. Brushes not seating properly on starter motor commutator 4. Defective starter relay/neutral relay 5. Defective main fuse/ignition fuse	Repair or replace. Replace. Repair or replace. Replace. Replace.

Complaint	Symptom and possible causes	Remedy
4WD button dose not work	1. Defective 4WD/diff-lock relay 2. Defective 4WD button 3. Open- or short-circuited lead wires, or loose lead connections	Replace. Replace. Repair or replace or retighten.
Diff-lock button dose not work	1. Defective diff-lock relay 2. Defective 4WD/diff-lock relay 3. Open- or short-circuited lead wires, or loose lead connections	Replace. Replace. Repair or replace or retighten.

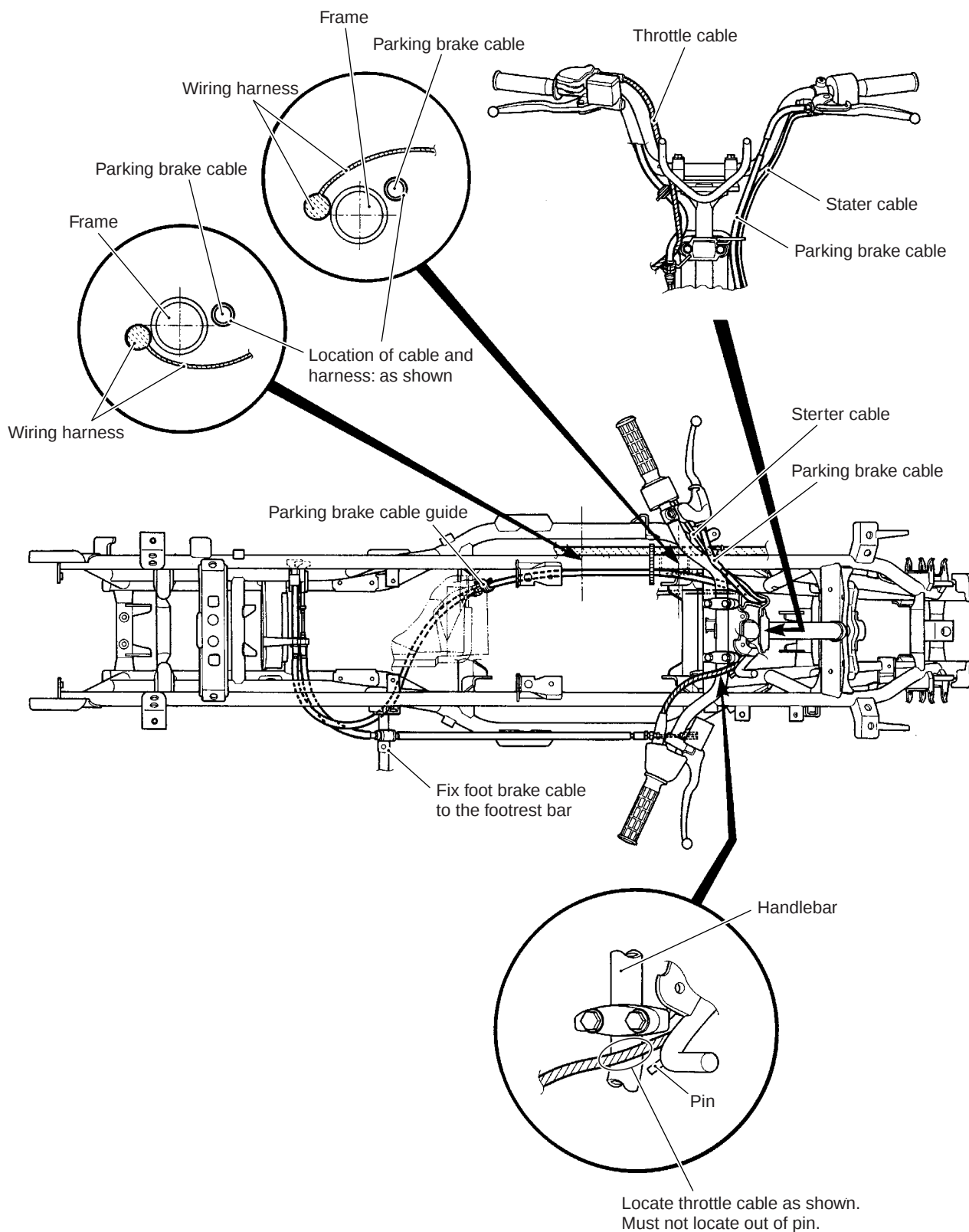
BATTERY

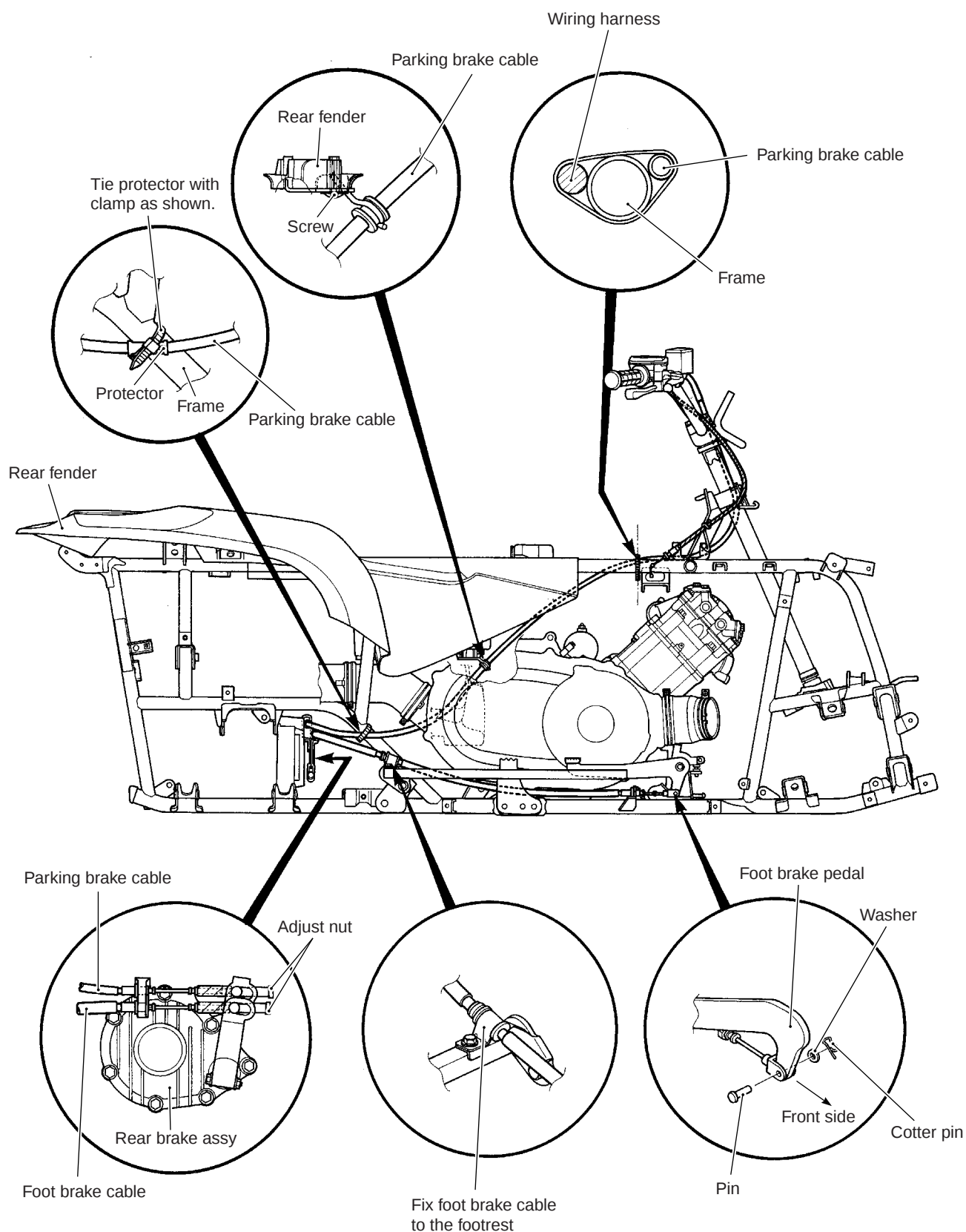
Complaint	Symptom and possible causes	Remedy
“Sulfation”, acidic white powdery substance or spots on surface of cell plates	1. Cracked battery case 2. Battery has been left in a run-down condition for a long time.	Replace the battery. Replace the battery.
Battery runs down quickly.	1. Trouble in the charging system 2. Cell plates have lost much of their active material as a result of overcharging. 3. Internal short-circuit in the battery 4. Too low battery voltage 5. Too old battery	Check the generator, regulator/ rectifier and circuit connections and make necessary adjustments to obtain specified charging operation. Replace the battery and correct the charging system. Replace the battery. Recharge the battery fully. Replace the battery.
Battery “sulfation”	1. Incorrect charging rate (When not in use batteries should be checked at least once a month to avoid sulfation.) 2. The battery was left unused in a cold climate for too long.	Replace the battery. Replace the battery if badly sulfated.
Battery discharged too polarity	1. Dirty container top and sides. 2. Old battery.	Clean. Replace the battery.



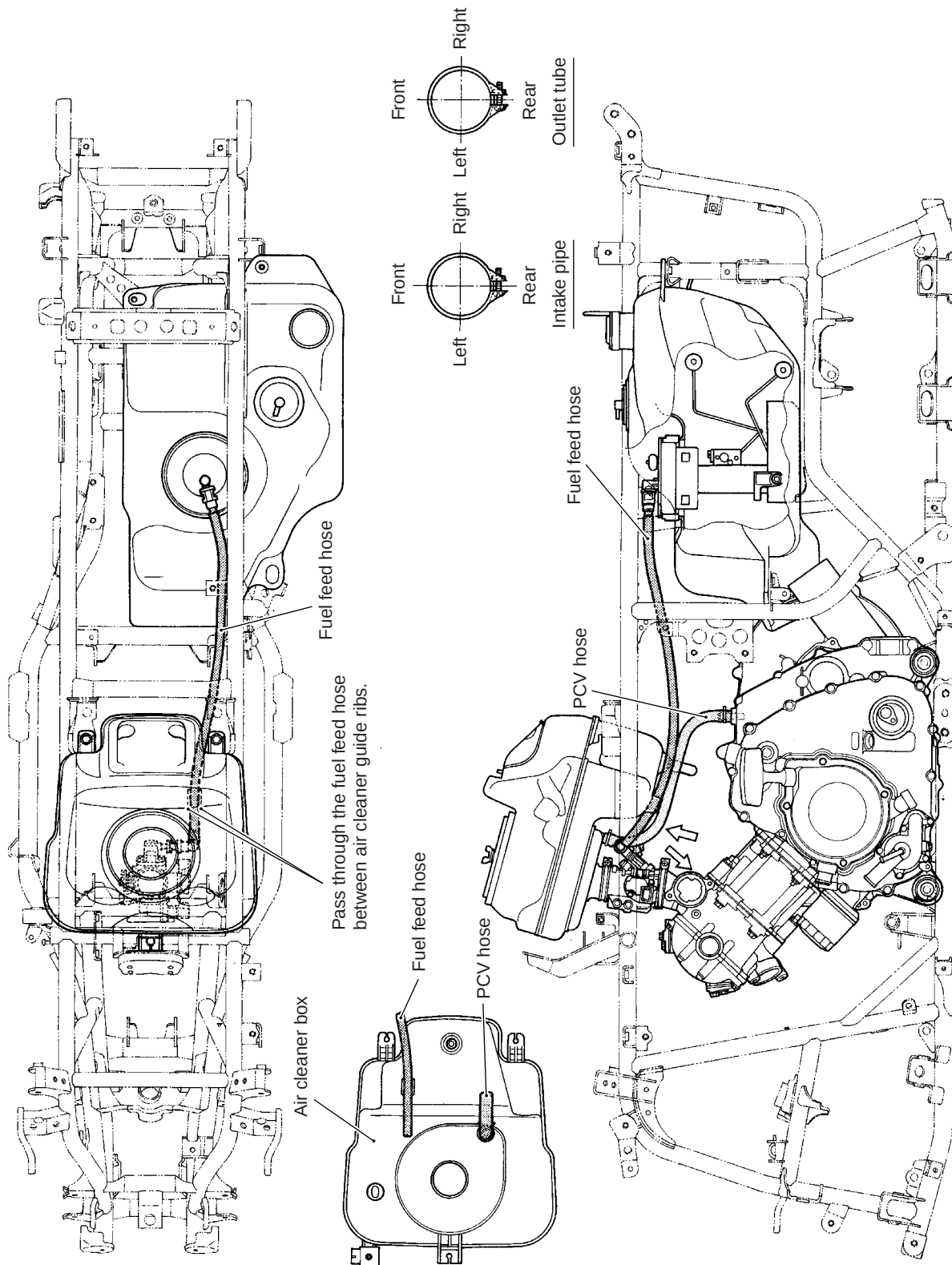


CABLE ROUTING

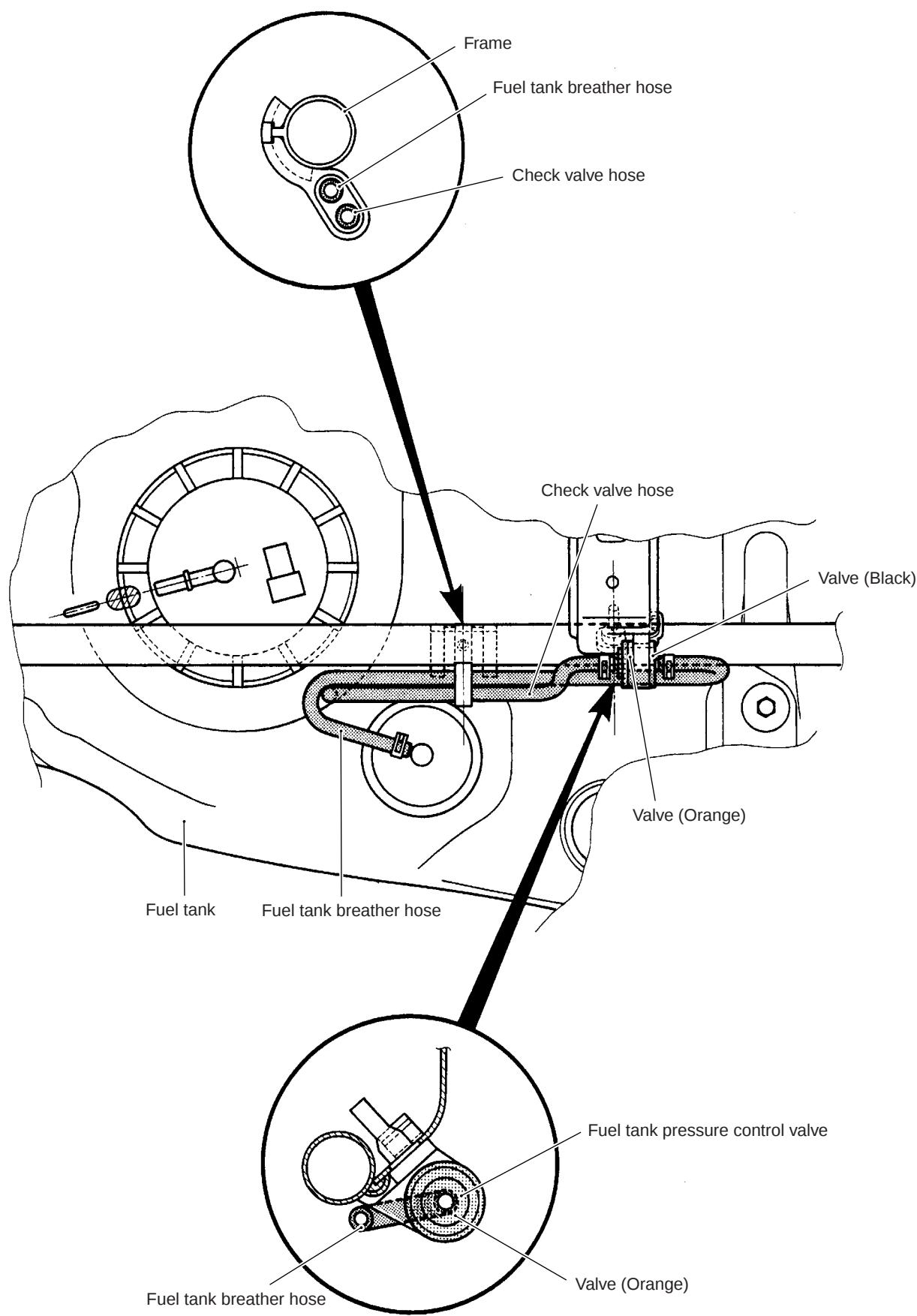




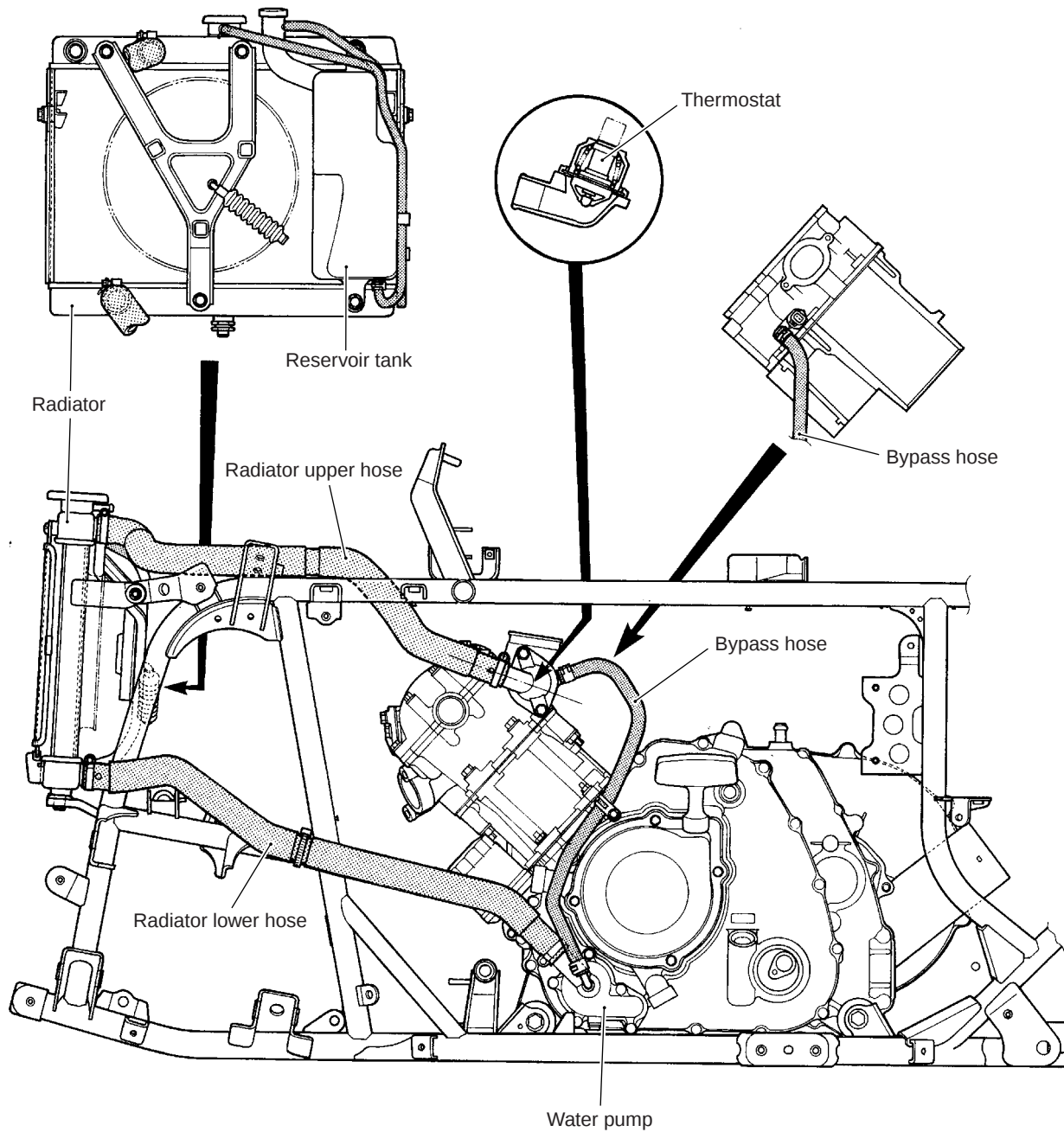
FUEL HOSE ROUTING



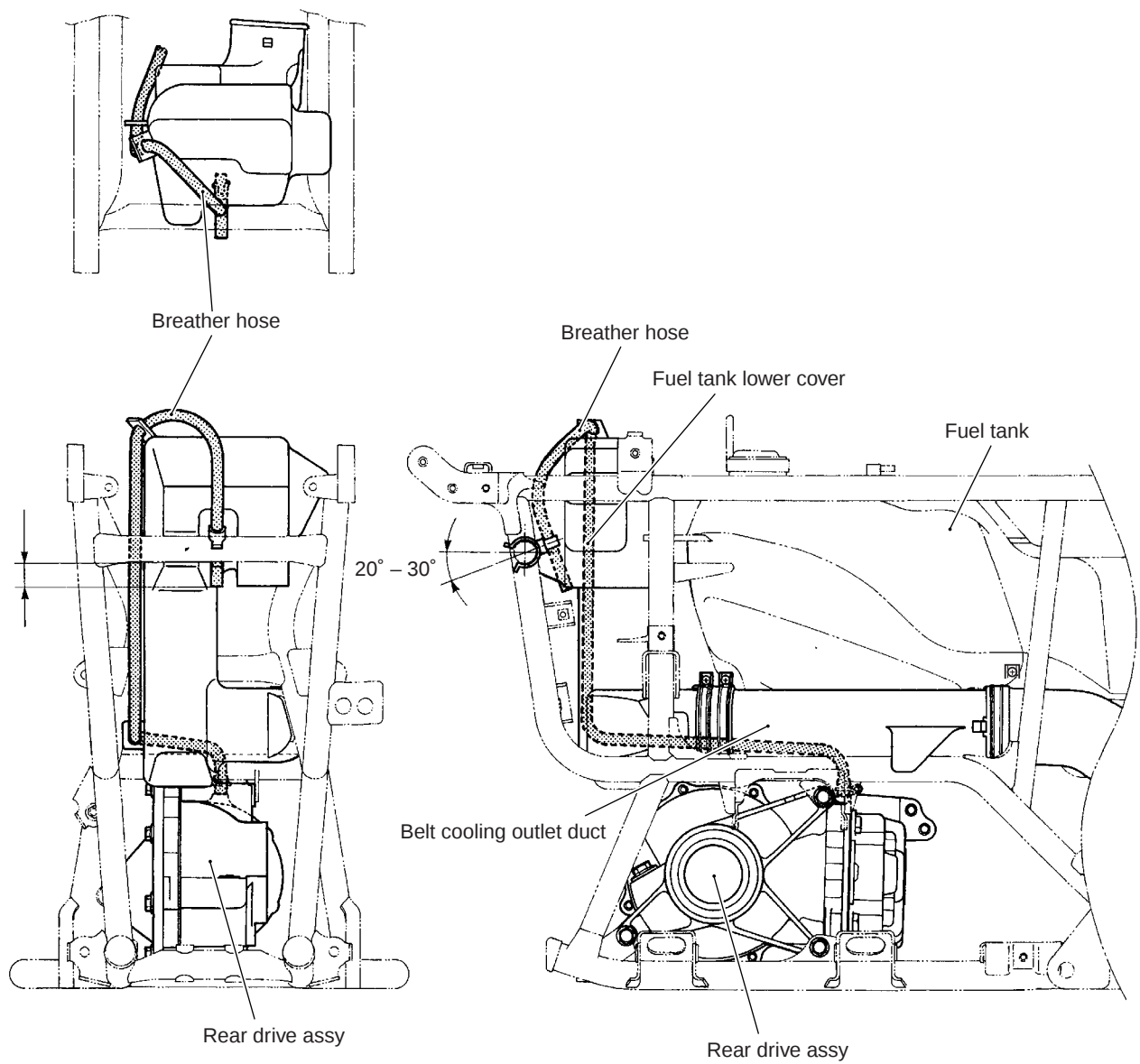
FUEL TANK BREATHER HOSE ROUTING



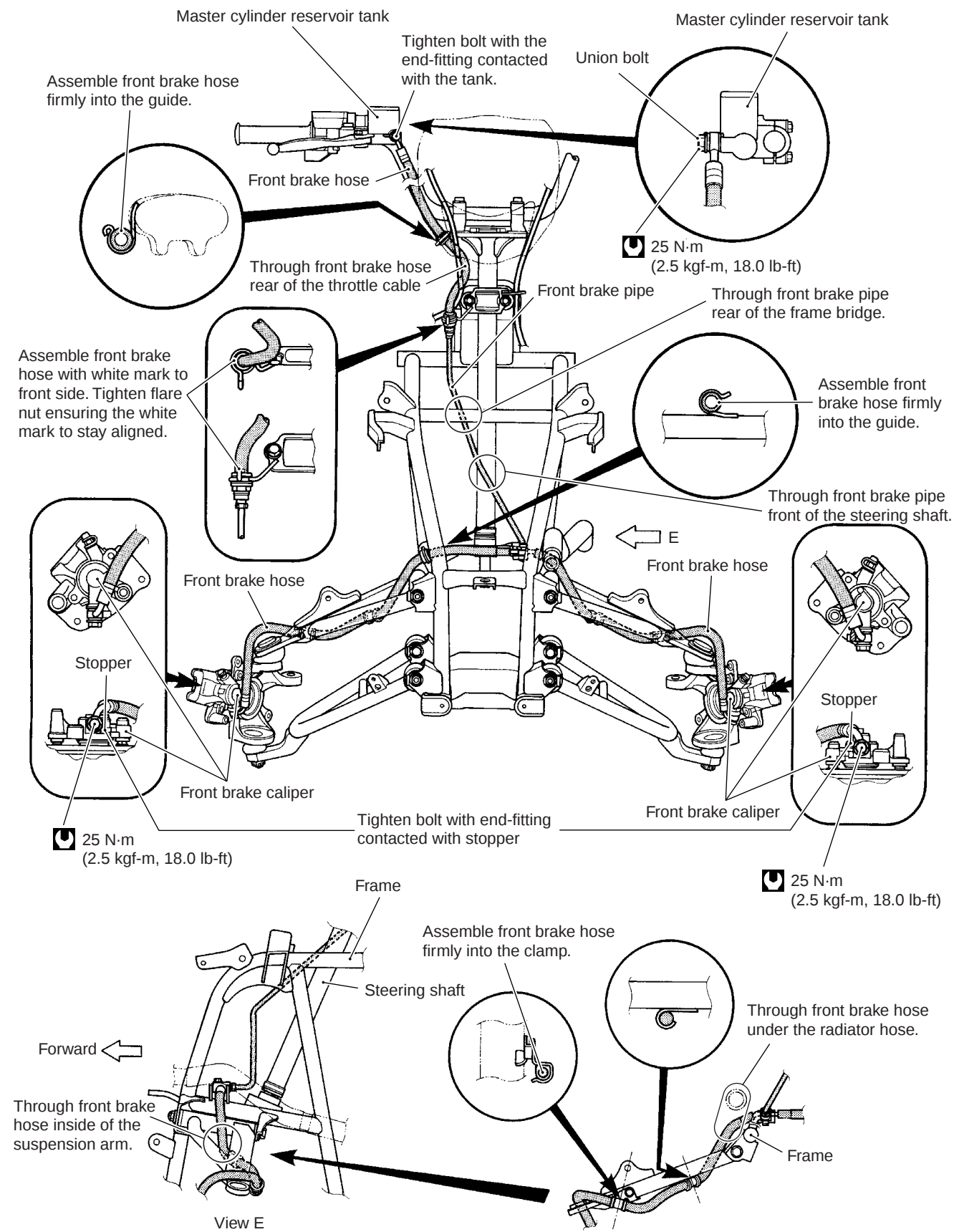
COOLING SYSTEM HOSE ROUTING



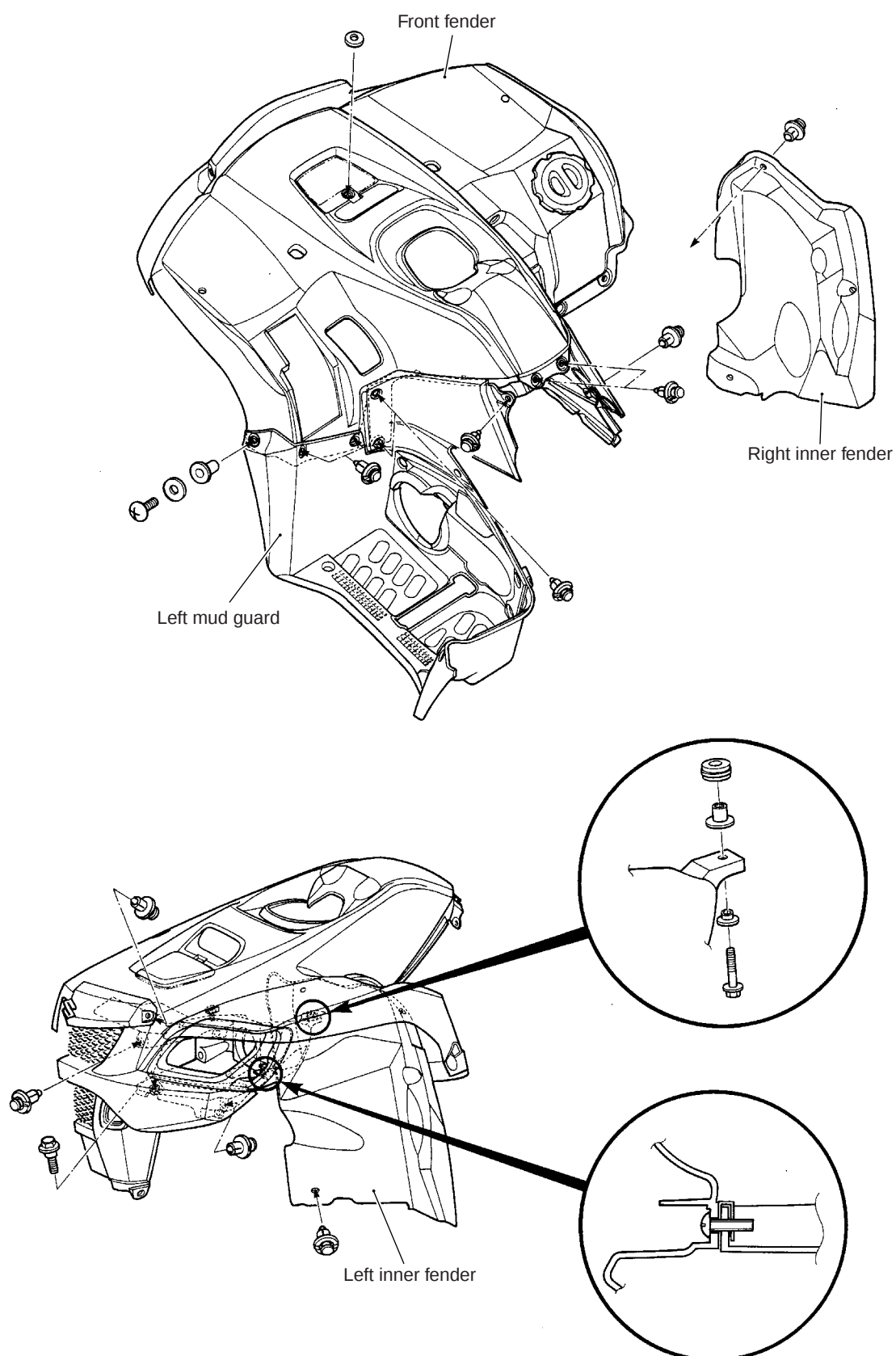
REAR DRIVE BREATHER HOSE ROUTING

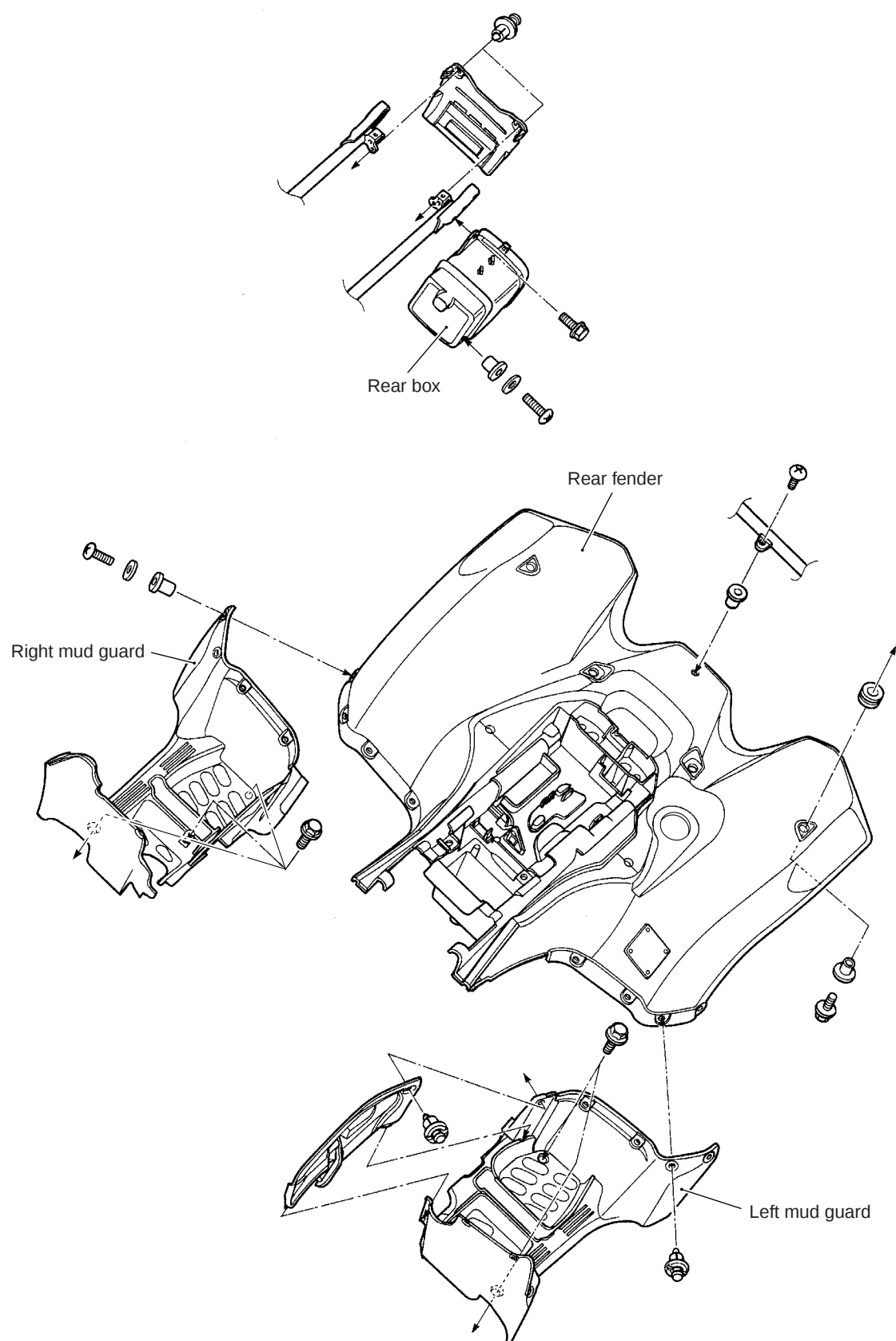


FRONT BRAKE HOSE AND PIPE ROUTING

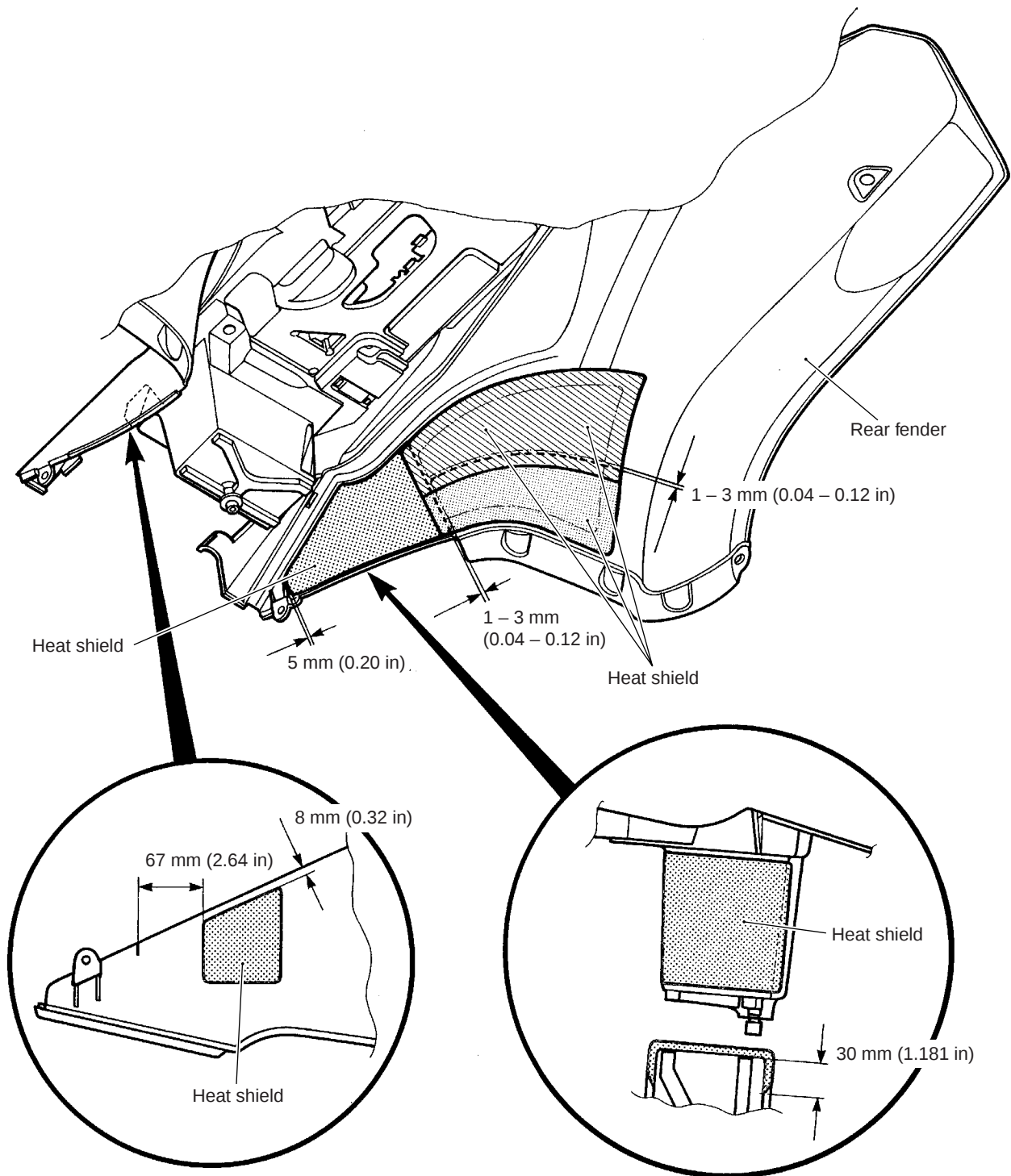


FENDER INSTALLATION

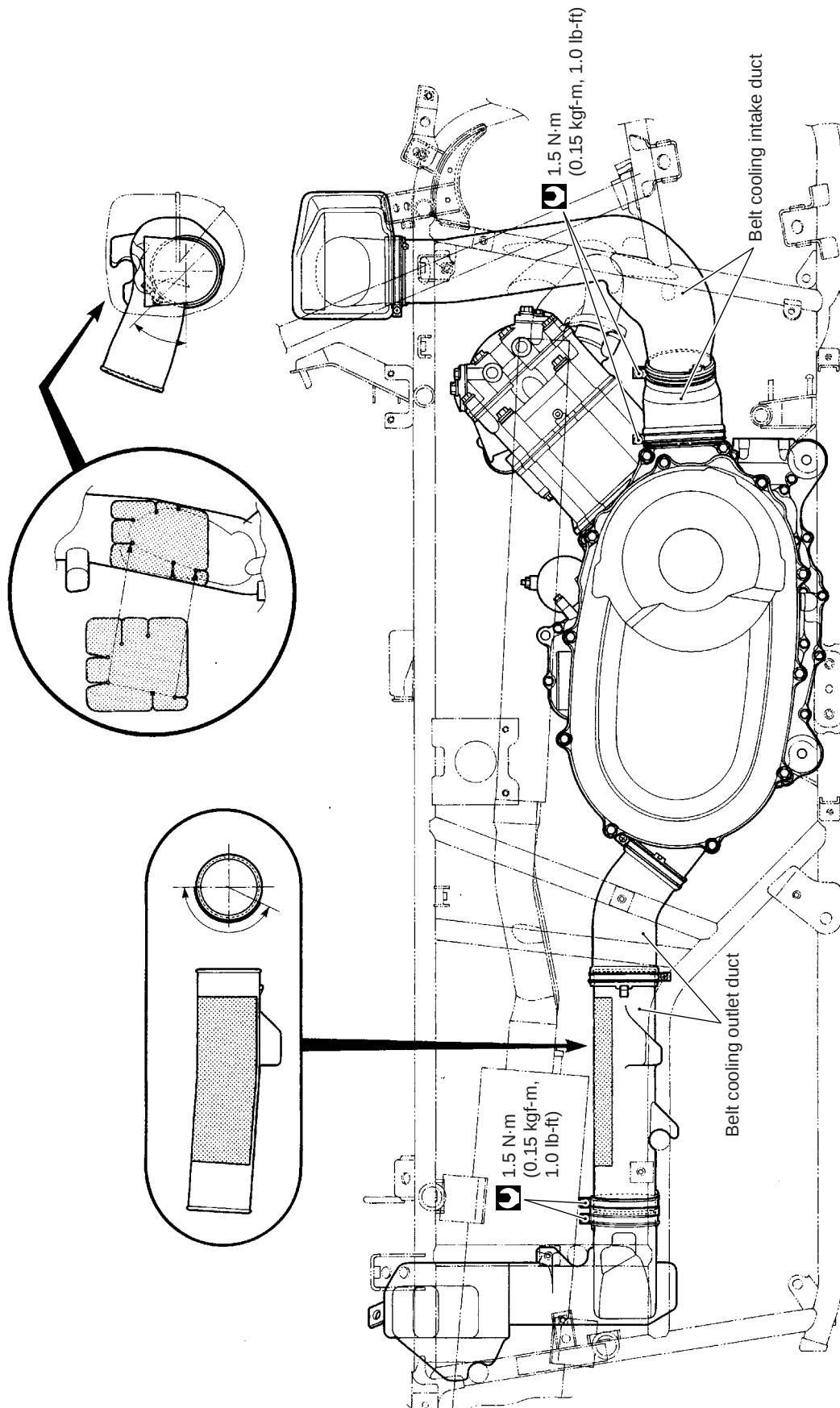




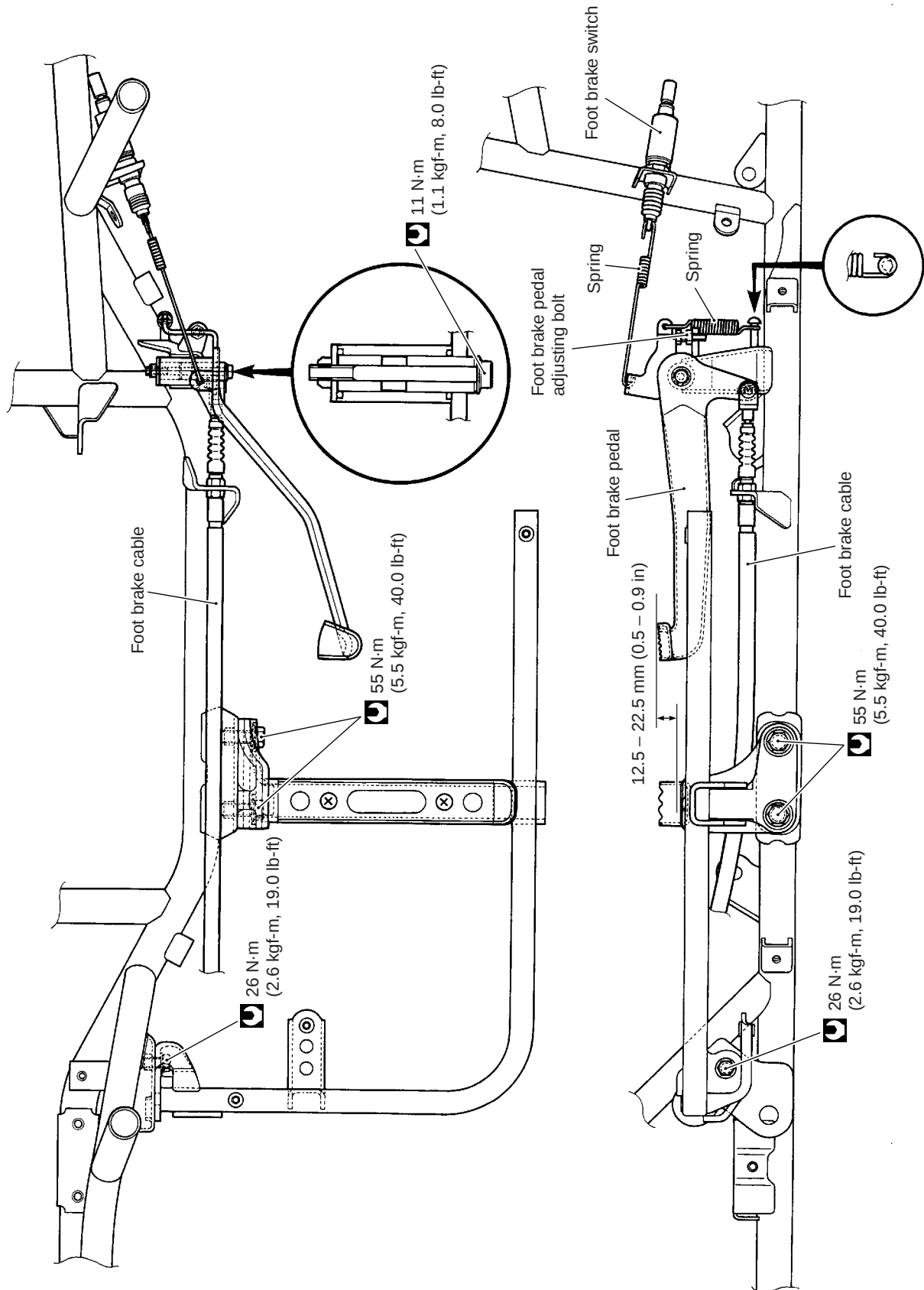
REAR FENDER HEAT SHIELD INSTALLATION



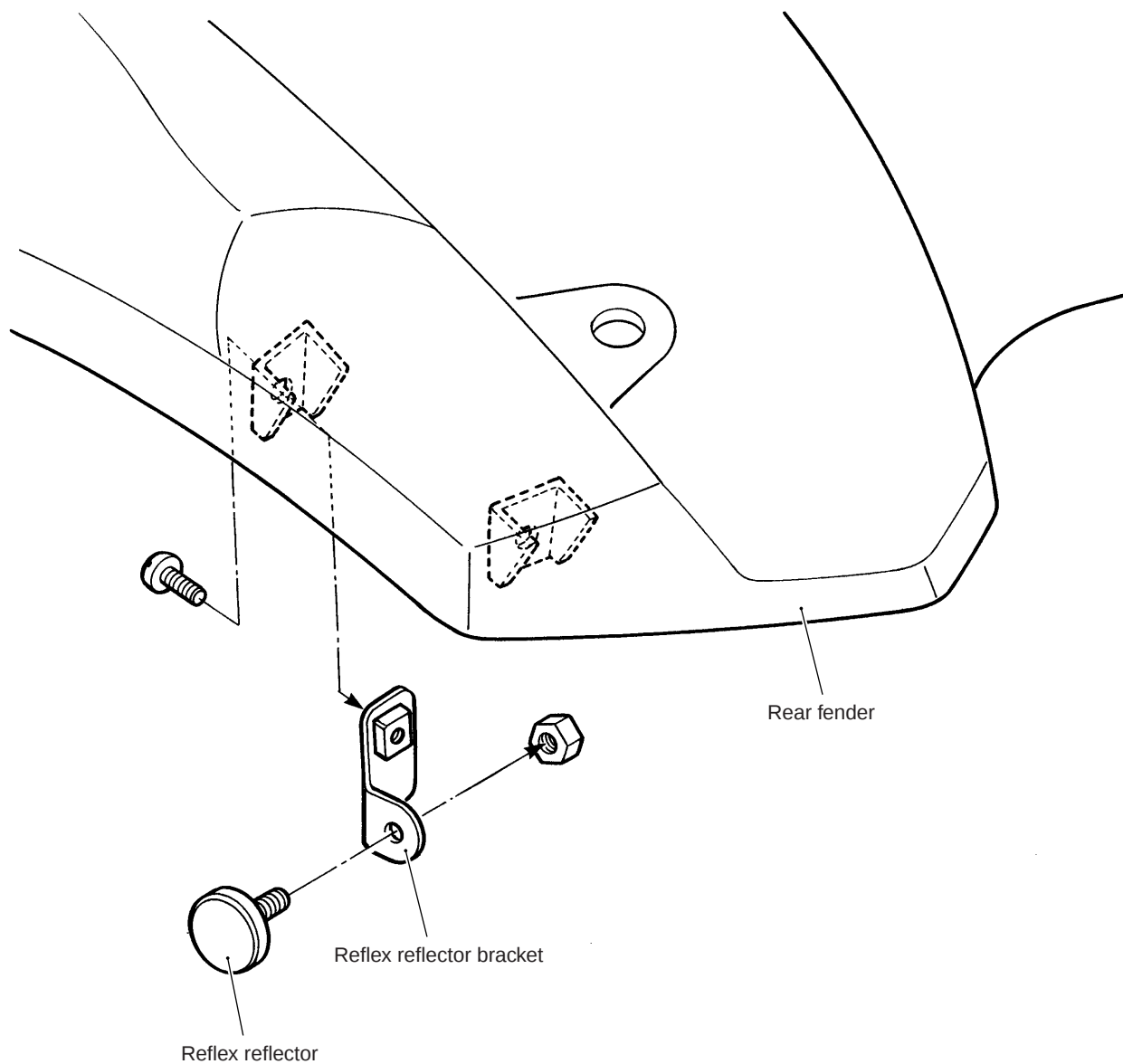
BELT COOLING DUCT INSTALLATION



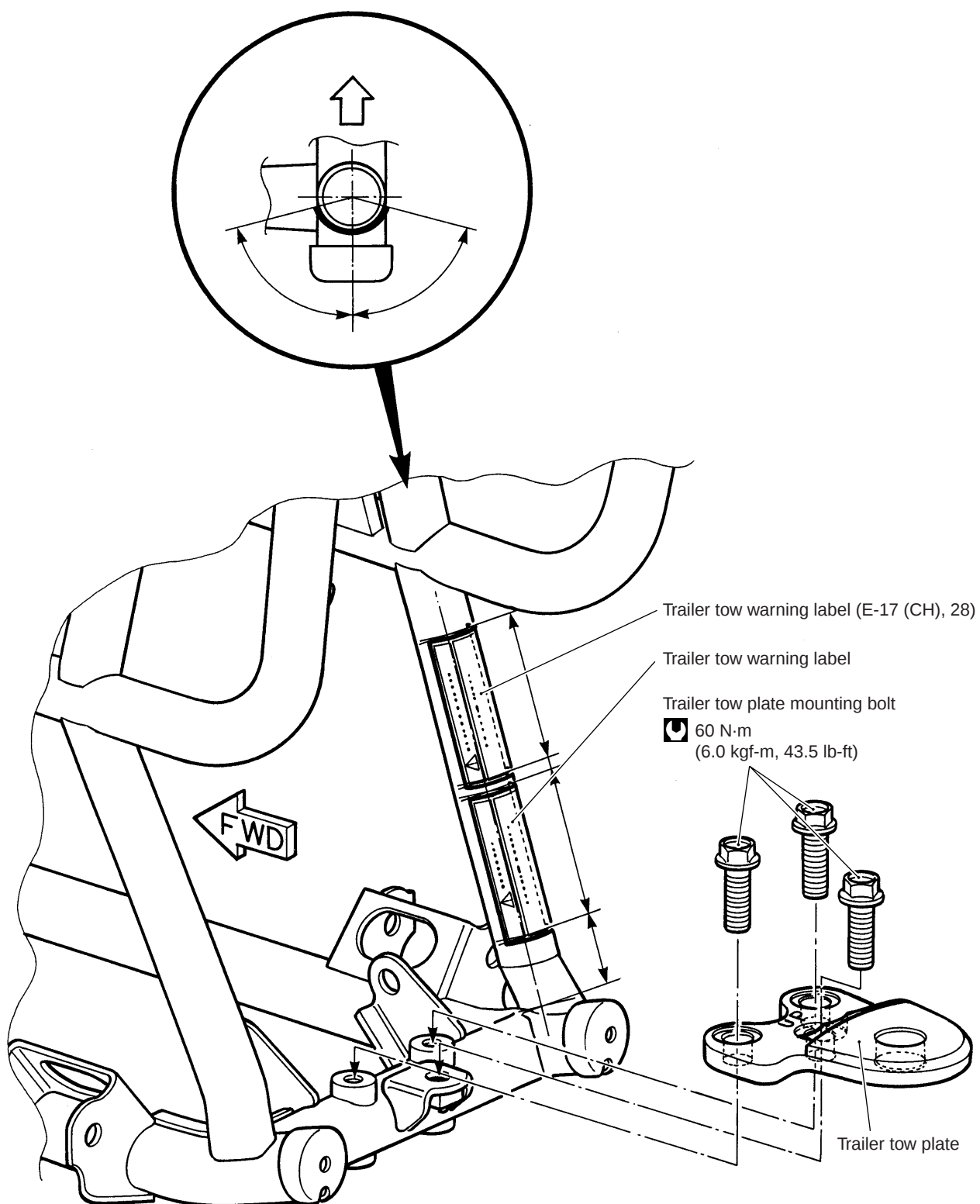
REAR BRAKE PEDAL



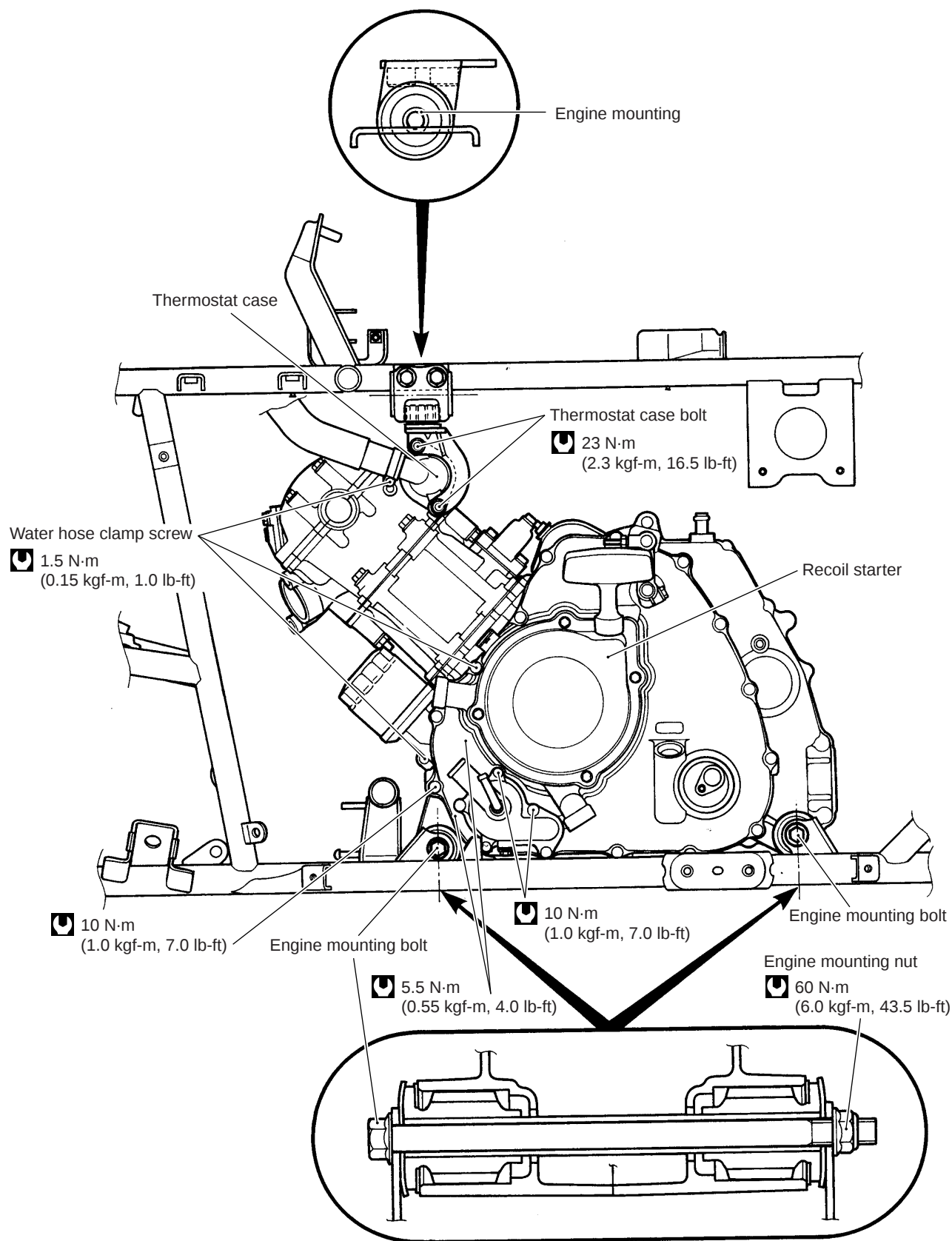
REAR SIDE REFLEX REFLECTOR INSTALLATION (FOR E-28)



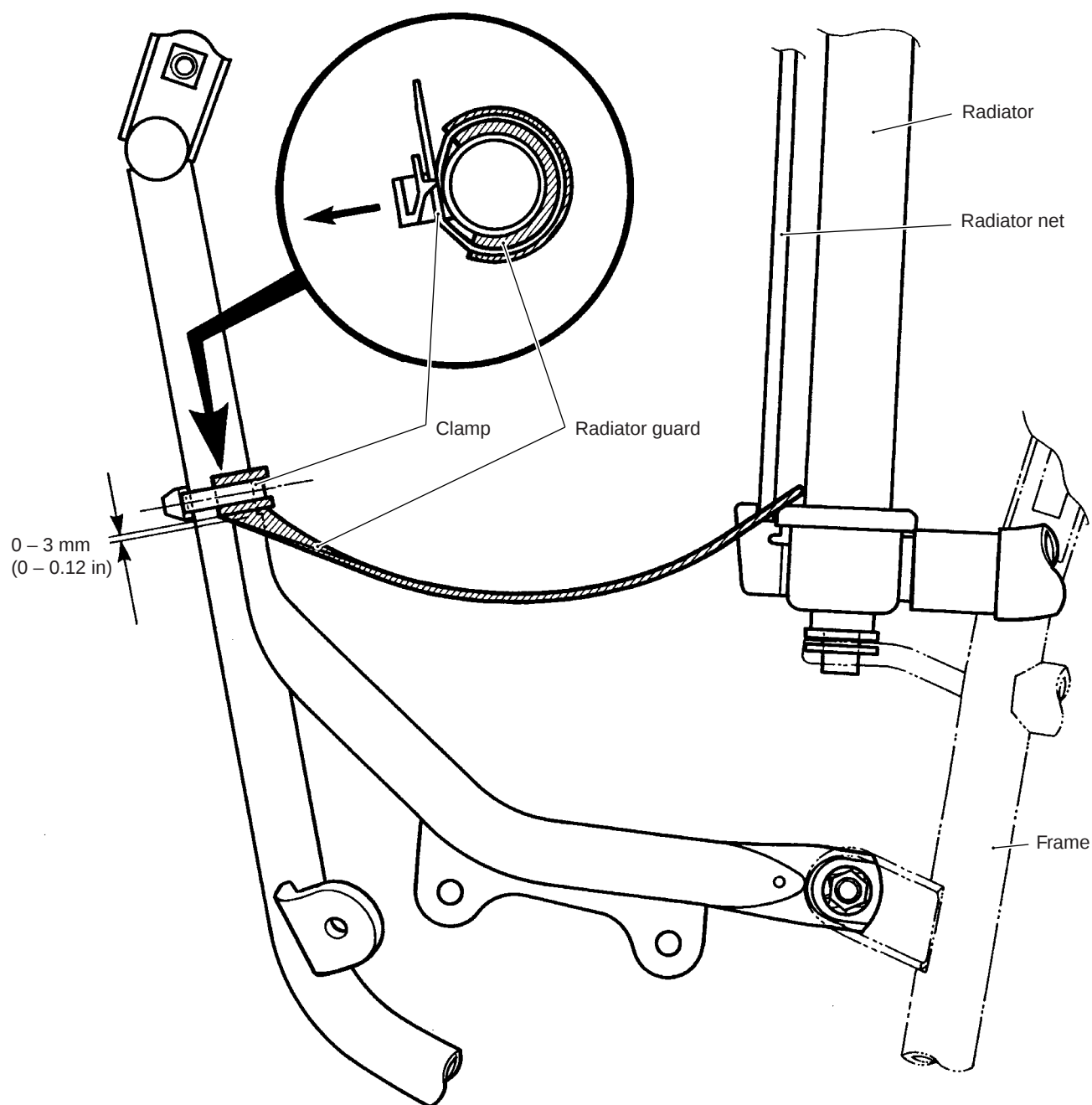
TRAILER TOW PLATE INSTALLATION



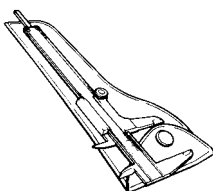
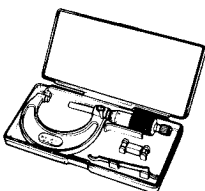
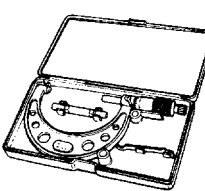
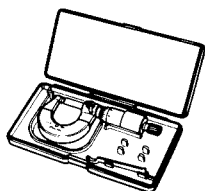
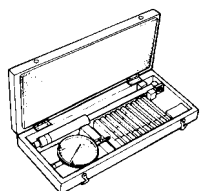
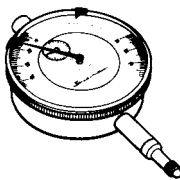
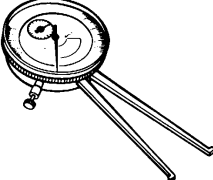
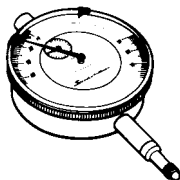
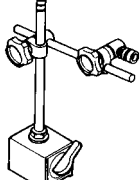
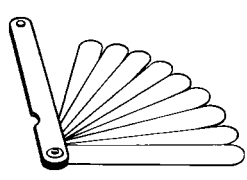
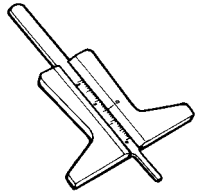
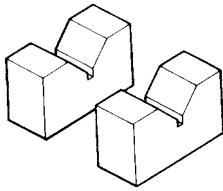
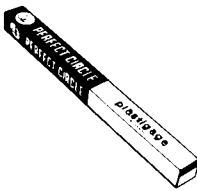
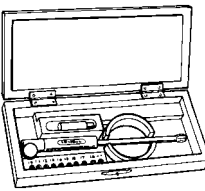
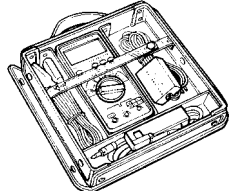
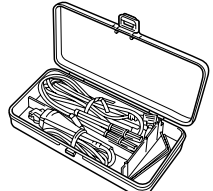
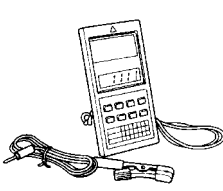
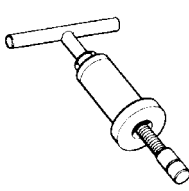
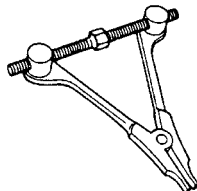
ENGINE MOUNTING

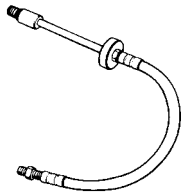
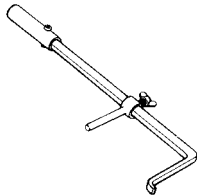
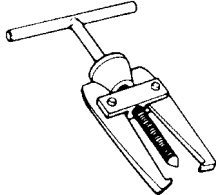
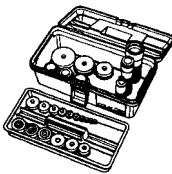
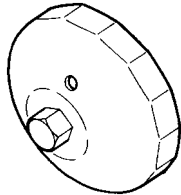
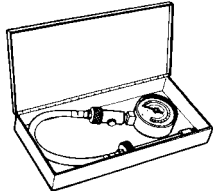
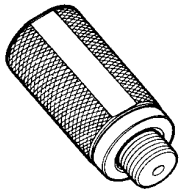
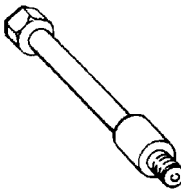
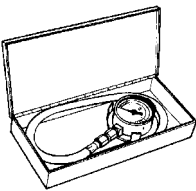
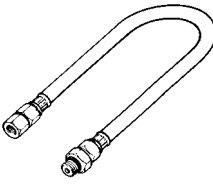
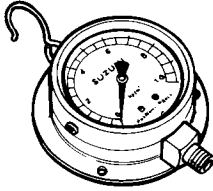
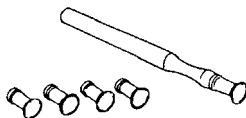
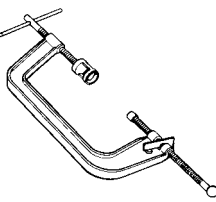
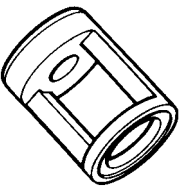
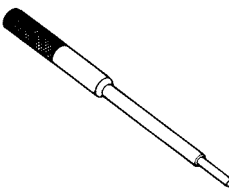
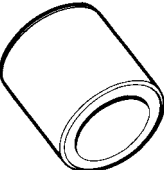
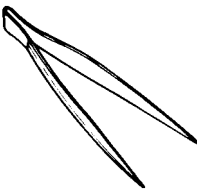


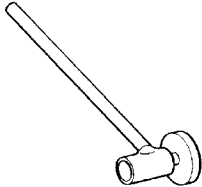
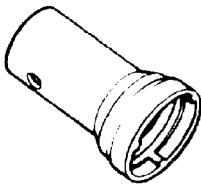
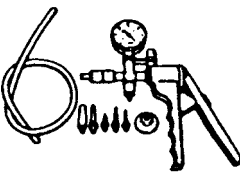
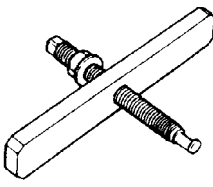
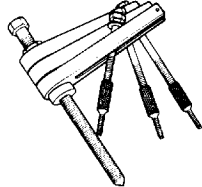
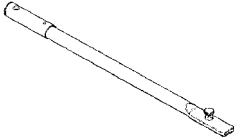
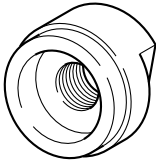
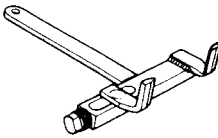
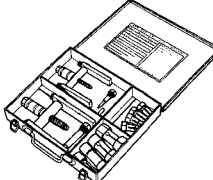
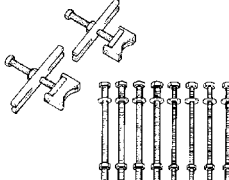
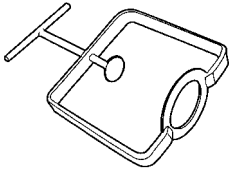
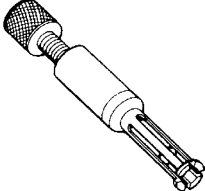
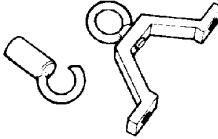
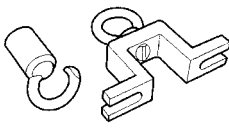
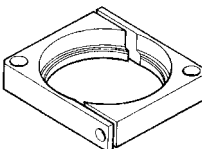
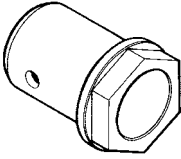
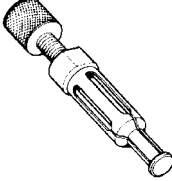
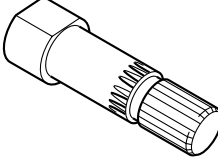
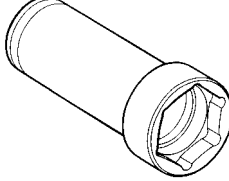
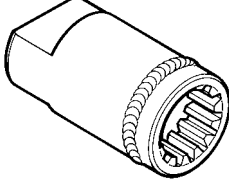
RADIATOR GUARD INSTALLATION (For E-24)

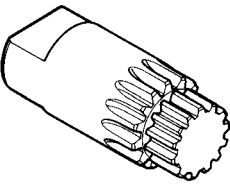
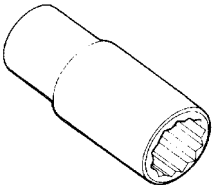
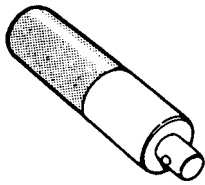
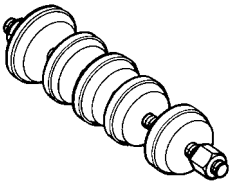
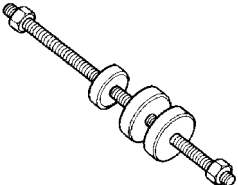
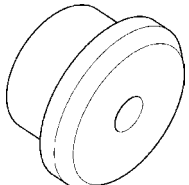
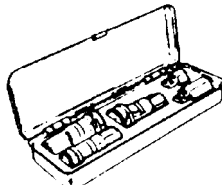
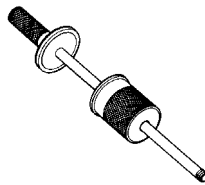
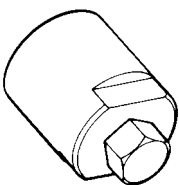
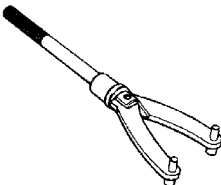
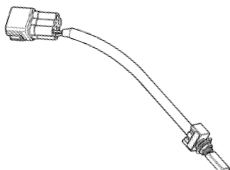
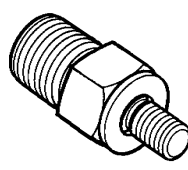
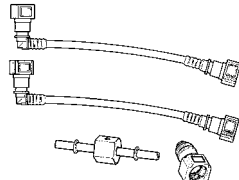
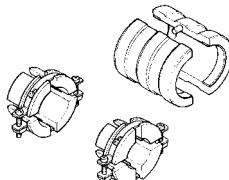
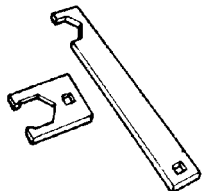
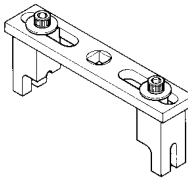
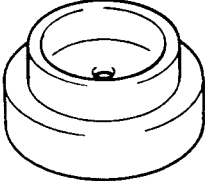
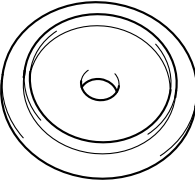
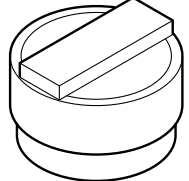
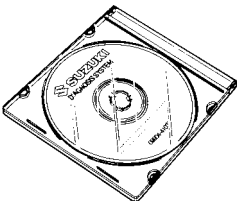


SPECIAL TOOLS

				
09900-20101 09900-20102 Vernier calipers	09900-20202 Micrometer (25 – 50 mm)	09900-20204 Micrometer (75 – 100 mm)	09900-20205 Micrometer (0 – 25 mm)	09900-20530 Cylinder gauge set
				
09900-20602 Dial gauge (1/1000 mm, 1 mm)	09900-20605 Dial calipers (1/100 mm, 10 – 34 mm)	09900-20607 Dial gauge (1/100 mm, 10 mm)	09900-20701 Magnetic stand	09900-20803 09900-20806 Thickness gauge
				
09900-20805 Tire depth gauge	09900-21304 V-block set (100 mm)	09900-22301 09900-22302 Plastigauge	09900-22401 (10 – 18 mm) 09900-22403 (18 – 35 mm) Small bore gauge	09900-25008 Multi-circuit tester set
				
09900-25009 Needle pointed probe set	09900-26006 Tachometer	09904-41010 SDS set tool	09910-32812 Crank shaft installer	09912-34510 Cylinder disas- sembling tool

				
09913-10750 Adaptor	09913-50121 Oil seal remover	09913-60910 Bearing and gear puller	09913-70210 Bearing installer set	09915-40610 Oil filter wrench
				
09915-64512 Compression gauge set	09915-70610 Oil pressure gauge attachment	09915-72410 Oil pressure gauge attachment	09915-74511 Oil pressure gauge set	09915-74521 Oil pressure gauge hose
				
09915-77331 Meter (for high pressure)	09916-10911 Valve lapper set	09916-14510 Valve lifter	09916-14910 Valve lifter attachment	09916-34570 Valve guide reamer (5.0 mm)
				
09916-34542 Reamer handle	09916-34580 Valve guide reamer (10.8 mm)	09916-44310 Valve guide remover/installer	09916-53370 Attachment	09916-84511 Tweezers

 09917-13210 Valve clearance adjusting driver	 09917-23711 Ring nut socket wrench	 09917-47011 Vacuum pump gauge	 09917-50410 Bearing remover	 09920-13120 Crankcase and shaft remover
 09920-31020 Extension handle	 09920-33540 Clutch shoe remover	 09920-53740 Clutch sleeve hub holder	 09921-20240 Bearing remover set	 09921-21910 Bearing holder
 09922-31430 Movable drive face spring compressor	 09923-73210 Bearing remover	 09924-21920 Drive shaft remover	 09924-21940 Wheel hub remover	 09924-21950 Front drive shaft remover
 09924-41830 Bearing lock-nut wrench	 09923-74511 Bearing remover (φ 20 – 38)	 09924-52450 Output shaft holder	 09924-52460 Socket wrench 52 mm	 09924-52470 Fixed final drive gear holder

 09924-52480 Fixed propeller shaft holder	 09924-62430 Long socket (22 mm)	 09924-74510 Bearing and oil seal installer handle	 09924-84510 Bearing installer set	 09924-84521 Bearing installer set
 09926-27610 Oil seal installer	 09930-10121 Spark plug wrench set	 09930-30104 Sliding shaft	 09930-30721 Rotor remover	 09930-40113 Rotor holder
 09930-40120 Rotor holder attachment A	 09930-82720 Mode select switch	 09940-40211 Fuel pressure gauge adaptor	 09940-40221 Fuel pressure gauge hose attachment	 09940-52861 Front fork oil seal installer
 09940-92430 Rear axle wrench A	 09941-51012 Ring locknut wrench	 09944-66010 Bearing installer	 09944-66030 Oil seal installer	 09951-15810 Bearing installer
 99565-01010-009 CD-ROM Ver.9				

NOTE:

When order the special tool, please confirm whether it is available or not.

TIGHTENING TORQUE

ENGINE

ITEM		N·m	kgf-m	lb-ft
Spark plug		11	1.1	8.0
Cylinder head cover bolt		10	1.0	7.0
Rocker arm shaft bolt		27.5	2.75	20.0
Intake pipe bolt		27.5	2.75	20.0
Cylinder head bolt (M8)		25	2.5	18.0
Cylinder head bolt (M10)	Initial	25	2.5	18.0
	Final	37	3.7	27.0
Cylinder base nut		25	2.5	18.0
Camshaft sprocket bolt		15	1.5	11.0
Cam chain tensioner bolt		13	1.3	9.5
Cam chain tension adjuster mounting bolt		10	1.0	7.0
Cam chain tension adjuster cap bolt		8	0.8	5.7
Crankcase bolt (M6)		10	1.0	7.0
Crankcase bolt (M8)		26	2.6	19.0
Valve timing inspection plug		22.5	2.25	16.5
Valve clearance adjuster lock-nut		10	1.0	7.0
Valve clearance inspection cap bolt		10	1.0	7.0
Clutch shoe nut		150	15.0	108.5
Movable drive face bolt		110	11.0	79.5
Movable driven face bolt		110	11.0	79.5
Movable driven face ring nut		110	11.0	79.5
Clutch cover bolt		8	0.8	5.7
Clutch inner cover bolt		9	0.9	6.5
Generator rotor nut		140	14.0	101.5
Generator starter bolt		11	1.1	8.0
Speed sensor bolt		10	1.0	7.0
Starter clutch bolt		25.5	2.55	18.5
Exhaust pipe nut		23	2.3	16.5
Muffler connect bolt		23	2.3	16.5
Muffler mounting bolt		23	2.3	16.5
Engine oil drain plug		20.5	2.05	15.0
Engine coolant drain plug		12.5	1.25	9.0
Drive bevel gear nut		100	10.0	72.5
Front output shaft bolt		10	1.0	7.0
Engine mounting nut		60	6.0	43.5
Engine mounting damper stopper bolt		23	2.3	16.5
Rear output shaft nut		100	10.0	72.5
Crank balancer drive gear nut		150	15.0	108.5
Crank balancer driven gear bolt		50	5.0	36.0
Starter motor mounting bolt		10	1.0	7.0
Starter motor lead wire connecting nut		6	0.6	4.5
Main oil gallery plug		23	2.3	16.5

DRIVE TRAIN

ITEM	N·m	kgf-m	lb-ft
4WD/diff-lock actuator mounting bolt	22	2.2	16.0
Front drive train (differential) gear case bolt	22	2.2	16.0
Front drive train (differential) gear case mounting nut	50	5.0	36.0
Front differential gear oil level plug	8	0.8	5.7
Front differential gear oil filler plug	34.5	3.45	25.0
Front differential gear oil drain plug	32	3.2	23.0
Front propeller shaft boot clamp screw	1.3	0.13	0.94
Rear pinion gear lock-nut	100	10.0	72.5
Rear drive bearing lock-nut	100	10.0	72.5
Final gear case bolt (M8)	26	2.6	19.0
Final gear case bolt (M10)	55	5.5	40.0
Final gear case mounting nut	65	6.5	47.0
Rear propeller shaft boot clamp screw	2	0.2	1.5
Final gear oil drain plug	23	2.3	16.5
Output drive gear shaft lock-nut	100	10.0	72.5
Output shaft nut	100	10.0	72.5

FI SYSTEM, INTAKE AIR SYSTEM AND FUEL SYSTEM

ITEM	N·m	kgf-m	lb-ft
CKP sensor mounting bolt	6	0.6	4.3
CKP sensor bracket bolt	6	0.6	4.3
Fuel delivery pipe mounting screw	5	0.5	3.5
Air cleaner box mounting bolt	4.5	0.45	3.3
Fuel pump retainer	35	3.5	25.5
ECT sensor	12	1.2	8.5

COOLING SYSTEM

ITEM	N·m	kgf-m	lb-ft
Water pump cover screw	5.5	0.55	4.0
Water pump mounting bolt	10	1.0	7.0
Cooling fan thermo-switch	17	1.7	12.5
Thermostat case bolt	23	2.3	16.5
Cooling fan mounting bolt	8.5	0.85	6.0
Water hose clamp screw	1.5	0.15	1.0

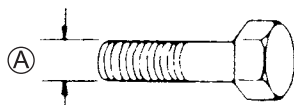
CHASSIS

ITEM	N·m	kgf-m	lb-ft
Handlebar upper clamp bolt	26	2.6	19.0
Handlebar holder nut	60	6.0	43.5
Rear brake lever holder clamp bolt	10	1.0	7.5
Throttle lever case bolt	5	0.5	3.5
Steering shaft holder bolt	23	2.3	16.5
Steering shaft lower nut	170	17.0	123.0
Front wishbone arm pivot nut (upper)	60	6.0	43.5
Front wishbone arm pivot nut (lower)	65	6.5	47.0
Steering knuckle end nut (upper and lower)	29	2.9	21.0
Tie rod end nut	29	2.9	21.0
Tie rod lock-nut	45	4.5	32.5
Front shock absorber mounting bolt (upper)	55	5.5	40.0
Front shock absorber mounting nut (lower)	60	6.0	43.5
Front hub nut	110	11.0	79.5
Rear hub nut	130	13.0	94.0
Wheel set nut (front and rear)	60	6.0	43.5
Front brake hose union bolt	25	2.5	18.0
Front brake air bleeder valve	6.0	0.6	4.3
Front brake pad mounting bolt	17	1.7	12.5
Front brake caliper mounting bolt	26	2.6	19.0
Caliper holder pin	17	1.7	12.5
Caliper holder slide pin	22	2.2	16.0
Front brake pad mounting pin	17	1.7	12.5
Brake pipe nut	16	1.6	11.5
Front brake disc plate mounting bolt	23	2.3	16.5
Brake master cylinder clamp bolt	11	1.1	8.0
Footrest mounting bolt (M8)	26	2.6	19.0
Footrest mounting bolt (M10)	55	5.5	40.0
Rear stabilizer link nut	34	3.4	24.5
Rear shock absorber mounting nut (upper and lower)	60	6.0	43.5
Rear wishbone arm pivot nut (upper and lower)	60	6.0	43.5
Rear knuckle end nut (upper and lower)	60	6.0	43.5
Rear brake cam lever nut	11	1.1	8.0
Rear brake case bolt	26	2.6	19.0
Rear brake pedal pivot bolt	11	1.1	8.0
Trailer towing bolt	60	6.0	43.5
Gear shift lever assembly mounting bolt	10	1.0	7.0

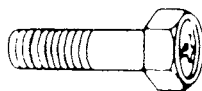
TIGHTENING TORQUE CHART

For other nuts and bolts not listed in the preceding page, refer to this chart:

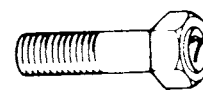
Bolt Diameter Ⓐ (mm)	Conventional or "4" marked bolt			"7" marked bolt		
	N·m	kgf-m	lb-ft	N·m	kgf-m	lb-ft
4	1.5	0.15	1.0	2.3	0.23	1.5
5	3	0.3	2.0	4.5	0.45	3.0
6	5.5	0.55	4.0	10	1.0	7.0
8	13	1.3	9.5	23	2.3	16.5
10	29	2.9	21.0	50	5.0	36.0
12	45	4.5	32.5	85	8.5	61.5
14	65	6.5	47.0	135	13.5	97.5
16	105	10.5	76.0	210	21.0	152.0
18	160	16.0	115.5	240	24.0	173.5



Conventional bolt



"4" marked bolt



"7" marked bolt

SERVICE DATA

VALVE + VALVE GUIDE

Unit: mm (in)

ITEM	STANDARD		LIMIT
Valve diam.	IN.	30.6 (1.20)	—
	EX.	27.0 (1.06)	—
Tappet clearance (when cold)	IN.	0.05 – 0.10 (0.002 – 0.004)	—
	EX.	0.17 – 0.22 (0.007 – 0.009)	—
Valve guide to valve stem clearance	IN.	0.010 – 0.037 (0.0004 – 0.0015)	—
	EX.	0.030 – 0.057 (0.0012 – 0.0022)	—
Valve guide I.D.	IN. & EX.	5.000 – 5.012 (0.1968 – 0.1973)	—
Valve stem O.D.	IN.	4.975 – 4.990 (0.1958 – 0.1964)	—
	EX.	4.955 – 4.970 (0.1950 – 0.1956)	—
Valve stem deflection	IN. & EX.	—	0.35 (0.014)
Valve stem runout	IN. & EX.	—	0.05 (0.002)
Valve head thickness	IN. & EX.	—	0.5 (0.02)
Valve seat width	IN. & EX.	0.9 – 1.1 (0.035 – 0.043)	—
Valve head radial runout	IN. & EX.	—	0.03 (0.001)
Valve spring free length	IN. & EX.	—	38.8 (1.52)
Valve spring tension	IN. & EX.	182 – 210 N (18.6 – 21.4 kgf, 41.0 – 47.2 lbs) at length 31.5 mm (1.24 in)	—

CAMSHAFT + CYLINDER HEAD

Unit: mm (in)

ITEM	STANDARD		LIMIT
Cam height	IN.	33.450 – 33.504 (1.3169 – 1.3190)	33.15 (1.3051)
	EX.	33.470 – 33.524 (1.3177 – 1.3198)	33.17 (1.3059)
Camshaft journal oil clearance	0.028 – 0.059 (0.0011 – 0.0023)		0.150 (0.0059)
	0.032 – 0.066 (0.0012 – 0.0025)		
Camshaft journal holder I.D.	17.512 – 17.525 (0.6894 – 0.6899)		—
	22.012 – 22.025 (0.8666 – 0.8671)		
Camshaft journal O.D.	17.466 – 17.484 (0.6876 – 0.6883)		—
	21.959 – 21.980 (0.8645 – 0.8653)		
Camshaft runout	—		0.10 (0.004)
Rocker arm I.D	IN. & EX.	12.000 – 12.018 (0.4724 – 0.4731)	
Rocker arm shaft O.D	IN. & EX.	11.973 – 11.984 (0.4713 – 0.4718)	
Cylinder head distortion	—		0.05 (0.002)
Cylinder head cover distortion	—		0.05 (0.002)

CYLINDER + PISTON + PISTON RING

Unit: mm (in)

ITEM	STANDARD		LIMIT
Compression pressure (Automatic-decomp. actuated)	Approx. 1 000 kPa (10.0 kgf/cm ² , 142 psi)		—
Piston-to-cylinder clearance	0.030 – 0.040 (0.0012 – 0.0016)		0.120 (0.0047)
Cylinder bore	84.000 – 84.015 (3.3070 – 3.3076)		Nicks or Scratches
Piston diam.	83.965 – 83.980 (3.3057 – 3.3062) Measure at 15 mm (0.6 in) from the skirt end.		83.880 (3.3023)
Cylinder distortion	—		0.05 (0.102)
Piston ring free end gap	1st	R	Approx 9.9 (0.38) 7.9 (0.31)
	2nd	R	Approx 9.7 (0.38) 7.7 (0.30)

ITEM	STANDARD			LIMIT
Piston ring end gap	1st	R	0.10 – 0.25 (0.004 – 0.010)	0.50 (0.020)
	2nd	R	0.10 – 0.30 (0.004 – 0.011)	0.50 (0.020)
Piston ring to groove clearance	1st		—	0.180 (0.0071)
	2nd		—	0.150 (0.0059)
Piston ring groove width	1st		1.21 – 1.23 (0.0476 – 0.0484)	—
	2nd		1.01 – 1.03 (0.0398 – 0.0406)	—
	Oil		2.51 – 2.53 (0.0988 – 0.0996)	—
Piston ring thickness	1st		1.17 – 1.19 (0.0460 – 0.0468)	—
	2nd		0.97 – 0.99 (0.0382 – 0.0390)	—
Piston pin bore I.D.			20.002 – 20.008 (0.7874 – 0.7877)	20.030 (0.7885)
Piston pin O.D.			19.992 – 20.000 (0.7870 – 0.7874)	19.980 (0.7866)

CONROD + CRANKSHAFT

Unit: mm (in)

ITEM	STANDARD	LIMIT
Conrod small end I.D.	20.006 – 20.014 (0.7876 – 0.7879)	20.040 (0.7889)
Conrod deflection	—	3.0 (0.12)
Conrod big end side clearance	0.10 – 0.65 (0.004 – 0.025)	1.0 (0.039)
Conrod big end width	24.95 – 25.00 (0.982 – 0.984)	—
Crank web to web width	70.9 – 71.1 (2.79 – 2.78)	—
Crankshaft runout	—	0.08 (0.003)

OIL PUMP

ITEM	STANDARD	LIMIT
Oil pressure (at 60 °C, 140 °F)	100 kPa (1.0 kgf/cm ² , 14.2 psi) at 3 000 r/min	—

CLUTCH

Unit: mm (in)

ITEM	STANDARD	LIMIT
Clutch wheel I.D.	140.0 – 140.2 (5.512 – 5.520)	140.5 (5.53)
Clutch shoe	—	No groove at any part
Clutch engagement r/min.	1 700 – 2 200 r/min.	—
Clutch lock-up r/min.	3 750 – 4 250 r/min.	—

DRIVE TRAIN

Unit: mm (in) Except ratio

ITEM	STANDARD	LIMIT
Automatic transmission ratio	Variable change (2.902 – 0.779)	—
Secondary reduction ratio	2.733 (41/19 × 19/15)	—
Final reduction ratio	Front	3.600 (36/10)
	Rear	3.600 (36/10)
Transfer gear ratio	Low	2.562 (41/16)
	High	1.240 (31/25)
	Reverse	2.000 (32/16)
Drive belt width	31.1 (1.22)	30.1 (1.18)
Movable driven face spring free length	215.0 (8.46)	204.3 (8.04)
Shift fork to groove clearance	0.10 – 0.30 (0.004 – 0.012)	0.50 (0.020)
Shift fork groove width	Reverse	5.50 – 5.60 (0.217 – 0.220)
	High	5.50 – 5.60 (0.217 – 0.220)
Shift fork thickness	Reverse	5.30 – 5.40 (0.209 – 0.213)
	High	5.30 – 5.40 (0.209 – 0.213)
Front/rear output shaft bevel gear backlash	0.03 – 0.15 (0.001 – 0.006)	—
Front drive (differential) gear backlash	0.05 – 0.10 (0.002 – 0.004)	—
Final gear backlash	0.08 – 0.15 (0.003 – 0.005)	—
Front differential gear oil type	Hypoid gear oil SAE #90, API grade GL-5 or SAE 75 W-90	—
Final gear oil type	Mobil fluid 424 (or equivalent gear oil)	—
Front differential gear oil capacity	500 ml (16.9/17.6 US/Imp oz)	—
Final gear oil capacity	770 ml (26.0/27.1 US/Imp oz)	—

THERMOSTAT + RADIATOR + FAN + COOLANT

ITEM	STANDARD/SPECIFICATION		NOTE
Thermostat valve opening temperature	Approx. 82 °C (180 °F)		
Thermostat valve lift	8 mm (0.315 in) and over at 95 °C (203 °F)		
Radiator cap valve opening pressure	110 – 137.3 kPa (1.1 – 1.4 kgf/cm ² , 15.6 – 19.9 psi)		
Cooling fan thermo-switch operating temperature	OFF→ON	Approx. 93 °C (199 °F)	
	ON→OFF	Approx. 87 °C (189 °F)	
Engine coolant type	Use an antifreeze/coolant compatible with aluminum radiator, mixed with distilled water only, at the ratio of 50:50.		
Engine coolant capacity	Reservoir	250 ml (0.26/0.22 US/Imp qt)	
	Engine	2 200 ml (2.32 – 1.94 US/Imp qt)	

INJECTOR + FUEL PUMP + FUEL PRESSURE REGULATOR

ITEM	SPECIFICATION	NOTE
Injector resistance	11.5 – 12.5 Ω at 20 °C (68 °F)	
Fuel pump discharge amount	55.5 ml (1.88/1.95 US/Imp oz) and more/10 sec.	
Fuel pressure regulator operating set pressure	Approx. 294 kPa (3.0 kgf/cm ² , 41 psi)	

FI SENSORS

ITEM	SPECIFICATION		NOTE
CKP sensor resistance	200 – 250 Ω		
CKP sensor peak voltage	65 V and more		When cranking
IAP sensor input voltage	4.5 – 5.5 V		
IAP sensor output voltage	2.17 – 3.15 V at idle speed		
TP sensor input voltage	4.5 – 5.5 V		
TP sensor resistance	Closed	Approx. 1.17 k Ω	
	Opened	Approx. 4.30 k Ω	
TP sensor output voltage	Closed	0.93 – 1.31 V	
	Opened	3.64 – 4.82 V	
ECT sensor input voltage	4.5 – 5.5 V		
ECT sensor resistance	20 °C (68 °F)	Approx. 2.45 k Ω	
	40 °C (104 °F)	Approx. 1.15 k Ω	
	80 °C (176 °F)	Approx. 0.31 k Ω	
	100 °C (182 °F)	Approx. 0.18 k Ω	
IAT sensor input voltage	4.5 – 5.5 V		
IAT sensor output voltage	Approx. 1.88 – 3.06 V at 20 °C (68 °F)		
IAT sensor resistance	20 °C (68 °F)	2.22 – 3.11 k Ω	
	40 °C (104 °F)	1.00 – 1.56 k Ω	
TO sensor resistance	19 – 20 k Ω		
TO sensor voltage	Normal	0.4 – 1.4 V	
	Leaning	3.7 – 4.4 V	When leaning 65 °
Injector voltage	Battery voltage		
Ignition coil primary peak voltage	80 V and more		When cranking

THROTTLE BODY

ITEM	STANDARD/SPECIFICATION
Bore size	35 mm
I.D. No.	11H0
Idle r/min.	1 500 ± 100 r/min.
Throttle cable play	3 – 5 mm (0.1 – 0.2 in)

ELECTRICAL

Unit: mm (in)

ITEM		STANDARD/SPECIFICATION	NOTE
Spark plug	Type	NGK: CR6E DENSO: U20ESR-N	
	Gap	0.7 – 0.8 (0.028 – 0.031)	
Spark performance	Over 8 (0.3) at 1 atm.		
Ignition coil resistance	Primary	0.1 – 0.6 Ω	Terminal – Ground
	Secondary	12 – 19 kΩ	Plug cap – Terminal
Generator coil resistance	0.1 – 1.0 Ω		
Generator Max. output	Approx. 375 W at 5 000 r/min		
Generator no-load voltage (when engine is cold)	65 V (AC) and more at 5 000 r/min.		
Regulated voltage	13.5 – 15.5 V at 5 000 r/min.		
Starter relay resistance	3 – 5 Ω		
Battery	Type designation	YTX14-BS	
	Capacity	12 V 43.2 kC (12 Ah)/10 HR	
Fuse size	Headlight	HI	10 A
		LO	10 A
	Power source		10 A
	Ignition		15 A
	Fuel		10 A
	Fan		15 A
	Main		30 A

WATTAGE

Unit: W

ITEM		STANDARD/SPECIFICATION	
		E-24, -28, -33	E-17
Headlight	HI	35 × 2	←
	LO	35 × 2	←
Brake light/Taillight		21/5	←
Reversing light			21
Speedometer light		LED	←
High beam indicator light			LED
Neutral indicator light		LED	←
FI indicator light/Engine coolant temp. indicator light		LED	←
Reverse indicator light		LED	←
Differential lock indicator light		LED	←

BRAKE + WHEEL

Unit: mm (in)

ITEM	STANDARD/SPECIFICATION	LIMIT
Rear brake pedal height	12.5 – 22.5 (0.5 – 0.9)	—
Rear brake pedal free travel	20 – 30 (0.8 – 1.2)	—
Front brake disc thickness	3.3 – 3.7 (0.13 – 0.15)	3.0 (0.20)
Front brake disc runout	—	0.30 (0.012)
Front master cylinder bore	14.000 – 14.043 (0.5512 – 0.5529)	—
Front master cylinder piston diam.	13.957 – 13.984 (0.5495 – 0.5506)	—
Front brake caliper cylinder bore	33.960 – 34.010 (1.3370 – 1.3390)	—
Front brake caliper piston diam.	33.878 – 33.928 (1.3338 – 1.3357)	—
Rear brake lever play	6 – 8 (0.2 – 0.3)	—
Brake fluid type	DOT 4	—

ITEM	STANDARD	LIMIT
Steering angle	46 ° (right & left)	—
Turning radius	3.1 m (10.2 ft)	—
Toe (with 75 kg, 165 lbs)	-10 ± 4 mm (0.39 ± 0.16 in)	—
Camber	0.64 °	—
Caster	1.6 °	—

TIRE

Unit: mm (in)

ITEM	STANDARD		LIMIT
Cold inflation tire pressure (Solo riding)	Front	35 kPa (0.35 kgf/cm ² , 5.1 psi)	—
	Rear	30 kPa (0.30 kgf/cm ² , 4.4 psi)	—
Tire size	Front	AT 25 × 8-12 ☆☆, tubeless	—
	Rear	AT 25 × 10-12 ☆☆, tubeless	—
Tire tread depth	Front	—	4.0 (0.16)
	Rear	—	4.0 (0.16)

SUSPENSION

ITEM	STANDARD	LIMIT
Front shock absorber spring adjuster	2/5 position	—
Rear shock absorber spring adjuster	2/5 position	—

FUEL + OIL

ITEM	SPECIFICATION		NOTE
Fuel type	Use only unleaded gasoline of at least 87 pump octane (R/2 + M/2) or 91 octane or higher rated by the Research Method. Gasoline containing MTBE (Methyl Tertiary Butyl Ether), less than 10 % ethanol, or less than 5 % methanol with appropriate cosolvents and corrosion inhibitor is permissible.		E-28, 33
	Gasoline used should be graded 91 octane or higher. An unleaded gasoline is recommended.		The others
Fuel tank capacity	17.5 L (4.6/3.8 US/lmp gal)		
Engine oil type	SAE 10 W-40, API SF/SG or SH/SJ with JASO MA		
Engine oil capacity	change	2 500 ml (2.6/2.2 US/lmp qt)	
	Filter change	2 700 ml (2.8/2.4 US/lmp qt)	
	Overhaul	3 200 ml (3.4/2.8 US/lmp qt)	

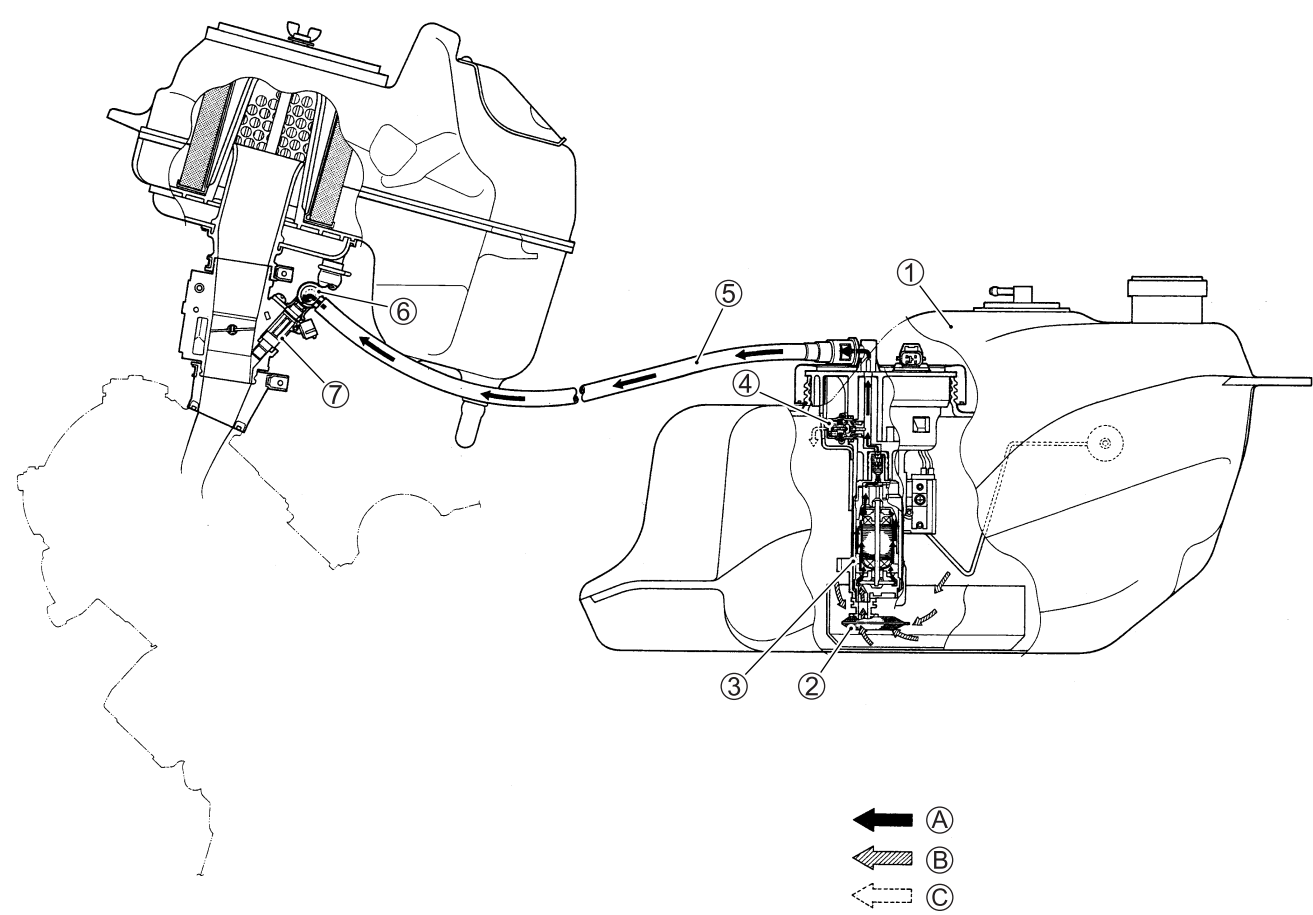
EMISSION CONTROL INFORMATION

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<i>FUEL INJECTION SYSTEM.....</i>	<i>11- 2</i>
<i>CRANKCASE EMISSION CONTROL SYSTEM.....</i>	<i>11- 3</i>

EMISSION CONTROL SYSTEMS
FUEL INJECTION SYSTEM

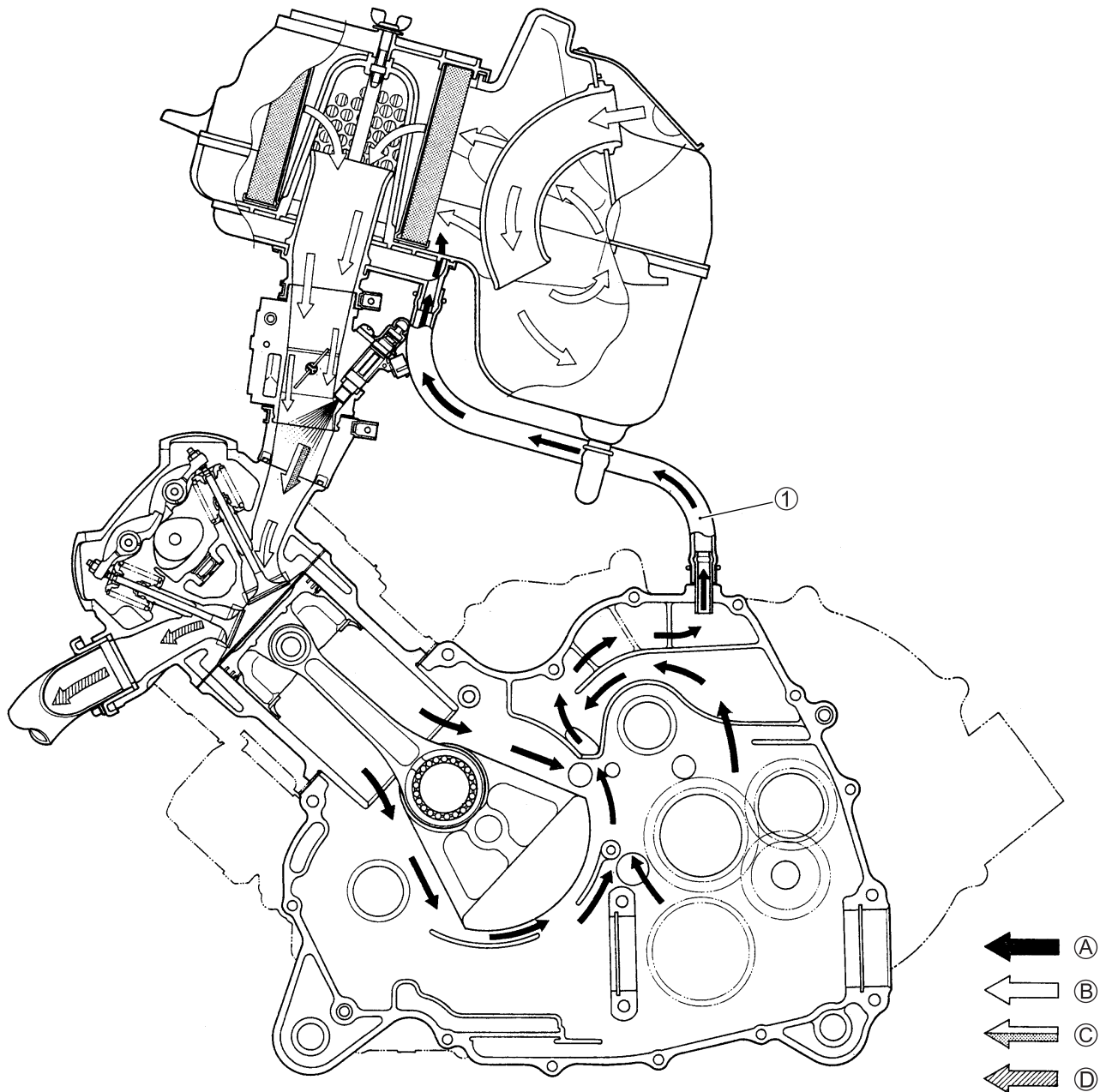
LT-A450 vehicles are equipped with a fuel injection system for emission level control. This fuel injection system is precision designed, manufactured and adjusted to comply with the applicable emission limits. With a view to reducing CO, NOX and HC, all of the fuel injection volumes are stringently controlled with the programmed injection maps in the ECM by varying engine conditions. Adjusting, interfering with, improper replacement, or resetting of any of the fuel injection components may adversely affect injection performance and cause the vehicle to exceed the exhaust emission level limits. if unable to effect repairs, contact the distributor’s representative for further technical information and assistance.



①	Fuel tank	⑤	Fuel feed hose	Ⓐ	Pressurized fuel
②	Fuel mesh filter	⑥	Fuel delivery pipe	Ⓑ	Before-pressurized fuel
③	Fuel pump	⑦	Fuel injector	Ⓒ	Relived fuel
④	Fuel pressure regulator				

CRANKCASE EMISSION CONTROL SYSTEM

The engine is equipped with a PCV system. Blow-by gas in the engine is constantly drawn into the crankcase, which is returned to the combustion chamber through the PCV (breather) hose, air cleaner and throttle body.



①	PCV (breather) hose	Ⓒ	FUEL/AIR MIXTURE
Ⓐ	BLOW-BY GAS	Ⓓ	EXHAUST GAS
Ⓑ	FRESH AIR		

LT-A450XK8 ('08 MODEL)

12

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REAR SUSPENSION REASSEMBLING INFORMATION	12- 6
FUEL LEVEL GAUGE INSPECTION.....	12- 7

NOTE:

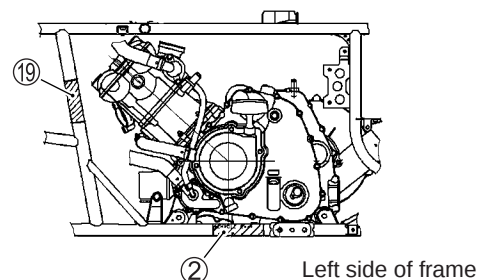
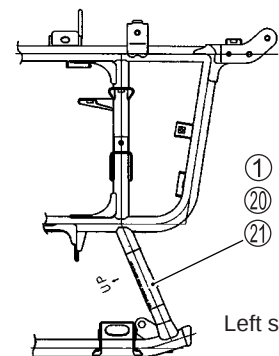
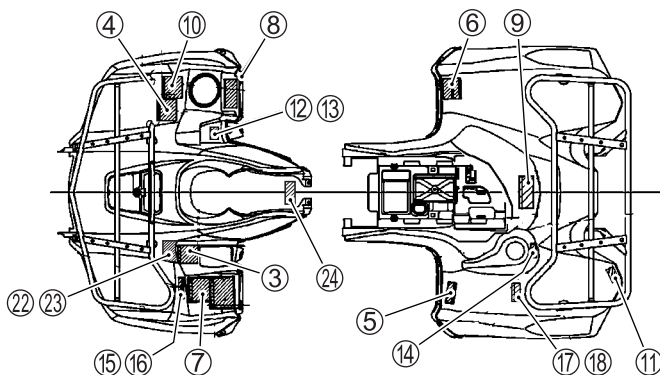
The specifications and service data are the same as the K-7MODEL.

INFORMATION LABELS

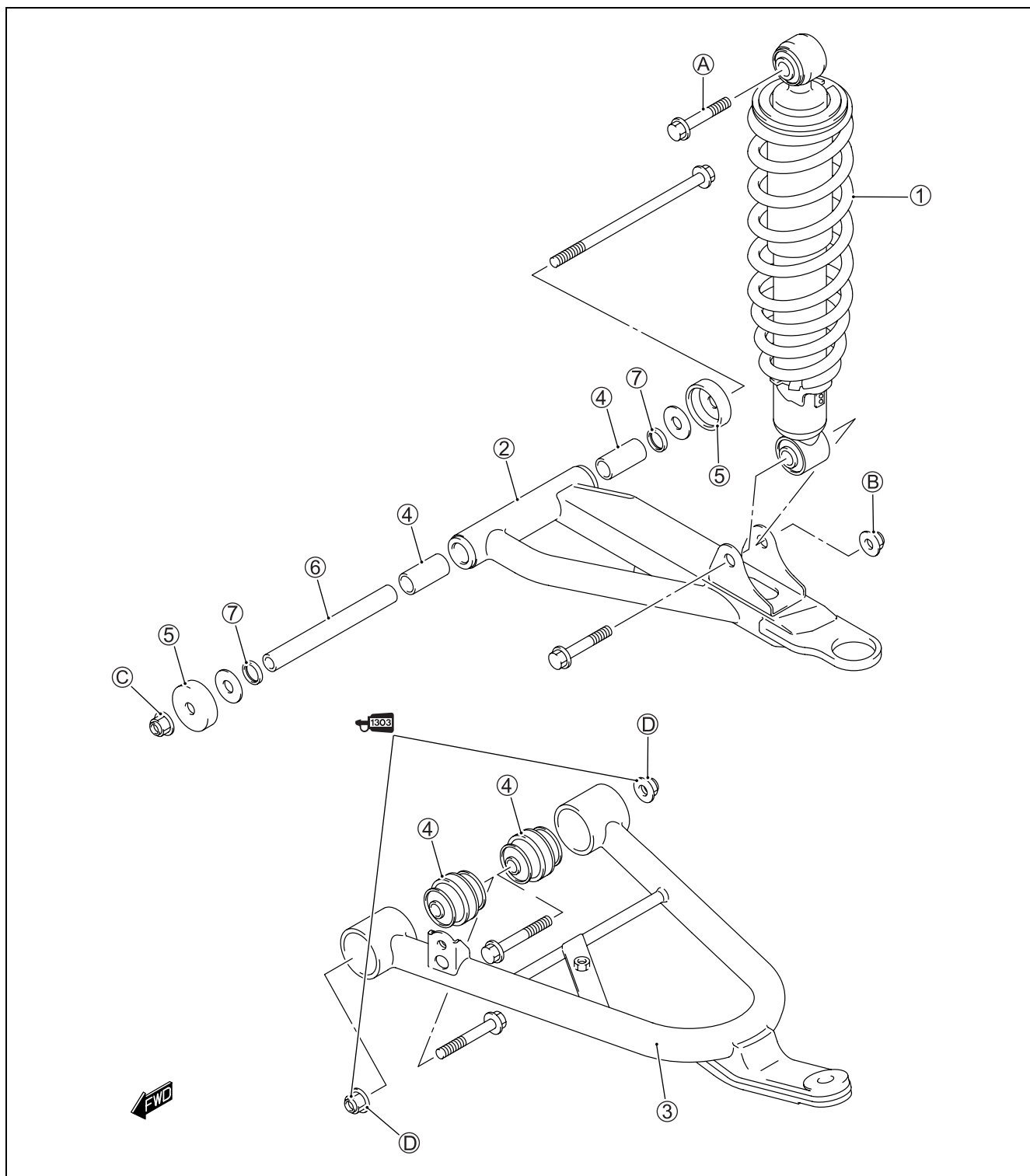
No.	LABEL or PLATE NAME	APPLIED SPECIFICATION			
		P-17	P-24	P-28	P-33
①	Certification plate (E)		A		A
②	Information label (E)				A
③	Gearshift label (E)	A	A	A	A
④	Gearshift label (F)			A	
⑤	Tire air pressure label (E)	A	A	A	A
⑥	Tire air pressure label and warning no-passenger label (F)			A	
⑦	General warning & AGE, 16 label (E)	A	A	A	A
⑧	General warning label (F)			A	
⑨	Warning no-passenger label (E)	A	A	A	A
⑩	AGE, 16 label (F)			A	
⑪	Manual notice label (E)				A
⑫	Max AMP caution label (E)		A		A
⑬	Max AMP caution label (E/F)	A		A	
⑭	Fuel caution label (E)		A		
⑮	Front carrier warning label (E)		A		A
⑯	Front carrier warning label (E/F)	A		A	
⑰	Rear carrier warning label (E)		A		A
⑱	Rear carrier warning label (E/F)	A		A	
⑲	ICES Canada label (E/F)			A	
⑳	Compliance label (E)			A	
㉑	ID plate (E)	A			
㉒	Cooling fan label (E)		A		A
㉓	Cooling fan label (E/F)	A		A	
㉔	Compliance label (E/F)			A	

(E): English (F): French

A: Attached



FRONT SUSPENSION CONSTRUCTION

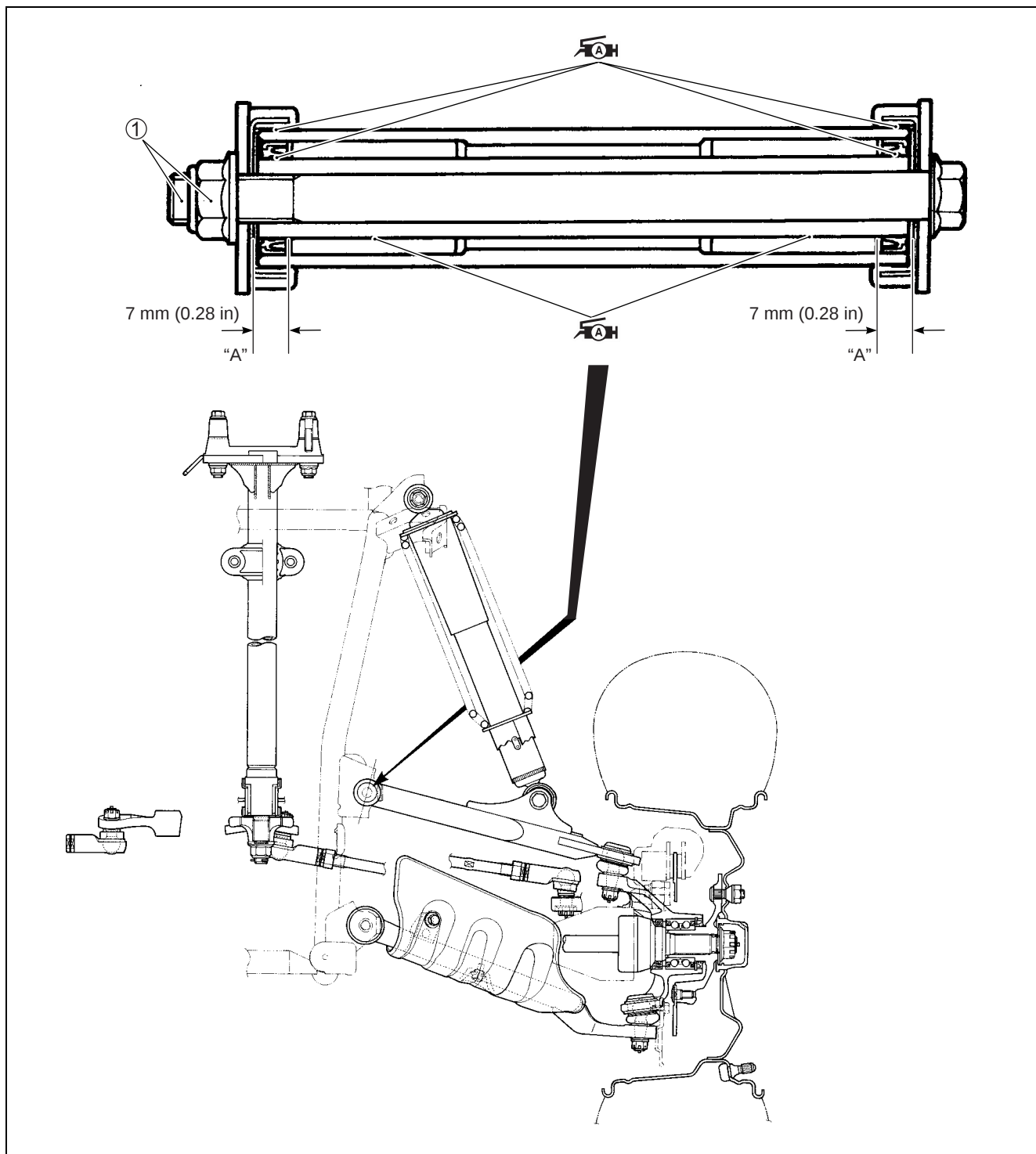


①	Front shock absorber	⑦	Seal
②	Front upper wishbone arm	(A)	Front shock absorber mounting upper bolt
③	Front lower wishbone arm	(B)	Front shock absorber mounting lower nut
④	Bush	(C)	Front wishbone arm pivot nut (upper)
⑤	Dust seal	(D)	Front wishbone arm pivot nut (lower)
⑥	Spacer		



ITEM	N·m	kgf-m	lb-ft
(A)	55	5.5	40.0
(B)	60	6.0	43.5
(C)	60	6.0	43.5
(D)	65	6.5	47.0

FRONT SUSPENSION REASSEMBLING INFORMATION

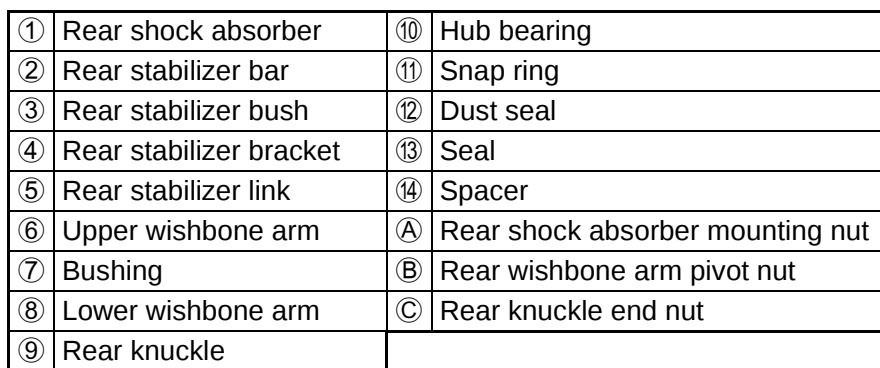


ITEM	N·m	kgf-m	lb-ft
①	60	6.0	43.5



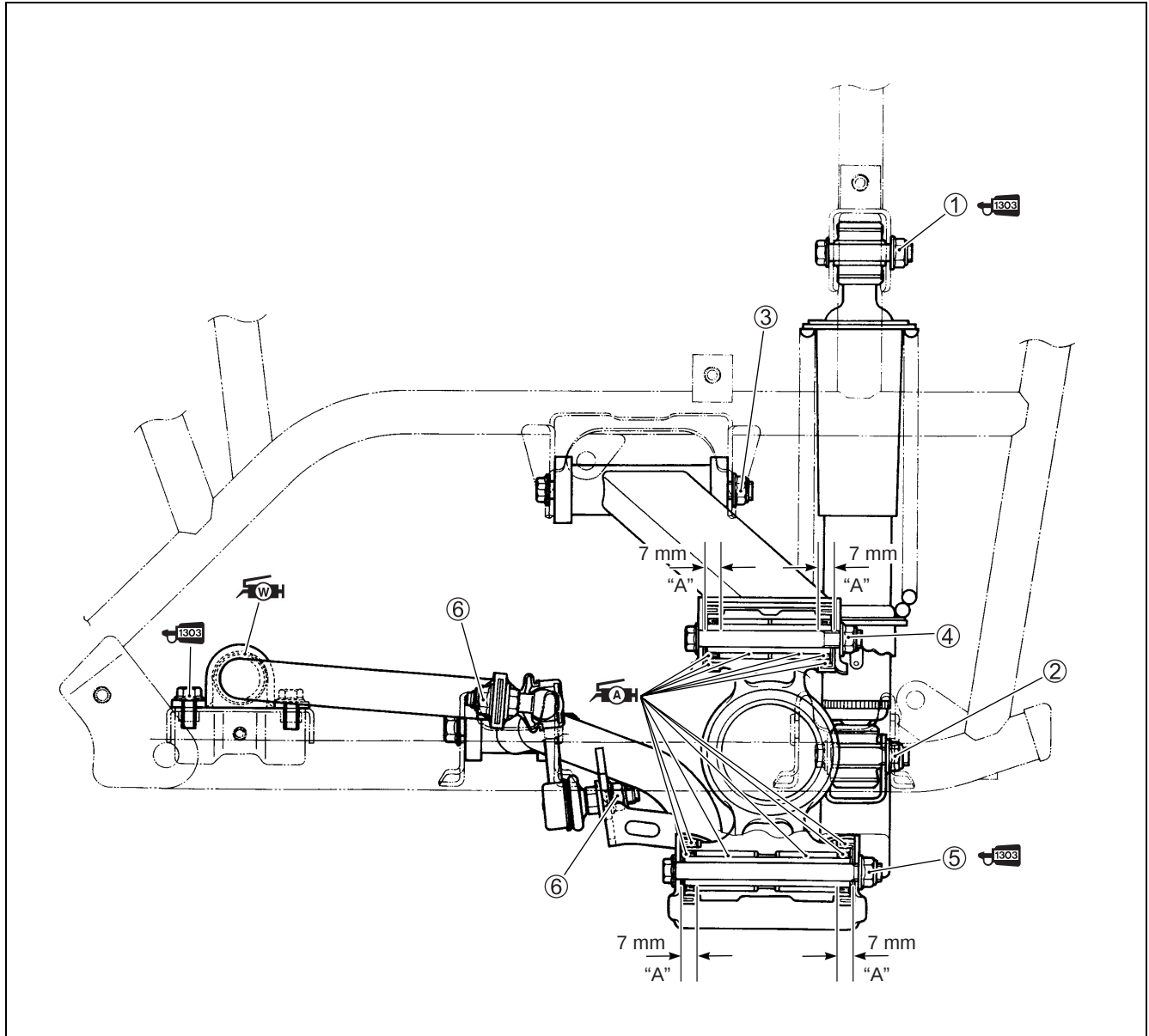
: Apply grease to the inside bush, dust seal and seal.

"A" : Press fitting position of the bush.



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REAR SUSPENSION REASSEMBLING INFORMATION



ITEM	N·m	kgf-m	lb-ft
①	60	6.0	43.5
②	60	6.0	43.5
③	60	6.0	43.5

ITEM	N·m	kgf-m	lb-ft
④	60	6.0	43.5
⑤	60	6.0	43.5
⑥	34	3.4	24.5



: Apply grease to the inside bush, dust seal and seal.

"A" : Press fitting position of the bush.

FUEL LEVEL GAUGE INSPECTION

- Remove the fuel pump assembly.
- Measure the resistance at each fuel level gauge float position. If the resistance is incorrect, replace the fuel pump assembly with a new one.

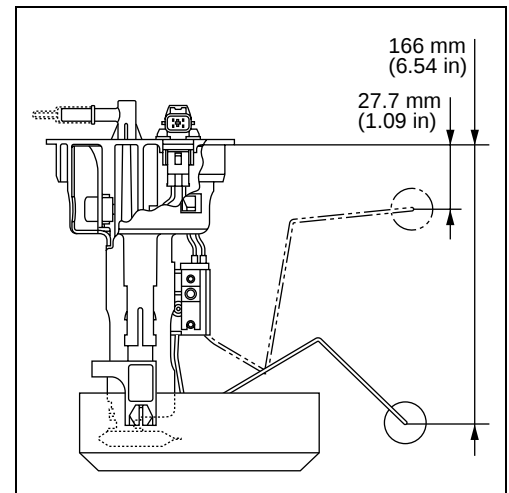
Float position	Resistance
27.7 mm (1.09 in)	6.4 – 8.4 Ω
166 mm (6.54 in)	216 – 222 Ω



09900-25008: Multi circuit tester set



Tester knob indication: Resistance (Ω)



LT-A450XK9 ('09-MODEL)

This chapter describes the service specifications, service data and servicing procedures which differ from those of the LT-A450XK8 ('08-MODEL).

NOTE:
* Any differences between the LT-A450XK8 ('08-MODEL) and LT-A450XK9 ('09-MODEL) in specifications are clearly indicated with an asterisk (*) mark.
* Please refer to the chapters 1 through 12 for details which are not given in this chapter.

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SPECIFICATIONS (LT-A450XK9)

DIMENSIONS AND CURB MASS

Overall length	2 115 mm (83.3 in)	P-28, 33
	2 135 mm (84.1 in)	P-17, 24
Overall width	1 210 mm (47.6 in)	P-28, 33
	1 250 mm (49.2 in)	P-17, 24
Overall height	1 215 mm (47.8 in)	
Wheelbase	1 280 mm (50.4 in)	
Ground clearance	260 mm (10.2 in)	
Seat height	860 mm (33.9 in)	
* Curb mass	305 kg (672 lbs)	P-28, 33
	307 kg (676 lbs)	P-17, 24
Front track	930 mm (36.6 in)	
Rear track	940 mm (37.0 in)	

ENGINE

Type	4-stroke, liquid-cooled, OHC
Number of cylinders	1
Bore	84.0 mm (3.0307 in)
Stroke	82.0 mm (3.228 in)
Displacement	454 cm ³ (27.7 cu. in)
Compression ratio	10.0 : 1
Fuel system	Fuel injection
Air cleaner	Non-woven fabric element
Starter system	Electric & recoil starter
Lubrication system	Wet sump
Idle speed	1 500 ± 100 r/min

DRIVE TRAIN

Clutch	Wet shoe, automatic, centrifugal type
Transmission	Automatic variable ratio (V-belt)
Transfer	2-speed forward with reverse
Gearshift pattern, Transmission	Automatic
Transfer	L-H-N-R (Hand operated)
Primary reduction ratio (Automatic drive)	2.902 – 0.779 (Variable change)
Secondary reduction ratio	2.733 (41/19 × 19/15)
Final reduction ratio (Front & Rear)	3.600 (36/10)
Transfer gear ratio, Low	2.562 (41/16)
High	1.240 (31/25)
Reverse	2.000 (32/16)
Drive system	Shaft drive

CHASSIS

Front suspension	Independent, double wishbone, coil spring, oil damped
Rear suspension	Independent, double wishbone, coil spring, oil damped
Front wheel travel	180 mm (7.1 in)
Rear wheel travel	200 mm (7.9 in)
Caster	1.6°
Trail	3.4 mm (0.13 in)
Toe-out	12 mm (0.47 in)
Camber	0.64°
Steering angle	46° (right & left)
Turning radius	3.1 m (10.2 ft)
Front brake	Disc brake, twin
Rear brake	Sealed oil-bathed multi-disc
Front tire size	AT25 × 8-12☆☆, tubeless
Rear tire size	AT25 × 10-12☆☆, tubeless

ELECTRICAL

Ignition type	Electronic ignition (CDI)
Ignition timing	7° B.T.D.C. at 1 500 r/min
Spark plug	NGK CR6E or DENSO U20ESR-N
Battery	12V 43.2kC (12Ah)/10HR
Generator	Three-phase A.C. generator
Main fuse	30 A
Fuse	10/10/10/10/15/15 A
Headlight	12 V 35/35 W × 2
Brake light/Tailight	12 V 21/5 W
Reversing light	12 V 21 W P-17
Speedometer light	LED
Coolant temperature/Fi indicator light	LED
Neutral indicator light	LED
High beam indicator light	LED P-17
Reverse indicator light	LED
Difflock indicator light	LED

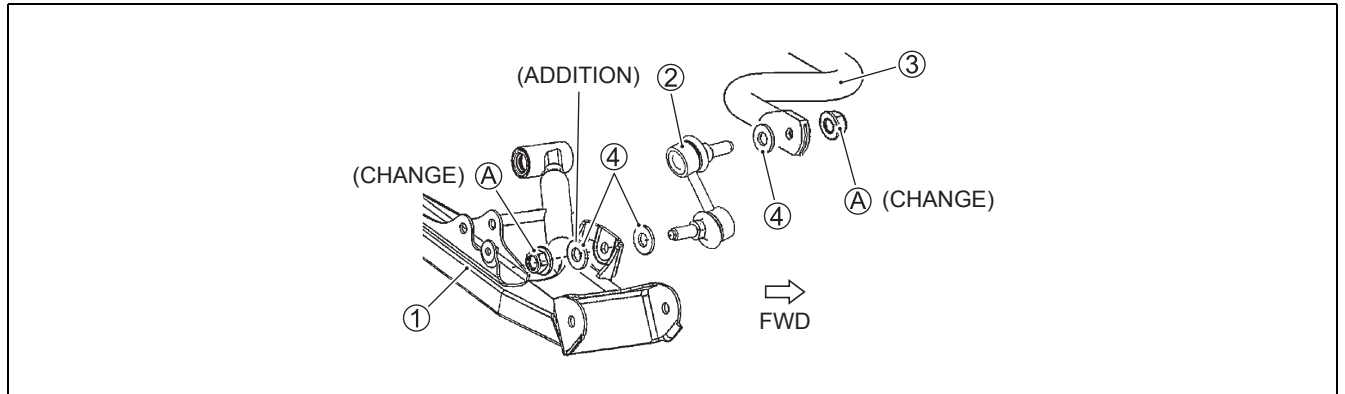
CAPACITIES

Fuel tank	17.5 L (4.6/3.8 US/Imp gal)
Engine oil, Oil change	2 500 ml (2.6/2.2 US/Imp qt)
With filter change	2 700 ml (2.9/2.4 US/Imp qt)
Overhaul	3 200 ml (3.4/2.8 US/Imp qt)
Differential gear oil	500 ml (16.9/17.6 US/Imp oz)
Final gear oil	770 ml (26.0/27.1 US/Imp oz)
Coolant	2.5 L (2.6/2.2 US/Imp qt)

REAR SUSPENSION

Effective frame No.

From 5SAAL42AX97103961



①	Rear suspension arm (lower)	④	Washer
②	Rear stabilizer joint	Ⓐ	Rear stabilizer joint nut
③	Rear stabilizer		



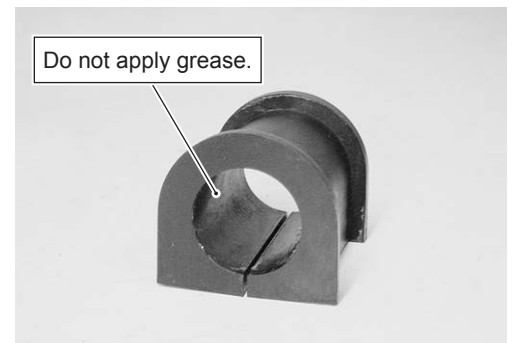
ITEM	N·m	kgf·m	lb·ft
Ⓐ	60	6.0	43.5

REAR STABILIZER BUSH

Effective frame No.

From 5SAAL42A897104381

- Do not apply grease to the inside of the stabilizer bushing.



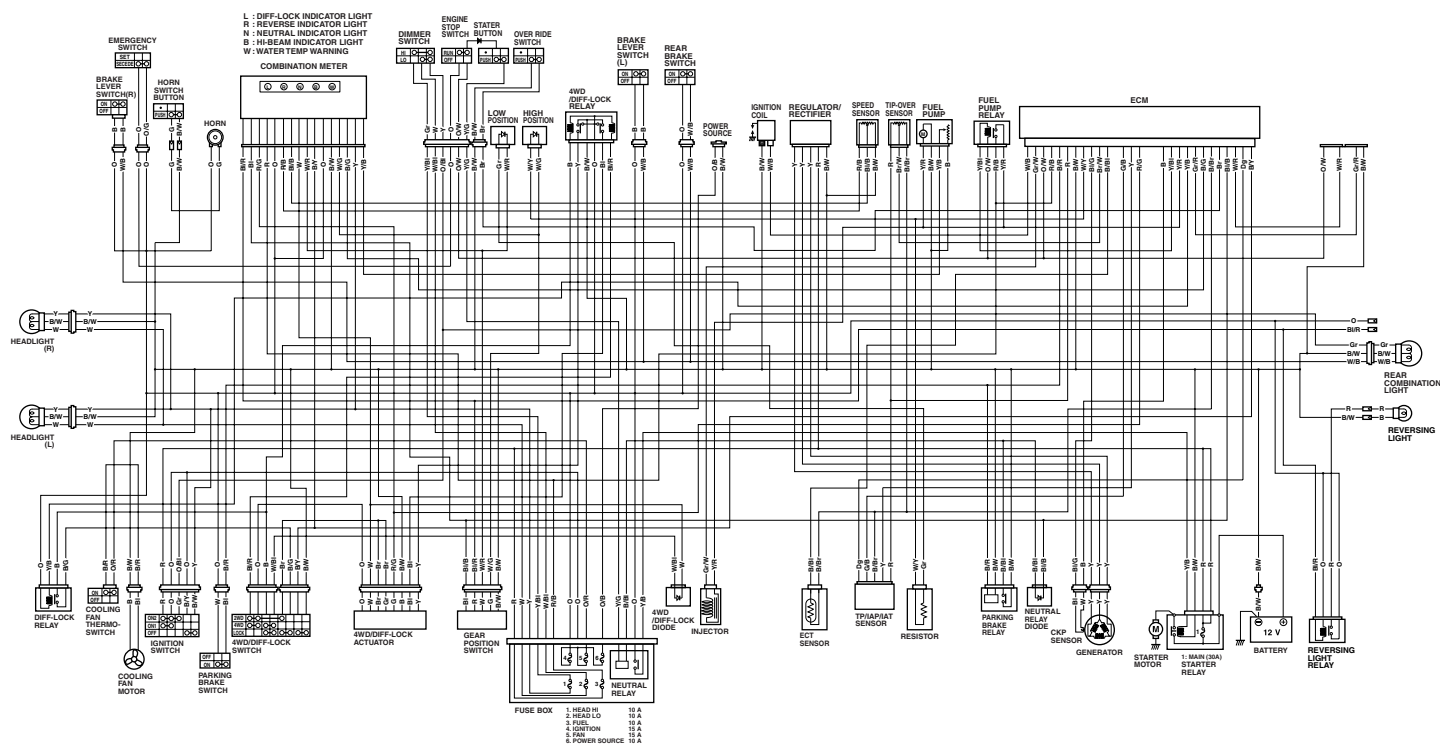
WIRE COLOR

B	: Black	Gr	: Gray
Bl	: Blue	O	: Orange
Br	: Brown	R	: Red
Dg	: Dark green	W	: White
G	: Green	Y	: Yellow

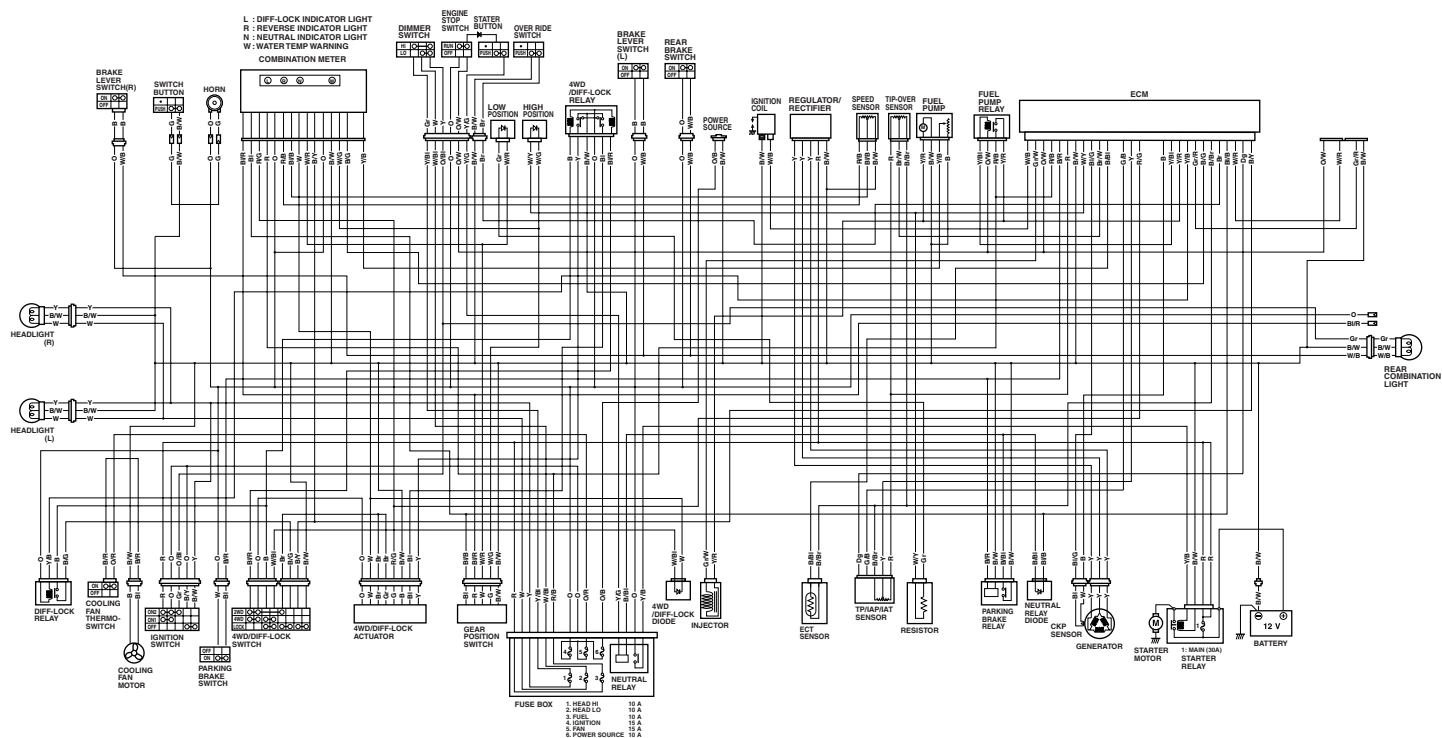
B/Bl	: Black with Blue tracer
B/Br	: Black with Brown tracer
B/G	: Black with Green tracer
B/R	: Black with Red tracer
B/W	: Black with White tracer
B/Y	: Black with Yellow tracer
Bl/B	: Blue with Black tracer
Bl/G	: Blue with Green tracer
Bl/R	: Blue with Red tracer
Br/W	: Brown with White tracer
G/B	: Green with Black tracer
Gr/R	: Gray with Red tracer
Gr/W	: Gray with White tracer
O/B	: Orange with Black tracer
O/Bl	: Orange with Blue tracer
O/G	: Orange with Green tracer
O/R	: Orange with Red tracer
O/W	: Orange with White tracer
O/Y	: Orange with Yellow tracer
R/B	: Red with Black tracer
R/G	: Red with Green tracer
W/B	: White with Black tracer
W/Bl	: White with Blue tracer
W/G	: White with Green tracer
W/R	: White with Red tracer
W/Y	: White with Yellow tracer
Y/B	: Yellow with Black tracer
Y/Bl	: Yellow with Blue tracer
Y/G	: Yellow with Green tracer
Y/R	: Yellow with Red tracer

WIRING DIAGRAM For Sweden Model

Wiring diagram wire color, refer to section "WIRE COLOR".



For Australia Model



For Canada, USA Models

