SUZUKI

GW250

SERVICE MANUAL

99500-32170-01E

FOREWORD

This manual contains an introductory description on the SUZUKI GW250 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 motorcycle 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 motorcycle 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 motorcycle.*
- ** Illustrations in this manual are used to show the basic principles of operation and work procedures. They may not represent the actual motorcycle exactly in detail.*
- ** This manual is written for persons who have enough knowledge, skills and tools, including special tools, for servicing SUZUKI motorcycles. If you do not have the proper knowledge and tools, ask your authorized SUZUKI motorcycle dealer to help you.*

⚠ WARNING

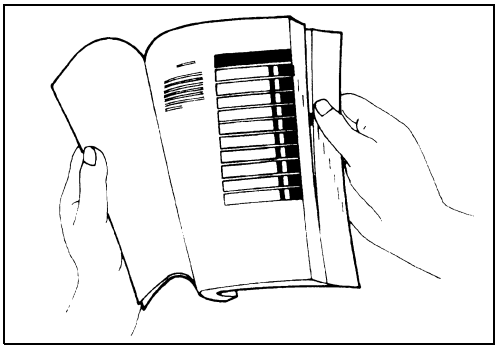
Inexperienced mechanics or mechanics without the proper tools and equipment may not be able to properly perform the services described in this manual.
Improper repair may result in injury to the mechanic and may render the motorcycle unsafe for the rider and passenger.

SUZUKI MOTOR CORPORATION

GROUP INDEX

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.

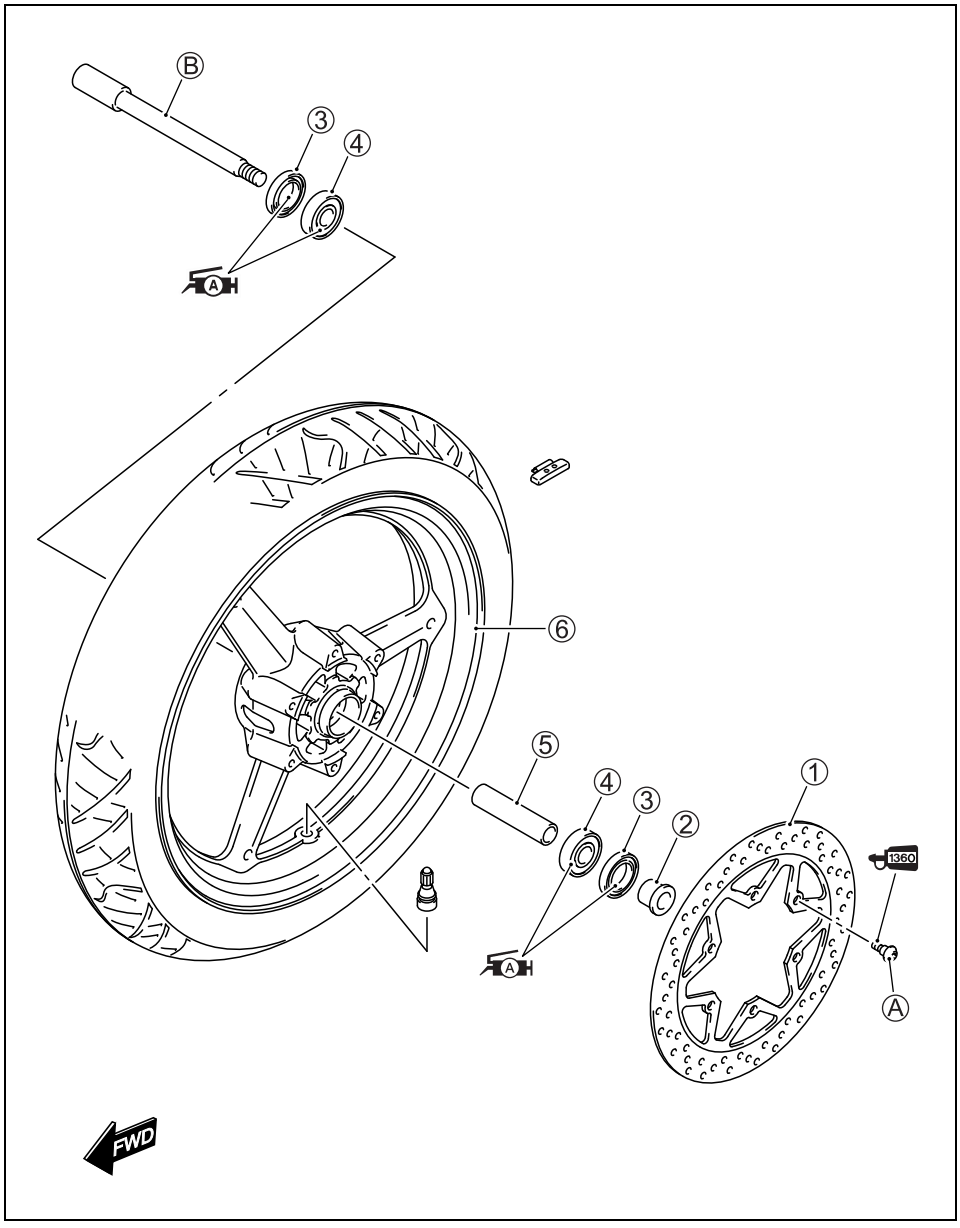


COMPONENT PARTS AND WORK TO BE DONE

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: Front wheel

①	Brake disc
②	Collar
③	Dust seal
④	Bearing
⑤	Spacer
⑥	Front wheel
Ⓐ	Front axle
Ⓑ	Brake disc bolt

ITEM	N·m	kgf-m	lbf-ft
Ⓐ	18	1.8	13.0
Ⓑ	65	6.5	47.0



SYMBOL MARKS AND MATERIALS

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

SYMBOL	DEFINITION	SYMBOL	DEFINITION
	Torque control required. Data beside it indicates specified torque.		Use SUZUKI SUPER LONG LIFE COOLANT (BLUE). 99000-99032-20X
			Use SUZUKI LONG LIFE COOLANT (GREEN) or equivalent. 99000-99032-12X
	Apply oil. Use engine oil or transmission oil unless otherwise specified.		Use SUZUKI FORK OIL G10 or equivalent. 99000-99001-G10
	Apply molybdenum oil solution. (Mixture of engine oil and SUZUKI MOLY PASTE in a ratio of 1:1)		Apply or use brake fluid.
	Apply SUZUKI SUPER GREASE “A” or equivalent. 99000-25010		Measure in voltage range.
	Apply SUZUKI SILICONE GREASE or equivalent. 99000-25100		Measure in current range.
	Apply SUZUKI MOLY PASTE or equivalent. 99000-25140		Measure in resistance range.
	Apply SUZUKI BOND “1207B” or equivalent. 99000-31140		Measure in diode test range.
	Apply THREAD LOCK CEMENT SUPER “1303” or equivalent. 99000-32030		Measure in continuity test range.
	Apply THREAD LOCK CEMENT SUPER “1322” or equivalent. 99000-32110		Use special tool.
	Apply THREAD LOCK CEMENT SUPER “1360” or equivalent. 99000-32130		Indication of service data.
	Apply THREAD LOCK CEMENT SUPER“1342” or equivalent. 99000-32050		

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
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
CLP Switch	: Clutch Lever Position Switch (Clutch Switch)
CO	: Carbon Monoxide
CPU	: Central Processing Unit

D

DC	: Direct Current
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
FWD	: Forward

G

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

H

HC	: Hydrocarbons
HO2 Sensor	: Heated Oxygen Sensor (HO2S)

I

IAP Sensor	: Intake Air Pressure Sensor (IAPS) (MAP Sensor)
IAT Sensor	: Intake Air Temperature Sensor (IATS)
IG	: Ignition
ISC Valve	: Idle Speed Control Valve (ISCV)

J

JASO	: Japanese Automobile Standards Organization

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
OPS	: Oil Pressure Switch

P

PAIR	: Pulsed Secondary Air Injection
PCM	: Power control module
PCV	: Positive Crankcase Ventilation (Crankcase Breather)

R

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)

WIRE COLOR

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

B/Bl	: Black with Blue tracer	O/Bl	: Orange with Blue tracer
B/Br	: Black with Brown tracer	O/R	: Orange with Red tracer
B/G	: Black with Green tracer	O/W	: Orange with White tracer
B/R	: Black with Red tracer	O/Y	: Orange with Yellow tracer
B/W	: Black with White tracer	R/B	: Red with Black tracer
B/Y	: Black with Yellow tracer	R/Y	: Red with Yellow tracer
Bl/G	: Blue with Green tracer	W/B	: White with Black tracer
Bl/W	: Blue with White tracer	W/R	: White with Red tracer
Bl/Y	: Blue with Yellow tracer	Y/G	: Yellow with Green tracer
Br/Y	: Brown with Yellow tracer	Y/R	: Yellow with Red tracer
G/Y	: Green with Yellow tracer	Y/W	: Yellow with White tracer
O/B	: Orange with Black tracer		

GENERAL INFORMATION

1

CONTENTS

COUNTRY AND AREA CODES

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

CODE	COUNTRY or AREA	EFFECTIVE FRAME NO.
P-12	Indonesia	LC6GJ55B0C1 100001 –
P-21	E.U.	LC6DC111101 100001 –
P-24	Australia	LC6DC111201 100001 –
P-71	Mexico	LC6GJ55E D1 100001 –

WARNING/CAUTION/NOTICE/NOTE

Please read this manual and follow its instructions carefully. To emphasize special information, the symbol and the words WARNING, CAUTION, NOTICE 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 motorcycle damage.

NOTICE

Indicates a potential hazard that could result in motorcycle or equipment 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 motorcycle. In addition to the WARNINGS, CAUTIONS and NOTICES 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

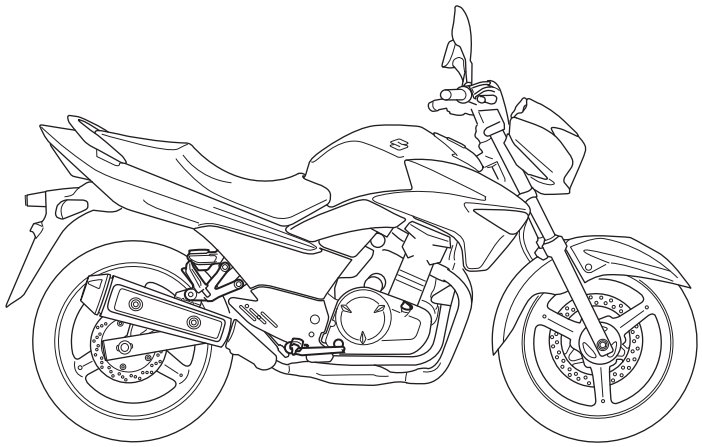
⚠ WARNING

- **Proper service and repair procedures are important for the safety of the service mechanic and the safety and reliability of the motorcycle.**
- **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.**
- **To avoid getting burned, do not touch the engine, engine oil, radiator and exhaust system until they have cooled.**

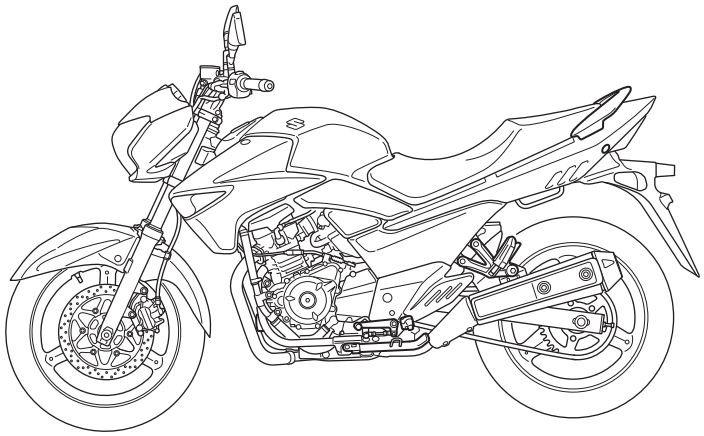
NOTICE

*** Never use gasoline as a cleaning solvent.**
*** After servicing the fuel, oil, water, exhaust or brake systems, check all lines and fittings related to the system for leaks.**
*** 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 motorcycle and parts.**

SUZUKI GW250L3 ('13-MODEL)



RIGHT SIDE

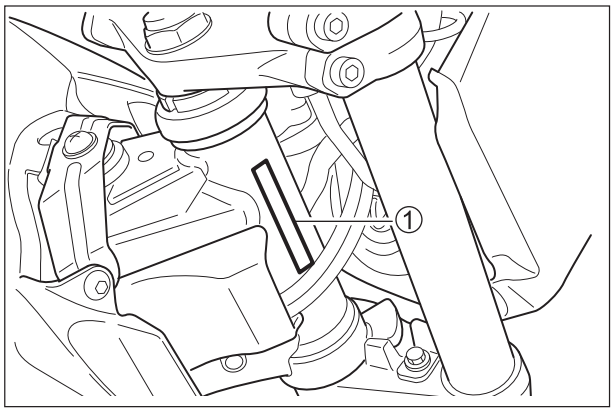


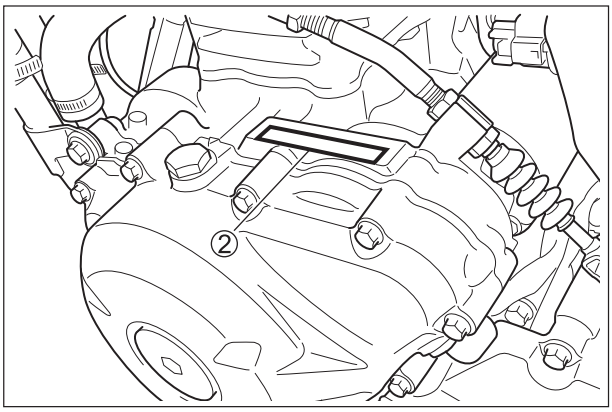
LEFT SIDE

NOTE:
Difference between illustration and actual motorcycle 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 right side of the steering head pipe. The engine serial number ② is located on the left side of the crankcase. These numbers are required especially for registering the machine and ordering spare parts.





FUEL, OIL AND ENGINE COOLANT RECOMMENDATION

FUEL

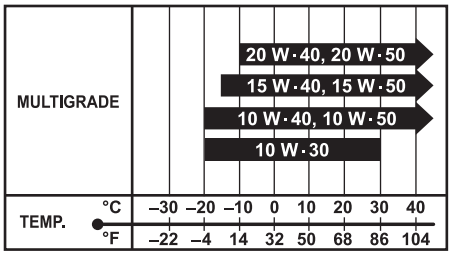
Gasoline used should be graded 91 octane (Research Method) or higher. Unleaded gasoline is recommended.

ENGINE OIL

Oil quality is a major contributor to your engine's performance and life. Always select good quality engine oil.
Use oil with an API (American Petroleum Institute) classification of SG or higher with a JASO classification of MA.

SAE	API	JASO
10W-40	SG or higher	MA

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.



Suzuki does not recommend the use of "ENERGY CONSERVING" and "RESOURCE CONSERVING" oils.

Recommend

"Donut" without "ENERGY CONSERVING" nor "RESOURCE CONSERVING"

No recommend

"Donut" with "ENERGY CONSERVING"

No recommend

"Donut" with "RESOURCE CONSERVING"

BRAKE FLUID

Specification and classification: DOT 4

⚠ WARNING

Since the brake system of this motorcycle 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.

FRONT FORK OIL

Use SUZUKI FORK OIL G10 or equivalent.

ENGINE COOLANT RECOMMENDATION

RECOMMENDED ENGINE COOLANT

The factory filled engine coolant of this vehicle is SUZUKI super long life coolant (Blue). It is recommended to use this SUZUKI super long life coolant when replenishing or charging the engine coolant.
SUZUKI super long life coolant (Blue) as supply part is already diluted to the 50 percentage with deionized water. Use it as it is without diluting.
SUZUKI recommends to use following coolants in that order.

1) SUZUKI super long life coolant (Blue)
2) SUZUKI long life coolant (Green) or equivalent

ENGINE COOLANT

Use an anti-freeze/engine coolant compatible with an aluminum radiator.
There are two types of engine coolant: one used after diluting with distilled water and the other used as it is (without diluting). SUZUKI super long life coolant is the latter type and SUZUKI long life coolant is the former type.

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.

LIQUID AMOUNT OF WATER/ENGINE COOLANT

Solution capacity (total): Approx. 1 350 ml (1.4/1.2 US/Imp qt)

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

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:

Initial 800 km (500 miles): Below 5 500 r/min
Up to 1 600 km (1 000 miles): Below 8 250 r/min
Over to 1 600 km (1 000 miles): Below 11 000 r/min

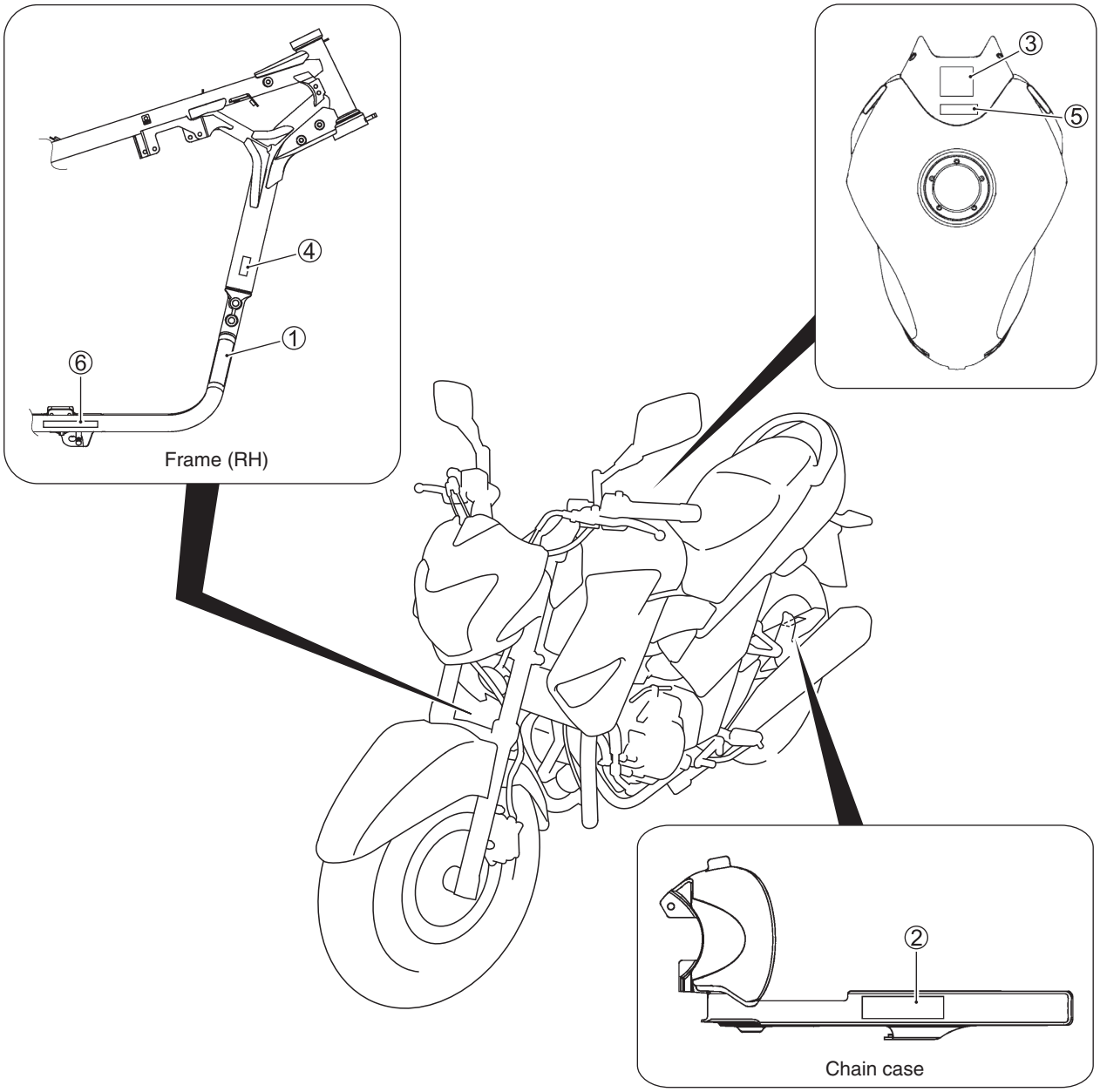
- Upon reaching an odometer reading of 1 600 km (1 000 miles) you can subject the motorcycle to full throttle operation.
  However, do not exceed 11 000 r/min at any time.

CYLINDER IDENTIFICATION

The two cylinders of this engine are identified as #1 and #2 cylinder, as counted from left to right (as viewed by the rider on the seat).

INFORMATION LABELS

NO.	LABEL or PLATE NAME
①	I.D. Plate (For-P21, 24, 71)
②	Tire information label
③	General warning label
④	Brake Approval Label (For-P21, 24)
⑤	Fuel limitation label (For-P12)
⑥	Noise label (For-P24)



SPECIFICATIONS

DIMENSIONS AND CURB MASS

Overall length	2 145 mm (84.4 in)
Overall width	760 mm (29.9 in)
Overall height	1 075 mm (42.3 in)
Wheelbase	1 430 mm (56.3 in)
Ground clearance	165 mm (6.4 in)
Seat height	780 mm (30.7 in)
Curb mass	183 kg (403 lbs)

ENGINE

Type	Four stroke, liquid-cooled, SOHC
Number of cylinders	2
Bore	53.5 mm (2.106 in)
Stroke	55.2 mm (2.173 in)
Displacement	248 cm^3 (15.1 cu. in)
Compression ratio	11.5 : 1
Fuel system	Fuel injection
Air cleaner	Non-woven fabric element
Starter system	Electric
Lubrication system	Wet sump
Idle speed	1 400 ± 100 r/min

DRIVE TRAIN

Clutch		Wet multi-plate type
Transmission		6-speed constant mesh
Gearshift pattern		1-down, 5-up
Primary reduction ratio		3.238 (68/21)
Gear ratios,	Low	2.417 (29/12)
	2nd	1.529 (26/17)
	3rd	1.182 (26/22)
	4th	1.043 (24/23)
	5th	0.909 (20/22)
	Top	0.808 (21/26)
Final reduction ratio		3.286 (46/14)
Drive chain		DID520VF, 116 links

CHASSIS

Front suspension	Telescopic, coil spring, oil damped
Rear suspension	Swingarm type, coil spring, oil damped
Front fork stroke	120 mm (4.7 in)
Rear wheel travel	125 mm (4.9 in)
Steering angle	40°
Caster	26°
Trail	105 mm (4.13 in)
Turning radius	2.5 m (8.2 ft)
Front brake	Disc brake
Rear brake	Disc brake
Front tire size	110/80-17 M/C 57H, tubeless
Rear tire size	140/70-17 M/C 66H, tubeless

ELECTRICAL

Ignition type	Electronic ignition (Transistorized)
Ignition timing	10° CA B.T.D.C.at 1 400 r/min
Spark plug	NGK CR7E or DENSO U22ESR-N
Battery	12 V 36.0 kC (8 Ah)/10 HR
Generator	Three-phase A.C. generator
Main fuse	30 A
Fuse	10/10/10/15 A
Headlight	12 V 60/55 W
Position light	12 V 5 W × 2
Turn signal light	12 V 10 W
License plate light	12 V 5 W
Brake/Tail light	12 V 21/5 W
Combination meter light	LED
Neutral indicator light	LED
High beam indicator light	LED
Turn signal indicator light	LED
Oil pressure/Coolant temperature/Fuel injection warning light	LED
Engine rpm indicator light	LED

CAPACITIES

Fuel tank, including reserve	13.3 L (3.5/2.9 US/Imp gal)
Engine oil, oil change	2 100 ml (2.2/1.8 US/Imp qt)
with filter change	2 400 ml (2.5/2.1 US/Imp qt)
overhaul	2 400 ml (2.5/2.1 US/Imp qt)
Coolant	1 350 ml (1.4/1.2 US/Imp qt)

These specifications are subject to change without notice.

PERIODIC MAINTENANCE

CONTENTS

PERIODIC MAINTENANCE SCHEDULE

The chart below lists the recommended intervals for all the required periodic service work necessary to keep the motorcycle operating at peak performance and economy. Mileages are expressed in terms of kilometers, miles and time for your convenience.

NOTE:
More frequent servicing may be required on motorcycles that are used under severe conditions.

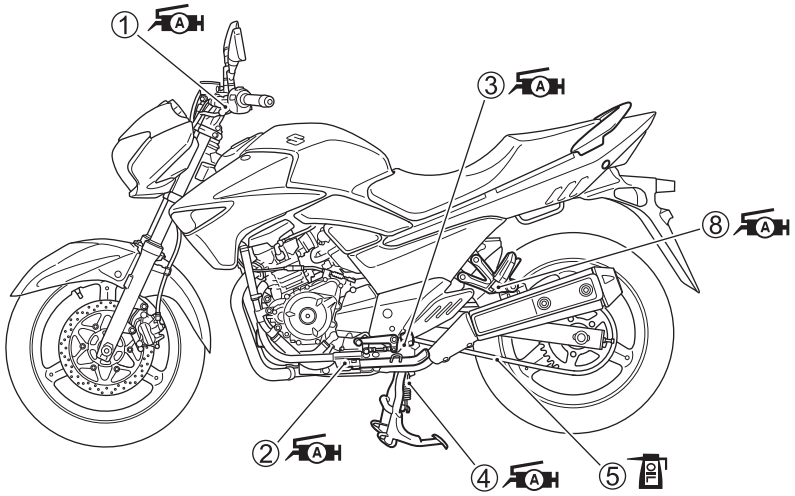
PERIODIC MAINTENANCE CHART

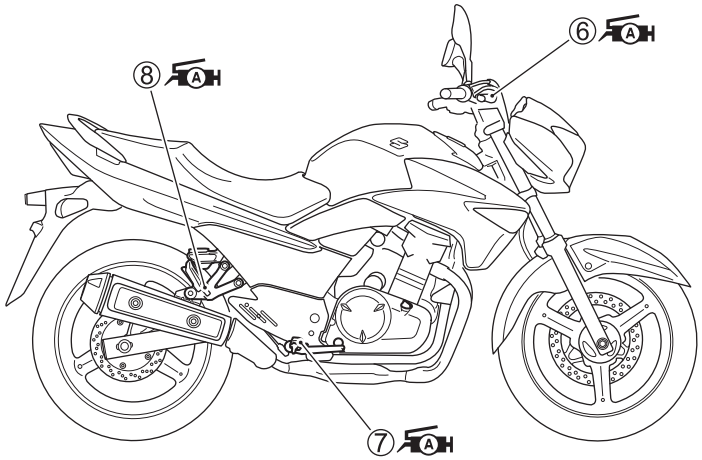
Item \ Interval		km	1 000	5 000	10 000	15 000
		miles	600	3 000	6 000	9 000
		months	3	15	30	45
Air cleaner element			—	I	I	R
Exhaust pipe bolts and muffler bolts			T	—	T	—
Valve clearance			I	I	I	I
Spark plugs			—	I	R	I
Fuel line			—	I	I	I
Engine oil			R	R	R	R
Engine oil filter			R	—	R	—
Throttle cable play			I	I	I	I
Idle speed			I	I	I	I
PAIR (air supply) system			—	I	—	I
Engine coolant	SUZUKI SUPER LONG LIFE COOLANT (Blue)		Replace every 16 000 km (9 600 miles) or 48 months.			
	SUZUKI LONG LIFE COOLANT (Green) or other than SUZUKI SUPER LONG LIFE COOLANT (Blue)		Replace every 8 000 km (5 000 miles) or 24 months.			
Radiator hoses			—	I	I	I
Clutch cable play			I	I	I	I
Drive chain			I	I	I	I
			Clean and lubricate every 1 000 km (600 miles).			
Brakes			I	I	I	I
Brake fluid			—	I	I	I
			Replace every 2 years.			
Brake hoses			—	I	I	I
			Replace every 4 years.			
Tires			—	I	I	I
Steering			I	—	I	—
Front forks			—	—	I	—
Rear suspension			—	—	I	—
Chassis bolts and nuts			T	T	T	T

NOTE:
I = Inspect and clean, adjust, replace or lubricate as necessary, R = Replace, T = Tighten

LUBRICATION POINTS

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





①	Clutch lever pivot	⑤	Drive chain
②	Side-stand pivot and spring hook	⑥	Brake lever pivot
③	Gearshift lever pivot and front footrest pivot	⑦	Brake pedal pivot and front footrest pivot
④	Center stand pivot and spring hook (For P12)	⑧	Pillion footrest

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 whenever the motorcycle has been operated under wet or rainy conditions.*

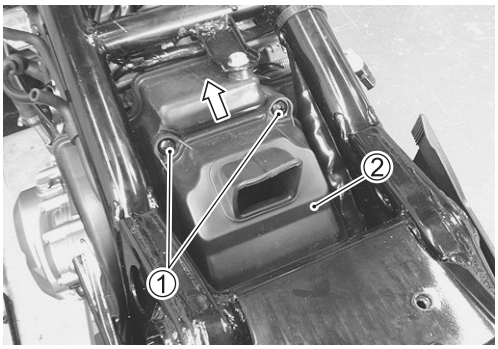
MAINTENANCE AND TUNE-UP PROCEDURES

This section describes the servicing procedures for each item of the Periodic Maintenance requirements.

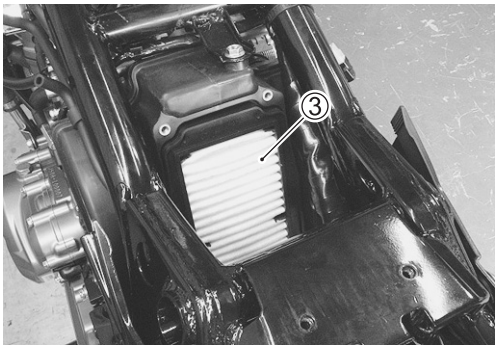
AIR CLEANER

Inspect every 5 000 km (3 000 miles, 15 months).
Replace every 15 000 km (9 000 miles, 45 months).

- Remove the fuel tank. (☞5-2)
- Remove the screws ① and slide the air cleaner cover ② upward.

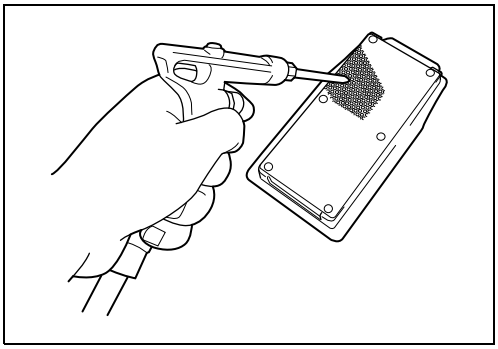


- Remove the air cleaner element ③.



- Carefully use air hose to blow the dust from the cleaner element.

NOTE:
Always use air pressure on the throttle body side of the air cleaner element. If air pressure is used on the other side, dirt will be forced into the pores of the air cleaner element thus restricting air flow through the air cleaner element.

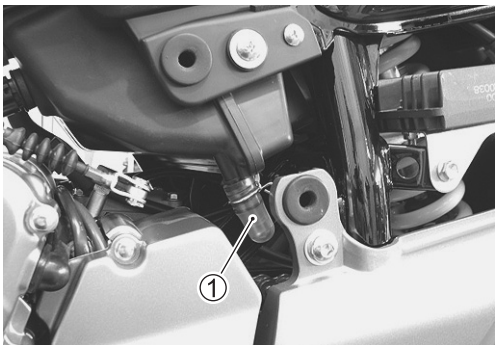


- Install the cleaned element or new air cleaner element in the reverse order of removal.

NOTE:
If driving under dusty conditions, clean the air cleaner element more frequently. Make sure that the air cleaner is in good condition at all times. The life of the engine depends largely on this component.

DRAIN PLUG

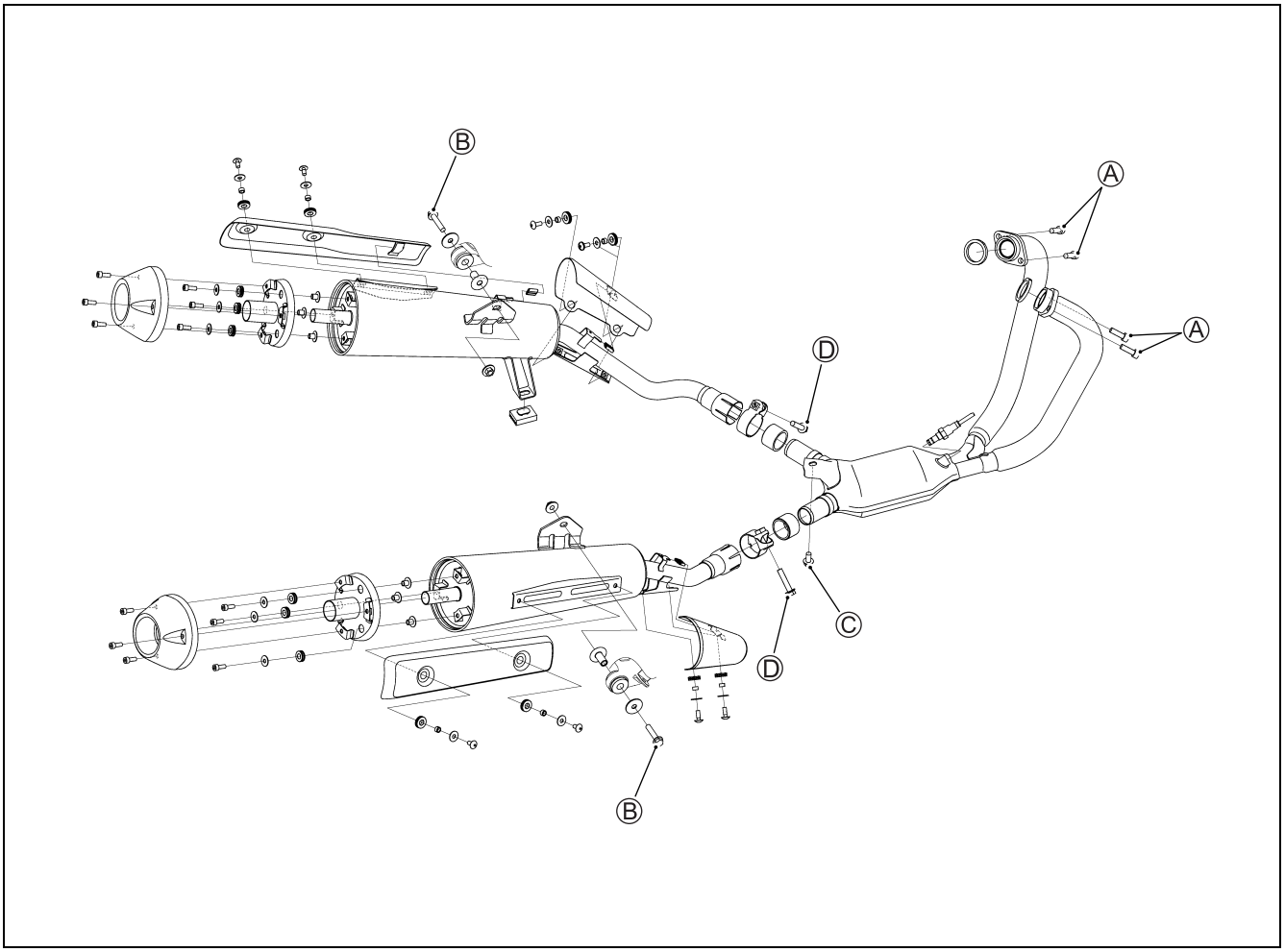
- Remove the left frame cover. (☞8-4)
- Drain water by removing the drain plug ①.



EXHAUST PIPE BOLTS AND MUFFLER BOLTS

Tighten initially at 1 000 km (600 miles, 3 months) and every 10 000 km (6 000 miles, 30 months) thereafter.

- Tighten the exhaust pipe bolts, muffler support bolts, muffler chamber support bolt and exhaust connecting bolts to the specified torque.



Ⓐ	Exhaust pipe bolt
Ⓑ	Muffler support bolt
Ⓒ	Muffler chamber support bolt
Ⓓ	Exhaust connecting bolt

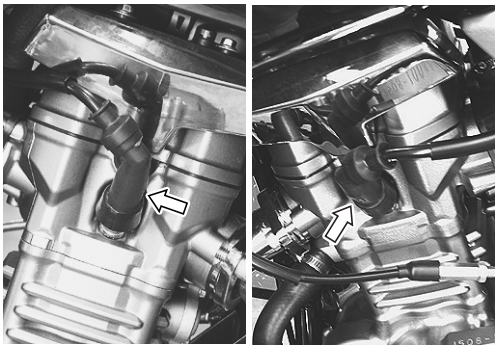
ITEM	N·m	kgf-m	lbf-ft
Ⓐ	23	2.3	16.5
Ⓑ	23	2.3	16.5
Ⓒ	23	2.3	16.5
Ⓓ	17	1.7	12.5

SPARK PLUGS

Inspect every 5 000 km (3 000 miles, 15 months).
Replace every 10 000 km (6 000 miles, 30 months).

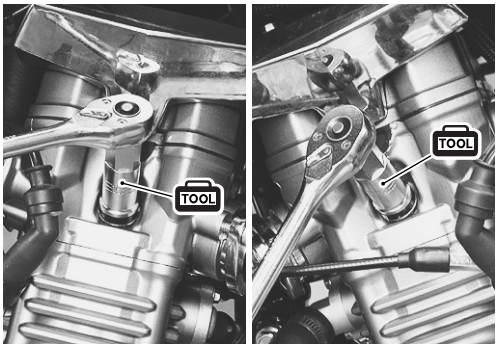
REMOVAL

- Disconnect the spark plug caps.



- Remove the spark plugs.

TOOL **09930-10121: Spark plug wrench set**



HEAT RANGE

- Check spark plug heat range by observing electrode color. If the electrode of the spark plug is wet appearing or dark color, replace the spark plug with hotter type one. If it is white or glazed appearing, replace the spark plug with colder type one.

	Hot type	Standard	Cold type
NGK	CR6E	CR7E	CR8E
ND	U20ESR-N	U22ESR-N	U24ESR-N

CARBON DEPOSITS

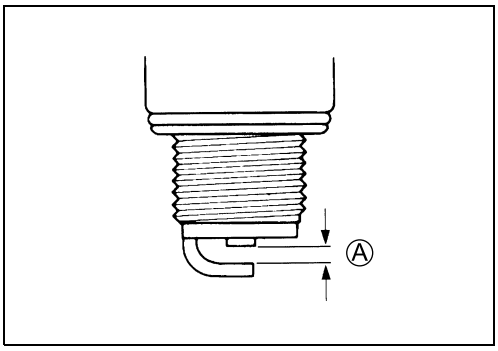
- Check carbon deposits on the spark plug.
- If carbon is deposited, remove it using a spark plug cleaner machine.

SPARK PLUG GAP

- Measure the spark plug gap Ⓐ with a thickness gauge.
- Adjust the spark plug gap if necessary.

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

TOOL **09900-20803: Thickness gauge**



ELECTRODE'S CONDITION

- Check the condition of the electrode.
- If it is extremely worn or burnt, replace the spark plug. Replace the spark plug if it has a broken insulator, damaged thread, etc.

NOTICE

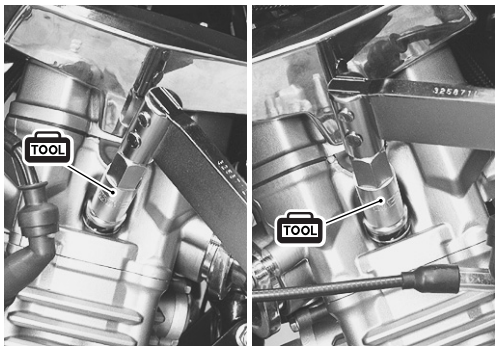
Confirm the thread size and reach when replacing the plug. If the reach is too short, carbon will be deposited on the screw portion of the plug hole and engine damage may result.

INSTALLATION

- Screw the spark plugs into the cylinder head with fingers, and then tighten them to the specified torque.

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

09930-10121: Spark plug wrench set



NOTICE

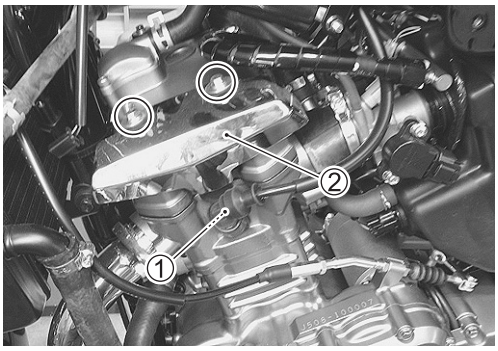
Do not cross thread or over tighten the spark plug, or such an operation will damage the aluminum threads of the cylinder head.

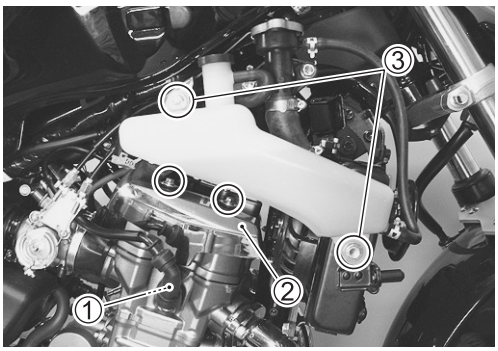
- Connect the spark plug caps.

VALVE CLEARANCE

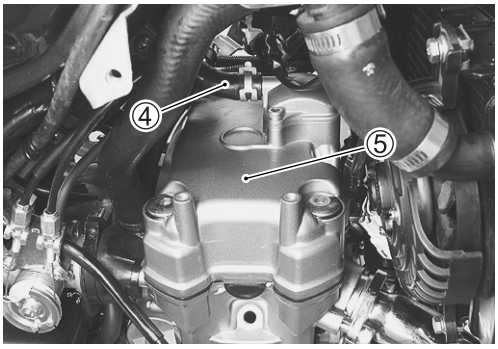
Inspect initially at 1 000 km (600 miles, 3 months) and every 5 000 km (3 000 miles, 15 months) thereafter.

- Remove the fuel tank covers. (☞8-5)
- Remove the spark plugs ①. (☞2-6)
- Remove the cylinder head caps ② and reservoir tank mounting bolts ③.





- Disconnect the PAIR hose ④ and remove the cylinder head cover ⑤. (☞3-12)

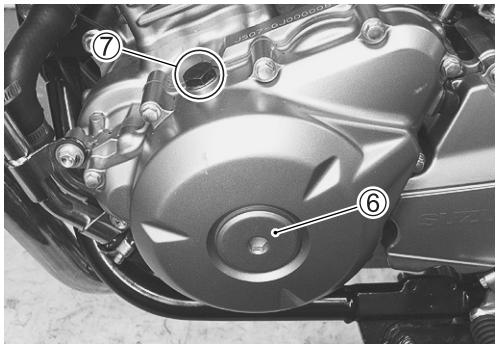


The valve clearance specification is different for intake and exhaust valves. Valve clearance must be checked and adjusted, 1) at the time of periodic inspection, 2) when the valve mechanism is serviced, and 3) when the camshafts are removed for servicing.

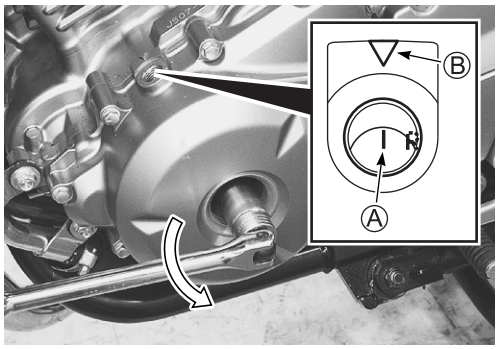
DATA **Valve clearance (when cold):**
Standard: IN. : 0.05 – 0.10 mm (0.002 – 0.004 in)
EX.: 0.17 – 0.22 mm (0.007 – 0.009 in)

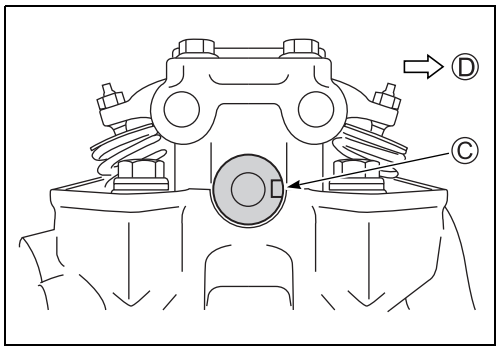
NOTE:
* *The valve clearance should be taken when each cylinder is at Top Dead Center (TDC) of compression stroke.*
* *The clearance specification is for COLD state.*
* *To turn the crankshaft for valve clearance checking, be sure to use a wrench, and rotate in the normal running direction.*

- Remove the generator cover plug ⑥ and valve timing inspection plug ⑦.



- Turn the crankshaft counterclockwise to set the #2 (Right) cylinder at TDC of compression stroke. (Align the "I R" line Ⓐ on the generator rotor to the mark Ⓑ of valve timing inspection hole and also bring the notch Ⓒ on the left end of camshaft to the position as shown.)



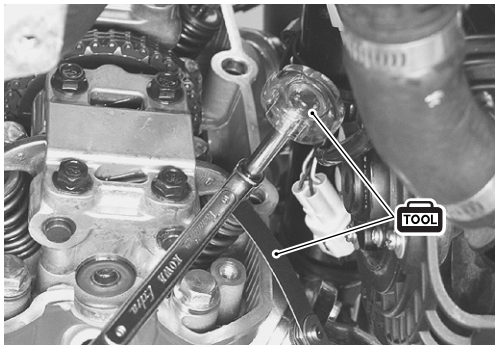


Ⓓ Intake side

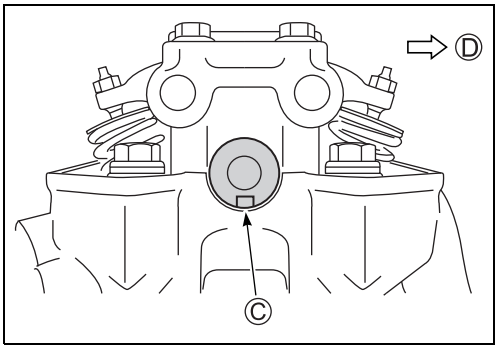
- To inspect the #2 (Right) cylinder valve clearance, use a thickness gauge between the valve stem end and adjusting screw. If the clearance is out of specification, adjust it into the specified range.

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

09900-20803: Thickness gauge
09917-14910: Tappet adjust driver



• Turn the crankshaft counterclockwise 540 degrees (1-1/2 turns) to set the #1 (Left) cylinder at TDC of compression stroke. Bring the notch Ⓒ on the left end of camshaft to the position as shown.

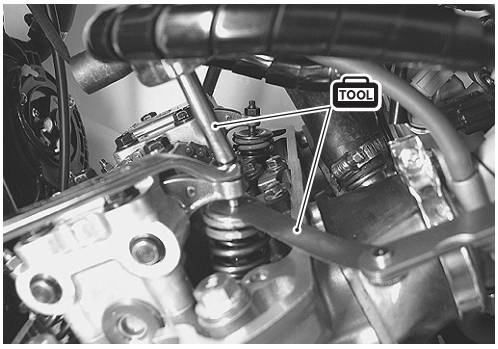


Ⓓ Intake side

• Inspect the #1 (Left) cylinder valve clearance as the same manner of #2 (Right) cylinder and adjust the clearance if necessary.

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

09900-20803: Thickness gauge
09917-14910: Tappet adjust driver



• After finishing the valve clearance adjustment, reinstall the following items.

* Cylinder head cover and cylinder head caps (☞3-93)
* Spark plugs and plug caps (☞2-7)
* Reservoir tank (☞7-7)
* Exterior parts

ENGINE OIL AND OIL FILTER

(ENGINE OIL)
Replace initially at 1 000 km (600 miles, 3 months) and every 5 000 km (3 000 miles, 15 months) thereafter.

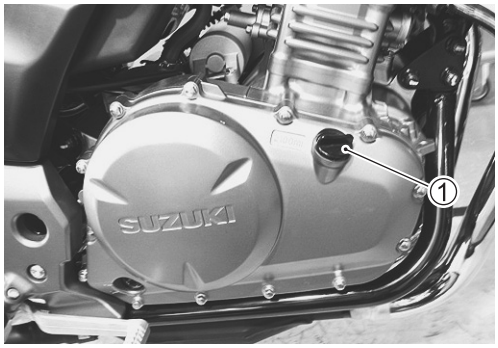
(OIL FILTER)
Replace initially at 1 000 km (600 miles, 3 months) and every 10 000 km (6 000 miles, 30 months) thereafter.

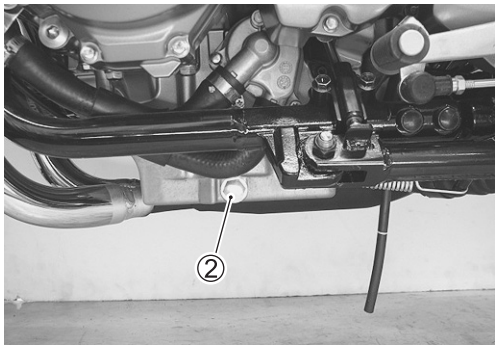
ENGINE OIL REPLACEMENT

- Keep the motorcycle upright.
- Place an oil pan below the engine, and drain oil by removing the filler cap ① and oil drain plug ②.
- Tighten the drain plug ② to the specified torque, and pour new oil through the oil filler. The engine will hold about 2.1 L (2.2/1.8 US/Imp qt) of oil. Use of SG or higher in API with MA in JASO.

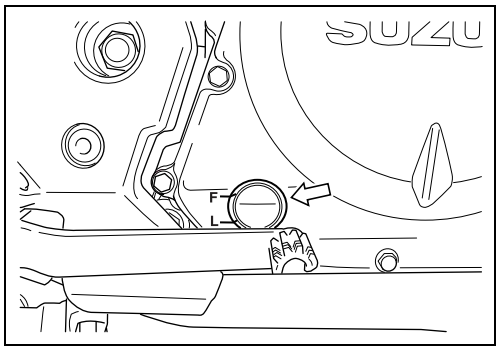
Oil drain plug: 23 N·m (2.3 kgf-m, 16.5 lbf-ft)

- Tighten the filler cap ①.





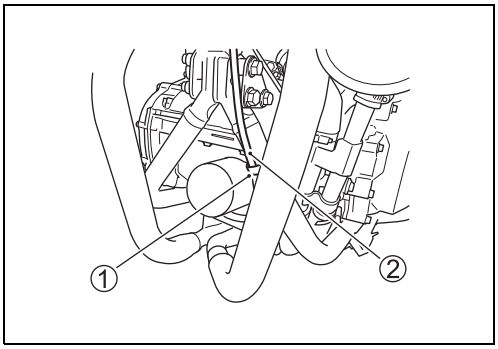
- Start up the engine and allow it to run for several minutes at idling speed.
- Turn off the engine and wait about three minutes.
- Hold the motorcycle vertically and check the oil level through the inspection window. If the level is below mark “L”, add oil to “F” level. If the level is above mark “F”, drain oil to “F” level.



OIL FILTER REPLACEMENT

- Drain the engine oil as described in the engine oil replacement procedure.
- Remove the clamp ① and move the HO2 sensor lead wire ② to left side of the oil filter.

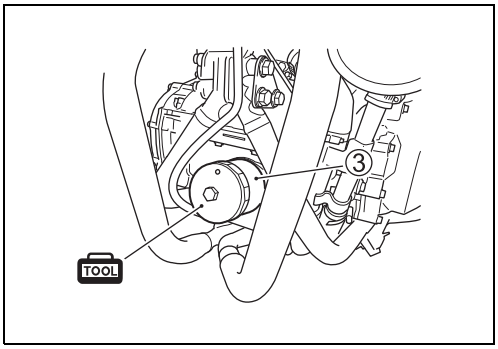
NOTE:
Be careful not to damage the HO2 sensor lead wire by the engine oil.



- Remove the oil filter ③ using the special tool.

TOOL 09915-40620: Oil filter wrench

- Apply engine oil lightly to the gasket of the new oil filter before installation. Wipe off the mounting surface on the engine where the new oil filter will be seated with a clean rag.
- Install the new oil filter. 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) using the special tool.



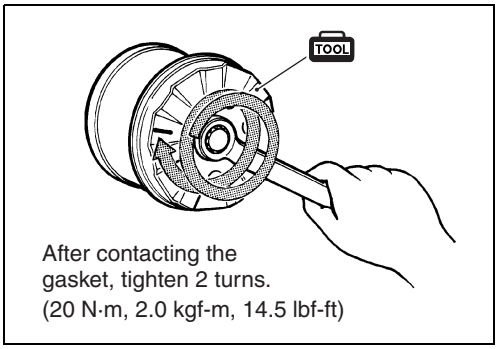
NOTE:
To properly tighten the oil filter, use the special tool. Never tighten the oil filter by hand.

Oil filter: 20 N·m (2.0 kgf-m, 14.5 lbf-ft)

- Add new engine oil and check the oil level is as described in the engine oil replacement procedure.

DATA NECESSARY AMOUNT OF ENGINE OIL:

Oil change	**: 2.1 L (2.2/1.8 US/Imp qt)**
Oil and filter change	**: 2.4 L (2.5/2.1 US/Imp qt)**
Engine overhaul	**: 2.4 L (2.5/2.1 US/Imp qt)**



After contacting the gasket, tighten 2 turns.
(20 N·m, 2.0 kgf-m, 14.5 lbf-ft)

NOTICE

ONLY USE A GENUINE SUZUKI MOTORCYCLE OIL FILTER. Other manufacturer'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 motorcycle.

FUEL LINE

Inspect every 5 000 km (3 000 miles, 15 months).

- Remove the left fuel tank cover. (☞8-5)
- Inspect the fuel feed hose for damage and fuel leakage. If any defects are found, the fuel feed hose must be replaced.

PAIR (AIR SUPPLY) SYSTEM

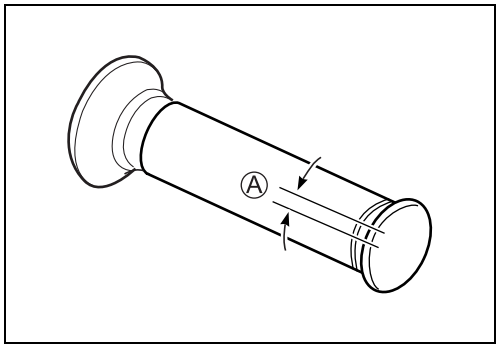
Inspect initially at 5 000 km (3 000 miles, 15 months) and then every 10 000 km (6 000 miles, 30 months) thereafter.

- Inspect the PAIR (air supply) system periodically. (☞11-3)

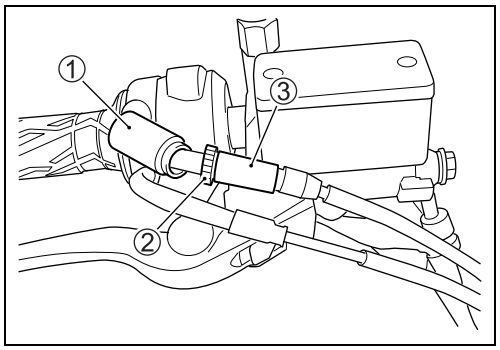
THROTTLE CABLE PLAY

Inspect initially at 1 000 km (600 miles, 3 months) and every 5 000 km (3 000 miles, 15 months) thereafter.

- Adjust the throttle cable play Ⓐ as follows.



- Slide the boot ①.
- Loosen the lock-nut ② of the throttle pulling cable.
- Turn the adjuster ③ clockwise or counterclockwise until the throttle cable play (at the throttle grip) Ⓐ is between 2.0 – 4.0 mm (0.08 – 0.16 in).
- Tighten the lock-nut ② while holding the adjuster ③.



DATA Throttle cable play Ⓐ: 2.0 – 4.0 mm (0.08 – 0.16 in)

⚠ WARNING

After the adjustment is completed, check that handlebar movement does not raise the engine idle speed and that the throttle grip returns smoothly and automatically.

ENGINE IDLE SPEED

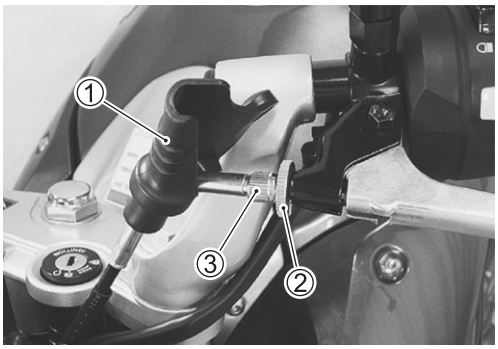
Inspect initially at 1 000 km (600 miles, 3 months) and every 5 000 km (3 000 miles, 15 months) thereafter.

- Warm up the engine.
- Inspect the engine idle speed. If the engine idle speed is not within the specified range, check the ISC system. (☞4-60)

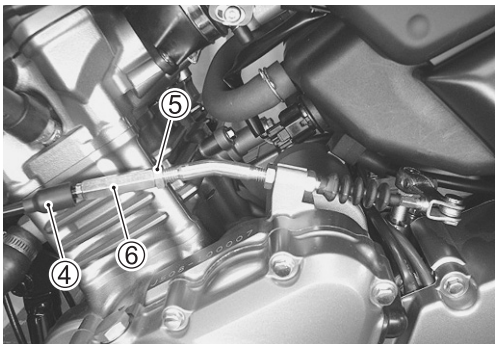
DATA Engine idle speed: 1 400 ± 100 r/min

CLUTCH CABLE PLAY

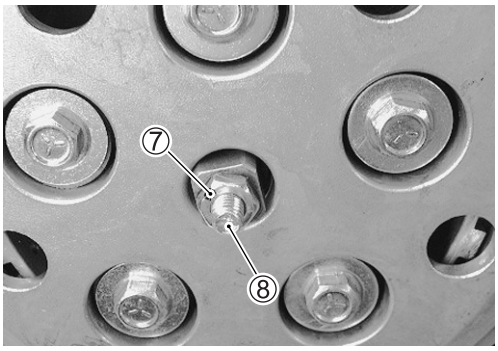
Inspect initially at 1 000 km (600 miles, 3 months) and every 5 000 km (3 000 miles, 15 months) thereafter.



- Slide the boot ①.
- Loosen the lock-nut ② and turn the adjuster ③ clockwise as far as it will go.

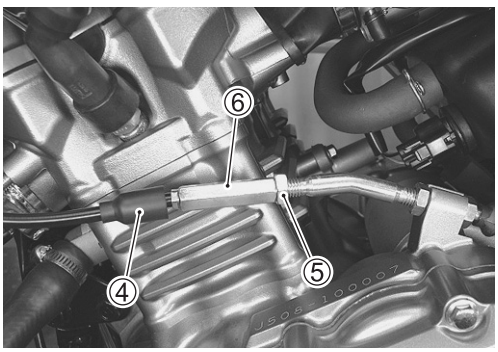


- Slide the boot ④.
- Loosen the lock-nut ⑤ and turn the cable adjuster ⑥ clockwise as far as it will go.



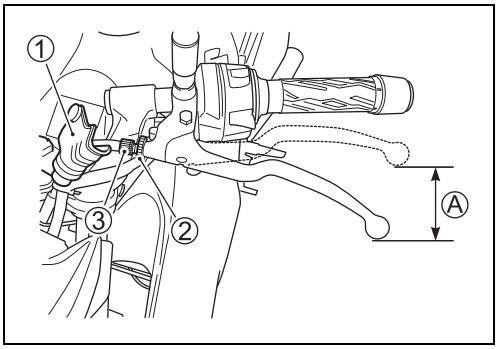
- Drain engine oil and remove the clutch cover. (☞2-11 and 3-16)
- Loosen the lock-nut ⑦ and turn the release screw ⑧ clockwise until it stop.
- From this position, turn the release screw ⑧ counterclockwise 1 rotation, and tighten the lock-nut ⑦ while holding the release screw ⑧.

Clutch release adjuster lock-nut ⑦:
5.5 N·m (0.55 kgf-m, 4.0 lbf-ft)



- Reinstall the clutch cover and pour engine oil. (☞3-85 and 2-11)
- Loosen the adjuster ③ to the 3 to 5 rotation.
- Turn the cable adjuster ⑥ to obtain 10 – 15 mm (0.4 – 0.6 in) of free play Ⓐ at the clutch lever end.
- Minor adjustment can be made with the adjuster ③.
- Tighten the lock-nuts ② and ⑤.

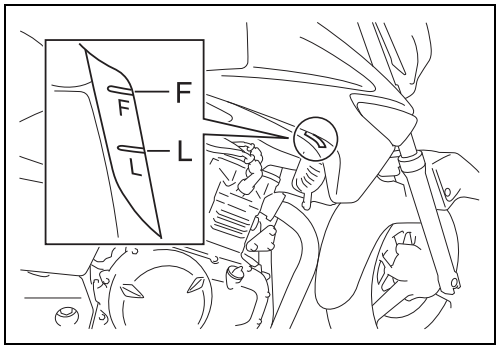
Clutch cable adjuster lock-nut ⑤:
4.5 N·m (0.45 kgf-m, 3.5 lbf-ft)



- Reinstall the boots ① and ④.

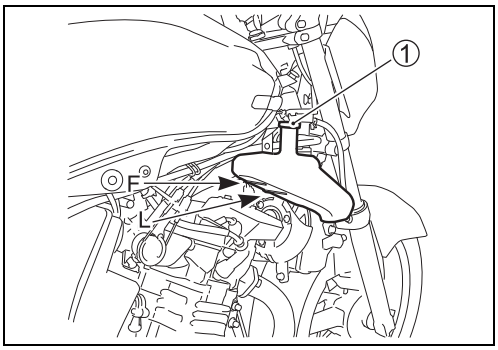
COOLING SYSTEM

Replace engine coolant (SUZUKI super long life coolant: Blue) every 16 000 km (9 600 miles) or 48 months. Replace engine coolant (SUZUKI long life coolant: Green) every 8 000 km (5 000 miles) or 24 months.



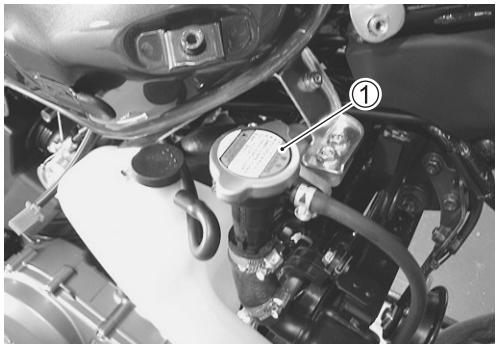
ENGINE COOLANT LEVEL CHECK

- Keep the motorcycle upright.
- Check the engine coolant level by observing the "F" and "L" lines on the engine coolant reservoir.
- If the level is below the "L" line, and add engine coolant to the "F" line from the engine coolant reservoir tank filler ① behind the right fuel tank cover. (☞8-5)



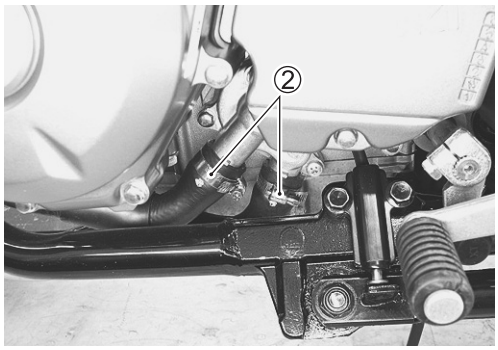
ENGINE COOLANT CHANGE

- Remove the right fuel tank cover. (☞8-5)
- Remove the radiator cap ①.
- Drain engine coolant by disconnecting the water pump inlet and outlet hoses ②.



⚠ 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 skin or eyes. If engine coolant gets into the eyes or in contact with the skin, flush thoroughly with plenty of water.**



- Flush the radiator with fresh water if necessary.
- Connect the water pump inlet and outlet hoses ② securely. (☞10-21)
- Pour the specified engine coolant up to the radiator inlet.

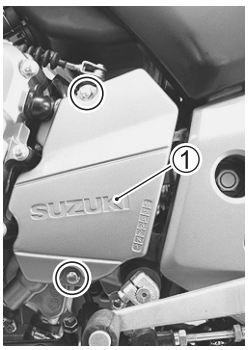
LLC Engine coolant capacity (excluding reservoir):
1 100 ml (1.2/1.0 US/Imp qt)

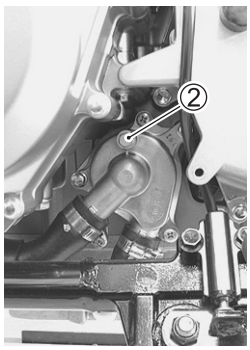
- Bleed the air from the engine coolant circuit. (☞2-16)

ENGINE COOLANT INFORMATION (☞7-2 to 3)

AIR BLEEDING THE COOLING CIRCUIT

1) Add engine coolant up to the radiator inlet.
2) Support the motorcycle upright.
3) Slowly swing the motorcycle, right and left, to bleed the air trapped in the cooling circuit.
4) Add engine coolant up to the radiator inlet.
5) Start up the engine and bleed air from the radiator inlet completely.
6) Add engine coolant up to the radiator inlet.
7) Repeat the above procedure 4) – 5) until no air bleeds from the radiator inlet.
8) Remove the engine sprocket cover ①.
9) Loosen the water pump air bleeder bolt ② and check the engine coolant flows out.
10) Tighten the water pump air bleeder bolt to the specified torque.





Water pump air bleeder bolt: 6 N·m (0.6 kgf-m, 4.5 lbf-ft)

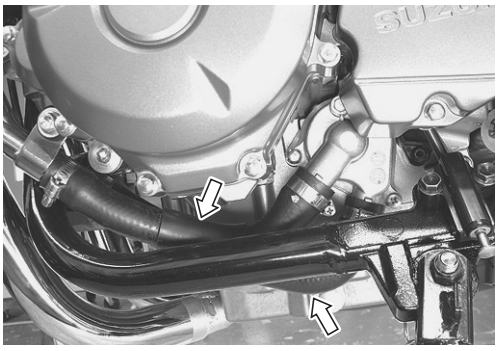
11) Close the radiator cap securely.
12) After warming up and cooling down the engine several times, add the engine coolant up to the full level of the reservoir tank.

NOTICE

Make sure that the radiator is filled with engine coolant up to the reservoir full level.

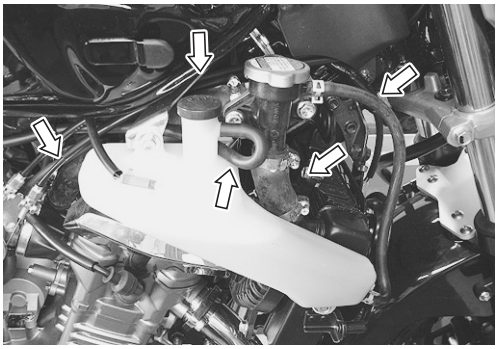
LLC Engine coolant capacity:
Engine side : 1 100 ml (1.2/1.0 US/Imp qt)
Reservoir tank side : 250 ml (0.3/0.2 US/Imp qt)

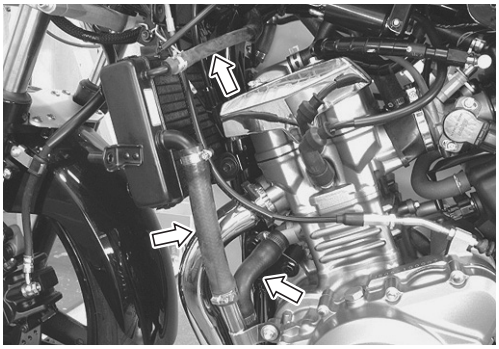
RADIATOR HOSES



- Remove the fuel tank covers. (☞8-5)
- Check the cramp screws and radiator hoses for crack, damage or engine coolant leakage.
- If any defects are found, tighten the clamp or replace the radiator hose with a new one.

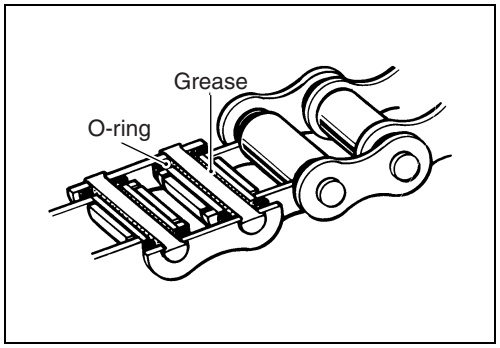
Water hose clamp screw: 1.5 N·m (0.15 kgf-m, 1.0 lbf-ft)





DRIVE CHAIN

Inspect initially at 1 000 km (600 miles, 3 months) and every 5 000 km (3 000 miles, 15 months) thereafter. Clean and lubricate every 1 000 km (600 miles).



- Support the motorcycle with a jack. (for P-21, 24, 71)
- Place the motorcycle on the center stand. (for P-12)
- Visually check the drive chain for the possible defects listed below.

* Loose pins
* Damaged rollers
* Dry or rusted links
* Kinked or binding links
* Excessive wear
* Improper chain adjustment
* Missing O-ring seals

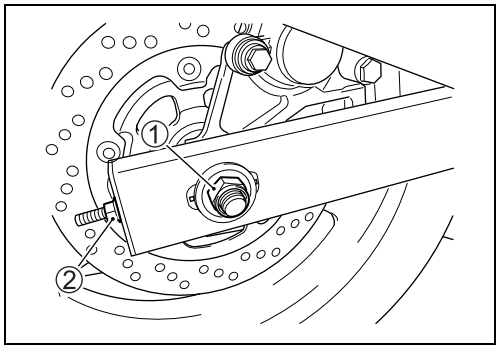
If any defects are found, the drive chain must be replaced.

NOTE:

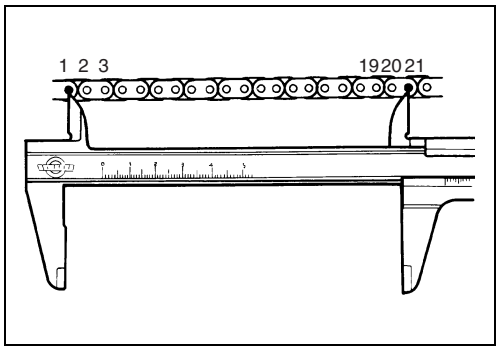
** When replacing the drive chain, replace the drive chain and sprockets as a set.*

** The standard drive chain is DID520VF (116 L). Suzuki recommends to use this standard drive chain as a replacement.*

CHECKING AND ADJUSTING



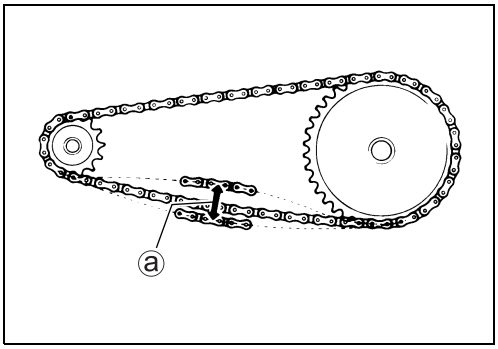
- Support the motorcycle with a jack. (for P-21, 24, 71)
- Place the motorcycle on the center stand. (for P-12)
- Loosen the rear axle nut ①.
- Give tension to the drive chain fully by turning both chain adjuster nuts ②.



- Count out 21 pins (20 pitches) on the chain and measure the distance between the two points. If the distance exceeds the service limit, the chain must be replaced.

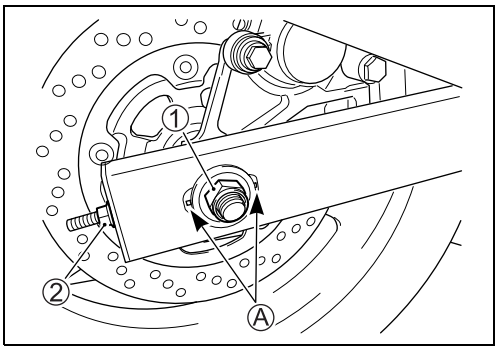
DATA Drive chain 20-pitch length:
Service limit: 320.5 mm (12.62 in)

• Loosen or tighten both chain adjuster nuts ② until there is 20 – 30 mm (0.8 – 1.2 in) of slack ⓐ at the middle of the chain between the engine and rear sprockets as shown.



NOTICE

The reference marks Ⓐ on both sides of the swingarm and the edge of each chain adjuster must be aligned to ensure that the front and rear wheels are correctly aligned.



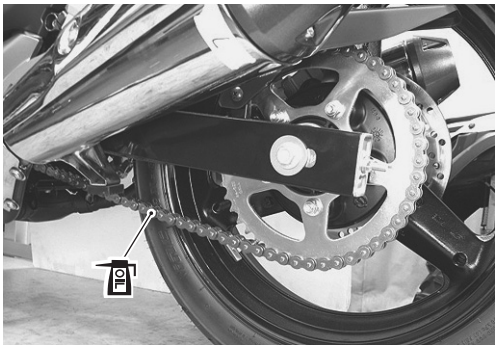
DATA Drive chain slack ⓐ: Standard: 20 – 30 mm (0.8 – 1.2 in)

• After adjusting the drive chain, tighten the axle nut ① to the specified torque.

Rear axle nut: 65 N·m (6.5 kgf-m, 47.0 lbf-ft)

• Recheck the drive chain slack ⓐ after tightening the axle nut ①.

CLEANING AND LUBRICATING



• Remove dirt and dust from the drive chain. Be careful not to damage the seal ring.
• Clean the drive chain with a sealed drive chain cleaner, or water and neutral detergent.

NOTICE

Cleaning the drive chain improperly can damage seal rings and ruin the drive chain.
- **Do not use a volatile solvent such as paint thinner, kerosene and gasoline.**
- **Do not use high pressure cleaner to clean the drive chain.**
- **Do not use wire brush to clean the drive chain.**

• Use a soft brush to clean the drive chain. Be careful not to damage the seal ring even though using a soft brush.
• Wipe off water and neutral detergent.
• Lubricate with a motorcycle sealed drive chain lubricant or high viscosity oil.

NOTICE

Some drive chain lubricant contains solvents and additives which could damage the seal rings in the drive chain.

Use sealed drive chain lubricant which is specifically intended for use with sealed drive chains.

• Lubricate both front and back plates of the drive chain.
• Wipe off excess lubricant after lubricating all around of the drive chain.

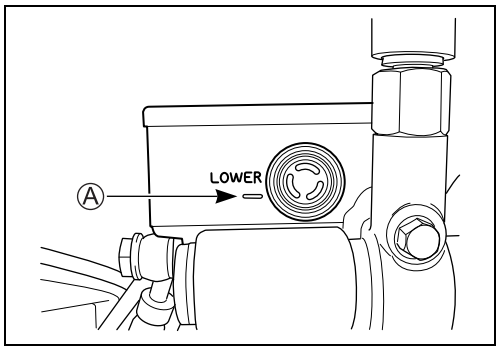
NOTE:
The standard drive chain is DID520VF. Suzuki recommends to use this standard drive chain as a replacement.

BRAKE

(BRAKE)
Inspect initially at 1 000 km (600 miles, 3 months) and every 5 000 km (3 000 miles, 15 months) thereafter.

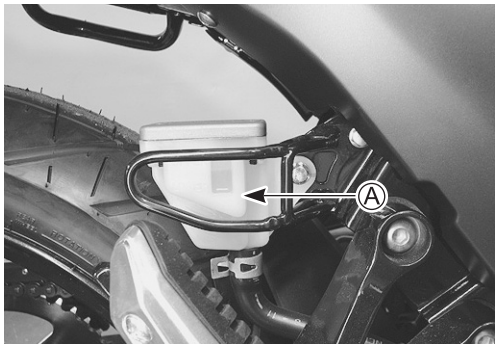
(BRAKE HOSE AND BRAKE FLUID)
Inspect every 5 000 km (3 000 miles, 15 months). Replace hoses every 4 years. Replace fluid every 2 years.

BRAKE FLUID LEVEL CHECK



- Keep the motorcycle upright and place the handlebars straight.
- Check the brake fluid level by observing the lower lines Ⓐ on the front and rear brake fluid reservoirs.
- When the brake fluid level is below the lower line, replenish with brake fluid that meets the following specification.

BF Specification and classification: DOT 4



⚠ WARNING

The brake system of this motorcycle is filled with a glycol-based brake fluid. Do not use or mix different types of fluid such as silicone-based and petroleum-based 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 stored for a long period of time.

NOTICE

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.

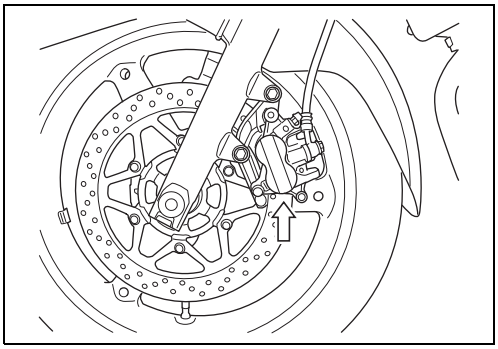
BRAKE PADS

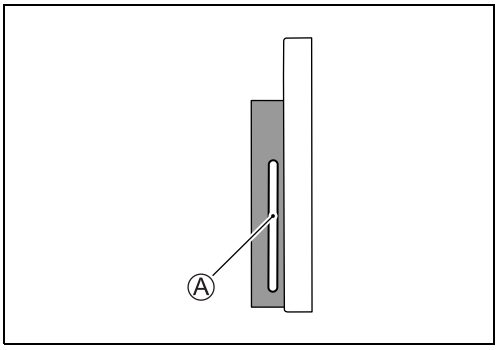
Front brake

- The extent of brake pad wear can be checked by observing the grooved limit line Ⓐ on the pad. When the wear exceeds the grooved limit line, replace the pads with the new ones. (☞8-52)

NOTICE

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



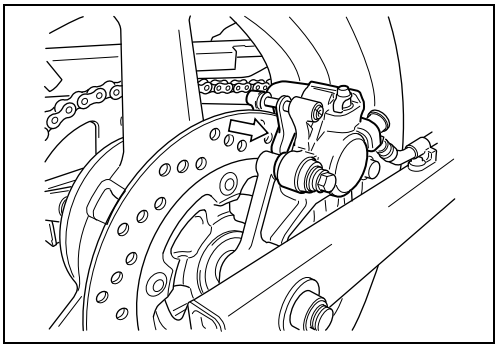


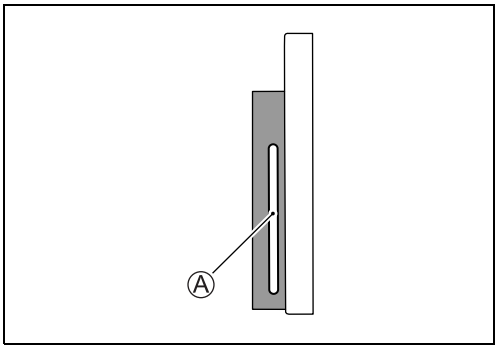
Rear brake

- The extent of brake pad wear can be checked by observing the grooved limit line Ⓐ on the pad. When the wear exceeds the grooved limit line, replace the pads with the new ones. (☞8-64)

NOTICE

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



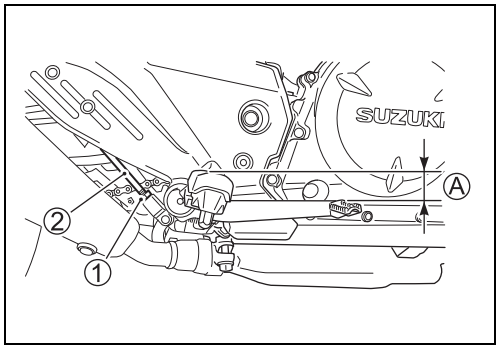


BRAKE PEDAL HEIGHT

- Loosen the lock-nut ①.
- Turn the push rod ② until the brake pedal height becomes 38 – 48 mm (1.5 – 1.9 in) Ⓐ below the top of the footrest.
- Tighten the lock-nut ① securely.

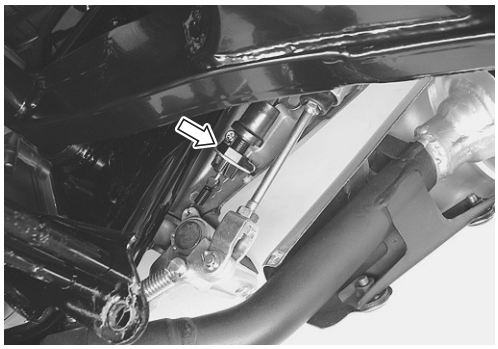
Rear brake master cylinder rod lock-nut:
18 N·m (1.8 kgf-m, 13.0 lbf-ft)

DATA Brake pedal height Ⓐ:
Standard: 38 – 48 mm (1.5 – 1.9 in)



BRAKE LIGHT SWITCH

- 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.



AIR BLEEDING FROM BRAKE FLUID CIRCUIT

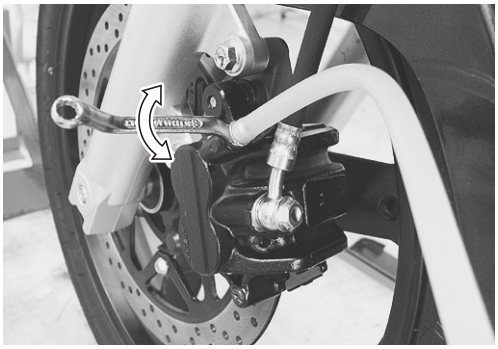
- Air trapped in the brake fluid circuit acts like a cushion to absorb a large proportion of the pressure developed by the master cylinder and thus interferes with the full braking performance of the brake caliper. The presence of air is indicated by “sponginess” of the brake lever and also by lack of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

NOTICE

Spilled brake fluid can damage painted surfaces and plastic parts.
Be careful not to spill any fluid when filling the brake fluid reservoir. Wipe spilled fluid up immediately.

Front brake

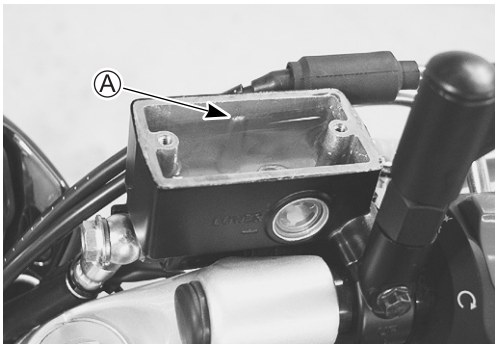
- Fill the master cylinder reservoir to the upper level. Place the reservoir cap to prevent dirt from entering.
- Attach a hose to the air bleeder valve and insert the free end of the hose into a receptacle.
- Squeeze and release the brake lever several times in rapid succession and squeeze the lever 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. Then, close the air bleeder valve, pump and squeeze the lever, and open the valve. Repeat this process until fluid flowing into the receptacle contains no 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 upper line Ⓐ.

Air bleeder valve: 6 N·m (0.6 kgf-m, 4.5 lbf-ft)

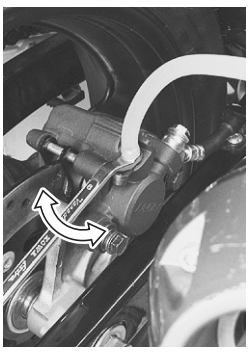


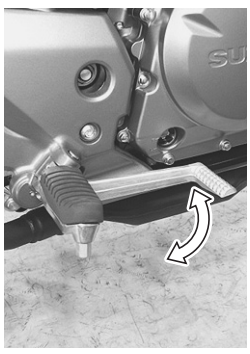
Ⓐ Upper line

Rear brake

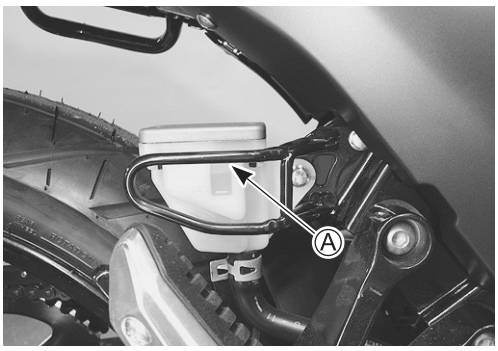
- Bleed air from the rear brake system in the same manner as front brake.

Air bleeder valve: 6 N·m (0.6 kgf-m, 4.5 lbf-ft)





NOTE:
The only of between operation from bleeding the front brake is that the rear master cylinder is actuated by a pedal.



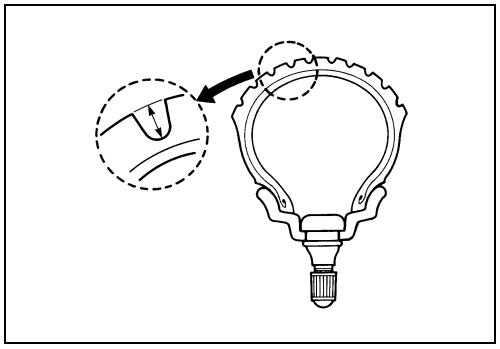
Ⓐ Upper line

TIRES

Inspect every 5 000 km (3 000 miles, 15 months).

TIRE TREAD CONDITION

Operating the motorcycle 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 tire tread reaches the following specification.

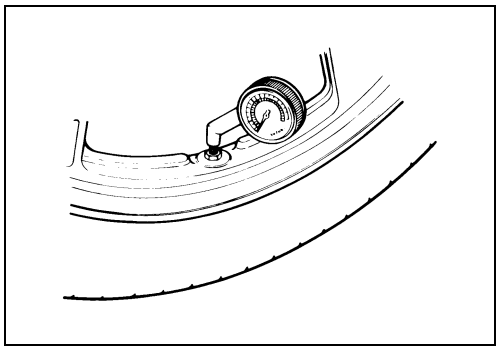


DATA Tire tread depth (Recommended depth):
Service Limit: FRONT: 1.6 mm (0.06 in)
REAR : 2.0 mm (0.08 in)

TOOL 09900-20805: Tire depth gauge

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, or shorter tire life will result. Cold inflation tire pressure is as follows.



DATA Cold inflation tire pressure:
Solo riding: Front: 250 kPa (2.50 kgf/cm², 36 psi)
Rear: 250 kPa (2.50 kgf/cm², 36 psi)
Dual riding: Front: 250 kPa (2.50 kgf/cm², 36 psi)
Rear: 250 kPa (2.50 kgf/cm², 36 psi)

CAUTION

The standard tire fitted on this motorcycle is 110/80-17M/C 57H for the front and 140/70-17M/C 66H for the rear. The use of tires other than those specified may cause instability. It is highly recommended to use the specified tires.

DATA TIRE TYPE:
IRC (Front: RX-01F D, Rear: RX-01R)

STEERING

Inspect initially at 1 000 km (600 miles, 3 months) and every 10 000 km (6 000 miles, 30 months) thereafter.

The steering should be adjusted properly for smooth turning of the handlebars and safe running. Overtighten steering prevents smooth turning of the handlebars and too loose steering will cause poor stability. Check that there is no play in the front fork. Support the motorcycle so that the front wheel is off the ground. With the wheel facing straight ahead, grasp the lower fork tubes near the axle and pull forward. If play is found, readjust the steering. (☞8-26)

FRONT FORKS

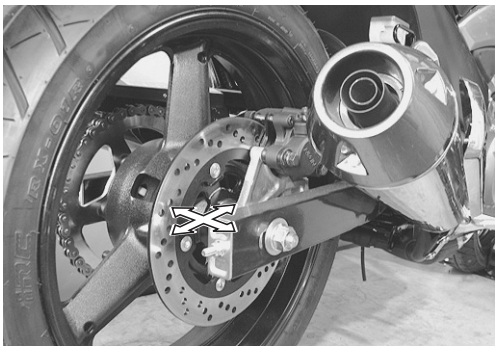
Inspect every 10 000 km (6 000 miles, 30 months).

- Inspect the front forks for oil leakage, scoring or scratches on the outer surface of the inner tubes. Replace any defective parts, if necessary. (☞8-16)

REAR SUSPENSION

Inspect every 10 000 km (6 000 miles, 30 months).

- Inspect the rear shock absorber for oil leakage and check that there is no play in the swingarm. Replace any defective parts if necessary. (☞8-41 and 8-46)

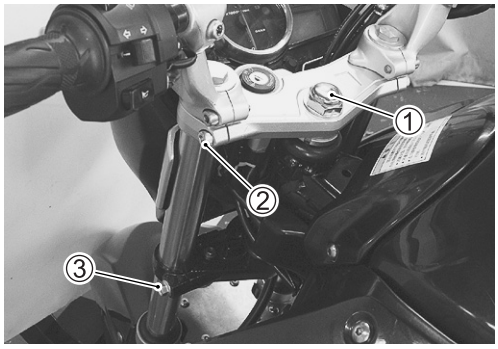


CHASSIS BOLTS AND NUTS

Tighten initially at 1 000 km (600 miles, 3 months) and every 5 000 km (3 000 miles, 15 months) thereafter.

Check that all chassis bolts and nuts are tightened to their specified torque. (Refer to page 2-26 for the locations of the following nuts and bolts on the motorcycle.)

Item	N·m	kgf-m	lbf-ft
① Steering stem head nut	65	6.5	47.0
② Front fork upper clamp bolt	23	2.3	16.5
③ Front fork lower clamp bolt	33	3.3	24.0
④ Front axle	65	6.5	47.0
⑤ Front axle pinch bolt	23	2.3	16.5
⑥ Handlebar clamp bolt	16	1.6	11.5
⑦ Front brake master cylinder holder bolt	10	1.0	7.0
⑧ Front brake caliper mounting bolt	26	2.6	19.0
⑨ Brake hose union bolt	23	2.3	16.5
⑩ Air bleeder valve (Front and Rear brake caliper)	6	0.6	4.5
⑪ Brake disc bolt (Front)	18	1.8	13.0
⑫ Brake disc bolt (Rear)	23	2.3	16.5
⑬ Rear brake master cylinder mounting bolt	10	1.0	7.0
⑭ Rear brake master cylinder rod lock-nut	18	1.8	13.0
⑮ Front footrest bracket mounting bolt	23	2.3	16.5
⑯ Swingarm pivot nut	65	6.5	47.0
⑰ Rear shock absorber mounting nut (Upper)	50	5.0	36.0
⑱ Rear shock absorber mounting nut (Lower)	84	8.4	61.0
⑲ Rear axle nut	65	6.5	47.0
⑳ Frame down tube nut (Front)	60	6.0	43.5
㉑ Frame down tube bolt (Rear)	50	5.0	36.0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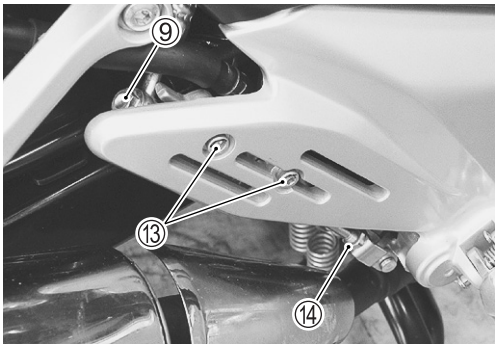
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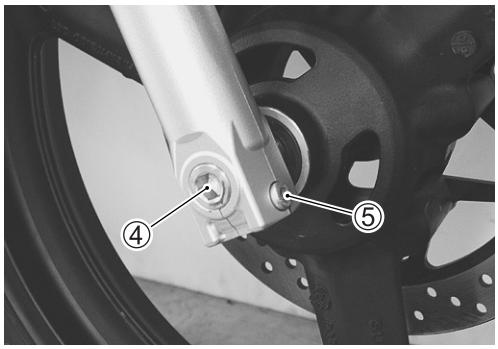
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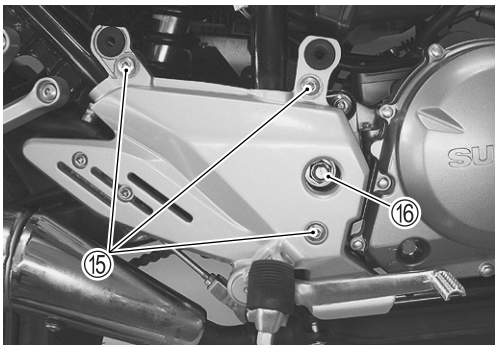
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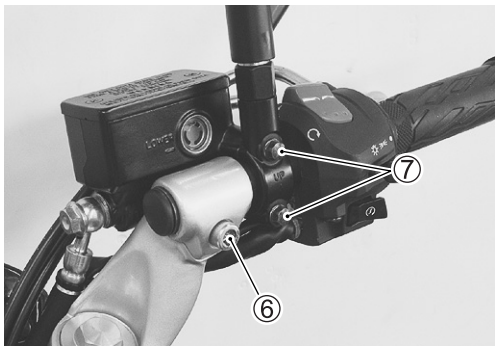
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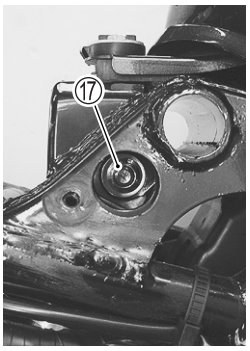
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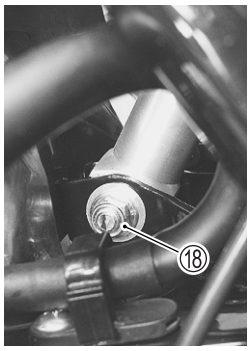
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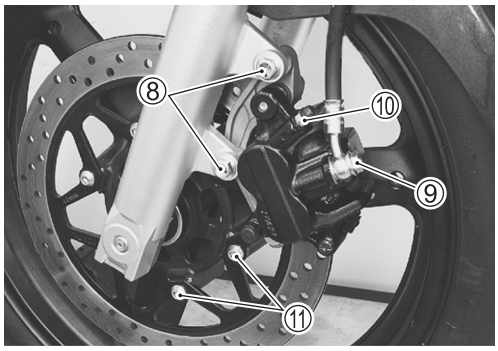
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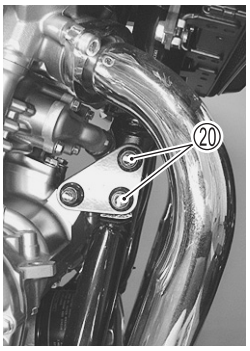
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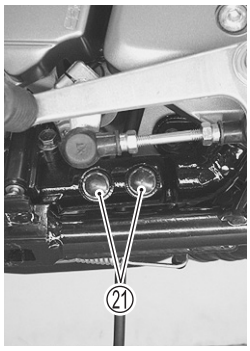
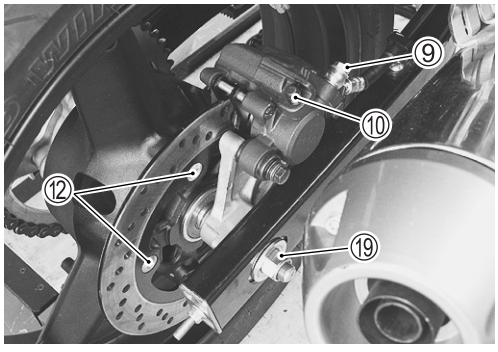

㉑


⑨
⑩
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⑲

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.

COMPRESSION PRESSURE SPECIFICATION

Standard	Limit	Difference
1 300 – 1 700 kPa (13 – 17 kgf/cm², 185 – 242 psi)	1 000 kPa (10 kgf/cm², 142 psi)	200 kPa (2 kgf/cm², 28 psi)

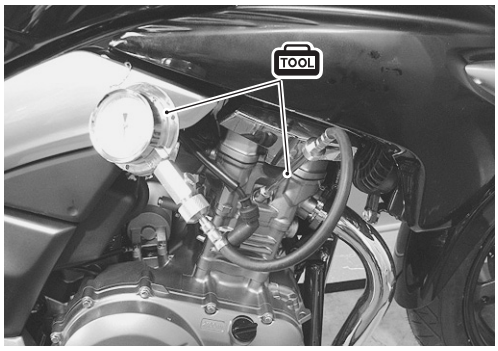
Low compression pressure can indicate any of the following conditions:

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

Overhaul the engine in the following cases:

* Compression pressure in one of the cylinders is 1 000 kPa (10 kgf/cm², 142 psi) and less.
* The difference in compression pressure between any two cylinders is 200 kPa (2 kgf/cm², 28 psi) and more.
* All compression pressure readings are below 1 300 kPa (13 kgf/cm², 185 psi) even when they measure 1 000 kPa (10 kgf/cm², 142 psi) and more.

COMPRESSION TEST PROCEDURE

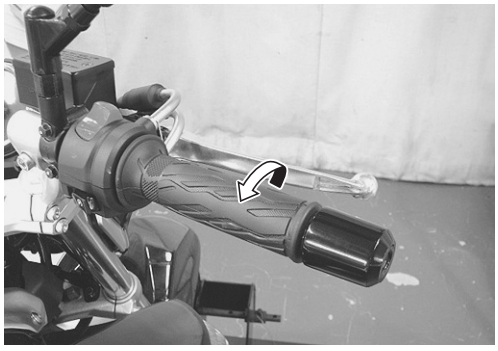


NOTE:

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

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

- Warm up the engine.
- Remove all the spark plugs. (☞2-6)
- Install the compression gauge and adaptor in the spark plug hole. Make sure that the connection is tight.
- Keep the throttle grip in the fully-opened position.
- Press the starter button and crank the engine for a few seconds. Record the maximum gauge reading as the cylinder compression.
- Repeat this procedure with the other cylinders.



TOOL 09915-64512: Compression gauge
09913-10750: Compression gauge adaptor

OIL PRESSURE CHECK

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

OIL PRESSURE SPECIFICATION

200 – 500 kPa (2 – 5 kgf/cm², 28 – 71 psi) at 3 000 r/min, Oil temp. at 60 °C (140 °F)

If the oil pressure is 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

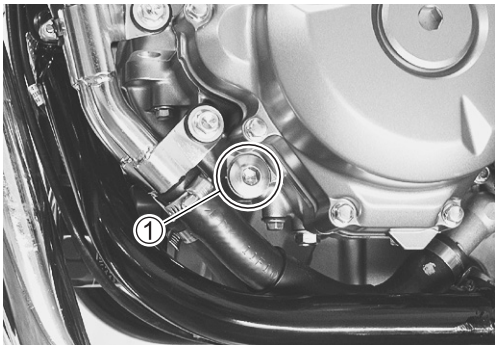
HIGH OIL PRESSURE

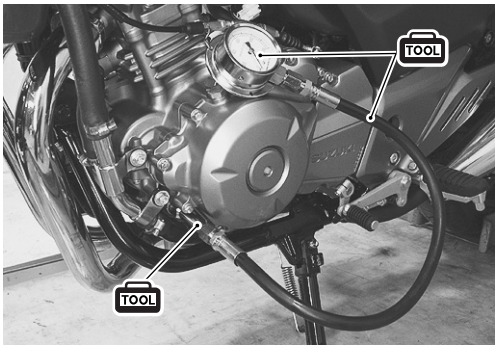
* Engine oil viscosity is too high
* Clogged oil passage
* Combination of the above items

OIL PRESSURE TEST PROCEDURE

Start the engine and check if the oil pressure indicator light is turned on. If the light stays on, check the oil pressure indicator light circuit. If the circuit is OK, check the oil pressure in the following manner.

- Remove the oil gallery plug ①.
- Install the oil pressure gauge and attachment into the oil gallery.
- Warm up the engine as follows:
  Summer : 10 min at 2 000 r/min
  Winter : 20 min at 2 000 r/min
- After warming up, increase the engine speed to 3 000 r/min (observe the tachometer), and read the oil pressure gauge.





TOOL 09915-74521: Adapter hose
09915-72410: Oil pressure gauge attachment
09915-77331: Oil pressure gauge (1 000 kpa)

- Install the oil gallery plug. (☞3-57)

Oil gallery plug (Crankcase side):
25 N·m (2.5 kgf-m, 18.0 lbf-ft)

SDS CHECK

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

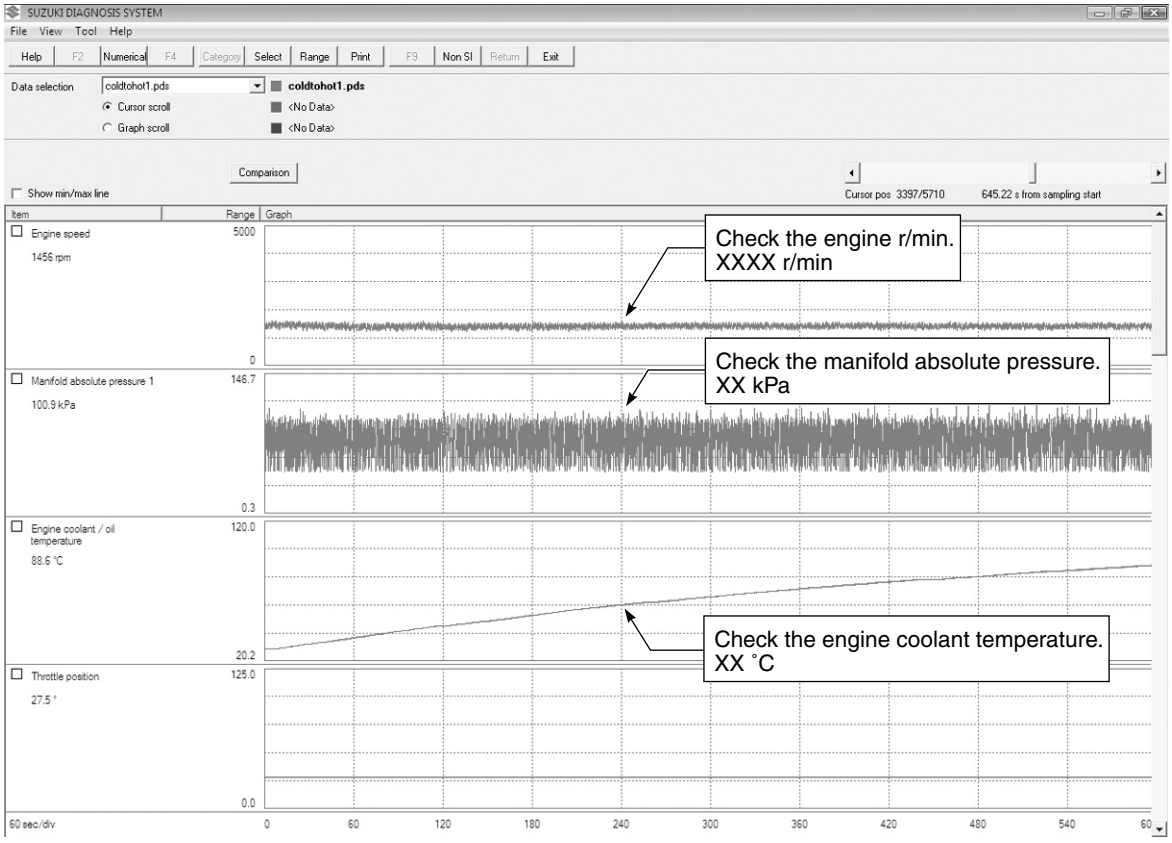
After saving the sampled data in the computer, file them by model and by user.
The periodically filed data help improve the accuracy of troubleshooting since they can indicate the condition of vehicle functions that has changed with time.
For example, when a vehicle is brought in for service but the 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 to facilitate the troubleshooting.

- Remove the right frame cover. (☞8-4)
- Set up the SDS tools. (☞4-24 and refer to the SDS operation manual for further details.)

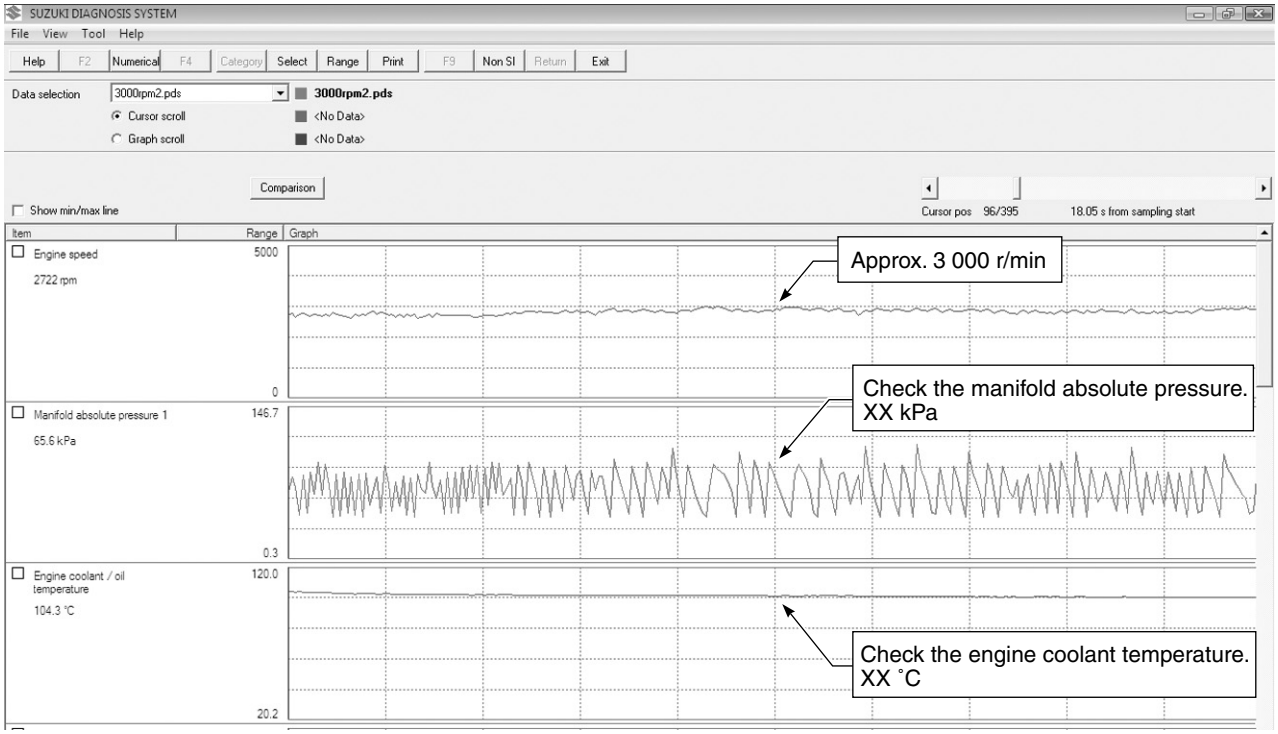
TOOL 09904-41010: SDS set tool
99565-01010-028: CD-ROM Ver.28

NOTE:
** Before taking the sample of data, check and clear the Past DTC. (☞4-27 to 29)*
** A number of different data under a fixed condition as shown below should be saved or filed as sample.*

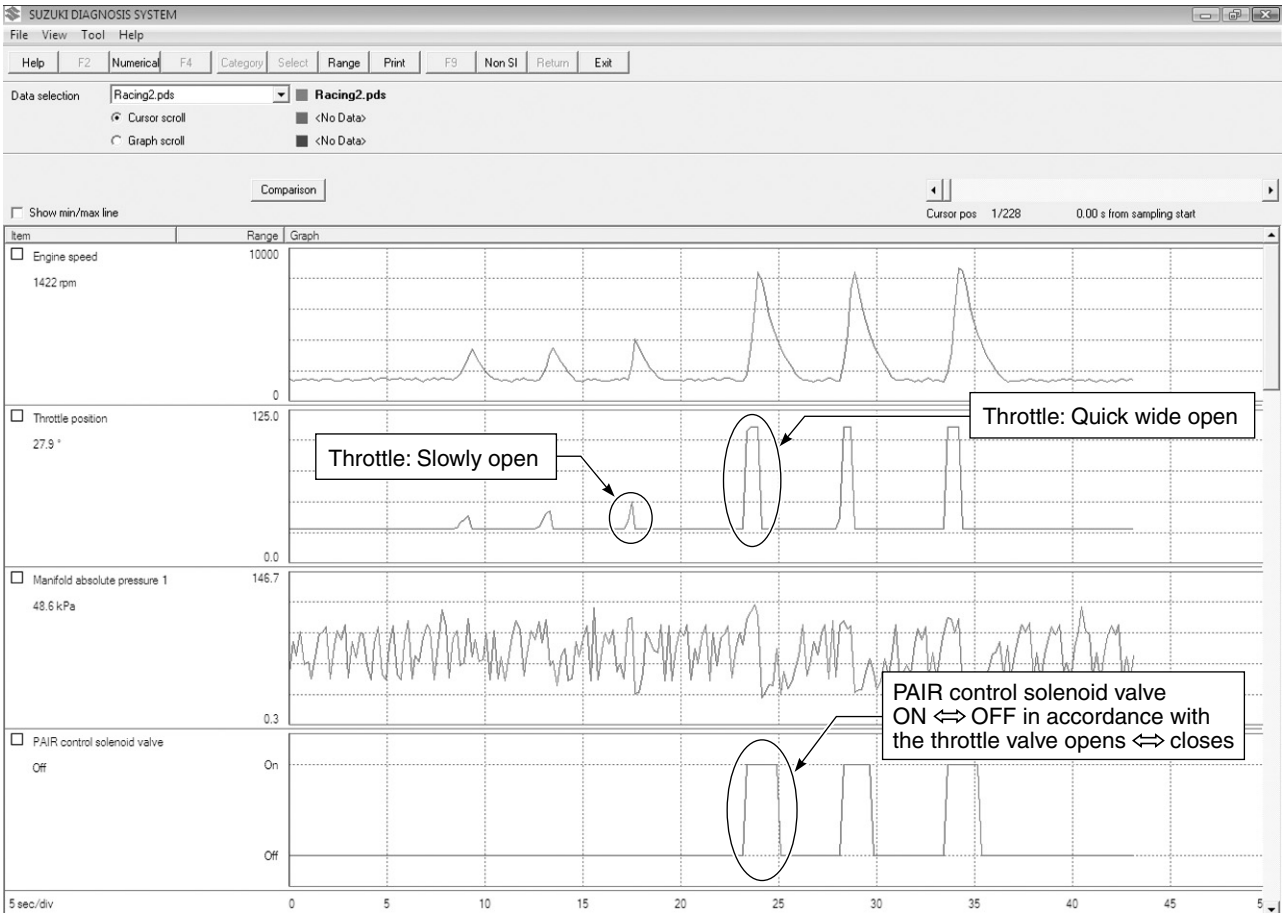
SAMPLE:
Data sampled from cold starting through warm-up



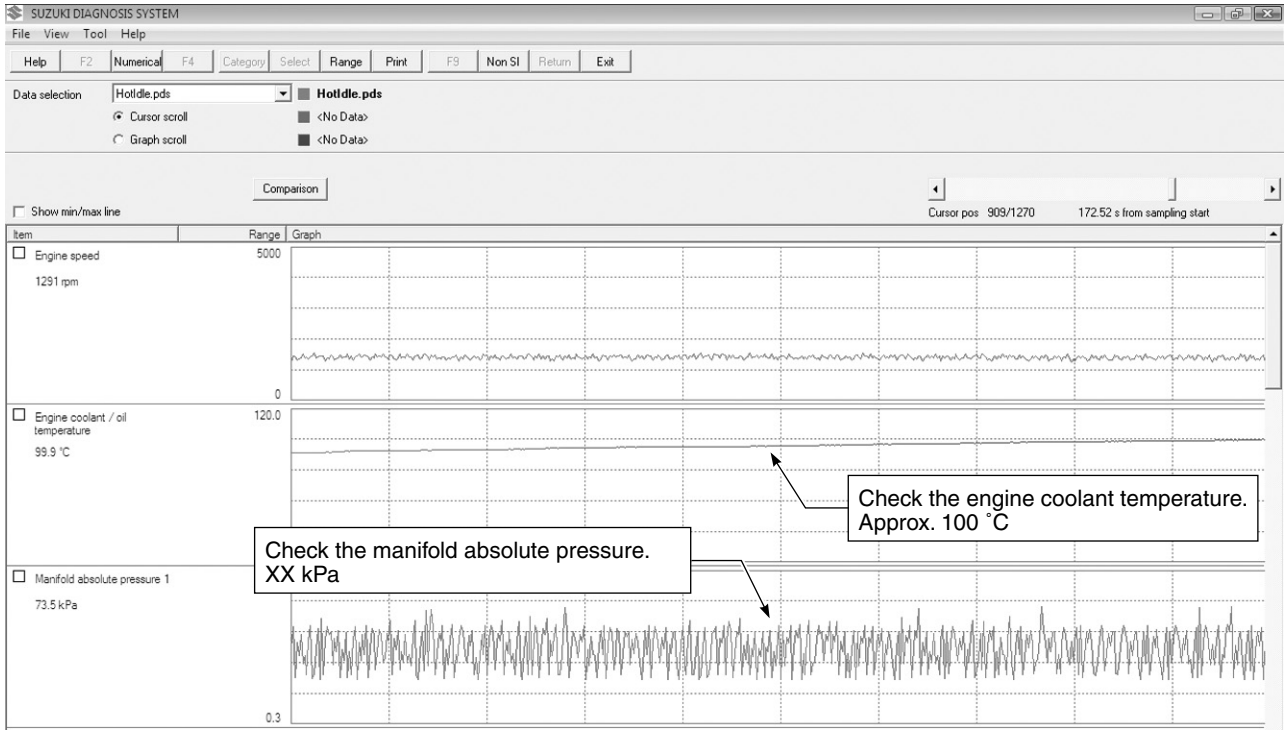
Data at 3 000 r/min under no load



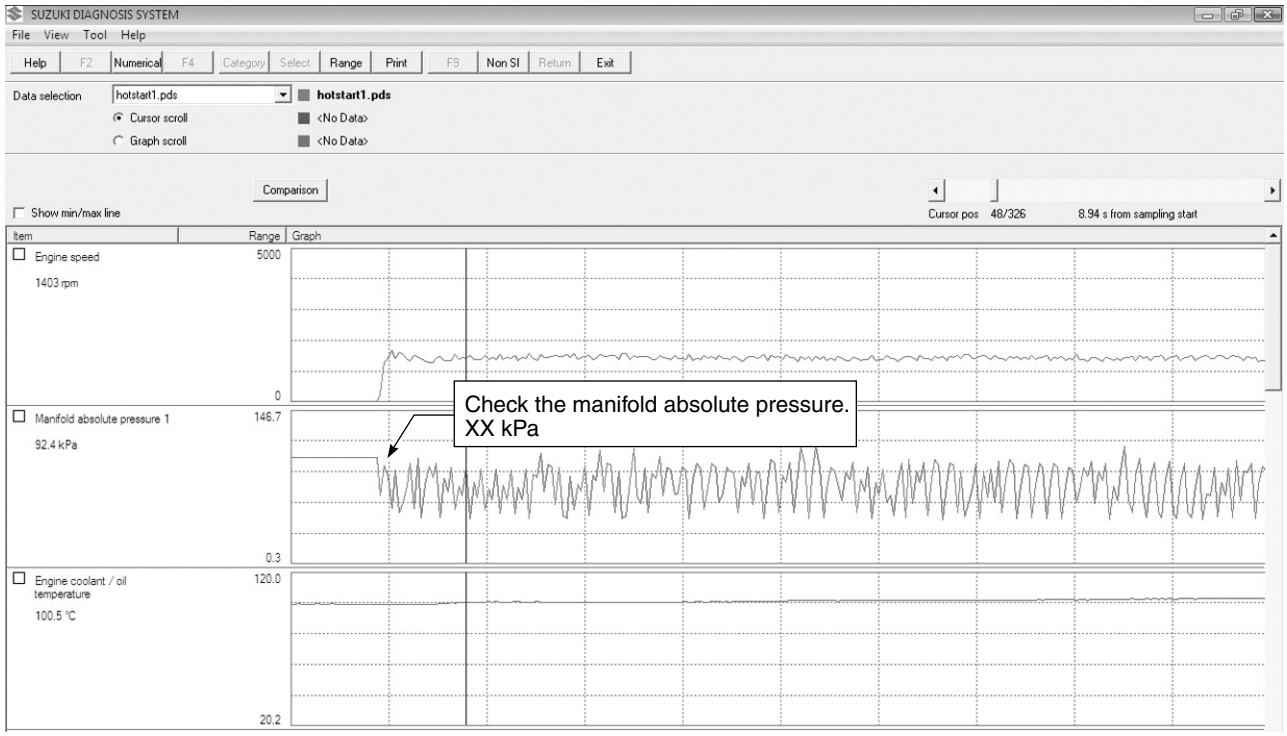
Data at the time of racing



Data of intake negative pressure during idling (100 °C)



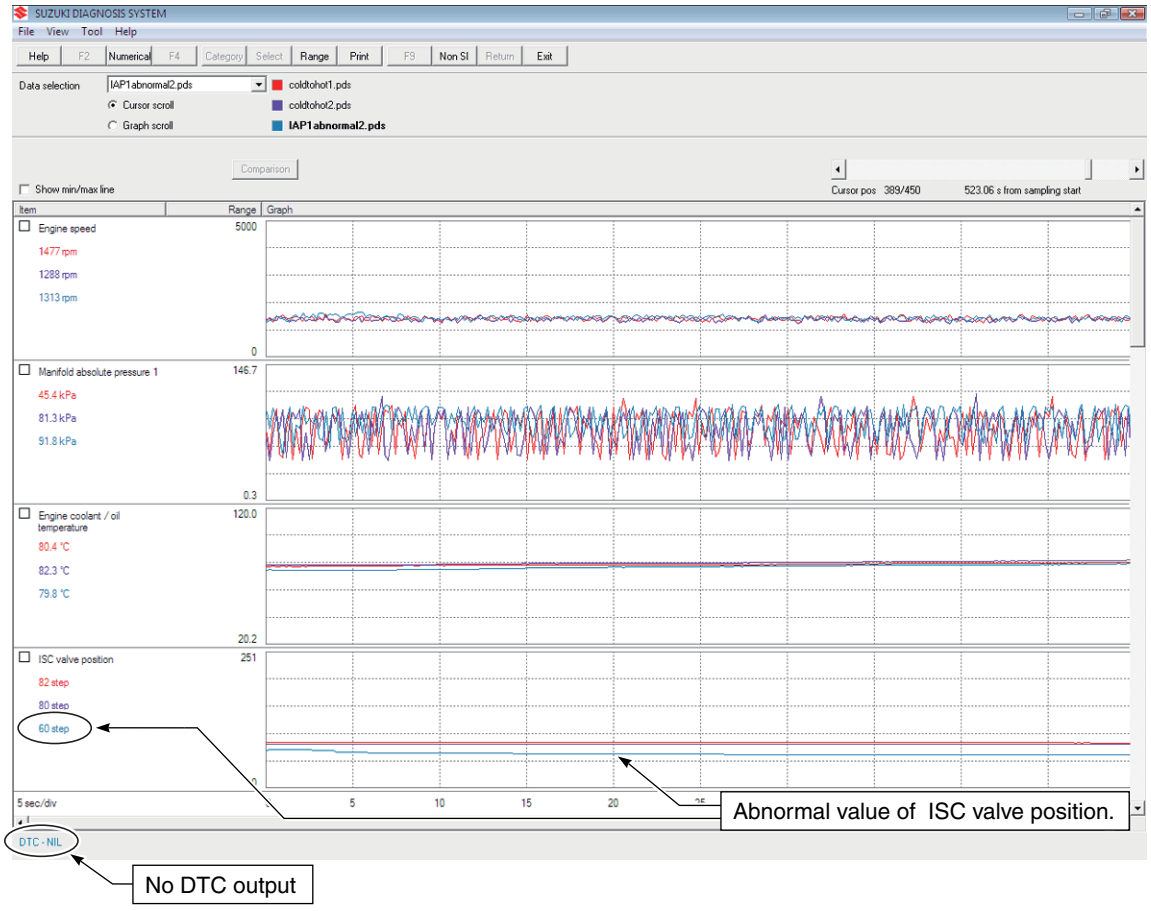
Data of manifold absolute pressure operation at the time of starting



Example of trouble

Three data; value 3 (current data 3), value 2 (past data 2) and value 1 (past data 1); 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 passing of time and identify what problem is currently occurring.

With DTC not output, if the ISC valve stepping position is found to be abnormal than the data saved previously, the possible cause may probably lie in the hardware side such as ISC valve air inlet hose crumple, bend, etc.



ENGINE

CONTENTS

ENGINE COMPONENTS REMOVABLE WITH ENGINE IN PLACE

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

ENGINE CENTER

ITEM	REMOVAL	INSPECTION	INSTALLATION
Air cleaner element	☞2-4	☞2-4	☞2-4
Exhaust pipe and muffler	☞6-2	☞6-3	☞6-3
Oil filter	☞2-12	—	☞2-12
Oil pan, oil strainer and oil pressure regulator	☞3-22	☞3-47	☞3-74
Oil pressure switch	☞3-22	☞9-34	☞3-76
PAIR control solenoid valve	☞11-4	☞11-4	☞11-5
PAIR reed valve	☞11-3	☞11-3	☞11-3
Throttle body	☞5-12	☞5-15	☞5-17
Cam chain tension adjuster	☞3-13	☞3-36	☞3-92
Cylinder head cover	☞3-12	☞3-25	☞3-93
Camshafts	☞3-12	☞3-34	☞3-89
Rocker arms	☞3-26	☞3-26	☞3-26
Cylinder head	☞3-14	☞3-28	☞3-87
Cylinder	☞3-15	☞3-36	☞3-87
Pistons	☞3-15	☞3-37	☞3-86
Starter motor	☞9-13	☞9-14	☞9-16

ENGINE RIGHT SIDE

ITEM	REMOVAL	INSPECTION	INSTALLATION
Clutch cover	☞3-16	—	☞3-85
Clutch (plates)	☞3-16	☞3-40	☞3-84
Clutch sleeve hub	☞3-17	☞3-41	☞3-82
Primary driven gear	☞3-18	☞3-41	☞3-82
Primary drive gear	☞3-20	☞3-44	☞3-77
Oil pump	☞3-18	☞3-41	☞3-80
Gearshift shaft	☞3-19	☞3-45	☞3-79
Oil pump drive sprocket and driven sprocket	☞3-18	—	☞3-81

ENGINE LEFT SIDE

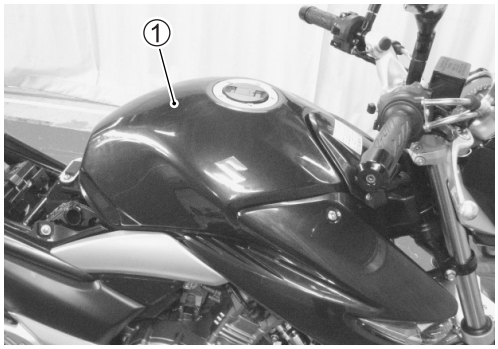
ITEM	REMOVAL	INSPECTION	INSTALLATION
Engine sprocket	☞3-6	—	☞3-9
Gear position switch	☞3-22	☞9-20	☞3-76
Generator (cover)	☞3-19	☞3-44	☞3-78
Generator rotor	☞3-21	—	☞3-77
Water pump	☞7-14	☞7-16	☞7-17
Starter idle gear	☞3-20	—	☞3-77
Starter clutch	☞3-42	☞3-42	☞3-43

ENGINE REMOVAL AND INSTALLATION
ENGINE REMOVAL

- Drain engine oil. (☞2-11)
- Drain engine coolant. (☞2-15)
- Remove the seat. (☞8-5)

- Disconnect the battery ⊖ lead wire.

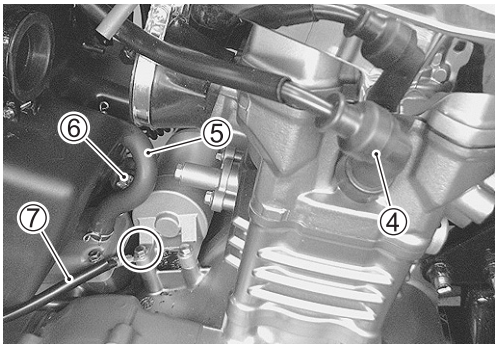
- Remove the fuel tank ①. (☞5-2)



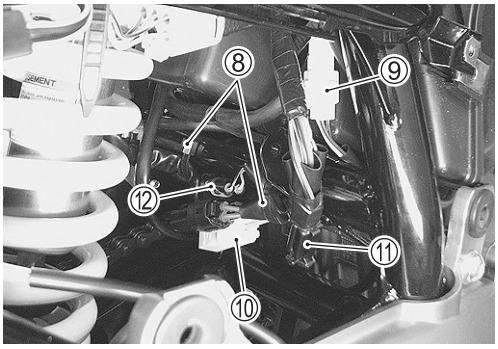
- Remove the throttle body assembly ②. (☞5-12)

- Remove the exhaust pipes and mufflers ③. (☞6-2)

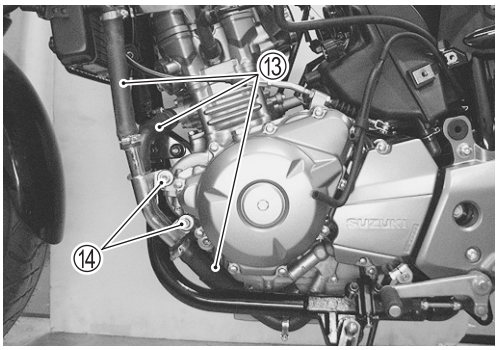
- Disconnect the spark plug cap #2 ④, PCV hose ⑤, starter motor lead wire ⑥ and battery ⊖ lead wire ⑦.



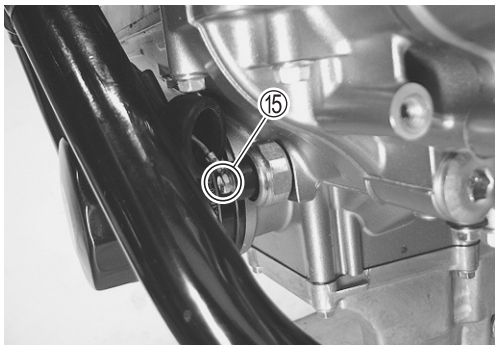
- Disconnect the clamps ⑧, GP switch coupler ⑨, generator coupler ⑩, CKP sensor coupler ⑪ and side-stand switch coupler ⑫.



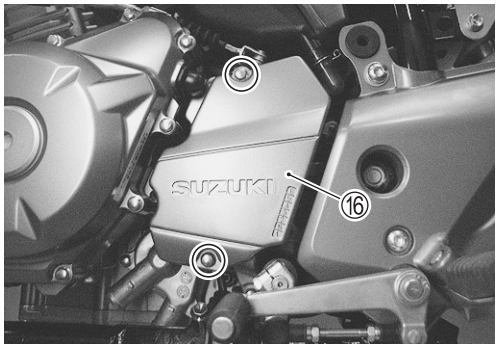
- Disconnect the water hoses ⑬ and remove the water pump pipe bolts ⑭.



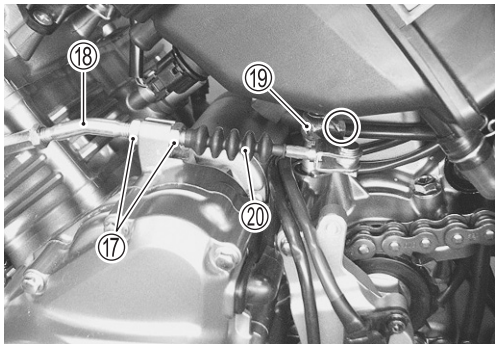
- Remove the oil pressure switch lead wire ⑮.



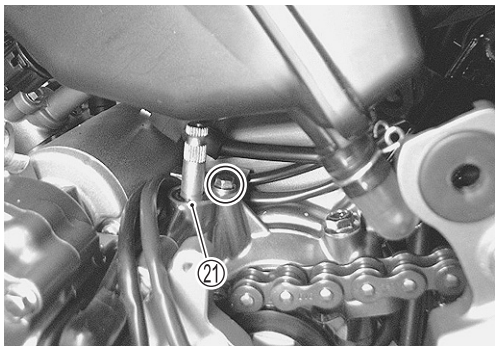
- Remove the engine sprocket cover ⑯.



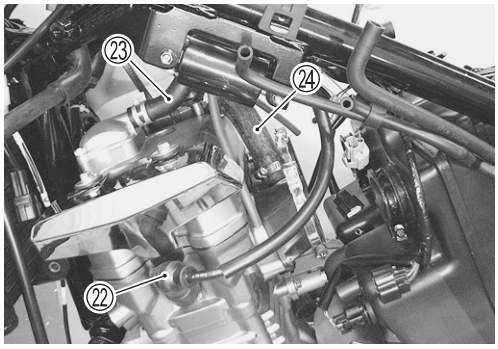
- Loosen the clutch cable nuts ⑰ and clutch cable adjuster ⑱.
- Remove the clutch release arm ⑲ along with the clutch cable ⑳.



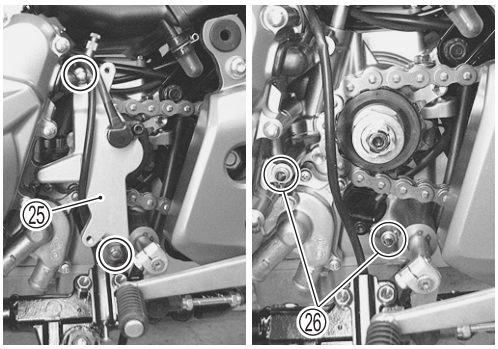
- Remove the clutch release camshaft retainer ㉑.



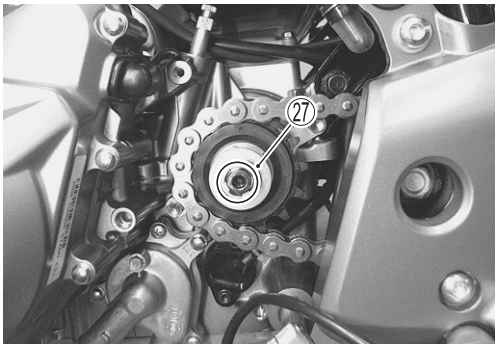
- Disconnect the spark plug cap #1 ㉒, PAIR hose ㉓ and thermostat connector hose ㉔.



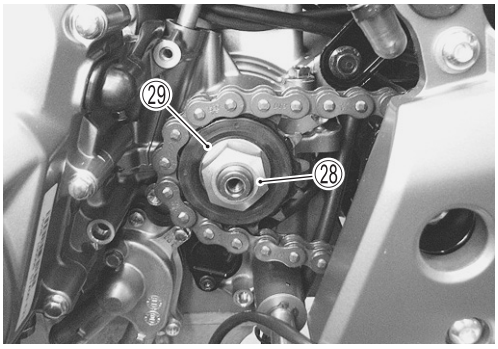
- Move the speed sensor bracket ㉕ and remove the dowel pins ㉖.



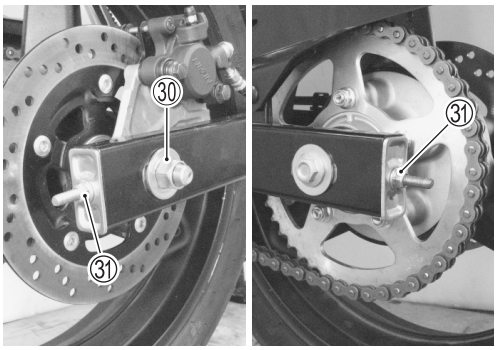
- Remove the speed sensor rotor ㉗ by removing it bolt while depressing the rear brake pedal.



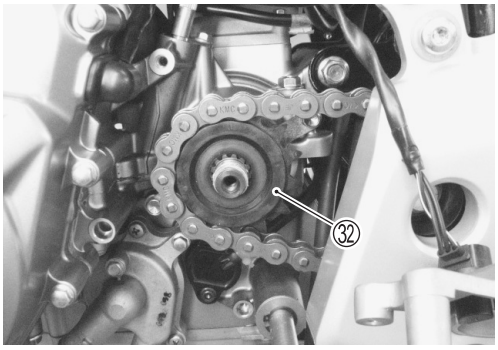
- Remove the engine sprocket nut ㉘ while depressing the rear brake pedal.
- Remove the washer ㉙.



- Loosen the rear axle nut ㉚ and left and right chain adjuster nuts ㉛ to provide additional chain slack.

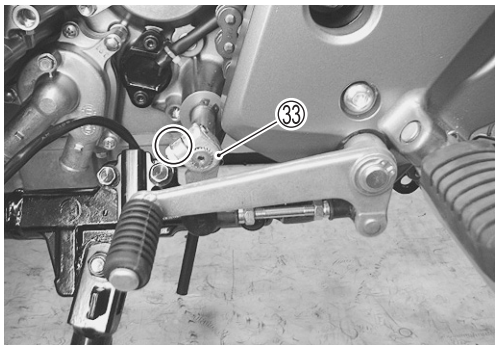


- Remove the engine sprocket ㉜.

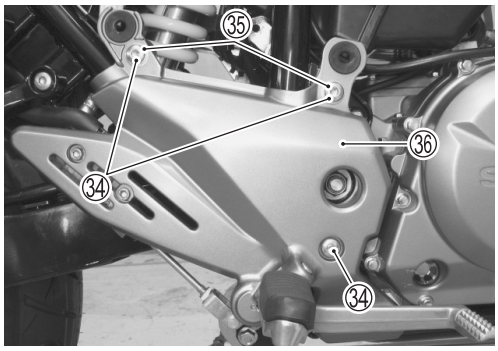


• Disengage the gearshift link arm ㉝ by removing the bolt.

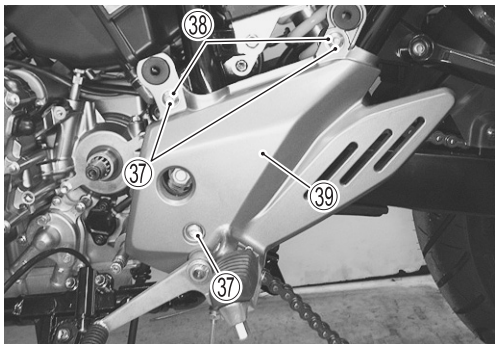
NOTE:
Mark the position of the gearshift link arm on the gearshift shaft before removing.



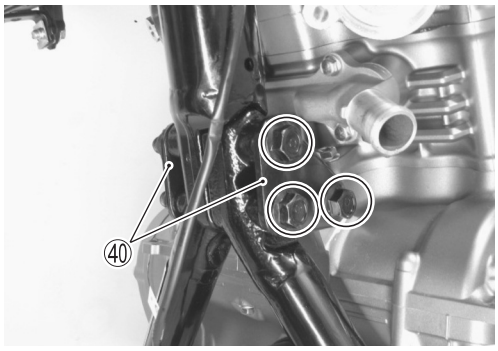
• Remove the bolts ㉞ and washers ㉟.
• Move the right footrest bracket assembly ㊱.



• Remove the bolts ㊲ and washers ㊳.
• Remove the left footrest bracket ㊴.

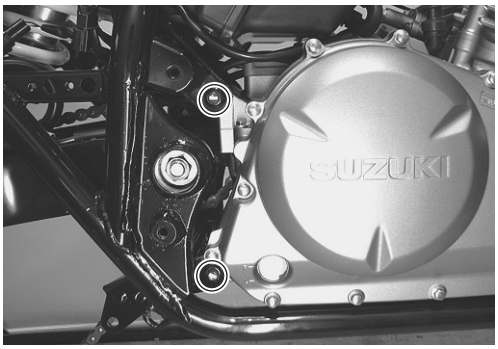


• Support the engine using an engine jack.
• Remove the engine mounting brackets ㊵ by removing the bolts and nuts.



• Remove the frame down tube ㊶ by removing the bolt and nuts.

- Remove the engine mounting bolts and nuts.
- Gradually lower the engine.
- Remove the engine assembly.

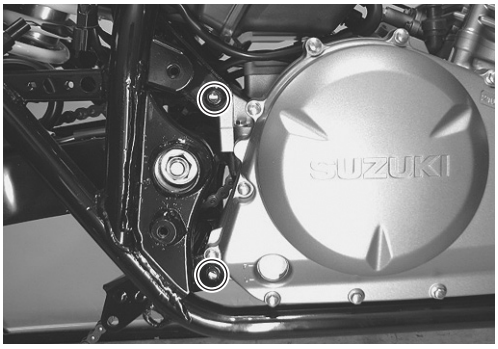


ENGINE INSTALLATION

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

NOTE:
The engine mounting nuts and frame down tube nuts are self-locking. Once the nuts have been removed, they are no longer of any use.

- Insert the two engine mounting bolts from left side, and tighten their nuts.

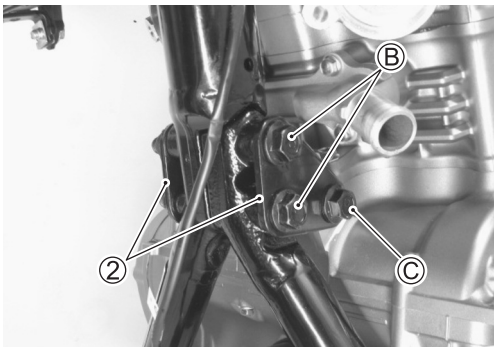


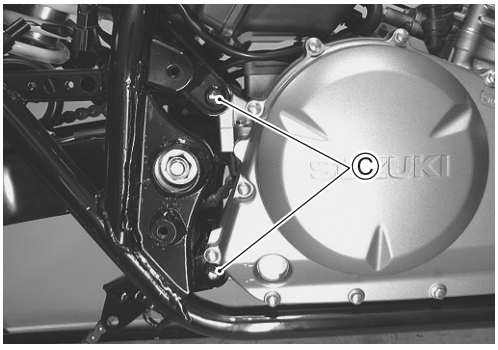
- Install the frame down tube ① and engine mounting brackets ②.
- Tighten the bolts and nuts to the specified torque.

Frame down tube nut Ⓐ: 50 N·m (5.0 kgf-m, 36.0 lbf-ft)
Engine mounting bracket nut Ⓑ: 60 N·m (6.0 kgf-m, 43.5 lbf-ft)

- Tighten the engine mounting bolts and nuts to the specified torque.

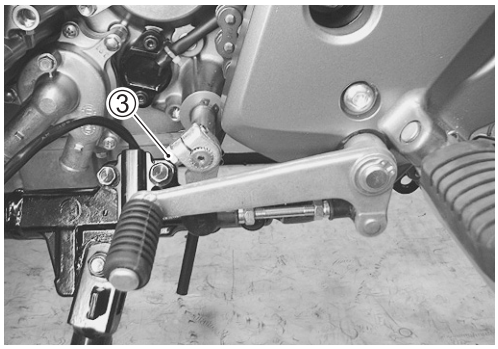
Engine mounting nut Ⓒ: 55 N·m (5.5 kgf-m, 40.0 lbf-ft)





• Tighten the gearshift link arm bolt ③ to the specified torque.

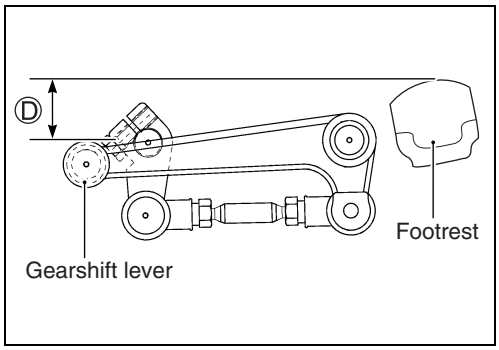
Gearshift link arm bolt: 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



• Inspect the gearshift lever height Ⓓ between the gearshift lever top and footrest.

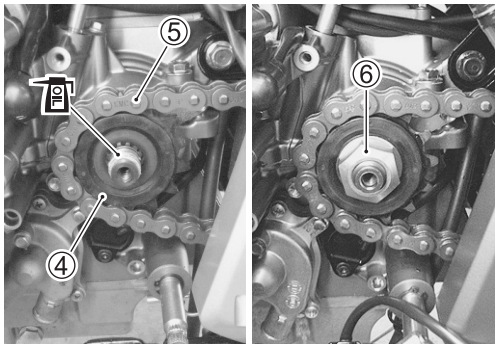
DATA Gearshift lever height:

Standard: 28 – 38 mm (1.1 – 1.5 in)



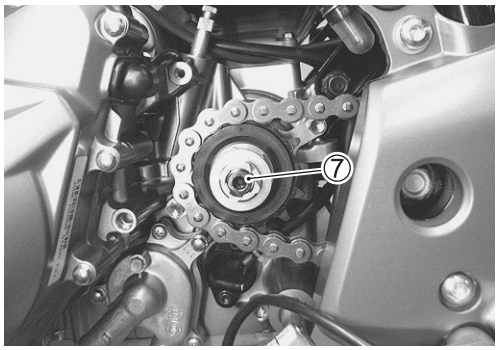
• Install the engine sprocket ④ with drive chain ⑤.
• Apply engine oil to the driveshaft thread portion.
• Tighten the engine sprocket nut ⑥ to the specified torque.

Engine sprocket nut: 120 N·m (12.0 kgf-m, 87.0 lbf-ft)



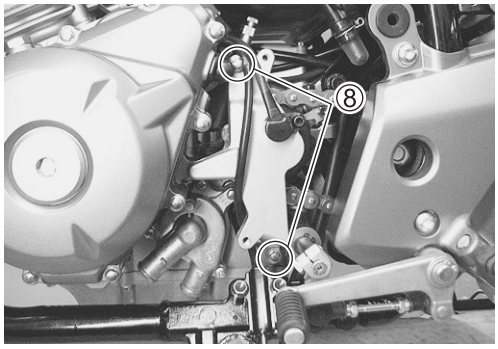
• Tighten the speed sensor rotor bolt ⑦ to the specified torque.

Speed sensor rotor bolt: 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



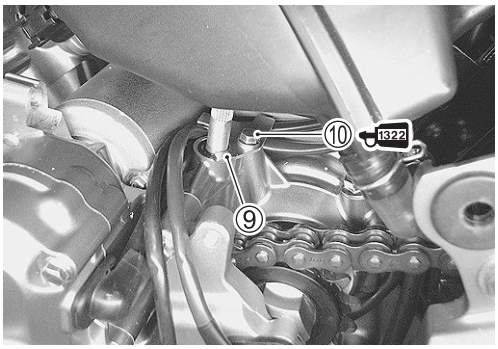
• Tighten the speed sensor bracket bolts ⑧ to the specified torque.

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

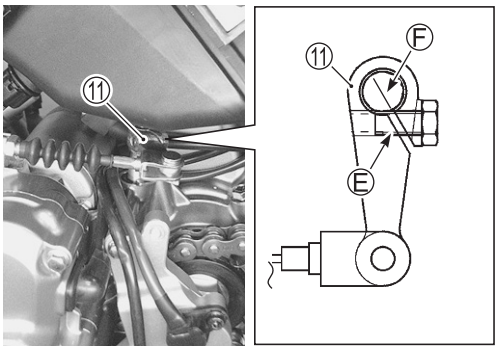


- Install the clutch release camshaft retainer ⑨. (☞10-16)
- Apply a small quantity of thread lock to the oil clutch release camshaft retainer bolt ⑩.

1322 99000-32110: THREAD LOCK CEMENT SUPER "1322" or equivalent

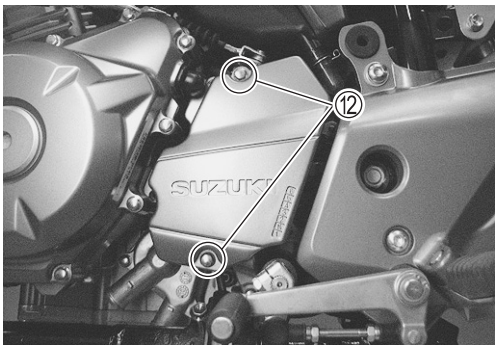


- When installing the clutch release arm ⑪, align the groove Ⓔ of clutch release arm ⑪ with the slit Ⓕ of clutch release camshaft.



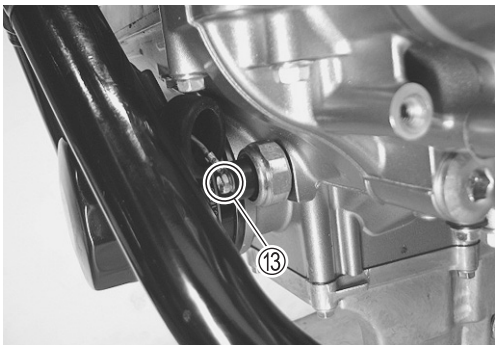
- Tighten the engine sprocket cover bolts ⑫ to the specified torque.

Engine sprocket cover bolt: 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



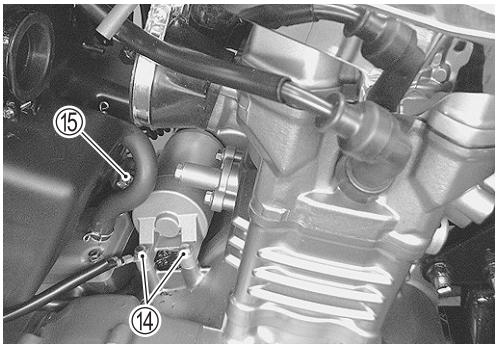
- Tighten the oil pressure switch lead wire bolt ⑬ to the specified torque.

Oil pressure switch lead wire bolt: 1.5 N·m (0.15 kgf-m, 1.0 lbf-ft)



- Tighten the starter motor mounting bolts ⑭ and starter motor lead wire bolt ⑮ to the specified torque. (☞10-16)

Starter motor mounting bolt: 10 N·m (1.0 kgf-m, 0.7 lbf-ft)
Starter motor lead wire bolt: 2.7 N·m (0.27 kgf-m, 2.0 lbf-ft)



• After finishing the engine installation, check the following items.

* Wiring harness, cables and hoses routing (☞10-14 to 10-22 and 10-25)
* Throttle cable play (☞2-13)
* Clutch cable play (☞2-14)
* Drive chain slack (☞2-18)
* Engine oil (☞2-11)
* Engine coolant (☞2-15)
* Throttle valve synchronization (☞5-23)

ENGINE DISASSEMBLY

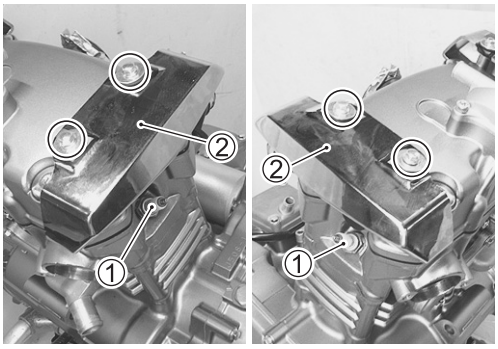
CAUTION

Identify the position of each removed part. Organize the parts in their respective groups (e.g., intake, exhaust) so that they can be reinstalled in their original positions.

- Remove the spark plugs ①.

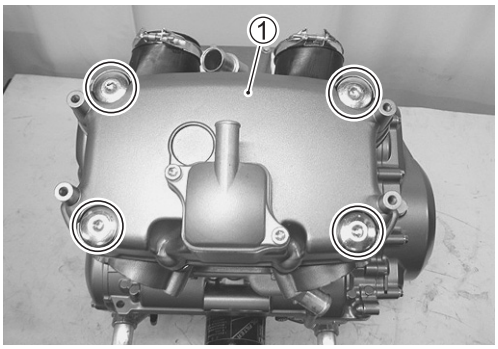
TOOL 09930-10121: Spark plug wrench set

- Remove the cylinder head cover caps ②.

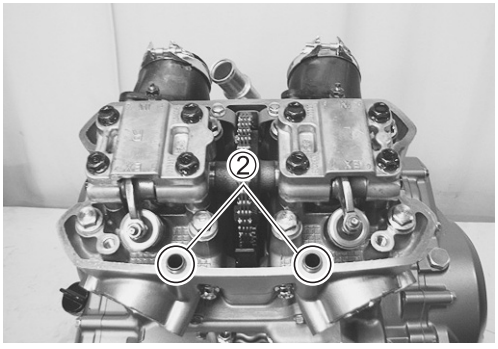


CYLINDER HEAD COVER

- Remove the cylinder head cover ① and its gasket.

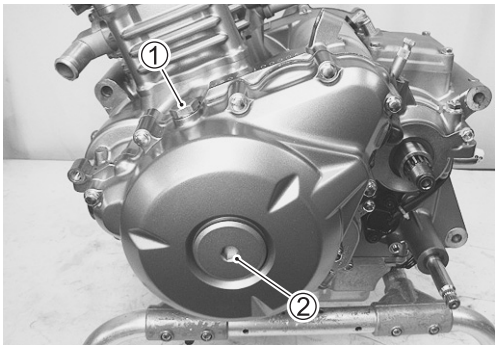


- Remove the dowel pins ②.



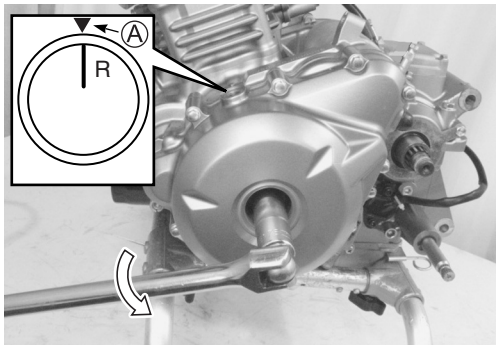
CAMSHAFT

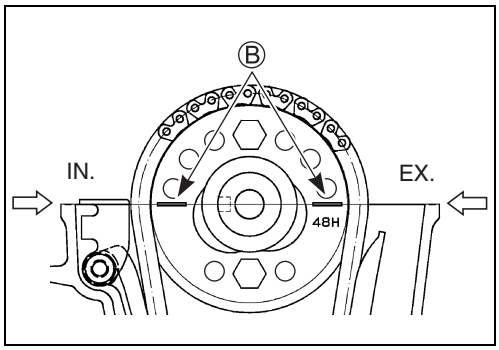
- Remove the valve timing inspection cap ① and generator cover plug ②.



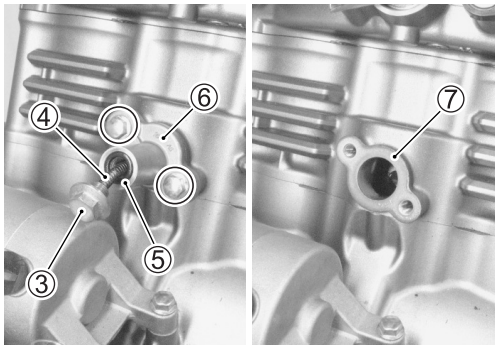
- Turn the crankshaft counterclockwise to bring the "I R" line on generator rotor to the index mark Ⓐ of the valve inspection hole and also to bring the camshaft to the position as shown.

NOTE:
At the above condition, the cylinder is at TDC of compression stroke and also the engraved lines Ⓑ on the camshafts are parallel with the mating surface of the cylinder head cover.



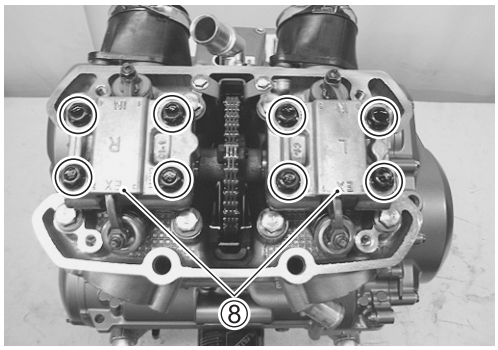


- Remove the cam chain tension adjuster cap bolt ③, spring ④ and O-ring ⑤.
- Remove the cam chain tension adjuster ⑥ and gasket ⑦.

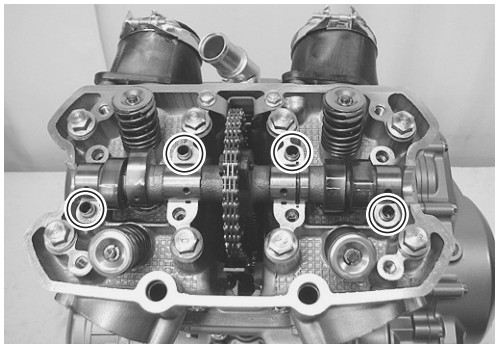


- Remove the camshaft journal holders ⑧.

NOTE:
Be sure to loosen the camshaft journal holder bolts evenly by shifting the wrench in the descending order of numbers.

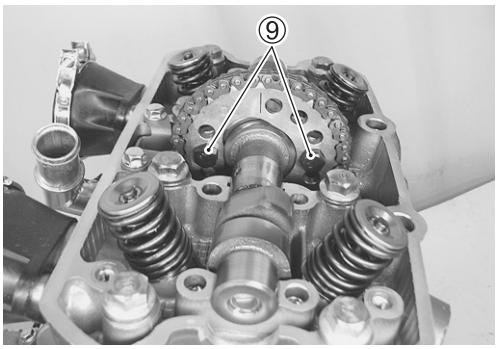


- Remove the dowel pins.

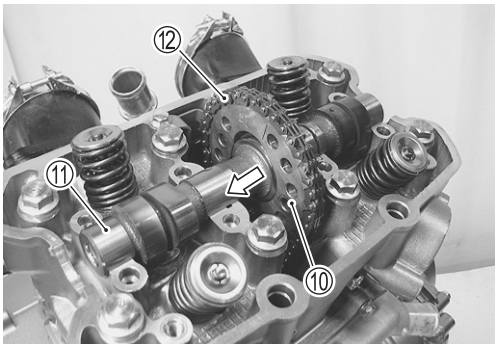


• Turn the crankshaft counterclockwise and remove the camshaft sprocket bolts ⑨.

NOTE:
Do not drop the camshaft sprocket bolts ⑨ into the cylinder head.

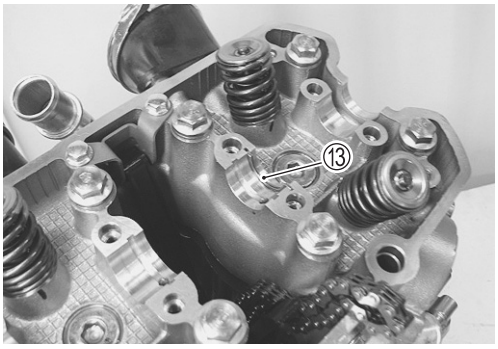


• Slide and drop the camshaft sprocket ⑩ to the camshaft ⑪.
• Disengage the cam chain ⑫ from the camshaft sprocket ⑩.
• Remove the camshaft ⑪ and camshaft sprocket ⑩.



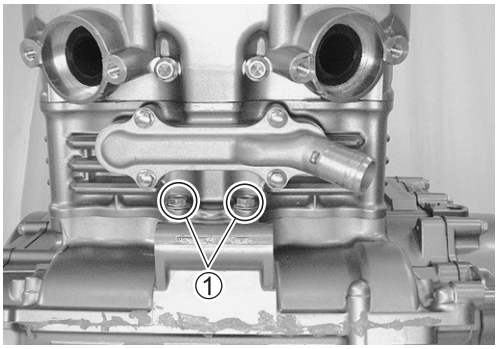
• Remove the C-ring ⑬.

NOTE:
Do not drop the C-ring ⑬ into the cylinder head.



CYLINDER HEAD

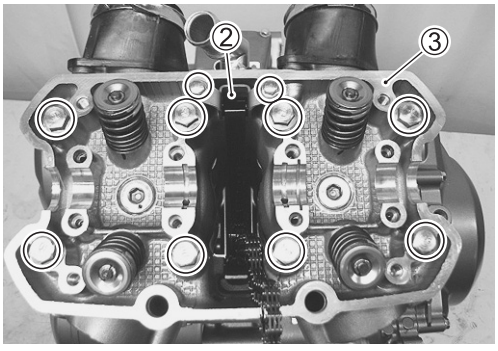
• Loosen the cylinder bolts ①.



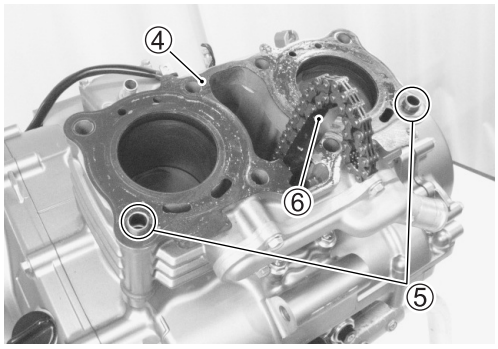
• Remove the cam chain tensioner ②.
• Remove the cylinder head bolts and washers.

NOTE:
When loosening the cylinder head bolts, loosen each bolt little by little diagonally.

• Remove the cylinder head ③.

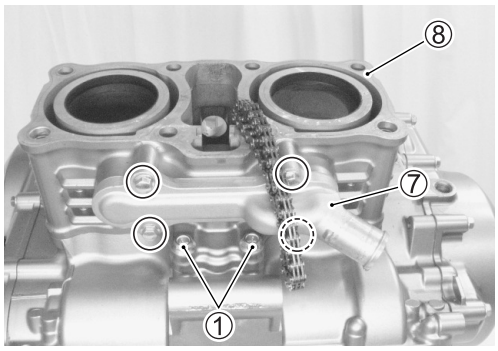


- Remove the cylinder head gasket ④, dowel pins ⑤ and cam chain guide ⑥.

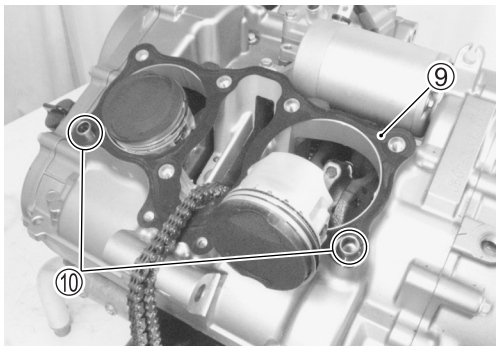


- Remove the water inlet connector ⑦.
- Remove the cylinder bolts ① and cylinder ⑧.

NOTE:
If the cylinder does not come off, lightly tap it with a plastic hammer.



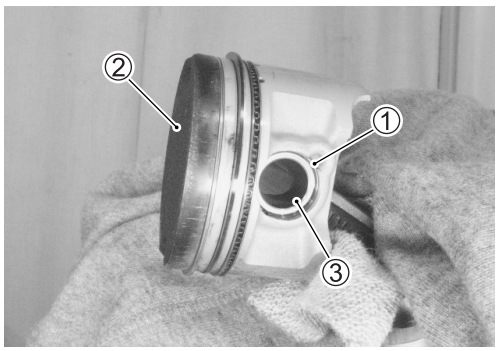
- Remove the gasket ⑨ and dowel pins ⑩.



PISTON

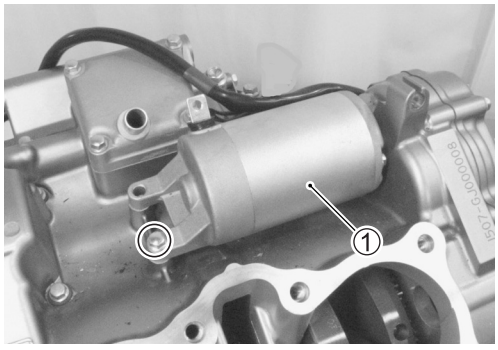
- Place a clean rag over the cylinder base so as not to drop the piston pin circlip into the crankcase.
- Remove the piston pin circlip ①.
- Remove the piston ② by drawing out the piston pin ③.

NOTE:
Scribe the cylinder number on the piston head.



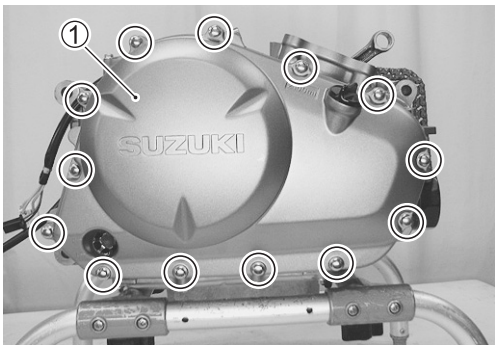
STARTER MOTOR

- Remove the starter motor ①.

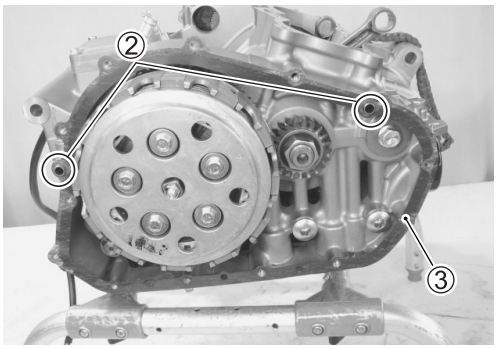


CLUTCH COVER

- Remove the clutch cover ①.



- Remove the dowel pins ② and gasket ③.

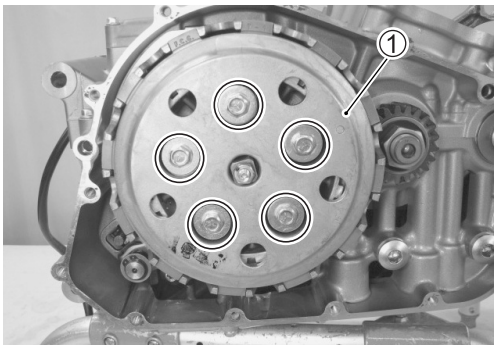


CLUTCH

- Remove the clutch spring bolts and clutch springs.

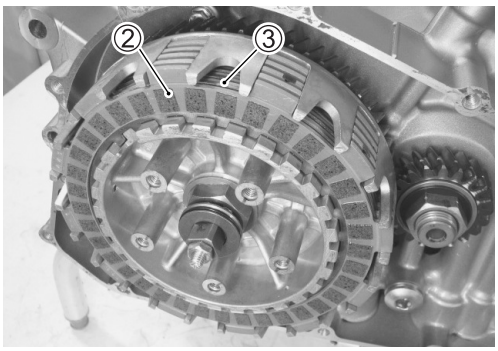
NOTE:
Loosen the clutch spring set bolts little by little and diagonally.

- Remove the clutch pressure plate ①.

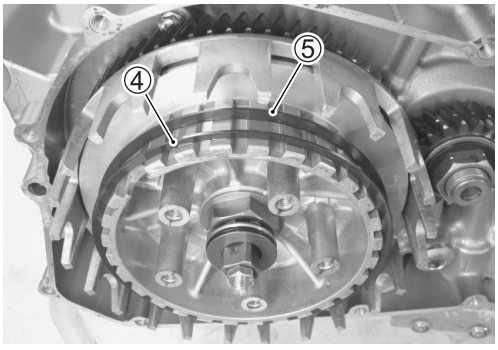


- Remove the clutch drive plates ② and driven plates ③.

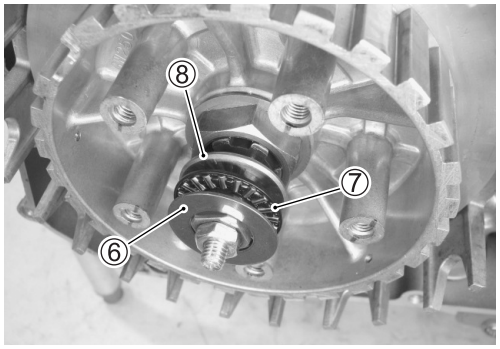
NOTE:
Prior to removal, mark each plates original position with a paint or scribe for accurate reinstallation.



- Remove the spring washer ④ and its seat ⑤.

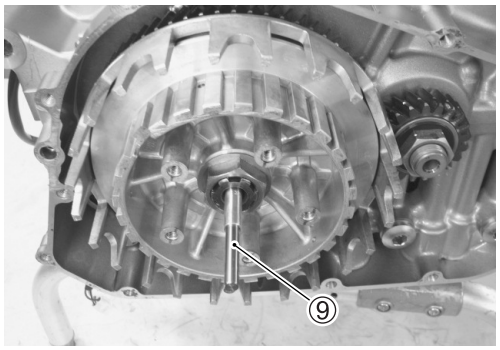


• Remove the thrust washer ⑥, bearing ⑦ and clutch push piece ⑧.

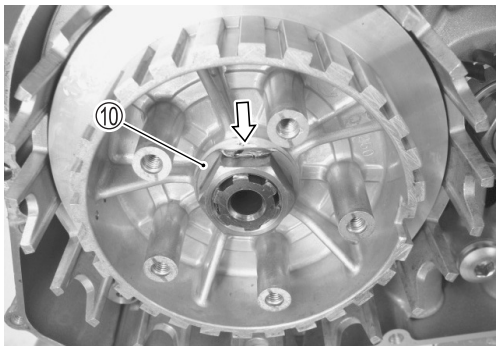


• Remove the clutch push rod ⑨.

NOTE:
If it is difficult to pull out the push rod ⑨, use a magnetic hand or a wire.

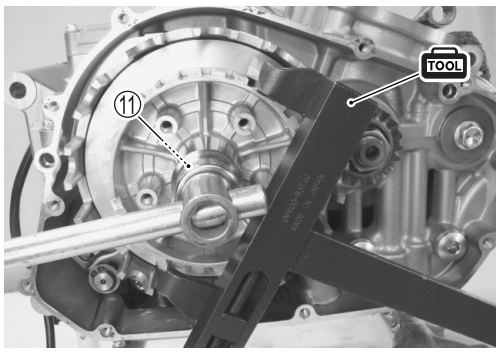


• Flatten the lock washer ⑩ of the clutch sleeve hub nut.

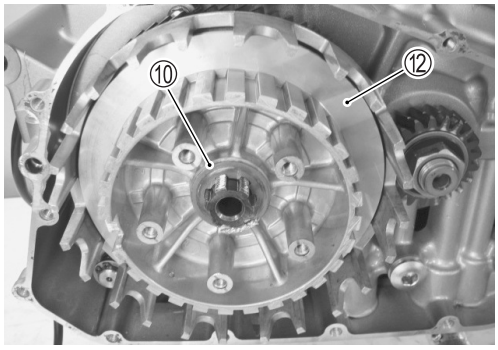


• Remove the clutch sleeve hub nut ⑪ with the special tool.

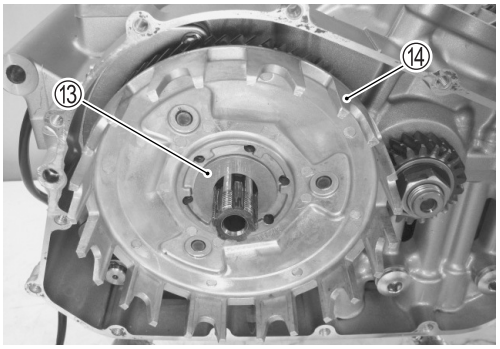
TOOL 09920-53740: Clutch sleeve hub holder



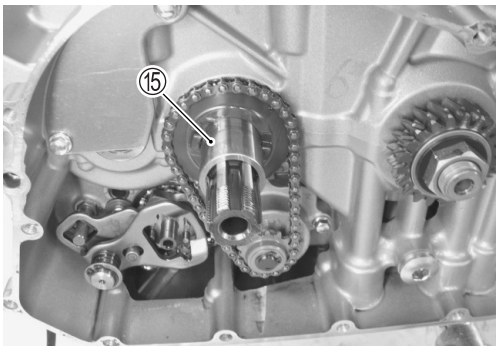
• Remove the lock washer ⑩ and clutch sleeve hub ⑫.



- Remove the thrust washer ⑬ and primary driven gear assembly ⑭.



- Remove the spacer ⑮.



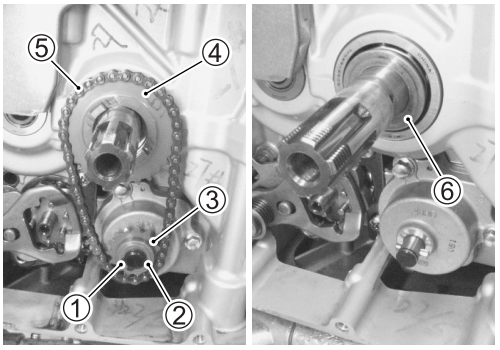
OIL PUMP

- Remove the snap ring ①, washer ② and oil pump driven sprocket ③.

TOOL 0990-06107: Snap ring pliers (Open type)

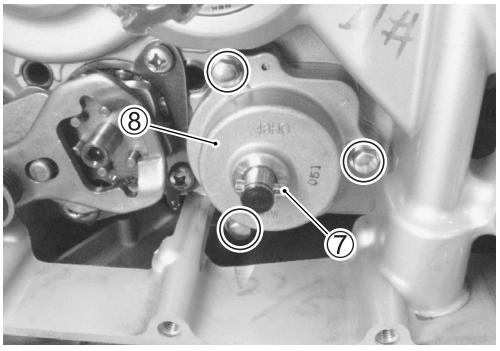
NOTE:
Do not drop the snap ring ① and washer ② into the crankcase.

- Remove the oil pump drive sprocket ④ along with the oil pump drive chain ⑤.
- Remove the thrust washer ⑥.



- Remove the pin ⑦ and oil pump ⑧.

NOTE:
Do not drop the pin ⑦ into the crankcase.

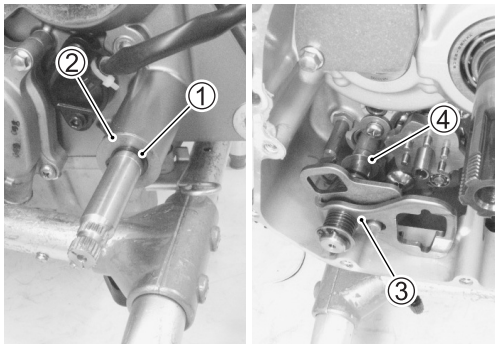


GEARSHIFT SYSTEM

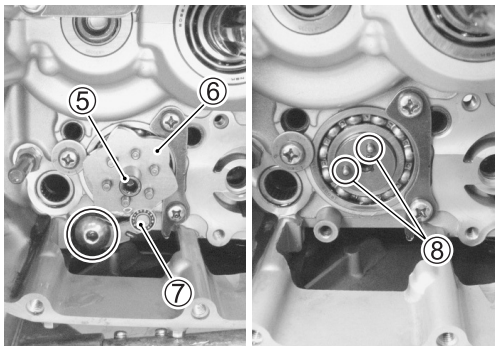
- Remove the snap ring ① and washer ② from the gearshift shaft.

TOOL 0990-06107: Snap ring pliers (Open type)

- Remove the gearshift shaft assembly ③ and washer ④.

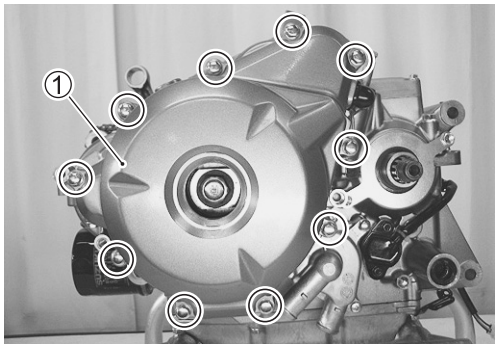


- Remove the gearshift cam stopper plate bolt ⑤ and gearshift cam stopper plate ⑥.
- Remove the gearshift cam stopper ⑦ and pins ⑧.

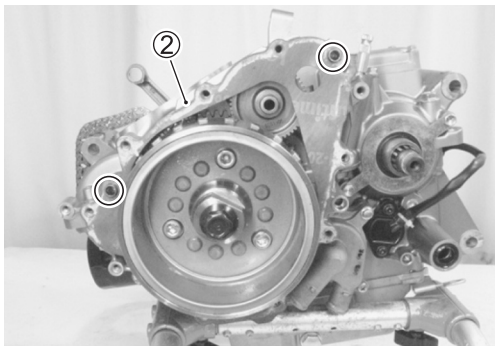


GENERATOR COVER

- Remove the generator cover ①.

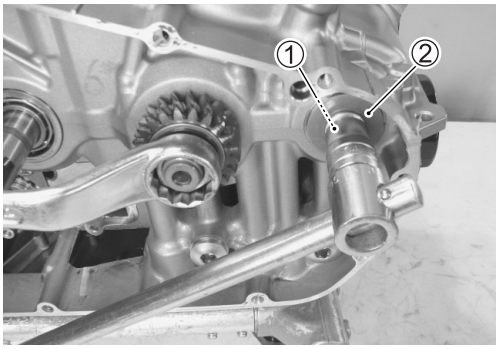


- Remove the dowel pins and gasket ②.



PRIMARY DRIVE GEAR

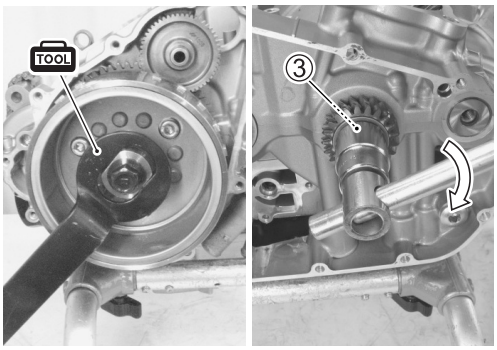
- Hold the primary drive gear nut and remove the crank balancer bolt ① and washer ②.



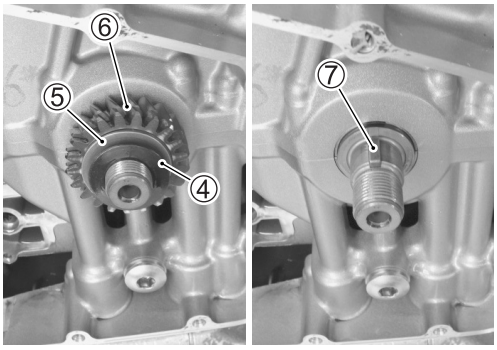
- Hold the generator rotor and remove the primary drive gear nut ③.

TOOL 09930-44521: Rotor holder

NOTE:
The primary drive gear nut ③ has left-hand threads.

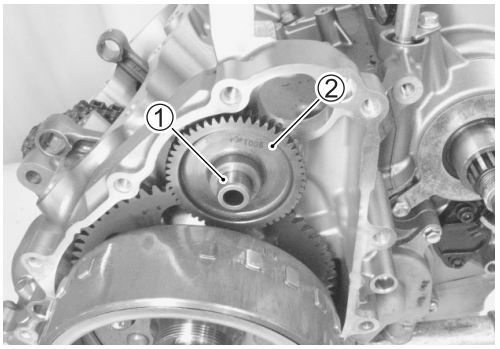


- Remove the spring washer ④, washer ⑤ and primary drive gear assembly ⑥.
- Remove the key ⑦.



STARTER IDLE GEAR

- Remove the shaft ① and starter idle gear ②.



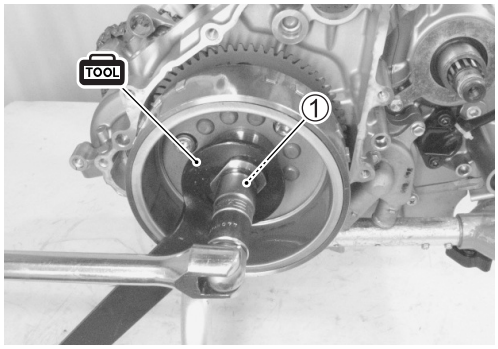
GENERATOR ROTOR

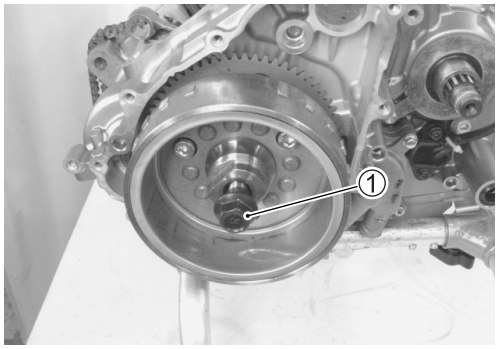
- Hold the generator rotor with the special tool.

TOOL 09930-44521: Rotor holder

- Loosen the generator rotor bolt ①.

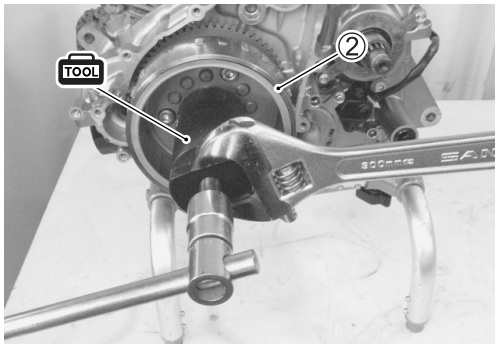
NOTE:
When loosen the generator rotor bolt ①, do not remove it. The generator rotor bolt is used in conjunction with the generator rotor remover when removing the generator rotor.



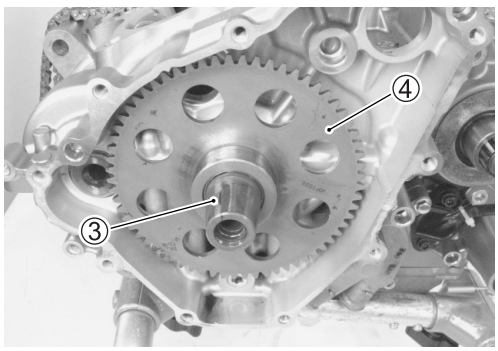


- Remove the generator rotor ② with the special tool.

TOOL 09930-31921: Rotor remover set



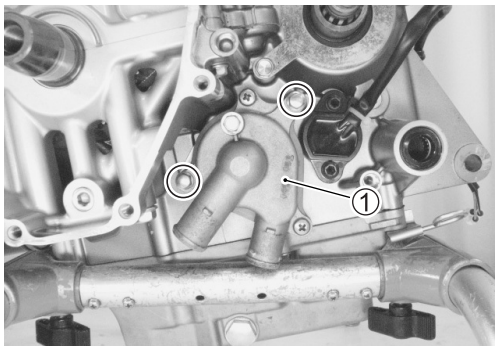
- Remove the key ③ and starter driven gear ④.



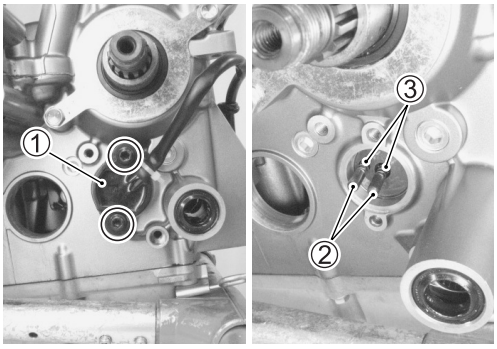
WATER PUMP

- Remove the water pump ①.

Water pump servicing (☞7-14)



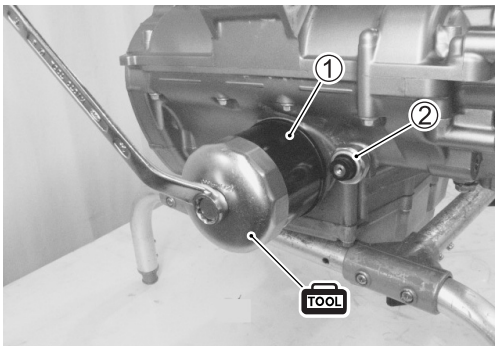
GEAR POSITION SWITCH
- Remove the gear position switch ①.
- Remove the switch contacts ② and springs ③.



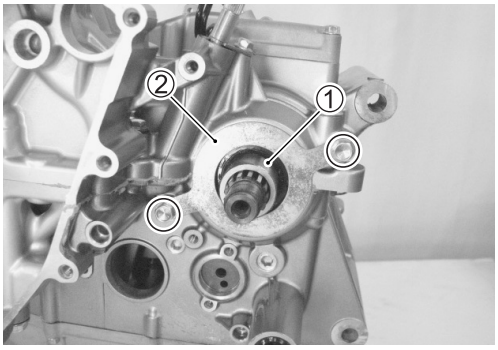
OIL FILTER AND OIL PRESSURE SWITCH
- Remove the oil filter ① with the special tool.

TOOL 09915-40620: Oil filter wrench

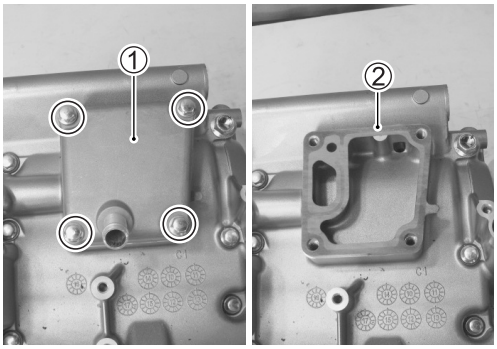
- Remove the oil pressure switch ②.



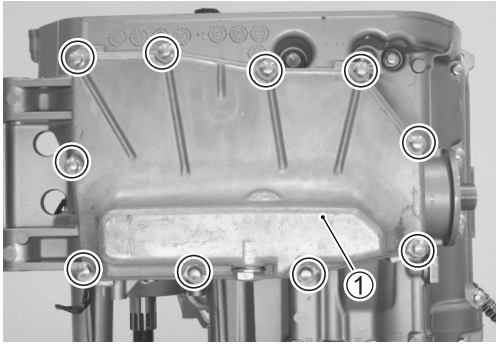
ENGINE SPROCKET SPACER
- Remove the engine sprocket spacer ① and oil seal retainer ②.



CRANKCASE BREATHER COVER
- Remove the crankcase breather cover ① and gasket ②.

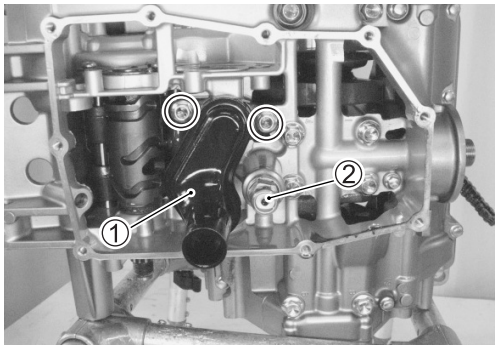


OIL PAN
- Remove the oil pan ① and its gasket.



OIL STRAINER AND OIL PRESSURE REGULATOR

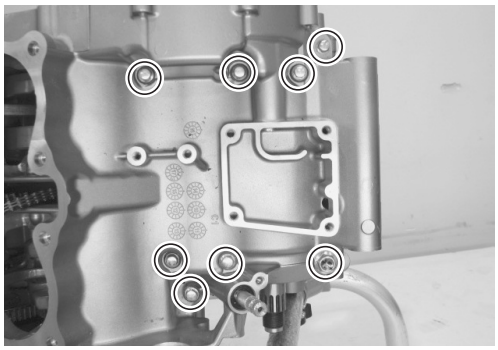
- Remove the oil strainer ①.
- Remove the oil pressure regulator ②.

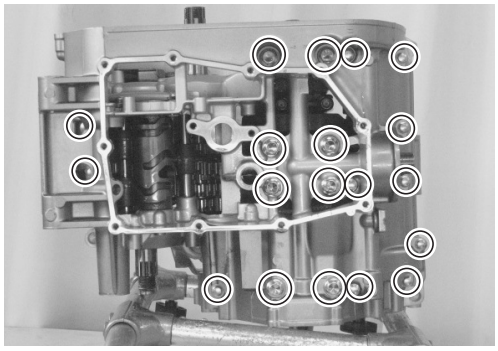


CRANKCASE

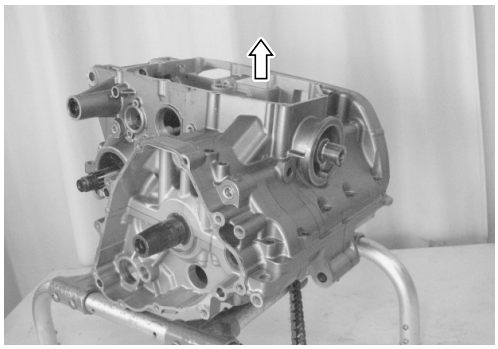
- Remove the upper and lower crankcase bolts (M6).
- Remove the upper and lower crankcase bolts (M8).

NOTE:
Loosen the crankcase bolts diagonally and the smaller sizes first.

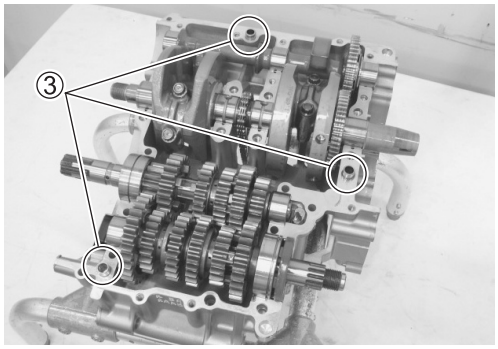




- Make sure that all of the bolts are removed. Then, tap the sides of the lower crankcase using a plastic mallet to separate the upper and lower crankcase halves and then lift the lower crankcase off of the upper crankcase.

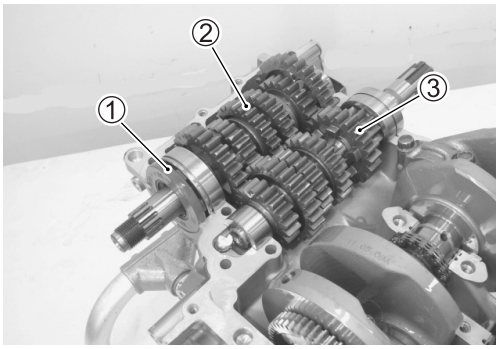


- Remove the dowel pins ③.

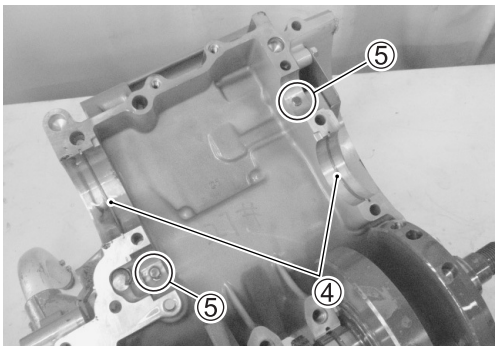


TRANSMISSION

- Remove the oil seal ①.
- Remove the driveshaft assembly ② and countershaft assembly ③.

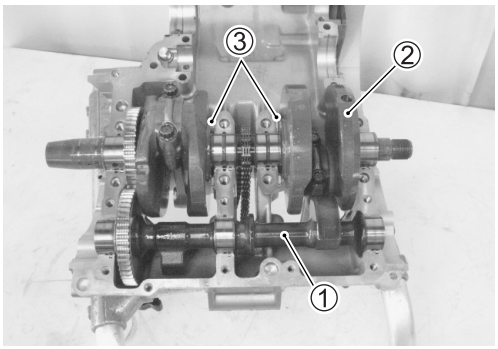


- Remove the C-rings ④ and pins ⑤.

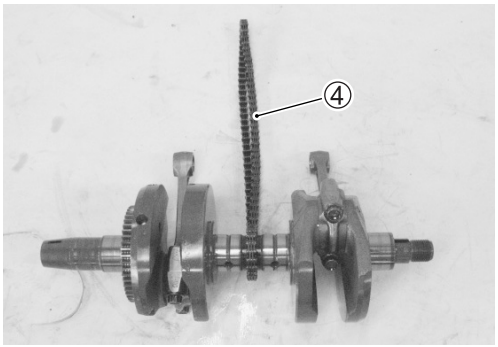


CRANK BALANCER AND CRANKSHAFT

- Remove the crank balancer assembly ①.
- Remove the crankshaft assembly ② and thrust bearings ③.



- Remove the cam chain ④ from the crankshaft assembly.

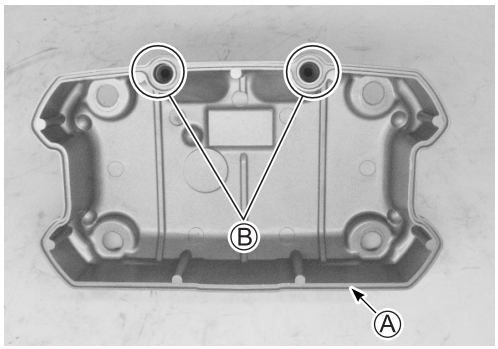


ENGINE COMPONENTS INSPECTION AND SERVICE

NOTICE

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

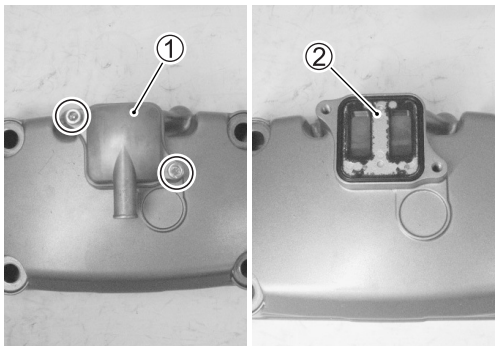
CYLINDER HEAD COVER



- Clean and check the gasket grooves Ⓐ and PAIR reed valve gasket mating surfaces Ⓑ of cylinder head cover.
  If it is damaged, replace the cylinder head cover with a new one.

PAIR REED VALVE

REMOVAL

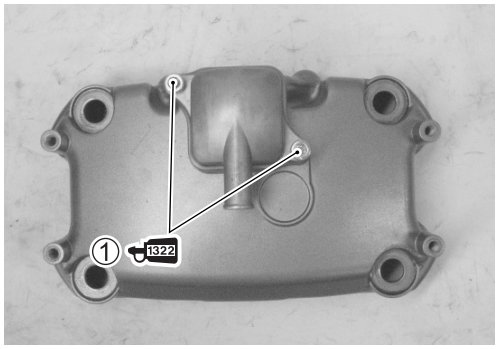


- Remove the PAIR reed valve cover ① and PAIR reed valve ②.

INSPECTION

- Inspect the reed valve for the carbon deposit.
  If the carbon deposit is found in the reed valve, replace the PAIR reed valve with a new one.

INSTALLATION



- Install the PAIR reed valve and PAIR reed valve cover. (☞10-25)
- Apply thread lock to the bolts ① and tighten to the specified torque.

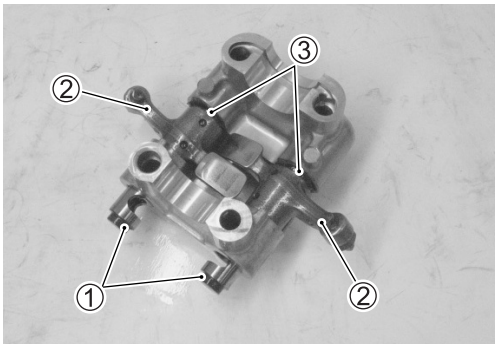
1322 99000-32110: THREAD LOCK CEMENT SUPER “1322” or equivalent

PAIR reed valve cover bolt: 10 N·m (1.0 kgf-m, 7.0 lbf-ft)

CAMSHAHT HOUSING

DISASSEMBLY

- Pull out the rocker arm shafts ①.
- Remove the valve rocker arms ② and wave washers ③.



ROCKER ARM SHAFT OUTSIDE DIAMETER INSPECTION

- Measure each rocker arm shaft out side diameter using the micrometer.
- If the diameter exceeds the limit, replace the rocker arm shaft with a new one.

DATA Rocker arm shaft O.D. (IN. & EX.):
Standard: 11.986 – 11.994 mm (0.4719 – 0.4722 in)

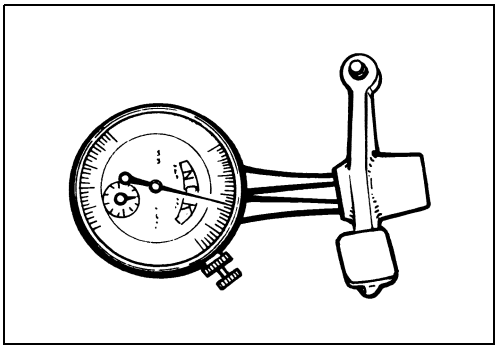
TOOL 09900-20205: Micrometer (0 – 25 mm)

ROCKER ARM INSIDE DIAMETER INSPECTION

- Measure the inside diameter of the rocker arm and check the wear of the camshaft contacting surface.
- If the diameter exceeds the limit or any damage is found, replace the rocker arm with a new one.

DATA Rocker arm I.D. (IN. & EX.):
Standard: 12.003 – 12.018 mm (0.4726 – 0.4731 in)

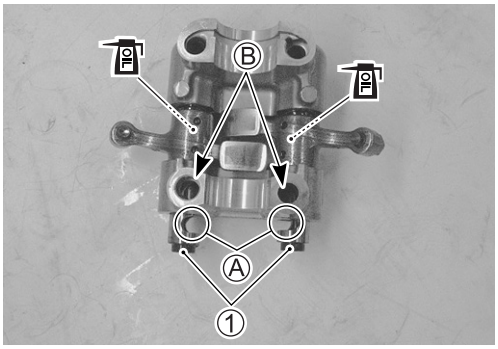
TOOL 09900-20605: Dial calipers (10 – 34 mm)



REASSEMBLY

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

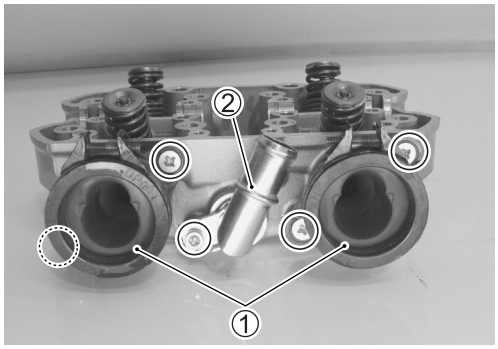
- Apply engine oil to the rocker arm shafts ①.
- Align the rocker arm shaft grooves Ⓐ with the camshaft housing holes Ⓑ.



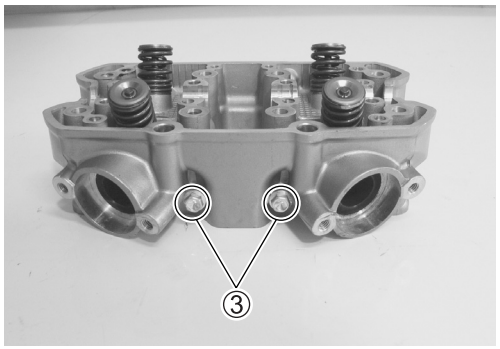
CYLINDER HEAD

DISASSEMBLY

- Remove the intake pipes ① and cylinder head water outlet pipe ②.



- Remove the oil gallery plugs ③ if necessary.

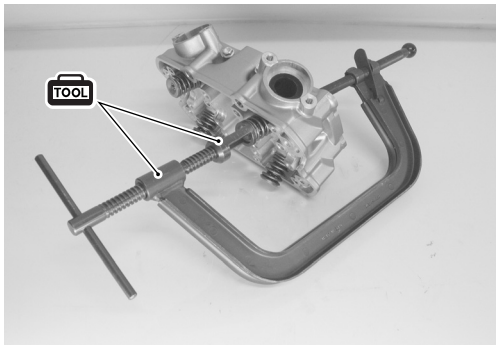


- Compress the valve spring using the special tools.

NOTICE

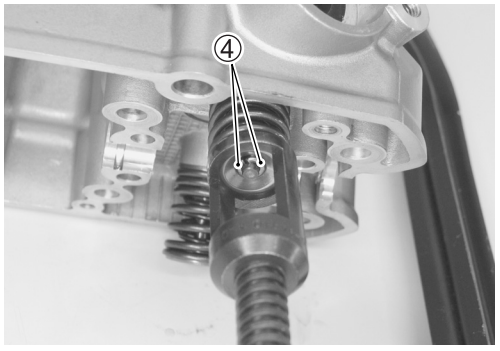
Compressing of the valve spring must be limited to the extent only necessary to prevent the spring from fatigue.

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

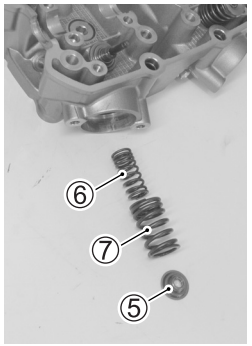


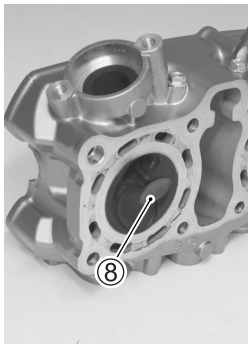
- Remove the two cotter halves ④.

TOOL 09916-84511: Tweezer

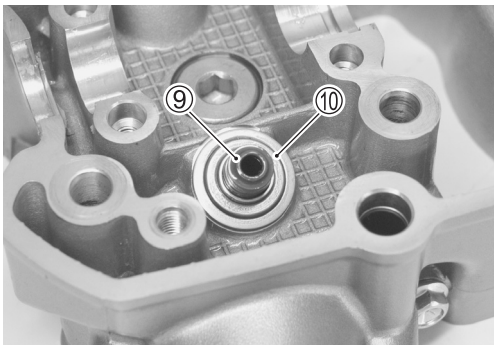


- Remove the valve spring retainer ⑤, inner valve spring ⑥ and outer valve spring ⑦.
- Pull out the valve ⑧ from the combustion chamber side.





- Remove the oil seal ⑨ and spring seat ⑩.
- Remove the other valves in the same manner as described previously.

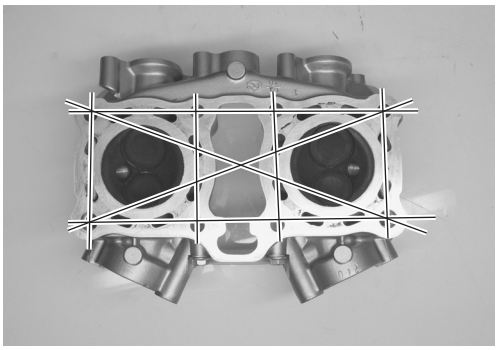


CYLINDER HEAD DISTORTION

- Decarbonize the combustion chambers.
- Check the gasket surface of the cylinder head for distortion. Use a straightedge and thickness gauge. Take clearance readings at several places.
- If readings exceeds the service limit, replace the cylinder head.

DATA Cylinder head distortion:
Service Limit: 0.10 mm (0.004 in)

TOOL 09900-20803: Thickness gauge

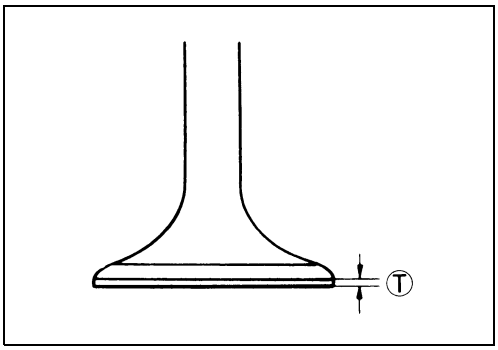


VALVE FACE WEAR

- Visually inspect each valve face for wear. Replace any valve with an abnormally worn face.
- The thickness of the valve face decreases as the face wears. Measure the valve head Ⓣ. If it is out of specification replace the valve with a new one.

DATA Valve head thickness Ⓣ:
Service Limit: 0.5 mm (0.02 in)

TOOL 09900-20101: Venier calipers (150 mm)

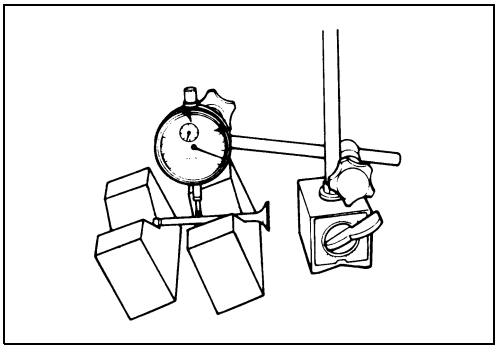


VALVE STEM RUNOUT

- Support the valve using V blocks and check 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
09900-20701: Dial gauge chuck
09900-21304: V blocks

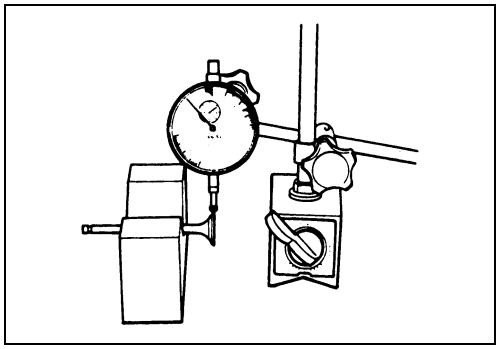


VALVE HEAD RADIAL RUNOUT

- 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
09900-20701: Dial gauge chuck
09900-21304: V blocks

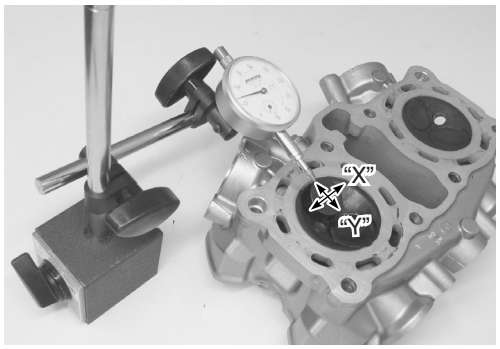


VALVE STEM DEFLECTION

- Lift the valve about 10 mm (0.39 in) from the valve seat.
- Measure the valve stem deflection in two directions, "X" and "Y", perpendicular to each other, by positioning the dial gauge as shown.
- If the deflection measured exceeds the limit, then determine whether the valve or cylinder head 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
09900-20701: Dial gauge chuck

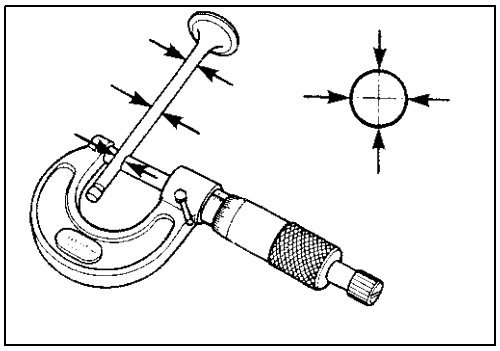


VALVE STEM WEAR

- If the valve stem is worn down to the limit, when measured with the micrometer, and the clearance is found to be in excess of the limit indicated previously, replace the valve.
- If the stem is within the limit, replace the cylinder head.
- After replacing the valve or cylinder head, be sure to recheck the deflection.

DATA Valve stem O.D.:
Standard (IN.): 4.975 – 4.990 mm (0.1959 – 0.1965 in)
(EX.): 4.955 – 4.970 mm (0.1951 – 0.1957 in)

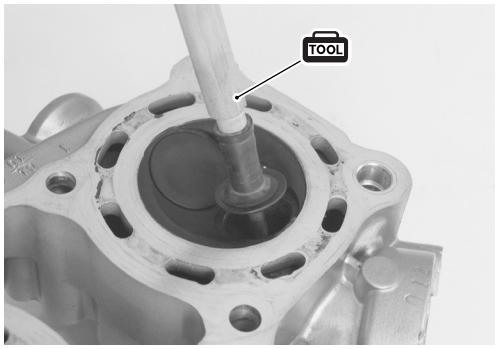
TOOL 09900-20205: Micrometer (0 – 25 mm)



VALVE SEAT WIDTH

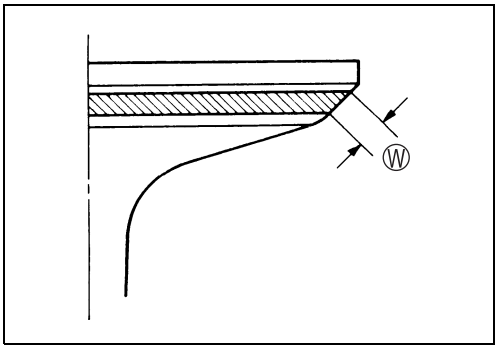
- Visually check for valve seat width on each valve face. If the valve face has worn abnormally, replace the valve.
- Coat the valve seat with a red lead (Prussian Blue) and set the valve in place. Rotate the valve with light pressure.
- Check that the transferred red lead (blue) on the valve face is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

TOOL 09916-10911: Valve lapper set



• If the seat width Ⓦ measured exceeds the standard value or seat width is not uniform, reface the seat using the seat cutter.

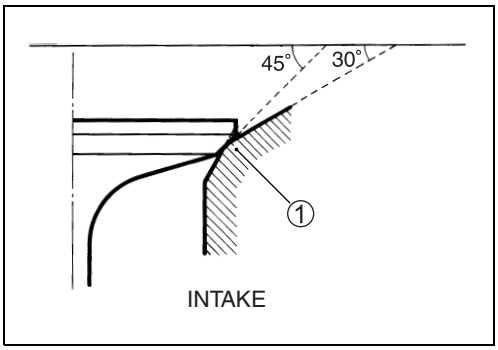
DATA Valve seat width Ⓦ:
Standard (IN. & EX.): 0.9 – 1.1 mm (0.035 – 0.043 in)



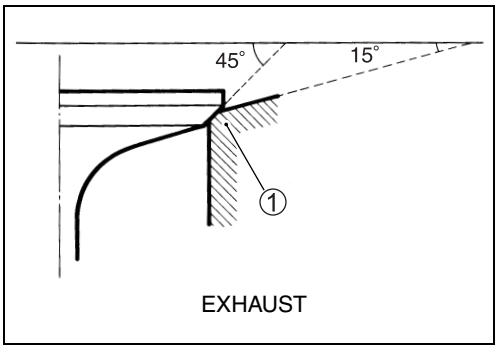
VALVE SEAT SERVICING

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

	INTAKE	EXHAUST
Seat angle	30°, 45°	15°, 45°
Seat width	0.9 – 1.1 mm (0.035 – 0.043 in)	
Valve diameter	27.0 mm (1.06 in)	22.5 mm (0.89 in)
Valve guide I.D.	5.000 – 5.012 mm (0.1969 – 0.1973 in)	



INTAKE



EXHAUST

NOTICE

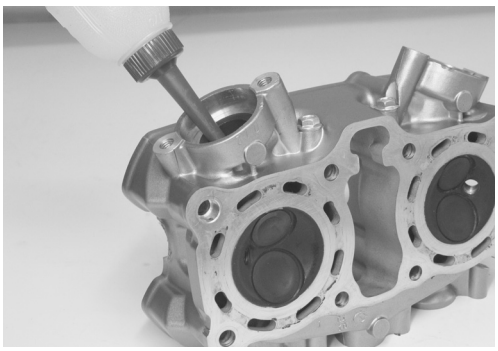
*** The valve seat contact area must be inspected after each cut.**
*** Do not use lapping compound after the final cut is made. The finished valve seat should have a velvety smooth finish but not a highly polished or shiny finish. This will provide a soft surface for the final seating of the valve which 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. (☞2-8)

• 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.

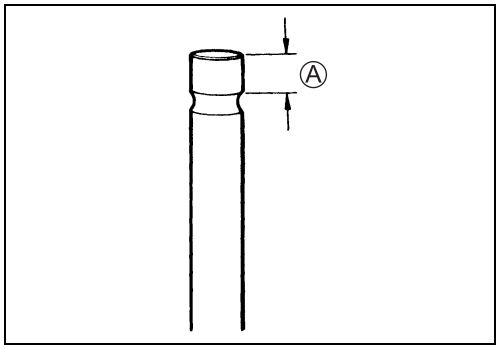
⚠ WARNING

Always use extreme caution when handling gasoline.



VALVE STEM END CONDITION

- Inspect the valve stem end face for pitting and wear. If pitting or wear is present, resurface the valve stem end.
- Make sure that the length Ⓐ is not less than 2.2 mm (0.09 in). If this length becomes less than 2.2 mm (0.09 in), replace the valve.



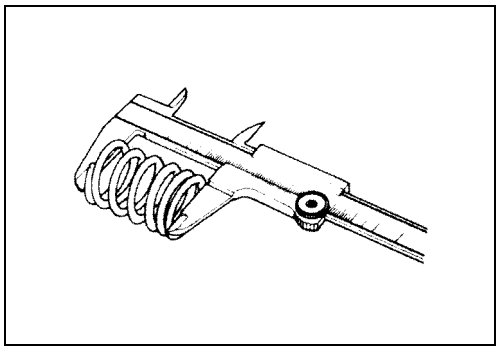
DATA Valve stem end length Ⓐ:
Service Limit (IN. & EX.): 2.2 mm (0.09 in)

TOOL 09900-20101: Vernier calipers (150 mm)

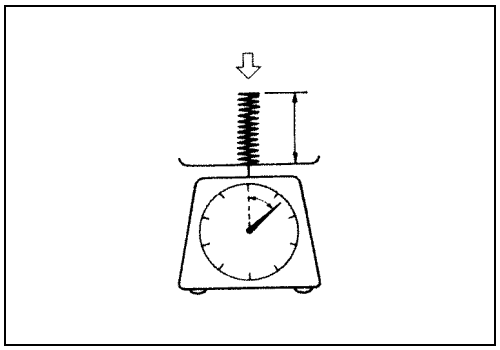
VALVE SPRING

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

- Check the valve spring for proper strength by measuring their free length and also by the force required to compress them.
- 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 valve spring.



DATA Valve spring free length (IN. & EX.):
Service Limit(INNER): 32.1 mm (1.26 in)
(OUTER): 31.8 mm (1.25 in)



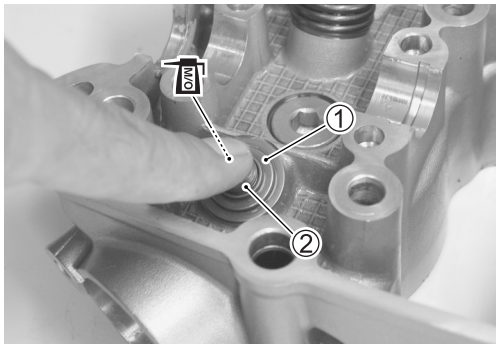
TOOL 09900-20101: Vernier calipers (150 mm)

DATA Valve spring tension (IN. & EX.):
Standard (INNER): 58.2 – 71.2 N (6.0 – 7.3 kgf, 13.2 – 16.1 lbs)/28.0 mm (1.10 in)
Standard (OUTER): 158.7 – 182.5 N (16.2 – 18.6 kgf, 35.7 – 41.0 lbs)/31.5 mm (1.24in)

REASSEMBLY

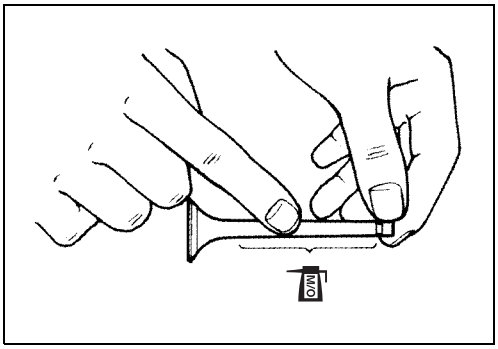
Reassemble the cylinder head in the reverse order of diassembly. Pay attention to the following points:

- Install the valve spring seat ①.
- Apply molybdenum oil solution to the new oil seal ②, and press-fit it into position.



MO MOLYBDENUM OIL SOLUTION

• Insert the valve, with its stem coated with molybdenum oil solution all around and along the full stem length without any break.

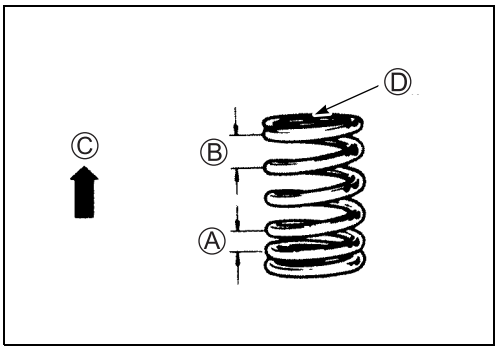


NOTICE

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

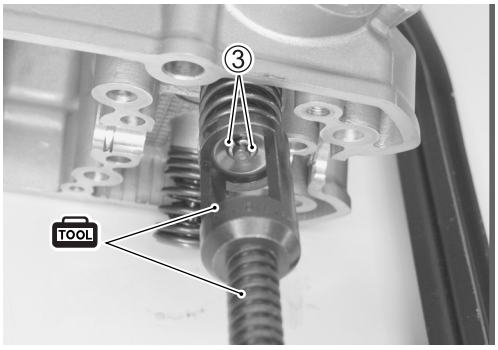
MOLYBDENUM OIL SOLUTION

• Install each valve spring with the small-pitch portion Ⓐ facing cylinder head.



Ⓐ Small-pitch portion
Ⓑ Large-pitch portion
Ⓒ UPWARD
Ⓓ Paint

• Compress the valve spring using the special tools.

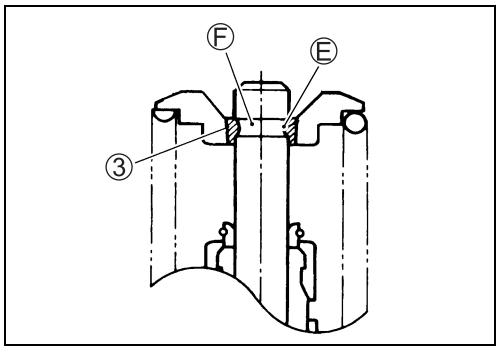


NOTICE

Compressing of the valve spring must be limited to the extent only necessary to prevent the spring from fatigue.

09916-14510: Valve lifter
09916-14910: Valve lifter attachment

• Install the cotter halves ③.



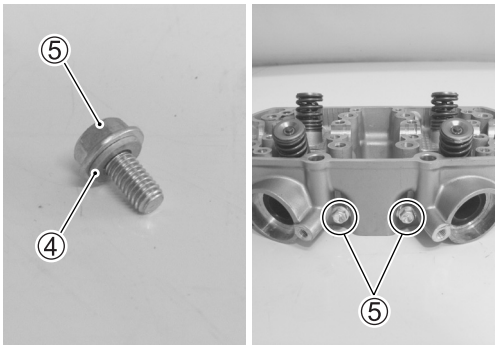
NOTICE

Check that the rounded lip Ⓔ of the cotter is securely fitted in the groove Ⓕ in the valve stem end.

NOTE:
To facilitate assembly, apply a little grease to the valve cotter when fitting into the valve stem groove.

09916-84511: Tweezer

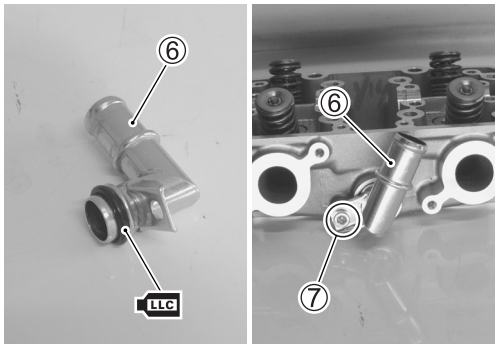
• Fit the new gasket ④ to each oil gallery plug ⑤.
• Tighten the oil gallery plugs ⑤ to the specified torque.



Oil gallery plug (Cylinder head):
10 N·m (1.0 kgf-m, 7.0 lbf-ft)

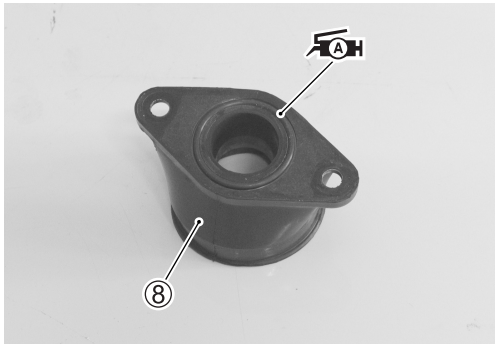
- Apply engine coolant to the new O-ring of the cylinder head water outlet pipe ⑥.
- Tighten the water outlet pipe bolt ⑦ to the specified torque.

Cylinder head water outlet pipe bolt:
10 N·m (1.0 kgf-m, 7.0 lbf-ft)

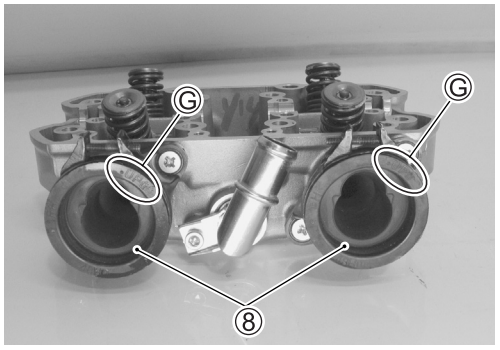


- Apply grease to the new O-rings of the intake pipes ⑧.

99000-25010: SUZUKI SUPER GREASE "A"
or equivalent



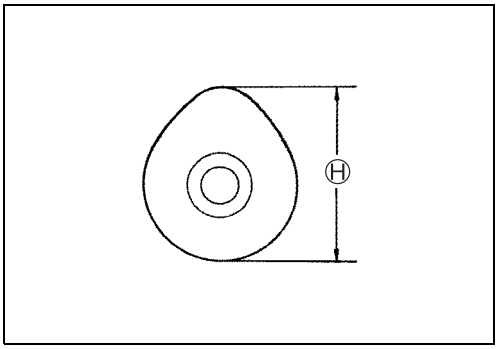
- Install the intake pipes ⑧ with "UP" mark Ⓖ faced upward.



CAMSHAFT

CAM WEAR

- Check the camshaft for wear or damage.
- Measure the cam height Ⓗ with the micrometer. Replace a camshaft if the cams are worn to the service limit.

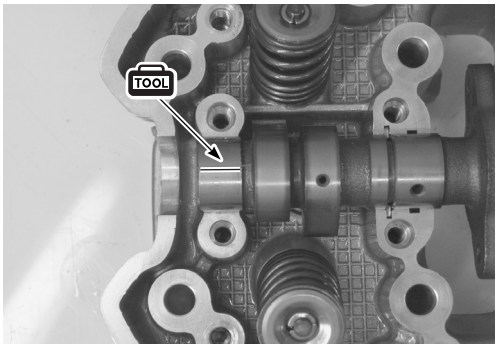


DATA Cam height Ⓗ:
Service Limit: (IN.) : 33.04mm (1.301 in)
(EX.) : 32.75 mm (1.289 in)

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

CAMSHAFT JOURNAL WEAR

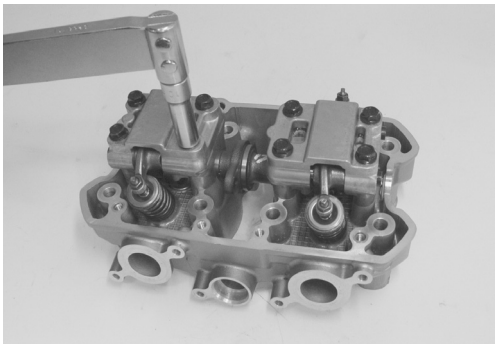
- Determine whether or not each journal is worn down to the limit by measuring the oil clearance with the camshaft installed in place.
- Use the plastigage to read the clearance at the widest portion, which is specified as follows:



DATA Camshaft journal oil clearance:
Service Limit: 0.150 mm (0.0059 in)

TOOL 09900-22301: Plastigage (0.025 – 0.076 mm)
09900-22302: Plastigage (0.051 – 0.152 mm)

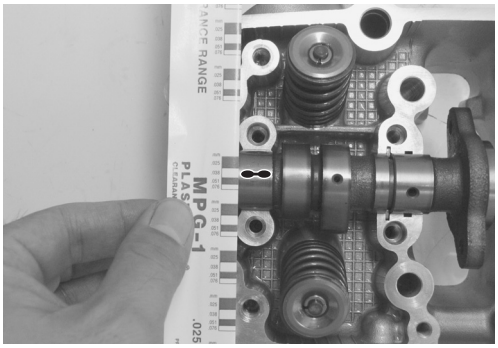
- Install the camshaft journal holders and tighten the camshaft journal holder bolts in ascending order of numbers to the specified torque. (☞3-90)



NOTE:
Do not rotate the camshaft with the plastigage in place.

Camshaft journal holder bolt:
10 N·m (1.0 kgf-m, 7.0 lbf-ft)

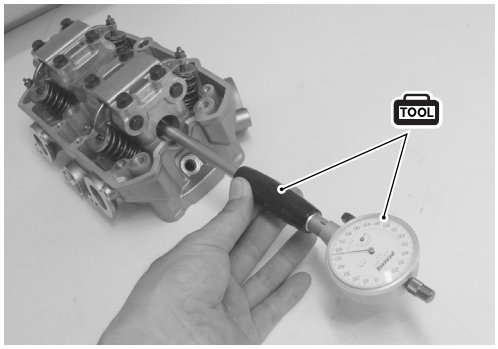
- Remove the camshaft journal holders and measure the width of the compressed plastigage using the envelope scale. This measurement should be taken at the widest part of the compressed plastigage.



- If the camshaft journal oil clearance 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.

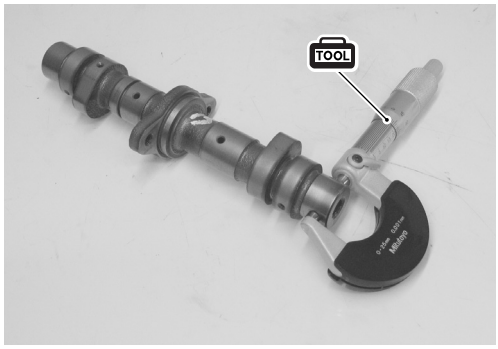
DATA Camshaft journal holder I.D.:
Standard: 22.012 – 22.025 mm (0.8666 – 0.8671 in)

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



DATA Camshaft jouranal O.D.:
Standard: 21.959 – 21.980 mm (0.8645 – 0.8654 in)

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

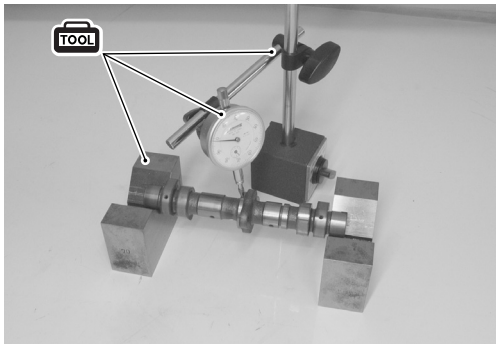


CAMSHAFT RUNOUT

- Measure the runout using the dial gauge.
- Replace the camshaft if the runout exceeds the limit.

DATA Camshaft runout:
Service Limit: 0.10 mm (0.004 in)

TOOL 09900-20607: Dial gauge
09900-20701: Dial gauge chuck
09900-21304: V blocks



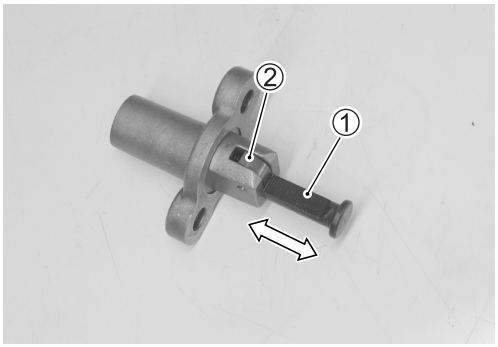
CAM SPROCKET

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

CAM CHAIN TENSION ADJUSTER

INSPECTION

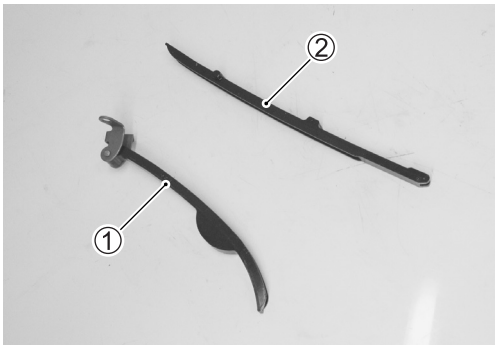
- Check that the push rod ① can slide smoothly with the lock ② of the ratchet mechanism released.
- If it does not slide smoothly or the ratchet mechanism is worn or damaged, replace the cam chain tension adjuster with a new one.



CAM CHAIN TENSIONER AND CAM CHAIN GUIDE

INSPECTION

- Check the contacting surface of the cam chain tensioner ① and cam chain guide ②.
- If it is worn or damaged, replace it with a new one.



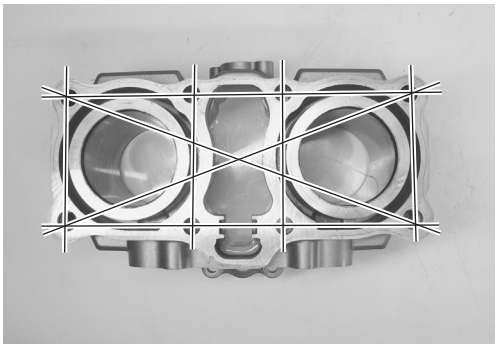
CYLINDER

CYLINDER DISTORTION

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

DATA Cylinder distortion:
Service Limit: 0.10 mm (0.004 in)

TOOL 09900-20803: Thickness gauge

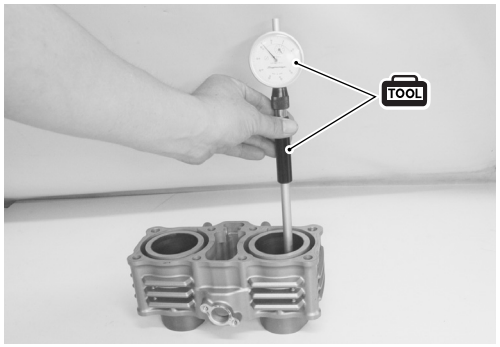


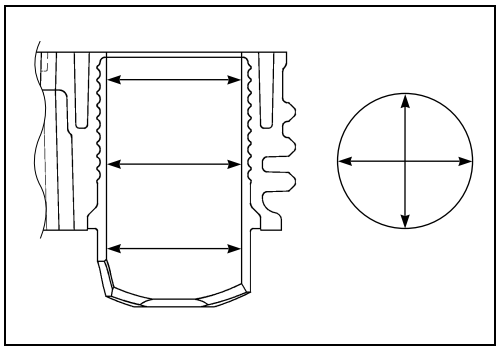
CYLINDER BORE

- Measure the cylinder bore diameter at six places.
- If any one of the measurements exceed the limit, overhaul the cylinder and replace the piston with an oversize piston, or replace the cylinder.

DATA Cylinder bore:
Service Limit: 53.590 mm (2.1098 in)

TOOL 09900-20530: Cylinder gauge set





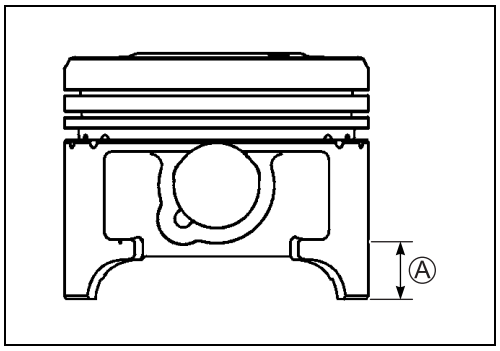
PISTON

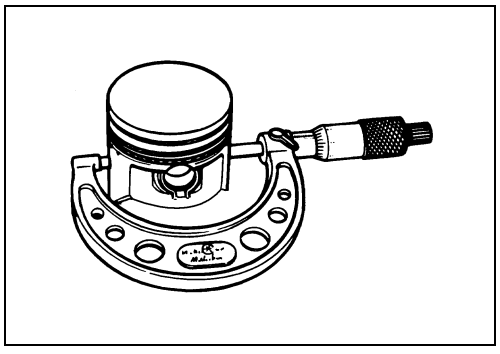
PISTON DIAMETER

- Using a micrometer, measure the piston outside diameter at 10 mm (0.4 in) Ⓐ from the piston skirt end.
- If the measurement is less than the limit, replace the piston.

DATA Piston diameter:
Service Limit: 53.380 mm (2.1016 in)
at 10 mm (0.4 in) from the skirt end
Piston oversize: 0.5 mm

TOOL 09900-20203: Micrometer (50 – 75 mm)





PISTON-TO-CYLINDER CLEARANCE

- Subtract the piston diameter from the cylinder bore diameter.
- If the piston-to-cylinder clearance exceeds the service limit, rebore the cylinder and use an oversize piston or replace both the cylinder and the piston.

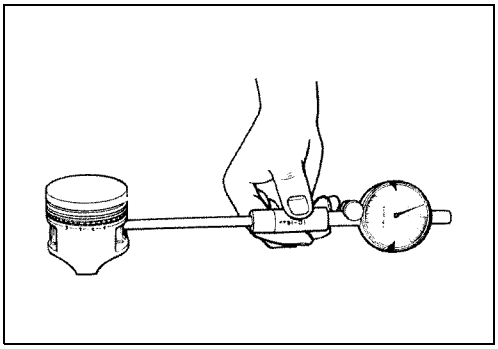
DATA Piston-to-cylinder clearance:
Service Limit: 0.120 mm (0.0047 in)

PISTON PIN AND PIN BORE

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

DATA Piston pin bore I.D.:
Service Limit: 15.030 mm (0.5917 in)

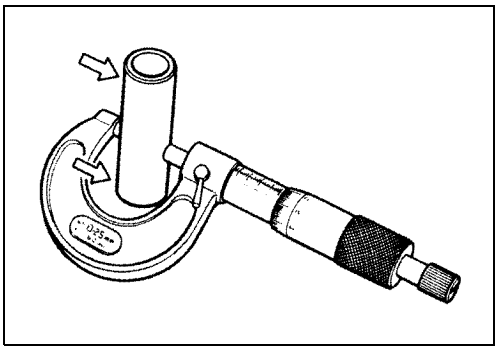
TOOL 09900-20602: Dial gauge
09900-22401: Small bore gauge (10 – 18 mm)



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

DATA Piston pin O.D.:
Service Limit: 14.980 mm (0.5898 in)

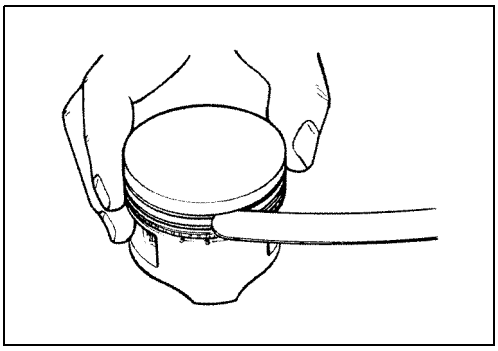
TOOL 09900-20205: Micrometer (0 – 25 mm)



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.

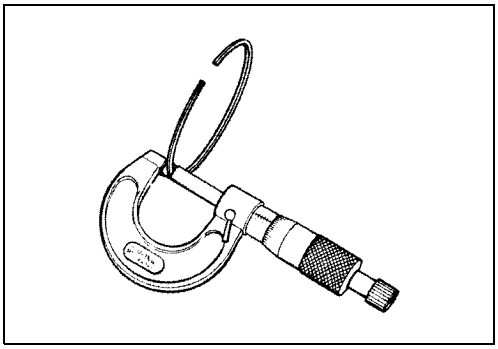
TOOL 09900-20803: Thickness gauge
09900-20205: Micrometer (0 – 25 mm)



DATA Piston ring-to-groove clearance:
Service Limit (1st) : 0.180 mm (0.0071 in)
(2nd) : 0.150 mm (0.0059 in)

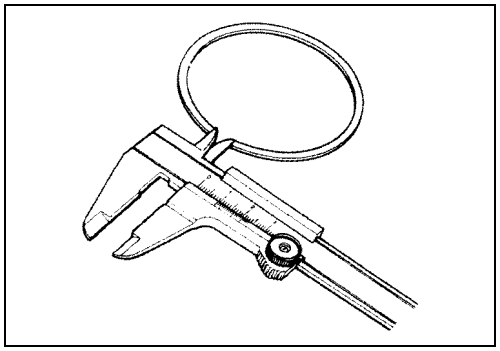
DATA Piston ring groove width:
Standard (1st) : 1.01 – 1.03 mm (0.0398 – 0.0406 in)
(2nd) : 1.01 – 1.03 mm (0.0398 – 0.0406 in)
(Oil) : 2.01 – 2.03 mm (0.0791 – 0.0799 in)

DATA Piston ring thickness:
Standard (1st) : 0.97 – 0.99 mm (0.0382 – 0.0390 in)
(2nd) : 0.97 – 0.99 mm (0.0382 – 0.0390 in)

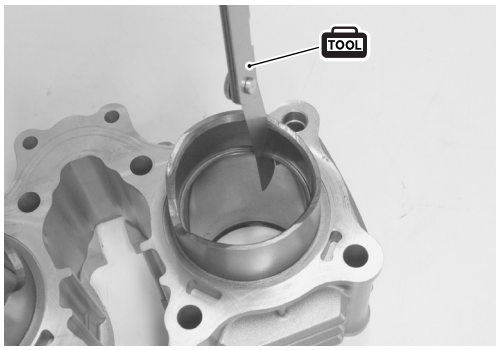


PISTON RING FREE END GAP AND PISTON RING END GAP

- Measure the piston ring free end gap using the vernier calipers.



- Next, 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 free end gap:
Service Limit (1st) : 4.2 mm (0.17 in)
(2nd) : 3.6 mm (0.14 in)

TOOL 09900-20101: Vernier calipers (150 mm)

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

OVERSIZE RINGS

Oversize piston ring

The following oversize piston ring is used. It bears the following identification number.

Piston ring 1st and 2nd 0.5 mm: 50

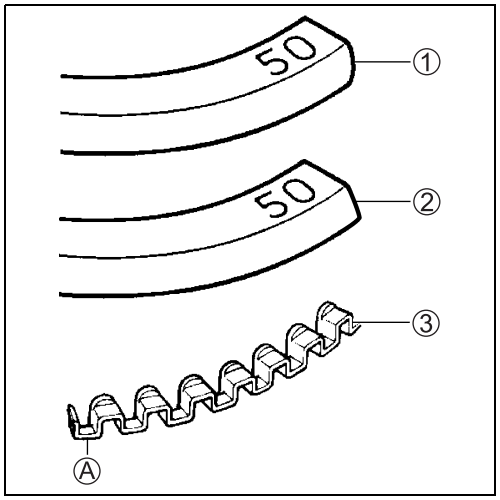
Oversize oil ring

The following oversize oil ring is used. It bears the following identification mark.

Oil ring 0.5 mm: Painted red

Oversize side rail

Measure the outside diameter to identify the size.



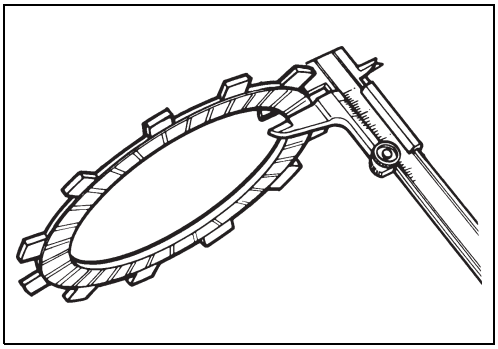
① 1st ring (0.5 mm O.S.)
② 2nd ring (0.5 mm O.S.)
③ Oil ring spacer (0.5 mm O.S.)
Ⓐ Paint

CLUTCH

CLUTCH DRIVE PLATE INSPECTION

NOTE:
Wipe off engine oil from the clutch drive plates with a clean rag.

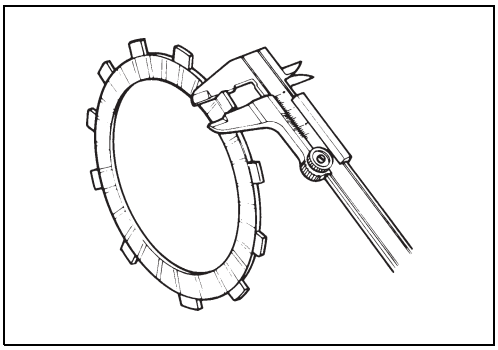
Measure the thickness of drive plates with a vernier calipers.
If the drive plate thickness is found to have reached the limit, replace it with a new one.



DATA Drive plate thickness:
Service Limit (No.1 and No.2): 2.62 mm (0.103 in)
Service Limit (No.3): 3.12 mm (0.123 in)

TOOL 09900-20102: Vernier calipers (200 mm)

Measure the claw width of drive plates with a vernier calipers.
Replace the drive plates found to have worn down to the limit.



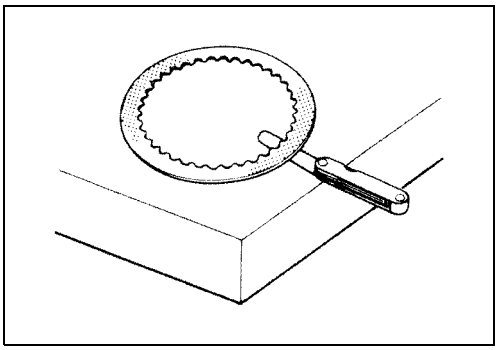
DATA Drive plate claw width:
Service Limit: 15.2 mm (0.598 in)

TOOL 09900-20102: Vernier calipers (200 mm)

CLUTCH DRIVEN PLATE INSPECTION

NOTE:
Wipe off engine oil from the clutch driven plates with a clean rag.

Measure each driven plate for distortion with a thickness gauge and surface plate.
Replace driven plates which exceed the limit.

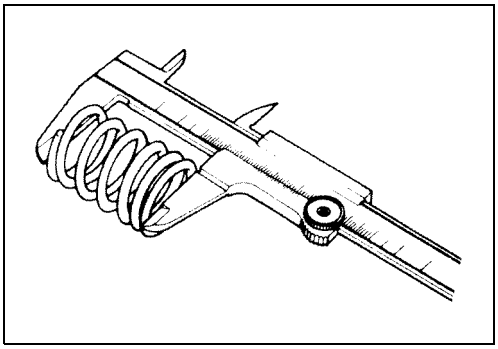


DATA Driven plate distortion (No.1, No.2 and No.3):
Service Limit: 0.10 mm (0.004 in)

TOOL 09900-20803: Thickness gauge

CLUTCH SPRING INSPECTION

Measure the free length of each coil spring with a vernier calipers, and compare the length with the specified limit.
Replace all the springs if any spring is not within the limit.



DATA Clutch spring free length:
Service Limit: 36.6 mm (1.441 in)

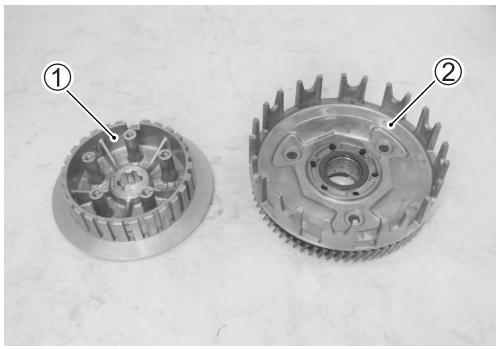
TOOL 09900-20102: Vernier calipers (200 mm)

CLUTCH RELEASE BEARING INSPECTION

Inspect the clutch release bearing for any abnormality, particularly cracks, to decide whether it can be reused or should be replaced.
Smooth engagement and disengagement of the clutch depends on the condition of this bearing.

CLUTCH SLEEVE HUB/PRIMARY DRIVEN GEAR ASSEMBLY

Inspect the slot of the clutch sleeve hub ① and primary driven gear assembly ② for damage or wear caused by the clutch plates. If necessary, replace it with a new one.



CLUTCH PUSH ROD

Inspect the clutch push rod for damage and bend. If necessary, replace it with a new one.

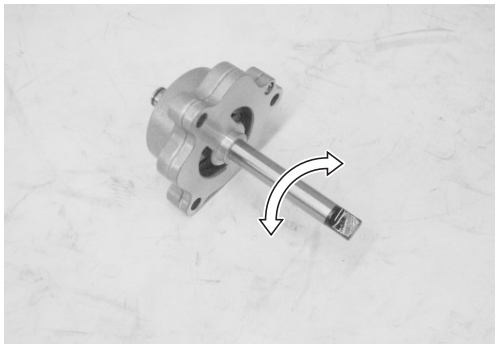
OIL PUMP

INSPECTION

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

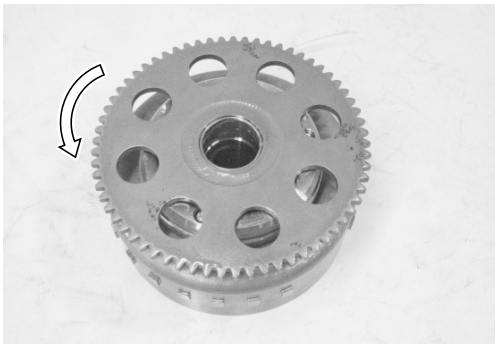
NOTICE

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

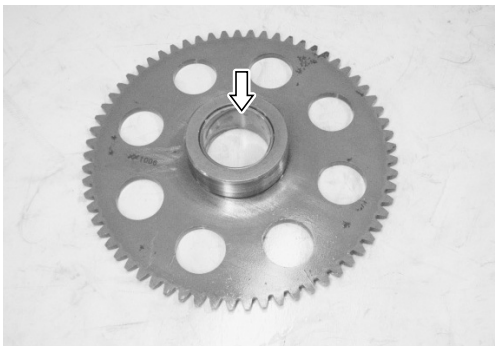


STARTER CLUTCH

STARTER DRIVEN GEAR INSPECTION

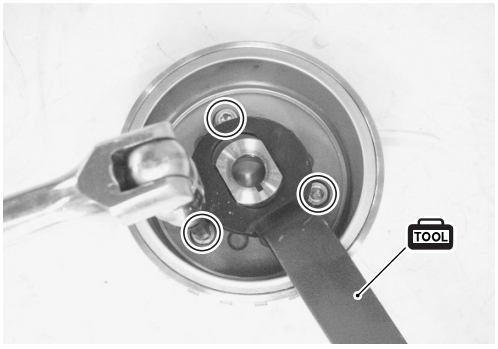


- Install the starter driven gear to the starter clutch and turn the starter driven gear by hand to inspect the starter clutch for a smooth movement. The gear turns one direction only. If a large resistance is felt to rotation, inspect the starter clutch for damage or inspect the starter clutch contacting surface of the starter driven gear for wear or damage.
  I they are found to be damaged, replace them with new ones.



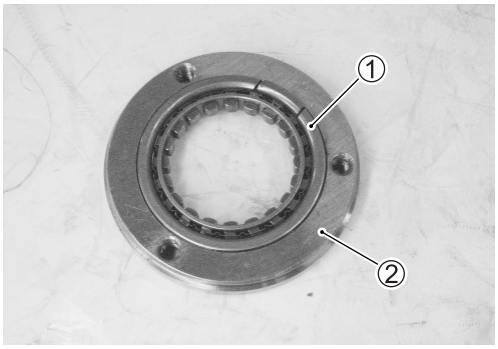
- Inspect the starter driven gear bushing for any damage.
  If necessary, replace it with a new one.

DISASSEMBLY



- Hold the generator rotor with the special tool and remove the starter clutch bolts.

TOOL 09930-44521: Rotor holder

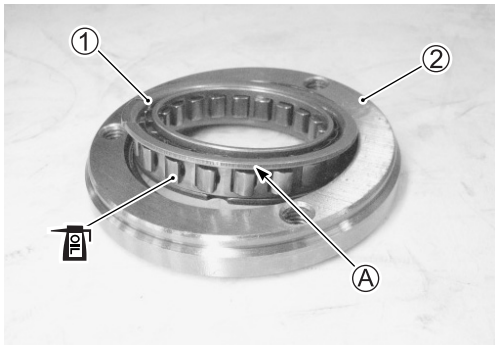


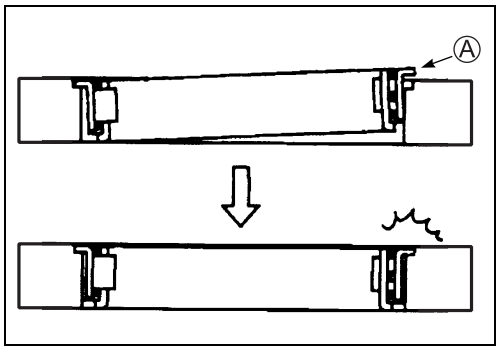
- Remove the one way clutch ① from the guide ②.

REASSEMBLY

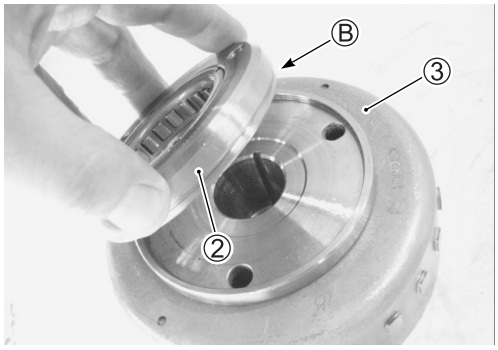
- Apply engine oil to the one way clutch ①.
- When inserting the one way clutch ① into the guide ②, fit the flange Ⓐ in the step of the guide ②.

NOTE:
Be sure to seat the flange Ⓐ of the one way clutch ① to the guide ②.





- When installing the guide ② to the generator rotor ③, face the groove Ⓑ of the guide ② inside.

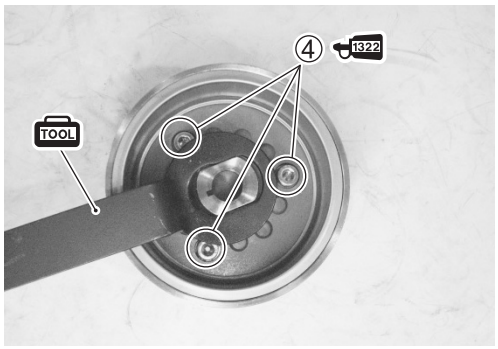


- Apply thread lock to the bolts ④, and then tighten them to the specified torque with the special tool.

Starter clutch bolt: 26 N·m (2.6 kgf-m, 19.0 lbf-ft)

1322 99000-32110: THREAD LOCK CEMENT SUPER "1322" or equivalent

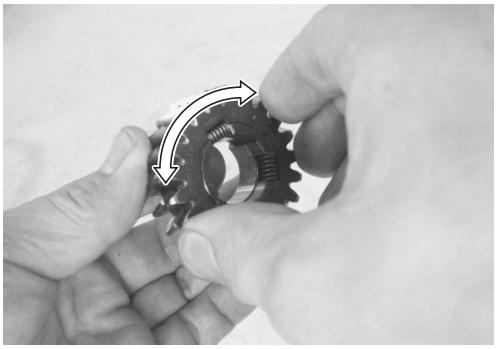
TOOL 09930-44521: Rotor holder



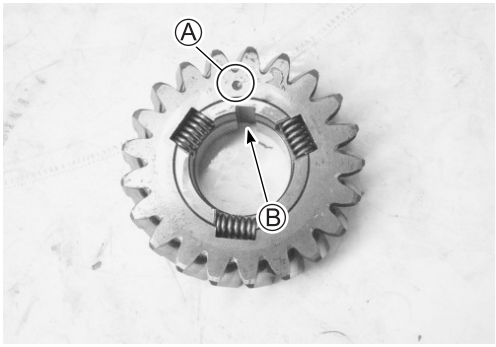
PRIMARY DRIVE GEAR

Rotate the primary drive scissors gear by finger to inspect for smooth rotation.

If there are signs of any abnormalities, replace the springs.



- When installing the primary drive scissors gear, align the punch mark Ⓐ on the scissors gear with the rib Ⓑ.

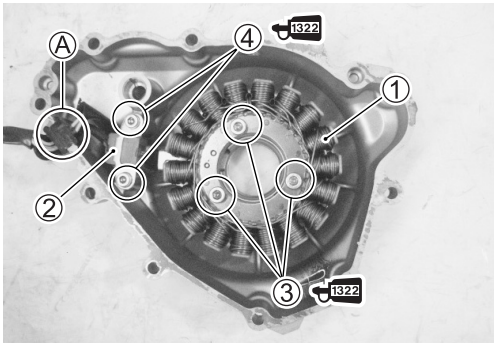


GENERATOR

INSPECTION (☞9-10 to -11)

REASSEMBLY

- When replacing the generator coil ① or CKP sensor ②, apply thread lock to the generator starter set bolts ③ and CKP sensor mounting bolts ④ and tighten them to the specified torque.



1322 99000-32110: THREAD LOCK CEMENT SUPER "1322" or equivalent

Generator starter set bolt: 11 N·m (1.1 kgf-m, 8.0 lbf-ft)
CKP sensor mounting bolt: 5.5 N·m (0.55 kgf-m, 4.0 lbf-ft)

NOTE:

Be sure to install the grommet Ⓐ to the generator cover.

WATER PUMP

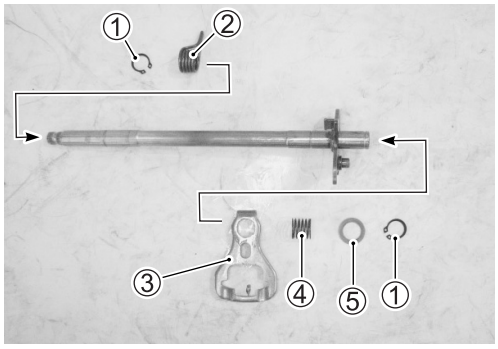
☞7-14

GEARSHIFT SYSTEM

GEARSHIFT SHAFT DISASSEMBLY

- Remove the following parts from the gearshift shaft.

① Snap ring
② Gearshift shaft return spring
③ Gearshift cam drive plate
④ Plate return spring
⑤ Washer



GEARSHIFT SHAFT INSPECTION

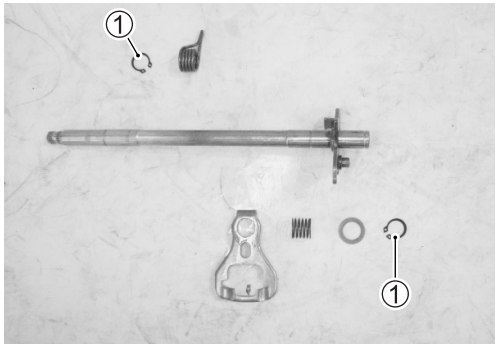
- Inspect the gearshift shaft for wear or bend.
- Inspect the return springs for damage or fatigue.
- Replace the gearshift shaft or springs if there is anything unusual.

GEARSHIFT SHAFT REASSEMBLY

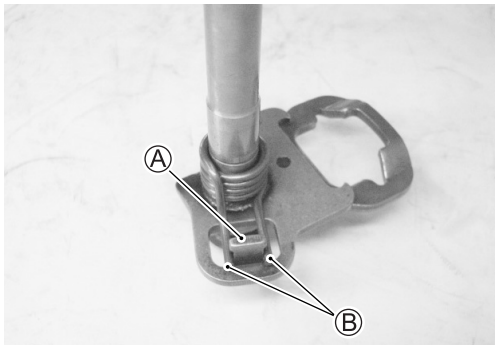
Reassembly the gearshift shaft in the reverse order of disassembly. Play attention to the following points:

- Install the new snap rings ①.

TOOL 09900-06107: Snap ring pliers (Open type)



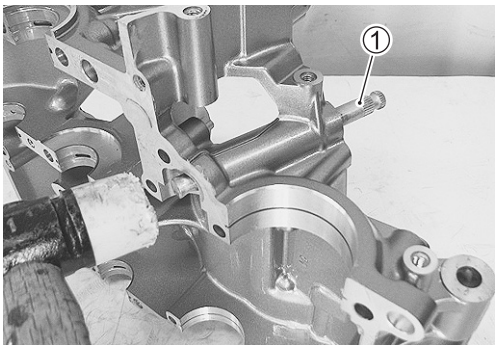
NOTE:
When installing the gearshift shaft return spring, position the stopper Ⓐ of gearshift arm between the shaft return spring ends Ⓑ.



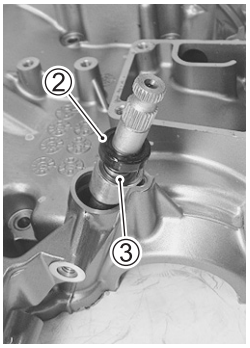
CLUTCH RELEASE CAMSHAFT

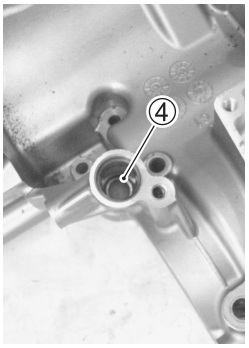
DISASSEMBLY

- Pull out the clutch release camshaft ①.



- Remove the oil seal ② and washer ③.
- Remove the bearing ④.





INSPECTION

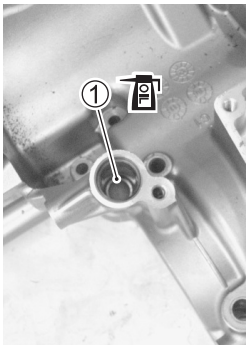
Inspect the clutch release camshaft of wear bend.
Replace the camshaft if there is anything unusual.

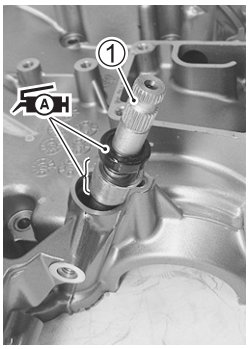
REASSEMBLY

Reassemble the clutch release camshaft in the reverse order of disassembly. Pay attention to the following points:

- Apply engine oil to the new bearing ①.
- Apply grease to the camshaft sliding surface of the clutch release camshaft ① and new oil seal lip.

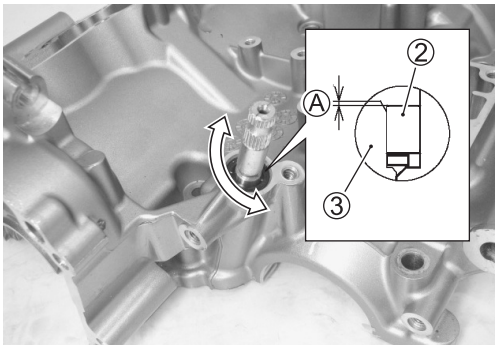
99000-25010: SUZUKI SUPER GREASE "A"
or equivalent





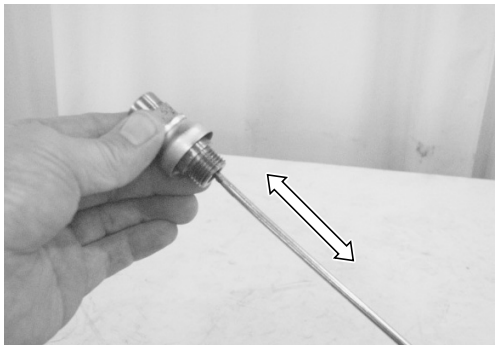
- Pass the new oil seal ② into the upper crankcase ③ at 0 – 0.5 mm (0.02 in) depth Ⓐ from the upper crankcase side surface.

NOTE:
After installing the clutch release camshaft, be sure to check the clutch release camshaft operation.



OIL PRESSURE REGULATOR

Inspect the operation of the oil pressure regulator by pushing on the piston with a proper bar.
If the piston does not operate, replace the oil pressure regulator with a new one.



OIL STRAINER

- Clean the oil strainer if necessary.
- Inspect the oil strainer body for damage. If necessary, replace it with a new one.

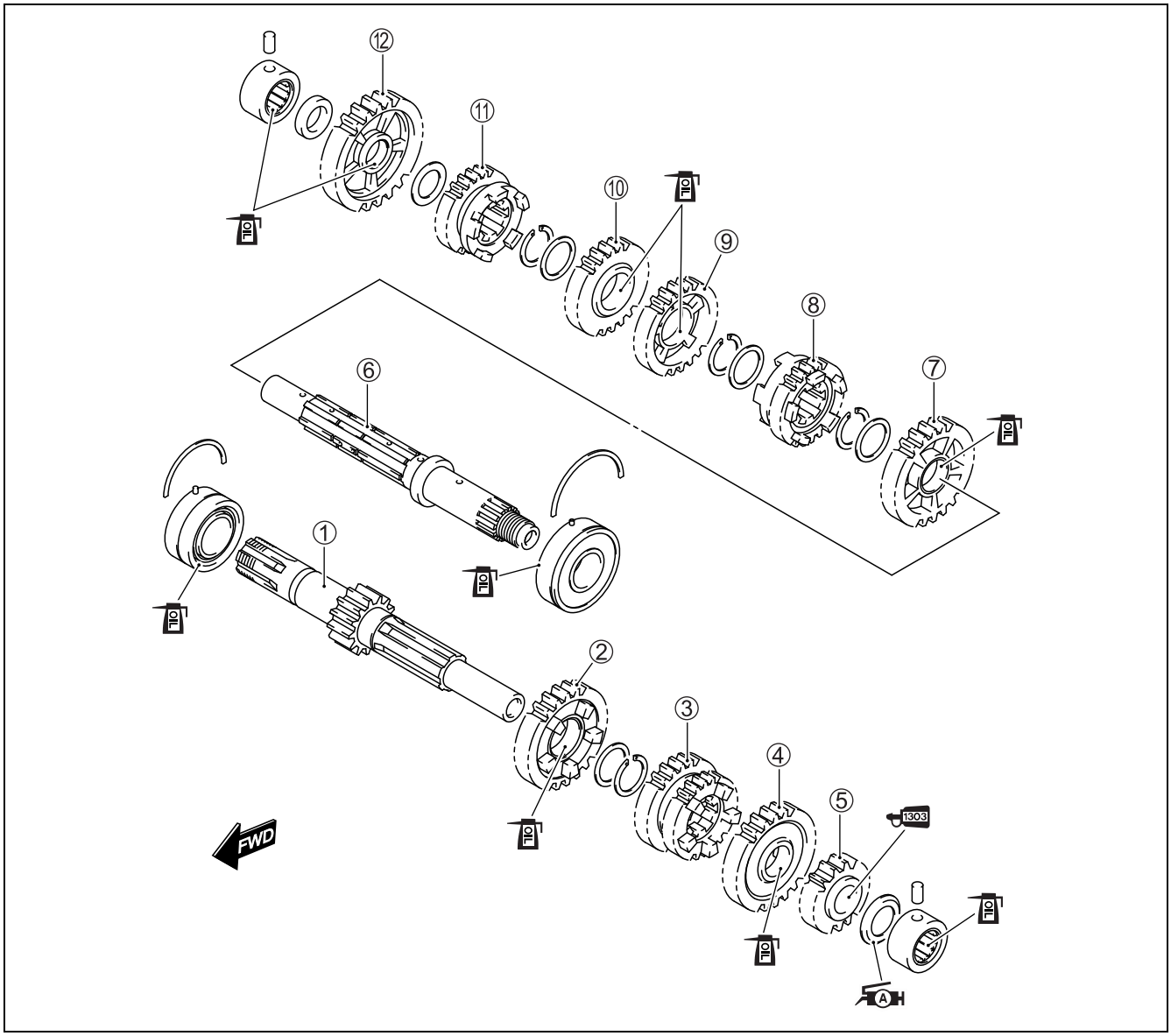
TRANSMISSION

DISASSEMBLY

Disassemble the countershaft and driveshaft as shown in the illustration.

NOTE:

Identify the position of each removed part. Organize the parts in their respective groups (i.e., drive or driven) so that they can be reinstalled in their original positions.



①	Countershaft/1st drive gear	⑦	2nd driven gear
②	5th drive gear	⑧	6th driven gear
③	3rd/4th drive gears	⑨	3rd driven gear
④	6th drive gear	⑩	4th driven gear
⑤	2nd drive gear	⑪	5th driven gear
⑥	Driveshaft	⑫	1st driven gear

REASSEMBLY

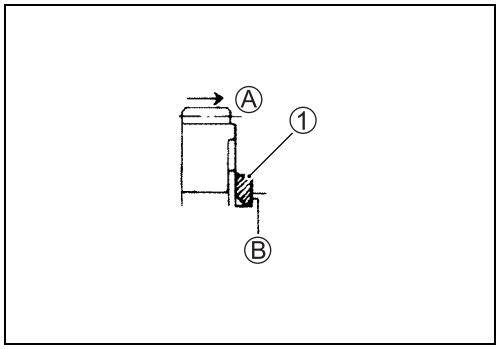
Assemble the countershaft and driveshaft in the reverse order of disassembly. Pay attention to the following points:

NOTE:

* *When reassembling the transmission gears, attention must be given to the locations and positions of washers and snap rings. The cross sectional view shows the correct position of the gears, washers and snap rings. (☞3-50)*
* *Rotate the bearings by hand to inspect if there is any abnormal noise and for smooth rotation. Replace the bearings if there is anything unusual.*
* *Before installing the gears, apply engine oil to the driveshaft and countershaft.*
* *When installing the new oil seal, apply grease to it.*
* *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.*

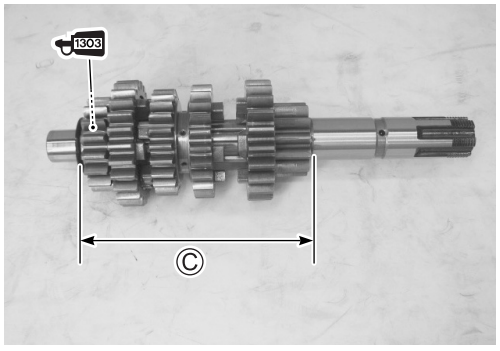
99000-25010: SUZUKI SUPER GREASE "A" or equivalent

- When installing a new snap ring ①, pay attention to its direction. Fit it to the side where the thrust is as shown in the illustration.



Ⓐ Thrust
Ⓑ Sharp edge

- Press fitted 2nd drive gear onto the countershaft. Before reassembling, coat the internal face of the 2nd drive gear with thread lock and install the gears so that the length Ⓒ is as shown.



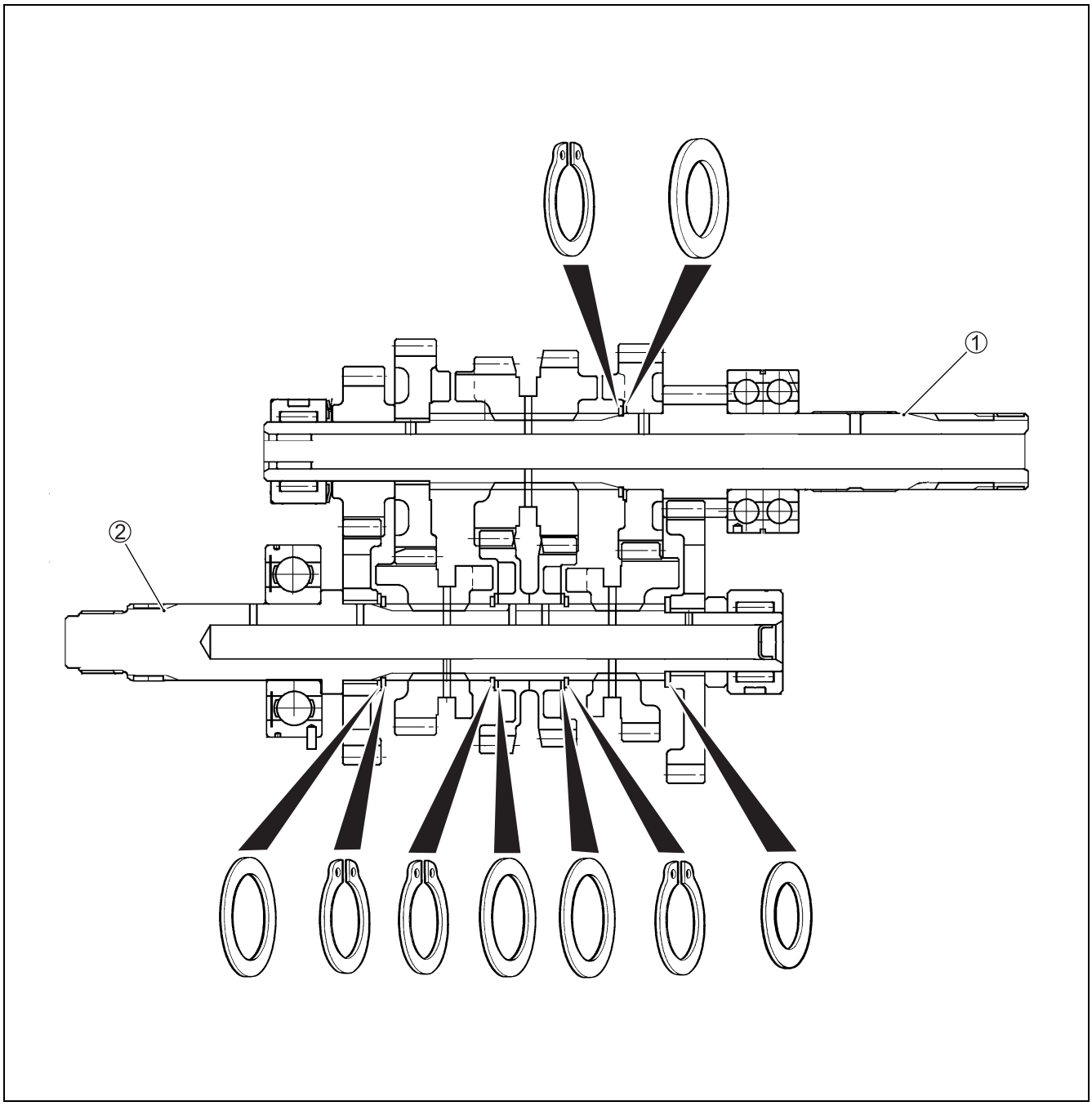
Countershaft length Ⓒ: 114.1 – 114.2 mm

99000-32030: THREAD LOCK CEMENT SUPER "1303" or equivalent

NOTE:

This procedure may be performed only twice before shaft replacement is required.

TRANSMISSION PARTS LOCATION



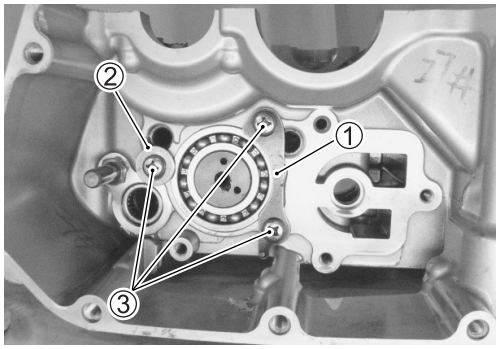
①	Countershaft	②	Driveshaft

CRANKCASE

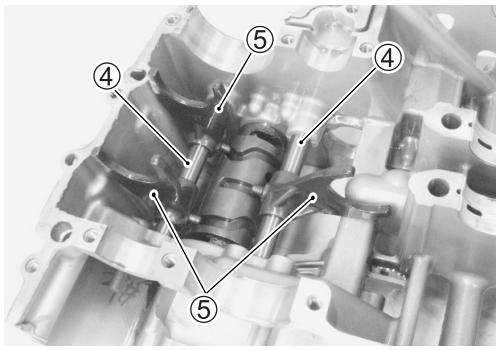
GEARSHIFT FORK AND GEARSHIFT CAM

Removal

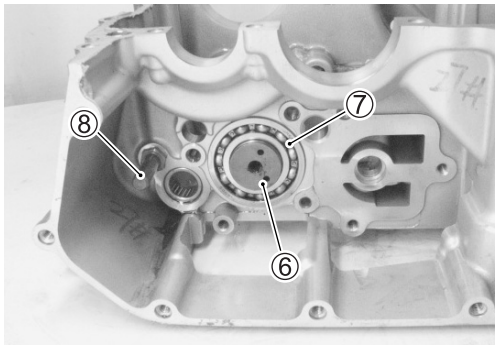
- Remove the gearshift cam bearing retainer No.1 ① and No.2 ② by removing the bearing retainer screws ③ from the lower crankcase.



- Remove the gearshift fork shafts ④ and gearshift forks ⑤ from the lower crankcase.



- Remove the gearshift cam ⑥ and its bearing ⑦.
- Remove the gearshift arm stopper ⑧.



GEARSHIFT FORK TO GROOVE CLEARANCE

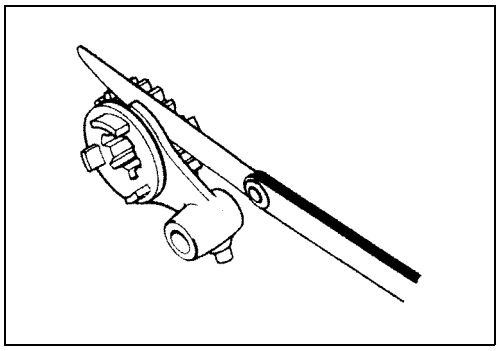
Using a thickness gauge, check the gearshift fork clearance in the groove of its gear.

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

DATA Shift fork to groove clearance:
Service Limit: 0.5 mm (0.020 in)

TOOL 09900-20803: Thickness gauge

If the clearance checked is noted to exceed the limit specified, replace the fork or its gear, or both.

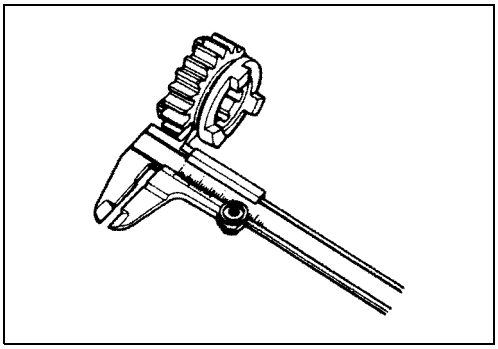


GEARSHIFT FORK GROOVE WIDTH

Measure the gearshift fork groove width using the vernier calipers.

DATA Shift fork groove width:
Standard: 5.0 – 5.1 mm (0.197 – 0.201 in)

TOOL 09900-20101: Vernier calipers (150 mm)

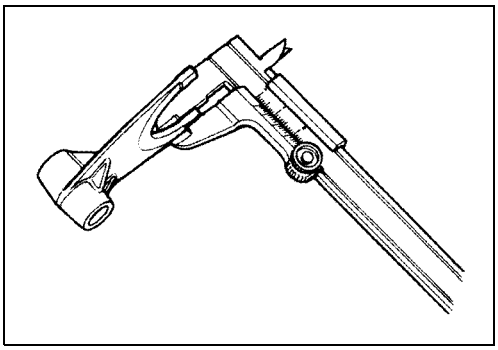


GEARSHIFT FORK THICKNESS

Measure the gearshift fork thickness using the vernier calipers.

DATA Shift fork thickness:
Standard: 4.8 – 4.9 mm (0.189 – 0.193 in)

TOOL 09900-20101: Vernier calipers (150 mm)



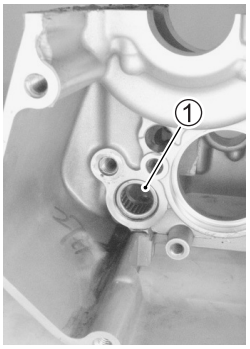
GEARSHIFT CAM BEARING AND GEARSHIFT SHAFT BEARING

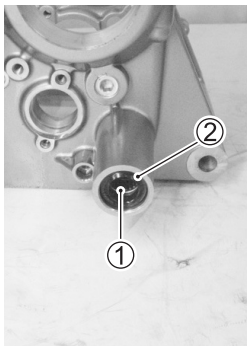
Bearing inspection

Inspect the gearshift cam bearing for abnormal noise and smooth rotation.

Replace the bearings if there is anything unusual.

- Inspect the gearshift shaft bearings ① and ② for abnormal noise and smooth rotation while they are in the crankcase.
- Replace a bearing if there is anything unusual.

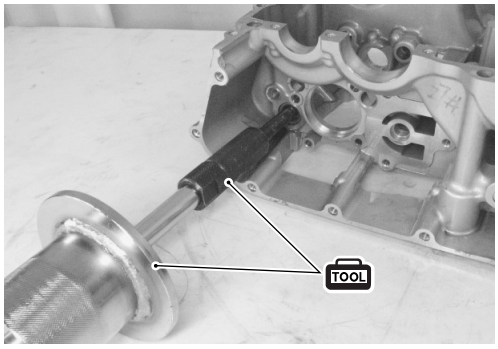




Bearing removal

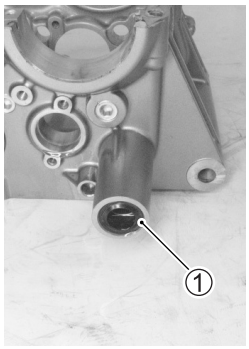
- Remove the gearshift shaft bearing with the special tools.

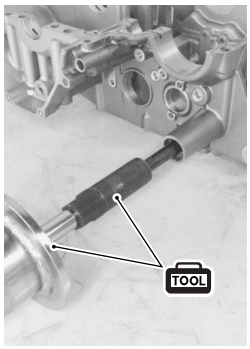
09921-20210: Bearing remover (12 mm)
09930-30104: Rotor remover sliding shaft



- Remove the oil seal ①.
- Remove the gearshift shaft bearing with the special tools.

09921-20210: Bearing remover (12 mm)
09930-30104: Rotor remover sliding shaft



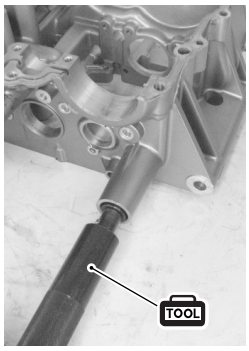


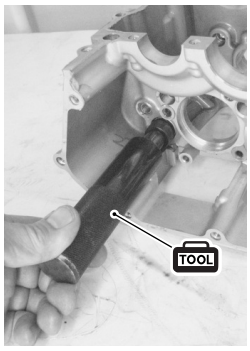
Bearing installation

- Install the new bearings with the special tool.

09913-70210: Bearing installing set (10 – 75 ϕ)

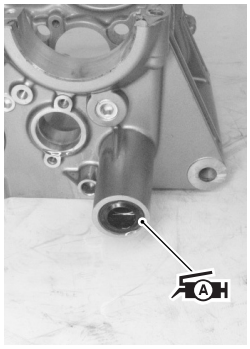
NOTE:
The stamped mark side of the gearshift shaft bearing faces outside.





- Install the new oil seal with a suitable size socket wrench.
- Apply grease to the oil seal lip.

99000-25010: SUZUKI SUPER GREASE "A"
or equivalent



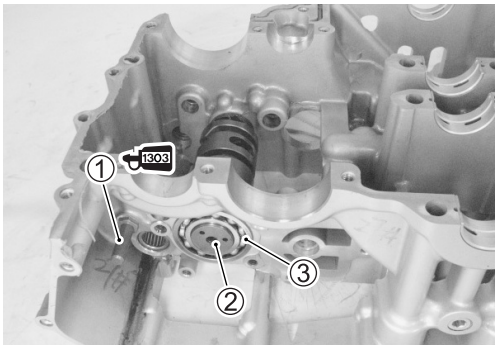
GEARSHIFT FORK AND GEARSHIFT CAM

Installation

- Apply a small quantity of thread lock to the gearshift arm stopper ① and tighten it to the specified torque.

1303 09900-32030: THREAD LOCK CEMENT SUPER "1303" or equivalent

Gearshift arm stopper: 19 N·m (1.9 kgf-m, 13.5 lbf-ft)

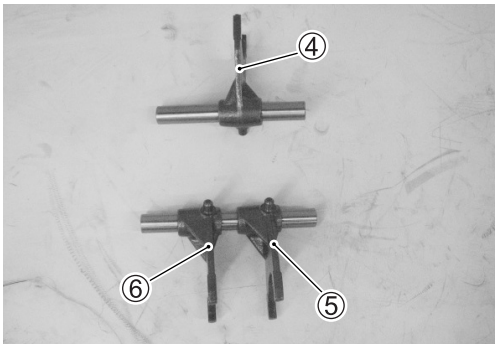


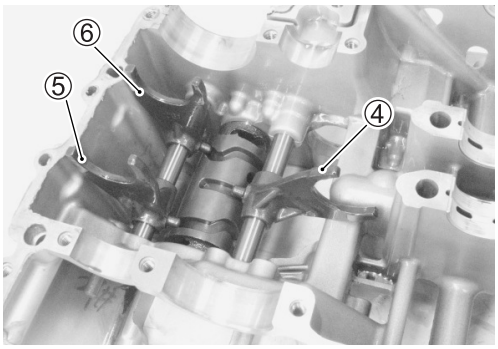
- Install the gearshift cam ② with the bearing ③ fitted.

NOTE:
The stamped mark side of the gearshift cam bearing faces outside.

- Install the gearshift forks and their shafts as shown.

④ For 3rd/4th drive gears
⑤ For 5th driven gear
⑥ For 6th driven gear

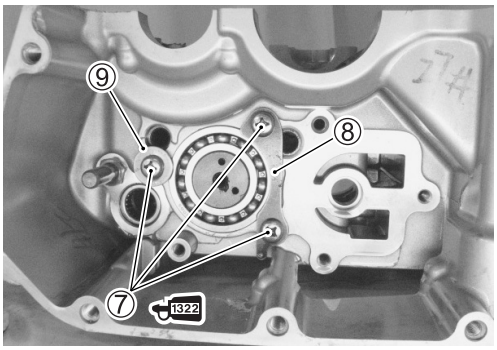




- Apply a small quantity of thread lock to the bearing retainer screws ⑦.
- Install the gearshift cam bearing retainer No.1 ⑧ and No.2 ⑨.
- Tighten the bearing retainer screws ⑦ to the specified torque.

1322 99000-32110: THREAD LOCK CEMENT SUPER "1322" or equivalent

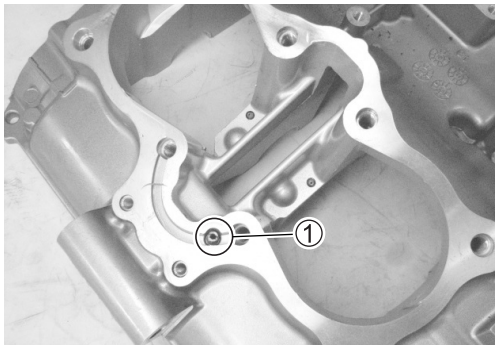
Shift cam bearing retainer screw: 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



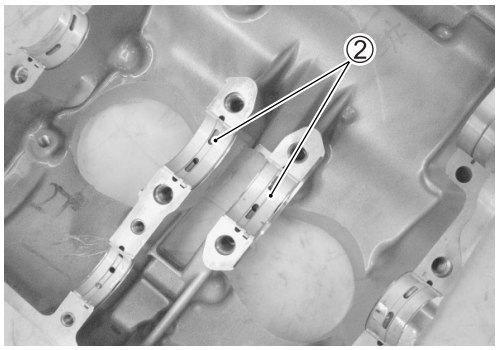
OIL JET

Removal

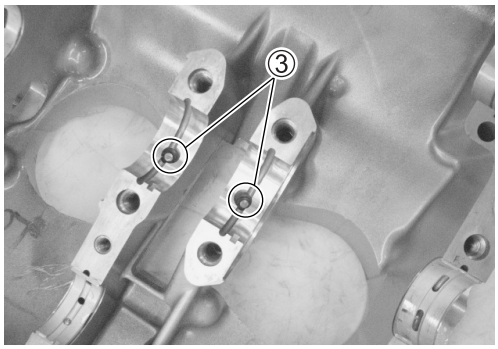
- Remove the oil jet ① (for cylinder head) from the upper crankcase.



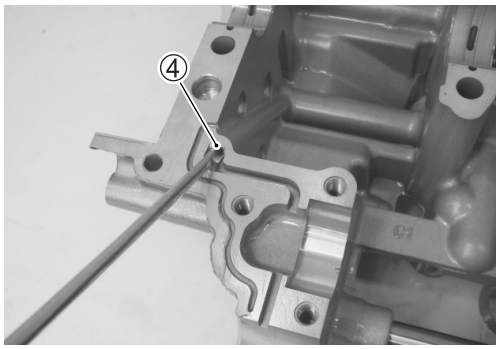
- Remove the crankshaft journal bearings ②.



- Remove the piston cooling oil jets ③ from the upper crankcase.

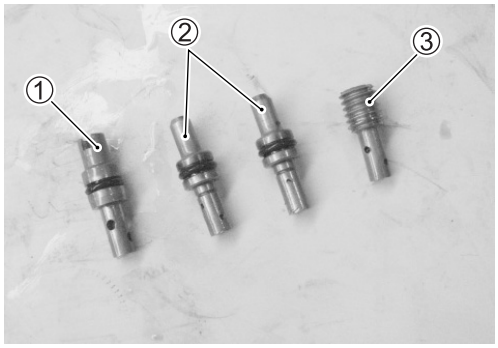


- Remove the oil jet ④ (for transmission) from the lower crankcase.



Inspection and cleaning

- Make sure that the oil jets are not clogged. If they are clogged, clean their oil passage using a wire of the proper size and compressed air.

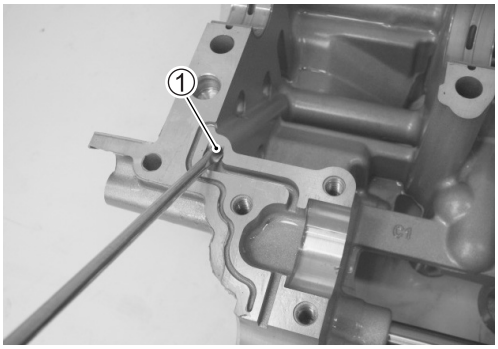


① Oil jet (For cylinder head)
② Piston cooling oil jet
③ Oil jet (For transmission)

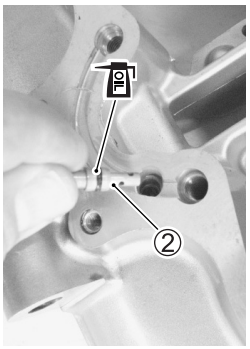
Installation

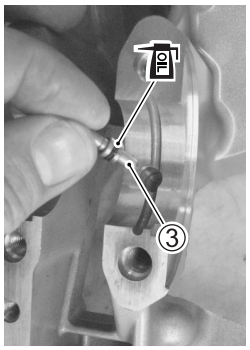
Installation is in the reverse order of removal. Pay attention to the following points:

- After tightening the oil jet ① (for transmission), make sure that the oil jet end is flush with the crankcase mating surface.



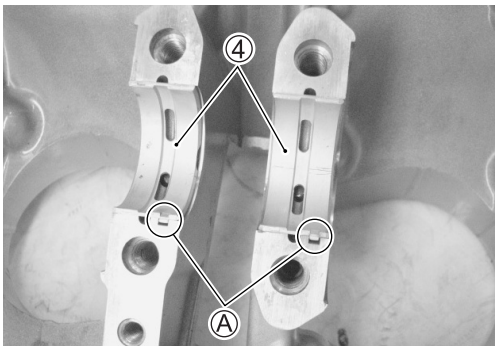
- Apply engine oil to the new O-rings.
- Install the oil jet (cylinder head) ② and each piston cooling jet ③.





- When fitting the crankshaft journal bearings ④ to the upper crankcase, be sure to fix the stopper part Ⓐ first and press the order end.

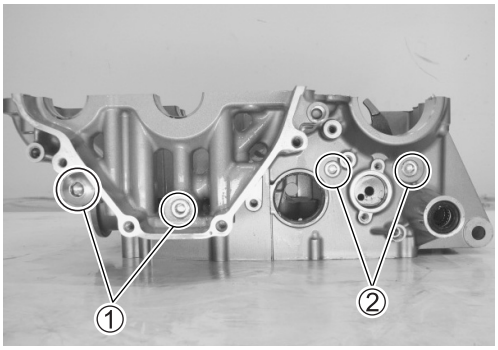
NOTE:
Do not touch the bearing surfaces with your hands. Grasp by the edge of the bearing shell.

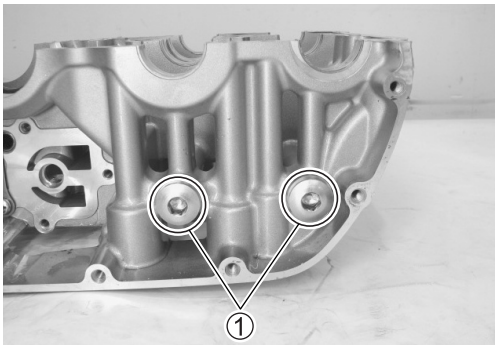


PLUG

Removal

- Remove the oil gallery plugs ① and gearshift fork shaft plugs ② from the lower crankcase.



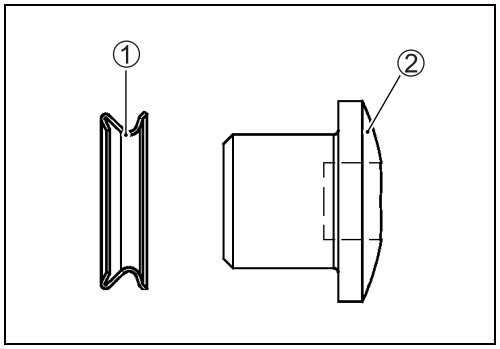


Installation

Installation is in the reverse order of removal. Pay attention to the following points:

- Fit the new gaskets ① to the oil gallery plugs ② as shown in the illustration.
- Tighten the oil gallery plugs ② to the specified torque.

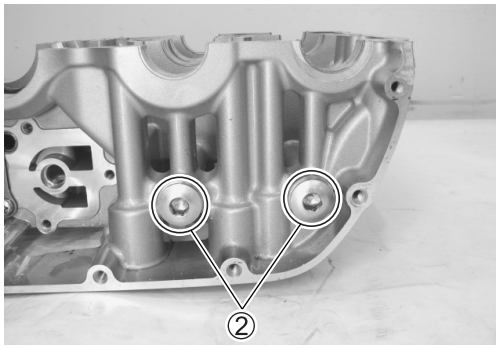
Oil gallery plug (lower crankcase):
25 N·m (2.5 kgf-m, 18.0 lbf-ft)

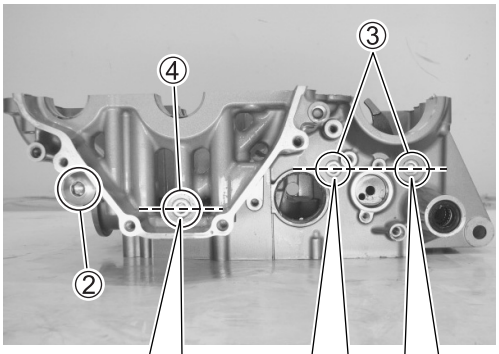


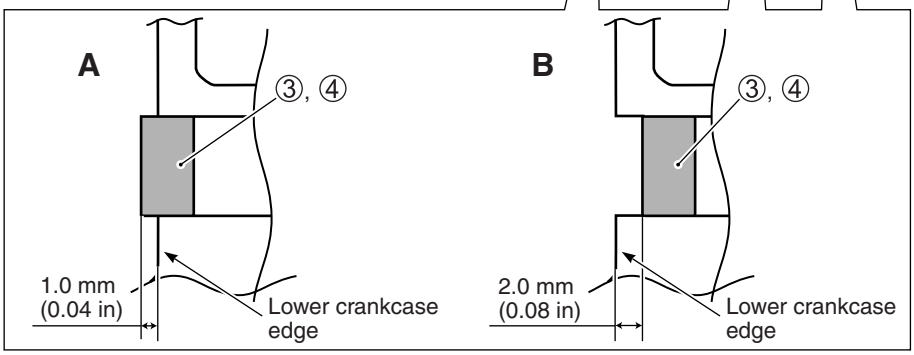
- Apply thread lock to the gearshift fork shaft plugs ③ and oil gallery plug ④.

1322 99000-32110: THREAD LOCK CEMENT SUPER "1322" or equivalent

- Fit the gearshift fork shaft plugs ③ and oil gallery plug ④ as shown in illustration A and tighten them until they are in the range as shown in illustration B.







NOTICE

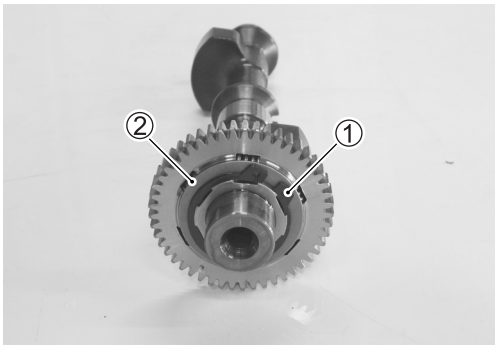
When installing a new plug to the new lower crankcase, tighten it by 25 N·m (2.5 kgf-m, 18.0 lbf-ft) and check to ensure that it is within the range as shown in the illustration.

CRANK BALANCER

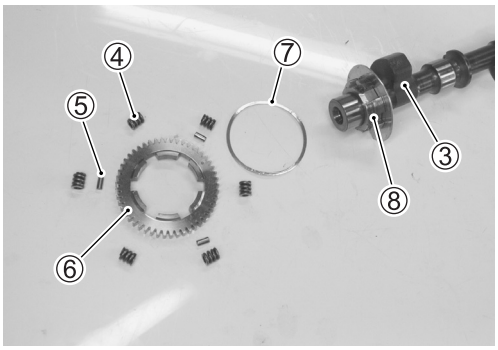
DISASSEMBLY

- Remove the snap ring ① and washer ②.

TOOL 09900-06107: Snap ring pliers (Open type)



- Remove the following parts from the crank balancer ③.
  - ④ Balancer spring (6 pcs.)
  - ⑤ Pin (3 pcs.)
  - ⑥ Crank balancer driven gear
  - ⑦ Wave washer

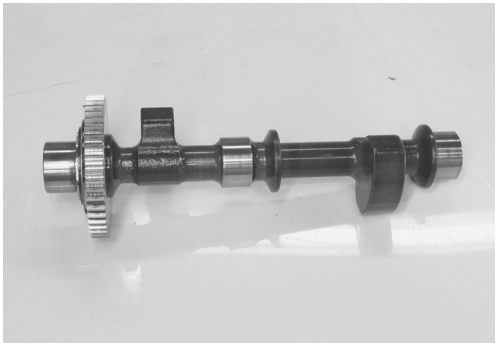


NOTICE

Never remove the driven gear inner race ⑧ from the crank balancer ③.

INSPECTION

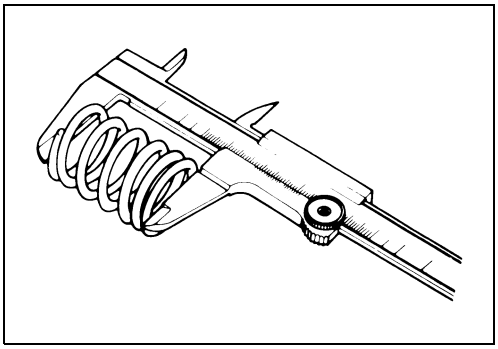
- Inspect the crank balancer and crank balancer driven gear for wear or damage. If any defects are found, replace the defective part.



- Measure the free length of each balancer spring. If any spring length is less than the service limit, replace all of the spring.

DATA Balancer spring free length:
Service Limit: 10.3 mm (0.41 in)

TOOL 09900-20101: Vernier calipers (150 mm)

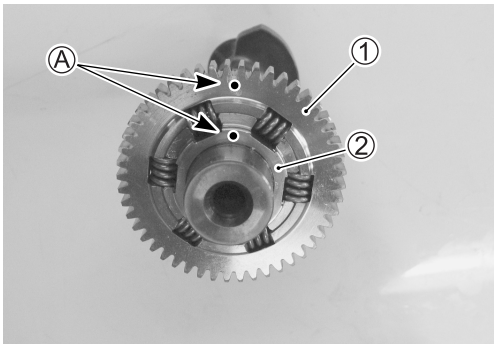


REASSEMBLY

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

- Align the punch marks Ⓐ on the driven gear ① and inner race ②.
- Install a new snap ring.

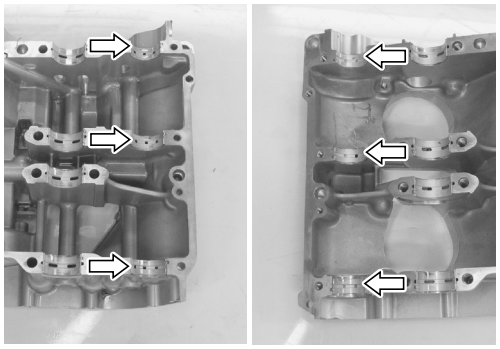
TOOL 09900-06107: Snap ring pliers (Open type)



CRANK BALANCER JOURNAL BEARING

INSPECTION

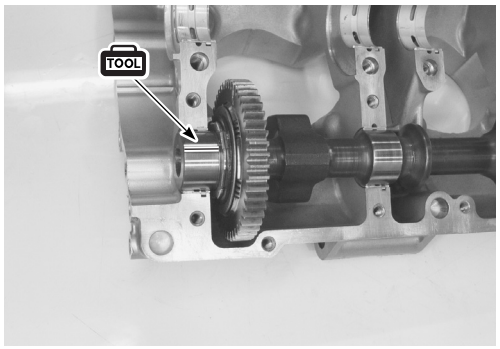
- Inspect each bearing of upper and lower crankcases for any damage.



SELECTION

- Place the plastigage axially along the crank balancer journal as shown.

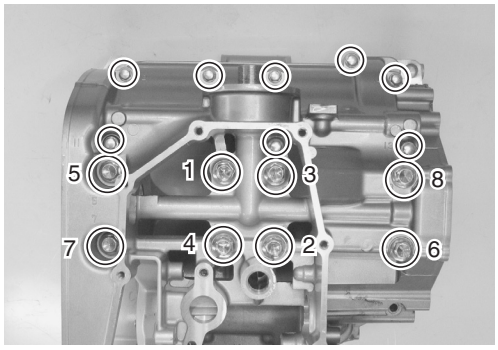
TOOL 09900-22301: Plastigage (0.025 – 0.076 mm)



- Mate the lower crankcase with the upper crankcase.
- Tighten the crankshaft journal bolts (M:8) and crankcase bolts (M:6) to the specified torque. (☞3-73)

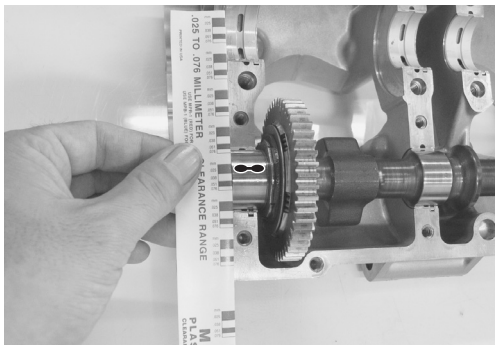
NOTE:
Never rotate the crank balancer when a piece of plastigage is installed.

Crankshaft journal bolt (M:8):
Initial: 15 N·m (1.5 kgf-m, 11.0 lbf-ft)
Final: 26 N·m (2.6 kgf-m, 19.0 lbf-ft)
Crankcase bolt (M:6):
11 N·m (1.1 kgf-m, 8.0 lbf-ft)



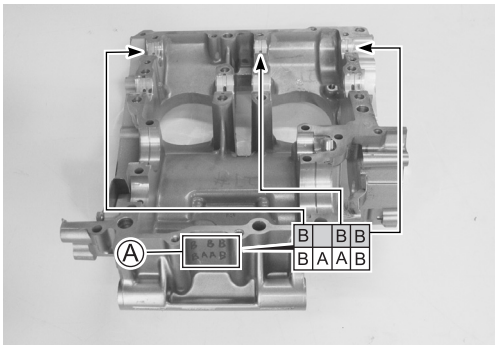
- Remove the lower crankcase and measure the width of the compressed plastigage using the envelope scale. This measurement should be taken at the widest part of the compressed plastigage.

DATA Crank balancer journal oil clearance:
Standard: 0.020 – 0.044 mm (0.0008 – 0.0017 in)
Service Limit: 0.080 mm (0.031 in)



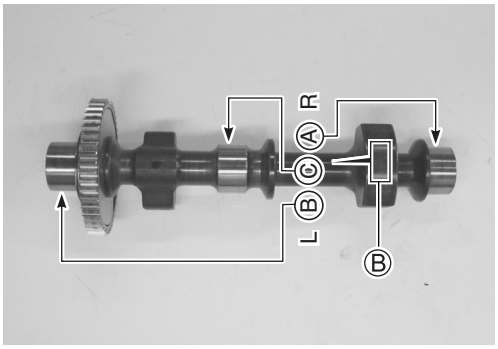
- If the oil clearance exceeds the service limit, select the specified bearings from the bearing selection table.

- Check the corresponding crankcase journal I.D. codes Ⓐ, “A” or “B” which is stamped on the rear of upper crankcase.
- Check the corresponding crank balancer journal O.D. codes Ⓑ, “A”, “B” or “C” which is stamped on the crank balancer.



DATA Bearing selection table

		Crank balancer journal O.D. Ⓑ		
	Code	A	B	C
Crankcase I.D. Ⓐ	A	Green	Black	Brown
	B	Black	Brown	Yellow

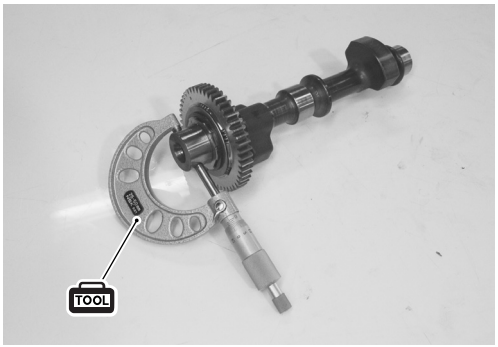


DATA Crankcase I.D. specification

Code	I.D. specification
A	31.000 – 31.008 mm (1.2205 – 1.2208 in)
B	31.008 – 31.016 mm (1.2208 – 1.2211 in)

DATA Crank balancer journal O.D. specification

Code	O.D. specification
A	27.992 – 28.000 mm (1.1020 – 1.1024 in)
B	27.984 – 27.992 mm (1.1017 – 1.1020 in)
C	27.976 – 27.984 mm (1.1014 – 1.1017 in)

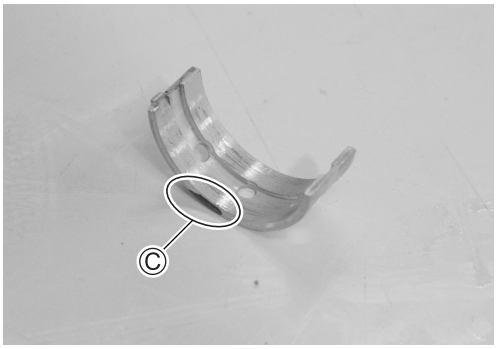


TOOL 09900-20202: Micrometer (25 – 50 mm)

DATA Bearing thickness specification

Color (Part No.)	Thickness
Green (12229-48H00-0A0)	1.486 – 1.490 mm (0.0585 – 0.0587 in)
Black (12229-48H00-0B0)	1.490 – 1.494 mm (0.0587 – 0.0588 in)
Brown (12229-48H00-0C0)	1.494 – 1.498 mm (0.0588 – 0.0590 in)
Yellow (12229-48H00-0D0)	1.498 – 1.502 mm (0.0590 – 0.0591 in)

Ⓒ Color code

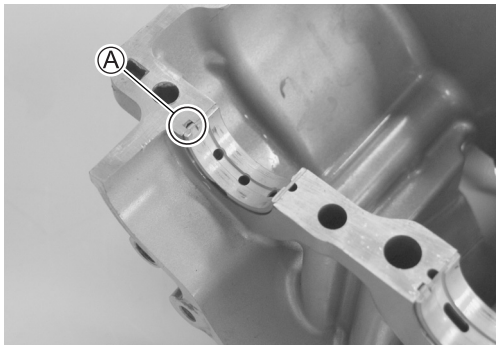


NOTE:
The crank balancer journal bearings on upper and lower crankcases are the same.

INSTALLATION

- When installing the bearings into the upper and lower crankcases, be sure to install the tab Ⓐ first, and then press in the other opposite side of the bearing.

NOTE:
Do not touch the bearing surfaces with your hands. Grasp by the edge of the bearing shell.



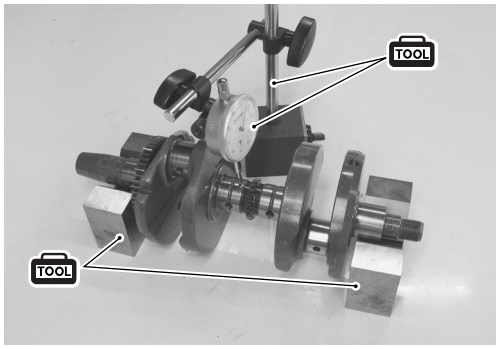
CRANKSHAFT AND CONROD

CRANKSHAFT RUNOUT

- Support the crankshaft with V blocks as shown, with the two end journals resting on the blocks.
- Set up the dial gauge, as shown.
- Rotate the crankshaft slowly to read the runout.
- Replace the crankshaft if the runout exceeds the limit.

DATA Crankshaft runout:
Service Limit: 0.05 mm (0.002 in)

TOOL 09900-20607: Dial gauge
09900-20701: Dial gauge chuck
09900-21304: V blocks

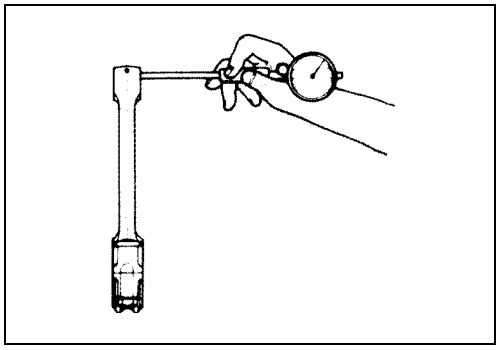


CONROD SMALL END I.D.

- 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: 15.040 mm (0.5921 in)

TOOL 09900-20602: Dial gauge
09900-22401: Small bore gauge (10 – 18 mm)



CONROD BIG END SIDE CLEARANCE

- Inspect the conrod side clearance using a thickness gauge.
- If the clearance exceeds the limit, remove the conrod and inspect the conrod big end width and the crank pin width.
- If the width exceed the limit, replace conrod or crankshaft.

DATA Conrod big end side clearance:
Service Limit: 0.30 mm (0.012 in)

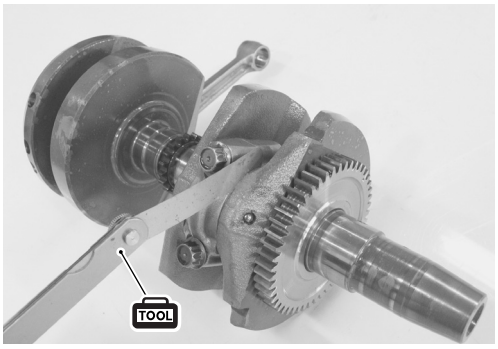
TOOL 09900-20803: Thickness gauge

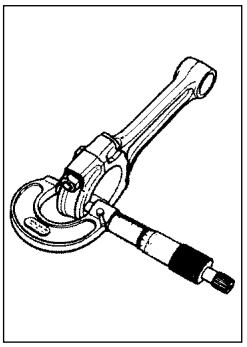
DATA Conrod big end width:
Standard: 19.95 – 20.00 mm (0.7854 – 0.7874 in)

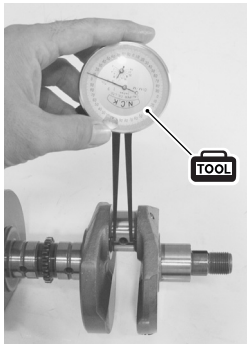
TOOL 09900-20205: Micrometer (0 – 25 mm)

DATA Crank pin width:
Standard: 20.10 – 20.15 mm (0.7913 – 0.7933 in)

TOOL 09900-20605: Dial calipers (10 – 34 mm)

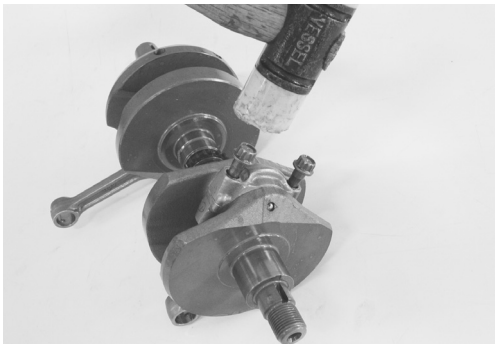




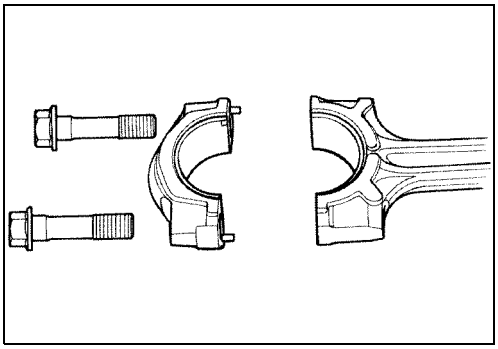


CONROD CRANK PIN BEARING INSPECTION

- Loosen the conrod cap bolts, and tap the conrod cap bolts lightly with a plastic hammer to remove the conrod cap.



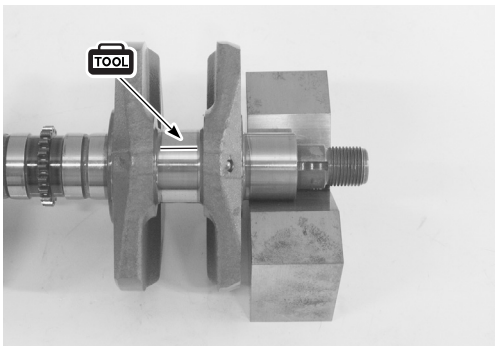
- Inspect the bearing surfaces for any sign of fusion, pitting, burn, or flaws. If any, replace them with a specified set of bearings.



CONROD CRANK PIN BEARING SELECTION

- Place the plastigage axially along the crank pin, avoiding the oil hole, as shown.

TOOL 09900-22301: Plastigage (0.025 – 0.076 mm)



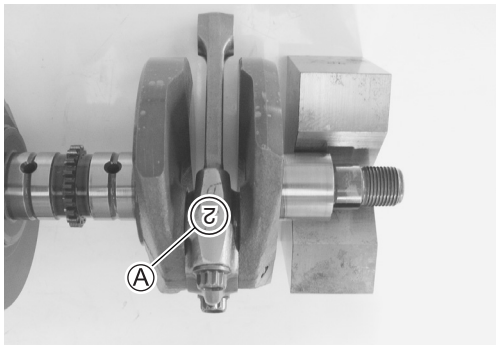
• Tighten the conrod cap bolts to the specified torque, in two steps. (☞3-65)

NOTE:

** When installing the conrod cap bolts to the crank pin, make sure that I.D. code Ⓐ on the conrod faces towards the intake side.*

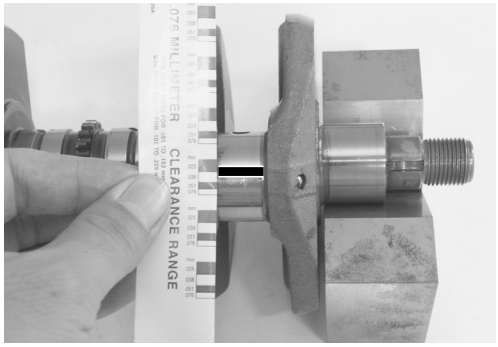
** Never rotate the crankshaft or conrod when a piece of plastigage is installed.*

Comrod cap bolt: 15 N·m (1.5 kgf-m, 11.0 lbf-ft)
then turn 90° clockwise



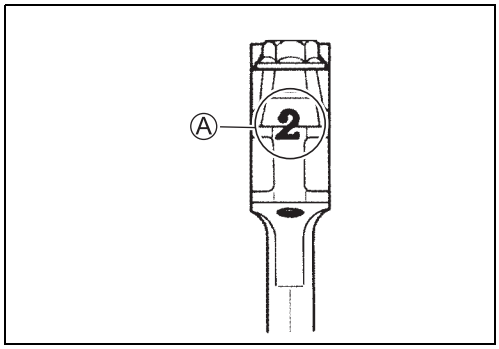
• Remove the conrod caps and measure the width of the compressed plastigage using the envelope scale. This measurement should be taken at the widest part of the compressed plastigage.

DATA Conrod big end oil clearance:
Standard: 0.032 – 0.056 mm (0.0013 – 0.0022 in)
Service Limit: 0.080 mm (0.0031 in)



• If the oil clearance exceeds the service limit, select the specified bearings from the bearing selection table.

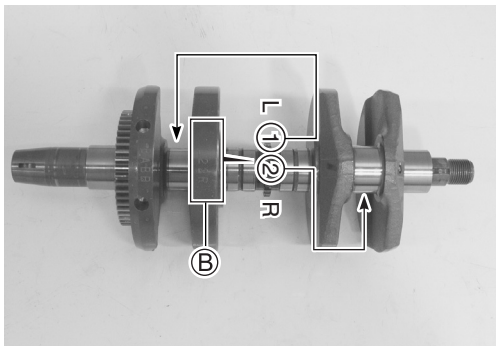
• Check the corresponding conrod I.D. code number (“1” or “2”) Ⓐ.



• Check the corresponding crank pin O.D. code number (“1”, “2” or “3”) Ⓑ.

DATA Bearing selection table

		Crank pin O.D. Ⓑ		
	Code	1	2	3
Conrod I.D Ⓐ	1	Green	Black	Brown
	2	Black	Brown	Yellow

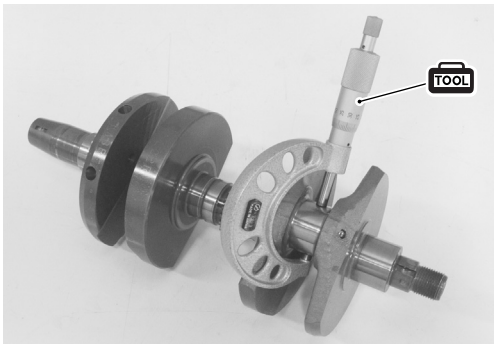


DATA Conrod I.D.

Code	I.D. specification
1	34.000 – 34.008 mm (1.3386 – 1.3389 in)
2	34.008 – 34.016 mm (1.3389 – 1.3392 in)

DATA Crank pin O.D.

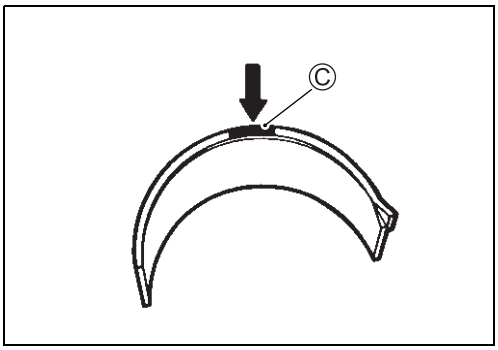
Code	O.D. specification
1	30.992 – 31.000 mm (1.2202 – 1.2205 in)
2	30.984 – 30.992 mm (1.2198 – 12202 in)
3	30.976 – 30.984 mm (1.2195 – 1.2198 in)



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

DATA Bearing thickness

Color (Part No.)	Thickness
Green (12164-39F00-0A0)	1.480 – 1.484 mm (0.0583 – 0.0584 in)
Black (12164-39F00-0B0)	1.484 – 1.488 mm (0.0584 – 0.0586 in)
Brown (12164-39F00-0C0)	1.488 – 1.492 mm (0.0586 – 0.0587 in)
Yellow (12164-39F00-0D0)	1.492 – 1.496 mm (0.0587 – 0.0589 in)

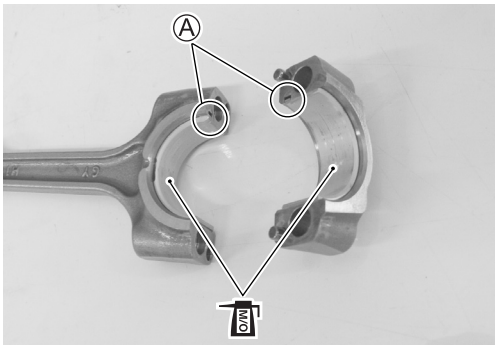


Ⓒ Color code

NOTE:
The bearings must be replaced as a set.

CONROD CRANK PIN BEARING AND CONROD INSTALLATION

- When installing the bearings into the conrod cap and conrod, be sure to install the tab Ⓐ first, and then press in the other opposite side of the bearing.
- Apply molybdenum oil to each crank pin and bearing surface.

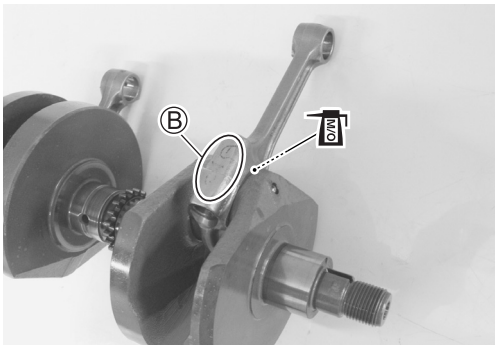


NOTICE

Be sure to clean the conrod big end.

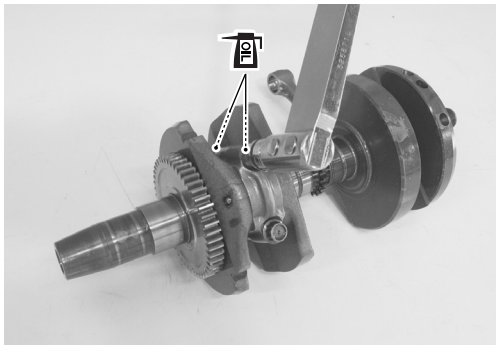
MO MOLYBDENUM OIL SOLUTION

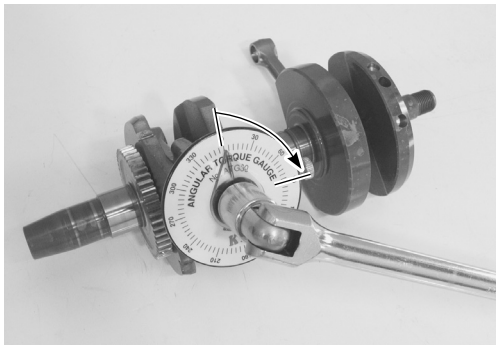
- When fitting the conrod cap, make sure that I.D. code Ⓑ on each conrod faces intake side.



- Apply engine oil to the thread portion and bearing surface of the bolts.
- Tighten the conrod cap bolts in the following two steps.

Conrod cap bolt: 15 N·m (1.5 kgf-m, 11.0 lbf-ft)
then turn 90° (1/4 turn) clockwise

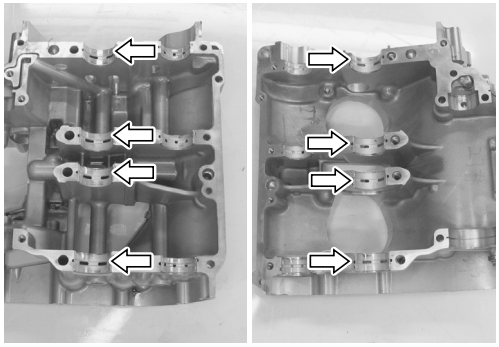




CRANKSHAFT JOURNAL BEARING

INSPECTION

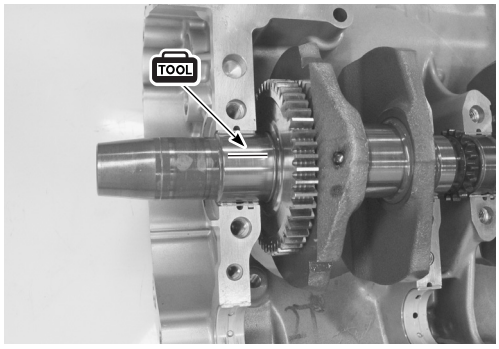
- Inspect each bearing of upper and lower crankcases for any damage.



SELECTION

- Place the plastigage axially along the crankshaft journal, avoiding the oil hole, as shown.

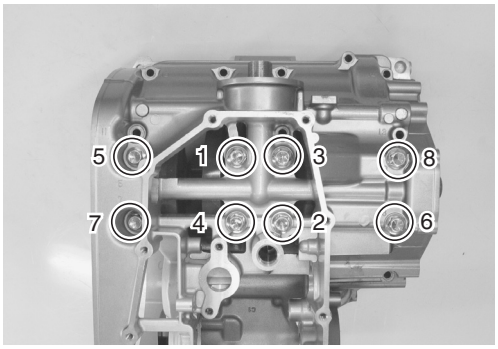
TOOL 09900-22301: Plastigage (0.025 – 0.076 mm)



- Mate the lower crankcase with the upper crankcase.
- Tighten each crankshaft journal bolt (M:8) to the specified torque. (☞3-73)

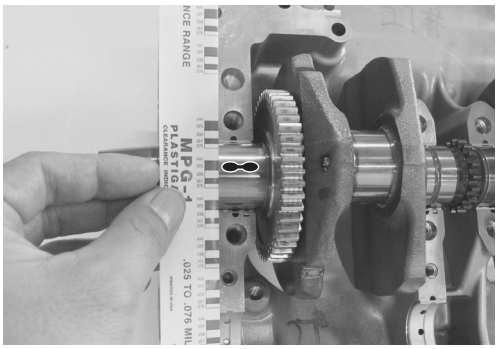
NOTE:
Never rotate the crankshaft when a piece of plastigage is installed.

Crankshaft journal bolt (M:8):
Initial: 15 N·m (1.5 kgf-m, 11.0 lbf-ft)
Final : 26 N·m (2.6 kgf-m, 19.0 lbf-ft)



- Remove the lower crankcase and measure the width of the compressed plastigage using the envelope scale. This measurement should be taken at the widest part of the compressed plastigage.

DATA Crankshaft journal oil clearance:
Standard: 0.016 – 0.040 mm (0.0006 – 0.0016 in)
Service Limit: 0.080 mm (0.0031 in)

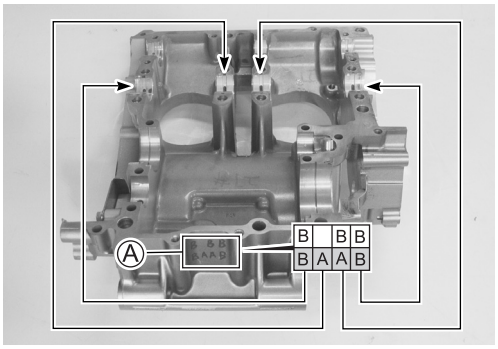


- If the oil clearance exceeds the service limit, select the specified bearings from the bearing selection table.

- Check the corresponding crankcase journal I.D. codes Ⓐ, "A" or "B" which are stamped on the rear of upper crankcase.
- Check the corresponding crankshaft journal O.D. codes Ⓑ, "A", "B" or "C" which are stamped on the crankshaft.

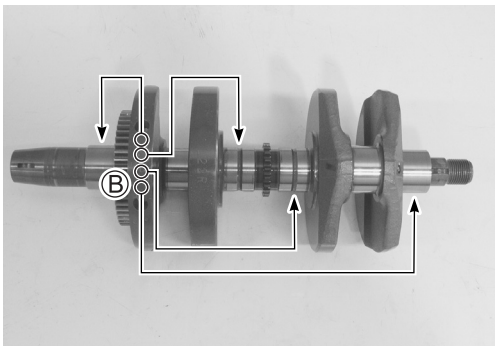
DATA Bearing selection table

		Crankshaft journal O.D. Ⓑ		
	Code	A	B	C
Crankcase I.D. Ⓐ	A	Green	Black	Brown
	B	Black	Brown	Yellow



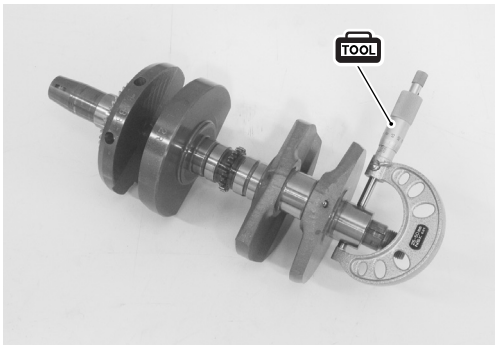
DATA Crankcase I.D. specification

Code	I.D. specification
A	33.000 – 33.008 mm (1.2992 – 1.2995 in)
B	33.008 – 33.016 mm (1.2995 – 1.2998 in)



DATA Crankshaft journal O.D. specification

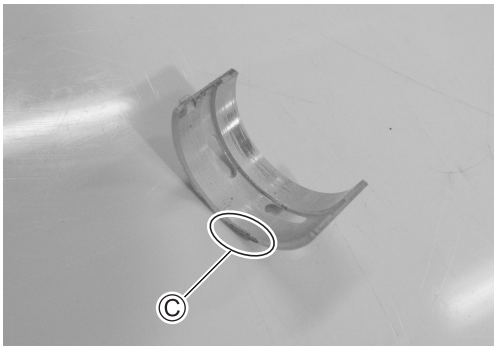
Code	O.D. specification
A	29.992 – 30.000 mm (1.1808 – 1.1811 in)
B	29.984 – 29.992 mm (1.1805 – 1.1808 in)
C	29.976 – 29.984 mm (1.1802 – 1.1805 in)



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

DATA Bearing thickness specification

Color (Part No.)	Thickness
Green (12229-48H10-0A0)	1.488 – 1.492 mm (0.0586 – 0.0587 in)
Black (12229-48H10-0B0)	1.492 – 1.496 mm (0.0587 – 0.0589 in)
Brown (12229-48H10-0C0)	1.496 – 1.500 mm (0.0589 – 0.0591 in)
Yellow (12229-48H10-0D0)	1.500 – 1.504 mm (0.0591 – 0.0592 in)



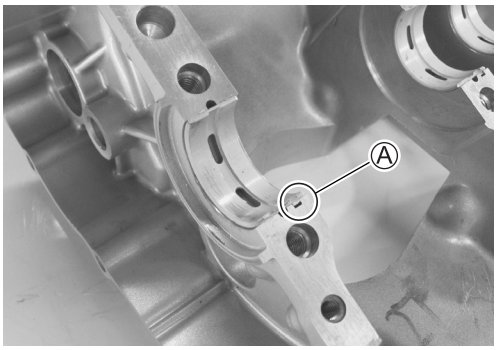
Ⓒ Color code

NOTE:
Upper and lower crankshaft journal bearings are the same.

INSTALLATION

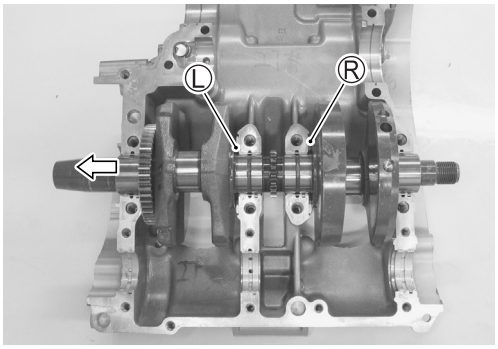
- When installing the bearings into the upper and lower crankcases, be sure to install the tab Ⓐ first, and then press in the other opposite side of the bearing.

NOTE:
Do not touch the bearing surfaces with your hands. Grasp by the edge of the bearing shell.



CRANKSHAFT THRUST BEARING

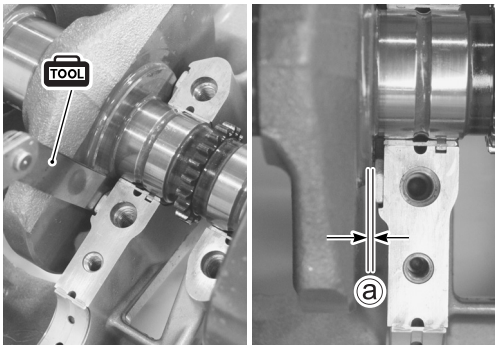
INSPECTION



- With the crankshaft, right-side thrust bearing and left-side thrust bearing inserted in the upper crankcase.
- Measure the thrust clearance ⓐ between the left side thrust bearing and crankshaft using the thickness gauge.

Ⓛ: Left-side thrust bearing
Ⓡ: Right-side thrust bearing

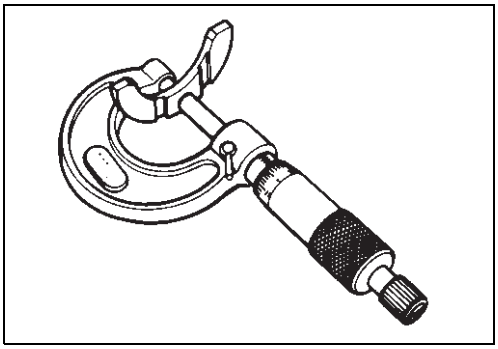
NOTE:
Pull the crankshaft to the left (generator side), so that there is no clearance on the right-side thrust bearing.



DATA Crankshaft thrust clearance:
Standard: 0.050 – 0.105 mm (0.0020 – 0.0041 in)

TOOL 09900-20803: Thickness gauge

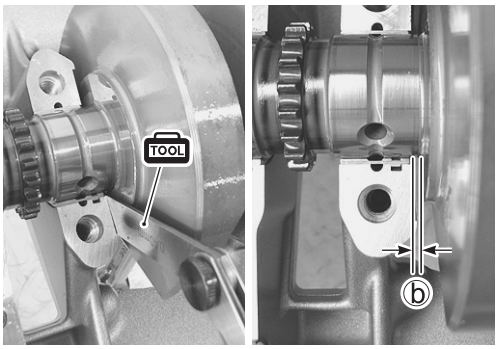
- If the thrust clearance exceeds the standard range, measure the thrust bearing thickness.
- Remove the left-side thrust bearing.
- Measure the thickness of the left-side thrust bearing using the micrometer.
- If the thickness of the left-side thrust bearing is below standard, replace it with a new one and once again perform the thrust clearance measurement listed above, checking to make sure it is within standard.



DATA Thrust bearing thickness (Left side):
Standard: 2.450 – 2.475 mm (0.0965 – 0.0974 in)

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

- If the left-side thrust bearing is within the standard range, reinsert the left-side thrust bearing and remove the right-side thrust bearing.
- With the right-side thrust bearing removed, measure the clearance ⓑ using the thickness gauge.



NOTE:
Pull the crankshaft to the right (clutch side), so that there is no clearance on the left-side thrust bearing.

TOOL 09900-20803: Thickness gauge

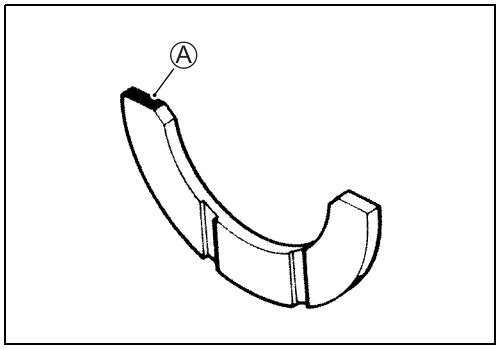
- Select a right-side thrust bearing from the selection table. (☞3-69)

DATA Thrust bearing selection table (Right side)

Clearance before inserting right-side thrust bearing	Color (Part No.)	Thrust bearing thickness	Thrust clearance
2.680 – 2.700 mm (0.1055 – 0.1063 in)	None (12228-17E00-0L0)	2.600 – 2.625 mm (0.1024 – 0.1033 in)	0.055 – 0.100 mm (0.0022 – 0.0039 in)
2.655 – 2.680 mm (0.1045 – 0.1055 in)	Purple (12228-17E00-0K0)	2.575 – 2.600 mm (0.1014 – 0.1024 in)	0.050 – 0.105 mm (0.0020 – 0.0041 in)
2.630 – 2.655 mm (0.1035 – 0.1045 in)	Brown (12228-17E00-0J0)	2.550 – 2.575 mm (0.1004 – 0.1014 in)	
2.605 – 2.630 mm (0.1026 – 0.1035 in)	Pink (12228-17E00-0H0)	2.525 – 2.550 mm (0.0994 – 0.1004 in)	
2.580 – 2.605 mm (0.1016 – 0.1026 in)	Orange (12228-17E00-0G0)	2.500 – 2.525 mm (0.0984 – 0.0994 in)	
2.555 – 2.580 mm (0.1006 – 0.1016 in)	White (12228-17E00-0F0)	2.475 – 2.500 mm (0.0974 – 0.0984 in)	
2.525 – 2.555 mm (0.0994 – 0.1006 in)	Yellow (12228-17E00-0E0)	2.450 – 2.475 mm (0.0965 – 0.0974 in)	

- After selecting a right-side thrust bearing, insert it and again perform the thrust clearance measurement to make sure it is within the standard range.

Ⓐ Color code



NOTE:
Left-side thrust bearing has the same specification as the YELLOW (12228-17E00-0E0) of right-side thrust bearing.

ENGINE REASSEMBLY

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

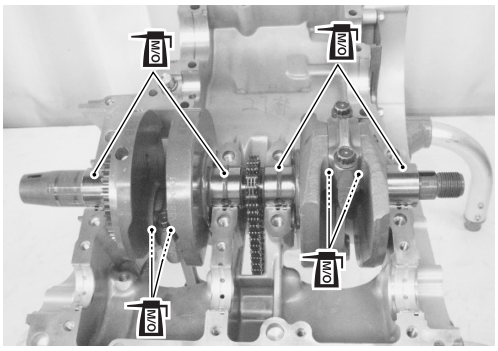
NOTE:
Apply engine oil to each running and sliding part before reassembling.

CRANKSHAFT

- Before installing the crankshaft assembly, apply a molybdenum oil solution to each crankshaft journal surface and bearing surface lightly.

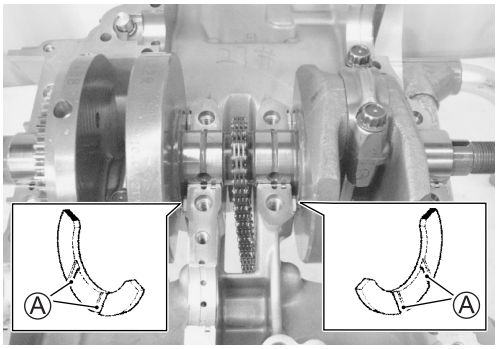
MOLYBDENUM OIL SOLUTION

- Apply engine oil to the conrod big end side surfaces.
- Check the conrod movement for smooth turning.
- Install the crankshaft assembly along with the cam chain into the upper crankcase.



- Insert the right and left-thrust bearings with oil groove Ⓐ facing the crank web.

NOTE:
Inspect the crankshaft thrust clearance if necessary. (☞3-68)

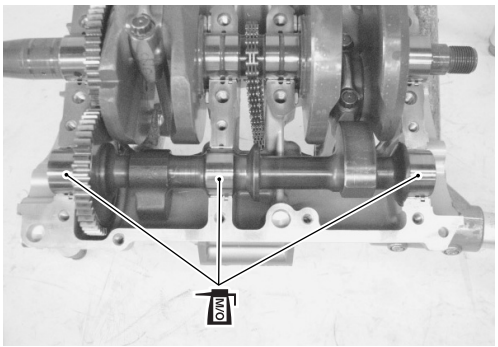


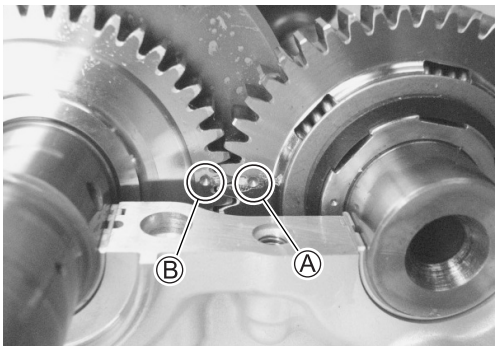
CRANK BALANCER

- Before installing the crank balancer assembly, apply a molybdenum oil solution to each crank balancer journal surface and bearing surface lightly.

MOLYBDENUM OIL SOLUTION

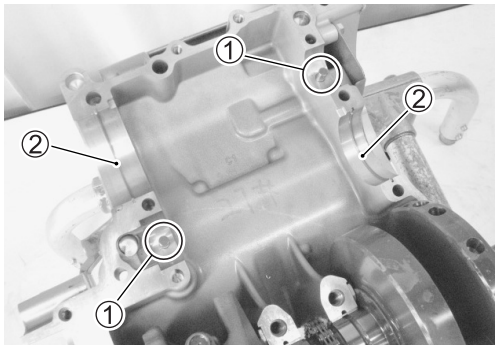
- Set the crank balancer so that its punch mark Ⓐ is aligned with the index Ⓑ on the crankshaft.





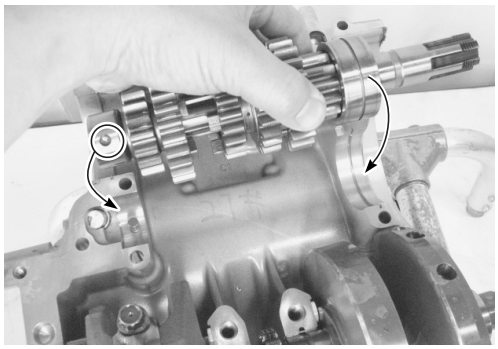
TRANSMISSION

- Install the bearing pins ① and the C-rings ② on the upper crankcase.



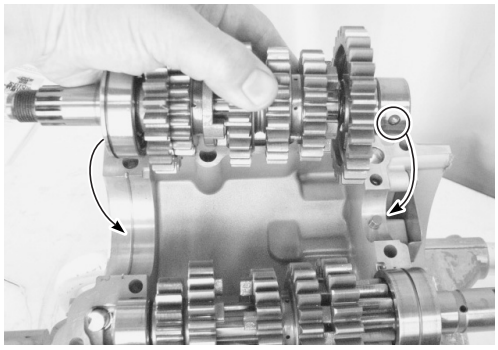
- Install the countershaft assembly to the upper crankcase.

NOTE:
Align the C-ring with the groove of bearing and the bearing pin with the indent on the bearing.

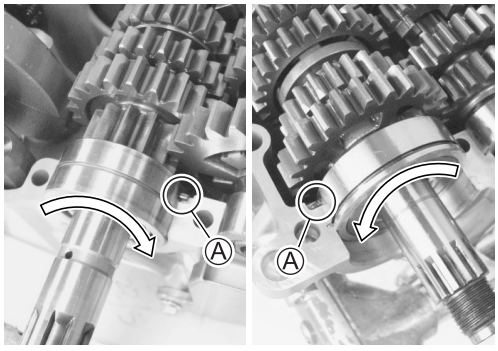


- Install the driveshaft assembly to the upper crankcase.

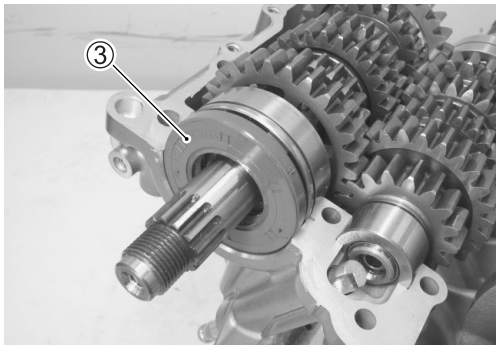
NOTE:
Align the C-ring with the groove of bearing and the bearing pin with the indent on the bearing.



- Turn the bearings to fit the bearing dowel pins Ⓐ in the respective positions.

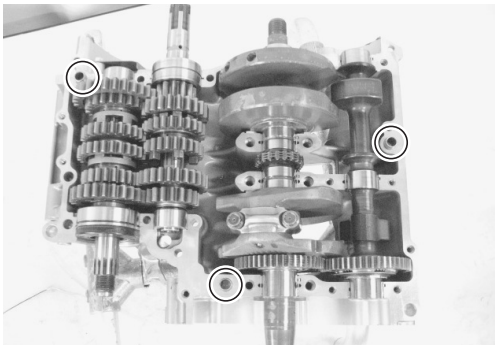


- Install the oil seal ③.



CRANKCASE

- Clean the mating surfaces of the crankcases.
- Install the dowel pins to the upper crankcase.



- Apply bond to the mating surface of the lower crankcase as follows.

1207B 99000-31140: SUZUKI BOND No.1207B or equivalent

NOTE:

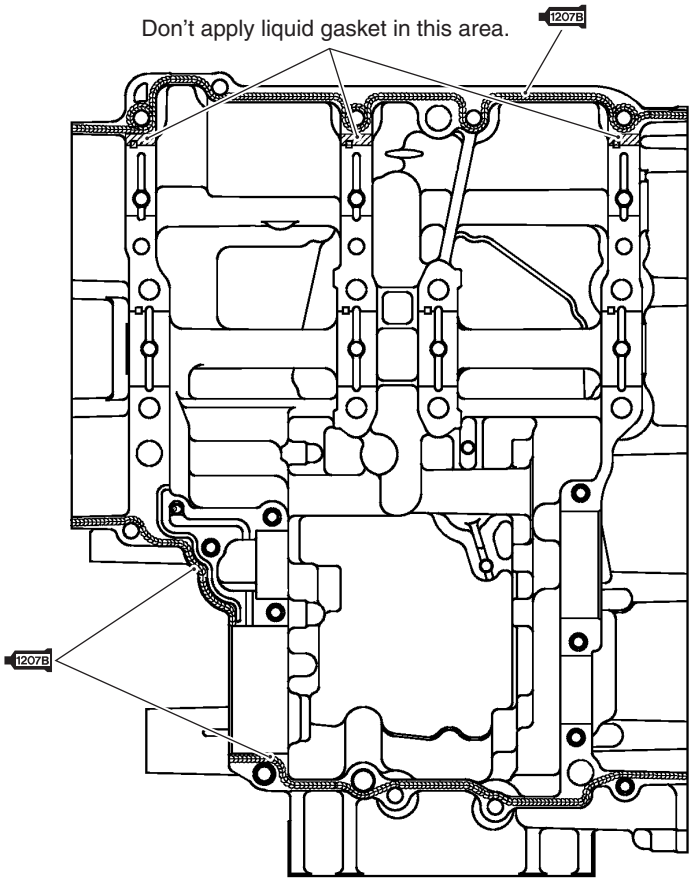
• Use of SUZUKI bond is as follows:

** Make surfaces free from moisture, oil, dust and other foreign materials.*

** Spread the sealant on surfaces thinly to form an even layer, and assemble the crankcases within few minutes.*

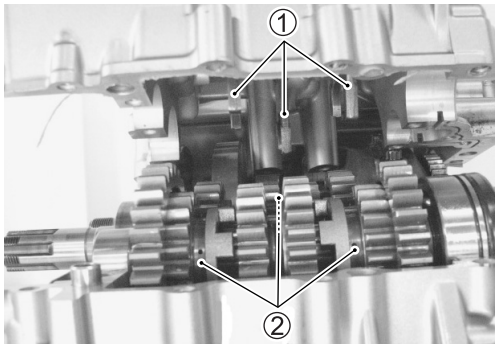
** Take extreme care not to apply sealant to any oil hole, oil groove and bearing.*

** Apply sealant to distorted surfaces as it forms a comparatively thick film.*



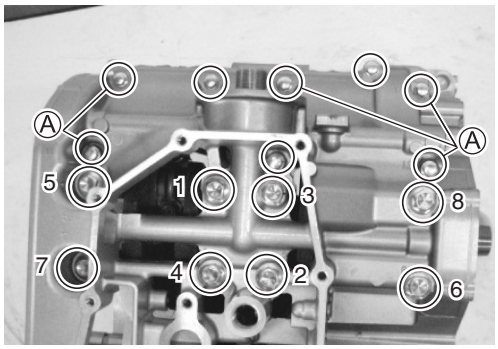
• Match the upper and lower crankcases.

NOTE:
Align the gearshift forks ① with their grooves ②.



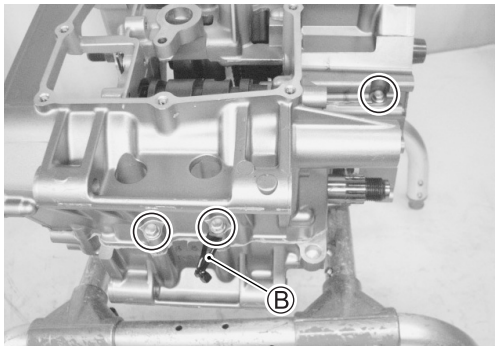
• Fit the new gasket washers to the bolts 5 to 8 numbers.
• Tighten the crankshaft journal bolts (M:8) in ascending order of numbers assigned to these bolts. Tighten each bolt a little at a time to equalize the pressure in the following two steps.

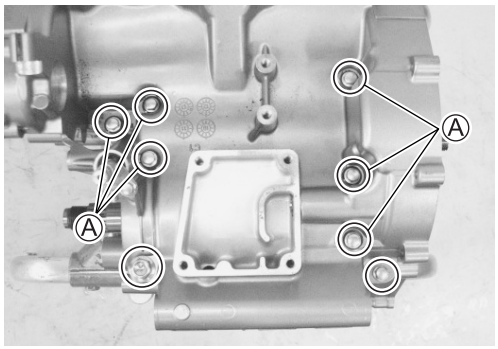
Crankshaft journal bolt:
(M:8) Initial : 15 N·m (1.5 kgf-m, 11.0 lbf-ft)
Final : 26 N·m (2.6 kgf-m, 19.0 lbf-ft)



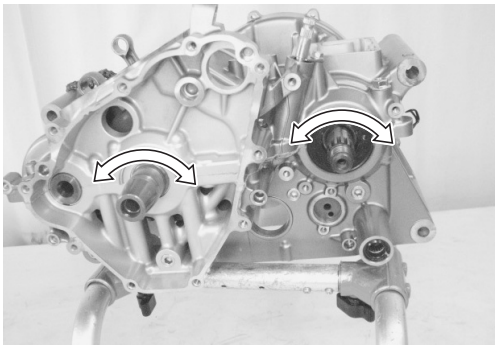
• Fit the new gasket washer Ⓐ and clamp Ⓑ to the crankcase bolt.
• Tighten the crankcase bolts a little at a time to equalize the pressure.

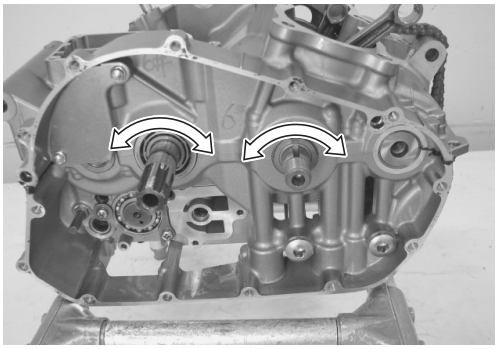
Crankcase bolt: (M:6): 11 N·m (1.1 kgf-m, 8.0 lbf-ft)
(M:8): 26 N·m (2.6 kgf-m, 19.0 lbf-ft)





- After the crankshaft journal bolts and crankcase bolts have been tightened, check if the crankshaft rotates smoothly.
- Also check that the driveshaft and countershaft rotate smoothly.



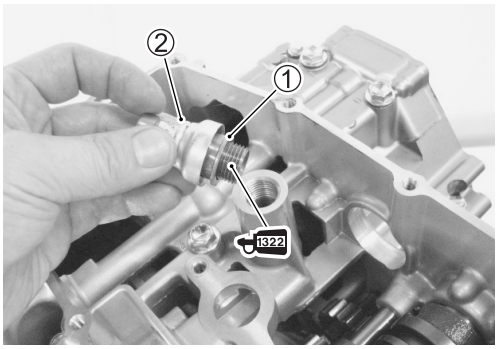


OIL PRESSURE REGULATOR

- Fit a new gasket washer ① to the oil pressure regulator ②.
- Apply thread lock to the oil pressure regulator and tighten it to the specified torque.

1322 99000-32110: THREAD LOCK CEMENT SUPER "1322" or equivalent

Oil pressure regulator: 28 N·m (2.8 kgf-m, 20.0 lbf-ft)



OIL STRAINER

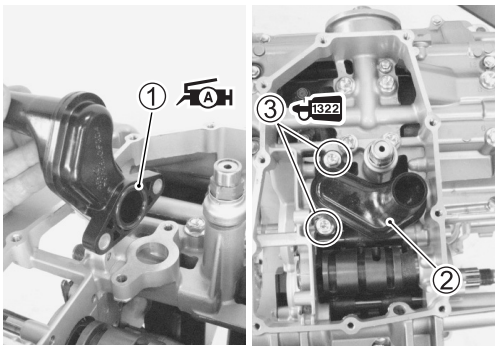
- Apply grease to the new O-ring ①.

A 99000-25010: SUZUKI SUPER GREASE "A" or equivalent

- Install the oil strainer ②.
- Apply thread lock to the oil strainer bolts ③ and tighten them to the specified torque.

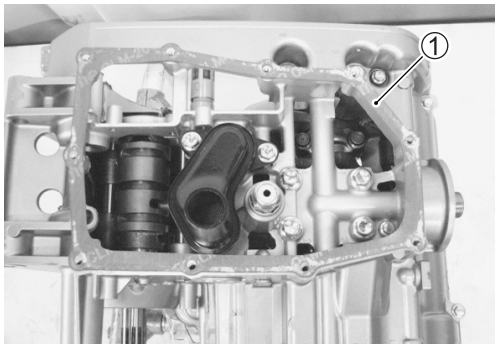
1322 99000-32110: THREAD LOCK CEMENT SUPER "1322" or equivalent

Oil strainer bolt: 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



OIL PAN

- Install a new gasket ①.

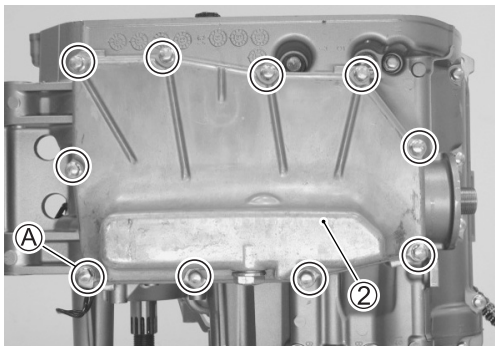


- Install the oil pan ②.

NOTE:
Fit the clamp to the oil pan bolts Ⓐ.

- Tighten the oil pan bolts diagonally to the specified torque.

Oil pan bolt: 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



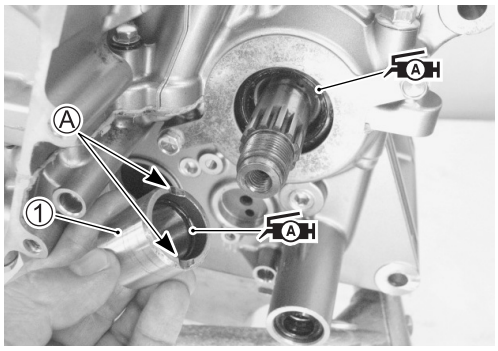
ENGINE SPROCKET SPACER

- Apply grease to the new O-ring and oil seal lip.

99000-25010: SUZUKI SUPER GREASE "A"
or equivalent

- Install the engine sprocket spacer ①.

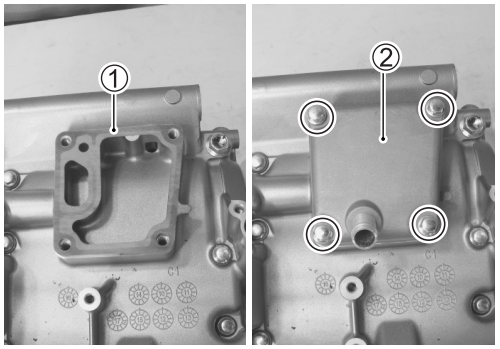
NOTE:
The grooved Ⓐ side of the engine sprocket spacer ① must face crankcase side.



CRANKCASE BREATHER COVER

- Install a new gasket ① and tighten the breather cover ②.

Breather cover bolt: 10 N·m (1.0 kgf-m, 7.0 lbf-ft)

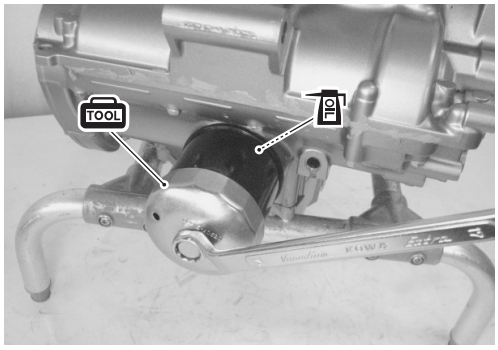


OIL FILTER

- Apply engine oil lightly to the gasket.
- Install oil filter with the special tool. (☞2-12)

09915-40620: Oil filter wrench

Oil filter: 20 N·m (2.0 kgf-m, 14.5 lbf-ft)



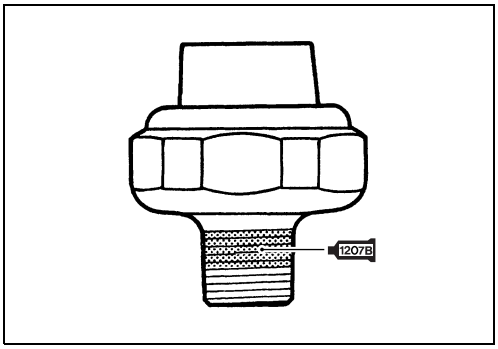
OIL PRESSURE SWITCH

- Apply bond to the thread part of oil pressure switch and tighten oil pressure switch to the specified torque.

1207B 99000-31140: SUZUKI BOND No.1207B or equivalent

Oil pressure switch: 13 N·m (1.3 kgf-m, 9.5 lbf-ft)

NOTE:
Be careful not to apply bond to the hole of thread end.



GEAR POSITION SWITCH

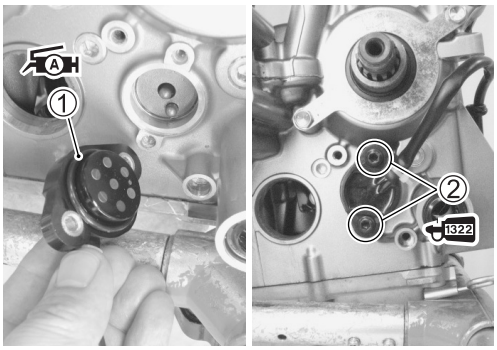
- Apply grease to the new O-ring ①.

A 99000-25010: SUZUKI SUPER GREASE "A" or equivalent

- Apply thread lock to the gear position switch mounting bolts ② and tighten them to the specified torque.

1322 99000-32110: THREAD LOCK CEMENT SUPER "1322" or equivalent

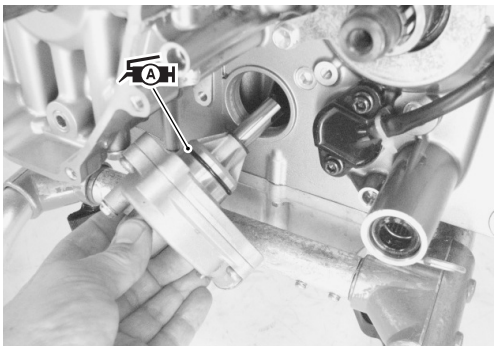
GP switch mounting bolt: 6.5 N·m (0.65 kgf-m, 4.5 lbf-ft)



WATER PUMP

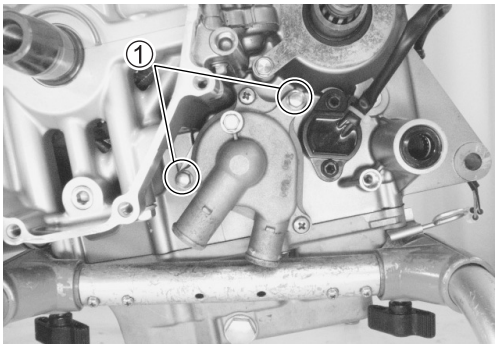
- Apply grease to the new O-ring.

A 99000-25010: SUZUKI SUPER GREASE "A" or equivalent



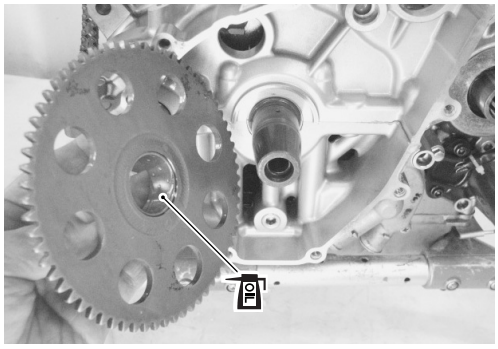
- Tighten the water pump mounting bolts ① to the specified torque.

Water pump mounting bolt: 10 N·m (1.0 kgf-m, 7.0 lbf-ft)

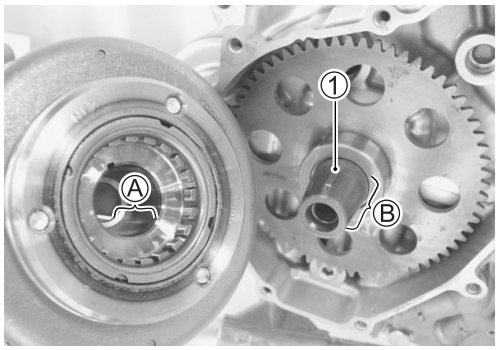


GENERATOR ROTOR

- Apply engine oil to the bushing of the starter driven gear.



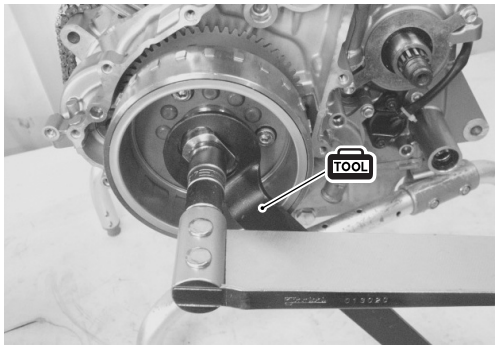
- Fit the key ① in the key slot on the crankshaft.
- Degrease the tapered portion Ⓐ of generator rotor and also the crankshaft Ⓑ. Use nonflammable cleaning solvent to wipe off oily or greasy matter and make these surfaces completely dry.



- Install the generator rotor onto the crankshaft.
- Hold the generator rotor with the special tool and tighten its bolt to the specified torque.

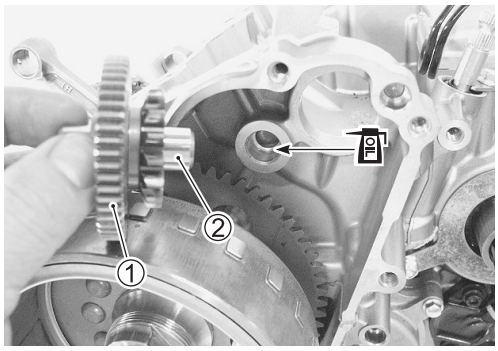
TOOL 09930-44521: Rotor holder

Generator rotor bolt: 130 N·m (13.0 kgf-m, 94.0 lbf-ft)



STARTER IDLE GEAR

- Apply engine oil to the idle gear shaft hole.
- Install the starter idle gear ① with the idle gear shaft ②.



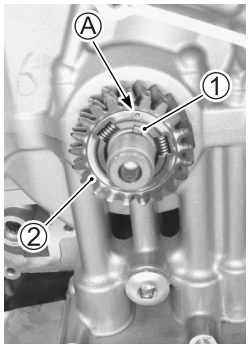
PRIMARY DRIVE GEAR

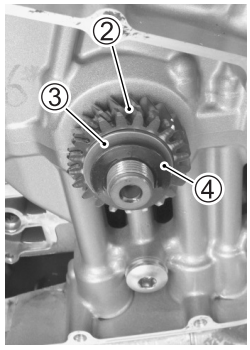
- Install the key ① onto the crankshaft.
- Install the primary drive gear assembly ②, washer ③ and spring washer ④.

NOTE:

** The punch mark Ⓐ on the* primary drive gear assembly ② *should face to the outside.*

** The conical curve side of spring washer ④ face outside.*



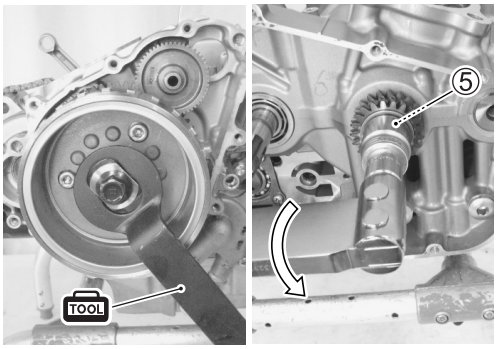


- Hold the generator rotor and tighten the primary drive gear nut ⑤ to the specified torque.

NOTE:
This primary drive gear nut ⑤ has left-hand threads.

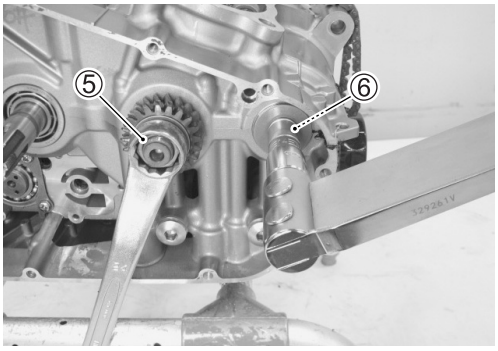
09930-44521: Rotor holder

Primary drive gear nut: 70 N·m (7.0 kgf-m, 50.5 lbf-ft)



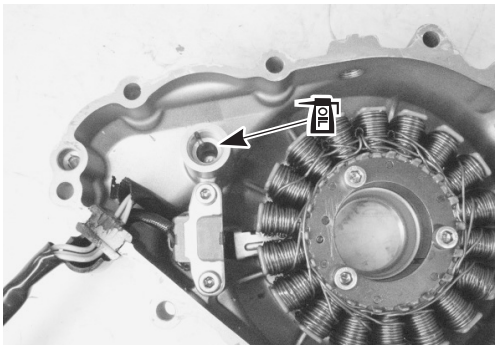
- Hold the primary drive gear nut ⑤ and tighten the crank balancer bolt ⑥ to the specified torque.

Crank balancer bolt: 50 N·m (5.0 kgf-m, 36.0 lbf-ft)



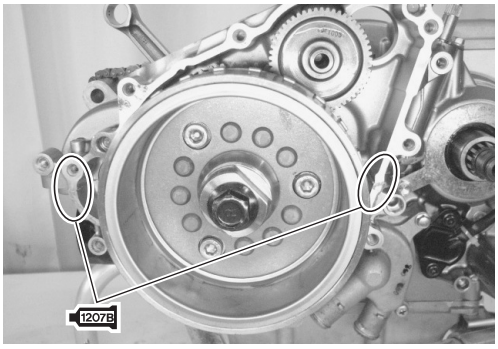
GENERATOR COVER

- Apply engine oil to the starter idle gear shaft hole.

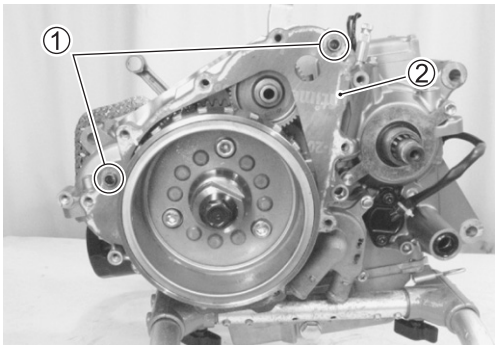


- Apply bond lightly to the mating surfaces at the parting line between the upper and lower crankcases as shown.

99000-31140: SUZUKI BOND No.1207B or equivalent



- Install the dowel pins ① and new gasket ②.

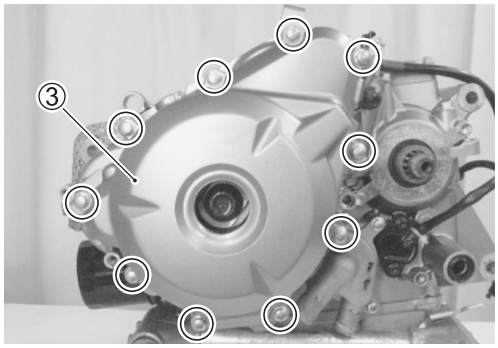


• Install the generator cover ③ and tighten the generator cover bolts to the specified torque.

Generator cover bolt: 10 N·m (1.0 kgf-m, 7.0 lbf-ft)

⚠ WARNING

Be careful not to pinch finger between the generator cover and crankcase.

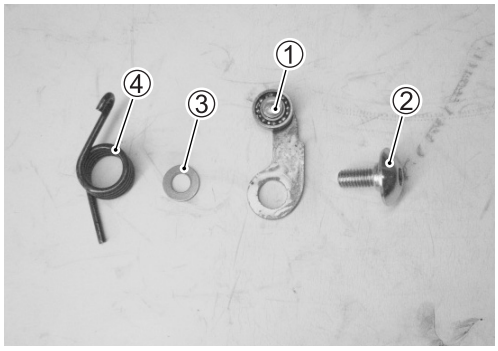


GEARSHIFT SYSTEM

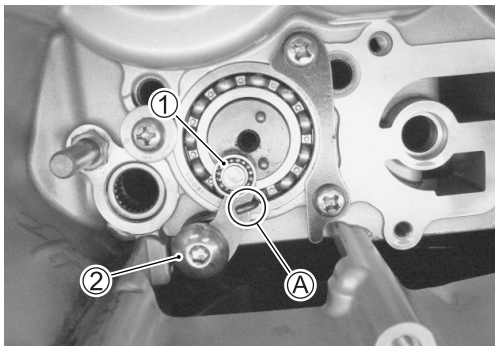
• Install the gearshift cam stopper ①, its bolt ②, washer ③ and return spring ④.
• Tighten the gearshift cam stopper bolt ② to the specified torque.

Gearshift cam stopper bolt: 10 N·m (1.0 kgf-m, 7.0 lbf-ft)

NOTE:
Hook the return spring end Ⓐ to the gearshift cam stopper ①.

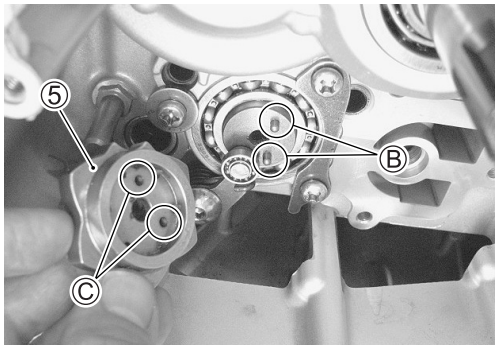


• Check the gearshift cam stopper ① moves smoothly.
• Locate the gearshift cam in the neutral position.



• Install the gearshift cam stopper plate ⑤.

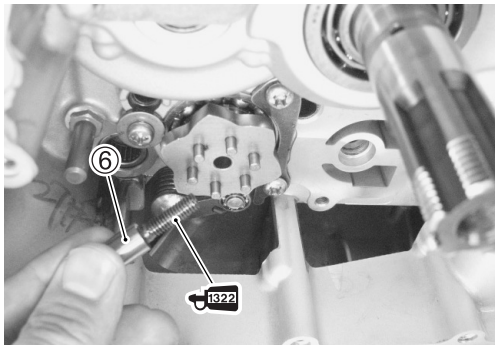
NOTE:
Align the gearshift cam pins Ⓑ with the gearshift cam stopper plate holes Ⓒ.



• Apply a small quantity of thread lock to the gearshift cam stopper plate bolt ⑥ and tighten it to the specified torque.

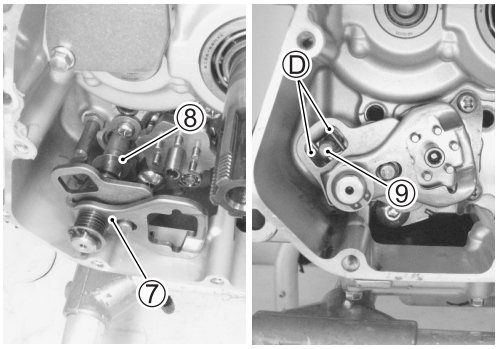
1322 99000-32110: THREAD LOCK CEMENT SUPER "1322" or equivalent

Gearshift cam stopper plate bolt: 11 N·m (1.1 kgf-m, 8.0 lbf-ft)



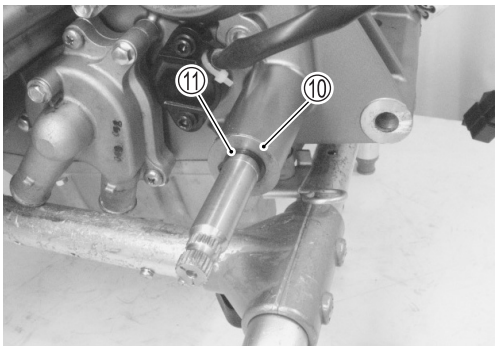
• Install the gearshift shaft assembly ⑦ with the washer ⑧.

NOTE:
Pinch the gearshift arm stopper ⑨ with return spring ends Ⓓ.



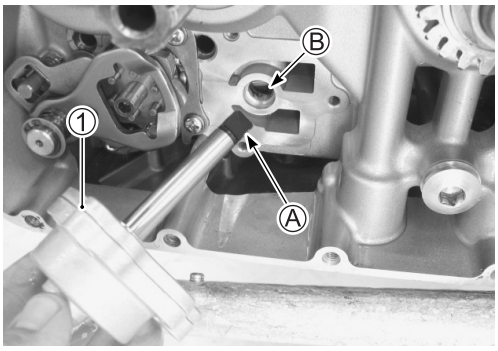
• Install the washer ⑩ and new snap ring ⑪.

TOOL 09900-06107: Snap ring pliers (Open type)



OIL PUMP

• When install the oil pump ①, fit the convex part Ⓐ of the oil pump shaft onto the concave part Ⓑ of the water pump shaft.



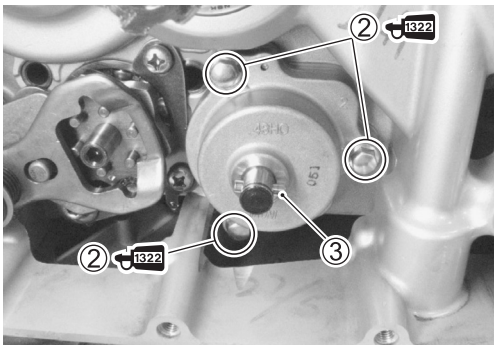
• Apply thread lock to the oil pump mounting bolts ② and tighten them to the specified torque.

1322 99000-32110: THREAD LOCK CEMENT SUPER "1322" or equivalent

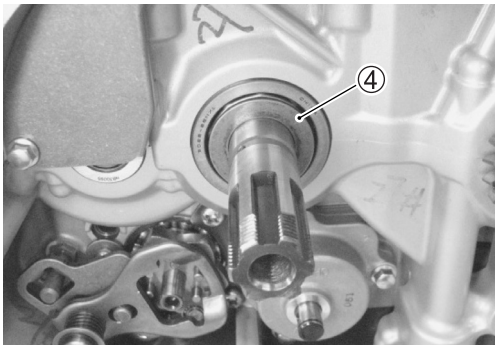
Oil pump mounting bolt: 10 N·m (1.0 kgf-m, 7.0 lbf-ft)

• Install the pin ③.

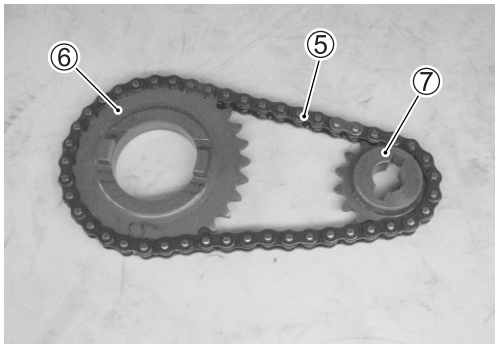
NOTE:
Be careful not to drop the pin ③ into the crankcase.



• Install the thrust washer ④.

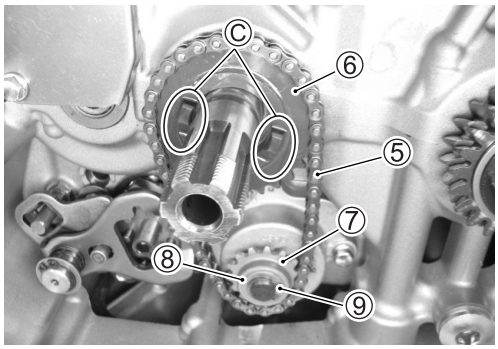


• Engage the oil pump drive chain ⑤ to the oil pump drive sprocket ⑥ and oil pump driven sprocket ⑦.



• Install the oil pump drive chain ⑤ with the oil pump drive sprocket ⑥ and oil pump driven sprocket ⑦.

NOTE:
Teeth Ⓒ on the oil pump drive sprocket ⑥ must face the clutch side.

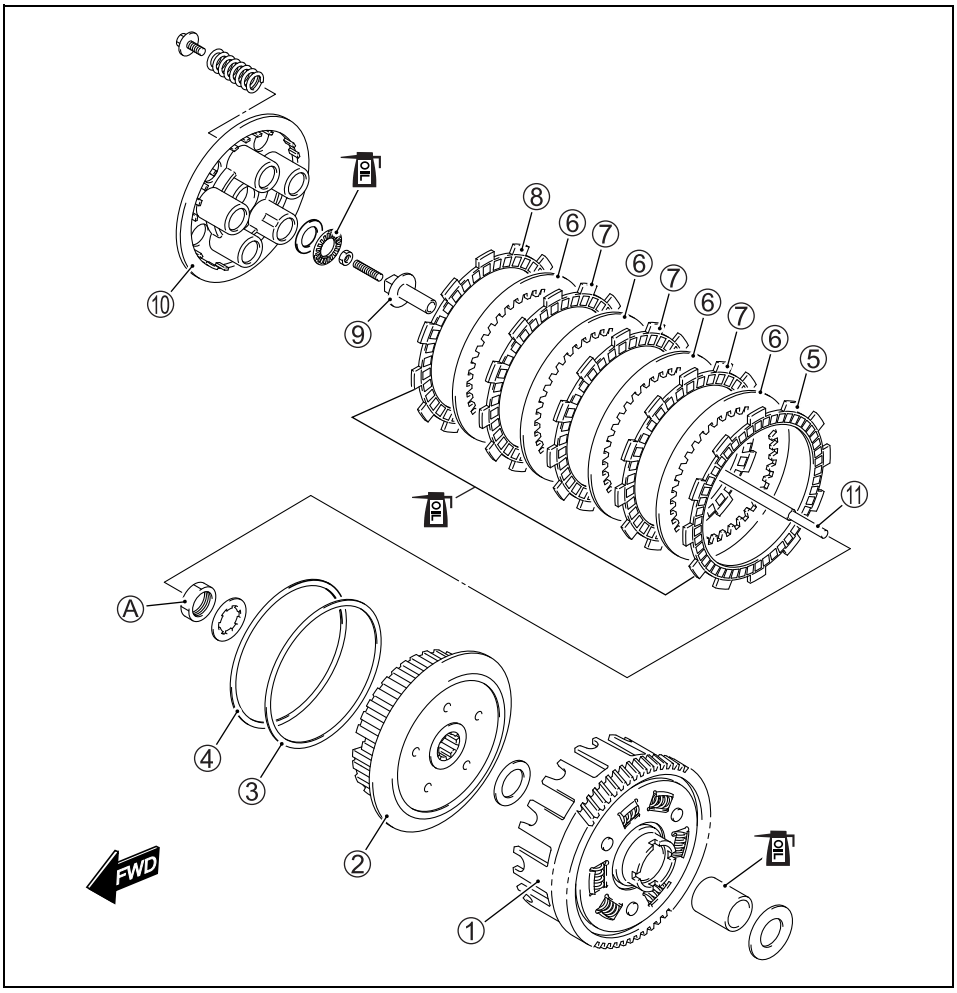


• Install the washer ⑧ and new snap ring ⑨.

TOOL 09900-06107: Snap ring pliers (Open type)

NOTE:
Be careful not to drop any parts into the crankcase.

CLUTCH

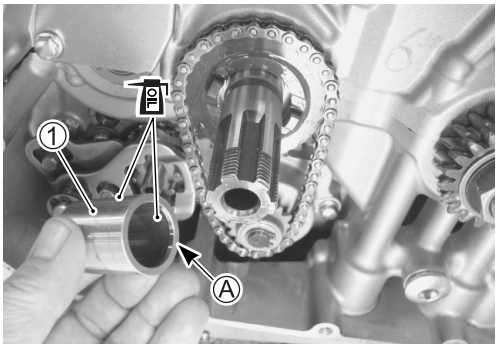


①	Primary driven gear assembly
②	Clutch sleeve hub
③	Spring washer seat
④	Spring washer
⑤	Clutch drive No.3 plate
⑥	Clutch driven plate
⑦	Clutch drive No.2 plate
⑧	Clutch drive No.1 plate
⑨	Clutch push piece
⑩	Clutch pressure plate
⑪	Clutch push rod
Ⓐ	Clutch sleeve hub nut

ITEM	N·m	kgf-m	lbf-ft
Ⓐ	50	5.0	36.0

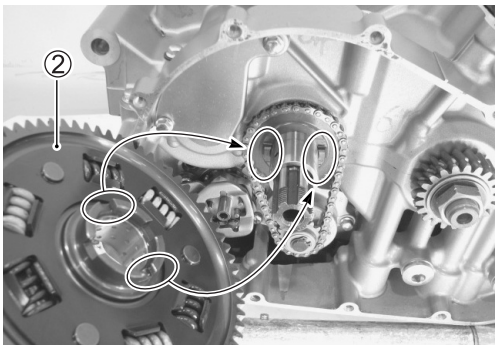
- Apply engine oil to the inside and outside surface of the spacer ①.
- Install the spacer ① onto the countershaft.

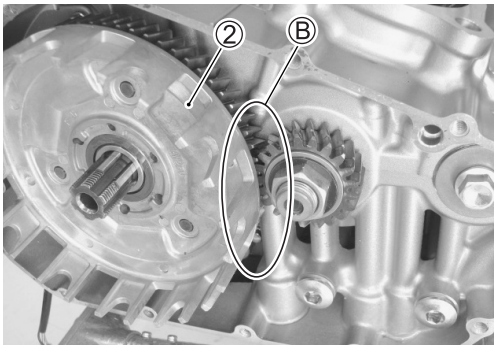
NOTE:
The chamfer side Ⓐ of spacer ① crankcase inside.



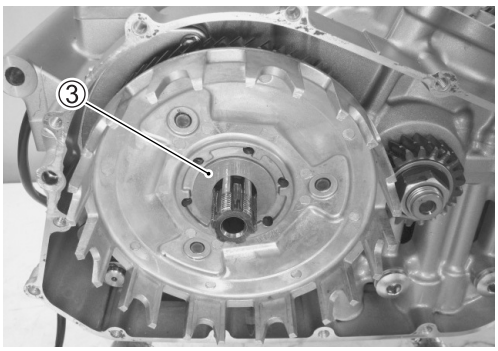
- Install the primary driven gear assembly ② onto the countershaft.

NOTE:
** Be sure to engage the oil pump drive sprocket with the primary driven gear sprocket.*
** When engaging the primary drive gear and primary driven gears Ⓑ, turn the primary driven gear assembly ② to the counterclockwise.*

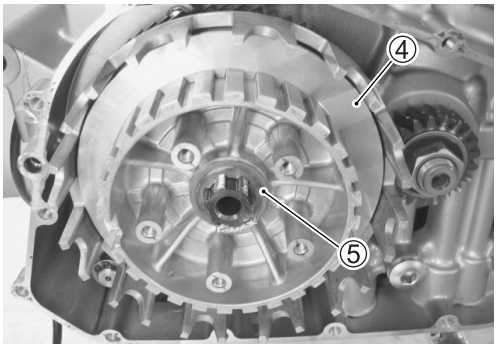




- Install the thrust washer ③.



- Install the clutch sleeve hub ④ onto the countershaft.
- Install the new lock washer ⑤.



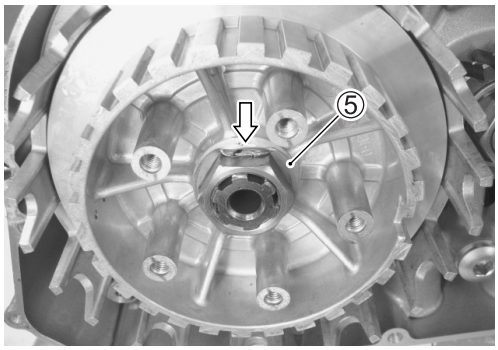
- Hold the clutch sleeve hub with the special tool.

09920-53740: Clutch sleeve hub holder

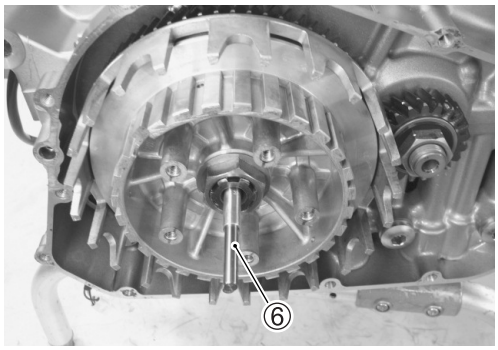
- Tighten the clutch sleeve hub nut to the specified torque.

Clutch sleeve hub nut: 50 N·m (5.0 kgf-m, 36.0 lbf-ft)

- Bend the lock washer ⑤ securely.

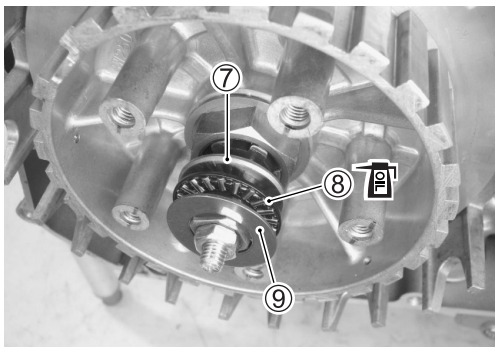


- Install the clutch push rod ⑥ into the countershaft.

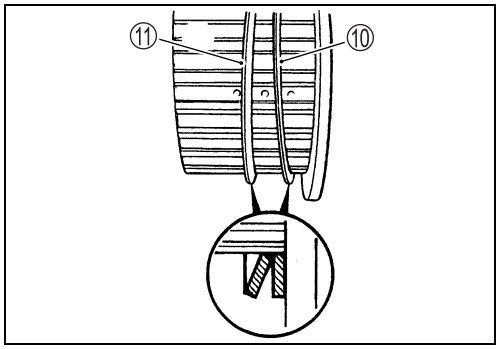


- Apply engine oil to the bearing ⑧.
- Install the clutch push piece ⑦, bearing ⑧ and thrust washer ⑨ to the countershaft.

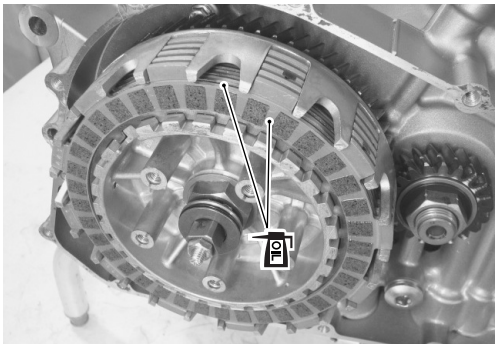
NOTE:
Thrust washer ⑨ is located between the pressure plate and bearing ⑧.



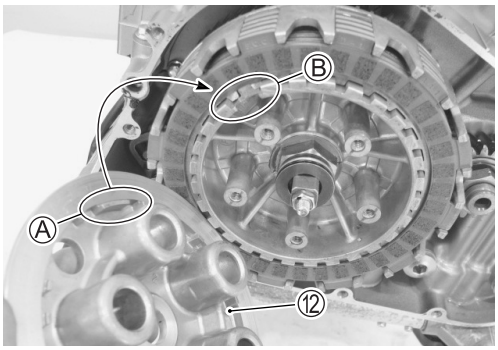
- Install the spring washer seat ⑩ and spring washer ⑪ onto the clutch sleeve hub correctly.



- Apply engine oil to the clutch drive plates and driven plates.
- Insert the clutch drive plates and driven plates one by one into the clutch sleeve hub in the prescribed order.



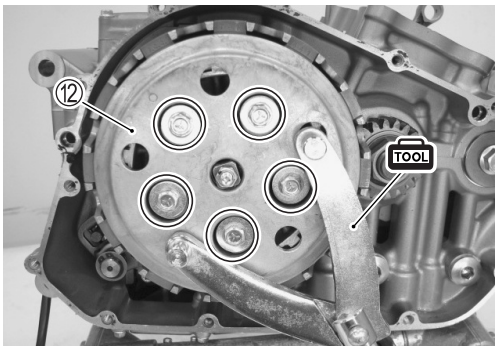
- When install the clutch pressure plate ⑫, fit the convex part Ⓐ of the clutch pressure plate onto the concave part Ⓑ of the clutch sleeve hub.



- Install the clutch springs and clutch spring bolts.
- Hold the clutch pressure plate ⑫ with the special tool.

TOOL 09930-40113: Flywheel rotor holoder

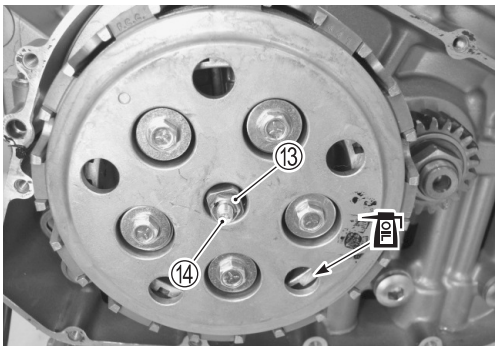
- Tighten the clutch spring bolts securely in diagonal.



- Loosen the clutch release adjuster nut ⑬ and turn in the clutch release screw ⑭ to feel resistance.
- From this position, turn the release screw ⑭ counterclockwise 1 rotation, and tighten the lock-nut ⑬ while holding the release screw ⑭.

Clutch release adjuster lock-nut:
5.5 N·m (0.55 kgf-m, 4.0 lbf-ft)

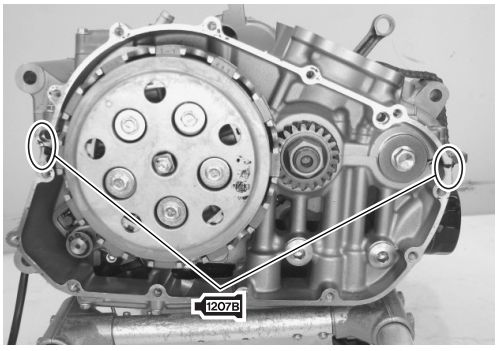
- Pour engine oil (30 ml – 40 ml) from the hole of the clutch pressure plate into the clutch sleeve hub.



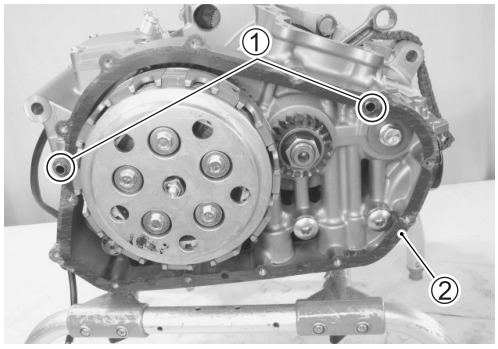
CLUTCH COVER

- Apply bond lightly to the mating surfaces at the parting line between the upper and lower crankcases as shown.

1207B 99000-31140: SUZUKI BOND No.1207B or equivalent

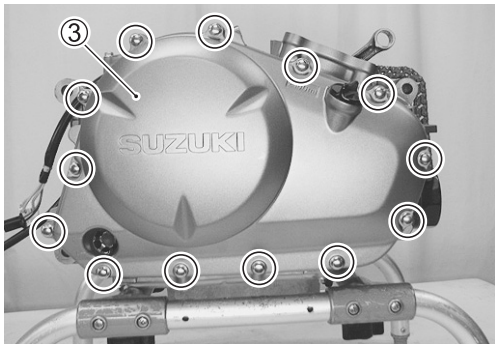


• Install dowel pins ① and new gasket ②.



• Install the clutch cover ③ and tighten its bolts to the specified torque.

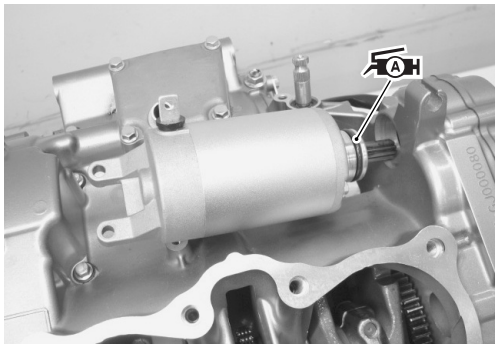
Clutch cover bolt: 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



STARTER MOTOR

• Apply grease to the new O-ring.

99000-25010: SUZUKI SUPER GREASE "A"
or equivalent

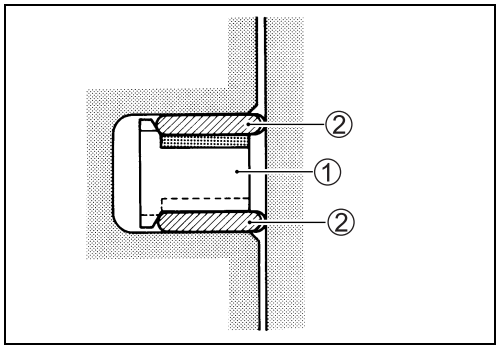


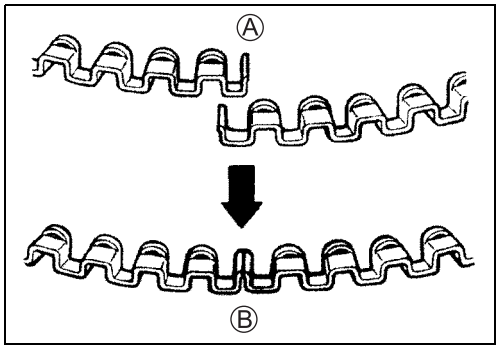
PISTON RING

• 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.*
** When installing the piston ring, be careful not to damage the piston.*
** Do not expand the piston ring excessively since it is apt to be broken down.*
** When installing the spacer, be careful not to allow its two ends to overlap in the groove.*

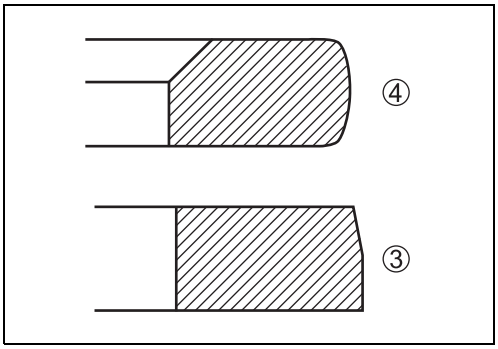




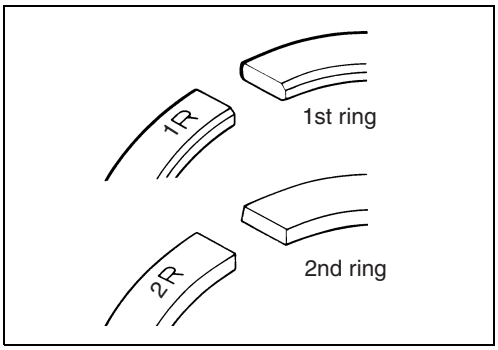
Ⓐ INCORRECT
Ⓑ CORRECT

• Install the 2nd ring ③ and the 1st ring ④ to the piston.

NOTE:
1st ring and 2nd ring differ in shape.

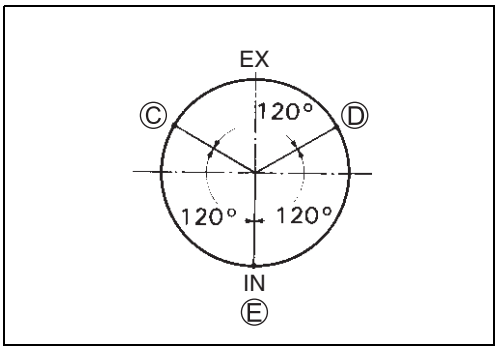


NOTE:
Face the side with the stamped mark upward when assembling.



• Position the gaps of the three ring as shown. Before inserting each piston into the cylinder, check that the gaps are so located.

Ⓒ 2nd ring and lower side rail
Ⓓ Upper side rail
Ⓔ 1st ring and Spacer



PISTON

• Apply a small quantity of molybdenum oil solution onto each piston pins ①.

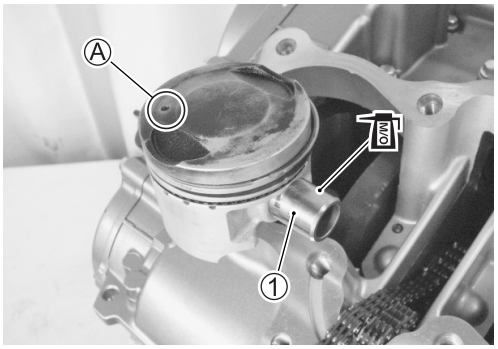
MOLYBDENUM OIL SOLUTION

• Assemble the piston and conrod.

NOTE:

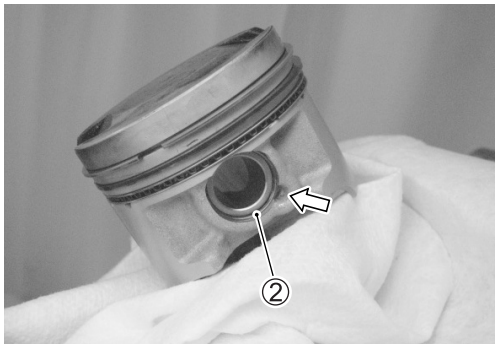
** Be sure to install the pistons in the cylinders from which they were removed in disassembly.*

** When installing the pistons, the indents Ⓐ on the piston head must be located to each exhaust side.*



- Place a clean rag over the cylinder base so as not to drop the piston pin circlip ② into the crankcase.
- Install a piston pin circlip ②.

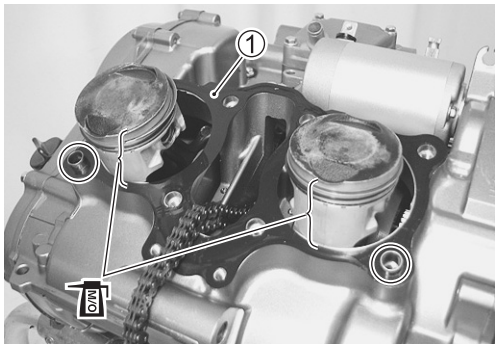
NOTE:
End gap of the circlip ② should not be aligned with the cutaway in the piston pin bore.



CYLINDER

- Install the dowel pins and new gasket ① to the crankcase.
- Apply a small quantity of molybdenum oil solution to the sliding surface of the pistons, piston ring sets and cylinder walls.

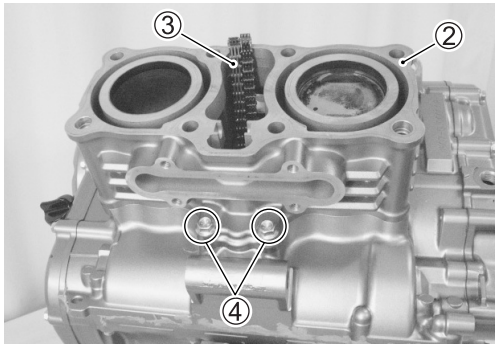
MOLYBDENUM OIL SOLUTION



- Hold the piston rings in proper position, and insert each of the pistons into the respective cylinder ②.

NOTE:
When mounting the cylinder, keep the cam chain ③ taut.

- Tighten the cylinder nuts ④ temporarily.

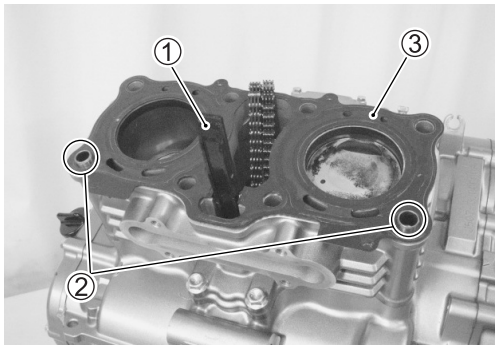


CYLINDER HEAD

- Install the cam chain guide ①.

NOTE:
There are the guide holder for the bottom end of cam chain guide cast in the crankcase. Be sure that the cam chain guide are inserted properly.

- Fit the dowel pins ② and new gasket ③ to the cylinder.

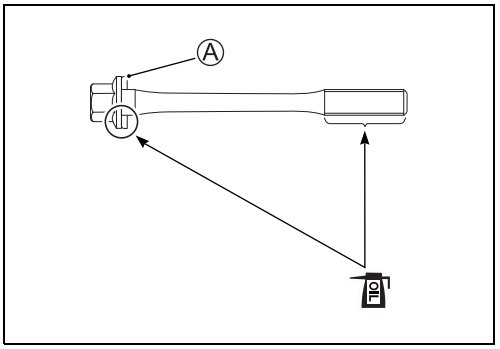


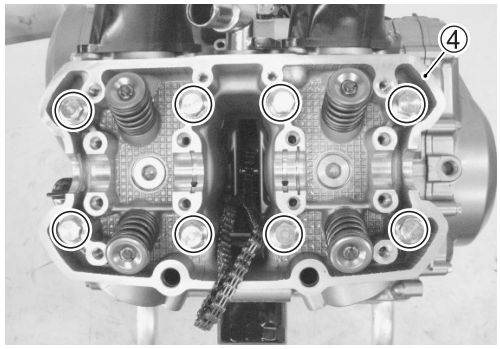
• Place the cylinder head ④ on the cylinder.

NOTE:
When installing the cylinder head, keep the cam chain taut.

• Apply engine oil to the washers Ⓐ and thread portion of the bolts before installing the cylinder head bolts.
• The conical curve side of washers Ⓐ faces upside.
• Tighten the cylinder head bolts to the specified torque and diagonally.

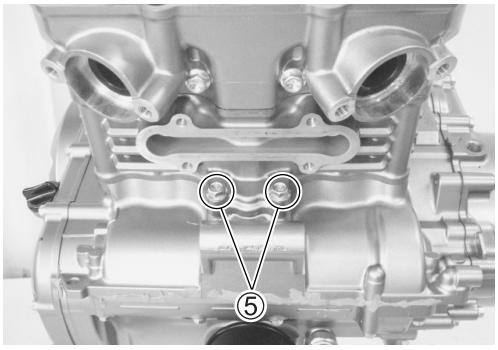
Cylinder head bolt: 25 N·m (2.5 kgf-m, 18.0 lbf-ft)



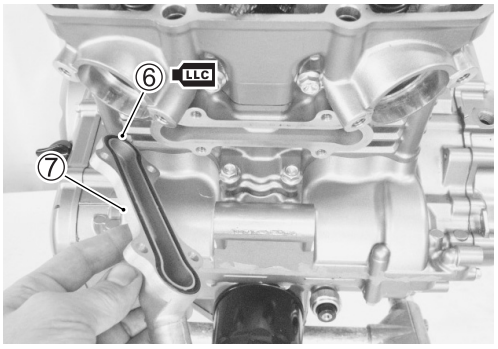


• Tighten the cylinder side bolts ⑤ to the specified torque.

Cylinder side bolt: 10 N·m (1.0 kgf-m, 7.0 lbf-ft)

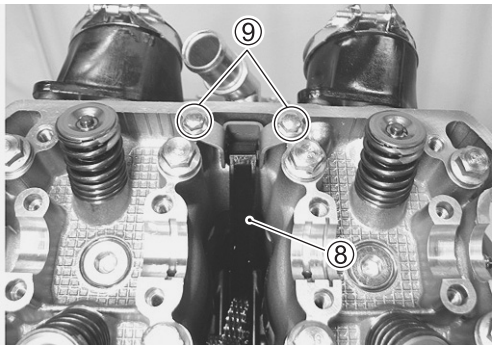


• Apply engine coolant to new O-ring ⑥ of water inlet connector ⑦.



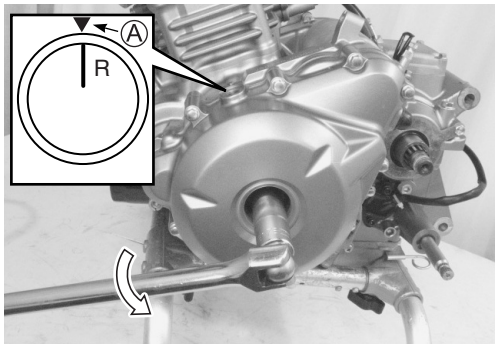
• Install the cam chain tensioner ⑧ on the cylinder head.
• Tighten the cam chain tensioner bolts ⑨ to the specified torque.

Cam cain tensioner bolt: 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



CAMSHAFT

- Turn the crankshaft counterclockwise and align the "I R" line on the generator rotor with the index mark Ⓐ of valve timing inspection hole while keeping the cam chain pulled upward.



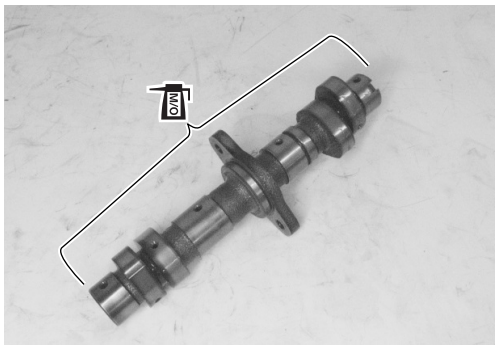
NOTE:

** Pull the cam chain upward, or the chain will be caught between crankcase and cam drive sprocket.*

** To adjust the camshaft timing correctly, be sure to align the "I R" line with the index mark Ⓐ and hold this position when installing the camshafts.*

- Before placing the camshaft on cylinder head, apply molybdenum oil solution to their journals and cam faces.

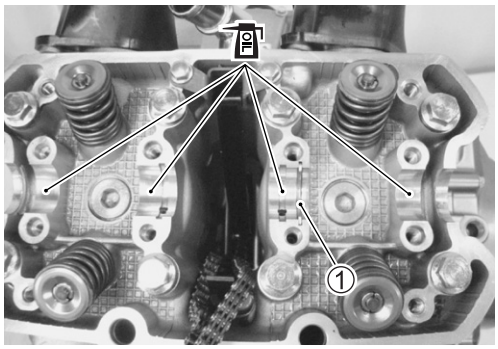
MOLYBDENUM OIL SOLUTION



- Apply a engine oil to the camshaft journal holders.
- Install the C-ring ①.

NOTE:

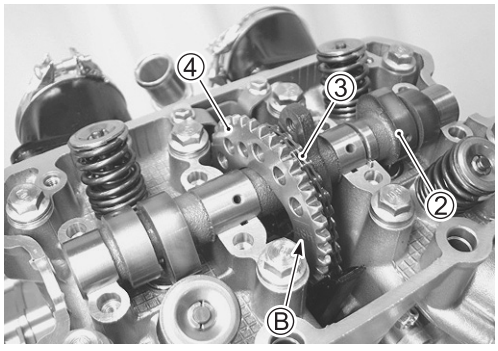
Be careful not to drop the C-ring ① into the cylinder head.



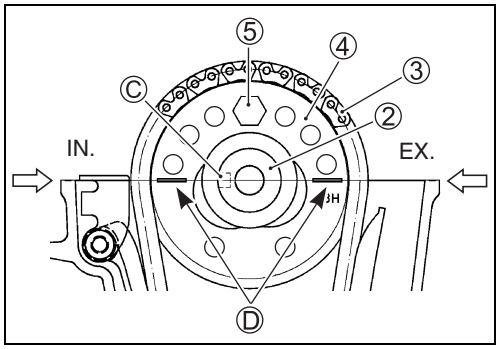
- Position the camshaft ②, cam chain ③ and camshaft sprocket ④.

NOTE:

Position the camshaft sprocket so that the stamped mark side Ⓑ faces #2 cylinder side.

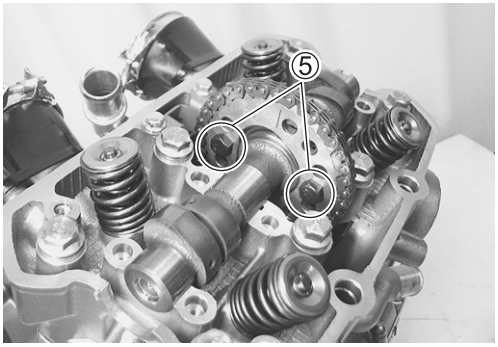


- Align the notches Ⓒ on the camshaft left end with the cylinder head top surface.
- Align the engraved lines Ⓓ on the camshaft sprocket ④ with the cylinder head top surface and engage the cam chain ③ with the camshaft sprocket ④.
- Set the cam sprocket ④ onto the camshaft ② as shown.
- Tighten the camshaft sprocket bolt ⑤ temporarily.

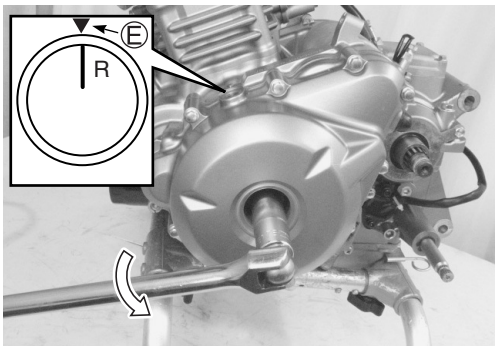


- Turn the crankshaft counterclockwise and tighten the camshaft sprocket bolts ⑤ to the specified torque.

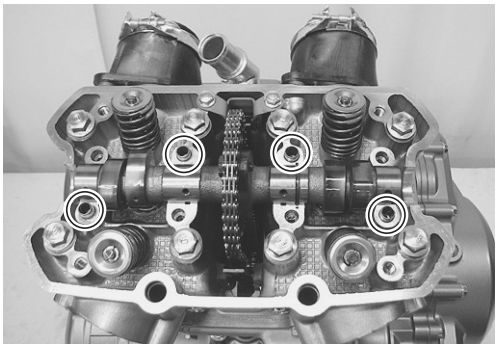
Camshaft sprocket bolt: 15 N·m (1.5 kgf-m, 11.0 lbf-ft)



- Turn the crankshaft counterclockwise to bring the “I R” line on generator rotor to the index mark Ⓔ of the valve inspection hole and also to bring the camshaft to the position as shown. (☞3-89)

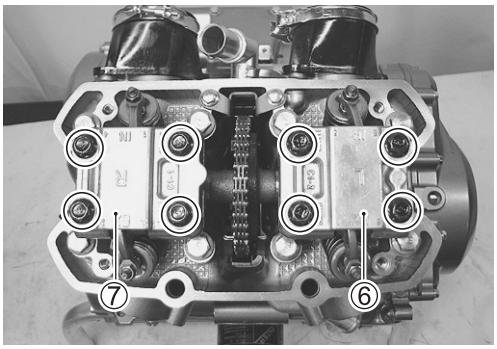


- Install the dowel pins.
- Apply engine oil to camshaft journal holders.
- Install the camshaft journal holders, (L) ⑥ and (R) ⑦.
- Fasten the camshaft journal holder (R) ⑦ evenly by tightening the camshaft journal holder bolts lightly, in the ascending order of numbers.



NOTICE

Damage to head or camshaft journal holder thrust surfaces may result if the camshaft journal holders are not drawn down evenly.

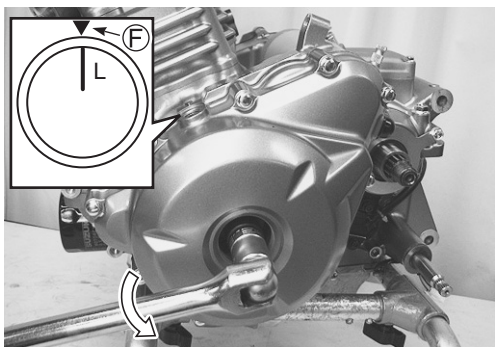


NOTE:

** Each camshaft journal holder is identified with a embossed letters Land R.* (☞3-91)

** The ascending order of numbers are indicated on the camshaft journal holders.* (☞3-91)

- Turn the crankshaft counterclockwise 540 degrees (1-1/2 turns) and align the “I L” line on the generator rotor to the index mark Ⓕ of valve timing inspection hole.
- Fasten the camshaft journal holder (L) ⑥ evenly by tightening the camshaft journal holder bolts lightly, in the ascending order of numbers.

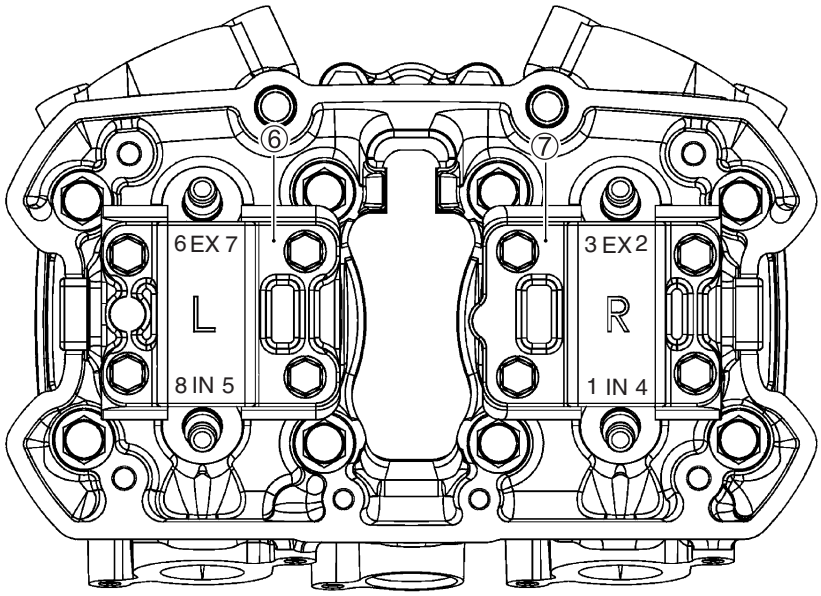


- Tighten the camshaft journal holder bolts in ascending order of numbers to the specified torque.

Camshaft journal holder bolt: 10 N·m (1.0 kgf-m, 7.0 lbf-ft)

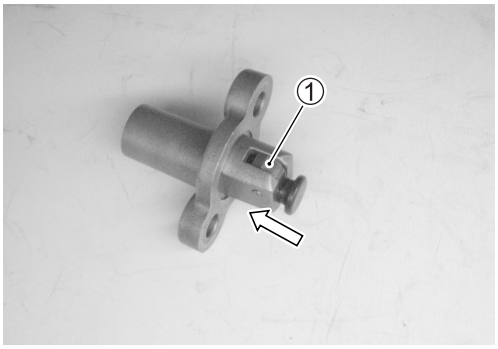
NOTICE

The camshaft journal holder bolts are made of a special material and much superior in strength, compared with other types of high strength bolts.
Take special care not to use other types of bolts.



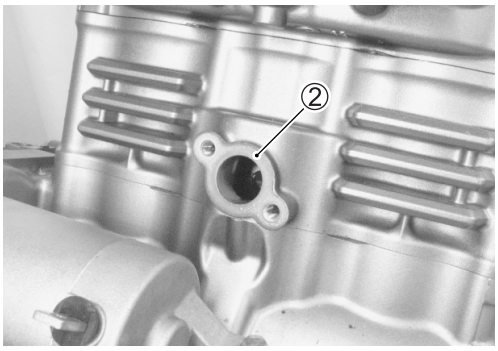
CAM CHAIN TENSION ADJUSTER

- Retract the push rod by pushing the stopper ①.



- Fit a new gasket ②.
- Install the cam chain tension adjuster ③ and tighten its mounting bolts ④.

Cam chain tension adjuster mounting bolt:
10 N·m (1.0 kgf-m, 7.0 lbf-ft)

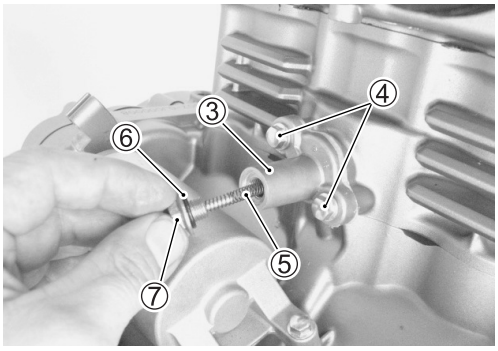


- Install the spring ⑤, new O-ring ⑥ and cam chain tension adjuster cap bolt ⑦.

NOTE:
Click sound is heard when the cam chain tension adjuster cap bolt is installed.

- Tighten the cam chain tension adjuster cap bolt ⑦ to the specified torque.

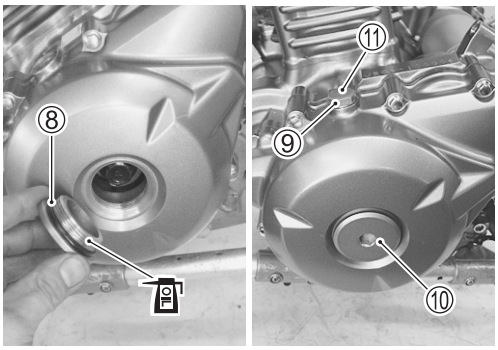
Cam chain tension adjuster cap bolt:
8 N·m (0.8 kgf-m, 6.0 lbf-ft)



- After installing the cam chain tension adjuster, rotate the crankshaft (some turns), and recheck the positions of the camshafts. (☞3-89)

- Install the new O-ring ⑧ and new gasket ⑨.
- Apply engine oil to the generator cover plug thread part.
- Tighten the generator cover plug ⑩ and valve timing inspection plug ⑪ to the specified torque.

Generator cover plug: 11 N·m (1.1 kgf-m, 8.0 lbf-ft)
Valve timing inspection plug:
21 N·m (2.1 kgf-m, 15.0 lbf-ft)

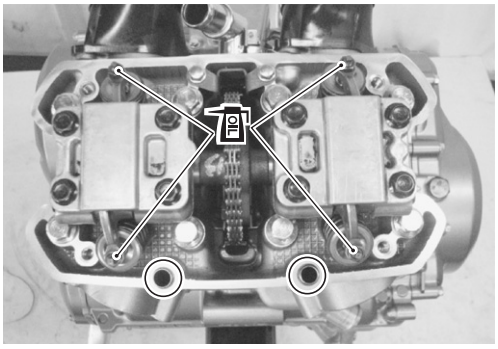


CYLINDER HEAD COVER

- Pour engine oil to valve clearance adjuster.

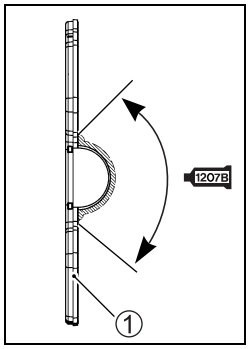
NOTE:
Be sure to check the valve clearance. (☞2-8)

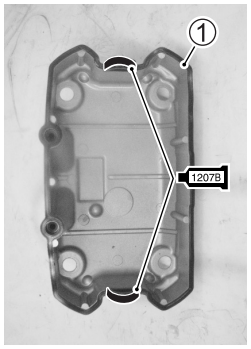
- Install the dowel pins.



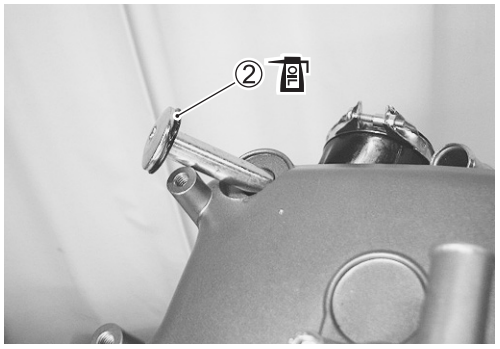
- Install new gasket ① to the cylinder head cover.
- Apply bond to the cam end caps of the gaskets as shown.

1207B 99000-31140: SUZUKI BOND No.1207B or equivalent



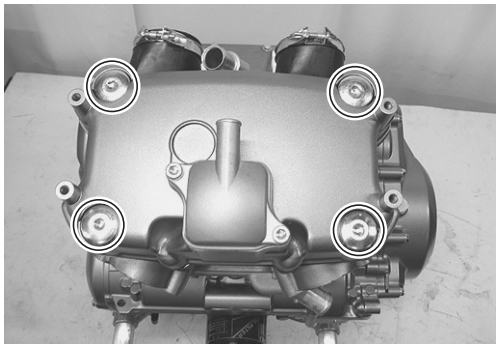


- Place the cylinder head cover on the cylinder head.
- Apply engine oil to both sides of the new gaskets ②.
- Fit a new gasket ② to each head cover bolt.



- Tighten the cylinder head cover bolts to the specified torque.

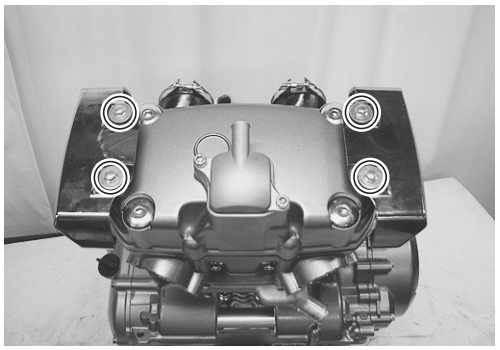
Cylinder head cover bolt:
Initial: 10 N·m (1.0 kgf-m, 7.0 lbf-ft)
Final : 14 N·m (1.4 kgf-m, 10.0 lbf-ft)



- Tighten the cylinder head cover cap bolts to the specified torque.

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

- Install the spark plug. (☞2-7)



FI SYSTEM DIAGNOSIS

CONTENTS

FI SYSTEM DIAGNOSIS

CONTENTS

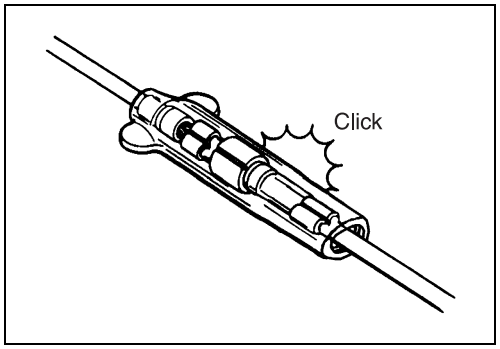
PRECAUTIONS IN SERVICING

When handling the component parts or servicing the FI system, observe the following points for the safety of the system.

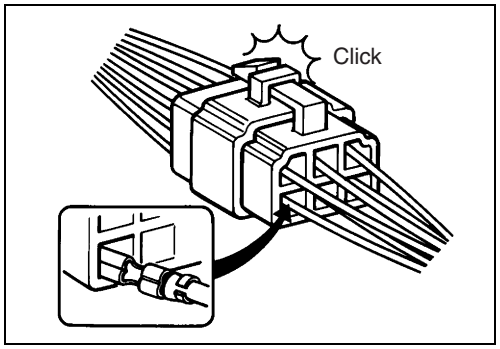
ELECTRICAL PARTS

CONNECTOR/COUPLER

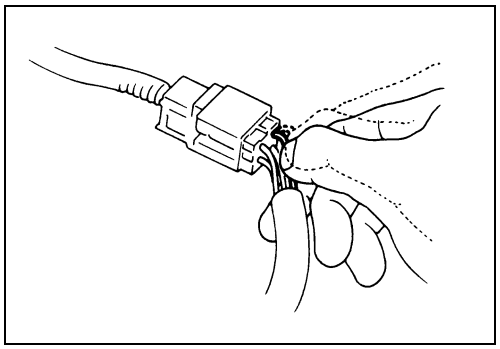
- Faulty FI system is often related to poor electrical contact of connector/coupler. Before servicing individual electronic part, check electrical contact of connector/coupler.
- When connecting a connector, be sure to push it in until a click is felt.



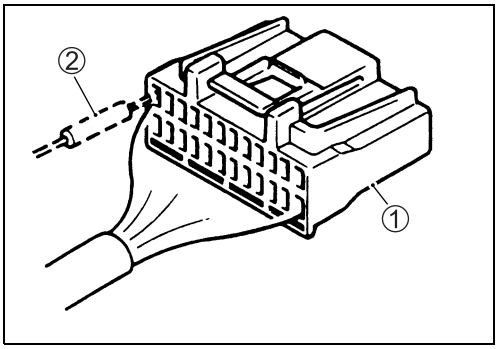
- With a lock type coupler, be sure to release the lock when disconnecting, and push in fully to engage the lock when connecting.
- When disconnecting the coupler, be sure to hold the coupler body and do not pull the lead wires.
- Inspect each terminal on the connector/coupler for looseness or bending.
- Push in the coupler straightly. An angled or skewed insertion may cause the terminal to be deformed, possibly resulting in poor electrical contact.
- Inspect each terminal for corrosion and contamination. The terminals must be clean and free of any foreign material which could impede proper terminal contact.
- Before refitting the sealed coupler, make sure its seal rubber is positioned properly. The seal rubber may possibly come off the position during disconnecting work and if the coupler is refitted with the seal rubber improperly positioned, it may result in poor water sealing.



- Inspect each lead wire circuit for poor connection by shaking it by hand lightly. If any abnormal condition is found, repair or replace.

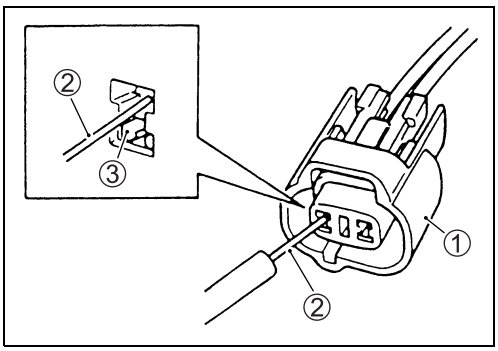


- When taking measurements at electrical connectors using a tester probe, be sure to insert the probe from the wire harness side (rear) of the connector/coupler.



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.

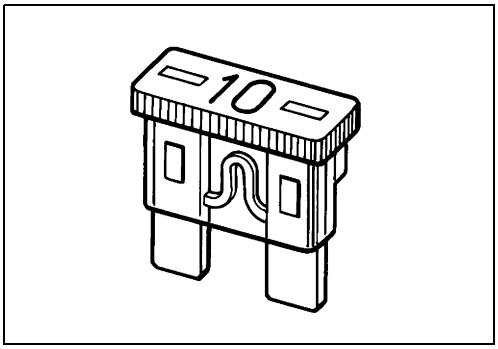


① Coupler
② Probe
③ Where male terminal fits

- Avoid applying grease or other similar material to connector/coupler terminals to prevent electric trouble.

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.

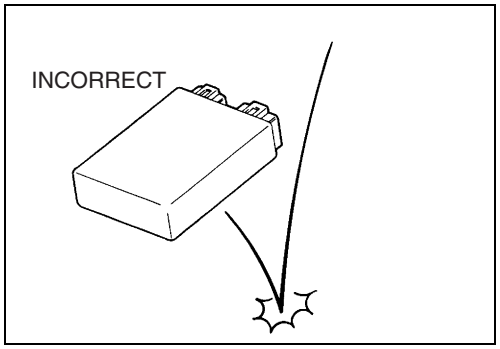


SWITCH

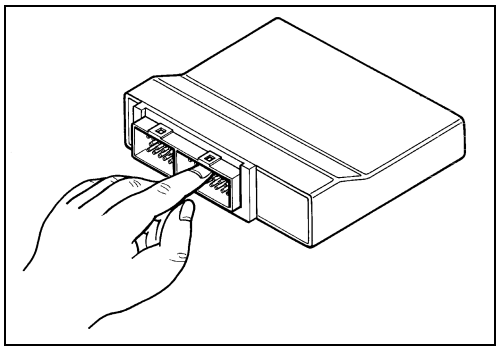
- Never apply grease material to switch contact points to prevent damage.

ECM/VARIOUS SENSORS

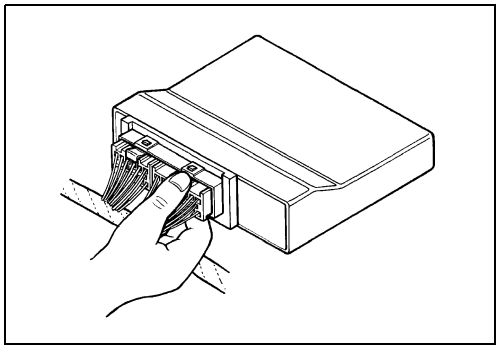
- Since each component is a high-precision part, great care should be taken not to apply any severe impacts during removal and installation.



- Be careful not to touch the electrical terminals of the electronic parts (ECM, etc.). The static electricity from your body may damage them.

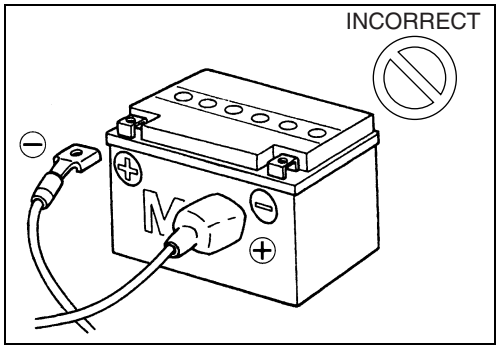


- When disconnecting and connecting the coupler, make sure to turn OFF the ignition switch, or electronic parts may get damaged.

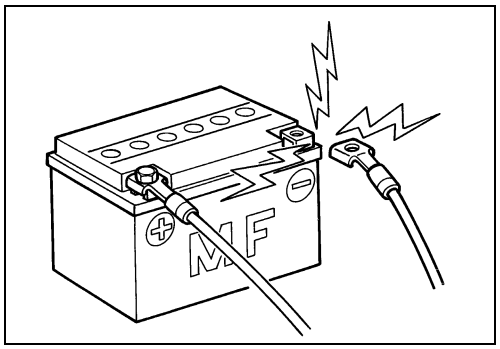


BATTERY

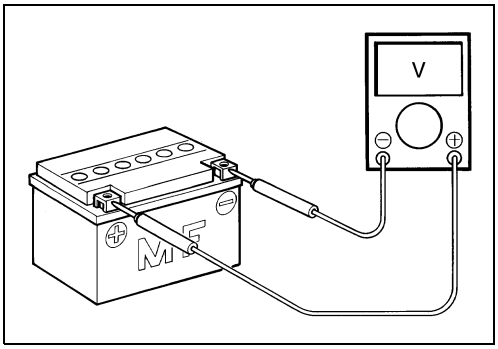
- Battery connection in reverse polarity is strictly prohibited.
  Such a wrong connection will damage the components of the FI system instantly when reverse power is applied.



- 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 electronic unit 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 electronic unit when its coupler is disconnected. Otherwise, damage to electronic unit may result.
- Never connect an ohmmeter to the electronic unit 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.

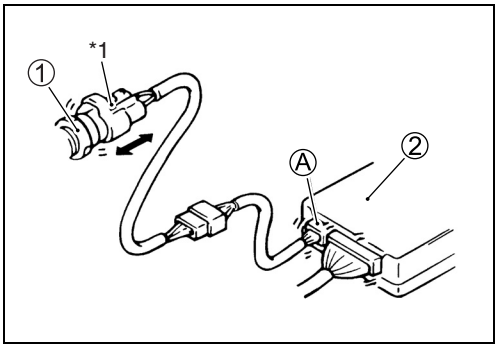
OPEN CIRCUIT CHECK

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.

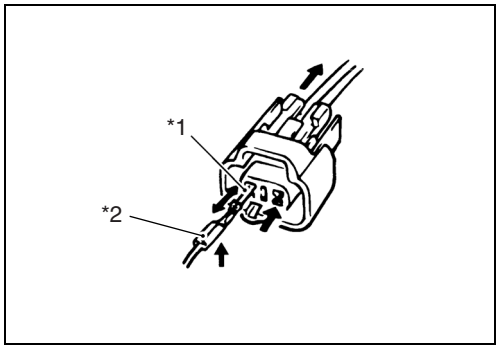
When checking system circuits including an electronic control unit such as ECM, etc., it is important to perform careful check, starting with items which are easier to check.

- 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.

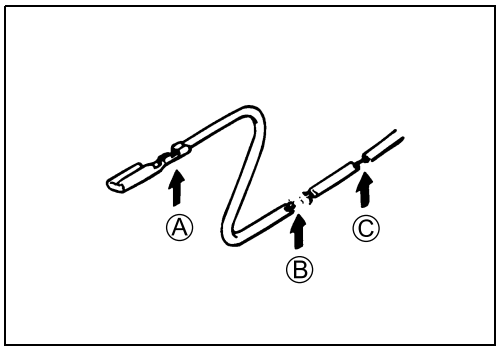


① Sensor
② ECM
*1 Check for loose connection.

- 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.



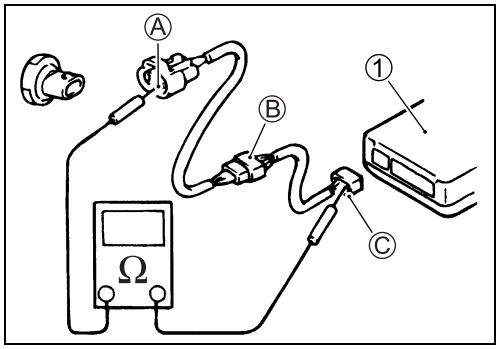
- Using continuity inspect or voltage check procedure as described below, inspect the wire harness terminals for open circuit and poor connection. Locate abnormality, if any.



Ⓐ Looseness of crimping
Ⓑ Open
Ⓒ Thin wire (a few strands left)

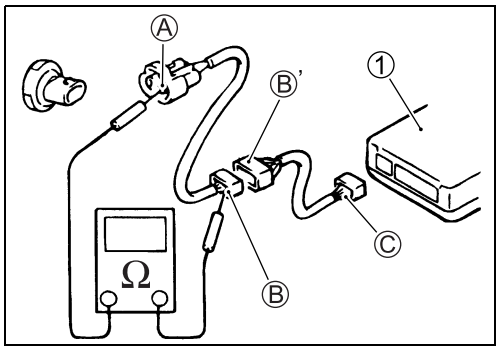
Continuity check

- Measure resistance across coupler Ⓑ (between Ⓐ and Ⓒ in the figure).
  If no continuity is indicated (infinity or over limit), the circuit is open between terminals Ⓐ and Ⓒ.



① ECM

- Disconnect the coupler Ⓑ and measure resistance between couplers Ⓐ and Ⓑ.
  If no continuity is indicated, the circuit is open between couplers Ⓐ and Ⓑ. If continuity is indicated, there is an open circuit between couplers Ⓑ' and Ⓒ or an abnormality in coupler Ⓑ' or coupler Ⓒ.



① ECM

VOLTAGE CHECK

If voltage is supplied to the circuit being checked, voltage check can be used as circuit check.

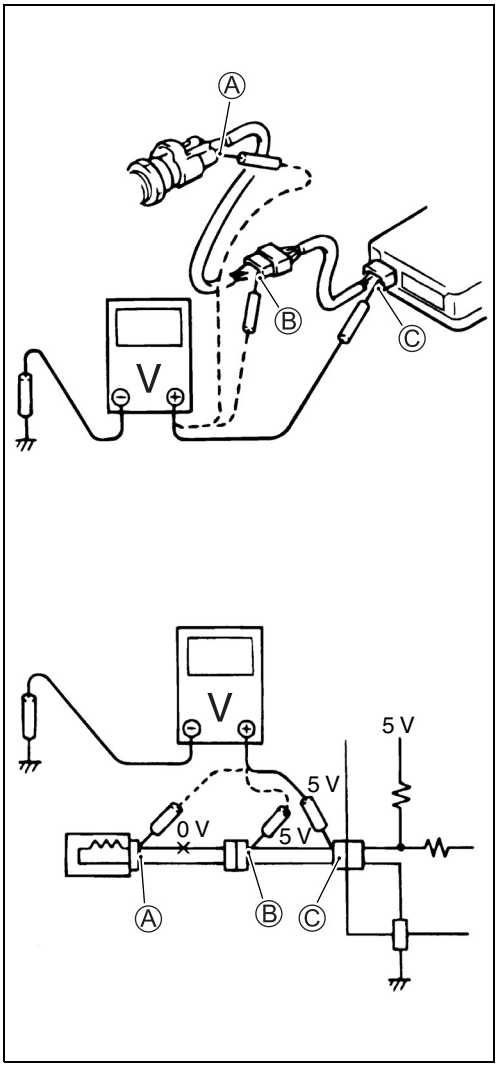
- With all connectors/couplers connected and voltage applied to the circuit being checked, measure voltage between each terminal and body ground.

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 Ⓐ and Ⓑ.

Voltage Between:
Ⓐ and body ground: Approx. 5 V
Ⓑ and body ground: Approx. 5 V
Ⓒ 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 Ⓐ and Ⓑ.

Voltage Between:
Ⓐ and body ground: Approx. 5 V
Ⓑ and body ground: Approx. 5 V — 2 V voltage drop
Ⓒ and body ground: 3 V

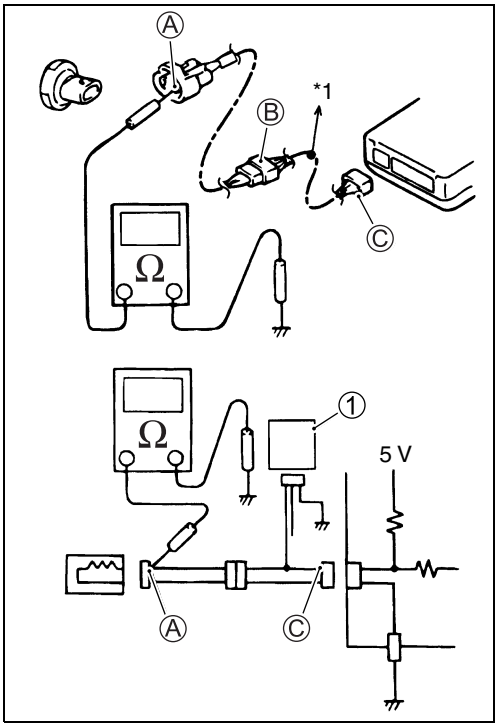


SHORT CIRCUIT CHECK (WIRE HARNESS TO GROUND)

- Disconnect the negative ⊖ cable from the battery.
- Disconnect the connectors/couplers at both ends of the circuit to be checked.

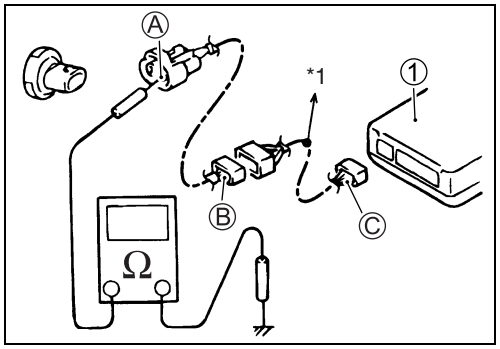
NOTE:
If the circuit to be checked branches to other parts ① as shown, disconnect all connectors/couplers of those parts. Otherwise, diagnosis will be misled.

- Measure resistance between terminal at one end of circuit (Ⓐ terminal in figure) and body ground. If continuity is indicated, there is a short circuit to ground between terminals Ⓐ and Ⓒ.



① Other parts
*1 To other parts

- Disconnect the connector/coupler included in circuit (coupler Ⓑ) and measure resistance between terminal Ⓐ and body ground.
  If continuity is indicated, the circuit is shorted to the ground between terminals Ⓐ and Ⓑ.

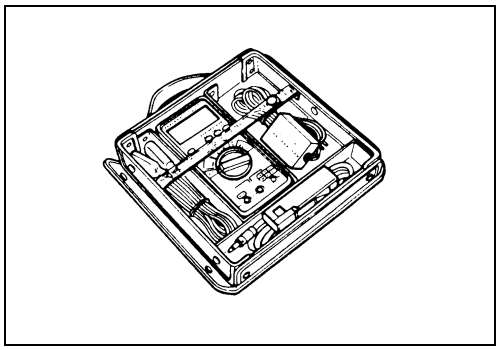


① ECM
*1 To other parts

USING THE MULTI CIRCUIT TESTER

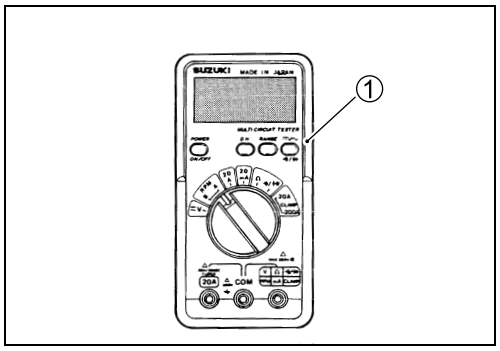
- Use the Suzuki multi circuit tester set.
- Use well-charged batteries in the tester.
- Be sure to set the tester to the correct testing range.

TOOL 09900-25008: Multi circuit tester set



USING THE TESTER

- Incorrectly connecting the ⊕ and ⊖ 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 MΩ 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.



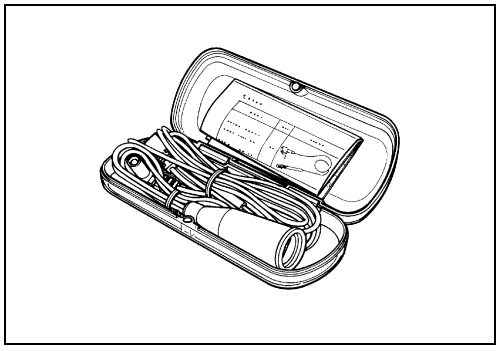
TOOL 09900-25008: Multi circuit tester set

NOTE:

** When connecting the multi circuit tester, use the needle-point probe to the back side of the lead wire coupler and connect the probes of tester to them.*

** Use the needle-point probe to prevent the rubber of the water proof coupler from damage.*

** When using the multi circuit tester, do not strongly touch the terminal of the ECM coupler with a needle-point tester probe to prevent the terminal damage.*

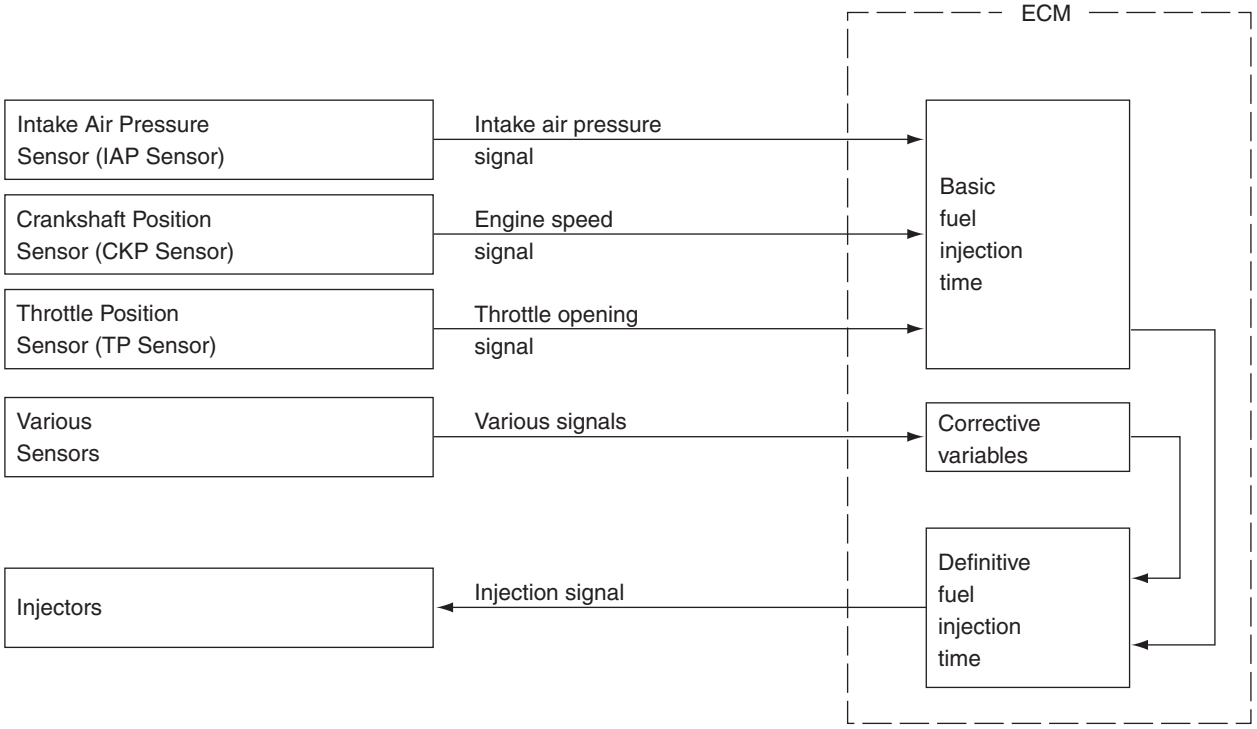


TOOL 09900-25009: Needle-point probe set

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)

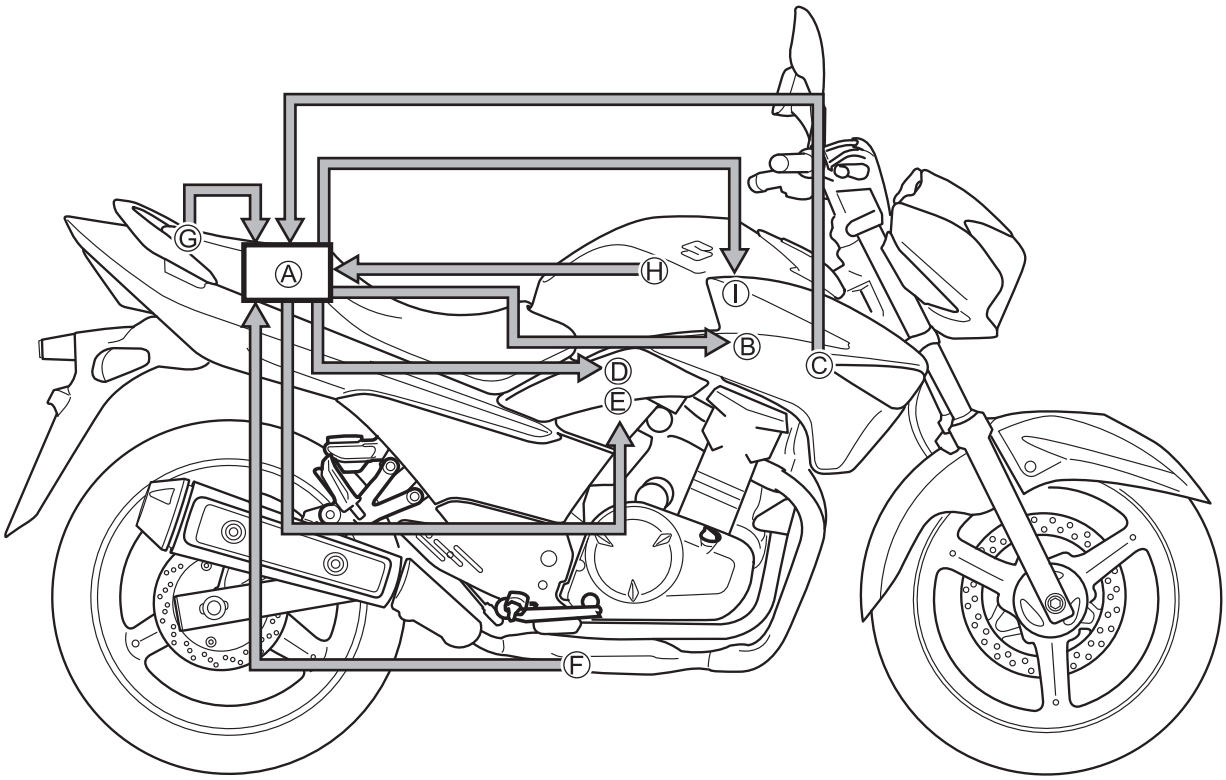
The following different signals are output from the respective sensors for compensation of the fuel injection time (volume).

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.
HEATED OXYGEN SENSOR SIGNAL	Air/fuel ratio is compensated to the theoretical ratio from density of oxygen in exhaust gas. The compensation occurs in such a way that more fuel is supplied if detected air/fuel ratio is lean and less fuel is supplied if it is rich.
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 SPEED 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.

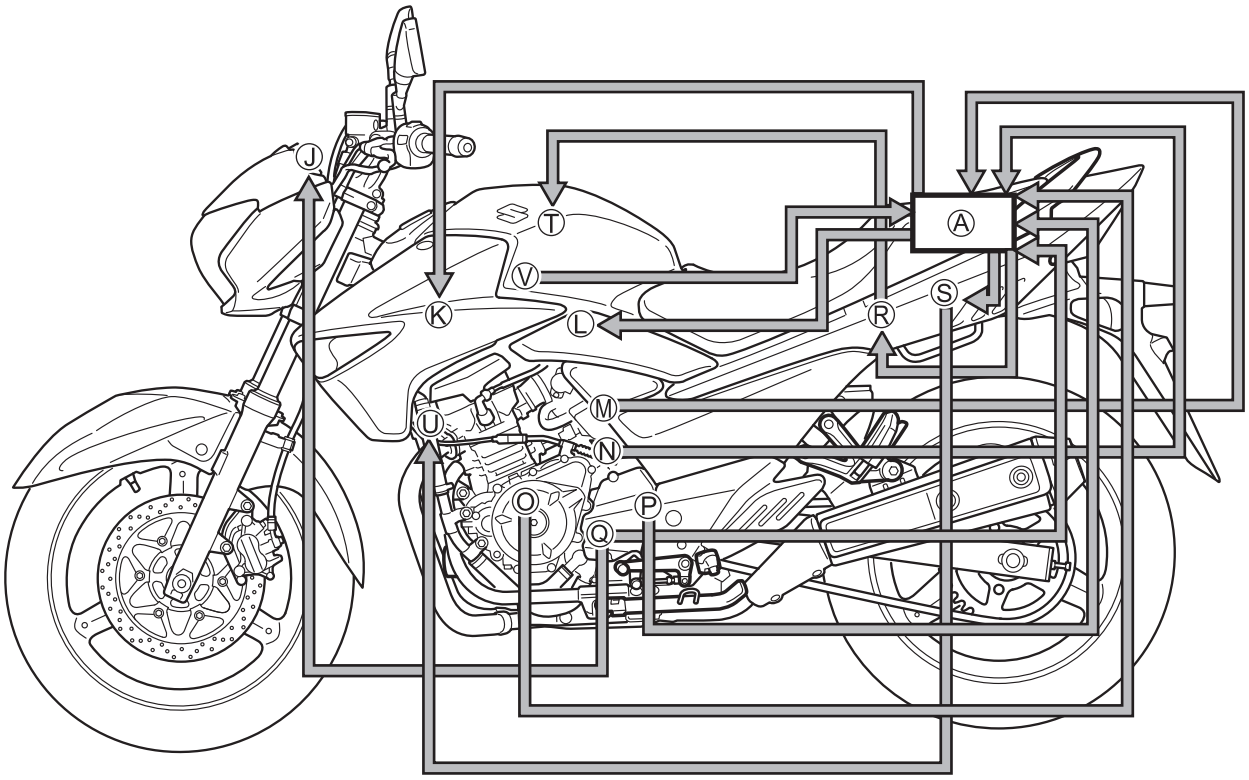
INJECTION STOP CONTROL

SIGNAL	DESCRIPTION
TIP-OVER SENSOR SIGNAL (FUEL SHUT-OFF)	When the motorcycle tips over, the tip-over sensor sends a signal to the ECM. Then, this signal cuts OFF current supplied to the fuel pump, fuel injectors and ignition coils.
OVER-REV. LIMITER SIGNAL	The fuel injectors stop operation when engine rpm reaches rev. limit rpm. The fuel cut-off circuit is incorporated in this ECM in order to prevent over-running of engine. When engine speed reaches 11 400 r/min, this circuit cuts off fuel at the fuel injectors. But under no load, the clutch lever is pulled or the gear position is in neutral, this circuit cuts off fuel when engine speed reaches 10 800 r/min. ***NOTICE*** **Under no load, the engine can run over 11 000 r/min through the fuel cut-off circuit is effective, which may possibly cause engine damage. Do not run the engine without load over 11 000 r/min at anytime.**

FI SYSTEM PARTS LOCATION

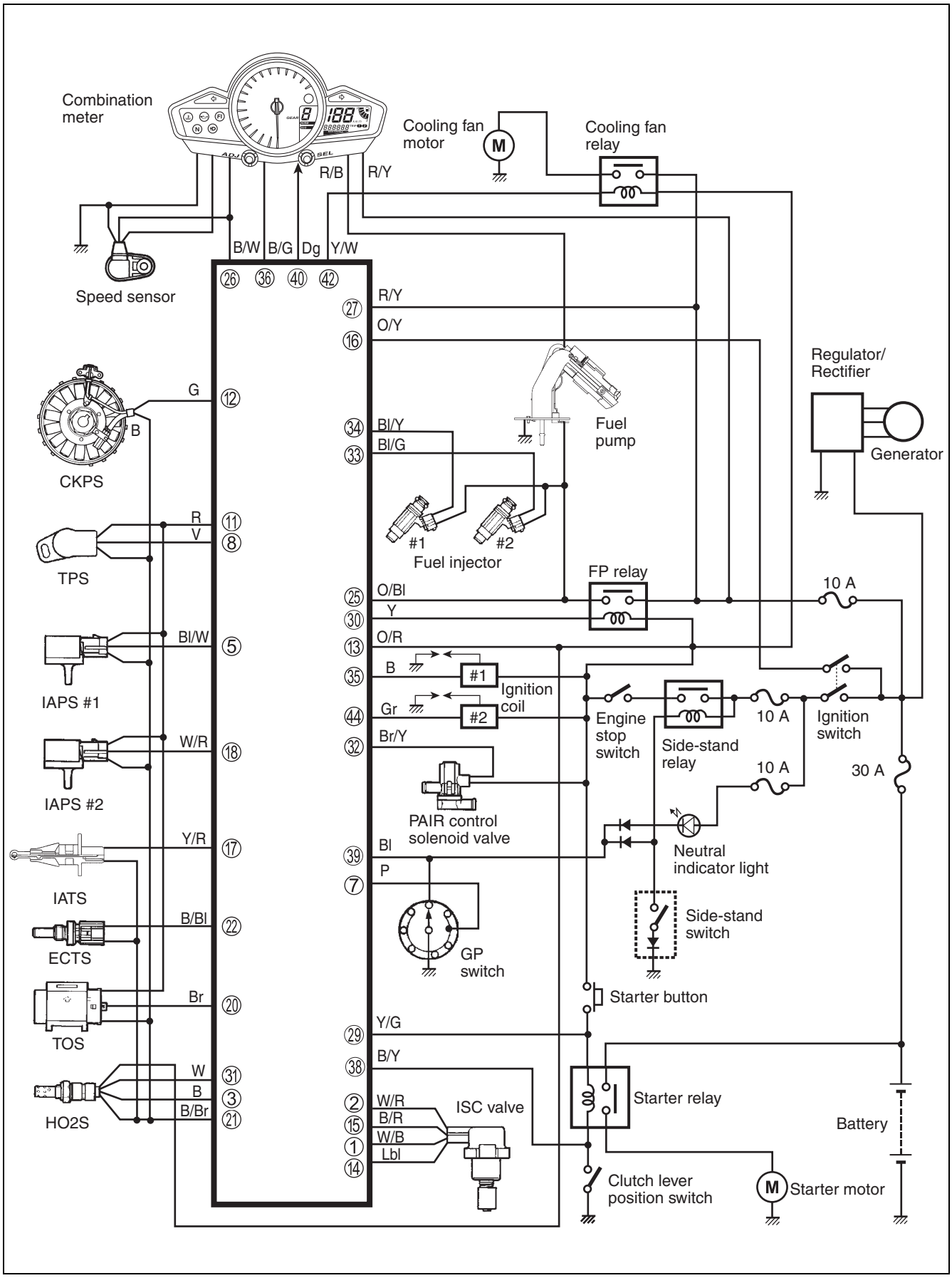


Ⓐ ECM
Ⓑ Ignition coil #2 (IG coil #2)
Ⓒ Engine coolant temperature sensor (ECTS)
Ⓓ Fuel injector #2
Ⓔ Idle speed control valve (ISC valve)
Ⓕ Heated oxygen sensor (HO2S)
Ⓖ Tip-over sensor (TOS)
Ⓗ Intake air pressure sensor #2 (IAPS #2)
Ⓘ PAIR control solenoid valve

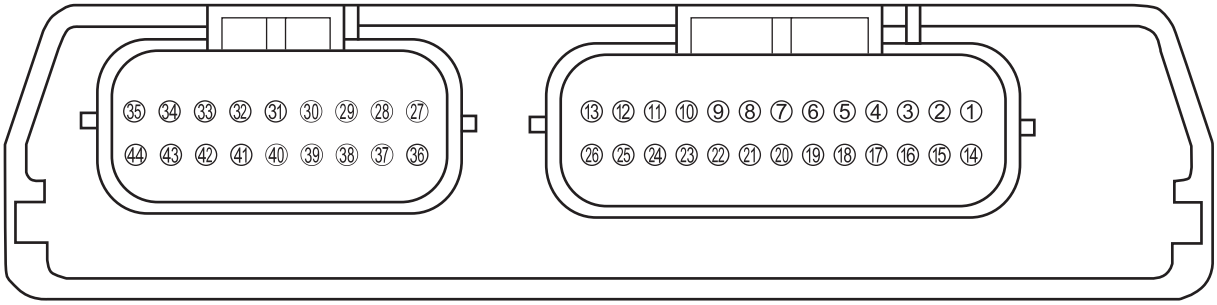


Ⓐ ECM
Ⓙ Combination meter
Ⓚ Ignition coil #1 (IG coil #1)
Ⓛ Fuel injector #1
Ⓜ Throttle position sensor (TPS)
Ⓝ Intake air temperature sensor (IATS)
Ⓞ Crankshaft position sensor (CKPS)
Ⓟ Gear position switch (GP switch)
Ⓠ Speed sensor
Ⓡ Fuel pump relay (FP relay)
Ⓢ Cooling fan relay
Ⓣ Fuel pump (FP)
Ⓤ Cooling fan
Ⓥ Intake air pressure sensor #1 (IAPS #1)

FI SYSTEM WIRING DIAGRAM



ECM TERMINAL



TERMINAL NO.	CIRCUIT	TERMINAL NO.	CIRCUIT
①	ISC valve signal (ISC 2A)	㉓	—
②	ISC valve signal (ISC 1A)	㉔	Serial data for self-diagnosis
③	HO2 sensor (HO2S)	㉕	Power source for fuel injectors (VM)
④	—	㉖	ECM ground (E1)
⑤	IAP sensor signal #1 (IAPS #1)	㉗	Power source for back-up (BATT)
⑥	—	㉘	Mode selection switch
⑦	Gear position switch signal (GP)	㉙	Starter switch
⑧	TP sensor signal (TPS)	㉚	Fuel pump relay (FP relay)
⑨	—	㉛	HO2 sensor heater (HO2SH)
⑩	—	㉜	PAIR control solenoid (PAIR)
⑪	Power source for sensors (VCC)	㉝	Fuel injector #2 (#2)
⑫	CKP sensor (CKPS+)	㉞	Fuel injector #1 (#1)
⑬	Power source (+B)	㉟	Ignition coil #1 (IG #1)
⑭	ISC valve signal (ISC 2B)	㊱	Tachometer
⑮	ISC valve signal (ISC 1B)	㊲	—
⑯	Ignition switch signal	㊳	Clutch lever switch
⑰	IAT sensor signal (IATS)	㊴	Neutral signal
⑱	IAP sensor signal #2 (IAPS #2)	㊵	Serial data for combination meter
⑲	—	㊶	—
⑳	TO sensor signal (TOS)	㊷	Cooling fan relay (FAR)
㉑	Sensor ground (E2)	㊸	Ignition system ground (E03)
㉒	ECT sensor signal (ECTS)	㊹	Ignition coil #2 (IG #2)

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 (DISPLAY) panel and LED (FI indicator light). To check the function of the individual FI system devices, the dealer mode is provided. In this check, the special tool is necessary to read the code of the malfunction items.

USER MODE

MALFUNCTION	LCD (DISPLAY) Ⓐ INDICATION	FI INDICATOR LIGHT Ⓑ INDICATION	INDICATION MODE
“NO”	Odo/Trip/Clock	—	—
“YES”	Odo/Trip/Clock and “FI” letters	FI indicator light turns ON.	Each 2 sec. Odo/Trip/Clock or “FI” is indicated.
Engine can start	*1		
Engine can not start	“FI” letter *2	FI indicator light turns ON and blinks.	“FI” is indicated continuously.

*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” and Odo/Trip/Clock are indicated in the LCD panel and motorcycle can run.

*2

The injection signal is stopped, when the crankshaft position sensor signal, tip-over sensor signal, #1 and #2 ignition signals, #1 and #2 injector signals, fuel pump relay signal or ignition switch signal is not sent to ECM. In this case, “FI” is indicated in the LCD panel. Motorcycle 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”.

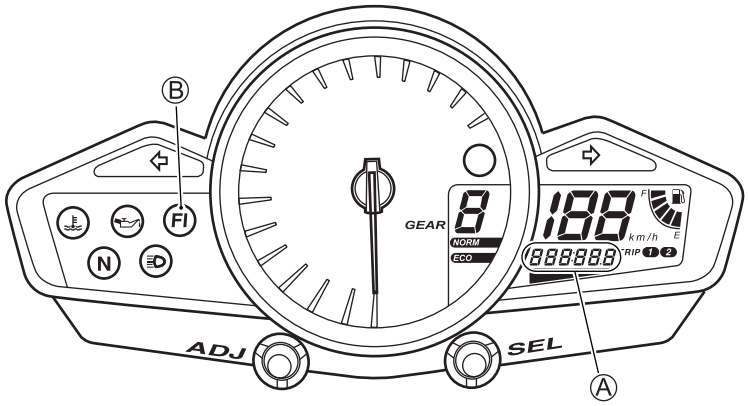
If CHEC is indicated, the LCD does not indicate the trouble code. It is necessary to check the wiring harness between ECM and combination meter couplers.

The possible cause of this indication is as follows;

Engine stop switch is in OFF position. Side-stand/ignition inter-lock system is not working. Ignition fuse is burnt.

NOTE:

The FI indicator light Ⓑ turn ON about 3 seconds after turning the ignition switch ON.



DEALER MODE

The defective function is memorized in the computer. Use the special tool's coupler to connect to the mode selection switch. 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.

TOOL 09930-82720: Mode selection switch

NOTE:
Before checking the malfunction code, do not disconnect the ECM lead wire coupler.
If the coupler from the ECM is disconnected, the malfunction code memory is erased and the malfunction code can not be checked.

MALFUNCTION	LCD (DISPLAY) INDICATION	FI INDICATOR LIGHT INDICATION	INDICATION MODE
"NO"	C00	FI indicator light turns OFF.	—
"YES"	C**code is indicated from small numeral to large one.		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 #2 (IAPS #2)	For #2 cylinder
C14	Throttle position sensor (TPS)	*1
C15	Engine coolant temperature sensor (ECTS)	
C17	Intake air pressure sensor #1 (IAPS #1)	For #1 cylinder
C21	Intake air temperature sensor (IATS)	
C23	Tip-over sensor (TOS)	
C24	Ignition signal #1 (IG coil #1)	For #1 cylinder
C25	Ignition signal #2 (IG coil #2)	For #2 cylinder
C31	Gear position signal (GP switch)	
C32	Injector signal #1 (FI #1)	For #1 cylinder
C33	Injector signal #2 (FI #2)	For #2 cylinder
C40	Idle speed control valve (ISC valve)	
C41	Fuel pump control system (FP control system), ECM/PCM power input signal	Fuel pump, Fuel pump relay
C42	Ignition switch signal	Anti-theft
C44	Heated Oxygen sensor (HO2S)	
C49	PAIR control solenoid valve	
C60	Cooling fan control system	Cooling fan relay
C65	Idle speed control system	

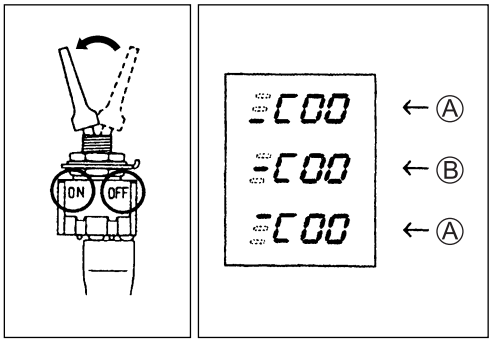
In the LCD (DISPLAY) panel, the malfunction code is indicated from small code to large code.

*1

To get the proper signal from the throttle position sensor, the sensor basic position is indicated in the LCD (DISPLAY) panel. The malfunction code is indicated in three digits. In front of the three digits, a line appears in any of the three positions, upper, middle or lower line. If the indication is upper or lower line when engine speed is 1 400 r/min, slightly turn the throttle position sensor and bring the line to the middle.

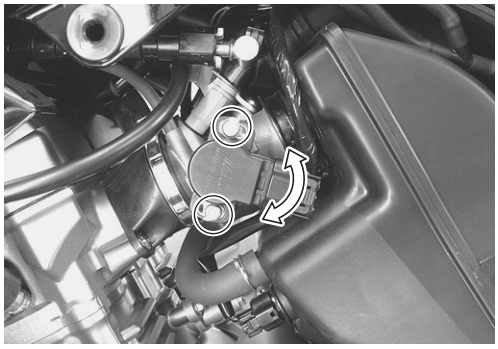
TPS ADJUSTMENT

1. Connect the special tool (Mode selection switch) to the mode select coupler. (☞4-23)
2. Warm up the engine and keep it running in idling speed.
3. Turn the mode selection switch ON.
4. Check the position of the bar in the left of C code displayed on the LCD panel.



Ⓐ Incorrect position
Ⓑ Correct position

5. If the TP sensor adjustment is necessary, remove the left frame front cover. (☞8-4)
6. Loosen the TP sensor mounting screws using the torx® wrench (T25H) and turn the TP sensor to bring the bar to the correct position.
7. Tighten the TP sensor mounting screws.



TOOL 09930-11950: Torx® wrench (T25H)
09930-82720: Mode selection switch

FAIL-SAFE FUNCTION

FI system is provided with fail-safe function to allow the engine to start and the motorcycle 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 101 kPa (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). Cooling fan is fixed on position.	"YES"	"YES"
IAT sensor	Intake air temperature value is fixed to 40 °C (104 °F).	"YES"	"YES"
Ignition signal	#1 fuel-cut	"YES"	"YES"
		#2 cylinder can run.	
	#2 fuel-cut	"YES"	"YES"
		#1 cylinder can run.	
Injection signal	—	"YES"	"YES"
		#2 cylinder can run.	
	—	"YES"	"YES"
		#1 cylinder can run.	
Gear position signal	Gear position signal is fixed to 6th gear.	"YES"	"YES"
HO2 sensor	Feedback compensation is inhibited. (Air/fuel ratio is fixed to normal.)	"YES"	"YES"
PAIR control solenoid valve	ECM stops controlling PAIR control solenoid valve.	"YES"	"YES"
ISC valve	When motor disconnection or lock occurs, power from ECM is shut off.	"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 motorcycle to the workshop for complete repair.

When two ignition signals or two injector signals are not received by ECM, the fail-safe circuit can not work and ignition/injection is stopped.

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 such an inspection form such as following will facilitate collecting information to the point 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**	☐ **Poor Driveability**
☐ No cranking	☐ Hesitation on acceleration
☐ No initial combustion	☐ Back fire/☐ After fire
☐ No combustion	☐ Lack of power
☐ Poor starting at	☐ Surging
(☐ cold ☐ warm ☐ always)	☐ Abnormal knocking
☐ Other _____	☐ Engine rpm jumps briefly
	☐ Other _____
☐ **Poor Idling**	☐ **Engine Stall when**
☐ Poor fast Idle	☐ Immediately after start
☐ Abnormal idling speed	☐ Throttle valve is opened
(☐ High ☐ Low) (r/min)	☐ Throttle valve is closed
☐ Unstable	☐ Load is applied
☐ Hunting (r/min to r/min)	☐ Other _____
☐ Other _____	
☐ OTHERS:	

MOTORCYCLE/ENVIRONMENTAL CONDITION WHEN PROBLEM OCCURS	
Environmental condition	
Weather Temperature Frequency	☐ Fair ☐ Cloudy ☐ Rain ☐ Snow ☐ Always ☐ Other _____ ☐ Hot ☐ Warm ☐ Cool ☐ Cold (°C/ °F) ☐ Always ☐ Always ☐ Sometimes (times/ day, month) ☐ Only once ☐ Under certain condition
Road	☐ Urban ☐ Suburb ☐ Highway ☐ Mountainous (☐ Uphill ☐ Downhill) ☐ Tarmacadam ☐ Gravel ☐ Other _____
Motorcycle condition	
Engine condition	☐ Cold ☐ Warming up phase ☐ Warmed up ☐ Always ☐ Other at starting ☐ Immediately after start ☐ Racing without load ☐ Engine speed (r/min)
Motorcycle condition	During driving: ☐ Constant speed ☐ Accelerating ☐ Decelerating ☐ Right hand corner ☐ Left hand corner ☐ At stop ☐ Motorcycle speed when problem occurs (km/h, mile/h) ☐ Other _____

NOTE:
The form is a standard sample. The form should be modified according to conditions and characteristics of each market.

VISUAL INSPECTION

Prior to diagnosis using the mode selection 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 selection switch or SDS.

* Engine oil level and leakage (☞2-11)
* Engine coolant level and leakage (☞2-15)
* Fuel level and leakage (☞9-31 and 2-12)
* Clogged air cleaner element (☞2-4)
* Battery condition (☞9-9)
* Throttle cable play (☞2-13)
* Vacuum hose looseness, bend and disconnection
* Broken fuse
* FI indicator light operation (☞4-16)
* Each warning light operation (☞9-26)
* Combination meter operation (☞9-26)
* Exhaust gas leakage and noise (☞6-3)
* Each coupler disconnection
* Clogged radiator fins (☞7-8)

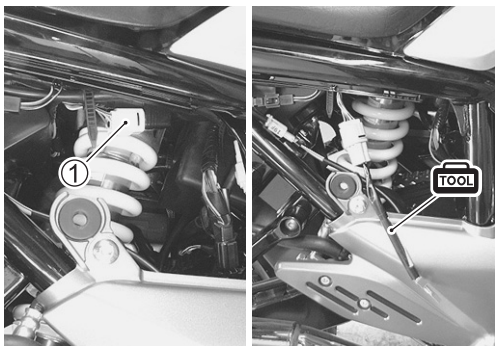
SELF-DIAGNOSTIC PROCEDURES

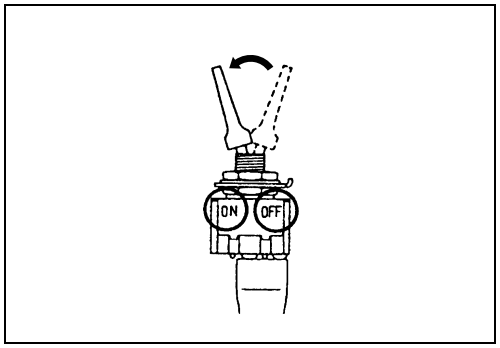
NOTE:

* *Do not disconnect the couplers from ECM, battery cable from battery, ECM ground wire from engine or main fuse before confirming the DTC (Diagnostic Trouble Code) stored in memory. Such disconnection will erase the memorized information in ECM memory.*
* *DTC stored in ECM memory can be checked by the special tool.*
* *Before checking DTC, read SELF-DIAGNOSIS FUNCTION "USER MODE and DEALER MODE" (☞4-16 and -17) carefully to have good understanding as to what functions are available and how to use it.*
* *Be sure to read "PRECAUTIONS IN SERVICING" (☞4-3) before inspection and observe what is written there.*

- Remove the right frame cover. (☞8-4)
- Connect the special tool to the mode select coupler ① and start the engine or crank the engine for more than 4 seconds.
- Turn the special tool's switch ON and check the DTC to determine the malfunction part. (☞4-27)

TOOL 09930-82720: Mode selection switch





SELF-DIAGNOSIS RESET PROCEDURE

After repairing the trouble, turn OFF the ignition switch and turn ON again. If the DTC is indicates (C00), the malfunction is cleared.

NOTE:

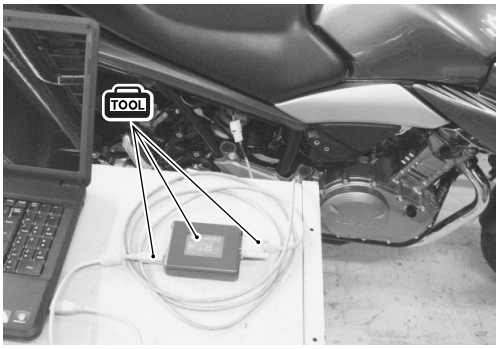
* *Even though DTC (C00) is indicated, the previous malfunction history DTC still remains stored in the ECM. Therefore, erase the history DTC memorized in the ECM using SDS.*
* *DTC is memorized in the ECM also when the lead wire coupler of any sensor is disconnected. Therefore, when a lead wire coupler has been disconnected at the time of diagnosis, erase the stored history DTC using SDS. (☞4-25)*

USE OF SDS DIAGNOSTIC PROCEDURES

NOTE:

* *Do not disconnect the couplers from ECM, battery cable from battery, ECM ground wire from the engine or main fuse before confirming the DTC (Diagnostic Trouble Code) stored in memory. Such disconnection will erase the memorized information in ECM memory.*
* *DTC stored in ECM memory can be checked by SDS.*
* *Be sure to read "PRECAUTIONS IN SERVICING" (☞4-3) before inspection and observe what is written there.*

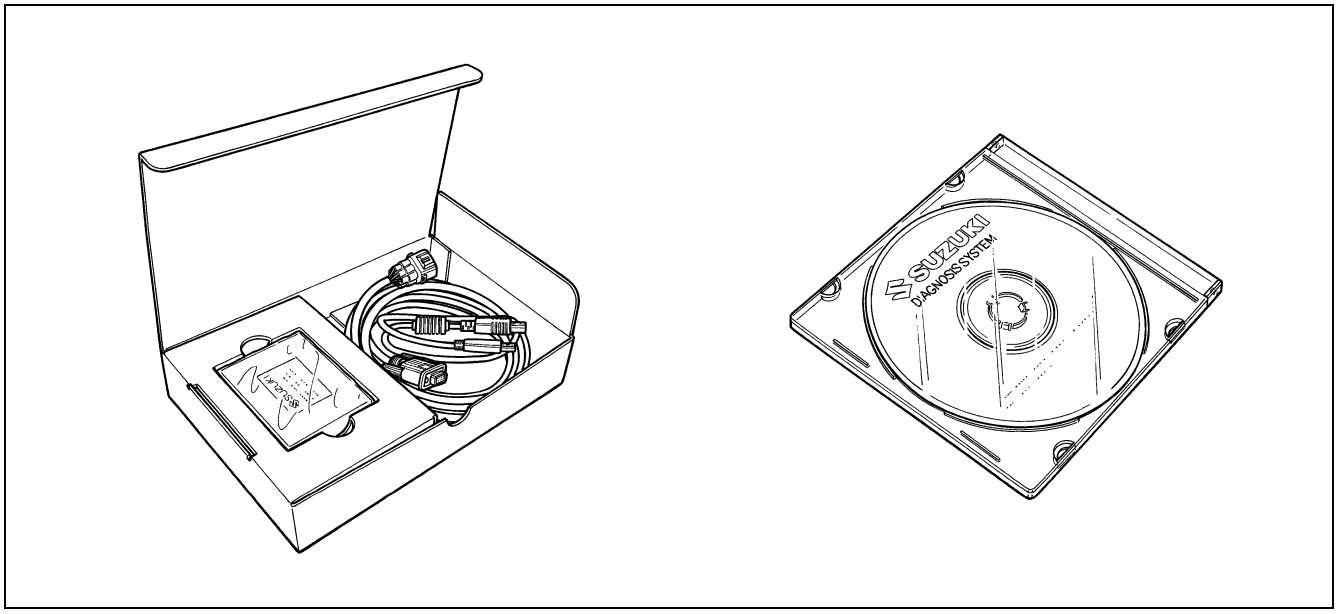
- Remove the right frame cover. (☞8-4)
- Connect the mode select coupler and set up the SDS tools. (☞4-24 and refer to the SDS operation manual for further details.)
- Click the DTC inspection button. (☞4-25)
- Start the engine or crank the engine for more than 4 seconds and check the DTC to determine the malfunction part. (☞4-27)



NOTE:

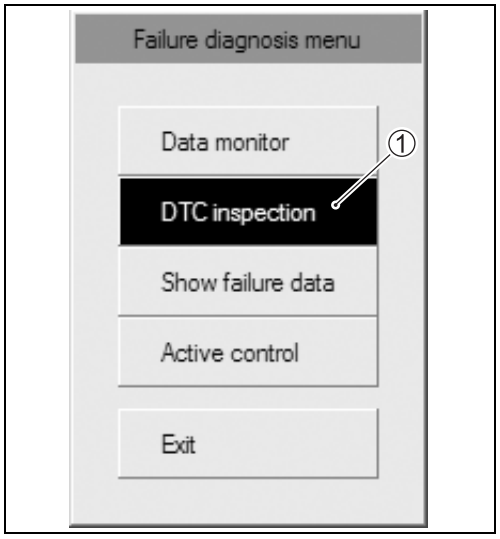
* *Read the DTC (Diagnostic Trouble Code) and show failure data when trouble (displaying data at the time of DTC) according to instructions displayed on SDS.*
* *SDS is not only used for detecting DTC but also for reproducing and checking on screen the failure condition as described by customers using the trigger.*
* *How to use trigger, refer to the SDS operation manual for further details.*

TOOL 09904-41010: SUZUKI Diagnostic system set
99565-01010-028: CD-ROM Ver.28



- After repairing the trouble, clear to delete history code (past DTC). (☞4-25)

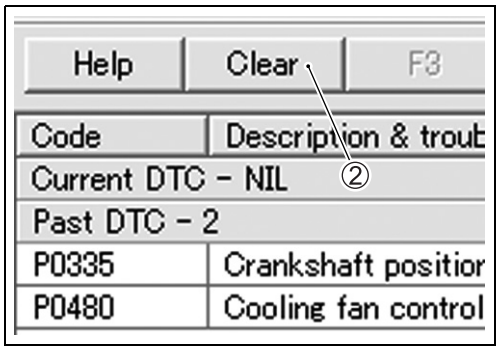
USE OF SDS DIAGNOSIS RESET PROCEDURE



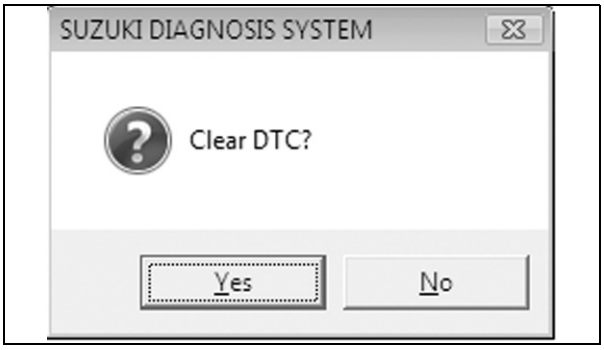
- After repairing the trouble, turn OFF the ignition switch and turn ON again.
- Click the DTC inspection button ①.
- Check the DTC.
- The previous malfunction history code (Past DTC) still remains stored in the ECM. Therefore, erase the history code memorized in the ECM using SDS tool.

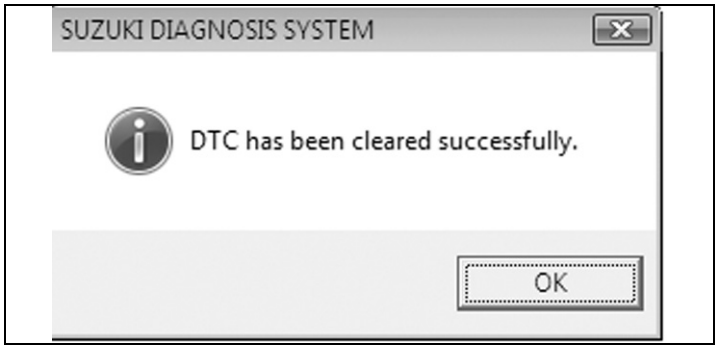
NOTE:
The malfunction code is memorized in the ECM also when the wire coupler of any sensor is disconnected. Therefore, when a wire coupler has been disconnected at the time of diagnosis, erase the stored malfunction history code using SDS.

- Click “Clear” ② to delete history code (Past DTC).



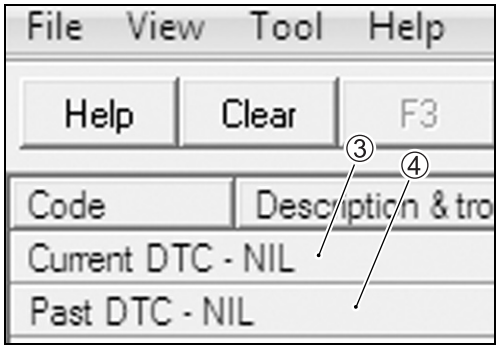
- Follow the displayed instructions.





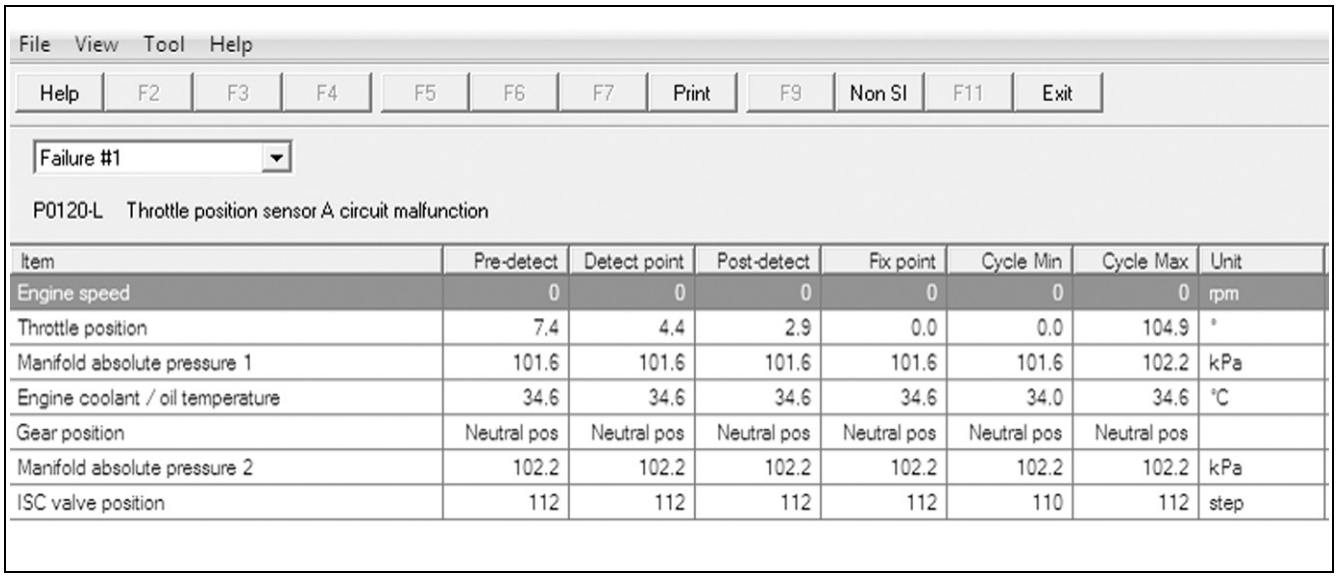
- Check that both “Current DTC” ③ and “Past DTC” ④ are deleted (NIL).

NOTE:
The clear of past DTC is automatically started after the ignition switch is turned OFF.



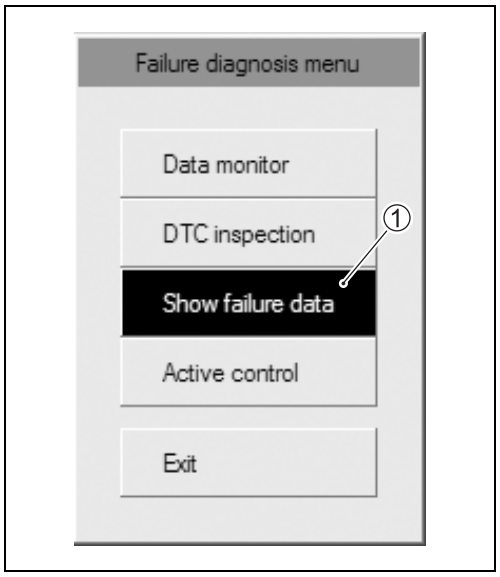
SHOW FAILURE DATA (DISPLAYING DATA AT THE TIME OF DTC)

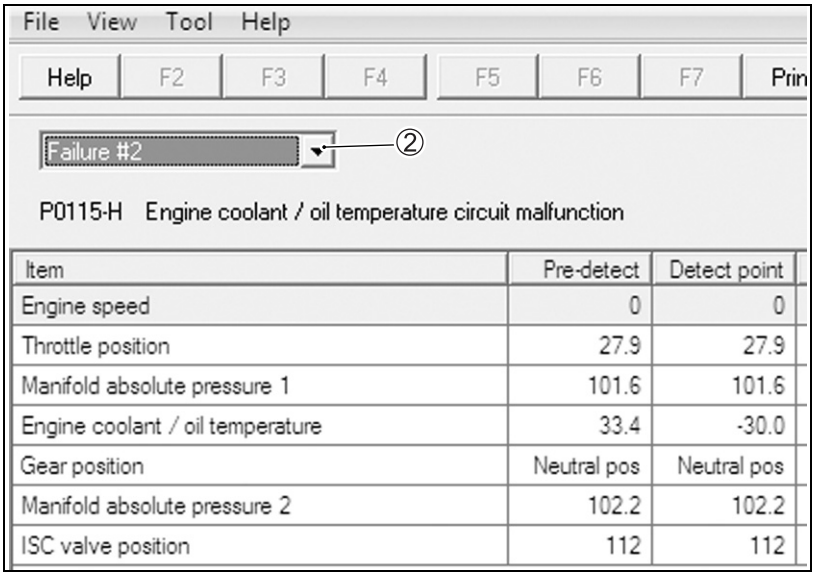
ECM stores the engine and driving conditions (in the form of data as shown in the figure) at the moment of the detection of a malfunction in its memory. This data is called “Show failure data”.
Therefore, it is possible to know engine and driving conditions (e.g., whether the engine was warm or not, where the motorcycle was running or stopped) when a malfunction was detected by checking the show failure data. This show failure data function can record the maximum of two Diagnostic Trouble Codes in the ECM.
Also, ECM has a function to store each show failure data 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.



Item	Pre-detect	Detect point	Post-detect	Fix point	Cycle Min	Cycle Max	Unit
Engine speed	0	0	0	0	0	0	rpm
Throttle position	7.4	4.4	2.9	0.0	0.0	104.9	°
Manifold absolute pressure 1	101.6	101.6	101.6	101.6	101.6	102.2	kPa
Engine coolant / oil temperature	34.6	34.6	34.6	34.6	34.0	34.6	°C
Gear position	Neutral pos	Neutral pos	Neutral pos	Neutral pos	Neutral pos	Neutral pos	
Manifold absolute pressure 2	102.2	102.2	102.2	102.2	102.2	102.2	kPa
ISC valve position	112	112	112	112	110	112	step

- Click “Show failure data” ① to display the data. By clicking the drop down button ②, either “Failure #1” or “Failure #2” can be selected.





Item	Pre-detect	Detect point
Engine speed	0	0
Throttle position	27.9	27.9
Manifold absolute pressure 1	101.6	101.6
Engine coolant / oil temperature	33.4	-30.0
Gear position	Neutral pos	Neutral pos
Manifold absolute pressure 2	102.2	102.2
ISC valve position	112	112

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 wiring and mechanical parts CKP sensor, lead wire/coupler connection
P0335				
C13/C17		IAP sensor	The sensor should produce following voltage. 0.5 V ≦ sensor voltage < 4.85 V In other than the above range, C13 (P1750) (#2 cylinder) or C17 (P0105) (#1 cylinder) is indicated.	IAP sensor, lead wire/coupler connection
P1750/ P0105	H		Sensor voltage is higher than specified value.	IAP sensor signal circuit shorted to VCC or ground circuit open
	L		Sensor voltage is lower than specified value.	IAP sensor signal circuit open or 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 range, C14 (P0120) is indicated.	TP sensor, lead wire/coupler connection
P0120	H		Sensor voltage is higher than specified value.	TP sensor signal circuit shorted to VCC or ground circuit open
	L		Sensor voltage is lower than specified value.	TP sensor signal 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 range, 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
C21		IAT sensor	The sensor voltage should be the following. 0.15 V ≦ sensor voltage < 4.85 V In other than the above range, C21 (P0110) is indicated.	IAT sensor, lead wire/coupler connection
P0110	H		Sensor voltage is higher than specified value.	IAT sensor signal circuit open or ground circuit open
	L		Sensor voltage is lower than specified value.	IAT sensor signal circuit shorted to ground

DTC No.		DETECTED ITEM	DETECTED FAILURE CONDITION	CHECK FOR
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 signal circuit shorted to VCC or ground circuit open
	L		Sensor voltage is lower than specified value.	TO sensor signal circuit open or shorted to ground or VCC circuit open
C24/C25 P0351/P0352		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) or C25 (P0352) is indicated.	Ignition coil, wiring/coupler connection, power supply from the battery
C31 P0705		Gear position signal	Gear position signal voltage should be higher than the following for 3 seconds and more. Gear position signal voltage ≧ 0.6 V If lower than the above value, C31 (P0705) is indicated.	GP switch, wiring/coupler connection, gearshift cam, etc.
C32/C33 P0201/P0202		Fuel injector	CKP sensor (pickup coil) signal is produced, but fuel injector signal is interrupted 4 times or more continuously. In this case, the code C32 (P0201) or C33 (P0202) is indicated.	Fuel injector, wiring/coupler connection, power supply to the injector
C40 P0505		ISC valve	The circuit voltage of motor drive is unusual.	ISC valve circuit open or shorted to ground
C41		FP 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.	Fuel pump relay, lead wire/coupler connection, power source to fuel pump relay and fuel injectors
P0230	H		Voltage is applied to fuel pump although fuel pump relay is turned OFF.	Fuel pump relay switch circuit shorted to power source Fuel pump relay (switch side)
	L		No voltage is applied to the fuel pump, although fuel pump relay is turned ON.	Fuel pump relay circuit open or short Fuel pump relay (coil side)
C41 P2505		ECM/PCM power input signal	No voltage is applied to the ECM.	Lead wire/coupler connection of ECM terminal to fuel fuse
C42 P1650		Ignition switch	Ignition switch signal is not input to the ECM.	Ignition switch, lead wire/coupler, etc.

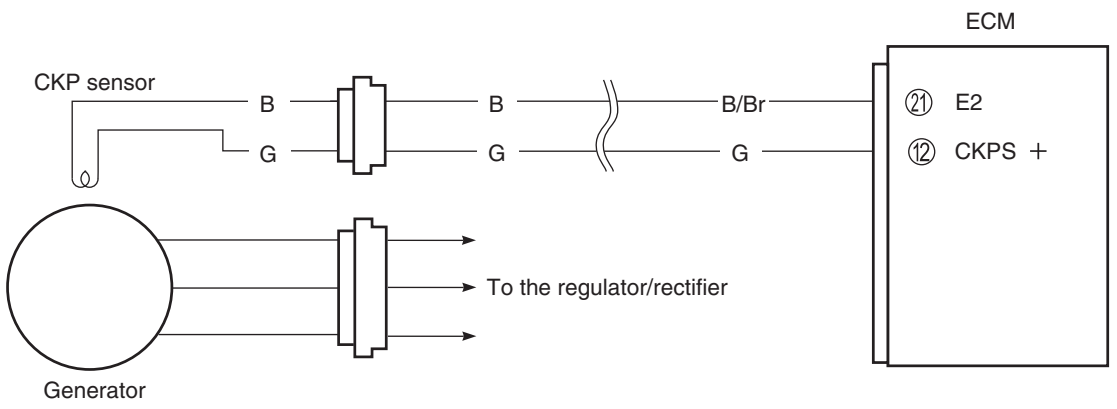
DTC No.	DETECTED ITEM	DETECTED FAILURE CONDITION	CHECK FOR
C44	HO2 sensor	HO2 sensor output voltage is not input to ECM during engine operation and running condition. C44 (P0130) is indicated.	Output state of HO2 sensor
P0130			
C44		The Heater can not operate so that heater operation voltage is not supply to the oxygen heater circuit, C44 (P0135) is indicated.	HO2 sensor lead wire/coupler connection Battery voltage supply to the HO2 sensor
P0135			
C49	PAIR control solenoid valve	PAIR control solenoid valve voltage is not input to ECM.	PAIR control solenoid valve, lead wire/coupler
P1656			
C60	Cooling fan relay	Cooling fan relay signal is not input to ECM.	Cooling fan relay, lead wire/coupler connection
P0480			
C65	ISC valve (Idle speed)	Idle speed dropped lower than desired idle speed by more than specified range.	Air passage clogged ISC valve is fixed ISC valve preset position is incorrect
P0506			
C65		Idle speed rose higher than desired idle speed by more than specified range.	ISC valve hose connection ISC valve is fixed ISC valve preset position is incorrect
P0507			

DTC “C12” (P0335): CKP SENSOR CIRCUIT MALFUNCTION

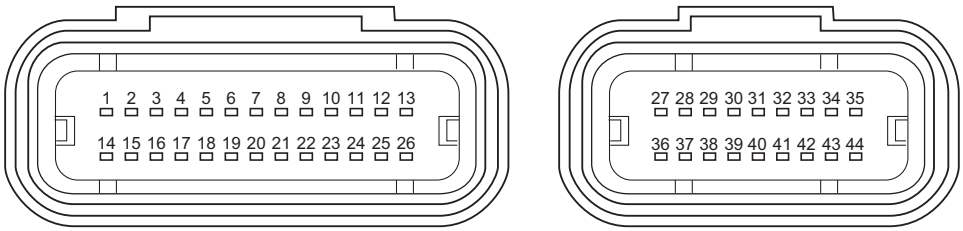
DETECTED CONDITION AND POSSIBLE CAUSE

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.

WIRING DIAGRAM



ECM coupler (Harness side)



TROUBLESHOOTING

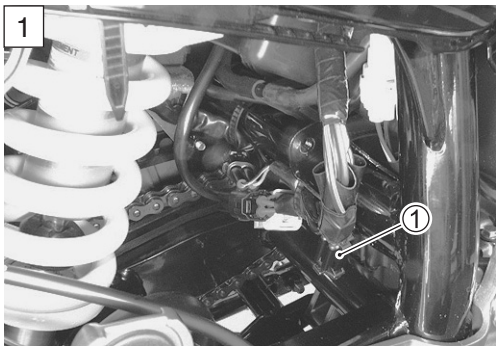
NOTICE

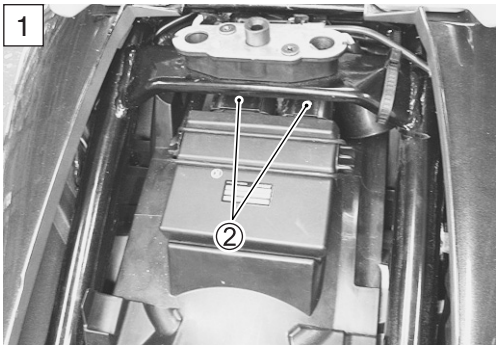
When using the multi circuit tester, do not strongly touch the terminal of the ECM coupler with a needle-point tester probe to prevent terminal damage.

NOTE:
After repairing the trouble, clear the DTC using SDS tool. (☞4-25)

Step 1
CKP sensor signal circuit check

1) Turn the ignition switch OFF.
2) Remove the seat and right frame cover. (☞8-4 and 8-5)
3) Disconnect the CKP sensor coupler ① and ECM couplers ②.





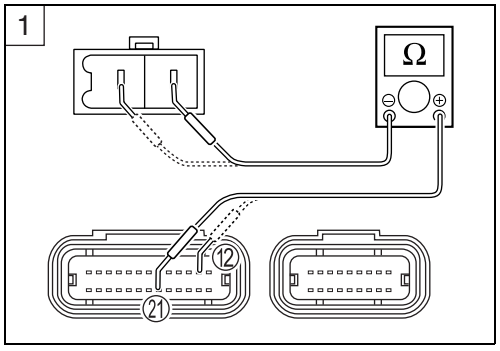
4) Check for proper terminal connection to the CKP sensor coupler and ECM couplers.
5) If connections are OK, check the following points.

• Resistance

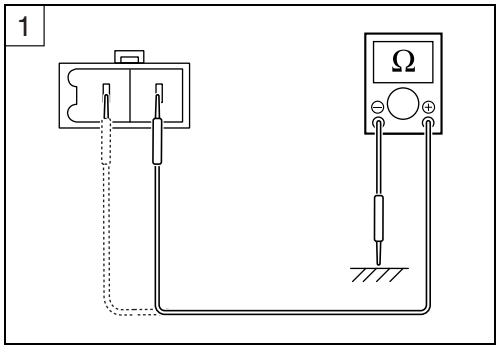
TOOL **09900-25008: Multi circuit tester set**
09900-25009: Needle-point probe set

Tester knob indication: Resistance (Ω)

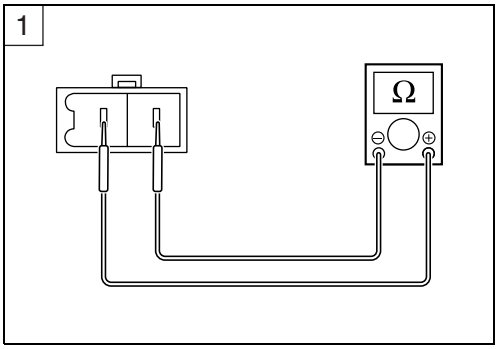
– Between G wire and B wire of CKP sensor coupler and ECM coupler: less than 1 Ω



– Between the G wire or B wire and ground: infinity



– Between the G wire and B wire at CKP sensor coupler: infinity

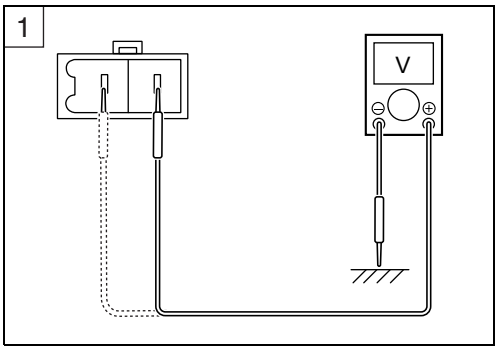


• Voltage

09900-25008: Multi circuit tester set

Tester knob indication: Voltage (⎓)

– Between G wire or B wire and ground: approx. 0 V (When ignition switch is ON)



Is check result OK?

YES	Go to Step 2.
NO	Repair or replace the defective wire harness.

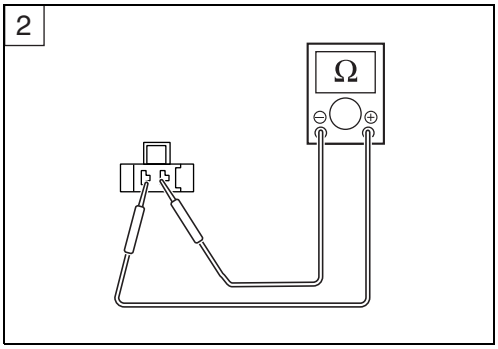
Step 2
CKP sensor check

1) Measure the CKP sensor resistance.

09900-25008: Multi circuit tester set

Tester knob indication: Resistance (Ω)

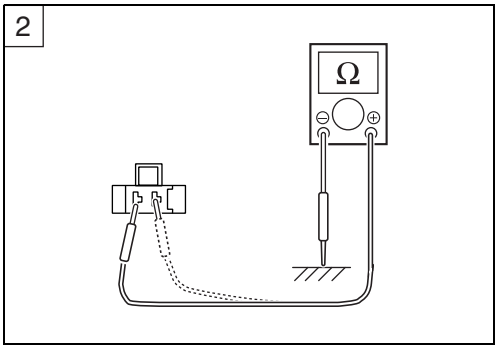
CKP sensor resistance: 150 – 230 Ω



2) Check the continuity between each terminal and ground.

09900-25008: Multi circuit tester set

CKP sensor continuity: ∞ Ω (Infinity)
(G – Ground)
(B – Ground)



Is check result OK?

YES	Go to Step 3.
NO	Replace the CKP sensor with a new one. (☞4-91)

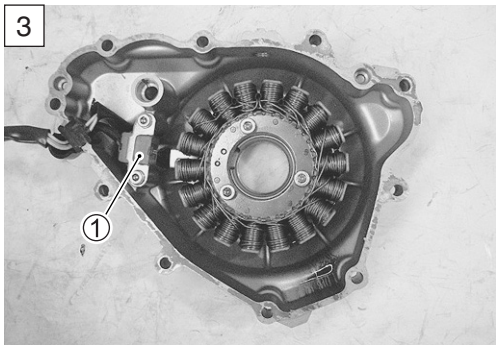
Step 3
CKP sensor and signal rotor check

1) Remove the generator cover. (☞3-19)
2) Check that end face of the CKP sensor ① and generator teeth ② are free from any metal particles and damage.

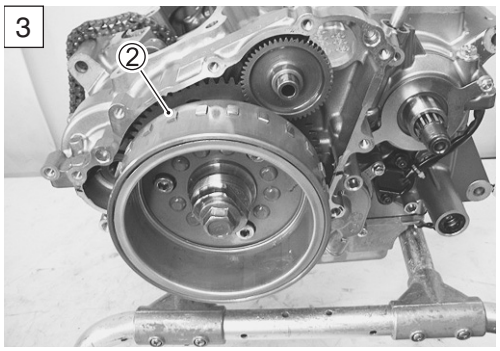
Is check result OK?

YES	Go to Step 4.
NO	Clear or replace defective parts.

3



3



Step 4
CKP sensor signal check

1) Connect the ECM couplers.
2) Crank the engine several seconds with the starter motor, and measure the CKP sensor peak voltage at the coupler.

TOOL 09900-25008: Multi circuit tester set

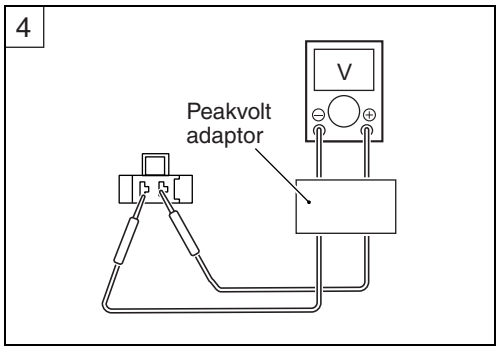
Tester knob indication: Voltage (⎓)

DATA CKP sensor peak voltage: 1.5 V or more

Is check result OK?

YES	Replace the ECM with a known good one, and inspect it again.
NO	Replace the CKP sensor with a new one. (☞4-91)

4

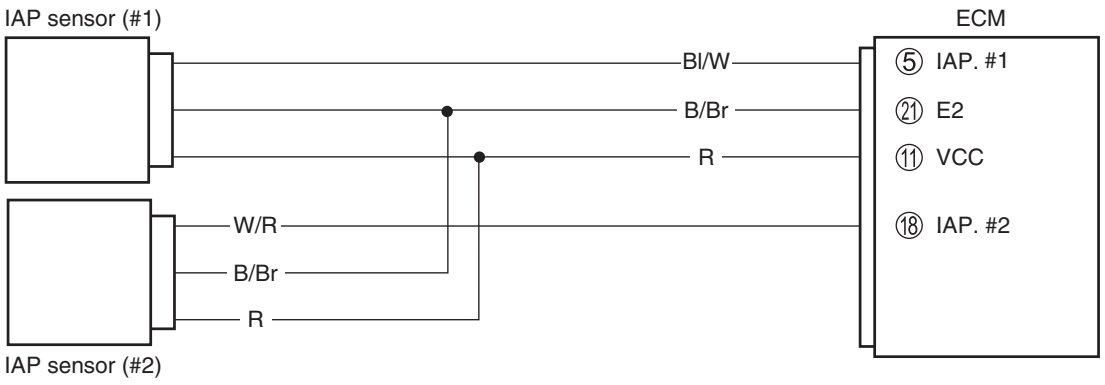


DTC “C13” (P1750-H/L) or “C17” (P0105-H/L): IAP SENSOR CIRCUIT MALFUNCTION

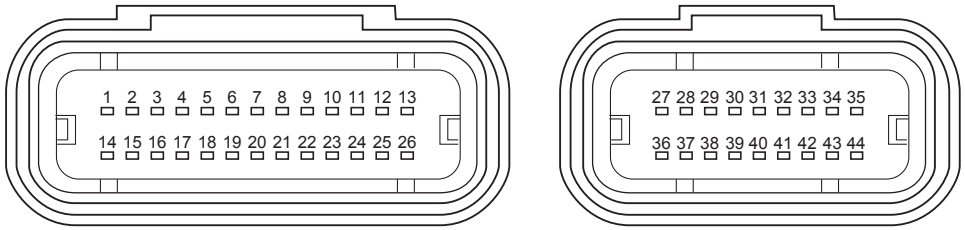
DETECTED CONDITION AND POSSIBLE CAUSE

		DETECTED CONDITION	POSSIBLE CAUSE
C13/C17		IAP sensor voltage is not within the following range. 0.5 V ≦ Sensor voltage < 4.85 V *NOTE:* *Note that atmospheric pressure varies depending on weather conditions as well as altitude.* *Take that into consideration when inspecting voltage.*	• 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.
P1750/ P0105	H	Sensor voltage is higher than specified value.	• IAP sensor signal circuit is open or shorted to VCC or ground circuit open.
	L	Sensor voltage is lower than specified value.	• IAP sensor signal circuit is shorted to ground or VCC circuit open.

WIRING DIAGRAM



ECM coupler (Harness side)



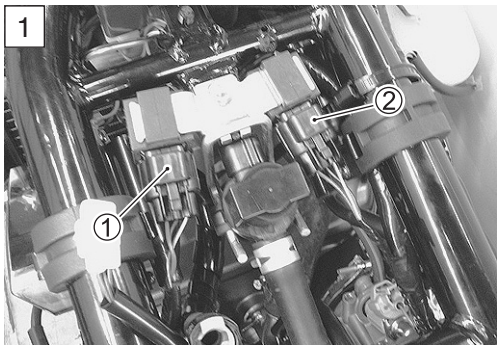
TROUBLESHOOTING

NOTICE

When using the multi circuit tester, do not strongly touch the terminal of the ECM coupler with a needle-point tester probe to prevent terminal damage.

NOTE:
After repairing the trouble, clear the DTC using SDS tool. (☞4-25)

Step 1
IAP sensor power supply circuit check
1) Turn the ignition switch OFF.
2) Remove the fuel tank. (☞5-2)
3) Disconnect the IAP sensor coupler related DTC. (#1 cylinder ① or #2 cylinder ②)

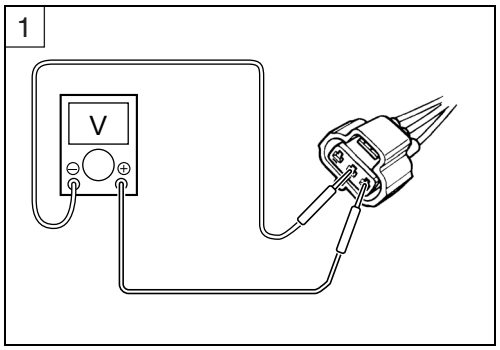


4) Check for proper terminal connection to the IAP sensor coupler.
5) If connections are OK, turn the ignition switch ON.
6) Measure the voltage between the R wire and B/Br wire.

TOOL 09900-25008: Multi circuit tester set

Tester knob indication: Voltage (⎓)

DATA IAP sensor power supply voltage:
4.5 – 5.5 V (⊕ terminal: R – ⊖ terminal: B/Br)



Is check result OK?

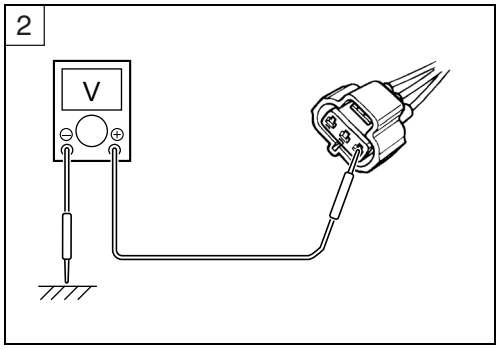
YES	Go to Step 3.
NO	Go to Step 2.

Step 2
IAP sensor ground circuit check
1) Measure the voltage between the R wire and ground.

TOOL 09900-25008: Multi circuit tester set

Tester knob indication: Voltage (⎓)

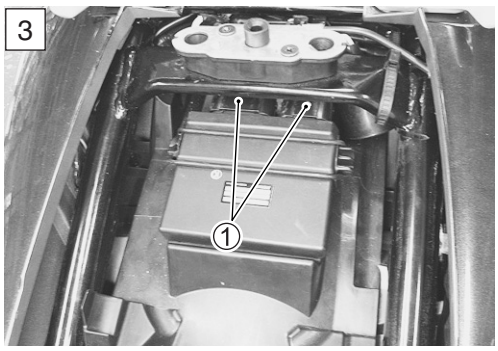
DATA IAP sensor power supply voltage:
4.5 – 5.5 V (⊕ terminal: R – ⊖ terminal: Ground)



Is check result OK?

YES	Repair or replace the B/Br wire.
NO	Repair or replace the R wire.

Step 3
IAP sensor signal circuit check
1) Turn the ignition switch OFF.
2) Disconnect the ECM couplers ①.

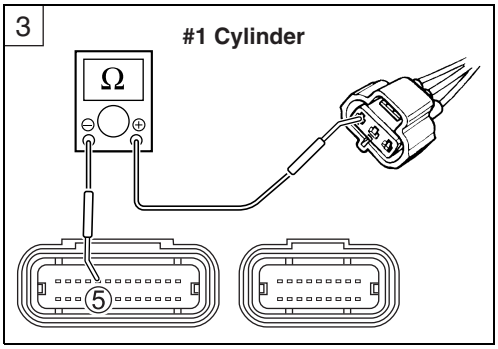


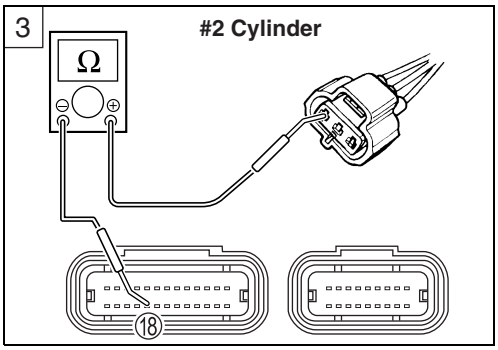
3) Check for proper terminal connection to the ECM couplers.
4) If connections are OK, check the following points.
• Resistance

09900-25008: Multi circuit tester set
09900-25009: Needle-point probe set

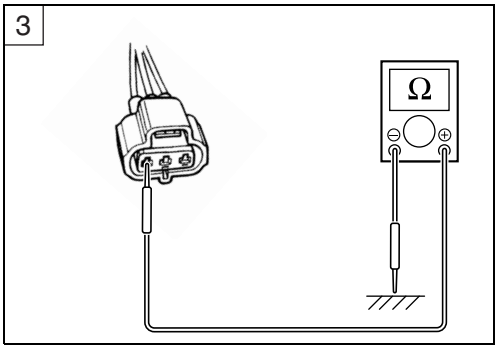
Tester knob indication: Resistance (Ω)

– Between Bl/W wire (#1) or W/R wire (#2) of IAP sensor coupler and ECM coupler: less than 1 Ω

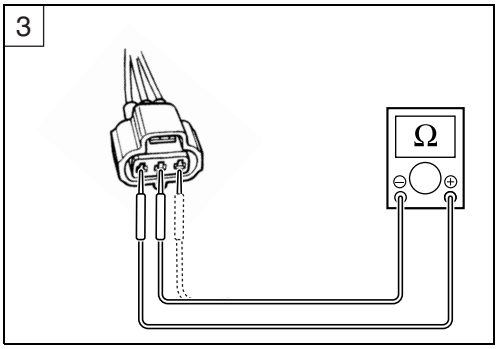




– Between Bl/W wire (#1) or W/R wire (#2) and ground: infinity



– Bl/W wire (#1) or W/R wire (#2) terminal and other terminal at IAP sensor connector: infinity



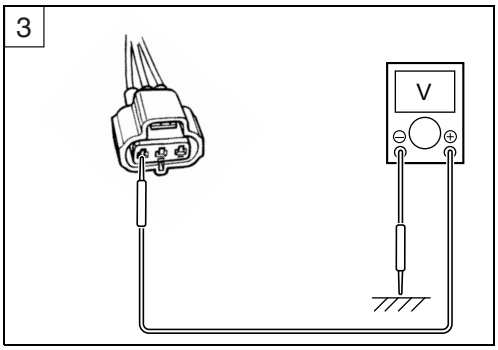
• Voltage

09900-25008: Multi circuit tester set

Tester knob indication: Voltage (⎓)

– Between Bl/W wire (#1) or W/R wire (#2) and ground: approx. 0 V (When ignition switch is ON)

Is check result OK?



YES	Go to Step 4.
NO	Repair or replace the Bl/W wire (#1) or W/R wire (#2).

Step 4
IAP sensor check 1

1) Turn the ignition switch OFF.
2) Connect the ECM couplers and IAP sensor coupler.
3) Insert the needle-point probes to the lead wire coupler.
4) Run the engine at idle speed and measure the IAP sensor output voltage between the Bl/W wire (#1) or W/R wire (#2) and B/Br wire.

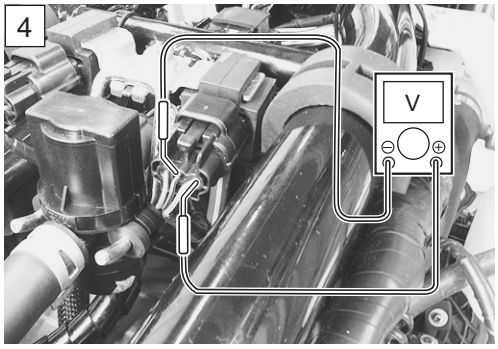
TOOL 09900-25008: Multi circuit tester set
09900-25009: Needle-point probe set

Tester knob indication: Voltage (⎓)

DATA IAP sensor output voltage:
Approx. 2.6 V at idle speed (atmospheric pressure: approx. 100 kPa (760 mmHg)
#1: (⊕ terminal: Bl/W – ⊖ terminal: B/Br)
#2: (⊕ terminal: W/R – ⊖ terminal: B/Br)

Is check result OK?

YES	Go to Step 5.
NO	• Check the vacuum hoses for crack or damage. • If vacuum hoses are OK, replace the IAP sensor with a new one. (☞4-91)



Step 5
IAP sensor check 2

1) Turn the ignition switch OFF.
2) Remove the IAP sensor. (☞4-91)
3) Connect the vacuum pump gauge to the vacuum port of the IAP sensor.
4) Arrange 3 new 1.5 V batteries ① in series (check that total voltage is 4.5 – 5.0 V) and connect ⊖ terminal to the ground terminal Ⓑ and ⊕ terminal to the VCC terminal Ⓐ.
5) Check the voltage between Vout terminal Ⓒ and ground. Also, check if voltage reduces when vacuum is applied using the vacuum pump gauge.

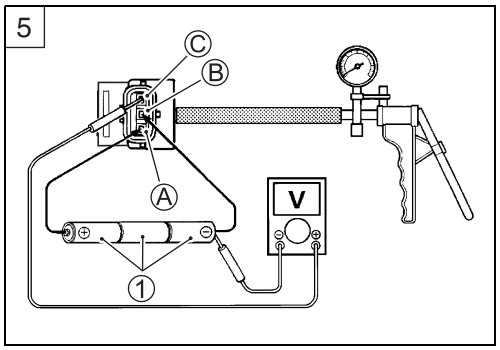
TOOL 09917-47011: Vacuum pump gauge set
09900-25008: Multi circuit tester set

Tester knob indication: Voltage (⎓)

ALTITUDE (Reference)		ATOMOSPHERIC PRESSURE		OUTPUT VOLTAGE
m	ft	kPa	mmHg	V
0 – 610	0 – 2 000	100 – 94	760 – 707	3.1 – 3.6
611 – 1 524	2 001 – 5 000	94 – 85	707 – 634	2.8 – 3.4
1 525 – 2 438	5 001 – 8 000	85 – 76	634 – 567	2.6 – 3.1
2 439 – 3 048	8 001 – 10 000	76 – 70	567 – 526	2.4 – 2.9

Is check result OK?

YES	Replace the ECM with a known good one, and inspect it again.
NO	Replace the IAP sensor with a new one.

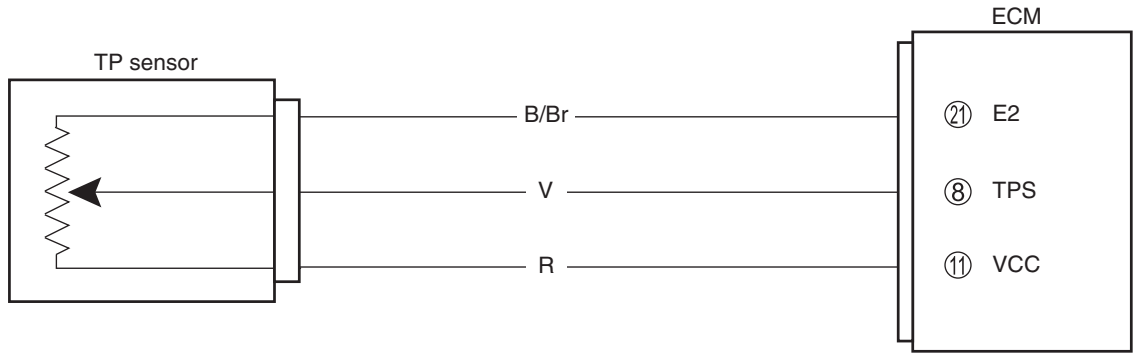


DTC “C14” (P0120-H/L): TP SENSOR CIRCUIT MALFUNCTION

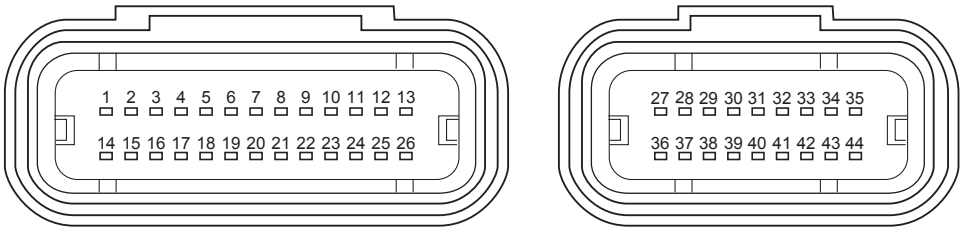
DETECTED CONDITION AND POSSIBLE CAUSE

DETECTED CONDITION			POSSIBLE CAUSE
C14		Output voltage is not within the following range. 0.2 V ≦ Sensor voltage < 4.8 V	• TP sensor maladjusted. • TP sensor circuit open or short. • TP sensor malfunction. • ECM malfunction.
P0120	H	Sensor voltage is higher than specified value.	• TP sensor signal circuit is shorted to VCC or ground circuit open.
	L	Sensor voltage is lower than specified value.	• TP sensor signal circuit is open or shorted to ground or VCC circuit open.

WIRING DIAGRAM



ECM coupler (Harness side)



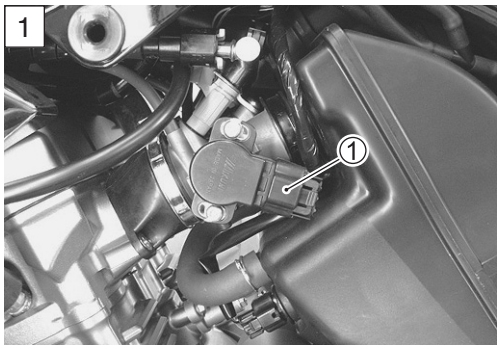
TROUBLESHOOTING

NOTICE

When using the multi circuit tester, do not strongly touch the terminal of the ECM coupler with a needle-point tester probe to prevent terminal damage.

NOTE:
After repairing the trouble, clear the DTC using SDS tool. (☞4-25)

Step 1
TP sensor power supply circuit check
1) Turn the ignition switch OFF.
2) Remove the left frame front cover. (☞8-4)
3) Disconnect the TP sensor coupler ①.

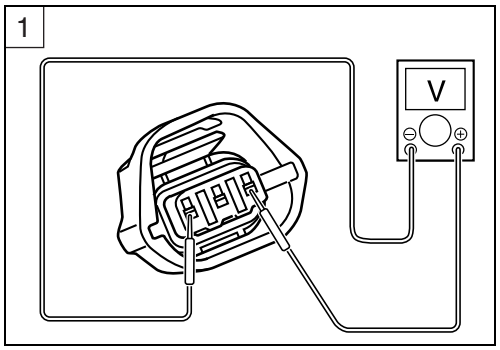


4) Check for proper terminal connection to the TP sensor coupler.
5) If connections are OK, turn the ignition switch ON.
6) Measure the voltage between the R wire and B/Br wire.

TOOL 09900-25008: Multi circuit tester set

Tester knob indication: Voltage (⎓)

DATA TP sensor power supply voltage:
4.5 – 5.5 V (⊕ terminal: R – ⊖ terminal: B/Br)



Is check result OK?

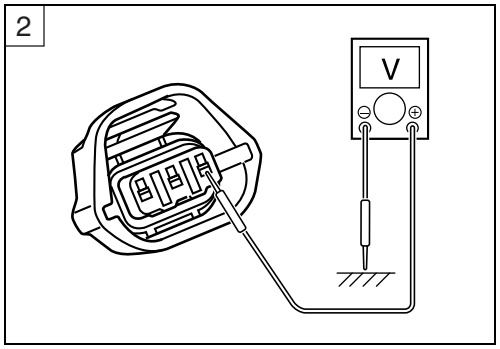
YES	Go to Step 3.
NO	Go to Step 2.

Step 2
TP sensor ground circuit check
1) Measure the voltage between the R wire and ground.

TOOL 09900-25008: Multi circuit tester set

Tester knob indication: Voltage (⎓)

DATA TP sensor power supply voltage:
4.5 – 5.5 V (⊕ terminal: R – ⊖ terminal: Ground)

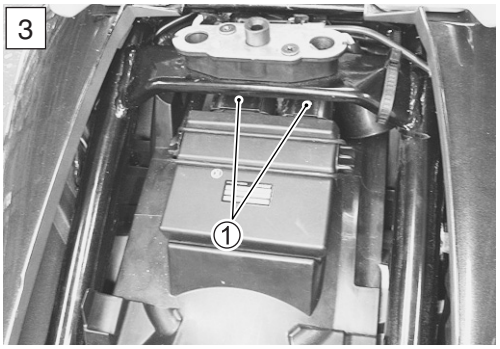


Is check result OK?

YES	Repair or replace the B/Br wire.
NO	Repair or replace the R wire.

Step 3
TP sensor signal circuit check

1) Turn the ignition switch OFF.
2) Remove the seat. (☞8-5)
3) Disconnect the ECM couplers ①.



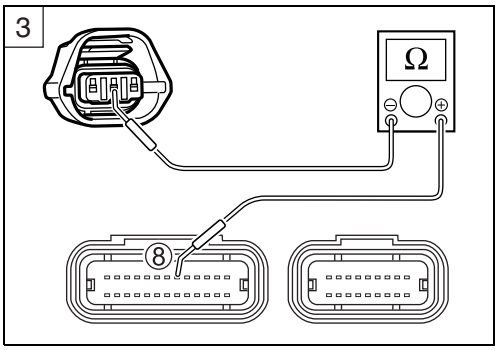
4) Check for proper terminal connection to the ECM couplers.
5) If connections are OK, check the following points.

• Resistance

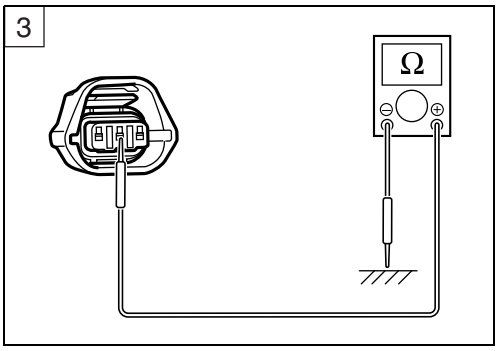
09900-25008: Multi circuit tester set
09900-25009: Needle-point prove set

Tester knob indication: Resistance (Ω)

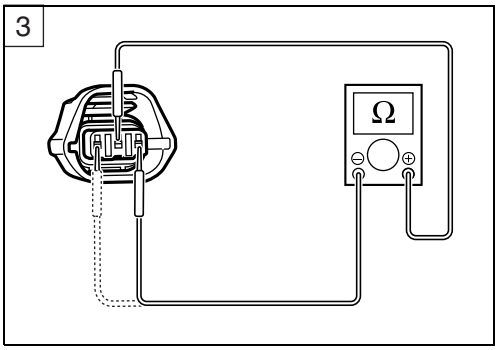
– Between V wire of TP sensor coupler and ECM coupler: less than 1 Ω



– Between V wire and ground: infinity



– Between V wire terminal and other terminal at TP sensor connector: infinity



• Voltage

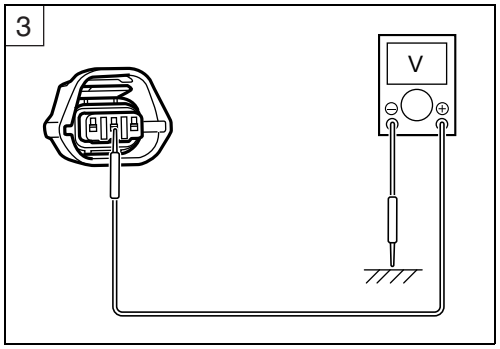
09900-25008: Multi circuit tester set

Tester knob indication: Voltage (⎓)

– Between V wire and ground: approx. 0 V (When ignition switch is ON)

Is check result OK?

YES	Go to Step 4.
NO	Repair or replace the V wire.



Step 4

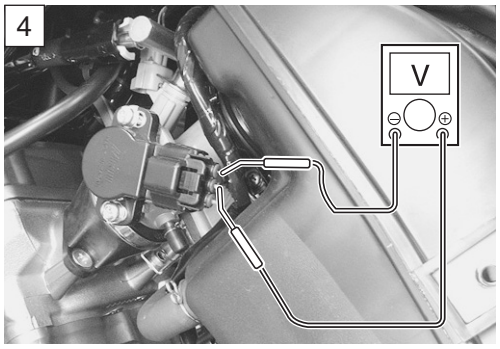
TP sensor check

1) Turn the ignition switch OFF.
2) Connect the ECM couplers and TP sensor coupler.
3) Insert the needle-point probes to the lead wire coupler.
4) Turn the ignition switch ON.
5) Measure the TP sensor output voltage between the V wire terminal ⊕ and B/Br wire terminal ⊖ with turning the throttle grip open and close.

09900-25008: Multi circuit tester set
09900-25009: Needle-point probe set

Tester knob indication: Voltage (⎓)

TP sensor output voltage:
Throttle valve is closed: Approx. 1.1 V
Throttle valve is opened: Approx. 4.4 V
(⊕ terminal: V – ⊖ terminal: B/Br)



Is check result OK?

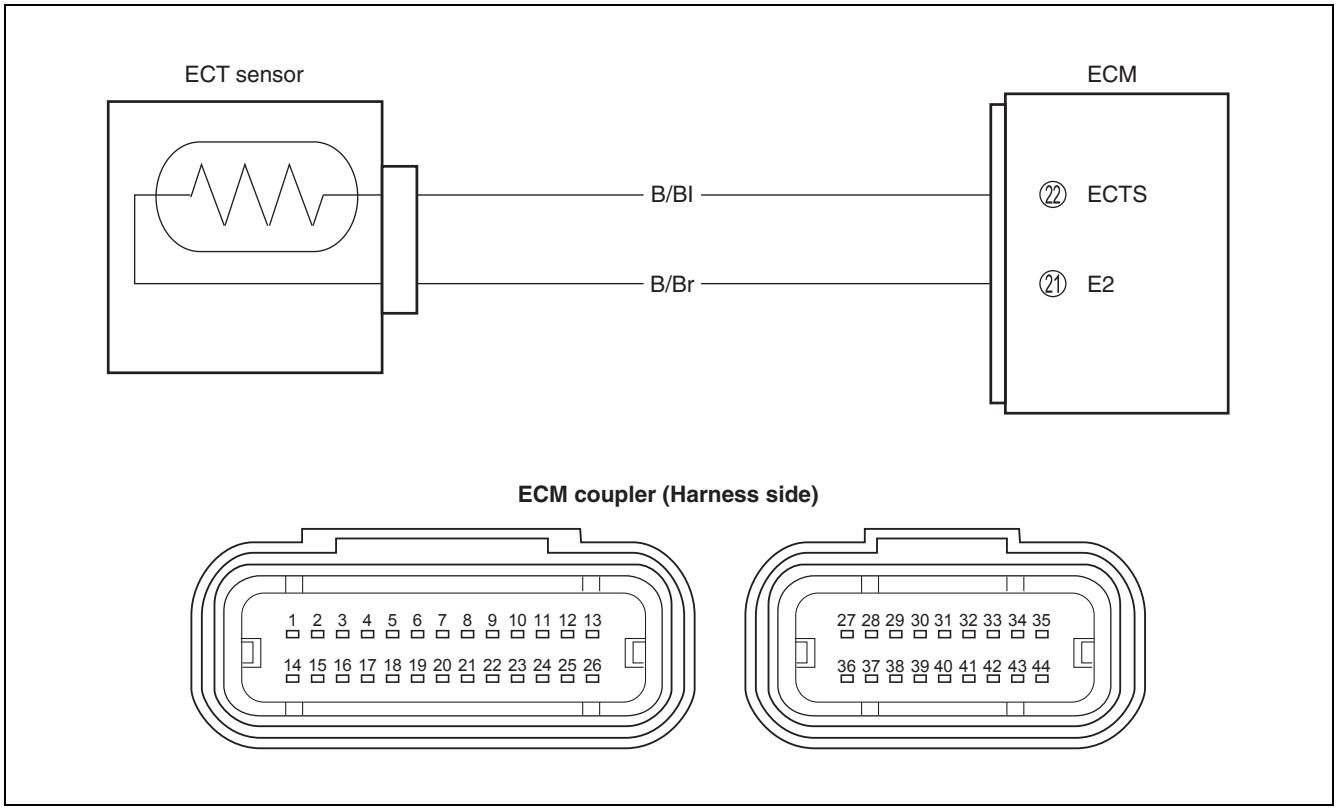
YES	Replace the ECM with a known good one, and inspect it again.
NO	Replace the TP sensor with a new one. (☞4-91)

DTC “C15” (P0115-H/L): ECT SENSOR CIRCUIT MALFUNCTION

DETECTED CONDITION AND POSSIBLE CAUSE

DETECTED CONDITION			POSSIBLE CAUSE
C15		Output voltage is not within the following range. 0.15 V ≦ Sensor voltage < 4.85 V	• ECT sensor circuit open or short. • ECT sensor malfunction. • ECM malfunction.
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.

WIRING DIAGRAM



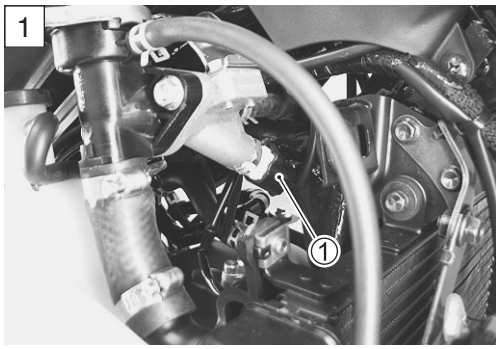
TROUBLESHOOTING

NOTICE

When using the multi circuit tester, do not strongly touch the terminal of the ECM coupler with a needle-point tester probe to prevent terminal damage.

NOTE:
After repairing the trouble, clear the DTC using SDS tool. (☞4-25)

Step 1
ECT sensor input voltage check
1) Turn the ignition switch OFF.
2) Remove the right fuel tank cover. (☞8-5)
3) Disconnect the ECT sensor coupler ①.

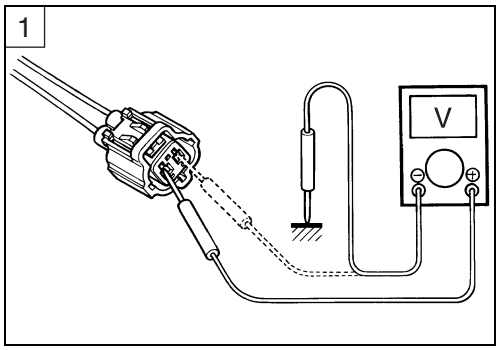


4) Check for proper terminal connection to the ECT sensor coupler.
5) If connections are OK, turn the ignition switch ON.
6) Measure the input voltage between the B/Bl wire and ground.
7) If OK, measure the input voltage between the B/Bl wire and B/Br wire.

TOOL 09900-25008: Multi circuit tester set

Tester knob indication: Voltage (⎓)

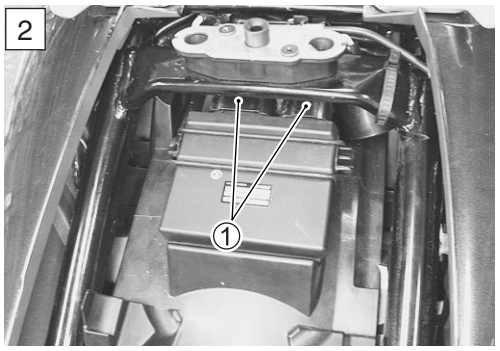
DATA ECT sensor input voltage:
4.5 – 5.5 V
(⊕ terminal: B/Bl – ⊖ terminal: Ground)
(⊕ terminal: B/Bl – ⊖ terminal: B/Br)



Is check result OK?

YES	Go to Step 3.
NO	Go to Step 2.

Step 2
ECT sensor circuit check
1) Turn the ignition switch OFF.
2) Remove the seat. (☞8-5)
3) Disconnect the ECM couplers ①.

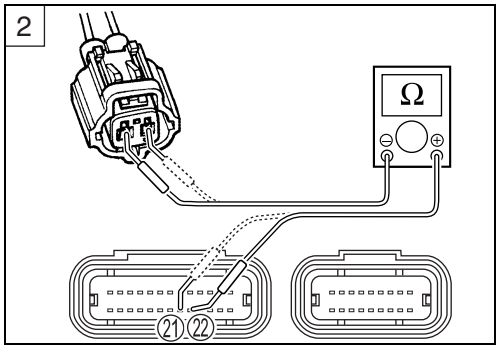


4) Check for proper terminal connection to the ECM couplers.
5) If connections are OK, check the following points.
• Resistance

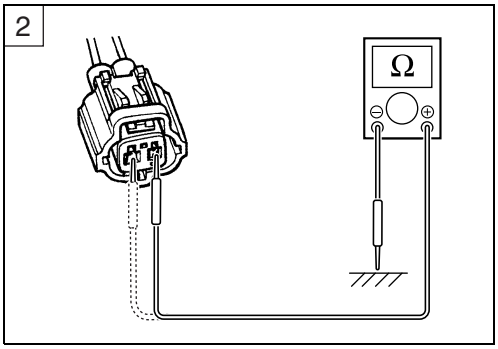
TOOL 09900-25008: Multi circuit tester set
09900-25009: Needle-point probe set

Tester knob indication: Resistance (Ω)

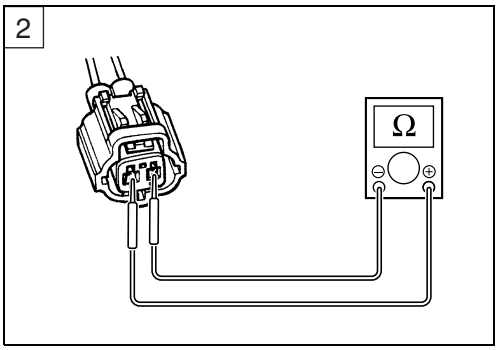
– Between B/Bl wire and B/Br wire of ECT sensor coupler and ECM coupler: less than 1 Ω



– Between each of B/Bl and B/Br wire and ground: infinity



– Between B/Bl wire terminal and B/Br wire at ECT sensor coupler: infinity

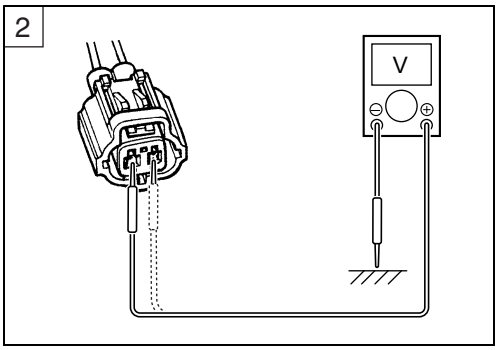


• Voltage

09900-25008: Multi circuit tester set

Tester knob indication: Voltage (⎓)

– Between B/Bl wire or B/Br wire and ground: approx. 0 V (When ignition switch is ON)

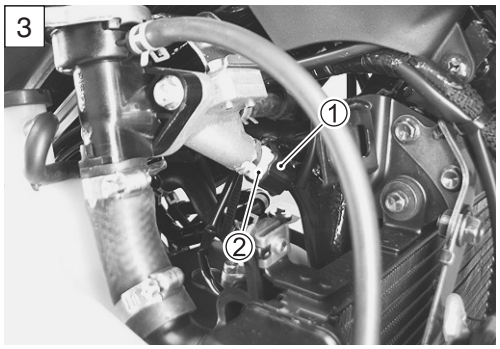


Is check result OK?

YES	Replace the ECM with a known good one, and inspect it again.
NO	Repair or replace the defective wire harness.

Step 3
ECT sensor check

1) Turn the ignition switch OFF.
2) Drain a small amount of engine coolant. (☞2-15)
3) Disconnect the ECT sensor coupler ① and remove the ECT sensor ②.



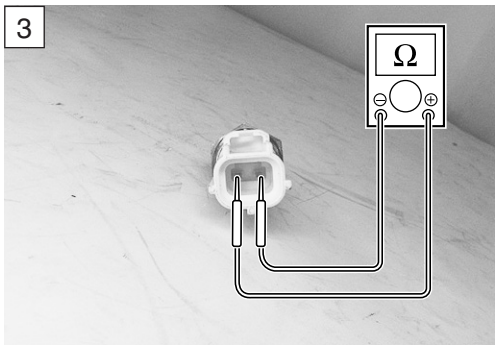
4) Measure the ECT sensor resistance.

NOTE:
Refer to "ECT SENSOR INSPECTION" for details. (☞7-10)

09900-25008: Multi circuit tester set

Tester knob indication: Resistance (Ω)

ECT sensor resistance:
Approx. 2.45 kΩ at 20 °C (68 °F)
(Terminal – Terminal)



Is check result OK?

YES	Replace the ECM with a known good one, and inspect it again.
NO	Replace the ECT sensor with a new one.

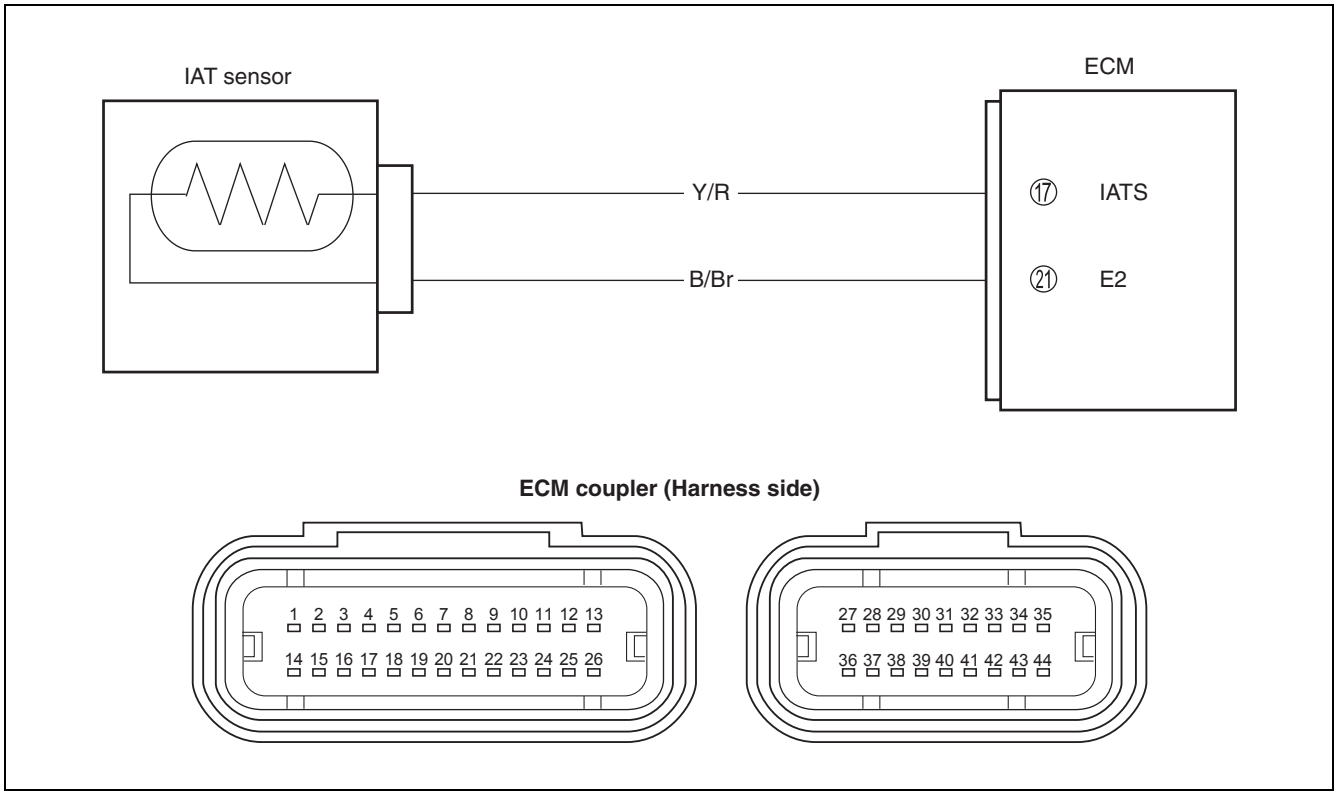
5) Install the ECT sensor. (☞7-10)

DTC “C21” (P0110-H/L): IAT SENSOR CIRCUIT MALFUNCTION

DETECTED CONDITION AND POSSIBLE CAUSE

DETECTED CONDITION			POSSIBLE CAUSE
C21		Output voltage is not within the following range. 0.15 V ≦ Sensor voltage < 4.85 V	• IAT sensor circuit open or short. • IAT sensor malfunction. • ECM malfunction.
P0110	H	Sensor voltage is higher than specified value.	• IAT sensor circuit open or ground circuit open. • IAT sensor circuit shorted to ground.
	L	Sensor voltage is lower than specified value.	

WIRING DIAGRAM



TROUBLESHOOTING

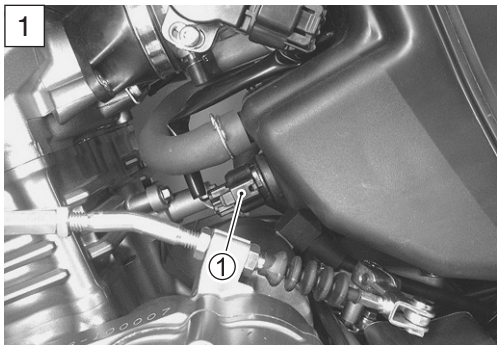
NOTICE

When using the multi circuit tester, do not strongly touch the terminal of the ECM coupler with a needle-point tester probe to prevent terminal damage.

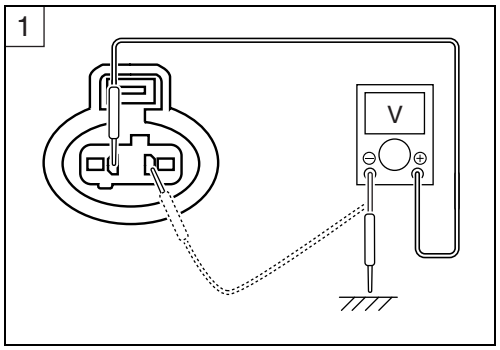
NOTE:
After repairing the trouble, clear the DTC using SDS tool. (☞4-25)

Step 1
IAT sensor input voltage check

1) Turn the ignition switch OFF.
2) Disconnect the IAT sensor coupler ①.



3) Check for proper terminal connection to the IAT sensor coupler.
4) If connections are OK, turn the ignition switch ON.
5) Measure the input voltage between the Y/R wire and ground.
6) If OK, measure the input voltage between the Y/R wire and B/Br wire.



TOOL 09900-25008: Multi circuit tester set

Tester knob indication: Voltage (⎓)

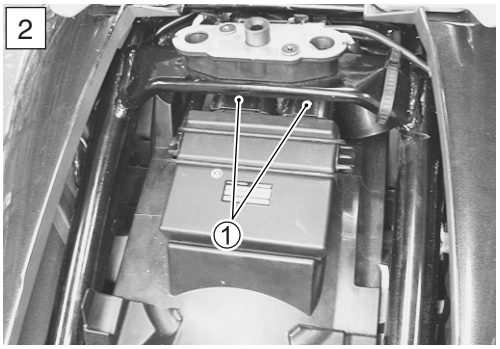
DATA IAT sensor input voltage:
4.5 – 5.5 V
(⊕ terminal: Y/R – ⊖ terminal: Ground)
(⊕ terminal: Y/R – ⊖ terminal: B/Br)

Is check result OK?

YES	Go to Step 3.
NO	Go to Step 2.

Step 2
IAT sensor circuit check

1) Turn the ignition switch OFF.
2) Remove the seat. (☞8-5)
3) Disconnect the ECM couplers ①.



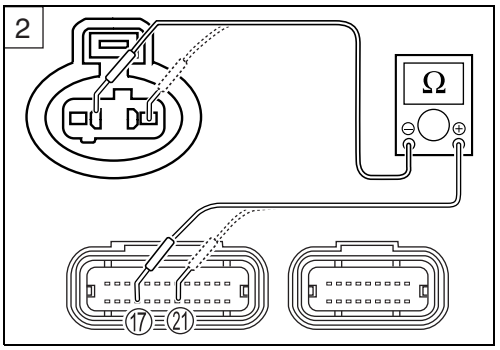
4) Check for proper terminal connection to the ECM couplers.
5) If connections are OK, check the following points.

• Resistance

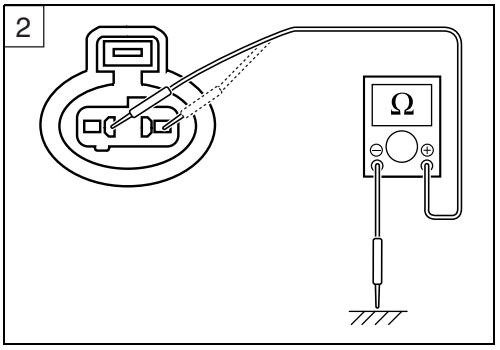
09900-25008: Multi circuit tester set
09900-25009: Needle-point probe set

Tester knob indication: Resistance (Ω)

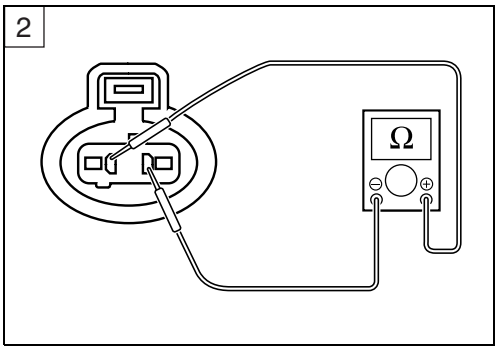
– Between Y/R wire and B/Br wire of IAT sensor coupler and ECM coupler: less than 1 Ω



– Between Y/R or B/Br wire and ground: infinity



– Between Y/R wire terminal and B/Br wire at IAT sensor coupler: infinity

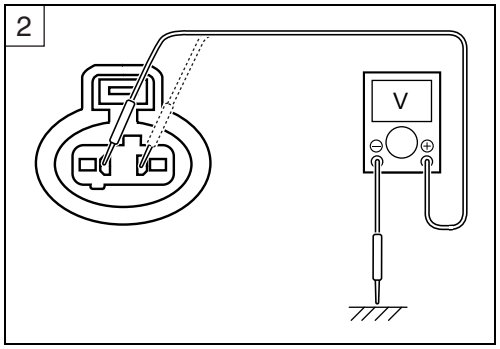


• Voltage

09900-25008: Multi circuit tester set

Tester knob indication: Voltage (⎓)

– Between Y/R wire or B/Br wire and ground: approx. 0 V (When ignition switch is ON)



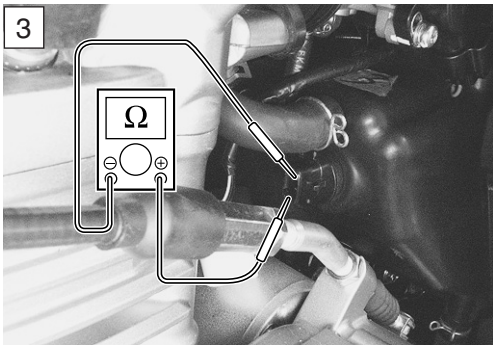
Is check result OK?

YES	Replace the ECM with a known good one, and inspect it again.
NO	Repair or replace the defective wire harness.

Step 3
IAT sensor check

1) Turn the ignition switch OFF.
2) Measure the IAT sensor resistance.

NOTE:
IAT sensor resistance measurement method is the same way as that of the ECT sensor. Refer to page 7-10 for details.



09900-25008: Multi circuit tester set

Tester knob indication: Resistance (Ω)

IAT sensor resistance:
Approx. 2.45 kΩ at 20 °C (68 °F)
(Terminal – Terminal)

Is check result OK?

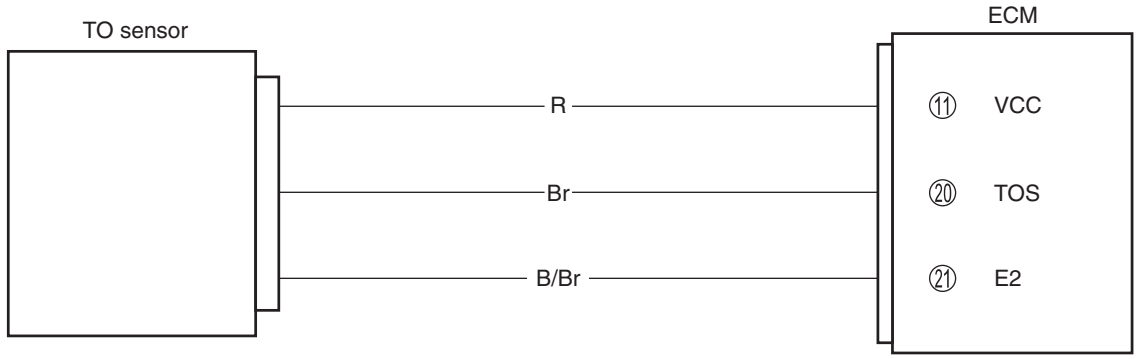
YES	Replace the ECM with a known good one, and inspect it again.
NO	Replace the IAT sensor with a new one.

DTC “C23” (P1651-H/L): TO SENSOR CIRCUIT MALFUNCTION

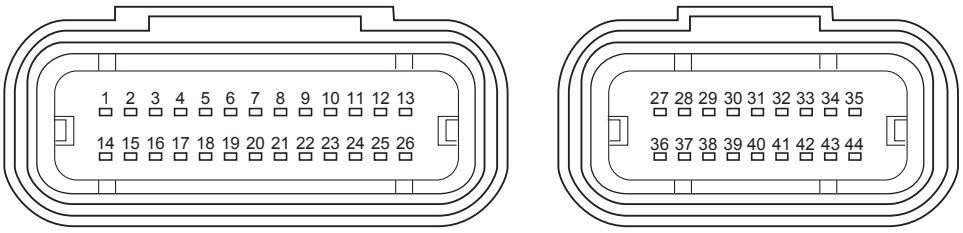
DETECTED CONDITION AND POSSIBLE CAUSE

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 V ≦ Sensor voltage < 4.8 V	• TO sensor circuit open or short. • TO sensor malfunction. • ECM malfunction.
P1651	H	Sensor voltage is higher than specified value.	• TO sensor signal circuit is open or ground circuit open.
	L	Sensor voltage is lower than specified value.	• TO sensor signal circuit is open or shorted to ground or VCC circuit open.

WIRING DIAGRAM



ECM coupler (Harness side)



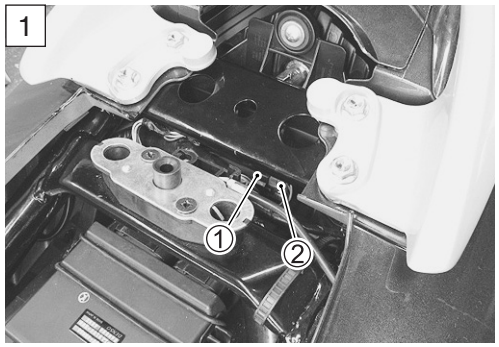
TROUBLESHOOTING

NOTICE

When using the multi circuit tester, do not strongly touch the terminal of the ECM coupler with a needle-point tester probe to prevent terminal damage.

NOTE:
After repairing the trouble, clear the DTC using SDS tool. (☞4-25)

Step 1
TO sensor power supply circuit check
1) Turn the ignition switch OFF.
2) Remove the seat. (☞8-5)
3) Remove the TO sensor ① and disconnect the TO sensor coupler ②. (☞4-92)

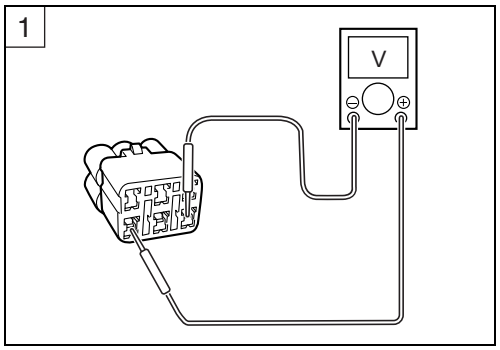


4) Check for proper terminal connection to the TO sensor coupler.
5) If connections are OK, turn the ignition switch ON.
6) Measure the voltage between the R wire and B/Br wire.

TOOL 09900-25008: Multi circuit tester set

Tester knob indication: Voltage (⎓)

DATA TO sensor power supply voltage:
4.5 – 5.5 V
(⊕ terminal: R – ⊖ terminal: B/Br)



Is check result OK?

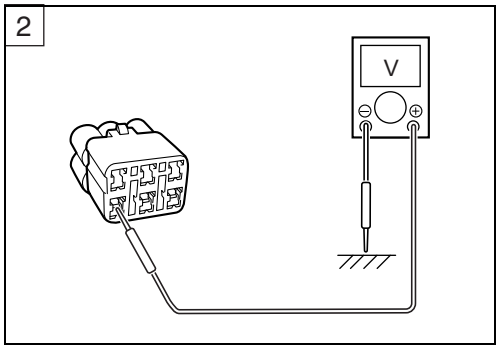
YES	Go to Step 3.
NO	Go to Step 2.

Step 2
TO sensor ground circuit check
1) Measure the voltage between the R wire and ground.

TOOL 09900-25008: Multi circuit tester set

Tester knob indication: Voltage (⎓)

DATA TO sensor power supply voltage:
4.5 – 5.5 V
(⊕ terminal: R – ⊖ terminal: Ground)

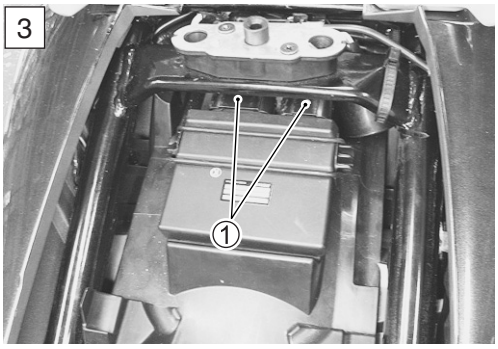


Is check result OK?

YES	Repair or replace the B/Br wire.
NO	Repair or replace the R wire.

Step 3
TO sensor signal circuit check

1) Turn the ignition switch OFF.
2) Remove the seat. (☞8-5)
3) Disconnect the ECM couplers ①.



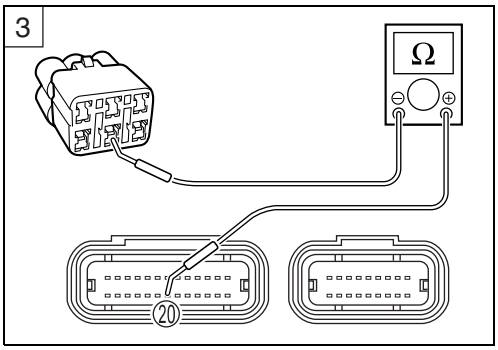
4) Check for proper terminal connection to the ECM couplers.
5) If connections are OK, check the following points.

• Resistance

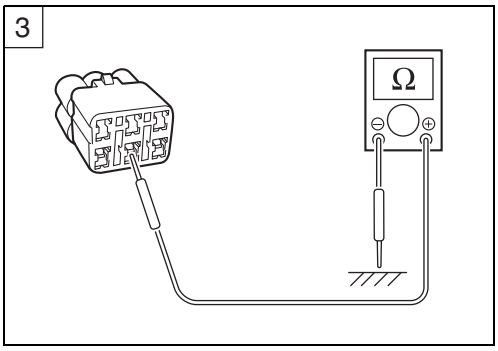
09900-25008: Multi circuit tester set
09900-25009: Needle-point probe set

Tester knob indication: Resistance (Ω)

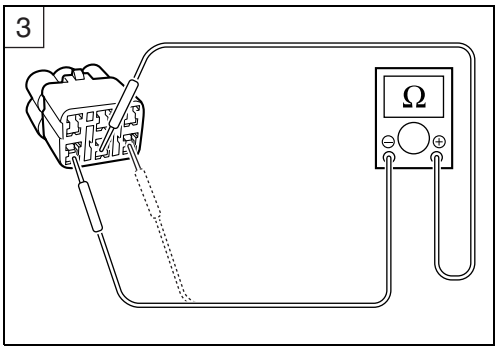
– Between Br wire of TO sensor coupler and ECM coupler: less than 1 Ω



– Between Br wire and ground: infinity



– Between Br wire terminal and other terminal at TO sensor connector: infinity

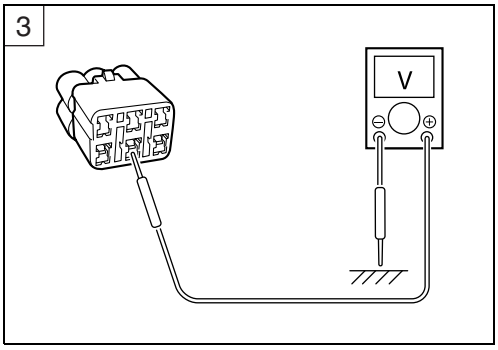


• Voltage

09900-25008: Multi circuit tester set

Tester knob indication: Voltage (⎓)

– Between Br wire and ground: approx. 0 V (When ignition switch is ON)

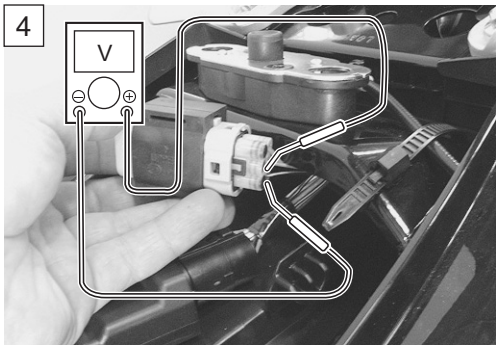


Is check result OK?

YES	Go to Step 4.
NO	Repair or replace the defective wire.

Step 4
TO sensor check

1) Turn the ignition switch OFF.
2) Connect the ECM couplers and TO sensor coupler.
3) Insert the needle-point probes to the lead wire coupler.
4) Turn the ignition switch ON.
5) Measure the TO sensor voltage between the Br wire and B/Br wire.

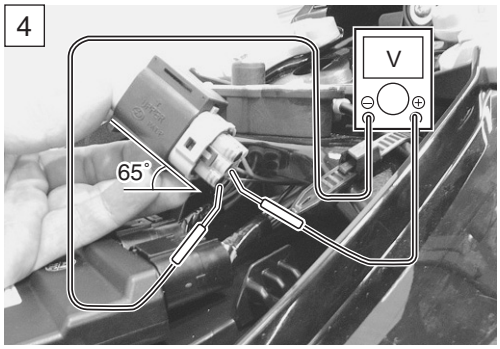


TOOL 09900-25008: Multi circuit tester set
09900-25009: Needle-point probe set

Tester knob indication: Voltage (⎓)

DATA TO sensor voltage (Normal):
0.4 – 1.4 V
(⊕ terminal: Br – ⊖ terminal: B/Br)

6) Measure the voltage when it is leaned 65° and more, left and right, from the horizontal level.



TOOL 09900-25008: Multi circuit tester set
09900-25009: Needle-point probe set

Tester knob indication: Voltage (⎓)

DATA TO sensor voltage (Leaning):
3.7 – 4.4 V
(⊕ terminal: Br – ⊖ terminal: B/Br)

Is check result OK?

YES	Replace the ECM with a known good one, and inspect it again.
NO	Replace the TO sensor with a new one.

7) Install the TO sensor. (☞4-92)

DTC “C24” (P0351) or “C25” (P0352): IGNITION SYSTEM MALFUNCTION

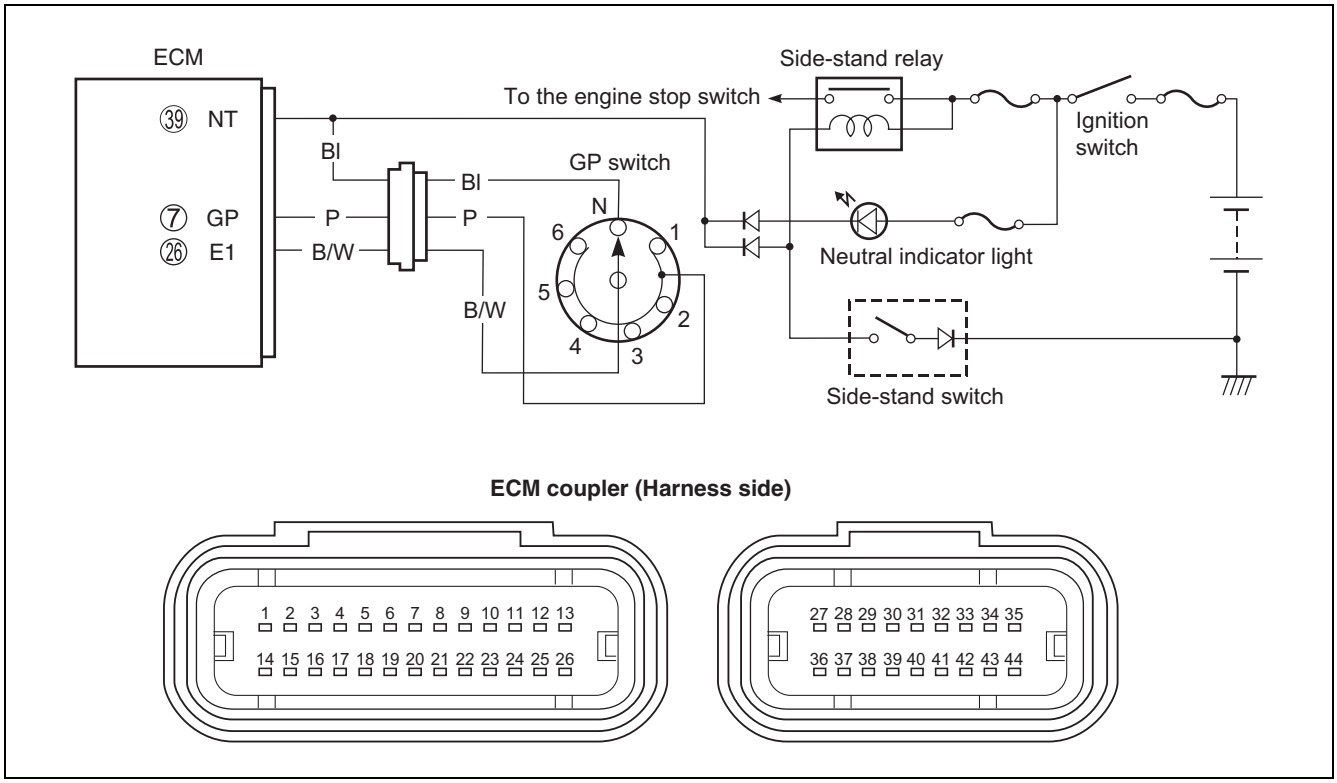
NOTE:
Refer to NO SPARK or POOR SPARK for details. (☞9-21)

DTC “C31” (P0705): GP SWITCH CIRCUIT MALFUNCTION

DETECTED CONDITION AND POSSIBLE CAUSE

DETECTED CONDITION	POSSIBLE CAUSE
No GP switch voltage GP switch voltage is not within the following range. GP switch voltage ≧ 0.6 V	• GP switch circuit open or short. • GP switch malfunction. • ECM malfunction.

WIRING DIAGRAM



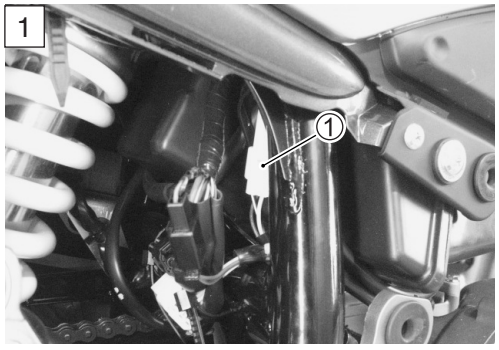
TROUBLESHOOTING

NOTICE

When using the multi circuit tester, do not strongly touch the terminal of the ECM coupler with a needle-point tester probe to prevent terminal damage.

NOTE:
After repairing the trouble, clear the DTC using SDS tool. (☞4-25)

Step 1
GP switch input voltage check
1) Turn the ignition switch OFF.
2) Remove the right frame cover. (☞8-4)
3) Disconnect the GP switch coupler ①.

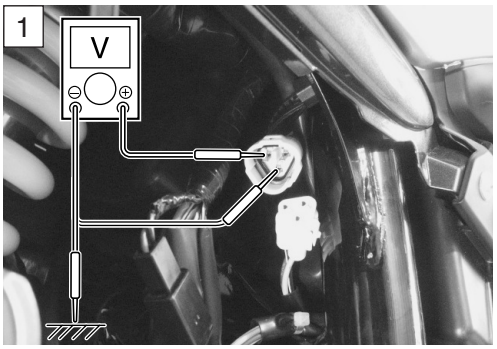


4) Check for proper terminal connection to the GP switch coupler.
5) If connections are OK, turn the ignition switch ON.
6) Measure the input voltage between the P wire and ground.
7) If OK, measure the input voltage between the P wire and B/W wire.

09900-25008: Multi circuit tester set

Tester knob indication: Voltage (⎓)

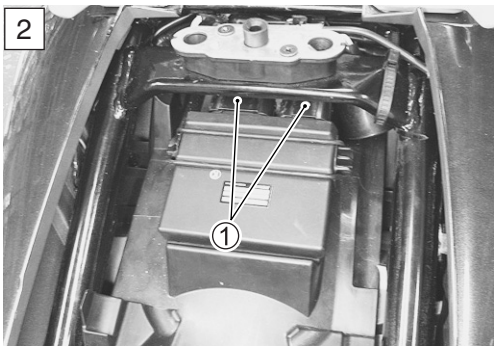
GP switch input voltage:
4.5 – 5.5 V
(⊕ terminal: P – ⊖ terminal: Ground)
(⊕ terminal: P – ⊖ terminal: B/W)



Is check result OK?

YES	Go to Step 3.
NO	Go to Step 2.

Step 2
GP switch circuit check
1) Turn the ignition switch OFF.
2) Remove the seat. (☞8-5)
3) Disconnect the ECM couplers ①.

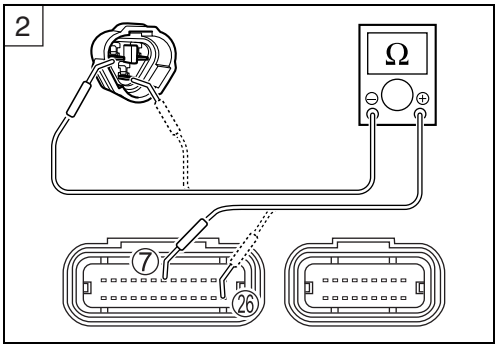


4) Check for proper terminal connection to the ECM couplers.
5) If connections are OK, check the following points.
• Resistance

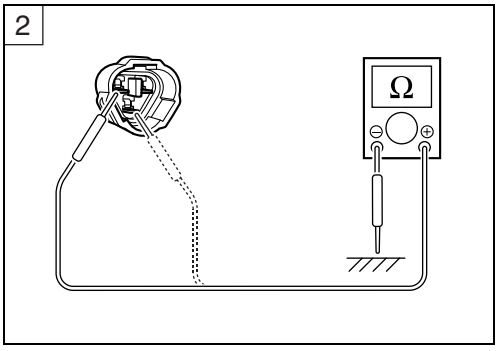
09900-25008: Multi circuit tester set
09900-25009: Needle-point probe set

Tester knob indication: Resistance (Ω)

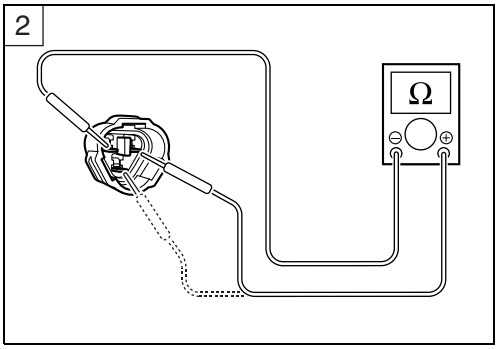
– Between P wire and B/W wire of GP switch coupler and ECM coupler: less than 1 Ω



– Between P or B/W wire and ground: infinity



– Between P wire terminal and other terminal at GP switch coupler: infinity

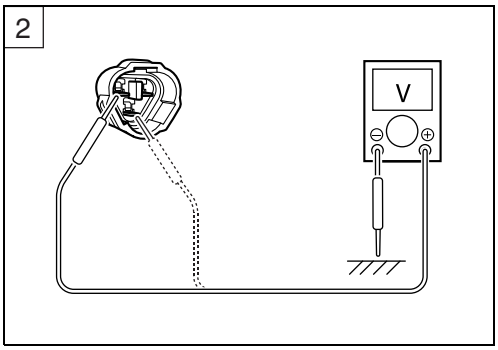


• Voltage

09900-25008: Multi circuit tester set

Tester knob indication: Voltage (⎓)

– Between P wire or B/W wire and ground: approx. 0 V (When ignition switch is ON)



Is check result OK?

YES	Replace the ECM with a known good one, and inspect it again.
NO	Repair or replace the defective wire harness.

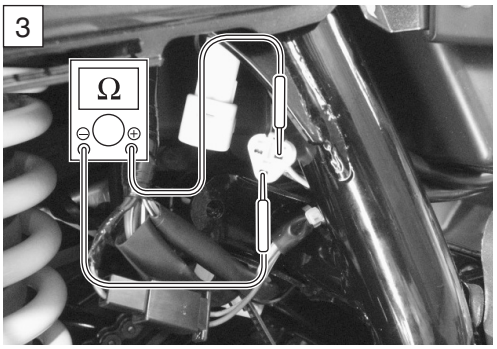
Step 3
GP switch check

1) Turn the ignition switch OFF.
2) Measure the resistance between the P wire and B/W wire, when shifting the gearshift lever from 1st to Top.

09900-25008: Multi circuit tester set

Tester knob indication: Resistance (Ω)

GP switch resistance:
Approx. 500 Ω or more
(⊕ terminal: P – ⊖ terminal: B/W)



Is check result OK?

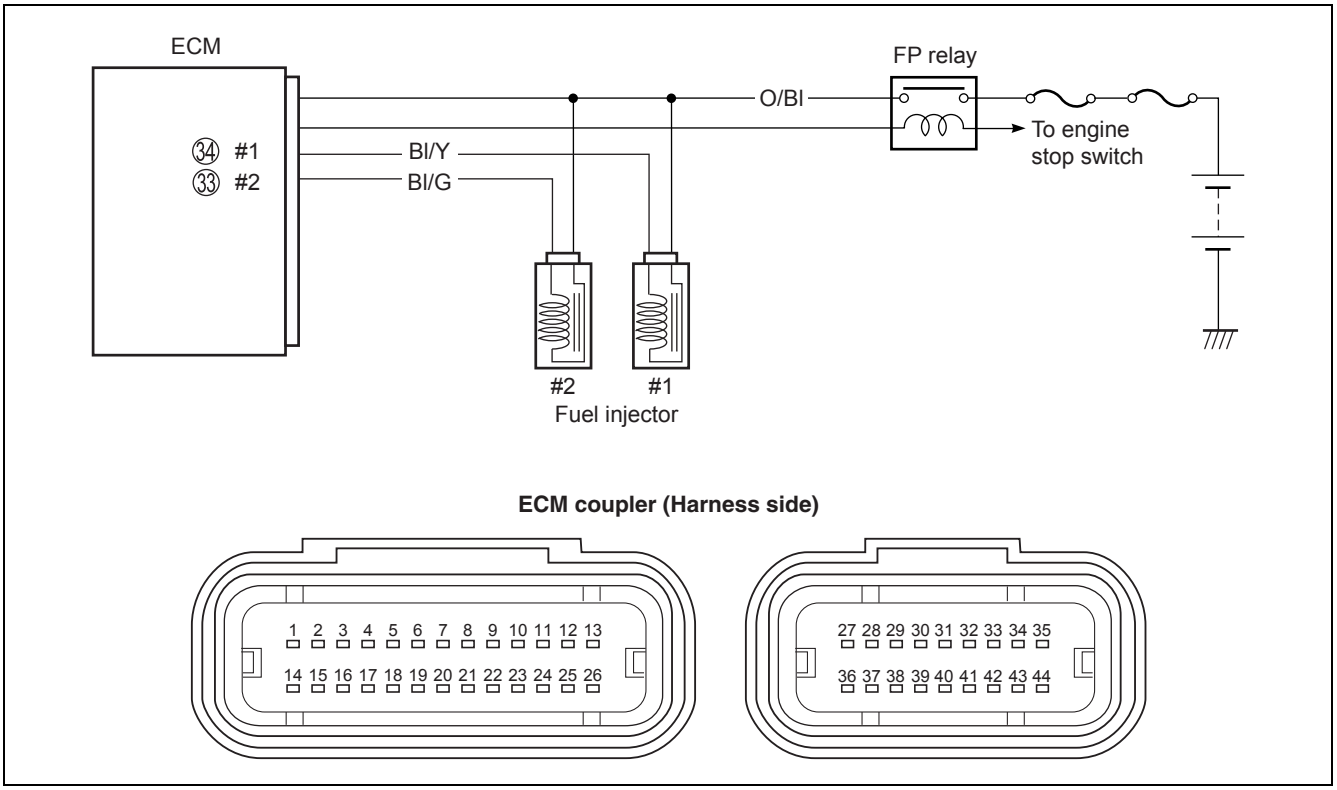
YES	Replace the ECM with a known good one, and inspect it again.
NO	Replace the GP switch with a new one. (☞3-22 and 3-76)

DTC “C32” (P0201) or “C33” (P0202): FUEL INJECTOR CIRCUIT MALFUNCTION

DETECTED CONDITION AND POSSIBLE CAUSE

DETECTED CONDITION	POSSIBLE CAUSE
CKP signal is produced but fuel injector signal is interrupted by 4 times or more continuity.	• Injector circuit open or short. • Injector malfunction. • ECM malfunction.

WIRING DIAGRAM



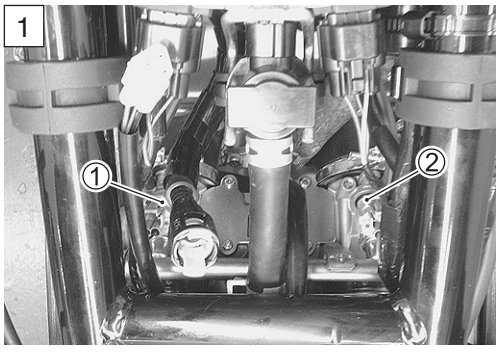
TROUBLESHOOTING

NOTICE

When using the multi circuit tester, do not strongly touch the terminal of the ECM coupler with a needle-point tester probe to prevent terminal damage.

NOTE:
After repairing the trouble, clear the DTC using SDS tool. (☞4-25)

Step 1
Injector power supply circuit check
1) Turn the ignition switch OFF.
2) Remove the fuel tank. (☞5-2)
3) Disconnect the injector coupler related to DTC. (#1 cylinder ① or #2 cylinder ②)



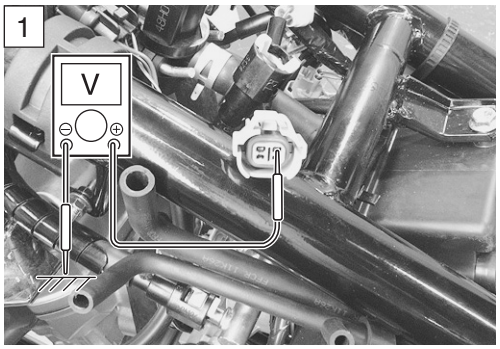
4) Check for proper terminal connection to the injector coupler.
5) If connections are OK, turn the ignition switch ON.
6) Measure the voltage between O/Bl wire and ground.

NOTE:
Voltage can be detected only for 3 seconds after ignition switch is turned ON.

09900-25008: Multi circuit tester set

Tester knob indication: Voltage (⎓)

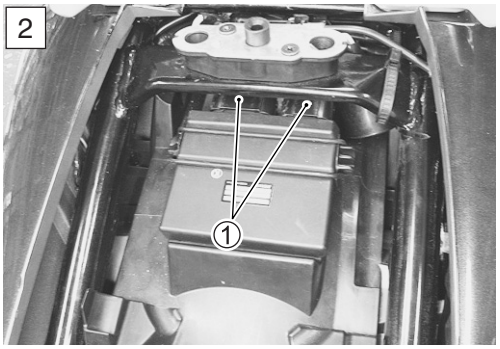
Injector power supply voltage:
Battery voltage
(⊕ terminal: O/Bl – ⊖ terminal: Ground)



Is check result OK?

YES	Go to Step 2.
NO	Repair or replace the O/Bl wire.

Step 2
Injector drive circuit check
1) Turn the ignition switch OFF.
2) Disconnect the ECM couplers ①.

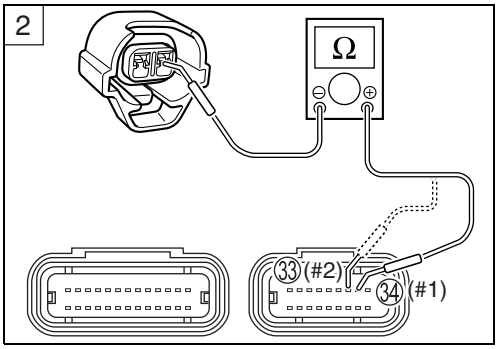


3) Check for proper terminal connection to the ECM couplers.
4) If connections are OK, check the following points.
• Resistance

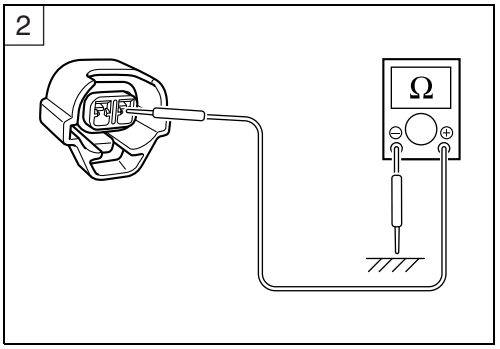
09900-25008: Multi circuit tester set
09900-25009: Needle-point probe set

Tester knob indication: Resistance (Ω)

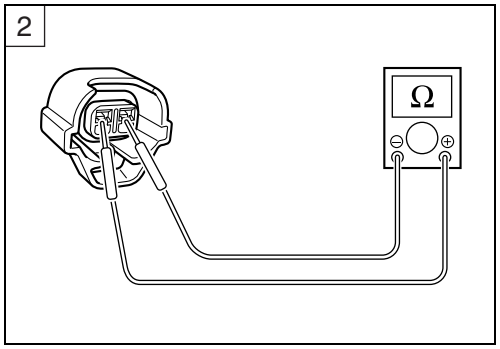
– Between Bl/Y (#1) or Bl/G (#2) wire of injector coupler and ECM coupler: less than 1 Ω



– Between Bl/Y (#1) wire or Bl/G (#2) wire and ground: infinity



– Between Bl/Y (#1) or Bl/G (#2) wire terminal and other terminal at injector coupler: infinity

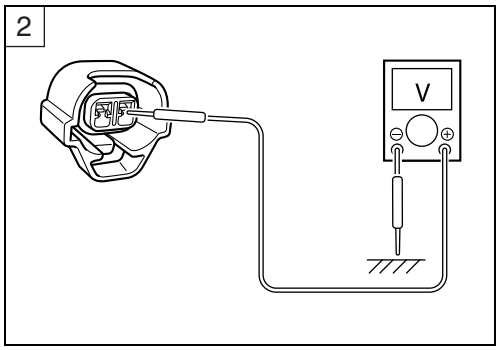


• Voltage

TOOL 09900-25008: Multi circuit tester set

Tester knob indication: Voltage (⎓)

– Between Bl/Y (#1) or Bl/G (#2) and ground wire: approx. 0 V (When ignition switch is ON)



Is check result OK?

YES	Go to Step 3.
NO	Repair or replace the defective wire harness.

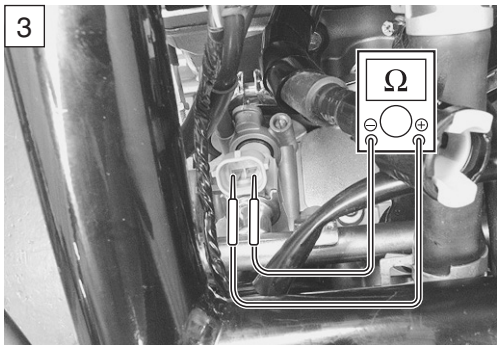
Step 3
Injector check

1) Turn the ignition switch OFF.
2) Measure the injector resistance between terminals.

TOOL 09900-25008: Multi circuit tester set

Tester knob indication: Resistance (Ω)

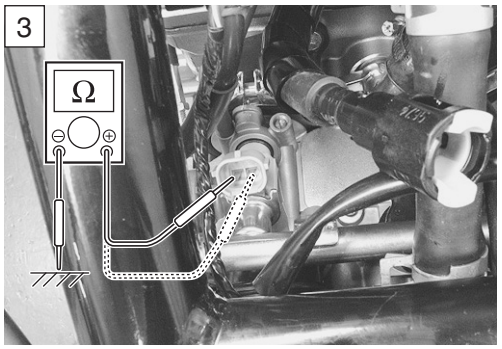
DATA Injector resistance: 11.5 – 12.5 Ω at 20 °C (68 °F) (Terminal – Terminal)



3) If OK, check the continuity between each terminal and ground.

TOOL 09900-25008: Multi circuit tester set

DATA Injector continuity: ∞ Ω (Infinity)



Is check result OK?

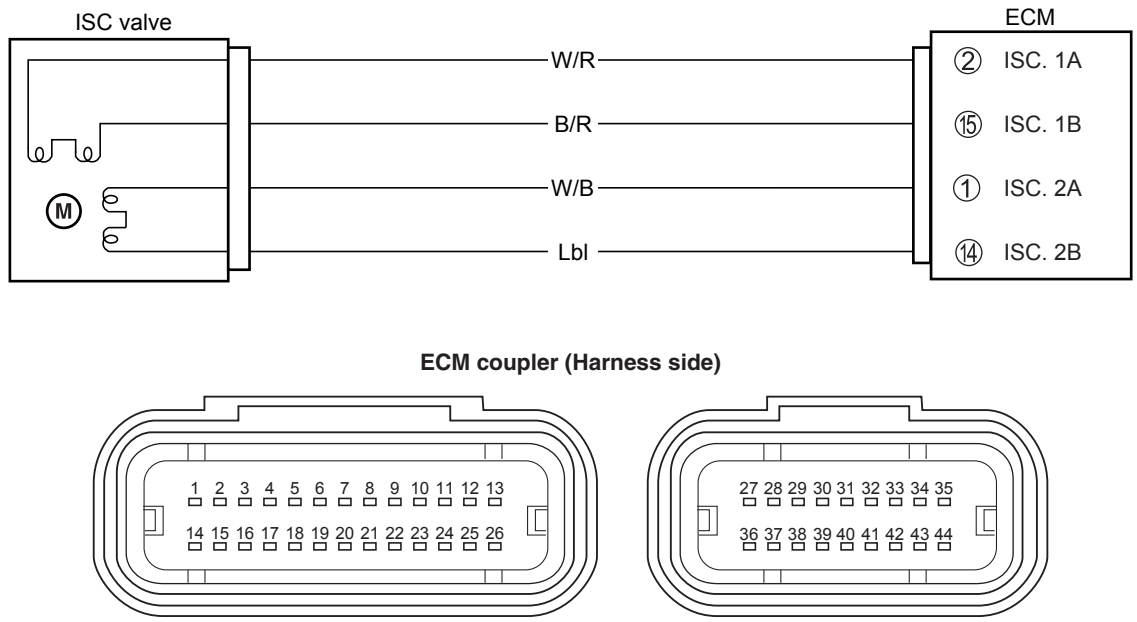
YES	Replace the ECM with a known good one, and inspect it again.
NO	Replace the injector with a new one. (☞5-18)

DTC “C40” (P0505): ISC VALVE CIRCUIT MALFUNCTION

DETECTED CONDITION AND POSSIBLE CAUSE

DETECTED CONDITION	POSSIBLE CAUSE
The circuit voltage of motor drive is unusual.	ISC valve circuit open or shorted to ground.

WIRING DIAGRAM



TROUBLESHOOTING

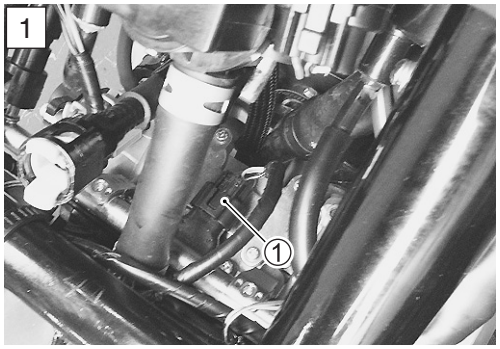
NOTICE

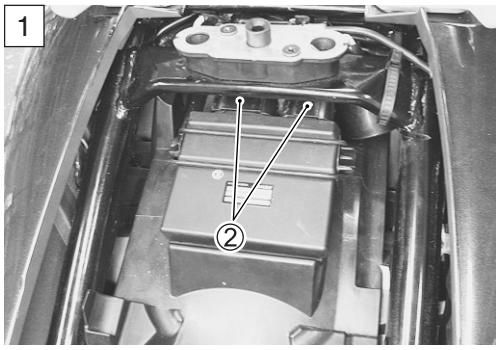
*** Be careful not to disconnect the ISC valve coupler at least 5 seconds after ignition switch is turned to OFF.**
If the ECM coupler or ISC valve coupler is disconnected within 5 seconds after ignition switch is turned to OFF, there is a possibility of an unusual value being written in the ECM and causing an error of ISC valve operation.
*** When using the multi circuit tester, do not strongly touch the terminal of the ECM coupler with a needle-point tester probe to prevent terminal damage.**

NOTE:
After repairing the trouble, clear the DTC using SDS tool. (☞4-25)

Step 1
ISC valve drive circuit check

1) Turn the ignition switch OFF.
2) Remove the fuel tank. (☞5-2)
3) Disconnect the ISC valve coupler ① and ECM couplers ②.





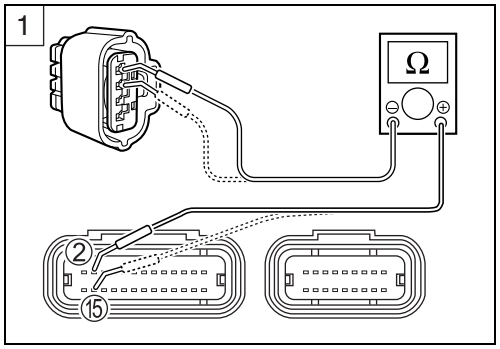
4) Check for proper terminal connection to the ISC valve coupler and ECM couplers.
5) If connections are OK, check the following points.

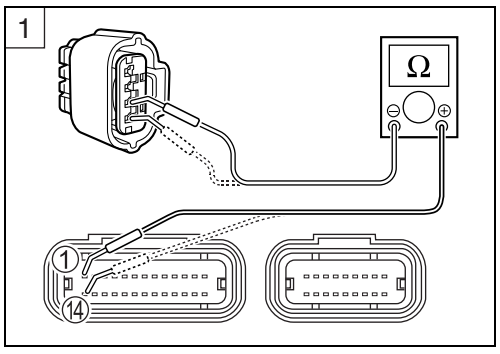
• Resistance

09900-25008: Multi circuit tester set
09900-25009: Needle-point probe set

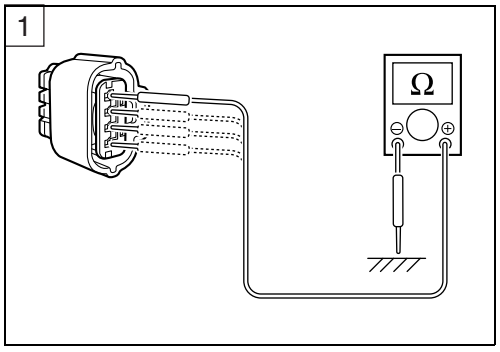
Tester knob indication: Resistance (Ω)

– Between W/R, B/R, W/B and Lbl wires of ISC valve coupler and ECM coupler: less than 1 Ω

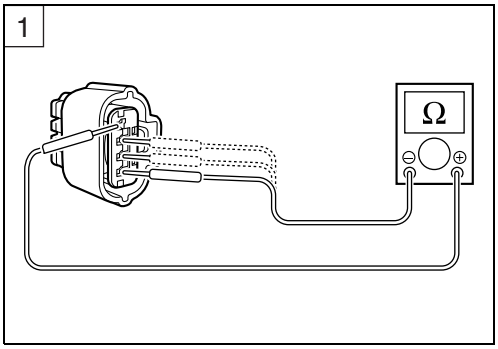




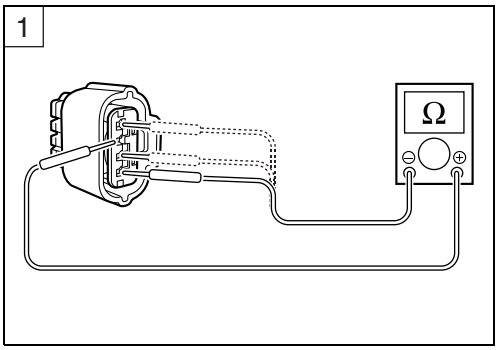
– Between each of W/R, B/R, W/B and Lbl wires and ground: infinity



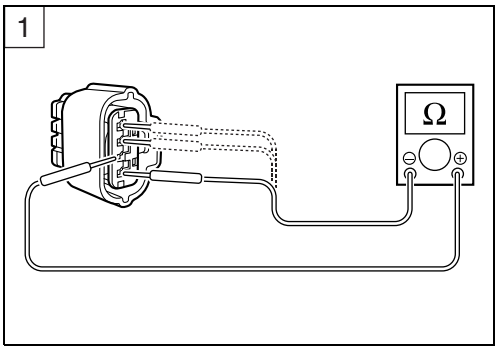
– Between W/R wire terminal and other terminal at ISC valve coupler: infinity



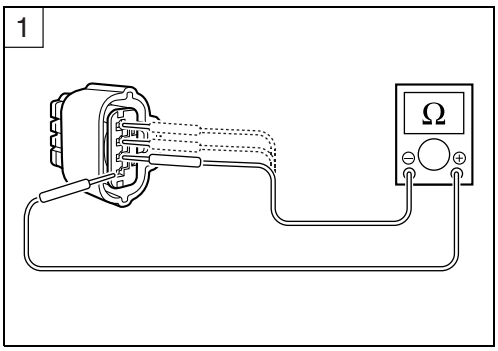
– Between B/R wire terminal and other terminal at ISC valve coupler: infinity



– Between W/B wire terminal and other terminal at ISC valve coupler: infinity



– Between Lbl wire terminal and other terminal at ISC valve coupler: infinity



• Voltage

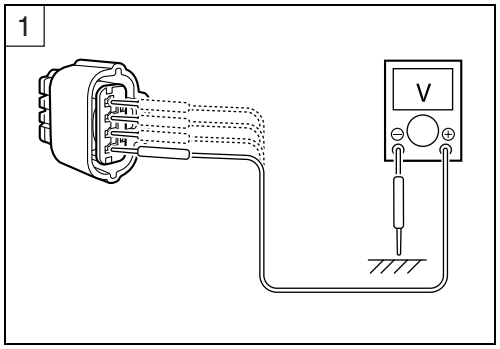
09900-25008: Multi circuit tester set

Tester knob indication: Voltage (⎓)

– Between W/R, B/R, W/B or Lbl wires and ground: approx. 0 V (When ignition switch is ON)

Is check result OK?

YES	Go to Step 2.
NO	Repair or replace the defective wire harness.



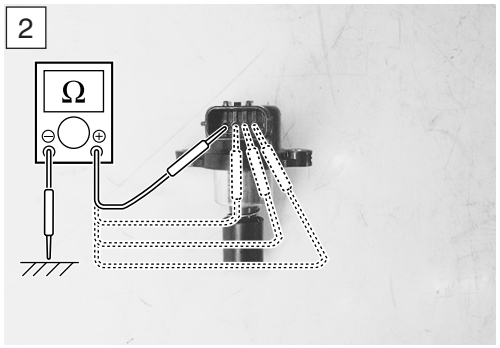
Step 2
ISC valve check

1) Remove the ISC valve. (☞5-18)
2) Check the continuity between each ISC valve terminal and ground.

09900-25008: Multi circuit tester set

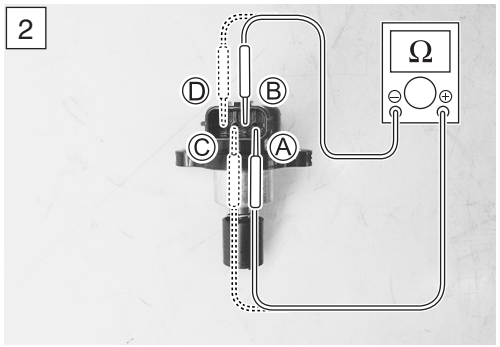
Tester knob indication: Resistance (Ω)

ISC valve continuity: ∞ Ω (Infinity)
(Terminal – Ground)



3) If OK, measure the resistance (between the W/R wire terminal Ⓐ and B/R wire terminal Ⓑ) and (between the W/B wire terminal Ⓒ and Lbl wire terminal Ⓓ).

ISC valve resistance:
Approx. 20 Ω at 20 °C (68 °F)
(Terminal: Ⓐ – Terminal: Ⓑ)
(Terminal: Ⓒ – Terminal: Ⓓ)

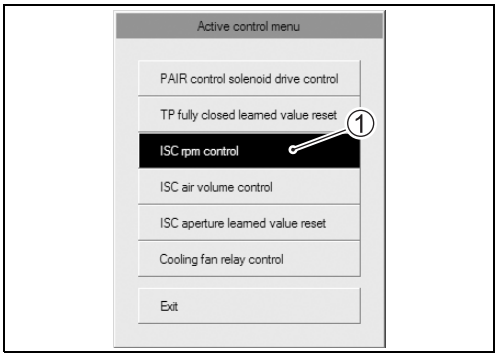


Is check result OK?

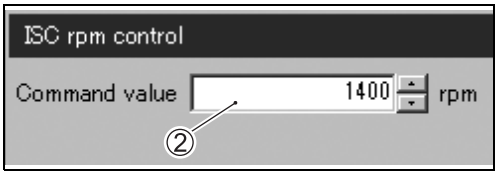
YES	Replace the ECM with a known good one, and inspect it again.
NO	Replace the ISC valve with a new one.

ACTIVE CONTROL INSPECTION (ISC RPM CONTROL)

Check 1



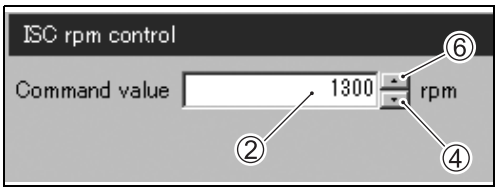
1) Set up the SDS tools. (☞4-24 and refer to the SDS operation manual for further details.)
2) Check that the engine is running.
3) Click the “Active control”.
4) Click the “ISC rpm control” ①.



5) Check that the “Command value” ② is idle speed 1 400 ± 100 rpm.
6) Check that the “Desired idle rpm” ③ is within the specified idle rpm.

Item	Value	Unit
Engine speed	1435	rpm
Throttle position	27.5	°
Manifold absolute pressure 1	43.4	kPa
Engine coolant / oil temperature	40.9	°C
Intake air temperature	34.6	°C
Battery voltage	14.4	V
O2 sensor Bank1-Sensor1	0.3	V
Desired idle rpm	③ 1405	rpm

Check 2

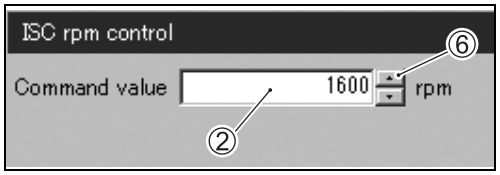


1) Click the button ④ and decrease the “Command value” ② to 1 300 rpm slowly.
2) Check that the “Desired idle rpm” ③ is nearly equal to the “Command value” ②. At the same time, check that the number of steps ⑤ in the ISC valve position decreases.
3) Click the button ⑥ and increase the “Command value” ② slowly.
4) Check that the “Desired idle rpm” ③ is nearly equal to the “Command value” ②. Also, check that the number of steps ⑤ in the ISC valve position increases.

Item	Value	Unit
Engine speed	1409	rpm
Throttle position	27.9	°
Manifold absolute pressure 1	83.3	kPa
Engine coolant / oil temperature	44.7	°C
Intake air temperature	34.0	°C
Battery voltage	14.3	V
O2 sensor Bank1-Sensor1	0.1	V
Desired idle rpm	③ 1305	rpm
ISC valve position	⑤ 76	step

Check 3

1) Click the button ⑥ and increase the “Command value” ② to 1 600 rpm slowly.
2) Check that the “Desired idle rpm” ③ is nearly equal to the “Command value” ②. Also, check that the number of steps ⑤ in the ISC valve position increases.

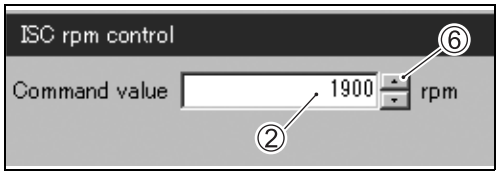


Item	Value	Unit
Engine speed	1528	rpm
Throttle position	27.9	°
Manifold absolute pressure 1	93.1	kPa
Engine coolant / oil temperature	67.3	°C
Intake air temperature	33.4	°C
Battery voltage	14.4	V
O2 sensor Bank1-Sensor1	0.1	V
Desired idle rpm	③ 1606	rpm
ISC valve position	⑤ 86	step

Check 4

1) Click the button ⑥ and increase the “Command value” ② to 1 900 rpm slowly.
2) Check that the “Desired idle rpm” ③ is approx. 1 900 rpm.
3) Check that the “Engine speed” ⑦ is close to 1 900 rpm.

NOTE:
Be careful not to increase the “Command value” to more than 2 000 rpm, or the “Engine speed” may reach the upper limit.



Item	Value	Unit
Engine speed	⑦ 1840	rpm
Throttle position	27.9	°
Manifold absolute pressure 1	93.7	kPa
Engine coolant / oil temperature	77.9	°C
Intake air temperature	33.4	°C
Battery voltage	14.5	V
O2 sensor Bank1-Sensor1	0.1	V
Desired idle rpm	③ 1907	rpm

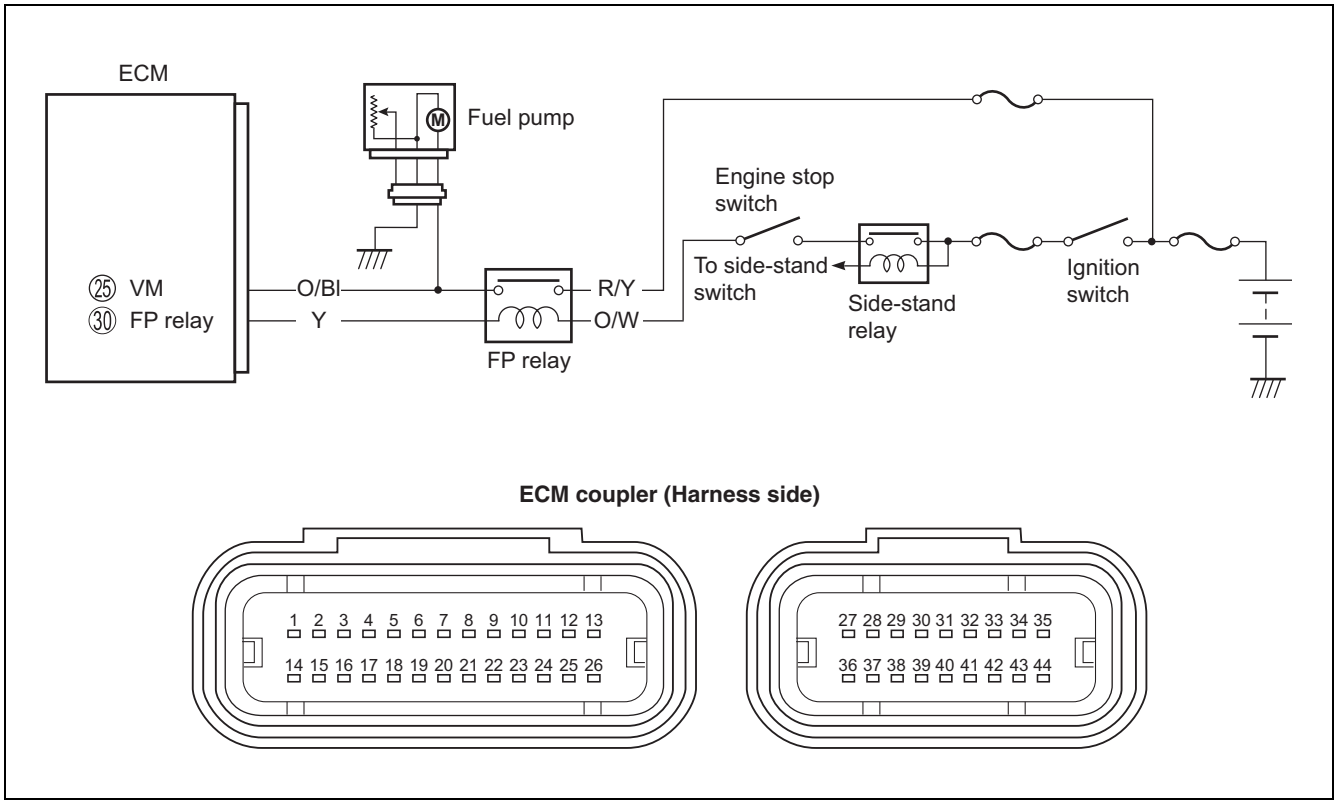
If the ISC valve does not function properly, inspect the ISC valve. (☞5-20)

DTC “C41” (P0230-H/L): FP RELAY CIRCUIT MALFUNCTION

DETECTED CONDITION AND POSSIBLE CAUSE

DETECTED CONDITION			POSSIBLE CAUSE
C41		No voltage is applied to fuel pump.	• FP relay circuit open or short. • FP relay malfunction.
P0230	H	Voltage is applied to fuel pump although FP relay is turned OFF.	• FP relay switch circuit is shorted to power source. • Faulty FP relay (switch side).
	L	No voltage is applied to fuel pump although FP relay is turned ON.	• FP relay coil circuit open or short. • Faulty FP relay (coil side).

WIRING DIAGRAM



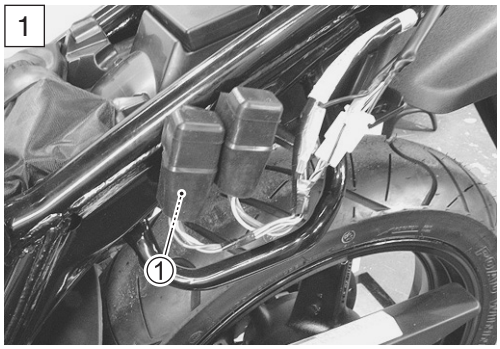
TROUBLESHOOTING

NOTICE

When using the multi circuit tester, do not strongly touch the terminal of the ECM coupler with a needle-point tester probe to prevent terminal damage.

NOTE:
After repairing the trouble, clear the DTC using SDS tool. (☞4-25)

Step 1
FP relay power supply circuit check
1) Turn the ignition switch OFF.
2) Remove the frame upper cover assembly. (☞8-6)
3) Disconnect the FP relay coupler ①.

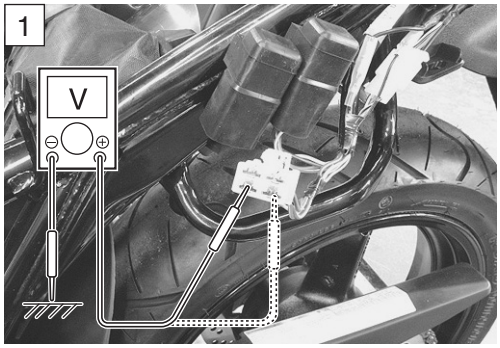


4) Check for proper terminal connection to the FP relay coupler.
5) If connections are OK, turn the ignition switch ON.
6) Check the following points.
- Voltage between O/W wire and ground is battery voltage.
- Voltage between R/Y wire and ground is battery voltage.

TOOL 09900-25008: Multi circuit tester set

Tester knob indication: Voltage (⎓)

DATA FP relay power supply voltage:
Battery voltage
(⊕ terminal: O/W – ⊖ terminal: Ground)
(⊕ terminal: R/Y – ⊖ terminal: Ground)



Is check result OK?

YES	Go to Step 2.
NO	Repair or replace the defective wire harness.

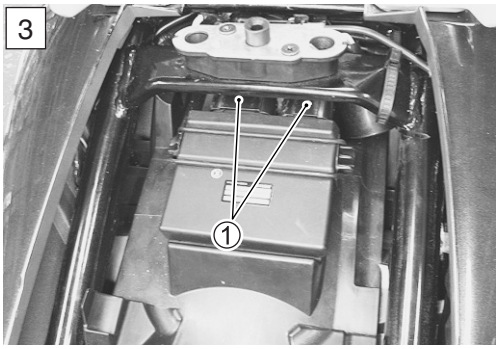
Step 2
FP relay check
Check the FP relay. (☞5-5)

Is check result OK?

YES	Go to Step 3.
NO	Replace the FP relay.

Step 3
FP relay drive circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM couplers ①.



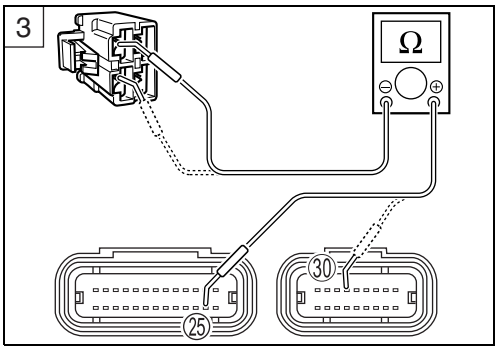
3) Check for proper terminal connection to the ECM couplers.
4) If connections are OK, check the following points.

• Resistance

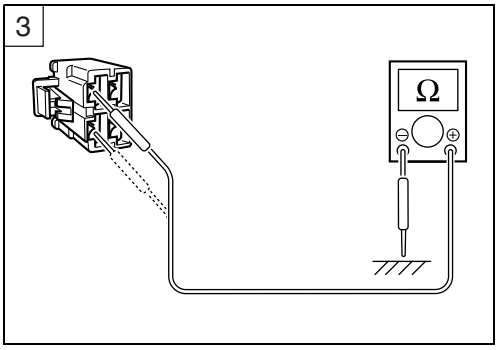
09900-25008: Multi circuit tester set
09900-25009: Needle-point probe set

Tester knob indication: Resistance (Ω)

– Between O/Bl wire and Y wire of FP relay coupler and ECM coupler: less than 1 Ω



– Between O/Bl or Y wire and ground: infinity

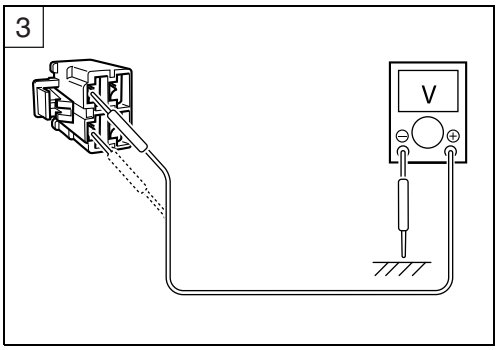


• Voltage

09900-25008: Multi circuit tester set

Tester knob indication: Voltage (⎓)

– Between O/Bl wire or Y wire and ground: approx. 0 V (When ignition switch is ON)



Is check result OK?

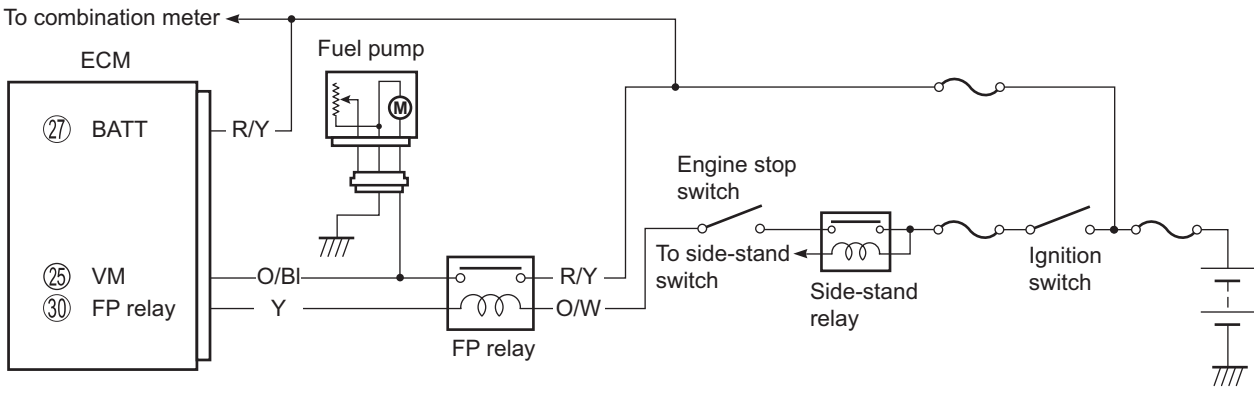
YES	Replace the ECM with a known good one, and inspect it again.
NO	Repair or replace the defective wire harness.

DTC “C41” (P2505): ECM POWER INPUT SIGNAL MALFUNCTION

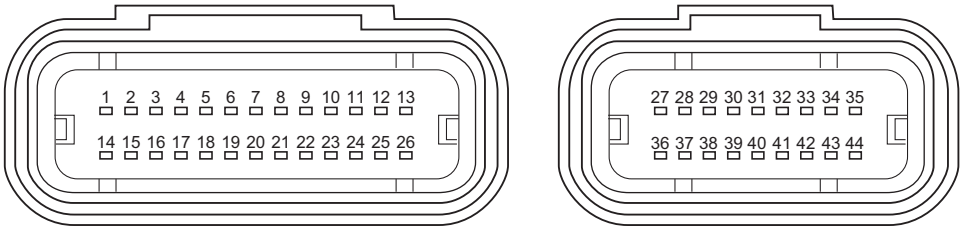
DETECTED CONDITION AND POSSIBLE CAUSE

DETECTED CONDITION	POSSIBLE CAUSE
No voltage is applied to the ECM.	• Lead wire/coupler connection of ECM terminal to fuel fuse. • Fuel fuse.

WIRING DIAGRAM



ECM coupler (Harness side)



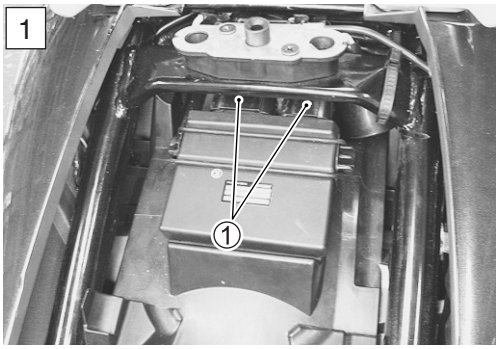
TROUBLESHOOTING

NOTICE

When using the multi circuit tester, do not strongly touch the terminal of the ECM coupler with a needle-point tester probe to prevent terminal damage.

NOTE:
After repairing the trouble, clear the DTC using SDS tool. (☞4-25)

Step 1
ECM power supply circuit check
1) Turn the ignition switch OFF.
2) Remove the seat. (☞8-5)
3) Disconnect the ECM couplers ①.

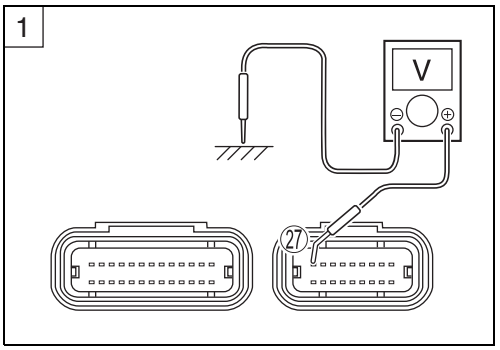


4) Check for proper terminal connection to the ECM couplers.
5) If connections are OK, Measure the voltage between R/Y and ground.

TOOL 09900-25008: Multi circuit tester set
09900-25009: Needle-point probe set

Tester knob indication: Voltage (⎓)

DATA ECM input voltage:
Battery voltage
(⊕ terminal: R/Y – ⊖ terminal: Ground)



Is check result OK?

YES	Replace the ECM with a known good one, and inspect it again.
NO	Check Fuel fuse for blowout. If fuse is not blown, repair or replace the R/Y wire.

DTC "C42" (P1650): IG SWITCH CIRCUIT MALFUNCTION

DETECTED CONDITION AND POSSIBLE CAUSE

DETECTED CONDITION	POSSIBLE CAUSE
Ignition switch signal is not input to the ECM.	• Ignition system circuit open or short. • ECM malfunction.

TROUBLESHOOTING

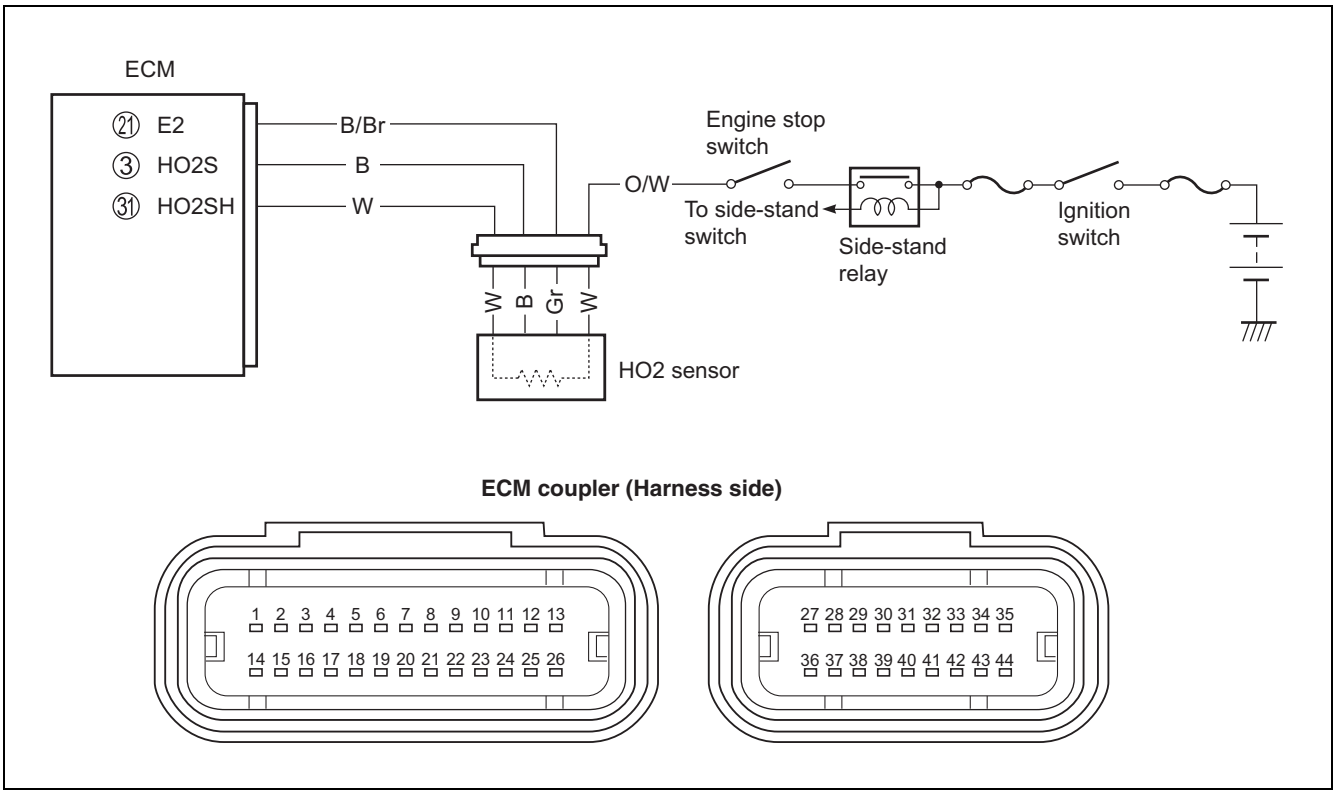
NOTE:
Refer to IGNITION SWITCH INSPECTION for details. (☞9-43)

DTC “C44” (P0130/P0135): HO2 SENSOR (HO2S) CIRCUIT MALFUNCTION

DETECTED CONDITION AND POSSIBLE CAUSE

DETECTED CONDITION		POSSIBLE CAUSE
C44 P0130	HO2 sensor output voltage is not input to ECM specified running condition.	• Output state of HO2 sensor.
C44 P0135	The heater can not operate so that heater operation voltage is not supplied to the oxygen heater circuit.	• Oxygen heater circuit is open or shorted to ground. • Battery voltage is not supplied to the HO2 sensor.

WIRING DIAGRAM



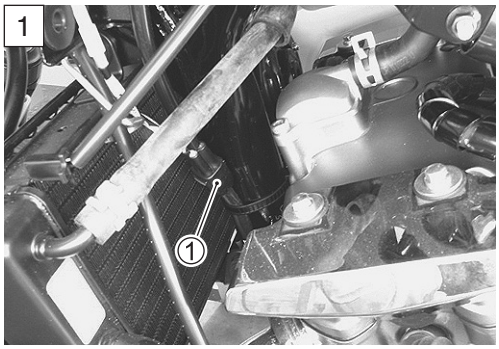
TROUBLESHOOTING

NOTICE

When using the multi circuit tester, do not strongly touch the terminal of the ECM coupler with a needle-point tester probe to prevent terminal damage.

NOTE:
After repairing the trouble, clear the DTC using SDS tool. (☞4-25)

Step 1
HO2 sensor heater power supply circuit check
1) Turn the ignition switch OFF.
2) Disconnect the HO2 sensor coupler ①. (☞4-93)

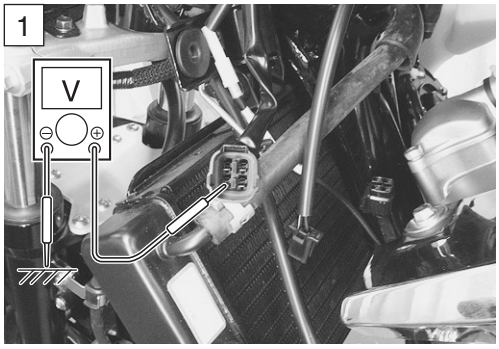


3) Check for proper terminal connection to the HO2 sensor coupler.
4) If connections are OK, turn the ignition switch ON.
5) Measure the voltage between O/W wire and ground.

09900-25008: Multi circuit tester set

Tester knob indication: Voltage (⎓)

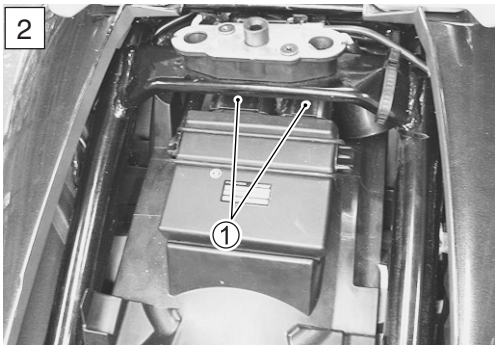
HO2 sensor heater power supply voltage:
Battery voltage
(⊕ terminal: O/W – ⊖ terminal: Ground)



Is check result OK?

YES	Go to Step 2.
NO	Repair or replace the O/W wire.

Step 2
HO2 sensor circuit check
1) Turn the ignition switch OFF.
2) Remove the seat. (☞8-5)
3) Disconnect the ECM couplers ①.

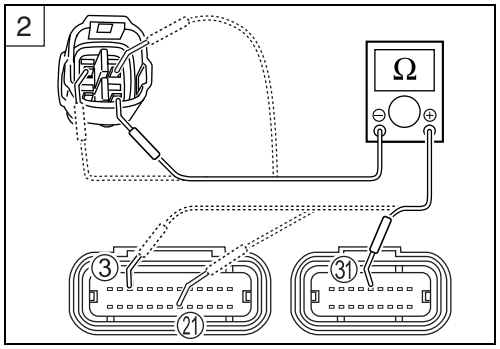


4) Check for proper terminal connection to the ECM couplers.
5) If connections are OK, check the following points.
• Resistance

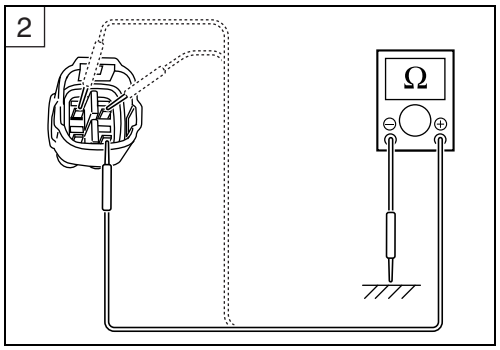
09900-25008: Multi circuit tester set
09900-25009: Needle-point probe set

Tester knob indication: Resistance (Ω)

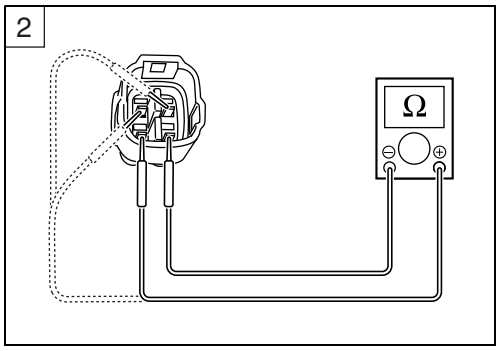
– Between W, B and B/Br wires of HO2 sensor coupler and ECM coupler: less than 1 Ω



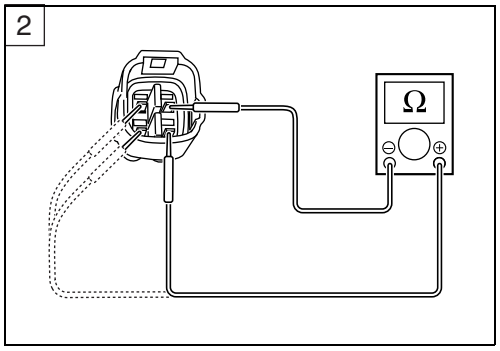
– Between each of W, B and B/Br wires and ground: infinity



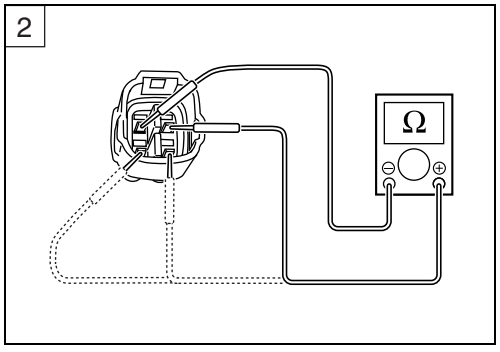
– Between W wire terminal and other terminal at HO2 sensor coupler: infinity



– Between B wire terminal and other terminal at HO2 sensor coupler: infinity



– Between B/Br wire terminal and other terminal at HO2 sensor coupler: infinity



• Voltage

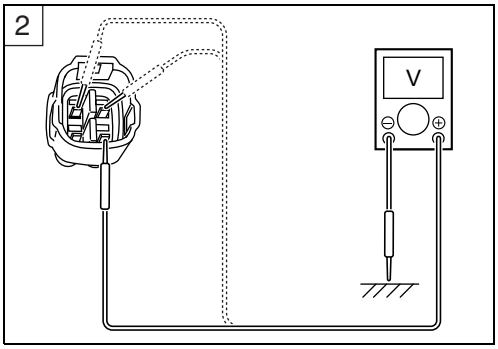
09900-25008: Multi circuit tester set

Tester knob indication: Voltage (⎓)

– Between W, B or B/Br wires and ground: approx. 0 V (When ignition switch is ON)

Is check result OK?

YES	Go to Step 3.
NO	Repair or replace the defective wire harness.



Step 3
HO2 sensor heater check

1) Measure the resistance between terminals.

NOTE:

** Temperature of the HO2 sensor affects resistance value largely.*

** Make sure that the HO2 sensor heater is in atmospheric temperature.*

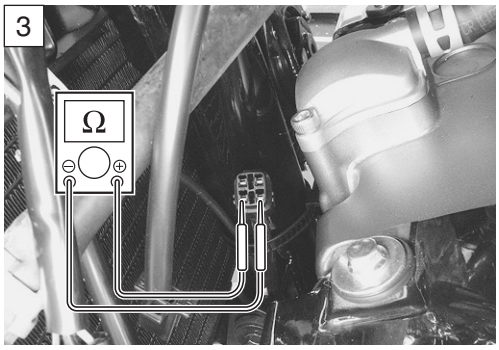
09900-25008: Multi circuit tester set

Tester knob indication: Resistance (Ω)

HO2 sensor heater resistance:
6.7 – 9.5 Ω at 23 °C (73 °F) (W – W)

Is check result OK?

YES	Go to Step 4.
NO	Replace the HO2 sensor with a new one. (☞4-93)



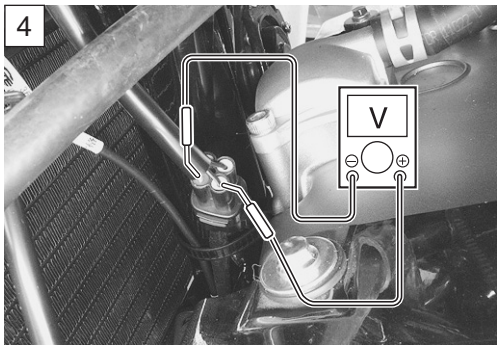
Step 4
HO2 sensor output voltage check

1) Connect the ECM coupler and HO2 sensor coupler.
2) Warm up the engine enough.
3) Insert the needle-point probes to the lead wire coupler.
4) Measure the HO2 sensor output voltage between the B wire and B/Br wire, in idling condition.

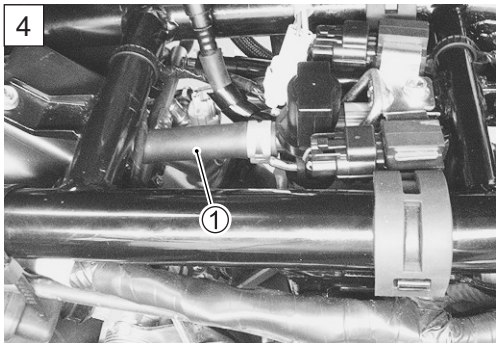
TOOL 09900-25008: Multi circuit tester set
09900-25009: Needle-point probe set

Tester knob indication: Voltage (⎓)

DATA HO2 sensor output voltage at idle speed:
0.4 V or less
(⊕ terminal: B – ⊖ terminal: B/Br)

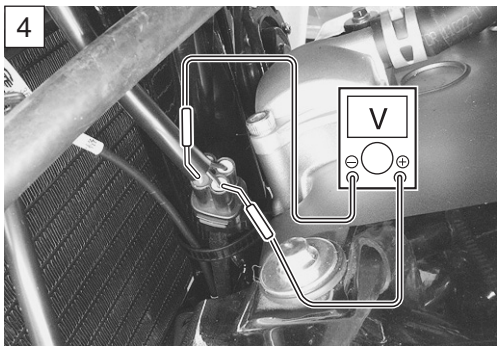


5) If OK, lift and support the fuel tank (☞5-2) and pinch the PAIR hose ① with a proper hose clamp.



6) Measure the HO2 sensor output voltage while holding the engine speed at 5 000 r/min.

DATA HO2 sensor output voltage at 5 000 r/min:
0.6 V or more
(⊕ terminal: B – ⊖ terminal: B/Br)

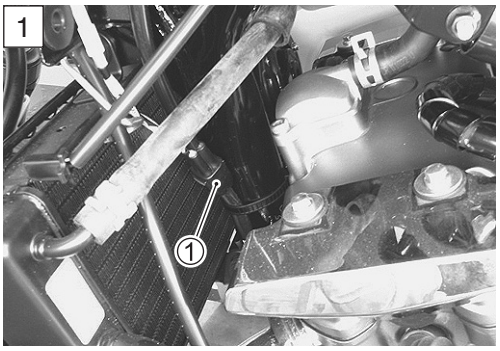


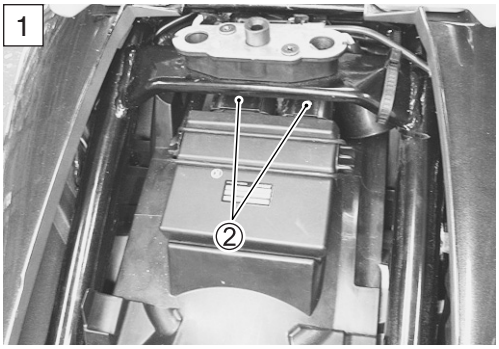
Is check result OK?

YES	Replace the ECM with a known good one, and inspect it again.
NO	Replace the HO2 sensor with a new one. (☞4-93)

P0130 for HO2 sensor (Use of SDS)
Step 1
HO2 sensor circuit check

1) Turn the ignition switch OFF.
2) Remove the seat. (☞8-5)
3) Disconnect the HO2 sensor coupler ① (☞4-93) and ECM couplers ②.





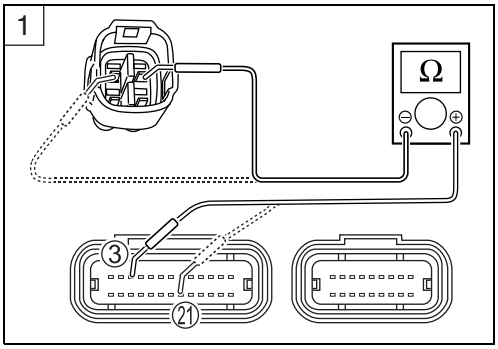
4) Check for proper terminal connection to the HO2 sensor coupler and the ECM couplers.
5) If connections are OK, check the following points.

• Resistance

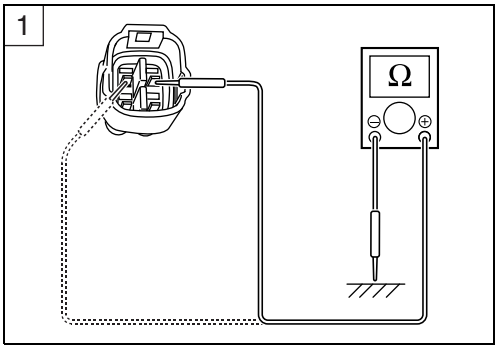
09900-25008: Multi circuit tester set
09900-25009: Needle-point probe set

Tester knob indication: Resistance (Ω)

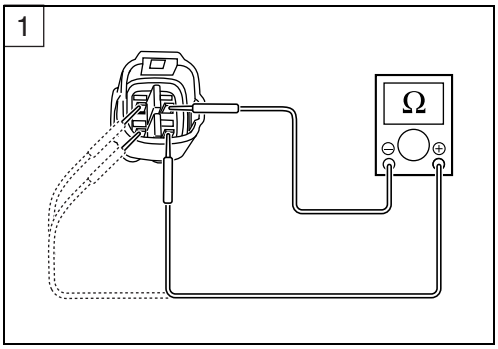
– Between B wire and B/Br wire of HO2 sensor coupler and ECM coupler: less than 1 Ω



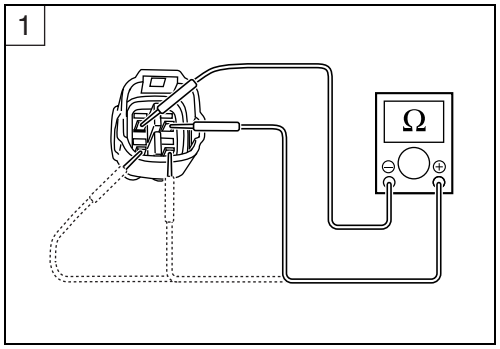
– Between B and B/Br wire and ground: infinity



– Between B wire terminal and other terminal at HO2 sensor coupler: infinity



– Between B/Br wire terminal and other terminal at HO2 sensor coupler: infinity

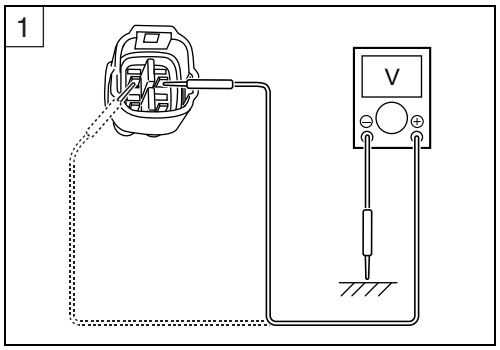


• Voltage

09900-25008: Multi circuit tester set

Tester knob indication: Voltage (⎓)

– Between B wire or B/Br wire and ground: approx. 0 V (When ignition switch is ON)



Is check result OK?

YES	Go to Step 2.
NO	Repair or replace the defective wire harness.

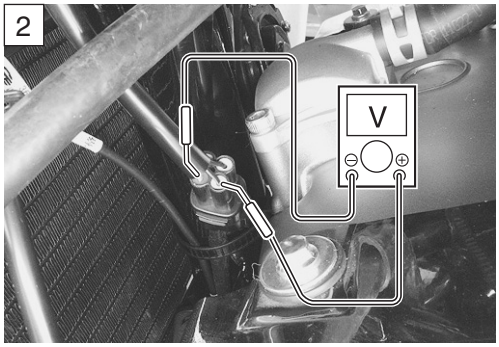
Step 2
HO2 sensor output voltage check

1) Connect the ECM couplers and HO2 sensor coupler.
2) Warm up the engine enough.
3) Insert the needle-point probes to the lead wire coupler.
4) Measure the HO2 sensor output voltage between the B wire and B/Br wire, in idling condition.

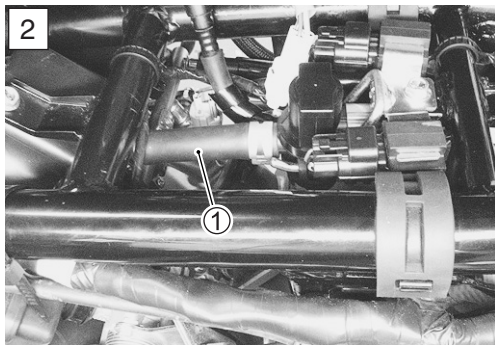
09900-25008: Multi circuit tester set
09900-25009: Needle-point probe set

Tester knob indication: Voltage (⎓)

HO2 sensor output voltage at idle speed:
0.4 V or less
(⊕ terminal: B – ⊖ terminal: B/Br)

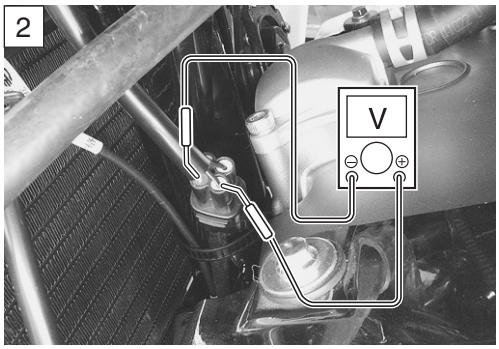


5) If OK, lift and support the fuel tank (☞5-2) and pinch the PAIR hose ① with a proper hose clamp.



6) Measure the HO2 sensor output voltage while holding the engine speed at 5 000 r/min.

DATA HO2 sensor output voltage at 5 000 r/min:
0.6 V or more
(⊕ terminal: B – ⊖ terminal: B/Br)

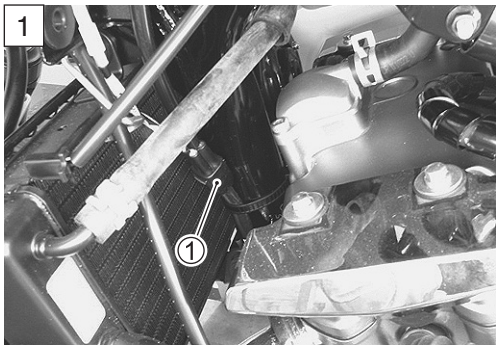


Is check result OK?

YES	Replace the ECM with a known good one, and inspect it again.
NO	Replace the HO2 sensor with a new one. (☞4-93)

P0135 for HO2 sensor (Use of SDS)
Step 1
HO2 sensor heater power supply circuit check

1) Turn the ignition switch OFF.
2) Disconnect the HO2 sensor coupler ①. (☞4-93)

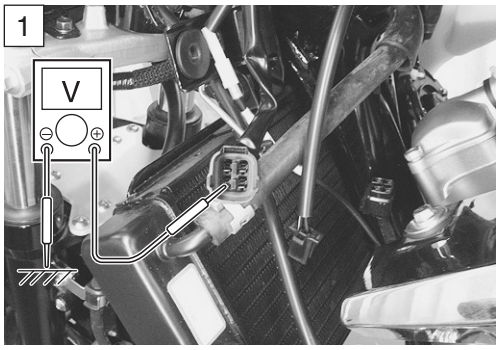


3) Check for proper terminal connection to the HO2 sensor coupler.
4) If connections are OK, turn the ignition switch ON.
5) Measure the voltage between O/W wire and ground.

TOOL 09900-25008: Multi circuit tester set

Tester knob indication: Voltage (⎓)

DATA HO2 sensor heater power supply voltage:
Battery voltage
(⊕ terminal: O/W – ⊖ terminal: Ground)

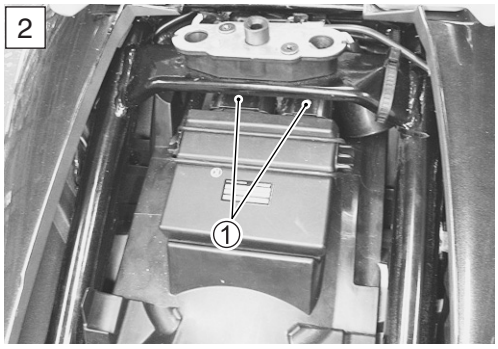


Is check result OK?

YES	Go to Step 2.
NO	Repair or replace the O/W wire.

Step 2
HO2 sensor heater drive circuit check

1) Turn the ignition switch OFF.
2) Remove the seat. (☞8-5)
3) Disconnect the ECM couplers ①.



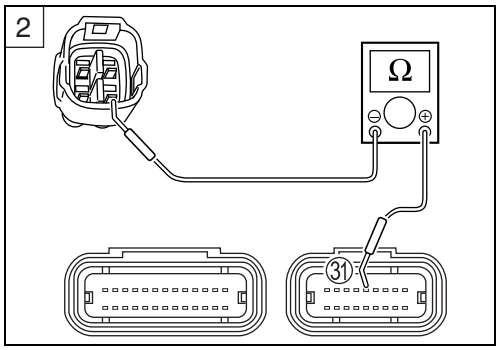
4) Check for proper terminal connection to the ECM couplers.
5) If connections are OK, check the following points.

• Resistance

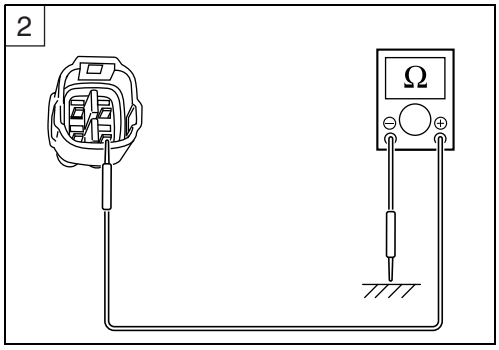
09900-25008: Multi circuit tester set
09900-25009: Needle-point probe set

Tester knob indication: Resistance (Ω)

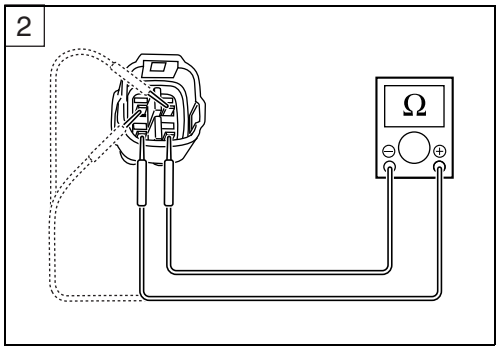
– Between W wire of HO2 sensor coupler and ECM coupler: less than 1 Ω



– Between W wire and ground: infinity



– Between W wire terminal and other terminal at HO2 sensor coupler: infinity



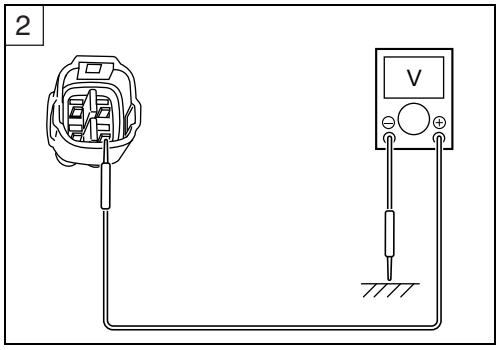
• Voltage

09900-25008: Multi circuit tester set

Tester knob indication: Voltage (⎓)

– Between W wire and ground: approx. 0 V (When ignition switch is ON)

Is check result OK?



YES	Go to Step 3.
NO	Repair or replace the W wire.

Step 3
HO2 sensor heater check

1) Measure the resistance between terminals.

NOTE:

* *Temperature of the HO2 sensor affects resistance value largely.*
* *Make sure that the HO2 sensor heater is in atmospheric temperature.*

09900-25008: Multi circuit tester set

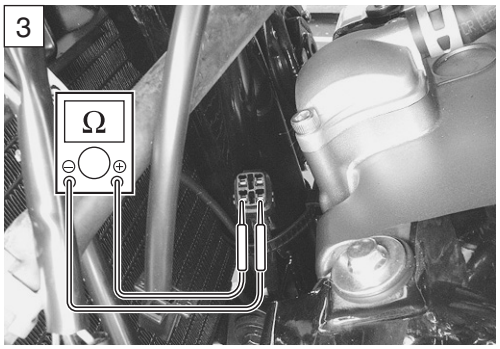
Tester knob indication: Resistance (Ω)

HO2 sensor heater resistance:
6.7 – 9.5 Ω at 23 °C (73 °F) (W – W)

Is check result OK?

YES	Replace the ECM with a known good one, and inspect it again.
NO	Replace the HO2 sensor with a new one. (☞4-93)

3

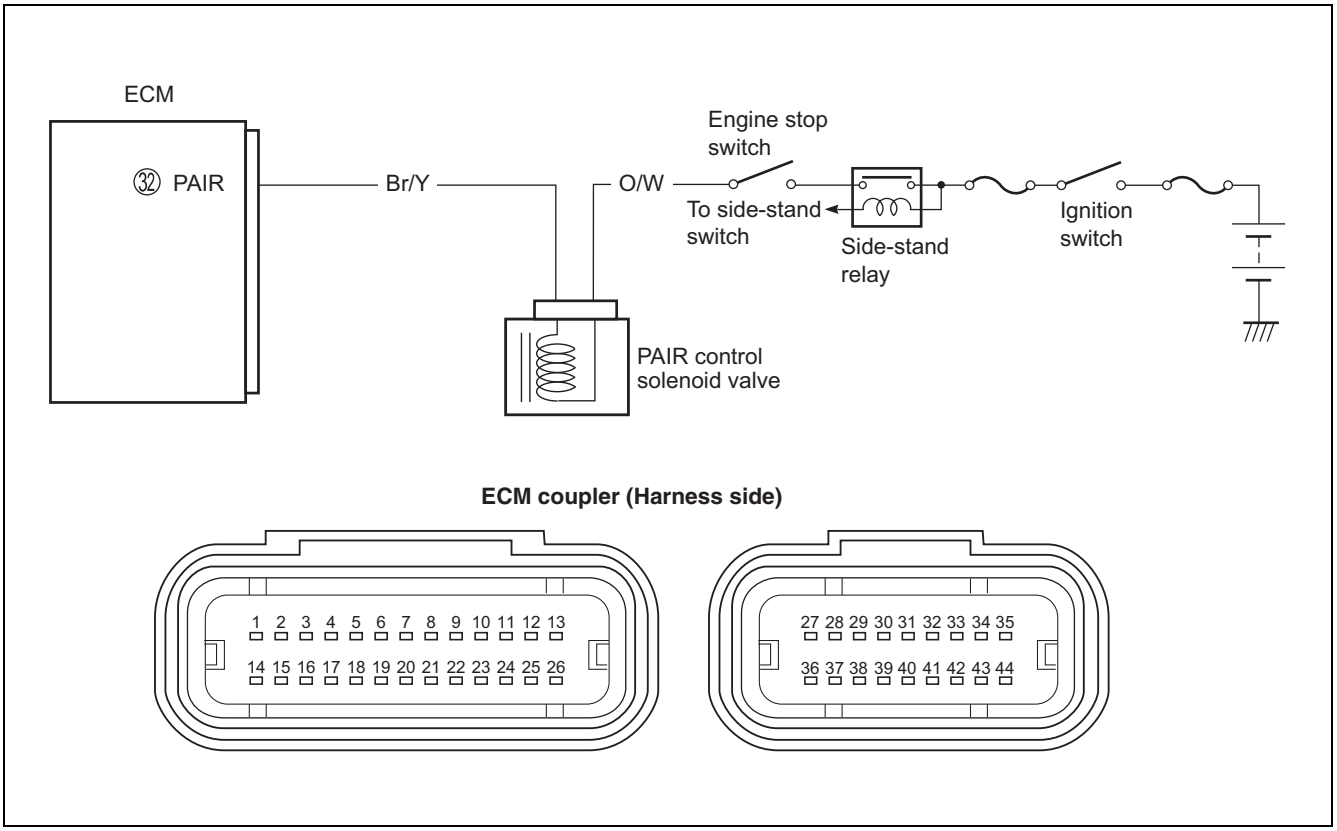


DTC “C49” (P1656): PAIR CONTROL SOLENOID VALVE CIRCUIT MALFUNCTION

DETECTED CONDITION AND POSSIBLE CAUSE

DETECTED CONDITION	POSSIBLE CAUSE
PAIR control solenoid valve voltage is not input to ECM.	• PAIR control solenoid valve circuit open or short. • PAIR control solenoid valve malfunction. • ECM malfunction.

WIRING DIAGRAM



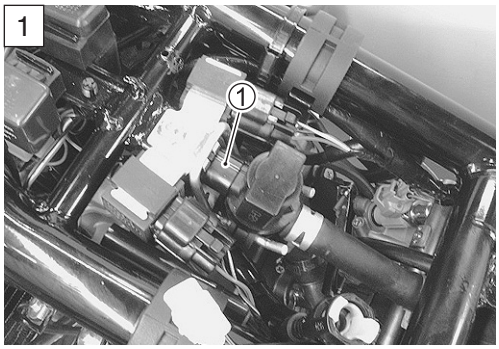
TROUBLESHOOTING

NOTICE

When using the multi circuit tester, do not strongly touch the terminal of the ECM coupler with a needle-point tester probe to prevent terminal damage.

NOTE:
After repairing the trouble, clear the DTC using SDS tool. (☞4-25)

Step 1
PAIR control solenoid valve power supply circuit check
1) Turn the ignition switch OFF.
2) Remove the fuel tank. (☞5-2)
3) Disconnect the PAIR control solenoid valve coupler ①.

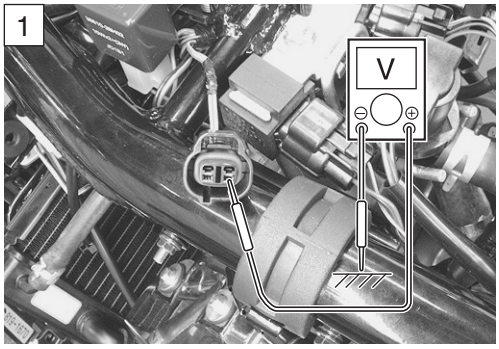


4) Check for proper terminal the PAIR control solenoid valve coupler.
5) If connections are OK, turn the ignition switch ON.
6) Measure the voltage between O/W wire and ground.

TOOL 09900-25008: Multi circuit tester set

Tester knob indication: Voltage (⎓)

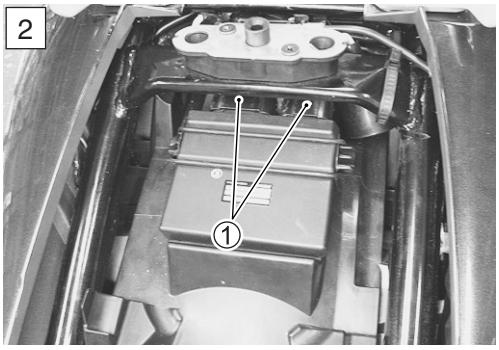
DATA PAIR control solenoid valve power supply voltage: Battery voltage (⊕ terminal: O/W – ⊖ terminal: Ground)



Is check result OK?

YES	Go to Step 2.
NO	Repair or replace the O/W wire.

Step 2
PAIR control solenoid valve drive circuit check
1) Turn the ignition switch OFF.
2) Disconnect the ECM couplers ①.

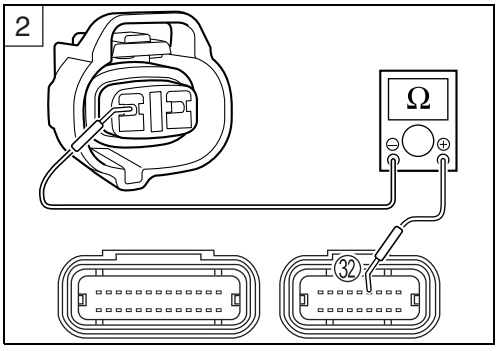


3) Check for proper terminal connection to the ECM couplers.
4) If connections are OK, check the following points.
• Resistance

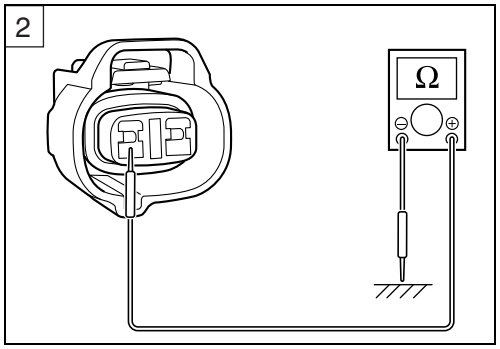
TOOL 09900-25008: Multi circuit tester set
09900-25009: Needle-point probe set

Tester knob indication: Resistance (Ω)

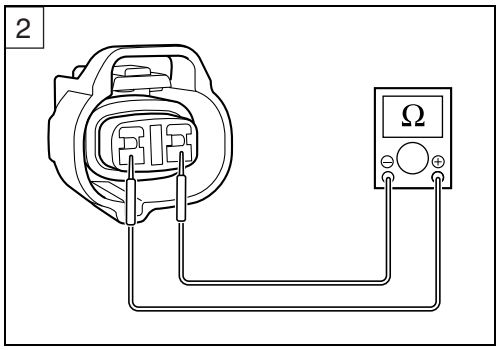
– Between Br/Y wire of PAIR control solenoid valve coupler and ECM coupler: less than 1 Ω



– Between Br/Y wire and ground: infinity



– Between Br/Y wire terminal and other terminal at PAIR control solenoid valve coupler: infinity

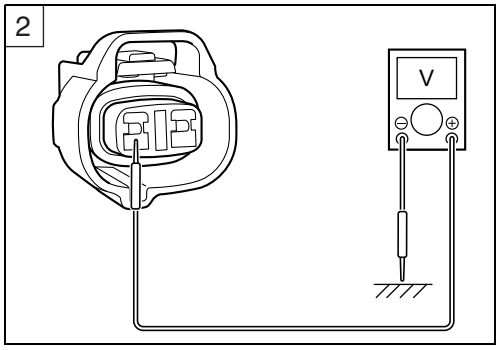


• Voltage

TOOL 09900-25008: Multi circuit tester set

Tester knob indication: Voltage (⎓)

– Between Br/Y wire and ground: approx. 0 V (When ignition switch is ON)



Is check result OK?

YES	Go to Step 3.
NO	Repair or replace the defective wire harness.

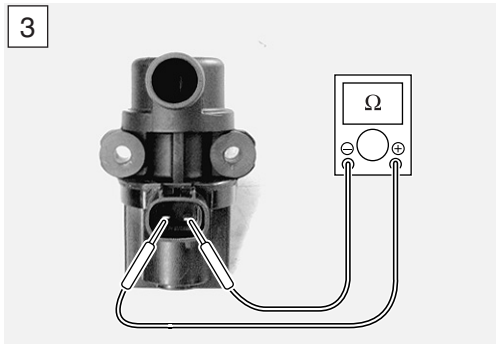
Step 3
PAIR control solenoid valve check

1) Turn the ignition switch OFF.
2) Remove the PAIR control solenoid valve. (☞11-4)
3) Measure the PAIR control solenoid valve resistance between terminals.

TOOL 09900-25008: Multi circuit tester set

Tester knob indication: Resistance (Ω)

DATA PAIR control solenoid valve resistance:
18 – 22 Ω at 20 °C (68 °F)
(Terminal – Terminal)

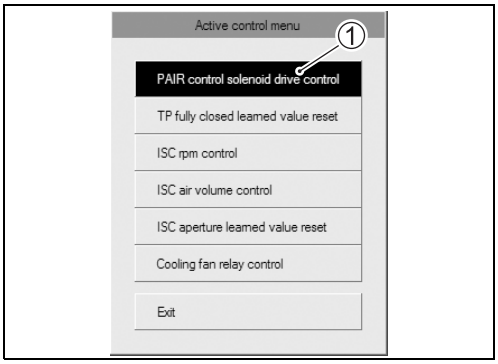


Is check result OK?

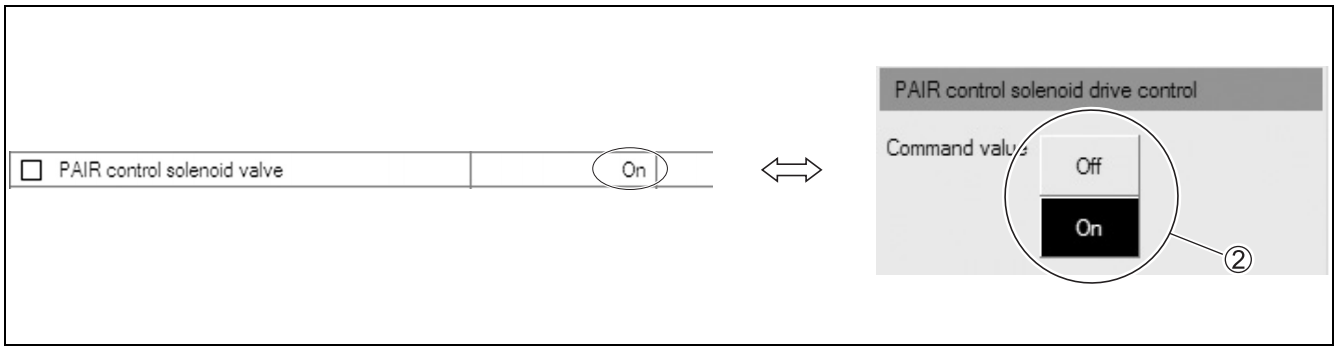
YES	Replace the ECM with a known good one, and inspect it again.
NO	Replace the PAIR control solenoid valve with a new one.

ACTIVE CONTROL INSPECTION

1) Set up the SDS tools. (☞4-24 and refer to the SDS operation manual for further details.)
2) Turn the ignition switch ON.
3) Click “PAIR control solenoid drive control” ①.



4) Click each button ②.
   At this time, if an operation sound is heard from the PAIR control solenoid valve, the function is normal.

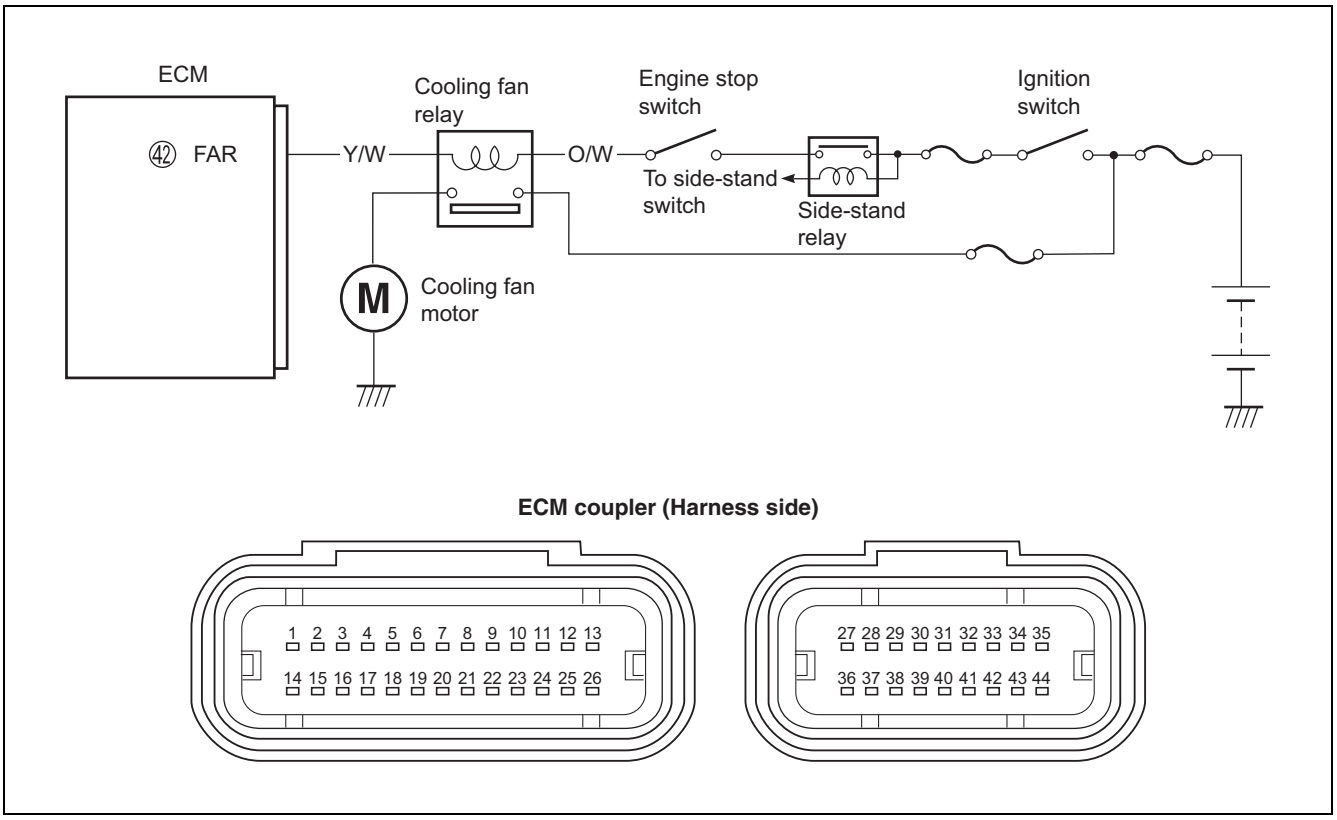


DTC “C60” (P0480): COOLING FAN RELAY CIRCUIT MALFUNCTION

DETECTED CONDITION AND POSSIBLE CAUSE

DETECTED CONDITION	POSSIBLE CAUSE
Cooling fan relay signal is not input to ECM.	• Cooling fan relay circuit open or short. • Cooling fan relay. • ECM malfunction.

WIRING DIAGRAM



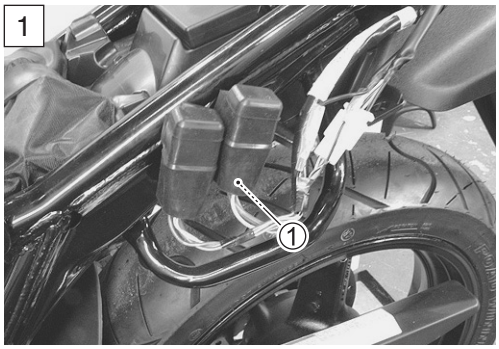
TROUBLESHOOTING

NOTICE

When using the multi circuit tester, do not strongly touch the terminal of the ECM coupler with a needle-point tester probe to prevent terminal damage.

NOTE:
After repairing the trouble, clear the DTC using SDS tool. (☞4-25)

Step 1
Cooling fan relay power supply circuit check
1) Turn the ignition switch OFF.
2) Remove the frame upper cover assembly. (☞8-6)
3) Disconnect the cooling fan relay coupler ①.

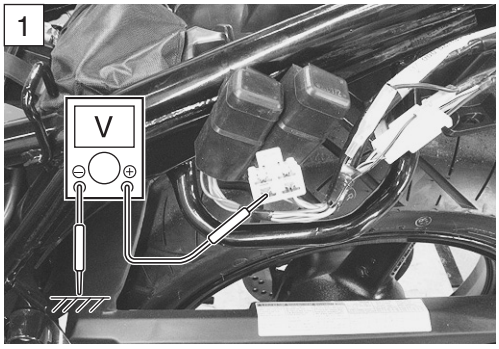


4) Check for proper terminal connection to the cooling fan relay coupler.
5) If connections are OK, turn the ignition switch ON.
6) Measure the voltage between O/W wire and ground.

09900-25008: Multi circuit tester set

Tester knob indication: Voltage (⎓)

Cooling fan relay power supply voltage:
Battery voltage
(⊕ terminal: O/W – ⊖ terminal: Ground)



Is check result OK?

YES	Go to Step 2.
NO	Repair or replace the O/W wire.

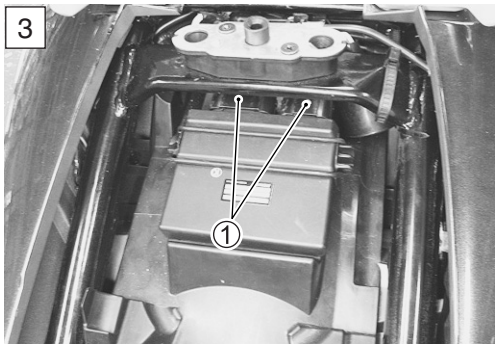
Step 2
Cooling fan relay check
Check the cooling fan relay. (☞7-9)

Is check result OK?

YES	Go to Step 3.
NO	Replace the cooling fan relay.

Step 3
Cooling fan relay drive circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM couplers ①.



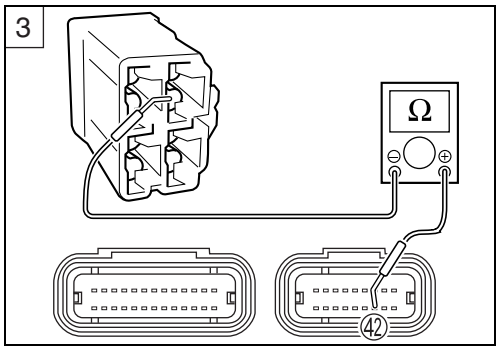
3) Check for proper terminal connection to the ECM couplers.
4) If connections are OK, check the following points.

• Resistance

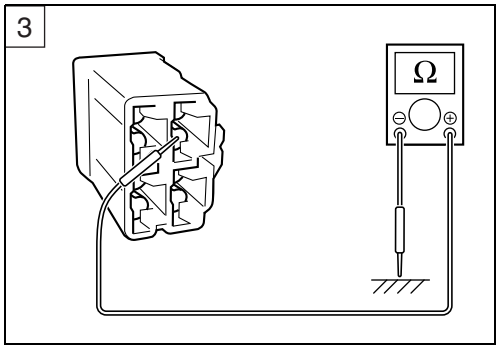
09900-25008: Multi circuit tester set
09900-25009: Needle-point probe set

Tester knob indication: Resistance (Ω)

– Between Y/W wire of cooling fan relay coupler and ECM coupler: less than 1 Ω



– Between Y/W wire and ground: infinity

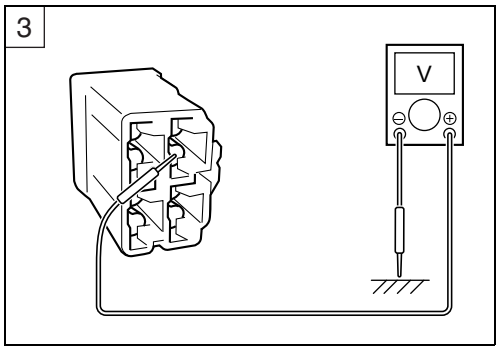


• Voltage

09900-25008: Multi circuit tester set

Tester knob indication: Voltage (⎓)

– Between Y/W wire and ground: approx. 0 V (When ignition switch is ON)

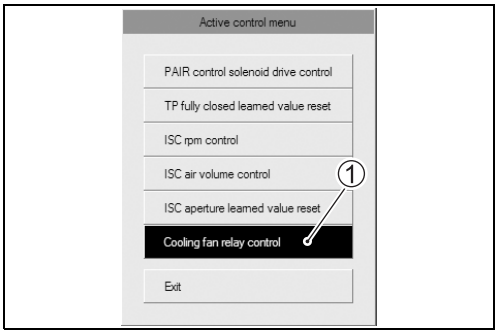


Is check result OK?

YES	Replace the ECM with a known good one, and inspect it again.
NO	Repair or replace the Y/W wire.

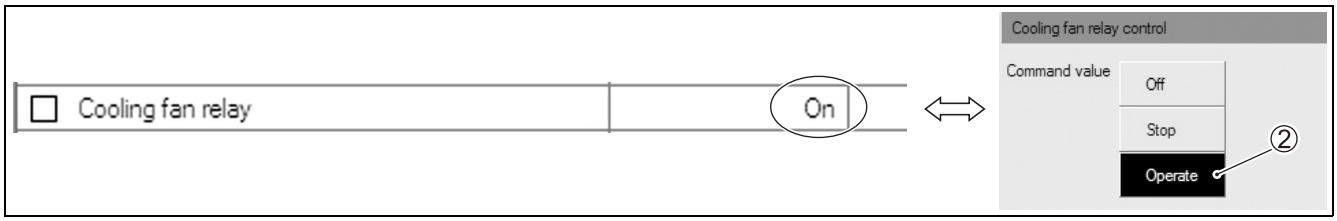
ACTIVE CONTROL INSPECTION

1) Set up the SDS tools. (☞4-24 and refer to the SDS operation manual for further details.)
2) Start the engine and run it idling condition.
3) Click “Cooling fan relay control” ①.

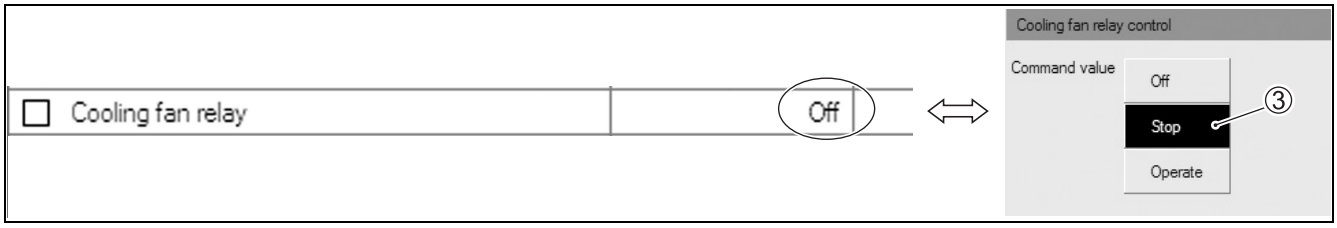


4) Click the “Operate” ②.
   At this time, if an operation sound is heard from the cooling fan relay and cooling fan motor is operated, the function is normal.

NOTE:
The cooling fan relay and cooling fan motor inspection is operational at any engine coolant temperature until reaching 100 °C (212 °F).



5) Click the “Stop” ③ to check the operation properly.

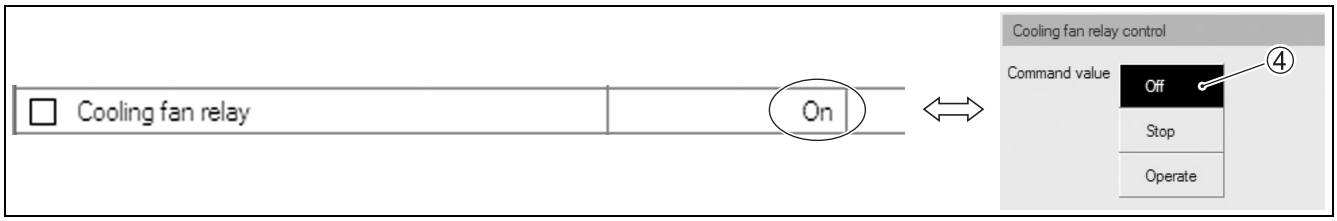


6) Click the “Off” ④ to check the cooling fan relay and cooling fan motor operation.

NOTE:

** This inspection should be begun from when the engine coolant temperature is below 50 °C (122 °F). Check that the cooling fan relay operates for a few seconds as the engine coolant temperature reaches each temp. of 50 °C (122 °F), 70 °C (158 °F) and 90 °C (194 °F)/above 4 000 r/min. It is cooling fan motor malfunction or its circuit failure when the motor would not run even if the relay turns ON.*

** There is a tolerance of operating temperature of cooling fan relay.*



DTC "C65" (P0506/P0507): IDLE SPEED MALFUNCTION

DETECTED CONDITION AND POSSIBLE CAUSE

DETECTED CONDITION		POSSIBLE CAUSE
C65	Idle speed rose higher than or dropped lower than desired idle speed by more than specified range.	• Air passage clogged. • ISC valve is fixed. • Idle speed malfunction. • Air leakage.
P0506	Idle speed dropped lower than desired idle speed by more than specified range.	
P0507	Idle speed rose higher than desired idle speed by more than specified range.	

TROUBLESHOOTING

NOTICE

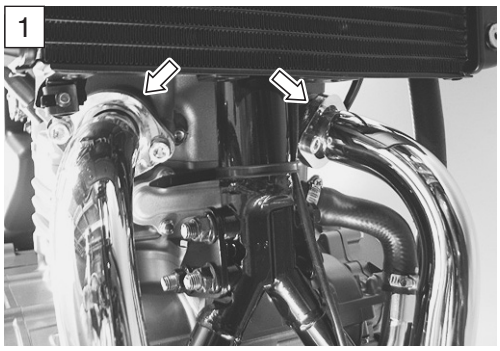
Be careful not to disconnect the ISC valve coupler at least 5 seconds after ignition switch is turned to OFF.
If the ECM coupler is disconnected within 5 seconds after ignition switch is turned to OFF, there is a possibility of an unusual value being written in the ECM and causing an error of ISC valve operation.

NOTE:
After repairing the trouble, clear the DTC using SDS tool. (☞4-25)

Step 1
Engine combustion check
1) Run the engine at idle speed.
2) By spraying water to exhaust pipes from #1 and #2, check evaporation from each of them to make sure for equal combustion among cylinders.

Is check result OK?

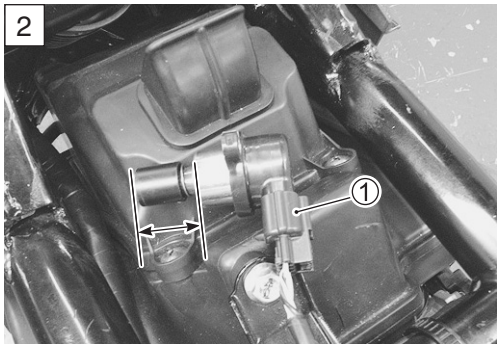
YES	Go to Step 2.
NO	Repair or replace defective parts.



Step 2
ISC valve initial check
1) Turn the ignition switch OFF.
2) Remove the ISC valve. (☞5-18)
3) Connect the ISC valve coupler ①.
4) Turn the ignition switch ON and then OFF again.
5) While performing above step 4), check that the ISC valve moves from fully open position to fully closed position.

Is check result OK?

YES	Install the ISC valve (☞5-20) and go to Step 3.
NO	Replace the ISC valve with a new one. (☞5-20)

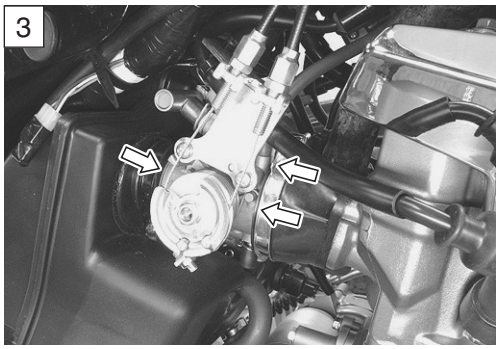


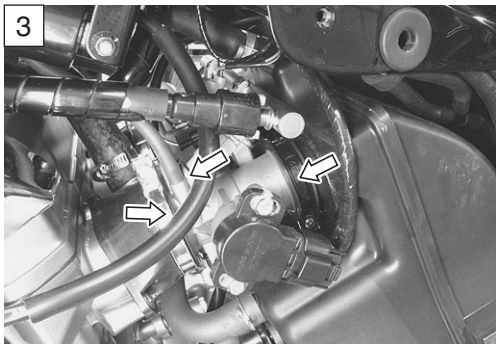
Step 3
Air intake system check

1) Check air intake system for clogging and leakage.

Is check result OK?

YES	Go to Step 4.
NO	Repair or replace defective parts.





Step 4
Engine mechanical systems check

1) Check the following points related to engine mechanical system.
- Engine compression. (☞2-27)
- Fuel pressure. (☞5-3)

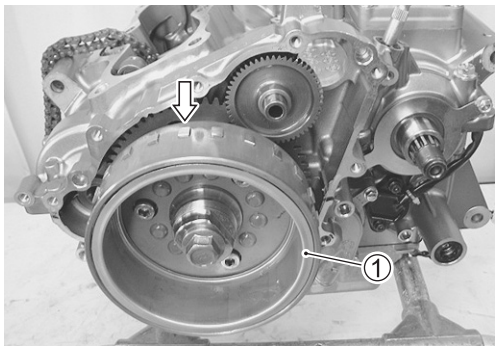
Is check result OK?

YES	Replace the ECM with a known good one, and inspect it again.
NO	Repair or replace defective parts.

SENSORS

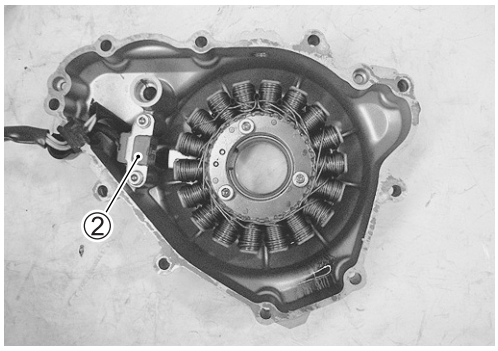
CKP SENSOR INSPECTION

The signal rotor is mounted on the generator rotor ① and CKP sensor ② is installed at the inside of the generator cover. (☞9-25)



CKP SENSOR REMOVAL AND INSTALLATION

- Remove the generator cover. (☞3-19)
- Remove the CKP sensor ②.
- Install the CKP sensor in the reverse order of removal. (☞3-44)

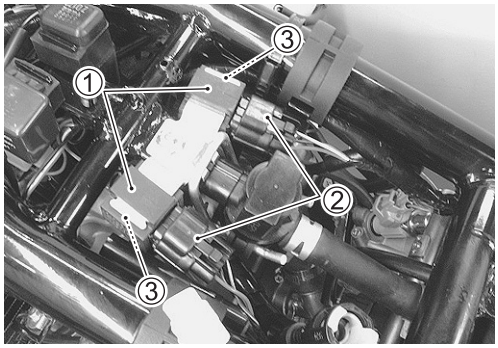


IAP SENSOR INSPECTION

The IAP sensors ① are installed under the fuel tank. (☞4-34)

IAP SENSOR REMOVAL AND INSTALLATION

- Remove the fuel tank. (☞5-2)
- Disconnect the IAP sensor couplers ②.
- Remove the IAP sensors ① from the bracket.
- Disconnect the vacuum hoses ③.
- Install the IAP sensors in the reverse order of removal.



TP SENSOR INSPECTION

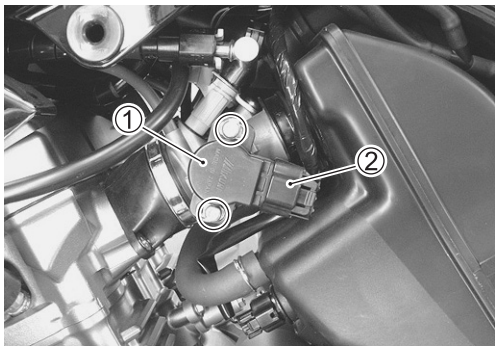
The TP sensor ① is installed on the #1 throttle body. (☞4-38)

TP SENSOR REMOVAL AND INSTALLATION

- Remove the left frame front cover. (☞8-4)
- Disconnect the TP sensor coupler ② and remove the TP sensor ①.

TOOL 09930-11950: Torx® wrench (T25H)

- Install the TP sensor to the throttle body. (☞5-16)
- Reinstall the removed parts.
- Adjust the TP sensor. (☞4-19)
- Reset the TP sensor. (☞5-22)

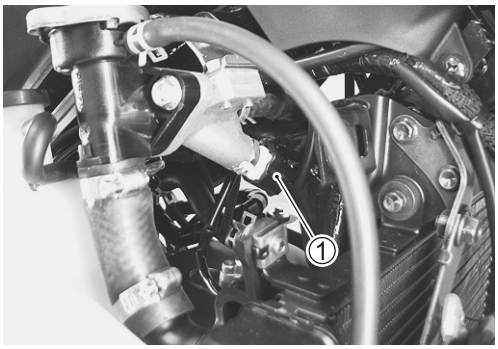


TPS ADJUSTMENT

- Adjust the TP sensor. (☞4-19)

ECT SENSOR INSPECTION

The ECT sensor ① is installed at the thermostat connector. (☞7-10)



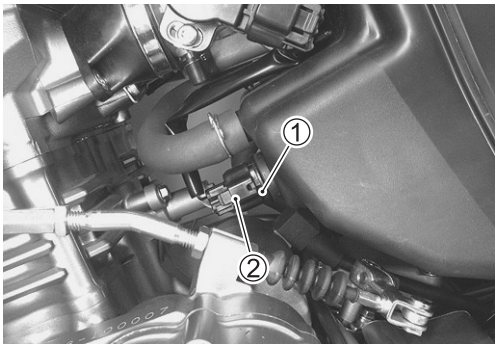
ECT SENSOR REMOVAL AND INSTALLATION

- Remove the ECT sensor ①. (☞7-9)
- Install the ECT sensor in the reverse order of removal.

ECT sensor: 18 N·m (1.8 kgf-m, 13.0 lbf-ft)

IAT SENSOR INSPECTION

The IAT sensor ① is installed in front of the air cleaner box. (☞4-46)

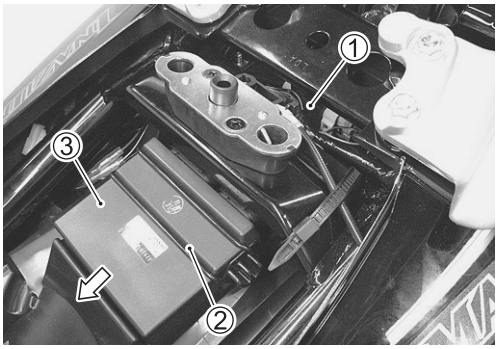


IAT SENSOR REMOVAL AND INSTALLATION

- Disconnect the IAT sensor coupler ② and remove the IAT sensor ①.
- Install the IAT sensor in the reverse order of removal.

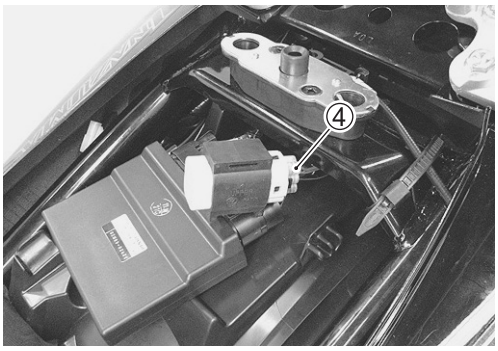
TO SENSOR INSPECTION

The TO sensor ① is located under the pillion rider handle. (☞4-50)



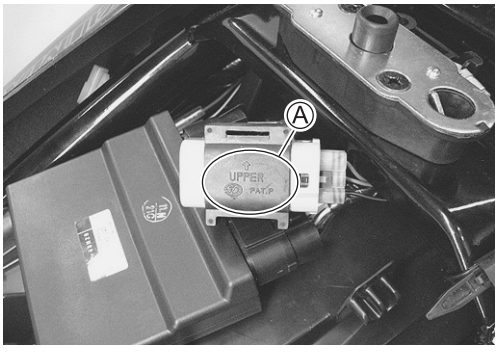
TO SENSOR REMOVAL AND INSTALLATION

- Remove the seat. (☞8-5)
- Remove the band ② and move the ECM ③ forward.
- Dismount the TO sensor ① from its bracket and disconnect the TO sensor coupler ④.



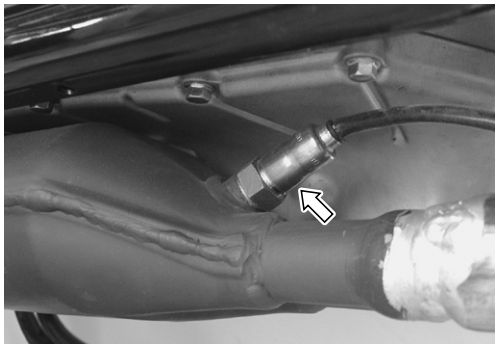
- Install the TO sensor in the reverse order of removal. (☞10-39)

NOTE:
When installing the TO sensor, the arrow mark Ⓐ must be pointed upward.



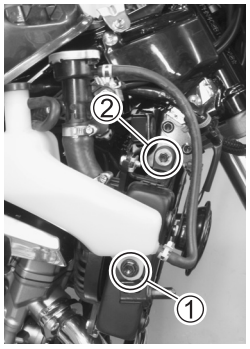
HO2 SENSOR INSPECTION

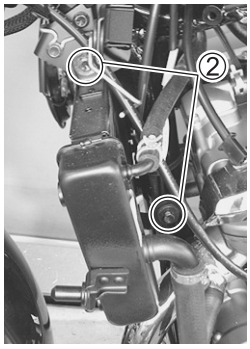
The heated oxygen sensor is installed to the muffler chamber. (☞4-71)



HO2 SENSOR REMOVAL AND INSTALLATION

- Remove the left and right fuel tank covers. (☞8-5)
- Remove the reservoir tank mounting bolt ① and radiator mounting bolts ②.





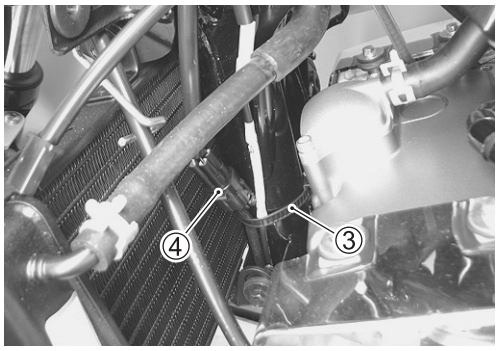
- Remove the clamps ③ and disconnect the HO2 sensor coupler ④.
- Remove the HO2 sensor ⑤.

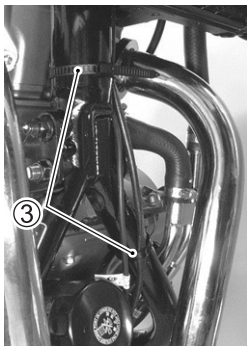
⚠ WARNING

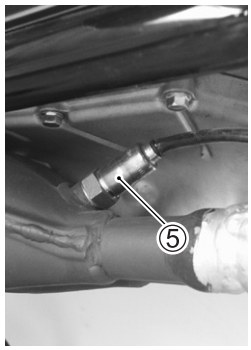
Do not remove the HO2 sensor while it is hot.

NOTICE

*** Be careful not to expose the HO2 sensor to excessive shock.**
*** Do not use an impact wrench when removing or installing the HO2 sensor.**
*** Be careful not to twist or damage the sensor lead wires.**







• Install the HO2 sensor is in the reverse order of removal. Pay attention to the following points:

NOTICE

Do not apply oil or other materials to the sensor air hole.

• Apply anti-seize compound to thread part ⓐ of HO2 sensor.
• Tighten the HO2 sensor ⑤ to the specified torque.

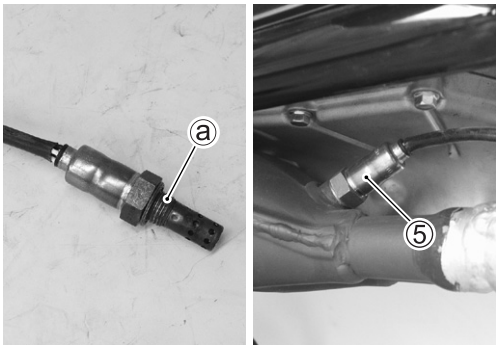
HO2 sensor: 25 N·m (2.5 kgf-m, 18.0 lbf-ft)

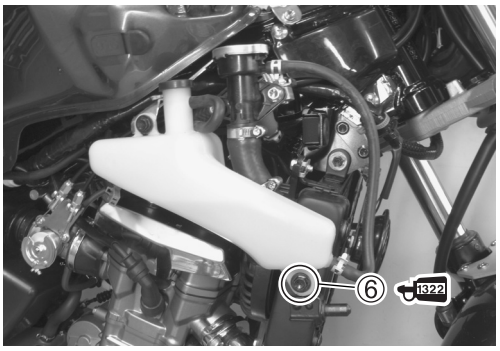
• Clamp the HO2 sensor lead wire. (☞10-14)

• Apply thread lock to the reservoir tank mounting bolt ⑥ and tighten it to the specified torque.

Reservoir tank mounting bolt:
6 N·m (0.6 kgf-m, 4.5 lbf-ft)

99000-32110: THREAD LOCK CEMENT SUPER "1322" or equivalent





FUEL SYSTEM AND THROTTLE BODY

CONTENTS

5

⚠ WARNING

* Keep away from fire or spark.
* During disassembling, use care to minimize spillage of gasoline.
* Spilled gasoline should be wiped off immediately.
* Work in a well-ventilated area.

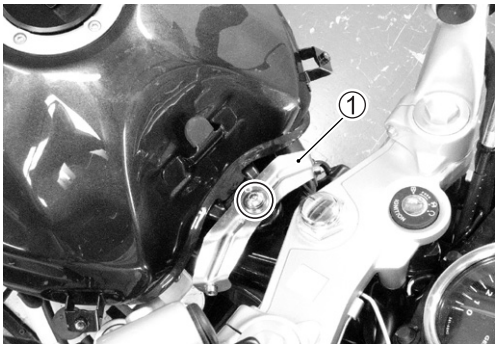
NOTICE

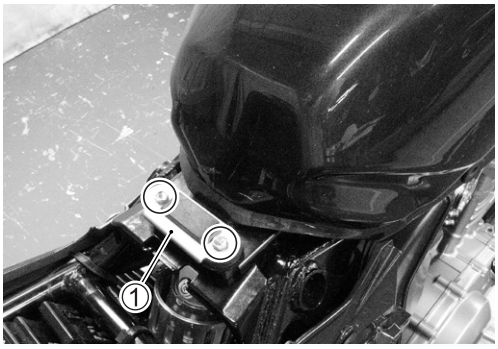
* To prevent the fuel system (fuel tank, fuel hose, etc.) from contamination with foreign particles, blind all openings.
* After removing the throttle body, tape the cylinder intake section to prevent foreign particles from entering.

FUEL SYSTEM

FUEL TANK REMOVAL

- Remove the seat. (☞8-5)
- Remove the fuel tank covers. (☞8-5)
- Remove the fuel tank bolts and brackets ①.

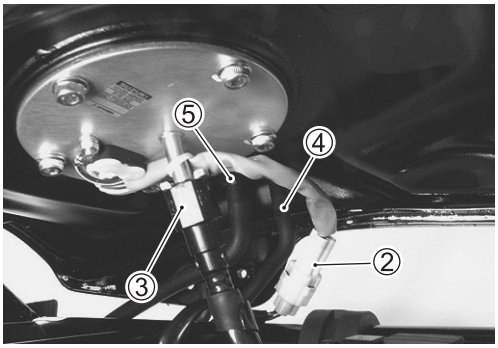




- Lift and support the fuel tank.

NOTE:
Do not lift the fuel tank too much, or the fuel feed hose ③ will be bent or twisted.

- Disconnect the fuel pump lead wire coupler ②.
- Place a rag under the fuel feed hose ③ and disconnect the fuel feed hose ③.



NOTE:
When removing the fuel tank, do not leave the fuel feed hose ③ on the fuel tank side.

⚠ WARNING

*** Keep away from fire or spark.**
*** Spilled gasoline should be wiped off immediately.**
*** Work in a well-ventilated area.**

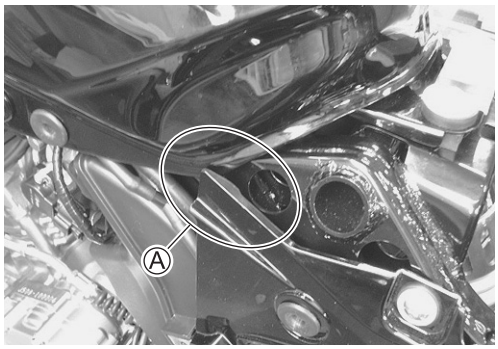
- Disconnect the fuel tank breather hose ④ and fuel tank water drain hose ⑤.
- Remove the fuel tank.

FUEL TANK INSTALLATION

- Installation is in the reverse order of removal. Pay attention to the following point:

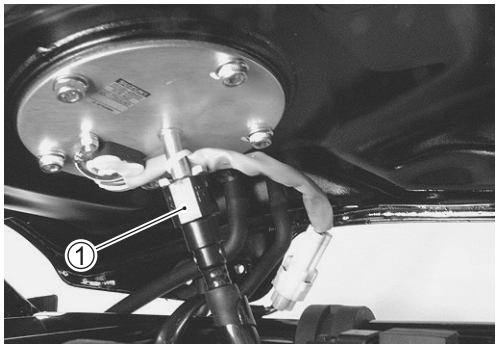
NOTE:
Connect the fuel feed hose to the fuel pump until it locks securely (a click is heard).

- Place the front end Ⓐ of the right and left frame upper covers outside of the fuel tank.



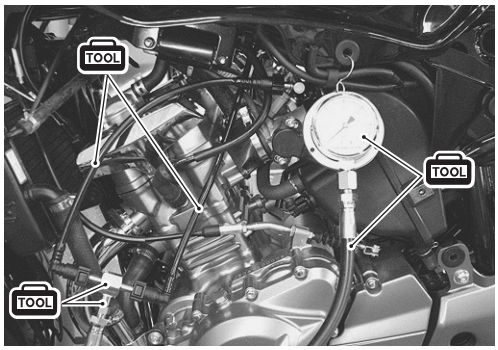
FUEL PRESSURE INSPECTION

- Lift and support the fuel tank. (☞5-2)
- Place a rag under the fuel feed hose ①.
- Remove the fuel feed hose ①.



- Install the special tools between the fuel pump and fuel delivery pipe.

TOOL **09940-40211: Fuel pressure gauge adapter**
09940-40220: Fuel pressure gauge attachment
09915-77331: Oil pressure gauge (1 000 kPa)
09915-74521: Adapter hose



- Turn the ignition switch ON and check the fuel pressure.

DATA **Fuel pressure: Approx. 300 kPa (3.0 kgf/cm², 43 psi)**

If the fuel pressure is lower than the specification, inspect the following items:

* Fuel hose leakage
* Clogged fuel filter
* Pressure regulator
* Fuel pump

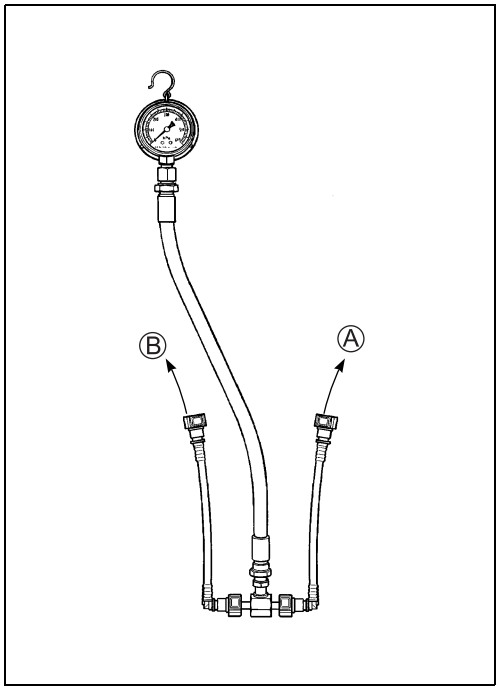
If the fuel pressure is higher than the specification, inspect the following items:

* Fuel pump
* Pressure regulator

⚠ WARNING

Before removing the special tools, turn the ignition switch OFF position and release the fuel pressure slowly.

Ⓐ To fuel pump
Ⓑ To fuel delivery pipe



FUEL PUMP INSPECTION

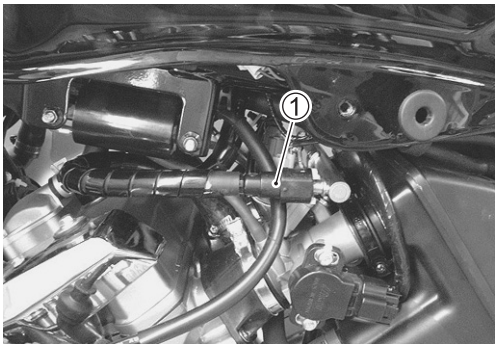
Turn the ignition switch ON and check that the fuel pump operates for few seconds.
If the fuel pump motor does not make operating sound, inspect the fuel pump circuit connections or inspect the fuel pump relay and tip-over sensor.
If the fuel pump relay, tip-over sensor and fuel pump circuit connections are OK, the fuel pump may be faulty, replace the fuel pump with a new one.

FUEL DISCHARGE AMOUNT INSPECTION

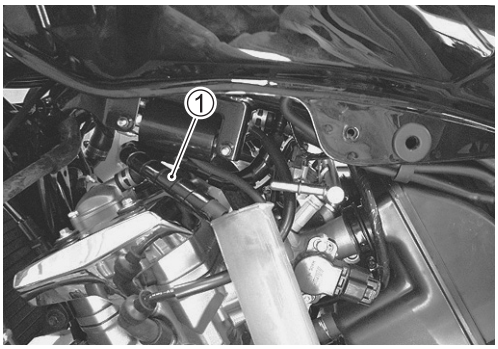
⚠ WARNING

*** Keep away from fire or spark.**
*** Spilled gasoline should be wiped off immediately.**
*** Work in a well-ventilated area.**

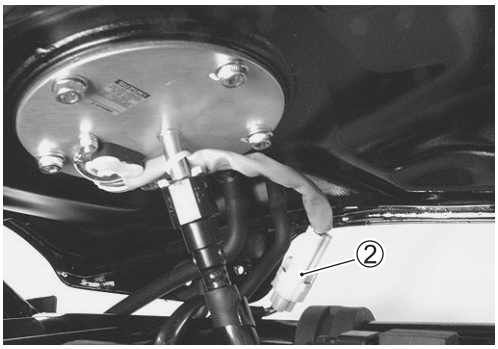
- Lift and support the fuel tank. (☞5-2)
- Place a rag under the fuel feed hose ① and disconnect the fuel feed hose ① from the fuel delivery pipe.



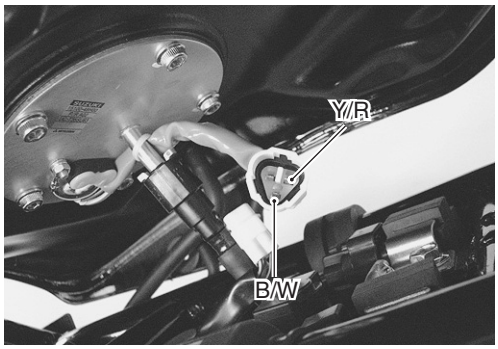
- Place the measuring cylinder and insert the fuel feed hose ① end into it.



- Disconnect the fuel pump lead wire coupler ②.



- Connect proper lead wires to the fuel pump lead wire coupler (fuel pump side) and apply 12 V to the fuel pump (between Y/R wire and B/W wire) for 10 seconds and measure the amount of fuel discharged.
  Battery ⊕ terminal ——— Y/R terminal
  Battery ⊖ terminal ——— B/W terminal



If the pump does not discharge the amount specified, it means that the fuel pump is defective or that the fuel filter is clogged.

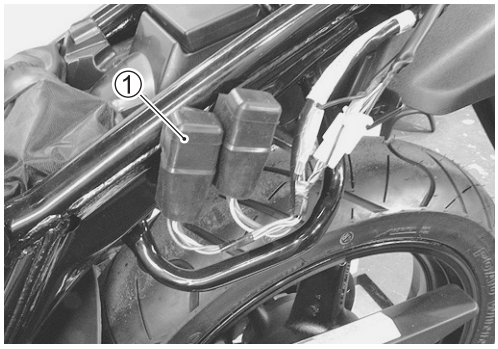
DATA Fuel discharge amount:
97.2 ml (3.3/3.4 US/Imp oz) or more/10 sec.

NOTE:
The battery must be in fully charged condition.

FUEL PUMP RELAY INSPECTION

Fuel pump relay is located to inside of the left frame upper cover.

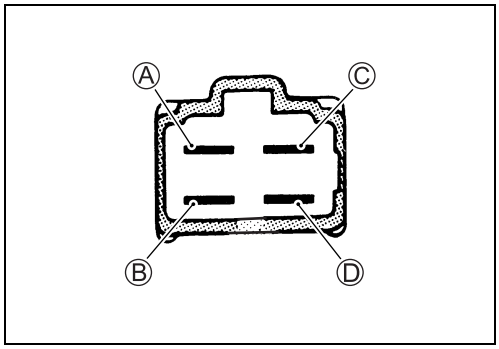
- Remove the frame upper cover assembly. (☞8-6)
- Remove the fuel pump relay ①.



First, check for insulation with the tester between terminals Ⓐ and Ⓑ. Next, check for continuity between Ⓐ and Ⓑ with 12 V voltage applied, positive ⊕ to terminal Ⓒ and negative ⊖ to terminal Ⓓ. If continuity does not exist, replace the fuel pump relay with a new one.

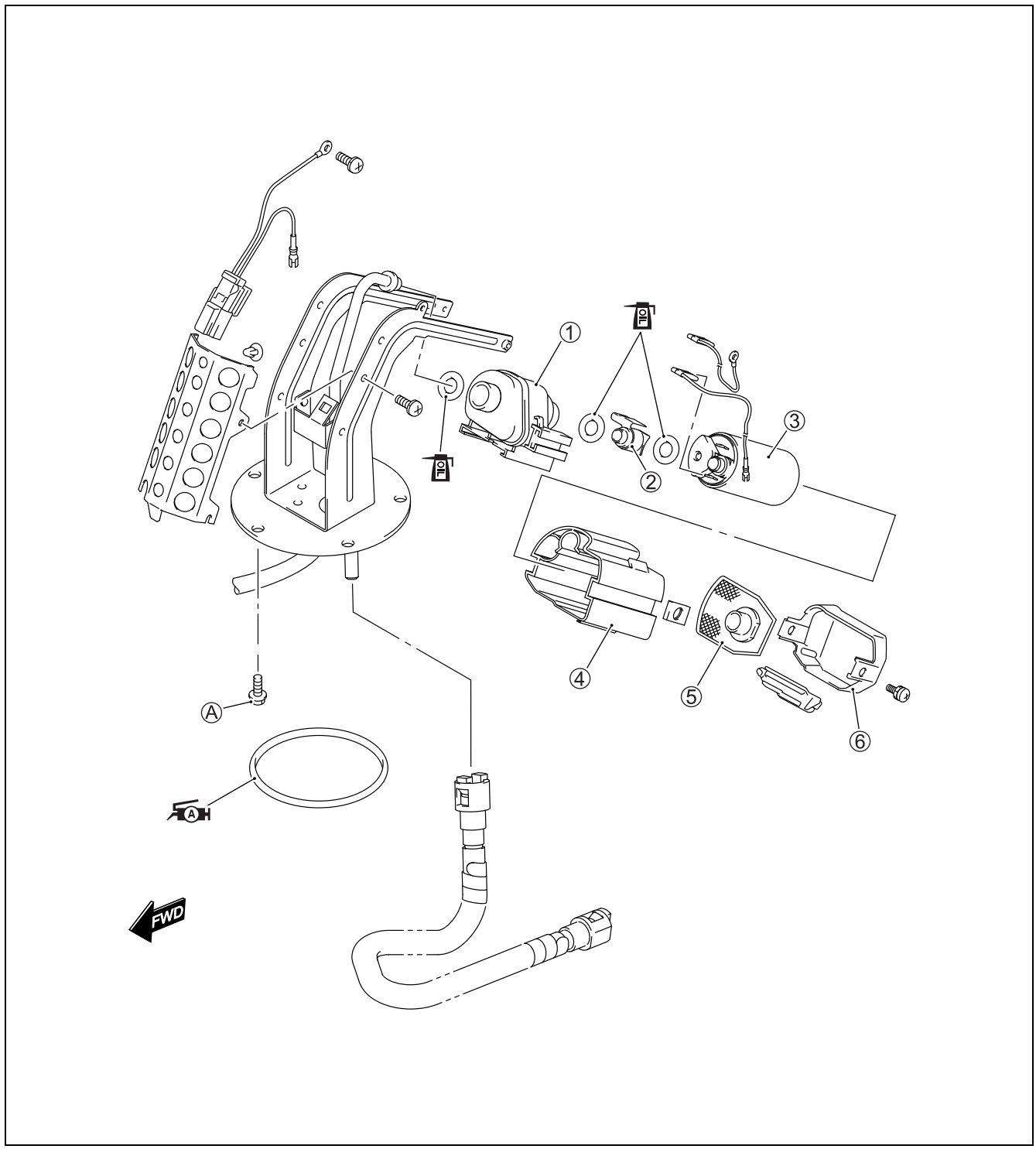
TOOL 09900-25008: Multi circuit tester set

Tester knob indication: Continuity test (•))))



FUEL PUMP AND FUEL LEVEL GAUGE REMOVAL

CONSTRUCTION

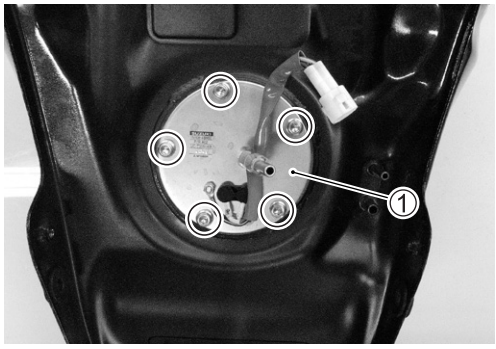


①	Fuel pressure regulator assembly	⑤	Fuel mesh filter
②	Joint	⑥	Dust cover
③	Fuel pump	Ⓐ	Fuel pump mounting bolt
④	Reservoir cup		

ITEM	N·m	kgf-m	lbf-ft
Ⓐ	10	1.0	7.0

REMOVAL

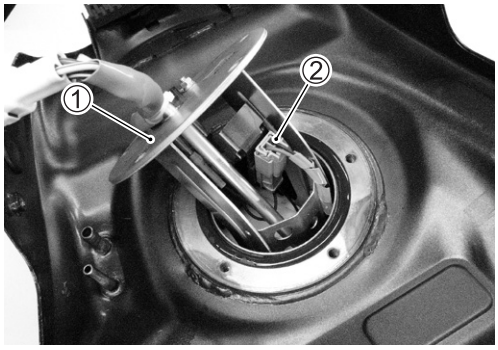
- Remove the fuel tank. (☞5-2)
- Remove the fuel pump assembly ① by removing its mounting bolts diagonally.



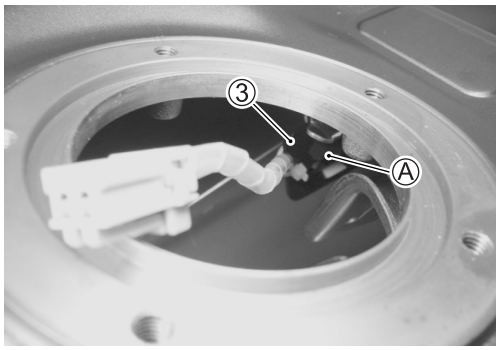
⚠ WARNING

*** Keep away from fire or spark.**
*** Spilled gasoline should be wiped off immediately.**
*** Work in a well-ventilated area.**

- Disconnect the fuel level gauge lead wire coupler ② and remove the fuel pump assembly ①.



- Remove the fuel level gauge ③ while pushing the pawl end Ⓐ.



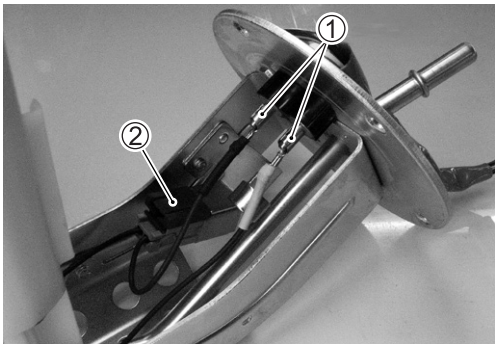
CAUTION

Do not pull the lead wire when removing the fuel level gauge.

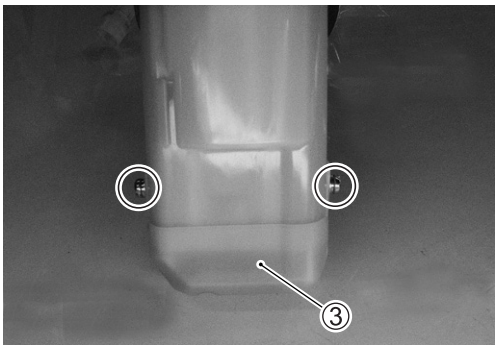
FUEL LEVEL GAUGE INSPECTION
(☞9-32)

FUEL PUMP DISASSEMBLY

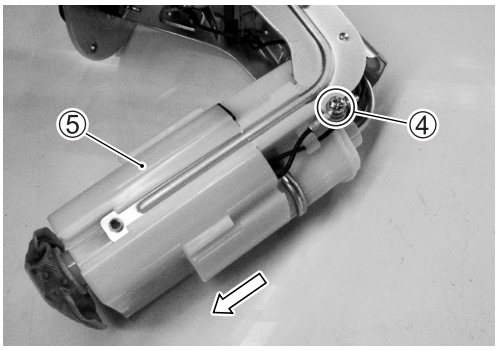
- Remove the fuel pump assembly. (☞5-7)
- Disconnect the lead wires ① and lead wire coupler ②.



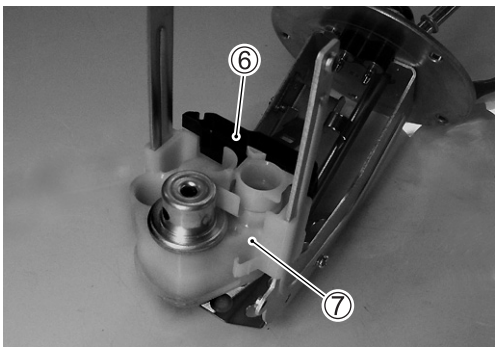
- Remove the dust cover ③.



- Remove the screw ④.
- Remove the fuel pump ⑤.



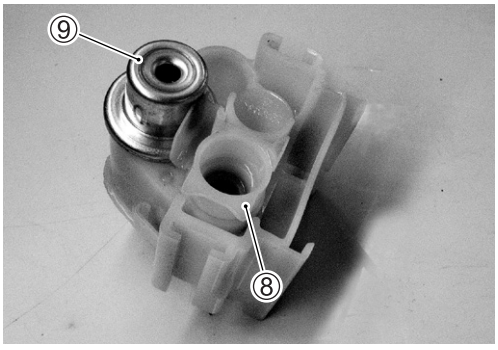
- Remove the cover ⑥ and fuel pressure regulator assembly ⑦.



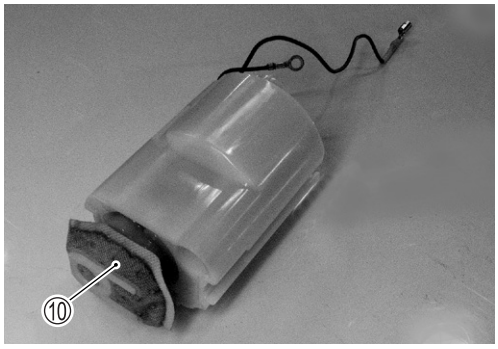
- Remove the joint ⑧.

NOTICE

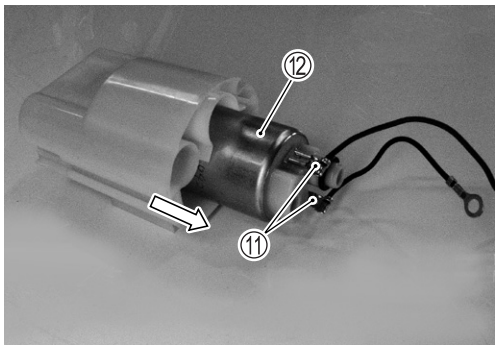
Never remove the fuel pressure regulator ⑨ from the holder.



- Remove the fuel mesh filter ⑩.



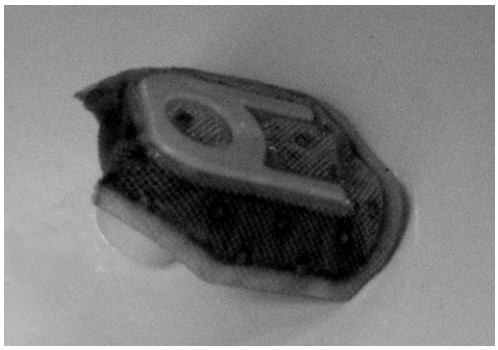
- Remove the lead wires ⑪.
- Remove the fuel pump ⑫ from the reservoir cup.



FUEL MESH FILTER INSPECTION AND CLEANING

If the fuel mesh filter is clogged with foreign particles, it hinders smooth gasoline flow resulting in loss of engine power.

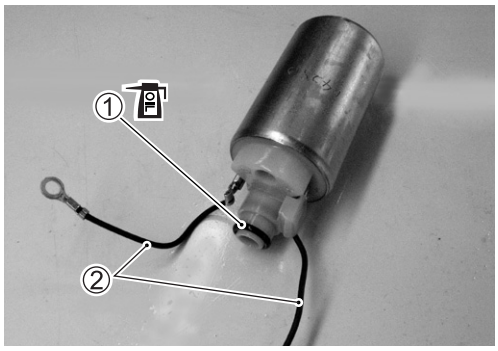
NOTE:
When the fuel mesh filter is dirtied excessively, replace the fuel mesh filter with a new one.



FUEL PUMP AND FUEL LEVEL GAUGE REASSEMBLY AND INSTALLATION

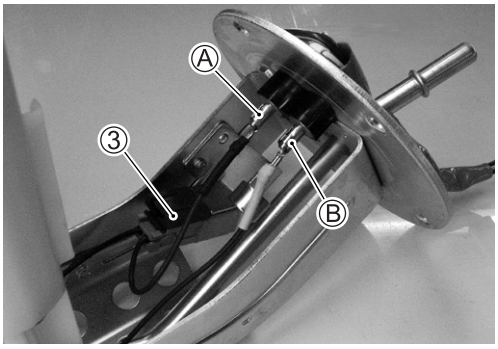
Reassembly and install the fuel pump and fuel level gauge in the reverse order of removal and disassembly. Pay attention to the following points:

- Replace the O-rings ① and lead wires ② with the new ones.
- Apply thin coat of engine oil to the O-rings ①.



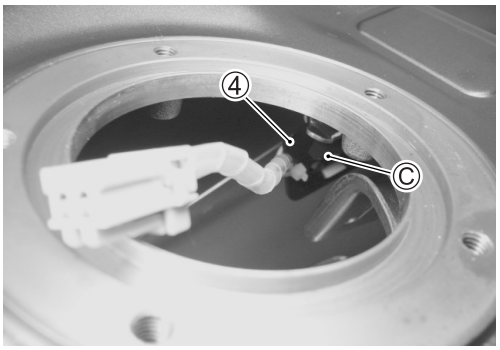
- Replace the lead wire coupler ③ with a new one.
- Be sure to connect the wires to the proper terminals.

Ⓐ (B)..... ⊕ terminal for fuel pump
Ⓑ (W)..... ⊕ terminal for fuel level gauge



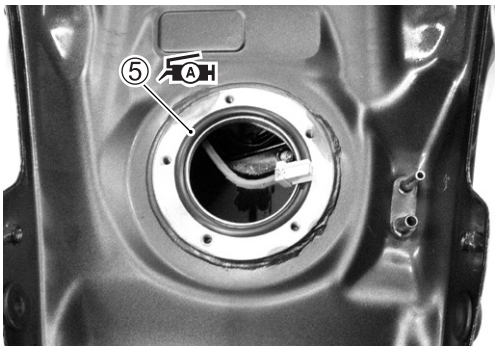
- Install the fuel level gauge ④ into the fuel tank.

NOTE:
Push the lock position Ⓒ fully until the clicking sound heard.



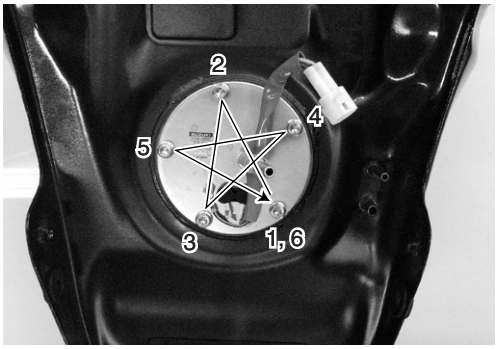
- Install a new O-ring ⑤ and apply grease to it.

99000-25010: SUZUKI SUPER GREASE "A"
or equivalent

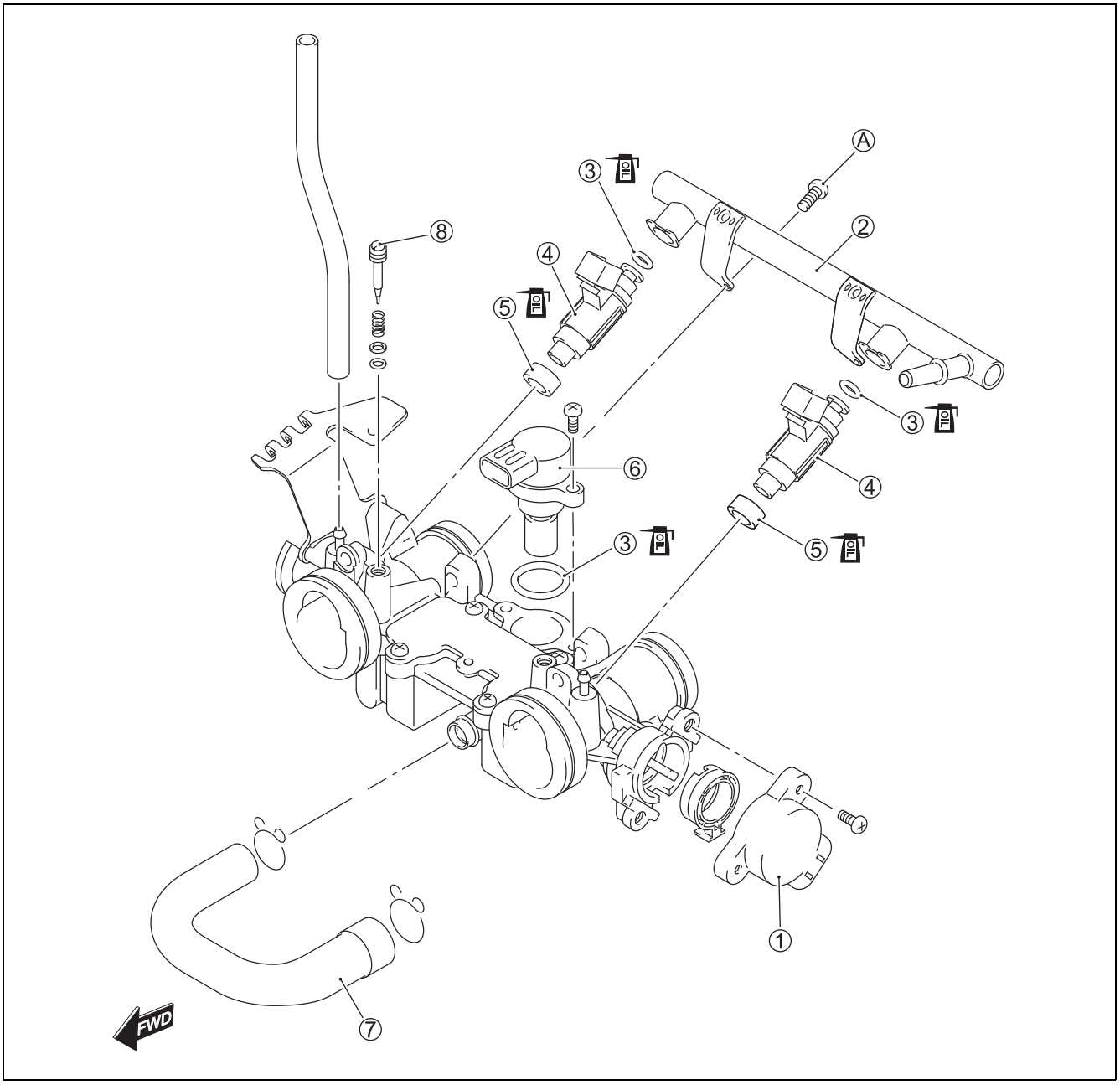


- Connect the fuel level gauge lead wire coupler.
- When installing the fuel pump assembly, first tighten all the fuel pump mounting bolts lightly in the ascending order and then tighten them to the specified torque.

Fuel pump mounting bolt: 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



THROTTLE BODY
CONSTRUCTION

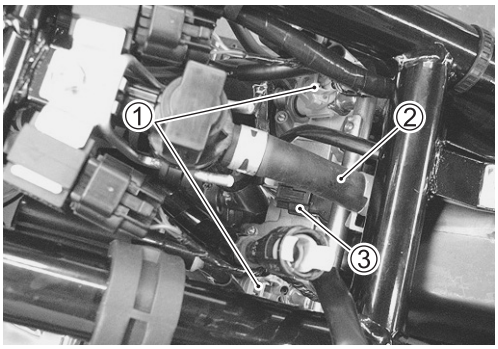


①	TP sensor	⑥	ISC valve
②	Fuel delivery pipe	⑦	ISC valve hose
③	O-ring	⑧	Air screw
④	Fuel injector	Ⓐ	Fuel delivery pipe mounting screw
⑤	Cushion seal		

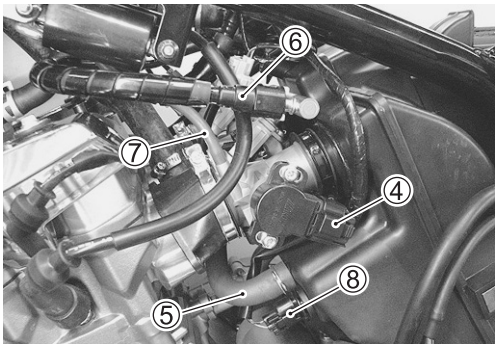
ITEM	N·m	kgf-m	lbf-ft
Ⓐ	5	0.5	3.5

THROTTLE BODY REMOVAL

- Remove the fuel tank. (☞5-2)
- Disconnect the fuel injector lead wire couplers ①.
- Disconnect the PAIR hose ② from the air cleaner box and ISC valve coupler ③.

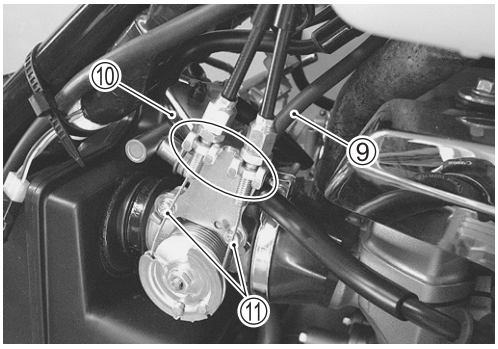


- Disconnect the TP sensor coupler ④, ISC valve hose ⑤, fuel feed hose ⑥, IAP sensor hose #1 ⑦ and IAT sensor coupler ⑧.

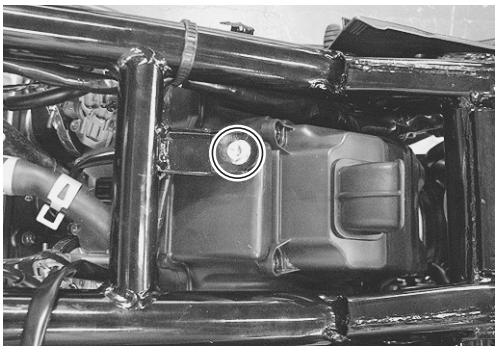


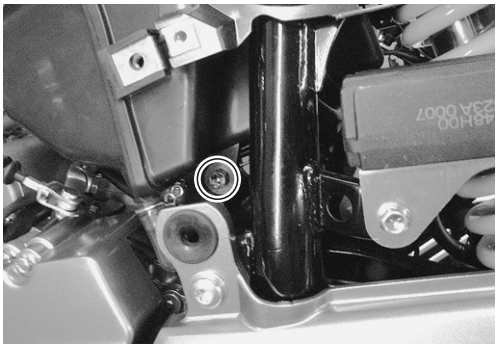
- Disconnect the IAP sensor hose #2 ⑨ and ignition coil clamp ⑩.
- Disconnect the throttle cables ⑪ from their drum.

NOTE:
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.

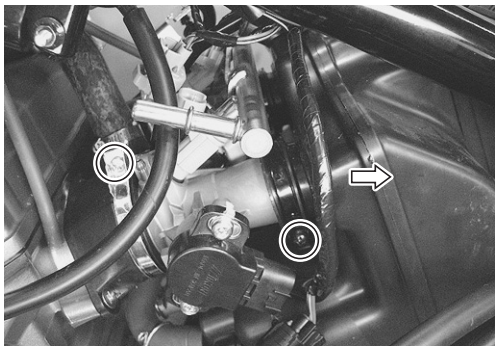


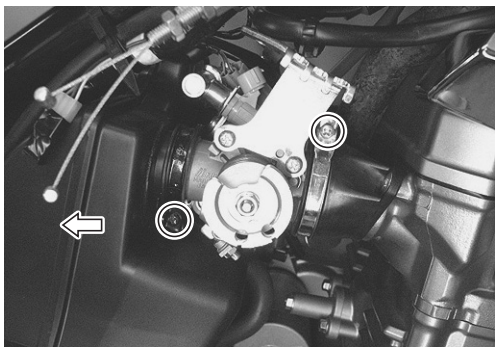
- Remove the air cleaner box mounting bolts.





- Loosen the throttle body clamp screws.
- Move the air cleaner box backward.
- Remove the throttle body assembly.

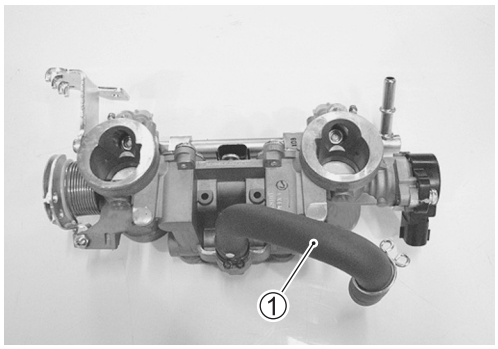




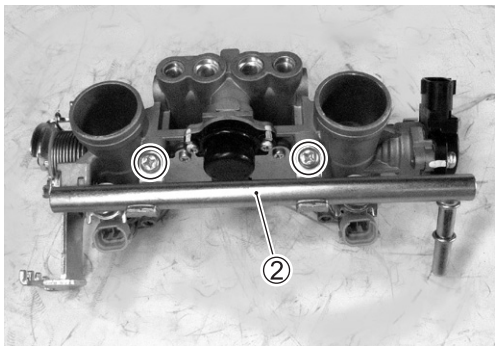
THROTTLE BODY DISASSEMBLY

NOTE:
Identify the position of each removed part. Organize the parts in their respective groups so that they can be reinstalled in their original positions.

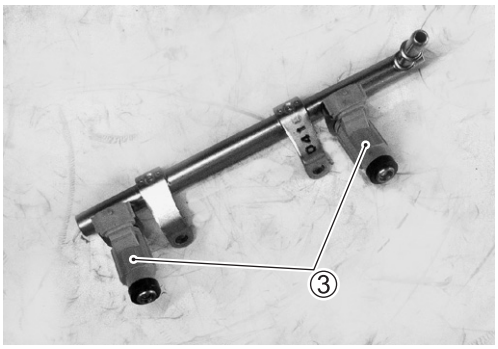
- Disconnect the ISC valve hose ①.



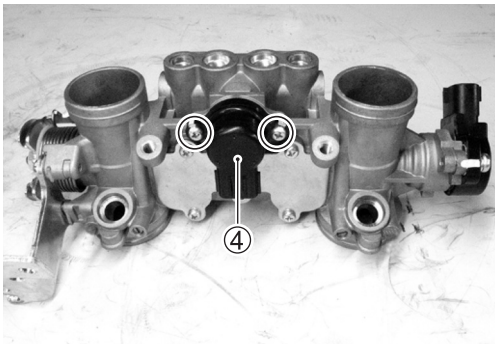
- Remove the fuel delivery pipe assembly ②.



• Remove the fuel injectors ③ from the fuel delivery pipe.



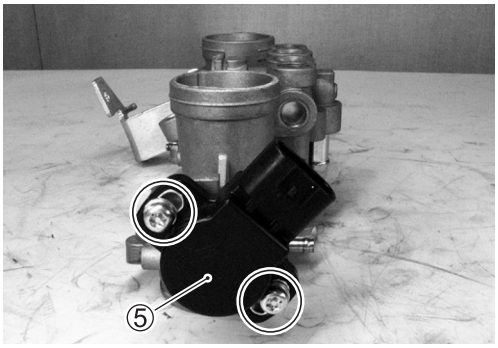
• Remove the ISC valve ④.



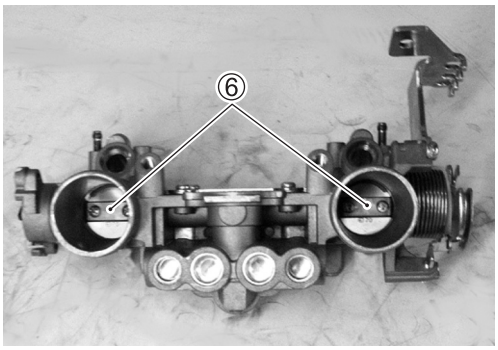
• Remove the TP sensor ⑤ with the special tool.

TOOL 09930-11950: Torx® wrench (T25H)

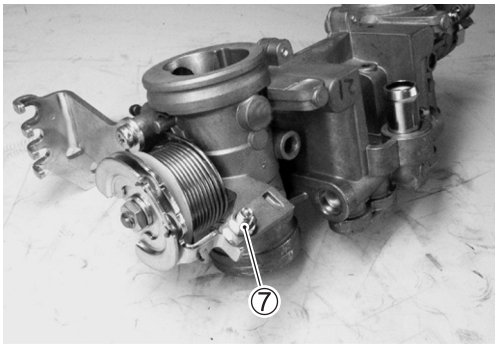
NOTE:
Prior to disassembly, mark the TP sensor original position with a paint or scribe for accurate reinstallation.



NOTE:
Never remove the throttle valves ⑥.



NOTE:
- The adjusting screw ⑦ are factory-adjusted at the time of delivery and do not turn or remove it.
- Don't push the throttle lever to TP sensor side. (Throttle valve operating angle: fully opened - fully closed)



THROTTLE BODY CLEANING

⚠ WARNING

Some carburetor cleaning chemicals, especially dip-type soaking solutions, are very corrosive and must be handled carefully. Always follow the chemical manufacturer's instructions on proper use, handling and storage.

- Use a swab moistened with a carburetor cleaner (petroleum solvent) to clean the passageways, throttle valve, and main bore and then dry the cleaned surfaces with compressed air.

NOTICE

Do not use wire to clean passageways. Wire can damage passageways.
Never spray a cleaner (petroleum solvent) directly to the throttle valve and ISC bypass passage.
The cleaner, if splayed, would work its way into the inside of the ISC valve and attack the insulation film of the coil there, causing a short circuit and eventual malfunction of the ISC valve. In addition, if a short circuit occurs in the coil, an over current would flow through the ISC valve drive circuit causing the ECM to break down.
When the throttle valve is molybdenum-coated, avoid applying the cleaner to the coated surfaces.
The cleaner will peel off the coating and this will impair the air-tightness of the throttle valve.
If the components cannot be cleaned with a spray cleaner it may be necessary to use a dip-type cleaning solution and allow them to soak. Always follow the chemical manufacturer's instructions for proper use and cleaning of the throttle body components. Do not apply carburetor cleaning chemicals to the upper and plastic materials.

INSPECTION

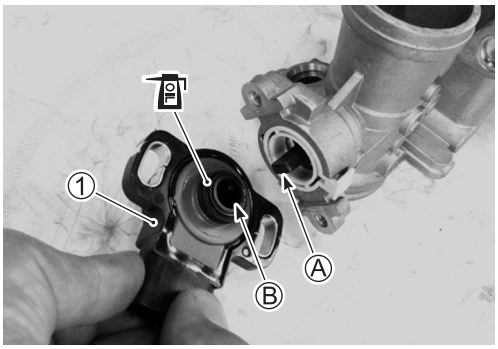
Check following items for any damage or clogging.
Replace the damaged part if necessary.

* O-rings
* Throttle valves
* ISC valve hose
* Fuel delivery pipe
* Cushion seals
* Fuel injectors

THROTTLE BODY REASSEMBLY

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

- Apply thin coat of engine oil to the new O-ring.
- With the throttle valves fully closed, install the TP sensor ① and tighten the TP sensor mounting screws.



NOTE:

** Align the throttle shaft end Ⓐ with the groove Ⓑ of TP sensor.*

** Apply grease to the throttle shaft end Ⓐ if necessary.*

99000-25010: SUZUKI SUPER GREASE "A"
or equivalent

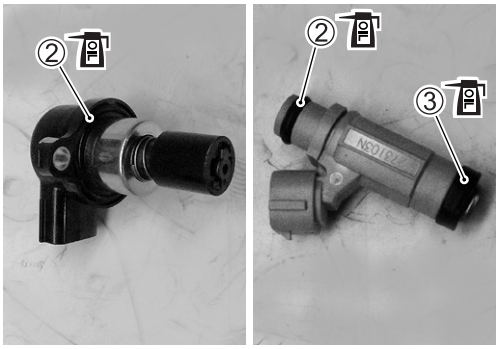
09930-11950: Torx® wrench (T25H)

- Make sure the throttle valves smoothly open and close.

NOTE:

Don't push the throttle lever to TP sensor side. (Throttle valve operating angle: fully opened - fully closed)

- Apply thin coat of engine oil to the new O-rings ② and cushion seals ③.

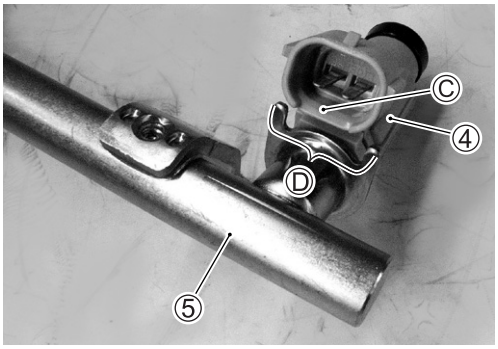


- Install the fuel injector ④ by pushing it straight to the delivery pipe ⑤.

NOTE:

** Never turn the injector while pushing it.*

** Align the coupler Ⓒ of injector with boss Ⓓ of the delivery pipe.*



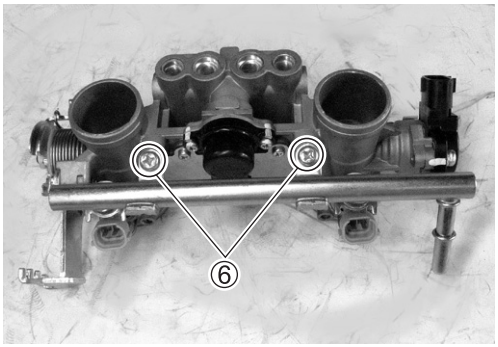
- Install the fuel delivery pipe assembly to the throttle body.

NOTE:

Never turn the injector while pushing it.

- Tighten the fuel delivery pipe mounting screws ⑥ to the specified torque.

Fuel delivery pipe mounting screw:
5 N·m (0.5 kgf-m, 3.5 lbf-ft)



THROTTLE BODY INSTALLATION

Install the throttle body assembly in the following points:

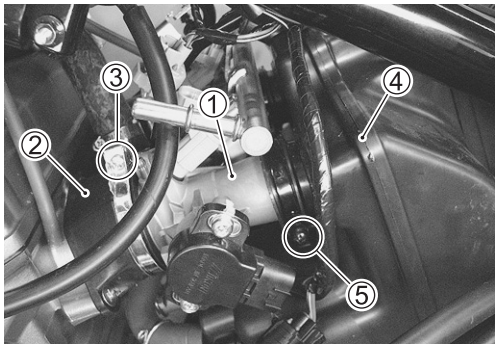
1) Install the throttle body assembly ① into the intake pipes ②.

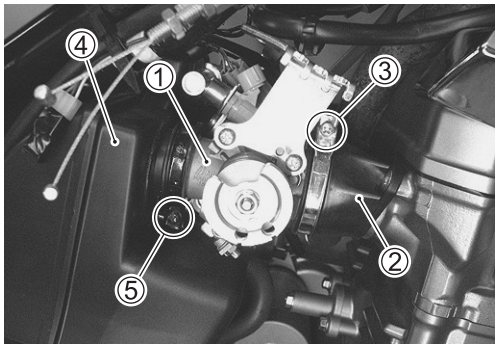
NOTE:

Never tighten the intake pipe clamp screws ③.

2) Install the air cleaner box ④ to the throttle body assembly ①.

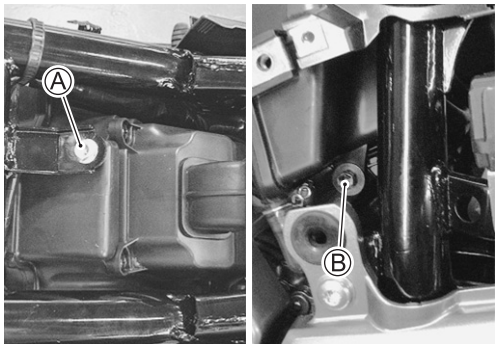
3) Tighten the outlet tube clamp screws ⑤ and then intake pipe clamp screws ③. (☞10-18)





4) Tighten the air cleaner box mounting bolts to the specified torque. (☞10-18)

Air cleaner upper mounting bolt Ⓐ:
10 N·m (1.0 kgf-m, 7.0 lbf-ft)
Air cleaner lower mounting bolt Ⓑ:
5.5 N·m (0.55 kgf-m, 4.0 lbf-ft)



5) Connect the throttle pulling cable ⑥ and throttle returning cable ⑦ to the throttle cable drum. (☞10-17)

6) Tighten the throttle cable nuts ⑧ to the specified torque.

Throttle cable nut: 4.5 N·m (0.45 kgf-m, 3.0 lbf-ft)

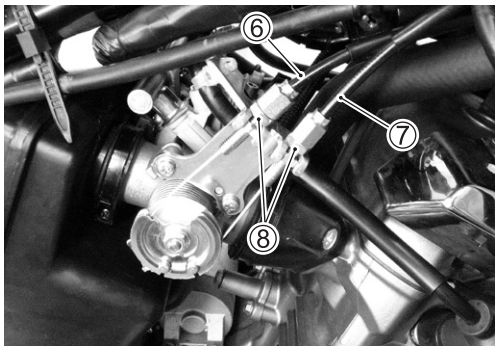
7) Adjust the throttle cable play. (☞2-13)

NOTE:

** Adjust the TP sensor when it was removed. (☞4-19)*

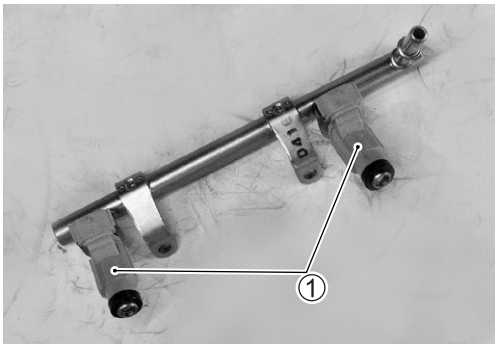
** Reset the ISC valve and TP sensor when they were removed. (☞5-21 and 5-22)*

8) After adjusting the throttle cable play, reinstall the removed parts.



FUEL INJECTOR REMOVAL

- Remove the fuel delivery pipe assembly with the fuel injectors. (☞5-19)
- Remove the fuel injectors ①.



FUEL INJECTOR INSPECTION

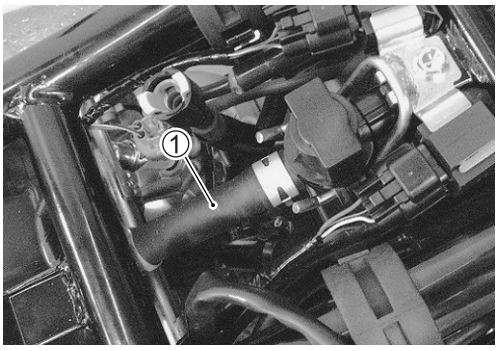
Check fuel injector filter for evidence of dirt and contamination. If present, clean and check for presence of dirt in the fuel lines and fuel tank.

FUEL INJECTOR INSTALLATION

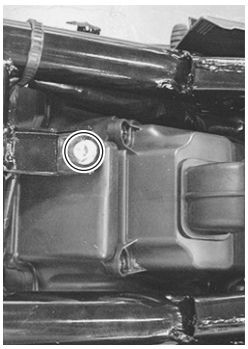
- Install the fuel injector in the reverse order of removal. (☞5-16)

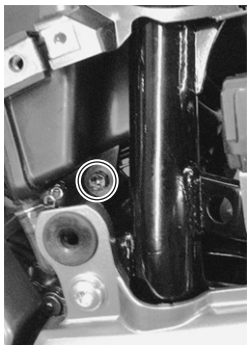
ISC VALVE REMOVAL

- Remove the fuel tank. (☞5-2)
- Disconnect the PAIR hose ① from the air cleaner box.

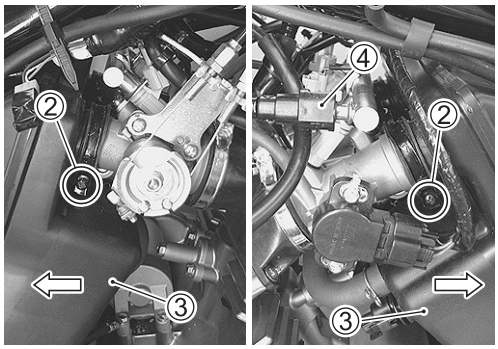


- Remove the air cleaner box mounting bolts.

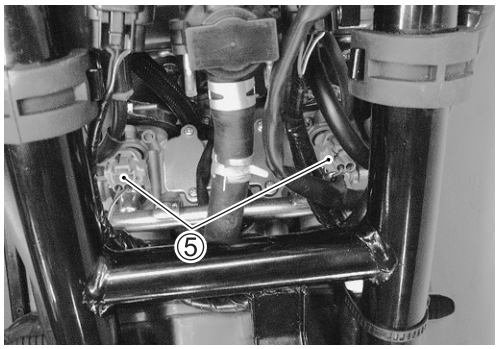




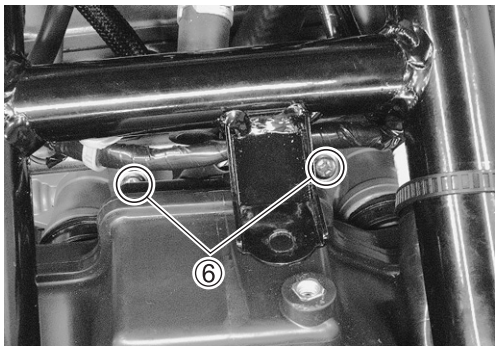
- Loosen the outlet tube clamp screws ②.
- Move the air cleaner box ③ backward.
- Disconnect the fuel feed hose ④.



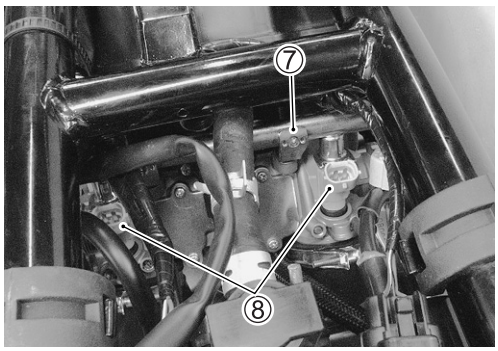
- Disconnect the fuel injector lead wire couplers ⑤.



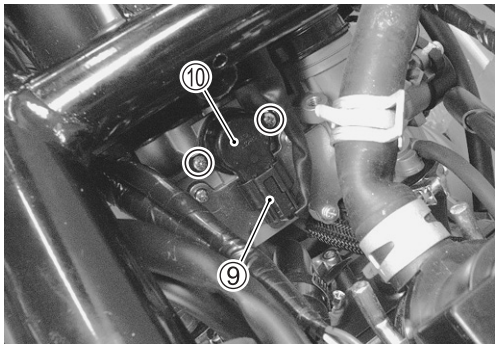
- Remove the fuel delivery pipe mounting screws ⑥.



- Remove the fuel delivery pipe assembly ⑦ with the fuel injectors ⑧.



- Disconnect the ISC valve coupler ⑨ and remove the ISC valve ⑩.



ISC VALVE INSPECTION

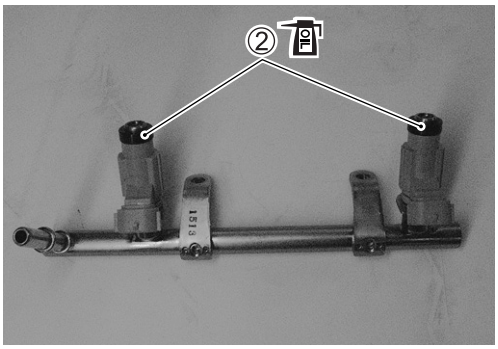
- Inspect the ISC valve for any carbon deposition defects. Clean or replace the ISC valve if necessary.

***Refer to the ISC VALVE INSPECTION for details. (☞4-60)**

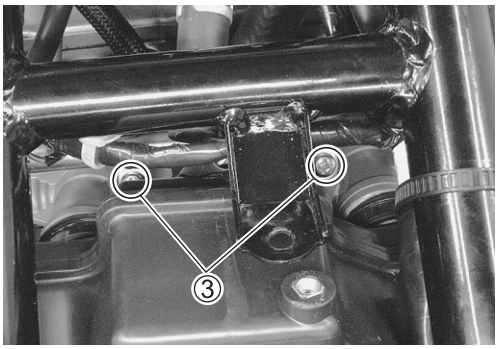
ISC VALVE INSTALLATION

Install the ISC valve in the reverse order of removal.
Pay attention to the following point:

- Apply thin coat of engine oil to the new O-ring ①.



- Apply thin coat of engine oil to the new cushion seals ②.



- Install the fuel delivery pipe assembly to the throttle body.

NOTE:
Never turn the injector while pushing it.

- Tighten the fuel delivery pipe mounting screws ③ to the specified torque.

Fuel delivery pipe mounting screw:
5 N·m (0.5 kgf-m, 3.5 lbf-ft)

- Tighten the air cleaner box mounting bolts to the specified torque. (☞10-18)

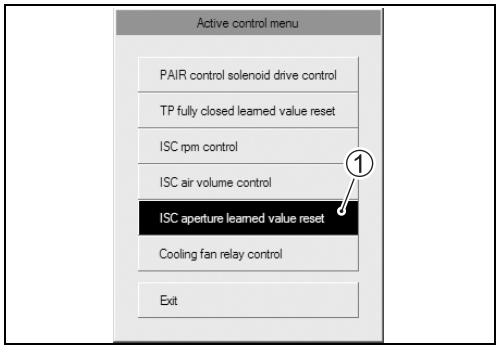
Air cleaner upper mounting bolt:
10 N·m (1.0 kgf-m, 7.0 lbf-ft)
Air cleaner lower mounting bolt:
5.5 N·m (0.55 kgf-m, 4.0 lbf-ft)

- Connect the PAIR hose. (☞10-25)
- After completing the ISC valve installation, reset learned value of ISC valve position. (☞5-21)

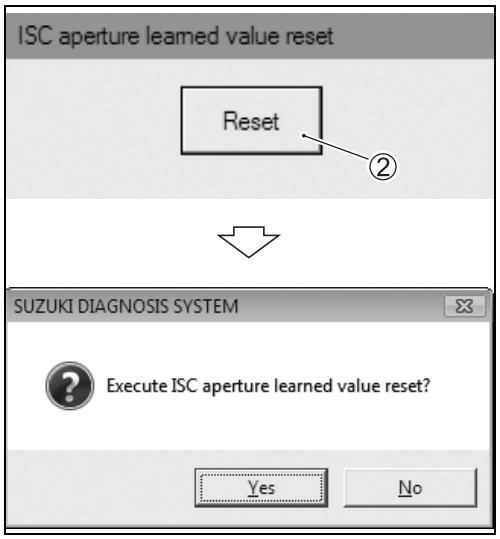
ISC VALVE RESET

When removing ISC valve or replacing the throttle body assembly, reset the ISC valve learned value in the following procedures:

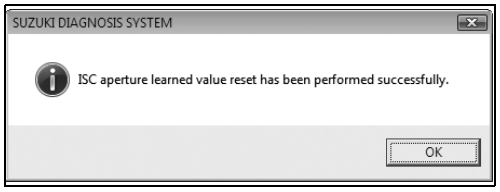
1) Set up the SDS tool. (☞4-24)
2) Turn the ignition switch ON.
3) Click “Active control”.
4) Click “ISC aperture learned value reset” ①.



5) Click “Reset” button ② to clear the ISC learned value.



NOTE:
The learned value of the ISC valve is set at RESET position.



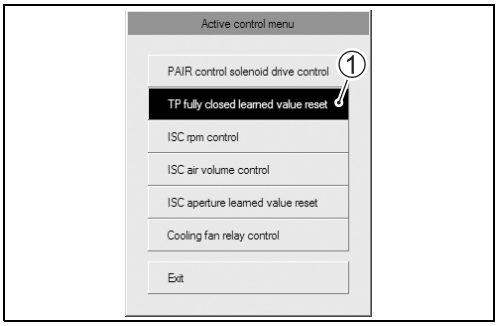
6) Close the SDS tool.
7) Turn the ignition switch OFF position.

NOTE:
The ISC valve opening initialization is automatically started after the ignition switch is turned OFF.

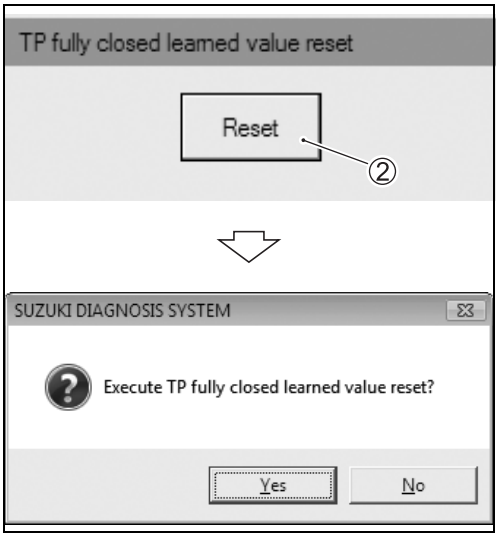
TP RESET

When replacing the throttle body assembly or TP sensor with a new one or reinstalling the TP sensor, reset the TP fully closed learned value in the following procedures:

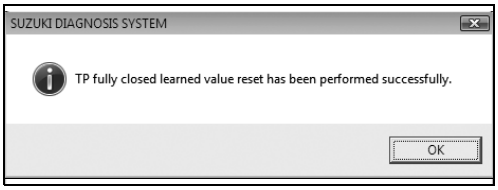
1) Set up the SDS tool. (☞4-24)
2) Turn the ignition switch ON.
3) Click “Active control”.
4) Click “TP fully closed learned value reset” ①.



5) Click “Reset” button ② to clear the TP fully closed learned value.



NOTE:
The learned value of the TP sensor is set at RESET position.

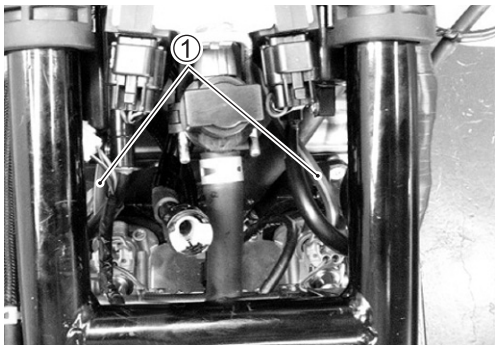


6) Close the SDS tool.
7) Turn the ignition switch OFF position.

NOTE:
The TP sensor opening initialization is automatically started after the ignition switch is turned OFF.

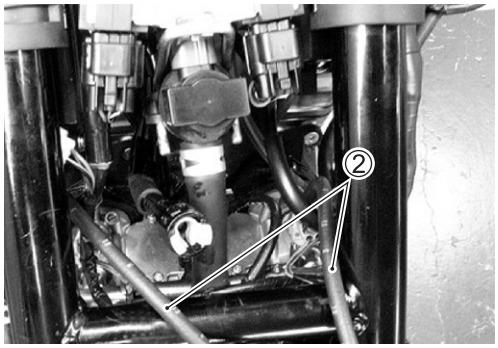
THROTTLE VALVE SYNCHRONIZATION

Check and adjust the throttle valve synchronization among two cylinders.



Step 1

- Lift up support the fuel tank. (☞5-2)
- Disconnect the respective vacuum hoses ① from each vacuum nipples on the throttle body.



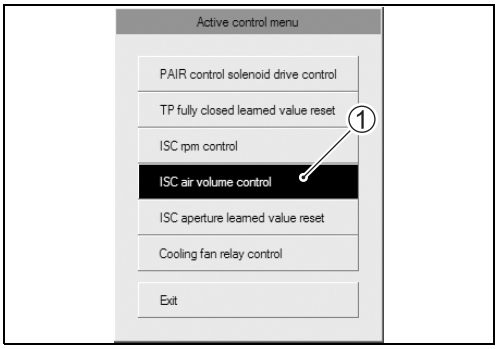
- Connect the respective vacuum tester hoses ② to the vacuum nipples.

Step 2

- Set up the SDS tool. (☞4-24)
- Start the engine.
- Click “Data monitor”.
- Warm up the engine (Water temp. more than 80 °C (176 °F)) Ⓐ.

Item	Value	Unit
Engine speed	1377	rpm
Throttle position	27.5	°
Manifold absolute pressure 1	46.7	kPa
Engine coolant / oil temperature	Ⓐ 89.2	°C
Intake air temperature	34.6	°C
Battery voltage	14.4	V

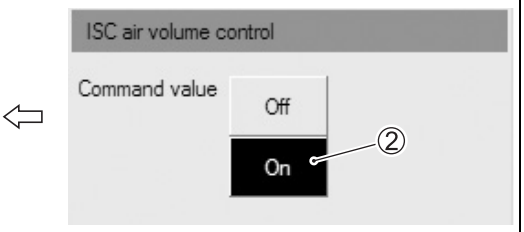
- Click “Active control”.
- Click “ISC air volume control” ①.
- Click “ON” button ② to fix the ISC air volume of two cylinders.



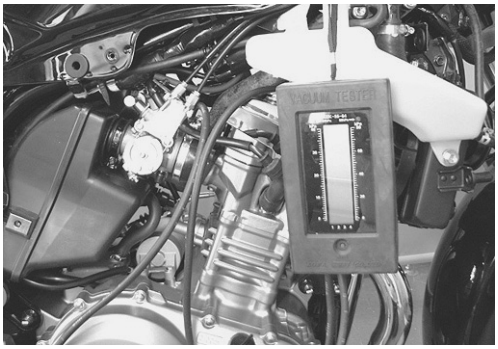
NOTE:
When making this synchronization, be sure that the water temperature is within 80 – 100 °C (176 – 212 °F).

Ⓑ Engine speed: Approx. 1 400 rpm
Ⓒ ISC valve position: Approx. 68 step

Item	Value	Unit
Engine speed	Ⓑ 1377	rpm
Throttle position	27.5	°
Manifold absolute pressure 1	46.7	kPa
Engine coolant / oil temperature	89.2	°C
Intake air temperature	34.6	°C
Battery voltage	14.4	V
O2 sensor Bank1-Sensor1	0.1	V
Desired idle rpm	1405	rpm
ISC valve position	Ⓒ 68	step



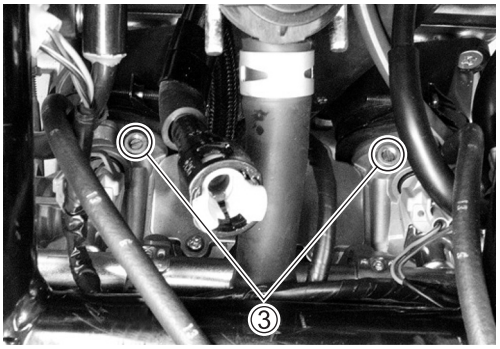
- Check for the synchronization of vacuum from #1 and #2 cylinders.



- Equalize the vacuum of the cylinders by turning each air screws ③ and keep it running at idling speed.

NOTE:
Always set the engine speed at idle speed.

- If the adjustment is not yet correct, remove each air screws ③ and clean them with a spray-type carburetor cleaner and blow dry with a compressed air. Also, clean the air screw passageways.



NOTE:
** Slowly turn the air screw clockwise and count the number of turns until the screw is lightly seated.*
** Make a note of how many turns were made so the screw can be reset correctly after cleaning.*

Step 3

- Repeat the procedures of step 2 when air screws were cleaned.
- Close the SDS tool and turn the ignition switch OFF.
- Disconnect the vacuum tester and reinstall the removed parts.
- After completing the throttle valve synchronization, clear the DTC and reset the ISC aperture learned value using SDS tool. (☞4-25 and 5-21)

EXHAUST SYSTEM

CONTENTS

EXHAUST SYSTEM
REMOVAL

⚠ WARNING

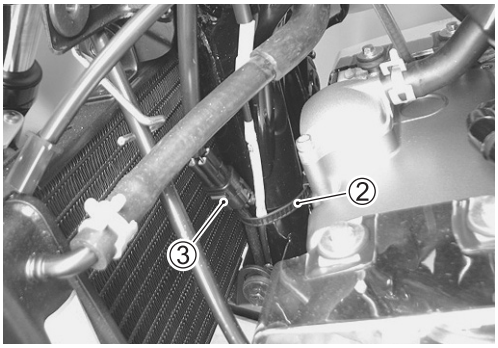
To avoid the risk of being burned, do not touch the exhaust system when the system is hot. Any service on the exhaust system should be performed when the system is cool.

NOTICE

Make sure that the exhaust pipe and mufflers have enough clearance from the rubber parts and plastic parts to avoid melting.

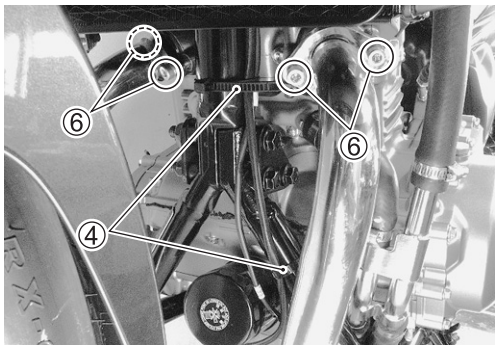
- Remove the left fuel tank cover. (☞8-5)
- Remove the left radiator mounting bolts (lower) ①.

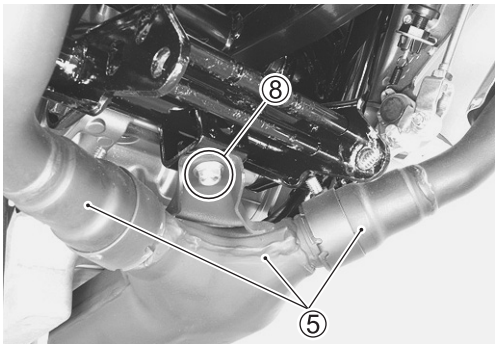
- Remove the clamp ② and disconnect the HO2 sensor coupler ③.

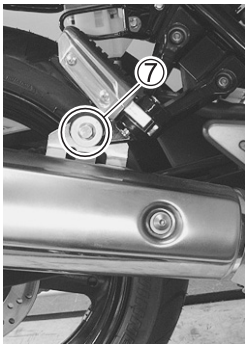


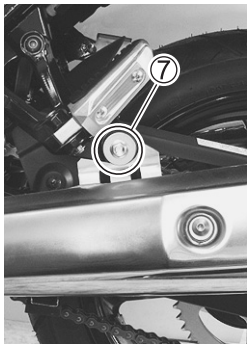
- Remove the clamps ④.
- Remove the exhaust pipe/muffler assembly ⑤ by removing the exhaust pipe bolts ⑥, muffler support bolts/nuts ⑦ and chamber support bolt ⑧.

NOTE:
Support the exhaust pipe/muffler assembly to prevent it from falling.









- Remove the each part from the muffler as shown in the exhaust system components. (☞10-27)

INSPECTION

- Inspect the exhaust pipe connection, muffler connection and HO2 sensor for exhaust gas leakage and mounting condition. If any defect is found, replace the defect part with a new one.
- Check the exhaust pipe bolts, muffler support nuts and chamber support bolt are tightened to their specified torque. (☞2-5)

INSTALLATION

Install the exhaust pipe and mufflers in the revers order of removal. Pay attention to the following points:

- Replace the exhaust pipe gaskets and joint connectors with new ones.
- Install the removed parts as shown in the exhaust system components. (☞10-27)

COOLING AND LUBRICATION SYSTEM

CONTENTS

ENGINE COOLANT

FOR SUZUKI SUPER LONG LIFE COOLANT

SUZUKI super long life coolant will provide the optimum corrosion protection and excellent heat protection, and will protect the cooling system from freezing at temperatures above –36 °C (–33 °F).

Anti-freeze concentration table

Anti-freeze density	Freezing point
50%	–36 °C (–33 °F)

NOTICE

*** Ethanol or methanol base coolant or water alone should not be used in cooling system at any time as damage to cooling system could occur.**
*** Do not mix the distilled water, SUZUKI long life coolant (coolant color: Green) or equivalent.**

FOR SUZUKI LONG LIFE COOLANT

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 concentration table

Anti-freeze density	Freezing point
50%	–31 °C (–24 °F)
55%	–40 °C (–44 °F)
60%	–55 °C (–67 °F)

NOTICE

*** 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 Fig. 1 and 2.)**
*** Do not use a radiator anti-leak additive.**

50% Engine coolant including reserve tank capacity

Anti-freeze	675 ml (0.7/0.6 US/Imp.qt)
Water	675 ml (0.7/0.6 US/Imp.qt)

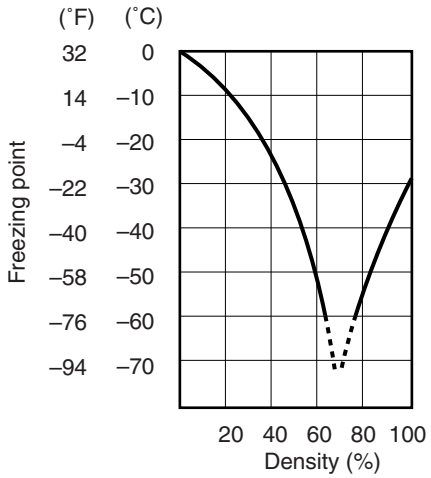


Fig. 1 Engine coolant density-freezing point curve

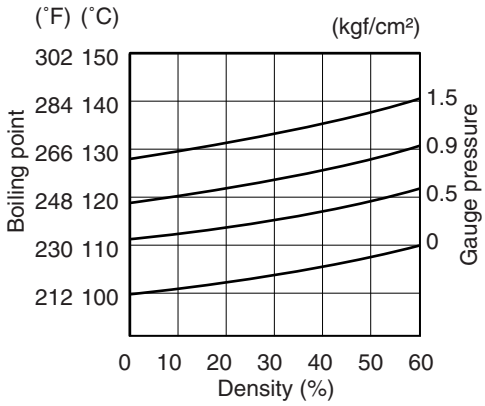
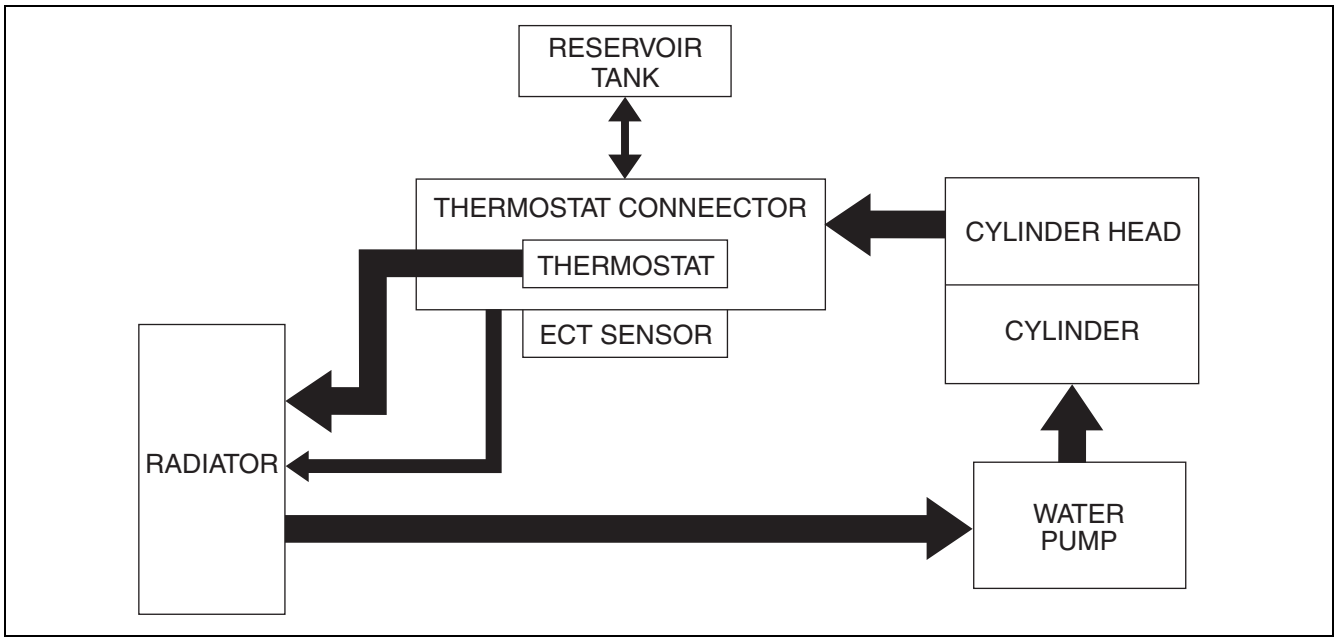


Fig. 2 Engine coolant density-boiling point curve

⚠ WARNING

*** You can be injured by boiling 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, do not induce vomiting. Immediately contact a physician.
• Keep it away from children.

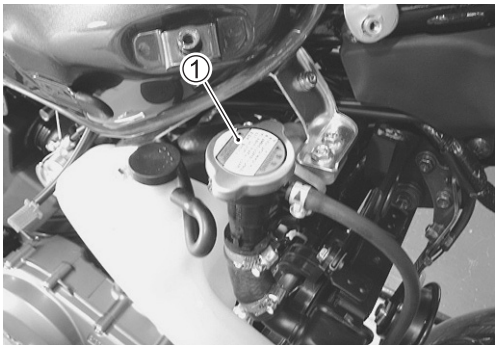
COOLING CIRCUIT

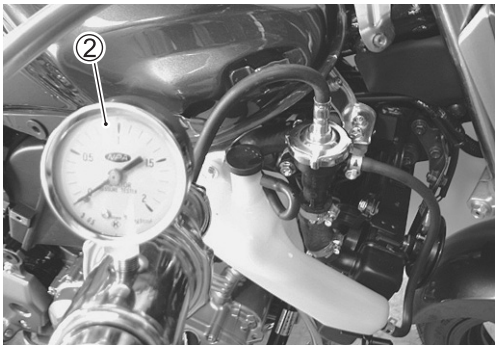


COOLING CIRCUIT INSPECTION

Before removing the radiator and draining the engine coolant, inspect the cooling circuit for tightness.

- Remove the right fuel tank cover. (☞8-5)
- Remove the radiator cap ① and connect the radiator cap tester ② to the filler.





⚠ WARNING

*** Do not open the radiator cap when the engine is hot, as you may be injured by escaping hot liquid or vapor.**
*** When removing the radiator cap tester, put a rag on the filler to prevent the engine coolant from spraying out.**

- Pressurize the cooling system with 120 kPa (1.2 kgf/cm², 17 psi) of pressure, and then check if it holds the 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.

NOTICE

Do not exceed the radiator cap release pressure, or the radiator cap and subsequently the radiator, can be damaged.

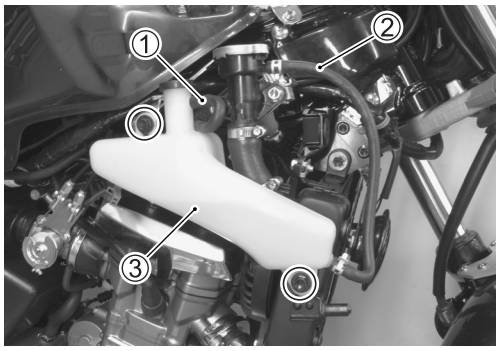
RADIATOR AND COOLING FAN MOTOR

RADIATOR AND COOLING FAN MOTOR

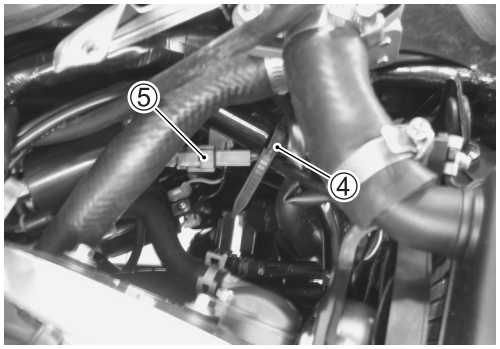
REMOVAL

- Remove the left and right fuel tank covers. (☞8-5)
- Drain the engine coolant. (☞2-15)

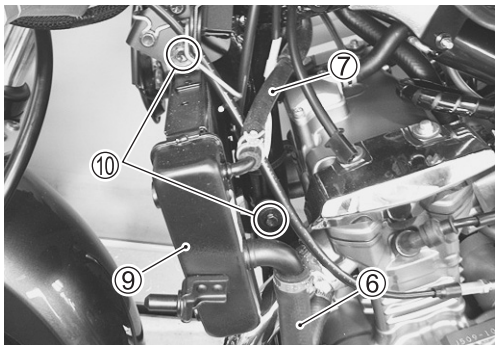
- Disconnect the reservoir tank over flow hose ① and reservoir tank inlet hose ②.
- Remove the reservoir tank ③.

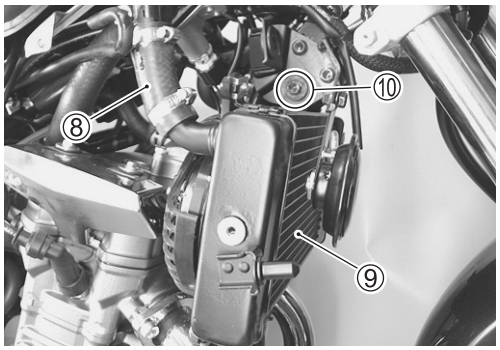


- Disconnect the clamp ④ and cooling fan motor coupler ⑤.

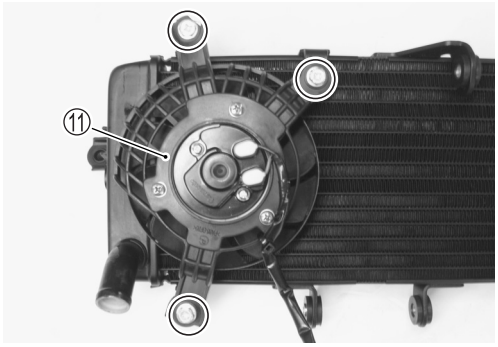


- Disconnect the radiator outlet hose ⑥, water bypass hose ⑦ and radiator inlet hose ⑧.
- Remove the radiator assembly ⑨ by removing the radiator assembly mounting bolts ⑩.





• Remove the cooling fan motor assembly ⑪.

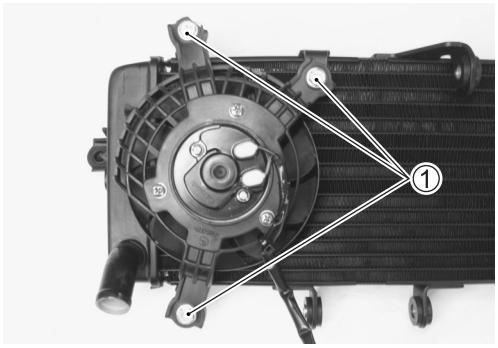


RADIATOR AND COOLING FAN MOTOR INSTALLATION

Install the radiator and cooling fan motor in the reverse order of removal. Pay attention to the following points:

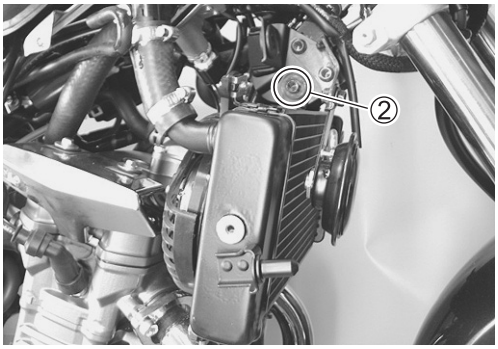
• Tighten the cooling fan motor assembly mounting bolts ① to the specified torque.

Cooling fan motor assembly mounting bolt:
7 N·m (0.7 kgf-m, 5.0 lbf-ft)



• Tighten the radiator assembly mounting bolts ② to the specified torque.

Radiator assembly mounting bolt:
10 N·m (1.0 kgf-m, 7.0 lbf-ft)



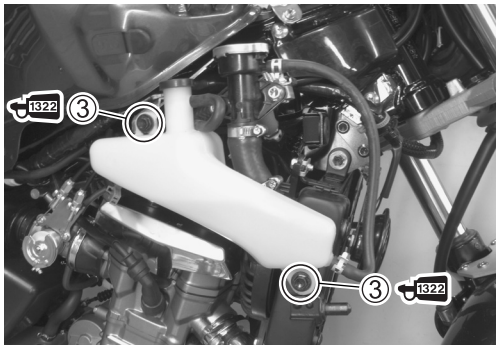
• Connect the radiator hoses. (☞10-20 to -21)

- Apply thread lock to the reservoir tank mounting bolts ③ and tighten them to the specified torque as shown in the cooling system hose routing. (☞10-20)

Reservoir tank mounting bolt:
6 N·m (0.6 kgf-m, 4.5 lbf-ft)

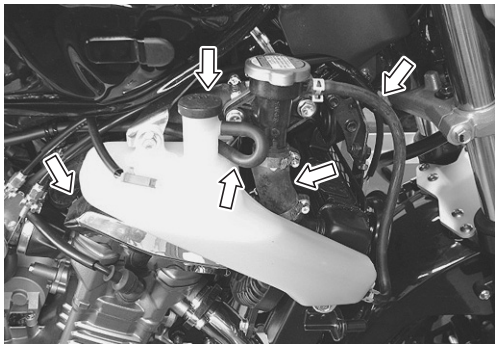
1322 99000-32110: THREAD LOCK CEMENT SUPER "1322" or equivalent

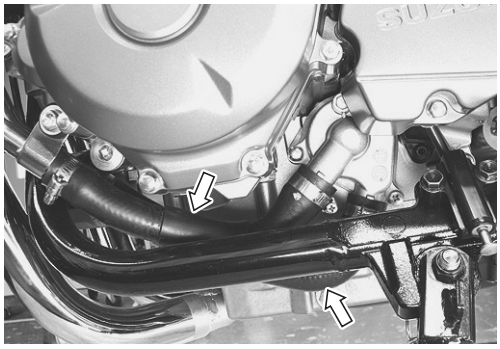
- Route the reservoir tank hoses properly. (☞10-20)
- Pour engine coolant. (☞2-15)
- Bleed air from the cooling circuit. (☞2-16)

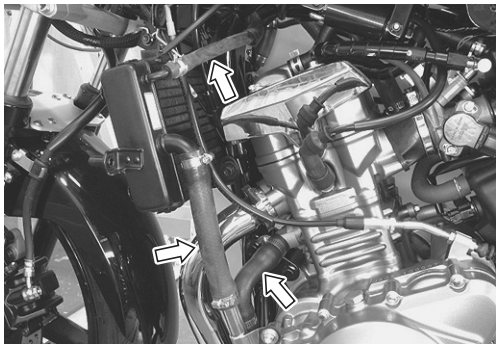


WATER HOSE INSPECTION

- Remove the left and right fuel tank covers. (☞8-5)
- Check the water hoses for crack, damage or engine coolant leakage. If any defect is found, replace the water hose with a new one.
- Any leakage from the connecting section should be corrected by proper tightening.



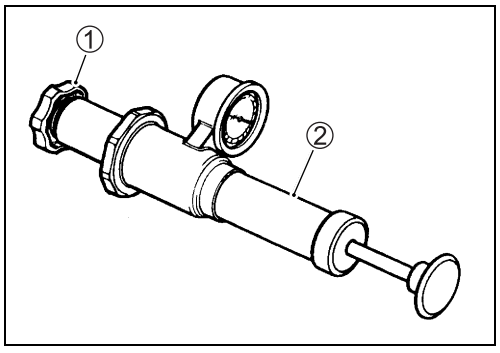




RADIATOR CAP INSPECTION

- Attach the cap ① to the radiator cap tester ②.
- Slowly apply pressure to the radiator cap ①. If the radiator cap does not hold the pressure for at least 10 seconds, replace it with a new one.

DATA Radiator cap valve opening pressure:
Standard: 93 – 123 kPa
(0.93 – 1.23 kgf/cm², 13.2 – 17.5 psi)



RADIATOR INSPECTION AND CLEANING

- Remove the left and right fuel tank covers. (☞8-5)
- Inspect the radiator for water leaks. If any defects are found, replace the radiator with a new one. If the fins are bent or dented, repair them by carefully straightening them with the blade of a small screwdriver.

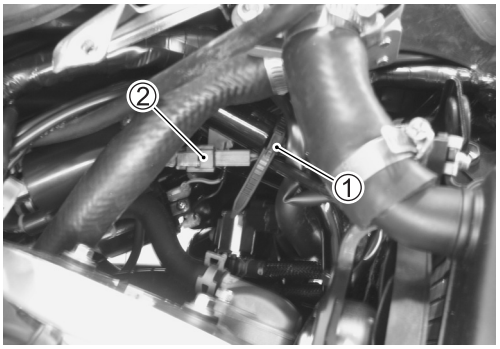
- Blow out any foreign matter that is stuck in the radiator fins using compressed air.

NOTICE

*** Make sure not to bend the fins when using compressed air.**
*** Always apply compressed air from the engine side of engine. If compressed air is applied from the front side, dirt will be forced into the pores of radiator.**

COOLING FAN

INSPECTION

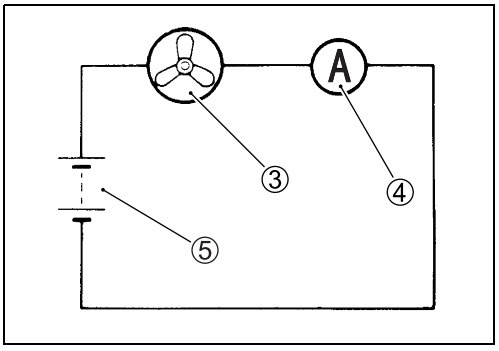


- Remove the right fuel tank cover. (☞8-5)
- Remove the reservoir tank. (☞7-5)

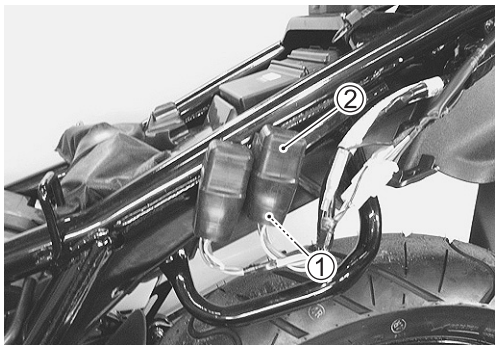
NOTE:
Do not drain the engine coolant.

- Disconnect the clamp ① and cooling fan motor coupler ②.
- Test the cooling fan motor ③ for load current with an ammeter ④ connected as shown in the figure.
  If the fan motor does not turn, replace the cooling fan motor assembly with a new one. (☞7-6)

NOTE:
** When making this test, it is not necessary to remove the cooling fan.*
** Make sure that the battery ⑤ has a capacity enough to supply the motor with 12 V.*
** With the motor running at full speed, the ammeter ④ should indicate an amperage not higher than 5 A.*



COOLING FAN RELAY INSPECTION



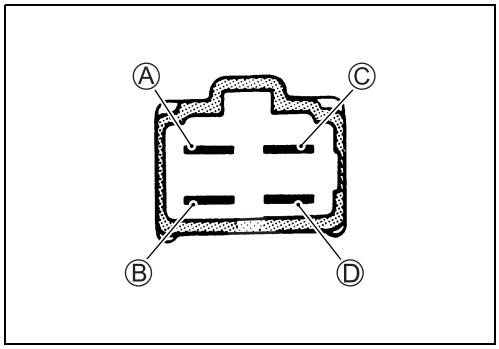
Cooling fan relay is located inside of the left frame upper cover.

- Remove the frame upper cover assembly. (☞8-6)
- Disconnect the cooling fan relay coupler ① and remove the cooling fan relay ②.

First check the insulation between Ⓐ and Ⓑ terminals with tester. Then apply 12 volts to Ⓒ and Ⓓ terminals, ⊕ to Ⓒ and ⊖ to Ⓓ, and check the continuity between Ⓐ and Ⓑ.
If there is no continuity, replace it with a new one.

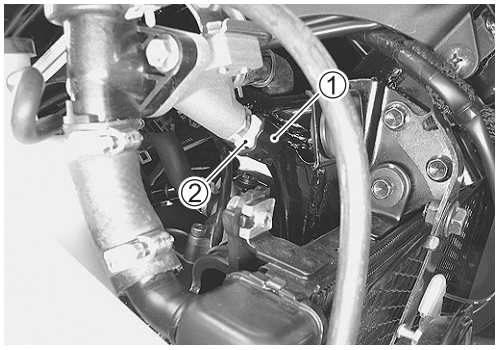
TOOL 09900-25008: Multi circuit tester set

Tester knob indication: Continuity test (•))))



ECT SENSOR

REMOVAL

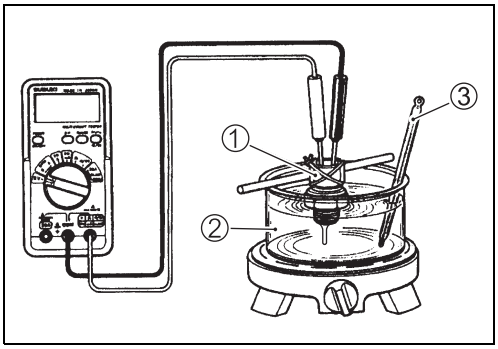


- Remove the right fuel tank cover. (☞8-5)
- Drain a small amount of engine coolant. (☞2-15)
- Disconnect the ECT sensor coupler ①.
- Place a rag under the ECT sensor ② and remove the ECT sensor ②.

NOTICE

Take special care when handling the ECT sensor. It may cause damage if it gets an excessive impact.

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 it with a new one.

DATA Temperature sensor specification

Temperature	Standard resistance
20 °C (68 °F)	Approx. 2.45 kΩ
50 °C (122 °F)	Approx. 0.811 kΩ
80 °C (176 °F)	Approx. 0.318 kΩ
110 °C (230 °F)	Approx. 0.142 kΩ

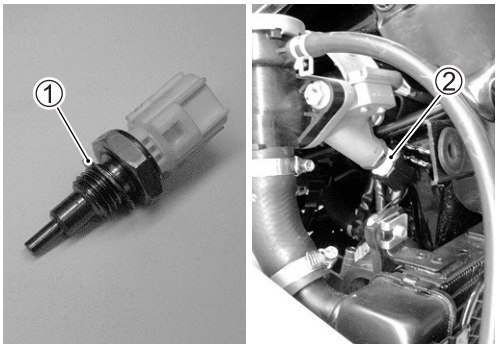
DATA Cooling fan operating temperature:
Standard (OFF→ON): Approx. 105 °C (221 °F)
(ON→OFF): Approx. 100 °C (212 °F)

- If the resistance is noted to show infinity or too much different resistance value, replace the ECT sensor with a new one.

NOTICE

*** 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 new gasket washer ①.
- Tighten the ECT sensor ② to the specified torque.

ECT sensor: 18 N·m (1.8 kgf-m, 13.0 lbf-ft)

NOTICE

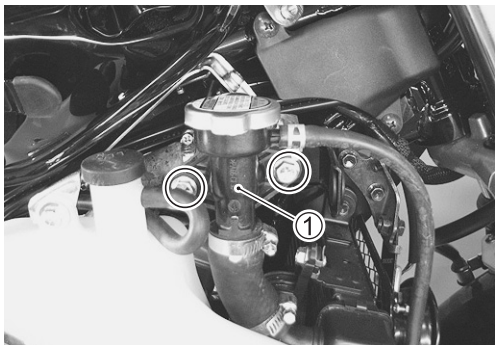
Take special care when handling the ECT sensor. It may cause damage if it gets a sharp impact.

- Pour engine coolant. (☞2-15)
- Bleed air from the cooling circuit. (☞2-16)

THERMOSTAT

REMOVAL

- Remove the right fuel tank cover. (☞8-5)
- Drain a small amount of engine coolant. (☞2-15)
- Place a rag under the connector cap ①.
- Move the connector cap ① by removing the connector cap bolts.

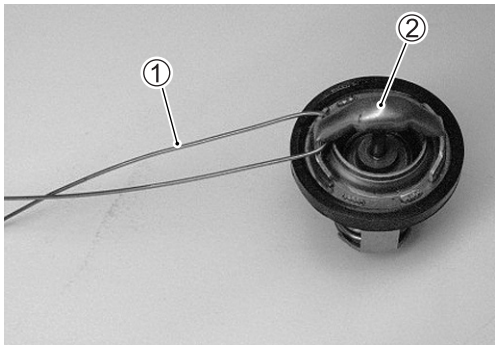


- Remove the thermostat ②.

INSPECTION

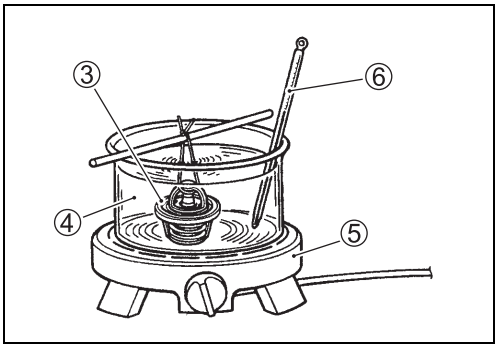
Inspect the thermostat pellet for signs of cracking.
Test the thermostat at the bench for control action, in the following manner.

- Pass a string ① between flange ② of thermostat, as shown.
- Immerse the thermostat ③ in the water contained in a pan and note that the immersed thermostat is in suspension. Heat the water ④ by placing the pan on a electric stove ⑤ and observe the rising temperature on a thermometer ⑥.



- Read the thermometer just when opening the thermostat. If this reading, which is the temperature level at which the thermostat valve begins to open, is out of the standard value, replace the thermostat with a new one.

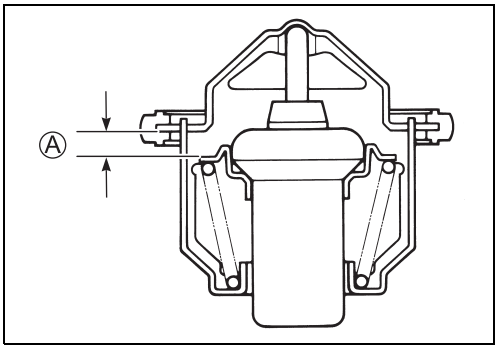
DATA Thermostat valve opening temperature:
Standard: Approx. 88 °C (190 °F)



NOTE:

** Do not contact the thermostat ③ and column thermometer ⑥ with a pan.*
** As the thermostat operating response to water temperature change is gradual, do not raise water temperature too quickly.*
** The thermostat ③ with its valve open even slightly under normal temperature must be replaced.*

- 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).

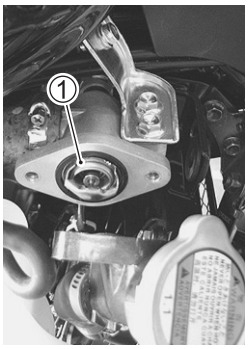


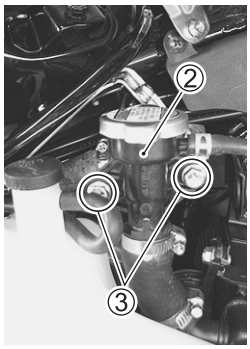
DATA Thermostat valve lift Ⓐ:
Standard: 4.5 mm and over at 100 °C
(0.18 in and over at 212 °F)

- A thermostat failing to satisfy either of the two requirements (start-to-open temperature and valve lift) must be replaced.

INSTALLATION

- Install the thermostat ① and connector cap ②.
- Temporarily tighten the connector cap bolts ③ and then tighten them.

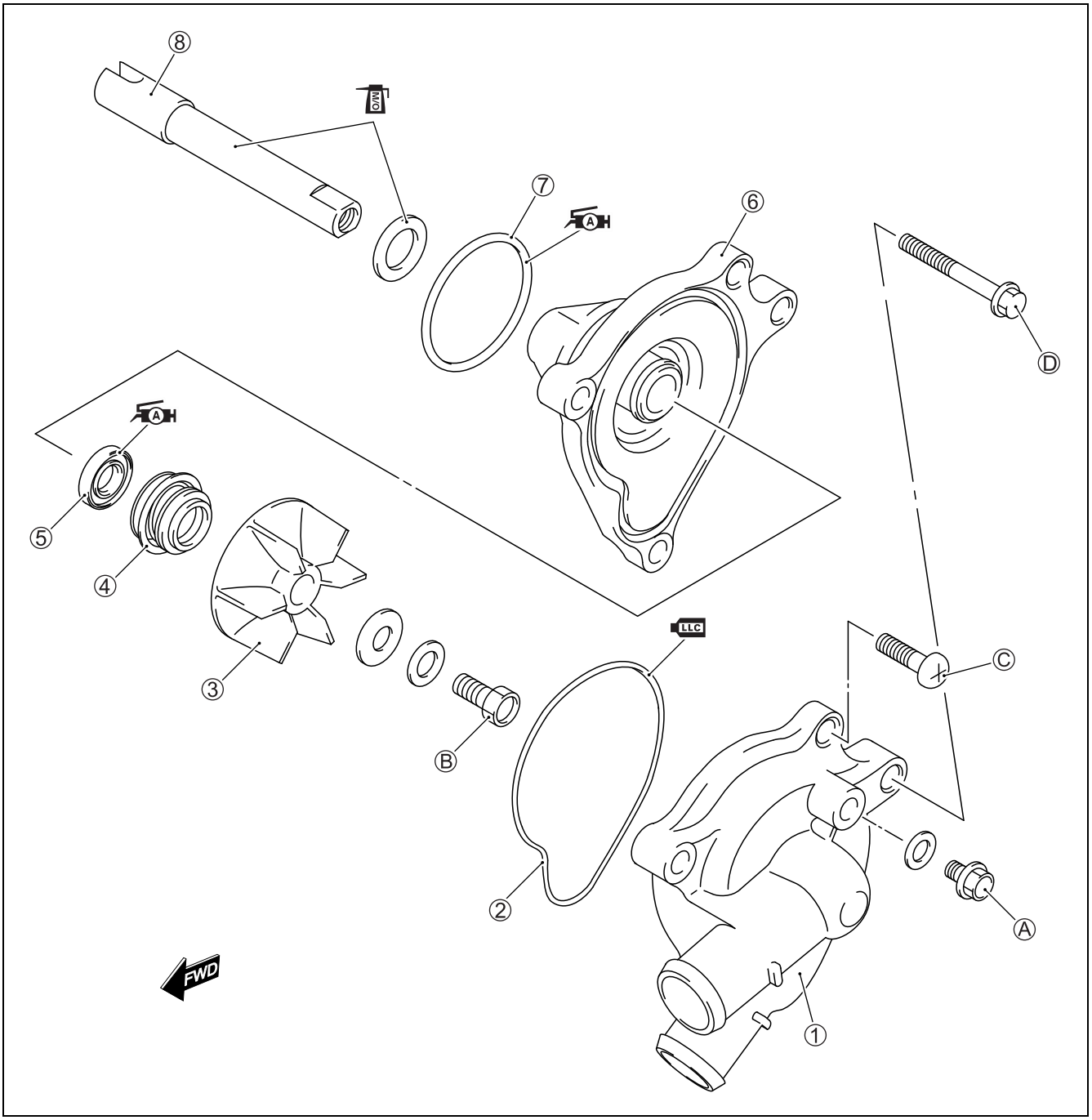




Thermostat connector cap bolt:
10 N·m (1.0 kgf-m, 7.0 lbf-ft)

- Pour engine coolant. (☞2-15)
- Bleed air from the cooling circuit. (☞2-16)

WATER PUMP
CONSTRUCTION

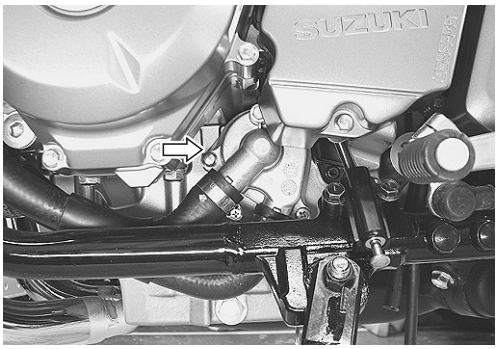


①	Water pump cover	⑦	O-ring
②	O-ring	⑧	Impeller shaft
③	Impeller	Ⓐ	Water pump air bleeder bolt
④	Mechanical seal	Ⓑ	Impeller securing bolt
⑤	Oil seal	Ⓒ	Water pump cover screw
⑥	Water pump body	Ⓓ	Water pump mounting bolt

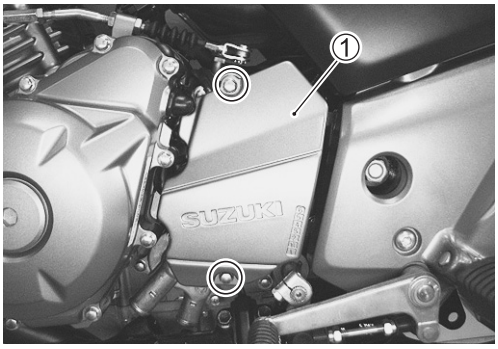
ITEM	N·m	kgf-m	lbf-ft
Ⓐ	6	0.6	4.5
Ⓑ	8	0.8	6.0
Ⓒ	5.5	0.55	4.0
Ⓓ	10	1.0	7.0

REMOVAL AND DISASSEMBLY

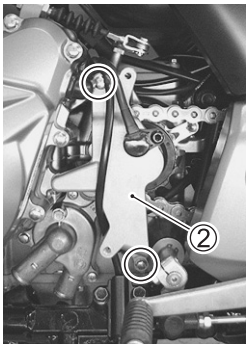
NOTE:
Before draining engine oil and engine coolant, inspect engine oil and coolant leakage between the water pump and crankcase. If engine oil is leaking, visually inspect the oil seal and O-ring. If engine coolant is leaking, visually inspect the mechanical seal and seal ring. (☞7-16)

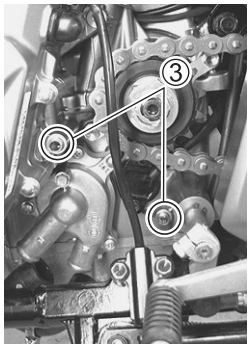


- Drain the engine coolant. (☞2-15)
- Drain the engine oil. (☞2-11)
- Remove the engine sprocket cover ①.

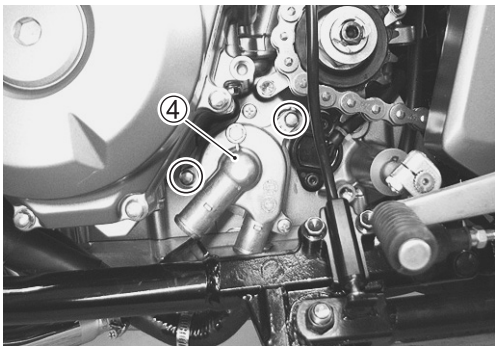


- Move the speed sensor bracket ② and remove the dowel pins ③.

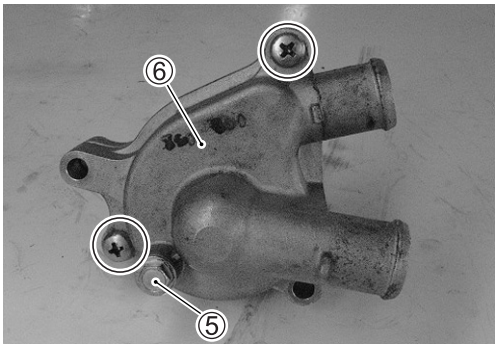




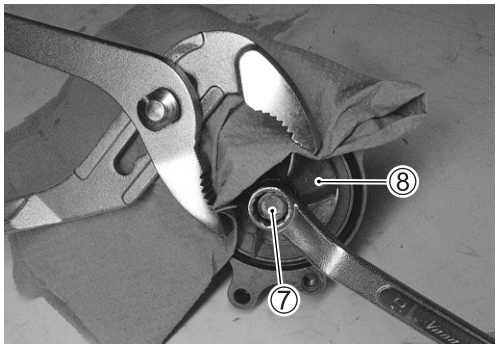
- Remove the water pump ④.



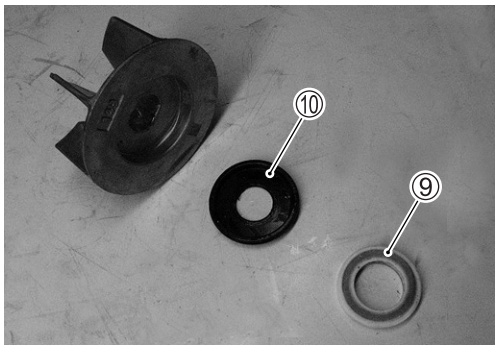
- Remove the air bleeder bolt ⑤.
- Remove the water pump cover ⑥.



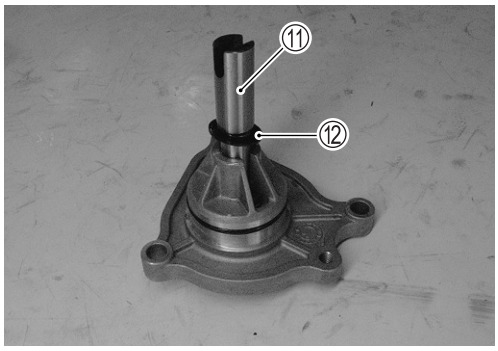
- Remove the impeller securing bolt ⑦ by holding the impeller ⑧ with a water pump pliers.



- Remove the mechanical seal ring ⑨ and rubber seal ⑩ from the impeller.



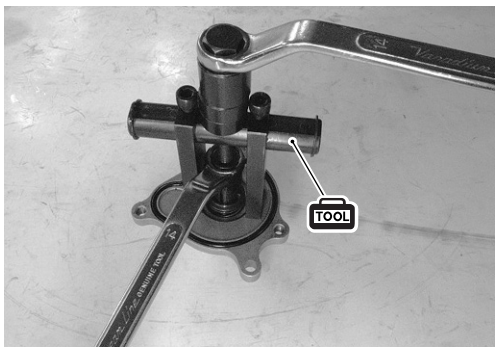
- Remove the impeller shaft ⑪ and washer ⑫.



- Remove the mechanical seal with the special tool.

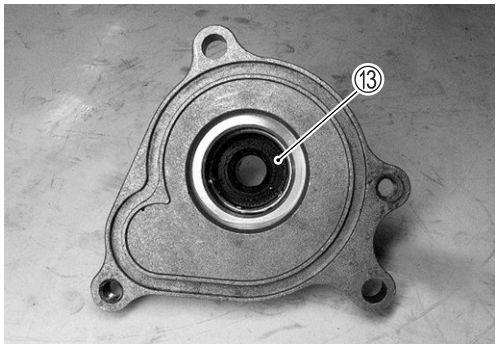
TOOL 09921-20240: Bearing remover set

NOTE:
If there is no abnormal condition, the mechanical seal removal is not necessary.



- Remove the oil seal ⑬.

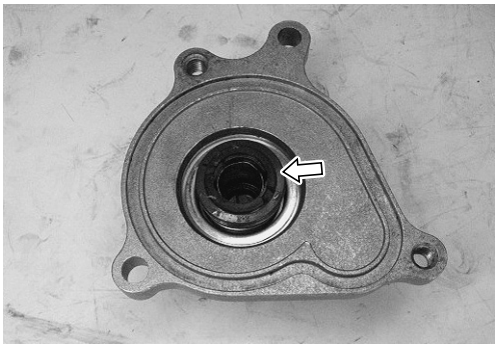
NOTE:
If there is no abnormal condition, the oil seal removal is not necessary.



INSPECTION

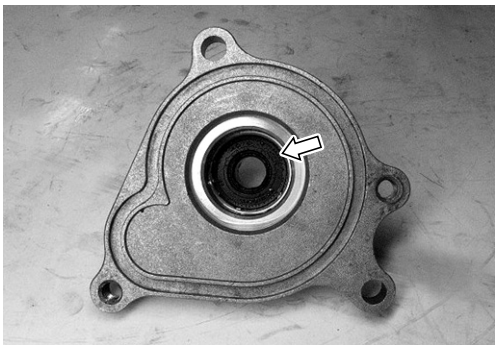
MECHANICAL SEAL

- Visually inspect the mechanical seal for damage, with particular attention given to the sealing face.
  Replace the mechanical seal that shows indications of leakage. Also replace the seal ring if necessary.



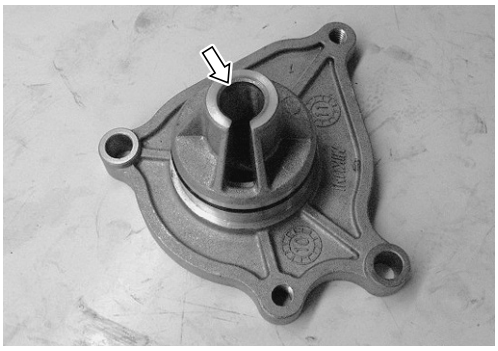
OIL SEAL

- Visually inspect the oil seal for damage, with particular attention given to the lip.
  Replace the oil seal that shows indications of leakage.



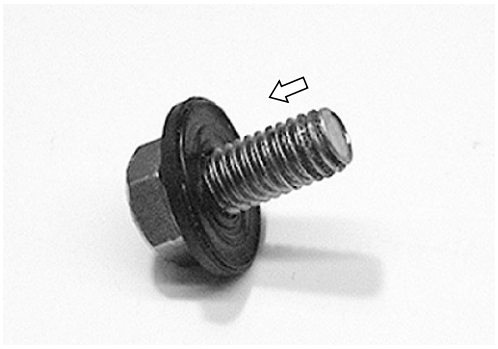
IMPELLER SHAFT JOURNAL

- Visually inspect the journal for damage or scratch.
  Replace the water pump body if necessary.



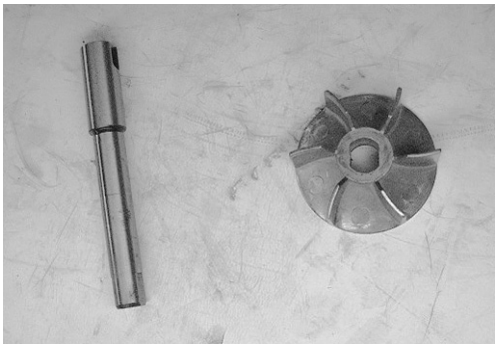
SEAL WASHER

- Visually inspect the seal washer for damage, with particular attention given to the sealing face.
  Replace the seal washer that shows indications of leakage.



IMPELLER/SHAFT

- Visually inspect the impeller and its shaft for damage. Replace the impeller or shaft if necessary.

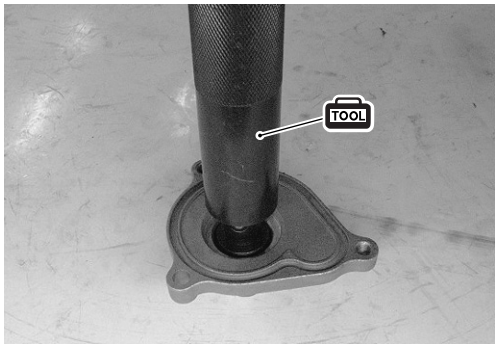


REASSEMBLY AND INSTALLATION

- Install a new oil seal with the special tool.

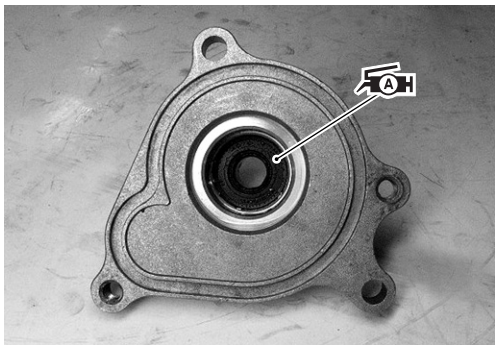
09913-70210: Bearing installing set (10 – 75 ϕ)

NOTE:
The stamped mark on the oil seal faces mechanical seal side.



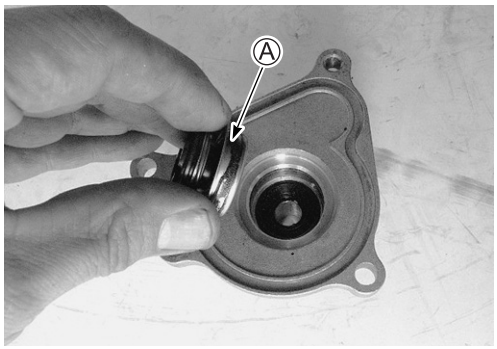
- Apply a small quantity of the grease to the oil seal lip.

99000-25010: SUZUKI SUPER GREASE "A"
or equivalent



- Install the new mechanical seal using a suitable size socket wrench.

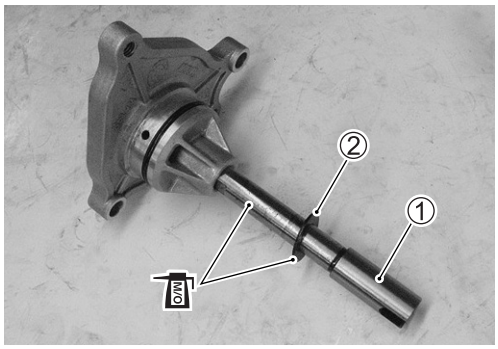
NOTE:
On the new mechanical seal, the sealer Ⓐ has been applied.



- Apply molybdenum solution to the impeller shaft ① and washer ②.

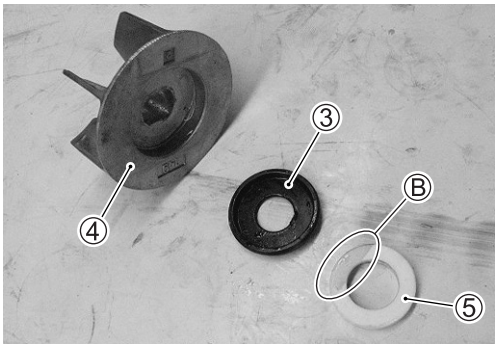
MOLYBDENUM OIL SOLUTION

- Install the impeller shaft ① and washer ② to the water pump body.



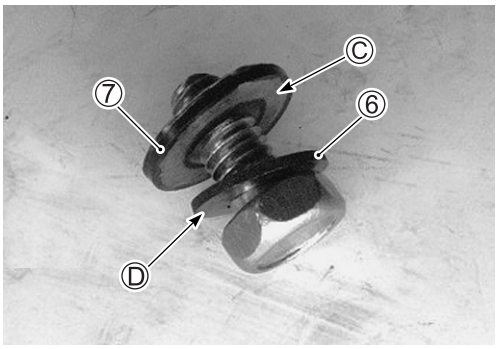
- Install the rubber seal ③ into the impeller ④.
- After wiping off the oily or greasy matter from the mechanical seal ring ⑤, install it into the impeller.

NOTE:
The paint marked side Ⓑ of mechanical seal ring faces the rubber seal.



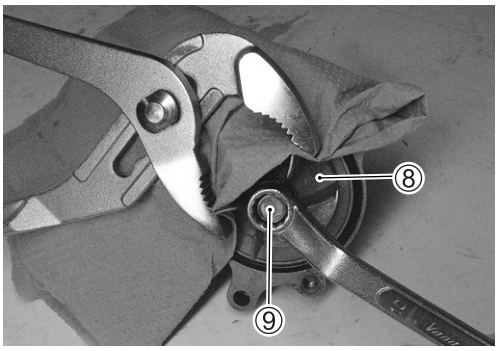
- Install the washer ⑥ and seal washer ⑦ onto the impeller securing bolt.

NOTE:
The metal side Ⓒ of seal washer and the curved side Ⓓ of washer face the impeller securing bolt head.

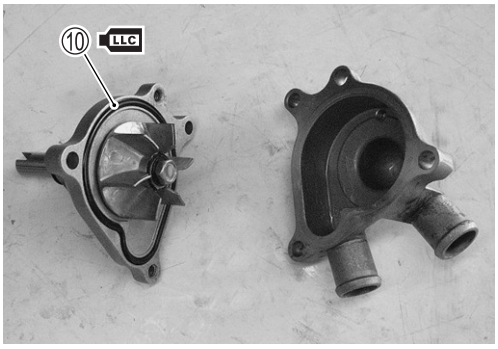


- Install the impeller ⑧.
- Tighten the impeller securing bolt ⑨ to the specified torque.

Impeller securing bolt: 8 N·m (0.8 kgf-m, 6.0 lbf-ft)



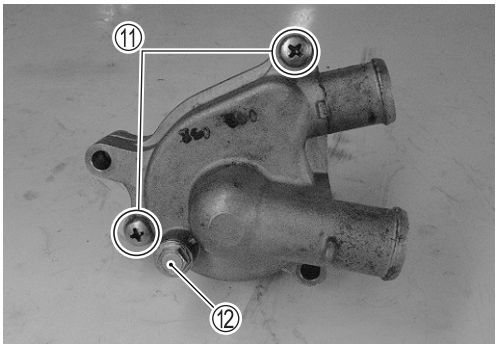
- Install a new O-ring ⑩ and apply engine coolant to it.



- Fit the water pump cover and tighten the water pump cover screws ⑪ to the specified torque.

Water pump cover screw: 5.5 N·m (0.55 kgf-m, 4.0 lbf-ft)

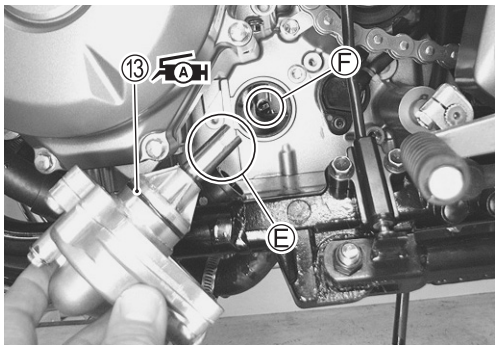
- Install a new gasket washer and tighten the water pump air bleeder bolt ⑫.



- Apply grease to the new O-ring ⑬.

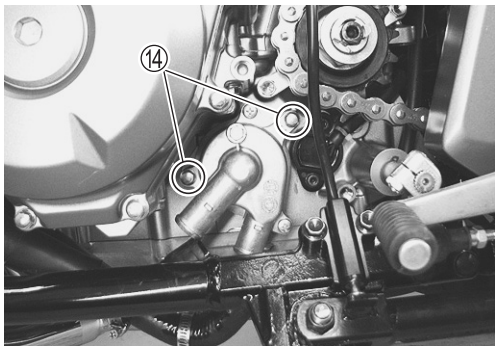
99000-25010: SUZUKI SUPER GREASE "A" or equivalent

- Install the water pump with the slot on the pump shaft end Ⓔ securely engaged with the flat Ⓕ of the oil pump shaft.



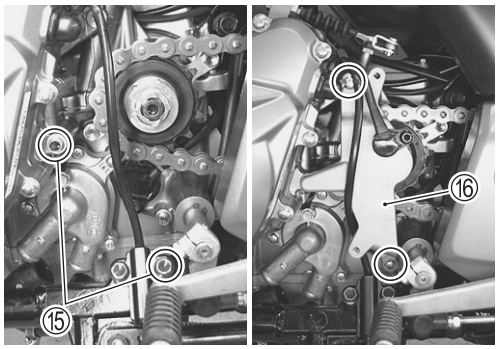
- Tighten the water pump mounting bolts ⑭ to the specified torque.

Water pump mounting bolt: 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



- Install the dowel pins ⑮ and speed sensor bracket ⑯.
- Tighten the speed sensor bracket bolts to the specified torque.

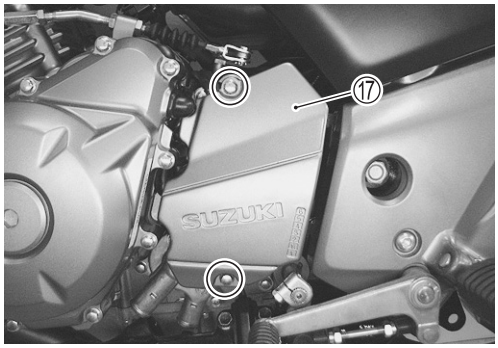
Speed sensor bracket bolt: 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



- Install the engine sprocket cover ⑰.
- Tighten the engine sprocket cover bolts to the specified torque.

Engine sprocket cover bolt: 10 N·m (1.0 kgf-m, 7.0 lbf-ft)

- Connect the water pump inlet and outlet hoses. (☞10-21)
- Pour engine coolant. (☞2-15)
- Pour engine oil. (☞2-11)
- Bleed air from the cooling circuit. (☞2-16)



LUBRICATION SYSTEM

OIL PRESSURE

☞2-28

OIL FILTER

☞2-12

OIL PRESSURE REGULATOR

☞3-23 and 3-47

OIL STRAINER

☞3-23 and 3-47

OIL JET

☞3-55

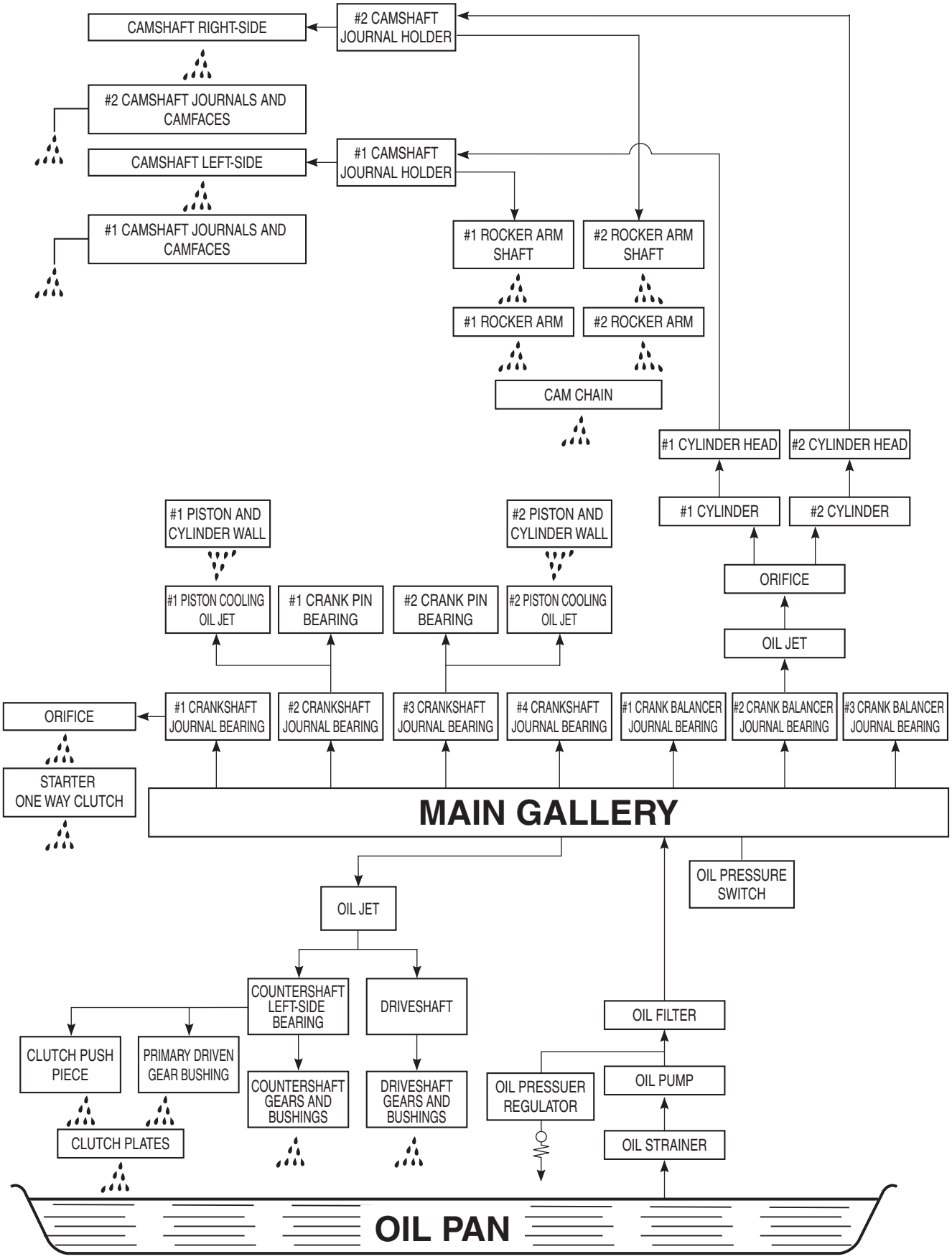
OIL PUMP

☞3-18 and 3-41

OIL PRESSURE SWITCH

☞9-34

ENGINE LUBRICATION SYSTEM CHART



CHASSIS

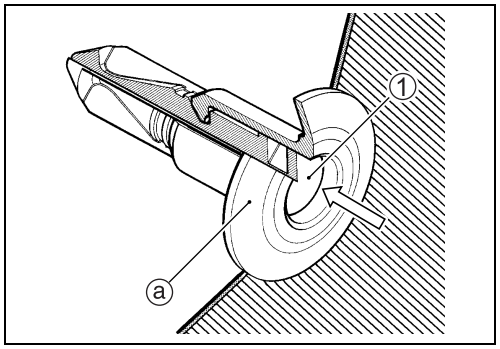
CONTENTS

CHASSIS

CONTENTS

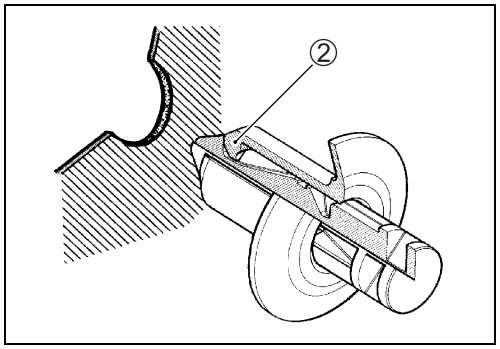
EXTERIOR PARTS

FASTENER



Removal

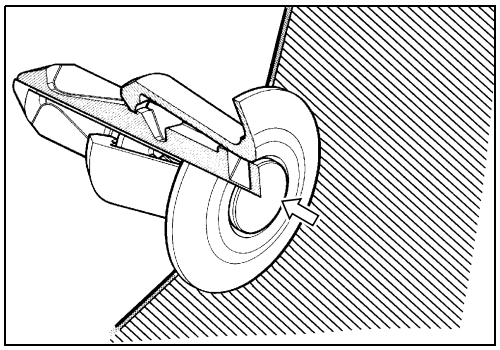
- Depress the head of fastener center piece ①.
- Pull out the fastener ⓐ.



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.

FRAME COVER

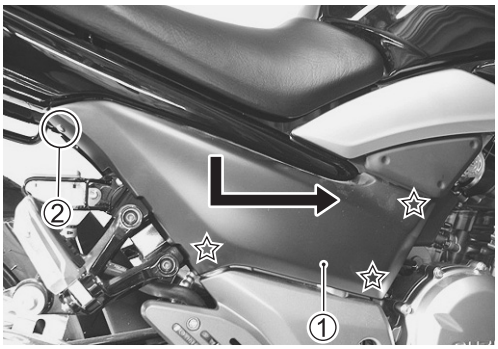
REMOVAL

NOTE:

The left and right side frame covers are installed symmetrically and therefore the removal procedure for one side is the same as that for the other side.

- Remove the frame cover ① by removing the screw ②.

☆: Hooked point



INSTALLATION

- Install the frame cover in the reverse order of removal.

FRAME FRONT COVER

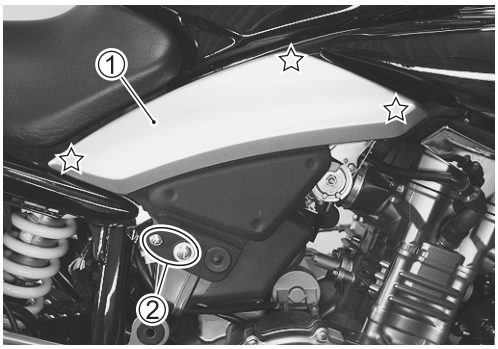
REMOVAL

NOTE:

The left and right side frame front covers are installed symmetrically and therefore the removal procedure for one side is the same as that for the other side.

- Remove the frame cover. (☞above)
- Remove the frame front cover ① by removing the screws ②.

☆: Hooked point



INSTALLATION

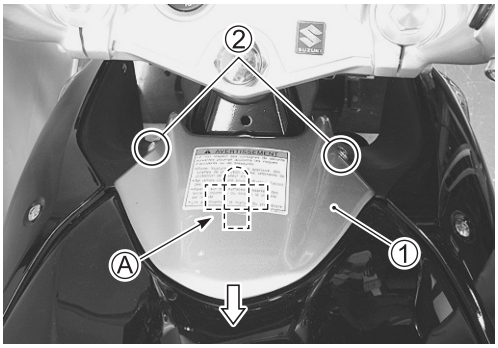
- Install the frame front cover in the reverse order of removal.

FUEL TANK CENTER COVER

REMOVAL

- Remove the fuel tank center cover ① by removing the screws ②.

Ⓐ: Guide



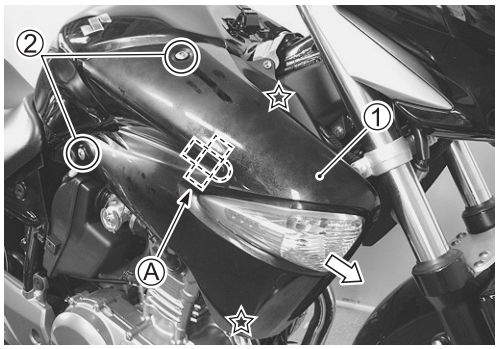
FUEL TANK COVER

REMOVAL

NOTE:

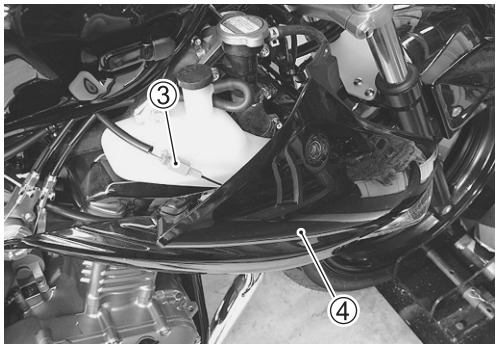
The left and right side fuel tank covers are installed symmetrically and therefore the removal procedure for one side is the same as that for the other side.

- Remove the frame front cover. (☞8-4)
- Remove the fuel tank center cover. (☞8-4)
- Pull the front part of fuel tank cover ① by removing the screws ②.



Ⓐ: Guide
☆:Hooked point

- Disconnect the front turn signal light coupler ③ and remove the fuel tank cover ④.



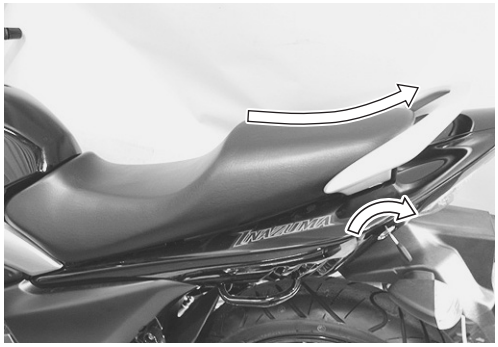
INSTALLATION

- Install the fuel tank cover in the reverse order of removal.

SEAT

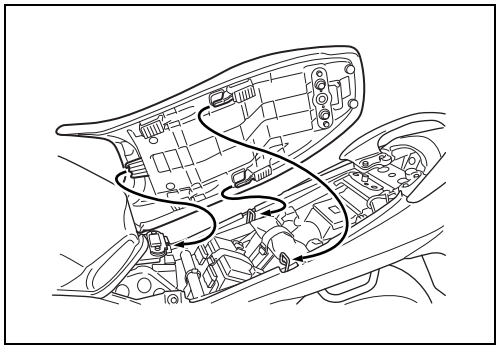
REMOVAL

- Unhook the seat using the ignition key.



INSTALLATION

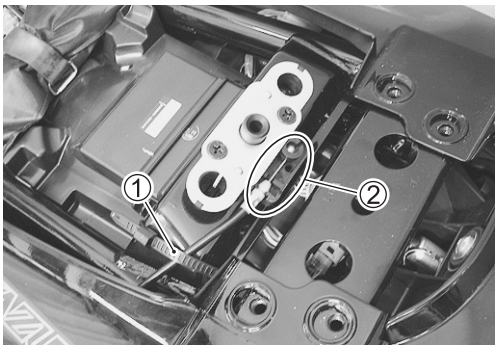
- Slide the seat hooks into the seat hook retainers and push down firmly until the seat snaps into the locked position.



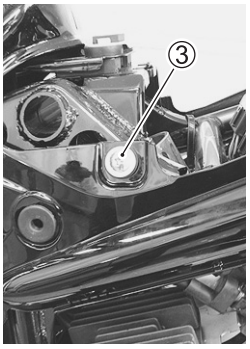
FRAME UPPER COVER

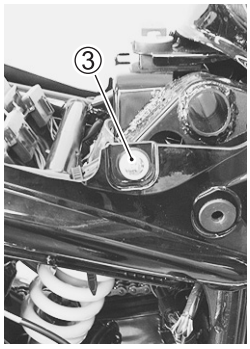
REMOVAL

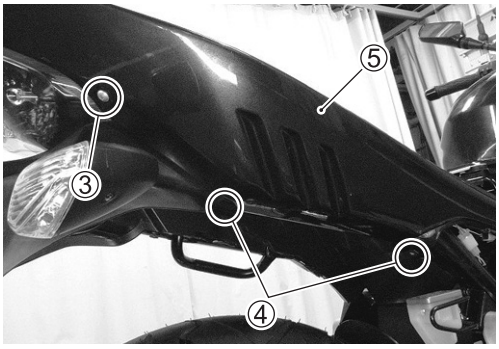
- Remove the seat. (☞8-5)
- Remove the left and right frame front covers. (☞8-4)
- Remove the pillion rider handle. (☞8-6)
- Disconnect the clamp ① and seat lock cable ②.

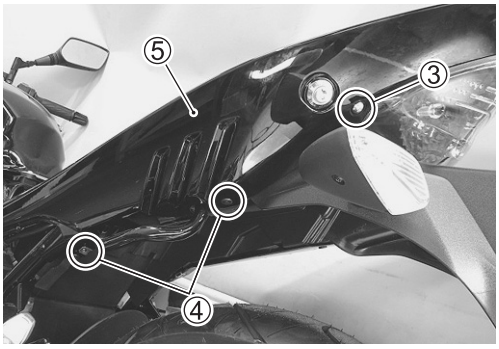


- Remove the screws ③ and fasteners ④.
- Remove the frame upper cover assembly ⑤.









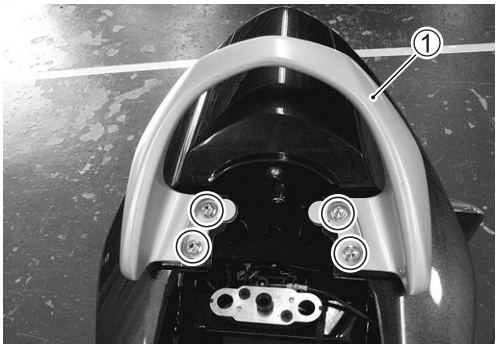
INSTALLATION

- Install the frame upper cover in the reverse order of removal.

PILLION RIDER HANDLE

REMOVAL

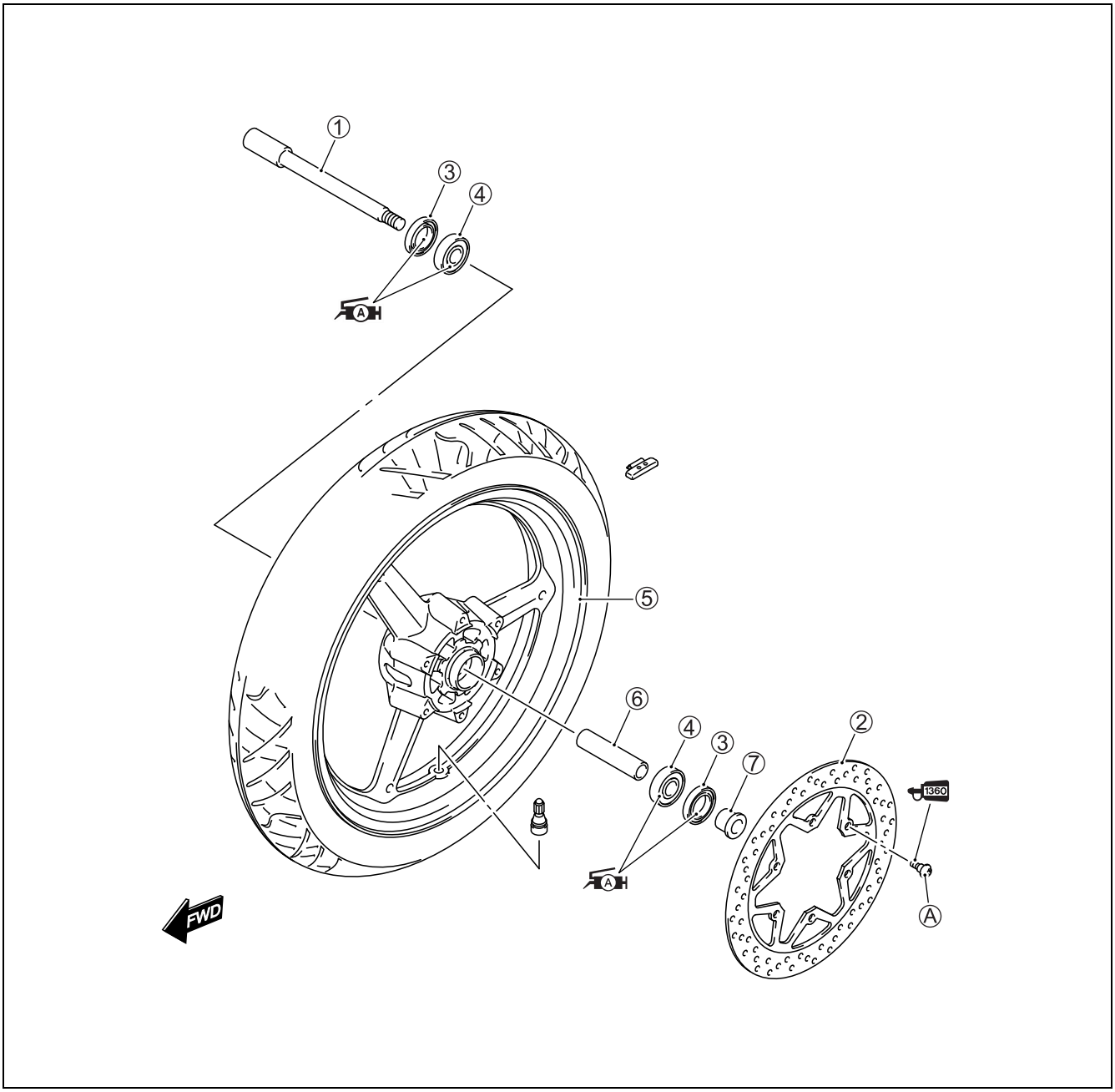
- Remove the seat. (☞8-5)
- Remove the pillion rider handle ①.



INTALLATION

- Install the pillion rider handle in the reverse order of removal.

FRONT WHEEL
CONSTRUCTION



①	Front axle	⑤	Front wheel
②	Brake disc	⑥	Spacer
③	Dust seal	⑦	Collar
④	Bearing	Ⓐ	Brake disc bolt

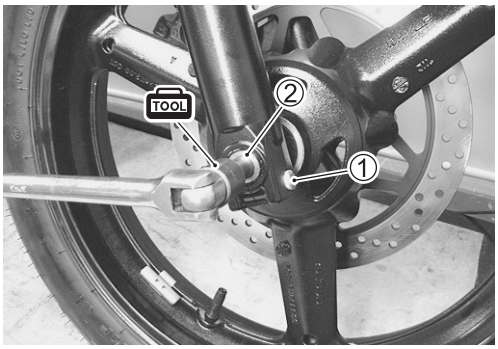
ITEM	N·m	kgf-m	lbf-ft
①	65	6.5	47.0
Ⓐ	18	1.8	13.0

REMOVAL

NOTE:
Do not operate the brake lever with the caliper removed.

- Loosen the front axle pinch bolt ①.
- Loosen the front axle ② using the special tool.

TOOL 09900-18710: Hexagon socket (12 mm)



- Raise the front wheel off the ground and support the motorcycle with a jack or a wooden block.

NOTICE

*** Do not support the motorcycle with the exhaust pipe.**
*** Make sure that the motorcycle is supported securely.**

- Draw out the front axle ② and remove the front wheel ③.

- Remove the collar ④ (LH only).

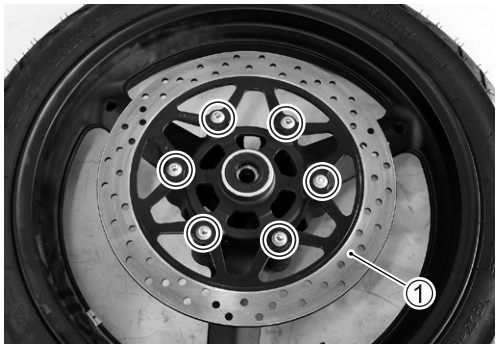
INSPECTION AND DISASSEMBLY

TIRE..... (☞2-23, 8-73)
BRAKE DISC..... (☞8-58)

DUST SEAL

Inspect the dust seal for wear or damage. If any damage is found, replace the dust seal with a new one.

• Remove the brake disc ①.



• Remove the dust seals ② on both sides using the special tool.

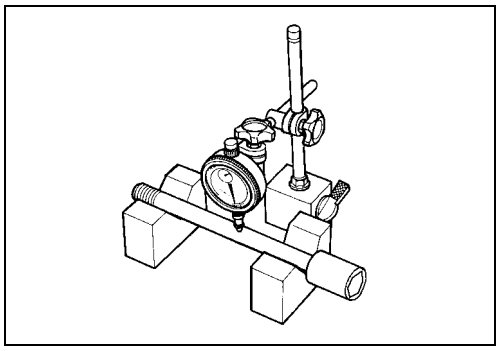
TOOL **09913-50121: Oil seal remover**

AXLE SHAFT

Using a dial gauge, check the axle shaft for runout and replace it if the runout exceeds the limit.

TOOL **09900-20607: Dial gauge**
09900-20701: Dial gauge chuck
09900-21304: V blocks

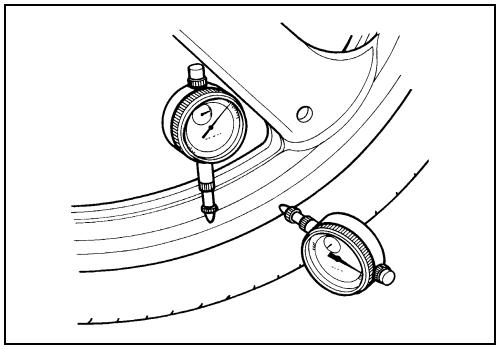
DATA **Wheel axle runout:**
Service Limit: 0.25 mm (0.010 in)



WHEEL

Make sure that the wheel runout checked as shown does not exceed the service limit. An excessive runout is usually due to worn or loosened wheel bearings and can be reduced by replacing the bearings. If bearing replacement fails to reduce the runout, replace the wheel.

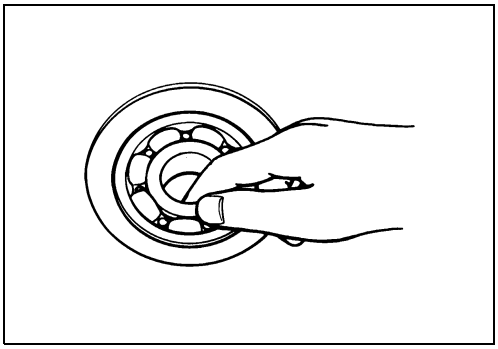
DATA **Wheel rim runout:**
Service Limit (Axial and Radial): 2.0 mm (0.08 in)



WHEEL BEARING

Inspect the play of wheel bearings by finger while they are in the wheel. Rotate the inner race by finger to inspect for abnormal noise and smooth rotation.

Replace the bearing in the following procedure if there is anything unusual.



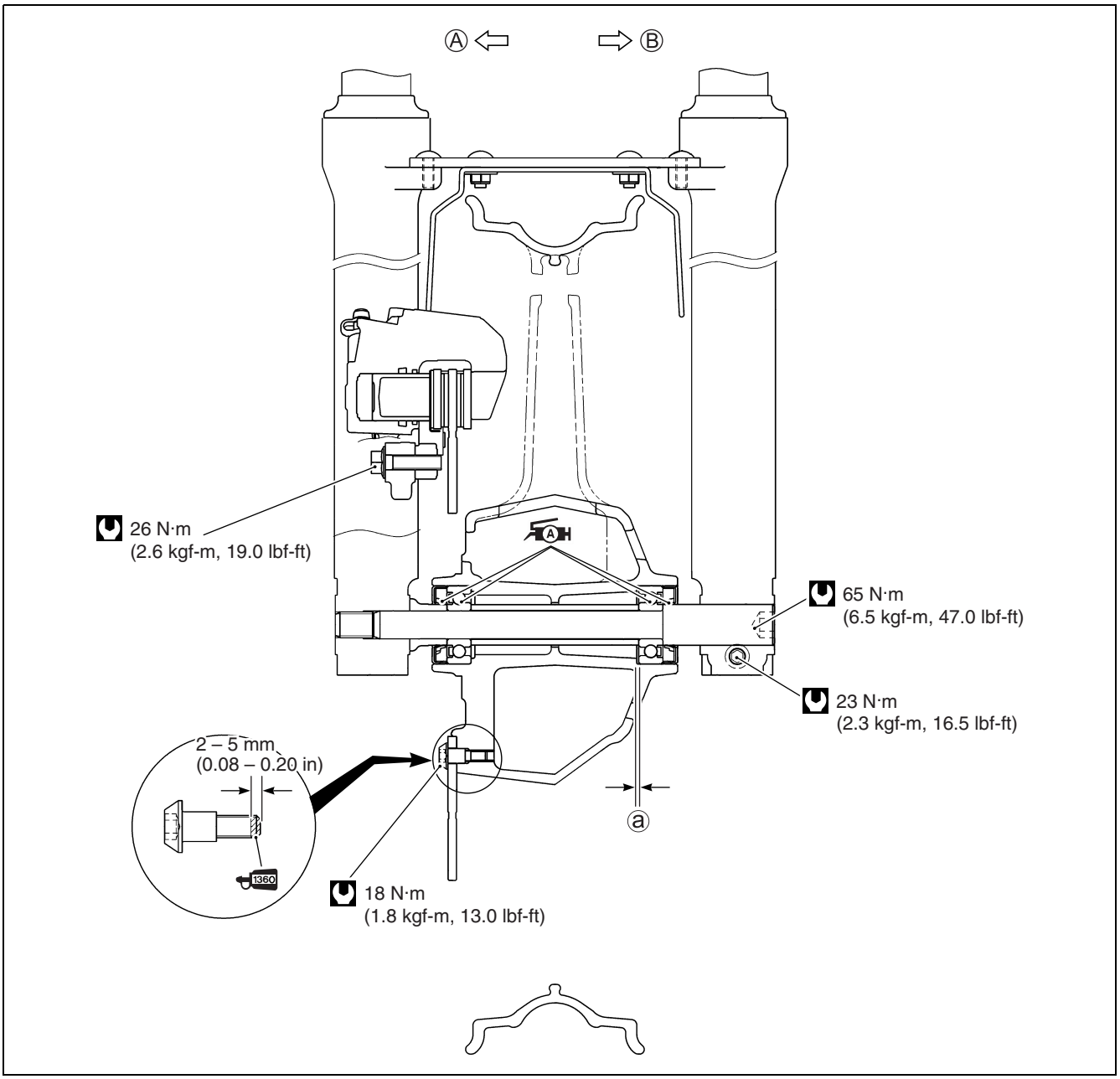
- Remove the wheel bearings ① on both sides using the special tool.

TOOL 09921-20240: Bearing remover set

- Remove the spacer ②.

REASSEMBLY AND INSTALLATION

Reassemble and install the front wheel in the reverse order of removal and disassembly.
Pay attention to the following points:

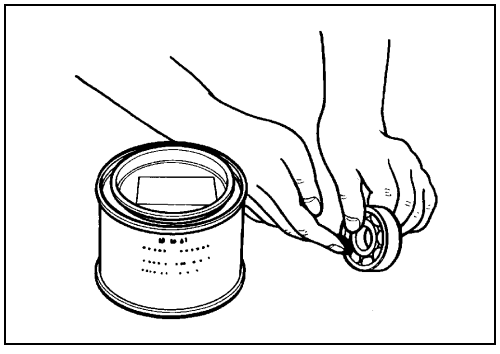


Ⓐ	LH	Ⓑ	RH	ⓐ	Clearance

WHEEL BEARING

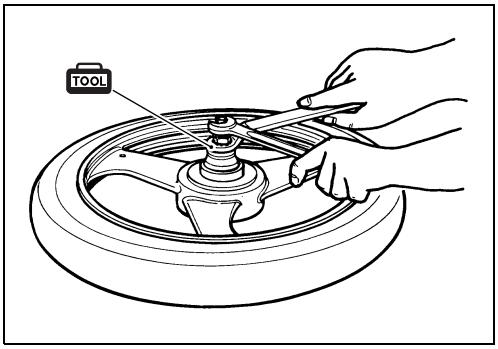
- Apply grease to the new wheel bearings.

99000-25010: SUZUKI SUPER GREASE "A" or equivalent



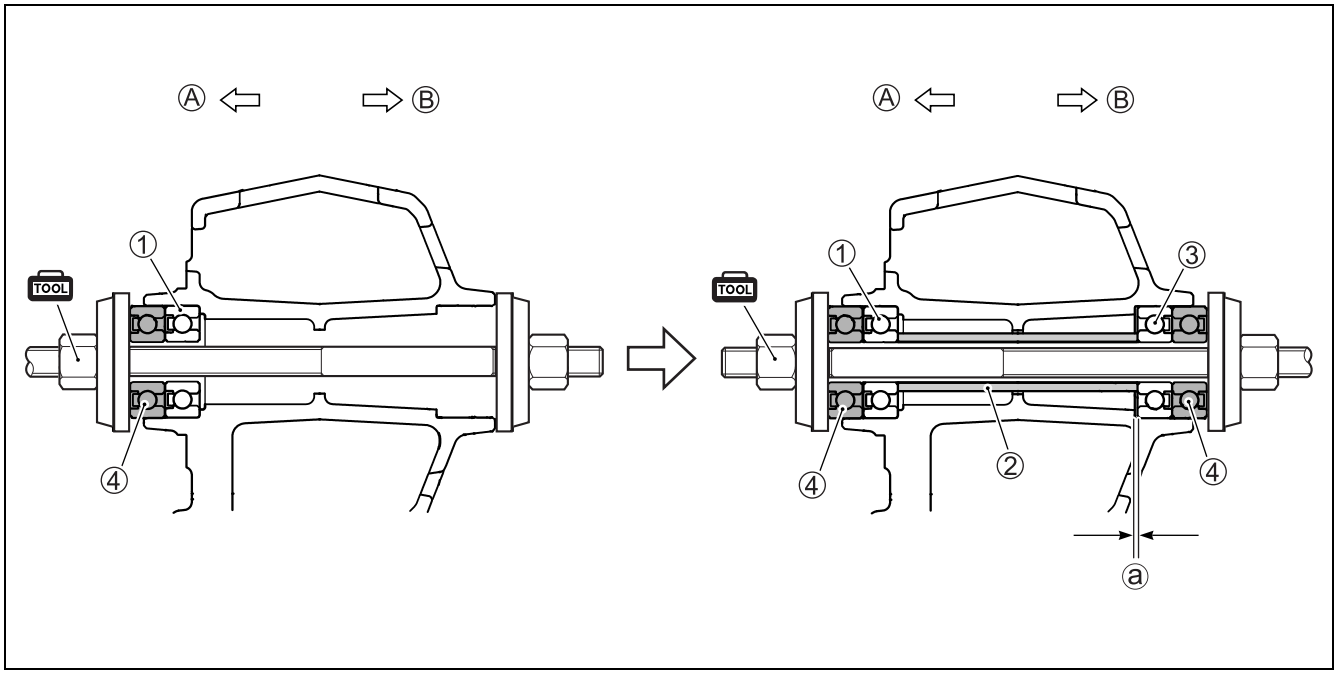
- First install the left wheel bearing ①, then install the spacer ② and right wheel bearing ③ using the special tool and removed wheel bearings ④.

09924-84510: Bearing installer set



NOTE:
The sealed cover of the bearing must face outside.

- Remove the removed wheel bearings ④.



①	Left wheel bearing	③	Right wheel bearing	Ⓐ	LH	ⓐ	Clearance
②	Spacer	④	Removed wheel bearing	Ⓑ	RH		

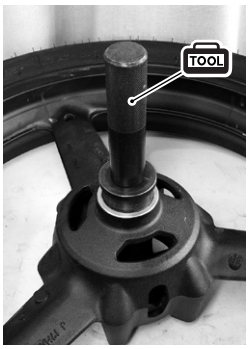
DUST SEAL

- Install the new dust seals using the special tool.

09913-70210: Bearing installing set (10 – 75 ϕ)

- Apply grease to the dust seal lips.

99000-25010: SUZUKI SUPER GREASE "A"
or equivalent

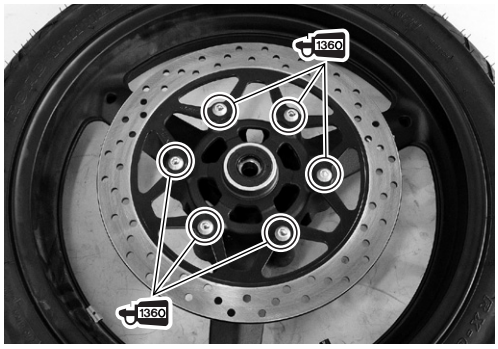


BRAKE DISC

- Make sure that the brake disc is clean and free of any greasy matter.
- Apply thread lock to the brake disc bolts and tighten them to the specified torque.

1360 99000-32130: THREAD LOCK CEMENT SUPER "1360" or equivalent

Brake disc bolt (Front): 18 N·m (1.8 kgf-m, 13.0 lbf-ft)



FRONT AXLE

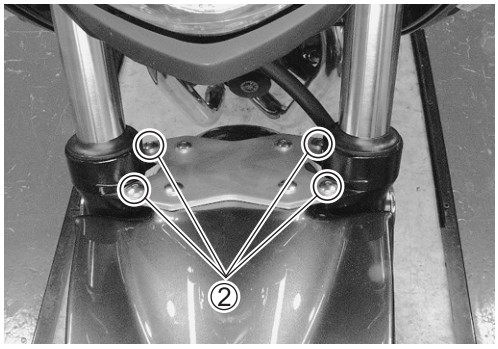
Install the front axle in the following procedure.

- Tighten the front axle ① using the special tool to the specified torque.

TOOL 09900-18710: Hexagon socket (12 mm)

Front axle: 65 N·m (6.5 kgf-m, 47.0 lbf-ft)

- Loosen the front stabilizer bolts ②.

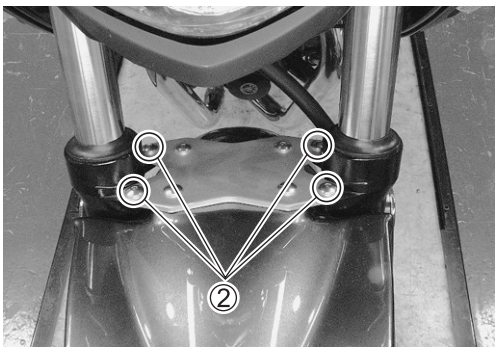


- Move the front forks up and down four or five times.

- Tighten the front axle pinch bolt ③ to the specified torque.

Front axle pinch bolt: 23 N·m (2.3 kgf-m, 16.5 lbf-ft)

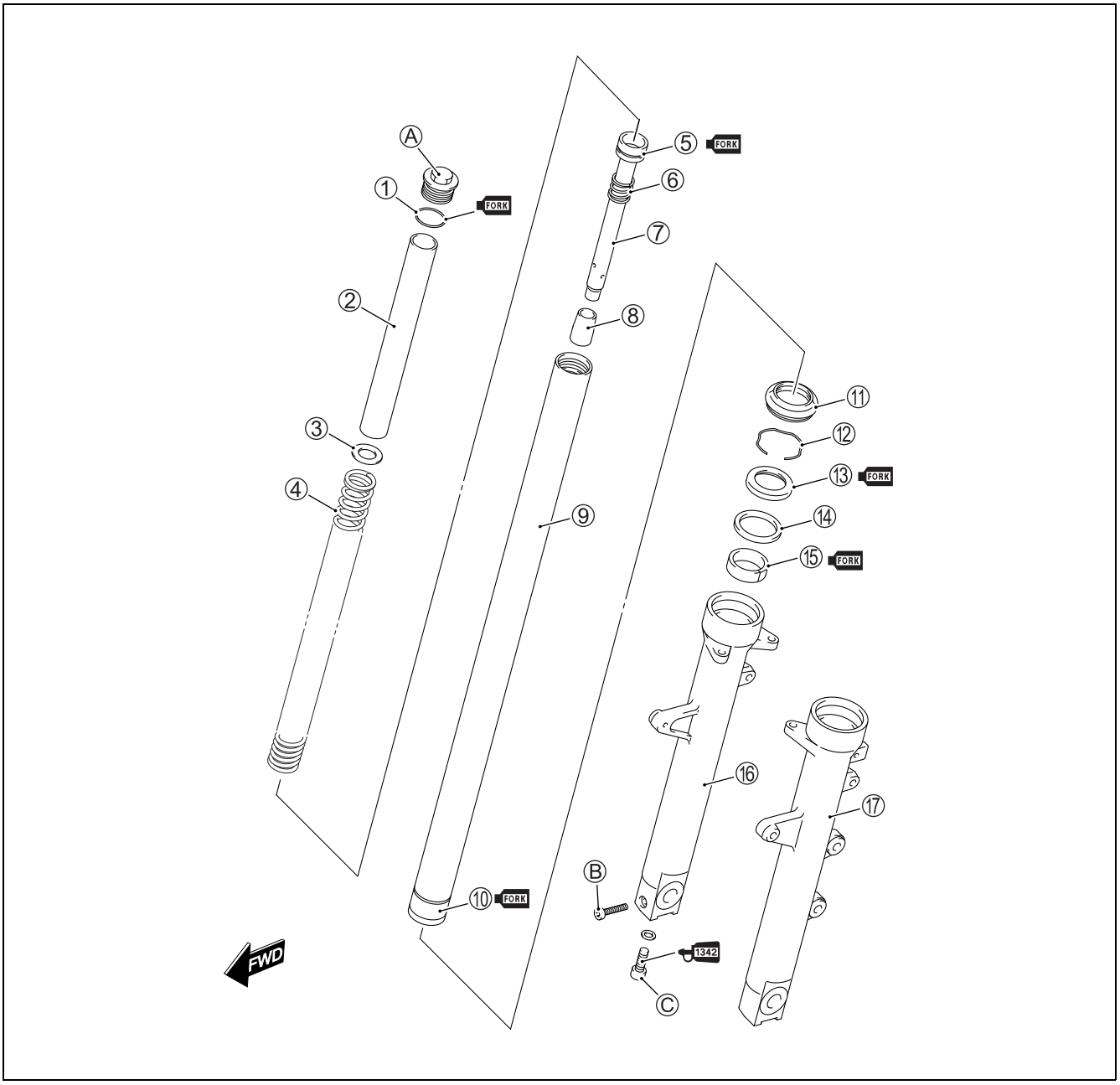
- Then, tighten the front stabilizer bolts ②.



⚠ WARNING

After installing the front wheel, pump the brake lever until the pistons push the pads correctly.

FRONT FORK
CONSTRUCTION



①	O-ring	⑪	Dust seal
②	Spacer	⑫	Oil seal stopper ring
③	Washer	⑬	Oil seal
④	Spring	⑭	Spacer
⑤	Damper rod ring	⑮	Outlet tube slide bushing
⑥	Rebound spring	⑯	Outer tube (RH)
⑦	Damper rod	⑰	Outer tube (LH)
⑧	Oil lock piece	Ⓐ	Front fork cap bolt
⑨	Inner tube	Ⓑ	Front axle pinch bolt
⑩	Inner tube slide bushing	Ⓒ	Damper rod bolt

ITEM	N·m	kgf-m	lbf-ft
Ⓐ	23	2.3	16.5
Ⓑ	23	2.3	16.5
Ⓒ	30	3.0	21.5

REMOVAL AND DISASSEMBLY

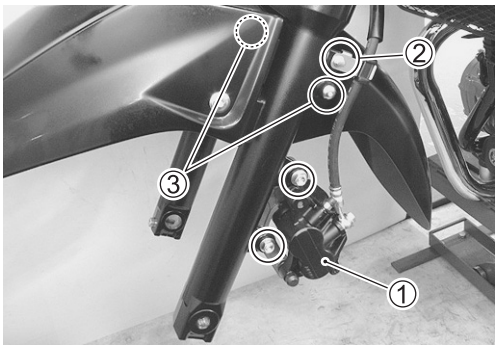
NOTE:
The left and right front forks are installed symmetrically and therefore the removal and disassembly procedure for one side is the same as that for the other side.

- Remove the front wheel. (☞8-8)

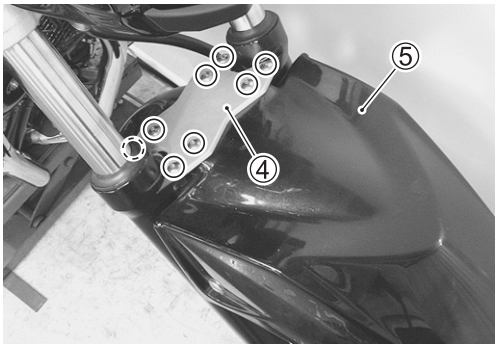
NOTICE

*** Make sure that the motorcycle is supported securely.**
*** Do not operate the front brake lever with the front wheel removed.**

- Remove the front brake caliper ① and brake hose clamp bolt ②.
- Remove the bolts ③ or front reflex reflectors (only for P-24).

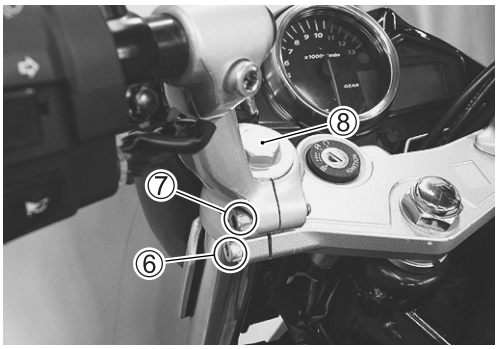


- Remove the front stabilizer ④ and front fender ⑤.



- Loosen the front fork upper clamp bolt ⑥ and handlebar holder bolt ⑦.

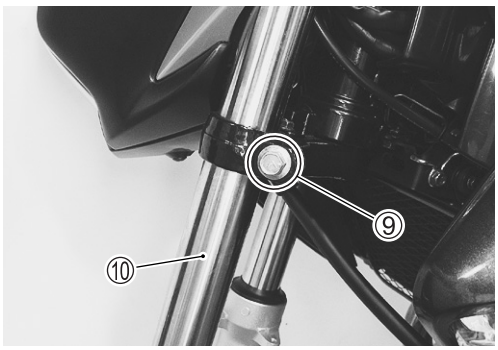
NOTE:
Slightly loosen the front fork cap bolt ⑧ to facilitate later disassembly.



- Loosen the front fork lower clamp bolt ⑨.
- Remove the front fork ⑩.

NOTE:
Hold the front fork by hand to prevent it from sliding out of the steering stem.

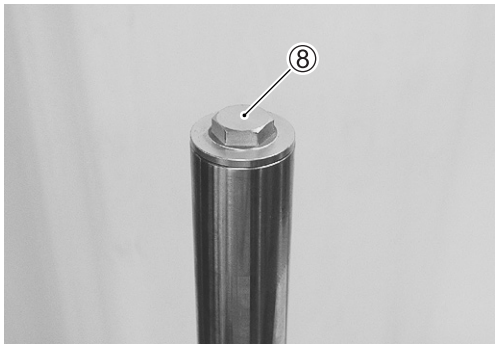
- Remove the front axle pinch bolt (RH only).



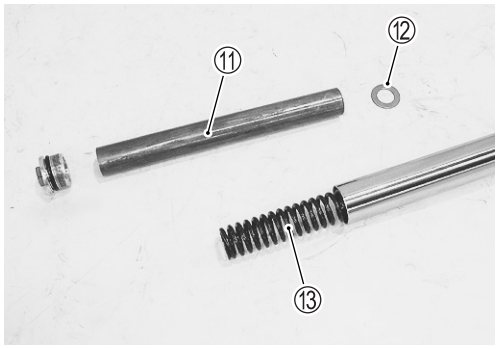
- Remove the front fork cap bolt ⑧.

CAUTION

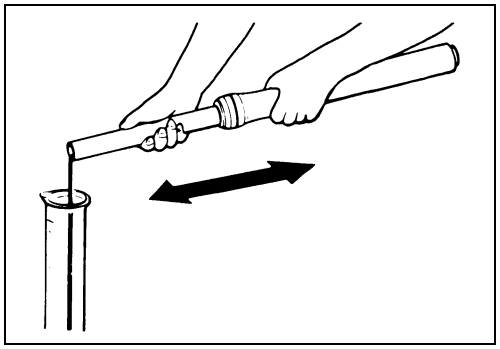
Take care so that the cap bolt does not spring out by the force of the spring.



- Remove the spacer ⑪, washer ⑫ and fork spring ⑬.

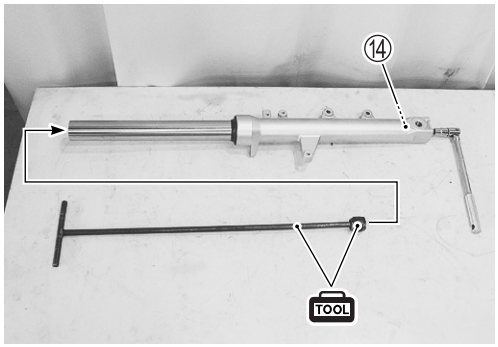


- Invert the front fork and stroke it several times to drain out fork oil.
- Hold the front fork in the inverted position for a few minutes to allow the fork oil to fully drain.

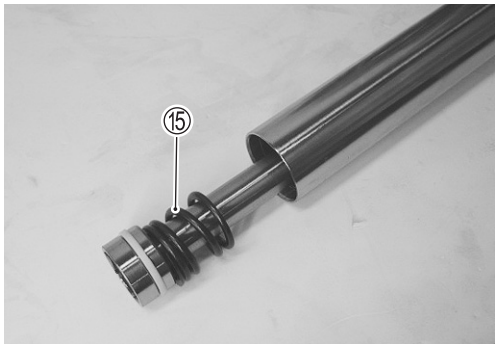


- Remove the damper rod bolt ⑭ using the wrench and special tools.

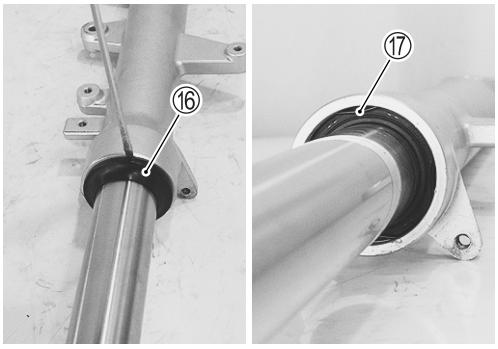
TOOL **09940-34520: T type handle**
09940-34581: Front fork assembling attachment (F)



- Remove the rebound spring ⑮.



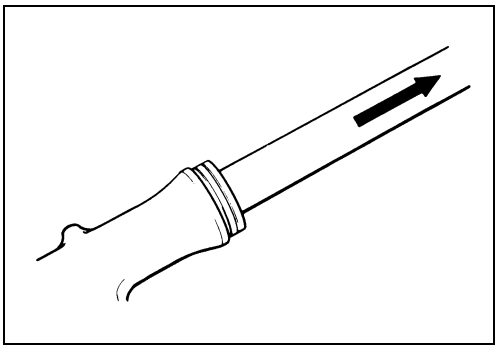
• Remove the dust seal ⑯ and oil seal stopper ring ⑰.



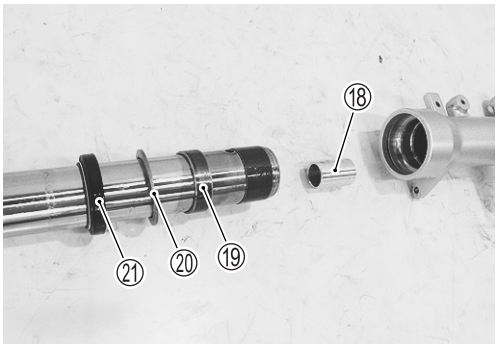
NOTICE

Be careful not to damage the inner tube.

• Pull the inner tube out of the outer tube.



• Remove the oil lock piece ⑱.
• Remove the following parts from the inner tube.
  ⑲ Outer tube slide bushing
  ⑳ Spacer
  ㉑ Oil seal



INSPECTION

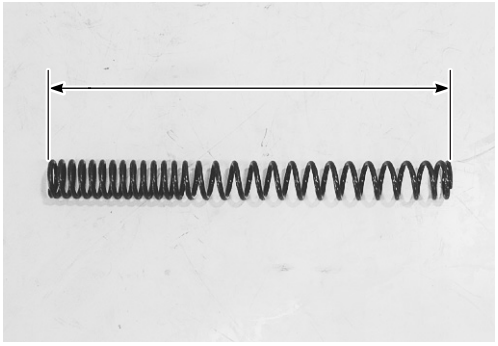
INNER AND OUTER TUBES

Inspect the inner tube sliding surface and outer tube sliding surface for any scuffing and damage. If any defects are found, replace them with new ones.

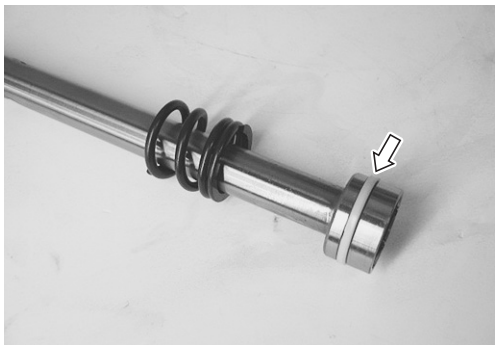
FORK SPRING

Measure the fork spring free length. If it is shorter than the service limit, replace it with a new one.

DATA **Front fork spring free length:**
Service Limit: 270 mm (10.6 in)



DAMPER ROD RING
Inspect the damper rod ring for wear or damage. If it is worn or damaged, replace it with a new one.



REASSEMBLY AND INSTALLATION

Reassemble and install the front fork in the reverse order of removal and disassembly. Pay attention to the following points:

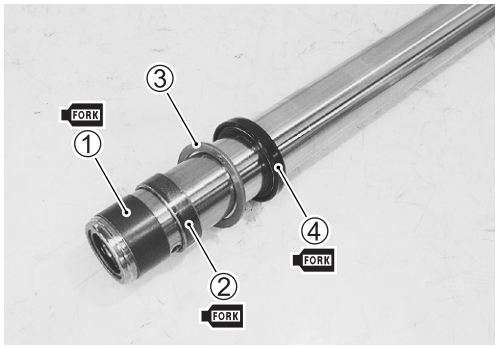
NOTICE

*** Thoroughly wash all the component parts being assembled.**
*** When reassembling the front fork, use new fork oil.**
*** Use the specified fork oil for the front fork.**

INNER TUBE

- Install the following parts onto the inner tube.
  ② Outer tube slide bushing
  ③ Spacer
  ④ New oil seal

NOTE:
The stamped mark on the oil seal must face upward.

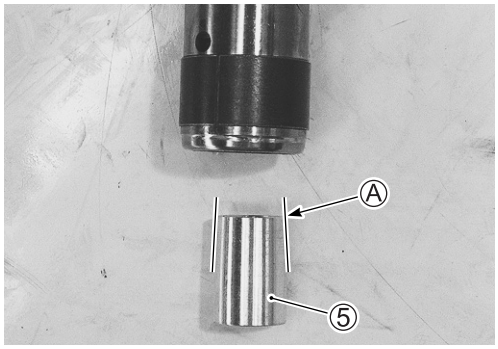


- Apply fork oil to the inner tube slide bushing ①, outer tube slide bushing ② and the lip of oil seal ④.

FORK **99000-99044-10G: SUZUKI FORK OIL G-10 or equivalent**

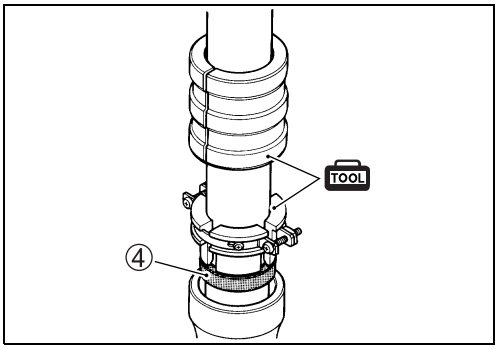
- Insert the oil lock piece ⑤ into the inner tube.

NOTE:
** When installing the oil lock piece, insert the tapered end Ⓐ of oil lock piece into the inner tube.*
** When inserting the inner tube into the outer tube, take care not to come off the oil lock piece from the inner tube.*



• Insert the inner tube into the outer tube and install the oil seal ④ using the special tool.

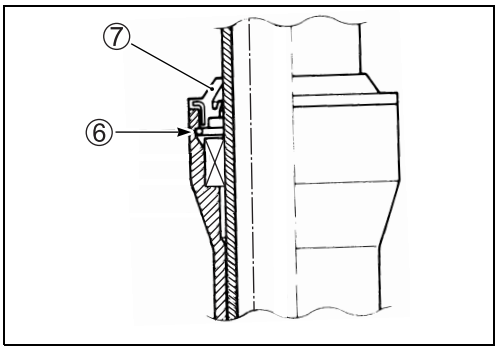
TOOL 09940-52861: Front fork oil seal installer set



• Install the oil seal stopper ring ⑥ and new dust seal ⑦.

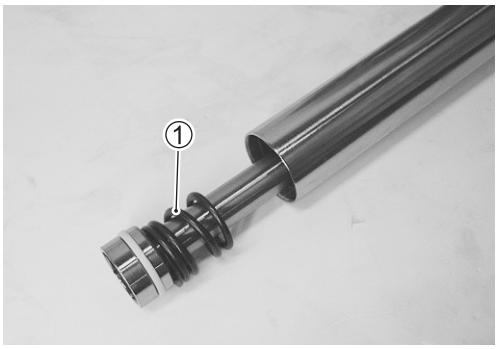
NOTICE

Make sure that the oil seal stopper ring is fitted securely.



DAMPER ROD

• Install the rebound spring ① and install them into the inner tube.

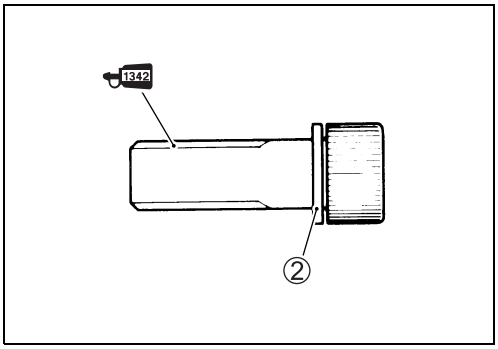


• Fit a new gasket ②.
• Apply thread lock to the damper rod bolt and tighten it to the specified torque using the special tools.

1342 99000-32050: THREAD LOCK "1342" or equivalent

TOOL 09940-34520: T type handle
09940-34581: Front fork assembling attachment (F)

Damper rod bolt: 30 N·m (3.0 kgf-m, 21.5 lbf-ft)

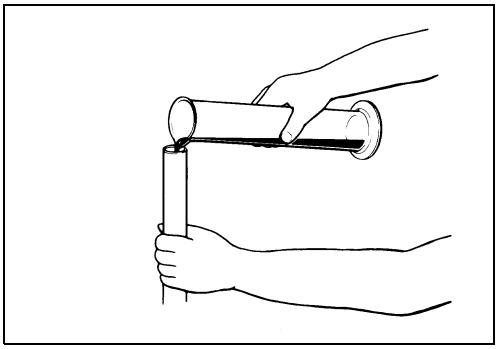


FORK OIL

• Pour the specified fork oil into the inner tube.

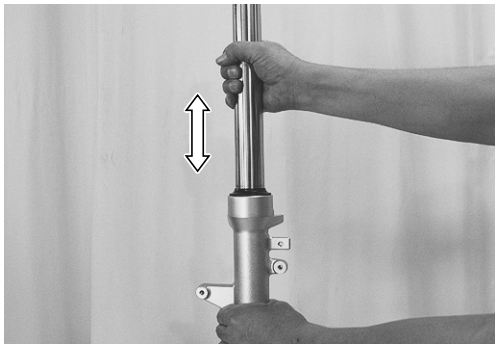
DATA Front fork oil capacity (each leg):
338 ml (11.4/11.9 US/Imp oz)

FORK 99000-99044-10G: SUZUKI FORK OIL G-10
or equivalent



- Move the inner tube up and down several strokes until no more bubbles come out from the fork oil.
- Keep the front fork vertically and wait 5 – 6 minutes.

NOTE:
Take extreme attention to pump out air completely.

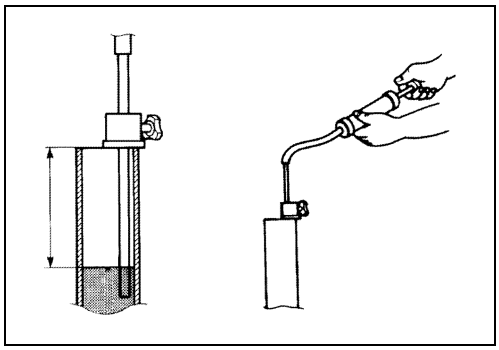


- Hold the front fork vertically and adjust the fork oil level using the special tool.

NOTE:
When adjusting the fork oil level, compress the inner tube fully without the fork spring.

DATA Fork oil level: 136 mm (5.4 in)

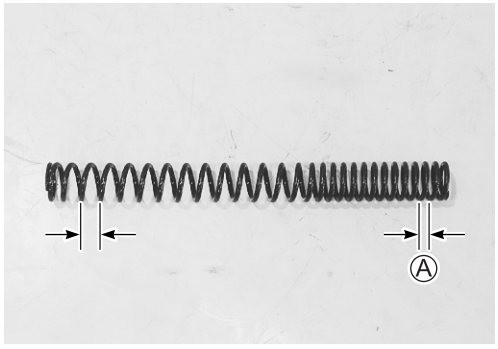
TOOL 09943-74111: Front fork oil level gauge



FORK SPRING

- Install the fork spring into the inner tube.

NOTE:
The smaller pitch end Ⓐ of fork spring must face downward.



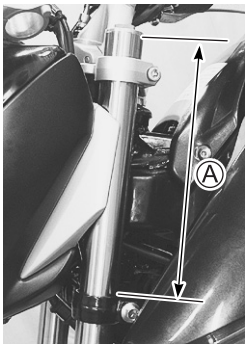
FRONT FORK CAP BOLT

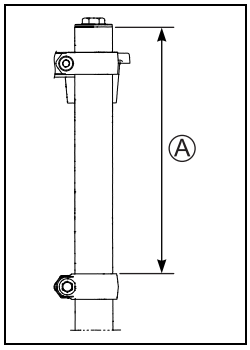
- Apply fork oil to the new O-ring.

FORK 99000-99044-10G: SUZUKI FORK OIL G-10 or equivalent

- Temporarily tighten the front fork cap bolt.

- Set the front fork with the upper surface of the inner tube positioned 244 mm (9.6 in) Ⓐ from the upper surface of the lower bracket.





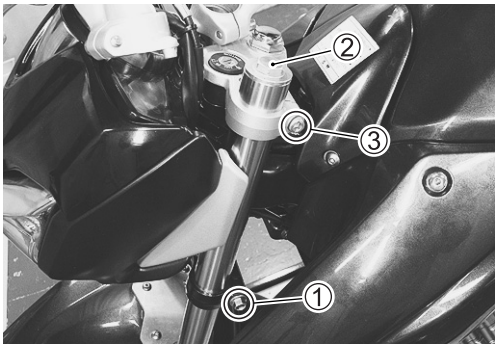
- Tighten the front fork lower clamp bolt ① to the specified torque.

Front fork lower clamp bolt:
33 N·m (3.3 kgf-m, 24.0 lbf-ft)

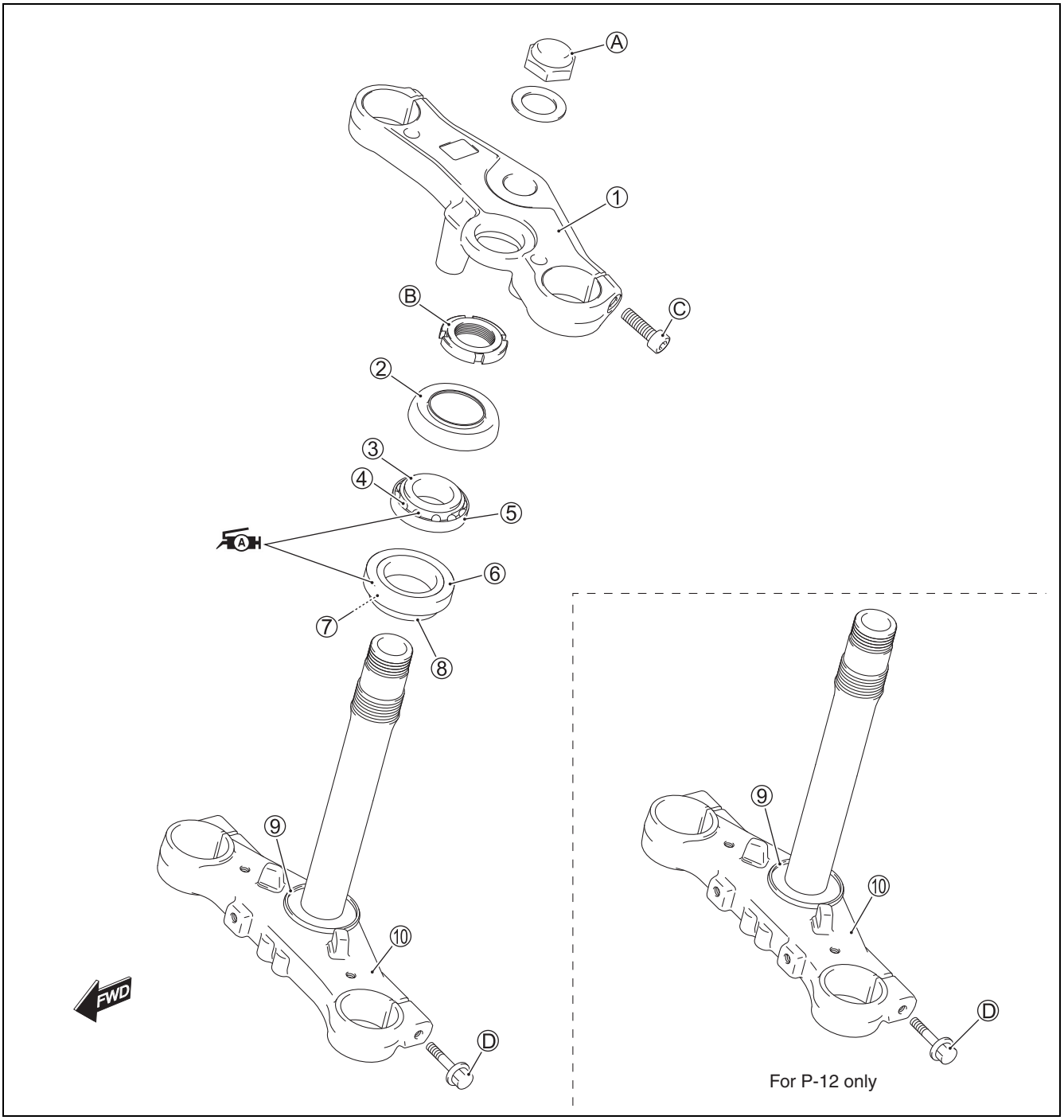
- Tighten the front fork cap bolt ② and front fork upper clamp bolt ③ to the specified torque.

Front fork cap bolt: 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
Front fork upper clamp bolt: 23 N·m (2.3 kgf-m, 16.5 lbf-ft)

- Install the handlebar holder. (☞8-30)
- Install the front fender (☞10-29) and front reflex reflectors (only for P-24) (☞10-30).
- Install the front brake caliper and front wheel. (☞8-58 and 8-13)



STEERING
CONSTRUCTION

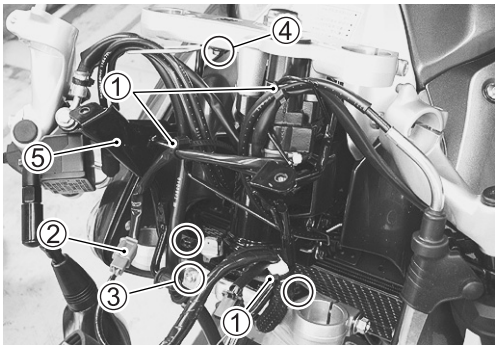


①	Steering stem upper bracket	⑧	Lower bearing inner race
②	Dust seal	⑨	Lower seal
③	Upper bearing inner race	⑩	Steering stem lower bracket
④	Steering stem upper bearing	Ⓐ	Steering stem head nut
⑤	Upper bearing outer race	Ⓑ	Steering stem nut
⑥	Lower bearing outer race	Ⓒ	Front fork upper clamp bolt
⑦	Steering stem lower bearing	Ⓓ	Front fork lower clamp bolt

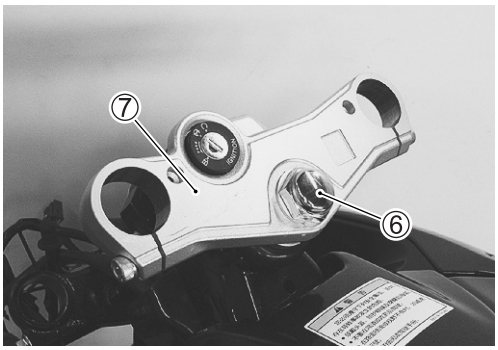
ITEM	N·m	kgf-m	lbf-ft
Ⓐ	65	6.5	47.0
Ⓑ	23 N·m (2.3 kgf-m, 16.5 lbf-ft) then turn counterclockwise 0 – 1/4		
Ⓒ	23	2.3	16.5
Ⓓ	33	3.3	24.0

REMOVAL

- Remove the combination meter and headlight assembly. (☞9-27 and 9-36)
- Remove the front wheel. (☞8-8)
- Remove the front forks. (☞8-16)
- Remove the clamps ①.
- Disconnect the ignition switch coupler ②.
- Remove the brake hose clamp bolt ③ and cable guide bolt ④.
- Remove the front licence plate (only for P-12)
- Remove the headlight bracket ⑤.



- Remove the steering stem head nut ⑥ and washer.
- Remove the steering stem upper bracket ⑦.

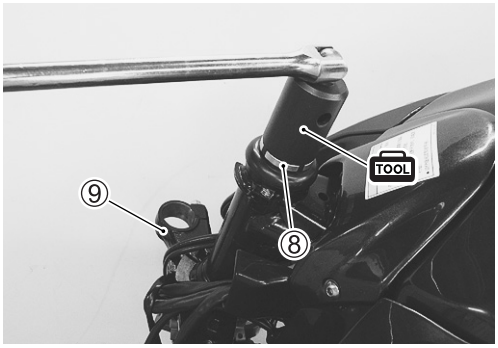


- Remove the steering stem nut ⑧ using the special tool.

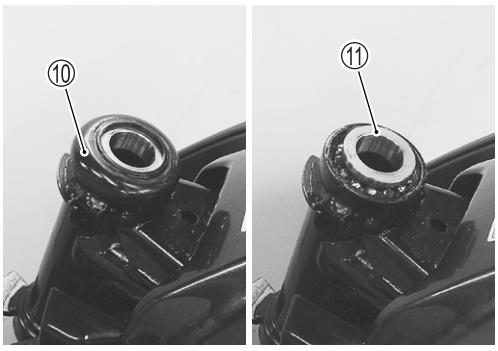
TOOL 09940-14911: Steering stem nut socket wrench

- Draw out the steering stem lower bracket ⑨.

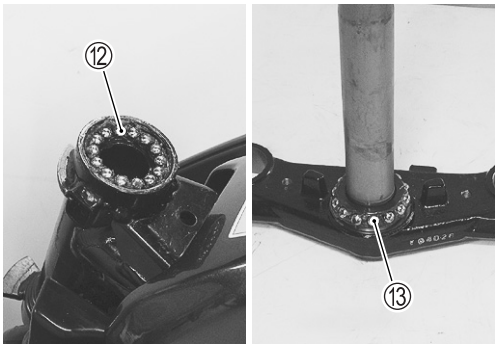
NOTE:
Hold the steering stem lower bracket by hand to prevent it from falling.



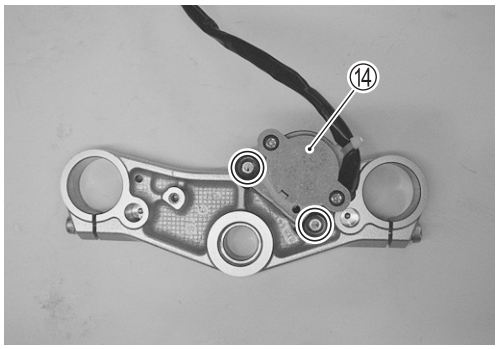
- Remove the dust seal ⑩ and upper bearing inner race ⑪.



- Remove the steering stem upper bearing ⑫ and lower bearing ⑬.



• Remove the ignition switch ⑭ if necessary.

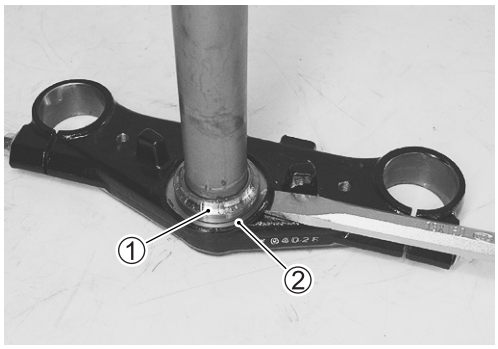


INSPECTION AND DISASSEMBLY

Inspect the removed parts for the following abnormalities.
* Distortion of the steering stem
* Bearing wear or damage
* Abnormal bearing noise
* Race wear or damage
* Dust seal wear or damage

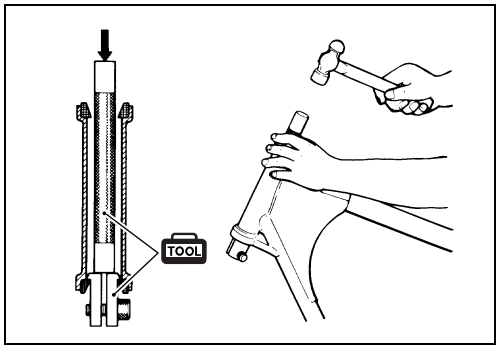
If any abnormal points are found, replace defective parts with new ones.

• Remove the steering stem lower bearing inner race ① and lower seal ② with a chisel.



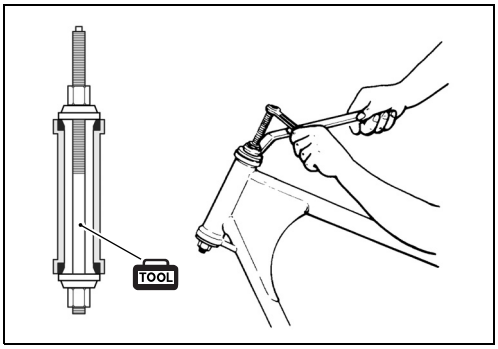
• Remove the steering stem upper and lower bearing outer races using the special tools.

TOOL **09941-54911: Bearing outer race remover**
09941-74911: Steering race installer



REASSEMBLY

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



OUTER RACE

- Press in the new upper and lower bearing outer races using the special tool.

TOOL 09941-34513: Bearing installer

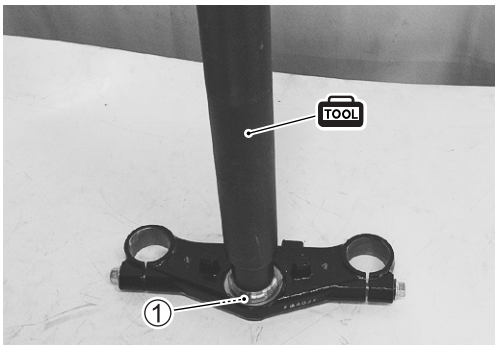
INNER RACE

- Apply grease to the new lower seal ①.

A 99000-25010: SUZUKI SUPER GREASE "A"
or equivalent

- Press in the new lower bearing inner race using the special tool.

TOOL 09925-18011: Bearing installer



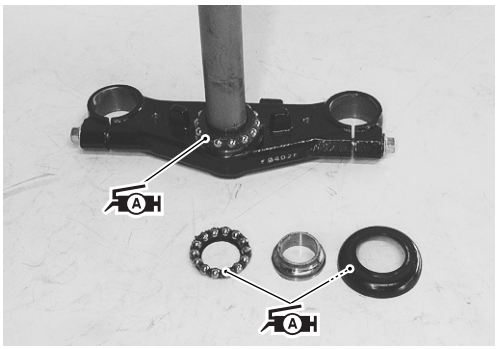
INSTALLATION

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

BEARING

- Apply grease to the bearings and dust seal.

A 99000-25010: SUZUKI SUPER GREASE "A"
or equivalent



STEM NUT

- Tighten the steering stem nut ① to the specified torque (23 N·m (2.3 kgf-m, 16.5 lbf-ft) using the special tool.

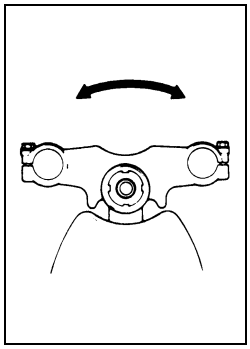
TOOL 09940-14911: Steering stem nut socket wrench

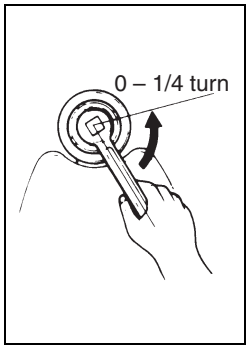
- Turn the steering stem lower bracket about five or six times to the left and right so that the angular ball bearings will be seated properly.
- Loosen the stem nut by 0 – 1/4 turn.

Steering stem nut: 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
then turn counterclockwise 0 – 1/4

- In this condition, check that the steering stem can turn smoothly with no rattle and stiffness.
- If there is a rattle or heavy movement, adjust the tightness by the stem nut.

NOTE:
This adjustment will vary from motorcycle to motorcycle.

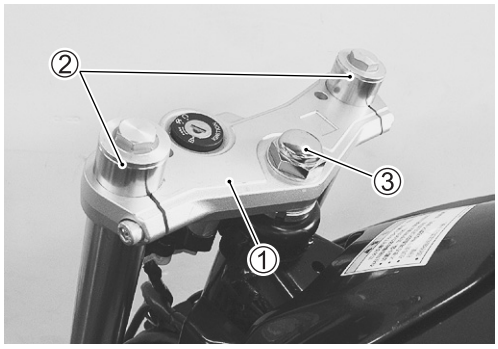




STEERING STEM UPPER BRACKET

- Temporarily install the steering stem upper bracket ①.
- Temporarily install the front forks ②.
- Tighten the steering stem head nut ③ to the specified torque.

Steering stem head nut: 65 N·m (6.5 kgf-m, 47.0 lbf-ft)

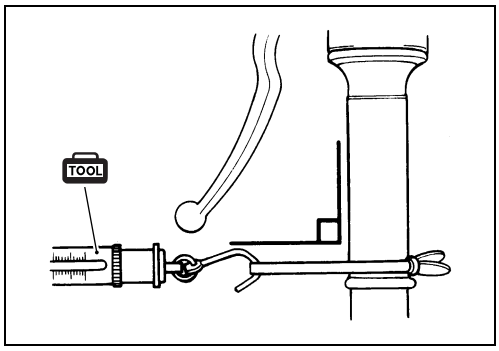


- Install the front licence plate (only for P-12). (☞10-29)
- Install the front forks. (☞8-21)
- Install the handlebar holders and front wheel. (☞8-30 and 8-13)
- Install the headlight assembly and combination meter.
- Cable and hose routing. (☞10-17 and 10-23)

STEERING TENSION ADJUSTMENT

Check the steering movement in the following procedure.

- By supporting the motorcycle with a jack, lift the front wheel until it is off the floor by 20 – 30 mm (0.8 – 1.2 in).
- Check to make sure that the cables and wire harnesses are properly routed.
- With the front wheel in the straight ahead state, hitch the spring scale (special tool) on one handlebar grip end as shown in the figure and read the graduation when the handlebar starts moving. Do the same on the other grip end.



DATA Initial force: 200 – 500 grams

TOOL 09940-92720: Spring scale

- If the initial force read on the scale when the handlebar starts turning is either too heavy or too light, adjust it till it satisfies the specification.

1) First, loosen the front fork upper clamp bolts, handlebar holder bolts and steering stem head nut, and then adjust the steering stem nut by loosening or tightening it.

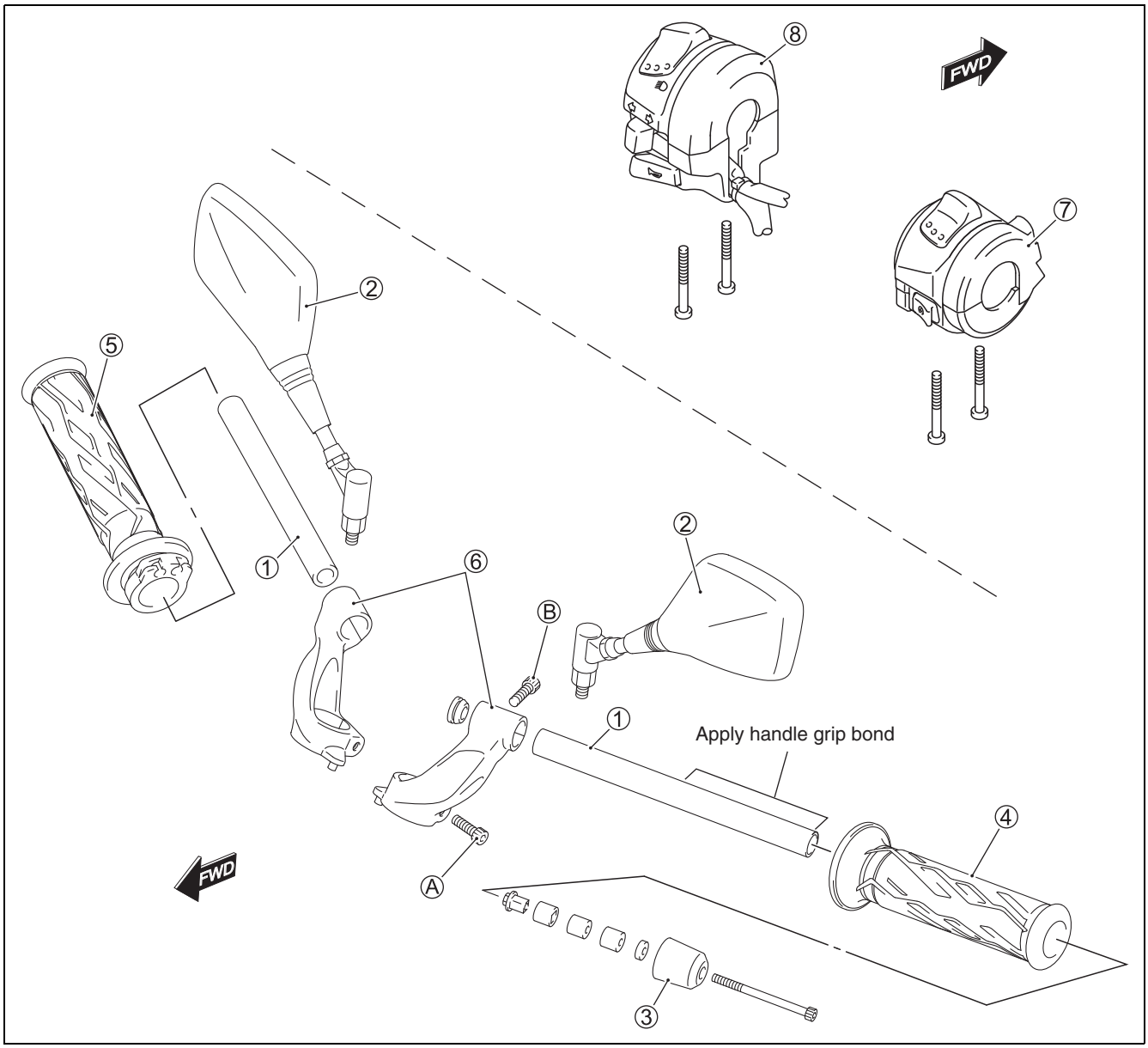
TOOL 09910-60611: Universal clamp wrench

2) Tighten the steering stem head nut, handlebar holder bolts and front fork upper clamp bolts to the specified torque and re-check the initial force with the spring scale according to the previously described procedure.

3) If the initial force is found within the specified range, adjustment has been completed.

NOTE:
Hold the front fork legs, move them back and forth and make sure that the steering is not loose.

HANDLEBARS
CONSTRUCTION



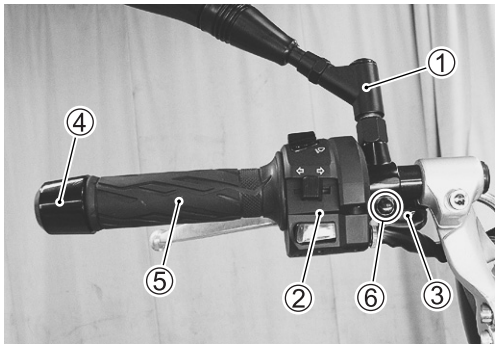
①	Handlebars	⑤	Throttle grip	Ⓐ	Handlebar holder bolt
②	Rear view mirror	⑥	Handlebar holders		
③	Handlebar balancer	⑦	Right handlebar switch box	Ⓑ	Handlebar clamp bolt
④	Left handlebar grip	⑧	Left handlebar switch box		

ITEM	N·m	kgf-m	lbf-ft
Ⓐ	23	2.3	16.5
Ⓑ	16	1.6	11.5

REMOVAL

HANDLEBAR LEFT SIDE PARTS

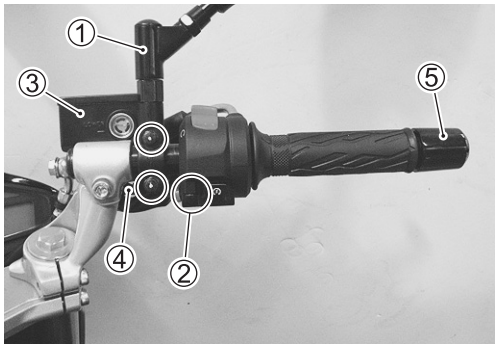
- Remove the rear view mirror ①.
- Remove the handlebar switch box ②.
- Disconnect the clutch lever position switch coupler ③.
- Remove the handlebar balancer ④.
- Remove the handlebar grip ⑤.
- Loosen the clutch lever holder bolt ⑥.



HANDLEBAR RIGHT SIDE PARTS

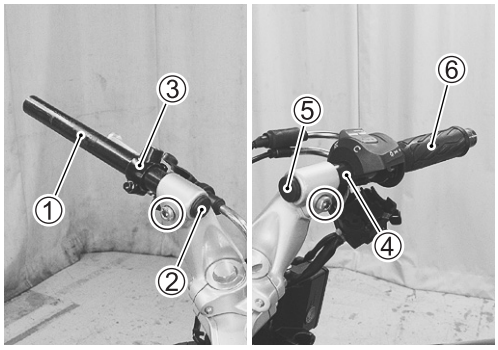
- Remove the rear view mirror ①.
- Remove the handlebar switch box screws ②.
- Remove the front brake master cylinder ③.
- Disconnect the brake light switch lead wires ④.
- Remove the handlebar balancer ⑤.

NOTE:
Do not turn the front brake master cylinder upside down.



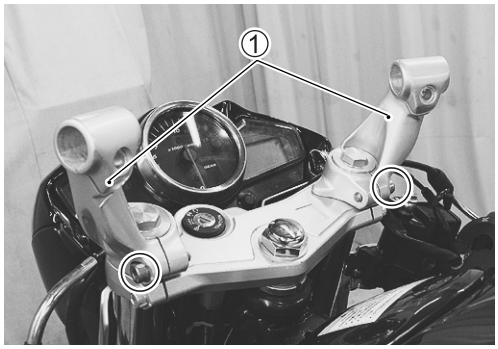
HANDLEBAR

- Remove the left handlebar ①, cap ② and clutch lever holder ③.
- Remove the right handlebar ④, cap ⑤ and throttle grip ⑥.



HANDLEBAR HOLDER

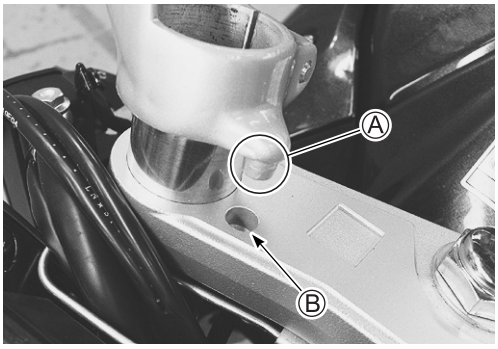
- Remove the handlebar holders ①.



INSTALLATION

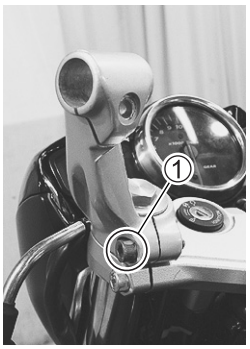
Install the handlebars in the reverse order of removal. Pay attention to the following points:

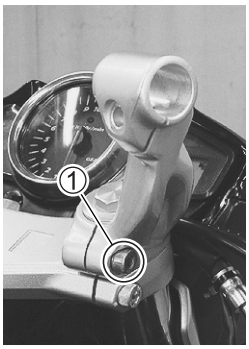
- Insert the boss Ⓐ of the handlebar holder into the hole Ⓑ of the upper bracket.



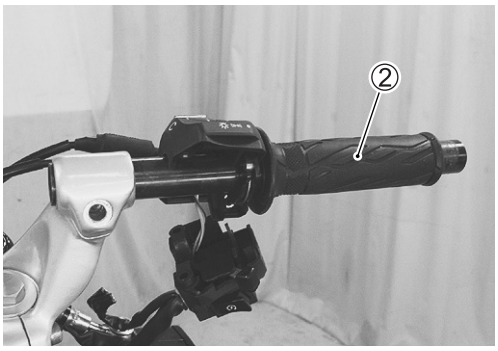
- Tighten the handlebar holder bolts ① to the specified torque.

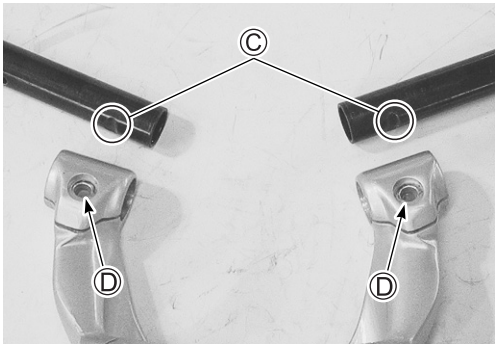
Handlebar holder bolt: 23 N·m (2.3 kgf-m, 16.5 lbf-ft)

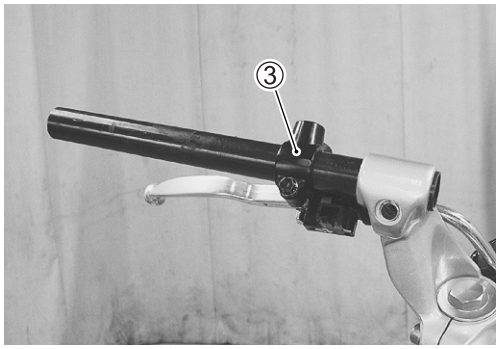




- Insert the throttle grip ② onto the right handlebar.
- Insert the clutch lever holder ③ onto the left handlebar.
- Align the depression Ⓒ of the handlebar with the hole Ⓓ of the handlebar holder.

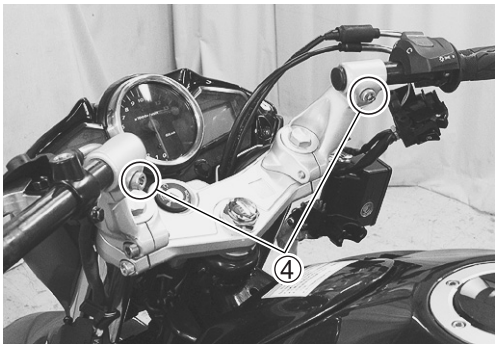






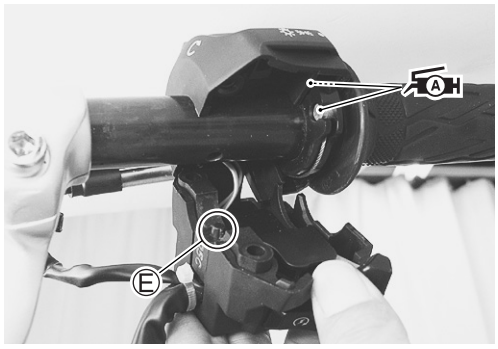
- Tighten the handlebar clamp bolts ④ to the specified torque. (☞10-35)

Handlebar clamp bolt: 16 N·m (1.6 kgf-m, 11.5 lbf-ft)



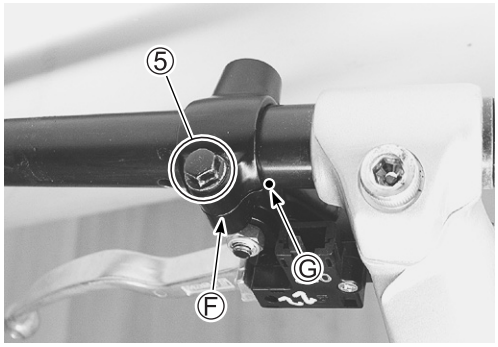
- Install the front brake master cylinder. (☞8-62)
- Insert the projection Ⓔ of the right handlebar switch box into hole of the right handlebar.
- Apply grease to the throttle cables and cable pulley.

A 99000-25010: SUZUKI SUPER GREASE "A" or equivalent



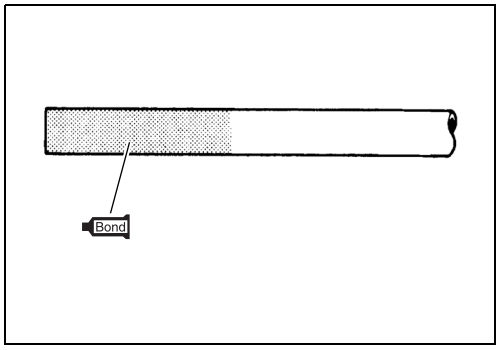
- Align the clutch lever holder's mating surface Ⓕ with the punch mark Ⓖ on the left handlebars.
- Tighten the clutch lever holder bolt ⑤ to the specified torque.

Clutch lever holder bolt: 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



- Apply a handle grip bond onto the left handlebar before installing the handlebar grip.

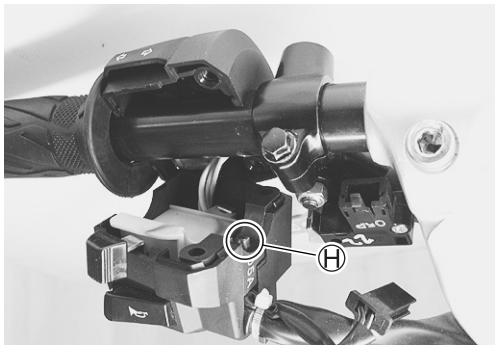
Bond HANDLE GRIP BOND (Commercially available)



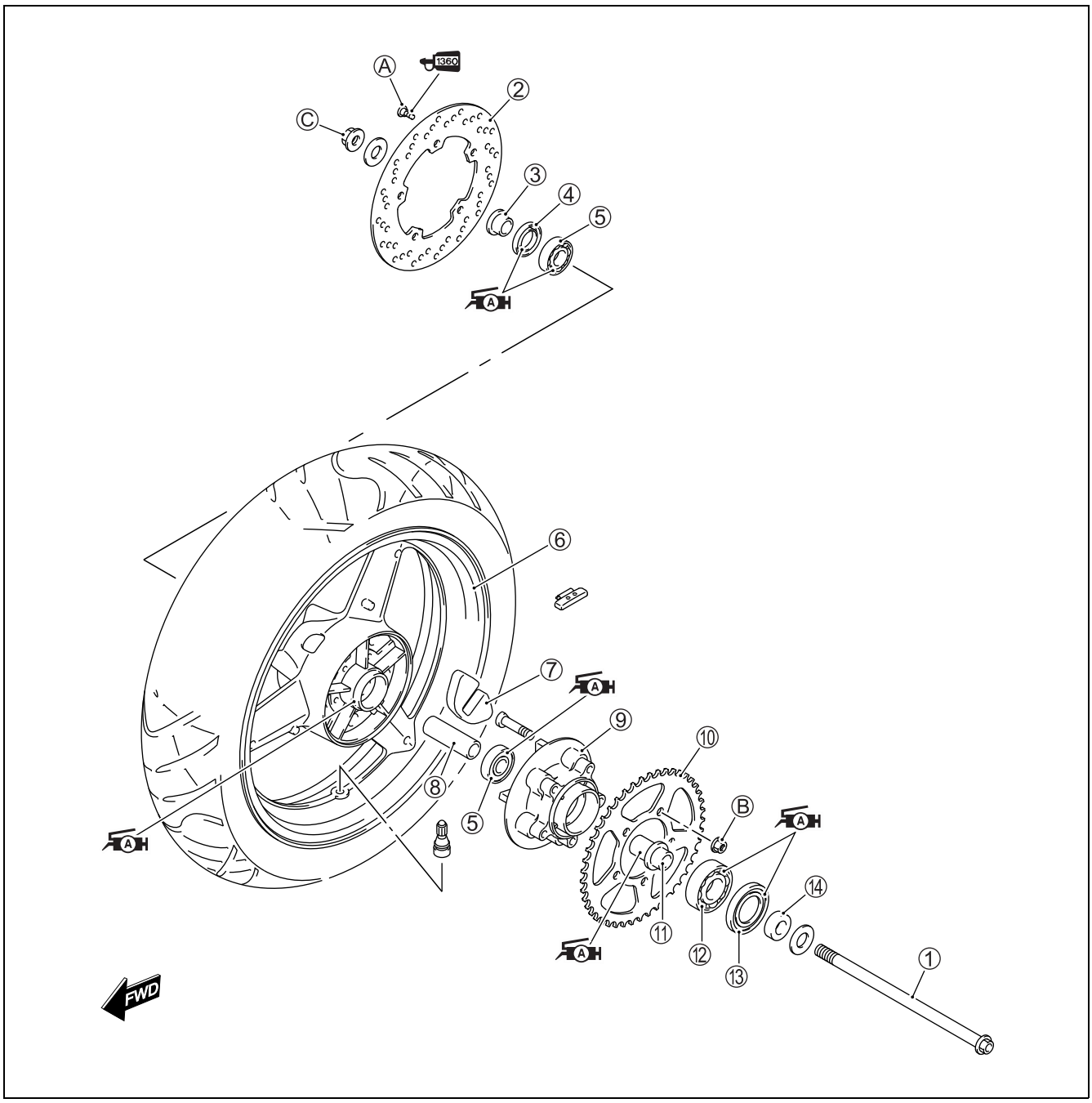
- Insert the projection Ⓗ of the left handlebar switch box into the hole of the left handlebar.

After installing the handlebars, the following adjustments are required before riding.

- Cable routing (☞10-17)
- Throttle cable play (☞2-13)
- Clutch lever play (☞2-14)



REAR WHEEL
CONSTRUCTION

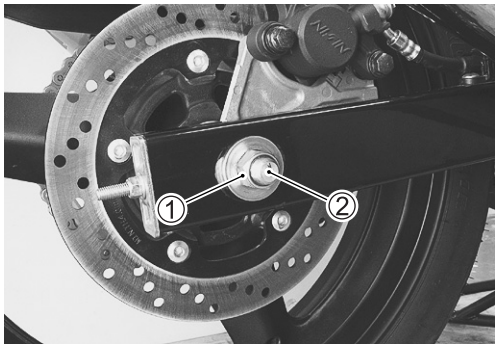


①	Rear axle	⑩	Rear sprocket
②	Brake disc	⑪	Retainer
③	Collar	⑫	Bearing
④	Dust seal	⑬	Dust seal
⑤	Bearing	⑭	Spacer
⑥	Rear wheel	Ⓐ	Brake disc bolt
⑦	Wheel damper	Ⓑ	Rear sprocket nut
⑧	Spacer	Ⓒ	Rear axle nut
⑨	Sprocket mounting drum		

ITEM	N·m	kgf-m	lbf-ft
Ⓐ	23	2.3	16.5
Ⓑ	49	4.9	35.5
Ⓒ	65	6.5	47.0

REMOVAL

- Loosen the axle nut ①.
- Raise the rear wheel off the ground and support the motorcycle with a jack or wooden block.

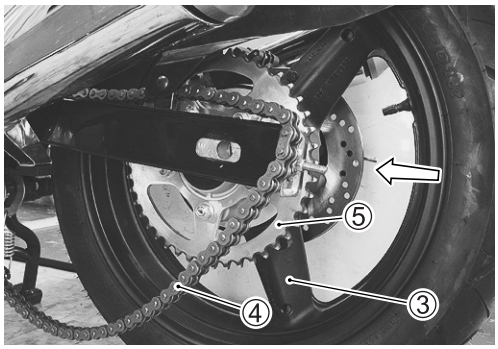


NOTICE

Make sure that the motorcycle is supported securely.

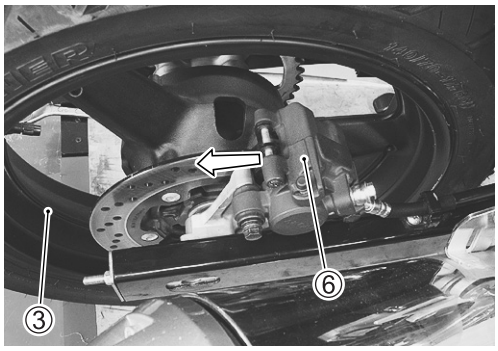
- Remove the axle nut ① and draw out the rear axle ②.

- With the rear wheel ③ moved forward, remove the drive chain ④ from the sprocket ⑤.

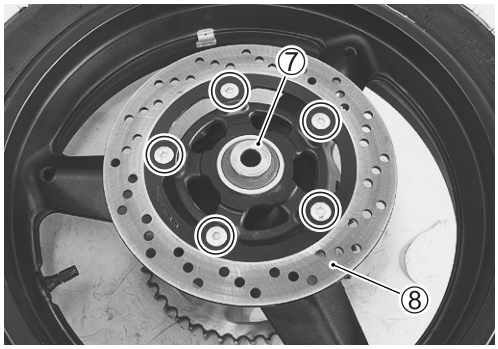


- Remove the rear brake caliper assembly ⑥ by moving it rearward.
- Pull the rear wheel ③ rearward.

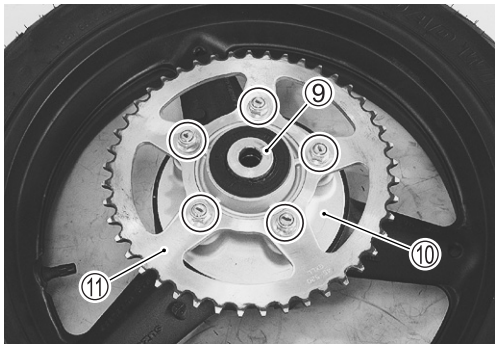
NOTE:
Do not operate the brake pedal with the rear wheel removed.



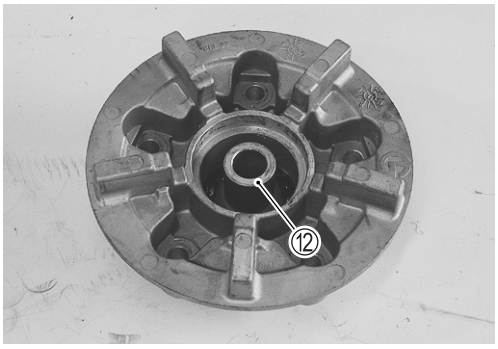
- Remove the collar ⑦.
- Remove the brake disc ⑧.



- Remove the spacer ⑨.
- Loosen the rear sprocket nuts.
- Draw out the rear sprocket mounting drum ⑩ from the wheel hub and separate the rear sprocket ⑪ from the mounting drum ⑩.



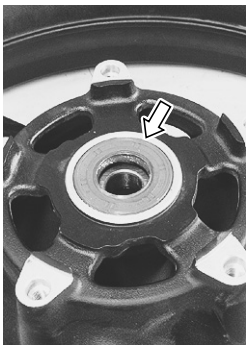
• Remove the rear sprocket mounting drum retainer ⑫.

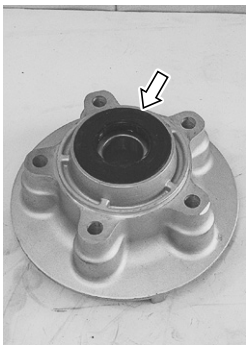


INSPECTION AND DISASSEMBLY

TIRE..... (☞2-23, 8-73)
WHEEL..... (☞8-9 and 8-73)
AXLE SHAFT ..... (☞8-9)
BRAKE DISC..... (☞8-58)
(Use the front wheel specifications and procedure.)

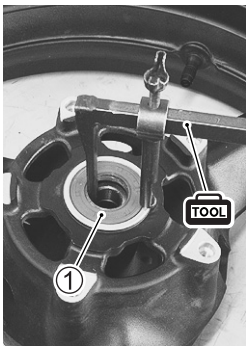
DUST SEAL
Inspect the wheel and sprocket mounting drum dust seal for wear or damage. If any damage is found, replace the dust seal with a new one.

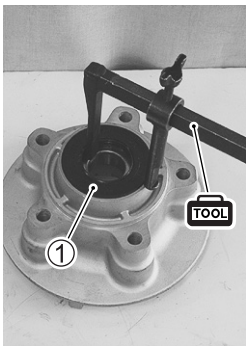




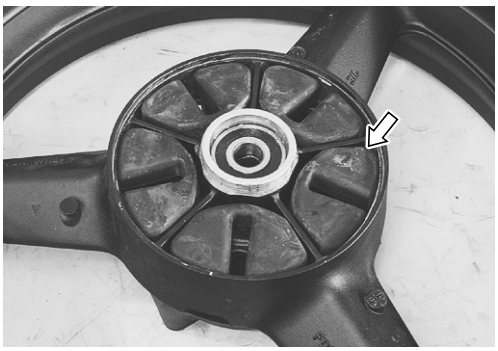
• Remove each dust seal ① using the special tool.

TOOL 09913-50121: Oil seal remover



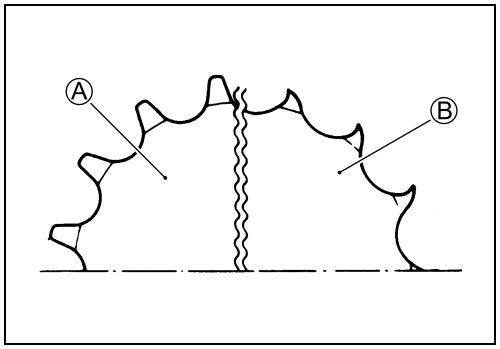


WHEEL DAMPER
Inspect the dampers for wear and damage.
Replace the damper if there is anything unusual.



SPROCKET

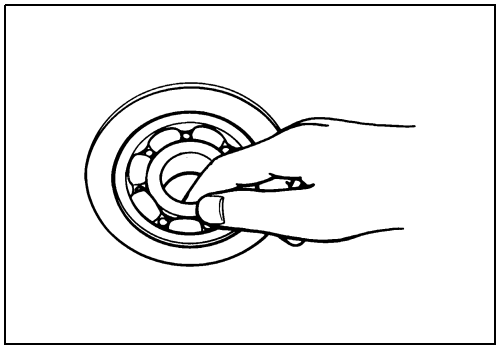
Inspect the sprocket teeth for wear. If they are worn as shown, replace the two sprockets and drive chain as a set.



Ⓐ Normal wear
Ⓑ Excessive wear

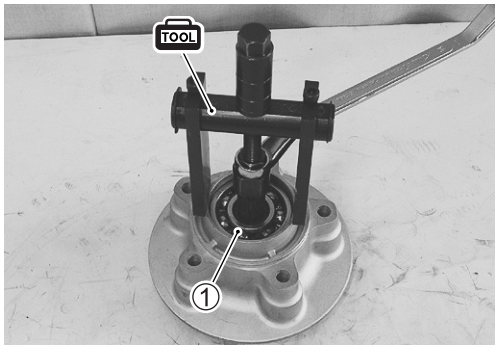
BEARING

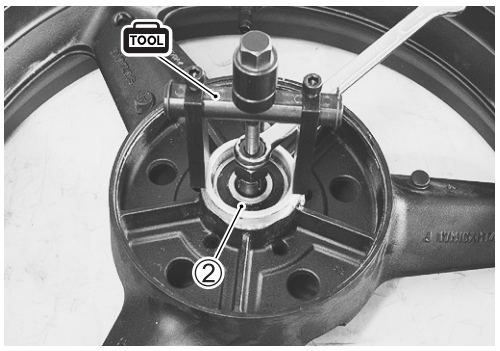
Inspect the play wheel bearing and sprocket mounting drum bearing by hand while they are installed in place. Rotate the inner race by hand to inspect for abnormal noise and smooth rotation. Replace the bearing if there is anything unusual.



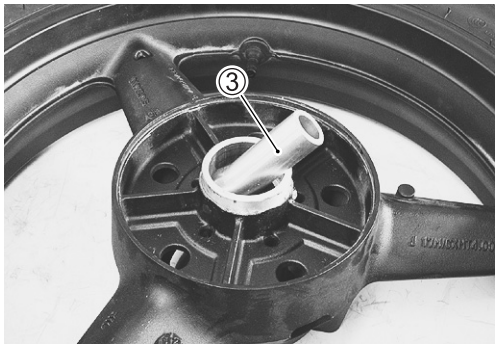
- Remove the sprocket mounting drum bearing ① and wheel bearings ② using the special tool.

TOOL 09921-20240: Bearing remover set



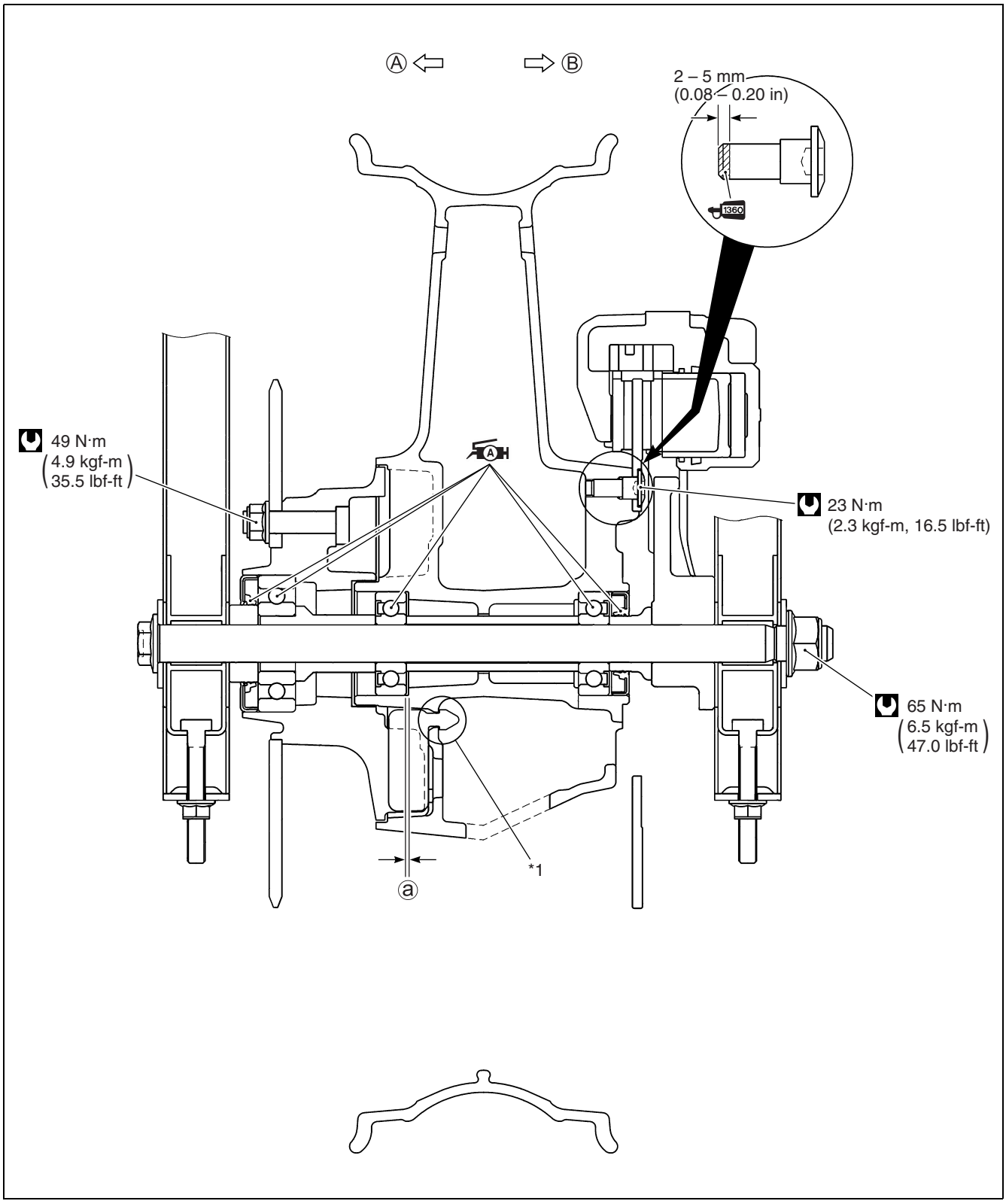


- Remove the spacer ③.



REASSEMBLY AND INSTALLATION

Reassemble and install the rear wheel in the reverse order of removal and disassembly.
Pay attention to the following points:

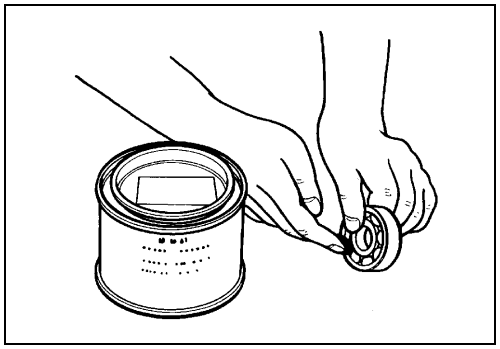


Ⓐ	LH	Ⓑ	RH	ⓐ	Clearance
*1	Insert the protrusion on the wheel damper firmly.				

BEARING

- Apply grease to the new bearings.

99000-25010: SUZUKI SUPER GREASE "A"
or equivalent



- Install the bearing to the sprocket mounting drum using the special tool.

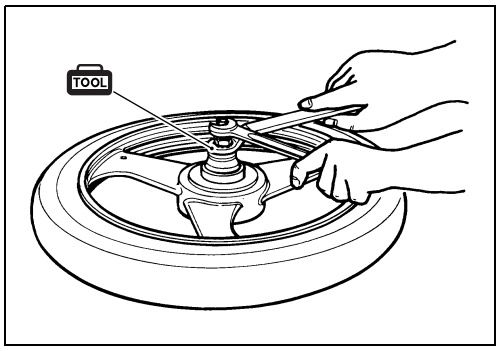
09913-70210: Bearing installing set (10 – 75 ϕ)

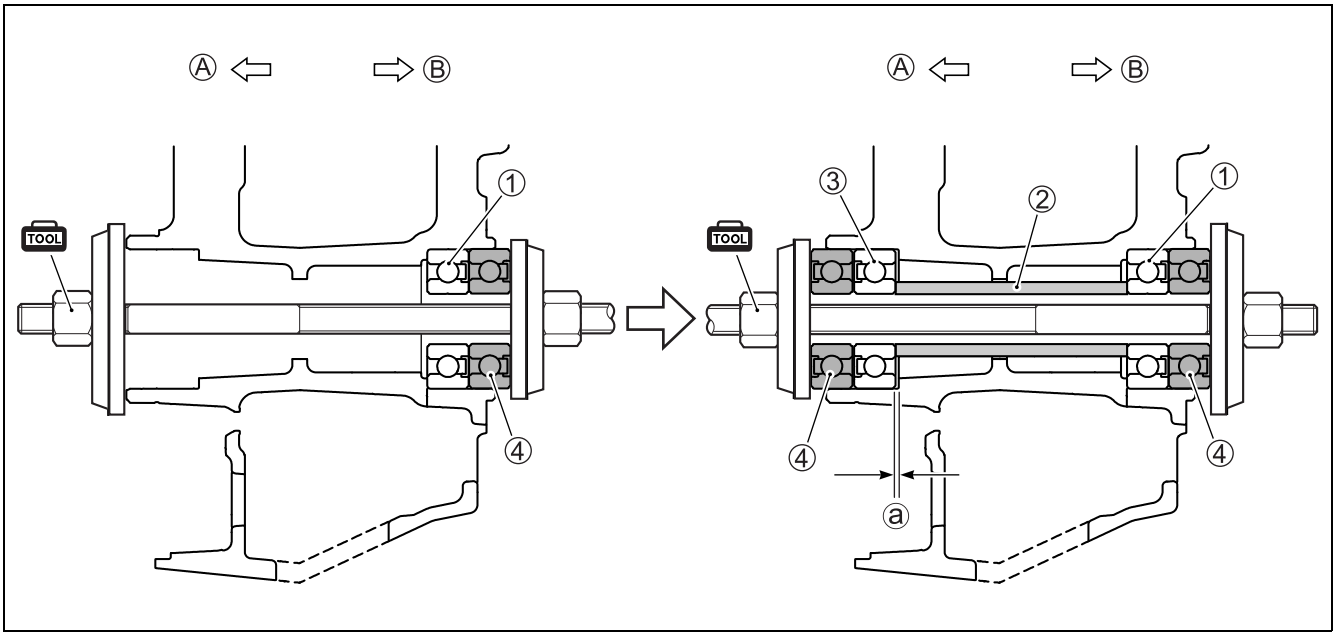
- First install the right wheel bearing ①, then install the spacer ② and left wheel bearing ③ using the special tool and removed wheel bearings ④.

09924-84510: Bearing installer set

NOTE:
The sealed cover of the bearing must face outside.

- Remove the removed wheel bearings ④.



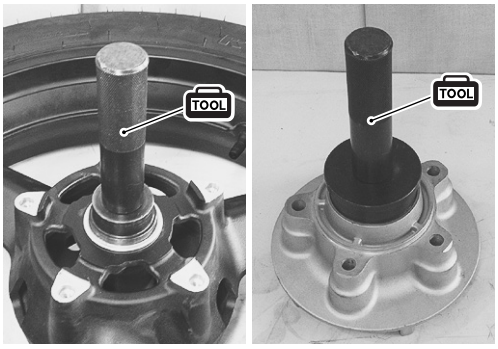


①	Right wheel bearing	③	Left wheel bearing	Ⓐ	LH	ⓐ	Clearance
②	Spacer	④	Removed wheel bearing	Ⓑ	RH		

DUST SEAL

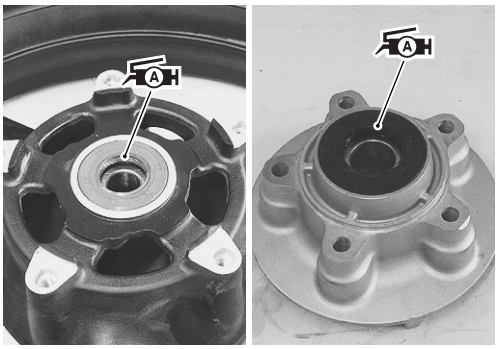
- Install the new dust seals using the special tool.

09913-70210: Bearing installing set (10 – 75 ϕ)



- Apply grease to the dust seal lips.

99000-25010: SUZUKI SUPER GREASE "A"
or equivalent



WHEEL DAMPER

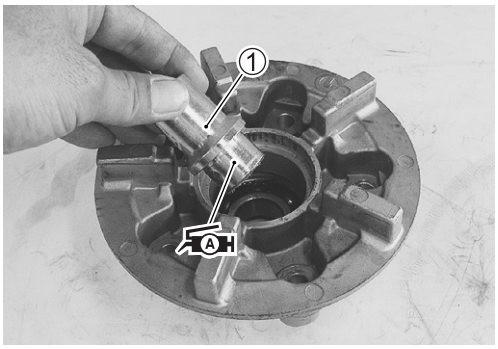
- Insert the protrusion on the wheel damper firmly. (☞8-36)

REAR SPROCKET AND SPROCKET MOUNTING DRUM

- Apply grease to the retainer ① before installing the rear sprocket mounting drum.

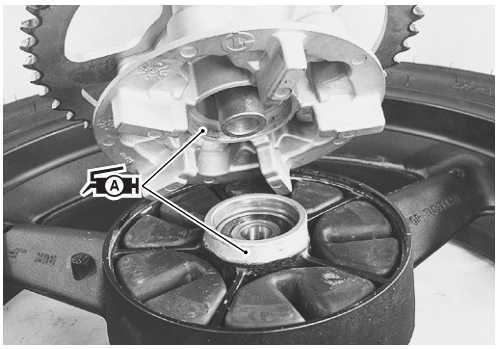
99000-25010: SUZUKI SUPER GREASE "A"
or equivalent

- Install the rear sprocket mounting drum to the rear wheel.



- Apply grease to the contacting surface between the rear sprocket mounting drum and rear wheel hub.

99000-25010: SUZUKI SUPER GREASE "A"
or equivalent

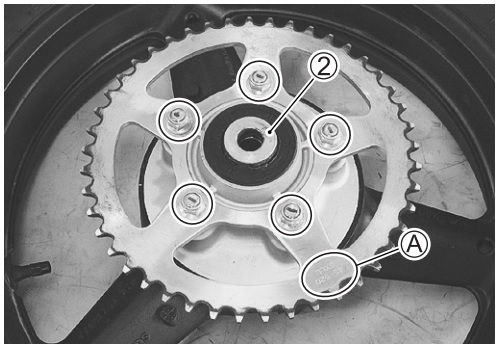


• Tighten the rear sprocket nuts to the specified torque.

Rear sprocket nut: 49 N·m (4.9 kgf-m, 35.5 lbf-ft)

NOTE:
Stamped mark Ⓐ on the sprocket must face outside.

• Install the spacer ②.



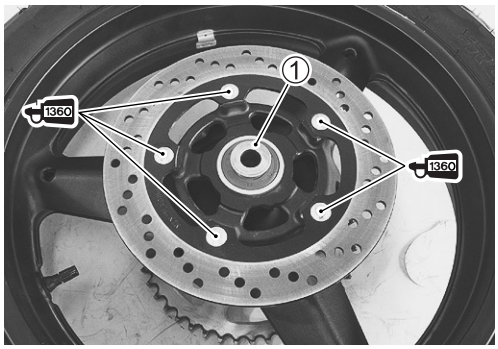
BRAKE DISC

• Make sure that the brake disc is clean and free of any greasy matter.
• Apply thread lock to the disc bolts and tighten them to the specified torque.

1360 99000-32130: THREAD LOCK CEMENT SUPER "1360" or equivalent

Brake disc bolt (Rear): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)

• Install the collar ①.



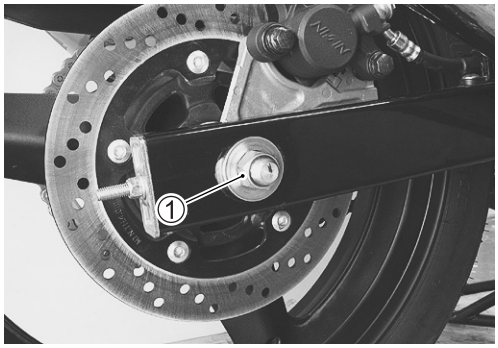
REAR AXLE

• Install the rear wheel with the rear axle and tighten the rear axle nut ①.
• Adjust the drive chain slack after installing the rear wheel. (☞2-18)
• Tighten the rear axle nut ① to the specified torque.

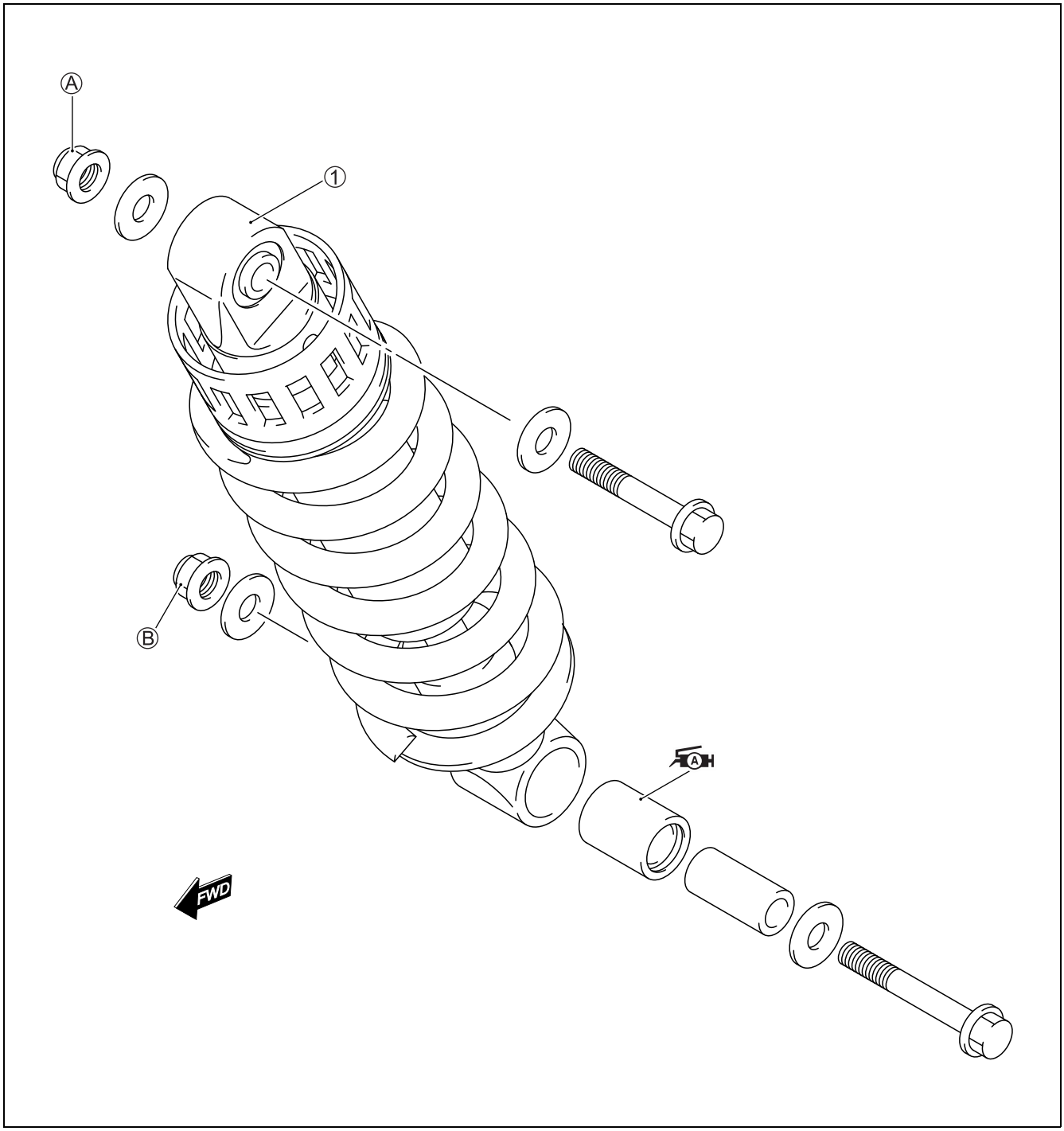
Rear axle nut: 65 N·m (6.5 kgf-m, 47.0 lbf-ft)

⚠ WARNING

After installing the rear wheel, pump the brake pedal several times to check for proper brake operation.



REAR SHOCK ABSORBER
CONSTRUCTION

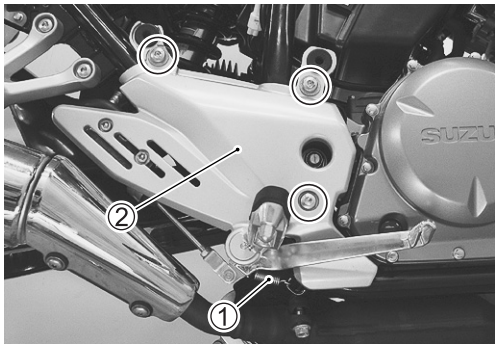


①	Rear shock absorber	Ⓑ	Rear shock absorber mounting nut (Lower)
Ⓐ	Rear shock absorber mounting nut (Upper)		

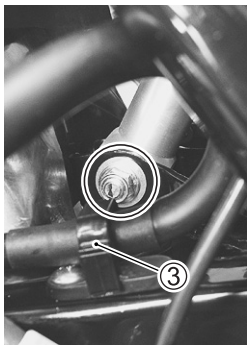
ITEM	N·m	kgf-m	lbf-ft
Ⓐ	50	5.0	36.0
Ⓑ	84	8.4	61.0

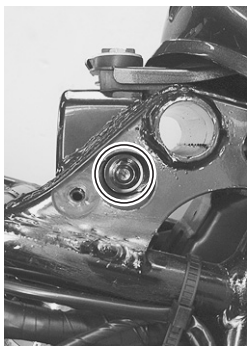
REMOVAL

- Remove the seat, frame covers, frame front covers, pillion rider handle and frame upper cover assembly. (☞8-4 to -6)
- Remove the left muffler. (☞6-2)
- Remove the rear wheel. (☞8-33)
- Unhook the return spring ① and remove the right front footrest bracket ②.



- Open the brake hose guide ③.
- Remove the rear shock absorber mounting bolts and nuts.
- Take out the rear shock absorber.





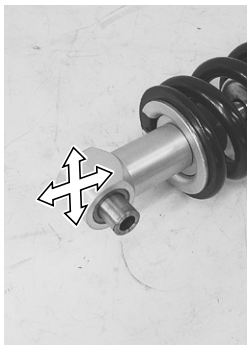
INSPECTION

- Inspect the shock absorber for damage and oil leakage, and absorber bushing for wear and damage.
  If any defects are found, replace the shock absorber with a new one.

NOTICE

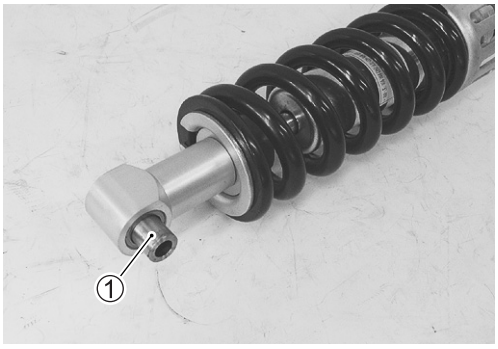
Do not attempt to disassemble the rear shock absorber unit. It is unserviceable.

- Inspect the spacer for any flaws or other damage.
  If any defects are found, replace the spacer with a new one.
- Insert the spacer into bearing and check the play when moving the spacer up and down.
  If excessive play is noted, replace the bearing with a new one.



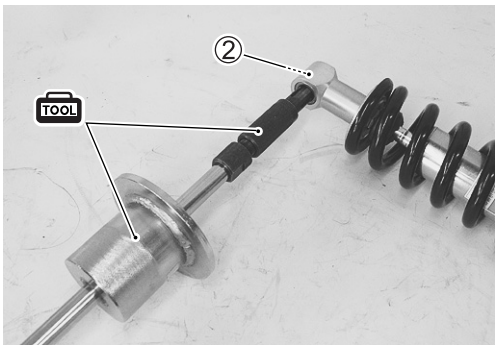
BEARING REPLACEMENT

- Remove the spacer ①.



- Remove the rear shock absorber bearing ② using the special tools.

09923-73210: Bearing remover
09930-30104: Rotor remover sliding shaft

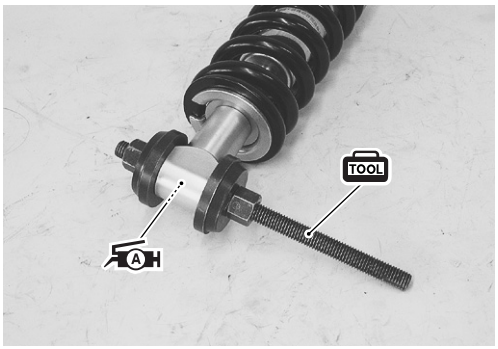


- Press the new bearing using the special tool.

09924-84510: Bearing installer set

- Apply grease to the bearing.

99000-25010: SUZUKI SUPER GREASE "A"
or equivalent



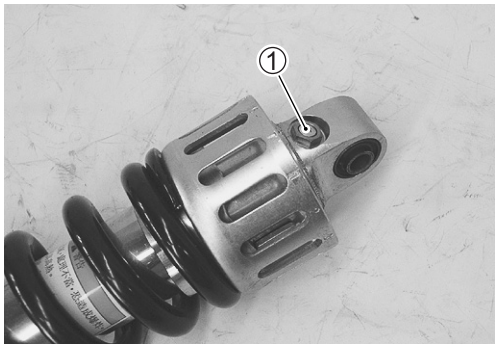
REAR SHOCK ABSORBER DISPOSAL

⚠ WARNING

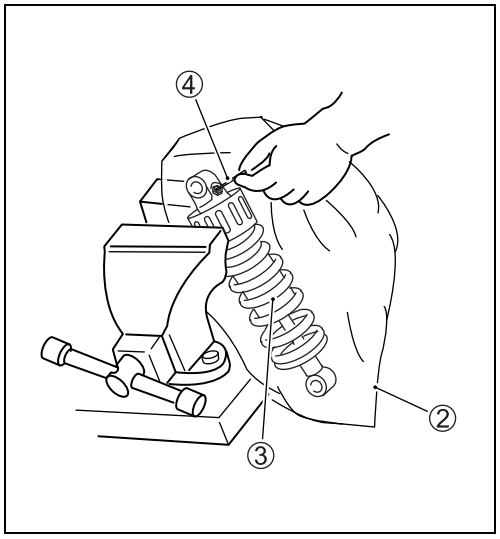
The rear shock unit contains high-pressure nitrogen gas.
*** Mishandling can cause explosion.**
*** Keep away from fire and heat. High gas pressure caused by heat can cause an explosion.**
*** Release gas pressure before disposing.**

GAS PRESSURE RELEASE

- Remove the screw ①.



- Cover the rear shock absorber with a plastic bag ②.
- Hold the rear shock absorber ③ with a vice.
- Make a hole to the rubber part of the screw hole with a needle ④.



⚠ WARNING

*** When making a hole, oil may spring out. Be sure to wear protective goggles or the like to protect your eyes.**
*** Do not bring your face close to the hole position to avoid the oil from splashing to your face or mouth.**

INSALLATION

Install the rear shock absorber in the reverse order of removal. Pay attention to the following points:

- Install the rear shock absorber and tighten the rear shock absorber mounting nuts to the specified torque.

Rear shock absorber mounting nut (Upper):
50 N·m (5.0 kgf-m, 36.0 lbf-ft)
Rear shock absorber mounting nut (Lower):
84 N·m (8.4 kgf-m, 61.0 lbf-ft)

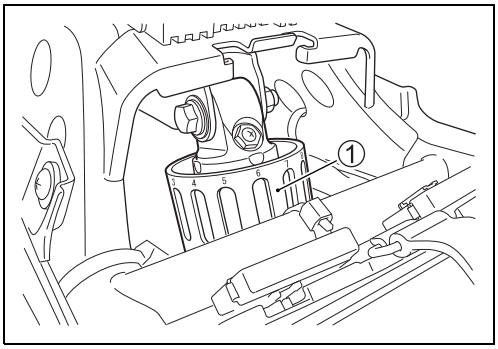
- Tighten the front footrest bracket mounting bolts to the specified torque.

Front footrest bracket mounting bolt:
23 N·m (2.3 kgf-m, 16.5 lbf-ft)

- Install the left muffler. (☞6-3)

SUSPENSION SETTING

After installing the rear suspension, adjust the spring pre-load as follows.



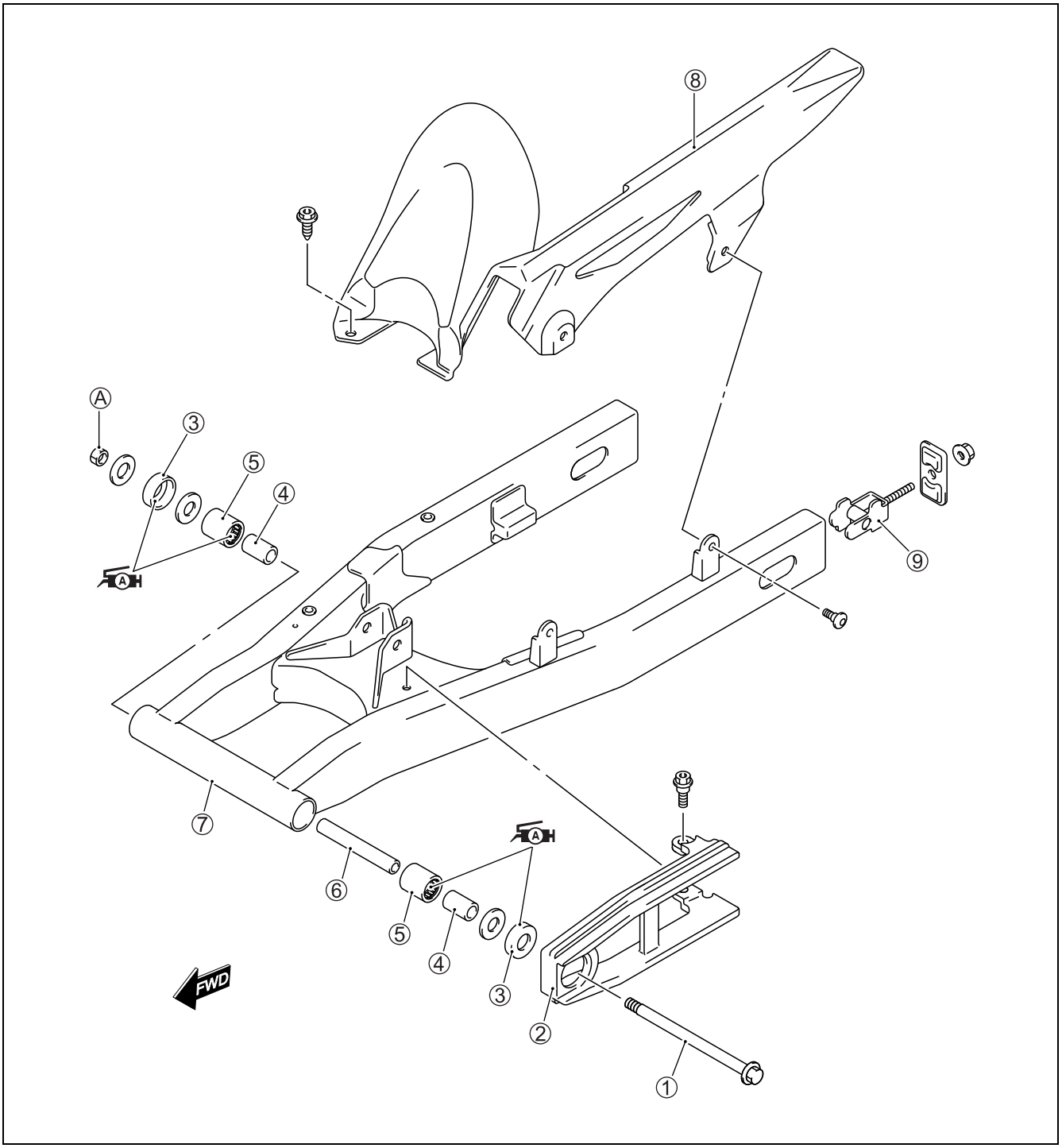
SPRING PRE-LOAD ADJUSTMENT

Twist the spring tension ring ① to the desired position.

NOTE:
Position "1" provides the softest spring tension and position "7" provides the stiffest.

STD position: 3

REAR SUSPENSION
CONSTRUCTION



①	Swingarm pivot shaft	⑥	Spacer
②	Chain buffer	⑦	Swingarm
③	Dust cover	⑧	Chain case
④	Spacer	⑨	Chain adjuster
⑤	Bearing	Ⓐ	Swingarm pivot nut

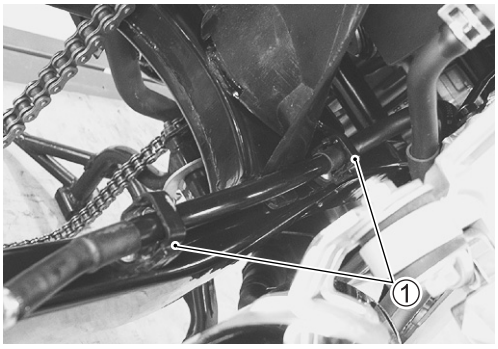
ITEM	N·m	kgf-m	lbf-ft
Ⓐ	65	6.5	47.0

REMOVAL

- Remove the right frame cover. (☞8-4)
- Remove the right front footrest bracket. (☞8-41)
- Support the motorcycle with a jack to be no load for the swingarm.

NOTICE

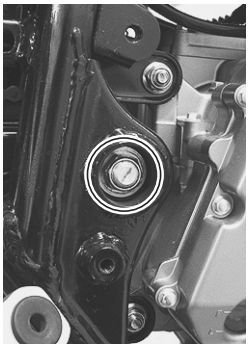
Make sure that the motorcycle is supported securely.

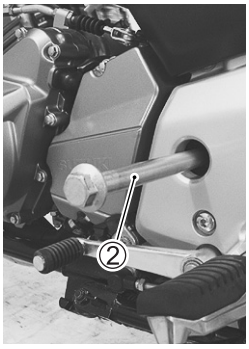


- Remove the rear wheel. (☞8-33)
- Open the brake hose guides ①.

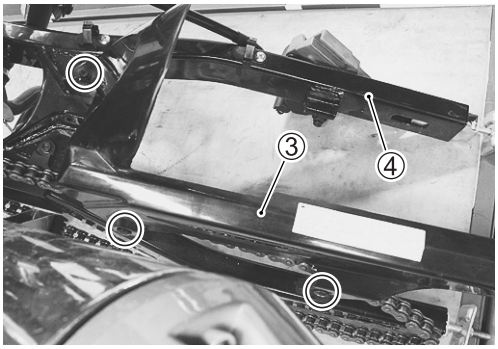
- Remove the rear shock absorber lower mounting bolt and nut.

- Remove the swingarm pivot nut.
- Draw out the swingarm pivot shaft ②.

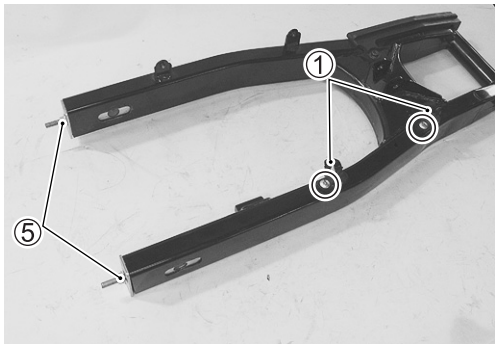




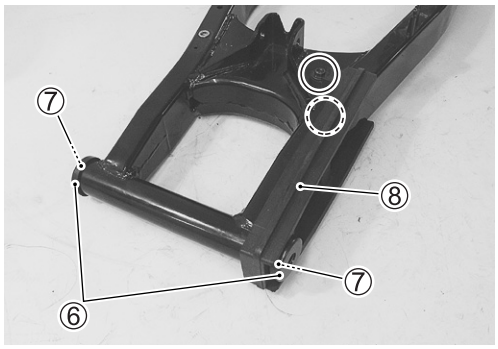
- Remove the chain case ③ and swingarm assembly ④.



- Remove the chain adjusters ⑤ and brake hose guides ①.



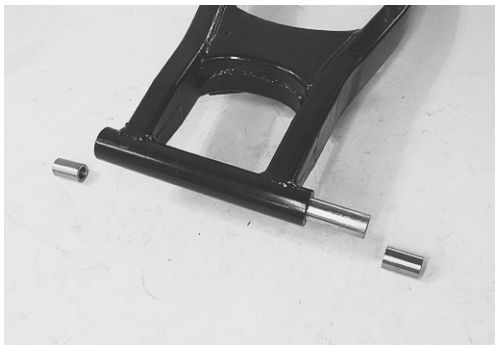
- Remove the dust covers ⑥, washers ⑦ and chain buffer ⑧.



INSPECTION AND DISASSEMBLY

SPACER

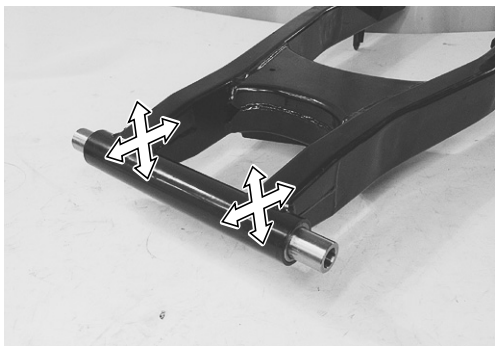
- Remove the spacers from swingarm.
- Inspect the spacers for wear and damage. If any defects are found, replace the spacer with a new one.



SWINGARM BEARING

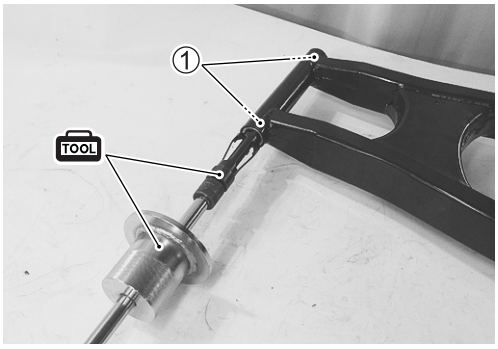
Insert the spacers into bearings and check the play by moving the spacers up and down.

If excessive play is noted, replace the bearing with a new one.



• Remove the swingarm pivot bearings ① using the special tools.

TOOL **09923-74511: Bearing remover**
09930-30104: Rotor remover sliding shaft

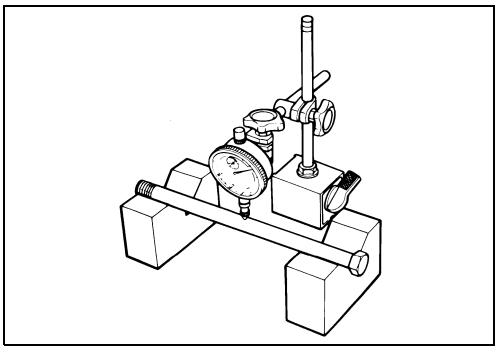


SWINGARM PIVOT SHAFT

Using a dial gauge, check the pivot shaft runout and replace it if the runout exceeds the limit.

DATA **Swingarm pivot shaft runout:**
Service limit: 0.3 mm (0.01 in)

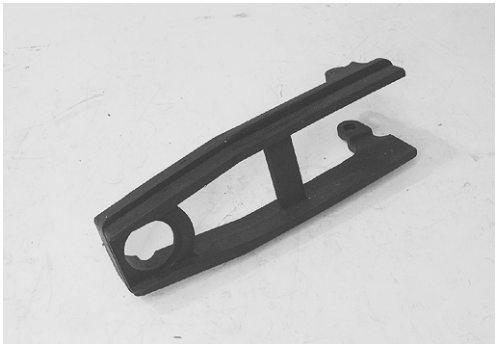
TOOL **09900-20607: Dial gauge**
09900-20701: Dial gauge chuck
09900-21304: V blocks



CHAIN BUFFER

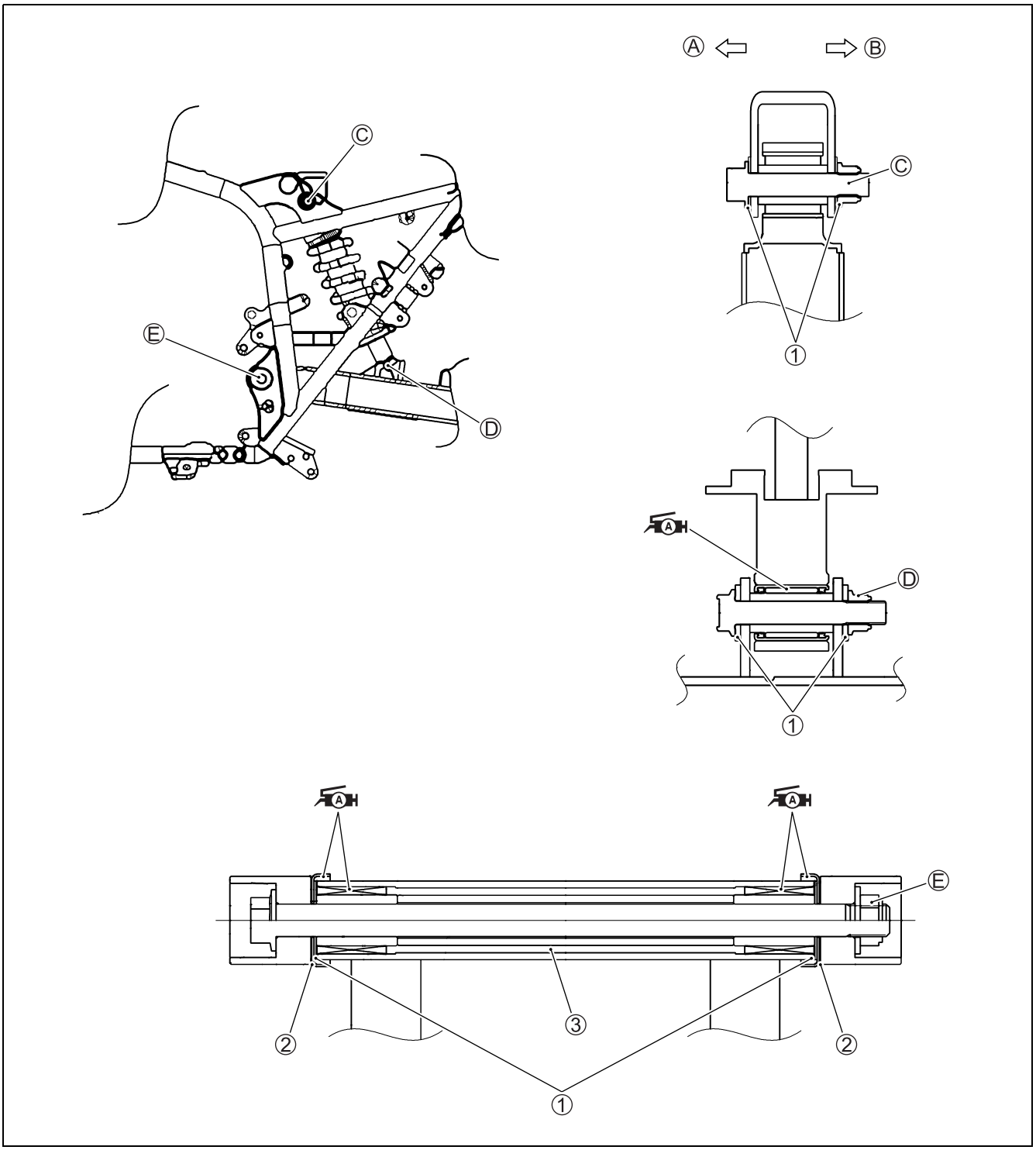
Inspect the chain buffer for wear and damage.

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



REASSEMBLY

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



①	Washer	Ⓑ	RH
②	Dust cover	Ⓒ	Rear shock absorber mounting nut (Upper)
③	Spacer	Ⓓ	Rear shock absorber mounting nut (Lower)
Ⓐ	LH	Ⓔ	Swingarm pivot nut

ITEM	N·m	kgf-m	lbf-ft
Ⓒ	50	5.0	36.0
Ⓓ	84	8.4	61.0
Ⓔ	65	6.5	47.0

SWINGARM BEARING

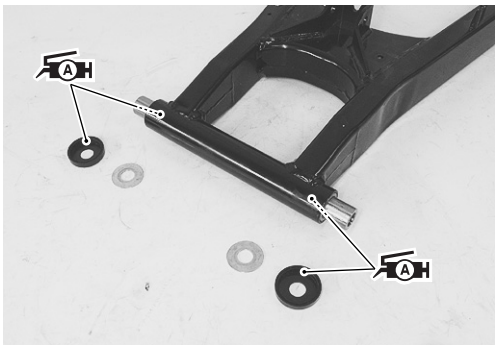
- Press the new bearings into the swingarm pivot using the special tool.

NOTE:
When installing the bearing, stamped mark on bearing must face outside.

09941-34513: Bearing installer

- Apply grease to the bearings and dust covers.

99000-25010: SUZUKI SUPER GREASE "A"
or equivalent



INSTALLATION

Install the rear suspension in the reverse order of removal. Pay attention to the following points:

- Insert the swingarm pivot shaft and tighten swingarm pivot nut to the specified torque.

Swingarm pivot nut: 65 N·m (6.5 kgf-m, 47.0 lbf-ft)

- Tighten the rear shock absorber lower mounting nut to the specified torque.

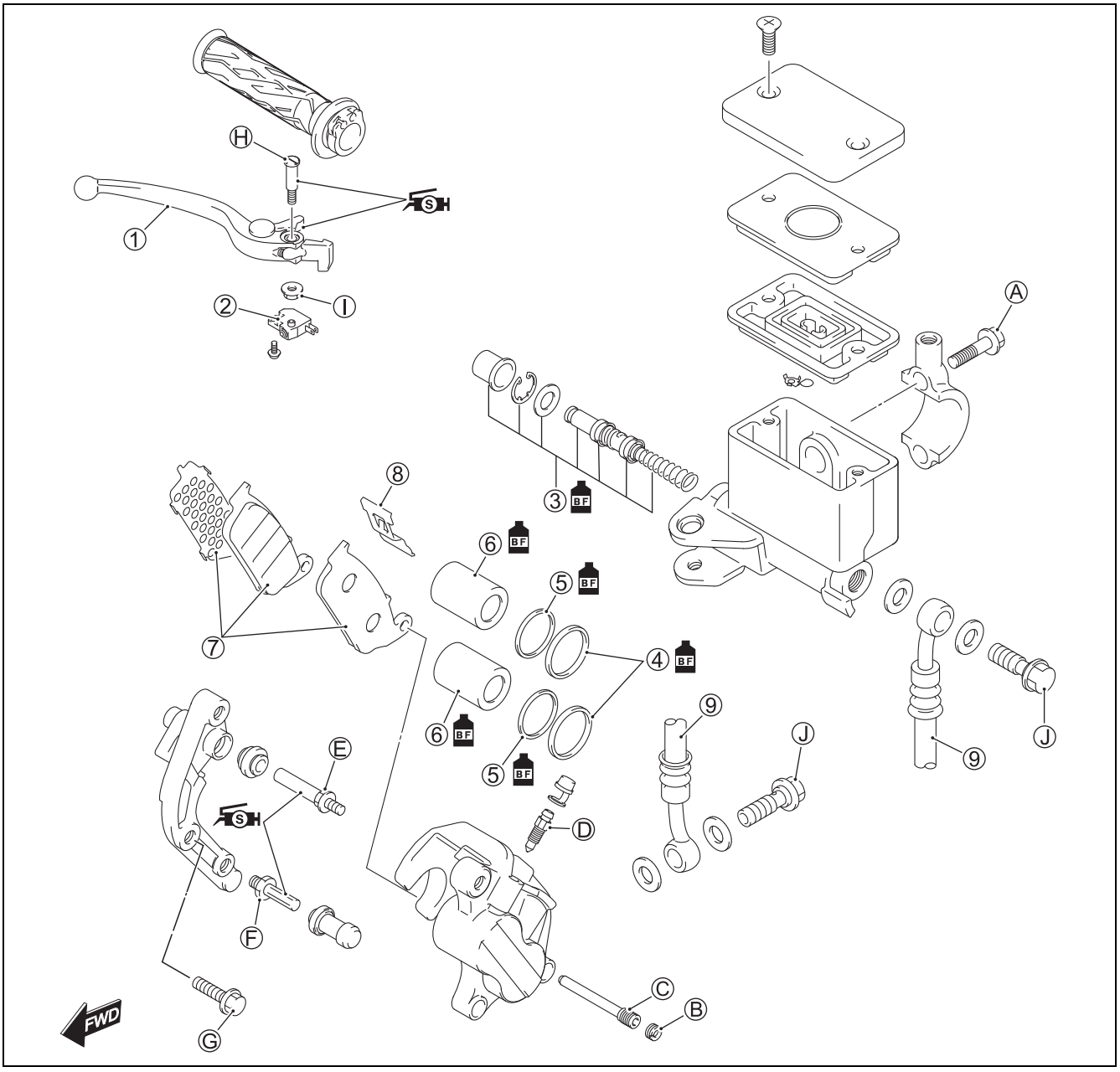
Rear shock absorber mounting nut (Lower):
84 N·m (8.4 kgf-m, 61.0 lbf-ft)

- Route the rear brake hose properly. (☞10-24)
- Install the rear wheel. (☞8-39)

After installing the rear suspension and wheel, the following adjustments are required before driving.

- Drive chain slack (☞2-18)
- Tire pressure (☞2-23)

FRONT BRAKE
CONSTRUCTION



①	Brake lever	Ⓑ	Brake pad mounting pin plug
②	Brake light switch	Ⓒ	Brake pad mounting pin
③	Piston cup set	Ⓓ	Brake caliper air bleeder valve
④	Piston seal	Ⓔ	Brake caliper sliding pin A
⑤	Dust seal	Ⓕ	Brake caliper sliding pin B
⑥	Brake caliper piston	Ⓖ	Brake caliper mounting bolt
⑦	Brake pad	Ⓗ	Brake lever pivot bolt
⑧	Brake pad spring	Ⓘ	Brake lever pivot bolt lock-nut
⑨	Brake hose	Ⓙ	Brake hose union bolt
Ⓐ	Master cylinder mounting bolt		

ITEM	N·m	kgf-m	lbf-ft
Ⓐ	10	1.0	7.0
Ⓑ	2.5	0.25	2.0
Ⓒ	18	1.8	13.0
Ⓓ	6	0.6	4.5
Ⓔ	23	2.3	16.5
Ⓕ	13	1.3	9.5
Ⓖ	26	2.6	19.0
Ⓗ	1	0.1	0.5
Ⓘ	6	0.6	4.5
Ⓙ	23	2.3	16.5

⚠ WARNING

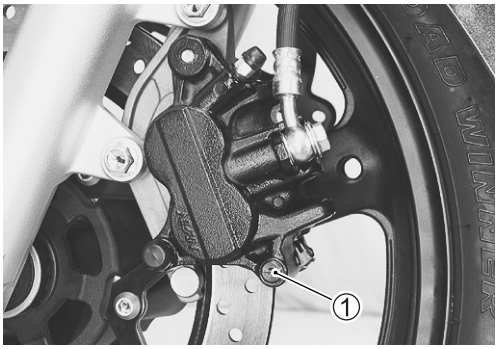
*** This brake system is filled with an ethylene glycol-based DOT 4 brake fluid. Do not use or mix different types of fluid such as silicone-based or petroleum-based.**
*** Do not use any brake fluid taken from old, used or unsealed containers. Never reuse brake fluid left over from the last servicing or which has been stored for a long period of time.**
*** When storing the brake fluid, seal the container completely and keep away from children.**
*** When replenishing brake fluid, take care not to get dust into 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 disc with high quality brake cleaner or neutral detergent.**

NOTICE

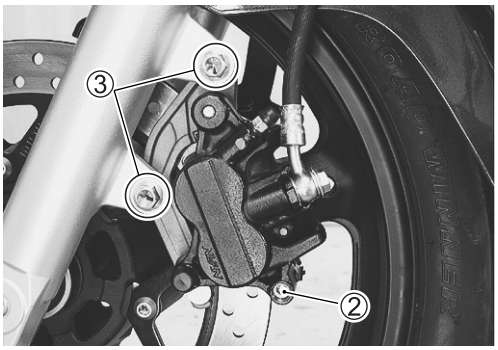
Immediately and completely wipe off any brake fluid contacting any part of the motorcycle. The brake fluid reacts chemically with paint, plastics and rubber materials, etc., and will damage them severely.

BRAKE PAD REPLACEMENT

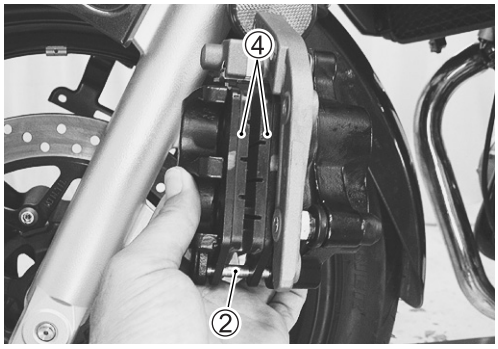
• Remove the pad pin plug ①.



• Loosen the pad mounting pin ②.
• Remove the brake caliper mounting bolts ③.



- Remove the pad mounting pin ② and brake pads ④.

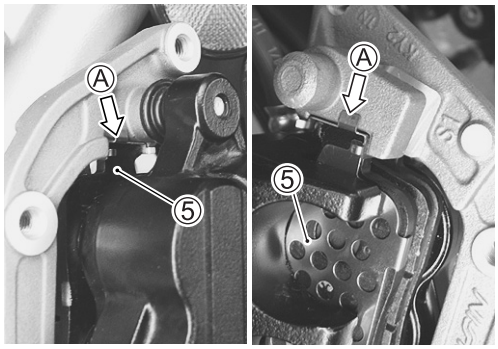


NOTICE

Do not operate the brake lever with the pads removed.

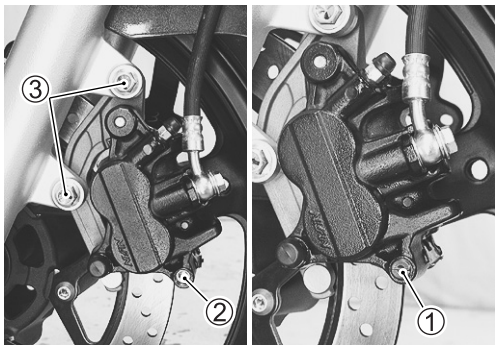
NOTE:
When the brake caliper is removed, care must be used so as not to cause stress to the brake hose. (Hang the brake caliper on the frame with a string etc.)

- Clean up the caliper especially around the caliper piston.
- Push the pistons all the way into brake caliper.
- Install the new brake pads ⑤.
- Temporarily tighten the pad mounting pin ②.



NOTE:
** Replace the brake pads as a set, otherwise braking performance will be adversely affected.*
** Make sure that the detent Ⓐ of the pad is seated onto the pad guide on the caliper bracket.*

- Tighten the brake caliper mounting bolts ③, pad mounting pin ② and pad pin plug ① to the specified torque.

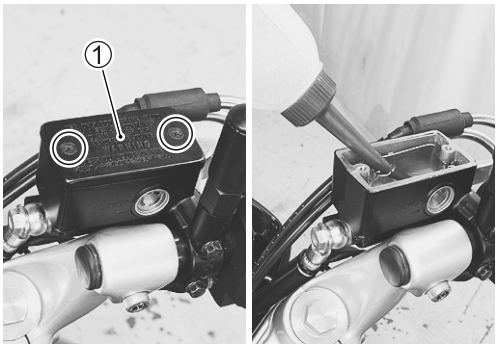


Front brake caliper mounting bolt:
26 N·m (2.6 kgf-m, 19.0 lbf-ft)
Front brake pad mounting pin:
18 N·m (1.8 kgf-m, 13.0 lbf-ft)
Front brake pad pin plug: 2.5 N·m (0.25 kgf-m, 2.0 lbf-ft)

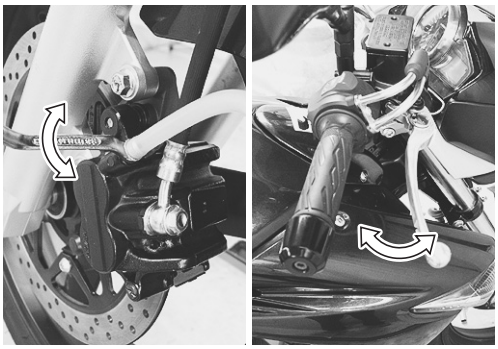
- After replacing the brake pads, pump the brake lever several times to check for proper brake operation and then check the brake fluid level.

BRAKE FLUID REPLACEMENT

- Place the motorcycle on a level surface and keep the handlebars straight.
- Remove the brake fluid reservoir cap ① and diaphragm.
- Suck up the old brake fluid as much as possible.
- Fill the reservoir with new brake fluid.



- Connect a clear hose to the caliper air bleeder valve and insert the other end of hose into a receptacle.
- Loosen the air bleeder valve and pump the brake lever until old brake fluid flows out of the bleeder system.



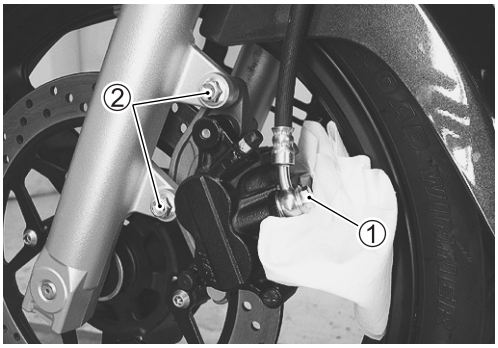
- Close the caliper air bleeder valve and disconnect a clear hose. Fill the reservoir with new fluid to the upper mark of the reservoir.

Specification and classification: DOT 4

- Bleed air from the brake system. (☞2-21 to -22)

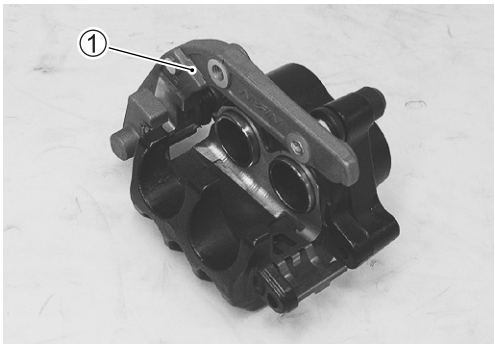
CALIPER REMOVAL

- Drain brake fluid. (☞above)
- Place a clean rag underneath the union bolt on the brake caliper to catch any split brake fluid.
- Remove the brake hose from the caliper by removing the union bolt ① and catch the brake fluid in a suitable receptacle.
- Remove the brake caliper by removing the caliper mounting bolts ②.

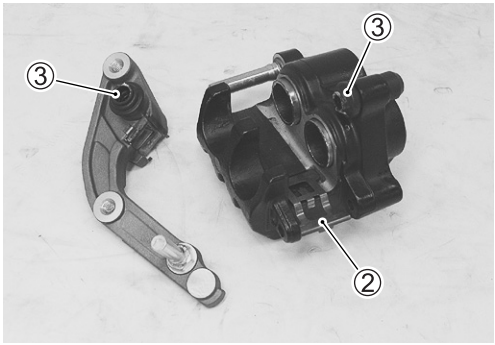


CALIPER DISASSEMBLY

- Remove the brake pads. (☞8-52)
- Remove the brake caliper holder ①.



- Remove the pad spring ②.
- Remove the rubber boots ③.



- Place a clean rag over the pistons to prevent it from popping out and then force out the pistons using compressed air.

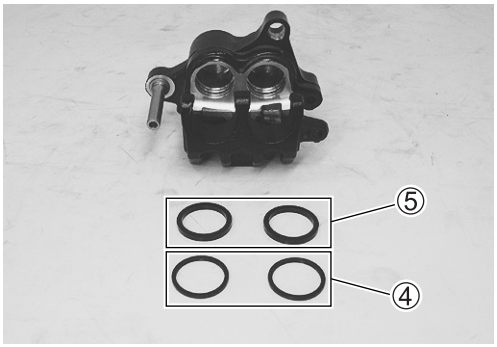
⚠ WARNING

Fingers can get caught between piston and caliper body when removing the piston.
Do not place your fingers on the piston when removing the piston.

NOTICE

Do not use high pressure air to prevent piston damage.

- Remove the dust seals ④ and piston seals ⑤.



CALIPER INSPECTION

BRAKE CALIPER

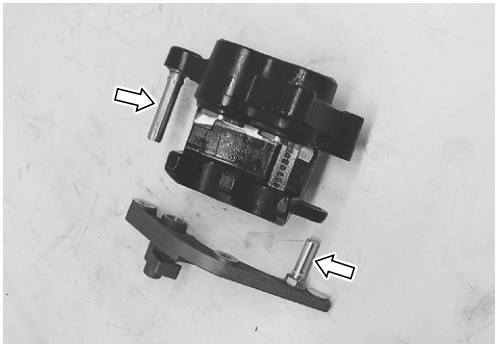
Inspect the brake caliper cylinder wall for nicks, scratches and other damage. If any damage is found, replace the caliper with a new one.

BRAKE CALIPER PISTON

Inspect the brake caliper piston surface for any scratches and other damage. If any damage is found, replace the pistons with a new set.

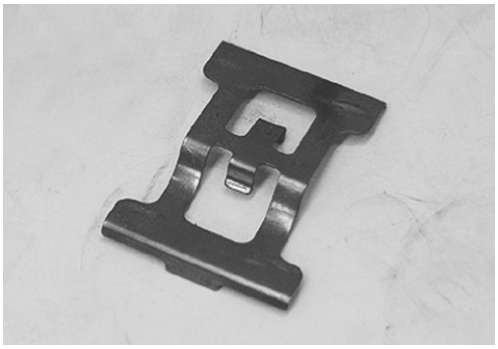
BRAKE CALIPER SLIDING PIN

Inspect the brake caliper sliding pins for wear and other damage. If any damage is found, replace it with a new one.



PAD SPRING

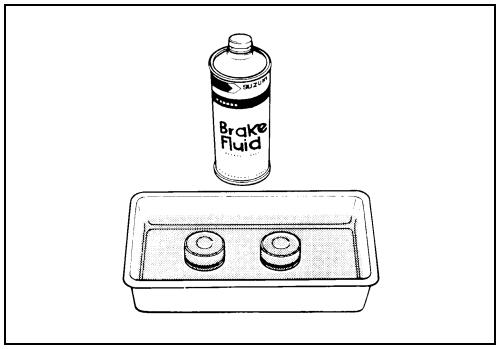
Inspect the pad spring for damage and excessive bend. If any defects are found, replace it with a new one.



RUBBER BOOT

Inspect the rubber boots for damage. If any damage is found, replace it with a new one.

CALIPER REASSEMBLY



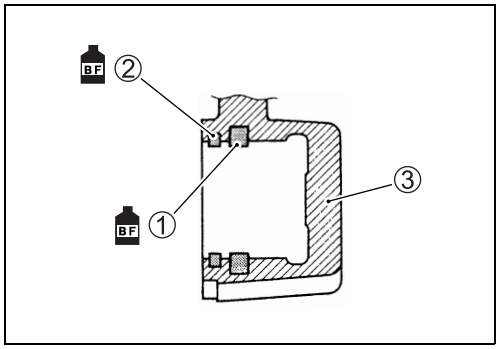
Reassemble the caliper in the reverse order of disassembly. Pay attention to the following points:

- Wash the caliper bores and pistons with specified brake fluid. Particularly wash the dust seal grooves and piston seal grooves.

BF Specification and classification: DOT 4

NOTICE

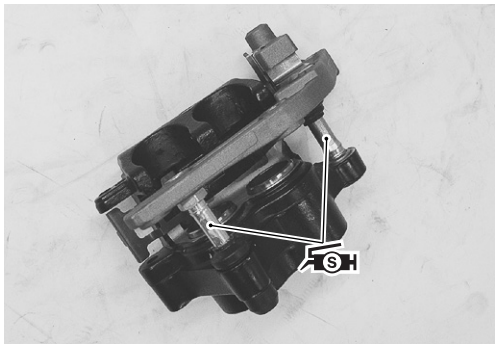
*** Wash the caliper components with fresh brake fluid before reassembly. Never use cleaning solvent or gasoline to wash them.**
*** Do not wipe the brake fluid off after washing the components.**
*** When washing the components, use the specified brake fluid. Never use different types of fluid or cleaning solvent such as gasoline, kerosine or the others.**



- Apply the brake fluid to new piston seals ① and new dust seals ②.

BF Specification and classification: DOT 4

- Install the each seal as shown in the illustration.
  ① Piston seal
  ② Dust seal
  ③ Caliper body

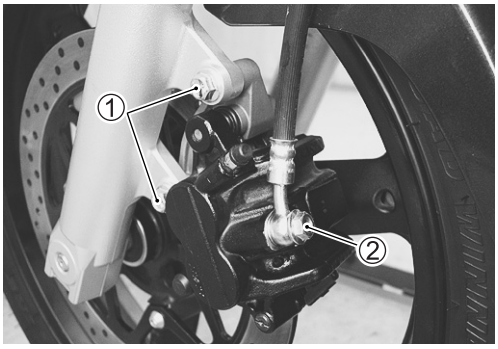


- Apply grease to the brake caliper sliding pins.

S H 99000-25100: SUZUKI SILICONE GREASE or equivalent

- Install the brake pads. (☞8-53)

CALIPER INSTALLATION



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

- Tighten the brake caliper mounting bolts ① to the specified torque.

Front brake caliper mounting bolt:
26 N·m (2.6 kgf-m, 19.0 lbf-ft)

- Install the brake hose with union bolt and new seal washers.
- After setting the brake hose union to the stopper, tighten the union bolt ② to the specified torque.

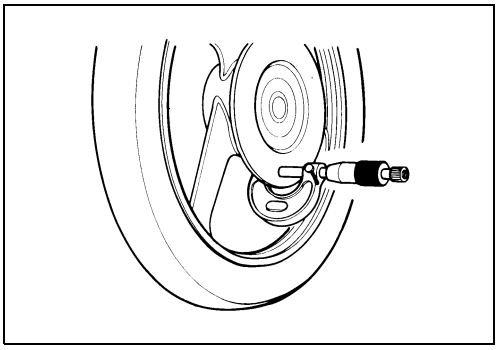
Brake hose union bolt: 23 N·m (2.3 kgf-m, 16.5 lbf-ft)

- Bleed air from the brake system after installing the caliper. (☞2-21 to -22)

⚠ WARNING

Brake fluid, if it leaks, will interfere with safe running and discolor painted surfaces. Check the brake hose and hose joints for cracks and fluid leakage.

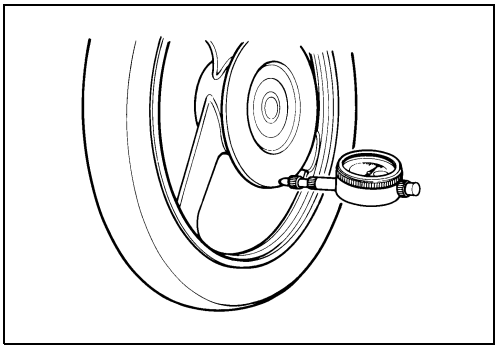
BRAKE DISC INSPECTION



- Visually check the brake disc for damage or cracks.
- Measure the thickness with a micrometer.
- Replace the disc if the thickness is less than the service limit or if damage is found.

DATA Front disc thickness: Service Limit: 4.5 mm (0.18 in)

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



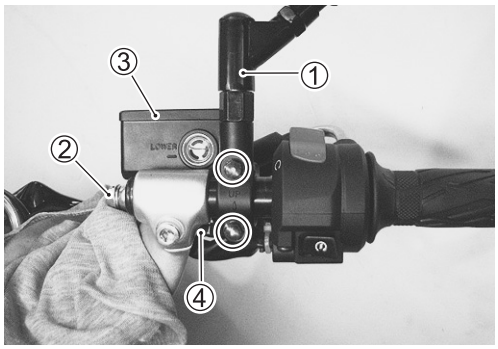
- Dismount the brake caliper.
- Measure the runout with the dial gauge.
- Replace the disc if the runout exceeds the service limit.

DATA Front disc runout: Service Limit: 0.30 mm (0.012 in)

TOOL 09900-20607: Dial gauge
09900-20701: Dial gauge chuck

Brake disc removal ..... (☞8-9)
Brake disc installation..... (☞8-13)

MASTER CYLINDER REMOVAL AND DISASSEMBLY

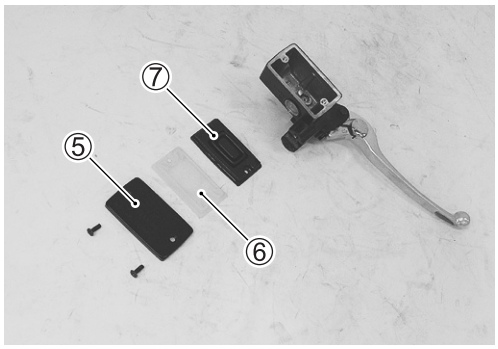


- Remove the right rear view mirror ①.
- Drain brake fluid. (☞8-54)
- Place a clean rag underneath the brake hose union bolt ② on the master cylinder to catch any split brake fluid.

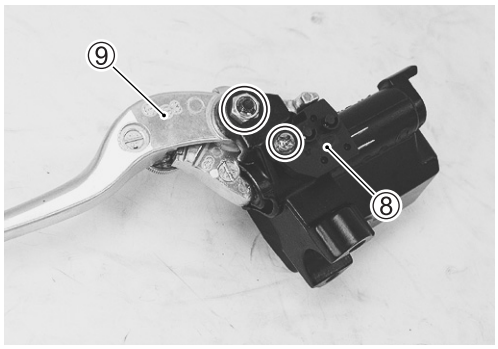
NOTICE

Spilled brake fluid can damage painted surfaces and plastic parts.
Be careful not to spill any fluid. Wipe spilled fluid up immediately.

- Remove the brake hose union bolt ② and disconnect the brake hose.
- Remove the master cylinder assembly ③ and disconnect the brake light switch lead wires ④.
- Remove the reservoir cap ⑤, plate ⑥ and diaphragm ⑦.

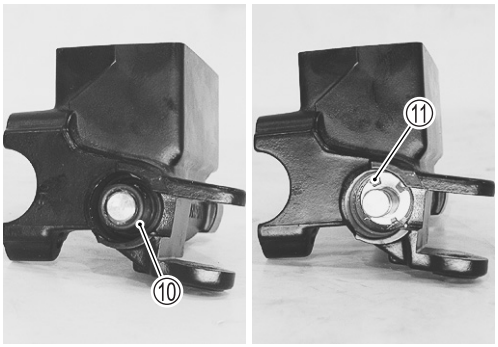


- Remove the brake light switch ⑧ and brake lever ⑨.

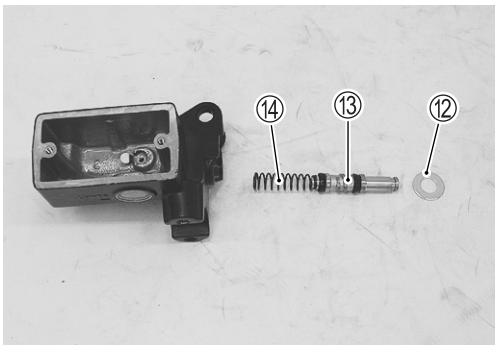


• Pull out the dust boot ⑩ and remove the snap ring ⑪.

09900-06108: Snap ring pliers (Close type)



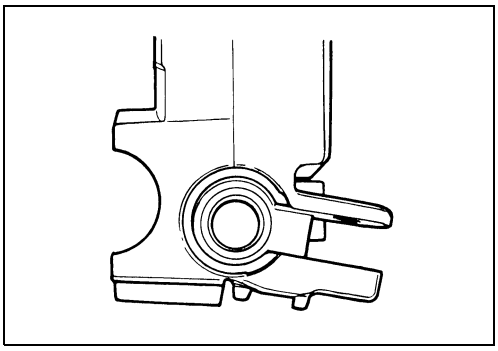
• Remove the stopper plate ⑫, piston cup set ⑬ and spring ⑭.



MASTER CYLINDER INSPECTION

MASTER CYLINDER

Inspect the master cylinder bore for any scratches or other damage.If any damage is found, replace the master cylinder with a new one.



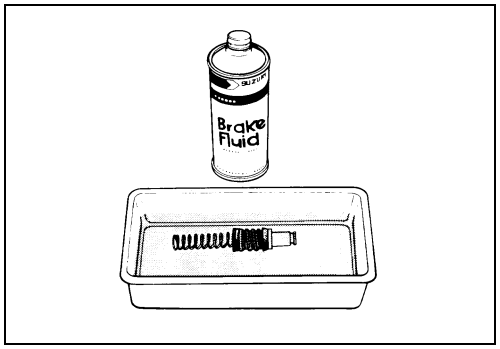
PISTON

Inspect the piston surface for any scratches or other damage. If any damage is found, replace the piston with a new one.

RUBBER PARTS

Inspect the primary cup, secondary cup and dust boot for wear or damage. If any defects are found, replace it with a new one.

MASTER CYLINDER REASSEMBLY AND INSTALLATION



Reassemble and install the master cylinder in the reverse order of removal and disassembly. Pay attention to the following points:

- Wash the master cylinder components with new brake fluid before reassembly.

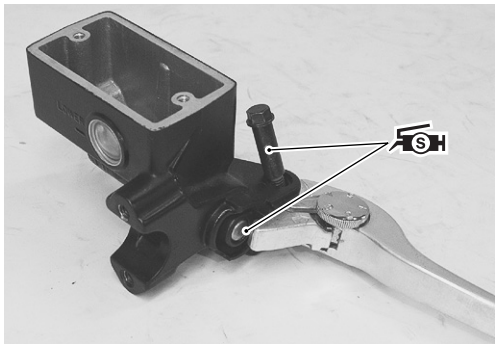
Specification and classification: DOT 4

NOTICE

*** Do not wipe the brake fluid off after washing the components.**
*** When washing the components, use the specified brake fluid. Never use different types of fluid or cleaning solvents such as gasoline, kerosine, etc.**
*** Apply brake fluid to the master cylinder bore and all of the master cylinder component to be inserted into the bore.**

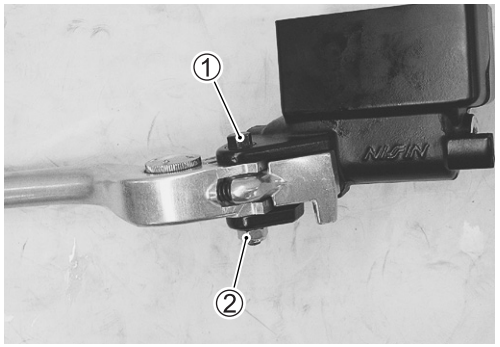
- Apply grease to the brake lever pivot bolt.
- Apply grease to the contact point between piston and brake lever.

99000-25100: SUZUKI SILICONE GREASE or equivalent



- Tighten the brake lever pivot bolt ① and lock-nut ② to the specified torque.

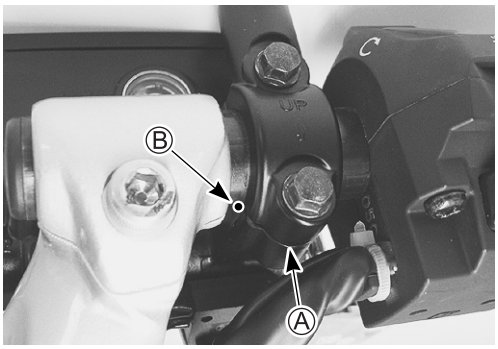
Front brake lever pivot bolt: 1 N·m (0.1 kgf-m, 0.5 lbf-ft)
Front brake lever pivot bolt lock-nut:
6 N·m (0.6 kgf-m, 4.5 lbf-ft)

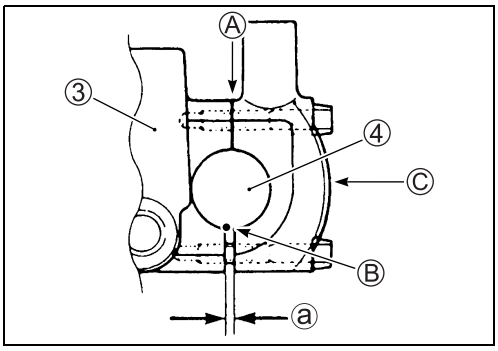


• When installing the brake light switch, align the projection on the switch with the hole in the master cylinder.

• When installing the master cylinder ③ onto the handlebar ④, align the master cylinder holder's mating surface Ⓐ with the punch mark Ⓑ on the handlebar ④ and tighten the upper holder bolt first.

Front brake Master cylinder holder bolt (Upper and Lower): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



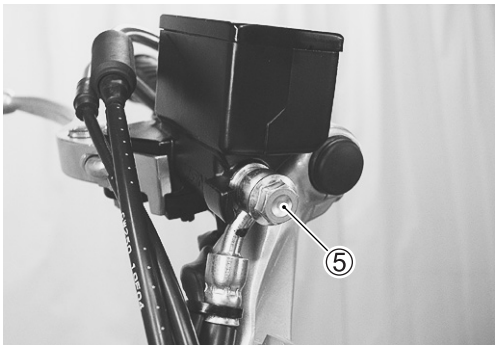


③ Master cylinder
④ Handlebar
Ⓐ Mating surface
Ⓑ Punch mark
Ⓒ UP mark
ⓐ Clearance

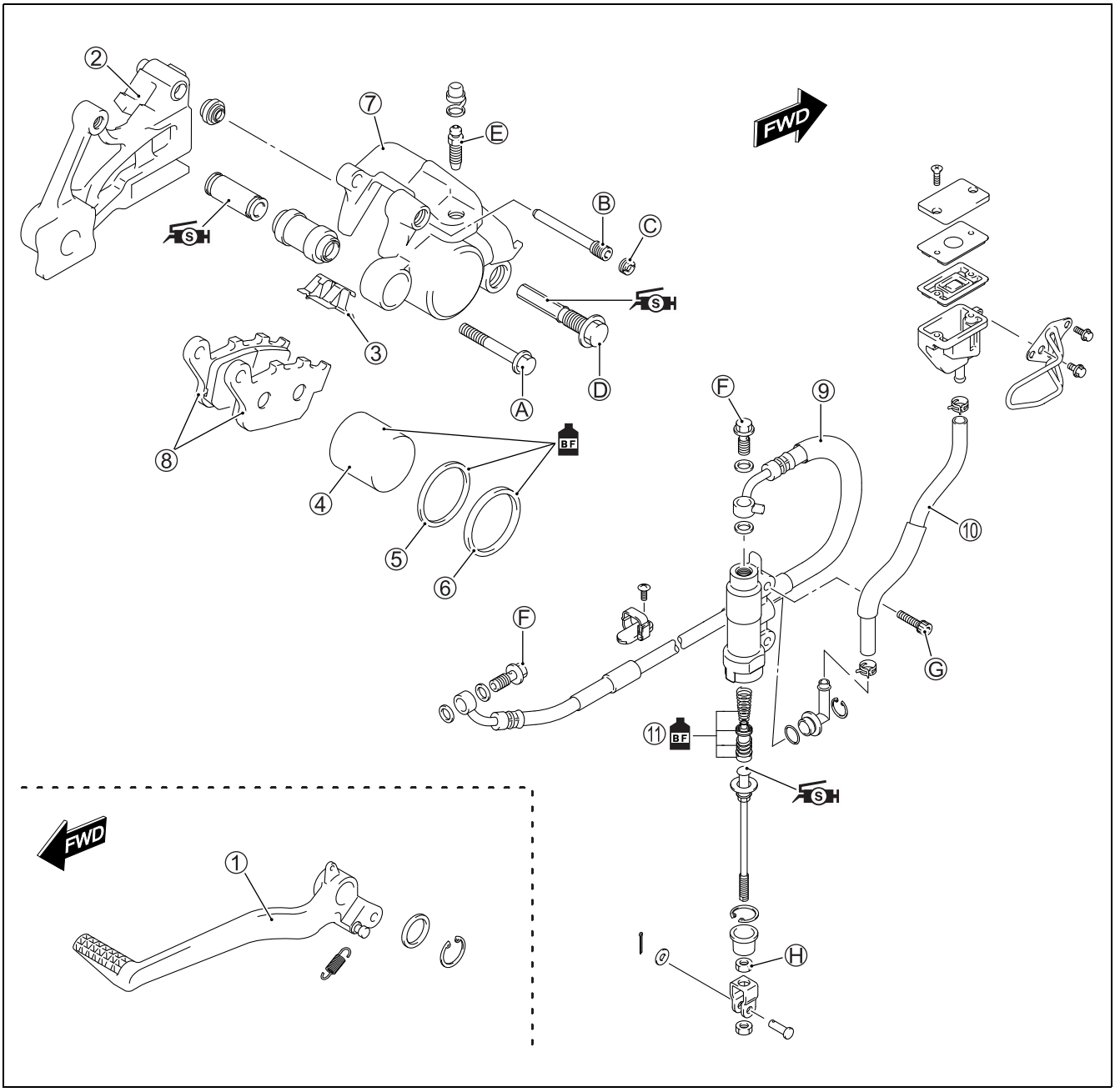
• Install the brake hose with union bolt and new seal washers.
• After setting the brake hose union to the stopper, tighten the union bolt ⑤ to the specified torque.

Brake hose union bolt: 23 N·m (2.3 kgf-m, 16.5 lbf-ft)

• Bleed air from the brake system after installing the master cylinder. (☞2-21 to -22)



REAR BRAKE
CONSTRUCTION



①	Brake pedal	⑪	Piston cup set
②	Brake caliper bracket	Ⓐ	Brake caliper mounting bolt
③	Brake pad spring	Ⓑ	Brake pad mounting pin
④	Caliper piston	Ⓒ	Brake pad mounting pin plug
⑤	Dust seal	Ⓓ	Brake caliper sliding pin
⑥	Piston seal	Ⓔ	Brake caliper air bleeder valve
⑦	Brake caliper	Ⓕ	Brake hose union bolt
⑧	Brake pad	Ⓖ	Master cylinder mounting bolt
⑨	Brake hose	Ⓗ	Master cylinder rod lock-nut
⑩	Reservoir hose		

ITEM	N·m	kgf-m	lbf-ft
Ⓐ	23	2.3	16.5
Ⓑ	18	1.8	13.0
Ⓒ	2.5	0.25	2.0
Ⓓ	27	2.7	19.5
Ⓔ	6	0.6	4.5
Ⓕ	23	2.3	16.5
Ⓖ	10	1.0	7.0
Ⓗ	18	1.8	13.0

⚠ 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.**
*** 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 period of time.**
*** When storing the brake fluid, seal the container completely and keep away from children.**
*** When replenishing brake fluid, take care not to get dust into 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 disc with high quality brake cleaner or neutral detergent.**

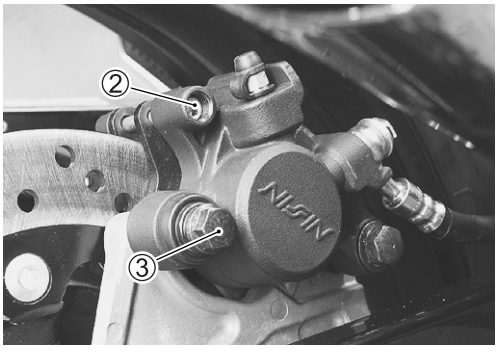
NOTICE

Immediately and completely wipe off any brake fluid contacting any part of the motorcycle. The brake fluid reacts chemically with paint, plastics and rubber materials, etc., and will damage them severely.

BRAKE PAD REPLACEMENT

- Remove the pad pin plug ①.

- Remove the pad mounting pin ②.
- Remove the brake caliper mounting bolt ③.



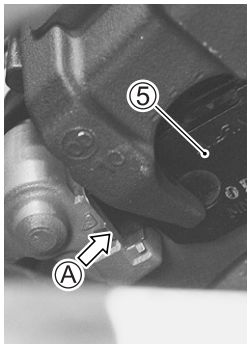
- Remove the brake pads ④ with the rear brake caliper pivoted up.

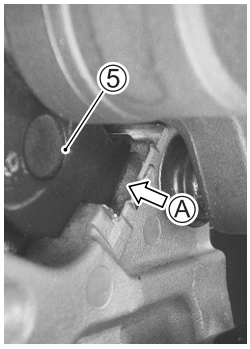
NOTICE

Do not operate the brake pedal with the pads removed.

- Clean up the caliper especially around the caliper piston.

- Push the piston all the way into brake caliper.
- Install the new brake pads ⑤.





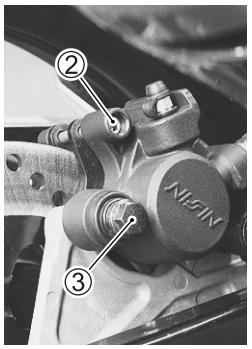
NOTE:

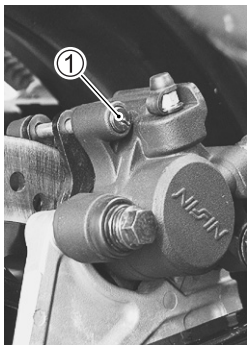
** Replace the brake pads as a set, otherwise braking performance will be adversely affected.*

** Make sure that the detent Ⓐ of the pad is seated onto the pad guide on the caliper bracket.*

- Tighten the brake caliper mounting bolt ③, pad mounting pin ② and pad pin plug ① to the specified torque.

Rear brake caliper mounting bolt:
23 N·m (2.3 kgf-m, 16.5 lbf-ft)
Rear brake pad mounting pin:
18 N·m (1.8 kgf-m, 13.0 lbf-ft)
Rear brake pad pin plug: 2.5 N·m (0.25 kgf-m, 2.0 lbf-ft)





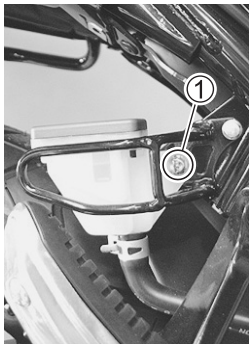
- After replacing the brake pads, pump the brake pedal several times to check for proper brake operation and then check the brake fluid level.

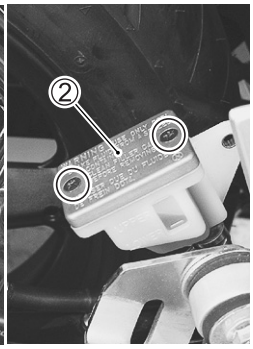
BRAKE FLUID REPLACEMENT

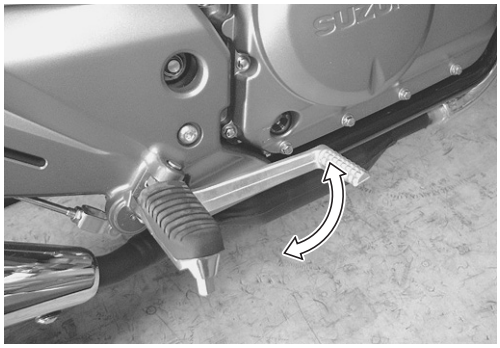
- Remove the brake fluid reservoir mounting bolt ①.
- Remove the brake fluid reservoir cap ② and diaphragm.
- Replace the brake fluid in the same manner as the front brake. (☞8-54)

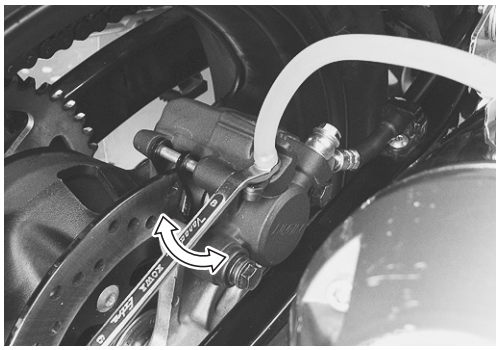
Specification and Classification: DOT 4

- Bleed air from the brake system. (☞2-21 to -22)



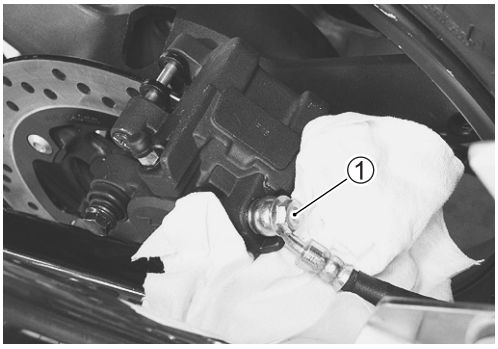




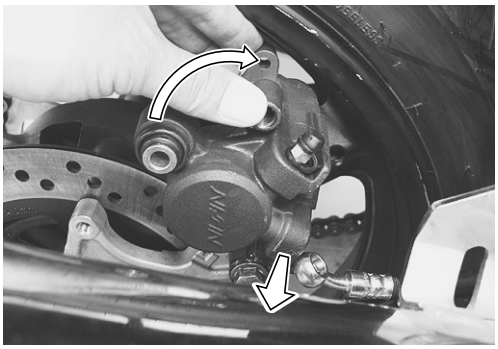


CALIPER REMOVAL

- Drain the brake fluid. (☞8-54)
- Place a clean rag underneath the union bolt on the brake caliper to catch any split brake fluid.
- Remove the brake hose from the caliper by removing the union bolt ① and catch the brake fluid in a suitable receptacle.
- Remove the brake pads. (☞8-64)

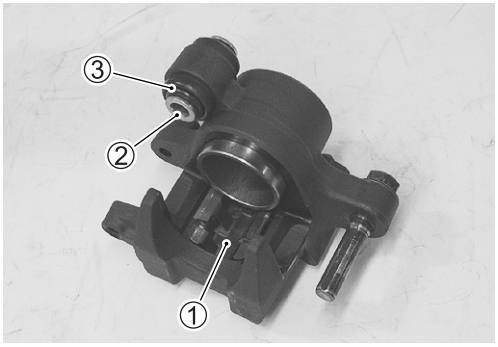


- Remove the brake caliper from the caliper bracket.



CALIPER DISASSEMBLY

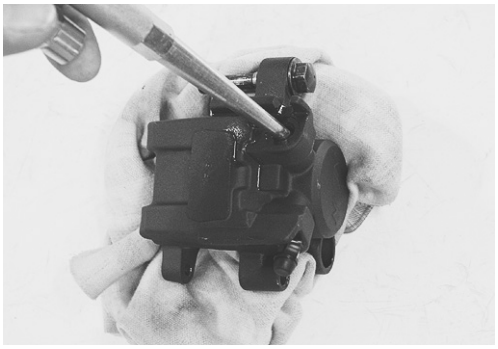
- Remove the brake pad spring ①.
- Remove the spacer ② and rubber boot ③.



- Place a clean rag over the piston to prevent it from popping out and then force out the piston using compressed air.

⚠ WARNING

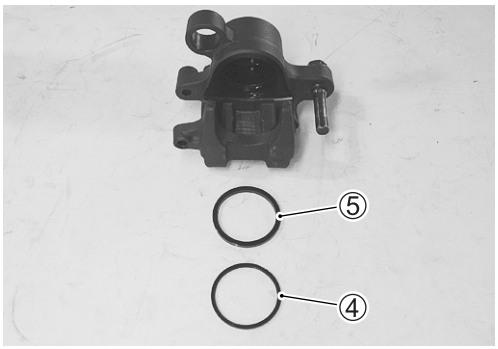
Fingers can get caught between piston and caliper body when removing the piston.
Do not place your fingers on the piston when removing the piston.



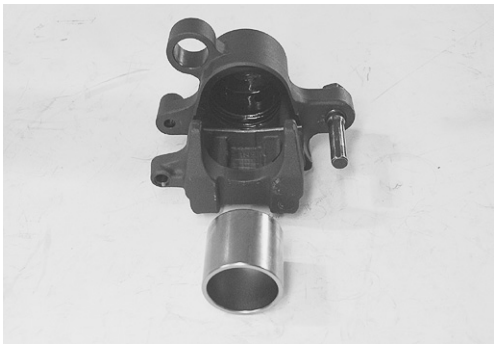
NOTICE

Do not use high pressure air to prevent piston damage.

- Remove the dust seal ④ and piston seal ⑤.



CALIPER INSPECTION

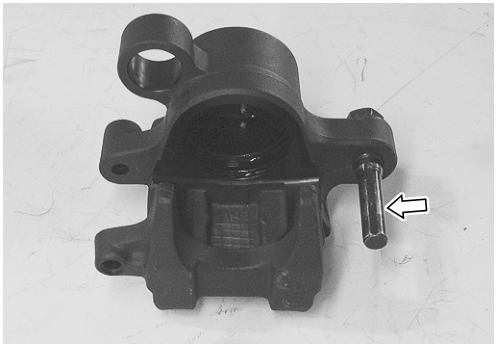


BRAKE CALIPER

Inspect the brake caliper cylinder wall for nicks, scratches and other damage. If any damage is found, replace the caliper with a new one.

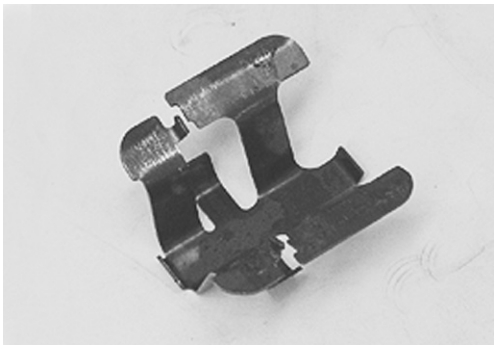
BRAKE CALIPER PISTON

Inspect the brake caliper piston surface for any scratches and other damage. If any damage is found, replace the piston with a new one.



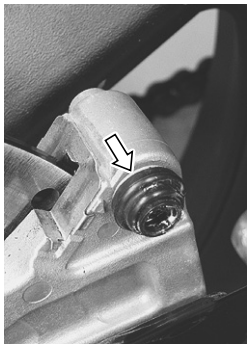
BRAKE CALIPER SLIDING PIN

Inspect the brake caliper sliding pin for wear and other damage. If any damage is found, replace it with a new one.



PAD SPRING

Inspect the pad spring for damage and excessive bend. If any defects are found, replace it with a new one.



RUBBER BOOT AND SPACER

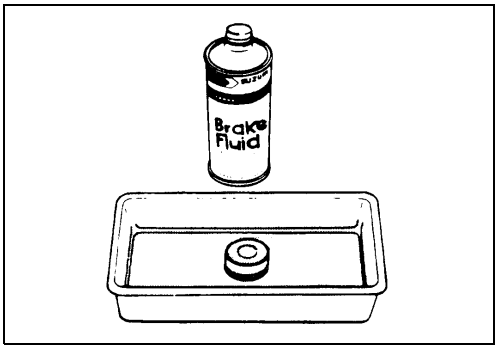
Inspect the rubber boots and spacer for damage and wear. If any defects are found, replace it with a new one.

CALIPER REASSEMBLY

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

- Wash the caliper bore and piston with specified brake fluid. Particularly wash the dust seal groove and piston seal groove.

BF Specification and classification: DOT 4



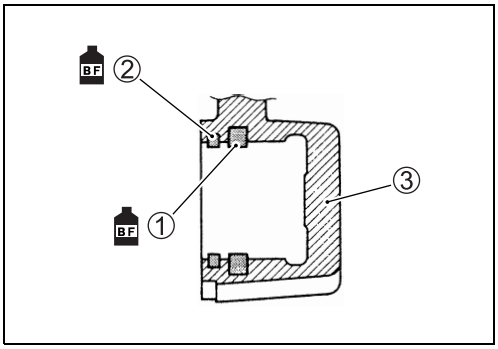
NOTICE

*** Wash the caliper components with fresh brake fluid before reassembly. Never use cleaning solvent or gasoline to wash them.**
*** Do not wipe the brake fluid off after washing the components.**
*** When washing the components, use the specified brake fluid. Never use different types of fluid or cleaning solvent such as gasoline, kerosine or the others.**

- Apply the brake fluid to new piston seal ① and new dust seal ②.

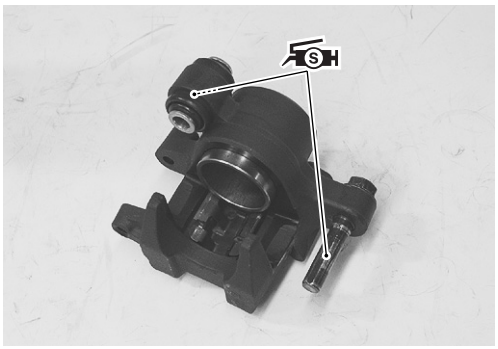
BF Specification and classification: DOT 4

- Install the each seal as shown in the illustration.
  ① Piston seal
  ② Dust seal
  ③ Caliper body

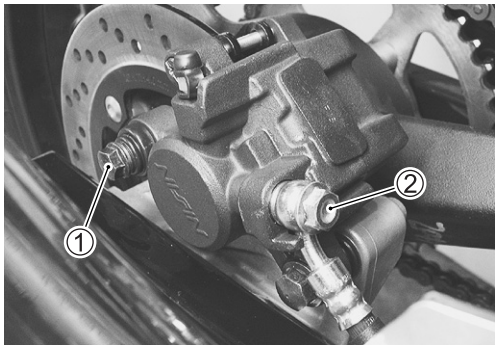


- Apply grease to the inside of boot.
- Apply grease to the brake caliper sliding pin.

SH 99000-25100: SUZUKI SILICONE GREASE or equivalent



CALIPER INSTALLATION



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

- Install the brake pads and tighten the brake caliper mounting bolt ① to the specified torque. (☞8-65)

Rear brake caliper mounting bolt:
23 N·m (2.3 kgf-m, 16.5 lbf-ft)

- Install the brake hose with union bolt and new seal washers.
- After setting the brake hose union to the stopper, tighten the union bolt ② to the specified torque.

Brake hose union bolt: 23 N·m (2.3 kgf-m, 16.5 lbf-ft)

- Bleed air from the brake system after installing the caliper. (☞2-21 to -22)

⚠ WARNING

Brake fluid, if it leaks, will interfere with safe running and discolor painted surfaces. Check the brake hose and hose joints for cracks and fluid leakage.

BRAKE DISC INSPECTION

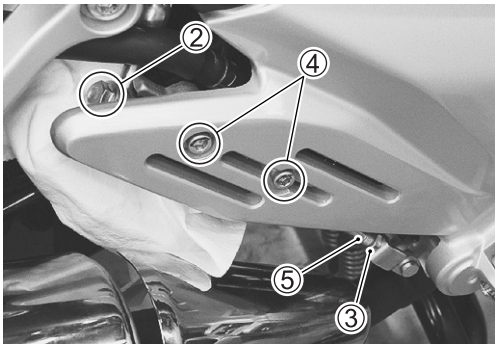
- Inspect the rear brake disc in the same manner as the front brake disc. (☞8-58)

DATA Rear disc thickness: Service Limit: 4.0 mm (0.16 in)
Rear disc runout: Service Limit: 0.30 mm (0.012 in)

MASTER CYLINDER REMOVAL AND DISASSEMBLY

- Remove the brake fluid reservoir mounting bolt ①.
- Drain brake fluid. (☞8-65)

- Place a clean rag underneath the union bolt ② on the master cylinder to catch spilled drops of brake fluid.

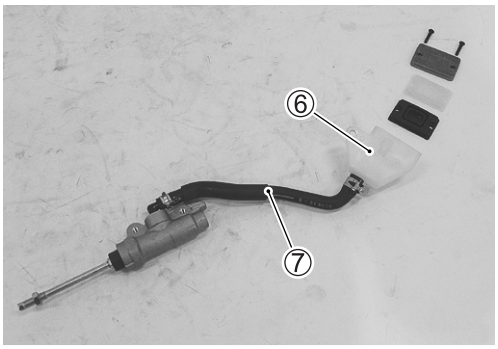


NOTICE

Spilled brake fluid can damage painted surfaces and plastic parts.
Be careful not to spill any fluid. Wipe spilled fluid up immediately.

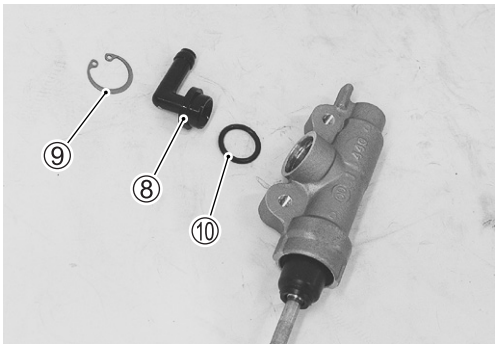
- Remove the union bolt ② and disconnect the brake hose.
- Loosen the lock-nut ③.
- Remove the master cylinder mounting bolts ④.
- Remove the master cylinder along with the reservoir by turning the push rod ⑤.

- Remove the reservoir tank ⑥ and reservoir hose ⑦.



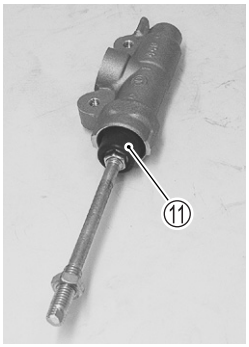
- Remove the connector ⑧ by removing the snap ring ⑨.
- Remove the O-ring ⑩.

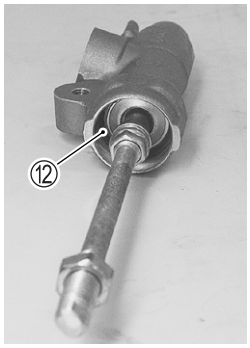
TOOL 09900-06108: Snap ring pliers (Close type)



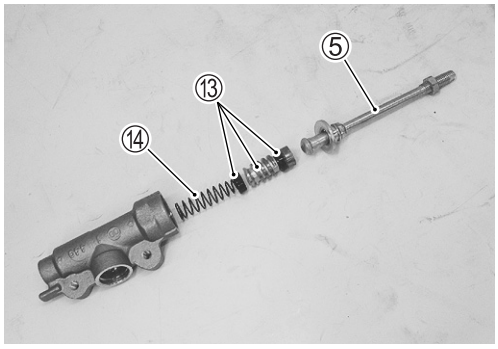
- Pull out the dust boot ⑪ and remove the snap ring ⑫.

TOOL 09900-06108: Snap ring pliers (Close type)





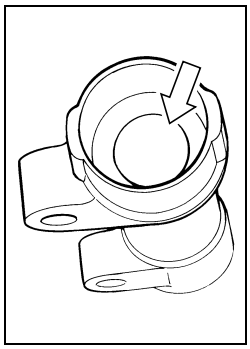
• Remove the push rod ⑤, piston cup set ⑬ and spring ⑭.



MASTER CYLINDER INSPECTION

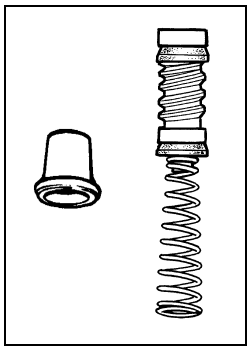
MASTER CYLINDER

Inspect the master cylinder bore for any scratches or other damage. If any damage is found, replace the master cylinder with a new one.



PISTON

Inspect the piston surface for any scratches or other damage. If any damage is found, replace the piston with a new one.



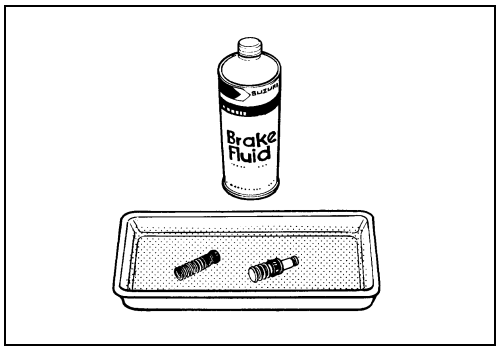
RUBBER PARTS

Inspect the primary cup, secondary cup and dust boot for wear or damage. If any defects are found, replace it with a new one.

MASTER CYLINDER REASSEMBLY AND INSTALLATION

Reassemble and install the master cylinder in the reverse order of removal and disassembly. Pay attention to the following points:

• Wash the master cylinder components with new brake fluid before reassembly.



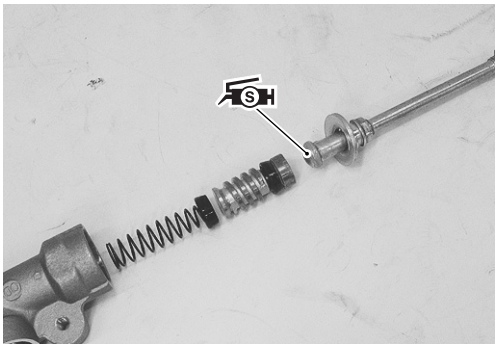
BF **Specification and classification: DOT 4**

NOTICE

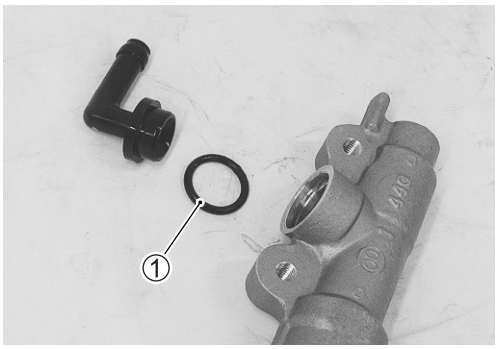
*** Do not wipe the brake fluid off after washing the components.**
*** When washing the components, use the specified brake fluid. Never use different types of fluid or cleaning solvents such as gasoline, kerosine, etc.**
*** Apply brake fluid to the master cylinder bore and all of the master cylinder component to be inserted into the bore.**

- Apply grease to the push rod end.

99000-25100: SUZUKI SILICONE GRADE or equivalent



- Install a new O-ring ①.

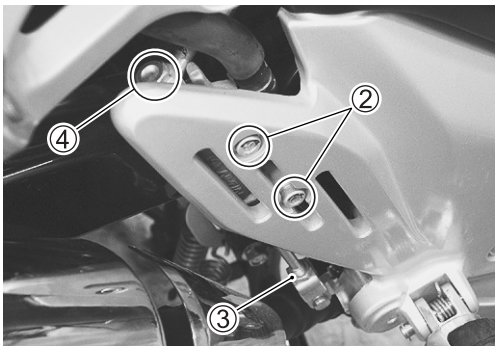


- Tighten the master cylinder mounting bolts ② and lock-nut ③ to the specified torque.

Rear brake master cylinder mounting bolt:
10 N·m (1.0 kgf-m, 7.0 lbf-ft)
Rear brake master cylinder rod lock-nut:
18 N·m (1.8 kgf-m, 13.0 lbf-ft)

- Install the brake hose with union bolt and new seal washers.
- After setting the brake hose union to the stopper, tighten the union bolt ④ to the specified torque.

Brake hose union bolt: 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



- Bleed air from the brake system after installing the master cylinder. (☞2-21 to -22)
- Route the rear brake hose properly. (☞10-24)
- Adjust the brake pedal height. (☞2-21)

TIRE AND WHEEL

TIRE REMOVAL

- The most critical factor of tubeless tire is the seal between the wheel rim and the tire bead. For this reason, it is recommended to use a tire changer that can satisfy this sealing requirement and can make the operation efficient as well as functional.

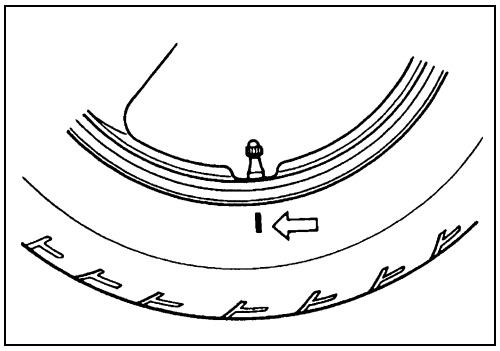
NOTICE

For operating procedures, refer to the instructions supplied by the tire changer manufacturer.

NOTE:

When removing the tire in the case of repair or inspection, mark the tire with a chalk to indicate the tire position relative to the valve position.

Even though the tire is refitted to the original position after repairing puncture, the tire may have to be balanced again since such a repair can cause imbalance.

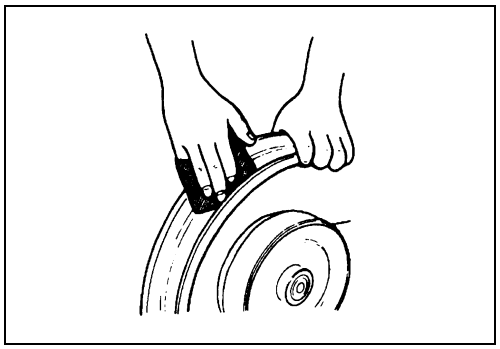


INSPECTION

WHEEL

Wipe the wheel clean and check for the following points:

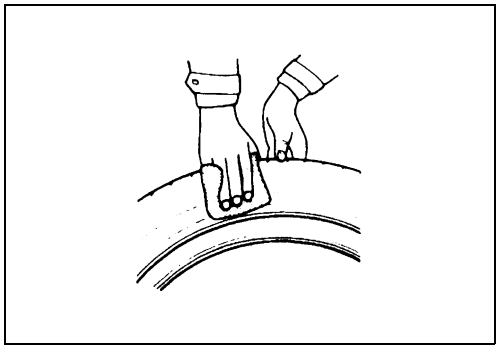
- Distortion and crack
- Any flaws and scratches at the bead seating area.
- Wheel runout (☞8-9)



TIRE

Tire must be checked for the following points:

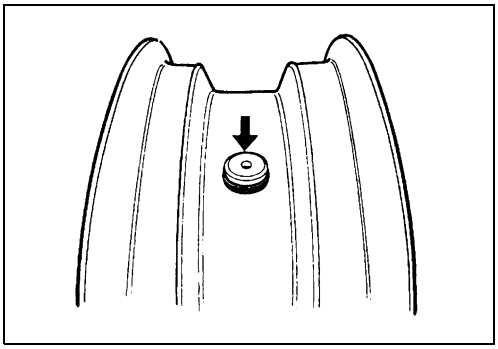
- Nick and rupture on side wall
- Tire tread depth (☞2-23)
- Tread separation
- Abnormal, uneven wear on tread
- Surface damage on bead
- Localized tread wear due to skidding (Flat spot)
- Abnormal condition of inner liner

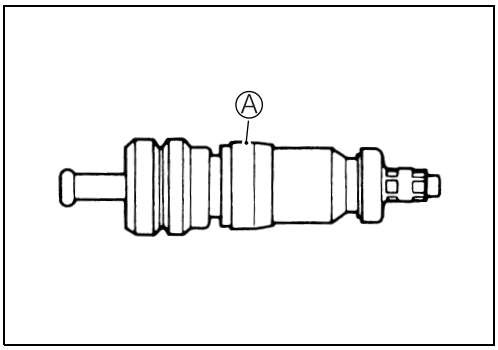


VALVE

- Inspect the valve after the tire is removed from the rim. Replace the valve with a new one if the seal Ⓐ rubber is peeling or has damage.

NOTE:
If the external appearance of the valve shows no abnormal condition, removing of the valve is not necessary.
If the seal has abnormal deformation, replace the valve with a new one.



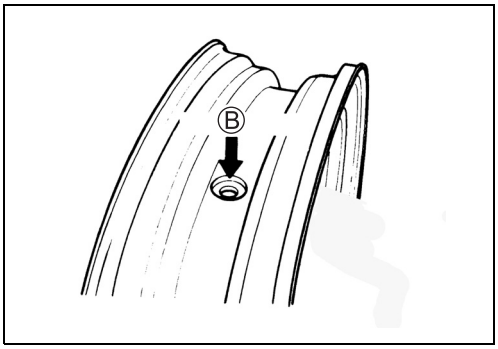


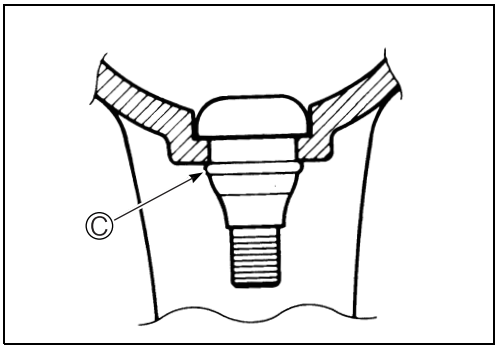
- Any dust or rust around the valve hole Ⓑ must be cleaned off.
- Then install the new valve Ⓒ in the rim.

NOTE:
To properly install the valve into the valve hole, apply a special tire lubricant or neutral soapy liquid to the valve.

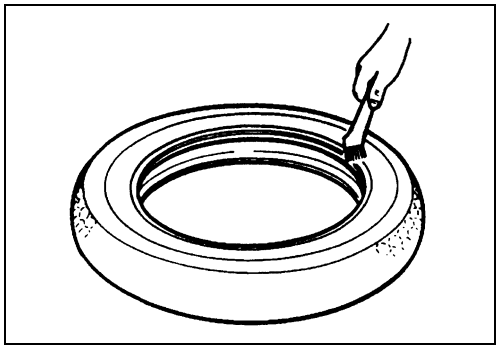
NOTICE

Be careful not to damage the lip Ⓒ of valve.





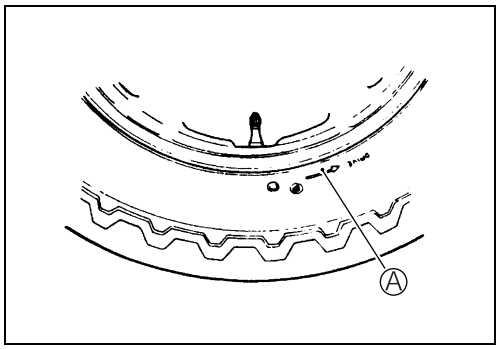
TIRE INSTALLATION



- Apply tire lubricant to the tire bead.

NOTICE

Never use oil, grease or gasoline on the tire bead in place of tire lubricant.



When installing the tire onto the wheel, observe the following points:

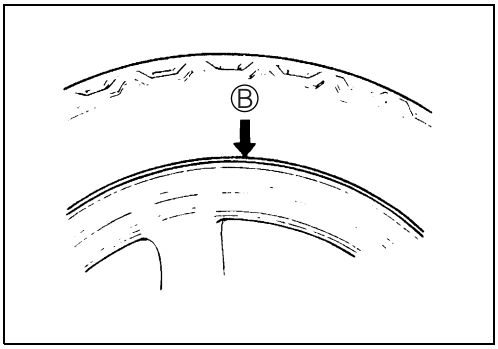
- When installing the tire, the arrow Ⓐ on the side wall should point to the direction of wheel rotation.
- Align the chalk mark put on the tire at the time of removal with the valve position.

- For installation procedure of tire onto the wheel, follow the instructions given by the tire changer manufacturer.
- Bounce the tire several times while rotating. This makes the tire bead expand outward to contact the wheel, thereby facilitating air inflation.
- Inflate the tire.

⚠ WARNING

*** Do not inflate the tire to more than 400 kPa (4.0 kgf/cm², 57 psi). If inflated beyond this limit, the tire can burst and possibly cause injury. Do not stand directly over the tire while inflating.**
*** In the case of preset pressure air inflator, pay special care for the set pressure adjustment.**

- In this condition, check the “rim line” Ⓑ cast on the tire side walls. The line must be equidistant from the wheel rim all around. If the distance between the rim line and wheel rim varies, this indicates that the bead is not properly seated. If this is the case, deflate the tire completely and unseat the bead for both sides. Coat the bead with lubricant and fit the tire again.
- When the bead has been fitted properly, adjust the pressure to specification.
- As necessary, adjust the tire balance.



⚠ WARNING

Do not run with a repaired tire at a high speed.

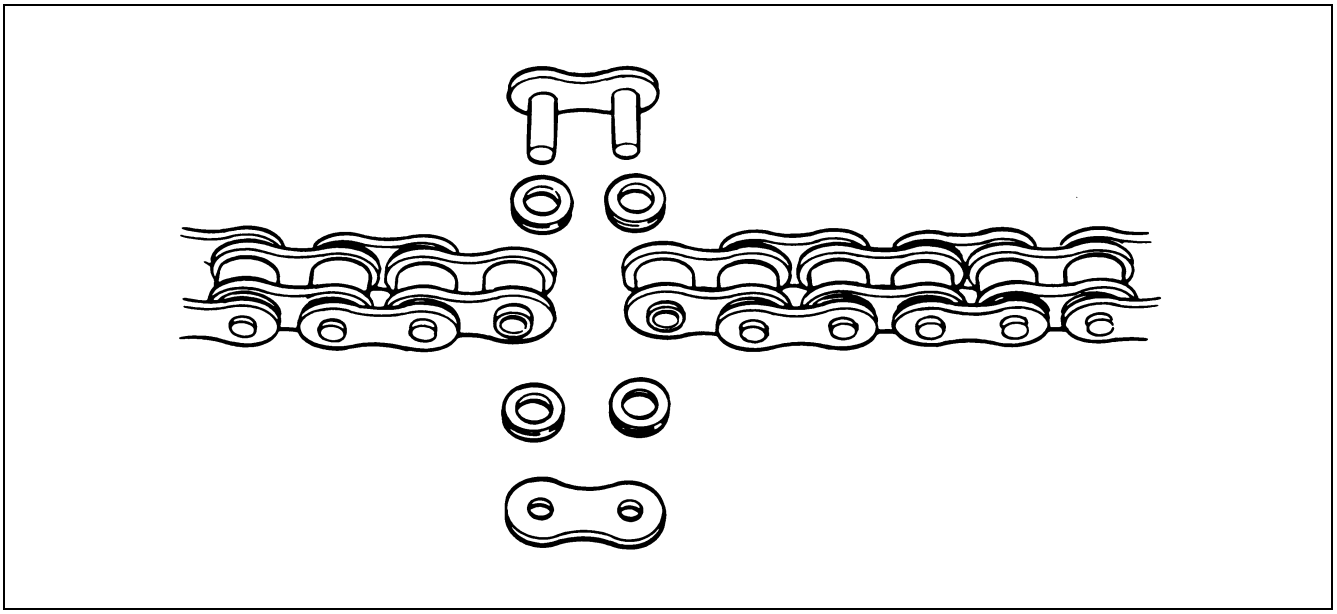
DATA Cold inflation tire pressure

	Front	Rear
Solo riding	250 kPa (2.50 kgf/cm², 36 psi)	250 kPa (2.50 kgf/cm², 36 psi)
Dual riding	250 kPa (2.50 kgf/cm², 36 psi)	250 kPa (2.50 kgf/cm², 36 psi)

BALANCER WEIGHT INSTALLATION

- When installing the balancer weight to the wheel, set the balancer weight Ⓐ on center rib of the wheel.

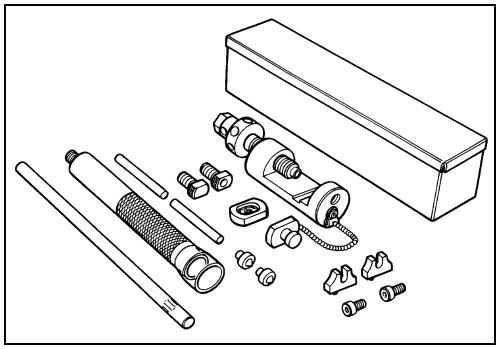
DRIVE CHAIN



Use the special tool in the following procedures, to cut and rejoin the drive chain.

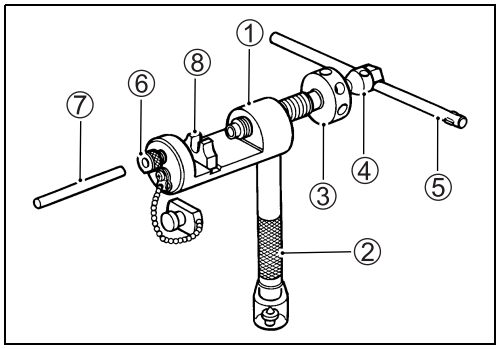
TOOL 09922-22711: Drive chain cutting and joining tool set

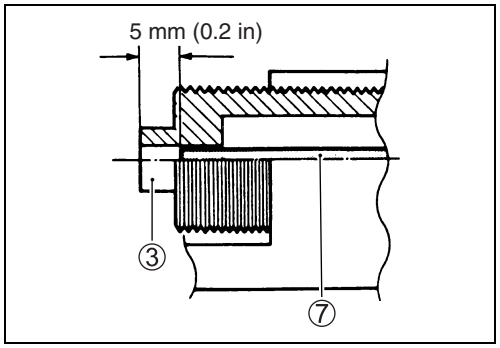
NOTE:
When using the special tool, apply a small quantity of grease to the threaded parts of the special tool.



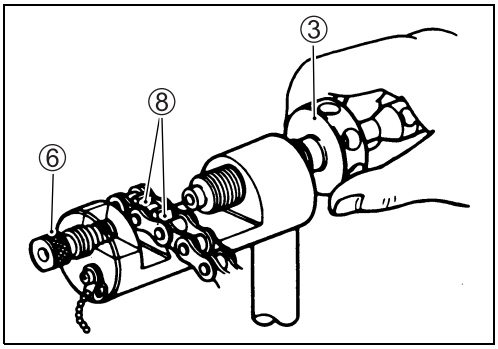
DRIVE CHAIN CUTTING

- Set up the special tool as shown in the illustration.
  - ① Tool body
  - ② Grip handle
  - ③ Pressure bolt “A”
  - ④ Pressure bolt “B”
  - ⑤ Bar
  - ⑥ Adjuster bolt (with through hole)
  - ⑦ Pin remover
  - ⑧ Chain holder (engraved mark 500) with reamer bolt M5 × 10
- The tip of pin remover ⑦ should be positioned inside approximately 5 mm (0.2 in) from the end face of pressure bolt “A” ③ as shown in the illustration.





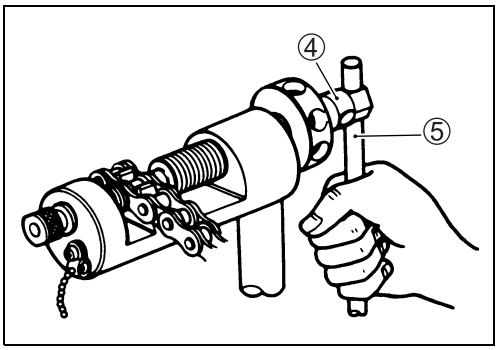
- Place the drive chain link being disjointed on the chain holder ⑧ of the tool.
- Turn in both the adjuster bolt ⑥ and pressure bolt "A" ③ so that each of their end hole fits over the chain joint pin properly.
- Tighten the pressure bolt "A" ③ with the bar.



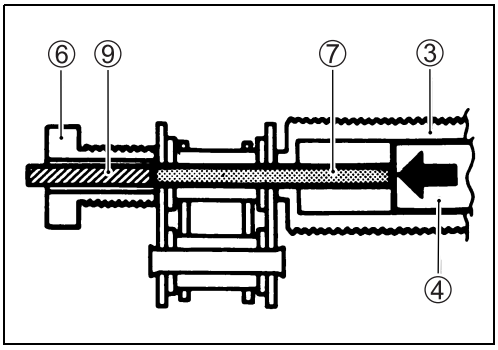
- Turn in the pressure bolt "B" ④ with the bar ⑤ and force out the drive chain joint pin ⑨.

NOTE:

- *Continue turning in the pressure bolt "B" ④ until the joint pin has been completely pushed out of the chain.*
- *After the joint pin ⑨ is removed, loosen the pressure bolt "B" ④ and then pressure bolt "A" ③.*



- Remove the joint pin ⑨ of the other side of joint plate.

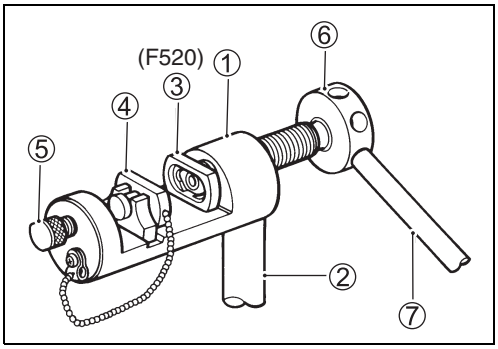


DRIVE CHAIN CONNECTING

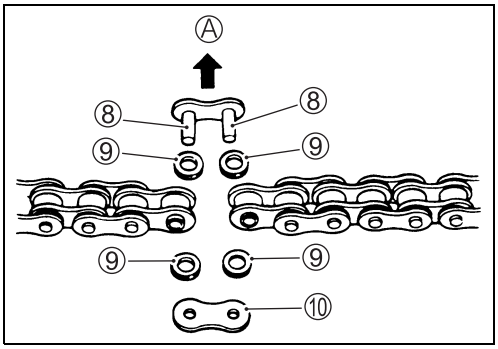
JOINT PLATE INSTALLATION

- Set up the special tool as shown in the illustration.

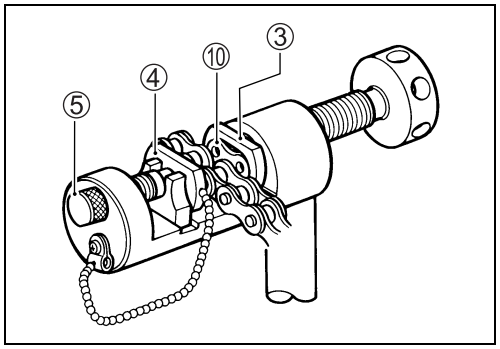
① Tool body	⑤ Adjuster bolt (without hole)
② Grip handle	⑥ Pressure bolt "A"
③ Joint plate holder (engraved mark "F520")	⑦ Bar
④ Wedge holder & wedge pin	

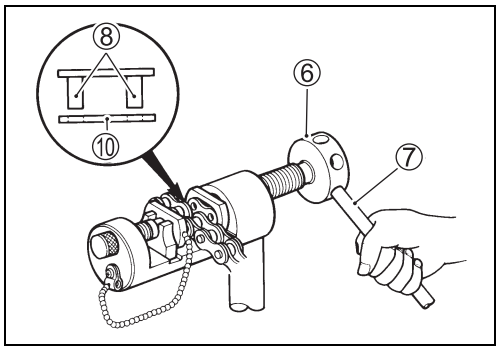


- Apply grease to the new joint pins ⑧, new O-rings ⑨ and new plates ⑩.
- Connect both ends of the drive chain with the joint pins ⑧ inserted from the wheel side Ⓐ as installed on the motorcycle.
  Joint set part number
  DID: 27620-48H10



- Apply grease on the recessed portion of the joint plate holder ③. Then install the joint plate ⑩ on the tool, its stamp mark must face the joint plate holder ③ side.
- Set the drive chain on the tool as illustrated and turn in the adjuster bolt ⑤ to secure the wedge holder & wedge pin ④.
- Turn in the pressure bolt "A" ⑥ and align two joint pins ⑧ properly with the respective holes of the joint plate ⑩
- Turn in the pressure bolt "A" ⑥ further using the bar ⑦ to press the joint plate over the joint pins.

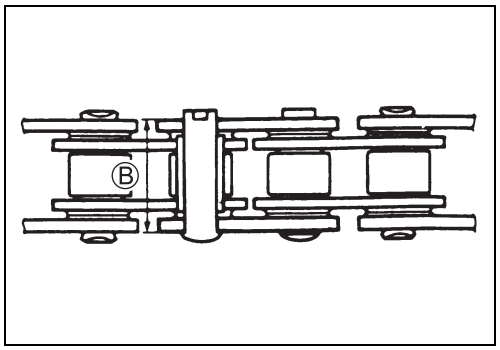




- Continue pressing the joint plate until the distance between the two joint plates come to the specification.

DATA Joint plate distance specification Ⓑ

DID	19.55 – 19.75 mm (0.770 – 0.778 in)

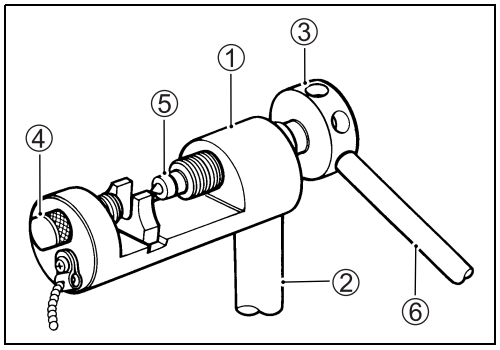


NOTICE

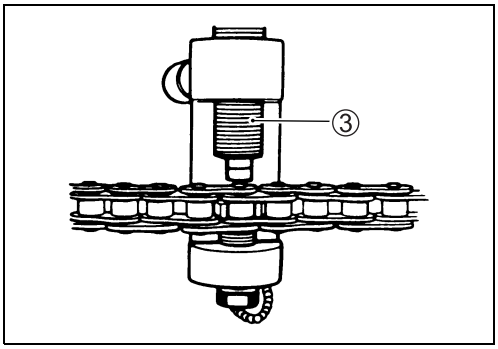
If pressing of the joint plate makes the dimension out of specification excessively, the work must be carried out again by using new joint parts.

JOINT PIN STAKING

- Set up the special tool as shown in the illustration.
  - ① Tool body
  - ② Grip handle
  - ③ Pressure bolt "A"
  - ④ Adjuster bolt (without hole)
  - ⑤ Staking pin (stowed inside grip handle behind rubber cap)
  - ⑥ Bar
- Apply a small quantity of grease to the staking pin ⑤.



- Stake the joint pin by turning (approximately 7/8 turn) the pressure bolt “A” ③ with the bar until the pin end diameter becomes the specified dimension.
- After joining of the chain has been completed, check to make sure that the link is smooth and no abnormal condition is found.

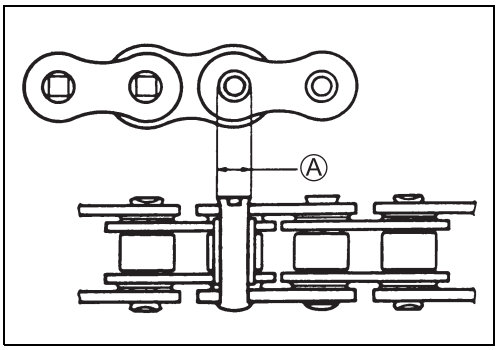


DATA Pin end diameter specification Ⓐ

DID	5.50 – 5.80 mm (0.217 – 0.228 in)

NOTICE

Should any abnormal condition be found, reassemble the chain link using the new joint parts.



- Adjust the drive chain, after connecting it. (☞2-17)

ELECTRICAL SYSTEM

CONTENTS

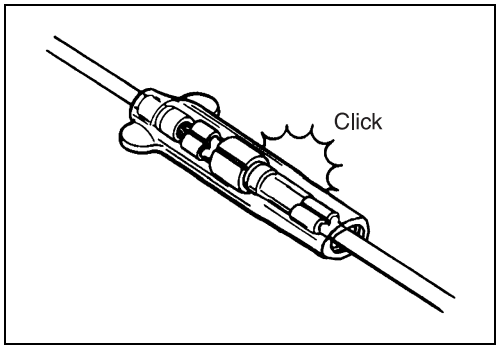
ELECTRICAL SYSTEM

CONTENTS

CAUTIONS IN SERVICING

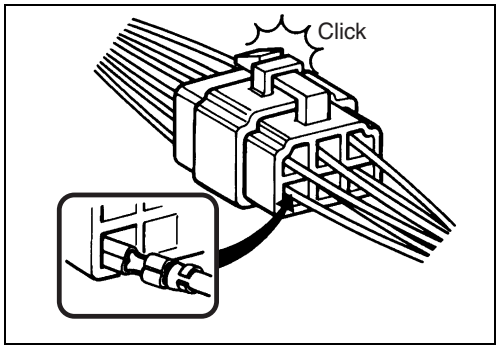
CONNECTOR

- 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.



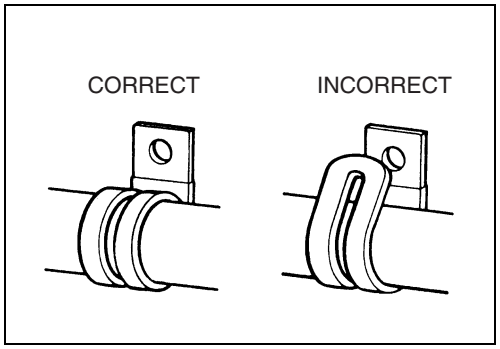
COUPLER

- With a lock type coupler, be sure to release the lock when disconnecting, and push in fully to engage the lock 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.
- Push in the coupler straightly. An angled or skewed insertion may cause the terminal to be deformed, possibly resulting in poor electrical contact.
- Inspect each terminal for corrosion and contamination.
  The terminals must be clean and free of any foreign material which could impede proper terminal contact.
- Before refitting the sealed coupler, make sure its seal rubber is positioned properly. The seal rubber may possibly come off the position during disconnecting work and if the coupler is refitted with the seal rubber improperly positioned, it may result in poor water sealing.



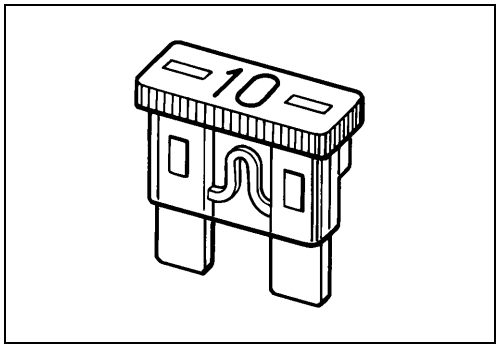
CLAMP

- Clamp the wire harness at such positions as indicated in “WIRING HARNESS ROUTING”. (☞10-14 to -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.

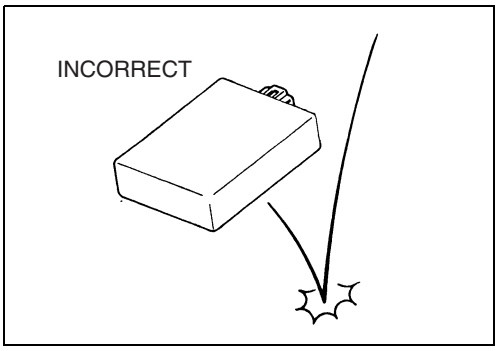


SWITCH

- Never apply grease material to switch contact points to prevent damage.

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.

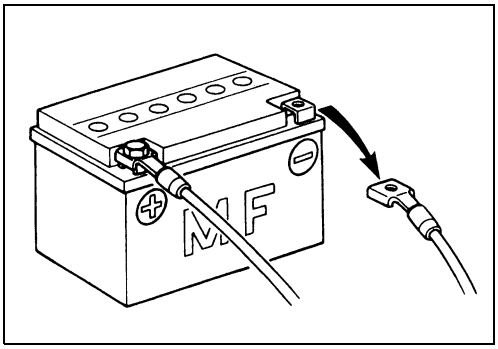


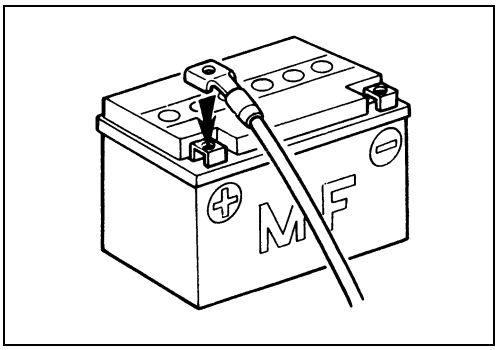
BATTERY

- The MF battery used in this motorcycle 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 ⊖ battery lead wire, first.
- When connecting the battery lead wires, be sure to connect the ⊕ 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 ⊕ battery terminal.

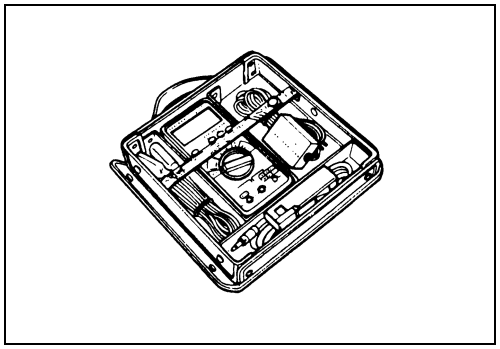




WIRING PROCEDURE

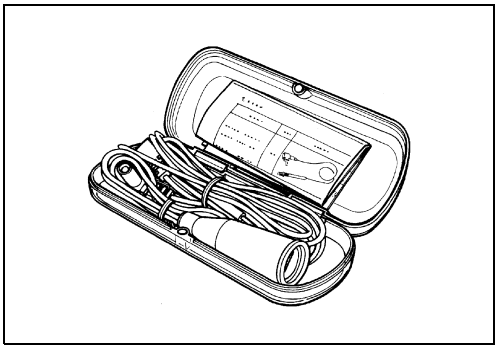
- Properly route the wire harness according to the “WIRING HARNESS ROUTING” section. (☞10-14 to -16)

USING THE MULTI CIRCUIT TESTER



- Properly use the multi circuit tester ⊕ and ⊖ probes. Improper use can cause damage to the motorcycle 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 OFF.

TOOL 09900-25008: Multi circuit tester set



CAUTION

Before using the multi circuit tester, read its instruction manual.

NOTE:

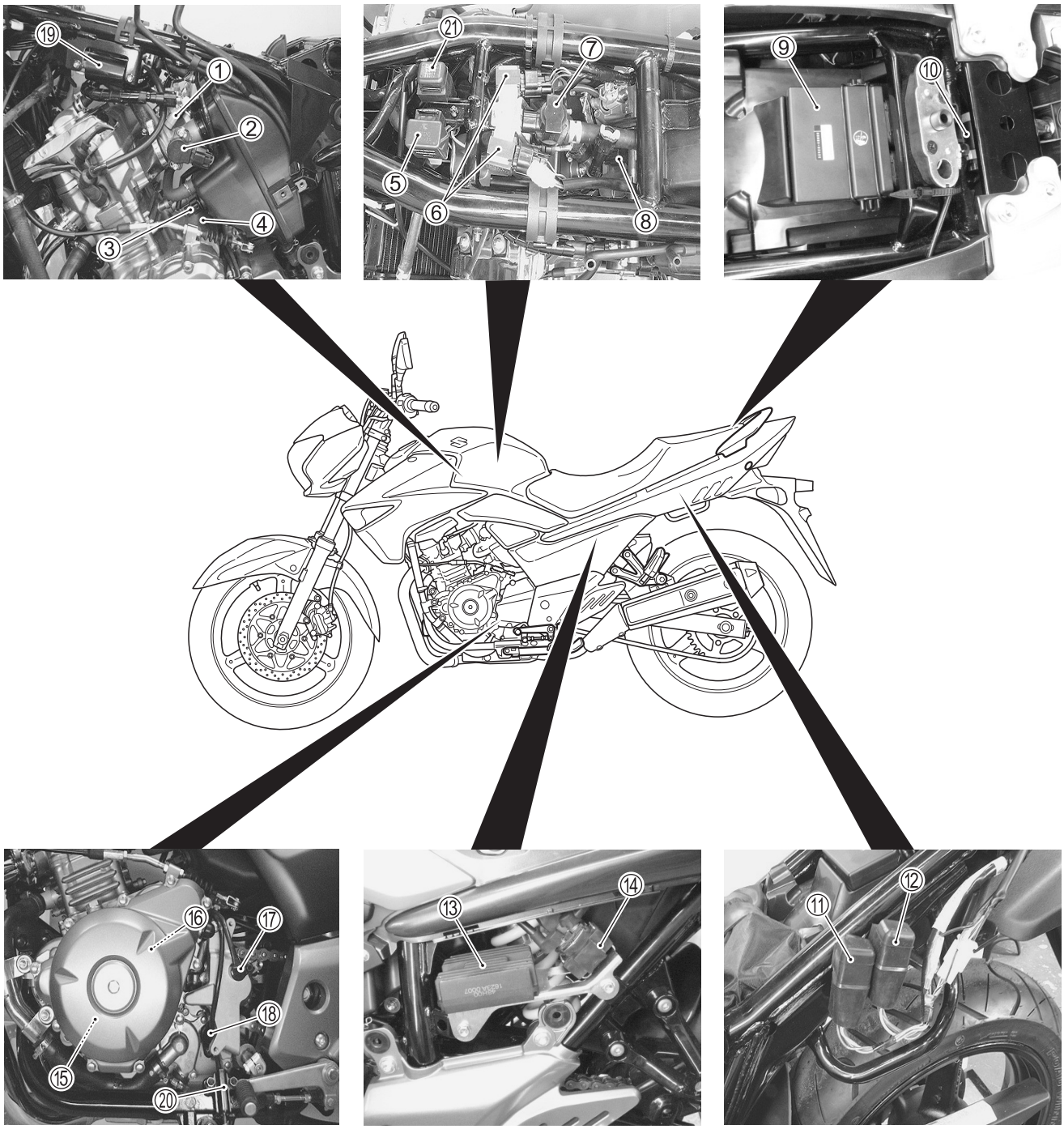
** When connecting the multi circuit tester, use the needle-pointed probe to the back side of the lead wire coupler and connect the probes of tester to them.*

** Use the needle-pointed probe to prevent the rubber of the water proof coupler from damage.*

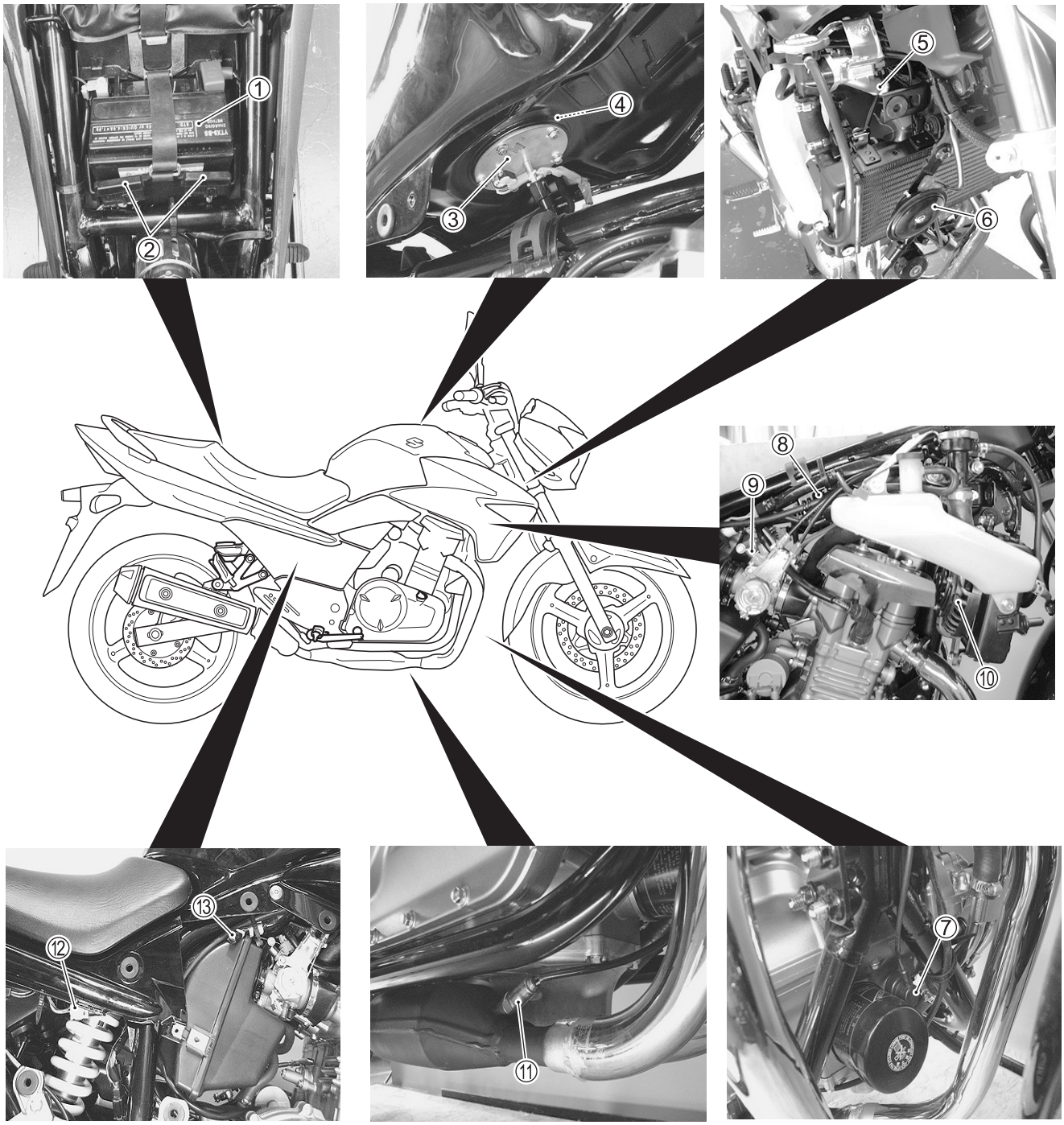
** When using the multi circuit tester, do not strongly touch the terminal of the ECM coupler with a needle-pointed tester probe to prevent the terminal damage or terminal bend.*

TOOL 09900-25009: Needle-pointed probe set

LOCATION OF ELECTRICAL COMPONENTS

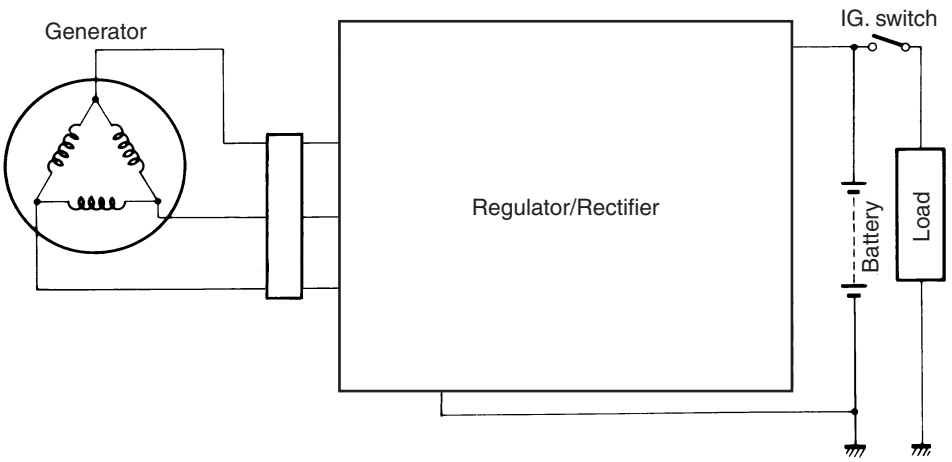


① Fuel injector (#1) (☞4-57)
② TP sensor (☞4-38)
③ IAT sensor (☞4-46)
④ Starter motor
⑤ Turn signal relay (☞9-42)
⑥ IAP sensor (☞4-34)
⑦ PAIR control solenoid valve (☞11-4)
⑧ ISC valve (☞4-60)
⑨ ECM
⑩ TO sensor (☞4-50)
⑪ Fuel pump relay (☞5-5)
⑫ Cooling fan relay (☞7-9)
⑬ Regulator/Rectifier (☞9-11)
⑭ Starter relay/Main fuse (☞9-17)
⑮ Generator
⑯ CKP sensor (☞4-30)
⑰ Speed sensor (☞9-33 to -34)
⑱ GP switch (☞4-54)
⑲ Ignition coil (#1) (☞9-23 to -24)
⑳ Side-stand switch (☞9-18)
㉑ Side-stand relay (☞9-18)



① Battery (☞9-9 to -10)
② Fuse box
③ Fuel pump (☞5-4)
④ Fuel level gauge (☞9-32)
⑤ ECT sensor (☞7-10)
⑥ Horn
⑦ Oil pressure switch (☞9-34)
⑧ Ignition coil (#2) (☞9-23 to -24)
⑨ Fuel injector (#2) (☞4-57)
⑩ Cooling fan (☞7-8)
⑪ HO2 sensor (☞4-71)
⑫ Mode select coupler
⑬ Side-stand diode (☞9-19)

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. (☞9-9)
   Is the battery for current leaks 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. (☞9-10)
   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. (☞9-10)
   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. (☞9-11)
   Is the generator no-load performance OK?

YES	Go to Step 6.
NO	Faulty generator.

Step 6

1) Inspect the regulator/rectifier. (☞9-11)
   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

- Turn the ignition switch OFF.
- Remove the seat. (☞8-5)
- Disconnect the battery ⊖ lead wire.
- Measure the current between ⊖ battery terminal and the ⊖ battery lead wire using the multi circuit tester. If the reading exceeds the specified value, leakage is evident.

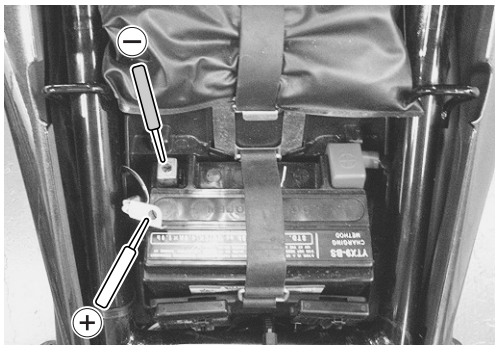
TOOL 09900-25008: Multi circuit tester set

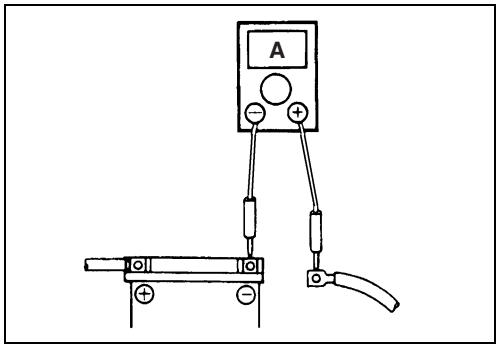
DATA Battery current (leak): Under 3 mA

Tester knob indication: Current (⎓, 20 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 ON when measuring current.**





REGULATED VOLTAGE

- Remove the seat. (☞8-5)
- Start the engine and keep it running at 5 000 r/min with the dimmer switch turned HI position.
- Measure the DC voltage between the ⊕ and ⊖ battery terminals using the multi circuit tester. If the voltage is not within the specified value, inspect the generator and regulator/rectifier. (☞9-10 to -11)

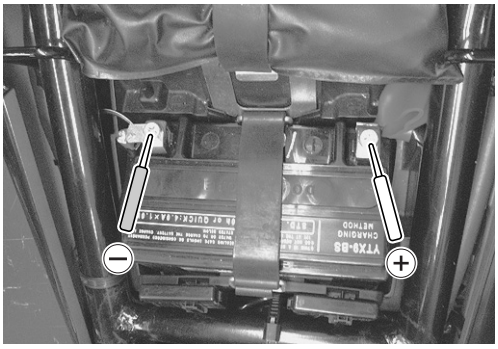
NOTE:

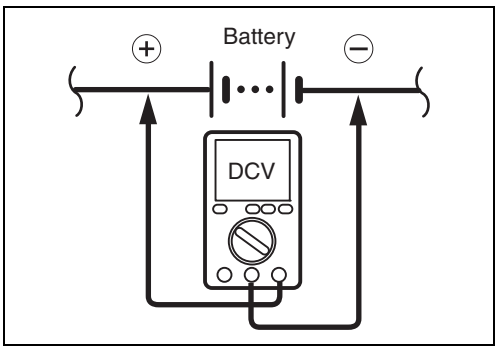
When making this test, be sure that the battery is in fully charged condition.

09900-25008: Multi circuit tester set

Tester knob indication: Voltage (⎓)

Regulated voltage (Charging output):
14.0 – 15.5 V at 5 000 r/min





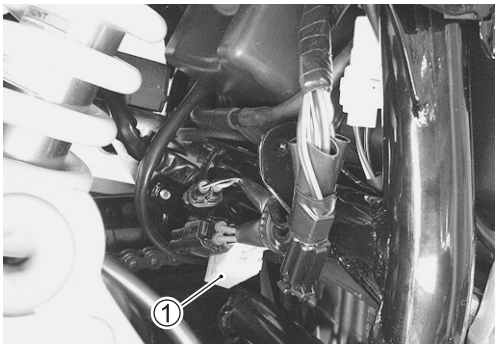
GENERATOR COIL RESISTANCE

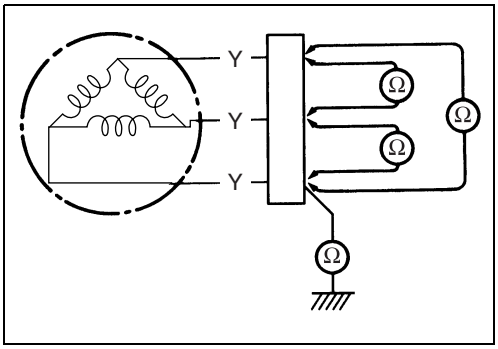
- Remove the right frame cover. (☞8-4)
- Disconnect the generator coupler ①.
- Measure the resistance between the three lead wires.
  If the resistance is out of specified value, replace the stator with a new one. Also, check that the generator core is insulated properly.

09900-25008: Multi circuit tester set

Tester knob indication: Resistance (Ω)

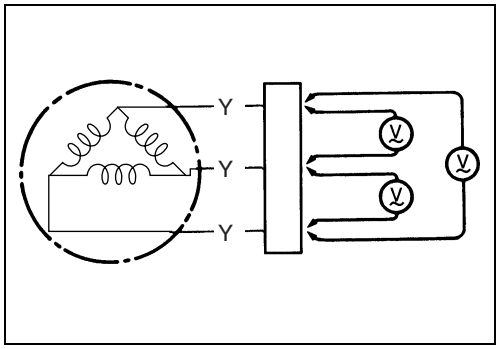
Generator coil resistance: 0.2 – 0.9 Ω (Y – Y)
∞ Ω (Y – Ground)





GENERATOR NO-LOAD PERFORMANCE

- Disconnect the generator coupler. (☞9-10)
- Start the engine and keep it running at 5 000 r/min.
- Using the multi circuit tester, measure the voltage between three lead wires.
  If the tester reads under the specified value, replace the generator with a new one. (☞3-44)



NOTE:
It is unnecessary to remove the engine assembly from the frame when removing the generator.

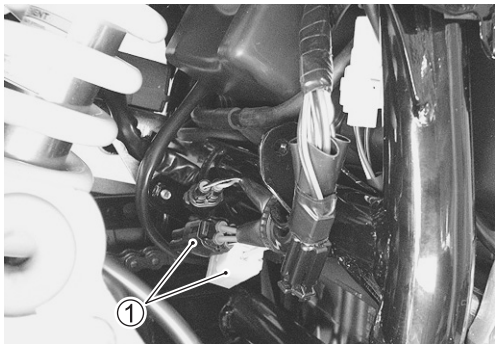
TOOL 09900-25008: Multi circuit tester set

Tester knob indication: Voltage (~)

DATA Generator no-load performance:
60 V (AC) or more at 5 000 r/min (When engine is cold)

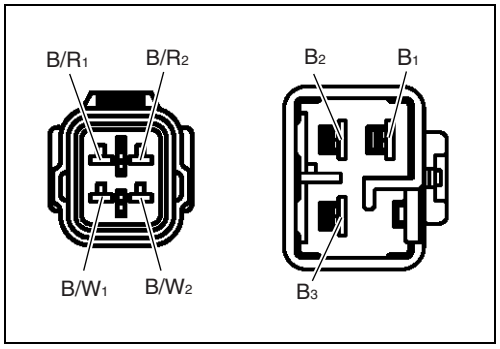
REGULATOR/RECTIFIER

- Remove the right frame cover. (☞8-4)
- Disconnect the regulator/rectifier couplers ①.
- Measure the voltage between the terminals using the multi circuit testers as indicated in the following table. If the voltage is not within the specified value, replace the regulator/rectifier with a new one. (☞10-40)



TOOL 09900-25008: Multi circuit tester set

Tester knob indication: Diode test (⊣◀)



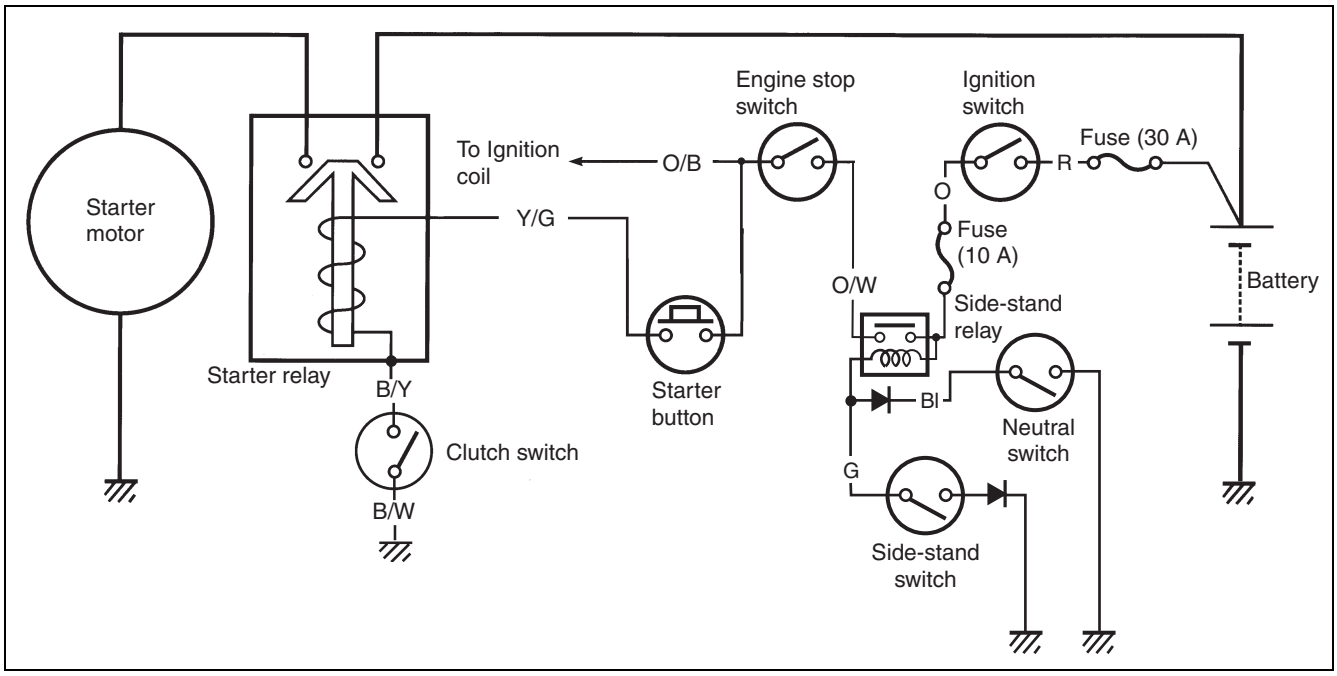
Unit: V

Probe of tester to: ⊖	Probe of tester to: ⊕ B/R1	B/R2	B1	B2	B3	B/W1	B/W2
B/R1		0	0.4 – 0.7	0.4 – 0.7	0.4 – 0.7	0.5 – 1.2	0.5 – 1.2
B/R2	0		0.4 – 0.7	0.4 – 0.7	0.4 – 0.7	0.5 – 1.2	0.5 – 1.2
B1	∗	∗		∗	∗	0.4 – 0.7	0.4 – 0.7
B2	∗	∗	∗		∗	0.4 – 0.7	0.4 – 0.7
B3	∗	∗	∗	∗		0.4 – 0.7	0.4 – 0.7
B/W1	∗	∗	∗	∗	∗		0
B/W2	∗	∗	∗	∗	∗	0	

∗1.4 V or more (tester's battery voltage)

NOTE:
If the tester reads 1.4 V and below when the tester probes are not connected, replace its battery.

STARTER SYSTEM



TROUBLESHOOTING

NOTE:
Make sure that the fuses are not blown and the battery is fully-charged before diagnosing.

Starter motor will not run
Step 1
1) Shift the transmission to neutral.
2) Grasp the clutch lever, turn on the ignition switch with the engine stop switch in the "RUN" position and listen for a click from the starter relay when the starter button is pushed.
   Is a click sound heard?

YES	Go to Step 2.
NO	Go to Step 3.

Step 2
1) Check if the starter motor runs when its terminal is connected to the battery ⊕ terminal. (Do not use thin "wire" because a large amount of current flows.)
   Does the starter motor run?

YES	• Faulty starter relay. • Loose or disconnected starter motor lead wire. • Loose or disconnected between starter relay and battery ⊕ terminal.
NO	Faulty starter motor.

Step 3

1) Measure the starter relay voltage at the starter relay connectors (between Y/G ⊕ and B/Y ⊖) when the starter button is pushed.
   Is a voltage OK?

YES	Go to Step 4.
NO	• Faulty engine stop switch. • Faulty clutch lever position switch. • Faulty GP switch. • Faulty starter button. • Faulty ignition switch. • Faulty side-stand switch. • Faulty side-stand relay. • Faulty side-stand diode. • Poor contact of connector. • Open circuit in wire harness.

Step 4

1) Check the starter relay. (☞9-17)
   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

NOTE:

The starter motor runs when the transmission is in neutral, but does not run when the transmission is in any position other than neutral, with the side-stand up.

Step 1

1) Check the side-stand switch. (☞9-18)
   Is the side-stand switch OK?

YES	Go to step 2.
NO	Faulty starter clutch.

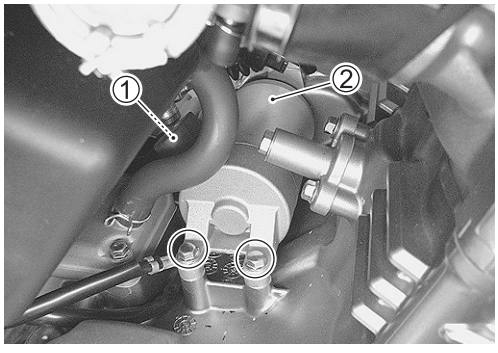
Step 2

1) Check the starter clutch.
   Is the starter clutch OK?

YES	• Open circuit in wire harness. • Poor contact of connector.
NO	Faulty starter clutch.

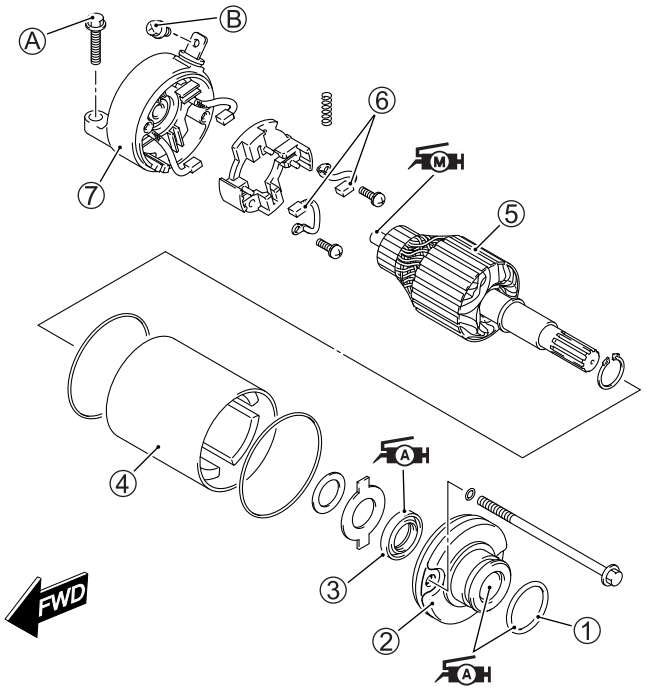
STARTER MOTOR REMOVAL

- Remove the seat. (☞8-5)
- Disconnect the battery ⊖ lead wire.
- 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	④	Starter motor case	⑦	Housing end (outside)
②	Housing end (inside)	⑤	Armature	Ⓐ	Starter motor mounting bolt
③	Oil seal	⑥	Brush	Ⓑ	Starter motor lead wire bolt

ITEM	N·m	kgf-m	lbf-ft
Ⓐ	10	1.0	7.0
Ⓑ	2.7	0.27	2.0

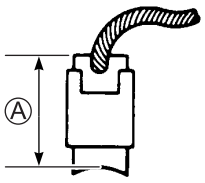
STARTER MOTOR INSPECTION

CARBON BRUSH

Inspect the carbon brushes for abnormal wear, cracks or smoothness in the brush holder.

If either carbon brush is defective, replace the brush with a new one.

Measure the length Ⓐ of the carbon brushes using a vernier calipers. If the measurement is less then the service limit, replace the brush with a new one.



DATA Starter motor brush length:
Service Limit: 6.5 mm (0.26 in)

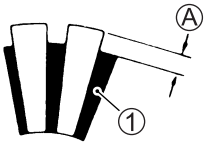
COMMUTATOR

Inspect the commutator for discoloration, abnormal wear or undercut Ⓐ.

If the commutator is abnormally worn, replace the armature.

If the commutator surface is discolored, polish it with #400 sandpaper and wipe it using a clean, dry cloth.

If there is no undercut, scrape out the insulator ① with a saw blade.

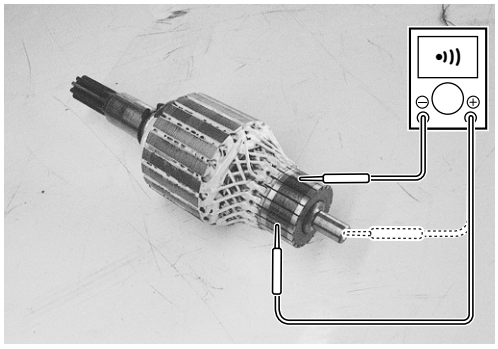


ARMATURE COIL

Inspect for continuity between each segment and between each segment and the armature shaft using 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.

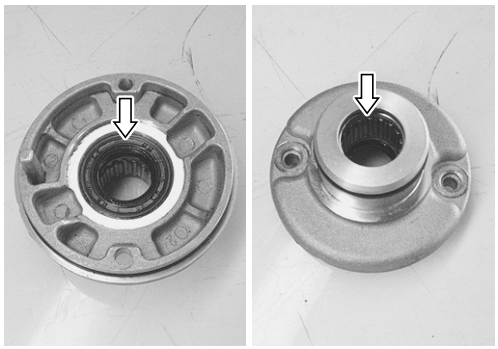
09900-25008: Multi circuit tester set

Tester knob indication: Continuity test (•)))



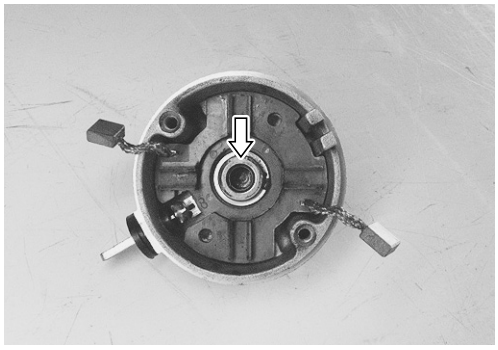
OIL SEAL AND BEARING

Inspect the oil seal lip for damage or leakage.
Inspect the bearing for abnormal noise and smooth movement.
If any defects are found, replace the housing end (inside).



BUSHING

Inspect the bushing for wear and damage.
If any defects are found, replace the housing end (outside).



STARTER MOTOR REASSEMBLY

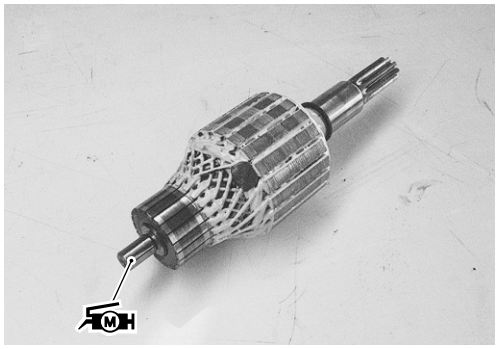
Reassemble the starter motor in the reverse order of disassembly. Pay attention to the following points:

- Apply grease to the lip of the oil seal and bearing.

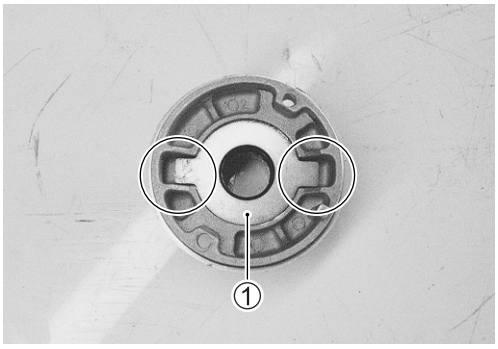
99000-25010: SUZUKI SUPER GREASE "A" or equivalent

- Apply a small quantity of moly paste to the armature shaft.

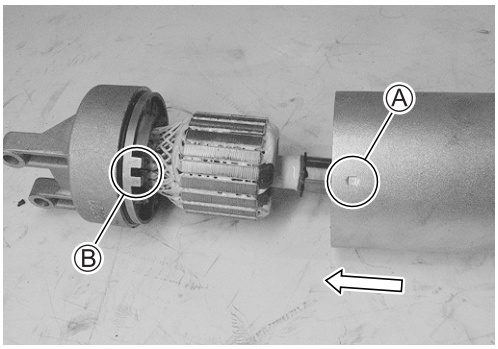
99000-25140: SUZUKI MOLY PASTE or equivalent



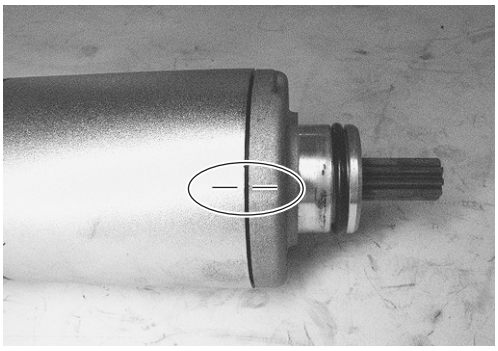
- Fit the washer ① to the housing end correctly as shown in the figure.



- Fit the depression Ⓐ of the starter motor case to the groove Ⓑ of the housing end (outside).

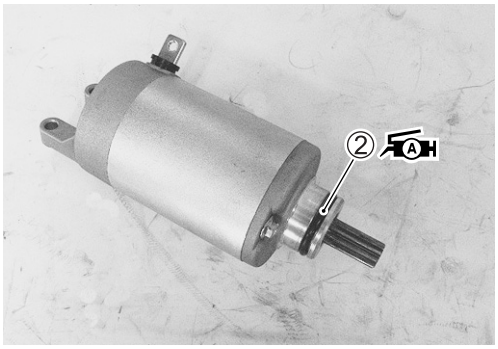


- Align the match mark on the starter motor case with the match mark on the housing end (inside).



- Apply grease to the new O-ring ②.

99000-25010: SUZUKI SUPER GREASE "A"
or equivalent

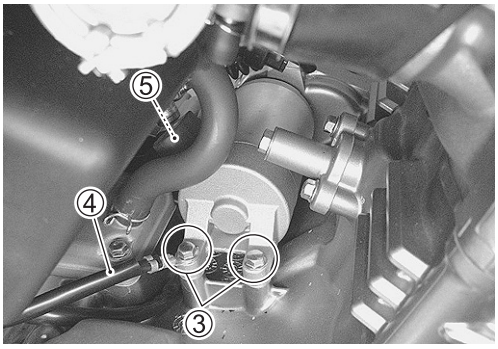


- Tighten the starter motor mounting bolt ③ with the battery ⊖ lead wire ④. (☞10-16)

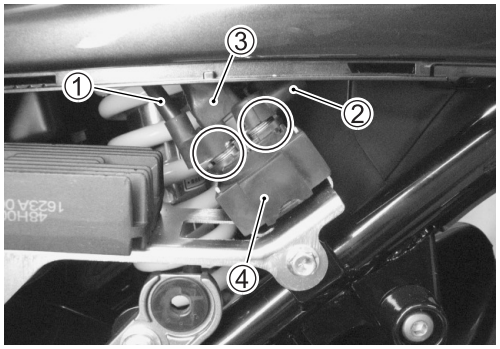
Starter motor mounting bolt:
10 N·m (1.0 kgf-m, 7.0 lbf-ft)

- Tighten the starter motor lead wire bolt ⑤ to the specified torque. (☞10-16)

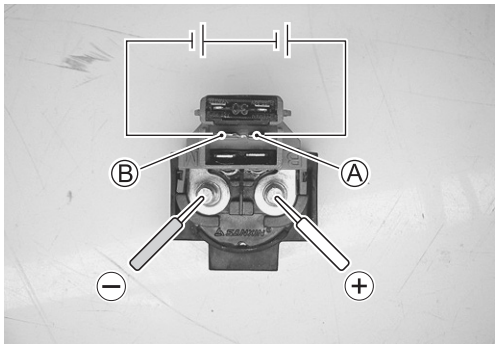
Starter motor lead wire bolt:
2.7 N·m (0.27 kgf-m, 2.0 lbf-ft)



STARTER RELAY INSPECTION



- Remove the seat. (☞8-5)
- Remove the left frame cover. (☞8-4)
- Disconnect the battery ⊖ lead wire from the battery.
- Disconnect the starter motor lead wire ①, battery ⊕ lead wire ② and starter relay coupler ③.
- Remove the starter relay ④.



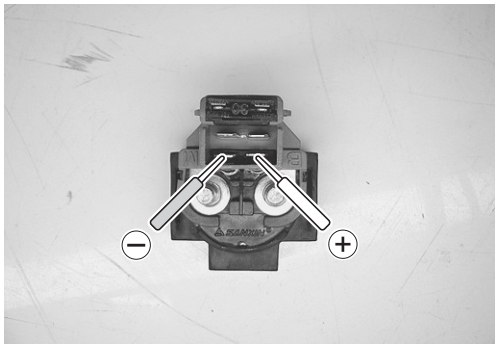
- Apply 12 V to Ⓐ and Ⓑ terminals and check for continuity between the positive ⊕ and negative ⊖ terminals using the multi circuit tester. If the starter relay clicks and continuity is found, the relay is OK.

TOOL 09900-25008: Multi circuit tester set

Tester knob indication: Continuity test (•))))

NOTICE

Do not apply battery voltage to the starter relay for more than five seconds, since the relay coil may overheat and get damaged.



- Measure the relay coil resistance between the terminals using 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 – 6 Ω

SIDE-STAND/IGNITION INTERLOCK SYSTEM PARTS INSPECTION

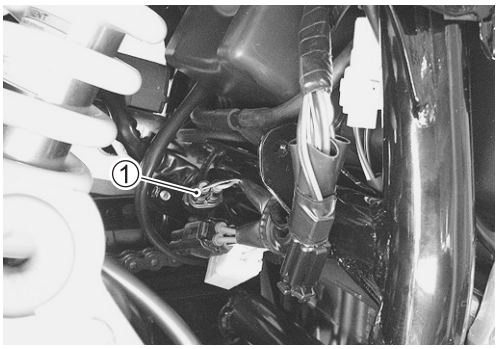
Check the interlock system for proper operation. If the interlock system does not operate properly, check each component for damage or abnormalities. If any abnormality is found, replace the component with a new one.

SIDE-STAND SWITCH INSPECTION

- Remove the right frame cover. (☞8-4)
- Disconnect the side-stand switch coupler ①.
- Measure the voltage between G and B/W lead wire.
  If the resistance is out of specification, replace the side-stand switch.

TOOL 09900-25008: Multi circuit tester set

Tester knob indication: Diode test (⊣◀)

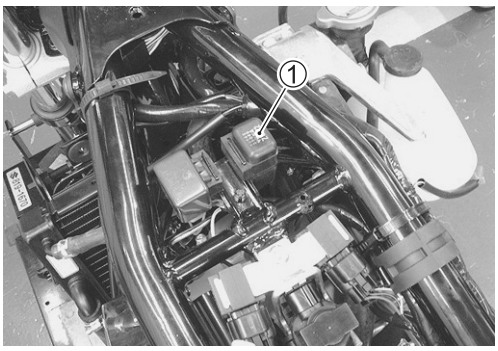


	G (⊕ probe)	B/W (⊖ probe)
ON (Side-stand up)	0.4 – 0.6 V	
OFF (Side-stand down)	1.4 V and more (Tester's battery voltage)	

NOTE:
If the tester reads under 1.4 V when the tester probes are not connected, replace its battery.

SIDE-STAND RELAY INSPECTION

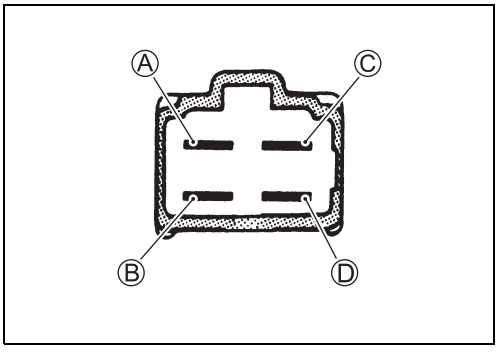
- Remove the fuel tank. (☞5-2)
- Remove the side-stand relay ①.



First, check for insulation with the tester between terminals Ⓐ and Ⓑ. Next, check for continuity between Ⓐ and Ⓑ with 12 V voltage applied, positive ⊕ to terminal Ⓒ and negative ⊖ to terminal Ⓓ. If continuity does not exist, replace the relay with a new one.

TOOL 09900-25008: Multi circuit tester

Tester knob indication: Continuity test (•))))



DIODE INSPECTION

- Remove the right frame front cover. (☞8-4)
- Remove the diode ①.

Measure the voltage between the terminals using the multi circuit tester.

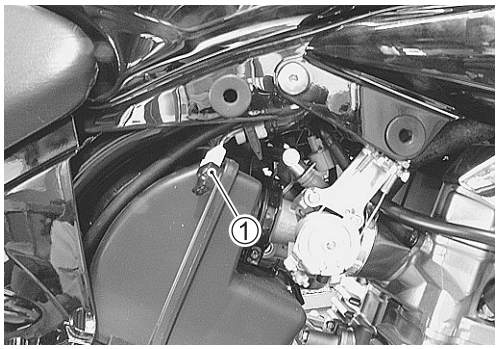
		⊕ Probe of tester to:	
		Ⓐ	Ⓑ, ⓒ
⊖ Probe of tester to:	Ⓐ		0.4 – 0.6 V
	Ⓑ, ⓒ	1.4 V and more (Tester's battery voltage)	

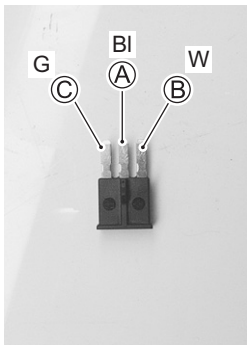
09900-25008: Multi circuit tester set

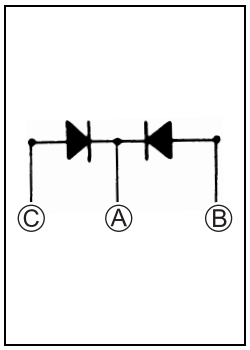
Tester knob indication: Diode test (⊣◀)

NOTE:

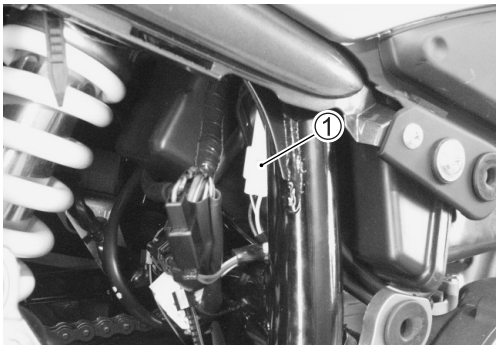
If the multi circuit tester reads 1.4 V and below when the tester probes are not connected, replace its battery.







GEAR POSITION SWITCH INSPECTION



- Remove the right frame cover. (☞8-4)
- Disconnect the gear position switch coupler ① and check the continuity between Bl and B/W lead wires with the transmission in “NEUTRAL”.

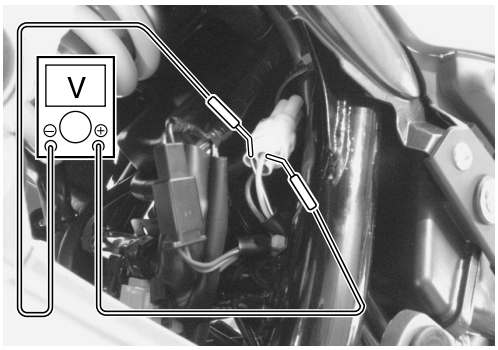
09900-25008: Multi circuit tester set

Tester knob indication: Continuity test (•))))

	Bl	B/W
ON (Neutral)	○———	———○
OFF (Except neutral)		

NOTICE

When disconnecting and connecting the gear position switch coupler, make sure to turn OFF the ignition switch, or electronic parts may get damaged.



- Connect the gear position switch coupler to the wiring harness.
- Insert the needle-point probes to the lead wire coupler.
- Turn the ignition switch ON and side-stand to upright position.
- Measure the voltage between P and B/W lead wires using the multi circuit tester when shifting the gearshift lever from low to top.

09900-25008: Multi circuit tester set
09900-25009: Needle-pointed probe set

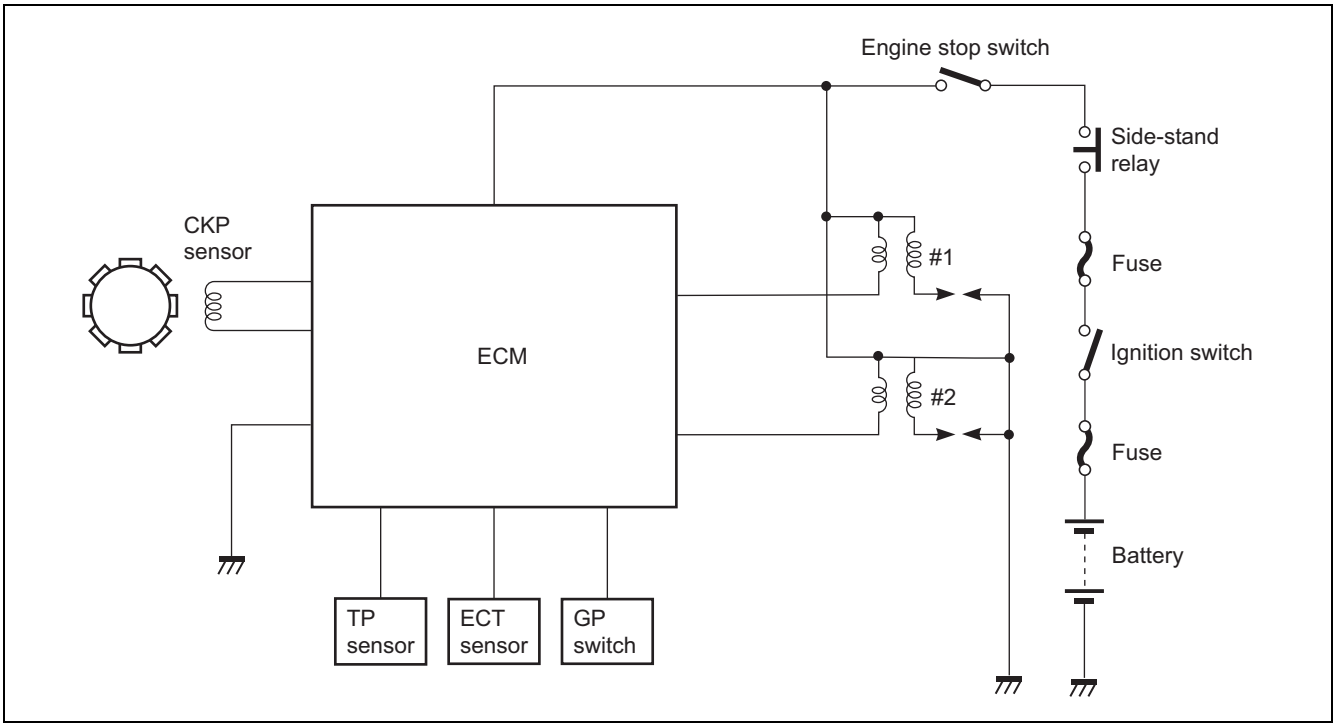
Tester knob indication: Voltage (⎓)

Gear position switch voltage (Except neutral position):
0.6 V or more (P ⊕ – B/W ⊖)

NOTICE

Use the special tool, to prevent the rubber of the water proof coupler from damage.

IGNITION SYSTEM



TROUBLESHOOTING

No spark or poor spark

NOTE:

** Check that the transmission is in neutral and the engine stop switch is in the RUN position. Grasp the clutch lever.*

** 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 at the ECM with the ignition switch in ON position. (O/R and B/W)
   Is the voltage OK?

YES	Go to Step 3.
NO	• Faulty ignition switch. • Side-stand relay. • Faulty engine stop switch. • Broken wire harness or poor connection of related circuit couplers.

Step 3
1) Measure the ignition coil primary peak voltage. (☞9-23)

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 plugs. (☞2-6 to -7)
Are the spark plugs OK?

YES	Go to Step 5.
NO	Faulty spark plug(-s).

Step 5
1) Inspect the ignition coil(-s). (☞9-24)
Is the ignition coil(-s) OK?

YES	Go to Step 6.
NO	• Poor connection of the ignition coil(-s). • Faulty ignition coil(-s).

Step 6
1) Measure the CKP sensor peak voltage and its resistance. (☞9-25)

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. • Open or short circuit in wire harness. • Poor connection of ignition couplers.
NO	• Faulty CKP sensor. • Metal particles or foreign material being stuck on the CKP sensor and rotor tip.

INSPECTION

IGNITION COIL PRIMARY PEAK VOLTAGE

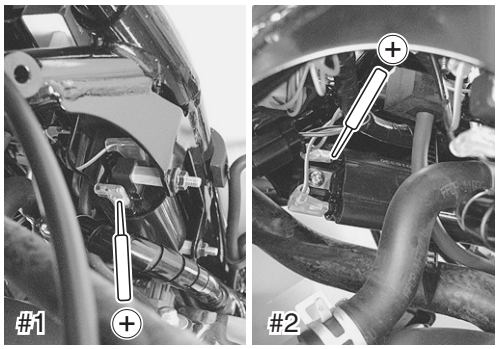
- Remove the fuel tank. (☞5-2)
- Disconnect the spark plug caps. (☞2-6)
- Connect new spark plugs to the spark plug caps and ground them to the cylinder head.

NOTE:
Make sure that spark plug cap and spark plug are connected properly and the battery is used in fully-charged condition.

Measure the ignition coil primary peak voltage in the following procedure:

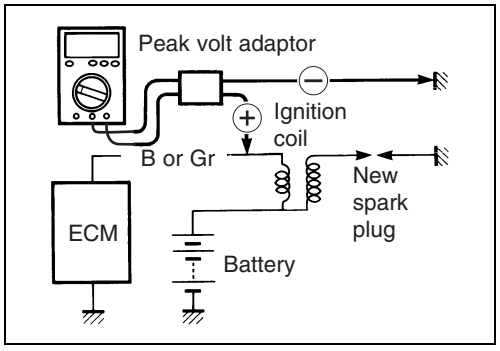
- Connect the multi circuit tester with the peak voltage adaptor as follows.

ignition coil #1: ⊕ Probe: Black lead wire terminal
⊖ Probe: Ground
ignition coil #2: ⊕ Probe: Gray lead wire terminal
⊖ Probe: Ground



NOTE:
Do not disconnect the ignition coil primary lead wire.

TOOL 09900-25008: Multi circuit tester set



NOTE:
Before using the multi circuit tester and peak volt adaptor, be sure to refer to the appropriate instruction manual.

- Shift the transmission into neutral, turn the ignition switch "ON" and grasp the clutch lever.
- Press 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 several times and measure the highest ignition coil primary peak voltage.

Tester knob indication: Voltage (⎓)

DATA Ignition coil primary peak voltage:
More than 80 V or more

⚠ WARNING

Do not touch the tester probes and spark plugs to prevent receiving an electric shock while testing.

If the peak voltage is lower than the specified values, inspect the ignition coil and CKP sensor. (☞9-24 and 9-25)

IGNITION COIL RESISTANCE

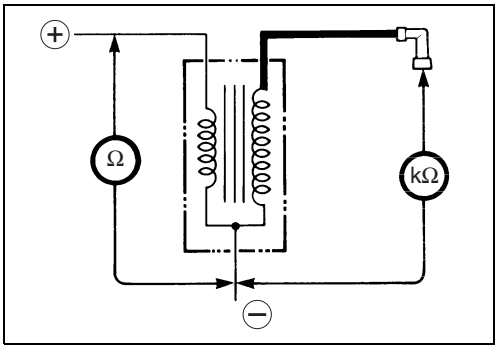
- Remove the fuel tank. (☞5-2)
- Disconnect the ignition coil lead wires and plug cap.
- Measure the ignition coil resistance in both the primary and secondary windings. If the resistance is not within the standard range, replace the ignition coil with a new one.

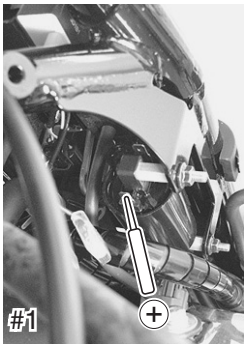
TOOL 09900-25008: Multi circuit tester set

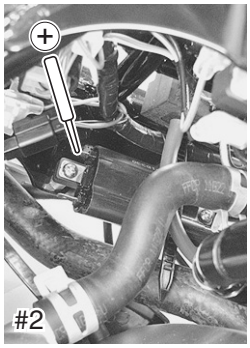
Tester knob indication: Resistance (Ω)

DATA Ignition coil resistance

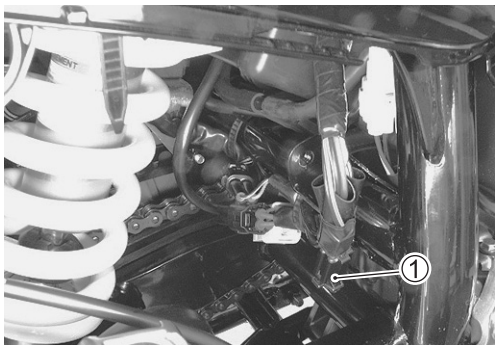
Primary : 3.4 – 4.0 Ω (⊕ Terminal – ⊖ Terminal)
Secondary: 11.05 – 14.95 kΩ (Plug cap – ⊖ Terminal)







CKP SENSOR PEAK VOLTAGE



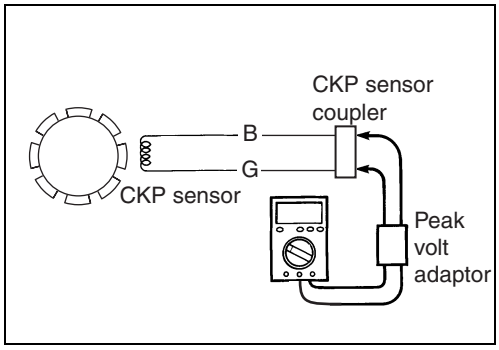
NOTE:
Be sure that all couplers are connected properly and the battery used is in fully-charged condition.

- Remove the right frame cover. (☞8-4)
- Disconnect the CKP sensor coupler ① and connect the multi circuit tester with the peak volt adaptor as follows.

G terminal (⊕ Probe) – B terminal (⊖ Probe)

TOOL 09900-25008: Multi circuit tester set

NOTE:
Before using the multi circuit tester and peak volt adaptor, be sure to refer to the appropriate instruction manual.



- Measure the CKP sensor peak voltage at the CKP sensor lead wire coupler.
- Shift the transmission into neutral, turn the ignition switch ON and grasp the clutch lever.
- Press the starter button and allow the engine to crank for a few seconds, and then measure the CKP sensor peak voltage.
- Repeat the above test procedure a several times and measure the highest peak voltage.

Tester knob indication: Voltage (⎓)

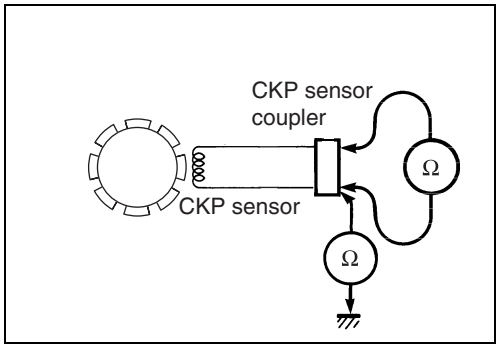
DATA CKP sensor peak voltage: 1.5 V or more (Green – Black)

If the peak voltage is within the specification, check the continuity between the CKP sensor coupler and ECM coupler.

NOTICE

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 ①. (☞above)
- Measure the resistance between the lead wires and ground. If the resistance is not within the standard range, replace the CKP sensor with a new one.

TOOL 09900-25008: Multi circuit tester set

Tester knob indication: Resistance (Ω)

DATA CKP sensor resistance: 150 – 230 Ω (Black – Green)
∞ Ω (Blue – Ground)

COMBINATION METER

DESCRIPTION

This combination meter mainly consists of the stepping motor, LCD (Liquid Crystal Display) and LED (Light Emitting Diode).

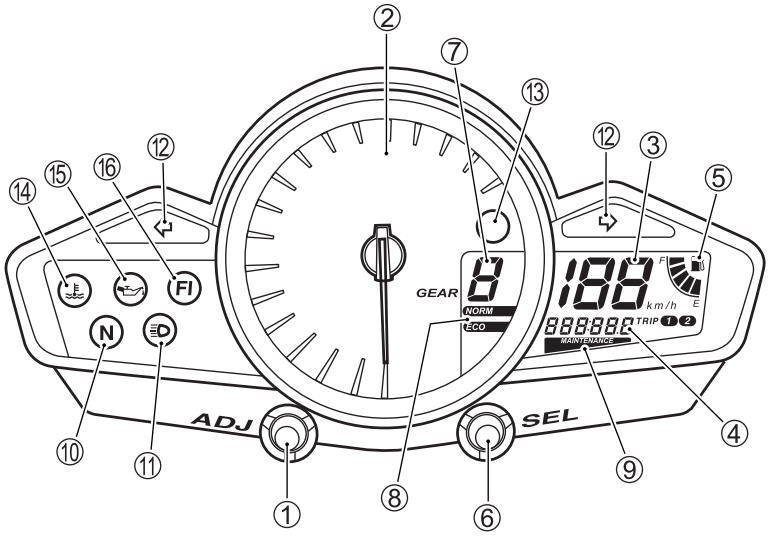
The rpm pointer is driven by the stepping motor.

The LCDs indicate Speed, Odo/Trip 1/Trip 2/Clock/Gear position, Eco/Norm and Fuel level indicator respectively.

LED (Light Emitting Diode)

LED is used for the illumination light and each indicator light.

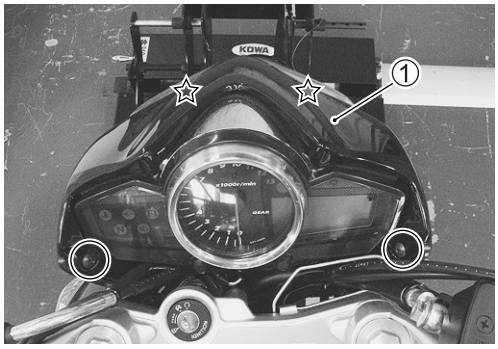
LED is maintenance free. LED is less electric-power consuming and stronger to vibration resistance compared to the bulb.



①	ADJ button (Trip 1/Trip 2/Clock/Eco/Norm/Maintenance)	⑨	LCD (Maintenance)
②	Tachometer	⑩	LED (Neutral indicator light)
③	LCD (Speedometer)	⑪	LED (High-beam indicator light)
④	LCD (Odo/Trip 1/Trip 2/Clock/Maintenance/FI (DTC))	⑫	LED (Turn signal indicator light)
⑤	LCD (Fuel level indicator)	⑬	LED (Engine rpm indicator light)
⑥	SEL button (Odo/Trip 1/Trip 2/Clock/Eco/Norm/ Maintenance)	⑭	LED (Engine coolant temperature indicator light)
⑦	LCD (Gear position)	⑮	LED (Oil pressure indicator light)
⑧	LCD (Eco/Norm)	⑯	LED (FI indicator light)

REMOVAL AND DISASSEMBLY

- Remove the headlight upper cover ① upward.

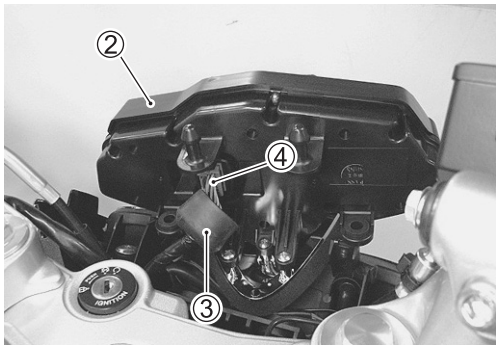


☆: Hooked point

- Move the combination meter assembly ② upward.

☆: Hooked point

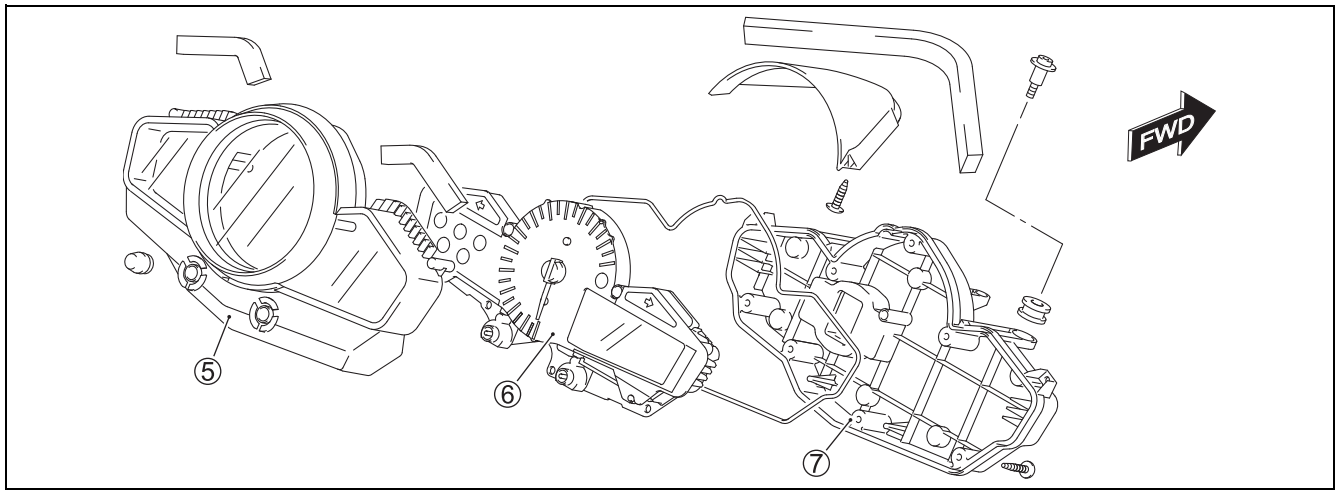
- Disconnect the boot ③ and combination meter assembly coupler ④.
- Remove the combination meter assembly ②.



- Disassemble the combination meter assembly as follows.

CAUTION

Do not attempt to disassemble the combination meter unit ⑥.



⑤	Upper case	⑥	Combination meter unit	⑦	Lower case

- Reinstall the removed parts.

NOTE:

Fix the boot ③ of the combination meter coupler firmly.

INSPECTION

LED (LIGHT EMITTING DIODE)

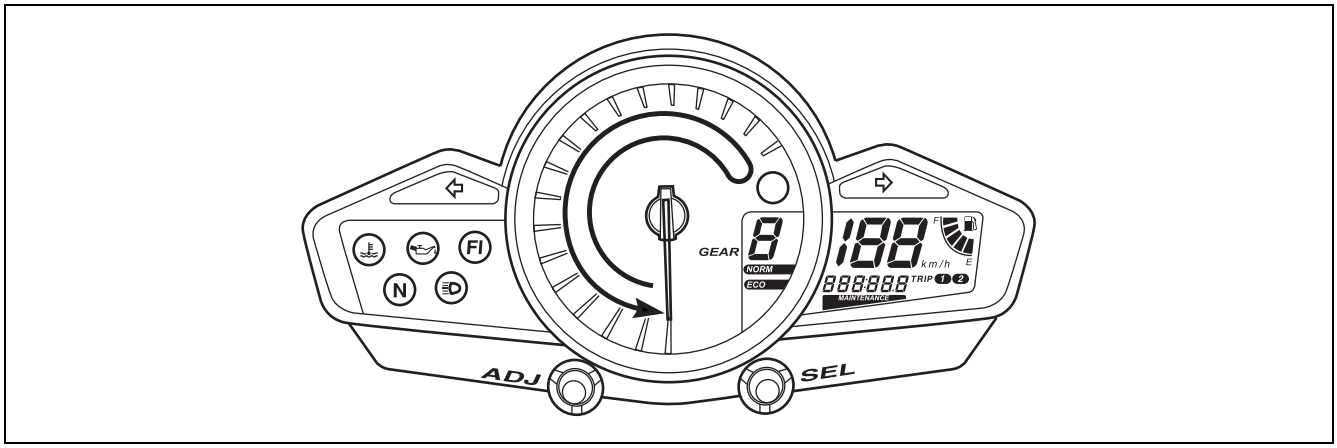
Check that the LED lights [FI light, Engine rpm indicator light, Oil pressure indicator light and Engine coolant temperature indicator light] immediately after turning the ignition switch ON. Also, other LED lights (Neutral indicator light, High-beam indicator light and Turn signal indicator light) can be checked by depending on each switch position.

If the LED fails in operation, replace the combination meter unit with a new one after checking its wire harness/coupler.

STEPPING MOTOR

Check that the pointer calibrates itself immediately after turning the ignition switch ON and stops at zero point.

If abnormal condition is found, replace the combination meter unit with a new one after checking its wire harness/coupler.

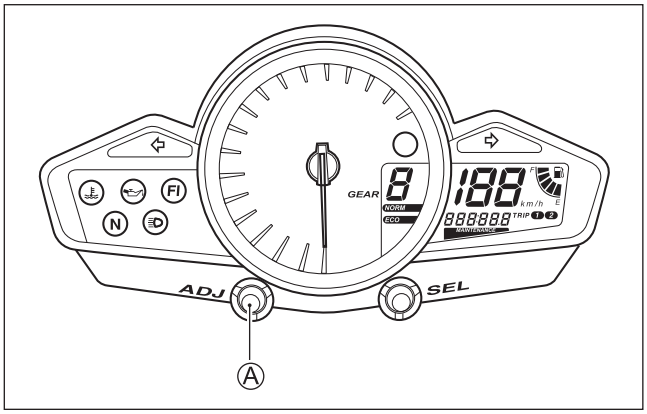


NOTE:

* *The pointer may not return to the proper position even turning the ignition switch ON under low temperature condition. In that case, you can reset the pointer to the proper position by following the instruction below:*
* *Complete the operation within 10 seconds after the ignition switch has been turned ON.*

1) With the ADJ button Ⓐ pressed, turn the ignition switch ON.
2) Release the ADJ button Ⓐ, 3 to 5 seconds after turning the ignition switch ON.
3) Press the ADJ button Ⓐ twice (within 1 second). →Reset

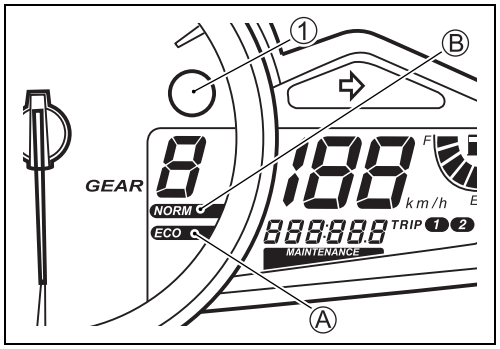
Time	Ignition switch	ADJ button Ⓐ
	OFF	PUSH
0	ON	
•		
•		
3 sec.		
•		
5 sec.		Release
•		Push
•		
•		Push→Reset
•		
10 sec.		



Pointer will return to the starting point right after the completion of the operation. In the case of the pointer not returning to the proper position after doing above, replace the combination meter unit.

ENGINE RPM INDICATOR LIGHT

While in ECO mode Ⓐ or NORM mode Ⓑ, when the tachometer shows engine rpm within the specified range the engine rpm indicator light ① turns on or blinks.



ECO mode Ⓐ:

Engine rpm (r/min)	Engine rpm indicator light ①
0 ≦ engine rpm < 4 500	No light
4 500 ≦ engine rpm < 6 000	Blink
6 000 ≦ engine rpm	Light

NORM mode Ⓑ:

Engine rpm (r/min)	Engine rpm indicator light ①
0 ≦ engine rpm < 8 000	No light
8 000 ≦ engine rpm	Light

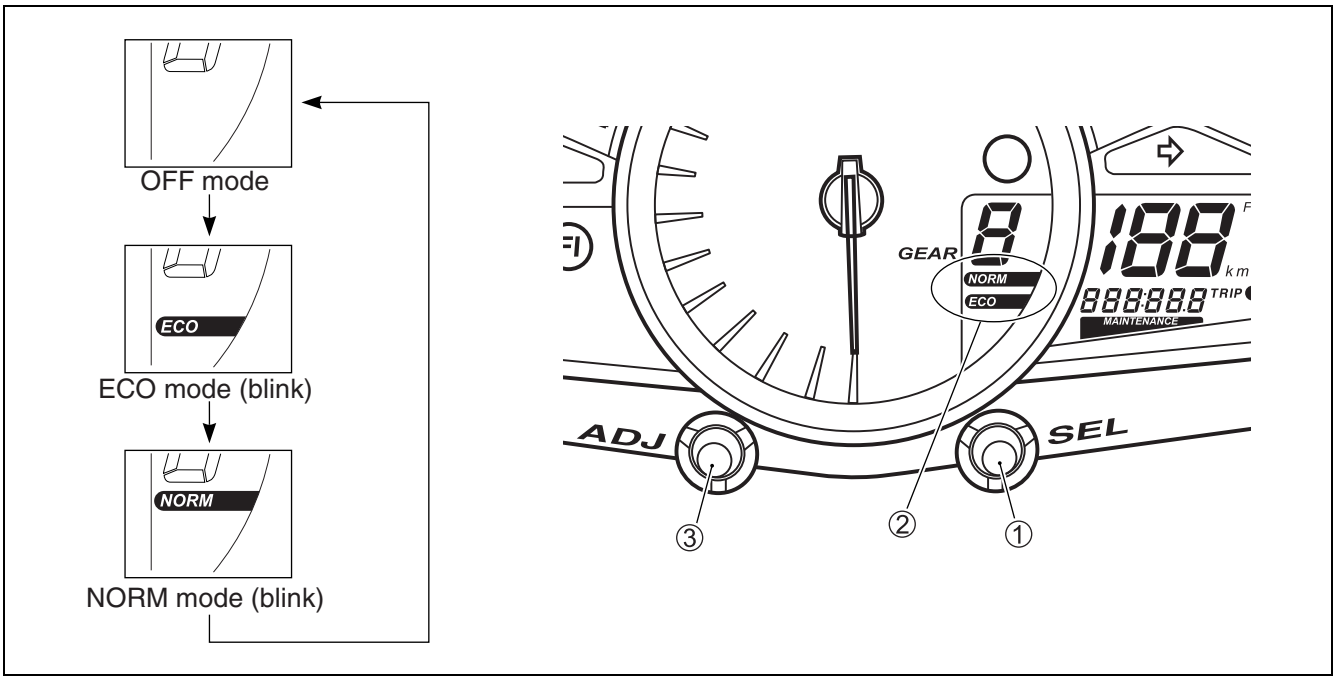
ECO/NORM

1) Press and hold the SEL button ① for more than 2 seconds to change to the mode selection display.
   When the previous setting is ECO or NORM mode, the ECO or NORM mark ② blinks.

NOTE:

The mode selection can not be operated while adjusting the clock.

2) To change the display, push the ADJ button ③. The display changes in the order below.



3) Push the SEL button ① to fix the selected mode.
   While in the mode selection, if the motorcycle reaches speed of more than 10 km/h or the ignition switch is turned to “OFF”, the mode selection is cancelled and the display returns to the previous display.

⚠ WARNING

Operating the display while riding can be hazardous. Removing a hand from the handlebars can reduce your ability to control the motorcycle.
Always keep both hands on the handlebars during riding.

MAINTENANCE

The maintenance comes on to notify engine oil replacement timing. The display comes on at initial 1 000 km (600 miles) and the display comes on at every time 5 000 km (3 000 miles) thereafter. After the initial 1 000 Km (600 miles) reset, interval can be varied in the range between 500 km (300 miles) to 5 000 km (3 000 miles) with a step of 500 km (300 miles). Reset the display after changing the engine oil to turn off the display.

To reset the interval:

1) Turn off the ignition switch.
2) Press and hold the SEL button ①. Turn on the ignition switch and wait for 3 seconds until MAINTENANCE display ③ blinks 3 time sand goes off.

NOTE:

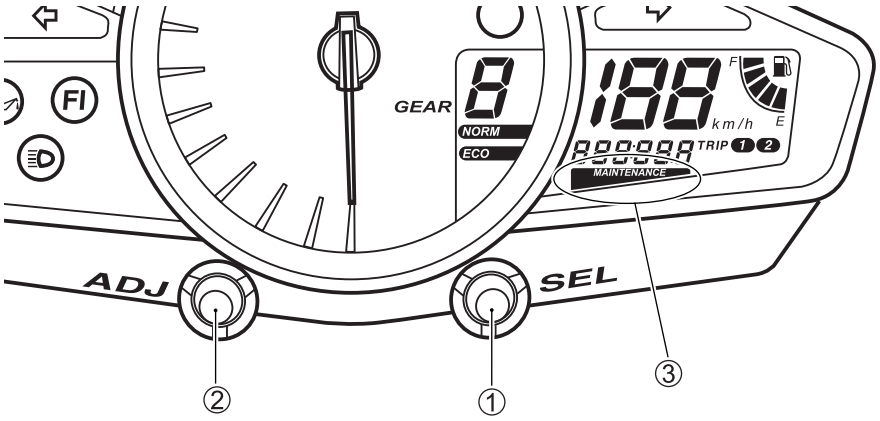
Reset the display after initial engine oil replacement.

To preset the interval:

1) Press and hold the ADJ button ② for 2 seconds until MAINTENANCE display ③ blinks while ODOMETER is displayed.
2) Push the SEL button ① to decrease interval from 5 000 km (3 000 miles) to 500 km (300 miles) in 500 km (300 miles) steps.
3) Push the ADJ button ② to increase interval from 500 km (300 miles) to 5 000 km (3 000 miles) in 500 km (300 miles) steps.
4) Push and hold the SEL button and ADJ button ② for 2 seconds.

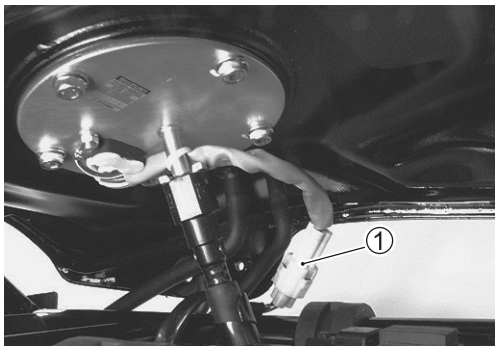
NOTE:

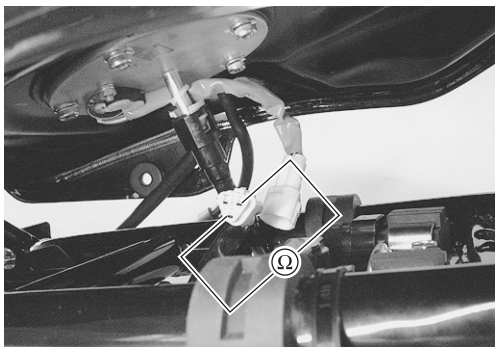
** The preset interval can be adjusted after odometer reaches 1 000 km (600 miles).*
** Reset the display after initial engine oil replacement.*
** Reset the display after oil replacement even if the display is not displayed.*

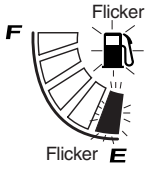
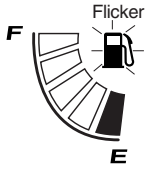


FUEL LEVEL INDICATOR INSPECTION

- Lift and support the fuel tank. (☞5-2)
- Disconnect the fuel pump lead wire coupler ①.
- Connect variable resistor between the R/Bl and B/W lead wires at the wire harness.
- Turn the ignition switch to the “ON” position when the motorcycle is held upright.
- Check the display of fuel level indicator as shown below, If any abnormality is found, replace the combination meter unit with a new one. (☞9-27)





Resistance	More than 183.6 Ω	120.5 – 183.5 Ω	98.1 – 120.4 Ω	58.7 – 98.0 Ω	28.0 – 58.6 Ω	Less than 27.9 Ω
Fuel level indicator		 ILLUMINATED	 ILLUMINATED	 ILLUMINATED	 ILLUMINATED	 ILLUMINATED

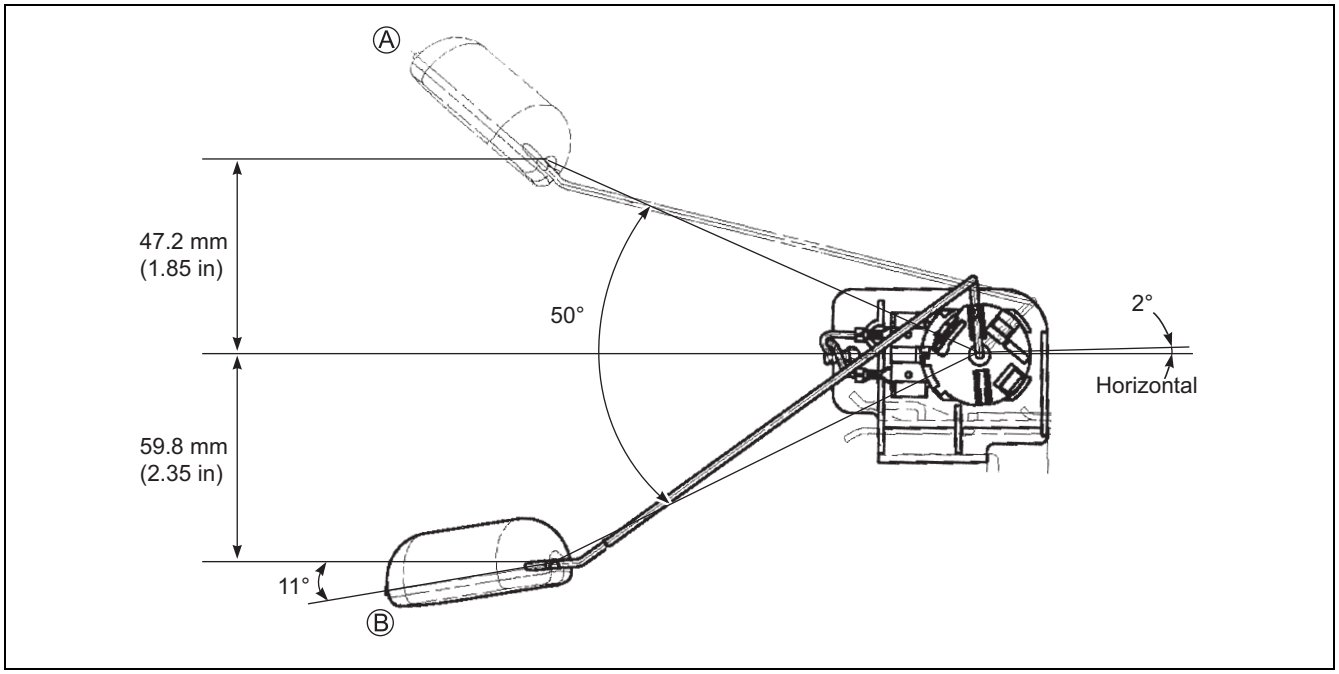
FUEL LEVEL GAUGE INSPECTION

- Remove the fuel level gauge. (☞5-7)
- Measure the resistance at each fuel level gauge float position. If the resistance is incorrect, replace the fuel level gauge with a new one.

Float position	Resistance
Ⓐ (Full)	9 – 11 Ω
Ⓑ (Empty)	213 – 219 Ω

09900-25008: Multi circuit tester set

Tester knob indication: Resistance (Ω)

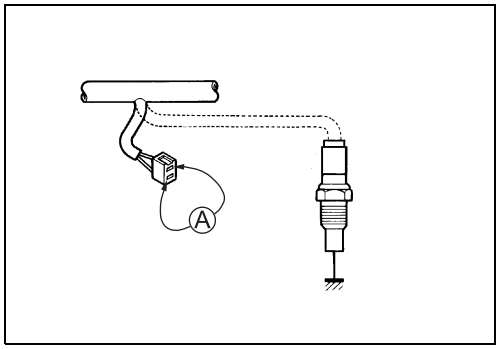


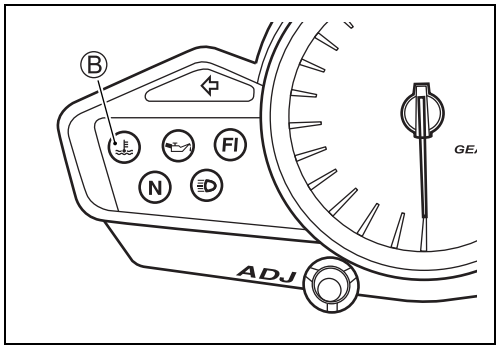
ENGINE COOLANT TEMPERATURE INDICATOR LIGHT
ECT sensor inspection (☞7-10)

- Remove the right fuel tank cover. (☞8-5)
- Disconnect the ECT sensor coupler ①.
- Connect the variable resistor Ⓐ between the terminals.
- Turn the ignition switch ON.
- Check the engine coolant temperature indicator light Ⓑ operation when the resistance is adjusted to the specified values.

Resistance Ⓐ	LED Ⓑ	Water temperature
2.45 kΩ and over	OFF	19 °C (67 °F) and below
Approx. 0.811 kΩ	OFF	Approx. 50 °C (122 °F)
Approx. 0.1 kΩ ON	ON	120 – 139 °C (248 – 282 °F)
0Ω (Jumper wire)	ON	140 °C (283 °F) and over

If either one or all indications are abnormal, replace the combination meter unit with a new one. (☞9-27)





SPEEDOMETER

If the speedometer, odometer or trip meter does not function properly, inspect the speed sensor and the coupler connections. If the speed sensor and coupler connection are OK, replace the combination meter unit with a new one. (☞9-27)

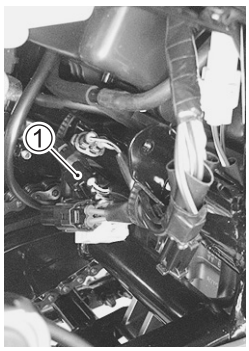
SPEED SENSOR

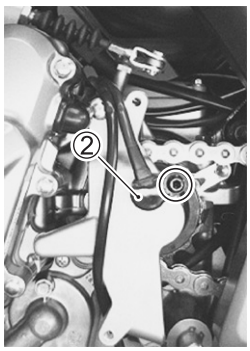
- Remove the right frame cover. (☞8-4)
- Remove the engine sprocket cover. (☞3-5)
- Disconnect speed sensor coupler ①.
- Remove the speed sensor ②.
- Connect 12 V battery, 10 kΩ resistor and the multi circuit tester as shown in the right illustration.

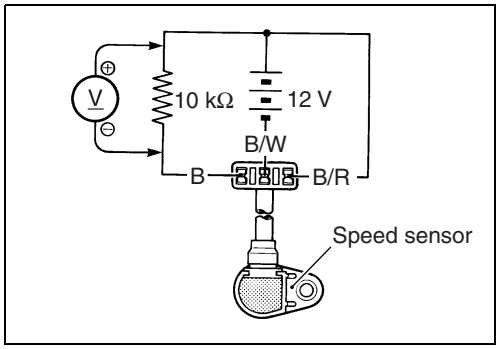
B/R : Black with Red tracer
B/W : Black with White tracer
B : Black

09900-25008: Multi circuit tester set

Tester knob indication: Voltage (⎓)





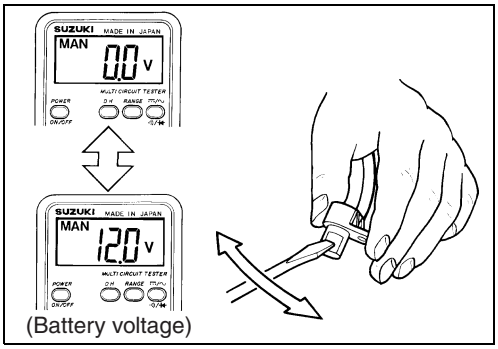


- Move a screwdriver back and forth across the pickup surface of the speed sensor. The voltage readings should cycle as follows (0 V → 12 V or 12 V → 0 V). If the voltage reading does not change, replace the speed sensor with a new one.

NOTE:
The highest voltage reading in this test will be the same as that of battery (12 V).

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

Speed sensor bolt: 4.5 N·m (0.45 kgf-m, 3.3 lbf-ft)

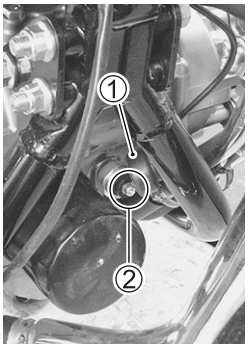


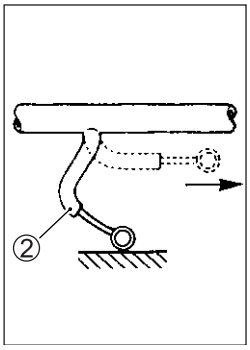
(Battery voltage)

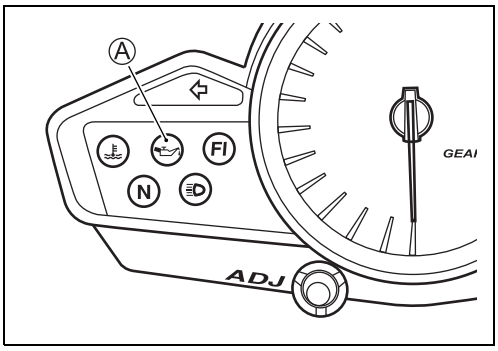
OIL PRESSURE INDICATOR

NOTE:
Before inspecting the oil pressure switch, check if the engine oil level is correct. (☞2-11)

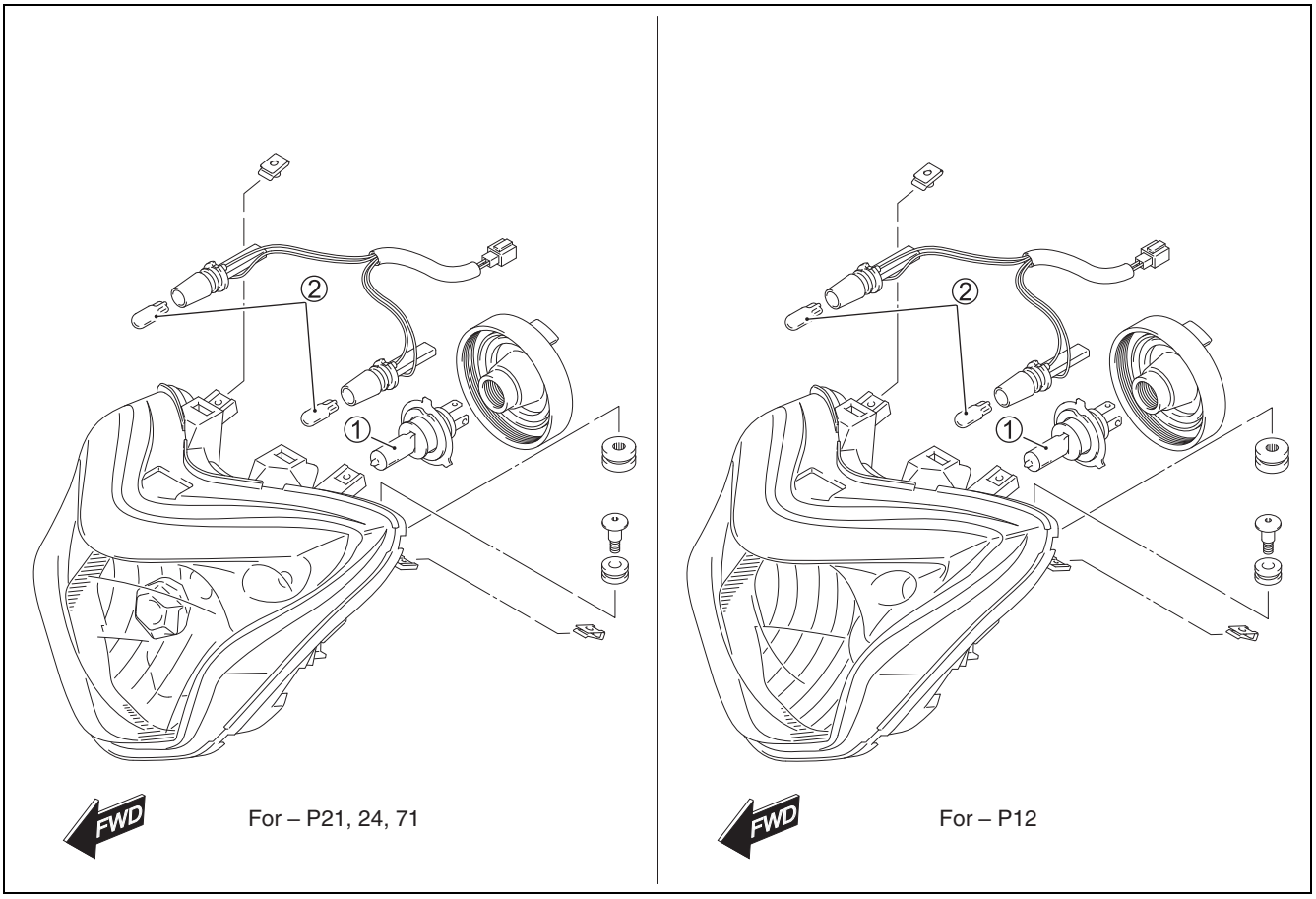
- Disconnect the boot ① and oil pressure switch lead wire ② from the oil pressure switch.
- Turn the ignition switch ON.
- Check if the oil pressure indicator light Ⓐ will light up grounding the lead wire ②. If the oil pressure indicator light Ⓐ does not light up, replace the combination meter unit with a new one after checking the connection of coupler.







LAMPS
HEADLIGHT AND POSITION LIGHT



Headlight bulb ①: 12 V 60/55 W
Position light bulb ②: 12 V 5 W

CAUTION

Remove the bulb when it gets cool, since it may be heated to an extremely high temperature when the headlight is turned ON.

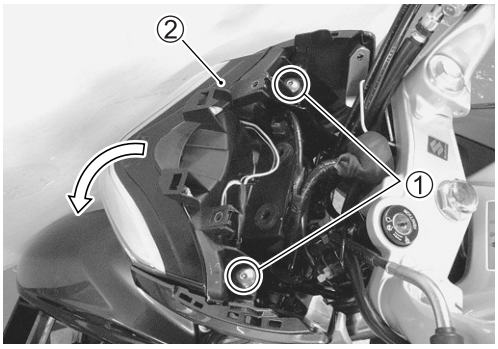
NOTICE

When you touch the bulb with your bare hands, clean the bulb with a cloth moistened with alcohol or soapy water to prevent premature bulb failure.

NOTE:
Do not use bulb other than those with predetermined wattage.

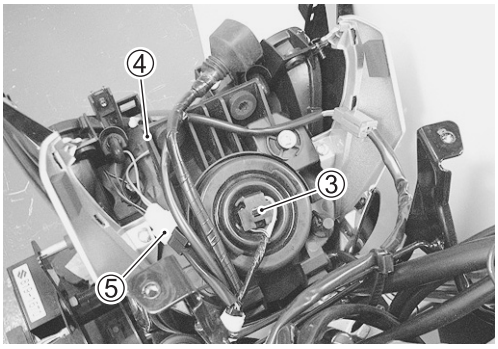
HEADLIGHT BULB REPLACEMENT

- Remove the combination meter assembly. (☞9-27)
- Remove the headlight mounting screws ①.
- Move the headlight assembly ② forward.



- Disconnect the headlight coupler ③.

NOTE:
When removing the headlight assembly ④, disconnect the position light coupler ⑤.

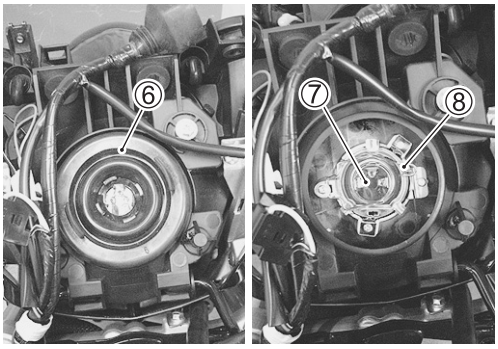


- Remove the rubber cap ⑥.
- Remove the headlight bulb ⑦ by unhooking the bulb holder spring ⑧.
- Replace the headlight bulb ⑦.
- Reinstall the removed parts.

NOTE:
Properly fit the rubber cap ⑥.

- Tighten the headlight mounting screws ① to the specified torque.

Headlight mounting screw: 6 N·m (0.6 kgf-m, 4.5 lbf-ft)

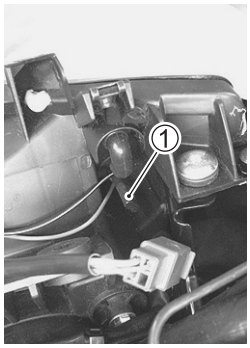


HEADLIGHT BEAM ADJUSTMENT

Adjust the headlight beam in the following procedures:
Adjust the headlight beam vertically.

POSITION LIGHT BULB REPLACEMENT

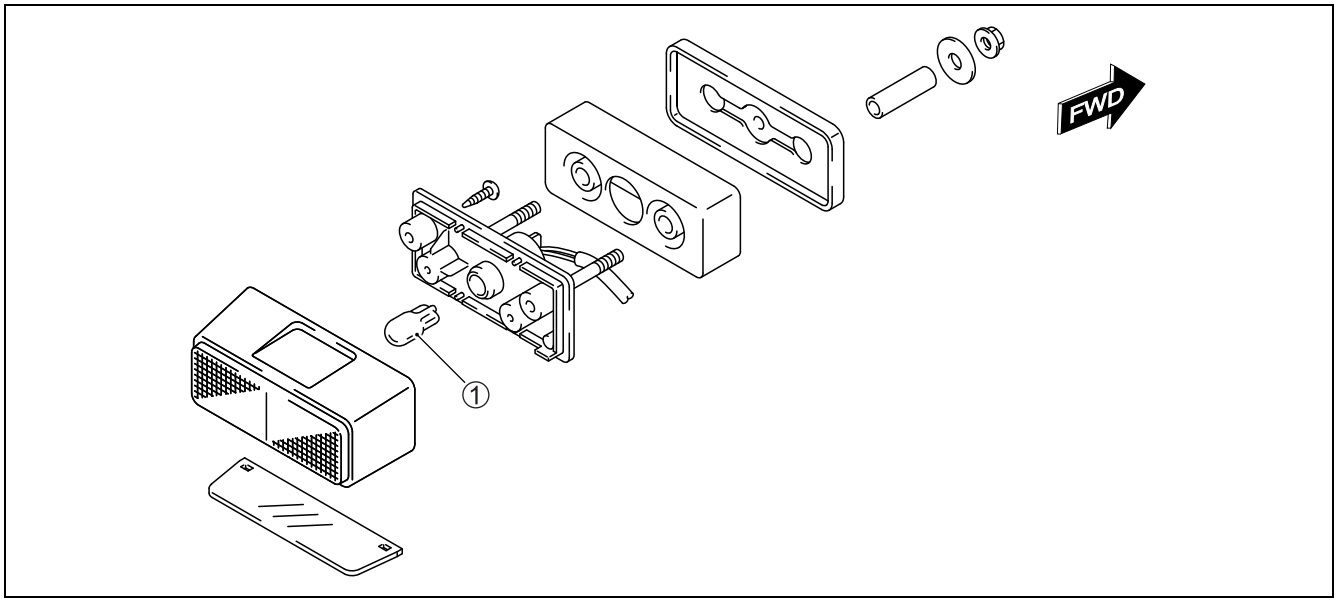
NOTE:
The right and left position light bulbs are installed symmetrically and therefore the replacement procedure for one side is the same as that for the other side.



- Remove the combination meter assembly. (☞9-27)
- Remove the position light socket ①.
- Replace the position light bulb ②.
- Reinstall the removed parts.

NOTE:
Properly fit the position light socket ①.

LICENSE PLATE LIGHT



License plate light bulb ①: 12 V 5 W

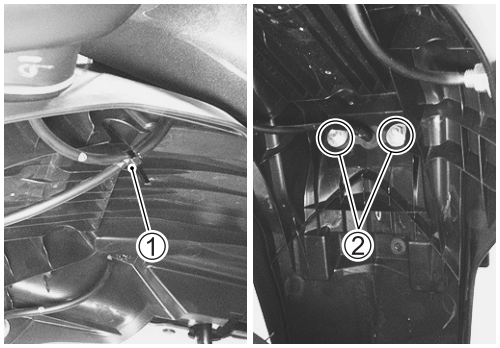
NOTICE

When you touch the bulb with your bare hands, clean the bulb with a cloth moistened with alcohol or soapy water to prevent premature bulb failure.

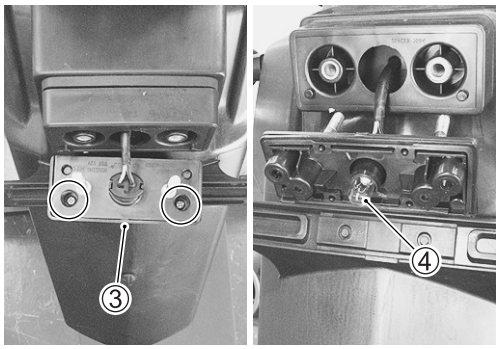
NOTE:
Do not use bulb other than those with predetermined wattage.

LICENSE PLATE LIGHT BULB REPLACEMENT

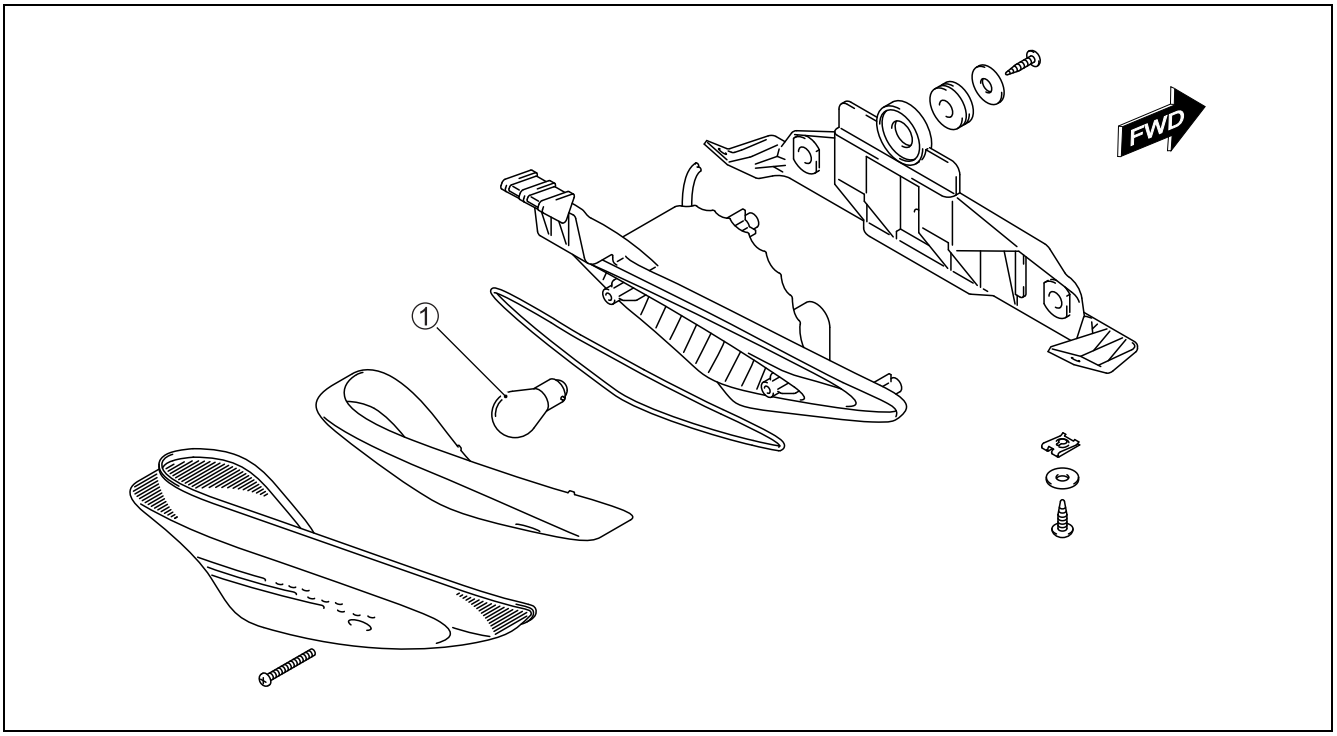
- Disconnect the clamp ①.
- Remove the license plate light nuts ②.



- Remove the lens cover ③.
- Replace the license plate light bulb ④.



BRAKE/TAIL LIGHT



Brake/Tail light ①: 12 V 21/5 W

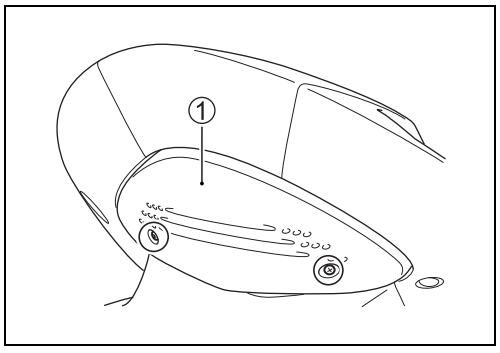
NOTICE

When you touch the bulb with your bare hands, clean the bulb with a cloth moistened with alcohol or soapy water to prevent premature bulb failure.

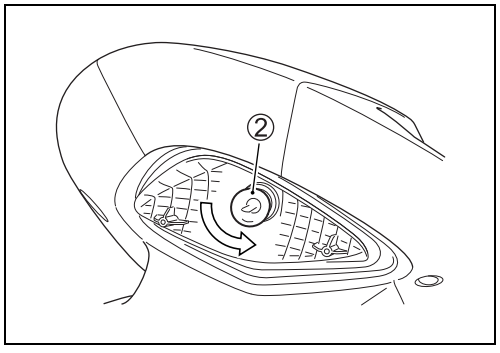
NOTE:
Do not use bulb other than those with predetermined wattage.

BRAKE/TAIL LIGHT BULB REPLACEMENT

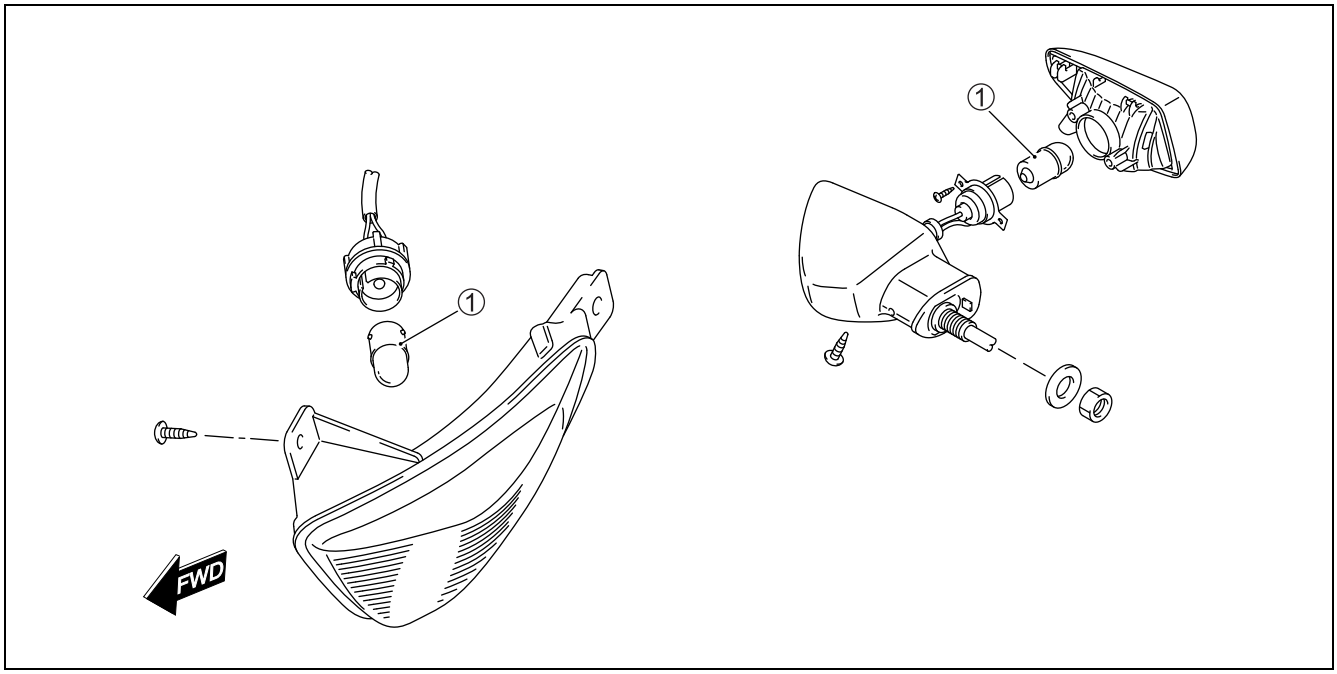
- Remove the lens ①.



- Push in on the brake/tail light bulb ②, turn it counterclockwise, and pull it out.
- Replace the brake/tail light bulb ②.



TURN SIGNAL LIGHT



Turn signal light ①: 12 V 10 W

NOTICE

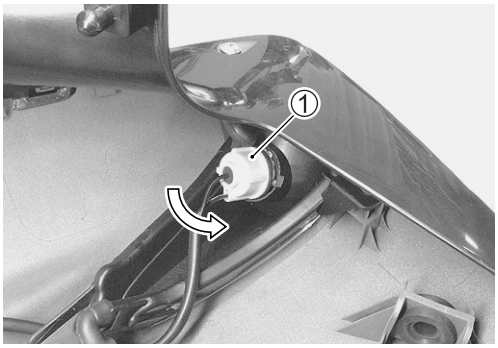
When you touch the bulb with your bare hands, clean the bulb with a cloth moistened with alcohol or soapy water to prevent premature bulb failure.

NOTE:
Do not use bulb other than those with predetermined wattage.

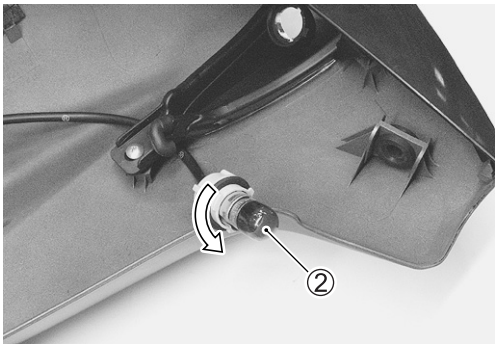
FRONT TURN SIGNAL LIGHT BULB REPLACEMENT

NOTE:
The right and left front turn signal light bulbs are installed symmetrically and therefore the replacement procedure for one side is the same as that for the other side.

- Remove the fuel tank cover. (☞8-5)
- Remove the bulb socket ① by turning it counterclockwise.

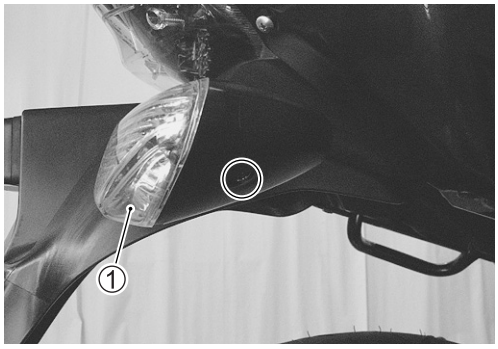


- Push in on the front turn signal light bulb ②, turn it counterclockwise, and pull it out.
- Replace the front turn signal light bulb ②.



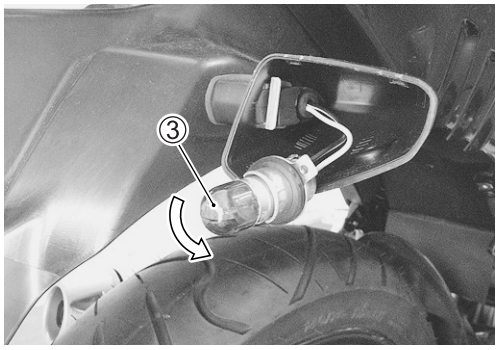
REAR TURN SIGNAL LIGHT BULB REPLACEMENT

NOTE:
The right and left rear turn signal light bulbs are installed symmetrically and therefore the replacement procedure for one side is the same as that for the other side.



- Remove the lens assembly ①.

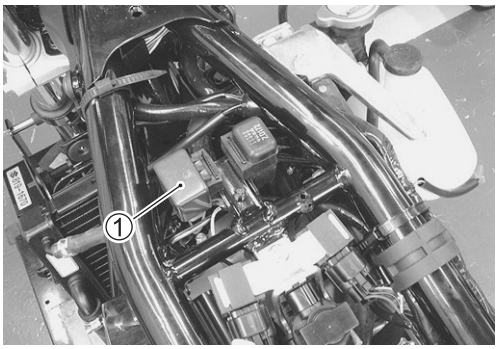
- Remove the socket ②.



- Push in on the rear turn signal light bulb ③, turn it counterclockwise, and pull it out.
- Replace the rear turn signal light bulb ③.

RELAYS

TURN SIGNAL RELAY INSPECTION



The turn signal relay ① is located under the fuel tank.
If the turn signal light does not light, inspect the bulb or repair the circuit connection.
If the bulb and circuit connection are OK, the turn signal relay ① may be faulty, replace it with a new one.

NOTE:
When making this test, be sure that the battery is fully-charged.

STARTER RELAY INSPECTION

☞9-17

FUEL PUMP RELAY INSPECTION

☞5-5

COOLING FAN RELAY INSPECTION

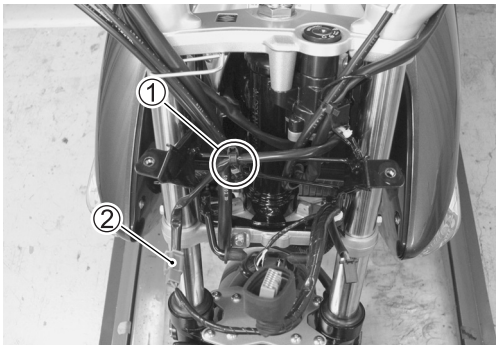
☞7-9

SWITCHES

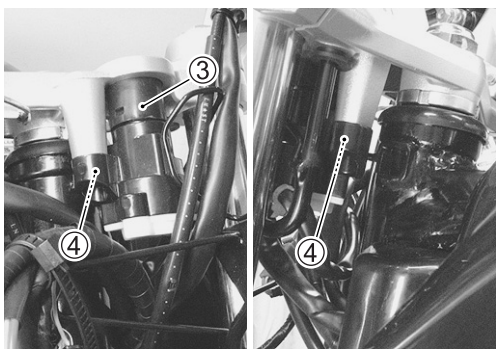
IGNITION SWITCH REMOVAL AND INSTALLATION

REMOVAL

- Remove the headlight assembly. (☞9-36)
- Disconnect the clamp ① and ignition switch coupler ②.



- Remove the ignition switch ③ by removing the bolts ④.



INSTALLATION

- Install the ignition switch in the reverse order removal.

SWITCHES INSPECTION

Inspect each switch for continuity with a tester. If any abnormality is found, replace the respective switch assemblies with new ones.

09900-25008: Multi circuit tester set

Tester knob indication: Continuity test (•)))

IGNITION SWITCH (For-P21)

Color / Position	Br	O	R	O/Y
P	○		○	
OFF				
ON	○	○	○	○

IGNITION SWITCH (For-P12, 24, 71)

Color / Position	R	O	O/Y
OFF			
ON	○	○	○

DIMMER SWITCH

Color / Position	W	Y	Y/W
HI (≡D)		○	○
LO (≡D)	○		○

TURN SIGNAL LIGHT SWITCH

Color / Position	Lg	Lbl	B
L		○	○
PUSH			
R	○	○	

PASSING LIGHT SWITCH

Color / Position	Y	Y/W
•		
PUSH	○	○

ENGINE STOP SWITCH

Color / Position	O/W	O/B
OFF (⊗)		
RUN (Ω)	○	○

STARTER BUTTON

Color / Position	O/B	Y/G
•		
PUSH	○	○

HORN BUTTON

Color / Position	B/Bl	B/W
•		
PUSH	○	○

FRONT BRAKE LIGHT SWITCH

Color / Position	B	B/G
OFF		
ON	○	○

REAR BRAKE LIGHT SWITCH

Color / Position	O	W/B
ON	○	○
OFF		

CLUTCH LEVER POSITION SWITCH

Color / Position	B/W	B/Y
ON	○	○
OFF		

OIL PRESSURE SWITCH

Color / Position	G/Y	Ground
OFF (engine is running)		
ON (engine is at stop)	○	○

NOTE:
Before inspecting the oil pressure switch, check that the engine oil level is correct. (☞2-11)

WIRE COLOR

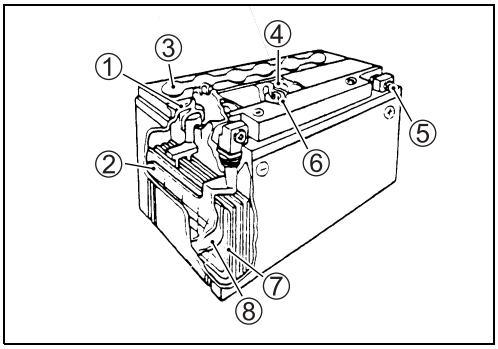
B : Black **Br : Brown** **Lbl : Light blue**
Lg : Light green **O : Orange** **R : Red**
W : White **Y : Yellow**
B/Bl : Black with Blue tracer
B/G : Black with Green tracer
B/W : Black with White tracer
B/Y : Black with Yellow tracer
G/Y : Green with Yellow tracer
O/B : Orange with Black tracer
O/W : Orange with White tracer
O/Y : Orange with Yellow tracer
W/B : White with Black tracer
Y/G : Yellow with Green tracer
Y/W : Yellow with White tracer

BATTERY

SPECIFICATIONS

Type designation	YTX9-BS
Capacity	12 V, 28.8 kC (8 Ah)/10 HR

① Upper cover breather
② Cathode plates
③ Stopper
④ Filter
⑤ Terminal
⑥ Safety valve
⑦ Anode plates
⑧ Separator (Fiberglass plate)

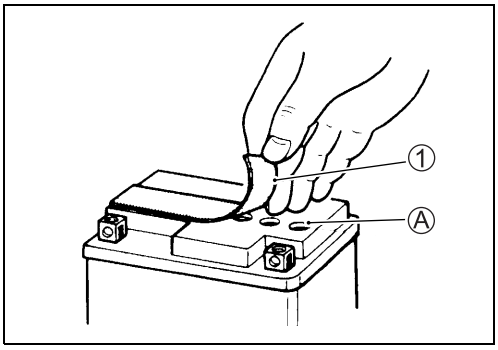


INITIAL CHARGING

Filling electrolyte

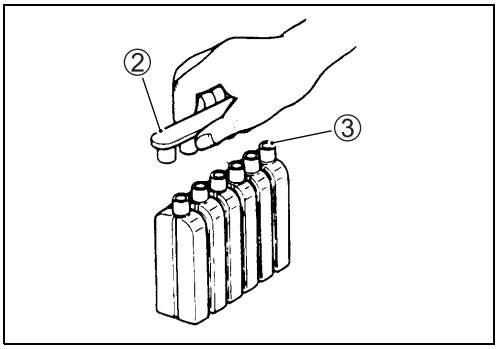
- Remove the aluminum tape ① sealing the battery electrolyte filler holes Ⓐ.

NOTE:
When filling electrolyte, the battery must be removed from the vehicle and must be put on the level ground.



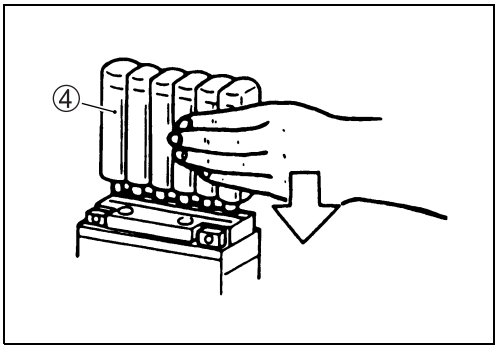
- Remove the caps ②.

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.*

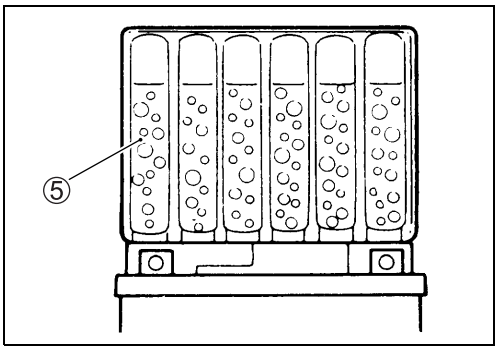


- Insert the nozzles of the electrolyte container ④ into the battery's electrolyte filler holes, holding the container firmly so that it does not fall.

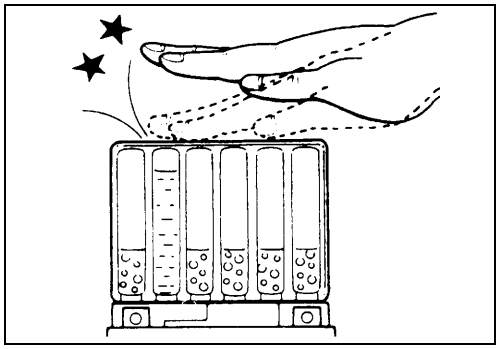
NOTE:
Take precaution not to allow any of the fluid to spill.



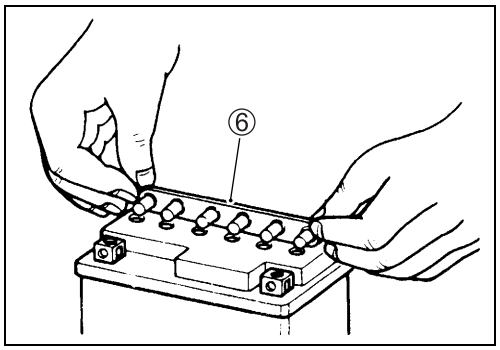
- Make sure air bubbles ⑤ are coming up each electrolyte container, and leave in this position for about more than 20 minutes.



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.



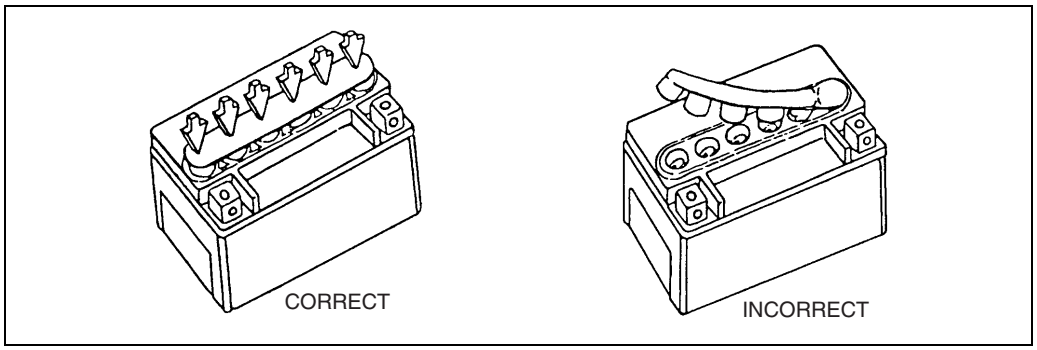
- After confirming that the electrolyte has entered the battery completely, remove the electrolyte containers from the battery. Wait for about 20 minutes.



- 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.

NOTICE

*** 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 hammer when installing them.**



For initial charging, use the charger specially designed for MF battery.

NOTICE

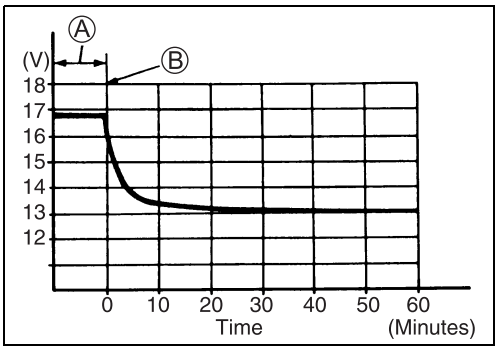
*** For charging the battery, make sure to use the charger specially designed for MF battery. Otherwise, the battery may be overcharged resulting in shortened service life.**
*** Do not remove the cap during charging.**
*** Position the battery with the cap facing upward during charging.**

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 the 12.0 V (DC) and less, recharge the battery with a battery charger.
- Remove the battery from the motorcycle.

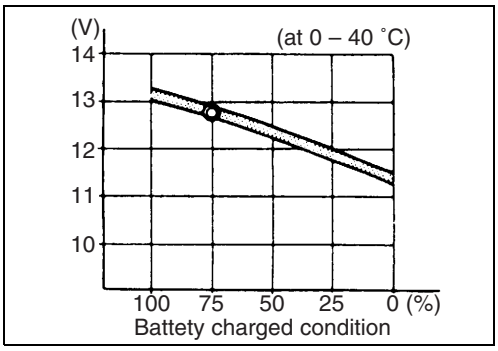


Ⓐ Charging period
Ⓑ Stop charging

NOTICE

Do not remove the caps on the battery top while recharging.

Recharging time: 0.9 A for 5 to 10 hours or 4 A for 1 hour



NOTICE

Be careful not to permit the charging current to exceed 5 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 the 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 motorcycle is not used for a long period, check the battery every 1 month to prevent the battery discharge.

SERVICING INFORMATION

CONTENTS

SERVICING INFORMATION

CONTENTS

TROUBLESHOOTING

FI SYSTEM MALFUNCTION CODE AND DEFECTIVE CONDITION

(☞4-27 to -29)

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 bores	Replace.
	6. Too slowly starter motor cranks	See electrical section.
	7. Poor seating of spark plugs	Retighten.
	Plug not sparking	
	1. Fouled spark plugs	Clean.
	2. Wet spark plugs	Clean and dry.
	3. Defective ignition coils	Replace.
	4. Defective CKP sensor	Replace.
	5. Defective ECM	Replace.
	6. Open-circuited wiring connections	Repair or replace.
	7. Open or short in high-tension cords	Replace.
	No fuel reaching the intake manifold	
	1. Clogged fuel filter or fuel 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. TP sensor out of adjustment	Adjust.
	2. Defective fuel pump	Replace.
	3. Defective fuel pressure regulator	Replace.
	4. Defective TP sensor	Replace.
	5. Defective CKP sensor	Replace.
	6. Defective IAP sensor	Replace.
	7. Defective ECM	Replace.
	8. Defective ECT sensor	Replace.
	9. Defective IAT sensor	Replace.
	10. Clogged ISC valve air passage way	Repair or replace.

Complaint	Symptom and possible causes	Remedy
Engine idles poorly	1. Valve clearance out of adjustment	Adjust.
	2. Poor seating of valves	Replace or repair.
	3. Defective valve guides	Replace.
	4. Worn down camshaft	Replace.
	5. Too wide spark plug gaps	Adjust or replace.
	6. Defective ignition coils	Replace.
	7. Defective CKP sensor	Replace.
	8. Defective ECM	Replace.
	9. Defective TP sensor	Replace.
	10. Defective fuel pump	Replace.
	11. Imbalanced throttle valve	Adjust.
	12. Damaged or cracked vacuum hose	Replace.
	13. Damaged or clogged ISC valve	Replace or repair.
	14. ISC bad learning	Reset learned value.
Engine stalls often	**Incorrect fuel/air mixture**	
	1. Defective IAP sensor or circuit	Repair or replace.
	2. Clogged fuel filter	Clean or replace.
	3. Defective fuel pump	Replace.
	4. Defective fuel pressure regulator	Replace.
	5. Defective ECT sensor	Replace.
	6. Defective thermostat	Replace.
	7. Defective IAT sensor	Replace.
	8. Damaged or cracked vacuum hose	Replace.
	9. Damaged or clogged ISC valve	Replace or repair.
	Fuel injector improperly operating	
	1. Defective fuel injectors	Replace.
	2. No injection signal from ECM	Repair or replace.
	3. Open or short circuited wiring connection	Repair or replace.
	4. Defective battery or low battery voltage	Replace or recharge.
	Control circuit or sensor improperly operating	
	1. Defective ECM	Replace.
	2. Defective fuel pressure regulator	Replace.
	3. Defective TP sensor	Replace.
	4. Defective IAT sensor	Replace.
	5. Defective CKP sensor	Replace.
	6. Defective ECT sensor	Replace.
	7. Defective fuel pump relay	Replace.
	8. Defective ISC valve	Replace.
	9. ISC bad learning	Reset learned value.
	Engine internal parts improperly operating	
	1. Fouled spark plugs	Clean.
	2. Defective CKP sensor or ECM	Replace.
	3. Clogged fuel hose	Clean.
	4. Out of adjustment valve clearance	Adjust.

Complaint	Symptom and possible causes	Remedy
Noisy engine	**Excessive valve chatter**	
	1. Too large valve clearance	Adjust.
	2. Weakened or broken valve springs	Replace.
	3. Worn rocker arm or cam surface	Replace.
	4. Worn and burnt camshaft journal	Replace.
	Noise seems to come from piston	
	1. Worn down pistons or cylinders	Replace.
	2. Carbon combustion chambers fouled with carbon	Clean.
	3. Worn piston pins or piston pin bore	Replace.
	4. Worn piston rings or ring grooves	Replace.
	Noise seems to come from timing chain	
	1. Stretched chain	Replace.
	2. Worn sprockets	Replace.
	3. Tension adjuster not working	Repair or replace.
	Noise seems to come from clutch	
	1. Worn splines of countershaft or hub	Replace.
	2. Worn teeth of clutch plates	Replace.
	3. Distorted clutch plates, driven and drive	Replace.
	4. Worn clutch release bearing	Replace.
	Noise seems to come from crankshaft	
	1. Rattling bearings due to wear	Replace.
	2. Worn and burnt big-end bearings	Replace.
	3. Worn and burnt journal bearings	Replace.
	4. Too large thrust clearance	Replace thrust bearing.
	Noise seems to come from balancer	
	1. Worn and burnt journal bearings	Replace.
	Noise seems to come from transmission	
	1. Worn or rubbing gears	Replace.
	2. Worn splines	Replace.
	3. Worn or rubbing primary gears	Replace.
	4. Worn bearings	Replace.
	Noise seems to come from water pump	
	1. Too much play on pump shaft	Replace.
	2. Worn or damaged impeller shaft	Replace.
	3. Worn or damaged mechanical seal	Replace.
	4. Contact between pump case and impeller	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 gaps	Adjust.
	5. Ignition not advanced sufficiently due to poorly working timing advance circuit	Replace ECM.
	6. Defective ignition coils	Replace.
	7. Defective CKP sensor	Replace.
	8. Defective ECM	Replace.
	9. Clogged air cleaner element	Clean or replace.
	10. Clogged fuel 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	Clean or replace.
	2. Defective throttle valve	Adjust or replace.
	3. Sucking air from throttle body joint	Repair or replace.
	4. Defective ECM	Replace.
	5. Imbalanced throttle valve synchronization	Adjust.
	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 GP switch	Replace.
	6. Defective IAP sensor	Replace.
	7. Defective ECM	Replace.
	8. TP sensor out of adjustment	Replace.
	9. Defective ISC valve	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 cylinders	Replace.
	5. Poor seating of valves	Repair.
	6. Fouled spark plugs	Clean or replace.
	7. Incorrect spark plugs	Replace.
	8. Clogged fuel injectors	Replace.
	9. TP sensor out of adjustment	Adjust.
	10. Clogged air cleaner element	Clean or replace.
	11. Imbalanced throttle valve synchronization	Adjust.
	12. Sucking air from throttle valve or vacuum hose	Repair or replace.
	13. Too much engine oil	Drain out excess oil.
	14. Defective fuel pump or ECM	Replace.
	15. Defective CKP sensor and ignition coils	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 GP switch	Replace.
	6. Defective IAP sensor	Replace.
	7. Defective ECM	Replace.
	8. TP sensor out of adjustment	Adjust.
	9. Defective ISC valve	Replace.
	10. Imbalanced throttle valve synchronization	Adjust.
Engine overheats	**Defective engine internal parts**	
	1. Heavy carbon deposit on piston crowns	Clean.
	2. Not enough oil in the engine	Add oil.
	3. Defective oil pump or clogged oil circuit	Replace or clean.
	4. Sucking air from intake pipes	Repair or replace.
	5. Use incorrect engine oil	Change.
	6. Defective cooling system	See radiator section.
	Lean fuel/air mixture	
	1. Short-circuited IAP sensor/lead wire	Repair or replace.
	2. Short-circuited IAT sensor/lead wire	Repair or replace.
	3. Sucking air from intake pipe joint	Repair or replace.
	4. Defective fuel injectors	Replace.
	5. Defective ECT sensor	Replace.
	Other factors	
	1. Ignition timing is too advanced due to defective timing advance system (ECT sensor, GP switch, CKP sensor and ECM)	Replace.
	2. Drive chain is too tight	Adjust.
	3. ISC bad learning	Reset learned value.

Complaint	Symptom and possible causes	Remedy
Dirty or heavy exhaust smoke	1. Too much engine oil in the engine	Check with inspection window, drain out excess oil.
	2. Worn piston rings or cylinders	Replace.
	3. Worn valve guides	Replace.
	4. Scored or scuffed cylinder walls	Replace.
	5. Worn valves stems	Replace.
	6. Defective stem oil seal	Replace.
	7. Worn oil ring side rails	Replace.
Slipping clutch	1. Weakened clutch springs	Replace.
	2. Worn or distorted pressure plate	Replace.
	3. Distorted clutch plates	Replace.
	4. Clutch release screw out of adjustment	Adjust.
Dragging clutch	1. Some clutch spring weakened while others are not	Replace.
	2. Distorted pressure plate or clutch plates	Replace.
	3. Clutch release screw out of adjustment	Adjust.
Transmission will not shift	1. Broken gearshift cam	Replace.
	2. Distorted gearshift forks	Replace.
	3. Worn gearshift pawl	Replace.
Transmission will not shift back	1. Broken return spring on shift shaft	Replace.
	2. Rubbing or stickily shift shaft	Repair or replace.
	3. Distorted or worn gearshift forks	Replace.
Transmission 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 stopper plate	Replace.

RADIATOR (COOLING SYSTEM)

Complaint	Symptom and possible causes	Remedy
Engine overheats	1. Not enough engine coolant	Add coolant.
	2. Radiator core clogged with dirt or scale	Clean.
	3. Faulty cooling fan	Repair or replace.
	4. Defective cooling fan relay, or open- or short-circuited	Repair or replace.
	5. Defective ECM	Replace.
	6. Defective ECT sensor	Replace.
	7. Clogged water passage	Clean.
	8. Air trapped in the cooling circuit	Bleed air.
	9. Defective water pump	Replace.
	10. Use incorrect coolant	Replace.
	11. Defective thermostat	Replace.
	12. Damaged ISC valve	Replace.
	13. ISC bad learning	Reset learned value.
Engine overcools	1. Defective ECT sensor	Replace.
	2. Extremely cold weather	Put on the radiator cover.
	3. Defective thermostat	Replace.
	4. Defective cooling fan relay, or open- or short-circuited	Repair or replace.
	5. Defective ECM	Replace.

CHASSIS

Complaint	Symptom and possible causes	Remedy
Heavy steering	1. Overtightened steering stem nut	Adjust.
	2. Broken bearing in steering stem	Replace.
	3. Distorted steering stem	Replace.
	4. Not enough pressure in tires	Adjust.
Wobbly handlebars	1. Loss of balance between right and left front forks	Adjust.
	2. Distorted front fork	Repair or replace.
	3. Distorted front axle or crooked tire	Replace.
	4. Loose steering stem nut	Adjust.
	5. Worn or incorrect tire or wrong tire pressure	Adjust or replace.
	6. Worn bearing/race in steering stem	Replace.
Wobbly front wheel	1. Distorted wheel rim	Replace.
	2. Worn front wheel bearings	Replace.
	3. Defective or incorrect tire	Replace.
	4. Loose axle or axle pinch bolt	Retighten.
	5. Incorrect front fork oil level	Adjust.
	6. Incorrect front wheel weight balance	Adjust.
Front suspension too soft	1. Weakened springs	Replace.
	2. Not enough fork oil	Replenish.
	3. Wrong weight fork oil	Replace.
Front suspension too stiff	1. Too viscous fork oil	Replace.
	2. Too much fork oil	Drain excess oil.
	3. Bent front axle	Replace.
Noisy front suspension	1. Not enough fork oil	Replenish.
	2. Loose bolts on suspension	Retighten.
Wobbly rear wheel	1. Distorted wheel rim	Replace.
	2. Worn rear wheel bearings or swingarm bearings	Replace.
	3. Defective or incorrect tire	Replace.
	4. Worn rear suspension bearings	Replace.
	5. Loose nuts or bolts on rear suspension	Retighten.
	6. Loose rear axle nut	Retighten.
	7. Incorrect rear wheel weight balance	Adjust.
Rear suspension too soft	1. Weakened spring of shock absorber	Replace.
	2. Leakage of oil from shock absorber	Replace.
	3. Improperly rear suspension setting	Adjust.
Rear suspension too stiff	1. Bent shock absorber shaft	Replace.
	2. Bent swingarm pivot shaft	Replace.
	3. Worn swingarm and rear suspension bearings	Replace.
	4. Improperly rear suspension setting	Adjust.
Noisy rear suspension	1. Loose nuts or bolts on rear suspension	Retighten.
	2. Worn swingarm and suspension bearings	Replace.

BRAKES

Complaint	Symptom and possible causes	Remedy
Insufficient brake power	1. Leakage of brake fluid from hydraulic system	Repair or replace.
	2. Worn pads	Replace.
	3. Friction surfaces of pad are dirty oil or dust	Clean disc/pads or replace.
	4. Worn disc	Replace.
	5. Air in hydraulic system	Bleed air.
	6. Not enough brake fluid in the reservoir	Replenish.
Brake squeaking	1. Carbon adhesion on pad surface	Repair surface with sandpaper.
	2. Tilted pad	Correct pad fitting or replace.
	3. Damaged wheel bearing	Replace.
	4. Loosen front wheel axle or rear wheel axle	Tighten to specified torque.
	5. Worn pads	Replace.
	6. Foreign material in brake fluid	Replace brake fluid.
	7. Clogged return port of master cylinder	Disassemble and clean master cylinder.
Excessive brake lever stroke	1. Air in hydraulic system	Bleed air.
	2. Insufficient brake fluid	Replenish fluid to specified level; bleed air.
	3. Improper quality of brake fluid	Replace with correct fluid.
Leakage of brake fluid	1. Insufficient tightening of connection joints	Tighten to specified torque.
	2. Cracked hose	Replace.
	3. Worn piston and/or cup	Replace piston and/or cup.
Brake drags	1. Rusty part	Clean and lubricate.
	2. Insufficient brake lever or brake pedal pivot lubrication	Lubricate.

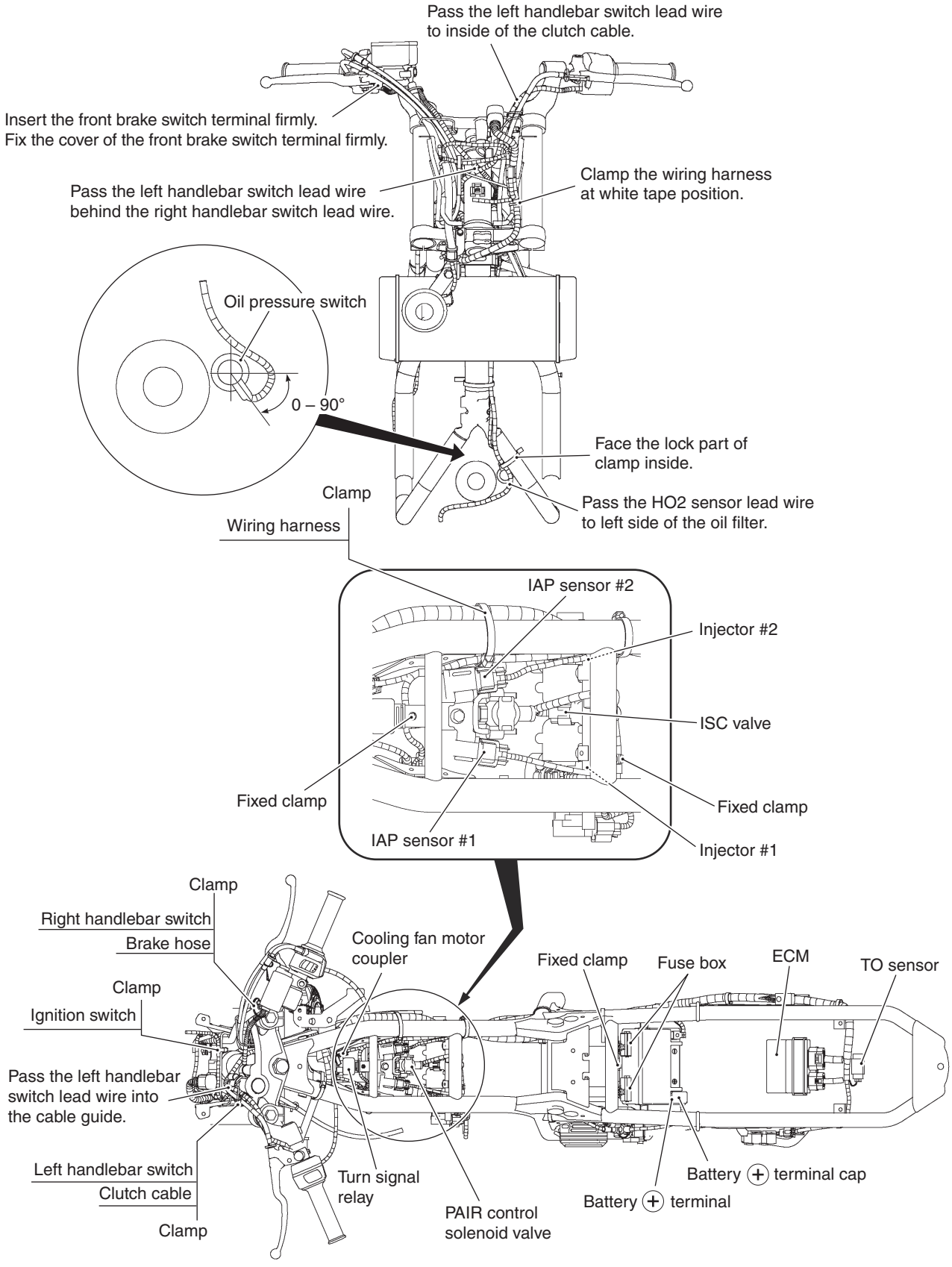
ELECTRICAL

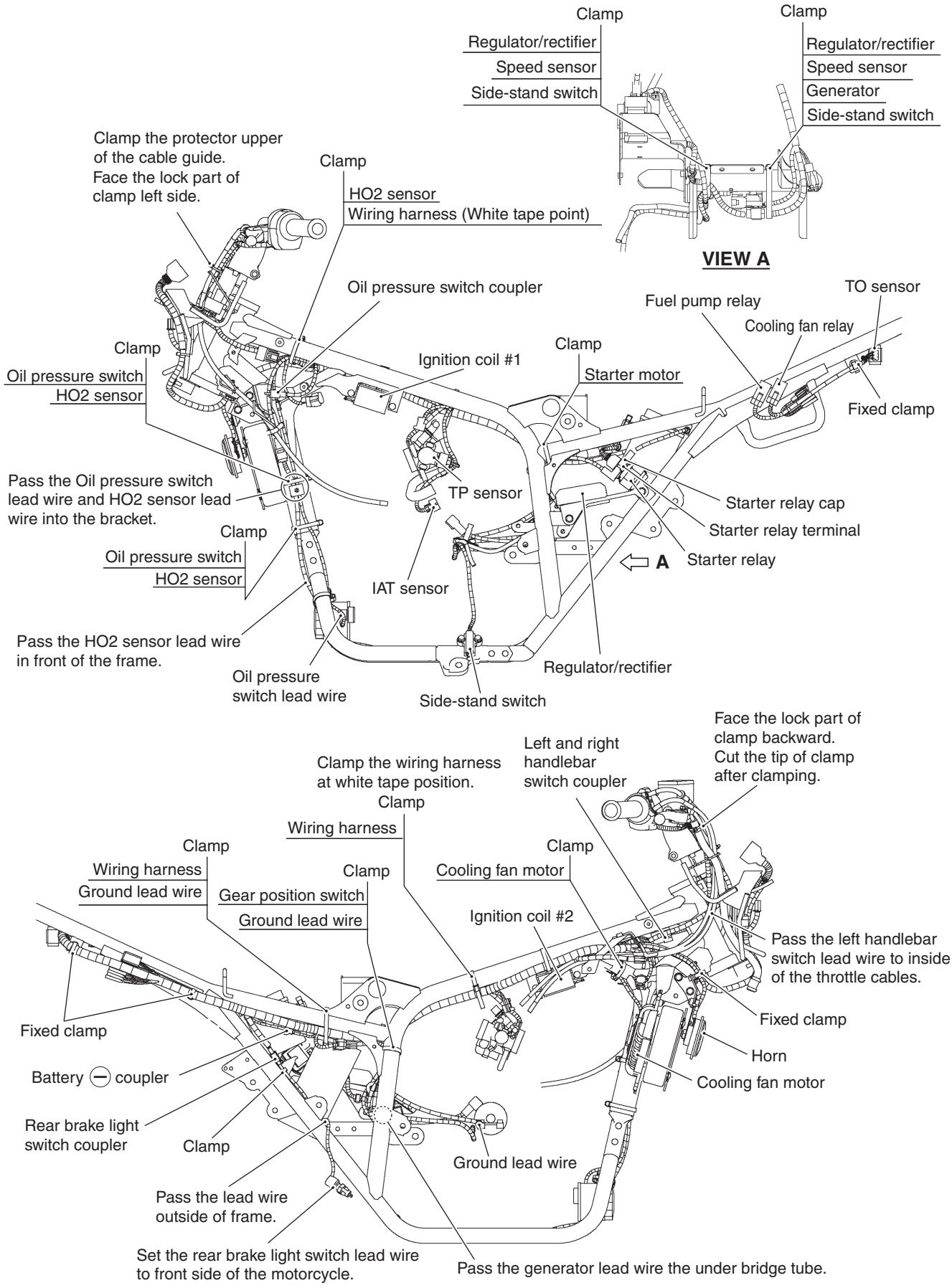
Complaint	Symptom and possible causes	Remedy
No sparking or poor sparking	1. Defective ignition coils	Replace.
	2. Defective spark plugs	Replace.
	3. Defective CKP sensor	Replace.
	4. Defective ECM	Replace.
	5. Defective TO sensor	Replace.
	6. Open-circuited wiring connections	Check and repair.
Spark plug soon become fouled with carbon	1. Mixture too rich	Inspect FI system.
	2. Excessively high idling speed	Inspect FI system.
	3. Incorrect gasoline	Change.
	4. Dirty air cleaner element	Replace.
	5. Too cold spark plugs	Replace with hot type plug.
Spark plug become fouled too soon	1. Worn piston rings	Replace.
	2. Worn piston or cylinders	Replace.
	3. Excessive clearance of valve stems in valve guides	Replace.
	4. Worn stem oil seal	Replace.
Spark plug electrodes overheat or burn	1. Too hot spark plugs	Replace with cold type plugs.
	2. Overheated the engine	Tune up.
	3. Loose spark plugs	Retighten.
	4. Too lean mixture	Inspect FI system.
Generator does not charge	1. Open- or short-circuited lead wires, or loose lead connections	Repair or replace or retighten.
	2. Short-circuited, grounded or open generator coil	Replace.
	3. Short-circuited or punctured regulator/rectifier	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	Repair or retighten.
	2. Grounded or open-circuited generator coil	Replace.
	3. Defective regulator/rectifier	Replace.
	4. Defective cell plates in the battery	Replace the battery.
Generator overcharges	1. Internal short-circuit in the battery	Replace the battery.
	2. Damaged or defective regulator/rectifier	Replace.
	3. Poorly grounded regulator/rectifier	Clean and tighten ground connection.
Unstable charging	1. Lead wire insulation frayed due to vibration, resulting in intermittent short-circuiting	Repair or replace.
	2. Internally shorted generator	Replace.
	3. Defective regulator/rectifier	Replace.
Starter button is not effective	1. Run down battery	Repair or replace.
	2. Defective switch contacts	Replace.
	3. Brushes not seating properly on starter motor commutator	Repair or replace.
	4. Defective starter relay/starter interlock switch	Replace.
	5. Defective main fuse	Replace.

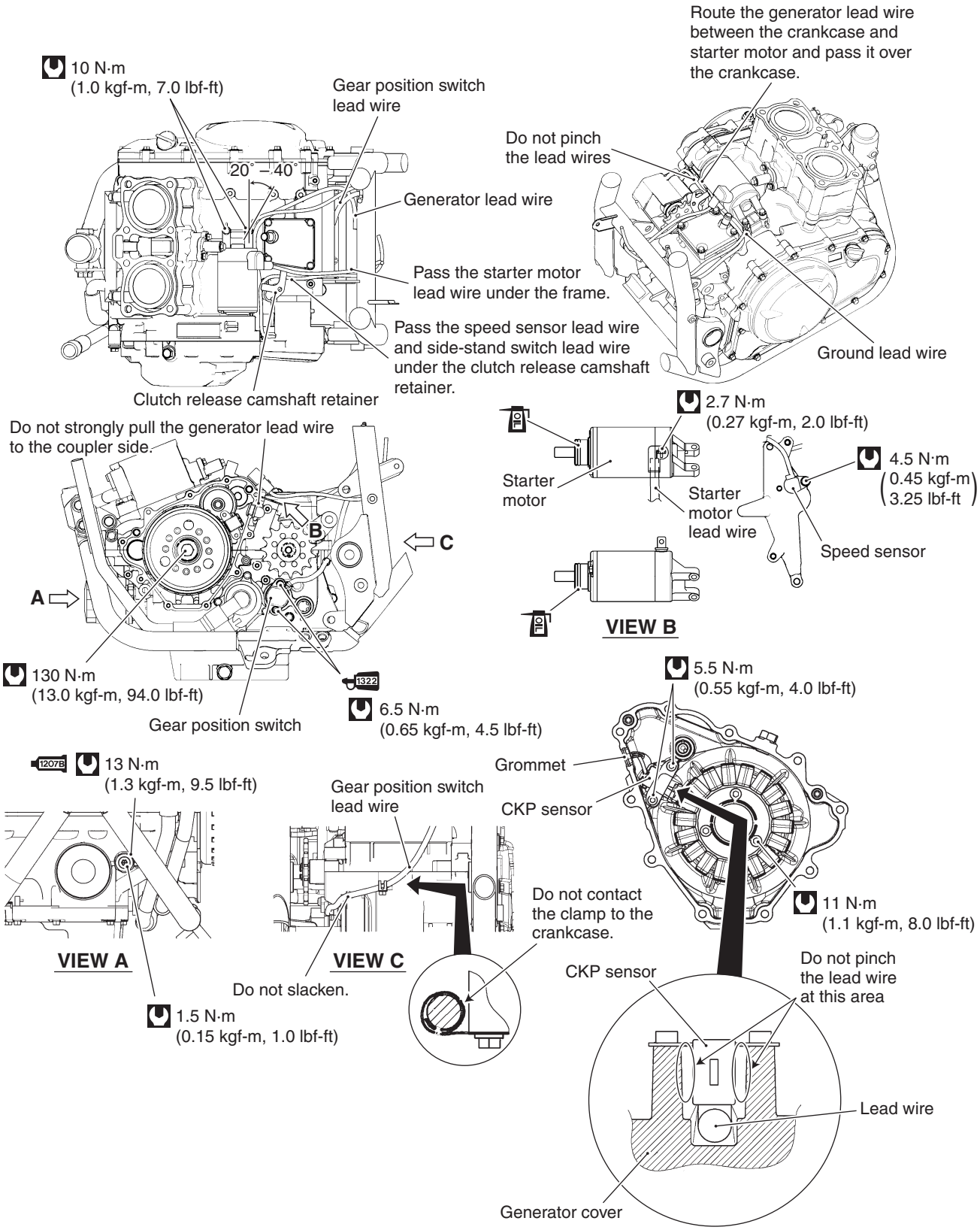
BATTERY

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	Check the generator, regulator/rectifier and circuit connections and make necessary adjustments to obtain specified charging operation.
	2. Cell plates have lost much of their active material as a result of overcharging	Replace the battery and correct the charging system.
	3. Internal short-circuit in the battery	Replace the battery.
	4. Too low battery voltage	Recharge the battery fully.
	5. Too old battery	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)	Replace the battery.
	2. The battery was left unused in a cold climate for too long	Replace the battery if badly sulfated.

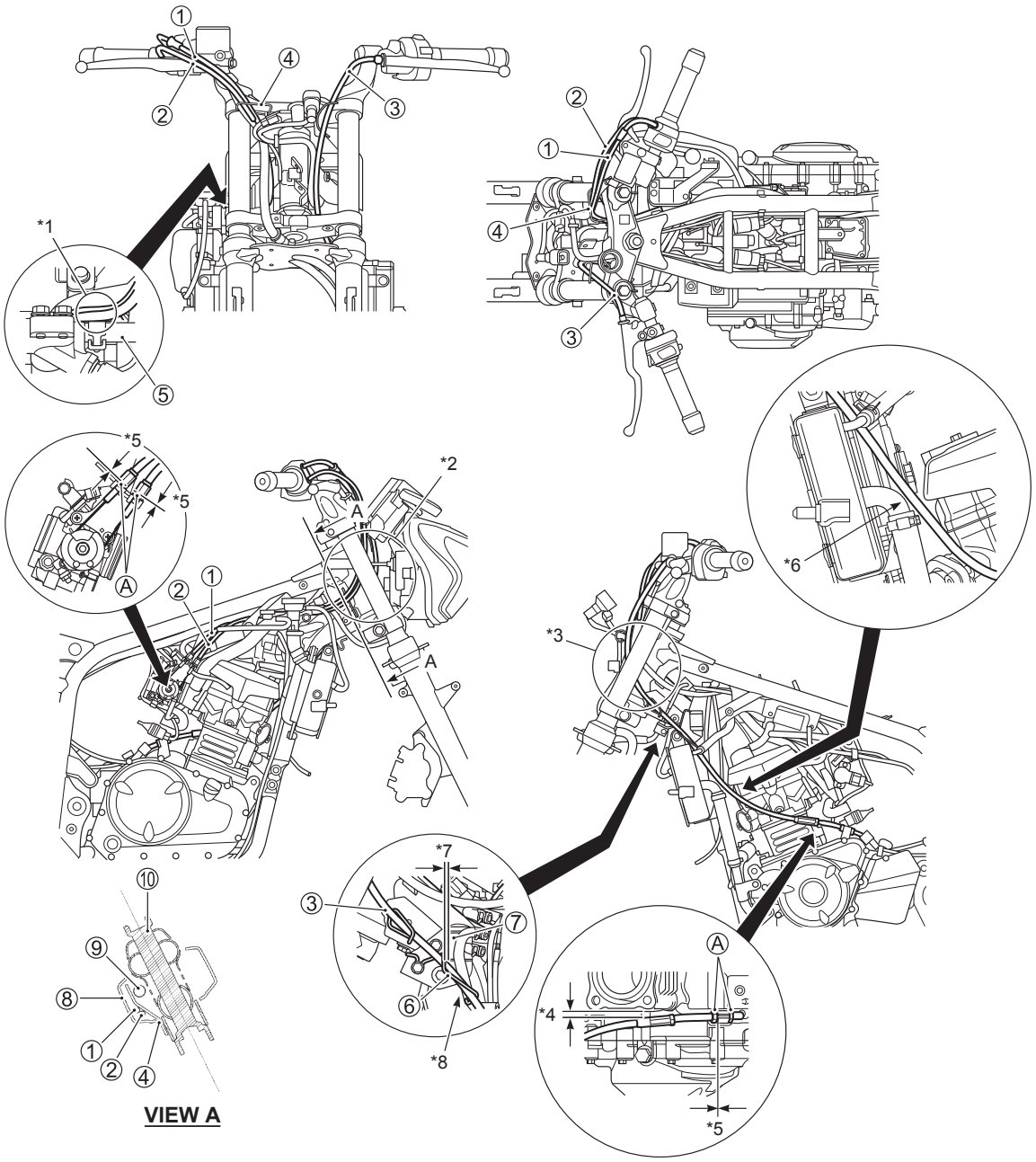
WIRING HARNESS, CABLE AND HOSE ROUTING
WIRING HARNESS ROUTING




Clamp
Regulator/rectifier
Speed sensor
Side-stand switch
Clamp
Regulator/rectifier
Speed sensor
Generator
Side-stand switch
VIEW A
Clamp the protector upper of the cable guide. Face the lock part of clamp left side.
Clamp
HO2 sensor
Wiring harness (White tape point)
Oil pressure switch coupler
Fuel pump relay
TO sensor
Cooling fan relay
Clamp
Oil pressure switch
HO2 sensor
Ignition coil #1
Clamp
Starter motor
Fixed clamp
Pass the Oil pressure switch lead wire and HO2 sensor lead wire into the bracket.
TP sensor
Starter relay cap
Starter relay terminal
Clamp
Oil pressure switch
HO2 sensor
A
Starter relay
IAT sensor
Pass the HO2 sensor lead wire in front of the frame.
Oil pressure switch lead wire
Regulator/rectifier
Side-stand switch
Face the lock part of clamp backward. Cut the tip of clamp after clamping.
Left and right handlebar switch coupler
Clamp the wiring harness at white tape position.
Clamp
Wiring harness
Clamp
Wiring harness
Ground lead wire
Clamp
Gear position switch
Ground lead wire
Clamp
Cooling fan motor
Ignition coil #2
Pass the left handlebar switch lead wire to inside of the throttle cables.
Fixed clamp
Fixed clamp
Horn
Battery ⊖ coupler
Cooling fan motor
Rear brake light switch coupler
Clamp
Ground lead wire
Pass the lead wire outside of frame.
Set the rear brake light switch lead wire to front side of the motorcycle.
Pass the generator lead wire the under bridge tube.


10 N·m
(1.0 kgf-m, 7.0 lbf-ft)
Gear position switch lead wire
20° – 40°
Generator lead wire
Pass the starter motor lead wire under the frame.
Pass the speed sensor lead wire and side-stand switch lead wire under the clutch release camshaft retainer.
Clutch release camshaft retainer
Route the generator lead wire between the crankcase and starter motor and pass it over the crankcase.
Do not pinch the lead wires
Ground lead wire
Do not strongly pull the generator lead wire to the coupler side.
A
B
C
130 N·m
(13.0 kgf-m, 94.0 lbf-ft)
Gear position switch
1322
6.5 N·m
(0.65 kgf-m, 4.5 lbf-ft)
2.7 N·m
(0.27 kgf-m, 2.0 lbf-ft)
Starter motor
Starter motor lead wire
4.5 N·m
(0.45 kgf-m
3.25 lbf-ft
Speed sensor
VIEW B
5.5 N·m
(0.55 kgf-m, 4.0 lbf-ft)
Grommet
CKP sensor
11 N·m
(1.1 kgf-m, 8.0 lbf-ft)
1207B
13 N·m
(1.3 kgf-m, 9.5 lbf-ft)
VIEW A
1.5 N·m
(0.15 kgf-m, 1.0 lbf-ft)
Gear position switch lead wire
VIEW C
Do not slacken.
Do not contact the clamp to the crankcase.
CKP sensor
Do not pinch the lead wire at this area
Lead wire
Generator cover

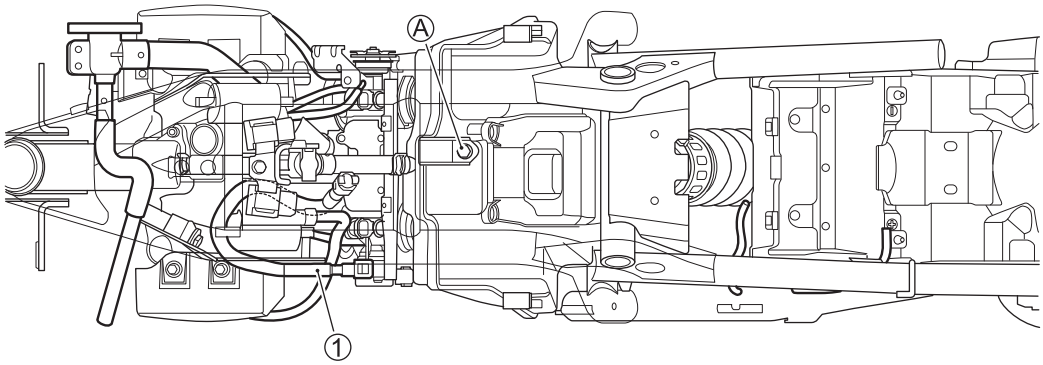
CABLE ROUTING

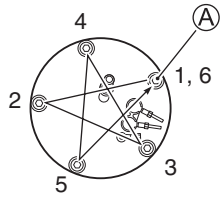


①	Throttle cable No.1	⑨	Left handlebar switch	*7	3 mm (0.12 in)
②	Throttle cable No.2	⑩	Frame	*8	Pass the clutch cable into the clutch cable guide.
③	Clutch cable	*1	Pass the throttle cables over the water bypass hose ⑤.		
④	Cable guide	*2	Pass the throttle cables to the right side of head pipe.		
⑤	Water bypass hose	*3	Pass the clutch cable to the left side of head pipe.		
⑥	Clutch cable guide	*4	7 mm (0.28 in)		
⑦	Bracket	*5	Within 1 turn counterclockwise.		
⑧	Right frame head cover	*6	Make sure the clutch cable is not contacted to the water hose and cylinder head cover cap.		

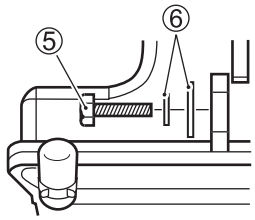
ITEM	N·m	kgf-m	lbf-ft
Ⓐ	4.5	0.45	3.5

INTAKE SYSTEM HOSE ROUTING

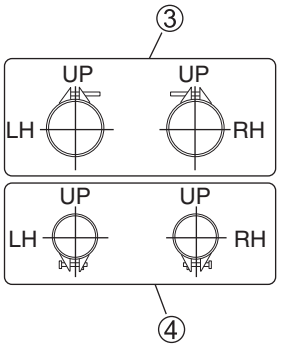


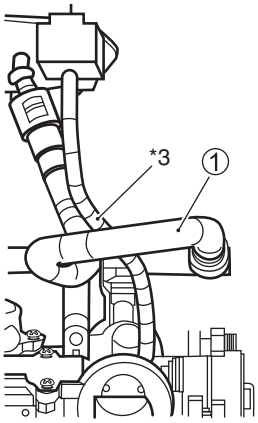


VIEW A

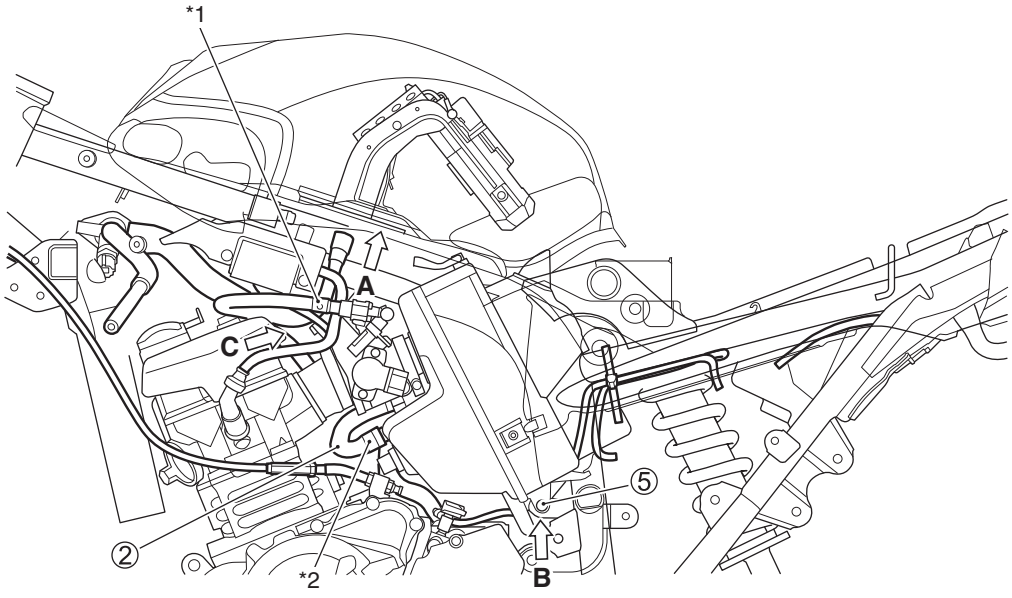


VIEW B





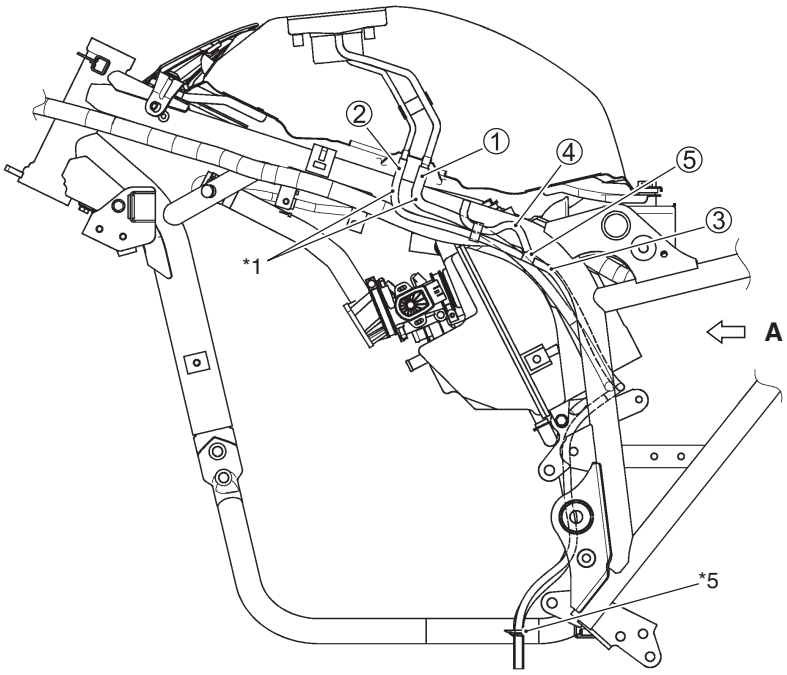
VIEW C

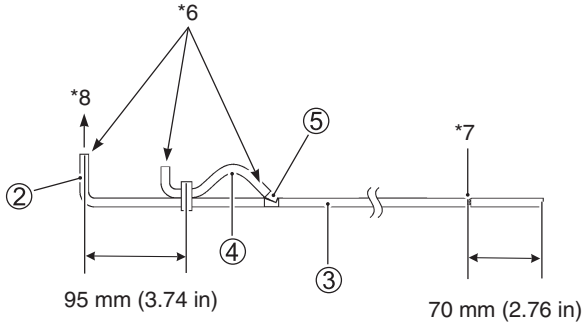


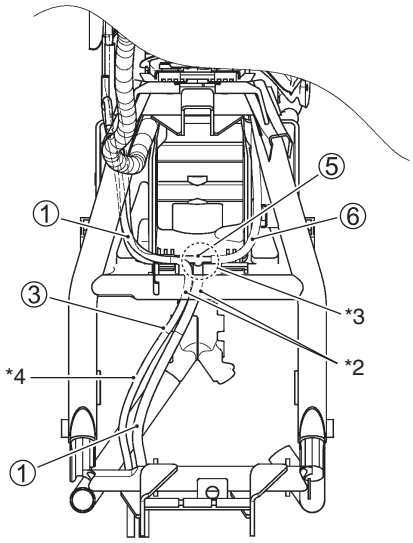
①	Fuel feed hose	⑥	Washer
②	ISC valve hose	*1	White mark
③	Intake pipe clamp	*2	Clamp end should face left side.
④	Outlet tube clamp	*3	Pass the IAP sensor hose #1 between the fuel feed hose.
⑤	Air cleaner lower mounting bolt		

ITEM	N·m	kgf-m	lbf-ft
Ⓐ	10	1.0	7.0
⑤	5.5	0.55	4.0

FUEL TANK DRAIN HOSE ROUTING



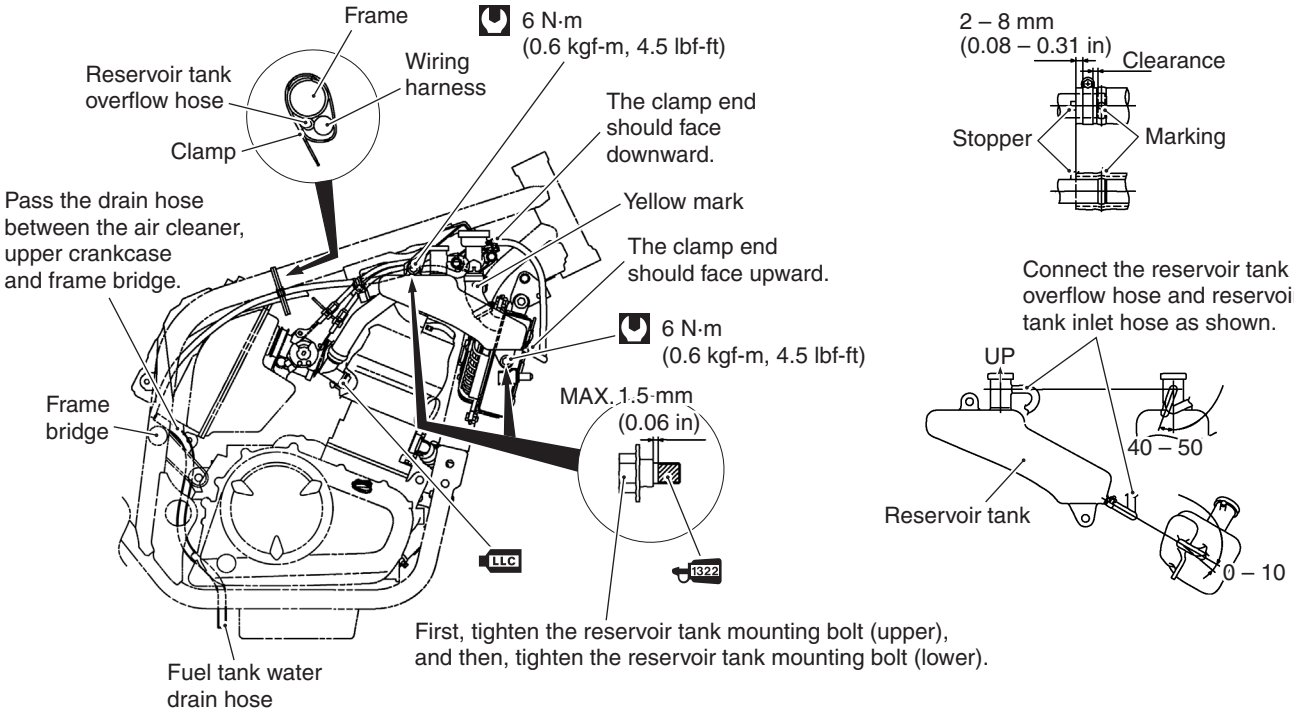


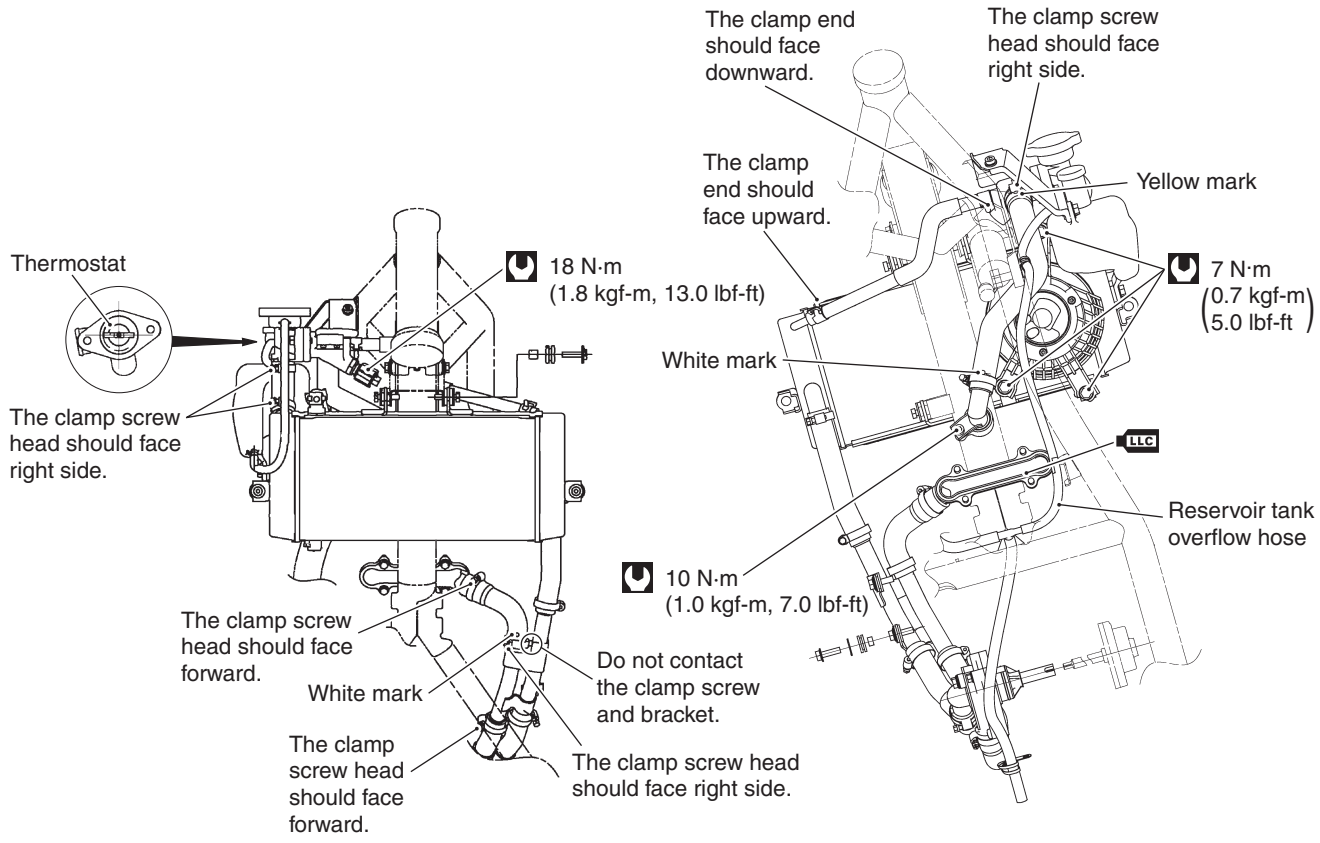


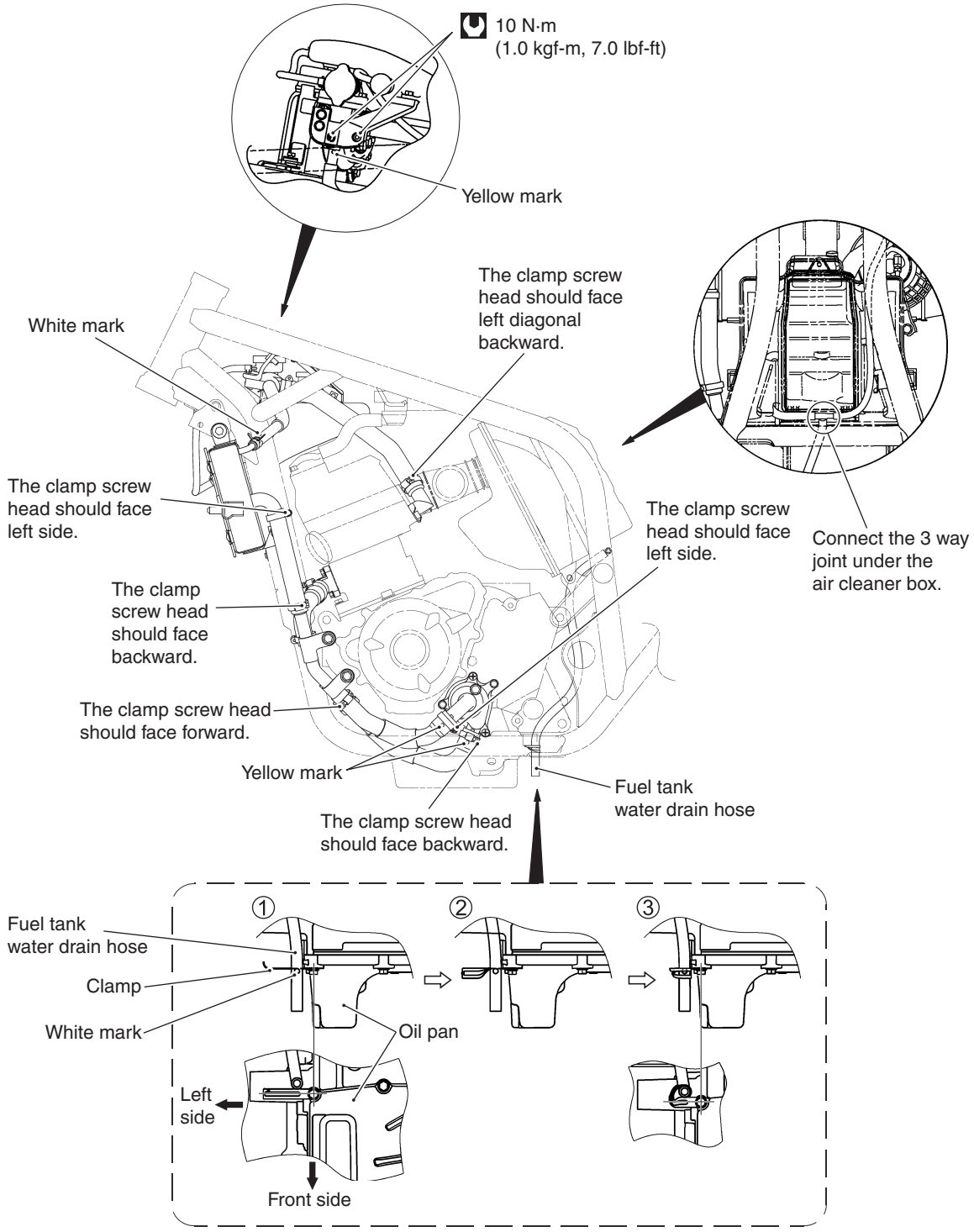
VIEW A

①	Fuel tank water drain hose	*2	Pass the hoses to the forward of frame.
②	Fuel tank breather hose No.1	*3	Connect the reservoir tank overflow hose ⑥ to the narrow side of 3 way joint ⑤.
③	Fuel tank breather hose No.2	*4	Pass the fuel tank breather hose No.2 to left side of the fuel tank water drain hose.
④	Fuel tank breather hose No.3	*5	Align the white making on the hoses with the clamp.
⑤	3-way joint	*6	Match the direction of 3-way joint and hoses.
⑥	Reservoir tank overflow hose	*7	White marking
*1	Set the fuel tank water drain hose and fuel tank breather hose No.1 with lengthwise backward.	*8	To fuel tank.

COOLING SYSTEM HOSE ROUTING

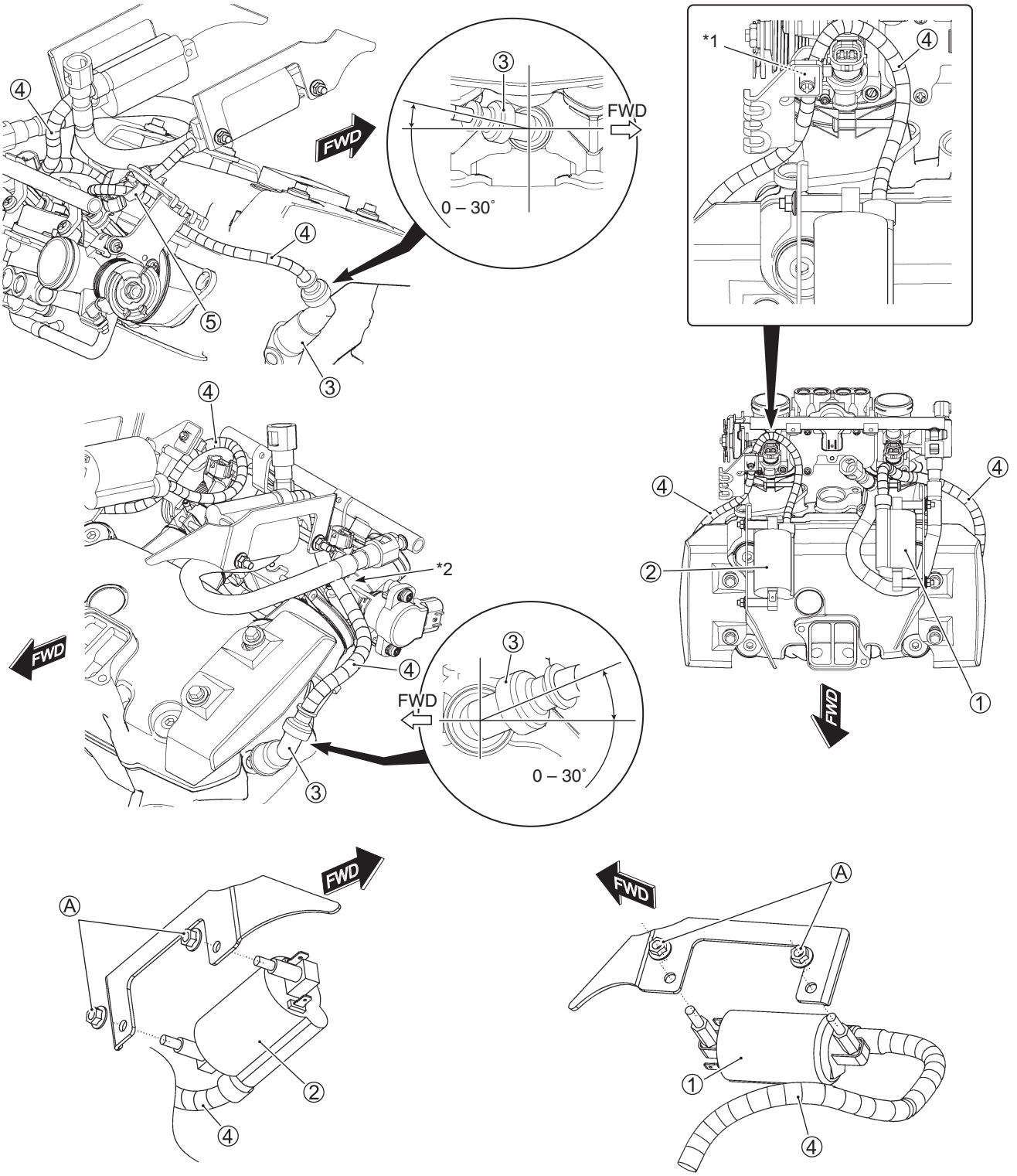






When clamping the fuel tank water drain hose, clamp the fuel tank water drain hose in this order (① → ② → ③).

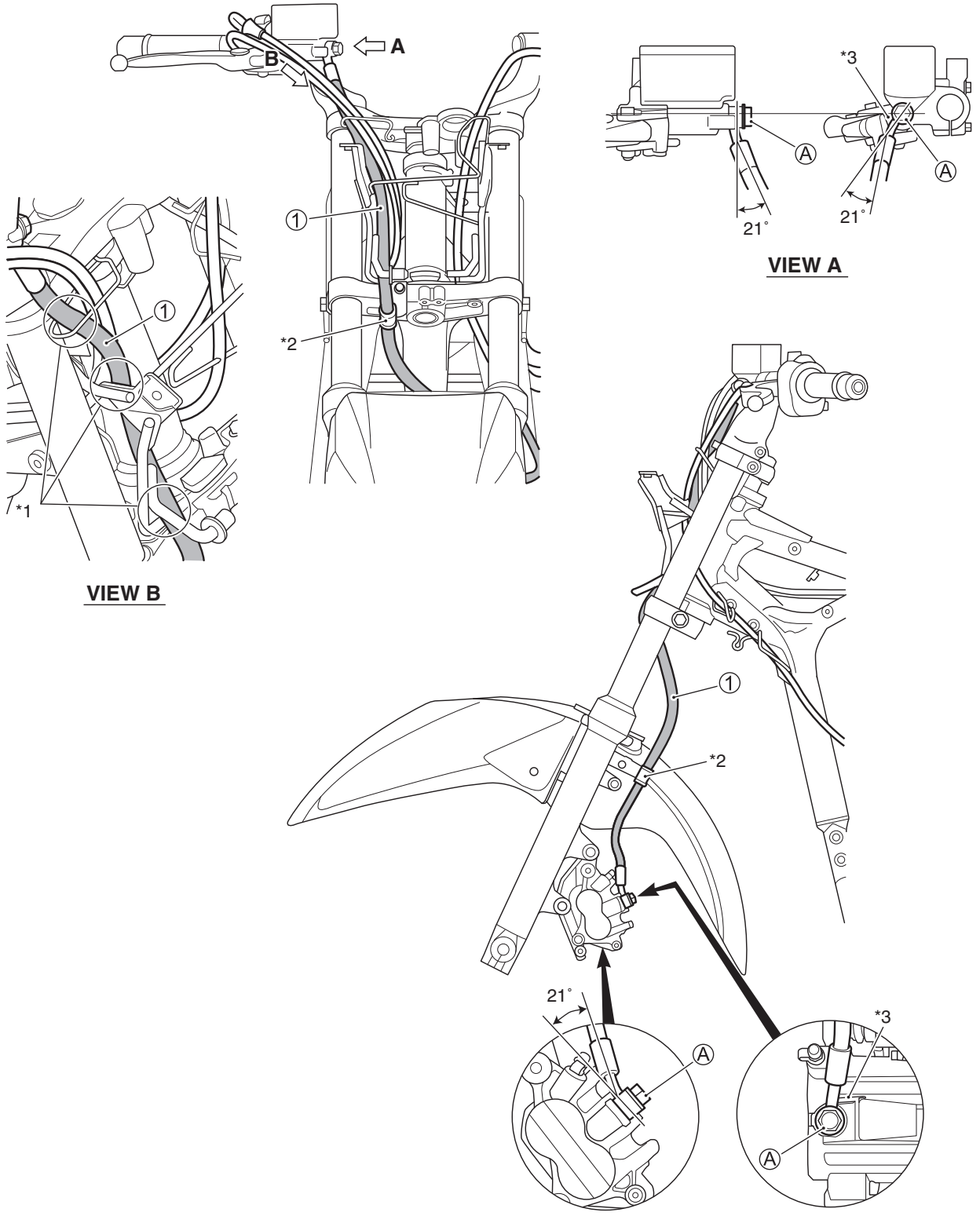
IGNITION COIL INSTALLATION



①	Ignition coil #1	*1	Pass the high tension cord behind the throttle cable guide.
②	Ignition coil #2		
③	Spark plug cap	*2	Pass the high tension cord under the fuel hose.
④	High tension cord		
⑤	Clamp		

ITEM	N·m	kgf-m	lbf-ft
Ⓐ	6.5	0.65	4.5

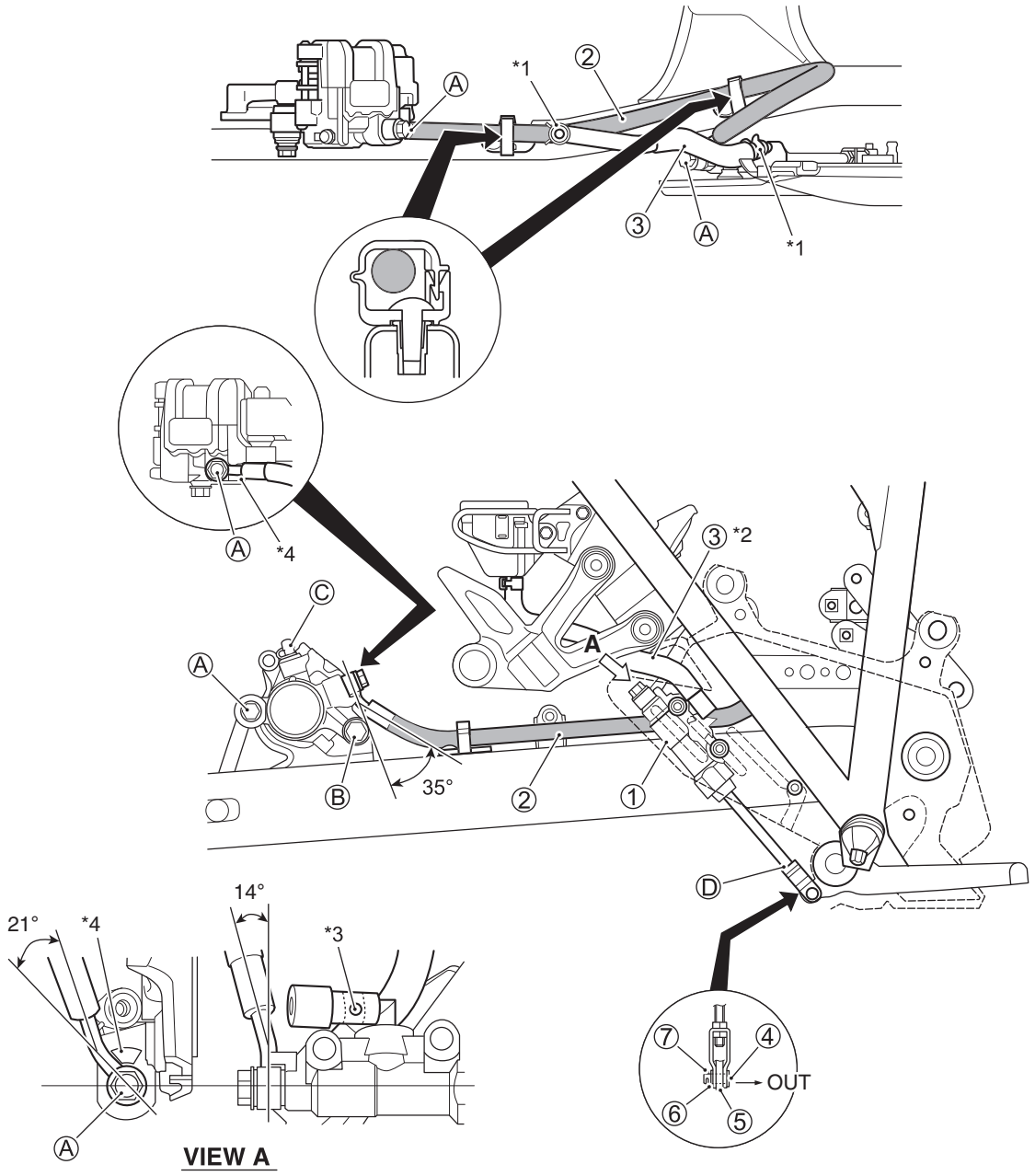
FRONT BRAKE HOSE ROUTING



①	Brake hose	*3	After the brake hose union has contacted the stopper, tighten the union bolt.
*1	Pass the brake hose as shown.		
*2	Clamp the brake hose firmly.		

ITEM	N·m	kgf-m	lbf-ft
Ⓐ	23	2.3	16.5

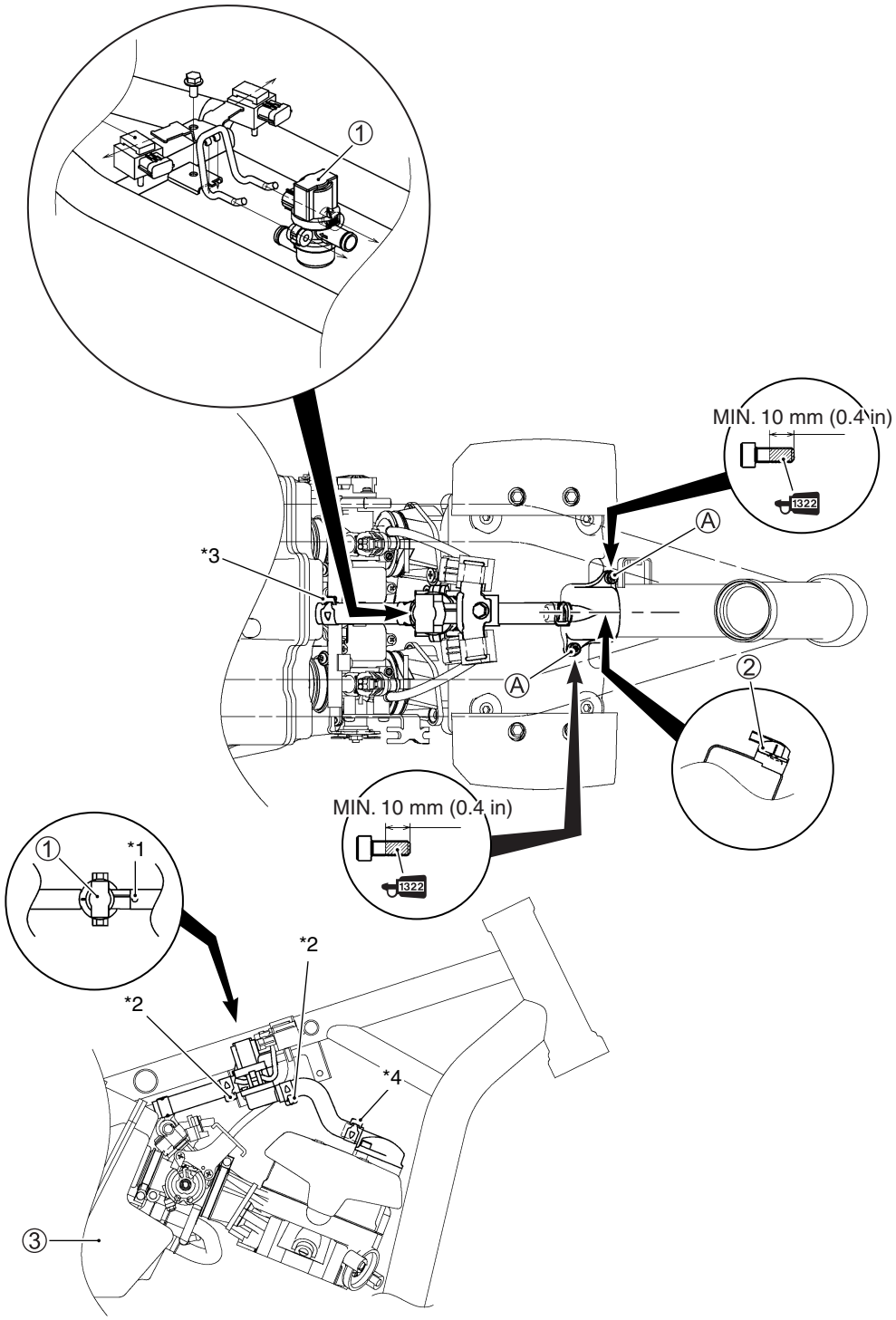
REAR BRAKE HOSE ROUTING



①	Rear brake master cylinder	*1	Clamp ends should face as shown.
②	Rear brake hose	*2	Insert the reservoir tank hose to the union firmly.
③	Rear brake reservoir tank hose		
④	Pin	*3	White paint faces outside before binding the clamp.
⑤	Rear brake pedal	*4	After the brake hose union has contacted the stopper, tighten the union bolt.
⑥	Washer		
⑦	Cotter pin		

ITEM	N·m	kgf-m	lbf-ft
Ⓐ	23	2.3	16.5
Ⓑ	27	2.7	19.5
Ⓒ	6	0.6	4.5
Ⓓ	18	1.8	13.0

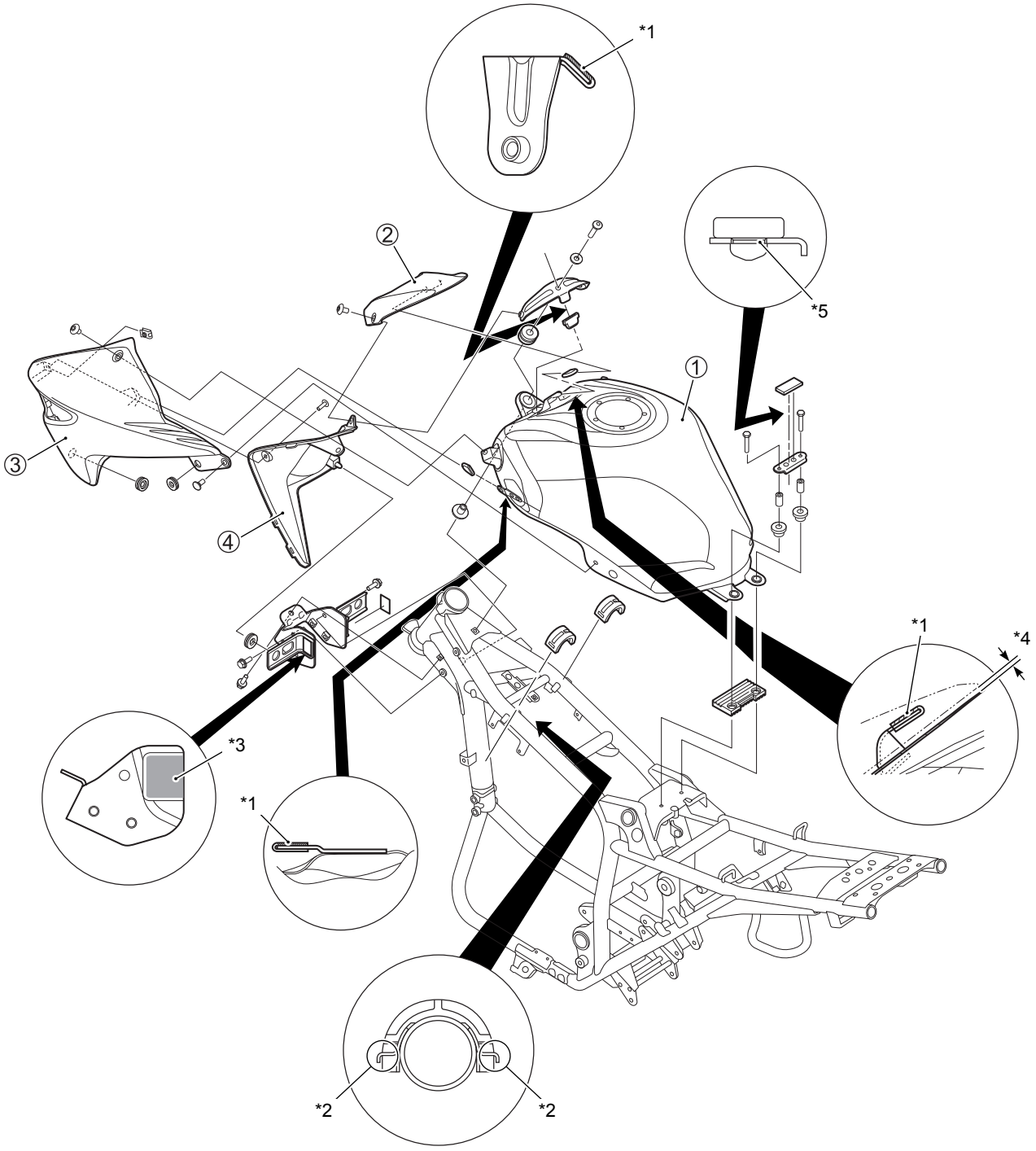
PAIR (AIR SUPPLY) SYSTEM HOSE ROUTING



①	PAIR control solenoid valve	*2	The clamp end should face downward.
②	PAIR reed valve	*3	The clamp end should face left side.
③	Air cleaner box	*4	The clamp end should face upward.
*1	White mark		

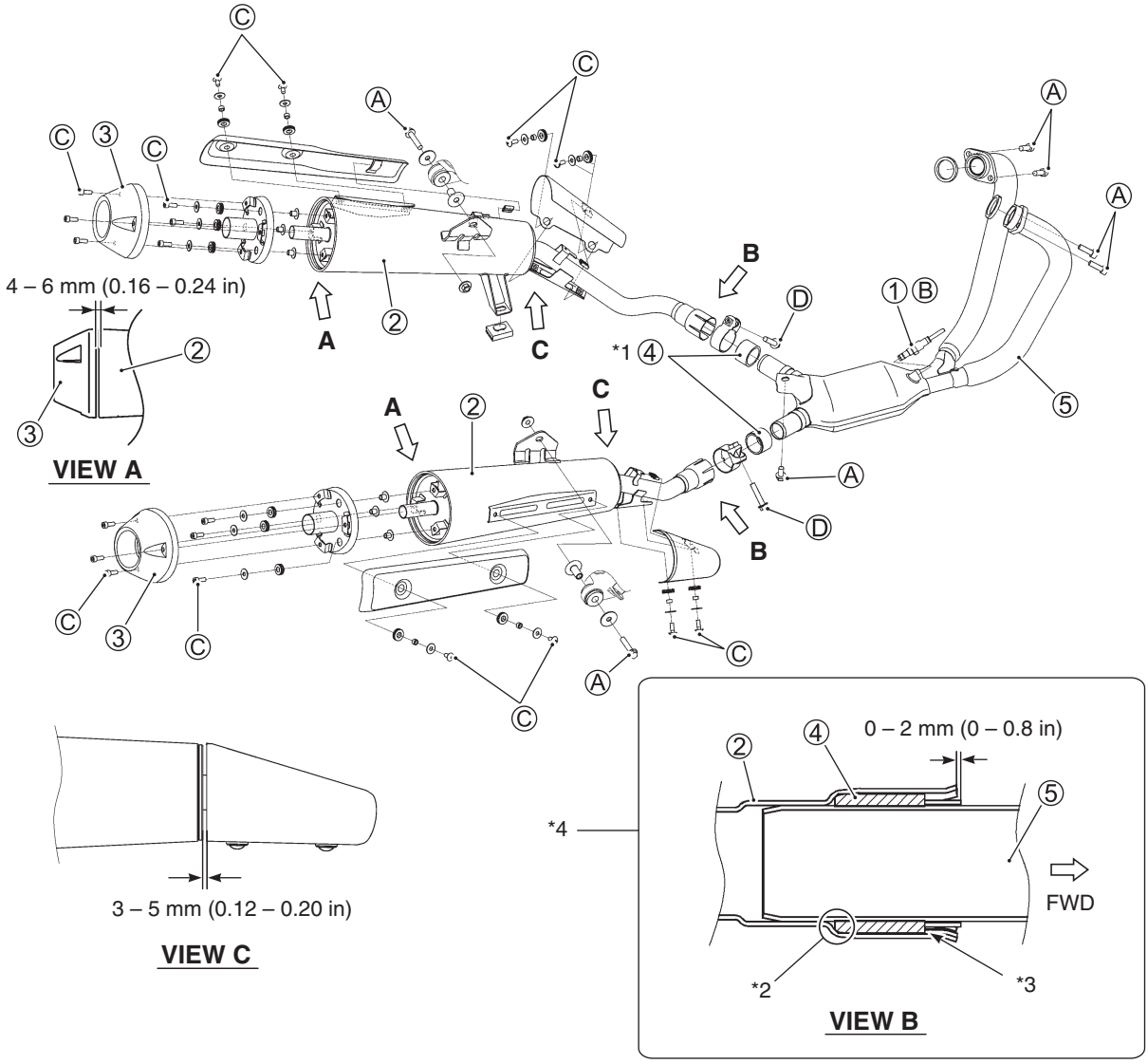
ITEM	N·m	kgf-m	lbf-ft
Ⓐ	10	1.0	7.0

FUEL TANK INSTALLATION



①	Fuel tank	*2	Hung on projection part firmly.
②	Fuel tank center cover	*3	Clean the surface before attaching the cushion.
③	Fuel tank cover	*4	Keep clearance 2 – 4 mm (0.08 – 0.16 in) between the fuel tank and fuel tank covers ②, ③, ④.
④	Fuel tank front cover		
*1	Apply adhesive agent.	*5	Insert the cushion to the bracket firmly.

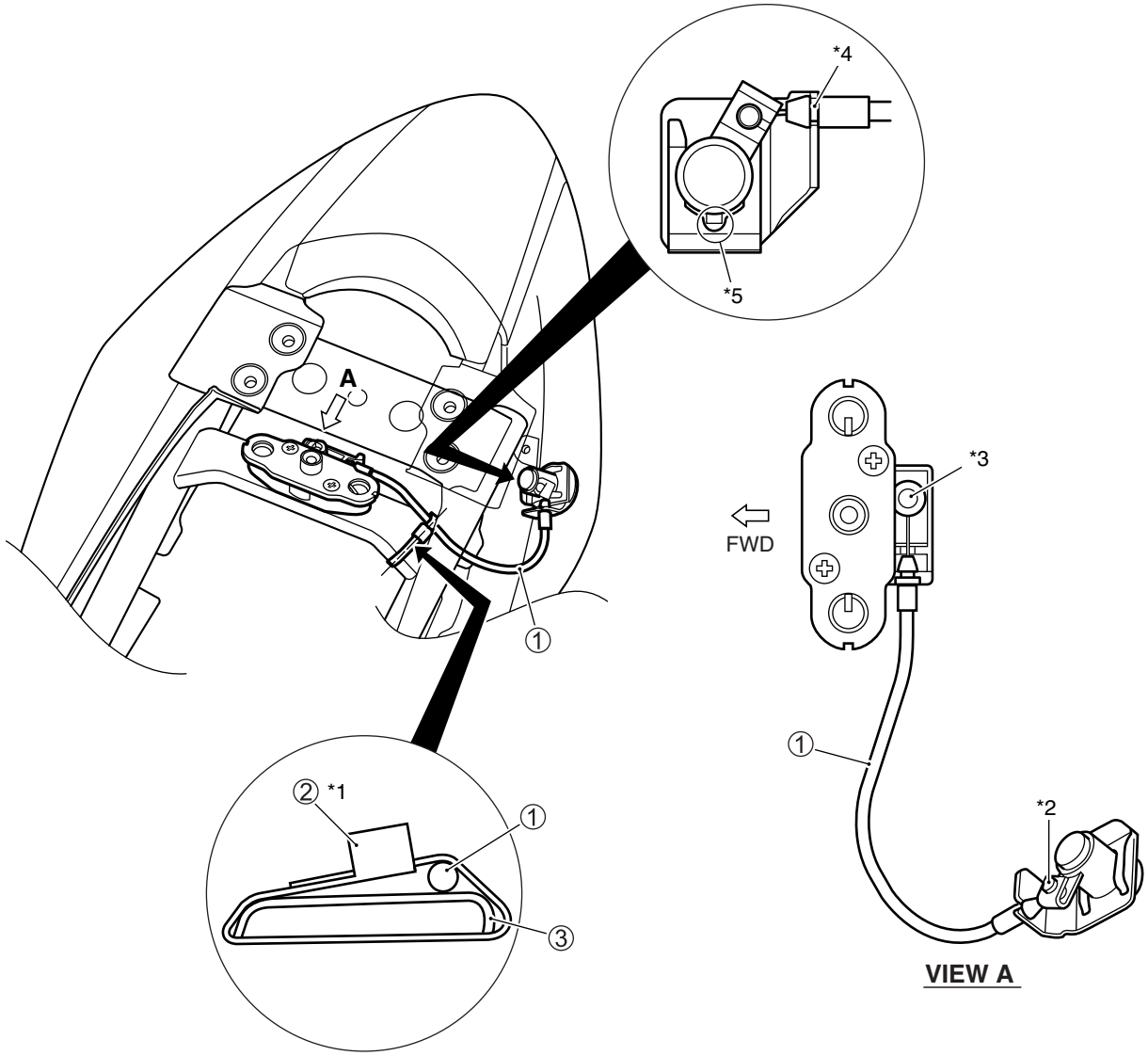
MUFFLER & EXHAUST PIPE INSTALLATION



①	HO2 sensor	*2	The chamfer side of connector face the muffler side.
②	Muffler		
③	Rear muffler cover	*3	Contact the connector ④ to the stopper.
④	Connector	*4	Install the connector ④ to the exhaust pipe ⑤ and then install the muffler ②.
⑤	Exhaust pipe		
*1	Apply muffler seal.		

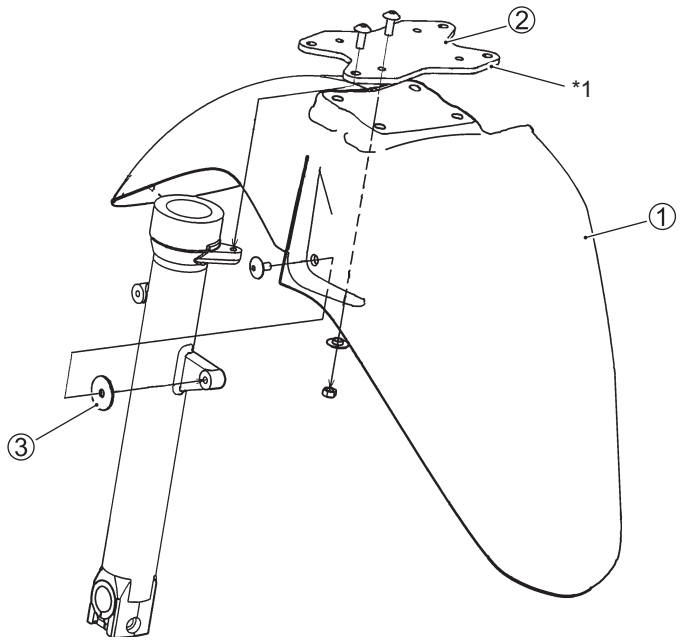
ITEM	N·m	kgf-m	lbf-ft
Ⓐ	23	2.3	16.5
Ⓑ	25	2.5	18.0
Ⓒ	10	1.0	7.0
Ⓓ	17	1.7	12.5

SEAT LOCK CABLE ROUTING



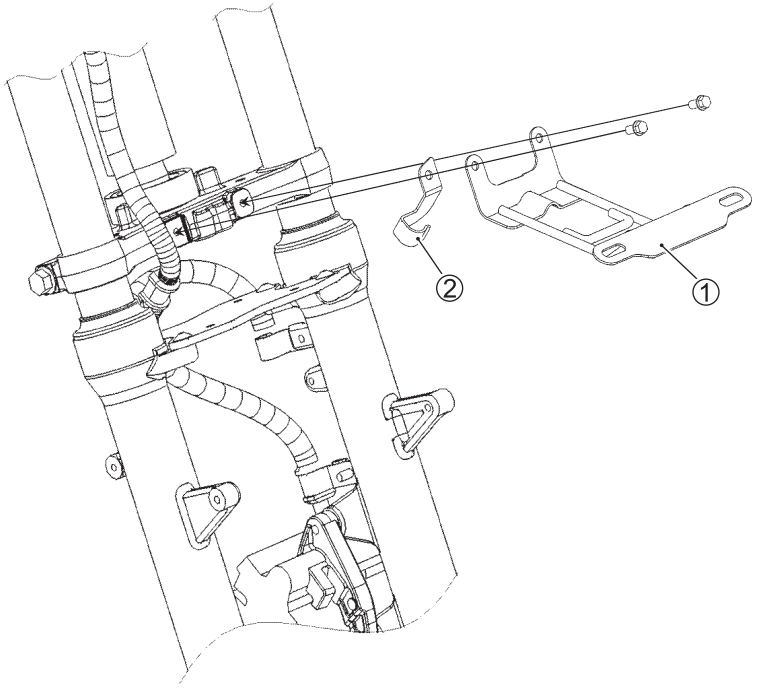
①	Seat lock cable	*2	The tip of the cable is cylindrical shaped.
②	Clamp	*3	The tip of the cable is spherical shaped.
③	Flame	*4	Set the cable firmly.
*1	The lock part of clamp over the frame.	*5	Align the lib of seat lock assembly and groove of each parts.

FRONT FENDER INSTALLATION



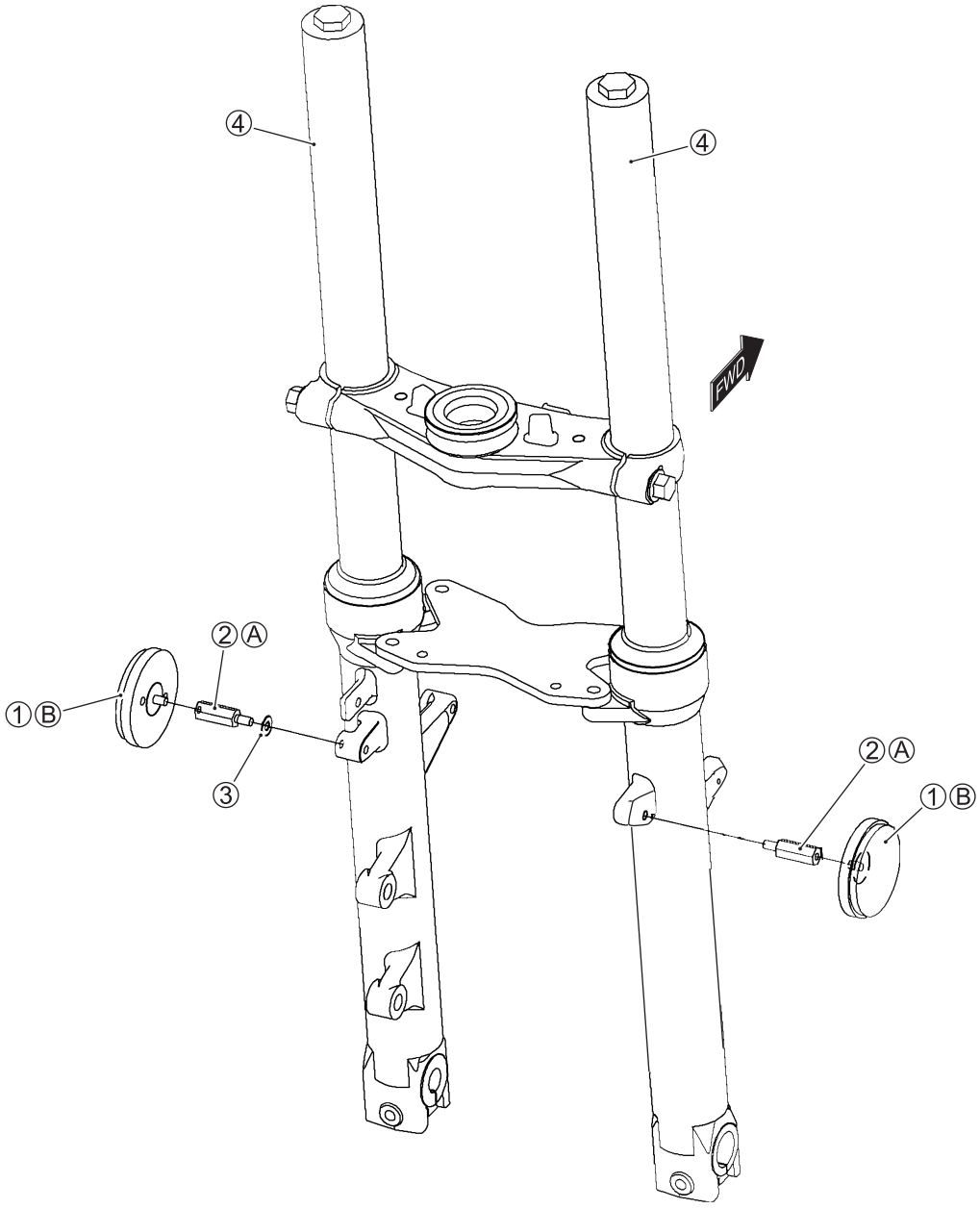
①	Front fender	③	Washer (RH only)
②	Front stabilizer	*1	The embossed lettering of the front stabilizer must face lower side

FRONT LICENSE PLATE INSTALLATION (Only for P-12)



①	Front license plate	②	Clamp

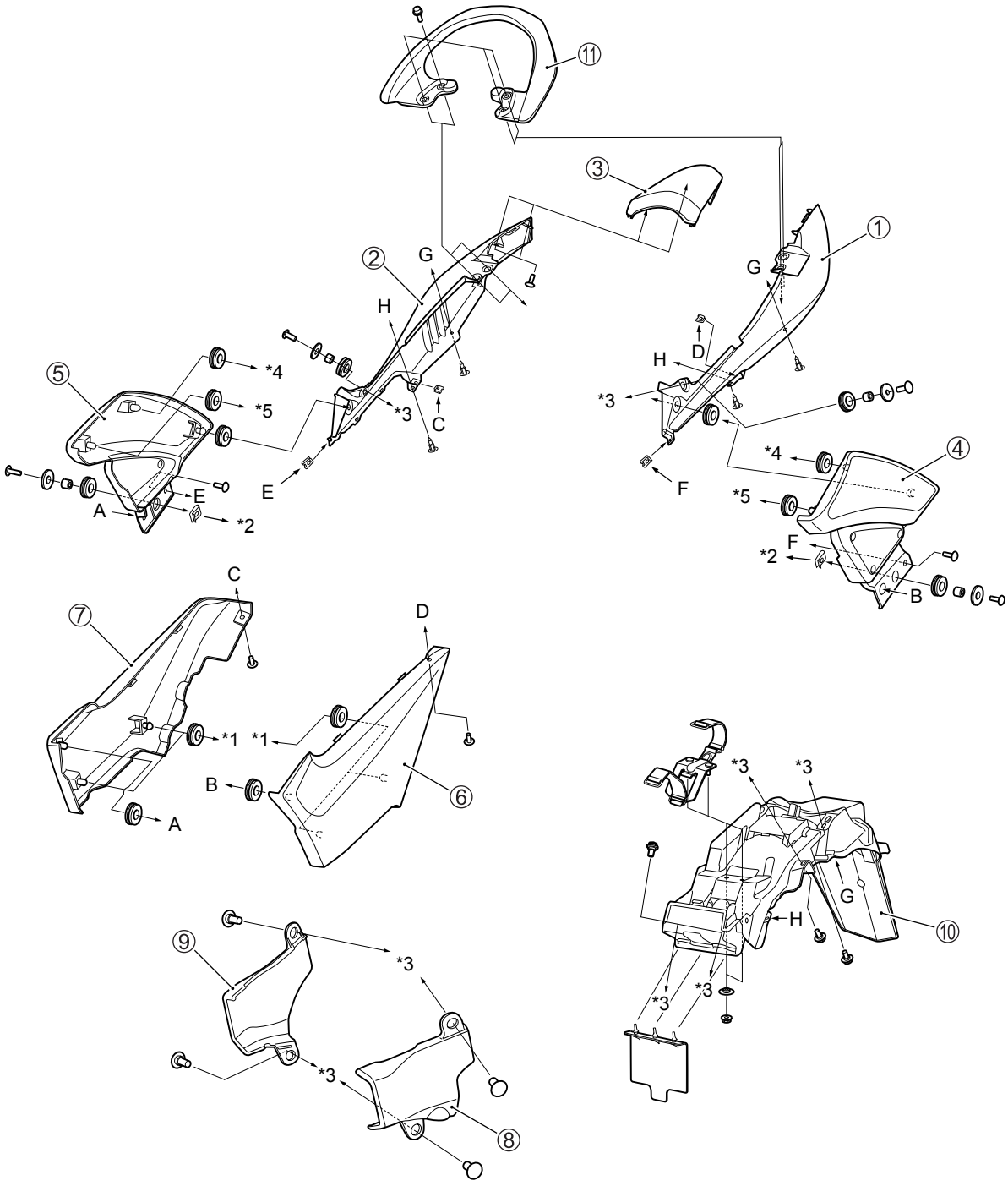
FRONT SIDE REFLEX REFLECTOR INSTALLATION (Only for P-24)



①	Reflex reflector	③	Washer
②	Reflector bolt	④	Front fork

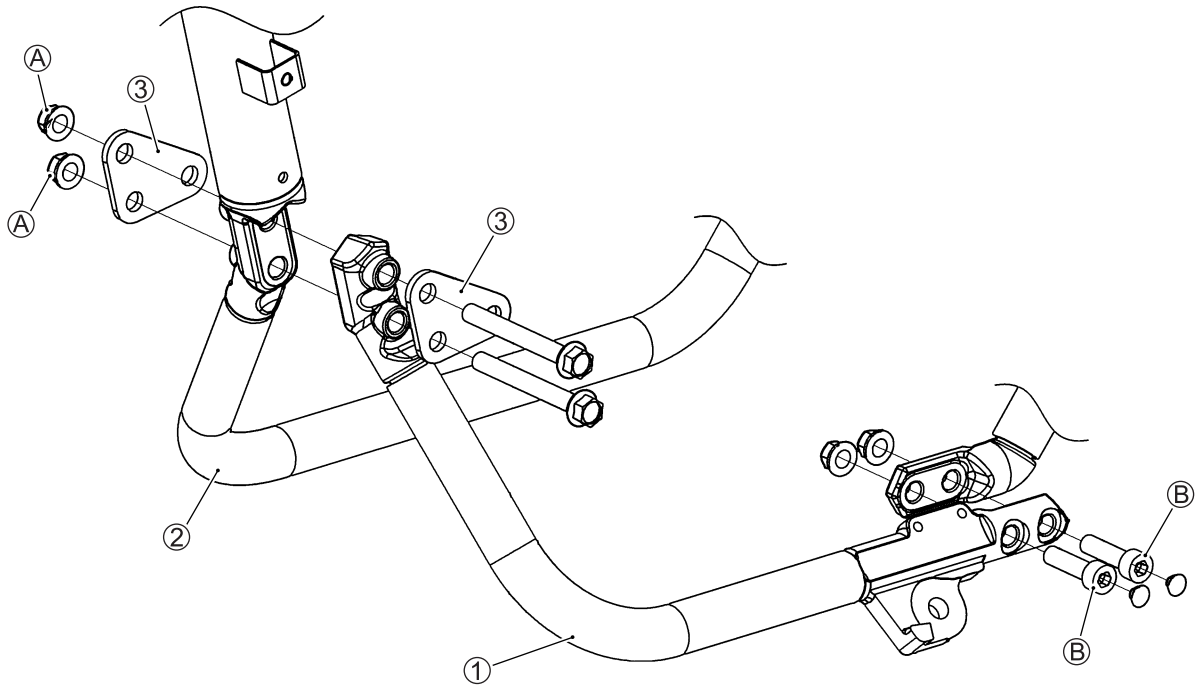
ITEM	N·m	kgf-m	lbf-ft
Ⓐ	4.5	0.45	3.5
Ⓑ	1.8	0.18	1.5

FRAME COVER INSTALLATION



①	Frame upper cover (LH)	⑨	Frame head cover (RH)
②	Frame upper cover (RH)	⑩	Rear fender
③	Frame upper cover (CENTER)	⑪	Pillion rider handle
④	Frame front cover (LH)	*1	To footrest bracket.
⑤	Frame front cover (RH)	*2	To air cleaner box.
⑥	Frame cover (LH)	*3	To frame.
⑦	Frame cover (RH)	*4	To fuel tank.
⑧	Frame head cover (LH)	*5	To fuel tank cover.

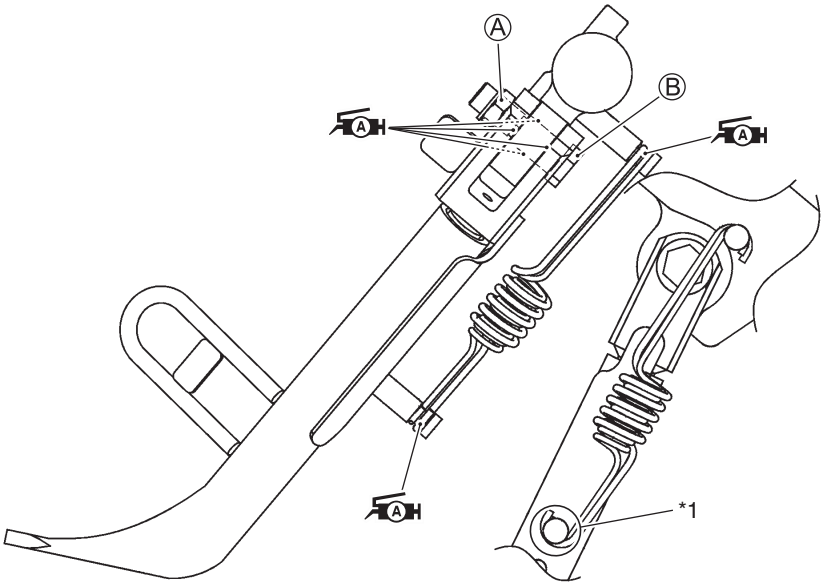
FRAME INSTALLATION



①	Frame down tube
②	Frame
③	Engine mounting bracket

ITEM	N·m	kgf-m	lbf-ft
Ⓐ	60	6.0	43.5
Ⓑ	50	5.0	36.0

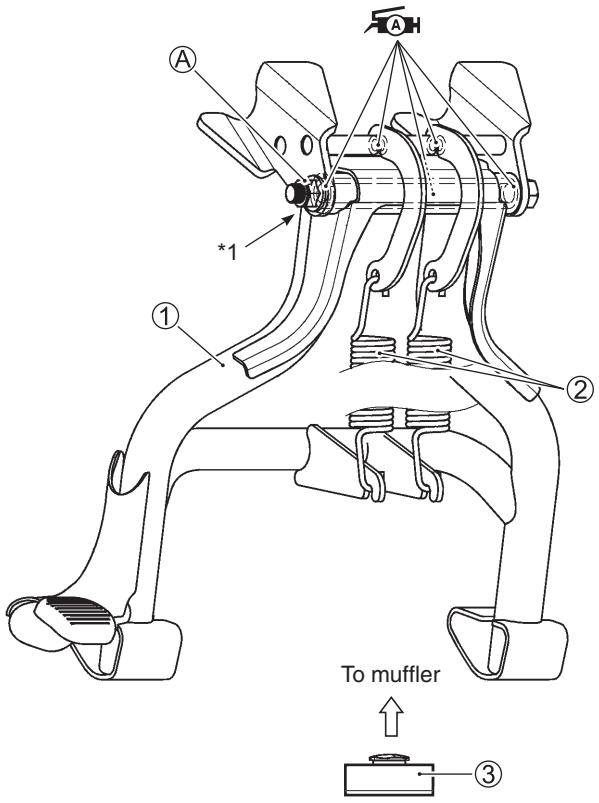
SIDE-STAND INSTALLATION



*1	Install the spring as shown.

ITEM	N·m	kgf-m	lbf-ft
Ⓐ	40	4.0	29.0
Ⓑ	10	1.0	7.0

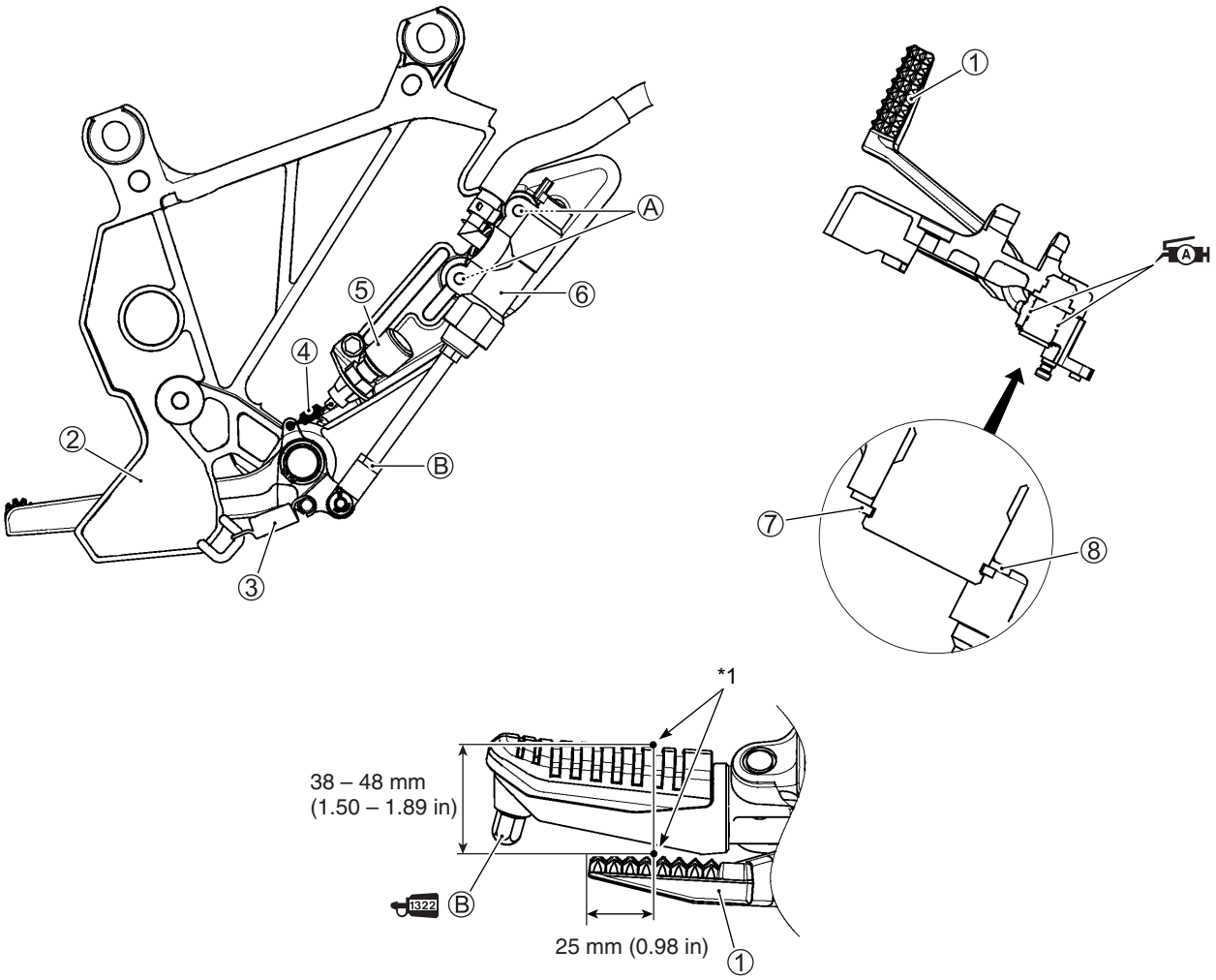
CENTER STAND INSTALLATION (For P-12)



①	Center stand	③	Center stand cushion
②	Center stand spring	*1	Do not apply grease to the flange and thread part.

ITEM	N·m	kgf-m	lbf-ft
Ⓐ	60	6.0	43.5

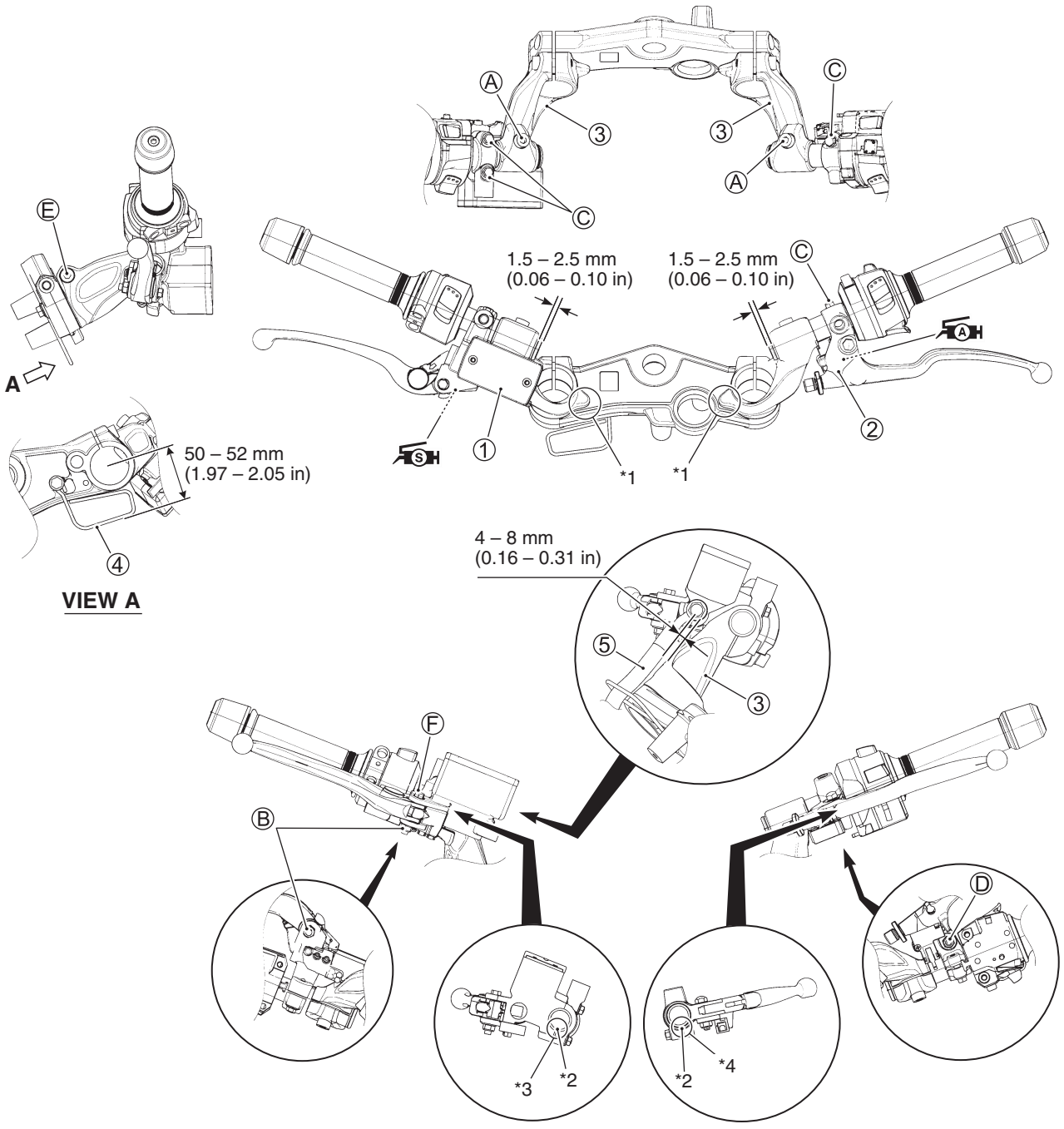
REAR BRAKE PEDAL INSTALLATION



①	Brake pedal	⑥	Rear brake master cylinder
②	Footrest bracket	⑦	Circlip
③	Brake pedal spring	⑧	Washer
④	Brake switch spring	*1	Measuring position.
⑤	Brake switch		

ITEM	N·m	kgf-m	lbf-ft
Ⓐ	10	1.0	7.0
Ⓑ	18	1.8	13.0

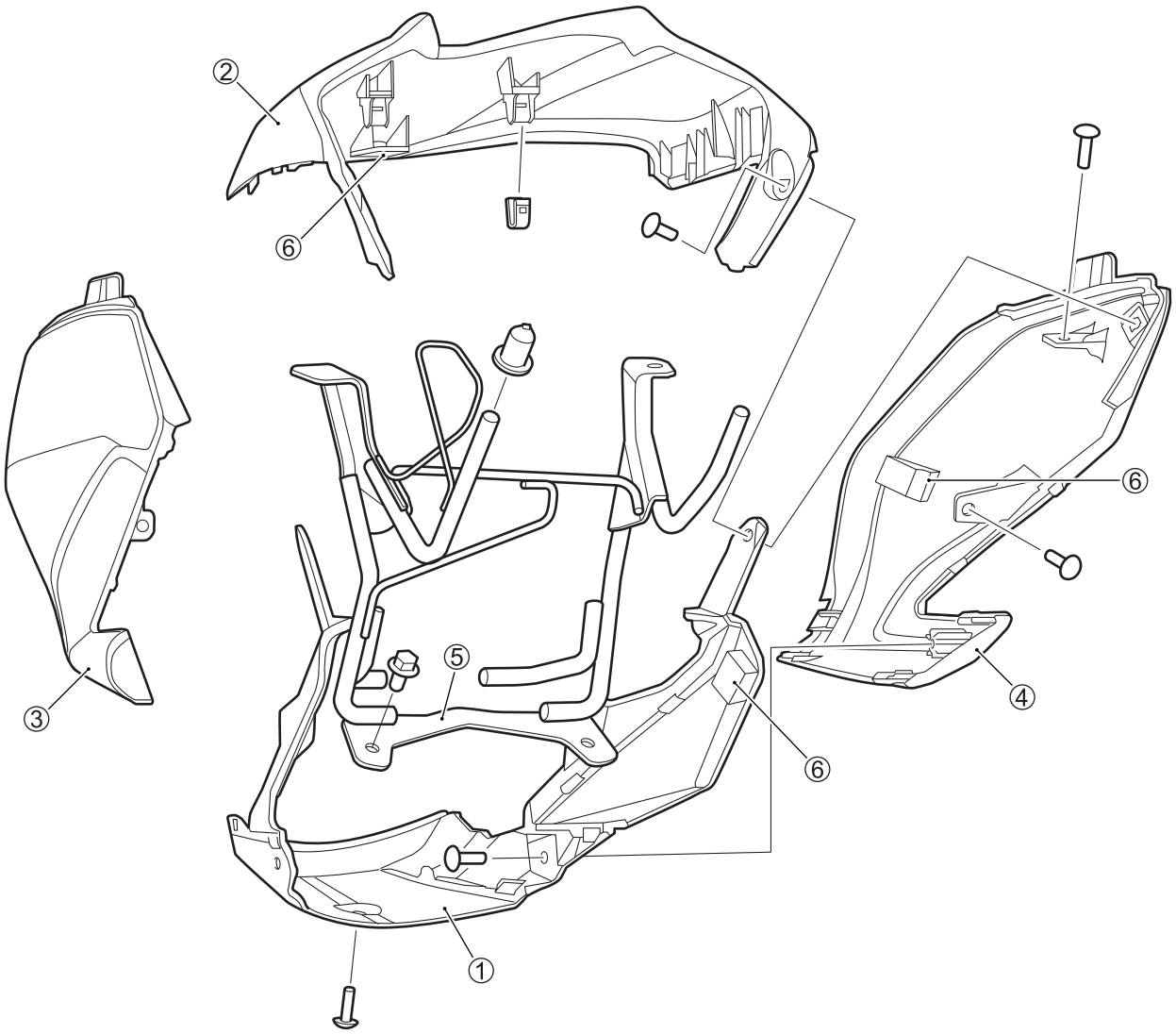
HANDLEBARS INSTALLATION



①	Front brake master cylinder	*1	Set the boss of handlebar holder into the hole of upper bracket.
②	Clutch lever holder	*2	punch mark.
③	Handlebar holder	*3	Align the matching surface of front brake master cylinder with punch mark.
④	Guide	*4	Align the matching surface of clutch lever holder with punch mark.
⑤	Front brake hose		

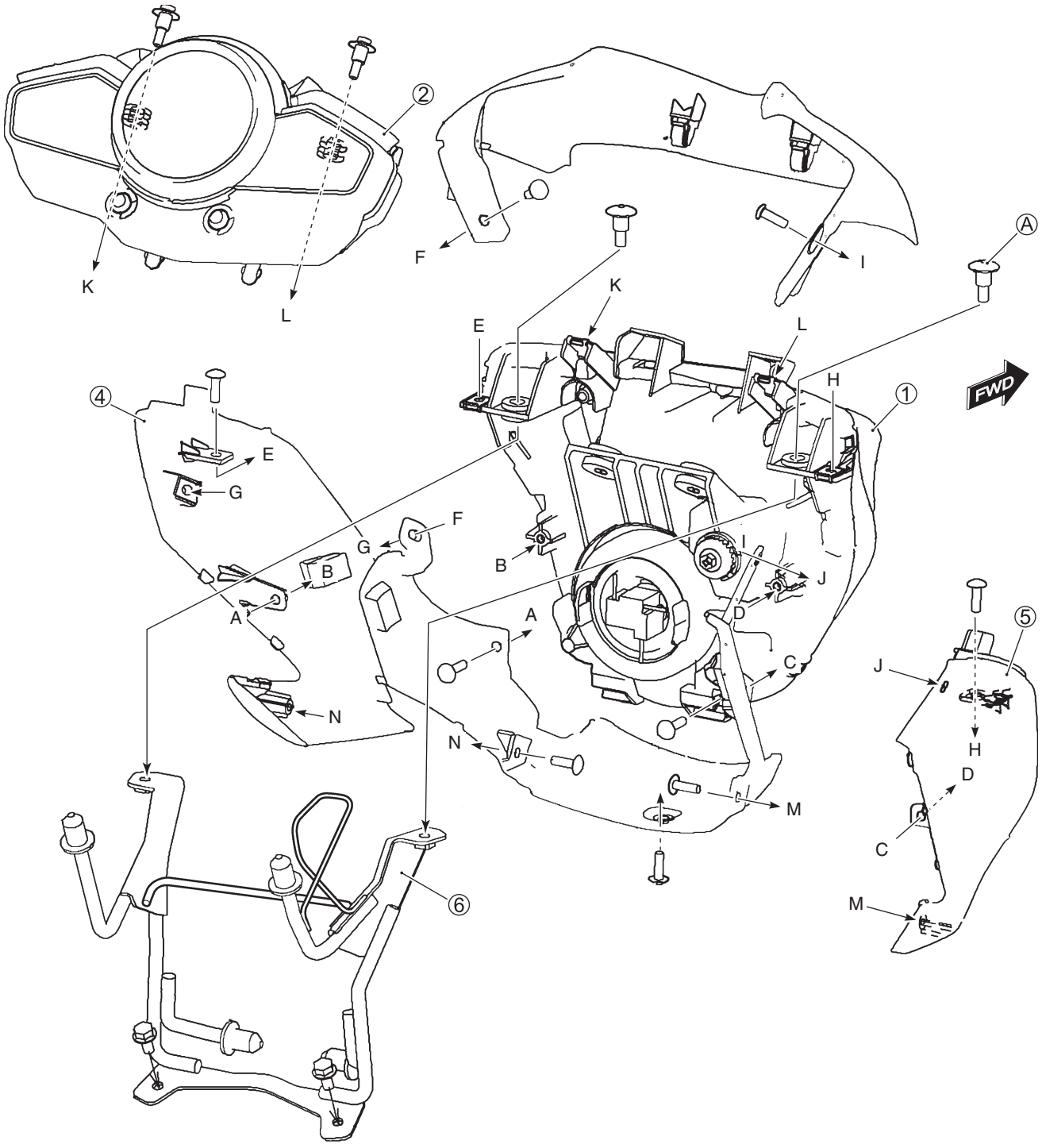
ITEM	N·m	kgf-m	lbf-ft
Ⓐ	16	1.6	11.5
Ⓑ	6	0.6	4.5
Ⓒ	10	1.0	7.0
Ⓓ	6.5	0.65	4.5
Ⓔ	23	2.3	16.5
Ⓕ	1	0.1	0.5

HEADLIGHT COVER INSTALLATION



①	Headlight lower cover	④	Headlight side cover (RH)
②	Headlight upper cover	⑤	Headlight housing brace
③	Headlight side cover (LH)	⑥	Cushion

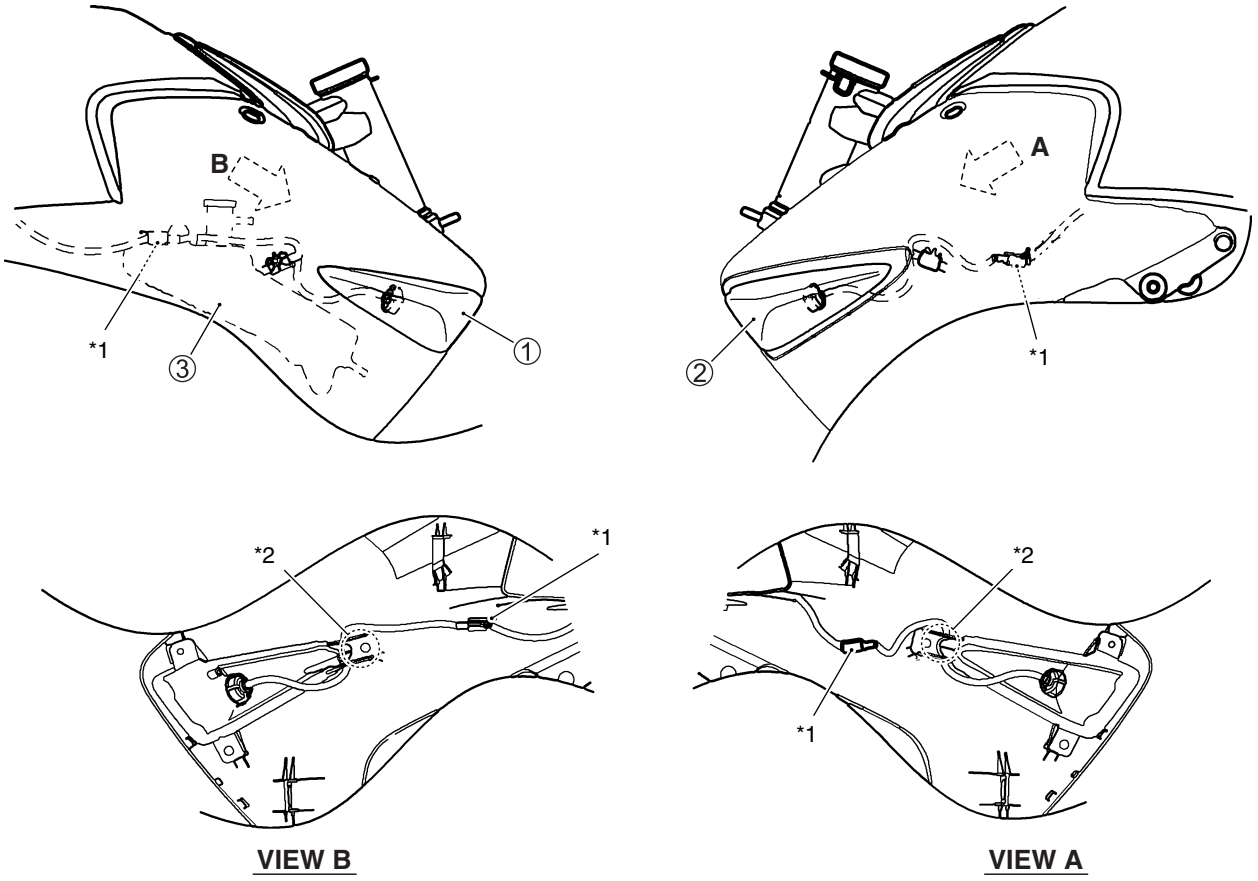
HEADLIGHT INSTALLATION



①	Headlight unit	④	Headlight side cover (LH)
②	Combination meter assembly	⑤	Headlight side cover (RH)
③	Headlight upper cover	⑥	Headlight housing brace

ITEM	N·m	kgf-m	lbf-ft
Ⓐ	6	0.6	4.5

FRONT TURN SIGNAL LIGHT INSTALLATION



VIEW B

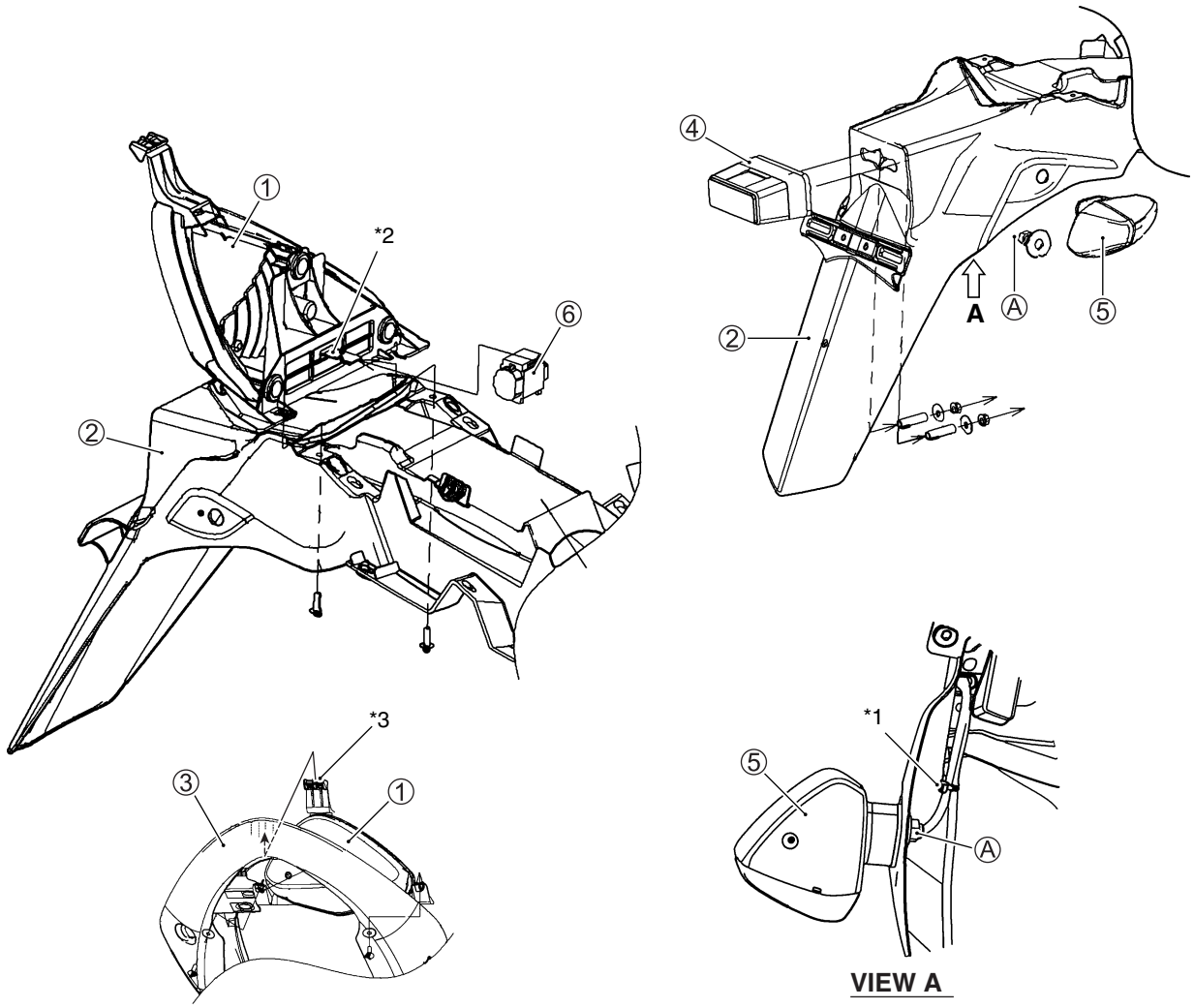
RH

VIEW A

LH

①	Front turn signal light (RH)	③	Radiator reservoir tank	*2	Pass the front turn signal lead wire behind the front turn signal light.
②	Front turn signal light (LH)	*1	Coupler position.		

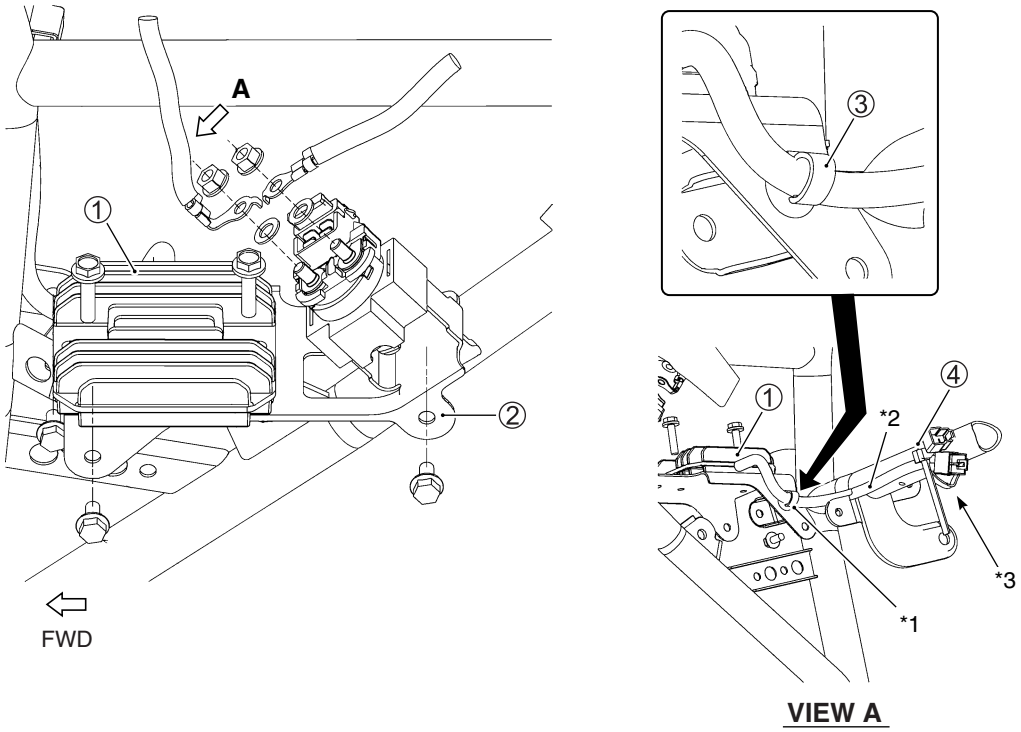
REAR COMBINATION LIGHT INSTALLATION

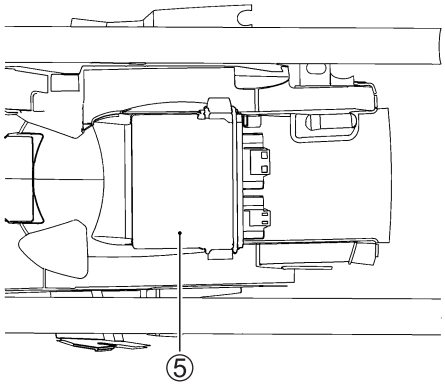


①	Brake/Tail light	*1	Cut the tip of clamp after clamping the lead wires. After clamping the rear turn signal light lead wire and license plate light lead wire, pass the lead wires inside the hole of the rear fender. Do not slacken.
②	Rear fender		
③	Rear frame center cover		
④	License plate light	*2	When installing the TO sensor, do not damage the brake/tail light bracket.
⑤	Rear turn signal light		
⑥	TO sensor	*3	Set the cushion of brake/tail light to the rib of the rear frame center cover.

ITEM	N·m	kgf-m	lbf-ft
Ⓐ	7	0.7	5.0

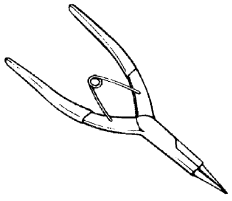
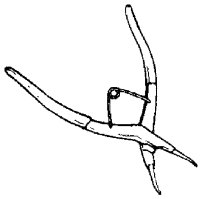
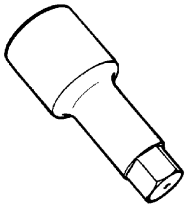
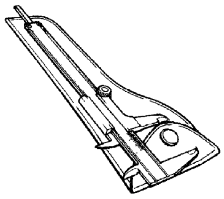
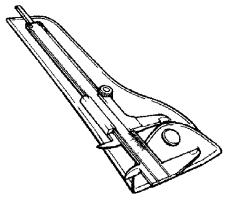
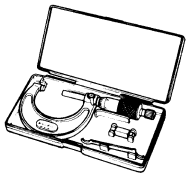
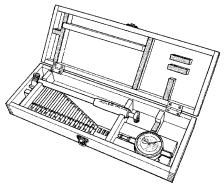
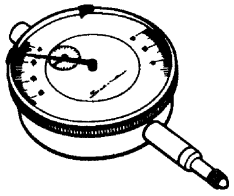
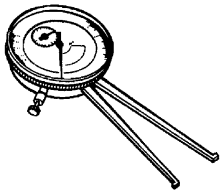
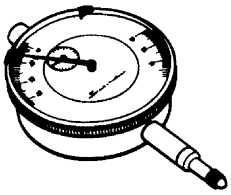
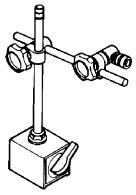
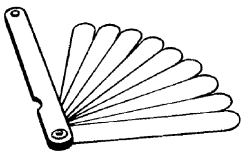
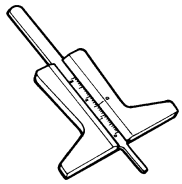
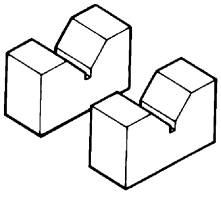
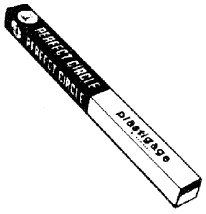
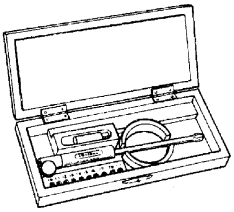
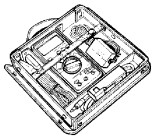
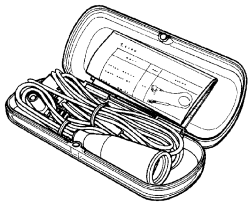
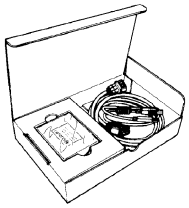
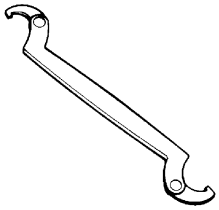
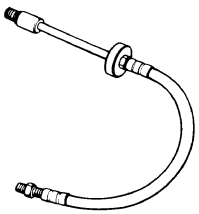
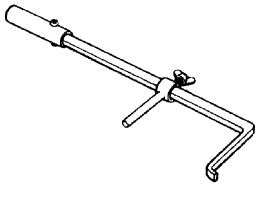
REGULATOR/RECTIFIER INSTALLATION

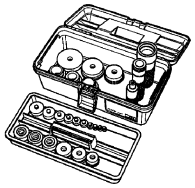
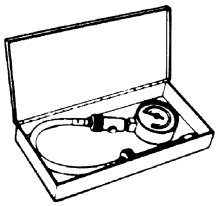
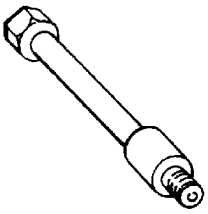
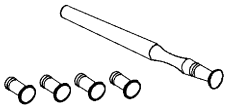
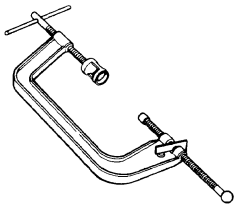
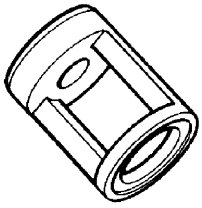
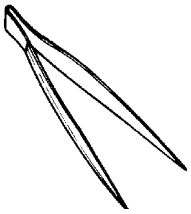
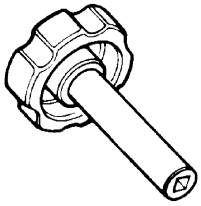
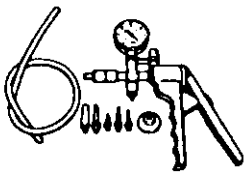
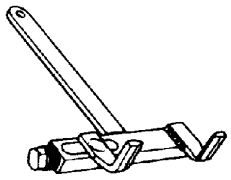
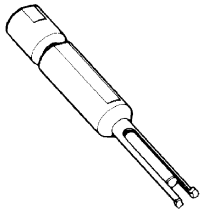
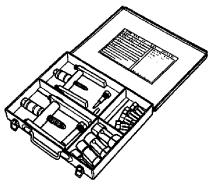
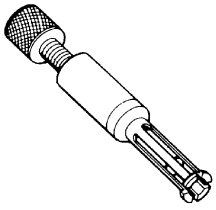
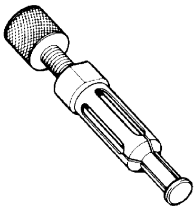
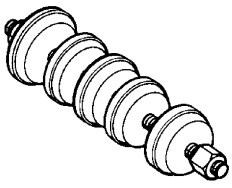
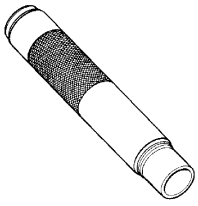
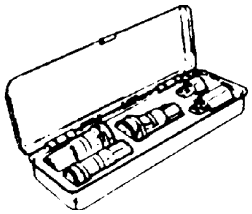
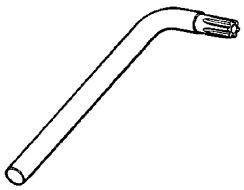
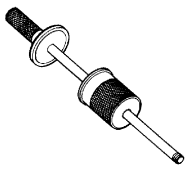
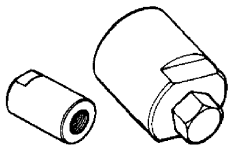
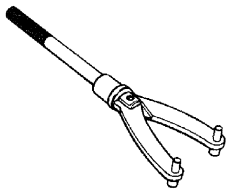
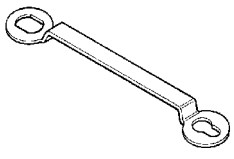


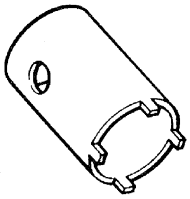
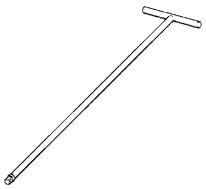
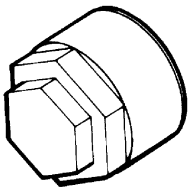
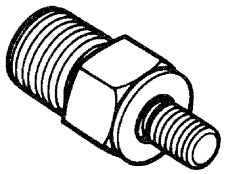
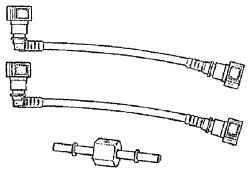
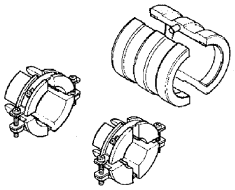
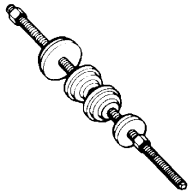
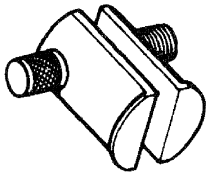
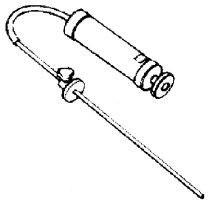
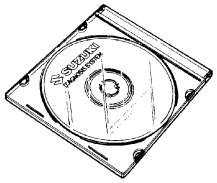


①	Regulator/Rectifier	④	Clamp	*2	Pass the regulator/rectifier lead wire along the frame. Do not slacken.
②	Bracket	⑤	ECM	*3	Clamp the regulator/rectifier lead wire at root of the connector.
③	Clamp	*1	Install the clamp to the bracket.		

SPECIAL TOOLS

 **09900-06107 Snap ring pliers (Open type)**	 **09900-06108 Snap ring pliers (Close type)**	 **09900-18710 Hexagon socket (12 mm)**	 **09900-20101 Vernier calipers (150 mm)**	 **09900-20102 Vernier calipers (200 mm)**
 **09900-20202 Micrometer (25 – 50 mm)**	 **09900-20203 Micrometer (50 – 75 mm)**	 **09900-20205 Micrometer (0 – 25 mm)**	 **09900-20530 Cylinder gauge set**	 **09900-20602 Dial gauge**
 **09900-20605 Dial calipers (10 – 34 mm)**	 **09900-20607 Dial gauge**	 **09900-20701 Dial gauge chuck**	 **09900-20803 Thickness gauge**	 **09900-20805 Tire depth gauge**
 **09900-21304 V blocks**	 **09900-22301 Plastigage (0.025 – 0.076 mm)**	 **09900-22302 Plastigage (0.051 – 0.152 mm)**	 **09900-22403 Small bore gauge (18 – 35 mm)**	 **09900-25008 Multi circuit tester set**
 **09900-25009 Needle-point probe set**	 **09904-41010 SUZUKI Diagnostic system set**	 **09910-60611 Universal clamp wrench**	 **09913-10750 Compression gauge adapter**	 **09913-50121 Oil seal remover**

 **09913-70210** **Bearing installing set (10 – 75 ϕ)**	 **09915-40620** **Oil filter wrench**	 **09915-64512** **Compression gauge**	 **09915-72410** **Oil pressure gauge attachment**	 **09915-74521** **Adapter hose**
 **09915-77331** **Oil pressure gauge (1 000 kPa)**	 **09916-10911** **Valve lapper set**	 **09916-14510** **Valve lifter**	 **09916-14910** **Valve lifter attachment**	 **09916-84511** **Tweezer**
 **09917-14910** **Tappet adjust driver**	 **09917-47011** **Vacuum pump gauge set**	 **09920-53740** **Clutch sleeve hub holder**	 **09921-20210** **Bearing remover (12 mm)**	 **09921-20240** **Bearing remover set**
 **09923-73210** **Bearing remover**	 **09923-74511** **Bearing remover**	 **09924-84510** **Bearing installer set**	 **09925-18011** **Bearing installer**	 **09930-10121** **Spark plug wrench set**
 **09930-11950** **Torx® wrench (T25H)**	 **09930-30104** **Rotor remover sliding shaft**	 **09930-31921** **Rotor remover set**	 **09930-40113** **Flywheel rotor holder**	 **09930-44521** **Rotor holder**

 **09930-82720 Mode selection switch**	 **09940-14911 Steering stem nut socket wrench**	 **09940-34520 T type handle**	 **09940-34581 Front fork assembling attachment (F)**	 **09940-40211 Fuel pressure gauge adapter**
 **09940-40220 Fuel pressure gauge attachment**	 **09940-52861 Front fork oil seal installer set**	 **09940-92720 Spring scale**	 **09941-34513 Bearing installer**	 **09941-54911 Bearing outer race remover**
 **09941-74911 Steering race installer**	 **09943-74111 Front fork oil level gauge**	 **99565-01010-028 CD-ROM Ver.28**		

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NOTE:
When order the special tool, please confirm whether it is available or not.

TIGHTENING TORQUE
ENGINE

ITEM		N·m	kgf-m	lbf-ft
Cylinder head cover bolt	(Initial)	10	1.0	7.0
	(Final)	14	1.4	10.0
Cylinder head bolt		25	2.5	18.0
Cylinder head cover cap bolt		10	1.0	7.0
Cylinder side bolt		10	1.0	7.0
Primary drive gear nut		70	7.0	50.5
Exhaust pipe bolt		23	2.3	16.5
Exhaust connecting bolt		17	1.7	12.5
Muffler support bolt		23	2.3	16.5
Muffler chamber support bolt		23	2.3	16.5
Muffler front cover screw		10	1.0	7.0
Muffler rear cover stay bolt		10	1.0	7.0
Muffler rear cover bolt		10	1.0	7.0
Muffler body cover screw		10	1.0	7.0
Speed sensor rotor bolt		23	2.3	16.5
Speed sensor bolt		4.5	0.45	3.5
Speed sensor bracket bolt		10	1.0	7.0
Engine sprocket nut		120	12.0	87.0
Engine mounting nut		55	5.5	40.0
Engine mounting bracket nut		60	6.0	43.5
Crank balancer bolt		50	5.0	36.0
Valve clearance adjuster lock-nut		10	1.0	7.0
Camshaft sprocket bolt		15	1.5	11.0
Spark plug		11	1.1	8.0
Throttle cable nut		4.5	0.45	3.0
Camshaft journal holder bolt		10	1.0	7.0
Cam chain tension adjuster cap bolt		8	0.8	6.0
Cam chain tension adjuster mounting bolt		10	1.0	7.0
Cam chain tensioner bolt		10	1.0	7.0
PAIR reed valve cover bolt		10	1.0	7.0
Generator cover plug		11	1.1	8.0
Clutch cover bolt		10	1.0	7.0
Clutch sleeve hub nut		50	5.0	36.0
Clutch release adjuster lock-nut		5.5	0.55	4.0
Clutch cable adjuster lock-nut		4.5	0.45	3.0
Valve timing inspection plug		21	2.1	15.0
Starter clutch bolt		26	2.6	19.0
Generator cover bolt		10	1.0	7.0
Generator rotor bolt		130	13.0	94.0
Generator stator set bolt		11	1.1	8.0
Gearshift cam stopper bolt		10	1.0	7.0
Gearshift cam stopper plate bolt		11	1.1	8.0

ITEM			N·m	kgf-m	lbf-ft
Shift cam bearing retainer screw			10	1.0	7.0
Oil pressure switch			13	1.3	9.5
Oil filter			20	2.0	14.5
Oil pressure switch lead wire bolt			1.5	0.15	1.0
Gearshift arm stopper			19	1.9	13.5
Gearshift fork shaft plug			25	2.5	18.0
Oil pressure regulator			28	2.8	20.0
Oil filter union bolt			15	1.5	11.0
Oil separator plate bolt			10	1.0	7.0
Engine sprocket cover bolt			10	1.0	7.0
Ignition coil nut			6.5	0.65	4.5
Gearshift lever shaft			40	4.0	29.0
Gearshift link arm bolt			10	1.0	7.0
Crankshaft journal bolt	(M: 8)	(Initial)	15	1.5	11.0
		(Final)	26	2.6	19.0
Crankcase bolt	(M: 6)		11	1.1	8.0
	(M: 8)		26	2.6	19.0
Oil gallery plug	Cylinder head		10	1.0	7.0
	Lower crankcase		25	2.5	18.0
Oil drain plug			23	2.3	16.5
Oil pump mounting bolt			10	1.0	7.0
Conrod cap bolt	(Initial)		15	1.5	11.0
	(Final)		90° (1/4 turn)		
Breather cover bolt			10	1.0	7.0
Oil strainer bolt			10	1.0	7.0
Oil pan bolt			10	1.0	7.0
Starter motor mounting bolt			10	1.0	7.0
Starter motor lead wire bolt			2.7	0.27	2.0
Headlight mounting screw			6	0.6	4.5

FI SYSTEM AND INTAKE AIR SYSTEM

ITEM	N·m	kgf-m	lbf-ft
GP switch mounting bolt	6.5	0.65	4.5
CKP sensor mounting bolt	5.5	0.55	4.0
Fuel delivery pipe mounting screw	5	0.5	3.5
Fuel pump mounting bolt	10	1.0	7.0
HO2 sensor	25	2.5	18.0
EVAP canister bracket mounting bolt	10	1.0	7.0
EVAP canister holder screw	5.5	0.55	4.0
EVAP system purge control solenoid valve mounting nut	7	0.7	5.0
Air cleaner upper mounting bolt	10	1.0	7.0
Air cleaner lower mounting bolt	5.5	0.55	4.0

COOLING SYSTEM

ITEM	N·m	kgf-m	lbf-ft
Impeller securing bolt	8	0.8	6.0
Water pump cover screw	5.5	0.55	4.0
Water pump mounting bolt	10	1.0	7.0
Water pump air bleeder bolt	6	0.6	4.5
Water jacket plug	25	2.5	18.0
Cooling fan motor assembly mounting bolt	7	0.7	5.0
Cooling fan mounting nut	1.1	0.11	1.0
ECT sensor	18	1.8	13.0
Cooling fan motor mounting screw	2.7	0.27	2.0
Radiator assembly mounting bolt	10	1.0	7.0
Reservoir tank mounting bolt	6	0.6	4.5
Reservoir tank bracket mounting bolt	10	1.0	7.0
Cylinder head water outlet pipe bolt	10	1.0	7.0
Water hose clamp screw	1.5	0.15	1.0
Thermostat connector cap bolt	10	1.0	7.0

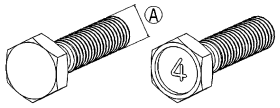
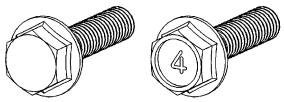
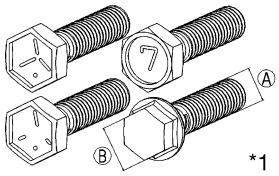
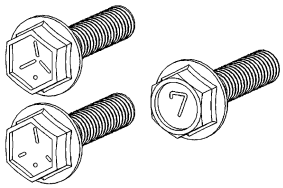
CHASSIS

ITEM	N·m	kgf-m	lbf-ft
Steering stem head nut	65	6.5	47.0
Steering stem nut	23 N·m (2.3 kgf-m, 16.5 lbf-ft) then turn counterclockwise 0 – 1/4		
Front fork upper clamp bolt	23	2.3	16.5
Front fork lower clamp bolt	33	3.3	24.0
Front fork cap bolt	23	2.3	16.5
Front fork damper rod bolt	30	3.0	21.5
Front axle	65	6.5	47.0
Front axle pinch bolt	23	2.3	16.5
Handlebar clamp bolt	16	1.6	11.5
Handlebar holder bolt	23	2.3	16.5

Front brake master cylinder holder bolt	10	1.0	7.0
Front brake caliper mounting bolt	26	2.6	19.0
Front brake caliper sliding pin A	23	2.3	16.5
Front brake caliper sliding pin B	13	1.3	9.5
Front brake pad mounting pin	18	1.8	13.0
Front brake pad pin plug	2.5	0.25	2.0
Brake hose union bolt	23	2.3	16.5
Front brake lever pivot bolt	1	0.1	0.5
Front brake lever pivot bolt lock-nut	6	0.6	4.5
Air bleeder valve (Front and Rear brake caliper)	6	0.6	4.5
Brake disc bolt (Front)	18	1.8	13.0
Brake disc bolt (Rear)	23	2.3	16.5
Rear brake caliper mounting bolt	23	2.3	16.5
Rear brake caliper sliding pin	27	2.7	19.5
Rear brake pad mounting pin	18	1.8	13.0
Rear brake pad pin plug	2.5	0.25	2.0
Rear brake master cylinder mounting bolt	10	1.0	7.0
Rear brake master cylinder rod lock-nut	18	1.8	13.0
Front footrest bracket mounting bolt	23	2.3	16.5
Swingarm pivot nut	65	6.5	47.0
Rear shock absorber mounting nut (Upper)	50	5.0	36.0
Rear shock absorber mounting nut (Lower)	84	8.4	61.0
Rear axle nut	65	6.5	47.0
Rear sprocket nut	49	4.9	35.5
Side-stand nut	40	4.0	29.0
Side-stand bolt	10	1.0	7.0
Frame down tube bolt/nut	50	5.0	36.0
Rear turn signal light mounting nut	7	0.7	5.0
Front reflector bolt (For P-24)	4.5	0.45	3.5
Front reflex reflector (For P-24)	1.8	0.18	1.5
Clutch lever holder bolt	10	1.0	7.0
Clutch lever pivot nut	6.5	0.65	4.5
Bank sensor bolt	18	1.8	13.0
Center stand nut (For P-12)	60	6.0	43.5

TIGHTENING TORQUE CHART

Each fastener should be tightened to the torque specified in “TIGHTENING LIST”. If no description or specification is provided, refer to the following tightening torque chart for the applicable torque for each fastener.

Strength	Unit	Thread diameter (Nominal diameter) Ⓐ [mm]								
		4	5	6	8	10	12	14	16	18
A equivalent of 4T strength fastener without flange 	N·m	1.5	3.0	5.5	13	29	45	65	105	160
	kgf-m	0.15	0.3	0.55	1.3	2.9	4.5	6.5	10.5	16.0
	lbf-ft	1.0	2.0	4.0	9.5	21.0	32.5	47.0	76.0	115.5
A equivalent of 4T strength fastener with flange 	N·m	1.7	3.3	6	14	32	50	72	116	176
	kgf-m	0.17	0.33	0.6	1.4	3.2	5.0	7.2	11.6	17.6
	lbf-ft	1.0	2.5	4.5	10.0	23.0	36.0	52.0	84.0	127.5
A equivalent of 7T strength fastener without flange and small crown shape bolt *1 	N·m	2.3	4.5	10	23	50	85	135	210	240
	kgf-m	0.23	0.45	1.0	2.3	5.0	8.5	13.5	21.0	24.0
	lbf-ft	1.5	3.5	7.0	16.5	36.0	61.5	97.5	152.0	173.5
A equivalent of 7T strength fastener with flange except small crown shape bolt 	N·m	2.5	5	11	25	55	94	149	231	264
	kgf-m	0.25	0.5	1.1	2.5	5.5	9.4	14.9	23.1	26.4
	lbf-ft	2.0	3.5	8.0	18.0	40.0	68.0	107.5	167.0	191.0

*1: Small crown shape bolt (crown shape bolt with flange either “Ⓐ = 5 & Ⓑ = 7” or “Ⓐ = 6 & Ⓑ = 8”)

SERVICE DATA

VALVE + GUIDE

Unit: mm (in)

ITEM	STANDARD		LIMIT
Valve diam.	IN.	27.0 (1.06)	—
	EX.	22.5 (0.89)	—
Valve 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 (0.1969 – 0.1973)	—
Valve stem O.D.	IN.	4.975 – 4.990 (0.1959 – 0.1965)	—
	EX.	4.955 – 4.970 (0.1951 – 0.1957)	—
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 stem end length	IN. & EX.	—	2.2 (0.09)
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.)	INNER	—	32.1 (1.26)
	OUTER	—	31.8 (1.25)
Valve spring tension (IN. & EX.)	INNER	58.2 – 71.2 N (6.0 – 7.3 kgf, 13.2 –16.1 lbs) at length 28.0 mm (1.10 in)	—
	OUTER	158.7 – 182.5 N (16.2 – 18.6 kgf, 35.7 – 41.0 lbs) at length 31.5 mm (1.24 in)	—

CAMSHAFT + CYLINDER HEAD

Unit: mm (in)

ITEM	STANDARD		LIMIT
Cam height	IN.	33.34 – 33.38 (1.313 – 1.314)	33.04 (1.301)
	EX.	33.05 – 33.09 (1.301 – 1.303)	32.75 (1.289)
Camshaft journal oil clearance	0.032 – 0.066 (0.0013 – 0.0026)		0.150 (0.0059)
Camshaft journal holder I.D.	22.012 – 22.025 (0.8666 – 0.8671)		—
Camshaft journal O.D.	21.959 – 21.980 (0.8645 – 0.8654)		—
Camshaft runout	—		0.10 (0.004)
Rocker arm I.D.	IN. & EX.	12.003 – 12.018 (0.4726 – 0.4731)	—
Rocker arm shaft O.D.	IN. & EX.	11.986 – 11.994 (0.4719 – 0.4722)	—
Cylinder head distortion	—		0.10 (0.004)

CYLINDER + PISTON + PISTON RING

Unit: mm (in)

ITEM	STANDARD			LIMIT
Compression pressure	1 300 – 1 700 kPa (13 – 17 kgf/cm², 185 – 242 psi)			1 000 kPa (10 kgf/cm², 142 psi)
Compression pressure difference	—			200 kPa (2 kgf/cm², 28 psi)
Piston-to-cylinder clearance	0.04 – 0.05 (0.001 – 0.002)			0.120 (0.0047)
Cylinder bore	53.500 – 53.515 (2.1063 – 2.1069)			53.590 (2.1098)
Piston diam.	53.455 – 53.470 (2.1045 – 2.1051) Measure at 10 mm (0.4 in) from the skirt end.			53.380 (2.1016)
Cylinder distortion	—			0.10 (0.004)
Piston ring free end gap	1st	1R	Approx. 5.3 (0.21)	4.2 (0.17)
	2nd	2R	Approx. 4.6 (0.18)	3.6 (0.14)
Piston ring end gap	1st		0.20 – 0.32 (0.008 – 0.013)	0.50 (0.020)
	2nd		0.20 – 0.32 (0.008 – 0.013)	0.50 (0.020)
Piston ring-to-groove clearance	1st		—	0.180 (0.0071)
	2nd		—	0.150 (0.0059)
Piston ring groove width	1st		1.01 – 1.03 (0.0398 – 0.0406)	—
	2nd		1.01 – 1.03 (0.0398 – 0.0406)	—
	Oil		2.01 – 2.03 (0.0791 – 0.0799)	—
Piston ring thickness	1st		0.97 – 0.99 (0.0382– 0.0390)	—
	2nd		0.97 – 0.99 (0.0382 – 0.0390)	—
Piston pin bore	15.002 – 15.008 (0.5906 – 0.5909)			15.030 (0.5917)
Piston pin O.D.	14.996 – 15.000 (0.5904 – 0.5906)			14.980 (0.5898)

CONROD + CRANKSHAFT

Unit: mm (in)

ITEM	STANDARD		LIMIT
Conrod small end I.D.	15.006 – 15.014 (0.5908 – 0.5911)		15.040 (0.5921)
Conrod big end side clearance	0.10 – 0.20 (0.004 – 0.008)		0.30 (0.012)
Conrod big end width	19.95 – 20.00 (0.7854 – 0.7874)		—
Crank pin width	20.10 – 20.15 (0.7913 – 0.7933)		—
Conrod big end oil clearance	0.032 – 0.056 (0.0013 – 0.0022)		0.080 (0.0031)
Crank pin O.D.	30.976 – 31.000 (1.2195 – 1.2205)		—
Crankshaft journal oil clearance	0.016 – 0.040 (0.0006 – 0.0016)		0.080 (0.0031)
Crankshaft journal O.D.	29.976 – 30.000 (1.1802 – 1.1811)		—
Crankshaft thrust bearing thickness	Right side	2.450 – 2.625 (0.0965 – 0.1033)	—
	Left side	2.450 – 2.475 (0.0965 – 0.0974)	
Crankshaft thrust clearance	0.050 – 0.105 (0.0020 – 0.0041)		—
Crankshaft runout	—		0.05 (0.002)

CRANK BALANCER

Unit: mm (in)

ITEM	STANDARD	LIMIT
Crank balancer journal oil clearance	0.020 – 0.044 (0.0008 – 0.0017)	0.080 (0.0031)
Crank balancer journal O.D.	27.976 – 28.000 (1.0660 – 1.1024)	—
Balancer spring free length	—	10.3 (0.41)

OIL PUMP

ITEM	STANDARD	LIMIT
Oil pressure (at 60 °C, 140 °F)	200 – 500 kPa (2 – 5 kgf/cm², 28 – 71 psi) at 3 000 r/min	—

CLUTCH

Unit: mm (in)

ITEM	STANDARD / SPECIFICATION		LIMIT
Clutch cable play	10 – 15 (0.39 – 0.59)		—
Clutch release screw	1 turn counterclockwise		—
Drive plate thickness	No. 1 and 2	2.92 – 3.08 (0.115 – 0.121)	2.62 (0.103)
	No. 3	3.42 – 3.58 (0.135 – 0.141)	3.12 (0.123)
Drive plate claw width	No. 1 and 2	15.9 – 16.0 (0.626 – 0.630)	15.2 (0.598)
	No. 3	15.98 – 16.05 (0.629 – 0.632)	15.2 (0.598)
Driven plate distortion	No. 1, 2 and 3	—	0.10 (0.004)
Clutch spring free length	38.5 (1.528)		36.6 (1.441)

TRANSMISSION + DRIVE CHAIN

Unit: mm (in) Except ratio

ITEM		STANDARD		LIMIT
Primary reduction ratio		3.238 (68/21)		—
Final reduction ratio		3.286 (46/14)		—
Gear ratios	Low	2.417 (29/12)		—
	2nd	1.529 (26/17)		—
	3rd	1.182 (26/22)		—
	4th	1.043 (24/23)		—
	5th	0.909 (20/22)		—
	Top	0.808 (21/26)		—
Shift fork to groove clearance		0.10 – 0.30 (0.004 – 0.012)		0.50 (0.020)
Shift fork groove width		5.0 – 5.1 (0.197 – 0.201)		—
Shift fork thickness		4.8 – 4.9 (0.189 – 0.193)		—
Drive chain		Type	DID520VF	
		Links	116 links	—
		20-pitch length	—	320.5 (12.62)
Drive chain slack		20 – 30 (0.8 – 1.2)		—
Gearshift lever height		28 – 38 (1.1 – 1.5)		—

THERMOSTAT + RADIATOR + FAN + COOLANT

ITEM	STANDARD/SPECIFICATION		NOTE
Thermostat valve opening temperature	Approx. 88 °C (190 °F)		—
Thermostat valve lift	4.5 mm (0.18 in) and over at 100 °C (212 °F)		—
ECT sensor resistance	20 °C (68 °F)	Approx. 2.45 kΩ	—
	50 °C (122 °F)	Approx. 0.811 kΩ	—
	80 °C (176 °F)	Approx. 0.318 kΩ	—
	110 °C (230 °F)	Approx. 0.142 kΩ	—
Radiator cap valve opening pressure	93 – 123 kPa (0.93 – 1.23 kgf/cm², 13.2 – 17.5 psi)		—
Cooling fan operating temperature	OFF→ON	Approx. 105 °C (221°F)	—
	ON→OFF	Approx. 100 °C (212 °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	Reserve tank side	Approx. 250 ml (0.3/0.2 US/Imp qt)	—
	Engine side	Approx. 1 100 ml (1.2/1.0 US/Imp qt)	—

INJECTOR + FUEL PUMP + FUEL PRESSURE REGULATOR

ITEM	STANDARD	NOTE
Injector resistance	11.5 – 12.5 Ω at 20 °C (68 °F)	
Fuel pump discharge amount	97.2 ml (3.3/3.4 US/Imp oz) or more/10 sec.	
Fuel pressure regulator operating set pressure	Approx. 300 kPa (3.0 kgf/cm², 43 psi)	

FI SENSORS

ITEM	STANDARD		NOTE
CKP sensor resistance	150 – 230 Ω		
CKP sensor peak voltage	1.5 V or more		When cranking
IAP sensor input voltage	4.5 – 5.5 V		
IAP sensor output voltage	Approx. 2.6 V at idle speed		
TP sensor input voltage	4.5 – 5.5 V		
TP sensor output voltage	Closed	Approx. 1.1 V	
	Opened	Approx. 4.4 V	
ECT sensor input voltage	4.5 – 5.5 V		
ECT sensor resistance	Approx. 2.45 kΩ at 20 °C (68 °F)		
IAT sensor input voltage	4.5 – 5.5 V		
IAT sensor resistance	Approx. 2.45 kΩ at 20 °C (68 °F)		
TO sensor resistance	25.0 – 26.0 kΩ		
TO sensor voltage	Normal	0.4 – 1.4 V	
	Leaning	3.7 – 4.4 V	When leaning 65°
GP switch voltage	0.6 V or more		From 1st to Top
GP switch resistance	Approx. 500 Ω or more		
Injector voltage	Battery voltage		
Ignition coil primary peak voltage	80 V or more		When cranking
HO2 sensor output voltage	0.4 V or less at idle speed		
	0.6 V or more at 5 000 r/min		
HO2 sensor heater resistance	6.7 – 9.5 Ω at 23 °C (73 °F)		
PAIR control solenoid valve resistance	18 – 22 Ω at 20 °C (68 °F)		
EVAP purge control solenoid valve resistance	Approx. 32 Ω at 20 – 30 °C (68 – 86 °F)		
ISC valve resistance	Approx. 20 Ω at 20 °C (68 °F)		

THROTTLE BODY

ITEM	STANDARD / SPECIFICATION
Bore size	26 mm (1.02 in)
I.D. No.	48H1
Idle r/min	1 400 ± 100 r/min
Throttle cable play	2.0 – 4.0 mm (0.08 – 0.16 in)

ELECTRICAL

Unit: mm (in)

ITEM		STANDARD / SPECIFICATION		NOTE
Firing order		1.2		
Spark plug		Type	NGK: CR7E DENSO: U22ESR-N	
		Gap	0.7 – 0.8 (0.028 – 0.031)	
Spark performance		Over 8 (0.3) at 1 atm.		
CKP sensor resistance		150 – 230 Ω		
CKP sensor peak voltage		1.5 V or more		
Ignition coil resistance		Primary	3.4 – 4.6 Ω	Terminal – Terminal
		Secondary	11.05 – 14.95 kΩ	Plug cap – Terminal
Ignition coil primary peak voltage		80 V or more		
Generator coil resistance		0.2 – 0.9 Ω		
Generator no-load voltage (When engine is cold)		60 V (AC) or more at 5 000 r/min		
Starter motor brush length		Standard	10 (0.39)	
		Limit	6.5 (0.26)	
Regulated voltage		14.0 – 15.5 V at 5 000 r/min		
Starter relay resistance		3 – 6 Ω		
GP switch voltage		0.6 V or more (From 1st to Top)		
Battery	Type designation	YTX9-BS		
	Capacity	12 V 28.8 kC (8 Ah)/10 HR		
Fuse size	Headlight	15 A		
	Signal	10 A		
	Ignition	10 A		
	Fuel	10 A		
	Main	30 A		

WATTAGE

Unit: W

ITEM		SPECIFICATION
Headlight	HI	60
	LO	55
Position		5 × 2
Brake/Tail light		21/5
Turn signal light		10 × 4
License plate light		5
Combination meter light		LED
Turn signal indicator light		LED
High beam indicator light		LED
Neutral indicator light		LED
FI indicator light		LED
Oil pressure indicator light		LED
Engine coolant temp. indicator light		LED
Engine rpm indicator light		LED

BRAKE + WHEEL

Unit: mm (in)

ITEM	STANDARD / SPECIFICATION			LIMIT
Rear brake pedal height	38 – 48 (1.5 – 1.9)			—
Brake disc thickness	Front	4.8 – 5.2 (0.189 – 0.205)		4.5 (0.18)
	Rear	4.3 – 4.7 (0.169 – 0.185)		4.0 (0.16)
Brake disc runout	—			0.30 (0.012)
Brake master cylinder bore & piston diam	Front	Approx 11.0 (0.43)		—
	Rear	Approx 14.0 (0.55)		—
Brake caliper cylinder bore & piston diam	Front	Leading	Approx 27.0 (1.06)	—
		Trailing		
	Rear	Approx 38.2 (1.50)		—
Brake fluid type	DOT 4			—
Wheel rim runout	Axial	—		2.0 (0.08)
	Radial	—		2.0 (0.08)
Wheel rim size	Front	17 M/C × MT 3.00		—
	Rear	17 M/C × MT 4.00		—
Wheel axle runout	Front	—		0.25 (0.010)
	Rear	—		0.25 (0.010)

TIRE

ITEM	STANDARD / SPECIFICATION		LIMIT
Cold inflation tire pressure (Solo riding)	Front	250 kPa (2.50 kgf/cm², 36 psi)	—
	Rear	250 kPa (2.50 kgf/cm², 36 psi)	—
Cold inflation tire pressure (Dual riding)	Front	250 kPa (2.50 kgf/cm², 36 psi)	—
	Rear	250 kPa (2.50 kgf/cm², 36 psi)	—
Tire size	Front	110/80-17 M/C 57H	—
	Rear	140/70-17 M/C 66H	—
Tire type	Front	IRC RX-01F D	—
	Rear	IRC RX-01R	—
Tire tread depth (Recommended depth)	Front	—	1.6 (0.06)
	Rear	—	2.0 (0.08)

SUSPENSION

Unit: mm (in)

ITEM	STANDARD / SPECIFICATION	LIMIT
Front fork stroke	120 (4.72)	—
Front fork spring free length	275.9 (10.86)	270 (10.6)
Front fork oil level (without spring, outer tube fully compressed)	136 (5.4)	—
Front fork oil type	SUZUKI FORK OIL G10 or equivalent	—
Front fork oil capacity (each leg)	338 ml (11.4/11.9 US/Imp oz)	—
Front fork inner tube O.D.	37 (1.46)	—
Rear shock absorber spring adjuster	3rd position	—
Rear wheel travel	120 (4.7)	—
Swingarm pivot shaft runout	—	0.3 (0.01)

FUEL + OIL

ITEM	SPECIFICATION		NOTE
Fuel type	Gasoline used should be graded 91 octane or higher. An unleaded gasoline is recommended.		
Fuel tank capacity	Including reserve	13.3 L (3.5/2.9 US/Imp gal)	
	Fuel mark indicator blinking	9.3 L (2.4/2.0 US/Imp gal)	
Engine oil type	SAE 10W-40, API SG or higher with JASO MA		
Engine oil capacity	Change	2.1 L (2.2/1.8 US/Imp qt)	
	Filter change	2.4 L (2.5/2.1 US/Imp qt)	
	Overhaul	2.4 L (2.5/2.1 US/Imp qt)	

EMISSION CONTROL INFORMATION

CONTENTS

EMISSION CONTROL SYSTEMS

NOISE EMISSION CONTROL SYSTEM

TAMPERING WITH THE NOISE CONTROL SYSTEM PROHIBITED: Local law or federal law prohibits the following acts or the causing thereof:

1. The removal or rendering inoperative by any person, other than for purposes of maintenance, repair or replacement, of any device or element of design incorporated into any new vehicle for the purpose of noise control prior to its sale or delivery to the ultimate purchaser or while it is in use, or
2. The use of the vehicle after such device or element of design has been removed or rendered inoperative by any person.

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

- Removing or puncturing the muffler, baffles, header pipes, screen type spark arrester (if equipped) or any other component which conducts exhaust gases.
- Removing or puncturing the air cleaner case, air cleaner cover, baffles or any other component which conducts intake air.
- Replacing the exhaust system or muffler with a system or muffler not marked with the same model specific code as the code listed on the Motorcycle Noise Emission Control Information label. (only for P-24)

HO2 SENSOR INSPECTION

(☞4-71)

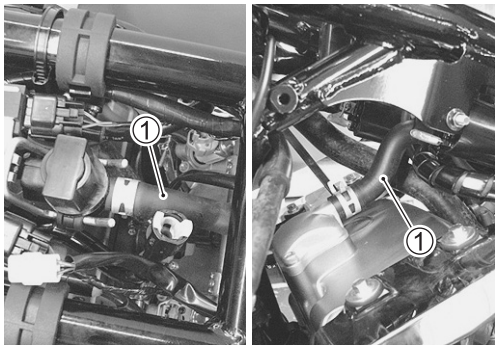
HO2 SENSOR REMOVAL AND INSTALLATION

(☞4-93)

PAIR (AIR SUPPLY) SYSTEM AND EMISSION CONTROL SYSTEM INSPECTION

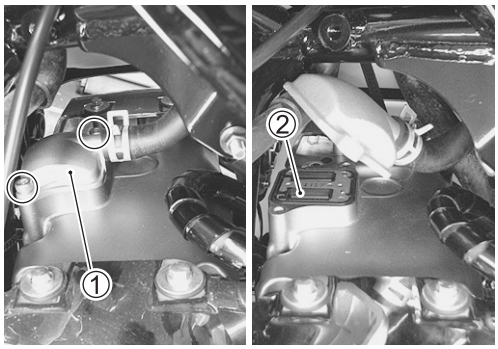
PAIR HOSES

- Remove the fuel tank. (☞5-2)
- Inspect the PAIR hoses ① for wear or damage. If it is worn or damaged, replace the PAIR hoses ① with a new one.



PAIR REED VALVE

- Remove the left fuel tank cover. (☞8-5)
- Remove the PAIR reed valve cover ① and PAIR read valve ②.

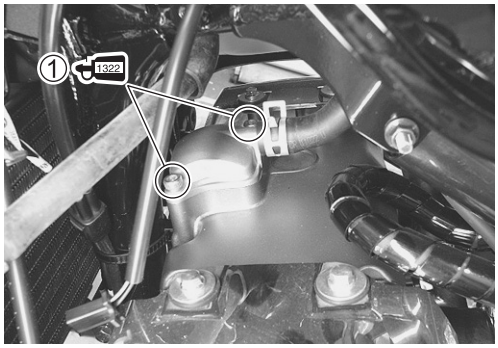


- Inspect the reed valve for the carbon deposit. If the carbon deposit is found in the PAIR reed valve, replace the PAIR reed valve with a new one.

- Install the PAIR reed valve and PAIR reed valve cover. (☞11-6)
- Apply thread lock to the bolts ① and tighten to the specified torque.

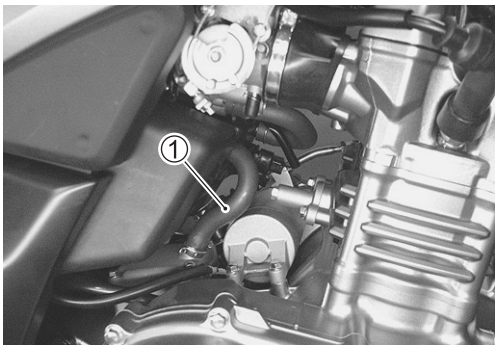
1322 99000-32110: THREAD LOCK CEMENT SUPER "1322" or equivalent

PAIR reed valve cover bolt: 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



PCV HOSE

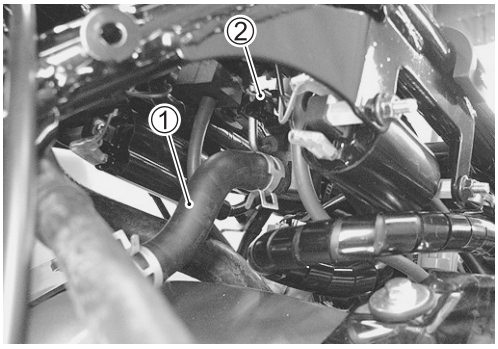
- Inspect the PCV hose ① for wear and damage. If it is worn or damaged, replace the PCV hose ① with a new one.



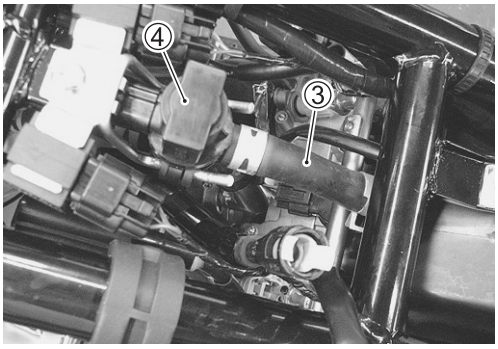
PAIR CONTROL SOLENOID VALVE

REMOVAL

- Remove the fuel tank. (☞5-2)
- Disconnect the PAIR hose ① and PAIR control solenoid valve coupler ②.

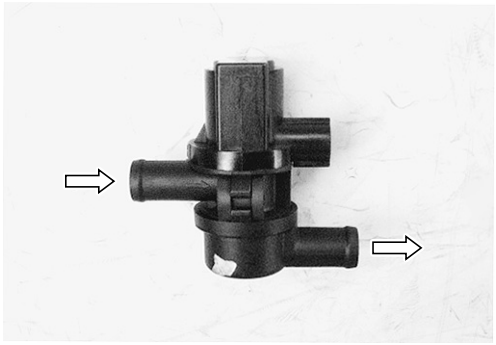


- Disconnect the PAIR hose ③.
- Remove the PAIR control solenoid valve ④ from the bracket.

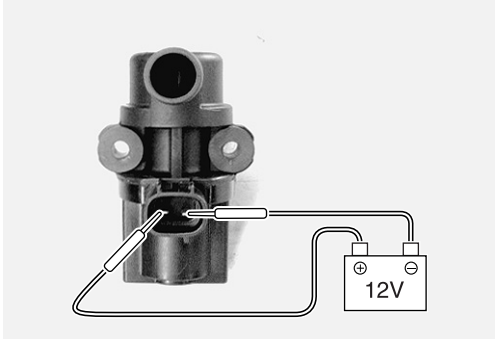


INSPECTION

- Check that air flows through the air inlet port to the air outlet port. If air does not flow out, replace the PAIR control solenoid valve with a new one.



- Connect the 12 V battery to the PAIR control solenoid valve terminals and check the air flow. If air does not flow out, the solenoid valve is in normal condition.

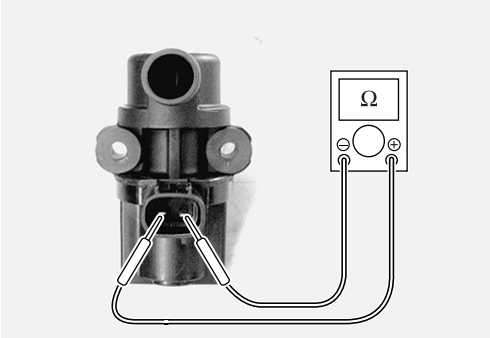


- Check the resistance between the terminals of the PAIR control solenoid valve.

DATA PAIR control solenoid valve resistance:
18 – 22 Ω at 20 °C (68 °F)

TOOL 09900-25008: Multi circuit tester set

Tester knob indication: Resistance (Ω)

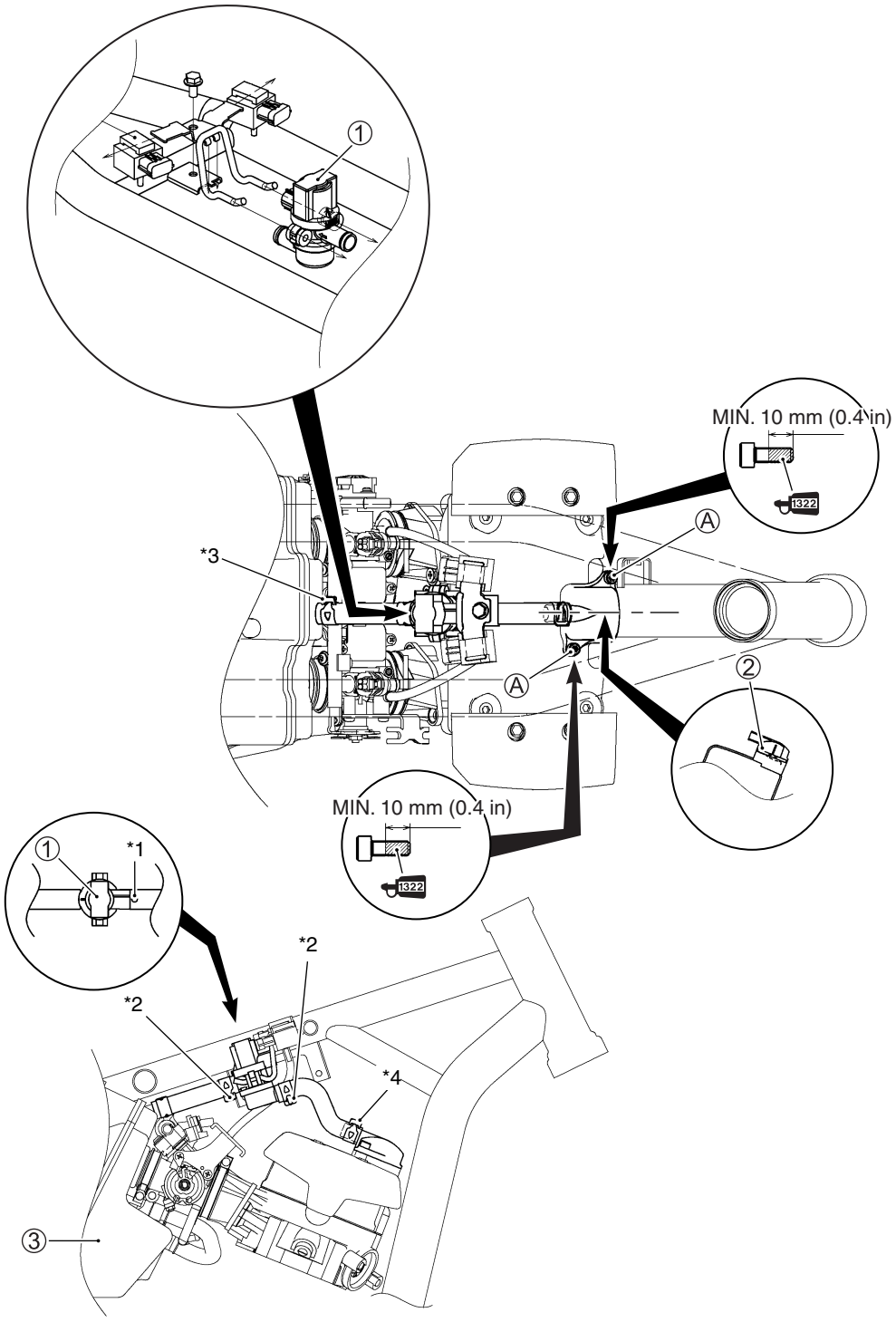


INSTALLATION

Installation is in the reverse order of removal. Pay attention to the following point:

- Install the PAIR control solenoid valve and connect the PAIR hoses securely. (☞11-6)

PAIR (AIR SUPPLY) SYSTEM HOSE ROUTING



①	PAIR control solenoid valve	*2	The clamp end should face downward.
②	PAIR reed valve	*3	The clamp end should face left side.
③	Air cleaner box	*4	The clamp end should face upward.
*1	White mark		

ITEM	N·m	kgf-m	lbf-ft
Ⓐ	10	1.0	7.0

WIRING DIAGRAM

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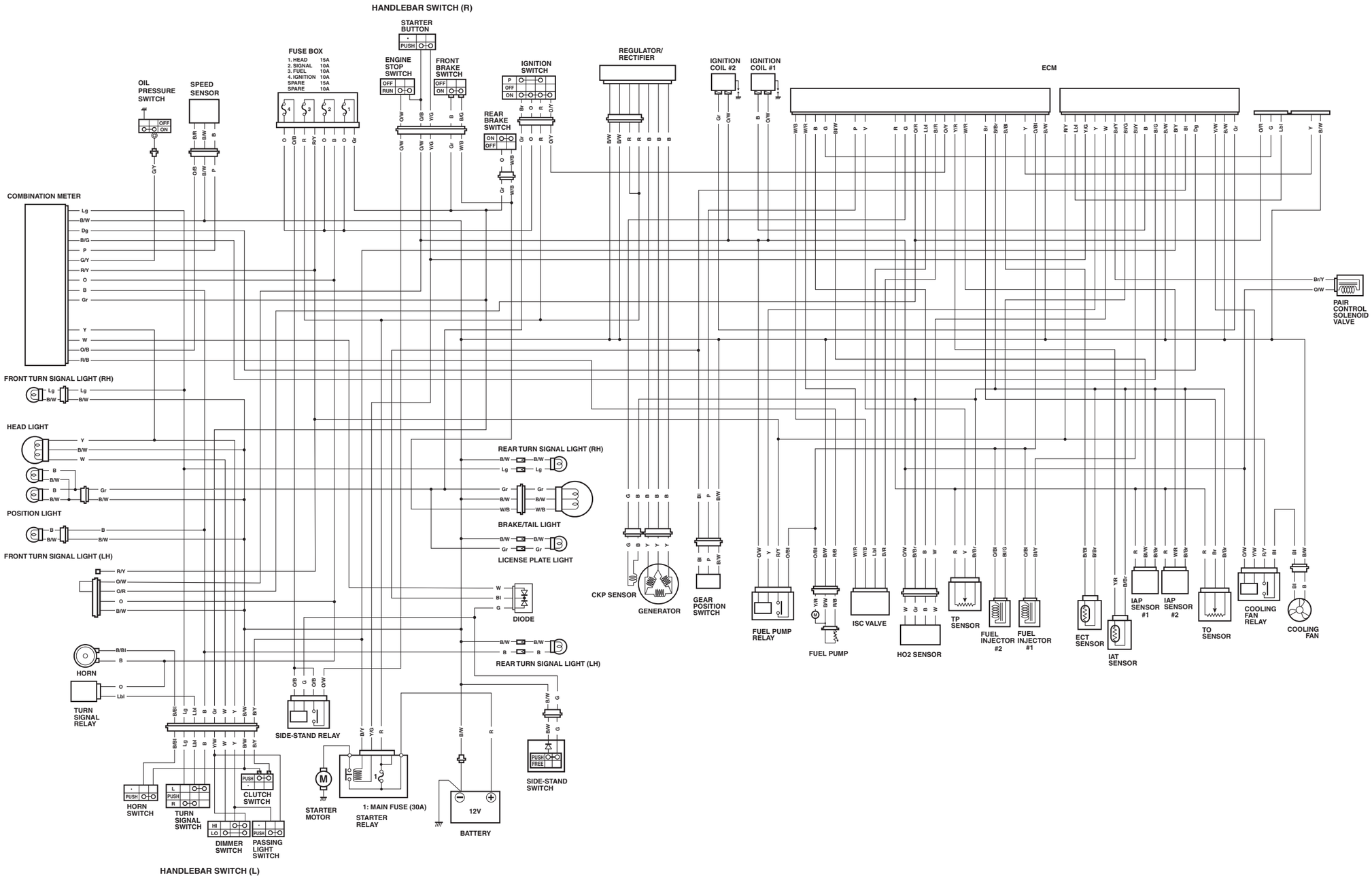
Wiring diagrams wire color, refer to section “WIRE COLOR”.



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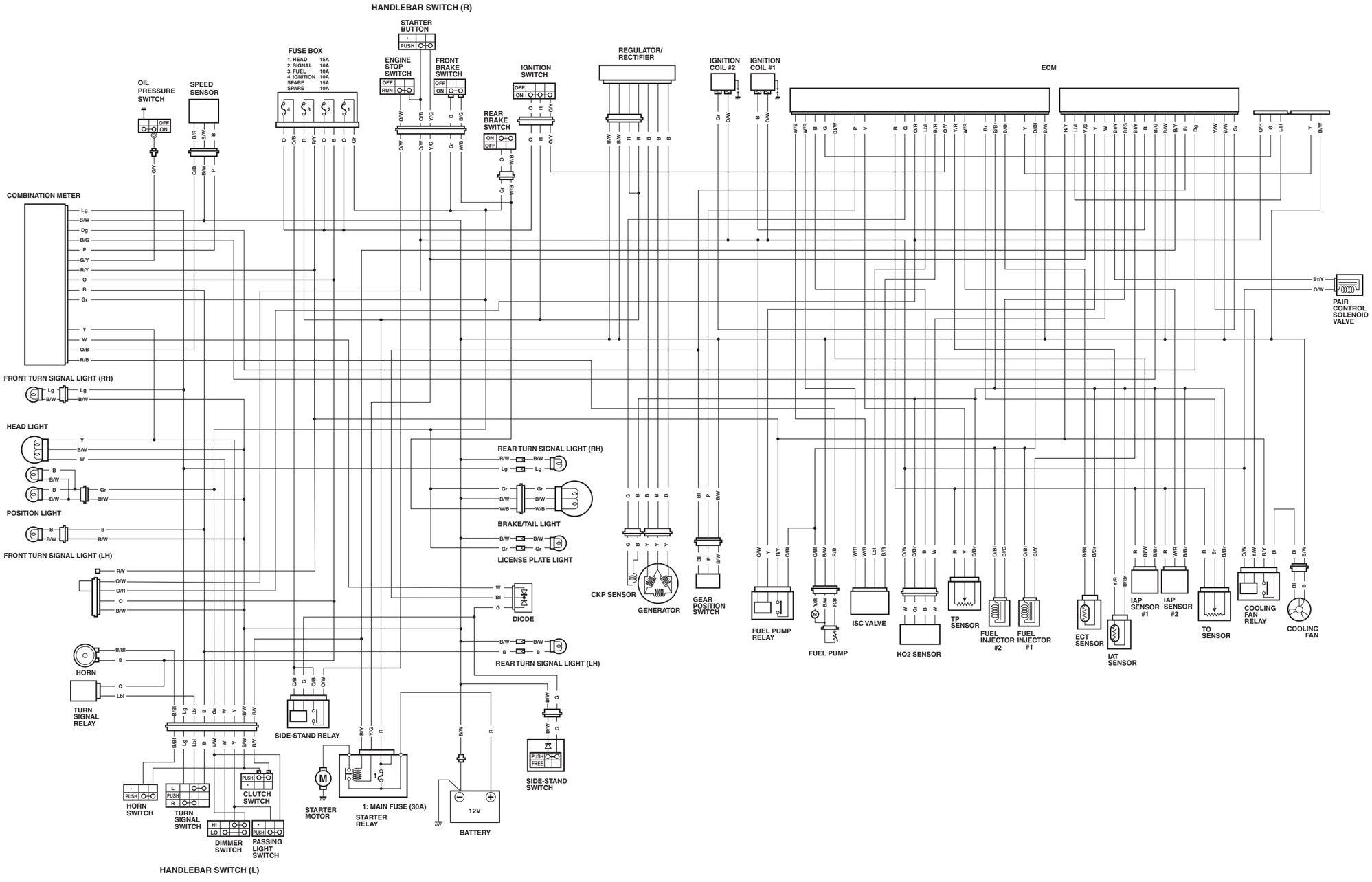
HANDLEBAR SWITCH (R)
STARTER BUTTON
PUSH
FUSE BOX
1. HEAD 15A
2. SIGNAL 10A
3. FUEL 10A
4. IGNITION 10A
SPARE 15A
SPARE 10A
ENGINE STOP SWITCH
OFF
RUN
FRONT BRAKE SWITCH
OFF
ON
IGNITION SWITCH
OFF
ON
REGULATOR/ RECTIFIER
IGNITION COIL #2
IGNITION COIL #1
ECM
OIL PRESSURE SWITCH
OFF
ON
SPEED SENSOR
REAR BRAKE SWITCH
ON
OFF
COMBINATION METER
Lg
B/W
Dg
B/G
P
G/Y
R/Y
O
B
Gr
Y
W
O/B
R/B
PAIR CONTROL SOLENOID VALVE
Br/Y
O/W
FRONT TURN SIGNAL LIGHT (RH)
HEAD LIGHT
POSITION LIGHT
FRONT TURN SIGNAL LIGHT (LH)
REAR TURN SIGNAL LIGHT (RH)
BRAKE/TAIL LIGHT
LICENSE PLATE LIGHT
REAR TURN SIGNAL LIGHT (LH)
DIODE
CKP SENSOR
GENERATOR
GEAR POSITION SWITCH
FUEL PUMP RELAY
FUEL PUMP
ISC VALVE
HO2 SENSOR
TP SENSOR
FUEL INJECTOR #2
FUEL INJECTOR #1
ECT SENSOR
IAT SENSOR
IAP SENSOR #1
IAP SENSOR #2
TO SENSOR
COOLING FAN RELAY
COOLING FAN
HORN
TURN SIGNAL RELAY
SIDE-STAND RELAY
HORN SWITCH
TURN SIGNAL SWITCH
CLUTCH SWITCH
DIMMER SWITCH
PASSING LIGHT SWITCH
STARTER MOTOR
1: MAIN FUSE (30A)
STARTER RELAY
12V
BATTERY
SIDE-STAND SWITCH
HANDLEBAR SWITCH (L)

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