SUZUKI

GSR600

SERVICE MANUAL

FOREWORD

This manual contains an introductory description on the SUZUKI GSR600 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

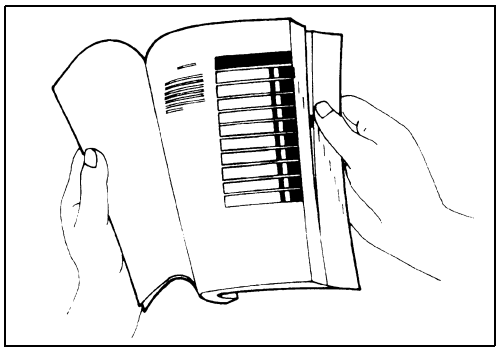
Inexperienced mechanics or mechanics without the proper tools and equipment may not be able to properly perform the services described in this manual.
Improper repair may result in injury to the mechanic and may render the motorcycle unsafe for the rider and passenger.

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.

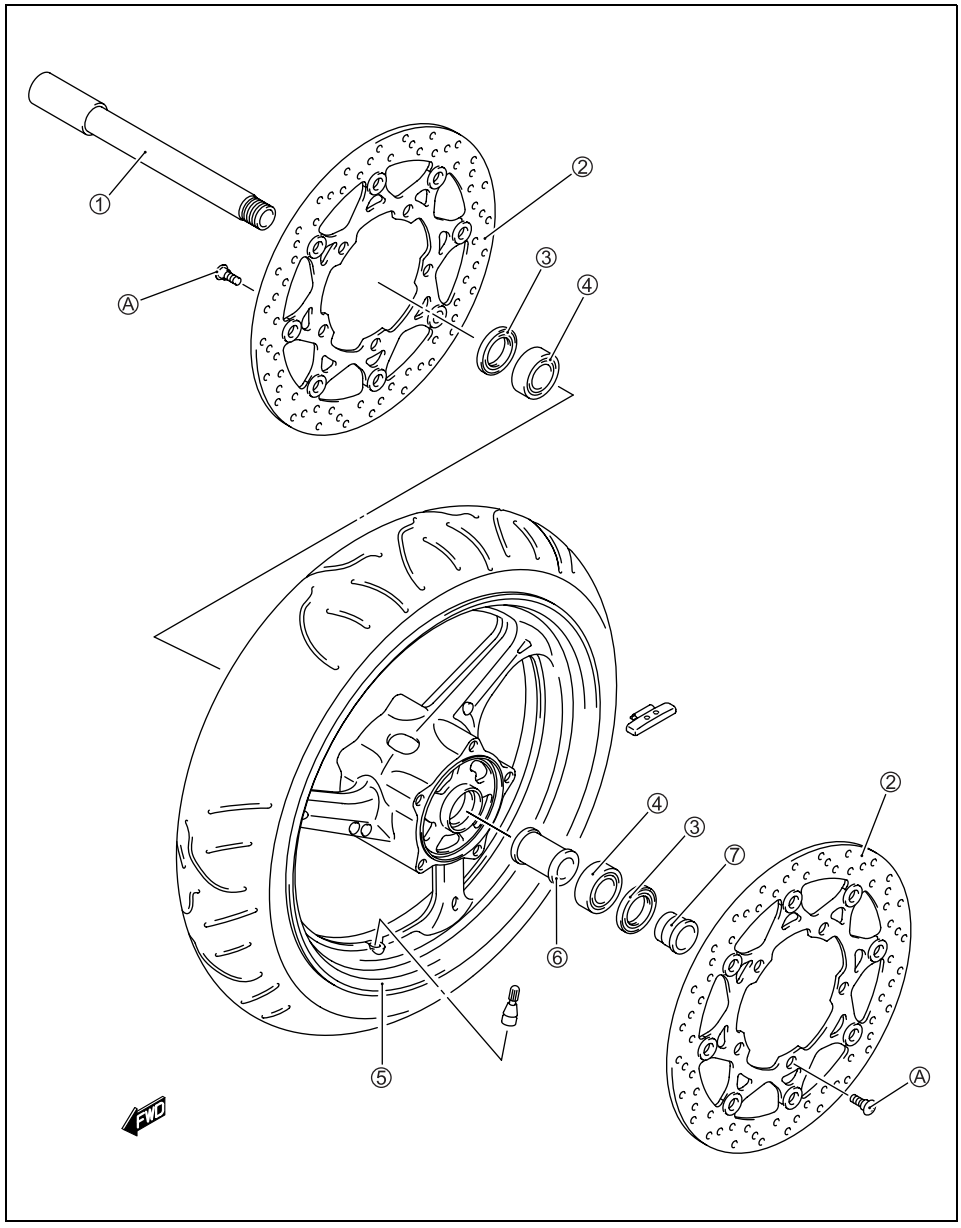


COMPONENT PARTS AND WORK TO BE DONE

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

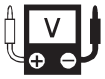
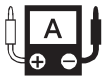
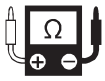
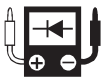
①	Front axle
②	Brake disc
③	Dust seal
④	Bearing
⑤	Front wheel
⑥	Spacer
⑦	Collar
Ⓐ	Brake disc bolt

ITEM	N·m	kgf-m
①	100	10.0
Ⓐ	23	2.3



SYMBOL

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

SYMBOL	DEFINITION	SYMBOL	DEFINITION
	Torque control required. Data beside it indicates specified torque.		Apply THREAD LOCK SUPER “1360”. 99000-32130
	Apply oil. Use engine oil unless otherwise specified.		Use engine coolant. 99000-99032-11X
	Apply molybdenum oil solution. (Mixture of engine oil and SUZUKI MOLY PASTE in a ratio of 1:1)		Use fork oil. 99000-99044-10G
	Apply SUZUKI SUPER GREASE “A” or equivalent grease. 99000-25010		Apply or use brake fluid.
	Apply SUZUKI MOLY PASTE. 99000-25140		Measure in voltage range.
	Apply SUZUKI SILICONE GREASE. 99000-25100		Measure in current range.
	Apply SUZUKI BOND “1215” or equivalent bond. 99000-31110		Measure in resistance range.
	Apply SUZUKI BOND “1207B” 99000-31140		Measure in diode test range.
	Apply THREAD LOCK SUPER “1303”. 99000-32030		Measure in continuity test range.
	Apply THREAD LOCK SUPER “1322” or equivalent thread lock. 99000-32110		Use special tool.
	Apply THREAD LOCK “1342”. 99000-32050		Indication of service data.

ABBREVIATIONS USED IN THIS MANUAL

A

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

B

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

C

CKP Sensor	: Crankshaft Position Sensor (CKPS)
CKT	: Circuit
CLP Switch	: Clutch Lever Position Switch (Clutch Switch)
CMP Sensor	: Camshaft Position Sensor (CMPS)
CO	: Carbon Monoxide
CPU	: Central Processing Unit

D

DC	: Direct Current
DMC	: Dealer Mode Coupler
DOHC	: Double Over Head Camshaft
DRL	: Daytime Running Light
DTC	: Diagnostic Trouble Code

E

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

F

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

G

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

H

HC	: Hydrocarbons
HO2 Sensor	: Heated Oxygen Sensor

I

IAP Sensor	: Intake Air Pressure Sensor (IAPS)
IAT Sensor	: Intake Air Temperature Sensor (IATS)
IG	: Ignition

L

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

M

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

N

NOX	: Nitrogen Oxides

O

OHC	: Over Head Camshaft
OPS	: Oil Pressure Switch

P

PCV	: Positive Crankcase Ventilation (Crankcase Breather)

R

RH	: Right Hand
ROM	: Read Only Memory

S

SAE	: Society of Automotive Engineers
SDS	: Suzuki Diagnosis System
STC System	: Secondary Throttle Control System (STCS)
STP Sensor	: Secondary Throttle Position Sensor (STPS)
ST Valve	: Secondary Throttle Valve (STV)
STV Actuator	: Secondary Throttle Valve Actuator (STVA)

T

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

WIRE COLOR

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

B/Bl	: Black with Blue tracer	B/Br	: Black with Brown tracer
B/G	: Black with Green tracer	B/Lg	: Black with Light green tracer
B/R	: Black with Red tracer	B/W	: Black with White tracer
B/Y	: Black with Yellow tracer	Bl/B	: Blue with Black tracer
Bl/G	: Blue with Green tracer	Bl/R	: Blue with Red tracer
Bl/W	: Blue with White tracer	Bl/Y	: Blue with Yellow tracer
Br/Y	: Brown with Yellow tracer	G/B	: Green with Black tracer
G/Bl	: Green with Blue tracer	G/R	: Green with Red tracer
G/W	: Green with White tracer	G/Y	: Green with Yellow tracer
Gr/B	: Gray with Black tracer	Gr/R	: Gray with Red tracer
Gr/W	: Gray with White tracer	Gr/Y	: Gray with Yellow tracer
Lg/Bl	: Light green with Blue tracer	Lg/G	: Light green with Green tracer
Lg/W	: Light green with White tracer	O/B	: Orange with Black tracer
O/Bl	: Orange with Blue tracer	O/G	: Orange with Green tracer
O/R	: Orange with Red tracer	O/W	: Orange with White tracer
O/Y	: Orange with Yellow tracer	P/B	: Pink with Black tracer
P/W	: Pink with White tracer	R/B	: Red with Black tracer
R/Bl	: Red with Blue tracer	R/Y	: Red with Yellow tracer
R/W	: Red with White tracer	W/B	: White with Black tracer
W/Bl	: White with Blue tracer	W/G	: White with Green tracer
W/R	: White with Red tracer	W/Y	: White with Yellow tracer
Y/B	: Yellow with Black tracer	Y/Bl	: Yellow with Blue tracer
Y/G	: Yellow with Green tracer	Y/R	: Yellow with Red tracer
Y/W	: Yellow with White tracer		

GENERAL INFORMATION

1

CONTENTS

COUNTRY AND AREA CODES

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

MODEL	CODE	COUNTRY or AREA	EFECTIVE FRAME NO.
GSR600	E-02	U.K.	JS1B9111100 100001 –
	E-19	EU	JS1B9111100 100001 –
	E-24	Australia	JS1B9111300 100001 –
GSR600UE	E-19	EU	JS1B9121100 100001 –

WARNING/CAUTION/NOTE

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

⚠ WARNING

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

CAUTION

Indicates a potential hazard that could result in motorcycle 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 and CAUTIONS stated, you must use good judgement and basic mechanical safety principles. If you are unsure about how to perform a particular service operation, ask a more experienced mechanic for advice.

GENERAL PRECAUTIONS

⚠ WARNING

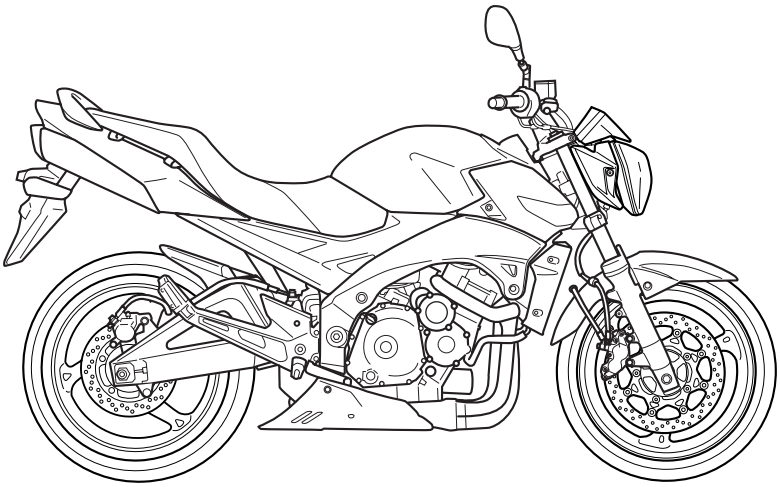
- **Proper service and repair procedures are important for the safety of the service mechanic and the safety and reliability of the motorcycle.**
- **When 2 or more persons work together, pay attention to the safety of each other.**
- **When it is necessary to run the engine indoors, make sure that exhaust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

CAUTION

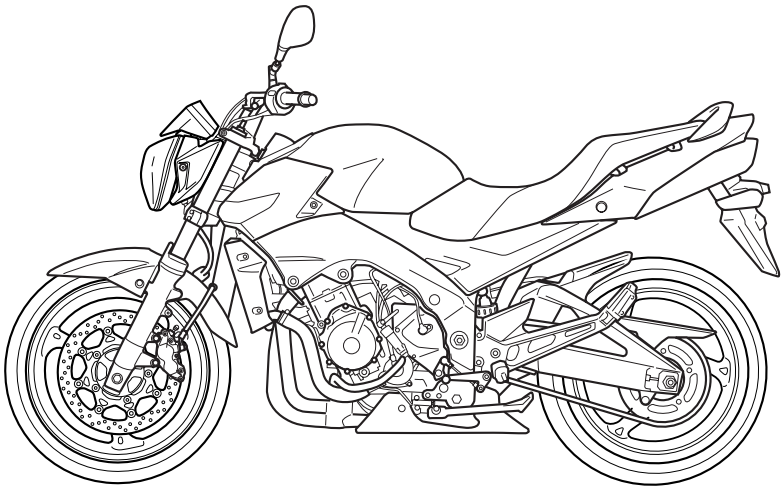
*** If parts replacement is necessary, replace the parts with Suzuki Genuine Parts or their equivalent.**
*** When removing parts that are to be reused, keep them arranged in an orderly manner so that they may be reinstalled in the proper order and orientation.**
*** Be sure to use special tools when instructed.**
*** Make sure that all parts used in reassembly are clean. Lubricate them when specified.**
*** Use the specified lubricant, bond, or sealant.**
*** When removing the battery, disconnect the negative cable first and then the positive cable.**
*** When reconnecting the battery, connect the positive cable first and then the negative cable, and replace the terminal cover on the positive terminal.**
*** When performing service to electrical parts, if the service procedures not require use of battery power, disconnect the negative cable the battery.**
*** When tightening the cylinder head and 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 GSR600K6 ('06-MODEL)



RIGHT SIDE

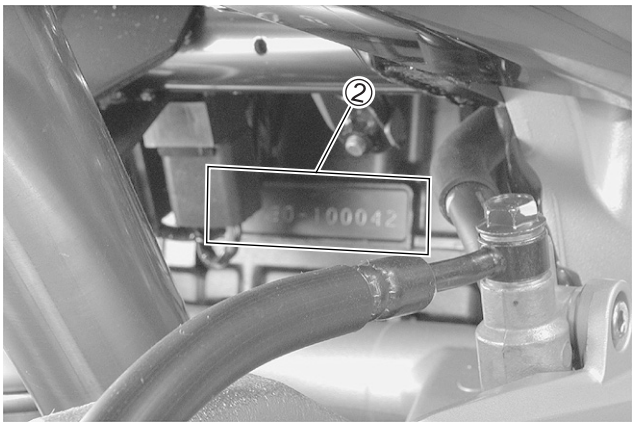


LEFT SIDE

- 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 rear side of the crankcase. These numbers are required especially for registering the machine and ordering spare parts.



FUEL, OIL AND ENGINE COOLANT RECOMMENDATION

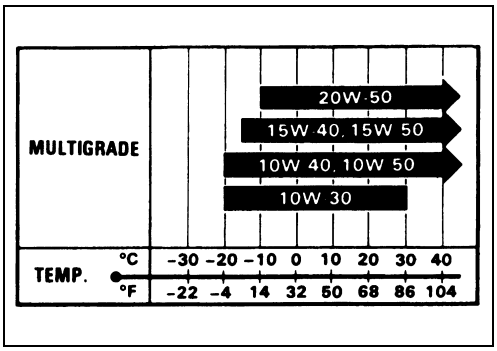
FUEL

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 of API SF/SG or SH/SJ with JASO 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.



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 fork oil G-10 or an equivalent fork oil.

ENGINE COOLANT

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

WATER FOR MIXING

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

ANTI-FREEZE/ENGINE COOLANT

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

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

LIQUID AMOUNT OF WATER/ENGINE COOLANT

Solution capacity (total): Approx. 2 800ml

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

CAUTION

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

BREAK-IN PROCEDURES

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

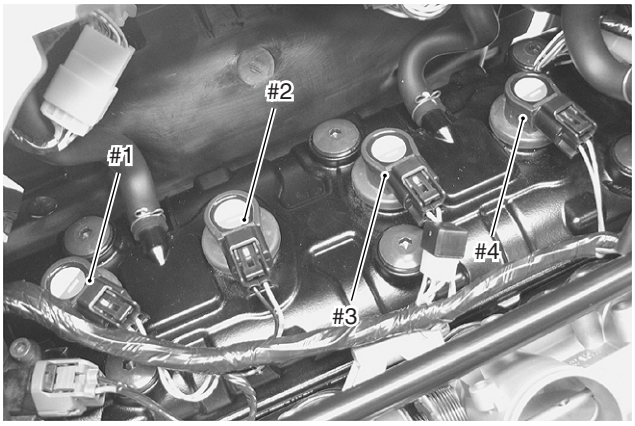
- Keep to these break-in engine speed limits:

Initial 800 km: Below 7 000 r/min
Up to 1 600 km: Below 10 500 r/min
Over to 1 600 km: Below 14 000 r/min

- Upon reaching an odometer reading of 1 600 km you can subject the motorcycle to full throttle operation. However, do not exceed 14 000 r/min at any time.

CYLINDER IDENTIFICATION

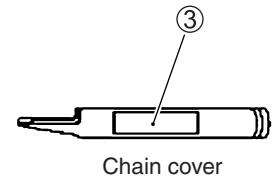
The four cylinders of this engine are identified as No.1, No.2, No.3 and No.4 cylinder, as counted from left to right (as viewed by the rider on the seat.)

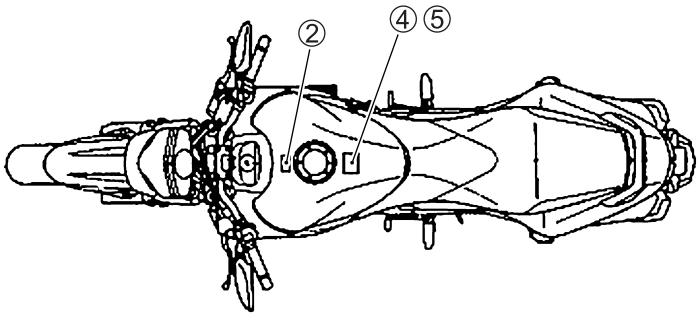


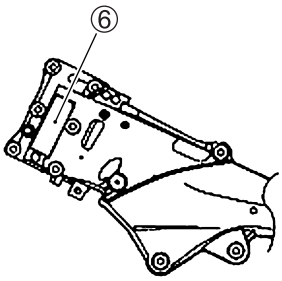
INFORMATION LABELS

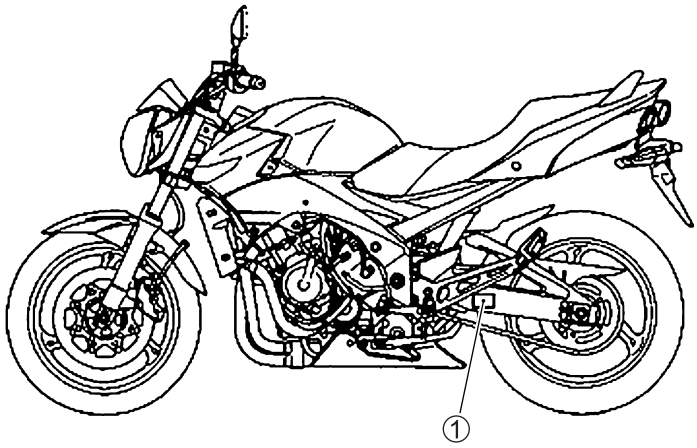
	GSR600			GSR600U
	E-02	E-19	E-24	E-19
① Noise label			A	
② Fuel caution label	A		A	
③ Tire information label	A	A	A	A
④ General information label	A		A	
⑤ General warning label		A		A
⑥ ID plate	A	A	A	A

A: Attached









SPECIFICATIONS

DIMENSIONS AND DRY MASS

Overall length	2 090 mm
Overall width	795 mm
Overall height	1 075 mm
Wheelbase	1 440 mm
Ground clearance	130 mm
Seat height	785 mm
Dry mass	183 kg

ENGINE

Type	Four stroke, liquid-cooled, DOHC
Number of cylinders	4
Bore	67.0 mm
Stroke	42.5 mm
Displacement	599 cm^3
Compression ratio	12.5:1
Fuel system	Fuel injection
Air cleaner	Paper element
Starter system	Electric
Lubrication system	Wet sump
Idle speed	1 300 ± 100 r/min

DRIVE TRAIN

Clutch	Wet multi-plate type
Transmission	6-speed constant mesh
Gearshift pattern	1-down, 5-up
Primary reduction ratio	1.926 (79/41)
Gear ratios, Low	2.785 (39/14)
2nd	2.000 (32/16)
3rd	1.600 (32/20)
4th	1.363 (30/22)
5th	1.208 (29/24)
Top	1.086 (25/23)
Final reduction ratio	3.000 (48/16)
Drive chain	RK525SMOZ7Y, 114 links

CHASSIS

Front suspension	Telescopic, coil spring, oil damped
Rear suspension	Link type, coil spring, oil damped
Front fork stroke	130 mm
Rear wheel travel	134 mm
Steering angle	33° (Right and left)
Caster	25°15’
Trail	104 mm
Turning radius	2.9 m
Front brake	Disc brake, twin
Rear brake	Disc brake
Front tire size	120/70 ZR 17 M/C (58 W), tubeless
Rear tire size	180/55 ZR 17 M/C (73 W), tubeless

ELECTRICAL

Ignition type	Electronic ignition (Transistorized)
Ignition timing	6° B.T.D.C. at 1 300 r/min
Spark plug	NGK CR9E or DENSO U27ESR-N
Battery	12 V 28.8 kC (8 Ah)/10 HR
Generator	Three-phase A.C. generator
Main fuse	30 A
Fuse	10/10/15/15/10/10 A
Headlight	12 V 60/55 W H4
Turn signal light	12 V 10 W
Brake light/Taillight	LED
Position light	12 V 5 W × 2
License plate light	12 V 5 W
Speedometer light	LED
Tachometer light	LED
Neutral indicator light	LED
High beam indicator light	LED
Turn signal indicator light	LED
Oil pressure/Engine coolant temp. warning indicator light	LED
FI warning indicator light	LED
Immobilizer indicator light	LED

CAPACITIES

Fuel tank	16.5 L
Engine oil, oil change	3 200 ml
with filter change	3 600 ml
overhaul	3 900 ml
Coolant	2.8 L

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

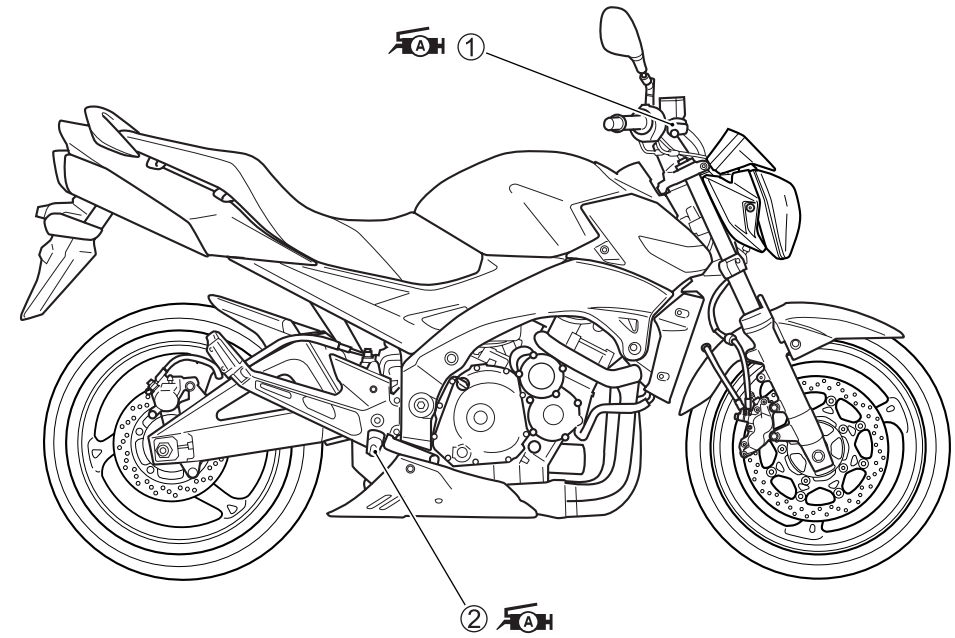
Item \ Interval	km	1 000	6 000	12 000	18 000	24 000
	months	2	12	24	36	48
Air cleaner element		—	I	I	R	I
Spark plugs		—	I	R	I	R
Valve clearance		—	—	—	—	I
Engine oil		R	R	R	R	R
Engine oil filter		R	—	—	R	—
Fuel line		—	I	I	I	I
Idle speed		I	I	I	I	I
Throttle valve synchronization		—	—	I	—	I
PAIR (air supply) system		—	—	I	—	I
Throttle cable play		I	I	I	I	I
Clutch cable play		—	I	I	I	I
Radiator hoses		—	I	I	I	I
Engine coolant		Replace every 2 years.				
Drive chain		I	I	I	I	I
		Clean and lubricate every 1 000 km.				
Brakes		I	I	I	I	I
Brake hoses		—	I	I	I	I
		Replace every 4 years.				
Brake fluid		—	I	I	I	I
		Replace every 2 years.				
Tires		—	I	I	I	I
Steering		I	—	I	—	I
Front forks		—	—	I	—	I
Rear suspension		—	—	I	—	I
Exhaust pipe bolts and muffler bolt and nut		T	—	T	—	T
Chassis bolts and nuts		T	T	T	T	T

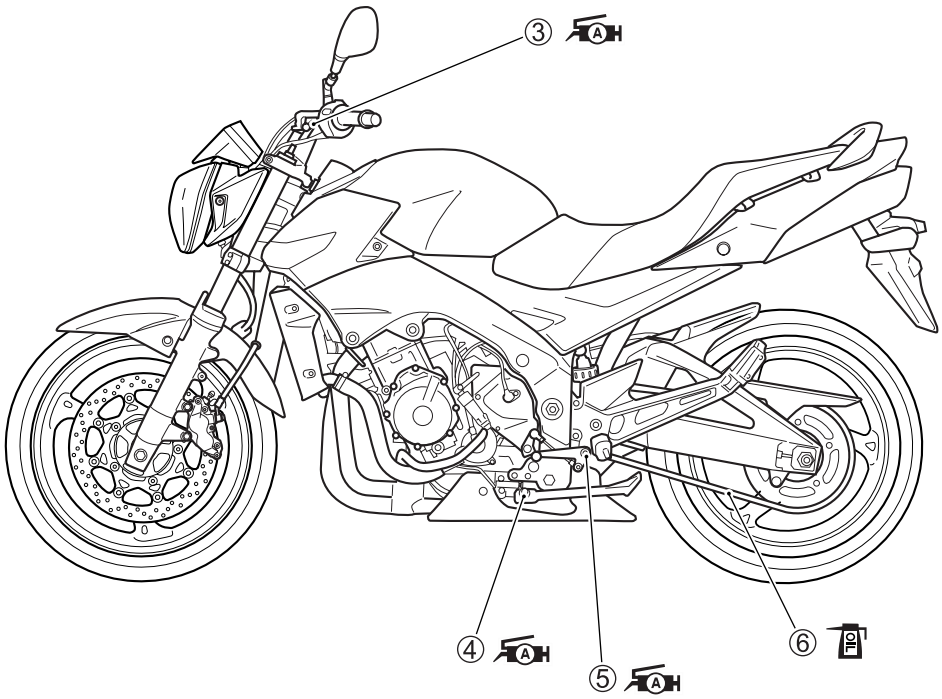
NOTE:
I = Inspect and clean, adjust, replace or lubricate as necessary
R = Replace
T = Tighten

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	Brake lever holder
②	Brake pedal pivot and footrest pivot
③	Clutch lever holder
④	Side-stand pivot and spring hook
⑤	Footrest pivot and gearshift lever pivot
⑥	Drive chain





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.*

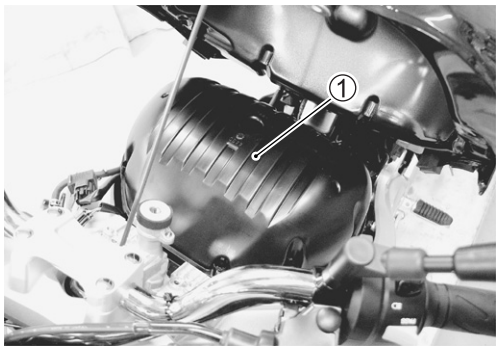
MAINTENANCE AND TUNE-UP PROCEDURES

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

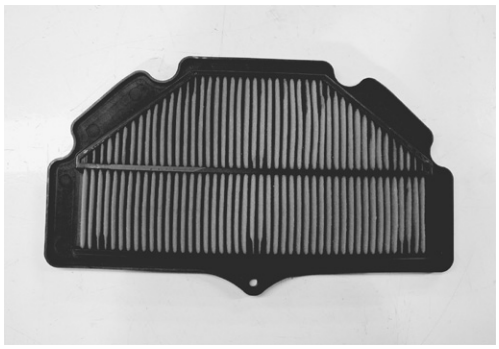
AIR CLEANER

Inspect every 6 000 km (12 months).
Replace every 18 000 km (36 months).

- Lift and support the fuel tank. (☞5-3)
- Remove the air cleaner box cover ① by removing the screws and IAP sensor.



- Remove the air cleaner element.
- Inspect the air cleaner element for clogging.
  If the air cleaner element is clogged with dust, replace the air cleaner element with a new one.

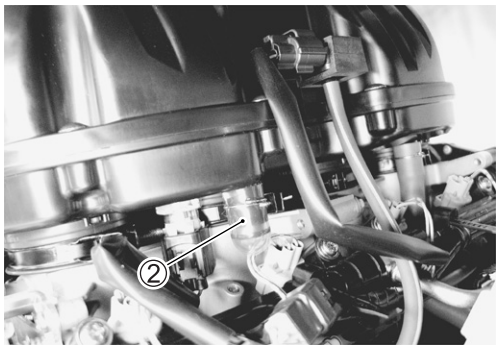


CAUTION

Do not blow the air cleaner element with compressed air.

NOTE:
If driving under dusty conditions, replace 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.

- Install a new air cleaner element in the reverse order of removal.
- Remove the drain plug ② from the air cleaner box to allow any water to drain out.

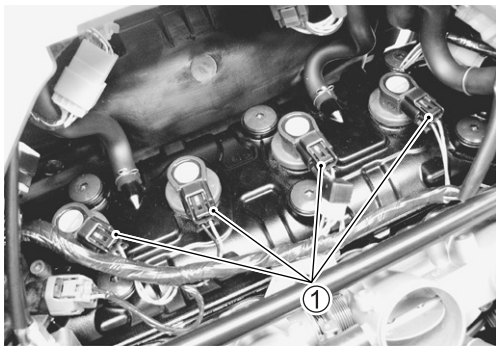


SPARK PLUG

Inspect every 6 000 km (12 months).
replace every 12 000 km (24 months).

SPARK PLUG AND IGNITION COIL/PLUG CAP REMOVAL

- Lift and support the fuel tank. (☞5-3)
- Remove the air cleaner box. (☞5-13)
- Disconnect all lead wire couplers ① from ignition coil/plug caps.



CAUTION

Disconnect the lead wire coupler before removing the ignition coil/plug cap to avoid lead wire coupler damage.

- Remove the ignition coil/plug caps.

CAUTION

*** Do not pry up the ignition coil/plug cap with a screw driver or a bar to avoid its damage.**
*** Be careful not to drop the ignition coil/plug cap to prevent short/open circuit.**

- 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	CR8E	CR9E	CR10E
ND	U24ESR-N	U27ESR-N	U31ESR-N

NOTE:
"R" type spark plug has a resistor built into at the center electrode to prevent radio noise.

CARBON DEPOSITS

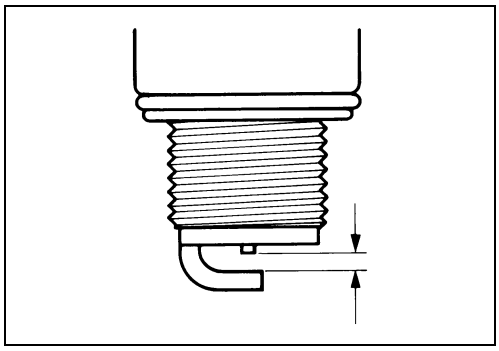
- Check carbon deposits on the spark plug.
- If carbon is deposited, remove it using a spark plug cleaner machine.

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

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.

CAUTION

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.

SPARK PLUG AND IGNITION COIL/PLUG CAP INSTALLATION

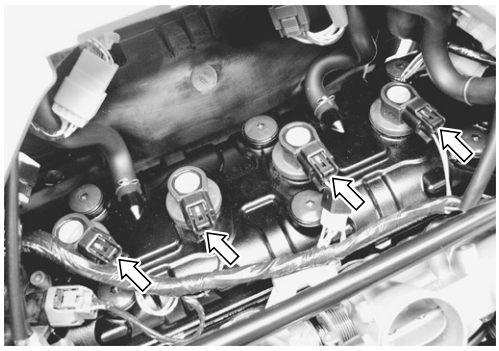
- Screw the spark plugs into the cylinder head with fingers, and then tighten them to the specified torque.

Spark plug: 11 N·m (1.1 kgf-m)

CAUTION

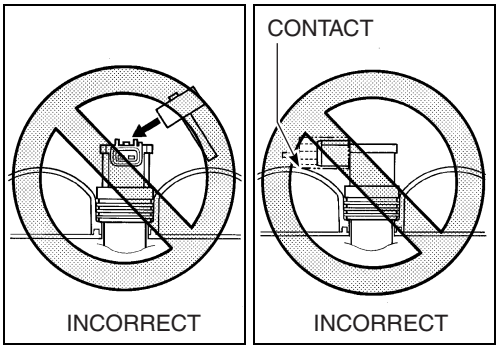
Do not cross thread or over tighten the spark plug, or such an operation will damage the aluminum threads of the cylinder head.

- Install the ignition coil/plug caps and connect their lead wire couplers.



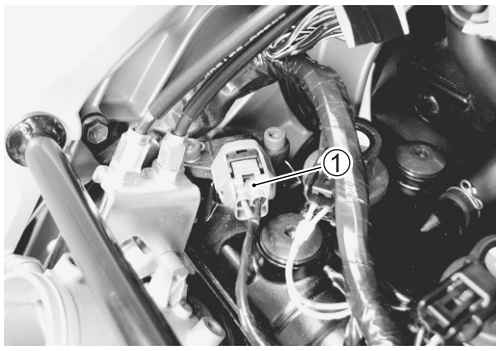
CAUTION

*** Do not hit the ignition coil/plug cap with a plastic hammer when installing it.**
*** Place the ignition coil/spark plug cap so that the coupler does not touch the cylinder head cover.**

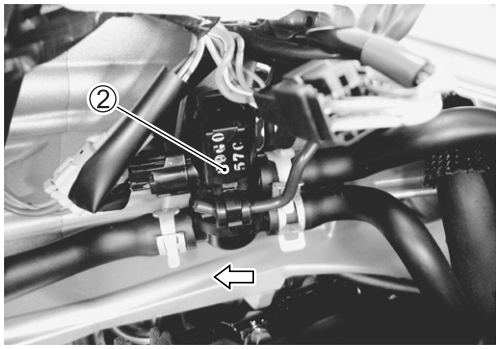


VALVE CLEARANCE

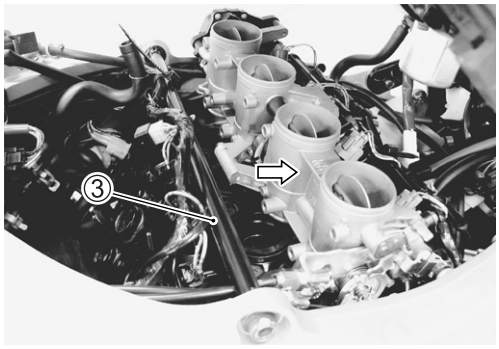
Inspect every 24 000 km (48 months).



- Lift and support the fuel tank. (☞5-3)
- Remove the air cleaner box. (☞5-13)
- Disconnect the CMP sensor coupler ①.



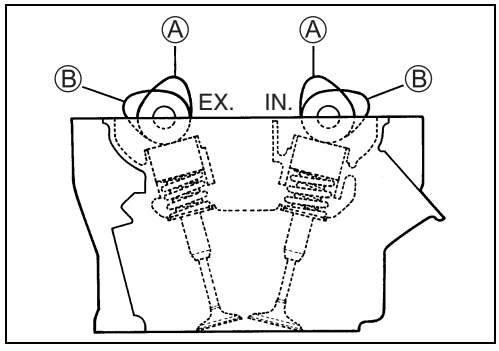
- Remove the PAIR control solenoid valve ②.
- Remove the spark plugs. (☞2-5)



- Loosen the throttle body clamp screws at the intake pipe side. (☞5-14)
- Move the throttle body assembly.
- Remove the frame bridge bar ③.
- Remove the cylinder head cover. (☞3-14)

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.

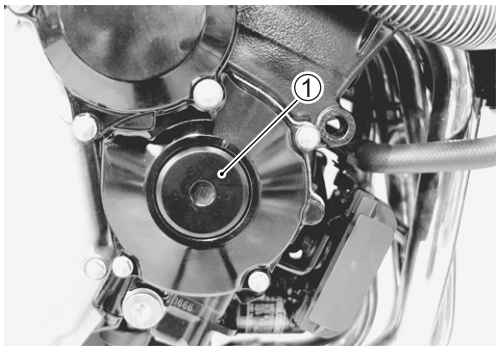
DATA **Valve clearance (when cold):**
Standard: IN. : 0.10 – 0.20 mm
EX. : 0.20 – 0.30 mm



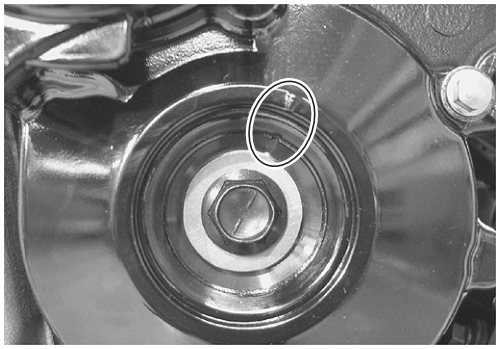
NOTE:

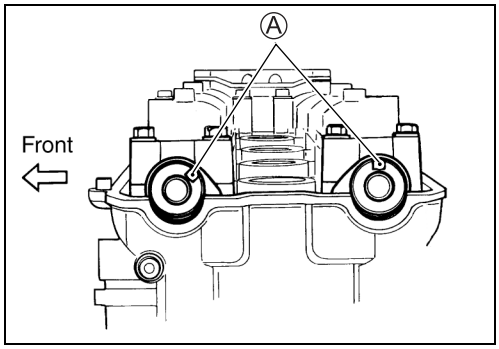
* *The cam must be at positions, Ⓐ or Ⓑ, when checking or adjusting the valve clearance. Clearance readings should not be taken with the cam in any other position than these two positions.*
* *The clearance specification is for COLD state.*
* *To turn the crankshaft for clearance checking, be sure to use a wrench, and rotate in the normal running direction. All spark plugs should be removed.*

- Remove the valve timing inspection plug ①.



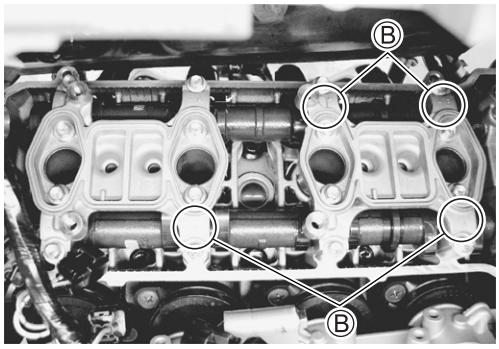
- Turn the crankshaft to bring the “Top” line on the starter clutch to the index mark and also to bring the notches Ⓐ on the left ends of both camshafts (Ex. and In.) to the positions as shown.



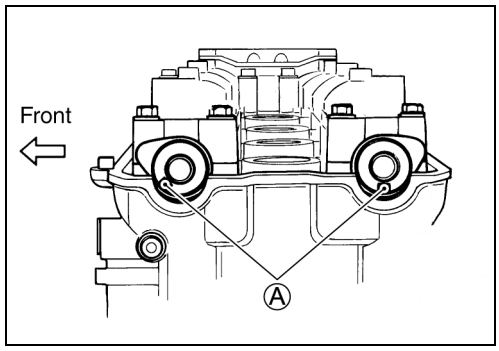


- In this condition, read the valve clearance at the valves Ⓑ (In. and Ex. of No.4 cylinder, Ex. of No.3 and In. of No.2).
- If the clearance is out of specification, adjust the clearance. (☞2-9)

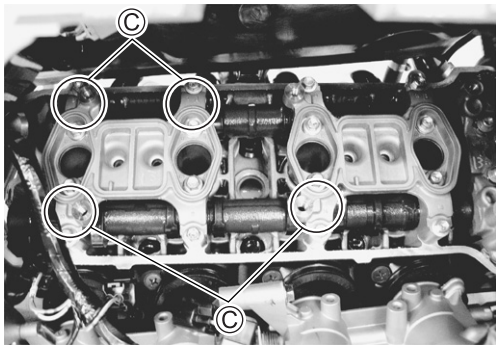
TOOL 09900-20803: Thickness gauge



- Turn the crankshaft 360 degrees (one rotation) to bring the "TOP" line on the starter clutch to the index mark of valve timing inspection hole and also to bring the notches Ⓐ to the position as shown.
- Read the clearance at the rest of the valves Ⓒ and adjust the clearance if necessary. (☞below)



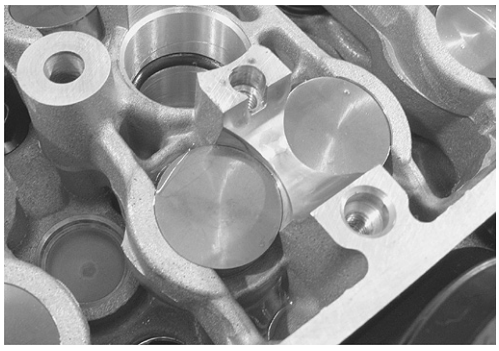
Cam position	Notch Ⓐ position	
	Exhaust Camshaft	Intake Camshaft
Ⓑ	← Front	← Front
Ⓒ	← Front	← Front



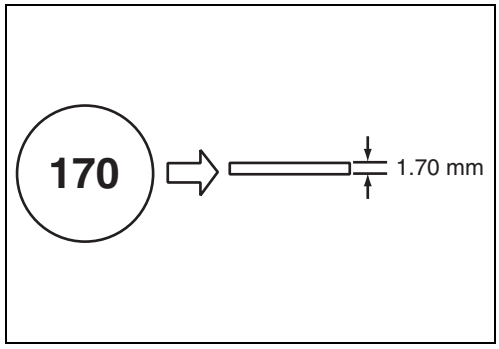
VALVE CLEARANCE ADJUSTMENT

The clearance is adjusted by replacing the existing tappet shim by a thicker or thinner shim.

- Remove the intake or exhaust camshafts. (☞3-15)
- Remove the tappet and shim by fingers or magnetic hand.



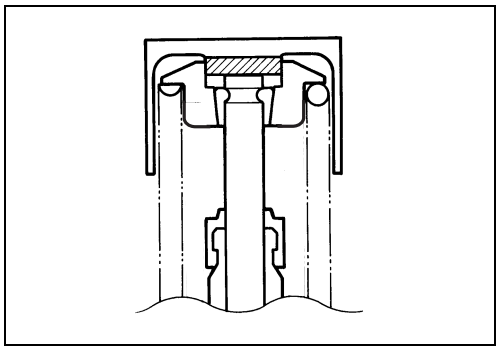
- Check the figures printed on the shim. These figures indicate the thickness of the shim, as illustrated.
- Select a replacement shim that will provide a clearance within the specified range. For the purpose of this adjustment, a total of 25 sizes of tappet shim are available ranging from 1.20 to 2.20 mm in steps of 0.05 mm. Fit the selected shim to the valve stem end, with numbers toward tappet. Be sure to check shim size with micrometer to ensure its size. Refer to the tappet shim selection table (☞2-11 and -12) for details.



NOTE:

** Be sure to apply engine oil to tappet shim top and bottom faces.*

** When seating the tappet shim, be sure the figure printed surface faces the tappet.*



NOTE:

Reinstall the camshafts in the specified manner. (☞3-97)

- After replacing the tappet shim and camshafts, rotate the engine so that the tappet is depressed fully. This will squeeze out oil trapped between the shim and the tappet that could cause an incorrect measurement. Then check the clearance again to confirm that it is within the specified range.

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

* Cylinder head cover (☞3-101)
* Spark plugs and plug caps (☞2-6)
* Throttle body assembly (☞5-19)

Valve timing inspection plug: 11 N·m (1.1 kgf-m)

TAPPET SHIM SELECTION TABLE [INTAKE]
TAPPET SHIM NO. (12892-05C00-XXX)

TAPPET SHIM SET (12800-05830)

MEASURED VALVE CLEARANCE (mm) \ SUFFIX NO.	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220
PRESENT SHIM SIZE (mm)	1.20	1.25	1.30	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20
0.00 – 0.04			1.20	1.25	1.30	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10
0.05 – 0.09		1.20	1.25	1.30	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15
0.10 – 0.20	SPECIFIED CLEARANCE/NO ADJUSTMENT REQUIRED																				
0.21 – 0.25	1.30	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20	2.20	
0.26 – 0.30	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20			
0.31 – 0.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20				
0.36 – 0.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20					
0.41 – 0.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20						
0.46 – 0.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20							
0.51 – 0.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20								
0.56 – 0.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20									
0.61 – 0.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20										
0.66 – 0.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20											
0.71 – 0.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20												
0.76 – 0.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20													
0.81 – 0.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20														
0.86 – 0.90	1.95	2.00	2.05	2.10	2.15	2.20															
0.91 – 0.95	2.00	2.05	2.10	2.15	2.20																
0.96 – 1.00	2.05	2.10	2.15	2.20																	
1.01 – 1.05	2.10	2.15	2.20																		
1.06 – 1.10	2.15	2.20																			
1.11 – 1.15	2.20																				

HOW TO USE THIS CHART:

I. Measure valve clearance. “ENGINE IS COLD”
II. Measure present shim size.
III. Match clearance in vertical column with present shim size in horizontal column.

EXAMPLE

Valve clearance is	0.23 mm
Present shim size	1.70 mm
Shim size to be used	1.80 mm

TAPPET SHIM SELECTION TABLE [EXHAUST]
TAPPET SHIM NO. (12892-05C00-XXX)

TAPPET SHIM SET (12800-05830)

MEASURED VALVE CLEARANCE (mm) \ SUFFIX NO.	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220
PRESENT SHIM SIZE (mm)	1.20	1.25	1.30	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20
0.05 – 0.09				1.20	1.25	1.30	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05
0.10 – 0.14			1.20	1.25	1.30	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10
0.15 – 0.19		1.20	1.25	1.30	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15
0.20 – 0.30	SPECIFIED CLEARANCE/NO ADJUSTMENT REQUIRED																				
0.31 – 0.35	1.30	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20	2.20	
0.36 – 0.40	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20			
0.41 – 0.45	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20				
0.46 – 0.50	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20					
0.51 – 0.55	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20						
0.56 – 0.60	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20							
0.61 – 0.65	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20								
0.66 – 0.70	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20									
0.71 – 0.75	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20										
0.76 – 0.80	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20											
0.81 – 0.85	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20												
0.86 – 0.90	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20													
0.91 – 0.95	1.90	1.95	2.00	2.05	2.10	2.15	2.20														
0.96 – 1.00	1.95	2.00	2.05	2.10	2.15	2.20															
1.01 – 1.05	2.00	2.05	2.10	2.15	2.20																
1.06 – 1.10	2.05	2.10	2.15	2.20																	
1.11 – 1.15	2.10	2.15	2.20																		
1.16 – 1.20	2.15	2.20																			
1.21 – 1.25	2.20																				

HOW TO USE THIS CHART:

I. Measure valve clearance. “ENGINE IS COLD”
II. Measure present shim size.
III. Match clearance in vertical column with present shim size in horizontal column.

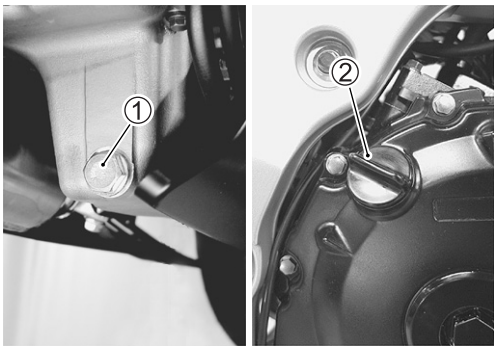
EXAMPLE

Valve clearance is	0.33 mm
Present shim size	1.70 mm
Shim size to be used	1.80 mm

ENGINE OIL AND OIL FILTER

(ENGINE OIL)
Replace initially at 1 000 km (2 months) and every 6 000 km (12 months) thereafter.

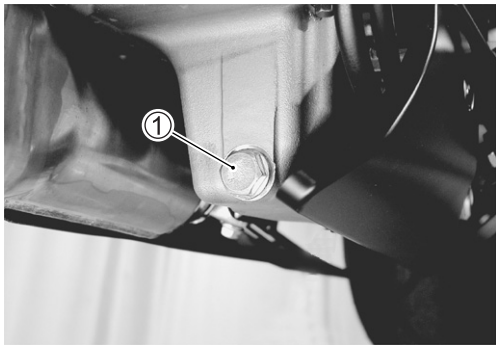
(OIL FILTER)
Replace initially at 1 000 km (2 months) and every 18 000 km (36 months) thereafter.



ENGINE OIL REPLACEMENT

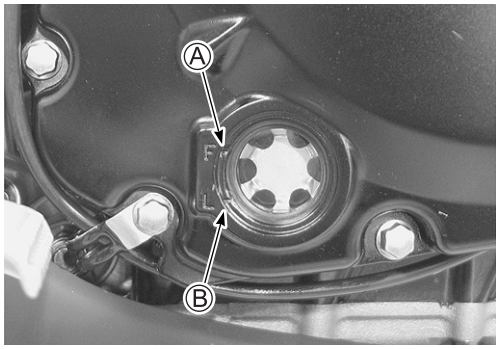
- Keep the motorcycle upright.
- Place an oil pan below the engine, and drain oil by removing the oil drain plug ① and filler cap ②.
- Tighten the drain plug ① to the specified torque, and pour fresh oil through the oil filler. The engine will hold about 3.2 L of oil. Use of API SF/SG or SH/SJ with JASO MA.

Oil drain plug: 23 N·m (2.3 kgf-m)

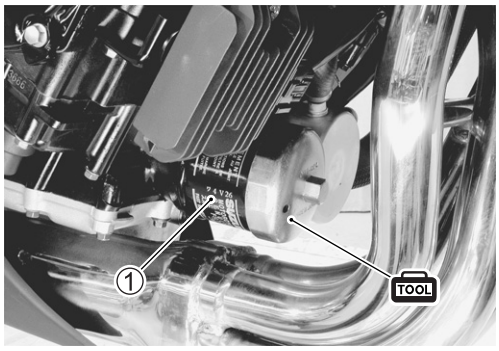


- Start up the engine and allow it to run for several minutes at idling speed.
- Turn off the engine and wait about three minutes, then check the oil level through the inspection window. If the level is below lower line Ⓑ, add oil to full line Ⓐ. If the level is above full line, drain oil to full line.

Ⓐ: Full line
Ⓑ: Lower line



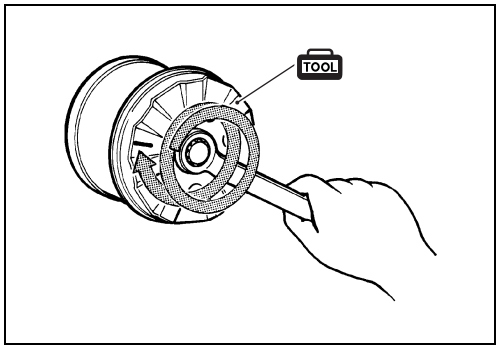
OIL FILTER REPLACEMENT



- Drain the engine oil as described in the engine oil replacement procedure.
- Remove the oil filter ① with the special tool.

TOOL 09915-40610: Oil filter wrench

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



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

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

Oil filter: 20 N·m (2.0 kgf-m)

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

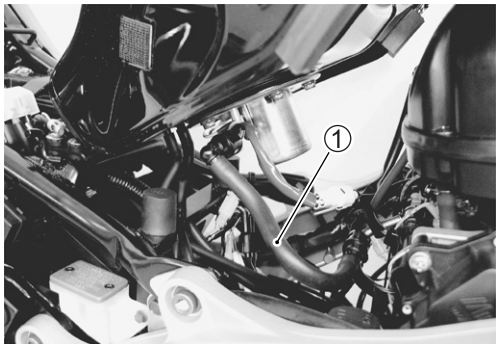
DATA NECESSARY AMOUNT OF ENGINE OIL:

Oil change	**: 3.2 L**
Oil and filter change	**: 3.6 L**
Engine overhaul	**: 3.9 L**

CAUTION

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

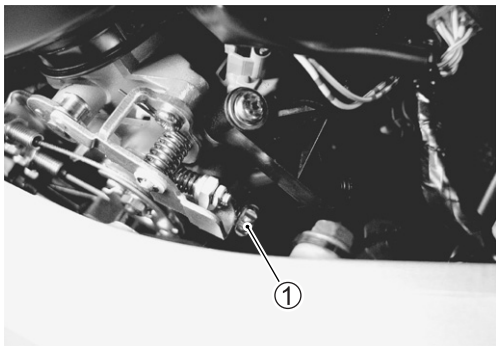


Inspect initially 6 000 km (12 months).

- Lift and support the fuel tank. (☞5-3)
- Inspect the fuel feed hose ① for damage and fuel leakage. If any defects are found, the fuel feed hose must be replaced.

ENGINE IDLE SPEED

Inspect initially at 1 000 km (2 months) and every 6 000 km (12 months) thereafter.



NOTE:
Warm up the engine before adjusting the engine idle speed.

- Start the engine, turn the throttle stop screw ① and set the engine idle speed as follows.

DATA **Engine idle speed: 1 300 ± 100 r/min**

THROTTLE VALVE SYNCHRONIZATION

Inspect initially at 1 000 km (2 months) (E-33 only) and every 12 000 km (24 moths).

Inspect the throttle valve synchronization periodically. (☞5-24)

PAIR (AIR SUPPLY) SYSTEM

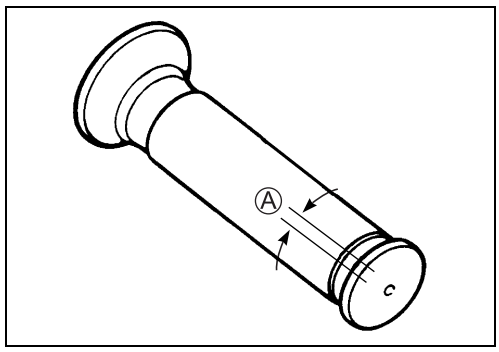
Inspect every 12 000 km (24 months).

Inspect the PAIR (air supply) system periodically. (☞11-6)

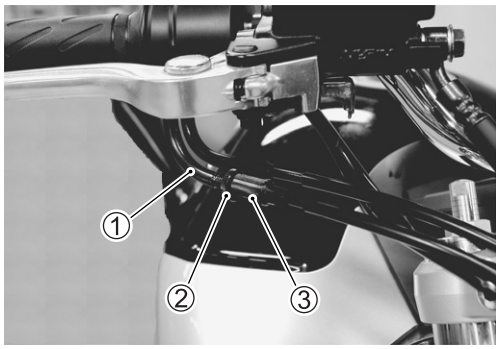
THROTTLE CABLE PLAY

Inspect initially at 1 000 km (2 months) and every 6 000 km (12 months) thereafter.

Adjust the throttle cable play Ⓐ as follows.



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



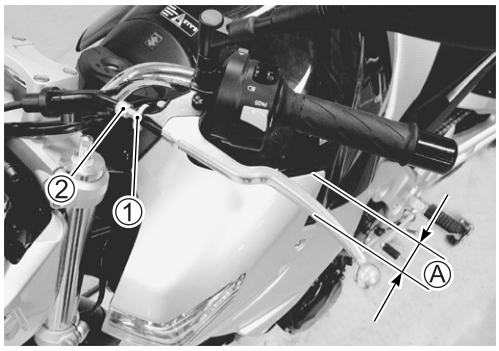
DATA **Throttle cable play Ⓐ: 2.0 – 4.0 mm**

⚠ WARNING

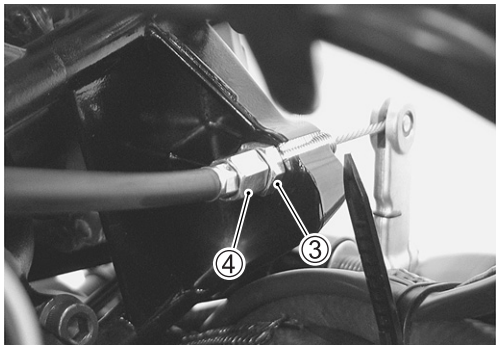
After the adjustment is completed, check that handlebar movement does not raise the engine idle speed and that the throttle grip returns smoothly and automatically.

CLUTCH

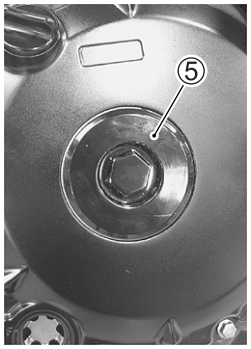
Inspect every 6 000 km (12 months).

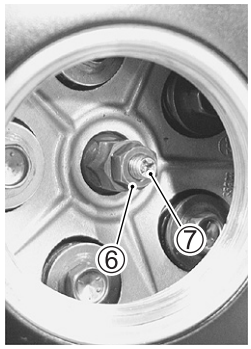


- Loosen the lock-nut ① and turn in the adjuster ② all the way into the clutch lever assembly.
- From that position, turn out the adjuster screw 3 rotations.

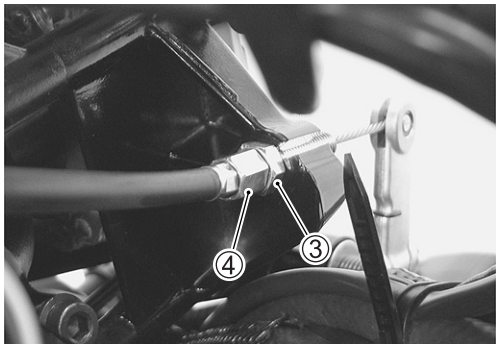


- Lift and support the fuel tank. (☞5-3)
- Loosen the lock-nut ③ and fully turn in the clutch cable adjuster ④.





- Remove the clutch release adjuster cap ⑤.
- Loosen the lock-nut ⑥ and turn in the adjusting screw ⑦ until it stop.
- From this position, turn out the adjusting screw ⑦ 1/2 rotation, and tighten the lock-nut ⑥ while holding the adjusting screw ⑦.



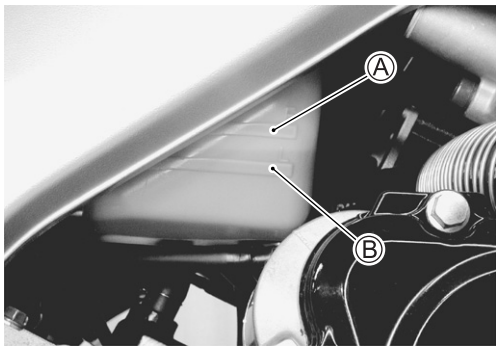
- Turn the cable adjuster ④ to obtain 10 – 15 mm of free play Ⓐ at the clutch lever end.
- Tighten the lock-nut ③ and ①.

DATA **Clutch lever play Ⓐ: 10 – 15 mm**
Clutch release screw: 1/2 turn out

Clutch release adjuster cap: 11 N·m (1.1 kgf-m)

COOLING SYSTEM

Inspect every 6 000 km (12 months).
Replace engine coolant every 2 years.

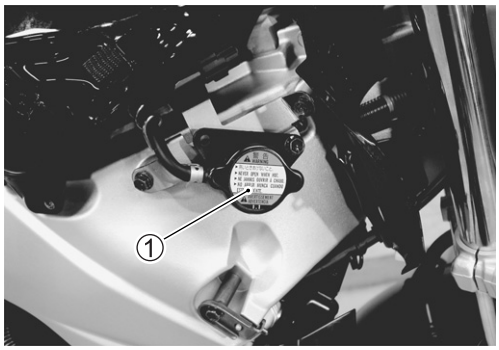


ENGINE COOLANT LEVEL CHECK

- Keep the motorcycle upright.
- Check the engine coolant level by observing the engine coolant reservoir.
  Ⓐ Full line Ⓑ Lower line
- If the level is below the lower line, Lift and support the fuel tank (☞5-3) and add engine coolant to the full line from the engine coolant reservoir filler.

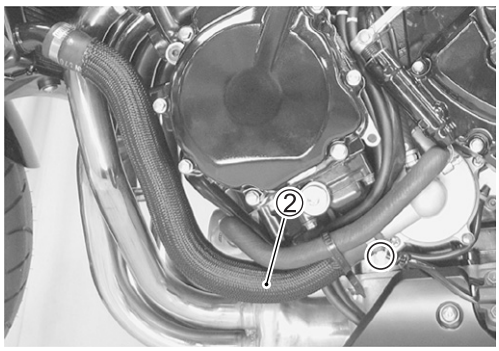
ENGINE COOLANT CHANGE

- Remove the right fuel tank side cover.
- Remove the radiator cap ①.
- Drain engine coolant by disconnecting the radiator hose ② from the pump.



⚠ 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. If swallowed, induce vomiting and call physician immediately!**



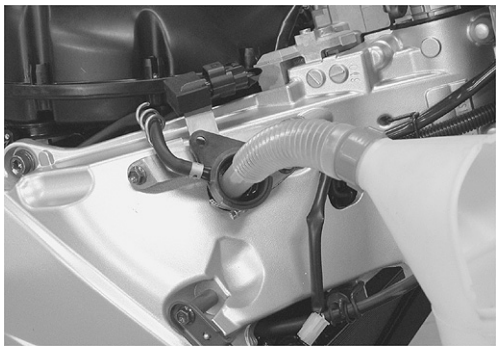
- Flush the radiator with fresh water if necessary.
- Connect the radiator hose ② securely.
- Pour the specified engine coolant up to the radiator inlet.

LLC Engine coolant capacity (total): 2 800 ml

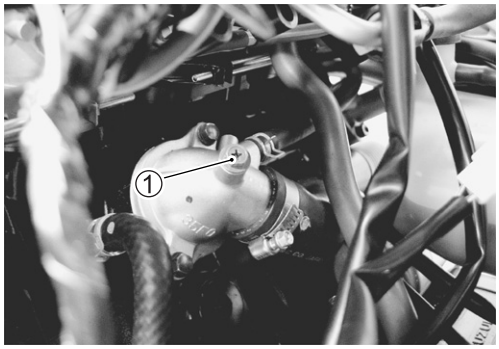
- Bleed the air from the engine coolant circuit. (☞2-18)

ENGINE COOLANT INFORMATION (☞7-2)

AIR BLEEDING THE COOLING CIRCUIT



- Add engine coolant up to the radiator inlet.
- Support the motorcycle upright.
- Slowly swing the motorcycle, right and left, to bleed the air trapped in the cooling circuit.
- Add engine coolant up to the radiator inlet.



- Start up the engine and bleed air from the radiator inlet completely.
- Add engine coolant up to the radiator inlet.
- Repeat the above procedure until no air bleeds from the radiator inlet.
- Loosen the air bleeding bolt ① and check that the engine coolant flows out.

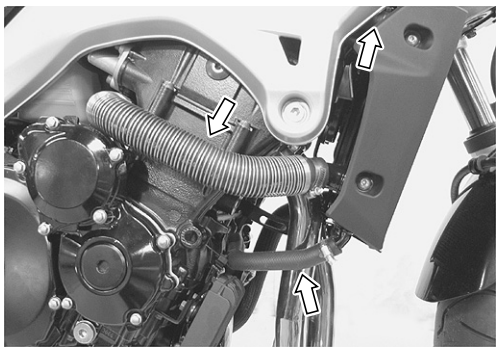
Air bleeder bolt: 0.5 N·m (0.05 kgf-m)

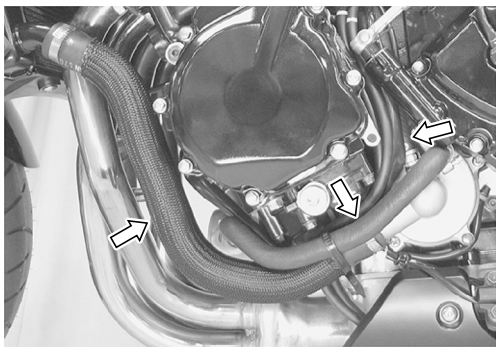
- Close the radiator cap securely.
- After warming up and cooling down the engine several times, add the engine coolant up to the full level of the reservoir.

CAUTION

Repeat the above procedure several times and make sure that the radiator is filled with engine coolant up to the reservoir full level.

RADIATOR HOSES





- Check the radiator hoses for crack, damage or engine coolant leakage.
- If any defect is found, replace the radiator hose with new one.

DRIVE CHAIN

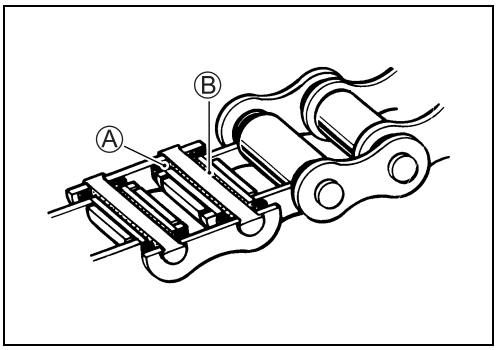
Inspect initially at 1 000 km (2 months) and every 6 000 km (12 months) thereafter.
Clean and lubricate every 1 000 km.

Visually check the drive chain for the possible defects listed below. (Support the motorcycle by a jack and a wooden block, turn the rear wheel slowly by hand with the transmission shifted to Neutral.)

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

If any defect is found, the drive chain must be replaced.

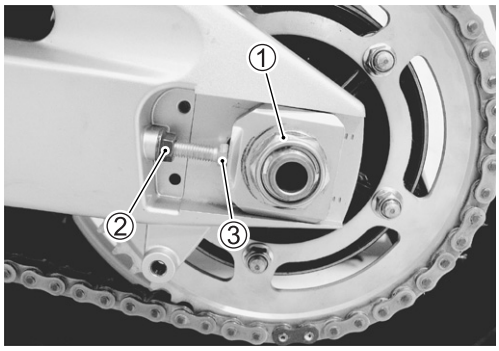
NOTE:
When replacing the drive chain, replace the drive chain and sprockets as a set.

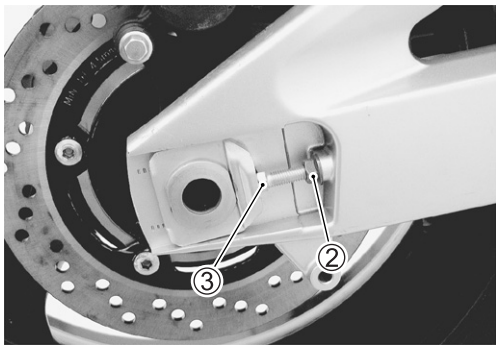


Ⓐ: O-ring
Ⓑ: Grease

CHECKING

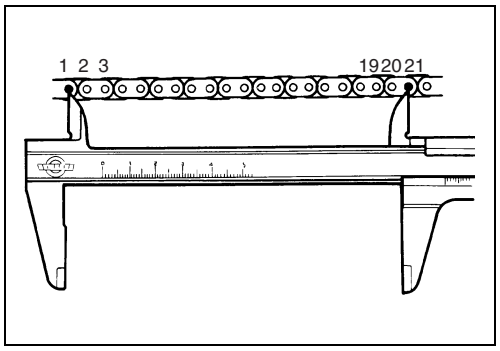
- Loosen the axle nut ①.
- Loosen the chain adjuster lock-nuts ②.
- Give tension to the drive chain fully by turning both chain adjuster bolts ③.





• 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.

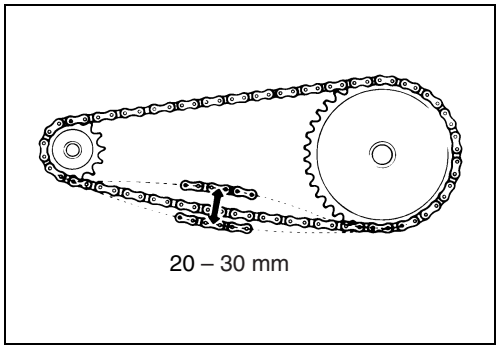
DATA Drive chain 20-pitch length:
Service limit: 336.5 mm



ADJUSTING

• Loosen or tighten both chain adjuster bolts ① until there is 20 – 30 mm of slack at the middle of the chain between the engine and rear sprockets as shown. The chain adjuster position relative to the reference marks Ⓐ on both sides of the swingarm must be equal to ensure that the front and rear wheels are correctly aligned.

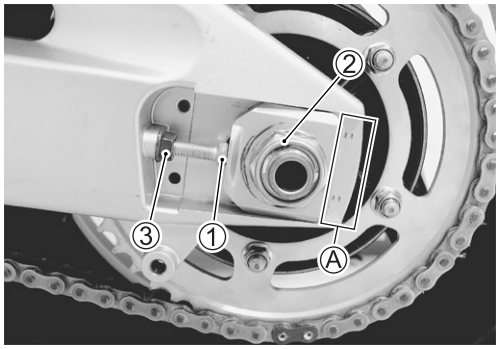
DATA Drive chain slack:
Standard: 20 – 30 mm

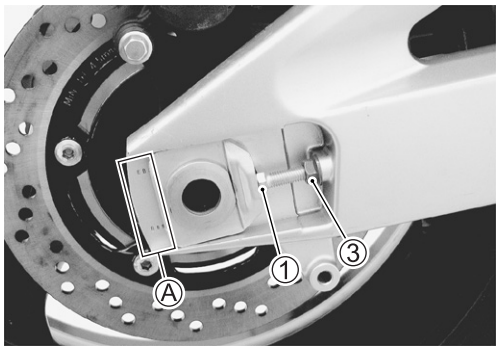


• Place the motorcycle on its side-stand for accurate adjustment.
• After adjusting the drive chain, tighten the axle nut ② to the specified torque.
• Tighten both chain adjuster lock-nuts ③ securely.

Rear axle nut: 100 N·m (10.0 kgf-m)

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





CLEANING AND LUBRICATING

- Clean the drive chain with kerosine. If the drive chain tends to rust quickly, the intervals must be shortened.

CAUTION

Do not use trichloroethylene, gasoline or any similar solvent. These fluids will damage the O-rings. Use only kerosine to clean the drive chain.

- After washing and drying the chain, oil it with a heavyweight motor oil.

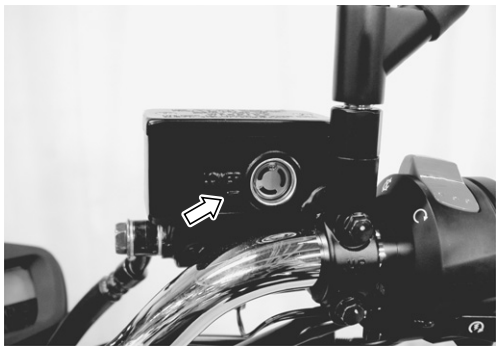
CAUTION

*** Do not use any oil sold commercially as "drive chain oil". Such oil can damage the O-rings.**
*** The standard drive chain is RK525SMOZ7Y. Suzuki recommends to use this standard drive chain as a replacement.**

BRAKE

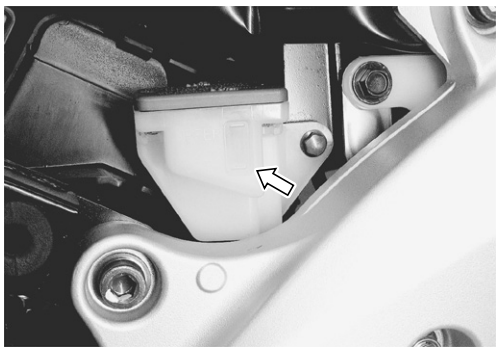
(BRAKE)
Inspect initially at 1 000 km (2 months) and every 6 000 km (12 months) thereafter.

(BRAKE HOSE AND BRAKE FLUID)
Inspect every 6 000 km (12 months).
Replace hoses every 4 years. Replace fluid every 2 years.



BRAKE FLUID LEVEL CHECK

- Keep the motorcycle upright and place the handlebars straight.
- Remove the right frame cover. (☞8-4)
- Check the brake fluid level relative to the lower limit lines on the front and rear brake fluid reservoirs.
- When the level is below the lower limit line, replenish with brake fluid that meets the following specification.



Specification and classification: DOT 4

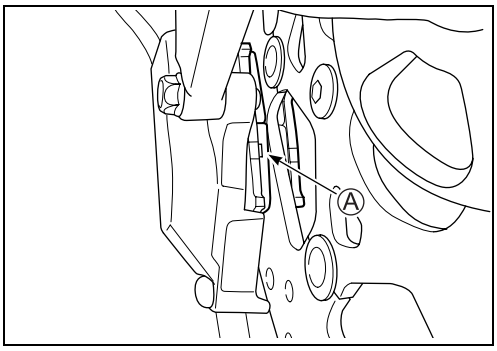
⚠ WARNING

*** The brake system of this 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 re-use brake fluid left over from the last servicing or stored for a long period of time.**
*** Brake fluid, if it leaks, will interfere with safe running and immediately discolor painted surfaces. Check the brake hoses and hose joints for cracks and fluid leakage before riding.**

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 new ones. (☞8-54)

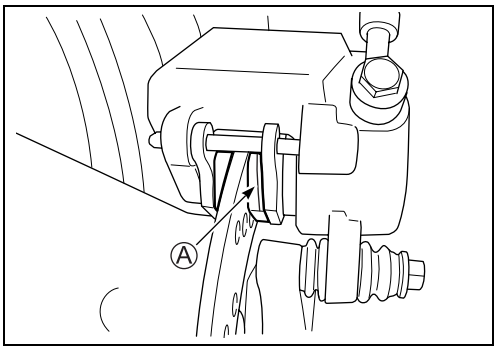


CAUTION

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 limit line Ⓐ on the pad. When the wear exceeds the limit line, replace the pads with new ones. (☞8-65)

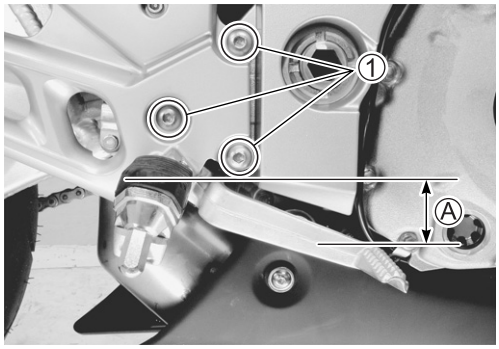


CAUTION

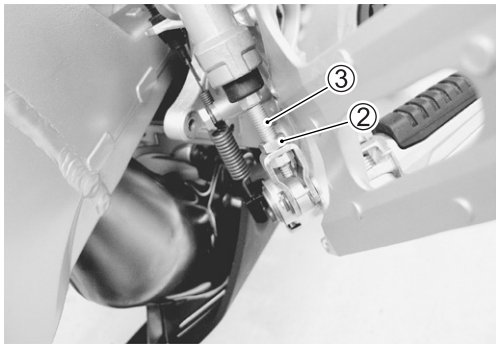
Replace the brake pads as a set, otherwise braking performance will be adversely affected.

BRAKE PEDAL HEIGHT

- Remove the front footrest bracket bolts ①.



- Loosen the lock-nut ②.
- Turn the push rod ③ until the brake pedal height Ⓐ becomes 45 – 55 mm below the top of the footrest.
- Tighten the lock-nut ② and front footrest bracket bolts ① to the specified torque.

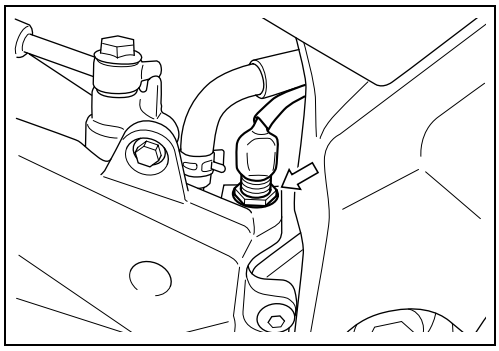


DATA **Brake pedal height Ⓐ:**
Standard: 45 – 55 mm

Rear brake master cylinder rod lock-nut: 18 N·m (1.8 kgf-m)
Front footrest bracket bolt: 23 N·m (2.3 kgf-m)

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.

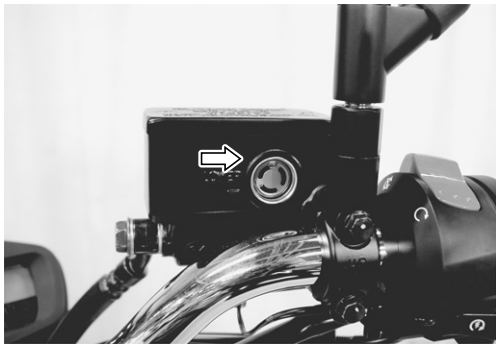


AIR BLEEDING FROM BRAKE FLUID CIRCUIT

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:

FRONT BRAKE

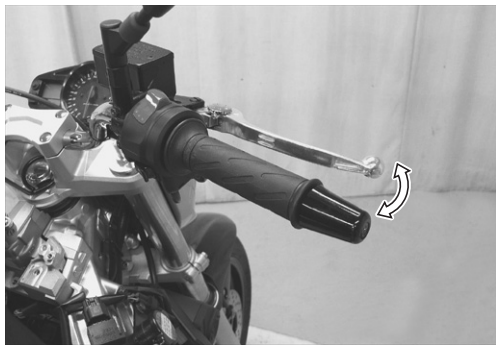
- Fill the reservoir with brake fluid to the top of the inspection window. Place the reservoir cap to prevent dirt from entering.
- Attach a hose to the air bleeder valve and insert the free end of the hose into a receptacle.
- Squeeze and release the brake lever several times in rapid succession and 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 no longer contains air bubbles.



NOTE:

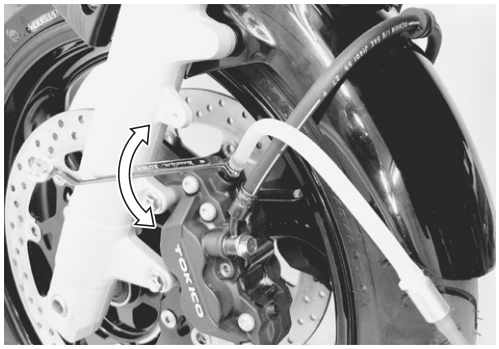
While bleeding the brake system, replenish the brake fluid in the reservoir as necessary. Make sure that there is always some fluid visible in the reservoir.

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



Specification and classification: DOT 4

Air bleeder valve: 7.5 N·m (0.75 kgf-m)



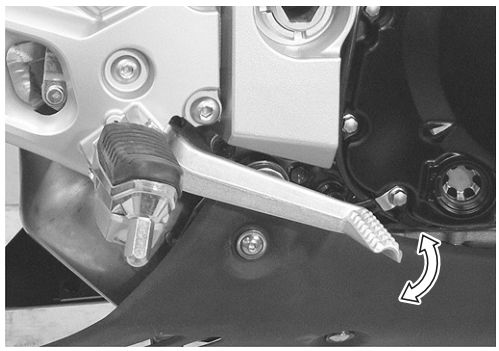
⚠ WARNING

*** 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 re-use brake fluid left over from the last servicing or stored for a long period of time.**

*** Brake fluid, if it leaks, will interfere with safe running and immediately discolor painted surfaces. Check the brake hoses and hose joints for cracks and fluid leakage before riding.**

REAR BRAKE

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



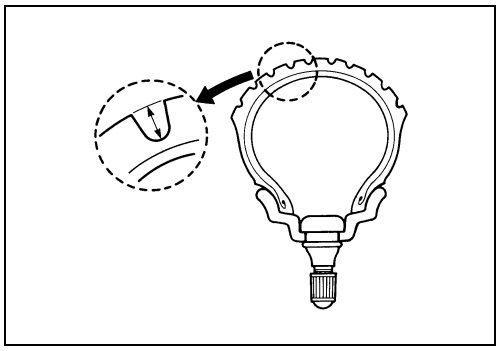
Air bleeder valve: 7.5 N·m (0.75 kgf-m)

NOTE:

The only difference of bleeding operation from the front brake is that the rear master cylinder is actuated by the pedal.

TIRES

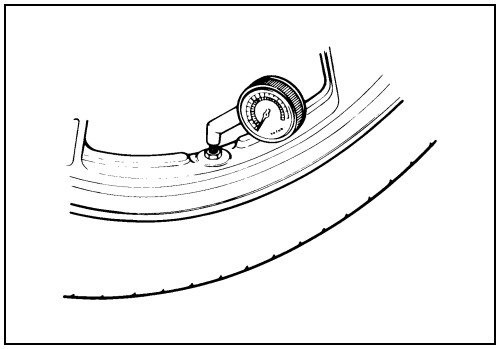
Inspect every 6 000 km (12 months).



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.

TOOL 09900-20805: Tire depth gauge



DATA Tire tread depth:

Service Limit: Front : 1.6 mm
Rear : 2.0 mm

TIRE PRESSURE

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

DATA Cold inflation tire pressure

Solo riding:	**Front:**	**250 kPa (2.50 kgf/cm²)**
	Rear:	**250 kPa (2.50 kgf/cm²)**
Dual riding:	**Front:**	**250 kPa (2.50 kgf/cm²)**
	Rear:	**290 kPa (2.90 kgf/cm²)**

CAUTION

The standard tire fitted on this motorcycle is 120/70 ZR17 M/C (58 W) for the front and 180/55 ZR17 M/C (73 W) 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

BRIDGESTONE (Front: BT014F SN, Rear: BT014R N)

STEERING

Inspect initially at 1 000 km (2 months) and every 12 000 km (24 months) thereafter.

The steering should be adjusted properly for smooth turning of the handlebars and safe operation. 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 FORK

Inspect every 12 000 km (24 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. (☞8-14)

REAR SUSPENSION

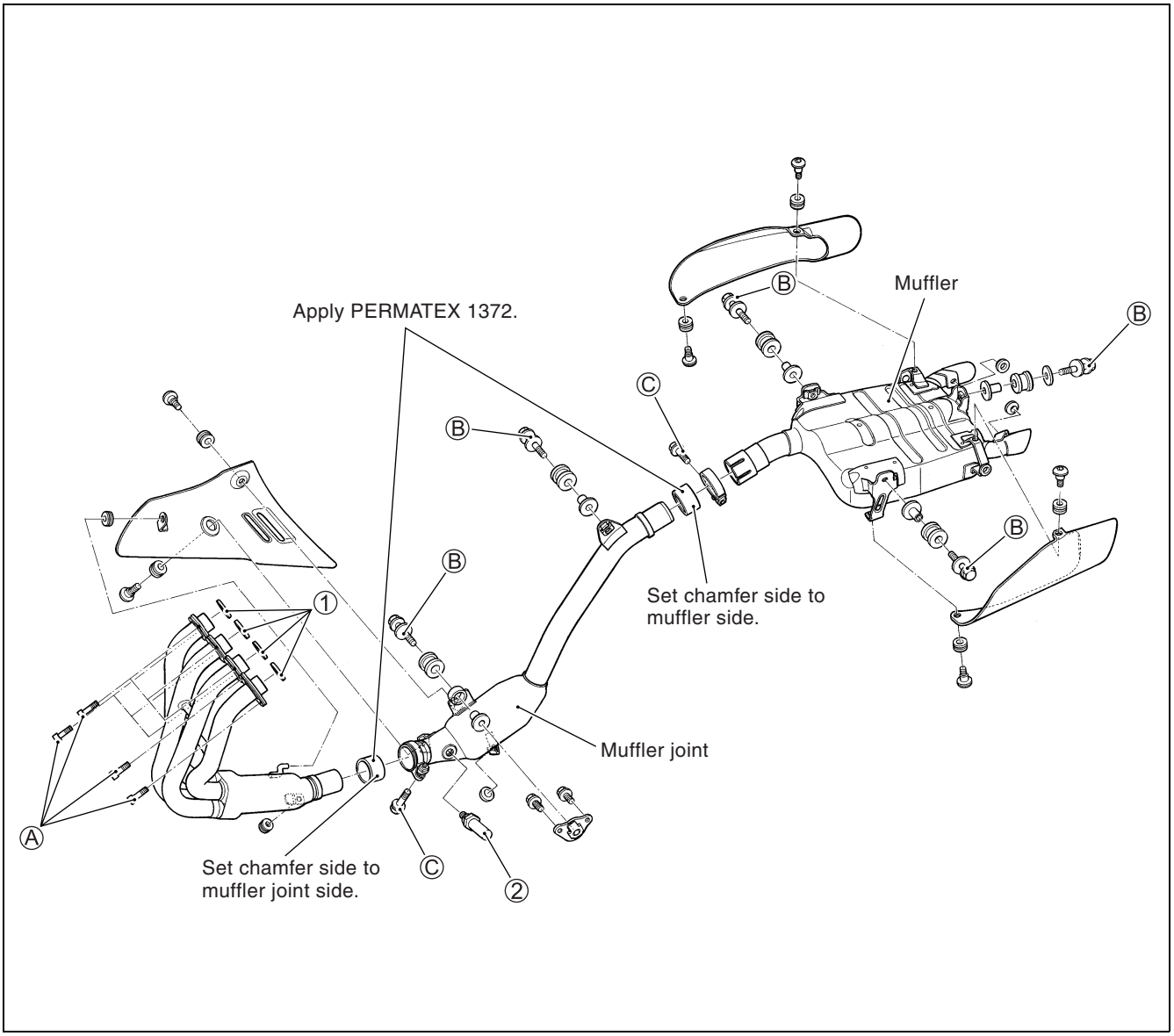
Inspect every 12 000 km (24 months).

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

EXHAUST PIPE BOLT AND NUT

Tighten initially at 1 000 km (2 months) and every 12 000 km (24 months) thereafter.

- Tighten the exhaust pipe bolts, muffler mounting bolts and muffler connecting bolts to the specified torque.



①	Gasket	Ⓑ	Muffler mounting bolt
②	HO2 sensor	Ⓒ	Muffler connecting bolt
Ⓐ	Exhaust pipe bolt		

ITEM	N·m	kgf-m
②	48	4.8
ⒶⒷⒸ	23	2.3

CAUTION

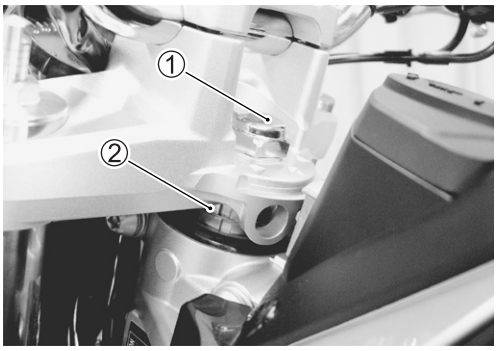
Replace the gaskets and connectors with new ones.

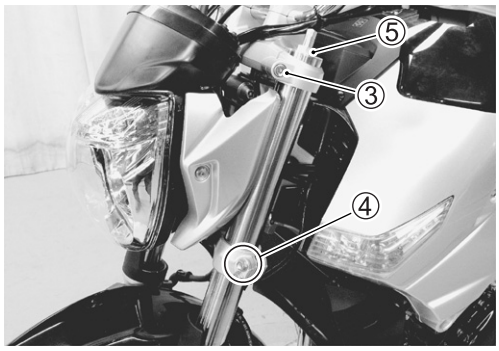
CHASSIS BOLTS AND NUTS

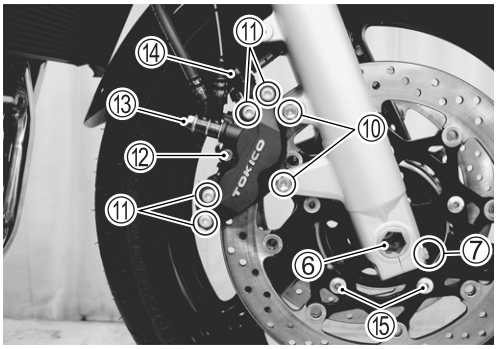
Tighten initially at 1 000 km (2 months) and every 6 000 km (12 months) thereafter.

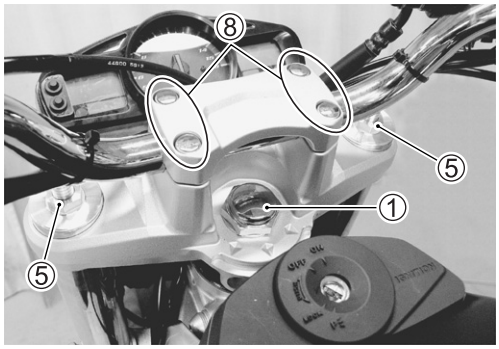
Check that all chassis bolts and nuts are tightened to their specified torque. (Refer to page 2-30 for the locations of the following nuts and bolts on the motorcycle.)

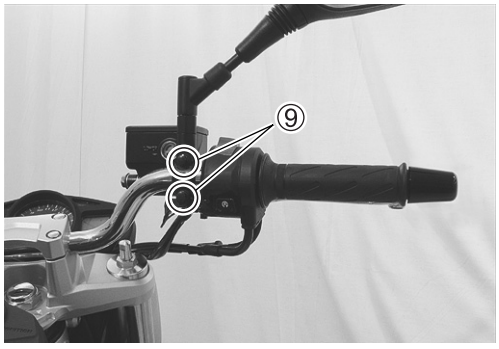
Item	N·m	kgf-m
① Steering stem head nut	90	9.0
② Steering stem lock-nut	80	8.0
③ Front fork upper clamp bolt	23	2.3
④ Front fork lower clamp bolt	23	2.3
⑤ Front fork cap bolt	23	2.3
⑥ Front axle	100	10.0
⑦ Front axle pinch bolt	23	2.3
⑧ Handlebar clamp bolt	23	2.3
⑨ Front brake master cylinder mounting bolt	10	1.0
⑩ Front brake caliper mounting bolt	25	2.5
⑪ Front brake caliper housing bolt	22	2.2
⑫ Front brake pad mounting pin	16	1.6
⑬ Brake hose union bolt	23	2.3
⑭ Air bleeder valve	7.5	0.75
⑮ Brake disc bolt	23	2.3
⑯ Rear brake caliper mounting bolt	18	1.8
⑰ Rear brake caliper sliding pin	33	3.3
⑱ Rear brake pad mounting pin	16	1.6
⑲ Rear brake master cylinder mounting bolt	10	1.0
⑳ Rear brake master cylinder rod lock-nut	18	1.8
㉑ Front footrest bracket mounting bolt	23	2.3
㉒ Swingarm pivot shaft	15	1.5
㉓ Swingarm pivot nut	100	10.0
㉔ Swingarm pivot lock-nut	90	9.0
㉕ Rear shock absorber mounting bolt/nut (Upper & Lower)	50	5.0
㉖ Cushion rod nut	78	7.8
㉗ Cushion lever mounting nut	132	13.2
㉘ Rear axle nut	100	10.0
㉙ Rear sprocket nut	60	6.0

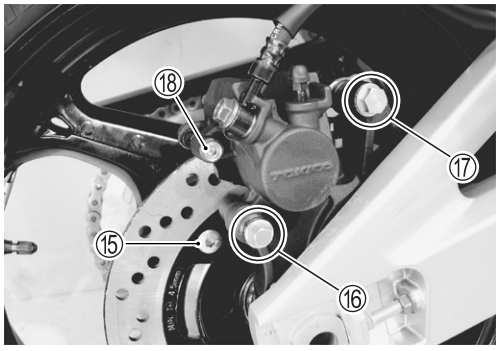


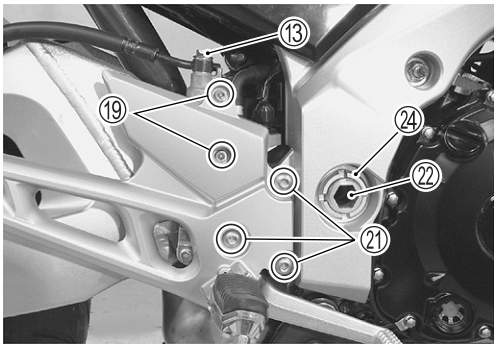


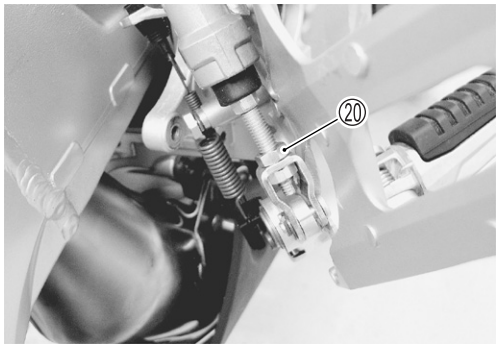


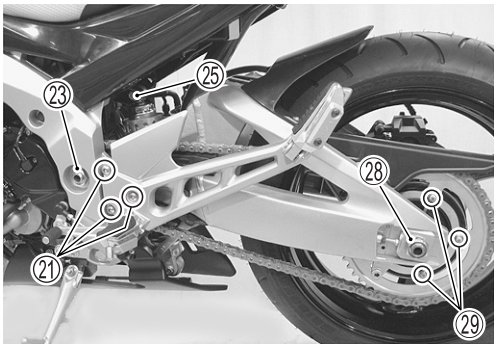


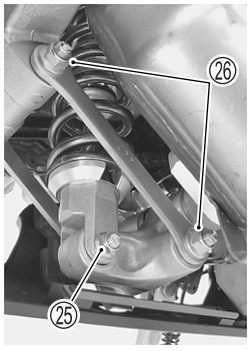












COMPRESSION PRESSURE CHECK

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
1 100 – 1 500 kPa (11 – 15 kgf/cm²)	900 kPa (9 kgf/cm²)	200 kPa (2 kgf/cm²)

Low compression pressure can indicate any of the following conditions:

* Excessively worn cylinder wall
* Worn piston or piston ring
* Piston ring stuck in groove
* 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 900 kPa (9 kgf/cm²) and less.
* The difference in compression pressure between any two cylinders is 200 kPa (2 kgf/cm²) and more.
* All compression pressure readings are below 1 100 kPa (11 kgf/cm²) even when they measure 900 kPa (9 kgf/cm²) and more.

COMPRESSION TEST PROCEDURE

NOTE:

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

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

- Lift and support the fuel tank. (☞5-3)
- Remove all the spark plugs. (☞2-5)
- 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 set
09913-10750: 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 (2.0 – 5.0 kgf/cm²) at 3 000 r/min, Oil temp. at 60 °C

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

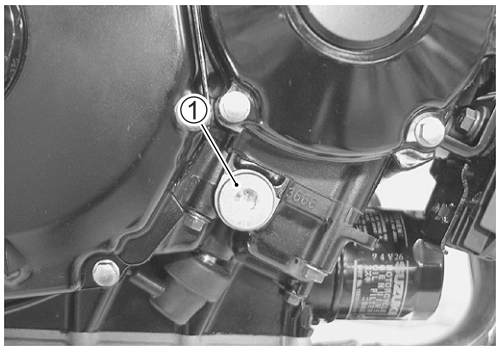
OIL PRESSURE TEST PROCEDURE

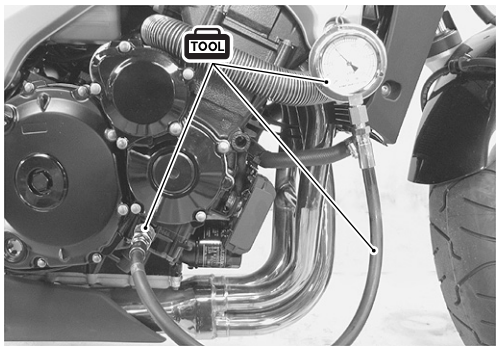
Start the engine and check if the oil pressure indicator light is turned on. If the light stays on, check the oil pressure indicator light circuit. If the circuit is OK, check the oil pressure in the following manner.

- Remove the main oil gallery plug ①.
- Install the oil pressure gauge and adaptor into the main oil gallery.
- Warm up the engine as follows:
  Summer : 10 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: Oil pressure gauge hose
09915-74540: Oil pressure gauge attachment
09915-77331: Meter (for high pressure)

Oil gallery plug (M16): 35 N·m (3.5 kgf-m)





SDS CHECK

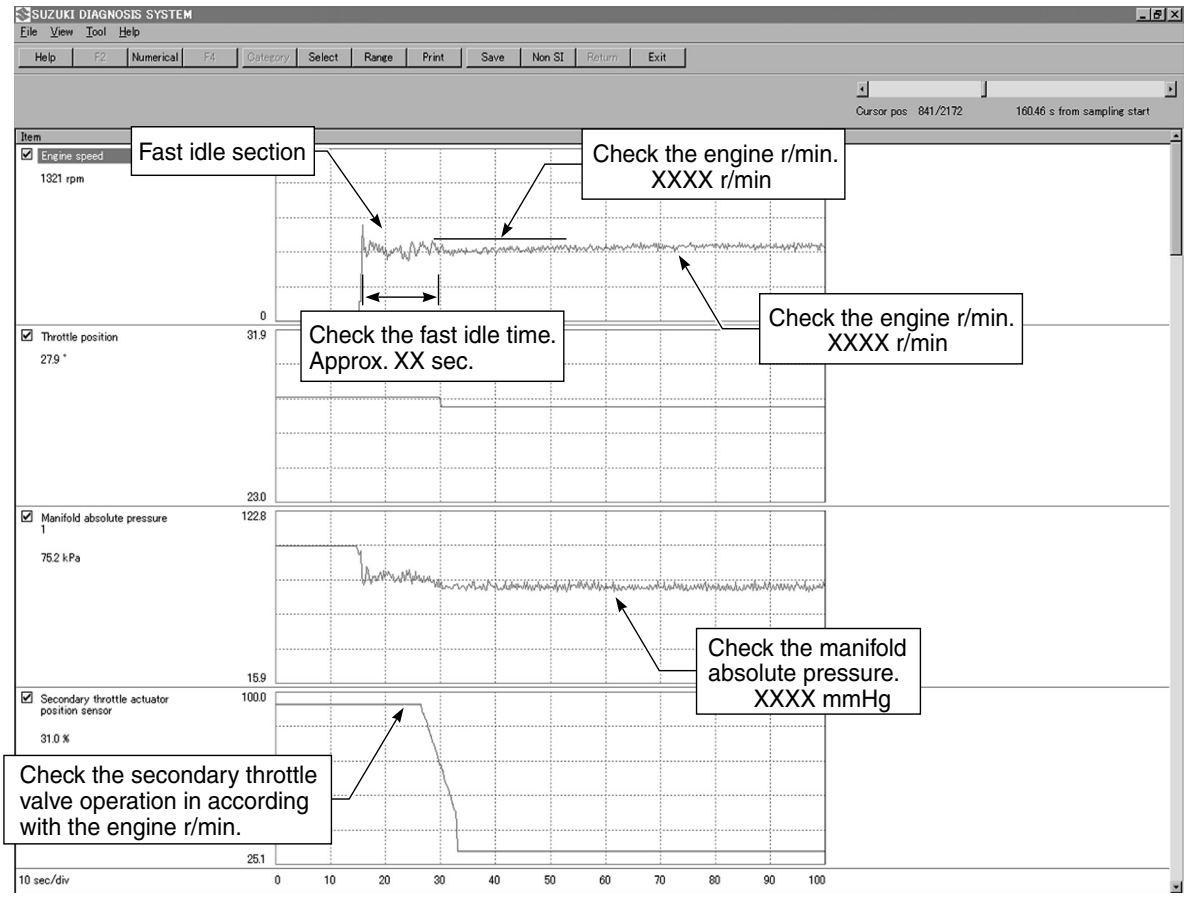
Using SDS, take the sample of data from the new motorcycle and at the time of periodic maintenance at your dealership.
Save the data in the computer or by printing and filing the hard copies. The saved or filed data are useful for troubleshooting as they can be compared periodically with changes over time or failure conditions of the motorcycle.
For example, when a motorcycle is brought in for service but the troubleshooting is difficult, comparison with the normal data that have been saved or filed can allow the specific engine failure to be determined.

- Remove the left frame cover. (☞8-4)
- Set up the SDS tools. (☞4-46)

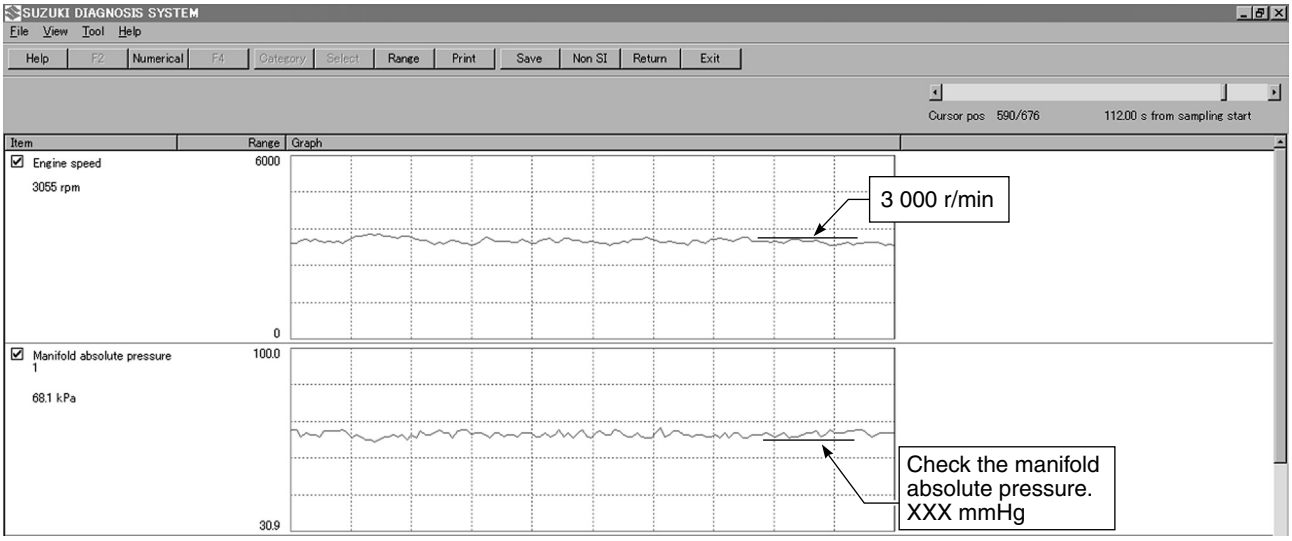
TOOL 09904-41010: SDS set tool
99565-01010-007: CD-ROM Ver. 7

NOTE:
** Before taking the sample of data, check and clear the Past DTC. (☞4-26)*
** A number of different data under a fixed condition as shown below should be saved or filed as sample.*

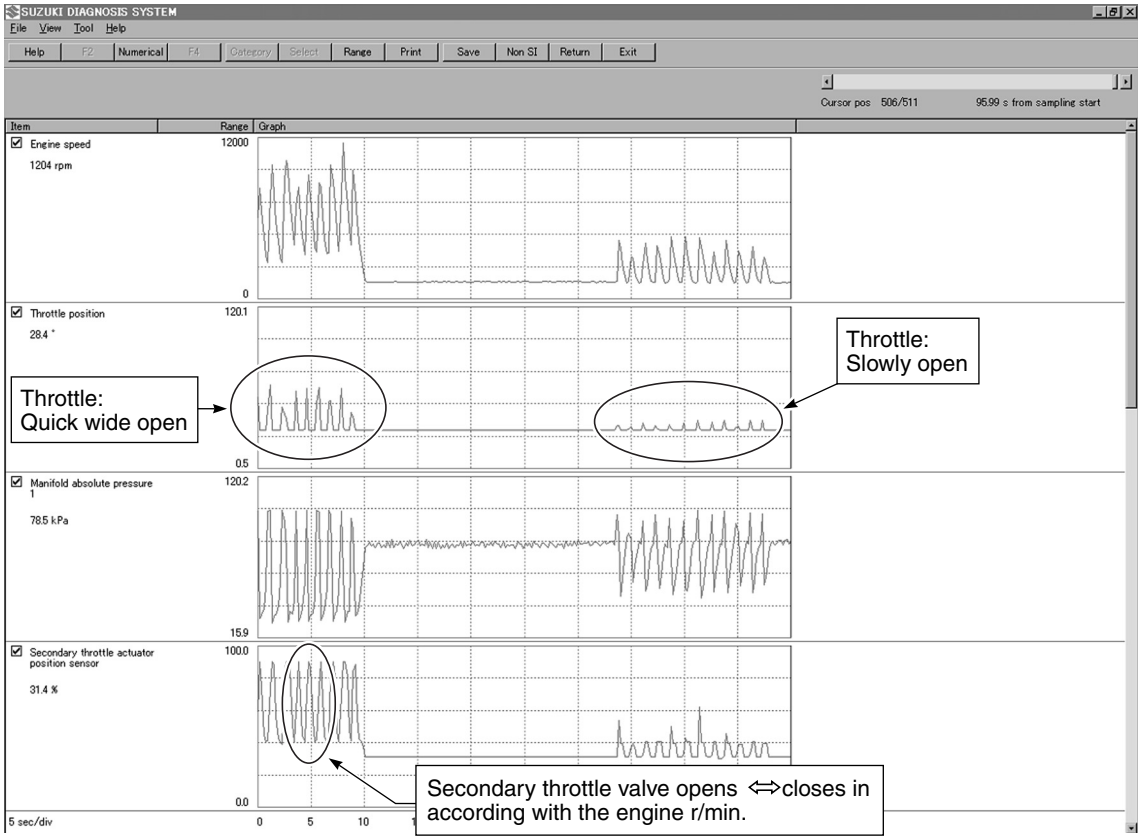
SAMPLE:
Data sampled from cold starting through warm-up



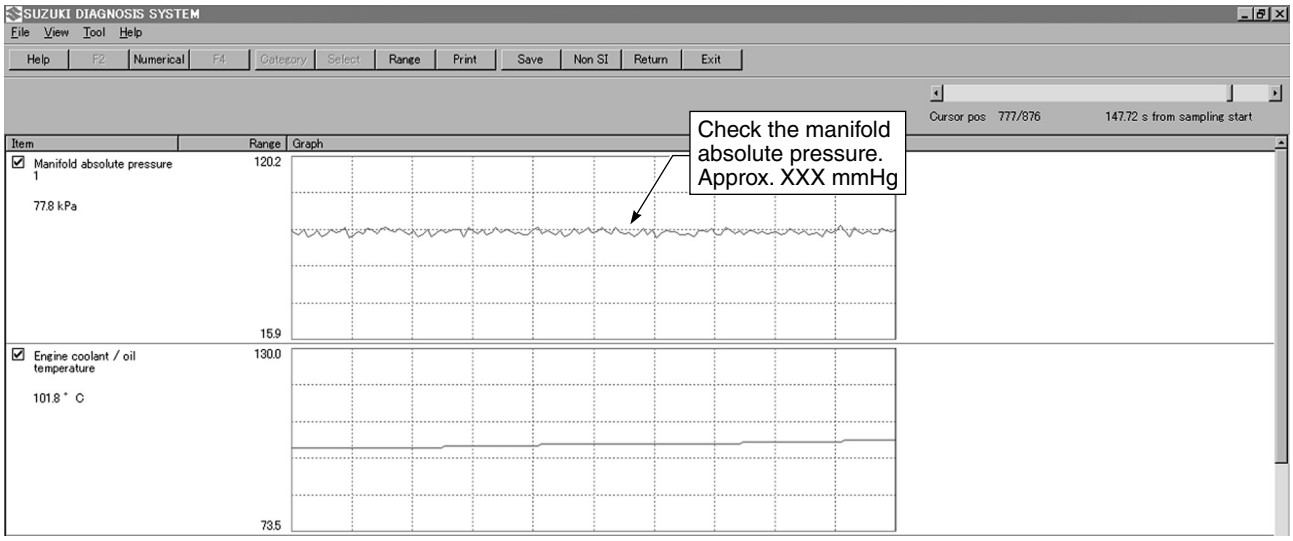
Data at 3 000 r/min under no load



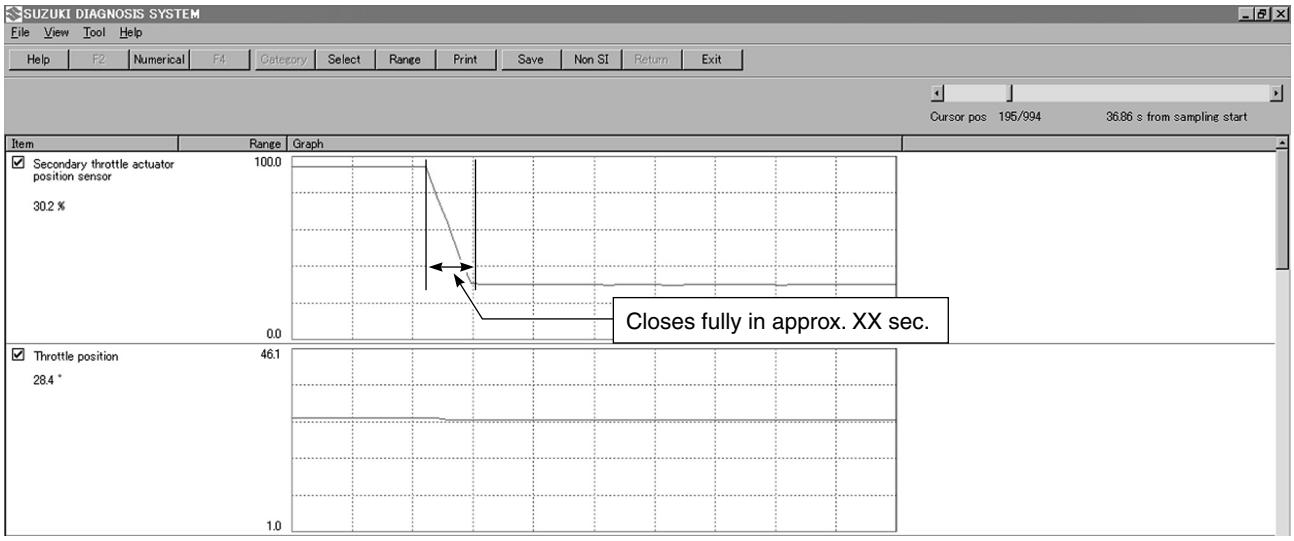
Data at the time of racing



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



Data of secondary throttle valve operation at the time of starting



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	REINSTALLATION
PAIR reed valve	☞3-14	☞3-17	☞3-100
Starter motor	☞3-14	☞9-14	☞3-101
Crankcase breather cover	☞3-23	———	☞3-79
Thermostat	☞3-16	☞7-9	☞3-93
Cylinder head cover	☞3-14	☞3-27	☞3-100
Camshaft	☞3-16	☞3-28	☞3-93
Intake pipe	☞3-39	———	☞3-39
Oil filter	☞3-23	———	☞3-78
Oil cooler	☞3-23	———	☞3-78
Oil pan	☞3-23	———	☞3-78

ENGINE RIGHT SIDE

ITEM	REMOVAL	INSPECTION	REINSTALLATION
Exhaust pipe and muffler joint	☞3-5	☞6-2	☞3-13
Cam chain tension adjuster	☞3-15	☞3-30	☞3-97
Clutch cover	☞3-17	———	☞3-91
Clutch (plates)	☞3-17	☞3-40	☞3-90
Primary driven gear	☞3-18	☞3-41	☞3-88
Oil pump	☞3-19	☞3-41	☞3-87
Gearshift shaft	☞3-19	☞3-43	☞3-85
Starter idle gear cover	☞3-20	———	☞3-85
Starter idle gear	☞3-20	———	☞3-84
Starter clutch cover	☞3-21	———	☞3-84
Starter clutch	☞3-21	☞3-41	☞3-84
CKP sensor	☞3-21	☞4-34	☞3-82
Oil pump driven gear	☞3-19	———	☞3-87
Cam chain tensioner	☞3-21	☞3-31	☞3-83
Cam chain guide	☞3-21	☞3-31	☞3-83

ENGINE LEFT SIDE

ITEM	REMOVAL	INSPECTION	REINSTALLATION
Engine sprocket	☞3-8	———	☞3-12
Gear position switch	☞3-23	☞4-72	☞3-79
Generator (cover)	☞3-22	☞3-42	☞3-82
Generator rotor	☞3-22	———	☞3-80
Water pump	☞3-22	☞7-13	☞3-79

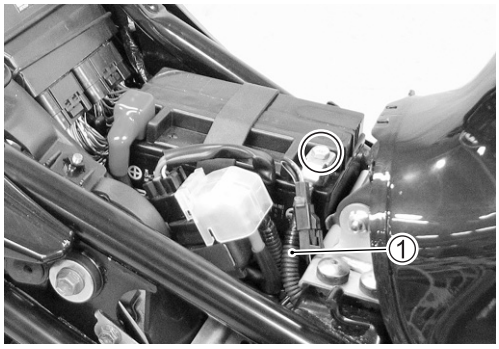
ENGINE REMOVAL AND INSTALLATION

ENGINE REMOVAL

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

- Remove the under covers. (☞8-5)
- Lift and support the fuel tank. (☞5-3)
- Drain engine oil. (☞2-13)
- Drain engine coolant. (☞2-17)

- Disconnect the battery ⊖ lead wire ①.

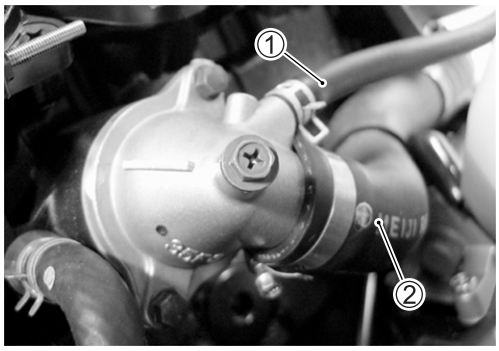


- Remove the air cleaner box ②. (☞5-13)

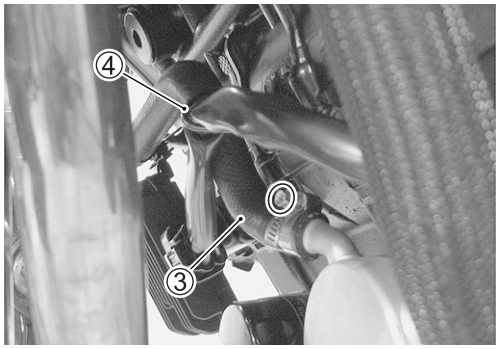
- Remove the throttle body assembly ③. (☞5-13)

RADIATOR

- Disconnect the radiator inlet hoses ① and ②.



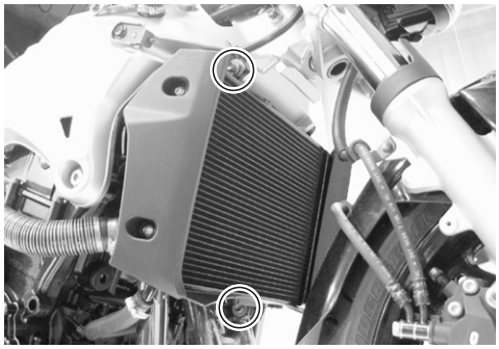
- Disconnect the oil cooler water hose ③.
- Open the hose clamp ④.



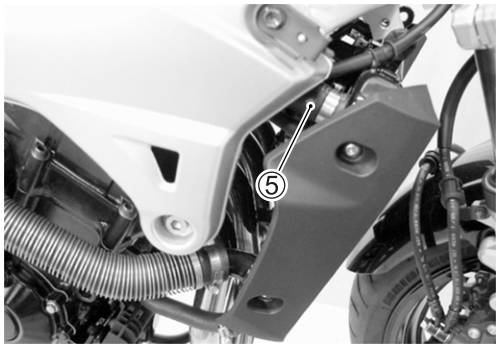
- Remove the radiator mounting bolts.
- Move the radiator forward.

CAUTION

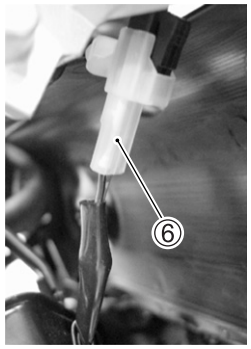
Be careful not to bent the radiator fins.

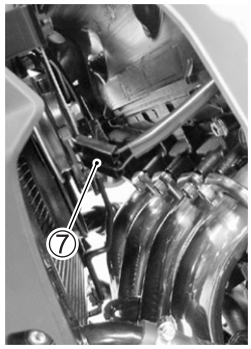


- Disconnect the radiator hose ⑤.

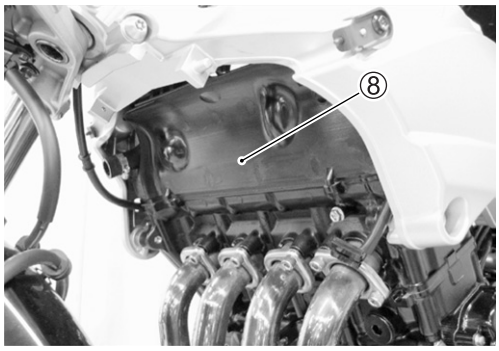


- Disconnect the cooling fan coupler ⑥.
- Disconnect the horn coupler ⑦.
- Remove the radiator.





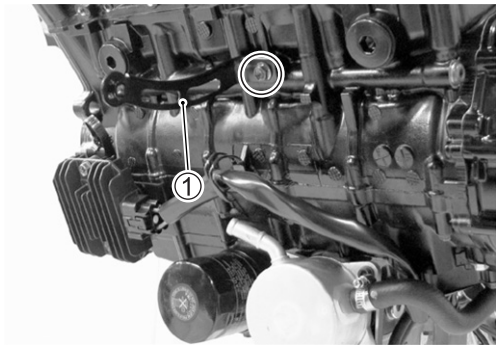
• Remove the front engine cover ⑧.



EXHAUST PIPE AND MUFFLER JOINT

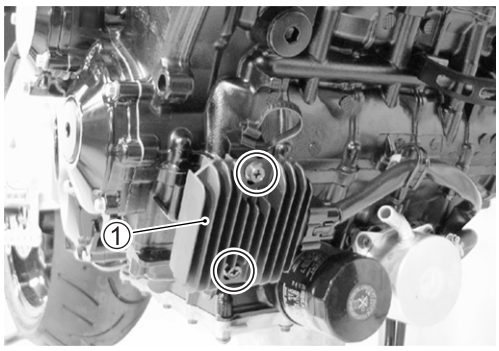
• Remove the exhaust pipe and muffler joint. (☞6-3)
• Remove the O2 sensor. (☞6-3)

• Remove the radiator mounting bracket ①.

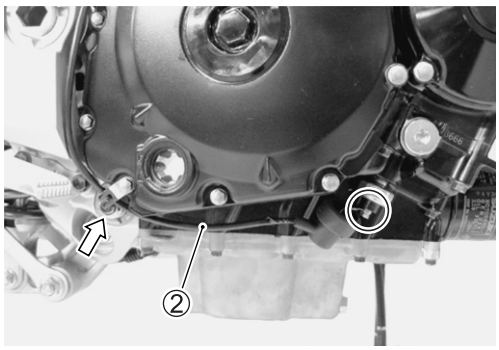


ELECTRIC PARTS AND PAIR HOSE

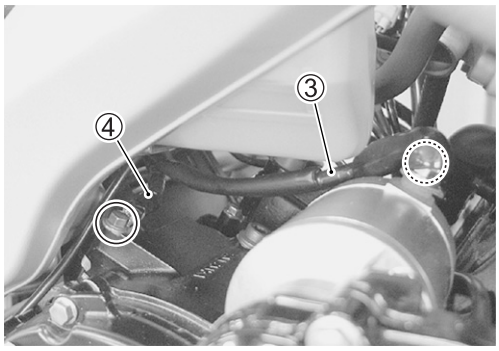
• Remove the regulator/rectifier ①.



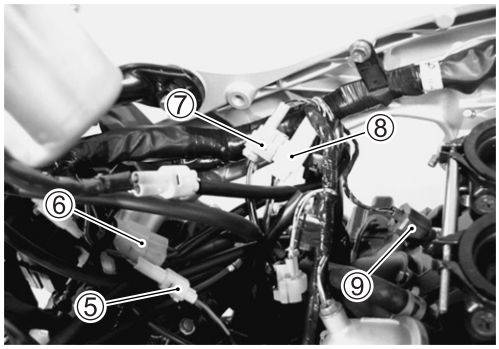
• Disconnect the oil pressure switch lead wire ②.



- Disconnect the starter motor lead wire ③.
- Disconnect the engine ground lead wire ④.



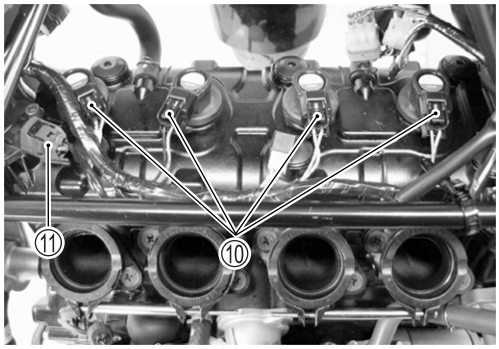
- Disconnect the respective lead wire couplers.
  CKP sensor ⑤
  Generator ⑥
  Side-stand ⑦
  GP switch ⑧
  ECT sensor ⑨



- Disconnect the ignition coil/plug cap lead wire couplers ⑩ and CMP sensor lead wire coupler ⑪.

CAUTION

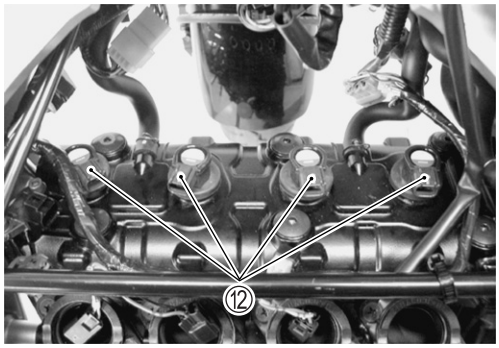
Do not remove the ignition coil/plug cap before disconnecting its coupler.



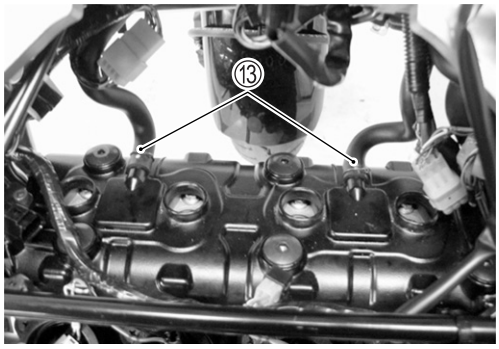
- Remove the ignition coil/plug caps ⑫.

CAUTION

*** Do not pry up the ignition coil/plug cap with a screw driver or a bar to avoid its damage.**
*** Be careful not to drop the ignition coil/plug cap to prevent its short or open circuit.**

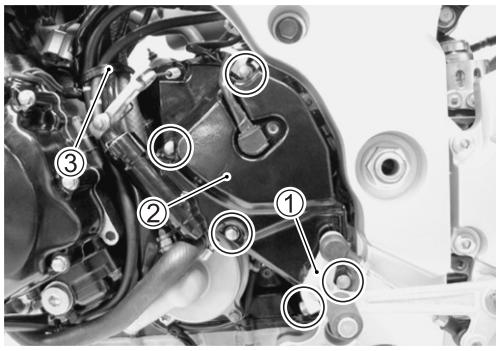


- Disconnect the PAIR hoses ⑬.

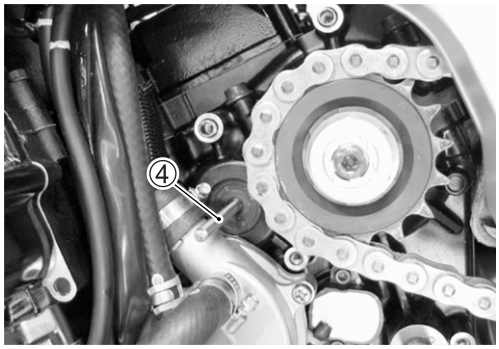


ENGINE SPROCKET AND GEAR SHIFT LEVER

- Disengage the gearshift lever ①.
- Remove the engine sprocket cover ②.
- Remove the clamp ③.

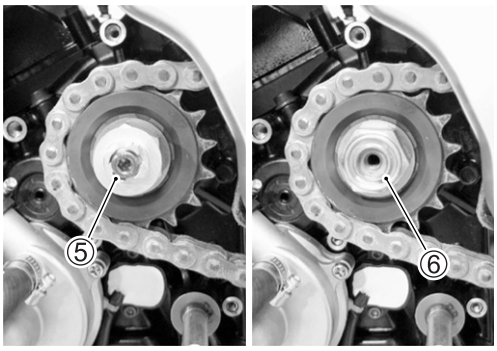


- Remove the clutch push rod ④.



- Remove the speed sensor rotor ⑤.
- Remove the engine sprocket nut ⑥ and its washer.

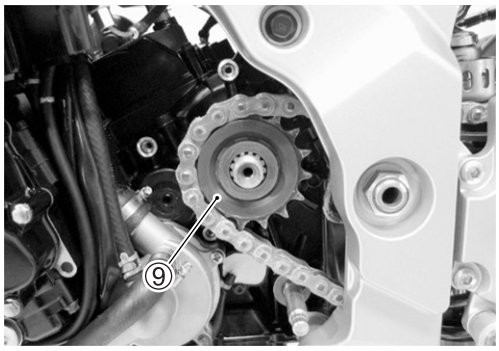
NOTE:
When loosening the engine sprocket nut ⑥, depress the brake pedal.



- Loosen the rear axle nut ⑦.
- Loosen the chain adjuster lock-nuts.
- Loosen the chain adjusters ⑧.

- Push the rear wheel forward and make sure that the drive chain has enough slack.
- Disengage the drive chain from the rear sprocket.

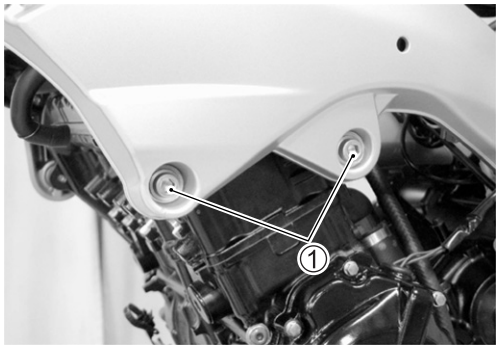
• Remove the engine sprocket ⑨.



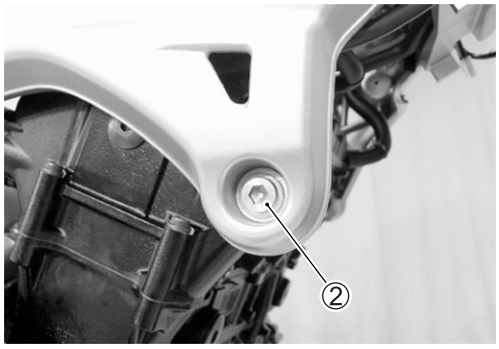
ENGINE MOUNTING

• Support the engine using an engine jack.

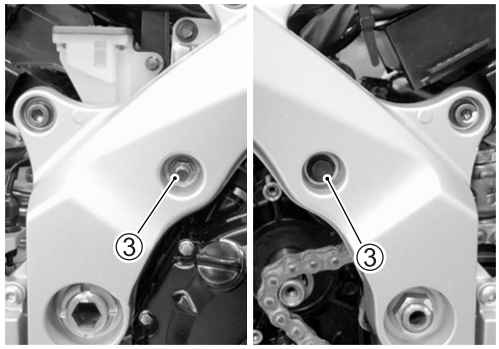
• Remove the engine mounting bolts ①.



• Remove the engine mounting bolt ②.

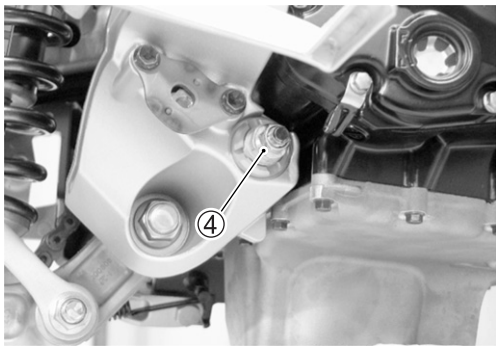


• Remove the engine mounting bolt/nut ③.

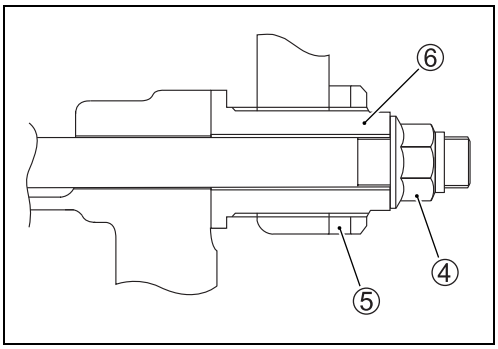


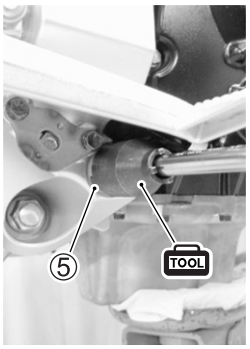
- Remove the engine mounting nut ④.
- Loosen the engine mounting thrust adjuster lock-nut ⑤ with the special tool.
- Loosen the engine mounting thrust adjuster ⑥.

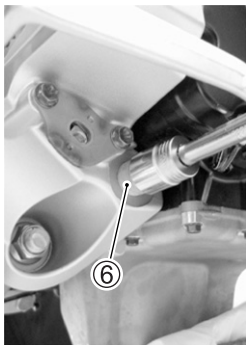
TOOL 09940-14980: Engine mounting thrust adjuster socket wrench



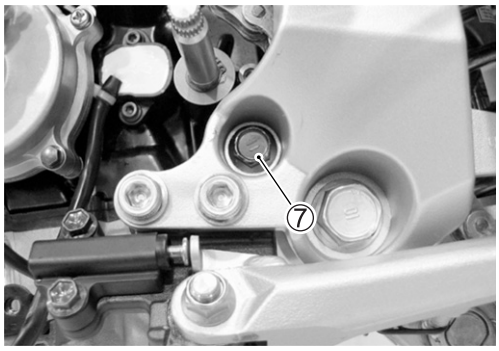
NOTE:
Do not remove the engine mounting bolt ⑦ at this stage.







- Remove the engine mounting bolt ⑦. Then, take off the drive chain from the driveshaft.
- Remove the engine assembly.

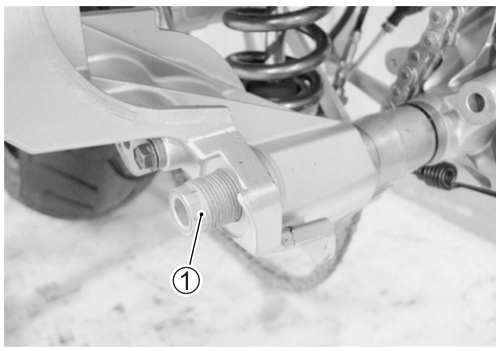


ENGINE INSTALLATION

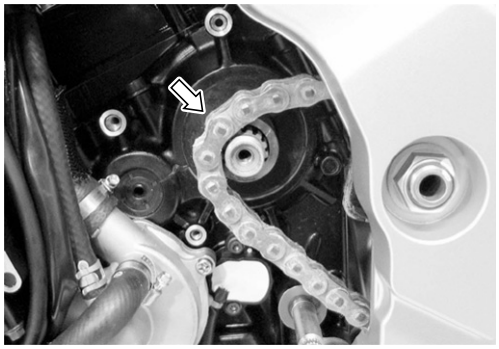
Install the engine in the reverse order of removal.
Pay attention to the following points:

NOTE:
Be careful not to damage the frame and engine when installing the engine.

- Before installing the engine, install the engine mounting thrust adjuster ①.



- Gradually raise the rear side of the engine assembly, and then put the drive chain on the driveshaft.
- Install all engine mounting bolts and tighten them temporarily. (☞3-11)



CAUTION

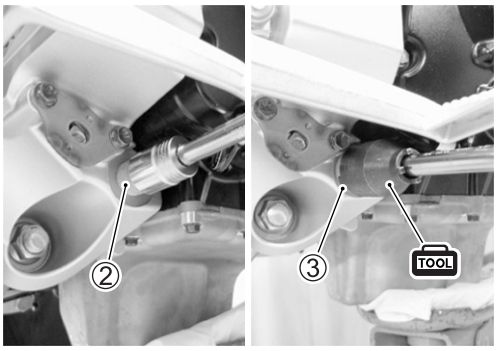
Be careful not to catch the wiring harness between the frame and the engine.

- Tighten the engine mounting thrust adjuster ② to the specified torque.

Engine mounting thrust adjuster: 23 N·m (2.3 kgf-m)

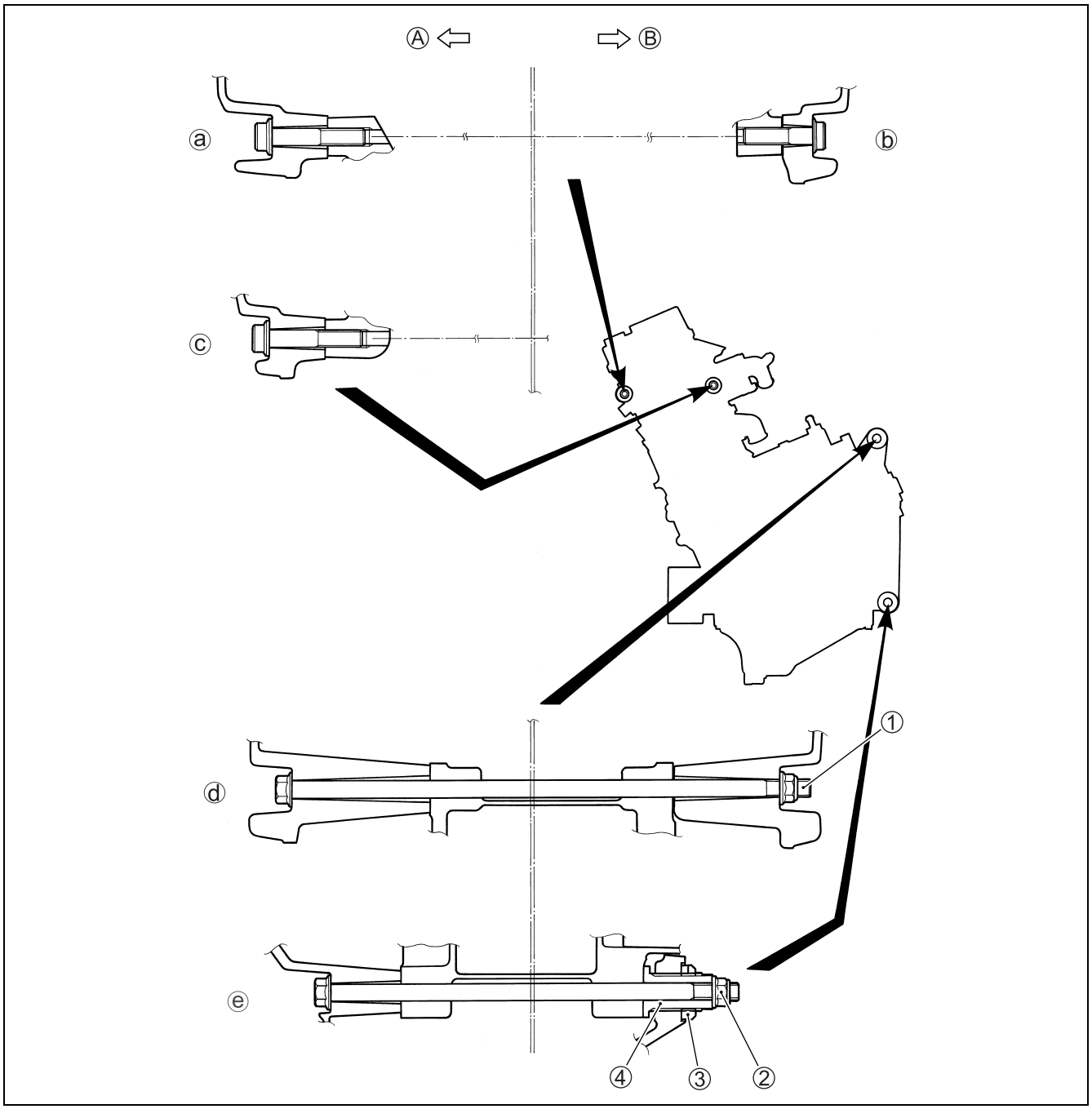
- Tighten the engine mounting thrust adjuster lock-nut ③ to the specified torque with the special tool.

Engine mounting thrust adjuster lock-nut: 45 N·m (4.5 kgf-m)



• Tighten all engine mounting bolts and nuts to the specified torque.

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



Ⓐ Left Ⓑ Right

ITEM	N·m	kgf-m
ⓐⓑⓒ	55	5.5
①②	75	7.5
③	45	4.5
④	23	2.3

LENGTH

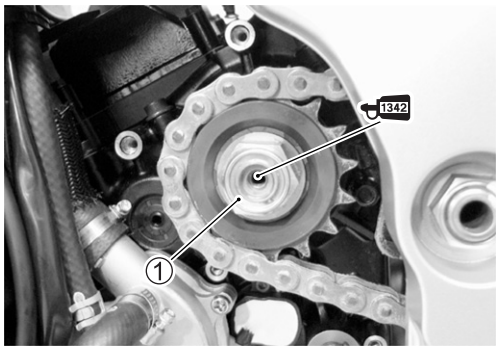
ITEM		mm
Bolt	ⓐⓒ	55
	ⓑ	40
	ⓓ	305
	ⓔ	204
Adjuster	④	40

- Install the engine sprocket and its washer.
- Apply a small quantity of THREAD LOCK to the driveshaft thread portion.

1342 99000-32050: THREAD LOCK "1342"

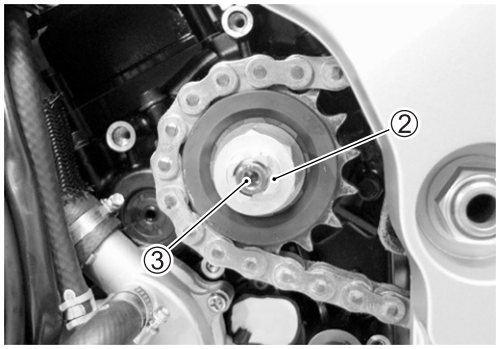
- Tighten the engine sprocket nut ① to the specified torque.

Engine sprocket nut: 115 N·m (11.5 kgf-m)



- Install the speed sensor rotor ②.
- Tighten the speed sensor rotor bolt ③ to the specified torque.

Speed sensor rotor bolt: 23 N·m (2.3 kgf-m)



- Apply SUZUKI SUPER GREASE "A" to the clutch push rod end.

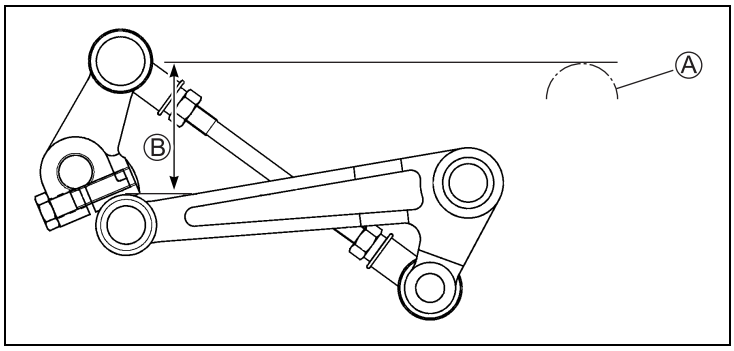
A 99000-25010: SUZUKI SUPER GREASE "A"
(or equivalent grease)

- Install the engine sprocket cover.

NOTE:
When installing the engine sprocket cover, align the clutch release cylinder hole with the end of clutch push rod.

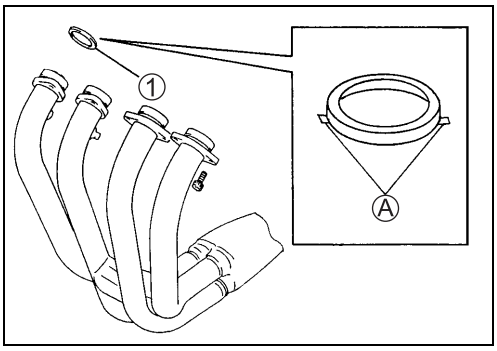
- Install the gearshift lever as shown.

Ⓐ Footrest
Ⓑ 35 – 45 mm



• Replace the exhaust pipe gaskets and muffler connectors with new ones.

NOTE:
Be sure to face the tabs Ⓐ on the exhaust pipe gaskets ① to the engine side when installing them.

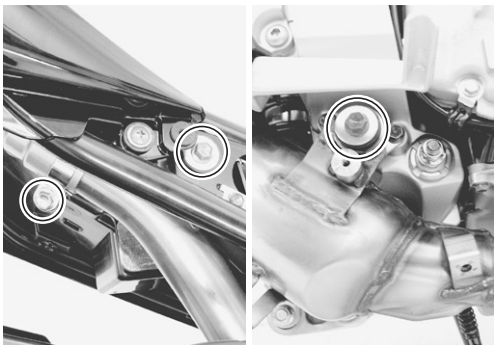


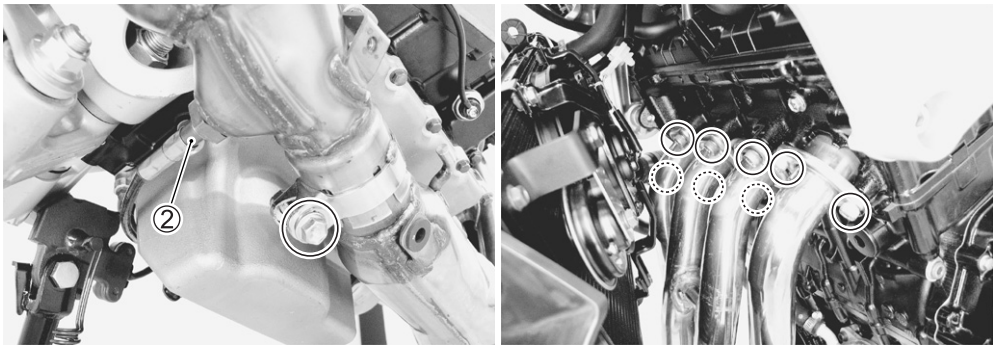
• Tighten the exhaust pipe bolts, muffler mounting bolts and muffler connecting bolts to the specified torque.

Exhaust pipe bolt: 23 N·m (2.3 kgf-m)
Muffler mounting bolt: 23 N·m (2.3 kgf-m)
Muffler connecting bolt: 23 N·m (2.3 kgf-m)

• Install the HO2 sensor ②.

HO2 sensor: 48 N·m (4.8 kgf-m)





• Perform service and adjustment in the following items.
* Engine oil (☞2-13)
* Engine coolant (☞2-17)
* Throttle cable play (☞2-15)
* Clutch (☞2-16)
* Idling adjustment (☞2-15)
* Throttle valve synchronization (☞5-24)
* Drive chain slack (☞2-20)
* Wiring harness, cables and hoses (☞10-17 to -23)

ENGINE DISASSEMBLY

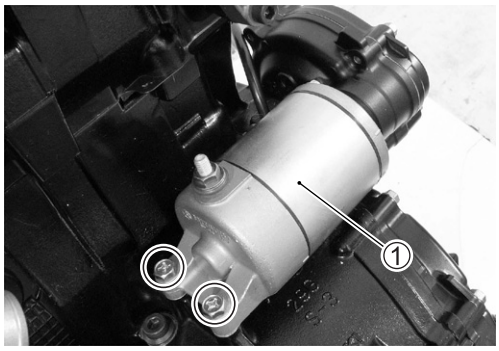
CAUTION

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. (☞2-5)

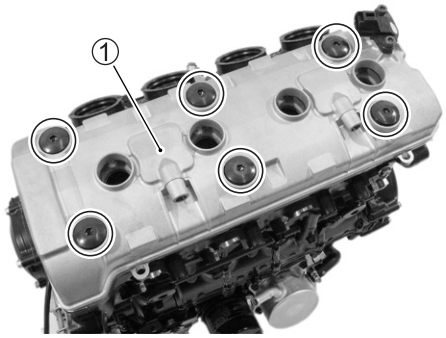
STARTER MOTOR

- Remove the starter motor ①.

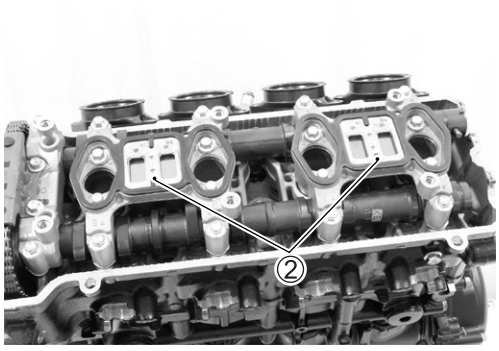


CYLINDER HEAD COVER AND PAIR REED VALVE

- Remove the cylinder head cover ① and its gaskets.

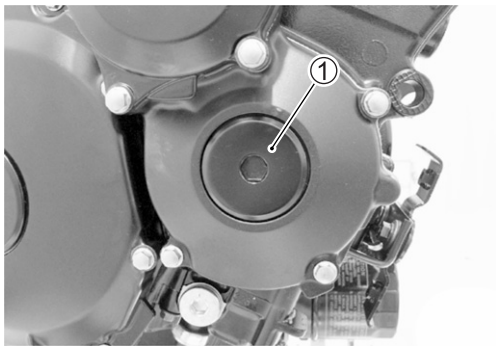


- Remove the PAIR reed valves ② and their gaskets.

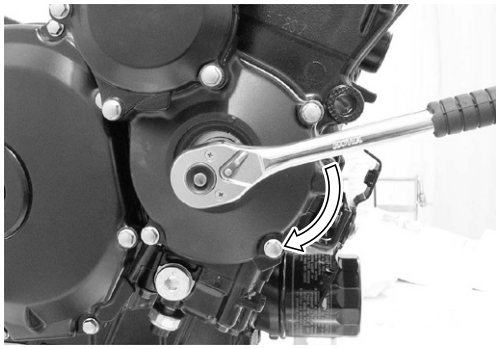


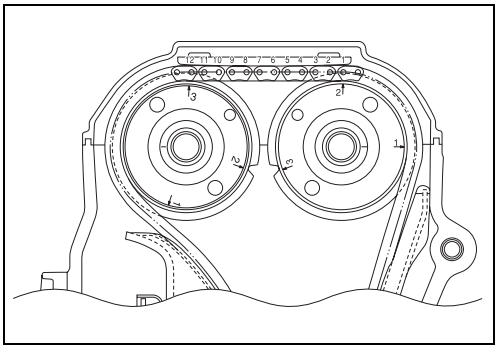
CAMSHAFTS

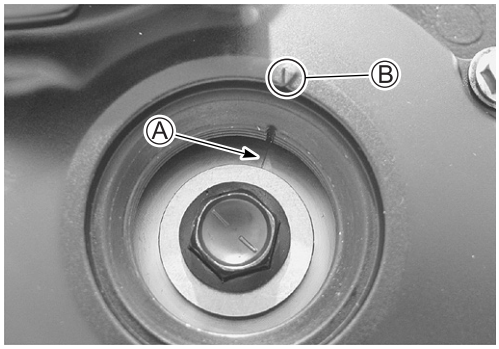
- Remove the valve timing inspection cap ①.



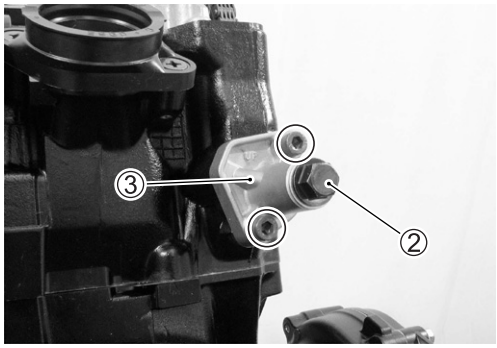
- Turn the crankshaft to bring the line Ⓐ on the starter clutch to the index mark Ⓑ of the valve timing inspection hole and also to bring the cams to the position as shown.







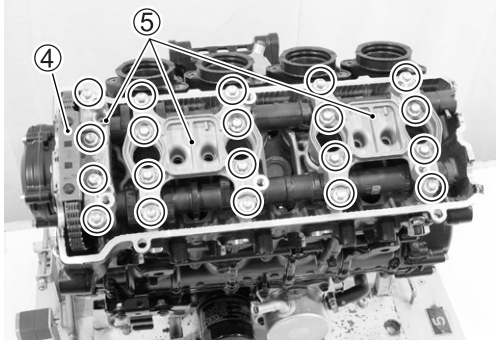
- Remove the cam chain tension adjuster cap bolt ②.
- Remove the cam chain tension adjuster ③ with the spring.



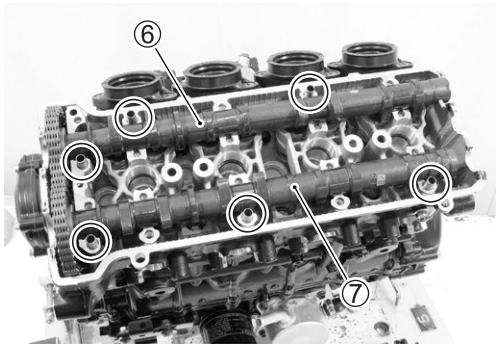
- Remove the cam chain guide ④.
- Remove the camshaft journal holders ⑤.

CAUTION

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



- Remove the intake camshaft ⑥.
- Remove the exhaust camshaft ⑦.
- Remove the dowel pins.



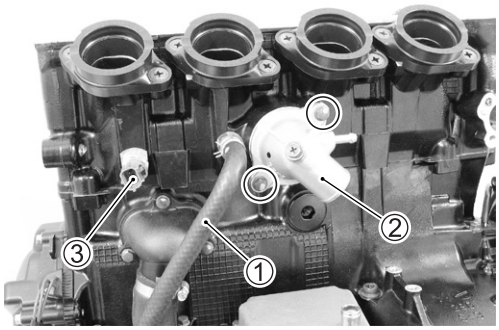
CYLINDER HEAD

- Remove the water hose ①.
- Remove the thermostat cover ② and thermostat.

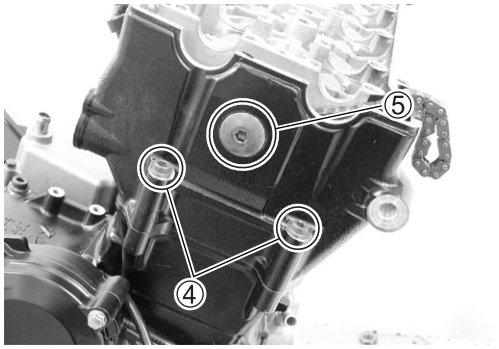
THERMOSTAT INSPECTION (☞7-9)

- Remove the ECT sensor ③.

ECT SENSOR INSPECTION (☞7-7)



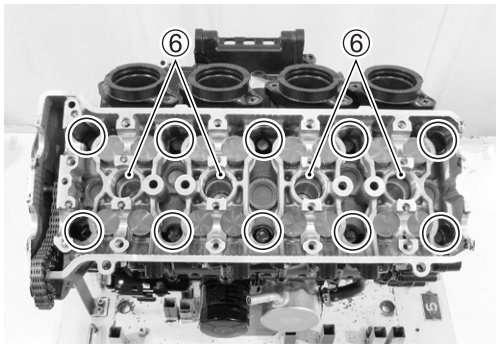
- Remove the cylinder head bolts (M6) ④ and side face bolt ⑤.



- Remove the O-rings ⑥.
- Remove the cylinder head bolts and washers.

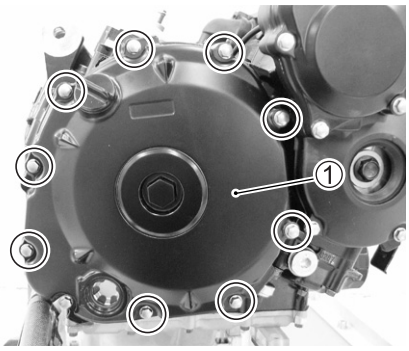
NOTE:
When loosening the cylinder head bolts, loosen each bolt little by little diagonally.

- Remove the cylinder head.
- Remove the dowel pins and cylinder head gasket.



CLUTCH

- Remove the clutch cover ①.
- Remove the dowel pins and gasket.

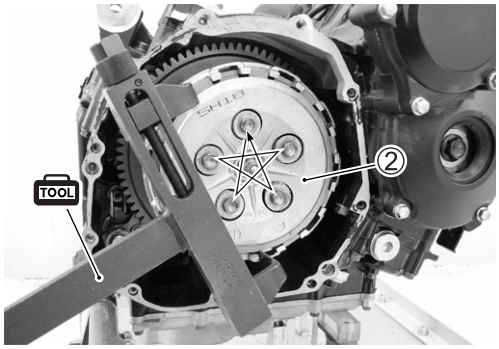


- Hold the clutch housing with the special tool.

CAUTION

Do not damage the clutch plates by the special tool.

TOOL 09920-53740: Clutch sleeve hub holder



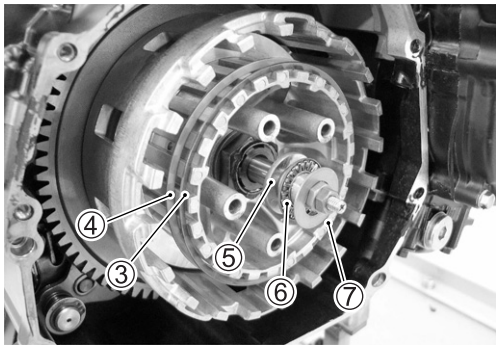
- Remove the clutch springs.

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

- Remove the pressure plate ②

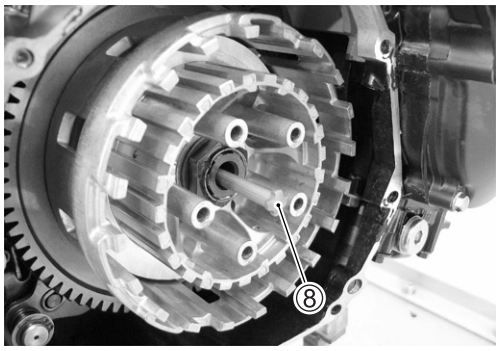
- Remove the clutch drive plates and driven plates.

- Remove the spring washer ③ and washer ④.
- Remove the clutch push piece ⑤, bearing ⑥ and thrust washer ⑦.

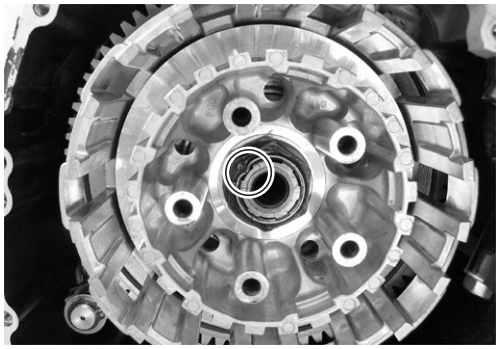


- Remove the clutch push rod ⑧.

NOTE:
If it is difficult to pull out the push rod ⑧, use a magnetic hand or a wire.



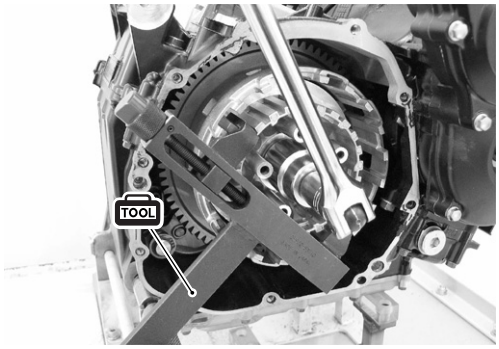
- Unlock the clutch sleeve hub nut.



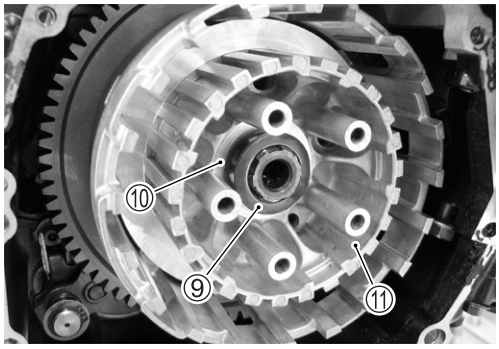
- Hold the clutch sleeve hub with the special tool.

TOOL 09920-53740: Clutch sleeve hub holder

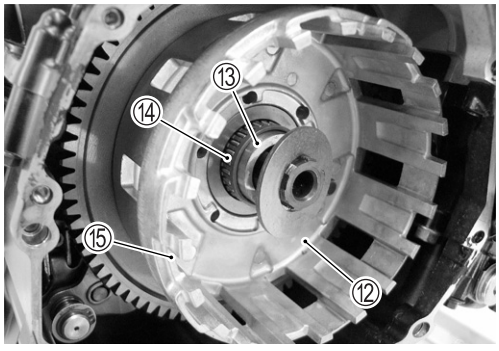
- Remove the clutch sleeve hub nut.



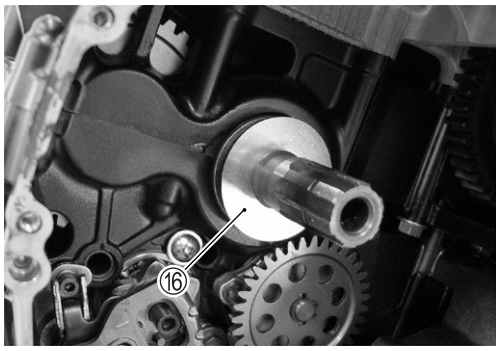
- Remove the concaved washer ⑨, washer ⑩ and clutch sleeve hub ⑪.



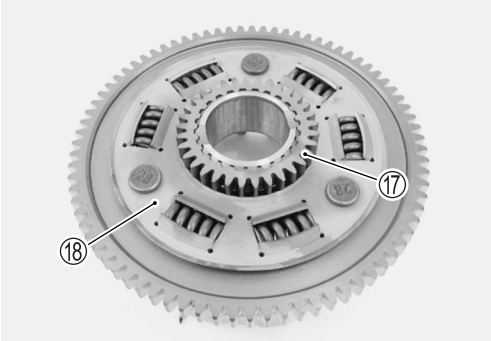
- Remove the washer ⑫, spacer ⑬ and bearing ⑭.
- Remove the primary driven gear assembly ⑮.



- Remove the thrust washer ⑯.



- Remove the oil pump drive gear ⑰ from the primary driven gear assembly ⑱.



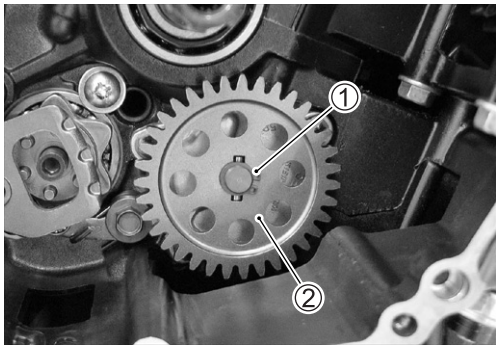
OIL PUMP

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

NOTE:

Do not drop the snap ring ① into the crankcase.

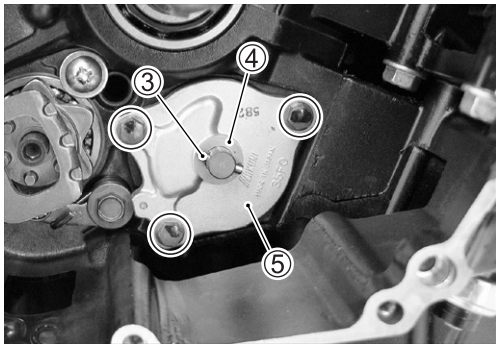
TOOL 09900-06107: Snap ring priers



- Remove the pin ③ and washer ④.
- Remove the oil pump ⑤.

NOTE:

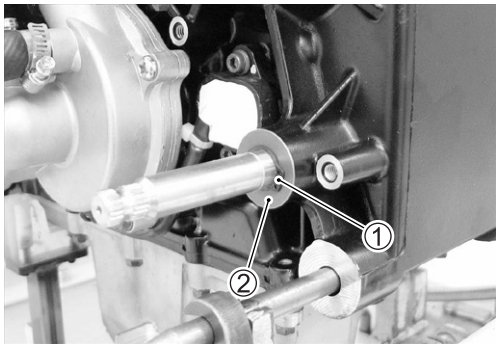
Do not drop the pin ③ and washer ④ into the crankcase.



GEARSHIFT SYSTEM

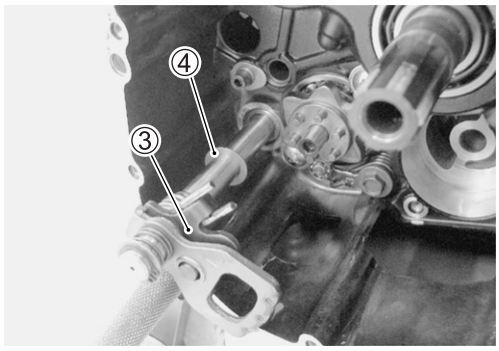
- Remove the snap ring ① and washer ②.

TOOL 09900-06107: Snap ring priers

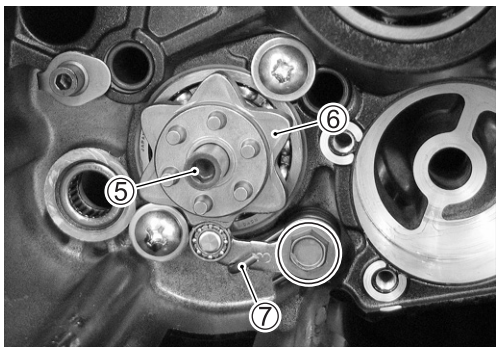


- Remove the gearshift shaft assembly ③ and washer ④.

NOTE:
Do not drop the washer ④ into the crankcase.

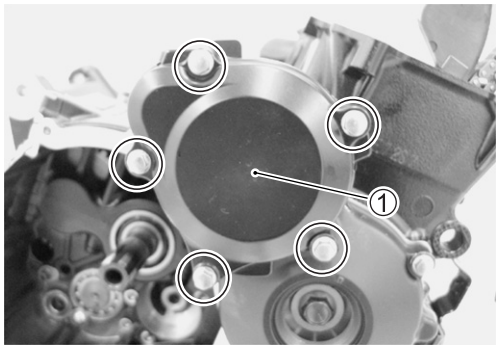


- Remove the gearshift cam plate bolt ⑤ and gearshift cam plate ⑥.
- Remove the gearshift cam stopper ⑦.

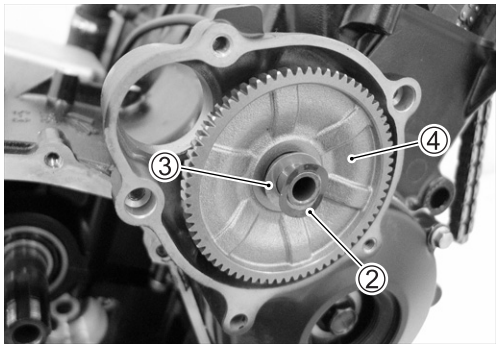


STARTER IDLE GEAR

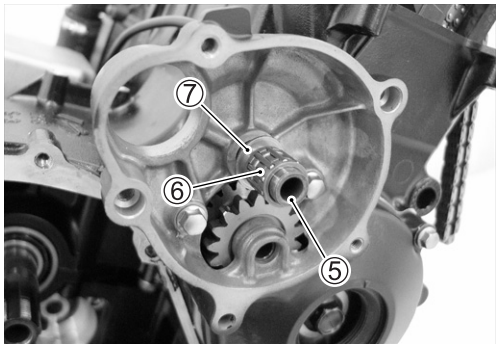
- Remove the starter idle gear cover ①.
- Remove the dowel pins and gasket.



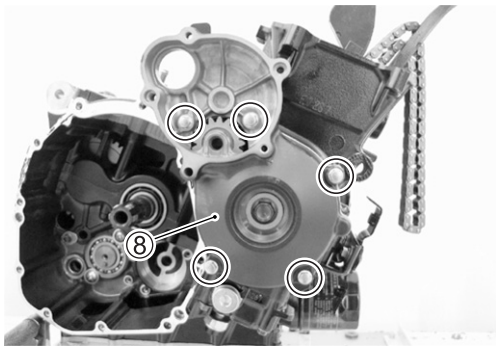
- Remove the concaved washer ②, washer ③ and starter idle gear No.1 ④.



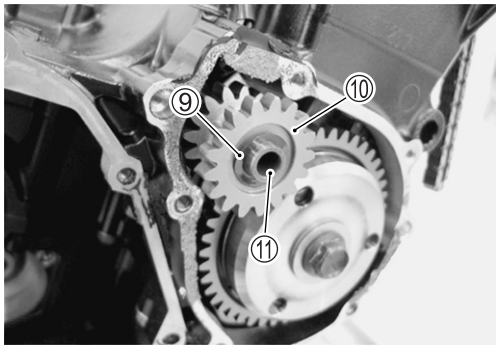
- Remove the shaft ⑤, bearing ⑥ and thrust washer ⑦.



- Remove the starter clutch cover ⑧.
- Remove the dowel pins and gasket.



- Remove the concaved washer ⑨, starter idle gear No.2 ⑩ and shaft ⑪.

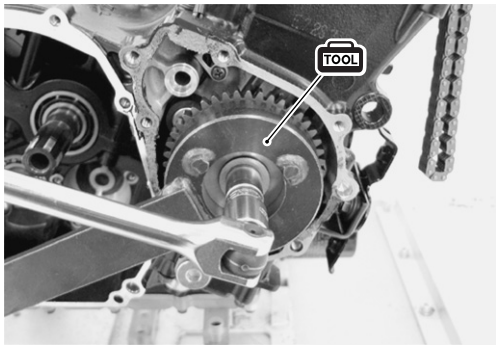


STARTER CLUTCH

- Hold the starter clutch with the special tool.

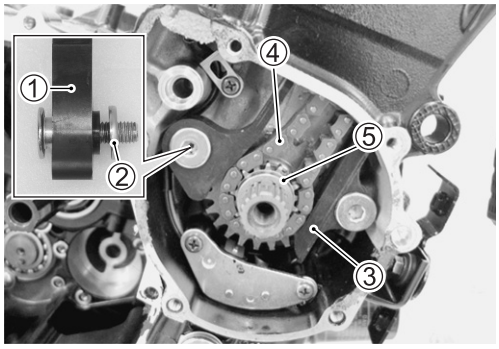
TOOL 09920-34830: Starter clutch holder

- Remove the starter clutch bolt and washer.
- Remove the starter clutch assembly and washer.



CAM CHAIN, CAM CHAIN TENSIONER AND CAM CHAIN GUIDE

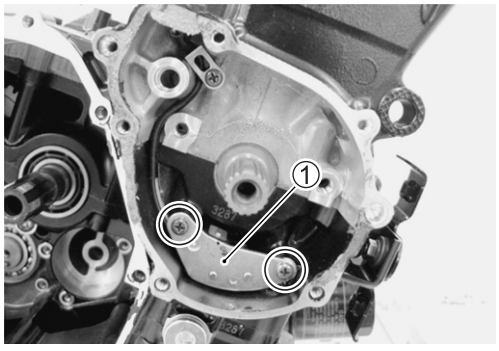
- Remove the cam chain tensioner ①, washer ② and cam chain guide ③.
- Remove the cam chain ④ and cam chain drive sprocket ⑤.



CKP SENSOR

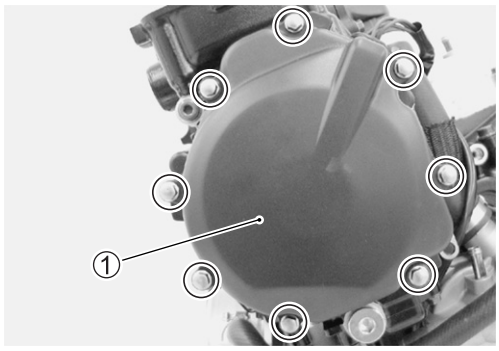
- Remove the CKP sensor ①.

CKP SENSOR INSPECTION (☞4-34)



GENERATOR COVER

- Remove the generator cover ①.
- Remove the dowel pins and gasket.

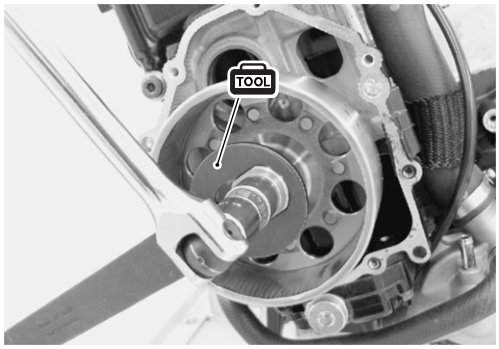


GENERATOR ROTOR

- Hold the generator rotor with the special tool.

TOOL 09930-44520: Rotor holder

- Remove the generator rotor bolt.

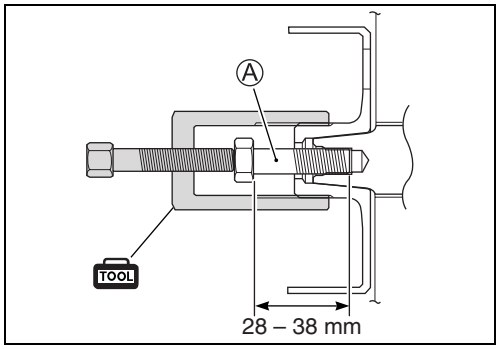


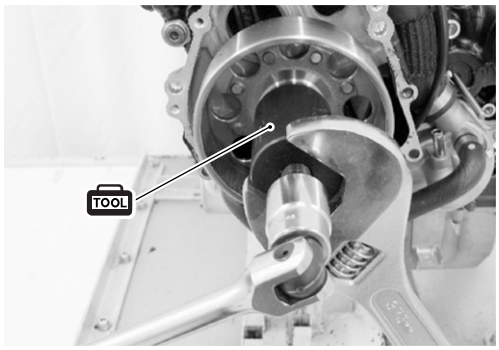
- Install a bolt Ⓐ of suitable size to the left end of crankshaft.

SUITABLE BOLT Ⓐ [M12, length: 28 – 38 mm]

- Remove the generator rotor with the special tool.

TOOL 09930-34980: Rotor remover

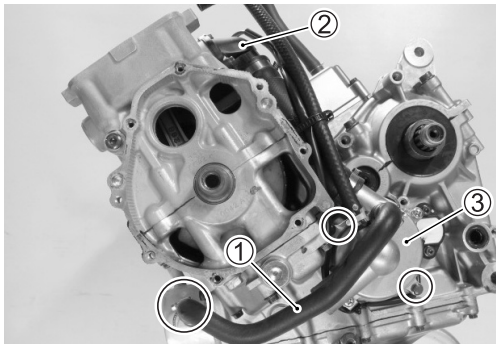




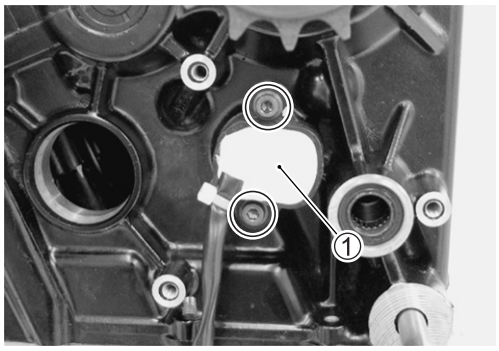
WATER PUMP

- Remove the water hose ① and water inlet cover ②.
- Remove the water pump ③.

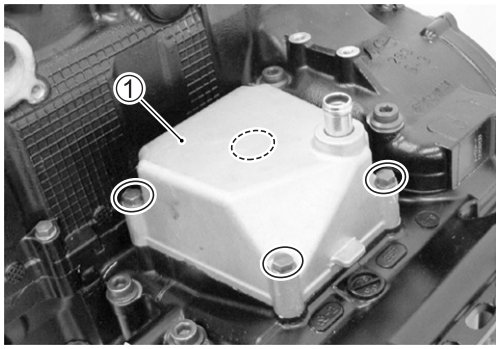
WATER PUMP SERVICING (☞7-11)



GEAR POSITION SWITCH
- Remove the gear position switch ①.

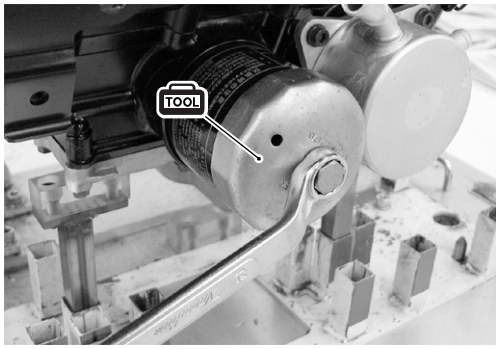


CRANKCASE BREATHER (PCV) COVER
- Remove the crankcase breather cover ①.

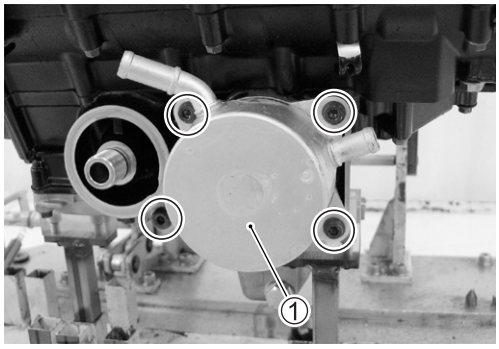


OIL FILTER
- Remove the oil filter with the special tool.

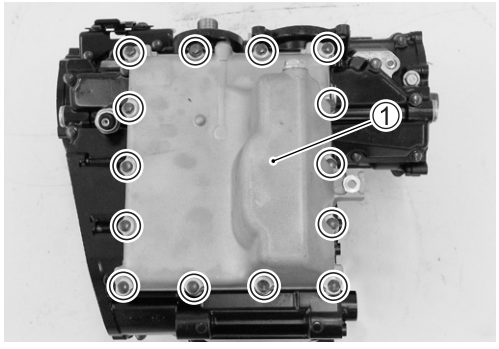
TOOL 09915-40610: Oil filter wrench



OIL COOLER
- Remove the oil cooler ①.

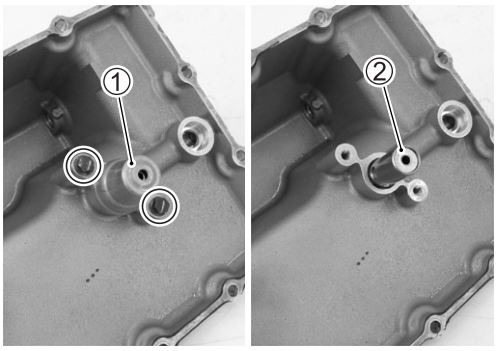


OIL PAN
- Remove the oil pan ①.



OIL PRESSURE REGULATOR

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

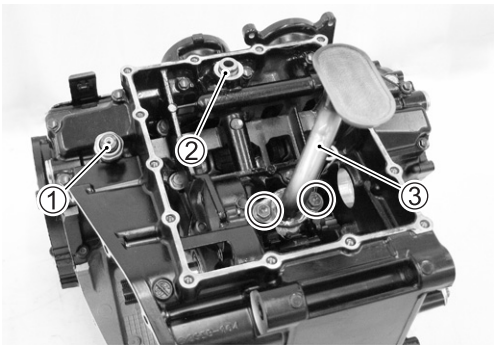


OIL PRESSURE SWITCH

- Remove the oil pressure switch ①.
- Remove the oil pipe ②.

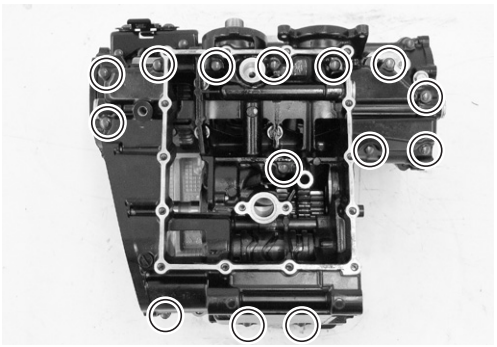
OIL STRAINER

- Remove the oil strainer ③ and its O-ring.

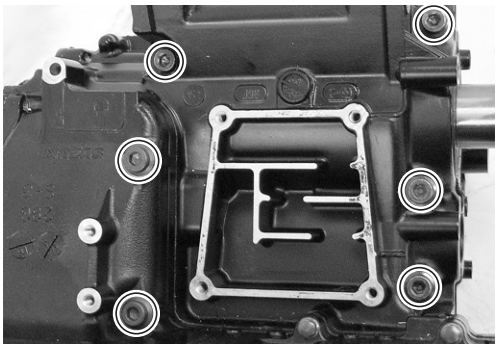


LOWER CRANK CASE

- Remove the lower crankcase bolts (M6).

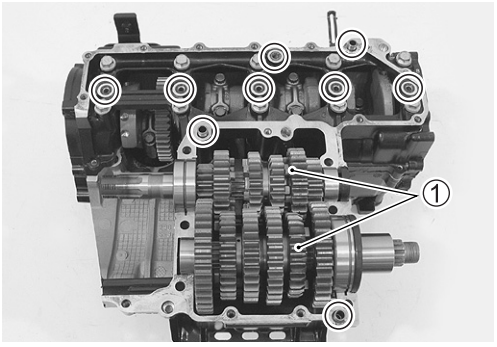


- Remove the lower crankcase bolts (M8).
- Remove the lower crankcase assembly.



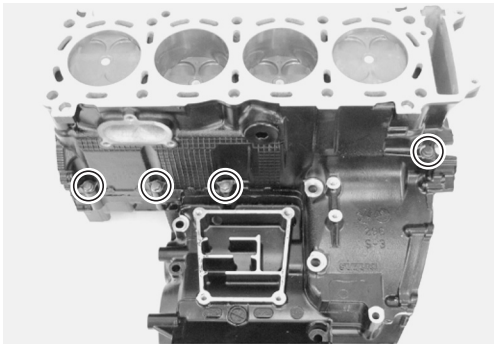
TRANSMISSION

- Remove the transmission assemblies ①.
- Remove the O-rings and dowel pins.



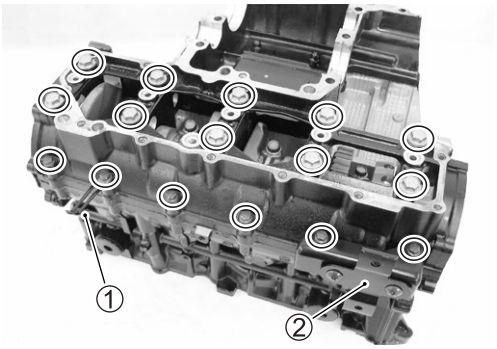
MIDDLE CRANKCASE

- Remove the crankcase bolts (M6).



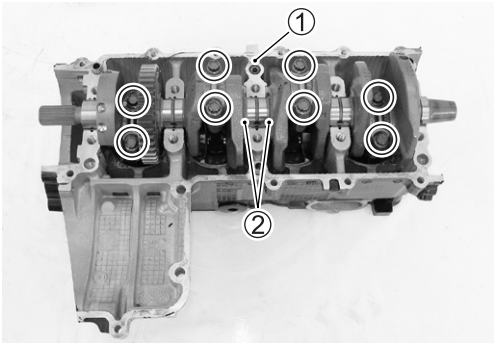
- Remove the crankcase bolts (M6), clamp ① and regulator/rectifier backet ②.
- Remove the crankshaft journal bolts (M9).

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



CRANKSHAFT

- Loosen the bearing cap bolts using a 10 mm, 12 point-socket wrench, and tap the bearing cap bolts lightly with a plastic hammer to remove the bearing cap.
- Remove the dowel pins.
- Remove the O-ring ①.
- Remove the crankshaft and thrust washers ②.

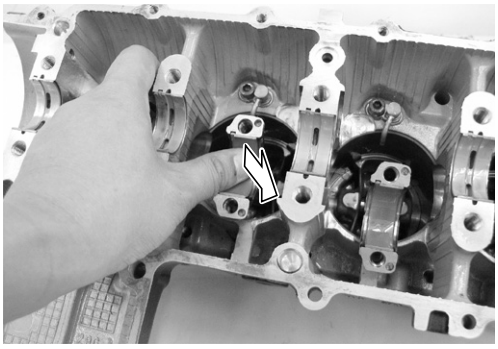


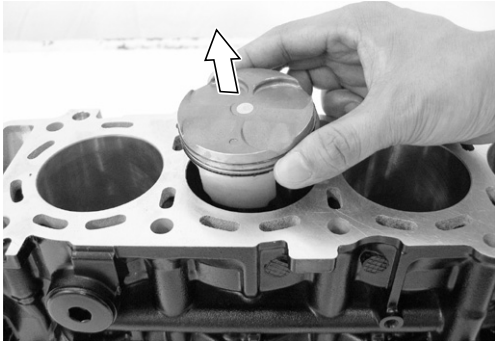
PISTON AND CONROD

- Push the conrod to cylinder head side and remove the piston and conrod from the upper crankcase.

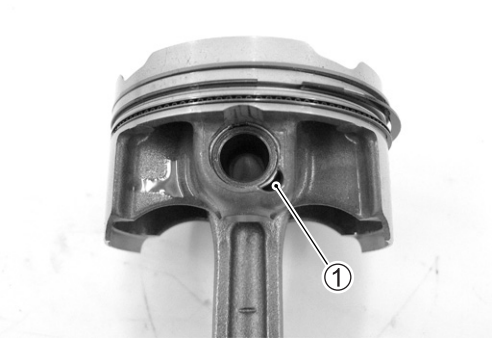
CAUTION

Be careful not to damage the cylinder wall by the conrod.



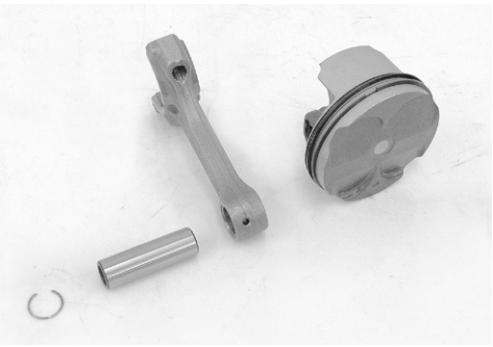


• Remove the piston pin circlip ①.



• Separate the piston and conrod by driving out the piston pin.

NOTE:
Scribe the cylinder number on the piston head.



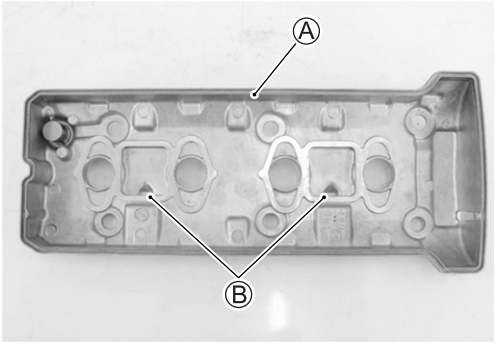
ENGINE COMPONENTS INSPECTION AND SERVICE

CAUTION

Identify the position of each removed part. Organize the parts in their respective groups (i.e., intake, exhaust, No.1 or No.2) so that they can be installed in their original locations.

CYLINDER HEAD COVER

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



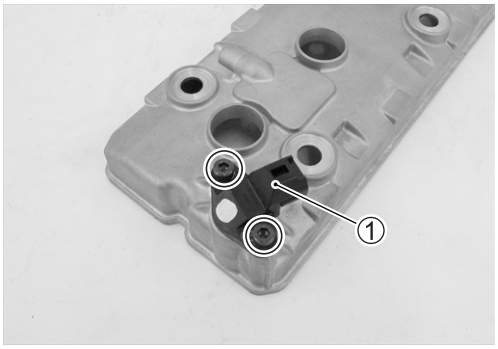
CMP SENSOR

REMOVAL

- Remove the CMP sensor ① from the cylinder head cover.

INSPECTION

- Inspect the CMP sensor. (☞4-32)

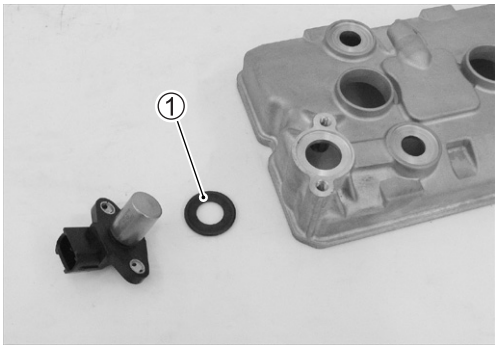


INSTALLATION

- Install the oil seal ① and CMP sensor.

NOTE:
When installing, clean the CMP sensor's surface.

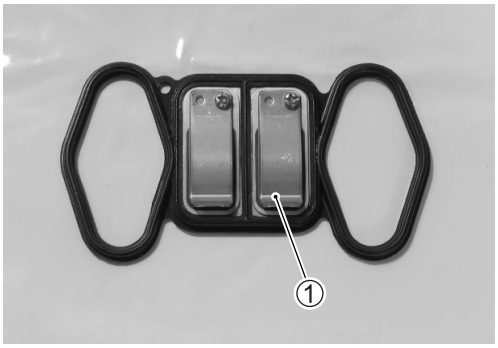
CMP sensor bolt: 11 N·m (1.1 kgf-m)



PAIR REED VALVE

REMOVAL

- Remove the PAIR reed valve ① from the gasket.



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
- Set new gasket to the PAIR reed valve as shown.

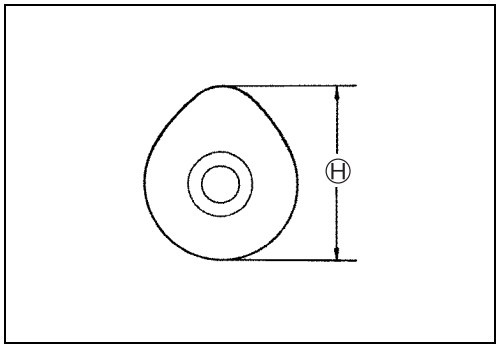
PCV HOSE
- Remove the PCV hose from the crankcase breather cover.
- Inspect the PCV hose for wear or damage.
- If it is worn or damaged, replace the PCV hose with a new one.

CAMSHAFT
CAMSHAFT IDENTIFICATION
The exhaust camshaft can be distinguished from that of the intake by the embossed letters “EX” (for exhaust) as against letters “IN” (for intake).

CAM WEAR
- Check the camshaft for wear or damage.
- Measure the cam height Ⓗ with a micrometer.

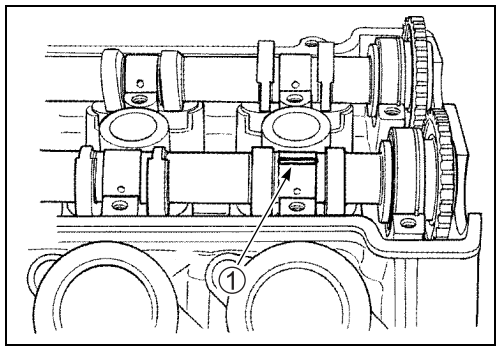
DATA Cam height Ⓗ:
Service Limit: (IN.) : 35.48 mm
(EX.) : 34.68 mm

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 plastigauge ① to read the clearance at the widest portion, which is specified as follows:

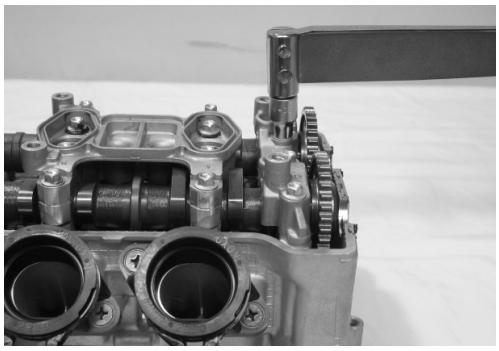


DATA Camshaft journal oil clearance:
Service Limit: (IN & EX): 0.150 mm

TOOL 09900-22301: Plastigauge
09900-22302: Plastigauge

NOTE:
Install camshaft journal holders to their original positions. (☞3-96)

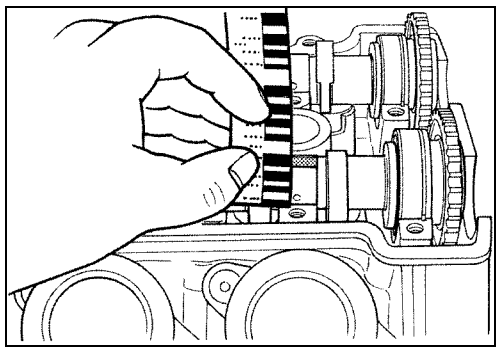
- Tighten the camshaft journal holder bolts evenly and diagonally to the specified torque.



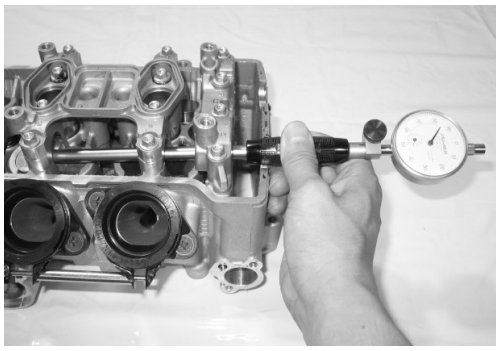
Camshaft journal holder bolt: 10 N·m (1.0 kgf-m)

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

- Remove the camshaft holders, and read the width of the compressed plastigauge with envelope scale.
- This measurement should be taken at the widest part.



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

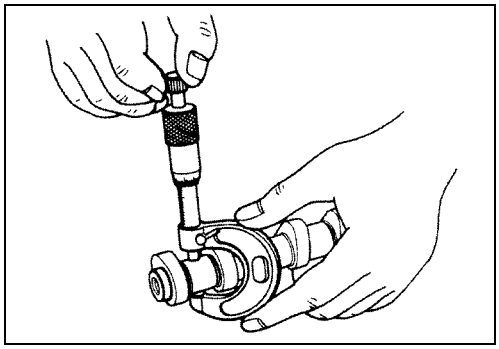


DATA Camshaft journal holder I.D.:
Standard: (IN & EX): 24.012 – 24.025 mm

TOOL 09900-20602: Dial gauge (1/1 000, 1 mm)
09900-22403: Small bore gauge (18 – 35 mm)

DATA Camshaft journal O.D.:
Standard (IN & EX): 23.959 – 23.980 mm

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

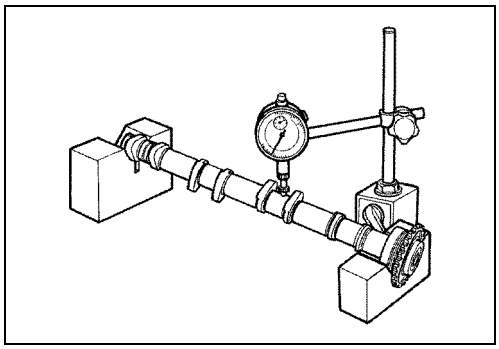


CAMSHAFT RUNOUT

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

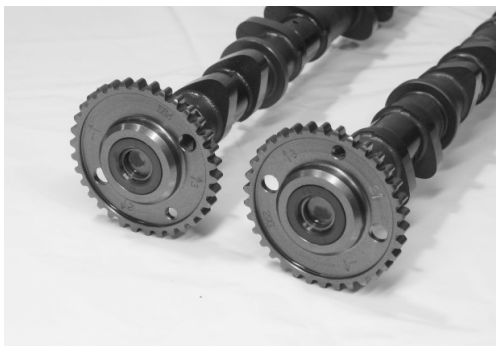
DATA Camshaft runout:
Service Limit (IN & EX): 0.10 mm

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



CAM SPROCKET

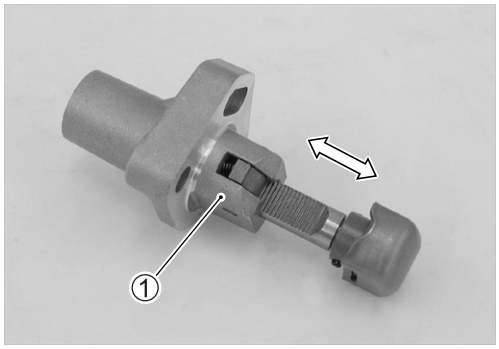
- Inspect the sprocket teeth for wear.
- If they are worn, replace the sprocket/camshaft assembly and cam chain as a set.



CAM CHAIN TENSION ADJUSTER

INSPECTION

- Remove the cam chain tension adjuster cap bolt, washer and spring.
- Check that the push rod slides smoothly when releasing stopper ①.
- If it does not slide smoothly, replace the cam chain tension adjuster with a new one.



CAM CHAIN TENSIONER

INSPECTION

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

CAM CHAIN GUIDE

INSPECTION

- Check the contacting surfaces of the cam chain guides.
- If they are worn or damaged, replace them with the new ones.

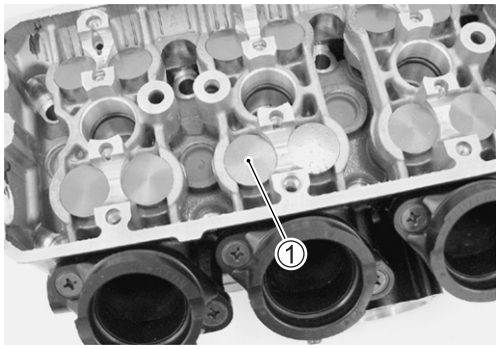
CYLINDER HEAD AND VALVE

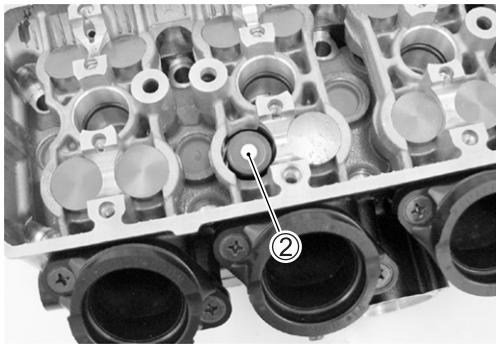
VALVE AND VALVE SPRING DISASSEMBLY

- Remove the tappet ① and shim ② by fingers or magnetic hand.

CAUTION

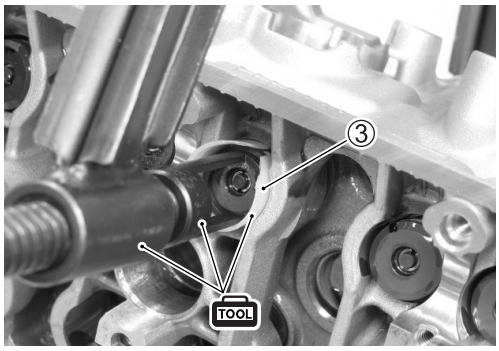
Identify the position of each removed part.





- Install the special tool ③ between the valve spring and cylinder head.
- Using the special tools, compress the valve spring and remove the two cotter halves from the valve stem.

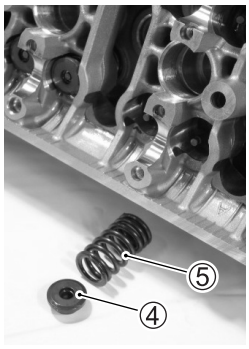
09916-14510: Valve lifter
09916-14530: Valve lifter attachment
09916-84511: Tweezers
09919-28610: Sleeve protector

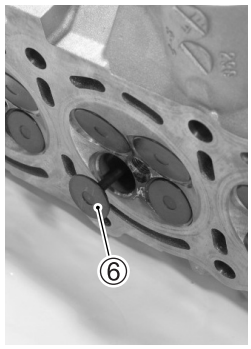


CAUTION

To prevent damage of the tappet sliding surface with the special tool, use the protector.

- Remove the valve spring retainer ④ and valve spring ⑤.
- Pull out the valve ⑥ from the combustion chamber side.



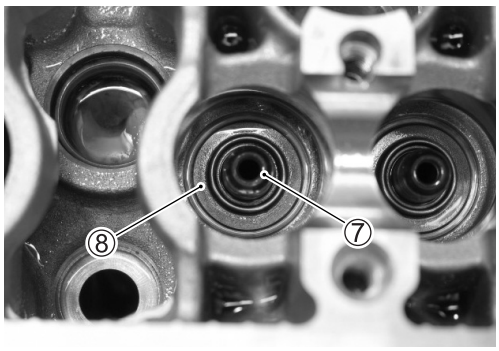


- Remove the oil seal ⑦ and spring seat ⑧.

CAUTION

Do not reuse the removed oil seal.

- Remove the other valves in the same manner as described previously.

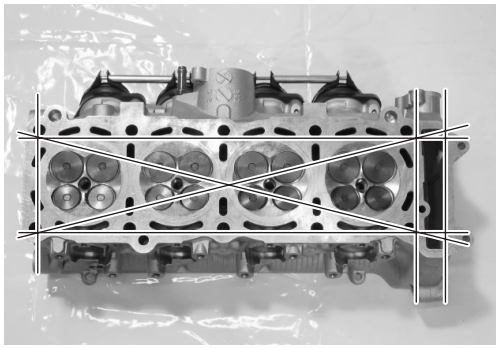


CYLINDER HEAD DISTORTION

- Decarbonize the combustion chambers.
- Check the gasketed surface of the cylinder head for distortion with a straightedge and thickness gauge, taking a clearance reading at several places indicated.
- If the largest reading at any position of the straightedge exceeds the limit, replace the cylinder head.

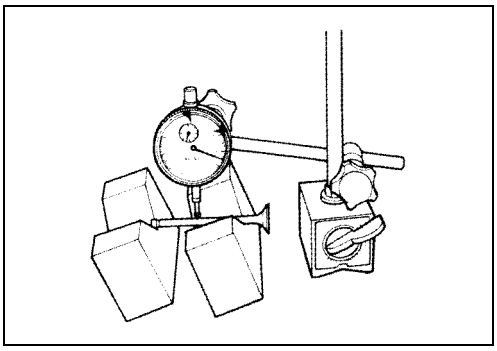
Cylinder head distortion:
Service Limit: 0.20 mm

09900-20803: Thickness gauge



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

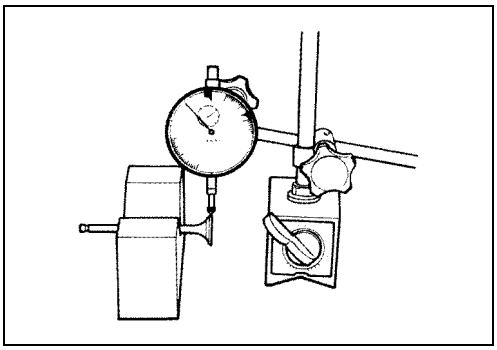
TOOL 09900-20607: Dial gauge (1/100 mm)
09900-20701: Magnetic stand
09900-21304: V-block set (100 mm)

CAUTION

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

VALVE HEAD RADIAL RUNOUT

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



DATA Valve head radial runout:
Service Limit: 0.03 mm

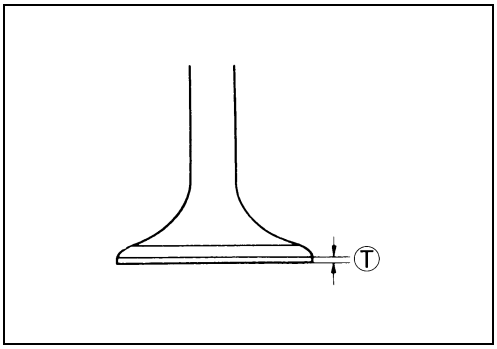
TOOL 09900-20607: Dial gauge (1/100 mm)
09900-20701: Magnetic stand
09900-21304: V-block set (100 mm)

CAUTION

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

VALVE FACE WEAR

- 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 face Ⓣ. If it is out of specification, replace the valve with a new one.

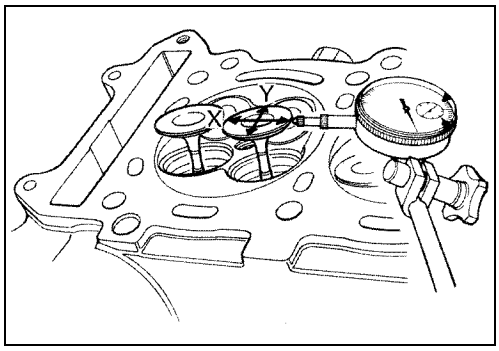


DATA Valve head thickness Ⓣ:
Service Limit: 0.5 mm

TOOL 09900-20102: Vernier calipers

VALVE STEM DEFLECTION

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

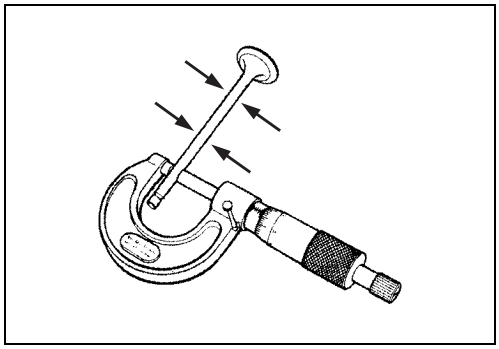


DATA Valve stem deflection (IN & EX):
Service Limit: 0.35 mm

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

VALVE STEM WEAR

- If the valve stem is worn down to the limit, as measured with a micrometer, replace the valve.
- If the stem is within the limit, then replace the guide.
- After replacing valve or guide, be sure to recheck the deflection.



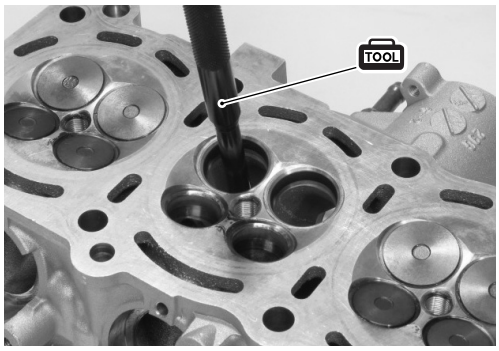
DATA Valve stem O.D.:
Standard (IN) : 3.975 – 3.990 mm
(EX): 3.955 – 3.970 mm

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

NOTE:
If valve guides have to be removed for replacement after inspecting related parts, carry out the steps shown in valve guide servicing. (☞ below)

VALVE GUIDE SERVICING

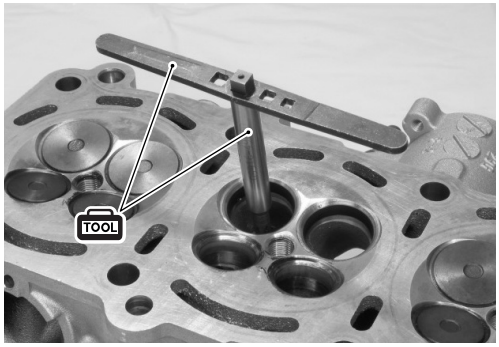
- Using the valve guide remover, drive the valve guide out toward the intake or exhaust camshaft side.



TOOL 09916-53310: Valve guide remover/installer

NOTE:
** Discard the removed valve guide subassemblies.*
** Only oversized valve guides are available as replacement parts. (Part No. 11115-11D70)*

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

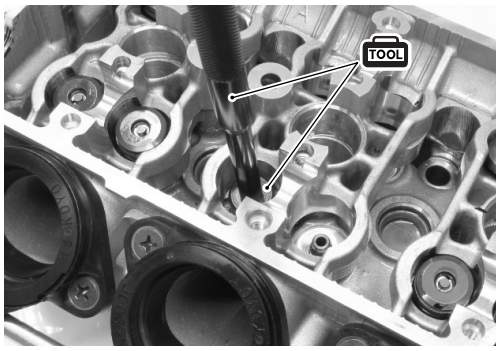


TOOL 09916-49030: Valve guide reamer
09916-34542: Reamer handle

CAUTION

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

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



CAUTION

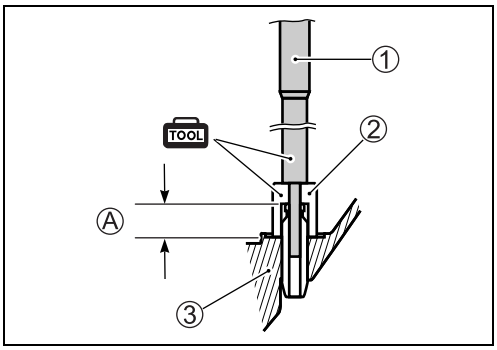
Do not use a burner to heat the valve guide hole to prevent cylinder head distortion.

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

TOOL 09916-53310: Valve guide installer/remover
09916-53330: Attachment
09916-53360: Attachment

NOTE:
Install the valve guide until the attachment ② contacts with the cylinder head ③.

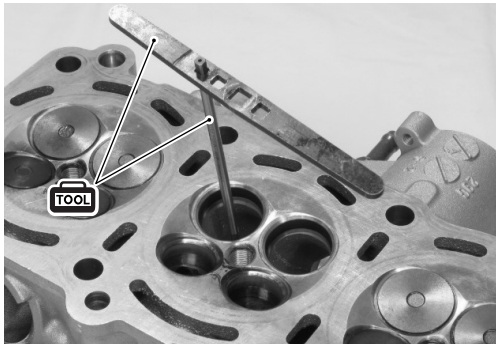
Ⓐ: 13.6 mm (IN)
12.2 mm (EX)



CAUTION

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

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

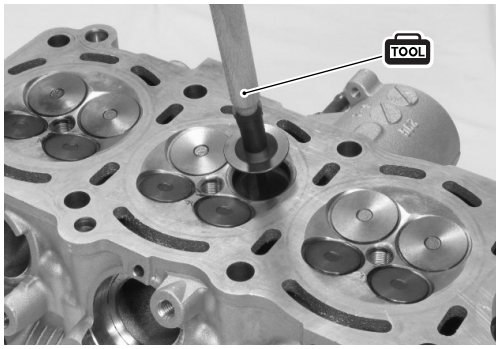


TOOL 09916-33310: Valve guide reamer (4 mm)
09916-34542: Reamer handle

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

VALVE SEAT WIDTH INSPECTION

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

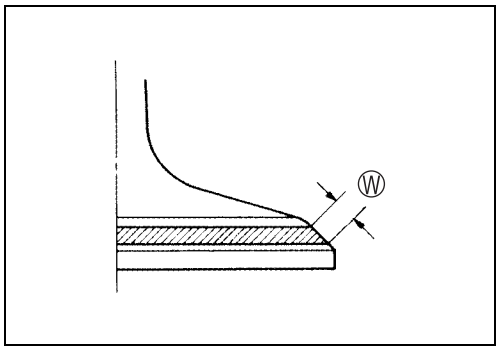


TOOL 09916-10911: Valve lapper set

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

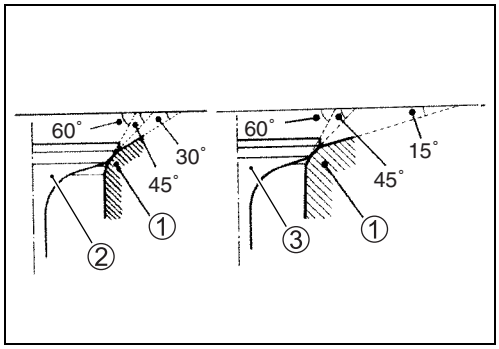
DATA Valve seat width Ⓦ:
Standard: 0.9 – 1.1 mm

If the valve seat is out of specification, re-cut the seat.



VALVE SEAT SERVICING

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



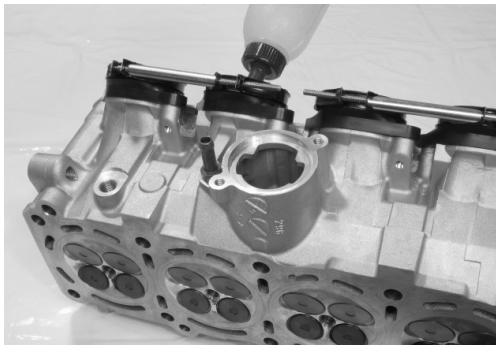
	INTAKE	EXHAUST
Seat angle	30°, 45°, 60°	15°, 45°, 60°
Seat width	0.9 – 1.1 mm	0.9 – 1.1 mm
Valve diameter	27.2 mm	22 mm
Valve guide I.D.	4.000 – 4.012 mm	4.000 – 4.012 mm

CAUTION

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

NOTE:
After servicing the valve seats, be sure to check the valve clearance after the cylinder head has been reinstalled. (☞2-7)

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



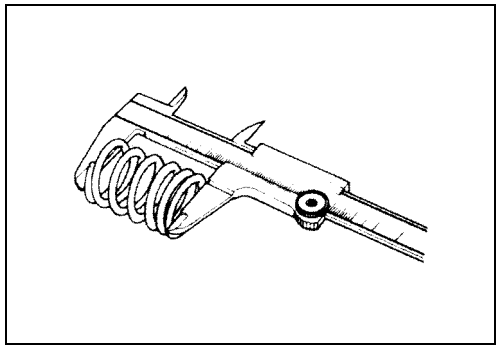
⚠ WARNING

Always use extreme caution when handling gasoline.

VALVE SPRING

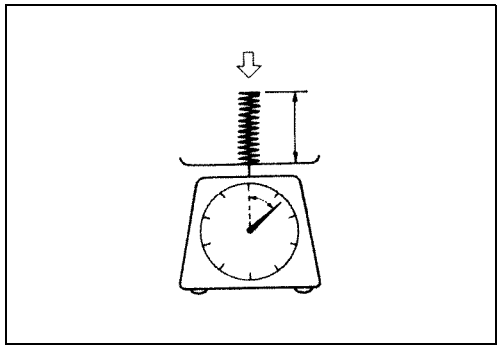
The force of the coil spring keeps the valve seat tight. Weakened spring result in reduced engine power output, and often account for the chattering noise coming from the valve mechanism.

- Check the valve spring for proper strength by measuring its free length and also by the force required to compress it.
- If the spring length is less than the service limit, or if the force required to compress the spring does not fall within the range specified, replace the spring.



DATA Valve spring free length:
Service limit: (IN) : 36.2 mm
(EX): 36.0 mm

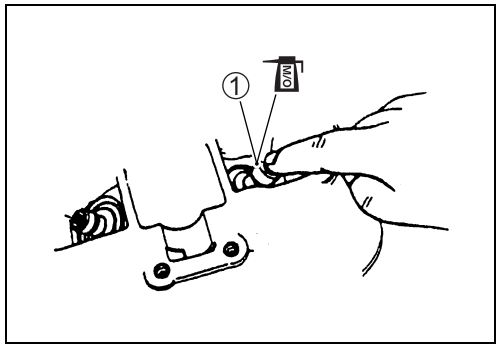
TOOL 09900-20102: Vernier calipers



DATA Valve spring tension:
Standard:
(IN) :155 – 179 N (15.8 – 18.3 kgf) 32.55 mm
(EX) :146 – 168 N (14.9 – 17.1 kgf) 32.55 mm

VALVE AND VALVE SPRING REASSEMBLY

- Install the valve spring seat.
- Apply MOLYBDENUM OIL SOLUTION to the oil seal ①, and press-fit it into position.

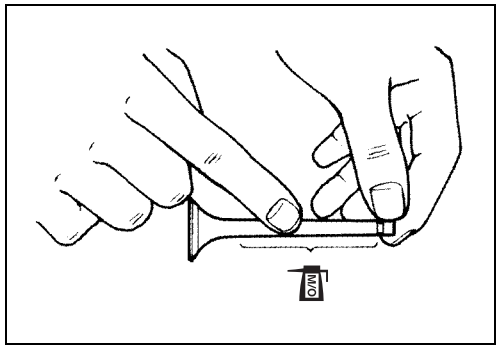


M/O MOLYBDENUM OIL SOLUTION

CAUTION

Do not reuse the removed oil seal.

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



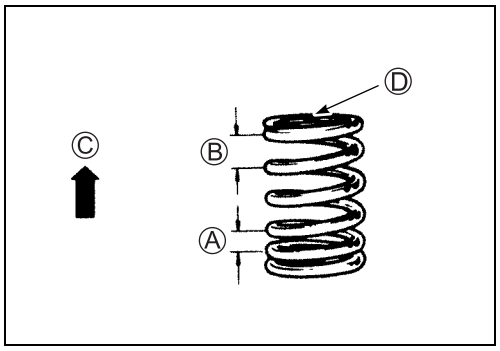
CAUTION

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

M/O MOLYBDENUM OIL SOLUTION

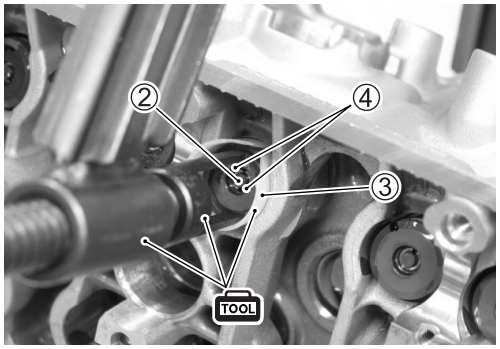
- Install the valve spring with the small-pitch portion Ⓐ facing cylinder head.

Ⓑ Large-pitch portion
Ⓒ UPWARD
Ⓓ Paint



- Put on the valve spring retainer ②, and using the special tool ③, press down the spring, fit the cotter halves ④ to the stem end, and release the lifter to allow the cotter halves to wedge in between retainer and stem.

TOOL **09916-14510: Valve lifter**
09916-14530: Valve lifter attachment
09916-84511: Tweezers
09919-28610: Sleeve protector



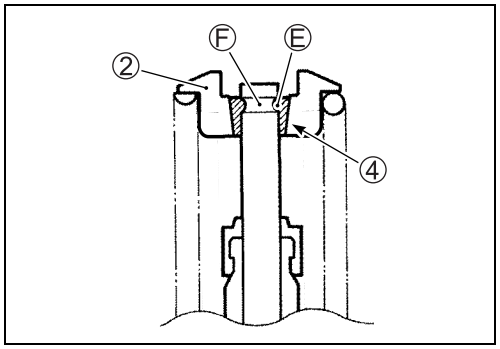
- Be sure that the rounded lip Ⓔ of the cotter fits snugly into the groove Ⓕ in the stem end.
- Install the other valves and springs in the same manner as described previously.

CAUTION

Be sure to restore each spring and valve to their original positions.

CAUTION

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



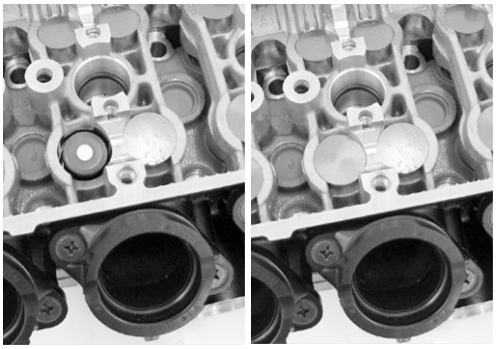
② Valve spring retainer
④ Cotter

- Install the tappet shims and the tappets to their original positions.

NOTE:

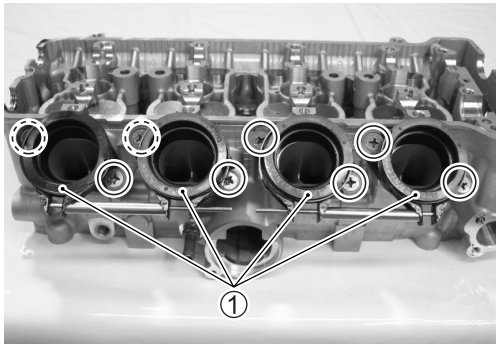
** Apply engine oil to the stem end, shim and tappet before fitting them.*

** When seating the tappet shim, be sure the figure printed surface faces the tappet.*

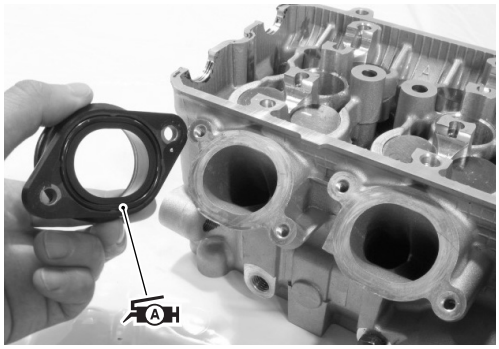


INTAKE PIPE

- Remove the intake pipes ①.

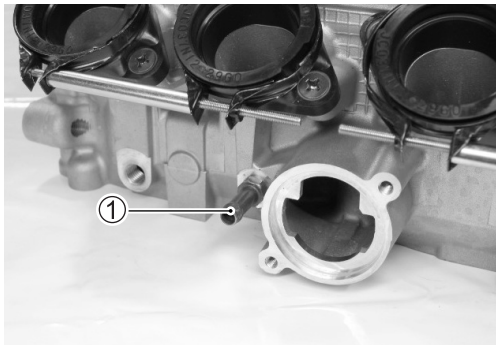


- Apply SUZUKI SUPER GREASE to the O-rings.
- Install the intake pipes.



WATER BYPASS UNION

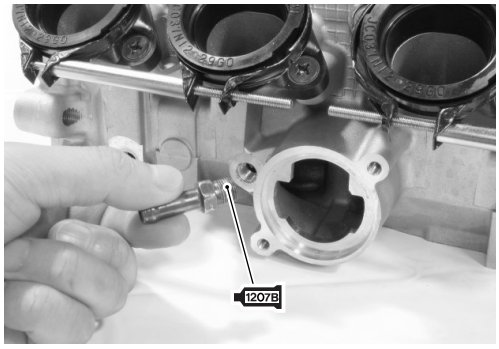
- Remove the water bypass union ①.



- Apply SUZUKI BOND to the thread part of water bypass union and tighten it to the specified torque.

1207B 99000-31140: SUZUKI BOND "1207B"

Water bypass union: 12 N·m (1.2 kgf-m)



CLUTCH

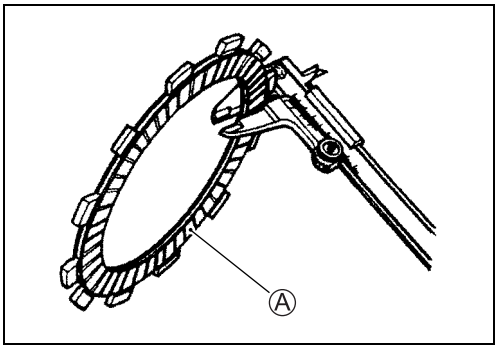
CLUTCH DRIVE PLATES INSPECTION

NOTE:

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

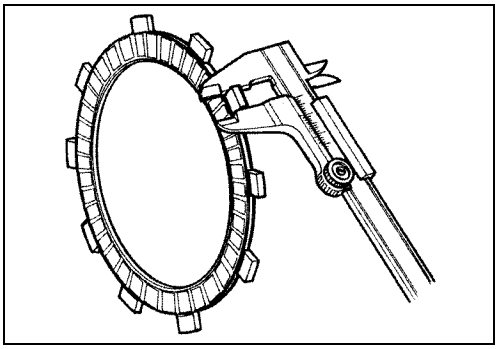
** Clutch drive plate No.1: 40 friction pieces*

** Clutch drive plate No.2 and No.3: 48 friction pieces*



Ⓐ Friction piece

- Measure the thickness of drive plates with a vernier calipers.
- If each drive plate thickness is the limit and less, replace it with a new one.



DATA Drive plate thickness:
Service Limit: 2.62 mm

TOOL 09900-20102: Vernier calipers

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

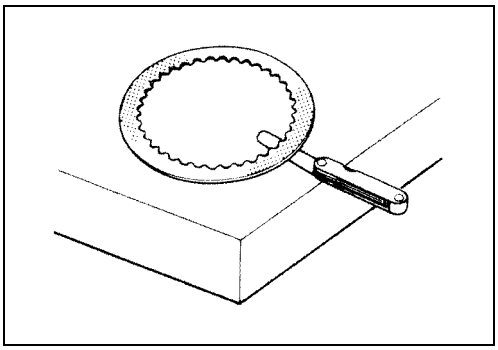
DATA Drive plate claw width:
Service Limit: 12.90 mm

TOOL 09900-20102: Vernier calipers

CLUTCH DRIVEN PLATES INSPECTION

NOTE:

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

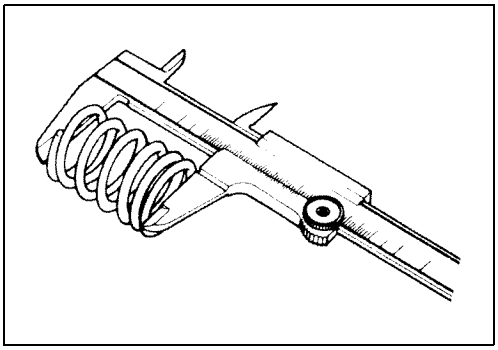


- Measure each driven plate for distortion with a thickness gauge and surface plate.
- Replace driven plates which exceed the limit.

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

TOOL 09900-20803: Thickness gauge

CLUTCH SPRING INSPECTION



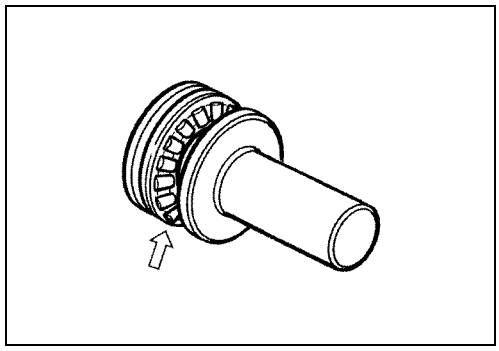
- Measure the free length of each coil spring with a vernier calipers, and compare the length with the specified limit.
- Replace all the springs if any spring is not within the limit.

DATA Clutch spring free length:
Service Limit: 52.4 mm

TOOL 09900-20102: Vernier calipers

CLUTCH 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 and primary driven gear assembly for damage or wear caused by the clutch plates. If necessary, replace it with a new one.

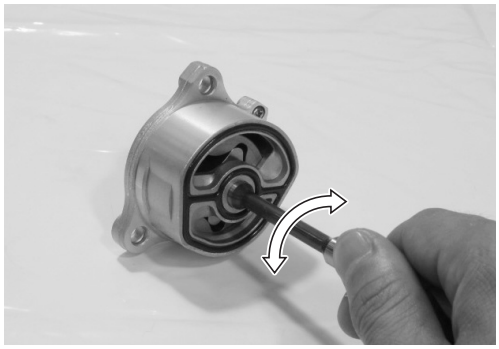
OIL PUMP

INSPECTION

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

CAUTION

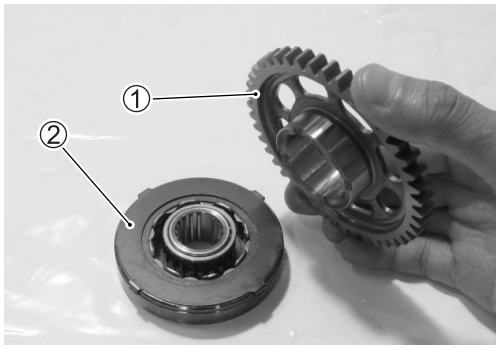
*** Do not attempt to disassemble the oil pump assembly.**
*** The oil pump is available only as an assembly.**



STARTER CLUTCH

INSPECTION

- Install the starter driven gear ① onto the starter clutch ②.



- Turn the starter driven gear by hand.
- Inspect the starter clutch for a smooth movement.
- Inspect that the gear turns one direction only.

- If a large resistance is felt for rotation, inspect the starter clutch bearing or the starter clutch contacting surface on the starter driven gear for wear and damage.
- If they are found to be damaged, replace them with the new ones.

GENERATOR

INSPECTION (☞9-10)

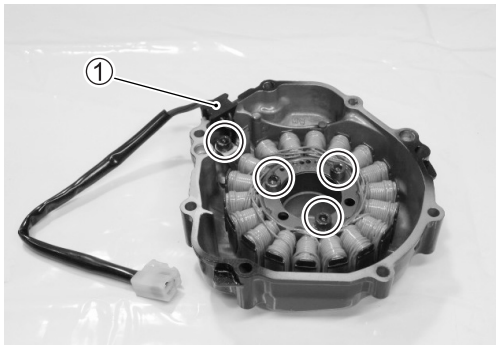
REASSEMBLY

- When installing the generator stator set bolts, tighten them to the specified torque.

Generator stator set bolt: 10 N·m (1.0 kgf-m)

NOTE:

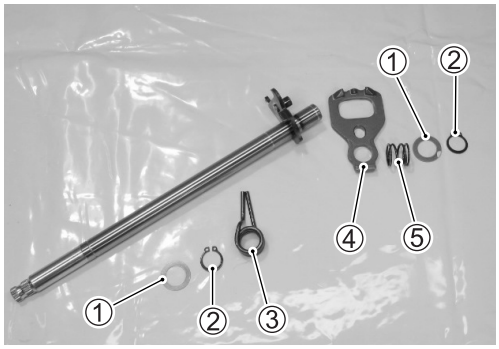
Be sure to install the grommet ① to the generator cover.



WATER PUMP

DISASSEMBLY/INSPECTION (☞7-12)

GEARSHIFT SYSTEM



GEARSHIFT SHAFT/GEARSHIFT ARM DISASSEMBLY

- Remove the following parts from the gearshift shaft/gearshift arm.

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

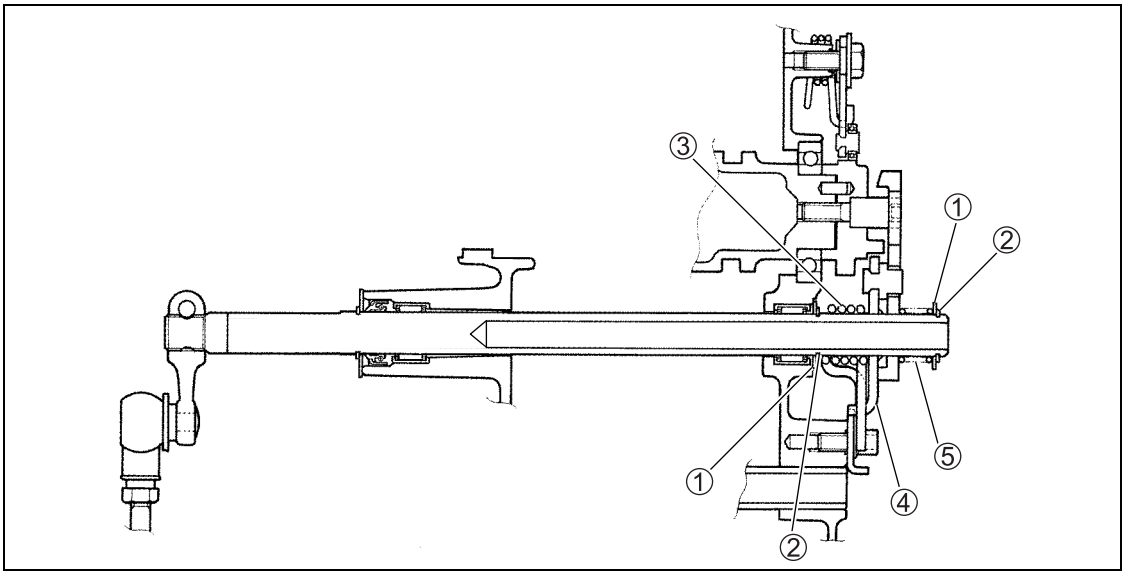
GEARSHIFT SHAFT/GEARSHIFT ARM INSPECTION

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

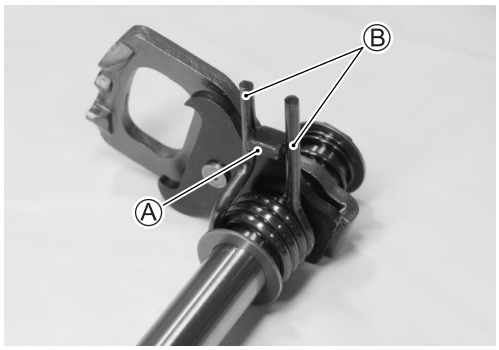
GEARSHIFT SHAFT/GEARSHIFT ARM REASSEMBLY

- Install the following parts to the gearshift shaft/gearshift arm as shown in the illustration.

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

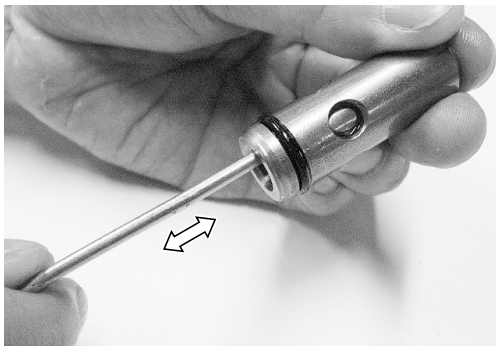


NOTE:
When installing the gearshift shaft return spring, position the stopper Ⓐ of gearshift arm between the shaft return spring ends Ⓑ.



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

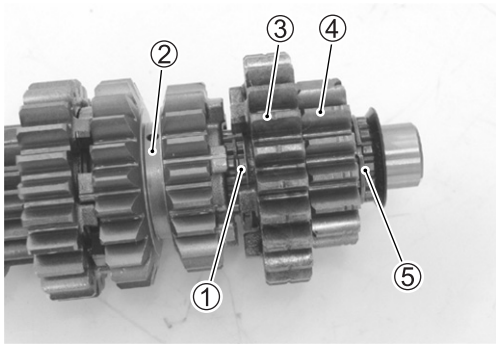
- Inspect the oil strainer body for damage.
- Clean the oil strainer if necessary.

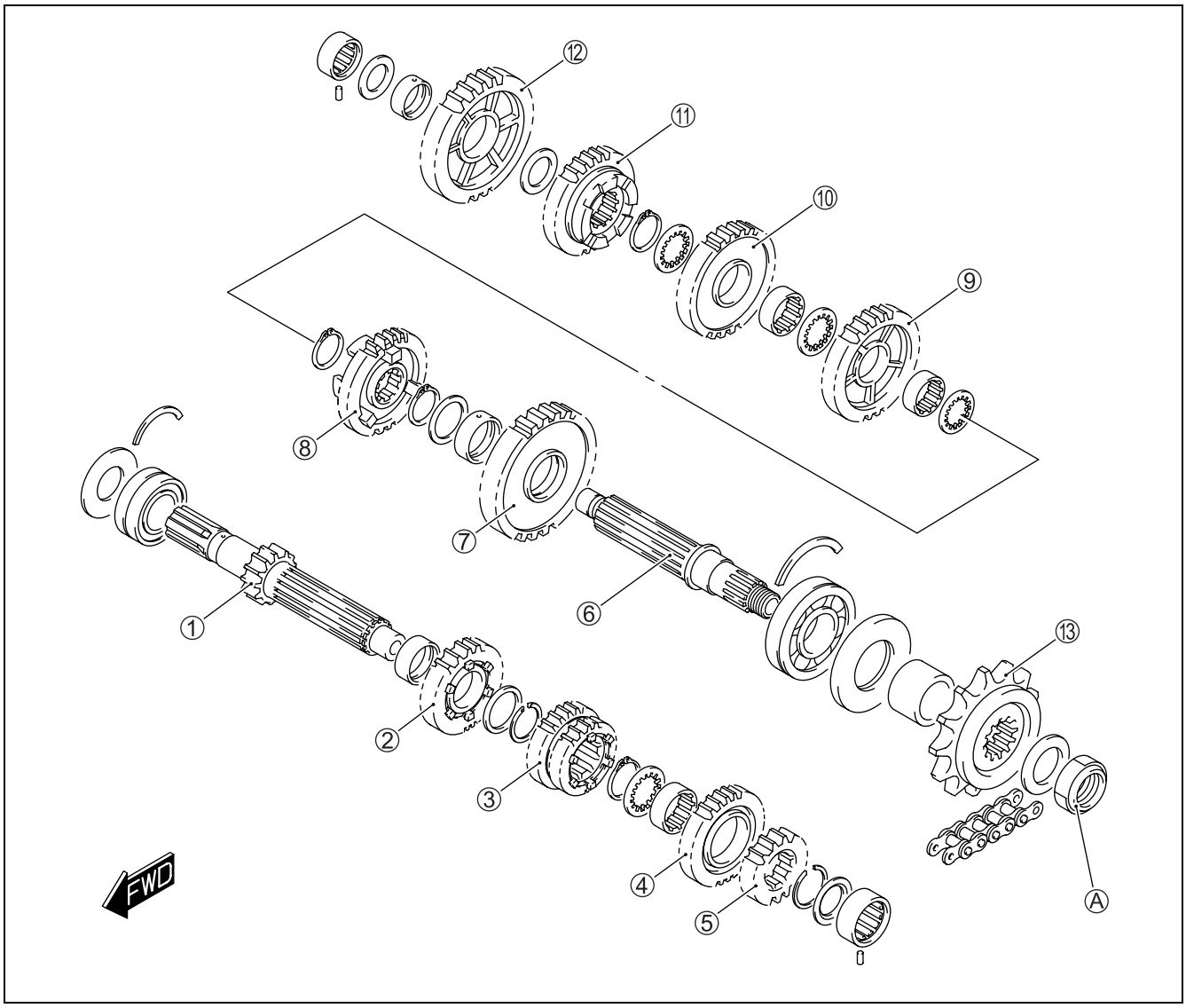
TRANSMISSION

DISASSEMBLY

Disassemble the countershaft and driveshaft. Pay attention to the following points:

- Remove the 6th drive gear snap ring ① from its groove and slide it towards the 3rd/4th drive gears ②.
- Slide the 6th ③ and 2nd ④ drive gears toward the 3rd/4th drive gears ②, then remove the 2nd drive gear circlip ⑤.





①	Countershaft/1st drive gear	⑧	6th driven gear
②	5th drive gear	⑨	3rd driven gear
③	3rd/4th drive gear	⑩	4th driven gear
④	6th drive gear	⑪	5th driven gear
⑤	2nd drive gear	⑫	1st driven gear
⑥	Driveshaft	⑬	Engine sprocket
⑦	2nd driven gear	Ⓐ	Engine sprocket nut

ITEM	N·m	kgf-m
Ⓐ	115	11.5

REASSEMBLY

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

NOTE:

** Rotate the bearings by hand to inspect 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 oil seal, apply SUZUKI SUPER GREASE " A" to it.*

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

CAUTION

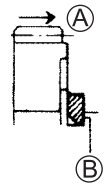
*** Never reuse a snap ring. After a snap ring has been removed from a shaft, it should be discarded and a new snap ring must be installed.**
*** When installing a new snap ring, do not expand the end gap larger than required to slip the snap ring over the shaft.**
*** After installing a snap ring, make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

NOTE:

When reassembling the transmission, 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, bushings, washers and snap rings. (☞3-47)

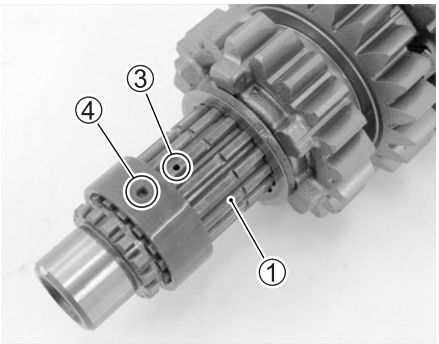
- When installing a new snap ring, pay attention to its direction. Fit it to the side where the thrust is as shown in the illustration.

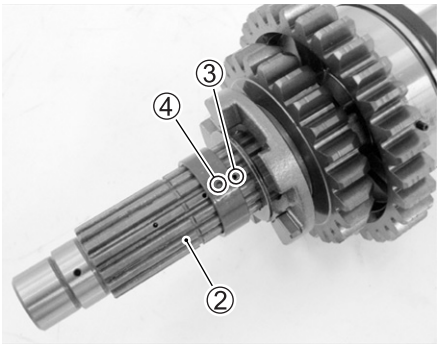
Ⓐ Thrust
Ⓑ Sharp edge

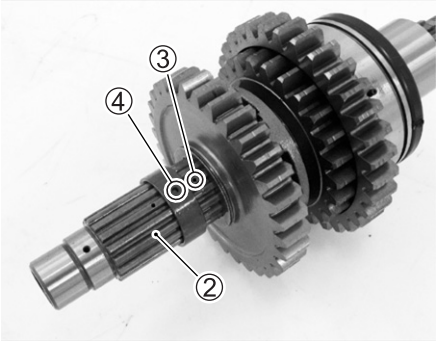


CAUTION

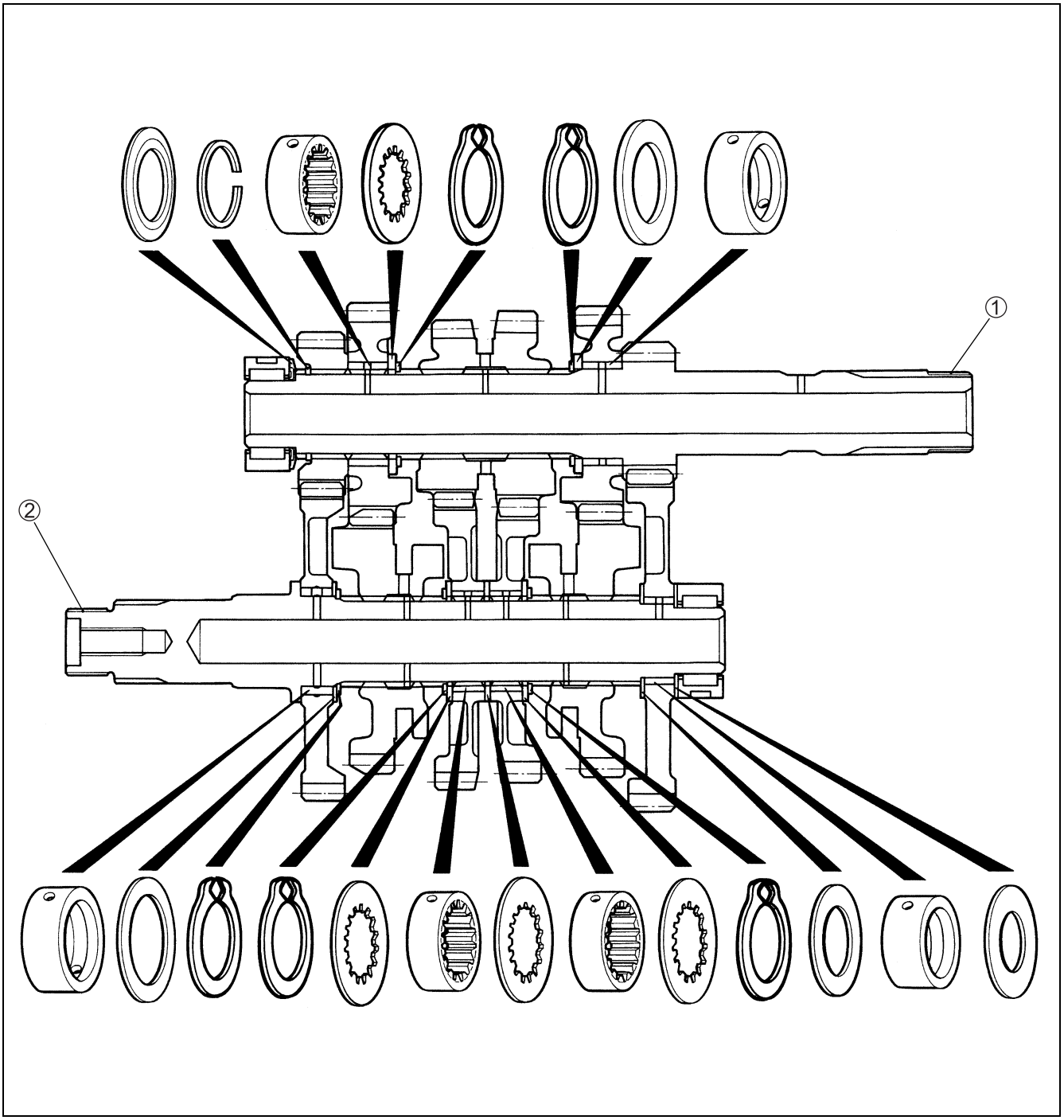
When installing the gear bushing onto the countershaft ① and driveshaft ②, align the shaft oil hole ③ with the bushing oil hole ④.







TRANSMISSION PARTS LOCATION



①	Countershaft
②	Driveshaft

CYLINDER

CRANKCASE SERVICING (☞3-51)

CYLINDER DISTORTION

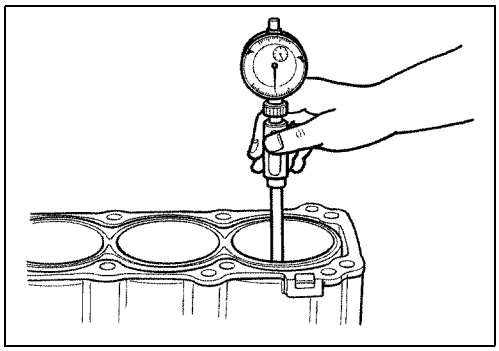
- Check the gasketed surface of the cylinder for distortion with a straightedge and thickness gauge, taking a clearance reading at several places as indicated.
- If the largest reading at any position of the straightedge exceeds the limit, replace the crankcase set.

DATA Cylinder distortion:
Service Limit: 0.02 mm

TOOL 09900-20803: Thickness gauge

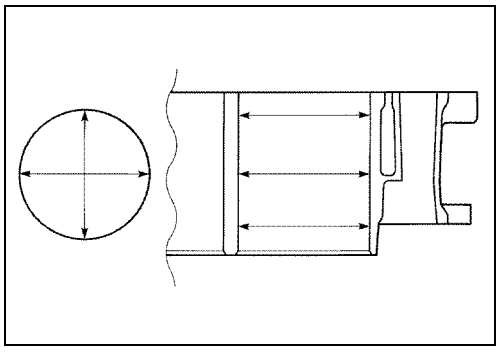
CYLINDER BORE

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



DATA Cylinder bore:
Standard: 67.000 – 67.015 mm

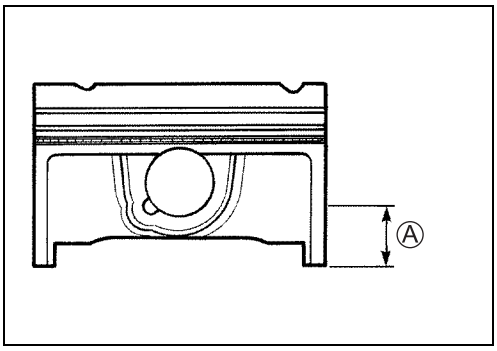
TOOL 09900-20508: Cylinder gauge set



PISTON AND PISTON RING

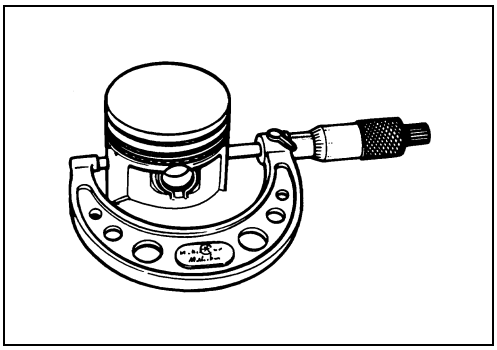
PISTON DIAMETER

- Using a micrometer, measure the piston outside diameter at 15 mm Ⓐ from the piston skirt end.
- If the measurement is less than the limit, replace the piston.



DATA Piston diameter:
Service Limit: 66.845 mm
at 15 mm from the skirt end

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



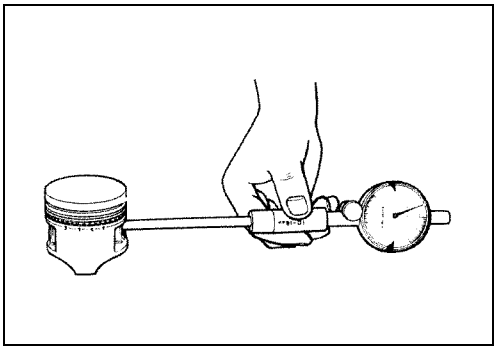
PISTON-TO-CYLINDER CLEARANCE

- Subtract the piston diameter from the cylinder bore diameter. (☞3-48)
- If the piston-to-cylinder clearance exceeds the service limit, replace the crankcase set or the piston, or both.

DATA Piston-to-cylinder clearance:
Service Limit: 0.120 mm

PISTON PIN AND PIN BORE

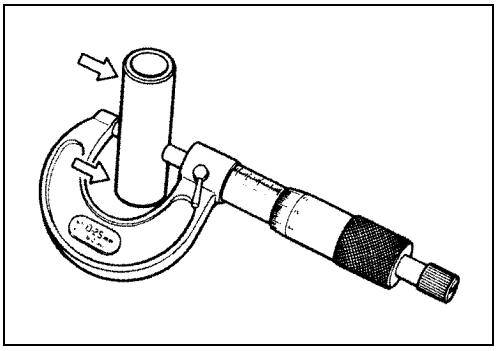
- Measure the piston pin bore inside diameter using the small bore gauge.
- If the measurement is out of specifications replace the piston.



DATA Piston pin bore I.D.:
Service Limit: 14.030 mm

TOOL 09900-20602: Dial gauge (1/1 000 mm)
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 are out of specification, replace the piston pin.



DATA Piston pin O.D.:
Service Limit: 13.980 mm

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

PISTON RING-TO-GROOVE CLEARANCE

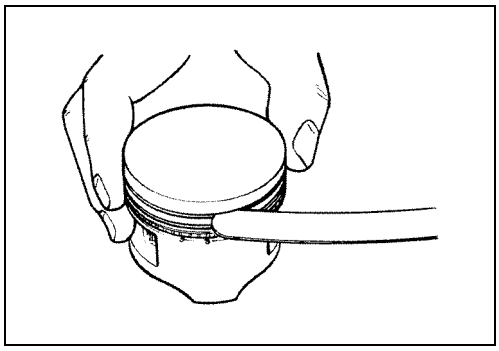
- Measure the side clearances of the 1st and 2nd piston rings using the thickness gauge.
- If any of the clearances exceed the limit, replace both the piston and piston rings.

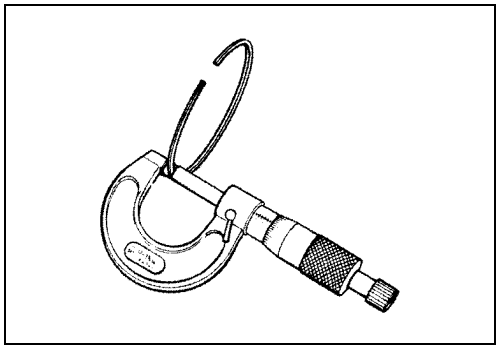
TOOL 09900-20803: Thickness gauge
09900-20205: Micrometer (0 – 25 mm)

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

DATA Piston ring groove width:
Standard (1st) : 1.01 – 1.03 mm
(2nd) : 0.81 – 0.83 mm
(Oil) : 1.51 – 1.53 mm

DATA Piston ring thickness:
Standard (1st) : 0.97 – 0.99 mm
(2nd) : 0.77 – 0.79 mm





PISTON RING FREE END GAP AND PISTON RING END GAP

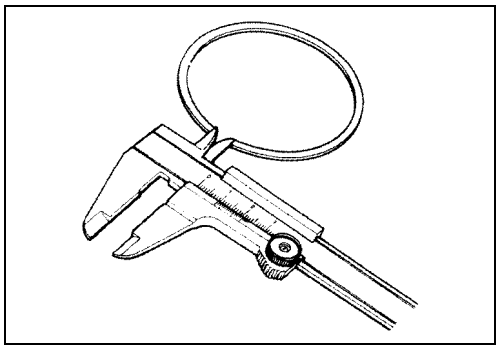
- Measure the piston ring free end gap using the vernier calipers.
- Next, fit the piston ring squarely into the cylinder and measure the piston ring end gap using the thickness gauge.
- If any of the measurements exceed the service limit, replace the piston ring with a new one.

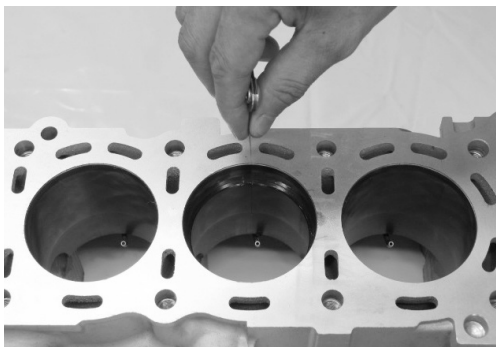
DATA Piston ring free end gap:
Service Limit (1st) : 4.4 mm
(2nd): 6.8 mm

TOOL 09900-20102: Vernier calipers

DATA Piston ring end gap:
Service Limit (1st) : 0.50 mm
(2nd): 0.50 mm

TOOL 09900-20803: Thickness gauge



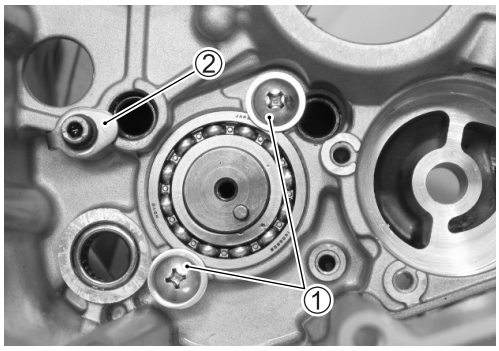


CRANKCASE

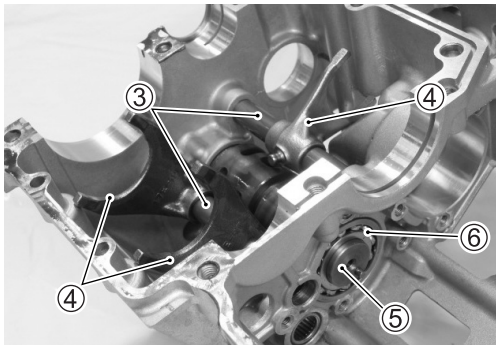
GEARSHIFT FORK AND GEARSHIFT CAM

Removal

- Remove the gearshift cam bearing retainer screws ① and gearshift fork shaft retainer ② from the lower crankcase.



- Remove the gearshift fork shafts ③ and gearshift ④ forks from the lower crankcase.
- Remove the gearshift cam ⑤ and its bearing ⑥.

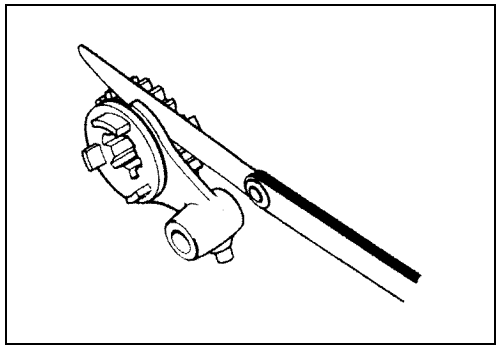


GEARSHIFT FORK-TO-GROOVE CLEARANCE

- 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

TOOL 09900-20803: Thickness gauge



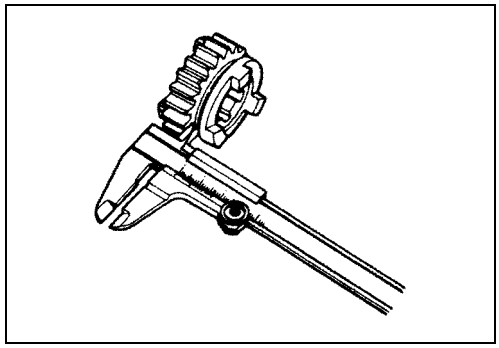
- If the clearance checked is noted to exceed the limit specified, replace the fork or its gear, or both.

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

TOOL 09900-20102: Vernier calipers

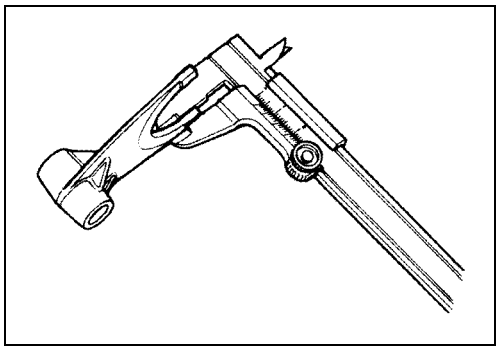


GEARSHIFT FORK THICKNESS

- Measure the gearshift fork thickness using the vernier calipers.

DATA **Shift fork thickness:**
Standard: 4.8 – 4.9 mm

TOOL **09900-20102: Vernier calipers**

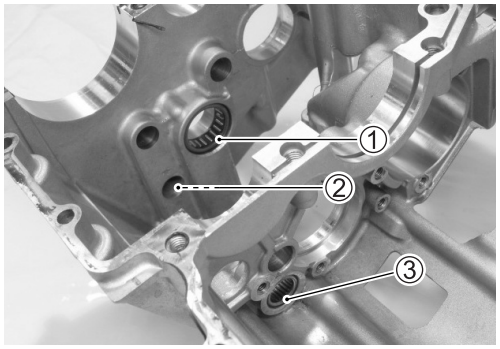


GEARSHIFT CAM BEARING AND GEARSHIFT SHAFT BEARING

Inspection

- Inspect the gearshift cam bearing for abnormal noise and smooth rotation.
- Replace the bearings if there is anything unusual.

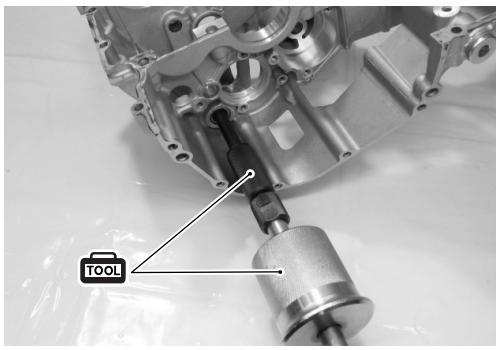
- Inspect the gearshift cam bearing ①, gearshift shaft bearings ② and ③ for abnormal noise and smooth rotation while they are in the crankcase.
- Replace the bearing if there is anything unusual.



Removal

- Remove the gearshift shaft bearing with the special tools.

TOOL **09921-20210: Bearing remover**
09930-30104: Sliding shaft

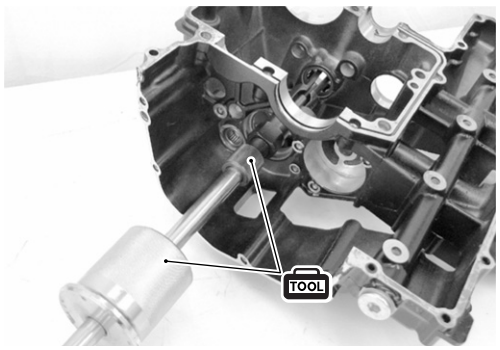


- Remove the gearshift cam bearing with the special tools.

TOOL **09923-74511: Bearing remover**
09930-30104: Sliding shaft

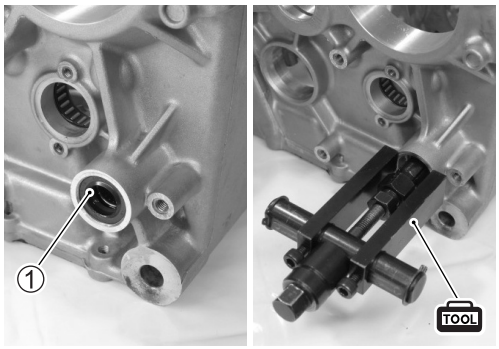
CAUTION

Be careful not to lean the bearing remover.



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

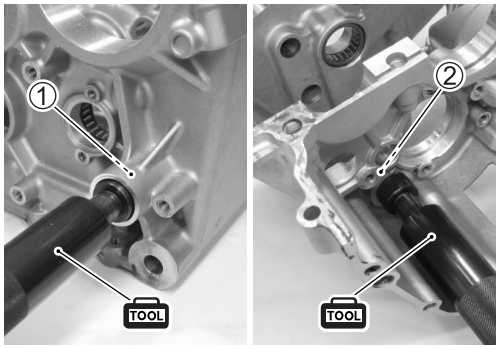
TOOL 09921-20240: Bearing remover set (15 mm)



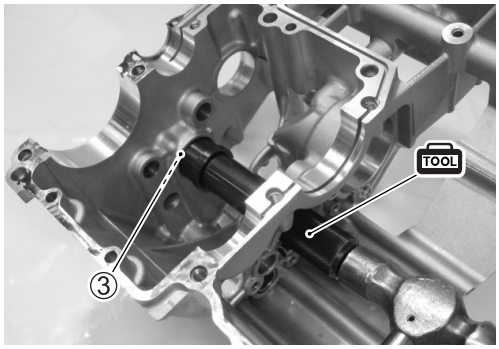
Installation

- Install the bearings with the special tool.

TOOL 09913-70210: Bearing installer set (①, ② ϕ22) (③ ϕ32)



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

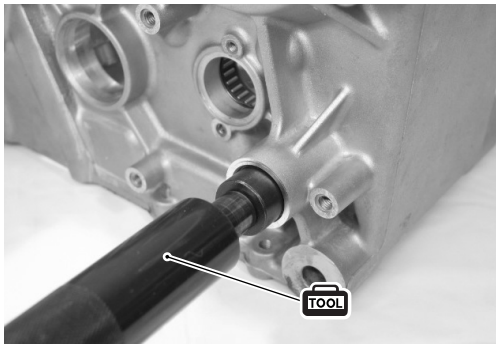


- Install the oil seal with the special tool.

TOOL 09913-70210: Bearing installer set (ϕ22)

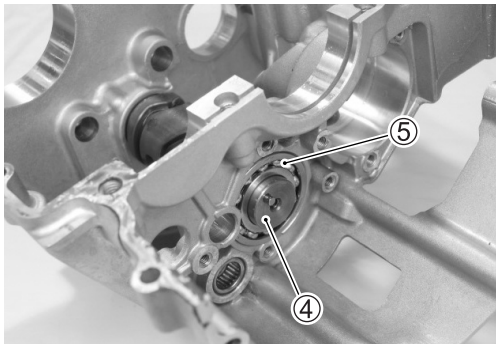
- Apply SUZUKI SUPER GREASE "A" to the oil seal lip.

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

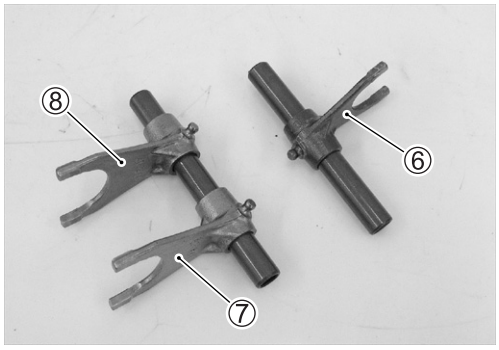


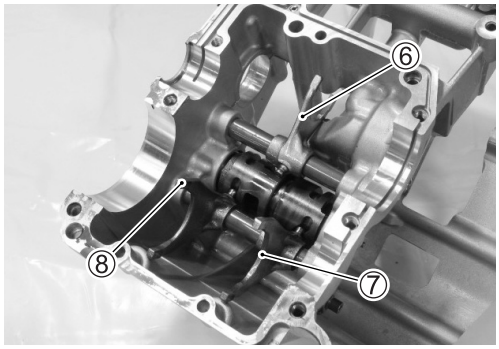
- Install the gearshift cam ④ with the bearing ⑤.

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



- Install the gearshift forks and their shafts as shown.
  ⑥ For 3rd/4th drive gears (17E-3W)
  ⑦ For 6th driven gear (17E-1E)
  ⑧ For 5th driven gear (17E-1F)

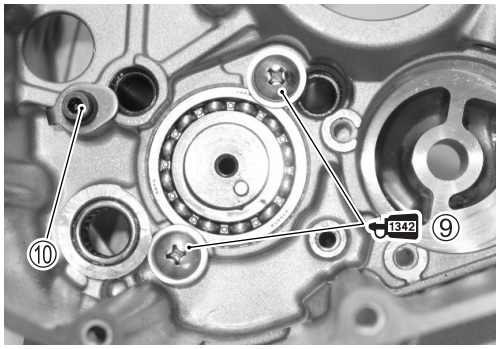




- Apply a small quantity of THREAD LOCK to the bearing retainer screws ⑨.
- Tighten the bearing retainer screws ⑨ and gearshift fork shaft retainer bolt ⑩ to the specified torque.

1342 99000-32050: THREAD LOCK "1342"

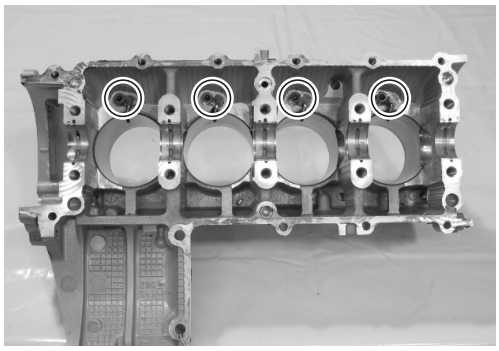
Bearing retainer screw: 10 N·m (1.0 kgf-m)
Gearshift fork shaft retainer bolt: 10 N·m (1.0 kgf-m)

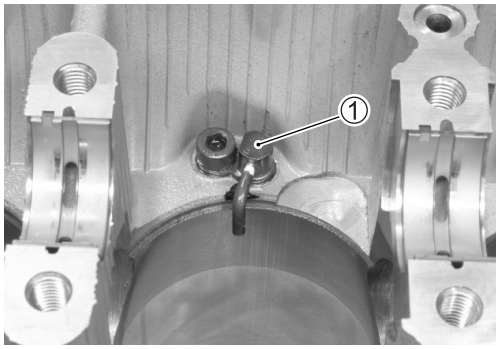


OIL JET

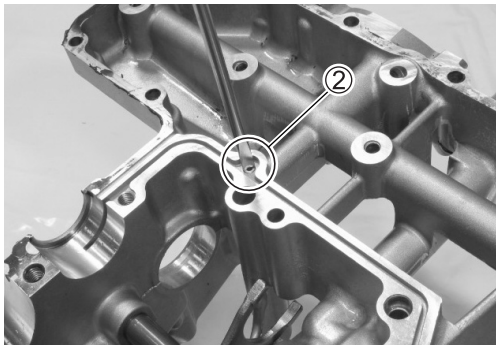
Removal

- Remove the piston cooling oil jets ① from the upper crankcase.

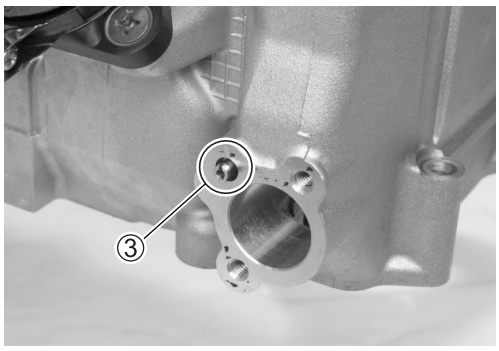




- Remove the oil jet ② (for transmission) from the lower crankcase.



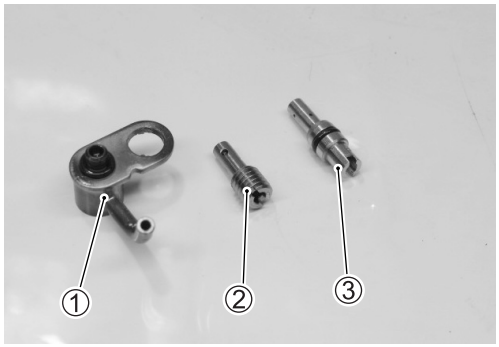
- Remove the oil jet ③ (for cam chain tension adjuster) from the cylinder head.



Inspection and cleaning

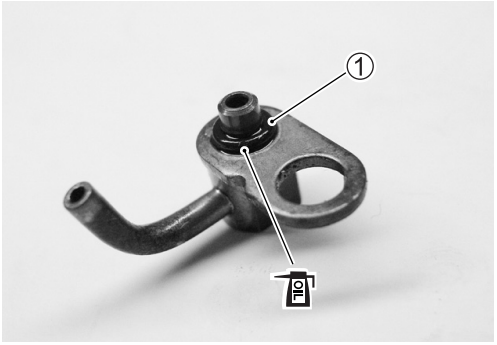
- Check the oil jets for clogging.
- If they are clogged, clean their oil passage with a proper wire and compressed air.

① Piston cooling oil jet
② Oil jet (#14) (For transmission)
③ Oil jet (#8) (For cam chain tension adjuster)



Installation

- Fit new O-ring ① to each piston cooling oil jet as shown and apply engine oil to them.



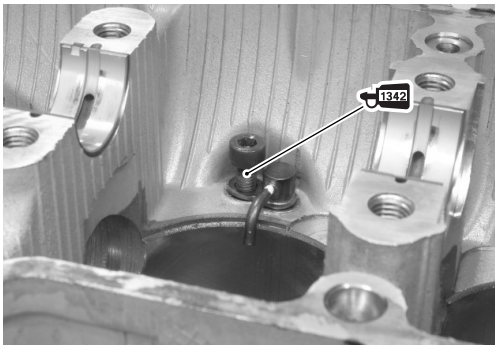
CAUTION

Use new O-rings to prevent oil pressure leakage.

- Install each piston cooling oil jet with the bolt.

NOTE:

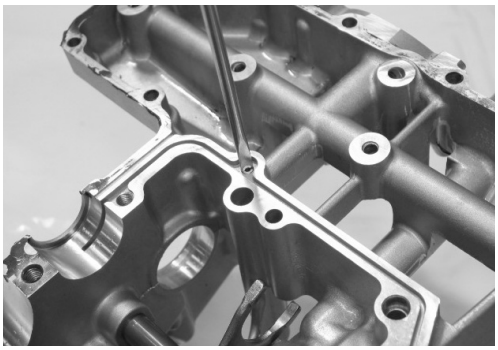
Apply a small quantity of THREAD LOCK to the bolts and tighten them to the specified torque.



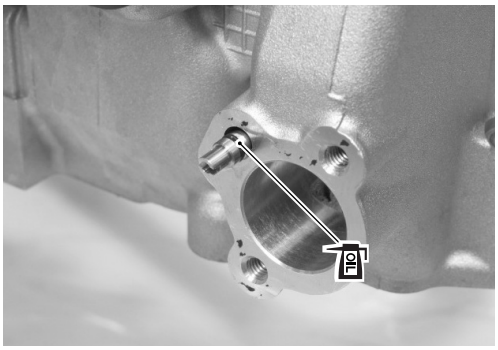
1342 99000-32050: THREAD LOCK "1342"

Piston cooling oil jet bolt: 10 N·m (1.0 kgf-m)

- Install the oil jet (for transmission).



- Apply engine oil to the O-ring.
- Install the oil jet (for cam chain tension adjuster).

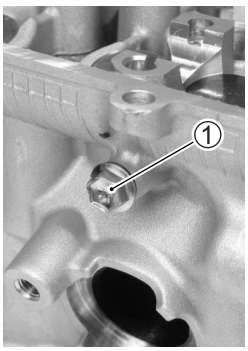


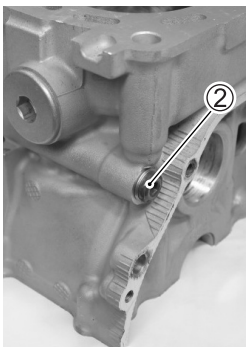
PLUG

Removal

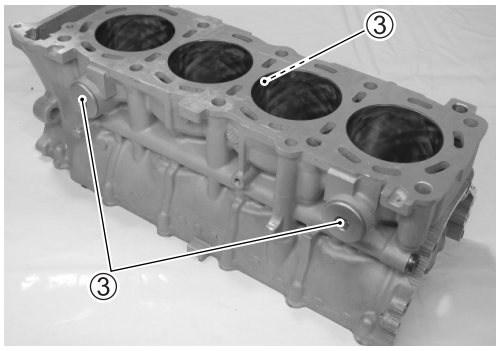
- Remove the oil gallery plugs ① and ②.

① (for cylinder head side)
② (for upper crankcase side)

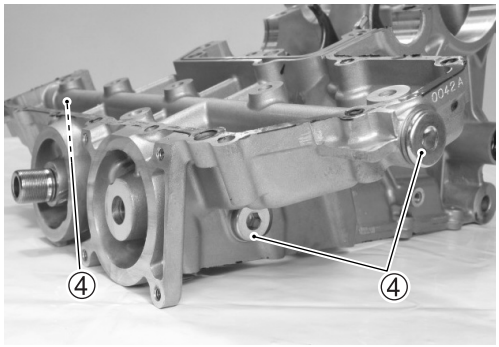




- Remove the water jacket plugs ③.



- Remove the oil gallery plugs ④ (for lower crankcase side).



Installation

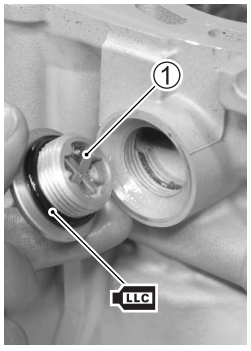
- Apply engine coolant to the O-rings of the water jacket plugs ①.

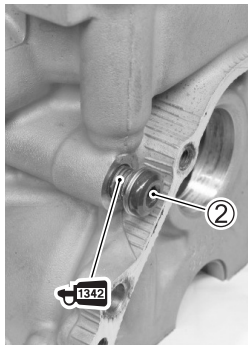
LLC 99000-99032-11X: SUZUKI COOLANT

- Apply THREAD LOCK to the oil gallery plug ②.

1342 99000-32050: THREAD LOCK "1342"

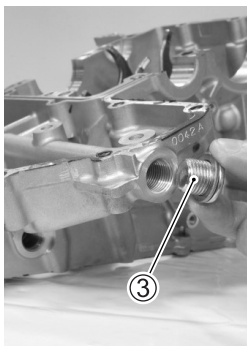
NOTE:
It is not required to apply THREAD LOCK when installing the other removed oil gallery plugs.

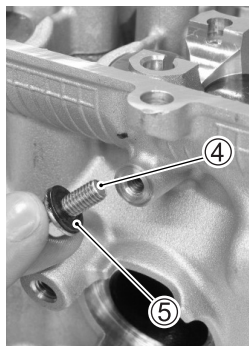




- Tighten each plug to the specified torque.

① Water jacket plug: 9.5 N·m (0.95 kgf-m)
② Oil gallery plug (upper crankcase): 11 N·m (1.1 kgf-m)
③ Oil gallery plug (lower crankcase): 35 N·m (3.5 kgf-m)
④ Oil gallery plug (cylinder head): 10 N·m (1.0 kgf-m)



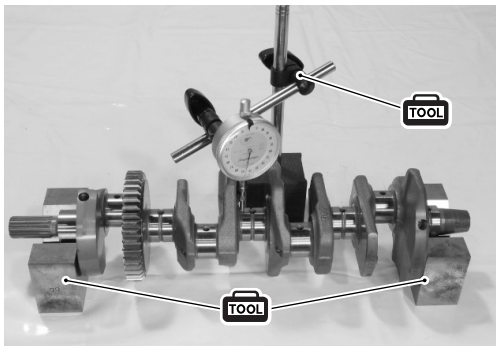


CAUTION

Use new gasket or O-ring for each plug.

CRANKSHAFT AND CONROD

CRANKSHAFT RUNOUT

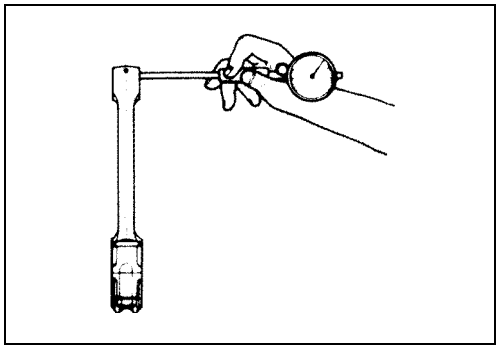


- Support the crankshaft with “V” blocks as shown, with the two end journals resting on the blocks.
- Set up the dial gauge, as shown.
- Rotate the crankshaft slowly to read the runout.
- Replace the crankshaft if the runout is greater than the limit.

DATA Crankshaft runout:
Service Limit: 0.05 mm

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

CONROD SMALL END I.D.



- Using a small bore gauge, measure the inside diameter of the conrod small end.

DATA Conrod small end I.D.:
Service Limit: 14.040 mm

TOOL 09900-20602: Dial gauge (1/1 000 mm, 1 mm)
09900-22401: Small bore gauge (10 – 18 mm)

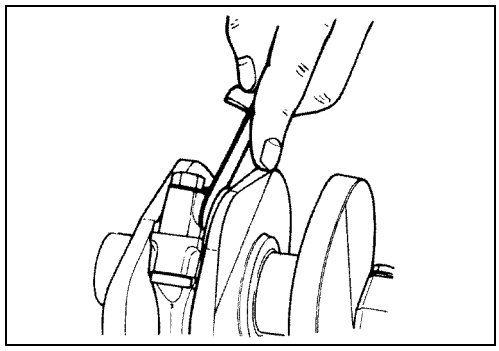
- If the inside diameter of the conrod small end exceeds the limit, replace the conrod.

CONROD BIG END SIDE CLEARANCE

- Inspect the conrod side clearance by 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.

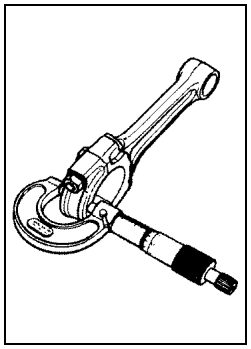
DATA Conrod big end side clearance:
Service Limit: 0.30 mm

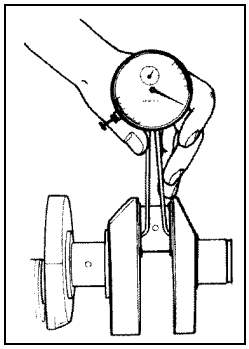
TOOL 09900-20803: Thickness gauge



DATA Conrod big end width:
Standard: 19.95 – 20.00 mm

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



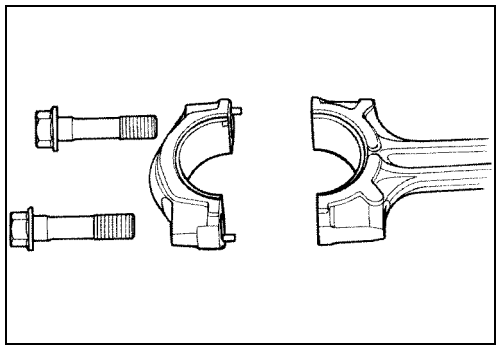


DATA Crank pin width:
Standard: 20.10 – 20.15 mm

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

CONROD-BIG END BEARING INSPECTION

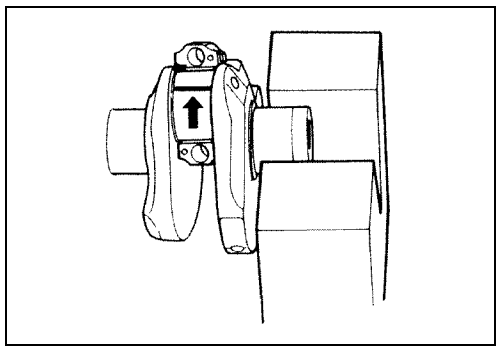
- Inspect the bearing surfaces for any sign of fusion, pitting, burn, or flaws. If any, replace them with a specified set of bearings.



CONROD-BIG END BEARING SELECTION

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

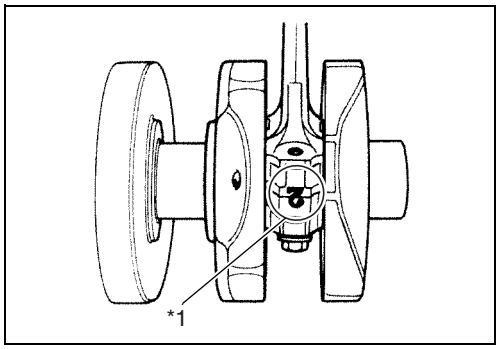
TOOL 09900-22301: Plastigauge



- Tighten the conrod bearing cap bolts to the specified torque, in two stages. (☞3-70)

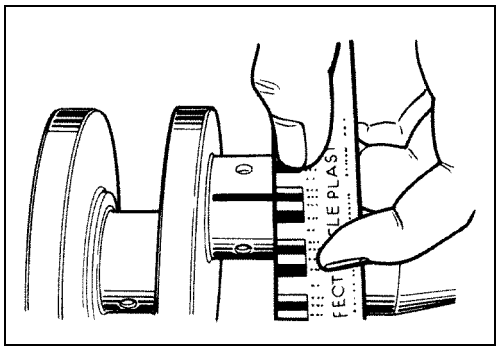
CAUTION

*** Apply engine oil to the bearing cap bolt.**
*** Never rotate the crankshaft or conrod when a piece of plastigauge is installed.**



*1: Face the intake side.

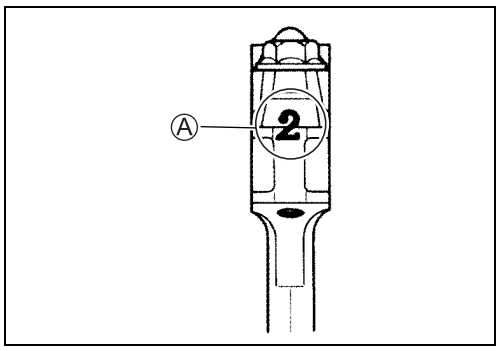
- Remove the bearing caps and measure the width of the compressed plastigauge using the envelope scale. This measurement should be taken at the widest part of the compressed plastigauge.



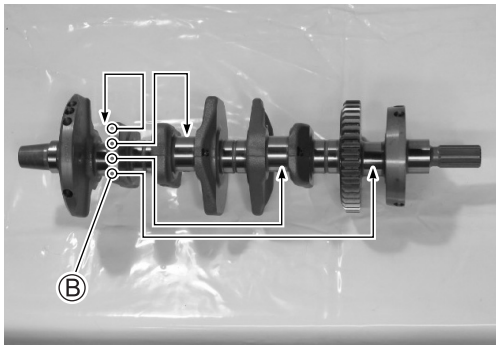
DATA Conrod big end oil clearance:
Standard: 0.032 – 0.056 mm
Service Limit: 0.080 mm

- 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

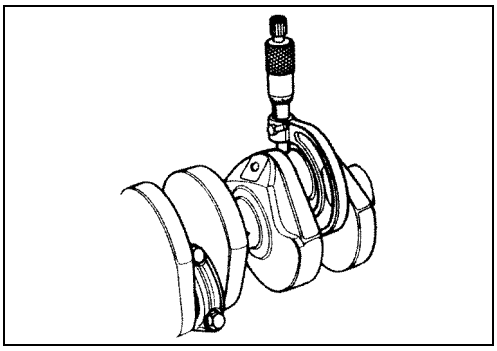
		Crank pin O.D. Ⓑ		
	Code	1	2	3
Conrod I.D Ⓐ	1	Green	Black	Brown
	2	Black	Brown	Yellow

DATA Conrod I.D.

Code	I.D. specification
1	34.000 – 34.008 mm
2	34.008 – 34.016 mm

DATA Crank pin O.D.

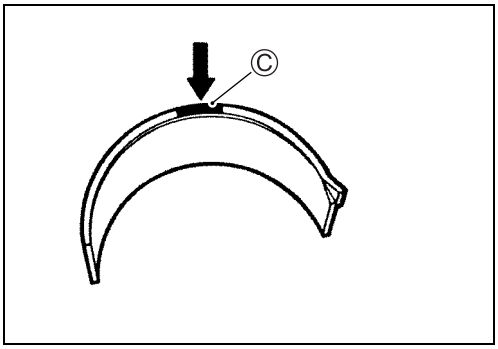
Code	O.D. specification
1	30.992 – 31.000 mm
2	30.984 – 30.992 mm
3	30.976 – 30.984 mm



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

DATA Bearing thickness

Color Ⓒ (Part No.)	Thickness
Yellow (12164-29G00-0D0)	1.492 – 1.496 mm
Brown (12164-29G00-0C0)	1.488 – 1.492 mm
Black (12164-29G00-0B0)	1.484 – 1.488 mm
Green (12164-29G00-0A0)	1.480 – 1.484 mm



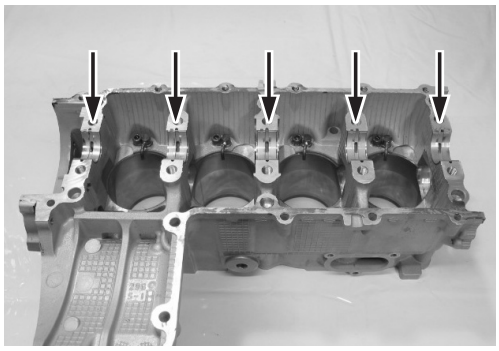
CAUTION

The bearings must be replaced as a set.

CRANKSHAFT JOURNAL BEARING

INSPECTION

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



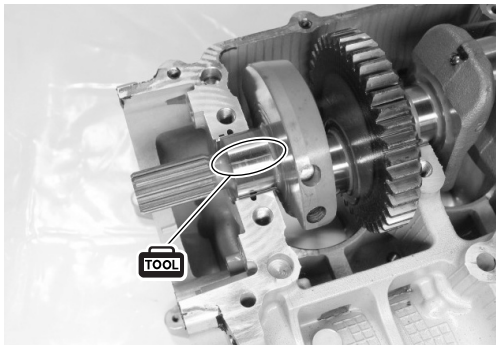
SELECTION

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

TOOL 09900-22301: Plastigauge

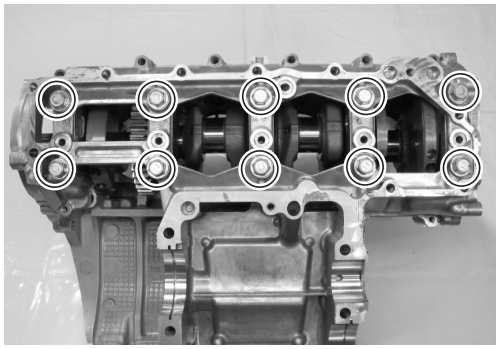
CAUTION

Never rotate the crankshaft when a piece of plastigauge is installed.



- Mate the middle crankcase with the upper crankcase, and tighten the crankshaft journal bolts (M9) in the following two steps in the indicated order.

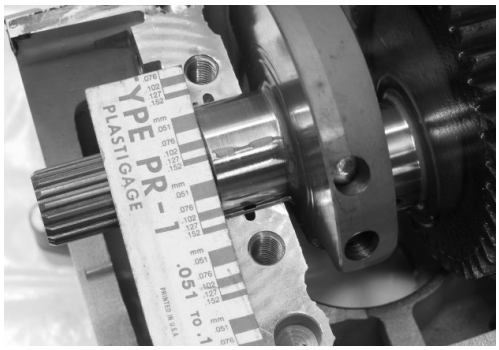
Crankshaft journal bolt (9 mm)
Initial: 18 N·m (1.8 kgf-m)
Final : 50°



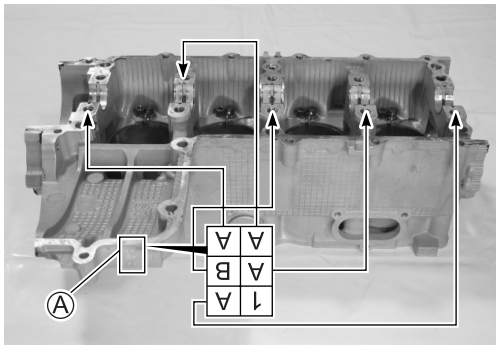
- Remove the middle crankcase and measure the width of the compressed plastigauge using the envelope scale. This measurement should be taken at the widest part of the compressed plastigauge.

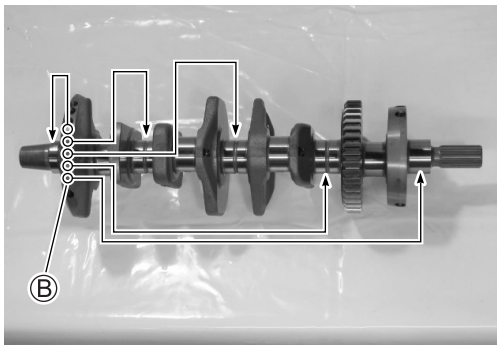
DATA Crankshaft journal oil clearance:
Standard: 0.016 – 0.040 mm
Service Limit: 0.080 mm

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



- Check the corresponding crankcase journal I.D. code number Ⓐ, “A” or “B” which is stamped on the rear of upper crankcase.
- Check the corresponding crankshaft journal O.D. code number Ⓑ, “A”, “B” or “C” which is 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
B	33.008 – 33.016 mm

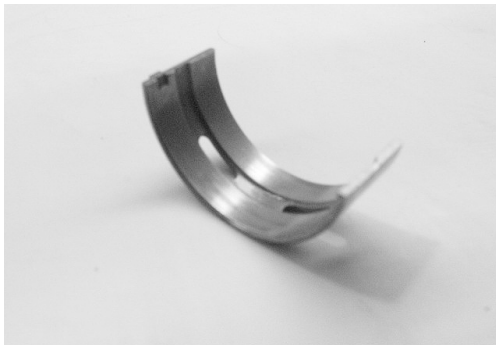
DATA Crankshaft journal O.D. specification

Code	O.D. specification
A	29.992 – 30.000 mm
B	29.984 – 29.992 mm
C	29.976 – 29.984 mm

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

DATA Bearing thickness specification

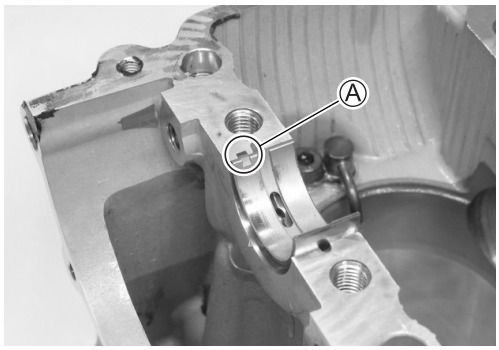
Color (Part No.)	Thickness
Yellow (12229-29G00-0D0)	1.500 – 1.504 mm
Brown (12229-29G00-0C0)	1.496 – 1.500 mm
Black (12229-29G00-0B0)	1.492 – 1.496 mm
Green (12229-29G00-0A0)	1.488 – 1.492 mm



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

INSTALLATION

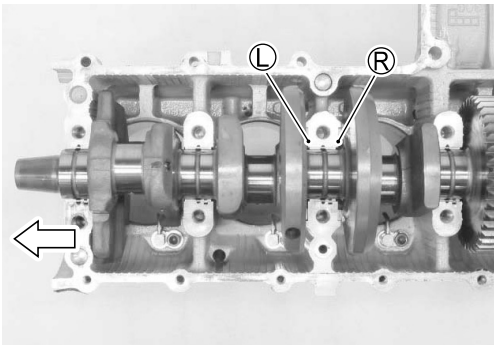
- When fitting the crankshaft journal bearings to the upper and middle crankcases, be sure to fix the stopper part Ⓐ first and press the other end.



CAUTION

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

CRANKSHAFT THRUST BEARING



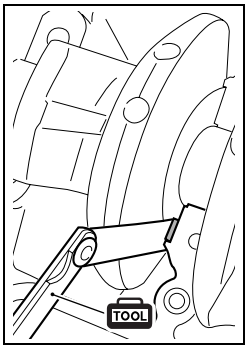
- With the crankshaft, right-side thrust bearing and left-side thrust bearing inserted in the upper crankcase, measure the thrust clearance on the left side by using the thickness gauge.

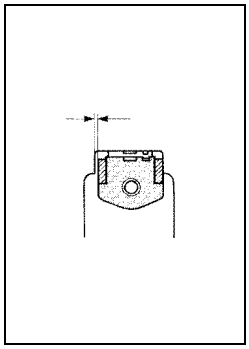
Ⓛ: Left-side thrust bearing
Ⓡ: Right-side thrust bearing

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

DATA Thrust clearance:
Standard: 0.055 – 0.110 mm

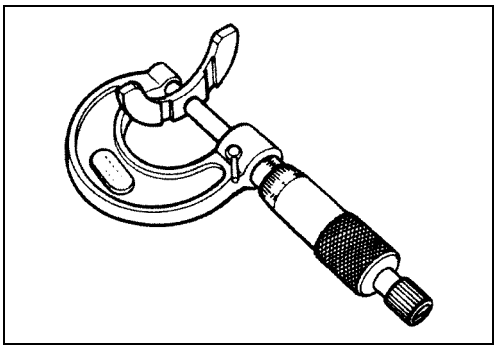
TOOL 09900-20803: Thickness gauge





- If the thrust clearance exceeds the standard range, adjust the thrust clearance by the following procedures.

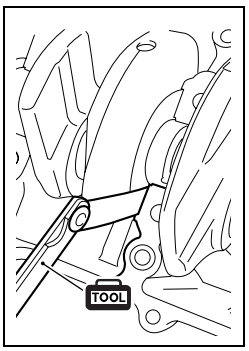
CRANKSHAFT THRUST CLEARANCE ADJUSTMENT

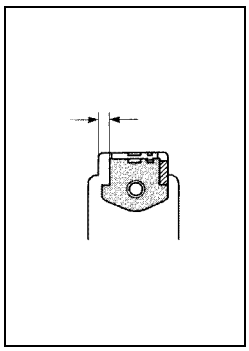


- Remove the right-side thrust bearing and measure its thickness with a micrometer.
- If the thickness of the right-side thrust bearing is below standard, replace it with a new one and once again perform the thrust clearance measurement listed above, checking to make sure it is within standard.

DATA Right-side thrust bearing thickness:
Standard: 2.425 – 2.450 mm

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





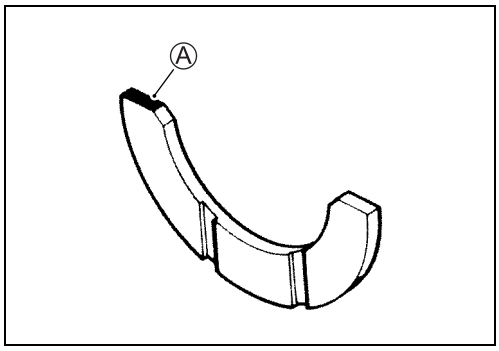
- If the right-side thrust bearing is within the standard range, reinsert the right-side thrust bearing and remove the left-side thrust bearing.
- As shown in the illustration, measure the clearance by using a thickness gauge before inserting of the left-side thrust bearing.
- Select a left-side thrust bearing from the selection table. (☞3-66)

DATA Thrust bearing selection table

Clearance before inserting left-side thrust bearing	Color (Part No.)	Thrust bearing thickness	Thrust clearance
2.560 – 2.585 mm	White (12228-17E00-0F0)	2.475 – 2.500 mm	0.060 – 0.110 mm
2.535 – 2.560 mm	Yellow (12228-17E00-0E0)	2.450 – 2.475 mm	0.060 – 0.110 mm
2.510 – 2.535 mm	Green (12228-17E00-0D0)	2.425 – 2.450 mm	0.060 – 0.110 mm
2.485 – 2.510 mm	Blue (12228-17E00-0C0)	2.400 – 2.425 mm	0.060 – 0.110 mm
2.460 – 2.485 mm	Black (12228-17E00-0B0)	2.375 – 2.400 mm	0.060 – 0.110 mm
2.430 – 2.460 mm	Red (12228-17E00-0A0)	2.350 – 2.375 mm	0.055 – 0.110 mm

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

Ⓐ Color code



NOTE:
Right-side thrust bearing has the same specification as the GREEN (12228-17E00-0D0) of left-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.

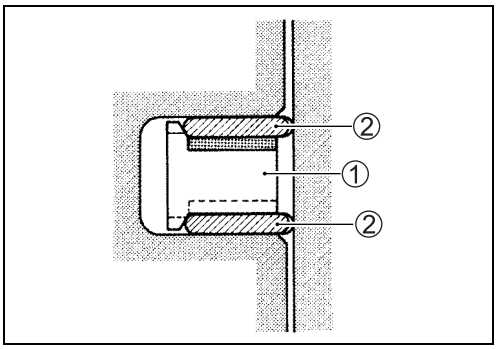
- Be sure to install the following items to the crankcase.

* Crankshaft journal bearing (☞3-62)
* Gearshift fork (☞3-54)
* Gearshift fork shaft (☞3-54)
* Gearshift shaft bearing (☞3-53)
* Gearshift cam bearing (☞3-53)
* Gearshift cam (☞3-53)
* Bearing retainer (☞3-54)
* Oil jets (☞3-55)

PISTON RING

- Install the piston rings in the order of oil ring, 2nd ring and 1st ring.
- The first member to go into the oil ring groove is a spacer ①. After placing the spacer, fit the two side rails ②.

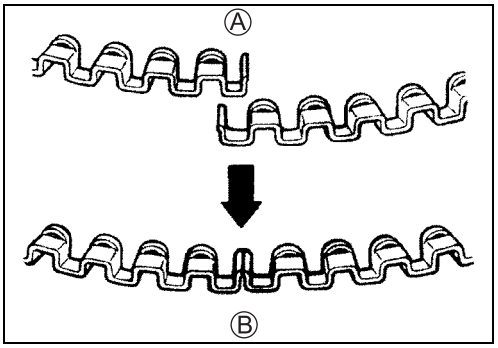
NOTE:
Side designations, top and bottom, are not applied to the spacer and side rails: you can position each either way.



CAUTION

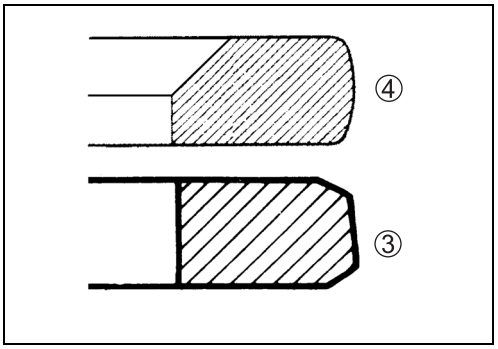
When installing the spacer, be careful not to allow its two ends to overlap in the groove.

Ⓐ INCORRECT
Ⓑ CORRECT

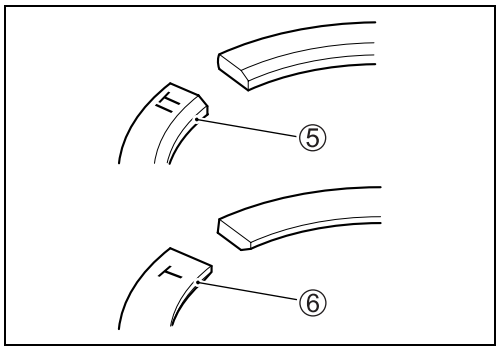


- Install the 2nd ring ③ and the 1st ring ④ to the piston.

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

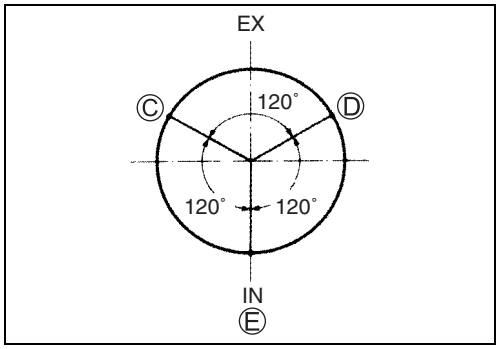


- 1st ring ⑤ and 2nd ring ⑥ have letters “IT” and “T” marked on the side. Be sure to bring the marked side to the top when fitting them to the piston.



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

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



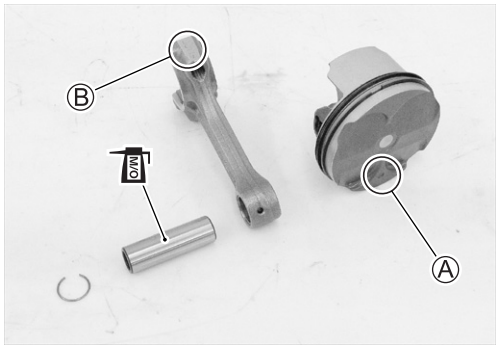
PISTON AND CONROD

- Rub a small quantity of MOLYBDENUM OIL SOLUTION onto each piston pin.

MOLYBDENUM OIL SOLUTION

- Assemble the piston and conrod.

NOTE:
When installing the pistons, the indent Ⓐ on the piston head must be brought to the other side of ID code Ⓑ on the conrod big end.

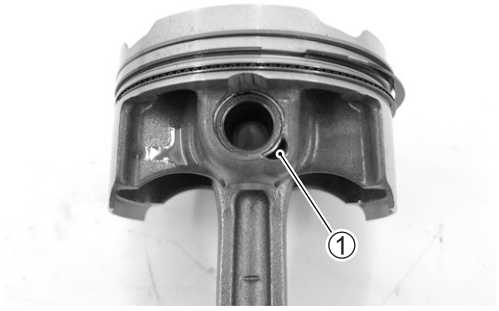


- Install the piston pin circlips ①.

CAUTION

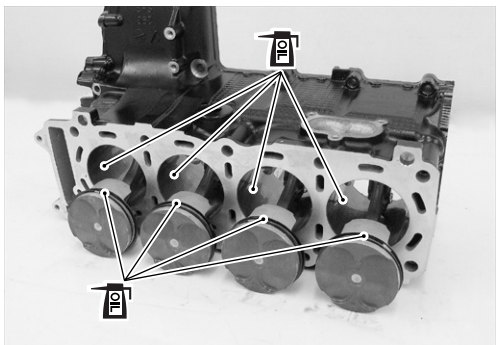
Use new piston pin circlips to prevent circlip failure which will occur with a bend one.

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



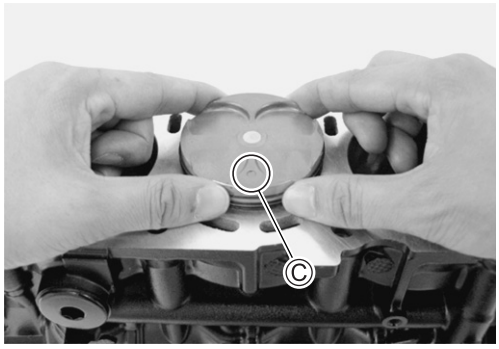
- Apply engine oil to the sliding surface of the pistons and cylinder walls.

NOTE:
Be sure to install the pistons in the cylinders from which they were removed in disassembly, refering to the cylinder numbers, “1” through “4”, scribed on the piston.



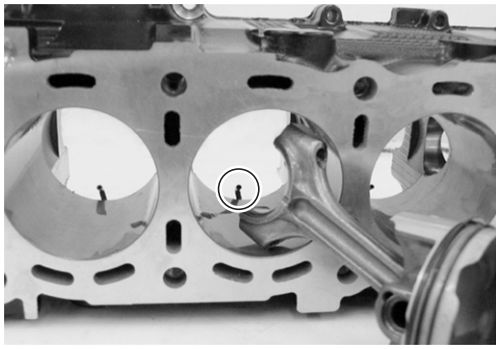
• Install the pistons and conrods into the cylinders from upside.

NOTE:
When installing the pistons, the indent Ⓒ of each piston head must be brought to the exhaust side.



CAUTION

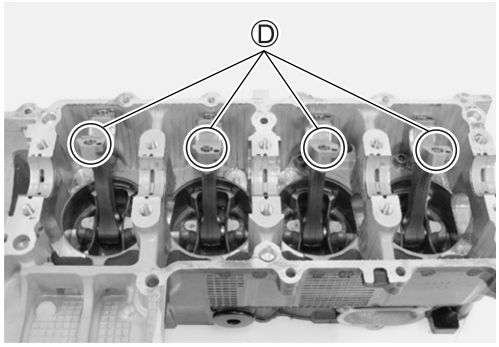
Be careful not to damage the cylinder wall and piston jet by the conrod.



• Check that ID code Ⓓ on each conrod faces intake side.

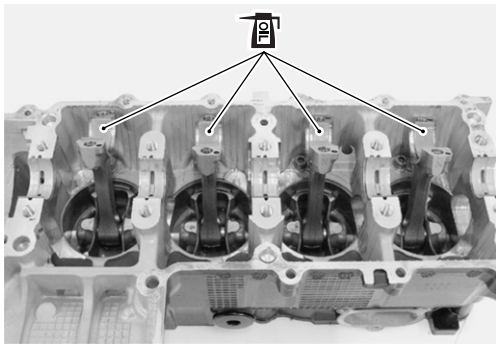
CAUTION

Be sure to clean the conrod big end.



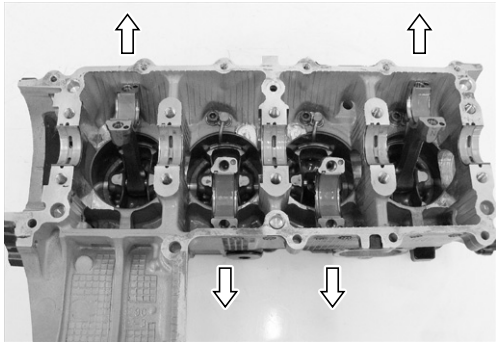
• Apply MOLYBDENUM OIL SOLUTION to the crank pin bearings surface.

MOLYBDENUM OIL SOLUTION

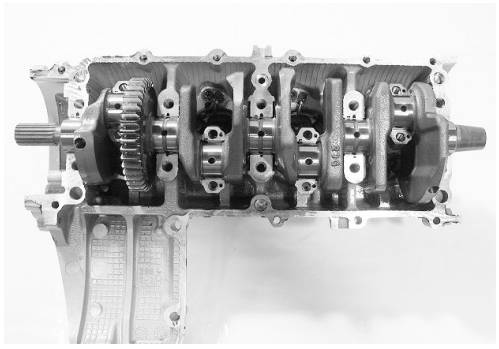


CRANKSHAFT

• Position the No.2 and No.3 conrod big ends on the same side, and the No.1 and No.4 conrod big ends on the opposite side of No.2 and No.3.



- Set the crankshaft to the conrods and upper crankcase.

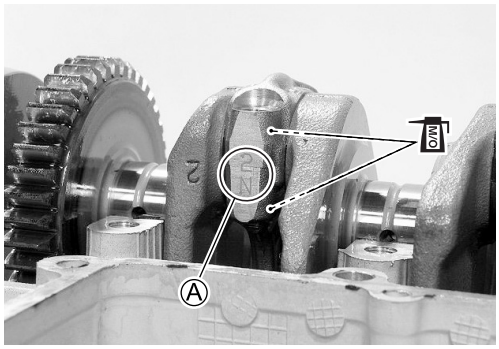


- Apply MOLYBDENUM OIL SOLUTION to the crank pin and bearing surface.

MOLYBDENUM OIL SOLUTION

CAUTION

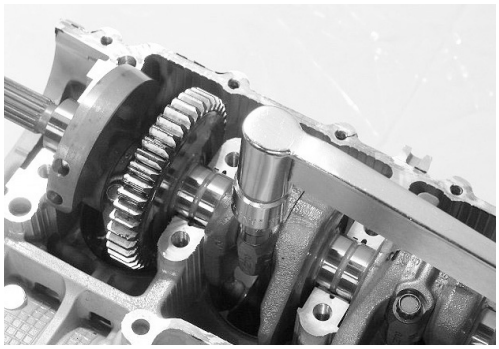
Be sure to clean the conrod big end.



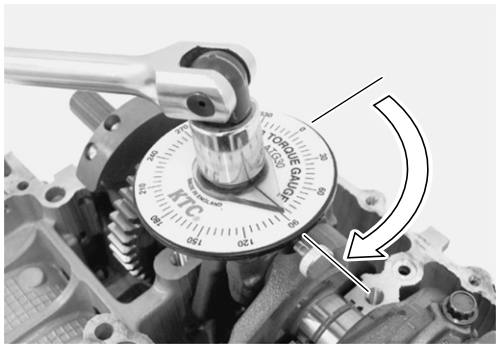
- When fitting the conrod cap, make sure that I.D. code Ⓐ on each conrod faces intake side.

- Apply engine oil to the bearing cap bolts.
- Tighten the bearing cap bolt by using a 10 mm, 12 point socket wrench in the following two steps.

Conrod bearing cap bolt:
Initial: 15 N·m (1.5 kgf-m)
Final : 90° (1/4 turn)

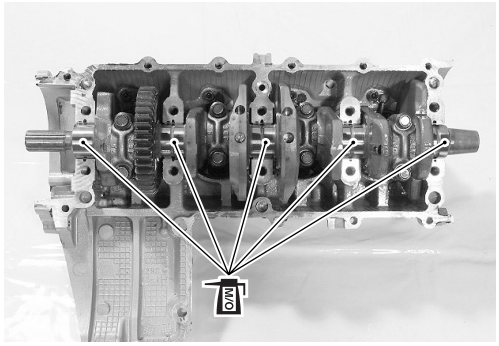


- Apply engine oil to the conrod big end side surfaces.
- Check the conrod movement for smooth turning.



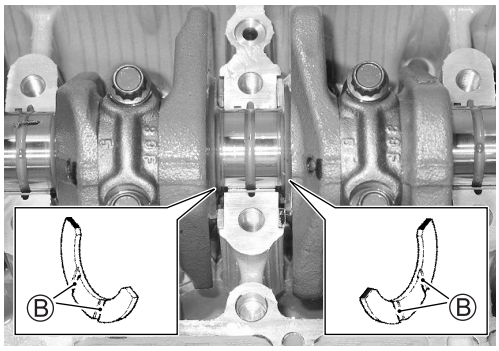
- Apply MOLYBDENUM OIL SOLUTION to each crankshaft journal bearing lightly.

MOLYBDENUM OIL SOLUTION



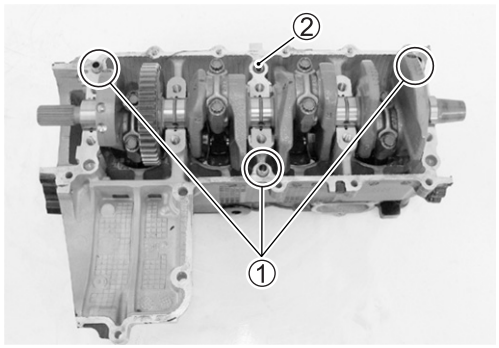
- Insert the right and left thrust bearings with oil groove Ⓑ facing the crank web.

NOTE:
Right thrust bearing has green painting.



CRANKCASE

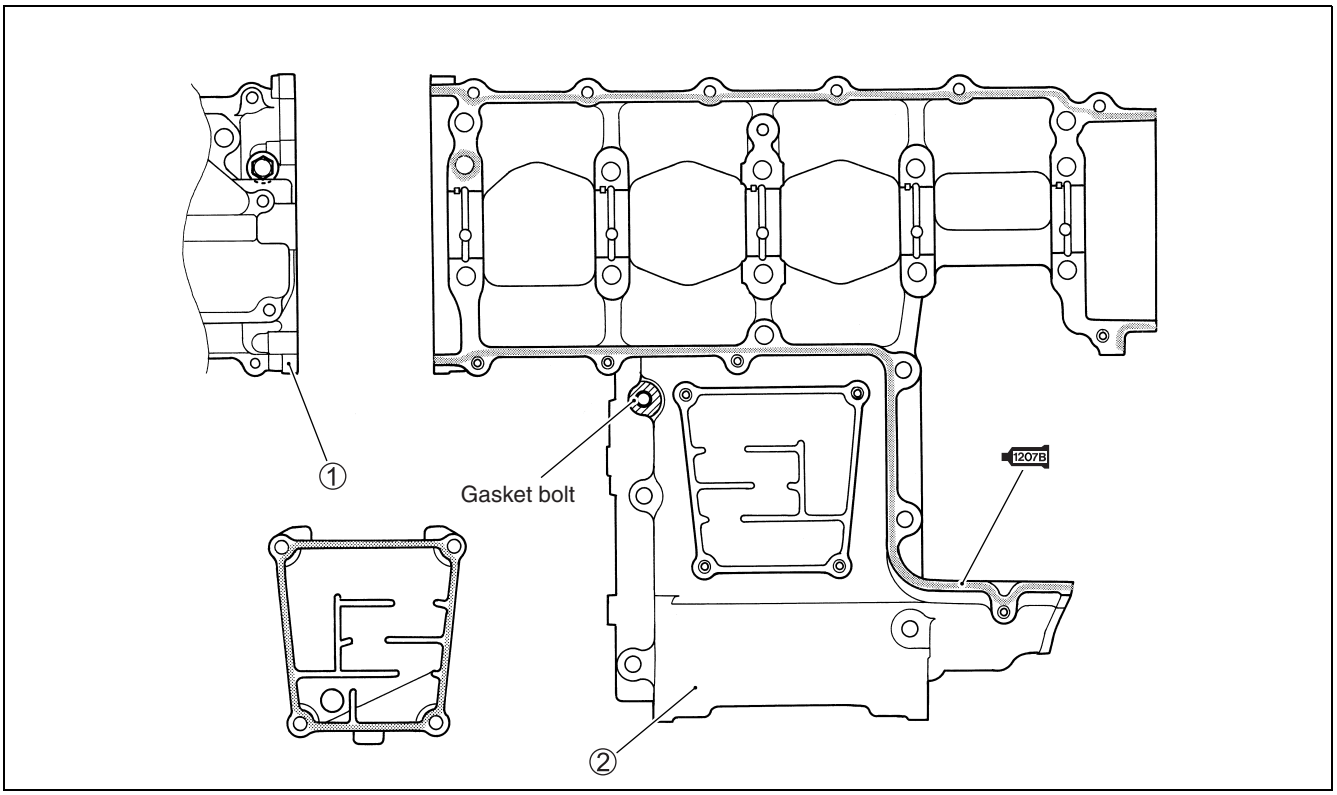
- Clean the mating surfaces of the crankcases.
- Install the dowel pins ① and O-ring ② to the upper crankcase.



• Apply SUZUKI BOND to the mating surface of the middle crankcase.

1207B 99000-31140: SUZUKI BOND "1207B"

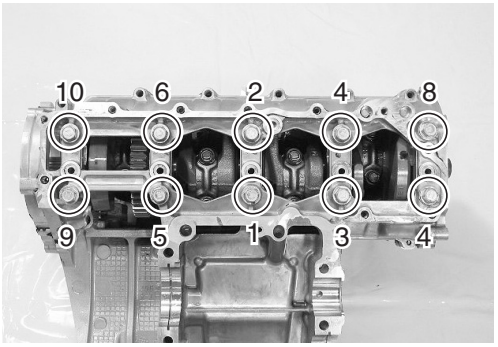
NOTE:
Use of SUZUKI BOND is as follows:
** Make surfaces free from moisture, oil, dust and other foreign materials.*
** Spread on surfaces thinly to form an even layer, and assemble the crankcases within few minutes.*
** Take extreme care not to apply any BOND to the oil hole, oil groove and bearing.*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



①	Lower crankcase
②	Middle crankcase

• Tighten the crankshaft journal bolts (9 mm) 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.

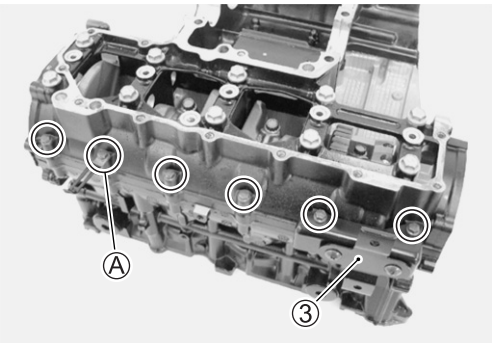
Crankshaft journal bolt: (M9)
Initial: 18 N·m (1.8 kgf-m)
Final : 50°



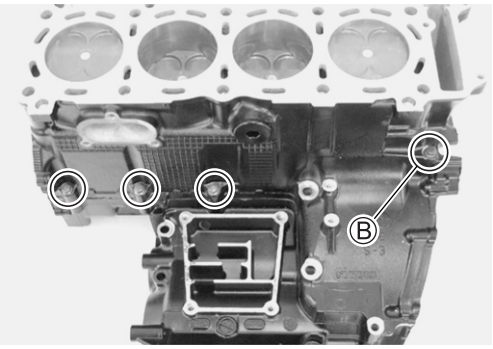
• Install the regulator/rectifier bracket ③ and tighten the other crankcase bolts a little at a time to equalize the pressure.

Crankcase bolt: (M6) Initial: 6 N·m (0.6 kgf-m)
Final : 11 N·m (1.1 kgf-m)

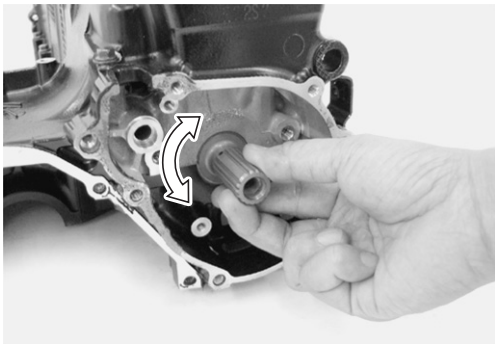
NOTE:
Fit the clamp to the crankcase bolt Ⓐ.



NOTE:
Fit a new gasket to the crankcase bolt Ⓑ.

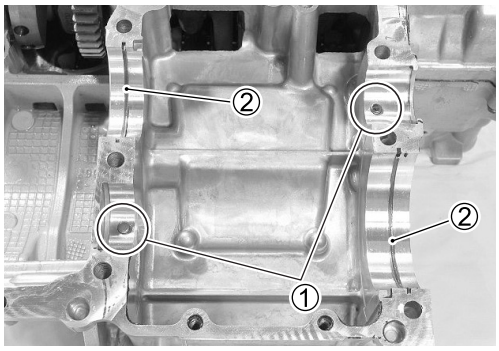


NOTE:
After the crankshaft journal bolts and crankcase bolts have been tightened, check if the crankshaft rotates smoothly.



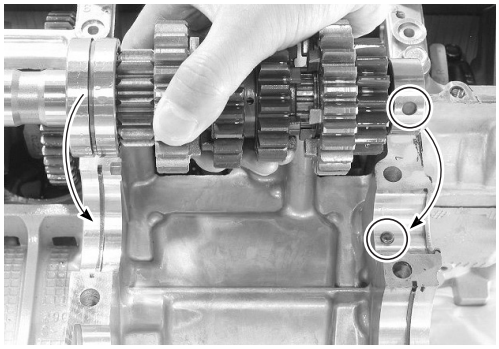
TRANSMISSION

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



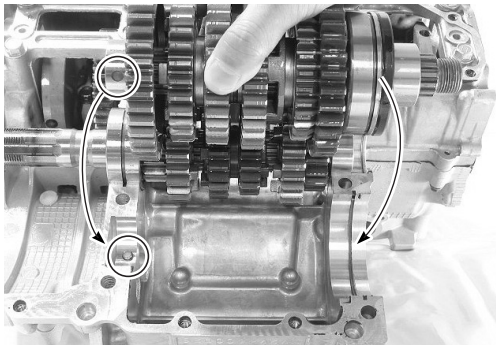
- Install the countershaft assembly on the middle crankcase.

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

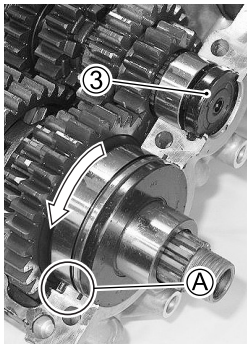


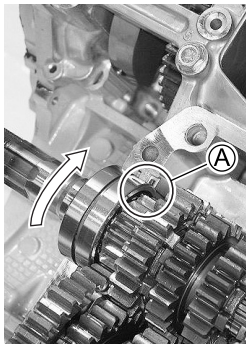
- Install the driveshaft assembly on the middle crankcase.

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



- Install the oil seal ③.
- Turn the bearings to install the bearing dowel pins Ⓐ in the respective positions.

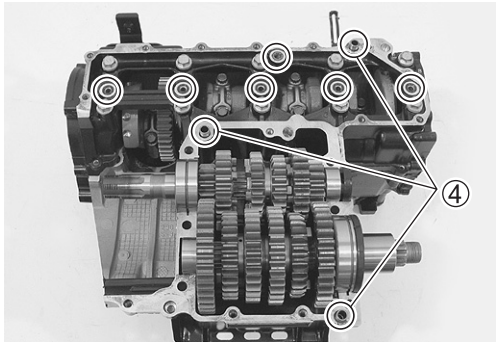




- Install O-rings.
- Install the dowel pins ④.

CAUTION

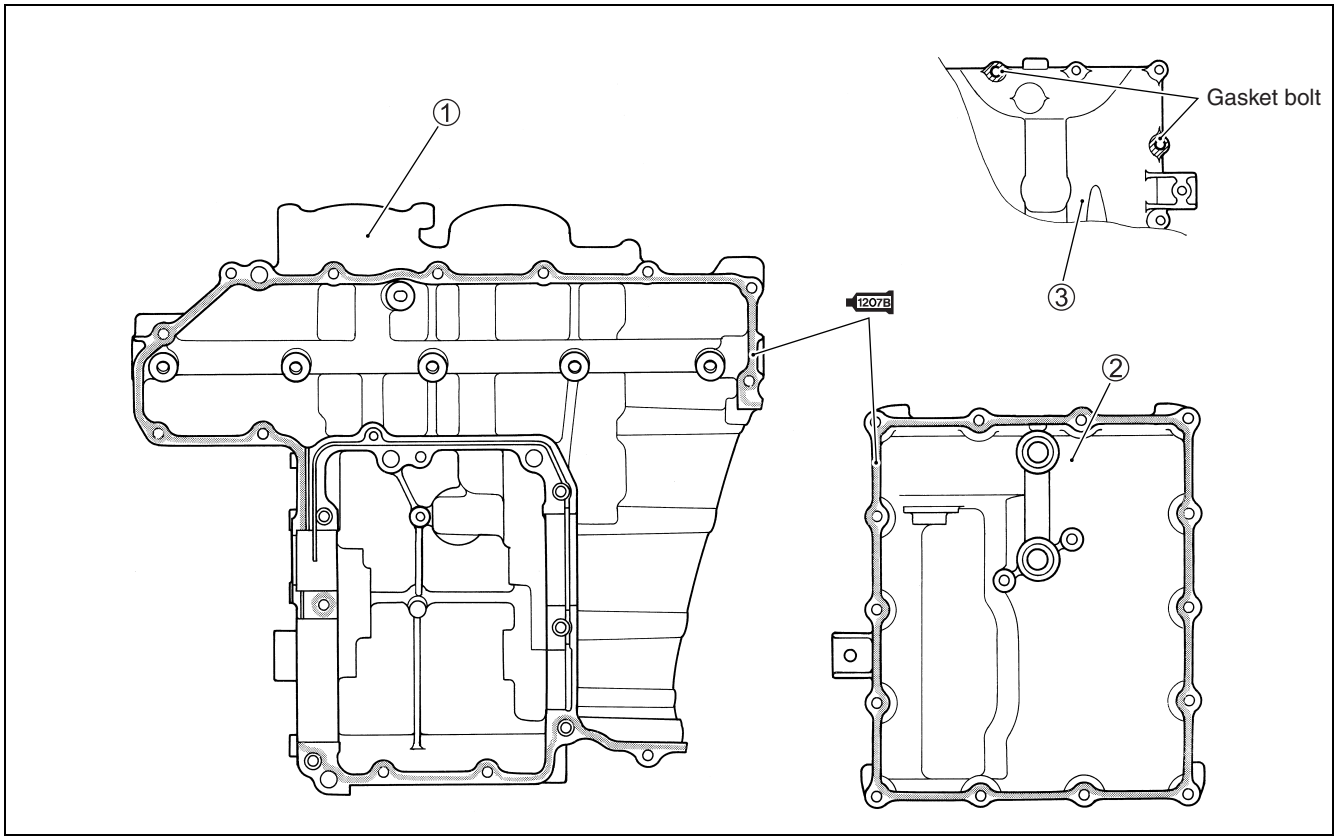
Replace the O-rings with new ones.



• Apply SUZUKI BOND to the mating surface.

1207B 99000-31140: SUZUKI BOND "1207B"

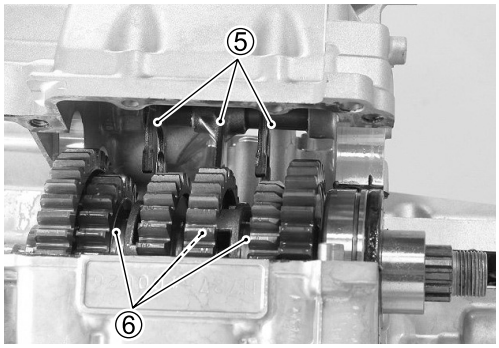
NOTE:
Use of SUZUKI BOND is as follows:
* *Make surfaces free from moisture, oil, dust and other foreign materials.*
* *Spread on surfaces thinly to form an even layer, and assemble the crankcases within few minutes.*
* *Take extreme care not to apply any BOND to the oil hole, oil groove and bearing.*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



①	Lower crankcase
②	Middle crankcase
③	Oil pan

• Match the middle and lower crankcases.

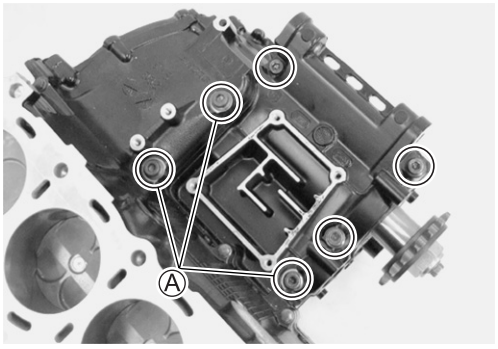
NOTE:
Align the gearshift forks ⑤ with their grooves ⑥.

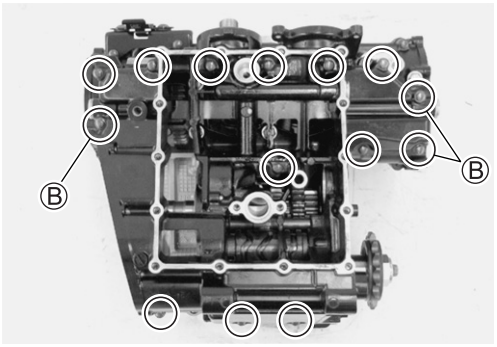


• Tighten the crankcase bolts a little at a time to equalize the pressure.

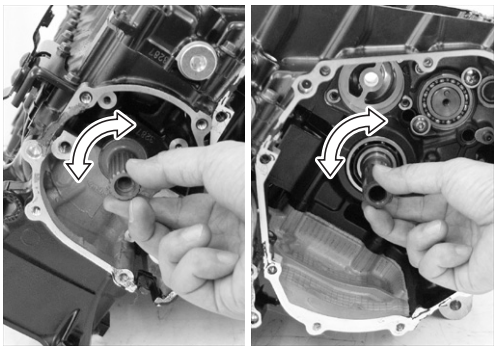
Crankcase bolt: (M6) Initial: 6 N·m (0.6 kgf-m)
Final : 11 N·m (1.1 kgf-m)
(M8) Initial: 15 N·m (1.5 kgf-m)
Final : 26 N·m (2.6 kgf-m)

NOTE:
** Fit new copper washer to the crankcase bolts Ⓐ.*
** Fit new gasket washer to the crankcase bolts Ⓑ.*





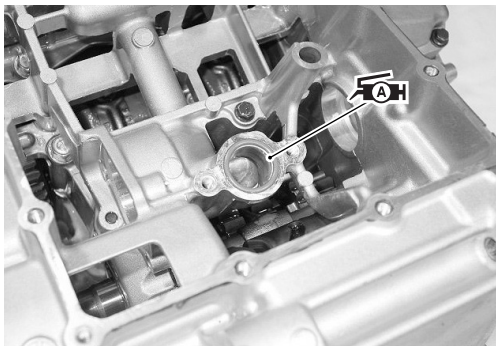
• Check that the driveshaft and countershaft rotate smoothly.



OIL STRAINER

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

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

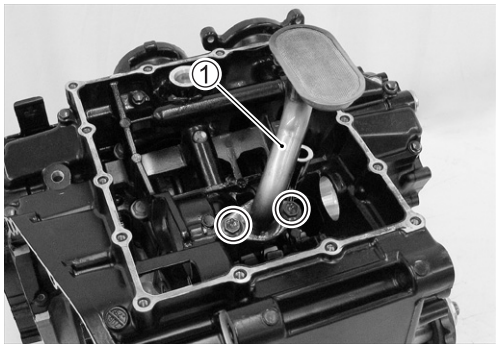


CAUTION

Use new O-ring to prevent oil leakage.

- Install the oil strainer ① as shown and tighten the oil strainer bolts to the specified torque.

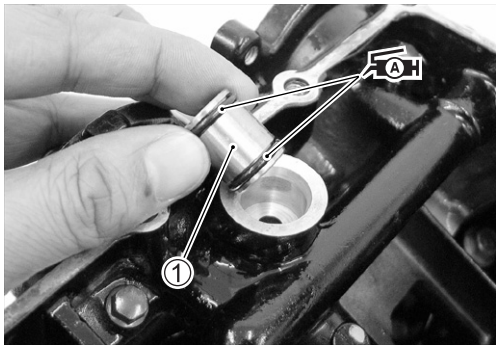
Oil strainer bolt: 10 N·m (1.0 kgf-m)



OIL PRESSURE REGULATOR

- Apply SUZUKI SUPER GREASE "A" to the O-rings.
- Press in the oil pipe ① to the crankcase.

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

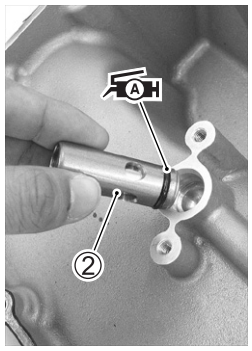


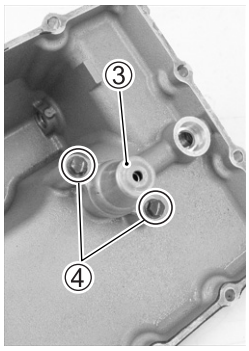
CAUTION

Use new O-ring to prevent oil leakage.

- Apply SUZUKI SUPER GREASE "A" to the O-ring.
- Press in the pipe ② to the oil pan.
- Install the oil pressure regulator case ③ and tighten the bolts ④ to the specified torque.

Oil pressure regulator case bolt ④: 10 N·m (1.0 kgf-m)





OIL PRESSURE SWITCH

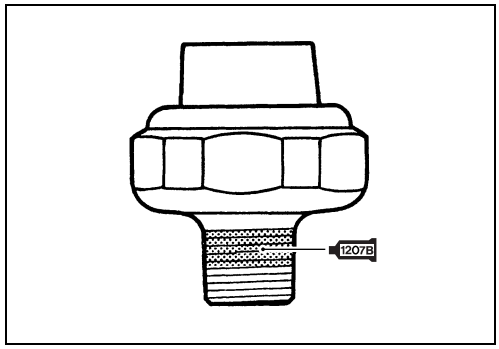
- Apply SUZUKI BOND to the thread part of oil pressure switch and tighten oil pressure switch to the specified torque.

99000-31140: SUZUKI BOND "1207B"

Oil pressure switch: 14 N·m (1.4 kgf-m)

NOTE:

Be careful not to apply SUZUKI BOND to the hole of thread end.



OIL PAN

- Apply SUZUKI BOND to the mating surface. (☞3-75)

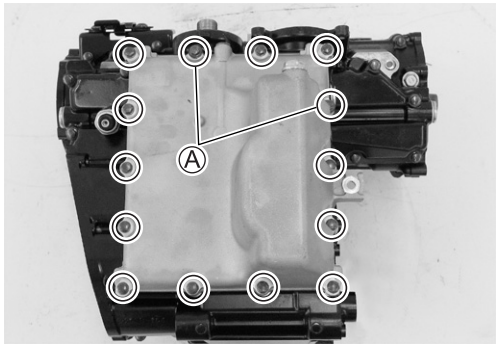
1207B 99000-31140: SUZUKI BOND "1207B"

- Install the oil pan.

NOTE:
Fit the gasket washer to the oil pan bolt Ⓐ.

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

Oil pan bolt: 10 N·m (1.0 kgf-m)



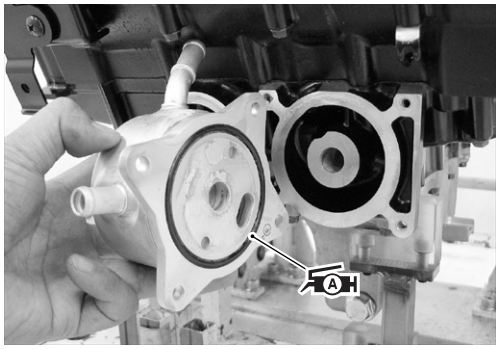
OIL COOLER

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

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

CAUTION

Use new O-ring to prevent oil leakage.

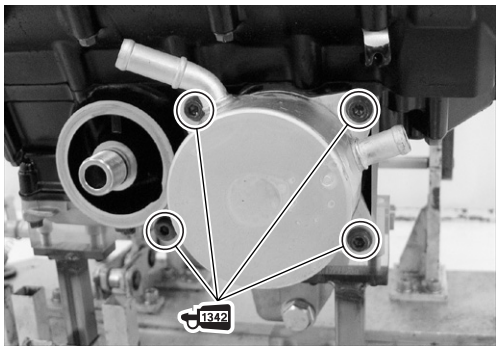


- Apply THREAD LOCK to the oil cooler mounting bolts and install the oil cooler.

1342 99000-32050: THREAD LOCK "1342"

- Tighten the oil cooler mounting bolts to the specified torque.

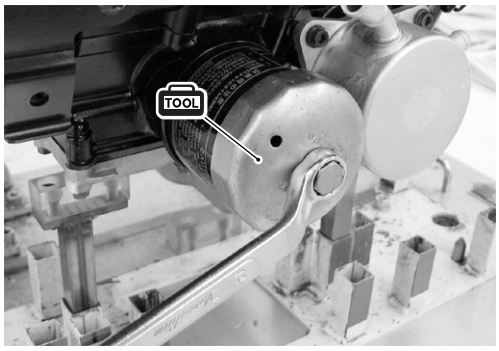
Oil cooler mounting bolt: 10 N·m (1.0 kgf-m)



OIL FILTER

- Install the oil filter with the special tool. (☞2-14)

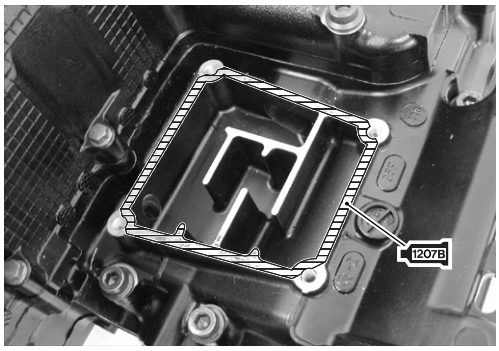
TOOL 09915-40610: Oil filter wrench



CRANKCASE BREATHER COVER

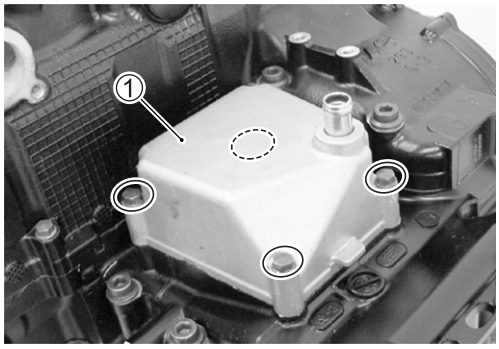
- Apply SUZUKI BOND to the mating surface.

1207B 99000-31140: SUZUKI BOND "1207B"



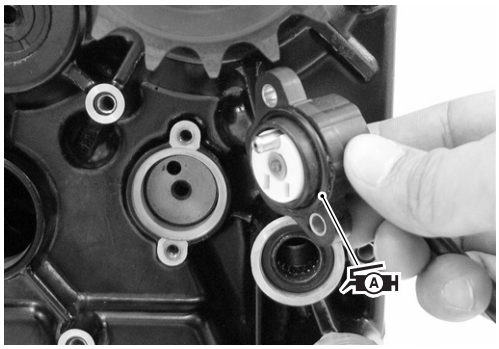
- Install the crankcase breather cover ①.

Crankcase breather cover bolt: 10 N·m (1.0 kgf-m)



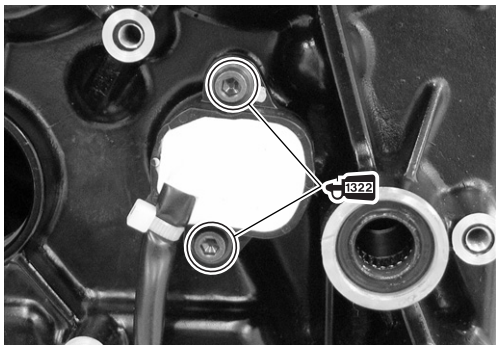
- Apply SUZUKI SUPER GREASE "A" to the O-ring.

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



- Install the gear position switch as shown.
- Apply THREAD LOCK to the gear position switch bolts.

1322 99000-32110: THREAD LOCK SUPER "1322"
(or equivalent thread lock)



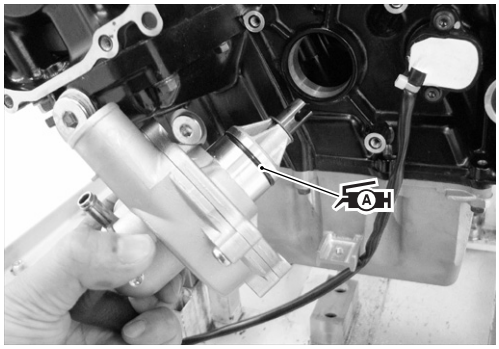
WATER PUMP

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

CAUTION

Use new O-ring to prevent oil leakage.

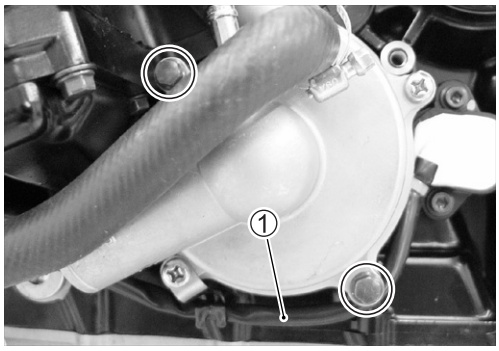
A 99000-25010: SUZUKI SUPER GREASE "A"
(or equivalent grease)



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

Water pump mounting bolt: 10 N·m (1.0 kgf-m)

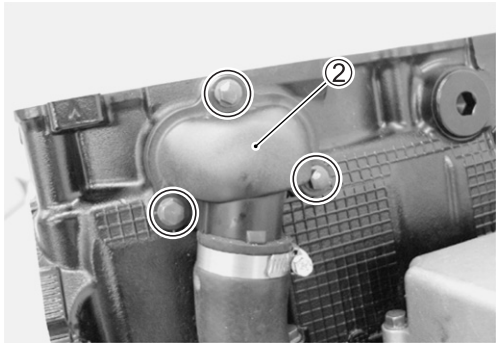
NOTE:
Pass the gear position switch lead wire ① under the water pump lib.



- Apply engine coolant to the O-ring.

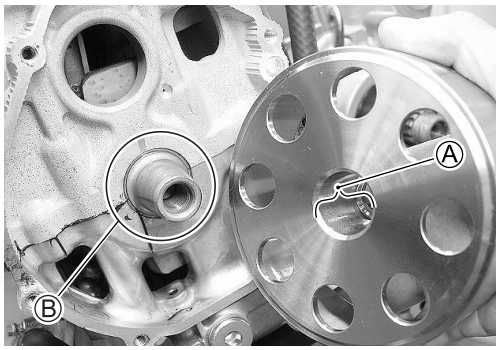
- Install the water inlet cover ②.

Water inlet cover bolt: 10 N·m (1.0 kgf-m)



GENERATOR ROTOR

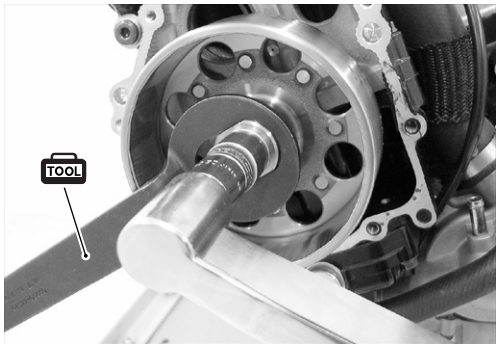
- Degrease the tapered portion Ⓐ of generator rotor and also the crankshaft Ⓑ. Use nonflammable cleaning solvent to wipe off oily or greasy matter and make these surfaces completely dry.



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

09930-44520: Rotor holder

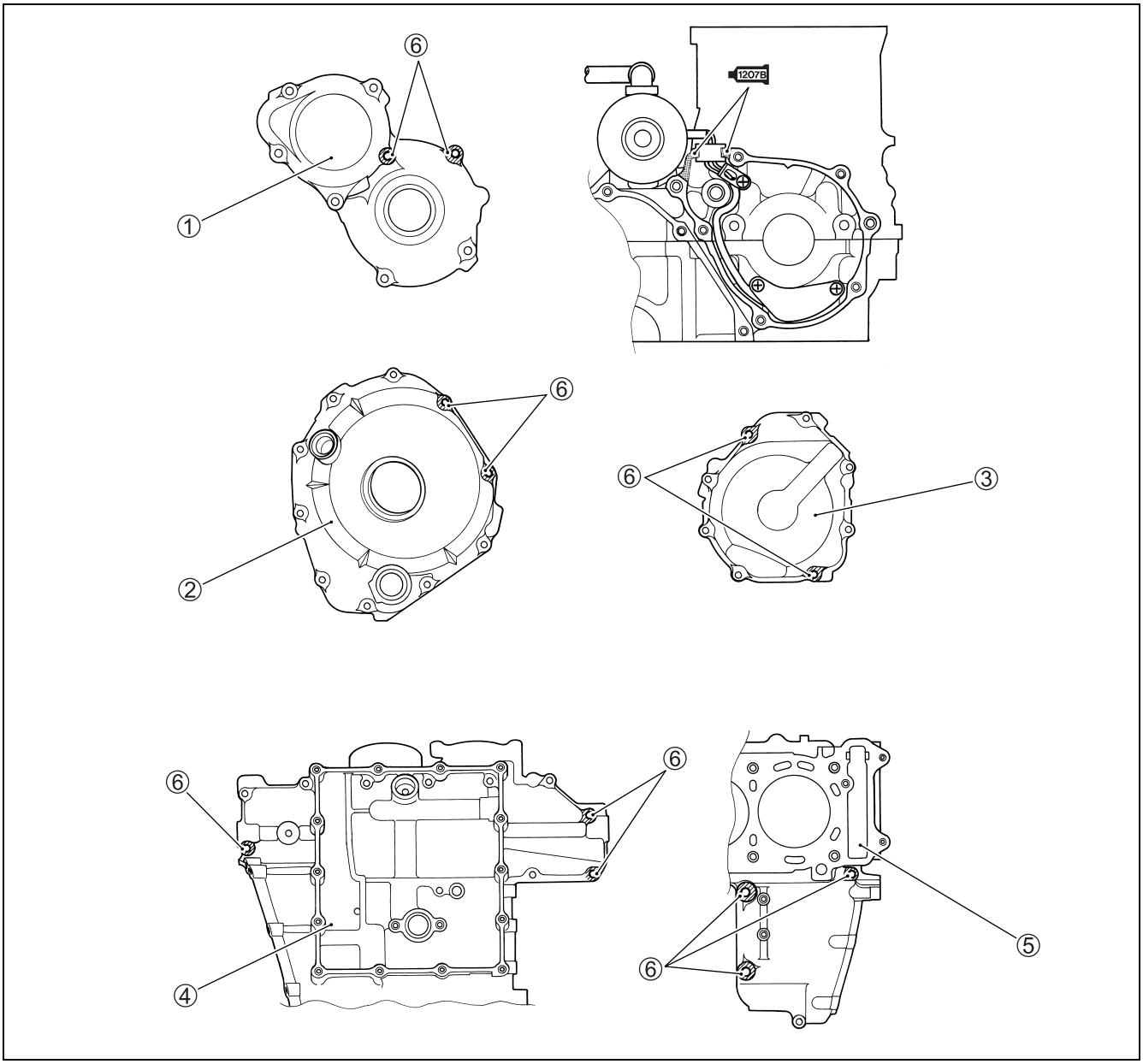
Generator rotor bolt: 120 N·m (12.0 kgf-m)



• Apply SUZUKI BOND to the mating surfaces.

1207B 99000-31140: SUZUKI BOND "1207B"

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

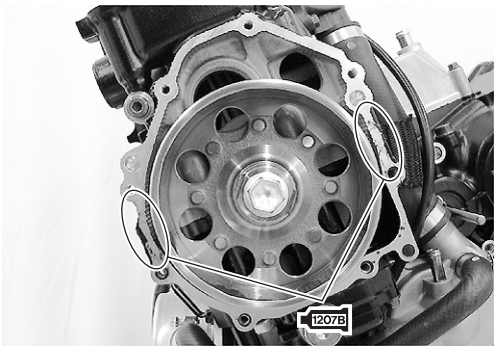


①	Starter clutch cover	③	Magnet cover	⑤	Upper crankcase
②	Clutch cover	④	Lower crankcase	⑥	Gasket bolt

GENERATOR COVER

- Apply SUZUKI BOND lightly to the mating surfaces at the parting line between the upper and middle crankcases as shown.

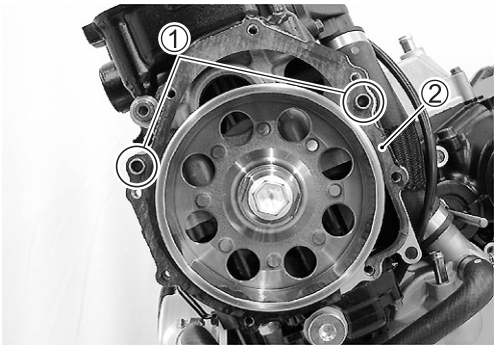
1207B 99000-31140: SUZUKI BOND "1207B"



- Install the dowel pins ① and new gasket ②.

CAUTION

Use new gasket to prevent oil leakage.

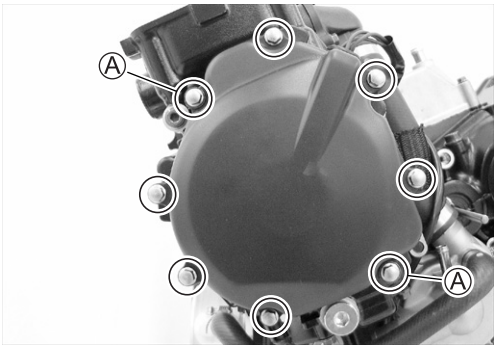


- Install the generator cover and tighten the generator cover bolts to the specified torque.

Generator cover bolt: 10 N·m (1.0 kgf-m)

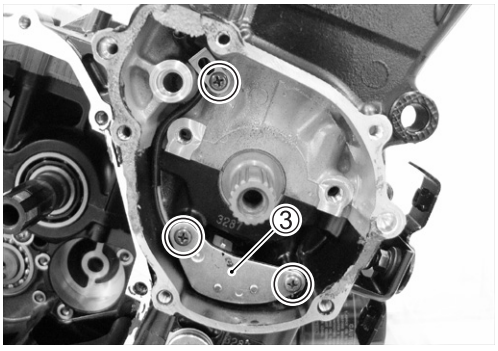
⚠ WARNING

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



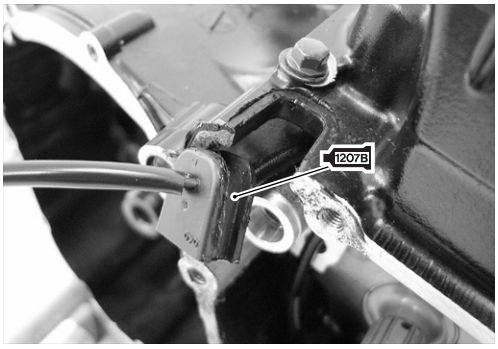
NOTE:
Fit the gasket washer to the bolts Ⓐ.

- Install the CKP sensor ③.



- Apply SUZUKI BOND lightly to the groove of CKP sensor lead wire gromet.

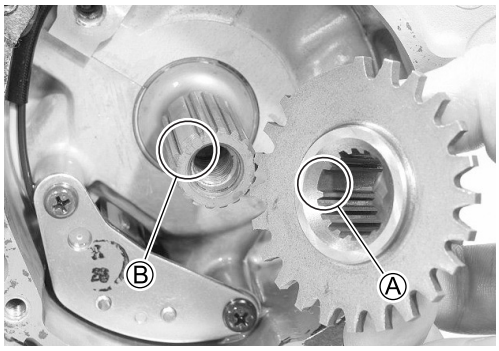
1207B 99000-31140: SUZUKI BOND "1207B"



CAM CHAIN DRIVE SPROCKET

- Install the cam chain drive sprocket onto the crankshaft.

NOTE:
When installing the cam chain drive sprocket, align the wide spline teeth Ⓐ and Ⓑ.

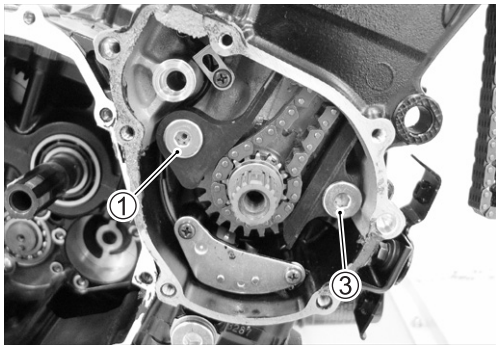


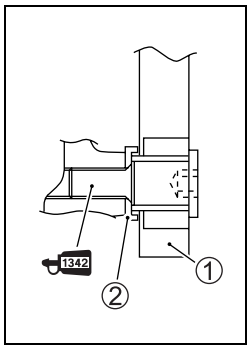
CAM CHAIN TENSIONER AND CAM CHAIN GUIDE

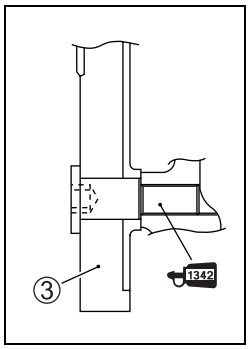
- Install the cam chain.
- Apply a small quantity of THREAD LOCK to the cam chain tensioner bolt and cam chain guide bolt.
- Install the cam chain tensioner ① along with the washer ②.
- Install the cam chain guide ③.

1342 99000-32050: THREAD LOCK "1342"

Cam chain tensioner bolt: 10 N·m (1.0 kgf-m)
Cam chain guide bolt: 10 N·m (1.0 kgf-m)



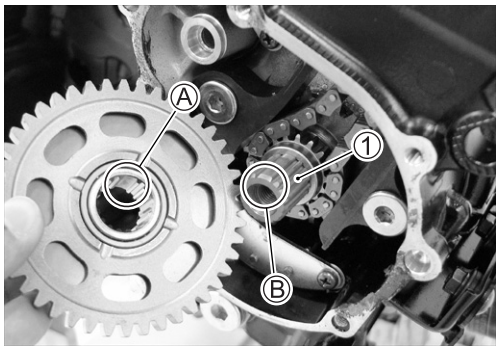




STARTER CLUTCH

- Install the washer ①.
- Install the starter clutch assembly onto the crankshaft.

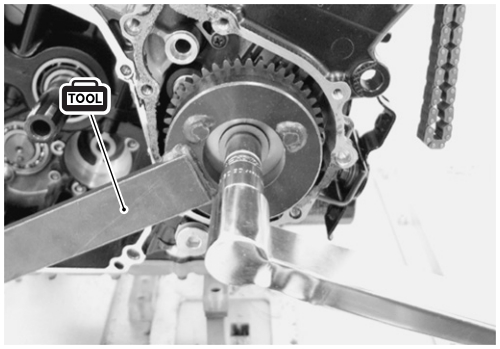
NOTE:
When installing the starter clutch assembly, align the wide spline teeth Ⓐ and Ⓑ.



- Install the starter clutch bolt with the washer.
- Hold the starter clutch with the special tool and tighten its bolt to the specified torque.

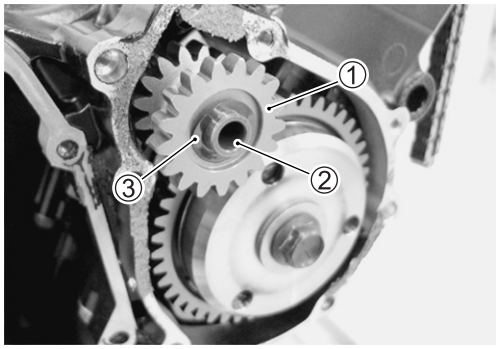
TOOL 09920-34830: Starter clutch holder

Starter clutch bolt: 54 N·m (5.4 kgf-m)



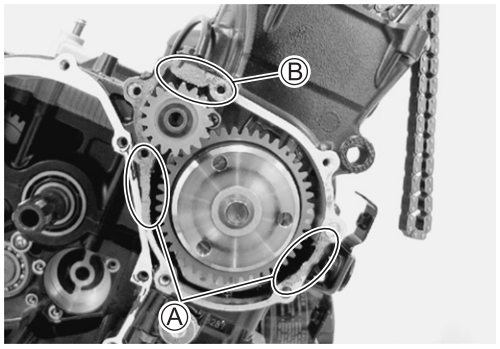
STARTER IDLE GEAR

- Install the starter idle gear No.2 ①, its shaft ② and concaved washer ③.



- Apply SUZUKI BOND lightly to the mating surfaces Ⓐ at the parting line between the upper and middle crankcases and surface Ⓑ as shown.

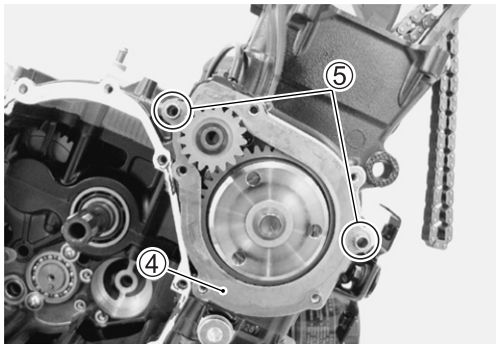
1207B 99000-31140: SUZUKI BOND "1207B"



- Install new gasket ④ and dowel pins ⑤.

CAUTION

Use a new gasket to prevent oil leakage.



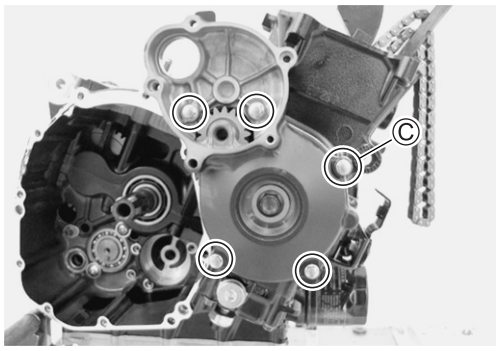
• Install the starter clutch cover and tighten its bolt as shown.

NOTE:
Fit a new gasket washer to the starter clutch cover bolt Ⓒ as shown.

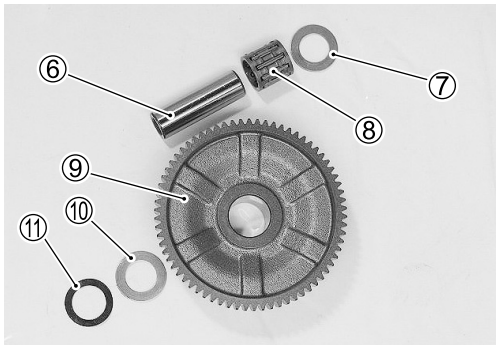
CAUTION

Use new gasket washer to prevent oil leakage.

Starter clutch cover bolt: 10 N·m (1.0 kgf-m)



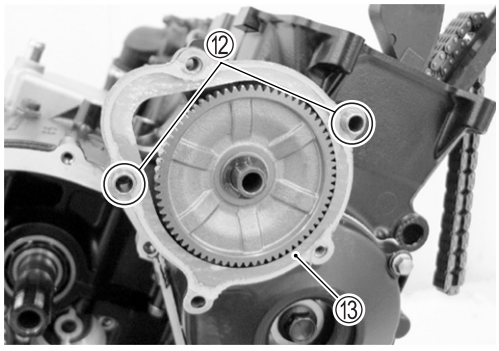
• Install the starter idle gear No.1 shaft ⑥, thrust washer ⑦, bearing ⑧, starter idle gear No.1 ⑨, washer ⑩, and concaved washer ⑪.



• Install the dowel pins ⑫ and new gasket ⑬.

CAUTION

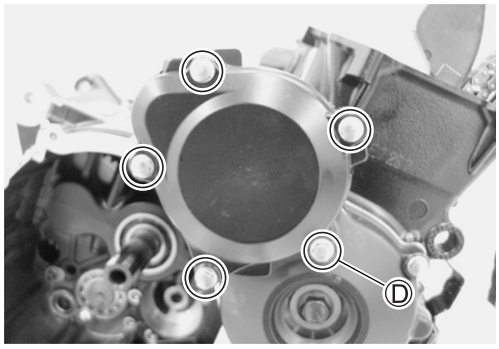
Use a new gasket to prevent oil leakage.



• Install the starter idle gear cover and tighten its bolts to the specified torque.

Starter idle gear cover bolt: 10 N·m (1.0 kgf-m)

NOTE:
Fit the gasket washer to the bolt Ⓓ.



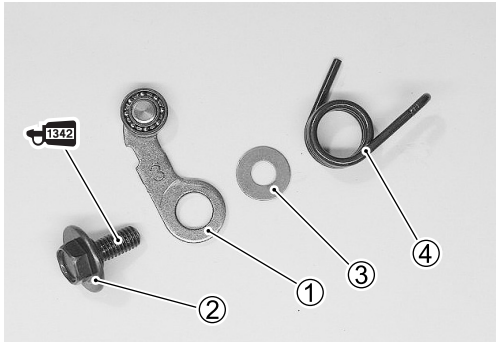
GEARSHIFT SYSTEM

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

NOTE:
Apply a small quantity of THREAD LOCK to the gearshift cam stopper bolt ② and tighten it to the specified torque.

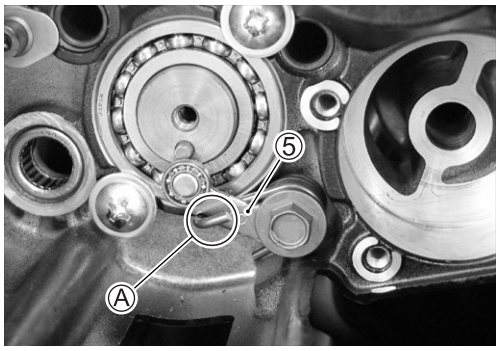
1342 99000-32050: THREAD LOCK "1342"

Gearshift cam stopper bolt: 10 N·m (1.0 kgf-m)



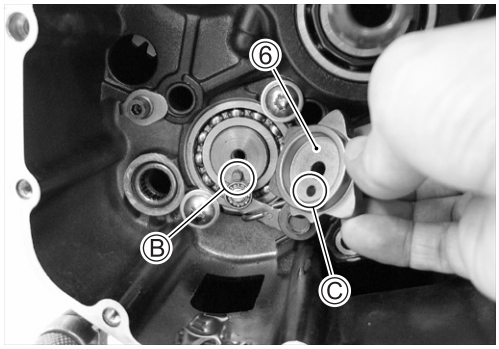
NOTE:
Hook the return spring end Ⓐ to the stopper ⑤.

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



- Install the gearshift cam stopper plate ⑥.

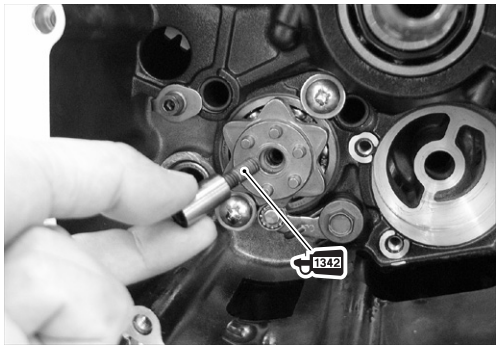
NOTE:
Align the gearshift cam pin Ⓑ with the gearshift cam stopper plate hole Ⓒ.



- Apply a small quantity of THREAD LOCK to the gearshift cam stopper plate bolt and tighten it to the specified torque.

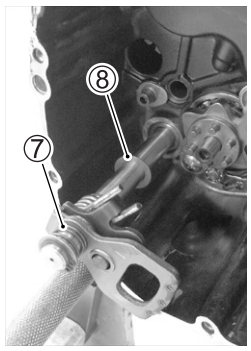
1342 99000-32050: THREAD LOCK "1342"

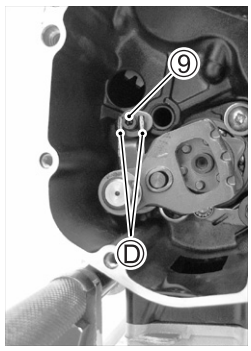
Gearshift cam stopper plate bolt: 13 N·m (1.3 kgf-m)



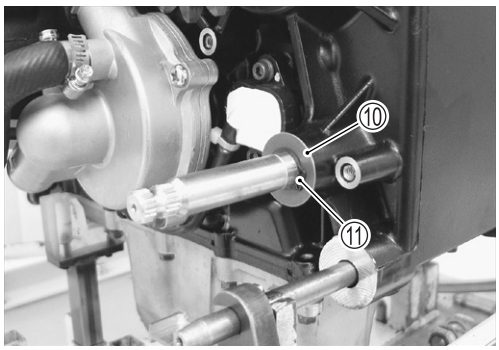
- Install the gearshift shaft assembly ⑦ and washer ⑧ as shown.

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





- Install the washer ⑩ and snap ring ⑪.



OIL PUMP

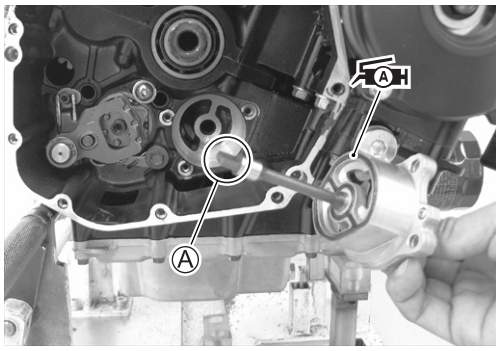
- Install the O-ring to the oil pump and apply SUZUKI SUPER GREASE "A" to it.

CAUTION

Use new O-ring to prevent oil leakage.

NOTE:
Set the oil pump shaft end Ⓐ to the water pump shaft.

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

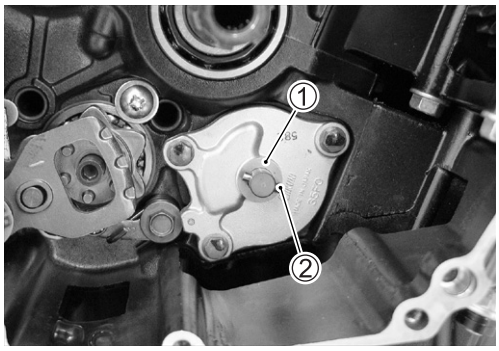


- Install the oil pump with the oil pump mounting bolts and then tighten them to the specified torque.

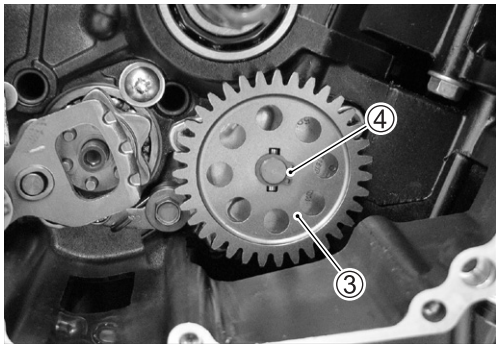
Oil pump mounting bolt: 10 N·m (1.0 kgf-m)

- Install the washer ① and pin ②.

NOTE:
Be careful not to drop the washer ① and pin ② into the crankcase.



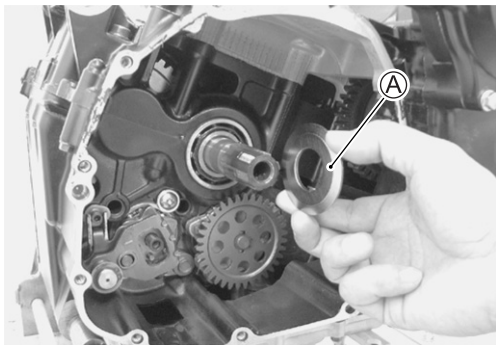
- Install the oil pump driven gear ③.
- Install the snap ring ④.



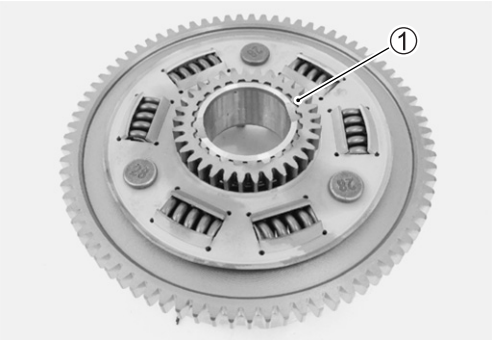
CLUTCH

- Install the thrust washer onto the countershaft.

NOTE:
The chamfer side Ⓐ of thrust washer faces inner side.



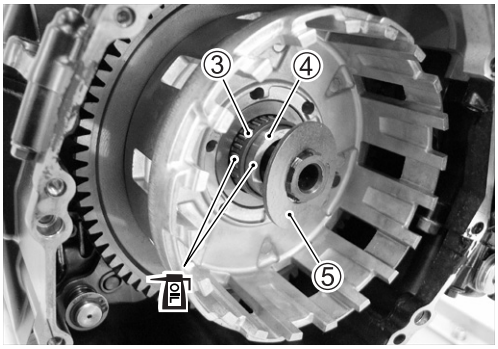
- Install the oil pump drive gear ① to the primary driven gear assembly.



- Install the primary driven gear assembly.

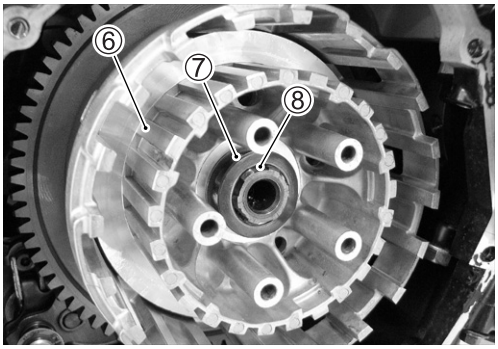
NOTE:
Be sure to engage the oil pump driven gear with drive gear and primary driven gear with drive gear.

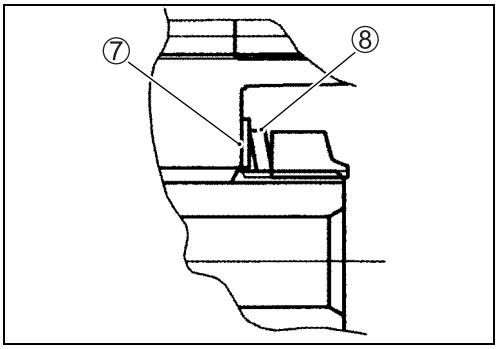
- Install the bearing ③ and spacer ④ and apply engine oil to them.
- Install the thrust washer ⑤.



- Install the clutch sleeve hub ⑥ onto the countershaft.
- Install the washer ⑦ and spring washer ⑧.

NOTE:
The convex side of spring washer ⑧ faces outside.



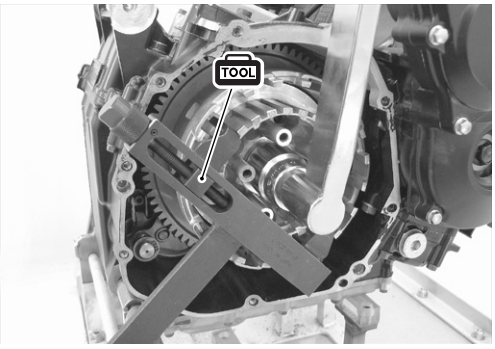


- Hold the clutch sleeve hub with the special tool.

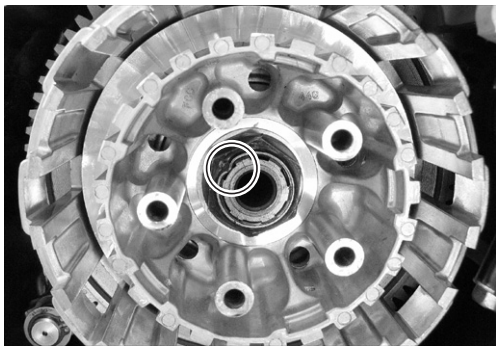
TOOL 09920-53740: Clutch sleeve hub holder

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

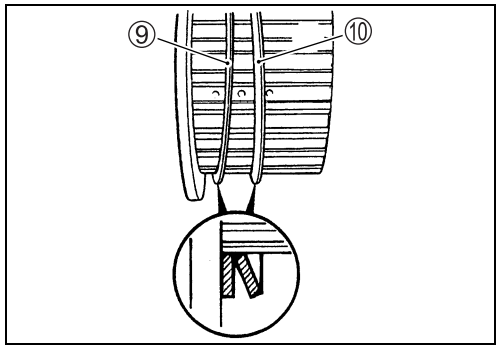
Clutch sleeve hub nut: 150 N·m (15.0 kgf-m)



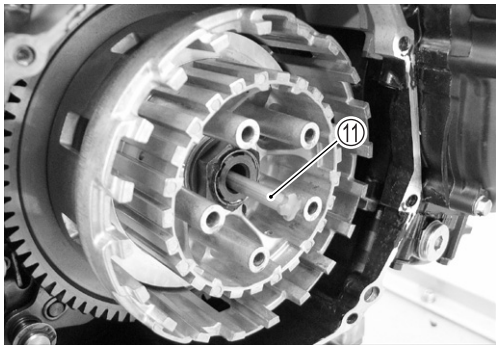
- Lock the clutch sleeve hub nut with a center punch.



- Install the spring washer seat ⑨ and spring washer ⑩ onto the clutch sleeve hub correctly.

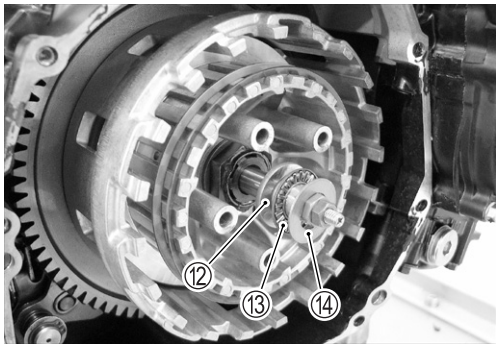


- Install the clutch push rod ⑪ into the countershaft.



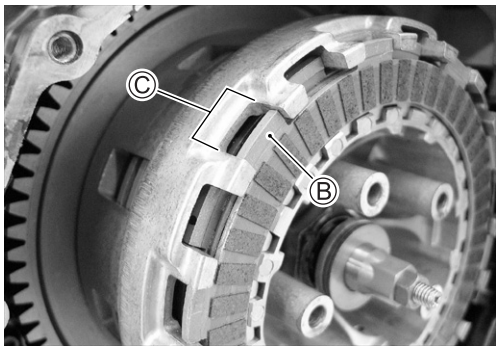
- Install the clutch push piece ⑫, bearing ⑬ and thrust washer ⑭ to the countershaft.

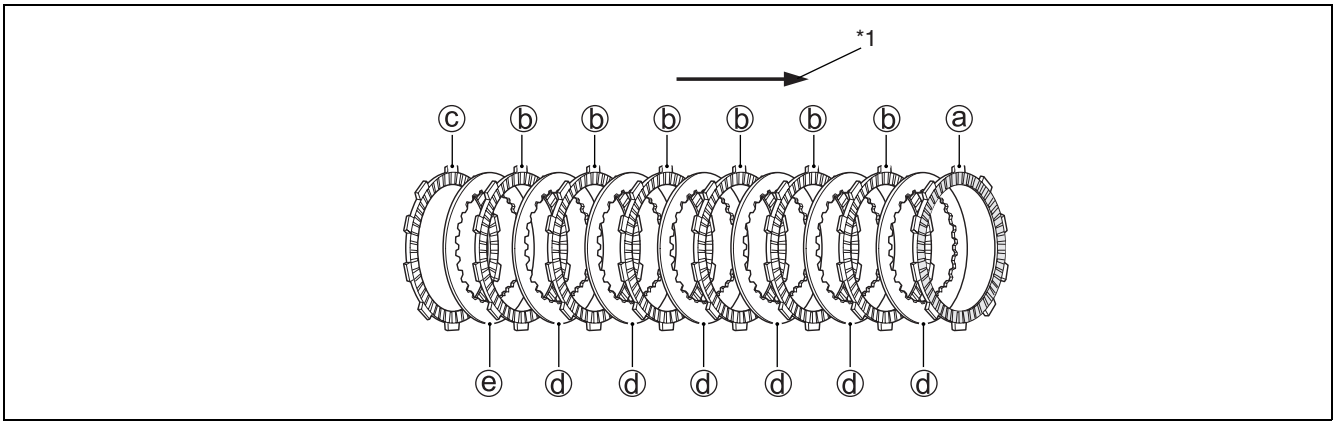
NOTE:
Thrust washer ⑭ is located between the pressure plate and bearing ⑬.



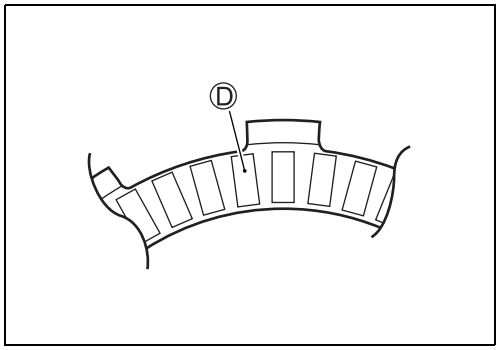
- Insert the clutch drive plates and driven plates one by one into the clutch sleeve hub in the prescribed order.

NOTE:
Insert the outermost drive plate claws Ⓑ to the other slits Ⓒ of clutch housing as shown.





*1: Direction of outside
DRIVE PLATE:
ⓐ No.2 Drive plate...1 pc [48 friction pieces/I.D. 101 mm]
ⓑ No.1 Drive plate...6 pcs [40 friction pieces/I.D. 101 mm]
ⓒ No.3 Drive plate...1 pc [48 friction pieces/I.D. 108 mm]
Ⓓ Friction piece



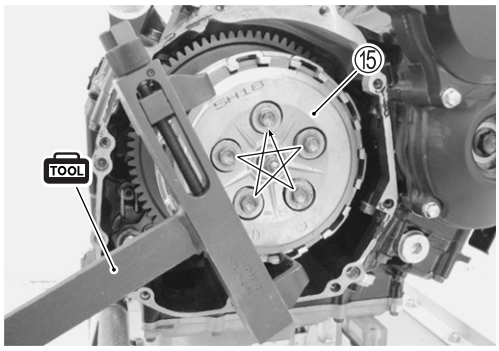
NOTE:
No.2 and No.3 drive plates can be distinguished by the inside diameter.

DRIVEN PLATE:
ⓓ No.1 Driven plate (Thickness: 2.6 mm)...5-7 pcs
ⓔ No.2 Driven plate (Thickness: 2.3 mm)...0-2 pcs (ⓓ + ⓔ = Total 7 pcs)

- Install the pressure plate ⑮.
- Install the clutch springs.
- Hold the clutch housing with the special tool.

CAUTION

Be careful not to damage the clutch housing or clutch plates.



TOOL 09920-53740: Clutch sleeve hub holder

- Tighten the clutch spring set bolts to the specified torque.

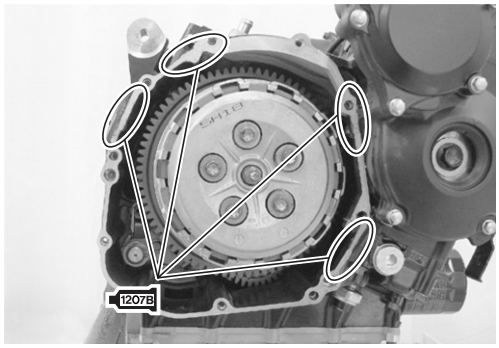
Clutch spring set bolt: 10 N·m (1.0 kgf-m)

NOTE:
Tighten the clutch spring set bolts diagonally.

CLUTCH COVER

- Apply SUZUKI BOND lightly to the mating surfaces at the parting line between the upper, middle and lower crankcases as shown.

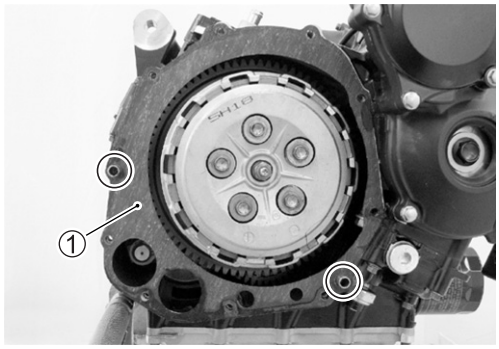
1207B 99000-31140: SUZUKI BOND "1207B"



- Install the dowel pins and gasket ①.

CAUTION

Use new gasket to prevent oil leakage.



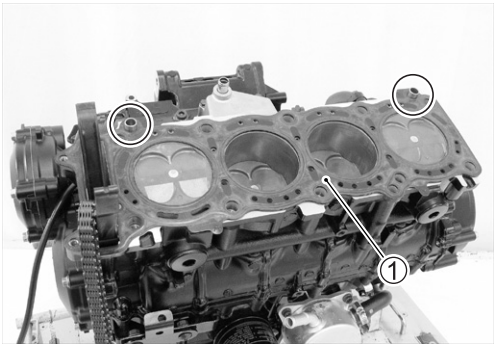
- Install the clutch cover and tighten its bolts to the specified torque.

Clutch cover bolt: 10 N·m (1.0 kgf-m)

NOTE:
** Fit the clamp to the bolt Ⓐ as shown.*
** Fit the gaskets to the bolts Ⓑ as shown.*

CYLINDER HEAD

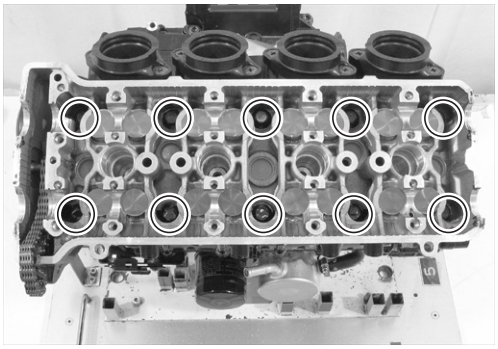
- Fit the dowel pins ① and new cylinder head gasket ② to the cylinder.



CAUTION

Use new gasket to prevent gas leakage.

- Place the cylinder head on the cylinder.



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

- Tighten the cylinder head bolts (M10) in the following four-step.

Step 1:
- Tighten the cylinder head bolts to the specified torque with a torque wrench sequentially and diagonally.

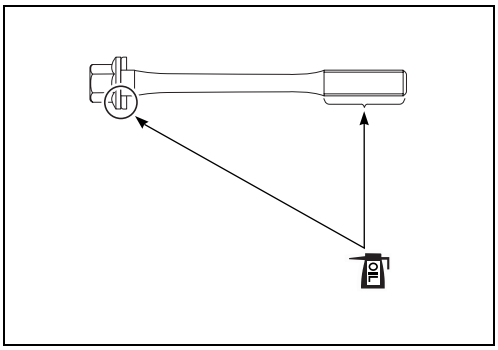
Step 2:
- Loosen all the cylinder head bolts diagonally.

Step 3:
- Retighten the cylinder head bolts to the specified torque with a torque wrench sequentially and diagonally.

Step 4:
- Tighten the cylinder head bolts to the specified angles diagonally with an angular torque gauge.

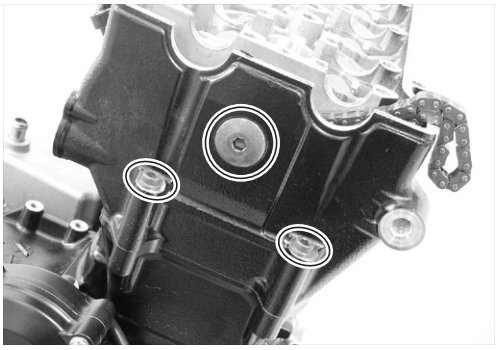
Cylinder head bolt (M10): Step 1/Step 3: 31 N·m (3.1 kgf-m)
Final Step: 60°

NOTE:
Apply engine oil to the washers and thread portion of the bolts before installing the cylinder head bolts.



- Tighten the cylinder head bolts to the specified torque.

Cylinder head bolt (M6): 10 N·m (1.0 kgf-m)
Cylinder head side face bolt: 14 N·m (1.4 kgf-m)

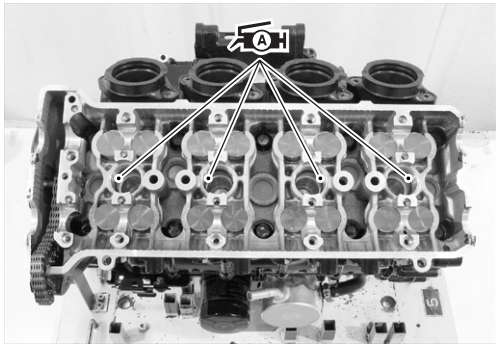


- Apply SUZUKI SUPER GREASE "A" to the O-rings and install them into the cylinder head.

CAUTION

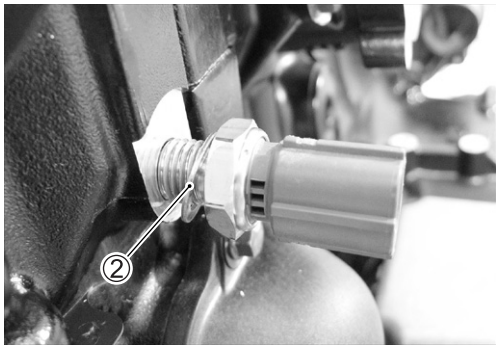
Replace the O-rings with new ones.

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



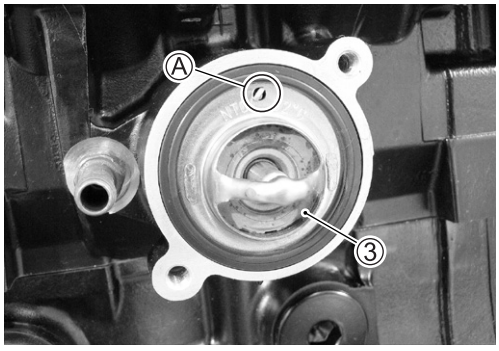
- Fit the gasket ② and tighten the ECT sensor.

ECT sensor: 18 N·m (1.8 kgf-m)



- Install the thermostat ③.

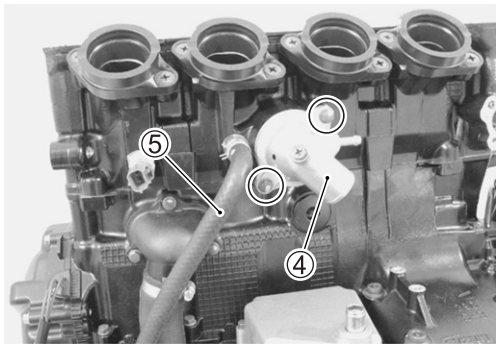
NOTE:
The jiggle valve Ⓐ of thermostat faces upside.



- Install the thermostat cover ④.

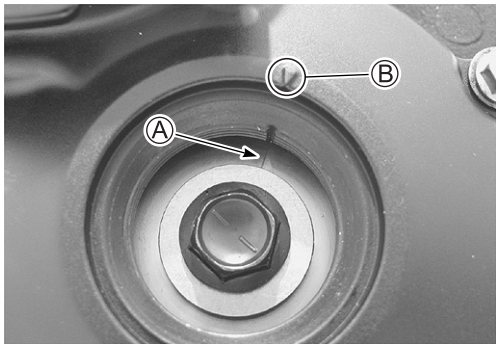
Thermostat cover bolt: 10 N·m (1.0 kgf-m)

- Install the water hose ⑤. (☞10-23)



CAMSHAFT

- Turn the crankshaft clockwise with the box wrench and align the line Ⓐ on the starter clutch with the index mark Ⓑ of valve timing inspection hole while keeping the cam chain pulled upward.



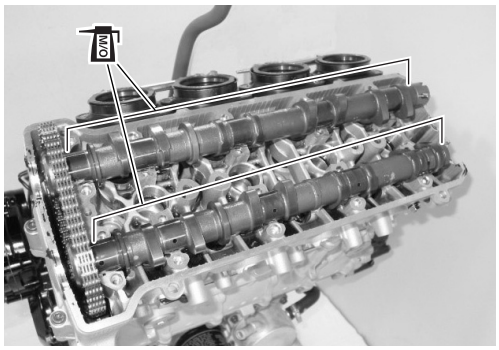
CAUTION

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

CAUTION

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

- The camshafts are identified by the embossed letters.
- Before replacing the camshafts on cylinder head, apply MOLYBDENUM OIL SOLUTION to their journals and cam faces.
- Apply MOLYBDENUM OIL SOLUTION to the camshaft journal holders.

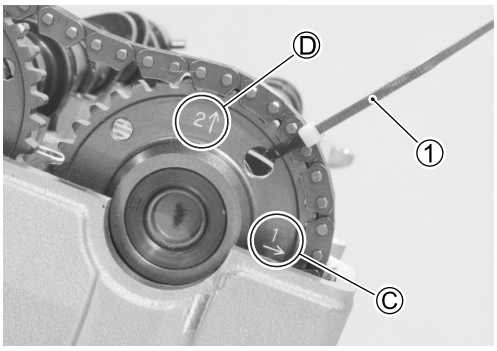


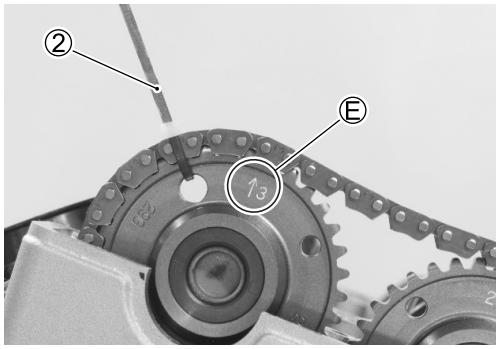
MOLYBDENUM OIL SOLUTION

NOTE:

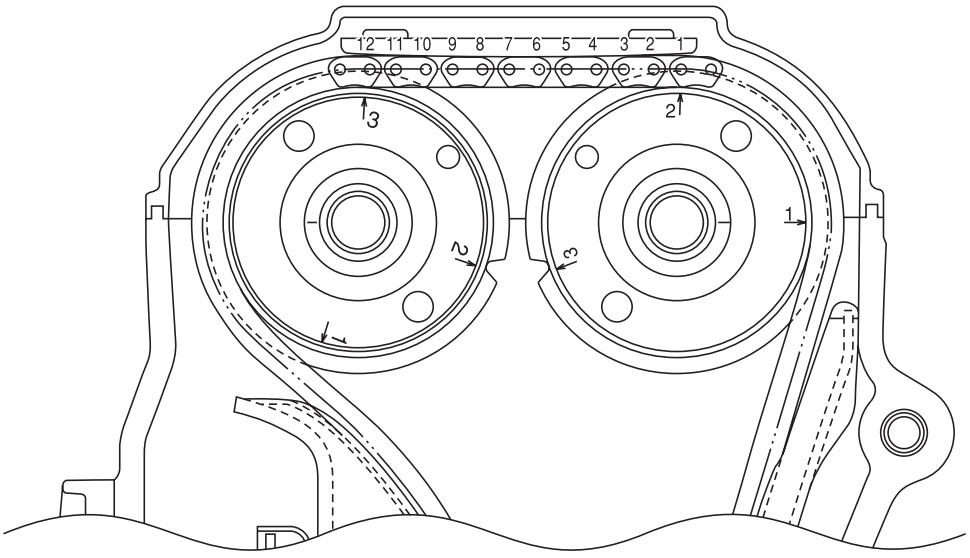
Before installing the camshaft, check that the tappets are installed correctly.

- Pull the cam chain lightly.
- The exhaust camshaft sprocket has an arrow marked “1” Ⓒ. Turn the exhaust camshaft so that the arrow is aligned with the gasket surface of the cylinder head.
- Engage the cam chain with the exhaust camshaft sprocket.
- Bind the cam chain and sprocket with a proper wire clamp ① to prevent the cam chain disengagement while installing the camshaft journal holders.
- The other arrow marked “2” Ⓓ should now be pointing straight up. Starting from the roller pin that is directly above the arrow marked “2” Ⓓ, count out 12 roller pins (from the exhaust camshaft side going towards the intake camshaft side).
- Engage the 12 roller pin Ⓔ on the cam chain with the arrow marked “3” on the intake sprocket.
- Bind the cam chain and sprocket with a proper wire clamp ② to prevent the cam chain disengagement while installing the camshaft journal holders.

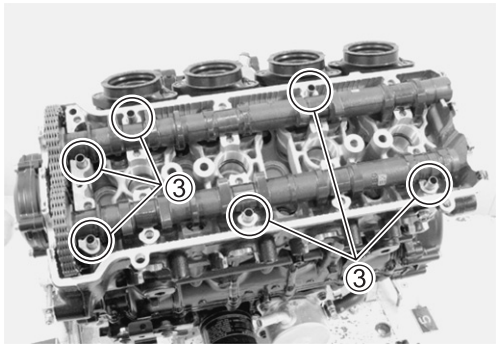




NOTE:
The cam chain should now be on all three sprockets. Be careful not to move the crankshaft until the camshaft journal holders and cam chain tension adjuster are secured.



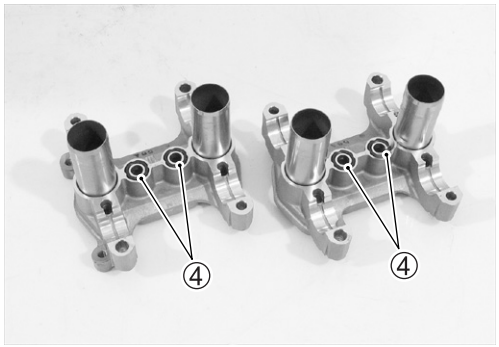
• Install the dowel pins ③.



• Install the O-rings ④ to the camshaft journal holders.

CAUTION

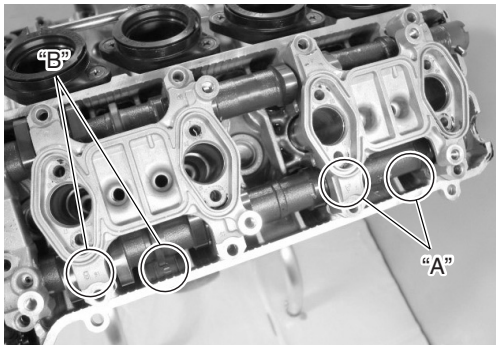
Replace the O-rings with new ones.



• Install the camshaft journal holders.

NOTE:

** Each camshaft journal holder is identified with an embossed letter.*
"A": No.1 and No.2 cylinders
"B": No.3 and No.4 cylinders
** Check that embossed letter on each holder faces exhaust side.*



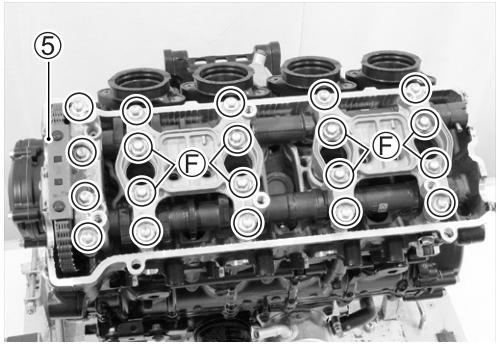
CAUTION

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

• Install the can chain guide ⑤.
• Fasten the camshaft journal holders evenly by tightening the camshaft journal holder bolts lightly, in the ascending order of numbers.

NOTE:

** Fit the copper washer to the camshaft journal holder bolts Ⓕ.*
** The ascending order of numbers are indicated on the camshaft journal holders.*

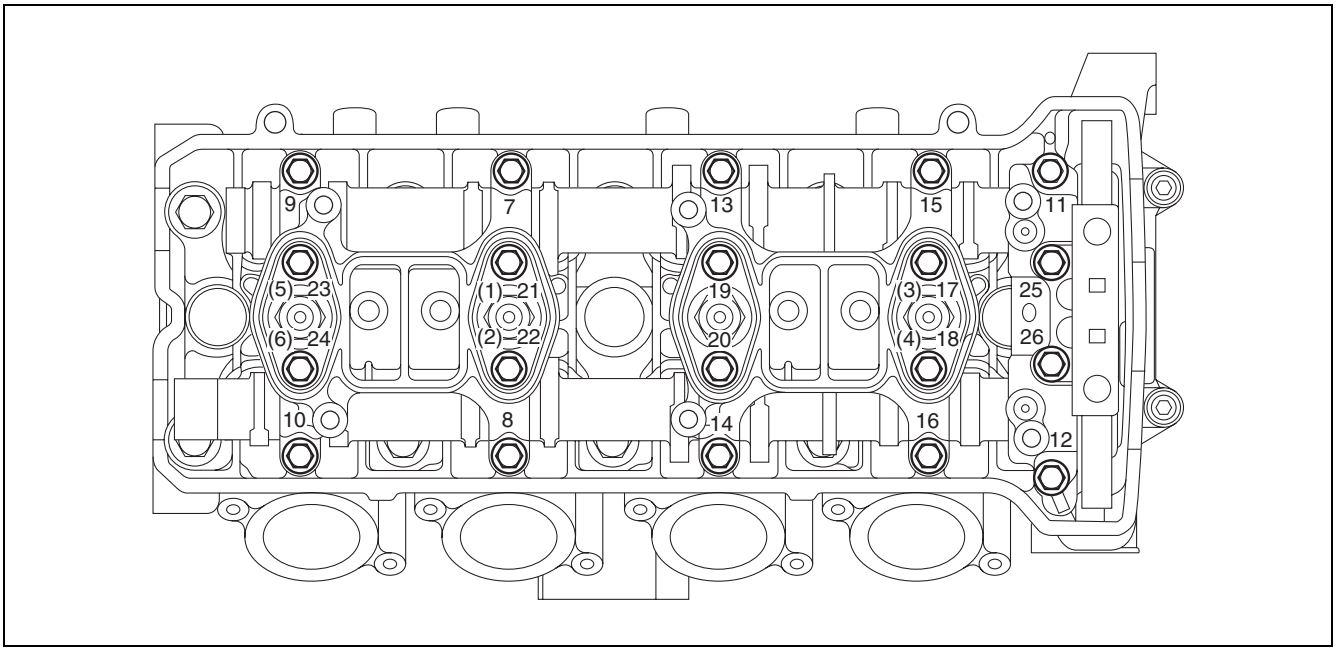


• Tighten the camshaft journal holder bolts in the ascending order of numbers to the specified torque.

Camshaft journal holder bolt: 10 N·m (1.0 kgf-m)

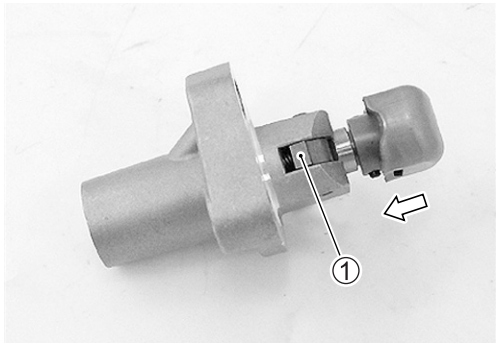
CAUTION

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.



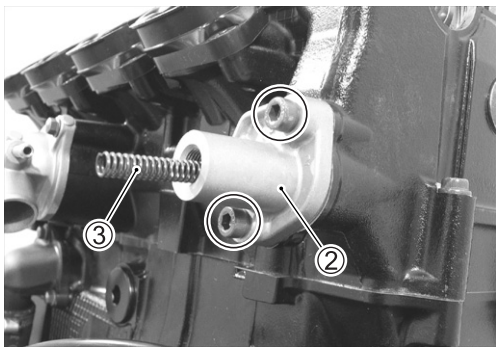
• Install new gasket.

CAUTION

Use new gasket to prevent oil leakage.

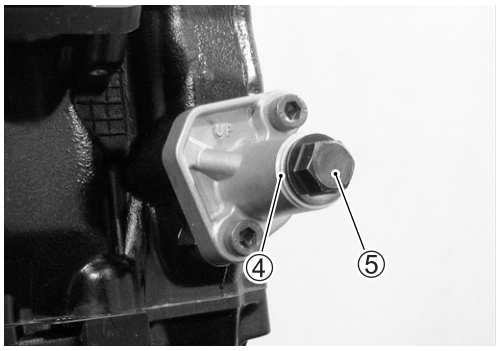
• Install the cam chain tension adjuster ② and tighten its mounting bolts.

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



• Install the spring ③.

- Install the gasket ④ and cam chain tension adjuster cap bolt ⑤.



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

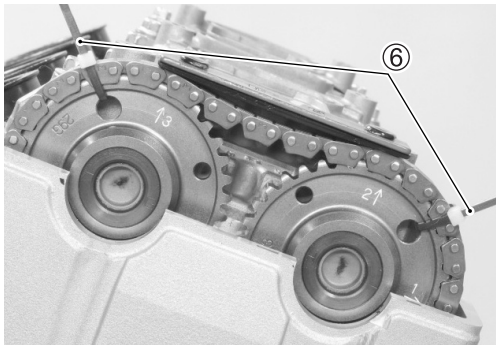
- Tighten the cam chain tension adjuster cap bolt to the specified torque.

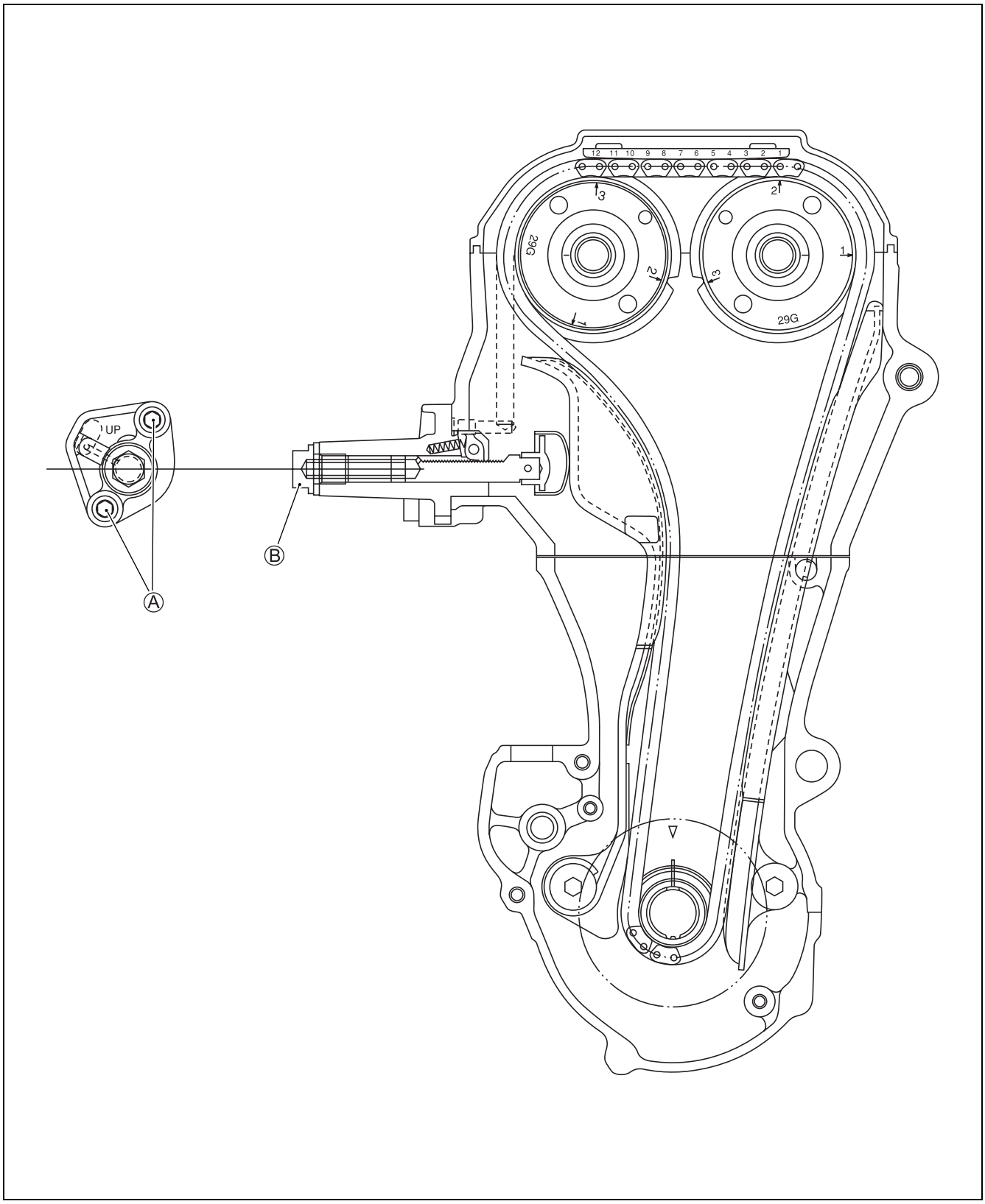
Cam chain tension adjuster cap bolt: 23 N·m (2.3 kgf-m)

CAUTION

After installing the cam chain tension adjuster, check to be sure that the adjuster works properly by checking the slack of cam chain.

- Cut the wire clamps ⑥.
- After installing the cam chain tension adjuster, rotate the crankshaft (some turns), and recheck the positions of the camshafts. (☞3-99)



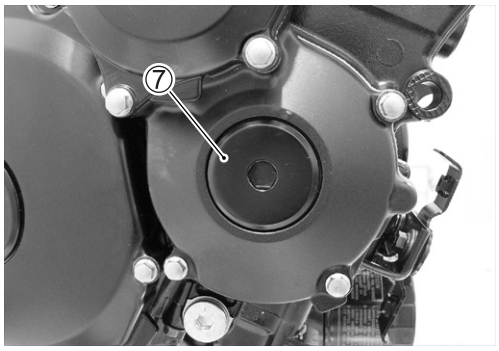


Ⓐ	Cam chain tension adjuster mounting bolt
Ⓑ	Cam chain tension adjuster cap bolt

ITEM	N·m	kgf-m
Ⓐ	10	1.0
Ⓑ	23	2.3

- Tighten the valve timing inspection plug ⑦ to the specified torque.

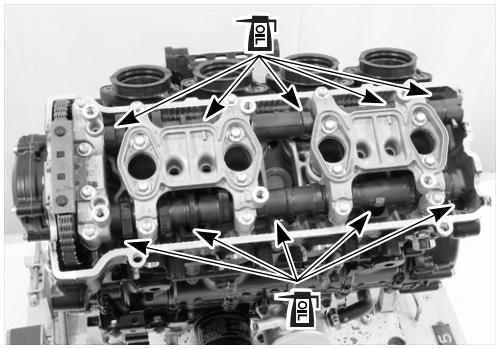
Valve timing inspection plug: 11 N·m (1.1 kgf-m)



CYLINDER HEAD COVER AND PAIR REED VALVE

- Pour engine oil in each oil pocket in the cylinder head.

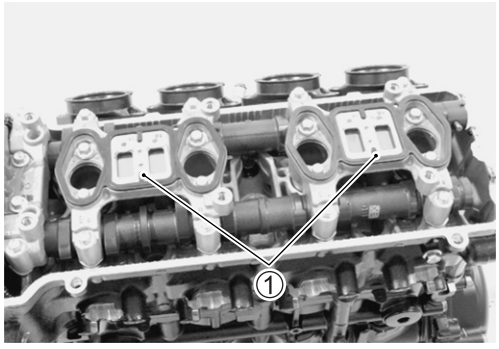
NOTE:
Be sure to check the valve clearance. (☞2-7)



- Install the PAIR reed valves ① along with the gaskets.

CAUTION

Replace the gaskets with new ones.

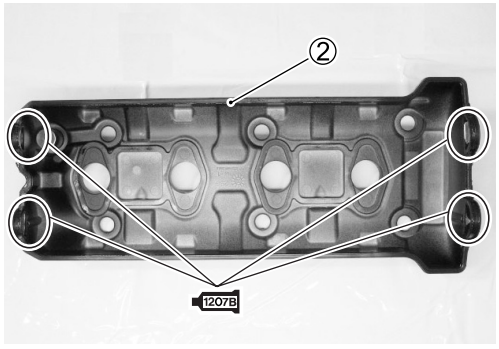


- Install new gasket ② to the cylinder head cover.
- Apply SUZUKI BOND to the cam end caps of the gasket as shown.

1207B 99000-31140: SUZUKI BOND "1207B"

CAUTION

Use new gasket to prevent oil leakage.



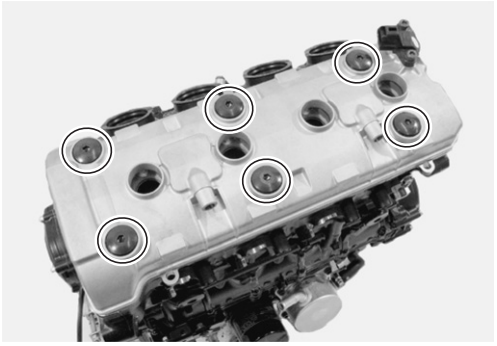
- Place the cylinder head cover on the cylinder head.
- Fit new gasket ③ to each head cover bolt.

CAUTION

Use new gasket to prevent oil leakage.

• Tighten the head cover bolts to the specified torque.

Head cover bolt: Initial: 10 N·m (1.0 kgf-m)
Final : 14 N·m (1.4 kgf-m)

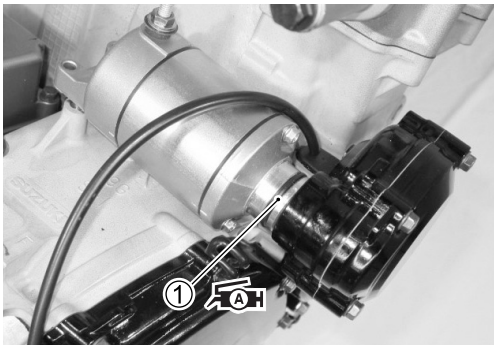


STARTER MOTOR

• Install the new O-ring ① to the starter motor.

CAUTION

Use new O-ring to prevent oil leakage.

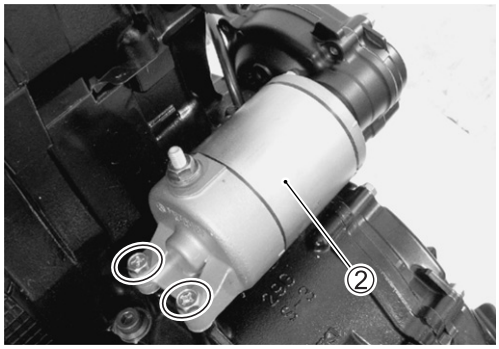


• Apply SUZUKI SUPER GREASE "A" to the O-ring.

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

• Install the starter motor ②.

Starter motor mounting bolt: 10 N·m (1.0 kgf-m)



• Install the spark plugs. (☞2-6)

FI SYSTEM DIAGNOSIS

CONTENTS

FI SYSTEM DIAGNOSIS

CONTENTS

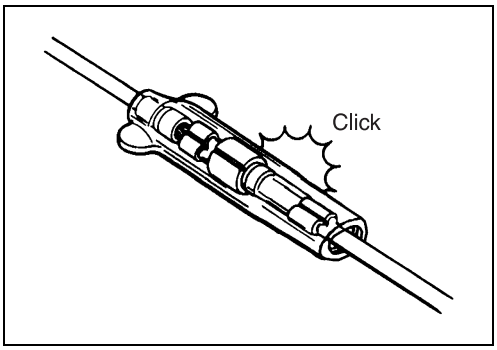
PRECAUTIONS IN SERVICING

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

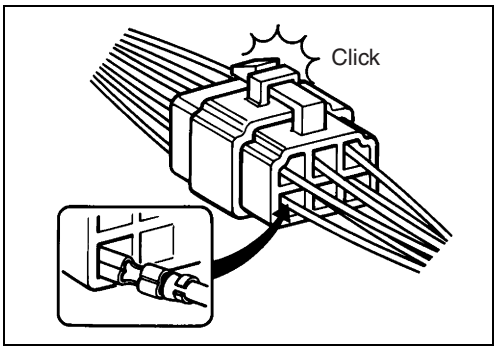
ELECTRICAL PARTS

CONNECTOR/COUPLER

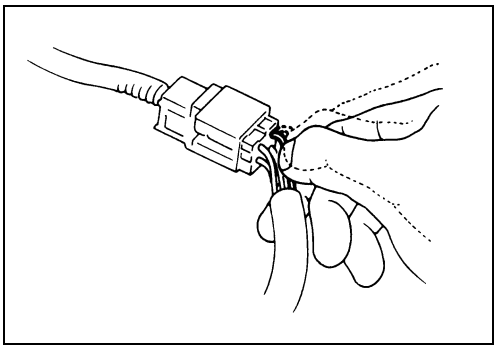
- When connecting a connector, be sure to push it in until a click is felt.



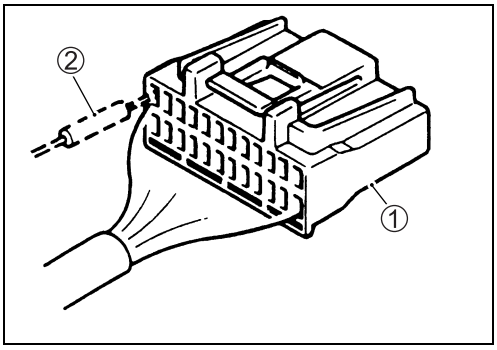
- With a lock type coupler, be sure to release the lock when disconnecting, and push in fully to engage the lock when connecting.
- When disconnecting the coupler, be sure to hold the coupler body and do not pull the lead wires.
- Inspect each terminal on the connector/coupler for looseness or bending.
- Inspect each terminal for corrosion and contamination. The terminals must be clean and free of any foreign material which could impede proper terminal contact.



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

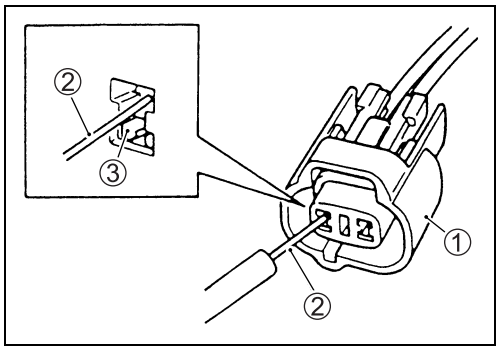


- When taking measurements at electrical connectors using a tester probe, be sure to insert the probe from the wire harness side (backside) of the connector/coupler.



① Coupler
② Probe

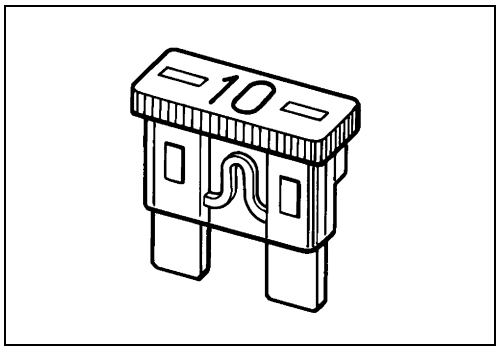
- When connecting meter probe from the terminal side of the coupler (where connection from harness side not being possible), use extra care not to force and cause the male terminal to bend or the female terminal to open.
  Connect the probe as shown to avoid opening of female terminal.
  Never push in the probe where male terminal is supposed to fit.
- Check the male connector for bend and female connector for excessive opening. Also check the coupler for locking (looseness), corrosion, dust, etc.



① Coupler
② Probe
③ Where male terminal fits

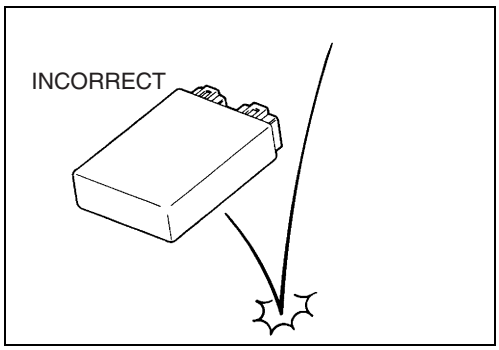
FUSE

- When a fuse blows, always investigate the cause to correct it and then replace the fuse.
- Do not use a fuse of a different capacity.
- Do not use wire or any other substitute for the fuse.

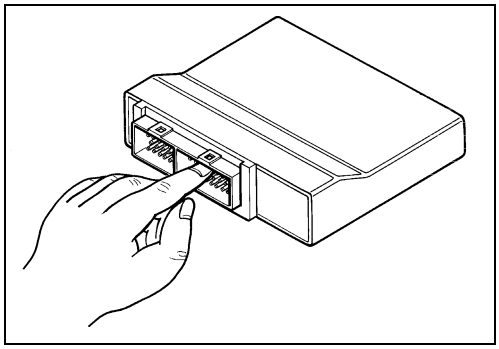


ECM/VARIOUS SENSORS

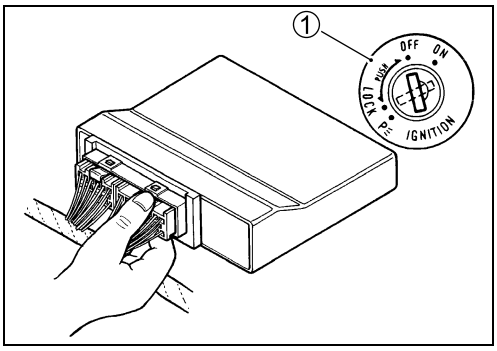
- Since each component is a high-precision part, great care should be taken not to apply any sharp impacts during removal and installation.



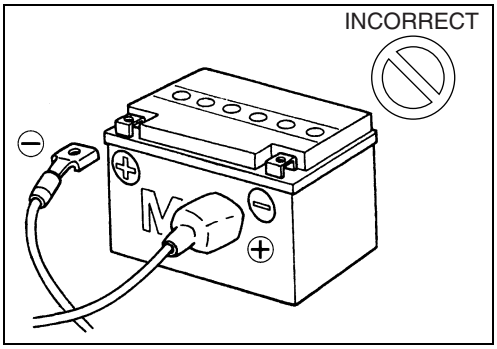
- Be careful not to touch the electrical terminals of the ECM. The static electricity from your body may damage this part.



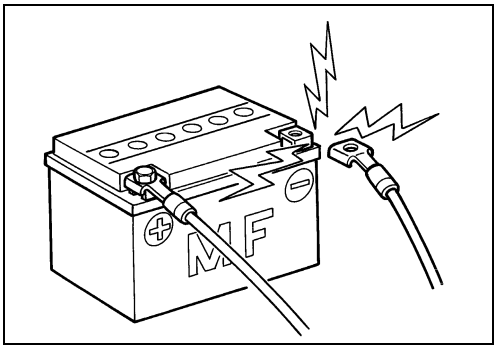
- When disconnecting and connecting the ECM, make sure to turn OFF the ignition switch ①, or electronic parts may get damaged.



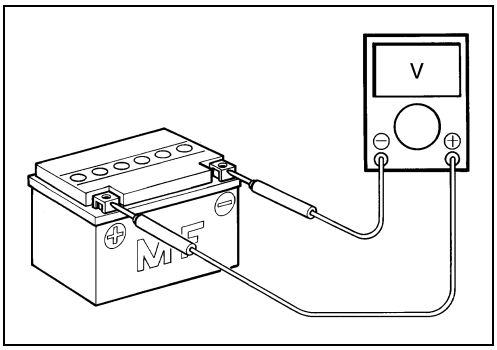
- Battery connection in reverse polarity is strictly prohibited. Such a wrong connection will damage the components of the FI system instantly when reverse power is applied.



- Removing any battery terminal of a running engine is strictly prohibited.
  The moment such removal is made, damaging counter electromotive force will be applied to the ECM which may result in serious damage.



- Before measuring voltage at each terminal, check to make sure that battery voltage is 11 V or higher. Terminal voltage check with a low voltage battery will lead to erroneous diagnosis.



- Never connect any tester (voltmeter, ohmmeter, or whatever) to the ECM when its coupler is disconnected.
  Otherwise, damage to ECM may result.
- Never connect an ohmmeter to the ECM with its coupler connected. If attempted, damage to ECM or sensors may result.
- Be sure to use a specified voltmeter/ohmmeter. Otherwise, accurate measurements may not be obtained and personal injury may result.

ELECTRICAL CIRCUIT INSPECTION PROCEDURE

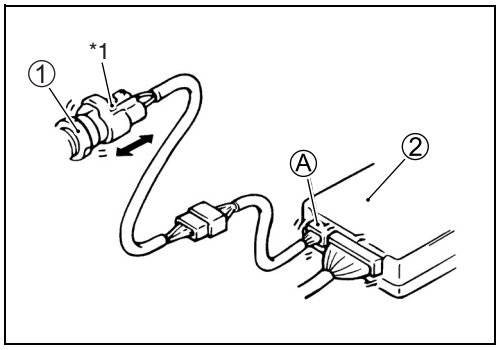
While there are various methods for electrical circuit inspection, described here is a general method to check for open and short circuit using an ohmmeter and a voltmeter.

OPEN CIRCUIT CHECK

Possible causes for the open circuits are as follows. As the cause can exist in the connector/coupler or terminal, they need to be checked carefully.

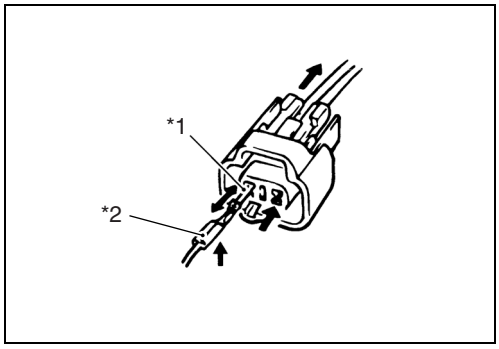
- Loose connection of connector/coupler.
- Poor contact of terminal (due to dirt, corrosion or rust, poor contact tension, entry of foreign object etc.).
- Wire harness being open.
- Poor terminal-to-wire connection.

- Disconnect the negative cable from the battery.
- Check each connector/coupler at both ends of the circuit being checked for loose connection. Also check for condition of the coupler lock if equipped.



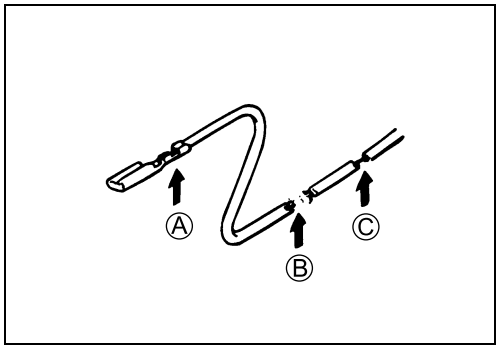
① Sensor
② ECM
*1 Check for loose connection.

- Using a test male terminal, check the female terminals of the circuit being checked for contact tension.
  Check each terminal visually for poor contact (possibly caused by dirt, corrosion, rust, entry of foreign object, etc.). At the same time, check to make sure that each terminal is fully inserted in the coupler and locked.
  If contact tension is not enough, rectify the contact to increase tension or replace.
  The terminals must be clean and free of any foreign material which could impede proper terminal contact.



*1 Check contact tension by inserting and removing.
*2 Check each terminal for bend and proper alignment.

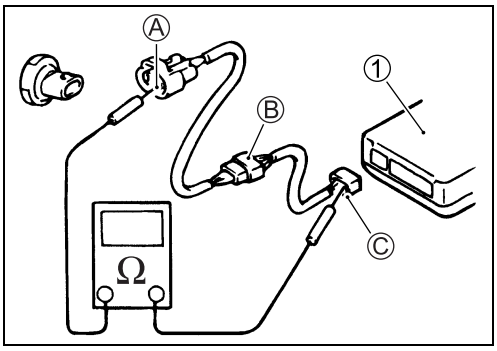
- Using continuity inspect or voltage check procedure as described on next page, inspect the wire harness terminals for open circuit and poor connection.



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

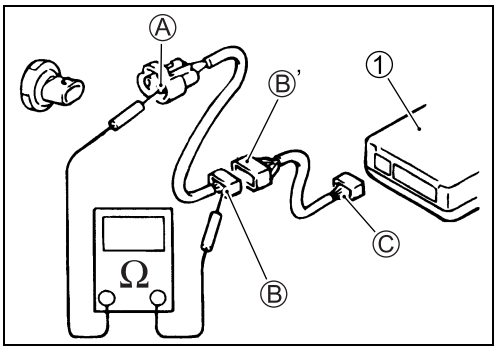
Continuity check

- 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 Ⓒ.

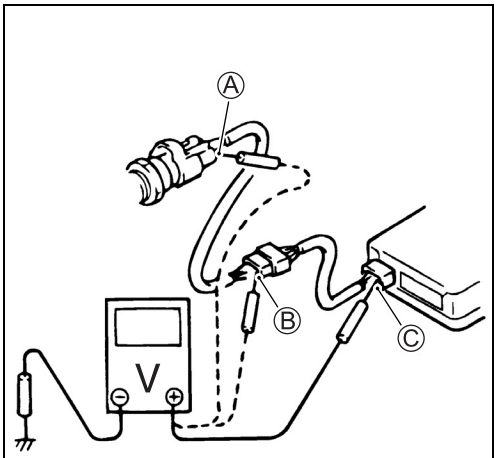


① ECM

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 Ⓑ.

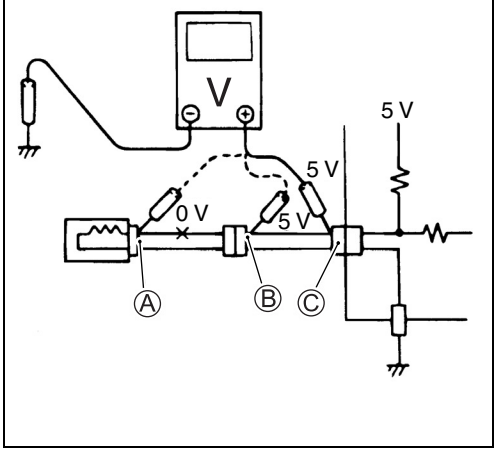
Voltage Between:

Ⓒ 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 ———

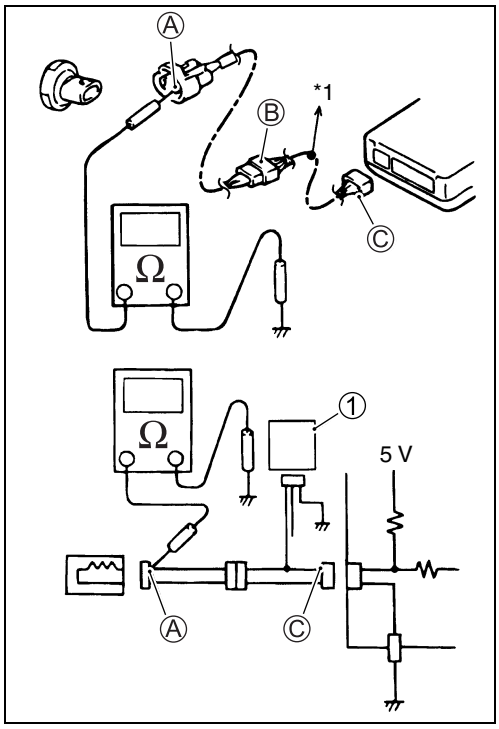


SHORT CIRCUIT CHECK (WIRE HARNESS TO GROUND)

- Disconnect the negative cable from the battery.
- Disconnect the connectors/couplers at both ends of the circuit to be checked.

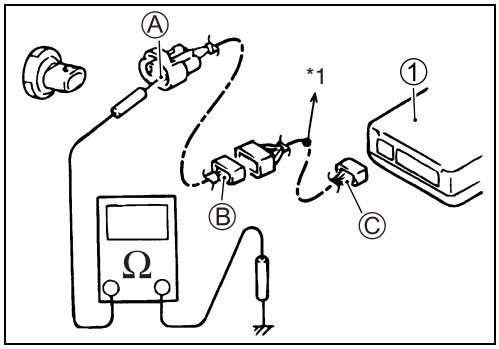
NOTE:
If the circuit to be checked branches to other parts as shown, disconnect all connectors/couplers of those parts. Otherwise, diagnosis will be misled.

- 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

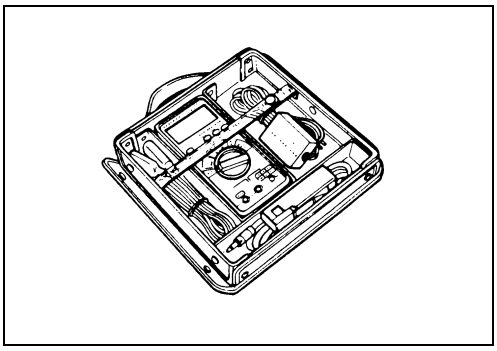
- Disconnect the connector/coupler included in circuit (coupler Ⓑ) and measure resistance between terminal Ⓐ and body ground.
  If continuity is indicated, the circuit is shorted to the ground between terminals Ⓐ and Ⓑ.



① ECM
*1: To other parts

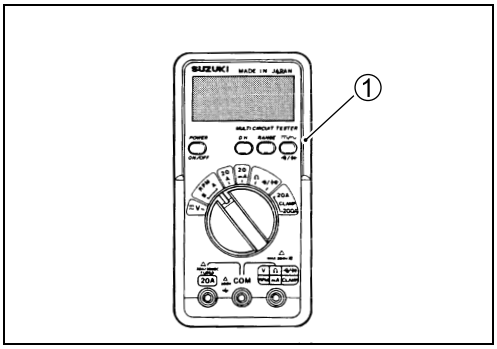
USING THE MULTI-CIRCUIT TESTER

- Use the Suzuki multi-circuit tester set (09900-25008).
- Use well-charged batteries in the tester.
- Be sure to set the tester to the correct testing range.



USING THE TESTER

- Incorrectly connecting the ⊕ 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.

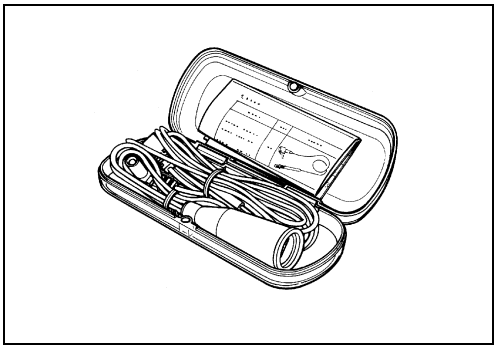


TOOL 09900-25008: Multi-circuit tester set

NOTE:

** When connecting the multi-circuit tester, use the needle 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.*

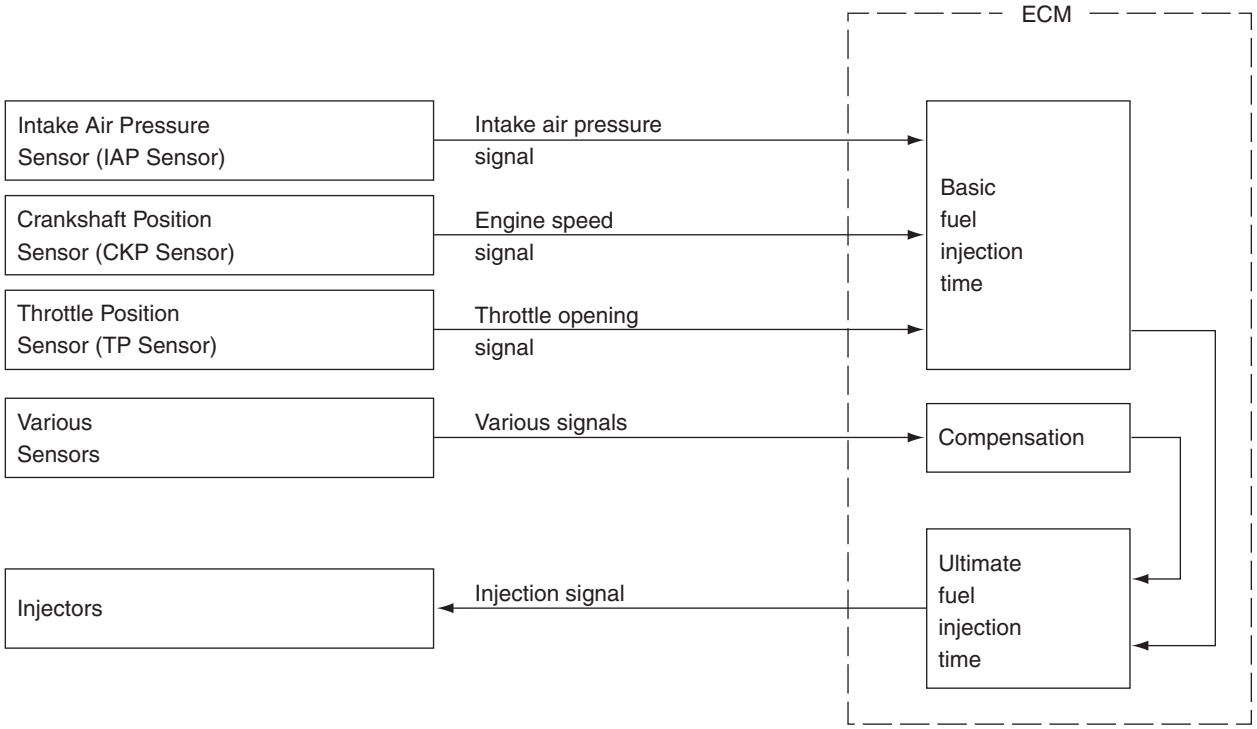


TOOL 09900-25009: Needle pointed probe set

FI SYSTEM TECHNICAL FEATURES

INJECTION TIME (INJECTION VOLUME)

The factors to determine the injection time include the basic fuel injection time, which is calculated on the basis of intake air pressure, engine speed and throttle opening angle, and various compensations.
These compensations are determined according to the signals from various sensors that detect the engine and driving conditions.



COMPENSATION OF INJECTION TIME (VOLUME)

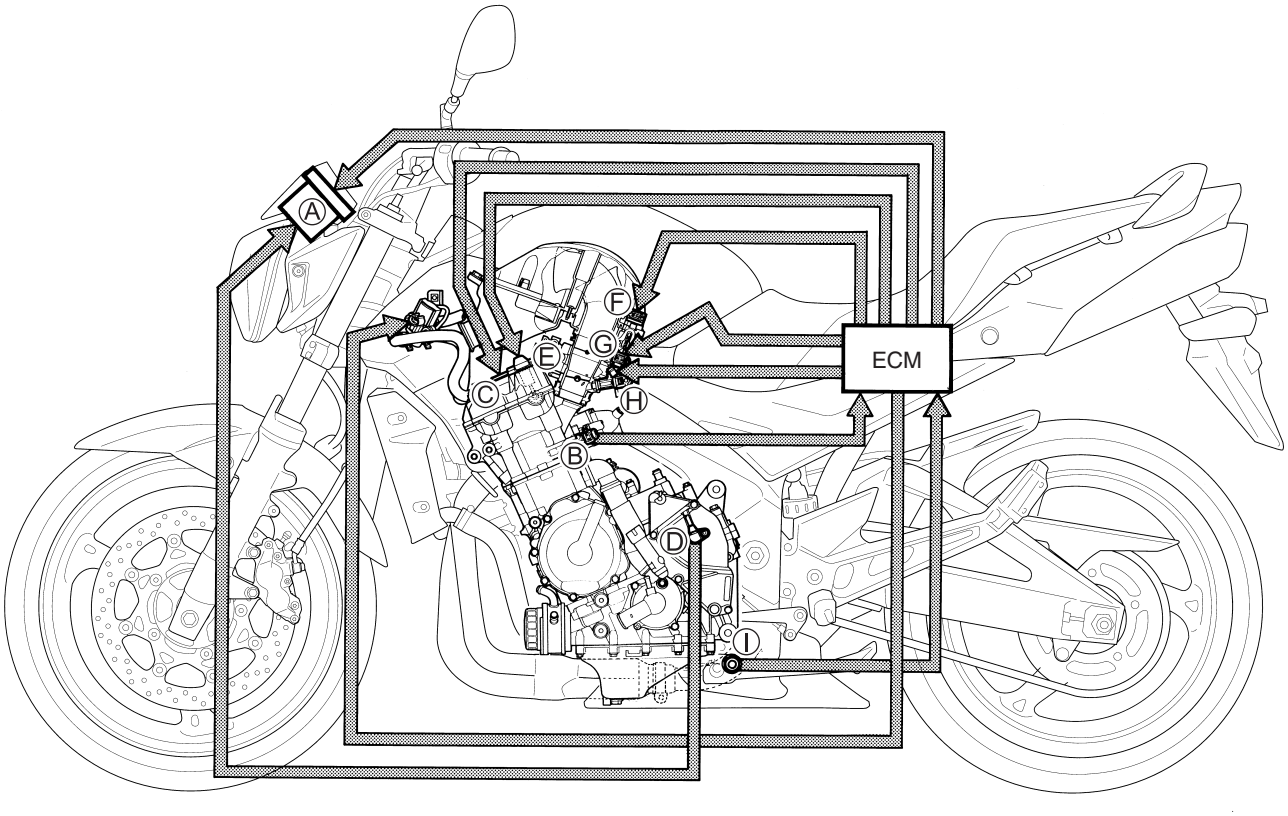
The following different signals are output from the respective sensors for compensation of the fuel injection time (volume).

SIGNAL	DESCRIPTION
ATMOSPHERIC PRESSURE SENSOR SIGNAL	When atmospheric pressure is low, the sensor sends the signal to the ECM and reduce the injection time (volume).
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 gasses. 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 RPM SIGNAL	At high speed, the injection time (volume) is increased.
STARTING SIGNAL	When starting engine, additional fuel is injected during cranking engine.
ACCELERATION SIGNAL/ DECELERATION SIGNAL	During acceleration, the fuel injection time (volume) is increased in accordance with the throttle opening speed and engine rpm. During deceleration, the fuel injection time (volume) is decreased.

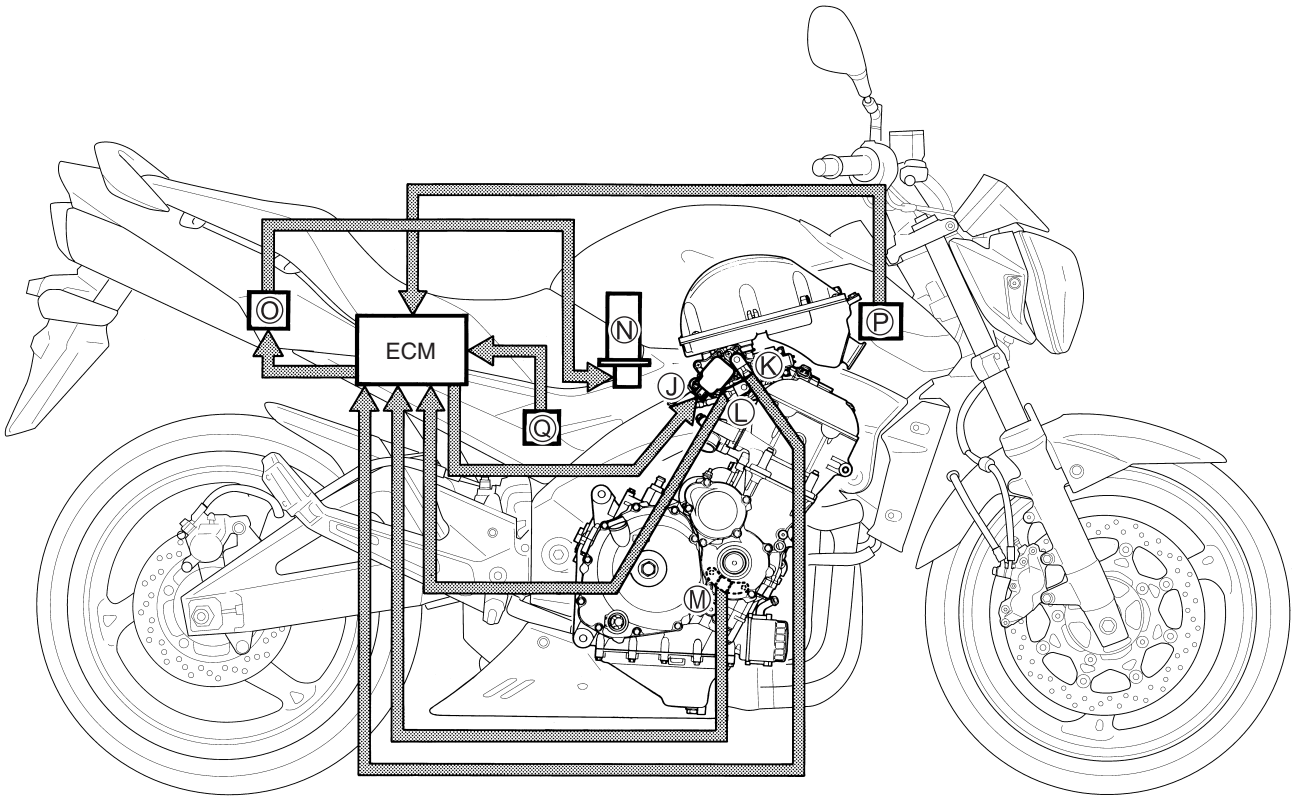
INJECTION STOP CONTROL

SIGNAL	DESCRIPTION
TIP-OVER SENSOR SIGNAL (FUEL SHUT-OFF)	When the 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.

FI SYSTEM PARTS LOCATION

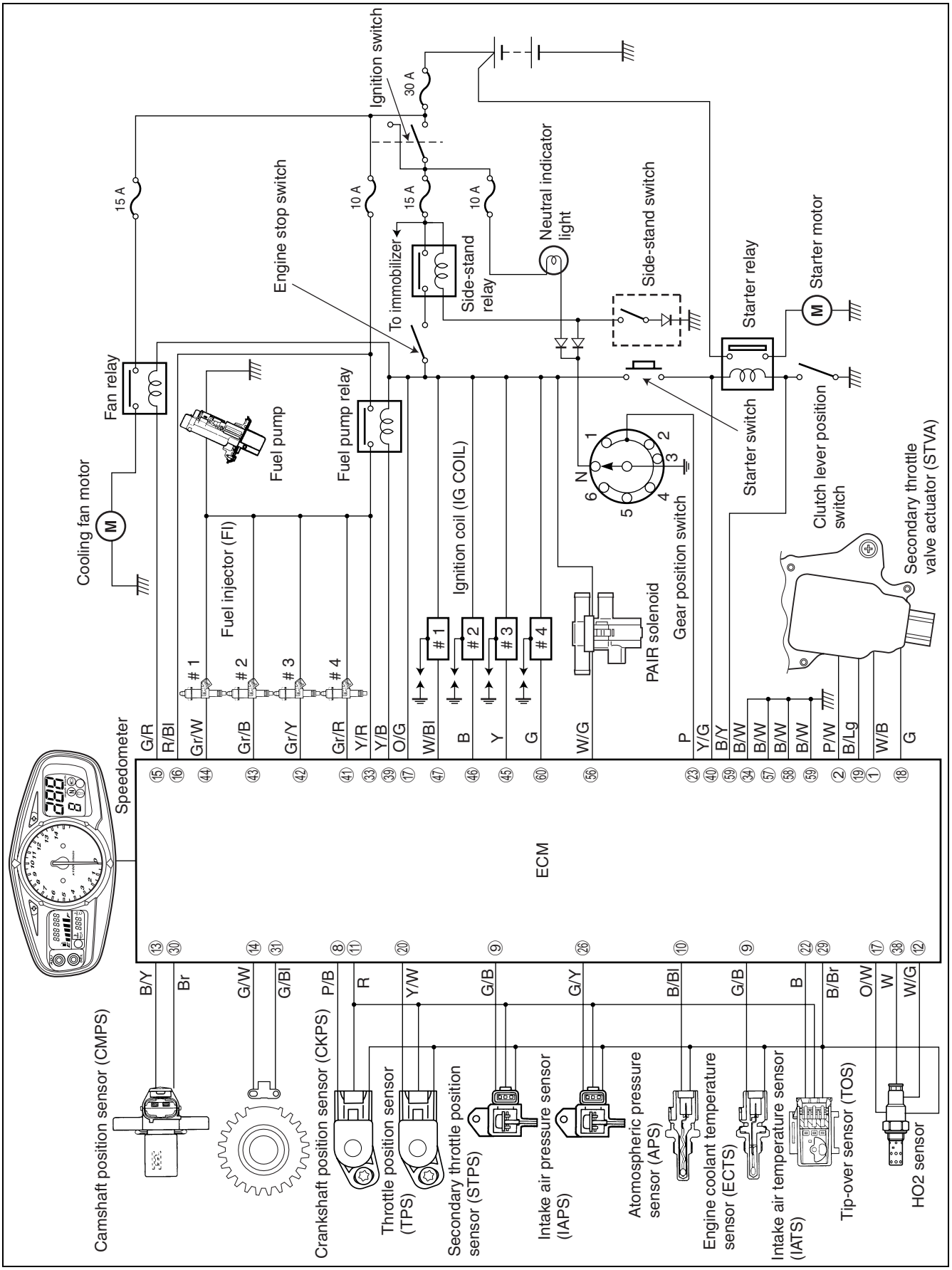


Ⓐ Speedometer
Ⓑ Engine coolant temperature sensor (ECTS)
Ⓒ Ignition coil
Ⓓ Speed sensor
Ⓔ Cam shaft position sensor (CMPS)
Ⓕ Intake air pressure sensor (IAPS)
Ⓖ Intake air temperature sensor (IATS)
Ⓗ Fuel injector
Ⓘ HO2 sensor

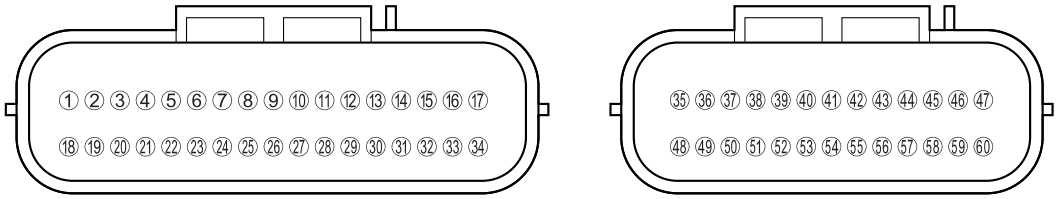


Ⓙ Secondary throttle valve actuator (STVA)
Ⓚ Secondary throttle position sensor (STPS)
Ⓛ Throttle position sensor (TPS)
Ⓜ Crankshaft position sensor (CKP)
Ⓝ Fuel pump (FP)
Ⓞ Fuel pump relay (FP relay)
Ⓟ Atmospheric pressure sensor (APS)
Ⓠ Tip-over sensor (TOS)

FI SYSTEM WIRING DIAGRAM



ECM TERMINAL



ECM couplers

TERMINAL NO.	CIRCUIT	TERMINAL NO.	CIRCUIT
①	STVA signal (STVA. 2A)	㉛	CKP sensor signal (CKP–)
②	STVA signal (STVA. 1A)	㉜	Serial data for self-diagnosis
③	Immobilizer indicator light	㉝	Power source for fuel injector (VM)
④	Immobilizer communication	㉞	ECM ground (E1)
⑤	Immobilizer communication	㉟	—
⑥	Serial data for speedometer	㊱	—
⑦	Blank	㊲	Tachometer
⑧	TP sensor signal (TP)	㊳	HO2 sensor heater
⑨	IAP sensor signal (IAP)	㊴	Fuel pump relay (FP Relay)
⑩	ECT sensor signal (ECT)	㊵	Starter relay
⑪	Power source for sensors (VCC)	㊶	Fuel injector #4
⑫	HO2 sensor signal (HO2)	㊷	Fuel injector #3
⑬	CMP sensor signal (CMP+)	㊸	Fuel injector #2
⑭	CKP sensor signal (CKP+)	㊹	Fuel injector #1
⑮	Cooling fan relay (FAR)	㊺	Ignition coil #3
⑯	Power source for back-up	㊻	Ignition coil #2
⑰	Power source	㊼	Ignition coil #1
⑱	STVA signal (STVA. 2B)	㊽	—
⑲	STVA signal (STVA. 1B)	㊾	—
⑳	STP sensor signal (STP)	㊿	—
㉑	—	(51)	HO2 sensor control selector
㉒	TO sensor signal (TOS)	(52)	Test switch
㉓	GP switch signal (GP)	(53)	Mode select switch
㉔	Blank	(54)	Gear position switch signal
㉕	Blank	(55)	Clutch switch signal
㉖	AP sensor signal (AP)	(56)	PAIR control solenoid valve (PAIR)
㉗	IAT sensor signal (IAT)	(57)	Ground
㉘	Blank	(58)	Ground
㉙	Sensor ground (E2)	(59)	Ground for ignition system
㉚	CMP sensor signal (CMP–)	(60)	Ignition coil #4

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 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 LIGHT INDICATION	INDICATION MODE
“NO”	Odd, trip or clock	—	—
“YES”	Odd, trip or clock and “FI” letters	FI light turns ON.	Each 2 sec., odd, trip or clock and “FI” is indicated alternately.
Engine can start	*1		
Engine can not start	“FI” letter *2	FI 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 odd, trip or clock are indicated in the LCD panel and motorcycle can run.

*2

The injection signal is stopped, when the camshaft position sensor signal, crankshaft position sensor signal, tip-over sensor signal, #1, #2, #3 and #4 ignition signals, #1, #2, #3 and #4 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 can not run.

“CHEC”: The LCD panel indicates “CHEC” when no communication signal from the ECM is received for 5 seconds.

For Example:

The ignition switch is turned ON, and the engine stop switch is turned OFF. In this case, the speedometer 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 speedometer 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:

Until starting the engine, the FI light turns ON.

DEALER MODE

The defective function is memorized in the computer. Use the special tool's coupler to connect to the dealer mode coupler. The memorized malfunction code is displayed on LCD (DISPLAY) panel. Malfunction means that the ECM does not receive signal from the devices. These affected devices are indicated in the code form.

09930-82720: Mode select switch

CAUTION

Before checking the malfunction code, do not disconnect the ECM lead wire couplers.
If the couplers from the ECM are disconnected, the malfunction code memory is erased and the malfunction code can not be checked.

MALFUNCTION	LCD (DISPLAY) INDICATION	FI LIGHT INDICATION	INDICATION MODE
"NO"	C00	FI 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
C11	Camshaft position sensor (CMPS)	
C12	Crankshaft position sensor (CKPS)	Pick-up coil signal, signal generator
C13	Intake air pressure sensor (IAPS)	
C14	Throttle position sensor (TPS)	*1
C15	Engine coolant temperature sensor (ECTS)	
C21	Intake air temperature sensor (IATS)	
C22	Atmospheric pressure sensor (APS)	
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
C26	Ignition signal #3 (IG coil #3)	For #3 cylinder
C27	Ignition signal #4 (IG coil #4)	For #4 cylinder
C28	Secondary throttle valve actuator (STVA)	*2
C29	Secondary throttle position sensor (STPS)	
C31	Gear position signal (GP switch)	
C32	Injector signal #1 (FI #1)	For #1 cylinder
C33	Injector signal #2 (FI #2)	For #2 cylinder
C34	Injector signal #3 (FI #3)	For #3 cylinder
C35	Injector signal #4 (FI #4)	For #4 cylinder
C41	Fuel pump control system (FP control system)	Fuel pump, Fuel pump relay
C42	Ignition switch signal (IG switch signal: Only for immobilizer)	Anti-theft
C44	HO2 Sensor	
C49	PAIR control solenoid valve	
C60	Cooling fan control system	Cooling fan relay

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 rpm is 1 300 r/min, slightly turn the throttle position sensor and bring the line to the middle.

In the normal condition, the throttle valve stop screw pushes throttle valves slightly, and the middle line will be indicated.

*2

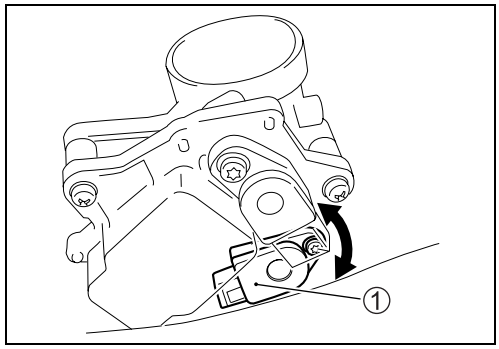
When the secondary throttle valve actuator and secondary throttle position sensor signals are not sent to ECM. In this case, C28 and C29 are indicated alternately.

TPS ADJUSTMENT

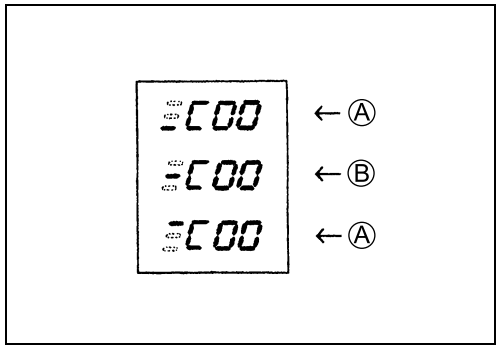
1. Adjust the engine rpm to 1 300 r/min. (☞2-15)
2. Connect the special tool (Mode select switch) to the dealer mode coupler at the wiring harness.

3. If the throttle position sensor adjustment is necessary, remove the air cleaner box (☞5-13) and follow the procedure below.
4. Loosen the screw and turn the throttle position sensor ① and bring the line to the middle.
5. Then, tighten the screw to fix the throttle position sensor.

TOOL 09930-11950: Torx wrench
09930-82720: Mode select switch



The LCD displays the line for 0.4 sec. at a time, and when such a display repeats two times, it indicates the current position where the sensor is fixed.



Ⓐ Incorrect
Ⓑ Correct position

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
CMP sensor	When camshaft position signal has failed during running, the ECM determines the cylinder positions as # to be the same as before occurrence of such a failure.	"NO"	"YES"
		Motorcycle can run, but once engine stops, engine can not start.	
IAP sensor	Intake air pressure is fixed to 760 mmHg.	"YES"	"YES"
TP sensor	The throttle opening is fixed to half open position. Ignition timing is also fixed.	"YES"	"YES"
ECT sensor	Engine coolant temperature value is fixed to 80 °C. Cooling fan is fixed on position.	"YES"	"YES"
IAT sensor	Intake air temperature value is fixed to 40 °C.	"YES"	"YES"
AP sensor	Atmospheric pressure is fixed to 760 mmHg.	"YES"	"YES"
Ignition signal	#1 Ignition-off	"YES"	"YES"
		#2, #3 & #4 cylinders can run.	
	#2 Ignition-off	"YES"	"YES"
		#1, #3 & #4 cylinders can run.	
	#3 Ignition-off	"YES"	"YES"
		#1, #2 & #4 cylinders can run.	
	#4 Ignition-off	"YES"	"YES"
		#1, #2 & #3 cylinders can run.	
Injection signal	#1 Fuel-cut	"YES"	"YES"
		#2, #3 & #4 cylinders can run.	
	#2 Fuel-cut	"YES"	"YES"
		#1, #3 & #4 cylinders can run.	
	#3 Fuel-cut	"YES"	"YES"
		#1, #2 & #4 cylinders can run.	
	#4 Fuel-cut	"YES"	"YES"
		#1, #2 & #3 cylinders can run.	

ITEM	FAIL-SAFE MODE	STARTING ABILITY	RUNNING ABILITY
Secondary throttle valve actuator	Secondary throttle valve is fixed to full close position. When motor disconnection or lock occurs, power from ECM is shut off.	"YES"	"YES"
STP sensor	Secondary throttle valve is fixed to full close position.	"YES"	"YES"
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"

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 or 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 below will facilitate collecting information required for proper analysis and diagnosis.

EXAMPLE: CUSTOMER PROBLEM INSPECTION FORM

User name:	Model:	VIN:	
Date of issue:	Date Reg.	Date of problem:	Mileage:

Malfunction indicator lamp condition (LED)	☐ Always ON ☐ Sometimes ON ☐ Always OFF ☐ Good condition
Malfunction display/code (LCD)	User mode: ☐ No display ☐ Malfunction display ( )
	Dealer mode: ☐ No code ☐ Malfunction code ( )

PROBLEM SYMPTOMS	
☐ **Difficult Starting**	☐ **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	☐ Fair ☐ Cloudy ☐ Rain ☐ Snow ☐ Always ☐ Other _____
Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold (°C) ☐ Always
Frequency	☐ 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 above 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 select switch or SDS, perform the following visual inspections. The reason for visual inspection is that mechanical failures (such as oil leakage) cannot be displayed on the panel with the use of mode select switch or SDS.

* Engine oil level and leakage (☞2-13)
* Engine coolant level and leakage (☞2-17 and -18)
* Fuel level and leakage (☞2-14 and 9-33)
* Clogged air cleaner element (☞2-4)
* Battery condition (☞9-42)
* Throttle cable play (☞2-15)
* Vacuum hoses looseness, bend and disconnection
* Burnt fuse
* FI light operation (☞4-16, 9-29 and -31)
* Each warning light operation (☞9-31)
* Speedometer operation (☞9-34)
* Exhaust gas leakage and noise (☞2-28)
* Each coupler disconnection
* Clogged radiator fins (☞7-4)

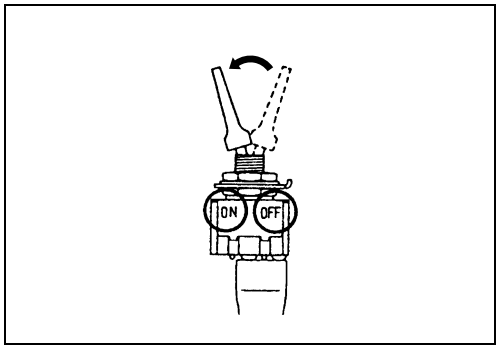
SELF-DIAGNOSTIC PROCEDURES

NOTE:

* *Do not disconnect couplers from the ECM, the battery cable from the battery, ECM ground wire harness from the engine or main fuse before confirming the malfunction code (self-diagnostic trouble code) stored in memory. Such disconnection will erase the memorized information in ECM memory.*
* *Malfunction code stored in ECM memory can be checked by the special tool.*
* *Before checking malfunction code, read SELF-DIAGNOSIS FUNCTION "USER MODE and DEALER MODE" (☞4-16 to -18) 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 left frame cover. (☞8-4)
- Connect the special tool to the dealer mode coupler at the wiring harness, and start the engine or crank the engine for more than 4 seconds.
- Turn the special tool's switch ON and check the malfunction code to determine the malfunction part.

TOOL 09930-82720: Mode select switch



SELF-DIAGNOSIS RESET PROCEDURE

- After repairing the trouble, turn OFF the ignition switch and turn ON again.
- If the malfunction code indicates (C00), the malfunction is cleared.
- Disconnect the special tool from the dealer mode coupler.

NOTE:

* *Even though the malfunction code (C00) is indicated, the previous malfunction history code still remains stored in the ECM. Therefore, erase the history code memorized in the ECM using SDS.*
* *The malfunction code is memorized in the ECM also when the wire coupler of any sensor is disconnected. Therefore, when a wire coupler has been disconnected at the time of diagnosis, erase the stored malfunction history code using SDS.*

USE OF SDS DIAGNOSTIC PROCEDURES

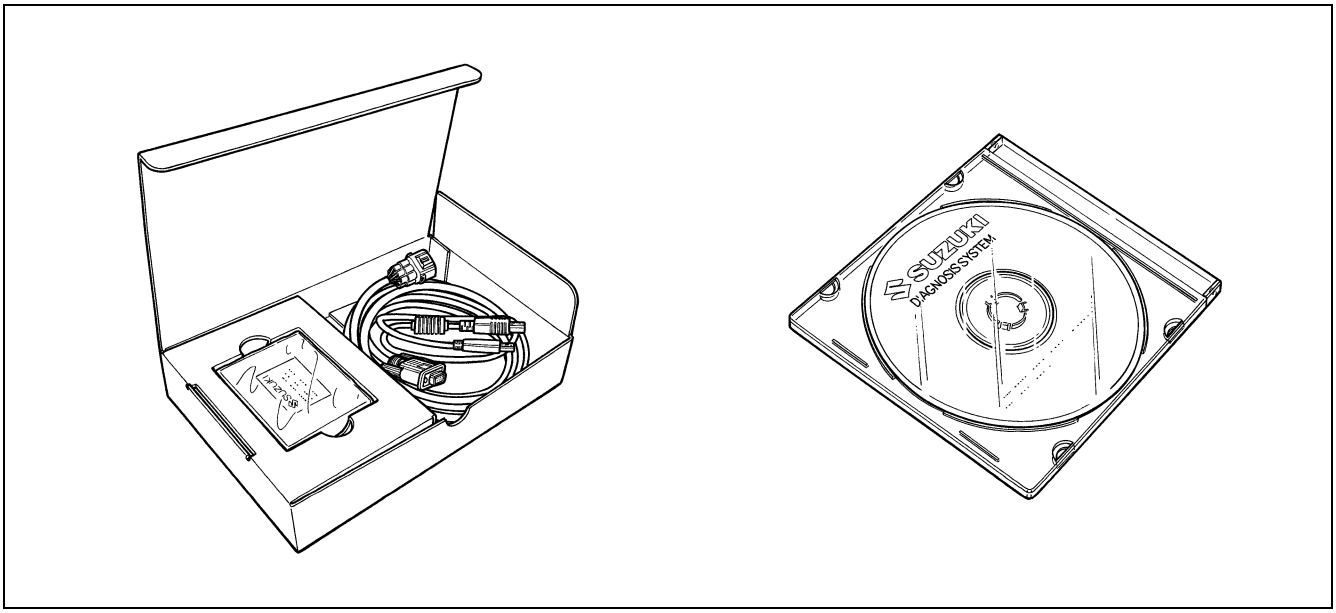
** Do not disconnect couplers from ECM, the battery cable from the battery, ECM ground wire harness from the engine or main fuse before confirming the malfunction code (self-diagnostic trouble code) stored in memory. Such disconnection will erase the memorized information in ECM memory.*

** Malfunction code stored in ECM memory can be checked by the SDS.*

** Be sure to read "PRECAUTIONS IN SERVICING" (☞4-3) before inspection and observe what is written there.*

- Remove the left frame cover. (☞8-4)
- Set up the SDS tool. (Refer to the SDS operation manual for further details.)
- Read the DTC (Diagnostic Trouble Code) and show data when trouble (displaying data at the time of DTC) according to instructions displayed on SDS.
- SDS is used not only for detecting Diagnostic Trouble Codes but also for reproducing and checking on screen the failure condition as described by customers using the trigger.
- How to use trigger. (Refer to the SDS operation manual for further details.)

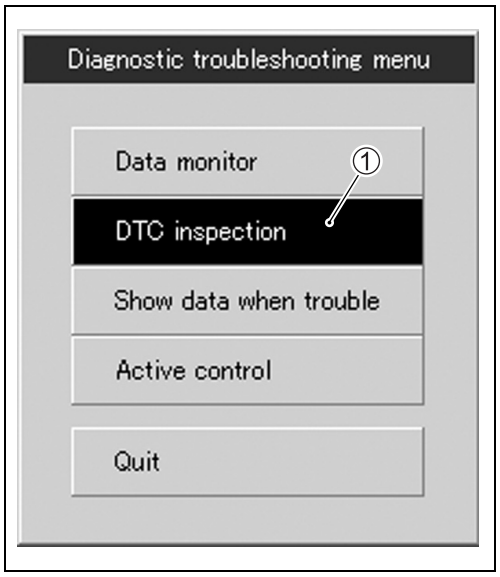
TOOL 09904-41010: SDS set tool
99565-01010-007: CD-ROM Ver. 7



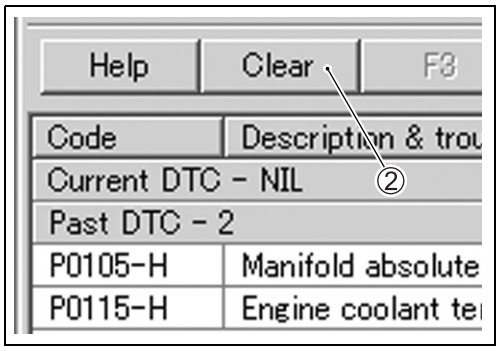
USE OF SDS DIAGNOSIS RESET PROCEDURE

- 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.

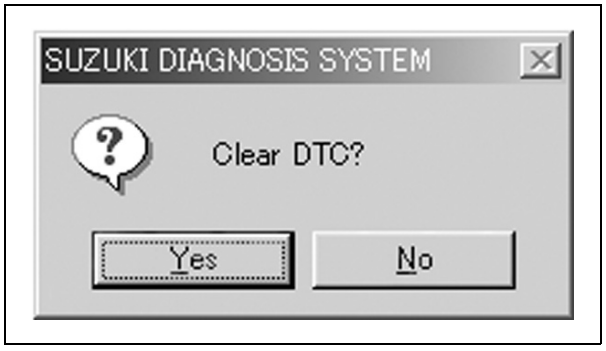
NOTE:
The malfunction code is memorized in the ECM also when the wire coupler of any sensor is disconnected. Therefore, when a wire coupler has been disconnected at the time of diagnosis, erase the stored malfunction history code using SDS.



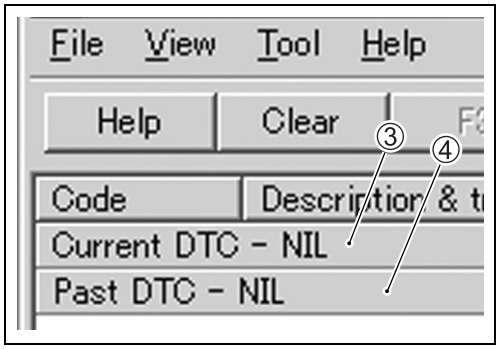
- Click “Clear” ② to delete history code (Past DTC).



- Follow the displayed instructions.

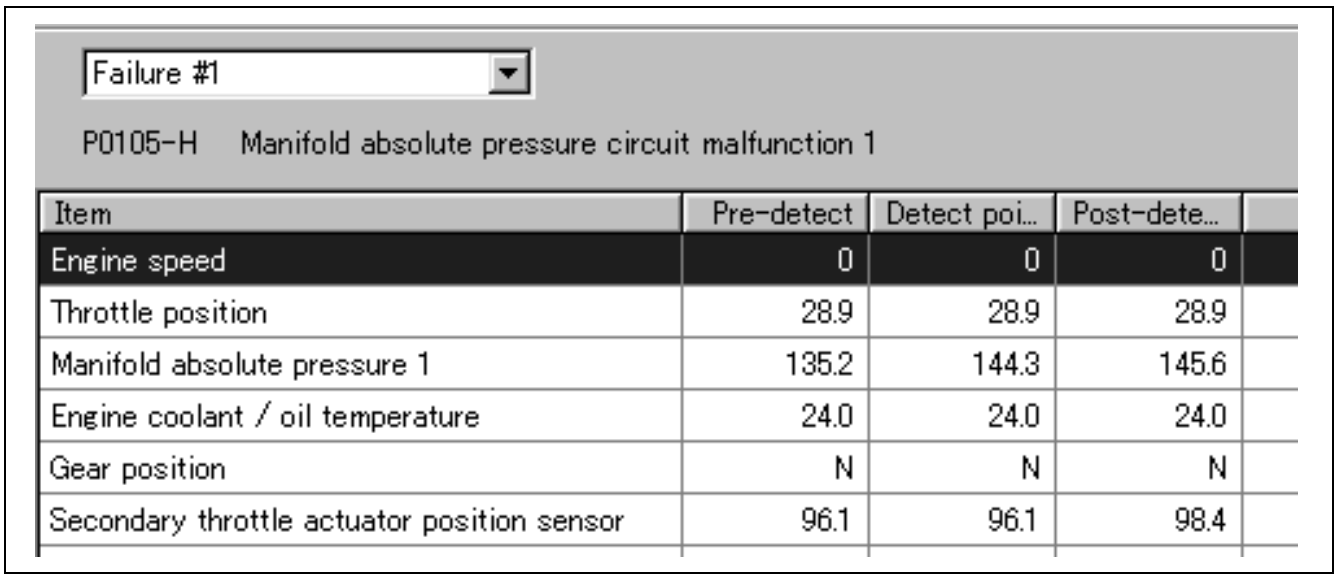


- Check that both “Current DTC” ③ and “Past DTC” ④ are deleted (NIL).

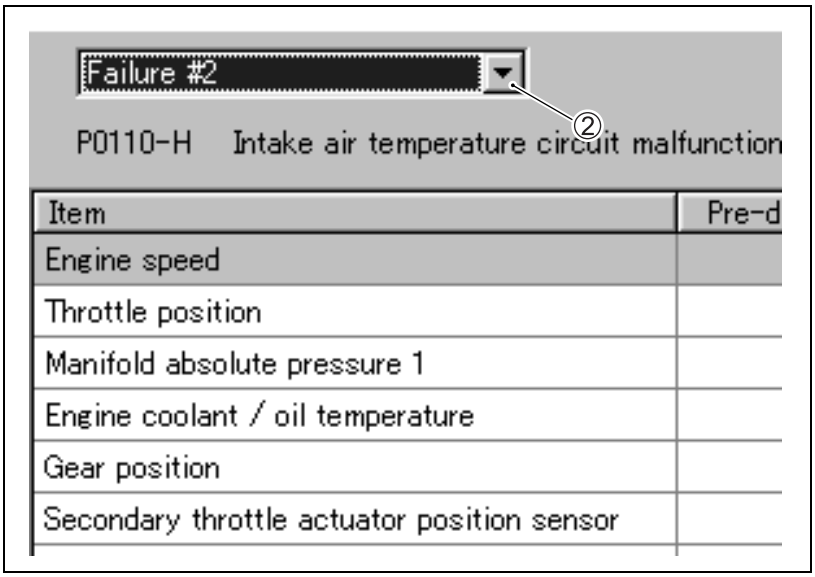


SHOW DATA WHEN TROUBLE (DISPLAING DATA AT THE TIME OF DTC)

ECM stores the engine and driving conditions (in the form of data as shown in the figure) at the moment of the detection of a malfunction in its memory. This data is called “Show data when trouble”.
Therefore, it is possible to know engine and driving conditions (e.g., whether the engine was warm or not, where the motorcycle was running or stopped) when a malfunction was detected by checking the show data when trouble. This show data when trouble function can record the maximum of two Diagnostic Trouble Codes in the ECM.
Also, ECM has a function to store each show data when trouble for two different malfunctions in the order as the malfunction is detected. Utilizing this function, it is possible to know the order of malfunctions that have been detected. Its use is helpful when rechecking or diagnosing a trouble.



- Click “Show data when trouble” ① to display the data. By clicking the drop down button ②, either “Failure #1” or “Failure #2” can be selected.



MALFUNCTION CODE AND DEFECTIVE CONDITION

DTC No.		DETECTED ITEM	DETECTED FAILURE CONDITION	CHECK FOR
C00		NO FAULT	————	————
C11		CMP sensor	The signal does not reach ECM for 3 sec. or more, after receiving the starter signal.	CMP sensor wiring and mechanical parts
P0340				CMP sensor, intake cam pin, wiring/coupler connection
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
P0335				CKP sensor, lead wire/coupler connection
C13		IAP sensor	The sensor should produce following voltage. 0.5 V ≦ sensor voltage < 4.85 V In other than the above range, C13 (P0105) is indicated.	IAP sensor, lead wire/coupler connection
P0105	H		Sensor voltage is higher than specified value.	IAP sensor circuit shorted to VCC or ground circuit open
	L		Sensor voltage is lower than specified value.	IAP sensor circuit open or shorted to ground or VCC circuit open
C14		TP sensor	The sensor should produce following voltage. 0.2 V ≦ sensor voltage < 4.80 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 circuit shorted to VCC or ground circuit open
	L		Sensor voltage is lower than specified value.	TP sensor circuit open or shorted to ground or VCC circuit open
C15		ECT sensor	The sensor voltage should be the following. 0.15 V ≦ sensor voltage < 4.85 V In other than the above 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

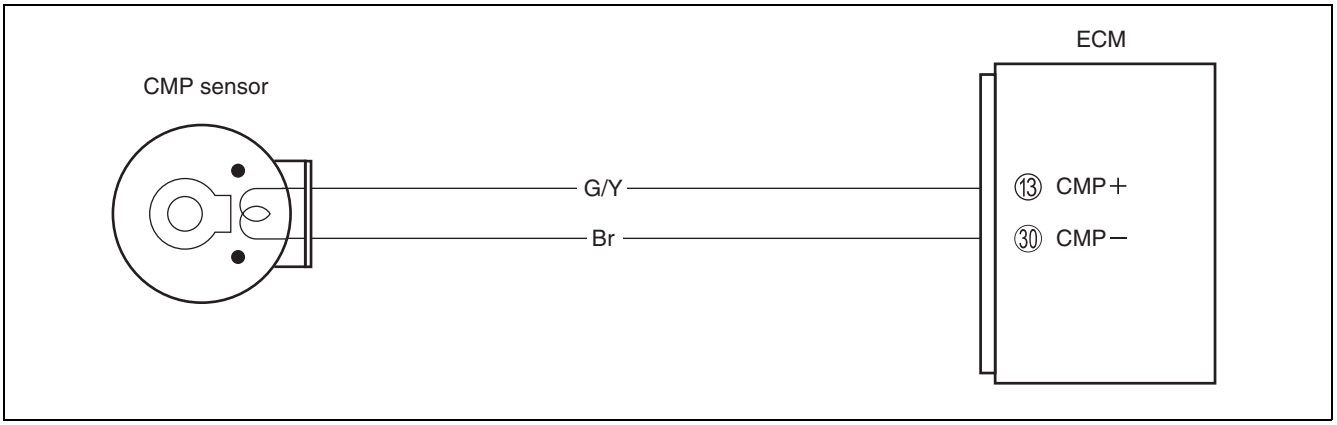
DTC No.		DETECTED ITEM	DETECTED FAILURE CONDITION	CHECK FOR
C21		IAT sensor	The sensor voltage should be the following. 0.15 V ≦ sensor voltage < 4.85 V In other than the above range, C21 (P0110) is indicated.	IAT sensor, lead wire/coupler connection
P0110	H		Sensor voltage is higher than specified value.	IAT sensor circuit open or ground circuit open
	L		Sensor voltage is lower than specified value.	IAT sensor circuit shorted to ground
C22		AP sensor	The sensor voltage should be the following. 0.5 V ≦ sensor voltage < 4.85 V In other than the above range, C22 (P1450) is indicated.	AP sensor, wiring/coupler connection
P1450	H		Sensor voltage is higher than specified value.	AP sensor circuit shorted to VCC or ground circuit open
	L		Sensor voltage is lower than specified value.	AP sensor circuit open or shorted to ground or VCC circuit open
C23		TO sensor	The sensor voltage should be the following for 2 sec. and more, after ignition switch is turned ON. 0.2 V ≦ sensor voltage < 4.8 V In other than the above value, C23 (P1651) is indicated.	TO sensor, lead wire/coupler connection
P1651	H		Sensor voltage is higher than specified value.	TO sensor circuit shorted to VCC or ground circuit open
	L		Sensor voltage is lower than specified value.	TO sensor circuit open or shorted to ground or VCC circuit open
C24/C25 C26/C27		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), C25 (P0352), C26 (P0353) or C27 (P0354) is indicated.	Ignition coil, wiring/coupler connection, power supply from the battery
P0351/P0352 P0353/P0354				
C28		Secondary throttle valve actuator	When no actuator control signal is supplied from the ECM, communication signal does not reach ECM or operation voltage does not reach STVA motor, C28 (P1655) is indicated. STVA can not operate.	STVA motor, STVA lead wire/coupler
P1655				

DTC No.		DETECTED ITEM	DETECTED FAILURE CONDITION	CHECK FOR
C29		STP sensor	The sensor should produce following voltage. 0.15 V ≦ sensor voltage < 4.85 V In other than the above range, C29 (P1654) is indicated.	STP sensor, lead wire/coupler connection
P1654	H		Sensor voltage is higher than specified value.	STP sensor circuit shorted to VCC or ground circuit open
	L		Sensor voltage is lower than specified value.	STP sensor circuit open or shorted to ground or VCC circuit open
C31		Gear position signal	Gear position signal voltage should be higher than the following for 3 seconds and more. Gear position sensor voltage > 0.6 V If lower than the above value, C31 (P0705) is indicated.	GP switch, wiring/coupler connection, gearshift cam, etc.
P0705				
C32/C33 C34/C35		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), C33 (P0202), C34 (P0203) or C35 (P0204) is indicated.	Fuel injector, wiring/coupler connection, power supply to the injector
P0201/P0202 P0203/P0204				
C41		Fuel pump relay	No voltage is applied to the fuel pump, although fuel pump relay is turned ON, or voltage is applied to fuel pump although fuel pump relay is turned OFF.	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).
C42		Ignition switch (Only for Immobilizer)	When the I.D. agreement is not verified. ECM does not receive communication signal from the immobilizer antenna.	Immobilizer/anti-theft system
P1650				

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. (Sensor voltage $\leqq$ 0.1 V) In other than the above value, C44 (P0130) is indicated.	HO2 sensor circuit open or shorted to ground
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			

"C11" (P0340) CMP SENSOR CIRCUIT MALFUNCTION

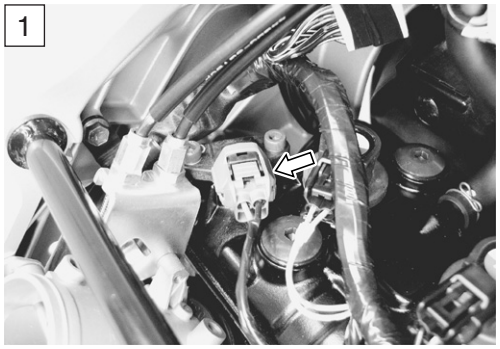
DETECTED CONDITION	POSSIBLE CAUSE
The signal does not reach ECM for 3 sec. or more, after receiving the starter signal.	• Metal particles or foreign material being stuck on the CMP sensor and rotor tip • CMP sensor circuit open or short • CMP sensor malfunction • ECM malfunction



INSPECTION

Step 1

1) Turn the ignition switch to OFF.
2) Lift and support the fuel tank. (☞5-3)
3) Remove the air cleaner box. (☞5-13)
4) Check the CMP sensor coupler for loose or poor contacts.
   If OK, then measure the CMP sensor resistance.

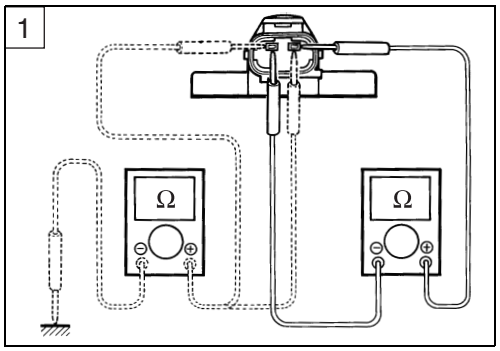


5) Disconnect the CMP sensor coupler and measure the resistance.

DATA **CMP sensor resistance: 0.9 – 1.7 kΩ (Terminal – Terminal)**

TOOL **09900-25008: Multi-circuit tester set**

Tester knob indication: Resistance (Ω)



6) If OK, then check the continuity between each terminal and ground.

DATA **CMP sensor continuity: ∞ Ω (Infinity) (Terminal – Ground)**

Are the resistance and continuity OK?

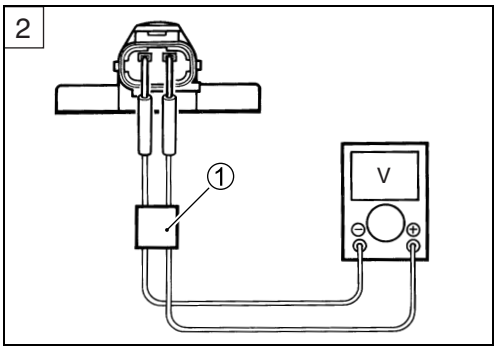
YES	Go to step 2.
NO	Replace the CMP sensor with a new one.

7) After repairing the trouble, clear the DTC using SDS tool. (☞4-26)

Step 2

1) Crank the engine a few seconds with the starter motor, and measure the CMP sensor peak voltage at the coupler.
2) Repeat the above test procedure a few times and measure the highest peak voltage.

DATA CMP sensor peak voltage: 0.7 V and more (⊕ B/Y – ⊖ B/Br)

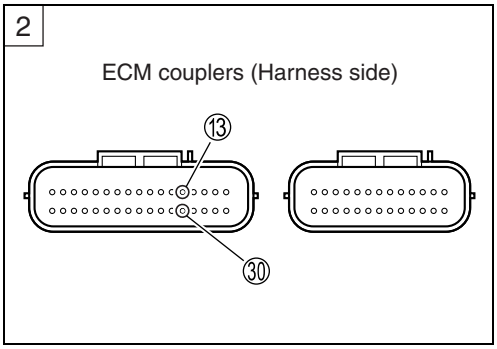


① Peak volt adaptor

TOOL 09900-25008: Multi-circuit tester set

Tester knob indication: Voltage (⎓)

Is the voltage OK?

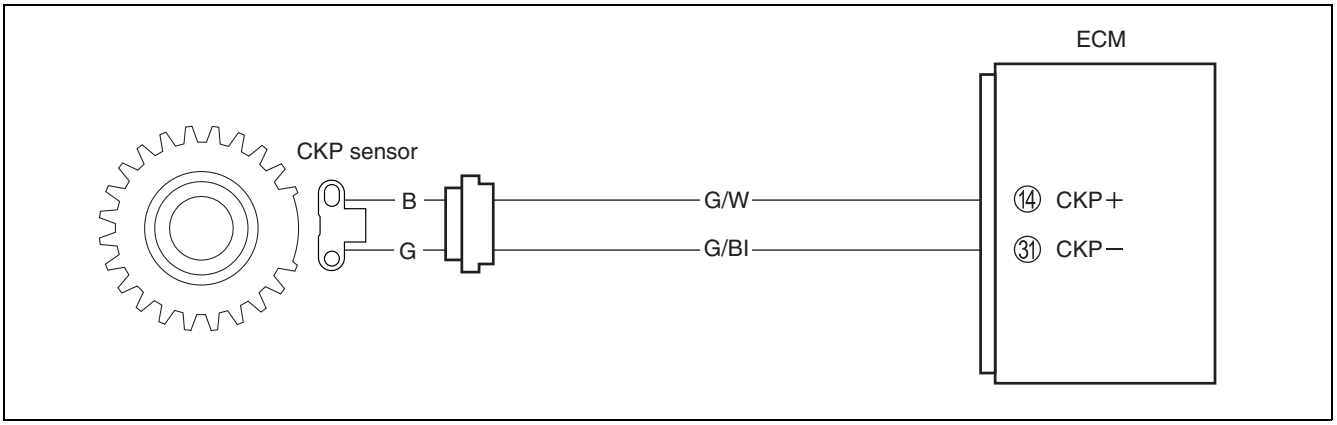


YES	• G/Y or Brown wire open or shorted to ground • Loose or poor contacts on the CKP sensor coupler or ECM coupler (terminal ⑬ or ㉚) • If wire and connection are OK, intermittent trouble or faulty ECM. • Recheck each terminal and wire harness for open circuit and poor connection. • Replace the ECM with a known good one, and inspect it again.
NO	• Inspect that metal particles or foreign material stuck on the CMP sensor and rotor tip. • If there are no metal particles and foreign material, then replace the CMP sensor with a new one.

3) After repairing the trouble, clear the DTC using SDS tool. (☞4-26)

"C12" (P0335) CKP SENSOR CIRCUIT MALFUNCTION

DETECTED CONDITION	POSSIBLE CAUSE
The signal does not reach ECM for 3 sec. or more, after receiving the starter signal.	• Metal particles or foreign material being stuck on the CKP sensor and rotor tip • CKP sensor circuit open or short • CKP sensor malfunction • ECM malfunction



INSPECTION

Step 1

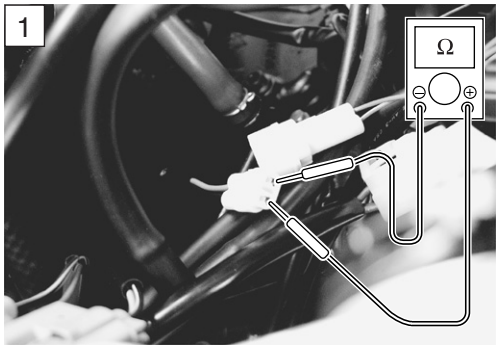
1) Turn the ignition switch to OFF.
2) Lift and support the fuel tank. (☞5-3)
3) Check the CKP sensor coupler for loose or poor contacts.
   If OK, then measure the CKP sensor resistance.

4) Disconnect the CKP sensor coupler and measure the resistance.

DATA CKP sensor resistance: 142 – 194 Ω (Black – Green)

TOOL 09900-25008: Multi-circuit tester set

Tester knob indication: Resistance (Ω)



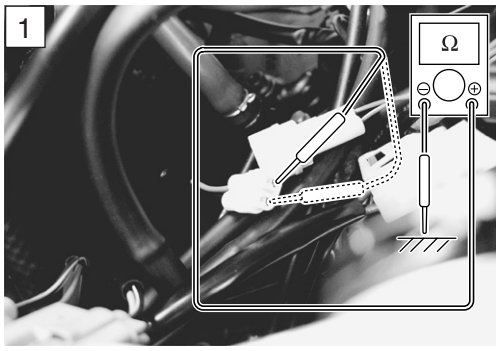
5) If OK, then check the continuity between each terminal and ground.

DATA CKP sensor continuity: ∞ Ω (Infinity)
(Black – Ground)
(Green – Ground)

Are the resistance and continuity OK?

YES	Go to step 2.
NO	Replace the CKP sensor with a new one.

6) After repairing the trouble, clear the DTC using SDS tool. (☞4-26)



Step 2

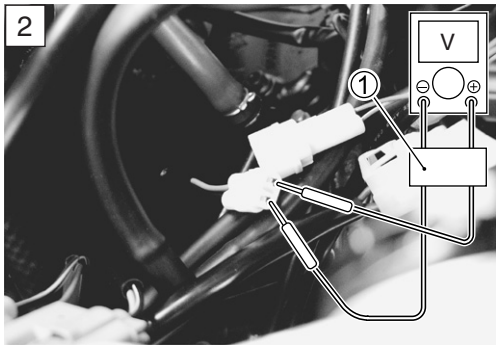
1) Crank the engine a few seconds with the starter motor, and measure the CKP sensor peak voltage at the coupler.
2) Repeat the above test procedure a few times and measure the highest peak voltage.

DATA CKP sensor peak voltage: 0.5 V and more
(⊕ Black – ⊖ Green)

① Peak volt adaptor

TOOL 09900-25008: Multi-circuit tester set

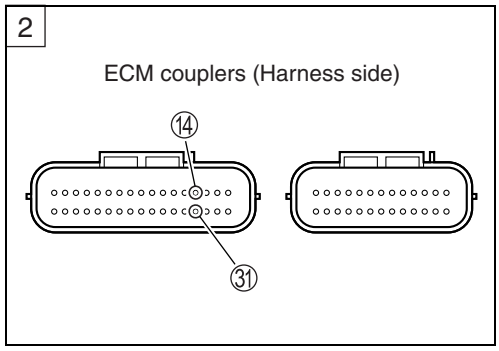
Tester knob indication: Voltage (⎓)



Is the voltage OK?

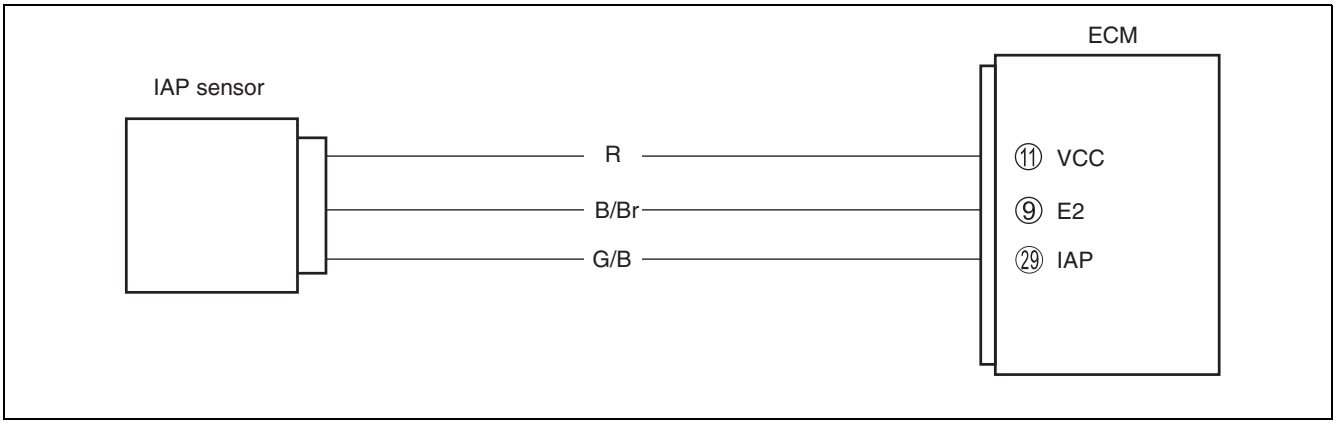
YES	• G/W or G/Bl wire open or shorted to ground. • Loose or poor contacts on the CKP sensor coupler or ECM coupler (terminal ⑭ or ㉛). • If wire and connection are OK, intermittent trouble or faulty ECM. • Recheck each terminal and wire harness for open circuit and poor connection. • Replace the ECM with a known good one, and inspect it again.
NO	• Inspect that metal particles or foreign material stuck on the CKP sensor and rotor tip. • If there are no metal particles and foreign material, then replace the CKP sensor with a new one.

3) After repairing the trouble, clear the DTC using SDS tool. (☞4-26)



"C13" (P0105-H/L) IAP SENSOR CIRCUIT MALFUNCTION

		DETECTED CONDITION	POSSIBLE CAUSE
C13		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.
P0105	H	Sensor voltage is higher than specified value.	• IAP sensor circuit open or shorted to VCC or ground circuit open.
	L	Sensor voltage is lower than specified value.	• IAP sensor circuit shorted to ground or VCC circuit open.



INSPECTION

Step 1 (When indicating C13:)

1) Turn the ignition switch to OFF.
2) Lift and support the fuel tank. (☞5-3)
3) Check the IAP sensor coupler for loose or poor contacts.
   If OK, then measure the IAP sensor input voltage.

4) Disconnect the IAP sensor coupler.
5) Turn the ignition switch to ON.
6) Insert the needle pointed probes to the lead wire coupler.
7) Measure the voltage at the Red wire and ground.
8) If OK, then measure the voltage at the Red wire and B/Br wire.

DATA IAP sensor input voltage: 4.5 – 5.5 V
(⊕ Red – ⊖ Ground)
(⊕ Red – ⊖ B/Br)

TOOL 09900-25008: Multi-circuit tester set
09900-25009: Needle pointed probe set

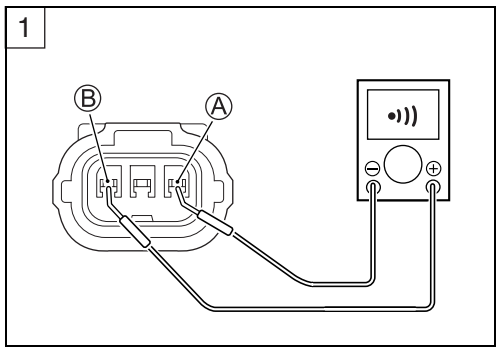
Tester knob indication: Voltage (⎓)

Is the voltage OK?

YES	Go to Step 2.
NO	• Loose or poor contacts on the ECM coupler (terminal ⑪ or ㉙). • Open or short circuit in the Red wire or B/Br wire.

Step 1 (When indicating P0105-H:)
1) Turn the ignition switch to OFF.
2) Lift and support the fuel tank. (☞5-3)
3) Check the IAP sensor coupler for loose or poor contacts.
If OK, then check the IAP sensor lead wire continuity.

4) Disconnect the IAP sensor coupler.
5) Check the continuity between Red wire Ⓐ and G/B wire Ⓑ.
If the sound is not heard from the tester, the circuit condition is OK.



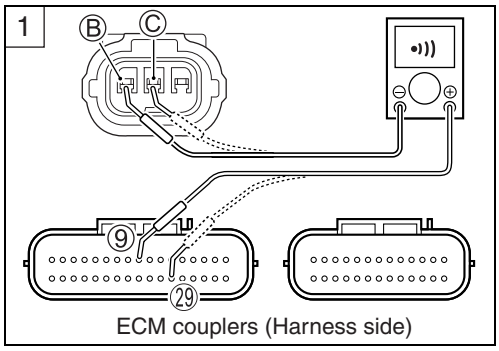
6) Disconnect the ECM coupler.
7) Check the continuity between G/B wire Ⓑ and terminal ⑨.
8) If OK, then check the continuity between B/Br wire Ⓒ and terminal ㉙.

DATA IAPS lead wire continuity: Continuity (•))))

TOOL 09900-25008: Multi-circuit tester set
09900-25009: Needle pointed probe set

Tester knob indication: Continuity test (•))))

Is the continuity OK?



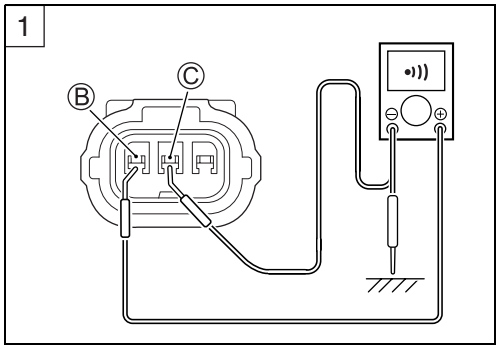
ECM couplers (Harness side)

YES	Go to Step 2.
NO	G/B wire shorted to VCC, or B/Br wire open.

9) After repairing the trouble, clear the DTC using SDS tool. (☞4-26)

Step 1 (When indicating P0105-L:)
1) Turn the ignition switch to OFF.
2) Lift and support the fuel tank. (☞5-3)
3) Check the IAP sensor coupler for loose or poor contacts.
If OK, then check the IAP sensor lead wire continuity.

4) Disconnect the IAP sensor coupler.
5) Check the continuity between G/B wire Ⓑ and ground.
6) Also, check the continuity between G/B wire Ⓑ and B/Br wire Ⓒ. If the sound is not heard from the tester, the circuit condition is OK.

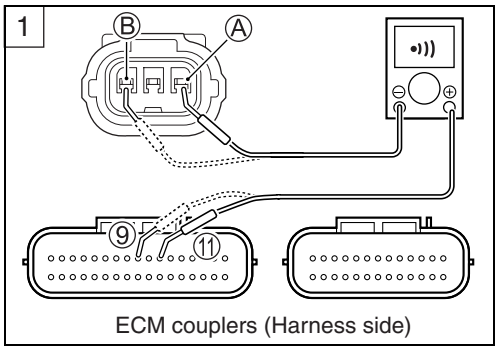


7) Disconnect the ECM coupler.
8) Check the continuity between Red wire Ⓐ and terminal ⑪.
9) Also, check the continuity between G/B wire Ⓑ and terminal ⑨.

DATA IAPS lead wire continuity: Continuity (•))))

TOOL 09900-25008: Multi-circuit tester set
09900-25009: Needle pointed probe set

Tester knob indication: Continuity test (•))))



ECM couplers (Harness side)

Is the continuity OK?

YES	Go to Step 1 (☞4-36) and go to Step 2.
NO	Red wire or G/B wire open, or G/B wire shorted to ground

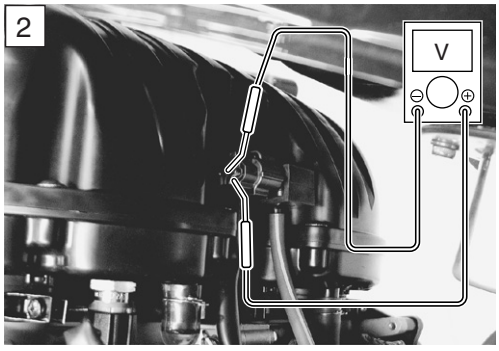
10) After repairing the trouble, clear the DTC using SDS tool. (☞4-26)

Step 2
1) Connect the IAP sensor coupler and ECM coupler.
2) Insert the needle pointed probes to the IAP sensor lead wire coupler as shown.
3) Start the engine at idle speed and measure the IAP sensor output voltage between G/B and B/Br wires.

DATA IAP sensor output voltage: Approx. 2.7 V at idle speed
(⊕ G/B – ⊖ B/Br)

TOOL 09900-25008: Multi-circuit tester set
09900-25009: Needle pointed probe set

Tester knob indication: Voltage (⎓)



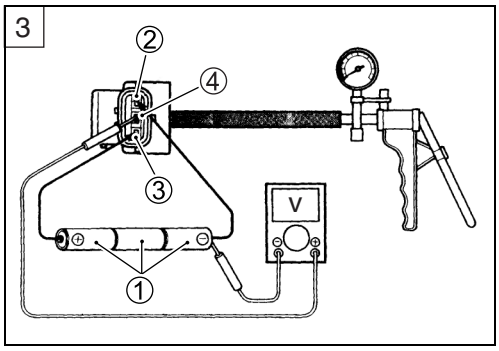
Is the voltage OK?

YES	Go to Step 3.
NO	• Check the vacuum hose for crack or damage. • Open or short circuit in the G/B wire • If vacuum hose and wire are OK, replace the IAP sensor with a new one.

4) After repairing the trouble, clear the DTC using SDS tool. (☞4-26)

Step 3

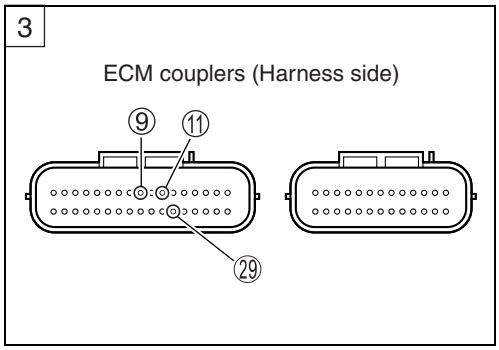
1) Turn the ignition switch to OFF.
2) Remove the IAP sensor.
3) Connect the vacuum pump gauge to the vacuum port of the IAP sensor.
   Arrange 3 new 1.5 V batteries in series ① (check that total voltage is 4.5 – 5.0 V) and connect ⊖ terminal to the ground terminal ② and ⊕ terminal to the VCC terminal ③.
4) Check the voltage between Vout ④ and ground. Also, check if voltage reduces when vacuum is applied up to 400 mmHg by using vacuum pump gauge. (☞4-41)



09917-47011: Vacuum pump gauge
09900-25008: Multi-circuit tester set

Tester knob indication: Voltage (⎓)

Is the voltage OK?



YES	• G/B, Red or B/Br wire open or shorted to ground, or poor ⑨, ⑪ or ㉙ connection • If wire and connection are OK, intermittent trouble or faulty ECM. • Recheck each terminal and wire harness for open circuit and poor connection. • Replace the ECM with a known good one, and inspect it again.
NO	If check result is not satisfactory, replace the IAP sensor with a new one.

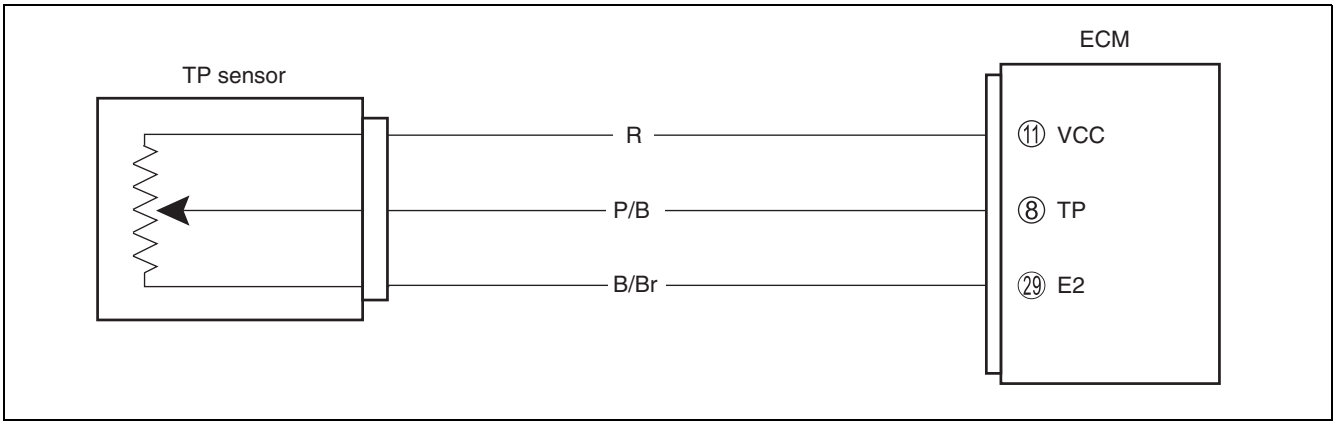
5) After repairing the trouble, clear the DTC using SDS tool. (☞4-26)

Output voltage
(VCC voltage 4.5 – 5.0 V, ambient temp. 20 – 30 °C)

ALTITUDE (Reference)	ATMOSPHERIC PRESSURE		OUTPUT VOLTAGE
(m)	(mmHg)	kPa	(V)
0 | 610	760 | 708	100 | 95	3.1 – 3.6
611 | 1 524	707 | 635	94 | 86	2.8 – 3.4
1 525 | 2 438	634 | 568	85 | 77	2.6 – 3.1
2 439 | 3 048	567 | 526	76 | 70	2.4 – 2.9

"C14" (P0120-H/L) TP SENSOR CIRCUIT MALFUNCTION

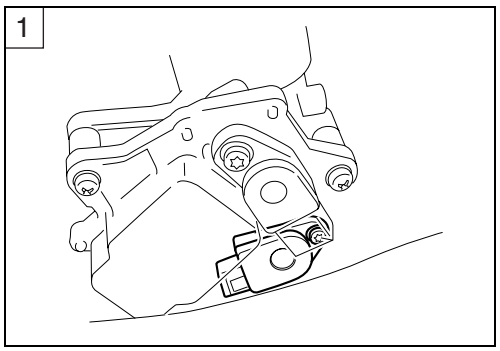
DETECTED CONDITION			POSSIBLE CAUSE
C14		Output voltage is not within the following range. Difference between actual throttle opening and opening calculated by ECM is larger than specified value. 0.2 V ≦ Sensor voltage < 4.8 V	• TP sensor maladjusted • TP sensor circuit open or short • TP sensor malfunction • ECM malfunction
P0120	H	Sensor voltage is higher than specified value.	• TP sensor circuit shorted to VCC or ground circuit open
	L	Sensor voltage is lower than specified value.	• TP sensor circuit open or shorted to ground or VCC circuit open



INSPECTION

Step 1 (When indicating C14:)

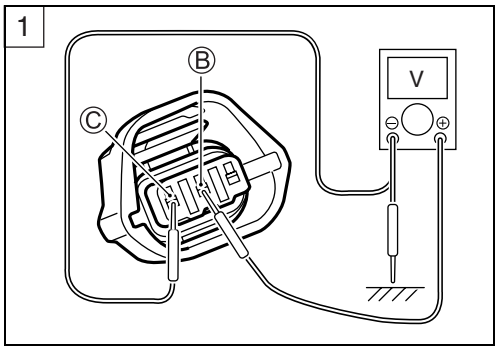
1) Turn the ignition switch to OFF.
2) Lift and support the fuel tank. (☞5-3)
3) Remove the air cleaner box and lift up the throttle body. (☞5-13)
4) Check the TP sensor coupler for loose or poor contacts.
   If OK, then measure the TP sensor input voltage.
5) Disconnect the TP sensor coupler.
6) Turn the ignition switch ON.
7) Measure the voltage at the Red wire Ⓑ and ground.
8) If OK, then measure the voltage at the Red wire Ⓑ and B/Br wire Ⓒ.



DATA TP sensor input voltage: 4.5 – 5.5 V
(⊕ Red – ⊖ Ground)
(⊕ Red – ⊖ B/Br)

TOOL 09900-25008: Multi-circuit tester set

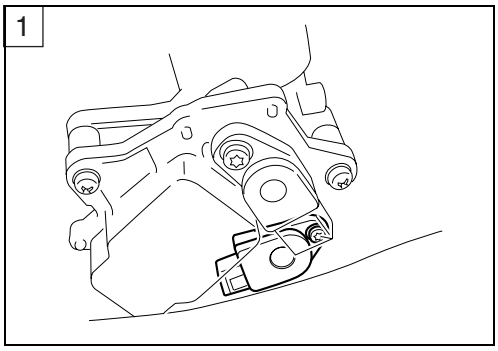
Tester knob indication: Voltage (⎓)



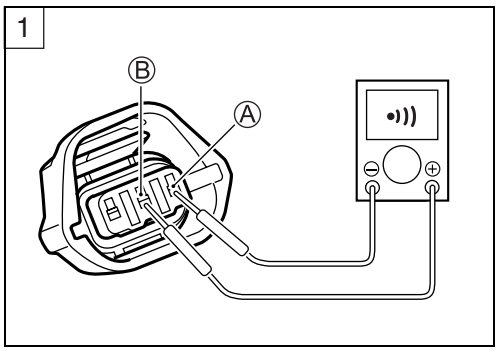
Is the voltage OK?

YES	Go to Step 2.
NO	• Loose or poor contacts on the ECM coupler (terminal ⑪ or ㉙). • Open or short circuit in the Red wire or B/Br wire.

Step 1 (When indicating P0120-H:)
1) Turn the ignition switch to OFF.
2) Lift and support the fuel tank. (☞5-3)
3) Remove the air cleaner box and lift up the throttle body. (☞5-13)
4) Check the TP sensor coupler for loose or poor contacts.
If OK, then check the TP sensor lead wire continuity.



5) Disconnect the TP sensor coupler.
6) Check the continuity between P/B wire Ⓐ and Red wire Ⓑ.
If the sound is not heard from the tester, the circuit condition is OK.

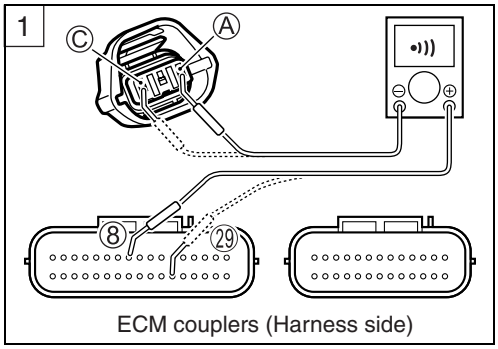


7) Disconnect the ECM coupler.
8) Check the continuity between P/B wire Ⓐ and terminal ⑧.
9) Also, check the continuity between B/Br wire Ⓒ and terminal ㉙.

DATA TPS lead wire continuity: Continuity (•))))

TOOL 09900-25008: Multi-circuit tester set
09900-25009: Needle pointed probe set

Tester knob indication: Continuity test (•))))



ECM couplers (Harness side)

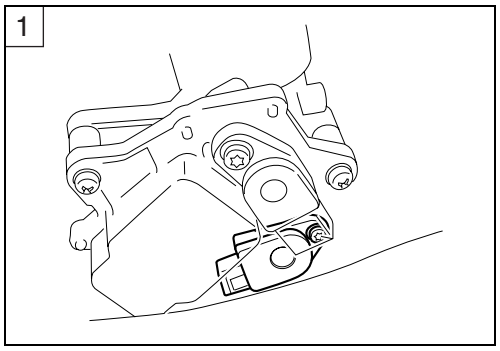
Is the continuity OK?

YES	Go to Step 2.
NO	P/B wire shorted to VCC, or B/Br wire open

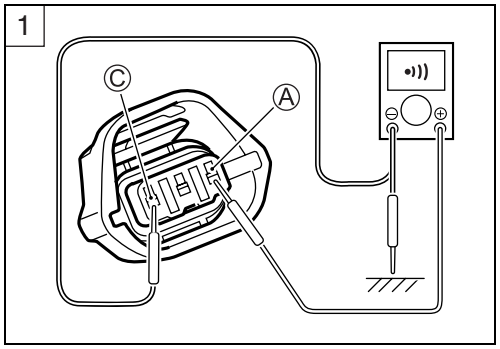
10) After repairing the trouble, clear the DTC using SDS tool. (☞4-26)

Step 1 (When indicating P0120-L:)

1) Turn the ignition switch to OFF.
2) Lift and support the fuel tank. (☞5-3)
3) Remove the air cleaner box and lift up the throttle body. (☞5-13)
4) Check the TP sensor coupler for loose or poor contacts.
   If OK, then check the TP sensor lead wire continuity.



5) Disconnect the TP sensor coupler.
6) Check the continuity between P/B wire Ⓐ and ground.
7) Also, check the continuity between P/B wire Ⓐ and B/Br wire Ⓒ. If the sound is not heard from the tester, the circuit condition is OK.

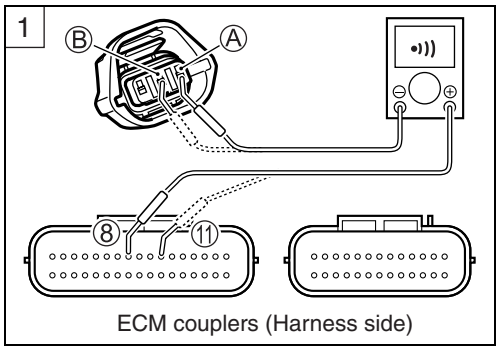


8) Disconnect the ECM coupler.
9) Check the continuity between P/B wire Ⓐ and terminal ⑧.
10) Also, check the continuity between Red wire Ⓑ and terminal ⑪.

DATA TPS lead wire continuity: Continuity (•))))

TOOL 09900-25008: Multi-circuit tester set
09900-25009: Needle pointed probe set

Tester knob indication: Continuity test (•))))



ECM couplers (Harness side)

Is the continuity OK?

YES	Go to Step 1 (☞4-42) and go to Step 2.
NO	Red wire or P/B wire open, or P/B wire shorted to ground

11) After repairing the trouble, clear the DTC using SDS tool. (☞4-26)

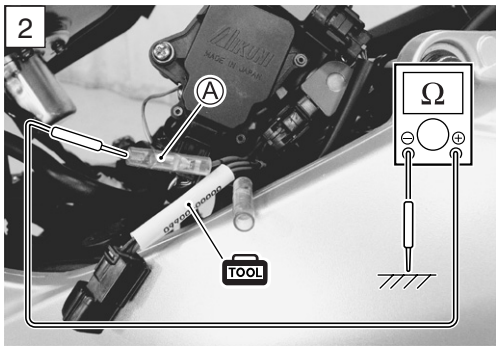
Step 2

1) Turn the ignition switch to OFF.
2) Disconnect the TP sensor coupler.
3) Install the test harness to the TP sensor.
4) Check the continuity between terminal Ⓐ and ground.

DATA TP sensor continuity: ∞ Ω (Infinity)
(Terminal Ⓐ – Ground)

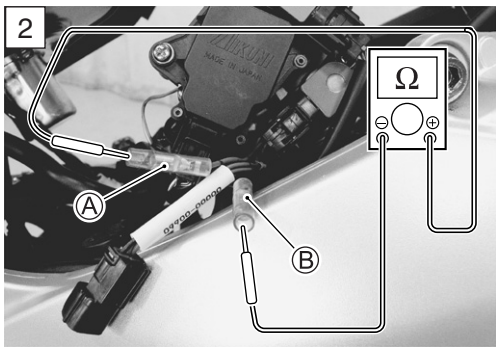
TOOL 09900-25008: Multi-circuit tester set
09900-28630: TPS test wire harness

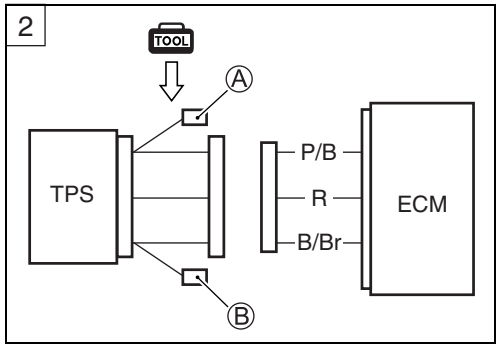
Tester knob indication: Continuity test (•))))



5) If OK, then measure the TP sensor resistance at the test harness terminals (between terminal Ⓐ and terminal Ⓑ).
6) Turn the throttle grip and measure the resistance.

DATA TP sensor resistance
Throttle valve is closed: Approx. 1.1 kΩ
Throttle valve is opened: Approx. 4.4 kΩ

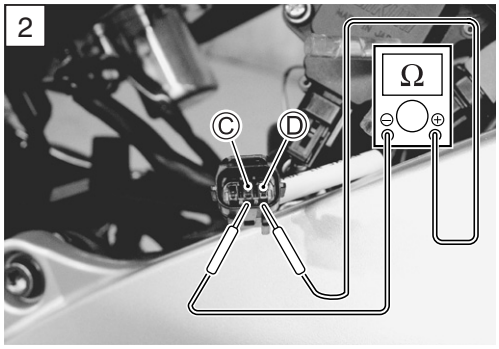




7) If OK, then measure the TP sensor resistance at the test harness terminals (between terminal Ⓒ and terminal Ⓓ).

DATA TP sensor resistance: Approx. 4.68 kΩ
(Terminal Ⓒ – Terminal Ⓓ)

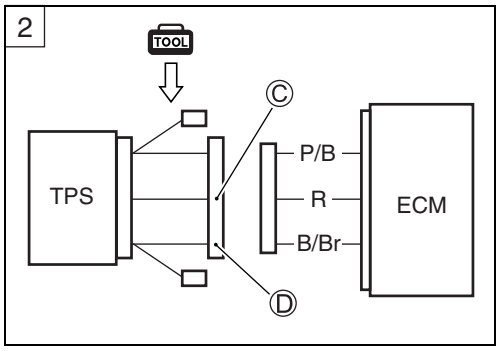
Tester knob indication: Resistance (Ω)



Are the continuity and resistance OK?

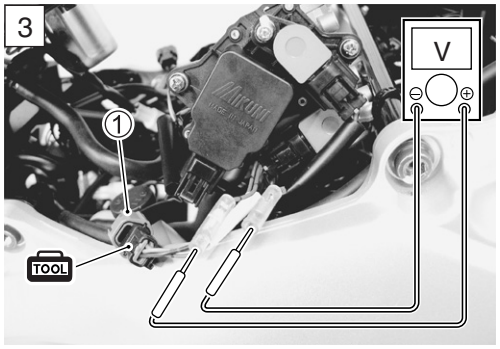
YES	Go to Step 3.
NO	• Reset the TP sensor position correctly. • Replace the TP sensor with a new one.

8) After repairing the trouble, clear the DTC using SDS tool. (☞4-26)



Step 3

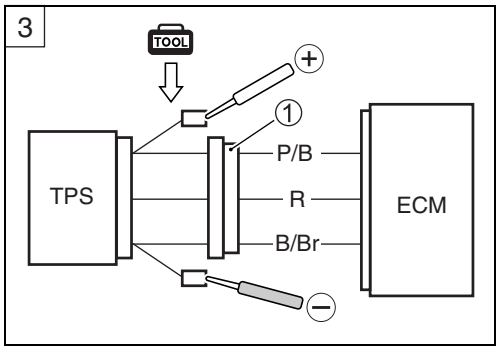
1) Connect the TP sensor coupler ① to the test harness.
2) Turn the ignition switch to ON.
3) Measure the TP sensor output voltage at the coupler (between ⊕ P/B and ⊖ B/Br) by turning the throttle grip.



DATA TP sensor output voltage
Throttle valve is closed: Approx. 1.1 V
Throttle valve is opened: Approx. 4.4 V

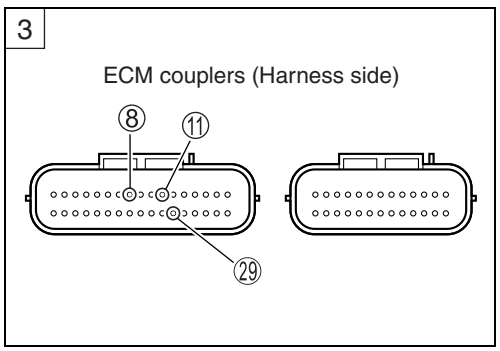
TOOL 09900-25008: Multi-circuit tester set

Tester knob indication: Voltage (⎓)



Is the voltage OK?

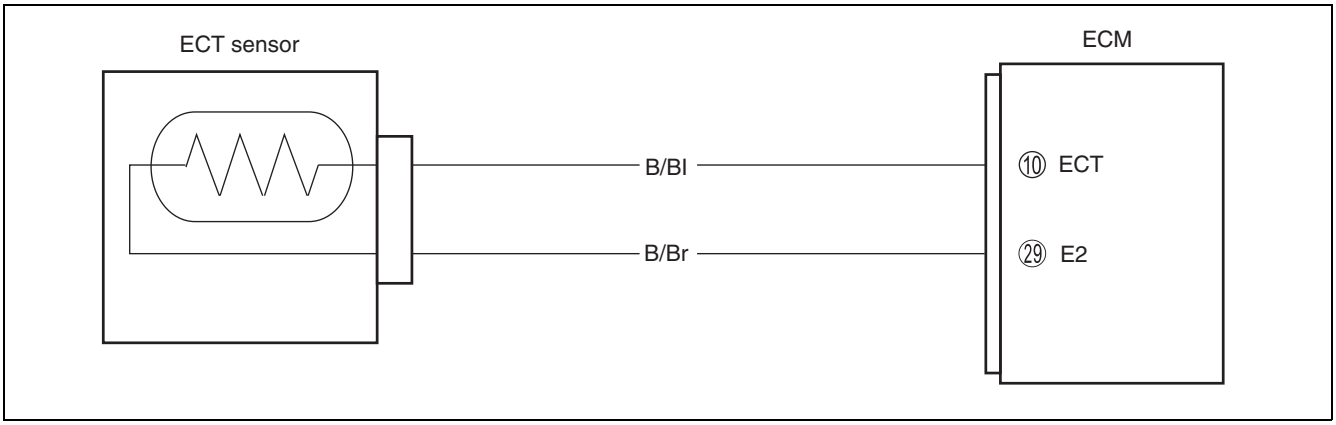
YES	• P/B, Red or B/Br wire open or shorted to ground, or poor ⑧, ⑪ or ㉙ connection • If wire and connection are OK, intermittent trouble or faulty ECM. • Recheck each terminal and wire harness for open circuit and poor connection. • Replace the ECM with a known good one, and inspect it again.
NO	If check result is not satisfactory, replace TP sensor with a new one.



4) After repairing the trouble, clear the DTC using SDS tool. (☞4-26)

"C15" (P0115-H/L) ECT SENSOR CIRCUIT MALFUNCTION

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

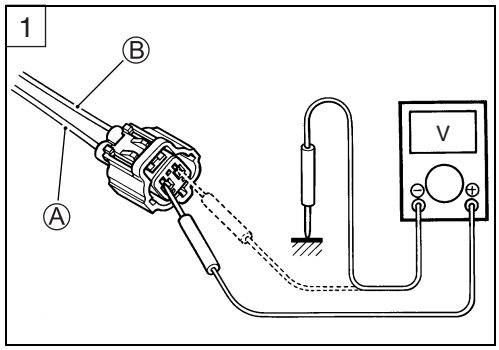


INSPECTION

Step 1 (When indicating C15:)

1) Turn the ignition switch to OFF.
2) Check the ECT sensor coupler for loose or poor contacts.
   If OK, then measure the ECT sensor voltage at the wire side coupler.
3) Disconnect the coupler and turn the ignition switch ON.
4) Measure the voltage between B/Bl wire terminal Ⓐ and ground.
5) If OK, then measure the voltage between B/Bl wire terminal Ⓐ and B/Br wire terminal Ⓑ.

DATA ECT sensor voltage: 4.5 – 5.5 V
(⊕ B/Bl – ⊖ Ground)
(⊕ B/Bl – ⊖ B/Br)



TOOL 09900-25008: Multi-circuit tester set

Tester knob indication: Voltage (⎓)

Is the voltage OK?

YES	Go to Step 2.
NO	• Loose or poor contacts on the ECM coupler (terminal ⑩ or ㉙). • Open or short circuit in the B/Bl wire or B/Br wire

Step 1 (When indicating P0115-H:)

1) Turn the ignition switch to OFF.
2) Check the ECT sensor coupler for loose or poor contacts.
   If OK, then check the ECT sensor lead wire continuity.

1

3) Disconnect the ECT sensor coupler and ECM coupler.
4) Check the continuity between B/Bl wire Ⓐ and terminal ⑩.
5) Also, check the continuity between B/Br wire Ⓑ and terminal ㉙.

DATA ECTS lead wire continuity: Continuity (•))))

TOOL 09900-25008: Multi-circuit tester set
09900-25009: Needle pointed probe set

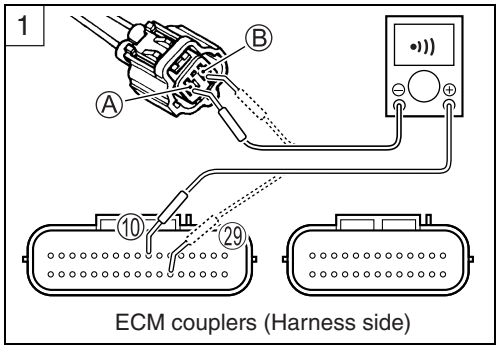
Tester knob indication: Continuity test (•))))

Is the continuity OK?

YES	Go to Step 2.
NO	B/Bl or B/Br wire open

6) After repairing the trouble, clear the DTC using SDS tool. (☞4-26)

1



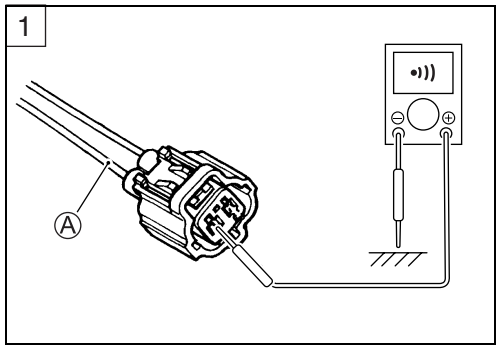
ECM couplers (Harness side)

Step 1 (When indicating P0115-L:)

1) Turn the ignition switch to OFF.
2) Check the ECT sensor coupler for loose or poor contacts.
   If OK, then measure the output voltage.

3) Disconnect the ECT sensor coupler.
4) Check the continuity between B/Bl wire Ⓐ and ground.
   If the sound is not heard from the tester, the circuit condition is OK.

Tester knob indication: Continuity test (•))))



5) Connect the ECT sensor coupler and turn the ignition switch to ON.
6) Measure the voltage between B/Bl wire Ⓐ and ground.

DATA ECT sensor output voltage: 0.15 – 4.85 V
(⊕ B/Bl – ⊖ Ground)

TOOL 09900-25008: Multi-circuit tester set
09900-25009: Needle pointed probe set

Tester knob indication: Voltage (⎓)

Are the continuity and voltage OK?

YES	Go to Step 2.
NO	• B/Bl wire shorted to ground • If wire is OK, go to Step 2.

7) After repairing the trouble, clear the DTC using SDS tool. (☞4-26)

Step 2

1) Turn the ignition switch to OFF.
2) Disconnect the ECT sensor coupler.
3) Measure the ECT sensor resistance.

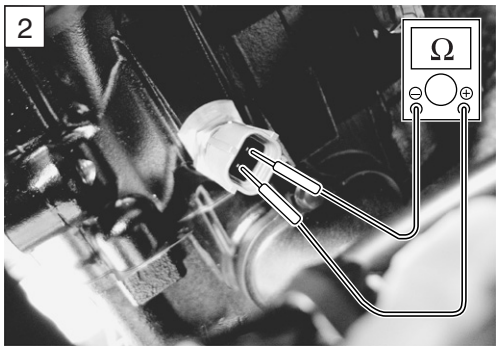
DATA ECT sensor resistance:

Approx. 2.3 – 2.6 kΩ at 20 °C
(Terminal – Terminal)

TOOL 09900-25008: Multi-circuit tester set

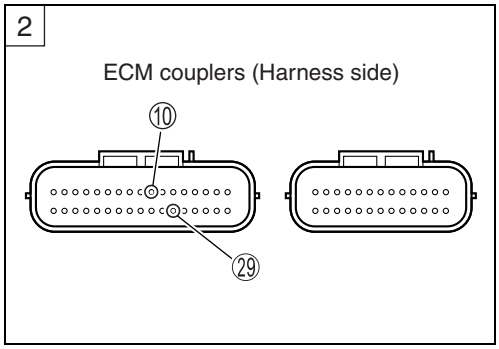
Tester knob indication: Resistance (Ω)

Refer to page 7-7 for details.



Is the resistance OK?

YES	• B/Bl or B/Br wire open or shorted to ground, or poor ⑩ or ㉙ connection. • If wire and connection are OK, intermittent trouble or faulty ECM. • Recheck each terminal and wire harness for open circuit and poor connection. • Replace the ECM with a known good one, and inspect it again.
NO	Replace the ECT sensor with a new one.



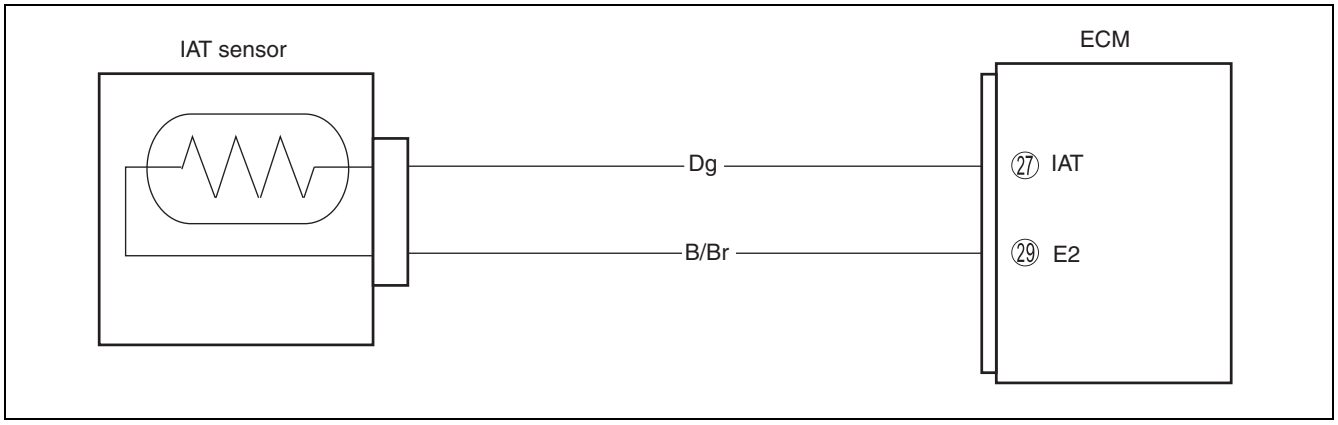
4) After repairing the trouble, clear the DTC using SDS tool. (☞4-26)

DATA ECT sensor specification

Engine Coolant Temp	Resistance
20 °C	Approx. 2.45 kΩ
50 °C	Approx. 0.811 kΩ
80 °C	Approx. 0.318 kΩ
110 °C	Approx. 0.142 kΩ

"C21" (P0110-H/L) IAT SENSOR CIRCUIT MALFUNCTION

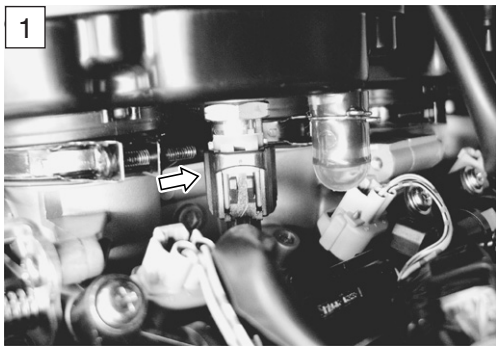
DETECTED CONDITION			POSSIBLE CAUSE
C21		Output voltage is not within the following range. 0.15 V ≦ Sensor voltage < 4.85 V	• IAT sensor circuit open or short • IAT sensor malfunction • ECM malfunction
P0110	H	Sensor voltage is higher than specified value.	• IAT sensor circuit open or ground circuit open
	L	Sensor voltage is lower than specified value.	• IAT sensor circuit shorted to ground



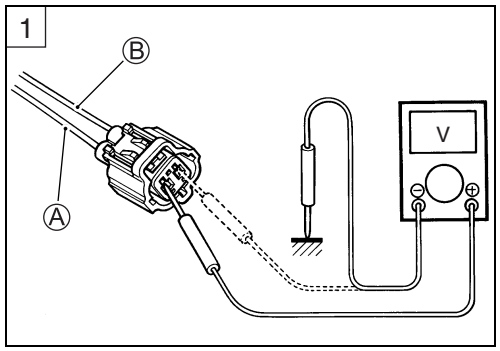
INSPECTION

Step 1 (When indicating C21:)

1) Turn the ignition switch to OFF.
2) Lift and support the fuel tank. (☞5-3)
3) Check the IAT sensor coupler for loose or poor contacts.
   If OK, then measure the IAT sensor voltage at the wire side coupler.
4) Disconnect the coupler and turn the ignition switch ON.



5) Measure the voltage between Dg wire terminal Ⓐ and ground.
6) If OK, then measure the voltage between Dg wire terminal Ⓐ and B/Br wire terminal Ⓑ.



DATA IAT sensor input voltage: 4.5 – 5.5 V
(⊕ Dg – ⊖ Ground)
(⊕ Dg – ⊖ B/Br)

TOOL 09900-25008: Multi-circuit tester set

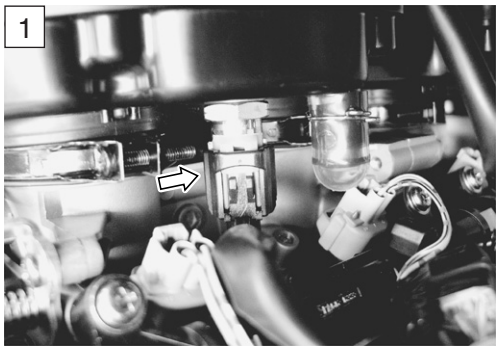
Tester knob indication: Voltage (⎓)

Is the voltage OK?

YES	Go to Step 2.
NO	• Loose or poor contacts on the ECM coupler (terminal ㉗ or ㉙) • Open or short circuit in the Dg wire or B/Br wire

Step 1 (When indicating P0110-H:)

1) Turn the ignition switch to OFF.
2) Lift and support the fuel tank. (☞5-3)
3) Check the IAT sensor coupler for loose or poor contacts.
   If OK, then check the IAT sensor lead wire continuity.

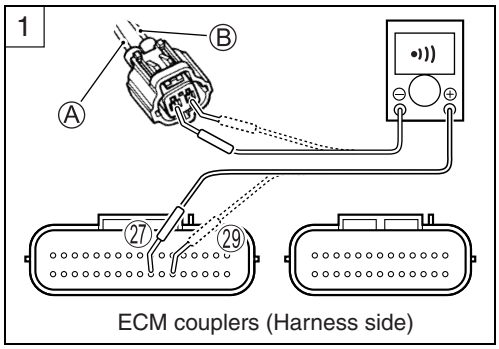


4) Disconnect the IAT sensor coupler and ECM coupler.
5) Check the continuity between Dg wire Ⓐ and terminal ㉗.
6) Also, check the continuity between B/Br wire Ⓑ and terminal ㉙.

DATA IATS lead wire continuity: Continuity (•))))

TOOL 09900-25008: Multi-circuit tester set
09900-25009: Needle pointed probe set

Tester knob indication: Continuity test (•))))



Is the continuity OK?

YES	Go to Step 2.
NO	Dg wire or B/Br wire open

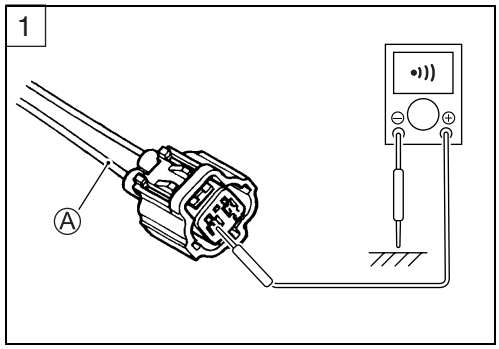
7) After repairing the trouble, clear the DTC using SDS tool. (☞4-26)

Step 1 (When indicating P0110-L:)

1) Turn the ignition switch to OFF.
2) Lift and support the fuel tank. (☞5-3)
3) Check the IAT sensor coupler for loose or poor contacts.
   If OK, then check the IAT sensor lead wire continuity.

4) Disconnect the IAT sensor coupler.
5) Check the continuity between Dg wire Ⓐ and ground. If the sound is not heard from the tester, the circuit condition is OK.

Tester knob indication: Continuity test (•))))

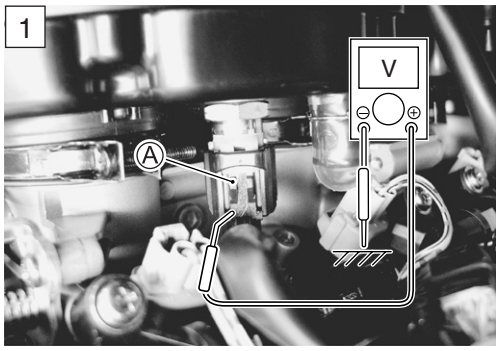


6) Connect the IAT sensor coupler and turn the ignition switch ON.
7) Measure the voltage between Dg wire Ⓐ and ground.

IAT sensor output voltage: 0.15 – 4.85 V
(⊕ Dg – ⊖ Ground)

09900-25008: Multi-circuit tester set
09900-25009: Needle pointed probe set

Tester knob indication: Voltage (⎓)



Are the continuity and voltage OK?

YES	Go to Step 2.
NO	• Dg wire shorted to ground • If wire is OK, go to Step 2.

8) After repairing the trouble, clear the DTC using SDS tool. (☞4-26)

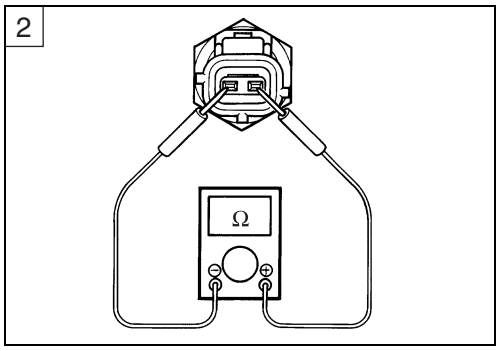
Step 2

1) Turn the ignition switch to OFF.
2) Measure the IAT sensor resistance.

DATA IAT sensor resistance: Approx. 2.45 kΩ at 20 °C (Terminal – Terminal)

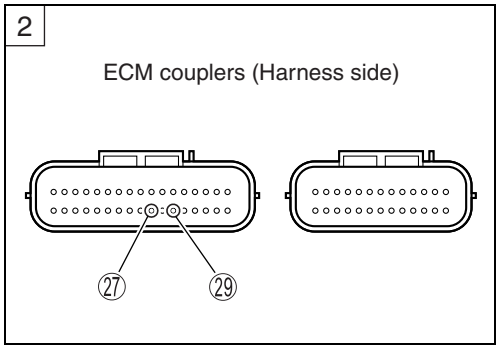
TOOL 09900-25008: Multi-circuit tester set

Tester knob indication: Resistance (Ω)



Is the resistance OK?

YES	• Dg or B/Br wire open or shorted to ground, or poor ㉗ or ㉙ connection • If wire and connection are OK, intermittent trouble or faulty ECM. • Recheck each terminal and wire harness for open circuit and poor connection. • Replace the ECM with a known good one, and inspect it again.
NO	Replace the IAT sensor with a new one.



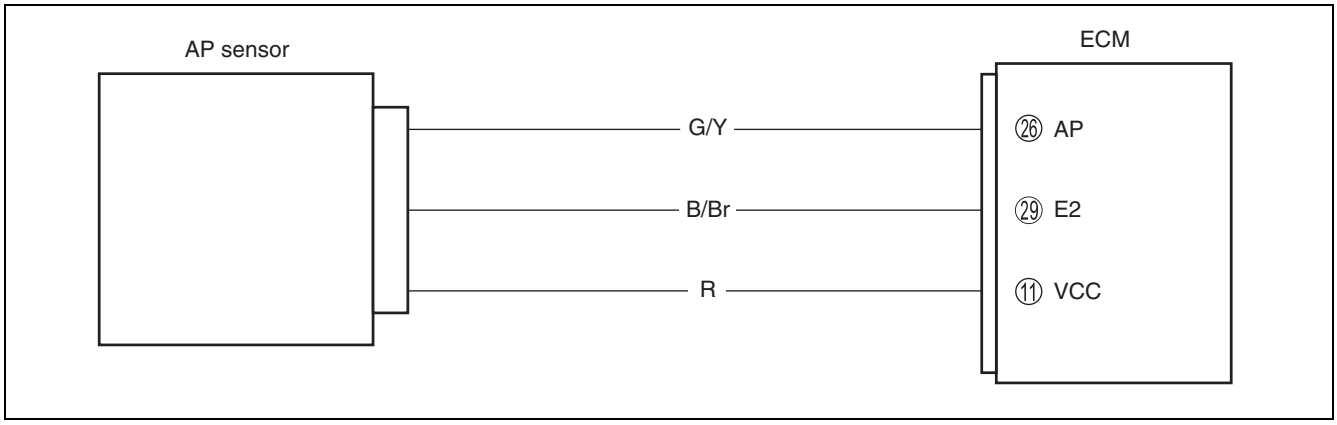
DATA IAT sensor specification

Intake Air Temp	Resistance
20 °C	Approx. 2.45 kΩ
50 °C	Approx. 0.808 kΩ
80 °C	Approx. 0.322 kΩ
110 °C	Approx. 0.148 kΩ

NOTE:
IAT sensor resistance measurement method is the same way as that of the ECT sensor. Refer to page 7-7 for details.

"C22" (P1450-H/L) AP SENSOR CIRCUIT MALFUNCTION

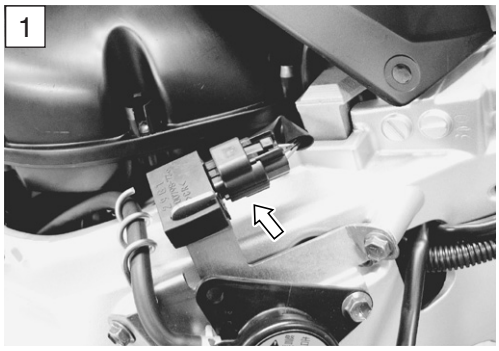
		DETECTED CONDITION	POSSIBLE CAUSE
C22		AP sensor voltage is not within the following range. 0.5 V ≦ Sensor voltage < 4.85 V *NOTE:* *Note that atmospheric pressure varies depending on weather conditions as well as altitude.* *Take that into consideration when inspecting voltage.*	• Clogged air passage with dust • AP sensor circuit open or shorted to ground • AP sensor malfunction • ECM malfunction
P1450	H	Sensor voltage is higher than specified value.	• AP sensor circuit shorted to VCC or ground circuit open
	L	Sensor voltage is lower than specified value.	• AP sensor circuit open or shorted to ground or VCC circuit open



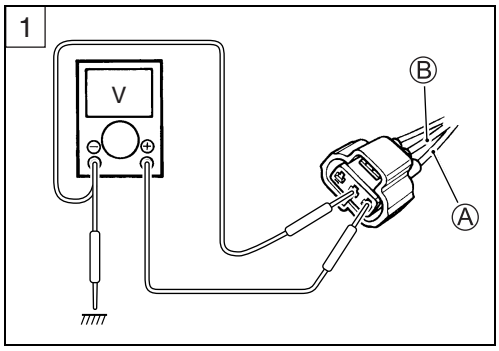
INSPECTION

Step 1 (When indicating C22:)

1) Turn the ignition switch to OFF.
2) Lift and support the fuel tank. (☞5-3)
3) Check the AP sensor coupler for loose or poor contacts.
   If OK, then measure the AP sensor input voltage.



4) Disconnect the AP sensor coupler.
5) Turn the ignition switch to ON.
6) Measure the voltage at the R wire and ground.
7) If OK, then measure the voltage at the Red wire Ⓐ and B/Br wire Ⓑ.



DATA AP sensor input voltage: 4.5 – 5.5 V
(⊕ R – ⊖ Ground)
(⊕ R – ⊖ B/Br)

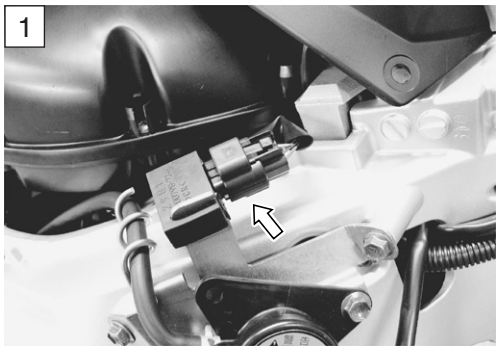
TOOL 09900-25008: Multi-circuit tester set

Tester knob indication: Voltage (⎓)

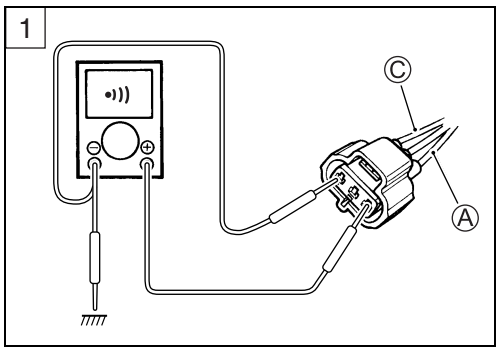
Is the voltage OK?

YES	Go to Step 2.
NO	• Loose or poor contacts on the ECM coupler (terminal ⑪ or ㉙) • Open or short circuit in the R wire or B/Br wire

Step 1 (When indicating P1450-H:)
1) Turn the ignition switch to OFF.
2) Lift and support the fuel tank. (☞5-3)
3) Check the AP sensor coupler for loose or poor contacts. If OK, then check the AP sensor lead wire continuity.



4) Disconnect the AP sensor coupler.
5) Check the continuity between R wire Ⓐ and G/Y wire Ⓒ. If the sound is not heard from the tester, the circuit condition is OK.



6) Disconnect the ECM coupler.
7) Check the continuity between G/Y wire Ⓒ and terminal ㉖.
8) If OK, then check the continuity between B/Br wire Ⓑ and terminal ㉙.

DATA APS lead wire continuity: Continuity (•))))

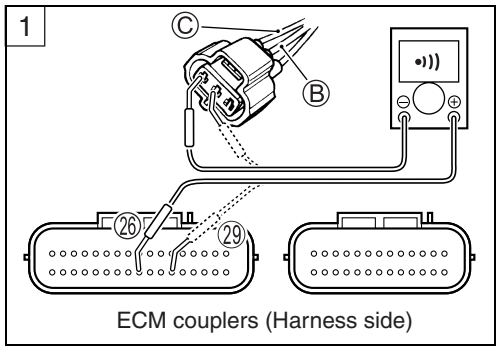
TOOL 09900-25008: Multi-circuit tester set
09900-25009: Needle pointed probe set

Tester knob indication: Continuity test (•))))

Is the continuity OK?

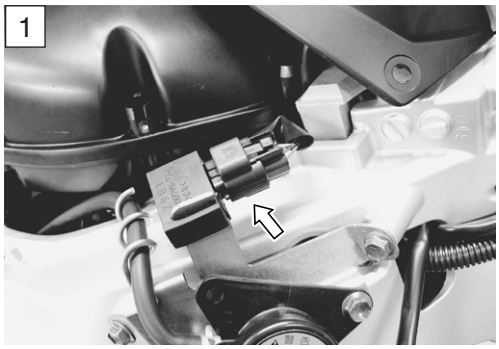
YES	Go to Step 2.
NO	G/Y wire shorted to VCC, or B/Br wire open

9) After repairing the trouble, clear the DTC using SDS tool. (☞4-26)

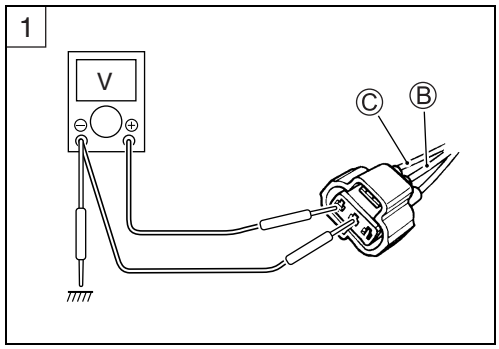


ECM couplers (Harness side)

Step 1 (When indicating P1450-L:)
1) Turn the ignition switch to OFF.
2) Remove the front seat. (☞8-3)
3) Check the AP sensor coupler for loose or poor contacts. If OK, then check the AP sensor lead wire continuity.



4) Disconnect the AP sensor coupler.
5) Check the continuity between G/Y wire Ⓒ and ground.
6) Also, check the continuity between G/Y wire Ⓒ and B/Br wire Ⓑ. If the sound is not heard from the tester, the circuit condition is OK.



7) Disconnect the ECM coupler.
8) Check the continuity between R wire Ⓐ and terminal ⑪.
9) If OK, then check the continuity between G/Y wire Ⓒ and terminal ㉖.

DATA APS lead wire continuity: Continuity (•))))

TOOL 09900-25008: Multi-circuit tester set
09900-25009: Needle pointed probe set

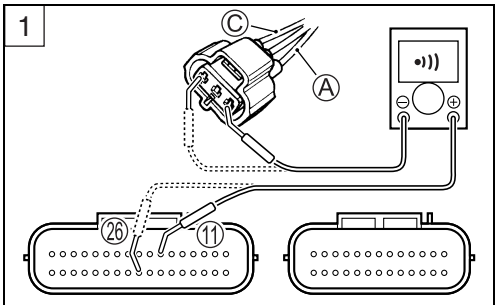
Tester knob indication: Continuity test (•))))

Is the continuity OK?

YES	Go to Step 1 (☞4-56) and go to Step 2.
NO	Red or G/Y wire open, or G/Y wire shorted to ground

10) After repairing the trouble, clear the DTC using SDS tool. (☞4-26)

1



ECM couplers (Harness side)

Step 2
1) Connect the AP sensor coupler and ECM coupler.
2) Insert the needle pointed probes to the lead wire coupler. Turn the ignition switch ON.
3) Measure the AP sensor output voltage at the wire side coupler (between G/Y and B/Br wires).

DATA AP sensor output voltage: Approx. 3.6 V at 100 kPa (760 mmHg) (⊕ G/Y – ⊖ B/Br)

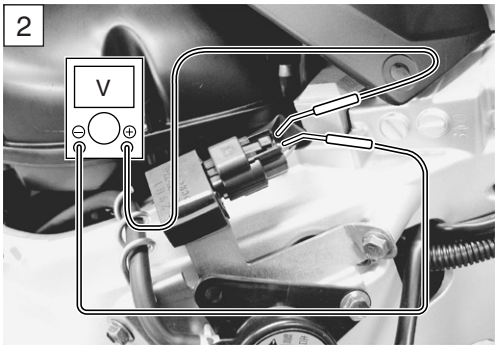
TOOL 09900-25008: Multi-circuit tester set
09900-25009: Needle pointed probe set

Tester knob indication: Voltage (⎓)

YES	Go to Step 3.
NO	• Check the air passage for clogging. • Open or short circuit in the G/Y wire • Replace the AP sensor with a new one.

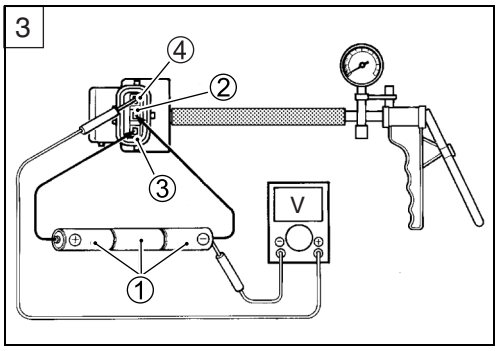
4) After repairing the trouble, clear the DTC using SDS tool. (☞4-26)

2



Step 3

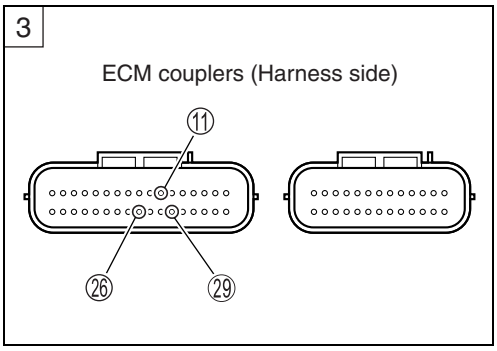
1) Remove the AP sensor.
2) Connect the vacuum pump gauge to the vacuum port of the AP sensor.
   Arrange 3 new 1.5 V batteries in series ① (check that total voltage is 4.5 – 5.0 V) and connect ⊖ terminal to the ground terminal ② and ⊕ terminal to the VCC terminal ③.
3) Check the voltage between Vout ④ and ground. Also, check if voltage reduces when vacuum is applied up to 400 mmHg by using vacuum pump gauge. (☞Below)



TOOL 09917-47011: Vacuum pump gauge
09900-25008: Multi-circuit tester set

Tester knob indication: Voltage (⎓)

Is the voltage OK?



YES	• R, G/Y or B/Br wire open or shorted to ground, or poor ⑪, ㉖ or ㉙ connection. • If wire and connection are OK, intermittent trouble or faulty ECM. • Recheck each terminal and wire harness for open circuit and poor connection. • Replace the ECM with a known good one, and inspect it again.
NO	If check result is not satisfactory, replace AP sensor with a new one.

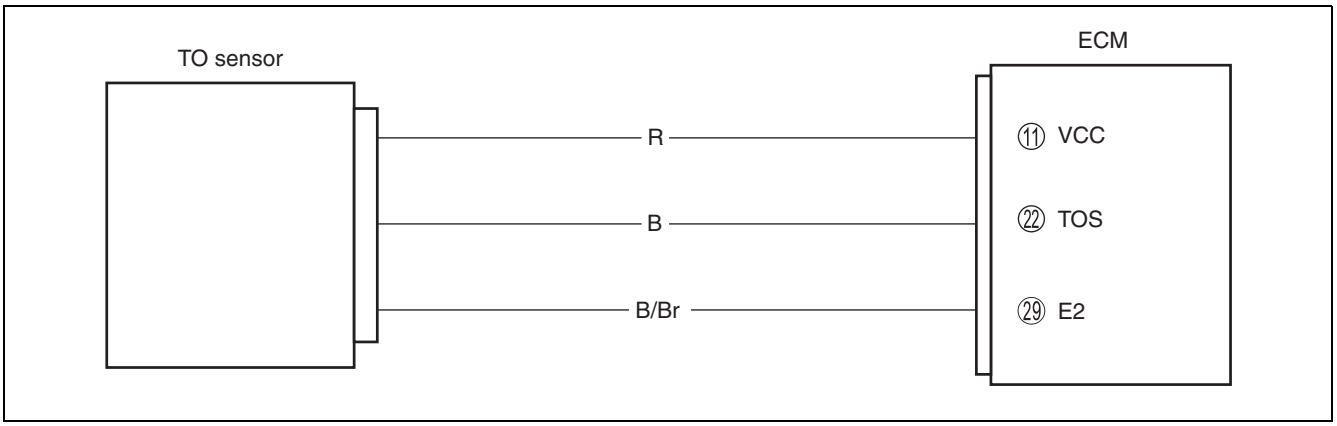
4) After repairing the trouble, clear the DTC using SDS tool. (☞4-26)

Output voltage
(VCC voltage 4.5 – 5.0 V, ambient temp. 20 – 30 °C)

ALTITUDE (Reference)	ATMOSPHERIC PRESSURE		OUTPUT VOLTAGE
(m)	(mmHg)	kPa	(V)
0 | 610	760 | 708	100 | 95	3.1 – 3.6
611 | 1 524	707 | 635	94 | 86	2.8 – 3.4
1 525 | 2 438	634 | 568	85 | 77	2.6 – 3.1
2 439 | 3 048	567 | 526	76 | 70	2.4 – 2.9

"C23" (P1651-H/L) TO SENSOR CIRCUIT MALFUNCTION

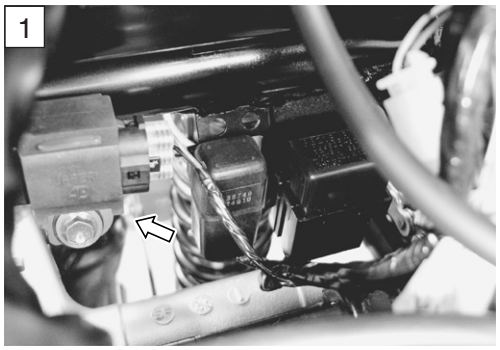
DETECTED CONDITION			POSSIBLE CAUSE
C23		The sensor voltage should be the following for 2 sec. and more, after ignition switch is turned ON. 0.2 V ≦ Sensor voltage < 4.8 V	• TO sensor circuit open or short • TO sensor malfunction • ECM malfunction
P1651	H	Sensor voltage is higher than specified value.	• TO sensor circuit shorted to VCC or ground circuit open
	L	Sensor voltage is lower than specified value.	• TO sensor circuit open or shorted to ground or VCC circuit open



INSPECTION

Step 1 (When indicating C23:)

1) Turn the ignition switch to OFF.
2) Lift and support the fuel tank. (☞5-3)
3) Check the TO sensor coupler for loose or poor contacts.
   If OK, then measure the TO sensor resistance.
4) Disconnect the TO sensor coupler.

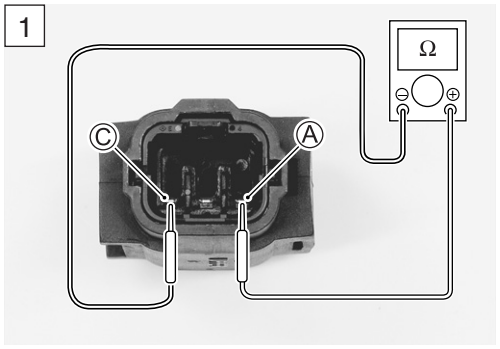


5) Measure the resistance between terminal Ⓐ and terminal Ⓒ.

DATA TO sensor resistance: 16.5 – 22.3 kΩ
(Terminal Ⓐ – Terminal Ⓒ)

TOOL 09900-25008: Multi-circuit tester set

Tester knob indication: Resistance (Ω)

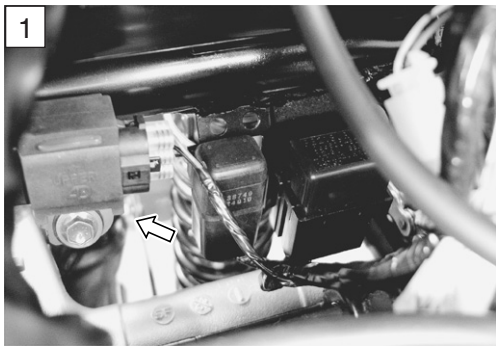


Is the resistance OK?

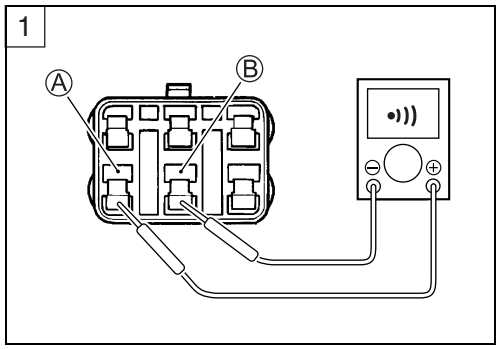
YES	Go to Step 2.
NO	Replace the TO sensor with a new one.

Step 1 (When indicating P1651-H:)

1) Turn the ignition switch to OFF.
2) Lift and support the fuel tank. (☞5-3)
3) Check the TO sensor coupler for loose or poor contacts.
   If OK, then check the TO sensor lead wire continuity.



4) Disconnect the TO sensor coupler.
5) Check the continuity between R wire Ⓐ and B wire Ⓑ.
   If the sound is not heard from the tester, the circuit condition is OK.

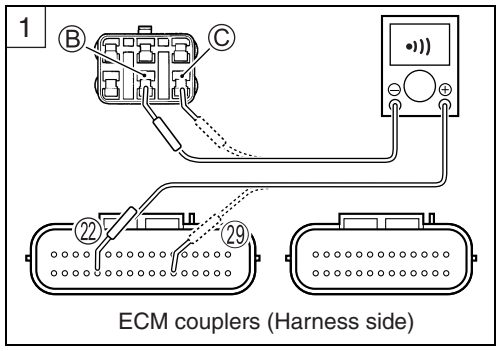


6) Disconnect the ECM coupler.
7) Check the continuity between B wire Ⓑ and terminal ㉒.
8) Also, check the continuity between B/Br wire Ⓒ and terminal ㉙.

DATA TOS lead wire continuity: Continuity (•))))

TOOL 09900-25008: Multi-circuit tester set
09900-25009: Needle pointed probe set

Tester knob indication: Continuity test (•))))



ECM couplers (Harness side)

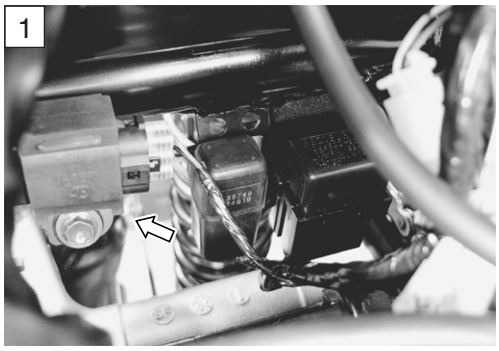
Is the continuity OK?

YES	Go to Step 2.
NO	Black wire shorted to VCC, or B/Br wire open.

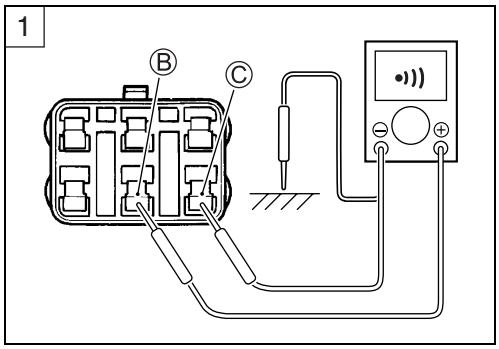
9) After repairing the trouble, clear the DTC using SDS tool. (☞4-26)

Step 1 (When indicating P1651-L:)

1) Turn the ignition switch to OFF.
2) Lift and support the fuel tank. (☞5-3)
3) Check the TO sensor coupler for loose or poor contacts.
   If OK, then check the TO sensor lead wire continuity.



4) Disconnect the TO sensor coupler.
5) Check the continuity between B wire Ⓑ and ground.
6) Also, check the continuity between B wire Ⓑ and B/Br wire Ⓒ. If the sound is not heard from the tester, the circuit condition is OK.

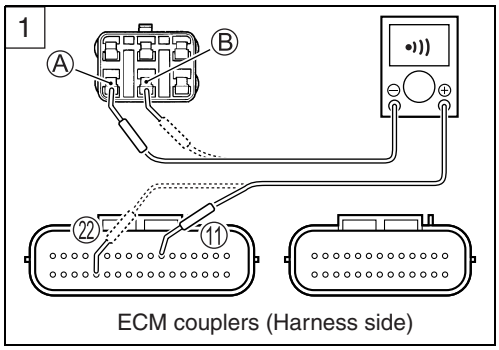


7) Disconnect the ECM coupler.
8) Check the continuity between R wire Ⓐ and terminal ⑪.
9) Also, then check the continuity between B wire Ⓑ and terminal ㉒.

DATA TOS lead wire continuity: Continuity (•))))

TOOL 09900-25008: Multi-circuit tester set
09900-25009: Needle pointed probe set

Tester knob indication: Continuity test (•))))



ECM couplers (Harness side)

Is the continuity OK?

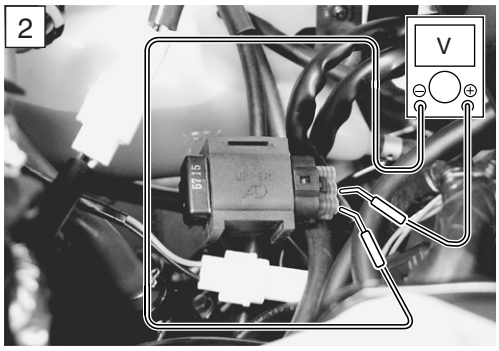
YES	Go to Step 2.
NO	R or B wire open, or B wire shorted to ground.

10) After repairing the trouble, clear the DTC using SDS tool. (☞4-26)

Step 2

1) Connect the TO sensor coupler and ECM coupler.
2) Insert the needle pointed probes to the lead wire coupler.
3) Turn the ignition switch to ON.
4) Measure the voltage at the wire side coupler between B and B/Br wires.

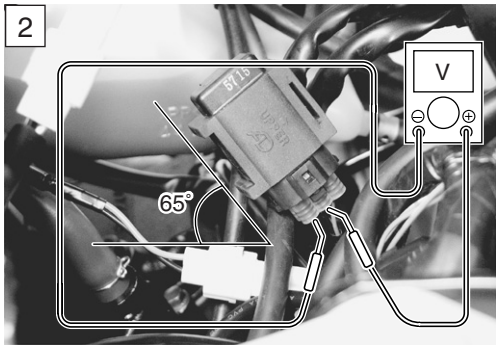
DATA TO sensor voltage (Normal): 0.4 – 1.4 V
(⊕ B – ⊖ B/Br)



Also, measure the voltage when leaning the motorcycle.

5) Dismount the TO sensor from its bracket and measure the voltage when it is leaned 65° and more, left and right, from the horizontal level.

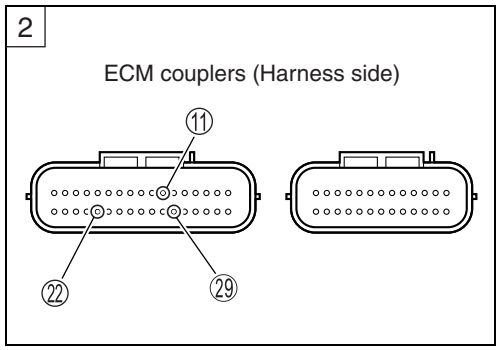
DATA TO sensor voltage (Leaning): 3.7 – 4.4 V
(⊕ B – ⊖ B/Br)



TOOL 09900-25008: Multi-circuit tester set
09900-25009: Needle pointed probe set

Tester knob indication: Voltage (⎓)

Is the voltage OK?



YES	• R, B or B/Br wire open or shorted to ground, or poor ⑪, ㉒ or ㉙ connection • If wire and connection are OK, intermittent trouble or faulty ECM. • Recheck each terminal and wire harness for open circuit and poor connection. • Replace the ECM with a known good one, and inspect it again.
NO	• Loose or poor contacts on the ECM coupler • Open or short circuit • Replace the TO sensor with a new one.

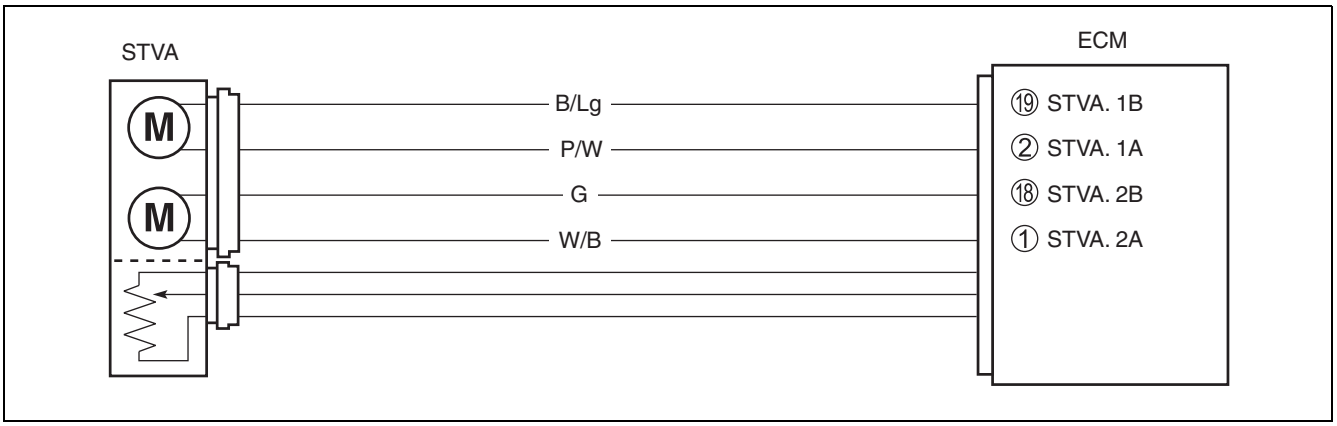
6) After repairing the trouble, clear the DTC using SDS tool. (☞4-26)

"C24" (P0351), "C25" (P0352), "C26" (P0353) or "C27" (P0354) IGNITION SYSTEM MALFUNCTION

*** Refer to the IGNITION SYSTEM for details. (☞9-20)**

"C28" (P1655) STV ACTUATOR CIRCUIT MALFUNCTION

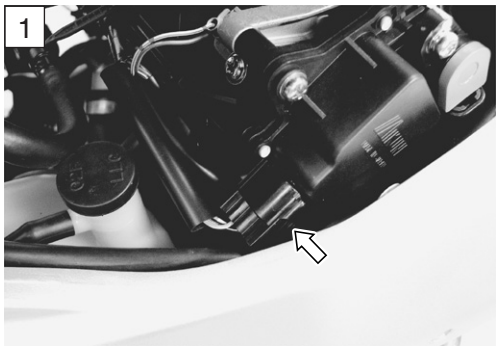
DETECTED CONDITION	POSSIBLE CAUSE
The operation voltage does not reach the STVA. ECM does not receive communication signal from the STVA.	• STVA malfunction • STVA circuit open or short • STVA motor malfunction



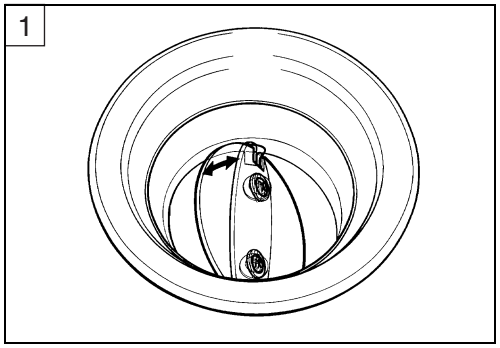
INSPECTION

Step 1

1) Lift and support the fuel tank. (☞5-3)
2) Remove the air cleaner box. (☞5-13)
3) Check the STVA lead wire coupler for loose or poor contacts.



4) Turn the ignition switch to ON to check the STV operation.
   (STV operating order: Full open → 95% open)



Is the operating OK?

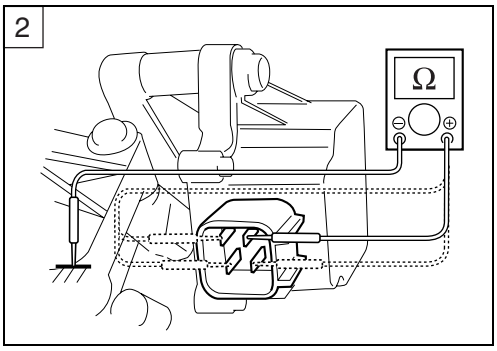
YES	Go to Step 2.
NO	• Loose or poor contacts on the STVA coupler • Open or short circuit in the B/Lg, P/W, W/B or Green wires • If wire and connection are OK, go to Step 2.

5) After repairing the trouble, clear the DTC using SDS tool. (☞4-26)

Step 2

1) Turn the ignition switch to OFF.
2) Disconnect the STVA lead wire coupler.
3) Check the continuity between each terminal and ground.

DATA **STVA continuity: ∞ Ω (Infinity)**
(Terminal – Ground)

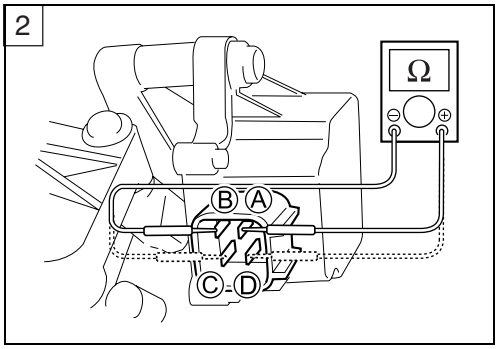


4) If OK, then measure the STVA resistance (between terminal Ⓐ and terminal Ⓑ) and (between terminal Ⓒ and terminal Ⓓ).

DATA **STVA resistance: Approx. 7.0 Ω**
(Terminal Ⓐ – Terminal Ⓑ)
(Terminal Ⓒ – Terminal Ⓓ)

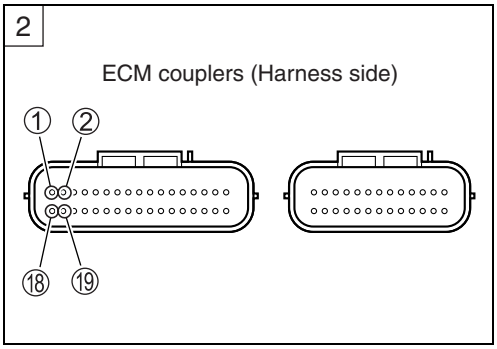
TOOL **09900-25008: Multi-circuit tester set**

Tester knob indication: Resistance (Ω)



Is the resistance OK?

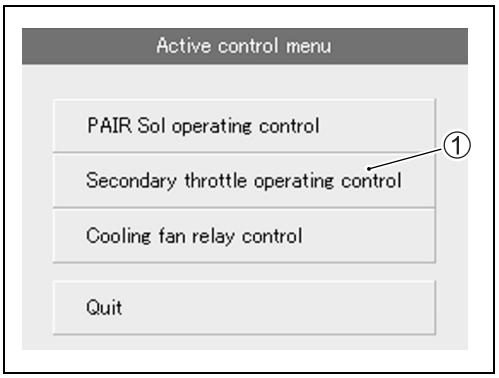
YES	• W/B, P/W, G and B/Lg wire open or shorted to ground, or poor ①, ②, ⑱ and ⑲ connection • If wire and connection are OK, intermittent trouble or faulty ECM. • Recheck each terminal and wire harness for open circuit and poor connection. • Replace the ECM with a known good one, and inspect it again.
NO	• Loose or poor contacts on the ECM coupler. • Replace the STVA with a new one.



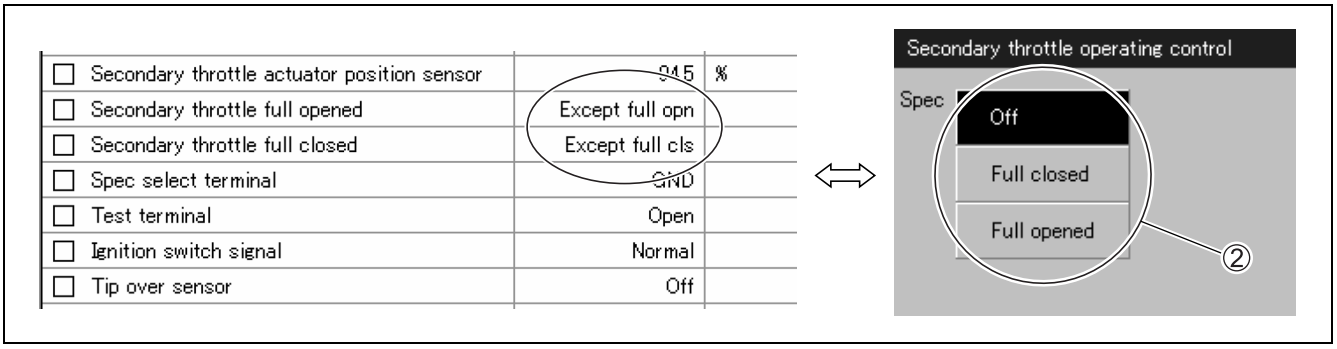
5) After repairing the trouble, clear the DTC using SDS tool. (☞4-26)

ACTIVE CONTROL INSPECTION

1) Set up the SDS tool. (Refer to the SDS operation manual for further details.)
2) Turn the ignition switch to ON.
3) Click “Secondary throttle operating control” ①.

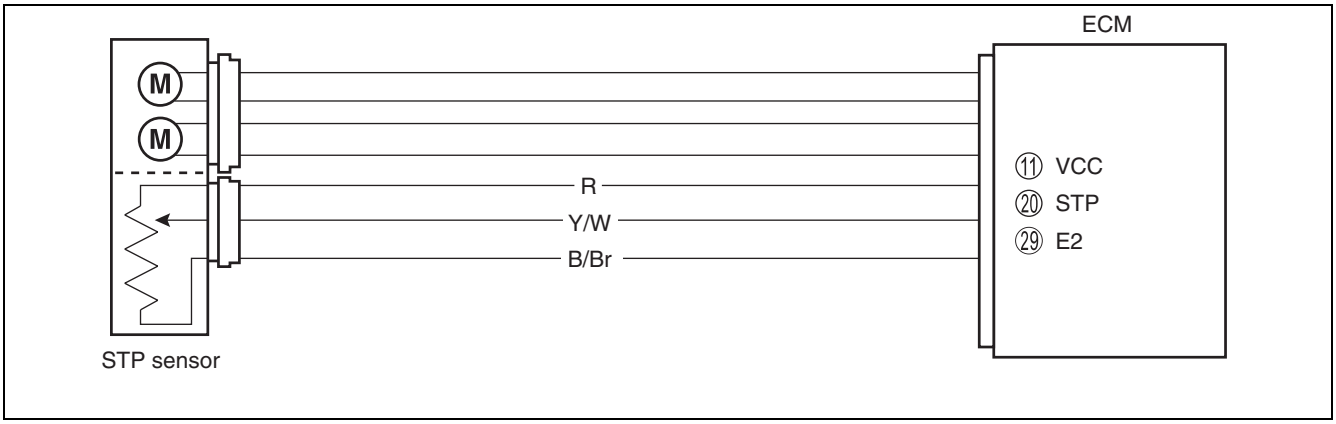


4) Click each button ②.
   At this time, if an operation sound is heard from the STVA, the function is normal.



"C29" (P1654-H/L) STP SENSOR CIRCUIT MALFUNCTION

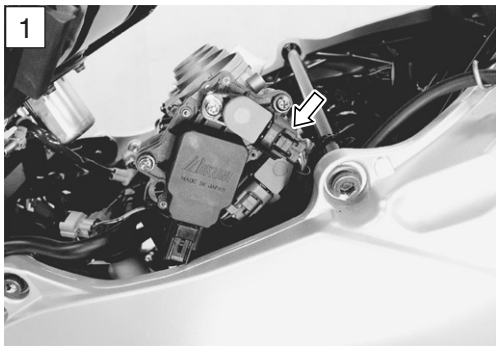
DETECTED CONDITION			POSSIBLE CAUSE
C29		Signal voltage is not within the following range. Difference between actual throttle opening and opening calculated by ECM is larger than specified value. 0.15 V ≦ Sensor voltage < 4.85 V	• STP sensor maladjusted • STP sensor circuit open or short • STP sensor malfunction • ECM malfunction
P1654	H	Sensor voltage is higher than specified value.	• STP sensor circuit shorted to VCC or ground circuit open
	L	Sensor voltage is lower than specified value.	• STP sensor circuit open or shorted to ground or VCC circuit open



INSPECTION

Step 1 (When indicating C29:)

1) Turn the ignition switch to OFF.
2) Lift and support the fuel tank. (☞5-3)
3) Remove the air cleaner box and lift up the throttle body. (☞5-13)
4) Check the STP sensor coupler for loose or poor contacts.
   If OK, then measure the STP sensor input voltage.
5) Disconnect the STP sensor coupler.
6) Turn the ignition switch ON.
7) Measure the voltage at the R wire Ⓐ and ground.
8) Also, measure the voltage at the R wire Ⓐ and B/Br wire Ⓒ.



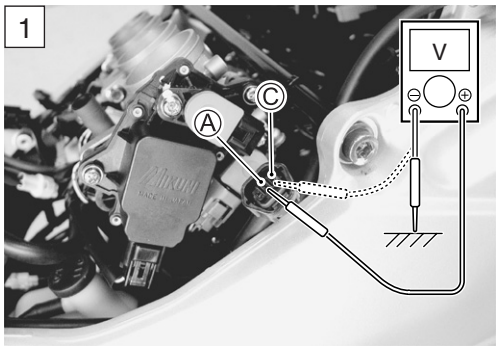
DATA STP sensor input voltage: 4.5 – 5.5 V
(⊕ R – ⊖ Ground)
(⊕ R – ⊖ B/Br)

TOOL 09900-25008: Multi-circuit tester set

Tester knob indication: Voltage (⎓)

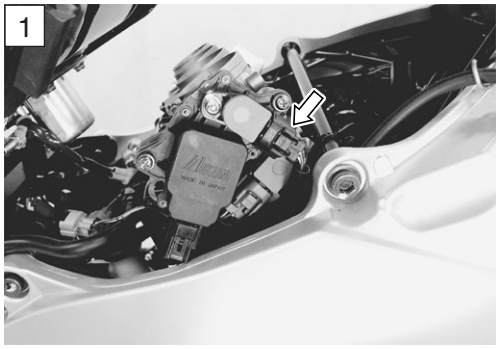
Is the voltage OK?

YES	Go to Step 2.
NO	• Loose or poor contacts on the ECM coupler (terminal ⑪ or ㉙) • Open or short circuit in the R wire or B/Br wire

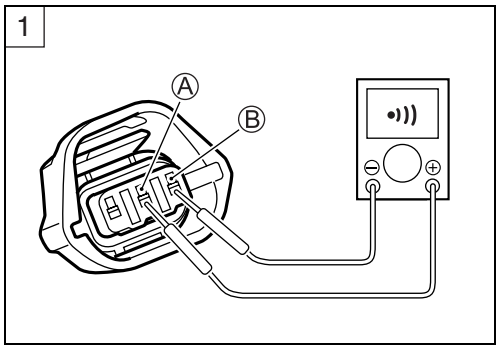


Step 1 (When indicating P1654-H:)

1) Turn the ignition switch to OFF.
2) Lift and support the fuel tank. (☞5-3)
3) Remove the air cleaner box and lift up the throttle body. (☞5-13)
4) Check the STP sensor coupler for loose or poor contacts.
   If OK, then check the STP sensor lead wire continuity.



5) Disconnect the STP sensor coupler.
6) Check the continuity between Y/W wire Ⓑ and R wire Ⓐ.
   If the sound is not heard from the tester, the circuit condition is OK.



7) Disconnect the ECM coupler.
8) Check the continuity between Y/W wire Ⓑ and terminal ⑳.
9) Also, check the continuity between B/Br wire Ⓒ and terminal ㉙.

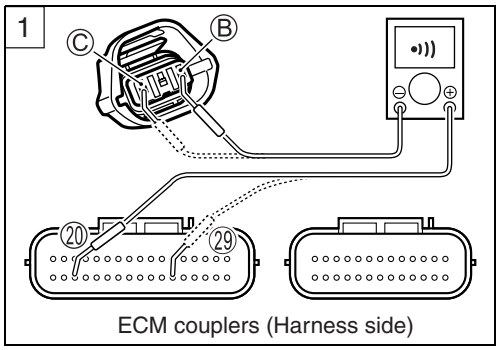
DATA STPS lead wire continuity: Continuity (•))))

TOOL 09900-25008: Multi-circuit tester set
09900-25009: Needle pointed probe set

Tester knob indication: Continuity test (•))))

Is the continuity OK?

YES	Go to Step 2.
NO	Y/W wire shorted to VCC, or B/Br wire open

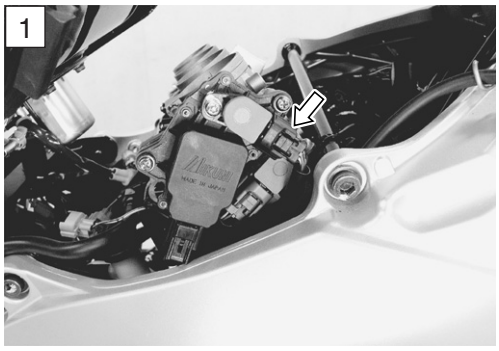


ECM couplers (Harness side)

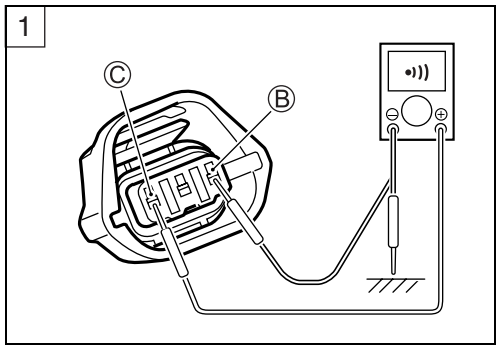
10) After repairing the trouble, clear the DTC using SDS tool. (☞4-26)

Step 1 (When indicating P1654-L:)

1) Turn the ignition switch to OFF.
2) Lift and support the fuel tank. (☞5-3)
3) Remove the air cleaner box and lift up the throttle body. (☞5-13)
4) Check the STP sensor coupler for loose or poor contacts. If OK, then check the STP sensor lead wire continuity.



5) Disconnect the STP sensor coupler.
6) Check the continuity between Y/W wire Ⓑ and ground.
7) Also, check the continuity between Y/W wire Ⓑ and B/Br wire Ⓒ. If the sound is not heard from the tester, the circuit condition is OK.

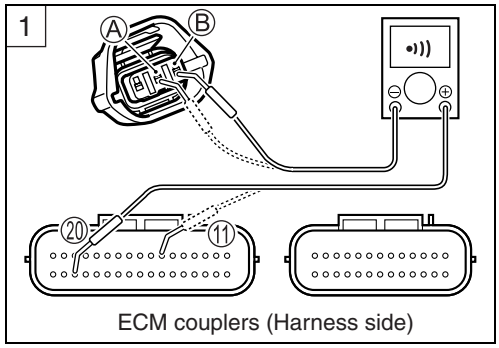


8) Disconnect the ECM coupler.
9) Check the continuity between Y/W wire Ⓑ and terminal ⑳.
10) Also, check the continuity between R wire Ⓐ and terminal ⑪.

DATA STPS lead wire continuity: Continuity (•))))

TOOL 09900-25008: Multi-circuit tester set
09900-25009: Needle pointed probe set

Tester knob indication: Continuity test (•))))



ECM couplers (Harness side)

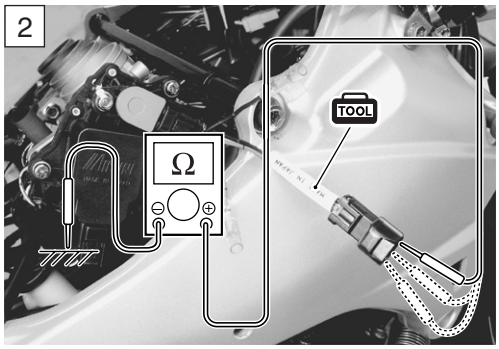
Is the continuity OK?

YES	Go to Step 1 (☞4-67) and go to Step 2.
NO	Red or Y/W wire open, or Y/W wire shorted to ground

11) After repairing the trouble, clear the DTC using SDS tool. (☞4-26)

Step 2

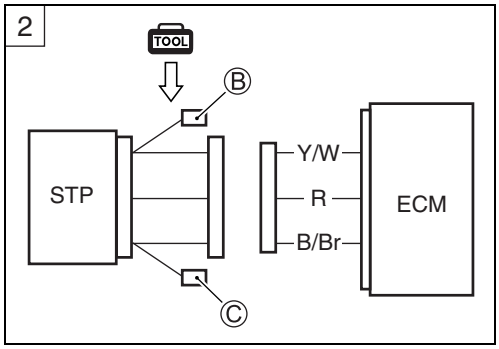
1) Turn the ignition switch to OFF.
2) Remove the air cleaner box and lift up the throttle body. (☞5-13)
3) Disconnect the STP sensor coupler.
4) Install the test harness to the STP sensor.
5) Check the continuity between each terminal and ground.



DATA STP sensor continuity: ∞ Ω (Infinity)
(Terminal – Ground)

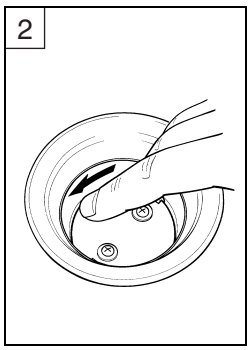
TOOL 09900-25008: Multi-circuit tester set
09900-28630: TPS test wire harness

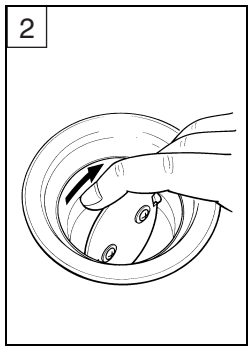
6) If OK, then measure the STP sensor resistance at the wire terminals (between terminal Ⓑ and terminal Ⓒ).
7) Close and open the secondary throttle valve by finger, and measure the valve closing and opening resistance.



DATA STP sensor resistance
Secondary throttle valve is closed: Approx. 0.5 kΩ
Secondary throttle valve is opened: Approx. 3.9 kΩ

Tester knob indication: Resistance (Ω)





8) If OK, then measure the STP sensor resistance at the wire terminals (between terminal Ⓐ and terminal Ⓒ).

DATA STP sensor resistance: Approx. 4.69 kΩ

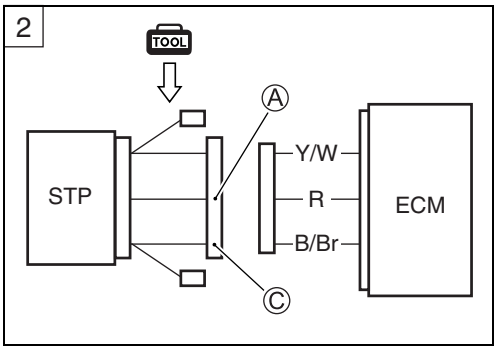
TOOL 09900-25008: Multi-circuit tester set
09900-28630: TPS test wire harness

Tester knob indication: Resistance (Ω)

Are the continuity and resistance OK?

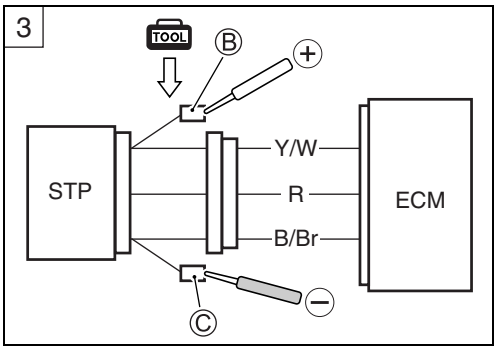
YES	Go to Step 3.
NO	• Reset the STP sensor position correctly. • Replace the STP sensor with a new one.

9) After repairing the trouble, clear the DTC using SDS tool. (☞4-26)



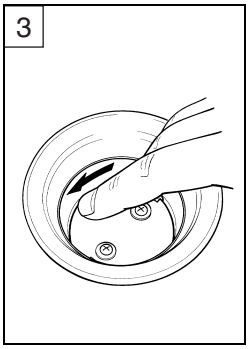
Step 3

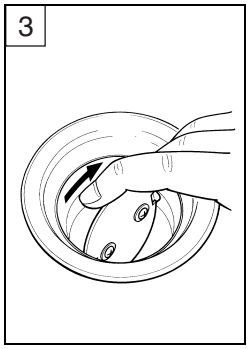
1) Turn the ignition switch to OFF.
2) Connect the STP sensor coupler to the test harness.
3) Disconnect the STVA lead wire coupler.
4) Turn the ignition switch to ON.
5) Measure the STP sensor output voltage at the wire terminal (between ⊕ terminal Ⓑ and ⊖ terminal Ⓒ) by turning the secondary throttle valve (close and open) with a finger.



DATA STP sensor output voltage
Secondary throttle valve is closed : Approx. 0.5 V
Secondary throttle valve is opened : Approx. 3.9 V

Tester knob indication: Voltage (⎓)

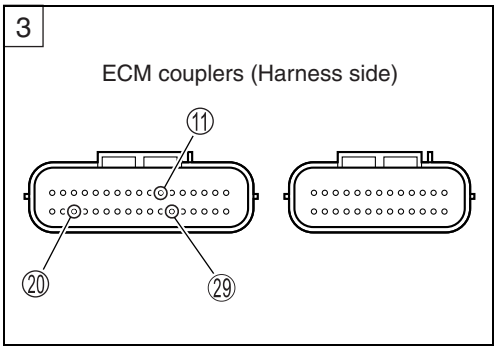




Is the voltage OK?

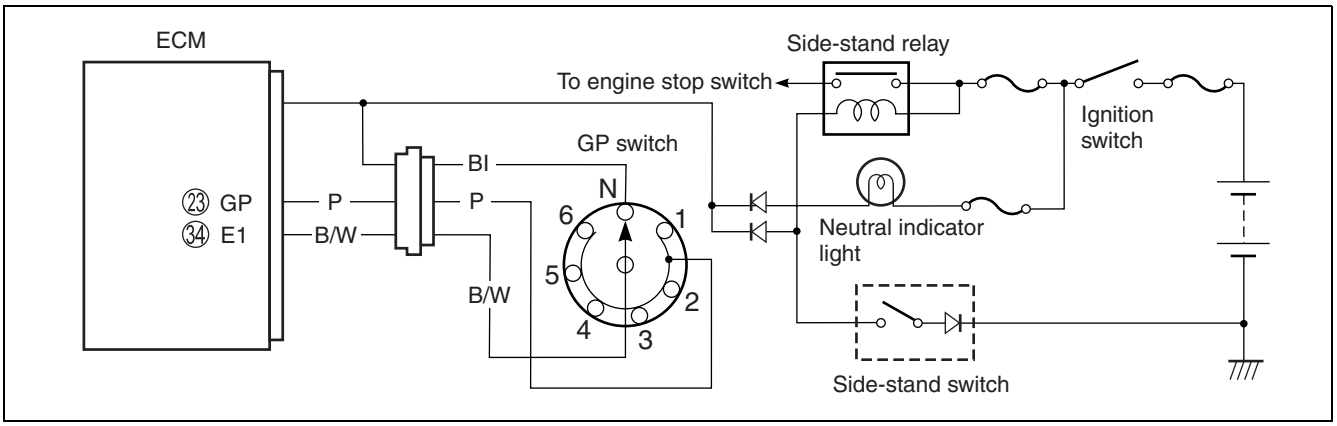
YES	• R, Y/W or B/Br wire open or shorted to ground, or poor ⑪, ⑳ or ㉙ connection • If wire and connection are OK, intermittent trouble or faulty ECM. • Recheck each terminal and wire harness for open circuit and poor connection. • Replace the ECM with a known good one, and inspect it again.
NO	If check result is not satisfactory, replace STP sensor with a new one.

After repairing the trouble, clear the DTC using SDS tool. (☞4-26)



"C31" (P0705) GP SWITCH CIRCUIT MALFUNCTION

DETECTED CONDITION	POSSIBLE CAUSE
No Gear Position switch voltage Switch voltage is not within the following range. Switch voltage > 0.6 V	• Gear Position switch circuit open or short • Gear Position switch malfunction • ECM malfunction



INSPECTION

Step 1

1) Turn the ignition switch to OFF.
2) Check the GP switch coupler for loose or poor contacts.
   If OK, then measure the GP switch voltage.

3) Support the motorcycle with a jack.
4) Fold the side-stand to up position.
5) Make sure the engine stop switch is in the "RUN" position.
6) Insert the needle pointed probe to the lead wire coupler.
7) Turn the ignition switch to ON.
8) Measure the voltage at the wire side coupler between P wire and B/W wire, when shifting the gearshift lever from 1st to Top.

DATA GP switch voltage: 0.6 V and more (⊕ P – ⊖ B/W)

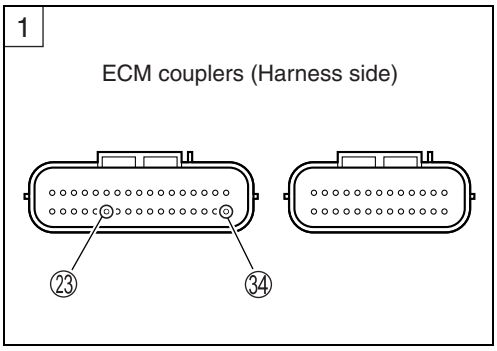
TOOL 09900-25008: Multi-circuit tester set
09900-25009: Needle pointed probe set

Tester knob indication: Voltage (⎓)

Is the voltage OK?

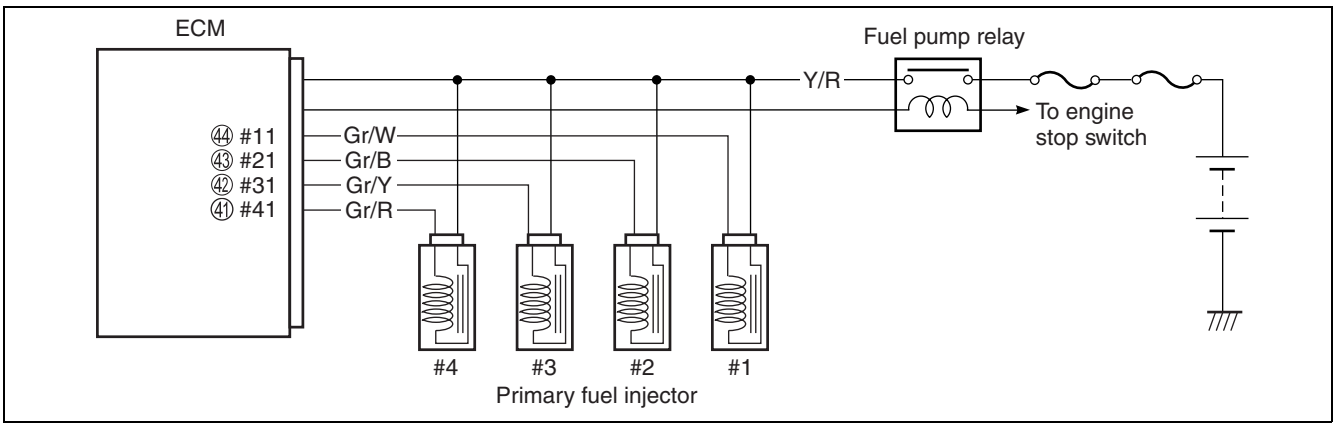
YES	• P wire open or shorted to ground • If wire and connection are OK, intermittent trouble or faulty ECM. • Recheck each terminal and wire harness for open circuit and poor connection. • Replace the ECM with a known good one, and inspect it again.
NO	• P or B/W wire open, or P wire shorted to ground • Loose or poor contacts on the ECM coupler (terminal ㉓ or ㉞) • If wire and connection are OK, replace the GP switch with a new one.

9) After repairing the trouble, clear the DTC using SDS tool. (☞4-26)



"C32" (P0201), "C33" (P0202), "C34" (P0203) or "C35" (P0204) FUEL INJECTOR CIRCUIT MALFUNCTION

DETECTED CONDITION	POSSIBLE CAUSE
CKP signal is produced but fuel injector signal is interrupted by 4 times or more continuously.	• Injector circuit open or short • Injector malfunction • ECM malfunction



INSPECTION

Step 1

1) Turn the ignition switch to OFF.
2) Lift and support the fuel tank (☞5-3)
3) Check the injector coupler for loose or poor contacts.
   If OK, then measure the injector resistance.

4) Disconnect the injector coupler and measure the resistance between terminals.

DATA Injector resistance: 11 – 13 Ω at 20 °C (Terminal – Terminal)

TOOL 09900-25008: Multi-circuit tester set

Tester knob indication: Resistance (Ω)

5) If OK, then check the continuity between each terminal and ground.

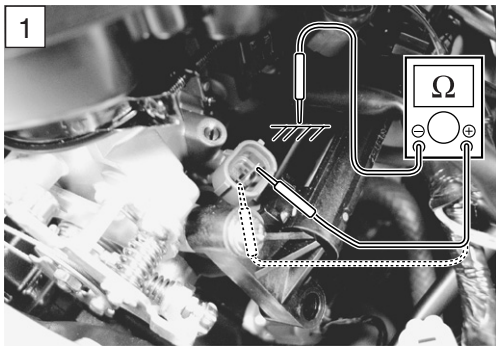
DATA Injector resistance: ∞ Ω (Infinity)

Are the resistance and continuity OK?

YES	Go to Step 2.
NO	Replace the injector with a new one. (☞5-14)

6) After repairing the trouble, clear the DTC using SDS tool. (☞4-26)

1



Step 2

1) Turn the ignition switch to ON.
2) Measure the injector voltage between Y/R wire and ground.

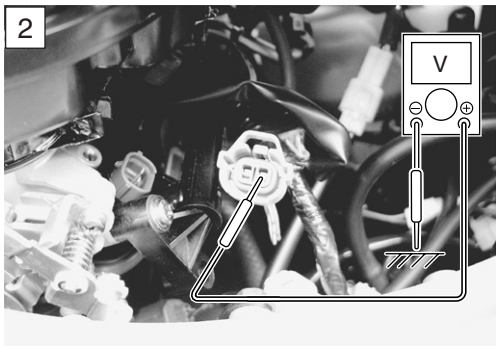
DATA Injector voltage: Battery voltage (⊕ Y/R – ⊖ Ground)

NOTE:
Injector voltage can be detected only 3 for seconds after ignition switch is turned ON.

TOOL 09900-25008: Multi-circuit tester set

Tester knob indication: Voltage (⎓)

2

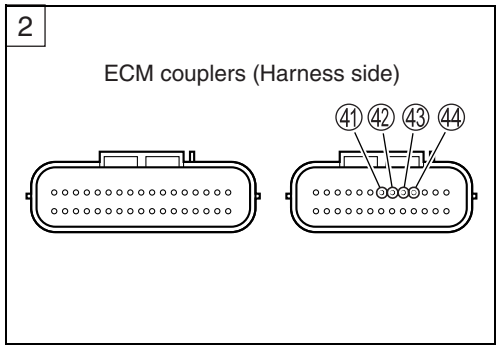


Is the voltage OK?

YES	• Gr/W wire open or shorted to ground, or poor ㊹ connection (#1 cylinder side) • Gr/B wire open or shorted to ground, or poor ㊸ connection (#2 cylinder side) • Gr/Y wire open or shorted to ground, or poor ㊷ connection (#3 cylinder side) • Gr/R wire open or shorted to ground, or poor ㊶ connection (#4 cylinder side) • If wire and connection are OK, intermittent trouble or faulty ECM. • Recheck each terminal and wire harness for open circuit and poor connection. • Replace the ECM with a known good one, and inspect it again.
NO	Open circuit in the Y/R wire

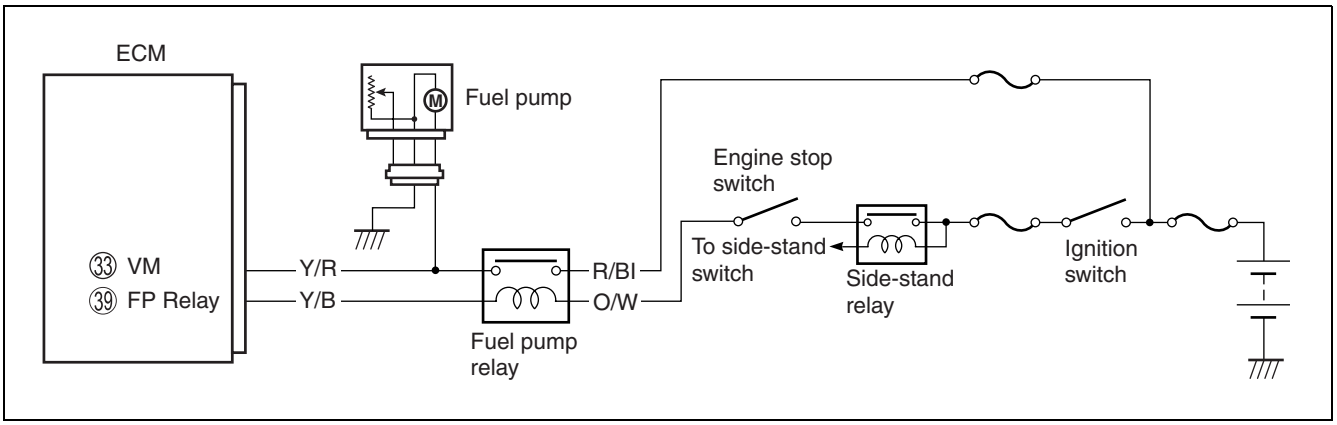
3) After repairing the trouble, clear the DTC using SDS tool. (☞4-26)

2



"C41" (P0230-H/L) FP RELAY CIRCUIT MALFUNCTION

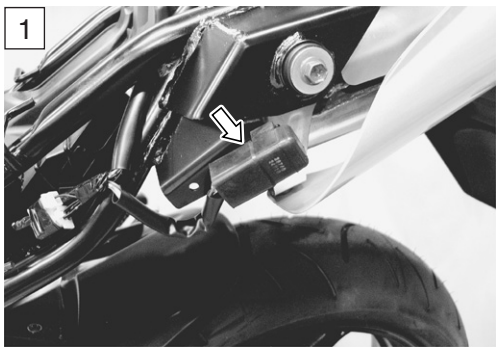
DETECTED CONDITION			POSSIBLE CAUSE
C41		No voltage is applied to fuel pump although fuel pump relay is turned ON, or voltage is applied to fuel pump, although fuel pump relay is turned OFF.	• Fuel pump relay circuit open or short • Fuel pump relay malfunction • ECM malfunction
P0230	H	Voltage is applied to fuel pump although fuel pump relay is turned OFF.	• Fuel pump relay switch circuit shorted to power source • Faulty fuel pump relay (switch side)
	L	No voltage is applied to fuel pump although fuel pump relay is turned ON.	• Fuel pump relay coil circuit open or short • Faulty fuel pump relay (coil side)



INSPECTION

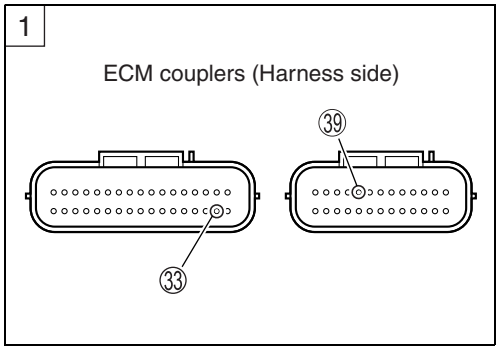
Step 1 (When indicating C41:)

1) Turn the ignition switch to OFF.
2) Remove the seat tail cover. (☞8-4)
3) Check the FP relay coupler for loose or poor contacts.
   If OK, then check the FP relay. (☞5-6)

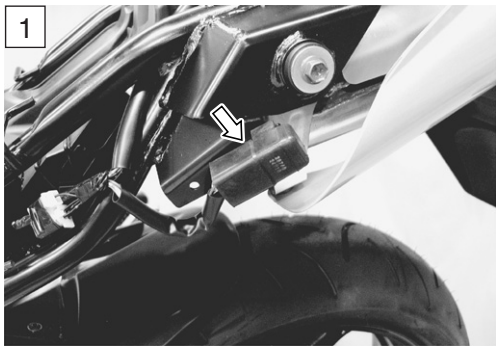


Is the FP relay OK?

YES	• Y/B or O/W wire open or short or poor ㊴ connection • Y/R or R/Bl wire open, shorted or poor ㉝ connection • If wire and connection are OK, intermittent trouble or faulty ECM. • Recheck each terminal and wire harness for open circuit and poor connection. • Replace the ECM with a known good one, and inspect it again.
NO	Replace the FP relay with a new one.

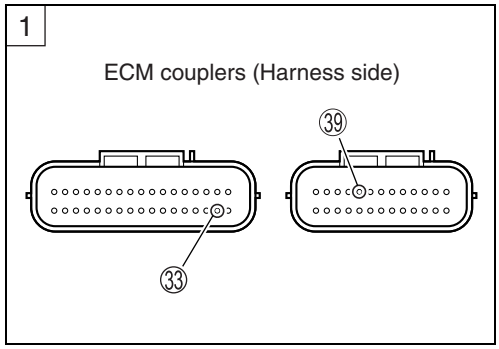


Step 1 (When indicating P0230-H:)
1) Turn the ignition switch to OFF.
2) Remove the seat tail cover. (☞8-4)
3) Check the FP relay coupler for loose or poor contacts.
   If OK, then check the FP relay. (☞5-6)



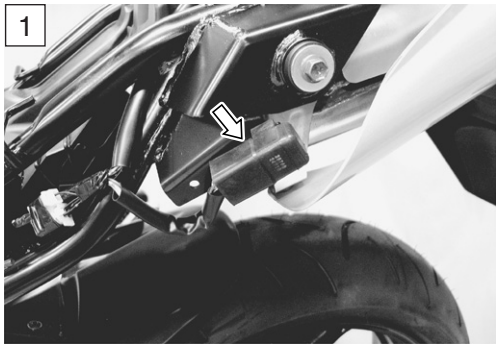
Is the FP relay OK?

YES	• Y/R wire shorted to power source • Y/B wire shorted to ground • If wire and connection are OK, intermittent trouble or faulty ECM. • Recheck each terminal and wire harness for open circuit and poor connection. • Replace the ECM with a known good one, and inspect it again.
NO	Replace the FP relay with a new one.



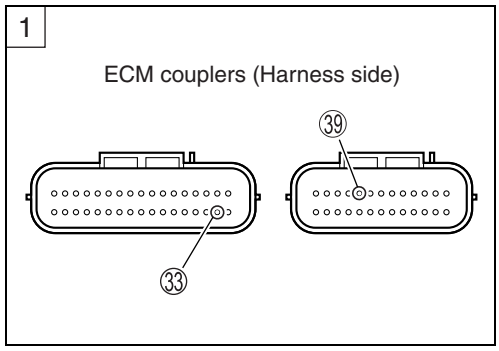
4) After repairing the trouble, clear the DTC using SDS tool. (☞4-26)

Step 1 (When indicating P0230-L:)
1) Turn the ignition switch to OFF.
2) Remove the seat tail cover. (☞8-4)
3) Check the FP relay coupler for loose or poor contacts.
   If OK, then check the FP relay. (☞5-6)



Is the FP relay OK?

YES	• Y/B wire open or poor ㊴ connection • O/W wire open or shorted to ground • R/Bl or Y/R wire open or shorted to ground or poor ㉝ connection • If wire and connection are OK, intermittent trouble or faulty ECM. • Recheck each terminal and wire harness for open circuit and poor connection. • Replace the ECM with a known good one, and inspect it again.
NO	Replace the FP relay with a new one.



4) After repairing the trouble, clear the DTC using SDS tool. (☞4-26)